World-Class Logistic Services & Support

Richardson Electronics offers a full line of industrial microwave products. Specializing in CW magnetrons and waveguide components, including launchers, isolators, directional couplers, tuners and loads, Richardson also offers complete microwave generators as well as the individual components necessary to build your own system. We offer transformers, high voltage diodes, capacitors, arc detectors, supervisory boards and diode detectors along with many other components necessary for the original equipment manufacturer that is designing an industrial microwave system. To insure safe operation of microwave equipment we also offer leakage meters and area detectors. With our manufacturing and engineering capabilities we can also offer custom designed products.

Call Richardson Electronics today — and have the industrial microwave components you need tomorrow!

Applications Engineering Support

Rely on our world-class power conversion applications engineering team to support your current designs and future applications. Call or e-mail us at ipg@rell.com.

Cross-Referencing

Our cross-reference library contains hundreds of thousands of part numbers accumulated over 50 years of experience. Selecting the right industry standard product for your application is as easy as calling Richardson Electronics or visiting our on-line catalog at http://industrial.rell.com.

Logistics Support

Through a world-class logistics support network (including 45 worldwide stocking locations), Richardson provides services designed to meet or exceed customer expectations. Some of these services include: 24 hours/7 days per week “on call” support; ship scheduling to meet JIT or future planned need dates; consolidated shipments (both to domestic or international locations); special re-packing and/or labeling (including bar-code labels to assist your receiving department); coordination with our customers’ freight carriers; consolidated purchasing services; special product testing or acting as the 3rd party logistics provider for your company.

Inventory Management Program

We will custom design our process to work for your requirement. Whatever replenishment tool you use — PC-based, bar coding, wand — can be interfaced with our system to deliver our stock to your production line efficiently and cost-effectively.

Electronic Data Interchange

Like many Fortune 500 customers utilizing our EDI capabilities, you can save time, money and eliminate paperwork. Your purchase order is transmitted to our EDI computer system which mobilizes our distribution logistics team to get the products you need out the door promptly.

Some Day Shipping Up to 6 PM (CST)

Same day shipments to domestic U.S. customers are provided when the stock order is received in the Richardson distribution center as late as 6 PM (Central Standard Time). Depend on our extensive inventory (70,000 SKUs) and efficient logistical system to get your order shipped today.

What is “Value-Added?”

Richardson Electronics believes value-added services are a total team effort of product customization, with an emphasis on quality.

“Value-added” is the process through which Richardson Electronics enhances a product or service before offering it to our customers. We utilize our unique manufacturing capabilities, technical knowledgde and design-in support capabilities to meet our customers’ stringent requirements. Offering cost-effective, engineered solutions to our valued customers is our mission.

915 MHz: Waveguide Components

Straight Sections

Straight waveguide is supplied either as a raw cut waveguide section or with flanges attached. The length of a straight waveguide piece is measured from face to face of the flanges. We also offer painted and special plating (e.g. irridite) options. Please contact us for a quote.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Material</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR975WGXXXXC</td>
<td>Copper</td>
<td>WR975</td>
<td>Straight section (no flanges)</td>
</tr>
<tr>
<td>WR975WGXXXXA</td>
<td>Aluminum</td>
<td>WR975</td>
<td>Straight section (no flanges)</td>
</tr>
<tr>
<td>WR975WGXXXXC</td>
<td>Copper</td>
<td>WR975</td>
<td>Straight section with flanges on either end.</td>
</tr>
<tr>
<td>WR975WGXXXXA</td>
<td>Aluminum</td>
<td>WR975</td>
<td>Straight section with flanges on either end.</td>
</tr>
</tbody>
</table>

X XXX = Length in mm (±2 mm)

Y = Flange type (1, 2, 3 or 4) see flange section below for detailed description.

Sample Part Number: WR975WG0422A3
- WR975 Waveguide straight section
- 422mm in length
- Aluminum material
- Two attached WR975FLAN3 type flanges

Flanges

Waveguide flanges are used to connect waveguide sections to one another.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR975FLAN1</td>
<td>WR975</td>
<td>Brass, Flat, Pocket</td>
</tr>
<tr>
<td>WR975FLAN2</td>
<td>WR975</td>
<td>Brass, Choke, Pocket</td>
</tr>
<tr>
<td>WR975FLAN3</td>
<td>WR975</td>
<td>Aluminum, Flat, Pocket</td>
</tr>
<tr>
<td>WR975FLAN4</td>
<td>WR975</td>
<td>Aluminum, Choke, Pocket</td>
</tr>
</tbody>
</table>

Richardson also offers the following waveguide components in WR284, 340, 430 & 975:
- Sliding Shorts
- Step Twists
- Gas Barrier Windows
- Tees & Folded Tees
- Flexible Waveguide
- Slotted Waveguide
- E/H Tuners
- Mitered Bends

E-Commerce

RELL Online, Richardson Electronics’ catalog on the web, now offers electronic commerce capabilities. Navigate through our extensive product offering of more than 130,000 items and place an order 24 hours a day, 7 days a week.

Enter catalog.rell.com in your browser to access our catalog.
Couplers
Directional couplers are waveguide components used to measure forward and/or reflected microwave energy.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Freq. (MHz)</th>
<th>Coupling Factor</th>
<th>Directivity</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR975DDCN*</td>
<td>915**</td>
<td>60</td>
<td>27dB</td>
<td>WR975</td>
<td>Single directional coupler with a female N-type connector.</td>
</tr>
<tr>
<td>WR975DDCA</td>
<td>915**</td>
<td>N/A</td>
<td>20 dB</td>
<td>WR975</td>
<td>Dual directional coupler with 2, BNC output detector diodes.</td>
</tr>
<tr>
<td>WR975DDCB</td>
<td>915**</td>
<td>N/A</td>
<td>20 dB</td>
<td>WR975</td>
<td>Dual directional coupler, includes galvanometers for reading forward &amp; reflected power.</td>
</tr>
<tr>
<td>WR975DDC60A*</td>
<td>915**</td>
<td>60</td>
<td>27 dB</td>
<td>WR975</td>
<td>Dual directional coupler with female N-type connectors.</td>
</tr>
</tbody>
</table>

* Additional coupling factors available on request (e.g. 30 dB, 50 dB and 60 dB).
** 896 & 922 MHz couplers available on request.

Coaxial adapters are waveguide components used to convert from standard waveguide to a specified coaxial waveguide connector.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Max. Power (kW)</th>
<th>VSWR</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR975/COAXTRANS</td>
<td>0.3</td>
<td>&lt;1.15</td>
<td>WR975</td>
<td>Waveguide to N-type connector.</td>
</tr>
<tr>
<td>WR975/COAX7/16</td>
<td>1.2</td>
<td>&lt;1.15</td>
<td>WR975</td>
<td>Waveguide to 7/16” connector.</td>
</tr>
<tr>
<td>WR975/COAX7/8</td>
<td>2.0</td>
<td>&lt;1.15</td>
<td>WR975</td>
<td>Waveguide to 7/8” connector.</td>
</tr>
<tr>
<td>WR975/COAX1/5-8</td>
<td>5.0</td>
<td>&lt;1.15</td>
<td>WR975</td>
<td>Waveguide to 1 5/8” connector.</td>
</tr>
</tbody>
</table>

Industrial Microwave Heating
by A. G. Metaxas and R. J. Meredith
Order No. PUB-101

This book offers a broad coverage of the theory and practice of industrial microwave heating. It introduces the physical processes behind dipolar and conductivity loss mechanisms and follows with a thorough presentation of dielectric property data of many industrial materials as a function of the moisture content, temperature and frequency, focusing on the interpretation of such data with regard to the suitability for processing these materials with microwave energy. The basic equations which govern the power dissipation, attenuation, phase constant, penetration depth, and skin depth are derived from first principles while the transport equations of heat, mass and pressure are qualitatively described, giving particular emphasis to the physical mechanisms behind high frequency drying.

The book provides established procedures backed by theoretical formulations for the design of industrial travelling wave and multimode applicators. It provides extensive coverage of single mode fundamental or higher order resonant cavities and it outlines a number of atypical applicator structures. It describes the essential features of processing with microwaves under vacuum and presents a brief introduction to the mechanisms which lead to gas breakdown. It stresses the need for a degree of hybridization with other electrical or conventional heating systems and discusses a few such schemes. The book outlines a number of systems for limiting leakage from on-line industrial microwave systems and concludes with an extensive discussion of successful industrial applications.

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RELL Online, Richardson Electronics’ catalog on the web, now offers electronic commerce capabilities. Navigate through our extensive product offering of more than 190,000 items and place an order 24 hours a day, 7 days a week.

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Efficient: Search by part number, key product characteristics, manufacturer or keyword to quickly find the item you are looking for.

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Other features of RELL Online include the ability to view thousands of datasheets, search new and featured products, as well as the ability to check the status of an order.

Existing Richardson customers may also be linked to their corporate account and receive the added benefits of their open account status.
Definitions

A guide to terms used in our catalog.

Anode
The electrode to which a principle electron stream flows by means of application of a positive voltage with respect to the cathode.

Antenna
The conductor used to couple energy from the magnetron resonant circuit to the launcher.

Applicator
That part of the microwave system used to transmit the microwave power to the product or load, typically designed for products of similar microwave properties.

Arc
Phenomenon caused by electrical breakdown between two conductors that results in the generation of visible light and high currents that may lead to damage or catastrophic failure of the magnetron.

Arc detector
An instrument used to detect waveguide arcs and provide a disabling signal to the magnetron power supply.

CW
Continuous wave.

Cathode/Filament
The electrode which is the primary source of an electron stream, typically constructed of carbonized thoriated tungsten wire which is directly heated by application of filament voltage.

Circulator
A three-port waveguide component utilizing ferrite technology to selectively direct energy to a specific port based on the direction of wave propagation.

Isolator
A circulator with a dummy load attached to one port, utilized to protect the magnetron from power reflected by the product/load.

Directional coupler
A device used to couple power from the waveguide system at a reduced value to facilitate equipment interface for frequency, power and other system measurements. Dual couplers are available that can be used to couple both forward and reverse power.

Dummy load
An air or water-cooled load that dissipates the power applied with little or no reflection.

F, f
Frequency/center frequency.

Ip
Mean anode current.

Ipe
Peak anode current.

Ih
Filament/heater current.

Ie
Electromagnet current.

ISM frequency bands
Industrial, scientific and medical bands allocated (with only minor variations worldwide) for use in activities at 915 MHz (L-band) and 2450 MHz (S-band).

Laucher/launching section
A waveguide component designed for a specific magnetron that couples the microwave energy from the antenna to the waveguide system.

Magnetron
A low-cost, efficient, cross-field microwave oscillator.

Moding
Operational instability of the magnetron resulting in oscillations at other than the fundamental frequency.

Parameters that cause moding are load VSWR and phase, and power supply design with respect to current waveform and input current regulation. Moding can lead to damage or catastrophic failure of the magnetron.

Pp
Average output power.

Power supply
The system that interfaces with the magnetron input terminals to provide power for filaments and oscillation of the device. System control circuits and magnetron fault protection are typically incorporated into this unit.

Probe
Used in the design phase of a microwave system to determine the operating point of the magnetron on the Rieke diagram with respect to the load.

Rieke diagram
A circular chart describing the relationship between the output phase and VSWR of a microwave system with respect to the operating frequency and output power of the magnetron.

Sink phase
The target operating phase of the magnetron, denoted on the Rieke diagram by a convergence of the frequency contours in conjunction with high output power. In order to avoid damage to the magnetron, the microwave system should be designed for operation in the sink phase.

Tuner
A mechanical waveguide component used for matching of the load impedance to that of the magnetron, thereby reducing reflected power and maximizing coupling of power to the load/product.

Vap
Mean anode voltage.

Vap
Peak anode voltage.

Vh
Filament/heater voltage.

Ve
Electromagnet voltage.

VSWR
Voltage standing wave ratio.

Waveguide components
A circular chart describing the relationship between the output phase and VSWR of a microwave system with respect to the operating frequency and output power of the magnetron.

Auto & Electrical Tuners
Auto & electrical tuners utilize motorized tuning stubs electronically controlled either remotely or by a microprocessor to match the load impedance with the source impedance. Auto & electrical tuners minimize the amount of reflected power, which results in the most efficient coupling of power to the load. Auto-tuners are generally used in applications where the load impedance varies significantly due to variations in the load.

Waveguide
A circular chart describing the relationship between the output phase and VSWR of a microwave system with respect to the operating frequency and output power of the magnetron.

Wavesguide bends are used to change direction in the waveguide transmission system.

Auto & Electrical Tuners
Auto & electrical tuners utilize motorized tuning stubs electronically controlled either remotely or by a microprocessor to match the load impedance with the source impedance. Auto & electrical tuners minimize the amount of reflected power, which results in the most efficient coupling of power to the load. Auto-tuners are generally used in applications where the load impedance varies significantly due to variations in the load.

Wavesguide bends are used to change direction in the waveguide transmission system.
### 915 MHz: Waveguide Components

#### Circulators and Isolators

A circulator is a passive, non-reciprocal device with three or more ports used to transmit microwave energy in a specific direction. Additionally, circulators are used to prevent reflected microwave energy from the load, thus preventing excessive magnetron heating or moding. An isolator is a circulator with a water or dry load attached to a port and is used to absorb the reflected energy.

#### Typical System Diagram

Richardson Electronics offers the components to help build a system similar to the one shown below.

---

### Control of Magnetron Output Power

The output power of a magnetron is proportional to the average operational anode current of the device. Variable output power is typically accomplished via one of the following methods of current control:

1. **Control of average anode current by variation of the duty cycle**
   This method requires operation of the magnetron at varying duty cycles. An increase in the duty cycle results in an increase in average current and a corresponding increase in output power. This approach may be implemented at a relatively low cost. The disadvantage of duty cycle control is that the output power is not constant with time. Periods of operation at high peak power levels followed by periods of no power will result, rendering this approach unacceptable for some applications.

2. **Control of peak anode current by power supply**
   Methods of power supply design may be employed that allow control of the peak anode current. These methods provide continuous output power. The disadvantage of this method is the cost and complexity of the power supply design.

3. **Control of anode current by variation of magnetic field**
   Magnetrons, like all electron tubes, have a finite life and should be considered a consumable item. There are a number of factors that contribute to the life of a magnetron. Certain steps may be taken to avoid shortened life. Care should be taken in the design of the power supply to ensure the magnetron is operated within specified parameters. The various input voltage and current specifications should be followed, particularly the filament voltage, peak anode voltage, and average anode current. Where applicable, the filament reduction schedule should be followed.

---

### Extending Magnetron Life

Magnetrons, like all electron tubes, have a finite life and should be considered a consumable item. There are a number of factors that contribute to the life of a magnetron. Certain steps may be taken to avoid shortened life. Care should be taken in the design of the power supply to ensure the magnetron is operated within specified parameters. The various input voltage and current specifications should be followed, particularly the filament voltage, peak anode voltage, and average anode current. Where applicable, the filament reduction schedule should be followed.

Adequate cooling should be provided to the magnetron. Most magnetrons rated below 3 kW of output power only require air cooling, however water cooling is a more effective method of dissipating heat and will increase the life of the magnetron. Most magnetrons rated 3 kW and above require water cooling for adequate heat dissipation. The magnetron data sheet will specify the minimum air or water flow required for cooling the magnetron. Even small amounts of microwave energy reflected by the load can be damaging to the magnetron. Reflected energy absorbed by the magnetron may cause overheating and moding, leading to premature failure. Reflective power may also affect magnetron operation by changing output power or causing a frequency shift. The use of an isolator (circulator) is recommended to minimize the amount of reflected energy and protect the magnetron. Although an isolator is an added expense to the total system cost, it will reduce expensive downtime and long-term maintenance costs. An isolator will normally operate throughout the life of the system, and it has the added benefit of stabilizing the output of the magnetron for more critical applications.

---

### Table: Part Number Details

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Freq. (MHz)</th>
<th>Rated Power (kW)</th>
<th>Min. Isolation (dB)</th>
<th>Max. Insertion Loss (dB)</th>
<th>Flange Type</th>
<th>Dummy Load</th>
<th>Recommended for use with Magnetron</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR975CIRC100A</td>
<td>915</td>
<td>100</td>
<td>—</td>
<td>—</td>
<td>EIA CPR975*</td>
<td>WR975LOAD30A</td>
<td>NLM915-100</td>
</tr>
<tr>
<td>WR975CIRC100B</td>
<td>922</td>
<td>100</td>
<td>19</td>
<td>0.2</td>
<td>EIA CPR975*</td>
<td>WR975LOAD30B</td>
<td>NLM922-100</td>
</tr>
<tr>
<td>WR975CIRC100C</td>
<td>896</td>
<td>100</td>
<td>19</td>
<td>0.2</td>
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<td>WR975LOAD30C</td>
<td>NLM966-100</td>
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<tr>
<td>0915.201.304.00</td>
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<td>75</td>
<td>20</td>
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<td>0915.203.303.00</td>
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<tr>
<td>0896.201.304.00</td>
<td>896</td>
<td>75</td>
<td>20</td>
<td>0.1</td>
<td>—</td>
<td>EIA CPR975*</td>
<td>0896.203.303.00</td>
</tr>
<tr>
<td>WR975CIRC50A</td>
<td>915</td>
<td>50</td>
<td>20</td>
<td>0.2</td>
<td>1.25:1</td>
<td>EIA CPR975*</td>
<td>WR975LOAD30A</td>
</tr>
<tr>
<td>WR975CIRC50B</td>
<td>922</td>
<td>50</td>
<td>20</td>
<td>0.2</td>
<td>1.25:1</td>
<td>EIA CPR975*</td>
<td>WR975LOAD30B</td>
</tr>
<tr>
<td>WR975CIRC50C</td>
<td>896</td>
<td>50</td>
<td>20</td>
<td>0.2</td>
<td>1.25:1</td>
<td>EIA CPR975*</td>
<td>WR975LOAD30C</td>
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<td>0915.201.124.00</td>
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<td>30</td>
<td>20</td>
<td>0.1</td>
<td>—</td>
<td>EIA CPR975*</td>
<td>0915.203.303.00</td>
</tr>
<tr>
<td>WR975SICL5A</td>
<td>915</td>
<td>5</td>
<td>20</td>
<td>0.3</td>
<td>1.2</td>
<td>EIA CPR975*</td>
<td>Integral Dummy Load</td>
</tr>
<tr>
<td>WR975SICL5B</td>
<td>915</td>
<td>5</td>
<td>20</td>
<td>0.3</td>
<td>1.2</td>
<td>EIA CPR975*</td>
<td>Integral Dummy Load</td>
</tr>
</tbody>
</table>

* British 18-Hole Flange Available Upon Request.
2450 MHz: Low Power Microwave Heads

