# N-Channel 60 V (D-S) Super Junction MOSFET

| PRODUCT SUMMARY | | | |
|---|---|---|---|
| $V_{DS}$ (V) | $R_{DS(on)}$ (mΩ) (Typ.) | $I_D$ (A)[a] | $Q_g$ (Typ.) |
| 60 | 12 at $V_{GS}$ = 10 V | 40 | 11.7 nC |

## FEATURES

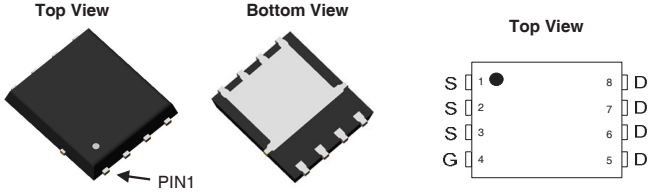
- DT-SJ Power MOSFET
- Very low on-resistance
- 100 % Rg and UIS Tested

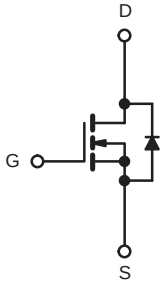
RoHS COMPLIANT

## APPLICATIONS

- Power Management
- Motor Drivers
- DC-DC Converters

**DFN5X6-8L Pin Configuration**




N-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS ($T_C$ = 25 °C, unless otherwise noted) | | | | |
|---|---|---|---|---|
| PARAMETER | | SYMBOL | LIMIT | UNIT |
| Drain-Source Voltage | | $V_{DS}$ | 60 | V |
| Gate-Source Voltage | | $V_{GS}$ | ± 20 | |
| Continuous Drain Current ($T_J$ = 150 °C) | $T_C$ = 25 °C | $I_D$ | 40 | A |
| | $T_C$ = 100 °C | | 30 | |
| Pulsed Drain Current | | $I_{DM}$ | 160 | |
| Single Avalanche Energy [a] | L = 0.1 mH | $E_{AS}$ | 70 | mJ |
| Maximum Power Dissipation [a] | $T_C$ = 25 °C | $P_D$ | 60 [b] | W |
| | $T_C$ = 100 °C | | 24 [b] | |
| 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) [c] | $R_{thJA}$ | 45 | °C/W |
| Junction-to-Case (Drain) | $R_{thJC}$ | 2.08 | |

**Notes**

a. Duty cycle ≤ 1 %.

b. See SOA curve for voltage derating.

c. When mounted on 1" square PCB (FR4 material).

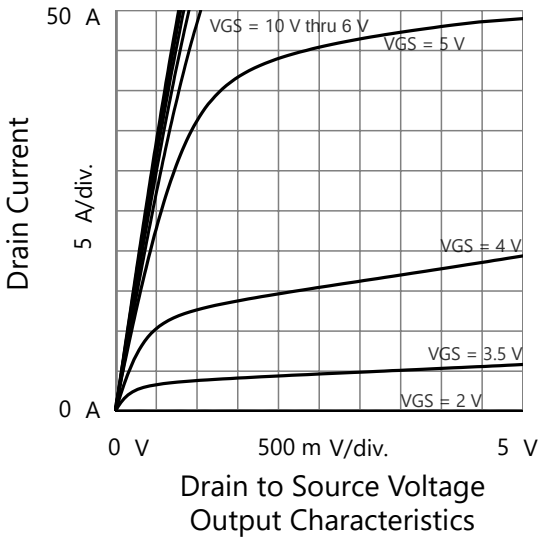
| **SPECIFICATIONS** ($T_J$ = 25 °C, unless otherwise noted) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{DS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 µA | 60 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | 1 | - | 3 | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ± 20 V | - | - | ± 100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 60 V, $V_{GS}$ = 0 V | - | - | 1 | µA |
| On-State Drain Current [a] | $I_{D(on)}$ | $V_{DS}$ ≥ 5 V, $V_{GS}$ = 10 V | 40 | - | - | A |
| Drain-Source On-State Resistance [a] | $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 20 A | - | 12 | 16 | mΩ |
| Forward Transconductance [a] | $g_{fs}$ | $V_{DS}$ = 10 V, $I_D$ = 20 A | - | 38 | - | S |
| **Dynamic [b]** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 30 V, f = 1MHz | - | 582 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 213 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 13.6 | - | |
| Total Gate Charge [c] | $Q_g$ | $V_{DS}$ = 30 V, $V_{GS}$ = 10 V, $I_D$ = 20 A | - | 11.7 | - | nC |
| Gate-Source Charge [c] | $Q_{gs}$ | | - | 1.5 | - | |
| Gate-Drain Charge [c] | $Q_{gd}$ | | - | 3.1 | - | |
| Gate Resistance | $R_g$ | f = 1 MHz | - | 2.6 | - | Ω |
| Turn-On Delay Time [c] | $t_{d(on)}$ | $V_{DD}$ = 30 V, $R_g$ = 6 Ω<br>$I_D$ = 20 A, $V_{GEN}$ = 10 V, | - | 30 | - | ns |
| Rise Time [c] | $t_r$ | | - | 65 | - | |
| Turn-Off Delay Time [c] | $t_{d(off)}$ | | - | 52 | - | |
| Fall Time [c] | $t_f$ | | - | 25 | - | |
| **Drain-Source Body Diode Ratings and Characteristics [b]** ($T_C$ = 25 °C) | | | | | | |
| Continuous Source Current | $I_S$ | $T_C$ = 25 °C | - | - | 40 | A |
| Pulsed Source Current | $I_{SM}$ | | - | - | 160 | A |
| Forward Voltage [a] | $V_{SD}$ | $I_F$ = 1 A, $V_{GS}$ = 0 V | - | - | 1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$ = 20 A, di/dt = 100 A/µs | - | 20 | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 10 | - | nC |

