

N-Channel 650 V (D-S) Super Junction Power MOSFET

| PRODUCT SUMMARY | | | |
|---------------------|--------------------------------|--------------------|-----------------------|
| V _{DS} (V) | R _{DS(on)} (mΩ)(Typ.) | I _D (A) | Q _g (Typ.) |
| 650 | 115 at V _{GS} = 10 V | 25 | 42 nC |

FEATURES

- DT-SJ Power MOSFET
- Low R_{DS(on)}×FOM
- Extremely low switching loss
- Excellent stability and uniformity

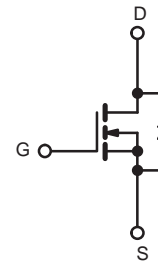
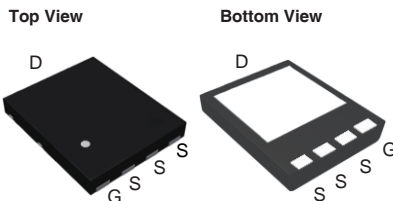


RoHS
COMPLIANT

APPLICATIONS

- PC power
- LED lighting
- Server power

DFN8X8 Pin Configuration



N-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted) | | | |
|---|-----------------------------------|-------------------------|------|
| PARAMETER | SYMBOL | LIMIT | UNIT |
| Drain-Source Voltage | V _{DS} | 650 | V |
| Gate-Source Voltage | V _{GS} | ± 30 | |
| Continuous Drain Current (T _J = 150 °C) ^a | I _D | T _C = 25 °C | 25 |
| | | T _C = 100 °C | 16 |
| Pulsed Drain Current ^b | I _{DM} | 75 | A |
| Single Avalanche Energy | E _{AS} | 730 | mJ |
| Maximum Power Dissipation ^c | P _D | T _C = 25 °C | 219 |
| | | T _C = 100 °C | 87.6 |
| Operating Junction and Storage Temperature Range | T _J , T _{stg} | -55 to +150 | °C |

| THERMAL RESISTANCE RATINGS | | | |
|--|-------------------|-------|------|
| PARAMETER | SYMBOL | LIMIT | UNIT |
| Junction-to-Ambient (PCB Mount) ^d | R _{thJA} | 62 | °C/W |
| Junction-to-Case (Drain) | R _{thJC} | 0.57 | |

Notes

- Calculated continuous current based on maximum allowable junction temperature.
- Repetitive rating; pulse width limited by max. junction temperature.
- P_D is based on max. junction temperature, using junction-case thermal resistance.
- The value of R_{thJA} is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_a=25 °C.

| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | | |
|--|--------------|--|------|------|-----------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V_{DS} | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 650 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 2.9 | - | 3.9 | |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 30\text{ V}$ | - | - | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}$ | - | - | 1 | μA |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 12.5\text{ A}$ | - | 115 | 125 | m Ω |
| | | $V_{GS} = 10\text{ V}, I_D = 12.5\text{ A}, T_J = 150\text{ }^\circ\text{C}$ | - | 280 | - | |
| Dynamic ^b | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}, f = 100\text{ kHz}$ | - | 2391 | - | pF |
| Output Capacitance | C_{oss} | | - | 155 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 4 | - | |
| Total Gate Charge ^c | Q_g | $V_{DS} = 400\text{ V}, V_{GS} = 10\text{ V}, I_D = 12.5\text{ A}$ | - | 42 | - | nC |
| Gate-Source Charge ^c | Q_{gs} | | - | 10.5 | - | |
| Gate-Drain Charge ^c | Q_{gd} | | - | 14 | - | |
| Gate Resistance | R_g | $f = 1\text{ MHz}$ | - | 5 | - | Ω |
| Turn-On Delay Time ^c | $t_{d(on)}$ | $V_{DS} = 400\text{ V}, I_D = 12.5\text{ A},$ $V_{GS} = 10\text{ V}, R_g = 2\Omega$ | - | 33 | - | ns |
| Rise Time ^c | t_r | | - | 31 | - | |
| Turn-Off Delay Time ^c | $t_{d(off)}$ | | - | 63 | - | |
| Fall Time ^c | t_f | | - | 5 | - | |
| Drain-Source Body Diode Ratings and Characteristics ^b ($T_C = 25\text{ }^\circ\text{C}$) | | | | | | |
| Continuous Source Current | I_S | $T_C = 25\text{ }^\circ\text{C}$ | - | - | 25 | A |
| Pulsed Current | I_{SM} | | - | - | 75 | A |
| Forward Voltage ^a | V_{SD} | $I_S = 12.5\text{ A}, V_{GS} = 0\text{ V}$ | - | - | 1.1 | V |
| Reverse Recovery Time | t_{rr} | $I_S = 12.5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ | - | 365 | - | ns |
| Reverse Recovery Charge | Q_{rr} | | - | 4.7 | - | μC |
| Peak reverse recovery current | I_{rrm} | | - | 25 | - | A |

