# N-Channel 80 V (D-S) MOSFET

| PRODUCT SUMMARY | | | |
|---|---|---|---|
| $V_{DS}$ (V) | $R_{DS(on)}$ (Ω) | $I_D$ (A)[a] | $Q_g$ (Typ.) |
| 80 | 0.062 at $V_{GS}$ = 10 V | 3.5 | 7.3 nC |

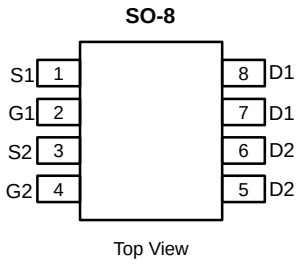
## FEATURES

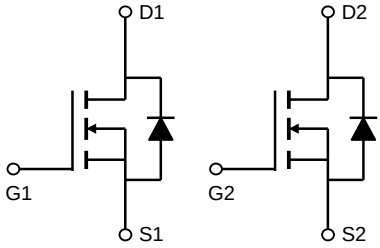
- **Halogen-free According to IEC 61249-2-21 Definition**
- TrenchFET® Power MOSFET
- 100 % $R_g$ and UIS Tested
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

## APPLICATIONS

- DC/DC Conversion
  - Notebook System Power




| Absolute Maximum Ratings $T_A$=25℃ unless otherwise noted | | | | |
|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Maximum** | **Units** |
| Drain-Source Voltage | | $V_{DS}$ | 80 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±30 | V |
| Continuous Drain Current | $T_A$=25℃ | $I_D$ | 3.5 | A |
| | $T_A$=70℃ | | 2.9 | |
| Pulsed Drain Current [C] | | $I_{DM}$ | 18 | |
| Avalanche Current [C] | | $I_{AR}$ | 16 | A |
| Repetitive avalanche energy L=0.1mH [C] | | $E_{AR}$ | 12.8 | mJ |
| Power Dissipation [B] | $T_A$=25℃ | $P_D$ | 2 | W |
| | $T_A$=70℃ | | 1.3 | |
| Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to 150 | ℃ |

| Thermal Characteristics | | | | | |
|---|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Typ** | **Max** | **Units** |
| Maximum Junction-to-Ambient [A] | t ≤ 10s | $R_{\theta JA}$ | 48 | 62.5 | ℃/W |
| Maximum Junction-to-Ambient [A D] | Steady-State | | 74 | 90 | ℃/W |
| Maximum Junction-to-Lead | Steady-State | $R_{\theta JL}$ | 32 | 40 | ℃/W |

