

N- and P- Channel 20 V (D-S) MOSFET

| PRODUCT SUMMARY | | | |
|-----------------|---------------------|------------------------------------|--------------------|
| | V _{DS} (V) | R _{DS(on)} (Ω) | I _D (A) |
| N-Channel | 20 | 0.090 at V _{GS} = 4.5 V | 3.28 |
| | | 0.110 at V _{GS} = 2.5 V | 2.13 |
| | | 0.130 at V _{GS} = 1.8 V | 1.50 |
| P-Channel | - 20 | 0.155 at V _{GS} = - 4.5 V | - 2.80 |
| | | 0.190 at V _{GS} = - 2.5 V | - 1.81 |
| | | 0.220 at V _{GS} = - 1.8 V | - 1.15 |

FEATURES

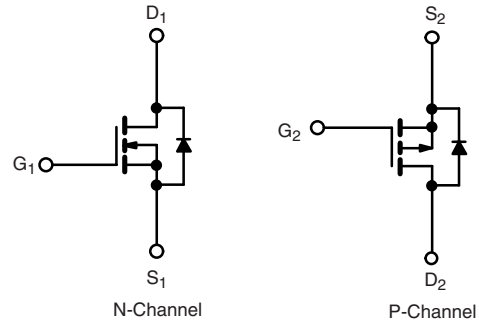
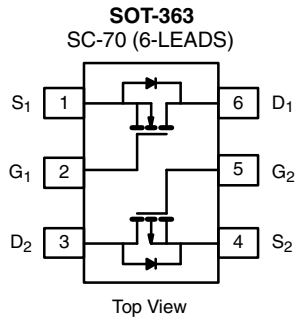
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFETs: 1.8 V Rated
- Thermally Enhanced SC-70 Package
- Fast Switching
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Load Switch for Portable Devices



| ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted | | | | | | | |
|---|-----------------------------------|------------------------|--------------|-----------|--------------|--------|---|
| Parameter | Symbol | N-Channel | | P-Channel | | Unit | |
| | | 5 s | Steady State | 5 s | Steady State | | |
| Drain-Source Voltage | V _{DS} | 20 | | - 20 | | V | |
| Gate-Source Voltage | V _{GS} | ± 20 | | ± 20 | | V | |
| Continuous Drain Current (T _J = 150 °C) ^a | I _D | T _A = 25 °C | 3.28 | 3.03 | - 2.80 | - 2.58 | A |
| | | T _A = 85 °C | 2.12 | 1.81 | - 1.72 | - 1.53 | |
| Pulsed Drain Current | I _{DM} | | 9.5 | | - 8.5 | A | |
| Continuous Source Current (Diode Conduction) ^a | I _S | 2.61 | 2.48 | - 1.61 | -1.48 | A | |
| Maximum Power Dissipation ^a | P _D | T _A = 25 °C | 1.24 | 1.17 | 1.10 | 0.97 | W |
| | | T _A = 85 °C | 0.88 | 0.75 | 0.66 | 0.5 | |
| 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 ^a | t ≤ 5 s | R _{thJA} | 130 | 170 | °C/W |
| | Steady State | | 170 | 220 | |
| Maximum Junction-to-Foot (Drain) | Steady State | R _{thJF} | 80 | 100 | |

Notes:

a. Surface mounted on 1" x 1" FR4 board.

