DALICAP

TECHNOLOGY DRIVES CHINA
QUALITY SERVES THE WORLD

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DALICAP PRODUCT MANUAL 2026

Dalicap
DALICAP TECH CORPORATION

DALICAP PRODUCT

High-Q RF/Microwave Multilayer Ceramic Capacitor
Broadband Ceramic Capacitor
Ceramic Thermal Conductor

2026

Professional RF/Microwave Ceramic Capacitor Manufacturer

ABOUT DALICAP

DALICAP TECH.

◆ Leading supplier of HiQ, RF/Microwave MLCC, especially in the fields of MRI, Telecom, semiconductor RF power, wireless broadcast, laser, testing and analyzing instruments, radar and aerospace etc.

◆ Years' experience in Telecom industry and working with clients in the time of 2G->3G->4G shift to 5G.

◆ With years of solid experience in the industry, including R&D, material, design, process and manuac turing lcapabilities.

◆ Individual IP for new product development to ensure competitiveness in the industry.

◆ Standard HiQ/RF MLCC or customized(ask sales for more information).

◆ New production capacity to match the continuous increasing demand worldwide.

◆ Global technical and commercial network to support clients.

Dalicap Tech. Corporation is a global leader in Precision RF/Microwave Solutions. As the No.1 leader in China's RF capacitor niche market and ranked among the top globally, Dalicap is a trusted strategic partner for Tier-1 international market leaders in medical MRI and semiconductor RF power sectors.

We provide high-performance solutions through a fully self-controlled manufacturing process, offering a comprehensive portfolio including High Q MLCCs, SLCCs, Power Capacitor Assemblies(Modules),Bracket Capacitors, Thin Film circuits and DPC ceramic PCBs for high-power RF modules.

Our veteran R&D teams ensure rapid response to customized requests, leveraging a unique RF lab and specialized testing to guarantee superior product realization in the world's most demanding RF environments.

ADVANTAGES OF DALICAP

R&D and Engineering Capability

During the phase of R&D, the electromagnetic field simulation technology is introduced and the Coaxial Resonance Line is applied on the measurement of Q value of MLCC.
An individual RF testing system is used to simulate the working conditions of MLCC, so as to ensure the technical performance and continuous improvement.

Production Environment and Facilities

Standard 10K-class clean room and temperature control contribute to production process and quality stability. With advanced production facilities, Dalicap ensures the consistency of the output and product quality.

High frequency/RF technical Support

Dalicap has S parameter test fixtures, calibrated by TRL, to measure the S parameter of capacitors, by which S2P file would be initiated and available to customers.
34A Coaxial Resonance Line system is dedicated to measuring the ESR and Q value, which is the most effective method to monitor the performance in the industry.
RF power testing system is built up for the measurement of the temperature rise under the working power, and breakdown voltage is also monitored.
With years of solid experience in the industry, Dalicap provides customized products and technical support as well.

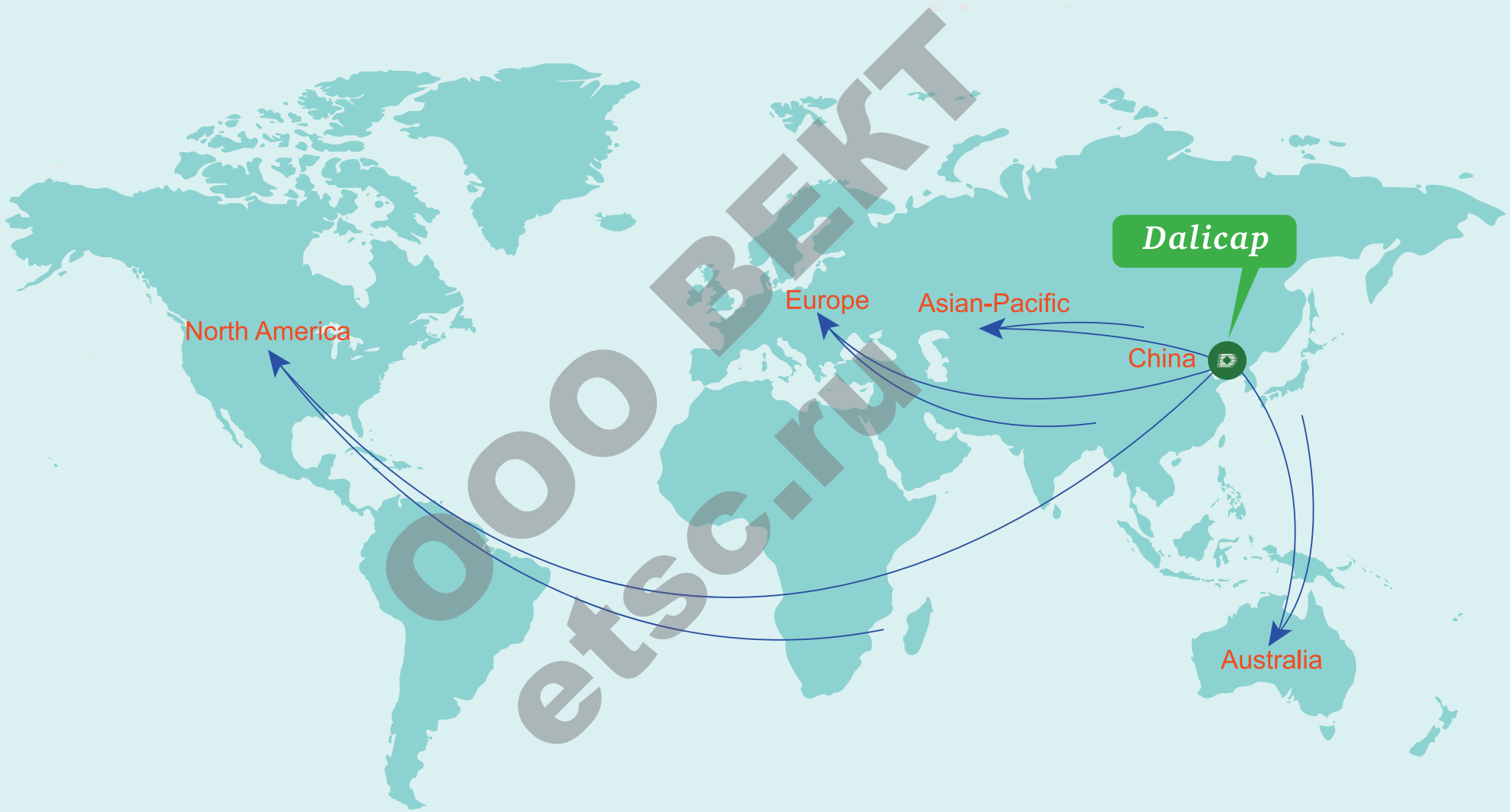
Quality Certification

ISO 9001 & ISO 14001 are certified.
RoHS is compliant.

Dalicap
DALICAP TECH. CORPORATION

CUSTOMERS OF DALICAP

With more than 1000 overseas customers distributed widely in the North America, Europe, Asian-Pacific and Autstralia, Dalicap gains a worldwide reputation.



PRODUCT CONTENTS

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DLC70 Series RF/Microwave Multilayer Ceramic Capacitor

◆Product Characteristics

High Q, high RF current/voltage, high RF power, low ESR/ESL, low noise, high reliability.

There are special coating on the surface of microstrip capacitors, and under high RF voltage, the arcing and corona discharge on the surface of the capacitors can be prevented.

◆Product Applications

Circuit applications: high frequency/microwave/RF amplifier, low noise amplifier, LC filter and so on.

Application fields: civil satellite communications, mobile communication base station, repeater, cluster communication/semiconductor RF power,MRI, high spead railway signal responsor,wireless broadcasting and TV station.

◆Part No.

DLC70	B	101	J	W	151	X	T	X	7	X
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿	⓫
Series	Size	Capacitance	Tolerance	Terminal type	Rated voltage	Marking	Package	Internal code	temperature range	internal code

① Capacitor series

DLC70 – Dalicap DLC70 series capacitor.

② Size and type

Unit: inch (mm)

	DLC70 H	DLC70 P	DLC70 A	DLC70 D
Length	.041 ± .004 (1.05 ± 0.10)	.063 ± .006 (1.60 ± 0.15)	.055 +.015 ~ −.010 (1.40+0.38 ~ −0.25)	.079 ± .008 (2.00 ± 0.20)
Width	.021 ± .004 (0.55 ± 0.10)	.031 ± .006 (0.80 ± 0.15)	.055 ± .010 (1.40 ± 0.25)	.049 ± .008 (1.25 ± 0.20)
Thickness	.021 ± .004 (0.55 ± 0.10)	.031 ± .006 (0.80 ± 0.15)	.057 (1.45) max.	.057 (1.45) max.

	DLC70 B	DLC70 C	DLC70 E
Length	.110 +.025 ~ −.010 (2.79+0.63 ~ −0.25)	.225 +.020 ~ −.010 (5.72+0.51 ~ −0.25)	.380 +.015 ~ −.010 (9.65+0.38 ~ −0.25)
Width	.110 ± .010 (2.79 ± 0.25)	.250 ± .015 (6.35 ± 0.38)	.380 ± .010 (9.65 ± 0.25)
Thickness	.100 (2.54) max.	.150 (3.81) max.	.170 (4.32) max.

③ Capacitance

Capacitance<10pF, For example, 1R0=1.0pF, R means decimal point.

Capacitance≥10pF, For example, 101=10×10¹=100pF, the third number is the power of 10.

④ Tolerance

Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC70 Series RF/Microwave Multilayer Ceramic Capacitor

⑤ Terminal type

Code	W	P	L	MS	AR	RR	AW	RW
Type	100%Sn over Nickel Plating RoHS Compliant	100%Sn over Copper Plating RoHS Compliant	10%Pb90%Sn over Nickel Plating	microstrip	Axial ribbon	Radial ribbon	Axial wire	Radial wire

Code	MN	AN	FN	BN	RN
Type	Non-magnetic microstrip	Non-magnetic axial ribbon	Non-magnetic radial ribbon	Non-magnetic axial wire	Non-magnetic radial wire

Remark: The above terminal types except "L" meet the RoHS requirements.

⑥ Rated voltage

Code	Rated voltage (V)	Code	Rated voltage (V)
500	50	601	600
101	100	102	1000
151	150	152	1500
201	200	252	2500
251	250	302	3000
301	300	362	3600
501	500	502	5000
		722	7200

⑦ Laser marking

Refer to the "Laser Marking", X means marking, N means no marking.

If the capacitance is less than 10pF, for example, 1.0pF capacitor, marked as "1R0".

If the capacitance is more than or equal to 10pF, for example, 100pF capacitor, marked as "101".

⑧ Package

Item	70 H	70 P	70 D	70 A	70 B	70 C	70 E
T: horizontal taping	√	√	√	√	√	√	√
TV: vertical taping			√	√	√	√	√
B: bulk packaging (Plastic bag)				√	√		
C: Tray packaging						√	√

Remark: For the capacitors with leads, B and C choose tray packaging type.

⑨ Internal code

Internal code can be blank

The internal code will be different if the product size is different.

⑩ working temperature range

Blank means -55℃ ~ 125℃; 5 means -55℃ ~ 150℃; 7 means -55℃ ~ 175℃

⑪ Internal code

Internal code can be blank

◆Performance requirement

The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

DLC70H RF/Microwave Multilayer Ceramic Capacitor

DLC70H (0402)

◆Product Characteristics

High Q value, high power, low ESR/ESL, low noise, high self-resonant frequency, high reliability.

◆Product Applications

Typical functions: frequency tuning, bypass, coupling, responsing, DC blocking and impedance matching.
Typical applications: civil satellite communications, mobile communication base station, repeater, cluster communication.

◆DLC70H capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.1	0R1			2.0	2R0			10	100		
0.2	0R2			2.1	2R1			11	110		
0.3	0R3			2.2	2R2			12	120		
0.4	0R4			2.4	2R4			13	130		200V code 201
0.5	0R5			2.7	2R7			15	150		
0.6	0R6			3.0	3R0			16	160	F,G, J.	
0.7	0R7			3.3	3R3			18	180		
0.8	0R8		200V code 201	3.6	3R6		200V code 201	20	200		
0.9	0R9	A,B, C,D.		3.9	3R9	A,B, C,D.		22	220		
1.0	1R0			4.3	4R3			24	240		
1.1	1R1			4.7	4R7			27	270		
1.2	1R2			5.1	5R1			30	300		50V code 500
1.3	1R3			5.6	5R6			33	330		
1.4	1R4			6.2	6R2						
1.5	1R5			6.8	6R8						
1.6	1R6			7.5	7R5						
1.7	1R7			8.2	8R2						
1.8	1R8			9.1	9R1						
1.9	1R9										

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

DLC70H	100	J	W	201	N	T	X	7	X
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿
Series	Capacitance code 100= 10×10⁰ =10pF 1R0=1.0pF	Tolerance	Terminal type	Rated voltage	No marking	Package type T: horizontal taping	Internal code	Temperature range	Internal code

Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC70H RF/Microwave Multilayer Ceramic Capacitor

◆DLC70H terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Terminal material
W	 chip	.041±.004 (1.05±0.10)	.021±.004 (0.55±0.10)	.021±.004 (0.55±0.10)	.010±.006 (0.25±0.15)	100%Sn over Nickel Plating RoHS Compliant
L						10%Pb90%Sn over Nickel Plating
P (non magnetic)						100%Sn over Copper Plating RoHS Compliant

◆Design kits

Dalicap provides various design kits, in which each capacitance has 10pcs and the capacitors are RoHS compliance.

Kits	Capacitance range (pF)	Capacitance (pF)	Tolerance
DKDLC70H01	0.1~2.0	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.2, 1.5, 1.6, 1.8, 2.0	±0.1pF
DKDLC70H02	1.0~10	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2	±0.1pF
		10	±5%
DKDLC70H03	10~33	10, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33	±5%

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10⁵MΩ, @25℃, apply rated voltage. ≥10⁴MΩ, @125℃, apply rated voltage.
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage(DWV)	Apply 250% rated voltage for 5s.
Operating temperature range	-55℃~+125℃, -55℃~+175℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃~+150℃) 0±60ppm/℃ (-125℃~+175℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

◆Environmental test

Item	Specification	Methods
Resistance to soldering Heat	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change: within -1.0%~+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes.Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Humidity steady state	Appearance: No evidence of mechanical damage. Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage. Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202 at the maximum operating temperature,apply 200% of the rated voltage for 2000 hours.

DLC70P RF/Microwave Multilayer Ceramic Capacitor

DLC70P (0603)

◆Product Characteristics

High Q value, high power, low ESR/ESL, low noise, high self-resonant frequency, high reliability.

◆Product Applications

Typical functions: frequency tuning, bypass, coupling, responsing, DC blocking and impedance matching.
Typical applications: civil satellite communications, mobile communication base station, repeater, cluster communication.

◆DLC70P capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.1	0R1	A,B,C,D.	250V code 251 or 300V code 301	2.2	2R2	A,B,C,D.	250V code 251 or 300V code 301	16	160	F,G,J.	250V code 251 or 300V code 301
0.2	0R2			2.4	2R4			18	180		
0.3	0R3			2.7	2R7			20	200		
0.4	0R4			3.0	3R0			22	220		
0.5	0R5			3.3	3R3			24	240		
0.6	0R6			3.6	3R6			27	270		
0.7	0R7			3.9	3R9			30	300		
0.8	0R8			4.3	4R3			33	330		
0.9	0R9			4.7	4R7			36	360		
1.0	1R0			5.1	5R1			39	390		
1.1	1R1			5.6	5R6			43	430		
1.2	1R2			6.2	6R2			47	470		
1.3	1R3			6.8	6R8			51	510		
1.4	1R4			7.5	7R5			56	560		
1.5	1R5			8.2	8R2			62	620		
1.6	1R6			9.1	9R1			68	680		
1.7	1R7			10	100	F,G,J.		75	750		
1.8	1R8			11	110			82	820		
1.9	1R9			12	120			91	910		
2.0	2R0			13	130			100	101		
2.1	2R1			15	150						

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

DLC70P	100	J	W	251	N	T	X	7	X
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿
Series	Capacitance code 100= 10×10⁰ =10pF 1R0=1.0pF	Tolerance	Terminal type	Rated voltage	No marking	Package type T: horizontal taping	Internal code	Temperature range	Internal code

Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC70P RF/Microwave Multilayer Ceramic Capacitor

◆DLC70P terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension			Terminal size (B)	Terminal material
		Length(Lc)	Width(Wc)	Thickness(Tc)		
W L P (non magnetic)	 chip	.063±.006 (1.60±0.15)	.031±.006 (0.80±0.15)	.031±.006 (0.80±0.15)	.008~.020 (0.20~0.50)	100%Sn over Nickel Plating RoHS Compliant 10%Pb90%Sn over Nickel Plating 100%Sn over Copper Plating RoHS Compliant

◆Design kits

Dalicap provides various design kits, in which each capacitance has 10pcs and the capacitors are RoHS compliance.

Kits	Capacitance range (pF)	Capacitance (pF)	Tolerance
DKDLC70P01	0.1~2.0	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.2, 1.5, 1.6, 1.8, 2.0	±0.1pF
DKDLC70P02	1.0~10	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2	±0.1pF
		10	±5%
DKDLC70P03	10~68	10, 12, 15, 18, 20, 22, 24, 27, 30, 33, 39, 47, 56, 68, 82, 100	±5%

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10⁵MΩ, @25℃, apply rated voltage. ≥10⁴MΩ, @125℃, apply rated voltage.
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage(DWV)	Apply 250% rated voltage for 5s.
Operating temperature range	-55℃~+125℃, -55℃~+175℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃~+150℃) 0±60ppm/℃ (-125℃~+175℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

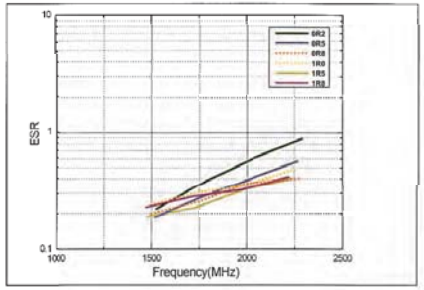
◆Environmental test

Item	Specification	Methods
Resistance to soldering Heat	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change: within -1.0%~+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage . Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202 . Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes.Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Humidity steady state	Appearance: No evidence of mechanical damage . Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage . Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202 at the maximum operating temperature,apply 200% of the rated voltage for 2000 hours.

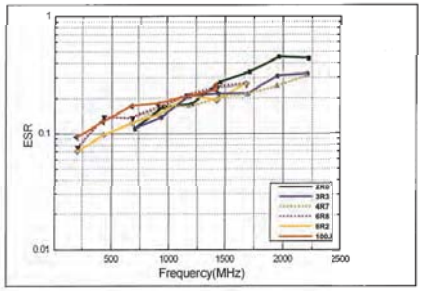
DLC70P RF/Microwave Multilayer Ceramic Capacitor

◆DLC70P performance curve

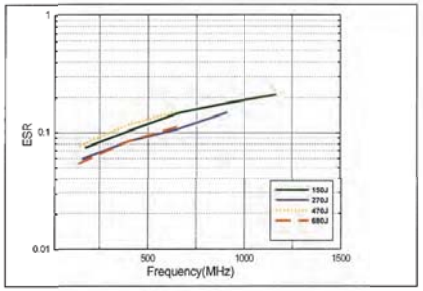
●ESR vs frequency



●ESR vs frequency



●ESR vs frequency

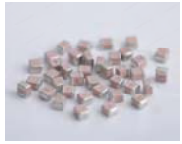


DLC70A RF/Microwave Multilayer Ceramic Capacitor

DLC70A (0505)

◆Product Characteristics

High Q value, high power, low ESR/ESL, low noise, high self-resonant frequency, high reliability.



◆Product Applications

Typical functions: frequency tuning, bypass, coupling, responsing, DC blocking and impedance matching.
Typical applications: civil satellite communications, mobile communication base station, repeater, cluster communication.

◆DLC70A capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.1	0R1	A、B、C、D.	150V code 151 or 300V code 301	2.4	2R4	A、B、C、D.	150V code 151 or 300V code 301	20	200	F、G、J.	150V code 151 or 300V code 301	160	161	F、G、J.	150V code 151 or 300V code 301
0.2	0R2			2.7	2R7			22	220			180	181		
0.3	0R3			3.0	3R0			24	240			200	201		
0.4	0R4			3.3	3R3			27	270			220	221		
0.5	0R5			3.6	3R6			30	300			240	241		
0.6	0R6			3.9	3R9			33	330			270	271		
0.7	0R7			4.3	4R3			36	360			300	301		
0.8	0R8			4.7	4R7			39	390			330	331		
0.9	0R9			5.1	5R1			43	430			360	361		
1.0	1R0			5.6	5R6			47	470			390	391		
1.1	1R1			6.2	6R2			51	510		150V code 151 or 200V code 201	430	431		50V code 500 or 200V code 201
1.2	1R2			6.8	6R8			56	560			470	471		
1.3	1R3			7.5	7R5			62	620			510	511		
1.4	1R4			8.2	8R2			68	680			560	561		
1.5	1R5			9.1	9R1			75	750			620	621		
1.6	1R6			10	100	F、G、J.		82	820			680	681		
1.7	1R7			11	110			91	910			750	751		
1.8	1R8			12	120			100	101			820	821		
1.9	1R9			13	130			110	111			910	911		
2.0	2R0			15	150			120	121			1000	102		
2.1	2R1			16	160			130	131						
2.2	2R2			18	180			150	151						

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

DLC70A	100	J	W	151	N	T	X	7	X
❶ Series	❷ Capacitance code 100= 10×10⁰ =10pF 1R0=1.0pF	❸ Tolerance	❹ Terminal type	❺ Rated voltage	❻ Laser marking	❼ Package type T: horizontal taping	❽ Internal code	❾ Temperature range	❿ Internal code

Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC70A RF/Microwave Multilayer Ceramic Capacitor

◆DLC70A terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Terminal material
		Length(Lc)	Width(Wc)	Thickness(Tc)	Terminal size (B)	
W	 chip	.055 +.015～－.010 (1.40 +0.38～－0.25)	.055± .010 (1.40±0.25)	.057 (1.45)max	.009～.024 (0.25～0.60)	100%Sn over Nickel Plating RoHS Compliant
L						10%Pb90%Sn over Nickel Plating
P (nonmagnetic)						100%Sn over Copper Plating RoHS Compliant

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥10000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10^5MΩ, @25℃, apply rated voltage. ≥10^4MΩ, @125℃, apply rated voltage.
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage(DWV)	Apply 250% rated voltage for 5s.
Operating temperature range	-55℃~ + 125 ℃, -55℃~ + 175 ℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃ ~+ 150℃) 0±60ppm/℃ (-125℃ ~+ 175℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

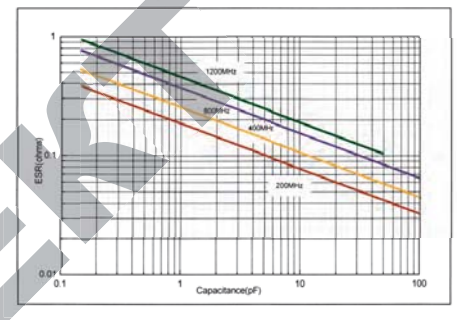
◆Environmental test

Item	Specification	Methods
Resistance to soldering Heat	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change: within -1.0%～+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage . Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202 . Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes.Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Humidity steady state	Appearance: No evidence of mechanical damage . Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202 . With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage . Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202 at the maximum operating temperature,apply 200% of the rated voltage for 2000 hours.

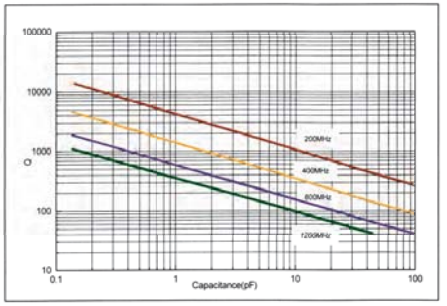
DLC70A RF/Microwave Multilayer Ceramic Capacitor

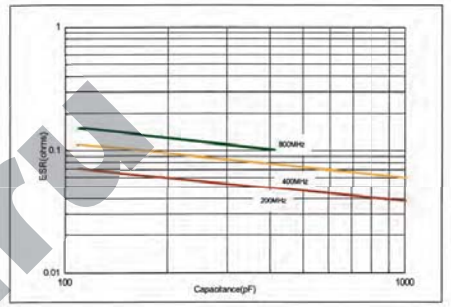
◆DLC70A performance curve

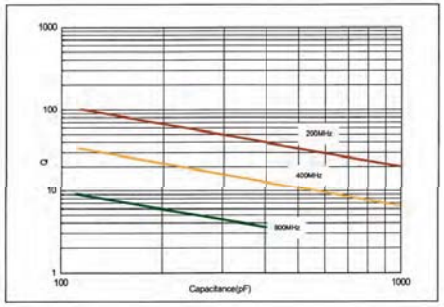
●ESR vs capacitance



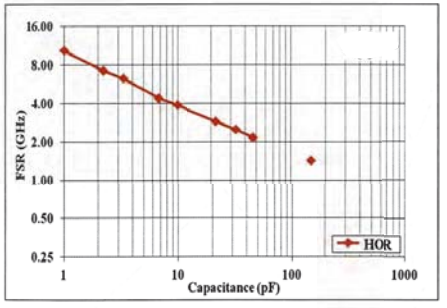
●Q vs capacitance







●The first series resonant frequency installed horizontally (FSRs)

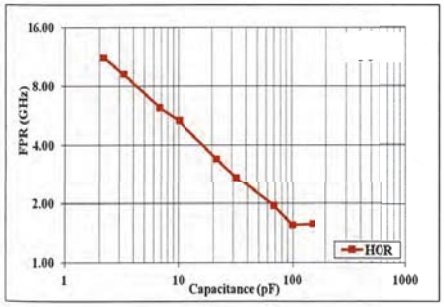


Definitions and Measurement Conditions
For a capacitor in a series configuration, i.e., mounted across a gap in a microstrip trace, with 50-Ohm source and termination resistances, the First Series Resonance, FSR, is defined as the lowest frequency at which the imaginary part of the input impedance, Im[Zin], equals zero. Should Im[Zin] or the real part of the input impedance, Re[Zin], not be monotonic with frequency at frequencies lower than those at which Im[Zin] = 0, the FSR shall be considered as undefined (gap in plot above). FSR is dependent on internal capacitor structure; substrate thickness and dielectric constant; capacitor orientation, as defined above; and mounting pad dimensions.
The measurement conditions are: substrate -- Rogers RO4350; substrate dielectric constant = 3.66; substrate thickness (mils) = 25; gap in microstrip trace (mils) = 15; horizontal mount microstrip trace width (mils) = 55. Reference planes at sample edges.

DLC70A RF/Microwave Multilayer Ceramic Capacitor

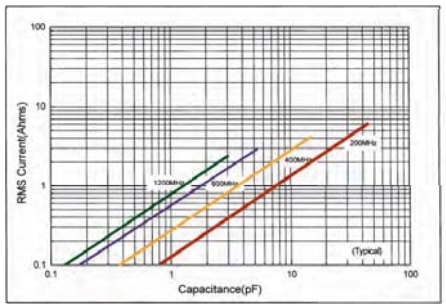
◆DLC70A terminal type and size

●The first parallel resonant frequency installed horizontally (FPRs)



Definitions and Measurement conditions:
For a capacitor in a series configuration, i.e., mounted across a gap in a microstrip trace, with 50-Ohm source and termination resistances, the First Parallel Resonance,FPR, is defined as the lowest frequencyat which a suckout or notch appears in [S21]. It is generally independent of substrate thickness or dielectric constant, but does depend on capacitor orientation. A horizontal orientation means the capacitor electrode planes are parallel to the plane of the substrate; a vertical orientation means the electrode planes are perpendicular to the substrate.
The measurement conditions are:
substrate --Rogers RO4350; substrate dielectric constant =3.66;
horizontal mount substrate thickness (mils) =25;
gap in microstrip trace(mils) =15;
horizontal mount microstrip trace width(mils)=55.
Reference planes at sample edges.

●Rated current vs capacitance



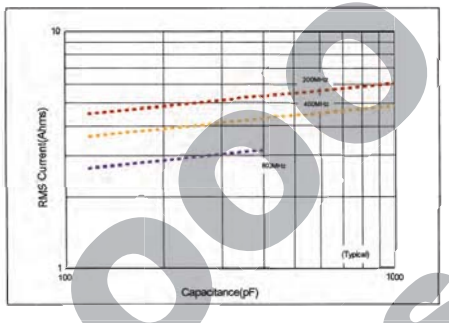
Remark:
The current determined by rated voltage:

$$I_{RMS}=\frac{\sqrt{2}}{2}I_{peak}=\frac{\sqrt{2}}{2}\times\frac{V_{rated}}{X_C}=\sqrt{2}\pi FCV_{rated}$$

The current determined by dissipated power:

$$I_{RMS}=\sqrt{\frac{Pd_{max}}{ESR}}$$

●Rated current vs capacitance



If the rated current is based on a temperature rise of 60℃ (Ambient Temperature at 65℃), with a thermal resistance of 40℃/W, the maximum power dissipation of the capacitor is 1.5W.

DLC70A RF/Microwave Multilayer Ceramic Capacitor

◆Design kits

Dalicap provides various design kits, and these capacitors are RoHS compliance.
DKDLC70A01-04 are magnetic capacitors, DKDLC70A05-08 are non-magnetic capacitors. Each capacitance has 10pcs.

Terminal	Capacitance range (pF)	Capacitance (pF)	Tolerance
DKDLC70A01	0.1～2.0	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.5	±0.1pF
		1.6, 1.8, 2.0	±0.25pF
DKDLC70A02	1.0～10	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7	±0.1pF
		3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2	±0.25pF
		10	±5%
DKDLC70A03	10～100	10, 12, 15, 18, 20, 22, 24, 27, 30, 33 39, 47, 56, 68, 82, 100	±5%
DKDLC70A04	100～1000	100, 120, 150, 180, 200, 220, 240, 270, 300, 330, 390, 470, 560, 680, 820, 1000	±5%
DKDLC70A05	0.1～2.0 Non-magnetic	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.5	±0.1pF
		1.6, 1.8, 2.0	±0.25pF
DKDLC70A06	1.0～10 Non-magnetic	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7	±0.1pF
		3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2	±0.25pF
		10	±5%
DKDLC70A07	10～100 Non-magnetic	10, 12, 15, 18, 20, 22, 24, 27, 30, 33 39, 47, 56, 68, 82, 100	±5%
DKDLC70A08	100～1000 Non-magnetic	100, 120, 150, 180, 200, 220, 240, 270, 300, 330, 390, 470, 560, 680, 820, 1000	±5%

DALICAP PRODUCT MANUAL

DLC70D RF/Microwave Multilayer Ceramic Capacitor

DLC70D (0805)

◆Product Characteristics:

High Q value, high power, low ESR/ESL, low noise, high self-resonant frequency, high reliability.

◆Product Applications:

Typical functions: frequency tuning, bypass, coupling, responsing, DC blocking and impedance matching.
Typical applications: civil satellite communications, mobile communication base station, repeater, cluster communication.

◆DLC70D capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.1	0R1	A,B,C,D.	250V code 251 or 60V code 501	2.4	2R4	A,B,C,D.	250V code 251 or 500V code 501	20	200	F,G,J.	250V code 251 or 500V code 501	160	161	F,G,J.	250V code 251 or 300V code 301
0.2	0R2			2.7	2R7			22	220			180	181		
0.3	0R3			3.0	3R0			24	240			200	201		
0.4	0R4			3.3	3R3			27	270			220	221		
0.5	0R5			3.6	3R6			30	300			240	241		
0.6	0R6			3.9	3R9			33	330			270	271		
0.7	0R7			4.3	4R3			36	360			300	301		
0.8	0R8			4.7	4R7			39	390			330	331		
0.9	0R9			5.1	5R1			43	430			360	361		
1.0	1R0			5.6	5R6			47	470			390	391		
1.1	1R1			6.2	6R2			51	510			430	431		
1.2	1R2			6.8	6R8			56	560			470	471		
1.3	1R3			7.5	7R5			62	620			510	511		
1.4	1R4			8.2	8R2			68	680			560	561		
1.5	1R5			9.1	9R1			75	750			620	621		
1.6	1R6			10	100	F,G,J.		82	820			680	681		100V code 101 or 200V code 201
1.7	1R7			11	110			91	910			750	751		
1.8	1R8			12	120			100	101			820	821		
1.9	1R9			13	130			120	121		250V code 251	910	911		
2.0	2R0			15	150			150	151			1000	102		
2.1	2R1			16	160										
2.2	2R2			18	180										

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

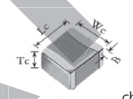
DLC70D	100	J	W	251	N	T	X	7	X
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿
Series	Capacitance code 100= 10×10⁰ =10pF 1R0=1.0pF	Tolerance	Terminal type	Rated voltage	No marking	Package type T: horizontal taping TV:vertical taping	Internal code	Temperature range	Internal code

Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC70D RF/Microwave Multilayer Ceramic Capacitor

◆DLC70D terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension Length (Lc)	Capacitor dimension Width (Wc)	Capacitor dimension Thickness (Tc)	Terminal size (B)	Terminal material
W	 chip	.079±.008 (2.00±0.20)	.049±.008 (1.25±0.20)	.057 (1.45) max	.014～.028 (0.35～0.70)	100%Sn over Nickel Plating RoHS Compliant
L						10%Pb90%Sn over Nickel Plating
P (non magnetic)						100%Sn over Copper Plating RoHS Compliant

◆Design kits

Dalicap provides various design kits, and these capacitors are RoHS compliance. Each capacitance has 10pcs.

