



**THE DATASHEET OF  
MRF8P20100HSR3**



# RF Power Field Effect Transistors

## N-Channel Enhancement-Mode Lateral MOSFETs

Designed for CDMA base station applications with frequencies from 1880 to 2025 MHz and GSM EDGE base station applications with frequencies from 1805 to 1880 MHz. Can be used in Class AB and Class C for all typical cellular base station modulation formats.

- Typical Doherty Single-Carrier W-CDMA Performance:  $V_{DD} = 28$  Volts,  $I_{DQA} = 400$  mA,  $V_{GSB} = 1.3$  Vdc,  $P_{out} = 20$  Watts Avg., IQ Magnitude Clipping, Channel Bandwidth = 3.84 MHz, Input Signal PAR = 9.9 dB @ 0.01% Probability on CCDF.

Frequency	$G_{ps}$ (dB)	$\eta_D$ (%)	Output PAR (dB)	ACPR (dBC)
2025 MHz	16.0	44.3	7.8	-33.5

### 1880 MHz

- Typical Doherty Single-Carrier W-CDMA Performance:  $V_{DD} = 28$  Volts,  $I_{DQA} = 400$  mA,  $V_{GSB} = 1.3$  Vdc,  $P_{out} = 20$  Watts Avg., IQ Magnitude Clipping, Channel Bandwidth = 3.84 MHz, Input Signal PAR = 9.9 dB @ 0.01% Probability on CCDF.

Frequency	$G_{ps}$ (dB)	$\eta_D$ (%)	Output PAR (dB)	ACPR (dBC)
1880 MHz	16.2	43.5	7.6	-30.8
1900 MHz	16.1	43.4	7.6	-32.6
1920 MHz	15.8	42.9	7.6	-34.6

### GSM EDGE

- Typical GSM EDGE Performance:  $V_{DD} = 28$  Volts,  $I_{DQA} = I_{DQB} = 330$  mA,  $P_{out} = 42$  Watts Avg.

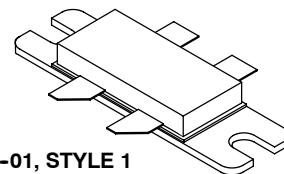
Frequency	$G_{ps}$ (dB)	$\eta_D$ (%)	SR1 @ 400 kHz (dBc)	SR2 @ 600 kHz (dBc)	EVM (% rms)
1805 MHz	17.1	43.8	-58.4	-74.4	3.0
1840 MHz	17.3	42.4	-60.0	-75.5	2.6
1880 MHz	17.1	41.7	-60.5	-75.3	2.4

### Features

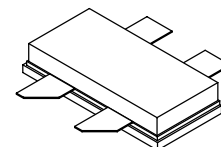
- Production Tested in a Symmetrical Doherty Configuration
- 100% PAR Tested for Guaranteed Output Power Capability
- Characterized with Series Equivalent Large-Signal Impedance Parameters and Common Source S-Parameters
- Internally Matched for Ease of Use
- Integrated ESD Protection
- Greater Negative Gate-Source Voltage Range for Improved Class C Operation
- Designed for Digital Predistortion Error Correction Systems
- RoHS Compliant
- In Tape and Reel. R3 Suffix = 250 Units per 56 mm, 13 inch Reel.

**MRF8P20100HR3**  
**MRF8P20100HSR3**

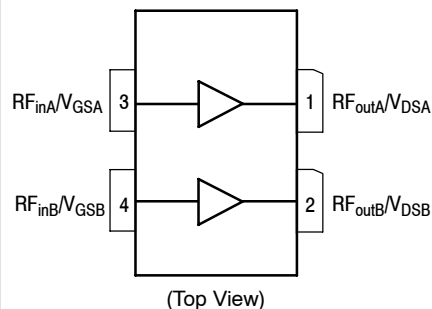
**1805-2025 MHz, 20 W AVG., 28 V**  
**SINGLE W-CDMA**  
**LATERAL N-CHANNEL**  
**RF POWER MOSFETs**



**CASE 465M-01, STYLE 1**  
**NI-780-4**  
**MRF8P20100HR3**



**CASE 465H-02, STYLE 1**  
**NI-780S-4**  
**MRF8P20100HSR3**



**Figure 1. Pin Connections**

**Table 1. Maximum Ratings**

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	-0.5, +65	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 (1,2)	$T_J$	225	°C
EDGE Operation @ $T_C = 25^\circ\text{C}$ (1) Derate above 25°C	EDGE	120 0.6	W (PEP) W (PEP)/°C

**Table 2. Thermal Characteristics**

Characteristic	Symbol	Value (2,3)	Unit
Thermal Resistance, Junction to Case Case Temperature 74°C, 20 W CW, 2025 MHz 28 Vdc, $I_{DQA} = 400$ mA 28 Vdc, $V_{GSB} = 1.3$ Vdc Case Temperature 80°C, 42 W CW, 1805 MHz 28 Vdc, $I_{DQA} = I_{DQB} = 330$ mA	$R_{\theta JC}$	0.88 0.88 0.59	°C/W

**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** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>Off Characteristics (4)</b>					
Zero Gate Voltage Drain Leakage Current ( $V_{DS} = 65$ Vdc, $V_{GS} = 0$ Vdc)	$I_{DSS}$	—	—	10	$\mu\text{Adc}$
Zero Gate Voltage Drain Leakage Current ( $V_{DS} = 28$ Vdc, $V_{GS} = 0$ Vdc)	$I_{DSS}$	—	—	1	$\mu\text{Adc}$
Gate-Source Leakage Current ( $V_{GS} = 5$ Vdc, $V_{DS} = 0$ Vdc)	$I_{GSS}$	—	—	1	$\mu\text{Adc}$
<b>On Characteristics (4)</b>					
Gate Threshold Voltage ( $V_{DS} = 10$ Vdc, $I_D = 75$ $\mu\text{Adc}$ )	$V_{GS(th)}$	1.2	1.9	2.7	Vdc
Gate Quiescent Voltage ( $V_{DD} = 28$ Vdc, $I_{DA} = 400$ 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	0.2	0.3	Vdc

1. Continuous use at maximum temperature will affect MTTF.
2. MTTF calculator available at <http://www.freescale.com/rf>. Select Software & Tools/Development Tools/Calculators to access MTTF calculators by product.
3. Refer to AN1955, *Thermal Measurement Methodology of RF Power Amplifiers*. Go to <http://www.freescale.com/rf>. Select Documentation/Application Notes - AN1955.
4. Each side of device measured separately.

(continued)

**Table 4. Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) (continued)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>Functional Tests</b> <sup>(1,2)</sup> (In Freescale Doherty Test Fixture, 50 ohm system) $V_{DD} = 28\text{ Vdc}$ , $I_{DQA} = 400\text{ mA}$ , $V_{GSB} = 1.3\text{ Vdc}$ , $P_{out} = 20\text{ W Avg.}$ , $f = 2025\text{ MHz}$ , Single-Carrier W-CDMA, IQ Magnitude Clipping, Input Signal PAR = 9.9 dB @ 0.01% Probability on CCDF. ACPR measured in 3.84 MHz Channel Bandwidth @ $\pm 5\text{ MHz}$ Offset.					
Power Gain	$G_{ps}$	15.0	16.0	18.0	dB
Drain Efficiency	$\eta_D$	42.0	44.3	—	%
Output Peak-to-Average Ratio @ 0.01% Probability on CCDF	PAR	7.2	7.8	—	dB
Adjacent Channel Power Ratio	ACPR	—	-33.5	-31.0	dBc

**Typical Performance** <sup>(2)</sup> (In Freescale Doherty Test Fixture, 50 ohm system)  $V_{DD} = 28\text{ Vdc}$ ,  $I_{DQA} = 400\text{ mA}$ ,  $V_{GSB} = 1.3\text{ Vdc}$ , 2010–2025 MHz Bandwidth

$P_{out}$ @ 1 dB Compression Point, CW	P1dB	—	78	—	W
$P_{out}$ @ 3 dB Compression Point, CW	P3dB	—	126	—	W
IMD Symmetry @ 20 W PEP, $P_{out}$ where IMD Third Order Intermodulation $\cong 30\text{ dBc}$ (Delta IMD Third Order Intermodulation between Upper and Lower Sidebands > 2 dB)	IMD <sub>sym</sub>	—	46	—	MHz
VBW Resonance Point (IMD Third Order Intermodulation Inflection Point)	VBW <sub>res</sub>	—	53	—	MHz
Gain Flatness in 15 MHz Bandwidth @ $P_{out} = 20\text{ W Avg.}$	$G_F$	—	0.1	—	dB
Gain Variation over Temperature ( $-30^\circ\text{C}$ to $+85^\circ\text{C}$ )	$\Delta G$	—	0.013	—	dB/ $^\circ\text{C}$
Output Power Variation over Temperature ( $-30^\circ\text{C}$ to $+85^\circ\text{C}$ )	$\Delta P_{1dB}$	—	0.004	—	dBm/ $^\circ\text{C}$

**Typical Broadband Performance — 1880 MHz** <sup>(2)</sup> (In Freescale 1880 MHz Doherty Test Fixture, 50 ohm system)  $V_{DD} = 28\text{ Vdc}$ ,  $I_{DQA} = 400\text{ mA}$ ,  $V_{GSB} = 1.3\text{ Vdc}$ ,  $P_{out} = 20\text{ W Avg.}$ , Single-Carrier W-CDMA, IQ Magnitude Clipping, Input Signal PAR = 9.9 dB @ 0.01% Probability on CCDF. ACPR measured in 3.84 MHz Channel Bandwidth @  $\pm 5\text{ MHz}$  Offset.

