

RF Power Field Effect Transistors

N-Channel Enhancement-Mode Lateral MOSFETs

Designed for GSM and EDGE base station applications with frequencies from 1800 to 2000 MHz. 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
- Capable of Handling 5:1 VSWR, @ 26 Vdc, 30 Watts CW Output Power

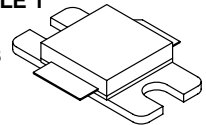
Features

- Internally Matched for Ease of Use
- High Gain, High Efficiency and High Linearity
- Integrated ESD Protection
- Designed for Maximum Gain and Insertion Phase Flatness
- Low Gold Plating Thickness on Leads, 40μ" Nominal.
- RoHS Compliant
- in Tape and Reel. R3 Suffix = 250 Units per 32 mm, 13 inch Reel.

MRF18030ALR3
MRF18030ALSR3

1800-1880 MHz, 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

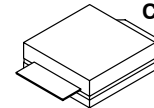


Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	-0.5, +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	83.3 0.48	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	$R_{\theta JC}$	2.1	$^\circ\text{C}/\text{W}$

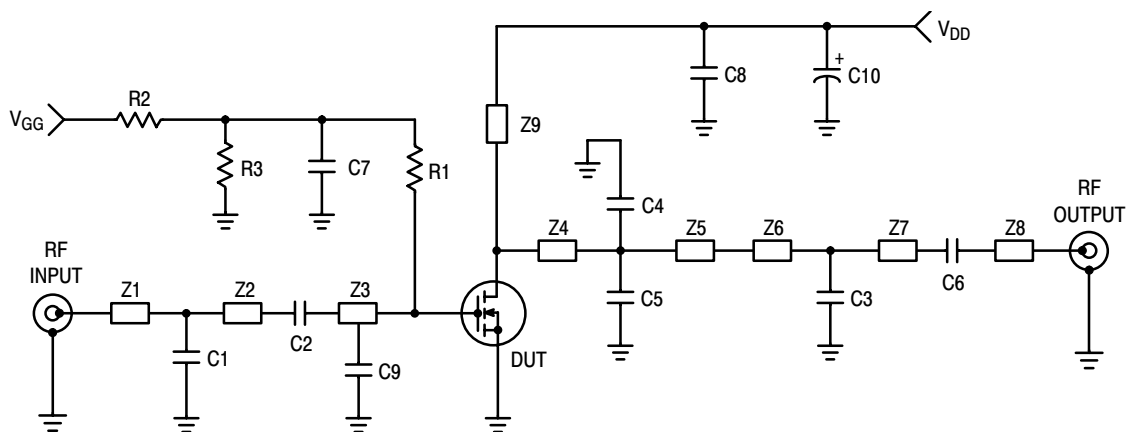
Table 3. ESD Protection Characteristics

Test Conditions	Class
Human Body Model	2 (Minimum)
Machine Model	M3 (Minimum)

Table 4. Electrical Characteristics ($T_C = 25^\circ\text{C}$, 50 ohm system unless otherwise noted)