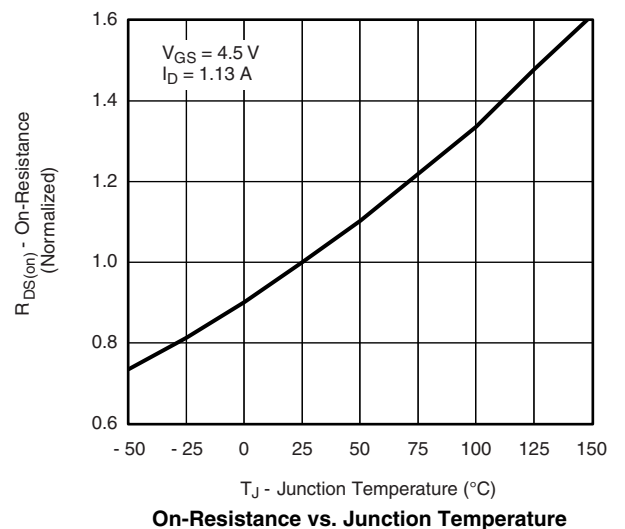
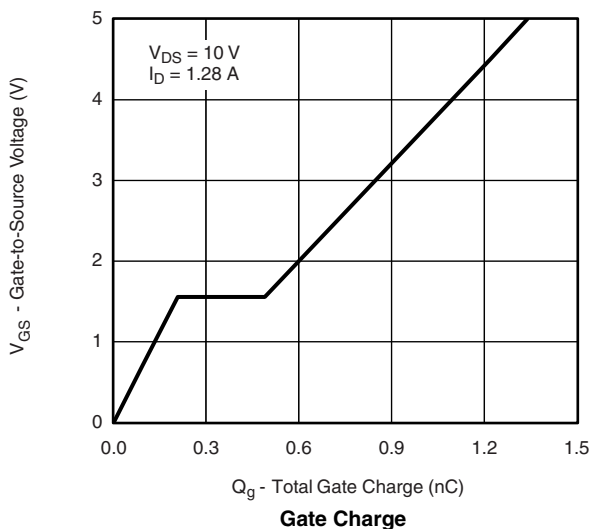
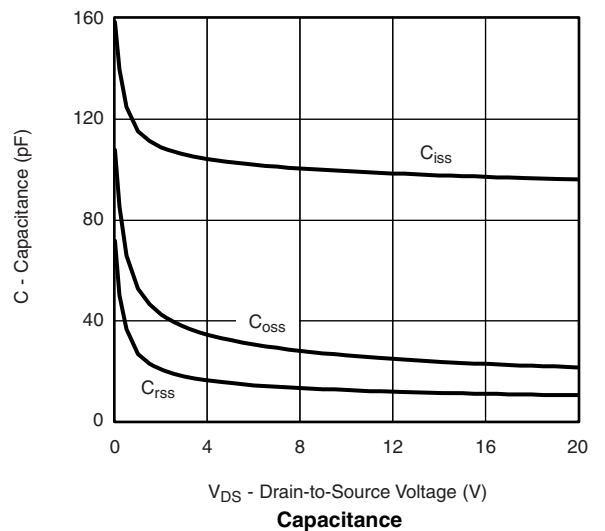
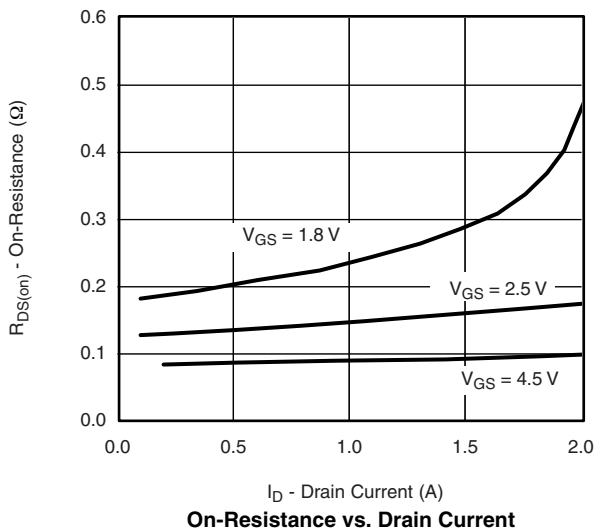
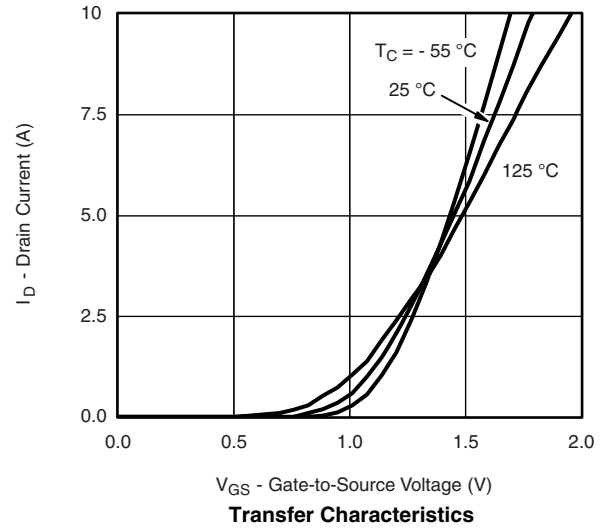
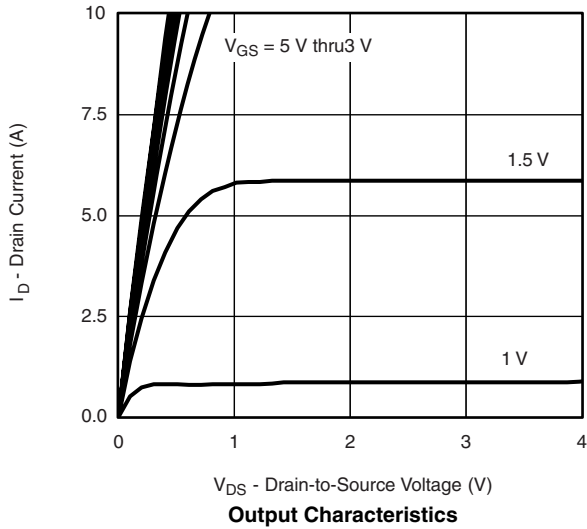
| SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted | | | | | | | | |
|--|--------------|---|---|-------|------------------------|---------------|----|----|
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit | | |
| Static | | | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 100\text{ }\mu\text{A}$ | N-Ch | 0.45 | 1 | V | | |
| | | $V_{DS} = V_{GS}, I_D = -100\text{ }\mu\text{A}$ | P-Ch | -0.45 | 1 | | | |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$ | N-Ch P-Ch | | ± 100 ± 100 | nA | | |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}$ | N-Ch | | 1 | μA | | |
| | | $V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$ | P-Ch | | -1 | | | |
| | | $V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$ | N-Ch | | 5 | | | |
| | | $V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$ | P-Ch | | -5 | | | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} \geq 5\text{ V}, V_{GS} = 4.5\text{ V}$ | N-Ch | 2 | | A | | |
| | | $V_{DS} \leq -5\text{ V}, V_{GS} = -4.5\text{ V}$ | P-Ch | -2 | | | | |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = 4.5\text{ V}, I_D = 2.55\text{ A}$ | N-Ch | | 0.090 | Ω | | |
| | | $V_{GS} = -4.5\text{ V}, I_D = -1.85\text{ A}$ | P-Ch | | 0.155 | | | |
| | | $V_{GS} = 2.5\text{ V}, I_D = 1.55\text{ A}$ | N-Ch | | 0.110 | | | |
| | | $V_{GS} = -2.5\text{ V}, I_D = -1.35\text{ A}$ | P-Ch | | 0.190 | | | |
| | | $V_{GS} = 1.8\text{ V}, I_D = 0.50\text{ A}$ | N-Ch | | 0.130 | | | |
