## Maximum Ratings @$T_A$ = 25°C unless otherwise specified

| Characteristic | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | -20 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±8 | V |
| Continuous Drain Current | Steady State | $T_A$ = 25°C (Note 4) | $I_D$ | -1.14 | A |
| | | $T_A$ = 85°C (Note 4) | | -0.83 | |
| | | $T_A$ = 25°C (Note 5) | | -0.82 | |
| Pulsed Drain Current (Note 6) | | | $I_{DM}$ | -4.0 | A |

## Thermal Characteristics @$T_A$ = 25°C unless otherwise specified

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation | (Note 4) | $P_D$ | 930 | mW |
| | (Note 5) | | 490 | mW |
| Thermal Resistance, Junction to Ambient | (Note 4) | $R_{\theta JA}$ | 135 | °C/W |
| | (Note 5) | | 256 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

Notes:
4. For a device surface mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of 2oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
5. Same as note 4, except the device is mounted on minimum recommended pad layout.
6. Device mounted on minimum recommended pad layout test board, 10µs pulse duty cycle = 1%.


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## Thermal Characteristics

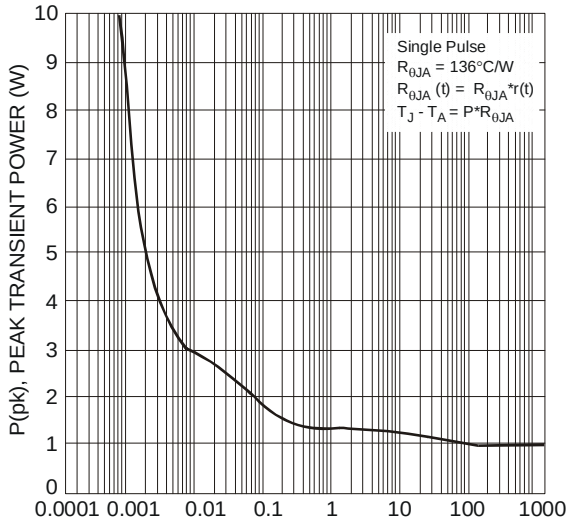


Fig. 1 Single Pulse Maximum Power Dissipation

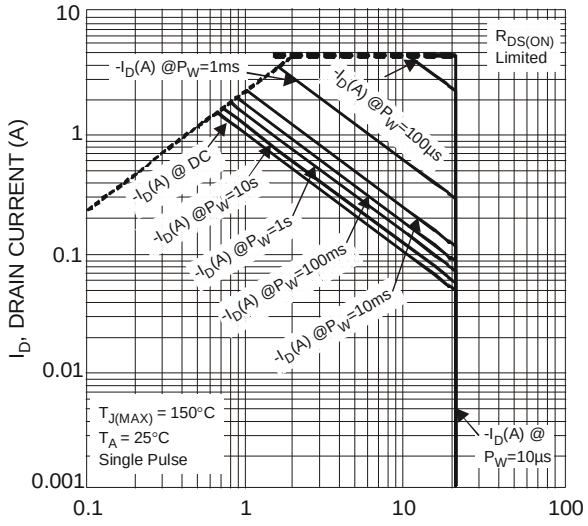


Fig. 2 SOA, Safe Operation Area

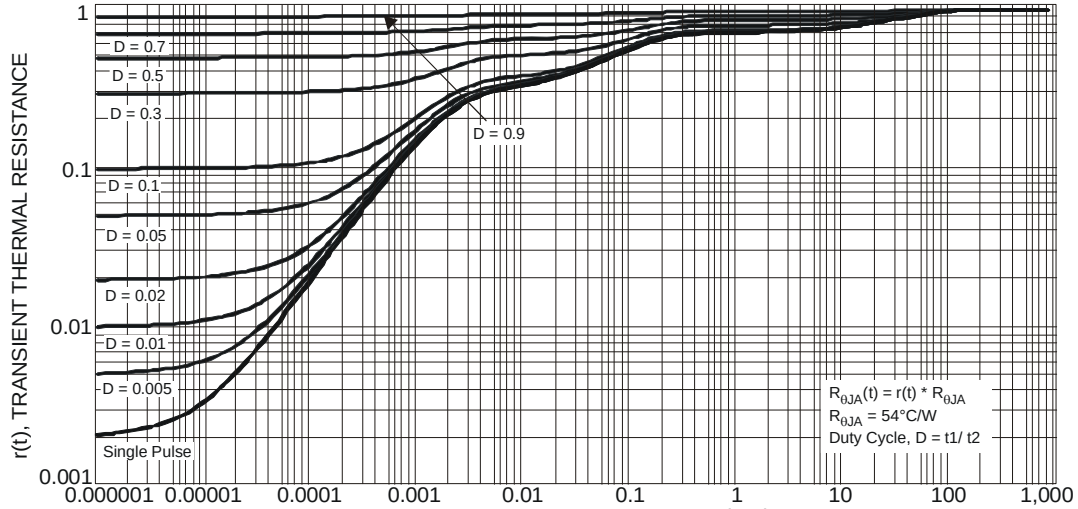


Fig. 3 Transient Thermal Resistance


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## Electrical Characteristics @$T_A$ = 25°C unless otherwise specified

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 7)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | -20 | - | - | V | $V_{GS}$ = 0V, $I_D$ = -250µA |
