

Description

The series of devices uses **Super Trench I** 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

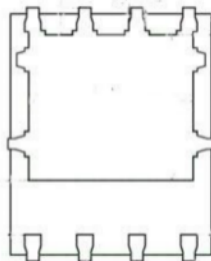
General Features

- $V_{DS} = 120V, I_D = 85A$
 $R_{DS(ON)} = 7.5m\Omega$, typical @ $V_{GS} = 10V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating

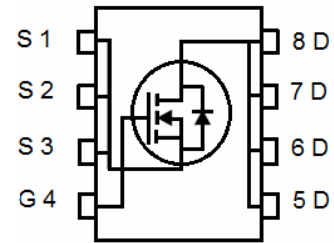
DFN 5X6



Top View



Bottom View



Schematic Diagram

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|-------------|----------------|-----------|------------|----------|
| SI007N12NG1 | SI007N12NG1 | DFN5X6-8L | - | - | 5000 |

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

| Parameter | Symbol | Limit | Unit |
|---|--------------------|------------|---------------|
| Drain-Source Voltage | V_{DS} | 120 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | 85 | A |
| Drain Current-Continuous($T_C = 100^\circ C$) | $I_D(100^\circ C)$ | 60 | A |
| Pulsed Drain Current ^(Note 1) | I_{DM} | 340 | A |
| Maximum Power Dissipation | P_D | 110 | W |
| Derating factor | | 0.88 | W/ $^\circ C$ |
| Single pulse avalanche energy ^(Note 4) | E_{AS} | 352 | mJ |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | $^\circ C$ |

Thermal Characteristic

| | | | |
|--------------------------------------|-----------------|------|--------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 1.14 | $^\circ C/W$ |
|--------------------------------------|-----------------|------|--------------|

Electrical Characteristics (T_C=25 °C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---------------------|---|-----|------|------|------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V, I _D =250μA | 120 | | - | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =120V, V _{GS} =0V | - | - | 1 | μA |
| Gate-Body Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | - | - | ±100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250μA | 1.0 | 2.0 | 3.0 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =10V, I _D =42.5A | - | 7.5 | 8.5 | mΩ |
| Forward Transconductance | g _{FS} | V _{DS} =5V, I _D =42.5A | | 55 | - | S |
| Dynamic Characteristics (Note 3) | | | | | | |
| Input Capacitance | C _{ISS} | V _{DS} =60V, V _{GS} =0V, F=1.0MHz | - | 3715 | - | pF |
| Output Capacitance | C _{OSS} | | - | 275 | - | pF |
| Reverse Transfer Capacitance | C _{RSS} | | - | 18 | - | pF |
| Switching Characteristics (Note 3) | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =60V, I _D =42.5A V _{GS} =10V, R _G =1.6Ω | - | 20 | - | nS |
| Turn-on Rise Time | t _r | | - | 16 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 45 | - | nS |
| Turn-Off Fall Time | t _f | | - | 12 | - | nS |
| Total Gate Charge | Q _g | V _{DS} =60V, I _D =42.5A, V _{GS} =10V | - | 58 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 21 | - | nC |
| Gate-Drain Charge | Q _{gd} | | - | 14.5 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 2) | V _{SD} | V _{GS} =0V, I _S =42.5A | - | - | 1.2 | V |
| Diode Forward Current | I _S | | - | - | 85 | A |
| Reverse Recovery Time | t _{rr} | T _J = 25 °C, I _F = 85A | - | 65 | - | nS |
| Reverse Recovery Charge | Q _{rr} | di/dt = 100A/μs (Note 3) | - | 105 | - | nC |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
3. Guaranteed by design, not subject to production
4. EAS condition : T_J=25 °C, V_{DD}=50V, V_G=10V, L=0.25mH, R_g=25Ω

