Hot New Products

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## MMIC PRODUCTS

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<th>Series</th>
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| EP-Series  | **Ultra-Wideband MMIC Splitter Combiners**
As wide as 2-26.5 GHz - the widest bandwidth in the industry in a single device!   | 4     |
| PMA3-83LN+ | **Ultra-Wideband MMIC LNA**
1.3 dB NF from 0.5 to 8 GHz - MATCHED!   | 5     |
| MDB-24H+   | **Ultra-Wideband MMIC Mixer**
5 to 21.5 GHz LO & RF; DC to 5 GHz IF   | 5     |
| CY2-143+   | **Ultra-Wideband MMIC Doubler**
4 – 14 GHz Output   | 5     |
| PGA-122-75+| **75Ω MMIC Amplifier for CATV**
Supports upstream and downstream applications   | 6     |
| PHA-1H+    | **High-Dynamic-Range MMIC Amplifier**
+40 dBm OIP3 from 50 to 6000 MHz   | 5     |
| MNA-Series | **High-Directivity MMIC Amplifiers**
Directivity up to 38 dB with supply voltage from +2.8 to +5.0V.   | 6-7   |
| D-Series   | **MMIC Directional Couplers**
4W power handling and low mainline loss in a tiny 3.1 x 3.0 x 1.6mm package   | 8     |
| MMIC Dice  | **Amplifiers, Attenuators, Mixers & More**
Unpackaged MMIC dice available from stock for direct integration into customer modules   | 9     |

## TEST SOLUTIONS

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<th>Series</th>
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</table>
| ZTM & RCM-Series | **Modular Test Systems**
Rack-mount and bench-top chassis with customizable hardware windows for routing and attenuation. Built and delivered in as little as 2 weeks! | 10   |
| RCDAT-Series | **USB & Ethernet Programmable Attenuators**
1 MHz to 8 GHz, 0 – +120 dB (0.25 dB step), power handling up to 2W. | 11   |
| PWR-6RMS-RC | **USB & Ethernet True RMS Power Sensor**
Precise measurement of CW and modulated signals from 50 to 6000 MHz, -35 to +20 dBm. | 11   |
| HPA-272+    | **High-Power (100W) Rack Mount Amplifier**
Ideal for high power testing applications and driving up to 80 channels for parallel processing in high-throughput production testing | 12-13|
| TVA- Series | **Instrument Amplifiers**
A variety of capabilities for high-performance test applications. | 14   |
| Test Accessories | **Test cables, precision attenuators and terminations to 40 GHz!** | 15   |
New Products

Ultra-Wideband LNA
PM43-83LN+
0.5 to 8 GHz

Features
• Manufactured using PHEMT technology
• 9-pad 3x3mm QFN package
• Excellent repeatability
• High ESD rating: HBM Class 2, MM Class M2
• Small quantity reels available (min. qty. 20)

Applications
• WiFi
• S-Band Radar
• UMTS
• LTE

Parameter Performance (typ.)
Gain 20 dB
Gain Flatness ±1.3 dB
Noise Figure 1.3 dB
P1dB +20.7 dBm
OIP3 +35 dBm
Supply Voltage 5V/6V

Typical Performance
Insertion Loss 2.4 dB
Isolation 20 dB
Phase Unbalance 5.4°
Amplitude Unbalance 0.3 dB
Power Handling 2.5W
DC Current Passing 1.2A

Ultra-Wideband Mixer
MDB-24A+
5 to 21.5 GHz

Features
• Ultra-wide bandwidth
• Manufactured using InGaP HBT technology
• Integrated LO and RF baluns
• 24-pad 4x4mm QFN package
• Excellent repeatability
• High ESD rating: HBM Class 1A
• Small quantity reels available (min. qty. 20)

Applications
• Satellite up and down converters
• Defense radar and communication
• VSAT
• Line of sight links
• Federal fixed service
• WiFi
• ISM

Parameter Performance (typ.)
LO Power +15 dBm
IP3 -11 dBm
Conversion Loss 8.5 dB
I/I Isolation 44 dB
L-F Isolation 28.4 dB
Input @ 1 dB Comp. +10 dBm
Input IP3 +21 dBm

Typical Performance
Widest bandwidth in the industry in a single device
Matched over entire bandwidth

Mini-Circuits
®
www.minicircuits.com   P.O. Box 350166, Brooklyn, NY 11235-0003   (718) 934-4500   sales@minicircuits.com

Ultra-Wideband Doubler
CY2-143+
4 to 14 GHz

Features
• Wide output bandwidth
• Manufactured using GaAs HBT technology
• 24-pad 4x4mm QFN package
• Excellent repeatability
• Small quantity reels available (min. qty. 20)

Applications
• Synthesizers
• Local oscillators
• EW and surveillance systems
• Test and measurement
• Radar
• Point-to-point radio

Recommended Application
and Characterization Circuit
**MMIC PRODUCTS**

**Typical Performance**

**Applications**

- DOCSIS® 3.1 systems
- CATV

- Covers DOCSIS® 3.1 downstream bandwidth
- Manufactured using PHEMT technology
- No external matching components required
- Excellent repeatability
- High ESD rating: HBM Class 1A, MM Class M1

**Features**

- Small quantity reels available (min. qty. 20)
- High ESD rating: HBM Class 1A, MM Class M1
- Excellent repeatability
- -59 dBc CSO and -80 dBc CTB
- Application circuit available for 5 – 200 MHz
- 8-pad 3 x 3mm QFN package
- Manufactured using PHEMT technology
- Wide operating voltage range

**Supply Voltage** 9 V

**Parameter**

- Gain: +13 dB
- Noise Figure: 2.2 dB
- OIP3: +43 dBm
- Supply Voltage: 9 V

**Applications**

- CATV & DBS
- Portable wireless
- Base station infrastructure
- SatCom
- Defense

**Typical Performance**

**Applications**

- Cellular infrastructure
- Buffer amplifier
- Defense

**Features**

- Integrated matching, DC blocks and RF choke
- Wide operating voltage range
- Manufactured using PHEMT technology
- Excellent repeatability
- High ESD rating: HBM Class 1A, MM Class M1
- Small quantity reels available (min. qty. 20)

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**Applications**

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- SatCom
- Defense
MMIC Dice

To support your needs for MMIC components in unpackaged die form, Mini-Circuits now offers a broad selection of MMIC models off the shelf as unpackaged dice in gel-paks (10, 50 and 100 KGO), and in partial and full wafers by request from authorized Mini-Circuits sales representatives. They’re ideal for Tx/Rx modules where small size and light weight are required such as phased array radar systems, and they allow direct integration into customer modules such as amplifier modules, mixer modules, signal sources and more. Don’t see what you need here? We’re releasing more models! Get in touch with sales@minicircuits.com to discuss your needs.

