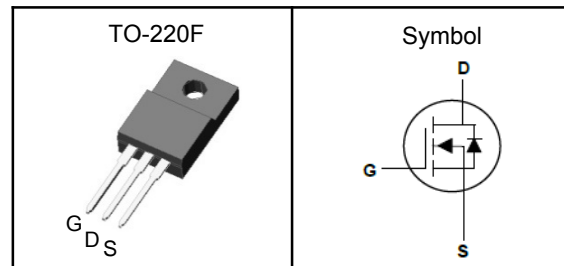


500V Super Junction Power MOSFET
Features

- Low drain-source on-resistance: $R_{DS(ON)}=0.28\Omega(\text{typ})$
- Easy to control gate switching
- Enhancement mode: $V_{th} = 2$ to $4V$
- 100% avalanche tested
- RoHS compliant

Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)
- Charger, Lighting.

Pin Description


| | | |
|------------------|------|------------|
| V_{DSS} | 500 | V |
| $R_{DS(ON)-Typ}$ | 280 | m Ω |
| I_D | 12.3 | A |

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

| Symbol | Parameter | N-Channel | Unit |
|--------------|--|------------------------|------------------|
| V_{DSS} | Drain-Source Voltage | 500 | V |
| V_{GSS} | Gate-Source Voltage | ± 20 | 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 | 165 | mJ |
| $I_{DM}^{①}$ | Pulse Drain Current Tested | 37 | 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 (Max) | 80 | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | 3.9 | $^\circ\text{C/W}$ |

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.



