

The RF MOSFET Line

RF Power Field Effect Transistors

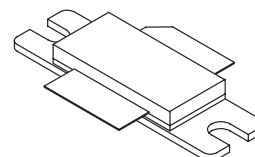
N-Channel Enhancement-Mode Lateral MOSFETs

Designed for PCN and PCS base station applications from frequencies up to 1.8 to 2.0 GHz. Suitable for FM, TDMA, CDMA and multicarrier amplifier applications. To be used in class AB for PCN-PCS/cellular radio and WLL applications. Specified for GSM1930 – 1990 MHz.

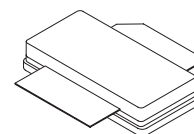
- GSM Performance, Full Frequency Band (1930 – 1990 MHz)
Power Gain — 13 dB (Typ) @ 60 Watts (CW)
Efficiency — 45% (Typ) @ 60 Watts (CW)
- Internally Matched, Controlled Q, for Ease of Use
- High Gain, High Efficiency and High Linearity
- Integrated ESD Protection: Class 2 Human Body Model, Class M3 Machine Model
- Ease of Design for Gain and Insertion Phase Flatness
- Capable of Handling 10:1 VSWR, @ 26 Vdc, 60 Watts (CW) Output Power
- Excellent Thermal Stability

MRF18060B
MRF18060BS

60 W, 1.90 – 1.99 GHz, 26 V
LATERAL N-CHANNEL
BROADBAND
RF POWER MOSFETs



CASE 465-04, STYLE 1
(MRF18060B)



CASE 465A-04, STYLE 1
(MRF18060BS)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	Vdc
Gate-Source Voltage	V_{GS}	+15, -0.5	Vdc
Total Device Dissipation @ $T_C \geq 25^\circ\text{C}$ Derate above 25°C	P_D	180 1.03	Watts 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	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.97	$^\circ\text{C/W}$

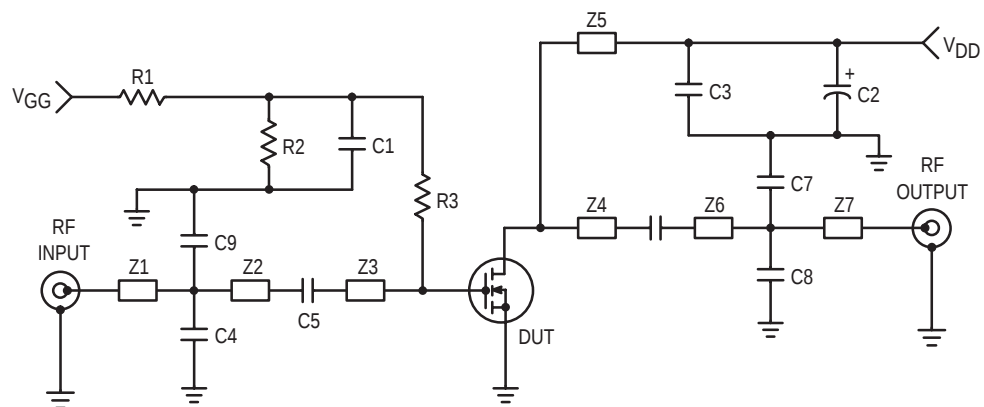
NOTE – **CAUTION** – MOS devices are susceptible to damage from electrostatic charge. Reasonable precautions in handling and packaging MOS devices should be observed.

