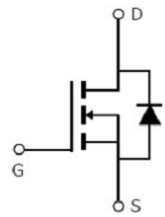


Main Product Characteristics

| | |
|--------------|----------------------|
| V_{DSS} | 60V |
| $R_{DS(on)}$ | 7.5m Ω (typ.) |
| I_D | 56A ① |


TO-252

Marking and Pin Assignment

Schematic Diagram
Features and Benefits

- Advanced 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
- 150°C operating temperature


Description

It utilizes the latest 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°C | Continuous Drain Current, V_{GS} @ 10V ① | 56 | A |
| I_{DM} | Pulsed Drain Current ② | 224 | |
| P_D @TC = 25°C | Power Dissipation ③ | 64 | W |
| V_{DS} | Drain-Source Voltage | 60 | V |
| V_{GS} | Gate-to-Source Voltage | ± 25 | V |
| E_{AS} | Single Pulse Avalanche Energy | 350 | mJ |
| T_J T_{STG} | Operating Junction and Storage Temperature Range | -55 to +150 | °C |

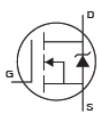
Thermal Resistance

| Symbol | Characterizes | Value | Units |
|-----------------|--------------------|-------|-------|
| $R_{\theta JC}$ | Junction-to-case ③ | 2.34 | °C/W |

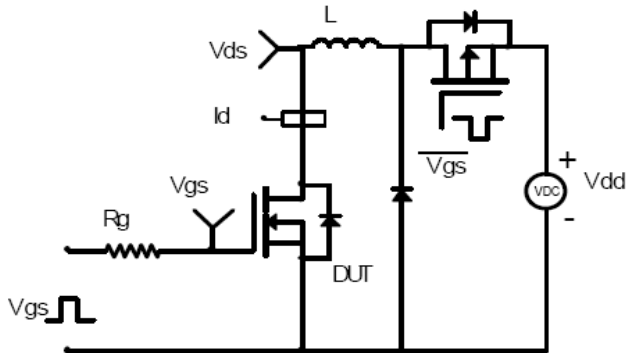
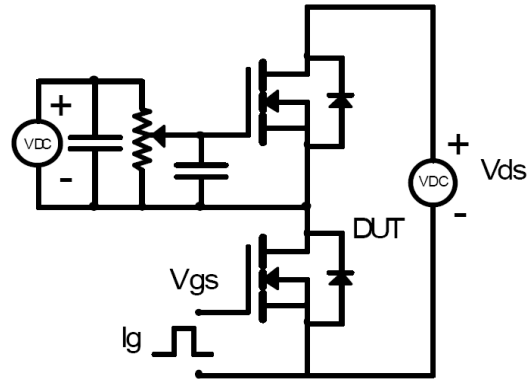
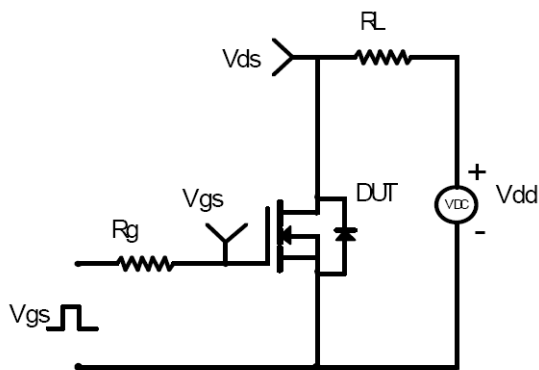
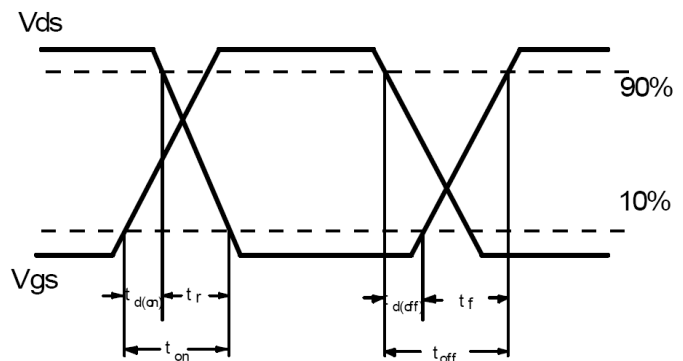
Electrical Characterizes @ $T_A=25^\circ\text{C}$ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---------------|--------------------------------------|------|------|------|------------|--|
| $V_{(BR)DSS}$ | Drain-to-Source breakdown voltage | 60 | — | — | V | $V_{GS} = 0V, I_D = 250\mu A$ |
| $R_{DS(on)}$ | Static Drain-to-Source on-resistance | — | 7.5 | 9 | m Ω | $V_{GS}=10V, I_D=40A$ |
| $V_{GS(th)}$ | Gate threshold voltage | 2.0 | — | 4.0 | V | $V_{DS} = V_{GS}, I_D = 250\mu A$ |
| I_{DSS} | Drain-to-Source leakage current | — | — | 1 | μA | $V_{DS} = 60V, V_{GS} = 0V$ |
| I_{GSS} | Gate-to-Source forward leakage | — | — | 100 | nA | $V_{GS} = 25V$ |
| | | — | — | -100 | | $V_{GS} = -25V$ |
| Q_g | Total gate charge | — | 75 | — | nC | $I_D = 40A,$ $V_{DS}=50V,$ $V_{GS} = 10V$ |
| Q_{gs} | Gate-to-Source charge | — | 15 | — | | |
| Q_{gd} | Gate-to-Drain("Miller") charge | — | 35 | — | | |
| $t_{d(on)}$ | Turn-on delay time | — | 20 | — | ns | $V_{GS}=10V, V_{DD}=30V,$ $R_{GEN}=2.5\Omega$ $I_D = 2A$ |
| t_r | Rise time | — | 30 | — | | |
| $t_{d(off)}$ | Turn-Off delay time | — | 55 | — | | |
| t_f | Fall time | — | 25 | — | | |
| C_{iss} | Input capacitance | — | 2850 | — | pF | $V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1MHz$ |
| C_{oss} | Output capacitance | — | 280 | — | | |
| C_{riss} | Reverse transfer capacitance | — | 260 | — | | |

