Freescale Semiconductor
Technical Data

Document Number: MRF8S8260H
Rev. 1, 2/2012

RoHS

RF Power Field Effect Transistors

N-Channel Enhancement-Mode Lateral MOSFETs

MRF8S8260HR3
MRF8S8260HSR3

Designed for CDMA base station applications with frequencies from 790 to 895 MHz. Can be used in Class AB and Class C for all typical cellular base station modulation formats.

- Typical Single-Carrier W-CDMA Performance: V_{DD} = 28 Volts, I_{DQ} = 1500 mA, P_{out} = 70 Watts Avg., IQ Magnitude Clipping, Channel Bandwidth = 3.84 MHz, Input Signal PAR = 7.5 dB @ 0.01% Probability on CCDF.

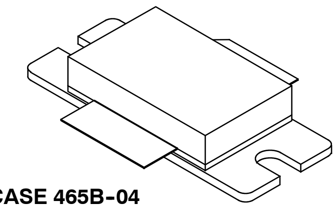
Frequency	G_{ps} (dB)	η_D (%)	Output PAR (dB)	ACPR (dBc)
850 MHz	21.3	36.2	6.5	-37.0
875 MHz	21.4	37.4	6.3	-36.7
895 MHz	21.1	37.5	6.2	-36.9

- Capable of Handling 7:1 VSWR, @ 32 Vdc, 875 MHz, 390 Watts CW (1) Output Power (3 dB Input Overdrive from Rated P_{out}), Designed for Enhanced Ruggedness
- Typical P_{out} @ 1 dB Compression Point ≃ 260 Watts CW (1)

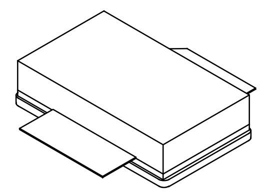
Features

- 100% PAR Tested for Guaranteed Output Power Capability
- Characterized with Series Equivalent Large-Signal Impedance Parameters and Common Source S-Parameters
- Internally Matched for Ease of Use
- Integrated ESD Protection
- Greater Negative Gate-Source Voltage Range for Improved Class C Operation
- Designed for Digital Predistortion Error Correction Systems
- Optimized for Doherty Applications
- In Tape and Reel. R3 Suffix = 250 Units, 56 mm Tape Width, 13 inch Reel. For R5 Tape and Reel option, see p. 16.

850-895 MHz, 70 W AVG. 28 V
SINGLE W-CDMA
LATERAL N-CHANNEL
RF POWER MOSFETs



CASE 465B-04
NI-880
MRF8S8260HR3



CASE 465C-03
NI-880S
MRF8S8260HSR3

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	-0.5, +70	Vdc
Gate-Source Voltage	V_{GS}	-6.0, +10	Vdc
Operating Voltage	V_{DD}	32, +0	Vdc
Storage Temperature Range	T_{stg}	- 65 to +150	°C
Case Operating Temperature	T_C	150	°C
Operating Junction Temperature (2,3)	T_J	225	°C
CW Operation @ T_C = 25°C Derate above 25°C	CW	201 0.94	W W/°C

Table 2. Thermal Characteristics

Characteristic	Symbol	Value (3,4)	Unit
Thermal Resistance, Junction to Case Case Temperature 83°C, 70 W CW, 28 Vdc, I_{DQ} = 1500 mA, 895 MHz Case Temperature 80°C, 260 W CW(1), 28 Vdc, I_{DQ} = 1500 mA, 895 MHz	$R_{\theta JC}$	 0.36 0.31	°C/W

1. Exceeds recommended operating conditions. See CW operation data in Maximum Ratings table.
2. Continuous use at maximum temperature will affect MTTF.
3. MTTF calculator available at http://www.freescale.com/rf. Select Software & Tools/Development Tools/Calculators to access MTTF calculators by product.
4. Refer to AN1955, *Thermal Measurement Methodology of RF Power Amplifiers.* Go to http://www.freescale.com/rf. Select Documentation/Application Notes - AN1955.

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Table 3. ESD Protection Characteristics

Test Methodology	Class
Human Body Model (per JESD22-A114)	2
Machine Model (per EIA/JESD22-A115)	A
Charge Device Model (per JESD22-C101)	IV

Table 4. Electrical Characteristics (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Off Characteristics					
Zero Gate Voltage Drain Leakage Current (V_{DS} = 70 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	—	—	10	μAdc
Zero Gate Voltage Drain Leakage Current (V_{DS} = 28 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	—	—	1	μAdc
Gate-Source Leakage Current (V_{GS} = 5 Vdc, V_{DS} = 0 Vdc)	I_{GSS}	—	—	1	μAdc
On Characteristics					
Gate Threshold Voltage (V_{DS} = 10 Vdc, I_D = 1380 μAdc)	$V_{GS(th)}$	1.5	2.3	3.0	Vdc
Gate Quiescent Voltage (V_{DD} = 28 Vdc, I_D = 1500 mAdc, Measured in Functional Test)	$V_{GS(Q)}$	2.3	3.0	3.8	Vdc
Drain-Source On-Voltage (V_{GS} = 10 Vdc, I_D = 3.0 Adc)	$V_{DS(on)}$	0.1	0.24	0.3	Vdc

Functional Tests [(1)] (In Freescale Test Fixture, 50 ohm system) V_{DD} = 28 Vdc, I_{DQ} = 1500 mA, P_{out} = 70 W Avg., f = 895 MHz, Single-Carrier W-CDMA, IQ Magnitude Clipping, Input Signal PAR = 7.5 dB @ 0.01% Probability on CCDF. ACPR measured in 3.84 MHz Channel Bandwidth @ ±5 MHz Offset.

Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain	G_{ps}	19.6	21.1	22.6	dB
Drain Efficiency	η_D	35.5	37.5	—	%
Output Peak-to-Average Ratio @ 0.01% Probability on CCDF	PAR	5.8	6.2	—	dB
Adjacent Channel Power Ratio	ACPR	—	-36.9	-35.0	dBc
Input Return Loss	IRL	—	-16	-12	dB

Typical Broadband Performance (In Freescale Test Fixture, 50 ohm system) V_{DD} = 28 Vdc, I_{DQ} = 1500 mA, P_{out} = 70 W Avg., Single-Carrier W-CDMA, IQ Magnitude Clipping, Input Signal PAR = 7.5 dB @ 0.01% Probability on CCDF. ACPR measured in 3.84 MHz Channel Bandwidth @ ±5 MHz Offset.

Frequency	G_{ps} (dB)	η_D (%)	Output PAR (dB)	ACPR (dBc)	IRL (dB)
850 MHz	21.3	36.2	6.5	-37.0	-9
875 MHz	21.4	37.4	6.3	-36.7	-13
895 MHz	21.1	37.5	6.2	-36.9	-16

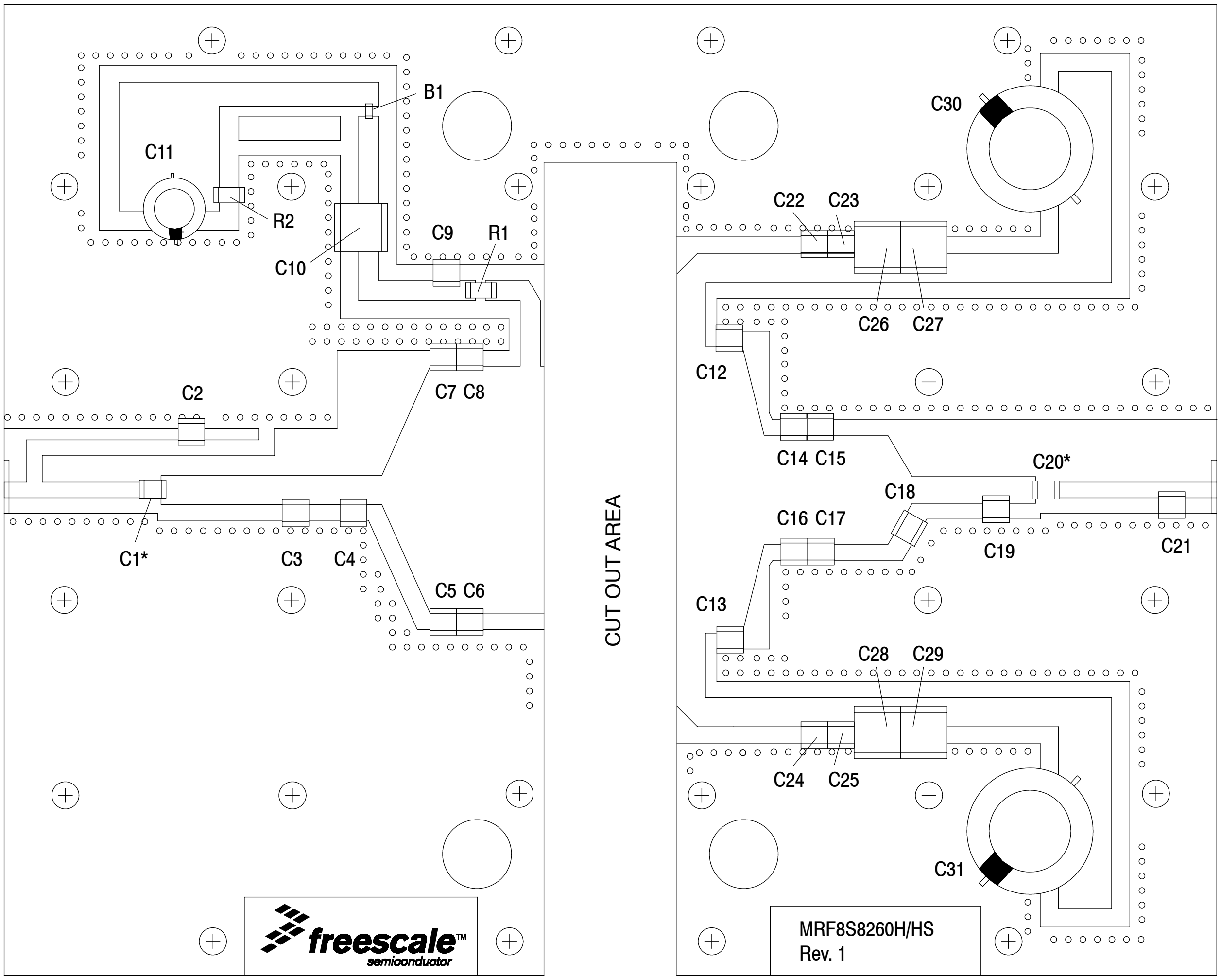
1. Part internally matched both on input and output.

