

P-Channel 30-V (D-S) MOSFET with Schottky Diode

| PRODUCT SUMMARY | | |
|-----------------|-----------------------------|-----------|
| V_{DS} (V) | $R_{DS(on)}$ (Ω) | I_D (A) |
| - 30 | 0.200 at $V_{GS} = - 10$ V | ± 1.8 |
| | 0.360 at $V_{GS} = - 4.5$ V | ± 1.2 |

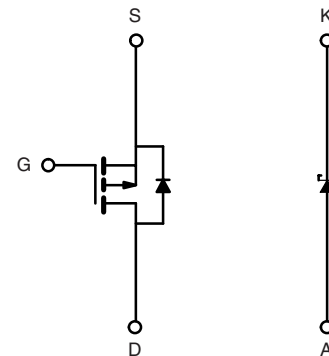
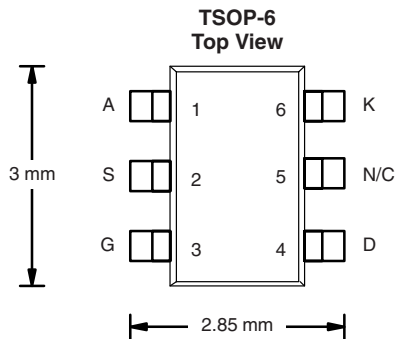
| SCHOTTKY PRODUCT SUMMARY | | |
|--------------------------|------------------------------------|-----------|
| V_{KA} (V) | V_F (V) Diode Forward Voltage | I_F (A) |
| 30 | 0.5 V at 0.5 A | 0.5 |

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- LITTLE FOOT® Plus
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available



P-Channel MOSFET

Ordering Information: Si3851DV-T1-E3 (Lead (Pb)-free)
Si3851DV-T1-GE3 (Lead (Pb)-free and Halogen-free)

| ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted | | | | | |
|--|----------------|---------------|--------------|-----------|------|
| Parameter | Symbol | 5 s | Steady State | Unit | |
| Drain-Source Voltage (MOSFET and Schottky) | V_{DS} | - 30 | | V | |
| Reverse Voltage (Schottky) | V_{KA} | 30 | | | |
| Gate-Source Voltage (MOSFET) | V_{GS} | ± 20 | ± 20 | | |
| Continuous Drain Current ($T_J = 150$ °C) (MOSFET) ^a | I_D | $T_A = 25$ °C | ± 1.8 | ± 1.6 | |
| | | $T_A = 70$ °C | ± 1.5 | ± 1.2 | |
| Pulsed Drain Current (MOSFET) | I_{DM} | ± 7 | | A | |
| Continuous Source Current (MOSFET Diode Conduction) ^a | I_S | - 1.05 | - 0.75 | | |
| Average Forward Current (Schottky) | I_F | 0.5 | | | |
| Pulsed Forward Current (Schottky) | I_{FM} | 7 | | W | |
| Maximum Power Dissipation (MOSFET) ^a | P_D | $T_A = 25$ °C | 1.15 | | 0.83 |
| | | $T_A = 70$ °C | 0.73 | | 0.53 |
| Maximum Power Dissipation (Schottky) ^a | P_D | $T_A = 25$ °C | 1.0 | | 0.76 |
| | | $T_A = 70$ °C | 0.64 | 0.48 | |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | - 55 to 150 | | °C | |

Notes:

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

| THERMAL RESISTANCE RATINGS | | | | | | |
|----------------------------|--------------|----------|-------------------|---------|---------|------|
| Parameter | | Device | Symbol | Typical | Maximum | Unit |
| Junction-to-Ambient | t ≤ 5 s | MOSFET | R _{thJA} | 93 | 110 | °C/W |
| | | Schottky | | 103 | 125 | |
| | Steady State | MOSFET | | 130 | 150 | |
| | | Schottky | | 140 | 165 | |
| Junction-to-Foot | Steady State | MOSFET | R _{thJF} | 75 | 90 | |
| | | Schottky | 80 | 95 | | |

