



RF Power Field Effect Transistor

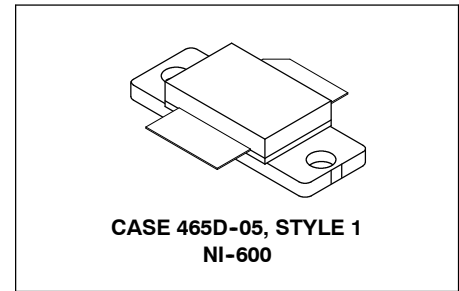
N-Channel Enhancement-Mode Lateral MOSFET

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**



LIFETIME BUY

LAST ORDER 3 OCT 08 LAST SHIP 14 MAY 09

Table 1. Maximum Ratings

| Rating | Symbol | Value | Unit |
|--|-----------|-------------|--------------------------|
| Drain-Source Voltage | V_{DSS} | -0.5, +65 | Vdc |
| Gate-Source Voltage | V_{GS} | ±20 | Vdc |
| Drain Current — Continuous | I_D | 7 | Adc |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°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

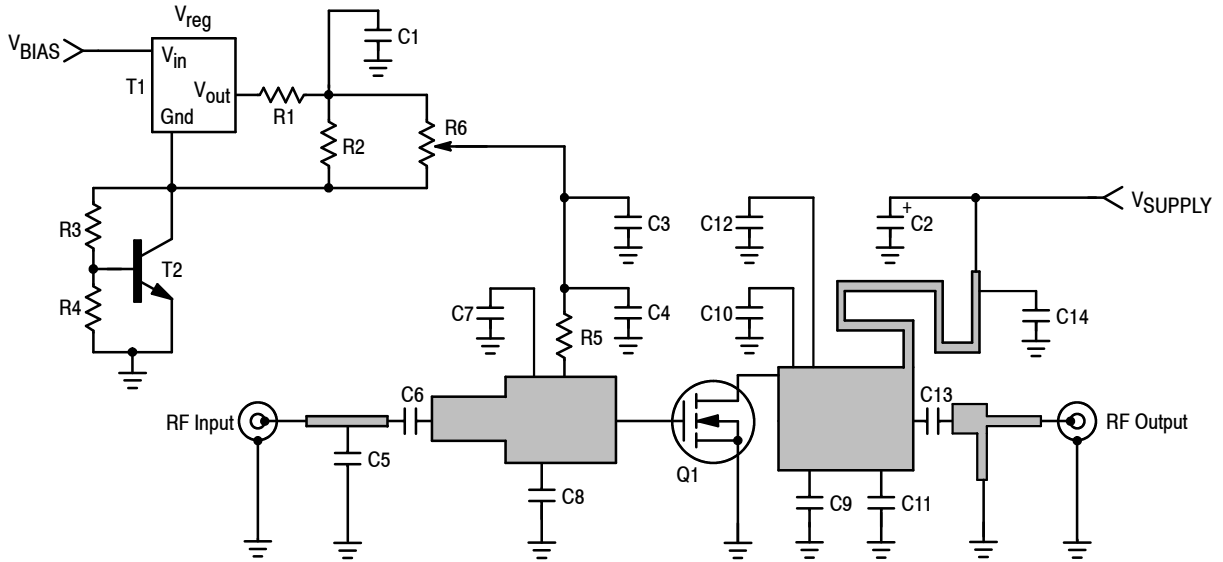
| Characteristic | Symbol | Value | Unit |
|--------------------------------------|-----------------|-------|---------------------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 1.1 | $^\circ\text{C}/\text{W}$ |

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)

