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RF Product Selector Guide PDF

Offering a broad portfolio of RF products, Freescale Semiconductor primarily serves the wireless infrastructure, wireless subscriber, general purpose amplifier, CATV, broadcast and industrial markets. Freescale pioneered RF technology and continues to be the leader in the field by providing the quality, reliability and consistency that is associated with our RF products. Our products enable developers to create cost–effective, high–performance, innovative designs. Freescale RF Solutions supports these developers through unequaled integration, ease of use, the most comprehensive RF toolkit in the industry and access to our global support team. Freescale is committed to developing new products and expanding our product offerings to meet the increasing demands of ISM band and personal communication systems, including cellular phone, broadband data, WiMAX, TV broadcast, land mobile and CATV systems.

How to Use This Selector Guide

The RF Low Power Components, LDMOS Power Transistors, GaAs Power Transistors, Power Amplifier ICs and Modules and General Purpose Amplifiers are FIRST divided into major categories by frequency band. SECOND, within each category, parts are listed by power level. THIRD, within a frequency band, transistors are further grouped by operating voltage and, finally, output power.

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!

Use the Internet to access semiconductor product data at http://www.freescale.com or http://www.freescale.com/rf. This web site provides you with instant access to 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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Low Power RF Components

Amplifiers

Product	RF Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Standby Current μA (Typ)	Small Signal Gain dB (Typ)	Output IP3 dBm (Typ)	NF dB (Typ)	Packaging	System Applicability
MBC13720NT1[18c]	400 to 2500	2.5 to 3.0	9.0	<20	14.5 @ 1900 MHz	24.5 @ 1900 MHz	1.38 @ 1900 MHz	419B/ SOT–363	ISM900, 2400, PCS, CDMA, DVB–H
MBC13916NT1[18c]	100 to 2500	2.7 to 5.0	4.7	—	19 @ 900 MHz	16.5 @ 900 MHz	0.9 @ 900 MHz	1404/ SOT–343R	General Purpose Cascode Amp for VCOs, Buffers, & LNAs
MC13821[18b]	800 to 2500	2.7 to 3.0	2.8	10	18 @ 1575 MHz	18.5 @ 1575 MHz	1.2 @ 1575 MHz	1345/ QFN–12	ISM900, ISM2400, GPS, Cellular, PCS, W–CDMA

RF Low Power Transistors

Product	Gain – Bandwidth		NFmin @ f		Gain @ f		Maximum Ratings		Packaging
	f_τ (Typ) GHz	I_C mA	(Typ) dB	GHz	(Typ) dB	GHz	V(BR) CEO Volts	I_C mA	
MBC13900NT1[18c]	15	20	1.0	1.0	17	1.0	7.0	20	318M/
			1.3	2.0	14	2.0			SOT–343

Low Noise Amplifiers/Mixers

Product	Input Freq. MHz	LO Freq. Vdc	IF Freq. (MHz)	Gain (dB)	NF (dB)	IIP3 (dBm)	Supply Current	Packaging	System Applicability
MC13770[42] (LNA)	2100 to 2170	n/a	n/a	15 –5.0	1.5 5.0	0 20	3.0 mA 10 μA	1345/ QFN–12	W–CDMA, PCS, PDC
MC13770[43] (Mixer)	2110 to 2170	2300 to 2360 2490 to 2550	190 380	10.0	8.0	–3.0	5.0 mA	1345/ QFN–12	W–CDMA, PCS, PDC

[18]Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

[42]In LNA section, specifications are represented in High Gain Mode first and Bypass Mode second.

[43]In Mixer section, LO frequency ranges are specified for 190 MHz and 380 MHz IF.

Low Power RF Components Packages

CASE 318M
(SOT-343)

CASE 419B
(SOT-363)

CASE 1345
(QFN-12)

CASE 1404
(SOT-343R)

SCALE 1:1

RF Transistors

Freescale Semiconductor[1] continues to be the industry leader in RF transistor technology. Our current portfolio ranges from high gain and low noise devices at microwave frequencies to high power devices for fixed RF and microwave applications. Technical innovation combined with world–class manufacturing capability allows Freescale to offer world class product, service and support to its customers.

From our LDMOS and GaAs portfolio, the user can choose from a variety of packages. They include plastic and ceramic that are microstrip circuit compatible or surface mountable. Many are designed for automated assembly equipment.

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(1) The Semiconductor Products sector of Motorola, Inc. became Freescale Semiconductor, Inc. in 2004.

RF Industrial, Scientific and Medical Power Transistors

Freescale Semiconductor has expanded its portfolio of RF Power devices into the Industrial, Scientific and Medical (ISM) market. New transistors are being introduced that are designed for both the HF/VHF frequency space (to 450 MHz) and the 2.45 GHz ISM band. Applications include Plasma generators, FM/TV broadcast, Magnetic Resonance Imaging (MRI), CO_2 lasers, RF Heating and many other industrial–based applications. Key technology innovations to this family are the use of VHV6 LDMOS, a 50 V enhancement to Freescale's widely accepted 28 V LDMOS technology.

VHV6 LDMOS technology allows for a much higher power density and RF performance levels that exceed existing ISM products in the market. For example, these devices will have the highest gain figures in the industry, which will allow for less gain stages, saving cost of pre–drivers and board space. Additionally, these devices will be housed in over molded plastic (OMP) packaging, which offers the most cost–effective ISM solutions available.

Table 1. HF/VHF – To 450 MHz

Product	Frequency Band[37] MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	η Eff. (Typ) %	θ_{JC} °C/W	Pkg/Style
MRF6V2010N[46c]	U	10–450	10 CW	1–Tone	50	25/220	68	—	1265/1
MRF6V2010NB[46c]	U	10–450	10 CW	1–Tone	50	25/220	68	—	1337/1
MRF6V2150N[46b]	U	10–450	150 CW	1–Tone	50	25.5/220	69	—	1486/1
MRF6V2150NB[46b]	U	10–450	150 CW	1–Tone	50	25.5/220	69	—	1484/1
MRF6V2300N[46c]	U	10–450	300 CW	1–Tone	50	27/220	68	—	1486/1
MRF6V2300NB[46c]	U	10–450	300 CW	1–Tone	50	27/220	68	—	1484/1

Table 2. ISM Band – 2.45 GHz

Product	Frequency Band[37] MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	η Eff. (Typ) %	θ_{JC} °C/W	Pkg/Style
MW6IC2420NBR1[18a, 46a]	I/O	2450	20 CW	1–Tone	28	21/2450	29	—	1329/–
MW6IC2420GNBR1[18a, 46a]	I/O	2450	20 CW	1–Tone	28	21/2450	29	—	1329A/–
MRF6S24140HR3[18i, 46a]	I/O	2450	140 CW	1–Tone	28	13.2/2450	45	—	465B/1
MRF6S24140HSR3[18i, 46a]	I/O	2450	140 CW	1–Tone	28	13.2/2450	45	—	465C/1
MRF6P24190HR6[18o, 46a]	I/O	2450	190 CW	1–Tone	28	13.2/2450	46.2	—	375D/1

[18]Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

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

[46]To be introduced: a) 2Q06; b) 3Q06; c) 4Q06.

RF LDMOS Power Transistors

Freescale Semiconductor LDMOS technology is ideally suited for RF power amplifier applications. Several families of products have been targeted for specific markets including VHF and UHF portable/land mobile, 900 MHz linear cellular, GSM, TDMA and CDMA, digital television, GSM EDGE, PCS, UMTS, and W–CDMA.

With the unique LDMOS characteristics, these parts offer superior thermal performance. This is due to the simplified package design, which offers excellent Class AB intermodulation performance under medium peak–to–average ratios providing a superior device choice for advanced digital modulations formats or high gain applications.

Table 1. Mobile – To 520 MHz

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 12.5/7.5 volt mobile, portable and base station operation.

Product	Frequency Band[37] MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	η Eff. (Typ) %	θ_{JC} °C/W	Pkg/Style
VHF & UHF, Land Mobile Radio, Class AB									
MRF1513NT1[18f]	U	400–520	3 CW	1–Tone	7.5/12.5	11/520	55	4.0	466/1
MRF1511NT1[18f]	U	135–175	8 CW	1–Tone	7.5	11.5/175	55	2.0	466/1
MRF1517NT1[18f]	U	430–520	8 CW	1–Tone	7.5	11/520	55	2.0	466/1
MRF1518NT1[18f]	U	400–520	8 CW	1–Tone	12.5	11/520	55	2.0	466/1
MRF1535NT1[18j]	U	400–520	35 CW	1–Tone	12.5	10(Min)/520	50(Min)	0.90	1264/1
MRF1535FNT1[18j]	U	400–520	35 CW	1–Tone	12.5	10(Min)/520	50(Min)	0.90	1264A/1
MRF1550NT1[18j]	U	135–175	50 CW	1–Tone	12.5	10(Min)/175	50(Min)	0.75	1264/1
MRF1550FNT1[18j]	U	135–175	50 CW	1–Tone	12.5	10(Min)/175	50(Min)	0.75	1264A/1
MRF1570NT1[18j]	U	400–470	70 CW	1–Tone	12.5	10(Min)/470	50(Min)	0.75	1366/1
MRF1570FNT1[18j]	U	400–470	70 CW	1–Tone	12.5	10(Min)/470	50(Min)	0.75	1366A/1
MRF9582NT1[18f]	U	900	6.3 CW	1–Tone	12.5	10.5/849	55	6	449/1

Table 2. TV Broadcast – To 1000 MHz

Product	Frequency Band [37] MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	η Eff. (Typ) %	θ_{JC} °C/W	Pkg/Style
470 – 1000 MHz, Class AB									
MRF373ALR1[18a]	U	470–860	75 CW	1–Tone	32	18.2/860	60	0.89	360B/1
MRF373ALSR1[18a]	U	470–860	75 CW	1–Tone	32	18.2/860	60	0.63	360C/1
MRF374A	U	470–860	130 PEP	2–Tone	32	17.3/860	41.2	0.58	375F/1
MRF372R3[18i]	I	470–860	180 PEP	2–Tone	32	17/860	36	0.5	375G/1
MRF372R5[18p]	I	470–860	180 PEP	2–Tone	32	17/860	36	0.5	375G/1
MRF377HR3[18i]	I/O	470–860	45 AVG	OFDM	32	18.2/860	23	0.27	375G/1
MRF377HR5[18p]	I/O	470–860	45 AVG	OFDM	32	18.2/860	23	0.27	375G/1

[18]Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

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

Table 2. TV Broadcast – To 1000 MHz (continued)

Product	Frequency Band (37) MHz		P_{out} Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	η Eff. (Typ) %	θ_{JC} °C/W	Pkg/Style
470 – 1000 MHz, Class AB (continued)									
MRF6P3300HR3(18i)★	I/O	470–860	270 PEP	2–Tone	32	20.2/860	44.1	0.23	375G/1
MRF6P3300HR5(18p)★	I/O	470–860	270 PEP	2–Tone	32	20.2/860	44.1	0.23	375G/1

Table 3. Cellular – To 500 MHz

Product	Frequency Band(37) MHz		P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	η Eff. (Typ) %	θ_{JC} °C/W	Packaging/ Style
400 – 500 MHz, Class AB									
MW6S004NT1(18f)★	U	1–2000	4 PEP	2–Tone	28	18/1960	33	8.8	466/1
MW6S010NR1(18a)	U	450–1500	10 PEP	2–Tone	28	18/960	32	2.85	1265/1
MW6S010GNR1(18a)	U	450–1500	10 PEP	2–Tone	28	18/960	32	2.85	1265A/1
MRF5S4140HR3(18i)★	I	465	28 AVG	N–CDMA	28	21/465	30	0.41	465/1
MRF5S4140HSR3(18i)★	I	465	28 AVG	N–CDMA	28	21/465	30	0.41	465A/1

Table 4. Cellular – To 1000 MHz

Product	Frequency Band(37) MHz		P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	η Eff. (Typ) %	θ_{JC} °C/W	Pkg/ Style
800 – 1000 MHz, Class AB									
MRF9002NR2(18e)	U	960	(3x) 2 PEP(41)	2–Tone	26	18/960	50	12	978/–
MW6S004NT1(18f)★	U	1–2000	4 PEP	2–Tone	28	18/1960	33	8.8	466/1
MW6S010NR1(18a)	U	450–1500	10 PEP	2–Tone	28	18/960	32	2.85	1265/1
MW6S010GNR1(18a)	U	450–1500	10 PEP	2–Tone	28	18/960	32	2.85	1265A/1
MRF9030NR1(18a)	U	945	30 PEP	2–Tone	26	20/945	41	1.08	1265/1
MRF9030NBR1(18a)	U	945	30 PEP	2–Tone	26	20/945	41	1.08	1337/1
MRF9030LR1(18a)	U	945	30 PEP	2–Tone	26	19/945	41.5	1.9	360B/1
MRF9030LSR1(18a)	U	945	30 PEP	2–Tone	26	19/945	41.5	1.5	360C/1
MRF6S9045NR1(18a)	U	880	10 AVG	N–CDMA	28	22.7/880	32	1.0	1265/1
MRF6S9045NBR1(18a)	U	880	10 AVG	N–CDMA	28	22.7/880	32	1.0	1337/1
MRF9045NR1(18a)	U	945	45 PEP	2–Tone	28	19/945	41	0.85	1265/1
MRF9045NBR1(18a)	U	945	45 PEP	2–Tone	28	19/945	41	0.85	1337/1
MRF9045LR1(18a)	U	945	45 PEP	2–Tone	28	18.8/945	42	1.4	360B/1
MRF9045LSR1(18a)	U	945	45 PEP	2–Tone	28	18.8/945	42	1.0	360C/1
MRF6S9060NR1(18a)	U	880	14 AVG	N–CDMA	28	21.4/880	32.1	0.77	1265/1
MRF6S9060NBR1(18a)	U	880	14 AVG	N–CDMA	28	21.4/880	32.1	0.77	1337/1
MRF9060NR1(18a)	U	945	60 PEP	2–Tone	26	18/945	40	0.56	1265/1
MRF9060NBR1(18a)	U	945	60 PEP	2–Tone	26	18/945	40	0.56	1337/1
MRF9060LR1(18a)	U	945	60 PEP	2–Tone	26	17/945	40	1.1	360B/1
MRF9060LSR1(18a)	U	945	60 PEP	2–Tone	26	17/945	40	0.8	360C/1
MRF5S9070NR1(18a)	U	800–900	14 AVG	N–CDMA	26	17.8/880	30	0.8	1265/1
MW5IC970NBR1(18a)★	I	800–900	70 PEP	2–Tone	28	30/870	48	5.2/0.8	1329/–
MRF6522–70R3(18i)	I	921–960	70 CW	1–Tone	26	16/921,960	58	1.1	465D/1

(18)Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

(37)U = Unmatched; I = Input; I/O = Input/Output.

(41)Three individual transistors in a single package.

