

N-Channel Enhancement Mode MOSFET

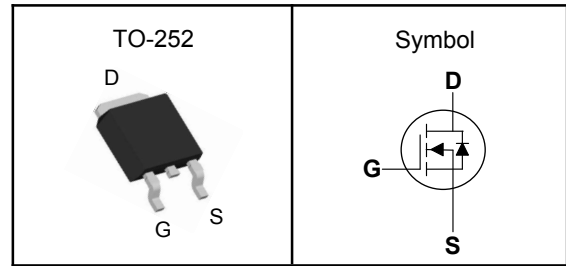
Features

- Fast switching speed
- Reliable and Rugged
- ROHS Compliant
- 100% UIS and Rg Tested

Applications

- High Frequency Point-of-Load, Synchronous Buck Converter
- Networking DC-DC Power System
- Load Switch

Pin Description



| | | |
|------------------|-----|----------|
| V_{DSS} | 650 | V |
| $R_{DS(ON)-Typ}$ | 4 | Ω |
| I_D | 2 | A |

Absolute Maximum Ratings ($T_C=25^\circ\text{C}$, Unless Otherwise Noted)

| Symbol | Parameter | N-Channel | Unit |
|--------------|--|------------------------------|------------------|
| V_{DSS} | Drain-Source Voltage | 650 | V |
| V_{GSS} | Gate-Source Voltage | ± 30 | V |
| T_J | Maximum Junction Temperature | -55 to 150 | $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| E_{AS} | Single Pulse Avalanche Energy ^③ | 95 | mJ |
| $I_{DM}^{①}$ | Pulse Drain Current Tested | 6 | A |
| I_D | Continuous Drain Current | $T_C=25^\circ\text{C}$ 2 | A |
| P_D | Maximum Power Dissipation | $T_C=25^\circ\text{C}$ 25 | W |

Thermal Characteristics

| Symbol | Parameter | Rating | Unit |
|-----------------|--|--------|---------------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ^① (Max) | 60 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ^① | 5 | $^\circ\text{C}/\text{W}$ |

Note ① : Max. current is limited by bonding wire.

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150°C .