**Electrical Characteristics ($T_J$=25℃ unless otherwise noted)**

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **STATIC PARAMETERS** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $I_D$=250μA, $V_{GS}$=0V | 80 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=80V, $V_{GS}$=0V | | | 1 | μA |
| | | $T_J$=55℃ | | | 5 | |
| $I_{GSS}$ | Gate-Body leakage current | $V_{DS}$=0V, $V_{GS}$= ±30V | | | 100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$ $I_D$=250μA | 3.5 | 4.2 | 5 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}$=10V, $V_{DS}$=5V | 18 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V, $I_D$=3.5A | | 62 | | mΩ |
| | | $T_J$=125℃ | | 113.0 | | |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$=5V, $I_D$=3.5A | | 15 | | S |
| $V_{SD}$ | Diode Forward Voltage | $I_S$=1A,$V_{GS}$=0V | | 0.77 | 1 | V |
| $I_S$ | Maximum Body-Diode Continuous Current | | | | 2.5 | A |
| $I_{SM}$ | Pulsed Body-diode Current[C] | | | | 18 | A |
| **DYNAMIC PARAMETERS** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$=40V, f=1MHz | 510 | 640 | 770 | pF |
| $C_{oss}$ | Output Capacitance | | 28 | 40 | 52 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | 12 | 20 | 30 | pF |
| $R_g$ | Gate resistance | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz | 0.9 | 1.8 | 2.7 | Ω |
| **SWITCHING PARAMETERS** | | | | | | |
| $Q_g$(10V) | Total Gate Charge | $V_{GS}$=10V, $V_{DS}$=40V, $I_D$=3.5A | 8 | 11 | 13 | nC |
| $Q_g$(4.5V) | Total Gate Charge | | 4 | 5.5 | 7 | |
| $Q_{gs}$ | Gate Source Charge | | 4 | 5 | 6 | nC |
| $Q_{gd}$ | Gate Drain Charge | | 0.7 | 1.2 | 1.7 | nC |
| $t_{D(on)}$ | Turn-On DelayTime | $V_{GS}$=10V, $V_{DS}$=40V, $R_L$=8Ω, $R_{GEN}$=3Ω | | 7.2 | | ns |
| $t_r$ | Turn-On Rise Time | | | 2.2 | | ns |
| $t_{D(off)}$ | Turn-Off DelayTime | | | 17 | | ns |
| $t_f$ | Turn-Off Fall Time | | | 2 | | ns |
| $t_{rr}$ | Body Diode Reverse Recovery Time | $I_F$=3.5A, dI/dt=300A/μs | 14 | 20 | 26 | ns |
| $Q_{rr}$ | Body Diode Reverse Recovery Charge | $I_F$=3.5A, dI/dt=300A/μs | 35 | 50 | 65 | nC |

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in$^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_A$ =25℃. The value in any given application depends on the user's specific board design.

B. The power dissipation $P_D$ is based on $T_{J(MAX)}$=150℃, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150℃. Ratings are based on low frequency and duty cycles to keep initial$T_J$=25℃.

D. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedence which is measured with the device mounted on 1in$^2$ FR-4 board with

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

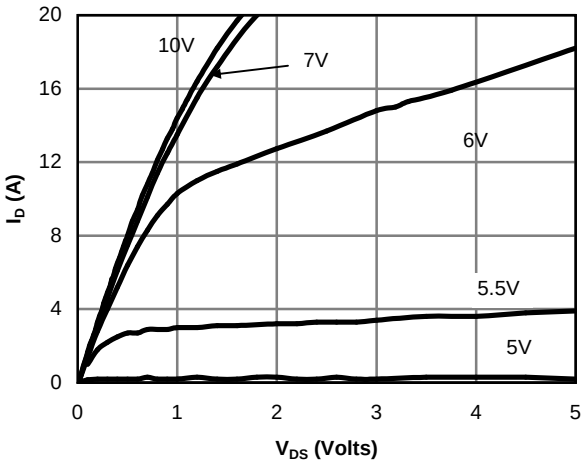



Fig 1: On-Region Characteristics (Note E)

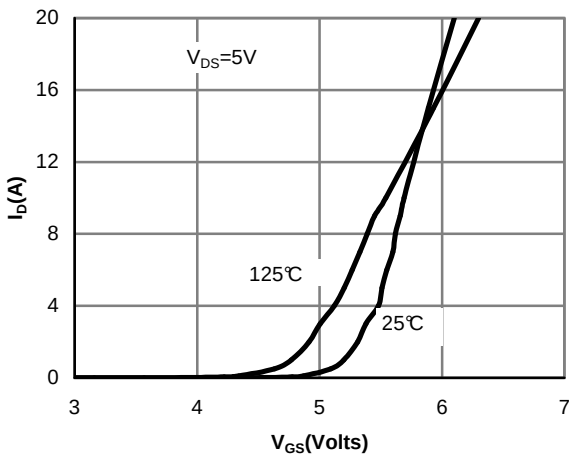



Figure 2: Transfer Characteristics (Note E)