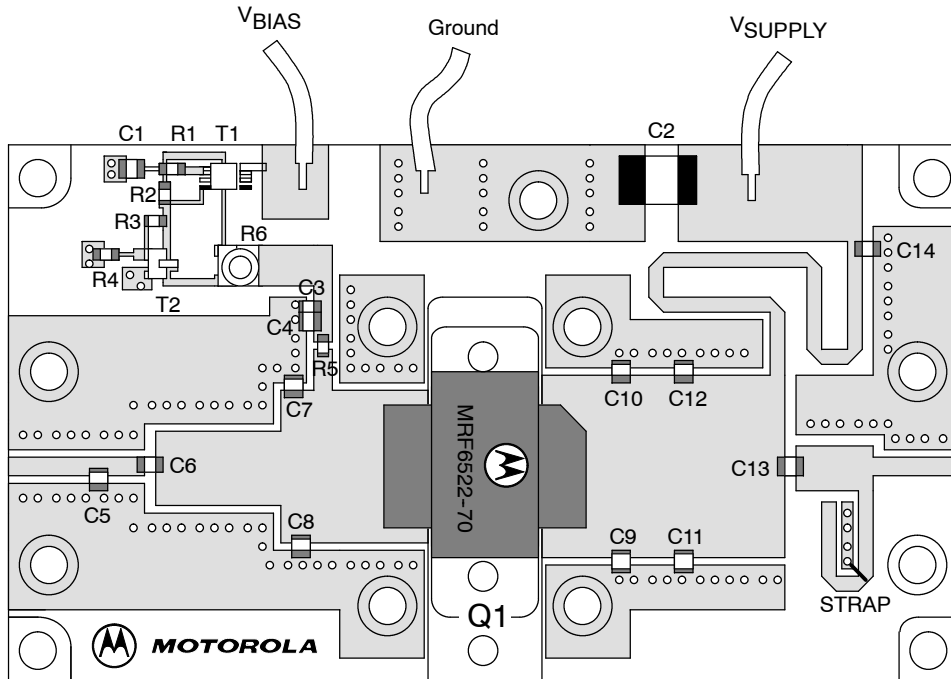
| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---------------|-----|------|-----|-----------------|
| Off Characteristics | | | | | |
| Drain-Source Breakdown Voltage ($V_{GS} = 0\text{ Vdc}$, $I_D = 20\ \mu\text{Adc}$) | $V_{(BR)DSS}$ | 65 | — | — | Vdc |
| Zero Gate Voltage Drain Current ($V_{DS} = 28\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$) | I_{DSS} | — | — | 10 | μAdc |
| Gate-Source Leakage Current ($V_{GS} = 20\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$) | I_{GSS} | — | — | 1 | μAdc |
| On Characteristics | | | | | |
| 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 |
| Dynamic Characteristics | | | | | |
| 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 |
| Functional Tests (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 @ $P_{out} = 50\ \text{W}$ ($V_{DD} = 26\text{ Vdc}$, $I_{DQ} = 400\ \text{mA}$, $f = 940\ \text{MHz}$) | η_1 | 47 | 51 | — | % |
| Drain Efficiency @ P1dB ($V_{DD} = 26\text{ Vdc}$, $I_{DQ} = 400\ \text{mA}$, $f = 940\ \text{MHz}$) | η_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.



- | | | | |
|-------------|---------------------------------------|----|-------------------------------------|
| C1 | 1.0 μ F Chip Capacitor (0805) | R3 | 1.2 k Ω Chip Resistor (0805) |
| C2 | 10 μ F, 35 Vdc Tantalum Capacitor | R4 | 2.2 k Ω Chip Resistor (0805) |
| C3 | 100 nF Chip Capacitor | R5 | 220 Ω Chip Resistor (0805) |
| C4, C6, C14 | 22 pF Chip Capacitors, ACCU-P (0805) | R6 | 5.0 k Ω SMD Potentiometer |
| C5 | 2.7 pF Chip Capacitor, ACCU-P (0805) | T1 | LP2951 Micro-8 |
| C7, C8, C13 | 4.7 pF Chip Capacitors, ACCU-P (0805) | T2 | BC847 SOT-23 |
| C9, C10 | 8.2 pF Chip Capacitors, ACCU-P (0805) | | |
| C11, C12 | 2.2 pF Chip Capacitors, ACCU-P (0805) | | |
| R1 | 10 Ω Chip Resistor (0805) | | |
| R2 | 1.0 k Ω Chip Resistor (0805) | | |
- SUBSTRATE GI180 0.8 mm