Kits	Capacitance range (pF)	Capacitance (pF)	Tolerance
DKDLC70D01	0.1～2.0	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.5	±0.1pF
		1.6, 1.8, 2.0	±0.25pF
DKDLC70D02	1.0～10	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7	±0.1pF
		3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2	±0.25pF
		10	±5%
DKDLC70D03	10～100	10, 12, 15, 18, 20, 22, 24, 27, 30, 33 39, 47, 56, 68, 82, 100	±5%
DKDLC70D04	100～1000	100, 120, 150, 180, 200, 220, 240, 270, 300, 330, 390, 470, 560, 680, 820, 1000	±5%

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10⁵MΩ, @25℃, apply rated voltage. ≥10⁴MΩ, @125℃, apply rated voltage.
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage (DWV)	Apply 250% rated voltage for 5s.
Operating temperature range	-55℃～+125℃, -55℃～+175℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃～+150℃) 0±60ppm/℃ (-125℃～+175℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

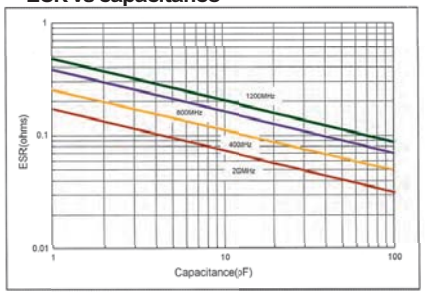
DLC70D RF/Microwave Multilayer Ceramic Capacitor

◆Environmental test

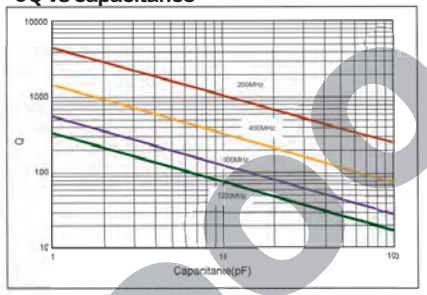
Item	Specification	Methods
Solder heat resistance	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change:within -1.0% ~ +2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes.Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Steady state damp heat	Appearance: No evidence of mechanical damage . Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage . Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202 at the maximum operating temperature,apply 200% of the rated voltage for 2000 hours.

◆DLC70D performance curve

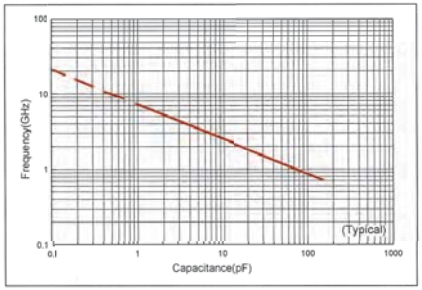
●ESR vs capacitance



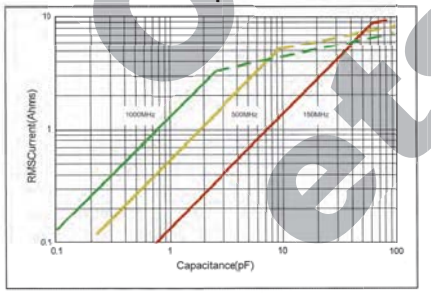
●Q vs capacitance



●Frequency vs capacitance



●Rated current vs capacitance



Remark:
The current determined by rated voltage:

$$I_{RMS}=\frac{\sqrt{2}}{2}I_{peak}=\frac{\sqrt{2}}{2}\times\frac{V_{rated}}{X_C}=\sqrt{2}\pi FCV_{rated}$$

The current determined by dissipated power: $I_{RMS}=\sqrt{\frac{Pd_{max}}{ESR}}$

If the rated current is based on a temperature rise of 60℃ (Ambient Temperature at 65℃), with a thermal resistance of 40℃/W, the maximum power dissipation of the capacitor is 1.5W.

DLC70B RF/Microwave Multilayer Ceramic Capacitor

DLC70B (1111)

◆Product Characteristics:

High Q value, high power, low ESR/ESL, low noise, high self-resonant frequency, high reliability.

◆Product Applications:

Typical functions: frequency tuning, bypass, coupling, responsing, DC blocking and impedance matching.
Typical applications: semiconductor RF power, MRI, repeater, high speed railway signal responsor, wireless broadcasting and TV device.

◆DLC70B capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.1	0R1	A, B, C, D.	500V code 501 or 1500V code 152	3.6	3R6	A, B, C, D.	500V code 501 or 1500V code 152	43	430	F, G, J.	500V code 501 or 1500V code 152	510	511	F, G, J.	100V code 101 or 300V code 301
0.2	0R2			3.9	3R9			47	470			560	561		
0.3	0R3			4.3	4R3			51	510			620	621		
0.4	0R4			4.7	4R7			56	560			680	681		
0.5	0R5			5.1	5R1			62	620			750	751		
0.6	0R6			5.6	5R6			68	680			820	821		
0.7	0R7			6.2	6R2			75	750			910	911		
0.8	0R8			6.8	6R8			82	820			1000	102		
0.9	0R9			7.5	7R5			91	910			1100	112		300V code 301
1.0	1R0			8.2	8R2			100	101			1200	122		
1.1	1R1			9.1	9R1			110	111		300V code 301 or 1000V code 102	1500	152		
1.2	1R2			10	100	F, G, J.		120	121			1800	182		
1.3	1R3			11	110			130	131			2200	222	F, G, J.	100V code 101 or 200V code 201
1.4	1R4			12	120			150	151			2700	272		
1.5	1R5			13	130			160	161			3000	302		
1.6	1R6			15	150			180	181			3300	332		
1.7	1R7			16	160			200	201			3900	392		
1.8	1R8			18	180			220	221		200V code 201 or 600V code 601	4700	472		
1.9	1R9			20	200			240	241			5100	512		
2.0	2R0			22	220			270	271			5600	562		50V code 500 or 100V code 101
2.1	2R1			24	240			300	301			10000	103		
2.2	2R2			27	270			330	331						
2.4	2R4			30	300			360	361						
2.7	2R7			33	330			390	391						
3.0	3R0			36	360			430	431						
3.3	3R3			39	390			470	471						

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

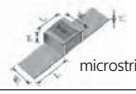
DLC70B	101	J	W	501	X	T	X	7	X
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
Series	Capacitance code 101= 10×10¹ =100pF 1R0=1.0pF	Tolerance	Terminal type	Rated voltage	Laser marking	Package type T: horizontal taping TV:vertical taping	Internal code	Temperature range	Internal code

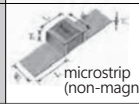
Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC70B RF/Microwave Multilayer Ceramic Capacitor

◆DLC70B terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Microstrip dimension			Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Length (L_L)	Width (W_L)	Thickness (T_L)	
W	 chip	.110+.025~-.010 (2.79+0.63~-0.25)	.110±.010 (2.79±0.25)	.100 (2.54)max	.016~.039 (0.40~1.00)	–	–	–	100%Sn over Nickel Plating RoHS Compliant
L									10%Pb90%Sn over Nickel Plating
MS	 microstrip				–	.250 (6.35)min	.093±.010 (2.36±0.25)	.004±.001 (0.10±.025)	100% silver

Terminal code	Type/Dimension	Capacitor dimension				Microstrip dimension			Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Length (L_L)	Width (W_L)	Thickness (T_L)	
P	 Chip (non-magnetic)	.110+.025~-.010 (2.79+0.63~-0.25)	.110±.010 (2.79±0.25)	.100 (2.54)max	.016~.039 (0.40~1.00)	–	–	–	100%Sn over Copper Plating RoHS Compliant
MN	 microstrip (non-magnetic)				–	.250 (6.35)min	.093±.010 (2.36±0.25)	.004±.001 (0.10±.025)	100% silver

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥10000, cap≤1000pF, 1±0.1MHz, 1±0.2Vrms (typical value) Q≥2000, cap>1000pF, 1±0.1KHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	0.1pF~470pF ≥10^5MΩ, @25℃, apply rated voltage.(no more than 500V) ≥10^4MΩ, @125℃, apply rated voltage.(no more than 500V) 510pF~10000pF ≥10^5MΩ, @25℃, apply rated voltage.(no more than 500V) ≥10^4MΩ, @125℃, apply rated voltage.(no more than 500V)
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage (DWV)	Test Voltage: Rated voltage≤500V: 250% of the rated voltage, Applied Time: 5 s 500V<Rated voltage≤1250V: 150% of the rated voltage, Applied Time: 5 s Rated voltage>1250V: 120% of the rated voltage, Applied Time: 5 s Charge/discharge current: 50mA max.
Operating temperature range	-55℃~+125℃, -55℃~+175℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃~+125℃)0±60ppm/℃ (-125℃~+175℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

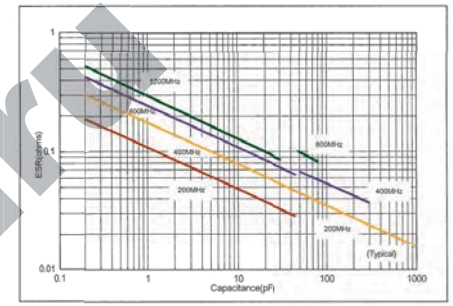
DLC70B RF/Microwave Multilayer Ceramic Capacitor

◆Environmental test

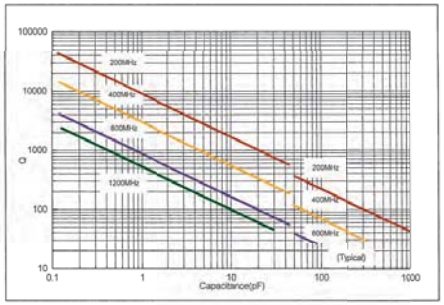
Item	Specification	Methods
Solder heat resistance	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change:within -1.0%~+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes.Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Steady state damp heat	Appearance: No evidence of mechanical damage . Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage . Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202,apply test voltage at the maximum operating temperature for 2000 hours. Test Voltage: Rated voltage≤500V: 200% of the rated voltage 500V<Rated voltage≤1250V: 120% of the rated voltage Rated voltage>1250V: 100% of the rated voltage. The charge/discharge current is less than 50mA.

◆DLC70B performance curve

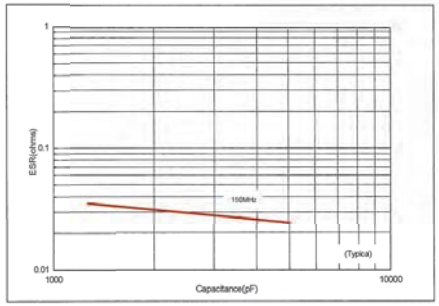
●ESR vs capacitance



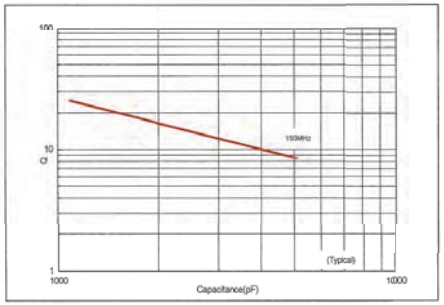
●Q vs capacitance



●ESR vs capacitance



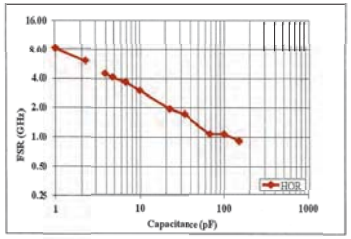
●Q vs capacitance



DLC70B RF/Microwave Multilayer Ceramic Capacitor

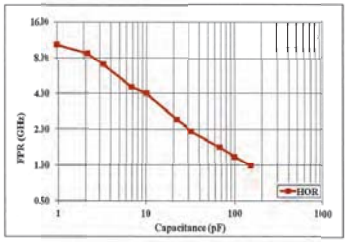
◆DLC70B performance curve

●The first series resonant frequency installed horizontally (FSRs)



Definitions and Measurement Conditions
For a capacitor in a series configuration, i.e., mounted across a gap in a microstrip trace, with 50-Ohm source and termination resistances, the First Series Resonance, FSR, is defined as the lowest frequency at which the imaginary part of the input impedance, Im[Zin], equals zero. Should Im[Zin] or the real part of the input impedance, Re[Zin], not be monotonic with frequency at frequencies lower than those at which Im [Zin] = 0, the FSR shall be considered as undefined (gap in plot above). FSR is dependent on internal capacitor structure; substrate thickness and dielectric constant; capacitor orientation, as defined above; and mounting pad dimensions.
The measurement conditions are:
substrate -- Rogers Ro4350; substrate dielectric constant = 3.66;
horizontal mount substrate thickness (mils) = 50;
gap in microstrip trace (mils) = 72;
horizontal mount microstrip trace width (mils) = 110.
Reference planes at sample edges.

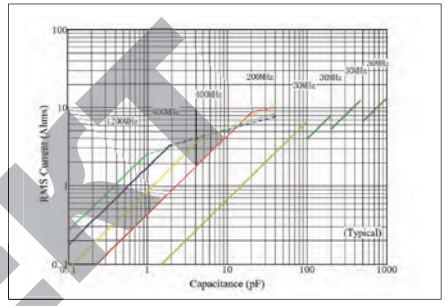
●The first parallel resonant frequency installed horizontally (FPRs)



Definitions and Measurement conditions:
For a capacitor in a series configuration, i.e., mounted across a gap in a microstrip trace, with 50-Ohm source and termination resistances, the First Parallel Resonance,FPR, is defined as the lowest frequencyat which a suckout or notch appears in [S21]. It is generally independent of substrate thickness or dielectric constant, but does depend on capacitor orientation.A horizontal orientation means the capacitor electrode planes are parallel to the plane of the substrate; a vertical orientation means the electrode planes are perpendicular to the substrate.
The measurement conditions are:
substrate --Rogers Ro4350; substrate dielectric constant =3.66;
horizontal mountsubstrate thickness (mils) =50;
gap in microstrip trace(mils) =72; horizontal mount microstrip trace width(mils)=110.
Reference planes at sample edges.

DLC70B RF/Microwave Multilayer Ceramic Capacitor

●Rated current vs capacitance



Remark:
The current determined by rated voltage:

$$I_{RMS}=\frac{\sqrt{2}}{2}I_{peak}=\frac{\sqrt{2}}{2}\times\frac{V_{rated}}{X_C}=\sqrt{2}\pi FCV_{rated}$$

The current determined by dissipated power:

$$I_{RMS}=\sqrt{\frac{Pd_{max}}{ESR}}$$

If the rated current is based on a temperature rise of 60℃ (Ambient Temperature at 65℃), with a thermal resistance of 20℃/W, the maximum power dissipation of the capacitor is 3W.

◆Design kits

Dalicap provides various design kits, and these capacitors are RoHS compliance.
DKDLC70B01-04 are magnetic capacitors, DKDLC70B05-08 are non-magnetic capacitors. There are 14-16 capacitance types in each kit, and each capacitance has 10pcs.

Kits	Capacitance (pF)	Quantity	Tolerance
DKDLC70B01	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7	16	±0.1pF
	3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2		±0.25pF
	10		±5%
DKDLC70B02	10, 12, 15, 18, 20, 22, 24, 27, 30, 33 39, 47, 56, 68, 82, 100	16	±5%
DKDLC70B03	100, 120, 150, 180, 200, 220, 240, 270, 300, 330, 390, 470, 560, 680, 820, 1000	16	±5%
DKDLC70B04	1000, 1100, 1200, 1500, 1800, 2000, 2200, 2700 3000, 3300, 3900, 4700, 5100, 5600, 10000	15	±5%
DKDLC70B05	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7	16	±0.1pF
	3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2		±0.25pF
	10		±5%
DKDLC70B06	10, 12, 15, 18, 20, 22, 24, 27, 30, 33 39, 47, 56, 68, 82, 100	16	±5%
DKDLC70B07	100, 120, 150, 180, 200, 220, 240, 270, 300, 330, 390, 470, 560, 680, 820, 1000	16	±5%
DKDLC70B08	1000, 1100, 1200, 1500, 1800, 2000, 2200, 2700 3000, 3300, 3900, 4700, 5100, 5600, 10000	15	±5%

DLC70C RF/Microwave Multilayer Ceramic Capacitor

DLC70C (2225)

◆Product Characteristics

High Q value, high power, low ESR/ESL, low noise, high self-resonant frequency, high reliability.

◆Product Applications

Typical functions: frequency tuning, bypass, coupling, responsing, DC blocking and impedance matching.
Typical applications: semiconductor RF power, MRI, repeater, high speed railway signal responsor, wireless broadcasting and TV device.

◆DLC70C capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.5	0R5	A、B、C、D.	2500V code 252 or 3600V code 362	3.9	3R9	A、B、C、D.	2500V code 252 or 3600V code 362	36	360	F、G、J.	2500V code 252 or 3600V code 362	330	331	F、G、J.	1500V code 152 or 2000V code 202
0.6	0R6			4.3	4R3			39	390			360	361		
0.7	0R7			4.7	4R7			43	430			390	391		
0.8	0R8			5.1	5R1			47	470			430	431		
0.9	0R9			5.6	5R6			51	510			470	471		
1.0	1R0			6.2	6R2			56	560			510	511		1000V code 102 or 1500V code 152
1.1	1R1			6.8	6R8			62	620			560	561		
1.2	1R2			7.5	7R5			68	680			620	621		
1.3	1R3			8.2	8R2			75	750			680	681		
1.4	1R4			9.1	9R1			82	820			750	751		
1.5	1R5			10	100	F、G、J.		91	910			820	821		
1.6	1R6			11	110			100	101			910	911		
1.7	1R7			12	120			110	111		2500V code 252 or 3000V code 302	1000	102		
1.8	1R8			13	130			120	121			1100	112		
1.9	1R9			15	150			130	131			1200	122		
2.0	2R0			16	160			150	151			1500	152		500V code 501 or 1000V code 102
2.1	2R1			18	180			160	161			1800	182		
2.2	2R2			20	200			180	181			2200	222		
2.4	2R4			22	220			200	201			2700	272		
2.7	2R7			24	240			220	221			3000	302		
3.0	3R0			27	270			240	241						
3.3	3R3			30	300			270	271						
3.6	3R6			33	330			300	301						

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆DLC70C capacitance list

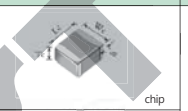
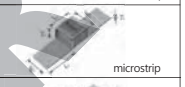
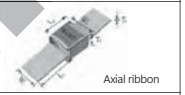
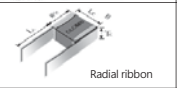
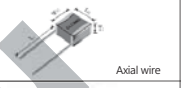
DLC70C	101	J	W	252	X	T	X	7	X
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿
Series	Capacitance code 101= 10×10¹ =100pF 1R0=1.0pF	Tolerance	Terminal type	Rated voltage	Laser marking	Package type T: horizontal taping TV: vertical taping	Internal code	Temperature range	Internal code

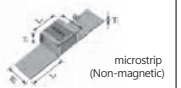
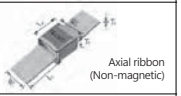
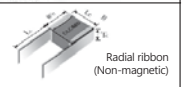
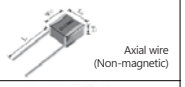
Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC70C RF/Microwave Multilayer Ceramic Capacitor

◆DLC70C terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Microstrip dimension Length (LL)	Width (WL)	Thickness (TL)	Terminal material
W	 chip	.225 +.020~−.010 (5.72 +0.51~−0.25)	.250±.015 (6.35±0.38)	.150 (3.81)max	.020~.047 (0.50~1.20)	—	—	—	100%Sn over Nickel Plating RoHS Compliant
L									10%Pb90%Sn over Nickel Plating
MS	 microstrip				—	.500 (12.70) min	.240±.010 (6.10±0.25)	.008±.001 (0.20±.025)	Copper strip plated silver
AR	 Axial ribbon							.008±.001 (0.20±.025)	Copper strip plated silver
RR	 Radial ribbon					.354 (9.00) min	.118±.010 (3.00±0.25)	.012±.001 (0.30±.025)	Copper strip plated silver
RW	 Axial wire					.709 (18.00) min	Wire diameter .031±.004 (0.80±0.10)		Silver wire
AW	 Radial wire					.906 (23.00) min			

Terminal code	Type/Dimension	Capacitor dimension Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Microstrip dimension Length (LL)	Width (WL)	Thickness (TL)	Terminal material
P	 Chip (Non-magnetic)	.225 +.020~−.010 (5.72 +0.51~−0.25)	.250±.015 (6.35±0.38)	.150 (3.81)max	.020~.047 (0.50~1.20)	—	—	—	100%Sn over Copper Plating RoHS Compliant
MN	 microstrip (Non-magnetic)				—	.500 (12.70) min	.240±.010 (6.10±0.25)	.008±.001 (0.20±.025)	Copper strip plated silver
AN	 Axial ribbon (Non-magnetic)							.008±.001 (0.20±.025)	Copper strip plated silver
FN	 Radial ribbon (Non-magnetic)					.354 (9.00) min	.118±.010 (3.00±0.25)	.012±.001 (0.30±.025)	Copper strip plated silver
RN	 Axial wire (Non-magnetic)					.709 (18.00) min	Wire diameter .031±.004 (0.80±0.10)		Silver wire
BN	 Radial wire (Non-magnetic)					.906 (23.00) min			

DLC70C RF/Microwave Multilayer Ceramic Capacitor

◆Electrical performance

Item	IteSpecificationm
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF 1KHz±10% test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥10000, cap≤1000pF, 1±0.1MHz, 1±0.2Vrms (typical value) Q≥10000, cap＞1000pF, 1±0.1KHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10⁵MΩ, @25℃, with rated voltage applied, test voltage is DC 500V ≥10⁴MΩ, @125℃, with rated voltage applied, test voltage is DC 500V
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage	Test Voltage: Rated voltage≤500V: 250% of the rated voltage, Applied Time: 5 s 500V＜Rated voltage≤1250V: 150% of the rated voltage, Applied Time: 5 s Rated voltage＞1250V: 120% of the rated voltage, Applied Time: 5 s Charge/discharge current: 50mA max.
Operating temperature range	-55℃~ + 125 ℃,-55℃~ + 175 ℃ (If there is any other operating temperature range,please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃ ~+ 1250℃) 0±60ppm/℃ (+125℃ ~+ 175℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

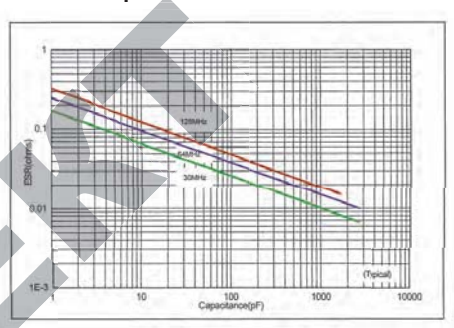
◆Environmental test

Item	Specification	Methods
Solder heat resistance	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change:within -1.0%～+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes.Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Steady state damp heat	Appearance: No evidence of mechanical damage . Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage . Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202, apply test voltage at the maximum operating temperature for 2000 hours. Test Voltage: Rated voltage≤500V: 200% of the rated voltage 500V＜Rated voltage≤1250V: 120% of the rated voltage Rated voltage ＞1250V: 100% of the rated voltage. The charge/discharge current is less than 50mA.

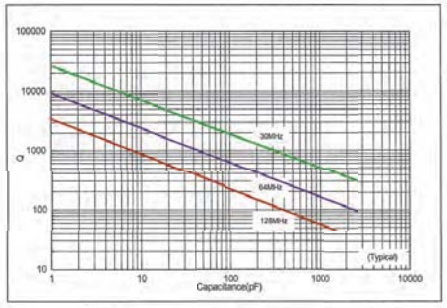
DLC70C RF/Microwave Multilayer Ceramic Capacitor

◆DLC70C performance curve

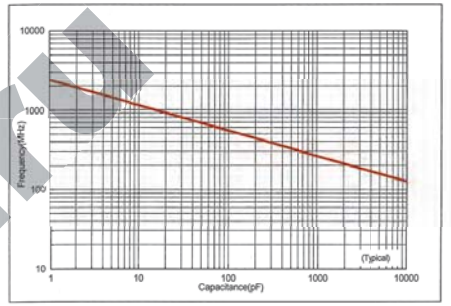
●ESR vs capacitance



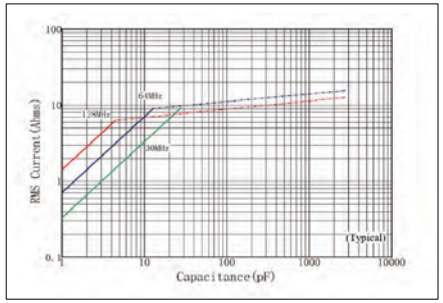
●Q vs capacitance



●Series resonance frequency vs capacitance



● Rated current vs capacitance



Remark:
The current determined by rated voltage:

$$I_{RMS}=\frac{\sqrt{2}}{2}I_{peak}=\frac{\sqrt{2}}{2}\times\frac{V_{rated}}{X_C}=\sqrt{2}\pi FCV_{rated}$$

The current determined by dissipated power:

$$I_{RMS}=\sqrt{\frac{Pd_{max}}{ESR}}$$

If the rated current is based on a temperature rise of 60℃ (Ambient Temperature at 65℃), with a thermal resistance of 15℃/W, the maximum power dissipation of the capacitor is 4W.

DLC70E RF/Microwave Multilayer Ceramic Capacitor

DLC70E (3838)

◆Product Characteristics:

High Q value, high power, low ESR/ESL, low noise, high self-resonant frequency, high reliability.

◆Product Applications:

Typical functions: frequency tuning, bypass, coupling, responsing, DC blocking and impedance matching.
Typical applications: semiconductor RF power, MRI, repeater, high speed railway signal responsor, wireless broadcasting and TV device.

◆DLC70E capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.5	0R5	A, B, C, D.	3600V code 362 or 7200V code 722	4.7	4R7	A, B, C, D.	3600V code 362 or 7200V code 722	51	510	F, G, J.	3600V code 362 or 7200V code 722	560	561	F, G, J.	2500V code 252 or 3600V code 362
0.6	0R6			5.1	5R1			56	560			620	621		
0.7	0R7			5.6	5R6			62	620			680	681		
0.8	0R8			6.2	6R2			68	680			750	751		
0.9	0R9			6.8	6R8			75	750			820	821		1000V code 102 or 2500V code 252
1.0	1R0			7.5	7R5			82	820			910	911		
1.1	1R1			8.2	8R2			91	910			1000	102		
1.2	1R2			9.1	9R1			100	101			1100	112		
1.3	1R3			10	100	F, G, J.		110	111			1200	122		
1.4	1R4			11	110			120	121			1500	152		
1.5	1R5	A, B, C, D.		12	120			130	131			1800	182		
1.6	1R6			13	130			150	151			2200	222		
1.7	1R7			15	150			160	161			2400	242		
1.8	1R8			16	160			180	181			2700	272		500V code 501 or 2000V code 202
1.9	1R9			18	180			200	201		3600V code 362 or 5000V code 502	3000	302		
2.0	2R0			20	200			220	221			3300	332		
2.1	2R1			22	220			240	241			3600	362		
2.2	2R2			24	240			270	271			3900	392		
2.4	2R4			27	270			300	301			4300	432		
2.7	2R7			30	300			330	331			4700	472		
3.0	3R0			33	330			360	361			5100	512		
3.3	3R3			36	360			390	391						
3.6	3R6			39	390			430	431		2500V code 252 or 3600V code 362				
3.9	3R9			43	430			470	471						
4.3	4R3			47	470			510	511						

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

DLC70E ❶ | 101 ❷ | J ❸ | W ❹ | 362 ❺ | X ❻ | T ❼ | X ❽ | 7 ❾ | X ❿

❶ Series
❷ Capacitance code 101= 10×10¹ =100pF 1R0=1.0pF
❸ Tolerance
❹ Terminal type
❺ Rated voltage
❻ Laser marking
❼ Package type T: horizontal taping TV: vertical taping
❽ Internal code
❾ Temperature range
❿ Internal code

Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC70E RF/Microwave Multilayer Ceramic Capacitor

◆DLC70E terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Microstrip dimension Length (L1)	Width (W1)	Thickness (T1)	Terminal material
W	chip	.380 +.015~−.010 (9.65 +0.38~−0.25)	.380±.010 (9.65±0.25)	.170 (4.32)max	.024~.059 (0.60~1.50)	–	–	–	100%Sn over Nickel Plating RoHS Compliant
L	chip								10%Pb90%Sn over Nickel Plating
MS	microstrip				–	.728 (18.50) min	.350±.020 (8.89±0.50)	.008±.001 (0.20±.025)	Copper strip plated silver
AR	Axial ribbon						.315±.010 (8.00±0.25)	.008±.001 (0.20±.025)	Copper strip plated silver
RR	Radial ribbon					.354 (9.00) min	.118±.010 (3.00±0.25)	.012±.001 (0.30±.025)	Copper strip plated silver
RW	Axial wire					.709 (18.00) min	Wire diameter .031±.004 (0.80±0.10)		Silver wire
AW	Radial wire					.906 (23.00) min			

Terminal code	Type/Dimension	Capacitor dimension Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Microstrip dimension Length (L1)	Width (W1)	Thickness (T1)	Terminal material
P	Chip (non-magnetic)	.380 +.015~−.010 (9.65 +0.38~−0.25)	.380±.010 (9.65±0.25)	.170 (4.32)max	.024~.059 (0.60~1.50)	–	–	–	100%Sn over Copper Plating RoHS Compliant
MN	microstrip (non-magnetic)				–	.728 (18.50) min	.350±.020 (8.89±0.50)	.008±.001 (0.20±.025)	Copper strip plated silver
AN	Axial ribbon (non-magnetic)						.315±.010 (8.00±0.25)	.008±.001 (0.20±.025)	Copper strip plated silver
FN	Radial ribbon (non-magnetic)					.354 (9.00) min	.118±.010 (3.00±0.25)	.012±.001 (0.30±.025)	Copper strip plated silver
RN	Axial wire (non-magnetic)					.709 (18.00) min	Wire diameter .031±.004 (0.80±0.10)		Silver wire
BN	Radial wire (non-magnetic)					.906 (23.00) min			

DLC70E
RF/Microwave Multilayer Ceramic Capacitor
DALICAP PRODUCT MANUAL

DLC70E RF/Microwave Multilayer Ceramic Capacitor

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF 1KHz±10% test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥10000, cap≤1000pF, 1±0.1MHz, 1±0.2Vrms (typical value) Q≥10000, cap＞1000pF, 1±0.1KHz, 1±0.2Vrms (typical value)
Insulation resistance (R)	≥10^5MΩ, @25℃, with rated voltage applied, test voltage is DC 500V ≥10^4MΩ, @125℃, with rated voltage applied, test voltage is DC 500V
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage	Test Voltage: Rated voltage≤500V: 250% of the rated voltage, Applied Time: 5 s 500V＜Rated voltage≤1250V: 150% of the rated voltage, Applied Time: 5 s Rated voltage＞1250V: 120% of the rated voltage, Applied Time: 5 s Charge/discharge current: 50mA max.
Operating temperature range	-55℃~＋125℃,-55℃~＋175℃ (If there is any other operating temperature range,please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃~＋1250℃) 0±60ppm/℃ (+125℃~＋175℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

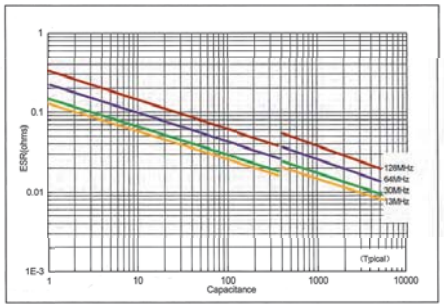
The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

◆Environmental test

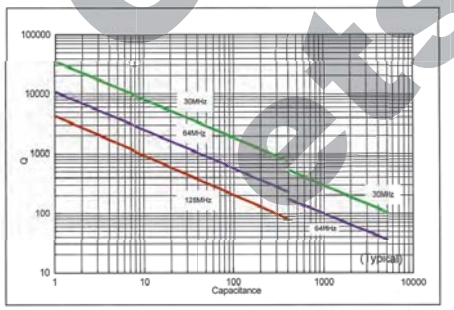
Item	Specification	Methods
Solder heat resistance	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change:within -1.0%~+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes.Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Steady state damp heat	Appearance: No evidence of mechanical damage . Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage . Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202, apply test voltage at the maximum operating temperature for 2000 hours. Test Voltage: Rated voltage≤500V: 200% of the rated voltage 500V＜Rated voltage≤1250V: 120% of the rated voltage Rated voltage＞1250V: 100% of the rated voltage. The charge/discharge current is less than 50mA.

◆DLC70E performance curve

●ESR vs capacitance



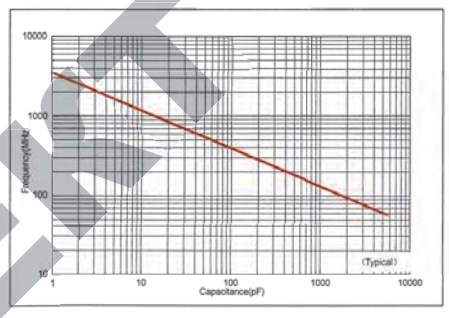
●Q vs capacitance



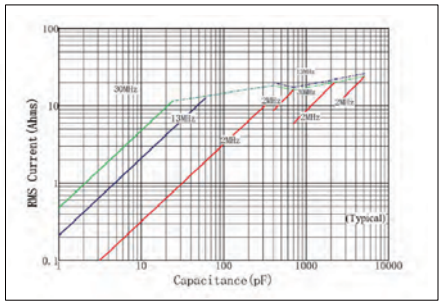
DLC70E RF/Microwave Multilayer Ceramic Capacitor

◆DLC70E performance curve

●Series resonance frequency vs capacitance



●Rated current vs capacitance



Remark:
The current determined by rated voltage:

$$I_{RMS}=\frac{\sqrt{2}}{2}I_{peak}=\frac{\sqrt{2}}{2}\times\frac{V_{rated}}{X_C}=\sqrt{2}\pi FCV_{rated}$$

The current determined by dissipated power:

$$I_{RMS}=\sqrt{\frac{Pd_{max}}{ESR}}$$

If the rated current is based on a temperature rise of 60℃ (Ambient Temperature at 65℃), with a thermal resistance of 12℃/W, the maximum power dissipation of the capacitor is 5W.

