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FEATURES **IEEE802.3af Compatible**

- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current : 10 μ A (Max.) @ $V_{DS} = 100V$
- Lower $R_{DS(ON)}$: 0.155 Ω (Typ.)

$BV_{DSS} = 100 V$
 $R_{DS(on)} = 0.2 \Omega$
 $I_D = 2.3 A$

SOT-223



1. Gate 2. Drain 3. Source

Absolute Maximum Ratings

| Symbol | Characteristic | Value | Units |
|----------------|---|--------------|---------------|
| V_{DSS} | Drain-to-Source Voltage | 100 | V |
| I_D | Continuous Drain Current ($T_A=25^\circ C$) | 2.3 | A |
| | Continuous Drain Current ($T_A=70^\circ C$) | 1.84 | |
| I_{DM} | Drain Current-Pulsed ^① | 18 | A |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| E_{AS} | Single Pulsed Avalanche Energy ^② | 123 | mJ |
| I_{AR} | Avalanche Current ^① | 2.3 | A |
| E_{AR} | Repetitive Avalanche Energy ^① | 0.24 | mJ |
| dv/dt | Peak Diode Recovery dv/dt ^③ | 6.5 | V/ns |
| P_D | Total Power Dissipation ($T_A=25^\circ C$) * | 2.4 | W |
| | Linear Derating Factor * | 0.019 | W/ $^\circ C$ |
| T_J, T_{STG} | Operating Junction and Storage Temperature Range | - 55 to +150 | $^\circ C$ |
| T_L | Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5-seconds | 300 | |

Thermal Resistance

| Symbol | Characteristic | Typ. | Max. | Units |
|-----------------|-----------------------|------|------|--------------|
| $R_{\theta JA}$ | Junction-to-Ambient * | -- | 52 | $^\circ C/W$ |

* When mounted on the minimum pad size recommended (PCB Mount).

Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise specified)

| Symbol | Characteristic | Min. | Typ. | Max. | Units | Test Condition |
|------------------------|---|------|------|------|---------------------|--|
| BV_{DSS} | Drain-Source Breakdown Voltage | 100 | -- | -- | V | $V_{GS}=0V, I_D=250\mu A$ |
| $\Delta BV/\Delta T_J$ | Breakdown Voltage Temp. Coeff. | -- | 0.12 | -- | V/ $^\circ\text{C}$ | $I_D=250\mu A$ See Fig 7 |
| $V_{GS(th)}$ | Gate Threshold Voltage | 2.0 | -- | 4.0 | V | $V_{DS}=5V, I_D=250\mu A$ |
| I_{GSS} | Gate-Source Leakage, Forward | -- | -- | 100 | nA | $V_{GS}=20V$ |
| | Gate-Source Leakage, Reverse | -- | -- | -100 | | $V_{GS}=-20V$ |
| I_{DSS} | Drain-to-Source Leakage Current | -- | -- | 1 | μA | $V_{DS}=30V$ ⑥ |
| | | -- | -- | 10 | | $V_{DS}=100V$ |
| | | -- | -- | 100 | | $V_{DS}=80V, T_A=125^\circ\text{C}$ |
| $R_{DS(on)}$ | Static Drain-Source On-State Resistance | -- | -- | 0.2 | Ω | $V_{GS}=10V, I_D=1.15A$ ④ |
| g_{fs} | Forward Transconductance | -- | 3.12 | -- | S | $V_{DS}=40V, I_D=1.15A$ ④ |
| C_{iss} | Input Capacitance | -- | 370 | 480 | pF | $V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$ See Fig 5 |
| C_{oss} | Output Capacitance | -- | 95 | 110 | | |
| C_{rss} | Reverse Transfer Capacitance | -- | 38 | 45 | | |
| $t_{d(on)}$ | Turn-On Delay Time | -- | 14 | 40 | ns | $V_{DD}=50V, I_D=9.2A,$ $R_G=18\Omega$ See Fig 13 ④ ⑤ |
| t_r | Rise Time | -- | 14 | 40 | | |
| $t_{d(off)}$ | Turn-Off Delay Time | -- | 36 | 90 | | |
| t_f | Fall Time | -- | 28 | 70 | | |
| Q_g | Total Gate Charge | -- | 16 | 22 | nC | $V_{DS}=80V, V_{GS}=10V,$ $I_D=9.2A$ See Fig 6 & Fig 12 ④ ⑤ |
| Q_{gs} | Gate-Source Charge | -- | 2.7 | -- | | |
| Q_{gd} | Gate-Drain("Miller") Charge | -- | 7.8 | -- | | |