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain–Source Breakdown Voltage ($V_{GS} = 0\text{ Vdc}$, $I_D = 10\text{ }\mu\text{Adc}$)	$V_{(BR)DSS}$	65	—	—	Vdc
Zero Gate Voltage Drain Current ($V_{DS} = 26\text{ Vdc}$, $V_{GS} = 0$)	I_{DSS}	—	—	6	μAdc
Gate–Source Leakage Current ($V_{GS} = 5\text{ Vdc}$, $V_{DS} = 0$)	I_{GSS}	—	—	1	μAdc
ON CHARACTERISTICS					
Gate Threshold Voltage ($V_{DS} = 10\text{ Vdc}$, $I_D = 300\text{ }\mu\text{Adc}$)	$V_{GS(th)}$	2	—	4	Vdc
Gate Quiescent Voltage ($V_{DS} = 26\text{ Vdc}$, $I_D = 500\text{ mAdc}$)	$V_{GS(Q)}$	2.5	3.9	4.5	Vdc
Drain–Source On–Voltage ($V_{GS} = 10\text{ Vdc}$, $I_D = 2\text{ Adc}$)	$V_{DS(on)}$	—	0.27	—	Vdc
Forward Transconductance ($V_{DS} = 10\text{ Vdc}$, $I_D = 2\text{ Adc}$)	g_{fs}	—	4.7	—	S
DYNAMIC CHARACTERISTICS					
Input Capacitance (Including Input Matching Capacitor in Package) (1) ($V_{DS} = 26\text{ Vdc}$, $V_{GS} = 0$, $f = 1\text{ MHz}$)	C_{iss}	—	160	—	pF
Output Capacitance (1) ($V_{DS} = 26\text{ Vdc}$, $V_{GS} = 0$, $f = 1\text{ MHz}$)	C_{oss}	—	740	—	pF
Reverse Transfer Capacitance ($V_{DS} = 26\text{ Vdc}$, $V_{GS} = 0$, $f = 1\text{ MHz}$)	C_{rss}	—	2.7	—	pF
FUNCTIONAL TESTS (In Motorola Test Fixture)					
Common–Source Amplifier Power Gain @ 60 W (2) ($V_{DD} = 26\text{ Vdc}$, $I_{DQ} = 500\text{ mA}$, $f = 1930 - 1990\text{ MHz}$)	G_{ps}	11.5	13	—	dB
Drain Efficiency @ 60 W (2) ($V_{DD} = 26\text{ Vdc}$, $I_{DQ} = 500\text{ mA}$, $f = 1930 - 1990\text{ MHz}$)	η	40	45	—	%
Input Return Loss (2) ($V_{DD} = 26\text{ Vdc}$, $P_{out} = 60\text{ W CW}$, $I_{DQ} = 500\text{ mA}$, $f = 1930 - 1990\text{ MHz}$)	IRL	10	—	—	dB
Output Mismatch Stress ($V_{DD} = 26\text{ Vdc}$, $P_{out} = 60\text{ W CW}$, $I_{DQ} = 500\text{ mA}$ 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.

(2) To meet application requirements, Motorola test fixtures have been designed to cover the full GSM1900 band, ensuring batch–to–batch consistency.



C1, C3	10 pF, 100B Chip Capacitor	C7, C9	0.3 pF, 100B Chip Capacitor
C2	10 μ F, 35 V Electrolytic Tantalum Capacitor	R1, R2	10 k Ω , Chip Resistor 0805
C4, C8	1.2 pF, 100B Chip Capacitor	R3	1.0 k Ω , Chip Resistor 0805
C5	1.0 pF, 100B Chip Capacitor		
C6	2.2 pF, 100B Chip Capacitor	PCB	Teflon [®] Glass

