# N＋P Channel Enhancement Mode MOSFET

# BL1415DW

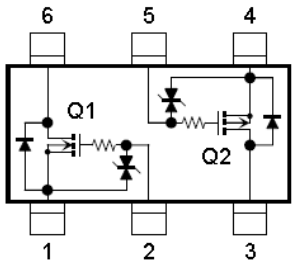
## Features

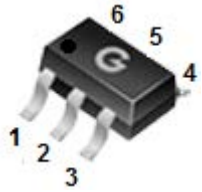
HF

- Extremely low threshold voltage
- ESD protected
- Advanced trench cell design

## Mechanical Data

- Case: SOT-363
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208




SOT-363

## Ordering Information

| Part Number | Package | Shipping Quantity | Marking Code |
|---|---|---|---|
| BL1415DW | SOT-363 | 3000 pcs / Tape & Reel | K5 |

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

| Parameter | Symbol | Q1 | Q2 | Unit |
|---|---|---|---|---|
| Drain-to-Source Voltage | $V_{DSS}$ | 30 | -30 | V |
| Gate-to-Source Voltage | $V_{GSS}$ | ±10 | ±10 | V |
| Continuous Drain Current($V_{GS}$ = ±4.5V) *1 | $I_D$ | 0.78 | -0.36 | A |
| Pulsed Drain Current($V_{GS}$ = ±4.5V) *1,2 | $I_{DM}$ | 3.1 | -1.4 | A |

## Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation($T_A$ = 25°C) *1 | $P_D$ | 0.3 | W |
| Thermal Resistance Junction-to-Air *1 | $R_{\theta JA}$ | 416 | °C/W |
| Operating Junction Temperature Range | $T_J$ | -55 ~ +150 | °C |
| Storage Temperature Range | $T_{STG}$ | -55 ~ +150 | °C |

## Electrical Characteristics-Q1 (@ $T_A$ = 25°C unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| $V_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ = 0V, $I_D$ = 250μA | 30 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 24V, $V_{GS}$ = 0V | - | - | 1 | μA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$ = ±10V, $V_{DS}$ = 0V | - | - | ±10 | μA |
| **On Characteristics** | | | | | | |
| $R_{DS(ON)}$ | Static Drain-Source On-resistance *2 | $V_{GS}$ = 4.5V,$I_D$ = 0.5A | - | - | 1.2 | Ω |
| | | $V_{GS}$ = 2.5V,$I_D$ = 0.2A | - | - | 1.6 | Ω |
| | | $V_{GS}$ = 1.8V,$I_D$ = 0.1A | - | - | 2 | Ω |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 0.5 | - | 1.0 | V |
| **Dynamic Characteristics** *3 | | | | | | |
| $C_{ISS}$ | Input Capacitance | $V_{GS}$ = 0V<br>$V_{DS}$ = 15V<br>f = 1.0MHz | - | 54 | - | pF |
| $C_{OSS}$ | Output Capacitance | | - | 9.4 | - | |
| $C_{RSS}$ | Reverse Transfer Capacitance | | - | 4.4 | - | |
| **Switching Characteristics** *3 | | | | | | |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{DD}$ = 15V, $V_{GS}$ = 4.5V<br>$R_G$ = 4.5Ω, $R_L$ = 30Ω<br>$I_D$ = 0.5A | - | 1.8 | - | ns |
| $t_r$ | Turn-on Rise Time | | - | 18 | - | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | - | 29 | - | |
| $t_f$ | Turn-Off Fall Time | | - | 22 | - | |
| $Q_G$ | Total Gate-Charge | $V_{DD}$ = 15V<br>$V_{GS}$ = 4.5V<br>$I_D$ = 0.5A | - | 0.8 | - | nC |
| $Q_{GS}$ | Gate to Source Charge | | - | 0.2 | - | |
| $Q_{GD}$ | Gate to Drain (Miller) Charge | | - | 0.08 | - | |
| **Source-Drain Diode Characteristics** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage *2 | $I_{SD}$ = 0.5A, $V_{GS}$ = 0V | - | - | 1.2 | V |