Amplifiers

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Frequency Range (GHz)</th>
<th>Gain (dB) typ.</th>
<th>Max Output Power @ 1 dB comp. (dBm) Typ.</th>
<th>N.F. (dB) typ.</th>
<th>IP3 (dBm) typ.</th>
<th>VSWR (1) Typ.</th>
<th>Device DC operating Voltage (V)</th>
<th>Device DC Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVA-24A-D+</td>
<td>2.0 – 2.100</td>
<td>10</td>
<td>1.00</td>
<td>7.6</td>
<td>10.0</td>
<td>1.6</td>
<td>128 Ultra Wideband</td>
<td>128 Ultra Wideband</td>
</tr>
<tr>
<td>AVA-180A-D+</td>
<td>2.0 – 2.100</td>
<td>15</td>
<td>1.50</td>
<td>9.0</td>
<td>12.0</td>
<td>1.6</td>
<td>150 Wideband</td>
<td>150 Wideband</td>
</tr>
<tr>
<td>AVA-273P-D+</td>
<td>2.0 – 2.100</td>
<td>20</td>
<td>2.00</td>
<td>11.0</td>
<td>14.0</td>
<td>1.6</td>
<td>560 Medium Power</td>
<td>560 Medium Power</td>
</tr>
<tr>
<td>GVA-62-D+</td>
<td>2.0 – 2.100</td>
<td>10</td>
<td>1.00</td>
<td>6.0</td>
<td>9.0</td>
<td>1.6</td>
<td>82 Ultra Flat Gain</td>
<td>82 Ultra Flat Gain</td>
</tr>
<tr>
<td>GVA-63-D+</td>
<td>2.0 – 2.100</td>
<td>15</td>
<td>1.50</td>
<td>9.0</td>
<td>12.0</td>
<td>1.6</td>
<td>56 Ultra Wideband</td>
<td>56 Ultra Wideband</td>
</tr>
<tr>
<td>GVA-123-D+</td>
<td>2.0 – 2.100</td>
<td>15</td>
<td>1.50</td>
<td>9.0</td>
<td>12.0</td>
<td>1.6</td>
<td>48 Ultra Wideband</td>
<td>48 Ultra Wideband</td>
</tr>
<tr>
<td>PQA-103-D+</td>
<td>2.0 – 2.100</td>
<td>10</td>
<td>1.00</td>
<td>6.0</td>
<td>9.0</td>
<td>1.6</td>
<td>60/97 Low Noise</td>
<td>60/97 Low Noise</td>
</tr>
<tr>
<td>PQA-105-D+</td>
<td>2.0 – 2.100</td>
<td>15</td>
<td>1.50</td>
<td>9.0</td>
<td>12.0</td>
<td>1.6</td>
<td>56 Low Noise</td>
<td>56 Low Noise</td>
</tr>
<tr>
<td>PHA-1-D+</td>
<td>2.0 – 2.100</td>
<td>10</td>
<td>1.00</td>
<td>6.0</td>
<td>9.0</td>
<td>1.6</td>
<td>155 High IP3</td>
<td>155 High IP3</td>
</tr>
<tr>
<td>PM2A-33LN-D+</td>
<td>2.0 – 2.100</td>
<td>15</td>
<td>1.50</td>
<td>9.0</td>
<td>12.0</td>
<td>1.6</td>
<td>58 Low Noise</td>
<td>58 Low Noise</td>
</tr>
<tr>
<td>PM2A-43LN-D+</td>
<td>2.0 – 2.100</td>
<td>20</td>
<td>2.00</td>
<td>11.0</td>
<td>14.0</td>
<td>1.6</td>
<td>60/77 Low Noise</td>
<td>60/77 Low Noise</td>
</tr>
<tr>
<td>PSA4-5043-D+</td>
<td>2.0 – 2.100</td>
<td>10</td>
<td>1.00</td>
<td>6.0</td>
<td>9.0</td>
<td>1.6</td>
<td>33/58 Low Noise</td>
<td>33/58 Low Noise</td>
</tr>
<tr>
<td>TSS-53LN-D+</td>
<td>2.0 – 2.100</td>
<td>15</td>
<td>1.50</td>
<td>9.0</td>
<td>12.0</td>
<td>1.6</td>
<td>82 Bypass</td>
<td>82 Bypass</td>
</tr>
</tbody>
</table>

Mixers

<table>
<thead>
<tr>
<th>Model Number</th>
<th>RF in @ 1 dB Comp (dBm)</th>
<th>Frequency Range</th>
<th>Conversion Loss (dB)</th>
<th>LO-RF Isolation (dB)</th>
<th>LO-F Isolation (dB)</th>
<th>IP3 @ midband (dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBD-37H-D+</td>
<td>10</td>
<td>2200 – 2700</td>
<td>DC</td>
<td>0.2</td>
<td>0.35</td>
<td>40</td>
</tr>
<tr>
<td>MBD-24H-D+</td>
<td>10</td>
<td>5000 – 25150</td>
<td>DC</td>
<td>0.2</td>
<td>0.35</td>
<td>40</td>
</tr>
</tbody>
</table>

