

Complementary 20 V (D-S) Low-Threshold MOSFET

| PRODUCT SUMMARY | | | |
|-----------------|---------------------|------------------------------------|--------------------|
| | V _{DS} (V) | R _{DS(on)} (Ω) | I _D (A) |
| N-Channel | 20 | 0.280 at V _{GS} = 4.5 V | 1.28 |
| | | 0.360 at V _{GS} = 2.5 V | 1.13 |
| | | 0.450 at V _{GS} = 1.8 V | 1 |
| P-Channel | - 20 | 0.490 at V _{GS} = - 4.5 V | - 1 |
| | | 0.750 at V _{GS} = - 2.5 V | - 0.81 |
| | | 1.10 at V _{GS} = - 1.8 V | - 0.67 |

FEATURES

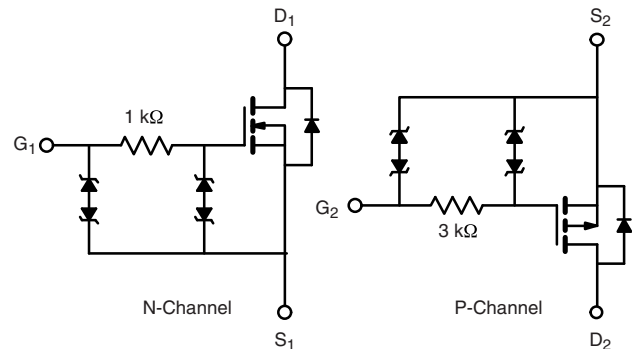
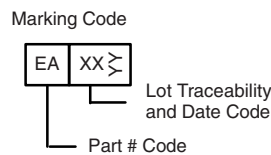
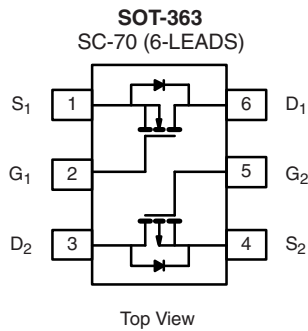
- TrenchFET® Power MOSFETS: 1.8 V Rated
- ESD Protected: 2000 V
- Thermally Enhanced SC-70 Package
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Load Switching
- PA Switch
- Level Switch



Ordering Information: Si1563EDH-T1-E3 (Lead (Pb)-free)
Si1563EDH-T1-GE3 (Lead (Pb)-free and Halogen-free)

| 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} | ± 12 | | ± 12 | | | |
| Continuous Drain Current (T _J = 150 °C) | I _D | T _A = 25 °C | 1.28 | 1.13 | - 1 | - 0.88 | A |
| | | T _A = 85 °C | 0.92 | 0.81 | - 0.72 | - 0.63 | |
| Pulsed Drain Current | I _{DM} | 4 | | - 3 | | | |
| Continuous Source Current (Diode Conduction) ^a | I _S | 0.61 | 0.48 | - 0.61 | - 0.48 | W | |
| Maximum Power Dissipation ^a | P _D | T _A = 25 °C | 0.74 | 0.57 | 0.30 | | 0.57 |
| | | T _A = 85 °C | 0.38 | 0.30 | 0.16 | 0.3 | |
| 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.