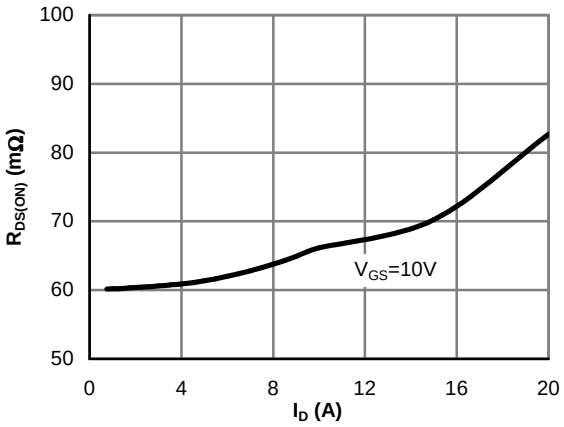



Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

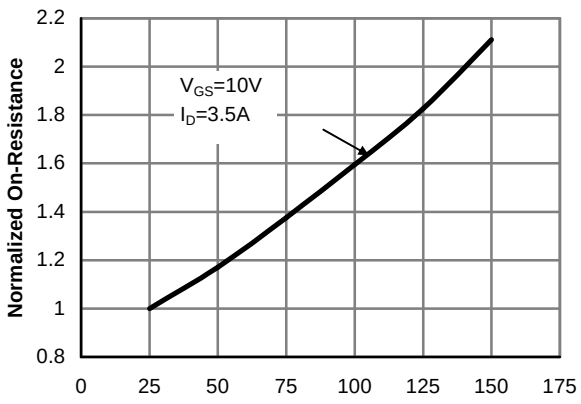



Figure 4: On-Resistance vs. Junction Temperature (Note E)

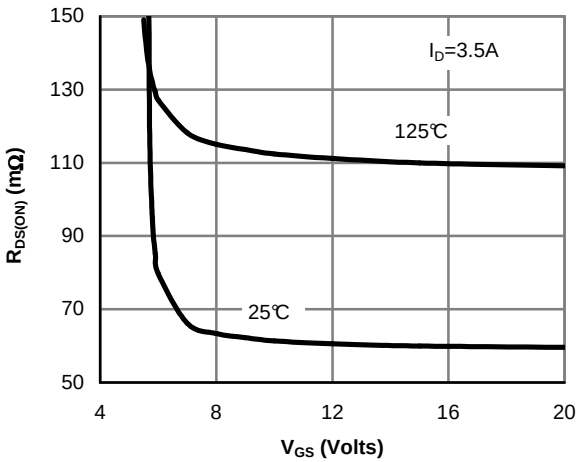



Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

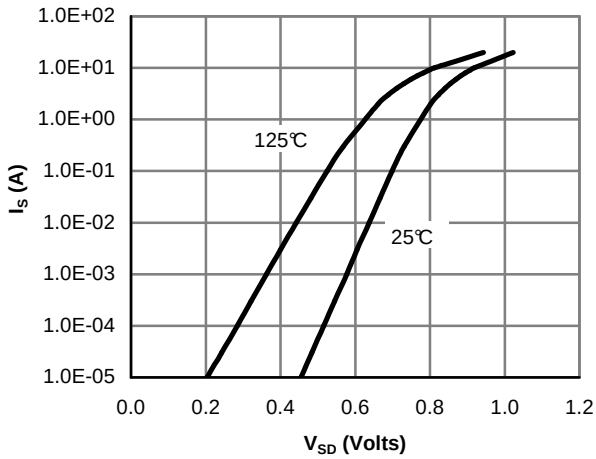



Figure 6: Body-Diode Characteristics (Note E)

