



# RF Power Field Effect Transistor

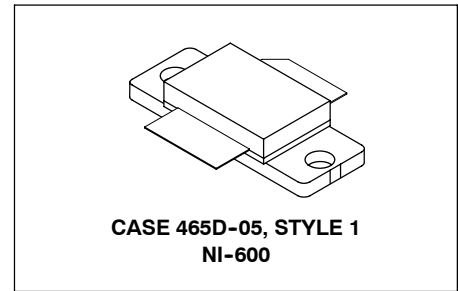
## N-Channel Enhancement-Mode Lateral MOSFET

Designed for GSM 900 frequency band, the high gain and broadband performance of this device make it ideal for large-signal, common source amplifier applications in 26 volt base station equipment.

- Specified Performance @ 940 MHz, 26 Volts  
 Output Power, P1dB — 80 Watts (Typ)  
 Power Gain @ P1dB — 16 dB (Typ)  
 Efficiency @ P1dB — 58% (Typ)
- Capable of Handling 5:1 VSWR, @ 26 Vdc, 945 MHz, 50 Watts CW Output Power
- RoHS Compliant
- In Tape and Reel. R3 Suffix = 250 Units per 32 mm, 13 inch Reel.

**MRF6522-70R3**

**920-960 MHz, 70 W, 26 V  
 LATERAL N-CHANNEL  
 RF POWER MOSFET**



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**Table 1. Maximum Ratings**

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	-0.5, +65	Vdc
Gate-Source Voltage	$V_{GS}$	$\pm 20$	Vdc
Drain Current — Continuous	$I_D$	7	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	159 0.9	W W/ $^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	- 65 to +150	$^\circ\text{C}$
Case Operating Temperature	$T_C$	150	$^\circ\text{C}$
Operating Junction Temperature	$T_J$	200	$^\circ\text{C}$

**Table 2. Thermal Characteristics**

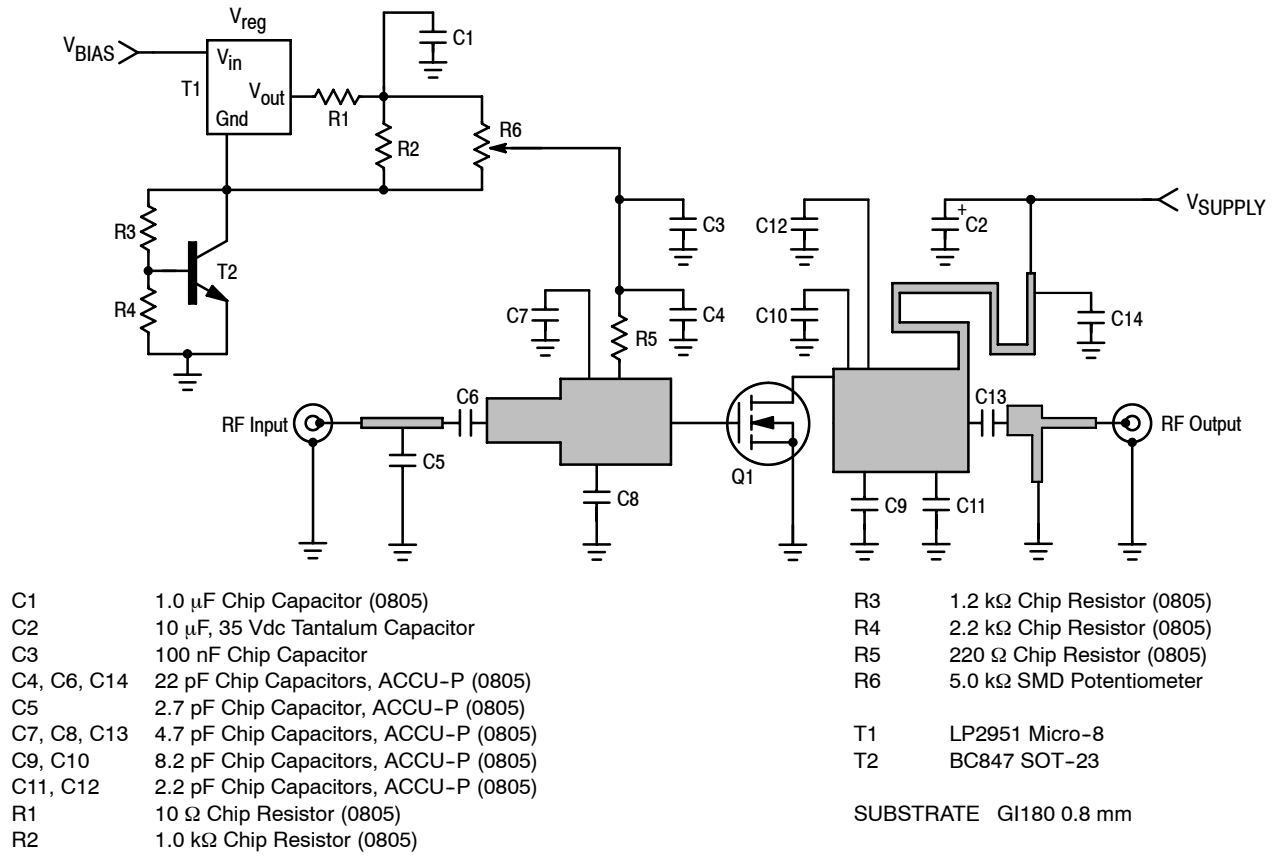
Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.1	$^\circ\text{C}/\text{W}$