★New Product

Table 4. Cellular – To 1000 MHz (continued)

Product	Frequency Band[37] MHz		P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	η Eff. (Typ) %	θ_{JC} °C/W	Pkg/ Style
800 – 1000 MHz, Class AB (continued)									
MRF5S9080NR1[18a]★	I	869–960	80 CW	1–Tone	26	18.5/960	60	0.5	1486/1
MRF5S9080NBR1[18a]★	I	869–960	80 CW	1–Tone	26	18.5/960	60	0.5	1484/1
MRF9080LR3[18i]	I	921–960	70 CW	1–Tone	26	18.5/921,960	52	0.7	465/1
MRF9080LSR3[18i]	I	921–960	70 CW	1–Tone	26	18.5/921,960	52	0.7	465A/1
MRF9085LR3[18i]	I	880	90 PEP	2–Tone	26	17.9/880	40	0.7	465/1
MRF9085LSR3[18i]	I	880	90 PEP	2–Tone	26	17.9/880	40	0.7	465A/1
MRF5S9100NR1[18a]	I	880	20 AVG	N–CDMA	26	19.5/880	28	0.52	1486/1
MRF5S9100NBR1[18a]	I	880	20 AVG	N–CDMA	26	19.5/880	28	0.52	1484/1
MRF9100LR3[18i]	I/O	921–960	100 CW	1–Tone	26	17.2/960	60	1.0	465/1
MRF9100LSR3[18i]	I/O	921–960	100 CW	1–Tone	26	17.2/960	60	1.0	465A/1
MRF5S9101NR1[18a]	I	869–960	100 CW	1–Tone	26	17.5/960	60	0.41	1486/1
MRF5S9101NBR1[18a]	I	869–960	100 CW	1–Tone	26	17.5/960	60	0.41	1484/1
MRF9120LR3[18i]	I	880	120 PEP	2–Tone	26	16.5/880	39	0.45	375B/1
MRF6S9125NR1[18a]	I	880	27 AVG	N–CDMA	28	20.2/880	31	0.44	1486/1
MRF6S9125NBR1[18a]	I	880	27 AVG	N–CDMA	28	20.2/880	31	0.44	1484/1
MRF6S9130HR3[18i]	I	880	27 AVG	N–CDMA	28	19.2/880	30.5	0.45	465/1
MRF6S9130HSR3[18i]	I	880	27 AVG	N–CDMA	28	19.2/880	30.5	0.45	465A/1
MRF9130LR3[18i]	I	921–960	130 CW	1–Tone	28	16.5/921,960	48	0.6	465/1
MRF9130LSR3[18i]	I	921–960	130 CW	1–Tone	28	16.5/921,960	48	0.6	465A/1
MRF9135LR3[18i]	I	880	25 AVG	N–CDMA	26	17.8/880	25	0.6	465/1
MRF9135LSR3[18i]	I	880	25 AVG	N–CDMA	26	17.8/880	25	0.6	465A/1
MRF5S9150HR3[18i]★	I	880	33 AVG	N–CDMA	28	19.7/880	28.4	0.34	465/1
MRF5S9150HSR3[18i]★	I	880	33 AVG	N–CDMA	28	19.7/880	28.4	0.34	465A/1
MRF6S9160HR3[18i]★	I	880	35 AVG	N–CDMA	28	20.9/880	30.5	0.31	465/1
MRF6S9160HSR3[18i]★	I	880	35 AVG	N–CDMA	28	20.9/880	30.5	0.31	465A/1
MRF9180R6[18o]	I	880	170 PEP	2–Tone	26	17.5/880	39	0.45	375D/1
MRF9200LR3[18i]	I/O	880	40 AVG	N–CDMA	26	17.5/880	25	0.28	465B/1
MRF9200LSR3[18i]	I/O	880	40 AVG	N–CDMA	26	17.5/880	25	0.28	465C/1
MRF6S9200H[9]	I	869–960	58 AVG	W–CDMA	28	21/880	35	0.29	465B/1
MRF6S9200HS[9]	I	869–960	58 AVG	W–CDMA	28	21/880	35	0.29	465C/1
MRF9210R3[18i]	I/O	880	40 AVG	N–CDMA	26	16.5/880	25.5	0.31	375G/1
MRF6P9220HR3[18i]★	I/O	880	47 AVG	N–CDMA	28	20/880	30	0.25	375G/1

Table 5. General Purpose LDMOS Drivers – To 2100 MHz

Product	Frequency Band[37] MHz		P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	η Eff. (Typ) %	θ_{JC} °C/W	Pkg/ Style
To 2100 MHz, Class AB									
MW4IC001NR4[18n]	I	800–2100	0.9 CW	1–Tone	28	13/2170	38	27.3	466/1
MW6S004NT1[18f]★	U	1–2000	4 PEP	2–Tone	28	18/1960	33	8.8	466/1
MW6S010NR1[18a]	U	450–1500	10 PEP	2–Tone	28	18/960	32	2.85	1265/1
MW6S010GNR1[18a]	U	450–1500	10 PEP	2–Tone	28	18/960	32	2.85	1265A/1

[9]In development.

[18]Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

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

★New Product

Table 6. PCS and 3G – To 2200 MHz

Product	Frequency Band[37] MHz		P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	η Eff. (Typ) %	θ_{JC} °C/W	Pkg/ Style
1800 – 2000 MHz, Class AB (GSM1800, GSM1900, GSM EDGE and W–CDMA)									
MRF6S20010NR1[18a]★	I	1805–1990	4 AVG	EDGE	28	16/1805,1880	33	2.5	1265/1
MRF6S20010GNR1[18a]★	I	1805–1990	4 AVG	EDGE	28	16/1805,1880	33	2.5	1265A/1
MRF18030ALR3[18i]	I/O	1805–1880	30 CW	1–Tone	26	14/1805,1880	50	2.1	465E/1
MRF18030ALSR3[18i]	I/O	1805–1880	30 CW	1–Tone	26	14/1805,1880	50	2.1	465F/1
MRF18030BLR3[18i]	I/O	1930–1990	30 CW	1–Tone	26	14/1930,1990	50	2.1	465E/1
MRF18030BLSR3[18i]	I/O	1930–1990	30 CW	1–Tone	26	14/1930,1990	50	2.1	465F/1
MRF6S18060NR1[18a]	I/O	1800–2000	60 CW	1–Tone	26	15/1990	50	0.81	1486/1
MRF6S18060NBR1[18a]	I/O	1800–2000	60 CW	1–Tone	26	15/1990	50	0.81	1484/1
MRF18060ALR3[18i]	I/O	1805–1880	60 CW	1–Tone	26	13/1805,1880	45	0.97	465/1
MRF18060ALSR3[18i]	I/O	1805–1880	60 CW	1–Tone	26	13/1805,1880	45	0.97	465A/1
MRF18060BLR3[18i]	I/O	1930–1990	60 CW	1–Tone	26	13/1930,1990	45	0.97	465/1
MRF18060BLSR3[18i]	I/O	1930–1990	60 CW	1–Tone	26	13/1930,1990	45	0.97	465A/1
MRF18085ALR3[18i]	I/O	1805–1880	85 CW	1–Tone	26	15/1805,1880	52	0.79	465/1
MRF18085ALSR3[18i]	I/O	1805–1880	85 CW	1–Tone	26	15/1805,1880	52	0.79	465A/1
MRF18085BLR3[18i]	I/O	1930–1990	85 CW	1–Tone	26	12.5/1930,1990	50	0.79	465/1
MRF18085BLSR3[18i]	I/O	1930–1990	85 CW	1–Tone	26	12.5/1930,1990	50	0.79	465A/1
MRF18090AR3[18i]	I/O	1805–1880	90 CW	1–Tone	26	13.5/1805,1880	52	0.70	465B/1
MRF18090BR3[18i]	I/O	1930–1990	90 CW	1–Tone	26	13.5/1930,1990	45	0.70	465B/1
MRF18090BSR3[18i]	I/O	1930–1990	90 CW	1–Tone	26	13.5/1930,1990	45	0.70	465C/1
MRF6S18100NR1[18a]★	I/O	1805–1990	100 CW	1–Tone	28	14.5/1930,1990	49	0.51	1486/1
MRF6S18100NBR1[18a]★	I/O	1805–1990	100 CW	1–Tone	28	14.5/1930,1990	49	0.51	1484/1
MRF7S18125AH[9]	I/O	1805–1880	125 CW	1–Tone	28	17/1880	54	—	465/1
MRF7S18125AHS[9]	I/O	1805–1880	125 CW	1–Tone	28	17/1880	54	—	465A/1
MRF7S18125BH[9]	I/O	1930–1990	125 CW	1–Tone	28	16/1990	54	—	465/1
MRF7S18125BHS[9]	I/O	1930–1990	125 CW	1–Tone	28	16/1990	54	—	465A/1
MRF7S18170H[9]	I/O	1805–1880	50 AVG	W–CDMA	28	17.5/1880	31	—	465B/1
MRF7S18170HS[9]	I/O	1805–1880	50 AVG	W–CDMA	28	17.5/1880	31	—	465C/1
MRF6P18190HR6[18o]	I/O	1805–1880	44 AVG	W–CDMA	28	15.9/1805,1880	27.5	0.27	375D/1
2000 MHz, Class AB (2–CH N–CDMA and W–CDMA)									
MRF6S20010NR1[18a]★	I	1930–1990	1 AVG	N–CDMA	28	15.5/1990	16	2.5	1265/1
MRF6S20010GNR1[18a]★	I	1930–1990	1 AVG	N–CDMA	28	15.5/1990	16	2.5	1265A/1
MRF19030LR3[18i]	I/O	1930–1990	30 PEP	2–Tone	26	13/1990	36	2.1	465E/1
MRF19030LSR3[18i]	I/O	1930–1990	30 PEP	2–Tone	26	13/1990	36	2.1	465F/1
MRF19045LR3[18i]	I/O	1930–1990	9.5 AVG	N–CDMA	26	14.5/1990	23.5	1.65	465E/1
MRF19045LSR3[18i]	I/O	1930–1990	9.5 AVG	N–CDMA	26	14.5/1990	23.5	1.65	465F/1
MRF6S19060NR1[18a]	I/O	1930–1990	12 AVG	N–CDMA	28	16/1990	26	0.84	1486/1
MRF6S19060NBR1[18a]	I/O	1930–1990	12 AVG	N–CDMA	28	16/1990	26	0.84	1484/1
MRF5S19060NR1[18a]	I/O	1930–1990	12 AVG	N–CDMA	28	14/1990	23	0.80	1486/1
MRF5S19060NBR1[18a]	I/O	1930–1990	12 AVG	N–CDMA	28	14/1990	23	0.80	1484/1
MRF19060LR3[18i]	I/O	1930–1990	60 PEP	2–Tone	26	12.5/1990	36	0.97	465/1
MRF19060LSR3[18i]	I/O	1930–1990	60 PEP	2–Tone	26	12.5/1990	36	0.97	465A/1
MRF19085LR3[18i]	I/O	1930–1990	18 AVG	N–CDMA	26	13/1990	23	0.79	465/1
MRF19085LSR3[18i]	I/O	1930–1990	18 AVG	N–CDMA	26	13/1990	23	0.79	465A/1
MRF5S19090HR3[18i]	I/O	1930–1990	18 AVG	N–CDMA	28	14.5/1990	25.8	0.66	465/1
MRF5S19090HSR3[18i]	I/O	1930–1990	18 AVG	N–CDMA	28	14.5/1990	25.8	0.66	465A/1
MRF19090R3[18i]	I/O	1930–1990	90 PEP	2–Tone	26	11.5/1990	35	0.65	465B/1
MRF19090SR3[18i]	I/O	1930–1990	90 PEP	2–Tone	26	11.5/1990	35	0.65	465C/1

[9]In development.

[18]Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

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

★New Product

Table 6. PCS and 3G – To 2200 MHz (continued)

Product	Frequency Band[37] MHz	P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	η Eff. (Typ) %	θ_{JC} °C/W	Pkg/ Style
2000 MHz, Class AB (2–CH N–CDMA and W–CDMA) (continued)								
MRF5S19100HR3[18i]	I/O	1930–1990	22 AVG	N–CDMA	28	13.9/1990	25.5	0.64	465/1
MRF5S19100HSR3[18i]	I/O	1930–1990	22 AVG	N–CDMA	28	13.9/1990	25.5	0.64	465A/1
MRF6S19100NR1[18a]	I/O	1930–1990	22 AVG	N–CDMA	28	14.5/1990	25.5	0.61	1486/1
MRF6S19100NBR1[18a]	I/O	1930–1990	22 AVG	N–CDMA	28	14.5/1990	25.5	0.61	1484/1
MRF6S19100HR3[18i]	I/O	1930–1990	22 AVG	N–CDMA	28	16.1/1990	28	0.44	465/1
MRF6S19100HSR3[18i]	I/O	1930–1990	22 AVG	N–CDMA	28	16.1/1990	28	0.44	465A/1
MRF7S19100NR1[18a]★	I/O	1930–1990	29 AVG	W–CDMA	28	17.5/1990	30	0.57	1486/1
MRF7S19100NBR1[18a]★	I/O	1930–1990	29 AVG	W–CDMA	28	17.5/1990	30	0.57	1484/1
MRF6S19120HR3[18i]	I/O	1930–1990	19 AVG	N–CDMA	28	15/1990	21.5	0.43	465/1
MRF6S19120HSR3[18i]	I/O	1930–1990	19 AVG	N–CDMA	28	15/1990	21.5	0.43	465A/1
MRF19125R3[18i]	I/O	1930–1990	24 AVG	N–CDMA	26	13.5/1990	22	0.53	465B/1
MRF19125SR3[18i]	I/O	1930–1990	24 AVG	N–CDMA	26	13.5/1990	22	0.53	465C/1
MRF5S19130HR3[18i]	I/O	1930–1990	26 AVG	N–CDMA	28	13/1990	25	0.40	465B/1
MRF5S19130HSR3[18i]	I/O	1930–1990	26 AVG	N–CDMA	28	13/1990	25	0.40	465C/1
MRF6S19140HR3[18i]	I/O	1930–1990	29 AVG	N–CDMA	28	16/1990	27.5	0.33	465B/1
MRF6S19140HSR3[18i]	I/O	1930–1990	29 AVG	N–CDMA	28	16/1990	27.5	0.33	465C/1
MRF5S19150HR3[18i]	I/O	1930–1990	32 AVG	N–CDMA	28	14/1990	26	0.41	465B/1
MRF5S19150HSR3[18i]	I/O	1930–1990	32 AVG	N–CDMA	28	14/1990	26	0.41	465C/1
MRF7S19150H[9]	I/O	1930–1990	44 AVG	W–CDMA	28	17.5/1990	31.5	—	465/1
MRF7S19150HS[9]	I/O	1930–1990	44 AVG	W–CDMA	28	17.5/1990	31.5	—	465A/1
MRF7S19170H[9]	I/O	1930–1990	50 AVG	W–CDMA	28	16.5/1990	31	—	465B/1
MRF7S19170HS[9]	I/O	1930–1990	50 AVG	W–CDMA	28	16.5/1990	31	—	465C/1
MRF5P20180HR6[18o]	I/O	1930–1990	38 AVG	W–CDMA	28	14/1990	26	0.33	375D/1
2000 MHz, Class A, AB								
MRF281SR1[18a]	U	1930–2000	4 PEP	2–Tone	26	12.5/2000	33	5.74	458B/1
MRF281ZR1[18a]	U	1930–2000	4 PEP	2–Tone	26	12.5/2000	33	5.74	458C/1
MRF282SR1[18a]	U	1930–2000	10 PEP	2–Tone	26	11.5/2000	28(min)	4.2	458B/1
MRF282ZR1[18a]	U	1930–2000	10 PEP	2–Tone	26	11.5/2000	28(min)	4.2	458C/1
MRF284LR1[18a]	U	1930–2000	30 PEP	2–Tone	26	10.5/2000	35	2.0	360B/1
MRF284LSR1[18a]	U	1930–2000	30 PEP	2–Tone	26	10.5/2000	35	2.0	360C/1
2200 MHz, Class AB (2–CH W–CDMA, UMTS)								
MRF6S20010NR1[18a]★	I	2110–2170	1 AVG	W–CDMA	28	15.5/2170	15	2.5	1265/1
MRF6S20010GNR1[18a]★	I	2110–2170	1 AVG	W–CDMA	28	15.5/2170	15	2.5	1265A/1
MRF21010LR1[18a]	U	2110–2170	10 PEP	2–Tone	28	13.5/2170	35	5.5	360B/1
MRF21010LSR1[18a]	U	2110–2170	10 PEP	2–Tone	28	13.5/2170	35	5.5	360C/1
MRF21030LR3[18i]	I/O	2110–2170	30 PEP	2–Tone	28	13/2170	33	2.1	465E/1
MRF21030LSR3[18i]	I/O	2110–2170	30 PEP	2–Tone	28	13/2170	33	2.1	465F/1
MRF5S21045NR1[18a]	I/O	2110–2170	10 AVG	W–CDMA	28	14.5/2170	25.5	1.35	1486/1
MRF5S21045NBR1[18a]	I/O	2110–2170	10 AVG	W–CDMA	28	14.5/2170	25.5	1.35	1484/1
MRF21045LR3[18i]	I/O	2110–2170	10 AVG	W–CDMA	28	15/2170	23.5	1.65	465E/1
MRF21045LSR3[18i]	I/O	2110–2170	10 AVG	W–CDMA	28	15/2170	23.5	1.65	465F/1
MRF6S21050LR3[18i]	I/O	2110–2170	11.5 AVG	W–CDMA	28	16/2170	27.7	1.16	465E/1
MRF6S21050LSR3[18i]	I/O	2110–2170	11.5 AVG	W–CDMA	28	16/2170	27.7	1.16	465F/1
MRF21060LR3[18i]	I/O	2110–2170	60 PEP	2–Tone	28	12.5/2170	34	1.02	465/1
MRF21060LSR3[18i]	I/O	2110–2170	60 PEP	2–Tone	28	12.5/2170	34	1.02	465A/1

[9]In development.

