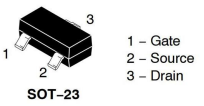
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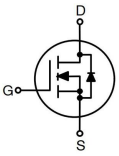
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# Si2387DS-T1-GE3
# P-Channel 80 V (D-S) MOSFET




SOT–23

1 – Gate
2 – Source
3 – Drain




## FEATURES

- TrenchFET® Gen IV p-channel power MOSFET
- 100 % $R_g$ and UIS tested

## APPLICATIONS

- Load switch
- Circuit protection
- Motor drive control

| PRODUCT SUMMARY | |
|---|---|
| $V_{DS}$ (V) | -80 |
| $R_{DS(on)}$ max. (Ω) at $V_{GS}$ = 10 V | 0.164 |
| $R_{DS(on)}$ max. (Ω) at $V_{GS}$ = 4.5 V | 0.242 |
| $Q_g$ typ. (nC) | 6.7 |
| $I_D$ (A) [a, e] | -3.0 |
| Configuration | Single |

| ORDERING INFORMATION | |
|---|---|
| Package | SOT-23 |
| Lead (Pb)-free and halogen-free | SI2387DS-T1-GE3 |

**ABSOLUTE MAXIMUM RATINGS** ($T_A$ = 25 °C, unless otherwise noted)

| PARAMETER | | SYMBOL | LIMIT | UNIT |
|---|---|---|---|---|
| Drain-source voltage | | $V_{DS}$ | -80 | V |
| Gate-source voltage | | $V_{GS}$ | ± 20 | |
| Continuous drain current ($T_J$ = 150 °C) | $T_C$ = 25 °C | $I_D$ | -3.0 [e] | A |
| | $T_C$ = 70 °C | | -2.4 | |
| | $T_A$ = 25 °C | | -2.1 [b, c] | |
| | $T_A$ = 70 °C | | -1.7 [b, c] | |
| Pulsed drain current (t = 100 µs) | | $I_{DM}$ | -10 | |
| Continuous source-drain diode current | $T_C$ = 25 °C | $I_S$ | -2.1 | |
| | $T_A$ = 25 °C | | -1.1 [b, c] | |
| Maximum power dissipation | $T_C$ = 25 °C | $P_D$ | 2.5 | W |
| | $T_C$ = 70 °C | | 1.6 | |
| | $T_A$ = 25 °C | | 1.3 [b, c] | |
| | $T_A$ = 70 °C | | 0.8 [b, c] | |
| Operating junction and storage temperature range | | $T_J$, $T_{stg}$ | -55 to +150 | °C |

**THERMAL RESISTANCE RATINGS**

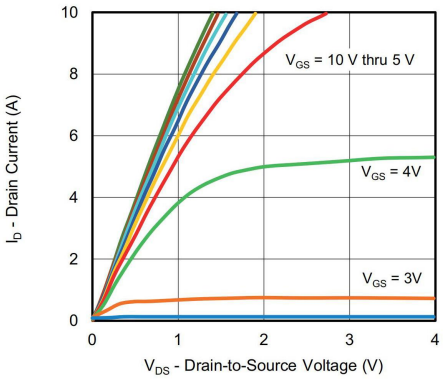
| PARAMETER | | SYMBOL | TYPICAL | MAXIMUM | UNIT |
|---|---|---|---|---|---|
| Maximum junction-to-ambient [b] | t ≤ 5 s | $R_{thJA}$ | 75 | 100 | °C/W |
| Maximum junction-to-case (drain) | Steady5 state | $R_{thJF}$ | 40 | 50 | |