## Electrical Characteristics-Q2 (@ $T_A$ = 25°C unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| $V_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ = 0V, $I_D$ = -250μA | -30 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = -24V, $V_{GS}$ = 0V | - | - | -1 | μA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$ = ±8V, $V_{DS}$ = 0V | - | - | ±10 | μA |
| **On Characteristics** | | | | | | |
| $R_{DS(ON)}$ | Static Drain-Source On-resistance *2 | $V_{GS}$ = -4.5V,$I_D$ = -0.3A | - | - | 2.5 | Ω |
| | | $V_{GS}$ = -2.5V,$I_D$ = -0.2A | - | - | 2.9 | Ω |
| | | $V_{GS}$ = -1.8V,$I_D$ = -0.1A | - | - | 5 | Ω |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = -250μA | -0.4 | - | -1.0 | V |
| **Dynamic Characteristics** *3 | | | | | | |
| $C_{ISS}$ | Input Capacitance | $V_{GS}$ = 0V<br>$V_{DS}$ = -10V<br>f = 1.0MHz | - | 50 | - | pF |
| $C_{OSS}$ | Output Capacitance | | - | 6 | - | |
| $C_{RSS}$ | Reverse Transfer Capacitance | | - | 5 | - | |
| **Switching Characteristics** *3 | | | | | | |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{DD}$ =-10V, $V_{GS}$ = -4.5V<br>$R_G$ = 6Ω, $R_L$ = 150Ω<br>$I_D$ = -0.1A | - | 3.4 | - | ns |
| $t_r$ | Turn-on Rise Time | | - | 13 | - | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | - | 37 | - | |
| $t_f$ | Turn-Off Fall Time | | - | 23 | - | |
| $Q_G$ | Total Gate-Charge | $V_{DD}$ = -10V<br>$V_{GS}$ = -4.5V<br>$I_D$ = -0.1A | - | 1.22 | - | nC |
| $Q_{GS}$ | Gate to Source Charge | | - | 0.33 | - | |
| $Q_{GD}$ | Gate to Drain (Miller) Charge | | - | 0.22 | - | |
| **Source-Drain Diode Characteristics** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage *2 | $I_{SD}$ = -0.3 A, $V_{GS}$ = 0V | - | - | -1.3 | V |

Notes:

1. Surface mounted on 1 $in^2$ pad area, t ≤ 10 sec
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
3. Guaranteed by design, not subject to production testing

