freescale™

RF Products

Selector Guide

freescale.com/RF

RF Product Selector Guide

Freescale is the global leader in RF transistors for power amplifiers, the largest provider of RF power solutions for more than 30 years. Freescale offers RF devices for communication and industrial applications serving low power, wireless infrastructure, broadcast, commercial aerospace, mobile radio communication, industrial, scientific and medical (ISM), consumer and commercial cooking and defense markets.

With products ranging from 1.8 mW to 1.25 kW and DC to 6000 MHz, using LDMOS, SIGe, GaAs and GaN technologies, Freescale offers the broadest portfolio of RF power transistors.

High-performing and innovative, Freescale solutions are available to meet today's RF application challenges, including reduction in overall system cost, form factor size reduction and simplified system design. Freescale maintains the highest standards for quality and long term reliability and, as the largest manufacturer of devices, is a proven partner for supply chain security.

Backed by a global support team dedicated to RF power products, reference design hardware and product models, Freescale provides the tools and support required to enable our customers to create market leading designs.

How to Use This Selector Guide

RF low power amplifiers, RF power transistors and RF power amplifier ICs are first divided into major categories by frequency band. And second, within each category, parts are listed by power level.

Applications Assistance

Applications assistance is only a phone call away — call the nearest Freescale Semiconductor Sales office or 1-800-521-6274.

Access Data On-Line

Access semiconductor product data at http://freescale.com or http://freescale.com/RF. Use our web site to access parametric search, part number search, product summary pages, data sheets, selector guide information, application information, design tools, package outlines, on-line technical support and much more.

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Access Data On-Line

Available online are part number search, the product library, documentation library, software and tools library, application sites, product sites, sales and support, training and where to buy at the following URL: http://www.freescale.com.

See the RF Design Resources at http://www.freescale.com/RFpower and http://www.freescale.com/RFlowpower for specific RF product support information for:

- Data sheets
- Applications notes
- Selector guides
- Packaging information
- Application information
- Models
- MTTF calculators
- .s2p Files
- Events
- RF Product Selector

Design Tools and Data Available On-Line for Your Design-in Process

RF High Power Models

Freescale Semiconductor continues to populate its RF High Power Model Library with FET^2, MET and Root models. All product models available in the RF High Power Model Library (FET^2, MET and Root) include package, bond wire and internal matching network effects.

The FET^2 and MET models for RF High Power transistors and RF ICs are nonlinear models that examine both electrical and thermal phenomena and can account for dynamic self-heating effects of device performance. They are specifically tailored to model high power RF transistors and RF ICs used in wireless base station applications.

Implemented in the Keysight Advanced Design System and AWR Microwave Office®, the FET^2 and MET models are capable of performing small-signal, large-signal, harmonic- balance, noise and transient simulations. Because of their ability to simulate self-heating effects, the FET^2 and MET models are more accurate than existing models, enabling circuit designers to predict prototype performance more accurately and reduce design cycle time.

The current release of the FET^2 and MET models are available for these tools:

- Agilent EEsof ADS nonlinear circuit simulator
- AWR Microwave Office

The RF High Power Model Library is available for all major computer platforms supported by these simulators.

For more information and latest releases supported, go to http://www.freescale.com/rf/models.

RF Power Electromigration MTTF Calculation Program

Program Functionality

This MTTF/FIT calculator software is designed to assist our customers in estimating the LDMOS device reliability in terms of electromigration wear-out failures. The program evaluates LDMOS device Mean-Time-To-Failure (MTTF) using Black's Equations. It also estimates the Failures-in-Time (FIT) value at the expected base transceiver system (BTS) life span.

About the Program

This program is designed for estimating LDMOS device electromigration failure rate. According to electromigration theory, there are two wear-out modes for silicon components employing aluminum as a metallization material:

- The formation of an electrically open circuit due to the condensation of vacancies in the aluminum to form voids.
- The growth of etch-pits into silicon by the dissolution of silicon into aluminum (to short out an underlying junction).

The program also estimates the FIT value at the expected base BTS life span. The calculation requires input for the drain voltage, drain currents, case temperature, RF input/output power and expected BTS life.

MTTF Calculator Availability

RF Power MTTF calculators are being added to the Freescale Semiconductor web site for all RF Power LDMOS discrete transistor and IC devices. MTTF calculators are available at http://www.freescale.com/rf/calculators.

RF Low Power

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RF General Purpose Amplifiers

Freescale's portfolio of GPAs combine the right level of gain, linearity, noise and power consumption specifications to meet the industry's most demanding applications. From high gain, small-signal applications found in consumer and commercial to industrial applications, Freescale GPAs provide an excellent solution.

Table 1. General Purpose Amplifiers — InGaP HBT, GaAs HFET, GaAs E-pHEMT

Product	Frequency Band MHz	Supply Voltage (Typ) Volts	Supply Current (Typ) mA	Small Signal Gain (Typ)/Freq. dB/MHz	P1dB (Typ)/Freq. dBm/MHz	3rd Order Output Intercept (Typ)/Freq. dBm/MHz	NF (Typ)/Freq. dB/MHz	θ_{JC} °C/W	Packaging
MMG38151BT1★	0–6000	5	47	17.1/3800	13.4/3800	25/3800	3.5/3800	55	SOT-89
MMG3012NT1	0–6000	5	70	19/900	18.5/900	34/900	3.8/900	85	SOT-89
MMG3015NT1	0–6000	5	95	15.5/900	20.5/900	36/900	5.6/900	41.5	SOT-89
MMG3H21NT1	0–6000	5	90	19.3/900	20.5/900	37/900	5.5/900	38.6	SOT-89
MMH3111NT1	250–4000	5	150	12/900	22.5/900	44/900	3.2/900	37.5	SOT-89
MMG20241HT1	450–3800	5	78	17.8/2655	23.9/2655	38/2655	2.1/2655	57	SOT-89
MMG3003NT1	40–3600	6.2	180	20/900	24/900	40.5/900	4/900	31.6	SOT-89
MMG15241HT1	500–2800	5	85	15.9/2140	24/2140	39.4/2140	1.6/2140	59	SOT-89
MMG3014NT1	40–4000	5	135	19.5/900	25/900	40.5/900	5.7/900	27.4	SOT-89
MMG3004NT1	400–2200	5	250	17/2140	27/2140	44/2140	3.4/2140	23.2	PQFN 5 × 5
MMG20271H9T1	1500–2700	5	215	16/2140	27.5/2140	43.1/2140	1.7/2140	29	SOT-89
MMG3005NT1	800–2200	5	480	15/2140	30/2140	47/2140	5/2140	21.5	PQFN 5 × 5
MMG3006NT1	400–2400	5	850	17.5/900	33/900	49/900	6.6/900	7.8	QFN 4 × 4

★New Product

RF Linear Amplifiers

Table 1. Linear Amplifiers — InGaP HBT

Product	Frequency Band MHz	Supply Voltage (Typ) Volts	Supply Current (Typ) mA	Small Signal Gain (Typ)/Freq. dB/MHz	P1dB (Typ)/Freq. dBm/MHz	3rd Order Output Intercept (Typ)/Freq. dBm/MHz	Packaging
MMZ09312BT1	400–1000	3–5	74	31.5/900	29.6/900	42/900	QFN 3 × 3
MMA20312BVT1	1800–2200	3–5	70	27.2/2140	30.5/2140	44.5/2140	QFN 3 × 3
MMA20312BT1	1800–2200	5	70	27.2/2140	30.5/2140	44.5/2140	QFN 3 × 3
MMA25312BT1	2300–2700	3–5	124	26/2500	31/2500	40/2500	QFN 3 × 3
MMZ25333BT1	1500–2700	5	265	43/2600	32/2600	42.8/2600	QFN 4 × 4
MMZ25332BT1	1500–2800	3–5	390	26.5/2500	33/2500	48/2500	QFN 3 × 3
MMZ25332B4[(2b)]	1500–2800	5	390	26.5/2500	33/2500	48/2500	QFN 4 × 4
MMZ09332B[(2c)]	400–1000	3–5	110	29/900	33/900	48/900	QFN 3 × 3

[(2)]To be introduced: a) 4Q14; b) 1Q15; c) 2Q15; d) 3Q15.

RF Low Noise Amplifiers

Table 1. Low Noise Amplifiers — GaAs E-pHEMT

Product	Frequency Band MHz	Supply Voltage (Typ) Volts	Supply Current (Typ) mA	Small Signal Gain (Typ)/Freq. dB/MHz	P1dB (Typ)/Freq. dBm/MHz	3rd Order Output Intercept (Typ)/Freq. dBm/MHz	NF (Typ)/Freq. dB/MHz	θ_{JC} °C/W	Packaging
MML20211HT1	1400–2800	5	60	18.6/2140	21.3/2140	33/2140	0.65/2140	43.4	DFN 2 × 2
MML09211HT1	400–1400	5	60	21.3/900	22/900	32.6/900	0.52/900	37.5	DFN 2 × 2
MML09212HT1	400–1400	5	150	37.5/900	22.8/900	37/900	0.52/900	37	QFN 3 × 3
MML25231H[2d]	1400–2900	5	60	15/2500	23.5/2500	34.5/2500	0.65/2500	—	DFN 2 × 2
MMG20241HT1★	450–3800	5	78	17.8/2655	23.9/2655	38/2655	2.1/2655	57	SOT-89
MMG15241HT1	500–2800	5	85	15.9/2140	24/2140	39.4/2140	1.6/2140	59	SOT-89
MML20242HT1	1400–2800	5	160	34/1950	24/1950	39.5/1950	0.59/1950	40	QFN 3 × 3
MML09231HT1	700–1400	5	55	17.2/900	24.5/900	37.4/900	0.36/900	77	DFN 2 × 2
MMG20271H9T1	1500–2700	5	215	16/2140	27.5/2140	43.1/2140	1.7/2140	29	SOT-89

Table 2. Low Noise and General Purpose Amplifiers — SiGe BiCMOS

Product	RF Frequency Range MHz	Supply Voltage Range Vdc	Supply Current (Typ) mA	Standby Current (Typ) μA	Small Signal Gain (Typ)/Freq. dB/MHz	Output IP3 (Typ)/Freq. dBm/MHz	NF (Typ)/Freq. dB/MHz	Packaging	System Applicability
MBC13916NT1	100 to 2500	2.1 to 5.0	4.7	—	19/900 11.5/1900	11/900 5.5/1900	1.25/900 2.1/1900	SOT-343R	General Purpose for Smart Metering, RKE, VCOs
MBC13917EP	100 to 2500	2.1 to 3.3	4.7	—	27/434 24/900	10.9/434 12.4/900	2.3/434 1.2/900	MLPD-6	General Purpose for Smart Metering, RKE, VCOs
MBC13720NT1	400 to 2500	2.3 to 3.0	5 Low IP3 11 High IP3	2	20/900 14/1900	22/900 24/1900	1.2/900 1.38/1900	SOT-363	Smart Metering, RKE, TPMS, UHF, ISM, CDMA, PCS
MC13850EP	400 to 2500	2.3 to 3.0	4.7 Low IP3 9.9 High IP3	2	24.1/470 15/1960	16.4/470 24.5/1960	1.33/470 1.75/1960	MLPD-8	Smart Metering, RKE, TPMS, Cellular, UHF, ISM, CDMA, PCS
MC13851EP	1000 to 2500	2.3 to 3.0	3.8	4	18.9/1575 18/1960	15.9/1575 17.1/1960	1.27/1575 1.35/1960	MLPD-8	W-CDMA, PCS, GPS, Cellular, 2400 ISM
MC13852EP	400 to 1000	2.3 to 3.0	4.4	4	19.3/434 18.2/900	7.9/434 13.1/900	1.6/434 1.18/900	MLPD-8	Smart Metering, RKE, Cellular, UHF, ISM, CDMA, PCS

[2]To be introduced: a) 4Q14; b) 1Q15; c) 2Q15; d) 3Q15.

