Elektronische Bauelemente

# SSPRDJ4511-C

**N-Ch: 8.2A, 100V, $R_{DS(ON)}$ 150mΩ**
**P-Ch: -6.9A, -100V, $R_{DS(ON)}$ 210mΩ**
**N & P-Ch Enhancement Mode Power MOSFET**

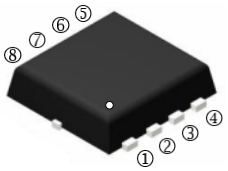
RoHS Compliant Product
A suffix of "-C" specifies halogen & lead-free

## DESCRIPTION

The SSPRDJ4511-C is the highest performance trench N-Ch and P-Ch MOSFETs with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The SSPRDJ4511-C meet the RoHS and Green Product requirement with full function reliability approved.

**DFN3x3-8DJ**



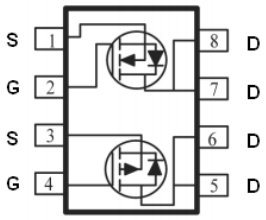

## FEATURES

- Advanced High Cell Density Trench Technology
- Super Low Gate Charge
- Green Device Available

## MARKING


## PACKAGE INFORMATION

| Package | MPQ | Leader Size |
|---|---|---|
| DFN3x3-8DJ | 5K | 13 inch |




## ORDER INFORMATION

| Part Number | Type |
|---|---|
| SSPRDJ4511-C | Lead (Pb)-free and Halogen-free |

## ABSOLUTE MAXIMUM RATINGS

| Parameter | | Symbol | Ratings | | Unit |
|---|---|---|---|---|---|
| | | | N-Ch | P-Ch | |
| Drain-Source Voltage | | $V_{DS}$ | 100 | -100 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | | V |
| Continuous Drain Current @$V_{GS}$=10V [1] | $T_C$=25°C | $I_D$ | 8.2 | -6.9 | A |
| | $T_C$=100°C | | 5.2 | -4.3 | |
| Pulsed Drain Current [3] | | $I_{DM}$ | 28 | -24 | A |
| Total Power Dissipation | $T_C$=25°C | $P_D$ | 16.67 | | W |
| Operating Junction & Storage Temperature Range | | $T_J$, $T_{STG}$ | -55~150 | | °C |
| **Thermal Data** | | | | | |
| Thermal Resistance Junction-Ambient [1] | | $R_{\theta JA}$ | 75 | | °C/W |
| Thermal Resistance Junction-Ambient [2] | | | 135 | | |
| Thermal Resistance Junction-Case [1] | | $R_{\theta JC}$ | 7.5 | | |

## N-CHANNEL ELECTRICAL CHARACTERISTICS ($T_J$=25°C unless otherwise specified)

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | 100 | - | - | V | $V_{GS}$=0, $I_D$=250μA |
| Gate Threshold Voltage | | $V_{GS(th)}$ | 1 | - | 2.5 | V | $V_{DS}$=$V_{GS}$, $I_D$=250μA |
| Forward Transfer Conductance | | $g_{fs}$ | - | 19 | - | S | $V_{DS}$=5V, $I_D$=8A |
| Gate-Source Leakage Current | | $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$= ±20V |
| Drain-Source Leakage Current | $T_J$=25°C | $I_{DSS}$ | - | - | 1 | μA | $V_{DS}$=80V, $V_{GS}$=0 |
| | $T_J$=55°C | | - | - | 5 | | |
| Static Drain-Source On-Resistance [4] | | $R_{DS(ON)}$ | - | 130 | 155 | mΩ | $V_{GS}$=10V, $I_D$=4A |
| | | | - | 135 | 160 | | $V_{GS}$=4.5V, $I_D$=2A |
| Total Gate Charge | | $Q_g$ | - | 25.5 | - | nC | $I_D$=4A<br>$V_{DS}$=60V<br>$V_{GS}$=10V |
| Gate-Source Charge | | $Q_{gs}$ | - | 4.2 | - | | |
| Gate-Drain (“Miller”) Change | | $Q_{gd}$ | - | 4.3 | - | | |
| Turn-on Delay Time | | $T_{d(on)}$ | - | 17.3 | - | nS | $V_{DS}$=50V<br>$I_D$=1A<br>$V_{GS}$=10V<br>$R_G$=3.3Ω |
| Rise Time | | $T_r$ | - | 2.8 | - | | |
| Turn-off Delay Time | | $T_{d(off)}$ | - | 50 | - | | |
| Fall Time | | $T_f$ | - | 2.8 | - | | |
| Input Capacitance | | $C_{iss}$ | - | 1077 | - | pF | $V_{GS}$=0<br>$V_{DS}$=15V<br>f=1MHz |
| Output Capacitance | | $C_{oss}$ | - | 46 | - | | |
| Reverse Transfer Capacitance | | $C_{rss}$ | - | 32 | - | | |
| **Source-Drain Diode** | | | | | | | |
| Continuous Source Current [1] | | $I_S$ | - | - | 8.2 | A | |
| Pulsed Source Current [3] | | $I_{SM}$ | - | - | 28 | | |
| Forward on Voltage [4] | | $V_{SD}$ | - | - | 1.2 | V | $V_{GS}$=0, $I_S$=1A, $T_J$=25°C |

