

Direct Modulator



High-Performance Modulators for CDMA, WCDMA, TDMA, GSM and EDGE Standards

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.

Features:

- Excellent linearity
- Very low noise floor
- High carrier and sideband suppression
- Supports multiple modulation formats
- Full infrastructure qualification

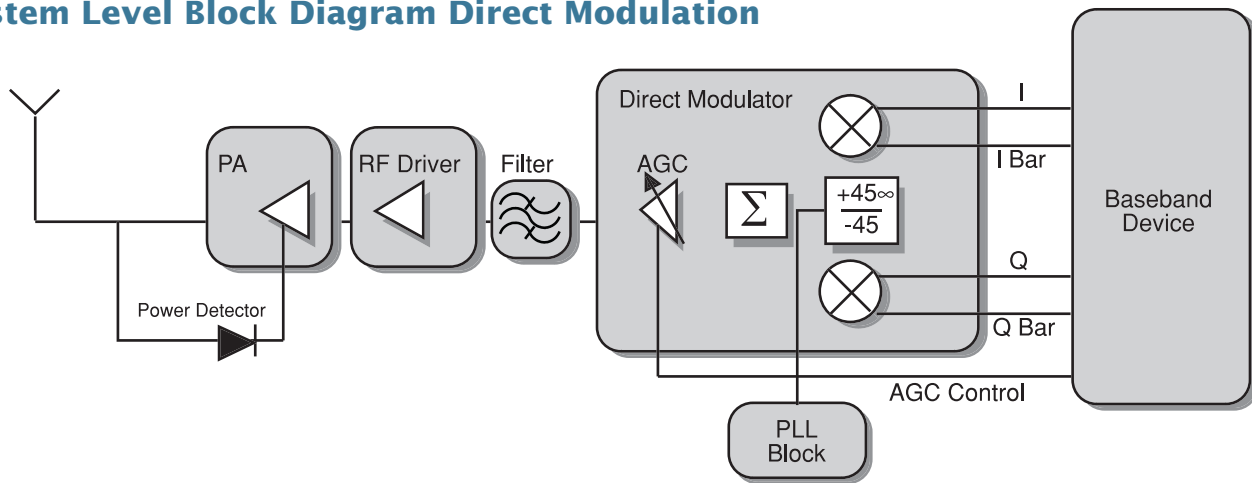
System Benefits:

- Single transmit path
- Reduced filtering
- Simpler frequency planning
- Fewer PLL circuits needed
- Meets all system requirements

Value:

- Reduced system complexity
- Less board space
- Reduced part count
- Smaller and lower cost products

System Level Block Diagram Direct Modulation

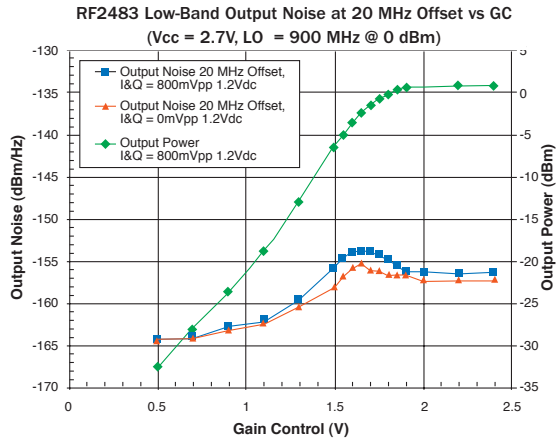
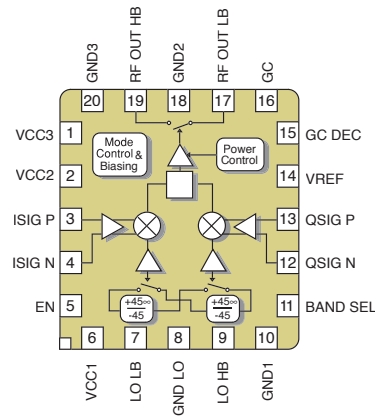


Parameter	Units	RF2483	RF3854*	RF2484	RF2850
Frequency range	(MHz)	700-1000/1700-2200	800-2200	800-2500	1700-2500
Power supply voltage	(V)	2.7 - 3.3	2.7-3.3	5	5
AGC range	(dB)	36/35	90	NA	NA
Output power	(dBm)	0.8/0.4	-14	-13	-14
Out-of-band noise density	(dBm/Hz)	-156/-155	-150	-152.5	-158
Carrier suppression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

*All Measurements are taken at 2.14 GHz

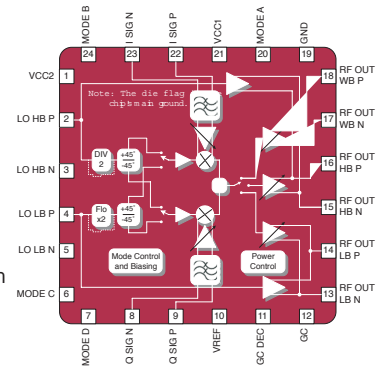
RF2483 Dual-Band Direct Quadrature Modulator

