Freescale Semiconductor
Technical Data

Document Number: MRF6VP41KH
Rev. 6, 4/2012

RoHS

RF Power Field Effect Transistors

N-Channel Enhancement-Mode Lateral MOSFETs

MRF6VP41KHR6
MRF6VP41KHSR6

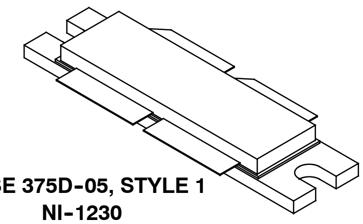
Designed for pulse and CW wideband applications with frequencies up to 500 MHz. Devices are unmatched and are suitable for use in industrial, medical and scientific applications.

- Typical Pulse Performance at 450 MHz: V_{DD} = 50 Volts, I_{DQ} = 150 mA, P_{out} = 1000 Watts Peak (200 W Avg.), Pulse Width = 100 μsec, Duty Cycle = 20%
  - Power Gain — 20 dB
  - Drain Efficiency — 64%
- Capable of Handling 10:1 VSWR @ 50 Vdc, 450 MHz, 1000 Watts Peak Power

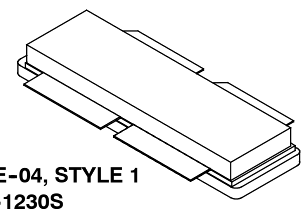
Features

- Characterized with Series Equivalent Large-Signal Impedance Parameters
- CW Operation Capability with Adequate Cooling
- Qualified Up to a Maximum of 50 V_{DD} Operation
- Integrated ESD Protection
- Designed for Push-Pull Operation
- Greater Negative Gate-Source Voltage Range for Improved Class C Operation
- In Tape and Reel. R6 Suffix = 150 Units per 56 mm, 13 inch Reel. For R5 Tape and Reel option, see p. 17.

10-500 MHz, 1000 W, 50 V
LATERAL N-CHANNEL
BROADBAND
RF POWER MOSFETs

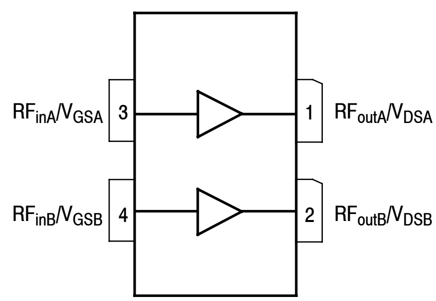


CASE 375D-05, STYLE 1
NI-1230
MRF6VP41KHR6



CASE 375E-04, STYLE 1
NI-1230S
MRF6VP41KHSR6

PARTS ARE PUSH-PULL



(Top View)

Figure 1. Pin Connections

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	-0.5, +110	Vdc
Gate-Source Voltage	V_{GS}	-6, +10	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
Total Device Dissipation @ T_C = 25°C, CW only (3)	P_D	1333	W

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 Fig. 12, Transient Thermal Impedance, for information to calculate value for pulsed operation.

freescale

Table 2. Thermal Characteristics

Characteristic	Symbol	Value (1,2)	Unit
Thermal Impedance, Junction to Case Pulse: Case Temperature 80°C, 1000 W Peak, 100 μsec Pulse Width, 20% Duty Cycle, 450 MHz (3)	$Z_{\theta JC}$	0.03	°C/W
Thermal Resistance, Junction to Case CW: Case Temperature 84°C, 1000 W CW, 352.2 MHz	$R_{\theta JC}$	0.15	°C/W

Table 3. ESD Protection Characteristics

Test Methodology	Class
Human Body Model (per JESD22-A114)	2, passes 2000 V
Machine Model (per EIA/JESD22-A115)	A, passes 125 V
Charge Device Model (per JESD22-C101)	IV, passes 2000 V

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

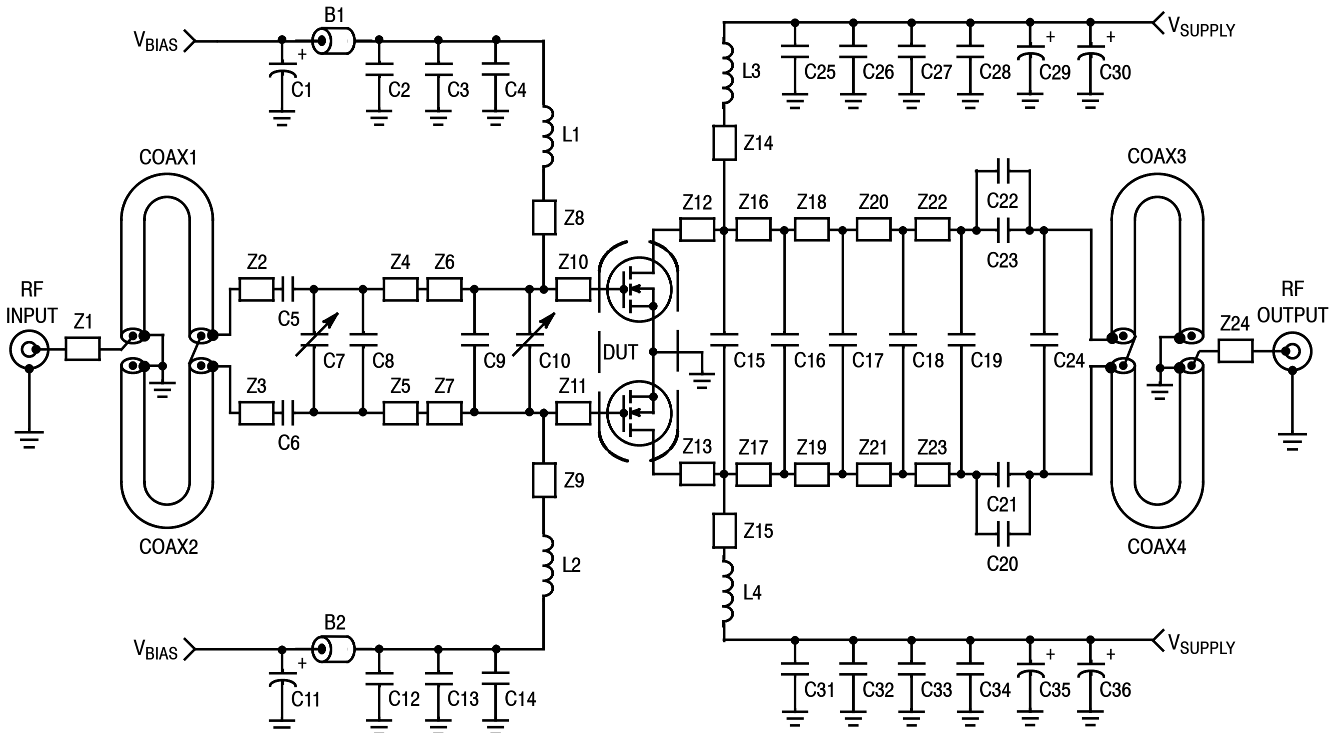
Characteristic	Symbol	Min	Typ	Max	Unit
Off Characteristics (4)					
Gate-Source Leakage Current (V_{GS} = 5 Vdc, V_{DS} = 0 Vdc)	I_{GSS}	—	—	10	μAdc
Drain-Source Breakdown Voltage (I_D = 300 mA, V_{GS} = 0 Vdc)	$V_{(BR)DSS}$	110	—	—	Vdc
Zero Gate Voltage Drain Leakage Current (V_{DS} = 50 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	—	—	100	μAdc
Zero Gate Voltage Drain Leakage Current (V_{DS} = 100 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	—	—	5	mA
On Characteristics					
Gate Threshold Voltage (4) (V_{DS} = 10 Vdc, I_D = 1600 μAdc)	$V_{GS(th)}$	1	1.68	3	Vdc
Gate Quiescent Voltage (5) (V_{DD} = 50 Vdc, I_D = 150 mAdc, Measured in Functional Test)	$V_{GS(Q)}$	1.5	2.2	3.5	Vdc
Drain-Source On-Voltage (4) (V_{GS} = 10 Vdc, I_D = 4 Adc)	$V_{DS(on)}$	—	0.28	—	Vdc
Dynamic Characteristics (4)					
Reverse Transfer Capacitance (V_{DS} = 50 Vdc ± 30 mV(rms)ac @ 1 MHz, V_{GS} = 0 Vdc)	C_{rss}	—	3.3	—	pF
Output Capacitance (V_{DS} = 50 Vdc ± 30 mV(rms)ac @ 1 MHz, V_{GS} = 0 Vdc)	C_{oss}	—	147	—	pF
Input Capacitance (V_{DS} = 50 Vdc, V_{GS} = 0 Vdc ± 30 mV(rms)ac @ 1 MHz)	C_{iss}	—	506	—	pF
Functional Tests (5) (In Freescale Test Fixture, 50 ohm system) V_{DD} = 50 Vdc, I_{DQ} = 150 mA, P_{out} = 1000 W Peak (200 W Avg.), f = 450 MHz, 100 μsec Pulse Width, 20% Duty Cycle					
Power Gain	G_{ps}	19	20	22	dB
Drain Efficiency	η_D	60	64	—	%
Input Return Loss	IRL	—	-18	-9	dB

