Freescale Semiconductor
Technical Data

Document Number: MRF6522-70
Rev. 8, 5/2006

RoHS

RF Power Field Effect Transistor

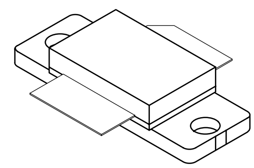
N-Channel Enhancement-Mode Lateral MOSFET

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 @ Full GSM Band, 921-960 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

921-960 MHz, 70 W, 26 V
LATERAL N-CHANNEL
RF POWER MOSFET



CASE 465D-05, STYLE 1
NI-600

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°C Derate above 25°C	P_D	159 0.9	W W/°C
Storage Temperature Range	T_{stg}	- 65 to +150	°C
Case Operating Temperature	T_C	150	°C
Operating Junction Temperature	T_J	200	°C

Table 2. Thermal Characteristics

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

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

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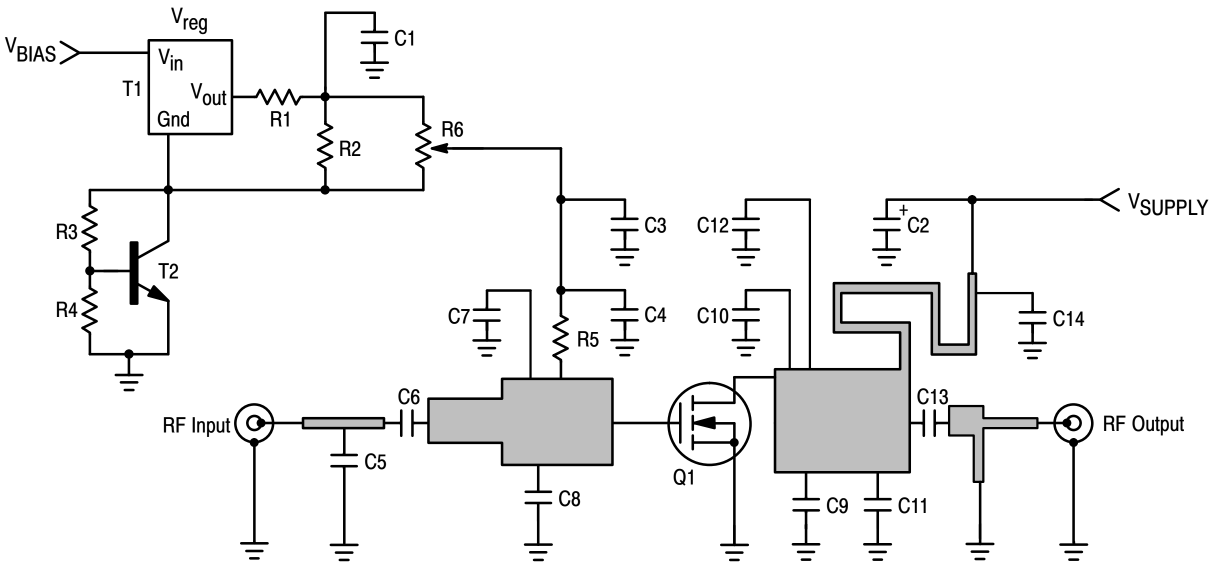
Table 3. Electrical Characteristics (T_C = 25°C unless otherwise noted)