Typical Electrical and Thermal Characteristics

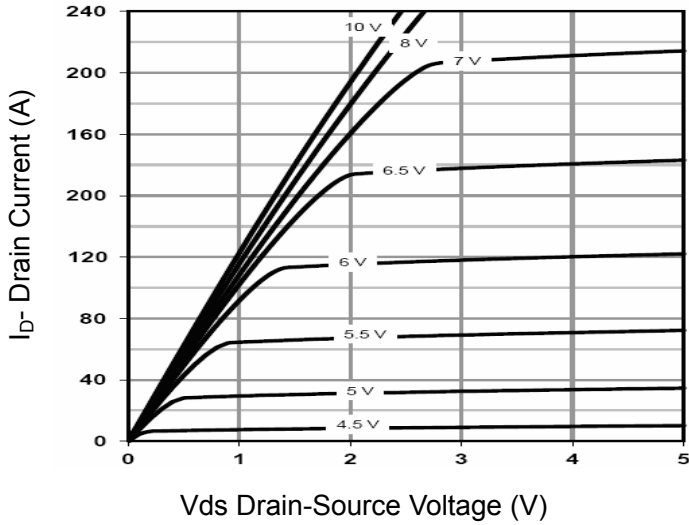


Figure 1 Output Characteristics

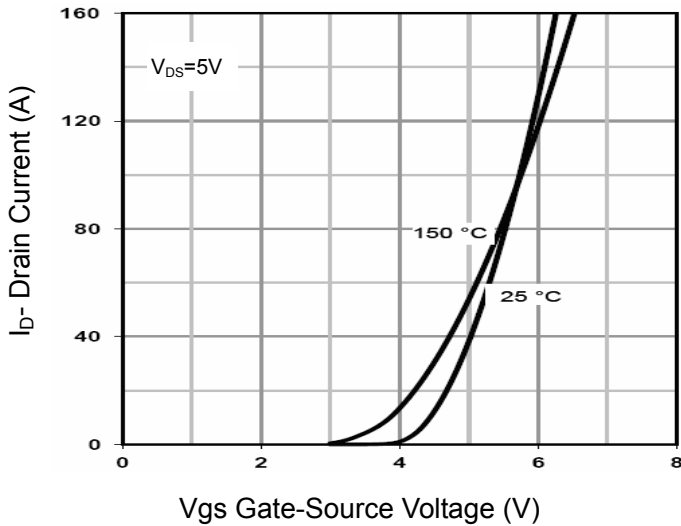


Figure 2 Transfer Characteristics

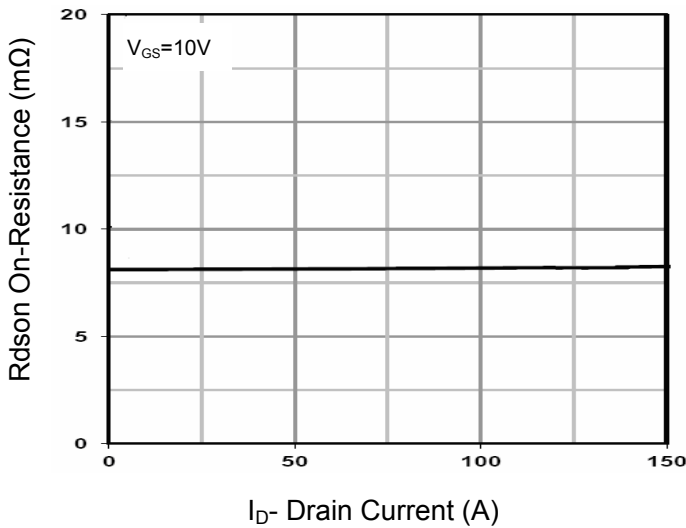


Figure 3 Rdson- Drain Current

