



# RF Power LDMOS Transistor

## High Ruggedness N-Channel Enhancement-Mode Lateral MOSFET

RF power transistor designed for both narrowband and broadband ISM, broadcast and aerospace applications operating at frequencies from 1.8 to 2000 MHz. This device is fabricated using Freescale's enhanced ruggedness platform and is suitable for use in applications where high VSWRs are encountered.

**Typical Performance:**  $V_{DD} = 50$  Volts

Frequency (MHz)	Signal Type	$P_{out}$ (W)	$G_{ps}$ (dB)	$\eta_D$ (%)	IMD (dBc)
1.8 to 30 <sup>(1)</sup>	Two-Tone (10 kHz spacing)	25 PEP	25	51	-30
512	Pulse (100 $\mu$ sec, 20% Duty Cycle)	25 Peak	25.4	74.5	—
512	CW	25	25.5	74.7	—
1030	CW	25	22.5	60	—

1. The values shown are the minimum measured performance numbers across the indicated frequency range.

### Load Mismatch/Ruggedness

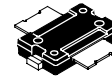
Frequency (MHz)	Signal Type	VSWR	$P_{out}$ (W)	Test Voltage	Result
30	CW	>65:1 at all Phase Angles	31 (3 dB Overdrive)	50	No Device Degradation
512	Pulse (100 $\mu$ sec, 20% Duty Cycle)		31 Peak (3 dB Overdrive)		
512	CW		30.5 (3 dB Overdrive)		
1030	CW		31 (3 dB Overdrive)		

### Features

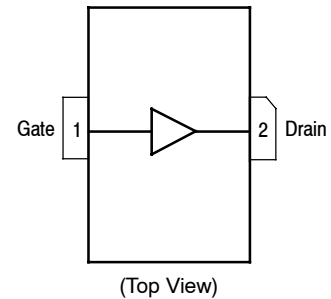
- Wide Operating Frequency Range
- Extremely Rugged
- Unmatched, Capable of Very Broadband Operation
- Integrated Stability Enhancements
- Low Thermal Resistance
- Extended ESD Protection Circuit
- In Tape and Reel. R1 Suffix = 500 Units, 24 mm Tape Width, 13 inch Reel.

**MRFE6VS25NR1**

**1.8-2000 MHz, 25 W, 50 V  
 WIDEBAND  
 RF POWER LDMOS TRANSISTOR**



**TO-270-2  
 PLASTIC**



Note: The backside of the package is the source terminal for the transistor.

**Figure 1. Pin Connections**

**Table 1. Maximum Ratings**

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-0.5, +133	Vdc
Gate-Source Voltage	$V_{GS}$	-6.0, +10	Vdc
Storage Temperature Range	$T_{stg}$	-65 to +150	°C
Case Operating Temperature	$T_C$	-40 to +150	°C
Operating Junction Temperature (1,2)	$T_J$	-40 to +225	°C

**Table 2. Thermal Characteristics**

Characteristic	Symbol	Value (2,3)	Unit
Thermal Resistance, Junction to Case CW: Case Temperature 80°C, 25 W CW, 50 Vdc, $I_{DQ} = 10$ mA, 512 MHz	$R_{\theta JC}$	1.2	°C/W
Thermal Impedance, Junction to Case Pulse: Case Temperature 77°C, 25 W Peak, 100 $\mu$ sec Pulse Width, 20% Duty Cycle, 50 Vdc, $I_{DQ} = 10$ mA, 512 MHz	$Z_{\theta JC}$	0.29	°C/W

**Table 3. ESD Protection Characteristics**

Test Methodology	Class
Human Body Model (per JESD22-A114)	2, passes 2500 V
Machine Model (per EIA/JESD22-A115)	B, passes 250 V
Charge Device Model (per JESD22-C101)	IV, passes 2000 V

**Table 4. Moisture Sensitivity Level**

Test Methodology	Rating	Package Peak Temperature	Unit
Per JESD22-A113, IPC/JEDEC J-STD-020	3	260	°C

**Table 5. Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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**Off Characteristics**

Gate-Source Leakage Current ( $V_{GS} = 5$ Vdc, $V_{DS} = 0$ Vdc)	$I_{GSS}$	—	—	400	nAdc
Drain-Source Breakdown Voltage ( $V_{GS} = 0$ Vdc, $I_D = 50$ mA)	$V_{(BR)DSS}$	133	142	—	Vdc
Zero Gate Voltage Drain Leakage Current ( $V_{DS} = 50$ Vdc, $V_{GS} = 0$ Vdc)	$I_{DSS}$	—	—	2	$\mu$ Adc
Zero Gate Voltage Drain Leakage Current ( $V_{DS} = 100$ Vdc, $V_{GS} = 0$ Vdc)	$I_{DSS}$	—	—	7	$\mu$ Adc

**On Characteristics**

Gate Threshold Voltage ( $V_{DS} = 10$ Vdc, $I_D = 85$ $\mu$ Adc)	$V_{GS(th)}$	1.5	2.0	2.5	Vdc
Gate Quiescent Voltage ( $V_{DD} = 50$ Vdc, $I_D = 10$ mAdc, Measured in Functional Test)	$V_{GS(Q)}$	2.0	2.4	3.0	Vdc
Drain-Source On-Voltage ( $V_{GS} = 10$ Vdc, $I_D = 210$ mAdc)	$V_{DS(on)}$	—	0.28	—	Vdc

**Dynamic Characteristics**

Reverse Transfer Capacitance ( $V_{DS} = 50$ Vdc $\pm$ 30 mV(rms)ac @ 1 MHz, $V_{GS} = 0$ Vdc)	$C_{rss}$	—	0.26	—	pF
Output Capacitance ( $V_{DS} = 50$ Vdc $\pm$ 30 mV(rms)ac @ 1 MHz, $V_{GS} = 0$ Vdc)	$C_{oss}$	—	14.2	—	pF
Input Capacitance ( $V_{DS} = 50$ Vdc, $V_{GS} = 0$ Vdc $\pm$ 30 mV(rms)ac @ 1 MHz)	$C_{iss}$	—	39.2	—	pF

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.

(continued)

**Table 5. Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) (continued)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>Functional Tests</b> (In Freescale Test Fixture, 50 ohm system) $V_{DD} = 50\text{ Vdc}$ , $I_{DQ} = 10\text{ mA}$ , $P_{out} = 25\text{ W Peak}$ (5 W Avg.), $f = 512\text{ MHz}$ , 100 $\mu\text{sec}$ Pulse Width, 20% Duty Cycle					
Power Gain	$G_{ps}$	24.0	25.4	27.0	dB
Drain Efficiency	$\eta_D$	70.0	74.5	—	%
Input Return Loss	IRL	—	-16	-10	dB

**Load Mismatch/Ruggedness** (In Freescale Test Fixture, 50 ohm system,  $I_{DQ} = 10\text{ mA}$ )

Frequency (MHz)	Signal Type	VSWR	$P_{out}$ (W)	Test Voltage, $V_{DD}$	Result
512	Pulse (100 $\mu\text{sec}$ , 20% Duty Cycle)	>65:1 at all Phase Angles	31 Peak (3 dB Overdrive)	50	No Device Degradation
	CW		30.5 (3 dB Overdrive)		