**Directional Coupler D17A+**
2000 to 2600 MHz

**Directional Coupler D17V+**
700 to 3000 MHz

4W power handling & low loss

**Typical Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupling</td>
<td>15 ± 2 dB</td>
</tr>
<tr>
<td>Maximum Loss</td>
<td>0.3 dB</td>
</tr>
<tr>
<td>Power Handling</td>
<td>4W</td>
</tr>
<tr>
<td>Directivity</td>
<td>16 dB</td>
</tr>
<tr>
<td>Input/Output VSWR</td>
<td>1:2:1</td>
</tr>
</tbody>
</table>

**Features**
- Built-in termination on isolated port
- Manufactured using silicon IPD technology
- 6-lead 3.1 x 3.0 x 1.6mm package
- Excellent repeatability
- High ESD rating: HBM Class 1B, MM Class M3
- High operating temperature, -40 to +105°C
- Small quantity reels available (min. qty. 20)

**Applications**
- WiMAX
- Small quantity reels available (min. qty. 20)
- High operating temperature, -40 to +105°C
- High ESD rating: HBM Class 1B, MM Class M3
- Excellent repeatability
- 6-lead 3.1 x 3.0 x 1.6mm package
- Manufactured using silicon IPD technology
- Built-in termination on isolated port
- High operating temperature, -40 to +105°C
- Small quantity reels available (min. qty. 20)

ISO 9001  ISO 14001  AS 9100

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New Products
Hot
New Products
Hot
USB/Ethernet Programmable Attenuators

Features
• Coverage from 1 MHz to 8 GHz
• Attenuation range from 0 to 120 dB
• 0.25 dB Step size
• Up to 2W power handling
• User-friendly GUI software included
• DLLs and programming instructions included

Overview
Mini-Circuits’ USB and Ethernet controlled programmable attenuators provide precise level control with accurate, repeatable performance for a wide range of test applications. Available in models with a variety of attenuation ranges to meet your needs, our unique designs maintain linear attenuation change per dB over their entire range of attenuation settings up to 120 dB.

Small enough to fit in your pocket, they’re perfect for use in the lab or in the field. Our Smart GUI software supplied with all models allows you to sweep or hop attenuation levels, and even recall specific attenuation patterns for R&D and production test, reducing test time.

Overview
Mini-Circuits’ new PWR-6RMS-RC smart power sensor is a pocket-sized, precision measurement device that provides highly accurate measurements of CW as well as modulated and multi-tone signals from 50 to 6000 MHz. USB and Ethernet control options give you the freedom to manage your test setup remotely from your PC, and our user-friendly GUI provides comprehensive control capability, including data acquisition tools for reporting and data analysis. It even includes built-in measurement applications for measurement of RF components such as couplers, filters, amplifiers and more!

Features
• 50 to 6000 MHz
• -35 to +20 dBm dynamic range
• Measure CW and modulated signals
• Good VSWR, 1:1:1
• Fast measurement speed, 30ms
• User-friendly GUI software included
• DLLs and programming instructions included

TEST SOLUTIONS

Modular Test Systems Built to Order

USB/Ethernet Programmable Attenuators

Visit minicircuits.com for complete list of models and detailed product information!

Visit minicircuits.com for complete list of models and detailed product information!

Mini-Circuits’ Modular Test System GUI for Windows® Systems

Configure Your System on Our Website for a Fast Quote!

Mini-Circuits’ USB/Ethernet True RMS Power Sensor

For more information visit http://www.minicircuits.com/products/RackMountedTestSystems.shtml

Visit minicircuits.com for more information!
**100W Rack Mount Amplifier**

**HPA-272+**

700 to 2700 MHz

**Functional Description**

Mini-Circuits’ HPA-272+ high power amplifier is capable of amplifying signals up to 100W across its entire operating bandwidth from 700 to 2700 MHz. It delivers 48 dB gain with ±1.7 dB gain flatness, supporting a wide variety of high power test applications including EMI, reliability testing, RF stress testing, and more. The amplifier operates on a self-contained 90 – 264V AC power supply, making setup quick and easy in most lab environments. Extensive safety features include over-temperature protection with automatic shut-off and the ability to handle open and short loads while delivering output power up to 3 dB compression point.

**Typical Performance**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td>700 – 2700 MHz</td>
</tr>
<tr>
<td>Gain</td>
<td>-48 – - dB</td>
</tr>
<tr>
<td>Gain Flatness</td>
<td>±1.7 – - dB</td>
</tr>
<tr>
<td>Output P1dB</td>
<td>+49 – - dBm</td>
</tr>
<tr>
<td>Noise Figure</td>
<td>8.2 – - dB</td>
</tr>
<tr>
<td>Input VSWR</td>
<td>1.3 – - :1</td>
</tr>
<tr>
<td>Output VSWR</td>
<td>1.3 – - :1</td>
</tr>
<tr>
<td>AC Supply</td>
<td>90 – 264 V</td>
</tr>
</tbody>
</table>

**Test Setup for Multi-Channel High-Temperature Operating Life (HTOL) Testing**

For cost-effective HTOL testing, it’s often desirable to test large numbers of units simultaneously. This requires a system capable of distributing a test signal over many channels with a high power signal source used to overcome the inevitable splitter losses.

The HPA-272+ 100W amplifier can be used to drive 80 test channels in a configuration similar to that shown below. This setup is popular for use in high-throughput production testing applications where parallel processing of many DUTs is a requirement.