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

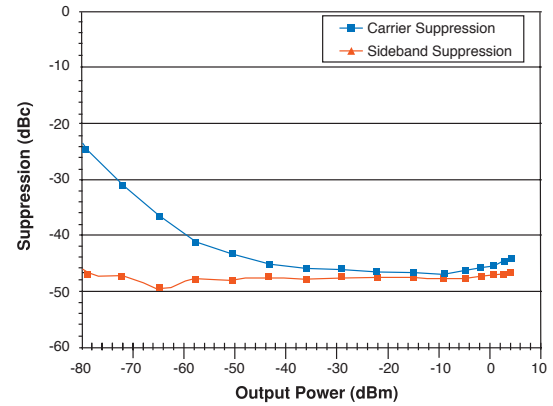


RF3854 Multi-Mode Quad-Band Quadrature Modulator

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

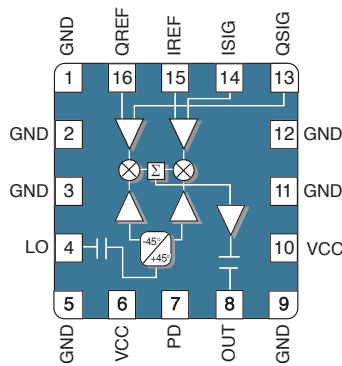


RF3854 WCDMA Carrier and Sideband Suppression vs Output Power
(Vcc = 2.7V, IQ = 1.2 VDC, 800m Vpp Diff @ 100 kHz, LO = 1950 MHz @ -12 dBm)

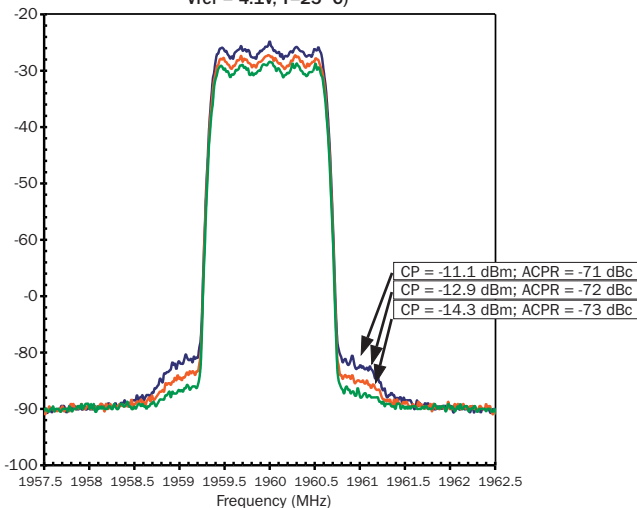


RF2484 Direct Quadrature Modulator

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

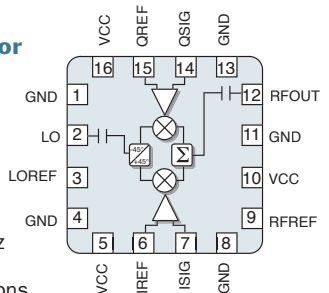


RF2484 PCS CDMA Spectra
At Various Output Levels
(ACPR @ 885 kHz, Vcc = 5.0V, Vref = 4.1V, T=25 °C)

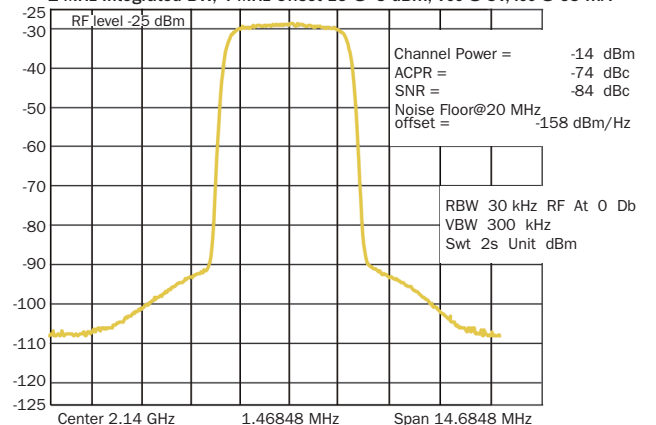


RF2850 Direct Quadrature Modulator

- 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)



RF2850 WCDMA
Single Carrier ACPR Performance Test Model 1, 64 DPCH, ACPR @ 2140 MHz, 1 MHz Integrated BW, 4 MHz Offset LO @ -5 dBm, Vcc @ 5V, Icc @ 65 mA



Optimum Technology Matching®

Power Amplifiers
Transceivers
Chipsets
Front-End Modules
Transmit Modules
Gain Blocks
High Power Amplifiers
Pre-Driver Amplifiers
Low Noise Amplifiers
Modulators
Switches

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.

what's next in RF™



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