## TYPICAL CHARACTERISTICS

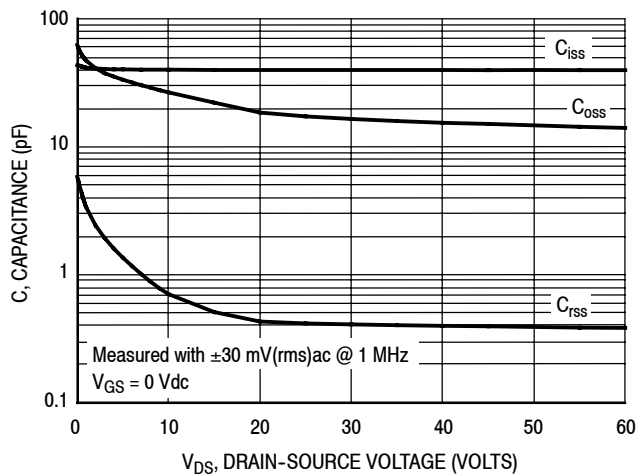


Figure 2. Capacitance versus Drain-Source Voltage

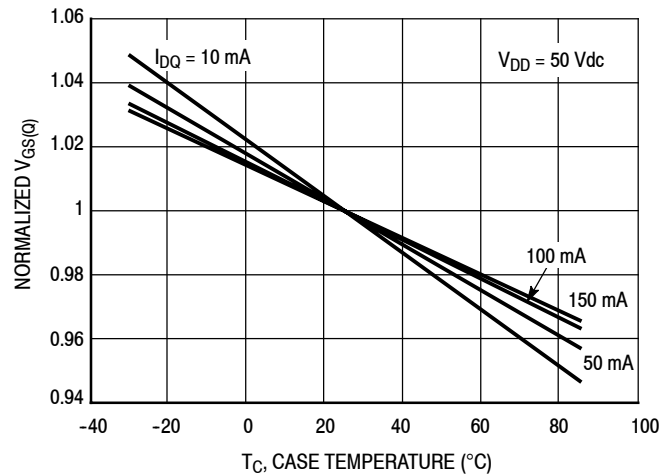
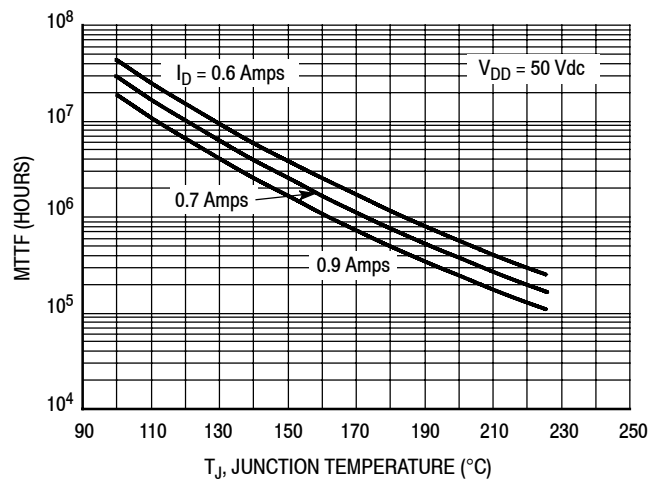


Figure 3. Normalized  $V_{GS}$  versus Quiescent Current and Case Temperature

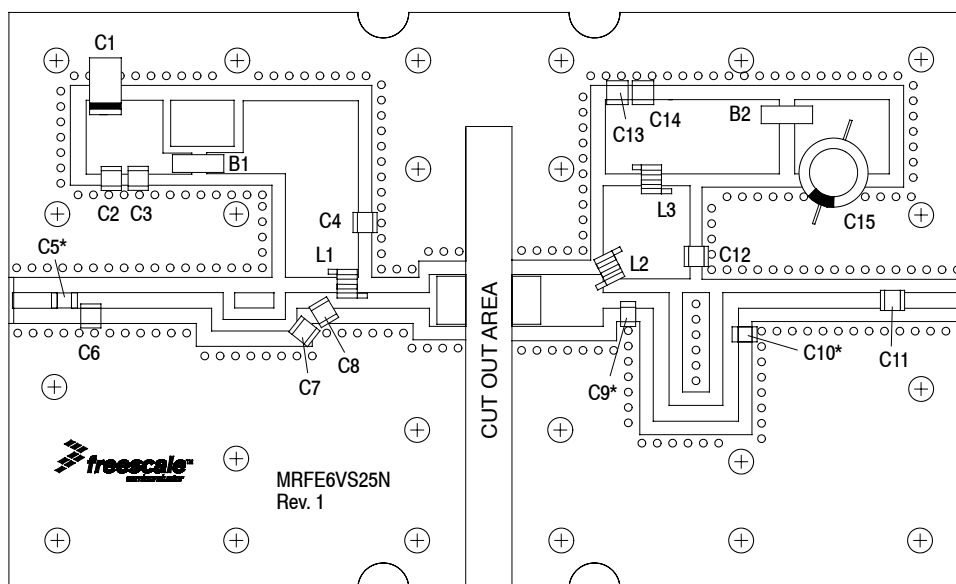
$I_{DQ}$ (mA)	Slope (mV/°C)
10	-2.160
50	-1.790
100	-1.760
150	-1.680



**Note:** MTTF value represents the total cumulative operating time under indicated test conditions.

Figure 4. MTTF versus Junction Temperature - CW

## 512 MHz NARROWBAND PRODUCTION TEST FIXTURE



\*C5, C9 and C10 are mounted vertically.

**Figure 5. MRFE6VS25NR1 Narrowband Test Circuit Component Layout — 512 MHz**

**Table 6. MRFE6VS25NR1 Narrowband Test Circuit Component Designations and Values — 512 MHz**

Part	Description	Part Number	Manufacturer
B1, B2	Long Ferrite Beads	2743021447	Fair-Rite
C1	22 $\mu$ F, 35 V Tantalum Capacitor	T491X226K035AT	Kemet
C2, C13	0.1 $\mu$ F Chip Capacitors	CDR33BX104AKWY	AVX
C3, C14	0.01 $\mu$ F Chip Capacitors	C0805C103K5RAC	Kemet
C4, C11, C12	180 pF Chip Capacitors	ATC100B181JT300XT	ATC
C5	18 pF Chip Capacitor	ATC100B180JT500XT	ATC
C6	2.7 pF Chip Capacitor	ATC100B2R7BT500XT	ATC
C7	15 pF Chip Capacitor	ATC100B150JT500XT	ATC
C8	36 pF Chip Capacitor	ATC100B360JT500XT	ATC
C9	4.3 pF Chip Capacitor	ATC100B4R3CT500XT	ATC
C10	13 pF Chip Capacitor	ATC100B130JT500XT	ATC
C15	470 $\mu$ F, 63 V Electrolytic Capacitor	MCGPR63V477M13X26-RH	Multicomp
L1	33 nH Inductor	1812SMS-33NJLC	Coilcraft
L2	12.5 nH Inductor	A04TJLC	Coilcraft
L3	82 nH Inductor	1812SMS-82NJLC	Coilcraft
PCB	0.030", $\epsilon_r = 2.55$	AD255A	Arlon

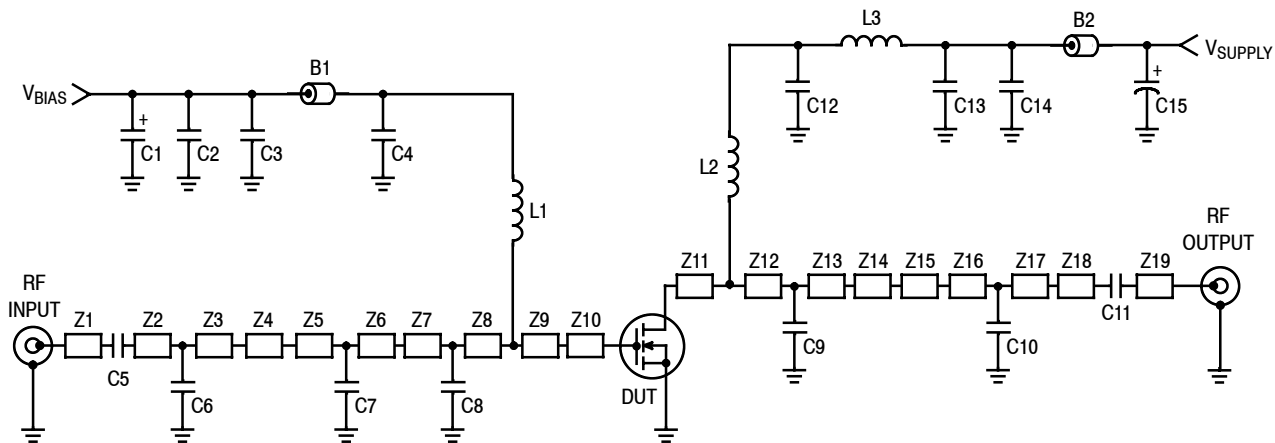


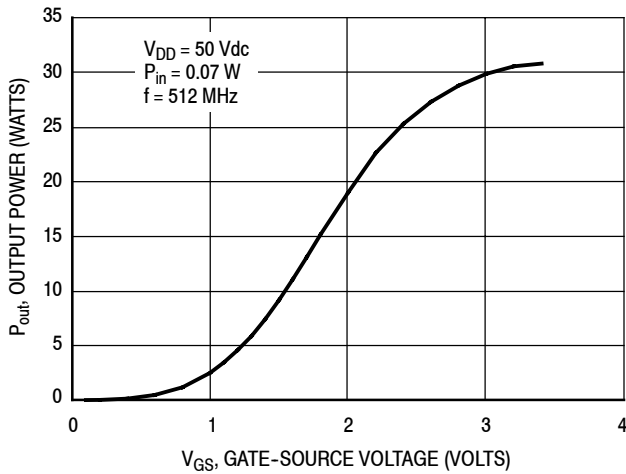
Figure 6. MRFE6VS25NR1 Narrowband Test Circuit Schematic — 512 MHz

