

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)MAX}$ | I_D |
|---------------|-----------------|-------|
| -150V | 150mΩ@-10V | -13A |
| | 165mΩ@-4.5V | |

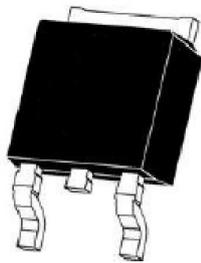
Feature

- Split gate trench MOSFET technology
- Low $R_{DS(on)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Suffix "-Q1" for AEC-Q101

Application

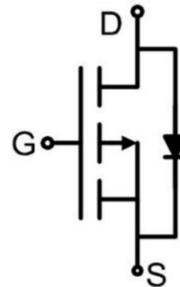
- Power management
- Portable equipment

Package

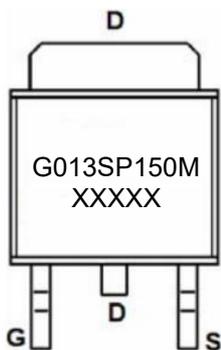


TO-252AB

Circuit diagram



Marking



Absolute maximum ratings (T_C=25°C unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|------------------------|------------|------|
| Drain-Source Voltage | V _{DS} | -150 | V |
| Gate-Source Voltage | V _{GS} | ±20 | V |
| Continuous Drain Current ^{1,3)} (V _{GS} = -10V, Chip limitation) | I _D | -13 | A |
| Continuous Drain Current ^{1,3)} (V _{GS} = -10V, T _C = 100°C) | I _D (100°C) | -8 | A |
| Pulsed Drain Current (t _p ≤ 10μs) | I _{DM} | -50 | A |
| Single Pulse Avalanche Energy ²⁾ | E _{AS} | 59.29 | mJ |
| Power Dissipation ^{1,3)} | P _D | 56 | W |
| Thermal Resistance Junction to Case | R _{θJC} | 2.2 | °C/W |
| Operating Junction Temperature | T _J | -55 ~ +150 | °C |
| Storage Temperature | T _{STG} | -55 ~ +150 | °C |

Electrical characteristics (T_J=25°C unless otherwise noted)

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|----------------------|--|------|------|------|------|
| Static Characteristics | | | | | | |
| Drain-source breakdown voltage | V _{(BR)DSS} | V _{GS} = 0V, I _D = -250μA | -150 | | | V |
| Zero gate voltage drain current | I _{DSS} | V _{DS} = -150V, V _{GS} = 0V | | | -1 | μA |
| Gate-body leakage current | I _{GSS} | V _{DS} = 0V, V _{GS} = ±20V | | | ±100 | nA |
| Gate threshold voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = -250μA | -1.4 | -1.9 | -2.4 | V |
| Drain-source on-resistance | R _{DS(on)} | V _{GS} = -10V, I _D = -10A | | 110 | 150 | mΩ |
| | | V _{GS} = -4.5V, I _D = -5A | | 120 | 165 | |
| Dynamic characteristics⁴⁾ | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} = -75V, V _{GS} = 0V, f = 1MHz | | 830 | | pF |
| Output Capacitance | C _{oss} | | | 86 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 6.3 | | |
| Total Gate Charge | Q _g | V _{DS} = -75V, V _{GS} = -10V I _D = -10A | | 17 | | nC |
| Gate-Source Charge | Q _{gs} | | | 2.4 | | |
| Gate-Drain Charge | Q _{gd} | | | 2.8 | | |
| Turn-on delay time | t _{d(on)} | V _{DS} = -75V, V _{GS} = -10V I _D = -10A, R _G = 3Ω | | 5.4 | | nS |
| Turn-on rise time | t _r | | | 4 | | |
| Turn-off delay time | t _{d(off)} | | | 22 | | |
| Turn-off fall time | t _f | | | 7.4 | | |
| Source-Drain Diode characteristics | | | | | | |
| Diode Forward Current | I _S | T _C = 25°C | | | -13 | A |
| Diode Forward Voltage | V _{SD} | V _{GS} = 0V, I _S = -10A | | | -1.2 | V |
| Reverse Recovery Time | T _{rr} | V _{GS} = 0V, V _R = -75V, I _F = -10A di/dt = -100A/μs | | 66 | | nS |
| Reverse Recovery Charge | Q _{rr} | | | | 193 | |

Notes:

- 1) The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- 2) The EAS data shows Max. rating. The test condition is T_J = 25°C, V_G = -10V, L = 0.5mH, I_{AS} = -15.4A, R_G = 25Ω.
- 3) Thermal resistance from junction to soldering point (on the exposed drain pad).
- 4) Guaranteed by design, not subject to production.

