

Description

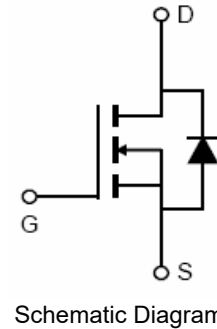
The series of devices uses **Super Trench II** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

- $V_{DS} = 85V, I_D = 300A$
 $R_{DS(ON)} = 1.8m\Omega$, typical (TO-220) @ $V_{GS} = 10V$
 $R_{DS(ON)} = 1.6m\Omega$, typical (TO-263) @ $V_{GS} = 10V$
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating



Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|-----------|----------------|-----------|------------|----------|
| VST08N016-TC | VST08N016 | TO-220C | - | - | - |
| VST08N016-T3 | VST08N016 | TO-263 | - | - | - |

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|--------------------|------------|---------------|
| Drain-Source Voltage | V_{DS} | 85 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | 300 | A |
| Drain Current-Continuous ($T_C = 100^\circ C$) | $I_D(100^\circ C)$ | 220 | A |
| Pulsed Drain Current | I_{DM} | 1200 | A |
| Maximum Power Dissipation | P_D | 340 | W |
| Derating factor | | 2.27 | W/ $^\circ C$ |
| Single pulse avalanche energy ^(Note 5) | E_{AS} | 2850 | mJ |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 175 | $^\circ C$ |