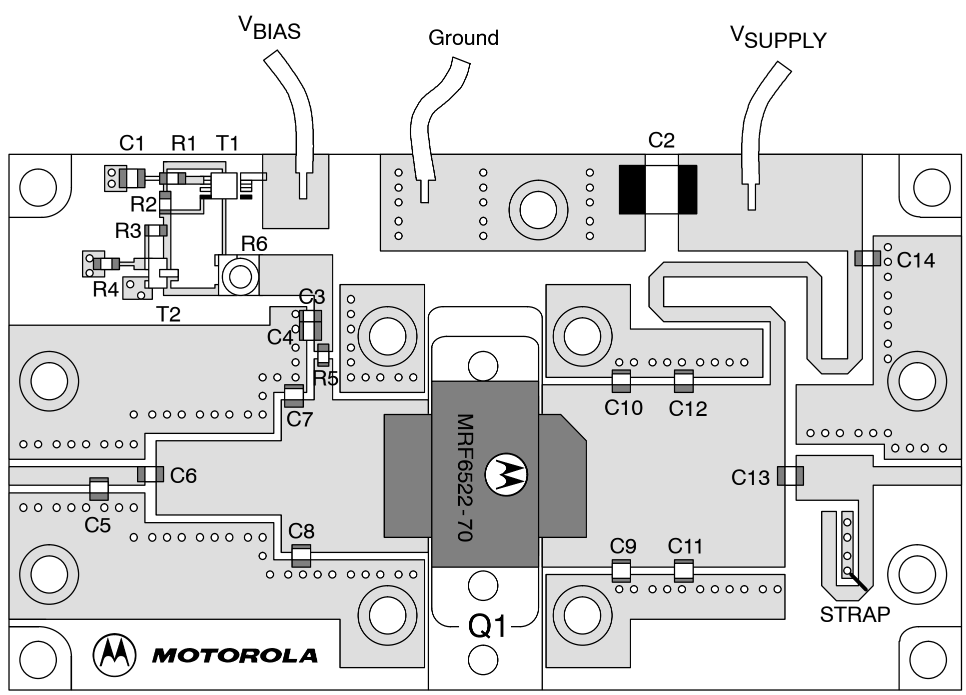
Characteristic	Symbol	Min	Typ	Max	Unit
Off Characteristics					
Drain-Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = 20 μAdc)	$V_{(BR)DSS}$	65	—	—	Vdc
Zero Gate Voltage Drain Current (V_{DS} = 28 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	—	—	10	μAdc
Gate-Source Leakage Current (V_{GS} = 20 Vdc, V_{DS} = 0 Vdc)	I_{GSS}	—	—	1	μAdc
On Characteristics					
Gate Threshold Voltage (V_{DS} = 10 Vdc, I_D = 300 μAdc)	$V_{GS(th)}$	2	3	4	Vdc
Gate Quiescent Voltage (V_{DS} = 26 Vdc, I_D = 400 mAdc)	$V_{GS(Q)}$	3	4	5	Vdc
Drain-Source On-Voltage (V_{GS} = 10 Vdc, I_D = 1 Adc)	$V_{DS(on)}$	—	0.15	0.6	Vdc
Forward Transconductance (V_{DS} = 10 Vdc, I_D = 2 Adc)	g_{fs}	2	3	—	S
Dynamic Characteristics					
Input Capacitance (1) (V_{DS} = 26 Vdc, V_{GS} = 0, f = 1 MHz)	C_{iss}	—	130	—	pF
Output Capacitance (V_{DS} = 26 Vdc, V_{GS} = 0, f = 1 MHz)	C_{oss}	41	47	52	pF
Reverse Transfer Capacitance (V_{DS} = 26 Vdc, V_{GS} = 0, f = 1 MHz)	C_{rss}	2.4	3	3.4	pF
Functional Tests (In Freescale Test Fixture)					
Output Power (2) (V_{DD} = 26 Vdc, I_{DQ} = 400 mA, f = Full GSM Band 921 - 960 MHz)	P1dB	73	80	—	W
Common-Source Amplifier Power Gain @ P1dB (Min) (2) (V_{DD} = 26 Vdc, I_{DQ} = 400 mA, f = Full GSM Band 921 - 960 MHz)	G_{ps}	14	16	18	dB
Drain Efficiency @ P_{out} = 50 W (V_{DD} = 26 Vdc, I_{DQ} = 400 mA, f = Full GSM Band 921 - 960 MHz)	η_1	47	51	—	%
Drain Efficiency @ P1dB (2) (V_{DD} = 26 Vdc, I_{DQ} = 400 mA, f = Full GSM Band 921 - 960 MHz)	η_2	—	58	—	%
Input Return Loss @ P_{out} = 50 W (V_{DD} = 26 Vdc, I_{DQ} = 400 mA,	IRL				dB
f = 921 MHz and 960 MHz		—	—	-10	
f = 940 MHz)		—	—	-15	

1. Value excludes the input matching.
2. To meet application requirements, Freescale test fixtures have been designed to cover full GSM 900 band ensuring batch-to-batch consistency.