1. MTTF calculator available at http://www.freescale.com/rf. Select Software & Tools/Development Tools/Calculators to access MTTF calculators by product.
2. Refer to AN1955, *Thermal Measurement Methodology of RF Power Amplifiers.* Go to http://www.freescale.com/rf. Select Documentation/Application Notes - AN1955.
3. Refer to Fig. 12, Transient Thermal Impedance, for other pulsed conditions.
4. Each side of device measured separately.
5. Measurement made with device in push-pull configuration.

(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
Typical Performance — 352.2 MHz (In Freescale 352.2 MHz Test Fixture, 50 ohm system) V_{DD} = 50 Vdc, I_{DQ} = 150 mA, P_{out} = 1000 W CW					
Power Gain	G_{ps}	—	20.1	—	dB
Drain Efficiency	η_D	—	67	—	%
Input Return Loss	IRL	—	-10.2	—	dB
Typical Performance — 500 MHz (In Freescale 500 MHz Test Fixture, 50 ohm system) V_{DD} = 50 Vdc, I_{DQ} = 150 mA, P_{out} = 1000 W Peak (200 W Avg.), f = 500 MHz, 100 μsec Pulse Width, 20% Duty Cycle					
Power Gain	G_{ps}	—	19.5	—	dB
Drain Efficiency	η_D	—	66	—	%
Input Return Loss	IRL	—	-23	—	dB



Z1	0.366″ x 0.082″ Microstrip	Z14*, Z15*	0.764″ x 0.150″ Microstrip
Z2*, Z3*	0.170″ x 0.100″ Microstrip	Z16, Z17	0.290″ x 0.430″ Microstrip
Z4*, Z5*	0.220″ x 0.451″ Microstrip	Z18, Z19	0.100″ x 0.430″ Microstrip
Z6, Z7	0.117″ x 0.726″ Microstrip	Z20, Z21, Z22, Z23	0.080″ x 0.430″ Microstrip
Z8*, Z9*	0.792″ x 0.058″ Microstrip	Z24	0.257″ x 0.215″ Microstrip
Z10, Z11	0.316″ x 0.726″ Microstrip	PCB	Arlon CuClad 250GX-0300-55-22, 0.030″, ε_r = 2.55
Z12, Z13	0.262″ x 0.507″ Microstrip		

* Line length includes microstrip bends

Figure 2. MRF6VP41KHR6(HSR6) Pulse Test Circuit Schematic — 450 MHz

Table 5. MRF6VP41KHR6(HSR6) Pulse Test Circuit Component Designations and Values — 450 MHz

Part	Description	Part Number	Manufacturer
B1, B2	47 Ω, 100 MHz Short Ferrite Beads	2743019447	Fair-Rite
C1, C11	47 μF, 50 V Electrolytic Capacitors	476KXM063M	Illinois
C2, C12, C28, C34	0.1 μF Chip Capacitors	CDR33BX104AKYS	Kemet
C3, C13, C27, C33	220 nF, 50 V Chip Capacitors	C1812C224K5RAC	Kemet
C4, C14	2.2 μF, 50 V Chip Capacitors	C1825C225J5RAC	Kemet
C5, C6, C8, C15	27 pF Chip Capacitors	ATC100B270JT500XT	ATC
C7, C10	0.8-8.0 pF Variable Capacitors	27291SL	Johanson Components
C9	33 pF Chip Capacitor	ATC100B330JT500XT	ATC
C16	12 pF Chip Capacitor	ATC100B120JT500XT	ATC
C17	10 pF Chip Capacitor	ATC100B100JT500XT	ATC
C18	9.1 pF Chip Capacitor	ATC100B9R1CT500XT	ATC
C19	8.2 pF Chip Capacitor	ATC100B8R2CT500XT	ATC
C20, C21, C22, C23, C25, C32	240 pF Chip Capacitors	ATC100B241JT200XT	ATC
C24	5.6 pF Chip Capacitor	ATC100B5R6CT500XT	ATC
C26, C31	2.2 μF, 100 V Chip Capacitors	2225X7R225KT3AB	ATC
C29, C30, C35, C36	330 μF, 63 V Electrolytic Capacitors	EMVY630GTR331MMH0S	Nippon Chemi-Con
Coax1, 2, 3, 4	25 Ω Semi Rigid Coax, 2.2″ Shield Length	UT-141C-25	Micro-Coax
L1, L2	2.5 nH, 1 Turn Inductors	A01TKLC	Coilcraft
L3, L4	43 nH, 10 Turn Inductors	B10TJLC	Coilcraft

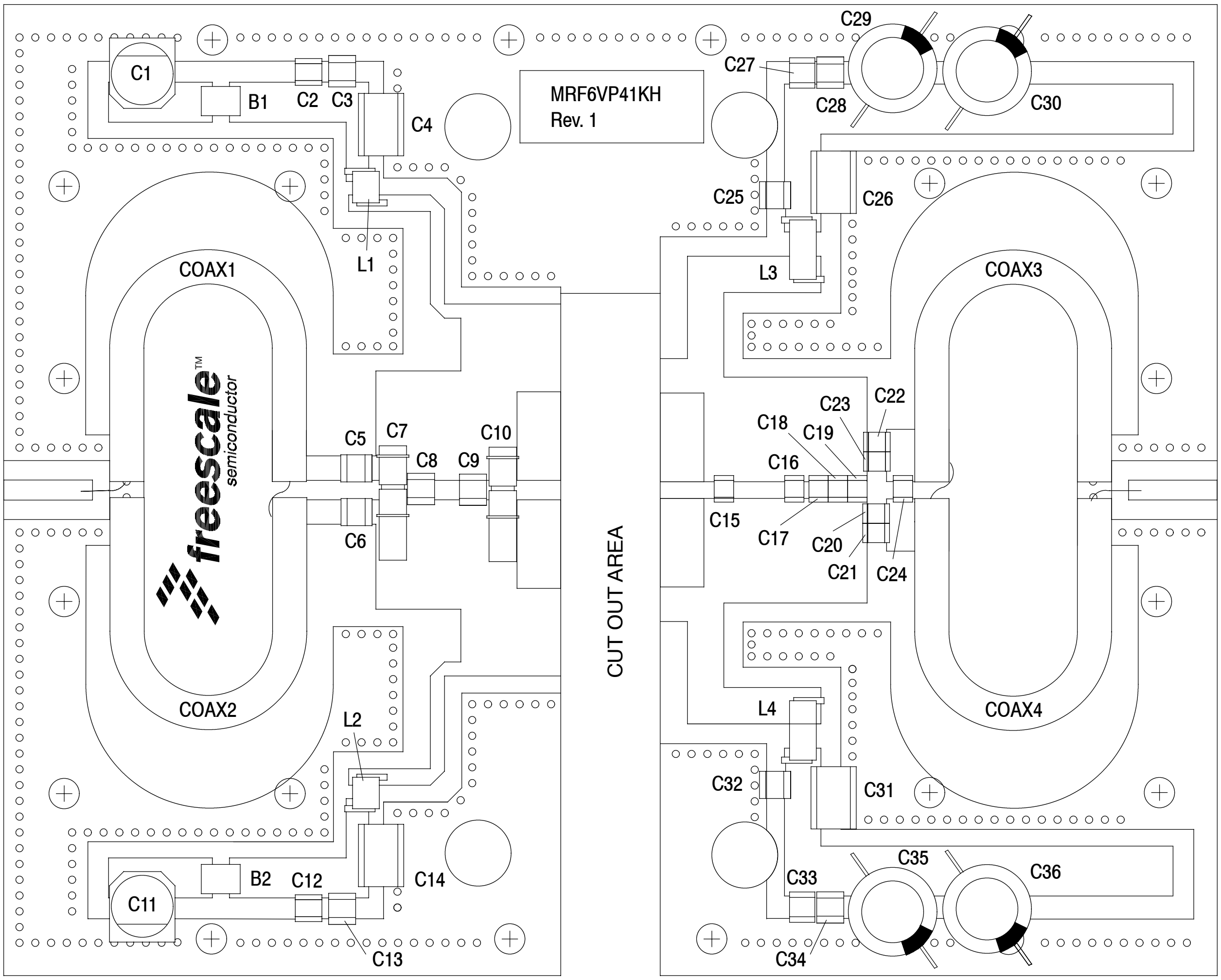
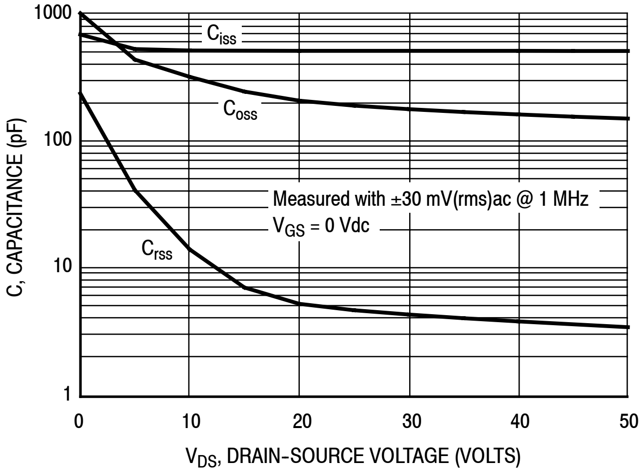