**Alter Low Power Microwave Heads**

**Designed for Switching Power Supplies (Variable Output)**

<table>
<thead>
<tr>
<th>Max Output Power</th>
<th>Part Number</th>
<th>Freq. MHz</th>
<th>Cooling Type</th>
<th>Recommended Power Supply</th>
<th>Cable Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>900 W</td>
<td>TM00.9V0x</td>
<td>2450</td>
<td>Air</td>
<td>CM340E</td>
<td>Call</td>
</tr>
<tr>
<td>900 W</td>
<td>TM00.9V0x</td>
<td>2450</td>
<td>Water</td>
<td>CM340E</td>
<td>Call</td>
</tr>
<tr>
<td>1200 W</td>
<td>TMA1.2V0x</td>
<td>2450</td>
<td>Air</td>
<td>SM445G or CM440E</td>
<td>Call</td>
</tr>
<tr>
<td>1200 W</td>
<td>TMA0.2V0x</td>
<td>2450</td>
<td>Water</td>
<td>SM445G or CM440E</td>
<td>Call</td>
</tr>
<tr>
<td>1500 W</td>
<td>TMA1.5V0x</td>
<td>2450</td>
<td>Air</td>
<td>SM745G</td>
<td>Call</td>
</tr>
<tr>
<td>1500 W</td>
<td>TMA0.5V0x</td>
<td>2450</td>
<td>Water</td>
<td>SM745G</td>
<td>Call</td>
</tr>
<tr>
<td>2000 W</td>
<td>TMA2.0V0x</td>
<td>2450</td>
<td>Air</td>
<td>SM745G or SM840E</td>
<td>Call</td>
</tr>
<tr>
<td>2000 W</td>
<td>TMA2.0V0x</td>
<td>2450</td>
<td>Water</td>
<td>SM745G or SM840E</td>
<td>Call</td>
</tr>
<tr>
<td>3000 W</td>
<td>TMA3.0V0x</td>
<td>2450</td>
<td>Water</td>
<td>SM1050D/T** or SM1150D</td>
<td>Call</td>
</tr>
</tbody>
</table>

**Common features:**
- Output power is variable from 10% of the max. rated power.
- CE compliant
- Framework and waveguide in stainless steel
- WR340/PDR26 style flange
- Separate industrial connectors for main & signals
- TMA overall dim. (air cooled type): 218 x 233 x 390 mm
- TM0 overall dim. (water cooled type): 218 x 233 x 305 mm

**Version 1 (V01) includes:**
- Water flow switch (on water cooled types)
- Air pressure switch (on air cooled types)
- Lamp (ON status)

**National Low Power Microwave Heads**

**Designed for Switching Power Supplies (Variable Output)**

<table>
<thead>
<tr>
<th>Max Output Power</th>
<th>Part Number</th>
<th>Freq. MHz</th>
<th>Cooling Type</th>
<th>Recommended Power Supply</th>
<th>Cable Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200 W</td>
<td>UWHEAD1.2FAC-SM</td>
<td>2450</td>
<td>Air</td>
<td>CS445G/2WXHEAD</td>
<td>Call</td>
</tr>
<tr>
<td>1200 W</td>
<td>MH1.2W-S</td>
<td>2450</td>
<td>Water</td>
<td>CS445G/2WXHEAD</td>
<td>Call</td>
</tr>
<tr>
<td>2000 W</td>
<td>UWHEAD2.0FAC-SM</td>
<td>2450</td>
<td>Air</td>
<td>CS745G/2WXHEAD</td>
<td>Call</td>
</tr>
<tr>
<td>2000 W</td>
<td>MH2.0W-S</td>
<td>2450</td>
<td>Water</td>
<td>CS745G/2WXHEAD</td>
<td>Call</td>
</tr>
<tr>
<td>3000 W</td>
<td>MH3.0W-S</td>
<td>2450</td>
<td>Water</td>
<td>SM1050D/T** or SM1150D</td>
<td>Call</td>
</tr>
</tbody>
</table>

**Common features:**
- Output power is variable from 10% of the max. rated power
- CE compliant
- Framework and waveguide in stainless steel
- WR340/PDR26 style flange
- Separate industrial connectors for main & signals

Richardson Microwave Head Features

**Basic Version (V00) Includes:**
- Magnetron
- Arc detector
- Thermoswitch
- Filament transformer
- Microwave switch cover
- Thermoswitch on magnetron
- Fan (only on air-cooled type)
- High voltage input direct (no connector)

**Version 1 (V01) Includes:**
- Water flow switch (on water cooled types)
- Air pressure switch (on air cooled types)
- Lamp (ON status)

**All Versions Include:**
- Magnetron
- Filament transformer
- Thermoswitch on magnetron
- Arc detector
- HV Lemo connector for input
- Microwave switch cover

Richardson Microwave Head Features

**3-Port Circulator**
- WR975CIRC50A or WR975CIRC100A

**Dummy Load**
- WR975LOAD30A or WR975LOAD150A

**Power Supply**
- MG7.5PSM/208
- MG36PS415
- MG72PS480
- MG84PS415
- MG120PS480

Note: Magnetrons are also available in 896 & 922 MHz.

915 MHz: Component Sets

**Component Sets**

A multitude of ancillary components used to transmit, measure and alter the microwave energy generated from the magnetron. These component sets usually include a magnetron, waveguide launcher, circulator, water-load and a power supply.

<table>
<thead>
<tr>
<th>Description</th>
<th>5kW</th>
<th>30kW</th>
<th>50kW</th>
<th>60kW</th>
<th>75kW</th>
<th>100kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>CW Magnetron</td>
<td></td>
<td>NL10257</td>
<td>NL915-30</td>
<td>NL915-50</td>
<td>NL915-60</td>
<td>NL915-75</td>
</tr>
<tr>
<td>Waveguide Launcher</td>
<td>WR975LAUND</td>
<td>WR975LAUND</td>
<td>WR975LAUND</td>
<td>WR975LAUND</td>
<td>WR975LAUND</td>
<td>WR975LAUND</td>
</tr>
<tr>
<td>Electromagnet</td>
<td>WR975EMB</td>
<td>WR975EMB</td>
<td>WR975EMB</td>
<td>WR975EMB</td>
<td>WR975EMB</td>
<td>WR975EMB</td>
</tr>
<tr>
<td>Upper Pole Piece</td>
<td>WR975UPPA-1</td>
<td>WR975UPPA-1</td>
<td>WR975UPPA-1</td>
<td>WR975UPPA-1</td>
<td>WR975UPPA-1</td>
<td>WR975UPPA-1</td>
</tr>
<tr>
<td>Lower Pole Piece</td>
<td>Included with WR975EMB</td>
<td>Included with WR975EMB</td>
<td>Included with WR975EMB</td>
<td>Included with WR975EMB</td>
<td>Included with WR975EMB</td>
<td>Included with WR975EMB</td>
</tr>
<tr>
<td>Filament Connector Set</td>
<td>NL10257-CONN</td>
<td>NL915CONNNA</td>
<td>NL915CONNNA</td>
<td>NL915CONNNA</td>
<td>NL915CONNNA</td>
<td>NL915CONNNA</td>
</tr>
<tr>
<td>3-Port Circulator</td>
<td>WR975CIRC50A</td>
<td>WR975CIRC100A</td>
<td>WR975CIRC100A</td>
<td>WR975CIRC100A</td>
<td>WR975CIRC100A</td>
<td>WR975CIRC100A</td>
</tr>
<tr>
<td>Dummy Load</td>
<td>Included with WR975LOAD30A</td>
<td>Included with WR975LOAD30A</td>
<td>Included with WR975LOAD30A</td>
<td>Included with WR975LOAD30A</td>
<td>Included with WR975LOAD30A</td>
<td>Included with WR975LOAD30A</td>
</tr>
</tbody>
</table>

Note: Magnetrons are also available in 896 & 922 MHz.

* See page 26 for detailed descriptions of power supplies.
5kW
- MG7.5PSM/415
- MG7.5PSM/480

The MG7.5 magnetron power supplies each comprise a single power module, measuring 10 1/2" x 19" x 19". They are designed to power CW magnetrons with RF output powers of 5kW @ 915MHz.

The units also contain the filament supply, magnet supply board, and the interface circuits between the user's system and the power supply. The high voltage output of the module is applied to the cathode of the magnetron. Magnetron output power is controlled by the anode current. At turn on, the filament current is first applied for the pre-heat period, followed by the anode voltage and current ramps. Provision is made in the control unit to allow local control of the output voltage and current. Filament current foldback is automatically adjusted according to the value of the anode current.

30kW
- MG36PS415
- MG36PS480

The MG36 magnetron power supply comprises three 12kW power modules, each measuring 10 1/2" x 19" x 19" to drive a 30kW magnetron. The units also contain the filament and magnet power supplies and the interface circuits between the user's system and the power supply.

The high voltage outputs of the modules are connected in parallel and applied to the cathode of the magnetron. At turn on, the filament and magnet currents are first applied for the pre-heat period, followed by the anode voltage and current ramps.

Provision is made to allow local control of the output voltage and local or remote control of the output current. RF output power is controlled by the anode current. The filament current foldback is automatically adjusted according to the value of the output current.

50-100kW
- MG72PS480/415
- MG84PS480/415
- MG120PS480/415

The MG72-MG120 series magnetron power supplies are comprised of multiple 12kW power modules, each measuring 10 1/2" x 19" x 19" to drive a 50-100 kW magnetron. The units also contain the filament and magnet power supplies and the interface circuits between the user's system and the power supply.

The high voltage outputs of the modules are connected in parallel and applied to the cathode of the magnetron. At turn on, the filament and magnet currents are first applied for the pre-heat period, followed by the anode voltage and current ramps. Provision is made to allow local control of the output voltage and local or remote control of the output current. RF output power is controlled by the anode current. The filament current foldback is automatically adjusted according to the value of the output current.

915 MHz Power Supplies: 10 - 120kW Switch Mode Power Supplies

2450 MHz: Low Power Microwave Generators (Fixed Output)

Low Power, Complete Microwave Generators
with Inductive Power Supply & Remote Magnetron Head

<table>
<thead>
<tr>
<th>Max Output Power</th>
<th>Freq. MHz</th>
<th>Cooling Type</th>
<th>Magnetron Head</th>
<th>Power Supply</th>
<th>Cable Set</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 W</td>
<td>2450</td>
<td>Air</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/30kWxxIA</td>
</tr>
<tr>
<td>850 W</td>
<td>2450</td>
<td>Water</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/30kWxxIW</td>
</tr>
<tr>
<td>1200 W</td>
<td>2450</td>
<td>Air</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/1.2kWxxIA</td>
</tr>
<tr>
<td>2000 W</td>
<td>2450</td>
<td>Air</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/2.0kWxxIA</td>
</tr>
<tr>
<td>3000 W</td>
<td>2450</td>
<td>Air</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/3.0kWxxIA</td>
</tr>
</tbody>
</table>

Note: See previous page for switch-mode type power supply systems.

Part Numbering System

Example Part Number: G2450/1.2kW1BIW
2450MHz, 1200W MW Generator with remote, water-cooled magnetron head and Inductive type power supply. 208V/60Hz.

Note: See previous page for switch-mode type power supply systems.
2450 MHz: High Power Microwave Generators (Variable Output)

High Power, Complete Microwave Generators with Remote or Integrated Magnetron Head.

All of our microwave generators come standard with an isolator, RS232 interface, LCD screen and keypad control.

The following interface options are also available:
• CANbus
• ProﬁBus
• Device Net
• RS485 interfacing.

Other options are available upon request. Please contact your local Richardson sales representative.

Max. Output Power MHz Cooling Magnetron Power Cable Part Number
6kW 2450 Water Remote or Integrated Inductive Included G2450/6kWxxxx
10kW 2450 Water Remote or Integrated Inductive or Switch-mode Included G2450/10kWxxxx
15kW 2450 Water Remote or Integrated Inductive or Switch-mode Included G2450/15kWxxxx
20kW 2450 Water Remote or Integrated Inductive or Switch-mode Included G2450/20kWxxxx
30kW 2450 Water Remote or Integrated Inductive or Switch-mode Included G2450/30kWxxxx

Note: See page 9 for 6kW, switch-mode type.

Part Numbering System

Example Part Number: G2450/15kW2AII
2450MHz, 15kW MW Generator with integrated magnetron head and inductive type power supply. 400V/50Hz.

915 MHz: Magnetrons and Solid State Generators

Magnetron: A low-cost, efﬁcient cross-ﬁeld microwave oscillator used for the generation of continuous-wave (CW) signals.

Below is a partial listing of magnetrons we offer from stock. We also offer custom design, testing and cross referencing.

Part Number Frequency Output Power Voltage Current (MHz) (kW) (V) (A)
NLM915-100 915 100kW 14 110 17.5 6.0 6.5
NLM915-75 915 75kW 12.6 112 17 5.0 6.0
NLM915-60 915 60kW 12.6 112 17 4.5 5.0
NLM915-50 915 50kW 12.6 112 17 4.0 4.0
NLM915-30 915 30kW 12.6 112 15 3.0 3.0
N10257 915 5kW 10.0 35 6.5 1.3 1.6

Notes: Magnetrons also available in 896 & 922 MHz.
All magnetrons require both water and air cooling.
Socket compatible with Burle and CTL magnetrons.
Rebuilt magnetrons are available. Please contact your local Richardson sales ofﬁce for details.

915MHz Solid State Generators

Part Number Frequency Max Output Power
NLSS915-150 915MHz 150 Watt
NLSS915-600 915MHz 600 Watt

System Features

Protection functions:
• Auto/manual reset
• Audible indication (User enable/disable)
• Maximum forward power
• Maximum VSWR (By internal isolator)
• Over temperature

Connectors:
• AC mains, receptacle, EMI ﬁltered
• Source output: BNC (F)
• RF input: BNC (F)
• RF output: Type N (F)
• Interface: 15 pin D (F), EMI ﬁltered

Controls, front panel:
• AC power on/off
• Forward/Reflected RF power
• Standby

Front panel indicators:
• AC power on
• Standby
• RF power control
• RF power display
• Over temperature
**High Power, Complete Microwave Generators with Remote or Integrated Magnetron Head.**

All of our microwave generators come standard with an isolator, RS232 interface, LCD screen and keypad control.

The following interface options are also available:
- CANbus
- Profinet
- Device Net
- RS485 interfacing.

Other options are available upon request. Please contact your local Richardson sales representative.

### Part Numbering System

Example Part Number: G915/60kW3BSR

915MHz, 60kW MW generator with remote magnetron head and switch-mode power supply, 480V/60Hz.

<table>
<thead>
<tr>
<th>Max. Output Power</th>
<th>Freq. MHz</th>
<th>Cooling Type</th>
<th>Magnetron Head</th>
<th>Power Supply</th>
<th>Cable Set</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>5kW</td>
<td>915°</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive or Switch-mode</td>
<td>Included</td>
<td>G915/5kWxxxx</td>
</tr>
<tr>
<td>30kW</td>
<td>915°</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive or Switch-mode</td>
<td>Included</td>
<td>G915/30kWxxxx</td>
</tr>
<tr>
<td>60kW</td>
<td>915°</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive or Switch-mode</td>
<td>Included</td>
<td>G915/60kWxxxx</td>
</tr>
<tr>
<td>75kW</td>
<td>915°</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive or Switch-mode</td>
<td>Included</td>
<td>G915/75kWxxxx</td>
</tr>
<tr>
<td>100kW</td>
<td>915°</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive or Switch-mode</td>
<td>Included</td>
<td>G915/100kWxxxx</td>
</tr>
</tbody>
</table>

* Also available in 896 & 502Mhz

### National 6kW

Complete microwave generator with switch-mode power supply, remote magnetron head and isolator.

<table>
<thead>
<tr>
<th>Max Output Power</th>
<th>Freq. MHz</th>
<th>Cooling Type</th>
<th>Magnetron Head</th>
<th>Power Supply</th>
<th>Cable Set</th>
<th>Input Voltage</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>6kW</td>
<td>2450</td>
<td>Water</td>
<td>Remote</td>
<td>MG10 series</td>
<td>Included</td>
<td>400V</td>
<td>GEN6KW400Vxx</td>
</tr>
</tbody>
</table>

The GEN6KW400Vxx is a 6kW, 2.45GHz microwave generator system consisting of a generator head, power supply, and isolator. The TM600 generator head is packaged in a stainless steel cabinet and houses a water-cooled YJ1600 magnetron, launching section, filament transformer, arc detector, and a reflected power measurement device. The power supply is the SM1180 switch-mode, low ripple supply featuring constant current control. The SM1180 is operated by a CPU and uses a front panel interface to control and display the functions of the power supply and microwave generator head. A 5.6kW isolator is supplied with the generator system to protect the magnetron from reflected energy. The optional reverse power measurement device is connected to a monitoring port on the isolator’s water-load. Reflected power information is relayed to the SM1180’s control unit and displayed on the interface. The system has been designed so that the microwave generator can be remotely installed with respect to the power supply. This separation allows for greater system flexibility and simplifies both installation and maintenance. This system is CE compliant.

Various options for the generator system are available on request. Please contact your local Richardson Electronics specialist for further information.

### 915 MHz: Microwave Generators (Variable)

**915 MHz: Microwave Generators (Variable)**

High Power, Complete Microwave Generators with Remote or Integrated Magnetron Head.

<table>
<thead>
<tr>
<th>Max. Output Power</th>
<th>Freq. MHz</th>
<th>Cooling Type</th>
<th>Magnetron Power</th>
<th>Cable Set</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>5kW</td>
<td>915*</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive or Switch-mode</td>
<td>Included</td>
</tr>
<tr>
<td>30kW</td>
<td>915*</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive or Switch-mode</td>
<td>Included</td>
</tr>
<tr>
<td>60kW</td>
<td>915°</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive or Switch-mode</td>
<td>Included</td>
</tr>
<tr>
<td>75kW</td>
<td>915°</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive or Switch-mode</td>
<td>Included</td>
</tr>
<tr>
<td>100kW</td>
<td>915°</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive or Switch-mode</td>
<td>Included</td>
</tr>
</tbody>
</table>

* Also available in 896 & 502Mhz

### 2450 MHz: 6kW, Microwave Generators (Variable Output)

**2450 MHz: 6kW, Microwave Generators (Variable Output)**

Complete microwave generator with switch-mode power supply and remote magnetron head and isolator.

<table>
<thead>
<tr>
<th>Max Output Power</th>
<th>Freq. MHz</th>
<th>Cooling Type</th>
<th>Magnetron Head</th>
<th>Power Supply</th>
<th>Cable Set</th>
<th>Input Voltage</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>6kW</td>
<td>2450</td>
<td>Water</td>
<td>Remote</td>
<td>SM1180</td>
<td>Included</td>
<td>400V</td>
<td>GEN6KW400Vxx</td>
</tr>
</tbody>
</table>

The GEN6KW400Vxx is a 6kW, 2.45GHz microwave generator system consisting of a generator head, power supply, and isolator. The TM600 generator head is packaged in a stainless steel cabinet and houses a water-cooled YJ1600 magnetron, launching section, filament transformer, arc detector, and a reflected power measurement device. The power supply is the SM1180 switch-mode, low ripple supply featuring constant current control. The SM1180 is operated by a CPU and uses a front panel interface to control and display the functions of the power supply and microwave generator head. A 5.6kW isolator is supplied with the generator system to protect the magnetron from reflected energy. The optional reverse power measurement device is connected to a monitoring port on the isolator’s water-load. Reflected power information is relayed to the SM1180’s control unit and displayed on the interface. The system has been designed so that the microwave generator can be remotely installed with respect to the power supply. This separation allows for greater system flexibility and simplifies both installation and maintenance. This system is CE compliant.

Various options for the generator system are available on request. Please contact your local Richardson Electronics specialist for further information.
2450 MHz: Component Sets

Component Sets
A multitude of ancillary components are used to transmit, measure and alter the microwave energy generated from a magnetron. These component sets usually include a magnetron, waveguide launcher, circulator, water-load and a power supply.