C1	1.0 µF Chip Capacitor (0805)	R3	1.2 kΩ Chip Resistor (0805)
C2	10 µF, 35 Vdc Tantalum Capacitor	R4	2.2 kΩ 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 kΩ SMD Potentiometer
C5	2.7 pF Chip Capacitor, ACCU-P (0805)		
C7, C8, C13	4.7 pF Chip Capacitors, ACCU-P (0805)	T1	LP2951 Micro-8
C9, C10	8.2 pF Chip Capacitors, ACCU-P (0805)	T2	BC847 SOT-23
C11, C12	2.2 pF Chip Capacitors, ACCU-P (0805)		
R1	10 Ω Chip Resistor (0805)	SUBSTRATE	GI180 0.8 mm
R2	1.0 kΩ Chip Resistor (0805)		

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

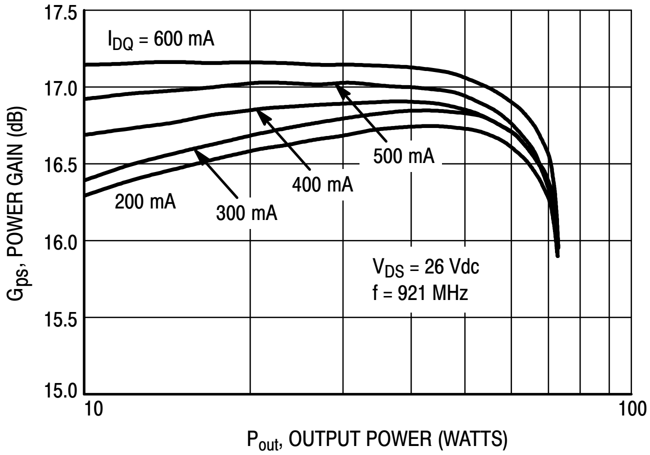


Figure 3. Power Gain versus Output Power

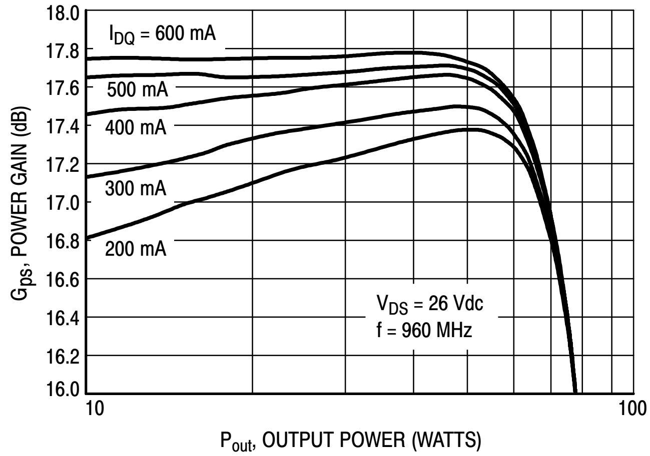


Figure 4. Power Gain versus Output Power

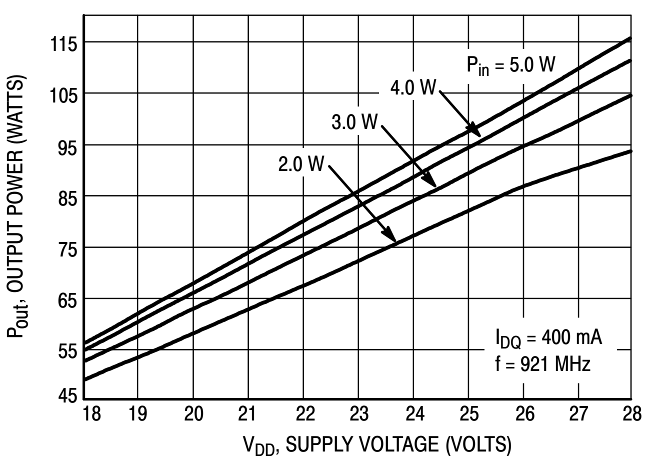


Figure 5. Output Power versus Supply Voltage

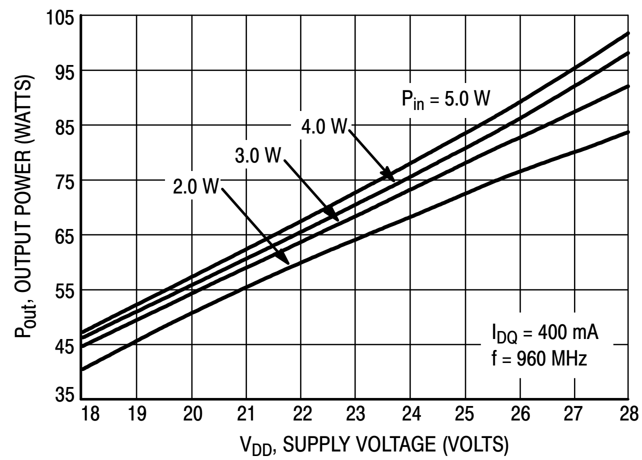


Figure 6. Output Power versus Supply Voltage

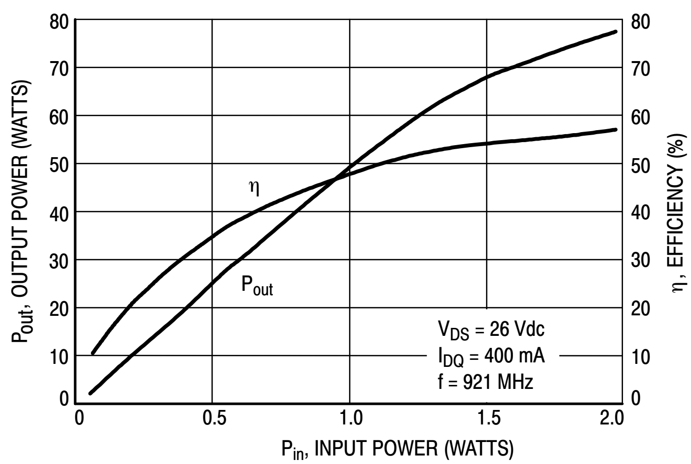