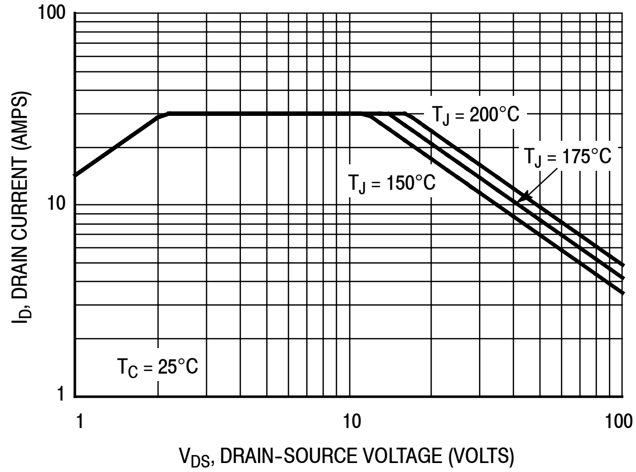
Figure 3. MRF6VP41KHR6(HSR6) Pulse Test Circuit Component Layout — 450 MHz

TYPICAL CHARACTERISTICS



Note: Each side of device measured separately.

Figure 4. Capacitance versus Drain-Source Voltage



Note: Each side of device measured separately.

Figure 5. DC Safe Operating Area

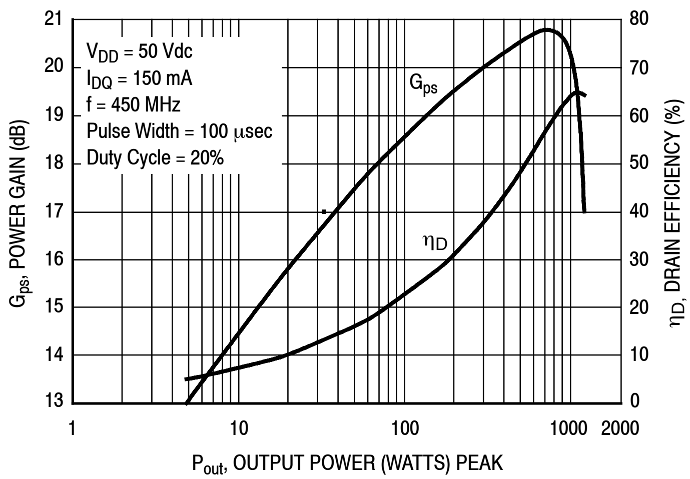


Figure 6. Power Gain and Drain Efficiency versus Output Power

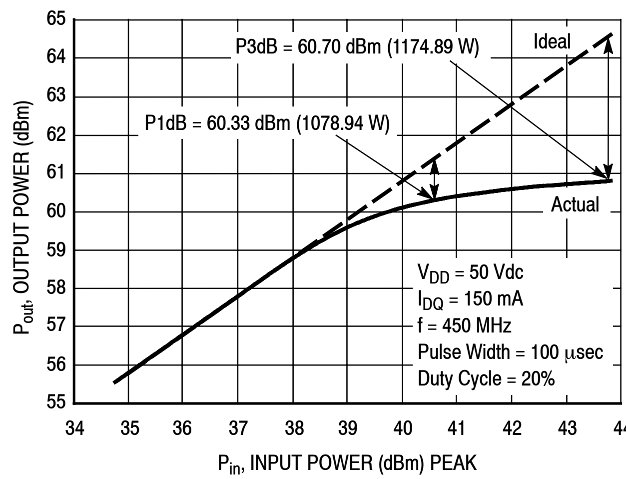


Figure 7. Output Power versus Input Power

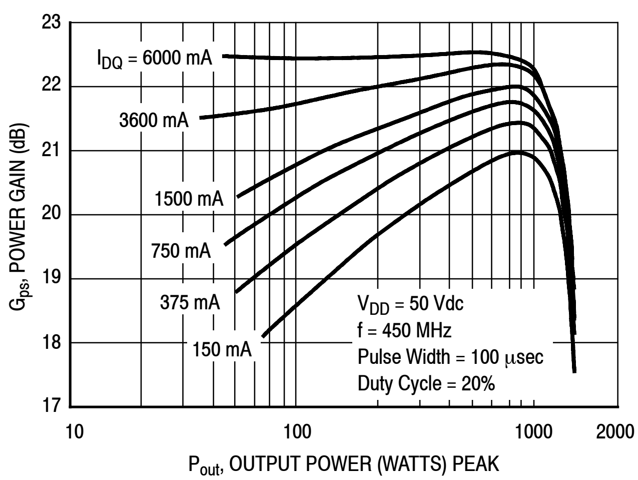


Figure 8. Power Gain versus Output Power

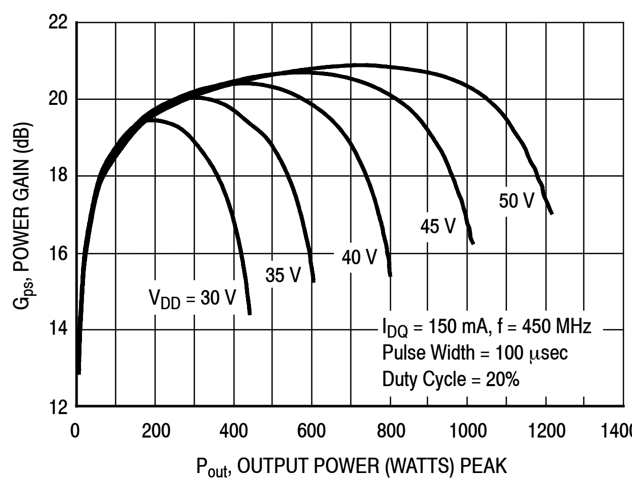


Figure 9. Power Gain versus Output Power

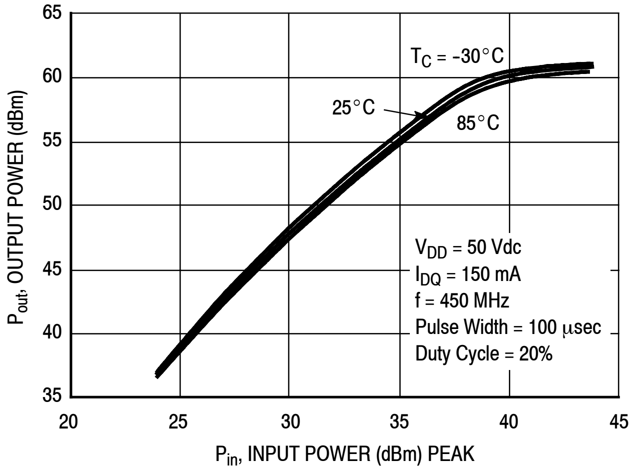


Figure 10. Output Power versus Input Power

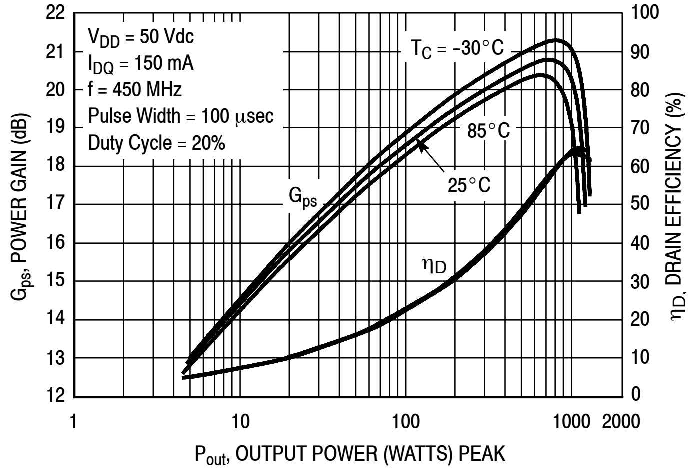


