MICROWAVE POWER SOLUTIONS

Microwave Power Solutions is the complete set of high power microwave products developed and provided by the Leonardo team based in Palermo since 1956, for the production of high power vacuum electronic devices. In the 90s the product range was expanded with the introduction of chip and wire technology for microwave microelectronics hybrid integrated circuits, modules and sub-assemblies.

Today an extensive expertise in the development and production of state-of-the-art TWTs, mini TWTs, Microwave Power Modules (MPM) and TWT-A (TWT Amplifiers), Solid State Power Amplifiers (SSPA) is available for Airborne, Surface, Missile and Space platforms for the Defense and Aerospace Market.

Microwave Power Solutions from Leonardo have been provided in the four continents for Radar, Security, Surveillance, EW & ESM, Instruments and Communication systems.

TECHNOLOGIES AND CAPABILITIES

Key high power vacuum device technology includes:
- Vacuum technology including brazing, RF induced and resistance welding
- Etching and plating
- Manual and automated microwave high power CW and pulsed testing
- Facilities for inspection, including CNC contactless equipment and SEM electronic microscope.

Key Microelectronic technology includes:
- Fully automated epoxy (and other adhesive) dispensing automatic eutectic attach
- Die placement and wire bonding
- Advanced microwave module assembling
- Automatic testing.

MAGNETRONS AND KLYSTRONS

World class design expertise of Magnetrons and Klystrons. Leonardo Microwave Power Solution is among the few players worldwide that still design, develop and produce such Tubes, among legacy products worth to mention:
- Klystron from S band up to 1.4M output power peak, 1% duty cycle; up to the X band with 500W CW output power ;
- Magnetron from L band 2MW output power peak 1.25 % duty cycle; up to the X band with 2kW power peak 1.0 % duty cycle ;

These tubes are ideal for several different application such as:
- seekers and threat simulators;
- SAR (synthetic aperture radar) for standoff airborne application or EO (earth observation) space payloads;
- ATM (air traffic management) systems and wheatear forecast ground radar.

TRAVELLING WAVE TUBE - COUPLED CAVITY TWT & TWT-AMPLIFIERS

Microwave Power Solution is among the few players worldwide that still design, develop and produce such Tubes, among legacy products worth to mention:
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- SAR (synthetic aperture radar) for standoff airborne application or EO (earth observation) space payloads;
- ATM (air traffic management) systems and wheatear forecast ground radar.

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency Range</th>
<th>Peak Output Power</th>
<th>Cathode voltage</th>
<th>Cathode current</th>
<th>Duty Cycle</th>
<th>Cooling</th>
<th>Focussing</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET948</td>
<td>5.3 to 5.8 GHz</td>
<td>120 kW</td>
<td>-46 kV</td>
<td>14.5 A</td>
<td>8% max</td>
<td>Liquid</td>
<td>solenoid</td>
</tr>
<tr>
<td>ET960</td>
<td>8.5 to 9.5 GHz</td>
<td>12 kW</td>
<td>-22 kV</td>
<td>4 A</td>
<td>2.7% max</td>
<td>Forced air</td>
<td>PPM</td>
</tr>
<tr>
<td>ET961</td>
<td>8.6 to 9.5 GHz</td>
<td>20 kW</td>
<td>-26 kV</td>
<td>6.5 A</td>
<td>1.5% max</td>
<td>Forced air</td>
<td>PPM</td>
</tr>
<tr>
<td>ET964</td>
<td>10.8 to 11.8 GHz</td>
<td>10 kW</td>
<td>-23.5 kV</td>
<td>3.9 A</td>
<td>2.7% max</td>
<td>Forced air</td>
<td>PPM</td>
</tr>
<tr>
<td>ET966</td>
<td>9 to 10 GHz</td>
<td>12 kW</td>
<td>-25 kV</td>
<td>3.4 A</td>
<td>10.5% max</td>
<td>Liquid</td>
<td>PPM</td>
</tr>
<tr>
<td>ET2980</td>
<td>16.5 to 17 GHz</td>
<td>13.5 kW</td>
<td>-29 kV</td>
<td>2.1 A</td>
<td>2.7% max</td>
<td>Liquid</td>
<td>PPM</td>
</tr>
</tbody>
</table>

