

Single P-Channel 20-V (D-S) MOSFET With Schottky Diode

| PRODUCT SUMMARY | | |
|---------------------|------------------------------------|--------------------|
| V _{DS} (V) | R _{DS(on)} (Ω) | I _D (A) |
| - 20 | 0.048 at V _{GS} = - 4.5 V | - 6.3 |
| | 0.068 at V _{GS} = - 2.5 V | - 5.3 |
| | 0.090 at V _{GS} = - 1.8 V | - 4.6 |

| SCHOTTKY PRODUCT SUMMARY | | |
|--------------------------|---|--------------------|
| V _{KA} (V) | V _f (V) Diode Forward Voltage | I _F (A) |
| 20 | 0.48 V at 0.5 A | 1.0 |

FEATURES

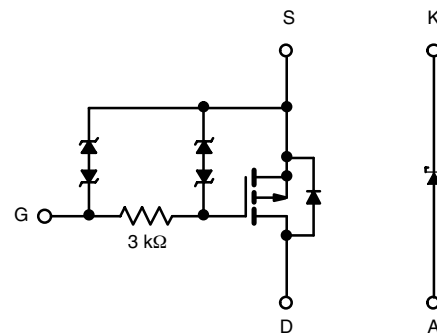
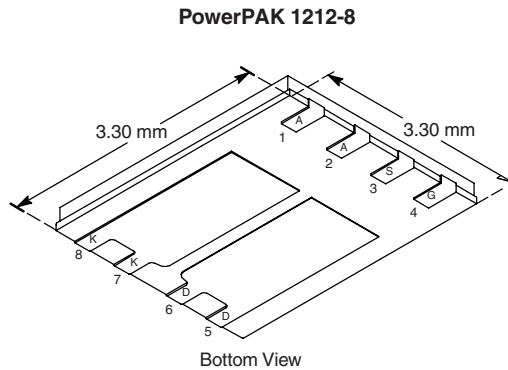
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET® Power MOSFETS: 1.8 V Rated
- ESD Protected: 4500 V
- Ultra-Low Thermal Resistance, PowerPAK® Package with Low 1.07 mm Profile



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Charger Switching



P-Channel MOSFET

Ordering Information: Si7703EDN-T1-E3 (Lead (Pb)-free)
Si7703EDN-T1-GE3 (Lead (Pb)-free and Halogen-free)

| ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted | | | | | |
|--|-----------------------------------|------------------------|--------------|------|-------|
| Parameter | Symbol | 10 s | Steady State | Unit | |
| Drain-Source Voltage (MOSFET and Schottky) | V _{DS} | - 20 | | V | |
| Reverse Voltage (Schottky) | V _{KA} | 20 | | | |
| Gate-Source Voltage (MOSFET) | V _{GS} | ± 12 | ± 12 | A | |
| Continuous Drain Current (T _J = 150 °C) (MOSFET) ^a | I _D | T _A = 25 °C | - 6.3 | | - 4.3 |
| | | T _A = 85 °C | - 4.5 | | - 3.1 |
| Pulsed Drain Current (MOSFET) | I _{DM} | - 20 | | | |
| Continuous Source Current (MOSFET Diode Conduction) ^a | I _S | - 2.3 | - 1.1 | | |
| Average Forward Current (Schottky) | I _F | 1.0 | | | |
| Pulsed Forward Current (Schottky) | I _{FM} | 7 | | W | |
| Maximum Power Dissipation (MOSFET) ^a | P _D | T _A = 25 °C | 2.8 | | 1.3 |
| | | T _A = 85 °C | 1.5 | | 0.7 |
| Maximum Power Dissipation (Schottky) ^a | P _D | T _A = 25 °C | 2.0 | | 1.1 |
| | | T _A = 85 °C | 1.0 | 0.6 | |
| Operating Junction and Storage Temperature Range | T _J , T _{stg} | - 55 to 150 | | °C | |
| Soldering Recommendations ^{b,c} | | 260 | | | |

Notes:

- Surface Mounted on 1" x 1" FR4 board.
- See Solder Profile (www.vishay.com/ppg?7325Z). The PowerPAK 1212-8 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
- Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

| THERMAL RESISTANCE RATINGS | | | | | | |
|----------------------------------|--------------|----------|-------------------|---------|---------|------|
| Parameter | | Device | Symbol | Typical | Maximum | Unit |
| Junction-to-Ambient ^a | t ≤ 10 s | MOSFET | R _{thJA} | 35 | 44 | °C/W |
| | | Schottky | | 51 | 64 | |
| | Steady State | MOSFET | | 75 | 94 | |
| | | Schottky | | 91 | 115 | |
| Junction-to-Case (Drain) | Steady State | MOSFET | R _{thJC} | 4 | 5 | |
| | | Schottky | | 10 | 12 | |

Notes

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

| MOSFET SPECIFICATIONS T _J = 25 °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 = - 800 μA | - 0.45 | | - 1.0 | V |
| Gate-Body Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ± 4.5 V | | | ± 1.5 | μA |
| | | V _{DS} = 0 V, V _{GS} = ± 12 V | | | ± 100 | mA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = - 20 V, V _{GS} = 0 V | | | - 1 | μA |
| | | V _{DS} = - 20 V, V _{GS} = 0 V, T _J = 85 °C | | | - 5 | |
| On-State Drain Current ^a | I _{D(on)} | V _{DS} ≤ - 5 V, V _{GS} = - 4.5 V | - 20 | | | A |
| Drain-Source On-State Resistance ^a | R _{DS(on)} | V _{GS} = - 4.5 V, I _D = - 6.3 A | | 0.041 | 0.048 | Ω |
| | | V _{GS} = - 2.5 V, I _D = - 5.3 A | | 0.057 | 0.068 | |
| | | V _{GS} = - 1.8 V, I _D = - 1 A | | 0.072 | 0.090 | |
| Forward Transconductance ^a | g _{fs} | V _{DS} = - 10 V, I _D = - 6.3 A | | 14 | | S |
| Diode Forward Voltage ^a | V _{SD} | I _S = - 2.3 A, V _{GS} = 0 V | | - 0.8 | - 1.2 | V |
| Dynamic^b | | | | | | |
| Total Gate Charge | Q _g | V _{DS} = - 10 V, V _{GS} = - 4.5 V, I _D = - 6.3 A | | 12 | 18 | nC |
| Gate-Source Charge | Q _{gs} | | | 2.5 | | |
| Gate-Drain Charge | Q _{gd} | | | 2.9 | | |
| Turn-On Delay Time | t _{d(on)} | V _{DD} = - 10 V, R _L = 10 Ω I _D ≅ - 1 A, V _{GEN} = - 4.5 V, R _G = 6 Ω | | 2.5 | 4 | vs |
| Rise Time | t _r | | | 4 | 6 | |
| Turn-Off Delay Time | t _{d(off)} | | | 15 | 23 | |
| Fall Time | t _f | | | 12 | 18 | |

Notes

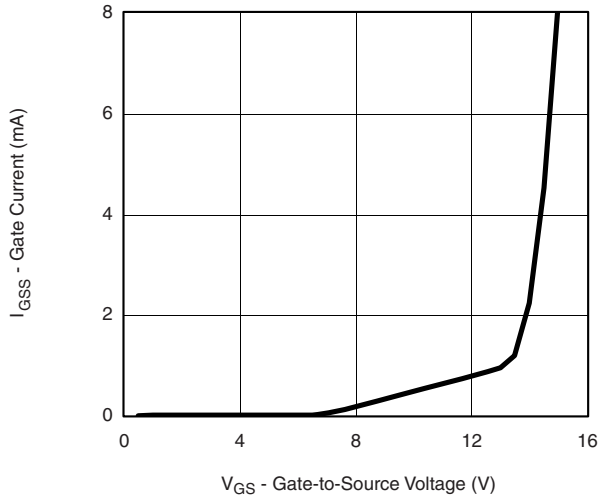
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.

b. Guaranteed by design, not subject to production testing.