**Notes**

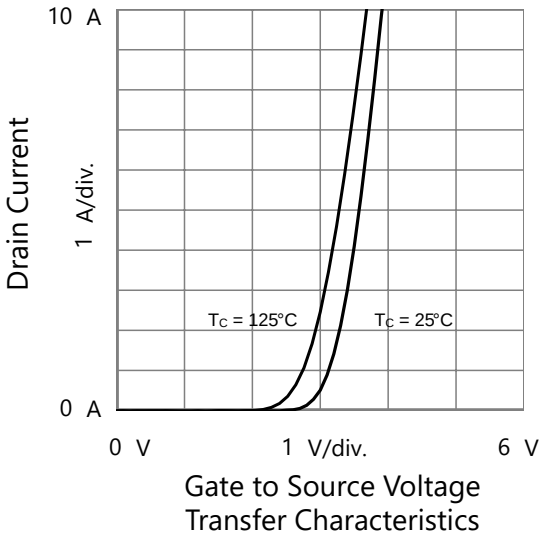
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

*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.*

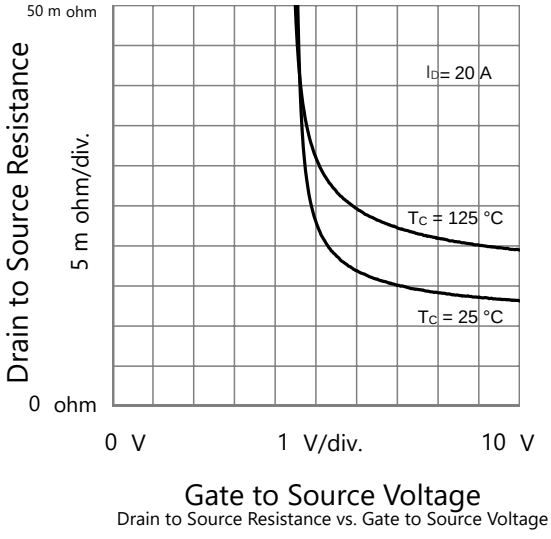
**TYPICAL CHARACTERISTICS** ($T_A$ = 25 °C, unless otherwise noted)



