

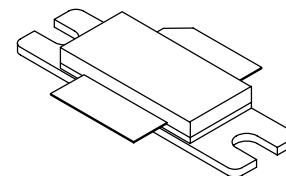
The RF MOSFET Line
RF Power Field Effect Transistors
N-Channel Enhancement-Mode Lateral MOSFETs

MRF19060R3
MRF19060SR3

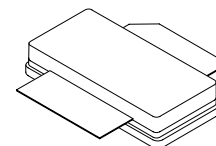
Designed for PCN and PCS base station applications with frequencies from 1.9 to 2.0 GHz. Suitable for CDMA, TDMA, GSM and multicarrier amplifier applications.

- Typical CDMA Performance: 1960 MHz, 26 Volts
IS-97 CDMA Pilot, Sync, Paging, Traffic Codes 8 Through 13
Output Power — 7.5 Watts
Power Gain — 12.5 dB
Adjacent Channel Power —
885 kHz: -47 dBc @ 30 kHz BW
1.25 MHz: -55 dBc @ 12.5 kHz BW
2.25 MHz: -55 dBc @ 1 MHz BW
- Internally Matched, Controlled Q, for Ease of Use
- High Gain, High Efficiency and High Linearity
- Integrated ESD Protection
- Designed for Maximum Gain and Insertion Phase Flatness
- Capable of Handling 10:1 VSWR, @ 26 Vdc, 1.93 GHz, 60 Watts CW Output Power
- Excellent Thermal Stability
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- In Tape and Reel. R3 Suffix = 250 Units per 56 mm, 13 Inch Reel.

1990 MHz, 60 W, 26 V
LATERAL N-CHANNEL
RF POWER MOSFETs



CASE 465-06, STYLE 1
NI-780
MRF19060R3



CASE 465A-06, STYLE 1
NI-780S
MRF19060SR3

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	Vdc
Gate-Source Voltage	V_{GS}	-0.5, +15	Vdc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	180 1.03	Watts $\text{W}/^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$
Operating Junction Temperature	T_J	200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.97	$^\circ\text{C}/\text{W}$

ESD PROTECTION CHARACTERISTICS

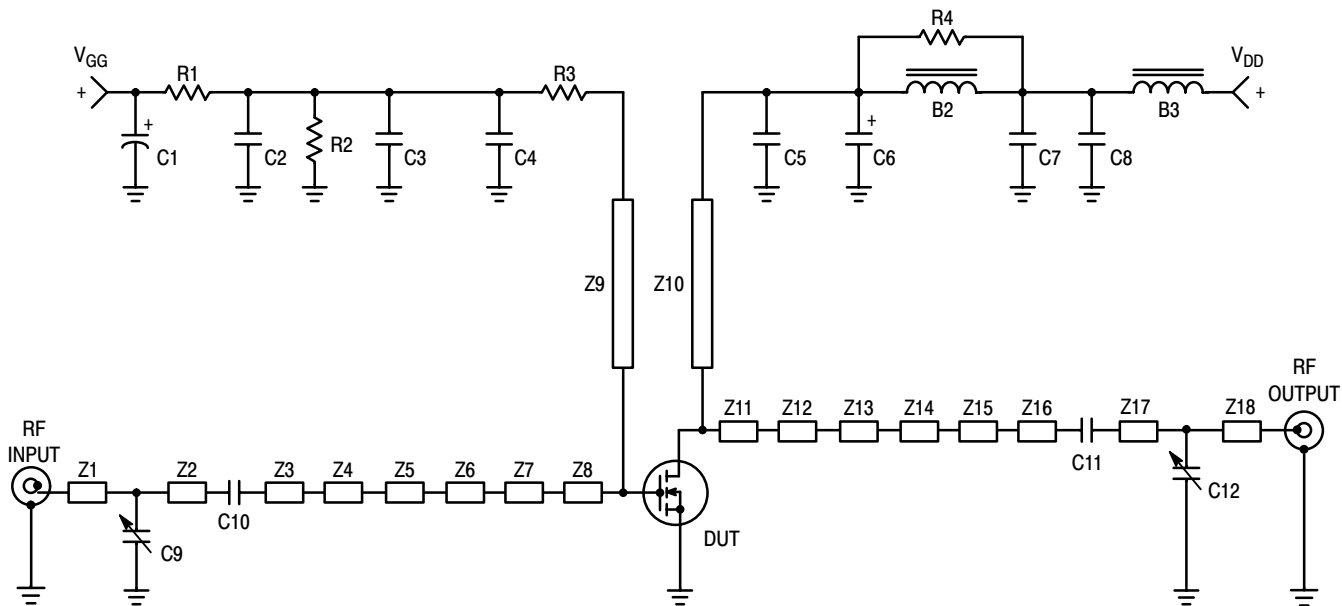
Test Conditions	Class
Human Body Model	1 (Minimum)
Machine Model	M3 (Minimum)