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

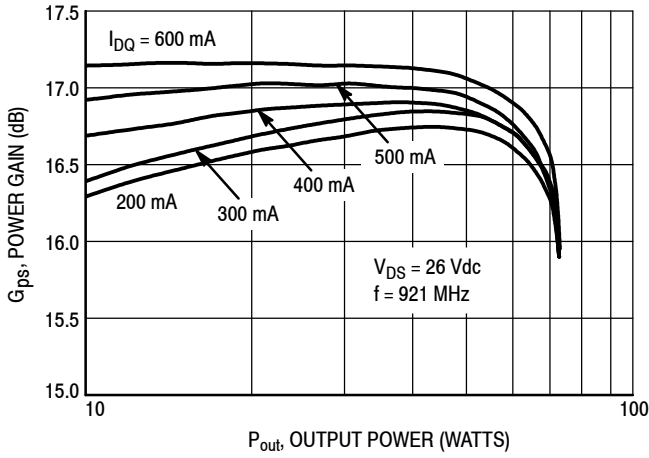


Figure 3. Power Gain versus Output Power

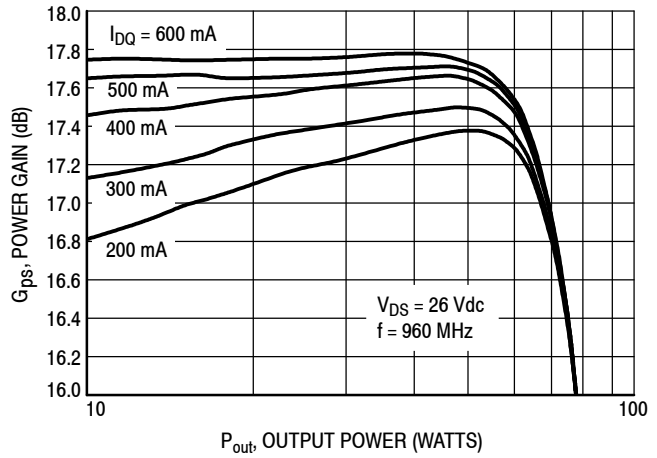


Figure 4. Power Gain versus Output Power

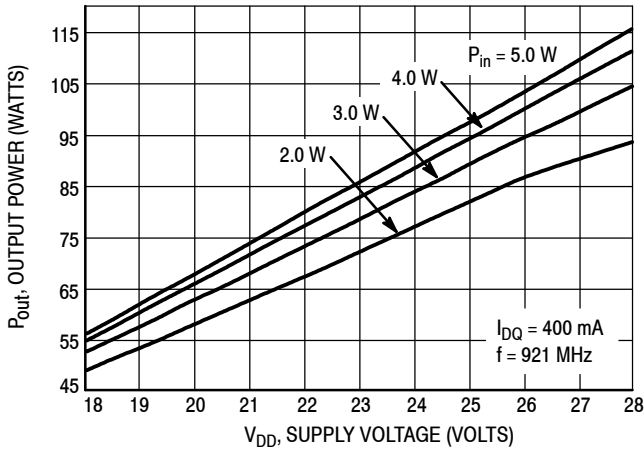


Figure 5. Output Power versus Supply Voltage