| | | $V_{GS} = -1.8\text{ V}, I_D = -0.50\text{ A}$ | P-Ch | | 0.220 | | | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 10\text{ V}, I_D = 1.13\text{ A}$ | N-Ch | | 2.6 | S | | |
| | | $V_{DS} = -10\text{ V}, I_D = -0.88\text{ A}$ | P-Ch | | 1.5 | | | |
| Diode Forward Voltage ^a | V_{SD} | $I_S = 0.48\text{ A}, V_{GS} = 0\text{ V}$ | N-Ch | | 0.8 | V | | |
| | | $I_S = -0.48\text{ A}, V_{GS} = 0\text{ V}$ | P-Ch | | -0.8 | | | |
| Dynamic^b | | | | | | | | |
| Total Gate Charge | Q_g | N-Channel $V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 2.55\text{ A}$ P-Channel $V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -0.88\text{ A}$ | N-Ch | | 1.25 | 2 | nC | |
| | | | P-Ch | | 1.2 | 1.8 | | |
| Gate-Source Charge | Q_{gs} | | N-Ch | | 0.21 | | | |
| | | | P-Ch | | 0.3 | | | |
| Gate-Drain Charge | Q_{gd} | | N-Ch | | 0.3 | | | |
| | | | P-Ch | | 0.21 | | | |
| Turn-On Delay Time | $t_{d(on)}$ | N-Channel $V_{DD} = 10\text{ V}, R_L = 20\text{ }\Omega$ $I_D \cong 0.5\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 6\text{ }\Omega$ P-Channel $V_{DD} = -10\text{ V}, R_L = 20\text{ }\Omega$ $I_D \cong -0.5\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 6\text{ }\Omega$ | N-Ch | | 15 | 25 | ns | |
| | | | P-Ch | | 18 | 30 | | |
| Rise Time | t_r | | N-Ch | | 22 | 35 | | |
| | | | P-Ch | | 25 | 40 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | N-Ch | | 25 | 40 | | |
| | | | P-Ch | | 15 | 25 | | |
| Fall Time | t_f | | N-Ch | | 12 | 20 | | |
| | | | P-Ch | | 12 | 20 | | |
| Reverse Recovery Time | t_{rr} | | $I_F = 0.48\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ | N-Ch | | 30 | | 60 |
| | | | | P-Ch | | 30 | | 60 |