## Ratings and Characteristics Curves-Q1 (@ $T_A$ = 25°C unless otherwise specified)

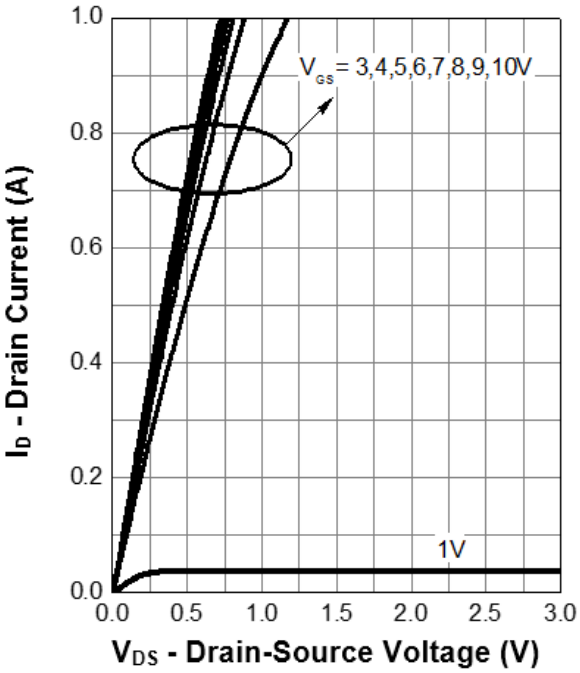



Fig. 1 On-Region Characteristics

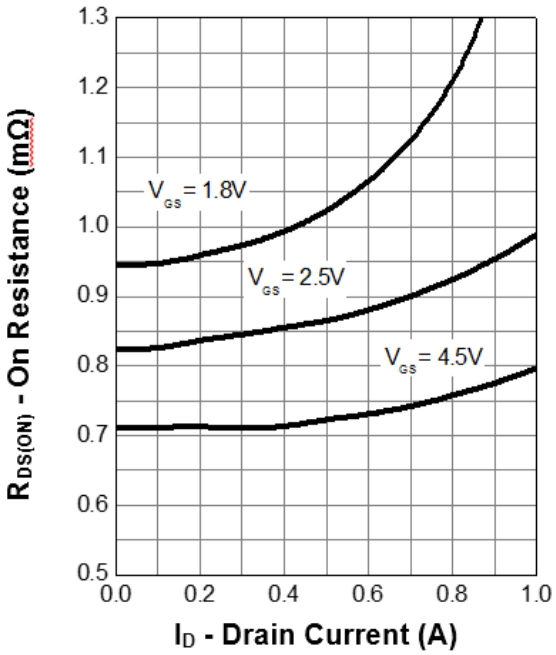



Fig. 2 On-Resistance vs. Drain Current and Gate Voltage

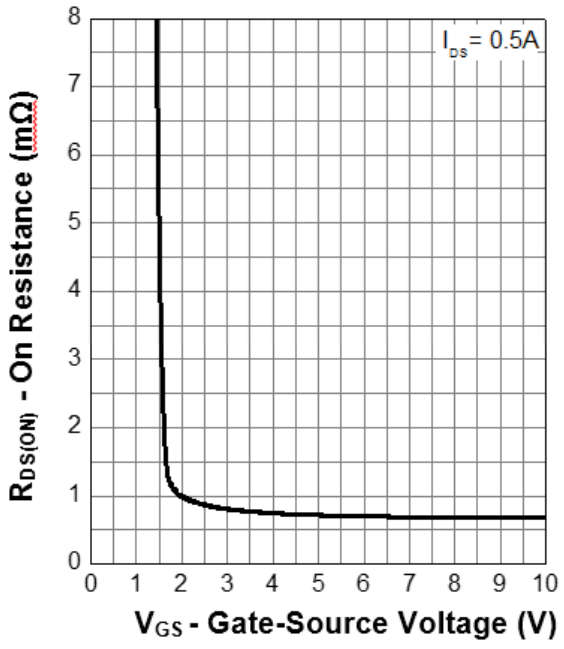



Fig. 3 On-Resistance vs. Gate-Source Voltage

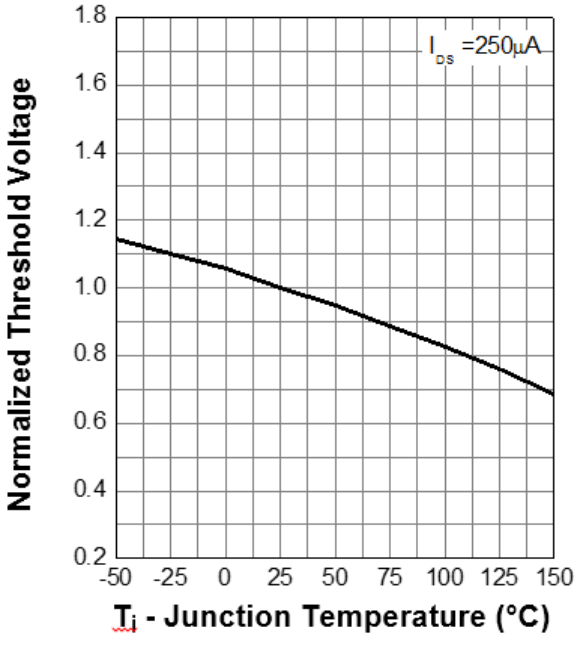



