

N-Channel Enhancement Mode Field Effect Transistor

Product Summary

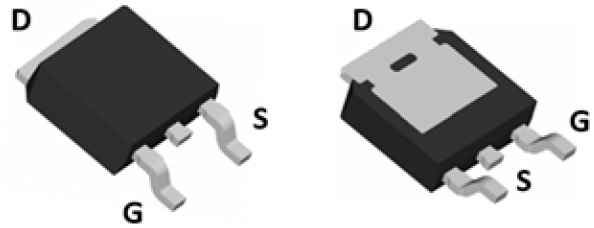
- V_{DS} 100V
- I_D 50A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) < 17 mohm
- $R_{DS(ON)}$ (at $V_{GS}=4.5V$) < 21.5 mohm
- 100% UIS Tested
- 100% ∇V_{DS} Tested

General Description

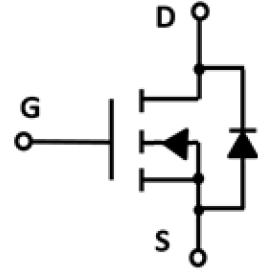
- Low $R_{DS(on)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Fast switching and soft recovery

Applications

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



TO-252



■ Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|--|----------------|-------------------------|------------------|
| Drain-source Voltage | V_{DS} | 100 | V |
| Gate-source Voltage | V_{GS} | ± 20 | V |
| Drain Current | I_D | $T_C=25^\circ\text{C}$ | 50 |
| | | $T_C=100^\circ\text{C}$ | 28.5 |
| Pulsed Drain Current ^A | I_{DM} | 180 | A |
| Avalanche energy ^B | EAS | 81 | mJ |
| Total Power Dissipation ^C | P_D | $T_C=25^\circ\text{C}$ | 72 |
| | | $T_C=100^\circ\text{C}$ | 28.8 |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55~+150 | $^\circ\text{C}$ |

■ Thermal resistance

| Parameter | Symbol | Typ | Max | Units |
|---|-----------------|--------------|-----|--------------------|
| Thermal Resistance Junction-to-Ambient ^D | $R_{\theta JA}$ | 15 | 20 | $^\circ\text{C/W}$ |
| Thermal Resistance Junction-to-Ambient ^D | | Steady-State | 40 | |
| Thermal Resistance Junction-to-Case | $R_{\theta JC}$ | 1.35 | 1.7 | |

■ Electrical Characteristics (T_j=25°C 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 |
| 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 | 1.8 | 3 | V |
| Static Drain-Source On-Resistance | R _{DS(on)} | V _{GS} = 10V, I _D =20A | | 14 | 17 | mΩ |
| | | V _{GS} = 4.5V, I _D =20A | | 17 | 21.5 | mΩ |
| Diode Forward Voltage | V _{SD} | I _S =20A, V _{GS} =0V | | | 1.3 | V |
| Maximum Body-Diode Continuous Current | I _S | | | | 45 | A |
| Gate resistance | R _G | f= 1 MHz, Open drain | | 1 | | Ω |
| Dynamic Parameters | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =50V, V _{GS} =0V, f=1MHZ | | 1135 | | pF |
| Output Capacitance | C _{oss} | | | 399 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 18 | | |
| Switching Parameters | | | | | | |
| Total Gate Charge | Q _g | V _{GS} =10V, V _{DS} =50V, I _D =25A | | 16 | | nC |
| Gate-Source Charge | Q _{gs} | | | 5.6 | | |
| Gate-Drain Charge | Q _{gd} | | | 2.4 | | |
| Reverse Recovery Chrage | Q _{rr} | I _F =20A, di/dt=100A/us | | 42 | | |
| Reverse Recovery Time | t _{rr} | | | 39.8 | | |
| Turn-on Delay Time | t _{D(on)} | V _{GS} =10V, V _{DD} =50V, I _D =25A R _{GEN} =2.2Ω | | 39.2 | | ns |
| Turn-on Rise Time | t _r | | | 11 | | |
| Turn-off Delay Time | t _{D(off)} | | | 53.2 | | |
| Turn-off fall Time | t _f | | | 15.8 | | |

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

B. V_{DD}=50V, V_{GS}=10V, L=5mH, I_{AS}=5.7A.

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

D. The value of RqJA is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C. The Power dissipation PDSM is based on R qJA ≤ 10s and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