5 & 6kW, 2450 MHz Component Sets

<table>
<thead>
<tr>
<th>Description</th>
<th>5kW</th>
<th>6kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>CW Magnetron</td>
<td>H3891</td>
<td>YJ1600</td>
</tr>
<tr>
<td>Waveguide Launcher</td>
<td>WR340LAUN-1600C*</td>
<td>WR340LAUN-1600C*</td>
</tr>
<tr>
<td>Isolator</td>
<td>2722-162-10311</td>
<td>2722-162-10311</td>
</tr>
<tr>
<td>Arc Detector</td>
<td>MON00020</td>
<td></td>
</tr>
<tr>
<td>Power Supply**</td>
<td>MG10PS (208 or 480V) or SM1180T (400V)</td>
<td>MG10PS (208 or 480V) or SM1180T (400V)</td>
</tr>
</tbody>
</table>

*Includes mounting cylinder for integral arc detector. (Arc detector not included).
** See pages 14 & 15 for detailed information.

8-30kW, 2450 MHz Component Sets

<table>
<thead>
<tr>
<th>Description</th>
<th>8kW</th>
<th>15kW</th>
<th>20kW</th>
<th>30kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>CW Magnetron</td>
<td>NL10245</td>
<td>NL15245</td>
<td>NL20245</td>
<td>NL30245</td>
</tr>
<tr>
<td>Waveguide Launcher</td>
<td>NL15245ASSY-A*</td>
<td>NL15245ASSY-A*</td>
<td>NL20245L</td>
<td>NL30245L</td>
</tr>
<tr>
<td>Isolator</td>
<td>NL15245ASSY-A*</td>
<td>NL15245ASSY-A*</td>
<td>NL20245M</td>
<td>NL30245M</td>
</tr>
<tr>
<td>Pole Pieces</td>
<td>NL15245ASSY-A*</td>
<td>NL15245ASSY-A*</td>
<td>NL20245POLE</td>
<td>NL30245POLE</td>
</tr>
<tr>
<td>Connector Set</td>
<td>NL10245-CONN</td>
<td>NL15245-CONN</td>
<td>NL20245-CONN</td>
<td>NL30245-CONN &amp; NL30245-CAT-CON</td>
</tr>
<tr>
<td>3-Port Circulator</td>
<td>2450.201.803.02</td>
<td>2450.201.803.02</td>
<td>2450.201.803.02</td>
<td>2450.201.124.00</td>
</tr>
<tr>
<td>Dummy Water Load</td>
<td>2450.203.203.01</td>
<td>2450.203.203.01</td>
<td>2450.203.203.01</td>
<td>2450.203.303.00</td>
</tr>
<tr>
<td>Power Supply**</td>
<td>MG12PS (208-480V)</td>
<td>MG24PS (415-480V)</td>
<td>MG24PS480 (415-480V)</td>
<td>MG48PS480 (415-480V)</td>
</tr>
</tbody>
</table>

* Includes electromagnet, launcher and upper & lower pole pieces.
** See page 15 for detailed information.

915 & 2450 MHz: Microwave Leakage Meters

Richardson offers microwave leakage detectors from Holaday Industries and other quality manufacturers. These detectors aid in protecting personnel and assist in meeting government regulations for microwave radiation.

The following hand-held models are of a meter and probe style. They feature a hand-held probe to check areas for microwave radiation without exposure to the operator. The meters are virtually immune to failure caused by excessive fields, completely portable, and battery-operated. They feature battery and meter checks to ensure proper operation of both the microwave equipment and meter.

The HI-1501 is a meter and probe style. It features a hand-held probe to check areas for microwave radiation without exposure to the operator. The meter is virtually immune to failure caused by excessive fields, completely portable and battery operated. It features battery and meter checks to ensure proper operation of both the microwave equipment and meter.

Specifications:
- Calibrated at 2450 MHz
- Ranges: 0-2, 0-10, 0-100 mW/cm²
- Accuracy: ± 1 dB
- Maximum power density: 2.0 W/cm²

Model HI-1801

The HI-1801 is a meter and probe style. It features a hand-held probe to check areas for microwave radiation without exposure to the operator. The meter is virtually immune to failure caused by excessive fields, completely portable and battery operated. It features battery and meter checks to ensure proper operation of both the microwave equipment and meter.

Specifications:
- Calibrated at 2450 MHz
- Range: 0-10 mW/cm²
- Accuracy: ± 1 dB
- Maximum power density: Continuous 2.0 W/cm²

Model HI-1600

The HI-1600 is a meter and probe style. It features a hand-held probe to check areas for microwave radiation without exposure to the operator. The meter is virtually immune to failure caused by excessive fields, completely portable and battery operated. It features battery and meter checks to ensure proper operation of both the microwave equipment and meter.

Specifications:
- Calibrated at 915 MHz and 2450 MHz
- Three ranges: 0-10 mW/cm² at 2450 MHz, 0-10 and 0-20 mW/cm² at 915 MHz
- Accuracy: ± 1 dB
- Maximum power density: 2.0 W/cm²

Model HI-2602

- The HI-2602 interlock monitor provides continuous surveillance of 2450 MHz microwave fields for protection of personnel and equipment. The device detects and indicates fields from 0.2-2 mW/cm² through a remotely mounted probe using Holaday’s patented microwave field sensor. Usable in any critical area, the panel-mounted HI-2602 interlocks with any alarm or microwave source. AC powered, adjustable alarm level.

Specifications:
- Calibrated: Standard is 2450 MHz. 915 MHz is available at an additional cost.
- Range: 0.2-2.0 mW/cm²
- Accuracy: ± 1 dB
- Maximum power density: 2.0 W/cm²

ModelHI-2602 - The HI-2602 interlock monitor provides continuous surveillance of 2450 MHz microwave fields for protection of personnel and equipment. The device detects and indicates fields from 0.2-2 mW/cm² through a remotely mounted probe using Holaday's patented microwave field sensor. Usable in any critical area, the panel-mounted HI-2602 interlocks with any alarm or microwave source. AC powered, adjustable alarm level.

Specifications:
- Calibrated: Standard is 2450 MHz. 915 MHz is available at an additional cost.
- Range: 0.2-2.0 mW/cm²
- Accuracy: ± 1 dB
- Maximum power density: 2.0 W/cm²

8-30kW, 2450 MHz Component Sets

<table>
<thead>
<tr>
<th>Description</th>
<th>8kW</th>
<th>15kW</th>
<th>20kW</th>
<th>30kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component Sets</td>
<td>A multitude of ancillary components are used to transmit, measure and alter the microwave energy generated from a magnetron. These component sets usually include a magnetron, waveguide launcher, circulator, water-load and a power supply.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CW Magnetron</td>
<td>N10245</td>
<td>N15245</td>
<td>N20245</td>
<td>N30245</td>
</tr>
<tr>
<td>Waveguide Launcher</td>
<td>N15245ASSY-A*</td>
<td>N15245ASSY-A*</td>
<td>N20245L</td>
<td>N30245L</td>
</tr>
<tr>
<td>Isolator</td>
<td>N15245ASSY-A*</td>
<td>N15245ASSY-A*</td>
<td>N20245M</td>
<td>N30245M</td>
</tr>
<tr>
<td>Arc Detector</td>
<td>N15245ASSY-A*</td>
<td>N15245ASSY-A*</td>
<td>N20245POLE</td>
<td>N30245POLE</td>
</tr>
<tr>
<td>Power Supply**</td>
<td>MG12PS (208-480V)</td>
<td>MG24PS (415-480V)</td>
<td>MG24PS480 (415-480V)</td>
<td>MG48PS480 (415-480V)</td>
</tr>
</tbody>
</table>

*Includes mounting cylinder for integral arc detector. (Arc detector not included).
** See pages 14 & 15 for detailed information.

2450 MHz: Component Sets

Component Sets
A multitude of ancillary components are used to transmit, measure and alter the microwave energy generated from a magnetron. These component sets usually include a magnetron, waveguide launcher, circulator, water-load and a power supply.
**Magnetrons**

A low-cost, efficient cross-field microwave oscillator used for the generation of continuous-wave (CW) energy.

Below is a partial listing of magnetrons we offer from stock. We also offer custom design, testing and cross-referencing.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Freq. (MHz)</th>
<th>Output Power (kW)</th>
<th>V_1 (V)</th>
<th>I_1 (A)</th>
<th>V_ap (kV)</th>
<th>I_ap (mA)</th>
<th>Cooling</th>
<th>Mounting Configuration**</th>
</tr>
</thead>
<tbody>
<tr>
<td>NL10230-1A*</td>
<td>2450</td>
<td>3.00</td>
<td>4.6</td>
<td>16</td>
<td>5.4</td>
<td>900</td>
<td>2650</td>
<td>water NIL (J)</td>
</tr>
<tr>
<td>NL10230-5*</td>
<td>2450</td>
<td>3.00</td>
<td>4</td>
<td>23</td>
<td>5</td>
<td>900</td>
<td>2100</td>
<td>air IL (H)</td>
</tr>
<tr>
<td>2M251-05</td>
<td>2450</td>
<td>3.00</td>
<td>4</td>
<td>23</td>
<td>5</td>
<td>900</td>
<td>2100</td>
<td>water NIL (J)</td>
</tr>
<tr>
<td>2M252-05</td>
<td>2450</td>
<td>3.00</td>
<td>4</td>
<td>23</td>
<td>5</td>
<td>900</td>
<td>2100</td>
<td>air NIL (J)</td>
</tr>
<tr>
<td>YU1442-C</td>
<td>2450</td>
<td>3.00</td>
<td>4</td>
<td>20</td>
<td>6</td>
<td>800</td>
<td>1100</td>
<td>water —</td>
</tr>
<tr>
<td>YU1442E</td>
<td>2450</td>
<td>3.00</td>
<td>5</td>
<td>20</td>
<td>6</td>
<td>800</td>
<td>1100</td>
<td>water —</td>
</tr>
<tr>
<td>DX582</td>
<td>2450</td>
<td>2.70</td>
<td>4.6</td>
<td>19</td>
<td>5</td>
<td>900</td>
<td>2100</td>
<td>air IL (H)</td>
</tr>
<tr>
<td>NL10250-1*</td>
<td>2450</td>
<td>1.90</td>
<td>4.6</td>
<td>19</td>
<td>4</td>
<td>725</td>
<td>2100</td>
<td>air NIL (J)</td>
</tr>
<tr>
<td>NL10250-2*</td>
<td>2450</td>
<td>1.90</td>
<td>4.6</td>
<td>19</td>
<td>4</td>
<td>725</td>
<td>2100</td>
<td>air NIL (J)</td>
</tr>
<tr>
<td>2M130-11/IL</td>
<td>2450</td>
<td>1.90</td>
<td>4.6</td>
<td>19</td>
<td>4</td>
<td>725</td>
<td>2100</td>
<td>air NIL (J)</td>
</tr>
<tr>
<td>2M130-06/NIL</td>
<td>2450</td>
<td>1.90</td>
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<td>19</td>
<td>4</td>
<td>725</td>
<td>2100</td>
<td>air NIL (J)</td>
</tr>
<tr>
<td>NL10250-3A*</td>
<td>2450</td>
<td>1.90</td>
<td>4.6</td>
<td>19</td>
<td>4</td>
<td>725</td>
<td>2100</td>
<td>water —</td>
</tr>
<tr>
<td>NL10251-2*</td>
<td>2450</td>
<td>1.60</td>
<td>4.6</td>
<td>19</td>
<td>3.6</td>
<td>700</td>
<td>1800</td>
<td>air IL (H)</td>
</tr>
<tr>
<td>2M121A-53</td>
<td>2450</td>
<td>1.45</td>
<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>450</td>
<td>1800</td>
<td>air NIL (J)</td>
</tr>
<tr>
<td>2M121A-57</td>
<td>2450</td>
<td>1.45</td>
<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>450</td>
<td>1800</td>
<td>air IL (H)</td>
</tr>
<tr>
<td>NL10259-1*</td>
<td>2450</td>
<td>1.45</td>
<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>450</td>
<td>1800</td>
<td>air NIL (J)</td>
</tr>
<tr>
<td>NL10259-2*</td>
<td>2450</td>
<td>1.45</td>
<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>450</td>
<td>1800</td>
<td>air NIL (J)</td>
</tr>
<tr>
<td>NL10259-3*</td>
<td>2450</td>
<td>1.45</td>
<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>450</td>
<td>1800</td>
<td>air NIL (J)</td>
</tr>
<tr>
<td>NL10259-6*</td>
<td>2450</td>
<td>1.45</td>
<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>450</td>
<td>1800</td>
<td>water IL (H)</td>
</tr>
<tr>
<td>YJ1540*</td>
<td>2450</td>
<td>1.26</td>
<td>4.4</td>
<td>14</td>
<td>4.5</td>
<td>400</td>
<td>1600</td>
<td>air IL (H)</td>
</tr>
<tr>
<td>2M137(IL)</td>
<td>2450</td>
<td>1.26</td>
<td>4.4</td>
<td>14</td>
<td>4.5</td>
<td>400</td>
<td>1600</td>
<td>air IL (H)</td>
</tr>
<tr>
<td>YJ1530SP*</td>
<td>2450</td>
<td>0.10–310</td>
<td>3.4</td>
<td>11.5</td>
<td>3</td>
<td>150</td>
<td>900</td>
<td>air IL/NIL (K)</td>
</tr>
</tbody>
</table>

* Recommended for new designs.

** See the bottom of page 12 for mounting configuration definitions.
High & Low Frequency, 2450MHz CW Magnets

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Freq. (MHz)</th>
<th>Output Power (kW)</th>
<th>Vg (V)</th>
<th>Ig (A)</th>
<th>Vsp (kV)</th>
<th>Is (mA)</th>
<th>Isp (mA)</th>
<th>Cooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>NL10250-20</td>
<td>Low</td>
<td>2.00</td>
<td>4.7</td>
<td>20</td>
<td>3.6</td>
<td>725</td>
<td>1800</td>
<td>Water</td>
</tr>
<tr>
<td>NL10250-54</td>
<td>Low</td>
<td>1.95</td>
<td>4.7</td>
<td>20</td>
<td>4.3</td>
<td>725</td>
<td>2100</td>
<td>Air</td>
</tr>
<tr>
<td>NL10250-64</td>
<td>High</td>
<td>1.95</td>
<td>4.7</td>
<td>20</td>
<td>4.3</td>
<td>725</td>
<td>2100</td>
<td>Air</td>
</tr>
<tr>
<td>NL10251-9</td>
<td>High</td>
<td>1.70</td>
<td>4.6</td>
<td>20</td>
<td>3.6</td>
<td>725</td>
<td>1800</td>
<td>Air</td>
</tr>
<tr>
<td>NL10251-10</td>
<td>Low</td>
<td>1.70</td>
<td>4.6</td>
<td>20</td>
<td>3.6</td>
<td>725</td>
<td>1800</td>
<td>Air</td>
</tr>
<tr>
<td>NL10251-3LOW</td>
<td>Low</td>
<td>1.70</td>
<td>4.6</td>
<td>20</td>
<td>3.6</td>
<td>725</td>
<td>1800</td>
<td>Water</td>
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</table>

5kw - 6kW, 2450MHz CW Magnets

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Frequency (MHz)</th>
<th>Output Power (kW)</th>
<th>Vg (V)</th>
<th>Ig (A)</th>
<th>Vsp (kV)</th>
<th>Is (mA)</th>
<th>Isp (mA)</th>
<th>Magnet</th>
</tr>
</thead>
<tbody>
<tr>
<td>YJ1600*</td>
<td>2450</td>
<td>0.6-6</td>
<td>5</td>
<td>33</td>
<td>7.2</td>
<td>1150</td>
<td>1300</td>
<td>PM/EM1</td>
</tr>
<tr>
<td>YJ1191A</td>
<td>2450</td>
<td>6</td>
<td>5.5</td>
<td>44</td>
<td>7.3</td>
<td>1250</td>
<td>1500</td>
<td>PM/EM1</td>
</tr>
<tr>
<td>YJ1193</td>
<td>2450</td>
<td>6</td>
<td>5.5</td>
<td>44</td>
<td>7.3</td>
<td>1250</td>
<td>1500</td>
<td>PM/EM1</td>
</tr>
<tr>
<td>H381*</td>
<td>2450</td>
<td>5</td>
<td>5</td>
<td>29</td>
<td>7.3</td>
<td>1100</td>
<td>2100</td>
<td>PM/EM1</td>
</tr>
<tr>
<td>H391*</td>
<td>2450</td>
<td>5</td>
<td>6</td>
<td>23.5</td>
<td>7.3</td>
<td>920</td>
<td>2100</td>
<td>PM/EM1</td>
</tr>
<tr>
<td>2M13</td>
<td>2450</td>
<td>5</td>
<td>6</td>
<td>56</td>
<td>7</td>
<td>1100</td>
<td>1300</td>
<td>EM/EM1</td>
</tr>
<tr>
<td>2M68</td>
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<td>5.3</td>
<td>5</td>
<td>46</td>
<td>7</td>
<td>1100</td>
<td>1300</td>
<td>EM/EM1</td>
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10-30kW, 2450MHz CW Magnets

<table>
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<th>Part Number</th>
<th>Frequency (MHz)</th>
<th>Output Power (kW)</th>
<th>Vg (V)</th>
<th>Ig (A)</th>
<th>Vsp (kV)</th>
<th>Is (mA)</th>
<th>Isp (mA)</th>
<th>Magnet</th>
</tr>
</thead>
<tbody>
<tr>
<td>NL10245</td>
<td>2450</td>
<td>1.0-10.0</td>
<td>10</td>
<td>36</td>
<td>10</td>
<td>1600</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>NL15245</td>
<td>2450</td>
<td>1.5-15.0</td>
<td>10</td>
<td>47</td>
<td>12</td>
<td>1800</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>NL20245</td>
<td>2450</td>
<td>1.5-20.0</td>
<td>10</td>
<td>50</td>
<td>14.5</td>
<td>2100</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td>NL30245</td>
<td>2450</td>
<td>1.5-30.0</td>
<td>6.4</td>
<td>66</td>
<td>13.5</td>
<td>3300</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Mounting Configurations

**IL/NIL (K)**
- Mounting is in-line (IL) with connector.
- Airflow is not-in-line (NIL) with connector.

**IL (H)**
- Mounting and airflow are in-line (IL) with connector.

**NIL (J)**
- Mounting and airflow are not-in-line (NIL) with connector.

2450 MHz: Waveguide Components

**Straight Sections**

Straight waveguide is supplied either as a raw cut waveguide section or with the attached flanges. The length of a straight waveguide piece is measured from face to face of the flanges. We also offer painting and special plating (e.g. irridite) options. Please contact us for a quote.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Material</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR430WGXXXXC</td>
<td>Copper</td>
<td>WR430</td>
<td>Waveguide straight section (no flanges)</td>
</tr>
<tr>
<td>WR430WGXXXXA</td>
<td>Aluminum</td>
<td>WR430</td>
<td>Waveguide straight section with flanges on either end</td>
</tr>
<tr>
<td>WR430WGXXXXCY</td>
<td>Copper</td>
<td>WR430</td>
<td>Waveguide straight section with flanges on either end</td>
</tr>
<tr>
<td>WR430WGXXXXA Y</td>
<td>Aluminum</td>
<td>WR430</td>
<td>Waveguide straight section with flanges on either end</td>
</tr>
<tr>
<td>WR340WGXXXXC</td>
<td>Copper</td>
<td>WR340</td>
<td>Waveguide straight section (no flanges)</td>
</tr>
<tr>
<td>WR340WGXXXXA</td>
<td>Aluminum</td>
<td>WR340</td>
<td>Waveguide straight section with flanges on either end</td>
</tr>
<tr>
<td>WR340WGXXXXCY</td>
<td>Copper</td>
<td>WR340</td>
<td>Waveguide straight section with flanges on either end</td>
</tr>
<tr>
<td>WR340WGXXXXA Y</td>
<td>Aluminum</td>
<td>WR340</td>
<td>Waveguide straight section with flanges on either end</td>
</tr>
<tr>
<td>WR284WGXXXXC</td>
<td>Copper</td>
<td>WR284</td>
<td>Waveguide straight section (no flanges)</td>
</tr>
<tr>
<td>WR284WGXXXXA</td>
<td>Aluminum</td>
<td>WR284</td>
<td>Waveguide straight section with flanges on either end</td>
</tr>
<tr>
<td>WR284WGXXXXCY</td>
<td>Copper</td>
<td>WR284</td>
<td>Waveguide straight section with flanges on either end</td>
</tr>
<tr>
<td>WR284WGXXXXA Y</td>
<td>Aluminum</td>
<td>WR284</td>
<td>Waveguide straight section with flanges on either end</td>
</tr>
</tbody>
</table>

**Flanges**

Waveguide flanges are used to connect waveguide sections to one another.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR430FLAN1</td>
<td>Brass, flat, pocket</td>
<td></td>
</tr>
<tr>
<td>WR430FLAN2</td>
<td>Brass, choke, pocket</td>
<td></td>
</tr>
<tr>
<td>WR430FLAN3</td>
<td>Aluminum, flat, pocket</td>
<td></td>
</tr>
<tr>
<td>WR430FLAN4</td>
<td>Aluminum, choke, pocket</td>
<td></td>
</tr>
<tr>
<td>WR430FLAN5</td>
<td>Stainless steel, choke, pocket</td>
<td></td>
</tr>
<tr>
<td>WR284FLAN1</td>
<td>Brass, flat, pocket</td>
<td></td>
</tr>
<tr>
<td>WR284FLAN2</td>
<td>Brass, choke, pocket</td>
<td></td>
</tr>
<tr>
<td>WR284FLAN3</td>
<td>Aluminum, flat, pocket</td>
<td></td>
</tr>
<tr>
<td>WR284FLAN4</td>
<td>Aluminum, choke, pocket</td>
<td></td>
</tr>
</tbody>
</table>

Richardson Electronics offers custom waveguide components designed to your specifications. If you do not see what you are looking for in our catalog, please contact your local sales representative for further details.
2450 MHz: Waveguide Components

Couplers
Directional couplers are waveguide components used to measure forward and/or reflected microwave energy.

