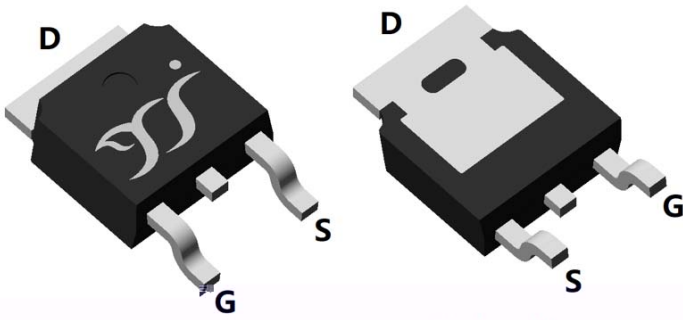


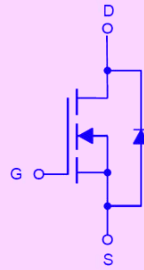
N-Channel Enhancement Mode Field Effect Transistor



Top View

Bottom View

TO-252



Product Summary

- V_{DS} 100V
- I_D 45A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) 17m Ω
- $R_{DS(ON)}$ (at $V_{GS}=4.5V$) 21.5m Ω
- 100% UIS Tested
- 100% V_{DS} Tested

General Description

- Low $R_{DS(on)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Fast switching and soft recovery
- Part no. with suffix "Q" means AEC-Q101 qualified

Applications

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply
- DC-DC convertor

■ Absolute Maximum Ratings ($T_A=25$ unless otherwise noted)

| Parameter | | Symbol | Limit | Unit |
|--|-------------------------|----------------|----------|------------------|
| Drain-source Voltage | | V_{DS} | 100 | V |
| Gate-source Voltage | | V_{GS} | ± 20 | V |
| Drain Current | $T_A=25^\circ\text{C}$ | I_D | 7 | A |
| | $T_A=100^\circ\text{C}$ | | 4.5 | |
| | $T_C=25^\circ\text{C}$ | | 45 | |
| | $T_C=100^\circ\text{C}$ | | 28 | |
| Pulsed Drain Current ^A | | I_{DM} | 180 | A |
| Avalanche energy ^B | | EAS | 90 | mJ |
| Total Power Dissipation ^C | $T_A=25^\circ\text{C}$ | P_D | 2.5 | W |
| | $T_A=100^\circ\text{C}$ | | 1 | |
| | $T_C=25^\circ\text{C}$ | | 73 | |
| | $T_C=100^\circ\text{C}$ | | 29 | |
| Junction and Storage Temperature Range | | T_J, T_{STG} | -55 +150 | $^\circ\text{C}$ |



YJD45G10AQ

■ Thermal resistance

| Parameter | | Symbol | Typ | Max | Units |
|---|--------------|-----------------|-----|-----|-------|
| Thermal Resistance Junction-to-Ambient ^D | Steady-State | $R_{\theta JA}$ | 40 | 50 | °C/W |
| Thermal Resistance Junction-to-Case | Steady-State | $R_{\theta JC}$ | 1.4 | 1.7 | |

■ Ordering Information (Example)

| PREFERRED P/N | PACKING CODE | Marking | MINIMUM PACKAGE(pcs) | INNER BOX QUANTITY(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|---------------|--------------|-----------|----------------------|-------------------------|----------------------------|---------------|
| YJD45G10AQ | F1 | YJD45G10A | 2500 | / | 25000 | 13"Reel |



YJD45G10AQ

■ Electrical Characteristics (T_J=25 unless otherwise noted)

