Table 3. ESD Protection Characteristics

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

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} = 65 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 = 86 μAdc)	$V_{GS(th)}$	1.2	1.9	2.7	Vdc
Gate Quiescent Voltage (V_{DD} = 28 Vdc, I_D = 450 mAdc, Measured in Functional Test)	$V_{GS(Q)}$	2.0	2.7	3.5	Vdc
Drain-Source On-Voltage (V_{GS} = 10 Vdc, I_D = 1 Adc)	$V_{DS(on)}$	0.1	0.18	0.3	Vdc

Functional Tests (1) (In Freescale Test Fixture, 50 ohm system) V_{DD} = 28 Vdc, I_{DQ} = 450 mA, P_{out} = 15.5 W Avg., f = 2690 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}	15.0	16.3	18.0	dB
Drain Efficiency	η_D	30.0	32.9	—	%
Output Peak-to-Average Ratio @ 0.01% Probability on CCDF	PAR	5.8	6.2	—	dB
Adjacent Channel Power Ratio	ACPR	—	-37.1	-34.5	dBc
Input Return Loss	IRL	—	-16	-10	dB

Typical Broadband Performance (In Freescale Test Fixture, 50 ohm system) V_{DD} = 28 Vdc, I_{DQ} = 450 mA, P_{out} = 15.5 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)
2620 MHz	16.3	33.2	6.3	-37.2	- 16
2655 MHz	16.3	33.0	6.3	-37.7	-17
2690 MHz	16.3	32.9	6.2	-37.1	-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 Performances (In Freescale Test Fixture, 50 ohm system) V_{DD} = 28 Vdc, I_{DQ} = 450 mA, 2620-2690 MHz Bandwidth					
P_{out} @ 1 dB Compression Point, CW	P1dB	—	60	—	W
IMD Symmetry @ 52 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}	—	16	—	MHz
VBW Resonance Point (IMD Third Order Intermodulation Inflection Point)	VBW_{res}	—	80	—	MHz
Gain Flatness in 70 MHz Bandwidth @ P_{out} = 15.5 W Avg.	G_F	—	0.2	—	dB
Gain Variation over Temperature (-30 °C to +85°C)	ΔG	—	0.014	—	dB/°C
Output Power Variation over Temperature (-30 °C to +85°C)	ΔP1dB	—	0.006	—	dBm/°C

