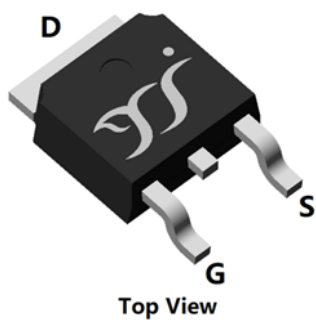
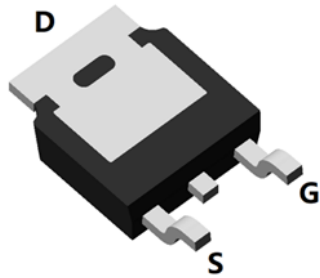


N-Channel Enhancement Mode Field Effect Transistor

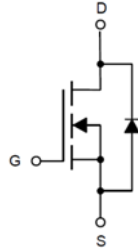


Top View



Bottom View

TO-252



Product Summary

- V_{DS} 100V
- I_D 22A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) <math><31m\Omega</math>
- 100% EAS Tested
- 100% ∇V_{DS} Tested

General Description

- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

Applications

- Power switching application
- Uninterruptible power supply
- DC-DC convertor

Limiting Values

| Parameter | Conditions | | Symbol | Min | Max | Unit |
|--|--|--|----------------|-----|------|------------|
| Drain-source Voltage | | | V_{DS} | - | 100 | V |
| Gate-source Voltage | | | V_{GS} | -20 | 20 | |
| Continuous Drain Current (Note 1,2) | Steady-State | $T_A=25^\circ C, V_{GS}=10V$ | I_D | - | 6.4 | A |
| | | $T_A=100^\circ C, V_{GS}=10V$ | | - | 4.5 | |
| Continuous Drain Current (Note 1,3) | Steady-State | $T_C=25^\circ C, V_{GS}=10V, \text{Chip limitation}$ | | - | 22 | |
| | | $T_C=100^\circ C, V_{GS}=10V$ | | - | 15.5 | |
| Pulsed Drain Current | $T_C=25^\circ C, t_p \leq 10\mu s$ | | I_{DM} | - | 80 | |
| Maximum Body-Diode Continuous Current | $T_C=25^\circ C$ | | I_S | | 22 | |
| Avalanche Energy (non-repetitive) | $T_J=25^\circ C, V_G=10V, R_G=25\Omega, L=0.5mH, I_{AS}=12A$ | | EAS | - | 36 | mJ |
| Total Power Dissipation (Note 1,2) | Steady-State | $T_A=25^\circ C$ | P_D | - | 3 | W |
| | | $T_A=100^\circ C$ | | - | 1.5 | |
| Total Power Dissipation (Note 1,3) | Steady-State | $T_C=25^\circ C$ | | - | 35 | |
| | | $T_C=100^\circ C$ | | - | 17 | |
| Junction and Storage Temperature Range | | | T_J, T_{STG} | -55 | 175 | $^\circ C$ |

Thermal Resistance

| Parameter | | Symbol | Typ | Max | Units |
|---|--------------|-----------------|-----|-----|--------------|
| Thermal Resistance Junction-to-Ambient (Note 2) | Steady-State | $R_{\theta JA}$ | - | 50 | $^\circ C/W$ |
| Thermal Resistance Junction-to-Case | Steady-State | $R_{\theta JC}$ | - | 4.2 | |

Ordering Information (Example)

| PREFERRED P/N | PACKING CODE | Marking | MINIMUM PACKAGE(pcs) | INNER BOX QUANTITY(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|---------------|--------------|------------|----------------------|-------------------------|----------------------------|---------------|
| YJD031G10H | F1/F2 | YJD031G10H | 2500 | / | 25000 | 13" reel |