★New Product

RF Control Circuits

Table 1. ADAM (Advanced Doherty Alignment Module)

Advanced Doherty alignment module (ADAM) is an innovative class of highly integrated GaAs MMIC control circuits designed specifically to optimize the performance of today's Doherty amplifiers. When combined with Airfast power transistors, these sophisticated devices improve manufacturing yields and power added efficiency and are available for frequency bands spanning from 700 MHz to 2700 MHz.

Product	Frequency Band MHz	Test Freq. MHz	Insertion Loss dB	Atten. Step Size dB	Atten. Control Range dB	Phase Step Size (°)	Phase Control Range (°)	P_{in} (Max) dBm	IIP3 dBm	Supply Voltage Volts	Supply Current mA	Packaging
MMDS09254H[2c]	700–1000	900	5.5	0.5	7.5	7	49	25	40	5	12	QFN 6 × 6
MMDS20254HT1	1800–2200	2140	5.5	0.5	7.5	7	49	25	40	5	12	QFN 6 × 6
MMDS25254HT1	2300–2700	2650	5.5	0.5	7.5	7	49	25	40	5	12	QFN 6 × 6

Table 2. Digital Step Attenuator

The MMT20303H is an integrated 3-bit attenuator with 1 dB step size, is controlled via a 3-bit parallel interface and operates using a 3 to 5 V supply. This device is suitable for 3G/4G base station and small cell transmitter applications requiring a band of operation across 50–4000 MHz.

Product	Frequency Band MHz	Test Freq. MHz	Insertion Loss dB	Atten. Step Size dB	Atten. Accuracy (Max) dB	Atten. Max. Range dB	P_{in} (Max) dBm	IIP3 dBm	Supply Voltage Volts	Packaging
MMT20303H[2a]	50–4000	900	0.7	1	0.25	7	30	50	3–5	QFN 3 × 3

[2] To be introduced: a) 4Q14; b) 1Q15; c) 2Q15; d) 3Q15.

RF GaAs Linear Power Transistors

Freescale Semiconductor GaAs power transistors are made using an InGaAs pHEMT or HFET epitaxial structure for superior RF efficiency and linearity. The FETs listed in this section are designed for operation in base station infrastructure RF power amplifiers and are grouped according to frequency range and type of application.

Table 1. Linear Transistors — To 5000 MHz — Class AB

Product	Frequency Band[3] MHz		P_{out} (Typ)/Freq Watts/MHz	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ)/Freq. %/MHz	θ_{JC} °C/W	Packaging
MRFG35003N6AT1	U	500–5000	0.45 Avg./ 3550	W-CDMA[4]	6	10/3550	27/3550	5.9	PLD-1.5
MRFG35005ANT1	U	500–5000	0.45 Avg./ 3550	W-CDMA[4]	12	11/3550	26/3550	13.7	PLD-1.5
MRFG35010ANT1	U	500–5000	1 Avg./ 3550	W-CDMA[4]	12	10/3550	25/3550	6.5	PLD-1.5

[3]U = Unmatched; I = Input; I/O = Input/Output.

[4]Peak-to-Average Power Ratio = 8.5 dB.

RF Cellular Infrastructure

Table 1. 450–1000 MHz

Product	Frequency Band[3] MHz		P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
MW6S004NT1	U	1–2000	4 PEP	2-Tone	28	18/1960	33	8.8	PLD-1.5
AFT27S006NT1	U	728–3600	0.76 Avg.	W-CDMA	28	22.5/2170	20.2	3.4	PLD-1.5W
AFT27S010NT1	U	728–3600	1.26 Avg.	W-CDMA	28	21.7/2170	22.6	3.5	PLD-1.5W
MW6S010NR1	U	450–1500	10 PEP	2-Tone	28	18/960	32	2.85	TO-270-2
MW6S010GNR1	U	450–1500	10 PEP	2-Tone	28	18/960	32	2.85	TO-270G-2
MW7IC915NT1	I	865–895	1.6 Avg.	W-CDMA	28	38/880	17.4	3.2	PQFN 8 × 8
A2T08VD020N[2c]	I	728–960	2 Avg.	W-CDMA	48	19.6/940	21.2	—	PQFN 8 × 8
MD8IC925NR1	I/O	728–960	2.5 Avg.	W-CDMA	28	36.2/940	17.4	1.8	TO-270WB-14
MD8IC925GNR1	I/O	728–960	2.5 Avg.	W-CDMA	28	36.2/940	17.4	1.8	TO-270WBG-14
MW7IC930NR1	I/O	920–960	3.2 Avg.	W-CDMA	28	35.9/940	16.5	1.6	TO-270WBL-16
MW7IC930GNR1	I/O	920–960	3.2 Avg.	W-CDMA	28	35.9/940	16.5	1.6	TO-270WBLG-16
MW7IC930NBR1	I/O	920–960	3.2 Avg.	W-CDMA	28	35.9/940	16.5	1.6	TO-272WB-16
A2I08H040N[2d]	I	728–960	4 Avg.	W-CDMA	28	30.4/940	47.4	—	TO-270WB-15
A2I08H040GN[2d]	I	728–960	4 Avg.	W-CDMA	28	30.4/940	47.4	—	TO-270WBG-15
MRF8S7120NR3	I/O	728–768	32 Avg.	W-CDMA	28	19.2/768	38.1	0.65	OM-780-2L
MRF8S7170NR3	I/O	728–768	50 Avg.	W-CDMA	28	19.5/748	37	0.37	OM-780-2L
MRF8S7235NR3	I/O	728–768	63 Avg.	W-CDMA	28	20/728	36.1	0.33	OM-780-2L
MRF8P8300HR6	I/O	790–820	96 Avg.	W-CDMA	28	20.9/820	35.7	0.26	NI-1230H-4S
MRF8P8300HSR6	I/O	790–820	96 Avg.	W-CDMA	28	20.9/820	35.7	0.26	NI-1230S-4S
MRFE6S9045NR1	U	865–895	10 Avg.	N-CDMA	28	22.1/880	32	1.1	TO-270-2
MRFE6S9060NR1	U	865–895	14 Avg.	N-CDMA	28	21.4/880	32.1	0.88	TO-270-2
MRFE6S9125NR1	I	865–895	27 Avg.	N-CDMA	28	20.2/880	31	0.45	TO-270WB-4
MRFE6S9125NBR1	I	865–895	27 Avg.	N-CDMA	28	20.2/880	31	0.45	TO-272WB-4
MD8IC970NR1	I/O	850–940	35 Avg.	2-Tone	28	32.6/940	42.1	0.6	TO-270WBL-16
MD8IC970GNR1	I/O	850–940	35 Avg.	2-Tone	28	32.6/940	42.1	0.6	TO-270WBLG-16
MRF8P9040NR1	I	728–960	4 Avg.	W-CDMA	28	19.9/960	19.1	1.5	TO-270WB-4
MRF8P9040GNR1	I	728–960	4 Avg.	W-CDMA	28	19.9/960	19.1	1.5	TO-270WBG-4
MRFE6S9046GNR1	I/O	920–960	35.5 CW	CW	28	19/960	57	1.3	TO-270WBG-4
MWE6IC9080NBR1	I/O	865–960	80 CW	CW	28	28.5/960	52.3	0.52	TO-272WB-14
MRF5S9080NBR1	I	869–960	80 CW	CW	26	18.5/960	60	0.5	TO-272WB-4
MWE6IC9100NBR1	I	869-960	100 CW	CW	26	33.5/960	54	0.38	TO-272WB-14
MRF8S9100HSR3	I	920–960	72 CW	CW	28	19.3/920	51.6	0.65	NI-780S-2L
MRF8S9102NR3	I/O	865–960	28 Avg.	W-CDMA	28	23.1/920	36.4	0.63	OM-780-2L
MRF8S9120NR3	I/O	865–960	33 Avg.	W-CDMA	28	19.8/960	34.2	0.62	OM-780-2L
A2T07D160W04SR3★	I/O	716–960	30 Avg.	W-CDMA	28	21.5/803	48.5	0.63	NI-780S-4L
MRFE6S9160HSR3	I	865–960	35 Avg.	N-CDMA	28	21/880	31	0.33	NI-780S-2L
MRF8S9170NR3	I/O	920–960	50 Avg.	W-CDMA	28	19.3/920	36.5	0.38	OM-780-2L
AFT09S200W02NR3	I/O	716–960	56 Avg.	W-CDMA	28	19.2/960	36.5	0.35	OM-780-2L
AFT09S200W02GNR3	I/O	716–960	56 Avg.	W-CDMA	28	19.2/960	36.5	0.35	OM-780G-2L
AFT09S200W02SR3★	I/O	920–960	56 Avg.	W-CDMA	28	19.4/960	35.6	0.34	NI-780S-2L
MRF8S9200NR3	I/O	920–960	58 Avg.	W-CDMA	28	19.9/940	37.1	0.30	OM-780-2L
MRF8S9202GNR3	I/O	865–960	58 Avg.	W-CDMA	28	19.0/920	36.3	0.31	OM-780G-2L
MRF8P9210NR3	I/O	920–960	63 Avg.	W-CDMA	28	16.7/960	47.4	0.53	OM-780-4L
AFT09S220-02N[2c]	I/O	850–960	54 Avg.	W-CDMA	28	19.5/960	36.4	—	OM-780-2L
AFT09S220-02GN[2c]	I/O	850–960	54 Avg.	W-CDMA	28	19.5/960	36.4	—	OM-780G-2L
MRF8S9220HSR3	I/O	920–960	65 Avg.	W-CDMA	28	19.4/960	35.7	0.39	NI-780S-2L
MRF8S9232NR3	I/O	865–960	63 Avg.	W-CDMA	28	18.1/960	36.3	0.27	OM-780-2L
A2T09VD250N[2d]	I	716–960	65 Avg.	W-CDMA	48	22.6/920	35.1	—	TO-270WB-6A
MRF8S9260HSR3	I/O	920–960	75 Avg.	W-CDMA	28	18.6/960	38.5	0.37	NI-880S-2L
AFT09S282NR3	I/O	720–960	80 Avg.	W-CDMA	28	20/960	36.1	0.31	OM-780-2L
A2T09VD300N[2d]	I	716–960	79 Avg.	W-CDMA	48	21.3/920	34.4	—	TO-270WB-6A
MRF8P9300HSR6	I/O	920–960	100 Avg.	W-CDMA	28	19.4/960	35.8	0.22	NI-1230S-4S

[2]To be introduced: a) 4Q14; b) 1Q15; c) 2Q15; d) 3Q15.

[3]U = Unmatched; I = Input; I/O = Input/Output.