DLC70 High RF power Ceramic Capacitor

◆Product Characteristics:

High Q, high RF current/voltage, high RF power, low ESR/ESL, low noise, high reliability.

◆Product Applications:

Semiconductor RF power, MRI, repeater, high speed railway signal responsor, wireless broadcasting and TV device.

◆Naming method

DLC70	F	101	J	AR	502	X	C	X	7	X
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿	⓫
Series	Size type	Capacitance code 101= 10×10¹ =100pF 1R0=1.0pF	Tolerance	Terminal type	Rated voltage	Laser marking	Package type T: horizontal taping	Internal code	Temperature range	Internal code

①Capacitor series

DLC70 – Dalicap DLC70 series ceramic capacitor.

②Size and type

Unit: inch (mm)

	DLC70 F	DLC70 G	DLC70 L
Length	.614 +.015/−.010 (15.60+0.38/−0.25)	.760 +.025/−.010 (19.30+0.64/−0.25)	1.350±.050 (34.29±1.27)
Width	.433±.010 (11.00±0.25)	.760 +.025/−.010 (19.30+0.64/−0.25)	1.350±.050 (34.29±1.27)
Thickness	.197(5.00)max.	.201(5.10)max.	.197(5.00)max.

③Capacitance

Capacitance<10pF, For example, 1R0=1.0pF, R means decimal point

Capacitance≥10pF, For example, 101=10×10¹=100pF, the third number is the power of 10.

④Tolerance

Code	B	C	D	F	G	G
Tolerance	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

⑤Terminal type

Code	W	P	L	MS	AR	AW	RW
Type	100%Sn over Nickel Plating RoHS Compliant	100%Sn over Copper Plating RoHS Compliant	10%Pb90%Sn over Nickel Plating	microstrip	Axial ribbon	Axial wire	Radial wire

Code	MN	AN	BN	RN
Type	Non-magnetic microstrip	Non-magnetic axial ribbon	Non-magnetic axial wire	Non-magnetic radial wire

DLC70 High RF power Ceramic Capacitor

⑥Rated voltage

Code	Rated voltage (V)	Code	Rated voltage (V)
301	300	302	3000
501	500	362	3600
102	1000	502	5000
152	1500	802	8000
202	2000	103	10000
252	2500		

⑦Laser marking

Refer to the "Laser Marking", X means marking, N means no marking.

If the capacitance is less than 10pF, for example, 1.0pF capacitor, marked as "1R0".

If the capacitance is more than or equal to 10pF, for example, 100pF capacitor, marked as "101".

⑧Package

	70 F	70 G	70 L
T: horizontal taping		√	
C: Tray packaging	√	√	√
I: Special packaging	Contact with Dalicap		

Remark: For the capacitors with leads, both B and C are tray packaging.

⑨Internal code

Internal code can be blank

The internal code will be different if the product size is different.

⑩working temperature range

Blank means -55℃ ~ 125℃; 5 means -55℃ ~ 150℃; 7 means -55℃ ~ 175℃

⑪Internal code

Internal code can be blank

◆Performance requirement

The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

DLC70F High RF power Ceramic Capacitor

DLC70F (6040)

◆Product Characteristics:

High Q value, high power, low ESR/ESL, low noise, high self-resonant frequency, high reliability.

◆Product Applications:

Typical applications: semiconductor RF power, MRI, repeater, high speed railway signal responsor, wireless broadcasting and TV device.

◆DLC70F capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
1.0	1R0	A, B, C, D.	5000V code 502 or 8000V code 802	22	220	F, G, J.	5000V code 502 or 8000V code 802	390	391	F, G, J.	3000V code 302 or 5000V code 502
1.2	1R2			27	270			470	471		
1.5	1R5			33	330			560	561		
1.8	1R8			39	390			680	681		
2.2	2R2			47	470			820	821		2000V code 202 or 3000V code 302
2.7	2R7			56	560			1000	102		
3.3	3R3			68	680			1200	122		
3.9	3R9			82	820			1500	152		
4.7	4R7			100	101			1800	182		
5.6	5R6			120	121		3000V code 302 or 5000V code 502	2200	222		
6.8	6R8			150	151			2700	272		1000V code 102 or 2000V code 202
8.2	8R2			180	181			3300	332		
10	100	F, G, J.		220	221			4700	472		
12	120			270	271			5100	512		
15	150			330	331			5600	562		
18	180							6800	682		

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

DLC70F	101	J	AR	502	X	C	X	7	X
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿
Series	Capacitance code 101= 10×10¹ =100pF 1R0=1.0pF	Tolerance	Terminal type	Rated voltage	Laser marking	Package type	Internal code	Temperature range	Internal code

Tolerance						
Code	B	C	D	F	G	J
Tolerance	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC70F High RF power Ceramic Capacitor

◆DLC70F terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Microstrip dimension			Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Length (LL)	Width (WL)	Thickness (TL)	
W L	chip	.614 +.015~−.010 (15.60 +0.38~−0.25)	.433±.010 (11.00±0.25)	.197 (5.00) max	.024~.059 (0.60~1.50)	–	–	–	100%Sn over Nickel Plating RoHS Compliant 10%Pb90%Sn over Nickel Plating
MS	microstrip				–	.728 (18.50) min	.350 ±.020 (8.89 ±0.50)	.008 ±.001 (0.20 ±0.025)	Copper strip plated silver
AR	Axial ribbon								
RW	Axial wire					.748 (19.00) min	Wire diameter .031±.006 (0.800±0.15)		Silver wire
AW	Radial wire					.906 (23.00) min			

Terminal code	Type/Dimension	Capacitor dimension				Microstrip dimension			Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Length (LL)	Width (WL)	Thickness (TL)	
P	Chip (Non-magnetic)	.614 +.015~−.010 (15.60 +0.38~−0.25)	.433±.010 (11.00±0.25)	.197 (5.00) max	.024~.059 (0.60~1.50)	–	–	–	100%Sn over Copper Plating RoHS Compliant
MN	microstrip (Non-magnetic)				–	.728 (18.50) min	.350 ±.020 (8.89 ±0.50)	.008 ±.001 (0.20 ±0.025)	Copper strip plated silver
AN	Axial ribbon (Non-magnetic)								
RN	Axial wire (Non-magnetic)					.748 (19.00) min	Wire diameter .031±.006 (0.800±0.15)		Silver wire
BN	Radial wire (Non-magnetic)					.906 (23.00) min			

DLC70F High RF power Ceramic Capacitor

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF 1KHz±10% test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, cap≤1000pF, 1±0.1MHz, 1±0.2Vrms Q≥2000, cap＞1000pF, 1±0.1KHz, 1±0.2Vrms
Insulation resistance (IR)	≥10⁵MΩ, @25℃, with rated voltage applied, test voltage is DC 500V ≥10⁴MΩ, @125℃, with rated voltage applied, test voltage is DC 500V
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage	Test Voltage: Rated voltage≤500V: 250% of the rated voltage, Applied Time: 5 s 500V＜Rated voltage≤1250V: 150% of the rated voltage, Applied Time: 5 s Rated voltage＞1250V: 120% of the rated voltage, Applied Time: 5 s Charge/discharge current: 50mA max.
Operating temperature range	-55℃~ + 125 ℃,-55℃~ + 175 ℃ (If there is any other operating temperature range,please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃ ~+ 1250℃) 0±60ppm/℃ (+125℃ ~+ 175℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

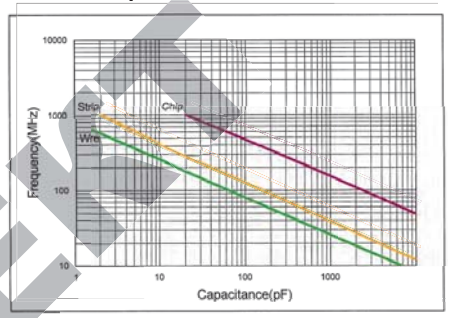
◆Environmental test

Item	Specification	Methods
Solder heat resistance	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change:within -1.0%～+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes.Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Steady state damp heat	Appearance: No evidence of mechanical damage . Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage . Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202,apply test voltage at the maximum operating temperature for 2000 hours. Test Voltage: Rated voltage≤500V: 200% of the rated voltage 500V＜Rated voltage≤1250V: 120% of the rated voltage Rated voltage＞1250V: 100% of the rated voltage. The charge/discharge current is less than 50mA.

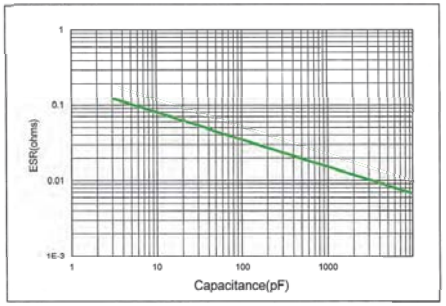
DLC70F High RF power Ceramic Capacitor

◆DLC70F performance curve

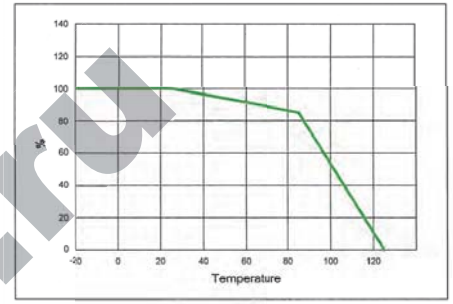
●ESR vs capacitance



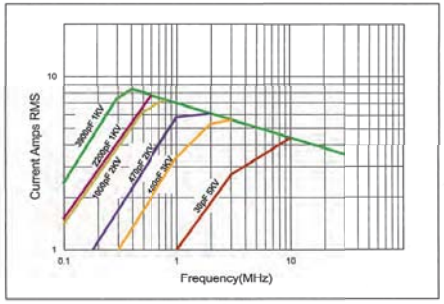
●Q vs capacitance



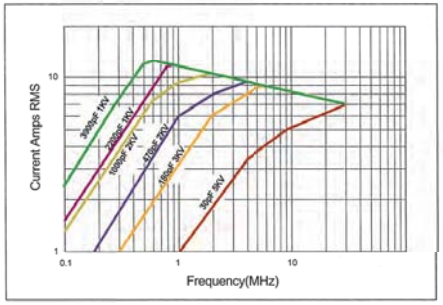
●Current vs environment temperature



● Wire leads rated current vs frequency



●Strip leads rated current vs frequency



DLC70G High RF power Ceramic Capacitor

DLC70G (7575)

◆Product Characteristics:

High Q value, high power, low ESR/ESL, low noise, high self-resonant frequency, high reliability.

◆Product Applications:

Typical applications: semiconductor RF power, MRI, repeater, high speed railway signal responsor, wireless broadcasting and TV device.

◆DLC70G capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
1.0	1R0	A, B, C, D.	5000V code 502 or 8000V code 802	33	330	F, G, J.	5000V code 502 or 8000V code 802	1000	102	F, G, J.	3000V code 302 or 5000V code 502
1.2	1R2			39	390			1200	122		
1.5	1R5			47	470			1500	152		
1.8	1R8			56	560			1800	182		
2.2	2R2			68	680			2200	222		
2.7	2R7			82	820			2700	272		
3.3	3R3			100	101			3300	332		
3.9	3R9			120	121			4700	472		
4.7	4R7			150	151			5100	512		
5.6	5R6			180	181			5600	562		1000V code 102 or 3000V code 302
6.8	6R8			220	221			6800	682		
8.2	8R2			270	271		3000V code 302 or 5000V code 502	7500	752		
10	100	F, G, J.		300	301			8200	822		
12	120			390	391			10000	103		
15	150			470	471			12000	123		2000V code 202
18	180			560	561			15000	153		
22	220			680	681			18000	183		
27	270			820	821			20000	203		

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

DLC70G ❶ | 101 ❷ | J ❸ | AR ❹ | 802 ❺ | X ❻ | C ❼ | X ❽ | 7 ❾ | X ❿

❶ Series
❷ Capacitance code 101= 10×10¹ =100pF 1R0=1.0pF
❸ Tolerance
❹ Terminal type
❺ Rated voltage
❻ Laser marking
❼ Package type
❽ Internal code
❾ Temperature range
❿ Internal code

Tolerance						
Code	B	C	D	F	G	J
Tolerance	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC70G High RF power Ceramic Capacitor

◆DLC70G terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Microstrip dimension			Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Length (L_L)	Width (W_L)	Thickness (T_L)	
W	chip	.760 +.025~−.010 (19.30 +0.64~−0.25)	.760 +.025~−.010 (19.30 +0.64~−0.25)	.201 (5.10) max	.024~.079 (0.60~2.00)	–	–	–	100%Sn over Nickel Plating RoHS Compliant
L									10%Pb90%Sn over Nickel Plating
MS	microstrip				–	.748 (19.00) min	.591 ±.010 (15.00 ±0.25)	.008 ±.001 (0.20 ±0.025)	Copper strip plated silver
AR	Axial ribbon								
RW	Axial wire					.748 (19.00) min	Wire diameter .031±.006 (0.800±0.15)		Silver wire
AW	Radial wire					.906 (23.00) min			

Terminal code	Type/Dimension	Capacitor dimension				Microstrip dimension			Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Length (L_L)	Width (W_L)	Thickness (T_L)	
P	Chip (non-magnetic)	.760 +.025~−.010 (19.30 +0.64~−0.25)	.760 +.025~−.010 (19.30 +0.64~−0.25)	.201 (5.10) max	.024~.079 (0.60~2.00)	–	–	–	100%Sn over Copper Plating RoHS Compliant
MN	microstrip (non-magnetic)				–	.748 (19.00) min	.591 ±.010 (15.00 ±0.25)	.008 ±.001 (0.20 ±0.025)	Copper strip plated silver
AN	Axial ribbon (non-magnetic)								
RN	Axial wire (non-magnetic)					.748 (19.00) min	Wire diameter .031±.006 (0.800±0.15)		Silver wire
BN	Radial wire (non-magnetic)					.906 (23.00) min			

DLC70G High RF power Ceramic Capacitor

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF 1KHz±10% test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, cap≤1000pF, 1±0.1MHz, 1±0.2Vrms Q≥2000, cap＞1000pF, 1±0.1KHz, 1±0.2Vrms
Insulation resistance (IR)	≥10^5MΩ, @25℃, with rated voltage applied, test voltage is DC 500V ≥10^4MΩ, @125℃, with rated voltage applied, test voltage is DC 500V
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage	Test Voltage: Rated voltage≤500V: 250% of the rated voltage, Applied Time: 5 s 500V＜Rated voltage≤1250V: 150% of the rated voltage, Applied Time: 5 s Rated voltage＞1250V: 120% of the rated voltage, Applied Time: 5 s Charge/discharge current: 50mA max.
Operating temperature range	-55℃~ + 125 ℃,-55℃~ + 175 ℃ (If there is any other operating temperature range,please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃ ~+ 1250℃) 0±60ppm/℃ (+125℃ ~+ 175℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

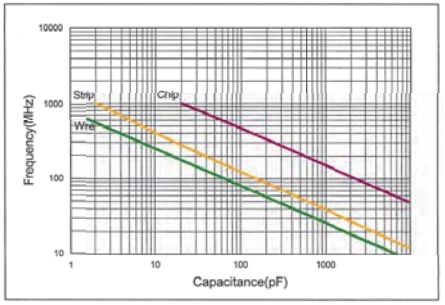
The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

◆Environmental test

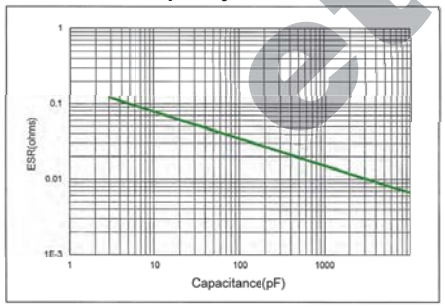
Item	Specification	Methods
Solder heat resistance	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change:within -1.0%～+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes.Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Steady state damp heat	Appearance: No evidence of mechanical damage . Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage . Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202, apply test voltage at the maximum operating temperature for 2000 hours. Test Voltage: Rated voltage≤500V: 200% of the rated voltage 500V＜Rated voltage≤1250V: 120% of the rated voltage Rated voltage＞1250V: 100% of the rated voltage. The charge/discharge current is less than 50mA.

◆DLC70G performance curve

●ESR vs capacitance

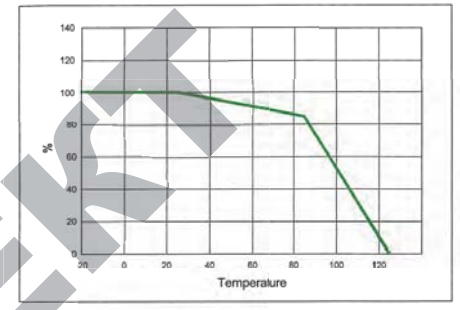


●Q vs capacitance (at 30MHz frequency)

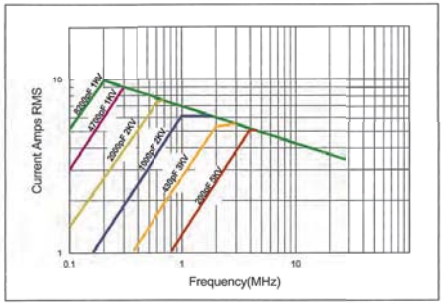


DLC70G High RF power Ceramic Capacitor

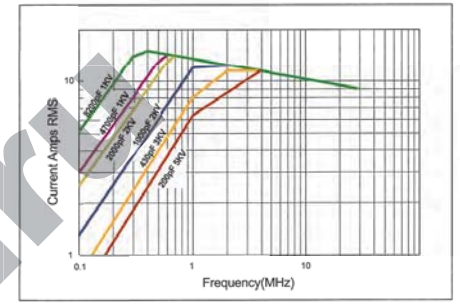
●Current vs environment temperature



●Wire leads rated current vs frequency



●Ribbon leads rated current vs frequency



DLC70L High RF power Ceramic Capacitor

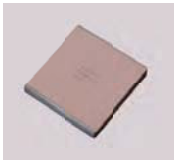
DLC70L (130130)

◆Product Characteristics

High Q value, high power, low ESR/ESL, low noise, high self-resonant frequency, high reliability.

◆Product Application

Typical applications: semiconductor RF power, MRI, repeater, high speed railway signal responsor, wireless broadcasting and TV device.



◆DLC70L capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
200	201	F, G, J.	10KV code 103	1800	182	F, G, J.	10KV code 103	12000	123	F, G, J.	3000V code 302
220	221			2200	222			15000	153		
270	271			2700	272			22000	223		
300	301			3300	332		5KV code 502	33000	333		
330	331			4700	472			47000	473		
390	391			5100	512			56000	563		
470	471			5600	562			68000	683		1000V code 102
560	561			6800	682			82000	823		
680	681			7500	752			100000	104		
820	821			8200	822			120000	124		
1000	102			10000	103						
1200	122										
1500	152										

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

DLC70L	102	J	MN	103	X	C	X	7	X
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿
Series	Capacitance code 102= 10×10² =1000pF 1R0=1.0pF	Tolerance	Terminal type	Rated voltage	Laser marking	Package type	Internal code	Temperature range	Internal code

Tolerance		
Code	G	J
Tolerance	±2%	±5%

DLC70L High RF power Ceramic Capacitor

◆DLC70L terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Microstrip dimension			Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Length (LL)	Width (WL)	Thickness (TL)	
W L	chip	1.350±.050 (34.29±1.27)	1.350±.050 (34.29±1.27)	.197 (5.00) max	.039～.079 (1.00～2.00)	–	–	–	100%Sn over Nickel Plating RoHS Compliant 10%Pb90%Sn over Nickel Plating
MS	microstrip				–	.748 (19.00) min	1.299 ±.020 (33.00 ±0.50)	.012 ±.001 (0.30 ±0.025)	Copper strip plated silver
AR	Axial ribbon								
RW	Axial wire					.748 (19.00) min	Wire diameter .031±.006 (0.800±0.15)		Silver wire
AW	Radial wire					.906 (23.00) min			
FS	Radial ribbon					.669 (17.00) min	.157 ±.010 (4.00 ±0.25	.012 ±.001 (0.30 ±0.025)	Copper strip plated silver

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Microstrip dimension			Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Length (LL)	Width (WL)	Thickness (TL)	
P	Chip (Non-magnetic)	1.350±.050 (34.29±1.27)	1.350±.050 (34.29±1.27)	.197 (5.00) max	.039～.079 (1.00～2.00)	–	–	–	100%Sn over Copper Plating RoHS Compliant
MN	microstrip (Non-magnetic)				–	.748 (19.00) min	1.299 ±.020 (33.00 ±0.50)	.012 ±.001 (0.30 ±0.025)	Copper strip plated silver
AN	Axial ribbon (Non-magnetic)								
RN	Radial ribbon (Non-magnetic)					.748 (19.00) min	Wire diameter .031±.006 (0.800±0.15)		Silver wire
BN	Radial wire (Non-magnetic)					.906 (23.00) min			
FN	Axial wire (Non-magnetic)					.669 (17.00) min	.157 ±.010 (4.00 ±0.25	.012 ±.001 (0.30 ±0.025)	Copper strip plated silver

DALICAP PRODUCT MANUAL

DLC70L High RF power Ceramic Capacitor

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF 1KHz±10% test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, cap≤1000pF, 1±0.1MHz, 1±0.2Vrms Q≥2000, cap＞1000pF, 1±0.1KHz, 1±0.2Vrms
Insulation resistance (IR)	≥10^5MΩ, @25℃, with rated voltage applied, test voltage is DC 500V ≥10^4MΩ, @125℃, with rated voltage applied, test voltage is DC 500V
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage	Rated voltage≤1250V: 150% of the rated voltage, Applied Time: 5 s Rated voltage＞1250V: 120% of the rated voltage, Applied Time: 5 s
Operating temperature range	-55℃~ + 125 ℃,-55℃~ + 175 ℃ (If there is any other operating temperature range,please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃ ~+ 1250℃) 0±60ppm/℃ (+125℃ ~+ 175℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

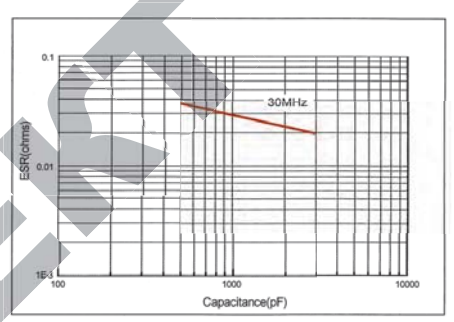
◆Environmental test

Item	Specification	Methods
Solder heat resistance	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change:within -1.0%～+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes.Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Steady state damp heat	Appearance: No evidence of mechanical damage . Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage . Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202, apply test voltage at the maximum operating temperature for 2000 hours. Test Voltage: Rated voltage≤500V: 200% of the rated voltage 500V＜Rated voltage≤1250V: 120% of the rated voltage Rated voltage ＞1250V: 100% of the rated voltage. The charge/discharge current is less than 50mA.

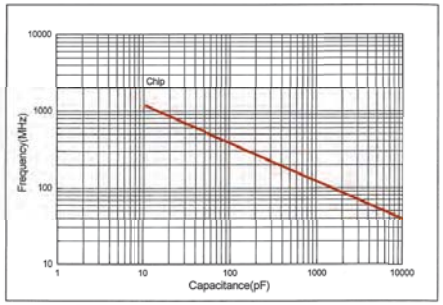
DLC70L High RF power Ceramic Capacitor

◆DLC70L performance curve

●ESR vs capacitance (at 30MHz frequency)

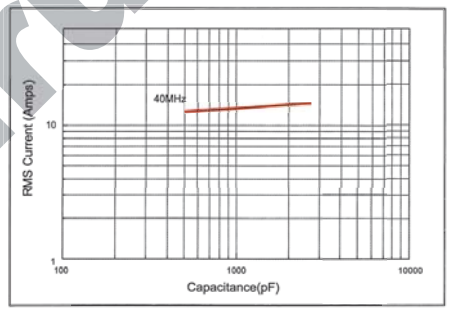


●Frequency vs capacitance



◆DLC70L performance curve

●Rated current vs frequency



Capacitor Assemblies offering

◆Product Characteristics

High Operating Voltage, High Operating Current, Extended Capacitance, Tighter Tolerances, High Reliability, High Q, Ultra-low ESR, Non-Magnetic.

◆Product Applications

Application fields: High Power RF, Medical Electronics, Broadcast, Semiconductor Manufacturing,High Magnetic Environments, Inductive Heating.

◆Part No.

DLC	V	6	7	N	C	101	F	252	X	G	X	7	X
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
Dalicap	Z: Series/Parallel; Y: Series; V: Parallel	Number Capacitors	Termination Type	Cap Type N:DLC70	Cap Size	Capacitance	Tolerance	Rated Voltage	Laser Marking	Coating type	Internal code	Temperature range	Internal code

④ Termination Type

5:Special requirements shall be specified in the drawings; 6:Silver; 7:Copper; 8:Silver plated copper strip; N:No leads

⑤ Cap Type

N:DLC70; P:DLC75; O:DLC85

⑥ Cap Size

B:1111; C:2225; E:3838; F:6040; G:7575; L:130130

⑪ Coating type

G: Molding; C/D: Coating; N/Blank: No any coating

⑫ Internal code

Internal code can be blank

The internal code will be different if the product size is different.

⑬ working temperature range

Blank means -55℃ ~ 125℃; 5 means -55℃ ~ 150℃; 7 means -55℃ ~ 175℃

⑭ Internal code

Internal code can be blank

◆Capacitance and Voltage

By Buyer's requirements using existing drawings, mechanical sketches, or we can help with capablemodeling of assemblies thermal rise predictions.

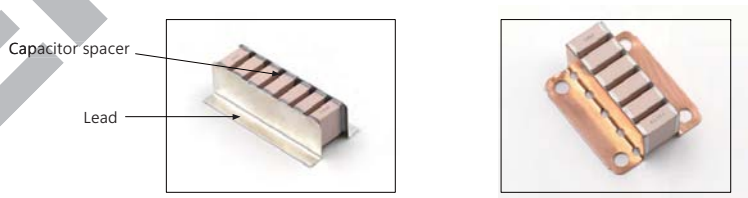
Capacitor Assemblies offering

◆Typical Assembly Configurations

1. Parallel Assemblies

Unit: inch (mm)

Item	70B	70C	70E	70F	70G	70L
Lead Material	Silver-plated Copper or silver					
Lead Thickness	0.2..					
Lead Length (max.)	According to the drawings or electrical performance requirements					
Capacitor Spacer (typ.)						
Mtg Configuration						



2. Series Assemblies

Unit: inch (mm)

Item	70B	70C	70E	70F	70G	70L
Lead Material	Silver-plated Copper or silver					
Lead Thickness	0.2..					
Lead Length (max.)	According to the drawings or electrical performance requirements					
Capacitor Spacer (typ.)						
Mtg Configuration						

3. Epoxy Molding

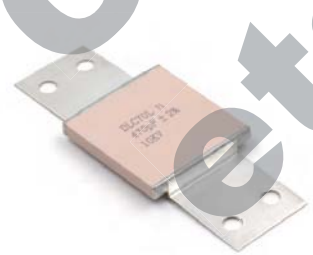
4. Other Assemblies By Buyer's requirement

Design and manufacturing by Dalicap shall be based on drawings or customer-specified electrical performance requirements.

Capacitor Assemblies offering





DLC75 Series Ultra low ESR, RF/Microwave Ceramic Capacitor

◆Product Characteristics:

Ultra low ESR value, high working voltage, high RF power, high self-resonant frequency.

◆Product Applications:

Circuit applications: high power filter network, combiner, coupler, matching network, output coupling, DC blocking, GaN-specific circuits.

Application fields: mobile communication base station, repeater, cluster communication, MRI.

◆Part No.

DLC75	P	100	J	W	251	N	T
❶	❷	❸	❹	❺	❻	❼	❽
Series	Size	Capacitance	Tolerance	Terminal type	Rated voltage	No marking	Package

① Capacitor series

DLC75 – Dalicap DLC75 series ultra low ESR, RF microwave ceramic capacitor.

② Size and type

Unit: inch (mm)

	DLC75 N	DLC75 H	DLC75 P	DLC75 D	DLC75 R	DLC75 B
Length	.024±.001 (0.60±0.03)	.041±.004 (1.05±0.10)	.063±.006 (1.60±0.15)	.078±.010 (2.00±0.25)	.070±.006 (1.78±0.15)	.110 +.020/−.010 (2.79+0.51/−0.25)
Width	.012±.001 (0.30±0.03)	.021±.004 (0.55±0.10)	.031±.006 (0.80±0.15)	.049±.010 (1.25±0.25)	.080±.010 (2.03±0.25)	.110±.010 (2.79±0.25)
Thickness	.012±.001 (0.30±0.03)	.021±.004 (0.55±0.10)	.031±.006 (0.80±0.15)	.041±.008 (1.05±0.20)	.120(3.04)max.	.102(2.60)max.

③ Capacitance

Capacitance<10pF, For example, 1R0=1.0pF, R means decimal point

Capacitance≥10pF, For example, 101=10×10¹=100pF, the third number is the power of 10.

④ Tolerance

Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

⑤ Terminal type

Code	W	P	L
Type	100%Sn over Nickel Plating RoHS Compliant	100%Sn over Copper Plating RoHS Compliant	10%Pb90%Sn over Nickel Plating

DLC75 Series Ultra low ESR, RF/Microwave Ceramic Capacitor

⑥Rated voltage

Code	Rated voltage (V)	Code	Rated voltage (V)
250	25	251	250
101	100	301	300
151	150	501	500
201	200	102	1000

⑦Laser marking

Refer to the "Laser Marking", X means marking, N means no marking.

If the capacitance is less than 10pF, for example, 1.0pF capacitor, marked as "1R0".

If the capacitance is more than or equal to 10pF, for example, 100pF capacitor, marked as "101".

⑧Package

Item	75N	75H	75P	75D	75B	75R
T: horizontal taping	√	√	√	√	√	√
TV: vertical taping				√	√	√

◆Performance requirement

The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

DLC75N Ultra low ESR, RF/Microwave Ceramic Capacitor

DLC75N (0201)

◆Product Characteristics:

Ultra low ESR value, high working voltage, high RF power, high self-resonant frequency.

◆Application Fields:

Typical applications: mobile communication base station, repeater, cluster communication, MRI.

◆DLC75N capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.2	0R2	A,B, C,D.	25V code 250	1.7	1R7	A,B, C,D.	25V code 250	6.2	6R2	A,B, C,D.	25V code 250
0.3	0R3			1.8	1R8			6.8	6R8		
0.4	0R4			1.9	1R9			7.5	7R5		
0.5	0R5			2.0	2R0			8.2	8R2		
0.6	0R6			2.1	2R1			9.1	9R1		
0.7	0R7			2.2	2R2			10	100	F,G, J.	
0.8	0R8			2.4	2R4			11	110		
0.9	0R9			2.7	2R7			12	120		
1.0	1R0			3.0	3R0			13	130		
1.1	1R1			3.3	3R3			15	150		
1.2	1R2			3.6	3R6			16	160		
1.3	1R3			3.9	3R9			18	180		
1.4	1R4			4.3	4R3						
1.5	1R5			4.7	4R7						
1.6	1R6			5.1	5R1						
				5.6	5R6						

Remark: if there is any special requirement on capacitance, tolerance and working voltage, please contact Dalicap.

◆Part Number

DLC75N	100	J	W	251	N	T
❶	❷	❸	❹	❺	❻	❼
Series	Capacitance code 100= 10×10⁰ =10pF 1R0=1.0pF	Tolerance	Terminal type	Rated voltage	No marking	Package type T: horizontal taping

Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC75N Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC75N terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	
W	 chip	.024±.001 (0.60±0.03)	.012±.001 (0.30±0.03)	.012±.001 (0.30±0.03)	.004~.008 (0.10~0.20)	100%Sn over Nickel Plating RoHS Compliant
L						10%Pb90%Sn over Nickel Plating

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10^5MΩ, @25℃, apply rated voltage. ≥10^4MΩ, @125℃, apply rated voltage.
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage(DWV)	Apply 250% rated voltage for 5s.
Operating temperature range	-55℃~+150℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃~+150℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

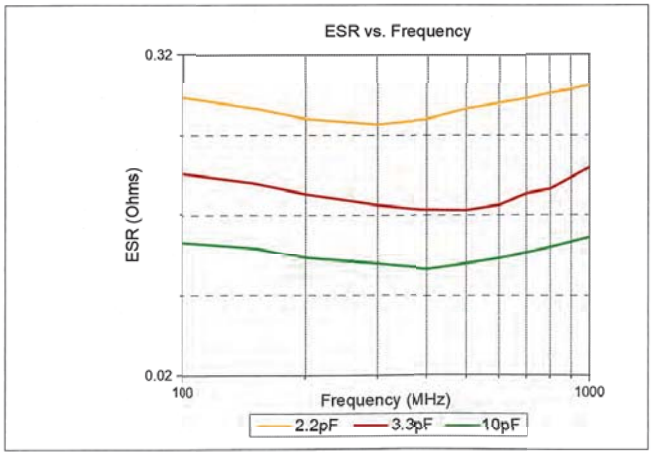
The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123, and GJB192B.