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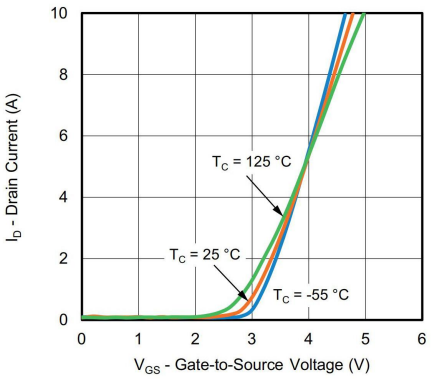
| **SPECIFICATIONS** ($T_J$ = 25 °C, unless otherwise noted) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| **Static** | | | | | | |
| Drain-source breakdown voltage | $V_{DS}$ | $V_{GS}$ = 0 V, $I_D$ = -250 µA | -80 | - | - | V |
| $V_{DS}$ temperature coefficient | $\Delta V_{DS}/T_J$ | $I_D$ = -250 µA | - | -24.7 | - | mV/°C |
| $V_{GS(th)}$ temperature coefficient | $\Delta V_{GS(th)}/T_J$ | $I_D$ = -250 µA | - | 4.7 | - | |
| Gate-source threshold voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | -1.5 | - | -2.5 | V |
| Gate-source leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ± 20 | - | - | 100 | nA |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$ = -80 V, $V_{GS}$ = 0 V | - | - | -1 | µA |
| | | $V_{DS}$ = -80 V, $V_{GS}$ = 0 V, $T_J$ = 70 °C | - | - | -15 | |
| On-state drain current [a] | $I_{D(on)}$ | $V_{DS} \geq$ -10 V, $V_{GS}$ = -10 V | -10 | - | - | A |
| Drain-source on-state resistance [a] | $R_{DS(on)}$ | $V_{GS}$ = -10 V, $I_D$ = -2.1 A | - | 0.137 | 0.164 | Ω |
| | | $V_{GS}$ = -4.5 V, $I_D$ = -1.7 A | - | 0.202 | 0.242 | |
| Forward transconductance [a] | $g_{fs}$ | $V_{DS}$ = -15 V, $I_D$ = -2.1 A | - | 5 | - | S |
| **Dynamic** [b] | | | | | | |
| Input capacitance | $C_{iss}$ | $V_{DS}$ = -40 V, $V_{GS}$ = 0 V, f = 1 MHz | - | 395 | - | pF |
| Output capacitance | $C_{oss}$ | | - | 155 | - | |
| Reverse transfer capacitance | $C_{rss}$ | | - | 7 | - | |
| Total gate charge | $Q_g$ | $V_{DS}$ = -40 V, $V_{GS}$ = -10 V, $I_D$ = -2.1 A | - | 6.8 | 10.2 | nC |
| | | $V_{DS}$ = -40 V, $V_{GS}$ = -4.5 V, $I_D$ =2.1 A | - | 3.2 | 4.8 | |
| Gate-source charge | $Q_{gs}$ | | - | 1.8 | - | |
| Gate-drain charge | $Q_{gd}$ | | - | 0.85 | - | |
| Gate resistance | $R_g$ | f = 1 MHz | 0.1 | 5.5 | 11 | Ω |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$ = -40 V, $R_L$ = 23.5 Ω, $I_D \cong$ -1.7 A, $V_{GEN}$ = -10 V, $R_g$ = 1 Ω | - | 12 | 24 | ns |
| Rise time | $t_r$ | | - | 5 | 10 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 22 | 44 | |
| Fall time | $t_f$ | | - | 13 | 26 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$ = -40 V, $R_L$ = 23.5 Ω, $I_D \cong$ -1.7 A, $V_{GEN}$ = -4.5 V, $R_g$ = 1 Ω | - | 25 | 50 | |
| Rise time | $t_r$ | | - | 20 | 40 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 22 | 44 | |
| Fall time | $t_f$ | | - | 15 | 30 | |
| **Drain-Source Body Diode Characteristics** | | | | | | |
| Continuous source-drain diode current | $I_S$ | $T_C$ = 25 °C | - | - | -2.1 | A |
| Pulse diode forward current | $I_{SM}$ | | - | - | -10 | |
| Body diode voltage | $V_{SD}$ | $I_S$ = -1.7 A, $V_{GS}$ = 0 V | - | -0.8 | -1.2 | V |
| Body diode reverse recovery time | $t_{rr}$ | $I_F$ = -4.8 A, di/dt = 100 A/µs, $T_J$ = 25 °C | - | 18 | 36 | ns |
| Body diode reverse recovery charge | $Q_{rr}$ | | - | 15 | 30 | nC |
| Reverse recovery fall time | $t_a$ | | - | 13 | - | ns |
| Reverse recovery rise time | $t_b$ | | - | 5 | - | |