Thermal Characteristic

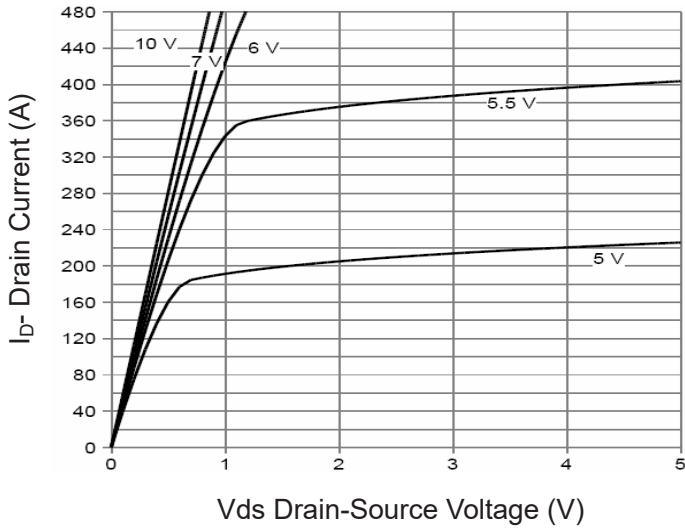
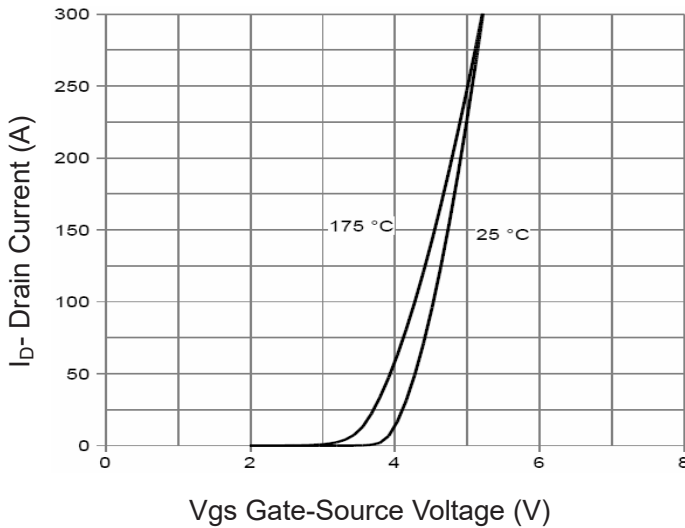
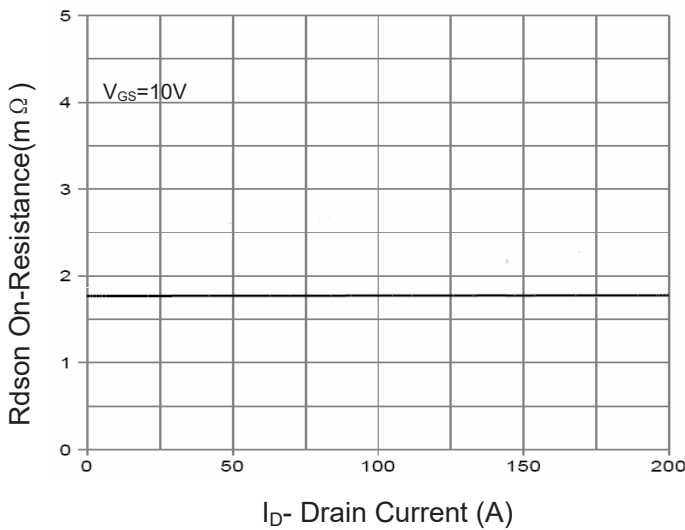
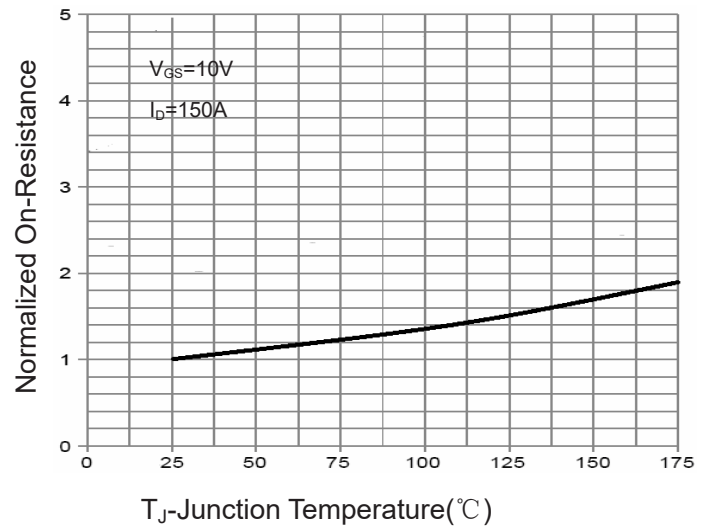
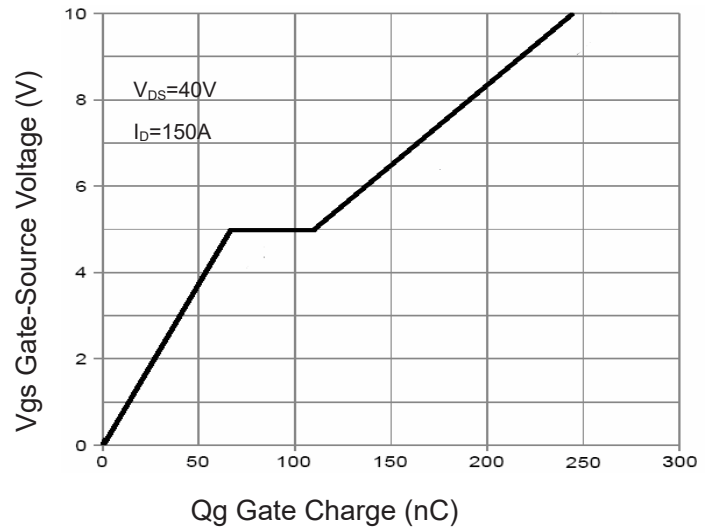
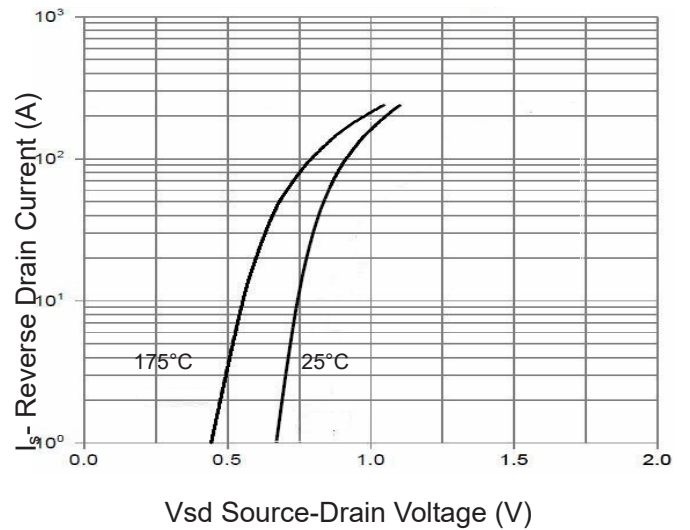
| | | | |
|--------------------------------------|-----------------|------|-----------------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 0.44 | $^{\circ}\text{C}/\text{W}$ |
|--------------------------------------|-----------------|------|-----------------------------|

