

650 Super Junction Power MOSFET

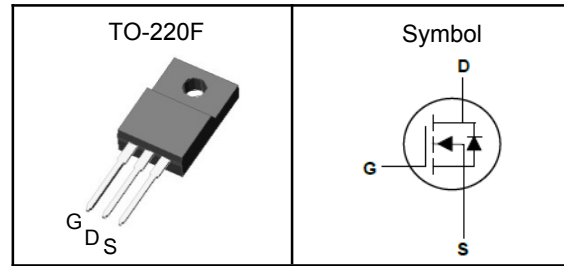
Features

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

Applications

- Switch Mode Power Supply (SMPS)
- TV power & LED Lighting Power
- AC to DC Converters
- Telecom

Pin Description



| | | |
|------------------|-----|------------|
| V_{DSS} | 650 | V |
| $R_{DS(ON)-Typ}$ | 120 | m Ω |
| I_D | 24 | A |

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

| Symbol | Parameter | Rating | 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 | 455 | mJ |
| $I_{DM}^{①}$ | Pulse Drain Current Tested | 72 | A |
| I_D | Continuous Drain Current | $T_c=25^\circ\text{C}$ | A |
| P_D | Maximum Power Dissipation | $T_c=25^\circ\text{C}$ | W |

Thermal Characteristics

| Symbol | Parameter | Rating | Unit |
|-----------------|--|--------|---------------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ^① | 62.5 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ^① | 2.85 | $^\circ\text{C}/\text{W}$ |

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

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150 $^\circ\text{C}$.

