

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)MAX}$ | I_D |
|---------------|-----------------|-------|
| -40V | 11.5mΩ@-10V | -45A |
| | 18mΩ@-4.5V | |

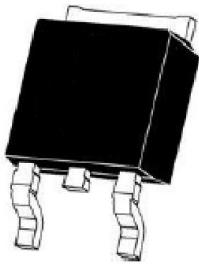
Feature

- Fast Switching
- Low Gate Charge and Rds(on)
- Suffix "-Q1" for AEC-Q101

Application

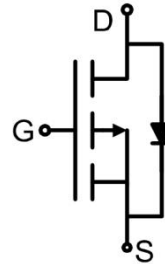
- Load switching
- DC/DC converter

Package



TO-252AB

Circuit diagram



Marking



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

| Parameter | Symbol | Value | Unit |
|---|--------------------------|------------|--------------------|
| Drain-Source Voltage | V_{DS} | -40 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current($T_C=25^\circ\text{C}$) | I_D | -45 | A |
| Continuous Drain Current($T_C=100^\circ\text{C}$) | $I_D(100^\circ\text{C})$ | -30 | A |
| Pulsed Drain Current | I_{DM} | -180 | A |
| Power Dissipation ($T_C=25^\circ\text{C}$) | P_D | 85 | W |
| Single pulse avalanche energy ¹⁾ | E_{AS} | 169 | mJ |
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 1.47 | $^\circ\text{C/W}$ |
| Junction Temperature | T_J | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{STG} | -55 ~ +150 | $^\circ\text{C}$ |

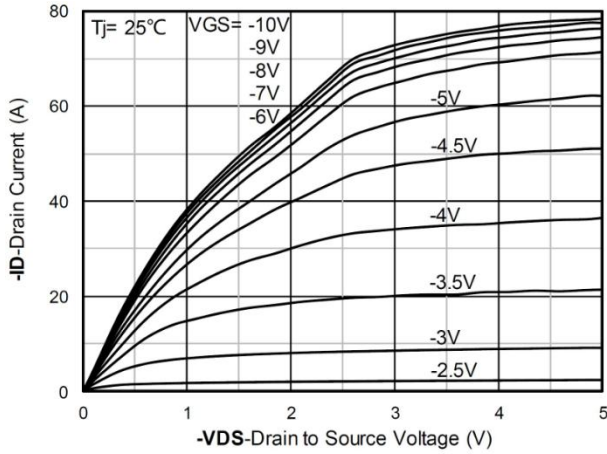
Electrical characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---------------|---|------|------|-----------|---------------|
| Static Characteristics | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = -250\mu\text{A}$ | -40 | | | V |
| Zero gate voltage drain current | I_{DSS} | $V_{DS} = -32V, V_{GS} = 0V, T_J = 25^\circ\text{C}$ | | | -1 | μA |
| Gate-body leakage current | I_{GSS} | $V_{GS} = \pm 20V, V_{DS} = 0V$ | | | ± 100 | nA |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\mu\text{A}$ | -1.2 | -1.6 | -2.5 | V |
| Drain-source on-resistance | $R_{DS(on)}$ | $V_{GS} = -10V, I_D = -10A$ | | 8.9 | 11.5 | m Ω |
| | | $V_{GS} = -4.5V, I_D = -8A$ | | 13 | 18 | |
| Dynamic characteristics²⁾ | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = -20V, V_{GS} = 0V, f = 1\text{MHz}$ | | 3800 | | pF |
| Output Capacitance | C_{oss} | | | 329 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 289 | | |
| Total Gate Charge | Q_g | $V_{DS} = -20V, V_{GS} = -10V, I_D = -20A$ | | 69 | | nC |
| Gate-Source Charge | Q_{gs} | | | 11 | | |
| Gate-Drain Charge | Q_{gd} | | | 13 | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = -20V, I_D = -20A, V_{GS} = -10V, R_G = 3\Omega$ | | 11 | | nS |
| Turn-on rise time | t_r | | | 81 | | |
| Turn-off delay time | $t_{d(off)}$ | | | 95 | | |
| Turn-off fall time | t_f | | | 73 | | |
| Source-Drain Diode characteristics | | | | | | |
| Diode forward voltage | V_{SD} | $V_{GS} = 0V, I_S = -1A, T_J = 25^\circ\text{C}$ | | | -1.2 | V |
| Diode forward current | I_S | | | | -45 | A |
| Reverse Recovery Time | t_{rr} | $T_J = 25^\circ\text{C}, I_S = -20A,$ | | 21 | | nS |
| Reverse Recovery Charge | Q_{rr} | $di/dt = 100A/\mu\text{s}$ | | 12 | | nC |