Table 7. MRFE6VS25NR1 Narrowband Test Circuit Microstrips — 512 MHz

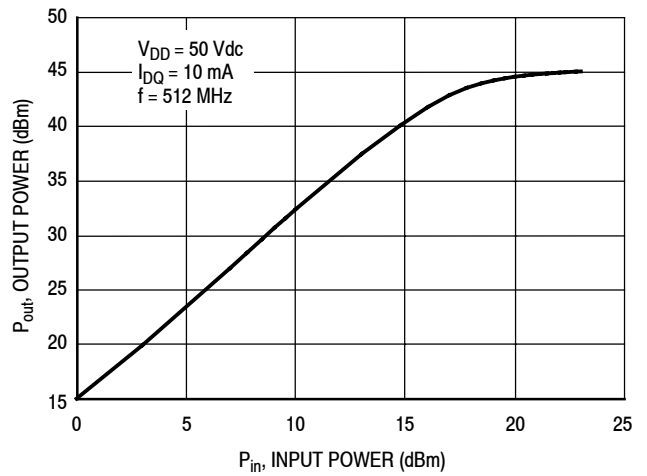
Microstrip	Description	Microstrip	Description
Z1	0.235" × 0.082" Microstrip	Z11	0.475" × 0.270" Microstrip
Z2	0.042" × 0.082" Microstrip	Z12	0.091" × 0.082" Microstrip
Z3	0.682" × 0.082" Microstrip	Z13	0.170" × 0.082" Microstrip
Z4*	0.200" × 0.060" Microstrip	Z14*	0.670" × 0.082" Microstrip
Z5	0.324" × 0.060" Microstrip	Z15	0.280" × 0.082" Microstrip
Z6*	0.200" × 0.060" Microstrip	Z16*	0.413" × 0.082" Microstrip
Z7	0.067" × 0.082" Microstrip	Z17*	0.259" × 0.082" Microstrip
Z8	0.142" × 0.082" Microstrip	Z18	0.761" × 0.082" Microstrip
Z9	0.481" × 0.082" Microstrip	Z19	0.341" × 0.082" Microstrip
Z10	0.190" × 0.270" Microstrip		

\* Line length includes microstrip bends

## TYPICAL CHARACTERISTICS — 512 MHz

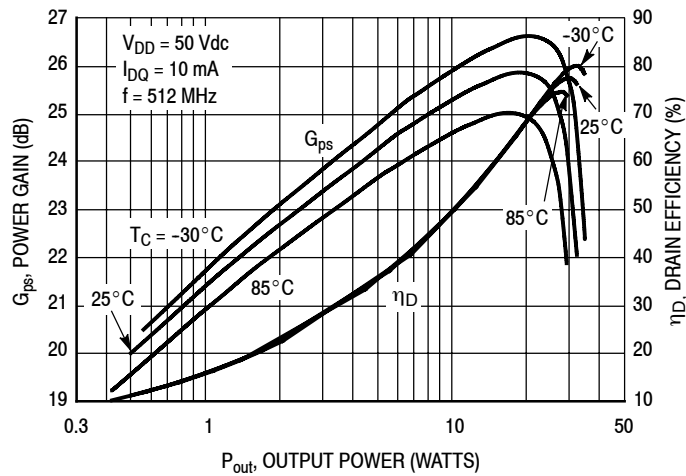


**Figure 7. CW Output Power versus Gate-Source Voltage at a Constant Input Power**



f (MHz)	P1dB (W)	P3dB (W)
512	27.8	31.4

**Figure 8. CW Output Power versus Input Power**



**Figure 9. Power Gain and Drain Efficiency versus CW Output Power**

## 512 MHz NARROWBAND PRODUCTION TEST FIXTURE

$V_{DD} = 50 \text{ Vdc}$ ,  $I_{DQ} = 10 \text{ mA}$ ,  $P_{out} = 25 \text{ W Peak}$

f MHz	$Z_{source}$ $\Omega$	$Z_{load}$ $\Omega$
512	$1.56 + j11.6$	$9.5 + j18.3$

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

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

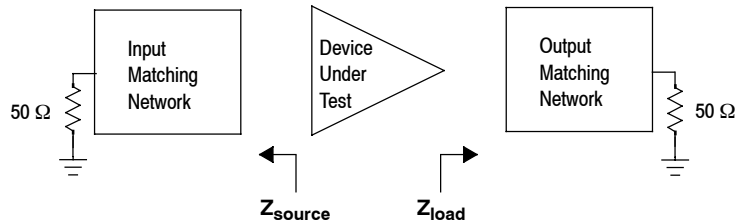


Figure 10. Narrowband Series Equivalent Source and Load Impedance — 512 MHz



## 1.8-30 MHz BROADBAND REFERENCE CIRCUIT

**Table 8. 1.8-30 MHz Broadband Performance** (In Freescale Reference Circuit, 50 ohm system)

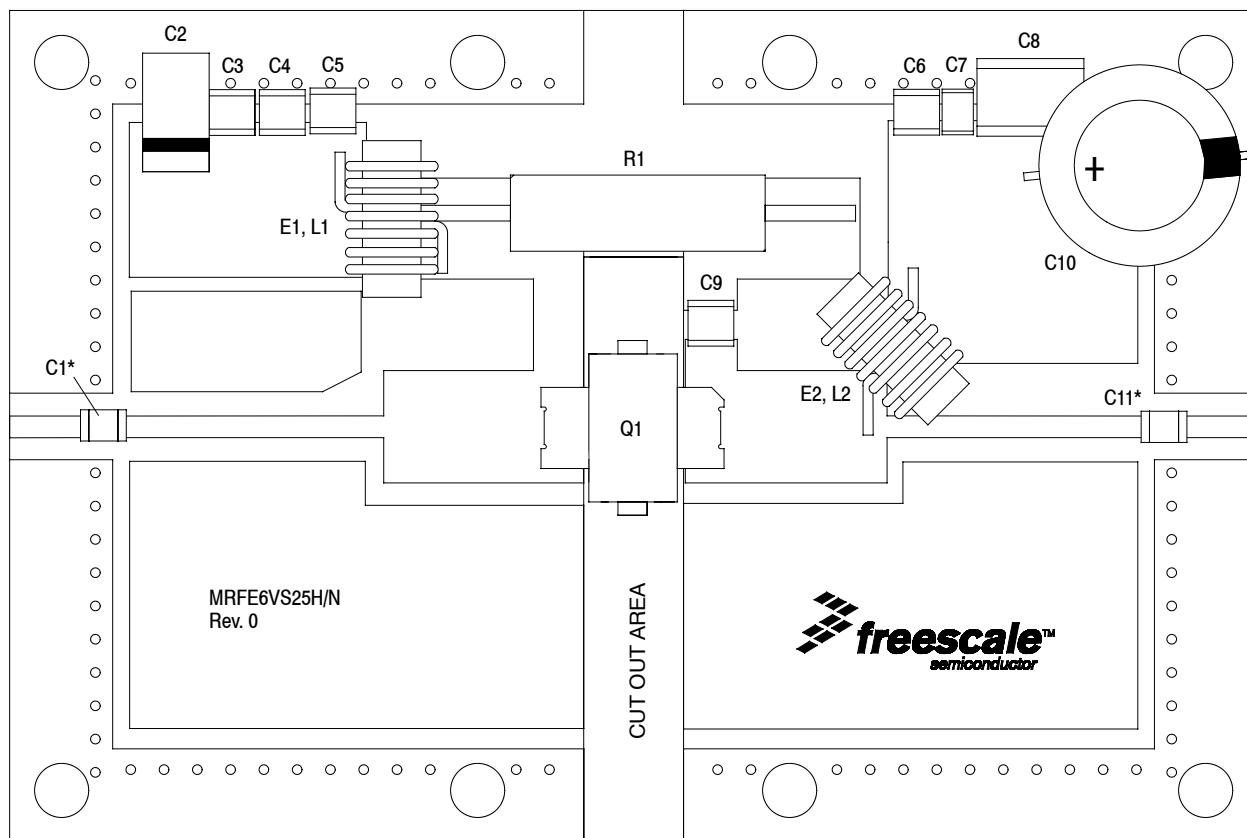
$V_{DD} = 50$  Volts,  $I_{DQ} = 100$  mA

Signal Type	$P_{out}$ (W)	f (MHz)	$G_{ps}$ (dB)	$\eta_D$ (%)	IMD (dBc)
Two-Tone (10 kHz spacing)	25 PEP	1.8	25.7	51.5	-30.7
		10	25.8	50.7	-34.8
		30	24.8	50.7	-33.0

**Table 9. Load Mismatch/Ruggedness** (In Freescale Reference Circuit, 50 ohm system,  $I_{DQ} = 25$  mA)

Frequency (MHz)	Signal Type	VSWR	$P_{out}$ (W)	Test Voltage, $V_{DD}$	Result
30	Pulse (100 $\mu$ sec, 20% Duty Cycle)	>65:1 at all Phase Angles	29 Peak (3 dB Overdrive)	50	No Device Degradation
	CW		31 (3 dB Overdrive)		

## 1.8-30 MHz BROADBAND REFERENCE CIRCUIT



\*C1 and C11 are mounted vertically.