Figure 11. Power Gain and Drain Efficiency versus Output Power

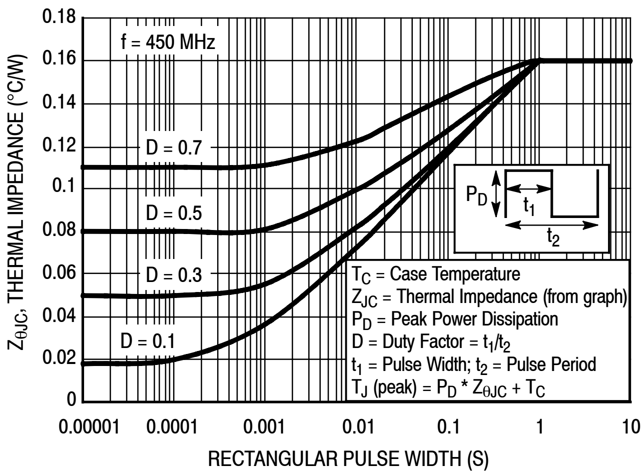
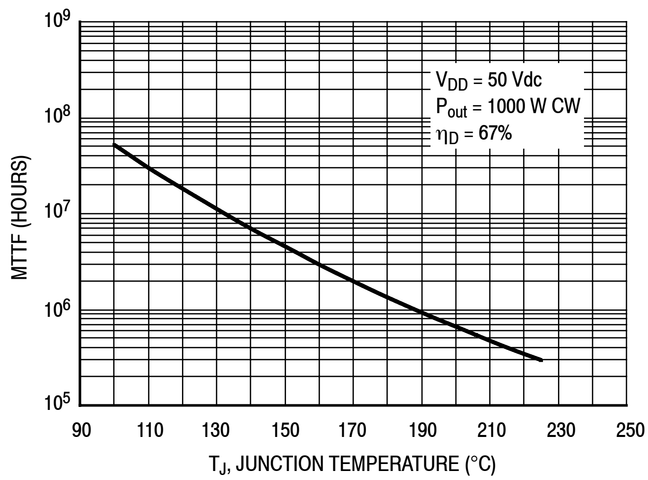


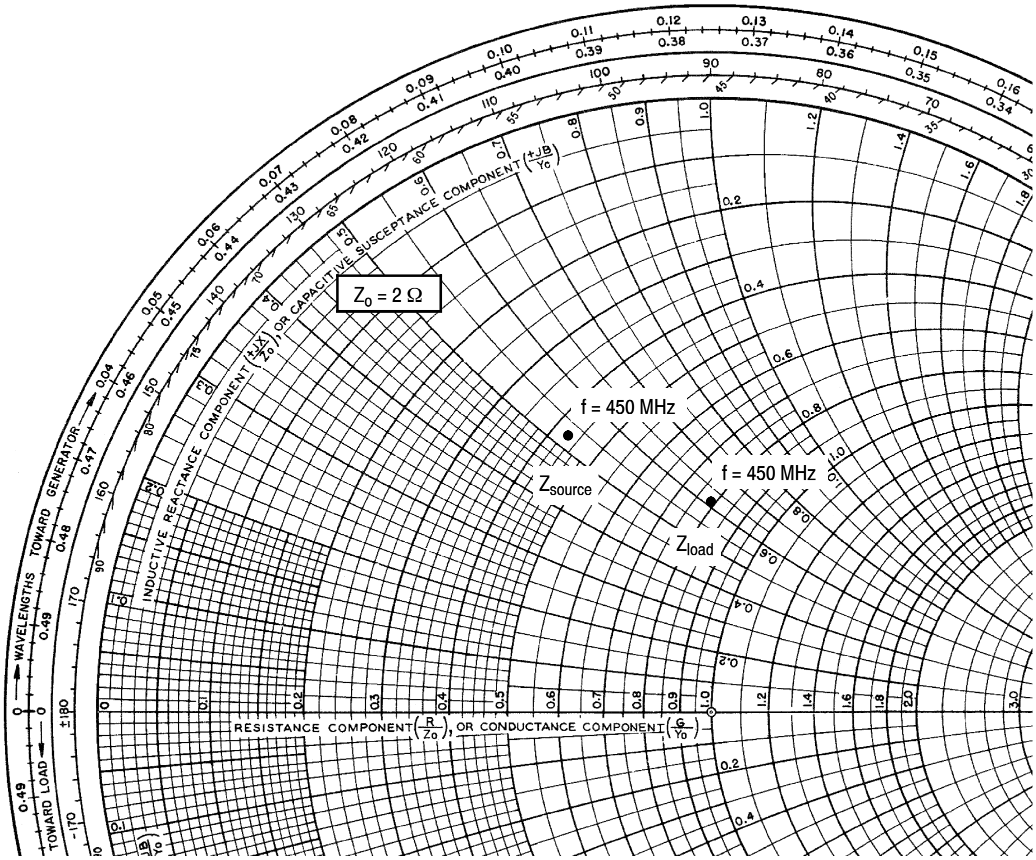
Figure 12. Transient Thermal Impedance



MTTF calculator available at http:/www.freescale.com/rf. Select Software & Tools/Development Tools/Calculators to access MTTF calculators by product.

NOTE: For pulse applications or CW conditions, use the MTTF calculator referenced above.

Figure 13. MTTF versus Junction Temperature – CW



V_{DD} = 50 Vdc, I_{DQ} = 150 mA, P_{out} = 1000 W Peak

f MHz	Z_{source} Ω	Z_{load} Ω
450	0.86 + j1.06	1.58 + j1.22

Z_{source} = Test circuit impedance as measured from gate to gate, balanced configuration.

Z_{load} = Test circuit impedance as measured from drain to drain, balanced configuration.