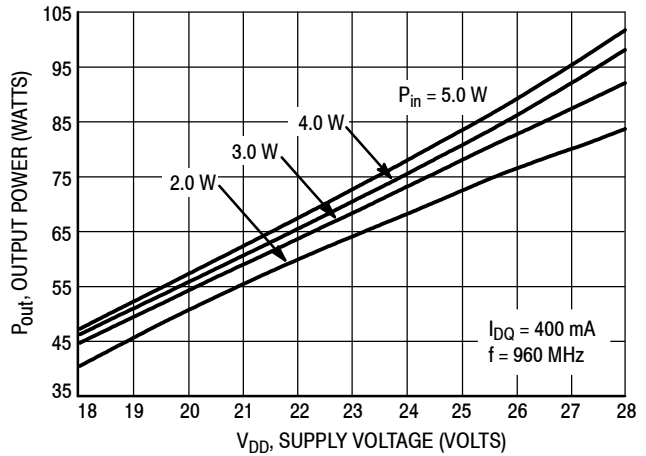


Figure 6. Output Power versus Supply Voltage

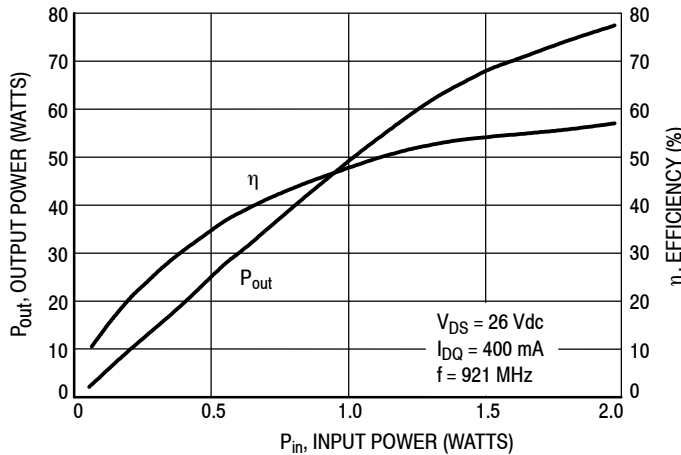


Figure 7. Efficiency and Output Power versus Input Power

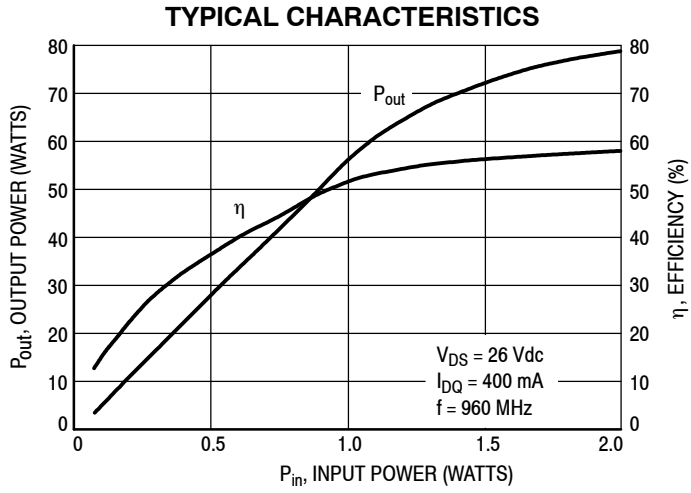


Figure 8. Efficiency and Output Power versus Input Power