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

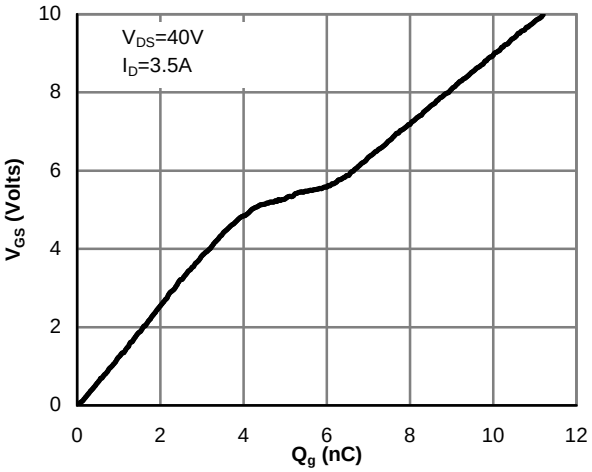



Figure 7: Gate-Charge Characteristics

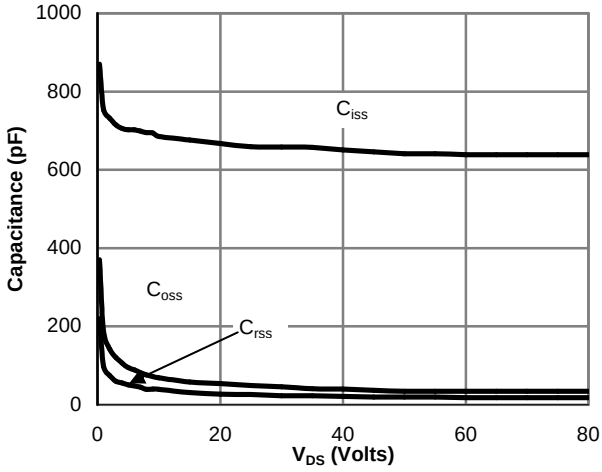



Figure 8: Capacitance Characteristics

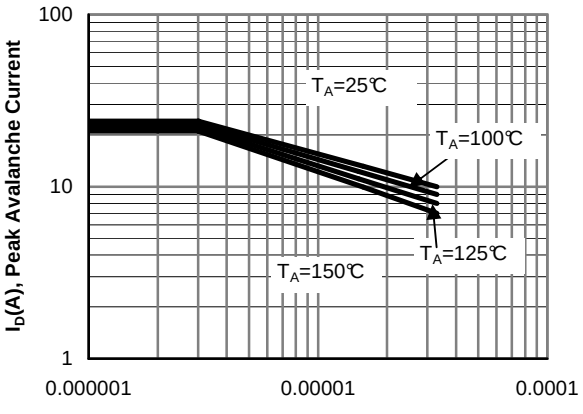



Figure 12: Single Pulse Avalanche capability