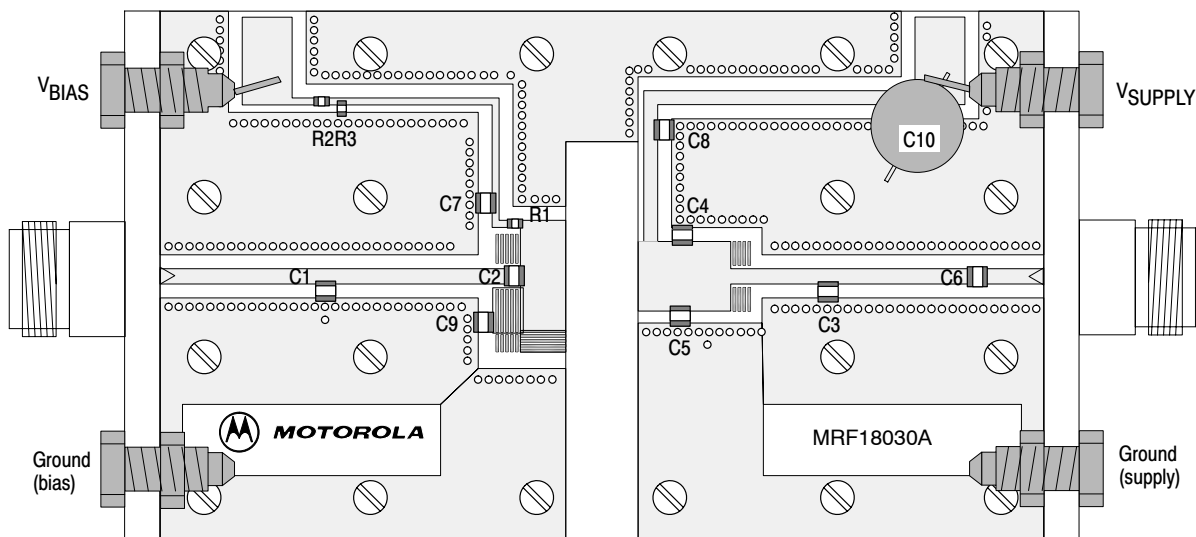
Characteristic	Symbol	Min	Typ	Max	Unit
Off Characteristics					
Drain-Source Breakdown Voltage ($V_{GS} = 0\text{ Vdc}$, $I_D = 20\text{ }\mu\text{Adc}$)	$V_{(BR)DSS}$	65	—	—	Vdc
Zero Gate Voltage Drain Current ($V_{DS} = 26\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$)	I_{DSS}	—	—	1	μAdc
Gate-Source Leakage Current ($V_{GS} = 5\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$)	I_{GSS}	—	—	1	μAdc
On Characteristics					
Gate Threshold Voltage ($V_{DS} = 10\text{ Vdc}$, $I_D = 100\text{ }\mu\text{Adc}$)	$V_{GS(th)}$	2	3	4	Vdc
Gate Quiescent Voltage ($V_{DS} = 26\text{ Vdc}$, $I_D = 250\text{ mAdc}$)	$V_{GS(Q)}$	2	3.9	4.5	Vdc
Drain-Source On-Voltage ($V_{GS} = 10\text{ Vdc}$, $I_D = 1\text{ Adc}$)	$V_{DS(on)}$	—	0.29	0.4	Vdc
Forward Transconductance ($V_{DS} = 10\text{ Vdc}$, $I_D = 1\text{ Adc}$)	g_{fs}	—	2	—	S
Dynamic Characteristics					
Reverse Transfer Capacitance ⁽¹⁾ ($V_{DS} = 26\text{ Vdc} \pm 30\text{ mV(rms)ac}$ @ 1 MHz, $V_{GS} = 0\text{ Vdc}$)	C_{rss}	—	1.3	—	pF
Functional Tests (In Freescale Test Fixture) ⁽²⁾					
Output Power, 1 dB Compression Point ($V_{DD} = 26\text{ Vdc}$, $I_{DQ} = 250\text{ mA}$, $f = 1805 - 1880\text{ MHz}$)	P_{1dB}	27	30	—	W
Common-Source Amplifier Power Gain @ 30 W ($V_{DD} = 26\text{ Vdc}$, $I_{DQ} = 250\text{ mA}$, $f = 1805 - 1880\text{ MHz}$)	G_{ps}	13	14	—	dB
Drain Efficiency @ 30 W ($V_{DD} = 26\text{ Vdc}$, $I_{DQ} = 250\text{ mA}$, $f = 1805 - 1880\text{ MHz}$)	η	46.5	50	—	%
Input Return Loss @ 30 W ($V_{DD} = 26\text{ Vdc}$, $I_{DQ} = 250\text{ mA}$, $f = 1805 - 1880\text{ MHz}$)	IRL	—	-12	-9	dB

1. Part 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 μ F, 63 V Electrolytic Capacitor	Z7	0.877" x 0.087" Microstrip
R1	1.0 k Ω , 1/8 W Chip Resistor (0805)	Z8	0.366" x 0.087" Microstrip
R2, R3	10 k Ω , 1/8 W Chip Resistors (0805)	Z9	$\approx$ 0.600" x 0.087" Microstrip