Airborne Radar
- X – Band CC TWT
- Ku – Band CC TWT

Ground/Shipboard Radar
- C – Band CC TWT
- X – Band CC TWT
MICROWAVE POWER SOLUTIONS

TRAVELLING WAVE TUBE - HELIX TWT - MINI TWT & TWT- AMPLIFIER

Surface and Airborne Radar
- X – Band HX TWT
- K – Band HX TWT
- Ku – Band HX TWT

Missile Seeker
- Ku – Band HX TWT

Electronic Counter Measure
- EW equipment
- Test and measurement equipment
- Commercial and military radars

MicroWave Power Module (MPM)

The Microwave Power Module is a microwave amplifier which includes: the mini TWT, the solid state amplifier and gain equalizer, the RF input and output network and the Electronic Power Conditioner.

All the parts are packaged into a single compact, lightweight housing. With respect to traditional TWT Amplifiers, the MPM is much smaller, lighter, more efficient, with significant noise reduction.

Based on proprietary novel potting-free concept the HVPS (high voltage power supply) results in high reliable module and very light weight and an easy concept for life cycle support and maintenance.

Applications for surface, missile or airborne platforms
- EW equipment
- Test and measurement equipment
- Commercial and military radars

Key Features
The amplifiers are designed for:
- 70 dB typical small signal gain
- -40°C to +90°C operating baseplate temperature (TBP)
- Output power flatness 1dB (typ.)
- -35dBm/MHz noise power density (typ.)

Unit is conductively cooled through baseplate and HVPS is hermetically sealed.

All the amplifiers are very compact, light weight 270 V DC Nominal input (other can be arranged) rack mount available.

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency Range</th>
<th>Power Output</th>
<th>Cathode Voltage</th>
<th>Cathode Current</th>
<th>Duty Cycle</th>
<th>Electrode</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET3201</td>
<td>1 to 2 GHz</td>
<td>280 W</td>
<td>-3.6 kV</td>
<td>475 mA</td>
<td>CW</td>
<td></td>
</tr>
<tr>
<td>ET3301</td>
<td>2 to 4 GHz</td>
<td>250 W</td>
<td>-4.2 kV</td>
<td>450 mA</td>
<td>CW</td>
<td></td>
</tr>
<tr>
<td>ET3401</td>
<td>4 to 8 GHz</td>
<td>280 W</td>
<td>-8 kV</td>
<td>320 mA</td>
<td>CW</td>
<td></td>
</tr>
<tr>
<td>ET3601</td>
<td>7.5 to 28.5 GHz</td>
<td>100 W</td>
<td>-12 kV</td>
<td>115 mA</td>
<td>CW</td>
<td></td>
</tr>
<tr>
<td>ET6306</td>
<td>3.1 to 3.5 GHz</td>
<td>8 kWp</td>
<td>-14.6 kV</td>
<td>322 mA</td>
<td>CW</td>
<td></td>
</tr>
<tr>
<td>ET6404</td>
<td>5.5 to 9.5 GHz</td>
<td>2 kWp</td>
<td>-9.2 kV</td>
<td>1.6A</td>
<td>10% max</td>
<td></td>
</tr>
<tr>
<td>ET6510</td>
<td>8 to 16 GHz</td>
<td>2 kWp</td>
<td>-10.7 kV</td>
<td>1.7A</td>
<td>2.5% max</td>
<td></td>
</tr>
<tr>
<td>ET6512</td>
<td>8.5 to 10.5 GHz</td>
<td>2 kWp</td>
<td>-10.9 kV</td>
<td>1.5A</td>
<td>6% max</td>
<td></td>
</tr>
<tr>
<td>ET6529</td>
<td>9.5 to 10.0 GHz</td>
<td>4 kWp</td>
<td>-12 kV</td>
<td>1.5A</td>
<td>6% max</td>
<td></td>
</tr>
</tbody>
</table>

(*): Preliminary data
MICROELECTRONICS

- State-of-the-art design expertise in µW solid-state hybrids: multi-assembly and front-ends
- Up-to-date facilities for hybrids manufacturing including fully automated manufacturing line and RF testing capabilities for modules up to 40GHz.
- Cutting edge expertise for Active Electronically Scanning Antenna Components.

