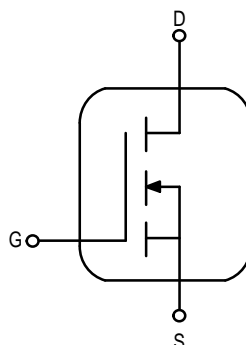


The RF MOSFET Line
RF Power
Field Effect Transistors
N-Channel Enhancement-Mode Lateral
MOSFETs

- High Gain, Rugged Device
- Broadband Performance from HF to 1 GHz
- Bottom Side Source Eliminates DC Isolators, Reducing Common Mode Inductances



MRF182
MRF182S

30 W, 1.0 GHz
LATERAL N-CHANNEL
BROADBAND
RF POWER MOSFETs

CASE 360B-01, STYLE 1
(MRF182)

CASE 360C-03, STYLE 1
(MRF182S)

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|-----------|--------------|--------------------------|
| Drain-Source Voltage | V_{DSS} | 65 | Vdc |
| Gate-Source Voltage | V_{GS} | ± 20 | Vdc |
| Total Device Dissipation @ $T_C = 70^\circ\text{C}$ Derate above 70°C | P_D | 74 0.57 | W 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 | $R_{\theta JC}$ | 1.75 | $^\circ\text{C}/\text{W}$ |

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | |
|---|---------------|----|---|---|--------------------|
| Drain-Source Breakdown Voltage ($V_{GS} = 0$, $I_D = 1.0 \mu\text{A}_{dc}$) | $V_{(BR)DSS}$ | 65 | - | - | Vdc |
| Zero Gate Voltage Drain Current ($V_{DS} = 28 \text{ V}$, $V_{GS} = 0$) | I_{DSS} | - | - | 1 | μA_{dc} |
| Gate-Source Leakage Current ($V_{GS} = 20 \text{ V}$, $V_{DS} = 0$) | I_{GSS} | - | - | 1 | μA_{dc} |

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

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

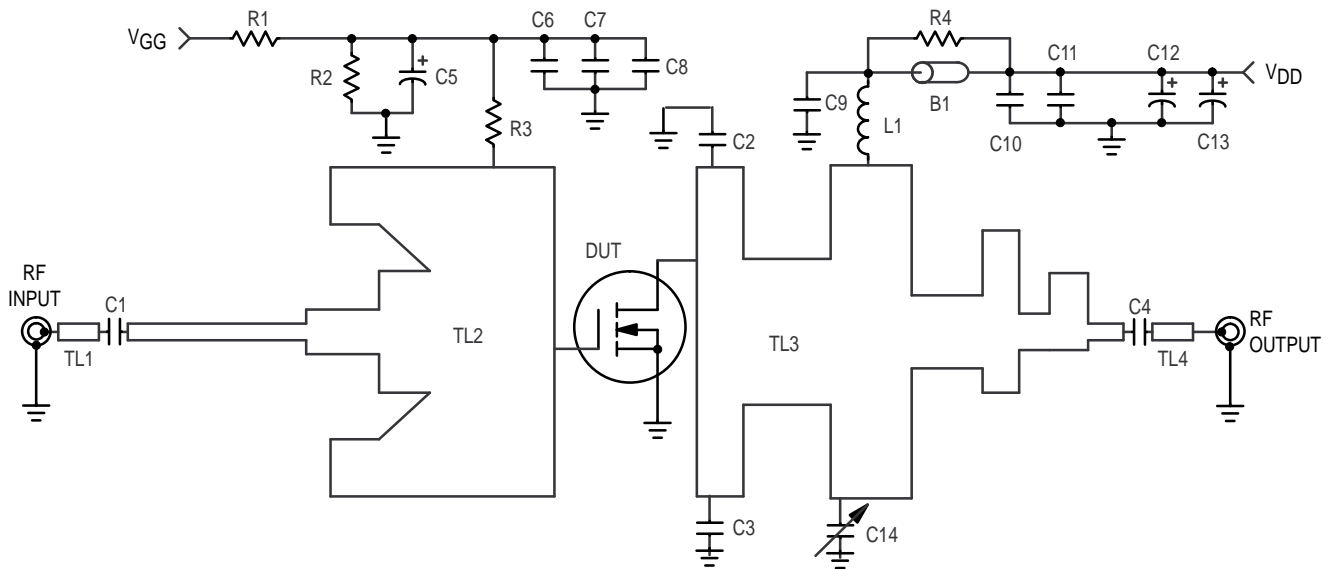
| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|--------------|-----|-----|-----|------|
| ON CHARACTERISTICS | | | | | |
| Gate Threshold Voltage ($V_{DS} = 10\text{ V}$, $I_D = 100\ \mu\text{A}$) | $V_{GS(th)}$ | 2 | 3 | 4 | Vdc |
| Gate Quiescent Voltage ($V_{DS} = 28\text{ V}$, $I_D = 50\text{ mA}$) | $V_{GS(Q)}$ | 3 | 4 | 5 | Vdc |
| Drain–Source On–Voltage ($V_{GS} = 10\text{ V}$, $I_D = 3\text{ A}$) | $V_{DS(on)}$ | – | 0.9 | 1.2 | Vdc |
| Forward Transconductance ($V_{DS} = 10\text{ V}$, $I_D = 3\text{ A}$) | g_{fs} | 1.6 | 1.8 | – | S |