YJD031G10H

■ Electrical Characteristics

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|-----------------------------------|--------------|---|-----|------|-----------|------------|
| Static Parameter | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A, T_j=25^\circ C$ | 100 | - | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=80V, V_{GS}=0V, T_j=25^\circ C$ | - | - | 1 | μA |
| | | $V_{DS}=80V, V_{GS}=0V, T_j=125^\circ C$ | - | - | 100 | |
| Gate-Source Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V, T_j=25^\circ C$ | - | - | ± 100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A, T_j=25^\circ C$ | 2.1 | 2.8 | 3.6 | V |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=10V, I_D=20A, T_j=25^\circ C$ | - | 24 | 31 | m Ω |
| Diode Forward Voltage | V_{SD} | $I_S=20A, V_{GS}=0V, T_j=25^\circ C$ | - | 0.94 | 1.3 | V |
| Gate Resistance | R_G | $f=1MHz, T_j=25^\circ C$ | - | 0.85 | - | Ω |
| Dynamic Parameters | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=50V, V_{GS}=0V, f=1MHz, T_j=25^\circ C$ | - | 470 | - | pF |
| Output Capacitance | C_{oss} | | - | 115 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 7.6 | - | |
| Switching Parameters | | | | | | |
| Total Gate Charge | Q_g | $V_{GS}=10V, V_{DS}=50V, I_D=20A, T_j=25^\circ C$ | - | 11.5 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 2.5 | - | |
| Gate-Drain Charge | Q_{gd} | | - | 5.1 | - | |
| Reverse Recovery Charge | Q_{rr} | $I_F=20A, di/dt=100A/\mu s, V_{GS}=0V, V_R=50V, T_j=25^\circ C$ | - | 30 | - | nC |
| Reverse Recovery Time | t_{rr} | | - | 32 | - | ns |
| Turn-on Delay Time | $t_{D(on)}$ | $V_{GS}=10V, V_{DS}=50V, I_D=20A, R_L=2.5\Omega, R_{GEN}=3\Omega, T_j=25^\circ C$ | - | 6.6 | - | ns |
| Turn-on Rise Time | t_r | | - | 10.2 | - | |
| Turn-off Delay Time | $t_{D(off)}$ | | - | 12.8 | - | |
| Turn-off Fall Time | t_f | | - | 4.8 | - | |

Note:

- The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- The value of $R_{\theta JA}$ is measured with the device mounted on the 40mm*40mm*1.1mm single layer FR-4 PCB board with 1 in² pad of 2oz. Copper, in the still air environment with $T_A=25^\circ C$. The maximum allowed junction temperature of 175 $^\circ C$. The value in any given application depends on the user's specific board design.
- Thermal resistance from junction to soldering point (on the exposed drain pad).