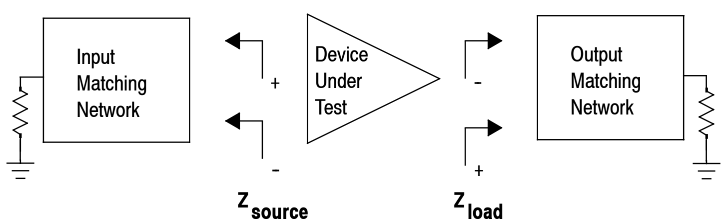


Figure 14. Series Equivalent Source and Load Impedance — 450 MHz

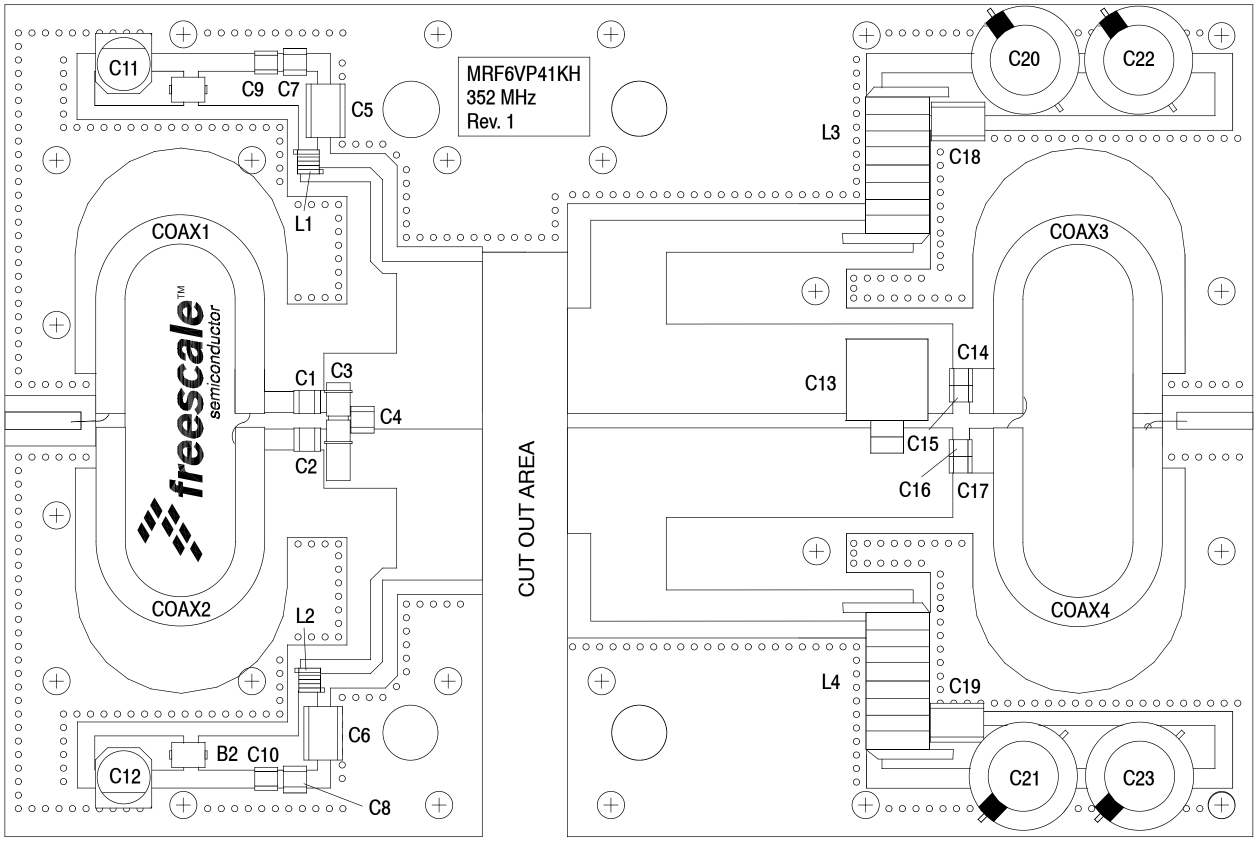
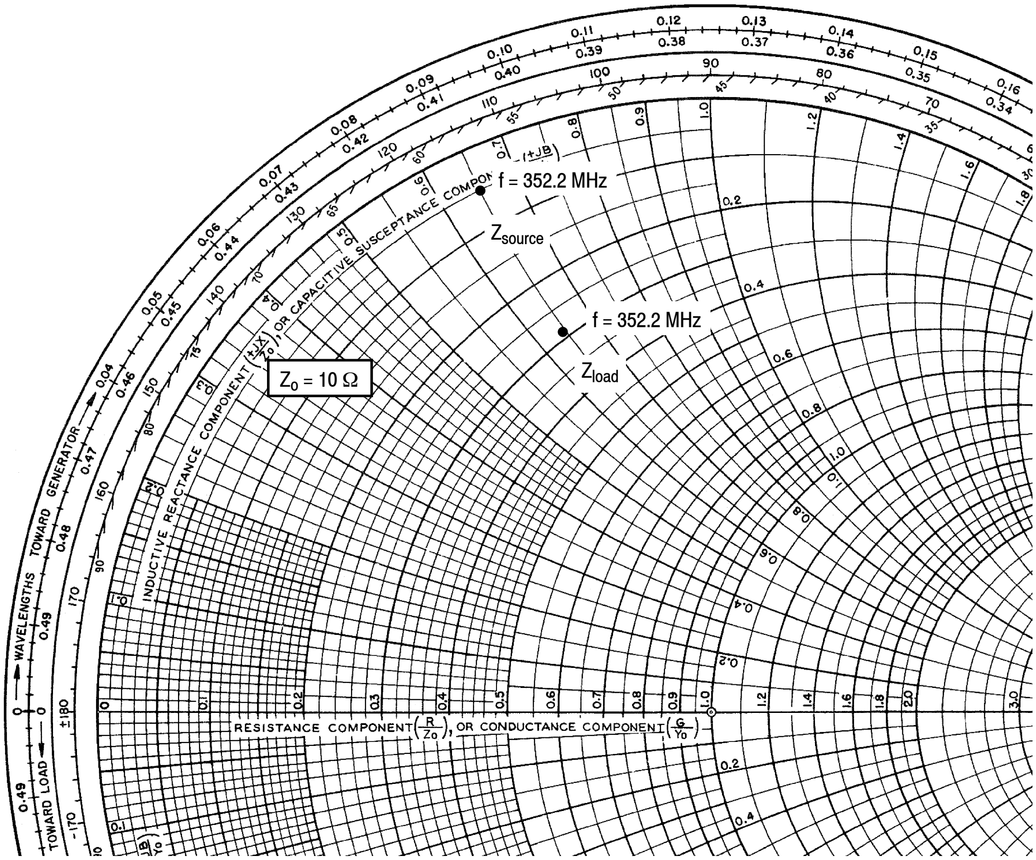


Figure 15. MRF6VP41KHR6(HSR6) Test Circuit Component Layout — 352.2 MHz

Table 6. MRF6VP41KHR6(HSR6) Test Circuit Component Designations and Values — 352.2 MHz

Part	Description	Part Number	Manufacturer
B1, B2	47 Ω, 100 MHz Short Ferrite Beads	2743019447	Fair-Rite
C1, C2	27 pF Chip Capacitors	ATC100B270JT500XT	ATC
C3	0.8-8.0 pF Variable Capacitor, Gigatrim	27291SL	Johanson
C4	75 pF Chip Capacitor	ATC100B750JT500XT	ATC
C5, C6	2.2 μF Chip Capacitors	C1825C225J5RAC	Kemet
C7, C8	220 nF Chip Capacitors	C1812C224J5RAC	Kemet
C9, C10	0.1 μF Chip Capacitors	CDR33BX104AKYS	AVX
C11, C12	47 μF, 50 V Electrolytic Capacitors	476KXM050M	Illinois Cap
C13	36 pF 500 V Chip Capacitor	MCM01-009ED360J-F	CDE
C14, C15, C16, C17	240 pF Chip Capacitors	ATC100B241JT200XT	ATC
C18, C19	2.2 μF Chip Capacitors	G2225X7R225KT3AB	ATC
C20, C21, C22, C23	470 μF, 63 V Electrolytic Capacitors	MCRH63V477M13X21-RH	Multicomp
Coax1, 2, 3, 4	25 Ω Semi Rigid Coax, 2.2″ Shield Length	UT141-25	Precision Tube Company
L1, L2	2.5 nH Inductors	A01T	Coilcraft
L3, L4	10 Turn #16 AWG ID=0.160″ Inductors, Hand Wound	Copper Wire	Freescale
PCB	Arlon CuClad 250GX-0300-55-22, 0.030″, ε_r = 2.55	DS2655	DS Electronics



V_{DD} = 50 Vdc, I_{DQ} = 150 mA, P_{out} = 1000 W CW

f MHz	Z_{source} Ω	Z_{load} Ω
352.2	0.5 + j6.5	2.9 + j6.35

Z_{source} = Test circuit impedance as measured from gate to gate, balanced configuration.

Z_{load} = Test circuit impedance as measured from drain to drain, balanced configuration.