Source-Drain Ratings and Characteristics

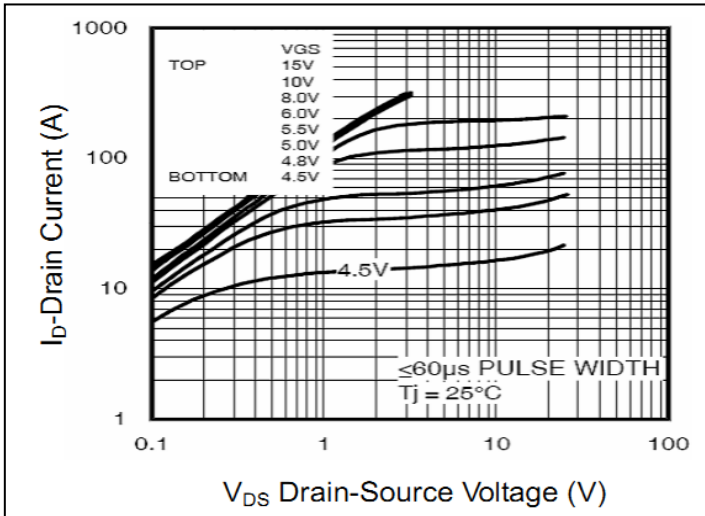
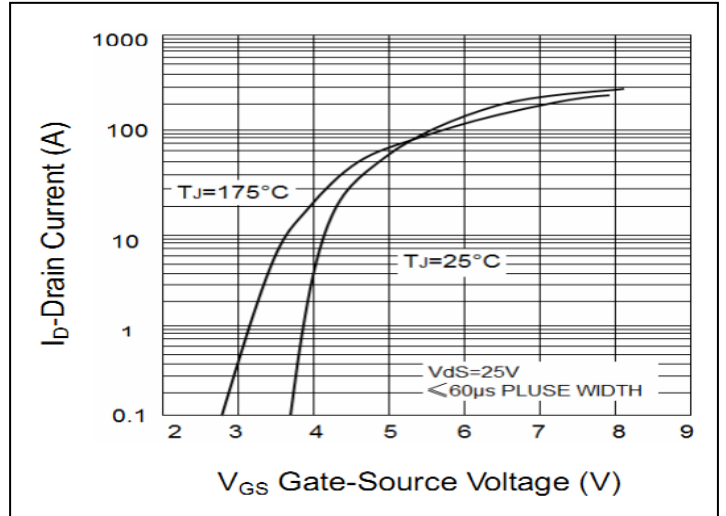
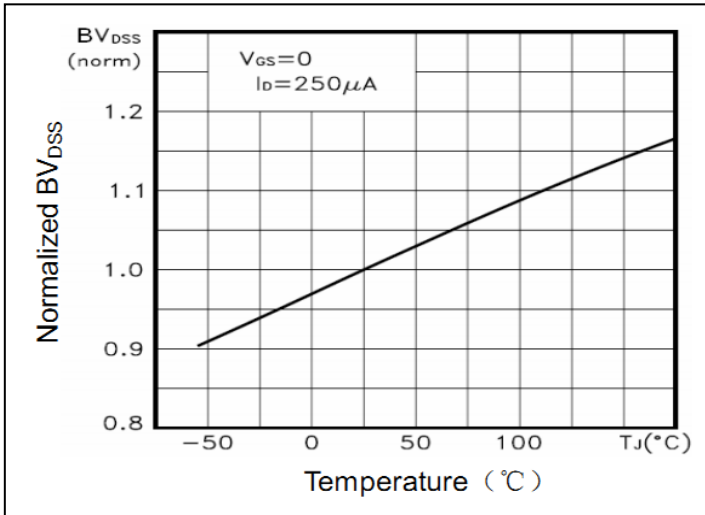
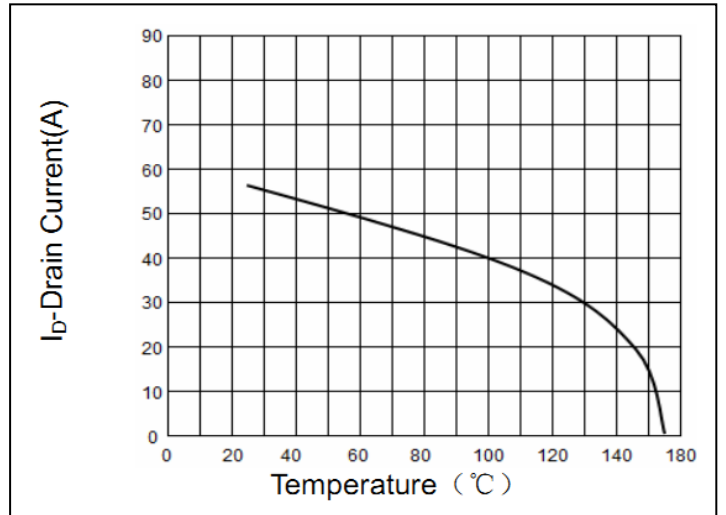
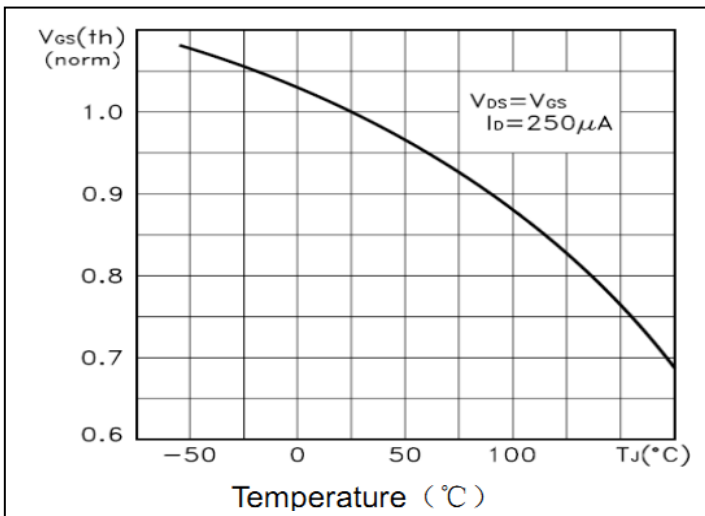
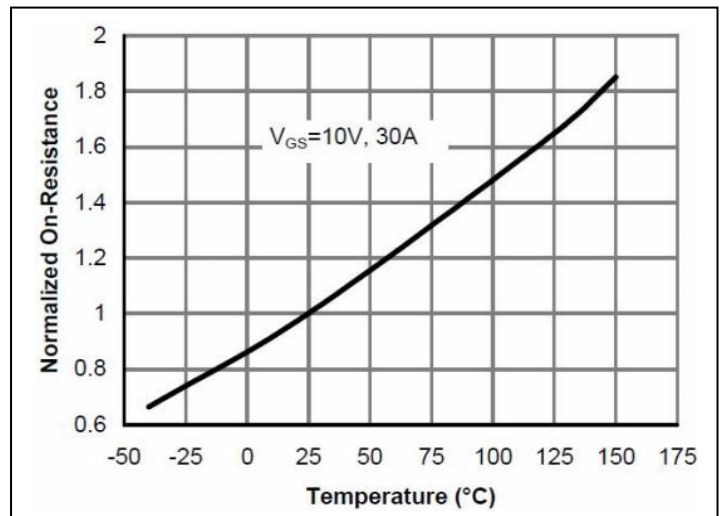
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|----------|--|------|------|------|-------|--|
| I_S | Continuous Source Current (Body Diode) ① | — | — | 56 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| I_{SM} | Maximum Body-Diode Pulse Current | — | — | 224 | A | |
| V_{SD} | Diode Forward Voltage | — | — | 0.99 | V | $I_S=40A, V_{GS}=0V, T_J = 25^\circ\text{C}$ |
| t_{rr} | Reverse Recovery Time | — | 25 | — | ns | $I_S=75A, di/dt=100A/us$ |
| Q_{rr} | Reverse Recovery Charge | — | 30 | — | nC | |

