Direct Modulator
These quadrature modulators developed by RFMD® will enable base station manufacturers to capitalize on the numerous benefits of direct modulation over dual-conversion transmit architectures.

These direct modulators set the industry standard with out-of-band noise density as low as -156 dBm/Hz, and carrier and sideband suppression of 35 dBc. The RF2483 is an ultra-low-noise, dual-band direct modulator with AGC designed for base station applications. The RF3854 is a multimode quad-band quadrature modulator with integrated variable gain power amplifier (PA) drivers for base station applications. The RF2850 and RF2484 are direct quadrature modulators specifically designed to meet 2.5G and 3G base station system requirements.

Each device includes quadrature generation, matched double-balanced mixers, summing amplifiers and RF outputs. The RF2483 and RF3854 also include variable gain control and independent high and low-band oscillator inputs and RF outputs.

**System Level Block Diagram Direct Modulation**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>RF2483</th>
<th>RF3854*</th>
<th>RF2484</th>
<th>RF2850</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>(MHz)</td>
<td>700-1000/1700-2200</td>
<td>800-2200</td>
<td>800-2500</td>
<td>1700-2500</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>(V)</td>
<td>2.7 - 3.3</td>
<td>2.7-3.3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>AGC range</td>
<td>(dB)</td>
<td>36/35</td>
<td>90</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Output power</td>
<td>(dBm)</td>
<td>0.8/0.4</td>
<td>-14</td>
<td>-13</td>
<td>-14</td>
</tr>
<tr>
<td>Out-of-band noise density</td>
<td>(dBm/Hz)</td>
<td>-156/-155</td>
<td>-150</td>
<td>-152.5</td>
<td>-158</td>
</tr>
<tr>
<td>Carrier suppression</td>
<td>(dBc)</td>
<td>52/40</td>
<td>40</td>
<td>35</td>
<td>40</td>
</tr>
<tr>
<td>Sideband suppression</td>
<td>(dBc)</td>
<td>45/43</td>
<td>40</td>
<td>35</td>
<td>40</td>
</tr>
<tr>
<td>Output IP3</td>
<td>(dBm)</td>
<td>19/20</td>
<td>20</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Power consumption</td>
<td>(mA)</td>
<td>85</td>
<td>112</td>
<td>66</td>
<td>65</td>
</tr>
<tr>
<td>Technology</td>
<td></td>
<td>SiGe BiCMOS</td>
<td>SiGe BiCMOS</td>
<td>GaAs HBT</td>
<td>GaAs HBT</td>
</tr>
<tr>
<td>Package</td>
<td></td>
<td>Leadless 20-pin 4X4mm</td>
<td>Leadless 24-pin 4X4mm</td>
<td>Leadless 16-pin 4X4mm</td>
<td>QFN 16-pin 4x4mm</td>
</tr>
</tbody>
</table>

*All Measurements are taken at 2.14 GHz
**RF2483**
Dual-Band Direct Quadrature Modulator

- Low noise reduces filter requirements
- Independent low and high-band outputs spanning from 700 to 2200 MHz

**RF2484**
Direct Quadrature Modulator

- Stable performance over temperature
- Designed to meet base station system requirements
- Low noise floor

**RF3854**
Multi-Mode Quad-Band Quadrature Modulator

- Integrated variable gain PA drivers
- Low noise
- Frequency doublers, dividers and LO buffers are included to support a variety of LO generation options

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**RF2483 Low-Band Output Noise at 20 MHz Offset vs GC**

(Vcc = 2.7V, LO = 900 MHz @ 0 dBm)

- Output Noise 20 MHz Offset, I&Q = 800mVpp 1.2Vdc
- I&Q = 0mVpp 1.2Vdc
- Output Power, I&Q = 800mVpp 1.2Vdc
- Output Power, I&Q = 0mVpp 1.2Vdc

**RF2484 PCS CDMA Spectra**
At Various Output Levels

(AcPR @ 885 kHz, Vcc = 5.0V, Vref = 4.1V, T=25° C)

**RF2850**
Direct Quadrature Modulator

- Targeted for high-performance wireless infrastructure applications: CDMA20001x, WCDMA, TD-SCDMA, GSM/ GPRS/EDGE, PHS and point-to-point radio applications
- RF frequency output of 1.7 GHz to 2.5 GHz is ideally suited for next-generation 3G base stations
- Based on an OIP3 of 21 dBm and a very low noise floor of -158 dBm/Hz, ACPR performance of -74 dBc and SNR performance of -84 dBc can be obtained with a single carrier WCDMA waveform (Test Model 1)
Optimum Technology Matching

GaAs HBT
25 GHz FT, 2 Micron, High Efficiency, High Dynamic Range, Low Noise, High Linearity, Single Supply

Si BiCMOS
25 GHz FT, 0.5 Micron, Low-Cost Process

SiGe BiCMOS
47 GHz FT, Bipolar RF Technology, Excellent for High Levels of RF Integration and High-Performance Rx

GaAs MESFET
20 GHz FT, 0.6 Micron, Low Noise, Excellent for Control Components (Switches and Attenuators)

Si CMOS
0.13 Micron, Low-Cost, Efficient Digital Circuitry

InGaP HBT
30 GHz FT, 2 Micron, High Efficiency, High Dynamic Range, Low Noise, High-Linearity, Single Supply

GaAs pHEMT
30 GHz FT, 0.5 Micron High-Power MMIC Process

GaN HEMT
25 GHz FT, 0.5 Micron High-Power, High-Linearity Process

Optimum Technology Matching® Strategy
RFMD’s success has been driven in part by our deep design expertise in multiple semiconductor process technologies—GaAs HBT, Si BiCMOS, SiGe BiCMOS, GaAs MESFET, Si CMOS as well as our newest processes, InGaP HBT, GaAs pHEMT and GaN HEMT—and our Optimum Technology Matching® (OTM) strategy. Through OTM, RFMD® engineers match the appropriate process technology and device technology to each product according to the best possible combination of price and performance.

For sales or technical support, contact RFMD at 336.678.5570 or sales-support@rfmd.com.
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