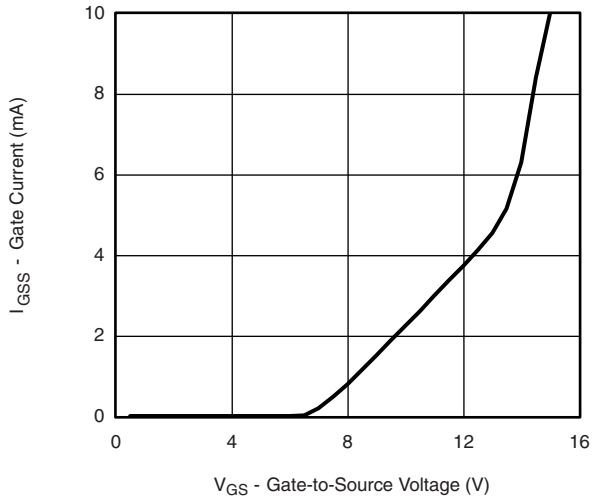
| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | | | |
|---|--------------|---|------|-------|-------|----------|---------------|
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit | |
| Static | | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 100\text{ }\mu\text{A}$ | 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} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$ | N-Ch | | | ± 1 | μA |
| | | | P-Ch | | | ± 1 | |
| | | $V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$ | N-Ch | | | ± 10 | mA |
| | | | P-Ch | | | ± 10 | |
| 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 | $R_{DS(on)}$ | $V_{GS} = 4.5\text{ V}, I_D = 1.13\text{ A}$ | N-Ch | | 0.220 | 0.280 | Ω |
| | | $V_{GS} = -4.5\text{ V}, I_D = -0.88\text{ A}$ | P-Ch | | 0.400 | 0.490 | |
| | | $V_{GS} = 2.5\text{ V}, I_D = 0.99\text{ A}$ | N-Ch | | 0.281 | 0.360 | |
| | | $V_{GS} = -2.5\text{ V}, I_D = -0.71\text{ A}$ | P-Ch | | 0.610 | 0.750 | |
| | | $V_{GS} = 1.8\text{ V}, I_D = 0.20\text{ A}$ | N-Ch | | 0.344 | 0.450 | |
| | | $V_{GS} = -1.8\text{ V}, I_D = -0.20\text{ A}$ | P-Ch | | 0.850 | 1.10 | |
| 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} | $I_S = 0.48\text{ V}, V_{GS} = 0\text{ V}$ | N-Ch | | 0.8 | 1.2 | V |
| | | $I_S = -0.48\text{ V}, V_{GS} = 0\text{ V}$ | P-Ch | | -0.8 | -1.2 | |
| Dynamic^b | | | | | | | |
| Total Gate Charge | Q_g | N-Channel $V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 1.13\text{ A}$ P-Channel $V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -0.88\text{ A}$ | N-Ch | | 0.65 | 1 | nC |
| | | | P-Ch | | 1.2 | 1.8 | |
| Gate-Source Charge | Q_{gs} | | N-Ch | | 0.2 | | |
| | | | P-Ch | | 0.3 | | |
| Gate-Drain Charge | Q_{gd} | | N-Ch | | 0.23 | | |
| | | | P-Ch | | 0.3 | | |
| 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 | | 45 | 70 | ns |
| | | | P-Ch | | 150 | 230 | |
| Rise Time | t_r | | N-Ch | | 85 | 130 | |
| | | | P-Ch | | 480 | 720 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | N-Ch | | 350 | 530 | |
| | | | P-Ch | | 840 | 1200 | |
| Fall Time | t_f | N-Ch | | 210 | 320 | | |
| | | P-Ch | | 850 | 1200 | | |

Notes:

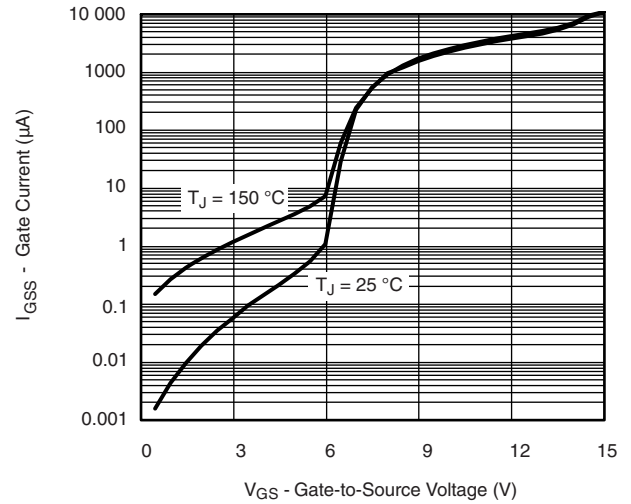
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

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.

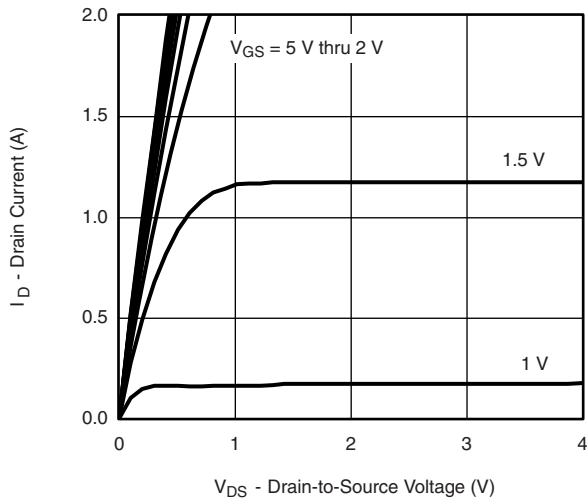
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



