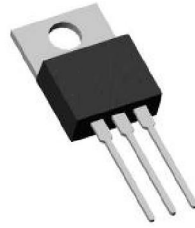


Main Product Characteristics

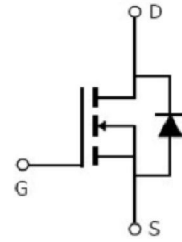
| | |
|--------------|---------------|
| V_{DSS} | 100V |
| $R_{DS(on)}$ | 9.5mohm(typ.) |
| I_D | 100A |



TO-220



Marking and Pin Assignment



Schematic Diagram

Features and Benefits

- Advanced trench MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 175°C operating temperature
- Lead free product



Description

It utilizes the latest trench processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

Absolute Max Rating

| Symbol | Parameter | Max. | Units |
|--------------------------|---|--------------|-------|
| $I_D @ TC = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ ^① | 100 | A |
| $I_D @ TC = 100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ ^① | 70 | |
| I_{DM} | Pulsed Drain Current ^② | 400 | |
| $P_D @ TC = 25^\circ C$ | Power Dissipation ^③ | 205 | W |
| | Linear Derating Factor | 1.3 | W/°C |
| V_{DS} | Drain-Source Voltage | 100 | V |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| E_{AS} | Single Pulse Avalanche Energy @ L=1.28mH | 576 | mJ |
| I_{AS} | Avalanche Current @ L=1.28mH | 30 | A |
| $T_J \quad T_{STG}$ | Operating Junction and Storage Temperature Range | -55 to + 175 | °C |

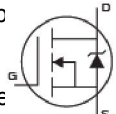
Thermal Resistance

| Symbol | Characteristics | Typ. | Max. | Units |
|-----------------|--|------|------|---------------|
| $R_{\theta JC}$ | Junction-to-case ^③ | — | 0.73 | $^{\circ}C/W$ |
| $R_{\theta JA}$ | Junction-to-ambient ($t \leq 10s$) ^④ | — | 62 | $^{\circ}C/W$ |
| | Junction-to-Ambient (PCB mounted, steady-state) ^④ | — | 40 | $^{\circ}C/W$ |

Electrical Characteristics @ $T_A=25^{\circ}C$ unless otherwise specified

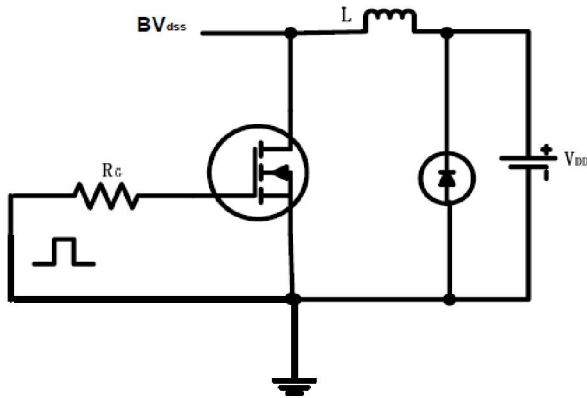
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---------------|--------------------------------------|------|------|------|------------|---|
| $V_{(BR)DSS}$ | Drain-to-Source breakdown voltage | 100 | — | — | V | $V_{GS} = 0V, I_D = 250\mu A$ |
| $R_{DS(on)}$ | Static Drain-to-Source on-resistance | — | 9.5 | 10 | m Ω | $V_{GS}=10V, I_D = 30A$ |
| | | — | 17.8 | — | | $T_J = 125^{\circ}C$ |
| $V_{GS(th)}$ | Gate threshold voltage | 2 | — | 4 | V | $V_{DS} = V_{GS}, I_D = 250\mu A$ |
| | | — | 2.52 | — | | $T_J = 125^{\circ}C$ |
| I_{DSS} | Drain-to-Source leakage current | — | — | 1 | μA | $V_{DS} = 100V, V_{GS} = 0V$ |
| | | — | — | 50 | | $T_J = 125^{\circ}C$ |
| I_{GSS} | Gate-to-Source forward leakage | — | — | 100 | nA | $V_{GS} = 20V$ |
| | | -100 | — | — | | $V_{GS} = -20V$ |
| Q_g | Total gate charge | — | 120 | — | nC | $I_D = 30A,$ $V_{DS}=30V,$ $V_{GS} = 10V$ |
| Q_{gs} | Gate-to-Source charge | — | 24 | — | | |
| Q_{gd} | Gate-to-Drain("Miller") charge | — | 45 | — | | |
| $t_{d(on)}$ | Turn-on delay time | — | 39 | — | ns | $V_{GS}=10V, V_{DS}=30V,$ $R_L=15\Omega,$ $R_{GEN}=2.5\Omega$ $I_D=2A$ |
| t_r | Rise time | — | 67 | — | | |
| $t_{d(off)}$ | Turn-Off delay time | — | 221 | — | | |
| t_f | Fall time | — | 79 | — | | |
| C_{iss} | Input capacitance | — | 5688 | — | pF | $V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1MHz$ |
| C_{oss} | Output capacitance | — | 312 | — | | |
| C_{rss} | Reverse transfer capacitance | — | 287 | — | | |