(continued)

Table 4. Electrical Characteristics (T_A = 25°C unless otherwise noted) **(continued)**

Characteristic	Symbol	Min	Typ	Max	Unit
Typical Performance (In Freescale Test Fixture, 50 ohm system) V_{DD} = 28 Vdc, I_{DQ} = 1500 mA, 850–895 MHz Bandwidth					
P_{out} @ 1 dB Compression Point, CW	P1dB	—	260 [1]	—	W
IMD Symmetry @ 80 W PEP, P_{out} where IMD Third Order Intermodulation ≅ 30 dBc (Delta IMD Third Order Intermodulation between Upper and Lower Sidebands > 2 dB)	IMD_{sym}	—	9.7	—	MHz
VBW Resonance Point (IMD Third Order Intermodulation Inflection Point)	VBW_{res}	—	60	—	MHz
Gain Flatness in 45 MHz Bandwidth @ P_{out} = 70 W Avg.	G_F	—	0.3	—	dB
Gain Variation over Temperature (–30°C to +85°C)	ΔG	—	0.016	—	dB/°C
Output Power Variation over Temperature (–30°C to +85°C) [1]	ΔP1dB	—	0.002	—	dB/°C

1. Exceeds recommended operating conditions. See CW operation data in Maximum Ratings table.



*C1 and C20 are mounted vertically.

Figure 1. MRF8S8260HR3(HSR3) Test Circuit Component Layout

Table 5. MRF8S8260HR3(HSR3) Test Circuit Component Designations and Values

Part	Description	Part Number	Manufacturer
B1	RF Bead	BLM21PG300SN1D	Murata
C1	2.7 pF Chip Capacitor	ATC100B2R7BT500XT	ATC
C2	100 pF Chip Capacitor	ATC100B101JT500XT	ATC
C3	2.4 pF Chip Capacitor	ATC100B2R4JT500XT	ATC
C4	5.1 pF Chip Capacitor	ATC100B5R1CT500XT	ATC
C5 C7	3.3 pF Chip Capacitors	ATC100B3R3CT500XT	ATC
C6, C8	3.9 pF Chip Capacitors	ATC100B3R9CT500XT	ATC
C9, C20, C22, C23, C24, C25	43 pF Chip Capacitors	ATC100B430JT500XT	ATC
C10	4.7 μF, 100 V Chip Capacitor	GRM55ER72A475KA01B	Murata
C11	22 μF Electrolytic Capacitor	UUD1V220MCL1GS	Nichicon
C12, C13	8.2 pF Chip Capacitors	ATC100B8R2CT500XT	ATC
C14, C16	3.9 pF Chip Capacitors	ATC100B3R9CT500XT	ATC
C15, C17	3.0 pF Chip Capacitors	ATC100B3R0CT500XT	ATC
C18	0.7 pF Chip Capacitor	ATC100B0R7BT500XT	ATC
C19	4.3 pF Chip Capacitor	ATC100B4R3CT500XT	ATC
C21	0.1 pF Chip Capacitor	ATC100B0R1BT500XT	ATC
C26, C27, C28, C29	10 μF, 50 V Chip Capacitors	GRM55DR61H106KA88L	Murata
C30, C31	470 μF Electrolytic Capacitors	MCGPR63V477M13X26-RH	Multicomp
R1	2.0 Ω, 1/4 W Chip Resistor	P2.0VCT-ND	Panasonic
R2	1 KΩ, 1/4 W Chip Resistor	CRCW12061K00FKEA	Vishay
PCB	0.030″, ε_r = 3.5	TC350	Arlon

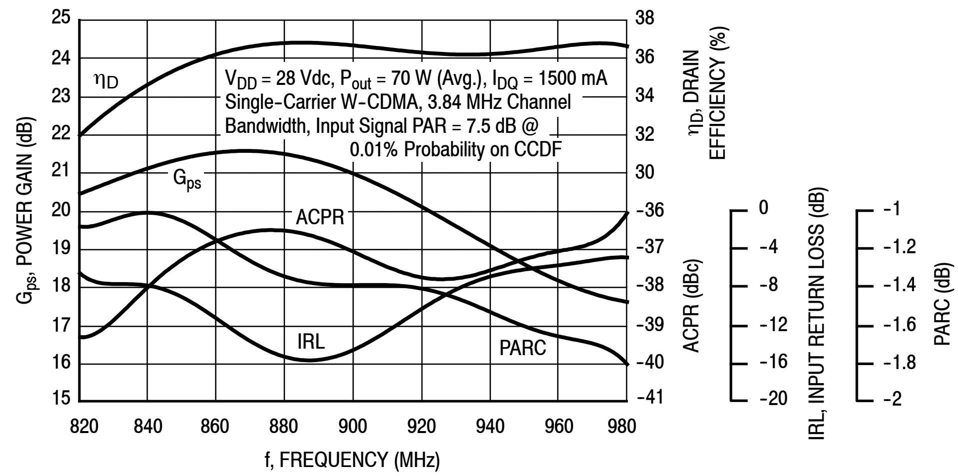


Figure 2. Output Peak-to-Average Ratio Compression (PARC) Broadband Performance @ P_{out} = 70 Watts Avg.