★New Product

Table 1. 450–1000 MHz (continued)

Product	Frequency Band[3] MHz		P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
A2T07H310-24SR6★	I/O	716–960	47 Avg.	W-CDMA	28	18.6/880	51.3	0.36	NI-1230S-4L2L
AFT09H310-03SR6	I/O	920–960	56 Avg.	W-CDMA	28	17.9/920	47.4	0.41	NI-1230S-4S
AFT09H310-04GSR6	I/O	920–960	56 Avg.	W-CDMA	28	17.9/920	47.4	0.41	NI-1230GS-4L
AFV09P350-04NR3	I/O	720–960	100 Avg.	W-CDMA	48	19.5/920	48.5	0.45	OM-780-4L
AFV09P350-04GNR3	I/O	720–960	100 Avg.	W-CDMA	48	19.5/920	48.5	0.45	OM-780G-4L

Table 2. 1500–2200 MHz

Product	Frequency Band[3] MHz		P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
MW6S004NT1	U	1–2000	4 PEP	2-Tone	28	18/1960	33	8.8	PLD-1.5
MW6S010NR1	U	450–1500	10 PEP	2-Tone	28	18/960	32	2.85	TO-270-2
MW6S010GNR1	U	450–1500	10 PEP	2-Tone	28	18/960	32	2.85	TO-270G-2
MRF6S20010NR1	I	1600–2200	10 PEP	2-Tone	28	15.5/2170	36	5.9	TO-270-2
MRF6S20010GNR1	I	1600–2200	10 PEP	2-Tone	28	15.5/2170	36	5.9	TO-270G-2
MD7IC1812NR1★	I/O	1805–2170	1.3 Avg.	W-CDMA	28	31.5/1880	14	2.9	TO-270WB-14
MD7IC1812GNR1★	I/O	1805–2170	1.3 Avg.	W-CDMA	28	31.5/1880	14	2.9	TO-270WBG-14
MD7IC2012NR1	I/O	1805–2170	1.3 Avg.	W-CDMA	28	31.5/2170	14.9	3.1	TO-270WB-14
MD7IC2012GNR1	I/O	1805–2170	1.3 Avg.	W-CDMA	28	31.5/2170	14.9	3.1	TO-270WBG-14
AFT20S015NR1	I	1805–2700	1.5 Avg.	W-CDMA	28	17.6/2170	22	4.2	TO-270-2
AFT20S015GNR1	I	1805–2700	1.5 Avg.	W-CDMA	28	17.6/2170	22	4.2	TO-270G-2
MW7IC2020NT1	I/O	1805–2170	2.4 Avg.	W-CDMA	28	32.6/2140	17	1.9	PQFN 8 × 8
MW7IC2220NR1	I/O	2110–2170	2 Avg.	W-CDMA	28	31/2170	13	1.5	TO-270WB-16
MW7IC2220GNR1	I/O	2110–2170	2 Avg.	W-CDMA	28	31/2170	13	1.5	TO-270WBG-16
MW7IC2220NBR1	I/O	2110–2170	2 Avg.	W-CDMA	28	31/2170	13	1.5	TO-272WB-16
MW7IC2040NR1	I/O	1930–1990	4 Avg.	W-CDMA	28	32/1930	17.5	1.5	TO-270WBL-16
MW7IC2040NBR1	I/O	1930–1990	4 Avg.	W-CDMA	28	32/1930	17.5	1.5	TO-272WB-16
MW7IC2240NR1	I/O	2110–2170	4 Avg.	W-CDMA	28	30/2110	14	1.3	TO-270WB-16
MW7IC2240GNR1	I/O	2110–2170	4 Avg.	W-CDMA	28	30/2110	14	1.3	TO-270WBG-16
MW6IC1940NBR1	I/O	1920–2000	4.5 Avg.	W-CDMA	28	28.5/1920	13.5	1.2	TO-272WB-16
A2I22D050NR1★	I	1800–2200	5.3 Avg.	W-CDMA	28	32.6/2170	17.9	1.1	TO-270WB-15
A2I22D050GNR1★	I	1800–2200	5.3 Avg.	W-CDMA	28	32.6/2170	17.9	1.1	TO-270WBG-15
MD7IC2250NR1	I/O	2110–2170	5.3 Avg.	W-CDMA	28	31.1/2170	16.8	1.1	TO-270WB-14
MD7IC2250GNR1	I/O	2110–2170	5.3 Avg.	W-CDMA	28	31.1/2170	16.8	1.1	TO-270WBG-14
MD7IC2250NBR1	I/O	2110–2170	5.3 Avg.	W-CDMA	28	31.1/2170	16.8	1.1	TO-272WB-14
MD7IC2251NR1	I/O	2110–2170	12 Avg.	W-CDMA	28	29.0/2140	37.9	1.5	TO-270WB-14
MD7IC2251GNR1	I/O	2110–2170	12 Avg.	W-CDMA	28	29.0/2140	37.9	1.5	TO-270WBG-14
MRF8S18120HSR3	I/O	1805–1880	72 CW	CW	28	18.2/1805	49.8	0.47	NI-780S-2L
A2T18H160-24S[2d]	I/O	1805–1880	37 Avg.	W-CDMA	28	17.6/1805	54	—	NI-780S-4L2L
A2T18H160-24GS[2d]	I/O	1805–1880	37 Avg.	W-CDMA	28	17.6/1805	54	—	NI-780GS-4L2L
A2T18S162W31S[2c]	I/O	1805–1880	32 Avg.	W-CDMA	28	20.1/1840	33.9	0.36	NI-780S-2L2LA
A2T18S162W31GS[2c]	I/O	1805–1880	32 Avg.	W-CDMA	28	20.1/1840	33.9	0.36	NI-780GS-2L2LA
AFT18S230-12N[2b]	I/O	1805–1880	50 Avg.	W-CDMA	28	19/1880	32	0.41	OM-780-2L2L
AFT18S230SR3	I/O	1805–1880	50 Avg.	W-CDMA	28	19.0/1880	32.0	0.41	NI-780S-2L4S
MRF8S18260HSR6	I/O	1805–1880	74 Avg.	W-CDMA	30	17.9/1805	31.6	0.27	NI-1230S-4S4S
AFT18P350-4S2LR6	I/O	1805–1880	63 Avg.	W-CDMA	28	16.1/1805	44.5	0.39	NI-1230S-4L2L
A2T18H450W19S[2c]	I/O	1805–1880	89 Avg.	W-CDMA	30	16.5/1880	46	—	NI-1230S-4S4S
MRF8P20161HSR3	I/O	1880–1920	37 Avg.	W-CDMA	28	16.4/1920	45.8	0.76	NI-780S-4L
MRF7S19100NR1	I/O	1930–1990	29 Avg.	W-CDMA	28	17.5/1990	30	0.68	TO-270WB-4
MRF6S19140HSR3	I/O	1930–1990	29 Avg.	N-CDMA	28	16/1990	27.5	0.38	NI-880S-2L
MRF7S19170HSR3	I/O	1930–1990	50 Avg.	W-CDMA	28	17.2/1990	32	0.31	NI-880S-2L
MRF7S19210HSR3	I/O	1930–1990	63 Avg.	W-CDMA	28	20/1990	29	0.38	NI-780S-2L

[2]To be introduced: a) 4Q14; b) 1Q15; c) 2Q15; d) 3Q15.

[3]U = Unmatched; I = Input; I/O = Input/Output.

★New Product

Table 2. 1500–2200 MHz (continued)

Product	Frequency Band[3]	MHz	P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
A2T18H100-25SR3★	I/O	1805–1995	18 Avg.	W-CDMA	28	18.1/1805	50.2	0.74	NI-780S-4L4S
A2T18S160W31SR3★	I/O	1805–1995	32 Avg.	W-CDMA	28	19.9/1880	31.6	0.36	NI-780S-2L2LA
A2T18S160W31GSR3★	I/O	1805–1995	32 Avg.	W-CDMA	28	19.9/1880	31.6	0.36	NI-780GS-2L2LA
MRF8P20165WHR3	I/O	1930–1995	37 Avg.	W-CDMA	28	16.3/1995	46.0	0.79	NI-780H-4L
AFT18S260W31SR3★	I/O	1805–1995	50 Avg.	W-CDMA	28	19.8/1880	29.3	0.32	NI-780S-2L2LA
AFT18S260W31GSR3★	I/O	1805–1995	50 Avg.	W-CDMA	28	19.8/1880	29.3	0.32	NI-780GS-2L2LA
MRF8S18210WHSR3	I/O	1805–1995	50 Avg.	W-CDMA	30	17.8/1930	29.2	0.48	NI-880XS-2L
MRF8S18210WGHSR3	I/O	1805–1995	50 Avg.	W-CDMA	30	17.8/1930	29.2	0.48	NI-880XGS-2L
AFT18S290-13SR3	I/O	1805–1995	63 Avg.	W-CDMA	28	18.2/1960	31.2	0.42	NI-880XS-2L4S
AFT18HW355SR6	I/O	1805–1995	63 Avg.	W-CDMA	28	15.2/1880	48.3	0.47	NI-1230S-4S
AFT18H356-24SR6	I/O	1805–1995	63 Avg.	W-CDMA	28	15/1880	46.7	0.47	NI-1230S-4L2L
AFT18H357-24NR6★	I/O	1805–1995	63 Avg.	W-CDMA	28	17.5/1805	48.7	0.23	OM-1230-4L2L
AFT18H357-24SR6	I/O	1805–1995	63 Avg.	W–CDMA	28	17.3/1805	50.3	0.43	NI-1230S-4L2L
A2T18H410-24SR6★	I/O	1805–1995	71 Avg.	W-CDMA	28	17.4/1805	51.2	0.24	NI-1230S-4L2L
AFT20P140-4WNR3	I/O	1880–2025	24 Avg.	W-CDMA	28	17.6/2025	41.2	0.60	OM-780-4L
AFT20P140-4WGNR3	I/O	1880–2025	24 Avg.	W-CDMA	28	17.6/2025	41.2	0.60	OM-780G-4L
MRF6S18060NR1	I/O	1805–2000	60 CW	CW	26	15/1990	50	0.81	TO-270WB-4
MRF8P20100HSR3	I/O	1805–2025	20 Avg.	W-CDMA	28	16/2025	44.3	0.72	NI-780S-4L
MRF8P20140WHR3	I/O	1880–2025	24 Avg.	W-CDMA	28	15.9/2025	42.0	0.68	NI-780H-4L
MRF8P20140WHSR3	I/O	1880–2025	24 Avg.	W-CDMA	28	15.9/2025	42.0	0.68	NI-780S-4L
MRF8P20140WGHSR3	I/O	1880–2025	24 Avg.	W-CDMA	28	15.9/2025	42.0	0.68	NI-780GS-4L
MRF8P20160HR3	I/O	1880–2025	37 Avg.	W-CDMA	28	16.5/1920	45.8	0.75	NI-780H-4L
MRF8P20160HSR3	I/O	1880–2025	37 Avg.	W-CDMA	28	16.5/1920	45.8	0.75	NI-780S-4L
A2T20H330W24SR6★	I/O	1880–2025	58 Avg.	W-CDMA	28	16.5/1880	50.9	0.25	NI-1230S-4L2L
MRF7P20040HSR3	I/O	2010–2025	10 Avg.	W-CDMA	32	18.2/2025	42.6	2.11	NI-780S-4L
AFT20P060-4NR3	I/O	1805–2170	6.3 Avg.	W-CDMA	28	18.9/2170	20	0.56	OM-780-4L
AFT20P060-4GNR3	I/O	1805–2170	6.3 Avg.	W-CDMA	28	18.9/2170	20	0.56	OM-780G-4L
MRF7S21080HSR3	I/O	2110–2170	22 Avg.	W-CDMA	28	18/2170	32	0.65	NI-780S-2L
MRF8HP21080HR3	I/O	2110–2170	16 Avg.	W-CDMA	28	14.4/2170	45.7	1.0	NI-780H-4L
MRF8HP21080HSR3	I/O	2110–2170	16 Avg.	W-CDMA	28	14.4/2170	45.7	1.0	NI-780S-4L
A2T21H100-25S[2a]	I/O	2110–2170	18 Avg.	W-CDMA	28	17.4/2170	50.5	0.76	NI-780S-4L4S
MRF8S21100HSR3	I/O	2110–2170	24 Avg.	W-CDMA	28	18.3/2170	33.4	0.48	NI-780S-2L
MRF8S21120HSR3	I/O	2110–2170	28 Avg.	W-CDMA	28	17.6/2170	34	0.53	NI-780S-2L
AFT21S140W02SR3	I/O	2110–2170	32 Avg.	W-CDMA	28	19.3/2140	33.5	0.59	NI-780S-2L
AFT21S140W02GSR3	I/O	2110–2170	32 Avg.	W-CDMA	28	19.3/2140	33.5	0.59	NI-780GS-2L
MRF7S21150HSR3	I/O	2110–2170	44 Avg.	W-CDMA	28	17.5/2110	31	0.37	NI-780S-2L
A2G22S160-01SR3★	I	1800–2200	32 Avg.	W-CDMA	48	19.6/2110	38	1.7	NI-400S-2S
MRF8S21200HSR6	I/O	2110–2170	48 Avg.	W-CDMA	28	18.1/2140	32.6	0.31	NI-1230S-4S
AFT21S220W02SR3	I/O	2110–2170	50 Avg.	W–CDMA	28	19.1/2140	29.3	0.56	NI-780S-2L
AFT21S220W02GSR3	I/O	2110–2170	50 Avg.	W-CDMA	28	19.1/2140	29.3	0.56	NI-780GS-2L
AFT21S230SR3	I/O	2110–2170	50 Avg.	W-CDMA	28	16.7/2110	30.5	0.43	NI-780S-2L4S
AFT21S230-12SR3	I/O	2110–2170	50 Avg.	W-CDMA	28	16.7/2110	30.5	0.43	NI-780S-2L2L
AFT21S232SR3	I/O	2110–2170	50 Avg.	W-CDMA	28	16.7/2110	30.5	0.43	NI-780S-2L
AFT21S240-12SR3	I/O	2110–2170	55 Avg.	W-CDMA	28	20.4/2170	33.9	0.35	NI-880XS-2L2L
AFT21H350W03SR6	I/O	2110–2170	63 Avg.	W-CDMA	28	16.4/2110	47.1	0.49	NI-1230S-4S
AFT21H350W04GSR6	I/O	2110–2170	63 Avg.	W-CDMA	28	16.4/2110	47.1	0.49	NI-1230GS-4L
A2T21H360-24SR6★	I/O	2110–2170	63 Avg.	W-CDMA	28	16.2/2140	51.8	0.33	NI-1230S-4L2L
A2T21H450W19S[2c]	I/O	2110–2180	89 Avg.	W-CDMA	30	15.9/2180	44.8	—	NI-1230S-4S4S