Frequency	$G_{ps}$ (dB)	$\eta_D$ (%)	Output PAR (dB)	ACPR (dBc)
1880 MHz	16.2	43.5	7.6	-30.8
1900 MHz	16.1	43.4	7.6	-32.6
1920 MHz	15.8	42.9	7.6	-34.6

**Typical GSM EDGE Performance** <sup>(3)</sup> (In Freescale Class AB Test Fixture, 50 ohm system)  $V_{DD} = 28\text{ Volts}$ ,  $I_{DQA} = I_{DQB} = 330\text{ mA}$ ,  $P_{out} = 42\text{ Watts Avg.}$ , 1805–1880 MHz EDGE Modulation

Frequency	$G_{ps}$ (dB)	$\eta_D$ (%)	SR1 @ 400 kHz (dBc)	SR2 @ 600 kHz (dBc)	EVM (% rms)
1805 MHz	17.1	43.8	-58.4	-74.4	3.0
1840 MHz	17.3	42.4	-60.0	-75.5	2.6
1880 MHz	17.1	41.7	-60.5	-75.3	2.4

1. Part internally matched both on input and output.
2. Measurement made with device in a Symmetrical Doherty configuration.
3. Measurement made with device in quadrature combined configuration.

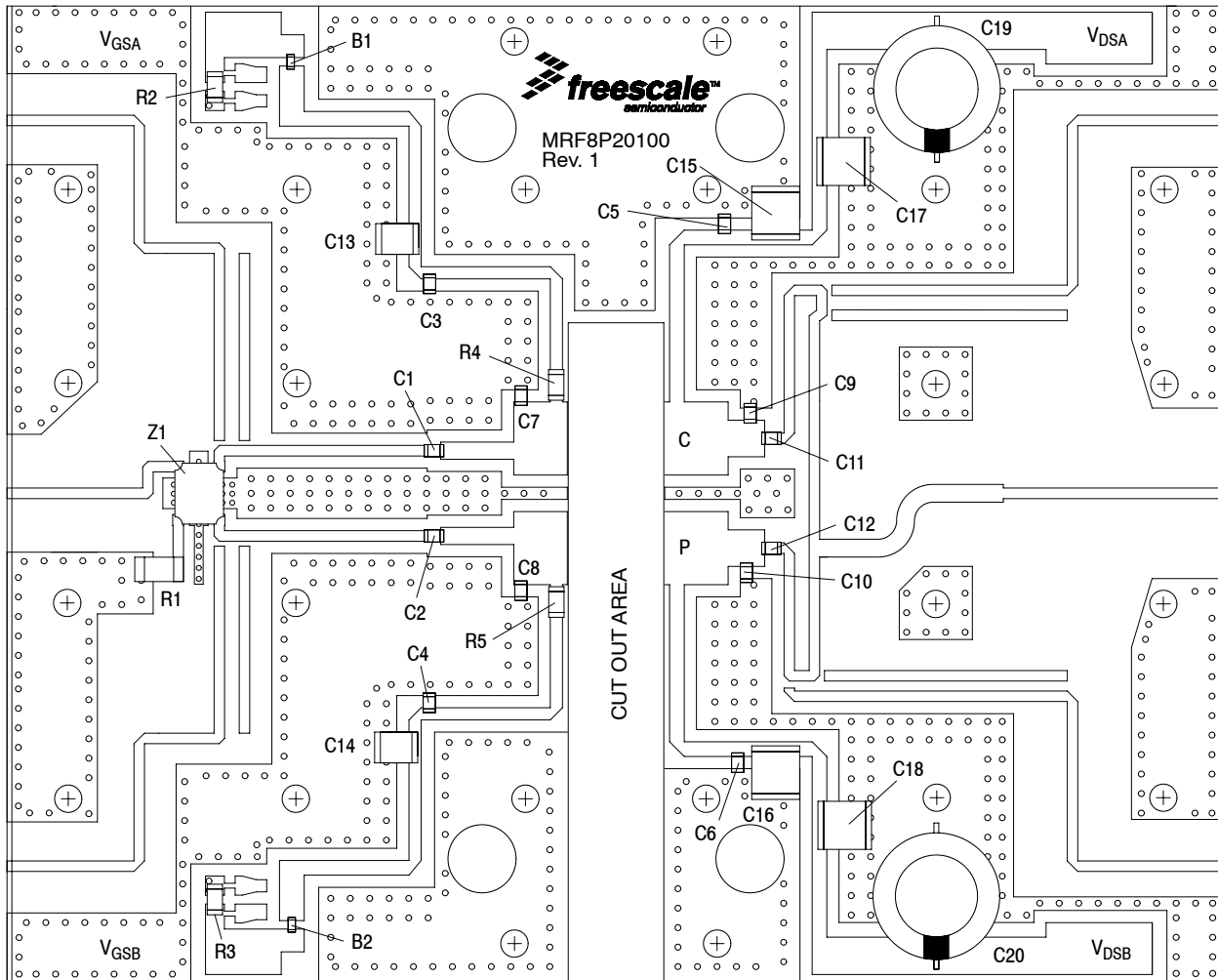
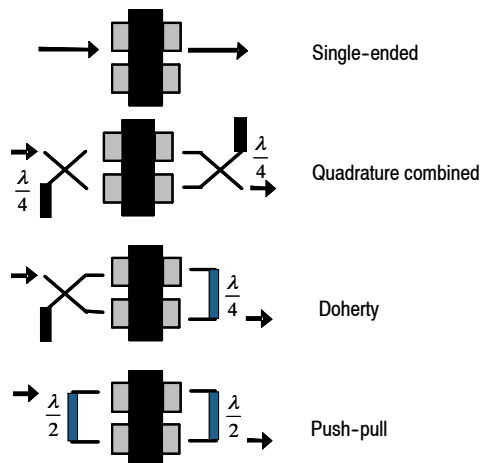


Figure 2. MRF8P20100HR3(HSR3) Test Circuit Component Layout

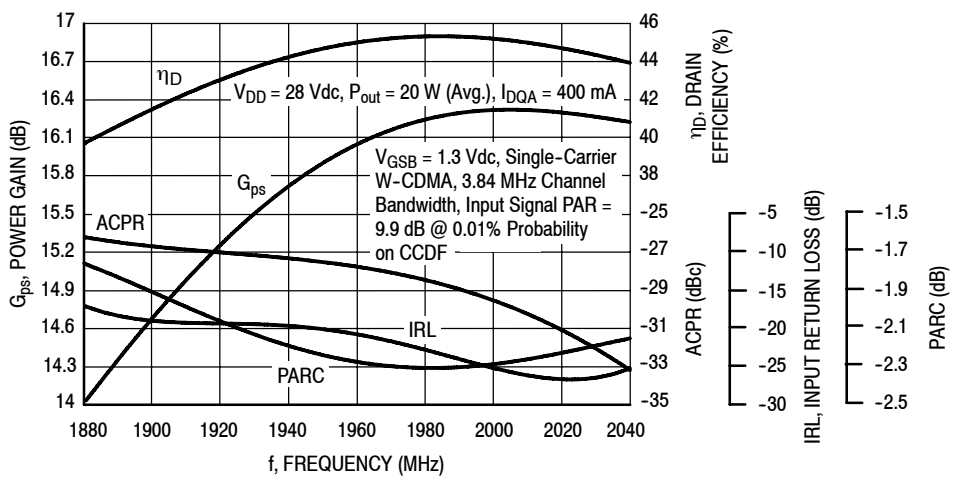
Table 5. MRF8P20100HR3(HSR3) Test Circuit Component Designations and Values