Figure 1. 1805 - 1880 MHz Test Fixture Schematic



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

Figure 2. 1805 - 1880 MHz Test Fixture Component Layout

TYPICAL CHARACTERISTICS

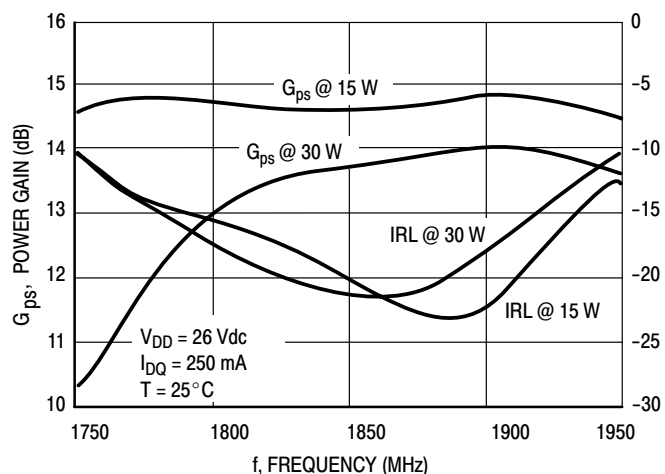


Figure 3. Wideband Gain and IRL at 30 W and 15 W Output Power

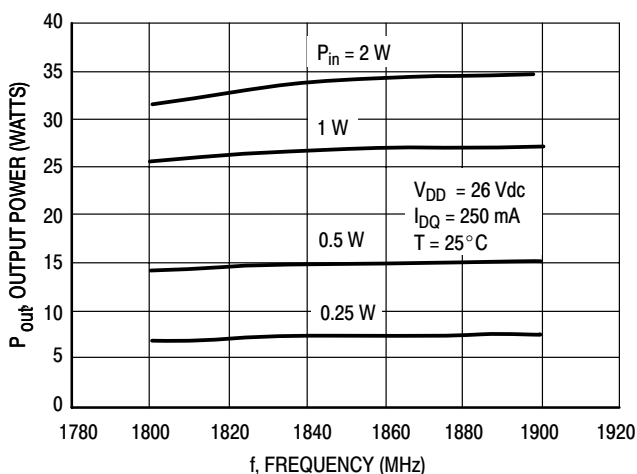


Figure 4. Output Power versus Frequency