| 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 = - 250 μA | - 1 | | | V |
| Gate-Body Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ± 20 V | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = - 24 V, V _{GS} = 0 V | | | - 1 | μA |
| | | V _{DS} = - 24 V, V _{GS} = 0 V, T _J = 75 °C | | | - 10 | |
| On-State Drain Current ^a | I _{D(on)} | V _{DS} ≥ - 5 V, V _{GS} = - 10 V | - 5 | | | A |
| Drain-Source On-State Resistance ^a | R _{DS(on)} | V _{GS} = - 10 V, I _D = - 1.8 A | | 0.165 | 0.200 | Ω |
| | | V _{GS} = - 4.5 V, I _D = - 1.2 A | | 0.298 | 0.360 | |
| Forward Transconductance ^a | g _{fs} | V _{DS} = - 15 V, I _D = - 1.8 A | | 2.4 | | S |
| Diode Forward Voltage ^a | V _{SD} | I _S = - 1.05 V, V _{GS} = 0 V | | - 0.83 | - 1.10 | V |
| Dynamic^b | | | | | | |
| Total Gate Charge | Q _g | V _{DS} = - 15 V, V _{GS} = - 5 V, I _D = - 1.8 A | | 2.4 | 3.6 | nC |
| Gate-Source Charge | Q _{gs} | | 0.9 | | | |
| Gate-Drain Charge | Q _{gd} | | 0.8 | | | |
| Turn-On Delay Time | t _{d(on)} | V _{DD} = - 15 V, R _L = 15 Ω I _D ≅ - 1 A, V _{GEN} = - 10 V, R _g = 6 Ω | | 8 | 12 | ns |
| Rise Time | t _r | | 12 | 18 | | |
| Turn-Off Delay Time | t _{d(off)} | | 12 | 18 | | |
| Fall Time | t _f | | 7 | 11 | | |
| Body Diode Reverse Recovery Time | t _{rr} | I _F = - 1.05 A, di/dt = 100 A/μs | | 30 | 60 | |

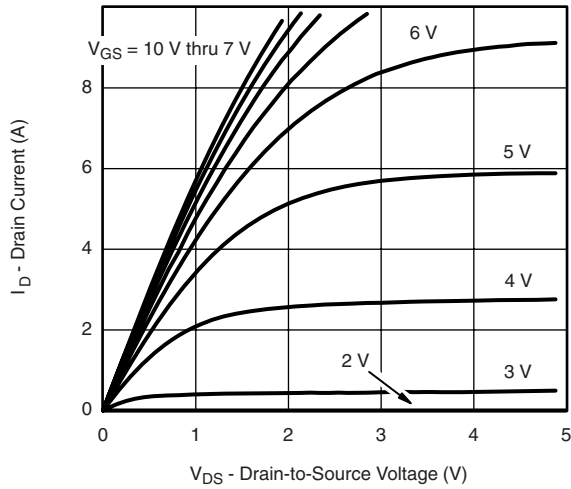
Notes:

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

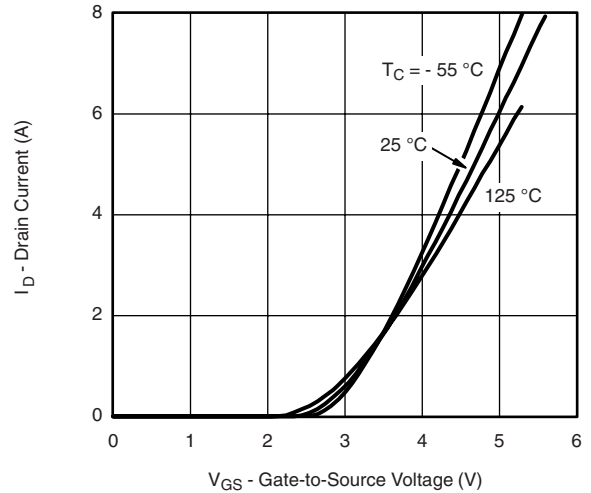
| SCHOTTKY SPECIFICATIONS T _J = 25 °C, unless otherwise noted | | | | | | |
|--|-----------------|---|------|-------|-------|------|
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
| Forward Voltage Drop | V _F | I _F = 0.5 A | | 0.45 | 0.5 | V |
| | | I _F = 0.5 A, T _J = 125 °C | | 0.35 | 0.4 | |
| Maximum Reverse Leakage Current | I _{rm} | V _R = 30 V | | 0.002 | 0.100 | mA |
| | | V _R = 30 V, T _J = 75 °C | | 0.06 | 1 | |
| | | V _R = 30 V, T _J = 125 °C | | 1.5 | 10 | |
| Junction Capacitance | C _T | V _R = 10 V | | 24 | | 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.