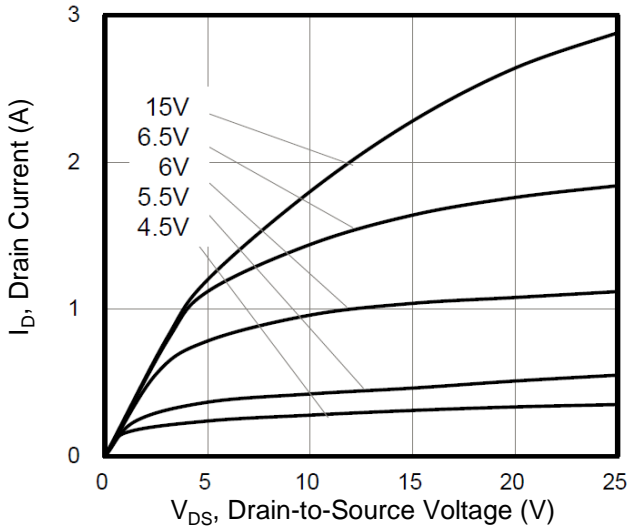
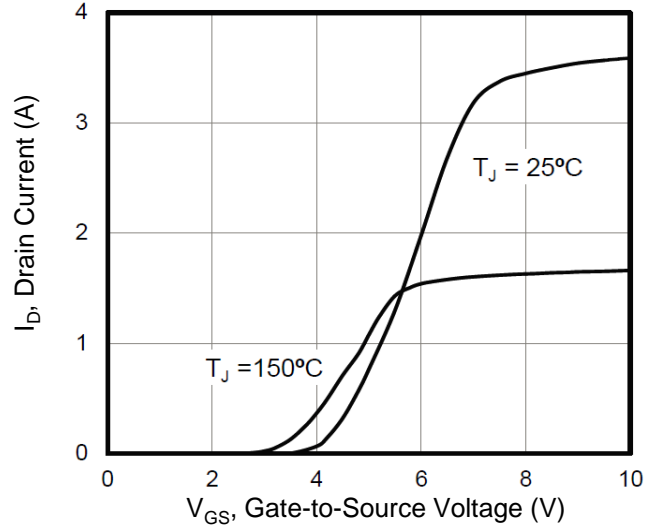
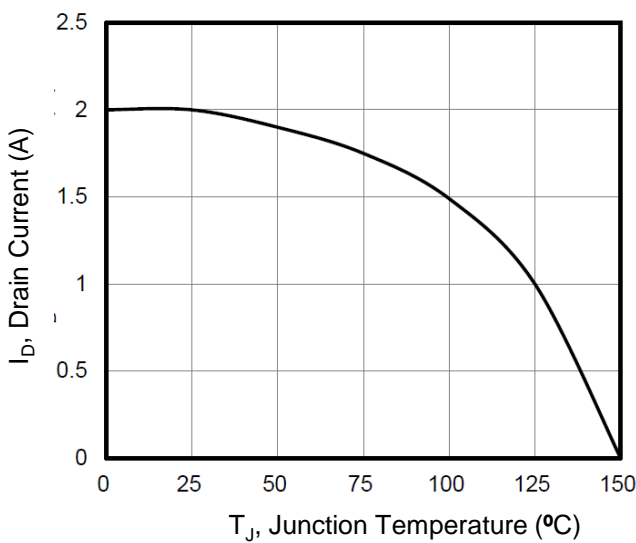
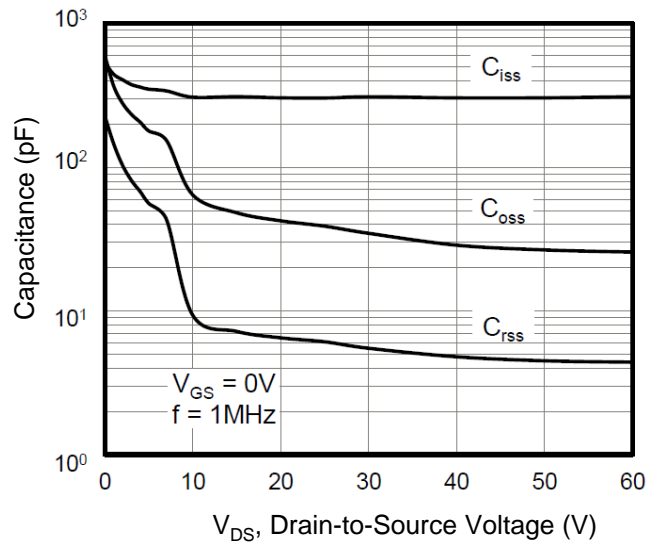
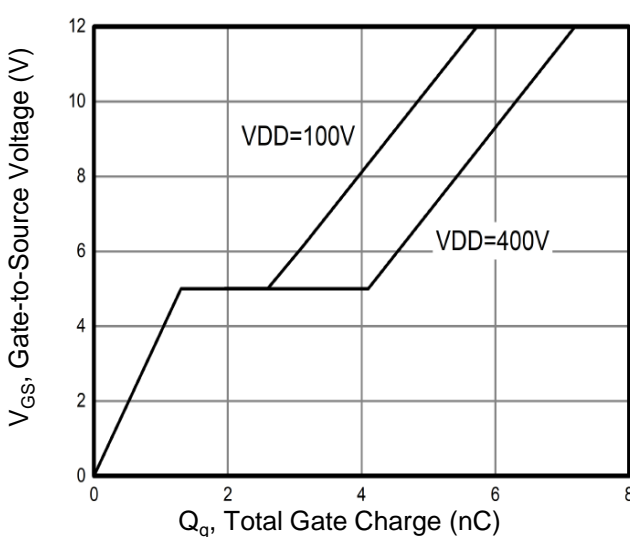
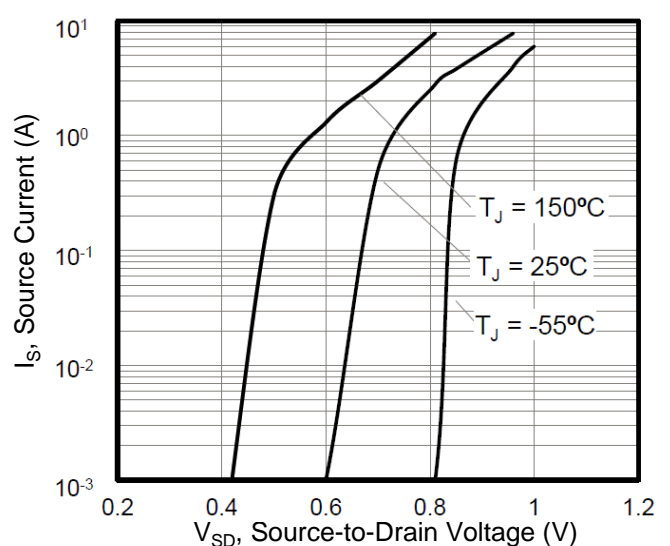
Note ③ : Surface Mounted on 1in^2 FR-4 board with 1oz.