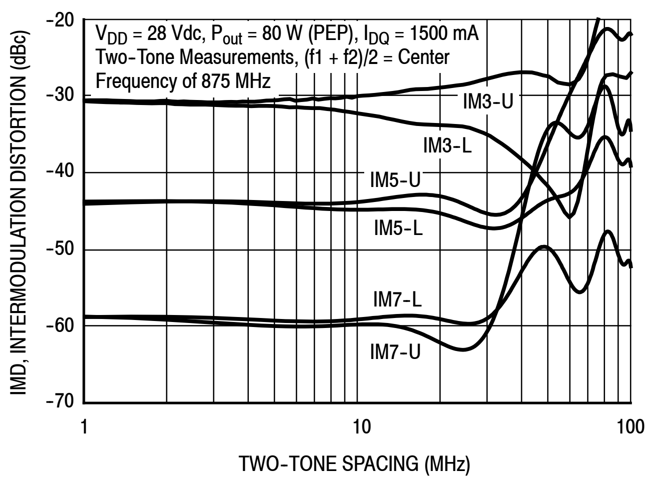


Figure 3. Intermodulation Distortion Products versus Two-Tone Spacing

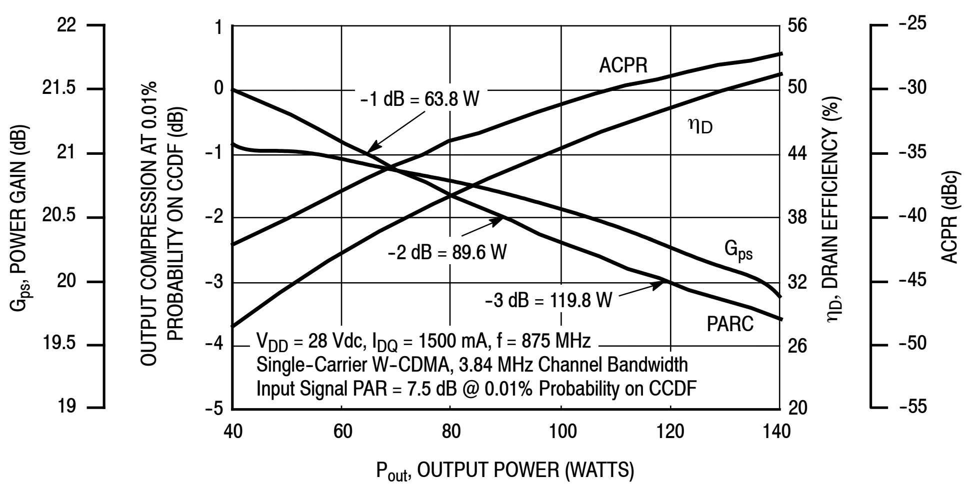


Figure 4. Output Peak-to-Average Ratio Compression (PARC) versus Output Power

TYPICAL CHARACTERISTICS

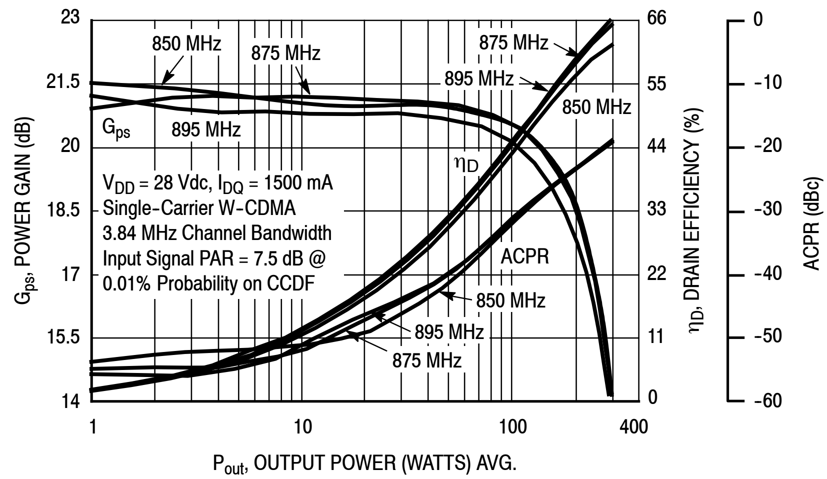


Figure 5. Single-Carrier W-CDMA Power Gain, Drain Efficiency and ACPR versus Output Power