Notes

- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

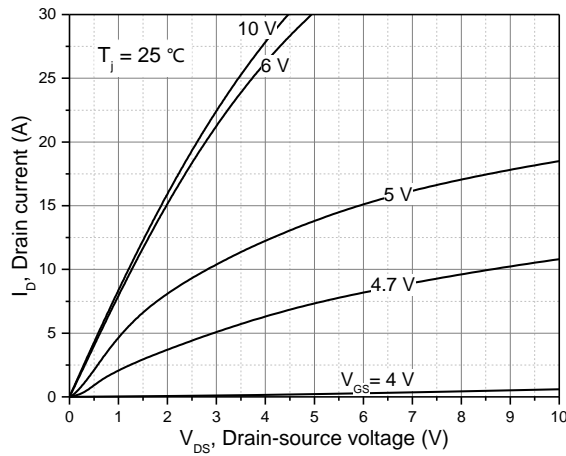


Figure 1. Typ. output characteristics

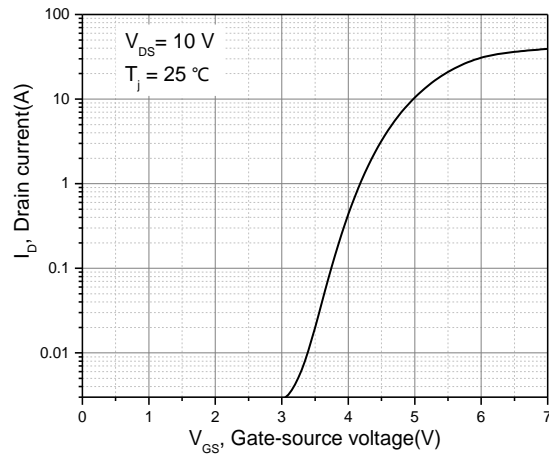


Figure 2. Typ. transfer characteristics

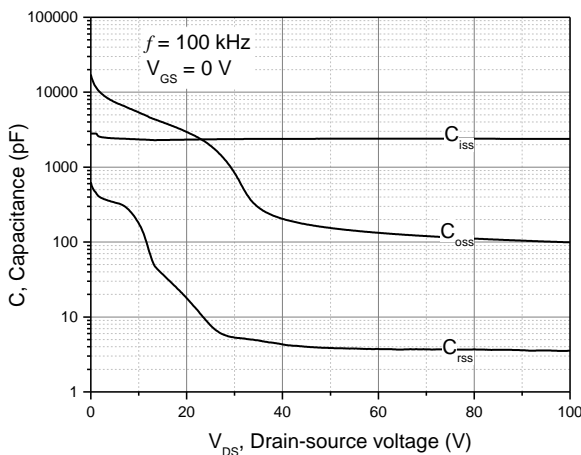


Figure 3. Typ. capacitances

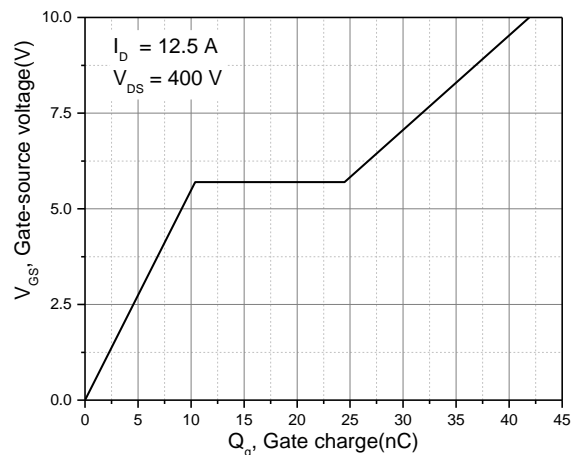


Figure 4. Typ. gate charge

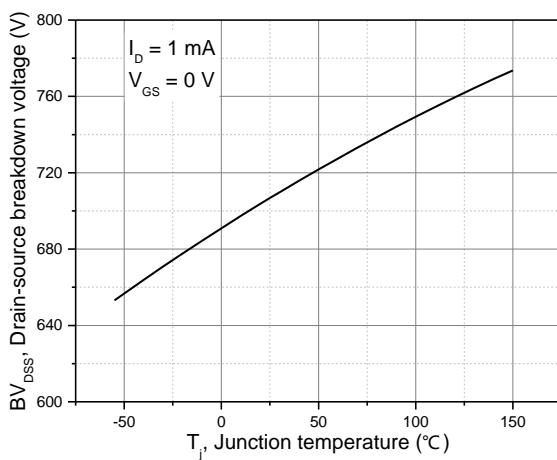


Figure 5. Drain-source breakdown voltage

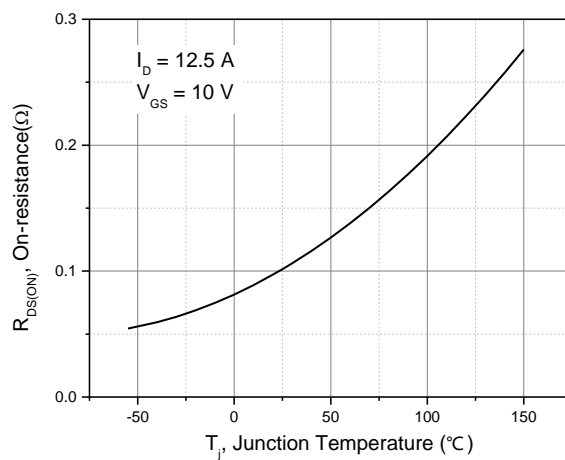