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

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage ($V_{GS} = 0 \text{ Vdc}$, $I_D = 10 \mu\text{A}$)	$V_{(BR)DSS}$	65	—	—	Vdc
Zero Gate Voltage Drain Current ($V_{DS} = 26 \text{ Vdc}$, $V_{GS} = 0 \text{ Vdc}$)	I_{DSS}	—	—	6	μA
Gate-Source Leakage Current ($V_{GS} = 5 \text{ Vdc}$, $V_{DS} = 0 \text{ Vdc}$)	I_{GSS}	—	—	1	μA
ON CHARACTERISTICS					
Forward Transconductance ($V_{DS} = 10 \text{ Vdc}$, $I_D = 2 \text{ A}$)	g_{fs}	—	4.7	—	S
Gate Threshold Voltage ($V_{DS} = 10 \text{ Vdc}$, $I_D = 300 \mu\text{A}$)	$V_{GS(th)}$	2	—	4	V
Gate Quiescent Voltage ($V_{DS} = 26 \text{ Vdc}$, $I_D = 500 \text{ mA}$)	$V_{GS(Q)}$	2.5	3.9	4.5	V
Drain-Source On-Voltage ($V_{GS} = 10 \text{ Vdc}$, $I_D = 2 \text{ A}$)	$V_{DS(on)}$	—	0.27	—	V
DYNAMIC CHARACTERISTICS					
Reverse Transfer Capacitance (1) ($V_{DS} = 26 \text{ Vdc}$, $V_{GS} = 0$, $f = 1 \text{ MHz}$)	C_{rss}	—	2.7	—	pF
FUNCTIONAL TESTS (In Motorola Test Fixture, 50 ohm system)					
Two-Tone Common-Source Amplifier Power Gain ($V_{DD} = 26 \text{ Vdc}$, $P_{out} = 60 \text{ W PEP}$, $I_{DQ} = 500 \text{ mA}$, $f = 1930 \text{ MHz}$ and 1990 MHz , Tone Spacing = 100 kHz)	G_{ps}	11	12.5	—	dB
Two-Tone Drain Efficiency ($V_{DD} = 26 \text{ Vdc}$, $P_{out} = 60 \text{ W PEP}$, $I_{DQ} = 500 \text{ mA}$, $f = 1930 \text{ MHz}$ and 1990 MHz , Tone Spacing = 100 kHz)	η	33	36	—	%
3rd Order Intermodulation Distortion ($V_{DD} = 26 \text{ Vdc}$, $P_{out} = 60 \text{ W PEP}$, $I_{DQ} = 500 \text{ mA}$, $f = 1930 \text{ MHz}$ and 1990 MHz , Tone Spacing = 100 kHz)	IMD	—	-31	-28	dBc
Input Return Loss ($V_{DD} = 26 \text{ Vdc}$, $P_{out} = 60 \text{ W PEP}$, $I_{DQ} = 500 \text{ mA}$, $f = 1930 \text{ MHz}$ and 1990 MHz , Tone Spacing = 100 kHz)	IRL	—	-12	—	dB
P_{out} , 1 dB Compression Point ($V_{DD} = 26 \text{ Vdc}$, $P_{out} = 60 \text{ W CW}$, $f = 1990 \text{ MHz}$)	P1dB	—	60	—	W
Output Mismatch Stress ($V_{DD} = 26 \text{ Vdc}$, $P_{out} = 60 \text{ W CW}$, $I_{DQ} = 500 \text{ mA}$, $f = 1930 \text{ MHz}$, VSWR = 10:1, All Phase Angles at Frequency of Tests)	Ψ	No Degradation In Output Power Before and After Test			

(1) Part is internally matched both on input and output.