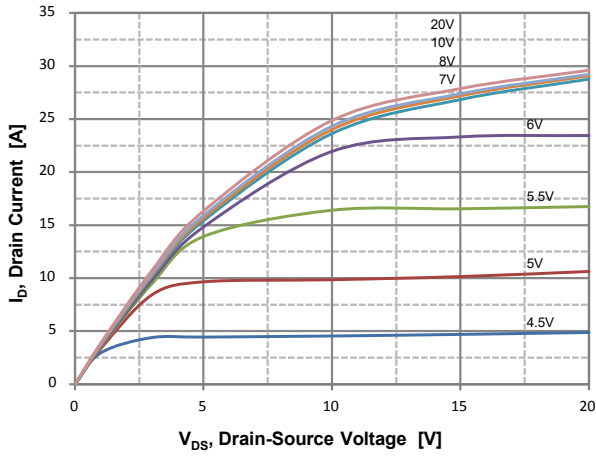
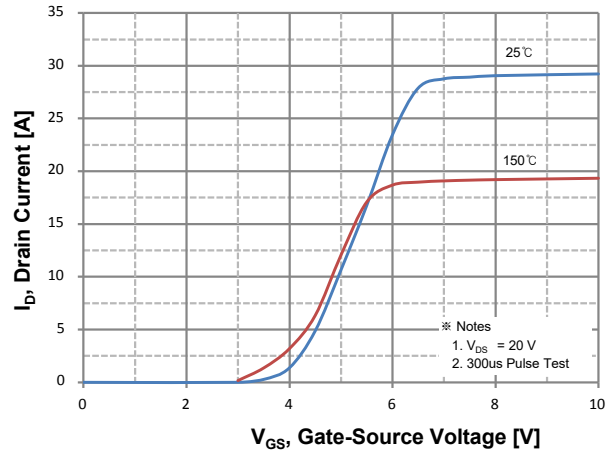
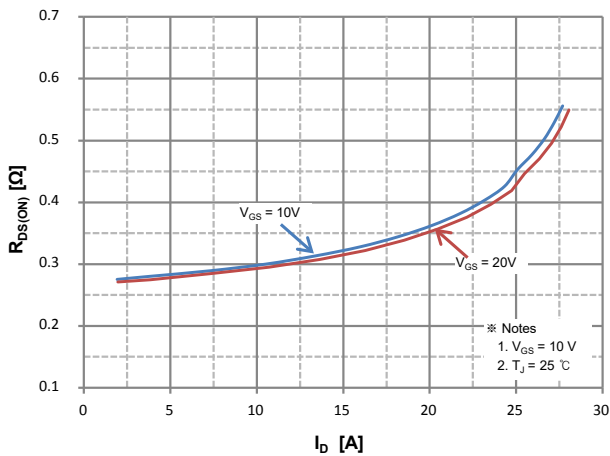
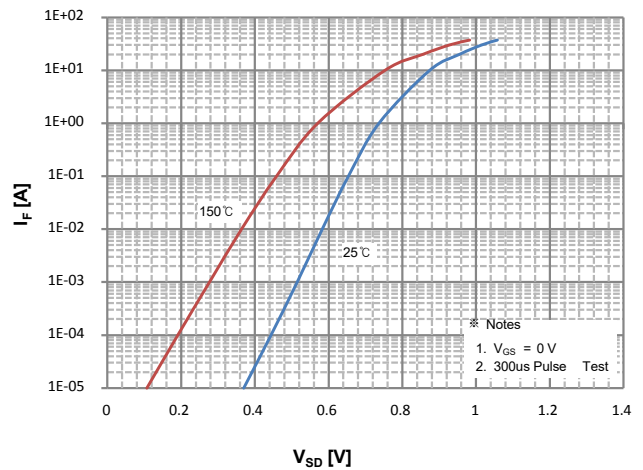
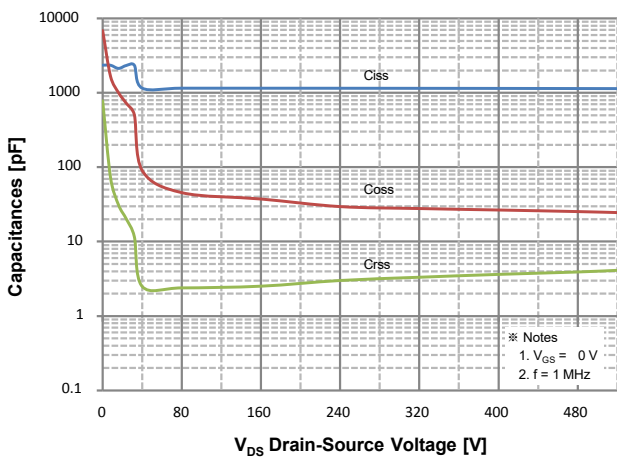
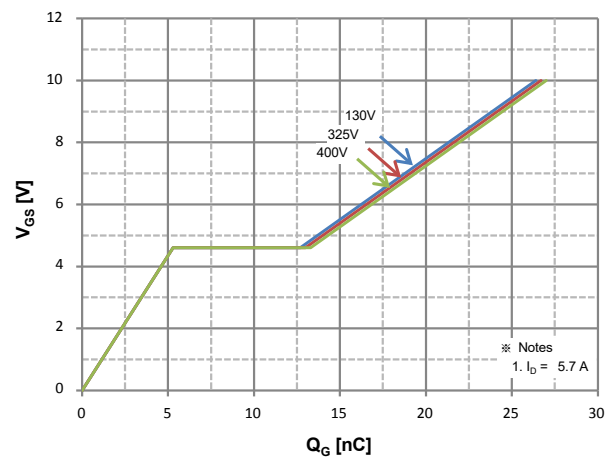
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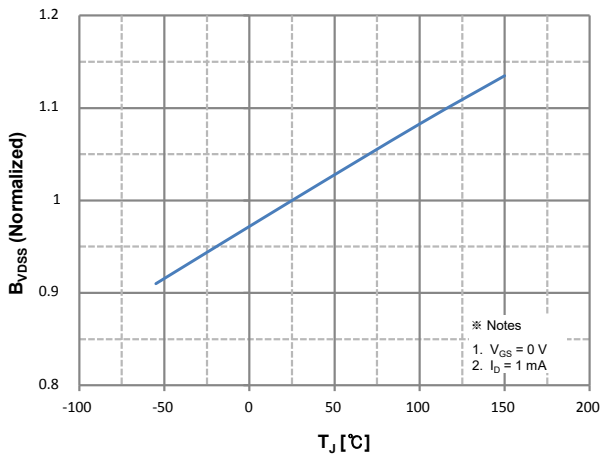
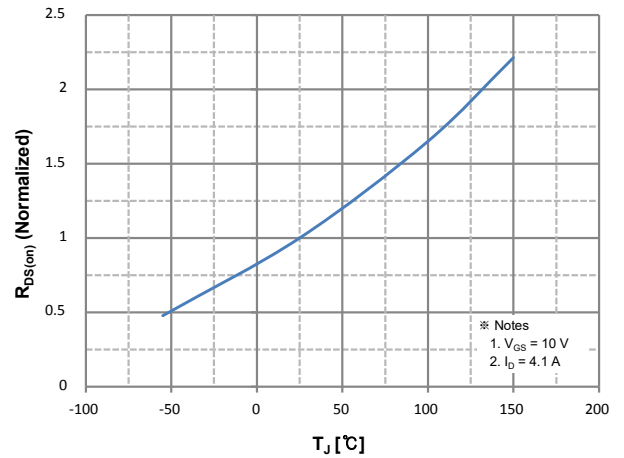
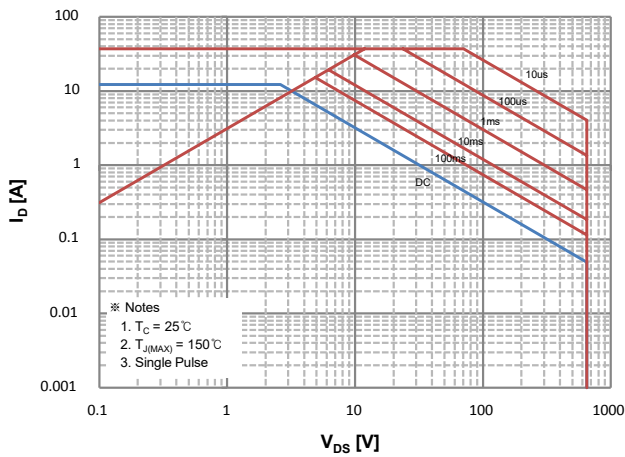
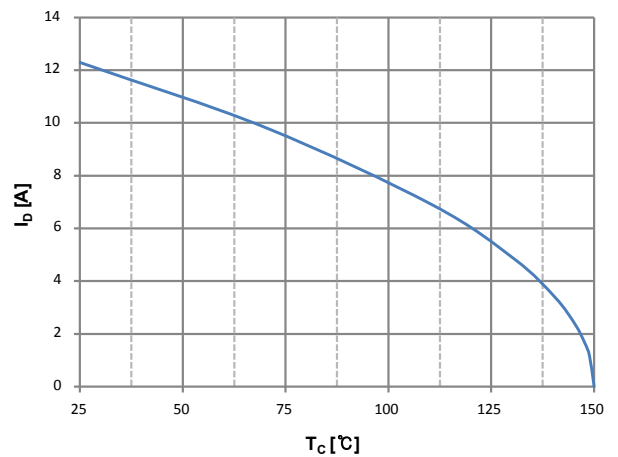
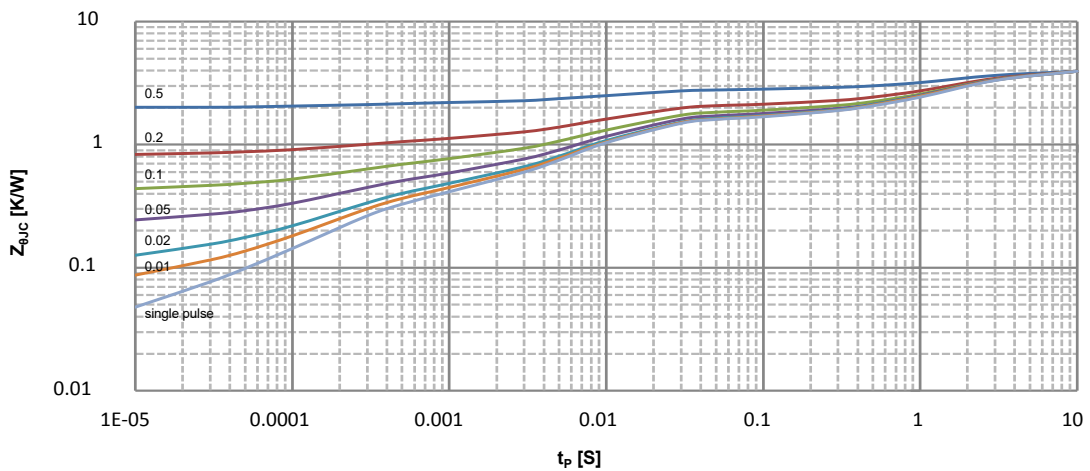
Electrical Characteristics ($T_J=25^{\circ}\text{C}$, Unless Otherwise Noted)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|---|------------------------------------|---|-----|------|-----------|-----------|
| Static Electrical Characteristics | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=1mA$ | 500 | --- | --- | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=500V, V_{GS}=0V$ | --- | --- | 1 | μA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 2.0 | --- | 4.0 | V |