Part	Description	Part Number	Manufacturer
B1, B2	RF Ferrite Beads	MPZ2012S300AT000	TDK
C1, C2, C3, C4, C5, C6	15 pF Chip Capacitors	ATC600F150JT250XT	ATC
C7, C8	0.3 pF Chip Capacitors	ATC600F0R3BT250XT	ATC
C9, C10	1.2 pF Chip Capacitors	ATC600F1R2BT250XT	ATC
C11, C12	10 pF Chip Capacitors	ATC600F100JT250XT	ATC
C13, C14	4.7 $\mu$ F, 50 V Chip Capacitors	C4532X5R1H475MT	TDK
C15, C16	10 $\mu$ F, 50 V Chip Capacitors	C5750X7R1H106KT	TDK
C17, C18	22 $\mu$ F, 50 V Chip Capacitors	C5750KF1H226ZT	TDK
C19, C20	220 $\mu$ F, 63 V Electrolytic Capacitors	MCGPR63V227M10X21	Multicomp
R1	50 $\Omega$ , 4 W Chip Resistor	ATCCW12010T0050GBK	ATC
R2, R3	10 K $\Omega$ , 1/4 W Chip Resistors	CRCW120612R0FKEA	Vishay
R4, R5	12 $\Omega$ , 1/4 W Chip Resistors	CRCW120612R0FKEA	Vishay
Z1	1900 MHz Band 90°, 3 dB Chip Hybrid Coupler	1P503S	Anaren
PCB	0.020", $\epsilon_r = 3.5$	RO4350B	Rogers