Notes:

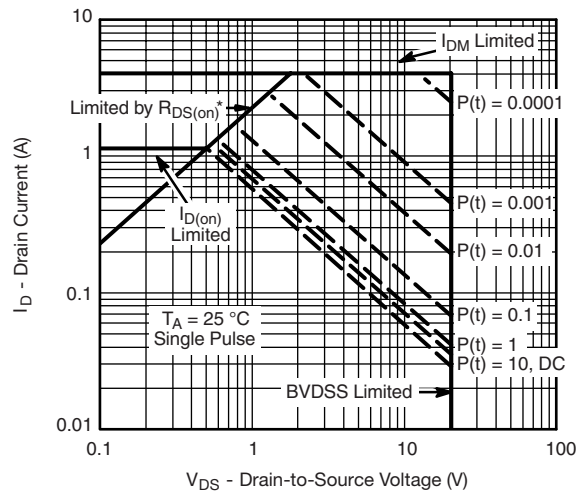
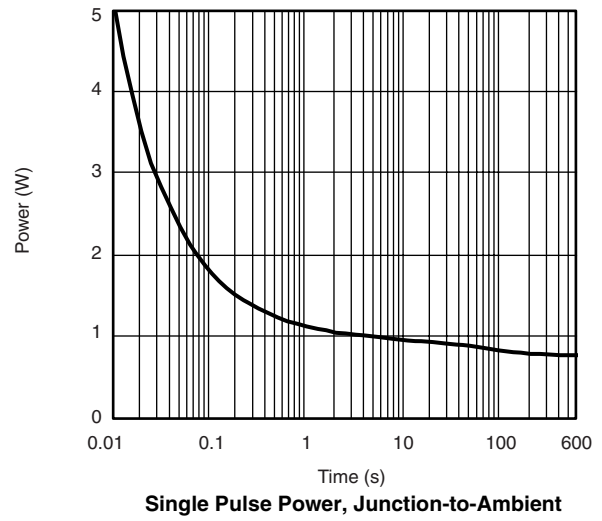
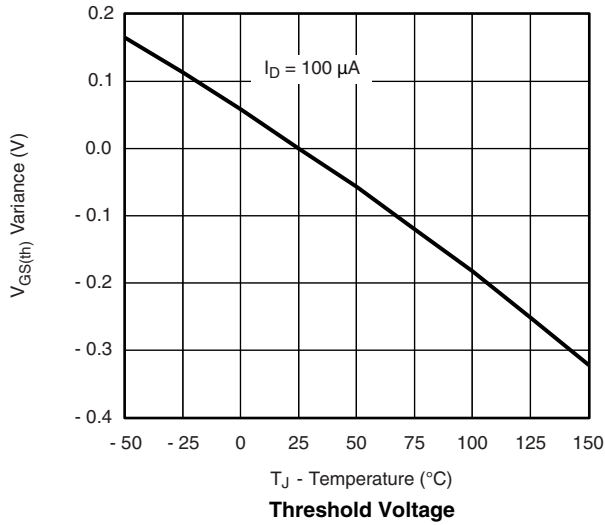
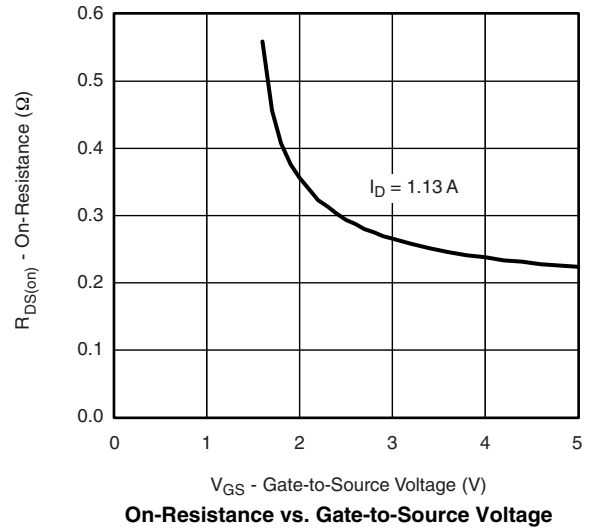
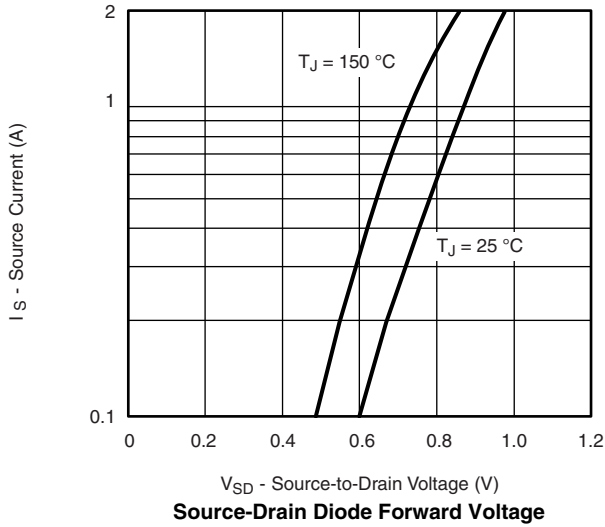
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

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.