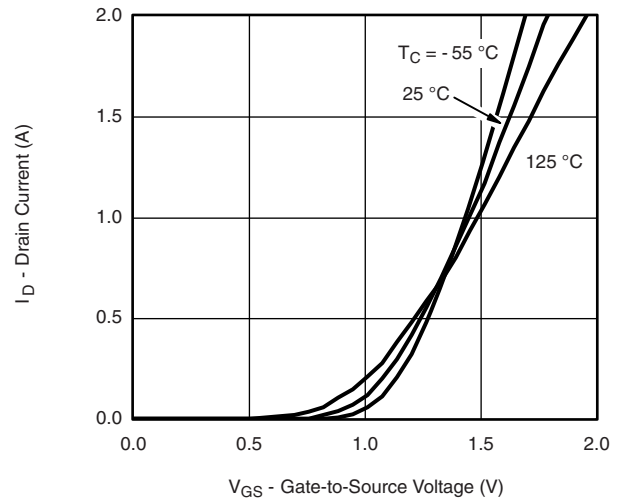
Gate-Current vs. Gate-Source Voltage



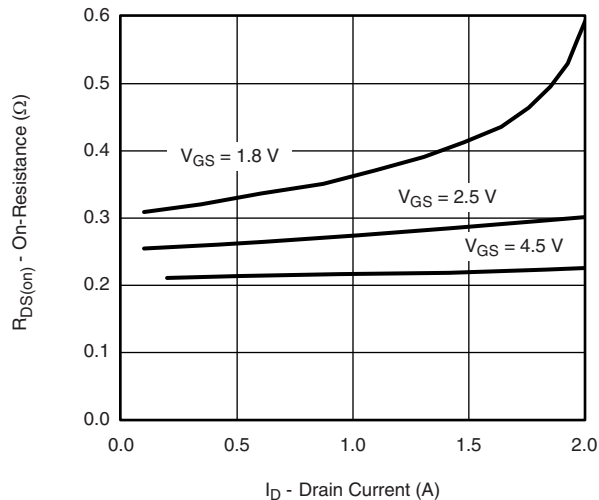
Gate-Current vs. Gate-Source Voltage



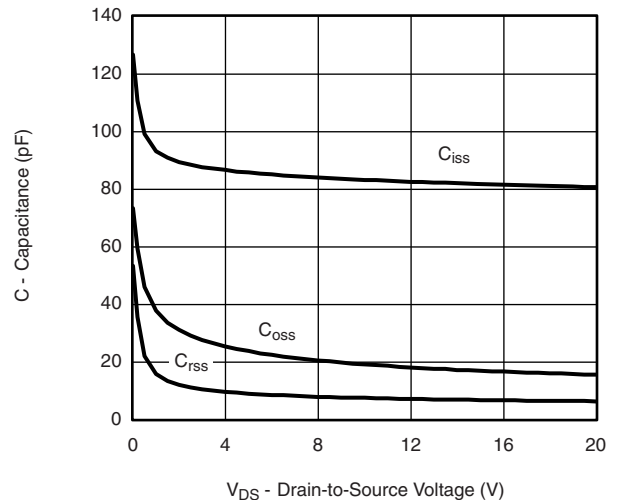
Output Characteristics



Transfer Characteristics