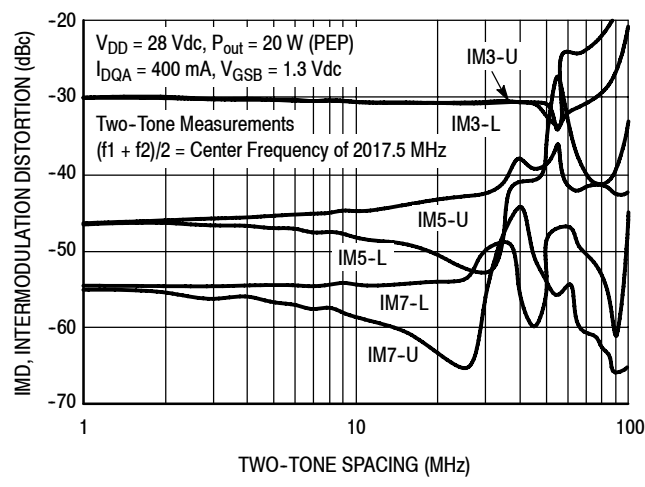


**Figure 3. Possible Circuit Topologies**

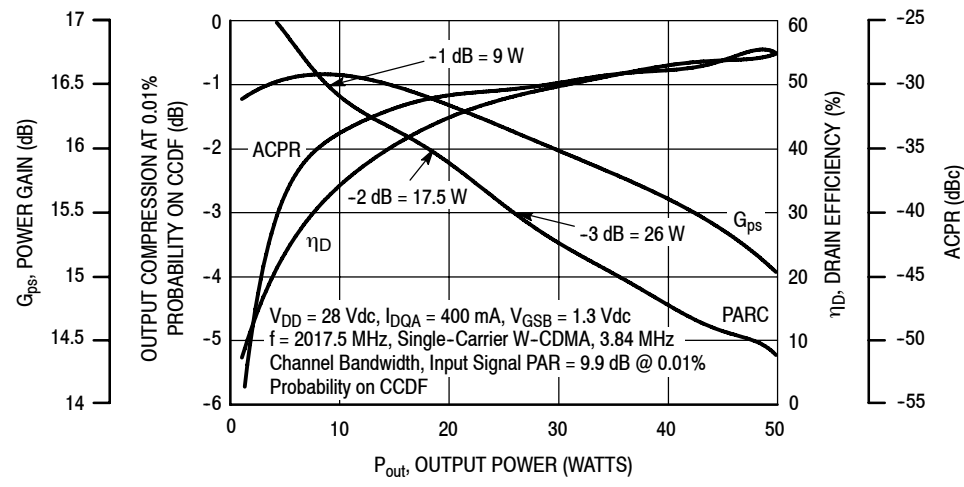
### TYPICAL CHARACTERISTICS



**Figure 4. Output Peak-to-Average Ratio Compression (PARC) Broadband Performance @ P<sub>out</sub> = 20 Watts Avg.**

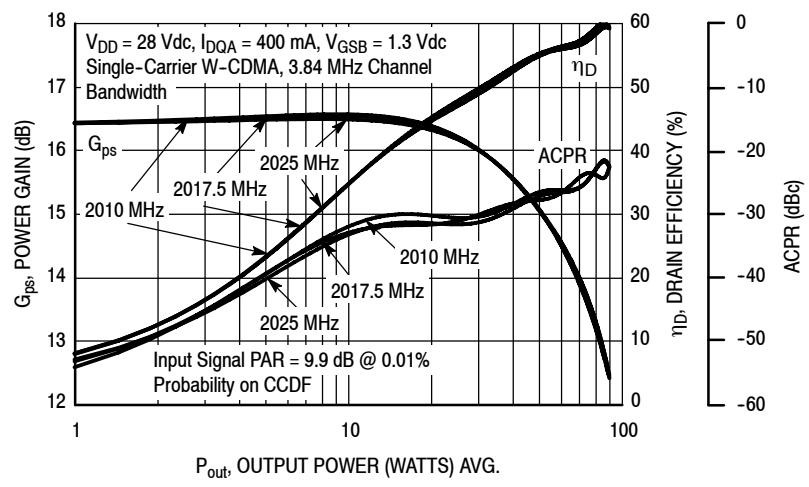


**Figure 5. Intermodulation Distortion Products versus Two-Tone Spacing**

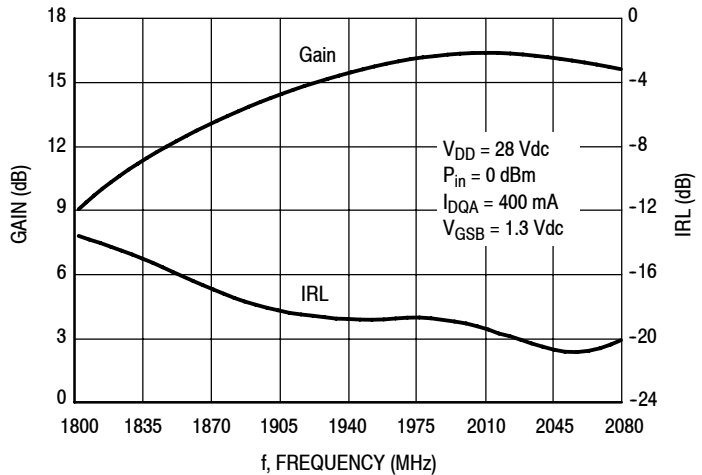


**Figure 6. Output Peak-to-Average Ratio Compression (PARC) versus Output Power**

### TYPICAL CHARACTERISTICS

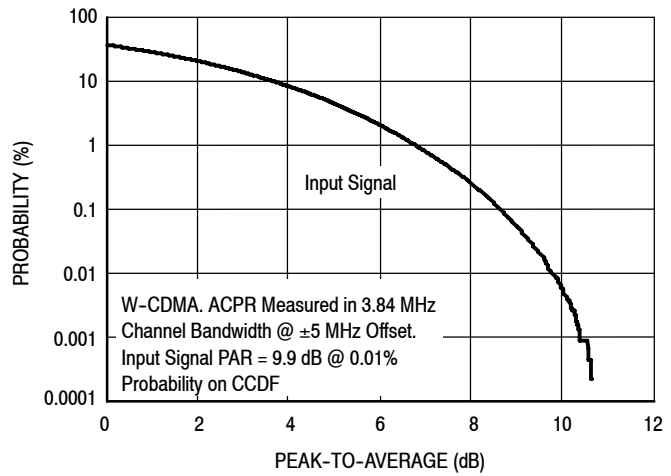


**Figure 7. Single-Carrier W-CDMA Power Gain, Drain Efficiency and ACPR versus Output Power**

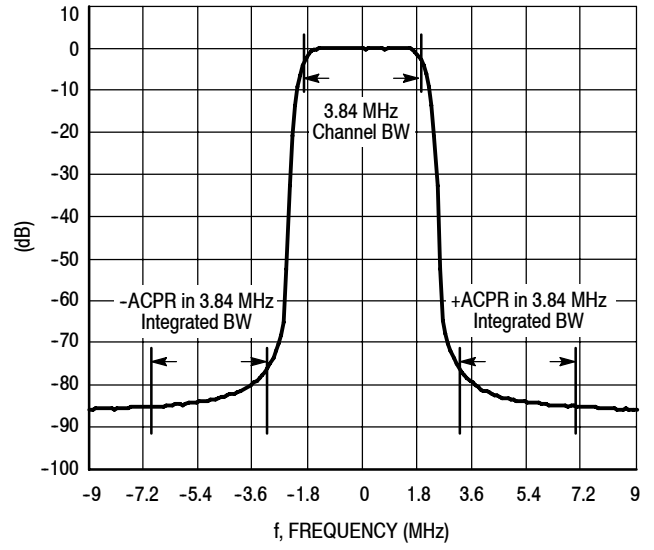


**Figure 8. Broadband Frequency Response**

### W-CDMA TEST SIGNAL



**Figure 9. CCDF W-CDMA IQ Magnitude Clipping, Single-Carrier Test Signal**



**Figure 10. Single-Carrier W-CDMA Spectrum**

$V_{DD} = 28 \text{ Vdc}$ ,  $I_{DQA} = 400 \text{ mA}$ ,  $V_{GSB} = 1.3 \text{ Vdc}$ ,  $P_{out} = 20 \text{ W Avg.}$

f MHz	$Z_{source}$ $\Omega$	$Z_{load}$ $\Omega$
1880	3.23 - j10.1	6.35 - j5.32
1900	3.36 - j9.78	6.64 - j5.29
1920	3.42 - j9.61	6.86 - j5.42
1940	3.33 - j9.44	6.94 - j5.64
1960	3.22 - j9.16	6.99 - j5.82
1980	3.31 - j8.90	7.17 - j6.03
2000	3.48 - j8.87	7.33 - j6.46
2020	3.39 - j8.92	7.10 - j6.92
2040	3.13 - j8.58	6.64 - j6.97

Note: Measured with Peaking side open.

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

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

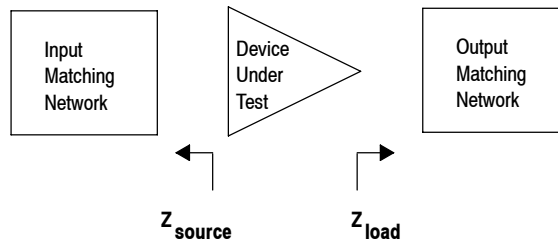


Figure 11. Series Equivalent Source and Load Impedance — Carrier Side

$V_{DD} = 28 \text{ Vdc}$ ,  $I_{DQA} = 400 \text{ mA}$ ,  $V_{GSB} = 1.3 \text{ Vdc}$ ,  $P_{out} = 20 \text{ W Avg.}$

f MHz	$Z_{source}$ $\Omega$	$Z_{load}$ $\Omega$
1880	3.83 - j10.28	0.67 - j7.03
1900	3.88 - j10.00	0.68 - j6.71
1920	3.82 - j9.81	0.62 - j6.43
1940	3.61 - j9.59	0.48 - j6.11
1960	3.50 - j9.30	0.35 - j5.70
1980	3.58 - j9.10	0.35 - j5.32
2000	3.61 - j9.13	0.35 - j5.07
2020	3.43 - j9.10	0.21 - j4.75
2040	3.10 - j8.55	0.10 - j4.19

Note: Measured with Carrier side open.

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

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

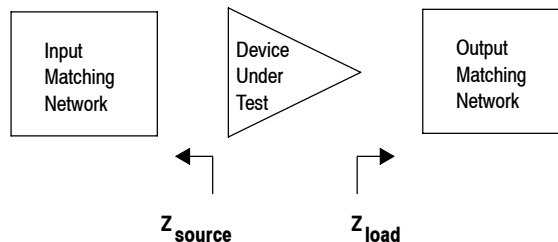
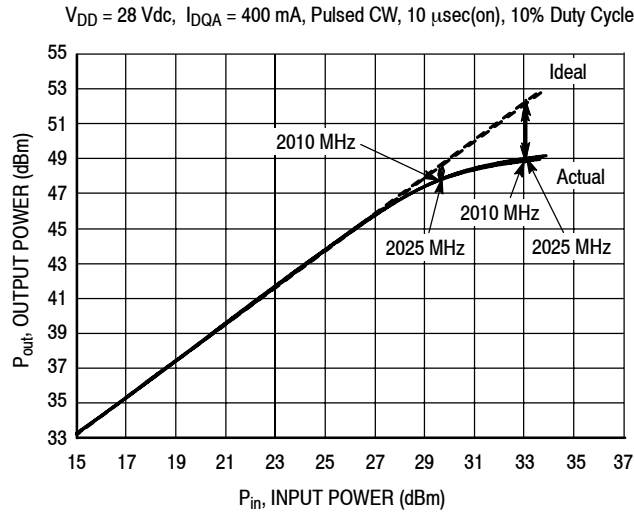


Figure 12. Series Equivalent Source and Load Impedance — Peaking Side

## 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
2010	62	47.9	76	48.8
2025	63	48.0	78	48.9

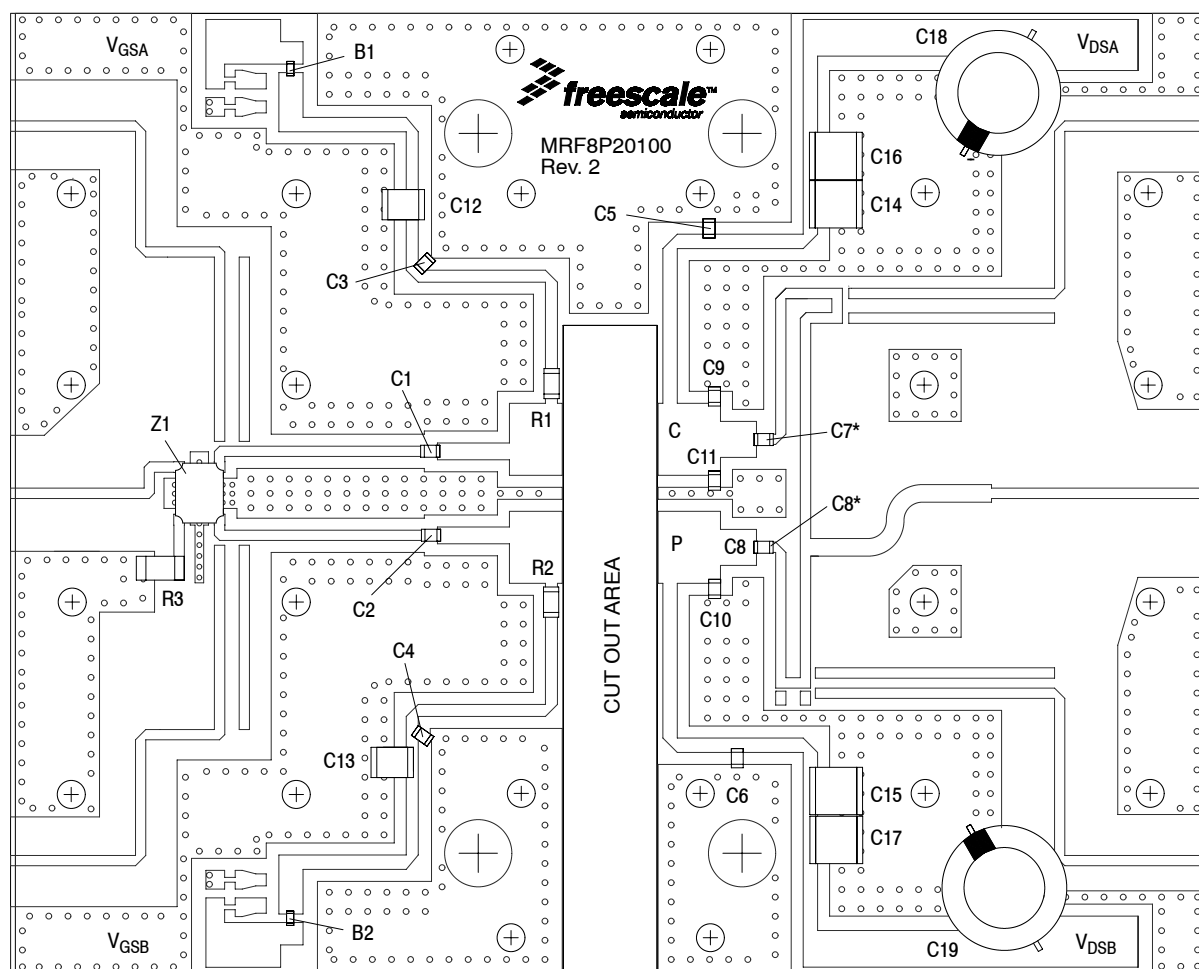
Test Impedances per Compression Level

f (MHz)		$Z_{source}$ $\Omega$	$Z_{load}$ $\Omega$
2010	P1dB	$2.83 - j12.46$	$3.18 - j6.16$
2025	P1dB	$3.43 - j13.20$	$3.16 - j6.14$

**Figure 13. Pulsed CW Output Power versus Input Power @ 28 V**

NOTE: Measurement made on the Class AB, carrier side of the device.