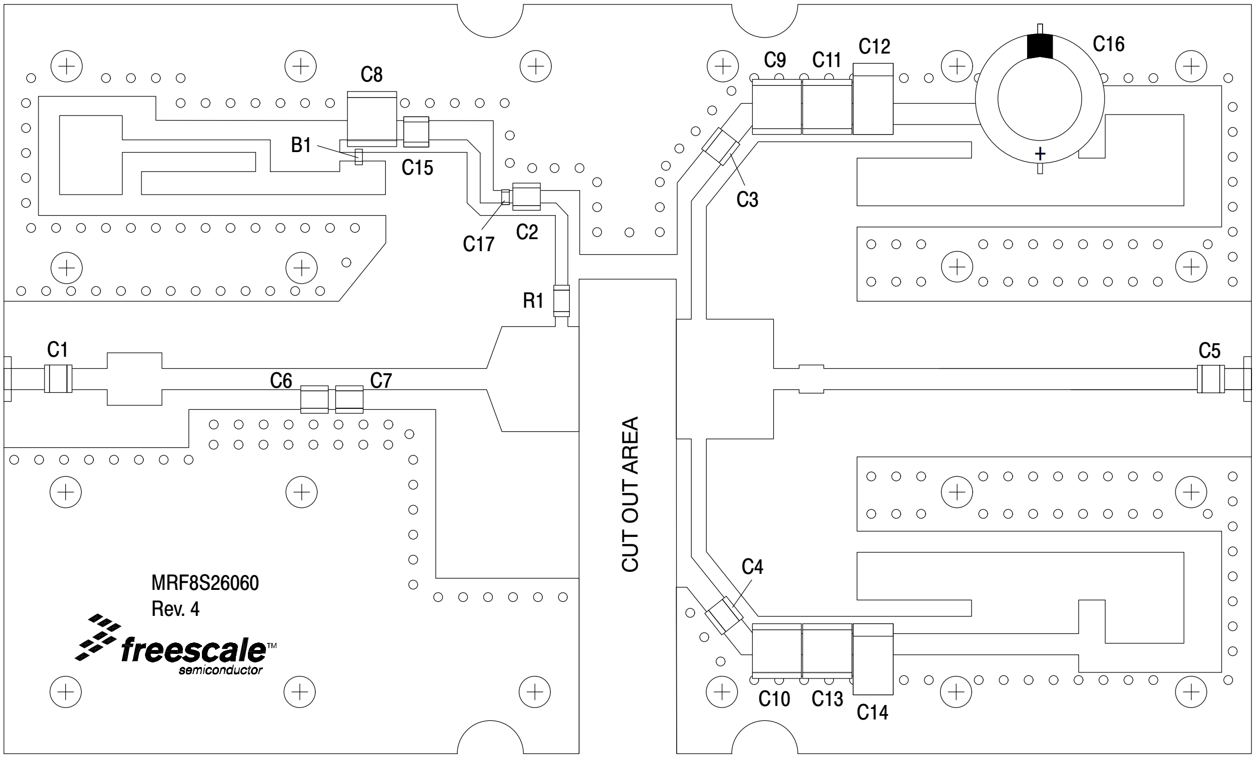


Figure 1. MRF8S26060HR3(HSR3) Test Circuit Component Layout

Table 5. MRF8S26060HR3(HSR3) Test Circuit Component Designations and Values

Part	Description	Part Number	Manufacturer
B1	RF Ferrite Bead	MPZ2012S300AT000	TDK
C1, C2, C3, C4, C5	5.6 pF Chip Capacitors	ATC100B5R6CT500XT	ATC
C6, C7	0.3 pF Chip Capacitors	ATC100B0R3BT500XT	ATC
C8, C9, C10	10 μF, 50 V Chip Capacitors	C5750X7R1H106KT	TDK
C11, C13	22 μF, 50 V Chip Capacitors	C5750JF1H226ZT	TDK
C12, C14	22 μF, 35 V Tantalum Capacitors	T491X226K035AT	Kemet
C15	680 nF, 100 V Chip Capacitor	C3225X7R2A684KT	TDK
C16	220 μF, 63 V Electrolytic Capacitor	MCGPR63V227M10X21	Multicomp
C17	1 nF, 250 V Chip Capacitor	C2012X7R2102KT	TDK
R1	12 Ω, 1/4 W Chip Resistor	CRCW120612R0FKEA	Vishay
PCB	0.030″, ε_r = 2.55	CuClad 25064-0300-55-22	Arlon

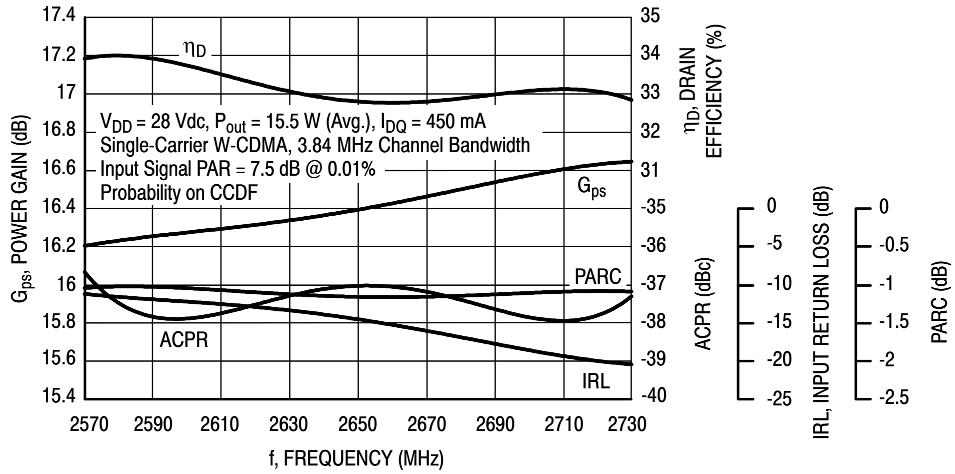


Figure 2. Output Peak-to-Average Ratio Compression (PARC) Broadband Performance @ P_{out} = 15.5 Watts Avg.