Active Phased Array Antenna Technology
- Active Components
- Compact Receivers
- Multifunction Hybrids (HPA, TTD, Switch matrix, etc.)
- Antenna Subsystem (Planks, Panels & Manifolds)

Radar and EW component and subsystem
- Front end and pedestal components
- Receiver, Exciter, Processor components
- Down converter (up to 2 conversion)
- Up converter (up to 2 conversion)
- Stretch module for de-ramp-on-receive SAR mode
- Synthesizer: Very low phase noise, fast switching
- Exciter and LO distributor
- Compact Receiver/Exciter
- Seeker, AOA/RW Receiver
- Multifunction Hybrids
- Broadband front-end and receiver
- Very wide band assembly
- Front end amplifier and receiver
- Fast switching synthesizer
- Transceiver.

MICROWAVE POWER SOLUTIONS

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency Range</th>
<th>Power Output</th>
<th>Dimensions/Weight</th>
<th>Duty</th>
<th>Input voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>MXXA022</td>
<td>X BAND 1GHz ISTANT BW</td>
<td>120 W</td>
<td>228.6mm x 177.8mm x 30.5mm / 1.5 kg</td>
<td>25%</td>
<td>28VDC</td>
</tr>
<tr>
<td>MXXA020</td>
<td>X BAND 1GHz ISTANT BW</td>
<td>500 W</td>
<td>228.6mm x 177.8mm x 40.2mm / 3.5 kg</td>
<td>20%</td>
<td>28VDC</td>
</tr>
<tr>
<td>MXXA017</td>
<td>X BAND 1GHz ISTANT BW</td>
<td>700 W</td>
<td>228.6mm x 177.8mm x 40.2mm / 4 kg</td>
<td>25%</td>
<td>28VDC</td>
</tr>
<tr>
<td>MXXA024</td>
<td>X BAND 1GHz ISTANT BW</td>
<td>1000 W</td>
<td>228.6mm x 177.8mm x 40.2mm / 4 kg</td>
<td>15%</td>
<td>28VDC</td>
</tr>
<tr>
<td>MXXA026</td>
<td>X BAND 1GHz ISTANT BW</td>
<td>2000 W</td>
<td>350mm x 250mm x 150mm / 8 kg</td>
<td>10%</td>
<td>28VDC</td>
</tr>
<tr>
<td>MXXA027</td>
<td>8 to 11GHz</td>
<td>500 W</td>
<td>228.6mm x 177.8mm x 40.2mm / 4 kg</td>
<td>17%</td>
<td>28VDC</td>
</tr>
<tr>
<td>MXXA018</td>
<td>8 to 11GHz</td>
<td>150 W</td>
<td>228.6mm x 177.8mm x 40.2mm / 4 kg</td>
<td>CW</td>
<td>28VDC</td>
</tr>
</tbody>
</table>

Several control bite are available.
- Status and control interface 5V TTL compatible
- Internal thermal regulation
- Over-temperature protection
- Alarm status communicated via Control connector

Unit is conductively cooled through baseplate and Hermetically sealed

All the amplifiers are very compact 177.8mm x 228.6mm x 40.2mm, weight, less than 4kg
28 V DC Nominal input (22-33 V) rack mount available.