**NOTE - CAUTION** - MOS devices are susceptible to damage from electrostatic charge. Reasonable precautions in handling and packaging MOS devices should be observed.

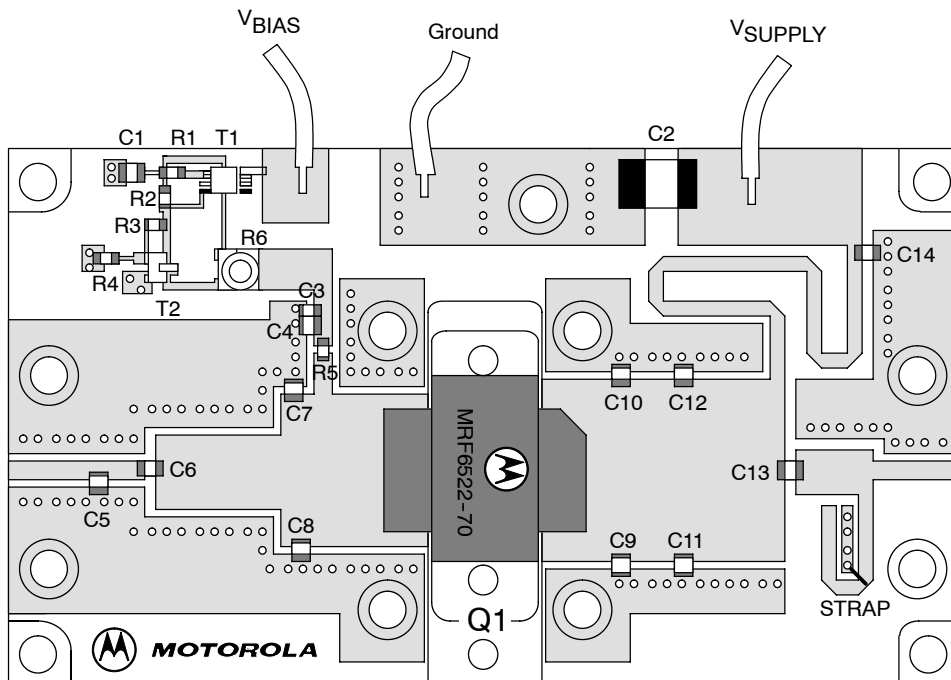
**Table 3. Electrical Characteristics** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>Off Characteristics</b>					
Drain-Source Breakdown Voltage ( $V_{GS} = 0\text{ Vdc}$ , $I_D = 20\ \mu\text{Adc}$ )	$V_{(BR)DSS}$	65	—	—	Vdc
Zero Gate Voltage Drain Current ( $V_{DS} = 28\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ )	$I_{DSS}$	—	—	10	$\mu\text{Adc}$
Gate-Source Leakage Current ( $V_{GS} = 20\text{ Vdc}$ , $V_{DS} = 0\text{ Vdc}$ )	$I_{GSS}$	—	—	1	$\mu\text{Adc}$
<b>On Characteristics</b>					
Gate Threshold Voltage ( $V_{DS} = 10\text{ Vdc}$ , $I_D = 300\ \mu\text{Adc}$ )	$V_{GS(th)}$	2	3	4	Vdc
Gate Quiescent Voltage ( $V_{DS} = 26\text{ Vdc}$ , $I_D = 400\text{ mAdc}$ )	$V_{GS(Q)}$	3	4	5	Vdc
Drain-Source On-Voltage ( $V_{GS} = 10\text{ Vdc}$ , $I_D = 1\text{ Adc}$ )	$V_{DS(on)}$	—	0.15	0.6	Vdc
Forward Transconductance ( $V_{DS} = 10\text{ Vdc}$ , $I_D = 2\text{ Adc}$ )	$g_{fs}$	2	3	—	S
<b>Dynamic Characteristics</b>					