DYNAMIC CHARACTERISTICS

| | | | | | |
|--|-----------|---|-----|---|----|
| Input Capacitance ($V_{DS} = 28\text{ V}$, $V_{GS} = 0$, $f = 1\text{ MHz}$) | C_{iss} | – | 56 | – | pF |
| Output Capacitance ($V_{DS} = 28\text{ V}$, $V_{GS} = 0$, $f = 1\text{ MHz}$) | C_{oss} | – | 28 | – | pF |
| Reverse Transfer Capacitance ($V_{DS} = 28\text{ V}$, $V_{GS} = 0$, $f = 1\text{ MHz}$) | C_{rss} | – | 2.5 | – | pF |

FUNCTIONAL CHARACTERISTICS

| | | | | | |
|--|-----------|--------------------------------|---------------|---|------|
| Common Source Power Gain ($V_{DD} = 28\text{ Vdc}$, $P_{out} = 30\text{ W}$, $I_{DQ} = 50\text{ mA}$, $f = 945\text{ MHz}$) | G_{ps} | 11 | 14 | – | dB |
| Drain Efficiency ($V_{DD} = 28\text{ Vdc}$, $P_{out} = 30\text{ W}$, $I_{DQ} = 50\text{ mA}$, $f = 945\text{ MHz}$) | η | 50 | 60 | – | % |
| Load Mismatch ($V_{DD} = 28\text{ Vdc}$, $P_{out} = 30\text{ W}$, $I_{DQ} = 50\text{ mA}$, $f = 945\text{ MHz}$, Load VSWR 5:1 at All Phase Angles) | Ψ | No Degradation in Output Power | | | |
| Series Equivalent Input Impedance ($V_{DD} = 28\text{ Vdc}$, $P_{out} = 30\text{ W}$, $I_{DQ} = 50\text{ mA}$, $f = 960\text{ MHz}$) | Z_{in} | – | $0.81 + j1.6$ | – | ohms |
| Series Equivalent Output Impedance ($V_{DD} = 28\text{ Vdc}$, $P_{out} = 30\text{ W}$, $I_{DQ} = 50\text{ mA}$, $f = 960\text{ MHz}$) | Z_{out} | – | $2.15 - j1.7$ | – | ohms |