Source-Drain Ratings and Characteristics

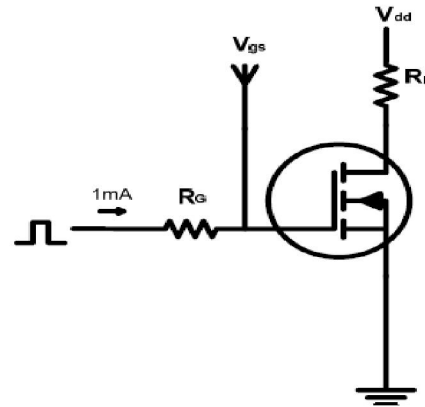
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|----------|---|------|------|------|-------|--|
| I_S | Continuous Source Current (Body Diode) | — | — | 100 | A | MOSFET symb showing the integral reverse p-n junction diode.  |
| I_{SM} | Pulsed Source Current (Body Diode) | — | — | 400 | A | |
| V_{SD} | Diode Forward Voltage | — | 0.85 | 1.3 | V | $I_S=60A, V_{GS}=0V$ |
| t_{rr} | Reverse Recovery Time | — | 51 | — | ns | $T_J = 25^{\circ}C, I_F = 75A, di/dt = 100A/\mu s$ |
| Q_{rr} | Reverse Recovery Charge | — | 135 | — | nC | |

Test Circuits and Waveforms

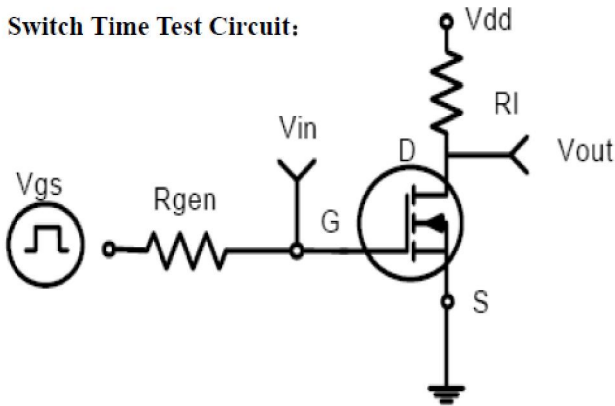
EAS test circuits:



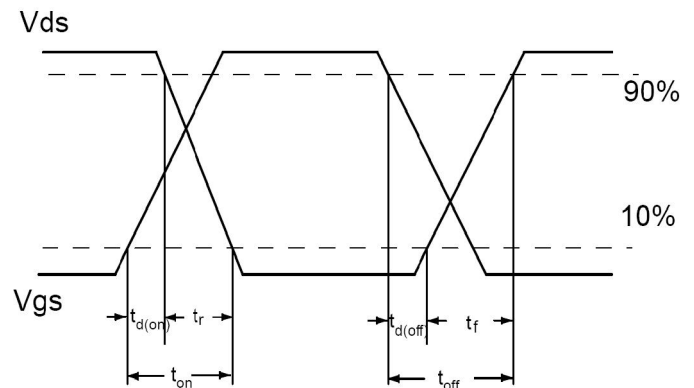
Gate charge test circuit:



Switch Time Test Circuit:



Waveforms:



Notes:

- ① The maximum current rating is limited by bond-wires.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ 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 $T_A = 25^\circ\text{C}$
- ⑤ These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)} = 175^\circ\text{C}$.
- ⑥ The maximum current rating is limited by bond-wires.

Typical Electrical and Thermal Characteristics

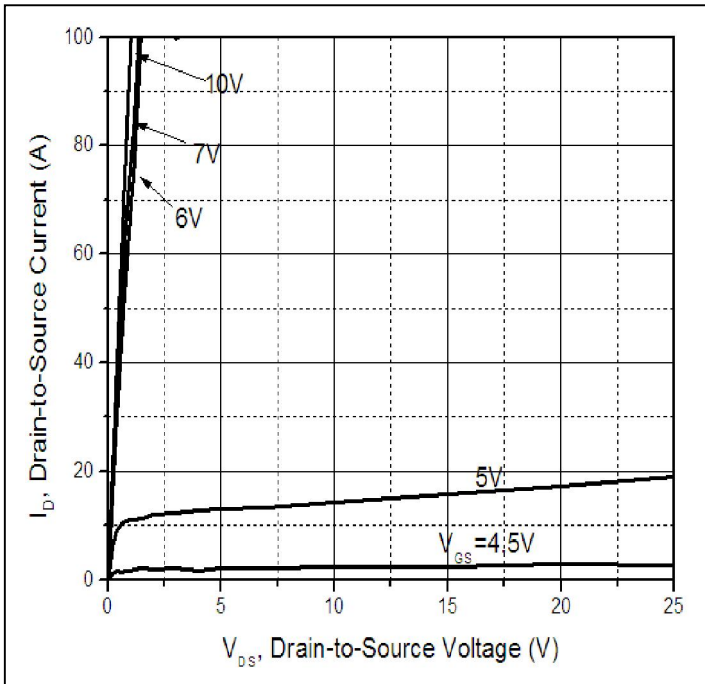


Figure 1: Typical Output Characteristics

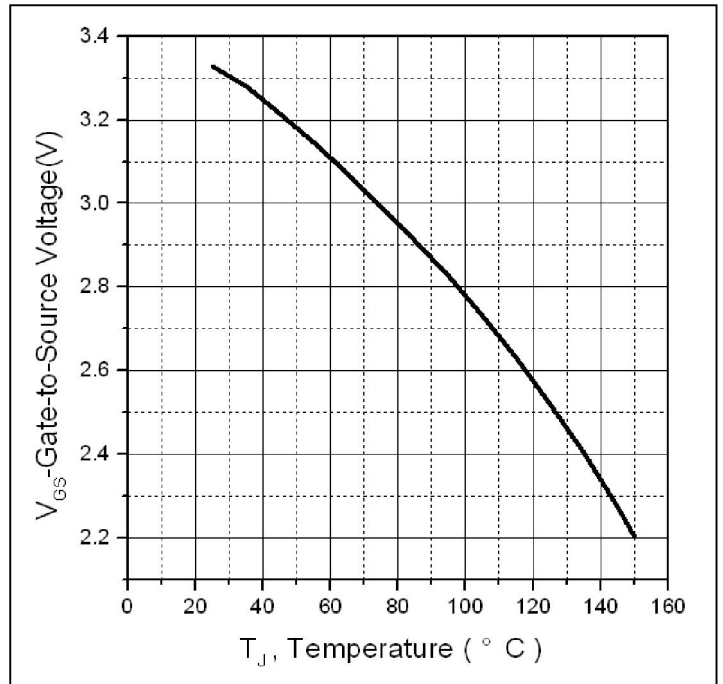


Figure 2. Gate to source cut-off voltage

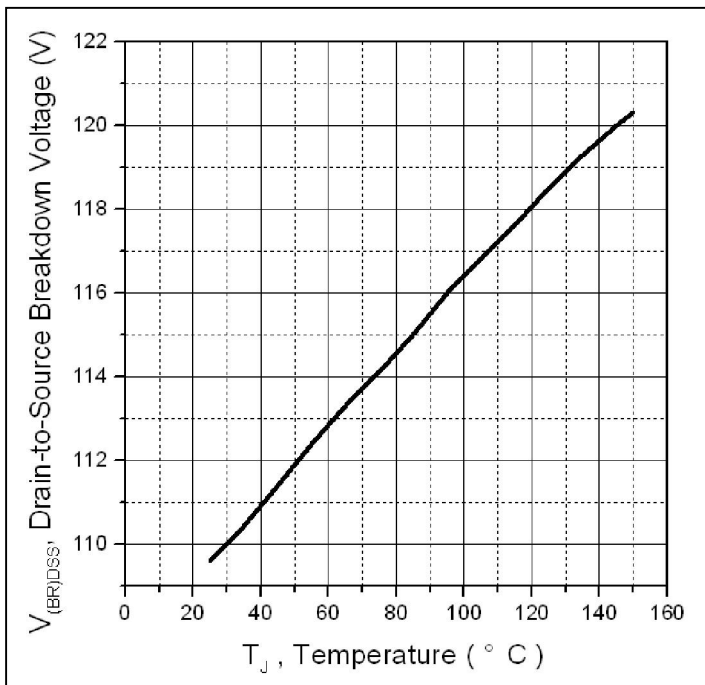


Figure 3. Drain-to-Source Breakdown Voltage vs. Temperature

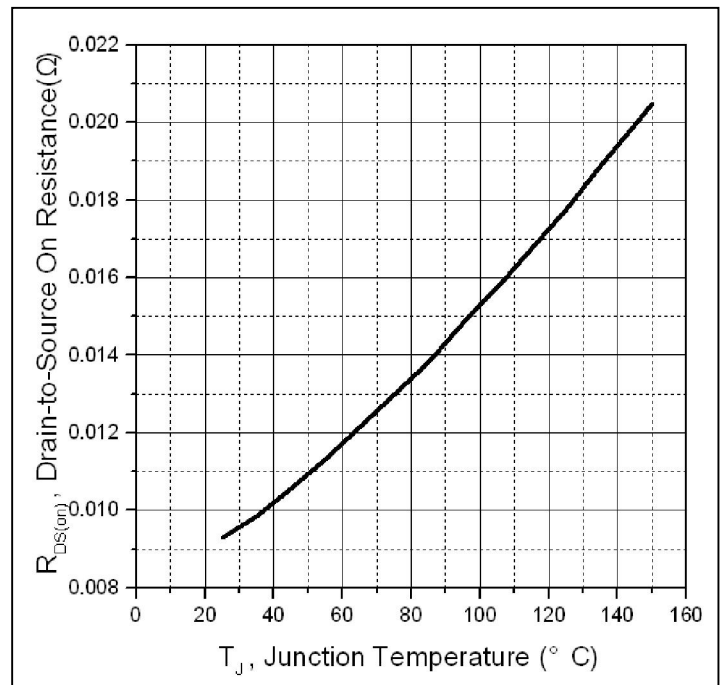


Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical Electrical and Thermal Characteristics