Input Capacitance (1) ( $V_{DS} = 26\text{ Vdc}$ , $V_{GS} = 0$ , $f = 1\text{ MHz}$ )	$C_{iss}$	—	130	—	pF
Output Capacitance ( $V_{DS} = 26\text{ Vdc}$ , $V_{GS} = 0$ , $f = 1\text{ MHz}$ )	$C_{oss}$	41	47	52	pF
Reverse Transfer Capacitance ( $V_{DS} = 26\text{ Vdc}$ , $V_{GS} = 0$ , $f = 1\text{ MHz}$ )	$C_{rss}$	2.4	3	3.4	pF
<b>Functional Tests</b> (In Freescale Test Fixture)					
Output Power ( $V_{DD} = 26\text{ Vdc}$ , $I_{DQ} = 400\text{ mA}$ , $f = 940\text{ MHz}$ )	P1dB	73	80	—	W
Common-Source Amplifier Power Gain @ P1dB (Min) ( $V_{DD} = 26\text{ Vdc}$ , $I_{DQ} = 400\text{ mA}$ , $f = 940\text{ MHz}$ )	$G_{ps}$	14	16	18	dB
Drain Efficiency @ $P_{out} = 50\text{ W}$ ( $V_{DD} = 26\text{ Vdc}$ , $I_{DQ} = 400\text{ mA}$ , $f = 940\text{ MHz}$ )	$\eta_1$	47	51	—	%
Drain Efficiency @ P1dB ( $V_{DD} = 26\text{ Vdc}$ , $I_{DQ} = 400\text{ mA}$ , $f = 940\text{ MHz}$ )	$\eta_2$	—	58	—	%
Input Return Loss @ $P_{out} = 50\text{ W}$ ( $V_{DD} = 26\text{ Vdc}$ , $I_{DQ} = 400\text{ mA}$ , $f = 940\text{ MHz}$ )	IRL	—	—	-15	dB

1. Value excludes the input matching.



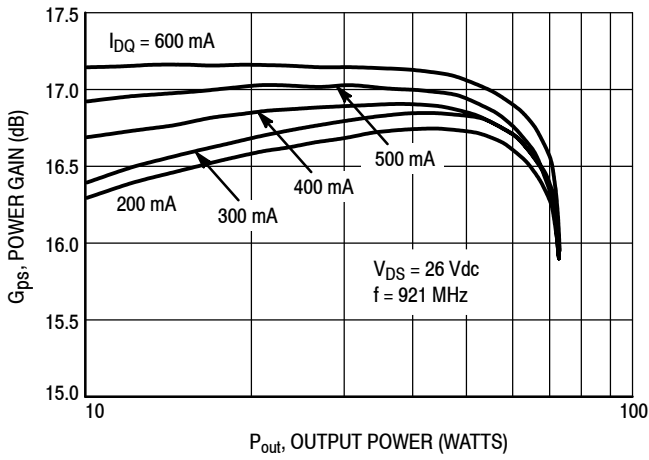
**Figure 1. MRF6522-70 Test Circuit Schematic**