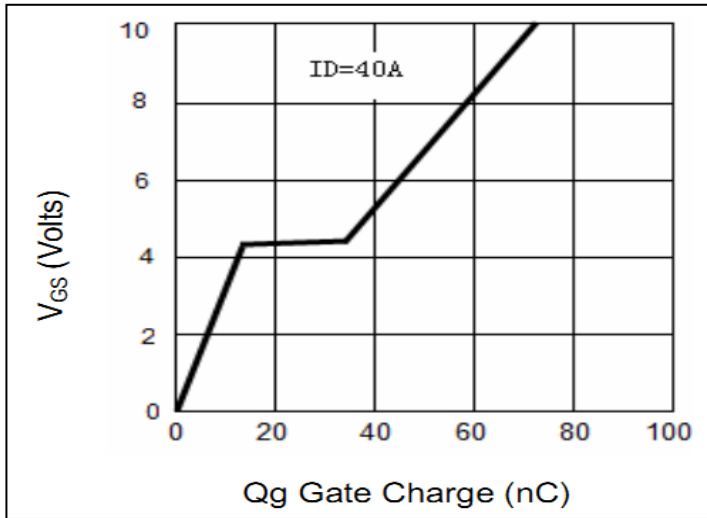
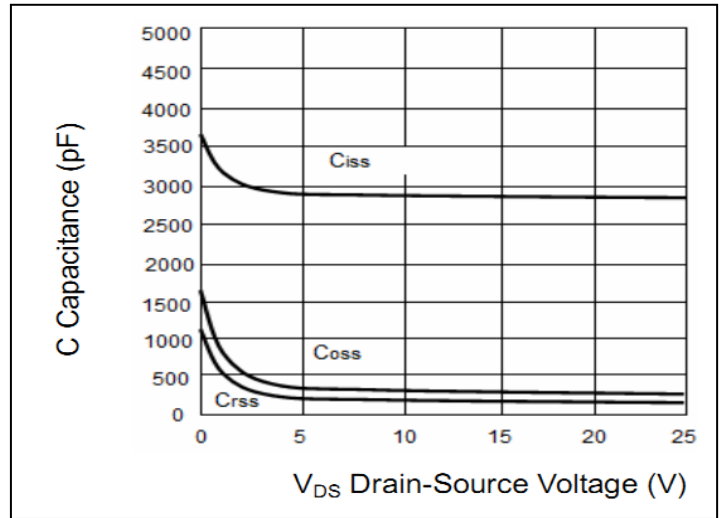
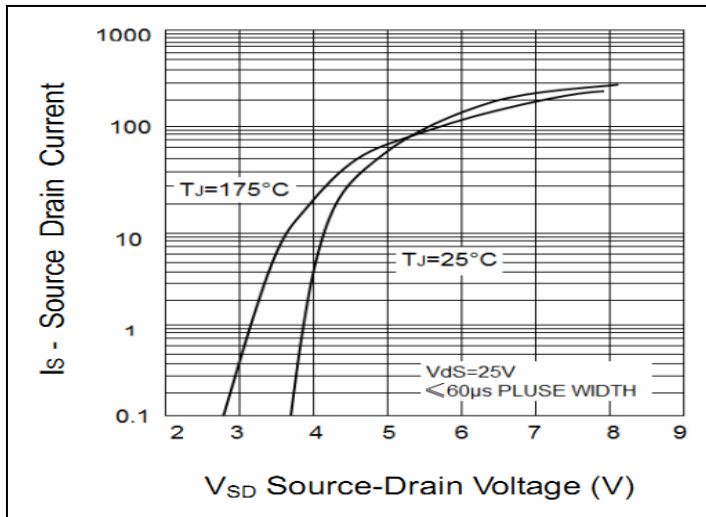