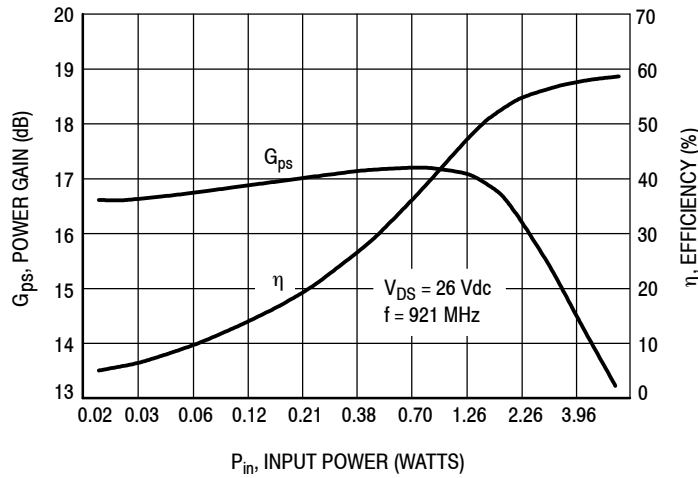


Figure 9. Power Gain and Efficiency versus Input Power

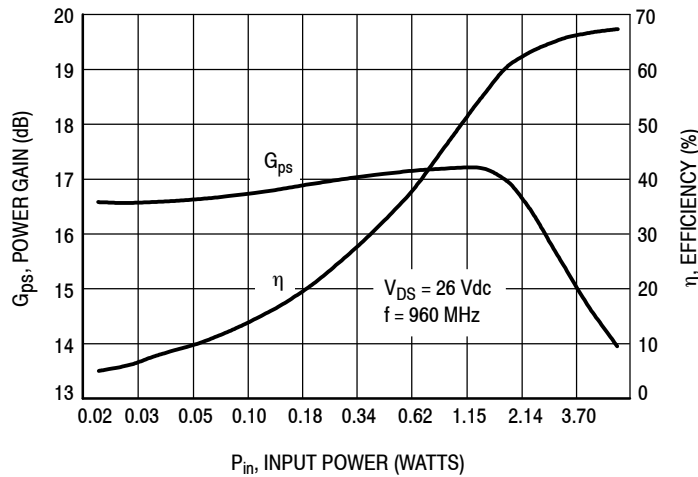


Figure 10. Power Gain and Efficiency versus Input Power

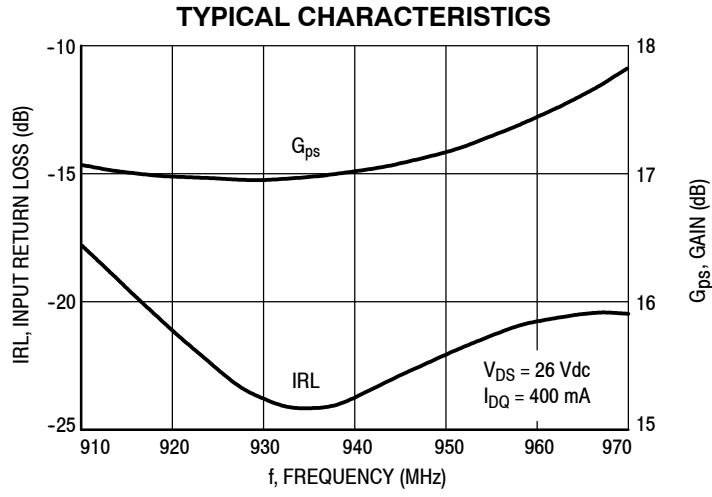
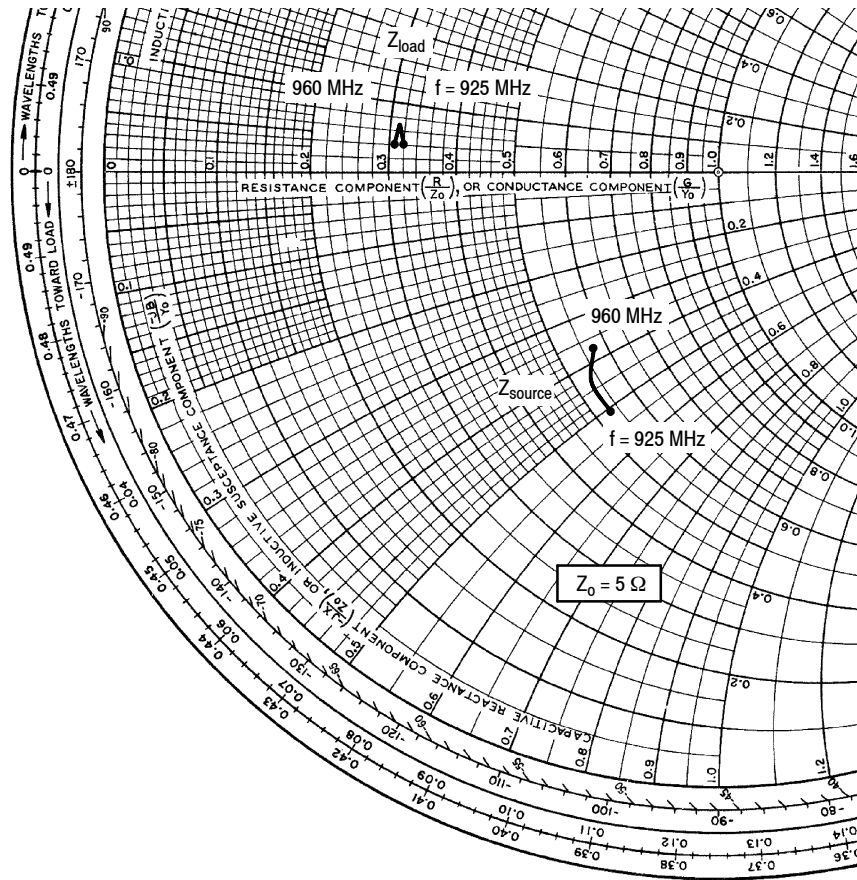