DLC75N Ultra low ESR, RF/Microwave Ceramic Capacitor

◆Environmental test

Item	Specification	Methods
Resistance to soldering Heat	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change: within -1.0%~+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes. Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Humidity steady state	Appearance: No evidence of mechanical damage. Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage. Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202 at the maximum operating temperature,apply 200% of the rated voltage for 2000 hours.

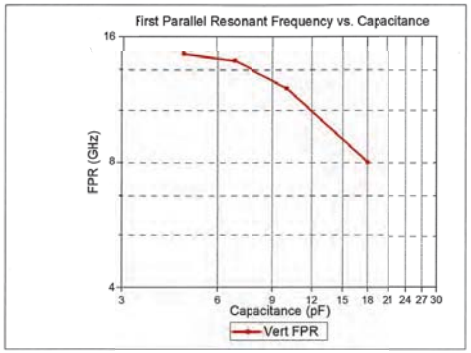
◆DLC75N Performance Curve



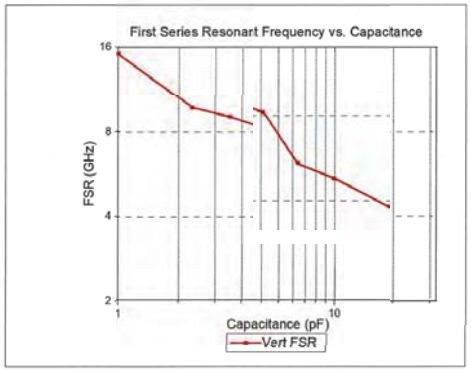
DALICAP PRODUCT MANUAL

DLC75N Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC75N Performance Curve



On the S21 curve of the capacitor, there are several parallel resonant points (V-shaped attenuation points), and the first parallel resonant frequency FPR is the frequency of the parallel resonant point with the lowest frequency. It is not affected by the thickness of the substrate or its dielectric constant. However, it is affected by the installation direction of the capacitor. The horizontal direction means that the internal electrodes of the capacitor are parallel to the substrate.



On the input impedance [Zin] curve of the capacitor, there are several series resonant points (V-shaped attenuation points). The first series resonant frequency FSR is the frequency of the series resonant point with the lowest frequency, where the imaginary part of the input impedance is zero (Im[Zin]=0). Below FSR the real part Re[Zin] and the imaginary part Im[Zin] of the input impedance do not change linearly with the frequency. The FSR value is related to the following factors: the structure of the internal electrodes of the capacitor, the substrate material, the substrate thickness, the dielectric constant of the substrate, the installation direction of the capacitor on the substrate, and the size of the substrate solder pads.

Definition and measurement conditions:
Definition: The capacitor is installed in series on the microstrip, that is, the capacitor is connected across the two ends of a 50Ω microstrip with a gap.
Measurement conditions: Ro3006 Rogers substrate with 6.15 dieletric constant, horizontally installed substrate thickness 10mils, microstrip gap 6mils, microstrip width 14.1mils, and reference plane at the edge of the sample.

DLC75H Ultra low ESR, RF/Microwave Ceramic Capacitor

DLC75H (0402)

◆Product Characteristics:

Ultra low ESR value, high working voltage, high RF power, high self-resonant frequency.

◆Application Fields:

Typical applications: mobile communication base station, repeater, cluster communication, MRI.

◆DLC75H capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.1	0R1	A,B, C,D.	50V code 500 or 200V code 201 or 250V code 251	2.0	2R0	A,B, C,D.	50V code 500 or 200V code 201 or 250V code 251	10	100	F,G, J.	50V code 500 or 200V code 201
0.2	0R2			2.1	2R1			11	110		
0.3	0R3			2.2	2R2			12	120		
0.4	0R4			2.4	2R4			13	130		
0.5	0R5			2.7	2R7			15	150		
0.6	0R6			3.0	3R0			16	160		
0.7	0R7			3.3	3R3			18	180		
0.8	0R8			3.6	3R6			20	200		
0.9	0R9			3.9	3R9			22	220		
1.0	1R0			4.3	4R3			24	240		
1.1	1R1			4.7	4R7			27	270		
1.2	1R2			5.1	5R1			30	300		50V code 500
1.3	1R3			5.6	5R6			33	330		
1.4	1R4			6.2	6R2						
1.5	1R5			6.8	6R8						
1.6	1R6			7.5	7R5						
1.7	1R7			8.2	8R2						
1.8	1R8			9.1	9R1						
1.9	1R9										

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

DLC75H	100	J	W	251	N	T
❶	❷	❸	❹	❺	❻	❼
Series	Capacitance code 100= 10×10⁰ =10pF 1R0=1.0pF	Tolerance	Terminal type	Rated voltage	No marking	Package type T: horizontal taping

Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC75H Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC75H terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	
W	 chip	.041 ± .004 (1.05±0.10)	.021 ± .004 (0.55±0.10)	.021 ± .004 (0.55±0.10)	.010 ± .006 (0.25±0.15)	100%Sn over Nickel Plating RoHS Compliant
L						10%Pb90%Sn over Nickel Plating

◆Design kits

Remark: if there is any special requirement on capacitance, tolerance and working voltage, please contact Dalicap.

Kits	Capacitance range (pF)	Capacitance (pF)	Tolerance
DKDLC75H01	0.1～2.0	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.2, 1.5, 1.6, 1.8, 2.0	±0.1pF
DKDLC75H02	1.0～10	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2	±0.1pF
		10	±5%
DKDLC75H03	10～33	10, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33	±5%

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10^5MΩ, @25℃, apply rated voltage. ≥10^4MΩ, @125℃, apply rated voltage.
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage(DWV)	Apply 250% rated voltage for 5s.
Operating temperature range	-55℃ ~ + 150 ℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃ ~+ 150℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

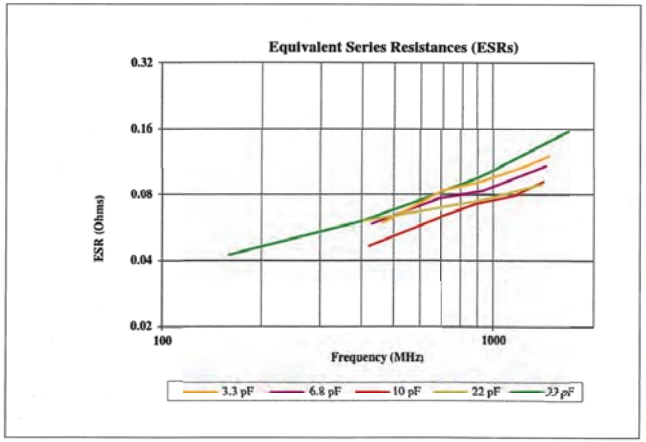
The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123, and GJB192B.

DLC75H Ultra low ESR, RF/Microwave Ceramic Capacitor

◆Environmental test

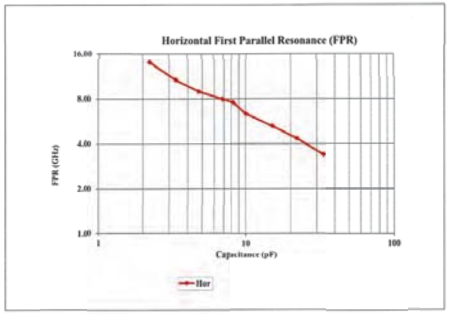
Item	Specification	Methods
Resistance to soldering Heat	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change: within -1.0%～+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes. Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Humidity steady state	Appearance: No evidence of mechanical damage. Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage. Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202 at the maximum operating temperature,apply 200% of the rated voltage for 2000 hours.

◆DLC75H Performance Curve

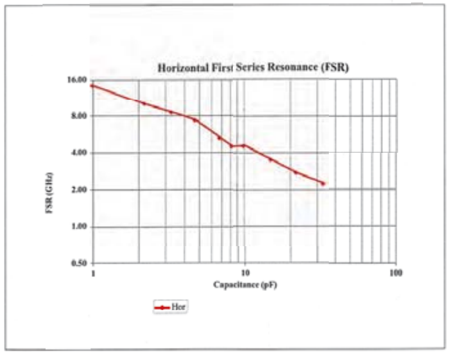


DLC75H Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC75H Performance Curve



On the S21 curve of the capacitor, there are several parallel resonant points (V-shaped attenuation points), and the first parallel resonant frequency FPR is the frequency of the parallel resonant point with the lowest frequency. It is not affected by the thickness of the substrate or its dielectric constant. However, it is affected by the installation direction of the capacitor. The horizontal direction means that the internal electrodes of the capacitor are parallel to the substrate.



On the input impedance [Zin] curve of the capacitor, there are several series resonant points (V-shaped attenuation points). The first series resonant frequency FSR is the frequency of the series resonant point with the lowest frequency, where the imaginary part of the input impedance is zero (Im[Zin]=0). Below FSR the real part Re[Zin] and the imaginary part Im[Zin] of the input impedance do not change linearly with the frequency. The FSR value is related to the following factors: the structure of the internal electrodes of the capacitor, the substrate material, the substrate thickness, the dielectric constant of the substrate, the installation direction of the capacitor on the substrate, and the size of the substrate solder pads.

Definition and measurement conditions:
Definition: The capacitor is installed in series on the microstrip, that is, the capacitor is connected across the two ends of a 50Ω microstrip with a gap.
Measurement conditions: Ro4350 Rogers substrate with 3.48 dieletric constant, horizontally installed substrate thickness 10mils, microstrip gap 15mils, microstrip width 22mils, and reference plane at the edge of the sample.

DLC75P Ultra low ESR, RF/Microwave Ceramic Capacitor

DLC75P (0603)

◆Product Characteristics:

Ultra low ESR value, high working voltage, high RF power, high self-resonant frequency.

◆Application Fields:

Typical applications: mobile communication base station, repeater, cluster communication, MRI.

◆DLC75P capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.1	0R1	A,B,C,D.	250V code 251	2.2	2R2	A,B,C,D.	250V code 251	16	160	F,G,J.	250V code 251
0.2	0R2			2.4	2R4			18	180		
0.3	0R3			2.7	2R7			20	200		
0.4	0R4			3.0	3R0			22	220		
0.5	0R5			3.3	3R3			24	240		
0.6	0R6			3.6	3R6			27	270		
0.7	0R7			3.9	3R9			30	300		
0.8	0R8			4.3	4R3			33	330		
0.9	0R9			4.7	4R7			36	360		
1.0	1R0			5.1	5R1			39	390		
1.1	1R1			5.6	5R6			43	430		
1.2	1R2			6.2	6R2			47	470		
1.3	1R3			6.8	6R8			51	510		
1.4	1R4			7.5	7R5			56	560		
1.5	1R5			8.2	8R2			62	620		
1.6	1R6			9.1	9R1			68	680		
1.7	1R7			10	100	F,G,J.		75	750		
1.8	1R8			11	110			82	820		
1.9	1R9			12	120			91	910		
2.0	2R0			13	130			100	101		
2.1	2R1			15	150						

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

DLC75P	100	J	W	251	N	T
❶	❷	❸	❹	❺	❻	❼
Series	Capacitance code 100= 10×10⁰ =10pF 1R0=1.0pF	Tolerance	Terminal type	Rated voltage	No marking	Package type T: horizontal taping

Tolerance								
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC75P Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC75P capacitance list

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	
W	 chip	.063±.006 (1.60±0.15)	.031±.006 (0.80±0.15)	.031±.006 (0.80±0.15)	.014±.006 (0.35±0.15)	100%Sn over Nickel Plating RoHS Compliant
L						10%Pb90%Sn over Nickel Plating

◆Design kits

Remark: if there is any special requirement on capacitance, tolerance and working voltage, please contact Dalicap.

Kits	Capacitance range (pF)	Capacitance (pF)	Tolerance
DKDLC75P01	0.1~2.0	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.5, 1.6, 1.8, 2.0	±0.1pF
DKDLC75P02	1.0~10	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2	±0.1pF
		10	±5%
DKDLC75P03	10~100	10, 12, 15, 18, 20, 22, 24, 27, 30, 33, 39, 47, 56, 68, 82, 100	±5%

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10^5MΩ, @25℃, apply rated voltage. ≥10^4MΩ, @125℃, apply rated voltage.
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage(DWV)	Apply 250% rated voltage for 5s.
Operating temperature range	-55℃~+150℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃~+150℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

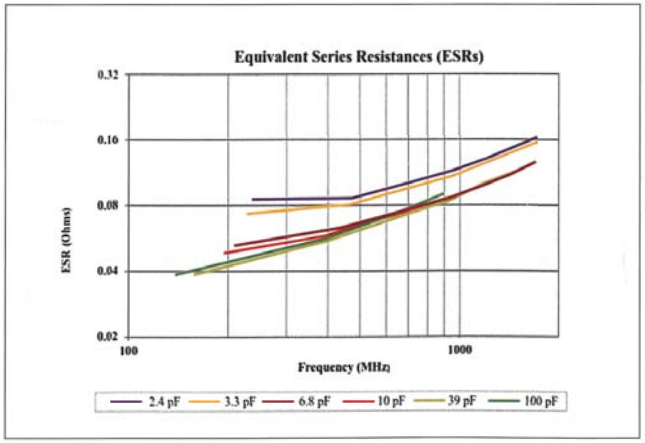
The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123, and GJB192B.

DLC75P Ultra low ESR, RF/Microwave Ceramic Capacitor

◆Environmental test

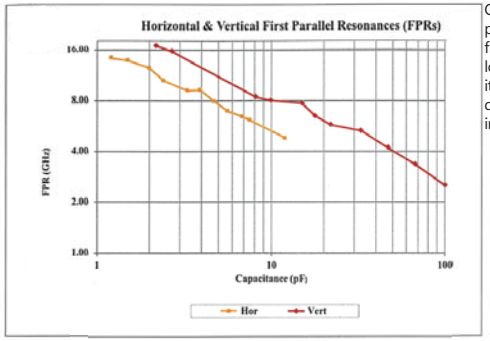
Item	Specification	Methods
Resistance to soldering Heat	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change: within -1.0%~+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes. Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Humidity steady state	Appearance: No evidence of mechanical damage. Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage. Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202 at the maximum operating temperature,apply 200% of the rated voltage for 2000 hours.

◆DLC75P Performance Curve

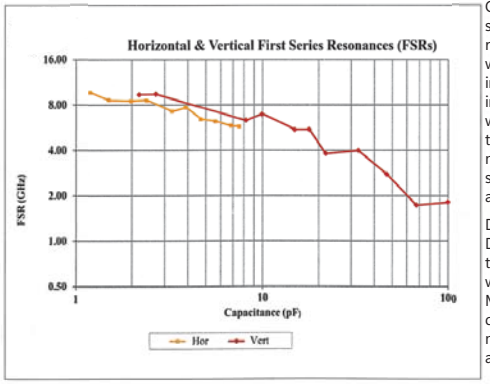


DLC75P Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC75P Performance Curve



On the S21 curve of the capacitor, there are several parallel resonant points (V-shaped attenuation points), and the first parallel resonant frequency FPR is the frequency of the parallel resonant point with the lowest frequency. It is not affected by the thickness of the substrate or its dielectric constant. However, it is affected by the installation direction of the capacitor. The horizontal direction means that the internal electrodes of the capacitor are parallel to the substrate.



On the input impedance [Zin] curve of the capacitor, there are several series resonant points (V-shaped attenuation points). The first series resonant frequency FSR is the frequency of the series resonant point with the lowest frequency, where the imaginary part of the input impedance is zero (Im[Zin]=0). Below FSR the real part Re[Zin] and the imaginary part Im[Zin] of the input impedance do not change linearly with the frequency. The FSR value is related to the following factors: the structure of the internal electrodes of the capacitor, the substrate material, the substrate thickness, the dielectric constant of the substrate, the installation direction of the capacitor on the substrate, and the size of the substrate solder pads.

Definition and measurement conditions:
Definition: The capacitor is installed in series on the microstrip, that is, the capacitor is connected across the two ends of a 50Ω microstrip with a gap.
Measurement conditions: RT/duroid5880 Rogers substrate with 2.20 dieletric constant, horizontally installed substrate thickness 10mils, microstrip gap 23.7mils, microstrip width 30mils, and reference plane at the edge of the sample.

DLC75D Ultra low ESR, RF/Microwave Ceramic Capacitor

DLC75D (0805)

◆Product Characteristics:

Ultra low ESR value, high working voltage, high RF power, high self-resonant frequency.

◆Application Fields:

Typical applications: mobile communication base station, repeater, cluster communication, MRI.

◆DLC75D capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.1	0R1	A,B, C,D.	250V code 251	3.0	3R0	A,B, C,D.	250V code 251	30	300	F,G, J.	250V code 251
0.2	0R2			3.3	3R3			33	330		
0.3	0R3			3.6	3R6			36	360		
0.4	0R4			3.9	3R9			39	390		
0.5	0R5			4.3	4R3			43	430		
0.6	0R6			4.7	4R7			47	470		
0.7	0R7			5.1	5R1			51	510		
0.8	0R8			5.6	5R6			56	560		
0.9	0R9			6.2	6R2			62	620		
1.0	1R0			6.8	6R8			68	680		
1.1	1R1			7.5	7R5			75	750		
1.2	1R2			8.2	8R2			82	820		
1.3	1R3			9.1	9R1			91	910		
1.4	1R4			10	100	F,G, J.		100	101		
1.5	1R5			11	110			110	111		
1.6	1R6			12	120			120	121		
1.7	1R7			13	130			130	131		
1.8	1R8			15	150			150	151		
1.9	1R9			16	160			160	161		
2.0	2R0			18	180			180	181		
2.1	2R1			20	200			200	201		
2.2	2R2			22	220			220	221		
2.4	2R4			24	240						
2.7	2R7			27	270						

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

DLC75D	100	J	W	251	N	T
❶	❷	❸	❹	❺	❻	❼
Series	Capacitance code 100= 10×10⁰ =10pF 1R0=1.0pF	Tolerance	Terminal type	Rated voltage	No marking	Package type T: horizontal taping TV: vertical taping

Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

◆DLC75D terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	
W	 chip	.078±.010 (2.00±0.25)	.049±.010 (1.25±0.25)	.041±.008 (1.05±0.20)	.200±.010 (0.50±0.25)	100%Sn over Nickel Plating RoHS Compliant
L						10%Pb90%Sn over Nickel Plating

◆Design kits

Dalicap provides various design kits, in which each capacitance has 10pcs and the capacitors are RoHS compliance.

Kits	Capacitance range (pF)	Capacitance (pF)	Tolerance
DKDLC75D01	0.1~2.0	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.2, 1.5, 1.6, 1.8, 2.0	±0.1pF
DKDLC75D02	1.0~10	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2	±0.1pF
		10	±5%
DKDLC75D03	10~100	10, 12, 15, 18, 20, 22, 24, 27, 30, 33, 39, 47, 56, 68, 82, 100	±5%
DKDLC75D04	10~220	10, 15, 18, 20, 24, 27, 30, 39, 47, 56, 68, 82, 100, 120, 150, 180, 220	±5%

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10^5MΩ, @25℃, apply rated voltage. ≥10^4MΩ, @125℃, apply rated voltage.
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage(DWV)	Apply 250% rated voltage for 5s.
Operating temperature range	-55℃~+150℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃~+150℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

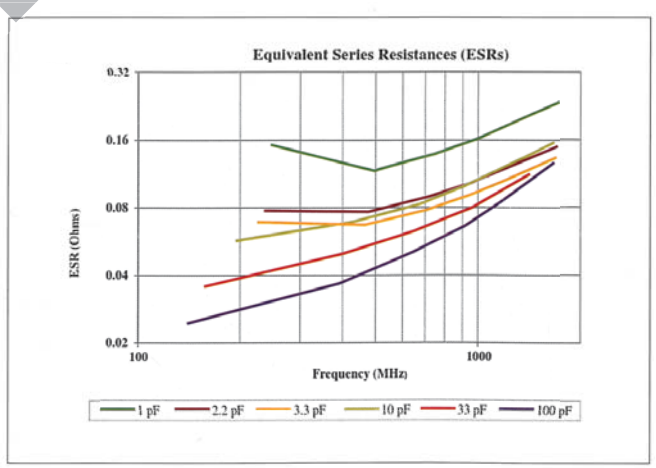
The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123, and GJB192B.

DLC75D Ultra low ESR, RF/Microwave Ceramic Capacitor

◆Environmental test

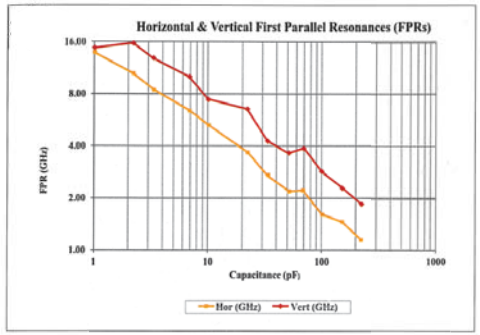
Item	Specification	Methods
Resistance to soldering Heat	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change: within -1.0%~+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes. Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Humidity steady state	Appearance: No evidence of mechanical damage. Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage. Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202 at the maximum operating temperature,apply 200% of the rated voltage for 2000 hours.

◆DLC75D Performance Curve

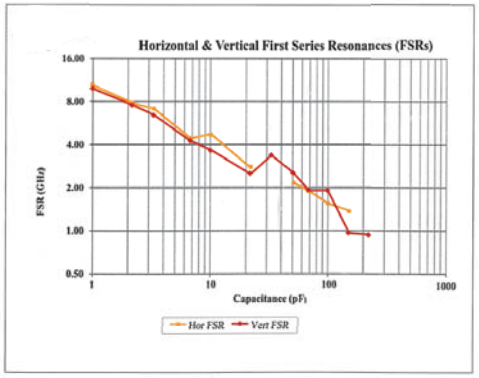


DLC75D Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC75D Performance Curve



On the S21 curve of the capacitor, there are several parallel resonant points (V-shaped attenuation points), and the first parallel resonant frequency FPR is the frequency of the parallel resonant point with the lowest frequency. It is not affected by the thickness of the substrate or its dielectric constant. However, it is affected by the installation direction of the capacitor. The horizontal direction means that the internal electrodes of the capacitor are parallel to the substrate.



On the input impedance [Zin] curve of the capacitor, there are several series resonant points (V-shaped attenuation points). The first series resonant frequency FSR is the frequency of the series resonant point with the lowest frequency, where the imaginary part of the input impedance is zero (Im[Zin]=0). Below FSR the real part Re[Zin] and the imaginary part Im[Zin] of the input impedance do not change linearly with the frequency. The FSR value is related to the following factors: the structure of the internal electrodes of the capacitor, the substrate material, the substrate thickness, the dielectric constant of the substrate, the installation direction of the capacitor on the substrate, and the size of the substrate solder pads.

Definition and measurement conditions:
Definition: The capacitor is installed in series on the microstrip, that is, the capacitor is connected across the two ends of a 50Ω microstrip with a gap.
Measurement conditions: Ro3003 Rogers substrate with 3.00 dieletric constant, horizontally installed substrate thickness 23mils, microstrip gap 23.6mils, microstrip width 57.1mils, and reference plane at the edge of the sample.

DLC75R Ultra low ESR, RF/Microwave Ceramic Capacitor

DLC75R (0708)

◆Product Characteristics:

Ultra low ESR value, high working voltage, high RF power, high self-resonant frequency.

◆Application Fields:

Typical applications: mobile communication base station, repeater, cluster communication, MRI.

◆DLC75R capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
1.0	1R0	A, B, C, D.	500V code 501	3.9	3R9	A, B, C, D.	500V code 501	22	220	F, G, J.	500V code 501
1.1	1R1			4.3	4R3			24	240		
1.2	1R2			4.7	4R7			27	270		
1.3	1R3			5.1	5R1			30	300		
1.4	1R4			5.6	5R6			33	330		
1.5	1R5			6.2	6R2			36	360		
1.6	1R6			6.8	6R8			39	390		
1.7	1R7			7.5	7R5			43	430		
1.8	1R8			8.2	8R2			47	470		
1.9	1R9			9.1	9R1			51	510		
2.0	2R0			10	100	F, G, J.		56	560		
2.1	2R1			11	110			62	620		
2.2	2R2			12	120			68	680		
2.4	2R4			13	130			75	750		
2.7	2R7			15	150			82	820		
3.0	3R0			16	160			91	910		
3.3	3R3			18	180			100	101		
3.6	3R6			20	200						

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

DLC75R ① Series
100 ② Capacitance code 100= 10×10⁰ =10pF 1R0=1.0pF
J ③ Tolerance
W ④ Terminal type
501 ⑤ Rated voltage
N ⑥ No marking
TV ⑦ Package type T: horizontal taping TV: vertical taping

Tolerance						
Code	B	C	D	F	G	J
Tolerance	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC75R Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC75R terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	
W	 chip	.070±.006 (1.78±0.15)	.080±.010 (2.03±0.25)	.120(3.04) max	.020±.010 (0.50±0.25)	100%Sn over Nickel Plating RoHS Compliant
L						10%Pb90%Sn over Nickel Plating

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10⁵MΩ, @25℃, apply rated voltage. ≥10⁴MΩ, @125℃, apply rated voltage.
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage(DWV)	Apply 250% rated voltage for 5s.
Operating temperature range	-55℃~+150℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃~+150℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123, and GJB192B.

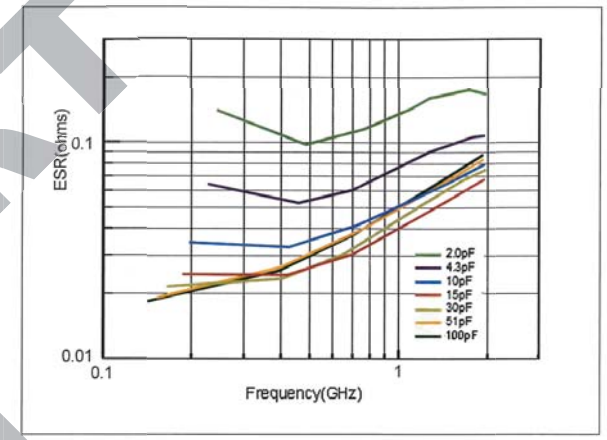
◆Environmental test

Item	Specification	Methods
Resistance to soldering Heat	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change: within -1.0%~+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes. Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Humidity steady state	Appearance: No evidence of mechanical damage. Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage. Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202 at the maximum operating temperature,apply 200% of the rated voltage for 2000 hours.

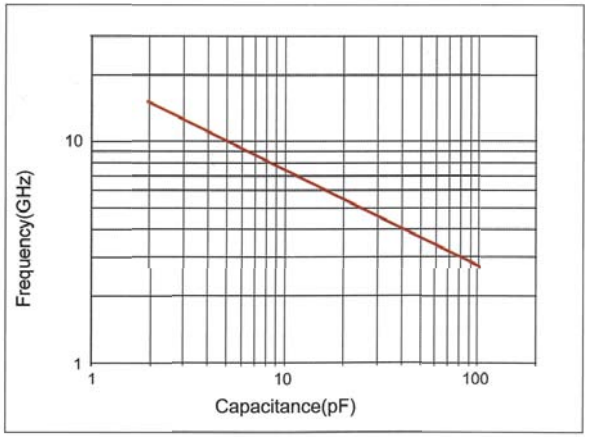
DLC75R Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC75R Performance Curve

●ESR vs frequency



●Frequency vs capacitance



DLC75R
Ultra low ESR, RF/Microwave Ceramic Capacitor
DALICAP PRODUCT MANUAL

DLC75B Ultra low ESR, RF/Microwave Ceramic Capacitor

DLC75B (1111)

◆Product Characteristics:

Ultra low ESR value, high working voltage, high RF power, high self-resonant frequency.

◆Application Fields:

Typical applications: mobile communication base station, repeater, cluster communication, MRI.

◆DLC75B capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.2	0R2	A, B, C, D.	500V code 501 or 1000V code 102	3.0	3R0	A, B, C, D.	500V code 501 or 1000V code 102	27	270	F, G, J.	500V code 501 or 1000V code 102	220	221	F, G, J.	200V code 201 or 500V code 501
0.3	0R3			3.3	3R3			30	300			240	241		
0.4	0R4			3.6	3R6			33	330			270	271		
0.5	0R5			3.9	3R9			36	360			300	301		
0.6	0R6			4.3	4R3			39	390			330	331		
0.7	0R7			4.7	4R7			43	430			360	361		
0.8	0R8			5.1	5R1			47	470			390	391		
0.9	0R9			5.6	5R6			51	510			430	431		
1.0	1R0			6.2	6R2			56	560			470	471		
1.1	1R1			6.8	6R8			62	620			510	511		100V code 101 or 500V code 501
1.2	1R2			7.5	7R5			68	680			560	561		
1.3	1R3			8.2	8R2			75	750			620	621		
1.4	1R4			9.1	9R1			82	820			680	681		50V code 500 or 300V code 301
1.5	1R5			10	100	F, G, J.		91	910		300V code 301 or 600V code 601	750	751		
1.6	1R6			11	110			100	101			820	821		
1.7	1R7			12	120			110	111			910	911		
1.8	1R8			13	130			120	121			1000	102		
1.9	1R9			15	150			130	131						
2.0	2R0			16	160			150	151						
2.1	2R1			18	180			160	161						
2.2	2R2			20	200			180	181						
2.4	2R4			22	220			200	201						
2.7	2R7			24	240										

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

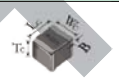
DLC75B ① Series
100 ② Capacitance code 100= 10×10⁰ =10pF
J ③ Tolerance
W ④ Terminal type
510 ⑤ Rated voltage
X ⑥ Laser marking
T ⑦ Package type T: horizontal taping TV: vertical taping

Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC75B Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC75B terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	
W	 chip	.110+.025~−.010 (2.79+0.63~−0.25)	.110±.010 (2.79±0.25)	.102(2.60) max	.016~.039 (0.40~1.00)	100%Sn over Nickel Plating RoHS Compliant
L						10%Pb90%Sn over Nickel Plating
P (non-magnetic)						100%Sn over Copper Plating RoHS Compliant

◆Design kits

Dalicap provides various design kits, in which each capacitance has 10pcs and the capacitors are RoHS compliance.

Kits	Capacitance range (pF)	Capacitance (pF)	Tolerance
DKDLC75B01	1~10	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.9, 4.7	±0.1pF
		5.6, 6.8, 8.2	
		10	±5%
DKDLC75B02	10~100	10, 12, 15, 18, 20, 22, 24, 27, 30, 33, 39, 47, 56, 68, 82, 100	±5%
DKDLC75B03	100~1000	100, 120, 150, 180, 200, 220, 240, 270, 300, 330, 390, 470, 560,	±5%
		680, 820, 1000	

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10⁵MΩ, @25℃, apply rated voltage.(no more than 500V) ≥10⁴MΩ, @125℃, apply rated voltage.(no more than 500V)
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage (DWV)	Test Voltage: Rated voltage≤500V: 250% of the rated voltage, Applied Time: 5 s 500V＜Rated voltage≤1250V: 150% of the rated voltage, Applied Time: 5 s Rated voltage＞1250V: 120% of the rated voltage, Applied Time: 5 s Charge/discharge current: 50mA max.
Operating temperature range	-55℃~+150℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃~+150℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

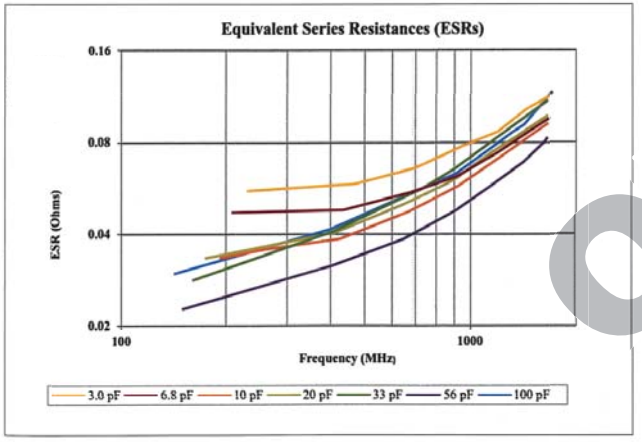
The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

DLC75B Ultra low ESR, RF/Microwave Ceramic Capacitor

◆Environmental test

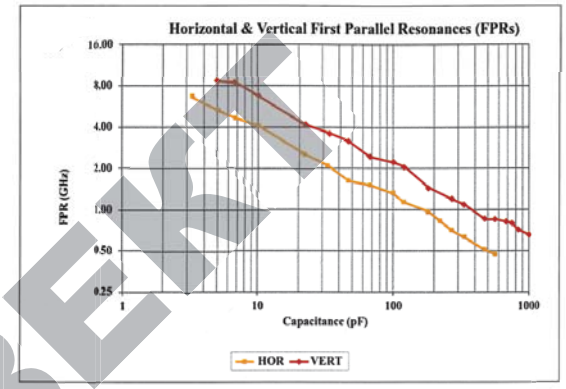
Item	Specification	Methods
Solder heat resistance	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change:within -1.0%～+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes.Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Steady state damp heat	Appearance: No evidence of mechanical damage . Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage . Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202,apply test voltage at the maximum operating temperature for 2000 hours. Test Voltage: Rated voltage≤500V: 200% of the rated voltage 500V＜Rated voltage≤1250V: 120% of the rated voltage Rated voltage＞1250V: 100% of the rated voltage. The charge/discharge current is less than 50mA.