Figure 6. Drain-source on-state resistance

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

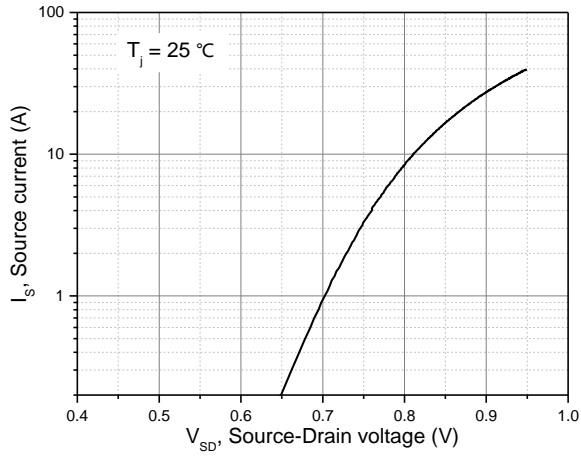


Figure 7. Forward characteristic of body diode

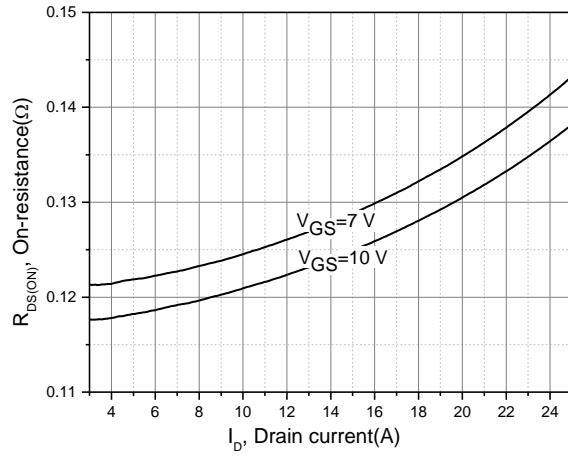


Figure 8. Drain-source on-state resistance

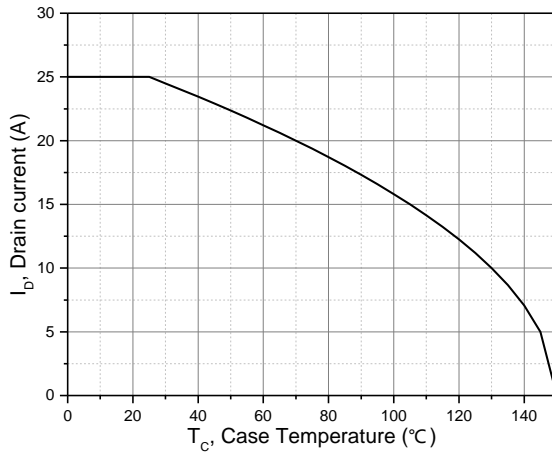


Figure 9. Drain current

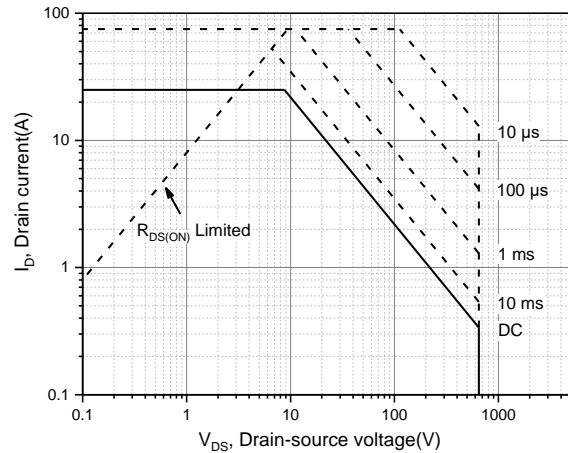


Figure 10. Safe operation area Tc=25 °C

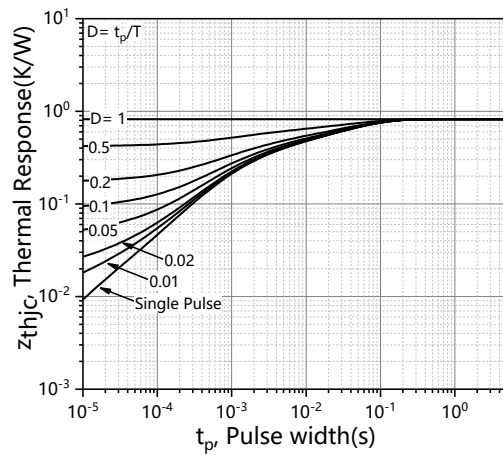
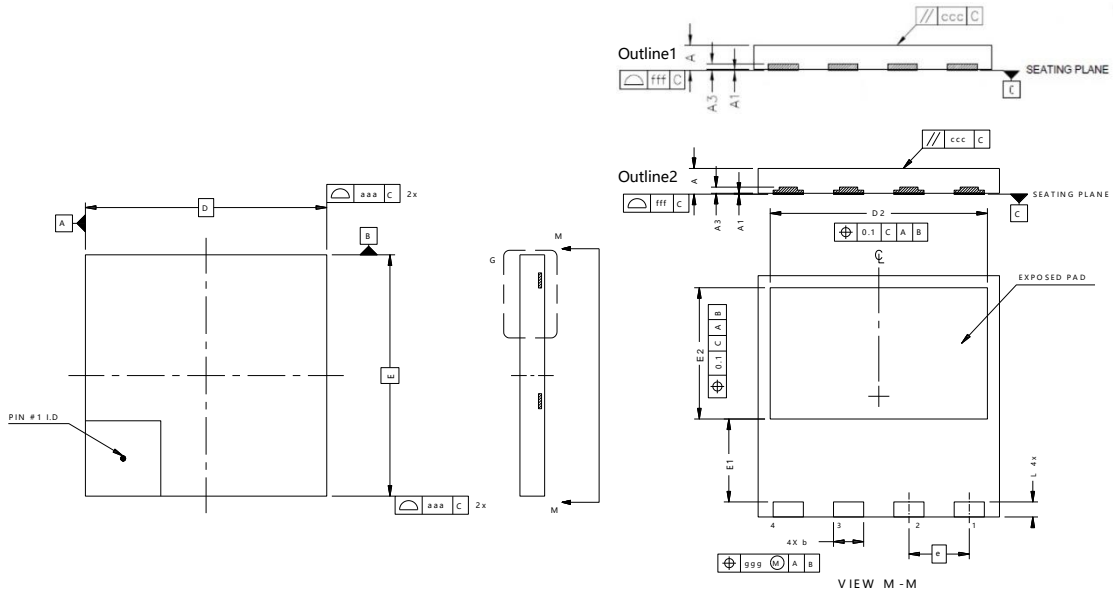


Figure 11. Max. transient thermal impedance

DFN8*8 PACKAGE OUTLINE



| Symbol | mm | |
|--------|---------|------|
| | Min | Max |
| A | 0.75 | 1.15 |
| A1 | 0.00 | 0.05 |
| A3 | 0.10 | 0.30 |
| b | 0.90 | 1.10 |
| D | 7.85 | 8.15 |
| E | 7.85 | 8.15 |
| D2 | 7.10 | 7.30 |
| E1 | 2.65 | 2.85 |
| E2 | 4.25 | 4.45 |
| e | 2.0 BSC | |
| L | 0.40 | 0.60 |
| aaa | 0.1 | |
| ggg | 0.05 | |
| ccc | 0.05 | |
| fff | 0.05 | |

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