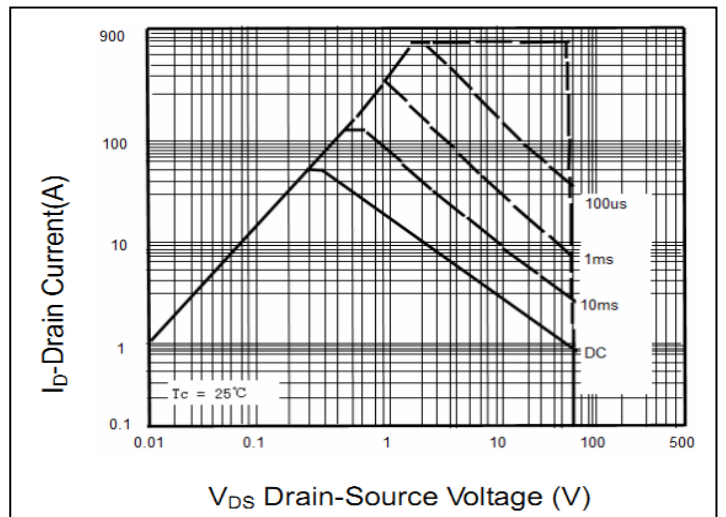
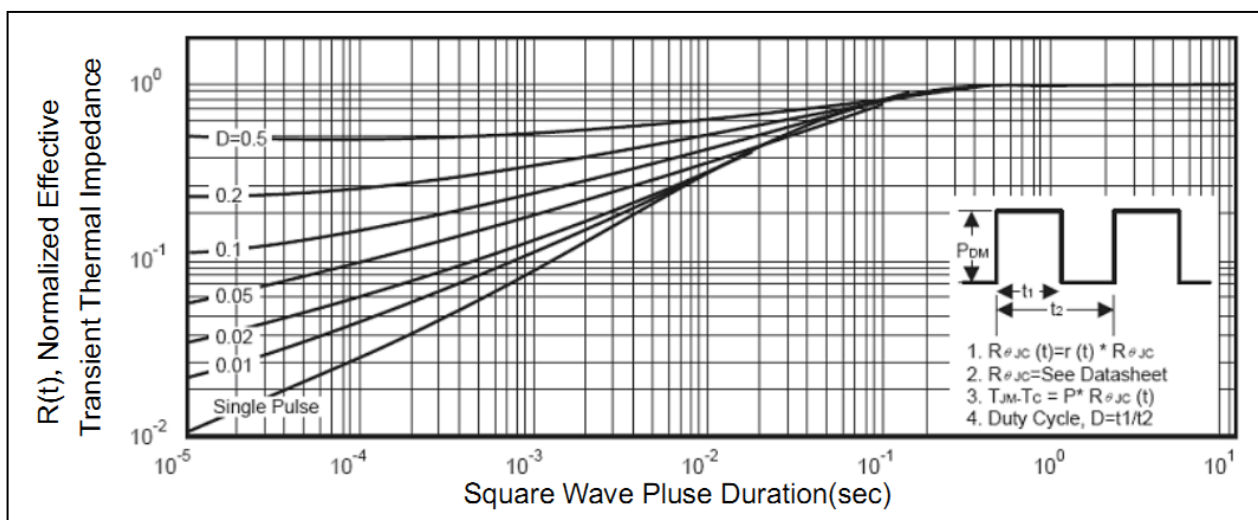
Test circuits and Waveforms