[2]To be introduced: a) 4Q14; b) 1Q15; c) 2Q15; d) 3Q15.

[3]U = Unmatched; I = Input; I/O = Input/Output.

★New Product

Table 3. 2300–3800 MHz

Product	Frequency Band[3]	MHz	P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
AFT27S006NT1	U	728–3600	0.76 Avg.	W-CDMA	28	22.5/2170	20.2	3.4	PLD-1.5W
AFT27S010NT1	U	728–3600	1.26 Avg.	W-CDMA	28	21.7/2170	22.6	3.5	PLD-1.5W
A2I25D012NR1★	I	2300–2690	2.2 Avg.	W-CDMA	28	33.2/2690	19.8	3.3	TO-270WB-15
A2I25D012GNR1★	I	2300–2690	2.2 Avg.	W-CDMA	28	33.2/2690	19.8	3.3	TO-270WBG-15
AFT20S015NR1	I	1805–2690	1.5 Avg.	W-CDMA	28	17.6/2170	22	4.2	TO-270-2
AFT20S015GNR1	I	1805–2690	1.5 Avg.	W-CDMA	28	17.6/2170	22	4.2	TO-270G-2
MRF6S27015NR1	I	2300–2700	3 Avg.	W-CDMA	28	14/2600	22	2.2	TO-270-2
A2I25D025NR1★	I	2100–2900	3.2 Avg.	W-CDMA	28	32.5/2600	20	1.8	TO-270WB-17
A2I25D025GNR1★	I	2100–2900	3.2 Avg.	W-CDMA	28	32.5/2600	20	1.8	TO-270WBG-17
MW7IC2725NR1	I/O	2500–2700	4 Avg.	WiMAX	28	28.5/2700	17	1.4	TO-270WB-16
MW7IC2725GNR1	I/O	2500–2700	4 Avg.	WiMAX	28	28.5/2700	17	1.4	TO-270WBG-16
MD7IC2755NR1	I/O	2500–2700	10 Avg.	WiMAX	28	25/2700	25	1.8	TO-270WB-14
MD7IC2755GNR1	I/O	2500–2700	10 Avg.	WiMAX	28	25/2700	25	1.8	TO-270WBG-14
A2I25H060N[2d]	I	2300-2690	10.5 Avg.	W-CDMA	28	27/2690	40.1	—	TO-270WB-17
A2I25H060GN[2d]	I	2300-2690	10.5 Avg.	W-CDMA	28	27/2690	40.1	—	TO-270WBG-17
MRF8P23080HSR3	I/O	2300–2400	16 Avg.	W-CDMA	28	14.6/2300	42	0.89	NI-780S-4L
A2T23H160-24S[2d]	I/O	2300-2400	28 Avg.	W-CDMA	28	17.3/2300	49.4	—	NI-780S-4L2L
A2T23H160-24GS[2d]	I/O	2300-2400	28 Avg.	W-CDMA	28	17.3/2300	49.4	—	NI-780GS-4L2L
AFT23H160-25S[2b]	I/O	2300-2400	32 Avg.	W-CDMA	28	16.9/2350	46.4	0.40	NI-880XS-4L4S
AFT23S160W02SR3	I/O	2300–2400	45 Avg.	W-CDMA	28	17.9/2400	30.3	0.53	NI-780S-2L
AFT23S160W02GSR3	I/O	2300–2400	45 Avg.	W–CDMA	28	17.9/2400	30.3	0.53	NI-780GS-2L
MRF8P23160WHSR3	I/O	2300–2400	30 Avg.	W-CDMA	28	14.1/2320	36.5	0.69	NI-780S-4L
AFT23S170-13SR3	I/O	2300–2400	45 Avg.	W-CDMA	28	18.8/2400	33.9	0.42	NI-780S-2L4S
AFT23H200-4S2LR6	I/O	2300–2400	45 Avg.	W-CDMA	28	15.3/2300	42.8	0.32	NI-1230S-4L2L
A2T23H300-24S[2c]	I/O	2300-2400	66 Avg.	W-CDMA	28	14.9/2300	46.7	0.25	NI-1230S-4L2L
AFT26HW050SR3	I/O	2496–2690	9 Avg.	W-CDMA	28	14.2/2690	47.1	0.75	NI-780S-4L4S
AFT26HW050GSR3	I/O	2496–2690	9 Avg.	W-CDMA	28	14.2/2690	47.1	0.75	NI-780GS-4L4L
AFT26H050W26SR3	I/O	2496–2690	9 Avg.	W-CDMA	28	14.2/2690	47.1	0.75	NI-780S-4L4L
AFT26P100-4WSR3	I/O	2496–2690	22 Avg.	W-CDMA	28	15.3/2690	43.9	0.60	NI-780S-4L
AFT26P100-4WGSR3	I/O	2496–2690	22 Avg.	W-CDMA	28	15.3/2690	43.9	0.60	NI-780GS-4L
A2T26H160-24SR3★	I/O	2496–2690	28 Avg.	W-CDMA	28	16.4/2690	48.1	0.56	NI-780S-4L2L
AFT26H160-4S4R3	I/O	2496–2690	32 Avg.	W-CDMA	28	14.9/2496	45.7	0.41	NI-880XS-4L4S
AFT26H200W03SR6	I/O	2496–2690	45 Avg.	W-CDMA	28	14.1/2496	45.2	0.46	NI-1230S-4S
AFT26H250-24SR6	I/O	2496–2690	50 Avg.	W-CDMA	28	14.1/2496	44.6	0.42	NI-1230S-4L2L
AFT26H250W03SR6	I/O	2496–2690	50 Avg.	W-CDMA	28	14.1/2496	44.6	0.42	NI-1230S-4S
A2T26H300-24S[2c]	I/O	2496-2690	60 Avg.	W-CDMA	28	14.9/2496	42.5	—	NI-1230S-4L2L
MRF8P26080HSR3	I/O	2500–2700	14 Avg.	W-CDMA	28	15.0/2620	36.9	0.88	NI-780S-4L
MRF7S27130HSR3	I/O	2500–2700	23 Avg.	WiMAX	28	16.5/2700	20	0.36	NI-780S-2L

[2]To be introduced: a) 4Q14; b) 1Q15; c) 2Q15; d) 3Q15.

[3]U = Unmatched; I = Input; I/O = Input/Output.

★New Product

RF Mobile Radio

Designed for broadband VHF and UHF commercial and industrial applications. The high gain and broadband performance of these devices make them ideal for large–signal, common–source amplifier applications in 13.6, 12.5 or 7.5 V mobile, portable and base station operation.

Table 1. Professional Mobile Radio — To 1000 MHz — Class AB

Product	Frequency Band[3] MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
AFIC901N[2d]	I/O	1.8–1000	1 CW	CW	7.5	31.6/520	74	—	QFN 4 × 4
AFT05MS003N[2c]	U	1.8–941	3 CW	CW	7.5	20.8/520	68.3	—	SOT-89
MRF1513NT1	U	To 520	3 CW	CW	7.5/12.5	15/520	65	4.0	PLD-1.5
AFT05MS004NT1★	U	To 941	4 CW	CW	7.5	20.9/520	74.9	4.4	SOT-89
AFT05MS006NT1★	U	To 941	6 CW	CW	7.5	18.3/520	73	1	PLD-1.5W
AFT09MS007NT1★	U	To 941	7 CW	CW	7.5	15.2/870	71	1.1	PLD-1.5W
MRF1511NT1	U	To 175	8 CW	CW	7.5	13/175	70	2.0	PLD-1.5
MRF1517NT1	U	To 520	8 CW	CW	7.5	14/520	70	2.0	PLD-1.5
MRF1518NT1	U	To 520	8 CW	CW	12.5	13/520	60	2.0	PLD-1.5
AFT09MS015NT1★	U	To 941	16 CW	CW	12.5	17.2/941	77	1.0	PLD-1.5W
AFT05MS031NR1	U	To 520	31 CW	CW	13.6/12.5	17.7/520	71.0	0.67	TO-270-2
AFT05MS031GNR1	U	To 520	31 CW	CW	13.6/12.5	17.7/520	71.0	0.67	TO-270G-2
AFT09MS031NR1	U	To 941	31 CW	CW	13.6/12.5	17.2/870	71.0	0.63	TO-270-2
AFT09MS031GNR1	U	To 941	31 CW	CW	13.6/12.5	17.2/870	71.0	0.63	TO-270G-2
MRF1535NT1	U	To 520	35 CW	CW	12.5	13.5/520	55	0.90	TO-272-6 Wrap
MRF1535FNT1	U	To 520	35 CW	CW	12.5	13.5/520	55	0.90	TO-272-6
MRF1550NT1	U	To 175	50 CW	CW	12.5	14.5/175	55	0.50	TO-272-6 Wrap
MRF1550FNT1	U	To 175	50 CW	CW	12.5	14.5/175	55	0.50	TO-272-6
AFT09MP055NR1	U	764–941	55 CW	CW	12.5	17.5/870	69	0.32	TO-270WB-4
AFT09MP055GNR1	U	764–941	55 CW	CW	12.5	17.5/870	69	0.32	TO-270WBG-4
MRF1570NT1	U	To 470	70 CW	CW	12.5	11.5/470	60	0.29	TO-272-8 Wrap
MRF1570FNT1	U	To 470	70 CW	CW	12.5	11.5/470	60	0.29	TO-272-8
AFT05MP075NR1	U	To 520	70 CW	CW	12.5	18.5/520	68.5	0.29	TO-270WB-4
AFT05MP075GNR1	U	To 520	70 CW	CW	12.5	18.5/520	68.5	0.29	TO-270WBG-4
MD8IC970NR1	I/O	850–940	35 Avg.	2-Tone	28	32.6/940	42.1	0.6	TO-270WBL-16
MD8IC970GNR1	I/O	850–940	35 Avg.	2-Tone	28	32.6/940	42.1	0.6	TO-270WBLG-16

[2]To be introduced: a) 4Q14; b) 1Q15; c) 2Q15; d) 3Q15.