**HPA-272+ in RF Burn-In System**

<table>
<thead>
<tr>
<th>TEST SOLUTION</th>
<th>Typical Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSG-6000-RC</td>
<td></td>
</tr>
<tr>
<td>ZAPD-272-N+</td>
<td></td>
</tr>
<tr>
<td>ZT-10HPS-272+</td>
<td></td>
</tr>
<tr>
<td>ZT-184</td>
<td></td>
</tr>
</tbody>
</table>
Instrument Amplifiers

**Digital gain control up to 15 dB**

**Typical Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain</td>
<td>25 dB</td>
</tr>
<tr>
<td>Gain Flatness</td>
<td>±1 dB</td>
</tr>
<tr>
<td>Return Isolation</td>
<td>70 dB</td>
</tr>
<tr>
<td>P1dB</td>
<td>+24 dB</td>
</tr>
<tr>
<td>OPS</td>
<td>+4 dB</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>110/220V</td>
</tr>
</tbody>
</table>

**Features**
- High reverse isolation, 70 dB
- Built-in 110/220V power supply
- Thermally self-protected
- Lightweight chassis ideal for benchtop use
- 2 N-M to SMA-F adapters included
- **marked**

**Applications**
- Lab use
- Wideband test instrumentation

**Wideband Instrument Amplifier**

TVA-11-422A+  70 to 4200 MHz

**High dynamic range**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain</td>
<td>25 dB</td>
</tr>
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<td>Gain Flatness</td>
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<td>P1dB</td>
<td>+24 dB</td>
</tr>
<tr>
<td>OPS</td>
<td>+4 dB</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>110/220V</td>
</tr>
</tbody>
</table>

**Features**
- Withstands open/short loads with P OUT up to P1dB
- Thermally self-protected
- Built-in 110/220V power supply
- High reverse isolation, 70 dB

**Applications**
- Test setups
- Defense & radar

**Ultra-Flexible Test Cables**

ULC-Series

DC to 18 GHz

**Stable performance vs. flexure**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion Loss</td>
<td>0.3 dB</td>
</tr>
<tr>
<td>Return Loss</td>
<td>20 dB</td>
</tr>
<tr>
<td>Power Handling @ 2 GHz</td>
<td>210W</td>
</tr>
<tr>
<td>Power Handling @ 18 GHz</td>
<td>67W</td>
</tr>
<tr>
<td>Minimum Bond Radius</td>
<td>2.5 in.</td>
</tr>
<tr>
<td>Connector Type</td>
<td>SMA-SMA (M)</td>
</tr>
</tbody>
</table>

**Features**
- Excellent stability of phase and insertion loss vs. flexure
- Performance qualified to 20,000 bend cycles
- Triple shielded cable construction
- Stainless steel SMA connectors
- Operating temperature from -55 to +85°C

**Applications**
- Satellite communications
- Cellular communications
- Defense & radar

**Instrumentation Test Cables**

VNAC-Series

DC to 40 GHz

**Pairs with your VNA**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion Loss</td>
<td>1.5 dB</td>
</tr>
<tr>
<td>Return Loss</td>
<td>15.5 dB</td>
</tr>
<tr>
<td>Power Handling</td>
<td>10W</td>
</tr>
<tr>
<td>Connector Type</td>
<td>2.92mm (M – F)</td>
</tr>
</tbody>
</table>

**Features**
- Specially designed for use with VNA equipment
- Performance qualified to 20,000 bend cycles
- Soft-rugged construction with protective shield and strain relief
- Crush and torque resistant
- PET monofilament yarn outer cover eliminates conductivity
- 40 GHz connector mates with 2.92mm, K, 3.5mm and SMA
- Cost-effective high-performance replacement for expensive OEM cables

**Applications**
- Test setups
- Defense & radar

**New Products**

**Ultra-Wideband Termination**

ANNE-50K+  DC to 40 GHz

**Excellent return loss to 40 GHz**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impedance</td>
<td>50Ω</td>
</tr>
<tr>
<td>Return Loss</td>
<td>35 dB @ 4 GHz</td>
</tr>
<tr>
<td>Power Handling</td>
<td>1.5W</td>
</tr>
<tr>
<td>Connector Type</td>
<td>2.92mm (M)</td>
</tr>
</tbody>
</table>

**Features**
- Ultra-wideband, DC to 40 GHz
- Excellent return loss up to 40 GHz
- Passivated stainless steel connector
- Can interface with SMA, K, and 3.5mm connectors
- Operating temperature from -55 to +100°C

**Applications**
- Satellite communications
- Cellular communications
- Test setups
- Defense & radar
**X Series Reflectionless Filters**

### High Pass, Low Pass and Band Pass Models

Passbands from DC to 21 GHz

#### Product Line Overview:
Mini-Circuits is proud to bring the industry a revolutionary breakthrough in the longstanding problem of signal reflections when embedding filters in RF systems. Whereas conventional filters are fully reflective in the stopband, our new X-Series reflectionless filters are matched to 50Ω in the passband, stopband and transition, eliminating intermods, ripples and other problems caused by reflections in the signal chain.

They’re perfect for pairing with non-linear devices such as mixers and multipliers, significantly reducing unwanted signals generated due to non-linearity and for increasing system dynamic range by eliminating matching attenuators. They’ll change the way you think about using filters in your design!

#### Key Features
- Patented design eliminates in-band spurs
- Absorbs stopband signal power rather than reflecting it
- Good impedance match in passband, stopband, and transition
- Intrinsically cascadable
- Passbands from DC to 21 GHz
- Stopbands up to 35 GHz
- Tiny 3x3mm QFN package

#### Application Example:
Pairing Mixers with Reflectionless Filters to Improve System Performance

View full application note (AN-75-007) at minicircuits.com

An application circuit was assembled to measure the IF reflection spectrum at the output of a mixer when paired with a conventional filter versus a reflectionless filter.