Source-Drain Diode Ratings and Characteristics

| Symbol | Characteristic | Min. | Typ. | Max. | Units | Test Condition |
|----------|---------------------------|------|------|------|---------|---|
| I_S | Continuous Source Current | -- | -- | 2.3 | A | Integral reverse pn-diode in the MOSFET |
| I_{SM} | Pulsed-Source Current ① | -- | -- | 18 | | |
| V_{SD} | Diode Forward Voltage ④ | -- | -- | 1.5 | V | $T_J=25^\circ\text{C}, I_S=2.3A, V_{GS}=0V$ |
| t_{rr} | Reverse Recovery Time | -- | 98 | -- | ns | $T_J=25^\circ\text{C}, I_F=9.2A$ |
| Q_{rr} | Reverse Recovery Charge | -- | 0.34 | -- | μC | $di_F/dt=100A/\mu s$ ④ |

Notes ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② $L=35\text{mH}, I_{AS}=2.3A, V_{DD}=25V, R_G=27\Omega,$ Starting $T_J=25^\circ\text{C}$
- ③ $I_{SD}\leq 9.2A, di/dt\leq 300A/\mu s, V_{DD}\leq BV_{DSS},$ Starting $T_J=25^\circ\text{C}$
- ④ Pulse Test : Pulse Width = $250\mu s,$ Duty Cycle $\leq 2\%$
- ⑤ Essentially Independent of Operating Temperature
- ⑥ Adjusted for Cisco