◆DLC75B Performance Curve

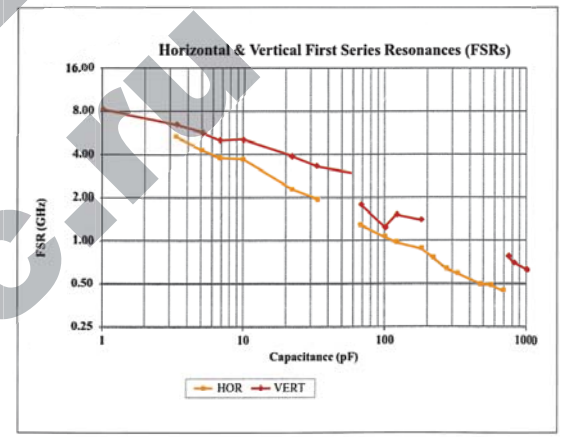


DLC75B Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC75B performance curve



On the S21 curve of the capacitor, there are several parallel resonant points (V-shaped attenuation points), and the first parallel resonant frequency FPR is the frequency of the parallel resonant point with the lowest frequency. It is not affected by the thickness of the substrate or its dielectric constant. However, it is affected by the installation direction of the capacitor. The horizontal direction means that the internal electrodes of the capacitor are parallel to the substrate.



On the input impedance [Zin] curve of the capacitor, there are several series resonant points (V-shaped attenuation points). The first series resonant frequency FSR is the frequency of the series resonant point with the lowest frequency, where the imaginary part of the input impedance is zero (Im[Zin]=0). Below FSR the real part Re[Zin] and the imaginary part Im[Zin] of the input impedance do not change linearly with the frequency. The FSR value is related to the following factors: the structure of the internal electrodes of the capacitor, the substrate material, the substrate thickness, the dielectric constant of the substrate, the installation direction of the capacitor on the substrate, and the size of the substrate solder pads.

Definition and measurement conditions:
Definition: The capacitor is installed in series on the microstrip, that is, the capacitor is connected across the two ends of a 50Ω microstrip with a gap.
Measurement conditions: Ro4350 Rogers substrate with 3.48 dieletric constant, horizontally installed substrate thickness 55mils, vertically installed substrate thickness 45mils, microstrip gap 61.1mils for both horizontally and vertically installation, microstrip width 123.7mils for horizontally installation, microstrip width 101.0mils for vertically installation and reference plane at the edge of the sample.

DLC85 Series Low ESR, RF/Microwave Ceramic Capacitor

◆Product Characteristics:

Low ESR , high working voltage, high RF power, high self-resonant frequency.

◆Product Applications:

Circuit applications: high power filter network, combiner, coupler, matching network, output coupling, antenna coupling, DC blocking and bypass

Application fields: Civil satellite communications, mobile communication base station, repeater, cluster communication/ semiconductor RF power,MRI, high spead railway signal responsor,wireless broadcasting and TV station.

◆Part Number

DLC85	H	100	J	W	201	N	T
❶	❷	❸	❹	❺	❻	❼	❽
Series	Size	Capacitance	Tolerance	Terminal type	Rated voltage	No marking	Package type

①Capacitor series

DLC85 – Dalicap 85 series capacitor

②Size and type

Unit: inch (mm)

	DLC85H	DLC85B	DLC85C	DLC85E
Length	.041 ± .004 (1.05±0.10)	.110+.025~-.010 (2.79+0.63~-0.25)	.225 +.020~-.010 (5.72+0.51~-0.25)	.380 +.015~-.010 (9.65+0.38~-0.25)
Width	.021 ± .004 (0.55±0.10)	.110 ± .015 (2.79± 0.38)	.250± .015 (6.35±0.38)	.380 +.015~-.010 (9.65+0.38~-0.25)
Thickness	.021 ± .004 (0.55±0.10)	.102 (2.60)max.	.150(3.81)max.	.190 (4.83)max.

③Capacitance

Capacitance<10pF, For example, 1R0=1.0pF, R means decimal point.
Capacitance≥10pF, For example, 101=10×10¹=100pF, the third number is the power of 10.

④Tolerance

Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC85 Series Low ESR, RF/Microwave Ceramic Capacitor

⑤Terminal type

Code	W	P	L	MS	AR	RR	AW	RW
Type	100%Sn over Nickel Plating RoHS Compliant	100%Sn over Copper Plating RoHS Compliant	10%Pb90%Sn over Nickel Plating	Microstrip	Axial ribbon	Radial ribbon	Axial wire	Radial wire

Code	MN	AN	FN	BN	RN
Type	Non-magnetic microstrip	Non-magnetic axial ribbon	Non-magnetic radial ribbon	Non-magnetic axial wire	Non-magnetic radial wire

Remark: except terminal type "L", the above terminal types are RoHS compliance.

⑥Rated voltage

Code	Rated voltage (V)	Code	Rated voltage (V)
201	200	202	2000
501	500	252	2500
601	600	362	3600
102	1000	502	5000
152	1500	722	7200

⑦Laser marking

Refer to the "Laser Marking", X means marking, N means no marking.
If the capacitance is less than 10pF, for example, 1.0pF capacitor, marked as "1R0".
If the capacitance is more than or equal to 10pF, for example, 100pF capacitor, marked as "101".

⑧Package

Item	85H	85B	85C	85E
T: horizontal taping	√	√	√	√
TV: vertical taping		√	√	√
C: Tray packing		√	√	√

◆Performance requirement

The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

DLC85H Low ESR, RF/Microwave Ceramic Capacitor

DLC85H (0402)

◆Product Characteristics:

Low ESR, high working voltage, high RF power, high self-resonant frequency.

◆Application Fields:

Typical function: high power filter network, combiner, coupler, matching network, output coupling, antenna coupling, DC blocking and bypass.
Typical applications: mobile communication base station, repeater, cluster communication.

◆DLC85H capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.1	0R1	A,B, C,D.	250V code 251	2.0	2R0	A,B, C,D.	250V code 251	10	100	F,G, J.	200V code 201
0.2	0R2			2.1	2R1			11	110		
0.3	0R3			2.2	2R2			12	120		
0.4	0R4			2.4	2R4			13	130		
0.5	0R5			2.7	2R7			15	150		
0.6	0R6			3.0	3R0			16	160		
0.7	0R7			3.3	3R3			18	180		
0.8	0R8			3.6	3R6		200V code 201	20	200		
0.9	0R9			3.9	3R9			22	220		
1.0	1R0			4.3	4R3			24	240		
1.1	1R1			4.7	4R7			27	270		
1.2	1R2			5.1	5R1			30	300		
1.3	1R3			5.6	5R6			33	330		
1.4	1R4			6.2	6R2						
1.5	1R5			6.8	6R8						
1.6	1R6			7.5	7R5						
1.7	1R7			8.2	8R2						
1.8	1R8			9.1	9R1						
1.9	1R9										

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

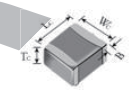
DLC85H	100	J	W	201	N	T
❶	❷	❸	❹	❺	❻	❼
Series	Capacitance code 100= 10×10⁰ =10pF 1R0=1.0pF	Tolerance	Terminal type	Rated voltage	No marking	Package type T: horizontal taping

Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC85H Low ESR, RF/Microwave Ceramic Capacitor

◆DLC80H terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	
W		.041±.004 (1.05±0.10)	.021±.004 (0.55±0.10)	.021±.004 (0.55±0.10)	.010±.006 (0.25±0.15)	100%Sn over Nickel Plating RoHS Compliant
L						10%Pb90%Sn over Nickel Plating
P (non-magnetic)						100%Sn over Copper Plating RoHS Compliant

◆Design kits

Dalicap provides various design kits, in which each capacitance has 10pcs and the capacitors are RoHS compliance.

Kits	Capacitance range (pF)	Capacitance (pF)	Quantity	Tolerance
DKDLC85H01	0.1~2.0	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.2, 1.5, 1.6, 1.8, 2.0	15	±0.1pF
DKDLC85H02	1.0~10	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7	16	±0.1pF
		3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2		±0.25pF
		10		±5%
DKDLC85H03	10~100	10, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33	12	±5%

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10⁵MΩ, @25℃, apply rated voltage. ≥10⁴MΩ, @125℃, apply rated voltage.
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage(DWV)	Apply 250% rated voltage for 5s.
Operating temperature range	-55℃~+150℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃~+150℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

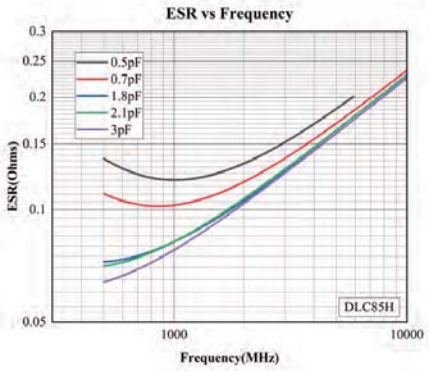
The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123, and GJB192B.

DLC85H Low ESR, RF/Microwave Ceramic Capacitor

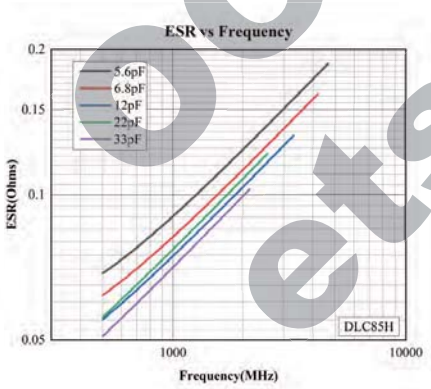
◆Environmental test

Item	Specification	Methods
Resistance to soldering Heat	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change: within -1.0%～+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes. Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Humidity steady state	Appearance: No evidence of mechanical damage. Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage. Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202 at the maximum operating temperature,apply 200% of the rated voltage for 2000 hours.

◆DLC85H Performance Curve



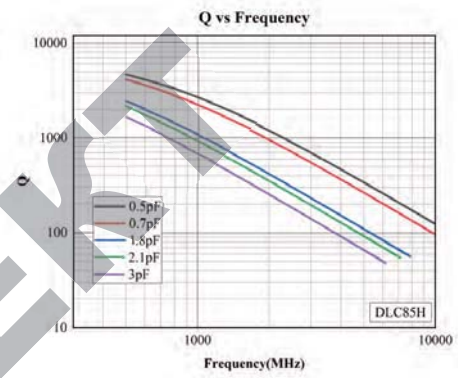
Remark: ESR Measurement: Coaxial Resonant Cavity Method.

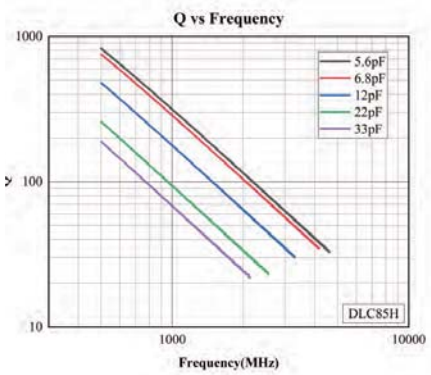


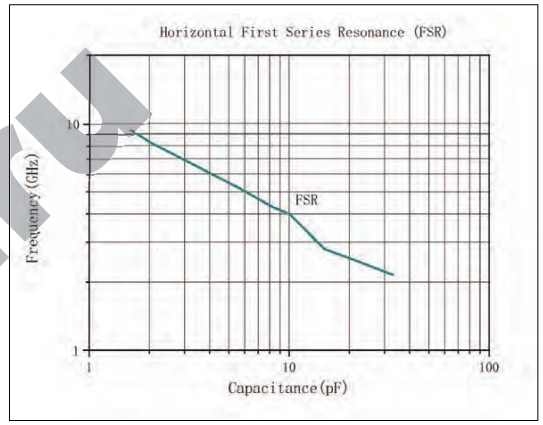
Remark: ESR Measurement: Coaxial Resonant Cavity Method.

DLC85H Low ESR, RF/Microwave Ceramic Capacitor

◆DLC85H Performance Curve







Definition and measurement conditions:
Definition: The capacitor is installed in series on the microstrip, that is, the capacitor is connected across the two ends of a 50Ω microstrip with a gap.
Measurement conditions: Ro4350 Rogers substrate with 3.48 dielectric constant, and characteristic impedance is 50Ω.

DLC85B Low ESR, RF/Microwave Ceramic Capacitor

DLC85B (1111)

◆Product Characteristics:

High Q, high power, low ESR/ESL, low noise, high self-resonant frequency, high reliability.

◆Product Applications:

Typical functions: frequency tuning, bypass, coupling, responsing, DC blocking and impedance matching.
Typical applications: semiconductor RF power, MRI, repeater, high speed railway signal responsor, wireless broadcasting and TV device.

◆DLC85B capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.1	0R1			2.4	2R4			20	200			160	161		300V code 301 or 1000V code 102
0.2	0R2			2.7	2R7			22	220			180	181		
0.3	0R3			3.0	3R0			24	240			200	201		
0.4	0R4			3.3	3R3			27	270			220	221		
0.5	0R5			3.6	3R6			30	300			240	241		200V code 201 or 600V code 601
0.6	0R6			3.9	3R9	A,B, C,D.	500V code 501 or 1500V code 152	33	330			270	271		
0.7	0R7			4.3	4R3			36	360		500V code 501 or 1500V code 152	300	301		
0.8	0R8			4.7	4R7			39	390			330	331	F,G, J.	
0.9	0R9		500V code 501 or 1500V code 152	5.1	5R1			43	430			360	361		
1.0	1R0	A,B, C,D.		5.6	5R6			47	470	F,G, J.		390	391		
1.1	1R1			6.2	6R2			51	510			430	431		
1.2	1R2			6.8	6R8			56	560			470	471		
1.3	1R3			7.5	7R5			62	620			510	511		100V code 101 or 300V code 301
1.4	1R4			8.2	8R2			68	680			560	561		
1.5	1R5			9.1	9R1			75	750			620	621		
1.6	1R6			10	100	F,G, J.		82	820			680	681		
1.7	1R7			11	110			91	910			750	751		
1.8	1R8			12	120			100	101			820	821		
1.9	1R9			13	130			110	111			910	911		
2.0	2R0			15	150			120	121		300V code 301 or 1000V code 102	1000	102		
2.1	2R1			16	160			130	131						
2.2	2R2			18	180			150	151						

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

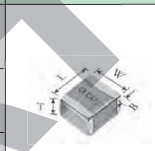
DLC85B ❶ Series
101 ❷ Capacitance code 100= 10×10⁰ =10pF 1R0=1.0pF
J ❸ Tolerance
W ❹ Terminal type
152 ❺ Rated voltage
X ❻ Laser marking
T ❼ Package type T: horizontal taping TV: vertical taping

Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC85B Low ESR, RF/Microwave Ceramic Capacitor

◆DLC85B terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	
W		.110+.025 −.010 (2.79 +0.63−−0.25)	.110±.015 (2.79±0.38)	.102 (2.60) max	.024 ~.039 (0.60~1.00)	100%Sn over Nickel Plating RoHS Compliant
L						10%Pb90%Sn over Nickel Plating
P (non-magnetic)						100%Sn over Copper Plating RoHS Compliant

◆Design kits

Dalicap provides various design kits, in which each capacitance has 10pcs and the capacitors are RoHS compliance.

Kits	Capacitance range (pF)	Capacitance (pF)	Types of capacitance values	Tolerance
DKDLC85B01	1.0~10	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7	16	±0.1pF
		3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2		±0.25pF
		10		±5%
DKDLC85B02	10~100	10, 12, 15, 18, 20, 22, 24, 27, 30, 33, 39, 47, 56, 68, 82, 100	16	±5%
DKDLC85B03	100~1000	100, 120, 150, 180, 200, 220, 240, 270, 300, 330, 390, 470, 560, 680, 820, 1000	16	±5%

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10⁵MΩ, @25℃, apply rated voltage.(no more than 500V) ≥10⁴MΩ, @125℃, apply rated voltage.(no more than 500V)
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage (DWV)	Test Voltage: Rated voltage≤500V: 250% of the rated voltage, Applied Time: 5 s 500V<Rated voltage≤1250V: 150% of the rated voltage, Applied Time: 5 s Rated voltage>1250V: 120% of the rated voltage, Applied Time: 5 s Charge/discharge current: 50mA max.
Operating temperature range	-55℃~+150℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃~+150℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

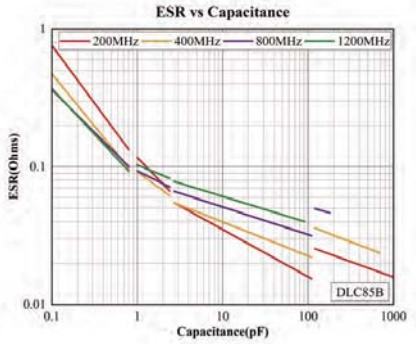
The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

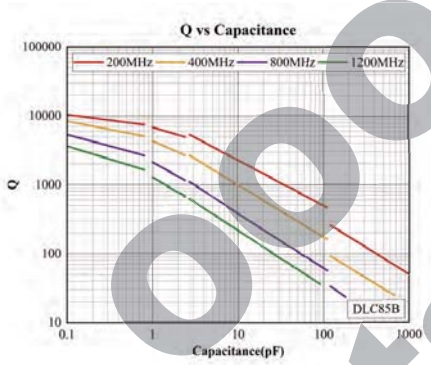
DLC85B Low ESR, RF/Microwave Ceramic Capacitor

◆Environmental test

Item	Specification	Methods
Solder heat resistance	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change:within -1.0%～+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes.Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Steady state damp heat	Appearance: No evidence of mechanical damage . Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage . Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202,apply test voltage at the maximum operating temperature for 2000 hours. Test Voltage: Rated voltage≤500V: 200% of the rated voltage 500V< Rated voltage≤1250V: 120% of the rated voltage Rated voltage >1250V: 100% of the rated voltage. The charge/discharge current is less than 50mA.

◆DLC85B Performance Curve

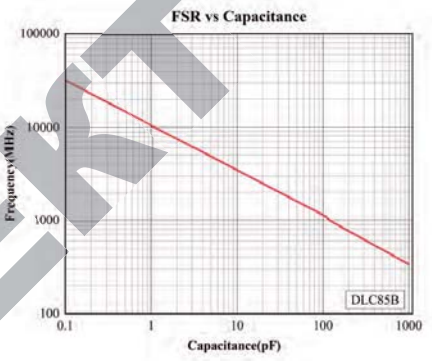


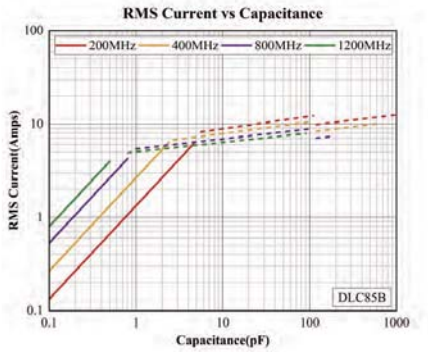


Remark: ESR Measurement: Coaxial Resonant Cavity Method.

DLC85B Low ESR, RF/Microwave Ceramic Capacitor

◆DLC85B performance curve





Definition and measurement conditions:
Definition: The capacitor is installed in series on the microstrip, that is, the capacitor is connected across the two ends of a 50Ω microstrip with a gap.
Measurement conditions: Ro4350 Rogers substrate with 2.2 dielectric constant, and characteristic impedance is 50Ω.

Remark:
The current determined by rated voltage:

$$I_{RMS}=\frac{\sqrt{2}}{2}I_{peak}=\frac{\sqrt{2}}{2}\times\frac{V_{rated}}{X_C}=\sqrt{2}\pi FCV_{rated}$$

The current determined by dissipated power:

$$I_{RMS}=\sqrt{\frac{Pd_{max}}{ESR}}$$

If the rated current is based on a temperature rise of 60℃ (Ambient Temperature at 65℃), with a thermal resistance of 24℃/W, the maximum power dissipation of the capacitor is 2.5W.

DLC85C RF/Microwave Multilayer Ceramic Capacitor

DLC85C (2225)

◆Product Characteristics:

High Q value, high power, low ESR/ESL, low noise, high self-resonant frequency, high reliability.

◆Product Applications:

Typical functions: frequency tuning, bypass, coupling, responsing, DC blocking and impedance matching.

Typical applications: semiconductor RF power, MRI, repeater, high speed railway signal responsor, wireless broadcasting and TV device.

◆DLC85C capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
2.2	2R2	A, B, C, D.	3600V code 362	20	200	F, G, J.	3600V code 362	180	181	F, G, J.	3000V code 302	2200	222	F, G, J.	1000V code 102
2.4	2R4			22	220			200	201			2700	272		
2.7	2R7			24	240			220	221			3000	302		
3.0	3R0			27	270			240	241						
3.3	3R3			30	300			270	271						
3.6	3R6			33	330			300	301						
3.9	3R9			36	360			330	331		2000V code 202				
4.3	4R3			39	390			360	361						
4.7	4R7			43	430			390	391						
5.1	5R1			47	470			430	431						
5.6	5R6			51	510			470	471						
6.2	6R2			56	560			510	511		1500V code 152				
6.8	6R8			62	620			560	561						
7.5	7R5			68	680			620	621						
8.2	8R2			75	750			680	681						
9.1	9R1			82	820			750	751						
10	100	F, G, J.		91	910			820	821						
11	110			100	101			910	911						
12	120			110	111		3000V code 302	1000	102						
13	130			120	121			1100	112						
15	150			130	131			1200	122						
16	160			150	151			1500	152		1000V code 102				
18	180			160	161			1800	182						

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

DLC85C ❶ Series

101 ❷ Capacitance code (1R0=1.0pF; 101= 10×10¹ =100pF)

J ❸ Tolerance

W ❹ Terminal type

362 ❺ Rated voltage

X ❻ Laser marking

T ❼ Package type (T: horizontal taping; TV: vertical taping)

Tolerance								
Code	A	B	C	D	F	G	J	K
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%	±10%

DLC85C RF/Microwave Multilayer Ceramic Capacitor

◆DLC85C terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension: Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Microstrip dimension: Length (LL)	Width (WL)	Thickness (TL)	Terminal material
W	chip	.225 (+.020~−.010) (5.72 +0.51~−0.25)	.250±.015 (6.35±0.38)	.150 (3.81)max.	.020~.047 (0.50~1.20)	–	–	–	100%Sn over Nickel Plating RoHS Compliant
L									10%Pb90%Sn over Nickel Plating
MS	microstrip				–	.500 (12.70) min	.240±.010 (6.10±0.25)	.008±.001 (0.20±0.025)	Copper strip plated silver
AR	Axial ribbon								Copper strip plated silver
RR	Radial ribbon					.354 (9.00) min	.118±.010 (3.00±0.25)	.012±.001 (0.30±0.025)	Copper strip plated silver
RW	Axial wire					.709 (18.00) min	Wire diameter .031±.004 (0.80±0.10)		Silver wire
AW	Radial wire					.906 (23.00) min			

Terminal code	Type/Dimension	Capacitor dimension: Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Microstrip dimension: Length (LL)	Width (WL)	Thickness (TL)	Terminal material
P	Chip (Non-magnetic)	.225 (+.020~−.010) (5.72 +0.51~−0.25)	.250±.015 (6.35±0.38)	.150 (3.81)max.	.020~.047 (0.50~1.20)	–	–	–	100%Sn over Copper Plating RoHS Compliant
MN	microstrip (Non-magnetic)				–	.500 (12.70) min	.240±.005 (6.10±0.13)	.008±.001 (0.20±0.025)	Copper strip plated silver
AN	Axial ribbon (Non-magnetic)								Copper strip plated silver
FN	Radial ribbon (Non-magnetic)					.354 (9.00) min	.118±.005 (3.00±0.13)	.012±.001 (0.30±0.025)	Copper strip plated silver
RN	Axial wire (Non-magnetic)					.709 (18.00) min	Wire diameter .031±.004 (0.80±0.10)		Silver wire
BN	Radial wire (Non-magnetic)					.906 (23.00) min			

DLC85C
RF/Microwave Multilayer Ceramic Capacitor
DALICAP PRODUCT MANUAL

DLC85C RF/Microwave Multilayer Ceramic Capacitor

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥5000, cap≤1000pF, 1±0.1MHz, 1±0.2Vrms Q≥5000, cap＞1000pF, 1±0.1KHz, 1±0.2Vrms
Insulation resistance (IR)	≥10⁵MΩ, @25℃, apply rated voltage.(no more than 500V) ≥10⁴MΩ, @125℃, apply rated voltage.(no more than 500V)
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage (DWV)	Test Voltage: Rated voltage≤500V: 250% of the rated voltage, Applied Time: 5 s 500V＜Rated voltage≤1250V: 150% of the rated voltage, Applied Time: 5 s Rated voltage＞1250V: 120% of the rated voltage, Applied Time: 5 s Charge/discharge current: 50mA max.
Operating temperature range	-55℃ ~ + 150 ℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃ ~+ 150℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

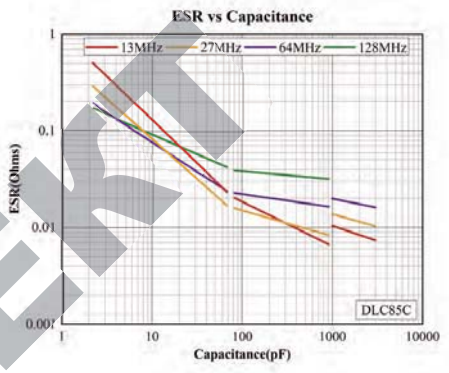
The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

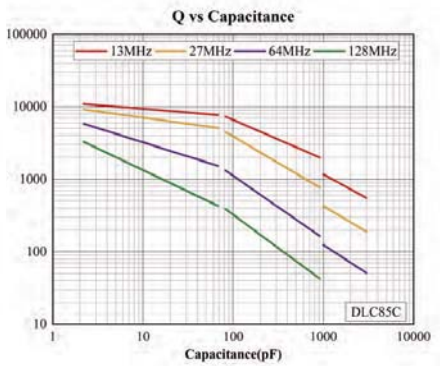
◆Environmental test

Item	Specification	Methods
Solder heat resistance	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change:within -1.0%～+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes.Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Steady state damp heat	Appearance: No evidence of mechanical damage . Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage . Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202,apply test voltage at the maximum operating temperature for 2000 hours. Test Voltage: Rated voltage≤500V: 200% of the rated voltage 500V＜Rated voltage≤1250V: 120% of the rated voltage Rated voltage＞1250V: 100% of the rated voltage. The charge/discharge current is less than 50mA.

DLC85C RF/Microwave Multilayer Ceramic Capacitor

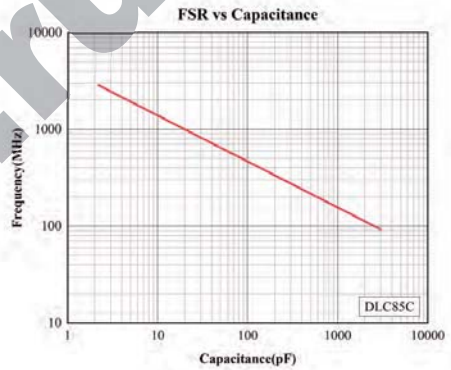
◆DLC85C performance curve

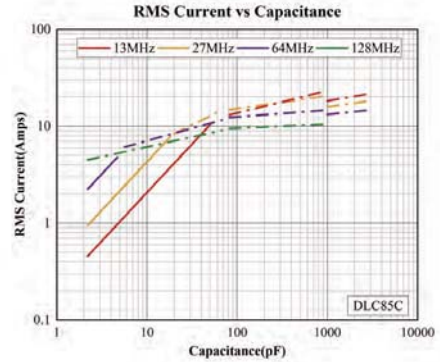




Remark: ESR Measurement: Coaxial Resonant Cavity Method.

◆ DLC85C performance curve





Remark:
The current determined by rated voltage(max voltage products). (Solid line)

$$I_{RMS}=\frac{\sqrt{2}}{2}I_{peak}=\frac{\sqrt{2}}{2}\times\frac{V_{rated}}{X_C}=\sqrt{2}\pi FCV_{rated}$$

The current determined by dissipated power.(Dashed line)

$$I_{RMS}=\sqrt{\frac{Pd_{max}}{ESR}}$$

If the rated current is based on a temperature rise of 60℃ (Ambient Temperature at 65℃), with a thermal resistance of 17.1℃/W, the maximum power dissipation of the capacitor is 3.5W.

DLC85E RF/Microwave Multilayer Ceramic Capacitor

DLC85E (3838)

◆Product Characteristics:

High Q value, high power, low ESR/ESL, low noise, high self-resonant frequency, high reliability.

◆Product Applications:

Typical functions: frequency tuning, bypass, coupling, responsing, DC blocking and impedance matching.
Typical applications: semiconductor RF power, MRI, repeater, high speed railway signal responsor, wireless broadcasting and TV device.

◆DLC85E capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
3.3	3R3	A, B, C, D	7200V code 722	36	360	F, G, J	7200V code 722	390	391	F, G, J	5000Vcode 502
3.6	3R6			39	390			430	431		3600V code 362
3.9	3R9			43	430			470	471		
4.3	4R3			47	470			510	511		
4.7	4R7			51	510			560	561		
5.1	5R1			56	560			620	621		
5.6	5R6			62	620			680	681		
6.2	6R2			68	680			750	751		
6.8	6R8			75	750			820	821		2500V code 252
7.5	7R5			82	820			910	911		
8.2	8R2			91	910			1000	102		
9.1	9R1			100	101			1100	112		
10	100	F, G, J		110	111			1200	122		
11	110			120	121			1300	132		
12	120			130	131			1500	152		
13	130			150	151			1800	182		
15	150			160	161			2200	222		
16	160			180	181			2400	242		
18	180			200	201		5000V code 502	2700	272		2000V code 202
20	200			220	221			3000	302		
22	220			240	241			3300	332		
24	240			270	271			3600	362		
27	270			300	301			3900	392		
30	300			330	331			4300	432		
33	330			360	361			4700	472		
								5100	512		

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

DLC85E ❶ Series
101 ❷ Capacitance code 101= 10×10¹ =100pF 2R2=2.2pF
J ❸ Tolerance
W ❹ Terminal type
722 ❺ Rated voltage
X ❻ Laser marking
T ❼ Package type T: horizontal taping TV: vertical taping

Tolerance								
Code	A	B	C	D	F	G	J	K
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%	±10%

DLC85E RF/Microwave Multilayer Ceramic Capacitor

◆DLC85E terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension: Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Microstrip dimension: Length (LL)	Width (WL)	Thickness (TL)	Terminal material
W	chip	.380 +.015 −.010 (9.65 +0.38 −0.25)	.380 +.015 −.010 (9.65 +0.38 −0.25)	.190 (4.83) max	.024±.059 (0.60±1.50)	–	–	–	100%Sn over Nickel Plating RoHS Compliant
L									10%Pb90%Sn over Nickel Plating
MS	microstrip				–	.728 (18.50) min	.350±.010 (8.89±0.25)	.008±.001 (0.20±0.025)	Copper strip silver plated
AR	Axial ribbon						.315±.010 (8.00±0.25)	.008±.001 (0.20±0.025)	Copper strip silver plated
RR	Radial ribbon					.354 (9.00) min	.118±.010 (3.00±0.25)	.012±.001 (0.30±0.025)	Copper strip silver plated
RW	Axial wire					.709 (18.00) min	Wire diameter .031±.004 (0.80±0.10)		Silver wire
AW	Radial wire					.906 (23.00) min			

Terminal code	Type/Dimension	Capacitor dimension: Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	Microstrip dimension: Length (LL)	Width (WL)	Thickness (TL)	Terminal material
P	Chip (non-magnetic)	.380 +.015 −.010 (9.65 +0.38 −0.25)	.380 +.015 −.010 (9.65 +0.38 −0.25)	.190 (4.83) max	.024±.059 (0.60±1.50)	–	–	–	100%Sn over Copper Plating RoHS Compliant
MN	microstrip (non-magnetic)				–	.728 (18.50) min	.350±.010 (8.89±0.25)	.008±.001 (0.20±0.025)	Copper strip silver plated
AN	Axial ribbon (non-magnetic)						.315±.010 (8.00±0.25)	.008±.001 (0.20±0.025)	Copper strip silver plated
FN	Radial ribbon (non-magnetic)					.354 (9.00) min	.118±.010 (3.00±0.25)	.012±.001 (0.30±0.025)	Copper strip silver plated
RN	Axial wire (non-magnetic)					.709 (18.00) min	Wire diameter .031±.004 (0.80±0.10)		Silver wire
BN	Radial wire (non-magnetic)					.906 (23.00) min			

DLC85E
RF/Microwave Multilayer Ceramic Capacitor
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DLC85E RF/Microwave Multilayer Ceramic Capacitor

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10%　C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥5000, cap≤1000pF, 1±0.1MHz, 1±0.2Vrms Q≥5000, cap＞1000pF, 1±0.1KHz, 1±0.2Vrms
Insulation resistance (IR)	≥10⁵MΩ, @25℃, apply rated voltage.(no more than 500V) ≥10⁴MΩ, @125℃, apply rated voltage.(no more than 500V)
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage (DWV)	Test Voltage: Rated voltage≤500V: 250% of the rated voltage, Applied Time: 5 s 500V＜Rated voltage≤1250V: 150% of the rated voltage, Applied Time: 5 s Rated voltage＞1250V: 120% of the rated voltage, Applied Time: 5 s Charge/discharge current: 50mA max.
Operating temperature range	-55℃~ + 150 ℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃ ~+ 150℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

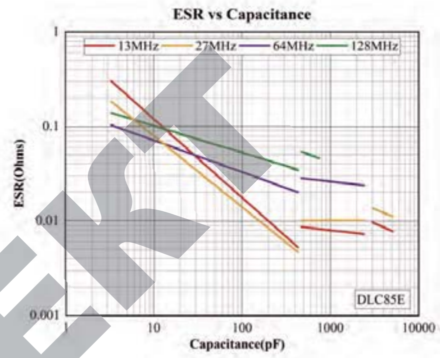
The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

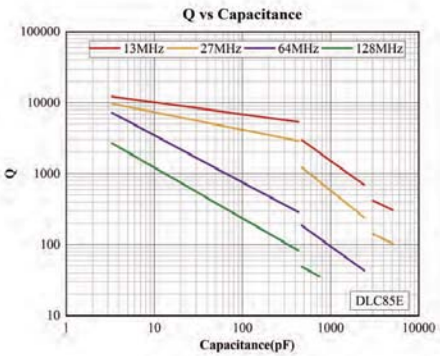
◆Environmental test

Item	Specification	Methods
Solder heat resistance	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change:within -1.0%～+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes.Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Steady state damp heat	Appearance: No evidence of mechanical damage . Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage . Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202,apply test voltage at the maximum operating temperature for 2000 hours. Test Voltage: Rated voltage≤500V: 200% of the rated voltage 500V＜Rated voltage≤1250V: 120% of the rated voltage Rated voltage＞1250V: 100% of the rated voltage. The charge/discharge current is less than 50mA.