Figure 7. Efficiency and Output Power versus Input Power

TYPICAL CHARACTERISTICS

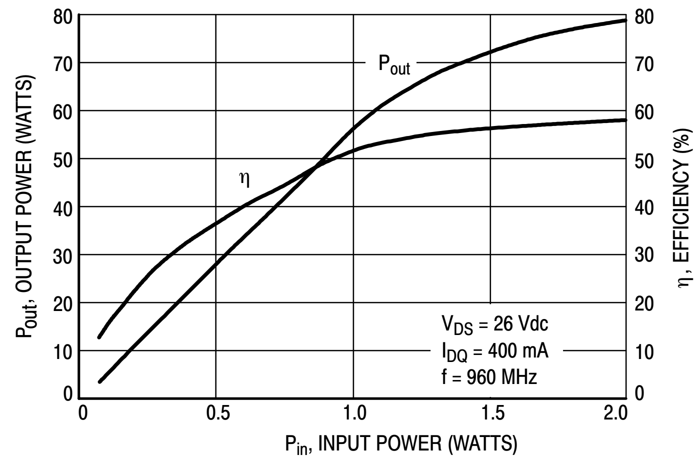


Figure 8. Efficiency and Output Power versus Input Power

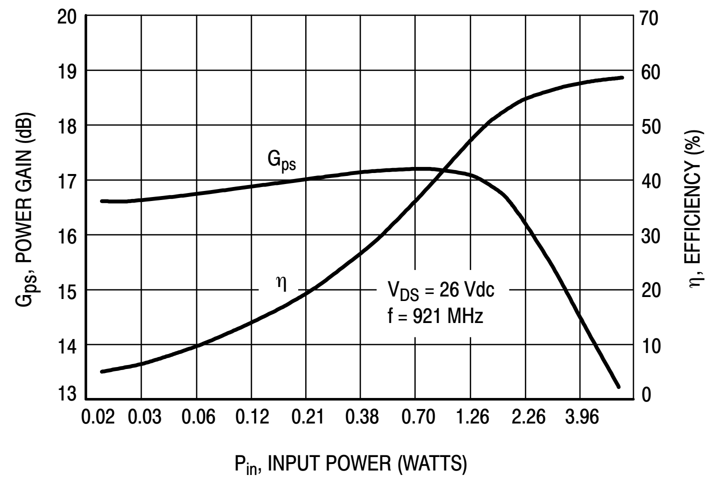


Figure 9. Power Gain and Efficiency versus Input Power

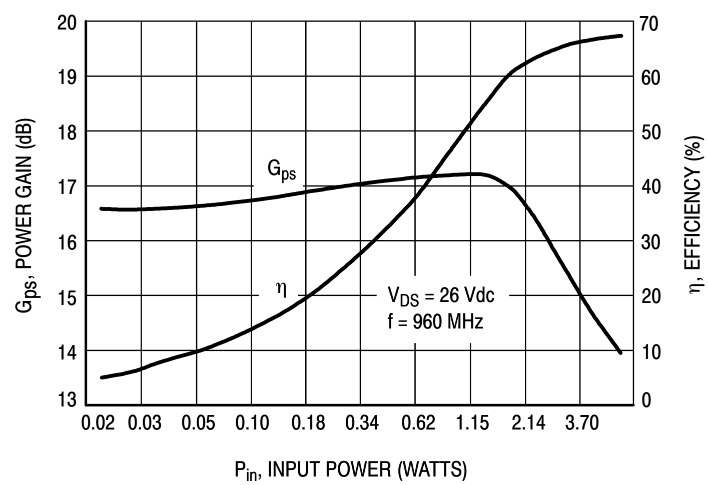


Figure 10. Power Gain and Efficiency versus Input Power

TYPICAL CHARACTERISTICS

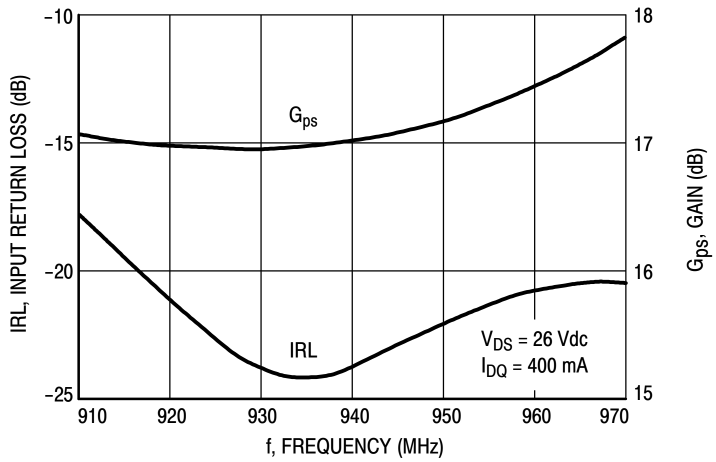
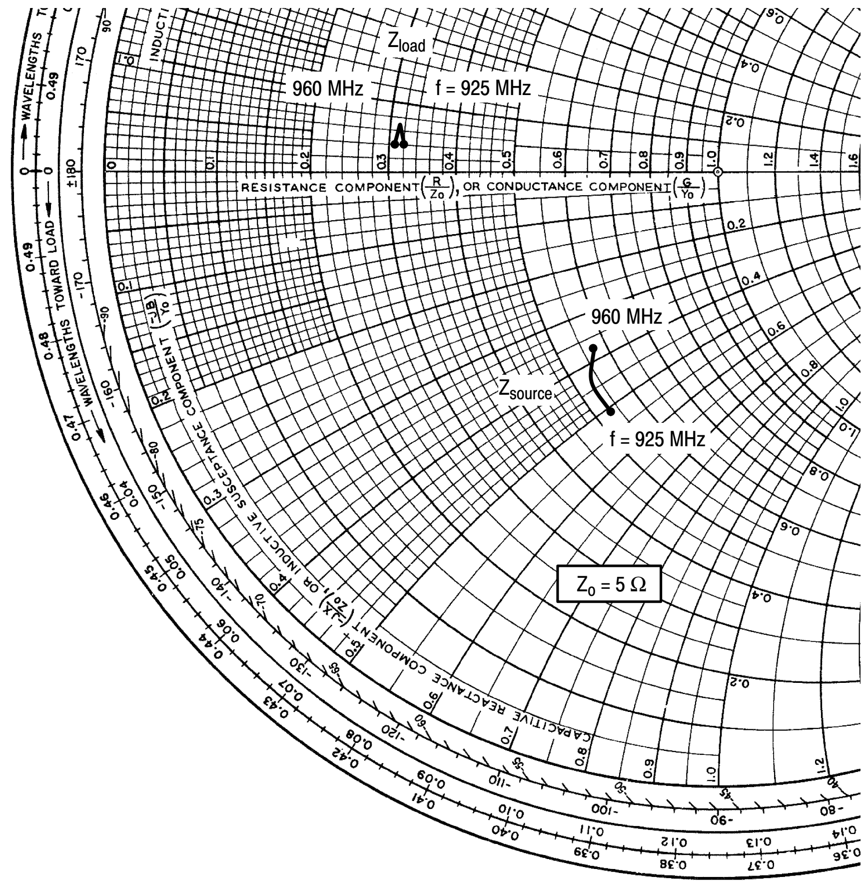