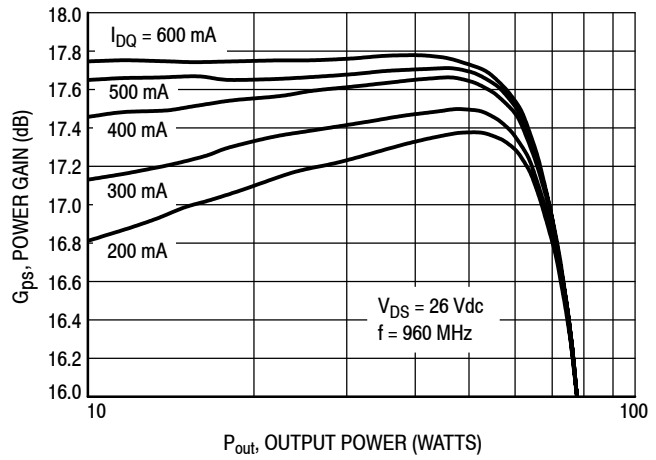
Freescale has begun the transition of marking Printed Circuit Boards (PCBs) with the Freescale Semiconductor signature/logo. PCBs may have either Motorola or Freescale markings during the transition period. These changes will have no impact on form, fit or function of the current product.

**Figure 2. MRF6522-70 Test Circuit Component Layout**

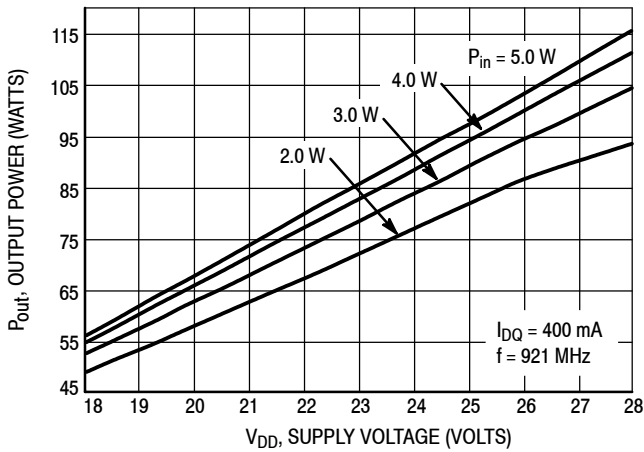
**TYPICAL CHARACTERISTICS**



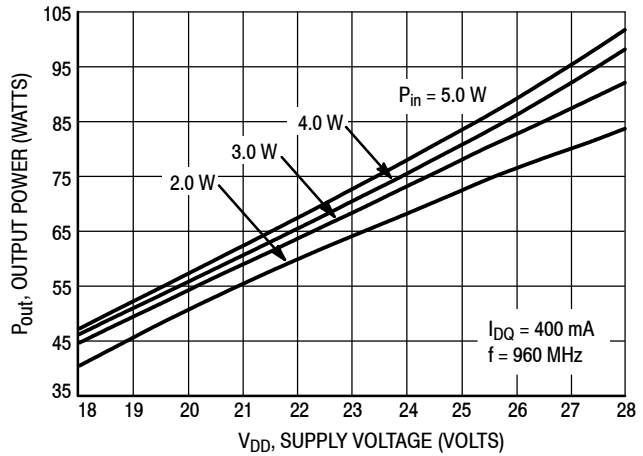
**Figure 3. Power Gain versus Output Power**



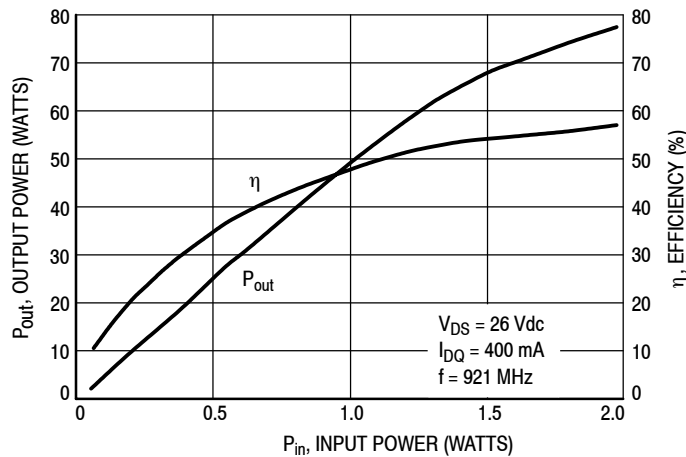
**Figure 4. Power Gain versus Output Power**