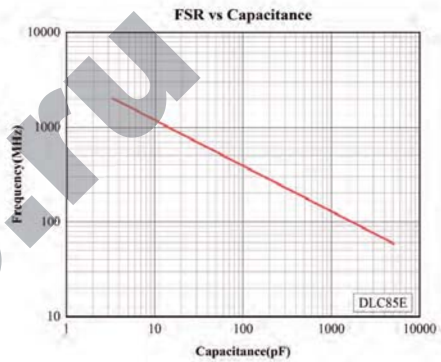
DLC85E RF/Microwave Multilayer Ceramic Capacitor

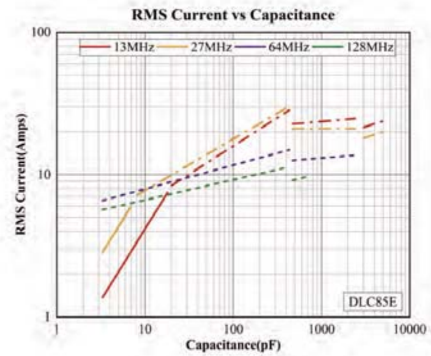
◆DLC85E performance curve





Remark: ESR Measurement: Coaxial Resonant Cavity Method.





Remark:
The current determined by rated voltage(max voltage products).
(Solid line)

$$I_{RMS}=\frac{\sqrt{2}}{2}I_{\text{peak}}=\frac{\sqrt{2}}{2}\times\frac{V_{\text{rated}}}{X_C}=\sqrt{2}\pi FCV_{\text{rated}}$$

The current determined by dissipated power. (Dashed line)

$$I_{RMS}=\sqrt{\frac{Pd_{max}}{ESR}}$$

If the rated current is based on a temperature rise of 60℃ (Ambient Temperature at 65℃), with a thermal resistance of 13.3℃/W, the maximum power dissipation of the capacitor is 4.5W.

DLC60 Series Ultra low ESR, RF/Microwave Ceramic Capacitor

◆Product Characteristics:

Ultra low ESR value, high working voltage, high RF power, high self-resonant frequency.

◆Product Application:

Circuit applications: high power filter network, combiner, coupler, matching network, output coupling, DC blocking, bypass, GaN-specific circuits.
Application fields: civil satellite communication, mobile communication base station, repeater, cluster communication, MRI.

◆Part Number

DLC60	P	101	J	W	251	N	T	X	5	X
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿	⓫
Series	Size	Capacitance	Tolerance	Terminal type	Rated voltage	No marking	Package	Internal code	Temperature range	Internal code

①Capacitor series: DLC60 – Dalicap DLC60 series capacitor

②Size and type

Unit: inch (mm)

	DLC60H	DLC60P	DLC60 D
Length	.0394±.004 (1.00±0.10)	.063±.006 (1.60±0.15)	.078±.010 (2.00±0.25)
Width	.0197±.004 (0.50±0.10)	.031±.006 (0.80±0.15)	.049±.010 (1.25±0.25)
Thickness	.0197±.004 (0.50±0.10)	.031±.006 (0.80±0.15)	.040±.006 (1.02±0.15)

③Capacitance

Capacitance<10pF, For example, 1R0=1.0pF, R means decimal point
Capacitance≥10pF, For example, 101=10×101=100pF, the third number means the power of 10.

④Tolerance

Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

⑤Terminal type

Code	W
Type	100%Sn over Nickel Plating RoHS Compliant

DLC60 Series Ultra low ESR, RF/Microwave Ceramic Capacitor

⑥Rated voltage

Code	Rated voltage (V)
201	200
251	250

⑦Laser marking

N means no marking
If the capacitance is less than 10pF, for example, 1.0pF capacitor, marked as "1R0".
If the capacitance is more than or equal to 10pF, for example, 100pF capacitor, marked as "101".

⑧Package

Item	60H	60P	60D
T: horizontal taping	√	√	√
TV: vertical taping			√

⑨internal code

Internal code can be blank
The internal code will be different if the product size is different.

⑩working temperature range

Blank means -55℃~125℃; 5 means -55℃~150℃

⑪Internal code

Internal code can be blank

◆Performance requirement

The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123 and GJB192B.

◆Environmental characteristics

All Dalicap DLC60 series products are RoHS compliance.

DLC60H Ultra low ESR, RF/Microwave Ceramic Capacitor

DLC60H (0402)

◆Product Characteristics:

Ultra low ESR value, high working voltage, high RF power, high self-resonant frequency.

◆Application Fields:

Typical applications: civil satellite communication, mobile communication base station, repeater, cluster communication.

◆DLC60H capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.1	0R1	A, B, C, D.	200V code 201	2.0	2R0	A, B, C, D.	200V code 201	10	100	F, G, J.	200V code 201
0.2	0R2			2.1	2R1			12	120		
0.3	0R3			2.2	2R2			13	130		
0.4	0R4			2.4	2R4			15	150		
0.5	0R5			2.7	2R7			16	160		
0.6	0R6			3.0	3R0			18	180		
0.7	0R7			3.3	3R3			20	200		
0.8	0R8			3.6	3R6			22	220		
0.9	0R9			3.9	3R9			24	240		
1.0	1R0			4.3	4R3			27	270		
1.1	1R1			4.7	4R7			30	300		
1.2	1R2			5.1	5R1			33	330		
1.3	1R3			5.6	5R6						
1.4	1R4			6.2	6R2	A, B, C, D.					
1.5	1R5			6.8	6R8						
1.6	1R6			7.5	7R5						
1.7	1R7			8.2	8R2						
1.8	1R8			9.1	9R1						
1.9	1R9										

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

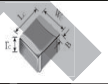
DLC60H ❶ Series
100 ❷ Capacitance code 100=10×10⁰=10pF 1R0=1.0pF
J ❸ Tolerance
W ❹ Terminal type
201 ❺ Rated voltage
N ❻ No marking
T ❼ Package type T: horizontal taping
X ❽ Internal code
5 ❾ Temperature range
X ❿ Internal code

Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC60H Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC60H terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	
W		.0394±.004 (1.00±0.10)	.0197±.004 (0.50±0.10)	.0197±.004 (0.50±0.10)	.004~.015 (0.10~0.40)	100%Sn over Nickel Plating RoHS Compliant

◆Design kits

Dalicap provides various design kits, in which each capacitance has 10pcs and the capacitors are RoHS compliance.

Kits	Capacitance range (pF)	Capacitance (pF)	Tolerance
DKDLC60H01	0.1~2.0	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.2, 1.5, 1.6 1.8, 2.0	±0.1pF
DKDLC60H02	1.0~10	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2	±0.1pF
		10	±5%
DKDLC60H03	10~33	10, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33	±5%

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10⁵MΩ, @25℃, apply rated voltage. ≥10⁴MΩ, @125℃, apply rated voltage.
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage(DWV)	Apply 200% rated voltage for 5s.
Operating temperature range	-55℃~+125℃, -55℃~+150℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃~+150℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

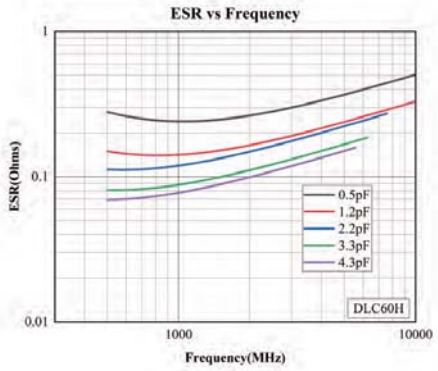
The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123, and GJB192B.

DLC60H Ultra low ESR, RF/Microwave Ceramic Capacitor

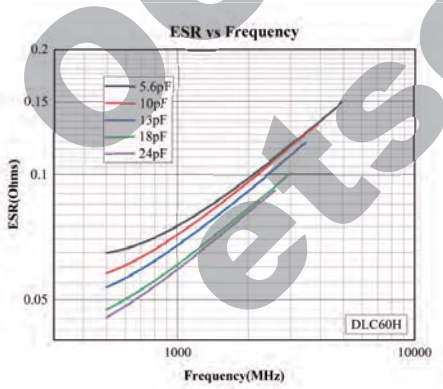
◆Environmental test

Item	Specification	Methods
Resistance to soldering Heat	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change: within -1.0% ~ +2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes. Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Humidity steady state	Appearance: No evidence of mechanical damage. Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage. Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202 at the maximum operating temperature,apply 200% of the rated voltage for 2000 hours.

◆DLC60H Performance Curve



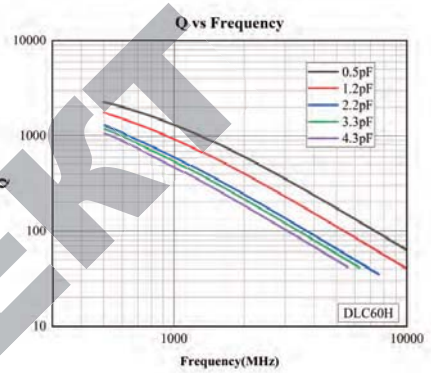
Remark: ESR Measurement: Coaxial Resonant Cavity Method.

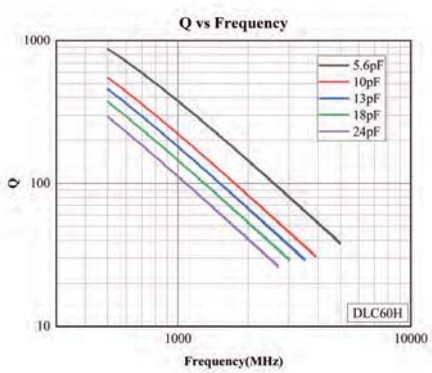


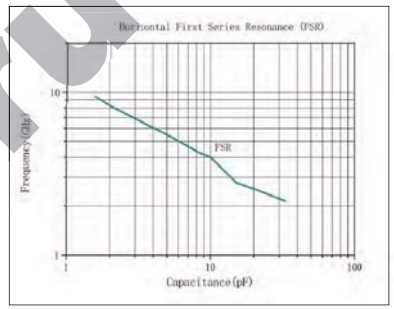
Remark: ESR Measurement: Coaxial Resonant Cavity Method.

DLC60H Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC60H Performance Curve







Definition and measurement conditions:
Definition: The capacitor is installed in series on the microstrip, that is, the capacitor is connected across the two ends of a 50Ω microstrip with a gap.
Measurement conditions: Ro4350 Rogers substrate with 3.48 dielectric constant, and characteristic impedance is 50Ω.

DLC60P Ultra low ESR, RF/Microwave Ceramic Capacitor

DLC60P (0603)

◆Product Characteristics:

Ultra low ESR value, high working voltage, high RF power, high self-resonant frequency.

◆Application Fields:

Typical applications: civil satellite communication, mobile communication base station, repeater, cluster communication.

◆DLC60P capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.1	0R1	A,B,C,D.	250V code 251	2.2	2R2	A,B,C,D.	250V code 251	16	160	F,G,J.	250V code 251
0.2	0R2			2.4	2R4			18	180		
0.3	0R3			2.7	2R7			20	200		
0.4	0R4			3.0	3R0			22	220		
0.5	0R5			3.3	3R3			24	240		
0.6	0R6			3.6	3R6			27	270		
0.7	0R7			3.9	3R9			30	300		
0.8	0R8			4.3	4R3			33	330		
0.9	0R9			4.7	4R7			36	360		
1.0	1R0			5.1	5R1			39	390		
1.1	1R1			5.6	5R6			43	430		
1.2	1R2			6.2	6R2			47	470		
1.3	1R3			6.8	6R8			51	510		
1.4	1R4			7.5	7R5			56	560		
1.5	1R5			8.2	8R2			62	620		
1.6	1R6			9.1	9R1			68	680		
1.7	1R7			10	100	F,G,J.		75	750		
1.8	1R8			11	110			82	820		
1.9	1R9			12	120			91	910		
2.0	2R0			13	130			100	101		
2.1	2R1			15	150						

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

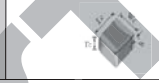
DLC60P ❶ Series
100 ❷ Capacitance code 100= 10×10⁰ =10pF 1R0=1.0pF
J ❸ Tolerance
W ❹ Terminal type
251 ❺ Rated voltage
N ❻ No marking
T ❼ Package type T: horizontal taping
X ❽ Internal code
5 ❾ Temperature range
X ❿ Internal code

Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC60P Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC60P terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	
W		.063±.006 (1.60±0.15)	.031±.006 (0.80±0.15)	.031±.006 (0.80±0.15)	.014±.006 (0.35±0.15)	100%Sn over Nickel Plating RoHS Compliant

◆Design kits

Dalicap provides various design kits, in which each capacitance has 10pcs and the capacitors are RoHS compliance.

Kits	Capacitance range (pF)	Capacitance (pF)	Tolerance
DKDLC60P01	0.1~2.0	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.5, 1.6, 1.8, 2.0	±0.1pF
DKDLC60P02	1.0~10	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2	±0.1pF
		10	±5%
DKDLC60P03	10~100	10, 12, 15, 18, 20, 22, 24, 27, 30, 33, 39, 47, 56, 68, 82, 100	±5%

◆Electrical performance

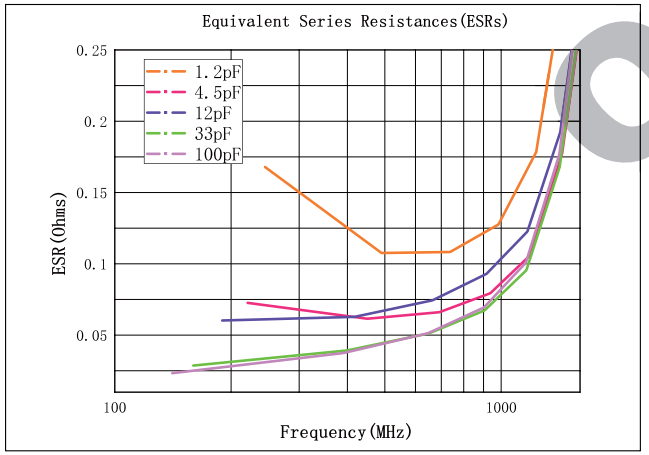
Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10⁵MΩ, @25℃, apply rated voltage. ≥10⁴MΩ, @125℃, apply rated voltage.
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage(DWV)	Apply 200% rated voltage for 5s.
Operating temperature range	-55℃~+125℃,-55℃~+150℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃~+150℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123, and GJB192B.

◆Environmental test

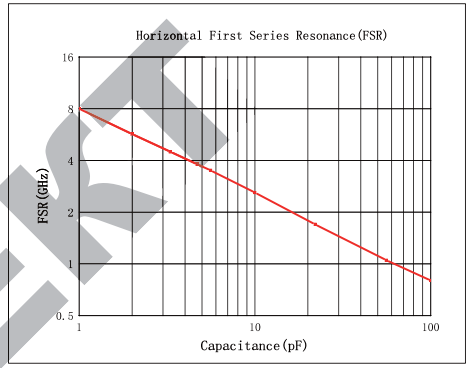
Item	Specification	Methods
Resistance to soldering Heat	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change: within -1.0%～+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes. Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Humidity steady state	Appearance: No evidence of mechanical damage. Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage. Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202 at the maximum operating temperature,apply 200% of the rated voltage for 2000 hours.

◆DLC60P Performance Curve



DLC60P Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC60P Performance Curve



Definition and measurement conditions:
Definition: The capacitor is installed in series on the microstrip, that is, the capacitor is connected across the two ends of a 50Ω microstrip with a gap.
Measurement conditions: Ro4350 Rogers substrate with 3.48 dielectric constant, and characteristic impedance is 50Ω.

DLC60D Ultra low ESR, RF/Microwave Ceramic Capacitor

DLC60D (0805)

◆Product Characteristics:

Ultra low ESR value, high working voltage, high RF power, high self-resonant frequency.

◆Application Fields:

Typical applications: civil satellite communication, mobile communication base station, repeater, cluster communication.

◆DLC60D capacitance table

Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage	Capacitance (pF)	Code	Tolerance	Rated Voltage
0.2	0R2	A,B,C,D.	250V code 251	2.4	2R4	A,B,C,D.	250V code 251	20	200	F,G,J.	250V code 251	160	161	F,G,J.	250V code 251
0.3	0R3			2.7	2R7			22	220			180	181		
0.4	0R4			3.0	3R0			24	240			200	201		
0.5	0R5			3.3	3R3			27	270			220	221		
0.6	0R6			3.6	3R6			30	300						
0.7	0R7			3.9	3R9			33	330						
0.8	0R8			4.3	4R3			36	360						
0.9	0R9			4.7	4R7			39	390						
1.0	1R0			5.1	5R1			43	430						
1.1	1R1			5.6	5R6			47	470						
1.2	1R2			6.2	6R2			51	510						
1.3	1R3			6.8	6R8			56	560						
1.4	1R4			7.5	7R5			62	620						
1.5	1R5			8.2	8R2			68	680						
1.6	1R6			9.1	9R1			75	750						
1.7	1R7			10	100	F,G,J.		82	820						
1.8	1R8			11	110			91	910						
1.9	1R9			12	120			100	101						
2.0	2R0			13	130			110	111						
2.1	2R1			15	150			120	121						
2.2	2R2			16	160			130	131						
				18	180			150	151						

Remark: if there is any special requirement on capacitance, tolerance and rated voltage, please contact Dalicap.

◆Part Number

DLC60D	100	J	W	251	N	T	X	5	X
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿
Series	Capacitance code 100= 10×10⁰ =10pF 1R0=1.0pF	Tolerance	Terminal type	Rated voltage	No marking	Package type T: horizontal taping	Internal code	Temperature range	Internal code

Tolerance							
Code	A	B	C	D	F	G	J
Tolerance	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%

DLC60D Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC60D terminal type and size

Unit: inch (mm)

Terminal code	Type/Dimension	Capacitor dimension				Terminal material
		Length (Lc)	Width (Wc)	Thickness (Tc)	Terminal size (B)	
W		.078±.010 (2.00±0.25)	.049±.010 (1.25±0.25)	.040±.006 (1.02±0.15)	.020±.010 (0.50±0.25)	100%Sn over Nickel Plating RoHS Compliant

◆Design kits

Dalicap provides various design kits, in which each capacitance has 10pcs and the capacitors are RoHS compliance.

Kits	Capacitance range (pF)	Capacitance (pF)	Tolerance
DKDLC60P01	0.1~2.0	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.2, 1.5, 1.6, 1.8, 2.0	±0.1pF
DKDLC60P02	1.0~10	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2	±0.1pF
		10	±5%
DKDLC60P03	10~100	10, 12, 15, 18, 20, 22, 24, 27, 30, 33, 39, 47, 56, 68, 82, 100	±5%
DKDLC60P04	10~ 20	10, 15, 18, 20, 24, 27, 30, 39, 47, 56, 68, 82, 100,120,150,180,220	±5%

◆Electrical performance

Item	Specification
Capacitance (C)	Refer to the capacitance table Test frequency: C≤1000pF: 1MHz±10% C>1000pF: 1KHz±10% Test voltage: 1.0±0.2Vrms
Quality factor (Q value)	Q≥2000, 1±0.1MHz, 1±0.2Vrms (typical value)
Insulation resistance (IR)	≥10⁵MΩ, @25℃, apply rated voltage. ≥10⁴MΩ, @125℃, apply rated voltage.
Rated voltage (WVDC)	Refer to capacitance table
Dielectric withstanding voltage(DWV)	Apply 200% rated voltage for 5s.
Operating temperature range	-55℃~ + 125 ℃,-55℃~ + 150 ℃ (If there is any other operating temperature range, please contact Dalicap)
Temperature coefficient (TC)	0±30ppm/℃ (-55℃ ~+ 150℃)
Capacitance Drift	±0.2% or ±0.05pF, take the greater value
Piezoelectric effect	No

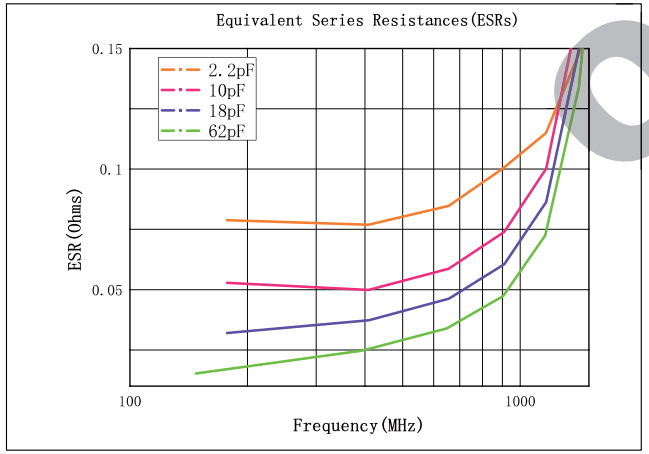
The capacitors meet the requirements of MIL-PRF-55681, MIL-PRF-123, and GJB192B.

DLC60D Ultra low ESR, RF/Microwave Ceramic Capacitor

◆Environmental test

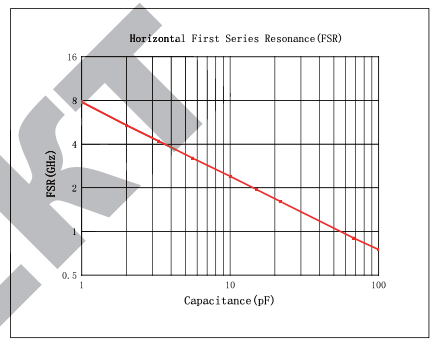
Item	Specification	Methods
Resistance to soldering Heat	Appearance: No evidence of mechanical damage or delamination or exposed. Cap change: within -1.0%～+2.0% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than initial requirement.	Preheat for 1 minute at 150℃ to 180℃ before immerse the capacitor in a eutectic solution at 260±5℃ for 10±1 seconds. Capacitor shall be immersed to a depth of 10mm. And following a 24±2 hours cooling period.
Thermal shock	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. Q: No less than initial requirement. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to test method 107, Condition A of MIL-STD-202. Expose to temperatures of -55°C and 125°C for 15 minutes. The transition time from -55°C to 125°C shall not exceed 5 minutes. Perform 5 cycles.
Moisture resistance	Appearance: No evidence of mechanical damage. Cap change: within ±0.5% or ±0.5pF whichever is larger. IR(25℃): No less than 30% initial requirement. DWV: To meet initial requirement.	According to the test method 106 of MIL-STD-202
Humidity steady state	Appearance: No evidence of mechanical damage. Cap change: within ±0.3% or ±0.3pF whichever is larger. IR(25℃): No less than initial requirement.	According to test method 107, Condition A of MIL-STD-202. With 1.5 Volts D.C. applied while subjected to an environment of 85℃ with 85% relative humidity for 240 hours minimum. Removed and sit 3.5±0.5 hours at room temperature.
Life	Appearance: No evidence of mechanical damage. Cap change: within ±2% or ±0.5pF whichever is larger. Q: No less than 50% initial requirement. IR(25℃): No less than 30% initial requirement.	According to test method 108 of MIL-STD-202 at the maximum operating temperature,apply 200% of the rated voltage for 2000 hours.

◆DLC60D Performance Curve



DLC60D Ultra low ESR, RF/Microwave Ceramic Capacitor

◆DLC60D Performance Curve



Definition and measurement conditions:
Definition: The capacitor is installed in series on the microstrip, that is, the capacitor is connected across the two ends of a 50Ω microstrip with a gap.
Measurement conditions: Ro4350 Rogers substrate with 3.48 dielectric constant, and characteristic impedance is 50Ω.

Laser Marking

Most of Dalicap capacitors have laser markings on the surfaces, which can normally be identified with the naked eye. Under normal storage and usage conditions, the markings will not be damaged. For different series of Dalicap capacitors , the laser markings are different. Please refer to the table below.

Chip capacitor series	70/75/85 B	70/85 C	70/85 E
Example			
Marking meaning	D: Dalicap marking 102: 1000pF	DLC: Dalicap marking 102: 1000pF	DLC: Dalicap marking 102: 1000pF

Chip capacitor series	70 F	70 G	70 L
Example			
Marking meaning	DLC: Dalicap marking 70F: series and size Capacitance: 100pF Tolerance: ±5% Rated voltage: 8000V	DLC: Dalicap marking 70G: series and size Capacitance: 100pF Tolerance: ±5% Rated voltage: 8000V	DLC: Dalicap marking 70L: series and size Capacitance: 200pF Tolerance: ±5% Rated voltage: 10000V

Welding capacitor series	70/75/85 B	70/85 C	70/85 E
Example			
Marking meaning	D: Dalicap marking 102:1000pF	DLC: Dalicap marking 102: 1000pF 3A: internal identification code	DLC: Dalicap marking 102: 1000pF 39: internal identification code

Welding capacitor series	70 F	70 G	70 L
Example			
Marking meaning	DLC: Dalicap marking 70F: series and size 3A: internal identification code Capacitance: 100pF Tolerance: ±5% Rated voltage: 8000V	DLC: Dalicap marking 70G: series and size 39: internal identification code Capacitance: 100pF Tolerance: ±5% Rated voltage: 8000V	DLC: Dalicap marking 70L: series and size 39: internal identification code Capacitance: 200pF Tolerance: ±5% Rated voltage: 10000V

If the customers have special requirements on laser marking, please contact with Dalicap.

Tuning stick

The tuning sticks are designed to facilitate engineers' circuit debugging. When replacing capacitors, engineers can use the tuning stick to avoid damaging the circuit board and precisely debug the circuit. Currently, engineers can do fine tuning on the capacitors to obtain the required design values with the help of tuning sticks.

◆Tuning stick

Test pen	Capacitance (pF)	Capacitance type	Tolerance
TSDLC70A01	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9,	16	±0.1pF
	1.0, 1.1, 1.2, 1.5, 1.6, 1.8, 2.0		±0.25pF
TSDLC70A02	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3,	16	±0.25pF
	3.9, 4.7, 5.6, 6.8, 8.2		
	10		±5%
TSDLC70A03	10, 12, 15, 18, 20, 22, 24, 27, 30, 33, 39, 47,	16	±5%
	56, 68, 82, 100		
TSDLC70B01	0.1, 0.2, 0.3, 0.4, 0.5,	10	±0.1pF
	0.6, 0.7, 0.8, 0.9, 1.0		±0.25pF
TSDLC70B02	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3,	16	±0.25pF
	3.9, 4.7, 5.6, 6.8, 8.2		
	10		±5%
TSDLC70B03	10, 12, 15, 18, 20, 22, 24, 27, 30, 33, 39, 47,	16	±5%
	56, 68, 82, 100		
TSDLC70B04	100, 120, 150, 180, 200, 220, 240, 270, 300, 330,	16	±5%
	390, 470, 560, 680, 820, 1000		
TSDLC75B01	0.1, 0.2, 0.3, 0.4, 0.5,	10	±0.1pF
	0.6, 0.7, 0.8, 0.9, 1.0		±0.25pF
TSDLC75B02	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3,	16	±0.25pF
	3.9, 4.7, 5.6, 6.8, 8.2		
	10		±5%
TSDLC75B03	10, 12, 15, 18, 20, 22, 24, 27, 30, 33, 39, 47,	16	±5%
	56, 68, 82, 100		
TSDLC75B04	100, 120, 150, 180, 200, 220, 240, 270, 300, 330,	16	±5%
	390, 470, 560, 680, 820, 1000		

Broadband ceramic capacitor

◆Product Overview

The BB series broadband capacitors developed by Dalicap have the dimensions (inch): 01005, 0201, 0402, and 0805.

These capacitors are intended primarily for coupling RF signals or, occasionally, for bypassing them to ground, while blocking DC. These applications for which they are intended require small, surface-mountable devices that provide low RF impedances, i.e., low insertion losses and reflections, across extremely large RF bandwidths and temperatures typically ranging from -55 to +85/125 ℃.

Small, single-layer capacitors, apart from not being surface-mountable, usually do not have sufficiently large capacitance values to cover the required frequency range, which may extend from the tens or hundreds of kilohertz to the tens of gigahertz. Ordinary multi-layer capacitors, when operated over these ranges, display "parallel resonances," narrow frequency bands over which they have high impedances and insertion losses.

Applications for the BB series are primarily found in the so-called "signal integrity" market:

- Optoelectronics/high- speed data
- ROSA/TOSA (Transmit/Receive optical subassemblies)
- SONET (Synchronous Optical Networks)
- Broadband test equipment
- Broadband microwave and millimeter wave amplifiers and oscillators

In general, best results are achieved by capacitors that are close in width to that of the transmission line trace. Most trace widths on commonly used substrates that must function well above 12 GHz lie in the 8- to 24-mil range, and so 0402 and 0201 SMT devices are well suited to the applications.

To reiterate, customers requiring surface-mountable, 10 nF or 100 nF capacitors that provide resonance-free, low insertion loss, low reflection operation over extremely large RF bandwidths will be well served by Dalicap.

01005BB (.010"× .005") Broadband ceramic capacitor

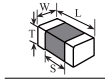
01005BB (.010"× .005") 01005BB104MW4R0

◆Product characteristics

Typical working frequency range: 16KHz (-3dB) to > 67GHz
Insertion loss: <1.2dB (typical value); 4WVDC;
Packaging quantity: 40K pcs/ reel, the purchase quantity can be lower than 40K pcs/reel

◆01005BB dimension

Unit: Inch (mm)

Type/Dimension	Capacitor size			
	Length(L)	Width(W)	Thickness(T)	Distance between the terminals(S)
	.016±.001 (0.40±0.03)	.008±.001 (0.20±0.03)	.008±.001 (0.20±0.03)	.005(0.13) min

◆Electric performance

Item	Specification
Capacitance	100nF
Insulation resistance (IR)	5GΩ min, @25℃, apply rated voltage
Rated voltage (WVDC)	4V
Withstand voltage (DWV)	Apply 250% rated voltage for 5s
Operating temperature range	-55℃ ~ + 85℃
Temperature Coefficient of Capacitance (TCC)	±15%

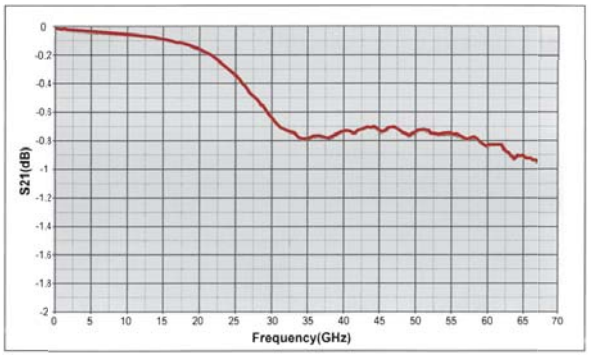
◆Naming method

01005	BB	104	M	W	4R0
❶ Size	❷ Series	❸ Capacitance code 104=100000pF	❹ Tolerance (M = ± 20%)	❺ Tin plated over Nickel Barrier (RoHS) compliance	❻ WVDC (4R0=4.0V)

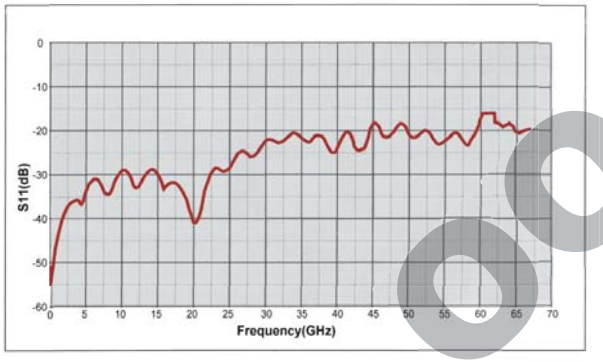
01005BB (.010"× .005") Broadband ceramic capacitor

◆01005BB performance curve– insertion loss and return loss

● Insertion loss curve



● Return loss curve



◆Test conditions

Place the test capacitor on the following test board for testing

The test board is 4mil thickness Roger Ro4350B

Mounting pad size

Length: 0.21mm(8.3mil) , Width0.29mm(11.4mil), Spacing: 0.127mm(5.0mil)

The test and simulated data have been calibrated to the edge of the mounting pad through TRL calibration

0201BB (.020"× .010") Broadband ceramic capacitor

0201BB (.020"× .010") 0201BB103KW250

◆Product characteristics

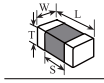
Typical working frequency range: 160KHz (-3dB) to > 32GHz

Insertion loss: <1.2dB (typical value); 25WVDC; Tin plated and Gold plated terminals

Packaging quantity: 15Kpcs/ reel, small quantity can choose cutting tapes and tray packaging

◆0201BB dimension

Unit: Inch (mm)

Type/Dimension	Capacitor size			
	Length(L)	Width(W)	Thickness(T)	Distance between the terminals(S)
	.023±.001 (0.58±0.03)	.012±.001 (0.30±0.03)	.0118(0.30) max	.0078(0.20) min

◆Electric performance

Item	Specification
Capacitance	10nF
Insulation resistance (IR)	50GΩ min, @25℃, apply rated voltage
Rated voltage (WVDC)	25V
Withstand voltage (DWV)	Apply 250% rated voltage for 5s
Operating temperature range	-55℃ ~ +125℃
Temperature Coefficient of Capacitance (TCC)	±15%

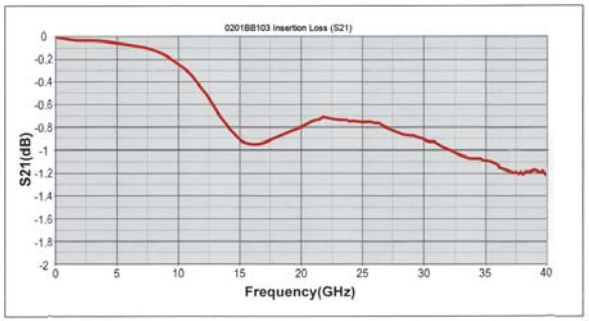
◆Naming method

0201	BB	103	K	W	250
❶ Size	❷ Series	❸ Capacitance code 103=10000pF	❹ Tolerance (K = ± 10%)	❺ Tin plated over Nickel Barrier (RoHS) compliance	❻ WVDC (250=25V)

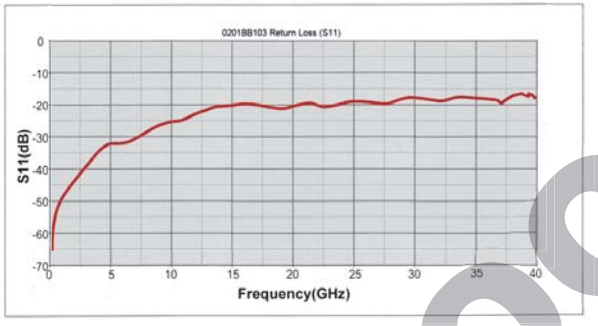
0201BB (.020"× .010") Broadband ceramic capacitor

◆0201BB performance curve– insertion loss and return loss

● Insertion loss curve



● Return loss curve



◆Test condition

The test capacitor is placed on test board with 3mil gap, and the pad's length is 8.5mil, and the transmission line width is 12.5mil.