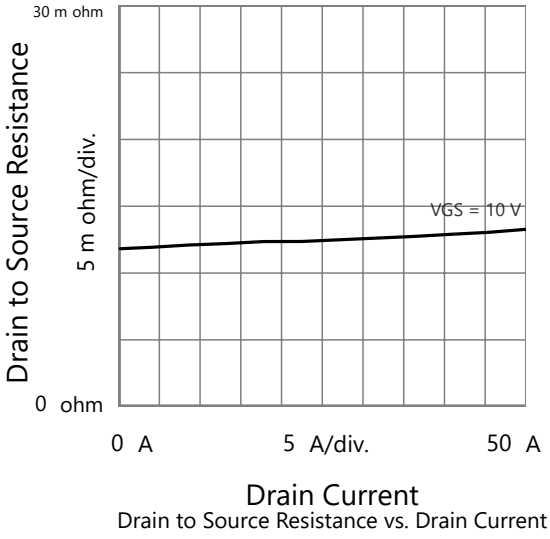

Output Characteristics



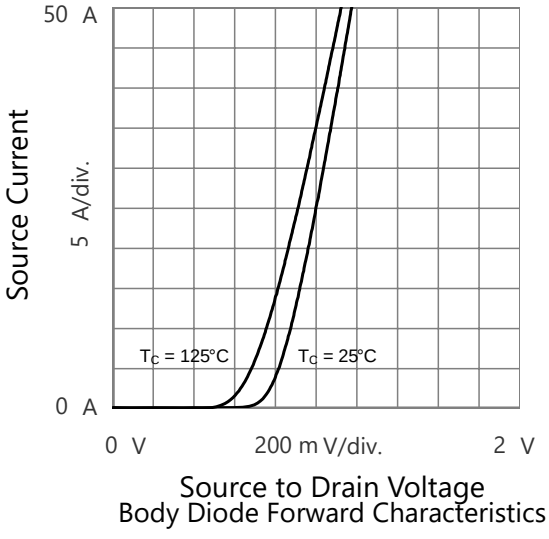

Transfer Characteristics



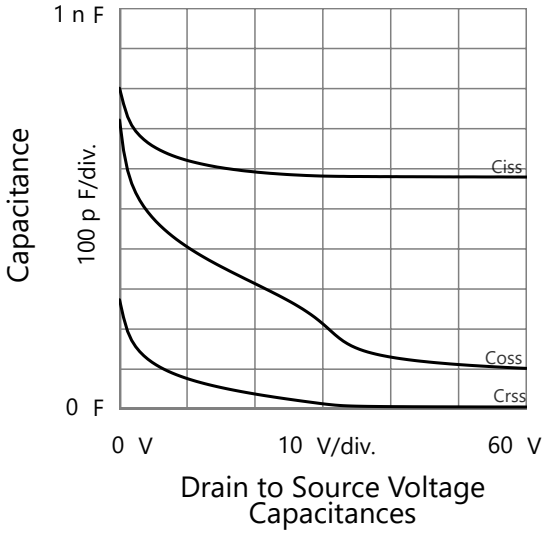

Drain to Source Resistance vs. Gate to Source Voltage




Drain to Source Resistance vs. Drain Current

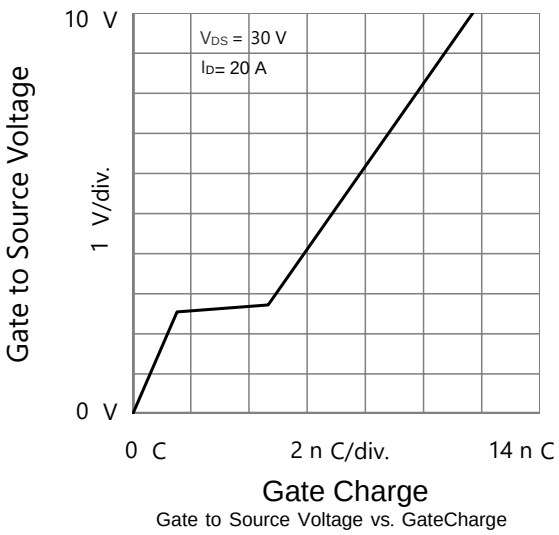



Body Diode Forward Characteristics

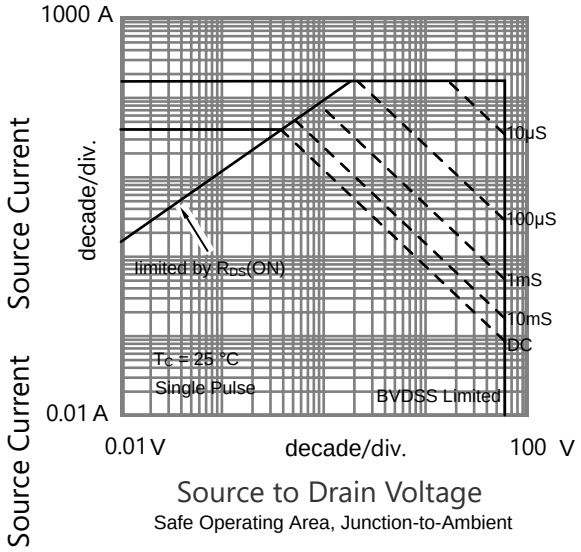



Capacitances

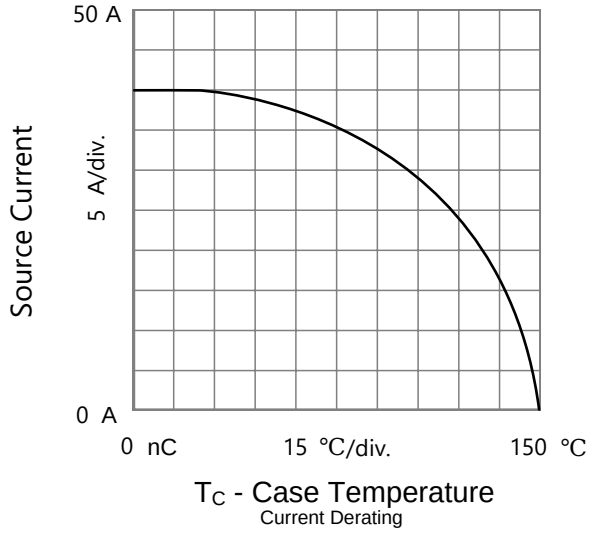
**TYPICAL CHARACTERISTICS** ($T_A$ = 25 °C, unless otherwise noted)