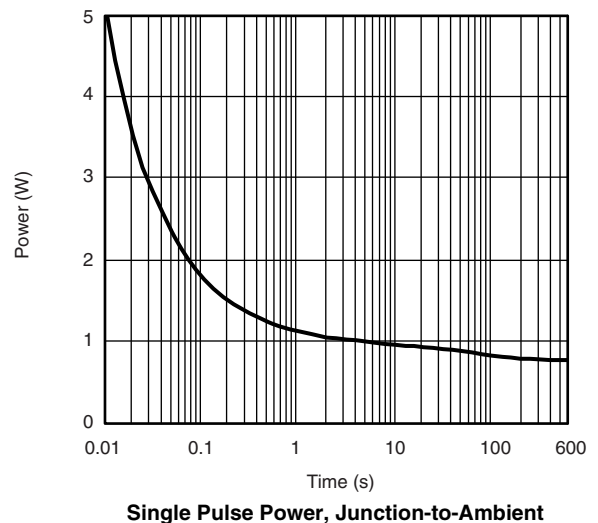
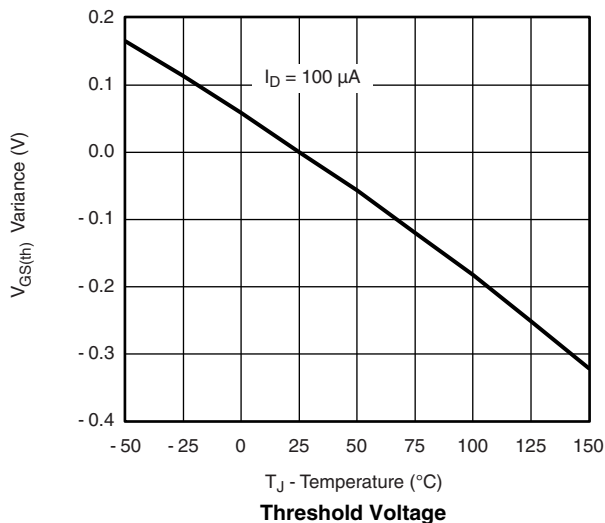
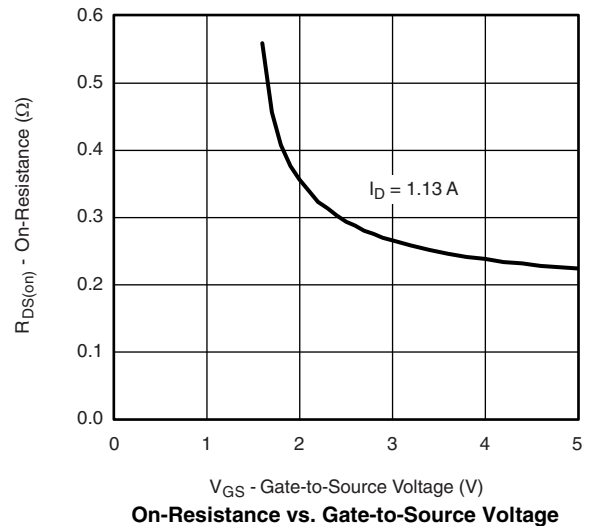
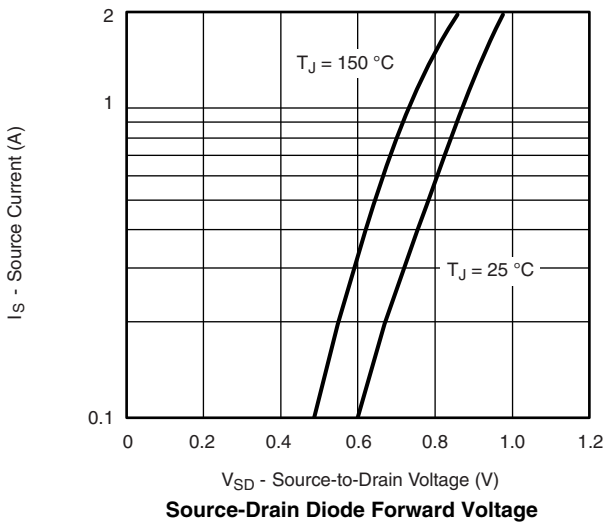
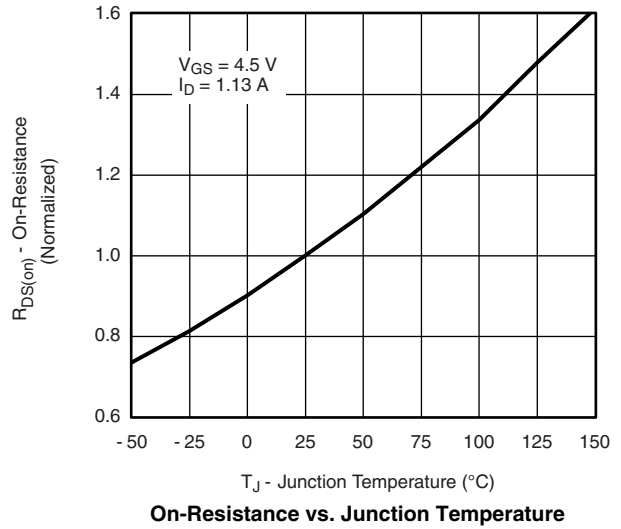
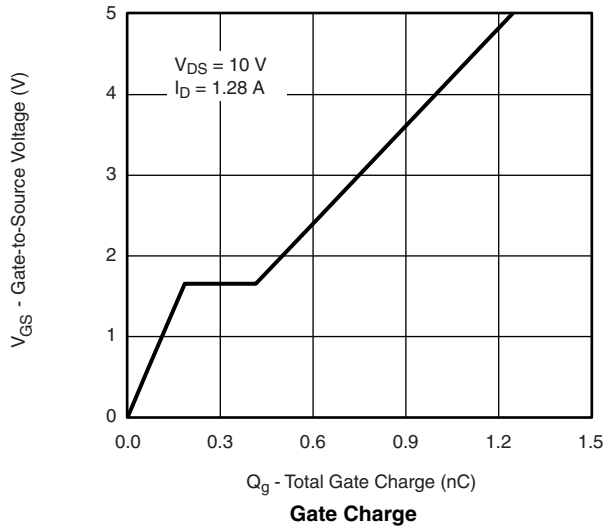