Figure 11. MRFE6VS25NR1 Broadband Reference Circuit Component Layout — 1.8-30 MHz

Table 10. MRFE6VS25NR1 Broadband Reference Circuit Component Designations and Values — 1.8-30 MHz

Part	Description	Part Number	Manufacturer
C1, C5, C6, C9, C11	20K pF Chip Capacitors	ATC200B203KT50XT	ATC
C2	10 $\mu$ F, 35 V Tantalum Capacitor	T491D106K035AT	Kemet
C3	0.1 $\mu$ F Chip Capacitor	CDR33BX104AKWY	AVX
C4	2.2 $\mu$ F Chip Capacitor	C3225X7R1H225KT	TDK
C7	0.1 $\mu$ F Chip Capacitor	GRM319R72A104KA01D	Murata
C8	2.2 $\mu$ F Chip Capacitor	G2225X7R225KT3AB	ATC
C10	220 $\mu$ F, 100 V Electrolytic Capacitor	MCGPR100V227M16X26-RH	Multicomp
E1	#43 Ferrite Toroid	5943001101	Fair-Rite
E2	#61 Ferrite Toroid	5961001101	Fair-Rite
L1	4 Turns, #22 AWG, Toroid Transformer with Ferrite E1	8077 Copper Magnetic Wire	Belden
L2	26 Turns, #22 AWG, Toroid Transformer with Ferrite E2	8077 Copper Magnetic Wire	Belden
Q1	RF Power LDMOS Transistor	MRFE6VS25NR1	Freescale
R1	1 k $\Omega$ , 3 W Chip Resistor	CPF31K0000FKE14	Vishay
PCB	0.030", $\epsilon_r = 4.8$	S1000	Shenzhen Multilayer PCB Technology

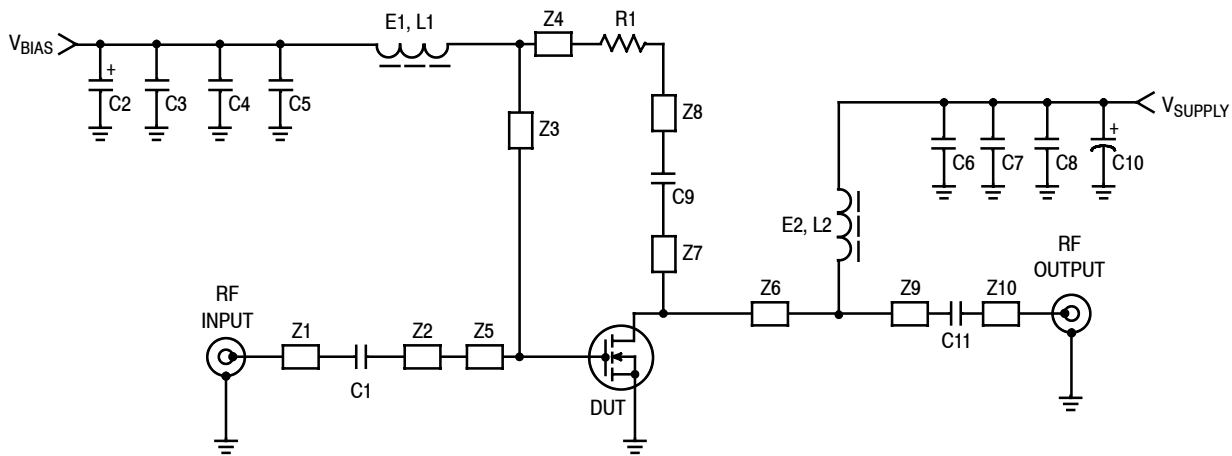
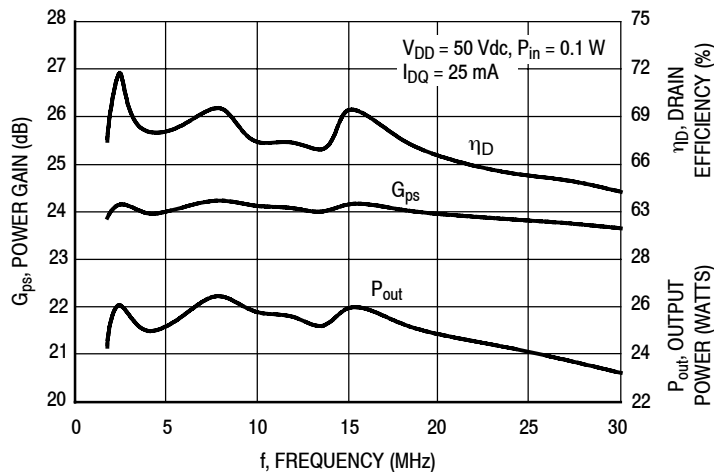


Figure 12. MRFE6VS25NR1 Broadband Reference Circuit Schematic — 1.8-30 MHz

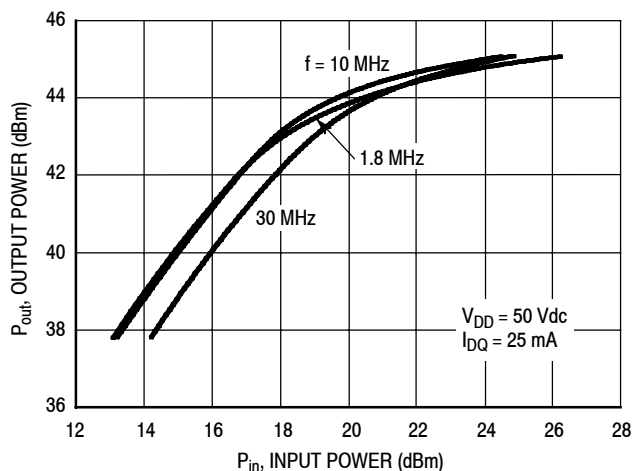
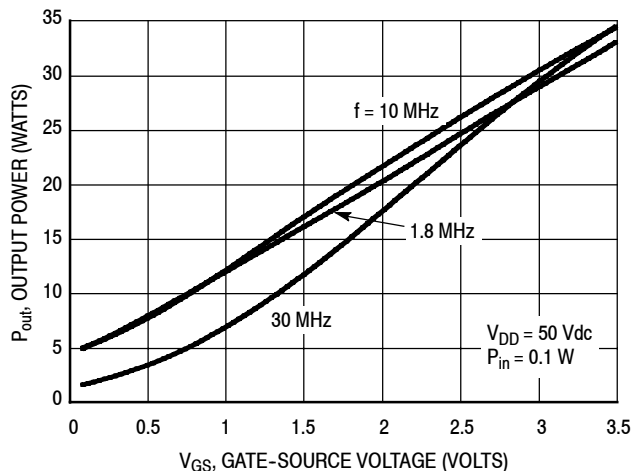
Table 11. MRFE6VS25NR1 Broadband Reference Test Circuit Microstrips — 1.8-30 MHz

Microstrip	Description	Microstrip	Description
Z1, Z10	0.141" × 0.047" Microstrip	Z4, Z8	0.422" × 0.241" Microstrip
Z2, Z9	0.625" × 0.047" Microstrip	Z5, Z6	0.469" × 0.263" Microstrip
Z3	0.119" × 0.219" Microstrip	Z7	0.119" × 0.063" Microstrip