### Reflectionless Filters Models

#### Low Pass Models

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Passband Frequency (MHz)</th>
<th>Stopband Frequency (MHz)</th>
<th>VSWR (1)</th>
<th>Power Input (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>XLF-151+</td>
<td>DC-150</td>
<td>280-2800</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-221+</td>
<td>DC-220</td>
<td>370-3500</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-421+</td>
<td>DC-420</td>
<td>610-5200</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-861+</td>
<td>DC-860</td>
<td>770-15800</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-122+</td>
<td>DC-1150</td>
<td>1150-7500</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-192+</td>
<td>DC-1900</td>
<td>1320-1900</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-252+</td>
<td>DC-2500</td>
<td>14500-2500</td>
<td>1.3</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-352+</td>
<td>DC-3250</td>
<td>21700-3000</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-633+</td>
<td>DC-6000</td>
<td>28000-30000</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-732+</td>
<td>DC-7300</td>
<td>3400-34000</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-73+</td>
<td>DC-7000</td>
<td>5000-12100</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-762+</td>
<td>DC-7600</td>
<td>13100-20000</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-962+</td>
<td>DC-9600</td>
<td>14800-25000</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-982+</td>
<td>DC-9800</td>
<td>19000-20000</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-14+</td>
<td>DC-10000</td>
<td>18000-20000</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-123+</td>
<td>DC-12200</td>
<td>18100-20000</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-133+</td>
<td>DC-13100</td>
<td>19500-20000</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XLF-173+</td>
<td>DC-17000</td>
<td>23900-30000</td>
<td>1.2</td>
<td>0.5</td>
</tr>
</tbody>
</table>

#### High Pass Models

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Passband Frequency (MHz)</th>
<th>Stopband Frequency (MHz)</th>
<th>VSWR (1)</th>
<th>Power Input (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>XHF-23+</td>
<td>DC-1210</td>
<td>1650</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XHF-252+</td>
<td>DC-1520</td>
<td>2030</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>XHF-392+</td>
<td>DC-2450</td>
<td>3220</td>
<td>1.4</td>
<td>0.5</td>
</tr>
</tbody>
</table>

#### Band Pass Models

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Center Frequency (MHz)</th>
<th>Passband Frequency (MHz)</th>
<th>Stop Band Frequency (MHz)</th>
<th>VSWR (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>XBF-282+</td>
<td>2750</td>
<td>2350-3150</td>
<td>1.2</td>
<td>1.5</td>
</tr>
</tbody>
</table>
**Overview**
Mini-Circuits’ new ZVBP-series cavity band pass filters are designed for narrow-band, high selectivity applications. They can provide bandwidths as narrow as 1% with very high selectivity and excellent low noise floor. These filters include a unique mechanical feature that prevents accidental detuning that would otherwise require expensive replacement or return to factory for re-tuning. This makes them very handy for field and lab applications where hard use is common. They come in rugged packages with a special powder-coated finish, which not only looks great, but also provides excellent protection against corrosion, tarnishing, and scratching. ZVBP-series filters are tested for use in extreme temperatures up to 100°C. They’re available in a wide range of passbands from 900 MHz to 12000 MHz. Contact apps@minicircuits.com for custom requirements!

**Slabline Band Pass Filter** ZVBP-909+
902 to 915 MHz

Typical Performance
- **Passband Insertion Loss** F1-F2 902-915 2.0 dB
- **Passband VSWR** F1-F2 902-915 1.2:1
- **Upper Stopband Insertion Loss** F4-F5 902-915 33 dB
- **Lower Stopband Insertion Loss** DC-F3 10-895 33 dB

Features
- Outstanding selectivity and high rejection
- >70 dB rejection @ 32 MHz from passband edge
- Wide operating temperature range, -55 to +100°C
- High power handling, 15W

Applications
- CDMA band rejection for GSM base stations

**Features**
- High power handling, 10W
- >95 dB rejection @ 2000/7500 MHz
- Outstanding selectivity and high rejection

**Applications**
- X-band satellite and radar

**Cavity Band Pass Filter** ZVBP-4300+
4250 to 4350 MHz

Typical Performance
- **Passband Insertion Loss** F1-F2 4250-4350 1.0 dB
- **Passband VSWR** F1-F2 4250-4350 1.3:1
- **Upper Stopband Insertion Loss** F4-F5 4940-5600 20 dB
- **Lower Stopband Insertion Loss** DC-F3 DC-4140 29 dB

Features
- Outstanding selectivity and high rejection
- >95 dB rejection @ 500/7000 MHz
- High power handling, 10W

Applications
- C-band applications
- Aeronautical

**Features**
- High power handling, 10W
- >64 dB rejection @ 11000 MHz
- >95 dB rejection @ 500 MHz
- Outstanding selectivity and high rejection

**Applications**
- X-band satellite and radar

**Cavity Band Pass Filter** ZVBP-4900+
4840 to 4960 MHz

Typical Performance
- **Passband Insertion Loss** F1-F2 4840-4960 1.2 dB
- **Passband VSWR** F1-F2 4840-4960 1.2:1
- **Upper Stopband Insertion Loss** F4-F5 5700-6900 28 dB
- **Lower Stopband Insertion Loss** DC-F3 DC-5950 51 dB

Features
- Outstanding selectivity and high rejection
- >95 dB rejection @ 2000/7500 MHz
- High power handling, 10W

Applications
- Wi-Fi
- Telecommunications & broadband

**Features**
- Outstanding selectivity and high rejection
- >84 dB rejection @ 500 MHz
- >53 dB rejection @ 18000 MHz
- Power handling, 1W

**Applications**
- X-band satellite and radar

**Cavity Band Pass Filter** ZVBP-8250+
8025 to 8475 MHz

Typical Performance
- **Passband Insertion Loss** F1-F2 8025-8475 1.5 dB
- **Lower Stopband Insertion Loss** DC-F3 DC-7650 28 dB
- **Upper Stopband Insertion Loss** F4-F5 8905-11000 28 dB

Features
- Outstanding selectivity and high rejection
- >95 dB rejection @ 500 MHz
- >64 dB rejection @ 11000 MHz
- High power handling, 10W

Applications
- X-band satellite and radar

**Features**
- Outstanding selectivity and high rejection
- >53 dB rejection @ 18000 MHz
- Power handling, 1W

**Applications**
- X-band satellite and radar

**Cavity Band Pass Filter** ZVBP-11G3+
11200 to 11400 MHz

Typical Performance
- **Passband Insertion Loss** F1-F2 11200-11400 2.0 dB
- **Lower Stopband Insertion Loss** DC-F3 DC-11030 48 dB
- **Upper Stopband Insertion Loss** F4-F5 11800-20000 48 dB