## P-CHANNEL ELECTRICAL CHARACTERISTICS ($T_J$=25°C unless otherwise specified)

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | -100 | - | - | V | $V_{GS}$=0, $I_D$= -250μA |
| Gate Threshold Voltage | | $V_{GS(th)}$ | -1 | - | -2.5 | V | $V_{DS}$=$V_{GS}$, $I_D$= -250μA |
| Forward Transfer Conductance | | $g_{fs}$ | - | 12 | - | S | $V_{DS}$= -5V, $I_D$= -5A |
| Gate-Source Leakage Current | | $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$= ±20V |
| Drain-Source Leakage Current | $T_J$=25°C | $I_{DSS}$ | - | - | -1 | μA | $V_{DS}$= -80V, $V_{GS}$=0 |
| | $T_J$=55°C | | - | - | -5 | | |
| Static Drain-Source On-Resistance [4] | | $R_{DS(ON)}$ | - | 175 | 210 | mΩ | $V_{GS}$= -10V, $I_D$= -3.2A |
| | | | - | 185 | 230 | | $V_{GS}$= -4.5V, $I_D$= -2A |
| Total Gate Charge | | $Q_g$ | - | 20 | - | nC | $I_D$= -3.2A<br>$V_{DS}$= -50V<br>$V_{GS}$= -10V |
| Gate-Source Charge | | $Q_{gs}$ | - | 3.5 | - | | |
| Gate-Drain (“Miller”) Change | | $Q_{gd}$ | - | 4.6 | - | | |
| Turn-on Delay Time | | $T_{d(on)}$ | - | 18 | - | nS | $V_{DS}$= -50V<br>$I_D$= -5A<br>$V_{GS}$= -10V<br>$R_G$=3.3Ω |
| Rise Time | | $T_r$ | - | 8 | - | | |
| Turn-off Delay Time | | $T_{d(off)}$ | - | 100 | - | | |
| Fall Time | | $T_f$ | - | 30 | - | | |
| Input Capacitance | | $C_{iss}$ | - | 1419 | - | pF | $V_{GS}$=0<br>$V_{DS}$= -15V<br>f=1MHz |
| Output Capacitance | | $C_{oss}$ | - | 89 | - | | |
| Reverse Transfer Capacitance | | $C_{rss}$ | - | 45 | - | | |
| **Source-Drain Diode** | | | | | | | |
| Continuous Source Current [1] | | $I_S$ | - | - | -6.9 | A | |
| Pulsed Source Current [3] | | $I_{SM}$ | - | - | -24 | | |
| Forward on Voltage [4] | | $V_{SD}$ | - | - | -1.2 | V | $V_{GS}$=0, $I_S$= -1A, $T_J$=25°C |

Notes:
1. Surface mounted on a 1 inch$^2$ FR-4 board with 2oz copper.
2. When mounted on Min. copper pad.
3. Pulse width limited by maximum junction temperature, pulse width≦300μs, duty cycle≦2%.
4. Pulse Test: pulse width≦300μs, duty cycle≦2%.