SOLID STATE POWER AMPLIFIER (SSPA)

Leonardo solid state power amplifier are based on gallium nitride (GaN) monolithic microwave integrated circuit (MMIC) provided in an environmentally sealed compact light weight mechanical housing.
Output power is saturated, in the same enclosure several different output power level are available, the efficient of these SSPAs is outstanding because the amplifiers are based on a proprietary novel power combining network that enable the compact outline line and light weight.

Applications for surface, missile or airborne platforms
- Test and measurement equipment
- Commercial and military radars

Key Features
The amplifiers are designed for:
- 70 dB typical small signal gain
- -40°C to +70°C operating baseplate temperat. (TBP)
- Output power flatness 1dB (typ.)
- -30dBm/MHz noise power density (typ.)
- Very long pulse width

Several control bite are available.
- Status and control interface 5V TTL compatible
- Internal thermal regulation
- Over-temperature protection
- Alarm status communicated via Control connector

Unit is conductively cooled through baseplate and Hermetically sealed

All the amplifiers are very compact 177.8mm x 228.6mm x 40.2mm, weight, less than 4kg
28 V DC Nominal input (22-33 V) rack mount available.
**FEATURES**

- 9 GHz to 10 GHz
- 60.5 dBm typical small signal gain
- -40°C to +70°C operating baseplate temperature (TBP)
- Power consumption 550W typical @10%
- Output power flatness 1dB (typ.)
- -30dBm/MHz noise power density (typ.)
- Status and control interface 5V TTL compatible
- Internal thermal regulation
- Over-temperature protection
- Alarm status communicated via Control connector
- Conductively cooled through baseplate
- Hermetically sealed
- Very compact 177.8mm x 228.6mm x 40.2mm
- light weight, less than 4kg
- 28 V DC Nominal input (22-33 V)
- rack mount available.

**APPLICATIONS**

- Test and measurement equipment
- Commercial and military radars

**GENERAL DESCRIPTION**

The MHXA024 is a 1kW peak solid state power amplifier based on gallium nitride (GaN) monolithic microwave integrated circuit (MMIC) that operates between 9 GHz and 10 GHz, provided in an environmentally sealed chassis. Other DC Supply configuration can be arranged.

**SPECIFICATIONS**

**POWER** = 28 VDC, overt operating temperature (baseplate -40°C to +70°C).

Min values refer to item performance in worst case condition (over temperature/frequency/duty/pulse width).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Test Conditions/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td>9.0</td>
<td>10</td>
<td></td>
<td>GHz</td>
<td></td>
</tr>
<tr>
<td>Gain (Small Signal Gain)</td>
<td>65</td>
<td>70</td>
<td>75</td>
<td>dB</td>
<td>Pin=-25dBm</td>
</tr>
<tr>
<td>Power gain</td>
<td>58.5</td>
<td>60</td>
<td></td>
<td></td>
<td>25-28dBm</td>
</tr>
<tr>
<td>Sat. Output Power (POUT)</td>
<td>60</td>
<td></td>
<td>80</td>
<td>dB</td>
<td>Pin=0dBm, see figure 1</td>
</tr>
<tr>
<td>Droop@128usec</td>
<td>1</td>
<td></td>
<td>2</td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Droop@256usec</td>
<td>1.5</td>
<td></td>
<td>2.5</td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Noise Figure</td>
<td>7</td>
<td></td>
<td>10</td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Spurious</td>
<td>-90</td>
<td></td>
<td>-50</td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Harmonics</td>
<td>-30</td>
<td></td>
<td>-20</td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Over pulse protection</td>
<td>350</td>
<td></td>
<td></td>
<td>usec</td>
<td></td>
</tr>
<tr>
<td>TX INHIBIT</td>
<td>3.4</td>
<td></td>
<td>5.0</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>TX INHIBIT (Low)</td>
<td>0</td>
<td></td>
<td>0.8</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>ON/OFF TIME</td>
<td>0.2</td>
<td></td>
<td>0.3</td>
<td>µsec</td>
<td>From rising/fall edge of EN/DISABLE to RF</td>
</tr>
<tr>
<td>Pulse width</td>
<td>256</td>
<td></td>
<td></td>
<td>µsec</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>4</td>
<td></td>
<td>5</td>
<td>kg</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>228,6mm x 177,8mm x 40,2mm, see figure 3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ABSOLUTE MAXIMUM RATINGS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF Input (RF IN) Power</td>
<td>5 dBm</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40°C to +70°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to +85°C</td>
</tr>
</tbody>
</table>

Changes at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only. Functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability.