On-Resistance vs. Drain Current

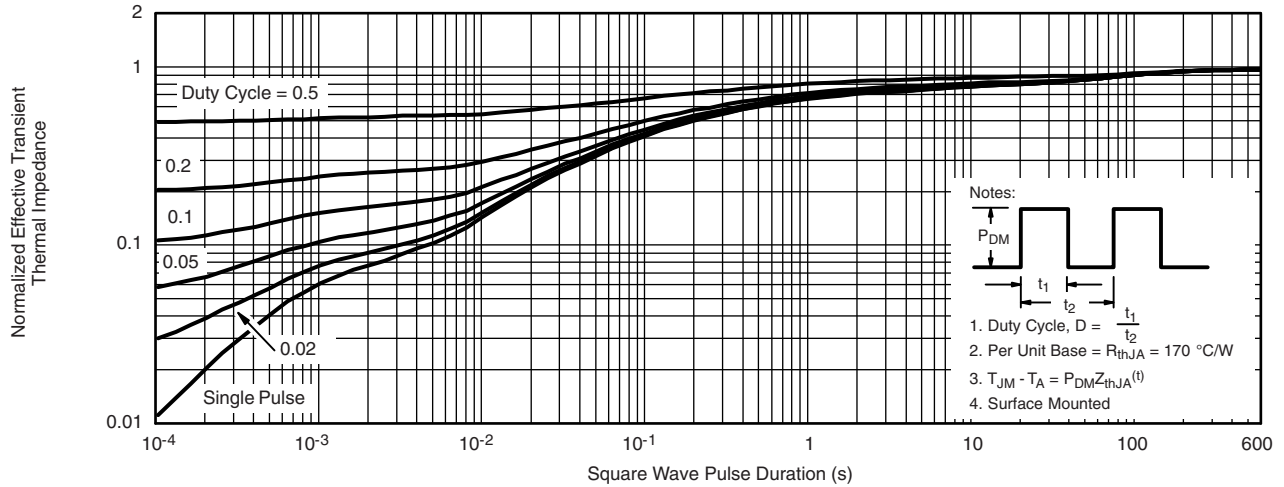


Capacitance

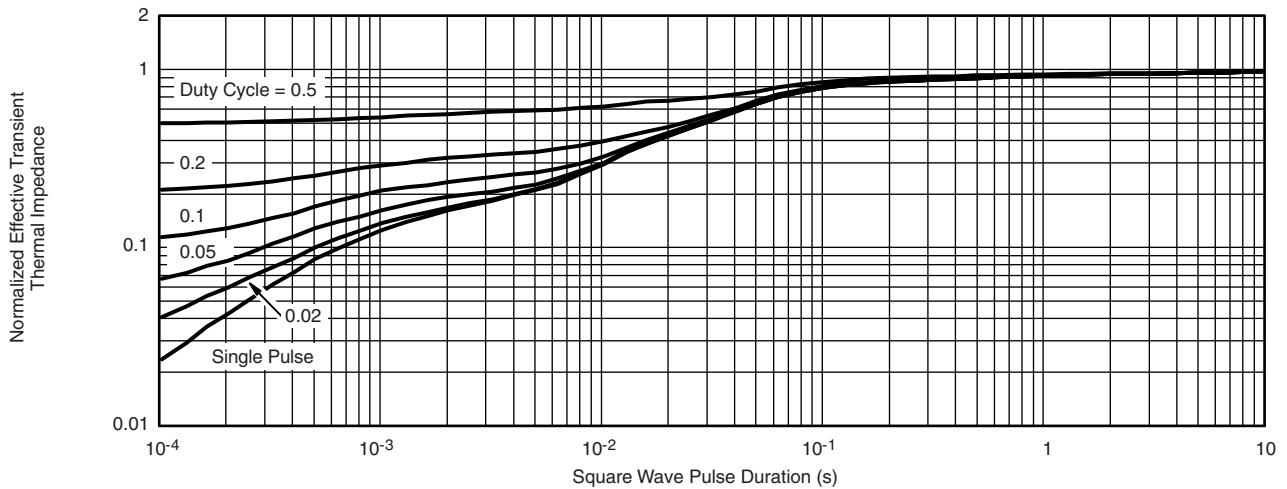
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