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|---------------------------------------|---------------------|---|-----|------|------|-------|
| Static Parameter | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} = 0V, I _D =250μA | 100 | - | - | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =100V, V _{GS} =0V | - | - | 1 | μA |
| | | V _{DS} =100V, V _{GS} =0V, T _J =150°C | - | - | 100 | |
| Gate-Body Leakage Current | I _{GSS} | V _{GS} = ±20V, V _{DS} =0V | - | - | ±100 | nA |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D =250μA | 1.0 | 1.8 | 2.5 | V |
| Static Drain-Source On-Resistance | R _{DS(on)} | V _{GS} =10V, I _D =22.5A | - | 14 | 17 | mΩ |
| | | V _{GS} =4.5V, I _D =20A | - | 17 | 21.5 | |
| Diode Forward Voltage | V _{SD} | I _S =22.5A, V _{GS} =0V | - | 0.9 | 1.2 | V |
| Maximum Body-Diode Continuous Current | I _S | | - | - | 45 | A |
| Gate resistance | R _G | f=1MHz, Open drain | - | 1.4 | - | Ω |
| Dynamic Parameters | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =50V, V _{GS} =0V, f=1MHz | - | 1165 | - | pF |
| Output Capacitance | C _{oss} | | - | 265 | - | |
| Reverse Transfer Capacitance | C _{rss} | | - | 8 | - | |
| Switching Parameters | | | | | | |
| Total Gate Charge | Q _g | V _{GS} =10V, V _{DS} =50V, I _D =22.5A | - | 19 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 6 | - | |
| Gate-Drain Charge | Q _{gd} | | - | 3 | - | |
| Reverse Recovery Charge | Q _{rr} | I _F =22.5A, di/dt=100A/us | - | 45 | - | nC |
| Reverse Recovery Time | t _{rr} | | - | 40 | - | ns |
| Turn-on Delay Time | t _{D(on)} | V _{GS} =10V, V _{DD} =50V, I _D =22.5A R _{GEN} =2.2Ω | - | 40 | - | ns |
| Turn-on Rise Time | t _r | | - | 12 | - | |
| Turn-off Delay Time | t _{D(off)} | | - | 55 | - | |
| Turn-off fall Time | t _f | | - | 16 | - | |

A. Repetitive rating; pulse width limited by max. junction temperature.

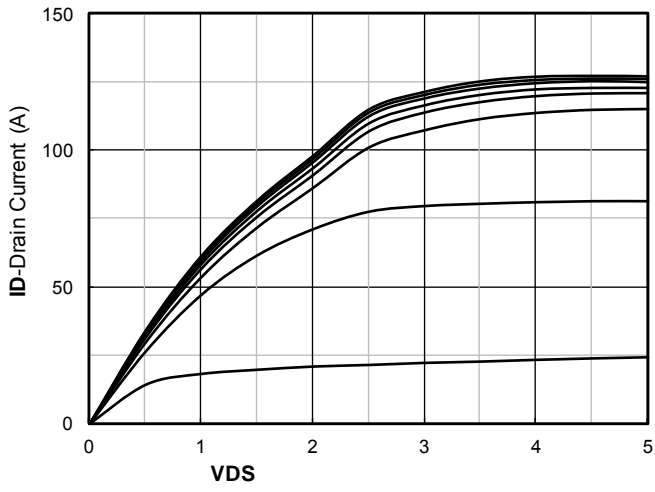
B. T_J=25°C, V_{DD}=50V, V_G=10V, R_G=25Ω, L=0.5mH, I_{AS}=19A.

C. P_d is based on max. junction temperature, using junction-case thermal resistance.

D. The value of R_{θJA} is measured with the device mounted on the minimum recommend pad size, in the still air environment with T_A=25°C. The maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.



Typical Electrical and Thermal Characteristics Diagrams





YJD45G10AQ

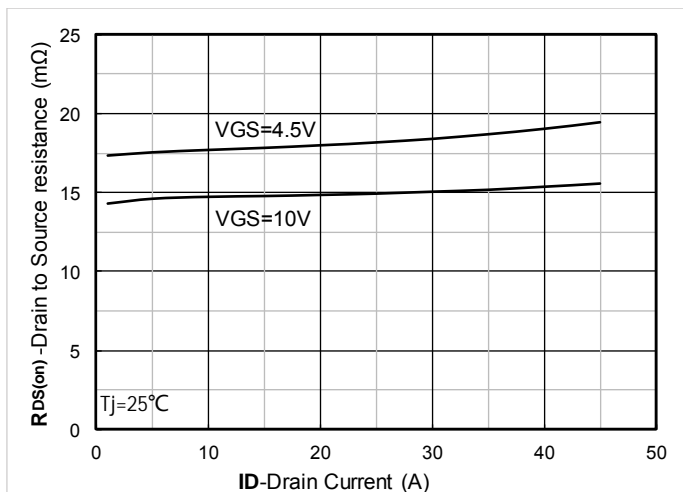


Figure 7. $R_{DS(on)}$ VS Drain Current

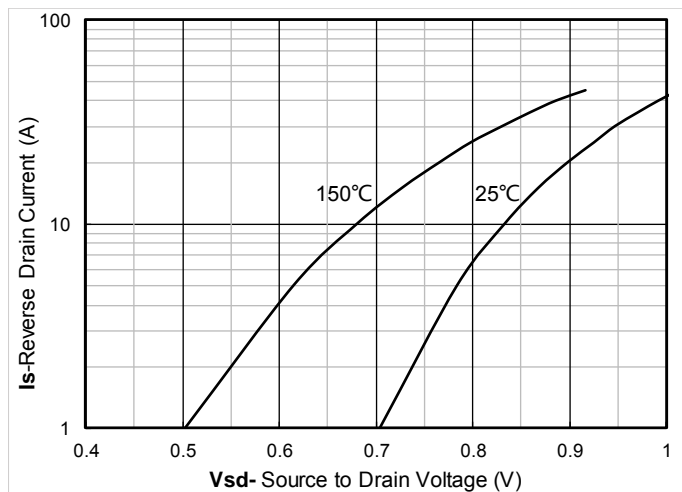


Figure 8.