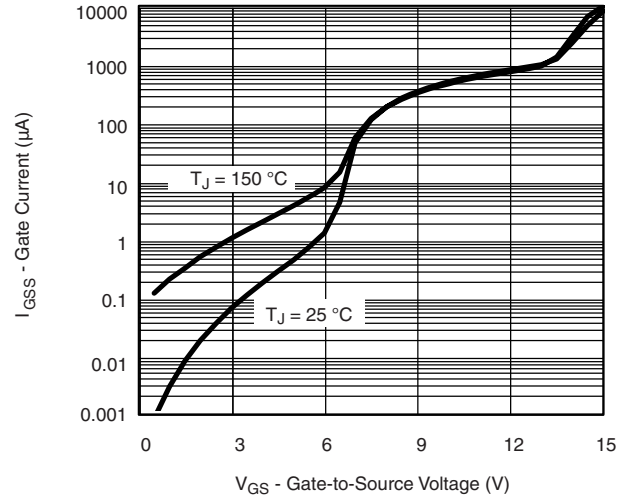
| SCHOTTKY SPECIFICATIONS T _J = 25 °C, unless otherwise noted | | | | | | |
|--|-----------------|---|------|-------|-------|------|
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
| Forward Voltage Drop | V _F | I _F = 0.5 A | | 0.42 | 0.48 | V |
| | | I _F = 0.5 A, T _J = 125 °C | | 0.33 | 0.4 | |
| Maximum Reverse Leakage Current | I _{rm} | V _r = 20 V | | 0.002 | 0.100 | mA |
| | | V _r = 20 V, T _J = 85 °C | | 0.10 | 1 | |
| | | V _r = 20 V, T _J = 125 °C | | 1.5 | 10 | |
| Junction Capacitance | C _T | V _r = 10 V | | 31 | | pF |

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.

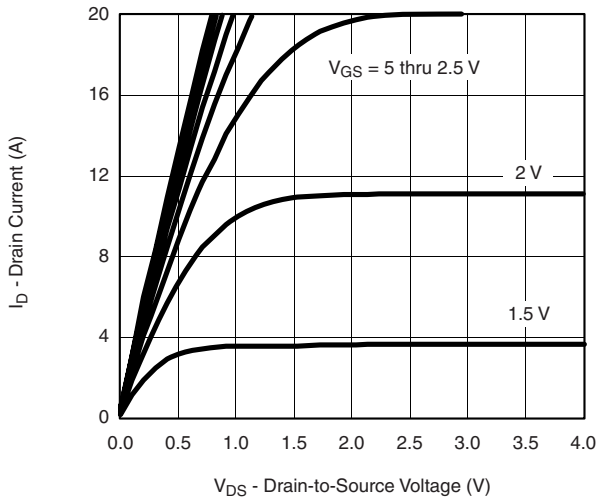
MOSFET TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