B2 - B3	Ferrite Beads, Fair Rite, 2743019447	Z4	0.152" x 0.140" Microstrip
C1	10 μ F, 50 V Electrolytic Capacitor, Panasonic #ECEV1HV100R	Z5	0.090" x 0.102" Microstrip
C2, C7	1000 pF Chip Capacitors, B Case, ATC #100B102JCA500X	Z6	0.245" x 0.217" Microstrip
C3, C8	0.10 μ F Chip Capacitors, B Case, Kemet #CDR33BX104AKWS	Z7	0.090" x 0.737" Microstrip
C4	5.1 pF Chip Capacitor, B Case, ATC #100B5R1JCA500X	Z8	0.530" x 0.941" Microstrip
C5	6.2 pF Chip Capacitor, B Case, ATC #100B6R2JCA500X	Z9	1.010" x 0.050" Microstrip
C6	22 μ F, 35 V Tantalum Capacitor, SMT, Sprague	Z10	1.060" x 0.050" Microstrip
C9	0.8 pF - 8.0 pF Variable Capacitor, Johanson Gigatrim	Z11	0.446" x 1.137" Microstrip
C10, C11	10 pF Chip Capacitors, B Case, ATC #100B100JCA500X	Z12	0.152" x 0.567" Microstrip
C12	0.4 pF - 2.5 pF Variable Capacitor, Johanson Gigatrim	Z13	0.183" x 0.220" Microstrip
R1	1 k Ω , 1/4 W Fixed Film Chip Resistor, 0.08" x 0.13"	Z14	0.100" x 0.338" Microstrip
R2	560 k Ω , 1/4 W Fixed Film Chip Resistor, 0.08" x 0.13"	Z15	0.480" x 0.142" Microstrip
R3	15 Ω , 1/4 W Fixed Film Chip Resistor, 0.08" x 0.13"	Z16	0.140" x 0.080" Microstrip
R4	10 Ω , 1/4 W Fixed Film Chip Resistor, 0.08" x 0.13"	Z17	0.173" x 0.080" Microstrip
Z1	0.580" x 0.074" Microstrip	Z18	0.420" x 0.080" Microstrip
Z2	0.100" x 0.074" Microstrip	Board	0.030" Glass Teflon [®] Arlon GX-0300-55-22, 2 oz Cu
Z3	0.384" x 0.074" Microstrip		