Typical Electrical and Thermal Characteristics Diagrams

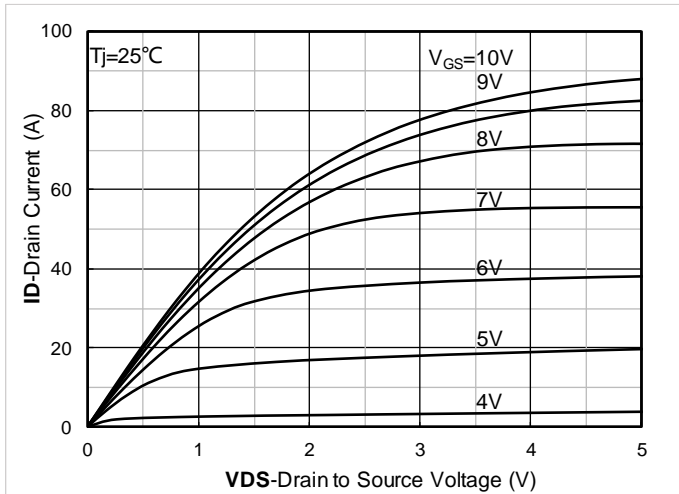


Figure 1. Output Characteristics; typical values

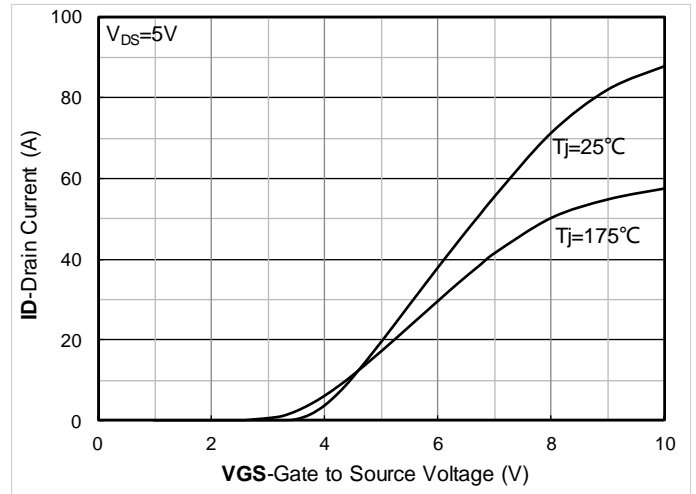


Figure 2. Transfer Characteristics; typical values

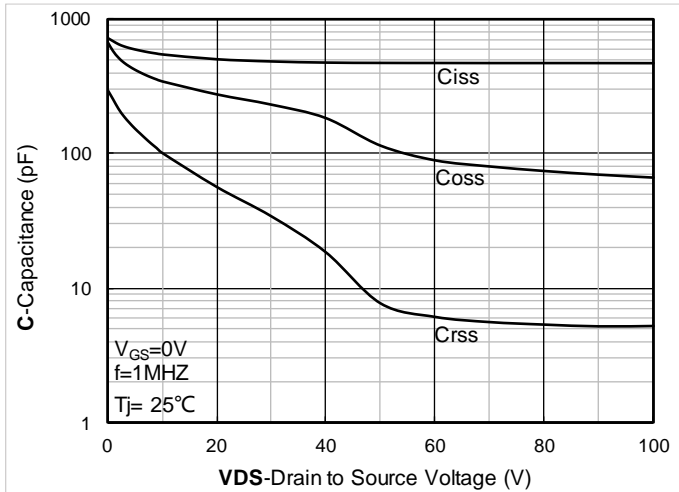


Figure 3. Capacitance Characteristics; typical values