| Zero Gate Voltage Drain Current $T_J$ = 25°C | $I_{DSS}$ | - | - | -1 | µA | $V_{DS}$ = -20V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | - | - | ±10 | µA | $V_{GS}$ = ±8V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | -0.45 | -0.7 | -1.2 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250µA |
| Static Drain-Source On-Resistance | $R_{DS\ (ON)}$ | - | - | 495 | mΩ | $V_{GS}$ = -4.5V, $I_D$ = -800mA |
| | | | | 730 | | $V_{GS}$ = -2.5V, $I_D$ = -700mA |
| | | | | 960 | | $V_{GS}$ = -1.8V, $I_D$ = -100mA |
| | | | | 1300 | | $V_{GS}$ = -1.5V, $I_D$ = -100mA |
| Forward Transfer Admittance | $\|Y_{fs}\|$ | 50 | - | - | mS | $V_{DS}$ = -3V, $I_D$ = -300mA |
| Diode Forward Voltage | $V_{SD}$ | - | - | -1.2 | V | $V_{GS}$ = 0V, $I_S$ = -300mA |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Input Capacitance | $C_{iss}$ | - | 76.5 | - | pF | $V_{DS}$ = -10V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | - | 13.7 | - | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | - | 10.7 | - | pF | |
| Gate Resistance | $R_g$ | - | 195 | - | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1MHz |
| Total Gate Charge (Note 8) | $Q_g$ | - | 1.5 | - | nC | $V_{GS}$ = -8V, $V_{DS}$ = -15V, $I_D$ = -1A |
| Total Gate Charge (Note 8) | $Q_g$ | - | 1.0 | - | nC | $V_{GS}$ = -4.5V, $V_{DS}$ = -15V, $I_D$ = -1A |
| Gate-Source Charge | $Q_{gs}$ | - | 0.2 | - | nC | |
| Gate-Drain Charge | $Q_{gd}$ | - | 0.3 | - | nC | |
| Turn-On Delay Time | $t_{D(on)}$ | - | 7.1 | - | ns | $V_{DS}$ = -10V, $-I_D$ = 1A, $V_{GS}$ = -4.5V, $R_G$ = 6Ω |
| Turn-On Rise Time | $t_r$ | - | 8.0 | - | ns | |
| Turn-Off Delay Time | $t_{D(off)}$ | - | 31.7 | - | ns | |
| Turn-Off Fall Time | $t_f$ | - | 18.5 | - | ns | |

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guarantee by design.