Figure 1. MRF19060 Test Circuit Schematic

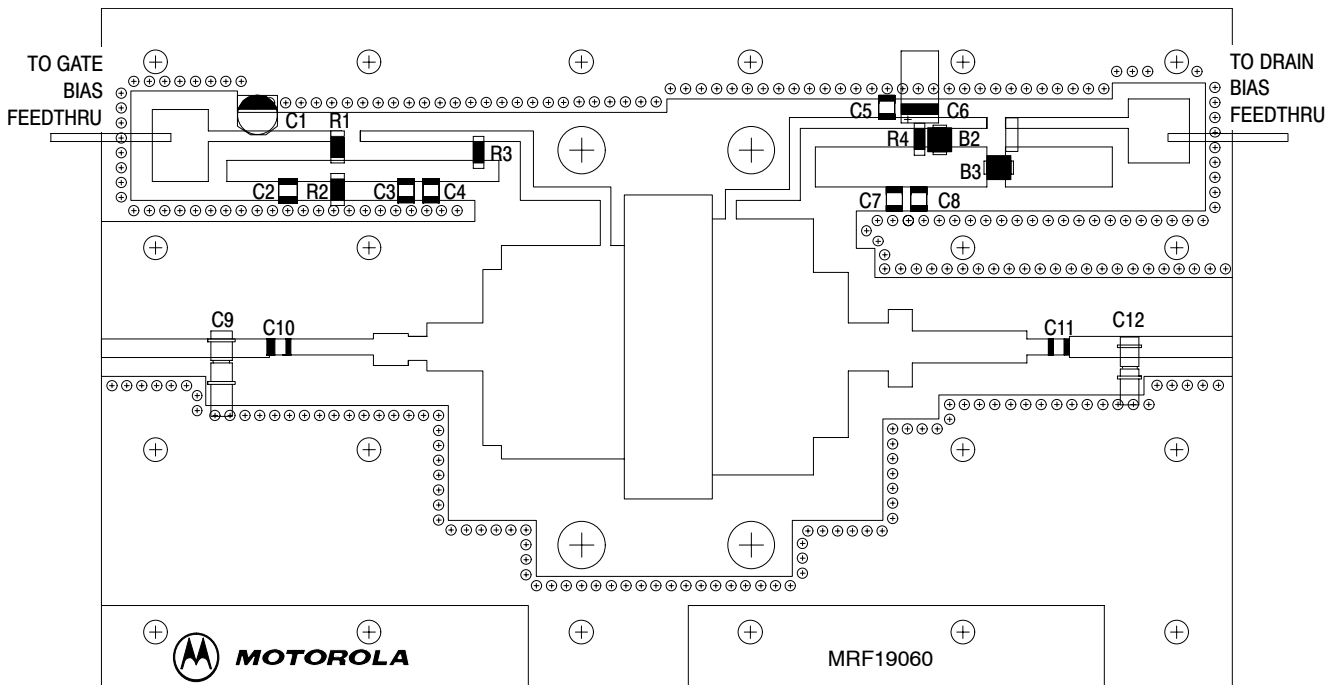


Figure 2. MRF19060 Test Circuit Component Layout

TYPICAL CHARACTERISTICS

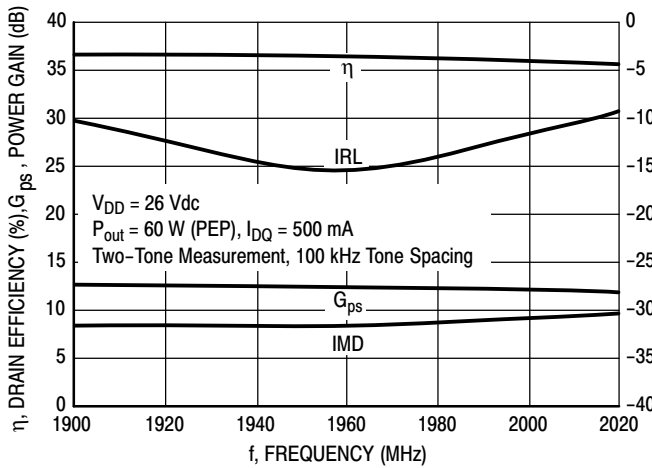


Figure 3. Class AB Broadband Circuit Performance