**TYPICAL CHARACTERISTICS — 1.8-30 MHz  
BROADBAND REFERENCE CIRCUIT**



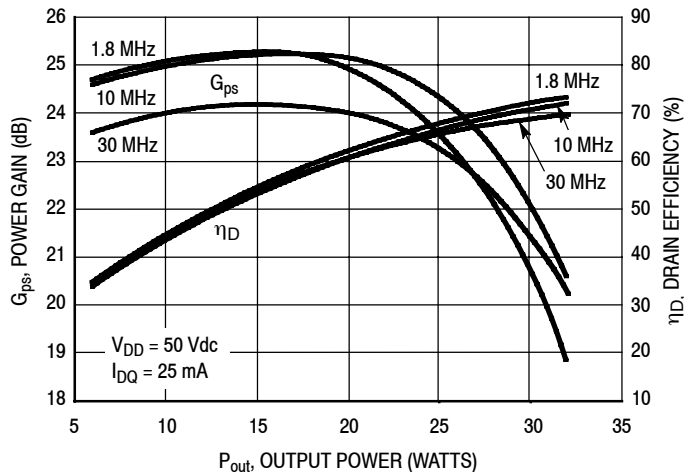
**Figure 13. Power Gain, CW Output Power and Drain Efficiency versus Frequency at a Constant Input Power**



**Figure 14. CW Output Power versus Gate-Source Voltage at a Constant Input Power**

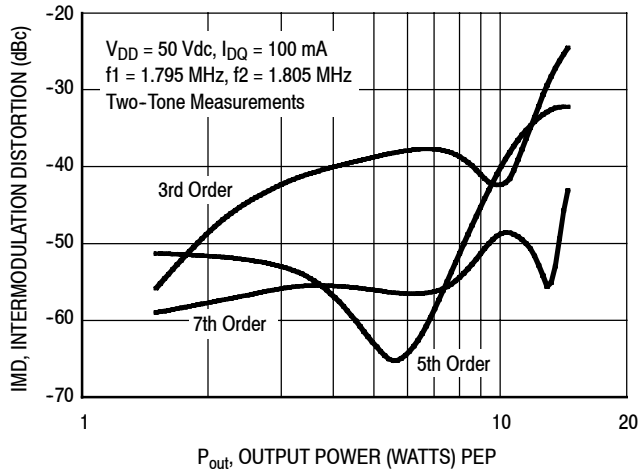
f (MHz)	P1dB (W)	P3dB (W)
1.8	23	28
10	25	30
30	25	30

**Figure 15. CW Output Power versus Input Power**

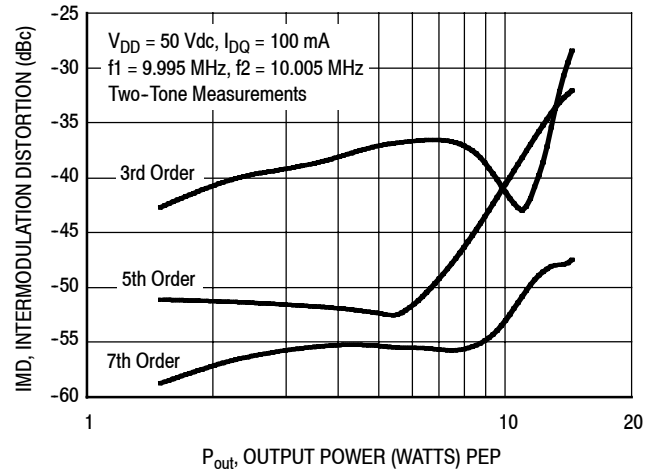


**Figure 16. Power Gain and Drain Efficiency versus CW Output Power**

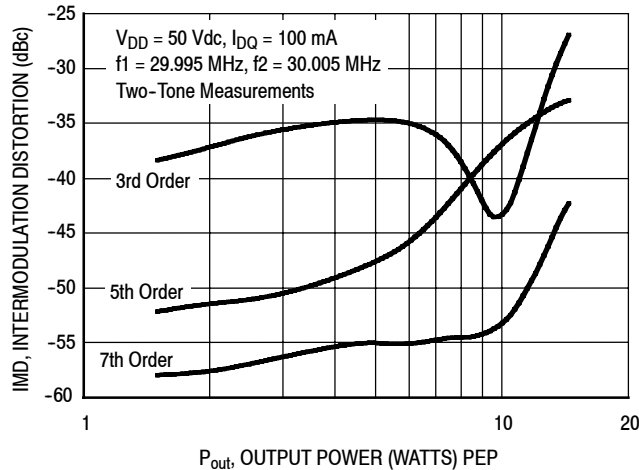
**TYPICAL CHARACTERISTICS — 1.8-30 MHz  
BROADBAND REFERENCE CIRCUIT — TWO-TONE (1)**



**Figure 17. Intermodulation Distortion Products versus Output Power — 1.8 MHz**



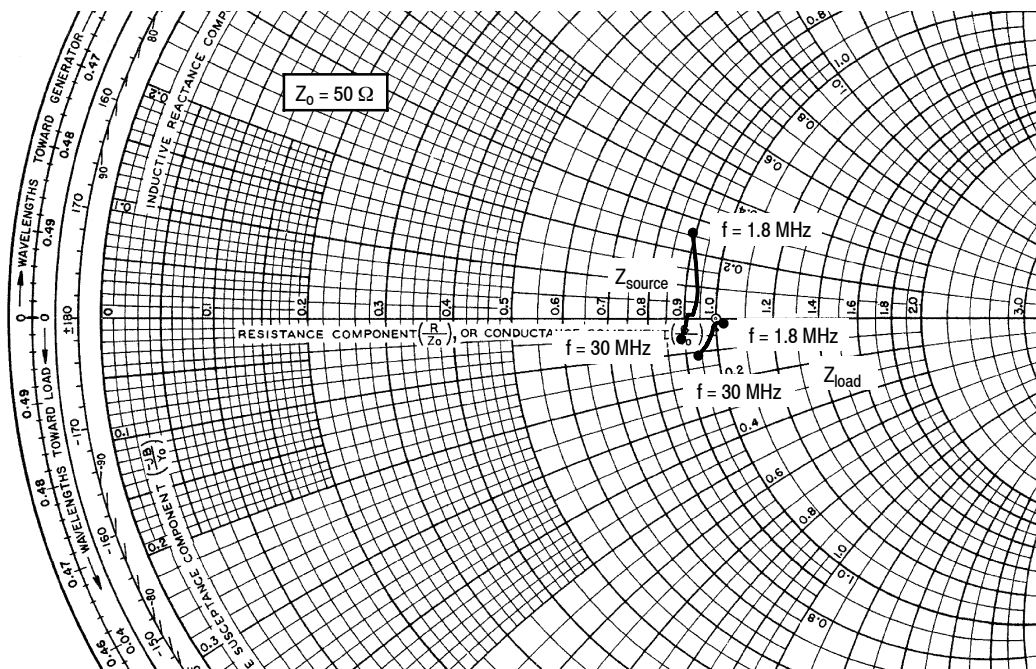
**Figure 18. Intermodulation Distortion Products versus Output Power — 10 MHz**



**Figure 19. Intermodulation Distortion Products versus Output Power — 30 MHz**

1. The distortion products are referenced to one of the two tones and the peak envelope power (PEP) is 6 dB above the power in a single tone.

### 1.8-30 MHz BROADBAND REFERENCE CIRCUIT



V<sub>DD</sub> = 50 Vdc, I<sub>DQ</sub> = 25 mA, P<sub>out</sub> = 25 W CW

f MHz	Z <sub>source</sub> Ω	Z <sub>load</sub> Ω
1.8	44.4 + j12.8	50.8 - j0.70
5	47.2 + j4.40	50.0 - j0.70
10	46.4 + j1.50	49.7 - j0.90
15	46.0 + j0.70	49.4 - j1.60
20	45.7 - j0.40	48.8 - j2.90
25	45.1 - j1.60	47.9 - j4.30
30	44.6 - j2.90	47.0 - j5.70

Z<sub>source</sub> = Test circuit impedance as measured from gate to ground.

Z<sub>load</sub> = Test circuit impedance as measured from drain to ground.