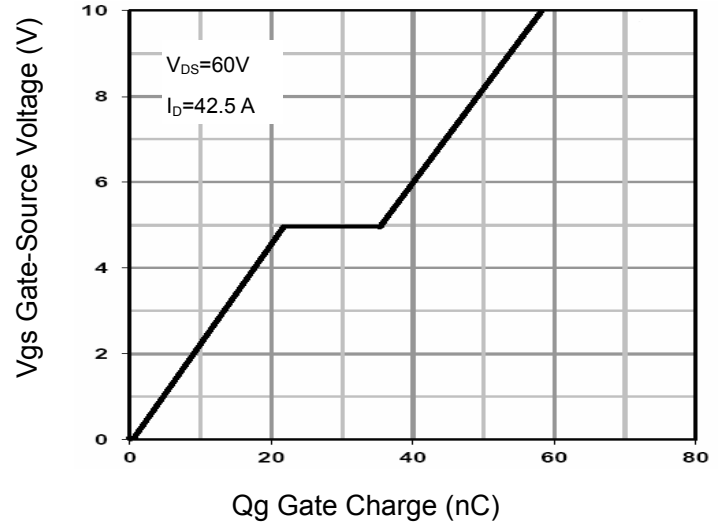


Figure 4 Gate Charge

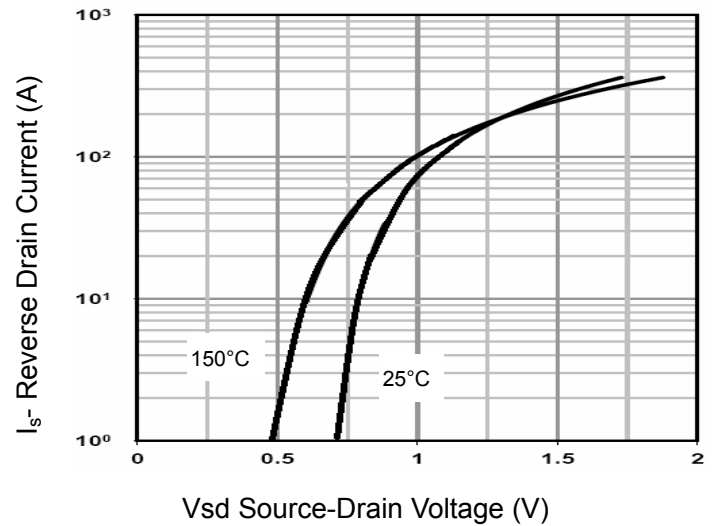


Figure 5 Source- Drain Diode Forward

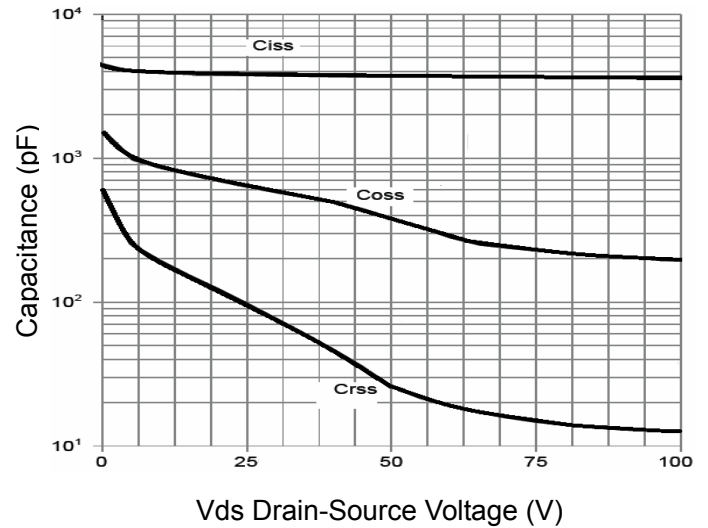
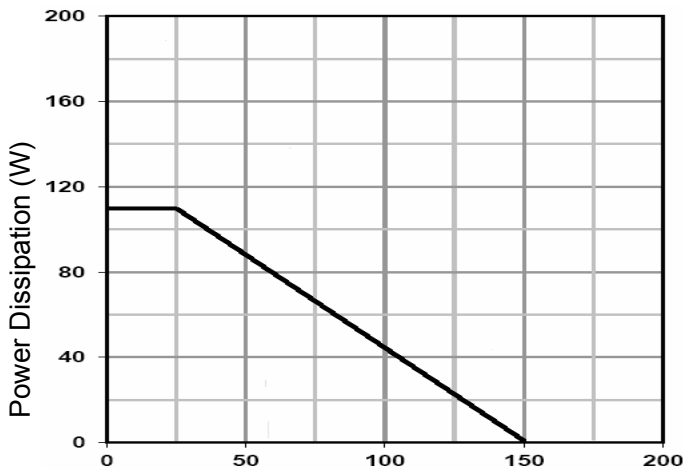
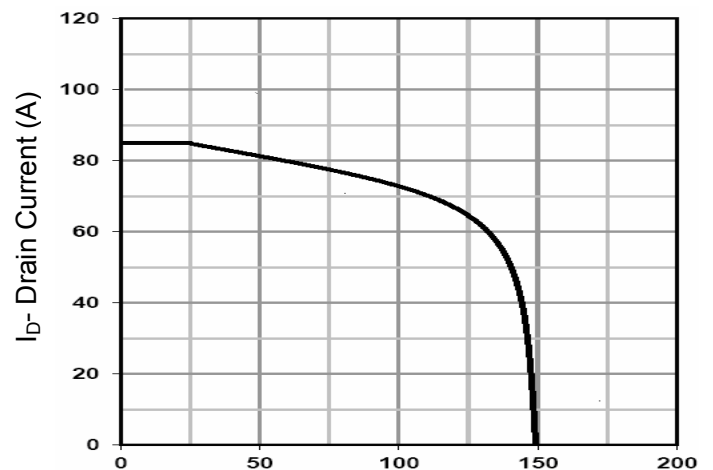