| | | | |
|----------------|--|-----------|---|
| B1 | Short RF Bead Fair Rite-274301944 | L1 | 5 Turns, 20 AWG, IDIA 0.126 |
| C1 | 18 pF Chip Capacitor | R1 | 10 k Ω , 1/4 W Resistor |
| C2, C3, C6, C9 | 43 pF Chip Capacitor | R2 | 13 k Ω , 1/4 W Resistor |
| C4 | 100 pF Chip Capacitor | R3 | 1.0 k Ω , 1/4 W Chip Resistor |
| C5, C12 | 10 μ F, 50 Vdc Electrolytic Capacitor | R4 | 4 x 39 Ω , 1/8 W Chip Resistor |
| C7, C10 | 1000 pF Chip Capacitor | "TL1-TL4 | Microstrip Line See Photomaster |
| C8, C11 | 0.1 μ F, 50 Vdc Chip Capacitor | Ckt Board | 1/32" Glass Teflon, $\epsilon_r = 2.55$ |
| C13 | 250 μ F, 50 Vdc Electrolytic Capacitor | | ARLON-GX-0300-55-22 |
| C14 | 0.6-4.5 pF Variable Capacitor | | |

Figure 1. MRF182 Schematic

TYPICAL CHARACTERISTICS

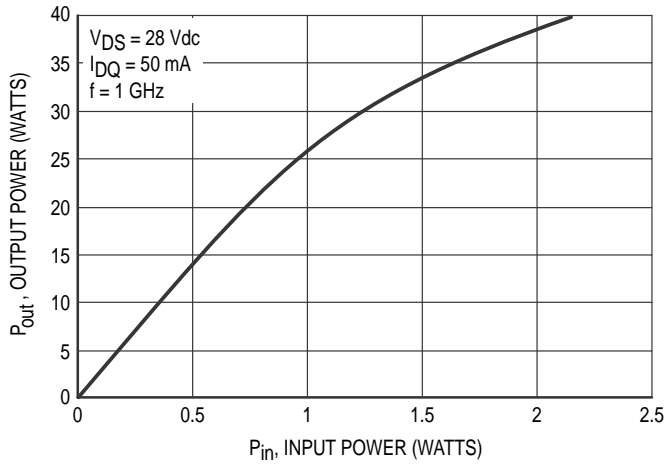


Figure 2. Output Power versus Input Power at 1 GHz

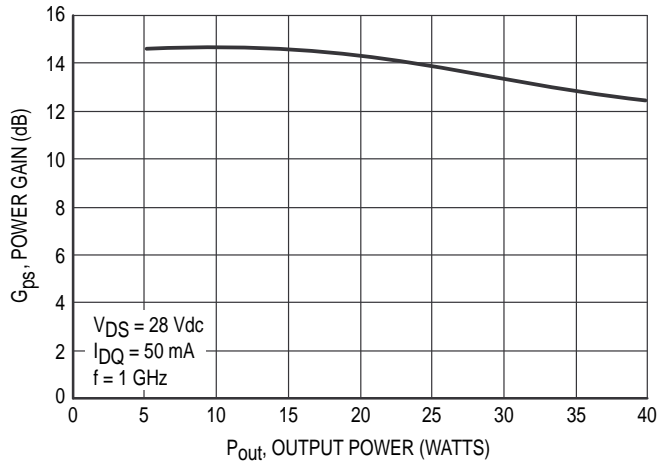


Figure 3. Power Gain versus Output Power at 1 GHz

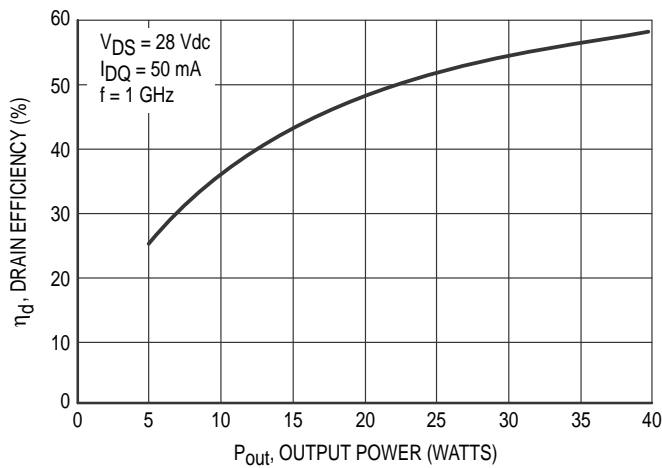


Figure 4. Drain Efficiency versus Output Power at 1 GHz

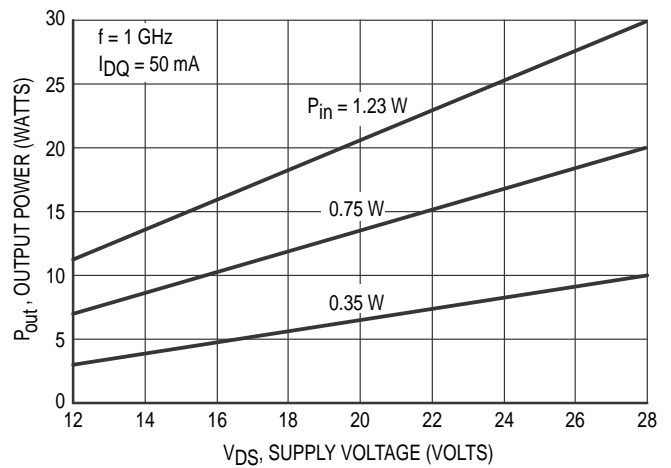


Figure 5. Output Power versus Supply Voltage

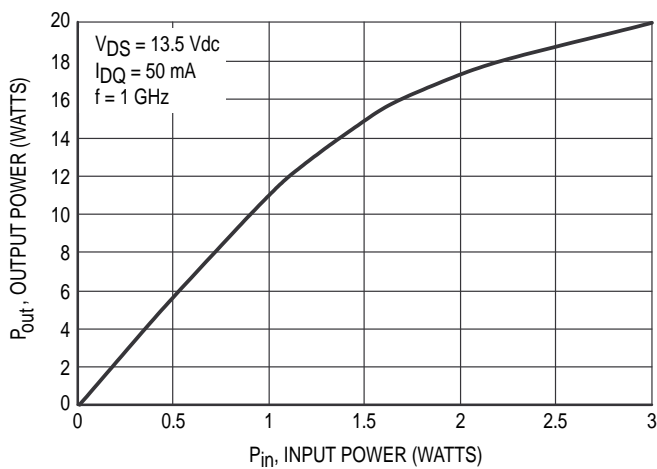


Figure 6. Output Power versus Input Power

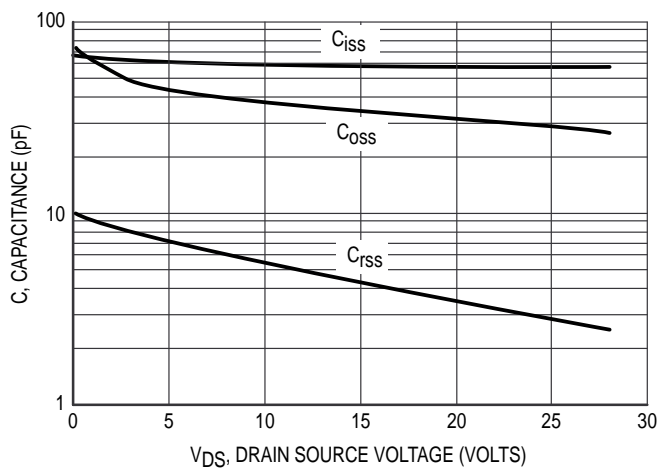


Figure 7. Capacitance versus Drain Source Voltage

Table 1. Typical Common Source S-Parameters ($V_{DS} = 13.5\text{ V}$)