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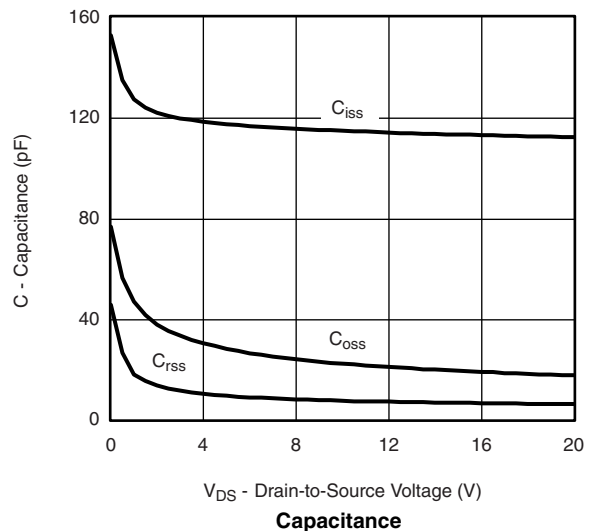
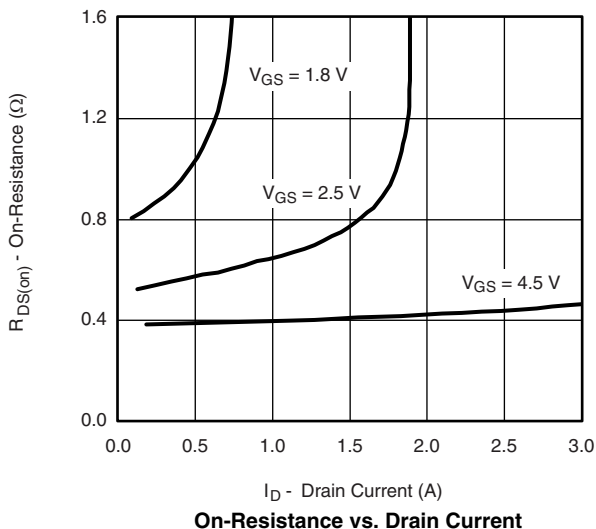
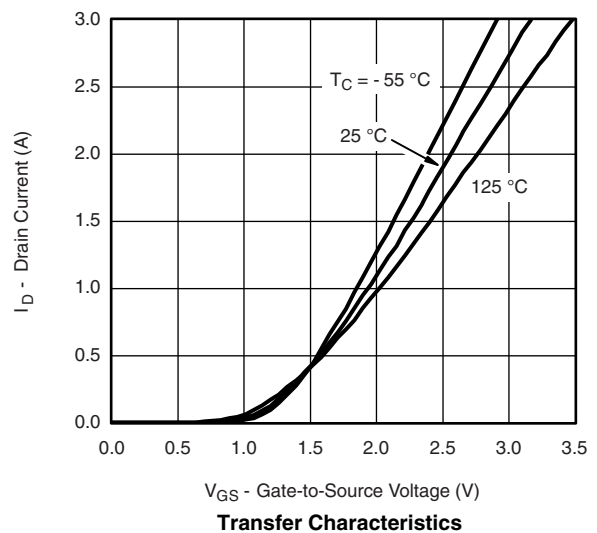
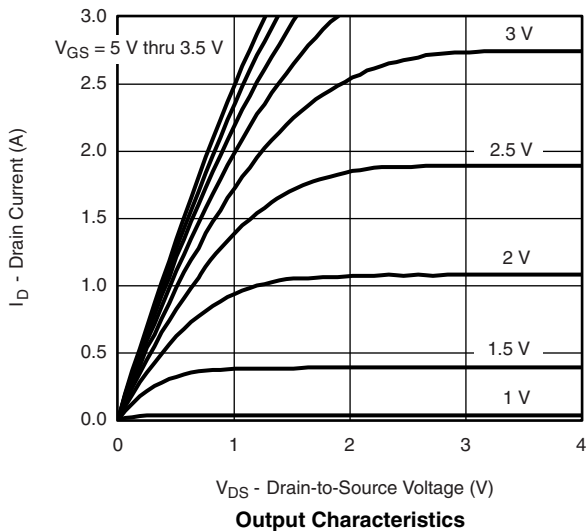
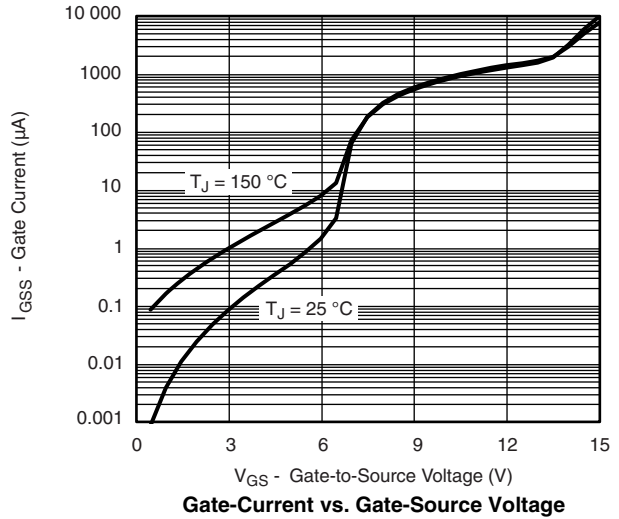
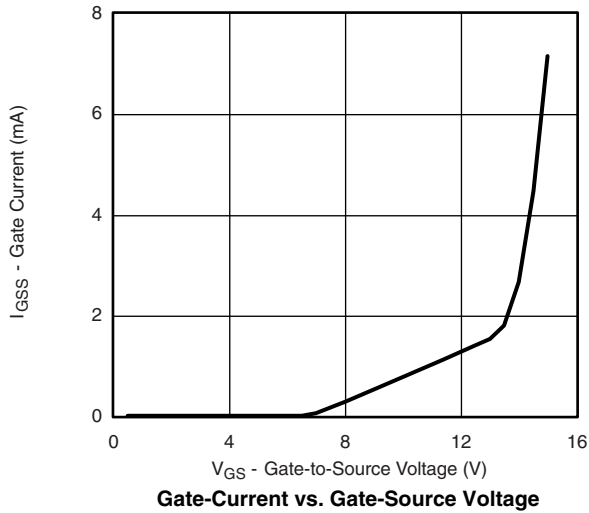