■ Typical Performance Characteristics

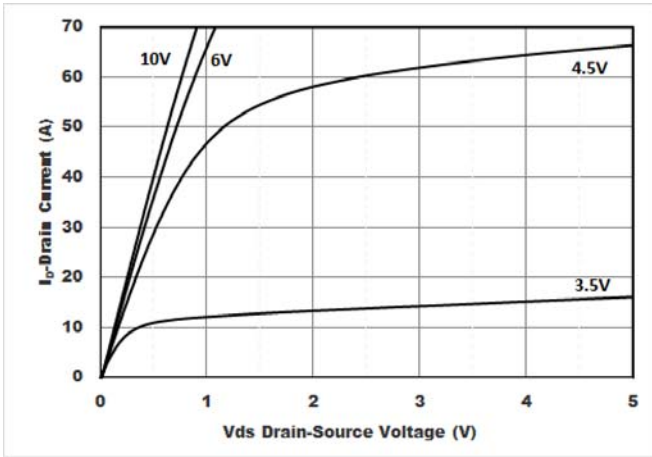


Figure1. Output Characteristics

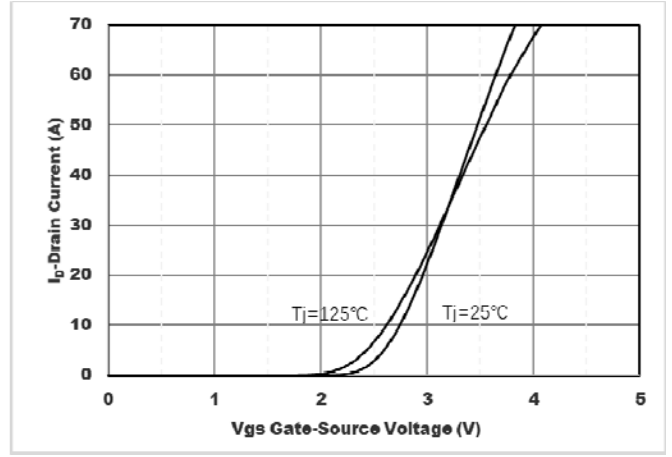


Figure2. Transfer Characteristics

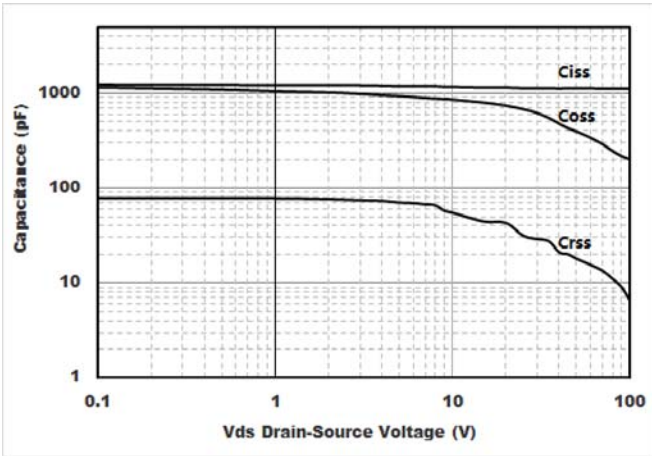


Figure3. Capacitance Characteristics

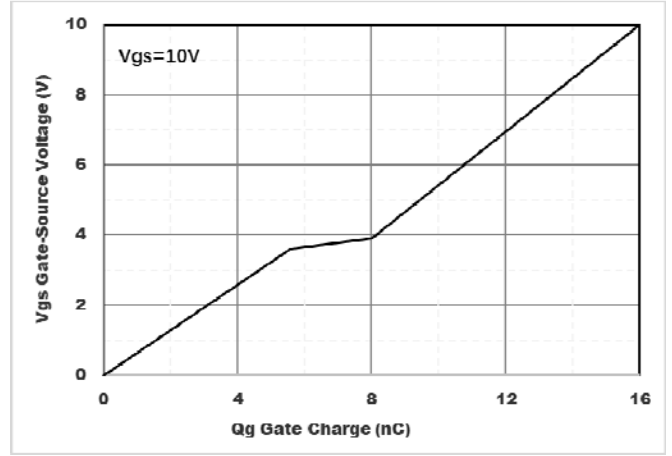


Figure4. Gate Charge