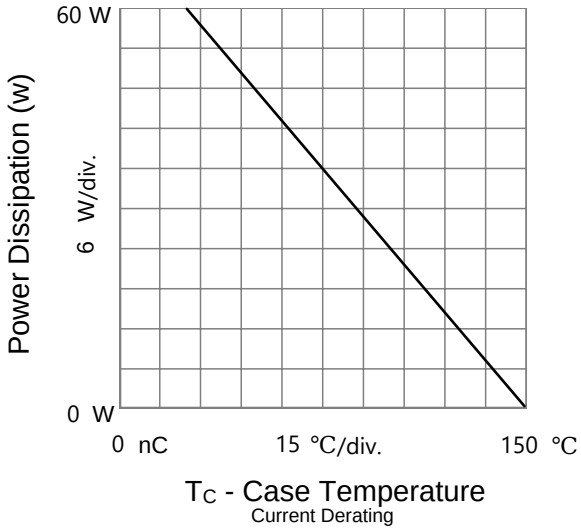

Gate to Source Voltage vs. GateCharge




Safe Operating Area, Junction-to-Ambient

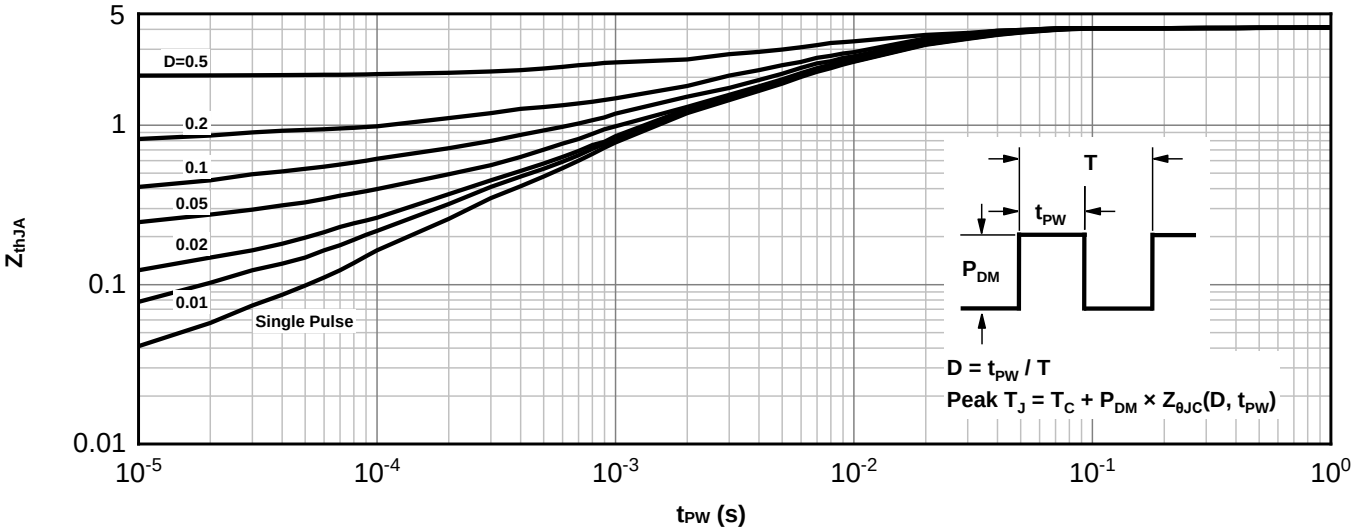



Current Derating

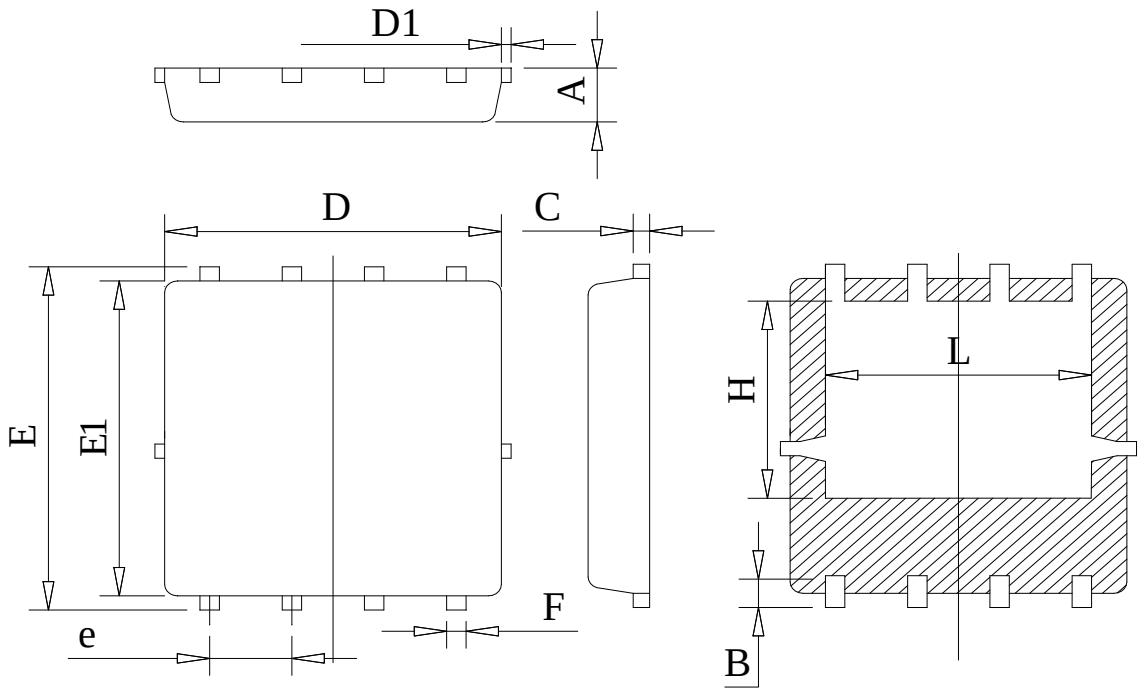



Current Derating

**Fig.15 Transient thermal impedance from junction to ambient**



# DFN5*6-8L PACKAGE OUTLINE




COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

Unit : mm

| Symbol | Min | Typ | Max |
|---|---|---|---|
| A | 0.78 | 0.95 | 1.12 |
| B | 0.45 | 0.58 | 0.78 |
| C | 0.18 | 0.254 | 0.36 |
| D | 4.70 | 5.20 | 5.45 |
| D1 | | | 0.18 |
| E | 5.85 | 6.05 | 6.25 |
| E1 | 5.38 | 5.55 | 5.98 |
| e | 1.15 | 1.27 | 1.40 |
| F | 0.18 | 0.30 | 0.52 |
| H | 3.25 | 3.47 | 3.70 |
| L | 3.75 | 4.00 | 4.25 |

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