Features
- Outstanding selectivity and high rejection
- >95 dB rejection @500/7000 MHz
- Outstanding selectivity and high rejection

Applications
- X-band satellite and radar

**Features**
- Outstanding selectivity and high rejection
- >84 dB rejection @ 500 MHz
- >53 dB rejection @ 18000 MHz
- Power handling, 1W

Applications
- X-band satellite and radar

**Cavity Band Pass Filter** ZVBP-10R5G+
8025 to 8475 MHz

Typical Performance
- **Passband Insertion Loss** F1-F2 8025-8475 1.0 dB
- **Upper Stopband Insertion Loss** F4-F5 11580-20000 48 dB
- **Lower Stopband Insertion Loss** DC-F3 DC-11030 48 dB

Features
- Outstanding selectivity and high rejection
- >95 dB rejection @500/7000 MHz
- Outstanding selectivity and high rejection

Applications
- X-band satellite and radar

**Features**
- Outstanding selectivity and high rejection
- >84 dB rejection @ 500 MHz
- >53 dB rejection @ 18000 MHz
- Power handling, 1W

Applications
- X-band satellite and radar

**Cavity Band Pass Filter** ZVBP-909+
902 to 915 MHz

Typical Performance
- **Passband Insertion Loss** F1-F2 902-915 2.0 dB
- **Upper Stopband Insertion Loss** F4-F5 902-915 33 dB

Features
- Outstanding selectivity and high rejection
- >70 dB rejection @ 32 MHz from passband edge
- Wide operating temperature range, -55 to +100°C
- High power handling, 15W

Applications
- CDMA band rejection for GSM base stations

**Features**
- High power handling, 10W
- >72 dB rejection @ 20000 MHz
- >95 dB rejection @3000 MHz
- Outstanding selectivity and high rejection

**Applications**
- X-band satellite and radar

**Cavity Band Pass Filter** ZVBP-909+
902 to 915 MHz

Typical Performance
- **Passband Insertion Loss** F1-F2 902-915 2.0 dB
- **Upper Stopband Insertion Loss** F4-F5 902-915 33 dB

Features
- Outstanding selectivity and high rejection
- >70 dB rejection @ 32 MHz from passband edge
- Wide operating temperature range, -55 to +100°C
- High power handling, 15W

Applications
- CDMA band rejection for GSM base stations

**Features**
- High power handling, 10W
- >64 dB rejection @ 11000 MHz
- >95 dB rejection @ 500 MHz
- Outstanding selectivity and high rejection

**Applications**
- X-band satellite and radar

**Cavity Band Pass Filter** ZVBP-11G3+
11200 to 11400 MHz

Typical Performance
- **Passband Insertion Loss** F1-F2 11200-11400 2.0 dB
- **Lower Stopband Insertion Loss** DC-F3 DC-11030 48 dB
- **Upper Stopband Insertion Loss** F4-F5 11800-20000 48 dB

Features
- Outstanding selectivity and high rejection
- >95 dB rejection @500/7000 MHz
- Outstanding selectivity and high rejection

Applications
- X-band satellite and radar

**Features**
- Outstanding selectivity and high rejection
- >84 dB rejection @ 500 MHz
- >53 dB rejection @ 18000 MHz
- Power handling, 1W

Applications
- X-band satellite and radar

**Cavity Band Pass Filter** ZVBP-10R5G+
8025 to 8475 MHz

Typical Performance
- **Passband Insertion Loss** F1-F2 8025-8475 1.0 dB
- **Upper Stopband Insertion Loss** F4-F5 11580-20000 48 dB

Features
- Outstanding selectivity and high rejection
- >95 dB rejection @500/7000 MHz
- Outstanding selectivity and high rejection

Applications
- X-band satellite and radar

**Features**
- Outstanding selectivity and high rejection
- >84 dB rejection @ 500 MHz
- >53 dB rejection @ 18000 MHz
- Power handling, 1W

Applications
- X-band satellite and radar

**Cavity Band Pass Filter** ZVBP-10R5G+
8025 to 8475 MHz

Typical Performance
- **Passband Insertion Loss** F1-F2 8025-8475 1.0 dB
- **Upper Stopband Insertion Loss** F4-F5 11580-20000 48 dB

Features
- Outstanding selectivity and high rejection
- >95 dB rejection @500/7000 MHz
- Outstanding selectivity and high rejection

Applications
- X-band satellite and radar

**Features**
- Outstanding selectivity and high rejection
- >84 dB rejection @ 500 MHz
- >53 dB rejection @ 18000 MHz
- Power handling, 1W

Applications
- X-band satellite and radar

www.minicircuits.com
**High-Power Stripline Couplers**

**Overview**

Mini-Circuits’ MBD series of surface mount couplers utilizes stripline construction to achieve extremely high power handling – up to 300W – in miniature, low-profile devices with excellent coupling performance, high directivity, and excellent shielding. Available in a selection of bi-directional and dual directional models, these couplers are ideal for a wide variety of applications from power amplifiers and antenna feeds to military applications and more!