[18]Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

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

★New Product

Table 6. PCS and 3G – To 2200 MHz (continued)

Product	Frequency Band[37] MHz		P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	η Eff. (Typ) %	θ_{JC} °C/W	Pkg/ Style
2200 MHz, Class AB (2–CH W–CDMA, UMTS) (continued)									
MRF6S21060NR1[18a]	I/O	2110–2170	14 AVG	W–CDMA	28	15.5/2170	26	0.89	1486/1
MRF6S21060NBR1[18a]	I/O	2110–2170	14 AVG	W–CDMA	28	15.5/2170	26	0.89	1484/1
MRF21085LR3[18i]	I/O	2110–2170	19 AVG	W–CDMA	28	13.6/2170	23	0.78	465/1
MRF21085LSR3[18i]	I/O	2110–2170	19 AVG	W–CDMA	28	13.6/2170	23	0.78	465A/1
MRF21090R3[18i]	I/O	2110–2170	90 PEP	2–Tone	28	11.7/2170	33	0.65	465B/1
MRF21090SR3[18i]	I/O	2110–2170	90 PEP	2–Tone	28	11.7/2170	33	0.65	465C/1
MRF5S21090HR3[18i]	I/O	2110–2170	19 AVG	W–CDMA	28	14.5/2170	26	0.65	465/1
MRF5S21090HSR3[18i]	I/O	2110–2170	19 AVG	W–CDMA	28	14.5/2170	26	0.65	465A/1
MRF5S21100HR3[18i]	I/O	2110–2170	23 AVG	W–CDMA	28	13.5/2170	26	0.57	465/1
MRF5S21100HSR3[18i]	I/O	2110–2170	23 AVG	W–CDMA	28	13.5/2170	26	0.57	465A/1
MRF6S21100NR1[18a]	I/O	2110–2170	23 AVG	W–CDMA	28	14.5/2170	25.5	0.57	1486/1
MRF6S21100NBR1[18a]	I/O	2110–2170	23 AVG	W–CDMA	28	14.5/2170	25.5	0.57	1484/1
MRF6S21100HR3[18i]	I/O	2110–2170	23 AVG	W–CDMA	28	15.9/2170	27.6	0.45	465/1
MRF6S21100HSR3[18i]	I/O	2110–2170	23 AVG	W–CDMA	28	15.9/2170	27.6	0.45	465A/1
MRF7S21110H[9]	I/O	2110–2170	33 AVG	W–CDMA	28	18/2170	32	—	465/1
MRF7S21110HS[9]	I/O	2110–2170	33 AVG	W–CDMA	28	18/2170	32	—	465A/1
MRF21120R6[3,18o]	I/O	2110–2170	120 PEP	2–Tone	28	11.4/2170	34.5	0.45	375D/1
MRF21125R3[18i]	I/O	2110–2170	20 AVG	W–CDMA	28	13/2170	18	0.53	465B/1
MRF21125SR3[18i]	I/O	2110–2170	20 AVG	W–CDMA	28	13/2170	18	0.53	465C/1
MRF5S21130HR3[18i]	I/O	2110–2170	28 AVG	W–CDMA	28	13.5/2170	26	0.44	465B/1
MRF5S21130HSR3[18i]	I/O	2110–2170	28 AVG	W–CDMA	28	13.5/2170	26	0.44	465C/1
MRF6S21140HR3[18i]	I/O	2110–2170	30 AVG	W–CDMA	28	15.5/2170	27.5	0.35	465B/1
MRF6S21140HSR3[18i]	I/O	2110–2170	30 AVG	W–CDMA	28	15.5/2170	27.5	0.35	465C/1
MRF5S21150HR3[18i]	I/O	2110–2170	33 AVG	W–CDMA	28	12.5/2170	25	0.46	465B/1
MRF5S21150HSR3[18i]	I/O	2110–2170	33 AVG	W–CDMA	28	12.5/2170	25	0.46	465C/1
MRF7S21170HR3[18i]★	I/O	2110–2170	50 AVG	W–CDMA	28	16/2170	31	0.31	465B/1
MRF7S21170HSR3[18i]★	I/O	2110–2170	50 AVG	W–CDMA	28	16/2170	31	0.31	465C/1
MRF5P21180HR6[18o]	I/O	2110–2170	38 AVG	W–CDMA	28	14/2170	25.5	0.31	375D/1
MRF21180R6[3,18o]	I/O	2110–2170	38 AVG	W–CDMA	28	12.1/2170	22	0.46	375D/1
MRF6P21190HR6[18a]	I/O	2110–2170	44 AVG	W–CDMA	28	15.5/2170	26.5	0.25	375D/1
MRF5P21240HR6[18o]	I/O	2110–2170	52 AVG	W–CDMA	28	13/2170	24	0.29	375D/1

[3]Internal Impedance Matched Push-Pull Transistors

[9]In development.

[18]Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

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

★New Product

RF GaAs 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. Parts are listed first by order of operating voltage, then by increasing output power.

Table 1. Linear Transistors – To 6000 MHz

Product	Frequency Band[37] 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	Pkg/ Style
To 6000 MHz, Class AB (WLL, BWA, W–CDMA)									
MRFG35002N6T1[18f]★	U	500–5000	0.16 AVG/ 3550	W–CDMA[44]	6	10/3550	27/3550	—	466/1
MRFG35003NT1[18f]	U	DC–5800	0.3 AVG/ 3550	W–CDMA[44]	12	11.5/3550	25/3550	—	466/1
MRFG35003AN[46c]	U	DC–5800	0.3 AVG/ 3550	W–CDMA[44]	12	11.5/3550	25/3550	—	466/1
MRFG35003N6T1[18f]	U	DC–5800	0.45 AVG/ 3550	W–CDMA[44]	6	9/3550	24/3550	—	466/1
MRFG35003N6A[46b]	U	DC–5800	0.45 AVG/ 3550	W–CDMA[44]	12	9.5/3550	24/3550	—	466/1
MRFG35005NT1[18f]	U	DC–5800	0.45 AVG/ 3550	W–CDMA[44]	12	11/3550	25/3550	—	466/1
MRFG35005AN[46c]	U	DC–5800	0.45 AVG/ 3550	W–CDMA[44]	12	11/3550	25/3550	—	466/1
MRFG35010NT1[18f]	U	DC–5800	0.9 AVG/ 3550	W–CDMA[44]	12	10/3550	28/3550	—	466/1
MRFG35010ANT1[18f]★	U	DC–5800	0.9 AVG/ 3550	W–CDMA[44]	12	10/3550	25/3550	—	466/1
MRFG35010R1[18a]	U	DC–5800	1 AVG/ 3550	W–CDMA[44]	12	10/3550	30/3550	4.8[15]	360D/1
MRFG35010AR1[18a]★	U	500–5000	1 AVG/ 3550	W–CDMA[44]	12	10/3550	25/3550	4.0[16]	360D/1
MRFG35020[46c]	I	2500–3900	2 AVG/ 3550	W–CDMA[44]	12	11/3550	21/3550	—	360E/1

[15]Class A = 5.3

[16]Class A = 4.1

[18]Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

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

[44]Peak–to–Average Power Ratio = 8.5 dB

[46]To be introduced: a) 2Q06; b) 3Q06; c) 4Q06.

★New Product

RF WiMAX, WiBro, BWA Power Transistors

With the coming deployment of WiMAX systems, device performance demands rise to a new level, requiring exceptional linearity and efficiency. WiMAX uses 64–state quadrature amplitude modulation (64 QAM) and orthogonal frequency–division multiplexing (OFDM), a combination that requires RF performance, especially in error vector magnitude (EVM), greater than even the latest deployed cellular access methods. To meet these requirements, Freescale has developed a full roadmap of RF power devices. Current products support the 1.6, 2.3, 2.5 and 3.5 GHz bands. Additionally, Freescale is the only supplier that offers both silicon and compound semiconductor WiMAX solutions.

Table 1. RF WiMAX, WiBro, BWA – To 6000 MHz

Product	Frequency Band[37] MHz		P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	η Eff. (Typ) %	θ_{JC} °C/W	Pkg/ Style
2300–5800 MHz, Class AB									
MRFG35003NT1[18f]	U	DC–5800	0.3 AVG	W–CDMA[44]	12	11.5/3550	25	—	466/1
MRFG35005NT1[18f]	U	DC–5800	0.45 AVG	W–CDMA[44]	12	11/3550	25	—	466/1
MRFG35010NT1[18f]	U	DC–5800	0.9 AVG	W–CDMA[44]	12	10/3550	28	—	466/1
MRFG35020[46c]	I	2500–3900	2 AVG	W–CDMA[44]	12	11/3550	21	—	360E/1
MRF7S38010H[9]	I/O	3400–3800	2 AVG	WiMAX	28	14/3400, 3800	18	—	465I/1
MRF7S38010HS[9]	I/O	3400–3800	2 AVG	WiMAX	28	14/3400, 3800	18	—	465J/1
MRF6S27015N[46a]	I	2000–2700	3 AVG	W–CDMA	28	14/2600	22	2.0	1265/1
MRF6S27015GN[46a]	I	2000–2700	3 AVG	W–CDMA	28	14/2600	22	2.0	1265A/1
MRF7S38040H[9]	I/O	3400–3800	8 AVG	WiMAX	28	13/3400, 3800	18	—	465I/1
MRF7S38040HS[9]	I/O	3400–3800	8 AVG	WiMAX	28	13/3400, 3800	18	—	465J/1
MRF6S27050H[46a]	I/O	2500–2700	7 AVG	W–CDMA	28	16/2500,2700	22.5	0.85	465/1
MRF6S27050HS[46a]	I/O	2500–2700	7 AVG	W–CDMA	28	16/2500,2700	22.5	0.85	465A/1
MRF7S38075H[9]	I/O	3400–3800	14 AVG	WiMAX	28	13/3400, 3800	18	—	465/1
MRF7S38075HS[9]	I/O	3400–3800	14 AVG	WiMAX	28	13/3400, 3800	18	—	465A/1
MRF6S27085HR3[18i]	I/O	2600–2700	20 AVG	N–CDMA	28	15.5/2655	23.5	0.50	465/1
MRF6S27085HSR3[18i]	I/O	2600–2700	20 AVG	N–CDMA	28	15.5/2655	23.5	0.50	465A/1
MRF6S23100HR3[18i]★	I/O	2300–2400	20 AVG	W–CDMA	28	15.4/2300, 2400	23.5	0.53	465/1
MRF6S23100HSR3[18i]★	I/O	2300–2400	20 AVG	W–CDMA	28	15.4/2300, 2400	23.5	0.53	465A/1
MRF6S23140HR3[18i]★	I/O	2300–2400	28 AVG	W–CDMA	28	15.2/2300, 2400	25	0.29	465B/1
MRF6S23140HSR3[18i]★	I/O	2300–2400	28 AVG	W–CDMA	28	15.2/2300, 2400	25	0.29	465C/1
MRF6P27160HR6[18o]	I/O	2600–2700	35 AVG	N–CDMA	28	14.6/2655	22.6	0.29	375D/1
MRF6P23190HR6[18o]★	I/O	2300–2400	40 AVG	W–CDMA	28	14/2300, 2400	23.5	0.22	375D/1

[9]In development.

[18]Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

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

[44]Peak–to–Average Power Ratio = 8.5 dB

[46]To be introduced: a) 2Q06; b) 3Q06; c) 4Q06.