The test board is 6.6mil thickness Roger Ro4350B

The test and simulated data have been calibrated to the edge of the mounting pad through TRL calibration

0201BB (.020"× .010") Broadband ceramic capacitor

0201BB (.020"× .010") 0201BB104KW160

◆Product characteristics

Typical working frequency range: 16KHz (-3dB) to > 40GHz

Insertion loss: <1.2dB (typical value); 16WVDC; Tin plated and Gold plated terminals

Packaging quantity: 15Kpcs/ reel, small quantity can choose cutting tapes and tray packaging

◆0201BB dimension

Unit: Inch (mm)

Type/Dimension	Capacitor size			
	Length(L)	Width(W)	Thickness(T)	Distance between the terminals(S)
	.023±.001 (0.58±0.03)	.012±.001 (0.30±0.03)	.0118(0.30) max	.0078(0.20) min

◆Electric performance

Item	Specification
Capacitance	100nF
Insulation resistance (IR)	5GΩ min, @25℃, apply rated voltage
Rated voltage (WVDC)	16V
Withstand voltage (DWV)	Apply 250% rated voltage for 5s
Operating temperature range	-55℃ ~ +125℃
Temperature Coefficient of Capacitance (TCC)	±15%

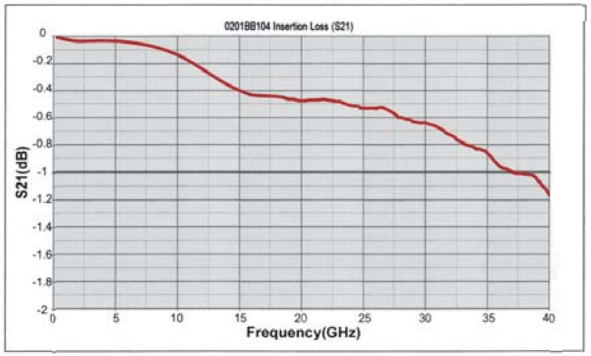
◆Naming method

0201	BB	104	K	W	160
❶ Size	❷ Series	❸ Capacitance code 104=100000pF	❹ Tolerance (K = ± 10%)	❺ Tin plated over Nickel Barrier, RoHS compliance G= Gold plated	❻ WVDC (160=16V)

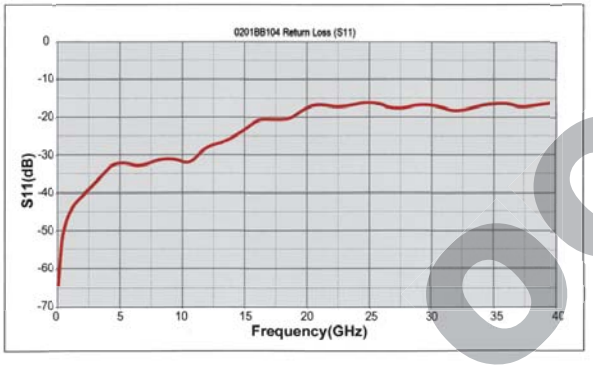
0201BB (.020"× .010") Broadband ceramic capacitor

◆0201BB performance curve– insertion loss and return loss

● Insertion loss curve



● Return loss curve



◆Test condition

The test capacitor is placed on test board with 3mil gap, and the pad's length is 8.5mil, and the transmission line width is 12.5mil.

The test board is 6.6mil thickness Roger Ro4350B

The test and simulated data have been calibrated to the edge of the mounting pad through TRL calibration

0402BB (.040"× .020") Broadband ceramic capacitor

0402BB (.040"× .020") 0402BB103KW500

◆Product characteristics

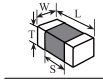
Typical working frequency range: 160KHz (-3dB) to > 40GHz

Insertion loss: <1.2dB (typical value); 50WVDC;

Packaging quantity: 10Kpcs/ reel, small quantity can choose cutting tapes and tray packaging

◆0402BB dimension

Unit: Inch (mm)

Type/Dimension	Capacitor size			
	Length(L)	Width(W)	Thickness(T)	Distance between the terminals(S)
	.040± .004 (1.02±0.10)	.020± .004 (0.51±0.10)	.024(0.61) max	.016(0.406) min

◆Electric performance

Item	Specification
Capacitance	10nF
Insulation resistance (IR)	50GΩ min, @25℃, apply rated voltage
Rated voltage (WCDV)	50V
Withstand voltage (DWV)	Apply 250% rated voltage for 5s
Operating temperature range	-55℃ ~ + 125℃
Temperature Coefficient of Capacitance (TCC)	±15%

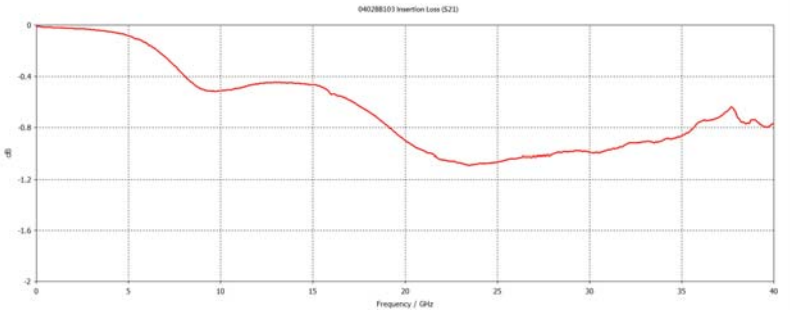
◆Naming method

0402	BB	103	K	W	500
❶	❷	❸	❹	❺	❻
Size	Series	Capacitance code 103=10000pF	Tolerance (K = ± 10%)	Tin plated over Nickel Barrier RoHS compliance	WVDC (500=50V)

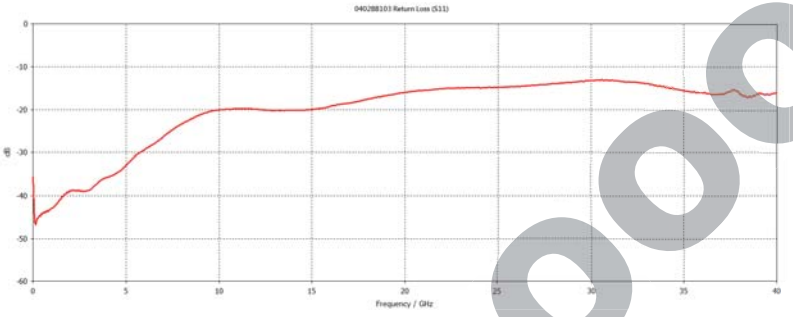
0402BB (.040"× .020") Broadband ceramic capacitor

◆0402BB performance curve– insertion loss and return loss

● Insertion loss curve



● Return loss curve



◆Test conditions

The test capacitor is placed on test board with 15.5mil gap, and the pad's length is 12.3mil,
and the transmission line width is 21mil.
The test board is 10mil thickness Roger Ro4350B
The test and simulated data have been calibrated to the edge of the mounting pad through TRL calibration

0402BB (.040"× .020") Broadband ceramic capacitor

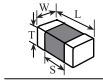
0402BB (.040"× .020") 0402BB104KW500

◆Product characteristics

Typical working frequency range: 16KHz (-3dB) to > 50GHz
Insertion loss: <1.2dB (typical value); 50WVDC; Tin plated and Gold plated terminals
Packaging quantity: 10Kpcs/ reel, small quantity can choose cutting tapes and tray packaging

◆0402BB dimension

Unit: Inch (mm)

Type/Dimension	Capacitor size			
	Length(L)	Width(W)	Thickness(T)	Distance between the terminals(S)
	.040± .004 (1.02±0.10)	.020± .004 (0.51±0.10)	.024(0.61) max	.016(0.406) min

◆Electric performance

Item	Specification
Capacitance	100nF
Insulation resistance (IR)	5GΩ min, @25℃, apply rated voltage
Rated voltage (WVDC)	50V
Withstand voltage (DWV)	Apply 250% rated voltage for 5s
Operating temperature range	-55℃ ~ +125℃
Temperature Coefficient of Capacitance (TCC)	±15%

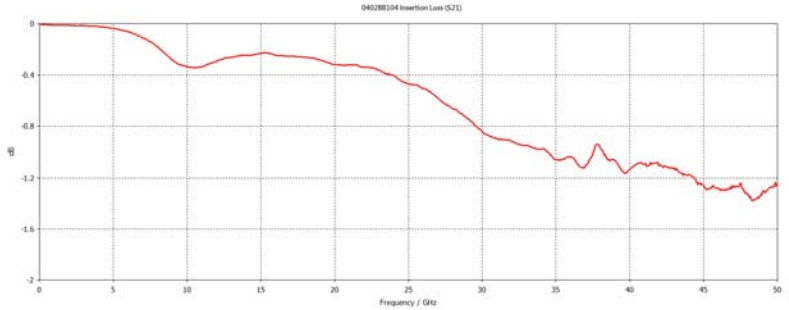
◆Naming method

0402	BB	104	K	W	500
❶ Size	❷ Series	❸ Capacitance code 104=100000pF	❹ Tolerance (K = ± 10%)	❺ Tin plated over Nickel Barrier RoHS compliance	❻ WVDC (500=50V)

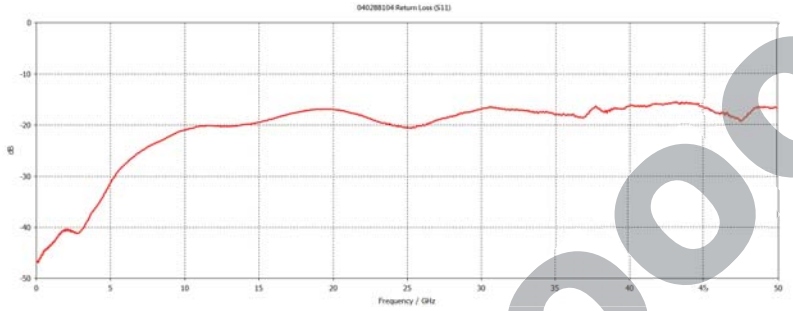
0402BB (.040"× .020") Broadband ceramic capacitor

◆0402BB performance curve– insertion loss and return loss

● Insertion loss curve



● Return loss curve



◆Test conditions

The test capacitor is placed on test board with 15.5mil gap, and the pad's length is 12.3mil,
and the transmission line width is 21mil.
The test board is 10mil thickness Roger Ro4350B
The test and simulated data have been calibrated to the edge of the mounting pad through TRL calibration

0805BB (.080 "× .050") Broadband ceramic capacitor

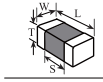
0805BB (.080"× .050") 0805BB103KW101

◆Product characteristics

Typical working frequency range: 160KHz (-3dB) to > 3GHz
Insertion loss: <0.25dB (typical value); rated voltage 100V;
Nickel plated, Tin plated terminals

◆0402BB dimension

Unit: Inch (mm)

Type/Dimension	Capacitor size			
	Length(L)	Width(W)	Thickness(T)	Distance between the terminals(S)
	.080±.006 (2.03±0.15)	.050±.006 (1.27±0.15)	.040(1.02) max	.044(1.12) min

◆Electric performance

Item	Specification
Capacitance	10nF
Insulation resistance (IR)	50GΩ min, @25℃, apply rated voltage
Rated voltage (WVDC)	100V
Withstand voltage (DWV)	Apply 250% rated voltage for 5s
Operating temperature range	-55℃ ~ + 125℃
Temperature Coefficient of Capacitance (TCC)	±15%

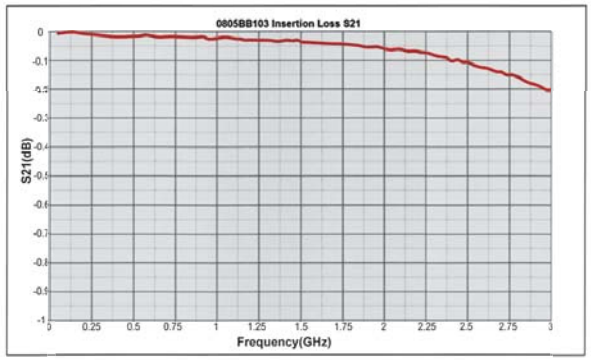
◆Naming method

0805	BB	103	K	W	101
❶ Size	❷ Series	❸ Capacitance code 103=10000pF	❹ Tolerance (K = ± 10%)	❺ Tin plated over Nickel Barrier RoHS compliance	❻ WVDC(101=100V)

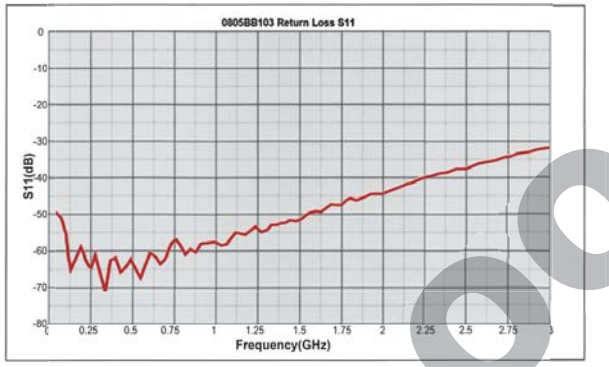
0805BB (.080" × .050") Broadband ceramic capacitor

◆0805BB performance curve– insertion loss and return loss

● Insertion loss curve



● Return loss curve



◆Test conditions

The test capacitor is placed on test board with 25.5mil gap, and the transmission line width is 20mil.

The test board is 20mil thickness Roger Ro4003C

The test and simulated data have been calibrated to the edge of the mounting pad through TRL calibration

Broadband ceramic capacitor product description

◆Product characteristics

There are a number of circuits that require coupling RF signals or bypassing them to ground while blocking DC over extraordinarily large RF bandwidths. The applications for which they are intended typically require small, surface-mountable (SMT) units with low insertion losses, reflections, and impedances across RF frequencies extending from the tens of KHz to the tens of GHz, and temperatures typically ranging from -55 to +85 ℃ This note focuses on a particular implementation of these devices — multilayer ceramic capacitors (MLCCs) and how to obtain the best performance when they're used on various substrates.

Broadband capacitors are used in the "signal integrity" market — optoelectronics/high-speed data; ROSA/TOSA (Transmit/Receive optical subassemblies); SONET(Synchronous Optical Networks); broadband test equipment as well as in broadband microwave and millimeter wave amplifiers (MMICs, GaN transistors) and oscillators. The basic requirement in the former is to produce an output waveform that closely replicates an input waveform, typically a train of digital pulses, as shown in Fig. 1.

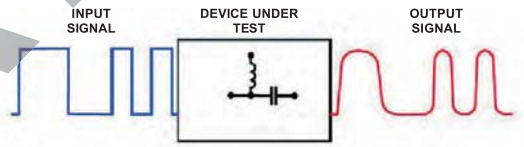


Fig.1"Signal Integrity"- output replication of input

While RF and microwave devices are typically measured in the frequency domain, digital systems are usually characterized in the time domain, and so it is necessary to make a connection between the two (Fig. 2).

Frequency domain
- insertion loss
- reflection

Time domain
- up and down time
- eye diagram
- jitter

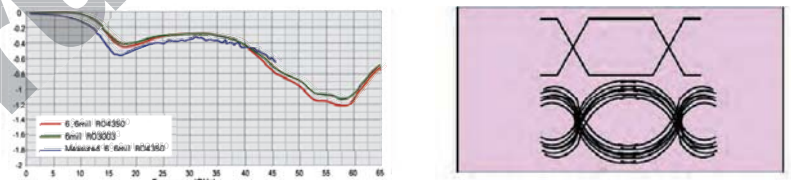
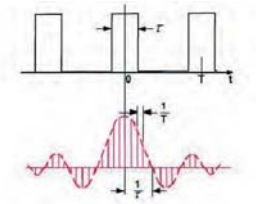


Fig.2 Frequency domain and time domain parameters

Fortunately, all electrical engineers are familiar with the Fourier and Laplace transforms that do precisely that. The low-frequency and high-frequency responses required to reproduce a train of rectangular pulses with reasonable fidelity are shown in Fig. 3.



Rules from experience:
If FL represents the frequency that needs to be superimposed to form the longest pulse (a series of "1"), and if R □ the pulse speed (GB/sec), and FH is the higher frequency that needs to be superimposed to form the pulse,

Fig.3 "Rules of thumb" for reproducing a rectangular pulse train

In general, systems that transmit all frequencies with equal velocity and minimal attenuation and reflection, will accurately reproduce input signal waveforms at their outputs. Conversely, systems that are dispersive, i.e., where signals at different frequencies travel at different speeds or have unequal attenuations or reflections, create distortions in the output waveform.

Product description of broadband ceramic capacitors

◆Broadband capacitors

In considering "broadband capacitors," perhaps the first question that arises is precisely what distinguishes these devices from any other capacitors. One property is alluded to above: When used to RF couple/DC block, the capacitor should have minimal attenuation and reflection. Fig. 4 compares the insertion loss vs. frequency plot of a typical high-Q ceramic microwave capacitor with that of a broadband capacitor.

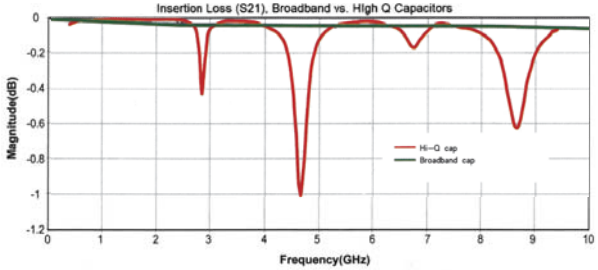


Fig.4 Insertion loss of a broadband capacitor compared to that of a high-Q capacitor

The salient feature of the plots is that the high-Q capacitor exhibits a number of "'parallel resonances" that create regions of high insertion loss, which is not the case with the broadband device.

◆A Lumped-Element Electrical Model

To understand the electrical behavior of an MLCC, one place to begin is with an equivalent circuit that produces the same performance, including interaction with a microstrip or coplanar waveguide transmission line. One such circuit, using lumped elements, is shown in Fig. 5

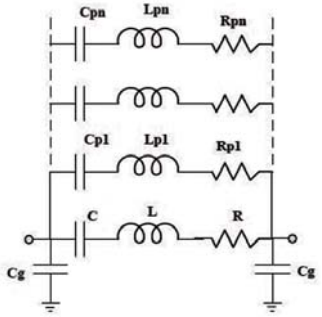


Fig.5 A lumped element equivalent circuit for an MLCC on microstrip

If we consider a reduction of this circuit to only the first (lowest order) branch, Cg can be considered to represent capacitance of the MLCC body to the groundplane; C, the capacitor's value; L, its net inductance in the presence of the groundplane; and R, the equivalent series resistance (ESR). Note that to more closely reflect actual performance, L and R are both frequency varying to accommodate skin and proximity effects.

The addition of a second branch consisting of another inductor, Lp1, in series with another capacitor, Cp1, and resistor, Rp1, enables modeling the lowest-frequency parallel resonance; addition of additional Lpn-Cpn-Rpn branches capture higher-order parallel resonances. There are, however, constraints on these higher order element values beyond yielding the correct resonant frequencies, e.g., the model's low-frequency capacitance value (all inductive reactances negligible) must equal the true low-frequency value of the device and the high-frequency inductance value (all capacitive reactances negligible) must also equal that of the device.

Product description of broadband ceramic capacitors

Product description of broadband ceramic capacitors

Both broadband and high-Q MLCCs have the same physical structure: interleaved metallic electrodes embedded in a ceramic brick. From whence, then, comes the difference in behavior? Examination of Figs. 4 and 5 suggests at least one answer: The broadband capacitor is lossy. Specifically, in Fig. 5, resistances Rp1 through Rpn, must be high enough that only exceedingly low-Q parallel resonances are created when their reactances are capacitive and those of the lower branches are inductive. If this is the case, then at frequencies high enough that the reactance of C is negligible compared to that of L, the circuit reduces to the simple one in Fig. 6. It may be observed that this is a lumped element (low-pass filter) approximation of a transmission line section and, as such, best performance should be achieved by having the characteristic impedance of that section, (Ls/Cg)1/2, about equal to 50 Ohms.

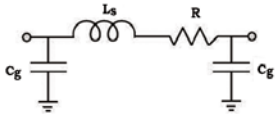


Fig.6 Simplified lumped circuit - high-frequency equivalent circuit for microstrip-mounted MLCC with very low-Q parallel resonances

While lumped-element models are quite flexible, particularly where element values can incorporate arbitrary variation with frequency, there is at least one reason to be wary in applying them to broadband capacitors: The models are ad hoc, heuristic representations, derived from a combination of experimental observations and "common sense" circuit theory (there must be some series inductance, there must be some shunt capacitance to ground, etcetera), rather than more fundamental principles. Nowhere is this clearer than in the addition of the Lp-Cp branches to create parallel resonances. As lumped elements, they have no obvious physical origin and are attached ad hoc purely to simulate observed electrical manifestations.

We should, in fact, be cautious about any lumped-element representation of capacitors that operate at sufficiently high frequencies - but let5s consider where usufficiently high" might begin. Typical X7R dielectrics for these devices have relative dielectric constants in the 2500 — 3000 range. This implies quarter wavelengths on the order of 60 mils or less at 1 GHz. Thus, an 0402 device of length 40 mils would reach a quarter wavelength at 1.5 GHz; a 20-mil-long 0201 device would reach a quarter wavelength at 3 GHz. It therefore seems evident that, to characterize these devices to 50 GHz and beyond, we'd really like a distributed model.

◆Distributed electrical models

Fig. 7 depicts how an idealized, lossy, open-circuit series stub can function as a broadband coupling device. Note the resolution of the apparent paradox: How can the stub itself be quite lossy and yet have only minimal effect on the main line? The answer is that as long as the stub characteristic impedance is low relative to the main line characteristic impedance, the main line insertion loss will also be low. In fact, if the stub loss is sufficiently gradual and large, the stub input impedance will approach its characteristic impedance.

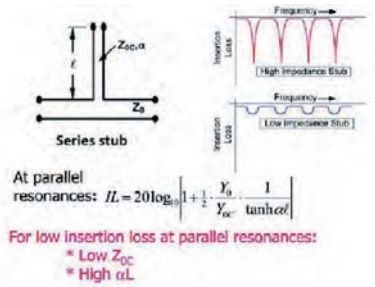


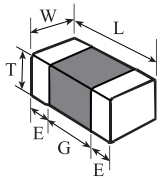
Fig.7 How to make a broadband series coupling stub

Product description of broadband ceramic capacitors

◆Optimizing Performance as a Coupling/Blocking Device

We will use 0201BB104 broadband capacitors to derive some general principles as to how best to achieve our objective. Two circumstances must be addressed: (1) The user has the freedom to select a substrate best suited for a broadband capacitor; or (2) the user already has a substrate and wants to optimize performance with a broadband capacitor. In each case, the user must know the highest operating frequency; this will determine the required characteristics of both substrate and broadband capacitor.

To achieve our objective, we modeled performance — insertion loss and return loss — of Dalicap 0201BB104 on microstrip substrates having three different dielectric constants. Three thicknesses of each substrate were chosen to create the following conditions with respect to the trace width necessary for a 50-Ohm characteristic impedance transmission line: Equal to the part width, less than the part width, greater than the partwidth. Fig. 9 shows the basic dimensions of the part; while Table 1 provides specifics on the substrates.



L = 24±1
W = 12±1
T = 12±1
E = 6±2
G = 8, Min.
All dimensions in mils

Fig.9 Dimensions of the Dalicap 0201BB104

Table1 substrates used in investigation

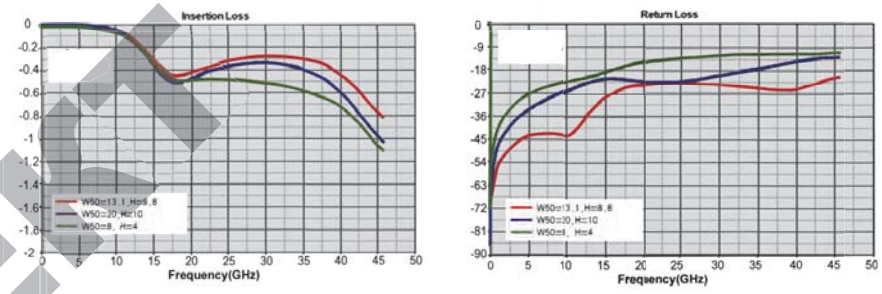
Closest Substrate	Dielectric Constant	Substrate Thickness (Mils)	Trace Thickness (Mils)	Linewidth for 50Ω Z0@10GHz (Mils)	
Rogers RO4350B	3.9	6.6	0.71	13.1	For the study, W_{PART}=13 mils
		10		20.1	
		4		7.7	
Rogers RO3006B	6.5	10	0.71	13.4	
		13.5		18.3	
		7		9.2	
Alumina	9.6	13	0.1	12.8	
		20		19.8	
		5		4.8	

Product description of broadband ceramic capacitors

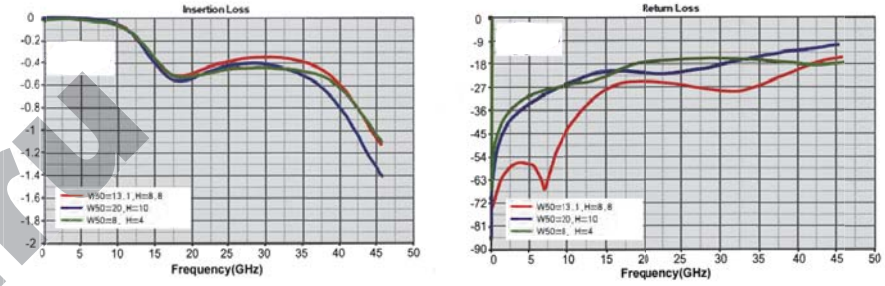
Product description of broadband ceramic capacitors

Figs. 10 –12 show insertion and return losses for the various substrates and thicknesses.

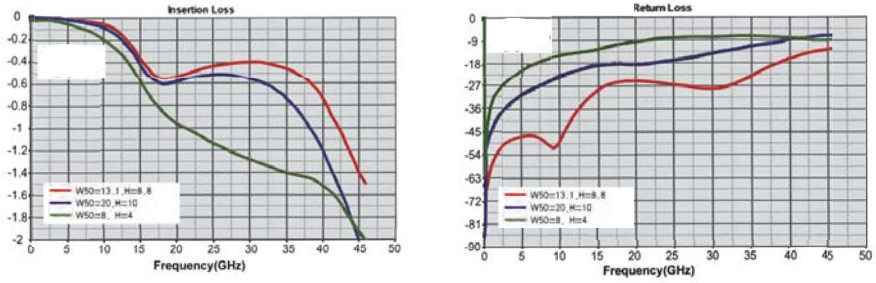
●Fig.10 Insertion and Return loss, 0201BB104, three K=3.9 substrate thicknesses, three 50-Ω linewidths



●Fig.11 Insertion and Return loss, 0201BB104, three K=6.5 substrate thicknesses, three 50-Ω linewidths



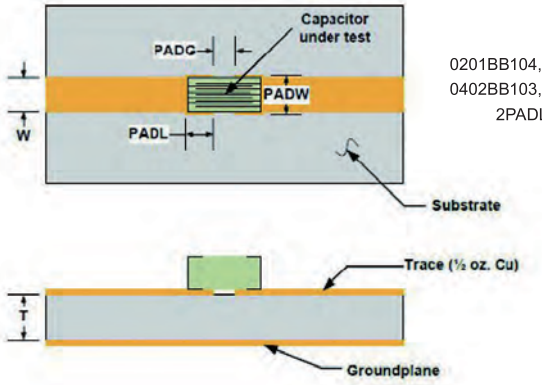
●Fig.11 Insertion loss, 0201BB104, three K=9.6(alumina) substrate thicknesses, three 50-Ω linewidths



It is seen that, in all cases, best performance (red curves) is achieved when the part width is about the same as W50, the 50-Ohm characteristic impedance trace width. If the part width is either significantly greater than W50 (blue curves) or less than W50 (green curves), performance is degraded. Note that this is roughly consistent with the very simple circuit of Fig. 6 and the seemingly naive observation above it that best performance would be obtained when (Ls/Cg)1/2 was about equal to 50 Ohms. (The caveats, however, still apply: The Fig. 6 circuit does not predict details of the frequency response.)

◆Mounting Pads and Impedance Matching

In light of the above, there is no one-size-fits-all prescription for mounting pad dimensions because there are too many variables involved: PC board dielectric constant and thickness, customer pick-and-place capabilities, PC trace tolerances, performance desired over frequency range, etc. In general, for good (but not necessarily optimum) performance, one wants the width of the part and mounting pad to be about equal to the width of a 50-Ohm trace on the substrate, and the lengths of the lands to extend only minimally beyond the length of the part. As for the gap, 5-mils nominal is a good starting point for the 020IBB104 and 01005BB104 — although (again) not necessarily the absolute optimum - while a 10-mil gap is a good starting point for the 0402BB103 and 0402BB104 . Fig. 13 illustrates these suggestions.



0201BB104,01005BB104: PADG=5 mils
0402BB103,0402BB104: PADG=10 mils
2PADL+PADG ≈ Part length

Fig 13 Pad installation layout

It may be of interest that the 020 IBB 104 model has a pad scalability feature, meaning that the landing pad dimensions can be changed within prescribed limits and the consequent electrical behavior characterized. Note that the min. and max. dimensions on the pads — PADL, PADW, PADG - are simply the ranges over which the model is valid, not recommended tolerances, as shown in Fig. 9.

Determining final pad tolerances often devolves to a struggle between RF engineers, who want the pad width and tolerance to match as closely as possible the part width and tolerance, and production processing engineers, who'd like the largest pad dimensions and tolerances possible to facilitate pick-and-place operation.Fortunately, performance over most frequency ranges through about 40 GHz seems relatively insensitive to small deviations of pad dimensions.

If the substrate thickness and trace width are determined before the broadband capacitor is selected, then it's best to choose a capacitor whose width is closest to that of the 50-Ohm trace. There is also the possibility of improvement if additional impedance matching is done. In general, when the part width exceeds the trace width, the imaginary part of the input impedance is capacitive, and the creation of additional series inductance by a short section of reduced trace width can help. Alternatively, removal of a portion of the dielectric beneath the capacitor (reducing the shunt capacitance to ground) can also be effective. Similarly, when the part width is less than the 50-Ohm trace width, the input impedance is inductive, and the creation of additional shunt capacitance by widening a section of trace width adjacent to one or both mounting pads, or the mounting pad widths (PADW) themselves, can improve performance.

An example of impedance matching is shown in Fig. 14, which applies to Dalicap model 01005BB104, a 100 nF EIA size 01005 part mounted on a 6.6 mil thick substrate of dielectric constant 3.9. The part itself is 8 mils wide and the trace it was mounted on was 12 mils wide. (The 50-Ohm trace width on the substrate at 10 GHz is 13.1 mils.) Using a scattering matrix for the part, return loss was plotted for (a) the part alone, and (b) a circuit that adds 5-mil-long sections of widened traces at input and output. Using Genesys5 s optimization function, dimensions of the traces were adjusted for best input and output return loss over the 0.05 to 46 GHz measurement range. It should be cautioned that, because of the part's insertion loss, input reflection after impedance matching at only one port is not necessarily equal to output reflection; one could improve return loss at one of the ports beyond that shown, but the improvement would come at the expense of the other port's reflection.

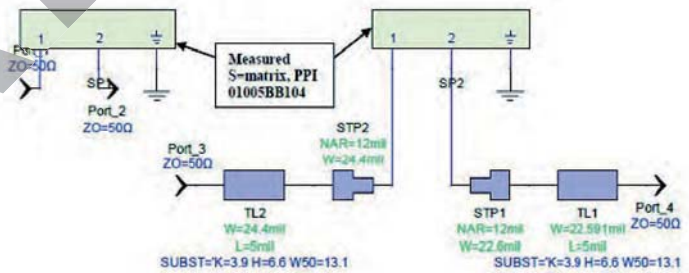


Fig.14a Circuit layout for 01005BB104M (a) as measured on K=3.9 H=6.6mil trace, and (b) with simple added impedance matching.

