

N-Channel 200 V (D-S) MOSFET

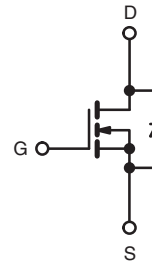
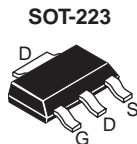
| PRODUCT SUMMARY | | |
|----------------------------|------------------------|-----|
| V _{DS} (V) | 200 | |
| R _{DS(on)} (Ω) | V _{GS} = 10 V | 1.2 |
| Q _g (Max.) (nC) | 8.2 | |
| Q _{gs} (nC) | 1.8 | |
| Q _{gd} (nC) | 4.5 | |
| Configuration | Single | |

FEATURES

- Available in tape and reel
- Dynamic dV/dt rating
- Repetitive avalanche rated
- Fast switching
- Ease of paralleling
- Simple drive requirements



RoHS
COMPLIANT
HALOGEN
FREE
Available



N-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted) | | | |
|---|-----------------------------------|-------------------------|------|
| PARAMETER | SYMBOL | LIMIT | UNIT |
| Drain-Source Voltage | V _{DS} | 200 | V |
| Gate-Source Voltage | V _{GS} | ± 20 | |
| Continuous Drain Current | V _{GS} at 10 V | T _C = 25 °C | A |
| | | T _C = 100 °C | |
| Pulsed Drain Current ^a | I _{DM} | 5.0 | W/°C |
| Linear Derating Factor | | 0.025 | |
| Linear Derating Factor (PCB Mount) ^e | | 0.017 | |
| Single Pulse Avalanche Energy ^b | E _{AS} | 50 | mJ |
| Repetitive Avalanche Current ^a | I _{AR} | 0.96 | A |
| Repetitive Avalanche Energy ^a | E _{AR} | 0.31 | mJ |
| Maximum Power Dissipation | P _D | T _C = 25 °C | W |
| | | T _A = 25 °C | |
| Peak Diode Recovery dV/dt ^c | dV/dt | 5.0 | V/ns |
| Operating Junction and Storage Temperature Range | T _J , T _{stg} | -55 to +150 | °C |
| Soldering Recommendations (Peak Temperature) ^d | for 10 s | 300 | |

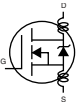

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- V_{DD} = 50 V, starting T_J = 25 °C, L = 81 mH, R_G = 25 Ω, I_{AS} = 0.96 A (see fig. 12).
- I_{SD} ≤ 3.3 A, dI/dt ≤ 70 A/μs, V_{DD} ≤ V_{DS}, T_J ≤ 150 °C.
- 1.6 mm from case.
- When mounted on 1" square PCB (FR-4 or G-10 material).

| THERMAL RESISTANCE RATINGS | | | | | |
|--|-------------------|------|------|------|------|
| PARAMETER | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Maximum Junction-to-Ambient (PCB Mount) ^a | R _{thJA} | - | - | 40 | °C/W |
| Maximum Junction-to-Case (Drain) | R _{thJC} | - | - | 60 | |

Note

a. When mounted on 1" square PCB (FR-4 or G-10 material).