Fig. 4 Gate Voltage vs. Junction Temperature

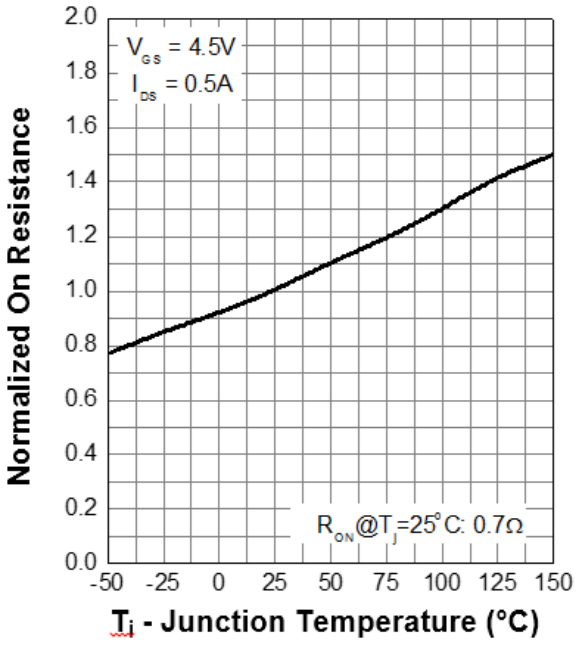



Fig. 5 On-Resistance vs. Junction Temperature

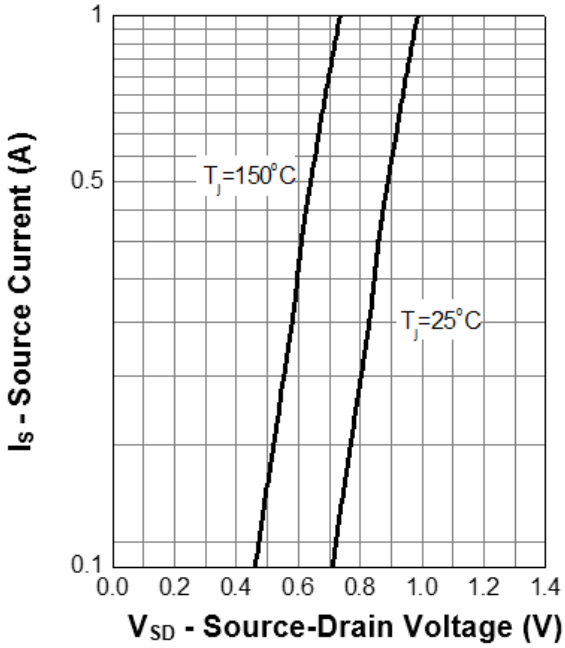



Fig. 6 Body-Diode Characteristics

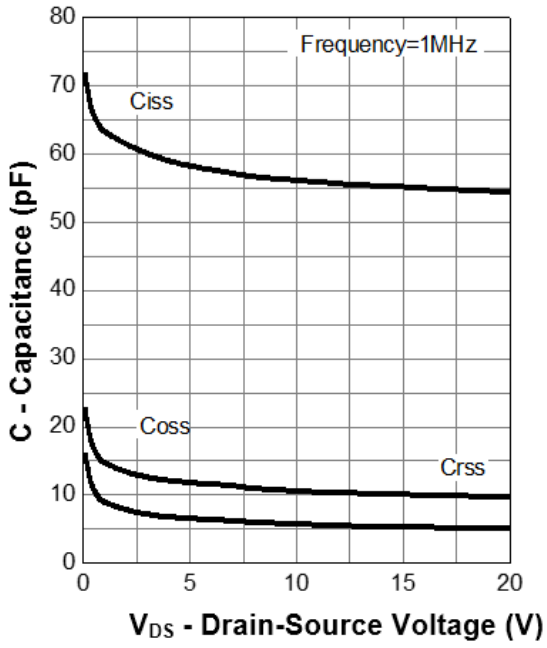



Fig. 7 Capacitance Characteristics

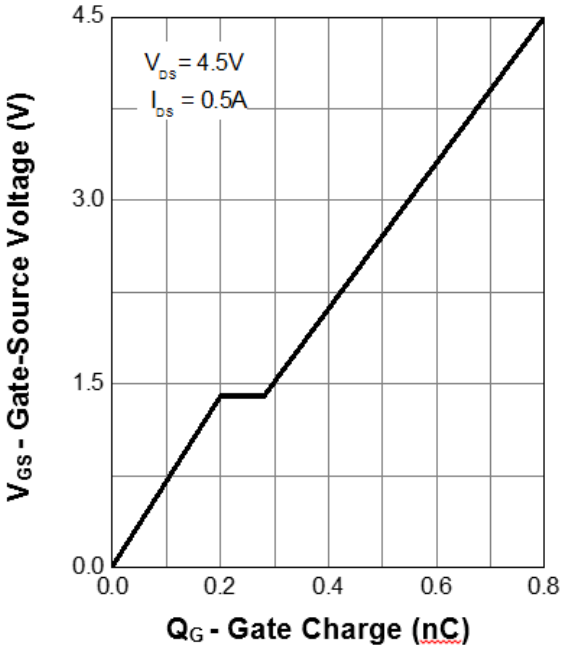



Fig. 8 Gate-Charge Characteristics