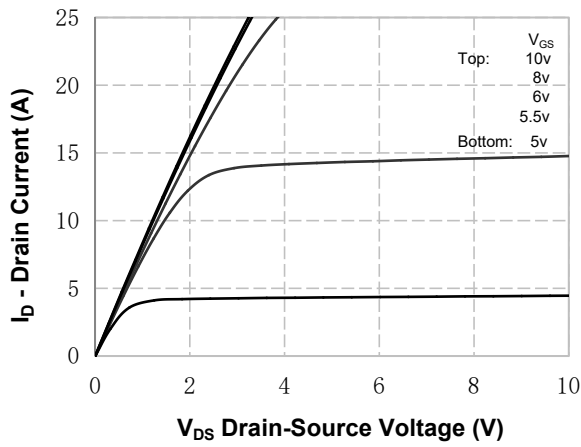
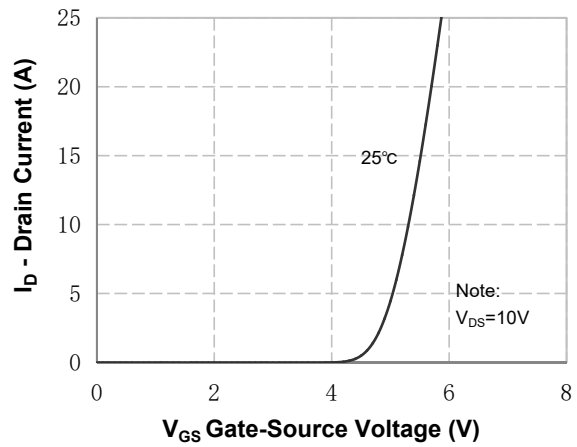
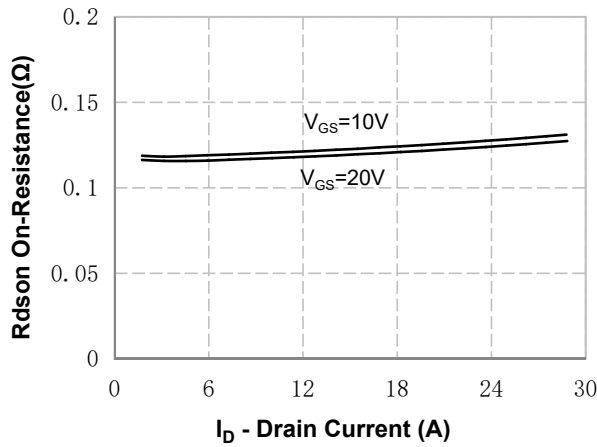
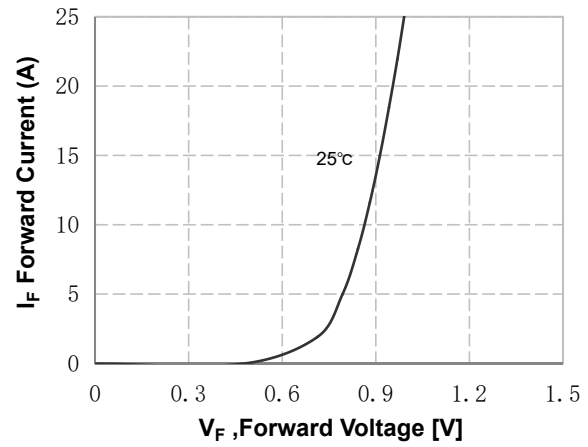
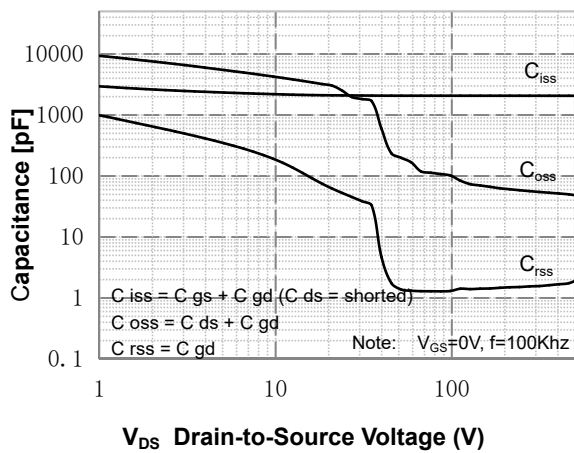
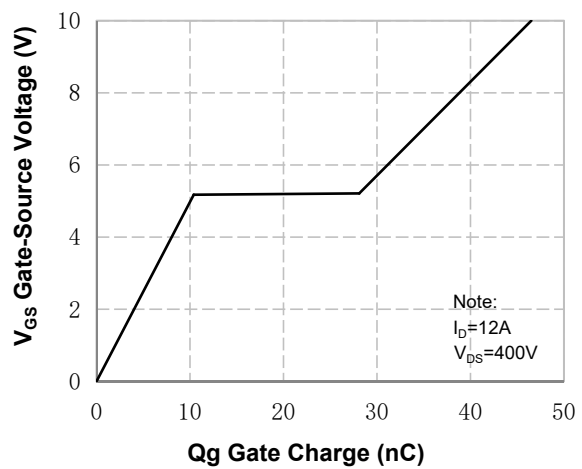
Note ③ : Surface Mounted on 1in² FR-4 board with 1oz.