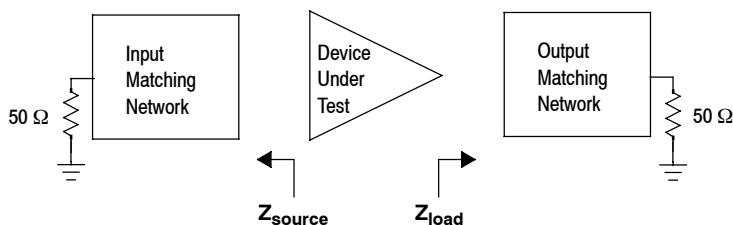


Figure 20. Broadband Series Equivalent Source and Load Impedance — 1.8-30 MHz

## 1030 MHz NARROWBAND REFERENCE CIRCUIT

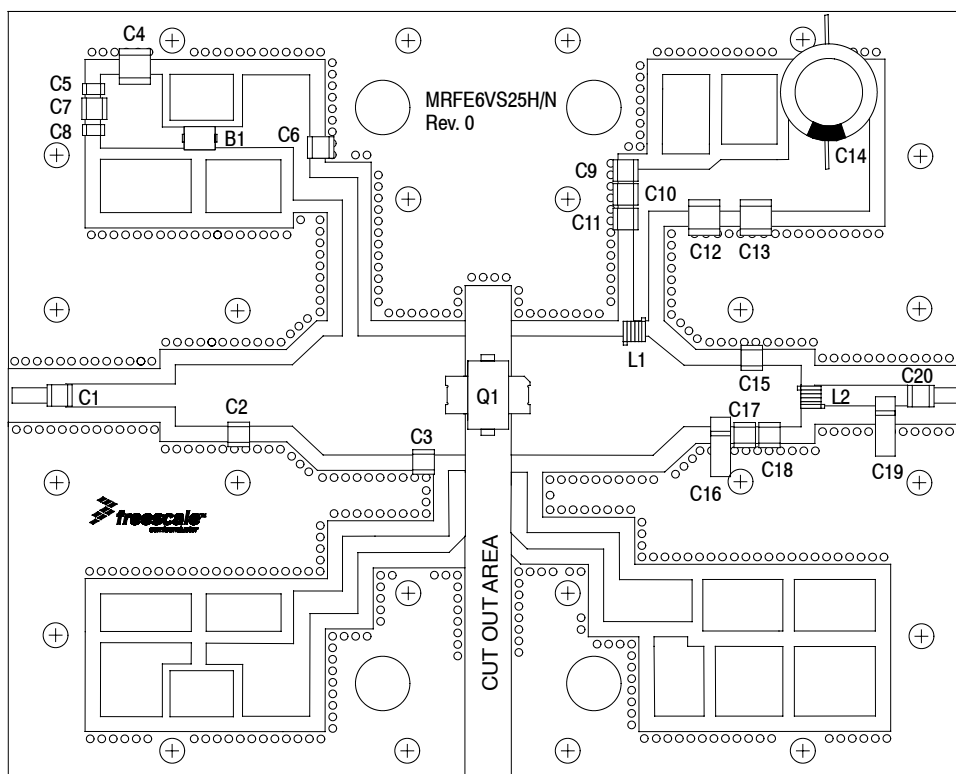
**Table 12. 1030 MHz Narrowband Performance** (In Freescale Reference Circuit, 50 ohm system)  
 $V_{DD} = 50$  Volts,  $I_{DQ} = 25$  mA

Signal Type	$P_{out}$ (W)	f (MHz)	$G_{ps}$ (dB)	$\eta_D$ (%)
CW	25	1030	22.5	60.0

**Table 13. Load Mismatch/Ruggedness** (In Freescale Reference Circuit, 50 ohm system,  $I_{DQ} = 25$  mA)

Frequency (MHz)	Signal Type	VSWR	$P_{out}$ (W)	Test Voltage, $V_{DD}$	Result
1030	Pulse (100 $\mu$ sec, 20% Duty Cycle)	>65:1 at all Phase Angles	30 Peak (3 dB Overdrive)	50	No Device Degradation
	CW		31 (3 dB Overdrive)		

## 1030 MHz NARROWBAND REFERENCE TEST FIXTURE



**Figure 21. MRFE6VS25NR1 Narrowband Reference Circuit Component Layout — 1030 MHz**

**Table 14. MRFE6VS25NR1 Narrowband Reference Circuit Component Designations and Values — 1030 MHz**

Part	Description	Part Number	Manufacturer
B1	Short Ferrite Bead	2743019447	Fair-Rite
C1, C3	22 pF Chip Capacitors	ATC100B220JT500XT	ATC
C2	6.2 pF Chip Capacitor	ATC100B6R2BT500XT	ATC
C4	10 $\mu$ F Chip Capacitor	GRM55DR61H106KA88L	Murata
C5	0.01 $\mu$ F Chip Capacitor	GRM319R72A103KA01D	Murata
C6	43 pF Chip Capacitor	ATC100B430JT500XT	ATC
C7	0.1 $\mu$ F Chip Capacitor	GRM32MR71H104JA01L	Murata
C8	1.0 $\mu$ F Chip Capacitor	GRM31MR71H105KA88L	Murata
C9	0.1 $\mu$ F Chip Capacitor	C1206C104K1RAC-TU	Kemet
C10	20K pF Chip Capacitor	ATC200B203KT50XT	ATC
C11	470 pF Chip Capacitor	ATC100B471JT200XT	ATC
C12, C13	22 $\mu$ F Chip Capacitors	C5750KF1H226ZT	TDK
C14	470 pF, 63 V Electrolytic Capacitor	MCGPR63V477M13X26-RH	Multicomp
C15, C17	4.3 pF Chip Capacitors	ATC100B4R3CT500XT	ATC
C16, C19	0.6-4.5 pF Tuning Capacitors	27271SL	Johanson Components
C18	2.2 pF Chip Capacitor	ATC100B2R2JT500XT	ATC
C20	20 pF Chip Capacitor	ATC100B200JT500XT	ATC
L1	43 nH, 10 Turn Inductor	B10TJLC	Coilcraft
L2	2.5 nH, 1 Turn Inductor	A01TKLC	Coilcraft
Q1	RF Power LD MOS Transistor	MRFE6VS25NR1	Freescale
PCB	0.030", $\epsilon_r = 3.5$	TL350	Arlon



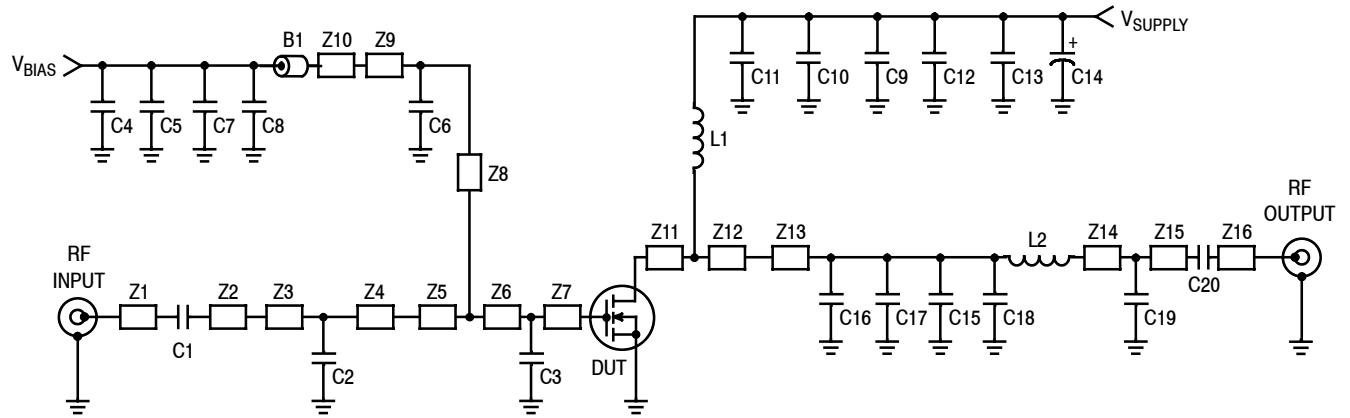


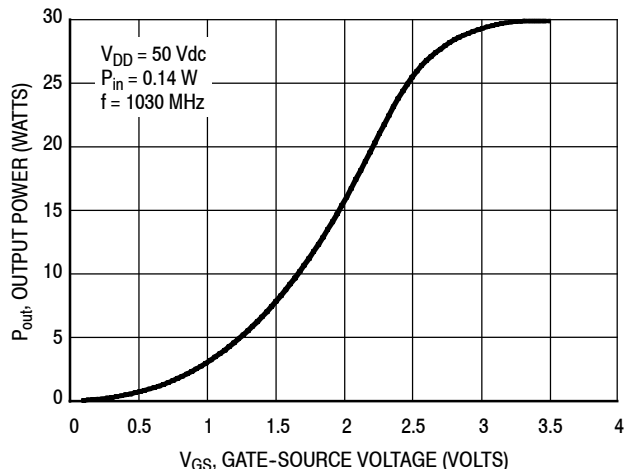
Figure 22. MRFE6VS25NR1 Narrowband Reference Circuit Schematic — 1030 MHz