Figure 1. 1930 – 1990 MHz Test Fixture Schematic

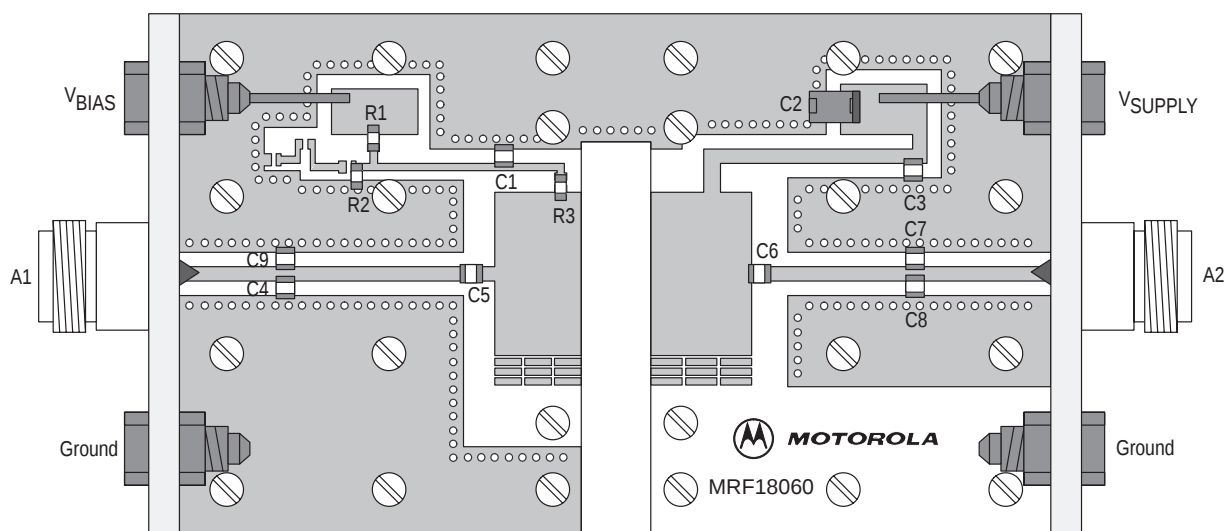


Figure 2. 1930 – 1990 MHz Test Fixture Component Layout

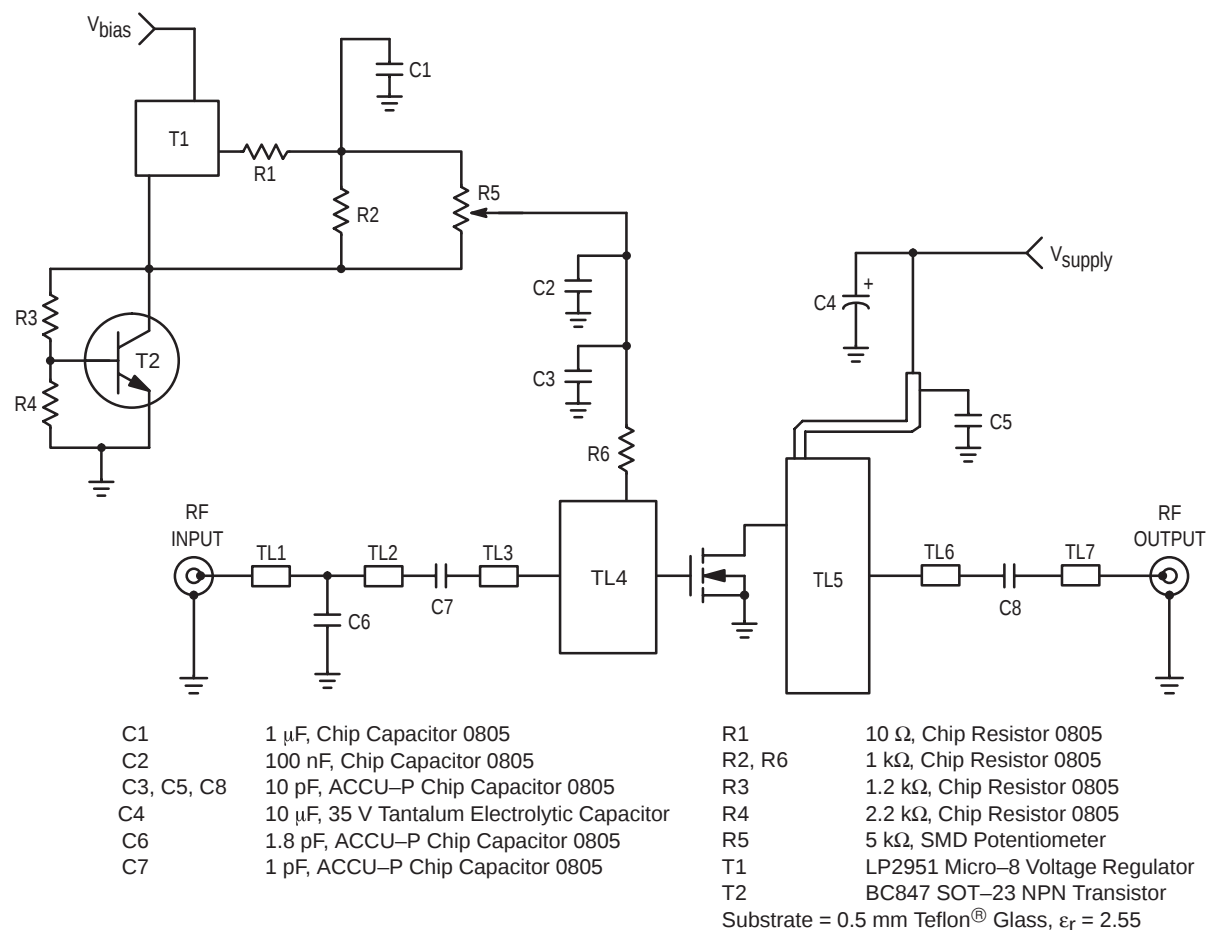