$I_D = 1.0\text{ A}$

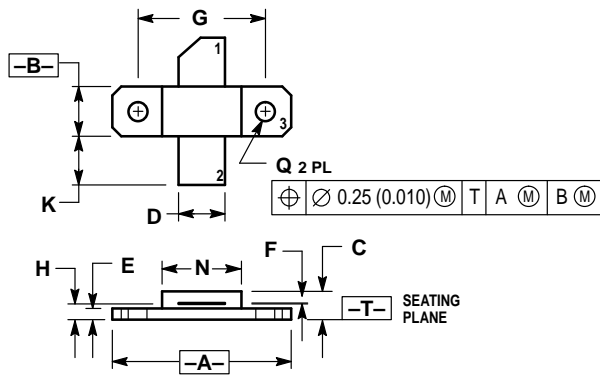
| f MHz | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | |
|----------|-----------------|------|-----------------|-----|-----------------|-----|-----------------|------|
| | S ₁₁ | ∠φ | S ₂₁ | ∠φ | S ₁₂ | ∠φ | S ₂₂ | ∠φ |
| 20 | 0.933 | -131 | 40.81 | 112 | 0.021 | 22 | 0.664 | -138 |
| 30 | 0.922 | -148 | 29.31 | 104 | 0.022 | 15 | 0.700 | -151 |
| 40 | 0.892 | -156 | 22.19 | 99 | 0.022 | 10 | 0.718 | -158 |
| 50 | 0.877 | -161 | 17.91 | 95 | 0.023 | 7 | 0.725 | -162 |
| 60 | 0.870 | -164 | 14.67 | 92 | 0.023 | 4 | 0.732 | -164 |
| 70 | 0.863 | -166 | 12.57 | 90 | 0.022 | 2 | 0.735 | -166 |
| 80 | 0.860 | -168 | 11.00 | 89 | 0.022 | 1 | 0.738 | -168 |
| 90 | 0.860 | -169 | 9.79 | 87 | 0.022 | 0 | 0.740 | -169 |
| 100 | 0.859 | -170 | 8.79 | 86 | 0.022 | -1 | 0.741 | -169 |
| 150 | 0.859 | -173 | 5.78 | 80 | 0.022 | -7 | 0.750 | -172 |
| 200 | 0.862 | -175 | 4.29 | 74 | 0.022 | -11 | 0.759 | -172 |
| 250 | 0.868 | -176 | 3.38 | 69 | 0.021 | -14 | 0.770 | -173 |
| 300 | 0.880 | -177 | 2.77 | 65 | 0.020 | -17 | 0.780 | -173 |
| 350 | 0.877 | -177 | 2.32 | 61 | 0.020 | -19 | 0.793 | -173 |
| 400 | 0.882 | -178 | 1.98 | 56 | 0.019 | -22 | 0.808 | -173 |
| 450 | 0.892 | -179 | 1.72 | 52 | 0.018 | -24 | 0.816 | -173 |
| 500 | 0.899 | -180 | 1.51 | 49 | 0.017 | -26 | 0.828 | -174 |
| 550 | 0.898 | 180 | 1.33 | 45 | 0.017 | -27 | 0.838 | -174 |
| 600 | 0.907 | 179 | 1.19 | 42 | 0.016 | -28 | 0.849 | -175 |
| 650 | 0.914 | 179 | 1.07 | 38 | 0.015 | -28 | 0.859 | -175 |
| 700 | 0.916 | 177 | 0.95 | 35 | 0.014 | -25 | 0.867 | -176 |
| 750 | 0.920 | 177 | 0.88 | 34 | 0.015 | -26 | 0.874 | -176 |
| 800 | 0.924 | 176 | 0.80 | 30 | 0.015 | -27 | 0.884 | -177 |
| 850 | 0.929 | 175 | 0.74 | 27 | 0.015 | -33 | 0.891 | -178 |
| 900 | 0.929 | 174 | 0.68 | 25 | 0.013 | -38 | 0.897 | -178 |
| 950 | 0.933 | 173 | 0.63 | 22 | 0.011 | -39 | 0.905 | -179 |
| 1000 | 0.934 | 173 | 0.58 | 20 | 0.010 | -37 | 0.912 | -180 |
| 1050 | 0.930 | 172 | 0.54 | 17 | 0.009 | -33 | 0.918 | 180 |
| 1100 | 0.938 | 171 | 0.52 | 15 | 0.009 | -29 | 0.924 | 179 |
| 1150 | 0.933 | 170 | 0.48 | 13 | 0.008 | -28 | 0.929 | 178 |
| 1200 | 0.930 | 169 | 0.45 | 10 | 0.008 | -25 | 0.930 | 177 |
| 1250 | 0.939 | 168 | 0.42 | 8 | 0.007 | -23 | 0.935 | 177 |
| 1300 | 0.936 | 168 | 0.40 | 6 | 0.007 | -21 | 0.934 | 176 |
| 1350 | 0.933 | 167 | 0.38 | 4 | 0.006 | -19 | 0.936 | 175 |
| 1400 | 0.937 | 166 | 0.35 | 2 | 0.005 | -14 | 0.939 | 174 |
| 1450 | 0.937 | 165 | 0.33 | 0 | 0.005 | -5 | 0.934 | 174 |
| 1500 | 0.927 | 164 | 0.32 | -2 | 0.004 | 0 | 0.930 | 173 |