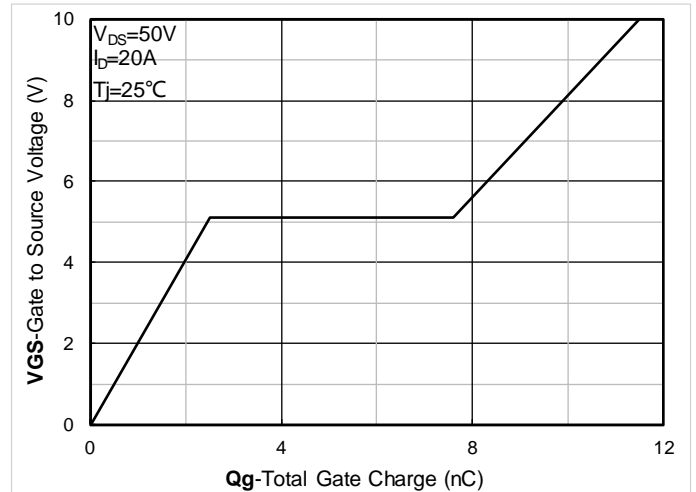


Figure 4. Gate Charge; typical values

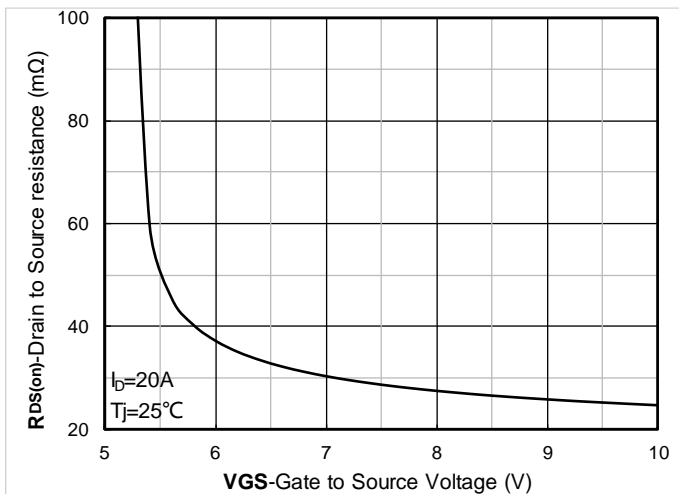


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

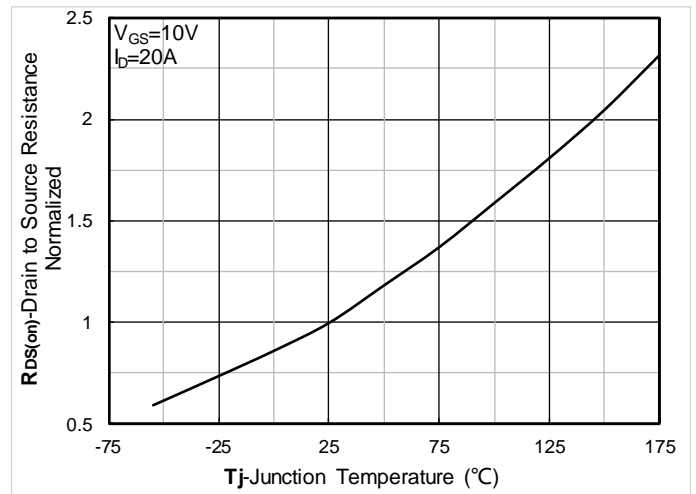


Figure 6. Normalized On-Resistance



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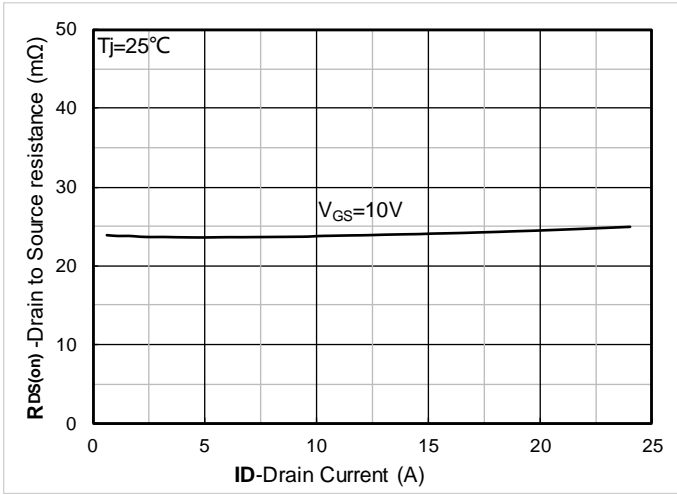