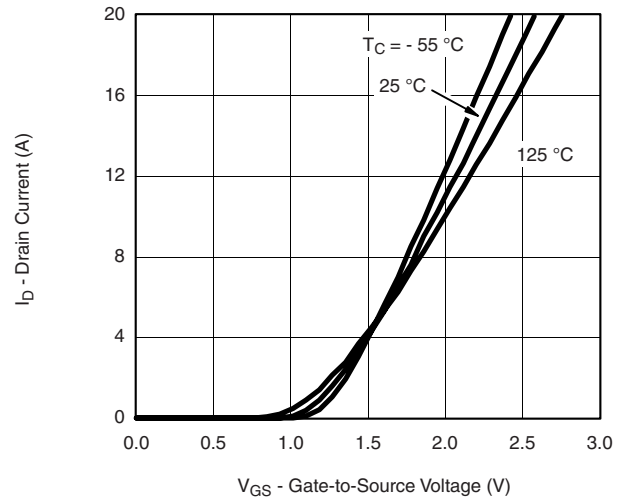
Gate-Current vs. Gate-Source Voltage



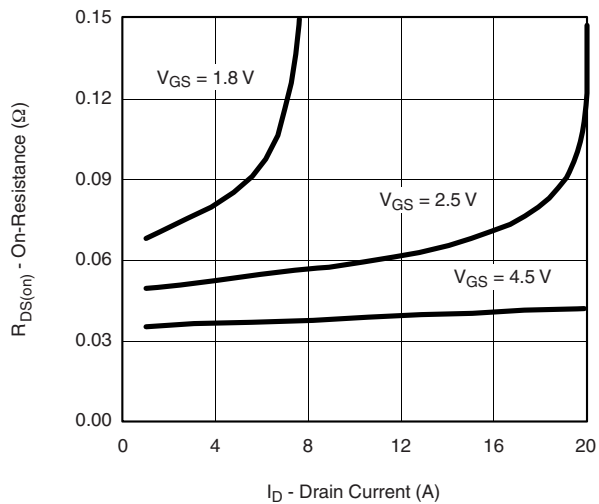
Gate Current vs. Gate-Source Voltage



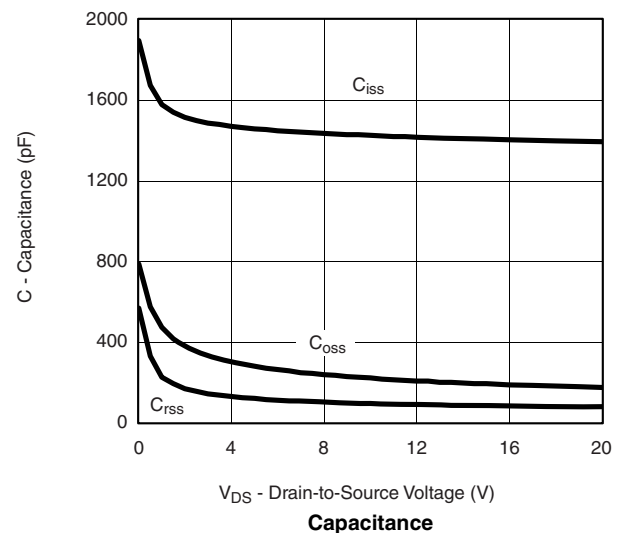
Output Characteristics



Transfer Characteristics