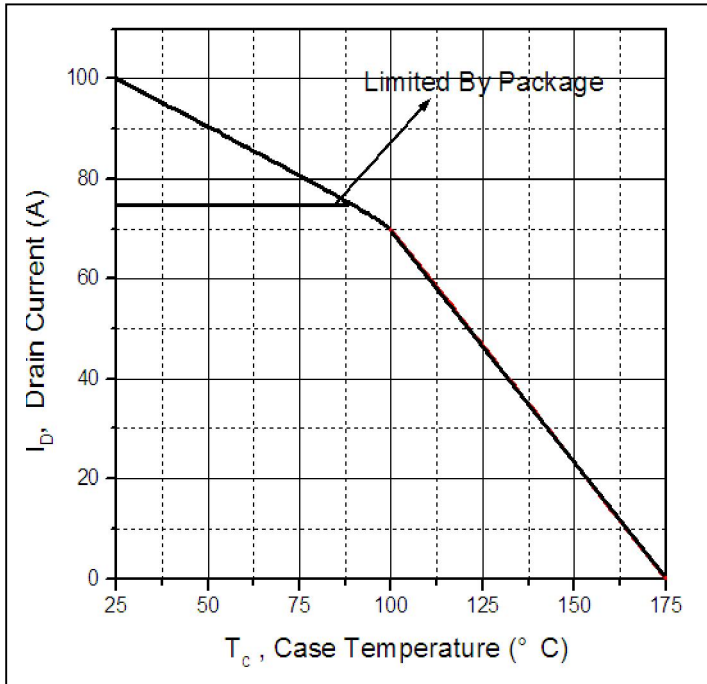


Figure 5. Maximum Drain Current Vs. Case Temperature

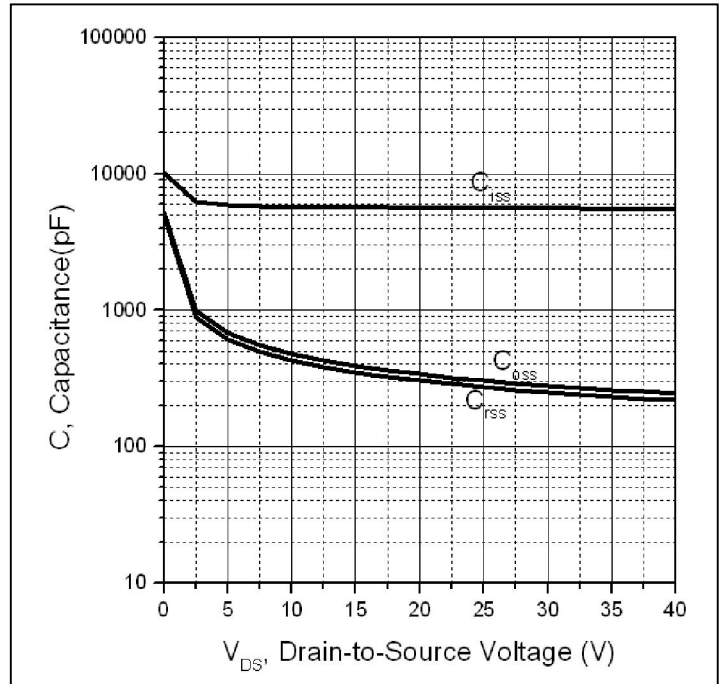