Figure 7. RDS(on) vs. Drain Current; typical values

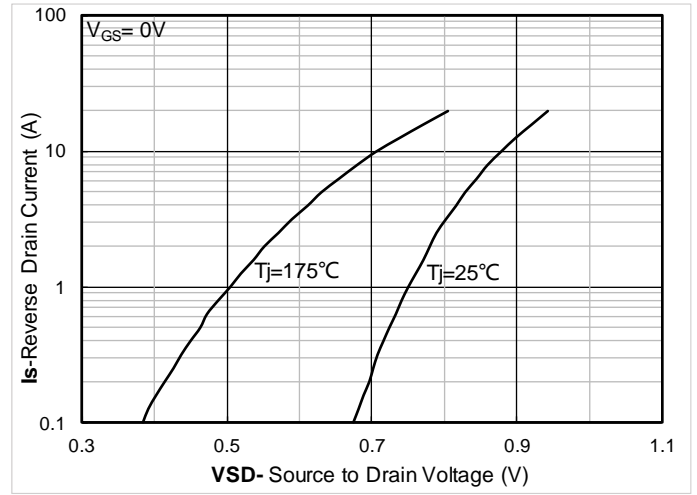


Figure 8. Forward characteristics of reverse diode; typical values

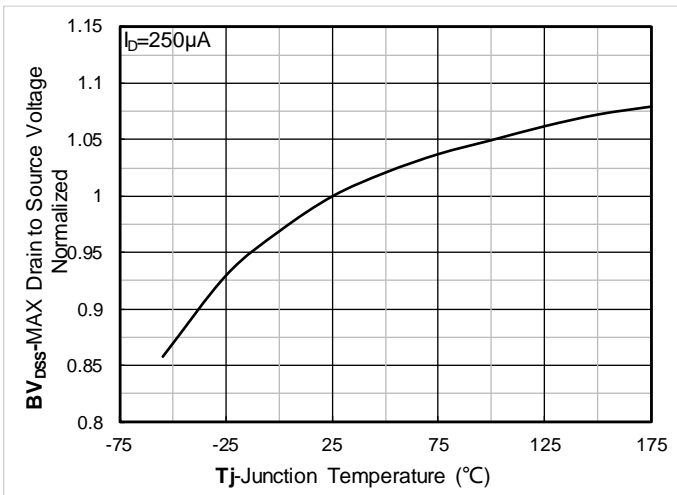


Figure 9. Normalized breakdown voltage

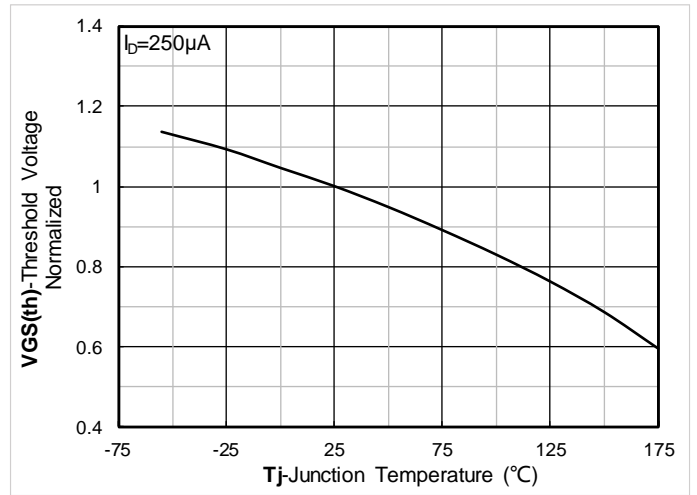


Figure 10. Normalized Threshold voltage

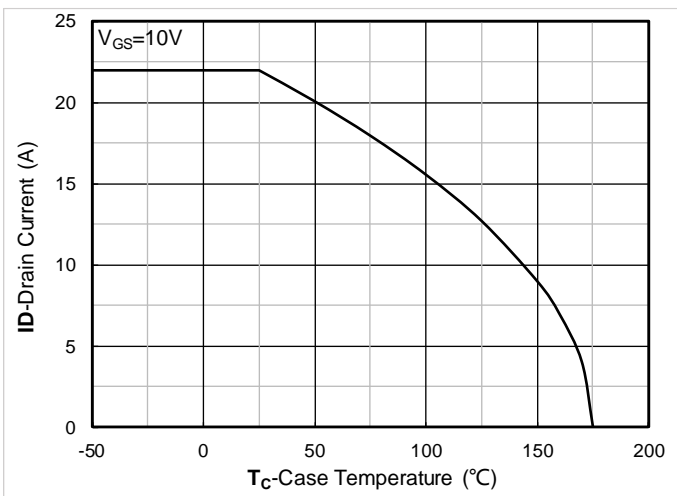


Figure 11. Current dissipation

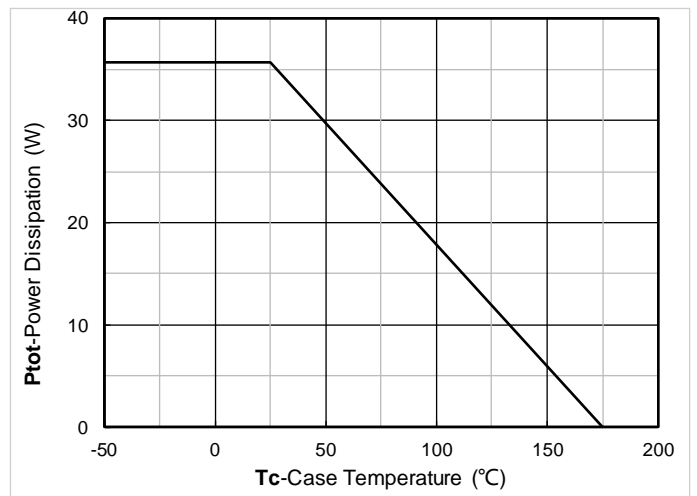


Figure 12. Power dissipation



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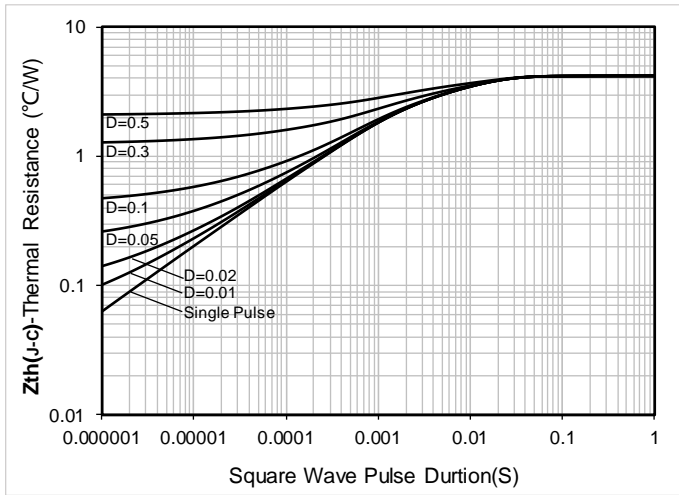