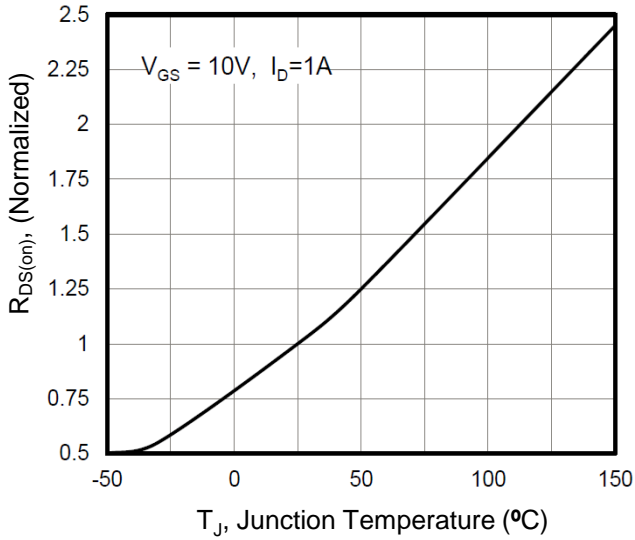
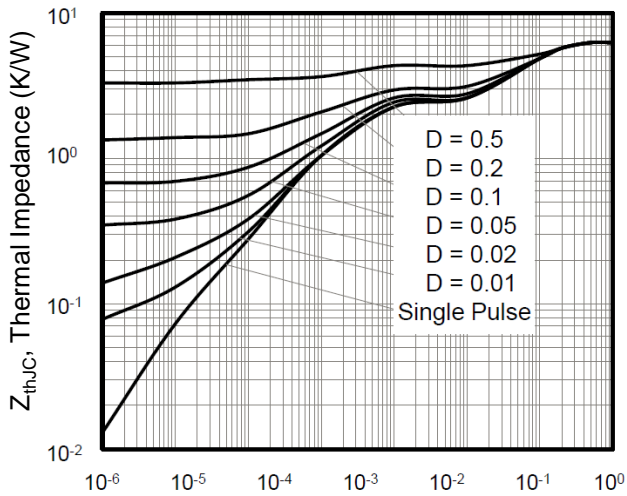
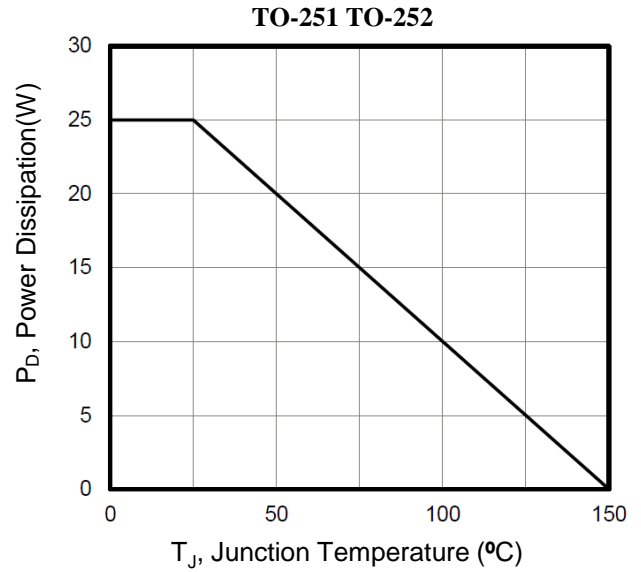
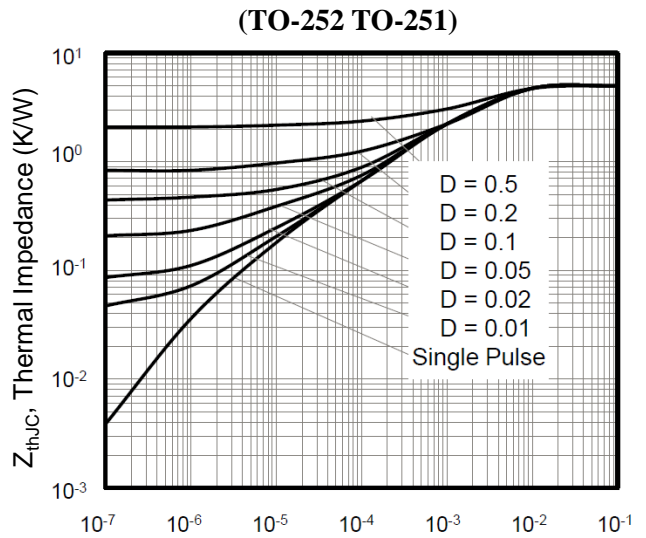
**N-Channel Enhancement Mode MOSFET****Electrical Characteristics** ($T_J=25^\circ\text{C}$, Unless Otherwise Noted)