★New Product

Wideband RF Power Transistors

Table 1. Wideband RF Power

Product	Frequency Band[37]	MHz	P_{out} (Typ) Watts	Test Signal	V_{DD} Volts	Gain (Typ)/Freq. dB/MHz	η Eff. (Typ) %	θ_{JC} °C/W	Pkg/ Style
135–520 MHz									
MRF1513NT1[18f]	U	400–520	3 CW	1–Tone	7.5/12.5	11/520	55	4.0	466/1
MRF1511NT1[18f]	U	135–175	8 CW	1–Tone	7.5	11.5/175	55	2.0	466/1
MRF1518NT1[18f]	U	400–520	8 CW	1–Tone	12.5	11/520	55	2.0	466/1
MRF1535NT1[18j]	U	400–520	35 CW	1–Tone	12.5	10/520	50	0.90	1264/1
MRF1550NT1[18j]	U	135–175	50 CW	1–Tone	12.5	10/175	50	0.75	1264/1
MRF1570NT1[18j]	U	400–470	70 CW	1–Tone	12.5	10/470	50	0.75	1366/1
450–3000 MHz									
MW4IC001NR4[18f]	I	450–3000	1 CW	1–Tone	28	13/2170	60	27.3	466/1
MW6S004NT1[18f]★	U	450–2000	4 PEP	2–Tone	28	18/1960	33	8.8	466/1
MHVIC915NR2[18e]	I/O	700–1000	15 CW	1–Tone	26	31/880	56	5.0	978/–
MW6S010NR1[18a]	U	450–1600	16 PEP	2–Tone	28	18/960	32	2.85	1265/1
MW4IC915NBR1[18a]	I/O	700–1000	20 CW	1–Tone	26	30/960	44	1.7	1329/–
MRF9030NR1[18a]	U	450–1200	30 PEP	2–Tone	26	20/945	41	1.08	1265/1
MRF9045NR1[18a]	U	450–1000	45 PEP	2–Tone	26	19/945	41	0.85	1265/1
MRF9060NR1[18a]	U	450–1200	60 PEP	2–Tone	26	18/945	40	0.56	1265/1
MRF5S9070NR1[18a]	U	450–1200	70 CW	1–Tone	26	16/945	62	0.80	1265/1
MRF374A	U	450–860	130 PEP	2–Tone	32	17/860	41	0.58	375F/1
MRF6P3300HR3[18i]★	I/O	450–860	270 PEP	2–Tone	32	20.2/860	44.1	0.23	375G/1
1000–3500 MHz									
MRF21010LR1[18a]	U	1000–3500	10 CW	1–Tone	28	13.5/2170	42	5.5	360B/1
MRF6S20010NR1[18a]★	I	1600–2200	10 CW	1–Tone	28	15.5/2170	45	2.5	1265/1
MHV5IC2215NR2[18e]	I/O	1250–2500	10 CW	1–Tone	28	24/2140	45	3.5	978/–
MRF6S27015N[46a]	I	2000–2700	15 CW	W–CDMA	28	15.4/2300, 2400	45	2.0	1265/1
MW5IC2030NBR1[18a]	I/O	1700–2300	30 CW	1–Tone	28	23/1960	45	1.75	1329/–
MW6IC2240NBR1[18a]★	I/O	2050–2230	40 CW	1–Tone	28	28/2140	45	0.87	1329/–
MRF6S27050H[46a]	I/O	2000–2700	50 CW	W–CDMA	28	16/2300, 2400	45	0.85	465/1
MRF6S27085HR3[18i]	I/O	2600–2700	85 CW	1–Tone	28	15.5/2630, 2660	48	0.50	465/1
MRF6S23100HR3[18i]★	I/O	2200–2500	100 CW	1–Tone	28	15.4/2300, 2400	50	0.53	465/1
MRF6P27160HR6[18o]	I/O	2600–2700	160 CW	1–Tone	28	14.6/2630, 2660	48	0.29	375D/1
DC–5800 MHz									
MRFG35003NT1[18f]	U	DC–5800	3 AVG	W–CDMA[44]	12	11.5/3550	50	—	466/1
MRFG35005NT1[18f]	U	DC–5800	5 AVG	W–CDMA[44]	12	11/3550	50	—	466/1
MRFG35010NT1[18f]	U	DC–5800	10 AVG	W–CDMA[44]	12	10/3550	50	—	466/1

[18]Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

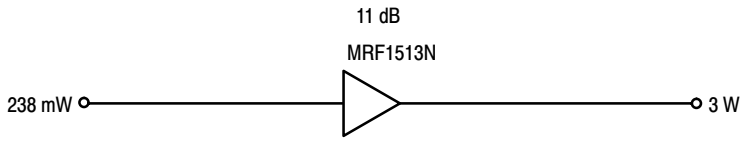
[37]U = Unmatched; I = Input; I/O = Input/Output.

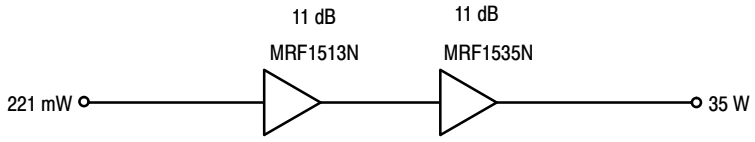
[44]Peak–to–Average Power Ratio = 8.5 dB

[46]To be introduced: a) 2Q06; b) 3Q06; c) 4Q06.

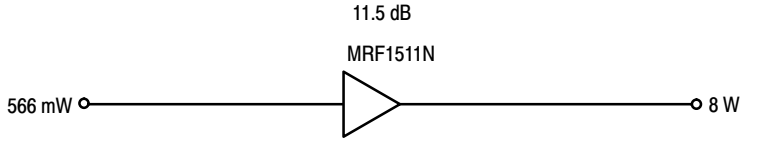
★New Product

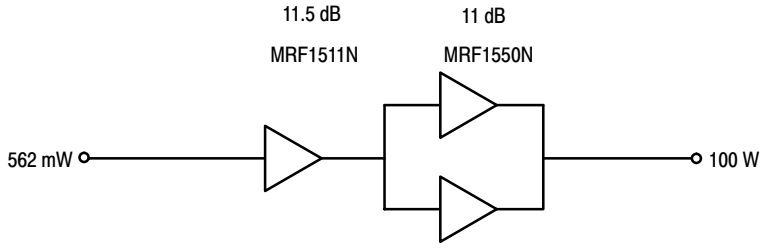
RF High Power Amplifier Line–ups



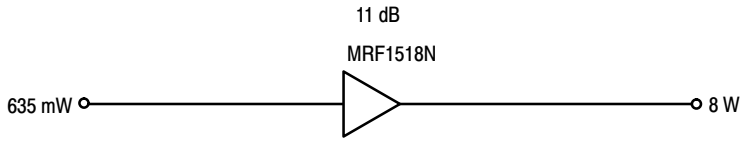


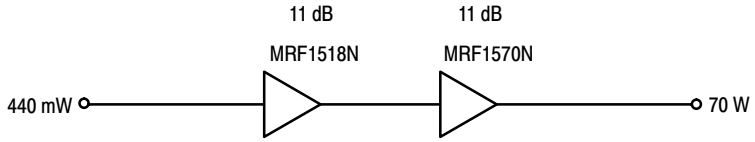
Mobile – UHF 400 – 520 MHz





Mobile – VHF 135 – 175 MHz

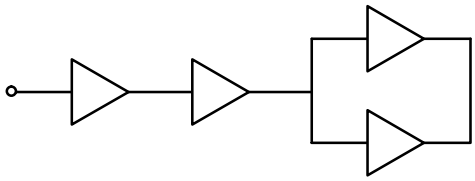




Mobile – UHF 400 – 470 MHz

RF High Power Amplifier Line–ups (continued)

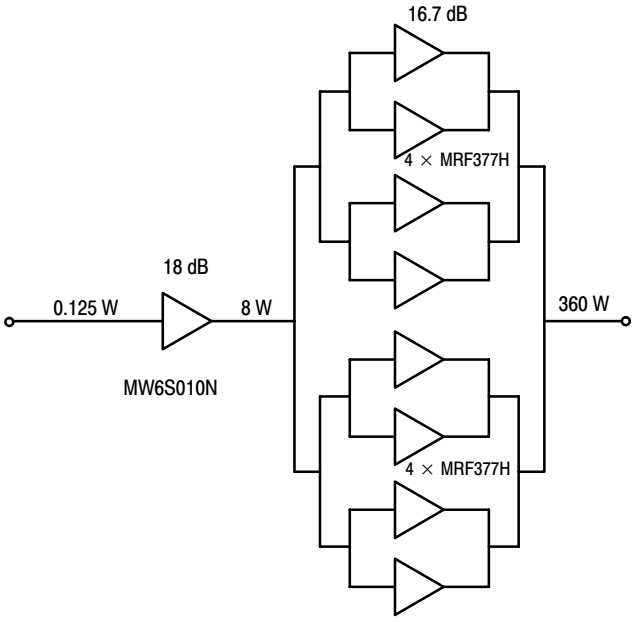
CDMA – 450 MHz



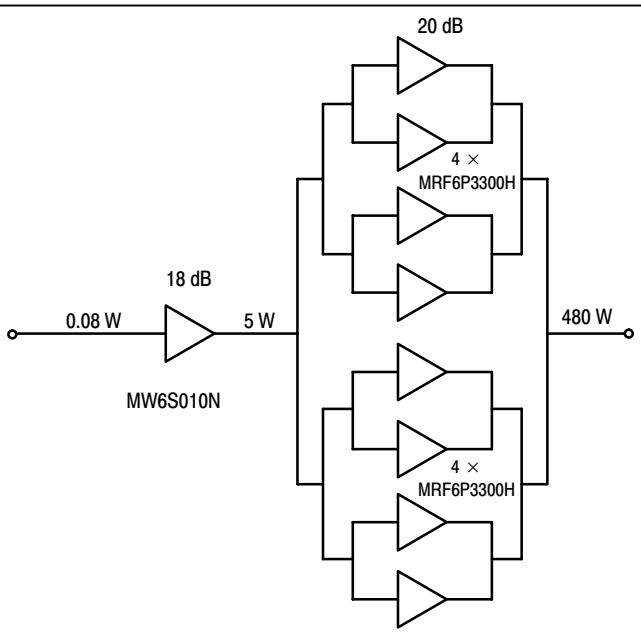
Ceramic	MRF373AL	MRF5S4140H MRF374A MRF372 MRF9210 MRF6P3300H

Plastic	MW6S004N MW6S010N	MRF9060N MRF5S9070N

RF High Power Amplifier Line–ups (continued)

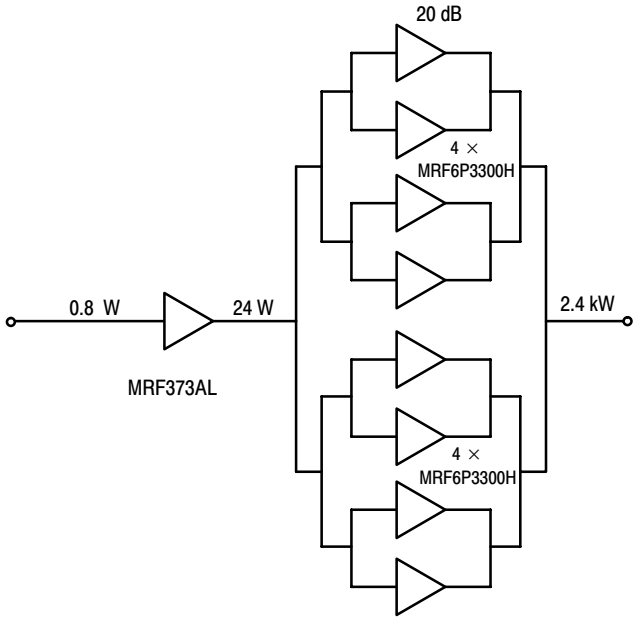


Broadcast 470 – 860 MHz – DVBT OFDM



Broadcast 470 – 860 MHz – DVBT OFDM

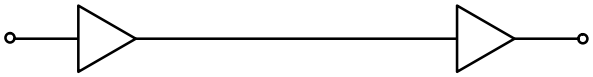
RF High Power Amplifier Line–ups (continued)



Broadcast 470 – 860 MHz – Analog

RF High Power Amplifier Line–ups (continued)

N–CDMA, GSM and EDGE – 900 MHz

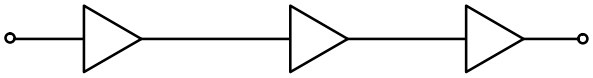


Ceramic	MRF9030	MRF9045L MRF9060L MRF9080L MRF9085L MRF9100L MRF9120L MRF6S9130H MRF5S9150H MRF6S9160H MRF9180 MRF9200L MRF6S9200H MRF9210 MRF6P9220H

Plastic	MW4IC001N MRF9002N MHVIC910H MW6S004N MW6S010N MHVIC915N MW4IC915NB/GNB MWIC930/G MRF9030N	MRF9045N MRF6S9045N MRF9060N MRF6S9060N MW5IC970N MRF5S9070N MRF5S9080N MRF5S9100N MRF5S9101N MRF6S9125N

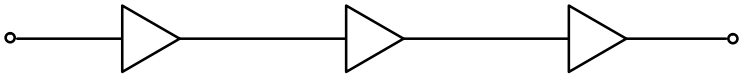
RF High Power Amplifier Line–ups (continued)

GSM and EDGE – 1800 MHz



Ceramic		MRF18030A	MRF18060AL MRF18085AL MRF18090A MRF7S18125AH MRF7S18170H MRF6P18190H
Hybrid	MHPA18010N		
Plastic	MW6S004N MHV5IC1810N MRF6S20010N MHVIC2114N MW6IC2015N MW4IC2020NB MW5IC2030NB MW6IC2015NB		MRF6S18060N MRF6S18100N

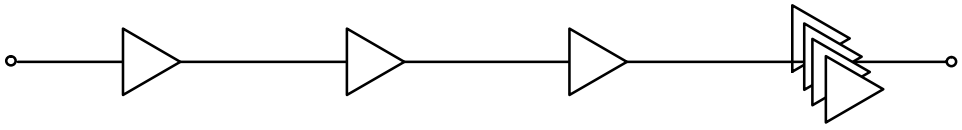
GSM and EDGE – 1900 MHz



Ceramic		MRF18030BL	MRF18060BL MRF18085BL MRF18090B MRF7S18125BH
Hybrid	MHPA19010N		
Plastic	MW6S004N MRF6S20010N MHV5IC2215N MW6IC2015N MW4IC2020NB MW5IC2030NB MW6IC2015NB	MW6IC1940N	MRF6S18060N MRF6S18100NB

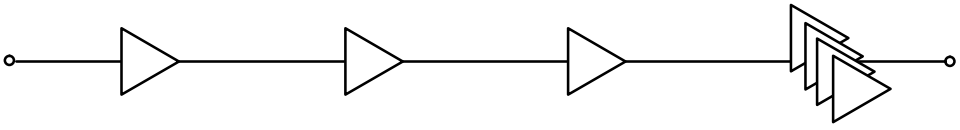
RF High Power Amplifier Line–ups (continued)

N–CDMA – 1900 MHz



Ceramic	MRF21010L	MRF19030L MRF19045L	MRF19060L MRF19085L MRF19090 MRF5S19090H	MRF5S19100H MRF6S19100H MRF6S19120H MRF19125 MRF5S19130H MRF6S19140H MRF5S19150H MRF7S19150H MRF7S19170H MRF5P20180H
Hybrid	MHPA19010N			
Plastic	MW6S004N MRF6S20010N MHV5IC2215N MW6IC2015NB MW4IC2020NB MW5IC2030NB		MW6IC1940N	MRF5S19060N MRF6S19060N MRF6S19100N MRF7S19100N

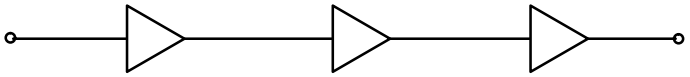
W–CDMA – 2200 MHz



Ceramic	MRF21010L	MRF21030L MRF21045L	MRF6S21050L MRF21060L MRF21085L MRF5S21090H MRF6S21100H MRF7S21100H MRF21120 MRF21125	MRF5S21130H MRF6S21140H MRF5S21150H MRF7S21170H MRF21180 MRF6P21190H MRF5P21240H
Hybrid		MHPA21010N		
Plastic		MRF6S20010N MHV5IC2215N MW4IC2230NB	MW6IC2240N MRF5S21045N	MRF6S21060N MRF6S21100N

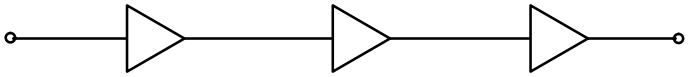
RF High Power Amplifier Line–ups (continued)

WiBro – 2400 MHz



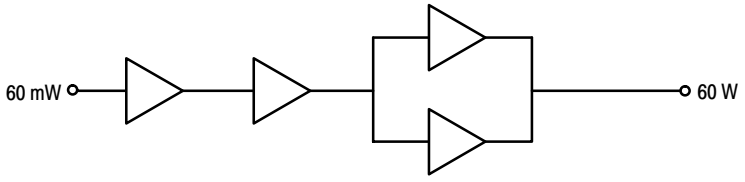
Ceramic	MRF21010L	MRF6S23100H MRF6S23140H MRF6P23190H
Plastic	MRFG35003AN MMG3005N MMG3014N MMH3101N MW6S004N	MRF6S20010N MRF6S27015N