| SPECIFICATIONS (T _J = 25 °C, unless otherwise noted) | | | | | | | |
|---|----------------------------------|--|--|------|------|-------|------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN. | TYP. | MAX. | UNIT |
| Static | | | | | | | |
| Drain-Source Breakdown Voltage | V _{DS} | V _{GS} = 0 V, I _D = 250 μA | | 200 | - | - | V |
| V _{DS} Temperature Coefficient | ΔV _{DS} /T _J | Reference to 25 °C, I _D = 1 mA | | - | 0.30 | - | V/°C |
| Gate-Source Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250 μA | | 2.0 | - | 4.0 | V |
| Gate-Source Leakage | I _{GSS} | V _{GS} = ± 20 V | | - | - | ± 100 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 200 V, V _{GS} = 0 V | | - | - | 25 | μA |
| | | V _{DS} = 160 V, V _{GS} = 0 V, T _J = 125 °C | | - | - | 250 | |
| Drain-Source On-State Resistance | R _{DS(on)} | V _{GS} = 10 V | I _D = 0.58 A ^b | - | 1.2 | - | Ω |
| Forward Transconductance | g _{fs} | V _{DS} = 50 V, I _D = 0.58 A | | 0.51 | - | - | S |
| Dynamic | | | | | | | |
| Input Capacitance | C _{iss} | V _{GS} = 0 V, V _{DS} = 25 V, f = 1.0 MHz, see fig. 5 | | - | 140 | - | pF |
| Output Capacitance | C _{oss} | | | - | 53 | - | |
| Reverse Transfer Capacitance | C _{rss} | | | - | 15 | - | |
| Total Gate Charge | Q _g | V _{GS} = 10 V | I _D = 3.3 A, V _{DS} = 160 V, see fig. 6 and 13 ^b | - | - | 8.2 | nC |
| Gate-Source Charge | Q _{gs} | | | - | - | 1.8 | |
| Gate-Drain Charge | Q _{gd} | | | - | - | 4.5 | |
| Turn-On Delay Time | t _{d(on)} | V _{DD} = 100 V, I _D = 3.3 A, R _g = 24 Ω, R _D = 30 Ω, see fig. 10 ^b | | - | 8.2 | - | ns |
| Rise Time | t _r | | | - | 17 | - | |
| Turn-Off Delay Time | t _{d(off)} | | | - | 14 | - | |
| Fall Time | t _f | | | - | 8.9 | - | |
| Internal Drain Inductance | L _D | Between lead, 6 mm (0.25") from package and center of die contact  | | - | 4.0 | - | nH |
| Internal Source Inductance | L _S | | | - | 6.0 | - | |
| Drain-Source Body Diode Characteristics | | | | | | | |
| Continuous Source-Drain Diode Current | I _S | MOSFET symbol showing the integral reverse p - n junction diode  | | - | - | 0.96 | A |
| Pulsed Diode Forward Current ^a | I _{SM} | | | - | - | 7.7 | |
| Body Diode Voltage | V _{SD} | T _J = 25 °C, I _S = 0.96 A, V _{GS} = 0 V ^b | | - | - | 2.0 | V |
| Body Diode Reverse Recovery Time | t _{rr} | T _J = 25 °C, I _F = 3.3 A, dI/dt = 100 A/μs ^b | | - | 150 | 310 | ns |
| Body Diode Reverse Recovery Charge | Q _{rr} | | | - | 0.60 | 1.4 | μC |
| Forward Turn-On Time | t _{on} | Intrinsic turn-on time is negligible (turn-on is dominated by L _S and L _D) | | | | | |

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).

b. Pulse width ≤ 300 μs; duty cycle ≤ 2 %.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