Figure 3. 1800 – 2000 MHz Demo Board Schematic

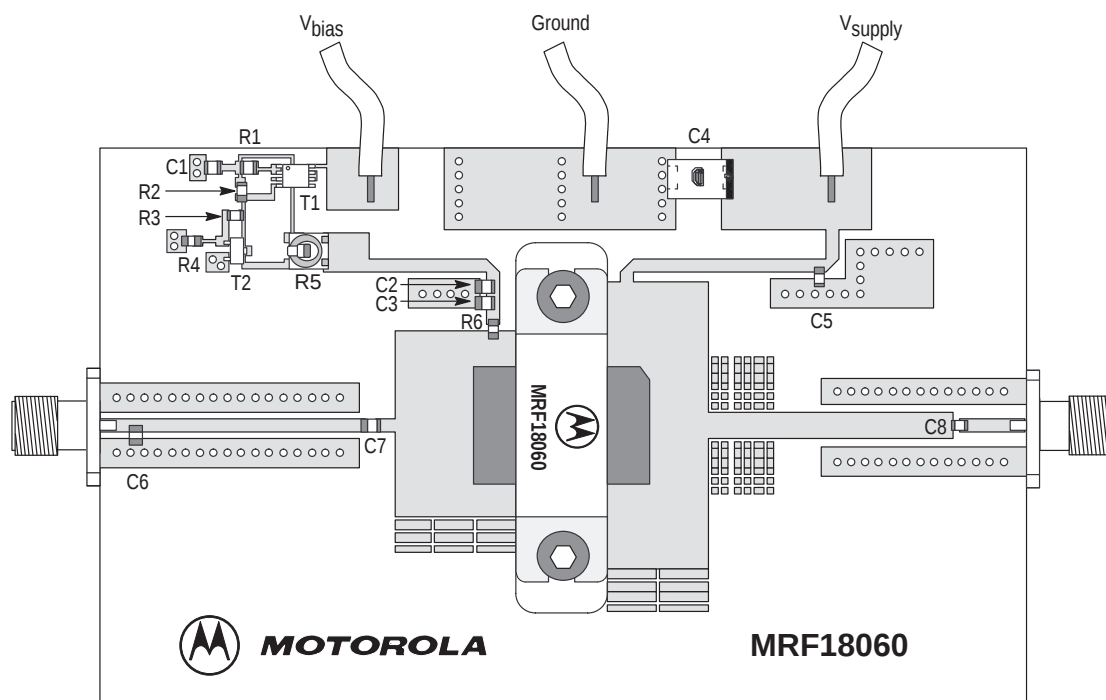


Figure 4. 1800 – 2000 MHz Demo Board Component Layout

TYPICAL CHARACTERISTICS (DATA TAKEN USING WIDEBAND DEMONSTRATION BOARD)