[3]U = Unmatched; I = Input; I/O = Input/Output.

★New Product

RF Industrial, Scientific and Medical

Table 1. ISM — To 600 MHz — Class AB

Product	Frequency Band[3] MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
MRF6VP11KHR5	U	To 150	1000 Peak	Pulse	50	26/130	71	0.03	NI-1230H-4S
MRF6VP11KGSR5	U	To 150	1000 Peak	Pulse	50	26/130	71	0.03	NI-1230GS-4L
MRF6VP21KHR5	U	To 235	1000 Peak	Pulse	50	24/235	67.5	0.03	NI-1230H-4S
MRF6VP41KHR5	U	To 450	1000 Peak	Pulse	50	20/450	64	0.03	NI-1230H-4S
MRF6VP41KHSR5	U	To 450	1000 Peak	Pulse	50	20/450	64	0.03	NI-1230S-4S
MRF6V2010NR1	U	To 450	10 CW	CW	50	23.9/220	62	3.0	TO-270-2
MRFE6VS25NR1	U	To 2000	25 CW	CW	50	25.5/512	75.0	1.2	TO-270-2
MRFE6VS25GNR1	U	To 2000	25 CW	CW	50	25.5/512	75.0	1.2	TO-270G-2
MRFE6VS25LR5	U	To 2000	25 CW	CW	50	25.9/512	74.0	1.4	NI-360H-2L
MRFE6VP100HR5	U	To 2000	100 CW	CW	50	27.2/512	70.0	0.38	NI-780H-4L
MRFE6VP100HSR5	U	To 2000	100 CW	CW	50	27.2/512	70.0	0.38	NI-780S-4L
MRF6V2150NR1	U	To 450	150 CW	CW	50	25/220	68.3	0.24	TO-270WB-4
MRF6V2150NBR1	U	To 450	150 CW	CW	50	25/220	68.3	0.24	TO-272WB-4
MRFE6VP5150NR1	U	To 600	150 CW	CW	50	26.3/230	72	0.21	TO-270WB-4
MRFE6VP5150GNR1	U	To 600	150 CW	CW	50	26.3/230	72	0.21	TO-270WBG-4
MRF6V2300NR1	U	To 600	300 CW	CW	50	25.5/220	68	0.24	TO-270WB-4
MRF6V2300NBR1	U	To 600	300 CW	CW	50	25.5/220	68	0.24	TO-272WB-4
MRF6V4300NR1	U	To 600	300 CW	CW	50	22/450	60	0.24	TO-270WB-4
MRF6V4300NBR1	U	To 600	300 CW	CW	50	22/450	60	0.24	TO-272WB-4
MRFE6VP5300NR1	U	To 600	300 CW	CW	50	25/230	70	0.22	TO-270WB-4
MRFE6VP5300GNR1	U	To 600	300 CW	CW	50	25/230	70	0.22	TO-270WBG-4
MRF6VP2600HR6	U	To 500	125 Avg.	OFDM	50	25/225	28.5	0.20	NI-1230H-4S
MRFE6VP6300HR3	U	To 600	300 CW	CW	50	25/130	80	0.19	NI-780H-4L
MRFE6VP6300HSR5	U	To 600	300 CW	CW	50	25/130	80	0.19	NI-780S-4L
MRFE6VP6300GSR5	U	To 600	300 CW	CW	50	25/130	80	0.19	NI-1230GS-4L
MRFE6VP5600HR6	U	To 600	600 CW	CW	50	24.6/230	75.2	0.12	NI-1230H-4S
MRFE6VP5600HSR5	U	To 600	600 CW	CW	50	24.6/230	75.2	0.12	NI-1230S-4S
MRFE6VP6600NR3★	U	1.8–600	600 CW	CW	50	24/98	81	—	OM-780-4L
MRFE6VP6600GNR3★	U	1.8–600	600 CW	CW	50	24/98	81	—	OM-780G-4L
MRFE6VP61K25NR6★	U	To 600	1250 CW	CW	50	22.5/230	72.3	0.06	OM-1230-4L
MRFE6VP61K25GNR6★	U	To 600	1250 CW	CW	50	22.5/230	72.3	0.06	OM-1230G-4L
MRFE6VP61K25HR5	U	To 600	1250 CW	CW	50	22.9/230	74.6	0.15	NI-1230H-4S
MRFE6VP61K25HR6	U	To 600	1250 CW	CW	50	22.9/230	74.6	0.15	NI-1230H-4S
MRFE6VP61K25HSR5	U	To 600	1250 CW	CW	50	22.9/230	74.6	0.15	NI-1230S-4S
MRFE6VP61K25GSR5	U	To 600	1250 CW	CW	50	22.9/230	74.6	0.15	NI-1230GS-4L

Table 2. ISM Band — 2450 MHz

Product	Frequency Band[3] MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
MW7IC2425GNR1	I/O	2450	25 CW	CW	28	27.7/2450	43.8	1.2	TO-270WBG-16
MW7IC2425NBR1	I/O	2450	25 CW	CW	28	27.7/2450	43.8	1.2	TO-272WB-16
MRF6S24140HSR3	I/O	2450	140 CW	CW	28	13.2/2450	45	0.29	NI-880S-2L
MRF6P24190HR6	I/O	2450	190 CW	CW	28	13.2/2450	46.2	0.22	NI-1230H-4S
MRF7S24250NR3★	I/O	2400–2500	250 CW	CW	32	15.9/2450	59	0.26	OM-780-2L
MRF8VP13350NR3★	I	700–1300	350 CW	CW	50	20.7/915	67.5	0.04	OM-780-4L
MRF8VP13350GNR3★	I	700–1300	350 CW	CW	50	20.7/915	67.5	0.04	OM-780G-4L

[3]U = Unmatched; I = Input; I/O = Input/Output.

★New Product

RF Broadcast

Table 1. HF/VHF/UHF Broadcast — To 860 MHz — Class AB

Product	Frequency Band [3] MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
MW6S004NT1	U	To 2000	4 PEP	2-Tone	28	18/1960	33	8.8	PLD-1.5
MW6S010NR1	U	450–1500	10 PEP	2-Tone	28	18/960	32	2.85	TO-270-2
MW6S010GNR1	U	450–1500	10 PEP	2-Tone	28	18/960	32	2.85	TO-270G-2
MRFE6VS25NR1	U	To 2000	25 CW	CW	50	25.5/512	75.0	1.2	TO-270-2
MRFE6VS25GNR1	U	To 2000	25 CW	CW	50	25.5/512	75.0	1.2	TO-270G-2
MRFE6VS25LR5	U	To 2000	25 CW	CW	50	25.9/512	74.0	1.4	NI-360H-2L
MRFE6S9045NR1	U	To 880	10 Avg.	N-CDMA	28	22.1/880	32	1.1	TO-270-2
MRFE6S9060NR1	U	To 880	14 Avg.	N-CDMA	28	21.4/880	32.1	0.88	TO-270-2
MRF6V3090NR1	I	470–860	18 Avg.	OFDM	50	22/860	28.5	0.79	TO-270WB-4
MRF6V3090NR5	I	470–860	18 Avg.	OFDM	50	22/860	28.5	0.79	TO-270WB-4
MRF6V3090NBR1	I	470–860	18 Avg.	OFDM	50	22/860	28.5	0.79	TO-272WB-4
MRF6V3090NBR5	I	470–860	18 Avg.	OFDM	50	22/860	28.5	0.79	TO-272WB-4
MRF6VP3091NR1	I	470–860	18 Avg.	OFDM	50	22/860	28.5	0.79	TO-270WB-4
MRF6VP3091NBR1	I	470–860	18 Avg.	OFDM	50	22/860	28.5	0.79	TO-272WB-4
MRFE6VP100HR5	U	To 2000	100 CW	CW	50	27.2/512	70.0	0.38	NI-780H-4L
MRFE6VP100HSR5	U	To 2000	100 CW	CW	50	27.2/512	70.0	0.38	NI-780S-4L
MRFE6P3300HR3	I/O	470–860	270 PEP	2-Tone	32	20.4/860	44.8	0.23	NI-860C
MRF6VP3450HR6	I	470–860	90 Avg.	OFDM	50	22.5/860	28	0.27	NI-1230H-4S
MRF6VP3450HR5	I	470–860	90 Avg.	OFDM	50	22.5/860	28	0.27	NI-1230H-4S
MRF6VP3450HSR5	I	470–860	90 Avg.	OFDM	50	22.5/860	28	0.27	NI-1230S-4S
MRFE6VP8600HR5	I	470–860	125 Avg.	OFDM	50	19.3/860	30	0.19	NI-1230H-4S
MRFE6VP8600HSR5	I	470–860	125 Avg.	OFDM	50	19.3/860	30	0.19	NI-1230S-4S
MRFE8VP8600HR5[2a]	I	470–860	140 Avg.	OFDM	50	20/810	34	0.16	NI-1230H-4S

[2] To be introduced: a) 4Q14; b) 1Q15; c) 2Q15; d) 3Q15.

[3] U = Unmatched; I = Input; I/O = Input/Output.

RF Commercial Aerospace

Table 1. Commercial Aerospace — L-Band — 960-1500 MHz — Class AB

Product	Frequency Band[3] MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
MRF6V10010NR4	I/O	960–1400	10 Peak	Pulse	50	25/1090	69	1.6	PLD-1.5
MRFE6VS25NR1	U	To 2000	25 CW	CW	50	25.5/512	75.0	1.2	TO-270-2
MRFE6VS25GNR1	U	To 2000	25 CW	CW	50	25.5/512	75.0	1.2	TO-270G-2
MRFE6VS25LR5	U	To 2000	25 CW	CW	50	25.9/512	74.0	1.4	NI-360H-2L
MRFE6VP100HR5	U	To 2000	100 CW	CW	50	27.2/512	70.0	0.38	NI-780H-4L
MRFE6VP100HSR5	U	To 2000	100 CW	CW	50	27.2/512	70.0	0.38	NI-780S-4L
AFIC10275NR1★	I	978–1090	250 Peak	Pulse	50	32.6/978	61	0.15	TO-270WB-14
AFIC10275GNR1★	I	978–1090	250 Peak	Pulse	50	32.6/978	61	0.15	TO-270WBG-14
MRF6V13250HR5	I/O	1300	250 Peak	Pulse	50	22.7/1300	57.0	0.07	NI-780H-2L
MRF6V13250HSR5	I/O	1300	250 Peak	Pulse	50	22.7/1300	57.0	0.07	NI-780S-2L
MRF6V12250HR5	I/O	960–1215	275 Peak	Pulse	50	20.3/1030	65.5	0.08	NI-780H-2L
MRF6V12250HSR5	I/O	960–1215	275 Peak	Pulse	50	20.3/1030	65.5	0.08	NI-780S-2L
MRF6V14300HR5	I/O	1200–1400	330 Peak	Pulse	50	18/1400	60.5	0.13	NI-780H-2L
MRF6V14300HSR5	I/O	1200–1400	330 Peak	Pulse	50	18/1400	60.5	0.13	NI-780S-2L
MRF6V12500HR5	I/O	965–1215	500 Peak	Pulse	50	19.7/1400	62	0.044	NI-780H-2L
MRF6V12500HSR5	I/O	965–1215	500 Peak	Pulse	50	19.7/1400	62	0.044	NI-780S-2L
MRF6VP121KHR5	I	965–1215	1000 Peak	Pulse	50	20/1030	56	0.02	NI-1230H-4S
MRF6VP121KHSR5	I	965–1215	1000 Peak	Pulse	50	20/1030	56	0.02	NI-1230S-4S
AFV121KH[2d]	U	960–1215	1100 Peak	Pulse	50	17.3/1090	51	—	NI-1230H-4S
AFV121KHS[2d]	U	960–1215	1100 Peak	Pulse	50	17.3/1090	51	—	NI-1230S-4S
AFV121KGS[2d]	U	960–1215	1100 Peak	Pulse	50	17.3/1090	51	—	NI-1230GS-4L

Table 2. Commercial Aerospace S-Band — 3100-3500 MHz — Class AB

Product	Frequency Band[3] MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
MRF8P29300HR6	I/O	2700–2900	320 Peak	Pulse	30	13.3/2900	50.5	0.06	NI-1230H-4S
MRF8P29300HSR6	I/O	2700–2900	320 Peak	Pulse	30	13.3/2900	50.5	0.06	NI-1230S-4S

[2]To be introduced: a) 4Q14; b) 1Q15; c) 2Q15; d) 3Q15.