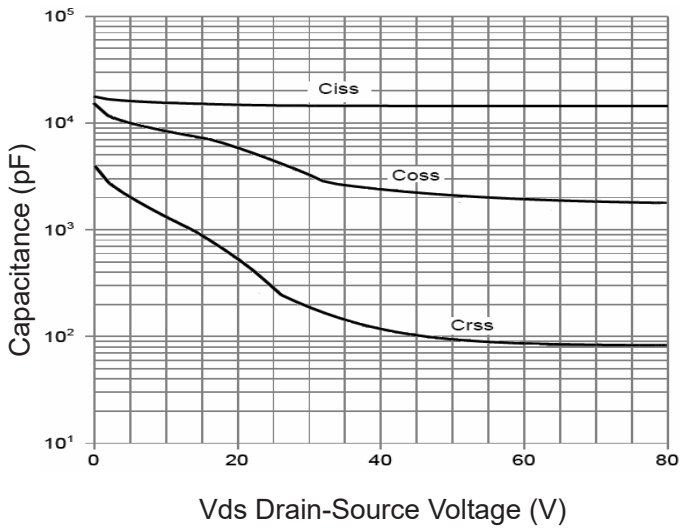
Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit | |
|---|--------------|---|--------|-------|-----------|---------|------------|
| Off Characteristics | | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 85 | | - | V | |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=85V, V_{GS}=0V$ | - | - | 1 | μA | |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA | |
| On Characteristics (Note 3) | | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 2.0 | 3.0 | 4.0 | V | |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}=10V, I_D=150A$ | TO-220 | - | 1.8 | 2.0 | m Ω |
| | | | TO-263 | | 1.6 | 2.0 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=5V, I_D=150A$ | | 210 | - | S | |
| Dynamic Characteristics (Note 4) | | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=40V, V_{GS}=0V,$ $F=1.0\text{MHz}$ | - | 15800 | - | PF | |
| Output Capacitance | C_{oss} | | - | 2450 | - | PF | |
| Reverse Transfer Capacitance | C_{rss} | | - | 111 | - | PF | |
| Switching Characteristics (Note 4) | | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=40V, I_D=150A$ $V_{GS}=10V, R_G=1.6\Omega$ | - | 43 | - | nS | |
| Turn-on Rise Time | t_r | | - | 39 | - | nS | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 108 | - | nS | |
| Turn-Off Fall Time | t_f | | - | 40 | - | nS | |
| Total Gate Charge | Q_g | $V_{DS}=40V, I_D=150A,$ $V_{GS}=10V$ | - | 245 | - | nC | |
| Gate-Source Charge | Q_{gs} | | - | 66 | | nC | |
| Gate-Drain Charge | Q_{gd} | | - | 65 | | nC | |
| Drain-Source Diode Characteristics | | | | | | | |
| Diode Forward Voltage (Note 3) | V_{SD} | $V_{GS}=0V, I_S=150A$ | - | | 1.2 | V | |
| Diode Forward Current | I_S | | - | - | 300 | A | |
| Reverse Recovery Time | t_{rr} | $T_J=25^{\circ}\text{C}, I_F=150A$ $di/dt=100A/\mu s$ (Note 3) | - | 109 | - | nS | |
| Reverse Recovery Charge | Q_{rr} | | - | 315 | - | nC | |

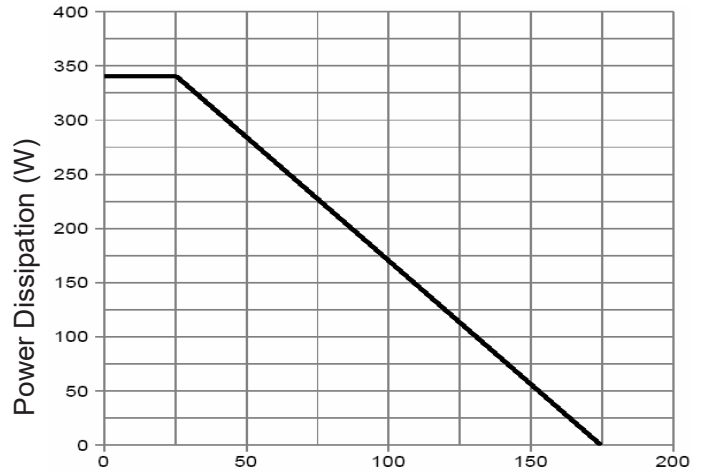
Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=40V, V_G=10V, L=0.5\text{mH}, R_g=25\Omega$