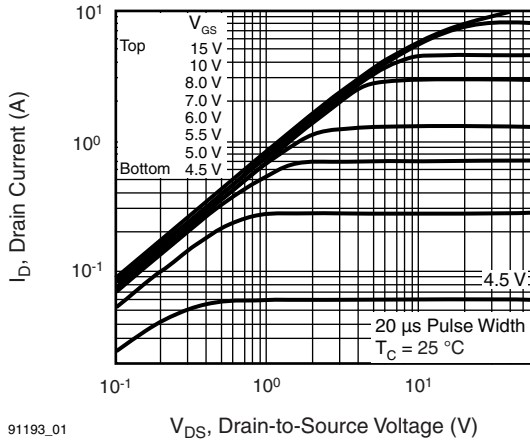


Fig. 1 - Typical Output Characteristics, $T_C = 25\text{ }^\circ\text{C}$

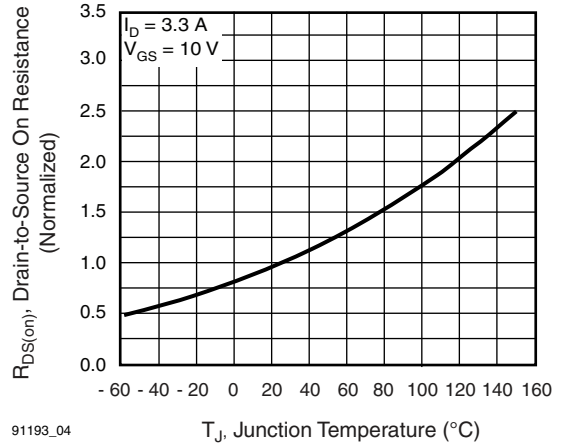


Fig. 4 - Normalized On-Resistance vs. Temperature

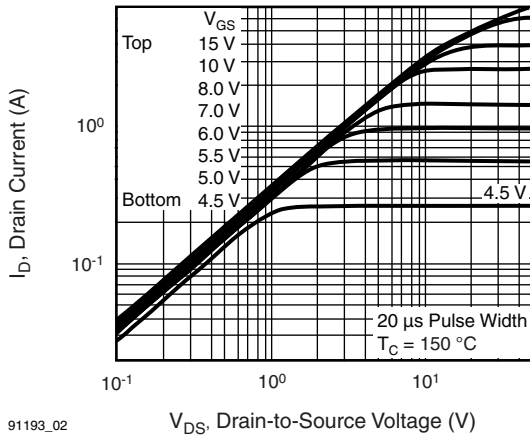


Fig. 2 - Typical Output Characteristics, $T_C = 150\text{ }^\circ\text{C}$

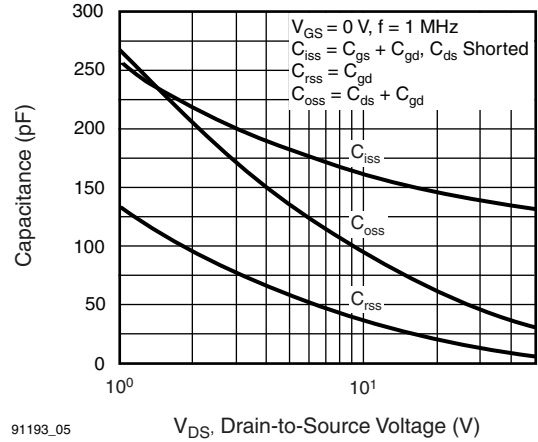


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

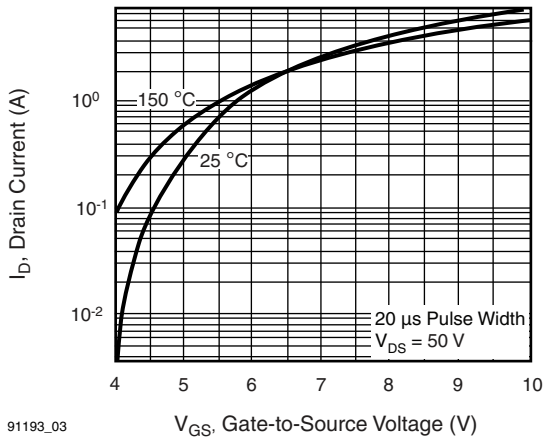


Fig. 3 - Typical Transfer Characteristics

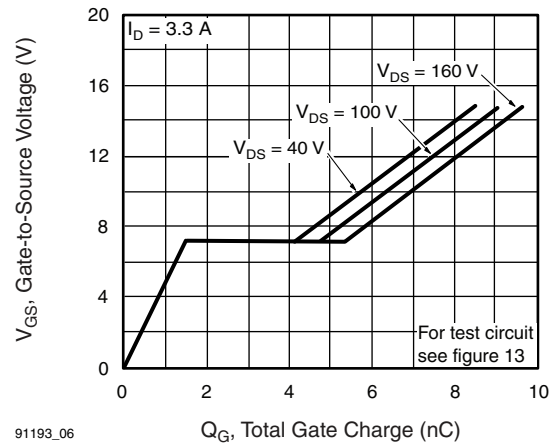
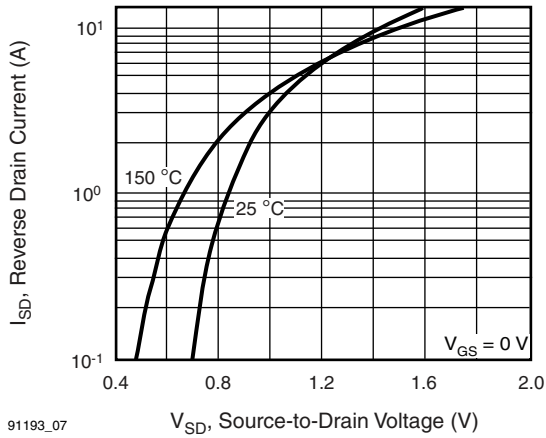
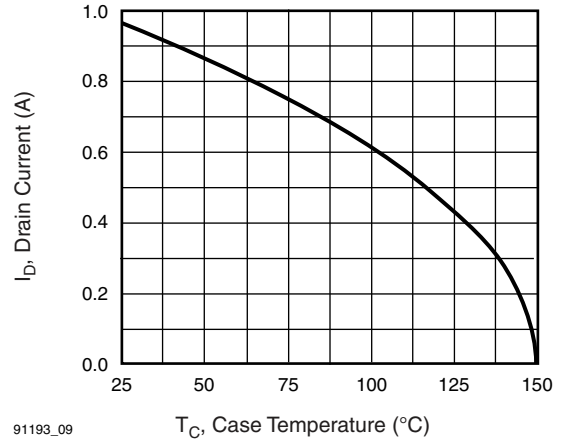


