Mercury Systems is a leading commercial provider of secure processing subsystems designed and made in the USA. Optimized for customer and mission success, Mercury's solutions power a wide variety of critical defense and intelligence programs.

SpectrumSeries™
RFM3111 Wideband Microwave Transceiver

**Versatile and scalable 3U open architecture**

- SOSA-aligned design
- Rugged, compact and full open systems compliance
- Wideband - Excellent phase noise - High dynamic range
- Built-in LO generation - System lockable via external reference inputs

Mercury’s SpectrumSeries RFM3111 is an ultra-wideband microwave transceiver with versatile local oscillator (LO), low-phase noise and fast tuning speed, packaged in a SOSA-aligned, low-SWaP 3U module. These versatile transceivers are open system architecture compliant and aligned in digital and RF processing domains through OpenVPX, OpenRFM, and SOSA.

**SOSA alignment**
Built to meet SOSA specifications as they emerge, open systems-focused users can exploit the architecture commonality benefits immediately. The design streamlines the deployment of the latest technology by increasing efficiency and maintaining interoperability and configurability. Alignment is achieved without compromising Mercury’s high standards for security and ruggedness.

**Open system architecture for RF processing - OpenRFM**
The challenges of digital and RF convergence, spectrum-fusion and maneuverability, complementary system interoperability and affordability are solved with OpenRFM and SOSA. This open architecture approach standardizes and streamlines the design, integration, and testing of RF and digital capabilities within embedded processing subsystems. OpenRFM design principles are compatible with prevailing embedded computing industry standards.

**SpectrumSeries subsystem building blocks**
Mercury’s SpectrumSeries open architecture transceivers, processing and A/D conversion building blocks are easily integrated into low-risk, turnkey, real-time signal processing subsystems. These subsystems comprise of complete receiver/analysis solutions for communication and electronic intelligence enabling practitioners to react quickly from resulting information.

**Signal collection, digitization and processing domain expertise**
Mercury leverages 35 years of high-frequency, wide-bandwidth signal acquisition, digitizing and decimation experience to produce performance optimized and balanced RF processing subsystems. We commit our proven hardware and software expertise to interoperable, scalable open system building blocks that minimize risk and leverage the best commercial technology to drive performance and affordability. Our application and system engineers integrate these proven building blocks in to sophisticated EW processing subsystems that can be refreshed at the speed of technology. With RF down and up conversion, the SpectrumSeries RFM3111 is ideally suited to EW applications.

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### Specifications

#### Packaging
- **Format/size:** 3U OpenVPX, single slot
- **Power:** 45W Maximum
- **Control interface:** 1GbE (consult factory for more options)
- **Weight:** <1kg (rugged air-cooled)
- Commercial and rugged air-cooled or rugged conduction cooled

**OpenRFM interoperability**

#### RF Downconverter specifications
- **RF input coverage:** 6GHz to 18GHz
- **Noise figure:** 14 dB typical (17 dB max)
- **Gain (max RF to IF):** 25 dB
- **Max RF (without damage):** 20 dBm
- **OP1dB (with max gain):** 16 dBm
- **OIP3 (with max gain):** 30 dBm
- **Attenuation:** 31 dB in 0.5 dB steps
- **Linear dynamic range:** 91 dB (with 1MHz BW)
- **Single-tone, signal related spurious:** -60 dBc (@ -15 dBm Input)
- **Single-tone, internally generated spurious:** -80 dBc (@ -15dBm Input)
- **IF output center frequency**
- **IF bandwidth:** 1.375GHz to 2.375GHz
- **IF band flatness:** +/-1.5dB
- **Tuning speed:** 25 µsecs typical (To within 10 kHz)
- **Tuning resolution:** 10MHz
- **VSWR (In/out):** 2:1
- **LO Leakage:** -80dBm typ (-70dBm max)

<table>
<thead>
<tr>
<th>Frequency Band</th>
<th>Noise figure</th>
<th>Gain (max IF to RF)</th>
<th>OP1dB (with max gain)</th>
<th>OIP3 (with max gain)</th>
<th>Attenuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>6GHz to 18GHz</td>
<td>14 dB</td>
<td>25 dB</td>
<td>16 dBm</td>
<td>30 dBm</td>
<td>31 dB</td>
</tr>
</tbody>
</table>

#### RF Upconverter specifications
- **RF output coverage:** 6GHz to 18GHz
- **Noise figure:** 23 dB typical (26 dB max)
- **Gain (max IF to RF):** 20dB
- **OP1dB (with max gain):** 21dBm
- **OIP3 (with max gain):** 30dBm
- **Attenuation:** 31dB in 0.5dB steps
- **Single-tone, signal related spurious:** -55dBc (@ -10dBm input and max gain)
- **Single-tone, internally generated spurious:** -80dBm (@ -10dBm input and max gain)
- **IF input center frequency**
- **IF bandwidth:** 1.375GHz to 2.375GHz
- **IF band flatness:** +/-1.5dB
- **Tuning speed:** 25 µsecs typical (To within 10 kHz)
- **Tuning resolution:** 10MHz
- **VSWR (In/out):** 2:1

<table>
<thead>
<tr>
<th>Frequency Band</th>
<th>Noise figure</th>
<th>Gain (max IF to RF)</th>
<th>OP1dB (with max gain)</th>
<th>OIP3 (with max gain)</th>
<th>Attenuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>6GHz to 18GHz</td>
<td>23 dB</td>
<td>20 dB</td>
<td>21 dBm</td>
<td>30 dBm</td>
<td>31 dB</td>
</tr>
</tbody>
</table>

#### Native LO generation specifications
- **Reference Input:** 10MHz – 100MHz; 100MHz preferred
- **Composite phase noise**