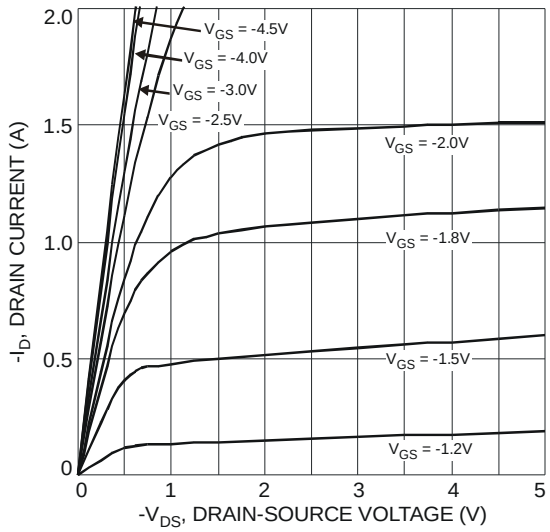


Fig. 4 Typical Output Characteristic

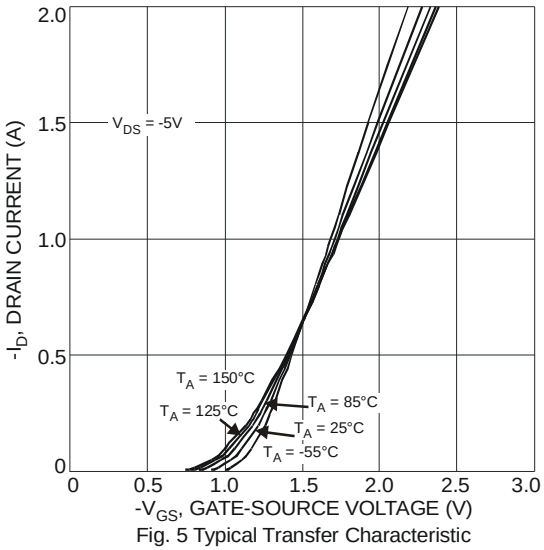


Fig. 5 Typical Transfer Characteristic


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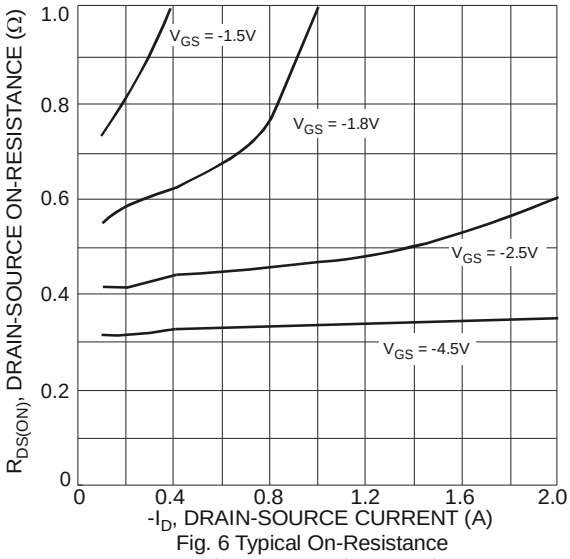