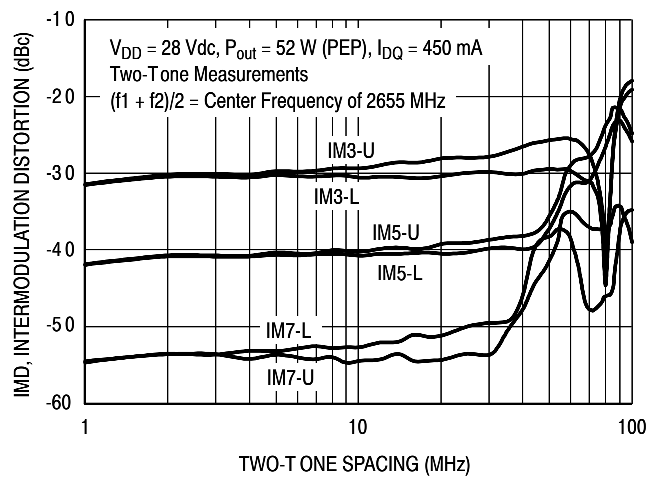


Figure 3. Intermodulation Distortion Products versus Two-Tone Spacing

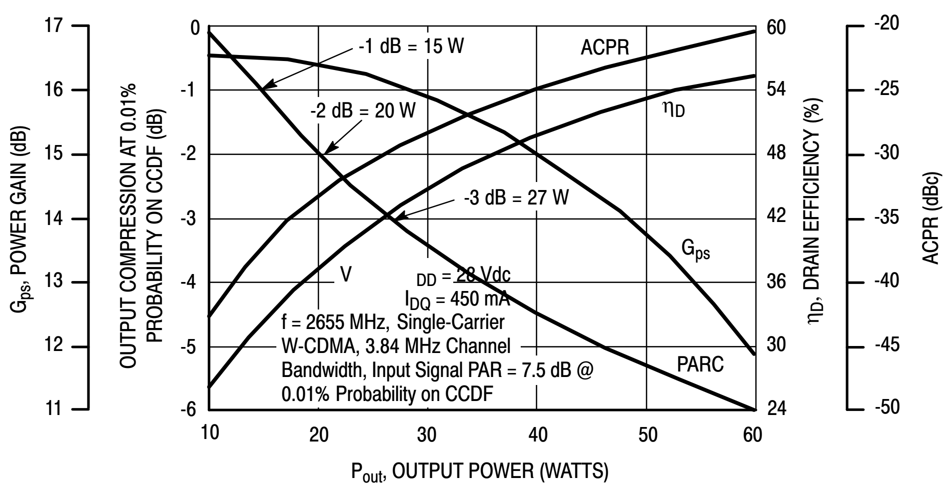


Figure 4. Output Peak-to-Average Ratio Compression (PARC) versus Output Power

TYPICAL CHARACTERISTICS

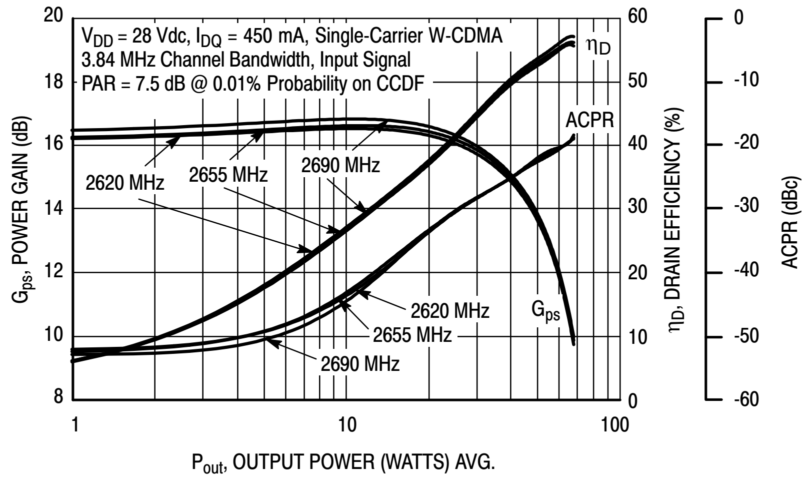


Figure 5. Single-Carrier W-CDMA Power Gain, Drain Efficiency and ACPR versus Output Power