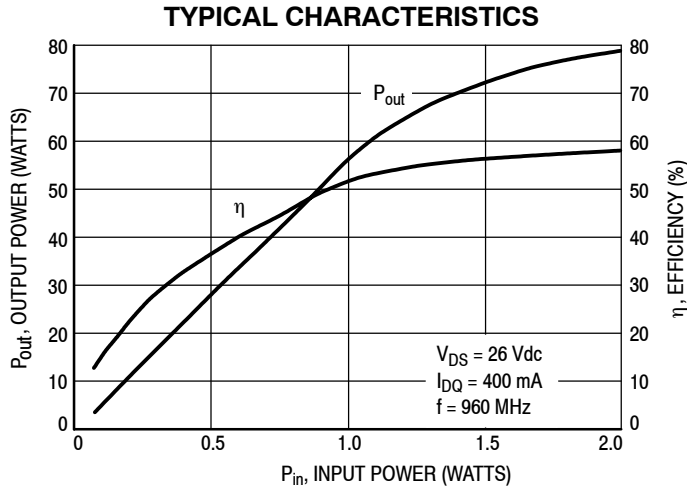
**Figure 5. Output Power versus Supply Voltage**



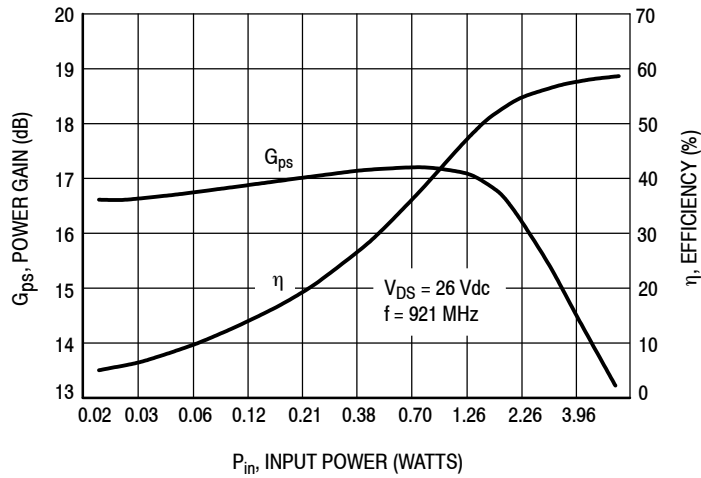
**Figure 6. Output Power versus Supply Voltage**



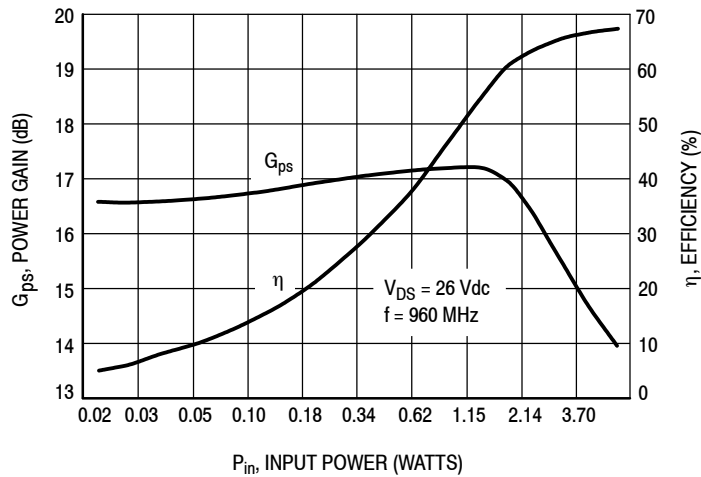
**Figure 7. Efficiency and Output Power versus Input Power**