### 200W Bi-Directional Coupler

**MBDA-30-451HP**

**Typical Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupling</td>
<td>30 dB</td>
</tr>
<tr>
<td>Power Handling</td>
<td>200W</td>
</tr>
<tr>
<td>Mainline Loss</td>
<td>0.15 dB</td>
</tr>
<tr>
<td>Input/Output Return Loss</td>
<td>33 dB</td>
</tr>
<tr>
<td>Directivity</td>
<td>28 dB</td>
</tr>
</tbody>
</table>

**Features**

- Very high power handling
- Constructed using stripline technology providing low profile and excellent shielding
- DC passing
- All ports interchangeable
- Wraparound terminations

**Applications**

- GSM
- R&D labs
- Military & defense

### 100W Bi-Directional Coupler

**MBDA-35-252HP**

**Typical Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupling</td>
<td>35 dB</td>
</tr>
<tr>
<td>Coupling Flatness</td>
<td>±1.0 dB</td>
</tr>
<tr>
<td>Power Handling</td>
<td>100W</td>
</tr>
<tr>
<td>Mainline Loss</td>
<td>0.3 dB</td>
</tr>
<tr>
<td>Input/Output Return Loss</td>
<td>19 dB</td>
</tr>
<tr>
<td>Directivity</td>
<td>18 dB</td>
</tr>
</tbody>
</table>

**Features**

- Very high power handling
- Constructed using stripline technology providing low profile and excellent shielding
- DC passing
- Wraparound terminations

**Applications**

- Digital communications such as Wi-Fi, Bluetooth and Zigbee
- GSM
- Defense & military

### 300W Dual-Directional Coupler

**MBDD-50-13HHP**

**Typical Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupling</td>
<td>50 dB</td>
</tr>
<tr>
<td>Coupling Flatness</td>
<td>±0.6 dB</td>
</tr>
<tr>
<td>Power Handling</td>
<td>300W</td>
</tr>
<tr>
<td>Mainline Loss</td>
<td>0.25 dB</td>
</tr>
<tr>
<td>Input/Output Return Loss</td>
<td>19 dB</td>
</tr>
<tr>
<td>Directivity</td>
<td>20 dB</td>
</tr>
</tbody>
</table>

**Features**

- Very high power handling
- Constructed using stripline technology providing low profile and excellent shielding
- DC passing
- Wraparound terminations
- Dual directional design allows simultaneous sampling of forward and reverse paths

**Applications**

- R&D labs
- Mobile SatCom
- Digital communications such as GSM, CDMA and LTE

### 150W Bi-Directional Coupler

**MBDB-15-272HP**

**Typical Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupling</td>
<td>25 dB</td>
</tr>
<tr>
<td>Coupling Flatness</td>
<td>±0.75 dB</td>
</tr>
<tr>
<td>Power Handling</td>
<td>150W</td>
</tr>
<tr>
<td>Mainline Loss</td>
<td>0.25 dB</td>
</tr>
<tr>
<td>Input/Output Return Loss</td>
<td>19 dB</td>
</tr>
<tr>
<td>Directivity</td>
<td>20 dB</td>
</tr>
</tbody>
</table>

**Features**

- Very high power handling
- Constructed using stripline technology providing low profile and excellent shielding
- DC passing
- Wraparound terminations

**Applications**

- R&D labs
- Mobile SatCom
- Digital communications such as TDMA, CDMA, GSM and LTE
- DAS
- GPS

---

**ISO 9001  ISO 14001  AS 9100**

Mini-Circuits®

www.minicircuits.com   P.O. Box 350166, Brooklyn, NY 11235-0003   (718) 934-4500 sales@minicircuits.com
Voltage Controlled Oscillators

5V Tuning for PLL ICs
MOS-400+ 400 MHz

**Typical Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Power</td>
<td>+2.5 dBm</td>
</tr>
<tr>
<td>Phase Noise @ 1 kHz offset</td>
<td>-1.19 dBc/Hz</td>
</tr>
<tr>
<td>Pulling</td>
<td>0.4 MHz</td>
</tr>
<tr>
<td>Pushing</td>
<td>0.1 MHz/°V</td>
</tr>
<tr>
<td>Harmonic Suppression</td>
<td>-26 dBc</td>
</tr>
<tr>
<td>Tuning Voltage Range</td>
<td>0.5 – 4.5V</td>
</tr>
<tr>
<td>Tuning Voltage Sensitivity</td>
<td>4 MHz/°V</td>
</tr>
</tbody>
</table>

**Features**
- Fixed frequency
- Linear tuning characteristics
- Metal package provides excellent shielding against unwanted signals and noise
- Small size, 0.375 x 0.375 x 0.131" (0.96 x 0.96 x 0.33 cm)
- Robust design

**Applications**
- Wireless communications
- Military

---

5V Tuning for PLL ICs
MOS-980+ 980 MHz

**Typical Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Power</td>
<td>+2.5 dBm</td>
</tr>
<tr>
<td>Phase Noise @ 1 kHz offset</td>
<td>-1.13 dBc/Hz</td>
</tr>
<tr>
<td>Pulling</td>
<td>0.7 MHz</td>
</tr>
<tr>
<td>Pushing</td>
<td>0.1 MHz/°V</td>
</tr>
<tr>
<td>Harmonic Suppression</td>
<td>-27 dBc</td>
</tr>
<tr>
<td>Tuning Voltage Range</td>
<td>0.5 – 5.0V</td>
</tr>
<tr>
<td>Tuning Voltage Sensitivity</td>
<td>15 MHz/°V</td>
</tr>
</tbody>
</table>

**Features**
- Linear tuning characteristics
- Metal package provides excellent shielding against unwanted signals and noise
- Small size, 0.375 x 0.375 x 0.131" (0.96 x 0.96 x 0.33 cm)
- Robust design

**Applications**
- Wireless communications
- Military

---

Linear Tuning, Optimal for Loop Filter Design
MOS-980+ 935 to 980 MHz

**Typical Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Power</td>
<td>+2.5 dBm</td>
</tr>
<tr>
<td>Phase Noise @ 1 kHz offset</td>
<td>-1.13 dBc/Hz</td>
</tr>
<tr>
<td>Pulling</td>
<td>0.7 MHz</td>
</tr>
<tr>
<td>Pushing</td>
<td>0.1 MHz/°V</td>
</tr>
<tr>
<td>Harmonic Suppression</td>
<td>-27 dBc</td>
</tr>
<tr>
<td>Tuning Voltage Range</td>
<td>0.5 – 5.0V</td>
</tr>
<tr>
<td>Tuning Voltage Sensitivity</td>
<td>15 MHz/°V</td>
</tr>
</tbody>
</table>