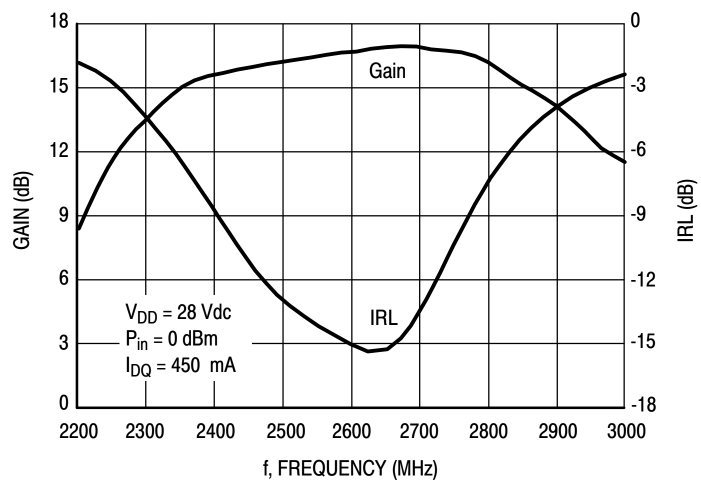


Figure 6. Broadband Frequency Response

W-CDMA TEST SIGNAL

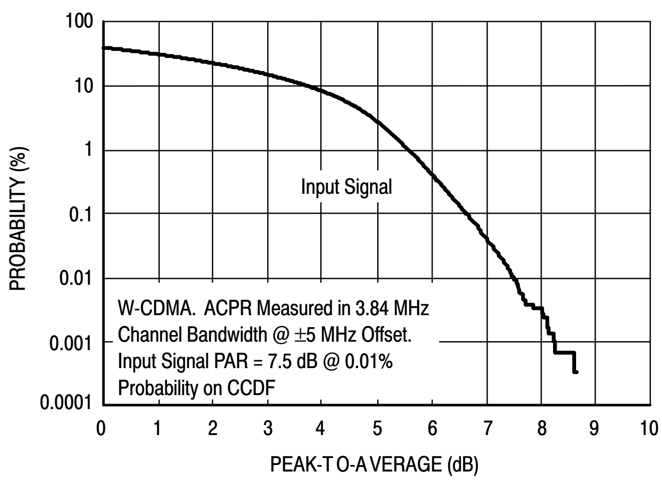


Figure 7. CCDF W-CDMA IQ Magnitude Clipping, Single-Carrier Test Signal

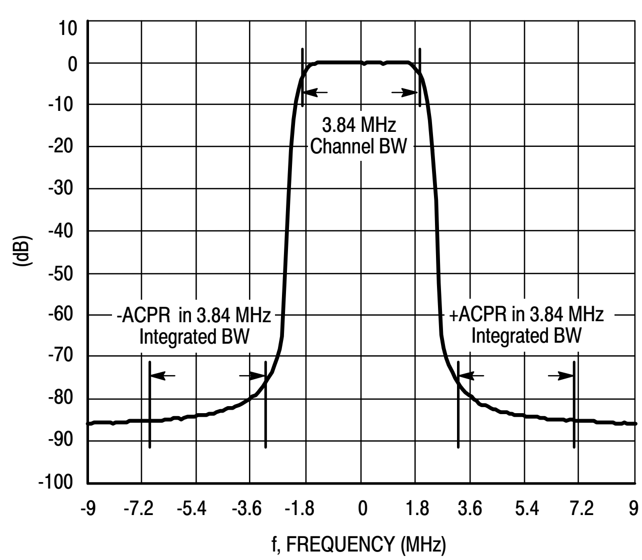


Figure 8. Single-Carrier W-CDMA Spectrum

V_{DD} = 28 Vdc, I_{DQ} = 450 mA, P_{out} = 15.5 W Avg.

f MHz	Z_{source} Ω	Z_{load} Ω
2570	8.55 - j8.59	6.29 - j8.92
2590	8.68 - j8.39	6.27 - j8.73
2610	8.84 - j8.21	6.27 - j8.54
2630	8.99 - j8.07	6.26 - j8.37
2650	9.14 - j7.84	6.26 - j8.20
2670	9.37 - j7.70	6.24 - j8.06
2690	9.58 - j7.61	6.21 - j7.91
2710	9.80 - j7.53	6.17 - j7.78
2730	10.02 - j7.48	6.13 - j7.65