## ALTERNATE CHARACTERIZATION — 1880 MHz



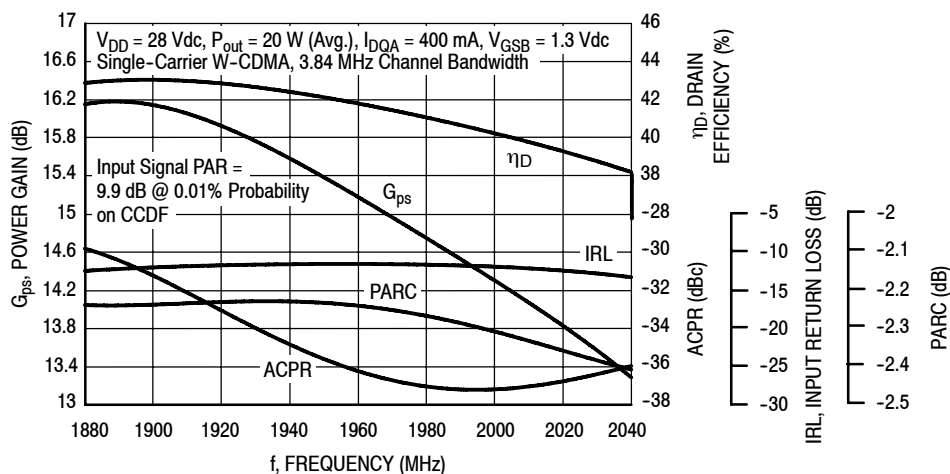
\*C7 and C8 are mounted vertically.

**Figure 14. MRF8P20100HR3(HSR3) Test Circuit Component Layout — 1880 MHz**

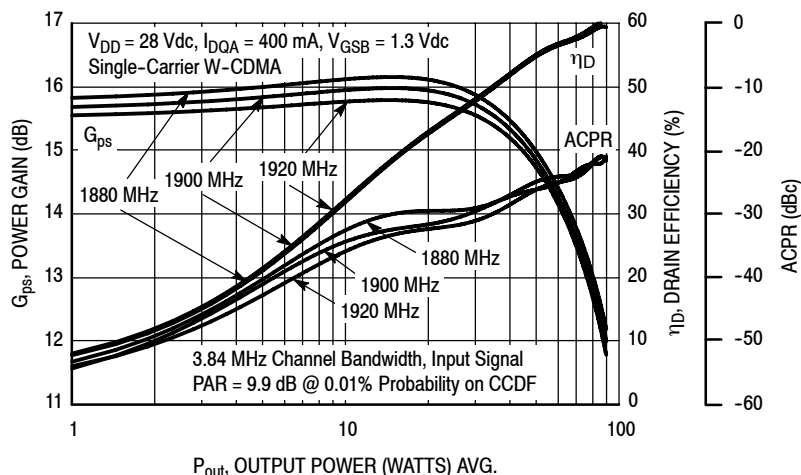
**Table 6. MRF8P20100HR3(HSR3) Test Circuit Component Designations and Values — 1880 MHz**

Part	Description	Part Number	Manufacturer
B1, B2	RF Ferrite Beads	MPZ2012S300AT000	TDK
C1, C2, C3, C4, C5, C6	12 pF Chip Capacitors	ATC600F120JT250XT	ATC
C7, C8	10 pF Chip Capacitors	ATC600F100JT250XT	ATC
C9, C10, C11	1.5 pF Chip Capacitors	ATC600F1R5BT250XT	ATC
C12, C13	4.7 $\mu$ F, 50 V Chip Capacitors	C4532X5R1H475MT	TDK
C14, C15	10 $\mu$ F, 50 V Chip Capacitors	C5750X7R1H106KT	TDK
C16, C17	22 $\mu$ F, 50 V Chip Capacitors	C5750KF1H226ZT	TDK
C18, C19	220 $\mu$ F, 63 V Electrolytic Capacitors	MCGPR63V227M10X21	Multicomp
R1, R2	12 $\Omega$ , 1/4 W Chip Resistors	CRCW120612R0FKEA	Vishay
R3	50 $\Omega$ , 4 W Chip Resistor	CW12010T0050GBK	ATC
Z1	1900 MHz Band 90°, 3 dB Chip Hybrid Coupler	1P503S	Anaren
PCB	0.020", $\epsilon_r = 3.5$	RO4350B	Rogers

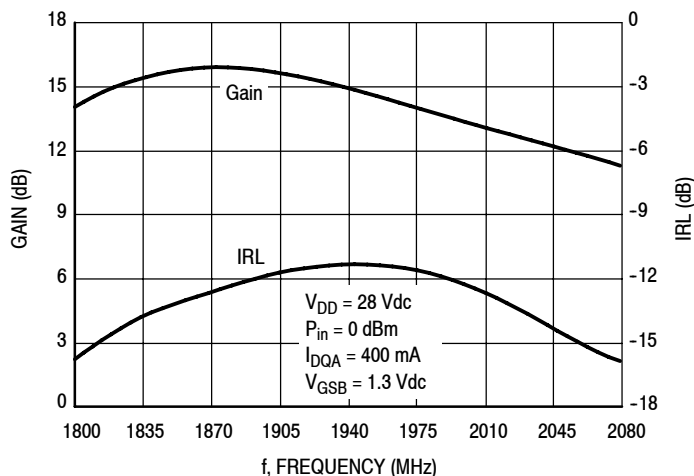
### TYPICAL CHARACTERISTICS — 1880 MHz



**Figure 15. Output Peak-to-Average Ratio Compression (PARC) Broadband Performance @  $P_{out} = 20$  Watts Avg.**



**Figure 16. Single-Carrier W-CDMA Power Gain, Drain Efficiency and ACPR versus Output Power**



**Figure 17. Broadband Frequency Response**

$V_{DD} = 28 \text{ Vdc}$ ,  $I_{DQA} = 400 \text{ mA}$ ,  $V_{GSB} = 1.3 \text{ Vdc}$ ,  $P_{out} = 20 \text{ W Avg.}$

f MHz	$Z_{source}$ $\Omega$	$Z_{load}$ $\Omega$
1880	2.22 - j7.34	6.32 - j6.84
1900	2.27 - j7.04	6.13 - j6.84
1920	2.35 - j6.75	5.91 - j6.87
1940	2.41 - j6.52	5.61 - j6.97
1960	2.40 - j6.33	5.25 - j7.09
1980	2.42 - j6.19	4.95 - j7.22
2000	2.45 - j6.17	4.62 - j7.41
2020	2.34 - j6.19	4.09 - j7.46
2040	2.15 - j5.91	3.56 - j7.08

Note: Measured with Peaking side open.

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

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

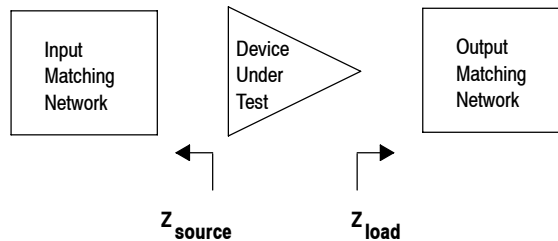


Figure 18. Series Equivalent Source and Load Impedance — Carrier Side — 1880 MHz

$V_{DD} = 28 \text{ Vdc}$ ,  $I_{DQA} = 400 \text{ mA}$ ,  $V_{GSB} = 1.3 \text{ Vdc}$ ,  $P_{out} = 20 \text{ W Avg.}$

f MHz	$Z_{source}$ $\Omega$	$Z_{load}$ $\Omega$
1880	2.67 - j6.62	0.50 - j3.80
1900	2.71 - j6.34	0.66 - j3.23
1920	2.76 - j6.11	0.88 - j2.69
1940	2.69 - j5.98	1.10 - j2.22
1960	2.62 - j5.84	1.36 - j1.80
1980	2.58 - j5.76	1.66 - j1.45
2000	2.50 - j5.75	2.03 - j1.17
2020	2.29 - j5.63	2.37 - j0.98
2040	2.11 - j5.23	2.64 - j0.79

Note: Measured with Carrier side open.