Normalized Thermal Transient Impedance, Junction-to-Ambient

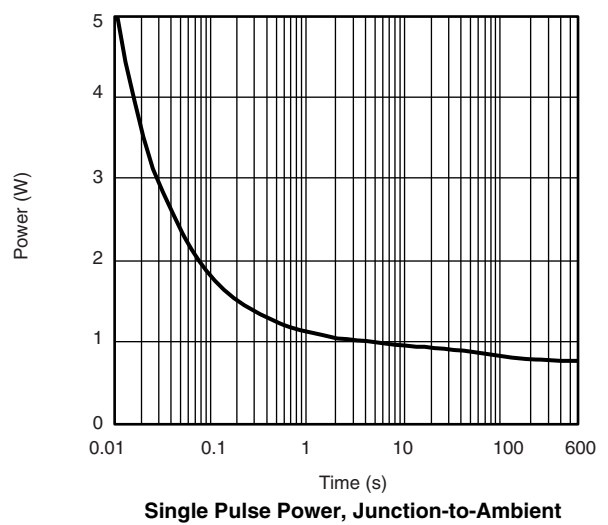
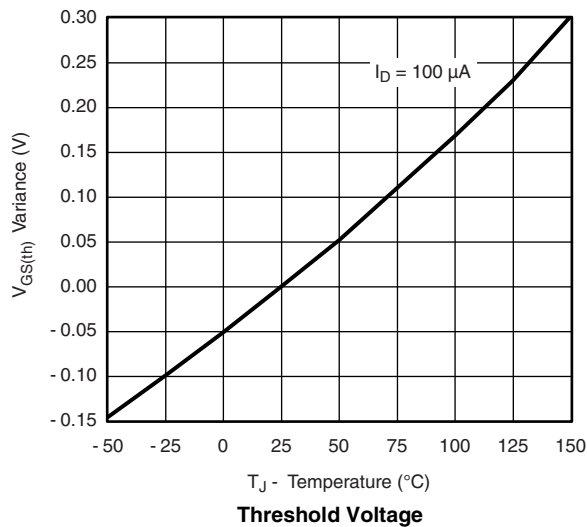
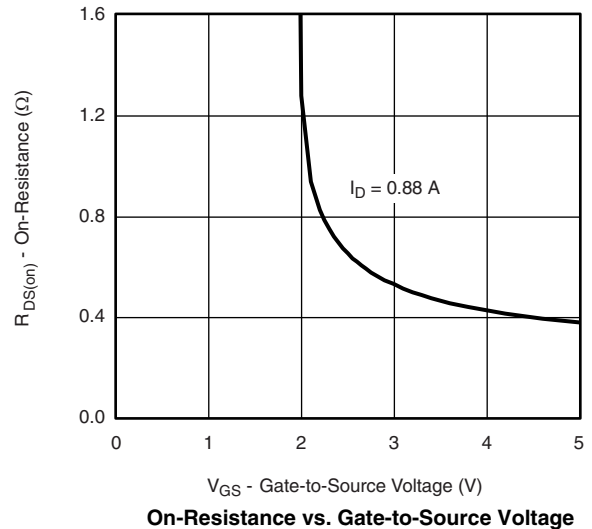
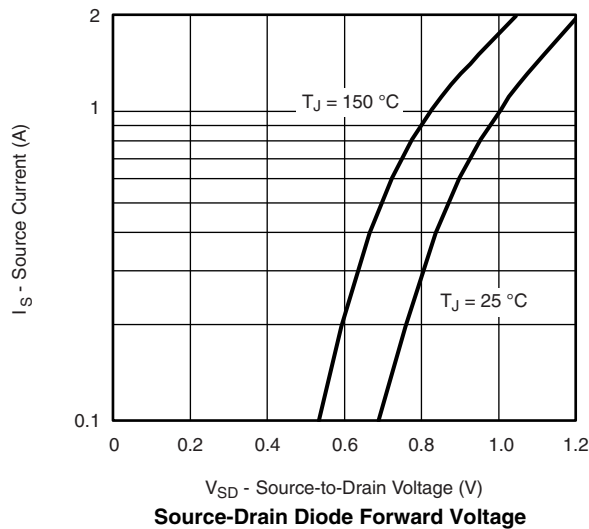
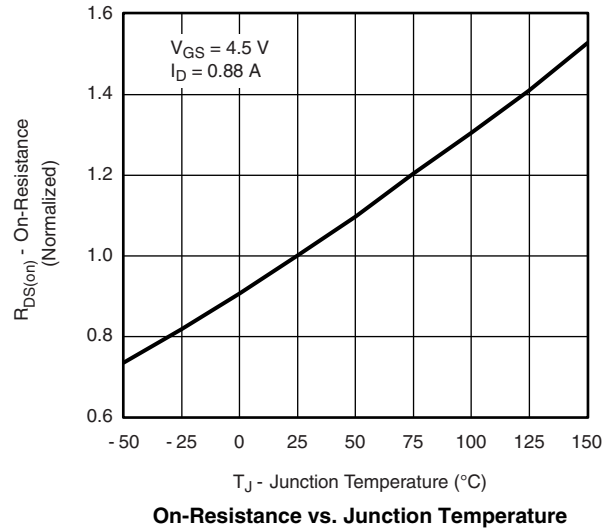
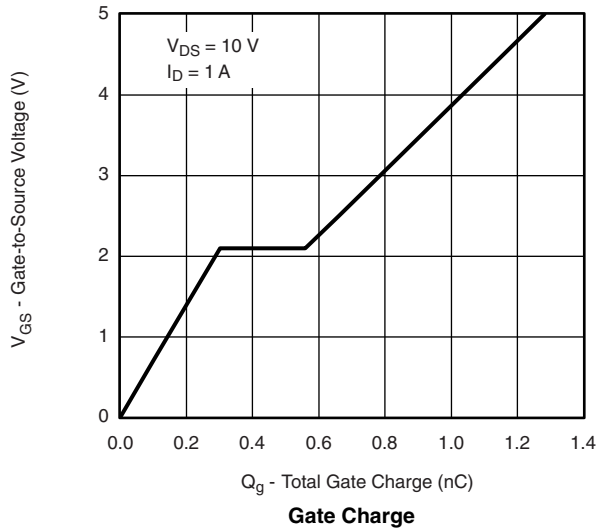