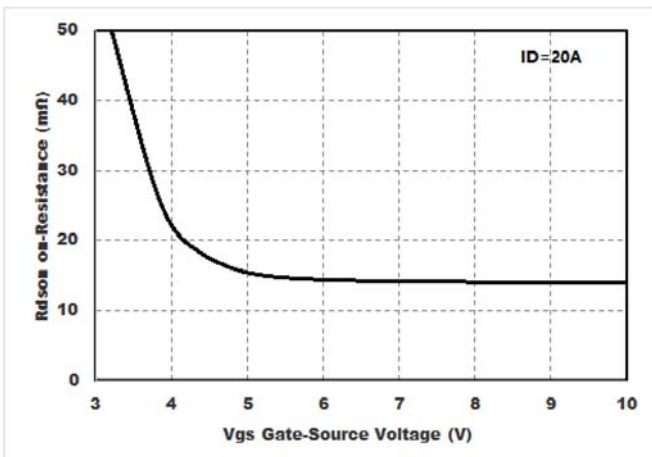


Figure5. : On-Resistance vs. Drain Current and Gate Voltage

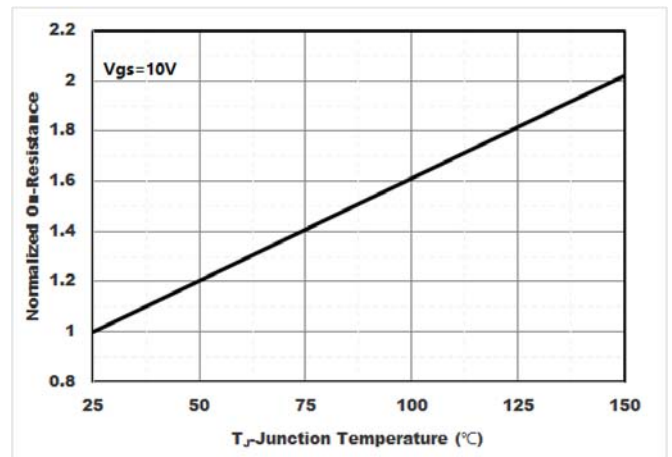


Figure6. Normalized On-Resistance

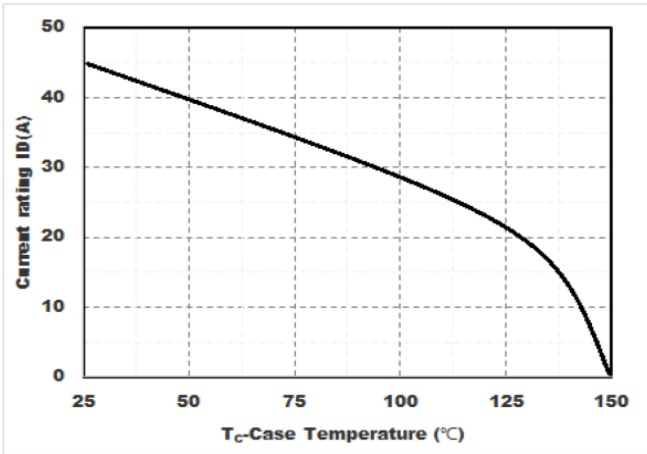


Figure7. Drain current

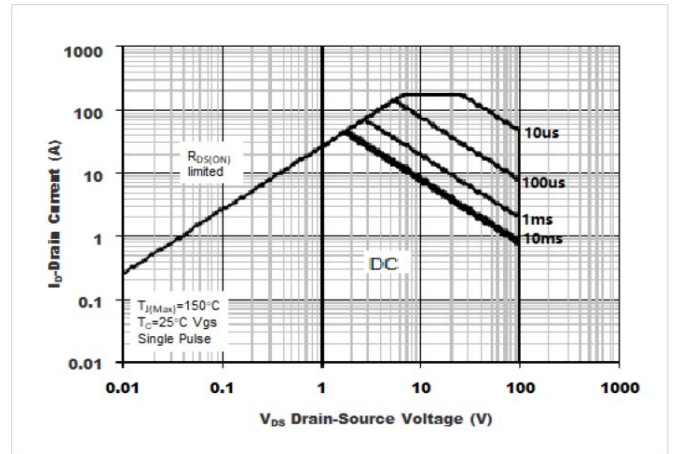


Figure8.Safe Operation Area

