

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

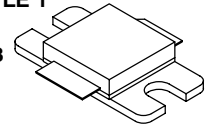
**MRF18030ALR3**  
**MRF18030ALSR3**

Designed for GSM and EDGE base station applications with frequencies from 1.8 to 2.0 GHz. Suitable for FM, TDMA, CDMA and multicarrier amplifier applications. Specified for GSM 1805 - 1880 MHz.

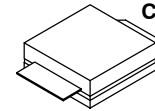
- Typical GSM Performance:  
 Power Gain - 14 dB (Typ) @ 30 Watts  
 Efficiency - 50% (Typ) @ 30 Watts
- Internally Matched, Controlled Q, for Ease of Use
- High Gain, High Efficiency and High Linearity
- Integrated ESD Protection
- Designed for Maximum Gain and Insertion Phase Flatness
- Capable of Handling 5:1 VSWR, @ 26 Vdc, 30 W Output Power
- Excellent Thermal Stability
- Low Gold Plating Thickness on Leads, 40μ" Nominal.
- in Tape and Reel. R3 Suffix = 250 Units per 32 mm, 13 inch Reel.

**1.8 - 1.88 GHz, 30 W, 26 V**  
**GSM/GSM EDGE**  
**LATERAL N-CHANNEL**  
**RF POWER MOSFETs**

**CASE 465E-04, STYLE 1**  
**NI-400**  
**MRF18030ALR3**



**CASE 465F-04, STYLE 1**  
**NI-400S**  
**MRF18030ALSR3**



**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	65	Vdc
Gate-Source Voltage	V <sub>GS</sub>	-0.5, +15	Vdc
Total Device Dissipation @ T <sub>C</sub> = 25°C Derate above 25°C	P <sub>D</sub>	83.3 0.48	Watts W/°C
Storage Temperature Range	T <sub>stg</sub>	- 65 to +150	°C
Operating Junction Temperature	T <sub>J</sub>	200	°C

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	2.1	°C/W

**ESD PROTECTION CHARACTERISTICS**

Test Conditions	Class
Human Body Model	2 (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.

# Freescale Semiconductor, Inc.

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C, 50 ohm system unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0 Vdc, I <sub>D</sub> = 20 μAdc)	V <sub>(BR)DSS</sub>	65	—	—	Vdc
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 26 Vdc, V <sub>GS</sub> = 0 Vdc)	I <sub>DSS</sub>	—	—	1	μAdc
Gate-Source Leakage Current (V <sub>GS</sub> = 5 Vdc, V <sub>DS</sub> = 0 Vdc)	I <sub>GSS</sub>	—	—	1	μAdc

### ON CHARACTERISTICS

Gate Threshold Voltage (V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 100 μAdc)	V <sub>GS(th)</sub>	2	3	4	Vdc
Gate Quiescent Voltage (V <sub>DS</sub> = 26 Vdc, I <sub>D</sub> = 250 mAdc)	V <sub>GS(Q)</sub>	2	3.9	4.5	Vdc
Drain-Source On-Voltage (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 1 Adc)	V <sub>DS(on)</sub>	—	0.29	0.4	Vdc
Forward Transconductance (V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 1 Adc)	g <sub>fs</sub>	—	2	—	S