[3]U = Unmatched; I = Input; I/O = Input/Output.

★New Product

RF Cooking

Freescale is leading a transformation from legacy RF power vacuum device-based systems to long-lasting solid-state transistor-based systems for a wide variety of consumer and commercial cooking applications.

Freescale solid-state solutions provide clean, efficient, controllable RF energy while minimizing equipment maintenance and downtime.

Table 1. RF Cooking — To 1000 MHz

Product	Frequency Band[3] MHz		P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
MHT1002NR3★	I	915	357 CW	CW	48	20.7/915	66.9	0.24	OM-780-4L
MHT1002GNR3★	I	915	357 CW	CW	48	20.7/915	66.9	0.24	OM-780G-4L
MHT2001N[2d]	I	915	175 CW	CW	50	74/915	64.8	0.6	TO-270WB-14

Table 2. RF Cooking — 2450 MHz

Product	Frequency Band[3] MHz		P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
MHT1000HR5	I/O	2400–2500	140 CW	CW	28	13.2/2450	45	0.29	NI-880H-2L
MHT1001HR5	I/O	2400–2500	190 CW	CW	28	13.2/2450	46.2	0.22	NI-1230H-4S
MHT1003NR3★	I/O	2400–2500	250 CW	CW	32	15.9/2450	59	0.26	OM-780-2L
MHE1003N[2d]	I/O	2400–2500	220 CW	CW	26	13.5/2450	65	—	OM-780-2L
MHT1006NT1	U	728–2700	10 CW	CW	28	19.8/2400	55.1	3.7	PLD-1.5W
MHT1008N[1]	U	2400–2500	12.5 CW	CW	26	17.1/2450	56.9	—	PLD-1.5W
MHT2000NR1	I/O	2400–2500	25 CW	CW	28	27.7/2450	43.8	1.2	TO-270WB-16
MHT2000GNR1	I/O	2400–2500	25 CW	CW	28	27.7/2450	43.8	1.2	TO-270WBG-16

[1]Product under development.

[2]To be introduced: a) 4Q14; b) 1Q15; c) 2Q15; d) 3Q15.

[3]U = Unmatched; I = Input; I/O = Input/Output.

★New Product

RF Military

Freescale RF GaN and LDMOS technologies are ideally suited for military applications such as battlefield communications, primary radar covering HF, VHF, UHF, L-Band, S-Band, and avionics (such as IFF transponders) and electronic warfare jamming. The high power and high-gain performance of these devices make them ideal for common-source amplifier applications under demanding conditions.

Table 1. General Purpose Driver ICs

Product	Frequency Band[3] MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
MMRF2005NR1★	I/O	728–960	3.2 Avg.	W-CDMA	28	35.9/940	16.5	1.6	TO-270WB-16
MMRF2005GNR1★	I/O	728–960	3.2 Avg.	W-CDMA	28	35.9/940	16.5	1.6	TO-270WBG-16
MMRF2006NT1	I	1805–2170	20 Avg.	W-CDMA	28	32.6/2140	50	1.9	PQFN 8 × 8
MMRF2004NBR1	I/O	2500–2700	25 Avg.	WiMAX	28	28.5/2700	36	1.4	TO-272WB-16
MMRF2007NR1★	I/O	136–940	35 Avg.	2-Tone	28	32.6/940	42.1	0.6	TO-270WBL-16
MMRF2007GNR1★	I/O	136–940	35 Avg.	2-Tone	28	32.6/940	42.1	0.6	TO-270WBLG-16

Table 2. General Purpose Driver Transistors

Product	Frequency Band[3] MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
28 Volt LDMOS									
MMRF1014NT1	U	1–2000	4 Avg.	2-Tone	28	18/1960	43	8.8	PLD-1.5
MMRF1015NR1	U	450–1500	10 Avg.	2-Tone	28	18/960	40	2.85	TO-270-2
MMRF1015GNR1	U	450–1500	10 Avg.	2-Tone	28	18/960	40	2.85	TO-270G-2
MMRF1004NR1	I	2110–2170	10 PEP	2-Tone	28	15.5/2170	36	2.3	TO-270-2
MMRF1004GNR1	I	2110–2170	10 PEP	2-Tone	28	15.5/2170	36	2.3	TO-270G-2
MMRF1315NR1★	I/O	500–1000	60 CW	CW	28	20/960	63	0.77	TO-270-2
MMRF1017NR3	I/O	720–960	80 Avg.	W-CDMA	28	20.0/960	36.1	0.31	OM-780-2L
50 Volt LDMOS									
MMRF1012NR1	U	10–450	10 CW	CW	50	23.9/220	62	3	TO-270-2
MMRF1304LR5	U	To 2000	25 Peak	Pulse	50	25.9/512	74	1.4	NI-360-2
MMRF1304NR1	U	To 2000	25 CW	CW	50	25.5/512	74.7	1.2	TO-270-2
MMRF1304GNR1	U	To 2000	25 CW	CW	50	25.5/512	74.7	1.2	TO-270G-2
MMRF1305HR5	U	To 2000	100 CW	CW	50	27.2/512	70	0.38	NI-780H-4L
MMRF1305HSR5	U	To 2000	100 CW	CW	50	27.2/512	70	0.38	NI-780S-4L
MMRF1316NR1★	I/O	1.8–600	300 CW	CW	50	25/230	70	0.22	TO-270WB-4
MMRF1318NR1★	U	10–600	300 CW	CW	50	22/450	60	0.24	TO-270WB-4

[3]U = Unmatched; I = Input; I/O = Input/Output.

★New Product

Table 3. Radar

Product	Frequency Band[3] MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
HF, VHF and UHF Radar									
MMRF1012NR1	U	10–450	10 CW	CW	50	23.9/220	62	3	TO-270-2
MMRF1304LR5	U	To 2000	25 Peak	Pulse	50	25.9/512	74	1.4	NI-360-2
MMRF1304NR1	U	To 2000	25 CW	CW	50	25.5/512	74.7	1.2	TO-270-2
MMRF1304GNR1	U	To 2000	25 CW	CW	50	25.5/512	74.7	1.2	TO-270G-2
MMRF1315NR1★	I/O	500–1000	60 CW	CW	28	20/960	63	0.77	TO-270-2
MMRF1305HR5	U	To 2000	100 CW	CW	50	27.2/512	70	0.38	NI-780H-4L
MMRF1305HSR5	U	To 2000	100 CW	CW	50	27.2/512	70	0.38	NI-780S-4L
MMRF1020-04NR3	I	720–960	100 Avg.	W-CDMA	48	19.5/920	48.5[5]	0.45	OM-780-4L
MMRF1020-04GNR3	I	720–961	100 Avg.	W-CDMA	48	19.5/920	48.5[5]	0.45	OM-780G-4L
MMRF1311H[2c]	I	470-860	140 Avg.	OFDM	50	20/810	34	0.16	NI-1230H-4S
MMRF1310HR5	U	To 600	300 CW	CW	50	25.0/300	80.0	0.19	NI-780H-4L
MMRF1310HSR5	U	To 600	300 CW	CW	50	25.0/300	80.0	0.19	NI-780S-4L
MMRF1316NR1★	I/O	1.8–600	300 CW	CW	50	25/230	70	0.22	TO-270WB-4
MMRF1318NR1★	U	10–600	300 CW	CW	50	22/450	60	0.24	TO-270WB-4
MMRF1016HR5	U	To 500	600 Peak	OFDM	50	25/225	59	0.2	NI-1230H-4S
MMRF1308HR5	U	To 600	600 CW	CW	50	24.6/230	75.2	0.12	NI-1230H-4S
MMRF1308HSR5	U	To 600	600 CW	CW	50	24.6/230	75.2	0.12	NI-1230S-4S
MMRF1006HR5	U	10–500	1000 Peak	Pulse	50	20/450	64	0.03	NI-1230H-4S
MMRF1006HSR5	U	10–500	1000 Peak	Pulse	50	20/450	64	0.03	NI-1230S-4S
MMRF1306HR5	U	1.8–600	1250 CW	CW	50	22.9/230	74.6	0.15	NI-1230H-4S
MMRF1306HSR5	U	1.8–600	1250 CW	CW	50	22.9/230	74.6	0.15	NI-1230S-4S
L-Band Radar									
MMRF1019NR4	I/O	960–1400	10 Peak	Pulse	50	25/1090	69	1.6	PLD-1.5
MMRF1304LR5	U	To 2000	25 Peak	Pulse	50	25.9/512	74	1.4	NI-360-2
MMRF1304NR1	U	To 2000	25 CW	CW	50	25.5/512	74.7	1.2	TO-270-2
MMRF1304GNR1	U	To 2000	25 CW	CW	50	25.5/512	74.7	1.2	TO-270G-2
MMRF1305HR5	U	To 2000	100 CW	CW	50	27.2/512	70	0.38	NI-780H-4L
MMRF1305HSR5	U	To 2000	100 CW	CW	50	27.2/512	70	0.38	NI-780S-4L
MMRF1005HR5	I	1300	250 Peak	Pulse	50	22.7/1300	57.0	0.07	NI-780H-2L
MMRF1005HSR5	I	1300	250 Peak	Pulse	50	22.7/1300	57.0	0.07	NI-780S-2L
MMRF1008HR5	I/O	960–1215	275 Peak	Pulse	50	20.3/1030	65.5	0.08	NI-780H-2L
MMRF1008HSR5	I/O	960–1215	275 Peak	Pulse	50	20.3/1030	65.5	0.08	NI-780S-2L
MMRF1011HR5	I/O	1400	330 Peak	Pulse	50	18/1400	60.5	0.13	NI-780H-2L
MMRF1011HSR5	I/O	1400	330 Peak	Pulse	50	18/1400	60.5	0.13	NI-780S-2L
MMRF1009HR5	I/O	960–1215	500 Peak	Pulse	50	19.7/1030	62.0	0.044	NI-780H-2L
MMRF1009HSR5	I/O	960–1215	500 Peak	Pulse	50	19.7/1030	62.0	0.044	NI-780S-2L
MMRF1007HR5	I	965–1215	1000 Peak	Pulse	50	20/1030	56	0.02	NI-1230H-4S
MMRF1007HSR5	I	965–1215	1000 Peak	Pulse	50	20/1030	56	0.02	NI-1230S-4S
MMRF1317H[2d]	U	1030-1090	1500 Peak	Pulse	50	18/1030	56	—	NI-1230H-4S
MMRF1317HS[2d]	U	1030-1090	1500 Peak	Pulse	50	18/1030	56	—	NI-1230S-4S
S-Band Radar									
MMRF1013HR5	I/O	2700–2900	320 Peak	Pulse	30	13.3/2900	50.5	0.06	NI-1230H-4S
MMRF1013HSR5	I/O	2700–2900	320 Peak	Pulse	30	13.3/2900	50.5	0.06	NI-1230S-4S

[2]To be introduced: a) 4Q14; b) 1Q15; c) 2Q15; d) 3Q15.