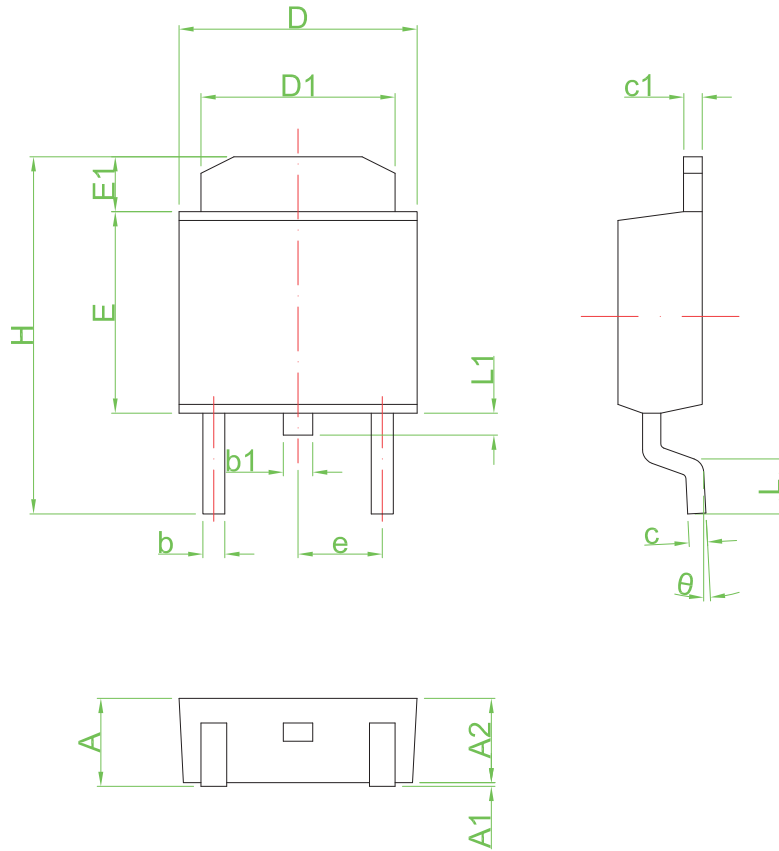
| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--|------------------------------------|--|-----|-----|-----------|----------|
| Static Electrical Characteristics | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250mA$ | 650 | --- | --- | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=650V, V_{GS}=0V$ | --- | --- | 1 | μA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 2 | --- | 4 | V |
| I_{GSS} | Gate Leakage Current | $V_{GS}=\pm 30V, V_{DS}=0V$ | --- | --- | ± 100 | nA |
| $R_{DS(on)}$ | Drain-Source On-state Resistance | $V_{GS}=10V, I_D=1A$ | --- | 4 | 4.8 | Ω |
| Dynamic Characteristics ^⑤ | | | | | | |
| C_{iss} | Input Capacitance | $V_{GS}=0V, V_{DS}=25V, \text{Freq.}=1MHz$ | --- | 359 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 46 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 10 | --- | |
| $T_{d(on)}$ | Turn-on Delay Time | $V_{DD}=300V, R_G=25\Omega, I_D=2A$ | --- | 8 | --- | nS |
| T_r | Turn-on Rise Time | | --- | 33 | --- | |
| $T_{d(off)}$ | Turn-off Delay Time | | --- | 23 | --- | |
| T_f | Turn-off Fall Time | | --- | 59 | --- | |
| Q_g | Total Gate Charge | $V_{DD}=400V, V_{GS}=10V, I_D=2A$ | --- | 6.3 | --- | nC |
| Q_{gs} | Gate-Source Charge | | --- | 1.2 | --- | |
| Q_{gd} | Gate-Drain Charge | | --- | 2.9 | --- | |
| Source-Drain Characteristics ($T_J=25^\circ\text{C}$) | | | | | | |
| V_{SD} | Diode Forward Voltage ₂ | $V_{GS}=0V, I_S=2A, T_J=25^\circ\text{C}$ | --- | --- | 1.4 | V |
| t_{rr} | Reverse Recovery Time | $V_R=400V, I_F=2A, di_F/dt=100A/\mu s$ | --- | 80 | --- | nS |
| Q_{rr} | Reverse Recovery Charge | | --- | 1.8 | --- | nC |