Fig 1. Output Characteristics

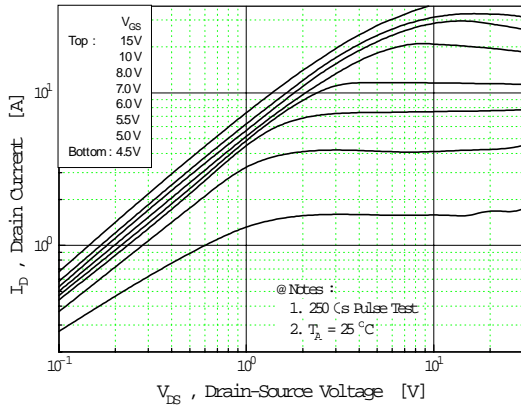


Fig 2. Transfer Characteristics

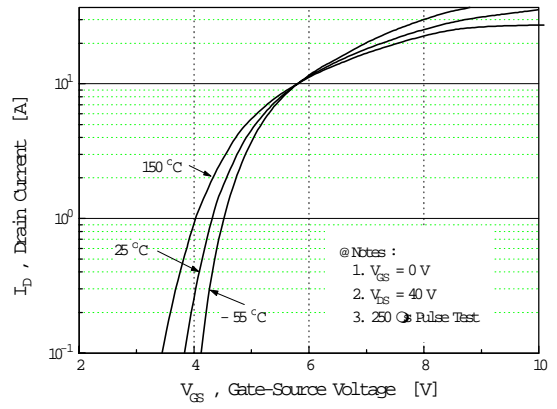


Fig 3. On-Resistance vs. Drain Current

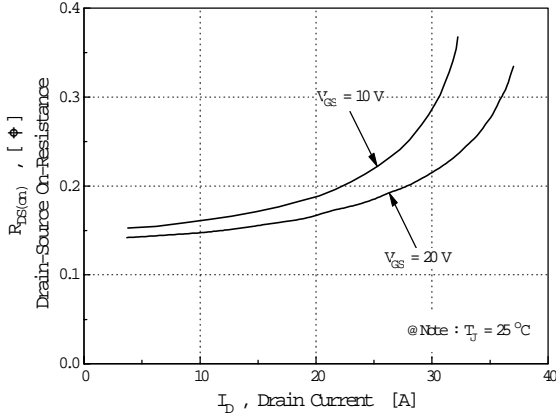


Fig 4. Source-Drain Diode Forward Voltage

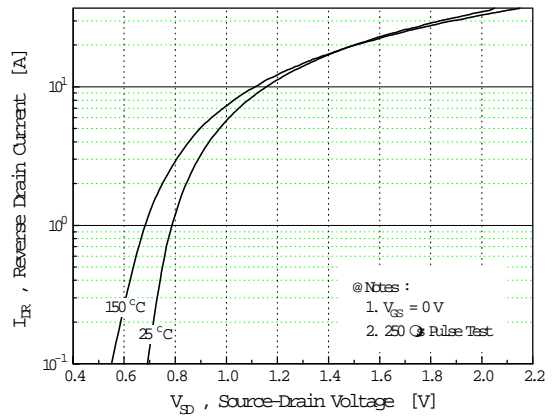


Fig 5. Capacitance vs. Drain-Source Voltage

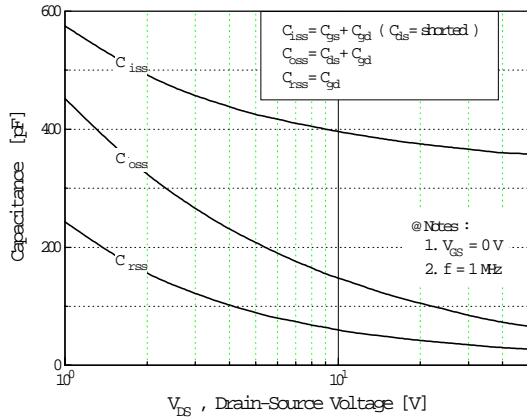


Fig 6. Gate Charge vs. Gate-Source Voltage

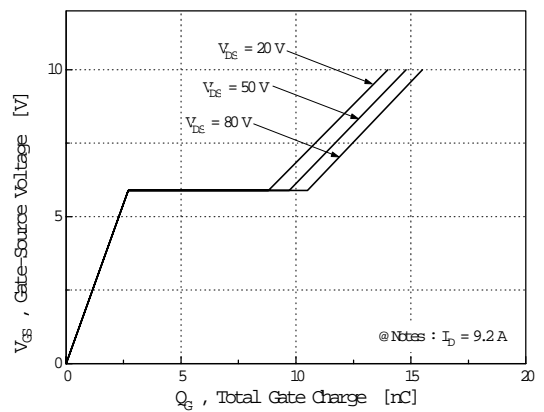