<table>
<thead>
<tr>
<th>Frequency Band</th>
<th>Phase Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Hz</td>
<td>-70 dBc/Hz</td>
</tr>
<tr>
<td>1 kHz</td>
<td>-80 dBc/Hz</td>
</tr>
<tr>
<td>10 kHz</td>
<td>-90 dBc/Hz</td>
</tr>
<tr>
<td>100 kHz</td>
<td>-95 dBc/Hz</td>
</tr>
<tr>
<td>1 MHz</td>
<td>-99 dBc/Hz</td>
</tr>
<tr>
<td>10 MHz</td>
<td>-125 dBc/Hz</td>
</tr>
<tr>
<td>20 MHz</td>
<td>-130 dBc/Hz</td>
</tr>
<tr>
<td>100 MHz</td>
<td>-133 dBc/Hz</td>
</tr>
</tbody>
</table>

* The IF output has a direct mode that allows 100MHz to 6 GHz to be routed directly to the IF output bypassing the RF translation chain and IF Filters.
** The IF input has a direct mode that allows 100MHz to 6 GHz to be routed directly to the RF output bypassing the RF translation chain and IF Filters.
*** Phase noise is based upon a 100MHz clean reference, such as OCXOs used for system references.

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### What SOSA Delivers

**Speed**
- Rapid technology insertions at the speed of innovation

**SWaP**
- Effectively addresses size, weight and power constraints (SWaP)

**Low Cost**
- Reductions in sustainment costs enable more and better systems to be deployed

**Competition**
- Increased competition to drive affordability and innovation

**Compatibility**
- Enhanced compatibility so systems can scale across platforms and domainst

**Security**
- Improved security to enable better threat mitigation
### Environmental Qualification Levels

<table>
<thead>
<tr>
<th></th>
<th>Air-cooled</th>
<th>Conduction-cooled</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ruggedness</strong></td>
<td>Commercial L0</td>
<td>Rugged L1</td>
</tr>
<tr>
<td><strong>Moisture/dust protection</strong></td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td><strong>Temperature</strong> Operating*</td>
<td>0°C to +40°C</td>
<td>-25°C to +55°C</td>
</tr>
<tr>
<td>Operating temperature maximum rate of change</td>
<td>N/A</td>
<td>5°C/min</td>
</tr>
<tr>
<td><strong>Humidity</strong> Operating*</td>
<td>10-90%, non-condensing</td>
<td>5-95%, non-condensing</td>
</tr>
<tr>
<td><strong>Altitude</strong> Operating*</td>
<td>0-10,000ft</td>
<td>0-30,000ft</td>
</tr>
<tr>
<td>Storage</td>
<td>-40°C to +85°C</td>
<td>-55°C to +85°C</td>
</tr>
<tr>
<td><strong>Vibration</strong> Random</td>
<td>0.003 g/Hz; 20-2000 Hz, 1 hr/axis</td>
<td>0.04 g/Hz; 20-2000 Hz, 1 hr/axis</td>
</tr>
<tr>
<td>Sine</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Shock</td>
<td>z-axis: 20g; x and y-axes: 32g; (11ms ½-sine pulse, 3 positive, 3 negative)</td>
<td>z-axis: 50g; x and y-axes: 80g; (11ms ½-sine pulse, 3 positive, 3 negative)</td>
</tr>
<tr>
<td><strong>Salt/Fog</strong></td>
<td>N/A</td>
<td>Contact Factory</td>
</tr>
<tr>
<td>VITA 47</td>
<td>Contact Factory</td>
<td></td>
</tr>
</tbody>
</table>

* Customer must maintain required cfm level. Consult factory for the required flow rates.

** Card edge should be maintained below 71°C

Storage Temperature is defined per MIL-STD-810F, Method 502.4, para 4.5.2, where the product under non-operational test is brought to an initial high temperature cycle to remove moisture. Then the unit under non-operational test will be brought to the low storage temperature. The low temperature test is maintained for 2 hours. The product is then brought back to ambient temperature. All temperature transitions are at a maximum rate of 10°C/min. One cold/hot cycle constitutes the complete non-operational storage temperature test. This assumes that the board level products are individually packaged in accordance with ASTM-D-3951 approved storage containers. These tests are not performed in Mercury shipping containers, but in an unrestained condition. Please consult the factory if you would like additional test details.

All products manufactured by Mercury meet elements of the following specifications: MIL-STD-454, MIL-STD-883, MIL-HDBK-217F, and MIL-I-46058 or IPC-CC-630, and various IPC standards. Mercury's inspection system has been certified in accordance with MIL-I-45208A.

### Additional Services

<table>
<thead>
<tr>
<th>Optional Environmental Screening and Analysis Services</th>
<th>Standard Module, Optional Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cold Start Testing</td>
<td>• Engineering Change Order (ECO) Notification</td>
</tr>
<tr>
<td>• Cold Soak Testing</td>
<td>• Alternate Mean Time Between Failure (MTBF) Calculations</td>
</tr>
<tr>
<td>• Custom Vibration</td>
<td>• Hazmat Analysis</td>
</tr>
<tr>
<td>• CFD Thermal Analysis</td>
<td>• Diminished Manufacturing Sources (DMS) Management</td>
</tr>
<tr>
<td>• Finite Element Analysis</td>
<td>• Longevity of Supply (LOS)</td>
</tr>
<tr>
<td>• Safety Margin Analysis</td>
<td>• Longevity of Repair (LOR)</td>
</tr>
</tbody>
</table>

Contact factory for additional information

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### Need more help? Need a variant of this product?

Contact Mercury’s Mixed Signal Engineering team at: [digital.rf@mrcy.com](mailto:digital.rf@mrcy.com) or visit [www.mrcy.com/sosa](http://www.mrcy.com/sosa) for a detailed listing of SOSA-aligned products.