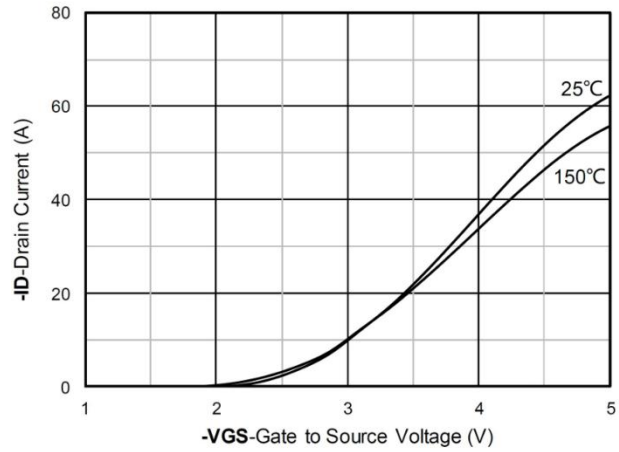
Notes:

- 1) EAS condition: $T_J = 25^\circ\text{C}, V_{DD} = -20V, V_G = -10V, L = 1\text{mH}, R_G = 25\Omega$.
- 2) Guaranteed by design, not subject to production testing.

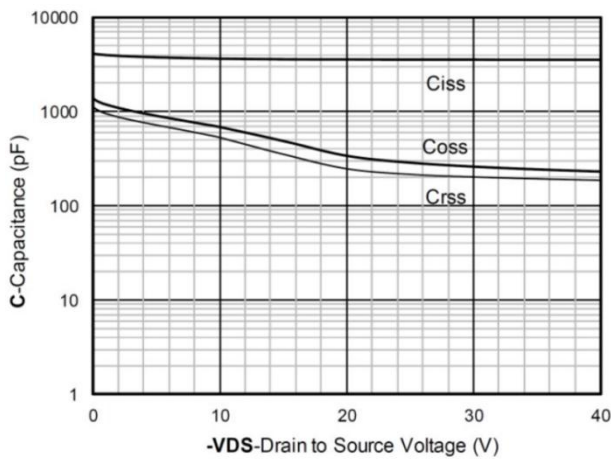
Typical Characteristics