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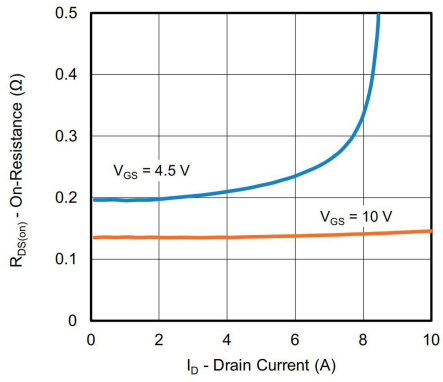
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



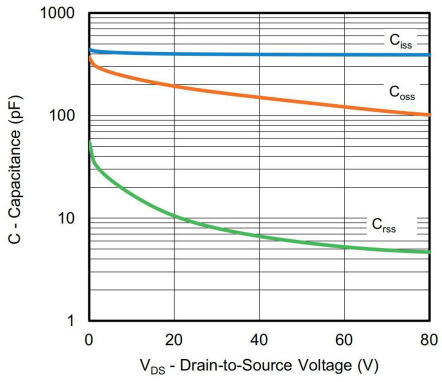

**Output Characteristics**



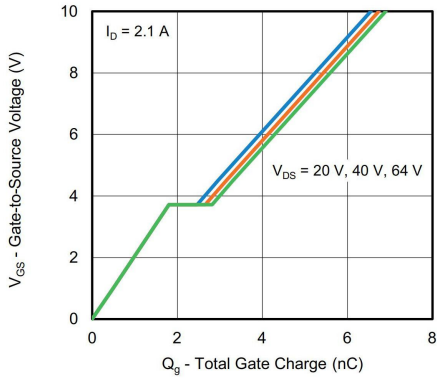

**Transfer Characteristics**



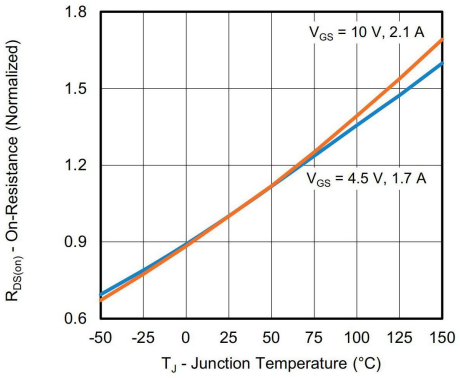

**On-Resistance vs. Drain Current and Gate Voltage**




**Capacitance**



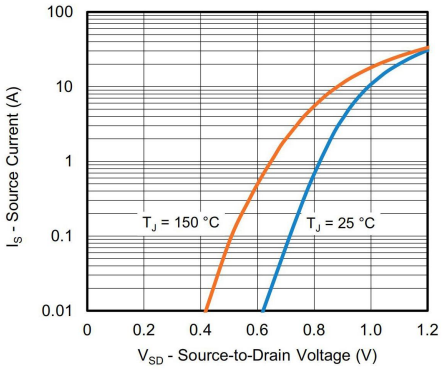

**Gate Charge**



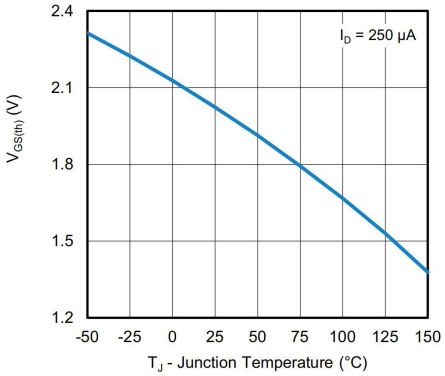

**On-Resistance vs. Junction Temperature**

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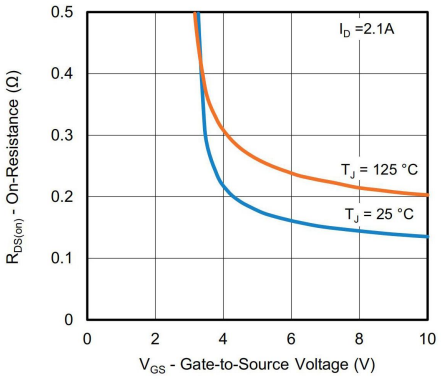
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