## Ratings and Characteristics Curves-Q2 (@ $T_A$ = 25°C unless otherwise specified)

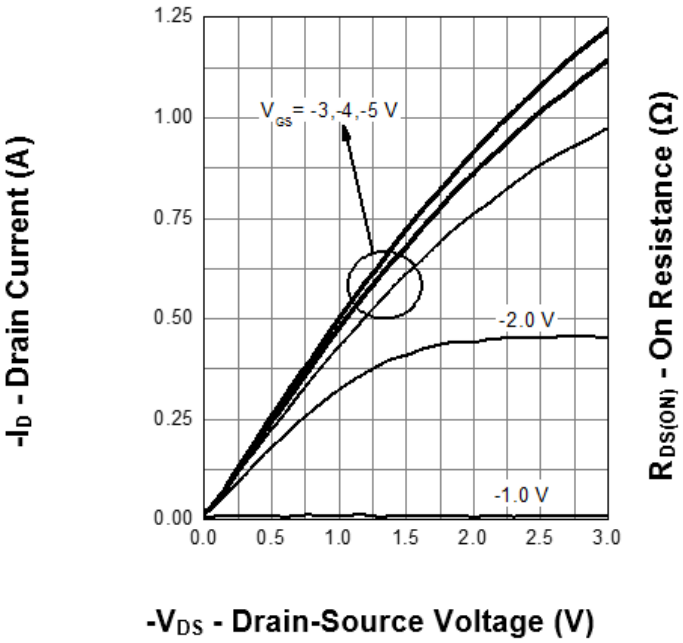



Fig. 1 On-Region Characteristics

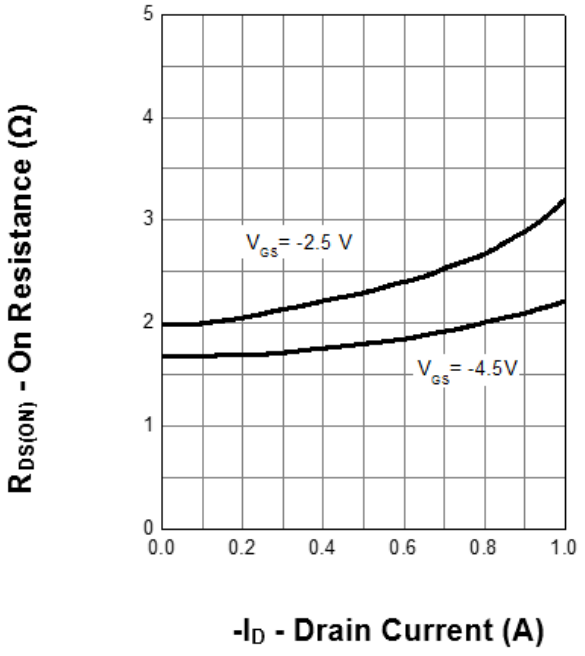



Fig. 2 On-Resistance vs. Drain Current and Gate Voltage

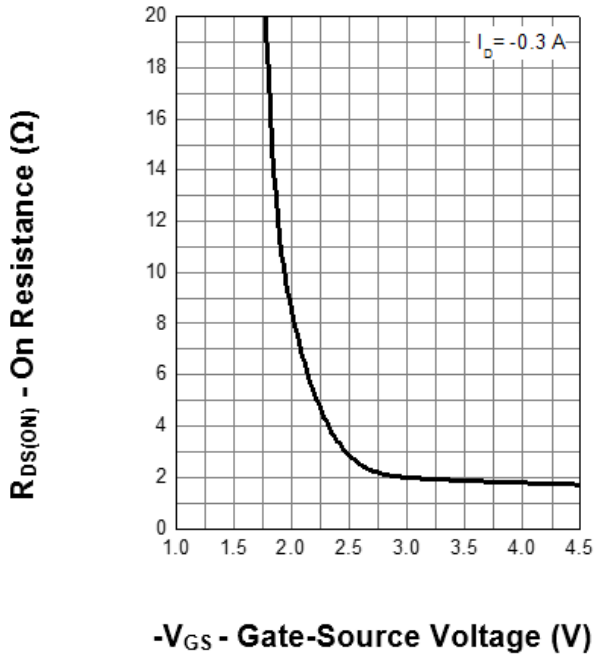



Fig. 3 On-Resistance vs. Gate-Source Voltage

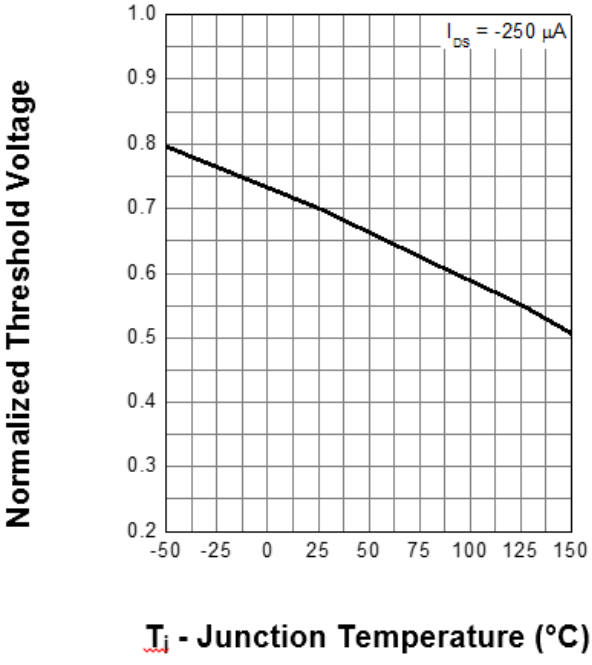



Fig. 4 Gate Voltage vs. Junction Temperature