MMDS – 2700 MHz



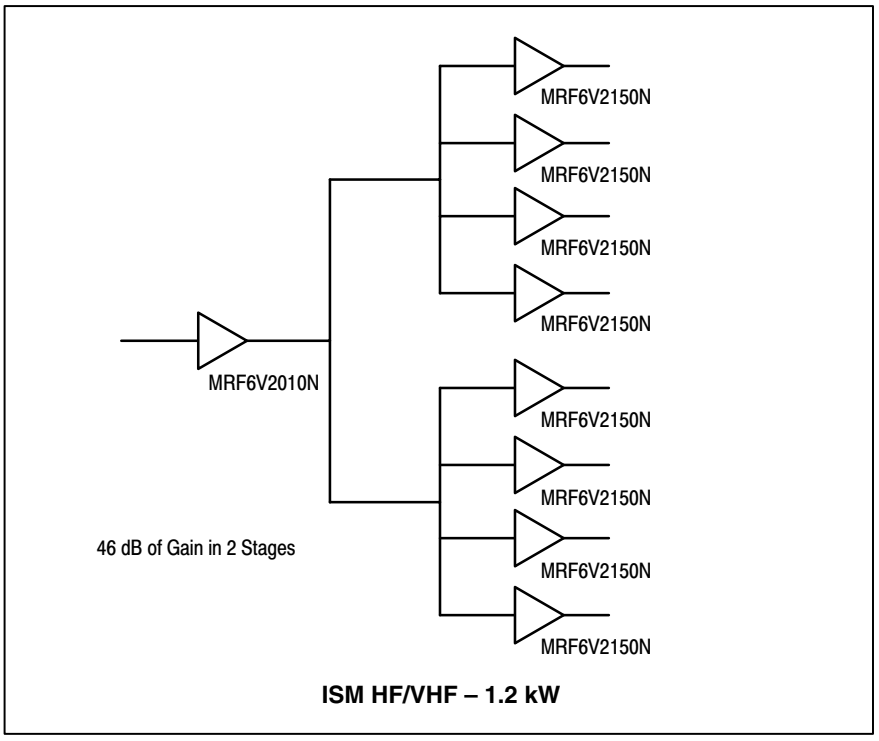
Ceramic	MRF6S27050H MRF6S27085H MRFG35020	MRF6S23140H MRF6P27160H
Plastic	MRFG35003AN MMG3005N MMG3014N MMH3101N	MRF6S27015N

WiMAX – 3400 – 3820 MHz

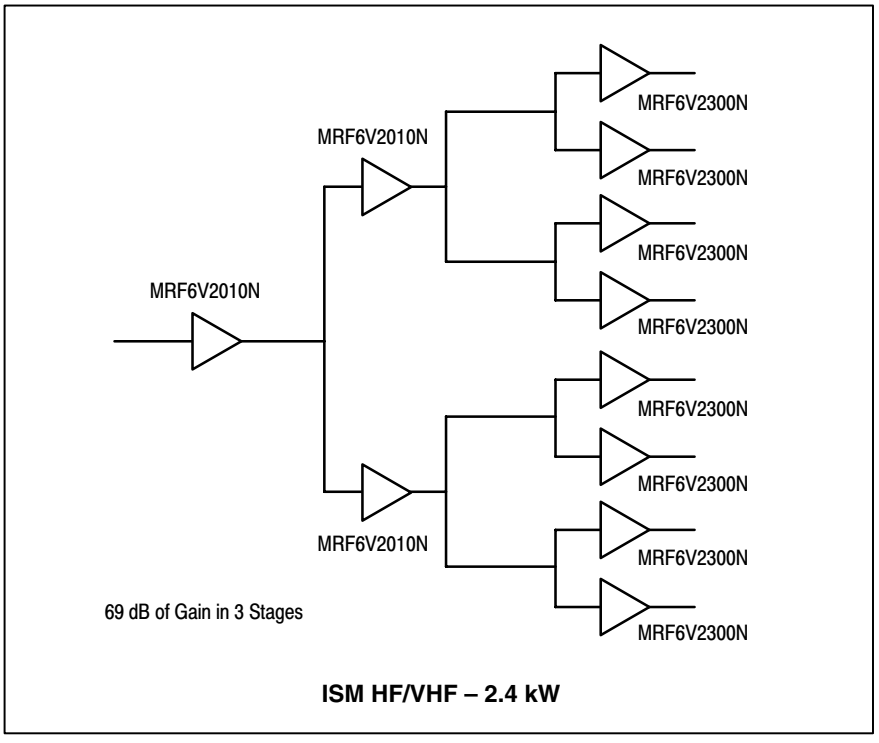


Ceramic	MRFG35010 MRFG35010A	
Plastic	MMG3005N MMG3014N MRFG35003N6 MRFG35003N MRFG35003AN	MRFG35005N MRFG35010AN MRFG35020

RF High Power Amplifier Line–ups (continued)

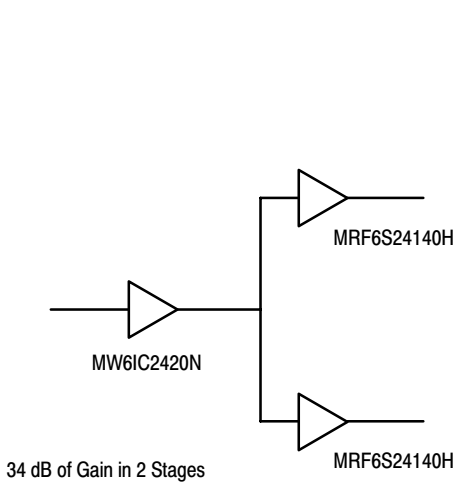


ISM HF/VHF – 1.2 kW

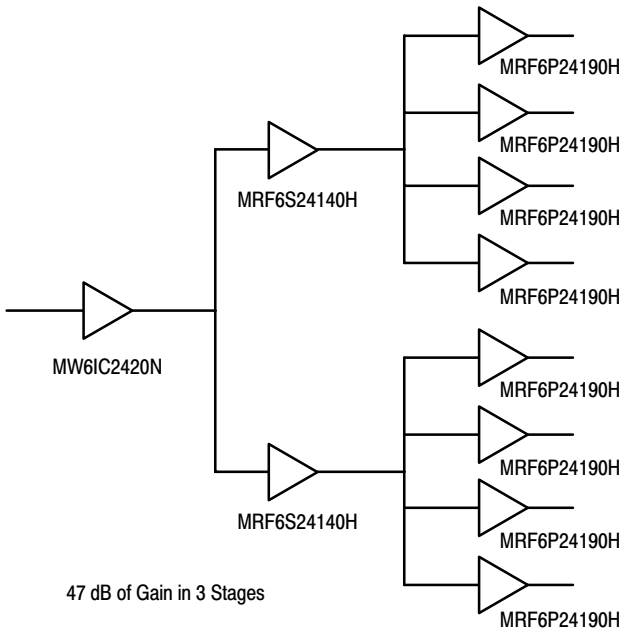


ISM HF/VHF – 2.4 kW

RF High Power Amplifier Line–ups (continued)

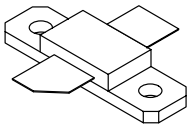


2.45 GHz ISM – 300 W

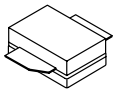


2.45 GHz ISM – 1.6 kW

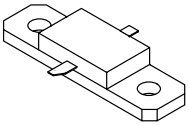
RF Transistor Packages



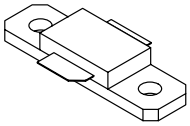
CASE 360B
STYLE 1
(NI-360)



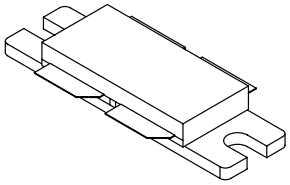
CASE 360C
STYLE 1
(NI-360S)



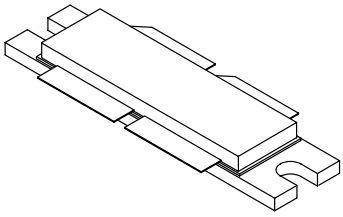
CASE 360D
STYLE 1
(NI-360HF)



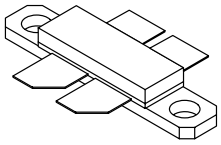
CASE 360E
STYLE 1
(NI-360 Short Lead)



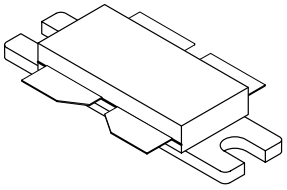
CASE 375B
STYLE 1
(NI-860)



CASE 375D
STYLE 1
(NI-1230)



CASE 375F
STYLE 1
(NI-650)

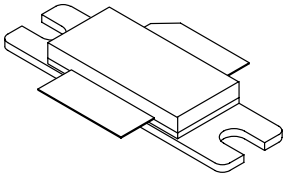


CASE 375G
STYLE 1
(NI-860C3)

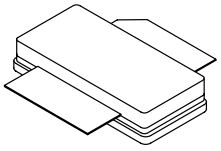
CASE 449
STYLE 1
(PLD-1)

CASE 458B
STYLE 1
(NI-200S)

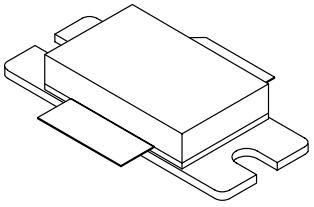
CASE 458C
STYLE 1
(NI-200Z)



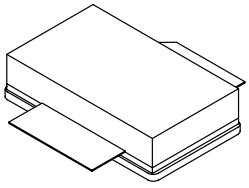
CASE 465
STYLE 1
(NI-780)



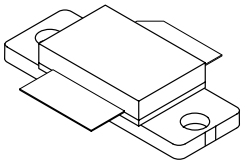
CASE 465A
STYLE 1
(NI-780S)



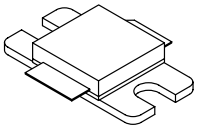
CASE 465B
STYLE 1
(NI-880)



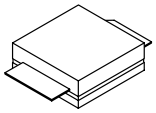
CASE 465C
STYLE 1
(NI-880S)



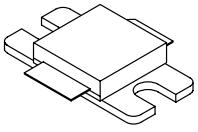
CASE 465D
STYLE 1
(NI-600)



CASE 465E
STYLE 1
(NI-400)



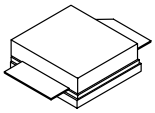
CASE 465F
STYLE 1
(NI-400S)



CASE 465I
STYLE 1
(NI-400-240)

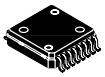
SCALE 1:1

RF Transistor Packages (continued)

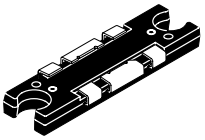


CASE 465J
STYLE 1
(NI-400S-240)

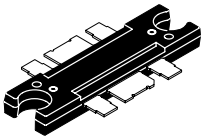
CASE 466
STYLE 1
PLASTIC
(PLD-1.5)



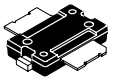
CASE 978
PLASTIC
(PFP-16)



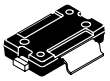
CASE 1264
STYLE 1
PLASTIC
(TO-272-6 Wrap)



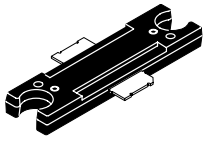
CASE 1264A
STYLE 1
PLASTIC
(TO-272-6)



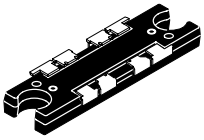
CASE 1265
STYLE 1
PLASTIC
(TO-270-2)



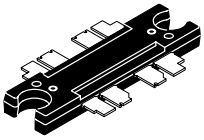
CASE 1265A
STYLE 1
PLASTIC
(TO-270-2 Gull)



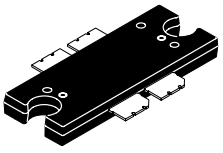
CASE 1337
STYLE 1
PLASTIC
(TO-272-2)



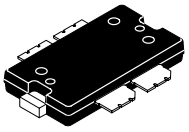
CASE 1366
STYLE 1
PLASTIC
(TO-272-8 Wrap)



CASE 1366A
STYLE 1
PLASTIC
(TO-272-8)



CASE 1484
STYLE 1
PLASTIC
(TO-272 WB-4)



CASE 1486
STYLE 1
PLASTIC
(TO-270 WB-4)

SCALE 1:1

RF Amplifier ICs and Modules

Freescale Semiconductor's RF portfolio includes IC designs optimized for wideband applications. For PA designers, IC driver devices offer the benefits of multiple gain stages in one package with most of the decoupling and matching circuitry incorporated into a single low–cost plastic device.

Freescale WLAN and WiMAX amplifier ICs are designed to address the high efficiency and high linearity requirements of 802.11 WLAN and 802.16 WiMAX amplifier applications. These devices feature built–in detectors, attenuators and bias compensation circuitry that gives the customer the best combination of performance and ease of use.

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RF Amplifier ICs and Modules

Complete amplifiers with 50 ohm input impedances are available for all popular base station transmitter systems, including GSM and CDMA, covering frequencies from 800 MHz up to 2.2 GHz.

Base Stations

Designed for applications such as macrocell drivers and microcell output stage, these Class AB amplifiers are ideal for base station systems with power requirements up to 30 watts.