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

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

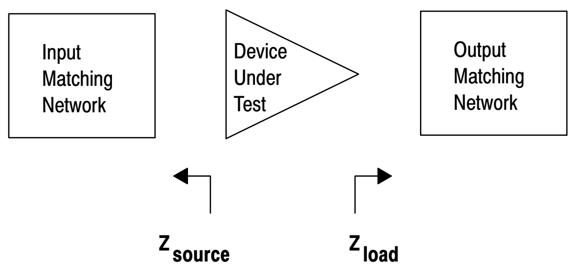
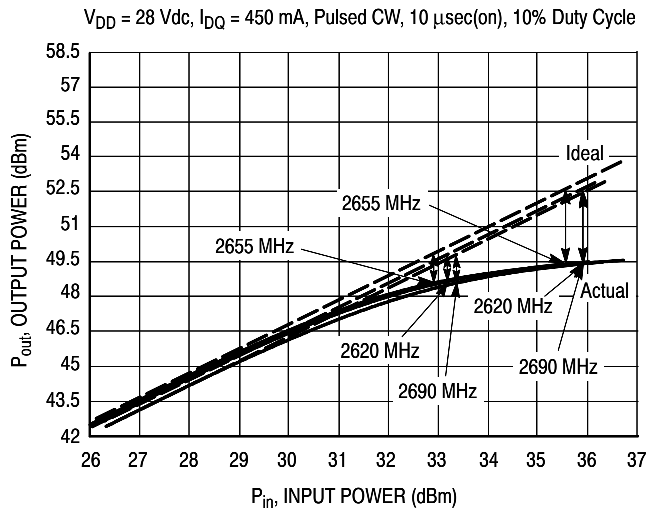


Figure 9. Series Equivalent Source and Load Impedance

ALTERNATIVE PEAK TUNE LOAD PULL CHARACTERISTICS



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

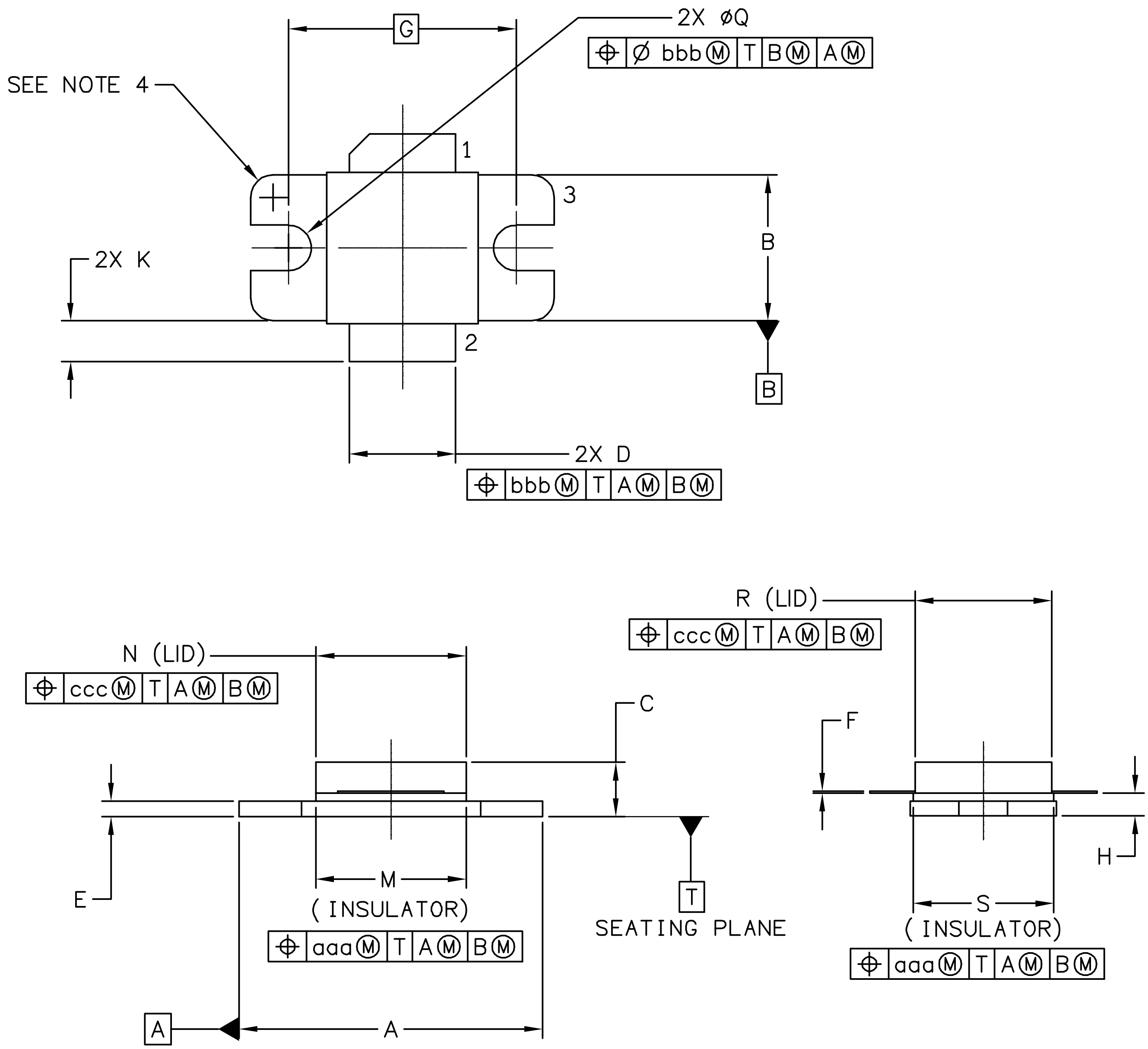
f (MHz)	P1dB		P3dB	
	Watts	**dBm**	**Watts**	**dBm**
2620	73	48.7	89	49.5
2655	73	48.6	88	49.4
2690	73	48.6	89	49.5