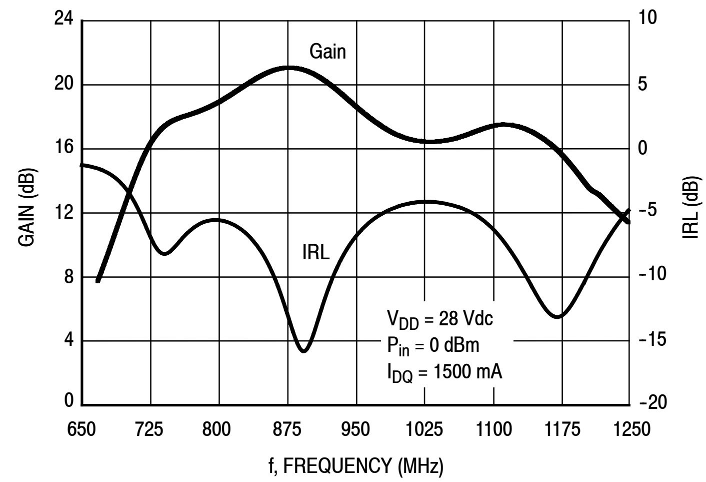


Figure 6. Broadband Frequency Response

W-CDMA TEST SIGNAL

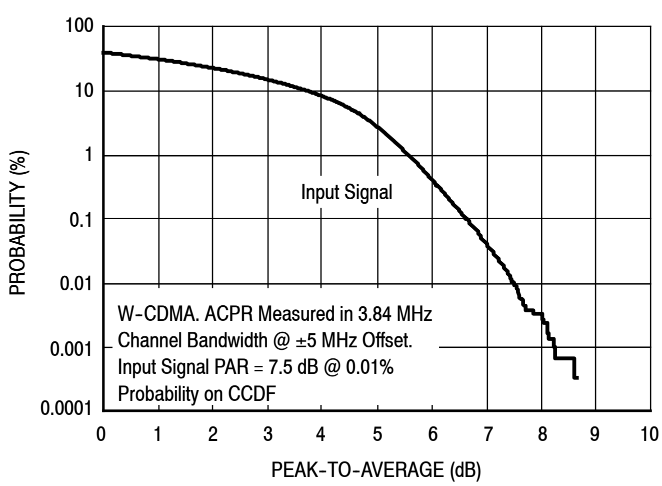


Figure 7. CCDF W-CDMA IQ Magnitude Clipping, Single-Carrier Test Signal

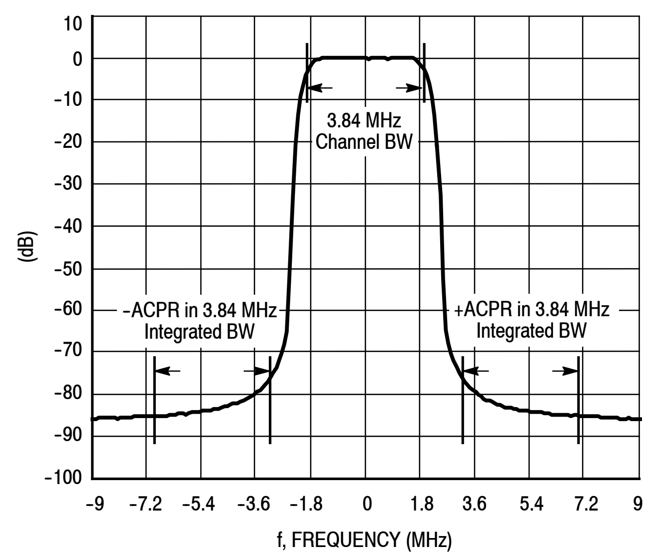


Figure 8. Single-Carrier W-CDMA Spectrum

V_{DD} = 28 Vdc, I_{DQ} = 1500 mA, P_{out} = 70 W Avg.

f MHz	Z_{source} Ω	Z_{load} Ω
820	3.19 - j1.47	1.38 - j0.80
840	2.98 - j1.61	1.37 - j0.52
860	2.78 - j1.75	1.38 - j0.29
880	2.50 - j1.87	1.44 - j0.14
900	2.20 - j1.92	1.48 - j0.01
920	1.96 - j1.79	1.52 + j0.12
940	1.82 - j1.58	1.59 + j0.32
960	1.74 - j1.35	1.68 + j0.51
980	1.68 - j1.12	1.77 + j0.61

Z_{source} = Test circuit impedance as measured from gate to ground.

Z_{load} = Test circuit impedance as measured from drain to ground.