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage



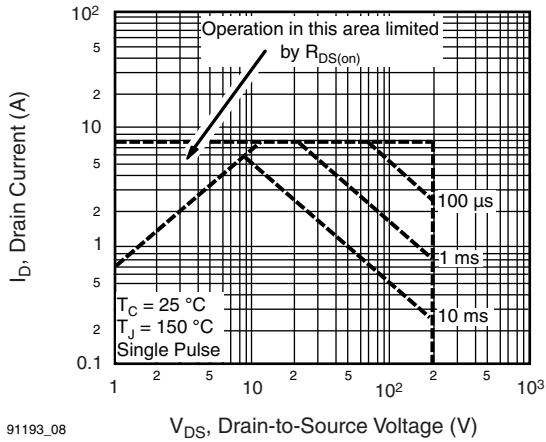
91193_07

Fig. 7 - Typical Source-Drain Diode Forward Voltage



91193_09

Fig. 9 - Maximum Drain Current vs. Case Temperature



91193_08

Fig. 8 - Maximum Safe Operating Area

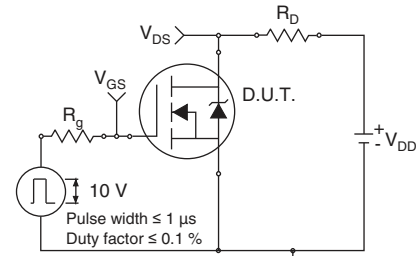


Fig. 10a - Switching Time Test Circuit

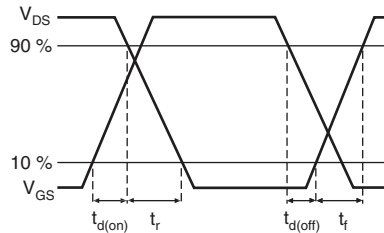
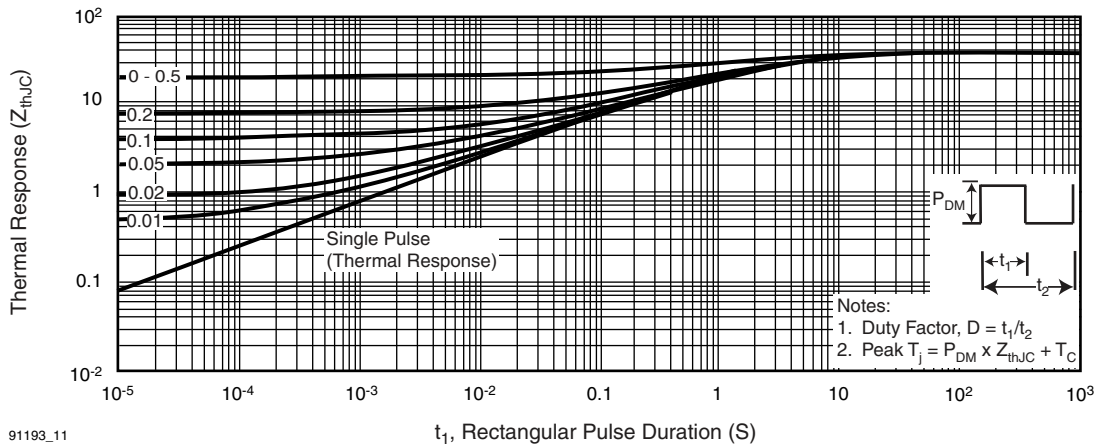