Fig. 6 Typical On-Resistance
vs. Drain Current and Gate Voltage

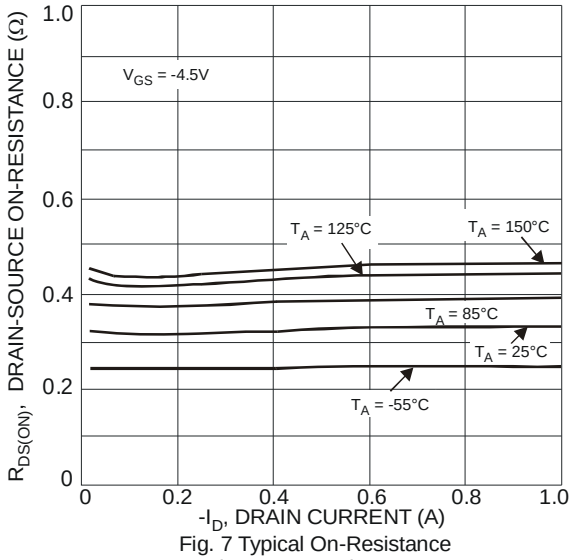


Fig. 7 Typical On-Resistance
vs. Drain Current and Temperature

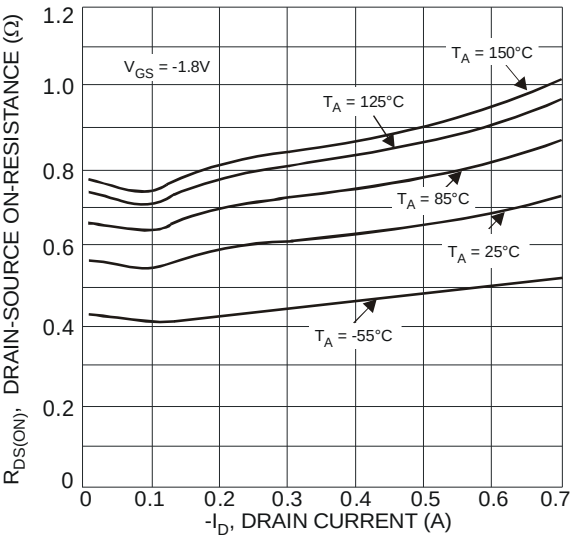


Fig. 8 Typical On-Resistance
vs. Drain Current and Temperature

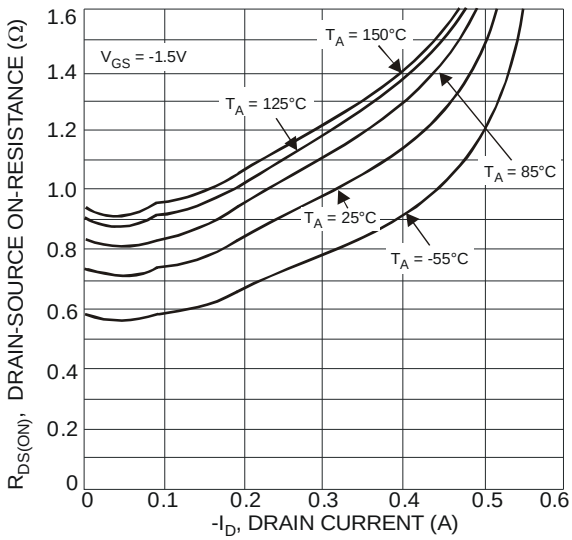


Fig. 9 Typical On-Resistance
vs. Drain Current and Temperature

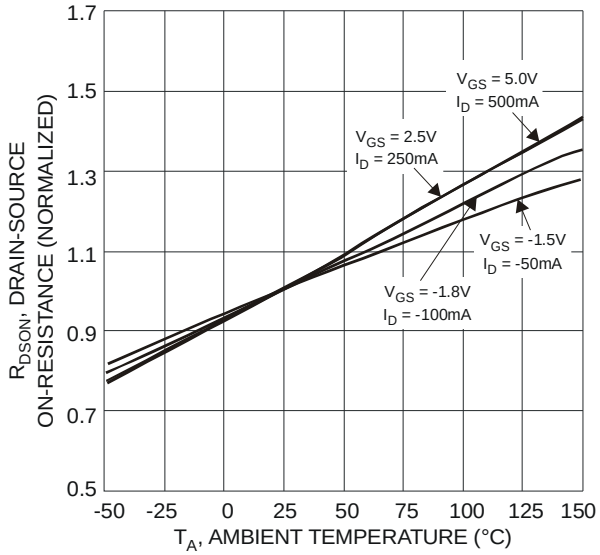


Fig. 10 On-Resistance Variation with Temperature

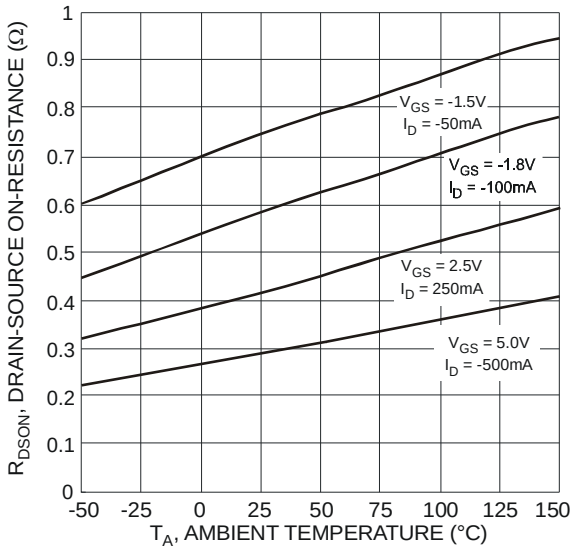


Fig. 11 On-Resistance Variation with Temperature


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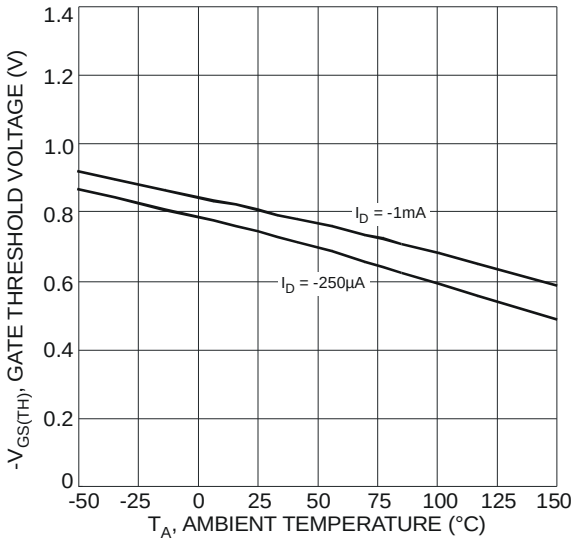