N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

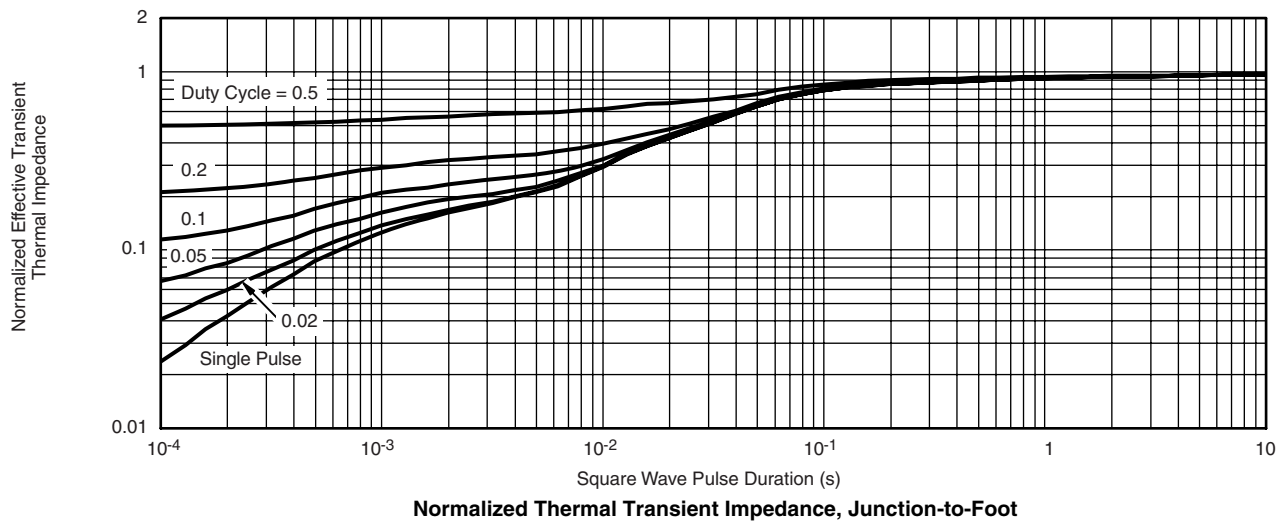
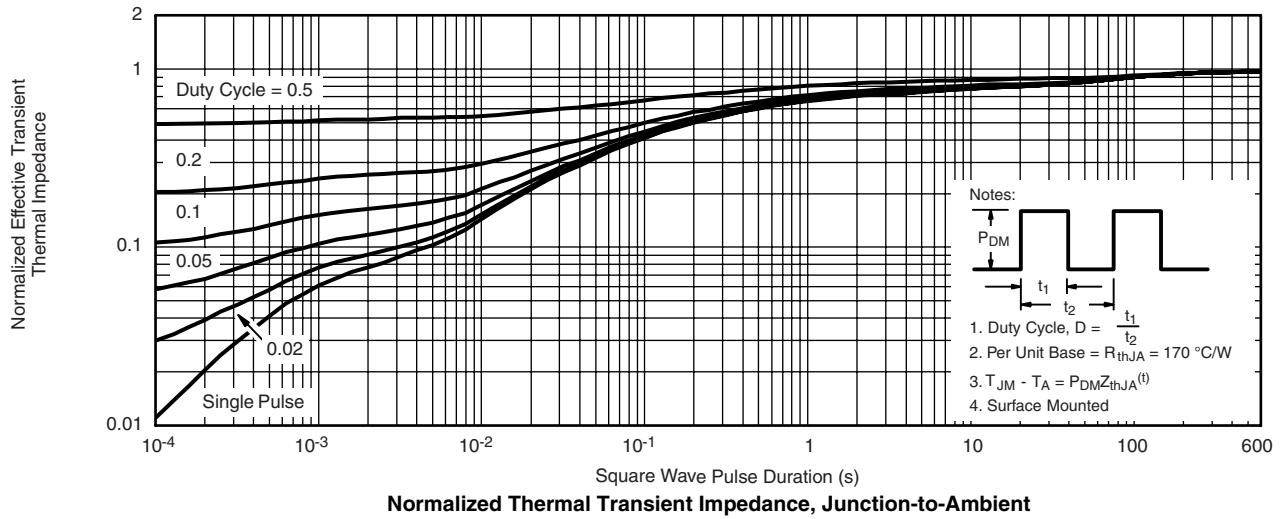


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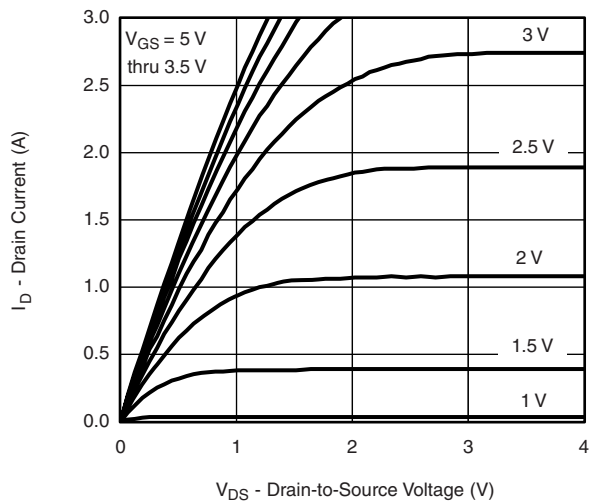


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified
Safe Operating Area, Junction-to-Ambient

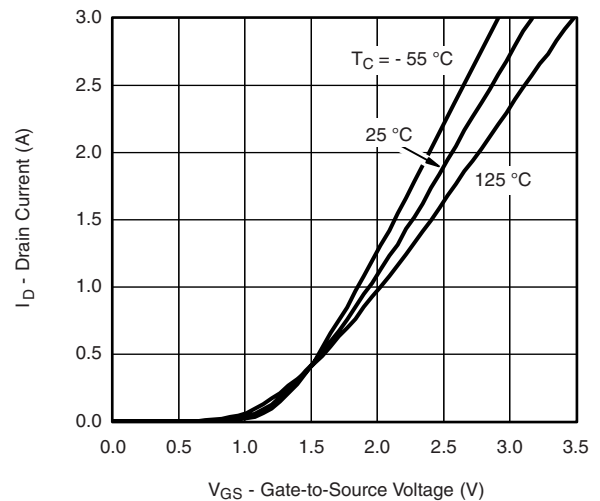
N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