YJD45G10AQ

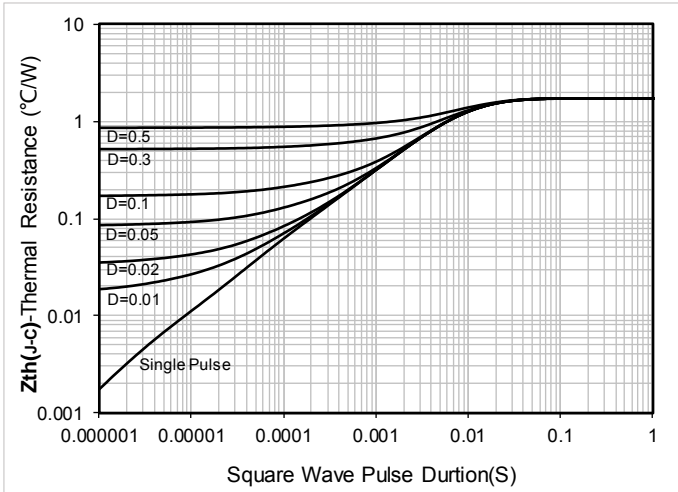


Figure 13. Maximum Transient Thermal Impedance

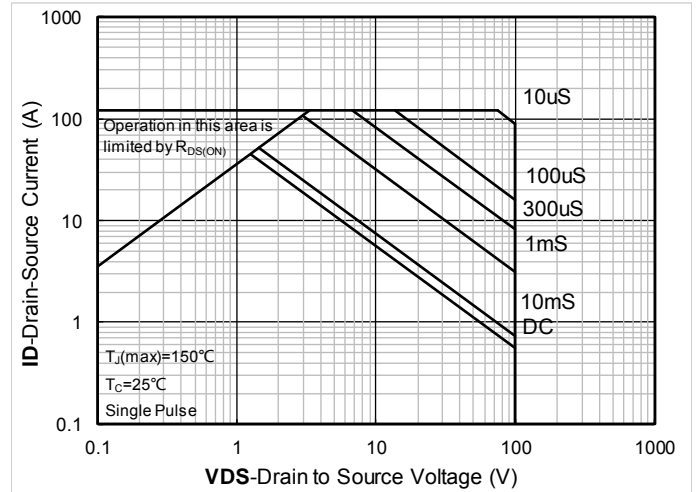


Figure 14. Safe Operation Area

■ Test Circuits & Waveforms

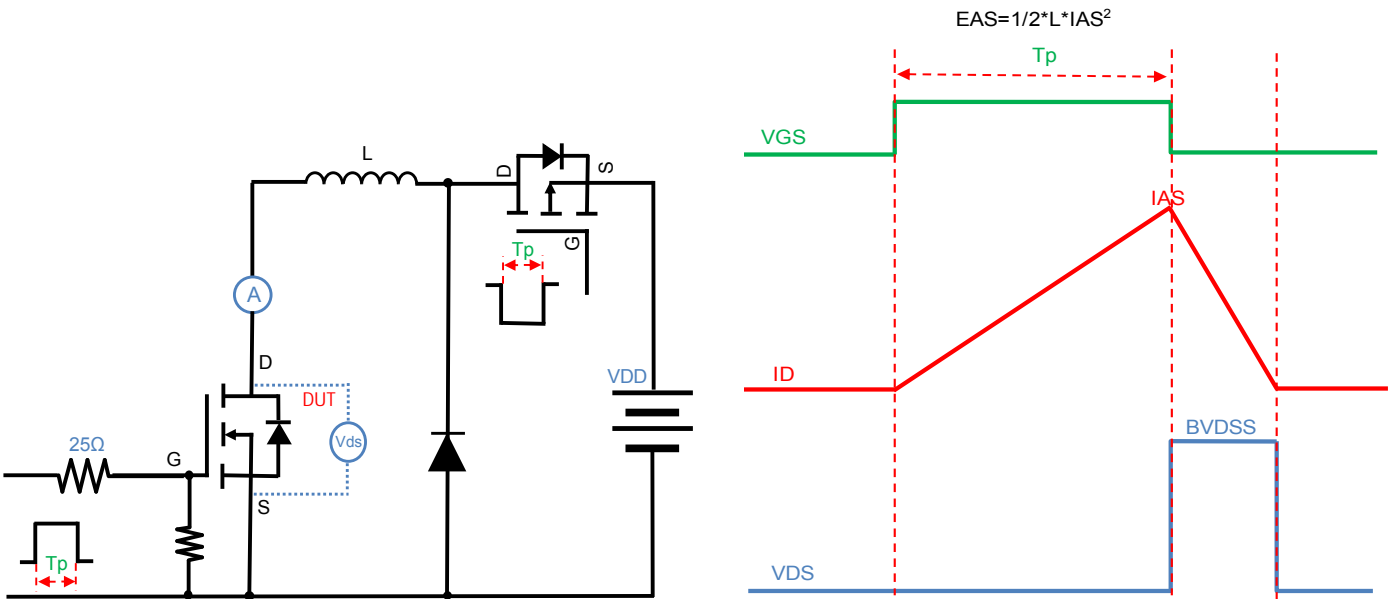


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