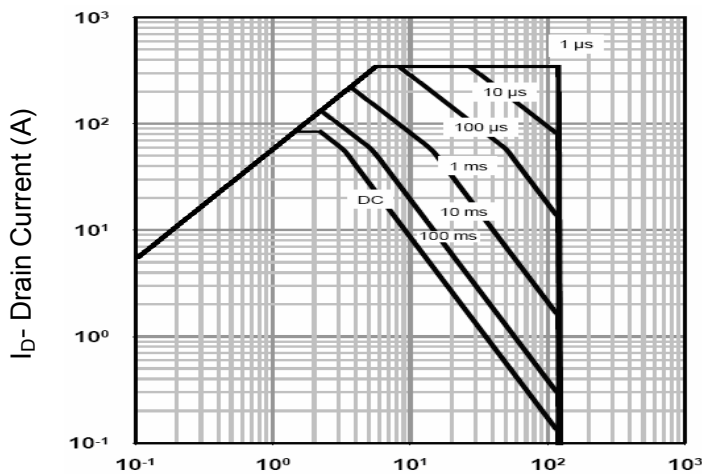
Figure 6 Capacitance vs Vds



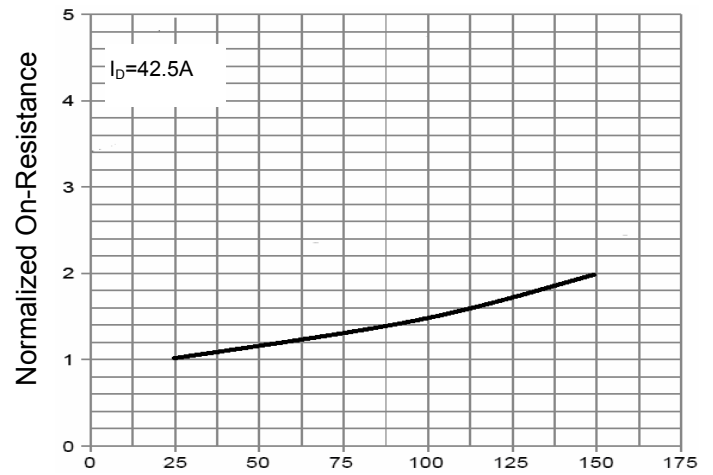
T_J-Junction Temperature(°C)
Figure 7 Power De-rating