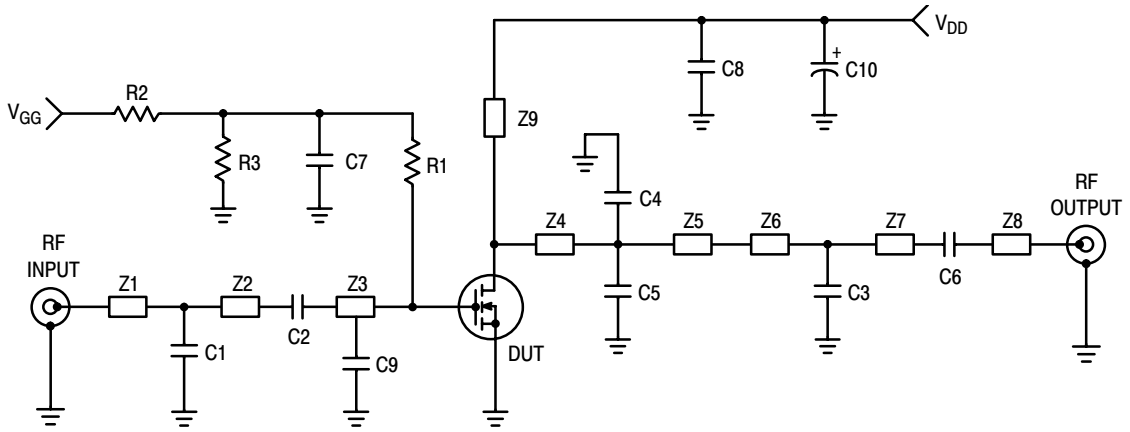
### DYNAMIC CHARACTERISTICS

Reverse Transfer Capacitance (1) (V <sub>DS</sub> = 26 Vdc ± 30 mV(rms)ac @ 1 MHz, V <sub>GS</sub> = 0 Vdc)	C <sub>rss</sub>	—	1.3	—	pF
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### FUNCTIONAL TESTS (In Motorola Test Fixture) (2)

Output Power, 1 dB Compression Point (V <sub>DD</sub> = 26 Vdc, I <sub>DQ</sub> = 250 mA, f = 1805 - 1880 MHz)	P <sub>1dB</sub>	27	30	—	Watts
Common-Source Amplifier Power Gain @ 30 W (V <sub>DD</sub> = 26 Vdc, I <sub>DQ</sub> = 250 mA, f = 1805 - 1880 MHz)	G <sub>ps</sub>	13	14	—	dB
Drain Efficiency @ 30 W (V <sub>DD</sub> = 26 Vdc, I <sub>DQ</sub> = 250 mA, f = 1805 - 1880 MHz)	η	46.5	50	—	%
Input Return Loss @ 30 W (V <sub>DD</sub> = 26 Vdc, I <sub>DQ</sub> = 250 mA, f = 1805 - 1880 MHz)	IRL	—	-12	-9	dB
Output Mismatch Stress @ 30 W (V <sub>DD</sub> = 26 Vdc, I <sub>DQ</sub> = 250 mA, f <sub>1</sub> = 1805 - 1880 MHz, VSWR = 5:1, 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.  
 (2) Device specifications obtained on a Production Test Fixture.



C1	1.8 pF, 100B Chip Capacitor	Z1	0.874" x 0.087" Microstrip
C2	0.8 pF, 100B Chip Capacitor	Z2	1.094" x 0.087" Microstrip
C3	1.0 pF, 100B Chip Capacitor	Z3	0.257" x 0.633" Microstrip
C4, C5	1.2 pF, 100B Chip Capacitors	Z4	0.189" x 0.394" Microstrip
C6, C7, C8	8.2 pF, 100B Chip Capacitors	Z5	0.335" x 0.394" Microstrip
C9	0.3 pF, 100B Chip Capacitor	Z6	0.484" x 0.087" Microstrip
C10	220 $\mu$ F, 63 V Electrolytic Capacitor	Z7	0.877" x 0.087" Microstrip
R1	1.0 k $\Omega$ , 1/8 W Chip Resistor (0805)	Z8	0.366" x 0.087" Microstrip
R2, R3	10 k $\Omega$ , 1/8 W Chip Resistors (0805)	Z9	$\approx$ 0.600" x 0.087" Microstrip