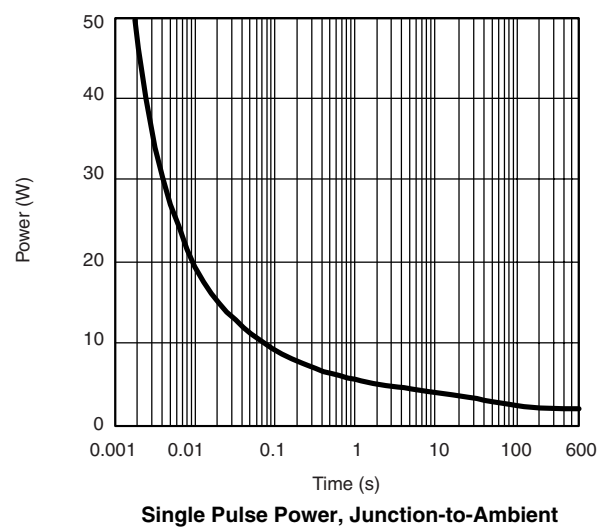
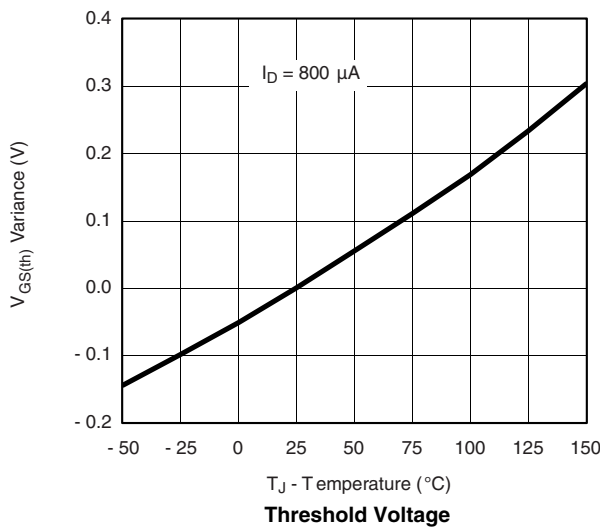
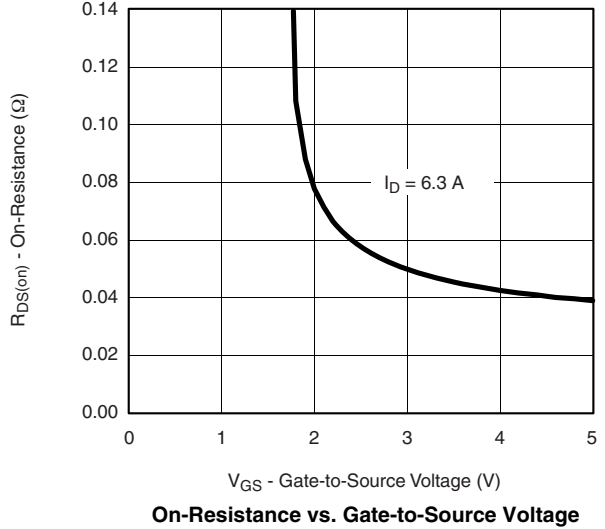
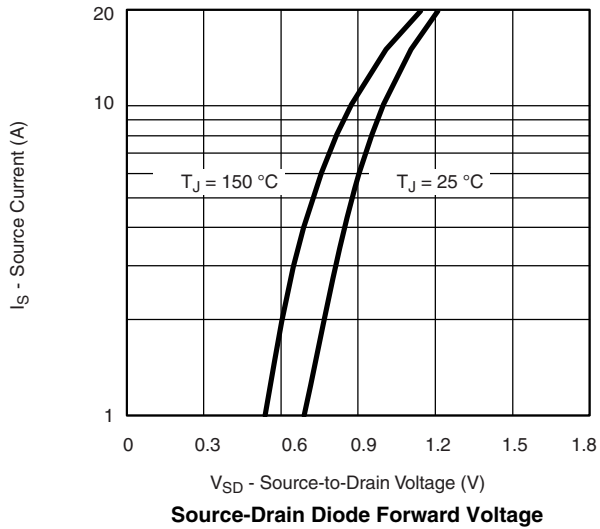
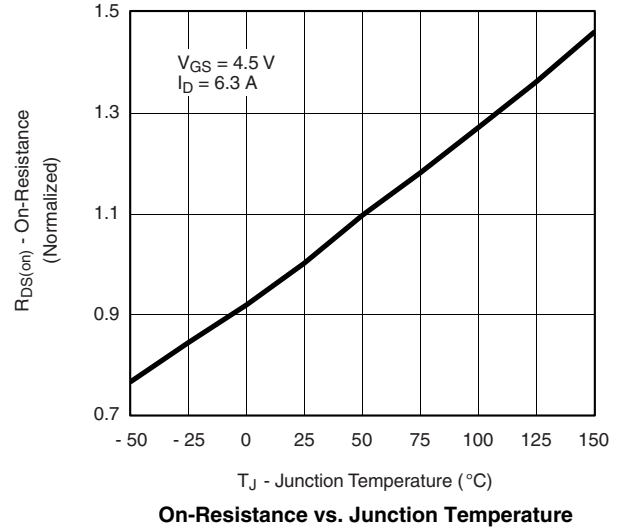
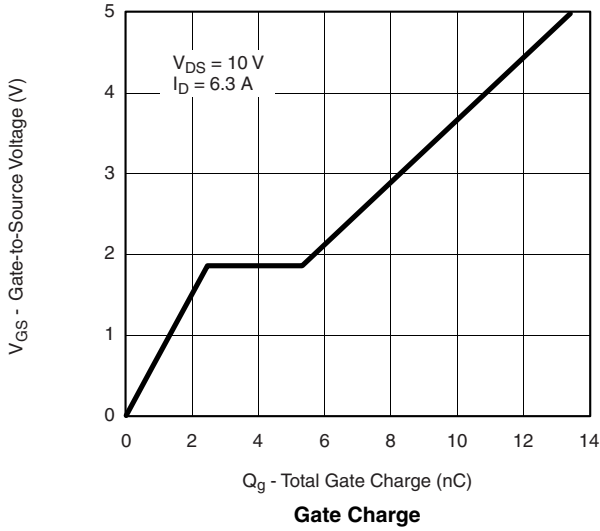