Waveguide Size WR430
Frequency (MHz): 2450+/-25
Directivity (dB): >20

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Coupling Factor (dB)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR340SDCN* 60 Single directional coupler with a female N-type connector.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WR340DDCA NA Dual directional coupler with BNC output detector diodes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WR340DDCB NA Dual directional coupler, includes galvanometers for reading forward &amp; reflected power.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Waveguide Size WR340
Frequency (MHz): 2450+/-25
Directivity (dB): >20

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Coupling Factor (dB)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR340DDCN* 60 Single directional coupler with a female N-type connector.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WR340DDCA1.5 NA Dual directional coupler with BNC output detector diode. (Calibrated to 1.5kW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WR340DDCA2.0 NA Dual directional coupler with BNC output detector diode. (Calibrated to 2.0kW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WR340DDCA3.0 NA Dual directional coupler with BNC output detector diode. (Calibrated to 3.0kW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WR340DDCA6.0 NA Dual directional coupler with BNC output detector diode. (Calibrated to 6.0kW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WR340DDCB1.2 NA Dual directional coupler, includes galvanometers for reading forward &amp; reflected power. (Calibrated to 1.2kW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WR340DDCB1.5 NA Dual directional coupler, includes galvanometers for reading forward &amp; reflected power. (Calibrated to 1.5kW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WR340DDCB2.0 NA Dual directional coupler, includes galvanometers for reading forward &amp; reflected power. (Calibrated to 2.0kW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WR340DDCB3.0 NA Dual directional coupler, includes galvanometers for reading forward &amp; reflected power. (Calibrated to 3.0kW)</td>
<td></td>
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</tr>
<tr>
<td>WR340DDCB6.0 NA Dual directional coupler, includes galvanometers for reading forward &amp; reflected power. (Calibrated to 6.0kW)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2450 MHz: Switch-mode Power Supplies

CM340 (1.0kW)
The CM340 switch-mode power supply is able to supply, from remote location, the current necessary for a 1 kW magnetron, such as the 2M167 or equivalent, observing the specifications set by the electron tube manufacturer.

The unit is housed in a very compact stainless steel cabinet, suitable to be installed into a closed cabinet. The output power can be adjusted by a 0-10V analog signal. In addition to powering magnetrons, the CM 340 generator also supplies power to magnetron cooling fans, monitors magnetron temperature, carries out a number of monitoring processes independently, cuts off the power in case of malfunction and displays the alarms by means of LED. This unit is CE compliant.

Note: CAN-bus option available.

CM440 (1.25kW)
The CM440 switch-mode power supply is able to supply, from remote location, the current necessary for a 1.25 kW magnetron, such as the YJ1540 or equivalent, observing the specifications set by the electron tube manufacturer.

The unit is housed in a very compact stainless steel cabinet, suitable to be installed into a closed cabinet. The output power can be adjusted by a 0-10V analog signal. In addition to powering magnetrons, the CM 440 generator also supplies power to magnetron cooling fans, moniors magnetron temperature, carries out a number of monitoring processes independently, cuts off the power in case of malfunction and displays the alarms by means of LED. This unit is CE compliant.

Note: CAN-bus option available.

SM445G (1.25kW)
The SM445F switch-mode power supply is capable of providing the required voltage and current to operate the 1250-watt YJ1540 magnetron or equivalent.

The power supply is designed for installation in a standard 19” rack mount cabinet and is connected to the magnetron/microwave generator with a standard 3-meter cable assembly. In addition to operating the magnetron, the SM445 power supply provides power for a cooling fan, and monitors the operating conditions of both the magnetron and the power supply. The output power can be adjusted on a continuous scale using a front panel potentiometer or through an external analog signal. Various options are available. This unit is CE compliant.

Note: CAN-bus option available.

SM745G (2.0kW)
The SM745F switch-mode power supply is capable of providing the required voltage and current to operate the 2000-watt NL10250 magnetron or equivalent.

The unit is housed in a very compact stainless steel cabinet, suitable to be installed into a closed cabinet. The output power can be adjusted by a 0-10V analog signal. In addition to powering magnetrons, the CM 745 generator also supplies power to magnetron cooling fans, monitors magnetron temperature, carries out a number of monitoring processes independently, cuts off the power in case of malfunction and displays the alarms by means of LED. This unit is CE compliant.

Note: CAN-bus option available.

CM340 (1.0kW)
The CM340 switch-mode power supply is able to supply, from remote location, the current necessary for a 1 kW magnetron, such as the 2M167 or equivalent, observing the specifications set by the electron tube manufacturer.

The unit is housed in a very compact stainless steel cabinet, suitable to be installed into a closed cabinet. The output power can be adjusted by a 0-10V analog signal. In addition to powering magnetrons, the CM 340 generator also supplies power to magnetron cooling fans, monitors magnetron temperature, carries out a number of monitoring processes independently, cuts off the power in case of malfunction and displays the alarms by means of LED. This unit is CE compliant.

Note: CAN-bus option available.
The compact size of the SM1180 allows greater system flexibility and simplifies both the installation and maintenance.

**Output Power Adjustment**

The output power can be adjusted on a continuous scale using the front panel interface or through a front panel potentiometer or through an external analog signal. This unit is CE compliant.

---

**SM1050D/T (3.0kW)**

The SM1050D/T switch-mode power supply is capable of providing the required voltage and current to operate the 3000-watt NL10230 magnetron or equivalent.

The power supply is designed for installation in a standard 19" rack cabinet and is connected to the magnetron/microwave generator with a standard 3-meter cable. In addition to operating the magnetron, the SM1050 power supply provides power for a cooling fan, and monitors the operating conditions of both the magnetron and power supply. The output power can be adjusted on a continuous scale using the front panel interface or through an analog signal. This unit is CE compliant.

**SM1150D/T (3.0kW)**

The SM1150 switch-mode power supply is capable of providing the required voltage and current to operate the 3000 watt NL10230 magnetron or equivalent.

The unit is controlled by an on-board CPU and can be connected to a standard PC through an RS232 port. The user interface is a 4-character display with an optical encoder for adjusting the power supply’s settings. The SM1150 is designed for installation in a standard 19" rack cabinet and is connected to the magnetron/microwave generator with a standard 3-meter cable assembly. In addition to operating the magnetron, the SM1150 switch-mode power supply provides power for a cooling fan, and monitors the operating conditions of both the magnetron and power supply. The output power can be adjusted on a continuous scale using a front panel potentiometer or through an external analog signal. Various options are available. This unit is CE compliant.

---

**SM1180** (6.0kW)

The SM1180 switch-mode power supply is designed to operate the 6kW, YJ1600 magnetron. The power supply may also be used to power the TM060 microwave generator head in the GEN6K6W400V00 microwave generator system. The unit is CE compliant and is built in a self-ventilated 19" wide rack, 7HE high, and is controlled by a front panel interface containing:

- A 4-digit display (upper) indicating forward power, anode current or voltage, and alarm codes.
- A 4-digit display (lower) indicating the reverse power (if the necessary external accessories are provided).
- Keypad interface for controlling the SM1180’s CPU status LEDs.

*Note: CAN-bus option available.*

---

**Waveguide Transitions**

Waveguide transitions are used to connect waveguides of different sizes.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Material</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR340/340TRANS</td>
<td>Aluminum</td>
<td>WR340 to WR340</td>
<td>WR340 to WR340 waveguide transition</td>
</tr>
<tr>
<td>WR340/284TRANS</td>
<td>Aluminum</td>
<td>WR340 to WR284</td>
<td>WR340 to WR284 waveguide transition</td>
</tr>
<tr>
<td>WR430/340TRANS</td>
<td>Aluminum</td>
<td>WR430 to WR340</td>
<td>WR430 to WR340 waveguide transition</td>
</tr>
</tbody>
</table>

**Coax Transitions**

Coaxial transitions are waveguide components used to convert standard waveguide to a specific coaxial connector.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Max. Power (kW)</th>
<th>VSWR</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR430/COAXTRANS</td>
<td>0.3</td>
<td>&lt;1.15</td>
<td>WR430</td>
<td>Waveguide to N-type connector</td>
</tr>
<tr>
<td>WR430/COAXTRANS</td>
<td>1.2</td>
<td>&lt;1.15</td>
<td>WR430</td>
<td>Waveguide to 7/16&quot; connector</td>
</tr>
<tr>
<td>WR430/COAXTRANS</td>
<td>2.0</td>
<td>&lt;1.15</td>
<td>WR430</td>
<td>Waveguide to 7/8&quot; connector</td>
</tr>
<tr>
<td>WR430/COAXTRANS</td>
<td>5.0</td>
<td>&lt;1.15</td>
<td>WR430</td>
<td>Waveguide to 1 5/8&quot; connector</td>
</tr>
<tr>
<td>WR340/COAXTRANS</td>
<td>0.3</td>
<td>&lt;1.15</td>
<td>WR340</td>
<td>Waveguide to N-type connector</td>
</tr>
<tr>
<td>WR340/COAXTRANS</td>
<td>1.2</td>
<td>&lt;1.15</td>
<td>WR340</td>
<td>Waveguide to 7/16&quot; connector</td>
</tr>
<tr>
<td>WR340/COAXTRANS</td>
<td>2.0</td>
<td>&lt;1.15</td>
<td>WR340</td>
<td>Waveguide to 7/8&quot; connector</td>
</tr>
<tr>
<td>WR284/COAXTRANS</td>
<td>5.0</td>
<td>&lt;1.15</td>
<td>WR284</td>
<td>Waveguide to 1 5/8&quot; connector</td>
</tr>
<tr>
<td>WR284/COAXTRANS</td>
<td>1.2</td>
<td>&lt;1.15</td>
<td>WR284</td>
<td>Waveguide to 7/16&quot; connector</td>
</tr>
<tr>
<td>WR284/COAXTRANS</td>
<td>2.0</td>
<td>&lt;1.15</td>
<td>WR284</td>
<td>Waveguide to 7/8&quot; connector</td>
</tr>
<tr>
<td>WR284/COAXTRANS</td>
<td>5.0</td>
<td>&lt;1.15</td>
<td>WR284</td>
<td>Waveguide to 1 5/8&quot; connector</td>
</tr>
</tbody>
</table>

---

**Bends**

Bends are used to change the direction of the waveguide transmission system.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Material</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR430/340EBBSB</td>
<td>Brass</td>
<td>WR430</td>
<td>E-Plane sweep bend</td>
</tr>
<tr>
<td>WR430/340HBBBSA</td>
<td>Aluminum</td>
<td>WR430</td>
<td>H-Plane sweep bend</td>
</tr>
<tr>
<td>WR340/340EBBSB</td>
<td>Brass</td>
<td>WR340</td>
<td>E-Plane sweep bend</td>
</tr>
<tr>
<td>WR340/340HBBBSA</td>
<td>Aluminum</td>
<td>WR340</td>
<td>H-Plane sweep bend</td>
</tr>
<tr>
<td>WR284/340EBBSB</td>
<td>Brass</td>
<td>WR284</td>
<td>E-Plane sweep bend</td>
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<tr>
<td>WR284/340HBBBSA</td>
<td>Aluminum</td>
<td>WR284</td>
<td>H-Plane sweep bend</td>
</tr>
</tbody>
</table>
**2450 MHz: Waveguide Components**

**Water-loads**
A water-load is used to absorb microwave energy from a system.

- It is often used as a test load for generators and as the terminating load in an isolator.

### Part Number | Frequency (MHz) | Power Max. | Waveguide | Flange Type
---|---|---|---|---
2450.203.300.00 | 2450 | 30 kW | WR430 |
2450.203.200.00 | 2450 | 20 kW | WR430 |
2722-162-1051 | 2450 | 6.5 kW | WR340 |
WR284LOAD6A | 2450 | 6.0 kW | WR284 |

**Auto-tuners**
Auto-tuners are waveguide components used to match the load impedance. Tuners minimize the amount of reflected power, which results in the most efficient coupling of power to the load.

### Part Number | Frequency (MHz) | Maximum Power (kW) | Waveguide |
---|---|---|---
WR430TUNER3A | 2450 | 30.0 | WR430 |
WR340TUNER3A | 2450 | 6.0 | WR340 |
WR284TUNER3A | 2450 | 6.0 | WR284 |

* 4 Stub tuners available upon request

**Tuners**
Tuners are waveguide components used to match the load impedance. Auto-tuners are generally used in applications where the load impedance varies significantly due to variations in the load.

### Part Number | Frequency (MHz) | Maximum Power (kW) | Waveguide |
---|---|---|---
WR430AUTOTUNE3A/B* | 2450 | up to 30kW | WR430 |
WR340ECOTUNE3A | 2450 | up to 30kW | WR430 |
WR340AUTOTUNE3A/B* | 2450 | 6.0 kW | WR340 |
WR284AUTOTUNE3A/B* | 2450 | 6.0 kW | WR284 |

* A = 19" Rack Mount Controller
  B = Panel Mount Controller

Note: Electrical Tuners in WR430, 340 & 284 are also available.

---

**2450 MHz: Switch-mode Power Supplies**

### 6-8.5kW

**MG10PS**
The MG10PS magnetron power supplies each comprise a single power module, measuring 10 1/2" x 19" x 19". They are designed to power CW magnetrons with RF output powers of 6kW and 8.5kW respectively. The units also contain the filament supply and the interface circuits between the user's system and the power supply.

The high voltage output of the module is applied to the cathode of the magnetron, and the magnetron output power is controlled by the anode current. A power supply is available for magnetrons which do not have a permanent magnet. At turn on, the filament current is first applied for the pre-heat period, followed by the anode voltage and current ramps. A provision is made in the control unit to allow local control of the output voltage and current. Filament current foldback is automatically adjusted according to the value of the anode current.

Note: *208V (CE compliant) or 480V *400V or 480V

### 15-20kW

**MG24PS415/480**
Both the MG24 series (MG24PS415 and MG24PS480) magnetron power supplies are comprised of multiple 12kW power modules, each measuring 10 1/2" x 19" x 19" to drive 15-20kW magnetrons. The units also contain the filament and magnet power supplies and the interface circuits between the user's system and the power supply.

The high voltage outputs of the modules are connected in parallel and applied to the cathode of the magnetron. At turn on, the filament and magnet currents are first applied for the pre-heat period, followed by the anode voltage and current ramps. A provision is made to allow local control of the output voltage and local or remote control of the output current. RF output power is controlled by the anode current. The filament current foldback is automatically adjusted according to the value of the output current.

### 30kW

**MG48PS415/480**
Both the MG48 series (MG48PS415 and MG48PS480) magnetron power supplies are comprised of four 12kW power modules, each measuring 10 1/2" x 19" x 19" to drive 30kW magnetron. The units also contain the filament and magnet power supplies and the interface circuits between the user's system and the power supply.

The high voltage outputs of the modules are connected in parallel and applied to the cathode of the magnetron. At turn on, the filament and magnet currents are first applied for the pre-heat period, followed by the anode voltage and current ramps. A provision is made to allow local control of the output voltage and local or remote control of the output current. RF output power is controlled by the anode current. The filament current foldback is automatically adjusted according to the value of the output current.

---

**Part Number | Frequency (MHz) | Maximum Power (kW) | Waveguide |
---|---|---|---
MG10PS* & MG12PS** | 2450 | up to 30kW | WR430 |
MG24PS415/480 | 2450 | up to 30kW | WR340 |
MG48PS415/480 | 2450 | up to 30kW | WR284 |

* A = 19” Rack Mount Controller
  B = Panel Mount Controller

Note: Electrical Tuners in WR430, 340 & 284 are also available.
2450 MHz: Pulse & Inductive Power Supplies

PM740T
The PM740T pulsing power supply is suitable to drive a 2kW magnetron, such as the 2M130 or similar. It has the capability to work as a continuous or as a pulsed power supply. In continuous mode, the PM740T works as a controlled, DC source for the magnetron with a max power of 2kW. In pulsed mode, the PM740T is able to supply the pre-set mean current at a given frequency with an adjustable duty factor. The maximum peak power is near 8kW. It is controlled by a powerful microprocessor, which allows setting and adjusting of all parameters (output current, pulse frequency, duty factor, etc.). The user interface is a graphic display, LED backlit, with an optical encoder. The encoder acts as the adjustable device (similar to a potentiometer). The display provides status and set point information, alarm codes, as well as output power values. The unit has an internal pulse generator to provide the pulsing capability. This unit is CE compliant.

1.5kW - 3.0 kW
- GEN1.5KWPS50/60
- GEN2.0KWPS50/60
- GEN3.0KWPS50/60

The inductive power supply refers to a series of custom high voltage power supplies designed to provide power to remotely located magnetrons. These supplies are available in 300W, 1.5kW, 2kW, & 3kW versions, 50Hz or 60Hz.