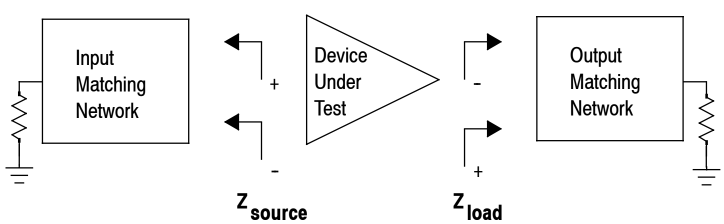
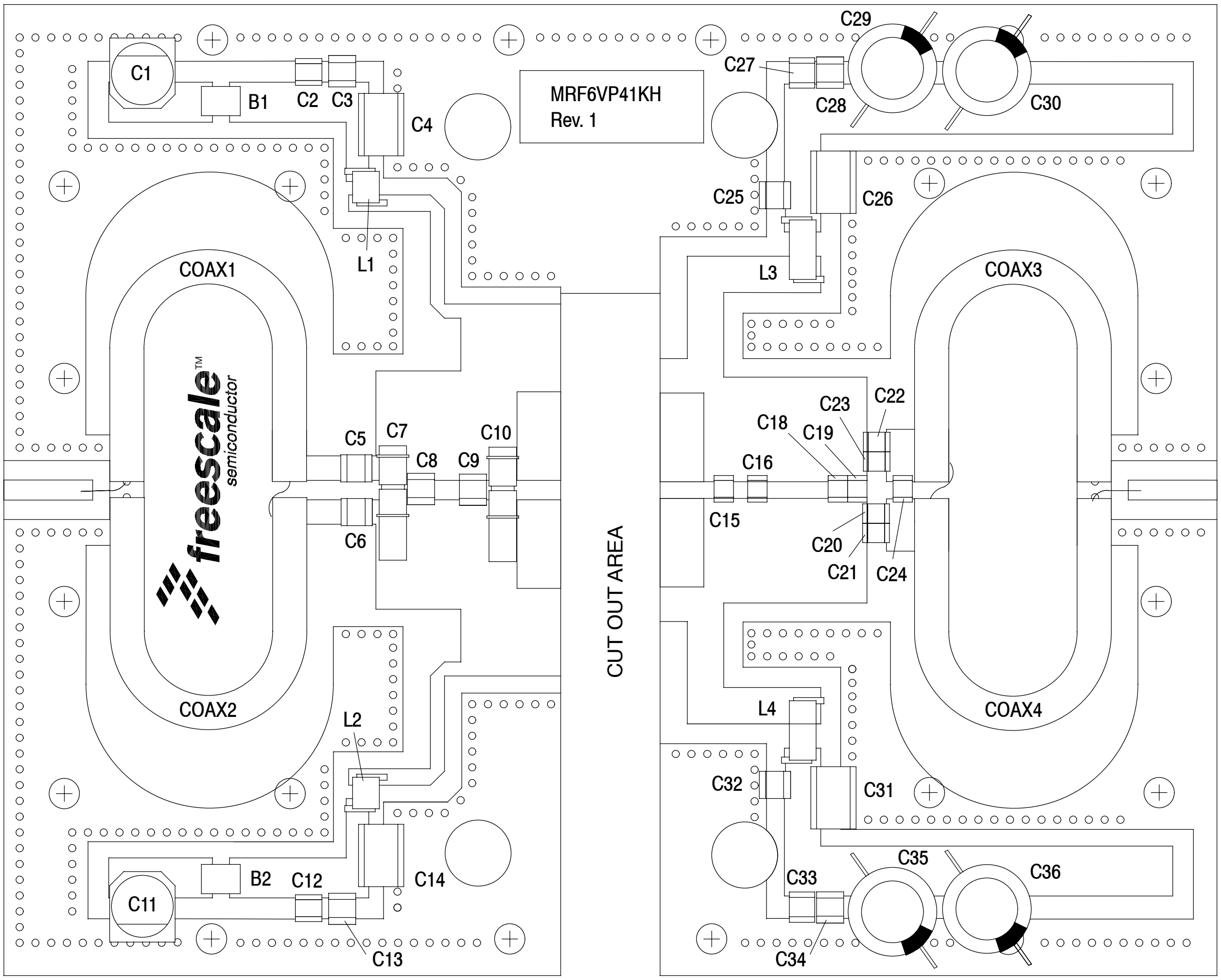


Figure 16. Series Equivalent Source and Load Impedance — 352.2 MHz



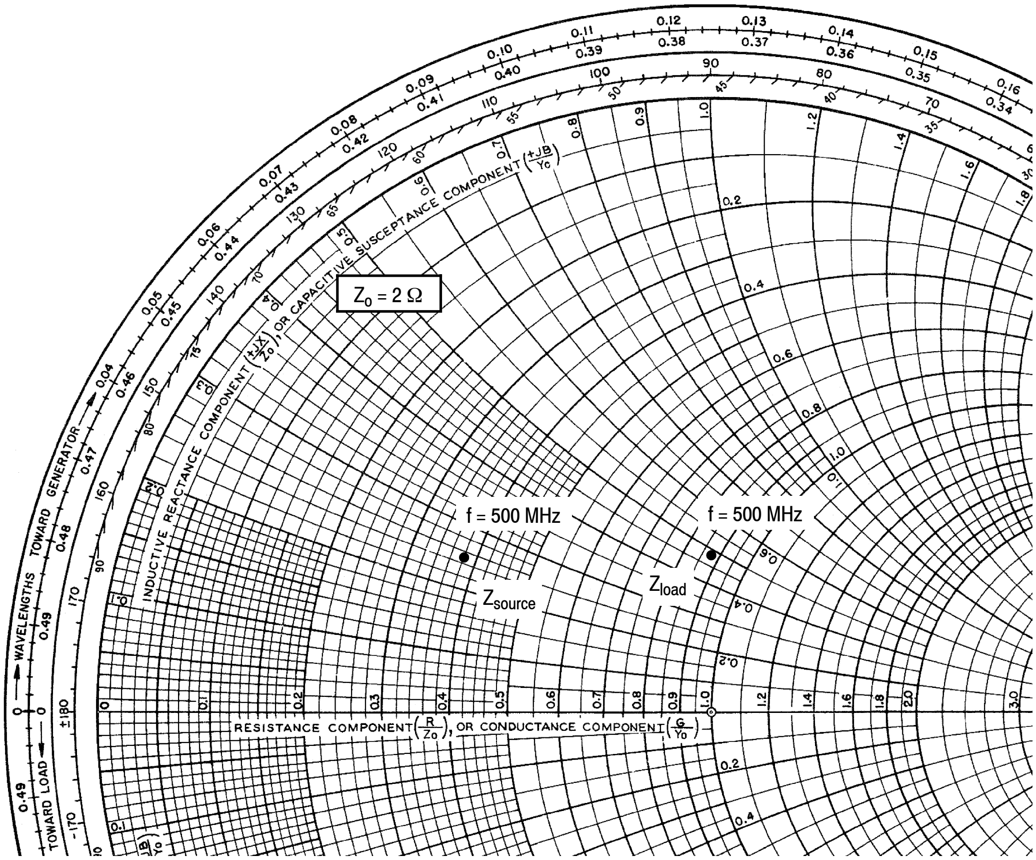
C17 not used in MRF6VP41KHR6(HSR6) 500 MHz application.

Figure 17. MRF6VP41KHR6(HSR6) Test Circuit Component Layout — 500 MHz

Table 7. MRF6VP41KHR6(HSR6) Test Circuit Component Designations and Values — 500 MHz

Part	Description	Part Number	Manufacturer
B1, B2	47 Ω, 100 MHz Short Ferrite Beads	2743019447	Fair-Rite
C1, C11	47 μF, 50 V Electrolytic Capacitors	476KXM063M	Illinois
C2, C12, C28, C34	0.1 μF Chip Capacitors	CDR33BX104AKYS	Kemet
C3, C13, C27, C33	220 nF, 50 V Chip Capacitors	C1812C224K5RAC	Kemet
C4, C14	2.2 μF, 50 V Chip Capacitors	C1825C225J5RAC	Kemet
C5, C6, C15	27 pF Chip Capacitors	ATC100B270JT500XT	ATC
C7, C10	0.8-8.0 pF Variable Capacitors	27291SL	Johanson Components
C8	13 pF Chip Capacitor	ATC100B120JT500XT	ATC
C9	33 pF Chip Capacitor	ATC100B330JT500XT	ATC
C18	9.1 pF Chip Capacitor	ATC100B9R1CT500XT	ATC
C16, C19	8.2 pF Chip Capacitors	ATC100B8R2CT500XT	ATC
C20, C21, C22, C23, C25, C32	240 pF Chip Capacitors	ATC100B241JT200XT	ATC
C24	5.6 pF Chip Capacitor	ATC100B5R6CT500XT	ATC
C26, C31	2.2 μF, 100 V Chip Capacitors	2225X7R225KT3AB	ATC
C29, C30, C35, C36	330 μF, 63 V Electrolytic Capacitors	MCRH63V337M13X21-RH	Multicomp
Coax1, 2, 3, 4	25 Ω Semi Rigid Coax, 2.2″ Shield Length	UT-141C-25	Micro-Coax
L1, L2	2.5 nH, 1 Turn Inductors	A01TKLC	Coilcraft
L3, L4	43 nH, 10 Turn Inductors	B10TJLC	Coilcraft

C17 not used in MRF6VP41KHR6(HSR6) 500 MHz application.