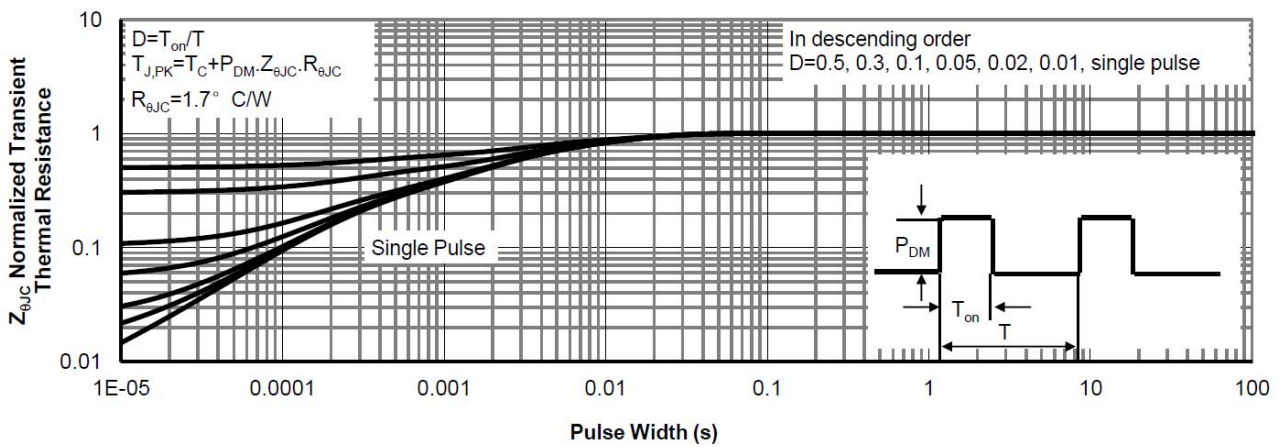
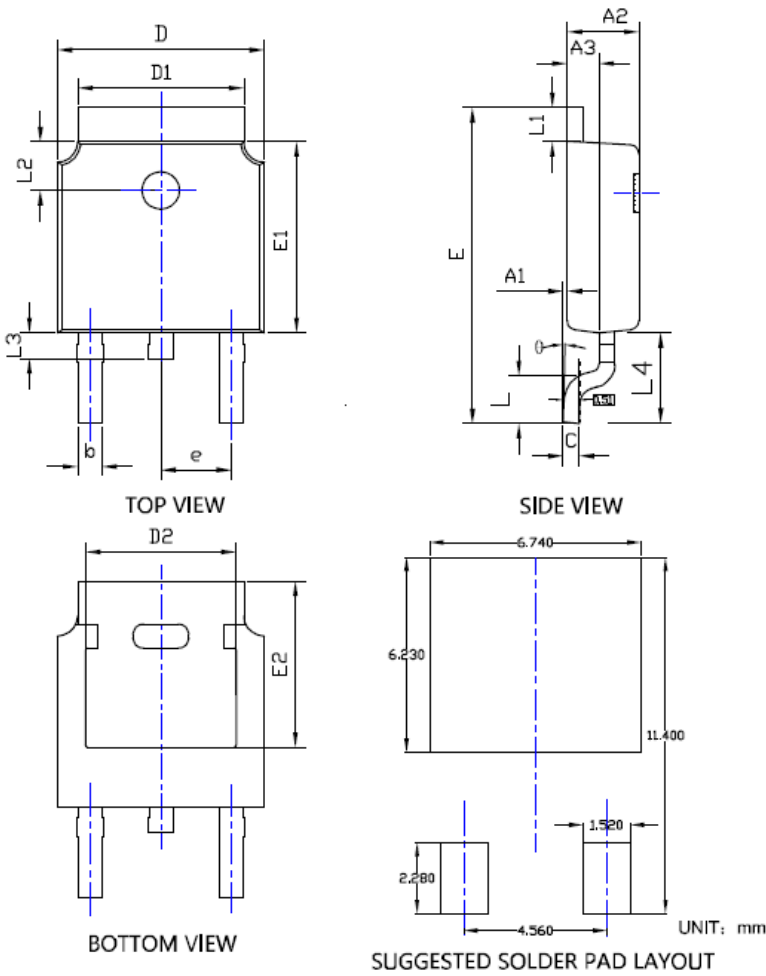


Figure9.Normalized Maximum Transient thermal impedance

■ TO-252 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 | 0.240 | 0.310 | 0.039 | 0.600 | 0.800 | 1.000 |
| L4 | 0.114REF | | | 2.900REF | | |
| θ | 0° | --- | 10° | 0° | --- | 10° |