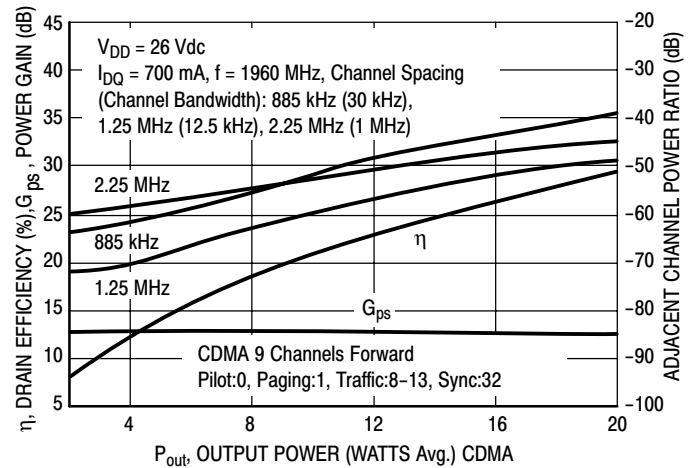


Figure 4. CDMA ACPR, Power Gain and Drain Efficiency versus Output Power

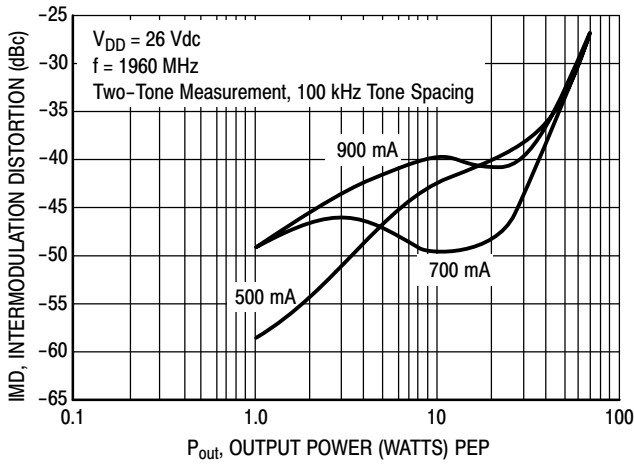


Figure 5. Intermodulation Distortion versus Output Power