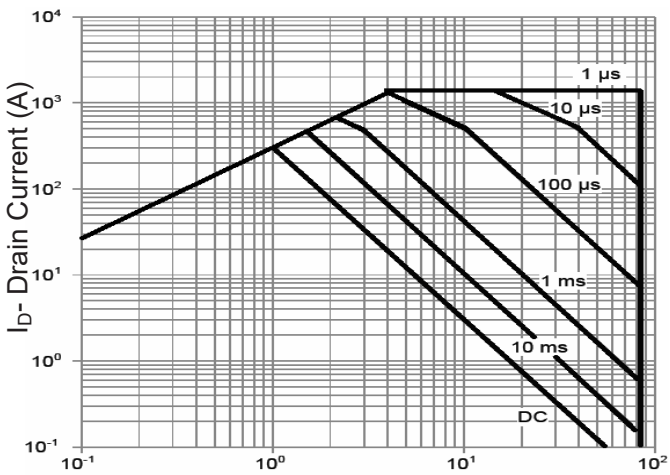
Typical Electrical and Thermal Characteristics

Figure 1 Output Characteristics

Figure 2 Transfer Characteristics

Figure 3 Rdson- Drain Current

Figure 4 Rdson-Junction Temperature

Figure 5 Gate Charge

Figure 6 Source- Drain Diode Forward



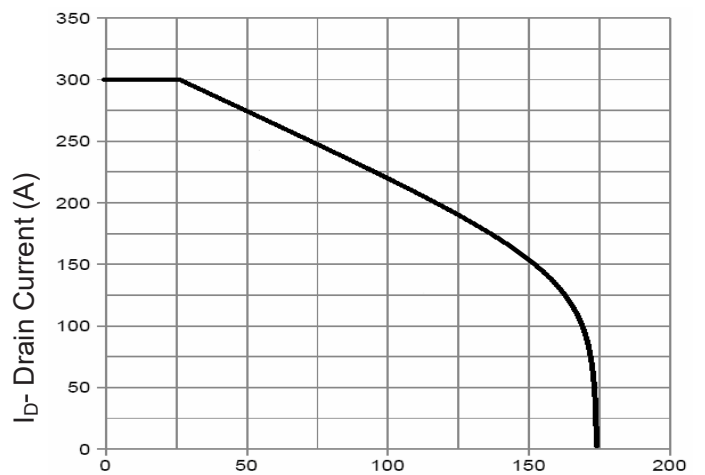
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



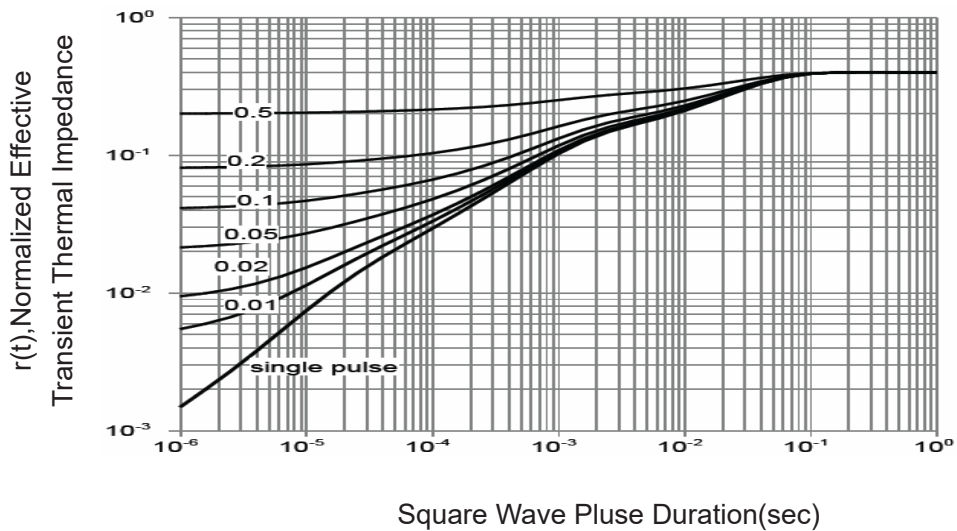
T_J-Junction Temperature(°C)
Figure 9 Power De-rating



Vds Drain-Source Voltage (V)
Figure 8 Safe Operation Area



T_J-Junction Temperature (°C)
Figure 10 Current De-rating



Square Wave Pluse Duration(sec)
Figure 11 Normalized Maximum Transient Thermal Impedance