[3]U = Unmatched; I = Input; I/O = Input/Output.

[5]In Doherty circuit.

★New Product

RF Military (continued)

Table 4. Radio Communications

Product	Frequency Band[3] MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	Eff. (Typ) %	θ_{JC} °C/W	Packaging
28 Volt GaN									
MMRF5011N[2d]	I	1–3000	10 CW	CW	28	13/2500	40	—	OM-270-8
50 Volt GaN									
MMRF5014HR5★	I	1–2700	125 CW	CW	50	16/2500	64.2	0.86	NI-360H-2SB
MMRF5015N[2c]	I	1–2700	125 CW	CW	50	16/2500	58	—	OM-270-2
7.5 Volt LDMOS									
MMRF1021NT1	U	136–941	7 CW	CW	7.5	15.2/870	71	1.1	PLD-1.5W
28 Volt LDMOS									
MMRF1024HS[2c]	I/O	2496–2690	50 Avg.	W-CDMA	28	14.4/2590	44.9	0.42	NI-1230S-4L2L
MMRF1022HS[2c]	I/O	2110–2170	63 Avg.	W-CDMA	28	16.2/2140	51.8	0.33	NI-1230S-4L2L
MMRF1023HS[2c]	I/O	2300–2400	69 Avg.	W-CDMA	28	16.9/2350	47	0.25	NI-1230S-4L2L
MMRF1315NR1★	I/O	500–1000	60 CW	CW	28	20/960	63	0.77	TO-270-2
50 Volt LDMOS — 1–600 MHz									
MMRF1012NR1	U	10–450	10 CW	CW	50	23.9/220	62	3	TO-270-2
MMRF1304LR5	U	To 2000	25 Peak	Pulse	50	25.9/512	74	1.4	NI-360-2
MMRF1304NR1	U	To 2000	25 CW	CW	50	25.5/512	74.7	1.2	TO-270-2
MMRF1304GNR1	U	To 2000	25 CW	CW	50	25.5/512	74.7	1.2	TO-270G-2
MMRF1310HR5	U	To 600	300 CW	CW	50	25.0/300	80.0	0.19	NI-780H-4L
MMRF1310HSR5	U	To 600	300 CW	CW	50	25.0/300	80.0	0.19	NI-780S-4L
MMRF1318NR1★	U	10–600	300 CW	CW	50	22/450	60	0.24	TO-270WB-4
MMRF1016HR5	U	To 500	600 Peak	OFDM	50	25/225	59	0.2	NI-1230H-4S
MMRF1308HR5	U	To 600	600 CW	CW	50	24.6/230	75.2	0.12	NI-1230H-4S
MMRF1308HSR5	U	To 600	600 CW	CW	50	24.6/230	75.2	0.12	NI-1230S-4S
MMRF1306HR5	U	1.8–600	1250 CW	CW	50	22.9/230	74.6	0.15	NI-1230H-4S
MMRF1306HSR5	U	1.8–600	1250 CW	CW	50	22.9/230	74.6	0.15	NI-1230S-4S
50 Volt LDMOS — 450–2000 MHz									
MMRF1304LR5	U	To 2000	25 Peak	Pulse	50	25.9/512	74	1.4	NI-360-2
MMRF1304NR1	U	To 2000	25 CW	CW	50	25.5/512	74.7	1.2	TO-270-2
MMRF1304GNR1	U	To 2000	25 CW	CW	50	25.5/512	74.7	1.2	TO-270G-2
MMRF1018NR1	I	470–860	90 CW	CW	50	22.0/860	57	0.79	TO-270WB-4
MMRF1018NBR1	I	470–860	90 CW	CW	50	22.0/860	57	0.79	TO-272WB-4
MMRF1305HR5	U	To 2000	100 CW	CW	50	27.2/512	70	0.38	NI-780H-4L
MMRF1305HSR5	U	To 2000	100 CW	CW	50	27.2/512	70	0.38	NI-780S-4L
MMRF1020-04NR3	I	720–960	100 Avg.	W-CDMA	48	19.5/920	48.5[5]	0.45	OM-780-4L
MMRF1020-04GNR3	I	720–961	100 Avg.	W-CDMA	48	19.5/920	48.5[5]	0.45	OM-780G-4L

[2]To be introduced: a) 4Q14; b) 1Q15; c) 2Q15; d) 3Q15.

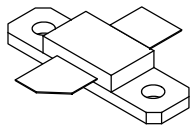
[3]U = Unmatched; I = Input; I/O = Input/Output.

[5]In Doherty circuit.

★New Product

RF Packages

AIR CAVITY PACKAGES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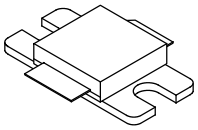
NI-360H-2SB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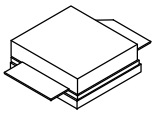
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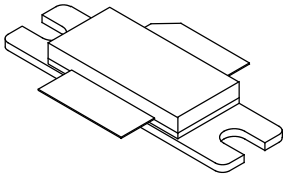
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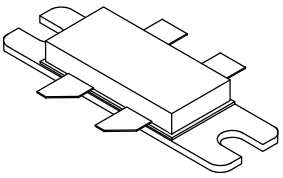
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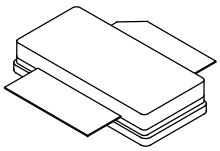
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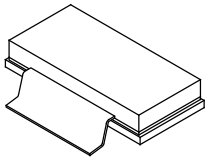
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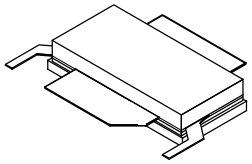
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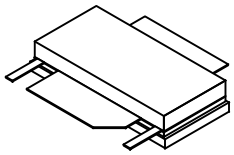
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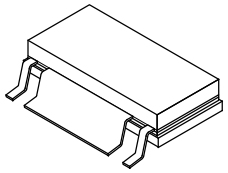
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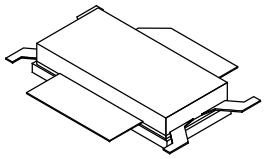
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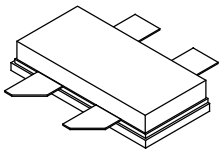
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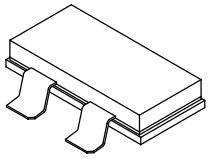
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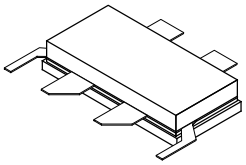
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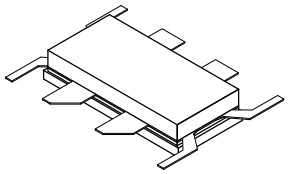
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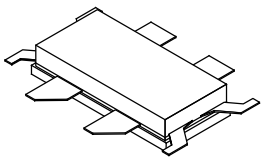
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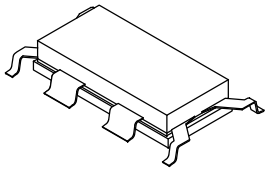
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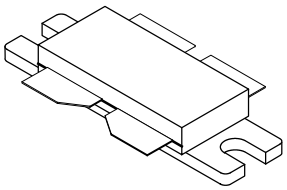
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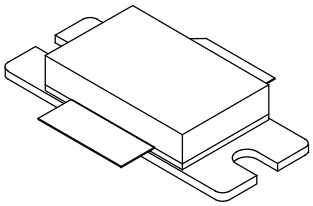
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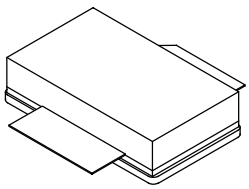
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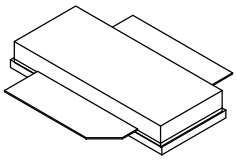
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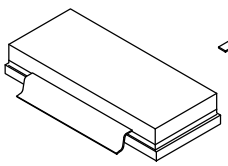
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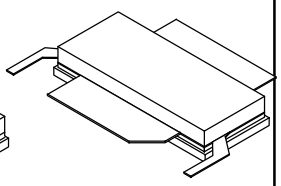
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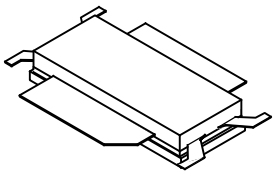
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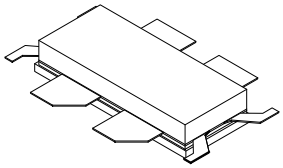
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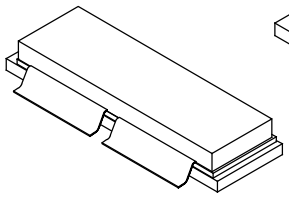
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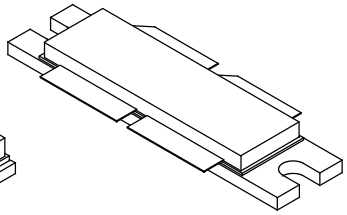
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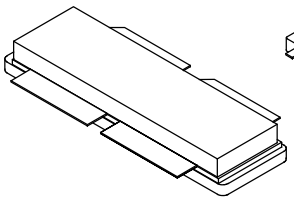
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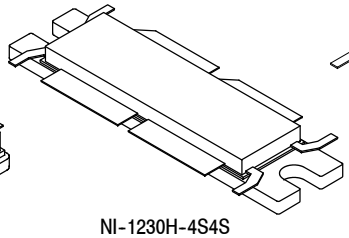
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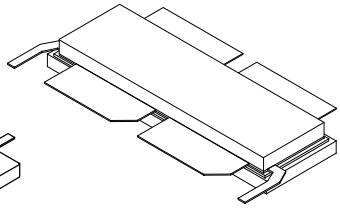
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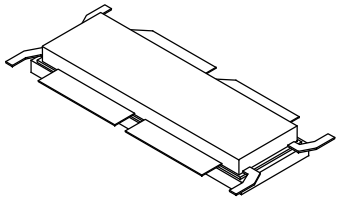
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Not to scale unless otherwise indicated.

OVER-MOLDED PLASTIC PACKAGES


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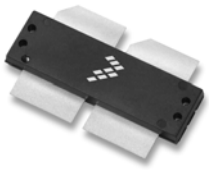
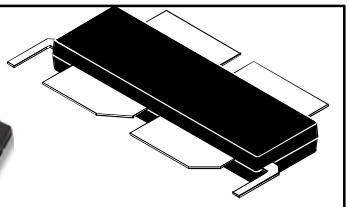
DFN 2 × 2


SCALE 2:1
MLPD-6


SCALE 2:1
MLPD-8


OM-1230-4L


OM-1230G-4L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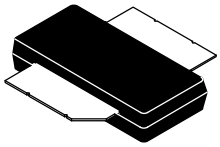
OM-270-2


OM-270-8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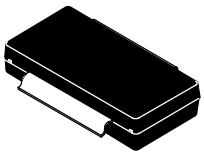
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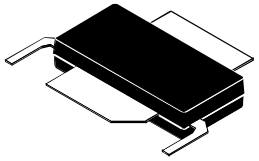
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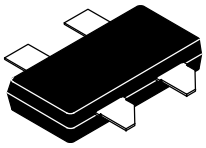
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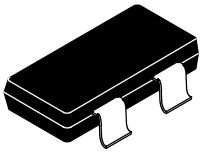
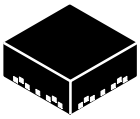

OM-780G-4L


PLD-1.5


PLD-1.5W


PQFN 8 × 8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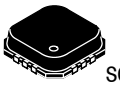
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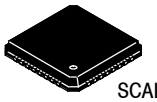
SCALE 2:1
QFN 4 × 4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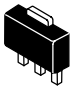
SCALE 3:1
SOT-343R


SCALE 3:1
SOT-363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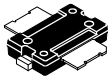
SOT-89
(98ASA00241D)


SCALE 2:1
SOT-89
(98ASA10586D)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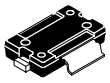
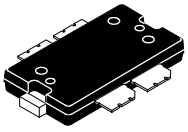
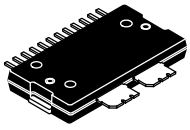

TO-270G-2


TO-270WB-4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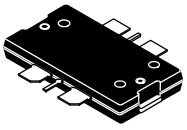
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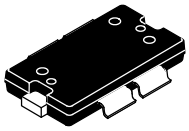
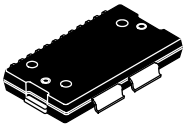

TO-270WB-14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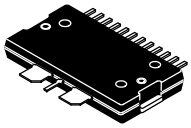
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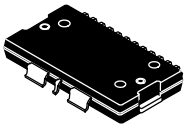
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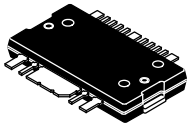
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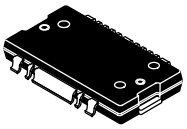
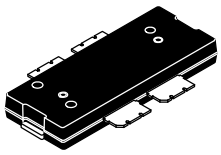

TO-270WBG-16


TO-270WB-17


TO-270WBG-17

Not to scale unless otherwise indicated.