Normalized Thermal Transient Impedance, Junction-to-Foot

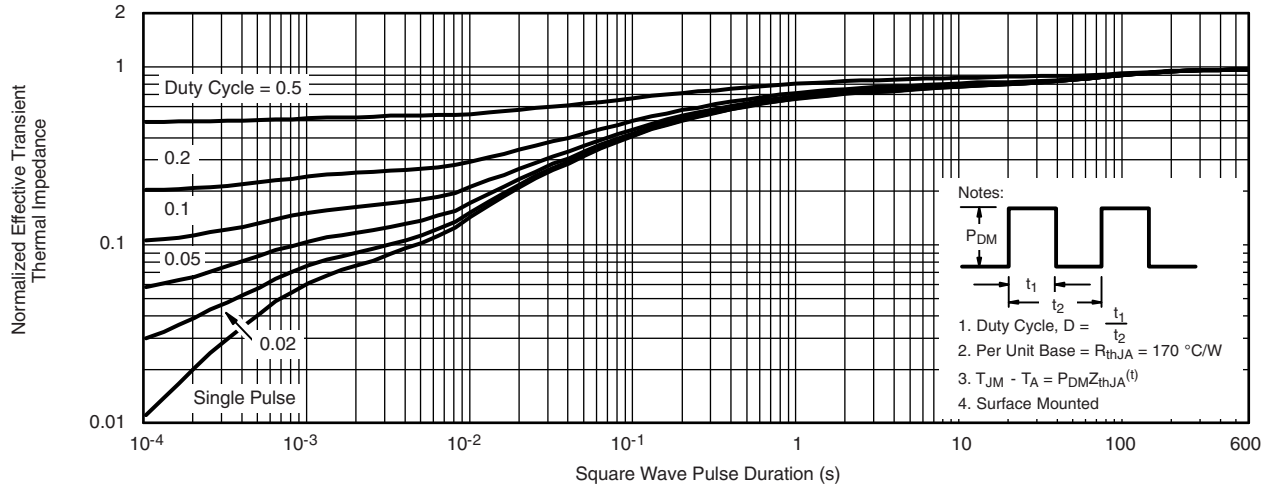
P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



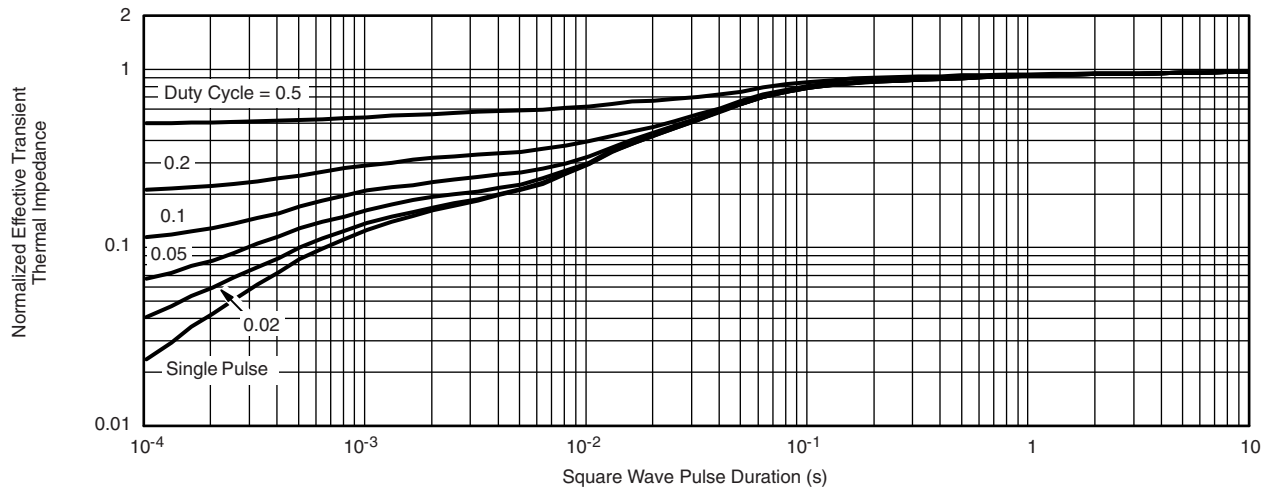
P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



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



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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