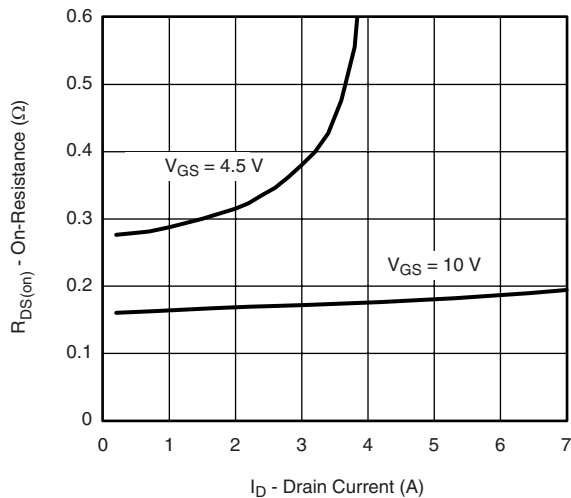
MOSFET TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



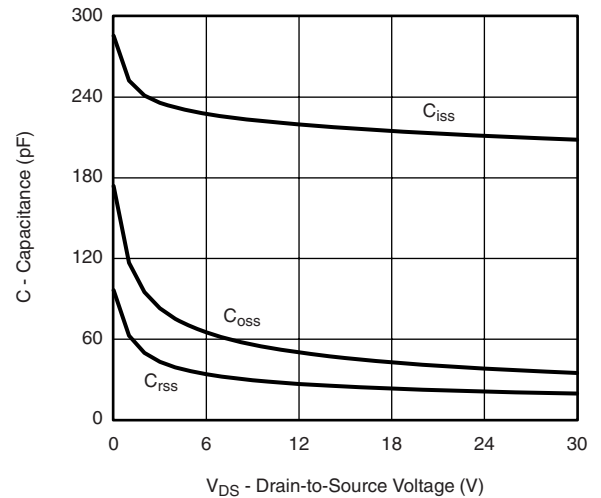
Output Characteristics



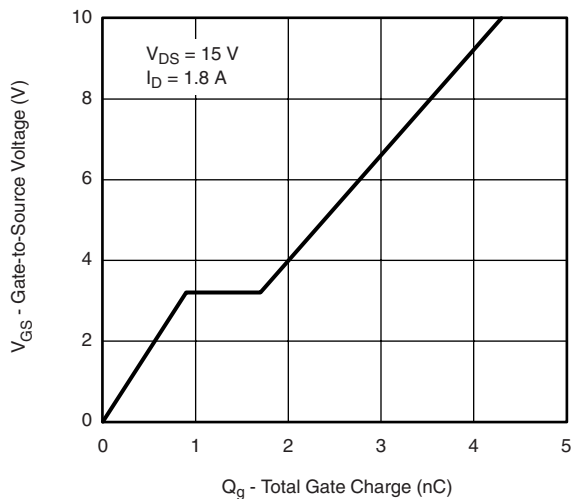
Transfer Characteristics



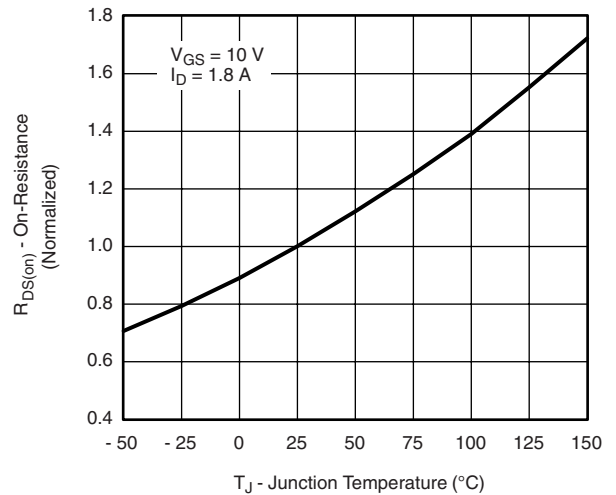