Figure 13. Maximum Transient Thermal Impedance

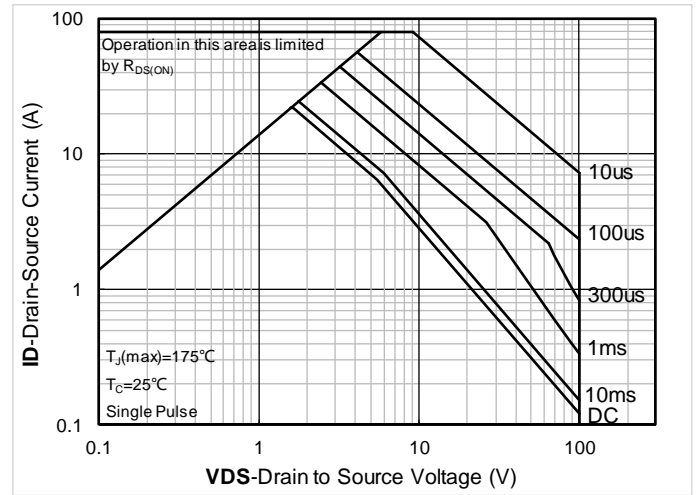


Figure 14. Safe Operation Area

■ Test Circuits & Waveforms

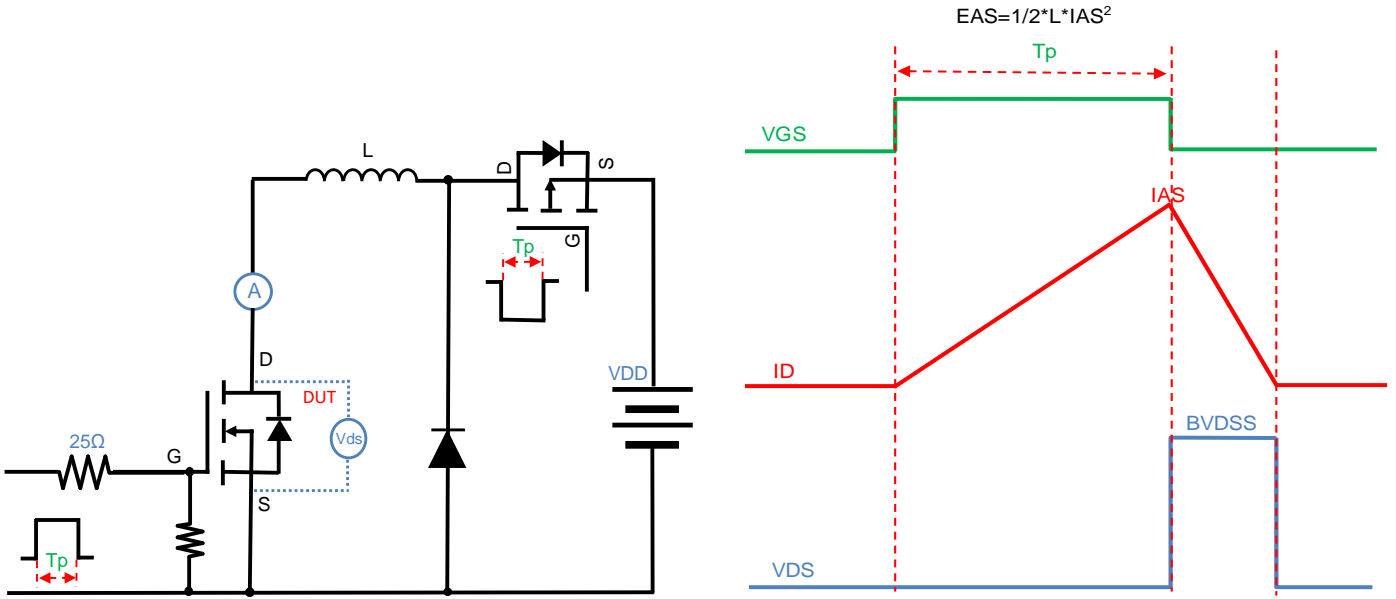


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

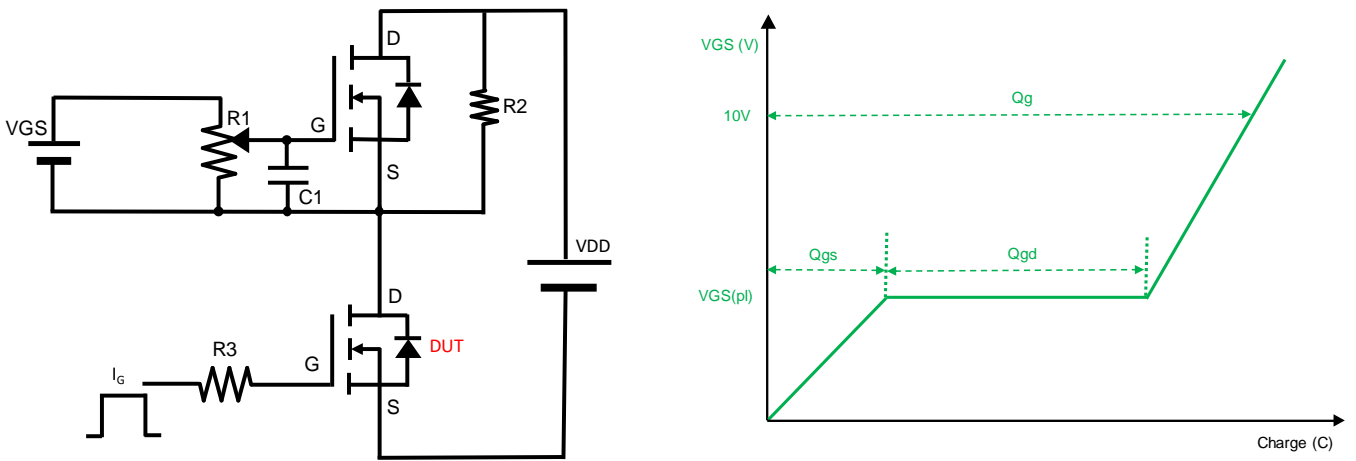


Figure B. Gate Charge Test Circuit & Waveform

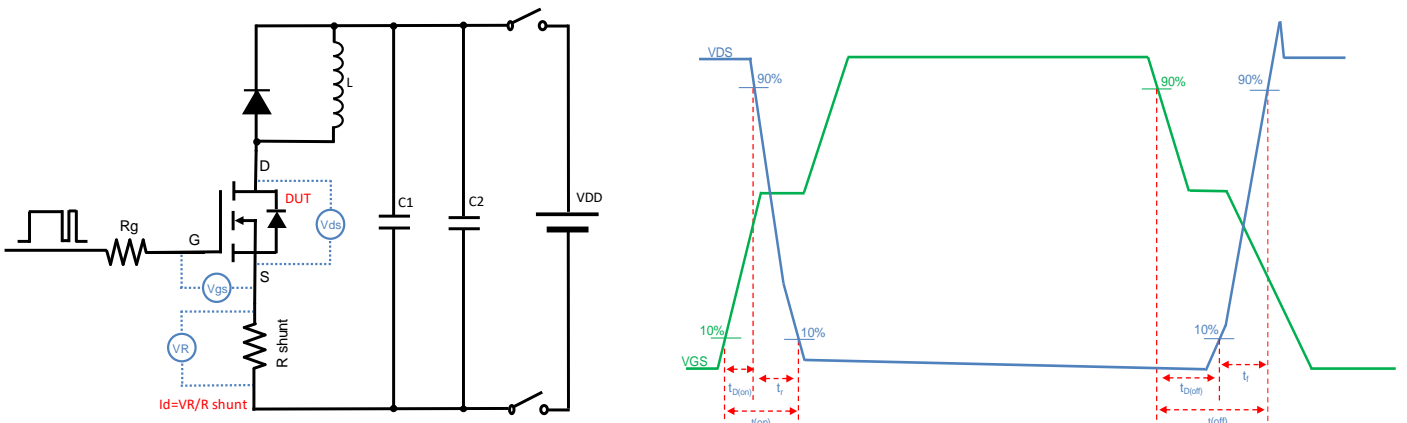


Figure C. Resistive Switching Test Circuit & Waveform

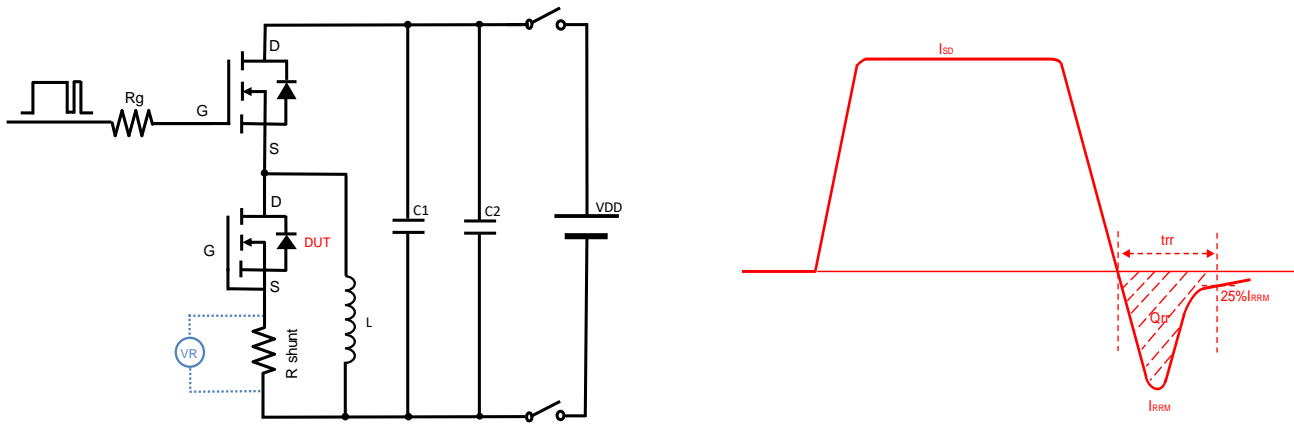
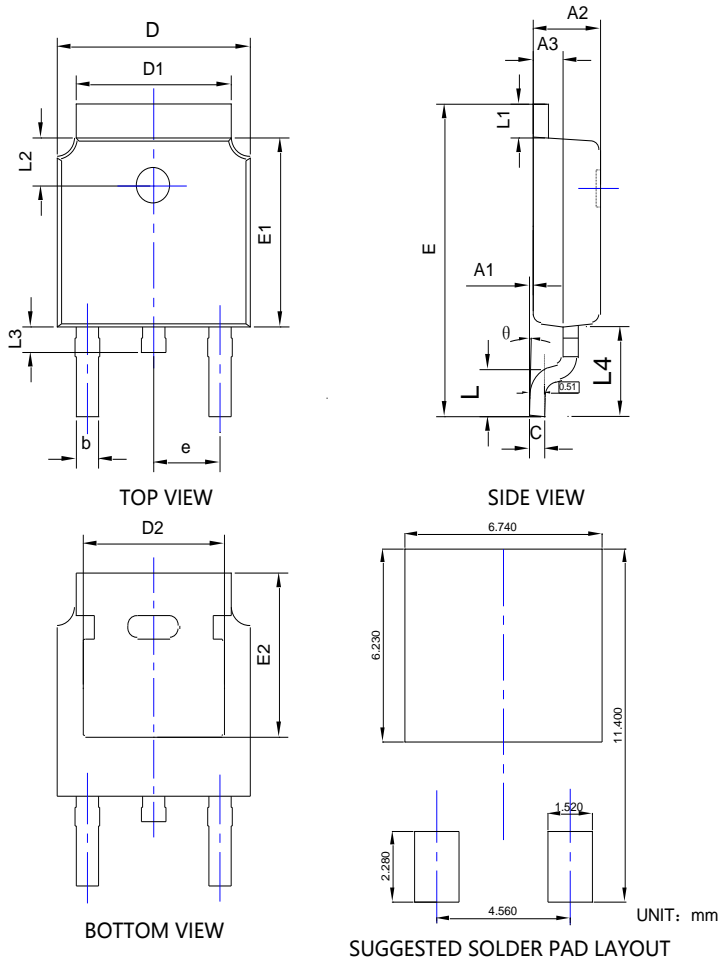


Figure D. Diode Recovery Test Circuit & Waveform



YJD031G10H

■ TO-252-B Package Information



| SYMBOL | DIMENSIONS | | | | | |