The basic model of the conventional series drives a remote magnetron at a single fixed output power level. It includes circuitry that reduces in-rush current upon starting and a time delay for magnetron filament warm up to avoid cold-starting. Connections are provided for an external interlock chain and auxiliary power to a remote location, such as a magnetron head. Installation of the basic model requires only the connection of input & output power, control signals and adjustment of the filament voltage. No other user adjustments or calibrations are required.

2450 MHz: Waveguide Components

Isolators & Circulators
A circulator is a passive, non-reciprocal device with three or more ports used to transmit microwave energy in a specific direction. Additionally, circulators are used to prevent reflected microwave energy from the load, thus preventing excessive magnetron heating or moding. An isolator is a circulator with a water or dry load attached to a port and is used to absorb the reflected energy.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Frequency (MHz)</th>
<th>Rated Forward Power (kW)</th>
<th>Rated Reflected Power (kW)</th>
<th>Isolation (dB)</th>
<th>Waveguide Size</th>
<th>Cooling</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2450.201.124.00*</td>
<td>2450+/-10</td>
<td>30</td>
<td>30</td>
<td>&gt;20</td>
<td>WR430</td>
<td>Water</td>
<td>Circulator</td>
</tr>
<tr>
<td>2450.201.873.00*</td>
<td>2450+/-10</td>
<td>30</td>
<td>15</td>
<td>&gt;20</td>
<td>WR430</td>
<td>Water</td>
<td>Circulator</td>
</tr>
<tr>
<td>2450.201.803.02*</td>
<td>2450+/-10</td>
<td>20</td>
<td>20</td>
<td>&gt;20</td>
<td>WR430</td>
<td>Water</td>
<td>Circulator</td>
</tr>
<tr>
<td>2722-162-10311*</td>
<td>2450+/-10</td>
<td>6.5</td>
<td>6.5</td>
<td>&gt;20</td>
<td>WR340</td>
<td>Water</td>
<td>Isolator, input in-line with output.</td>
</tr>
<tr>
<td>2722-162-10461</td>
<td>2450+/-10</td>
<td>6.5</td>
<td>6.5</td>
<td>&gt;20</td>
<td>WR340</td>
<td>Water</td>
<td>Isolator, input in-line with output.</td>
</tr>
<tr>
<td>2722-162-10471</td>
<td>2450+/-10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR340</td>
<td>Water</td>
<td>Isolator, input in-line with output.</td>
</tr>
<tr>
<td>2722-162-11171*</td>
<td>2450+/-10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR340</td>
<td>Water</td>
<td>Isolator, input 90° from output.</td>
</tr>
<tr>
<td>2722-163-02104</td>
<td>2450+/-10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR284</td>
<td>Water</td>
<td>Isolator, input 90° from output.</td>
</tr>
<tr>
<td>2722-162-11161*</td>
<td>2450+/-10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR284</td>
<td>Water</td>
<td>Isolator, input in-line with output.</td>
</tr>
<tr>
<td>2722-162-11101*</td>
<td>2450+/-10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR284</td>
<td>Water</td>
<td>Isolator, input 90° from output.</td>
</tr>
<tr>
<td>WR284CIRC6A</td>
<td>2450+/-10</td>
<td>6</td>
<td>6</td>
<td>&gt;20</td>
<td>WR284</td>
<td>Water</td>
<td>Circulator</td>
</tr>
<tr>
<td>WR284CIRC3A</td>
<td>2450+/-10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR284</td>
<td>Air</td>
<td>Circulator</td>
</tr>
<tr>
<td>2722-162-10921*</td>
<td>2450+/-10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR284</td>
<td>Air</td>
<td>Circulator</td>
</tr>
</tbody>
</table>

* Recommended for new designs.


### PM740T

The PM740T pulsing power supply is suitable to drive a 2kW magnetron, such as the 2M130 or similar. It has the capability to work as a continuous or as a pulsed power supply. In continuous mode, the PM740T works as a controlled, DC source for the magnetron with a max power of 2kW. In pulsed mode, the PM740T is able to supply the pre-set mean current at a given frequency with an adjustable duty factor; the maximum peak power is near 8kW. It is controlled by a powerful microprocessor, which allows setting and adjusting of all parameters (output current, pulse frequency, duty factor, etc.). The user interface is a graphic display, LED backlit, with an optical encoder. The encoder acts as the adjustable device (similar to a potentiometer). The display provides status and set point information, alarm codes, as well as output power values. The unit has an internal pulse generator to provide the pulsing capability. This unit is **CE compliant**.

### 1.5kW - 3.0 kW

- GEN1.5KWPS50/60
- GEN2.0KWPS50/60
- GEN3.0KWPS50/60

The inductive power supply refers to a series of custom high voltage power supplies designed to provide power to remotely located magnetrons. These supplies are available in 300W, 1.5kW, 2kW, & 3kW versions, 50Hz or 60Hz.

The basic model of the conventional series drives a remote magnetron at a single fixed output power level. It includes circuitry that reduces in-rush current upon starting and a time delay for magnetron filament warm up to avoid cold-starting. Connections are provided for an external interlock chain and auxiliary power to a remote location, such as a magnetron head. Installation of the basic model requires only the connection of input & output power, control signals and adjustment of the filament voltage. No other user adjustments or calibrations are required.

### 2450 MHz: Pulse & Inductive Power Supplies

#### PM740T Pulsing Power Supply

- **Frequency (MHz)**
- **Rated Forward Power (kW)**
- **Rated Reflected Power (kW)**
- **Isolation (dB)**
- **Waveguide Size**
- **Cooling**
- **Description**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Frequency (MHz)</th>
<th>Rated Forward Power (kW)</th>
<th>Rated Reflected Power (kW)</th>
<th>Isolation (dB)</th>
<th>Waveguide Size</th>
<th>Cooling</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2450.201.124.00*</td>
<td>2450 +/- 10</td>
<td>30</td>
<td>30</td>
<td>&gt;20</td>
<td>WR430</td>
<td>Water</td>
<td>Circulator</td>
</tr>
<tr>
<td>2450.201.873.00*</td>
<td>2450 +/- 10</td>
<td>30</td>
<td>15</td>
<td>&gt;20</td>
<td>WR430</td>
<td>Water</td>
<td>Circulator</td>
</tr>
<tr>
<td>2450.201.803.02*</td>
<td>2450 +/- 10</td>
<td>20</td>
<td>20</td>
<td>&gt;20</td>
<td>WR430</td>
<td>Water</td>
<td>Circulator</td>
</tr>
<tr>
<td>2722-162-10311*</td>
<td>2450 +/- 10</td>
<td>6.5</td>
<td>6.5</td>
<td>&gt;20</td>
<td>WR340</td>
<td>Water</td>
<td>Isolator, input in-line with output.</td>
</tr>
<tr>
<td>2722-162-10461</td>
<td>2450 +/- 10</td>
<td>6.5</td>
<td>6.5</td>
<td>&gt;20</td>
<td>WR340</td>
<td>Water</td>
<td>Isolator, input 90° from output.</td>
</tr>
<tr>
<td>2722-162-10471</td>
<td>2450 +/- 10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR340</td>
<td>Water</td>
<td>Isolator, input in-line with output.</td>
</tr>
<tr>
<td>2722-162-11171*</td>
<td>2450 +/- 10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR340</td>
<td>Water</td>
<td>Isolator, input 90° from output.</td>
</tr>
<tr>
<td>2722-162-11161*</td>
<td>2450 +/- 10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR284</td>
<td>Water</td>
<td>Isolator, input in-line with output.</td>
</tr>
<tr>
<td>2722-162-11101*</td>
<td>2450 +/- 10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR284</td>
<td>Water</td>
<td>Isolator, input 90° from output.</td>
</tr>
<tr>
<td>WR284CIRC6A</td>
<td>2450 +/- 10</td>
<td>6</td>
<td>6</td>
<td>&gt;20</td>
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<td>Water</td>
<td>Circulator</td>
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<td>3</td>
<td>3</td>
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<td>WR284</td>
<td>Air</td>
<td>Circulator</td>
</tr>
<tr>
<td>2722-162-10921*</td>
<td>2450 +/- 10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR284</td>
<td>Air</td>
<td>Circulator</td>
</tr>
</tbody>
</table>

* Recommended for new designs.

### 2450 MHz: Waveguide Components

#### Isolators & Circulators

An isolaor is a passive, non-reciprocal device with three or more ports used to transmit microwave energy in a specific direction. Additionally, circulators are used to prevent reflected microwave energy from the load, thus preventing excessive magnetron heating or moding. An isolator is a circulator with a water or dry load attached to a port and is used to absorb the reflected energy.

### Part Number | Frequency (MHz) | Rated Forward Power (kW) | Rated Reflected Power (kW) | Isolation (dB) | Waveguide Size | Cooling | Description |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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<tr>
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<td>30</td>
<td>&gt;20</td>
<td>WR430</td>
<td>Water</td>
<td>Circulator</td>
</tr>
<tr>
<td>2450.201.873.00*</td>
<td>2450 +/- 10</td>
<td>30</td>
<td>15</td>
<td>&gt;20</td>
<td>WR430</td>
<td>Water</td>
<td>Circulator</td>
</tr>
<tr>
<td>2450.201.803.02*</td>
<td>2450 +/- 10</td>
<td>20</td>
<td>20</td>
<td>&gt;20</td>
<td>WR430</td>
<td>Water</td>
<td>Circulator</td>
</tr>
<tr>
<td>2722-162-10311*</td>
<td>2450 +/- 10</td>
<td>6.5</td>
<td>6.5</td>
<td>&gt;20</td>
<td>WR340</td>
<td>Water</td>
<td>Isolator, input in-line with output.</td>
</tr>
<tr>
<td>2722-162-10461</td>
<td>2450 +/- 10</td>
<td>6.5</td>
<td>6.5</td>
<td>&gt;20</td>
<td>WR340</td>
<td>Water</td>
<td>Isolator, input 90° from output.</td>
</tr>
<tr>
<td>2722-162-10471</td>
<td>2450 +/- 10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR340</td>
<td>Water</td>
<td>Isolator, input in-line with output.</td>
</tr>
<tr>
<td>2722-162-11171*</td>
<td>2450 +/- 10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR340</td>
<td>Water</td>
<td>Isolator, input 90° from output.</td>
</tr>
<tr>
<td>2722-162-11161*</td>
<td>2450 +/- 10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR284</td>
<td>Water</td>
<td>Isolator, input in-line with output.</td>
</tr>
<tr>
<td>2722-162-11101*</td>
<td>2450 +/- 10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR284</td>
<td>Water</td>
<td>Isolator, input 90° from output.</td>
</tr>
<tr>
<td>WR284CIRC6A</td>
<td>2450 +/- 10</td>
<td>6</td>
<td>6</td>
<td>&gt;20</td>
<td>WR284</td>
<td>Water</td>
<td>Circulator</td>
</tr>
<tr>
<td>WR284CIRC3A</td>
<td>2450 +/- 10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR284</td>
<td>Air</td>
<td>Circulator</td>
</tr>
<tr>
<td>2722-162-10921*</td>
<td>2450 +/- 10</td>
<td>3</td>
<td>3</td>
<td>&gt;20</td>
<td>WR284</td>
<td>Air</td>
<td>Circulator</td>
</tr>
</tbody>
</table>

* Recommended for new designs.
2450 MHz: Waveguide Components

Water-loads
A water-load is used to absorb microwave energy from a system. It is often used as a test load for generators and as the terminating load in an isolator.

Part Number | Power Max. (kW) | Frequency (MHz) | Flange Type
--- | --- | --- | ---
2450.203.003.00 | 30 | 2450 | WR430
2450.203.003.01 | 20 | 2450 | WR430
2722-162-10511 | 6.5 | 2450 | WR340
WR284LOAD6A | 6.0 | 2450 | WR284

Tuners*
Tuners are waveguide components used to match the load impedance. Tuners minimize the amount of reflected power, which results in the most efficient coupling of power to the load.

Part Number | Frequency Power (kW) | Maximum VSWR | Waveguide
--- | --- | --- | ---
WR430TUNER3A | 2450 +/- 25 | 30.0 | WR430
WR340TUNERA | 2450 +/- 25 | 6.0 | WR340
WR430TUNER3A | 2450 +/- 25 | 6.0 | WR284

Auto-tuners
Auto-tuners utilize motorized tuning stubs electronically controlled by a microprocessor to match the load impedance with the source impedance. The auto-tuner minimizes the amount of reflected power, which results in the most efficient coupling of power to the load. Auto-tuners are generally used in applications where the load impedance varies significantly due to variations in the load.

Part Number | Frequency (MHz) | Max. Power (kW) | Waveguide | Description
--- | --- | --- | --- | ---
WR430AUTOTUNE3A/B* | 2450 +/- 25 | up to 30K | WR430 | 3-Stub Tuner Automatic Tuner. Reacts to the amount (amplitude) of reflected power.
WR430ECOTUNE3A | 2450 +/- 25 | up to 30K | WR430 | 3-Stub Tuner Automatic Tuner. Reacts to the amplitude and phase of the reflected power.
WR340AUTOTUNE3A/B* | 2450 +/- 25 | 6.0kW | WR340 | 3-Stub Tuner Automatic Tuner. Reacts to the amount (amplitude) of reflected power.
WR340ECOTUNE3A | 2450 +/- 25 | 6.0kW | WR340 | 3-Stub Tuner Automatic Tuner. Reacts to the amplitude and phase of the reflected power.
WR284AUTOTUNE3A/B* | 2450 +/- 25 | 6.0kW | WR284 | 3-Stub Tuner Automatic Tuner. Reacts to the amplitude and phase of the reflected power.
WR284ECOTUNE3A | 2450 +/- 25 | 6.0kW | WR284 | 3-Stub Tuner Automatic Tuner. Reacts to the amplitude and phase of the reflected power.

* A = 19" Rack Mount Controller
B = Panel Mount Controller
Note: Electrical Tuners in WR430, 340 & 284 are also available.

2450 MHz: Switch-mode Power Supplies

6-8.5kW
MG10PS* & MG12PS**
The MG10PS and MG12PS magnetron power supplies each comprise a single power module, measuring 10 1/2" x 19" x 19". They are designed to power CW magnetrons with RF output powers of 6kW and 8.5kW respectively. The units also contain the filament supply and the interface circuits between the user's system and the power supply.

The high voltage output of the module is applied to the cathode of the magnetron, and the magnetron output power is controlled by the anode current. A magnet supply is available for magnetrons which do not have a permanent magnet. At turn on, the filament current is first applied for the pre-heat period, followed by the anode voltage and current ramps. A provision is made in the control unit to allow local control of the output voltage and current. Filament current foldback is automatically adjusted according to the value of the anode current.

Note: *258V (CE compliant) or 480V **400V or 480V

15-20kW
MG24PS415/480
Both the MG24 series (MG24PS415 and MG24PS480) magnetron power supplies are comprised of multiple 12kW power modules, each measuring 10 1/2" x 19" x 19" to drive 15-20kW magnetrons. The units also contain the filament and magnet power supplies and the interface circuits between the user's system and the power supply.

The high voltage outputs of the modules are connected in parallel and applied to the cathode of the magnetron. At turn on, the filament and magnet currents are first applied for the pre-heat period, followed by the anode voltage and current ramps. A provision is made to allow local control of the output voltage and local or remote control of the output current. RF output power is controlled by the anode current. The filament current foldback is automatically adjusted according to the value of the output current.

30kW
MG48PS415/480
Both the MG48 series (MG48PS415 and MG48PS480) magnetron power supplies are comprised of four 12kW power modules, each measuring 10 1/2" x 19" x 19" to drive a 30kW magnetron. The units also contain the filament and magnet power supplies and the interface circuits between the user's system and the power supply.

The high voltage outputs of the modules are connected in parallel and applied to the cathode of the magnetron. At turn on, the filament and magnet currents are first applied for the pre-heat period, followed by the anode voltage and current ramps. A provision is made to allow local control of the output voltage and local or remote control of the output current. RF output power is controlled by the anode current. The filament current foldback is automatically adjusted according to the value of the output current.
The compact size of the SM1180 allows greater system flexibility and simplifies both the installation and maintenance.

- Output power can be adjusted using the front panel interface or by an external analog signal connected to the power supply.
- Keypad interface for controlling the SM1180’s CPU status LEDs.
- A 4-digit display (lower) indicating the reverse power.
- A 4-digit display (upper) indicating forward power, anode current or voltage.

The SM1150 switch-mode power supply is capable of providing the required voltage and current to operate the 3000-watt NL10230 magnetron or equivalent.

- The power supply is designed for installation in a standard 19” rack cabinet and is connected to the magnetron/microwave generator with a standard 3-meter cable assembly.
- In addition to operating the magnetron, the SM1150 provides power for a cooling fan, and monitors the operating condition of both the magnetron and power supply.
- The output power can be adjusted on a continuous scale using a front panel interface or through an analog signal. This unit is CE compliant.

Note: CAN-bus option available.

The SM1180 switch-mode power supply is designed to operate the 6kW, YJ1600 magnetron.

- The power supply may also be used to power the TM060 microwave generator with a standard 3-meter cable assembly.
- In addition to operating the magnetron, the SM1180 provides power for a cooling fan, and monitors the operating condition of both the magnetron and power supply.
- The output power can be adjusted on a continuous scale using a front panel potentiometer or through an external analog signal. Various options are available. This unit is CE compliant.