**Figure 8. Efficiency and Output Power versus Input Power**



**Figure 9. Power Gain and Efficiency versus Input Power**



**Figure 10. Power Gain and Efficiency versus Input Power**

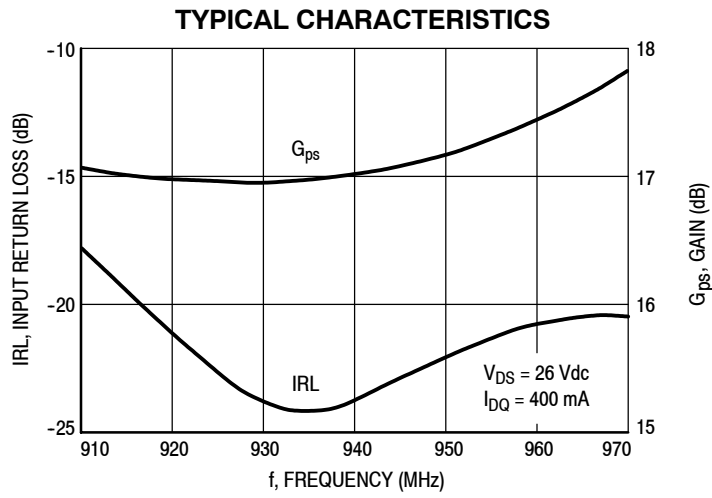
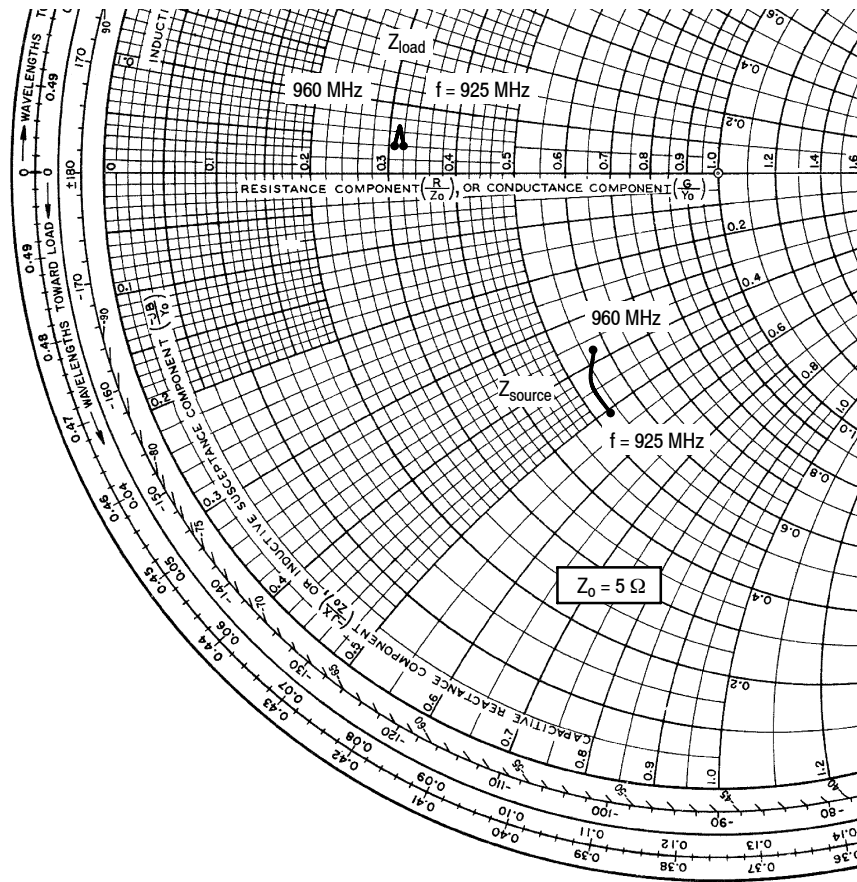


Figure 11. Performance in Broadband Circuit (at Small Signal)



$V_{SUPPLY} = 26 \text{ Vdc}$ ,  $I_{BIAS} = 400 \text{ mA}$ ,  $CW = \text{Room Temperature}$

f MHz	$Z_{source}$ $\Omega$	$Z_{load}$ $\Omega$
925	$2.65 - j2.53$	$1.62 + j0.2$
940	$2.67 - j2.14$	$1.56 + j0.34$
960	$2.85 - j1.87$	$1.55 + j0.2$