Table 2. Typical Common Emitter S-Parameters ($V_{DS} = 28\text{ V}$)

$I_D = 1.0\text{ A}$

| f MHz | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | |
|----------|-----------------|------|-----------------|-----|-----------------|-----|-----------------|------|
| | S ₁₁ | ∠φ | S ₂₁ | ∠φ | S ₁₂ | ∠φ | S ₂₂ | ∠φ |
| 20 | 0.964 | -99 | 54.39 | 129 | 0.014 | 39 | 0.429 | -108 |
| 30 | 0.949 | -121 | 43.46 | 118 | 0.017 | 28 | 0.478 | -125 |
| 40 | 0.909 | -134 | 34.35 | 109 | 0.018 | 20 | 0.520 | -137 |
| 50 | 0.884 | -142 | 28.27 | 103 | 0.018 | 15 | 0.540 | -144 |
| 60 | 0.875 | -148 | 23.38 | 98 | 0.019 | 11 | 0.553 | -149 |
| 70 | 0.862 | -152 | 20.10 | 95 | 0.019 | 8 | 0.562 | -152 |
| 80 | 0.861 | -156 | 17.64 | 92 | 0.019 | 5 | 0.569 | -154 |
| 90 | 0.858 | -158 | 15.72 | 90 | 0.019 | 3 | 0.575 | -156 |
| 100 | 0.858 | -160 | 14.11 | 88 | 0.019 | 1 | 0.580 | -157 |
| 150 | 0.856 | -166 | 9.26 | 79 | 0.018 | -7 | 0.606 | -160 |
| 200 | 0.862 | -169 | 6.80 | 71 | 0.018 | -12 | 0.633 | -161 |
| 250 | 0.871 | -171 | 5.29 | 65 | 0.017 | -16 | 0.661 | -161 |
| 300 | 0.882 | -173 | 4.27 | 59 | 0.016 | -21 | 0.690 | -162 |
| 350 | 0.883 | -174 | 3.52 | 54 | 0.015 | -23 | 0.718 | -162 |
| 400 | 0.895 | -175 | 2.97 | 49 | 0.014 | -26 | 0.747 | -163 |
| 450 | 0.904 | -176 | 2.54 | 45 | 0.013 | -28 | 0.767 | -164 |
| 500 | 0.911 | -177 | 2.20 | 41 | 0.012 | -30 | 0.789 | -165 |
| 550 | 0.911 | -178 | 1.90 | 37 | 0.011 | -30 | 0.807 | -166 |
| 600 | 0.923 | -179 | 1.69 | 33 | 0.010 | -30 | 0.825 | -167 |
| 650 | 0.929 | -180 | 1.50 | 30 | 0.009 | -29 | 0.841 | -168 |
| 700 | 0.929 | 179 | 1.32 | 26 | 0.009 | -22 | 0.855 | -169 |
| 750 | 0.933 | 178 | 1.21 | 24 | 0.010 | -22 | 0.865 | -170 |
| 800 | 0.938 | 177 | 1.09 | 21 | 0.009 | -20 | 0.877 | -171 |
| 850 | 0.942 | 176 | 1.00 | 18 | 0.010 | -31 | 0.886 | -172 |
| 900 | 0.942 | 175 | 0.92 | 16 | 0.008 | -37 | 0.894 | -173 |
| 950 | 0.947 | 174 | 0.84 | 13 | 0.006 | -38 | 0.904 | -174 |
| 1000 | 0.946 | 173 | 0.77 | 11 | 0.005 | -28 | 0.912 | -175 |
| 1050 | 0.943 | 172 | 0.72 | 8 | 0.005 | -18 | 0.919 | -176 |
| 1100 | 0.948 | 171 | 0.67 | 6 | 0.004 | -9 | 0.926 | -177 |
| 1150 | 0.945 | 171 | 0.62 | 4 | 0.005 | 0 | 0.932 | -178 |
| 1200 | 0.939 | 170 | 0.59 | 1 | 0.004 | 3 | 0.934 | -179 |
| 1250 | 0.949 | 169 | 0.54 | 0 | 0.005 | 12 | 0.940 | -180 |
| 1300 | 0.947 | 168 | 0.51 | -3 | 0.005 | 18 | 0.939 | 180 |
| 1350 | 0.944 | 167 | 0.48 | -4 | 0.005 | 22 | 0.941 | 179 |
| 1400 | 0.945 | 166 | 0.44 | -7 | 0.004 | 34 | 0.943 | 178 |
| 1450 | 0.944 | 165 | 0.42 | -9 | 0.005 | 45 | 0.940 | 177 |
| 1500 | 0.933 | 164 | 0.40 | -10 | 0.005 | 55 | 0.936 | 176 |