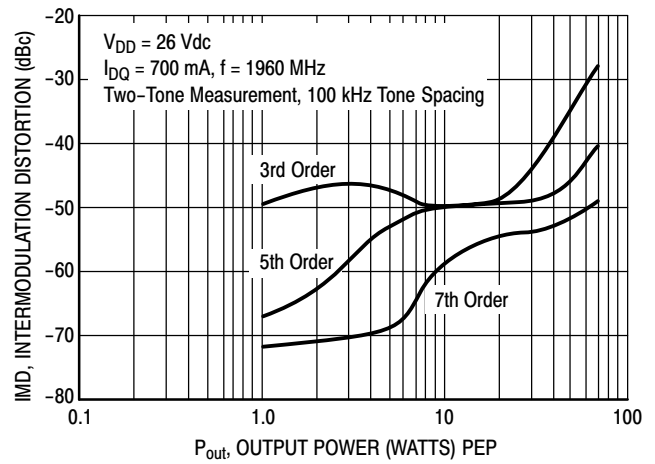


Figure 6. Intermodulation Products versus Output Power

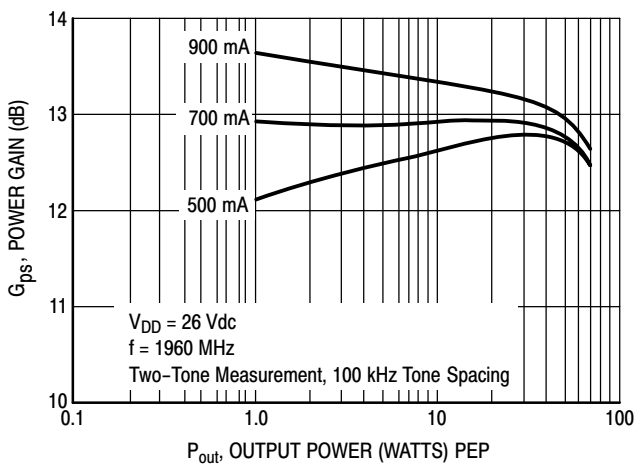


Figure 7. Power Gain versus Output Power

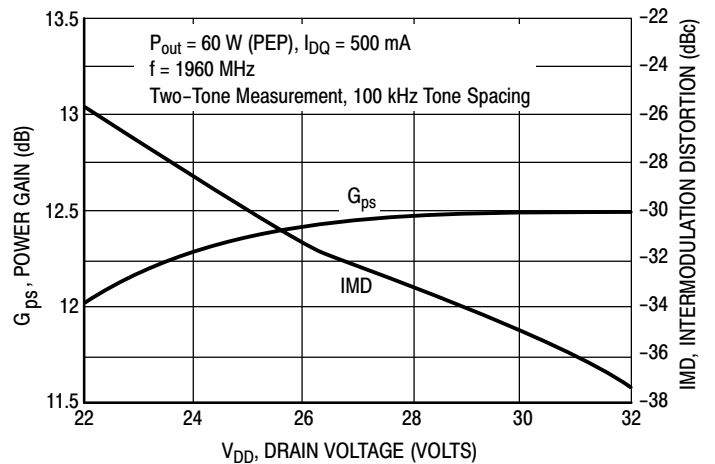
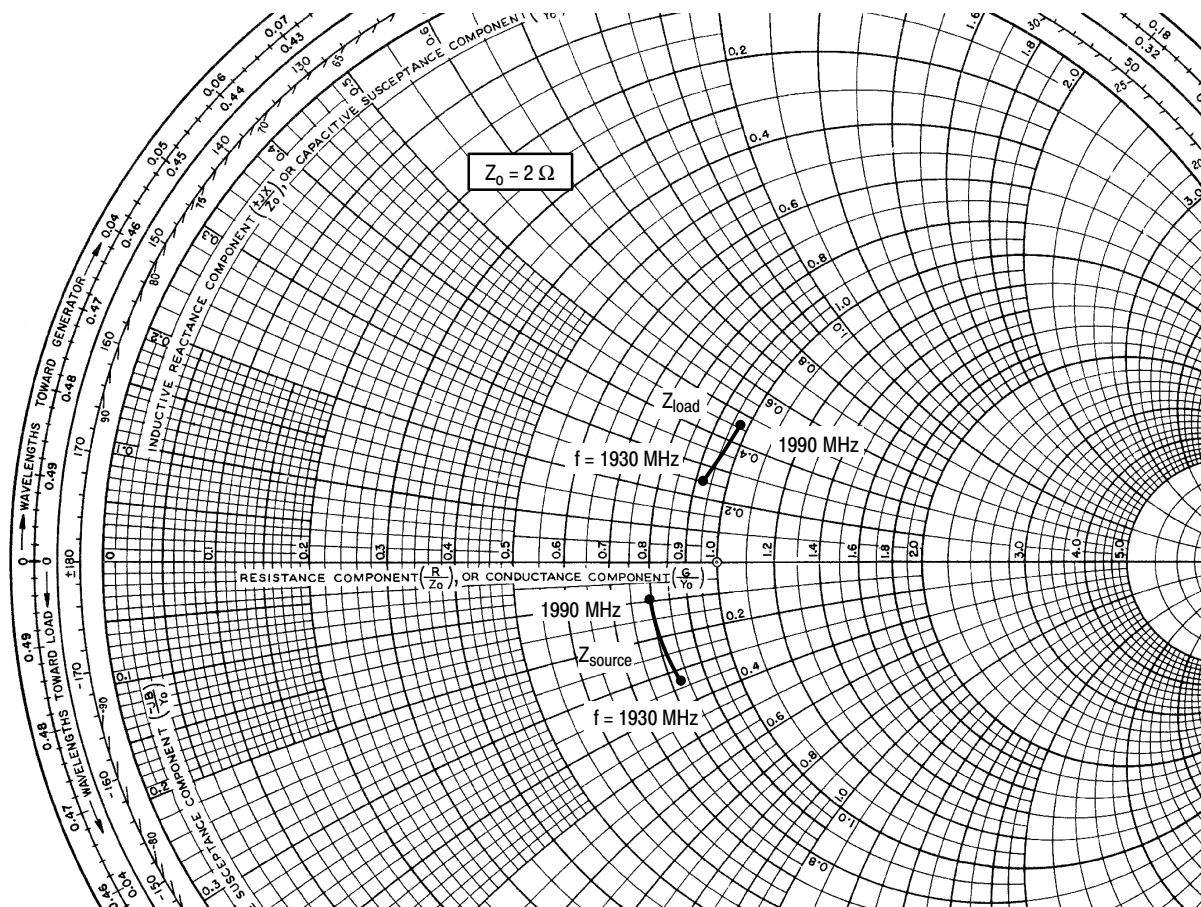