Fig. 12 Gate Threshold Variation vs. Ambient Temperature

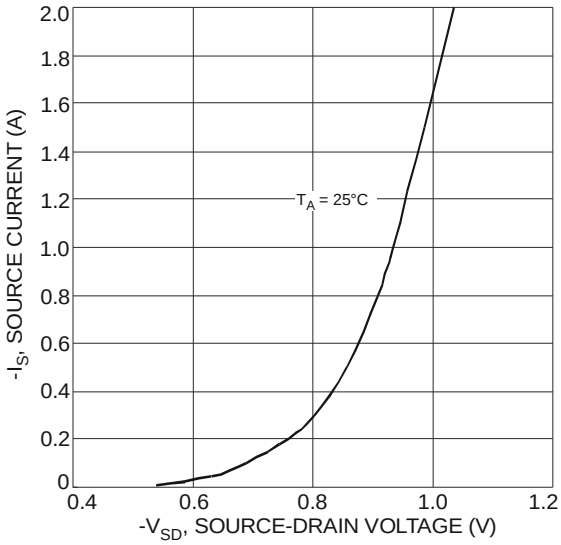


Fig. 13 Diode Forward Voltage vs. Current

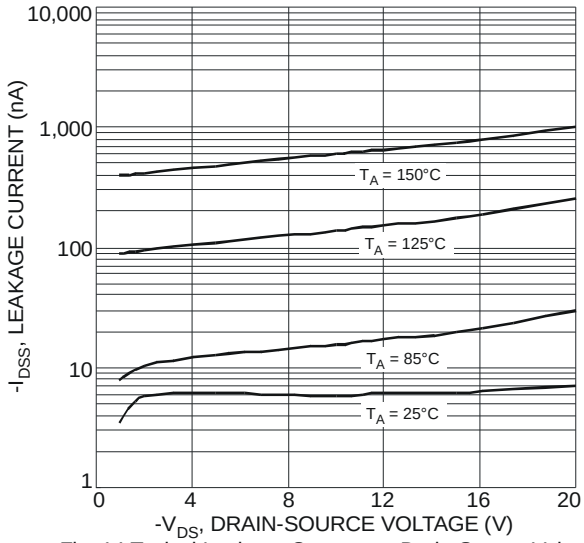


Fig. 14 Typical Leakage Current vs. Drain-Source Voltage

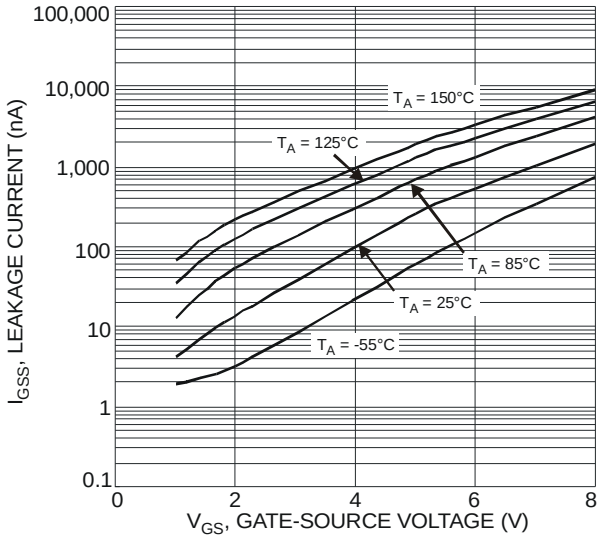


Fig.15 Leakage Current vs. Gate-Source Voltage

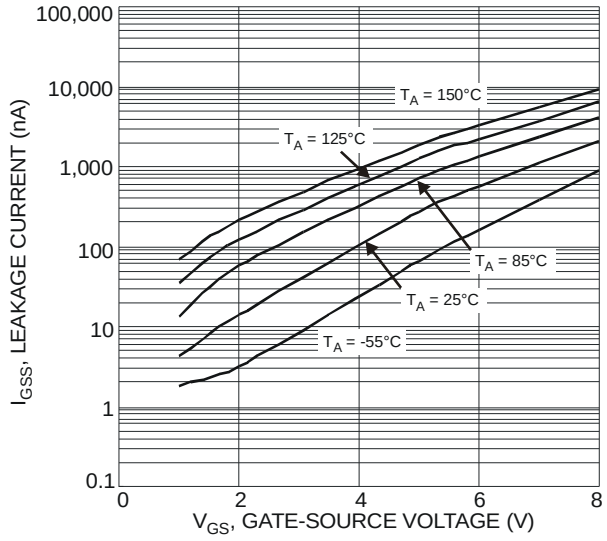


Fig.16 Leakage Current vs. Gate-Source Voltage

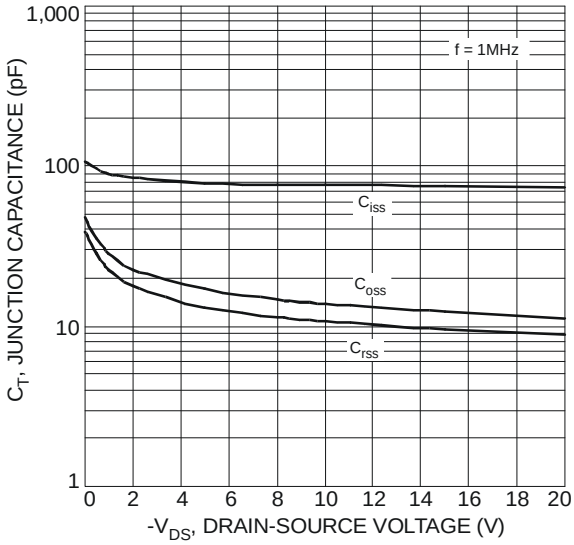


Fig. 17 Typical Junction Capacitance


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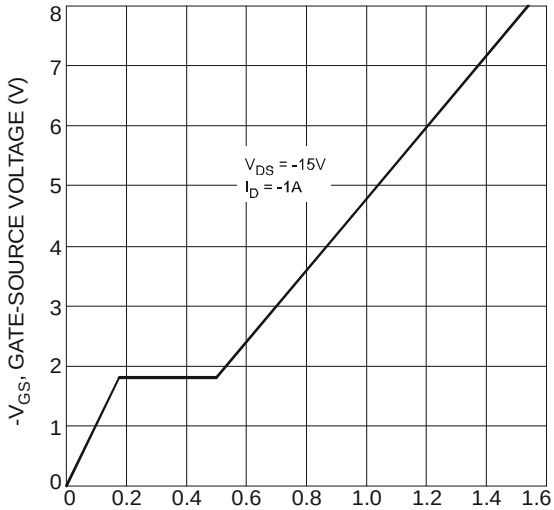
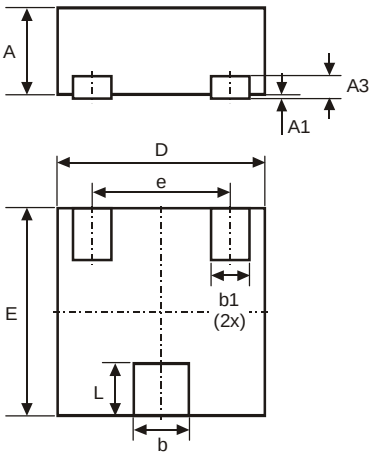


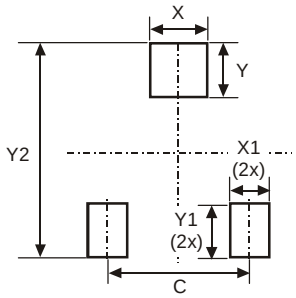

Fig. 18 Gate-Charge Characteristics

## Package Outline Dimensions




| X1-DFN1212-3 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.47 | 0.53 | 0.50 |
| **A1** | 0 | 0.05 | 0.02 |
| **A3** | - | - | 0.13 |
| **b** | 0.27 | 0.37 | 0.32 |
| **b1** | 0.17 | 0.27 | 0.22 |
| **D** | 1.15 | 1.25 | 1.20 |
| **E** | 1.15 | 1.25 | 1.20 |
| **e** | - | - | 0.80 |
| **L** | 0.25 | 0.35 | 0.30 |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout




| Dimensions | Value (in mm) |
|---|---|
| **C** | 0.80 |
| **X** | 0.42 |
| **X1** | 0.32 |
| **Y** | 0.50 |
| **Y1** | 0.50 |
| **Y2** | 1.50 |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