V_{DD} = 50 Vdc, I_{DQ} = 150 mA, P_{out} = 1000 W Peak

f MHz	Z_{source} Ω	Z_{load} Ω
500	0.75 + j0.5	1.73 + j0.95

Z_{source} = Test circuit impedance as measured from gate to gate, balanced configuration.

Z_{load} = Test circuit impedance as measured from drain to drain, balanced configuration.

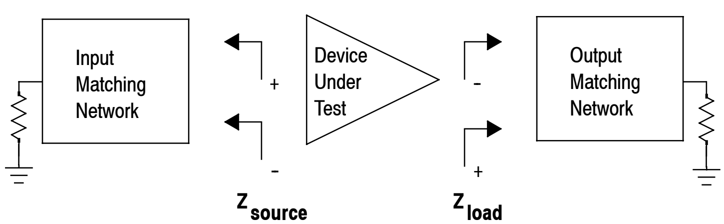
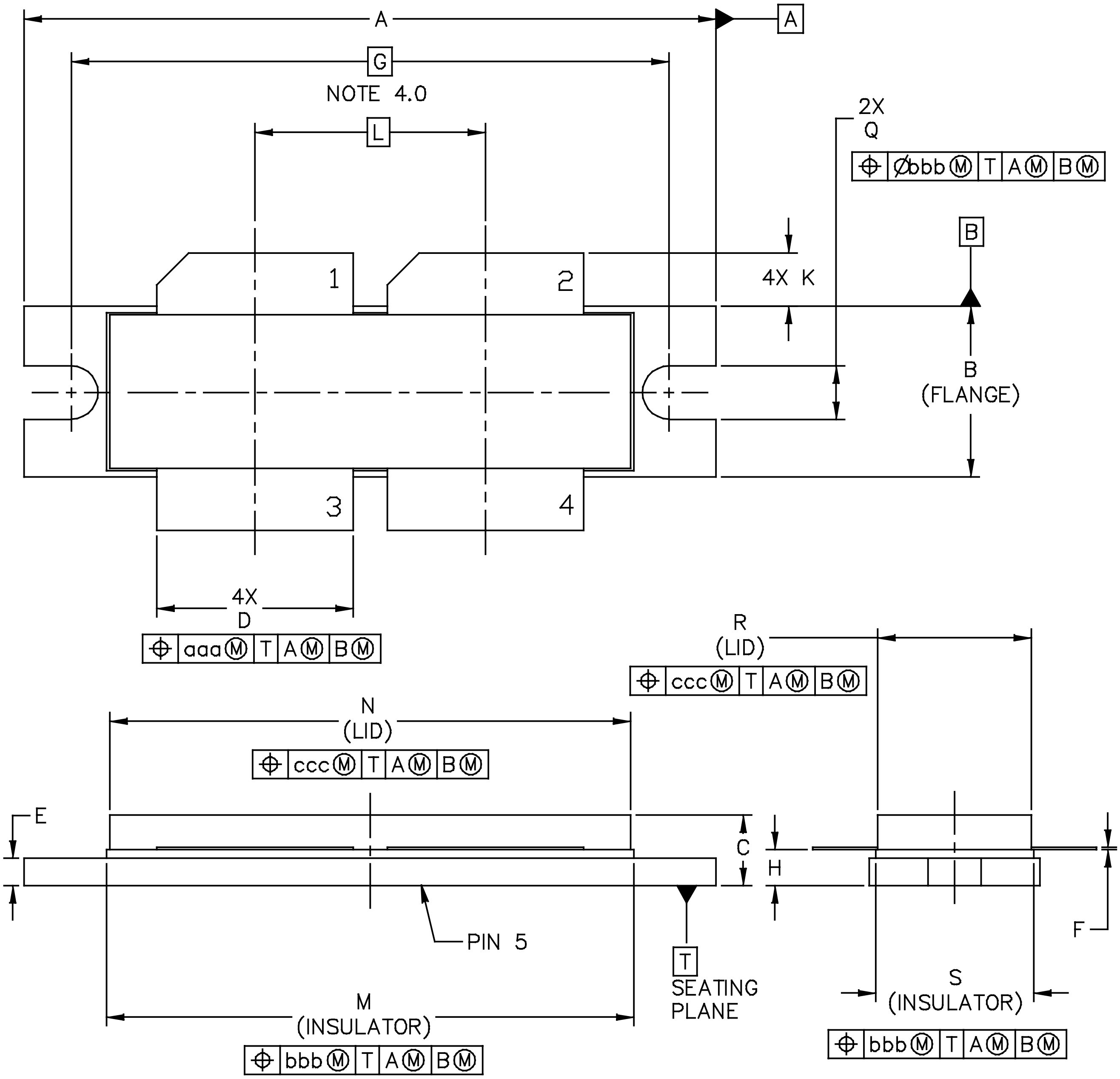


Figure 18. Series Equivalent Source and Load Impedance — 500 MHz

PACKAGE DIMENSIONS



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TITLE: NI–1230	DOCUMENT NO: 98ASB16977C	REV: E
	CASE NUMBER: 375D–05	31 MAR 2005
	STANDARD: NON–JEDEC	

NOTES:

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

2.0 CONTROLLING DIMENSION: INCH

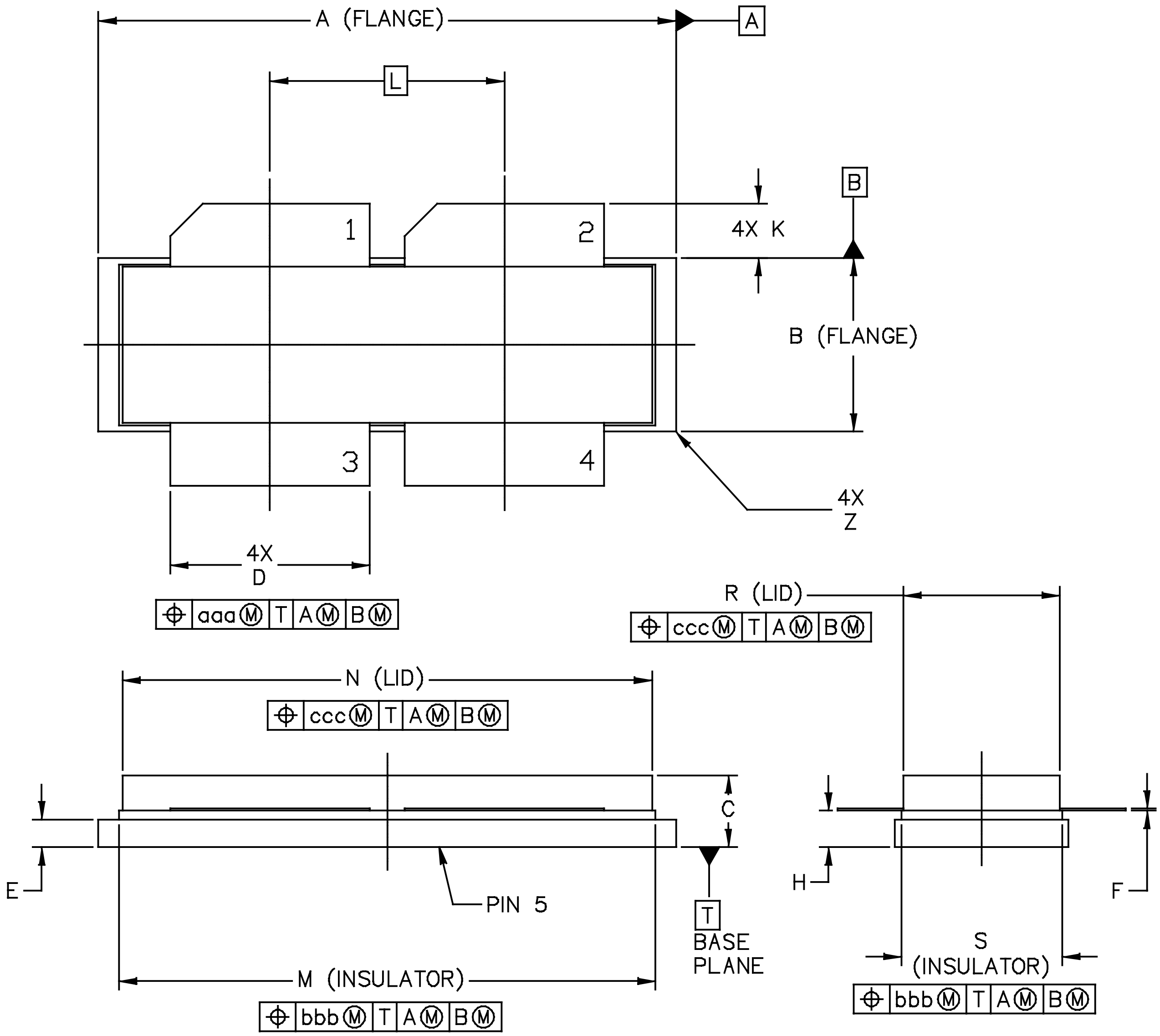
3.0 DIMENSION H IS MEASURED .030 (0.762) AWAY FROM PACKAGE BODY.