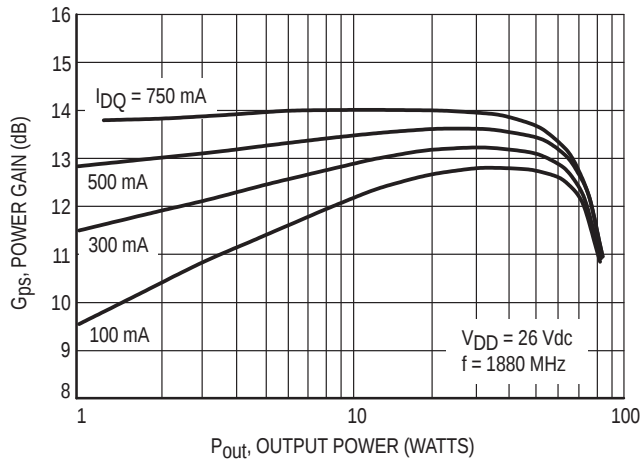


Figure 5. Power Gain versus Output Power

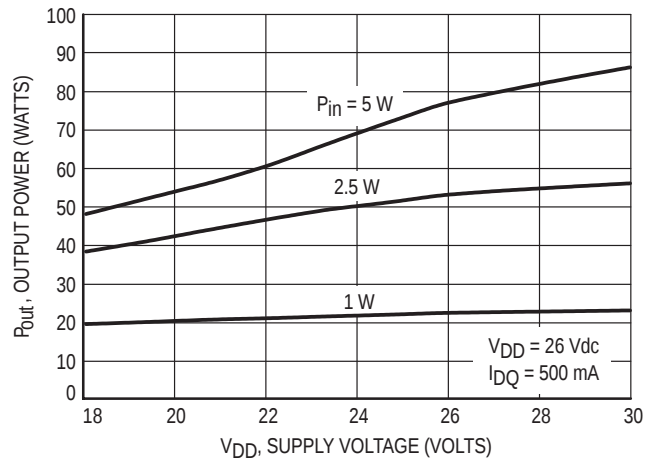


Figure 6. Output Power versus Supply Voltage

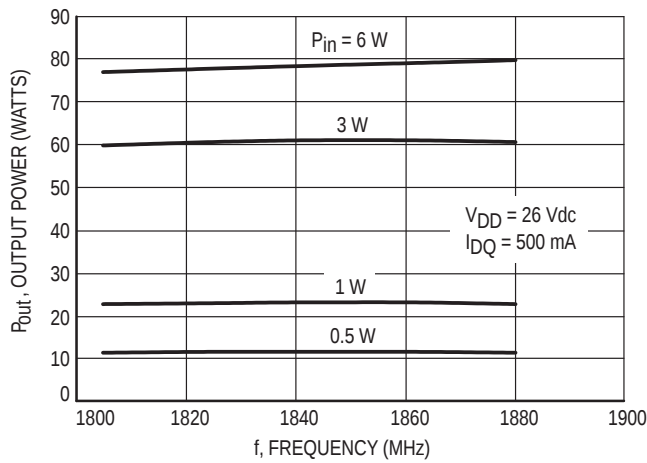


Figure 7. Output Power versus Frequency

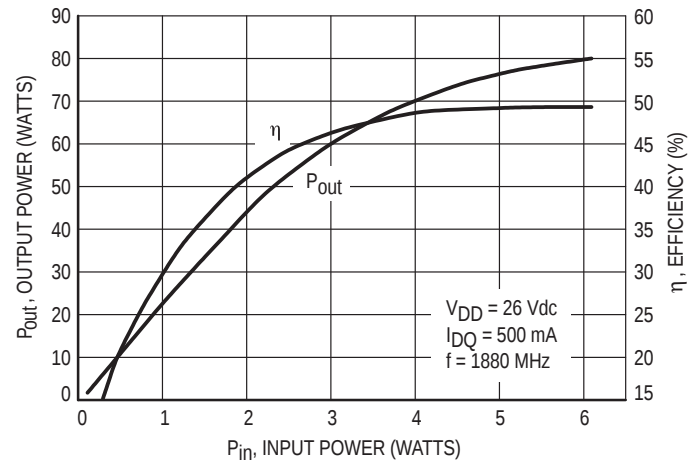


Figure 8. Output Power and Efficiency versus Input Power

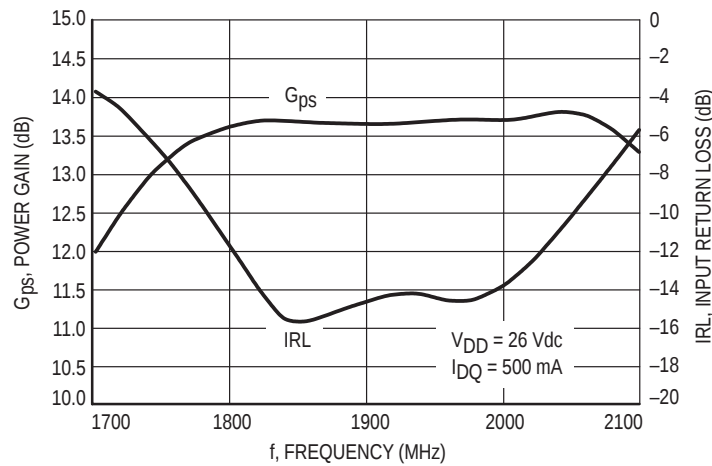


Figure 9. Wideband Gain and IRL (at Small Signal)

$V_{DD} = 26 \text{ V}$, $I_{DQ} = 500 \text{ mA}$, $P_{out} = 60 \text{ Watts (CW)}$