| I_{GSS} | Gate Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |
| $R_{DS(on)}$ | Drain-Source On-state Resistance | $V_{GS}=10V, I_D=4.1A$ | --- | 280 | 320 | $m\Omega$ |
| Dynamic Characteristics^⑤ | | | | | | |
| C_{iss} | Input Capacitance | $V_{GS}=0V,$ $V_{DS}=50V,$ Freq.=1MHz | --- | 1150 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 28 | --- | |
| C_{riss} | Reverse Transfer Capacitance | | --- | 3.3 | --- | |
| $T_{d(on)}$ | Turn-on Delay Time | $V_{DD}=325V, V_{GS}=10V,$ $R_G=25\Omega, I_D=5.7A$ | --- | 30 | --- | nS |
| T_r | Turn-on Rise Time | | --- | 20 | --- | |
| $T_{d(off)}$ | Turn-off Delay Time | | --- | 125 | --- | |
| T_f | Turn-off Fall Time | | --- | 18 | --- | |
| Q_g | Total Gate Charge | $V_{DD}=325V, V_{GS}=10V,$ $I_D=5.7A$ | --- | 27 | --- | nC |
| Q_{gs} | Gate-Source Charge | | --- | 5.3 | --- | |
| Q_{gd} | Gate-Drain Charge | | --- | 8 | --- | |
| Source-Drain Characteristics ($T_J=25^{\circ}\text{C}$) | | | | | | |
| V_{SD} | Diode Forward Voltage ² | $V_{GS}=0V, I_S=5.7A, T_J=25^{\circ}\text{C}$ | --- | 0.75 | 1.3 | V |
| t_{rr} | Reverse Recovery Time | $V_R=400V, I_F=5.7A,$ $di/dt=100A/\mu s, T_J=25^{\circ}\text{C}$ | --- | 310 | --- | nS |
| Q_{rr} | Reverse Recovery Charge | | --- | 3.4 | --- | 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.

500V 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 and Temperature

Figure 5. Capacitance Characteristics

Figure 6. Gate Charge Characteristics

500V Super Junction Power MOSFET

Figure 7. Breakdown Voltage Variation vs. Temperature

Figure 8. On-Resistance Variation vs. Temperature

Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Drain Current vs. Case Temperature

Figure 11. Transient Thermal Response Curve

500V Super Junction Power MOSFET
TO-220F Package Outline Data