Typical Characteristics

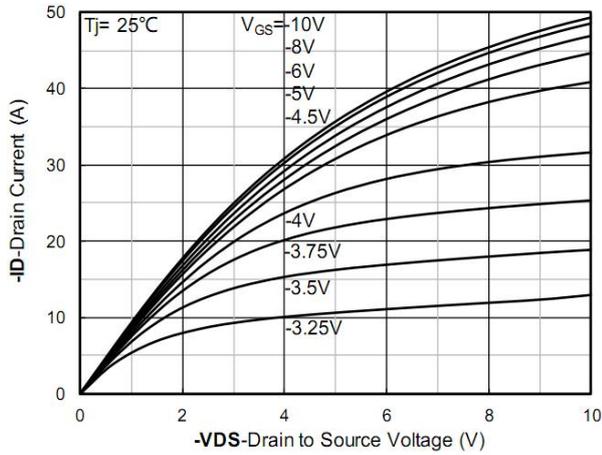


Figure 1. Output Characteristics; typical values

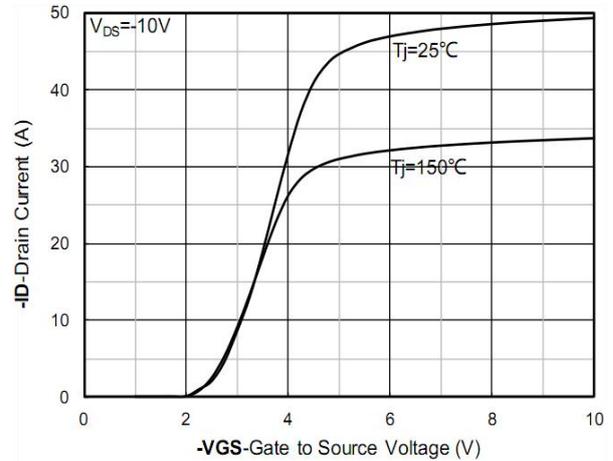


Figure 2. Transfer Characteristics; typical values

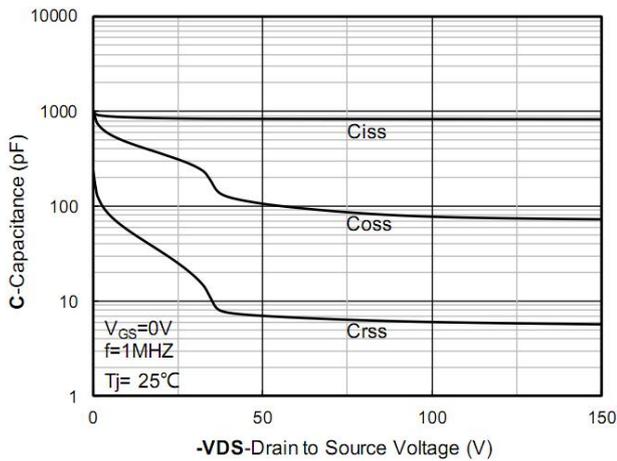


Figure 3. Capacitance Characteristics; typical values

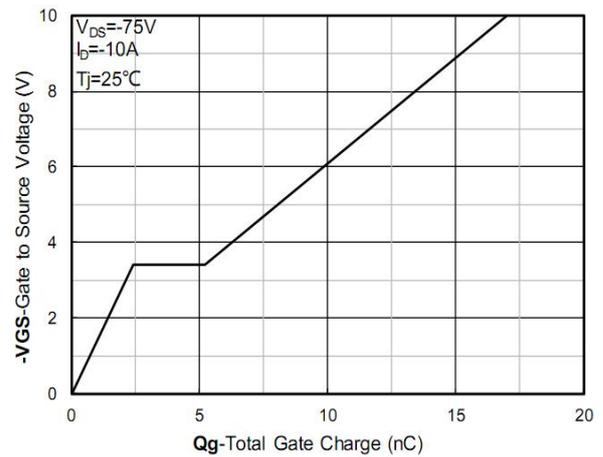


Figure 4. Gate Charge; typical values

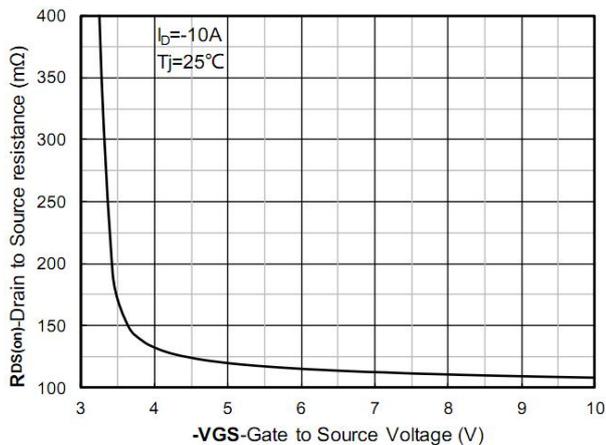


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

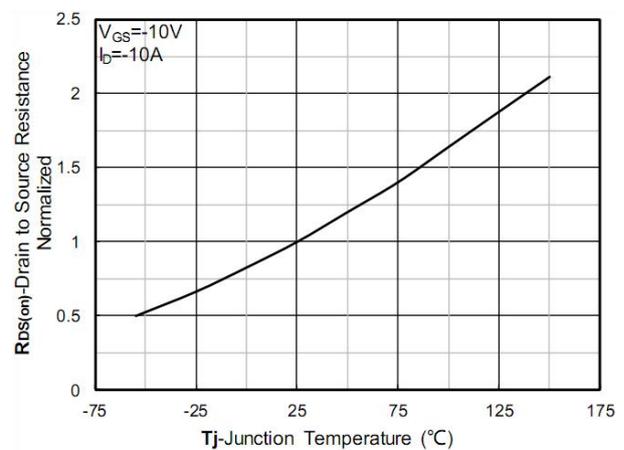