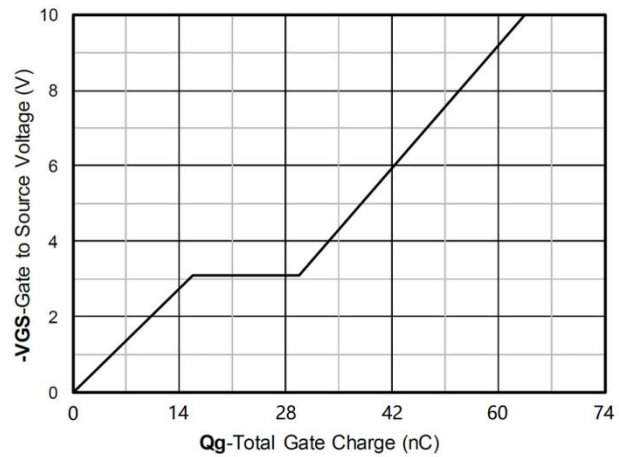
Output Characteristics



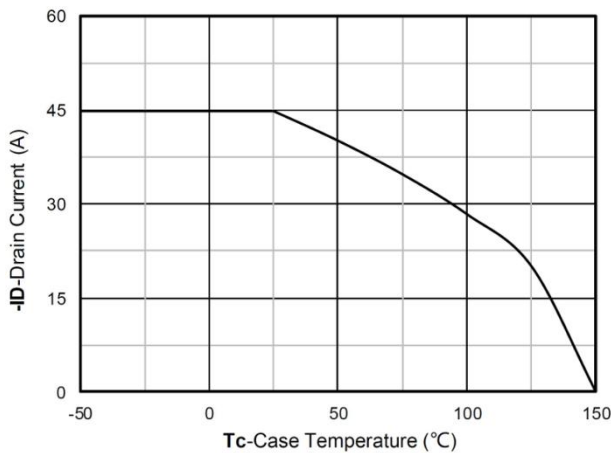
Transfer Characteristics



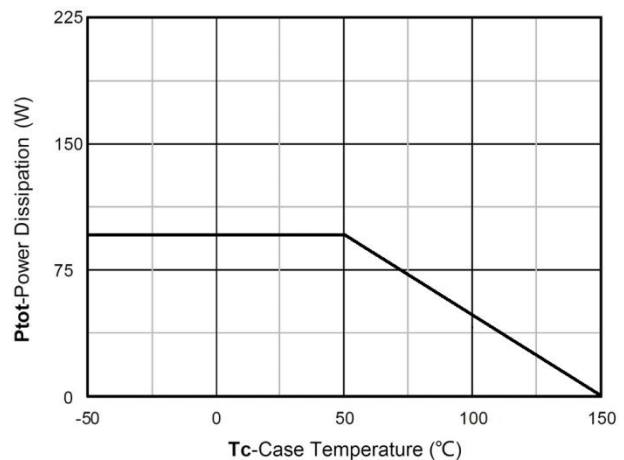
Capacitance Characteristics



Gate Charge

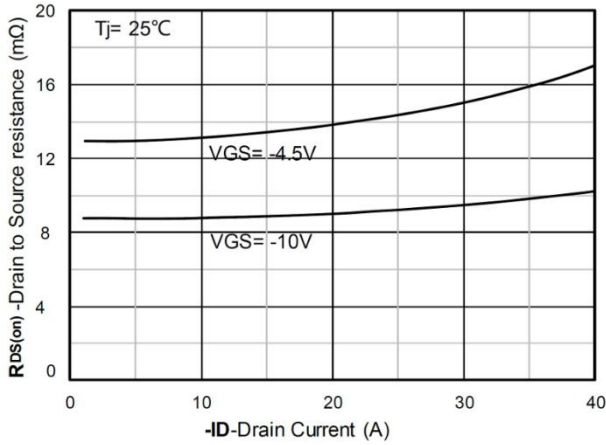


Current dissipation