Table 1. Base Station IC Drivers — Class AB

Product	Frequency MHz	P1dB Watts	Gain (Typ) dB	Supply Voltage Volts	System Application	Die Technology	Pkg/Style
MHVIC915NR2[18e]	746–960	15	30	26	N–CDMA, GSM/GSM EDGE	LDMOS	978/–
MWIC930NR1[18a]	746–960	30	30	27	N–CDMA, GSM/GSM EDGE	LDMOS	1329/–
MWIC930GNR1[18a]	746–960	30	30	27	N–CDMA, GSM/GSM EDGE	LDMOS	1329A/–
MW4IC915NBR1[18a]	860–960	15	30	26	N–CDMA, GSM/GSM EDGE	LDMOS	1329/–
MW4IC915GNBR1[18a]	860–960	15	30	26	N–CDMA, GSM/GSM EDGE	LDMOS	1329A/–
MW4IC001NR4[18n]	880–2170	0.85	13	28	N–CDMA, W–CDMA, GSM/GSM EDGE	LDMOS	466/1
MHVIC910HNR2[18e]	921–960	10	39	26	GSM900	LDMOS	978/–
MHV5IC1810NR2[18e]★	1805–1990	10	29	28	GSM/GSM EDGE	LDMOS	978/–
MW6IC2015NBR1[18a]★	1805–1990	15	26	26	GSM/GSM EDGE N–CDMA, W–CDMA	LDMOS	1329/–
MW6IC2015GNBR1[18a]★	1805–1990	15	26	26	GSM/GSM EDGE N–CDMA, W–CDMA	LDMOS	1329A/–
MW4IC2020NBR1[18a]	1805–1990	20	29	26	N–CDMA, GSM/GSM EDGE	LDMOS	1329/–
MW4IC2020GNBR1[18a]	1805–1990	20	29	26	N–CDMA, GSM/GSM EDGE	LDMOS	1329A/–
MHV5IC2215NR2[18e]	1930–1990	15	27.5	28	N–CDMA	LDMOS	978/–
	2130–2170	15	24	28	W–CDMA	LDMOS	978/–

[18]Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

★New Product

Table 1. Base Station IC Drivers — Class AB (continued)

Product	Frequency MHz	P1dB Watts	Gain (Typ) dB	Supply Voltage Volts	System Application	Die Technology	Pkg/Style
MW5IC2030NBR1[18a]	1930–1990	30	23	27	GSM/GSM EDGE, W–CDMA, PHS	LDMOS	1329/–
MW5IC2030GNBR1[18a]	1930–1990	30	23	27	GSM/GSM EDGE, W–CDMA, PHS	LDMOS	1329A/–
MW6IC1940NB[46b]	1920–2000	40	27	28	W–CDMA	LDMOS	1329/–
MW6IC1940GNB[46b]	1920–2000	40	27	28	W–CDMA	LDMOS	1329A/–
MHVIC2115NR2[18e]	2110–2170	15	34	26	W–CDMA	LDMOS	978/–
MHVIC2114NR2[18e]	2110–2170	15	32	27	W–CDMA	LDMOS	978/–
MW4IC2230NBR1[18a]	2110–2170	30	31.5	28	W–CDMA	LDMOS	1329/–
MW4IC2230GNBR1[18a]	2110–2170	30	31.5	28	W–CDMA	LDMOS	1329A/–
MW6IC2240NBR1[18a]★	2110–2170	40	28	28	W–CDMA	LDMOS	1329/–
MW6IC2240GNBR1[18a]★	2110–2170	40	28	28	W–CDMA	LDMOS	1329A/–

Table 2. Base Station Module Drivers — Class AB

Designed for applications such as macrocell drivers and microcell output stage, these Class AB amplifiers are ideal for base station systems with power requirements up to 10 watts.

Product	Frequency MHz	P1dB Watts	Gain (Min) dB	Supply Voltage Volts	System Application	Die Technology	Pkg/Style
MHPA18010N	1805–1880	10	24.5	28	N–CDMA	LDMOS	301AP/3
MHPA19010N	1930–1990	10	24.5	28	PCS1900	LDMOS	301AP/3
MHPA21010N	2110–2170	10	23.7	28	W–CDMA	LDMOS	301AP/3

[18]Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

[46]To be introduced: a) 2Q06; b) 3Q06; c) 4Q06.

★New Product

WLAN and WiMAX CPE Amplifiers

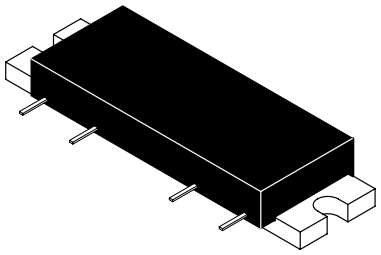
Table 1. Wireless LAN and WiMAX CPE Amplifiers — Class AB

Product	Frequency Band MHz	Supply Voltage (Typ) Volts	Total Quiescent Current (Typ) mA	I_{total} (Typ)/P_{out} mA/dBm	Gain (Typ)/P_{out} dB/dBm	P_{1dB} (Typ) dBm	EVM (Typ)/P_{out} %rms/dBm	Die Technology	Pkg/ Style
MMG2401NR2[18e]	2400–2500	3.3	156	210/19	27.5/19	26.5	3/19	GaAs HBT	1483/–
MMG5004N[46a]	4900–5900	3.3	105	200/18	24/18	23	3/18	GaAs HBT	1483/–
MME3501N[46a]	3400–3600	6	200	350/24	27/24	—	2.5/24	EMODE	1572/–

[18]Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

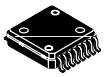
[46]To be introduced: a) 2Q06; b) 3Q06; c) 4Q06.

RF Amplifier ICs and Modules Packages

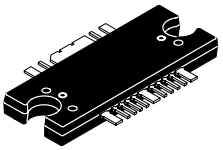


CASE 301AP
STYLE 3

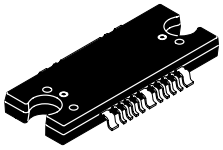
CASE 466
STYLE 1
PLASTIC
(PLD-1.5)



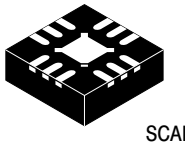
CASE 978
PLASTIC
(PFP-16)



CASE 1329
STYLE 1
PLASTIC
(TO-272 WB-16)

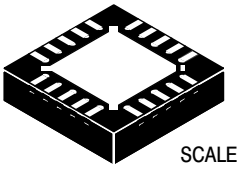


CASE 1329A
STYLE 1
PLASTIC
(TO-272 WB-16 Gull)



SCALE 4:1

CASE 1483
(QFN 3x3)
PLASTIC



SCALE 4:1

CASE 1572
(MLF 4x4)

SCALE 1:1

RF General Purpose Amplifiers

Freescale Semiconductor general purpose amplifiers are designed to address a broad range of general purpose RF and IF applications where linearity and dynamic range are essential.

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RF General Purpose Amplifiers

These devices have been optimized for 50 ohm applications and are designed for multi–purpose applications where linearity and dynamic range are of primary concern.

Table 1. General Purpose Amplifiers — Class A — GaAs HFET, InGaP HBT

Product	Frequency Band MHz	Supply Voltage (Typ) Volts	Supply Current (Typ) mA	Small Signal Gain (Typ) @ 900 MHz dB	P_{1dB} (Typ) @ 900 MHz dBm	3rd Order Intercept (Typ) dBm	NF (Typ) @ 900 MHz dB	θ_{JC} °C/W	Pkg/Style
MMG3001NT1(18f)	40–3600	5.6	58	20	18.5	32	4.1	92	1514/1
MMG3002NT1(18f)	40–3600	5.2	110	20	21	37.5	4.2	46.5	1514/1
MMG3003NT1(18f)	40–3600	6.2	180	20	24	40.5	4	31.6	1514/1
MMG3004NT1(18f)★	400–2400	5	250	16*	27*	44*	3.4*	33	1543/–
MMG3005NT1(18f)★	800–2200	5	480	15*	30*	47*	5*	21.5	1543/–
MMG3006NT1(9)	400–2400	5	800	14*	33*	51*	5*	—	1543/–
MMG3007NT1(18f)	0–6000	5	47	19	16	30	3.8	77	1514/1
MMG3008NT1(18f)	0–6000	5	38	18.5	15	26	4	84	1514/1
MMG3009NT1(18f)	0–6000	5	70	15	18	34	4.2	81	1514/1
MMG3010NT1(18f)	0–6000	5	54	15	17	31	4.5	83	1514/1
MMG3011NT1(18f)	0–6000	5	41	15	15	28	4.6	83	1514/1
MMG3012NT1(18f)	0–6000	5	70	19	18.5	34	3.8	85	1514/1
MMG3013NT1(18f)	0–6000	5	90	20	20.5	36	4	42	1514/1
MMG3014NT1(9)	0–4000	5	160	20	24	40.5	4	—	1514/1
MMG3015NT1(46b)	0–6000	5	95	15.5	21	37	4.5	—	1514/1
MMG3016NT1(9)	0–4000	5	160	15	24	40.5	4.5	—	1514/1
MMH3101NT1(46b)	250–3000	5	160	12*	21.5*	41*	2.5*	—	1514/2
MMH3107N(9)	60–3000	5	80	14	18	39	2.5	—	1514/2
				*@ 2140 MHz	*@ 2140 MHz	*@ 2140 MHz	*@ 2140 MHz		

Table 2. General Purpose Amplifiers — Class A — Silicon Bipolar

Product	Frequency Band MHz	V_{CC} (Typ) Volts	I_{CC} (Typ) mA	Gain (Typ) @ 100 MHz dB	Gain Flatness (Typ) dB	P_{1dB} (Typ) @ 200 MHz dBm	3rd Order Intercept (Typ) dBm	NF (Typ) @ 200 MHz dB	Pkg/Style
MHW1345N	10–200	24	310	34.5	1.0	28	44	3.8	1302/1

Note: Possible replacement for CA2830C.

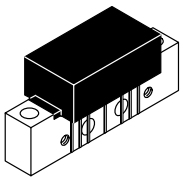
(9)In development.

(18)Tape and Reel Packaging Options: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units; i) R3 = 250 units; j) T1 = 500 units; k) R2 = 450 units; l) T1 = 5,000 units; m) R2 = 2,000 units; n) R4 = 100 units; o) R6 = 150 units; p) R5 = 50 units.

(46)To be introduced: a) 2Q06; b) 3Q06; c) 4Q06.

★New Product

RF General Purpose Amplifiers Packages

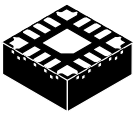


CASE 1302
STYLE 1

SCALE 1:2

CASE 1514
STYLE 1, 2
PLASTIC
(SOT−89)

SCALE 2:1



CASE 1543
PLASTIC
(PQFN 5x5)

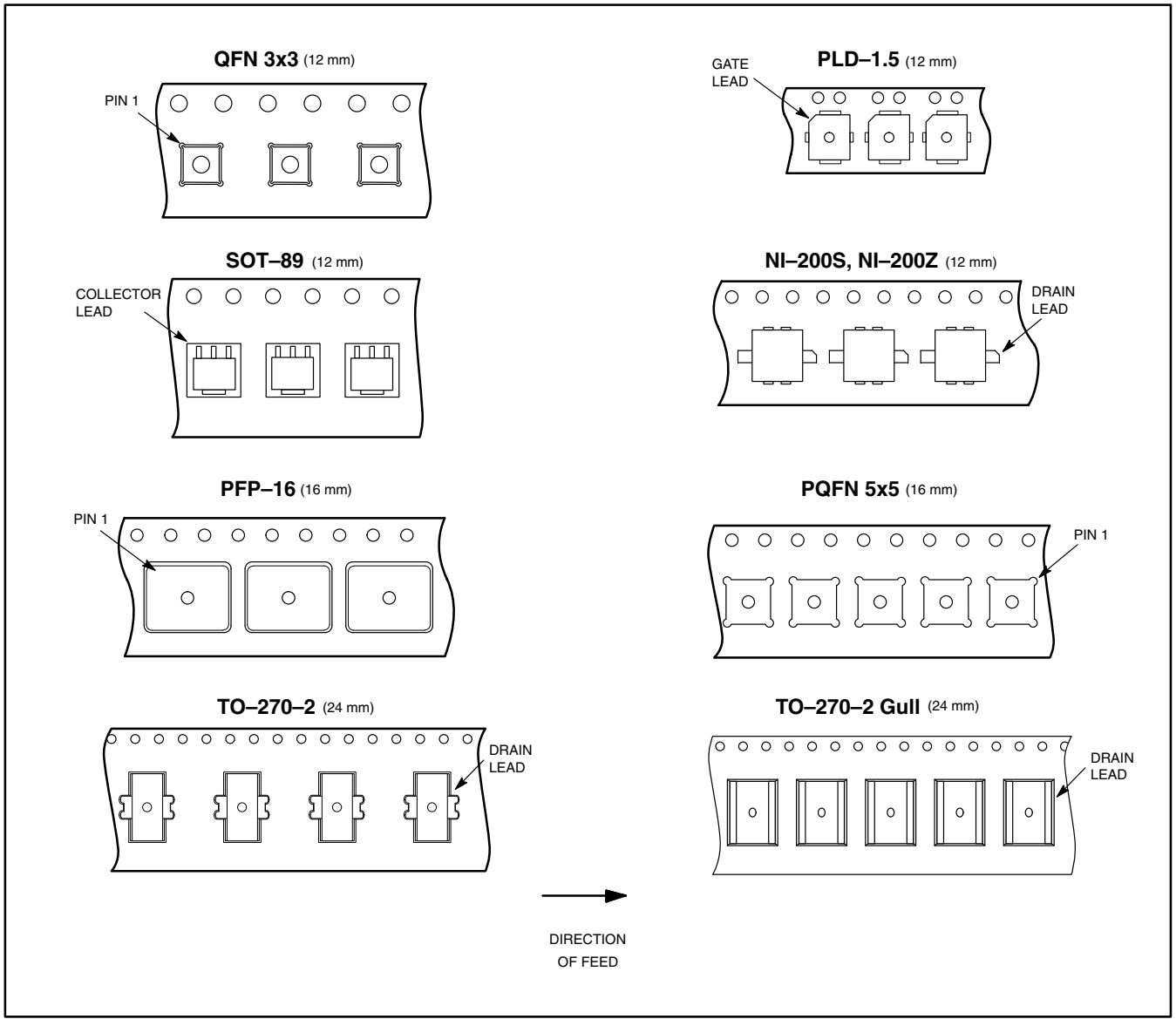
SCALE 2:1

RF Tape and Reel Specifications

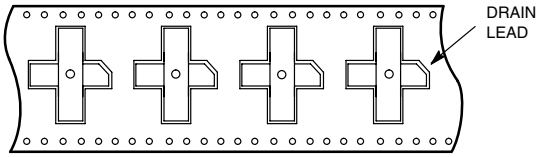
Embossed Tape and Reel is used to facilitate automatic pick and place equipment feed requirements. The tape is used as the shipping container for various products and requires a minimum of handling. The antistatic/conductive tape provides a secure cavity for the product when sealed with the “peel–back” cover tape.

- Two Reel Sizes Available (7″ and 13″)
- Used for Automatic Pick and Place Feed Systems
- Minimizes Product Handling
- EIA 481, –1, –2
- SOT–363 in 8 mm Tape
- PLD–1.5, NI–200S, NI–200Z, QFN 3x3, SOT–89 in 12 mm Tape
- PFP–16, PQFN 5x5 in 16 mm Tape
- TO–270–2, TO–270–2 Gull in 24 mm Tape
- NI–360, NI–360HF, NI–360S, NI–400, NI–400S, NI–600 in 32 mm Tape
- TO–270 WB–4, TO–272–2, TO–272–6 Wrap, TO–272–6, TO–272–8 Wrap, TO–272–8, TO–272 WB–4, TO–272 WB–16 in 44 mm Tape
- NI–780, NI–780S, NI–860, NI–880, NI–880S, NI–1230 in 56 mm Tape

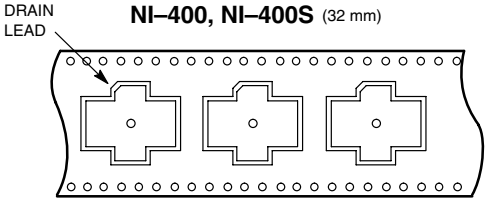
Use the standard device title and add the required suffix as listed in the option table on the following page. Note that the individual reels have a finite number of devices depending on the type of product contained in the tape. Also note the minimum lot size is one full reel for each line item, and orders are required to be in increments of the single reel quantity.