|----------|------------|-------|-------|------------|--------|--------|
| | INCHES | | | Millimeter | | |
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A1 | 0.000 | --- | 0.008 | 0.000 | --- | 0.200 |
| A2 | 0.087 | 0.091 | 0.094 | 2.200 | 2.300 | 2.400 |
| A3 | 0.035 | 0.039 | 0.043 | 0.900 | 1.000 | 1.100 |
| b | 0.026 | 0.030 | 0.034 | 0.660 | 0.760 | 0.860 |
| c | 0.018 | 0.020 | 0.023 | 0.460 | 0.520 | 0.580 |
| D | 0.256 | 0.260 | 0.264 | 6.500 | 6.600 | 6.700 |
| D1 | 0.203 | 0.209 | 0.215 | 5.150 | 5.300 | 5.450 |
| D2 | 0.181 | 0.189 | 0.195 | 4.600 | 4.800 | 4.950 |
| E | 0.390 | 0.398 | 0.406 | 9.900 | 10.100 | 10.300 |
| E1 | 0.236 | 0.240 | 0.244 | 6.000 | 6.100 | 6.200 |
| E2 | 0.203 | 0.209 | 0.215 | 5.150 | 5.300 | 5.450 |
| e | 0.090BSC | | | 2.286BSC | | |
| L | 0.049 | 0.059 | 0.069 | 1.250 | 1.500 | 1.750 |
| L1 | 0.035 | --- | 0.050 | 0.900 | --- | 1.270 |
| L2 | 0.055 | --- | 0.075 | 1.400 | --- | 1.900 |
| L3 | 0.024 | 0.031 | 0.039 | 0.600 | 0.800 | 1.000 |
| L4 | 0.114REF | | | 2.900REF | | |
| θ | 0° | --- | 10° | 0° | --- | 10° |

NOTE:
 1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
 2. TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.
 3. THE PAD LAYOUT IS FOR REFERENCE PURPOSES ONLY.



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