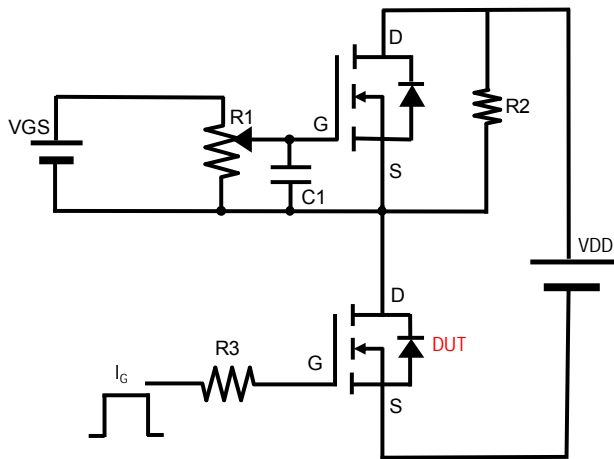


Figure B. Gate Charge Test Circuit & Waveform

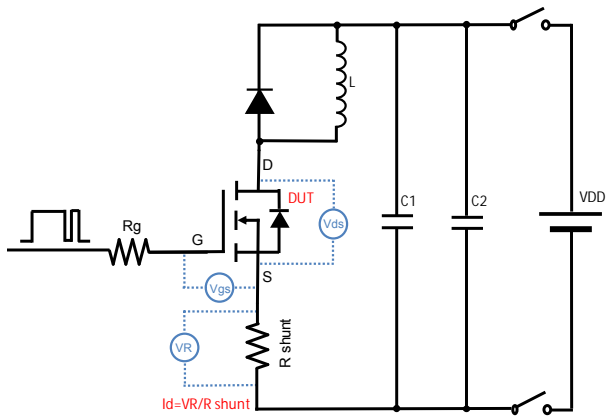


Figure C. Resistive Switching Test Circuit & Waveform

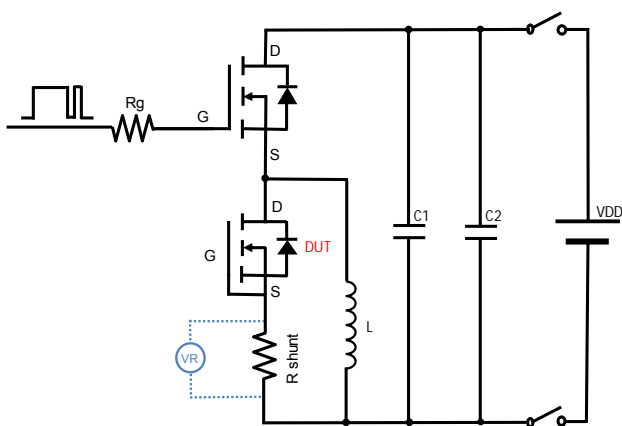
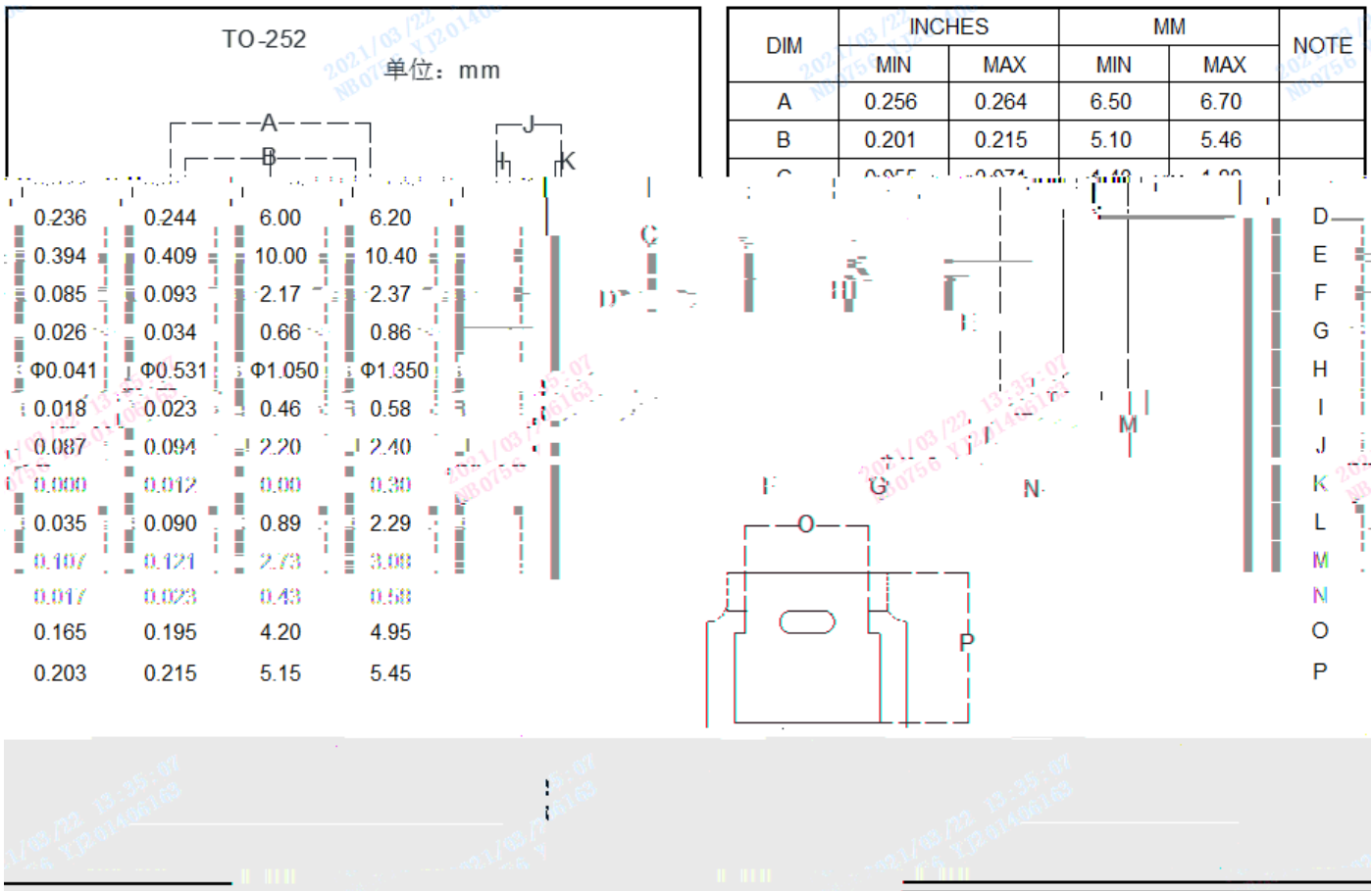