Figure 1. 1805 - 1880 MHz Test Fixture Schematic

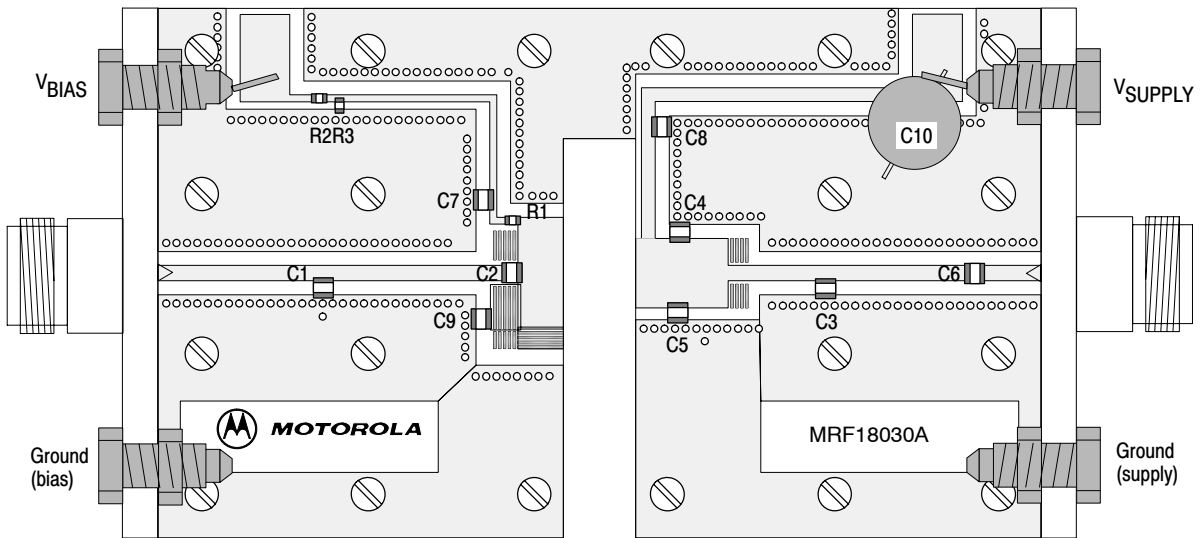


Figure 2. 1805 - 1880 MHz Test Fixture Component Layout

## TYPICAL CHARACTERISTICS

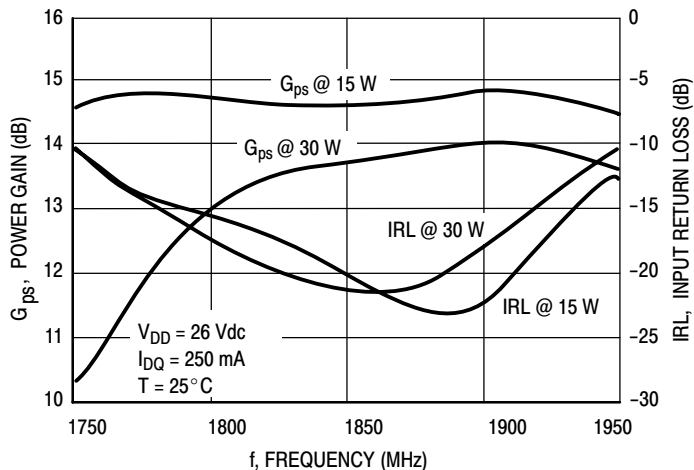


Figure 3. Wideband Gain and IRL at 30 W and 15 W Output Power

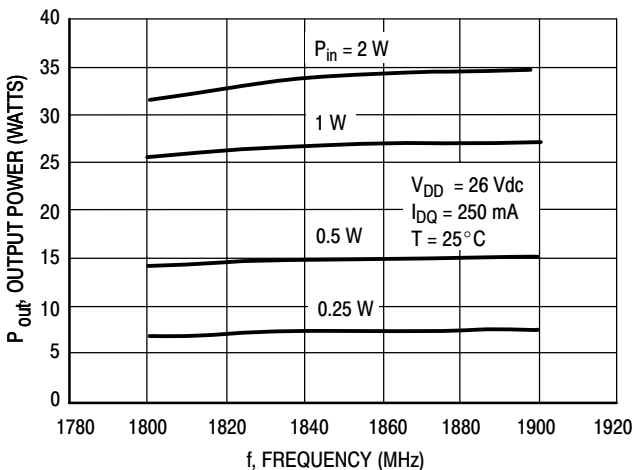


Figure 4. Output Power versus Frequency