Fig. 10b - Switching Time Waveforms



91193_11

Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

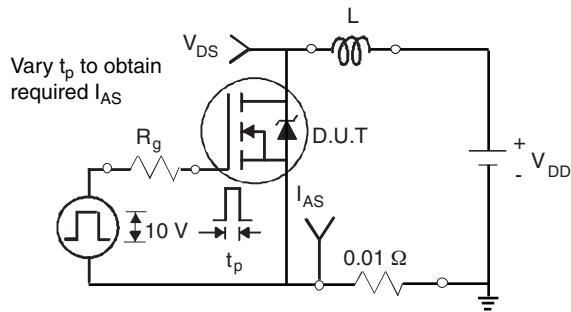


Fig. 12a - Unclamped Inductive Test Circuit

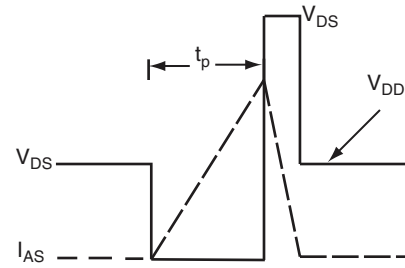


Fig. 12b - Unclamped Inductive Waveforms

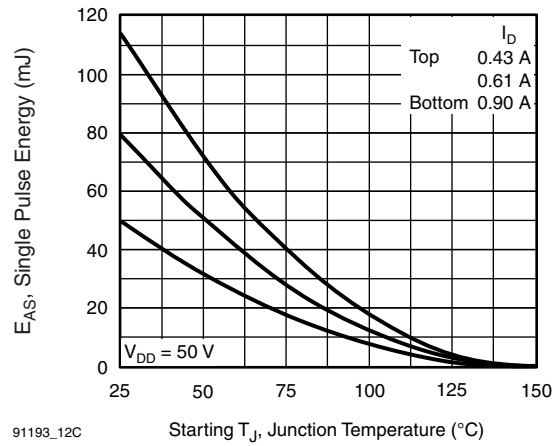


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

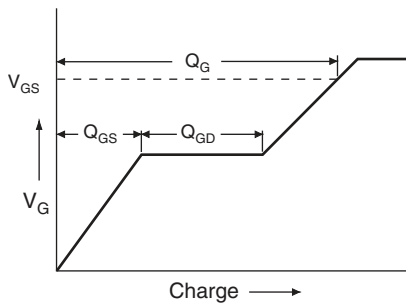


Fig. 13a - Basic Gate Charge Waveform

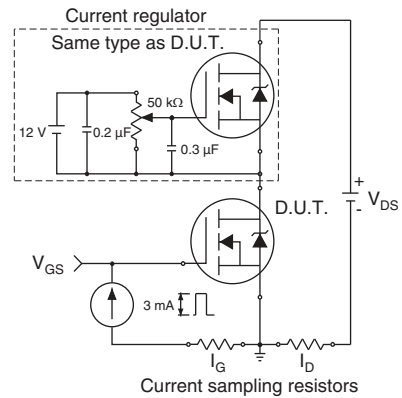
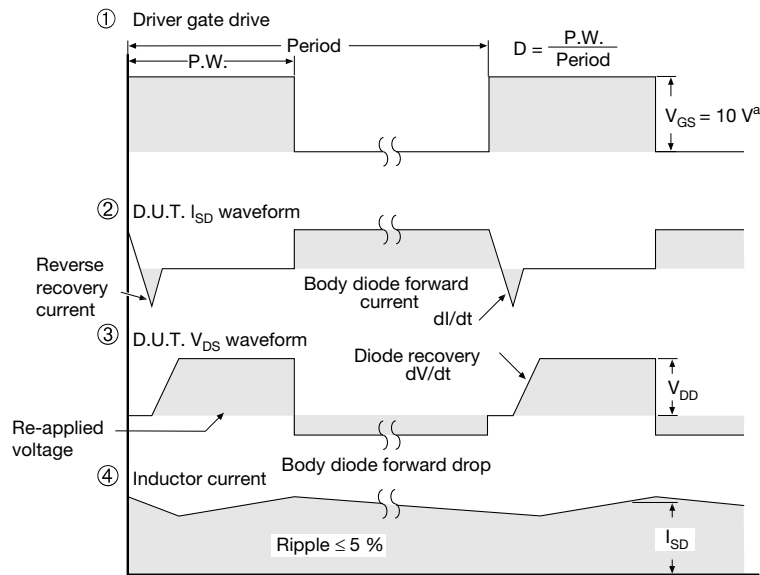
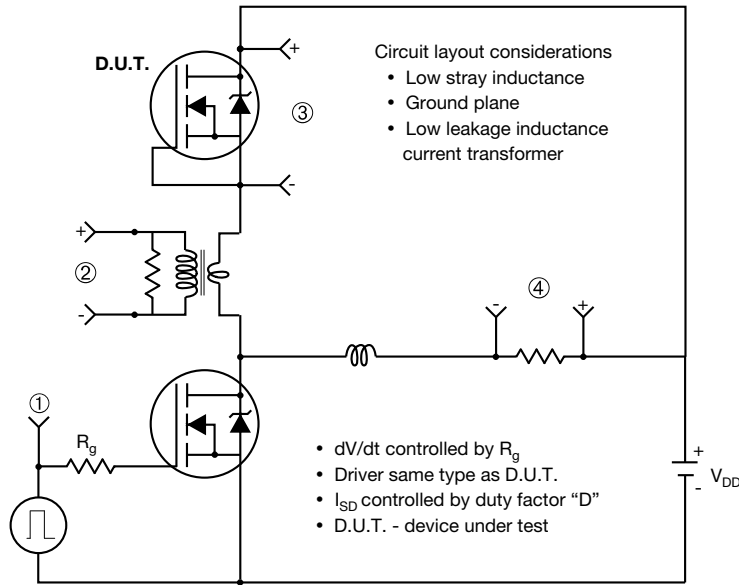