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

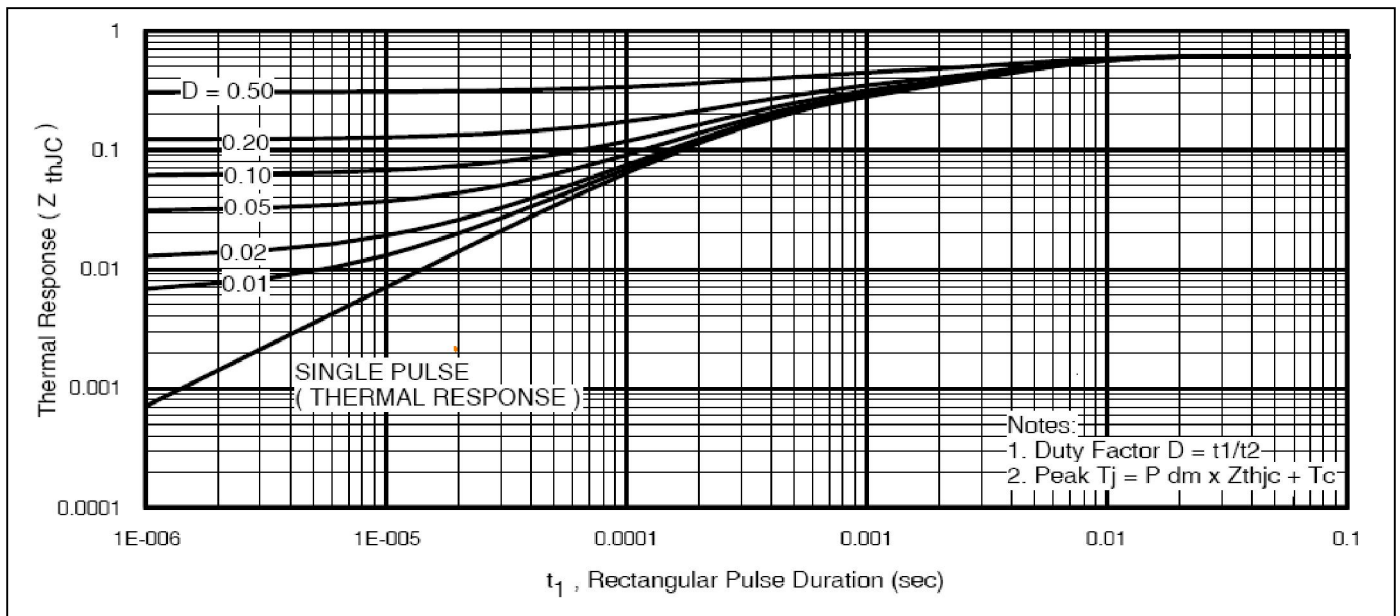
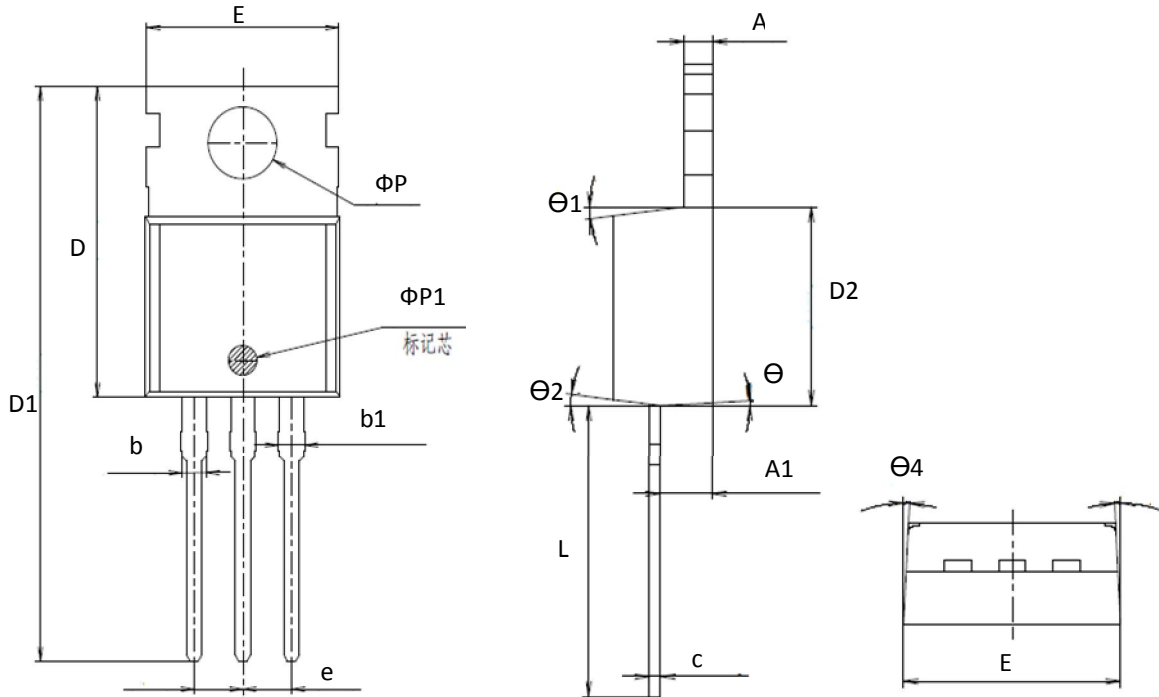