On-Resistance vs. Drain Current



Capacitance

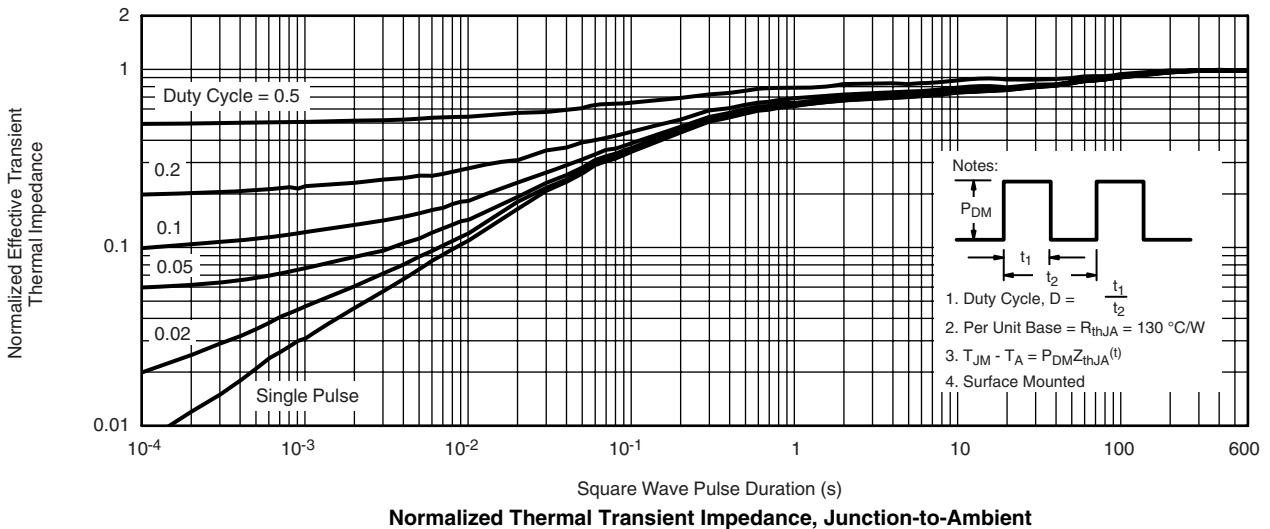
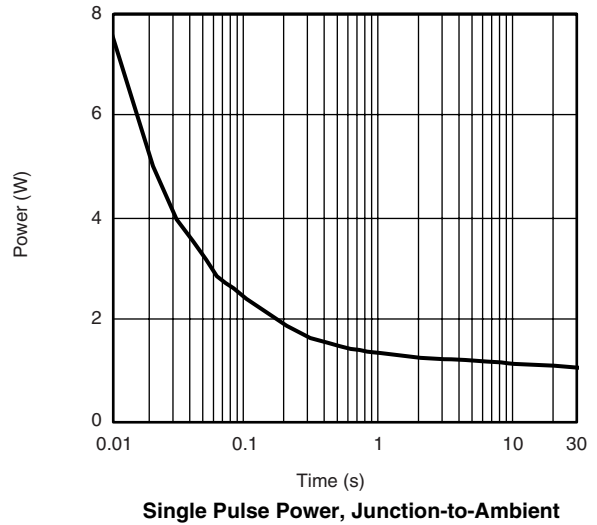
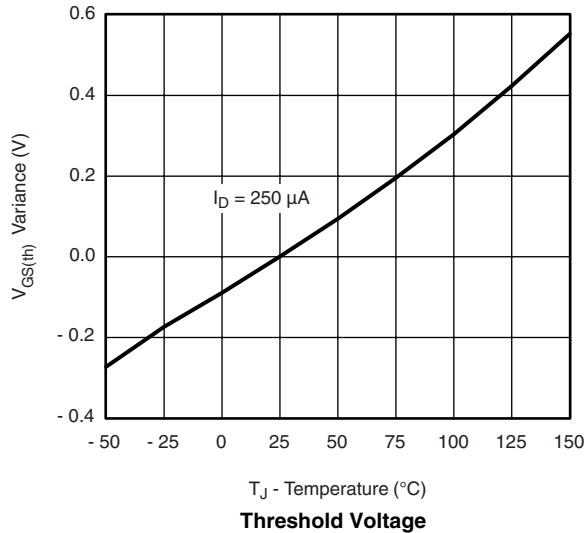
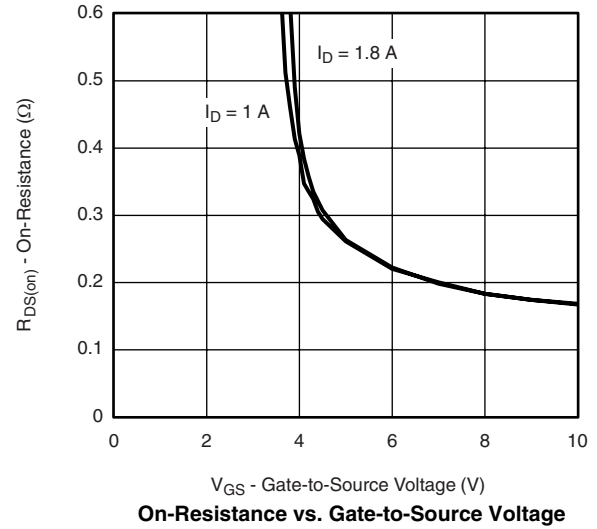
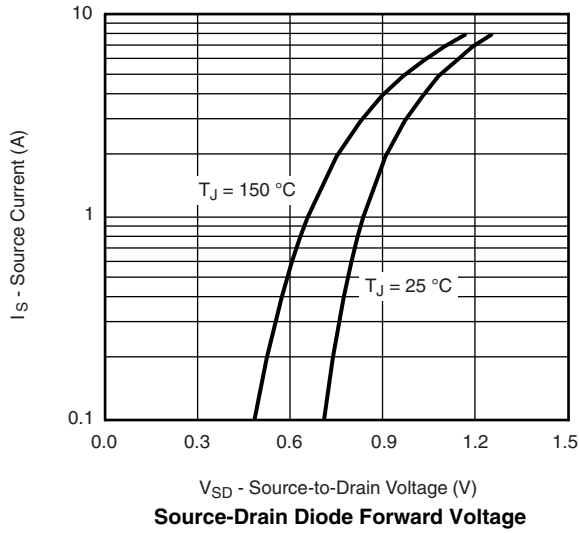