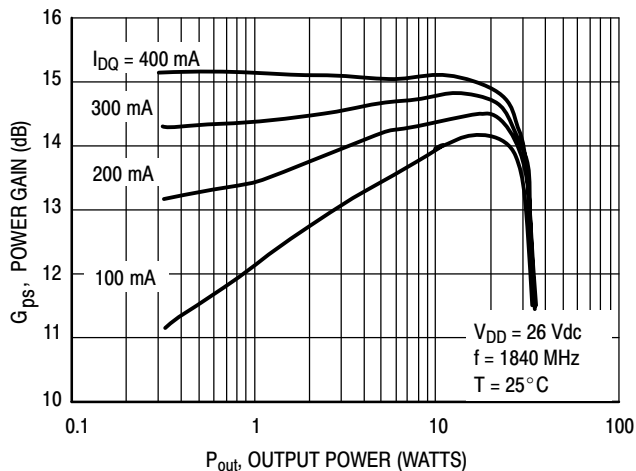


Figure 5. Power Gain versus Output Power

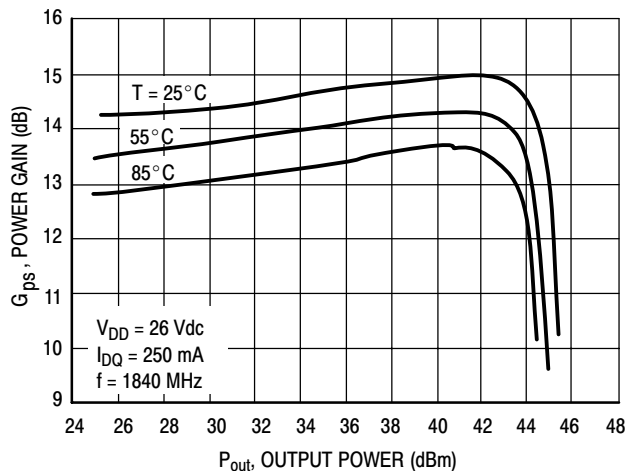


Figure 6. Power Gain versus Output Power

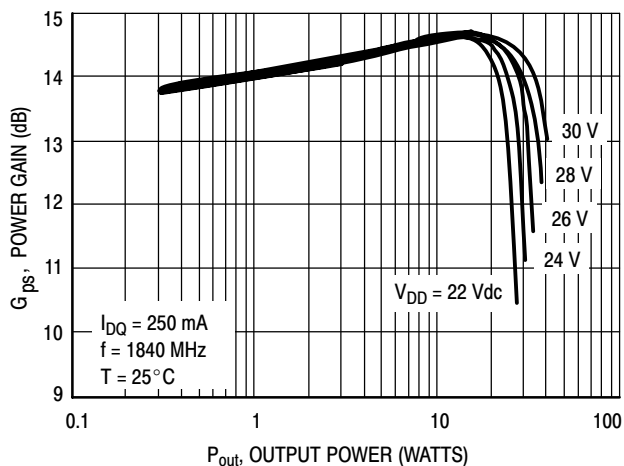


Figure 7. Power Gain versus Output Power

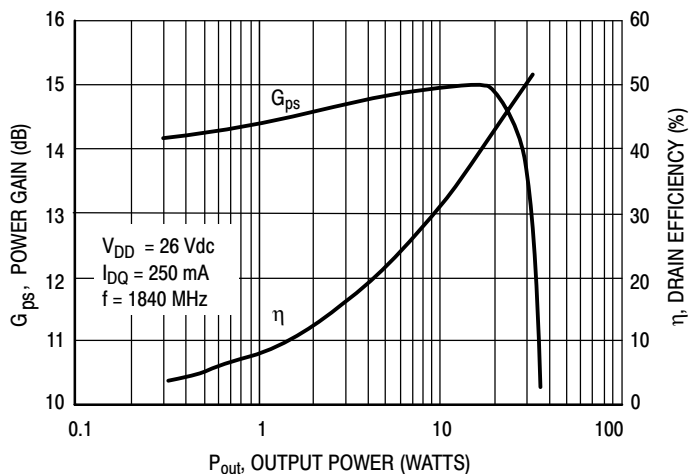
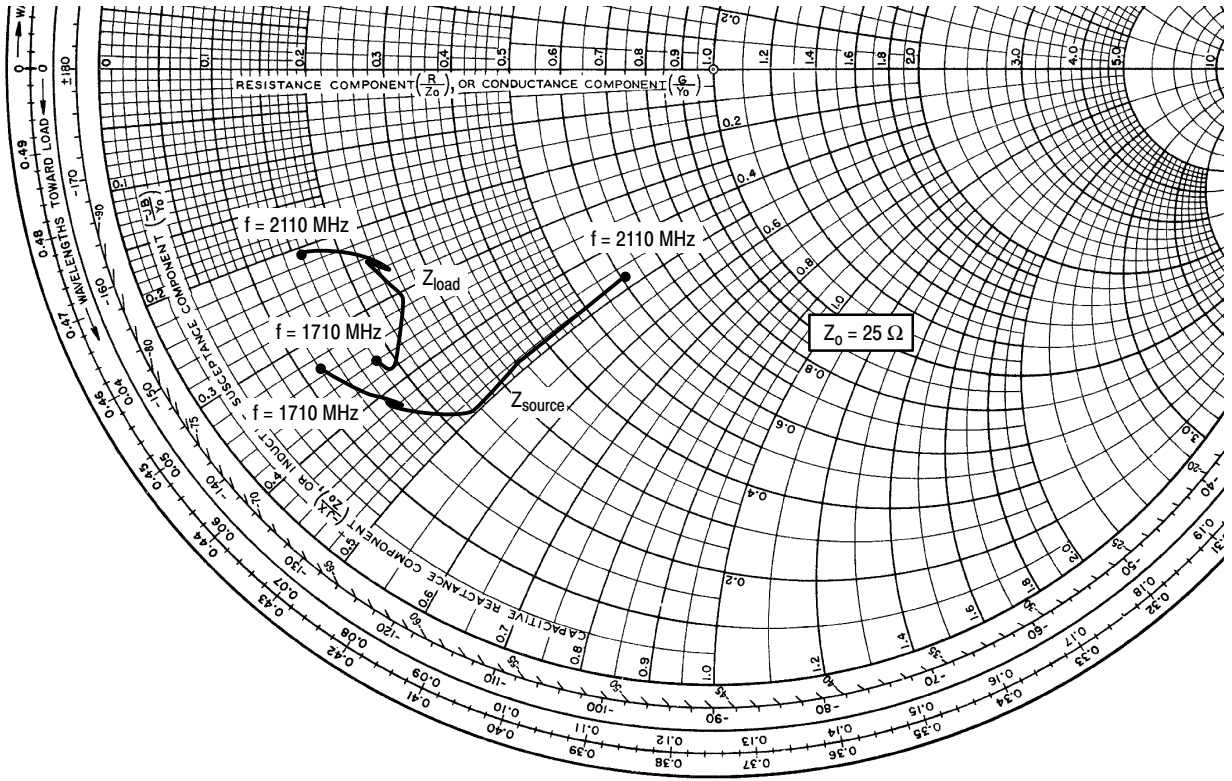


Figure 8. Power Gain and Efficiency versus Output Power



$V_{DD} = 26\text{ V}$ ,  $I_{DQ} = 250\text{ mA}$ ,  $P_{out} = 30\text{ W (CW)}$

f MHz	$Z_{source}$ $\Omega$	$Z_{load}$ $\Omega$
1710	2.92 - j8.24	4.18 - j9.06
1785	3.84 - j9.75	4.59 - j9.46
1805	4.15 - j10.38	4.98 - j9.06
1840	4.04 - j10.22	6.10 - j7.63
1880	6.12 - j12.29	5.83 - j6.89
1960	6.20 - j12.29	5.55 - j6.33
1990	8.61 - j12.10	5.93 - j6.66
2110	15.19 - j11.85	3.82 - j5.33