Figure 6. Normalized On-Resistance

Typical Characteristics

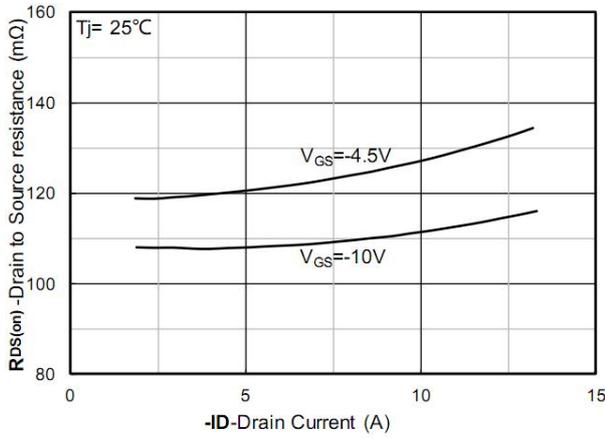


Figure 7. $R_{DS(on)}$ vs. Drain Current; typical values

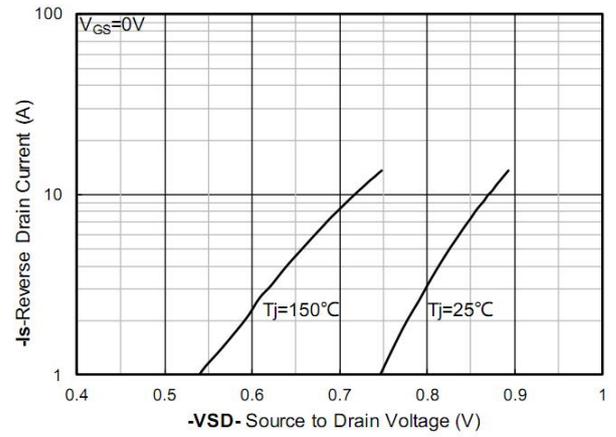


Figure 8. Forward characteristics of reverse diode; typical values

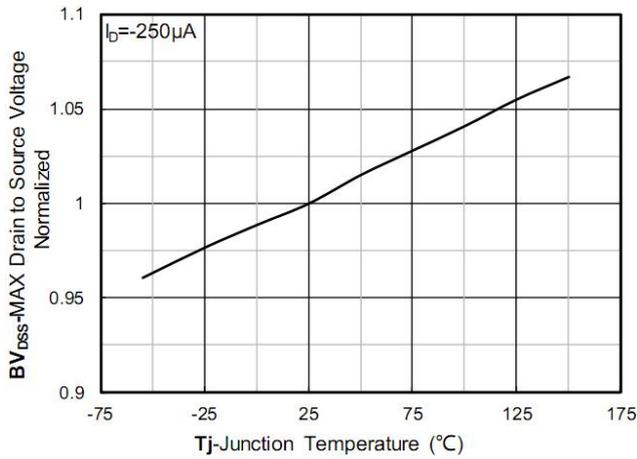


Figure 9. Normalized breakdown voltage

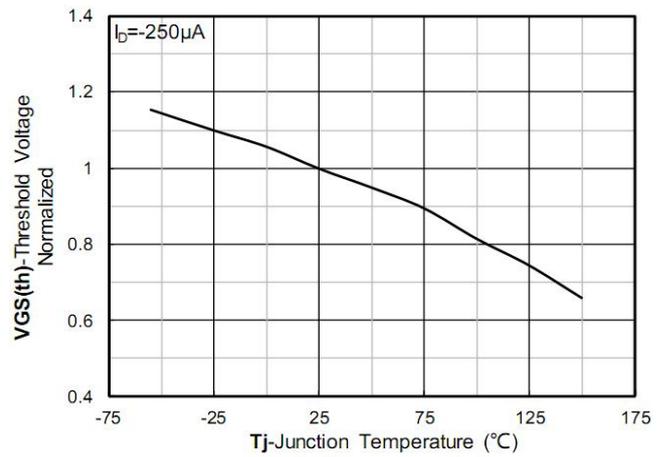


Figure 10. Normalized Threshold voltage

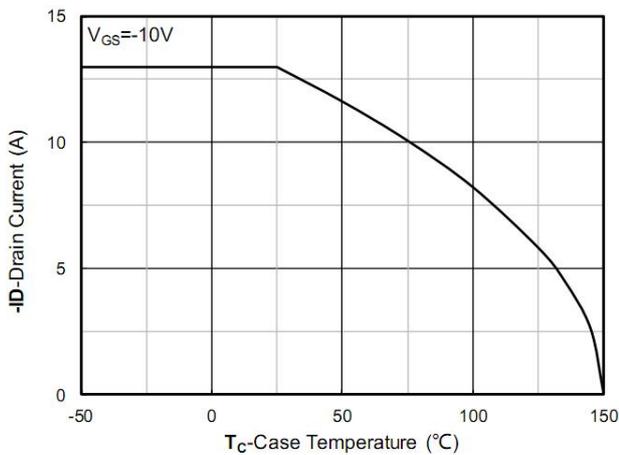


Figure 11. Current dissipation

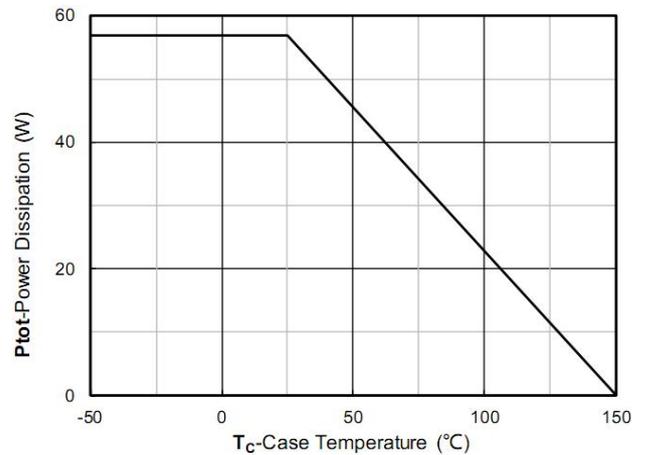