Note: D=208V/T=400V

Waveguide Transitions

Waveguide transitions are used to connect waveguides of different sizes.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Material</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR430/COAXTRANS</td>
<td>Aluminum</td>
<td>WR430 to 1 5/8&quot; connector</td>
<td>WR430 Waveguide to N-type connector</td>
</tr>
<tr>
<td>WR430/COAXTRANS</td>
<td>Aluminum</td>
<td>WR430 to 7/8&quot; connector</td>
<td>WR430 Waveguide to 7/8&quot; connector</td>
</tr>
<tr>
<td>WR430/COAXTRANS</td>
<td>Aluminum</td>
<td>WR430 to 5/8&quot; connector</td>
<td>WR430 Waveguide to 5/8&quot; connector</td>
</tr>
<tr>
<td>WR340/COAXTRANS</td>
<td>Aluminum</td>
<td>WR340 to 7/8&quot; connector</td>
<td>WR340 Waveguide to 7/8&quot; connector</td>
</tr>
<tr>
<td>WR340/COAXTRANS</td>
<td>Aluminum</td>
<td>WR340 to 5/8&quot; connector</td>
<td>WR340 Waveguide to 5/8&quot; connector</td>
</tr>
</tbody>
</table>

Coax Transitions

Coaxial transitions are waveguide components used to convert standard waveguide to a specific coaxial connector.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Max. Power (kW)</th>
<th>VSWR</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR430/COAXTRANS</td>
<td>0.3</td>
<td>&lt;1.15</td>
<td>WR430</td>
<td>Waveguide to N-type connector</td>
</tr>
<tr>
<td>WR430/COAXTRANS</td>
<td>1.2</td>
<td>&lt;1.15</td>
<td>WR430</td>
<td>Waveguide to 7/16&quot; connector</td>
</tr>
<tr>
<td>WR430/COAXTRANS</td>
<td>2.0</td>
<td>&lt;1.15</td>
<td>WR430</td>
<td>Waveguide to 7/8&quot; connector</td>
</tr>
<tr>
<td>WR430/COAXTRANS</td>
<td>5.0</td>
<td>&lt;1.15</td>
<td>WR430</td>
<td>Waveguide to 5/8&quot; connector</td>
</tr>
<tr>
<td>WR340/COAXTRANS</td>
<td>0.3</td>
<td>&lt;1.15</td>
<td>WR340</td>
<td>Waveguide to N-type connector</td>
</tr>
<tr>
<td>WR340/COAXTRANS</td>
<td>1.2</td>
<td>&lt;1.15</td>
<td>WR340</td>
<td>Waveguide to 7/16&quot; connector</td>
</tr>
<tr>
<td>WR340/COAXTRANS</td>
<td>2.0</td>
<td>&lt;1.15</td>
<td>WR340</td>
<td>Waveguide to 7/8&quot; connector</td>
</tr>
<tr>
<td>WR340/COAXTRANS</td>
<td>5.0</td>
<td>&lt;1.15</td>
<td>WR340</td>
<td>Waveguide to 5/8&quot; connector</td>
</tr>
<tr>
<td>WR284/COAXTRANS</td>
<td>0.3</td>
<td>&lt;1.15</td>
<td>WR284</td>
<td>Waveguide to N-type connector</td>
</tr>
<tr>
<td>WR284/COAXTRANS</td>
<td>1.2</td>
<td>&lt;1.15</td>
<td>WR284</td>
<td>Waveguide to 7/16&quot; connector</td>
</tr>
<tr>
<td>WR284/COAXTRANS</td>
<td>2.0</td>
<td>&lt;1.15</td>
<td>WR284</td>
<td>Waveguide to 7/8&quot; connector</td>
</tr>
<tr>
<td>WR284/COAXTRANS</td>
<td>5.0</td>
<td>&lt;1.15</td>
<td>WR284</td>
<td>Waveguide to 5/8&quot; connector</td>
</tr>
</tbody>
</table>
2450 MHz: Waveguide Components

**Couplers**
Directional couplers are waveguide components used to measure forward and/or reflected microwave energy.

### Waveguide Size WR430
**Frequency (MHz): 2450+/−25**
**Directivity (dB): >20**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Coupling Factor (dB)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR430DDCB</td>
<td>NA</td>
<td>Dual directional coupler, includes galvanometers for reading forward &amp; reflected power.</td>
</tr>
<tr>
<td>WR430DDCA</td>
<td>NA</td>
<td>Dual directional coupler with BNC output detector diodes.</td>
</tr>
<tr>
<td>WR430DDCN*</td>
<td>60</td>
<td>Dual directional coupler with female N-type connectors</td>
</tr>
</tbody>
</table>

**Waveguide Size WR340**
**Frequency (MHz): 2450+/−25**
**Directivity (dB): >20**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Coupling Factor (dB)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR340DDCB</td>
<td>NA</td>
<td>Dual directional coupler, includes galvanometers for reading forward &amp; reflected power. (Calibrated to 1.2kW)</td>
</tr>
<tr>
<td>WR340DDCA</td>
<td>NA</td>
<td>Dual directional coupler with BNC output detector diodes. (Calibrated to 2.0kW)</td>
</tr>
<tr>
<td>WR340DDCN*</td>
<td>60</td>
<td>Dual directional coupler with female N-type connectors</td>
</tr>
<tr>
<td>WR340DDCBA</td>
<td>3.0</td>
<td>Dual directional coupler with BNC output detector diodes. (Calibrated to 3.0kW)</td>
</tr>
</tbody>
</table>

**Waveguide Size WR284**
**Frequency (MHz): 2450+/−25**
**Directivity (dB): >20**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Coupling Factor (dB)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR284DDCB</td>
<td>NA</td>
<td>Dual directional coupler, includes galvanometers for reading forward &amp; reflected power.</td>
</tr>
<tr>
<td>WR284DDCA</td>
<td>NA</td>
<td>Dual directional coupler with BNC output detector diodes.</td>
</tr>
<tr>
<td>WR284DDCN*</td>
<td>60</td>
<td>Dual directional coupler with female N-type connectors</td>
</tr>
</tbody>
</table>

* Additional coupling factors available upon request (e.g. 30 dB, 50 dB and 60 dB).

### Switch-mode Power Supplies

**CM340 (1.0kW)**
The CM340 switch-mode power supply is able to supply, from remote location, the current necessary for a 1 kW magnetron, such as the ZM167 or equivalent, observing the specifications set by the electron tube manufacturer.

The unit is housed in a very compact stainless steel cabinet, suitable to be installed into a closed cabinet. The output power can be adjusted by a 0-10V analog signal. In addition to powering magnetrons, the CM 340 generator also supplies power to magnetron cooling fans, monitors magnetron temperature, carries out a number of monitoring processes independently, cuts off the power in case of malfunction and displays the alarms by means of LED. This unit is **CE compliant**.

Note: CAN-bus option available.

**CM440 (1.25kW)**
The CM440 switch-mode power supply is able to supply, from remote location, the current necessary for a 1.25 kW magnetron, such as the YJ1540 or equivalent, observing the specifications set by the electron tube manufacturer.

The unit is housed in a very compact stainless steel cabinet, suitable to be installed into a closed cabinet. The output power can be adjusted by a 0-10V analog signal. In addition to powering magnetrons, the CM 440 generator also supplies power to magnetron cooling fans, it monitors magnetron temperature, carries out a number of monitoring processes independently, cuts off the power in case of malfunction and displays the alarms by means of LED. This unit is **CE compliant**.

Note: CAN-bus option available.

**SM445G (1.25kW)**
The SM445F switch-mode power supply is capable of providing the required voltage and current to operate the 1250-watt YJ1540 magnetron or equivalent.

The power supply is designed for installation in a standard 19” rack mount cabinet and is connected to the magnetron/microwave generator with a standard 3-meter cable assembly. In addition to operating the magnetron, the SM445 power supply provides power for a cooling fan, and monitors the operating conditions of both the magnetron and the power supply. The output power can be adjusted on a continuous scale using a front panel potentiometer or through an external analog signal. Various options are available. This unit is **CE compliant**.

Note: CAN-bus option available.

**SM745G (2.0kW)**
The SM745F switch-mode power supply is capable of providing the required voltage and current to operate the 2000-watt NL10250 magnetron or equivalent.

The power supply is designed for installation in a standard 19” rack mount cabinet and is connected to the magnetron/microwave generator with a standard 3-meter cable assembly. In addition to operating the magnetron, the SM745 power supply provides power for a cooling fan, and monitors the operating conditions of both the magnetron and the power supply. The output power can be adjusted on a continuous scale using a front panel potentiometer or through an external analog signal. Various options are available. This unit is **CE compliant**.

Note: CAN-bus option available.
2450 MHz: Magnetrons

High & Low Frequency, 2450MHz CW Magnetrons

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Freq. (MHz)</th>
<th>Output Power (kW)</th>
<th>V_in (V)</th>
<th>I_in (A)</th>
<th>V_sp (kV)</th>
<th>I_sp (mA)</th>
<th>I_ap (mA)</th>
<th>Cooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>NL10250-20</td>
<td>Low</td>
<td>2.00</td>
<td>4.7</td>
<td>20</td>
<td>3.6</td>
<td>725</td>
<td>1800</td>
<td>Water</td>
</tr>
<tr>
<td>NL10250-54</td>
<td>Low</td>
<td>1.95</td>
<td>4.7</td>
<td>20</td>
<td>4.3</td>
<td>725</td>
<td>2100</td>
<td>Air</td>
</tr>
<tr>
<td>NL10250-64</td>
<td>High</td>
<td>1.95</td>
<td>4.7</td>
<td>20</td>
<td>4.3</td>
<td>725</td>
<td>2100</td>
<td>Air</td>
</tr>
<tr>
<td>NL10251-9</td>
<td>High</td>
<td>1.70</td>
<td>4.6</td>
<td>20</td>
<td>3.6</td>
<td>725</td>
<td>1800</td>
<td>Air</td>
</tr>
<tr>
<td>NL10251-10</td>
<td>Low</td>
<td>1.70</td>
<td>4.6</td>
<td>20</td>
<td>3.6</td>
<td>725</td>
<td>1800</td>
<td>Air</td>
</tr>
<tr>
<td>NL10251-3LOW</td>
<td>Low</td>
<td>1.70</td>
<td>4.6</td>
<td>20</td>
<td>3.6</td>
<td>725</td>
<td>1800</td>
<td>Water</td>
</tr>
<tr>
<td>NL10251-3HIGH</td>
<td>High</td>
<td>1.70</td>
<td>4.6</td>
<td>20</td>
<td>3.6</td>
<td>725</td>
<td>1800</td>
<td>Water</td>
</tr>
</tbody>
</table>

5kw - 6kW, 2450MHz CW Magnetrons

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Frequency (MHz)</th>
<th>Output Power (kW)</th>
<th>V_in (V)</th>
<th>I_in (A)</th>
<th>V_sp (kV)</th>
<th>I_sp (mA)</th>
<th>I_ap (mA)</th>
<th>Magnet</th>
</tr>
</thead>
<tbody>
<tr>
<td>YJ1600*</td>
<td>2450</td>
<td>0.6-6</td>
<td>5</td>
<td>33</td>
<td>7.2</td>
<td>1150</td>
<td>1300</td>
<td>PM/EM1</td>
</tr>
<tr>
<td>YJ1191A</td>
<td>2450</td>
<td>6</td>
<td>5.5</td>
<td>44</td>
<td>7.3</td>
<td>1250</td>
<td>1500</td>
<td>PM/EM1</td>
</tr>
<tr>
<td>YJ1193</td>
<td>2450</td>
<td>6</td>
<td>5.5</td>
<td>44</td>
<td>7.3</td>
<td>1250</td>
<td>1500</td>
<td>PM/EM1</td>
</tr>
<tr>
<td>H3811*</td>
<td>2450</td>
<td>6</td>
<td>5</td>
<td>29</td>
<td>7.3</td>
<td>1100</td>
<td>2100</td>
<td>PM/EM1</td>
</tr>
<tr>
<td>H38191</td>
<td>2450</td>
<td>5</td>
<td>5</td>
<td>23.5</td>
<td>7.3</td>
<td>920</td>
<td>2100</td>
<td>PM/EM1</td>
</tr>
<tr>
<td>2M13</td>
<td>2450</td>
<td>5</td>
<td>6</td>
<td>56</td>
<td>1100</td>
<td>2100</td>
<td>EM/EM1</td>
<td></td>
</tr>
<tr>
<td>2M68</td>
<td>2450</td>
<td>5.3</td>
<td>5</td>
<td>46</td>
<td>7</td>
<td>1100</td>
<td>1300</td>
<td>EM/EM1</td>
</tr>
</tbody>
</table>

10-30kW, 2450MHz CW Magnetrons

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Frequency (MHz)</th>
<th>Output Power (kW)</th>
<th>V_in (V)</th>
<th>I_in (A)</th>
<th>V_sp (kV)</th>
<th>I_sp (mA)</th>
<th>I_ap (mA)</th>
<th>Magnet</th>
</tr>
</thead>
<tbody>
<tr>
<td>NL10245</td>
<td>2450</td>
<td>1.0-10.0</td>
<td>10</td>
<td>36</td>
<td>10</td>
<td>1600</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>NL15245</td>
<td>2450</td>
<td>1.5-15.0</td>
<td>10</td>
<td>47</td>
<td>12</td>
<td>1800</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>NL20245</td>
<td>2450</td>
<td>1.5-20.0</td>
<td>10</td>
<td>50</td>
<td>14.5</td>
<td>2100</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td>NL30245</td>
<td>2450</td>
<td>1.5-30.0</td>
<td>6.4</td>
<td>66</td>
<td>13.5</td>
<td>3300</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Mounting Configurations

- IL/NIL (K): Mounting is in-line (IL) with connector. Airflow is not-in-line (NIL) with connector.
- IL (H): Mounting and airflow are in-line (IL) with connector.
- NIL (J): Mounting and airflow are not-in-line (NIL) with connector.

5kw - 6kW, 2450MHz CW Magnetrons

2450 MHz: Waveguide Components

Straight Sections

Straight waveguide is supplied either as a raw cut waveguide section or with the attached flanges. The length of a straight waveguide piece is measured from face to face of the flanges. We also offer painting and special plating (e.g. irridite) options. Please contact us for a quote.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Material</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR430WGXXXXC</td>
<td>Copper</td>
<td>WR430</td>
<td>Waveguide straight section (no flanges)</td>
</tr>
<tr>
<td>WR430WGXXXXA</td>
<td>Aluminum</td>
<td>WR430</td>
<td>Waveguide straight section with flanges on either end</td>
</tr>
<tr>
<td>WR340WGXXXXC</td>
<td>Copper</td>
<td>WR340</td>
<td>Waveguide straight section (no flanges)</td>
</tr>
<tr>
<td>WR340WGXXXXA</td>
<td>Aluminum</td>
<td>WR340</td>
<td>Waveguide straight section with flanges on either end</td>
</tr>
<tr>
<td>WR340WGXXXXAY</td>
<td>Aluminum</td>
<td>WR340</td>
<td>Waveguide straight section with flanges on either end</td>
</tr>
</tbody>
</table>

Flanges

Waveguide flanges are used to connect waveguide sections to one another.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR430FLAN1</td>
<td>Brass, flat, pocket</td>
<td></td>
</tr>
<tr>
<td>WR430FLAN2</td>
<td>Brass, choke, pocket</td>
<td></td>
</tr>
<tr>
<td>WR430FLAN3</td>
<td>Aluminum, flat, pocket</td>
<td></td>
</tr>
<tr>
<td>WR430FLAN4</td>
<td>Aluminum, choke, pocket</td>
<td></td>
</tr>
<tr>
<td>WR430FLAN5</td>
<td>Stainless steel, choke, pocket</td>
<td></td>
</tr>
<tr>
<td>WR284FLAN1</td>
<td>Brass, flat, pocket</td>
<td></td>
</tr>
<tr>
<td>WR284FLAN2</td>
<td>Brass, choke, pocket</td>
<td></td>
</tr>
<tr>
<td>WR284FLAN3</td>
<td>Aluminum, flat, pocket</td>
<td></td>
</tr>
<tr>
<td>WR284FLAN4</td>
<td>Aluminum, choke, pocket</td>
<td></td>
</tr>
</tbody>
</table>

Sample Part Number: WR340WG0250C2
- WR340 Waveguide Straight Section
- 250mm in Length
- Copper Material
- 2 Attached WR340FLAN2 Type Flanges

Richardson Electronics offers custom waveguide components designed to your specifications. If you do not see what you are looking for in our catalog, please contact your local sales representative for further details.
### 2450 MHz: Microwave Leakage Meters

**MLT441:**
Panel mount for easy integration/installation in existing equipment

**MLT442:**
19" rack, for easy mounting in cabinets or table top use.

**Features:**
- CE certification
- Threshold detection and switching for microwave power at 2450MHz
- Equipped to accommodate 1 to 4 measuring probes.
- Sensitivity level can be manually set from 0.5 to 10mW/cm²
- LCD display informs the following details:
  - Status
  - Actual measured data
  - Set point for threshold switch
  - Language
- Equipped with "watch-dog" circuitry to check the functions of the processor
- Line voltage: 85 to 265VAC

**Dimensions:**
- MLT441: 300mm * 200mm * 80mm
- MLT442: 478mm * 295mm * 88mm (19" rack)

**Measuring sensor:** diameter 20.5mm * 80mm

**Sensor Specs:**
Calibrated frequency: 2450MHz
Ambient temperature: 10 to 40 Deg. C
Max. field strength: 2.0mW/cm²
Measuring distance: 50mm
(Distance between the sensor head and area to be measured or supervised.)

### MLT4 Series Hand-held Leakage Meters

**MLT4A:** 0 to 2mW/cm²
**MLT4B:** 0 to 10mW/cm²
**MLT4C:** 0 to 5mW/cm² (non-linearized)

**Features:**
- Hand-held instrument
- LED-scale
- Overrange acoustic signal

**Dimensions:**
- Case: 120mm * 65mm * 40mm
- Battery control (9V alkaline)
- Measuring sensor: diameter 20.5mm * 80mm

**Specs:**
Display: LED-scale 11 steps
Accuracy: +/-1dB, calibrated at 2450MHz
Performance density: Max., 2.0mW/cm²
Working temperature: 10 to 40 Deg. C

---

### 2450 MHz: Magnetrons

**MLT41:**
Magnetron: A low-cost, efficient cross-field microwave oscillator used for the generation of continuous-wave (CW) energy.