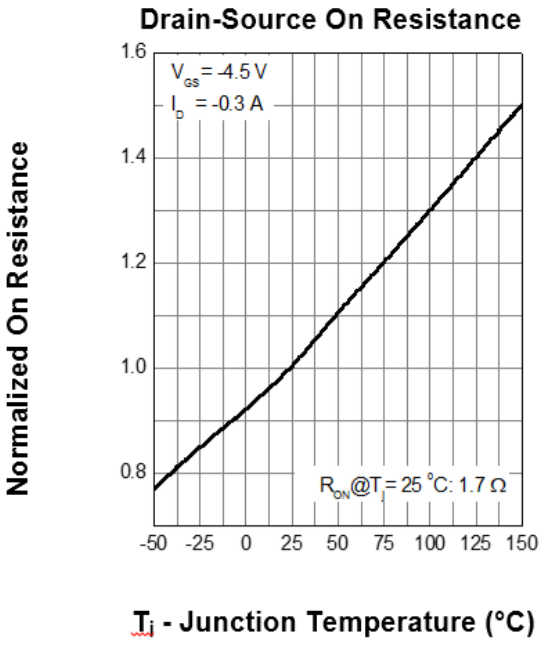



Fig. 5 On-Resistance vs. Junction Temperature

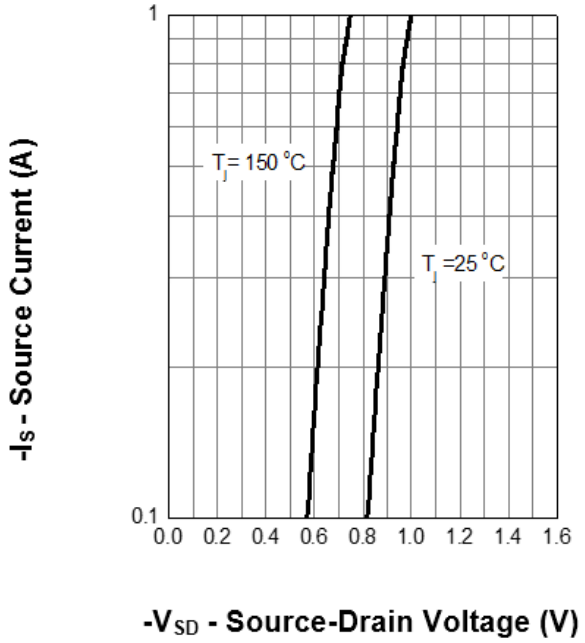



Fig. 6 Body-Diode Characteristics

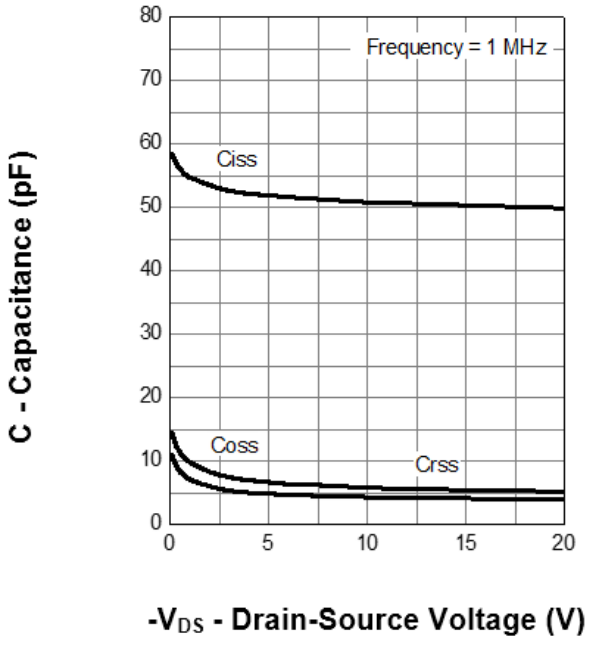



Fig. 7 Capacitance Characteristics

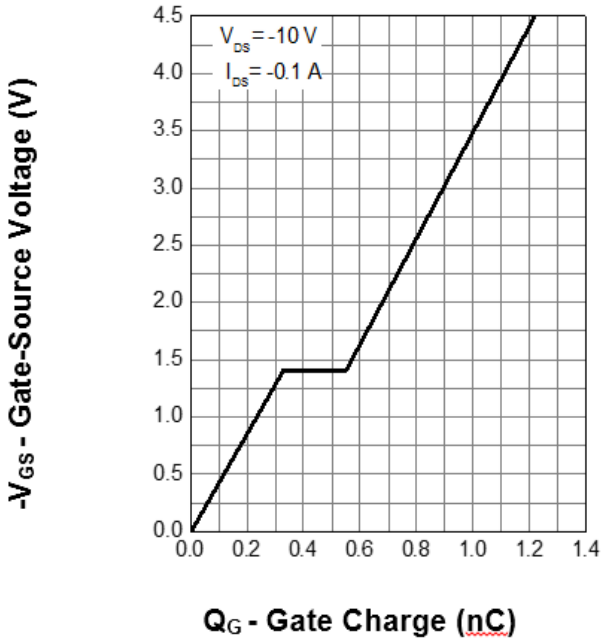
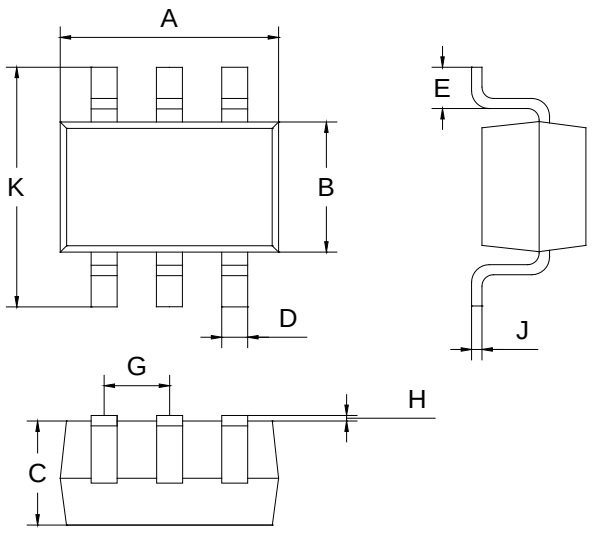



Fig. 8 Gate-Charge Characteristics

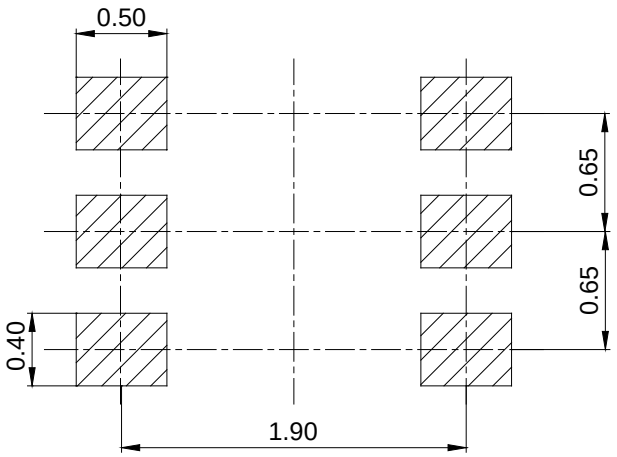
## Package Outline Dimensions (Unit: mm)




| SOT-363 | | |
|---|---|---|
| **Dimension** | **Min.** | **Max.** |
| A | 2.00 | 2.20 |
| B | 1.15 | 1.35 |
| C | 0.85 | 1.05 |
| D | 0.15 | 0.35 |
| E | 0.25 | 0.40 |
| G | 0.60 | 0.70 |
| H | 0.02 | 0.10 |
| J | 0.05 | 0.15 |
| K | 2.20 | 2.40 |

## Mounting Pad Layout (Unit: mm)

### SOT-363

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