Figure 12. Power dissipation

Typical Characteristics

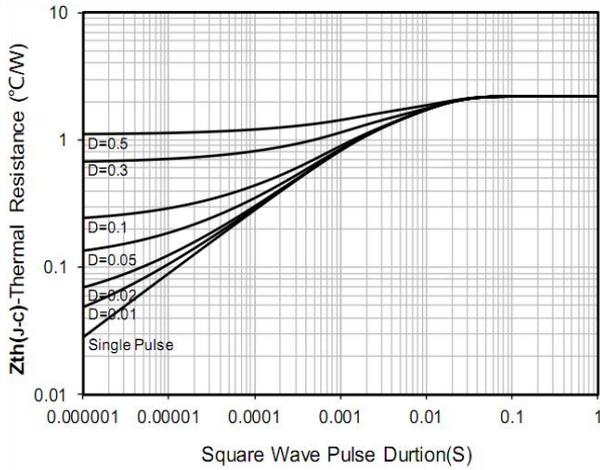


Figure 13. Maximum Transient Thermal Impedance

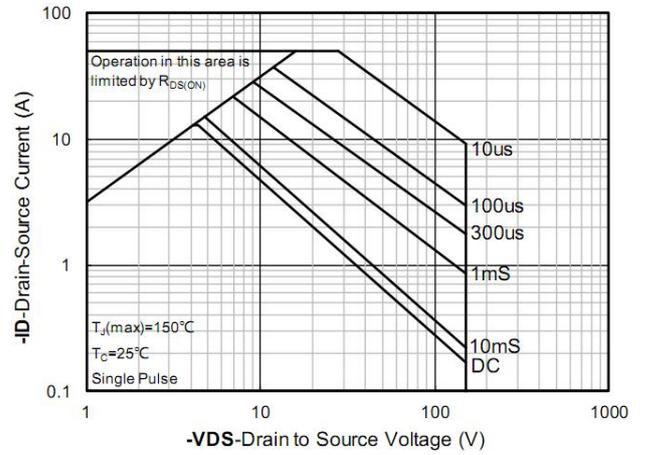
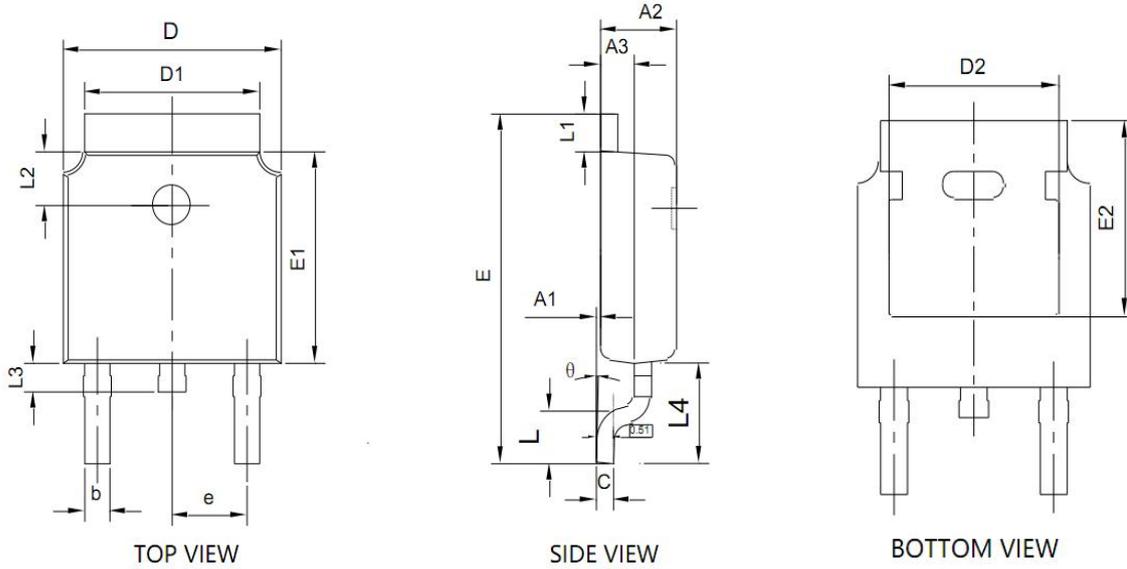


Figure 14. Safe Operation Area

TO-252AB Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|--------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A1 | 0.000 | 0.200 | 0.000 | 0.008 |
| A2 | 2.200 | 2.400 | 0.870 | 0.094 |
| A3 | 0.900 | 1.100 | 0.035 | 0.043 |
| b | 0.660 | 0.860 | 0.026 | 0.034 |
| c | 0.460 | 0.580 | 0.018 | 0.023 |
| D | 6.500 | 6.700 | 0.256 | 0.264 |
| D1 | 5.150 | 5.450 | 0.203 | 0.215 |
| D2 | 4.600 | 4.950 | 0.181 | 0.195 |
| E | 9.900 | 10.300 | 0.390 | 0.406 |
| E1 | 6.000 | 6.200 | 0.236 | 0.244 |
| E2 | 5.150 | 5.450 | 0.203 | 0.215 |
| e | 2.286 BSC. | | 0.090 BSC | |
| L | 1.250 | 1.750 | 0.049 | 0.069 |
| L1 | 0.900 | 1.270 | 0.035 | 0.050 |
| L2 | 1.400 | 1.900 | 0.055 | 0.075 |
| L3 | 0.600 | 1.000 | 0.024 | 0.039 |
| L4 | 2.900 REF. | | 0.114 REF | |
| θ | 0° | 10° | 0° | 10° |