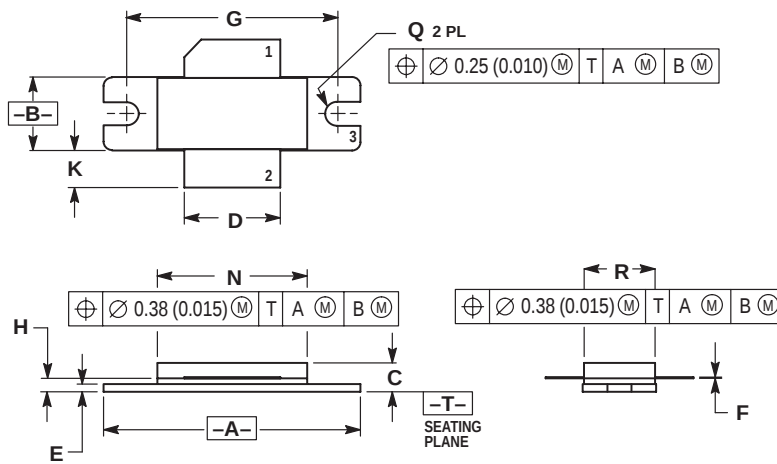
f MHz	Z_{in} Ω	Z_{OL}^* Ω
1700	$0.60 + j2.53$	$2.27 + j3.44$
1800	$0.80 + j3.20$	$2.05 + j3.05$
1900	$0.92 + j3.42$	$1.90 + j2.90$
2000	$1.07 + j3.59$	$1.64 + j2.88$
2100	$1.31 + j4.00$	$1.29 + j2.99$

Z_{in} = Complex conjugate of source impedance.

Z_{OL}^* = Complex conjugate of the optimum load at a given voltage, P1dB, gain, efficiency, bias current and frequency.

Table 1. Series Equivalent Input and Output Impedance

PACKAGE DIMENSIONS



**CASE 465-04
ISSUE D
(MRF18060B)**

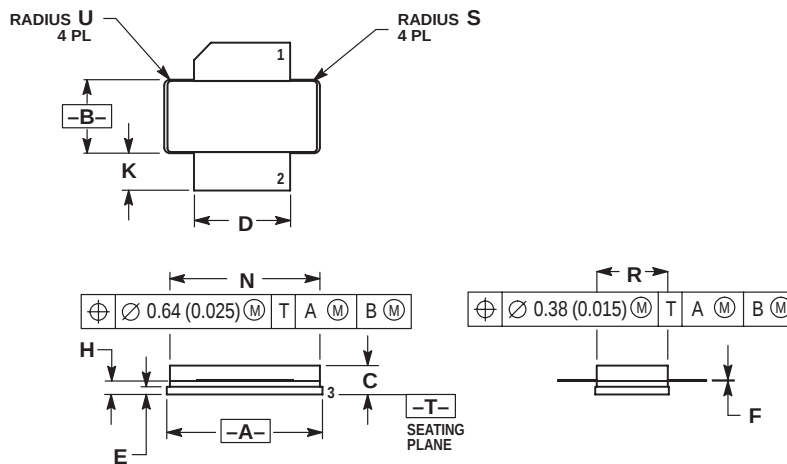
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 465-01, -02 AND -03 OBSOLETE, NEW STANDARD 465-04.
4. DIMENSION H IS MEASURED 0.030" AWAY FROM FLANGE.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	1.335	1.345	33.91	34.16
B	0.380	0.390	9.65	9.91
C	0.125	0.170	3.18	4.32
D	0.495	0.505	12.57	12.83
E	0.035	0.045	0.89	1.14
F	0.003	0.006	0.08	0.15
G	1.100 BSC		27.94 BSC	
H	0.055	0.065	1.40	1.65
K	0.170	0.210	4.32	5.33
N	0.772	0.788	19.60	20.00
Q	0.118	0.138	3.00	3.51
R	0.365	0.375	9.27	9.53

STYLE 1:

- PIN 1. DRAIN
- GATE
- SOURCE



**CASE 465A-04
ISSUE D
(MRF18060BS)**

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION H IS MEASURED 0.030" AWAY FROM FLANGE.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.805	0.815	20.45	20.70
B	0.380	0.390	9.65	9.91
C	0.125	0.170	3.18	4.32
D	0.495	0.505	12.57	12.83
E	0.035	0.045	0.89	1.14
F	0.003	0.006	0.08	0.15
H	0.055	0.065	1.40	1.65
K	0.170	0.210	4.32	5.33
N	0.775	0.785	19.69	19.94
R	0.365	0.375	9.27	9.53
S	0.020 REF		0.51 REF	
U	0.030 REF		0.76 REF	

STYLE 1:

- PIN 1. DRAIN
- GATE
- SOURCE

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