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

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

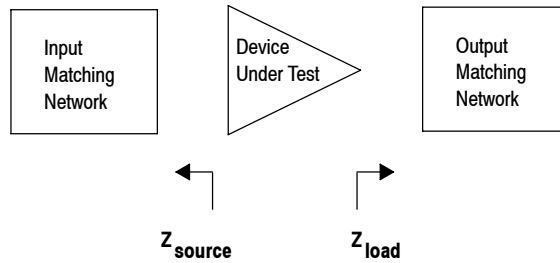
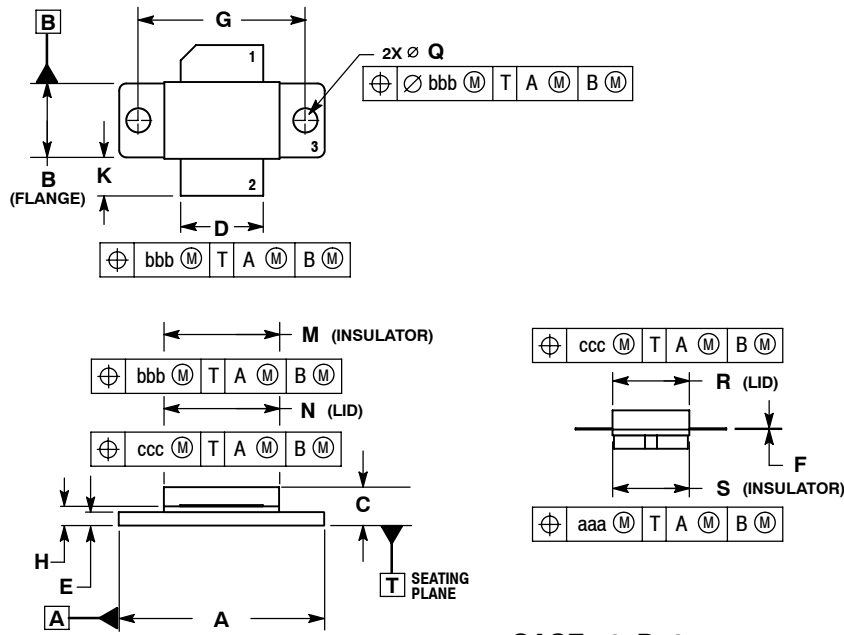


Figure 12. Series Equivalent Source and Load Impedance

### PACKAGE DIMENSIONS



- NOTES:
1. INTERPRET DIMENSIONS AND TOLERANCES PER ANSI Y14.5M-1994.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION H IS MEASURED 0.030 (0.762) AWAY FROM PACKAGE BODY.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.065	1.075	27.05	27.30
B	0.380	0.390	9.65	9.91
C	0.160	0.205	4.06	5.21
D	0.425	0.435	10.80	11.05
E	0.060	0.070	1.52	1.78
F	0.004	0.006	0.10	0.15
G	0.870 BSC		22.10 BSC	
H	0.096	0.106	2.44	2.69
K	0.190	0.223	4.83	5.66
M	0.594	0.606	15.09	15.39
N	0.591	0.601	15.01	15.27
Q	0.124	0.130	3.15	3.30
R	0.394	0.404	10.01	10.26
S	0.395	0.405	10.03	10.29
aaa	0.005 REF		0.13 REF	
bbb	0.010 REF		0.25 REF	
ccc	0.015 REF		0.38 REF	

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

**CASE 465D-05  
ISSUE D  
NI-600**



## PRODUCT DOCUMENTATION

Refer to the following documents to aid your design process.

### Engineering Bulletins

- EB212: Using Data Sheet Impedances for RF LDMOS Devices

## REVISION HISTORY

The following table summarizes revisions to this document.

Revision	Date	Description
9	Oct. 2008	<ul style="list-style-type: none"><li>• Modified data sheet to reflect RF Test Reduction described in Product and Process Change Notification number, PCN12779, p. 1, 2</li><li>• Added Product Documentation and Revision History, p. 9</li></ul>
	Dec. 2010	<ul style="list-style-type: none"><li>• Data sheet archived. Part no longer manufactured.</li></ul>

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