Fig 7. Breakdown Voltage vs. Temperature

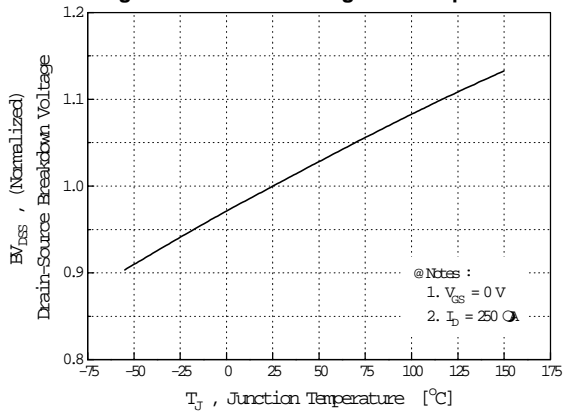


Fig 8. On-Resistance vs. Temperature

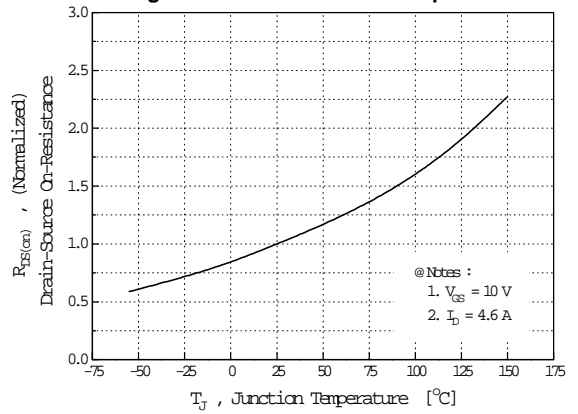


Fig 9. Max. Safe Operating Area

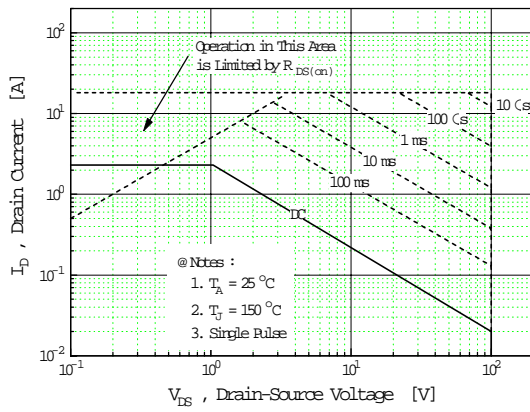


Fig 10. Max. Drain Current vs. Ambient Temperature

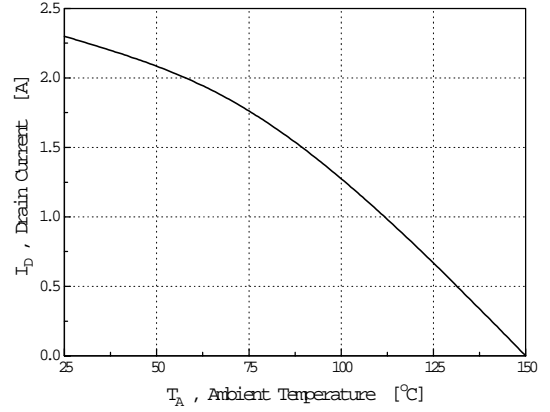


Fig 11. Thermal Response

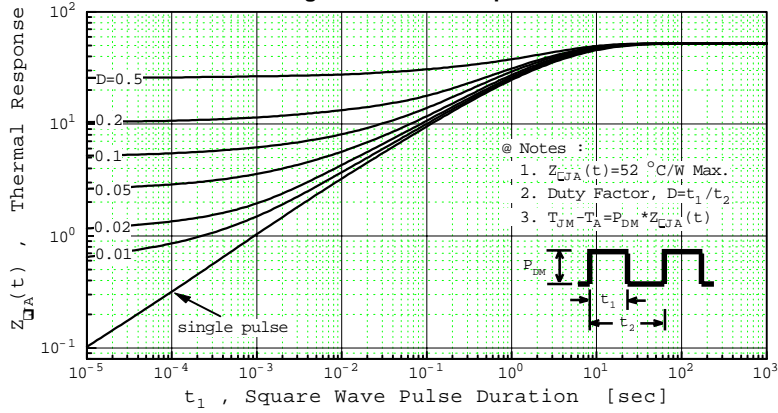


Fig 12. Gate Charge Test Circuit & Waveform

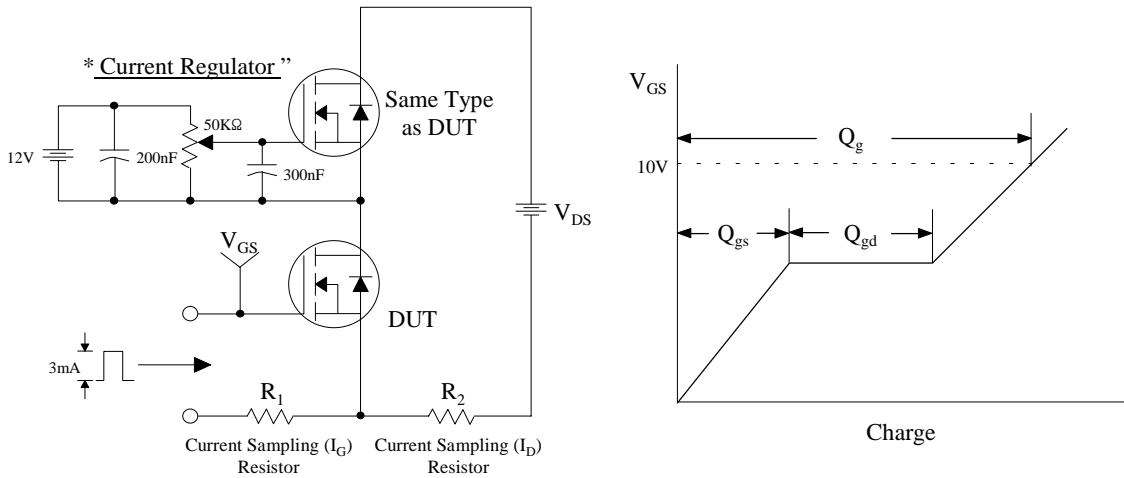