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

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

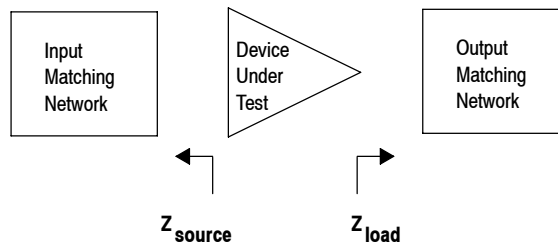
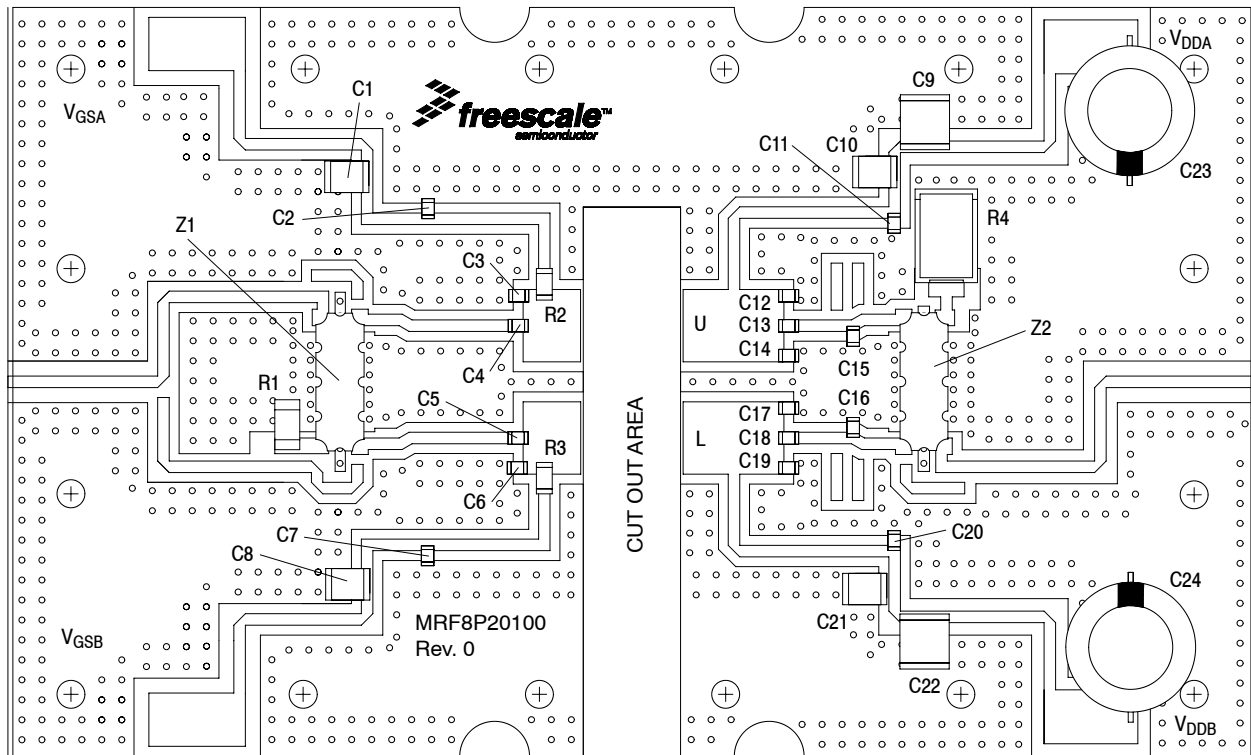


Figure 19. Series Equivalent Source and Load Impedance — Peaking Side — 1880 MHz

## ALTERNATE CHARACTERIZATION — GSM EDGE

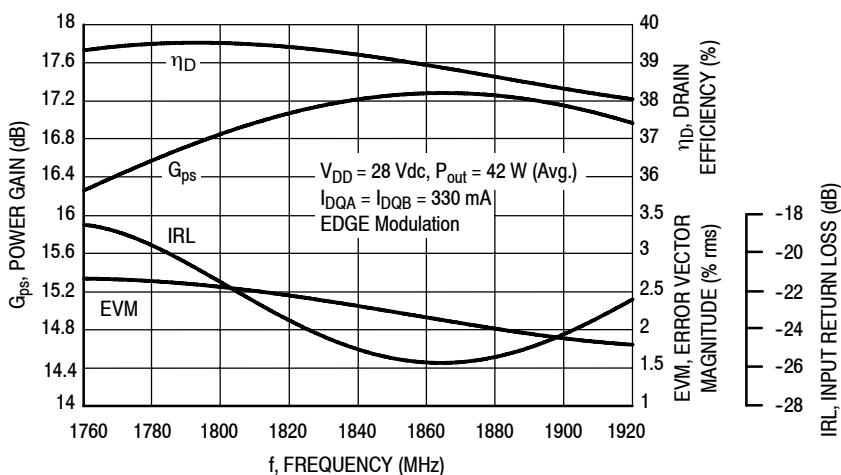


**Figure 20. MRF8P20100HR3(HSR3) Test Circuit Component Layout — GSM EDGE**

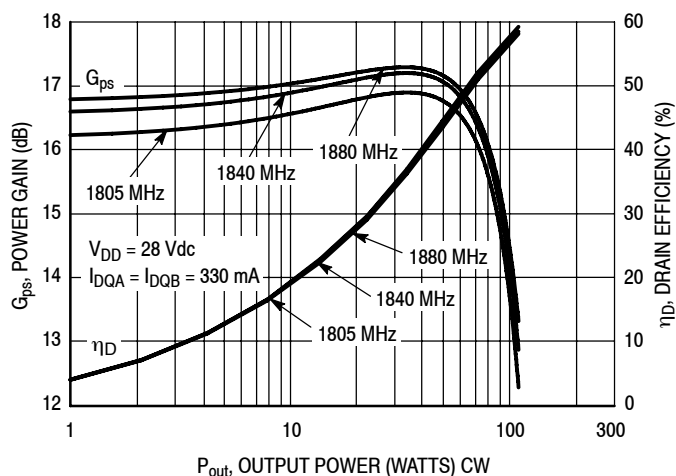
**Table 7. MRF8P20100HR3(HSR3) Test Circuit Component Designations and Values — GSM EDGE**

Part	Description	Part Number	Manufacturer
C1, C8	2.2 $\mu$ F, 50 V Chip Capacitors	C3225X7R2A225KT	TDK
C2, C7	12 pF Chip Capacitors	ATC600F120JT250XT	ATC
C3, C6	2.7 pF Chip Capacitors	ATC600F2R7BT250XT	ATC
C4, C5, C11, C20	15 pF Chip Capacitors	ATC600F150JT250XT	ATC
C9, C22	10 $\mu$ F, 50 V Chip Capacitors	C5750X7R1H106K	TDK
C10, C21	4.7 $\mu$ F, 50 V Chip Capacitors	C4532X5R1H475M	TDK
C12, C19	0.3 pF Chip Capacitors	ATC600F0R3BT250XT	ATC
C13, C18	22 pF Chip Capacitors	ATC600F220JT250XT	ATC
C14, C17	0.6 pF Chip Capacitors	ATC600F0R6BT250XT	ATC
C15, C16	0.5 pF Chip Capacitors	ATC600F0R5BT250XT	ATC
C23, C24	220 pF, 63 V Electrolytic Capacitors	MCGPR63V227M10X21	Multicomp
R1	50 $\Omega$ , 4 W Chip Resistor	CW12010T0050GBK	ATC
R2, R3	12 $\Omega$ , 1/4 W Chip Resistors	CRCW120612R0FKEA	Vishay
R4	50 $\Omega$ , 80 W, Termination	SMT3725ALNF	EMC
Z1, Z2	1900 MHz Band 90°, 3 dB Chip Hybrid Couplers	XC1900E-03	Anaren
PCB	0.020", $\epsilon_r = 3.5$	RO4350B	Rogers