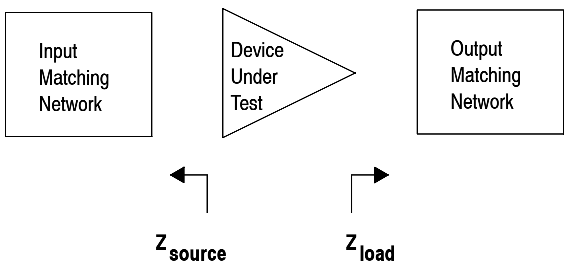
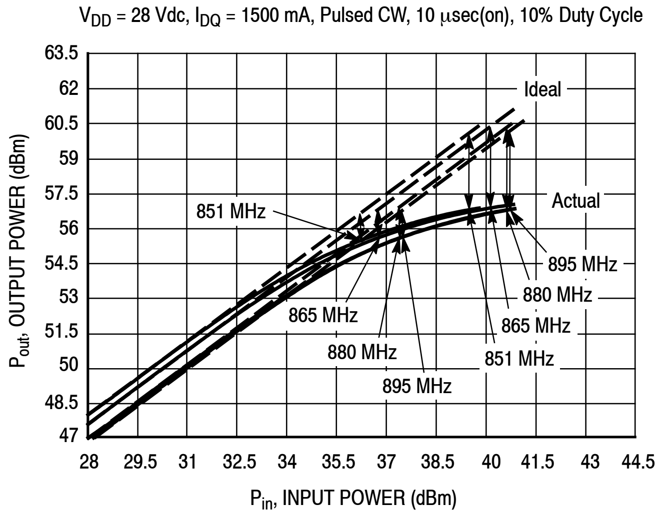


Figure 9. Series Equivalent Source and Load Impedance

ALTERNATIVE PEAK TUNE LOAD PULL CHARACTERISTICS



NOTE: Load Pull Test Fixture Tuned for Peak P1dB Output Power @ 28 V

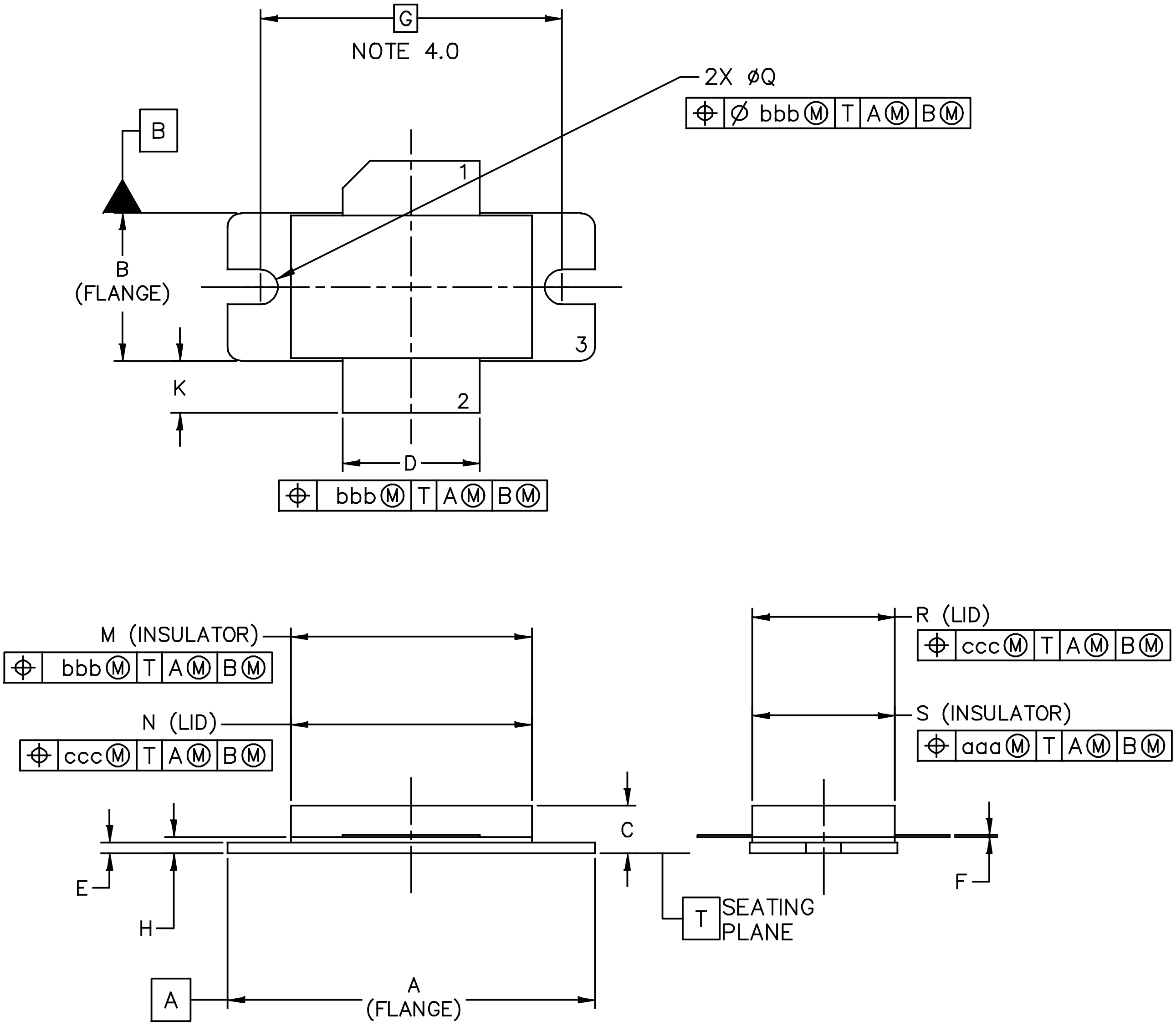
f (MHz)	P1dB		P3dB	
	Watts	**dBm**	**Watts**	**dBm**
851	359	55.5	482	56.8
865	366	55.6	485	56.9
880	362	55.6	477	56.8
895	365	55.6	478	56.8