**ESD CAUTION**

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.
MHXA024
9 GHz TO 10 GHz, 1kW POWER AMPLIFIER

CONNECTORS CONFIGURATION AND FUNCTION DESCRIPTIONS

**Connector Configurations**

<table>
<thead>
<tr>
<th>CONNECTOR NO.</th>
<th>MNEMONIC</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>RF IN</td>
<td>RF Input. This connector is ac-coupled and matched to 50 Ω.</td>
</tr>
<tr>
<td>J2</td>
<td>RF OUT</td>
<td>RF Output. This connector is ac-coupled and matched to 50 Ω.</td>
</tr>
<tr>
<td>J3</td>
<td>TX-INHIBIT</td>
<td>Alert and Command Interfaces. See Table 4 for pinout.</td>
</tr>
<tr>
<td>J4</td>
<td>+28 VDC</td>
<td>Supply Voltage Connector. See Table 5</td>
</tr>
<tr>
<td>Chassis</td>
<td>GND</td>
<td></td>
</tr>
</tbody>
</table>

**Connector 4 Pin Definition**

<table>
<thead>
<tr>
<th>PIN</th>
<th>NAME</th>
<th>HPA INPUT OR OUTPUT</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TX INHIBIT</td>
<td>TTL INPUT</td>
<td>LOW = STANDBY (RF AMP OFF)            HIGH = ENABLED (RF AMP ON)</td>
</tr>
<tr>
<td>2</td>
<td>ground</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>3</td>
<td>2, 3, 5</td>
<td>reserved for manufacturer</td>
<td>reserved for manufacturer;</td>
</tr>
<tr>
<td>4</td>
<td>4, 5</td>
<td>service pin</td>
<td>service pin</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>128.0 Vdc Ret (-)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>28.0 VDC FWD (+)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>N.C.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>N.C.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>N.C.</td>
<td></td>
</tr>
</tbody>
</table>

**Connector 1 Pin Definition**

<table>
<thead>
<tr>
<th>PIN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>128.0 Vdc Ret (-)</td>
</tr>
<tr>
<td>A2</td>
<td>28.0 VDC FWD (+)</td>
</tr>
<tr>
<td>A3</td>
<td>N.C.</td>
</tr>
<tr>
<td>A4</td>
<td>N.C.</td>
</tr>
<tr>
<td>A5</td>
<td>N.C.</td>
</tr>
</tbody>
</table>

**Connector Type**

<table>
<thead>
<tr>
<th>CONNECTOR NO.</th>
<th>MNEMONIC</th>
<th>DESCRIPTION OR PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RF IN</td>
<td>SMA-F</td>
</tr>
<tr>
<td>2</td>
<td>RF OUT</td>
<td>WR-90 low profile</td>
</tr>
<tr>
<td>3</td>
<td>CONTROL</td>
<td>MIL-C-83513/04B</td>
</tr>
<tr>
<td>4</td>
<td>+28 VDC</td>
<td>DAMM7W2P</td>
</tr>
</tbody>
</table>

**Figure 2. Block diagram and Interfaces**
ET3702A
HIGH POWER 35 GHz TWT

FEATURES
• 34 to 36 GHz Band
• 150 W Output Power
• 30 dB Gain
• High duty pulsed
• Helix type tube
• PPM focused

PHYSICAL DATA
MECHANICAL
Dimensions: 260 (L); 70 (W); 50 (H) (mm, including connectors)
Weight: 1.5 kg max
Cooling: Conduction
RF input interface: WR-28 flat flange
RF output interface: WR-28 flat flange

ENVIRONMENTAL
Constructional features allow tube operation in severe environmental conditions for defence and commercial applications.