Figure D. Diode Recovery Test Circuit & Waveform

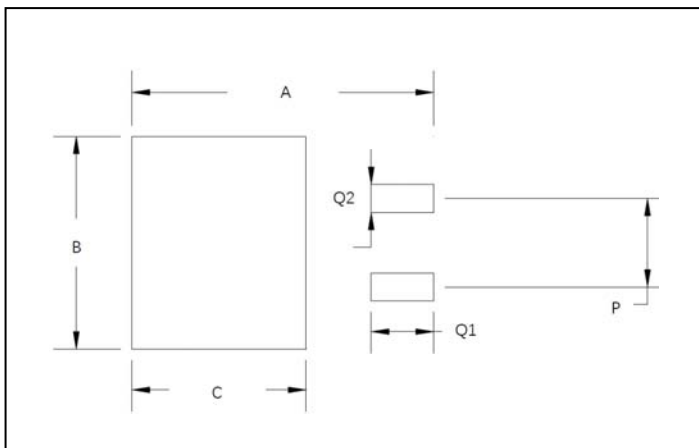


YJD45G10AQ

TO-252 Package information



Suggested Pad Layout



| Dim | Millimeters |
|-----|-------------|
| A | 11.4 |
| B | 6.74 |
| C | 6.23 |
| P | 4.56 |
| Q1 | 2.28 |
| Q2 | 1.52 |