## N-CHANNEL CHARACTERISTIC CURVE

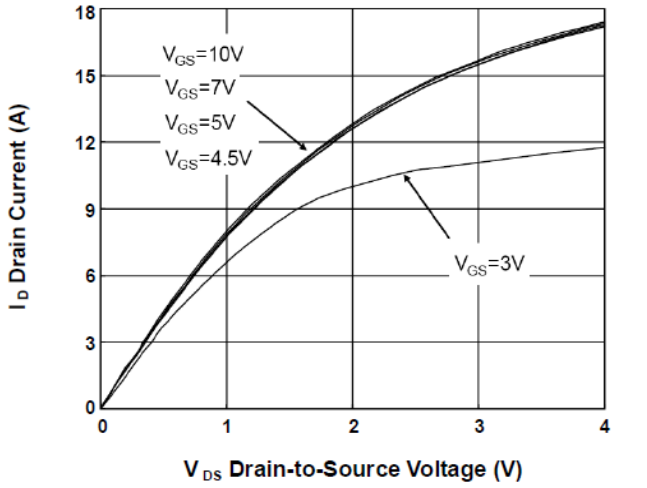



Fig.1 Typical Output Characteristics

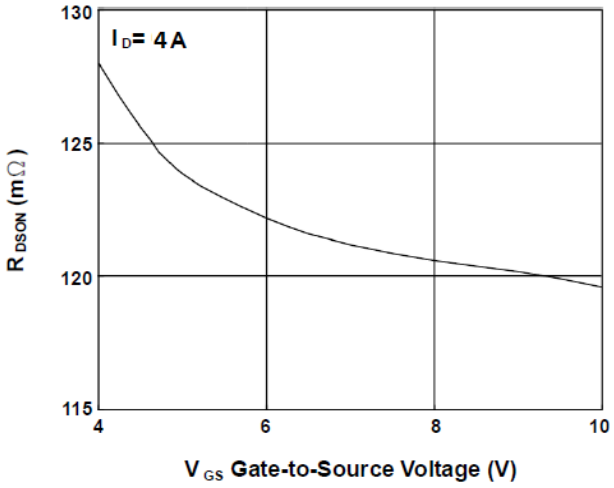



Fig.2 On-Resistance vs. G-S Voltage

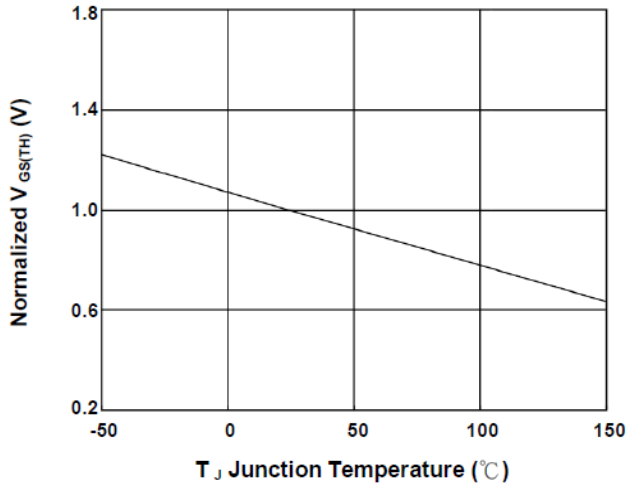



Fig.3 Normalized $V_{GS(th)}$ vs. $T_J$

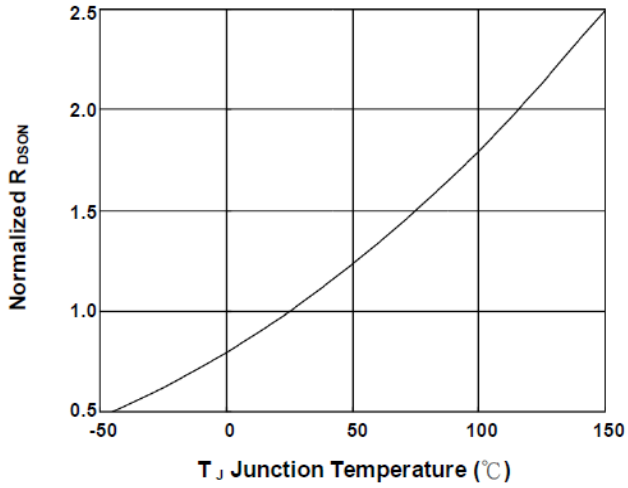



Fig.4 Normalized $R_{DSON}$ vs. $T_J$

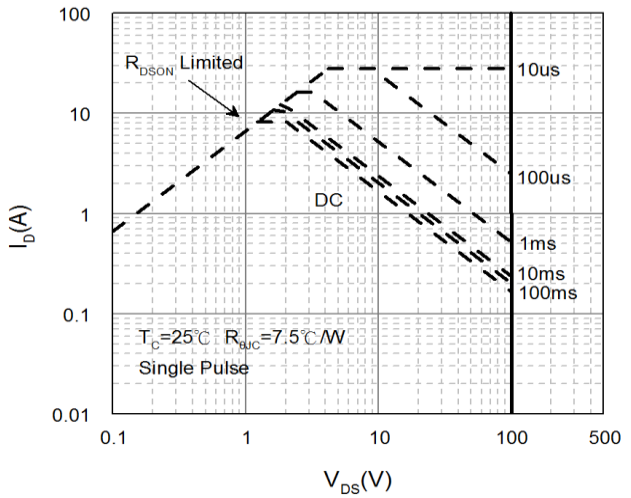