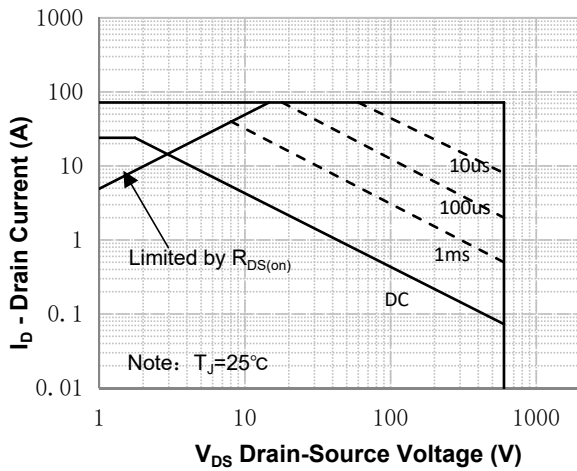
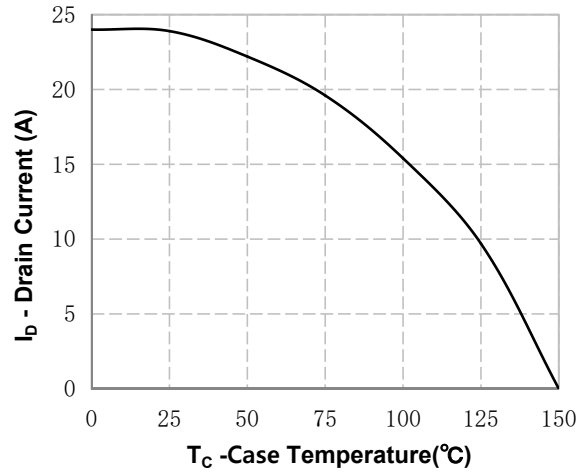
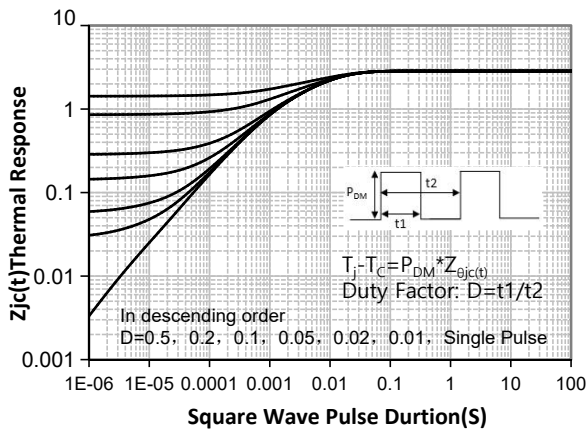
**650 Super Junction Power MOSFET****Electrical Characteristics** ($T_J=25^\circ\text{C}$, Unless Otherwise Noted)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--|------------------------------------|--|-----|------|-----------|------------|
| Static Electrical Characteristics | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 650 | --- | --- | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=600V, V_{GS}=0V$ | --- | --- | 10 | μA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 2.5 | --- | 4.5 | V |
| I_{GSS} | Gate Leakage Current | $V_{GS}=\pm 30V, V_{DS}=0V$ | --- | --- | ± 100 | nA |
| $R_{DS(ON)}$ | Drain-Source On-state Resistance | $V_{GS}=10V, I_D=12A$ | --- | 120 | 135 | m Ω |
| Dynamic Characteristics ^⑤ | | | | | | |
| C_{iss} | Input Capacitance | $V_{GS}=0V,$ $V_{DS}=100V,$ Freq.=1MHz | --- | 2072 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 101 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 1.3 | --- | |
| $T_{d(on)}$ | Turn-on Delay Time | $V_{DD}=400V, R_G=4.7\Omega,$ $I_D=12A$ | --- | 21 | --- | nS |
| T_r | Turn-on Rise Time | | --- | 40 | --- | |
| $T_{d(off)}$ | Turn-off Delay Time | | --- | 56 | --- | |
| T_f | Turn-off Fall Time | | --- | 14 | --- | |
| Q_g | Total Gate Charge | $V_{DD}=400V,$ $V_{GS}=10V, I_D=12A$ | --- | 46 | --- | nC |
| Q_{gs} | Gate-Source Charge | | --- | 8 | --- | |
| Q_{gd} | Gate-Drain Charge | | --- | 15 | --- | |
| Source-Drain Characteristics ($T_J=25^\circ\text{C}$) | | | | | | |
| V_{SD} | Diode Forward Voltage ² | $V_{GS}=0V, I_S=24A, T_J=25^\circ\text{C}$ | --- | --- | 1.4 | V |
| t_{rr} | Reverse Recovery Time | $I_S=12A, V_R=400V$ di/ $dt=130A/\mu s, T_J=25^\circ\text{C}$ | --- | 110 | --- | nS |
| Q_{rr} | Reverse Recovery Charge | | --- | 0.79 | --- | 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.

650 Super Junction Power MOSFET
Typical Characteristics

Figure 1. On-Region Characteristics

Figure 2. Transfer Characteristics

Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

Figure 4. Body Diode Forward Voltage Variation with Source Current

Figure 5. Capacitance Characteristics

Figure 6. Gate Charge Characteristics

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Figure 7. Maximum Safe Operating Area

Figure 8. Maximum Drain Current vs Case Temperature

Figure 9. Transient Thermal Response Curve

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TO-220F Package Outline Data