Test Impedances per Compression Level

f (MHz)		Z_{source} Ω	Z_{load} Ω
2620	P1dB	8.45 - j15.80	3.40 - j7.26
2655	P1dB	12.77 - j16.85	3.68 - j7.16
2690	P1dB	12.64 - j14.91	3.27 - j7.45

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

PACKAGE DIMENSIONS



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	STANDARD: NON-JEDEC		

NOTES:

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2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M–1994.

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

4. INFORMATION ONLY:
CORNER BREAK (4X) TO BE .060±.005 (1.52±0.13) RADIUS OR
.06±.005 (1.52±0.13) x 45° CHAMFER.

STYLE 1
PIN 1: DRAIN
PIN 2: GATE
PIN 3: SOURCE

STYLE 2
PIN 1: GATE
PIN 2: DRAIN
PIN 3: SOURCE

DIM	INCH MIN	INCH MAX	MILLIMETER MIN	MILLIMETER MAX	DIM	INCH MIN	INCH MAX	MILLIMETER MIN	MILLIMETER MAX
A	.795	.805	20.19	20.44	R	.355	.365	9.02	9.27
B	.380	.390	9.65	9.91	S	.365	.375	9.27	9.53
C	.125	.163	3.17	4.14					
D	.275	.285	6.98	7.24	aaa	.005		0.127	
E	.035	.045	0.89	1.14	bbb	.010		0.254	
F	.004	.006	0.10	0.15	ccc	.015		0.381	
G	.600 BSC		15.24 BSC						
H	.057	.067	1.45	1.70					
K	.0995	.1295	2.53	3.29					
M	.395	.405	10.03	10.29					
N	.385	.395	9.78	10.03					
Q	⌀.120	⌀.130	⌀3.05	⌀3.30					