**Features**
- Linear tuning characteristics
- Metal package provides excellent shielding against unwanted signals and noise
- Small size, 0.375 x 0.375 x 0.131" (0.96 x 0.96 x 0.33 cm)
- Robust design

**Applications**
- Wireless communications
- Military

---

Linear Tuning
MOS-2960+ 2622 to 2960 MHz

**Typical Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Power</td>
<td>+2.5 dBm</td>
</tr>
<tr>
<td>Phase Noise @ 1 kHz offset</td>
<td>-102 dBc/Hz</td>
</tr>
<tr>
<td>Pulling</td>
<td>3 MHz</td>
</tr>
<tr>
<td>Pushing</td>
<td>1.5 MHz/°V</td>
</tr>
<tr>
<td>Harmonic Suppression</td>
<td>-33 dBc</td>
</tr>
<tr>
<td>Tuning Voltage Range</td>
<td>0.5 – 1.0V</td>
</tr>
<tr>
<td>Tuning Voltage Sensitivity</td>
<td>18-29 MHz/°V</td>
</tr>
</tbody>
</table>

**Features**
- Linear tuning characteristics
- Metal package provides excellent shielding against unwanted signals and noise
- Small size, 0.375 x 0.375 x 0.131" (0.96 x 0.96 x 0.33 cm)
- Robust design

**Applications**
- Wireless communications
- Military

---

Linear Tuning
MOS-2500C+ 2500 MHz to 2500 MHz

**Typical Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Power</td>
<td>+5.0 dBm</td>
</tr>
<tr>
<td>Phase Noise @ 1 kHz offset</td>
<td>-106 dBc/Hz</td>
</tr>
<tr>
<td>Pulling</td>
<td>1.3 MHz</td>
</tr>
<tr>
<td>Pushing</td>
<td>0.4 MHz/°V</td>
</tr>
<tr>
<td>Harmonic Suppression</td>
<td>-22 dBc</td>
</tr>
<tr>
<td>Tuning Voltage Range</td>
<td>0 – 2V</td>
</tr>
<tr>
<td>Tuning Voltage Sensitivity</td>
<td>9-37 MHz/°V</td>
</tr>
</tbody>
</table>

**Features**
- Linear tuning characteristics
- Metal package provides excellent shielding against unwanted signals and noise equipment
- Small size, 0.5 x 0.5 x 0.22" (1.27 x 1.27 x 0.55 cm)
- Robust design

**Applications**
- Wireless communications
- Test and measurement

---

5V Tuning for PLL ICs
MOS-1120+ 1120 MHz

**Typical Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Power</td>
<td>+1.5 dBm</td>
</tr>
<tr>
<td>Phase Noise @ 1 kHz offset</td>
<td>-1.15 dBc/Hz</td>
</tr>
<tr>
<td>Pulling</td>
<td>0.4 MHz</td>
</tr>
<tr>
<td>Pushing</td>
<td>0.2 MHz/°V</td>
</tr>
<tr>
<td>Harmonic Suppression</td>
<td>-18 dBc</td>
</tr>
<tr>
<td>Tuning Voltage Range</td>
<td>0.5 – 4.9V</td>
</tr>
<tr>
<td>Tuning Voltage Sensitivity</td>
<td>10 MHz/°V</td>
</tr>
</tbody>
</table>

**Features**
- Fixed frequency
- Linear tuning characteristics
- Metal package provides excellent shielding against unwanted signals and noise
- Small size, 0.5 x 0.5 x 0.22" (1.27 x 1.27 x 0.55 cm)
- Robust design

**Applications**
- Wireless communications
- Military

---

Linear Tuning
ROS-3000C+ 2500 MHz to 3000 MHz

**Typical Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Power</td>
<td>+5.0 dBm</td>
</tr>
<tr>
<td>Phase Noise @ 1 kHz offset</td>
<td>-107 dBc/Hz</td>
</tr>
<tr>
<td>Pulling</td>
<td>0.45 MHz</td>
</tr>
<tr>
<td>Pushing</td>
<td>1.3 MHz/°V</td>
</tr>
<tr>
<td>Harmonic Suppression</td>
<td>-22 dBc</td>
</tr>
<tr>
<td>Tuning Voltage Range</td>
<td>0.25 – 14.95V</td>
</tr>
<tr>
<td>Tuning Voltage Sensitivity</td>
<td>14.36 MHz/°V</td>
</tr>
</tbody>
</table>

**Features**
- Fixed frequency
- Linear tuning characteristics
- Metal package provides excellent shielding against unwanted signals and noise equipment
- Small size, 0.5 x 0.5 x 0.22" (1.27 x 1.27 x 0.55 cm)
- Robust design

**Applications**
- Wireless communications
- Test and measurement equipment

---

Linear Tuning
ROS-4608C+ 4608 MHz

**Typical Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Performance (typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Power</td>
<td>+3.0 dBm</td>
</tr>
<tr>
<td>Phase Noise @ 1 kHz offset</td>
<td>-116 dBc/Hz</td>
</tr>
<tr>
<td>Pulling</td>
<td>0.6 MHz</td>
</tr>
<tr>
<td>Pushing</td>
<td>0.2 MHz/°V</td>
</tr>
<tr>
<td>Harmonic Suppression</td>
<td>-18 dBc</td>
</tr>
<tr>
<td>Tuning Voltage Range</td>
<td>0.5 – 4.95V</td>
</tr>
<tr>
<td>Tuning Voltage Sensitivity</td>
<td>-4.4 MHz/°V</td>
</tr>
</tbody>
</table>

**Features**
- Fixed frequency
- Linear tuning characteristics
- Metal package provides excellent shielding against unwanted signals and noise equipment
- Small size, 0.5 x 0.5 x 0.22" (1.27 x 1.27 x 0.55 cm)
- Robust design

**Applications**
- Wireless communications
- Test and measurement equipment
- CATV
- High speed DUCs (digital up-converters)
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