Figure 11. Performance in Broadband Circuit (at Small Signal)



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

| f MHz | Z_{source} Ω | Z_{load} Ω |
|----------|--------------------------|------------------------|
| 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.

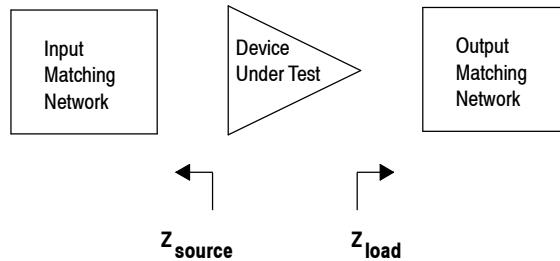
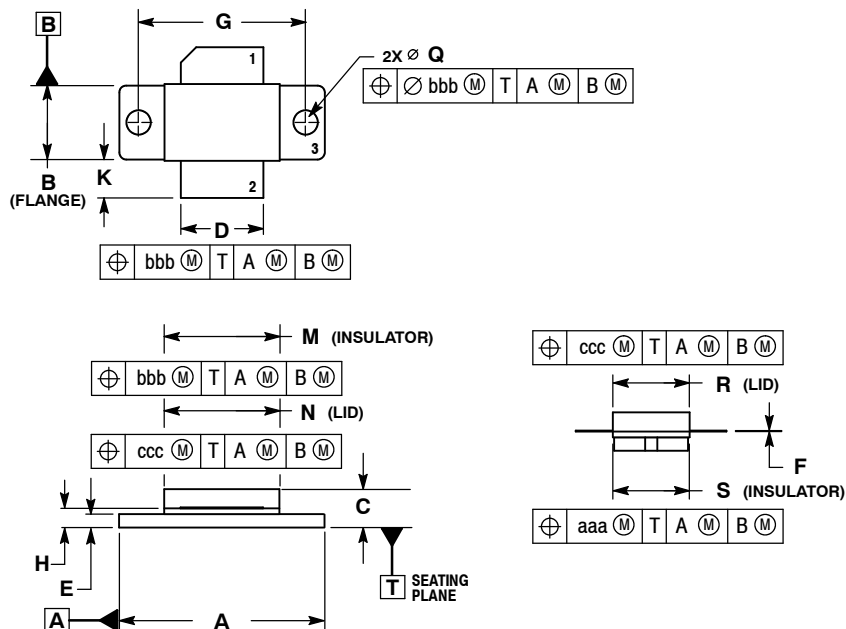


Figure 12. Series Equivalent Source and Load Impedance

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:
 PIN 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">• Modified data sheet to reflect RF Test Reduction described in Product and Process Change Notification number, PCN12779, p. 1, 2• Added Product Documentation and Revision History, p. 9 |

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