Test Impedances per Compression Level

f (MHz)		Z_{source} Ω	Z_{load} Ω
851	P1dB	1.46 - j2.70	3.02 + j0.04
865	P1dB	1.85 - j3.04	2.92 + j0.03
880	P1dB	2.20 - j3.31	2.85 + j0.70
895	P1dB	2.53 - j3.58	2.50 + j0.76

Figure 10. Pulsed CW Output Power versus Input Power @ 28 V

PACKAGE DIMENSIONS



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TITLE: NI–880	DOCUMENT NO: 98ARB18493C		REV: F
	CASE NUMBER: 465B–04		26 MAY 2011
	STANDARD: NON–JEDEC		

NOTES:

1.0 DIMENSIONING AND TOLERANCING PER ANSI Y14.5M–1994.

2.0 CONTROLLING DIMENSION: INCH.

3.0 DIMENSION H IS MEASURED .030 (0.762) AWAY FROM PACKAGE BODY.

4.0 RECOMMENDED BOLT CENTER DIMENSION OF 1.16 (29.57) BASED ON M3 SCREW.

DIM	INCH MIN	INCH MAX	MILLIMETER MIN	MILLIMETER MAX	DIM	INCH MIN		INCH MAX	MILLIMETER MIN		MILLIMETER MAX
A	1.335	1.345	33.91	34.16	R	.515	–	.525	13.08	–	13.34
B	.535	.545	13.59	13.84	S	.515	–	.525	13.08	–	13.34
C	.147	.200	3.73	5.08	aaa	–	.007	–	–	0.178	–
D	.495	.505	12.57	12.83	bbb	–	.010	–	–	0.254	–
E	.035	.045	0.89	1.14	ccc	–	.015	–	–	0.381	–
F	.003	.006	0.08	0.15	–	–	–	–	–	–	–
G	1.100 BSC		27.94 BSC		–	–	–	–	–	–	–
H	.057	.067	1.45	1.70	–	–	–	–	–	–	–
K	.175	.205	4.45	5.21	–	–	–	–	–	–	–
M	.872	.888	22.15	22.56	–	–	–	–	–	–	–
N	.871	.889	22.12	22.58	–	–	–	–	–	–	–
Q	ø.118	ø.138	ø3.00	ø3.51	–	–	–	–	–	–	–

	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE
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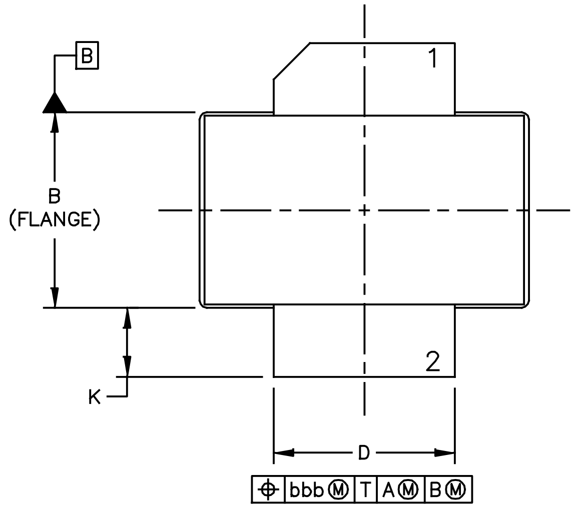
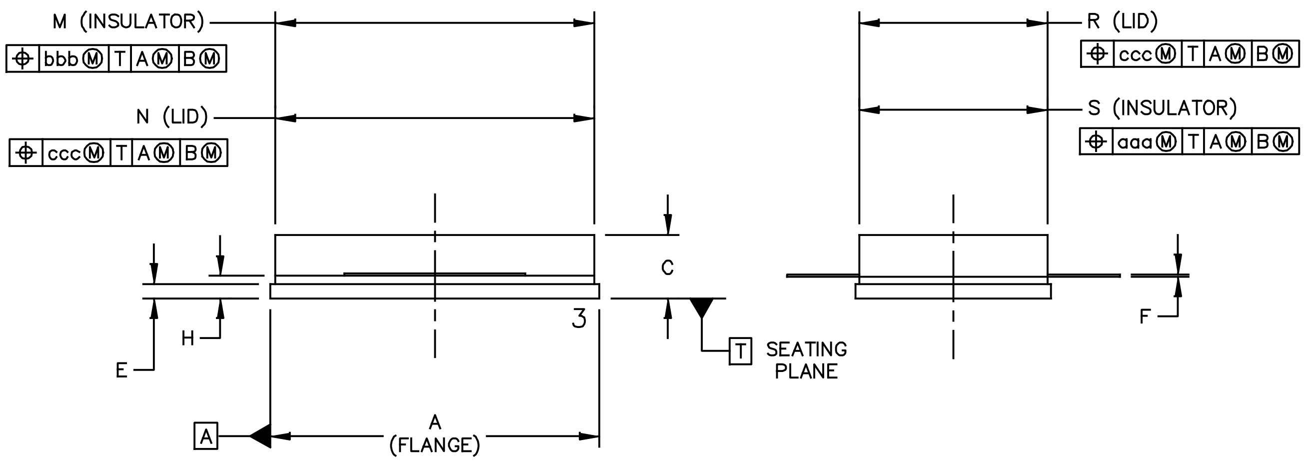
	CASE NUMBER: 465B–04	26 MAY 11
	STANDARD: NON–JEDEC	