Below is a partial listing of magnetrons we offer from stock. We also offer custom design, testing and cross-referencing.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Freq. (MHz)</th>
<th>Output Power (kW)</th>
<th>V_H (V)</th>
<th>I_H (A)</th>
<th>V_C (kV)</th>
<th>I_C (mA)</th>
<th>L_C (mA)</th>
<th>Cooling</th>
<th>Mounting Configuration**</th>
</tr>
</thead>
<tbody>
<tr>
<td>NL10230-1A*</td>
<td>2450</td>
<td>3.00</td>
<td>4.6</td>
<td>16</td>
<td>5.4</td>
<td>900</td>
<td>2650</td>
<td>water</td>
<td>NIL (J)</td>
</tr>
<tr>
<td>NL10230-5*</td>
<td>2450</td>
<td>3.00</td>
<td>4</td>
<td>23</td>
<td>5</td>
<td>900</td>
<td>2100</td>
<td>air</td>
<td>IL (H)</td>
</tr>
<tr>
<td>2M251-05</td>
<td>2450</td>
<td>3.00</td>
<td>4</td>
<td>23</td>
<td>5</td>
<td>900</td>
<td>2100</td>
<td>water</td>
<td>NIL (J)</td>
</tr>
<tr>
<td>2M252-05</td>
<td>2450</td>
<td>3.00</td>
<td>4</td>
<td>23</td>
<td>5</td>
<td>900</td>
<td>2100</td>
<td>water</td>
<td>NIL (J)</td>
</tr>
<tr>
<td>YJ1442-C</td>
<td>2450</td>
<td>3.00</td>
<td>5</td>
<td>20</td>
<td>6</td>
<td>800</td>
<td>1100</td>
<td>water</td>
<td>NIL (J)</td>
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<td>YJ1442E</td>
<td>2450</td>
<td>3.00</td>
<td>5</td>
<td>20</td>
<td>6</td>
<td>800</td>
<td>1100</td>
<td>water</td>
<td>—</td>
</tr>
<tr>
<td>DX582</td>
<td>2450</td>
<td>2.70</td>
<td>4.6</td>
<td>19</td>
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<td>900</td>
<td>2100</td>
<td>air</td>
<td>IL (H)</td>
</tr>
<tr>
<td>NL10250-1A*</td>
<td>2450</td>
<td>1.90</td>
<td>4.6</td>
<td>19</td>
<td>4</td>
<td>725</td>
<td>2100</td>
<td>air</td>
<td>NIL (J)</td>
</tr>
<tr>
<td>NL10250-2A*</td>
<td>2450</td>
<td>1.90</td>
<td>4.6</td>
<td>19</td>
<td>4</td>
<td>725</td>
<td>2100</td>
<td>air</td>
<td>NIL (J)</td>
</tr>
<tr>
<td>2M130-11/IL</td>
<td>2450</td>
<td>1.90</td>
<td>4.6</td>
<td>19</td>
<td>4</td>
<td>725</td>
<td>2100</td>
<td>air</td>
<td>IL (H)</td>
</tr>
<tr>
<td>2M130-06/NIL</td>
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<td>1.90</td>
<td>4.6</td>
<td>19</td>
<td>4</td>
<td>725</td>
<td>2100</td>
<td>air</td>
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<td>NL10250-3A*</td>
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<td>1.90</td>
<td>4.6</td>
<td>19</td>
<td>4</td>
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<td>2100</td>
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<td>—</td>
</tr>
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<td>NL10251-2A*</td>
<td>2450</td>
<td>1.60</td>
<td>4.6</td>
<td>19</td>
<td>3.6</td>
<td>700</td>
<td>1800</td>
<td>air</td>
<td>IL (H)</td>
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<td>2M131-04A</td>
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<td>1800</td>
<td>air</td>
<td>IL (H)</td>
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<td>NL10254-IL*</td>
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<td>1.45</td>
<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>450</td>
<td>1800</td>
<td>air</td>
<td>IL (H)</td>
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<td>2450</td>
<td>1.45</td>
<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>450</td>
<td>1800</td>
<td>air</td>
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<td>1800</td>
<td>air</td>
<td>NIL (J)</td>
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<tr>
<td>NL10259-1A*</td>
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<td>1.45</td>
<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>450</td>
<td>1800</td>
<td>air</td>
<td>NIL (J)</td>
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<td>2M120-21</td>
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<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>450</td>
<td>1800</td>
<td>air</td>
<td>IL (H)</td>
</tr>
<tr>
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<td>1.45</td>
<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>450</td>
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<td>air</td>
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<td>1.45</td>
<td>4.6</td>
<td>14</td>
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<td>1800</td>
<td>air</td>
<td>IL (H)</td>
</tr>
<tr>
<td>NL10259-6A*</td>
<td>2450</td>
<td>1.45</td>
<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>450</td>
<td>1800</td>
<td>water</td>
<td>NIL (J)</td>
</tr>
<tr>
<td>YJ1540*</td>
<td>2450</td>
<td>1.26</td>
<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>400</td>
<td>1600</td>
<td>air</td>
<td>IL (H)</td>
</tr>
<tr>
<td>2M137(IL)</td>
<td>2450</td>
<td>1.26</td>
<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>400</td>
<td>1600</td>
<td>air</td>
<td>IL (H)</td>
</tr>
<tr>
<td>YJ1540-2A*</td>
<td>2450</td>
<td>1.26</td>
<td>4.6</td>
<td>14</td>
<td>4.5</td>
<td>400</td>
<td>1600</td>
<td>water</td>
<td>IL (H)</td>
</tr>
<tr>
<td>NL10305-3</td>
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<td>4.3</td>
<td>13.5</td>
<td>3.35</td>
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<td>1400</td>
<td>air</td>
<td>NIL (J)</td>
</tr>
<tr>
<td>NL10305-2</td>
<td>2450</td>
<td>1.08</td>
<td>4.3</td>
<td>13.5</td>
<td>3.35</td>
<td>350</td>
<td>1400</td>
<td>air</td>
<td>IL (H)</td>
</tr>
<tr>
<td>2M247J</td>
<td>2450</td>
<td>1.08</td>
<td>4.3</td>
<td>13.5</td>
<td>3.35</td>
<td>350</td>
<td>1400</td>
<td>air</td>
<td>NIL (J)</td>
</tr>
<tr>
<td>2M247H</td>
<td>2450</td>
<td>1.08</td>
<td>4.3</td>
<td>13.5</td>
<td>3.35</td>
<td>350</td>
<td>1400</td>
<td>air</td>
<td>IL (H)</td>
</tr>
<tr>
<td>2M107A-605*</td>
<td>2450</td>
<td>0.88</td>
<td>3.3</td>
<td>10.5</td>
<td>4.1</td>
<td>300</td>
<td>1200</td>
<td>air</td>
<td>IL/NIL (K)</td>
</tr>
<tr>
<td>2M107A-795*</td>
<td>2450</td>
<td>0.88</td>
<td>3.3</td>
<td>10.5</td>
<td>4.1</td>
<td>300</td>
<td>1200</td>
<td>air</td>
<td>IL (H)</td>
</tr>
<tr>
<td>2M107A-825*</td>
<td>2450</td>
<td>0.88</td>
<td>3.3</td>
<td>10.5</td>
<td>4.1</td>
<td>300</td>
<td>1200</td>
<td>air</td>
<td>NIL (J)</td>
</tr>
<tr>
<td>YJ1530SP*</td>
<td>2450</td>
<td>0.10–310</td>
<td>3.4</td>
<td>11.5</td>
<td>3</td>
<td>150</td>
<td>900</td>
<td>air</td>
<td>IL/NIL (K)</td>
</tr>
</tbody>
</table>

* Recommended for new designs.
** See the bottom of page 12 for mounting configuration definitions.
915 & 2450 MHz: Microwave Leakage Meters

Richardson offers microwave leakage detectors from Holaday Industries and other quality manufacturers. These detectors aid in protecting personnel and assist in meeting government regulations for microwave radiation.

The following hand-held models are of a meter and probe style. They feature a hand-held probe to check areas for microwave radiation without exposure to the operator. The meters are virtually immune to failure caused by excessive fields, completely portable, and battery-operated. They feature battery and meter checks to ensure proper operation of both the microwave equipment and meter.

**Model HI-1501**

The HI-1501 is a meter and probe style. It features a hand-held probe to check areas for microwave radiation without exposure to the operator. The meter is virtually immune to failure caused by excessive fields, completely portable and battery operated. It features battery and meter checks to ensure proper operation of both the microwave equipment and meter.

**Specifications:**
- Calibrated at 2450 MHz
- Ranges: 0.2-2, 0-10, 0-100 mW/cm²
- Accuracy: ± 1 dB
- Maximum power density: 2.0 W/cm²

**Model HI-1801**

The HI-1801 is a meter and probe style. It features a hand-held probe to check areas for microwave radiation without exposure to the operator. The meter is virtually immune to failure caused by excessive fields, completely portable and battery operated. It features battery and meter checks to ensure proper operation of both the microwave equipment and meter.

**Specifications:**
- Calibrated at 2450 MHz
- Range: 0-10 mW/cm²
- Accuracy: ± 1 dB
- Maximum power density: Continuous 2.0 W/cm²

**Model HI-1600**

The HI-1600 is a meter and probe style. It features a hand-held probe to check areas for microwave radiation without exposure to the operator. The meter is virtually immune to failure caused by excessive fields, completely portable and battery operated. It features battery and meter checks to ensure proper operation of both the microwave equipment and meter.

**Specifications:**
- Calibrated: Standard is 2450 MHz. 915 MHz is available at an additional cost.
- Three ranges: 0-10 mW/cm² at 2450 MHz, 0-10 and 0-20 mW/cm² at 915 MHz
- Accuracy: ± 1 dB
- Maximum power density: 2.0 W/cm²

2450 MHz: Component Sets

A multitude of ancillary components are used to transmit, measure and alter the microwave energy generated from a magnetron. These component sets usually include a magnetron, waveguide launcher, circulator, water-load and a power supply.

### 5 & 6 kW, 2450 MHz Component Sets

**Description** | 5kW | 6kW
---|---|---
**CW Magnetron** | H3891 | YJ1600
**Waveguide Launcher** | WR340LJUN-1600C* | WR340LJUN-1600C*
**Isolator** | 2722-162-10311 | 2722-162-10311
**Arc Detector** | 2722-162-10320 | 2722-162-10320
**Power Supply** | MG10PS(208 or 480V) or SM1180T(400V) | MG10PS(208 or 480V) or SM1180T(400V)

*Includes mounting cylinder for integral arc detector. (Arc detector not included).
**See pages 14 & 15 for detailed information.

### 8-30 kW, 2450 MHz Component Sets

**Description** | 8kW | 15kW | 20kW | 30kW
---|---|---|---|---
**CW Magnetron** | NL10245 | NL15245 | NL20245 | NL30245
**Waveguide Launcher** | NL15245ASSY-A | NL15245ASSY-A | NL20245 | NL30245
**Isolator** | NL20245 | NL20245 | NL20245 | NL20245
**Electromagnet** | NL15245ASSY-A | NL15245ASSY-A | NL20245 | NL30245
**Pole Pieces** | NL15245ASSY-A | NL15245ASSY-A | NL20245 | NL30245
**Connector Set** | NL10245-CONN | NL15245-CONN | NL20245-CONN | NL30245-CONN
**3-Port Circulator** | 2450.201.803.01 | 2450.201.803.01 | 2450.201.803.01 | 2450.201.803.01
**Dummy Water Load** | 2450.203.203.01 | 2450.203.203.01 | 2450.203.203.01 | 2450.203.203.01
**Power Supply** | MG12PS(208-480V) | MG24PS(415-480V) | MG24PS(415-480V) | MG48PS(415-480V)

* Includes electromagnet, launcher and upper & lower pole pieces.
**See page 15 for detailed information.

### 5 & 6 kW, 2450 MHz Component Sets

A multitude of ancillary components are used to transmit, measure and alter the microwave energy generated from a magnetron. These component sets usually include a magnetron, waveguide launcher, circulator, water-load and a power supply.

### 8-30 kW, 2450 MHz Component Sets

A multitude of ancillary components are used to transmit, measure and alter the microwave energy generated from a magnetron. These component sets usually include a magnetron, waveguide launcher, circulator, water-load and a power supply.
915 MHz: Microwave Generators (Variable)

High Power, Complete Microwave Generators with Remote or Integrated Magnetron Head.

All of our microwave generators come standard with an isolator, RS232 interface, LCD screen and keypad control.

The following interface options are also available:
- CANbus
- ProfiBus
- Device Net
- RS485 interfacing.

Other options are available upon request. Please contact your local Richardson sales representative.

Part Numbering System

Example Part Number: G915/60KW3BSR

915MHz, 60kW/MW generator with remote magnetron head and switch-mode power supply, 480V/50Hz.

<table>
<thead>
<tr>
<th>Max. Output Power</th>
<th>Power Supply</th>
<th>Magnetron Head</th>
<th>Freq. MHz</th>
<th>Cooling Type</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>5kW</td>
<td>Inductive</td>
<td>Remote or Integrated</td>
<td>915</td>
<td>Water</td>
<td>G915/5kWxxxx</td>
</tr>
<tr>
<td>30kW</td>
<td>Inductive</td>
<td>Remote or Integrated</td>
<td>915</td>
<td>Water</td>
<td>G915/30kWxxxx</td>
</tr>
<tr>
<td>60kW</td>
<td>Inductive</td>
<td>Remote or Integrated</td>
<td>915</td>
<td>Water</td>
<td>G915/60kWxxxx</td>
</tr>
<tr>
<td>75kW</td>
<td>Inductive</td>
<td>Remote or Integrated</td>
<td>915</td>
<td>Water</td>
<td>G915/75kWxxxx</td>
</tr>
<tr>
<td>100kW</td>
<td>Inductive</td>
<td>Remote or Integrated</td>
<td>915</td>
<td>Water</td>
<td>G915/100kWxxxx</td>
</tr>
</tbody>
</table>

* Also available in 896 & 500MHz

2450 MHz: 6kW, Microwave Generators (Variable Output)

Alter 6kW Complete microwave generator with switch-mode power supply and remote magnetron head and isolator.

Max Output Power: 6kW
Freq. MHz: 2450
Cooling Type: Water
Magnetron Head: Remote
Power Supply: SM1180
Input Voltage: 400V
Part Number: GEN6KW400Vxx

The GEN6KW400Vxx is a 6kW, 2.45GHz microwave generator system consisting of a generator head, power supply, and isolator. The TM600 generator head is packaged in a stainless steel cabinet and houses a water-cooled YJ1600 magnetron, launching section, filament transformer, arc detector, and a reflected power measurement device. The power supply is the SM1180 switch-mode, low ripple supply featuring constant current control. The SM1180 is operated by a CPU and uses a front panel interface to control and display the functions of the power supply and microwave generator head. A 6.5kW isolator is supplied with the generator system to protect the magnetron from reflected energy. The optional reverse power measurement device is connected to a monitoring port on the isolator’s water-load. Reflected power information is relayed to the SM1180’s control unit and displayed on the interface. The system has been designed so that the microwave generator can be remotely installed with respect to the power supply. This separation allows for greater system flexibility and simplifies both installation and maintenance. This system is CE compliant.

National 6kW Complete microwave generator with switch-mode power supply, remote magnetron head and isolator.

Max Output Power: 6kW
Freq. MHz: 2450
Cooling Type: Water
Magnetron Head: Remote
Power Supply: MG10 series
Input Voltage: 208V / 480V
Part Number: GEN6KW208 / GEN6KW480

The GEN6KW208/480 is a 6kW, 2.45GHz microwave generator system consisting of a generator head, power supply, and isolator. The generator head is packaged in a stainless steel cabinet and houses a water-cooled YJ1600 magnetron, launching section, filament transformer, arc detection circuitry. The power supply is a Spellman MG10 series switch-mode, low ripple supply featuring constant current control. A 25-pin, D-sub connector on the back of the supply provides a user interface to control the system. Two front panel potentiometers are provided to adjust the magnetrons anode voltage and anode current, which are displayed on two front panel meters.
2450 MHz: High Power Microwave Generators (Variable Output)

High Power, Complete Microwave Generators with Remote or Integrated Magnetron Head.

All of our microwave generators come standard with an isolator, RS232 interface, LCD screen and keypad control.

The following interface options are also available:
- CANbus
- ProfiBus
- Device Net
- RS485 interfacing.

Other options are available upon request. Please contact your local Richardson sales representative.

<table>
<thead>
<tr>
<th>Max. Power</th>
<th>Output Frequency</th>
<th>Cooling Type</th>
<th>Magnetron Head</th>
<th>Power Supply Type</th>
<th>Cable Set</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>6kW</td>
<td>2450 MHz</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive*</td>
<td>Included</td>
<td>G2450/6kWxxxx</td>
</tr>
<tr>
<td>10kW</td>
<td>2450 MHz</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive or Switch-mode</td>
<td>Included</td>
<td>G2450/10kWxxxx</td>
</tr>
<tr>
<td>15kW</td>
<td>2450 MHz</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive or Switch-mode</td>
<td>Included</td>
<td>G2450/15kWxxxx</td>
</tr>
<tr>
<td>20kW</td>
<td>2450 MHz</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive or Switch-mode</td>
<td>Included</td>
<td>G2450/20kWxxxx</td>
</tr>
<tr>
<td>30kW</td>
<td>2450 MHz</td>
<td>Water</td>
<td>Remote or Integrated</td>
<td>Inductive or Switch-mode</td>
<td>Included</td>
<td>G2450/30kWxxxx</td>
</tr>
</tbody>
</table>

Note: See page 9 for 6kW, switch-mode type.

915 MHz: Magnetrons and Solid State Generators

Magnetron: A low-cost, efficient cross-field microwave oscillator used for the generation of continuous-wave (CW) signals.

Below is a partial listing of magnetrons we offer from stock. We also offer custom design, testing and cross referencing.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Frequency (MHz)</th>
<th>Output Power (kW)</th>
<th>Vf (V)</th>
<th>If (A)</th>
<th>Va (kV)</th>
<th>Ia (A)</th>
<th>Ip (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NLM915-100</td>
<td>915</td>
<td>100kW</td>
<td>14</td>
<td>110</td>
<td>17.5</td>
<td>6.0</td>
<td>6.5</td>
</tr>
<tr>
<td>NLM915-75</td>
<td>915</td>
<td>75kW</td>
<td>12.6</td>
<td>112</td>
<td>17</td>
<td>5.0</td>
<td>6.0</td>
</tr>
<tr>
<td>NLM915-60</td>
<td>915</td>
<td>60kW</td>
<td>12.6</td>
<td>112</td>
<td>17</td>
<td>4.5</td>
<td>5.0</td>
</tr>
<tr>
<td>NLM915-50</td>
<td>915</td>
<td>50kW</td>
<td>12.6</td>
<td>112</td>
<td>17</td>
<td>4.0</td>
<td>5.0</td>
</tr>
<tr>
<td>NLM915-30</td>
<td>915</td>
<td>30kW</td>
<td>12.6</td>
<td>112</td>
<td>15</td>
<td>3.0</td>
<td>4.0</td>
</tr>
<tr>
<td>NLI0257</td>
<td>915</td>
<td>5kW</td>
<td>10.0</td>
<td>35</td>
<td>6.5</td>
<td>1.3</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Notes: Magnetrons also available in 896 & 922 MHz. All magnetrons require both water and air cooling. Socket compatible with Burle and CTL magnetrons. Rebuilt magnetrons are available. Please contact your local Richardson sales office for details.

Part Numbering System

Example Part Number: G2450/15kW2All
2450MHz, 15kW MW Generator with integrated magnetron head and inductive type power supply. 400V/50Hz.

System Features

Protection functions:
- Auto/manual reset
- Audible indication (User enable/disable)
- Maximum forward power
- Maximum VSWR (By Internal isolator)
- Over temperature

Connectors:
- AC mains, receptacle, EMI filtered
- Source output: BNC (F)
- RF input: BNC (F)
- RF output: Type N(F)
- Interface: 15 pin D(F), EMI filtered

Controls, front panel:
- AC power on/off
- Forward/Reflected RF power
- Standby

Front panel indicators:
- AC power on
- Standby
- RF power control
- RF power display
- Over temperature

915MHz Solid State Generators

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Frequency (MHz)</th>
<th>Max Output Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>NLSS915-150</td>
<td>915MHz</td>
<td>150 Watt</td>
</tr>
<tr>
<td>NLSS915-600</td>
<td>915MHz</td>
<td>600 Watt</td>
</tr>
</tbody>
</table>
5kW
- MG7.5PSM/415
- MG7.5PSM/480

The MG7.5 magnetron power supplies each comprise a single power module, measuring 10 1/2” x 19” x 19”. They are designed to power CW magnetrons with RF output powers of 5kW @ 915MHz. The units also contain the filament supply, magnet supply board, and the interface circuits between the user’s system and the power supply. The high voltage output of the module is applied to the cathode of the magnetron. Magnetron output power is controlled by the anode current. At turn on, the filament current is first applied for the pre-heat period, followed by the anode voltage and current ramps. Provision is made in the control unit to allow local control of the output voltage and current. Filament current foldback is automatically adjusted according to the value of the anode current.

30kW
- MG36PS/415
- MG36PS/480

The MG36 magnetron power supply comprises three 12kW power modules, each measuring 10 1/2” x 19” x 19” to drive a 30kW magnetron. The units also contain the filament and magnet power supplies and the interface circuits between the user’s system and the power supply.

The high voltage outputs of the modules are connected in parallel and applied to the cathode of the magnetron. At turn on, the filament and magnet currents are first applied for the pre-heat period, followed by the anode voltage and current ramps. Provision is made to allow local control of the output voltage and local or remote control of the output current. RF output power is controlled by the anode current. The filament current foldback is automatically adjusted according to the value of the output current.

50-100kW
- MG72PS/480/415
- MG84PS/480/415
- MG120PS/480/415

The MG72-MG120 series magnetron power supplies are comprised of multiple 12kW power modules, each measuring 10 1/2” x 19” x 19” to drive a 50-100 kW magnetron. The modules also contain the filament and magnet power supplies and the interface circuits between the user’s system and the power supply.

The high voltage outputs of the modules are connected in parallel and applied to the cathode of the magnetron. At turn on, the filament and magnet currents are first applied for the pre-heat period, followed by the anode voltage and current ramps. Provision is made to allow local control of the output voltage and local or remote control of the output current. RF output power is controlled by the anode current. The filament current foldback is automatically adjusted according to the value of the output current.