Note ④ : Pulse test (pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$).

Note ⑤ : Guaranteed by design, not subject to production testing.

N-Channel Enhancement Mode MOSFET
Typical Characteristics
Figure 1. Output Characteristics

Figure 2. Transfer Characteristics

Figure 3. Drain Current vs. Temperature

Figure 4. Capacitance

Figure 5. Gate Charge

Figure 6. Body Diode Forward Voltage


N-Channel Enhancement Mode MOSFET
Figure 7. On-Resistance vs. Temperature

Figure 9. Transient Thermal Impedance (TO-220F)

Figure 8. Power Dissipation vs. Temperature

Figure 10. Transient Thermal Impedance (TO-252 TO-251)


N-Channel Enhancement Mode MOSFET
TO-252 Package Outline Dimensions


| Symbol | Dimensions in Millimeters | | Dimensions in Inches | |
|--------|---------------------------|------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 2.25 | 2.65 | 0.089 | 0.104 |
| A1 | 0.00 | 0.15 | 0.000 | 0.006 |
| A2 | 2.20 | 2.40 | 0.087 | 0.094 |
| b | 0.50 | 0.70 | 0.020 | 0.028 |
| b1 | 0.70 | 0.90 | 0.028 | 0.035 |
| c | 0.46 | 0.66 | 0.018 | 0.026 |
| c1 | 0.46 | 0.66 | 0.018 | 0.026 |
| D | 6.30 | 6.70 | 0.248 | 0.264 |
| D1 | 5.20 | 5.40 | 0.205 | 0.213 |
| E | 5.30 | 5.70 | 0.209 | 0.224 |
| E1 | 1.40 | 1.60 | 0.055 | 0.063 |
| H | 9.40 | 9.90 | 0.370 | 0.390 |
| e | 2.30 TYP | | 0.09 TYP | |
| L | 1.40 | 1.77 | 0.055 | 0.070 |
| L1 | 0.50 | 0.70 | 0.020 | 0.028 |
| theta | 0° | 8° | 0° | 8° |