MECHANICAL OUTLINE | PRINT VERSION NOT TO SCALE

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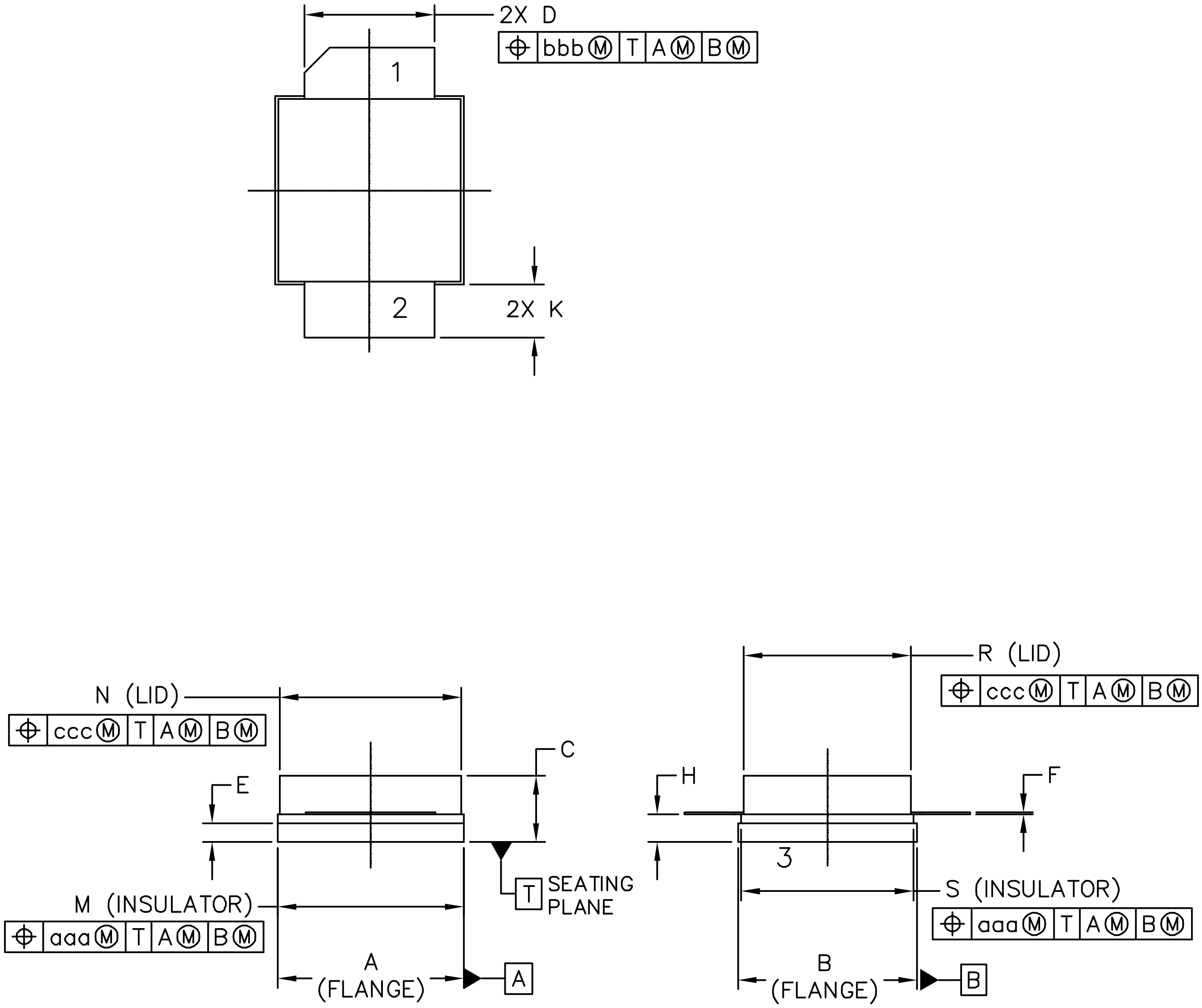
	CASE NUMBER: 465I–02	09 MAY 2006
	STANDARD: NON–JEDEC	



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	CASE NUMBER: 465J–02	09 MAY 2006
	STANDARD: NON–JEDEC	

NOTES:

1. CONTROLLING DIMENSION: INCH

2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M-1994.

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

STYLE 1:
PIN 1 - DRAIN
2 - GATE
3 - SOURCE

STYLE 2:
PIN 1 - GATE
2 - DRAIN
3 - SOURCE

DIM	INCH MIN	INCH MAX	MILLIMETER MIN	MILLIMETER MAX	DIM	INCH MIN	INCH MAX	MILLIMETER MIN	MILLIMETER MAX
A	.395	.405	10.03	10.29	aaa	.005		0.127	
B	.380	.390	9.65	9.91	bbb	.010		0.254	
C	.125	.163	3.18	4.14	ccc	.015		0.381	
D	.275	.285	6.98	7.24					
E	.035	.045	0.89	1.14					
F	.004	.006	0.10	0.15					
H	.057	.067	1.45	1.70					
K	.0995	.1295	2.53	3.29					
M	.395	.405	10.03	10.29					
N	.385	.395	9.78	10.03					
R	.355	.365	9.02	9.27					
S	.365	.375	9.27	9.53					

MECHANICAL OUTLINE

PRINT VERSION NOT TO SCALE

TITLE: NI-400S-240

DOCUMENT NO: 98ASA10732D

REV: A

CASE NUMBER: 465J-02

09 MAY 2006

STANDARD: NON-JEDEC

PRODUCT DOCUMENTATION 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, 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.

REVISION HISTORY

The following table summarizes revisions to this document.

Revision	Date	Description
0	Apr. 2010	• Initial Release of Data Sheet

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