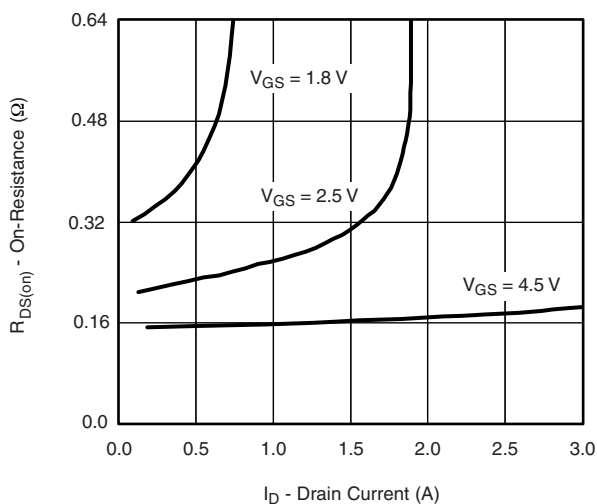
P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



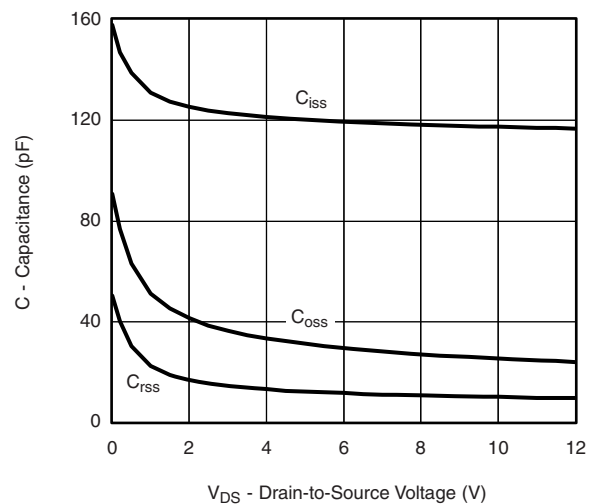
V_{DS} - Drain-to-Source Voltage (V)
Output Characteristics



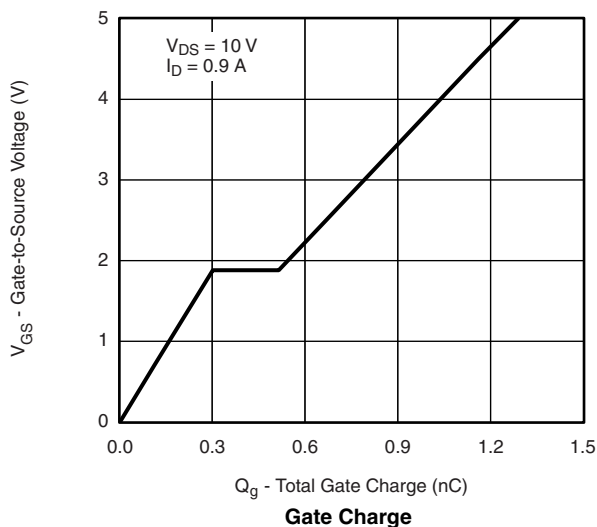
V_{GS} - Gate-to-Source Voltage (V)
Transfer Characteristics