ELECTRICAL DATA
RF PERFORMANCE (TYPICAL)
Frequency range: 34 to 36 GHz
Output power: 50.5 dBm min, see graph
Input drive power: 25 dBm max
RF Gain: 25 dB min, see graph
Input VSWR (cold): 2.5:1 max
Output VSWR (cold): 2.5:1 max
Duty Cycle: 40% max

TYPICAL POWER SUPPLY REQUIREMENTS
Cathode voltage: -13kV
Cathode current: 170 mA max
Anode voltage: 1000 V
Anode current: 1 mA max
Helix current: 20 mA max
Collector voltage: 5.1 V max
Collector current: 1.3 A
Power Consumption: 1000 W max

Note: all voltages are referenced to cathode, except the cathode and anode which are referenced to ground.

ET3702B
HIGH POWER Ka Band mini-TWT

FEATURES
• 28 to 38 GHz Band
• 150 W Output Power
• 30 dB Gain
• High duty pulsed
• Helix type tube
• PPM focused

PHYSICAL DATA
MECHANICAL
Dimensions: 260 (L); 70 (W); 50 (H) (mm, including connectors)
Weight: 1.5 kg max
Cooling: Conduction
RF input interface: WR-28 flat flange
RF output interface: WR-28 flat flange

ENVIRONMENTAL
Constructional features allow tube operation in severe environmental conditions for defence and commercial applications.

ELECTRICAL DATA
RF PERFORMANCE (TYPICAL)
Frequency range: 28 to 38 GHz
Output power: 51.2 dBm min, see graph
Input drive power: 23 dBm max
RF Gain: 28 dB min, see graph
Input VSWR (cold): 2.5:1 max
Output VSWR (cold): 2.5:1 max
Duty Cycle: 40% max

TYPICAL POWER SUPPLY REQUIREMENTS
Cathode voltage: -13kV
Cathode current: 170 mA max
Anode voltage: 1000 V
Anode current: 1 mA max
Helix current: 20 mA max
Collector voltage: 5.1 V max
Collector current: 1.3 A
Power Consumption: 1000 W max

Note: all voltages are referenced to cathode, except the cathode and anode which are referenced to ground.
ET3580
HIGH POWER 4.5 ÷ 18 GHz TWT

FEATURES

- 4.5 to 18 GHz band
- 150 W Output Power
- 30 dB Gain
- 100% Duty Cycle
- Helix type tube

PHYSICAL DATA

MECHANICAL
Dimensions: 220 (L); 50 (W); 70 (H) (mm, including connectors)
Weight: 0.6 kg max
Cooling: Conduction
RF input connector: SMA female
RF output connector: TNC female

ENVIRONMENTAL
Constructional features allow tube operation in severe environmental conditions for defence and commercial applications

ELECTRICAL DATA

RF PERFORMANCE
Frequency range: 4.5 to 18 GHz
Output power: see graph
Input drive power: 26 dBm max
Noise Power density: -15 dBm/100 MHz max
Harmonic output ratio:
-4 dB at 4.5 GHz
-7 dB at 6 GHz
-9 dB at 9 GHz
Spurious:
-50 dBc
Duty Cycle: 100%

TYPICAL POWER SUPPLY REQUIREMENTS
Cathode voltage: -4.65 KV
Cathode current: 230 mA max
Anode current: 8 A max
RF voltage:
-200 V (stages OFF)
-5 V (stages ON)
RF current: 0.6 A max
Collector voltages:
285 V: 1st stage
21 V: 2nd stage
16 V: 3rd stage
Collector Currents:
90 mA: 1st stage (with RF)
90 mA: 2nd stage (with RF)
250 mA: 3rd stage (with RF)

Heater voltage: 5.5 V
Heater current: 13 A
Heater Consumption: 63 W max

Note: all voltages are referenced to cathode, except the cathode and anode which are referenced to ground.