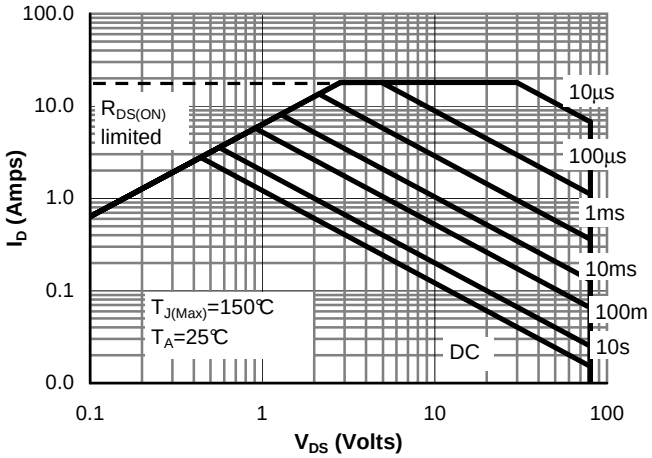



Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

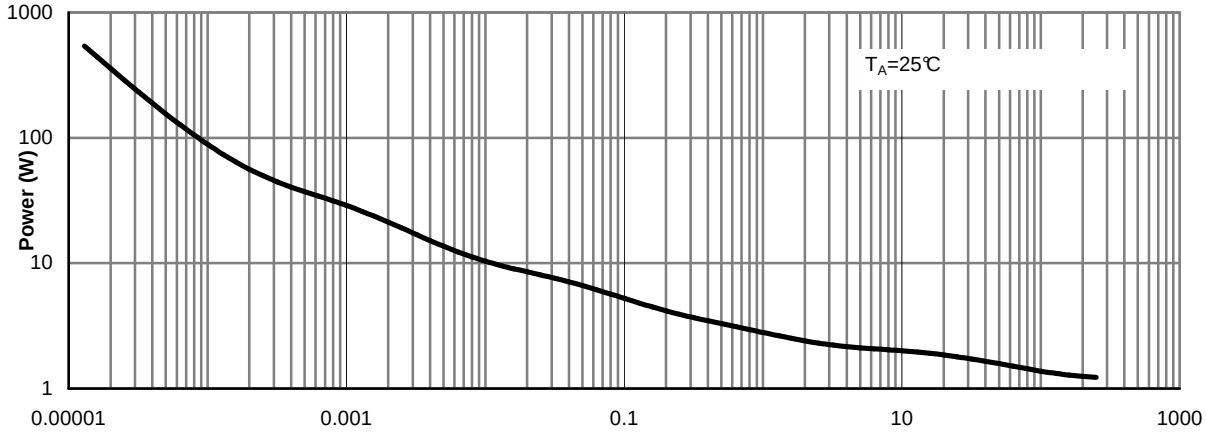



Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

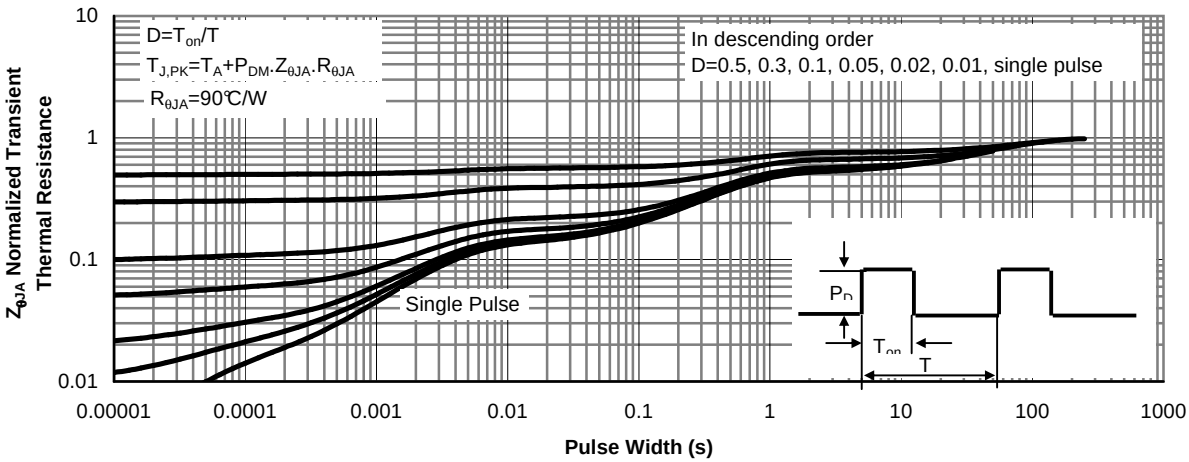
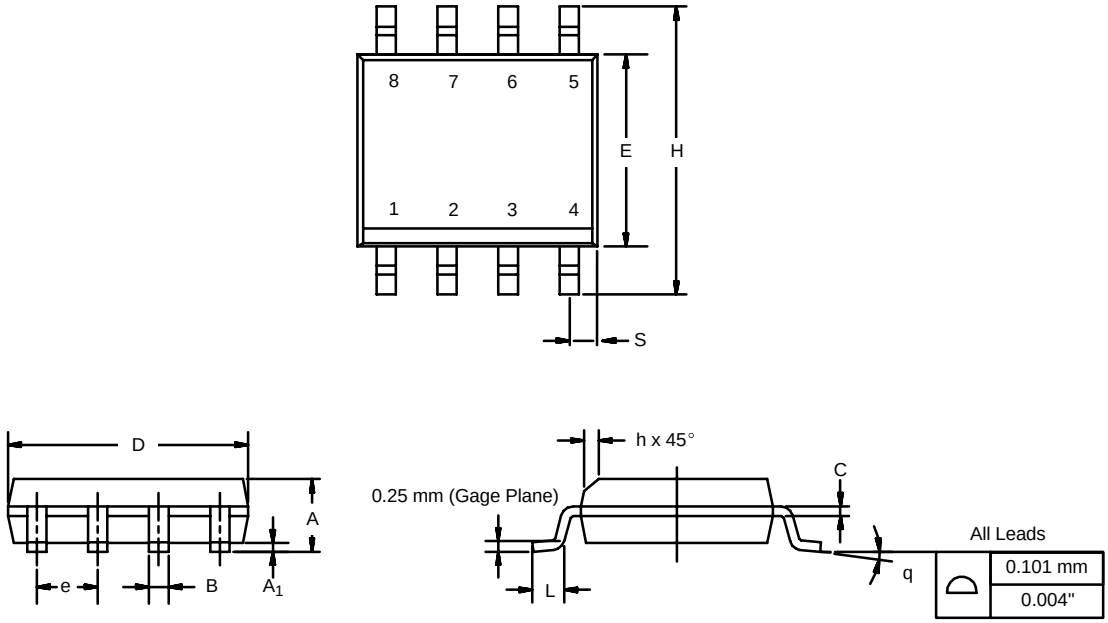



**Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)**

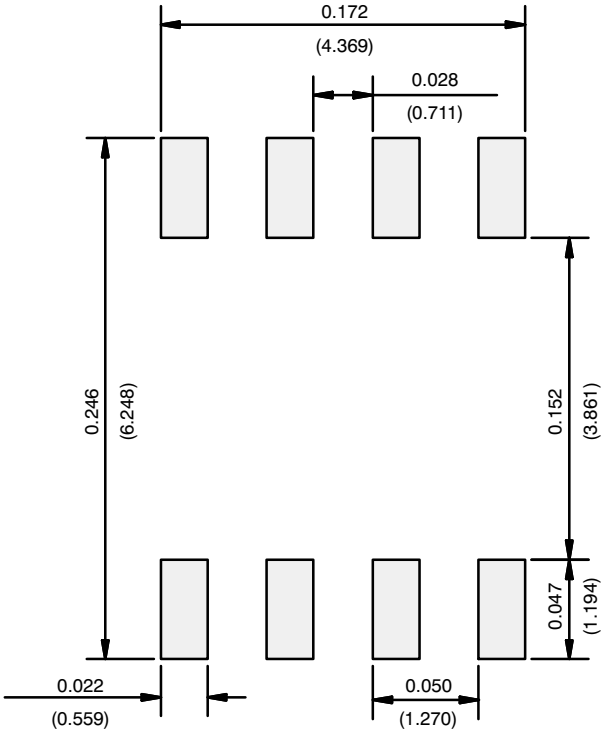
**SOIC (NARROW): 8-LEAD**

JEDEC Part Number: MS-012




| DIM | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.35 | 1.75 | 0.053 | 0.069 |
| $A_1$ | 0.10 | 0.20 | 0.004 | 0.008 |
| B | 0.35 | 0.51 | 0.014 | 0.020 |
| C | 0.19 | 0.25 | 0.0075 | 0.010 |
| D | 4.80 | 5.00 | 0.189 | 0.196 |
| E | 3.80 | 4.00 | 0.150 | 0.157 |
| e | 1.27 BSC | | 0.050 BSC | |
| H | 5.80 | 6.20 | 0.228 | 0.244 |
| h | 0.25 | 0.50 | 0.010 | 0.020 |
| L | 0.50 | 0.93 | 0.020 | 0.037 |
| q | 0° | 8° | 0° | 8° |
| S | 0.44 | 0.64 | 0.018 | 0.026 |
| ECN: C-06527-Rev. I, 11-Sep-06<br>DWG: 5498 | | | | |

## RECOMMENDED MINIMUM PADS FOR SO-8




Recommended Minimum Pads
Dimensions in Inches/(mm)

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