Figure 8. Power Gain and Intermodulation Distortion versus Supply Voltage



$V_{DD} = 26\text{ V}$, $I_{DQ} = 500\text{ mA}$, $P_{out} = 60\text{ W PEP}$

f MHz	Z_{source} Ω	Z_{load} Ω
1930	$1.65 - j0.67$	$1.85 + j0.50$
1960	$1.64 - j0.45$	$1.89 + j0.74$
1990	$1.60 - j0.20$	$1.96 + j0.94$

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

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

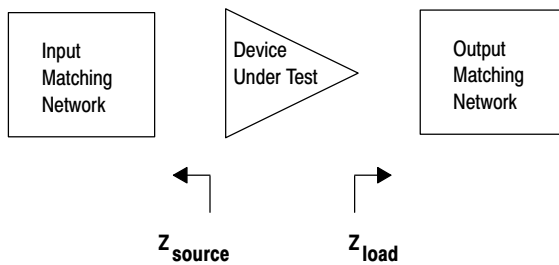
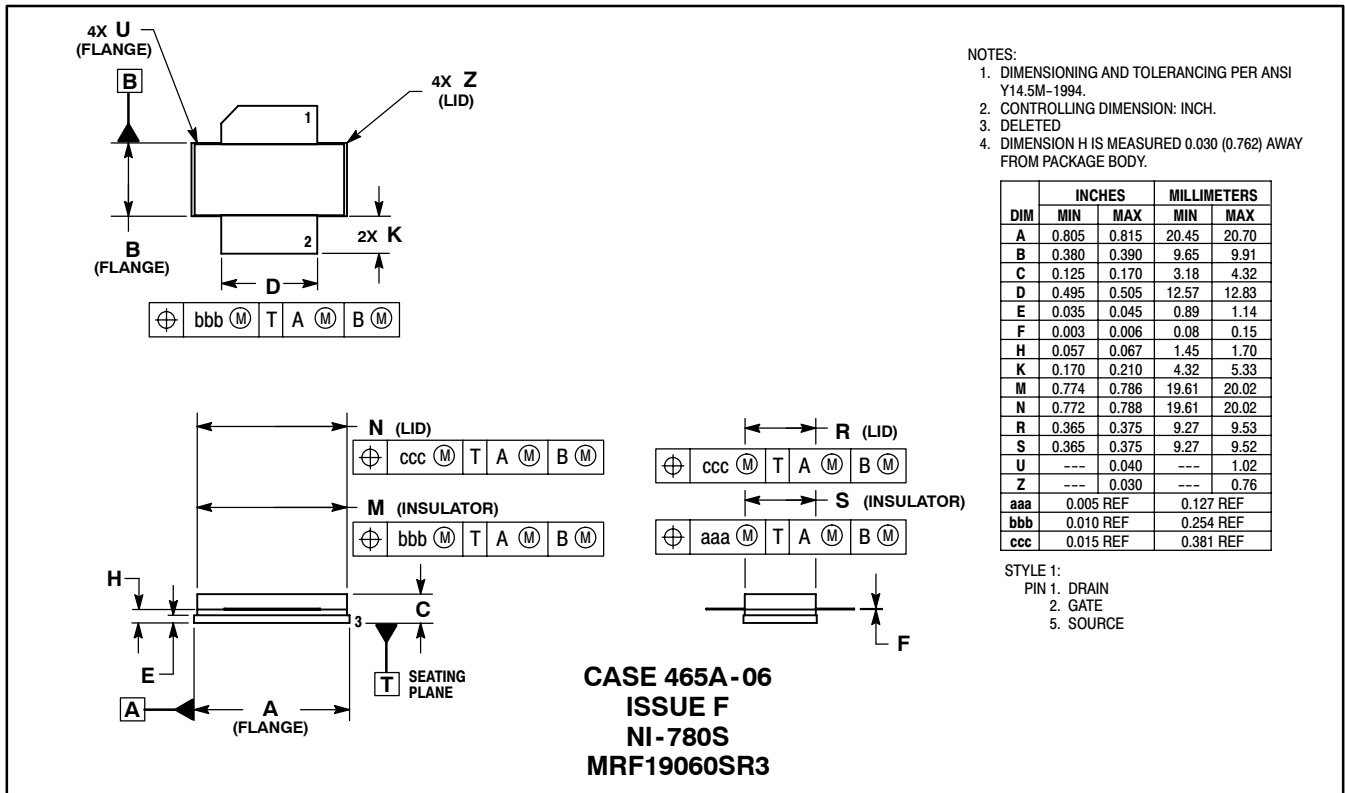
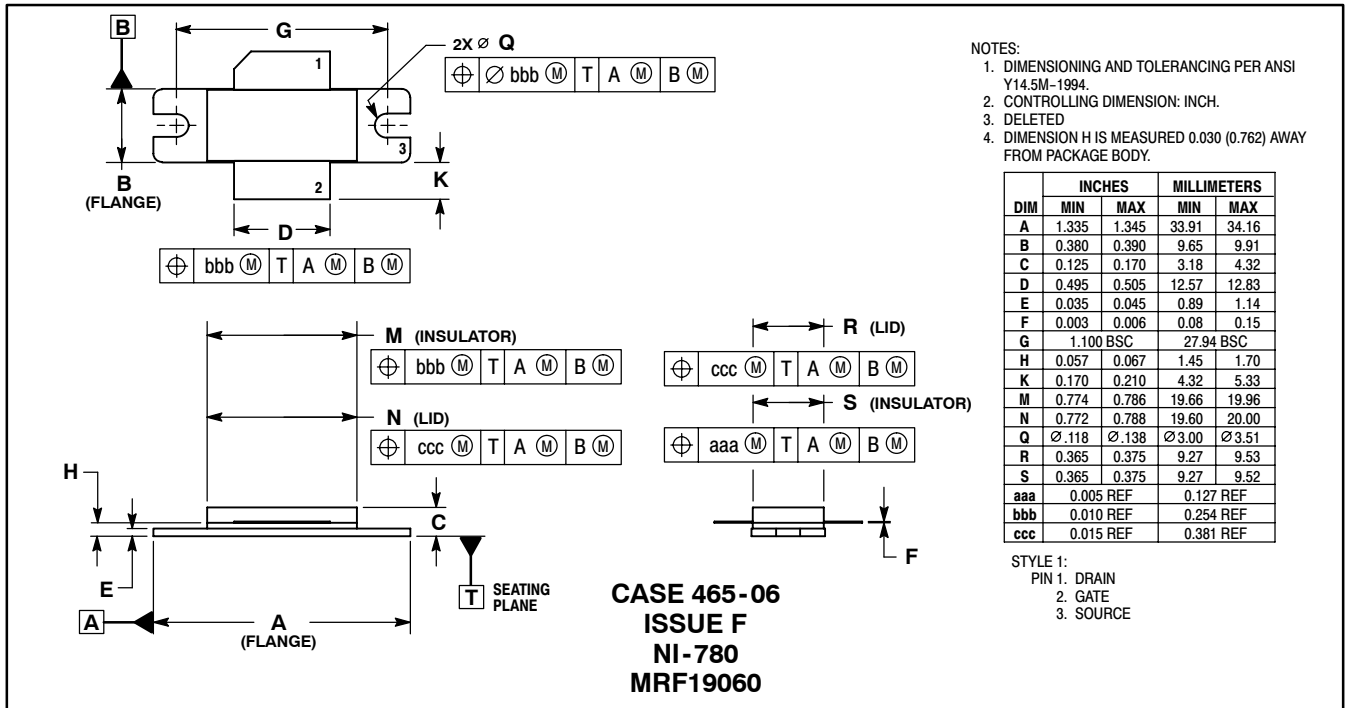


Figure 9. Series Equivalent Source and Load Impedance

PACKAGE DIMENSIONS



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