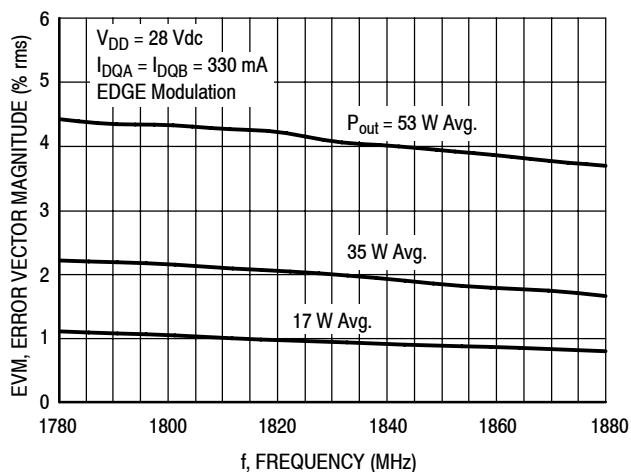
### TYPICAL CHARACTERISTICS — GSM EDGE



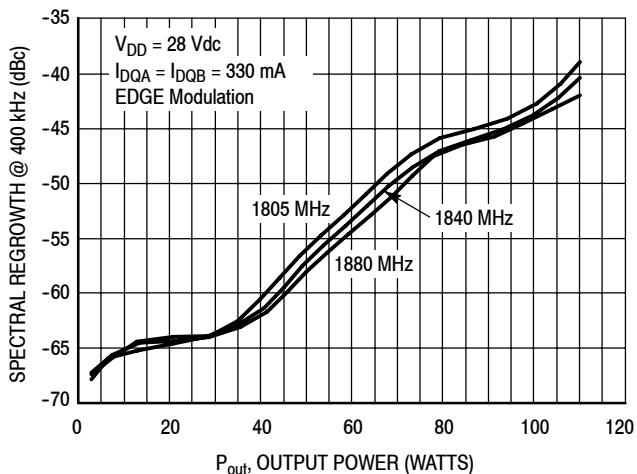
**Figure 21. Power Gain, Input Return Loss and Drain Efficiency versus Frequency @  $P_{out} = 42$  Watts Avg.**



**Figure 22. Power Gain and Drain Efficiency versus Output Power**

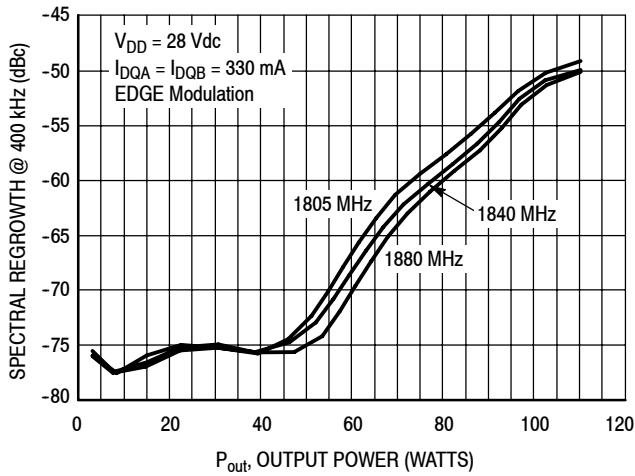


**Figure 23. EVM versus Frequency**

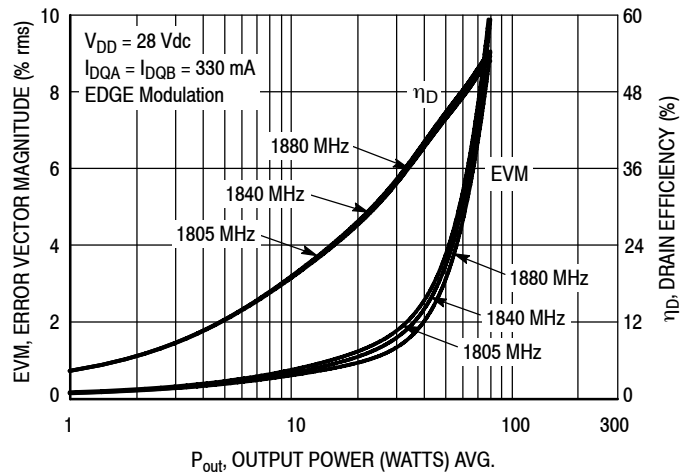


**Figure 24. Spectral Regrowth at 400 kHz versus Output Power**

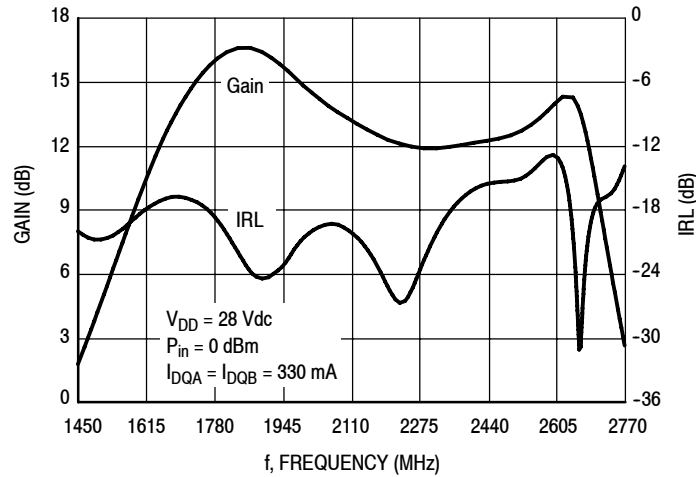
## TYPICAL CHARACTERISTICS — GSM EDGE



**Figure 25. Spectral Regrowth at 600 kHz versus Output Power**



**Figure 26. EVM and Drain Efficiency versus Output Power**



**Figure 27. Broadband Frequency Response**

$V_{DD} = 28 \text{ Vdc}$ ,  $I_{DQA} = I_{DQB} = 330 \text{ mA}$ ,  $P_{out} = 42 \text{ W Avg.}$

f MHz	$Z_{source}$ $\Omega$	$Z_{load}$ $\Omega$
1760	3.12 - j7.74	4.39 - j7.66
1780	3.13 - j7.35	4.44 - j7.38
1800	3.21 - j7.12	4.50 - j7.30
1820	3.20 - j7.05	4.42 - j7.31
1840	3.08 - j6.98	4.26 - j7.28
1860	2.95 - j6.82	4.10 - j7.15
1880	2.88 - j6.57	4.00 - j6.92
1900	2.87 - j6.21	3.95 - j6.62
1920	2.89 - j5.85	3.94 - j6.36

Note: Measured with Lower side open.

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

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

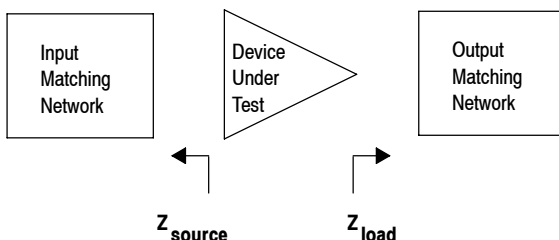


Figure 28. Series Equivalent Source and Load Impedance — Upper Side — GSM EDGE

$V_{DD} = 28 \text{ Vdc}$ ,  $I_{DQA} = I_{DQB} = 330 \text{ Vdc}$ ,  $P_{out} = 42 \text{ W Avg.}$

f MHz	$Z_{source}$ $\Omega$	$Z_{load}$ $\Omega$
1760	3.72 - j7.89	3.55 - j5.43
1780	3.77 - j7.60	3.62 - j5.09
1800	3.82 - j7.48	3.76 - j4.85
1820	3.72 - j7.46	3.87 - j4.75
1840	3.55 - j7.37	3.90 - j4.66
1860	3.39 - j7.16	3.92 - j4.52
1880	3.29 - j6.85	3.96 - j4.31
1900	3.24 - j6.48	4.03 - j4.02
1920	3.22 - j6.17	4.13 - j3.71

Note: Measured with Upper side open.