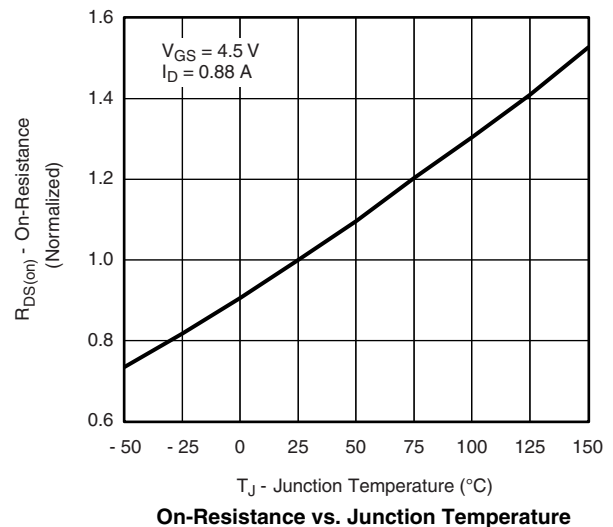
On-Resistance vs. Drain Current



Capacitance

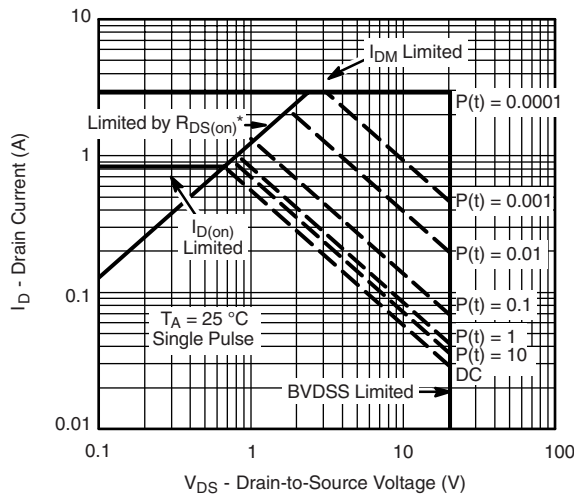
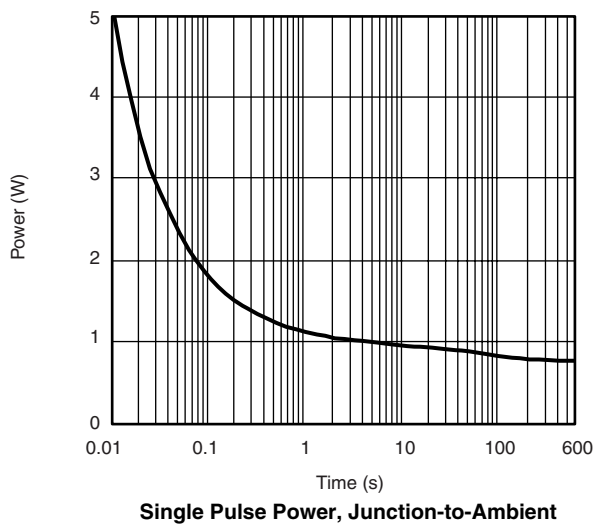
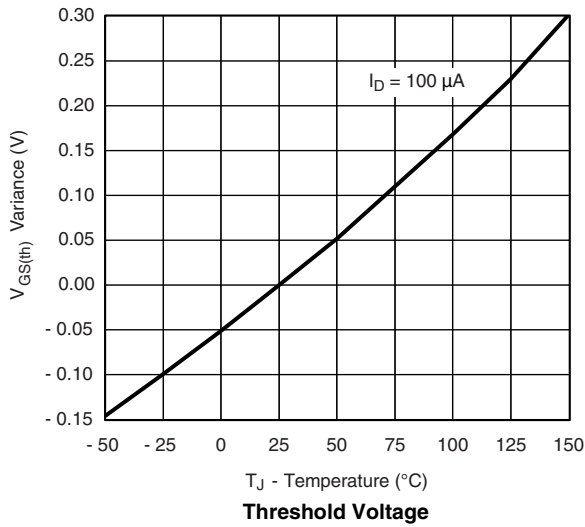
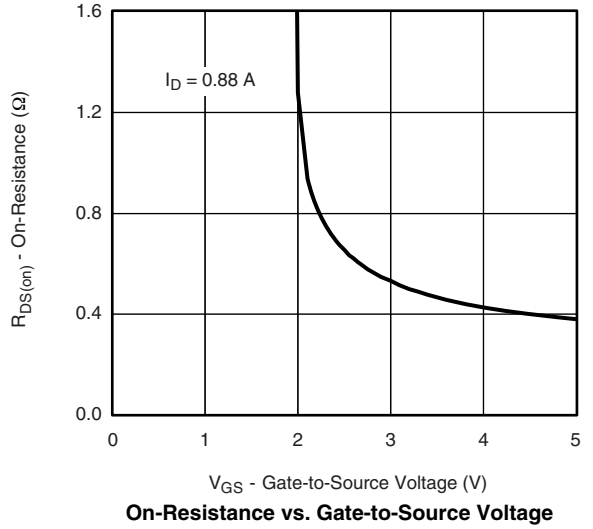
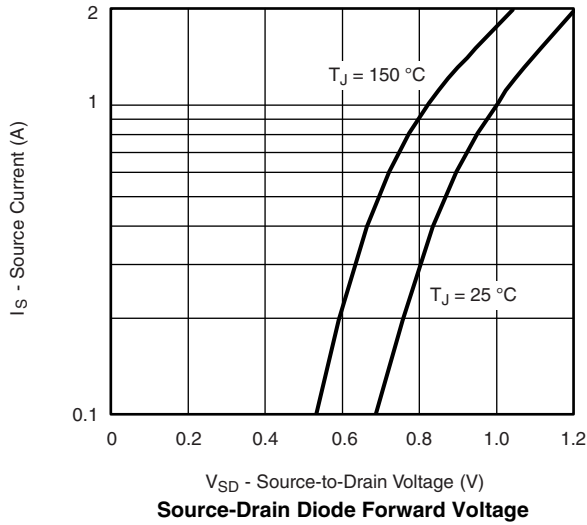