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	CASE NUMBER: 465C-03	26 MAY 2011	
	STANDARD: NON-JEDEC		

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M—1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION H IS MEASURED .030 (0.762) AWAY FROM PACKAGE BODY.

DIM	INCH MIN		INCH MAX	MILLIMETER MIN		MILLIMETER MAX	DIM	INCH MIN		INCH MAX	MILLIMETER MIN		MILLIMETER MAX
A	.905	—	.915	22.99	—	23.24	aaa	—	.007	—	—	0.178	—
B	.535	—	.545	13.59	—	13.84	bbb	—	.010	—	—	0.254	—
C	.147	—	.200	3.73	—	5.08	ccc	—	.015	—	—	0.381	—
D	.495	—	.505	12.57	—	12.83	—	—	—	—	—	—	—
E	.035	—	.045	0.89	—	1.14	—	—	—	—	—	—	—
F	.003	—	.006	0.08	—	0.15	—	—	—	—	—	—	—
H	.057		.067	1.45		1.70	—	—	—	—	—	—	—
K	.170	—	.210	4.32	—	5.33	—	—	—	—	—	—	—
M	.872	—	.888	22.15	—	22.56	—	—	—	—	—	—	—
N	.871	—	.889	22.12	—	22.58	—	—	—	—	—	—	—
R	.515	—	.525	13.08	—	13.34	—	—	—	—	—	—	—
S	.515	—	.525	13.08	—	13.34	—	—	—	—	—	—	—

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	CASE NUMBER: 465C—03	26 MAY 2011
	STANDARD: NON—JEDEC	

PRODUCT DOCUMENTATION, TOOLS AND SOFTWARE

Refer to the following documents, tools and software to aid your design process.

Application Notes

- AN1955: Thermal Measurement Methodology of RF Power Amplifiers

Engineering Bulletins

- EB212: Using Data Sheet Impedances for RF LDMOS Devices

Software

- Electromigration MTTF Calculator
- RF High Power Model
- .s2p File

For Software and Tools, do a Part Number search at http://www.freescale.com, and select the "Part Number" link. Go to the Software & Tools tab on the part's Product Summary page to download the respective tool.

R5 TAPE AND REEL OPTION

R5 Suffix = 50 Units, 56 mm Tape Width, 13 inch Reel.

The R5 tape and reel option for MRF8S8260H and MRF8S8260HS parts will be available for 2 years after release of MRF8S8260H and MRF8S8260HS. Freescale Semiconductor, Inc. reserves the right to limit the quantities that will be delivered in the R5 tape and reel option. At the end of the 2 year period customers who have purchased these devices in the R5 tape and reel option will be offered MRF8S8260H and MRF8S8260HS in the R3 tape and reel option.

REVISION HISTORY

The following table summarizes revisions to this document.

Revision	Date	Description
0	Jan. 2011	• Initial Release of Data Sheet
1	Feb. 2012	• Table 3, ESD Protection Characteristics, removed the word "Minimum" after the ESD class rating. ESD ratings are characterized during new product development but are not 100% tested during production. ESD ratings provided in the data sheet are intended to be used as a guideline when handling ESD sensitive devices, p. 2. • Replaced Case Outline 465B-03, Issue D, with 465B-04, Issue F, p. 1, 9-10. Deleted Style 1 pin note on Sheet 2. On Sheet 2, changed dimension B in mm from 13.6-13.8 to 13.59-13.84, changed dimension H in mm from 1.45-1.7 to 1.45-1.70, changed dimension K in mm from 4.44-5.21 to 4.45-5.21, changed dimension M in mm from 22.15-22.55 to 22.15-22.56, changed dimension N in mm from 19.3-22.6 to 22.12-22.58, changed dimension Q in mm from 3-3.51 to 3.00-3.51, changed dimension R and S in mm from 13.1-13.3 to 13.08-13.34. • Replaced Case Outline 465C-02, Issue D, with 465C-03, Issue E, p. 1, 11-12. Deleted Style 1 pin note on Sheet 2. On Sheet 2, changed dimension B in mm from 13.6-13.8 to 13.59-13.84, changed dimension H in mm from 1.45-1.7 to 1.45-1.70, changed dimension M in mm from 22.15-22.55 to 22.15-22.56, changed dimension N in mm from 19.3-22.6 to 22.12-22.58, changed dimension R and S in mm from 13.1-13.3 to 13.08-13.34.

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Document Number: MRF8S8260H
Rev. 1, 2/2012