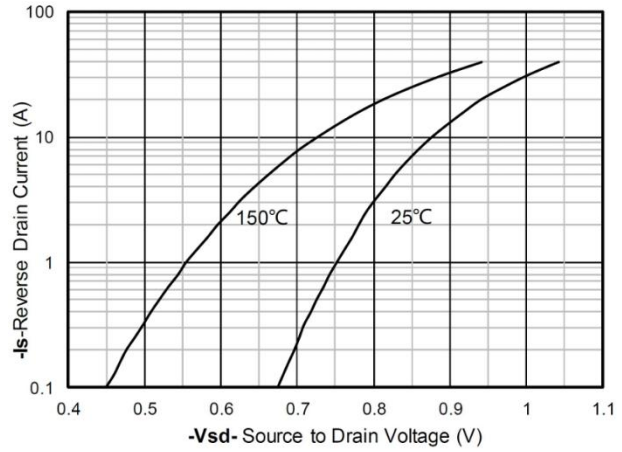


Power dissipation

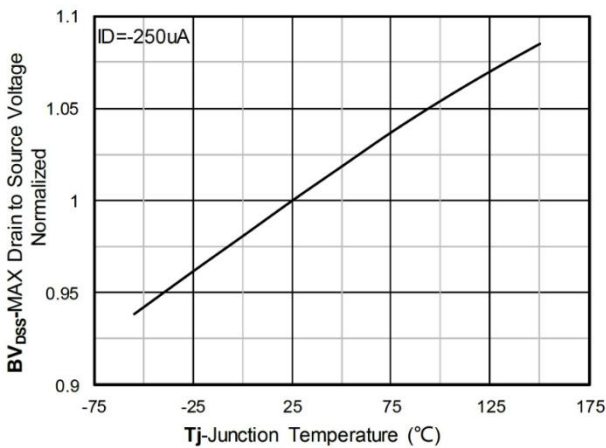
Typical Characteristic



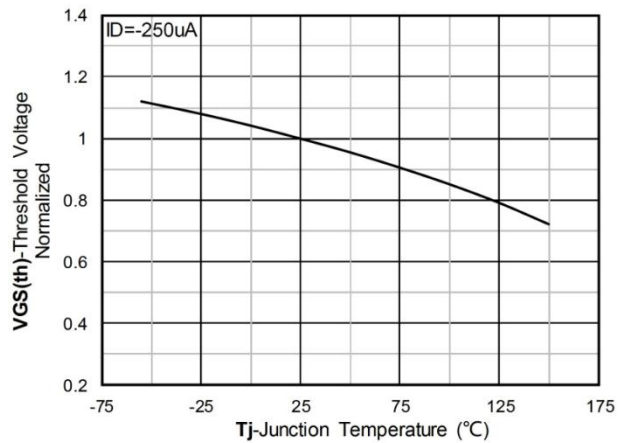
$R_{DS(on)}$ VS Drain Current



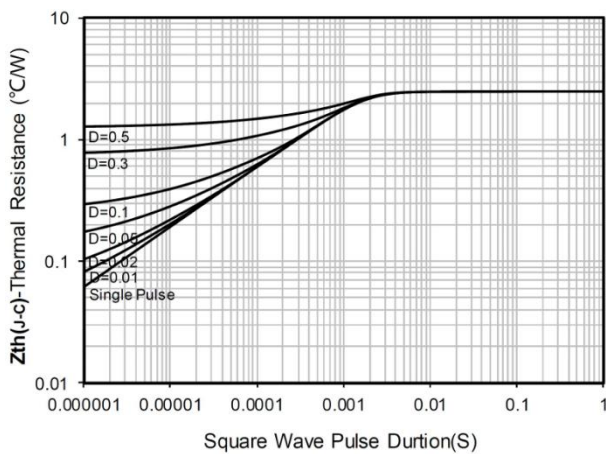
Forward characteristics of reverse diode