PACKAGE DIMENSIONS

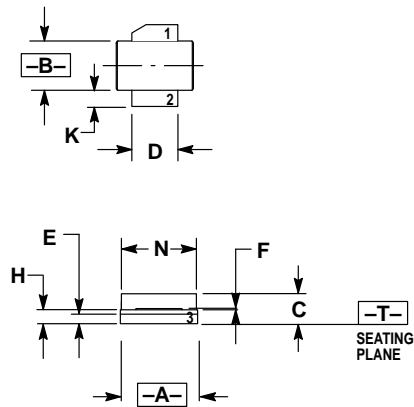


- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.790 | 0.810 | 20.07 | 20.57 |
| B | 0.220 | 0.240 | 5.59 | 6.09 |
| C | 0.125 | 0.175 | 3.18 | 4.45 |
| D | 0.205 | 0.225 | 5.21 | 5.71 |
| E | 0.050 | 0.070 | 1.27 | 1.77 |
| F | 0.004 | 0.006 | 0.11 | 0.15 |
| G | 0.562 BSC | | 14.27 BSC | |
| H | 0.070 | 0.090 | 1.78 | 2.29 |
| K | 0.215 | 0.255 | 5.47 | 6.47 |
| N | 0.350 | 0.370 | 8.89 | 9.39 |
| Q | 0.120 | 0.140 | 3.05 | 3.55 |

- STYLE 1:
 PIN 1. DRAIN
 2. GATE
 3. SOURCE

**CASE 360B-01
 ISSUE O
 (MRF182)**



- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.370 | 0.390 | 9.40 | 9.91 |
| B | 0.220 | 0.240 | 5.59 | 6.09 |
| C | 0.105 | 0.155 | 2.67 | 3.94 |
| D | 0.205 | 0.225 | 5.21 | 5.71 |
| E | 0.035 | 0.045 | 0.89 | 1.14 |
| F | 0.004 | 0.006 | 0.11 | 0.15 |
| H | 0.057 | 0.067 | 1.45 | 1.70 |
| K | 0.085 | 0.115 | 2.16 | 2.92 |
| N | 0.350 | 0.370 | 8.89 | 9.39 |

- STYLE 1:
 PIN 1. DRAIN
 2. GATE
 3. SOURCE

**CASE 360C-03
 ISSUE B
 (MRF182S)**

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