Gate Charge



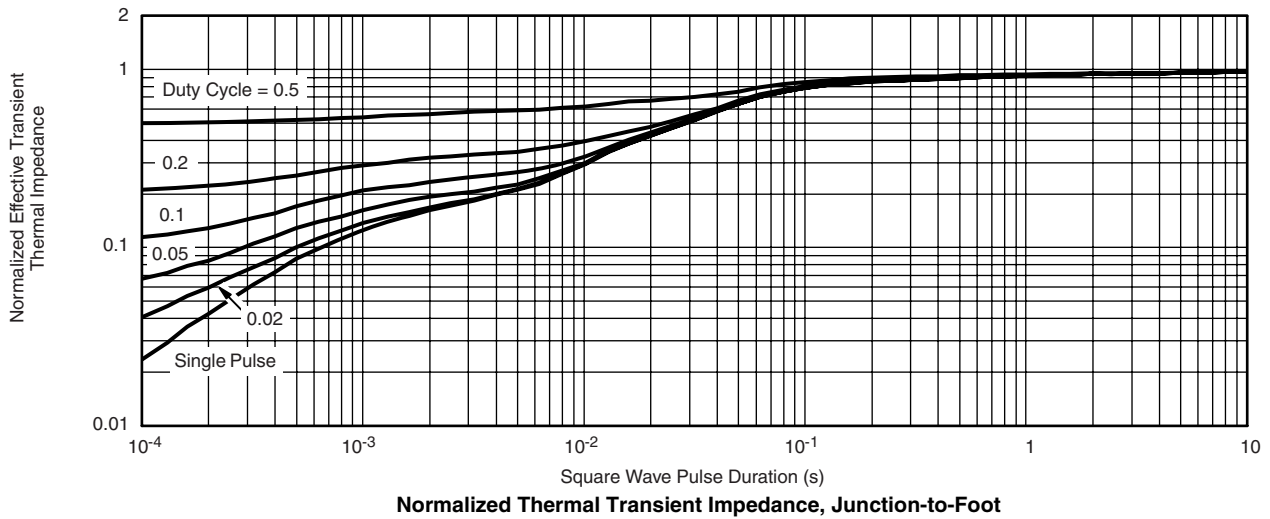
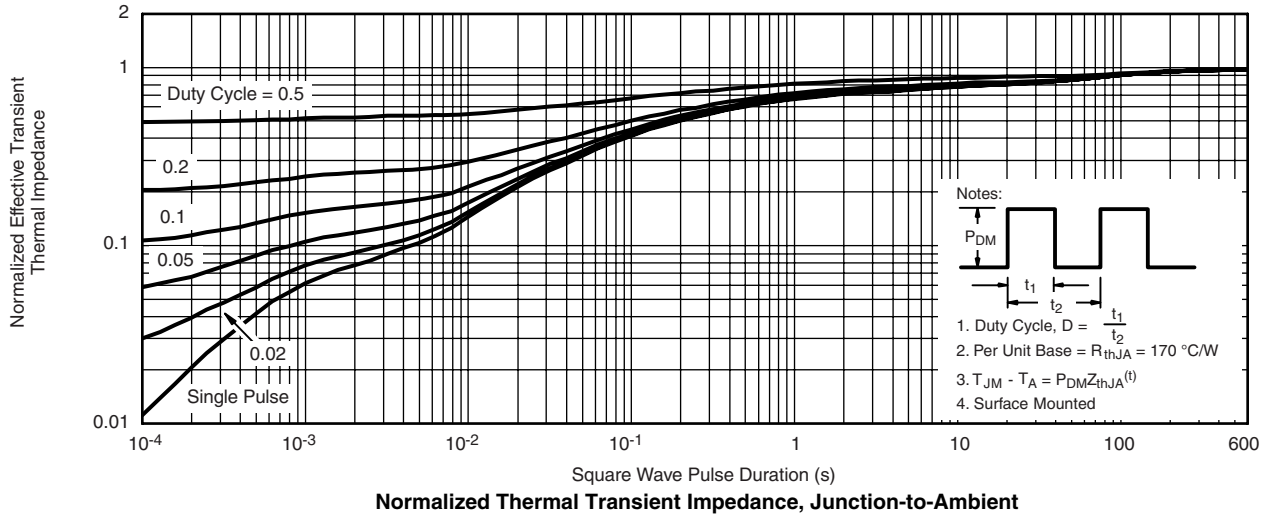
On-Resistance vs. Junction Temperature

P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

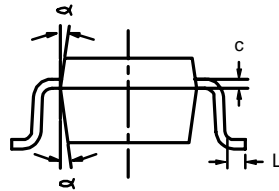
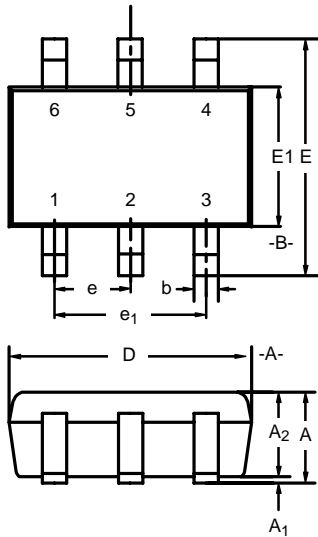


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



SC-70: 6-LEADS



| Dim | MILLIMETERS | | | INCHES | | |
|----------------|-------------|------|------|----------|-------|-------|
| | Min | Nom | Max | Min | Nom | Max |
| A | 0.90 | - | 1.10 | 0.035 | - | 0.043 |
| A ₁ | - | - | 0.10 | - | - | 0.004 |
| A ₂ | 0.80 | - | 1.00 | 0.031 | - | 0.039 |
| b | 0.15 | - | 0.30 | 0.006 | - | 0.012 |
| c | 0.10 | - | 0.25 | 0.004 | - | 0.010 |
| D | 1.80 | 2.00 | 2.20 | 0.071 | 0.079 | 0.087 |
| E | 1.80 | 2.10 | 2.40 | 0.071 | 0.083 | 0.094 |
| E ₁ | 1.15 | 1.25 | 1.35 | 0.045 | 0.049 | 0.053 |
| e | 0.65BSC | | | 0.026BSC | | |
| e ₁ | 1.20 | 1.30 | 1.40 | 0.047 | 0.051 | 0.055 |
| L | 0.10 | 0.20 | 0.30 | 0.004 | 0.008 | 0.012 |
| α | 7°Nom | | | 7°Nom | | |

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