On-Resistance vs. Drain Current

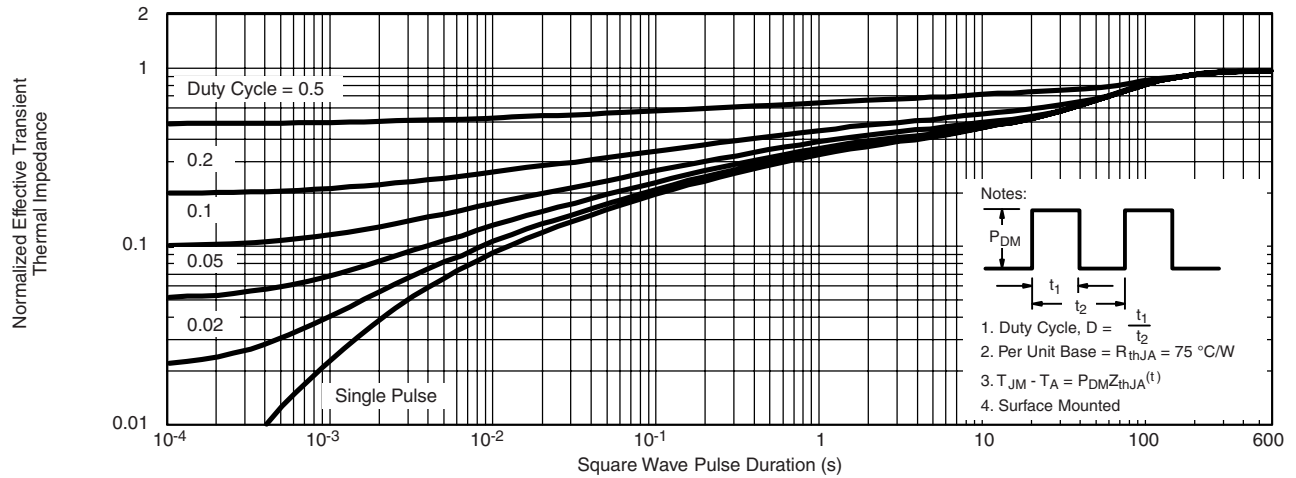


Capacitance

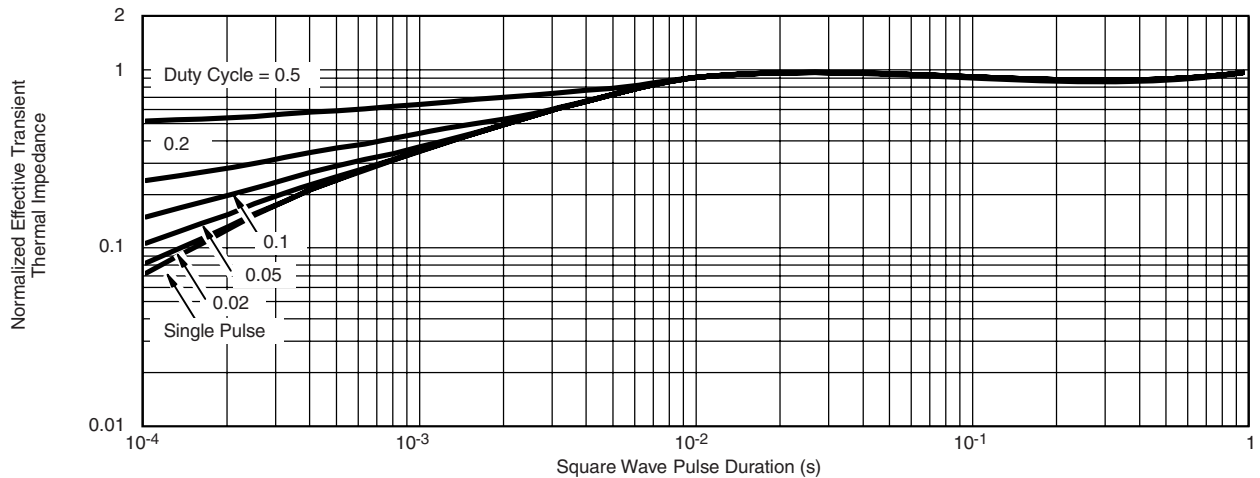
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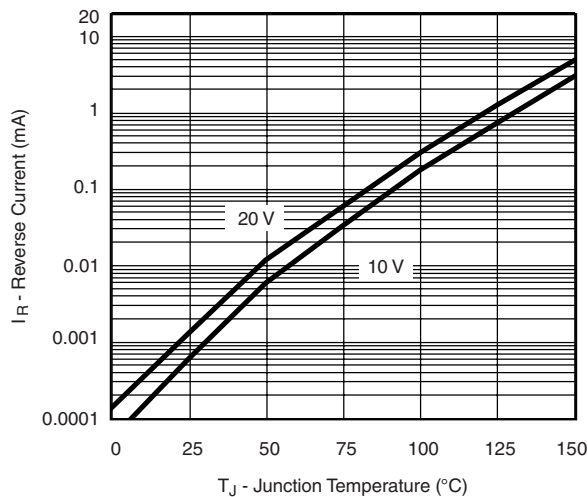