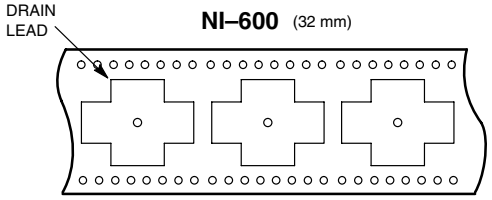
NI–360, NI–360HF, NI–360S (32 mm)



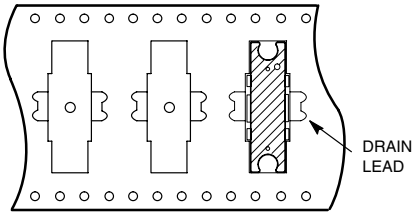
NI–400, NI–400S (32 mm)



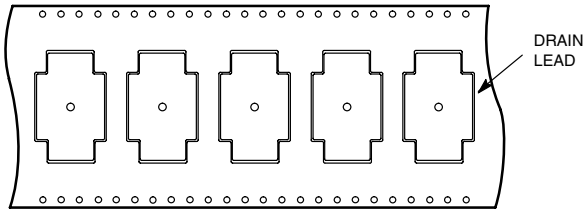
NI–600 (32 mm)



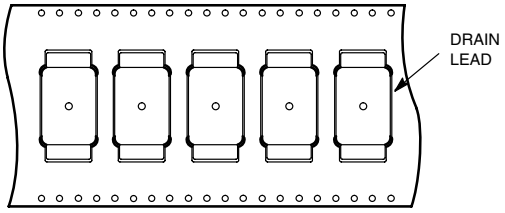
TO–272–2, TO–272–6 Wrap, TO–272–6, TO–272–8, TO–272–8 Wrap (44 mm)



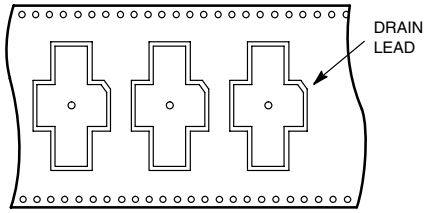
TO–270 WB–4, TO–272 WB–4, TO–272 WB–16 (44 mm)



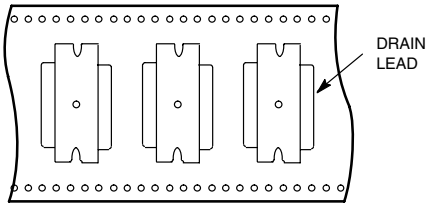
TO–272 WB–16 Gull (44 mm)

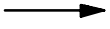


NI–780, NI–780S (56 mm)



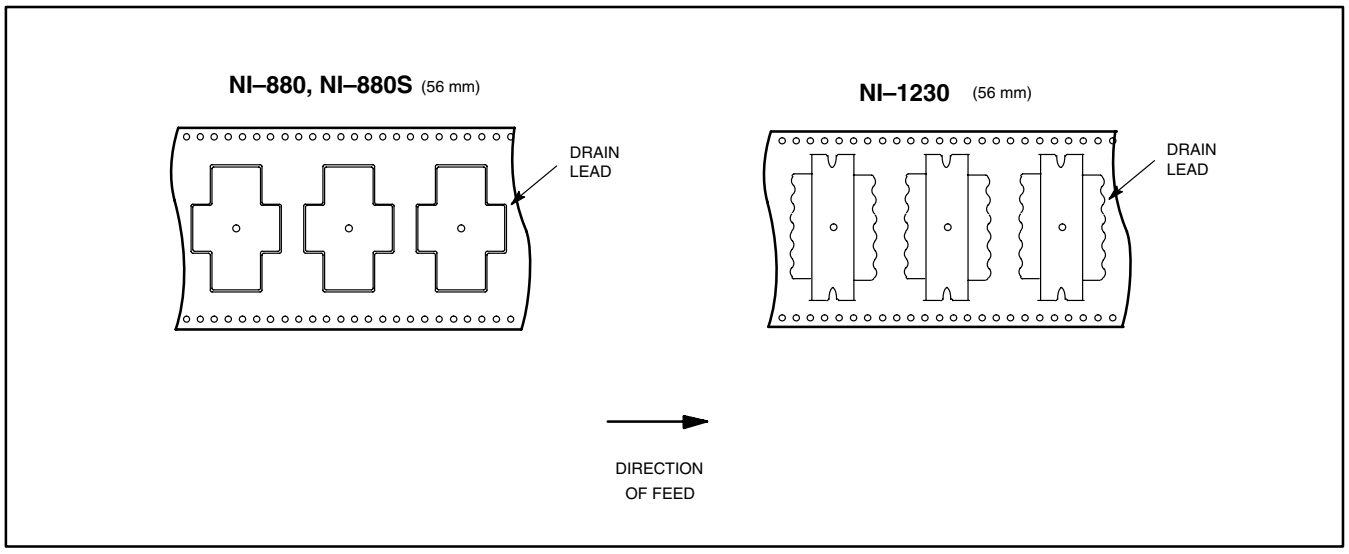
NI–860 (56 mm)





DIRECTION
OF FEED

,

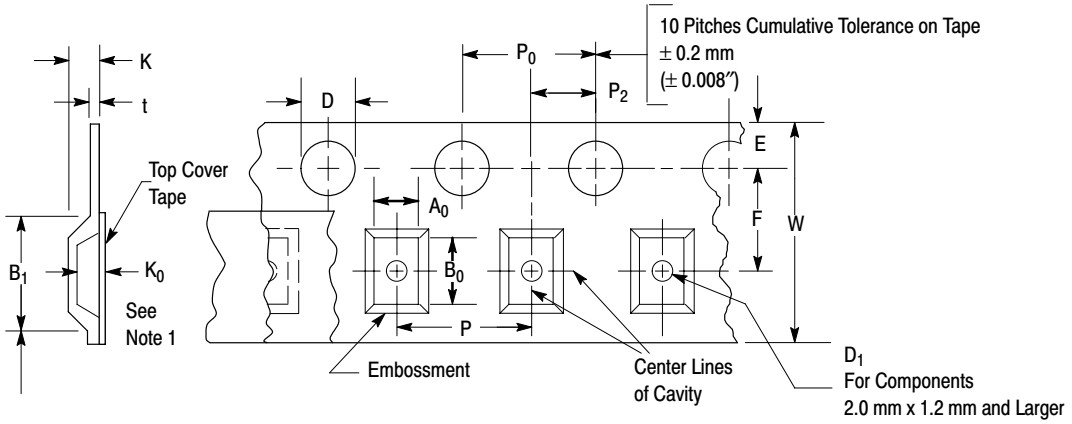

NI–880, NI–880S (56 mm)
DRAIN
LEAD
NI–1230 (56 mm)
DRAIN
LEAD
DIRECTION
OF FEED

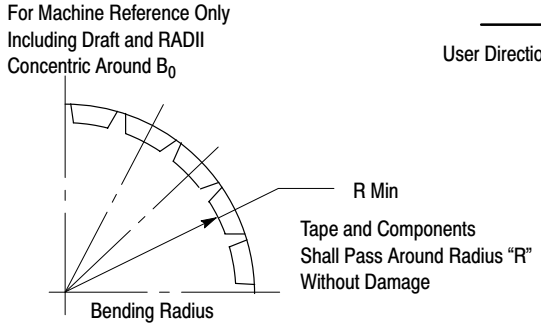
RF EMBOSSED TAPE AND REEL ORDERING INFORMATION

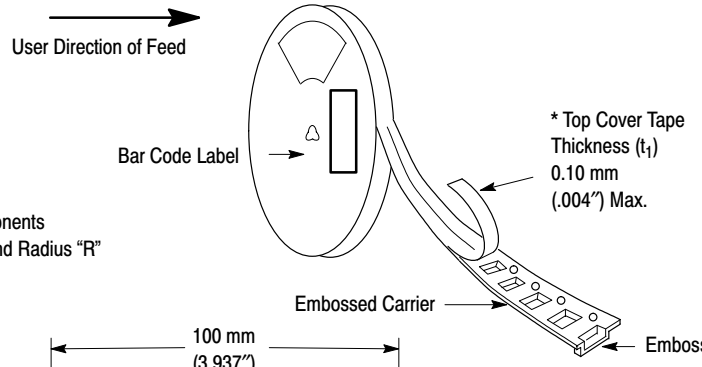
Package	Tape Width (mm)	Pitch mm (inch)	Reel Size mm (inch)	Devices Per Reel and Minimum Order Quantity	Device Suffix
NI–200S (458B)	12	12.0 ± 0.1 (.471 ± .004)	178 (7)	500	R1
NI–200Z (458C)	12	12.0 ± 0.1 (.471 ± .004)	178 (7)	500	R1
NI–360 (360B)	32	24.0 ± 0.1 (.945 ± .004)	330 (13)	500	R1
NI–360HF (360D)	32	24.0 ± 0.1 (.945 ± .004)	330 (13)	500 50	R1 R5
NI–360S (360C)	32	24.0 ± 0.1 (.945 ± .004)	330 (13)	500	R1
NI–400 (465E)	32	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI–400S (465F)	32	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI–600 (465D)	32	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI–780 (465)	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI–780S (465A)	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI–860 (375B, 375G) NI–860 (375G)	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–880 (465B)	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI–880S (465C)	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	250	R3
NI–1230 (375D)	56	32.0 ± 0.1 (1.26 ± .004)	330 (13)	150	R6
PLD–1.5 (466)	12 12	8.0 ± 0.1 (.315 ± .004) 8.0 ± 0.1 (.315 ± .004)	178 (7) 178 (7)	1,000 100	T1 R4
PFP–16	16	12.0 ± 0.1 (.472 ± .004)	330 (13)	1,500	R2
PQFN 5x5 (1543)	16	8.0 ± 0.1 (.315 ± .004)	330 (13)	1,000	T1
QFN 3x3 (1483)	12	8.0 ± 0.1 (.315 ± .004)	178 (7)	1,500	R2
SOT–89 (1514)	12	8.0 ± 0.1 (.315 ± .004)	178 (7)	1,000	T1
SOT–363	8	4.0 ± 0.1 (.157 ± .004)	178 (7)	3,000	T1
TO–270–2 (1265)	24	16.0 ± 0.1 (.631 ± .004)	330 (13)	500	R1
TO–270–2 Gull (1265A)	24	12.0 ± 0.1 (.471 ± .004)	330 (13)	500	R1
TO–270 WB–4 (1486)	44	20.0 ± 0.1 (.788 ± .004)	330 (13)	500	R1
TO–272–6 Wrap (1264), TO–272–6 (1264A)	44	16.0 ± 0.1 (.631 ± .004)	330 (13)	500	T1
TO–272–8 Wrap (1366), TO–272–8 (1366A)	44	20.0 ± 0.1 (.787 ± .004)	330 (13)	500	T1
TO–272–2 (1337)	44	16.0 ± 0.1 (.631 ± .004)	330 (13)	500	R1
TO–272 WB–16 (1329)	44	20.0 ± 0.1 (.788 ± .004)	330 (13)	500	R1
TO–272 WB–16 Gull (1329A)	44	16.0 ± 0.1 (.631 ± .004)	330 (13)	500	R1
TO–272 WB–4 (1484)	44	20.0 ± 0.1 (.788 ± .004)	330 (13)	500	R1

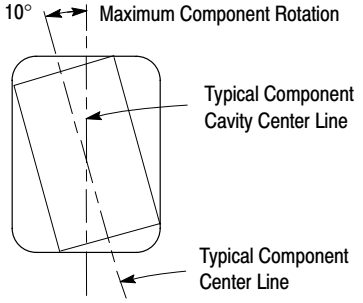
EMBOSSED TAPE AND REEL DATA FOR DISCRETES

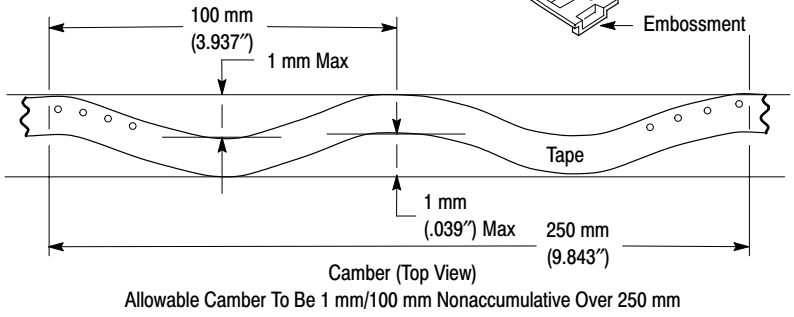
CARRIER TAPE SPECIFICATIONS











DIMENSIONS

Tape Size	B_1 Max	D	D_1	E_1	F	K	P_0	P_2	R Min	t Max	W Max
12 mm	8.2 mm (.323″)	1.5+0.1 mm −0.0 (.059+.004″ −0.0)	1.5 mm Min (.060″)	1.75±0.1 mm (.069±.004″)	5.5±0.05 mm (.217±.002″)	6.4 mm Max (.252″)	4.0±0.1 mm (.157±.004″)	2.0±0.1 mm (.079±.004″)	30 mm (1.18″)	0.4 mm (.016″)	12±.30 mm (.470±.012″)
	4.0 mm (.157″) QFN 3x3					1.2 mm Max (.048″) QFN 3x3		2.0±0.5 mm (.079±.002″)		0.30 mm (.012″)	
	5.1 mm (.201″) SOT-89		1.7 mm Min (.068″) SOT-89			1.9 mm Max (.076″) SOT-89					12±.2 mm (.470±.008″) SOT-89
16 mm	12.1 mm (.476″)		1.5 mm Min (.060″)		7.5±0.10 mm (.295±.004″)	7.9 mm Max (.311″)		2.0±0.1 mm (.079±.004″)		0.4 mm (.016″)	16±.3 mm (.642±.008″)
	6.1 mm (.241″) PQFN 5x5					2.8 mm Max (.110″) PQFN 5x5	4.0±0.2 mm (.157±.001″) PQFN 5x5	2.0±0.5 mm (.079±.002″) PQFN 5x5		0.30 mm (.012″) PQFN 5x5	
24 mm	20.1 mm (.791″)				11.5±0.1 mm (.453±.004″)	11.9 mm Max (.468″)	4.0±0.1 mm (.157±.004″)	2.0±0.1 mm (.079±.004″)		0.4 mm (.016″)	24.3 mm (.957″)
	11.1 mm (437″) TO-270-2 Gull					2.82 mm Max (.111″) TO-270-2 Gull				0.338 mm (.013″) TO-270-2 Gull	
32 mm	23.0 mm (.906″)		1.5 mm Min (.059″)		14.2±0.1 mm (.559 ±.004″)	4.6 mm (.181″) NI-360/HF/S			50 mm (1.969″)	0.6 mm (.024″)	32.2 mm (1.272″)
						4.3 mm (.169″) NI-400/S					
						5.34 mm (.210″) NI-600/S					
44 mm	35.0 mm (1.378″)		2.0 mm Min (.079″)		11.5±0.1 mm (.453±.004″)	15.9 mm Max (.625″)		2.0±0.15 mm (.079±.006″)			44±.30 mm (1.732±.012″)
	24.0 mm (.946″) TO-272 WB-4, TO-270 WB-4 TO-272 WB-16				20.2±0.15 mm (0.796±.006″)	2.92 mm (.115″) TO-272 WB-4, TO-272 WB-16	20.0±0.1 mm (.788±.004″) TO-272 WB-4, TO-272 WB-16			.318 mm (.012″) TO-272 WB-4, TO-272 WB-16	
	23.77 mm (.936″) TO-272 WB-16 Gull					3.20 mm (.126″) TO-272 WB-16 Gull	16.0±0.1 mm (.630±.004″) TO-272 WB-16 Gull			.343 mm (.013″) TO-272 WB-16 Gull	

Metric dimensions govern — English are in parentheses for reference only.