Figure 11. Performance in Broadband Circuit (at Small Signal)



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.

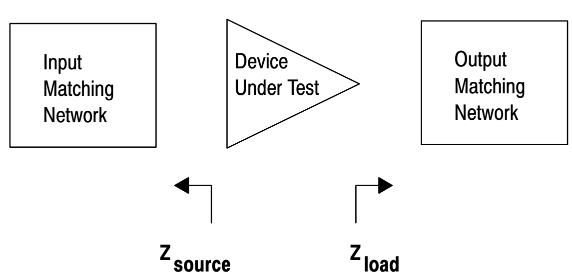


Figure 12. Series Equivalent Source and Load Impedance

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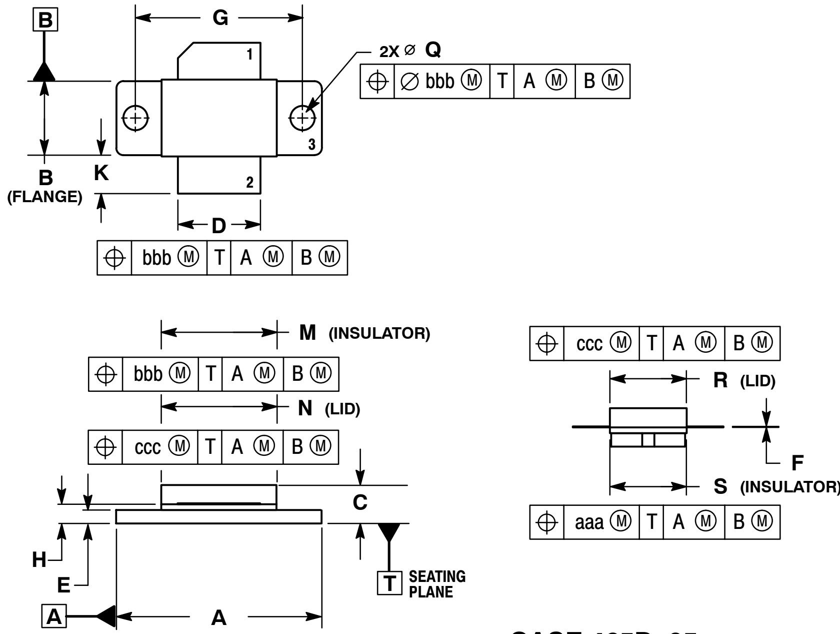
PACKAGE DIMENSIONS



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 MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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

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