Table 15. MRFE6VS25NR1 Narrowband Reversion Test Circuit Microstrips — 1030 MHz

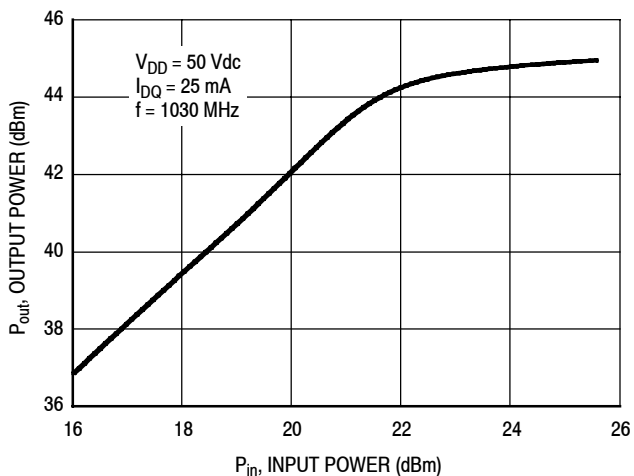
Microstrip	Description	Microstrip	Description
Z1	0.200" × 0.080" Microstrip	Z9	0.350" × 0.378" Microstrip
Z2	0.569" × 0.120" Microstrip	Z10	0.151" × 0.108" Microstrip
Z3	0.339" × 0.320" Microstrip	Z11	0.699" × 0.620" Microstrip
Z4	0.272" × 0.320" Microstrip	Z13	0.243" × 0.320" Microstrip
Z5, Z12	0.160" × 0.320" × 0.620" Taper	Z14	0.350" × 0.320" Microstrip
Z6	0.522" × 0.620" Microstrip	Z15	0.450" × 0.107" Microstrip
Z7	0.218" × 0.620" Microstrip	Z16	0.200" × 0.107" Microstrip
Z8*	0.094" × 1.121" Microstrip		

\* Line length includes microstrip bends

**TYPICAL CHARACTERISTICS — 1030 MHz  
NARROWBAND REFERENCE CIRCUIT**

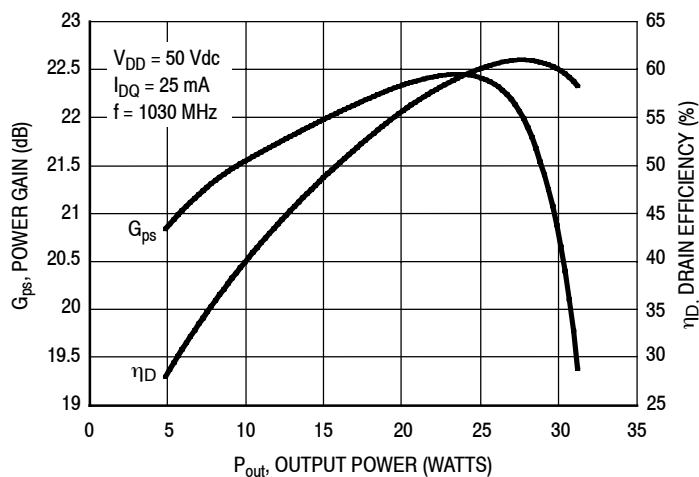


**Figure 23. CW Output Power versus Gate-Source Voltage at a Constant Input Power**



f (MHz)	P1dB (W)	P3dB (W)
1030	29	31

**Figure 24. CW Output Power versus Input Power**



**Figure 25. Power Gain and Drain Efficiency versus CW Output Power**

## 1030 MHz NARROWBAND REFERENCE CIRCUIT

$V_{DD} = 50 \text{ Vdc}$ ,  $I_{DQ} = 25 \text{ mA}$ ,  $P_{out} = 25 \text{ W CW}$

f MHz	$Z_{source}$ $\Omega$	$Z_{load}$ $\Omega$
1030	$0.74 + j4.53$	$3.08 + j7.78$