Fig.5 Safe Operating Area

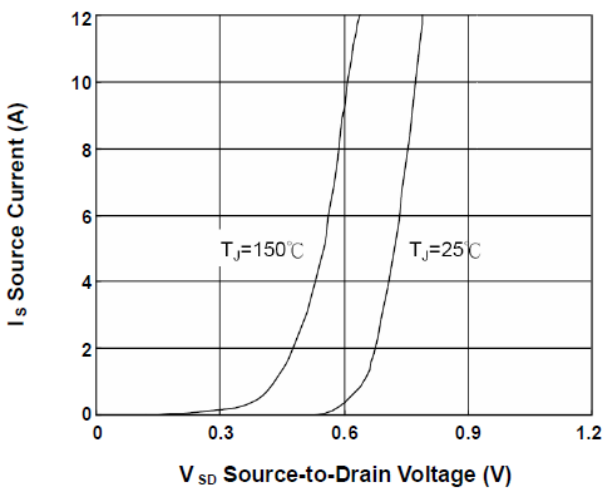



Fig.6 Forward Characteristics of Reverse

## N-CHANNEL CHARACTERISTIC CURVE

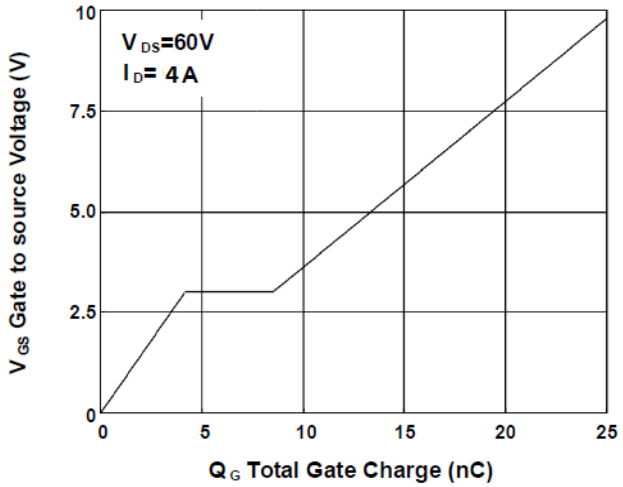



Fig.7 Gate Charge Characteristics

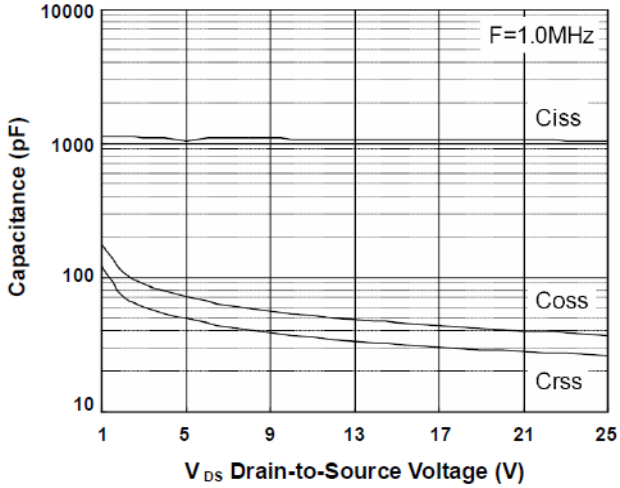



Fig.8 Capacitance Characteristics

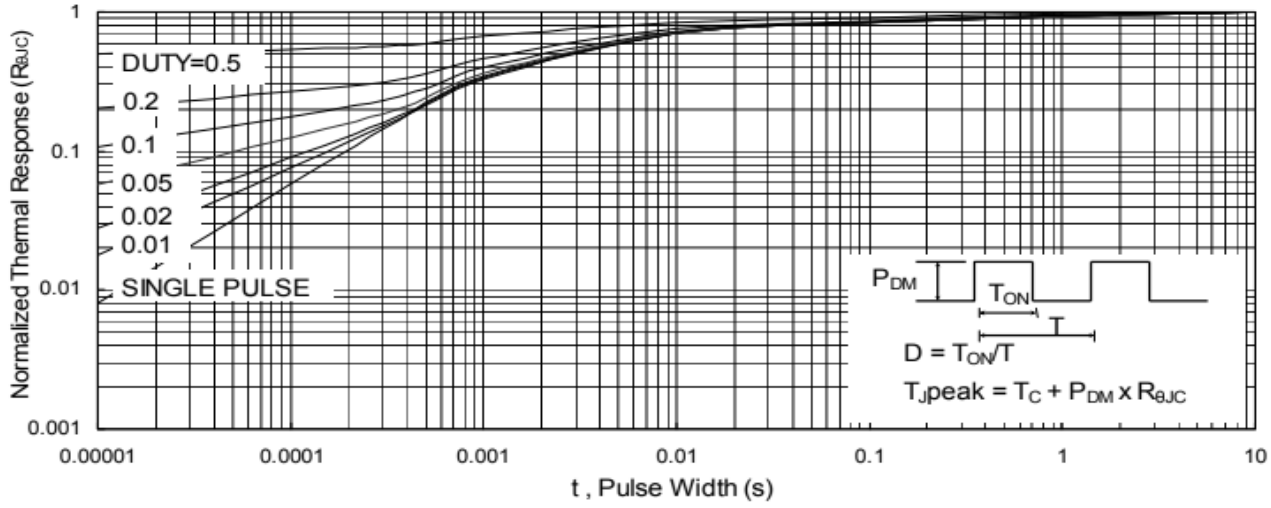



Fig.9 Normalized Maximum Transient Thermal Impedance