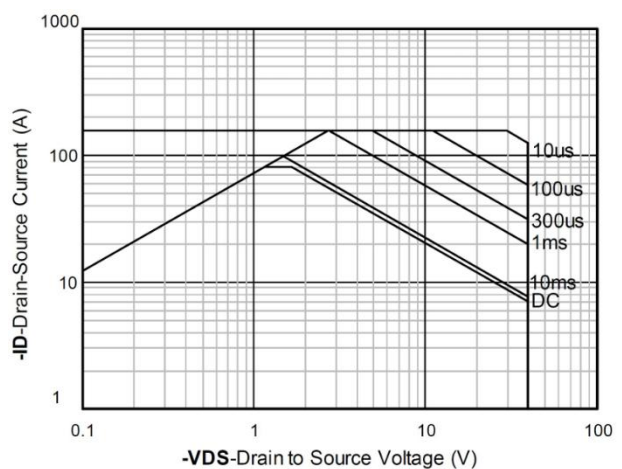
Normalized breakdown voltage



Normalized Threshold voltage

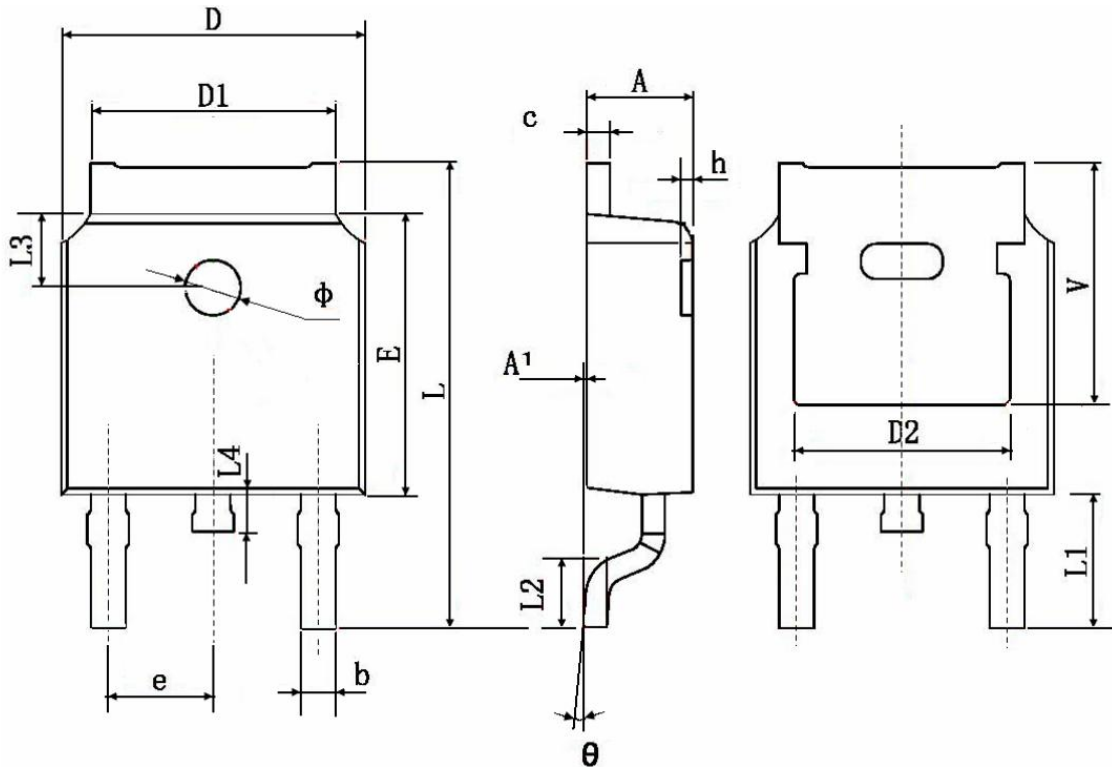


Maximum Transient Thermal Impedance



Safe Operation Area

TO-252AB Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 0.000 | 0.130 | 0.000 | 0.005 |
| 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 | 5.100 | 5.500 | 0.201 | 0.217 |
| D2 | 4.830 REF. | | 0.190 REF. | |
| E | 6.000 | 6.200 | 0.236 | 0.244 |
| e | 2.186 | 2.390 | 0.086 | 0.094 |
| L | 9.800 | 10.500 | 0.386 | 0.413 |
| L1 | 2.900 REF. | | 0.114 REF. | |
| L2 | 1.400 | 1.800 | 0.055 | 0.070 |
| L3 | 1.600 REF. | | 0.063 REF. | |
| L4 | 0.600 | 1.000 | 0.024 | 0.039 |
| φ | 1.100 | 1.300 | 0.043 | 0.051 |
| θ | 0° | 8° | 0° | 8° |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| V | 5.350 REF. | | 0.211 REF. | |