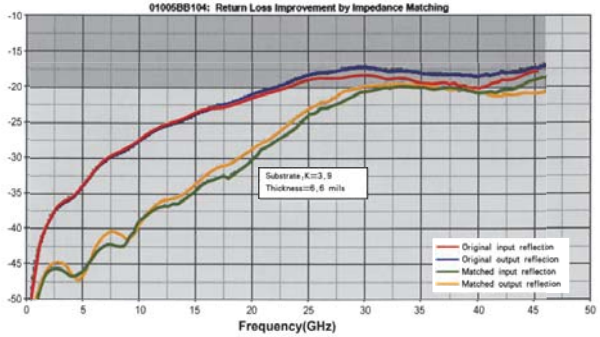


Fig.14b Input and Output Return loss, Dalicap 01005BB104 (red, blue) as measured on K=3.9 H=6.6 mil trace, and (orange, green) with added impedance matching

◆Non-linear Behavior — VCC Temperature, Aging

Thus far, we've discussed only the basic electrical performance of broadband capacitors as linear devices but, particularly where so-called "signal integrity" is important, e.g. in accurately reproducing a stream of (rectangular waveform) bits from input to output, a number of non-linear parameters are involved. Let's define the major ones before proceeding to some of the tradeoffs involved:

- The voltage coefficient of capacitance, VCC, is the change of capacitance — usually a decrease - with applied voltage. In general, VCC depends on the electric field (volts/mil) across the dielectric, and the higher the dielectric constant, the greater the VCC. Any decrease in capacitance is likely to impact the low-frequency range of performance. Fig. 15 shows the capacitance change with DC voltage for three PPI broadband MLCCs.

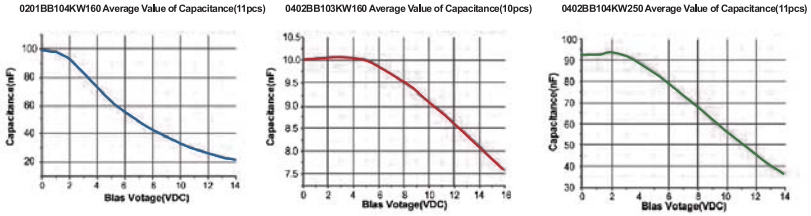


Fig.15 Capacitance change with DC voltage for three Dalicap broadband MLCCs

The voltage coefficient of capacitanceCapacitance will also change with AC voltage and frequency, sometimes rising with the latter before falling off.

- The Temperature coefficient of capacitance, TCC, is the change of capacitance with temperature. In general, the higher the dielectric constant, the greater will be its change with temperature. Most broadband capacitors have dielectrics rated as either X7R, signifying a ± 15% maximum capacitance change with temperature from - 55 to +125℃ or X5R, signifying a ± 15% maximum capacitance change with temperature from - 55 to +85℃. Again, any decrease in capacitance will impact the low-frequency range of performance.

- Aging is the tendency of non-linear dielectrics, e.g. the X7R type, to exhibit a reduction in dielectricconstant as time passes. It is usually given in "percent capacitance loss per decade hour,^^ implying that, on logarithmic graph paper where time is the " X?variable and capacitance is the "Y" variable, there is astraight line characteristic with a negative slope. Aging is typically measured starting from 10 to 24hours after a capacitor emerges from an oven set at a temperature above that of the dielectric's Curie temperature. Thus, a capacitor will lose capacitance by the same percentage from 10 hours to 100 hours as it will from 100 to 1000 or 1000 to 10,000. In order to be sure that customers receive a stable part, most manufacturers wait till the fourth decade, so that the part's age is between 1000 and 10,000 hoursbefore shipping. Nevertheless, when thinking about performance over shelf time at the factory and subsequent field life, customers should be cognizant that over 10,000 hours — about 14 months - capacitance values may, in the worst case (original shipment after 1000 hours), decrease by the aging specified maximum percentage.

Table 2 indicates some of the tradeoffs in design and selection of a broadband capacitor. The left-hand column contains independent parameters; the boxes show the results if any one parameter is changed as shown while the others are held constant.

Parameter	Parameter Change	Capacitance Low—freq. response	High Freq. Response	Voltage Rating (WVDC)	VCC	TCC	Aging
Case size	Smaller	Lower for same WVDC/Worse	Better	Lower for same capacitance	—	—	—
Dielectric constant	Higher	Higher/Better	—	—	Worse	Worse	Worse
Dielectric thickness	Lower	Higher/Better	—	Lower	Worse	—	—

Table2 Broadband capacitor tradeoffs with case size, dielectric constant, and dielectric thickness

In general, larger capacitance values enable operation down to lower frequencies. To extend the upper operating frequency, smaller case sizes are needed, since these are commensurate with the smaller substrate thicknesses and narrower line widths required for higher-mode-free, high-frequency operation. Therefore, to extend both ends of the spectrum, one must squeeze equal or greater capacitance into smaller case sizes, and the only ways to accomplish this are to either decrease the inter-electrode dielectric spacing and/or use a dielectric with a higher dielectric constant. The first reduces the voltage rating (WVDC), and either approach exacerbates the non-linear effects - and thus the tradeoffs.

◆Performance as a Bypass Device

It is often desired to bypass some point to ground over a large frequency range, that is, provide a path having very low impedance to RF signals while still blocking DC. In the past, this was typically accomplished by an array of capacitors having different values, as shown in Fig. 16.

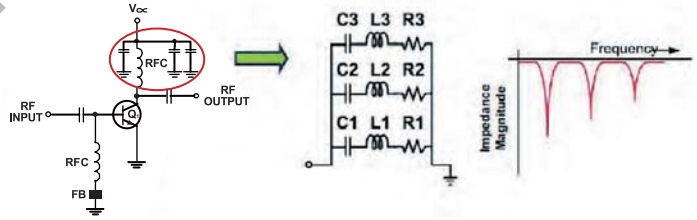


Fig.16 Capacitor array used as bypass to ground

Here, Cl might be perhaps 100 pF, C2 might be 1 nF, and C3 might be 10 nF. There were two problems with this arrangement: (1) Above the series resonance of C3 [= (27i)-1(L3C3)_0-5)], its impedance was inductive and would create a parallel resonance with Cl and C2; and (2), the individual capacitors had their own built-in parallel resonances. Either problem led to an impedance magnitude vs. frequency characteristic similar to that shown on the right of Fig. 16. To reduce the magnitude of the resonances, additional loss would need to be introduced in the form of low-value resistors connecting the capacitors or ferrite beads surrounding the connecting leads. In contrast, broadband capacitors offer a simple, cost effective way to replace these arrays with a single capacitor.

Product description of broadband ceramic capacitors

Again using Dalicap 0201BB104 on a 6.6 mil thick, K = 3.9 substrate, this time with a grounded output, Fig. 17 shows the real and reactive parts of the input impedance.

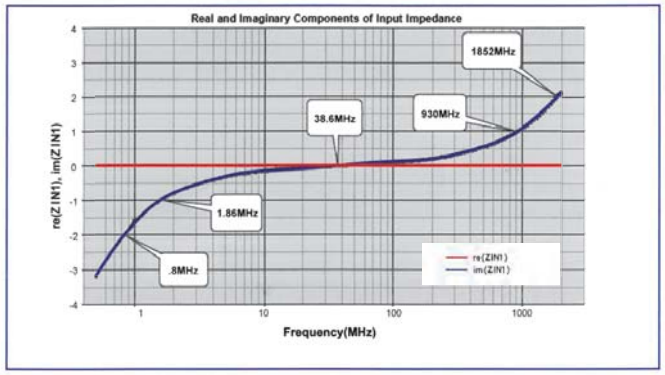


Fig.17 0201BB104K in bypass mode: Real and Imaginary parts of input impedance

It is seen that the reactance is inductive above 38.6 MHz and capacitive below that frequency; it is the magnitudes of these components that will determine the operational range. For example, if the absolute value of the impedance to ground needs to be < 1 Ohm, the frequency range over which this is achieved is 1.86 - 930 MHz; if the value can be extended to < 2 Ohms, the frequency range can be commensurately widened to cover 0.8 — 1852 MHz. Note that the plots do not include the inductive contribution of a via to the groundplane, which is likely required in many practical situations.

The inductive reactance could be reduced by decreasing spacing to the groundplane (although 6.6 mils is already quite thin), and total reactance can be reduced by paralleling two or more devices, but the latter may not be practical for reasons of space or economics. In summary, in a bypass mode, a broadband capacitor can effectively replace an array of capacitors to cover frequencies ranging from the high KHz/low MHz region to the low GHz region, depending on the requirements of the particular circuit.

◆Conclusions

The principal "take-aways" from the discussion are listed below:

- Used as DC blocking/RF coupling devices, SMT broadband ceramic capacitors can operate free of parallel resonances over a very wide frequency range. Resonances are suppressed by losses within the device.
- Circuit models, whether lumped or distributed, cannot adequately capture the effect of all the electrical phenomena involved in practical devices: mutual inductance and resistance of the electrodes; discontinuity reactances of microstrip-to-MLCC transitions (including solder joints); mounting pad dimensions that exceed those of the device5 s termination footprints; higher (non-TEM) mode generation; radiation; etc.
- Good experimental/theoretical combination models, such as those available from Modelithics Inc., enable performance simulation on a variety of substrate thicknesses and dielectric constants. Impedance matching can often be used to improve insertion loss and return loss performance.
- Non-linear effects - capacitance change with applied voltage, temperature, and time passage - can negatively affect performance. Tradeoffs can be made that impact maximum working voltage and case size.
- In a bypass mode, a single SMT ceramic capacitor can replace an array of various-value capacitors to effectively cover frequencies ranging from the high KHz/low MHz region to the low GHz region.

DLC Ceramic Thermal Conductor

◆ General Description

DLC Ceramic Thermal Conductor product is made of Aluminum Nitride (AlN), sizes are available in EIA form and also can be customized based on requests.□Ceramic Thermal Conductor provides a simple thermal management solution in circuit design by conducting heat to a thermal ground plane, heat sink etc., which will lower the temperature in some specific position in order to enhance the reliability of the adjacent components and circuit.
The inherently low capacitance makes this device virtually transparent at RF/microwave application. And it is manufactured with one-piece construction, providing a RoHS compliant SMT package that is fully compatible with high speed automated pick-and-place processing.

① Features

- More efficient thermal management
- High Thermal Conductivity
- Low Thermal Resistance
- Low Capacitance
- RoHS Compliant

② Applications

- GaN Power Amplifiers
- High RF Power Amplifiers
- Filters
- Synthesizers
- Switch Mode Power Supplies
- Pin & Laser Diodes

③Functional Applications

- Between active device and adjacent ground planes
- Specific contact pad to case
- Contact pad to contact pad
- Direct component contact to via pad or trace
- Edges fully metalized

◆Part Number

CTC	2525	A	302	W	T	60
❶	❷	❸	❹	❺	❻	❼
Ceramic Thermal Conductor	Case Size	Substrate A: ALN	Rated Voltage 302: 3000Vdc	Termination W: Tin/Nickel Plating over Silver P: Tin/Copper Plating over Silver	Packaging T: Tape & Reel	Thickness 60: 0.060 inch

Termination Materials

Code	Materials	RoHS
W	Tin/Nickel Plating over Silver	RoHS Compliant (AlN)
P	Tin/Copper Plating over Silver	RoHS Compliant (AlN)

Termination Options

Specific applications require certain materials for best use conditions.
Non-Magnetic applications are some of the leading examples with the strictest restraints.
To accommodate all designs, DLC Ceramic Thermal Conductor offers magnetic and non-magnetic termination styles.
Magnetic Terminations（W）
Tin/Nickel Plating over Silver
Non-Magnetic Termination（P）
Tin/Copper Plating over Silver

DLC Ceramic Thermal Conductor

Typical Characteristics

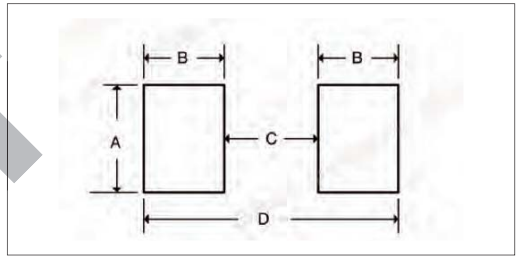
DLC Ceramic Thermal Conductor the length, width, and height are shown in the figure.

Size	Part Number	Capacitance (pF)	Capacitor Size						Thermal Resistance (°C/W)	Thermal Conductivity (mW/°C)
			Length(LC)	Wide(WC)	Thickness(TC)	Terminal(t)	Voltage Rating(v)	Wide(WC)	ALN	ALN
0505	CTC0505A251WT25	0.07		0.063 ± 0.006 (1.60 ± 0.152)	0.051 ± 0.006 (1.29 ± 0.152)	0.025 (0.64 ±0 .05)	0.015 (0.38) max	250	10	100
0603	CTC0603A251WT25	0.035		0.064 ± 0.006 (1.63 ± 0.152)	0.033 ± 0.006 (0.85 ± 0.152)	0.025 (0.64 ± 0.05)	0.015 (0.38) max	250	20	50
0805	CTC0805A251WT40	0.081		0.080 ± 0.008 (2.03 ±0.203)	0.050 ± 0.008 (1.27 ± 0.203)	0.04 (1.02 ±0.05)	0.02 (0.51) max	250	10	100
1005	CTC1005A501WT40	0.046		0.100 ± 0.008 (2.54 ±0.203)	0.050 ± 0.008 (1.27 ± 0.203)	0.04 (1.02 ±0.05)	0.02 (0.51) max	500	13	77
1111	CTC1111A501WT40	0.096		0.110 ± 0.008 (2.79 ±0.203)	0.110 ± 0.008 (2.79 ± 0.203)	0.04 (1.02 ±0.05)	0.03 (0.92 ±0.05) max	500	7	153
2010	CTC2010A202WT60	0.070		0.195 ±0.010 (4.95 ±0.254)	0.095 ± 0.010 (2.41 ± 0.254)	0.06 (1.52 ±0.05)	0.03 (0.77) max	2000	10	100
2525	CTC2525A302WT60	0.156		0.240 ± 0.010 (6.10 ±0.254)	0.250 ± 0.010 (6.35 ± 0.254)	0.06 (1.52 ±0.05)	0.04 (1.02) max	3000	4	240
3725	CTC3725A402WT60	0.105		0.370 ± 0.010 (9.40 ±0.254)	0.245±0.010 (6.22 ± 0.254)	0.06 (1.52 ±0.05)	0.05 (1.27) max	4000	6	160
3737	CTC3737A402WT60	0.164		0.365 ±0.010 (9.27 ±0.254)	0.375 ± 0.010 (9.53 ±0.254)	0.06 (1.52 ±0.05)	0.05 (1.27) max	4000	4	240
6725	CTC6725A502WT60	0.058		0.670 ± 0.010 (17.00 ±0.254)	0.250 ± 0.010 (6.35 ± 0.254)	0.06 (1.52 ±0.05)	0.05 (1.27) max	5000	10.7	93

Note: Any special requests, please contact DALICAP.

DLC Ceramic Thermal Conductor

Suggested Footprint



Inches（mm）

Case Size	A Min.	B Min.	C Min.	D Min.
0505	0.0512 (1.3)	0.0275 (0.7)	0.02 (0.5)	0.075 (1.9)
0603	0.0315 (0.8)	0.0275 (0.7)	0.0275 (0.7)	0.0825 (2.1)
0805	0.0512 (1.3)	0.039 (1)	0.039 (1)	0.118 (3)
1005	0.0512 (1.3)	0.039 (1)	0.059 (1.5)	0.138 (3.5)
1111	0.118 (3)	0.039 (1)	0.063 (1.6)	0.142 (3.6)
2010	0.118 (3)	0.059 (1.5)	0.126 (3.2)	0.244 (6.2)
2525	0.252 (6.4)	0.079 (2)	0.15 (3.81)	0.3075 (7.81)
3725	0.252 (6.4)	0.1 (2.54)	0.266 (6.75)	0.466 (11.83)
3737	0.386 (9.8)	0.1 (2.54)	0.266 (6.75)	0.466 (11.83)
6725	0.252 (6.40)	0.1 (2.54)	0.472 (12.00)	0.787 (20.00)

Installation Guide

◆Storage

① Chip capacitors can be packaged in tape or bulk

② Keep storage facility temperatures from +5℃ to +35℃, humidity less than 60%.

③ The storage atmosphere must be free of gas containing sulfur and chlorine. Avoid exposing the product to saline moisture. If the product is exposed to such atmospheres, the terminations will oxidize and solderability will be affected.

④ It is recommended that users use the capacitor within 12 months after receiving it, but it must be stored under the above conditions. If it exceeds 12 months, the electrical performance of the capacitor will not be affected, but the weldability may deteriorate.

◆Circuit Design

① Once application and assembly environments have been checked, the capacitor may be used in conformance with the rating and performance, provided in both the catalog and the specifications. Exceeding the specifications listed may result in inferior performance. It may also cause a short, open or smoking to occur, etc.

② Capacitors should be used in conformance with the operating temperature provided in both the catalog and the specifications using caution not to exceed the maximum temperature. If the maximum temperature set forth in both the catalog and specifications is exceeded, the capacitor's insulation resistance may deteriorate. Power may suddenly surge and short-circuit may occur. The capacitor has a loss and may self-heat due to equivalent series resistance when alternating electric current is passed through. As this effect becomes especially pronounced in high frequency circuits, please exercise caution. When using the capacitor in a (self-heating) circuit, please make sure the surface of the capacitor remains under the maximum temperature for usage. Also, please make certain temperature rise remains below 20°C.

③ Please keep voltage under the Rated Voltage, which is applied to the capacitor. Also, please make certain the Peak Voltage remains below the Rated Voltage when AC or voltage is super-imposed to the DC voltage. In the situation where AC or pulse voltage is employed, ensure average peak voltage does not exceed the Rated Voltage. Exceeding the Rated Voltage provided in both the catalog and specifications may lead to defect with standing voltage. In worse case situations, it may cause the capacitor to smoke or flame.

◆Handling

Chip capacitors should be handled with care to avoid contamination or damage. The use of vacuum pick-up or plastic tweezers is recommended for manual placement. Tape and reeled packages are suitable for automatic pick and placement machines.

◆Flux

① An excessive amount of flux or too rapid temperature rise causes solvent burst, and solder can generate a large quantity of gas. The gas spreads small solder particles which can cause a solder balling effect or bridging problem.

② Flux containing too high a percentage of halide may cause corrosion of termination unless sufficiently cleaned.

③ Use rosin-type flux, and do not use a highly acidic flux (halide content less than 0.2 wt%).

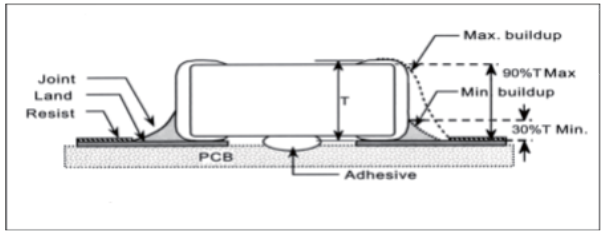
④ The water soluble flux causes deteriorated insulation resistance between outer termination unless sufficiently cleaned.

◆Component Spacing

For wave soldering components, the spacing must be sufficiently far apart to prevent bridging or shadowing. This is not so important for the reflow process, but sufficient space for rework should be considered. The suggested spacing for reflow soldering and wave soldering is 0.5mm and 1.0mm, respectively.

◆Solder Fillet

Too much solder amount may increase solder stress and cause cracking risks. Insufficient solder amount may PCB. When soldering, confirm that the solder is 30%T to reduce adhesive strength and cause parts to fall off 90%T.



Installation Guide

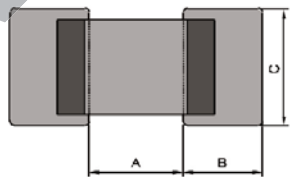
◆Recommended pad style

When mounting capacitors onto the solder pads of a circuit board, it is essential to carefully consider the amount of solder (solder fill size), as the size of the solder pad directly affects the installation of the capacitor.

① The larger the solder pad, the more solder is used, which in turn increases the stress on the capacitor during soldering, potentially increasing the risk of capacitor fracture

② When two or more capacitors are mounted on the same pad, solder barrier tape can be used to separate them

● Horizontal installation

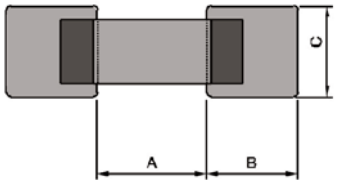


Horizontal installation - recommended values for reflow soldering pad dimensions (unit: mm)										
	0201	0402	0603	0505	0805	1111	2225	3838	6040	7575
A	0.2–0.3	0.3–0.5	0.70	0.70	1.00	2.00	4.00	7.10	13.00	16.00
B	0.2–0.35	0.35–0.45	0.90	0.60	0.80	1.50	2.30	3.00	3.30	3.30
C	0.2–0.4	0.4–0.6	0.90	1.50	1.30	2.80	7.00	10.00	11.30	19.60

Horizontal installation - recommended values for manual soldering pad dimensions (unit: mm)						
	0603	0505	0805	1111	2225	3838
A	0.70	0.70	1.10	1.90	3.90	7.10
B	2.00	2.00	2.00	2.50	4.00	5.00
C	0.90	1.50	1.40	2.90	7.00	10.20

Installation Guide

●Vertical installation



Vertical installation - recommended values for reflow soldering pad dimensions (unit: mm)						
	0505	0805	1111	2225	3838	0708
A	0.70	1.10	1.90	3.90	7.10	0.90
B	0.90	1.10	1.70	2.50	3.00	1.00
C	1.50	1.40	2.50	4.00	5.00	2.90

Vertical installation - recommended values for manual soldering pad dimensions (unit: mm)						
	0505	0805	1111	2225	3838	0708
A	0.70	1.10	1.90	3.90	7.10	0.90
B	2.00	2.00	2.50	4.00	5.00	2.00
C	1.50	1.40	2.50	4.00	5.00	2.90

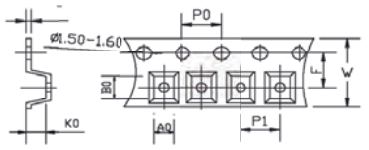
Installation Guide

◆Tape and reel specifications

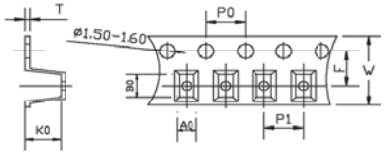
	A0 (mm)	B0 (mm)	K0 (mm)	W (mm)	P0 (mm)	P1 (mm)	T (mm)	F (mm)	QTY (pcs/Min)	QTY (pcs/reel)	Taping carrier material
0201—H	0.40	0.70	—	8.00	4.00	2.00	0.42	3.50	1000	15000	Paper
0402—H	0.70	1.20	—	8.00	4.00	2.00	0.65	3.50	1000	10000	Paper
0505—H	1.50	1.75	1.15	8.00	4.00	4.00	0.22	3.50	500	3000	Plastic
0505—H	1.40	1.80	0.95	8.00	4.00	4.00	0.25	3.50	500	3000	Plastic
0505—H	1.50	1.75	1.30	8.00	4.00	4.00	0.22	3.50	500	3000	Plastic
0505—V	1.10	1.60	1.40	8.00	4.00	4.00	0.30	3.50	500	1000	Plastic
0603—H	1.05	1.80	—	8.00	4.00	4.00	0.95	3.50	500	4000	Paper
0708—H	1.90	2.65	2.20	8.00	4.00	4.00	0.25	3.50	500	1000	Plastic
0805—H	1.45	2.30	0.95	8.00	4.00	4.00	0.22	3.50	500	3000	Plastic
0805—H	1.37	2.20	1.20	8.00	4.00	4.00	0.22	3.50	500	3000	Plastic
0805—V	1.35	2.25	1.35	8.00	4.00	4.00	0.22	3.50	500	1000	Plastic
1111—H	2.85	3.50	1.95	8.00	4.00	4.00	0.25	3.50	500	2000	Plastic
1111—H	2.85	3.60	2.40	8.00	4.00	4.00	0.25	3.50	500	2000	Plastic
1111—V	2.30	3.55	2.70	12.00	4.00	4.00	0.40	5.50	500	1500	Plastic
1206—H	1.91	3.51	1.30	8.00	4.00	4.00	0.25	3.50	500	2000	Plastic
1210—H	2.85	3.50	1.95	8.00	4.00	4.00	0.25	3.50	500	2000	Plastic
1210—H	2.85	3.60	2.40	8.00	4.00	4.00	0.25	3.50	500	2000	Plastic
1210—V	2.30	3.55	2.70	12.00	4.00	4.00	0.40	5.50	500	1500	Plastic
2225—H	6.70	6.20	3.40	16.00	4.00	12.00	0.30	7.50	100	500	Plastic
2225—V	4.10	6.15	6.55	16.00	4.00	8.00	0.40	7.50	100	300	Plastic
3838—H	10.10	10.10	3.30	16.00	4.00	16.00	0.30	7.50	50	300	Plastic
3838—H	10.10	10.10	4.30	16.00	4.00	16.00	0.40	7.50	50	200	Plastic
3838—V	4.30	10.10	10.10	24.00	4.00	12.00	0.50	11.50	50	500	Plastic

Remark: The specific dimensions may vary depending on the external supplier

●Horizontal direction



●Vertical direction



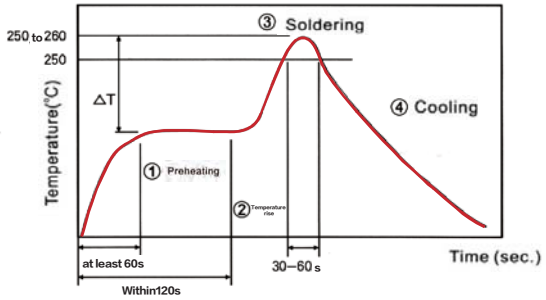
◆Resin molding

If a large amount of resin is used to mold capacitors, the shrinkage stress during solidification may cause cracks in the ceramic body. To avoid cracks, please use low-shrinkage resin. Carefully check that the resin does not produce decomposed or reactive gases during the curing process and storage. These gases can cause cracks in the capacitor or damage the device itself

Soldering

◆Reflow soldering

When sudden heat is applied to the elements, the mechanical strength of the components should decrease because remarkable temperature change can cause deformity of components inside. Also, long soldering time or high soldering temperatures, result in leaching by the external electrodes, causing poor adhesion or a reduction in capacitance value due to loss of contact between electrodes and end termination.
In order to avoid mechanical damage in the elements, preheating should be requested for both of the components and the PCB board. Preheating conditions are given in the table below. It is requested to keep the temperature gap between the soldering and the elements surface (ΔT) as small as possible.
When elements are submerged in solvent after mounting, be sure to maintain the temperature gas (ΔT) between the element and solvent within the range shown in the table below. Do not apply the flow soldering to capacitors not listed in the table below.



Capacitor series	0402/0603/0505/0805/1210	2225/3838
Preheating	△T≤190°C	△≤150°C
Suggested solder paste type	SAC305	

◆Soldering iron

A temperature-controlled iron of suitable wattage is strongly recommended. The iron temperature should typically be set 20-30°C above the solder liquidus temperature. Tip size is important; it should be about the same size as the part. Too small a tip (corresponding to an iron of insufficient wattage) will take too long to heat the printed circuit board land and part, while too large a tip (too high a wattage iron) may damage the board or component.

Soldering Procedure

The initial consideration is which end of the capacitor to solder first. The choice can generally be decided by recognizing that it is desirable to minimize the heat flowing directly through the component. Thus, it is best to start from the end that has the poorest heat conduction (equals highest thermal resistance) to a heat sink. (Were one to start from the opposite end, a good heat path would have been created through the capacitor to the heat sink when one soldered the second joint.) If it is not apparent which land has the poorer connection to a heat sink, begin with the one having the smallest area.

Follow these steps in soldering:

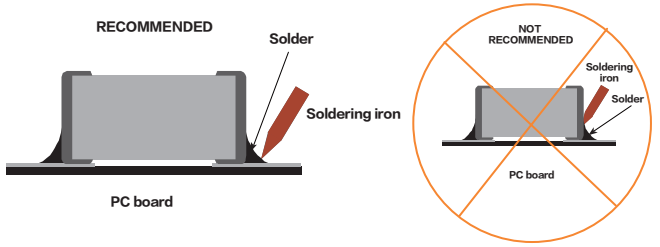
1. Pre-heat the substrate.
Where possible, it is very desirable to gradually pre-heat the substrate, e.g. on a hotplate, to about 30°C below the solder liquidus temperature. Two steps are usually sufficient: Start the hotplate at a temperature about halfway to the desired pre-heat temperature, place the board on it and wait till the board temperature stabilizes, then increase the hotplate temperature to the desired final pre- heat value.

2. Pre-"tin" the traces
2.Select one of the PC board lands and clean it with isopropyl alcohol. If the solder you are using does not contain its own flux, place a small quantity of flux on the land, and a small amount of solder into the flux. (A razor may be used to cut a tiny custom preform from solid wire.) Place the iron on the printed circuit trace adjacent to the flux (but not touching) and heat the land until the solder melts into a flat, shallow pool. Remove the iron, then clean off any remaining flux with isopropyl alcohol. Repeat the procedure for the second land, then add fresh flux and a fresh solder preform (if not using flux-core solder) to each tinned land. The preform should have sufficient mass to create a proper fillet(see step 5)on the component.

3. Pick up the component with either a hand tweezer or vacuum tweezer (Stainless steel or ceramic- tipped tweezers are preferred.)

4. Place the component so that it straddles the circuit board lands, and make sure it lies flat on the board. As shown in Fig. 1, Do not touch the component directly with the soldering iron. Rather, touch the iron to the land adjacent to the capacitor until the solder begins to flow; then move the iron slowly toward the component.

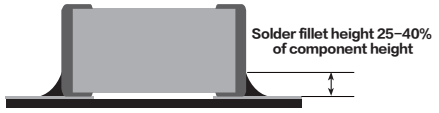
Fig. 1



5. When a fillet forms, remove the iron. As shown in Fig. 2, solder fillets should occupy about 25-40% of the component's height, have a concave profile, and be free of peaks and voids.

6. Repeat steps 1-5 for the second joint, then let the board cool gradually to room temperature. Use isopropyl alcohol to remove any residual flux from each joint.

Fig. 2

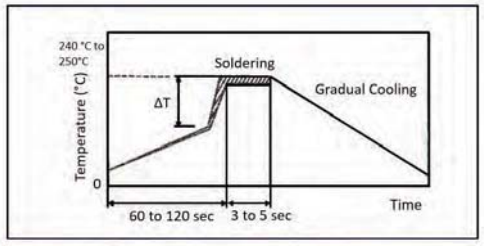


Installation Guide

◆Wave Soldering

When heating a capacitor, significant temperature changes can cause internal deformation, leading to a decrease in its mechanical strength. To prevent mechanical damage to the capacitor, both the circuit board and the capacitor should be preheated during soldering. The preheating conditions are listed in the table below. It is required to keep the temperature difference (△T) between the solder and the capacitor surface as small as possible. After soldering, when the capacitor is immersed in a solution, the temperature difference (△T) between the capacitors and the solution should be within the range specified in the table below.

Do not apply the wave soldering to capacitors not listed in the table below.



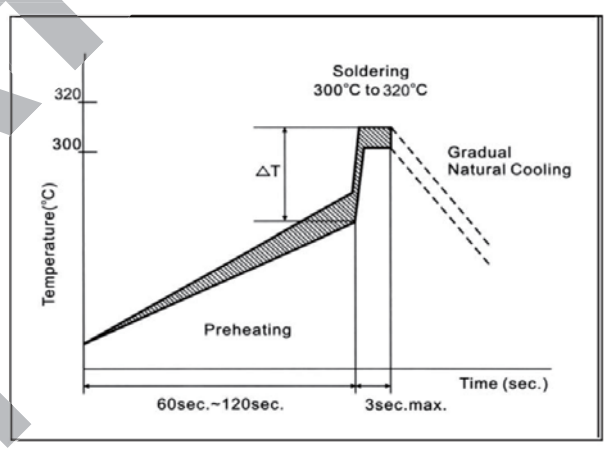
Series	0402/0603/0505/0805
Preheating	△T≤150℃

Remark: Dalicap does not suggest to use wave soldering for 70B, 70C, 70E.

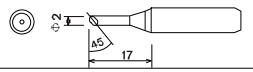
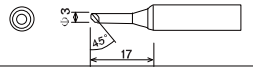
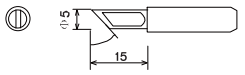
Installation Guide

◆Soldering Iron

When sudden heat is given to the elements by soldering iron, the mechanical strength of the components should weaken because sharp temperature change can cause deformity of components inside. In order to avoid mechanical damage in the elements, preheating should be requested for both of the components and the PCB board. Preheating conditions are given in the below table. It is requested to keep the temperature gap between the soldering and the elements surface (ΔT) as small as possible. After the soldering, it should not be allowed to cool down suddenly.



◆Chip capacitor electric soldering iron welding

Dimension	Electric soldering iron	Temperature	Electric soldering iron dimension	solder
0505/0805	70W temperature-controlled soldering iron	330℃		63Sn/37Pb, SAC305
1210	70W temperature-controlled soldering iron	350℃		
2225	70W temperature-controlled soldering iron	370℃		
3838	70W temperature-controlled soldering iron	370℃		

Note: When mounting on a thermally conductive copper foil with an area much larger than the solder pad, it is necessary to appropriately increase the soldering temperature (to 420℃). If a higher soldering temperature is required, it is recommended to use microstrip capacitors.