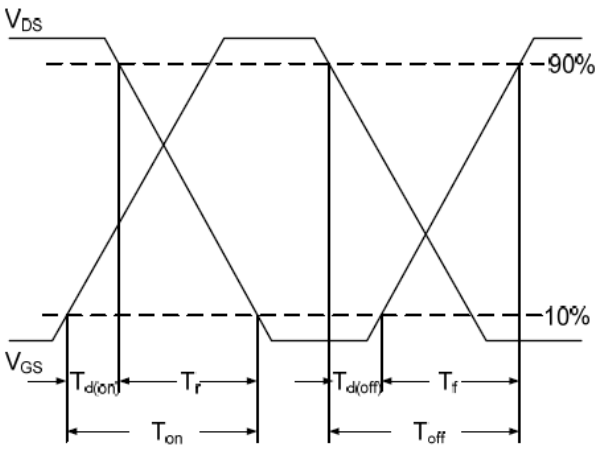



Fig.10 Switching Time Waveform

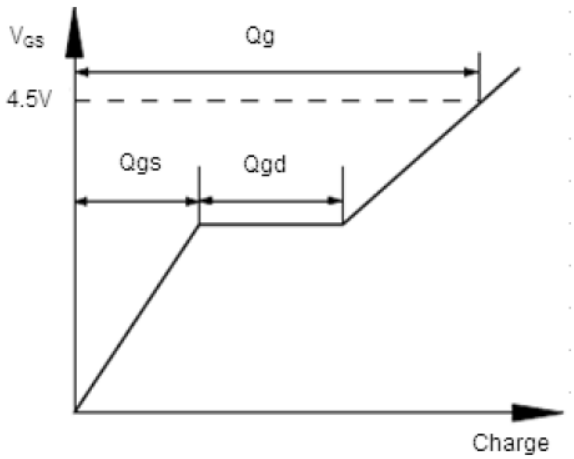



Fig.11 Gate Charge Waveform

## P-CHANNEL CHARACTERISTIC CURVE

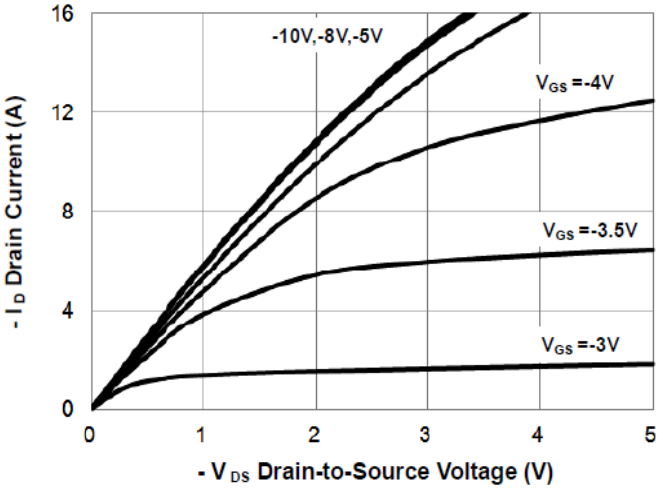



Fig.1 Typical Output Characteristics

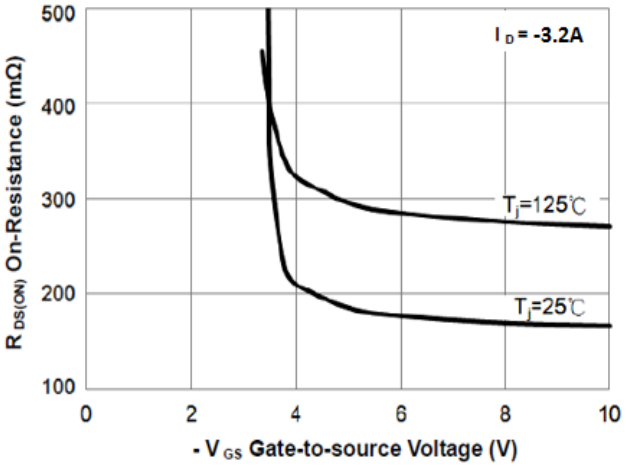



Fig.2 On-Resistance vs. G-S Voltage

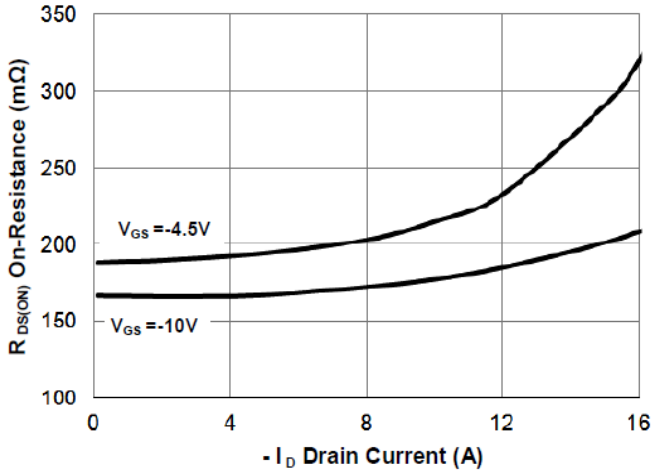