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



V_{ds} Drain-Source Voltage (V)
Figure 8 Safe Operation Area



T_J-Junction Temperature(°C)
Figure 10 Rdson-Junction Temperature

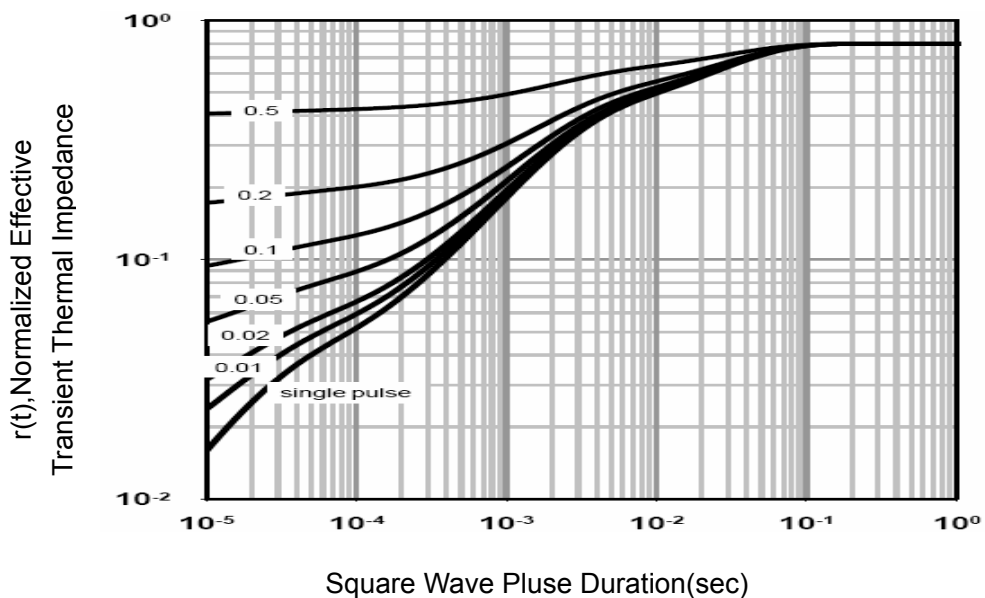
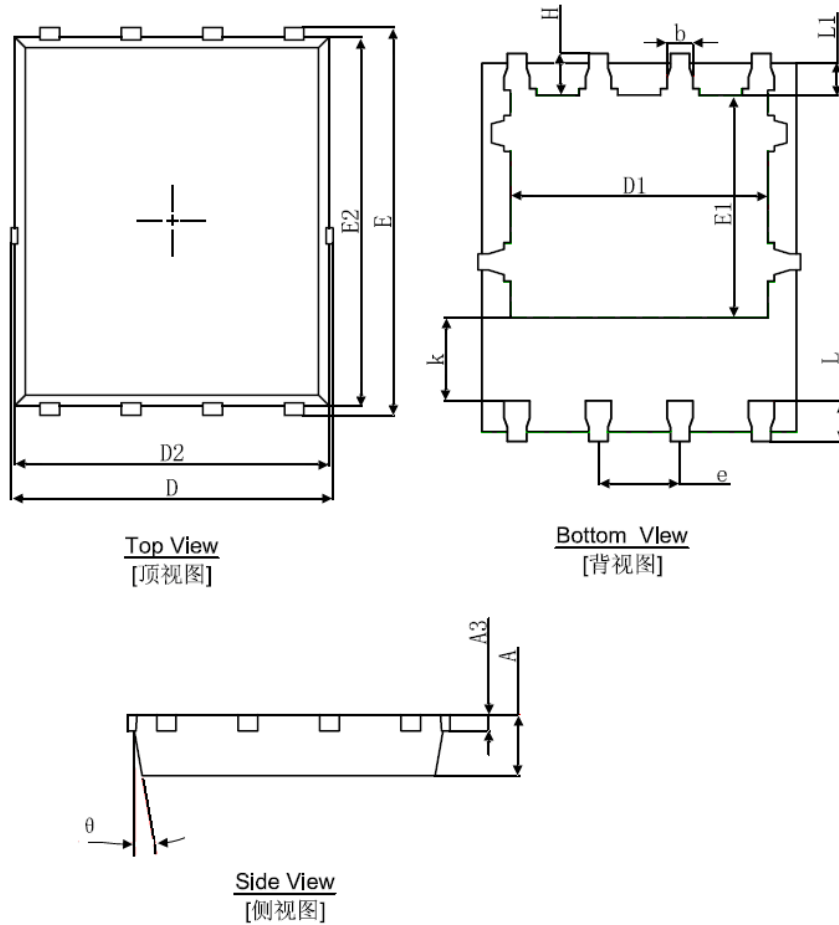


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information


| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 0.900 | 1.000 | 0.035 | 0.039 |
| A3 | 0.254REF. | | 0.010REF. | |
| D | 4.944 | 5.096 | 0.195 | 0.201 |
| E | 5.974 | 6.126 | 0.235 | 0.241 |
| D1 | 3.910 | 4.110 | 0.154 | 0.162 |
| E1 | 3.375 | 3.575 | 0.133 | 0.141 |
| D2 | 4.824 | 4.976 | 0.190 | 0.196 |
| E2 | 5.674 | 5.826 | 0.223 | 0.229 |
| K | 1.190 | 1.390 | 0.047 | 0.055 |
| b | 0.035 | 0.450 | 0.014 | 0.018 |
| e | 1.270(TYP.) | | 0.050(TYP.) | |
| L | 0.559 | 0.711 | 0.022 | 0.028 |
| L1 | 0.424 | 0.576 | 0.017 | 0.023 |
| H | 0.574 | 0.726 | 0.023 | 0.029 |
| θ | 8° | 12° | 8° | 12° |