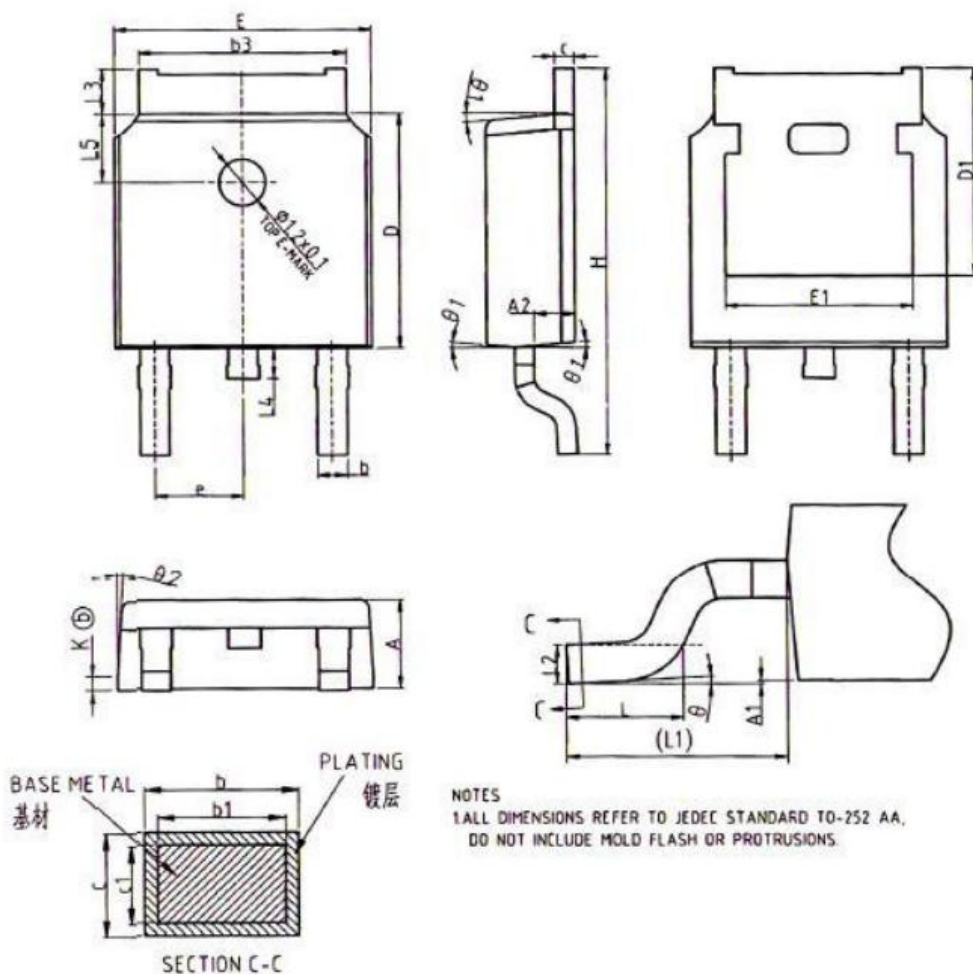
EAS Test Circuit:

Gate charge test circuit:

Switching Time Test Circuit:

Switching Waveforms:


Notes:

- ① Calculated continuous current based on maximum allowable junction temperature.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation P_D is based on max. junction temperature, using junction-to-case thermal resistance.

Typical electrical and thermal characteristics

Figure 1: Typical Output Characteristics

Figure 2: Typical Transfer Characteristics

Figure 3: BVdss-Junction Temperature

Figure 4: ID-Junction Temperature

Figure 5: VGS(th)-Junction Temperature

Figure 6: Rds(on)-Junction Temperature

Typical electrical and thermal characteristics

Figure 7: Gate Charge

Figure 8: Capacitance

Figure 9: Source-Drain Diode Forward

Figure 10: Safe Operation Area

Figure 11: Normalized Maximum Transient Thermal Impedance

Mechanical Data:


| COMMON DIMENSIONS | | | |
|-------------------|----------|-------|-------|
| SYMBOL | mm | | |
| | MIN | NOM | MAX |
| A | 2.20 | 2.30 | 2.38 |
| A1 | 0.00 | - | 0.10 |
| A2 | 0.97 | 1.07 | 1.17 |
| b | 0.72 | 0.78 | 0.85 |
| b1 | 0.71 | 0.76 | 0.81 |
| b3 | 5.23 | 5.33 | 5.46 |
| c | 0.47 | 0.53 | 0.58 |
| c1 | 0.46 | 0.51 | 0.56 |
| D | 6.00 | 6.10 | 6.20 |
| D1 | 5.30REF | | |
| E | 6.50 | 6.60 | 6.70 |
| E1 | 4.70 | 4.83 | 4.92 |
| e | 2.286BSC | | |
| H | 9.90 | 10.10 | 10.30 |
| L | 1.40 | 1.50 | 1.70 |
| L1 | 2.90REF | | |
| L2 | 0.51BSC | | |
| L3 | 0.90 | - | 1.25 |
| L4 | 0.60 | 0.80 | 1.00 |
| L5 | 1.70 | 1.80 | 1.90 |
| θ | 0° - 8° | | |
| $\theta 1$ | 5° | 7° | 9° |
| $\theta 2$ | 5° | 7° | 9° |
| K | 0.40REF | | |

NOTES
 1. ALL DIMENSIONS REFER TO JEDEC STANDARD TO-252 AA.
 DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

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