Fig.3 On-Resistance vs. Drain Current

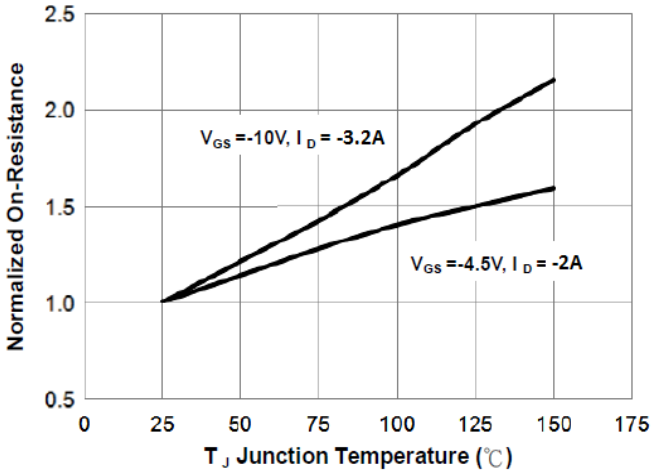



Fig.4 Normalized $R_{DSON}$ vs. $T_J$

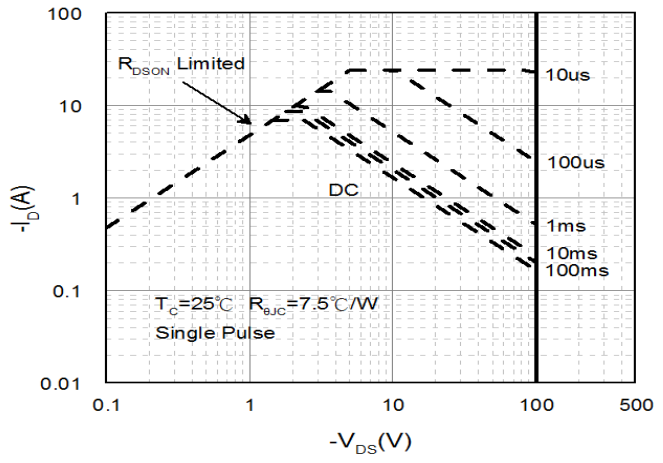



Fig.5 Safe Operating Area

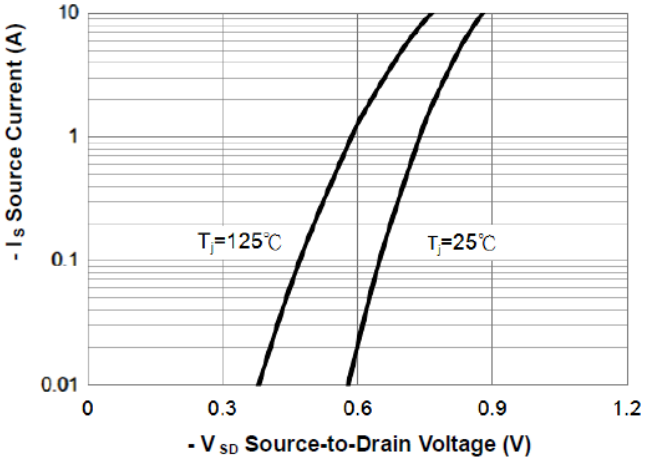



Fig.6 Forward Characteristics of Reverse

## P-CHANNEL CHARACTERISTIC CURVE

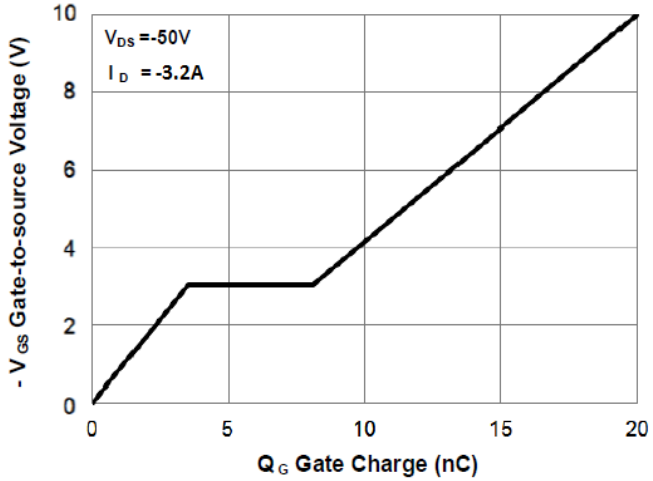



Fig.7 Gate Charge Characteristics

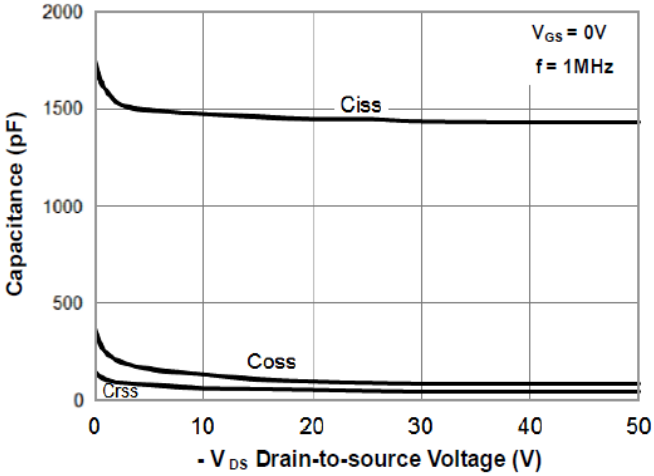