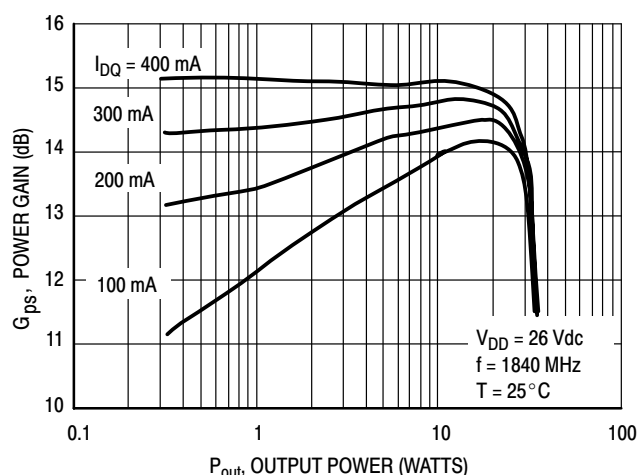


Figure 5. Power Gain versus Output Power

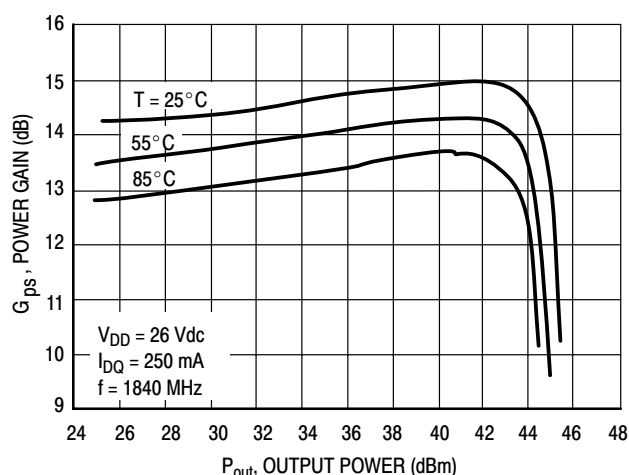


Figure 6. Power Gain versus Output Power

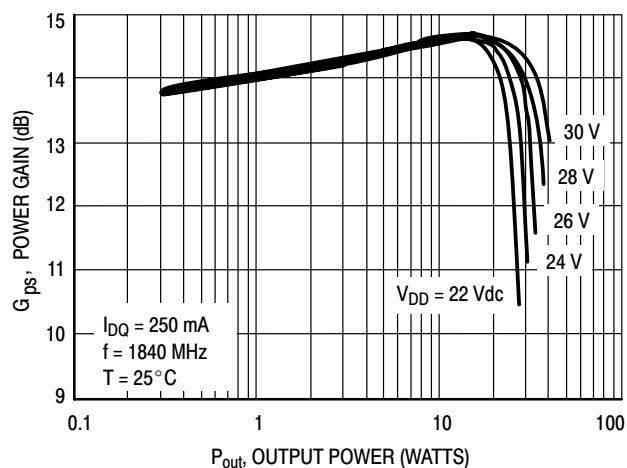


Figure 7. Power Gain versus Output Power

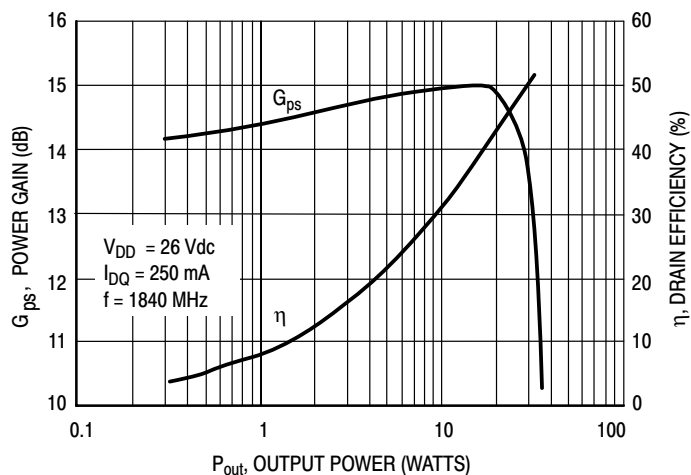
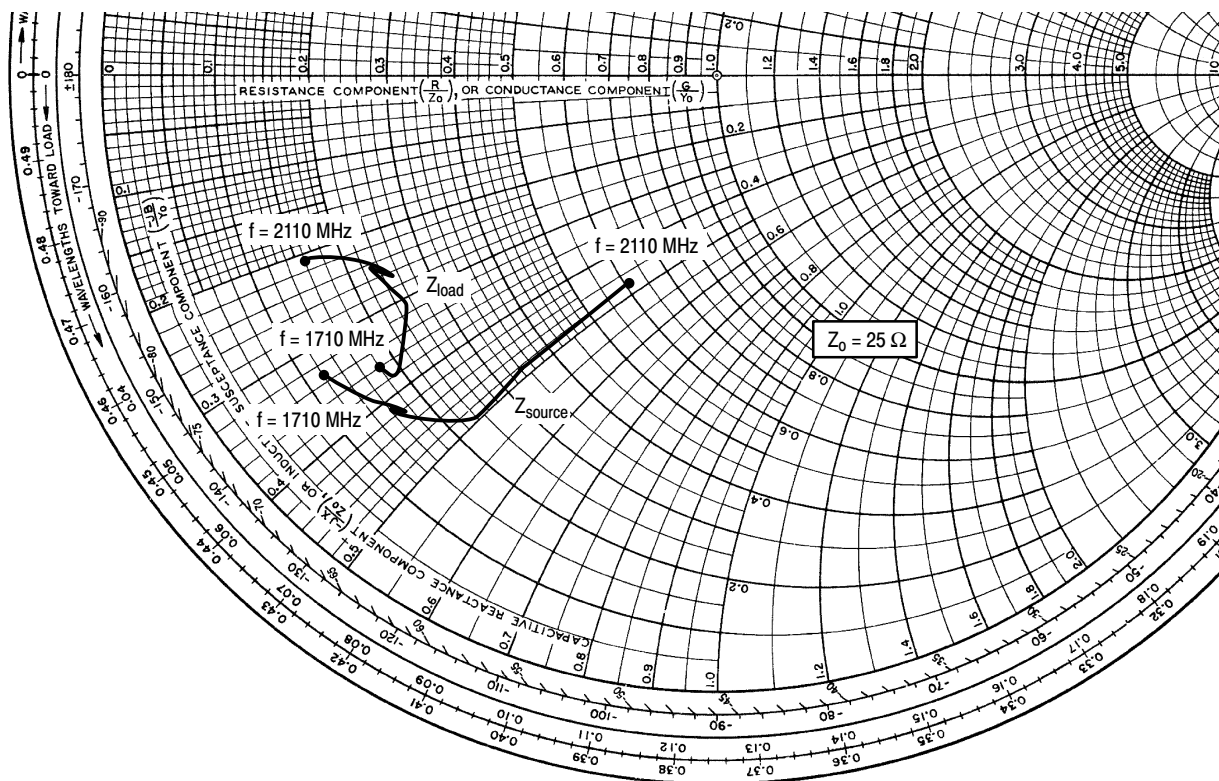