Fig. 13b - Gate Charge Test Circuit

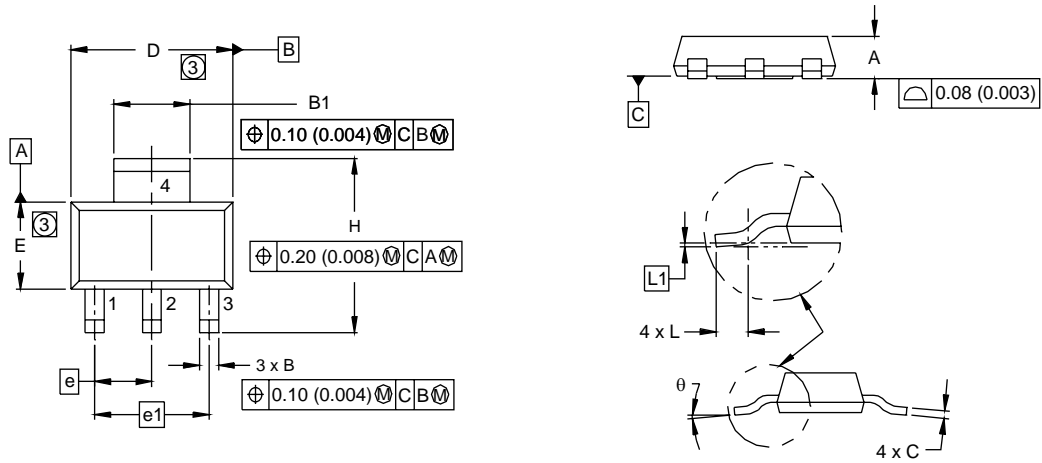
Peak Diode Recovery dV/dt Test Circuit



Note
a. $V_{GS} = 5 V$ for logic level devices

Fig. 14 - For N-Channel

SOT-223



| DIM. | MILLIMETERS | | INCHES | |
|----------|-------------|------|------------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 1.55 | 1.80 | 0.061 | 0.071 |
| B | 0.65 | 0.85 | 0.026 | 0.033 |
| B1 | 2.95 | 3.15 | 0.116 | 0.124 |
| C | 0.25 | 0.35 | 0.010 | 0.014 |
| D | 6.30 | 6.70 | 0.248 | 0.264 |
| E | 3.30 | 3.70 | 0.130 | 0.146 |
| e | 2.30 BSC | | 0.0905 BSC | |
| e1 | 4.60 BSC | | 0.181 BSC | |
| H | 6.71 | 7.29 | 0.264 | 0.287 |
| L | 0.91 | - | 0.036 | - |
| L1 | 0.061 BSC | | 0.0024 BSC | |
| θ | - | 10' | - | 10' |

ECN: S-82109-Rev. A, 15-Sep-08
DWG: 5969

Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension do not include mold flash.
4. Outline conforms to JEDEC outline TO-261AA.

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