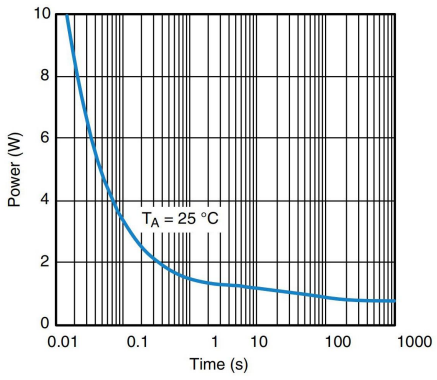

**Source-Drain Diode Forward Voltage**



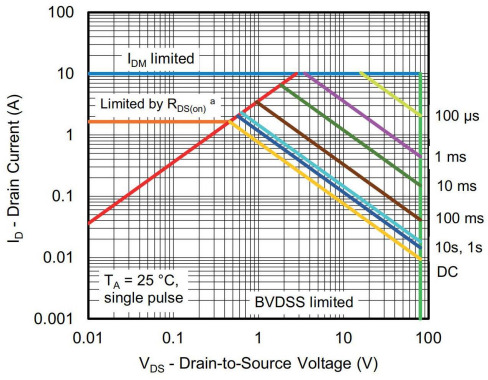

**Threshold Voltage**




**On-Resistance vs. Gate-to-Source Voltage**



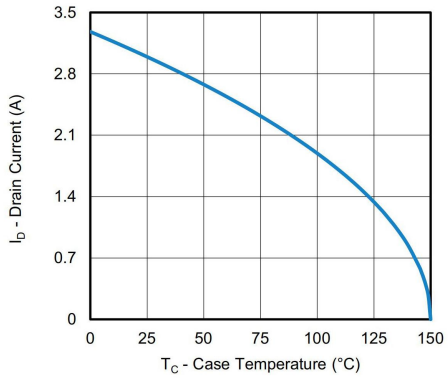

**Single Pulse Power, Junction-to-Ambient**



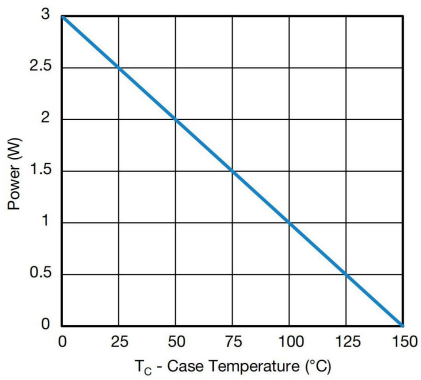

**Safe Operating Area, Junction-to-Ambient**

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

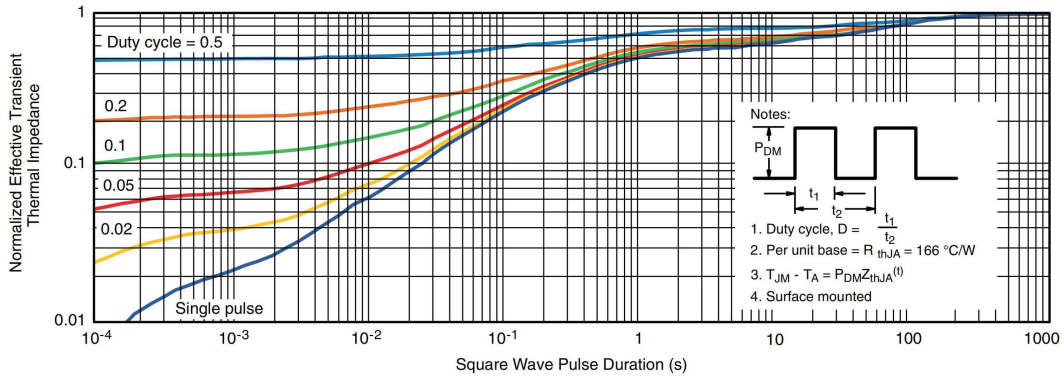



**Current Derating** [a]

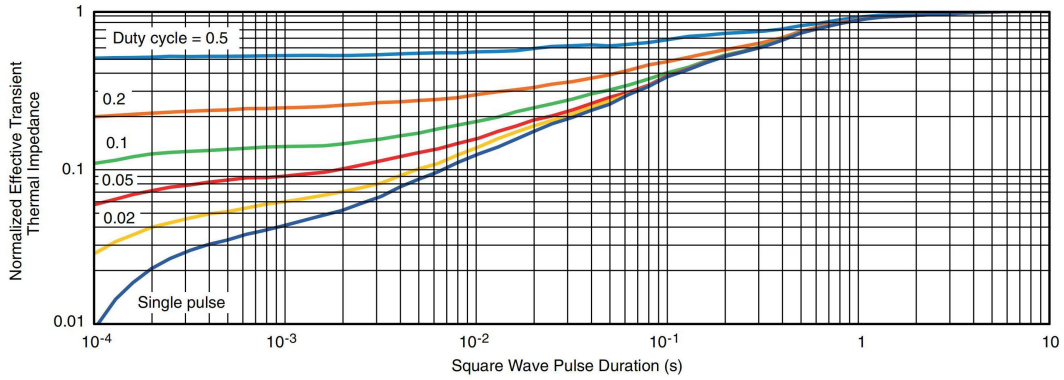



**Power, Junction-to-Case**

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




**Normalized Thermal Transient Impedance, Junction-to-Ambient**



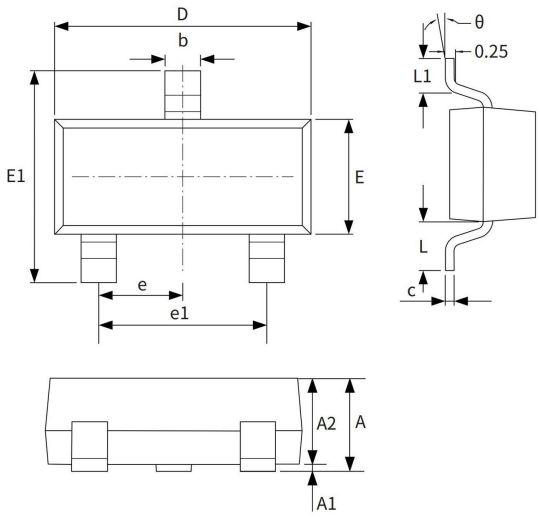

**Normalized Thermal Transient Impedance, Junction-to-Case**

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## Ordering Information

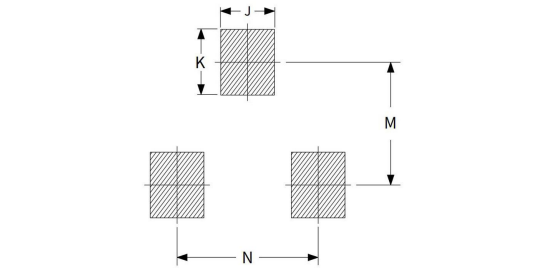