Figure 8. Power Gain and Efficiency versus Output Power



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

f MHz	Z_{source} Ω	Z_{load} Ω
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.

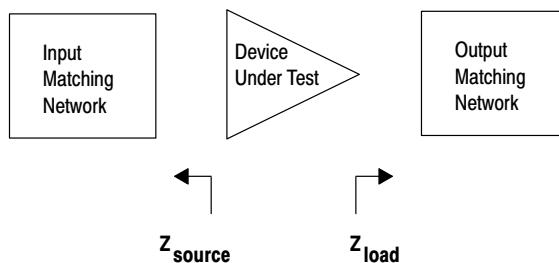
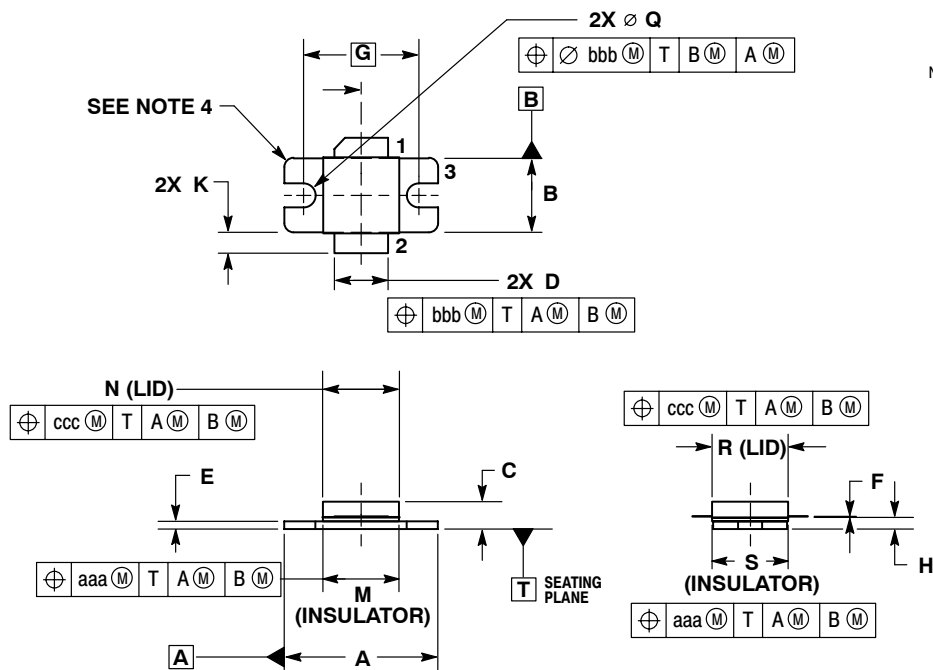