NOTE 1: A_0, B_0, and K_0 are determined by component size. The clearance between the components and the cavity must be within .05 mm min. to .50 mm max., the component cannot rotate more than 10° within the determined cavity.

NOTE 2: Pitch information is contained in the Embossed Tape and Reel Ordering Information on pg. 48.

DIMENSIONS (continued)

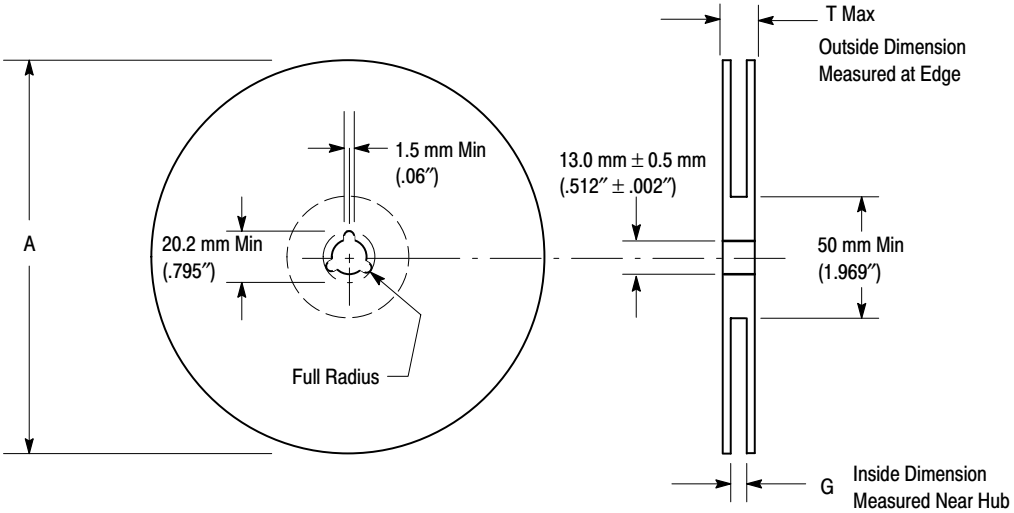
Tape Size	B_1 Max	D	D_1	E_1	F	K	P_0	P_2	R Min	t Max	W Max
56 mm	34.7 mm (1.366″) NI-780/S NI-860 NI-880/S	1.5+0.1 mm -0.0 (.059+.004″ -0.0)	2.0 mm Min (.079″)	1.75±0.1 mm (.069±.004″)	26.2 ±0.15 mm (1.031±.006″)	4.5 mm (0.177″) NI-780/S	4.0±0.1 mm (.157±.004″)	2.0±0.15 mm (.079±.006″)		0.6 mm (.024″) NI-780/S NI-860 NI-880/S NI-1230	56±.30 mm (2.205± .012″)
						5.0 mm (0.197″) NI-860					
						5.23 mm (0.206″) NI-880/S					
	41.6 mm (1.638″) NI-1230					5.2 mm (0.205″) NI-1230					

Metric dimensions govern — English are in parentheses for reference only.

NOTE 1: A_0, B_0, and K_0 are determined by component size. The clearance between the components and the cavity must be within .05 mm min. to .50 mm max., the component cannot rotate more than 10° within the determined cavity.

NOTE 2: Pitch information is contained in the Embossed Tape and Reel Ordering Information on pg. 48.

EMBOSSED TAPE AND REEL DATA FOR DISCRETES



Size	A Max	G	T Max
12 mm	330 mm (12.992″)	12.4 mm + 2.0 mm, –0.0 (.49″ + .079″, –0.00)	18.4 mm (.72″)
12 mm QFN 3x3	178 mm (7″)	12.4 mm + 2.0 mm, –0.0 (.49″ + .079″, –0.00)	18.4 mm (.72″)
12 mm SOT–89	178 mm (7″)	13.5 mm (.53″)	16.5 mm (.65″)
16 mm	330 mm (14.173″)	16.4 mm + 2.0 mm, –0.0 (.646″ + .078″, –0.00)	22.4 mm (.882″)
16 mm PQFN 5x5	360 mm (14.173″)	16.4 mm + 2.0 mm, –0.0 (.646″ + .078″, –0.00)	22.4 mm (.882″)
24 mm	360 mm (14.173″)	24.4 mm + 2.0 mm, –0.0 (.961″ + .070″, –0.00)	30.4 mm (1.197″)
24 mm TO–270–2 Gull	330 mm (12.992″)	24.4 mm + 2.0 mm, –0.0 (.961″ + .070″, –0.00)	30.4 mm (1.197″)
32 mm	360 mm (14.163″)	32.4 mm + 2.0 mm, –0.0 (1.276″+ 0.79″, –0.00)	38.4 mm (1.512″)
44 mm	330 mm (12.992″)	44.4 mm + 2.0 mm, –0.0 (1.748″+ 0.79″, –0.00)	50.4 mm (1.984″)
44 mm TO–270 WB–4, TO–272 WB–4, WB–16, WB–16 Gull	330 mm (12.992″)	45.3 mm + 0.5 mm, –0.0 (1.785″+ 0.02″, –0.00)	50.4 mm (1.984″)
56 mm	330 mm (12.992″)	56.4 mm + 2.0 mm, –0.0 (2.220″+ 0.79″, –0.00)	62 mm (2.441″)

Reel Dimensions

Metric Dimensions Govern — English are in parentheses for reference only

Applications and Product Literature

Application Notes and Engineering Bulletins of special interest to designers of RF equipment are listed below. This technical documentation is available on the Freescale Semiconductor Product Sector 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 our Accessing 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
AN1697 GSM900/DCS/1800 Dual–Band 3.6 V Power Amplifier Solution with Open Loop Control Scheme
AN1907 Surface Mount Solder Attach Method for the MRF9045MR1 in the TO–270 Plastic RF Package
AN1908 Solder Mounting Method for the MRF19090S and Similar 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
AN1941 Modeling Thermal Effects in RF LDMOS Transistors
AN1944 Generating Temperature–Dependent IV Curves Using ADS
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
AN4005 Thermal Management and Mounting Method for the PLD 1.5 RF Power Surface Mount Package

Engineering Bulletins

EB38 Measuring the Intermodulation Distortion of Linear Amplifiers
EB105 A 30 Watt, 800 MHz Amplifier Design
EB209 Mounting Method for RF Power Leadless Surface Mount Transistors

Product Literature

BR1593 Industrial, Scientific and Medical Solutions
DL110 RF Product Device Data Library
DL210 RF Linear Amplifiers Device Data Library
SG46 RF Product Selector Guide

SELECTOR GUIDE PRODUCT INDEX

Selector Guide Product Index (continued)

Selector Guide Product Index (continued)

Selector Guide Product Index (continued)

END OF LIFE RF PRODUCT INDEX

Freescale Semiconductor follows the industry standard “EIA-724 Product Life Cycle Data Model” to track the life cycle of its product. This model tracks the product’s life cycle from “Product Newly Introduced” to “Product Phase Out.” Products can be phased for a variety of reasons: improved product performance, change in technology roadmap, process obsolescence, market decline, etc. When products are discontinued, a suggested possible replacement device or an alternative source of supply for discontinued devices are made available when possible.

For a list of discontinued devices with possible alternative suppliers, please contact your local Freescale sales office or authorized distributor.

Product	Last Order Date	Last Ship Date	Possible Replacement
Not Recommended for New Design			
MRF18090ASR3	—	—	MRF6S18100NR1
End of Life			
MHL8018	Past	Past	None
MHL8115	Past	Past	None
MHL8118	Past	Past	None
MHL9236MN	05–Aug–06	03–Feb–07	MHVIC915NR2 or MWIC930NR1
MHL9318N	05–Aug–06	03–Feb–07	MHVIC915NR2 or MWIC930NR1
MHL18336N	05–Aug–06	03–Feb–07	MHV5IC1810NR2 or MW4IC2020NBR1
MHL18926N	05–Aug–06	03–Feb–07	MHV5IC1810NR2 or MW4IC2020NBR1
MHL19926N	05–Aug–06	03–Feb–07	MW5IC2030NBR1
MHL19936N	05–Aug–06	03–Feb–07	MW5IC2030NBR1
MHVIC1905R2	—	—	MW4IC2020GNBR1
MHW1223LA	30–Jun–06	30–Sep–06	MHW1244N
MHW1224	30–Jun–06	30–Sep–06	MHW1244N
MHW1224LA	30–Jun–06	30–Sep–06	MHW1244N
MHW1253LA	30–Jun–06	30–Sep–06	MHW1254LAN
MHW1304L	30–Jun–06	30–Sep–06	MHW1304LAN
MHW1353LA	30–Jun–06	30–Sep–06	MHW1354LAN
MHW1810–001	Past	Past	MW4IC2020NBR1
MHW1810–002	Past	Past	MW4IC2020NBR1
MHW1910–001	Past	Past	MW4IC2020NBR1
MHW7182B	Past	Past	MHW7182CN
MHW7205C	30–Jun–06	30–Sep–06	MHW7205CLN
MHW7222A	Past	Past	MHW7222BN
MHW7242A	30–Jun–06	30–Sep–06	MHW8242AN
MHW7272A	30–Jun–06	30–Sep–06	MHW8272AN
MHW7292	Past	Past	MHW7292AN
MHW7342	30–Jun–06	30–Sep–06	MHW8342N
MHW8182B	Past	Past	MHW8182CN
MHW8185	30–Jun–06	30–Sep–06	MHW8188AN
MHW8185L	30–Jun–06	30–Sep–06	MHW8188AN

END OF LIFE PRODUCT INDEX — continued

Product	Last Order Date	Last Ship Date	Possible Replacement
End of Life – continued			
MHW8185LR	Past	Past	None
MHW8185R	Past	Past	None
MHW8202B	Past	Past	None
MHW8205	30–Jun–06	30–Sep–06	MHW8227AN
MHW8205L	30–Jun–06	30–Sep–06	MHW8227AN
MHW8205R	Past	Past	None
MHW8207A	30–Jun–06	30–Sep–06	MHW8227AN
MHW8222	Past	Past	MHW8222BN
MHW8292	Past	Past	MHW7292AN
MHW910	Past	Past	MHVIC910HR2
MHW916	Past	Past	None
MHW9182B	Past	Past	MHW9182CN
MHW9189	Past	Past	None
MHW9189A	30–Jun–06	30–Sep–06	None
MHW9207A	30–Jun–06	30–Sep–06	MHW9227AN
MHW9227	Past	Past	MHW9227AN
MHW9242A	30–Jun–06	30–Sep–06	MHW8242AN
MRF1507T1	Past	Past	MRF1511NT1 or MRF1517NT1
MRF182	Past	Past	MRF9030LR1
MRF182R1	Past	Past	MRF9030LR1
MRF182LSR1	Past	Past	MRF9030LSR1
MRF182SR1	Past	Past	MRF9030LSR1
MRF183	Past	Past	MRF9045LR1
MRF183R1	Past	Past	MRF9045LR1
MRF183S	Past	Past	MRF9045NR1 or MRF9045LSR1
MRF183SR1	Past	Past	MRF9045NR1 or MRF9045LSR1
MRF183LSR1	Past	Past	MRF9045NR1 or MRF9045LSR1
MRF184R1	Past	Past	MRF9060LR1
MRF184LSR1	Past	Past	MRF9060LSR1 or MRF9060NR1
MRF185	Past	Past	MRF9080LR3
MRF186	Past	Past	MRF9120LR3
MRF187	Past	Past	MRF9085LR3
MRF187S	Past	Past	MRF9085LSR3
MRF187SR3	Past	Past	MRF9085LSR3
MRF1946	Past	Past	MRF1535NT1
MRF1946A	Past	Past	MRF1535NT1
MRF18090AS	Past	Past	MRF18085ALSR3
MRF19120	—	—	MRF5S19130HR3
MRF19120S	—	—	MRF5S19130HSR3
MRF20030R	Past	Past	MRF19030LR3
MRF20060R	Past	Past	MRF19060LR3
MRF20060RS	Past	Past	MRF19060LR3
MRF21120S	Past	Past	MRF21120R6

END OF LIFE PRODUCT INDEX — continued

Product	Last Order Date	Last Ship Date	Possible Replacement
End of Life – continued			
MRF21180S	—	—	MRF21180R6 or MRF5P21180HR6
MRF247	Past	Past	MRF1550NT1
MRF2628	Past	Past	None
MRF373	Past	Past	MRF373ALR1
MRF373R1	Past	Past	MRF373ALR1
MRF373S	Past	Past	MRF373ALSR1
MRF373LSR1	Past	Past	MRF373ALSR1
MRF374	Past	Past	MRF374A
MRF377	15–Aug–06	13–Feb–07	MRF377HR3
MRF377R3	15–Aug–06	13–Feb–07	MRF377HR3
MRF377R5	15–Aug–06	13–Feb–07	MRF377HR5
MRF492	Past	Past	MRF1550NT1
MRF5015	Past	Past	None
MRF6401	Past	Past	None
MRF6404	Past	Past	MRF9030LR1
MRF646	Past	Past	MRF1550NT1
MRF648	Past	Past	MRF1550NT1
MRF650	Past	Past	MRF1550NT1
MRF652	Past	Past	MRF1518NT1
MRF6522–060	Past	Past	MRF9060LR1
MRF6522–10R1	Past	Past	MRF282SR1
MRF6522–5R1	Past	Past	MRF282ZR1 or MRF9002NR2
MRF652S	Past	Past	MRF1518NT1
MRF847	Past	Past	MRF9045LR1
MRF857S	Past	Past	MRF9002NR2
MRF897	Past	Past	MRF9045LSR1
MRF897R	Past	Past	MRF9045LR1
MRF898	Past	Past	MRF9060LR1
MRF899	Past	Past	MRF9180R6
MRF9120S	Past	Past	MRF9120LR3 or MRF9130LR3
MRF9180S	Past	Past	MRF9180R6
MRF5S19090LR3	Past	Past	MRF5S19090HR3
MRF5S19090LSR3	Past	Past	MRF5S19090HSR3
MRF5S19100LR3	Past	Past	MRF5S19100HR3
MRF5S19100LSR3	Past	Past	MRF5S19100HSR3
MRF5S19130R3	Past	Past	MRF5S19130HR3
MRF5S19130SR3	Past	Past	MRF5S19130HSR3
MRF5S19150R3	Past	Past	MRF5S19150HR3
MRF5S19150SR3	Past	Past	MRF5S19150HSR3
MRF5P20180R6	Past	Past	MRF5P20180HR6
MRF5S21090LR3	Past	Past	MRF5S21090HR3
MRF5S21090LSR3	Past	Past	MRF5S21090HSR3

END OF LIFE PRODUCT INDEX — continued

Product	Last Order Date	Last Ship Date	Possible Replacement
End of Life – continued			
MRF5S21100LR3	Past	Past	MRF5S21100HR3
MRF5S21100LSR3	Past	Past	MRF5S21100HSR3
MRF5S21130R3	Past	Past	MRF5S21130HR3
MRF5S21130SR3	Past	Past	MRF5S21130HSR3
MRF5S21150R3	Past	Past	MRF5S21150HR3
MRF5S21150SR3	Past	Past	MRF5S21150HSR3
MRF5P21180R6	Past	Past	MRF5P21180HR6
MRF5P21240R6	Past	Past	MRF5P21240HR6
TPV8100B	Past	Past	None