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

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

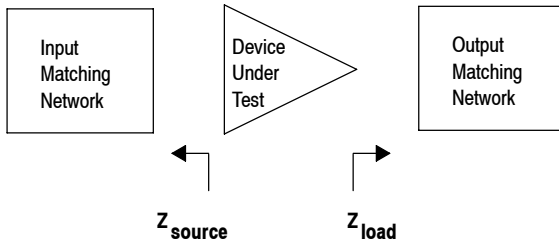
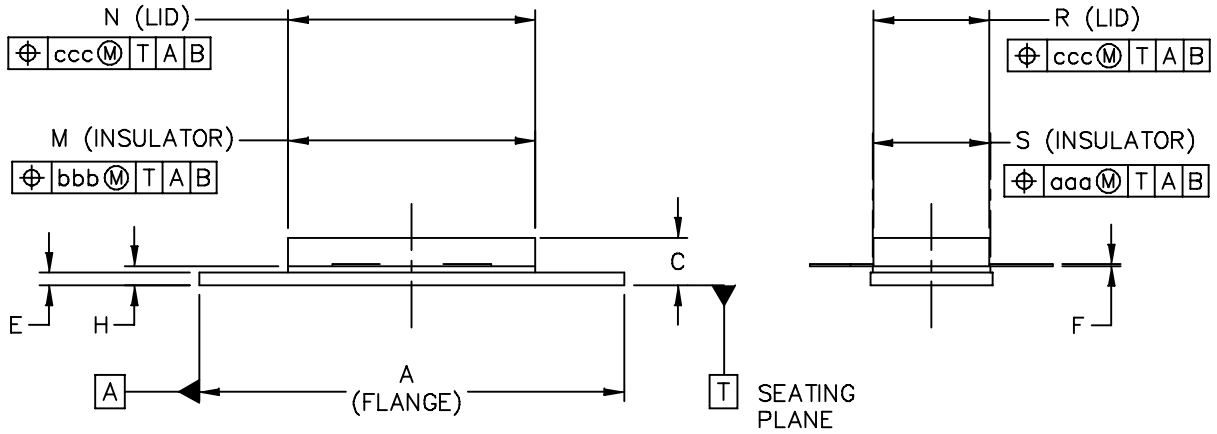
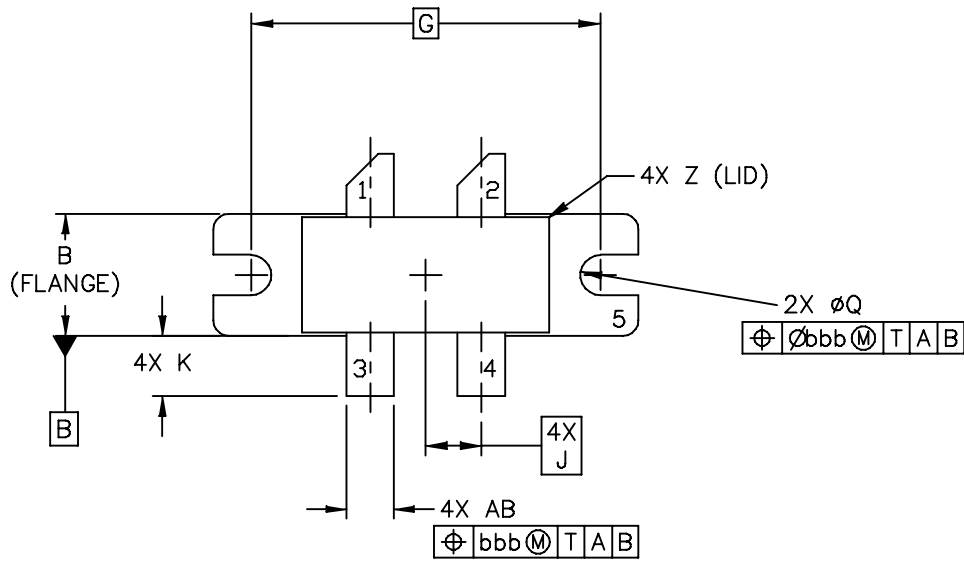


Figure 29. Series Equivalent Source and Load Impedance — Lower Side — GSM EDGE

PACKAGE DIMENSIONS



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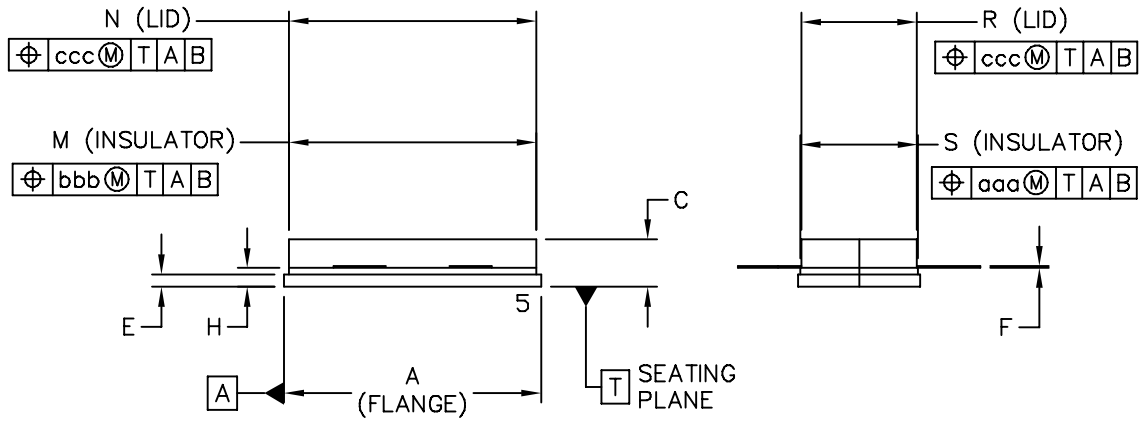
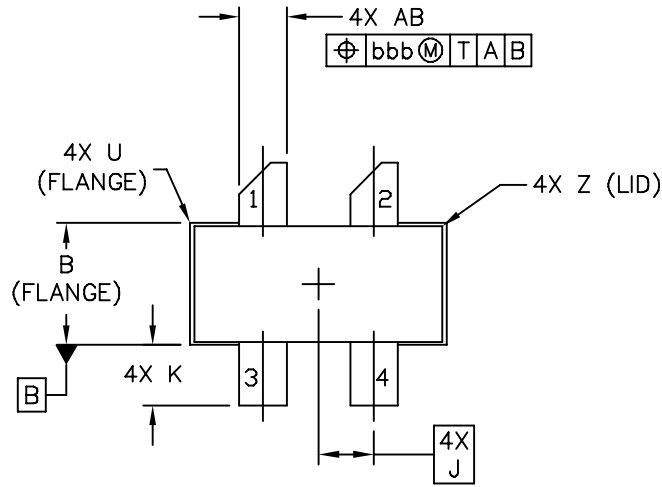
NOTES:

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.

STYLE 1:

- PIN
1. DRAIN
  2. DRAIN
  3. GATE
  4. GATE
  5. SOURCE

DIM	INCH		MILLIMETER		DIM	INCH		MILLIMETER	
	MIN	MAX	MIN	MAX		MIN	MAX	MIN	MAX
A	1.335	1.345	33.91	34.16	R	.365	.375	9.27	9.53
B	.380	.390	9.65	9.91	S	.365	.375	9.27	9.52
C	.125	.170	3.18	4.32	U		.040		1.02
E	.035	.045	0.89	1.14	Z		.030		0.76
F	.003	.006	0.08	0.15	AB	.145	.155	3.68	3.94
G	1.100 BSC		27.94 BSC						
H	.057	.067	1.45	1.7	aaa		.005		0.127
J	.175 BSC		4.44 BSC		bbb		.010		0.254
K	.170	.210	4.32	5.33	ccc		.015		0.381
M	.774	.786	19.61	20.02					
N	.772	.788	19.61	20.02					
Q	ø.118	ø.138	ø3	ø3.51					
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	CASE NUMBER: 465H-02	27 MAR 2007	
	STANDARD: NON-JEDEC		

NOTES:

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

STYLE 1:

- PIN 1. DRAIN  
 2. DRAIN  
 3. GATE  
 4. GATE  
 5. SOURCE

DIM	INCH		MILLIMETER		DIM	INCH		MILLIMETER	
	MIN	MAX	MIN	MAX		MIN	MAX	MIN	MAX
A	.805	.815	20.45	20.7	U		.040		1.02
B	.380	.390	9.65	9.91	Z		.030		0.76
C	.125	.170	3.18	4.32	AB	.145	.155	3.68	- 3.94
E	.035	.045	0.89	1.14					
F	.003	.006	0.08	0.15	aaa		.005		0.127
H	.057	.067	1.45	1.7	bbb		.010		0.254
J	.175 BSC		4.44 BSC		ccc		.015		0.381
K	.170	.210	4.32	5.33					
M	.774	.786	19.61	20.02					
N	.772	.788	19.61	20.02					
R	.365	.375	9.27	9.53					
S	.365	.375	9.27	9.52					
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TITLE:  NI 780S-4					DOCUMENT NO: 98ASA10718D			REV: A	
					CASE NUMBER: 465H-02			27 MAR 2007	
					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.

## REVISION HISTORY

The following table summarizes revisions to this document.

Revision	Date	Description
0	Apr. 2010	<ul style="list-style-type: none"> <li>• Initial Release of Data Sheet</li> </ul>

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