Figure 9. Series Equivalent Source and Load Impedance

MRF18030ALR3 MRF18030ALSR3

NOTES

PACKAGE DIMENSIONS



NOTES:

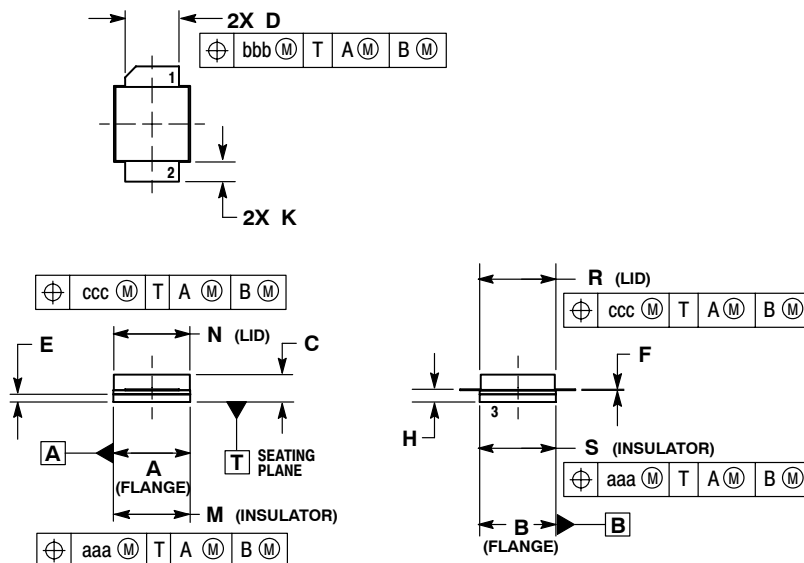
1. CONTROLLING DIMENSION: INCH.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSION H IS MEASURED 0.030 (0.762) AWAY FROM PACKAGE BODY.
4. INFORMATION ONLY: CORNER BREAK (4X) TO BE .060 $\pm$.005 (1.52 $\pm$ 0.13) RADIUS OR .06 $\pm$.005 (1.52 $\pm$ 0.13) x 45° CHAMFER.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.795	.805	20.19	20.44
B	.380	.390	9.65	9.9
C	.125	.163	3.17	4.14
D	.275	.285	6.98	7.24
E	.035	.045	0.89	1.14
F	.004	.006	0.10	0.15
G	.600 BSC		15.24 BSC	
H	.057	.067	1.45	1.7
K	.092	.122	2.33	3.1
M	.395	.405	10	10.3
N	.395	.405	10	10.3
Q	$\varnothing$.120	$\varnothing$.130	$\varnothing$ 3.05	$\varnothing$ 3.3
R	.395	.405	10	10.3
S	.395	.405	10	10.3
aaa	.005 BSC		0.127 BSC	
bbb	.010 BSC		0.254 BSC	
ccc	.015 BSC		0.381 BSC	

STYLE 1:

- PIN 1. DRAIN
- GATE
- SOURCE

**CASE 465E-04
ISSUE F
NI-400
MRF18030ALR3**



NOTES:

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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.395	.405	10.03	10.29
B	.395	.405	10.03	10.29
C	.125	.163	3.18	4.14
D	.275	.285	6.98	7.24
E	.035	.045	0.89	1.14
F	.004	.006	0.10	0.15
H	.057	.067	1.45	1.70
K	.092	.122	2.34	3.10
M	.395	.405	10.03	10.29
N	.395	.405	10.03	10.29
R	.395	.405	10.03	10.29
S	.395	.405	10.03	10.29
aaa	.005 REF		0.127 REF	
bbb	.010 REF		0.254 REF	
ccc	.015 REF		0.38 REF	

STYLE 1:

- PIN 1. DRAIN
- GATE
- SOURCE

**CASE 465F-04
ISSUE E
NI-400S
MRF18030ALSR3**

MRF18030ALR3 MRF18030ALSR3

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