Normalized Thermal Transient Impedance, Junction-to-Ambient

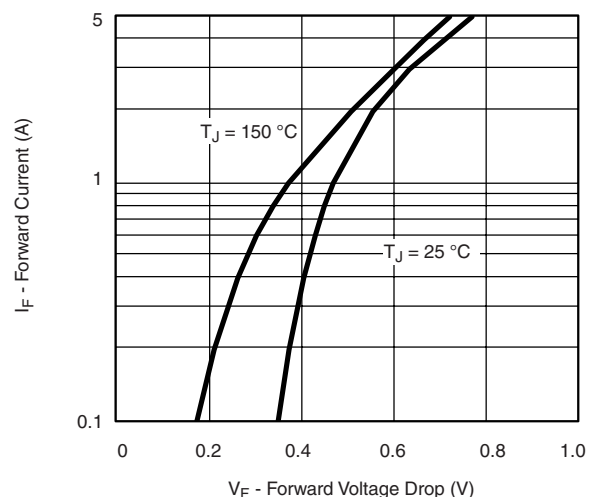


Normalized Thermal Transient Impedance, Junction-to-Case

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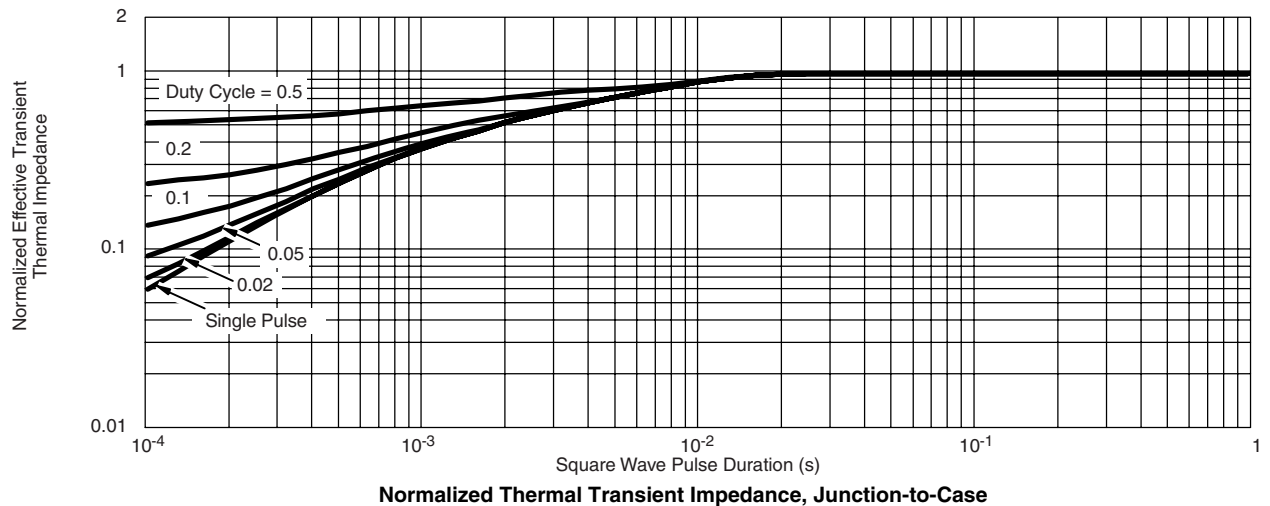