Fig.8 Capacitance Characteristics

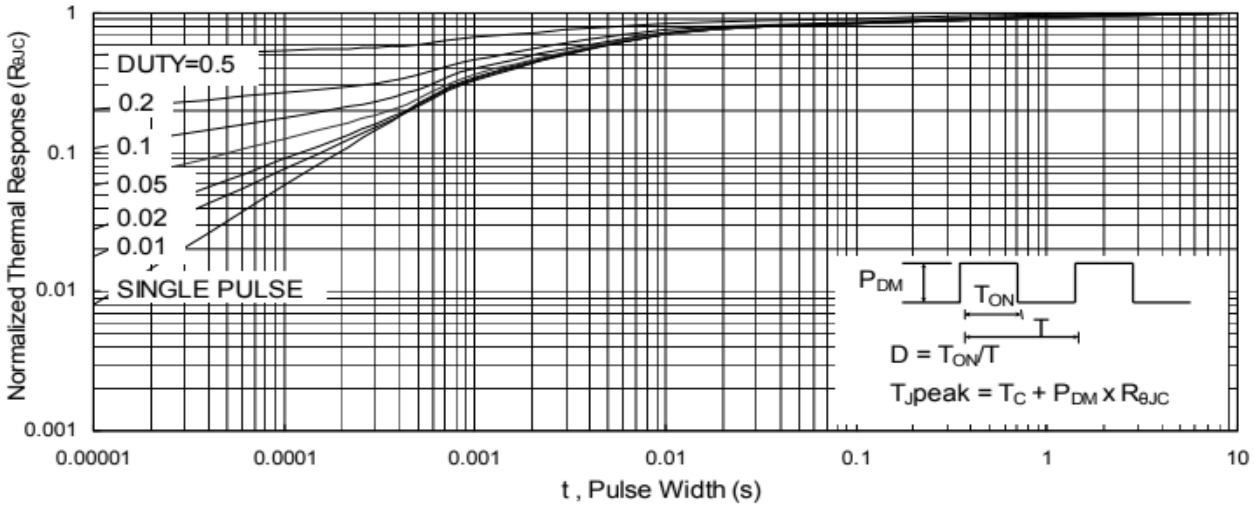



Fig.9 Normalized Maximum Transient Thermal Impedance

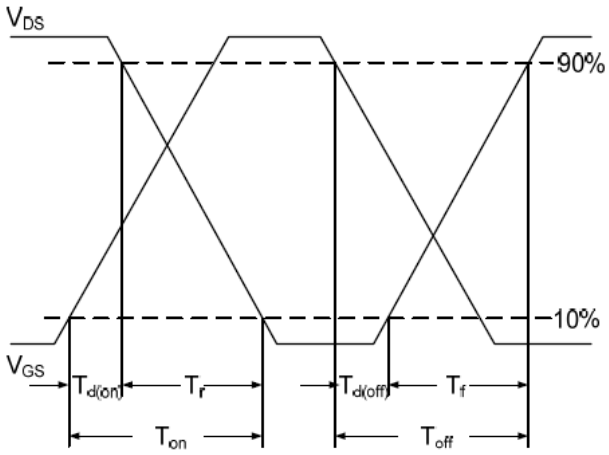



Fig.10 Switching Time Waveform

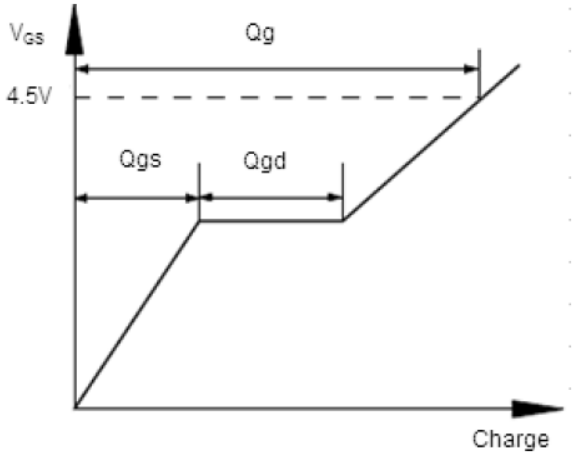
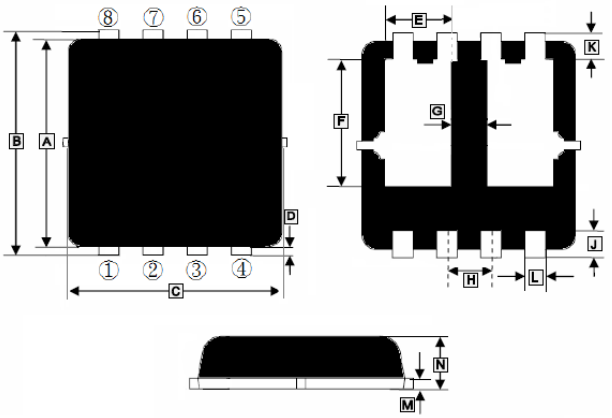



Fig.11 Gate Charge Waveform

## PACKAGE OUTLINE DIMENSIONS

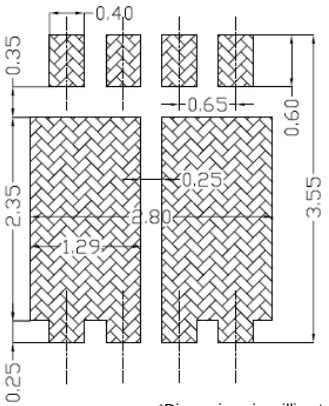
**DFN3x3-8DJ**




| REF. | Millimeter | |
|---|---|---|
| | Min. | Max. |
| A | 2.90 | 3.10 |
| B | 3.15 | 3.45 |
| C | 2.90 | 3.10 |
| D | 0.15 BSC. | |
| E | 0.935 | 1.135 |
| F | 1.535 | 1.935 |
| G | 0.28 | 0.48 |
| H | 0.55 | 0.75 |
| J | 0.30 | 0.50 |
| K | 0.315 | 0.515 |
| L | 0.20 | 0.40 |
| M | 0.152 REF. | |
| N | 0.65 | 0.85 |

## MOUNTING PAD LAYOUT

**DFN3x3-8DJ**




*Dimensions in millimeters