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

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

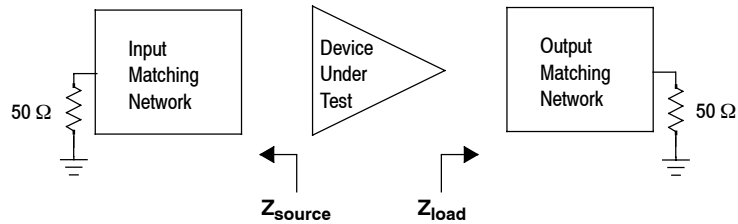
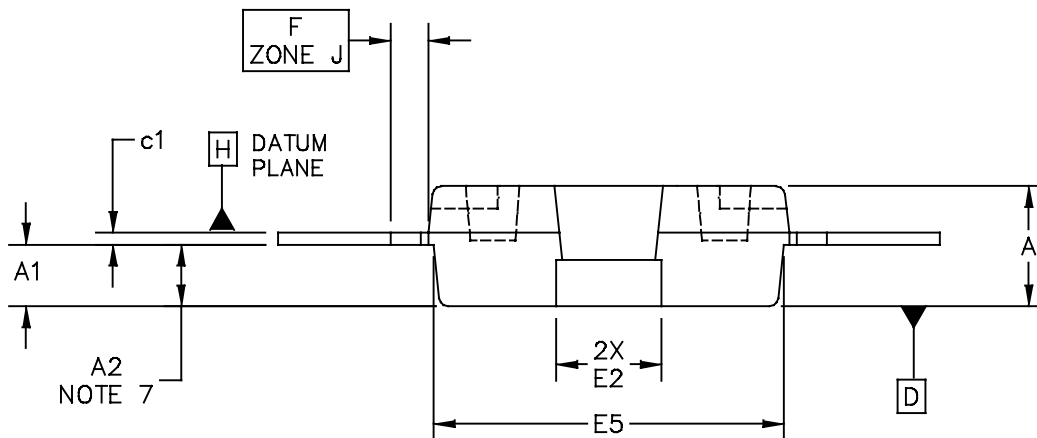
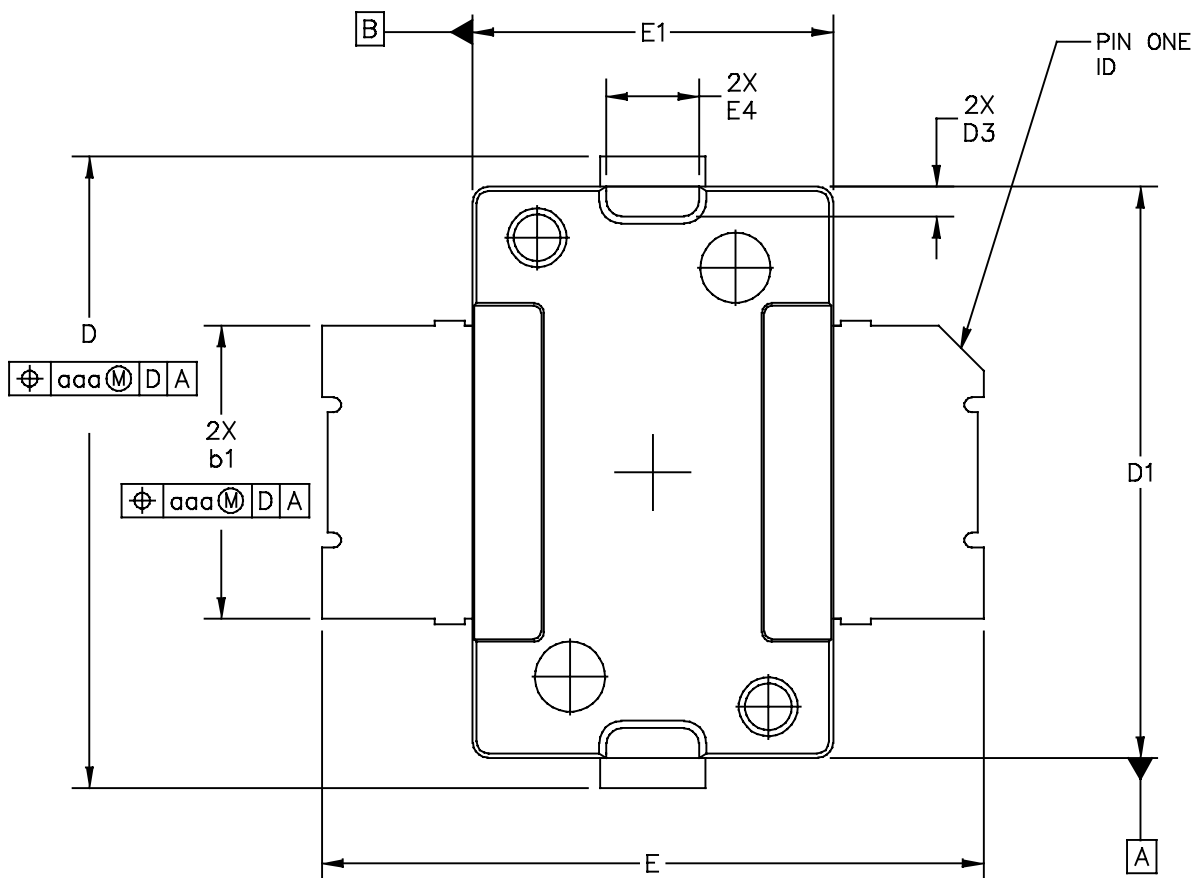
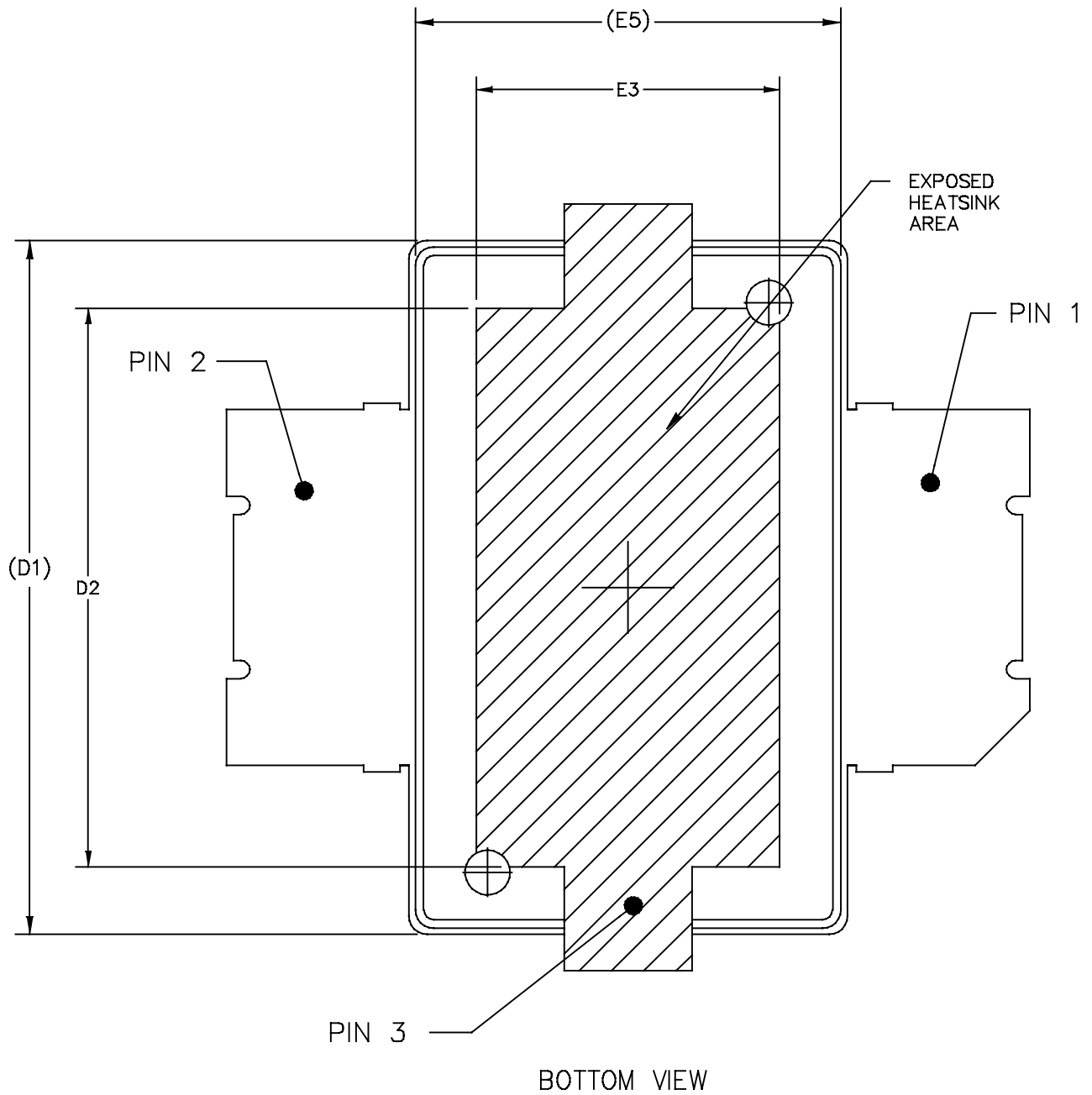


Figure 26. Narrowband Series Equivalent Source and Load Impedance — 1030 MHz

PACKAGE DIMENSIONS



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TITLE: TO-270 SURFACE MOUNT	DOCUMENT NO: 98ASH98117A	REV: K	
	CASE NUMBER: 1265-09	29 JUN 2007	
	STANDARD: JEDEC TO-270 AA		



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	CASE NUMBER: 1265-09	29 JUN 2007	
	STANDARD: JEDEC TO-270 AA		

MRFE6VS25NR1

NOTES:

1. CONTROLLING DIMENSION: INCH
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M-1994.
3. DATUM PLANE -H- IS LOCATED AT TOP OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE TOP OF THE PARTING LINE.
4. DIMENSIONS "D1" AND "E1" DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS .006 PER SIDE. DIMENSIONS "D1" AND "E1" DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
5. DIMENSION "b1" DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE .005 TOTAL IN EXCESS OF THE "b1" DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. DATUMS -A- AND -B- TO BE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION "A2" APPLIES WITHIN ZONE "J" ONLY.
8. DIMENSIONS "D" AND "E2" DO NOT INCLUDE MOLD PROTRUSION. OVERALL LENGTH INCLUDING MOLD PROTRUSION SHOULD NOT EXCEED 0.430 INCH FOR DIMENSION "D" AND 0.080 INCH FOR DIMENSION "E2". DIMENSIONS "D" AND "E2" DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -D-.

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

DIM	INCH		MILLIMETER		DIM	INCH		MILLIMETER	
	MIN	MAX	MIN	MAX		MIN	MAX	MIN	MAX
A	.078	.082	1.98	2.08	F	.025 BSC		0.64 BSC	
A1	.039	.043	0.99	1.09	b1	.193	.199	4.90	5.06
A2	.040	.042	1.02	1.07	c1	.007	.011	0.18	0.28
D	.416	.424	10.57	10.77	aaa	.004		0.10	
D1	.378	.382	9.60	9.70					
D2	.290	----	7.37	----					
D3	.016	.024	0.41	0.61					
E	.436	.444	11.07	11.28					
E1	.238	.242	6.04	6.15					
E2	.066	.074	1.68	1.88					
E3	.150	----	3.81	----					
E4	.058	.066	1.47	1.68					
E5	.231	.235	5.87	5.97					

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		CASE NUMBER: 1265-09		29 JUN 2007	
		STANDARD: JEDEC TO-270 AA			

## PRODUCT DOCUMENTATION, SOFTWARE AND TOOLS

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

### Application Notes

- AN1907: Solder Reflow Attach Method for High Power RF Devices in Over-Molded Plastic Packages
- AN1955: Thermal Measurement Methodology of RF Power Amplifiers
- AN3263: Bolt Down Mounting Method for High Power RF Transistors and RFICs in Over-Molded Plastic Packages
- AN3789: Clamping of High Power RF Transistors and RFICs in Over-Molded Plastic Packages

### Engineering Bulletins

- EB212: Using Data Sheet Impedances for RF LDMOS Devices
- EB38: Measuring the Intermodulation Distortion of Linear Amplifiers

### Software

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

### Development Tools

- Printed Circuit Boards

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	June 2012	• Initial Release of Data Sheet

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