| PACKAGE | PACKAGE CODE | UNIT WEIGHT(g) | REEL(pcs) | BOX(pcs) | CARTON(pcs) | DELIVERY MODE |
|---|---|---|---|---|---|---|
| SOT-23 | R1 | 0.008 | 3000 | 30000 | 240000 | 7'' |

## Package Outline Dimensions (SOT-23)




| Symbol | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 0.90 | 1.15 | 0.035 | 0.045 |
| A1 | - | 0.10 | - | 0.004 |
| A2 | 0.90 | 1.05 | 0.035 | 0.041 |
| b | 0.30 | 0.50 | 0.012 | 0.020 |
| c | 0.10 | 0.20 | 0.004 | 0.008 |
| D | 2.80 | 3.00 | 0.110 | 0.118 |
| E | 1.20 | 1.40 | 0.047 | 0.055 |
| E1 | 2.25 | 2.55 | 0.089 | 0.100 |
| e | 0.950TYP | | 0.037TYP | |
| e1 | 1.80 | 2.00 | 0.071 | 0.079 |
| L | 0.550REF | | 0.022REF | |
| L1 | 0.30 | 0.50 | 0.012 | 0.020 |
| θ | - | 8° | - | 8° |

## Suggested Pad Layout




| Symbol | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| J | 0.75 | 0.85 | 0.030 | 0.033 |
| K | 0.85 | 0.95 | 0.033 | 0.037 |
| M | 1.95 | 2.05 | 0.077 | 0.081 |
| N | 1.85 | 1.95 | 0.073 | 0.077 |