Fig 13. Resistive Switching Test Circuit & Waveforms

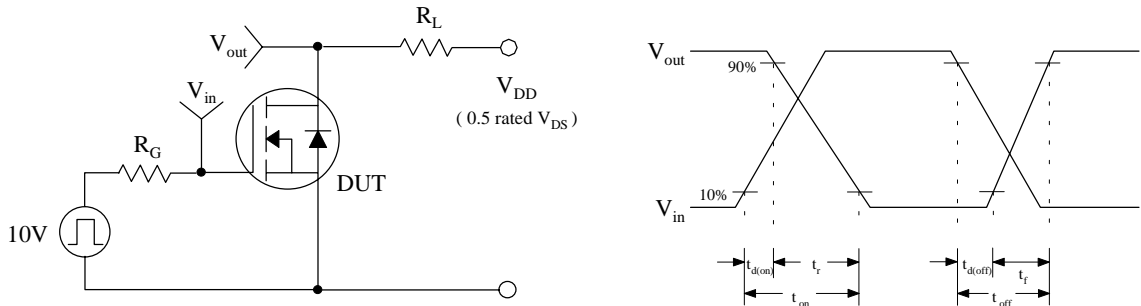


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

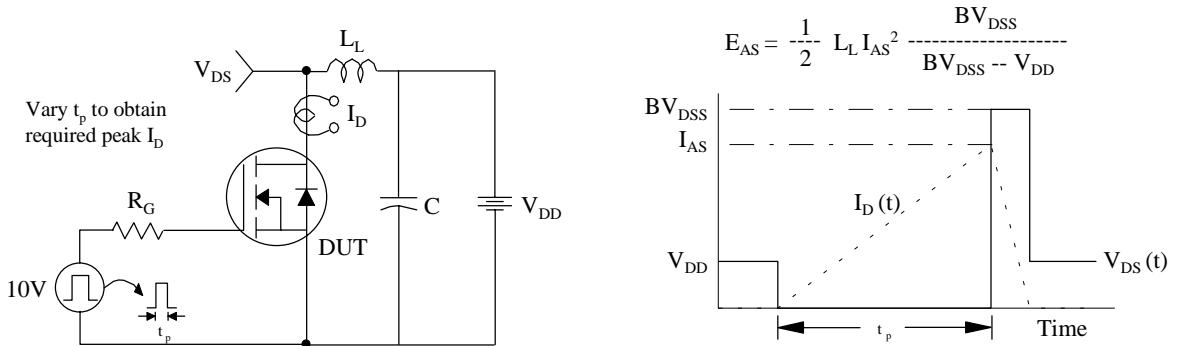
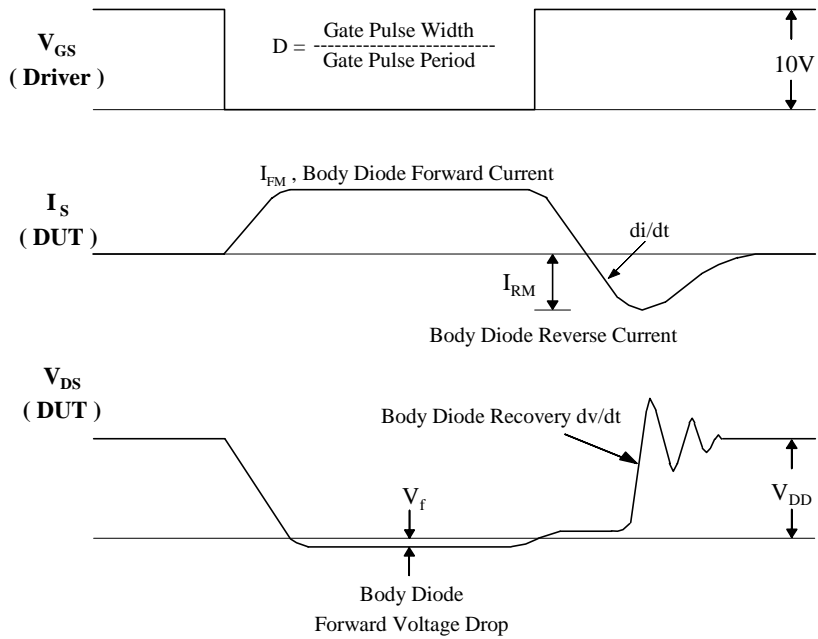
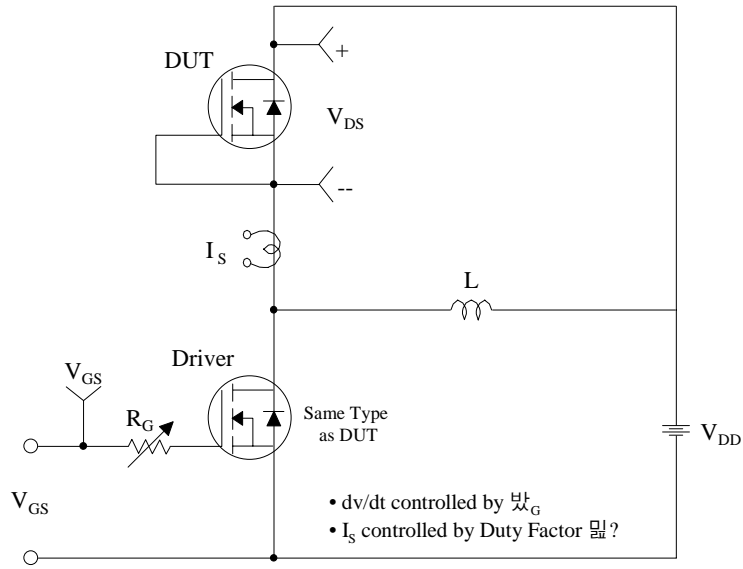
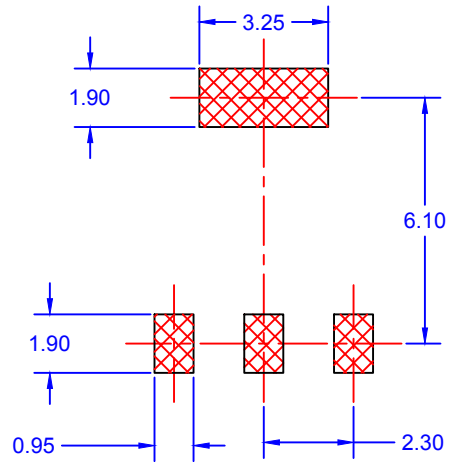
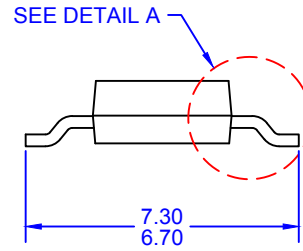
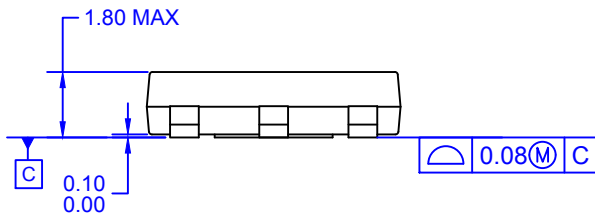


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

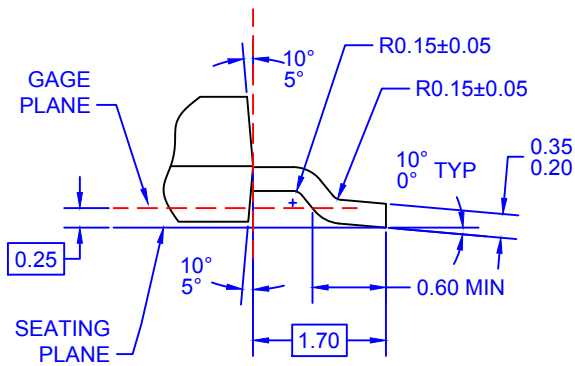




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- NOTES: UNLESS OTHERWISE SPECIFIED
 A) DRAWING BASED ON JEDEC REGISTRATION TO-261C, VARIATION AA.
 B) ALL DIMENSIONS ARE IN MILLIMETERS.
 C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
 D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.
 E) LANDPATTERN NAME: SOT230P700X180-4BN
 F) DRAWING FILENAME: MKT-MA04AREV3



DETAIL A
 SCALE: 2:1



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