OVER-MOLDED PLASTIC PACKAGES (continued)



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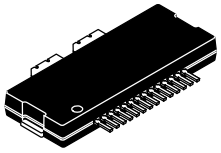

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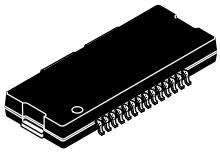

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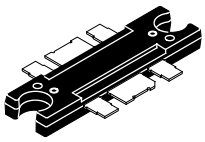
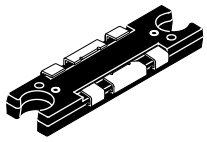
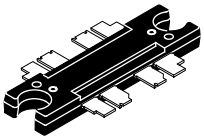


TO-272-6



TO-272-6 Wrap



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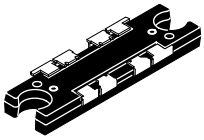
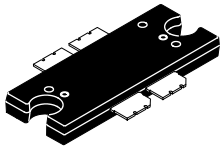


TO-272-8 Wrap



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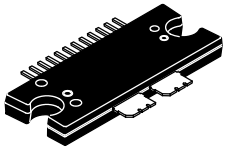

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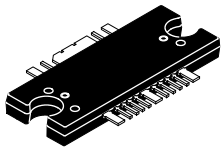

TO-272WB-16

SCALE 1:1

RF Tape and Reel Specifications

RF EMBOSSED TAPE AND REEL ORDERING INFORMATION

Package	Tape Width (mm)	Pitch mm (inch)	Reel Size mm (inch)	Devices Per Reel and Minimum Order Quantity	Device Suffix
DFN 2 × 2	12	8.0 ± 0.1 (.315 ± .004)	178 (7)	1,000	T1
NI-400H-2S	32	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI-400S-2S	32	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI-780H-2L	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI-780S-2L	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI-780GS-2L	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI-780H-4L	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI-780S-4L	32	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
NI-780GS-4L	32	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
NI-780S-2L2L	44	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
NI-780S-2L2LA	44	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
NI-780GS-2L2LA	44	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
NI-780S-2L4S	44	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
NI-780S-4L4L	44	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
NI-780GS-4L4L	44	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
NI-780S-4L4S	44	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
NI-860	56 56	28.0 ± 0.1 (1.10 ± .004) 28.0 ± 0.1 (1.10 ± .004)	330 (13) 330 (13)	250 50	R3 R5
NI-880H-2L	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI-880S-2L	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI-880XS-2L	56	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
NI-880XGS-2L	56	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
NI-880XS-2L4S	56	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
NI-880XS-4L4S	56	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
NI-1230H-4S	56 56	32.0 ± 0.1 (1.26 ± .004) 32.0 ± 0.1 (1.26 ± .004)	330 (13) 330 (13)	150 50	R6 R5
NI-1230S-4S	56 56	32.0 ± 0.1 (1.26 ± .004) 32.0 ± 0.1 (1.26 ± .004)	330 (13) 330 (13)	150 50	R6 R5
NI-1230S-4L2L	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	150	R6
NI-1230GS-4L	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	150	R6
NI-1230H-4S4S	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	150	R6
NI-1230S-4S4S	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	150	R6
OM-780-2L	32	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
OM-780G-2L	32	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
OM-780-4L	32	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
OM-780G-4L	32	28.0 ± 0.1 (1.10 ± .004)	330 (13)	250	R3
PLD-1.5	16 16	8.0 ± 0.1 (.315 ± .004) 8.0 ± 0.1 (.315 ± .004)	330 (7) 330 (7)	1,000 100	T1 R4
PLD-1.5W	16 16	8.0 ± 0.1 (.315 ± .004) 8.0 ± 0.1 (.315 ± .004)	330 (7) 330 (7)	1,000 100	T1 R4
PQFN 5 × 5	16	8.0 ± 0.1 (.315 ± .004)	330 (13)	1,000	T1
PQFN 8 × 8	16	12.0 ± 0.1 (.472 ± .004)	330 (13)	1,000	T1

(continued)

RF EMBOSSED TAPE AND REEL ORDERING INFORMATION (continued)

Package	Tape Width (mm)	Pitch mm (inch)	Reel Size mm (inch)	Devices Per Reel and Minimum Order Quantity	Device Suffix
QFN 3 × 3	12	8.0 ± 0.1 (.315 ± .004)	178 (7)	1,000	T1
QFN 4 × 4	12	8.0 ± 0.1 (.315 ± .004)	330 (13)	1,000	T1
QFN 6 × 6	16	12.0 ± 0.1 (.472 ± .004)	178 (7)	1,000	R1
SOT-89[1]	12	8.0 ± 0.1 (.315 ± .004)	178 (7)	1,000	T1
SOT-89[2]	12	8.0 ± 0.1 (.315 ± .004)	180 (7)	1,000	T1
SOT-363	8	4.0 ± 0.1 (.157 ± .004)	178 (7)	3,000	T1
TO-270-2	24	16.0 ± 0.1 (.631 ± .004)	330 (13)	500	R1
TO-270G-2	24	12.0 ± 0.1 (.471 ± .004)	330 (13)	500	R1
TO-270WB-4	44	24.0 ± 0.1 (.945 ± .004)	330 (13)	500	R1
TO-270WBL-4	44	20.0 ± 0.1 (.788 ± .004)	330 (13)	500	R1
TO-270WBG-4	44	24.0 ± 0.1 (.945 ± .004)	330 (13)	500	R1
TO-270WB-14	44	20.0 ± 0.1 (.788 ± .004)	330 (13)	500	R1
TO-270WBG-14	44	16.0 ± 0.1 (.631 ± .004)	330 (13)	500	R1
TO-270WBG-16	44	20.0 ± 0.1 (.788 ± .004)	330 (13)	500	R1
TO-270WBG-16	44	16.0 ± 0.1 (.631 ± .004)	330 (13)	500	R1
TO-270WBL-16	44	24.0 ± 0.1 (.945 ± .004)	330 (13)	500	R1
TO-270WBLG-16	44	24.0 ± 0.1 (.945 ± .004)	330 (13)	500	R1
TO-272-2	44	16.0 ± 0.1 (.631 ± .004)	330 (13)	500	R1
TO-272-6	44	20.0 ± 0.1 (.631 ± .004)	330 (13)	500	T1
TO-272-6 Wrap	44	20.0 ± 0.1 (.631 ± .004)	330 (13)	500	T1
TO-272-8	44	20.0 ± 0.1 (.787 ± .004)	330 (13)	500	T1
TO-272-8 Wrap	44	20.0 ± 0.1 (.787 ± .004)	330 (13)	500	T1
TO-272WB-4	44	20.0 ± 0.1 (.788 ± .004)	330 (13)	500	R1
TO-272WB-14	44	20.0 ± 0.1 (.788 ± .004)	330 (13)	500	R1
TO-272WB-16	44	20.0 ± 0.1 (.788 ± .004)	330 (13)	500	R1
TO-272WBLG-16	44	24.0 ± 0.1 (.945 ± .004)	330 (13)	500	R1

1. 98ASA10586D
2. 98ASA00241D

Applications and Product Literature

Application Notes of special interest to designers of RF equipment are listed below. This technical documentation is available on the Freescale Semiconductor web site or is available through the Freescale Semiconductor Literature Distribution Center. Phone and fax numbers for ordering literature are listed on the back cover of this book and in the Access Data On-line section.

Application Notes

AN211A Field Effect Transistors in Theory and Practice
AN419 UHF Amplifier Design Using Data Sheet Design Curves
AN423 Field Effect Transistor RF Amplifier Design Techniques
AN548A Microstrip Design Techniques for UHF Amplifiers
AN721 Impedance Matching Networks Applied to RF Power Transistors
AN923 800 MHz Test Fixture Design
AN1032 How Load VSWR Affects Non-Linear Circuits
AN1033 Match Impedances in Microwave Amplifiers
AN1034 Three Balun Designs for Push-Pull Amplifiers
AN1526 RF Power Device Impedances: Practical Considerations
AN1530 Advanced Amplifier Concept Package
AN1617 Mounting Recommendations for Copper Tungsten Flanged Transistors
AN1643 RF LDMOS Power Modules for GSM Base Station Application: Optimum Biasing Circuit
AN1670 60 Watts, GSM 900 MHz, LDMOS Two-Stage Amplifier
AN1696 Broadband Intermodulation Performance Development Using the Rohde & Schwarz Vector Network Analyzer ZVR
AN1907 Solder Reflow Attach Method for High Power RF Devices in Over-Molded Plastic Packages
AN1908 Solder Reflow Attach Method for High Power RF Devices in Air Cavity Packages
AN1923 Mounting Method with Mechanical Fasteners for the MRF19090 and Similar Packages
AN1938 Sensitivity of High Power RF Transistors to Source and Output Loads
AN1949 Mounting Method for the MHVIC910HR2 (PFP-16) and Similar Surface Mount Packages
AN1955 Thermal Measurement Methodology of RF Power Amplifiers
AN1977 Quiescent Current Thermal Tracking Circuit in the RF Integrated Circuit Family
AN1987 Quiescent Current Control for the RF Integrated Circuit Device Family
AN3100 General Purpose Amplifier and MMIC Biasing
AN3263 Bolt Down Mounting Method for High Power RF Transistors and RFICs in Over-Molded Plastic Packages
AN3778 PCB Layout Guidelines for PQFN/QFN Style Packages Requiring Thermal Vias for Heat Dissipation
AN3789 Clamping of High Power RF Transistors and RFICs in Over-Molded Plastic Packages
AN4005 Thermal Management and Mounting Method for the PLD 1.5 RF Power Surface Mount Package

Product Literature

BR1609 GaAs Solutions Brochure
BR1610 RF Power Tool System Brochure
BR1611 RF Military Solutions Brochure
AIRFASTWBFWP Advances in Freescale Airfast RFICs White Paper
RFLNAWP Practical Considerations for Low Noise Amplifier Design White Paper
RFPLASTICWP Designing with Plastic RF Power Transistors White Paper
SG46 RF Product Selector Guide
SMCELLRFWP Small Cells Call for Scalable Architecture White Paper
50VRFLDMOSWP 50 V RF LDMOS White Paper

SELECTOR GUIDE PRODUCT INDEX

Selector Guide Product Index (continued)

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