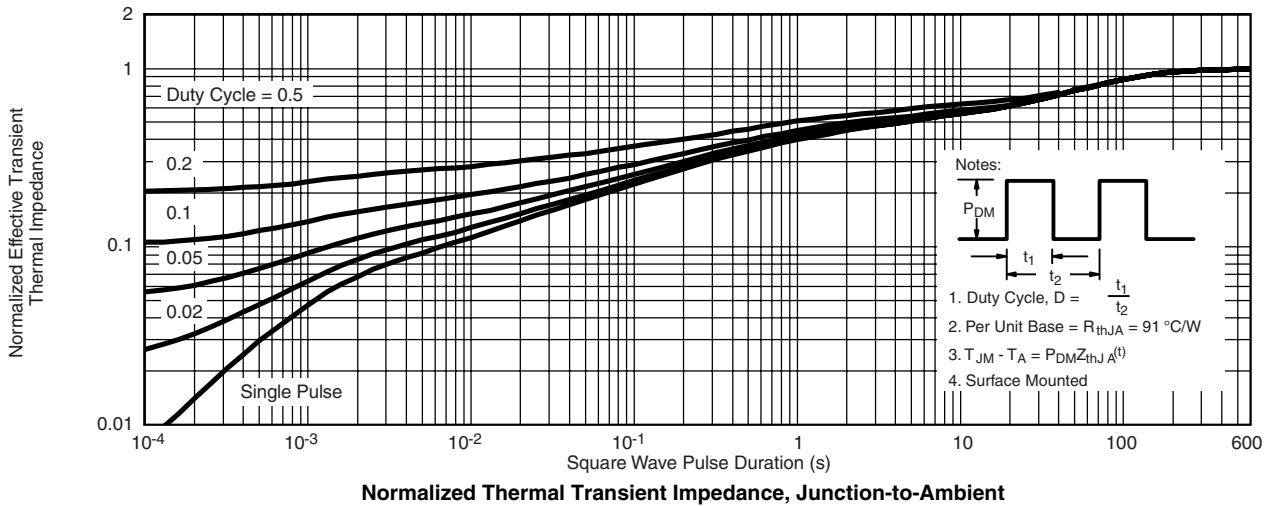
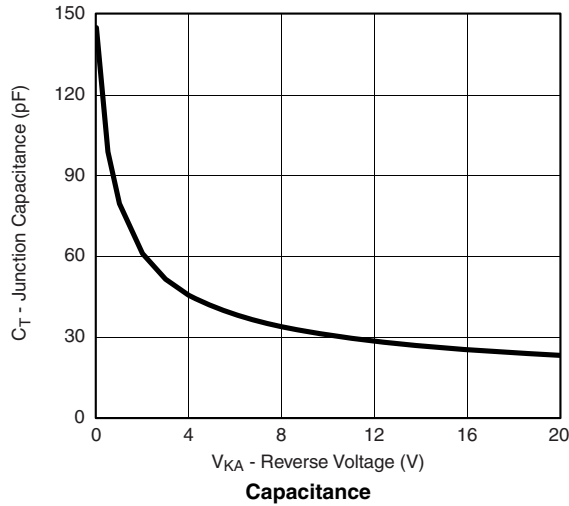


Reverse Current vs. Junction Temperature



Forward Voltage Drop

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