2450 MHz: Low Power Microwave Generators (Fixed Output)

Low Power, Complete Microwave Generators with Inductive Power Supply & Remote Magnetron Head

<table>
<thead>
<tr>
<th>Max Output Power</th>
<th>Freq. MHz</th>
<th>Cooling Type</th>
<th>Magnetron Head</th>
<th>Power Supply</th>
<th>Cable Set</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 W 2450</td>
<td>Air</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/30kWxxIA</td>
<td></td>
</tr>
<tr>
<td>850 W 2450</td>
<td>Water</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/85kWxxIW</td>
<td></td>
</tr>
<tr>
<td>1200 W 2450</td>
<td>Air</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/12kWxxIA</td>
<td></td>
</tr>
<tr>
<td>2000 W 2450</td>
<td>Air</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/20kWxxIA</td>
<td></td>
</tr>
<tr>
<td>3000 W 2450</td>
<td>Air</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/30kWxxIA</td>
<td></td>
</tr>
</tbody>
</table>

Note: See previous page for switch-mode type power supply systems.

Part Numbering System

Example Part Number: G2450/1.2kW1BIW
2450MHz, 1200W MW Generator with remote, water-cooled magnetron head and Inductive type power supply. 208V/60Hz.

915 MHz Power Supplies: 10 - 120kW Switch Mode Power Supplies

5kW
- MG7.5PSM/415
- MG7.5PSM/480

The MG7.5 magnetron power supply comprises three 12kW power modules, each measuring 10 1/2” x 19” x 19” to drive a 30kW magnetron. The units also contain the filament and magnet power supplies and the interface circuits between the user’s system and the power supply.

The high voltage outputs of the modules are connected in parallel and applied to the cathode of the magnetron. At turn on, the filament and magnet currents are first applied for the pre-heat period, followed by the anode voltage and current ramps. Provision is made to allow local control of the output voltage and local or remote control of the output current. RF output power is controlled by the anode current. The filament current foldback is automatically adjusted according to the value of the output current.

30kW
- MG36PS/415
- MG36PS/480

The MG36 magnetron power supply comprises three 12kW power modules, each measuring 10 1/2” x 19” x 19” to drive a 30kW magnetron. The units also contain the filament and magnet power supplies and the interface circuits between the user’s system and the power supply.

The high voltage outputs of the modules are connected in parallel and applied to the cathode of the magnetron. At turn on, the filament and magnet currents are first applied for the pre-heat period, followed by the anode voltage and current ramps. Provision is made to allow local control of the output voltage and local or remote control of the output current. RF output power is controlled by the anode current. The filament current foldback is automatically adjusted according to the value of the output current.

50-100kW
- MG72PS/480/415
- MG84PS/480/415
- MG120PS/480/415

The MG72-MG120 series magnetron power supplies are comprised of multiple 12kW power modules, each measuring 10 1/2” x 19” x 19” to drive a 50-100 kW magnetron. The units also contain the filament and magnet power supplies and the interface circuits between the user’s system and the power supply.

The high voltage outputs of the modules are connected in parallel and applied to the cathode of the magnetron. At turn on, the filament and magnet currents are first applied for the pre-heat period, followed by the anode voltage and current ramps. Provision is made to allow local control of the output voltage and local or remote control of the output current. RF output power is controlled by the anode current. The filament current foldback is automatically adjusted according to the value of the output current.

2450 MHz: Low Power Microwave Generators (Fixed Output)

Low Power, Complete Microwave Generators with Inductive Power Supply & Remote Magnetron Head

<table>
<thead>
<tr>
<th>Max Output Power</th>
<th>Freq. MHz</th>
<th>Cooling Type</th>
<th>Magnetron Head</th>
<th>Power Supply</th>
<th>Cable Set</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 W 2450</td>
<td>Air</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/30kWxxIA</td>
<td></td>
</tr>
<tr>
<td>850 W 2450</td>
<td>Water</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/85kWxxIW</td>
<td></td>
</tr>
<tr>
<td>1200 W 2450</td>
<td>Air</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/12kWxxIA</td>
<td></td>
</tr>
<tr>
<td>2000 W 2450</td>
<td>Air</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/20kWxxIA</td>
<td></td>
</tr>
<tr>
<td>3000 W 2450</td>
<td>Air</td>
<td>Remote</td>
<td>Inductive</td>
<td>Included</td>
<td>G2450/30kWxxIA</td>
<td></td>
</tr>
</tbody>
</table>

Note: See previous page for switch-mode type power supply systems.
**2450 MHz: Low Power Microwave Heads**

*Alter Microwave Head Features*

TMA = Air-cooled

TM0 = Water-cooled

**Common features:**

- Output power is variable from 10% of the max. rated power
- CE compliant
- Framework and waveguide in stainless steel
- WR340/PDR26 style flange
- Separate industrial connectors for main & signals

- TM0 overall dim. (water cooled type): 218 x 233 x 305 mm
- TMA overall dim. (air cooled type): 218 x 233 x 390 mm

* **Alter Low Power Microwave Heads Designed for Switching Power Supplies (Variable Output)**

<table>
<thead>
<tr>
<th>Max Output Power</th>
<th>Part Number</th>
<th>Freq. MHz</th>
<th>Cooling Type</th>
<th>Recommended Power Supply**</th>
<th>Cable Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>900 W</td>
<td>TM00.9V0x</td>
<td>2450</td>
<td>Air</td>
<td>CM340E</td>
<td>Call</td>
</tr>
<tr>
<td>1200 W</td>
<td>TM01.2V0x</td>
<td>2450</td>
<td>Water</td>
<td>SM445G or CM440E</td>
<td>Call</td>
</tr>
<tr>
<td>1500 W</td>
<td>TM01.5V0x</td>
<td>2450</td>
<td>Water</td>
<td>SM745G</td>
<td>Call</td>
</tr>
<tr>
<td>2000 W</td>
<td>TM02.0V0x</td>
<td>2450</td>
<td>Water</td>
<td>SM745G or SM840E</td>
<td>Call</td>
</tr>
<tr>
<td>3000 W</td>
<td>TM03.0V0x</td>
<td>2450</td>
<td>Water</td>
<td>SM1050D/T* or SM1150D</td>
<td>Call</td>
</tr>
</tbody>
</table>

**National Low Power Microwave Heads Designed for Switching Power Supplies (Variable Output)**

<table>
<thead>
<tr>
<th>Max Output Power</th>
<th>Part Number</th>
<th>Freq. MHz</th>
<th>Cooling Type</th>
<th>Recommended Power Supply**</th>
<th>Cable Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200 W</td>
<td>UWHFD1.2FA-SM</td>
<td>2450</td>
<td>Air</td>
<td>SM445G</td>
<td>Call</td>
</tr>
<tr>
<td>2000 W</td>
<td>UWHFD2.0FA-SM</td>
<td>2450</td>
<td>Air</td>
<td>SM745G</td>
<td>Call</td>
</tr>
<tr>
<td>2000 W</td>
<td>MH1.2W-S</td>
<td>2450</td>
<td>Water</td>
<td>SM445G</td>
<td>Call</td>
</tr>
<tr>
<td>3000 W</td>
<td>MH1.2W-S</td>
<td>2450</td>
<td>Water</td>
<td>SM445G or SM840E</td>
<td>Call</td>
</tr>
<tr>
<td>3000 W</td>
<td>MH3.0W-S</td>
<td>2450</td>
<td>Water</td>
<td>SM1050D/T* or SM1150D</td>
<td>Call</td>
</tr>
</tbody>
</table>

* **915 MHz: Component Sets**

Component Sets

A multitude of ancillary components used to transmit, measure and alter the microwave energy generated from the magnetron. These component sets usually include a magnetron, waveguide launcher, circulator, water-load and a power supply.

* **National Low Power Microwave Heads**

A multitude of ancillary components used to transmit, measure and alter the microwave energy generated from the magnetron. These component sets usually include a magnetron, waveguide launcher, circulator, water-load and a power supply.

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Power Supply*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waveguide</td>
<td>UWHFD1.2FA-SM</td>
<td>SM445G</td>
</tr>
<tr>
<td>Load</td>
<td>UWHFD2.0FA-SM</td>
<td>SM745G</td>
</tr>
<tr>
<td>Power Supply*</td>
<td>MH1.2W-S</td>
<td>SM445G or SM840E</td>
</tr>
<tr>
<td>Power Supply*</td>
<td>MH3.0W-S</td>
<td>SM1050D/T* or SM1150D</td>
</tr>
</tbody>
</table>

* See page 26 for detailed descriptions of power supplies.
915 MHz: Waveguide Components

Circulators and Isolators

A circulator is a passive, non-reciprocal device with three or more ports used to transmit microwave energy in a specific direction. Additionally, circulators are used to prevent reflected microwave energy from the load, thus preventing excessive magnetron heating or moding. An isolator is a circulator with a water or dry load attached to a port and is used to absorb the reflected energy.

Part Number  Freq. (MHz)  Rated Power (kW)  Min. Isolation (dB)  Max. Insertion Loss (dB)  Flange Type  Dummy Load  Recommended for use with Magnetron
0915.201.404.00  915  100  —  —  EIA CPR975*  WR975LOAD100A  NLM915-100
WR975CIRC100A  915  100  19  0.2  1.2:1  EIA CPR975*  WR975LOAD30A  NLM915-75
WR975CIRC100B  922  100  19  0.2  1.2:1  EIA CPR975*  WR975LOAD30B  NLM922-75
WR975CIRC100C  896  100  19  0.2  1.2:1  EIA CPR975*  WR975LOAD30C  NLM896-75
0915.201.304.00  915  75  20  0.1  —  EIA CPR975*  0915.203.303.00  NLM915-75
0915.202.304.00  922  75  20  0.1  —  EIA CPR975*  0922.203.303.00  NLM922-75
0966.201.304.00  896  75  20  0.1  —  EIA CPR975*  0896.203.303.00  NLM896-75
WR975CIRC50A  915  50  20  0.2  1.25:1  EIA CPR975*  WR975LOAD30A  NLM915-30
WR975CIRC50B  922  50  20  0.2  1.25:1  EIA CPR975*  WR975LOAD30B  NLM922-30
WR975CIRC50C  896  50  20  0.2  1.25:1  EIA CPR975*  WR975LOAD30C  NLM896-30
0915.201.124.00  915  30  20  0.1  —  EIA CPR975*  0915.203.303.00  NLM915-30
WR975ISOL5A  915  5  20  0.3  1.2:1  EIA CPR975*  Integral Dummy Load  NL0527
WR975ISOL5B  915  5  20  0.3  1.2:1  EIA CPR975*  Integral Dummy Load  NL0527

* British 18-Hole Flange Available Upon Request.

Control of Magnetron Output Power

The output power of a magnetron is proportional to the average operational anode current of the device. Variable output power is typically accomplished via one of the following methods of current control:

1. Control of average anode current by variation of the duty cycle

This method requires operation of the magnetron at varying duty cycles. An increase in the duty cycle results in an increase in average current and a corresponding increase in output power. This approach may be implemented at a relatively low cost. The disadvantage of duty cycle control is that the output power is not constant with time. Periods of operation at high peak power levels followed by periods of no power will result, rendering this approach unacceptable for some applications.

2. Control of peak anode current by power supply

Methods of power supply design may be employed that allow control of the peak anode current. These methods provide continuous output power. The disadvantage of this method is the cost and complexity of the power supply design.

3. Control of anode current by variation of magnetic field

Magnetrons, like all electron tubes, have a finite life and should be considered a consumable item. There are a number of factors that contribute to the life of a magnetron. Certain steps may be taken to avoid shortened life. Care should be taken in the design of the power supply to ensure the magnetron is operated within specified parameters. The various input voltage and current specifications should be followed, particularly the filament voltage, peak anode voltage, and average anode current. Where applicable, the filament reduction schedule should be followed.

Adequate cooling should be provided to the magnetron. Most magnetrons rated below 3 kW of output power only require air cooling, however water cooling is a more effective method of dissipating heat and will increase the life of the magnetron. Most magnetrons rated 3 kW and above require water cooling for adequate heat dissipation. The magnetron data sheet will specify the minimum air or water flow required for cooling the magnetron.

Even small amounts of microwave energy reflected by the load can be damaging to the magnetron. Reflected energy absorbed by the magnetron may cause overheating and moding, leading to premature failure. Reflected power may also affect magnetron operation by changing output power or causing a frequency shift. The use of an isolator (circulator) is recommended to minimize the amount of reflected energy and protect the magnetron. Although an isolator is an added expense to the total system cost, it will reduce expensive downtime and long-term maintenance costs. An isolator will normally operate throughout the life of the system, and it has the added benefit of stabilizing the output of the magnetron for more critical applications.

Extending Magnetron Life

Magnetrons, like all electron tubes, have a finite life and should be considered a consumable item. There are a number of factors that contribute to the life of a magnetron. Certain steps may be taken to avoid shortened life. Care should be taken in the design of the power supply to ensure the magnetron is operated within specified parameters. The various input voltage and current specifications should be followed, particularly the filament voltage, peak anode voltage, and average anode current. Where applicable, the filament reduction schedule should be followed.

Adequate cooling should be provided to the magnetron. Most magnetrons rated below 3 kW of output power only require air cooling, however water cooling is a more effective method of dissipating heat and will increase the life of the magnetron. Most magnetrons rated 3 kW and above require water cooling for adequate heat dissipation. The magnetron data sheet will specify the minimum air or water flow required for cooling the magnetron.

Even small amounts of microwave energy reflected by the load can be damaging to the magnetron. Reflected energy absorbed by the magnetron may cause overheating and moding, leading to premature failure. Reflected power may also affect magnetron operation by changing output power or causing a frequency shift. The use of an isolator (circulator) is recommended to minimize the amount of reflected energy and protect the magnetron. Although an isolator is an added expense to the total system cost, it will reduce expensive downtime and long-term maintenance costs. An isolator will normally operate throughout the life of the system, and it has the added benefit of stabilizing the output of the magnetron for more critical applications.

As you begin to build your industrial microwave system, Richardson Electronics offers these helpful guidelines.

Richardson Electronics offers the components to help build a system similar to the one shown below.

Typical System Diagram
Definitions

A node

Definitions

A circulator with a dummy load attached to one port, utilized to protect the system that interfaces with the magnetron input terminals to provide power for filaments and oscillation of the device. System control circuits and magnetron fault protection are typically incorporated into this unit.

Probe

Used in the design phase of a microwave system to determine the operating point of the magnetron on the Rieke diagram with respect to the load.

Rieke diagram

A circular chart describing the relationship between the output phase and VSWR of a microwave system with respect to the operating frequency and output power of the magnetron.

Sink phase

The target operating phase of the magnetron, denoted on the Rieke diagram by a convergence of the power, which results in the most efficient coupling of power to the load. Tuners are waveguide components used to match the load impedance with the source impedance. Auto & electrical tuners minimize the amount of reflected power, which results in the most efficient coupling of power to the load. Auto-tuners are generally used in applications where the load impedance varies significantly due to variations in the load.

Auto & Electrical Tuners

Auto & electrical tuners utilize motorized turning stubs electronically controlled either remotely or by a microprocessor to match the load impedance with the source impedance. Auto & electrical tuners minimize the amount of reflected power, which results in the most efficient coupling of power to the load. Auto-tuners are generally used in applications where the load impedance varies significantly due to variations in the load.

Part Number | Freq. (MHz) | Rated Power Level (kW) | Flange Type |
--- | --- | --- | --- |
WR975TUNER3A | 915 | 45 | 1.5:1 | WR975 |
WR975TUNER3B | 915 | 75 | 1.5:1 | WR975 |

Note: E/H Tuners also available.

3-Stub Tuners

Tuners are waveguide components used to match the load impedance with the source impedance. Tuners minimize the amount of reflected power, which results in the most efficient coupling of power to the load.

Part Number | Material | Waveguide Size | Description |
--- | --- | --- | --- |
WR975EBA | Aluminum | WR975 | E-Plane sweep 90° bend |
WR975HBA | Aluminum | WR975 | H-Plane sweep 90° bend |

Bends

Waveguide bends are used to change direction in the waveguide transmission system.

Part Number | Material | Waveguide Size | Description |
--- | --- | --- | --- |
WR975EBA | Aluminum | WR975 | E-Plane sweep 90° bend |
WR975HBA | Aluminum | WR975 | H-Plane sweep 90° bend |

Note: 45° and mitered bends are also available upon request.
Coaxial adapters are waveguide components used to convert from standard waveguide to a specified coaxial waveguide connector.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Max. Power (kW)</th>
<th>VSWR</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR975/COAXTRANS</td>
<td>0.3</td>
<td>&lt;1.15</td>
<td>WR975</td>
<td>Waveguide to N-type connector.</td>
</tr>
<tr>
<td>WR975/COAXX7/16</td>
<td>1.2</td>
<td>&lt;1.15</td>
<td>WR975</td>
<td>Waveguide to 7/16” connector.</td>
</tr>
<tr>
<td>WR975/COAXX7/8</td>
<td>2.0</td>
<td>&lt;1.15</td>
<td>WR975</td>
<td>Waveguide to 7/8” connector.</td>
</tr>
<tr>
<td>WR975/COAX1X5/8</td>
<td>5.0</td>
<td>&lt;1.15</td>
<td>WR975</td>
<td>Waveguide to 1 5/8” connector.</td>
</tr>
</tbody>
</table>
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**915 MHz: Waveguide Components**

**Straight Sections**

Straight waveguide is supplied either as a raw cut waveguide section or with flanges attached. The length of a straight waveguide piece is measured from face to face of the flanges. We also offer painted and special plating (e.g. irridite) options. Please contact us for a quote.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Material</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR975WGXXXXC</td>
<td>Copper</td>
<td>WR975</td>
<td>Straight section (no flanges)</td>
</tr>
<tr>
<td>WR975WGXXXXA</td>
<td>Aluminum</td>
<td>WR975</td>
<td>Straight section (no flanges)</td>
</tr>
<tr>
<td>WR975WGXXXXY</td>
<td>Copper</td>
<td>WR975</td>
<td>Straight section with flanges on either end.</td>
</tr>
<tr>
<td>WR975WGXXXXX</td>
<td>Aluminum</td>
<td>WR975</td>
<td>Straight section with flanges on either end.</td>
</tr>
</tbody>
</table>

XXX = Length in mm (+/-2 mm)

Y = Flange type (1, 2, 3 or 4) see flange section below for detailed description.

**Sample Part Number:** WR975WG0422A3

- WR975 Waveguide straight section
  - 422mm in length
  - Aluminum material
  - Two attached WR975FLAN3 type flanges

**Flanges**

Waveguide flanges are used to connect waveguide sections to one another.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Waveguide Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR975FLAN1</td>
<td>WR975</td>
<td>Brass, Flat, Pocket</td>
</tr>
<tr>
<td>WR975FLAN2</td>
<td>WR975</td>
<td>Brass, Choke, Pocket</td>
</tr>
<tr>
<td>WR975FLAN3</td>
<td>WR975</td>
<td>Aluminum, Flat, Pocket</td>
</tr>
<tr>
<td>WR975FLAN4</td>
<td>WR975</td>
<td>Aluminum, Choke, Pocket</td>
</tr>
</tbody>
</table>

**Richardson also offers the following waveguide components in WR284, 340, 430 & 975:**

- Sliding Shorts
- Step Twists
- Gas Barrier Windows
- Tees & Folded Tees
- Flexible Waveguide
- Slotted Waveguide
- E/H Tuners
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