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

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

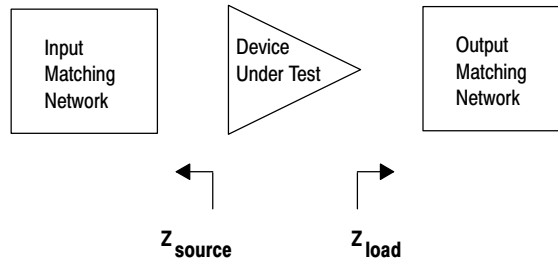


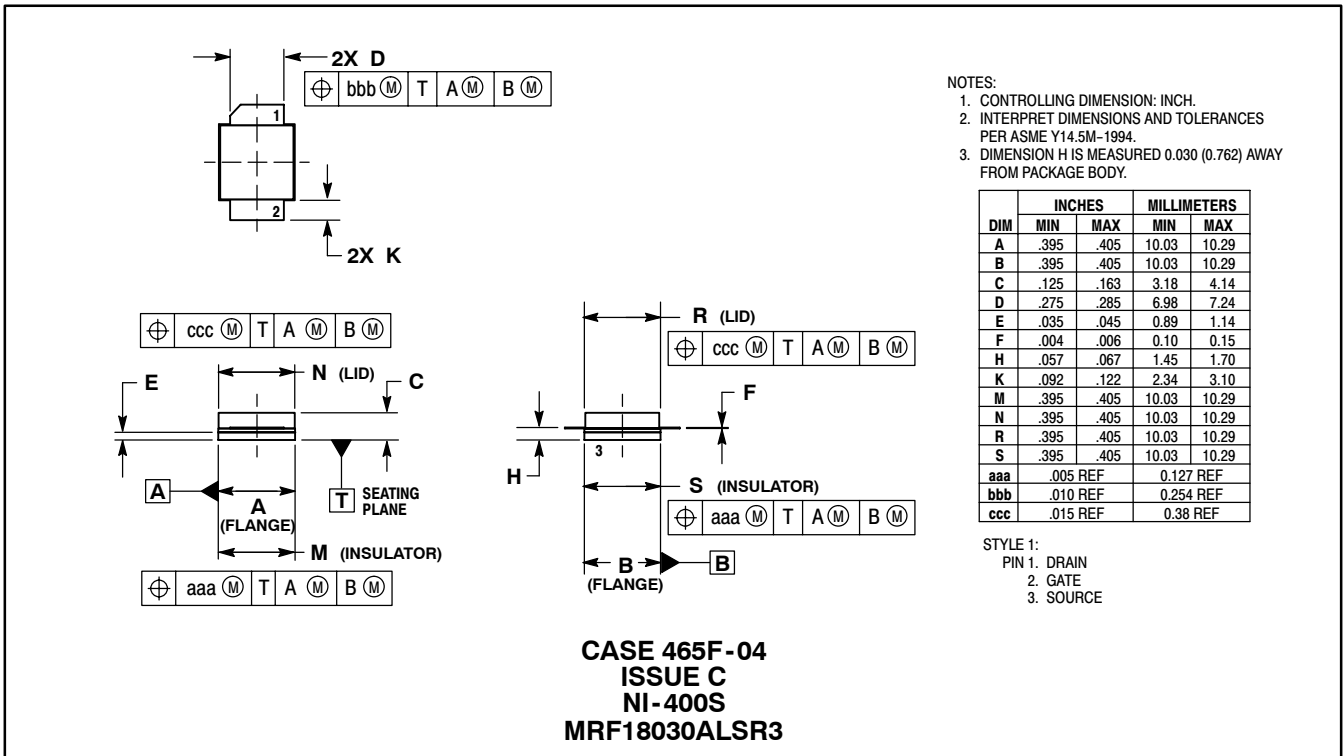
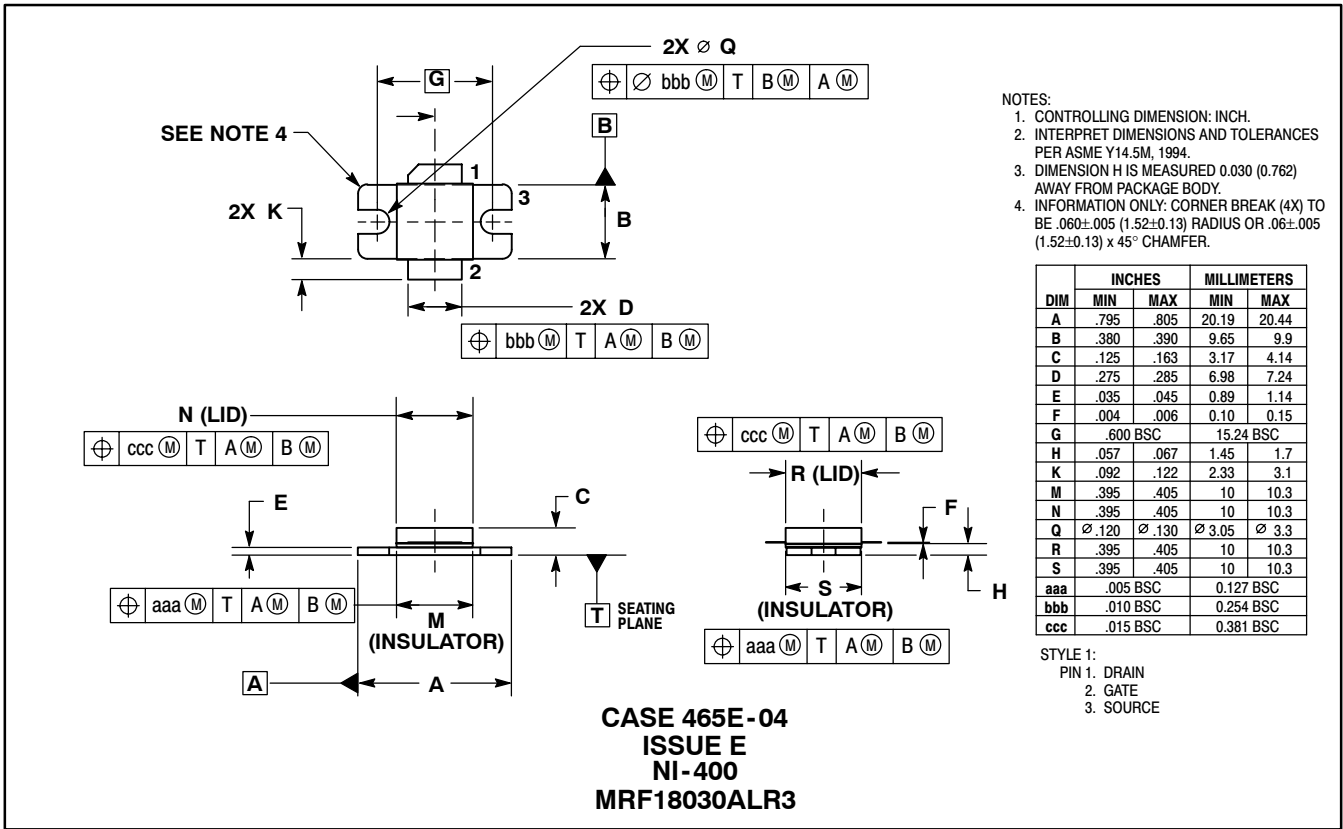
Figure 9. Series Equivalent Source and Load Impedance

**NOTES**

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## PACKAGE DIMENSIONS

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