Figure 7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Mechanical Data

TO-220 PACKAGE OUTLINE DIMENSION_GN



| Symbol | Dimension In Millimeters | | | Dimension In Inches | | |
|--------|--------------------------|----------------|--------|---------------------|----------------|----------------|
| | Min | Nom | Max | Min | Nom | Max |
| A | - | 1.300 | - | - | 0.051 | - |
| A1 | 2.200 | 2.400 | 2.600 | 0.087 | 0.094 | 0.102 |
| b | - | 1.270 | - | - | 0.050 | - |
| b1 | 1.270 | 1.370 | 1.470 | 0.050 | 0.054 | 0.058 |
| c | - | 0.500 | - | - | 0.020 | - |
| D | - | 15.600 | - | - | 0.614 | - |
| D1 | - | 28.700 | - | - | 1.130 | - |
| D2 | - | 9.150 | - | - | 0.360 | - |
| E | 9.900 | 10.000 | 10.100 | 0.390 | 0.394 | 0.398 |
| E1 | - | 10.160 | - | - | 0.400 | - |
| ΦP | - | 3.600 | - | - | 0.142 | - |
| ΦP1 | - | 1.500 | - | - | 0.059 | - |
| e | 2.54BSC | | | 0.1BSC | | |
| L | 12.900 | 13.100 | 13.300 | 0.508 | 0.516 | 0.524 |
| Θ1 | - | 7 ⁰ | - | - | 7 ⁰ | - |
| Θ2 | - | 7 ⁰ | - | - | 7 ⁰ | - |
| Θ3 | - | 3 ⁰ | - | 5 ⁰ | 7 ⁰ | 9 ⁰ |
| Θ4 | - | 3 ⁰ | - | 1 ⁰ | 3 ⁰ | 5 ⁰ |



Ordering and Marking Information

Device Marking: SSF1010

Package (Available)
TO-220
Operating Temperature Range
C : -55 to 175 °C

Devices per Unit

| Package Type | Units/Tube | Tubes/Inner Box | Units/Inner Box | Inner Boxes/Carton Box | Units/Carton Box |
|--------------|------------|-----------------|-----------------|------------------------|------------------|
| TO-220 | 50 | 20 | 1000 | 6 | 6000 |

Reliability Test Program

| Test Item | Conditions | Duration | Sample Size |
|-------------------------------------|---|--------------------------------------|---------------------|
| High Temperature Reverse Bias(HTRB) | $T_j=125^{\circ}\text{C}$ to 175°C @ 80% of Max $V_{DSS}/V_{CES}/V_R$ | 168 hours 500 hours 1000 hours | 3 lots x 77 devices |
| High Temperature Gate Bias(HTGB) | $T_j=150^{\circ}\text{C}$ or 175°C @ 100% of Max V_{GSS} | 168 hours 500 hours 1000 hours | 3 lots x 77 devices |