4.0 RECOMMENDED BOLT CENTER DIMENSION OF 1.52 (38.61) BASED ON M3 SCREW.

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

	INCH		MILLIMETER			INCH		MILLIMETER	
DIM	MIN	MAX	MIN	MAX	DIM	MIN	MAX	MIN	MAX
A	1.615	1.625	41.02	41.28	N	1.218	1.242	30.94	31.55
B	.395	.405	10.03	10.29	Q	.120	.130	3.05	3.3
C	.150	.200	3.81	5.08	R	.355	.365	9.01	9.27
D	.455	.465	11.56	11.81	S	.365	.375	9.27	9.53
E	.062	.066	1.57	1.68					
F	.004	.007	0.1	0.18					
G	1.400 BSC		35.56 BSC		aaa	.013		0.33	
H	.082	.090	2.08	2.29	bbb	.010		0.25	
K	.117	.137	2.97	3.48	ccc	.020		0.51	
L	.540 BSC		13.72 BSC						
M	1.219	1.241	30.96	31.52					

	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE
TITLE: NI-1230	DOCUMENT NO: 98ASB16977C	REV: E
	CASE NUMBER: 375D-05	31 MAR 2005
	STANDARD: NON-JEDEC	



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TITLE: NI–1230S	DOCUMENT NO: 98ARB18247C	REV: F
	CASE NUMBER: 375E–04	05 AUG 2005
	STANDARD: NON–JEDEC	

NOTES:

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

2. CONTROLLING DIMENSION: INCH

3. DIMENSION H IS MEASURED .030 AWAY FROM PACKAGE BODY

STYLE 1:
PIN 1 – DRAIN
2 – DRAIN
3 – GATE
4 – GATE
5 – SOURCE

DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX	DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	1.265	1.275	32.13	32.38	R	.355	.365	9.01	9.27
B	.395	.405	10.03	10.29	S	.365	.375	9.27	9.53
C	.150	.200	3.81	5.08	Z	---	.040	---	1.02
D	.455	.465	11.56	11.81					
E	.062	.066	1.57	1.68	aaa	.013		0.33	
F	.004	.007	0.1	0.18	bbb	.010		0.25	
H	.082	.090	2.08	2.29	ccc	.020		0.51	
K	.117	.137	2.97	3.48					
L	.540 BSC		13.72 BSC						
M	1.219	1.241	30.96	31.52					
N	1.218	1.242	30.94	31.55					

	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE
TITLE: NI–1230S	DOCUMENT NO: 98ARB18247C	REV: F
	CASE NUMBER: 375E–04	05 AUG 2005
	STANDARD: NON–JEDEC	

PRODUCT DOCUMENTATION AND SOFTWARE

Refer to the following documents 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

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.

R5 TAPE AND REEL OPTION

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

The R5 tape and reel option for MRF6VP41KH and MRF6VP41KHS parts will be available for 2 years after release of MRF6VP41KH and MRF6VP41KHS. 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 MRF6VP41KH and MRF6VP41KHS in the R6 tape and reel option.

REVISION HISTORY

The following table summarizes revisions to this document.

Revision	Date	Description
0	Jan. 2008	• Initial Release of Data Sheet
1	Apr. 2008	• Added Fig. 12, Maximum Transient Thermal Impedance, p. 6
2	Sept. 2008	• Added Note to Fig. 4, Capacitance versus Drain-Source Voltage, to denote that each side of device is measured separately, p. 5 • Updated Fig. 5, DC Safe Operating Area, to clarify that measurement is on a per-side basis, p. 5 • Corrected Fig. 13, MTTF versus Junction Temperature, to reflect the correct die size and increased the MTTF factor accordingly, p. 6
3	Nov. 2008	• Added CW operation capability bullet to Features section, p. 1 • Added CW operation to Maximum Ratings table, p. 1 • Added CW thermal data to Thermal Characteristics table, p. 2 • Fig. 14, Series Equivalent Source and Load Impedance, corrected Z_{source} copy to read "Test circuit impedance as measured from gate to gate, balanced configuration" and Z_{load} copy to read "Test circuit impedance as measured from drain to drain, balanced configuration"; replaced impedance diagram to show push-pull test conditions, p. 7
4	Mar. 2009	• CW rating limits updated from 1176 W to 1107 W and 5.5 W/°C to 4.6 W/°C to reflect recent remeasured data, Max Ratings table, p. 1 • CW Thermal Characteristics changed from 81°C to 48°C and 0.16 °C/W to 0.15 °C/W using data from the most recent 352.2 MHz CW application circuit, p. 2 • Added Typical Performances table for 352.2 MHz and 500 MHz applications, p. 3 • Added Fig. 14, MTTF versus Junction Temperature - CW, p. 7 • Added Figs. 16 and 18, Test Circuit Component Layout - 352.2 MHz and 500 MHz, and Tables 6 and 7, Test Circuit Component Designations and Values - 352.2 MHz and 500 MHz, p. 9, 11 • Added Figs. 17 and 19, Series Equivalent Source and Load Impedance - 352.2 MHz and 500 MHz, p. 10, 12

(continued)

Revision	Date	Description
5	Apr. 2010	• Operating Junction Temperature increased from 200°C to 225°C in Maximum Ratings table and related "Continuous use at maximum temperature will affect MTTF" footnote added, p. 1 • Added Electromigration MTTF Calculator and RF High Power Model availability to Product Software, p. 17
6	Apr. 2012	• Table 1, Maximum Ratings, CW Operation: changed CW rating from an RF based value to a maximum power dissipated value - CW Operation @ T_C = 25°C, 1107 W changed to Total Device Dissipation @ T_C = 25°C, CW only, 1333 watts. Value change to 1333 watts applies only to devices with a date code of QQ1218 or newer. Refer to PCN15074, p. 1 • Table 2, Thermal Characteristics, Thermal Resistance, Junction to Case: 2.4 mil wire configuration thermal testing resulted in a case temperature change from 48°C to 84°C, p. 2 • Table 3, ESD Protection Characteristics: added the device's ESD passing level as applicable to each ESD class, p. 2 • Modified figure titles and/or graph axes labels to clarify application use, p. 4-7 • Fig. 12, Transient Thermal Impedance: graph updated to show correct CW operation, p. 7 • Fig. 13, MTTF versus Junction Temperature - Pulsed removed, p. 7. Refer to the device's MTTF Calculator available at freescale.com/RFpower. Go to Design Resources > Software and Tools. • Fig. 14, MTTF versus Junction Temperature – CW: MTTF end temperature on graph changed to match maximum operating junction temperature, p. 7 (renumbered as Fig. 13 after Fig. 13, MTTF versus Junction Temperature - Pulsed removed)

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