Gate Charge

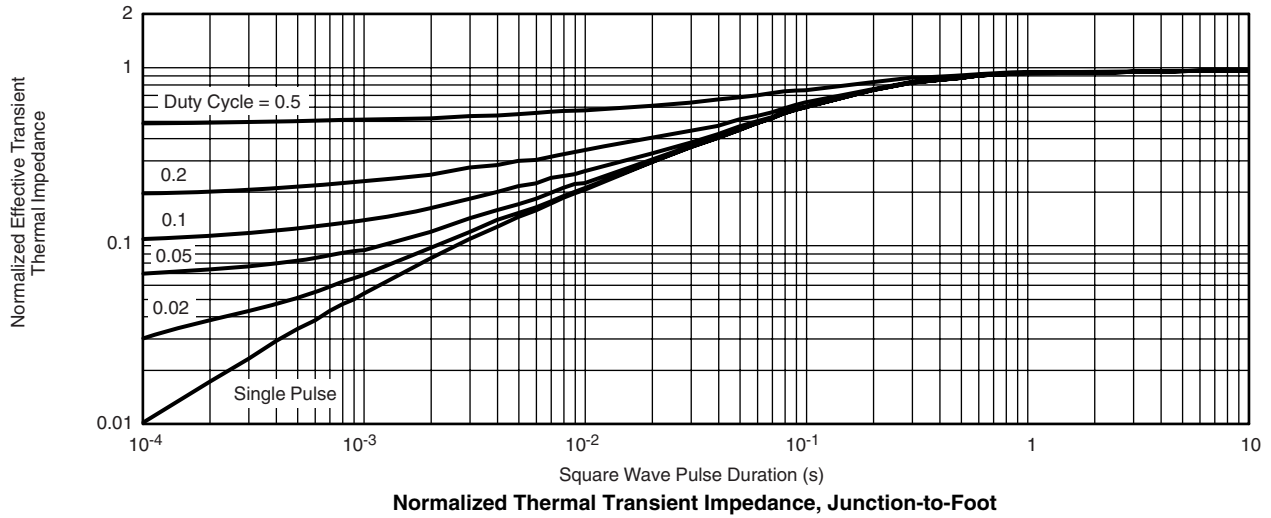


On-Resistance vs. Junction Temperature

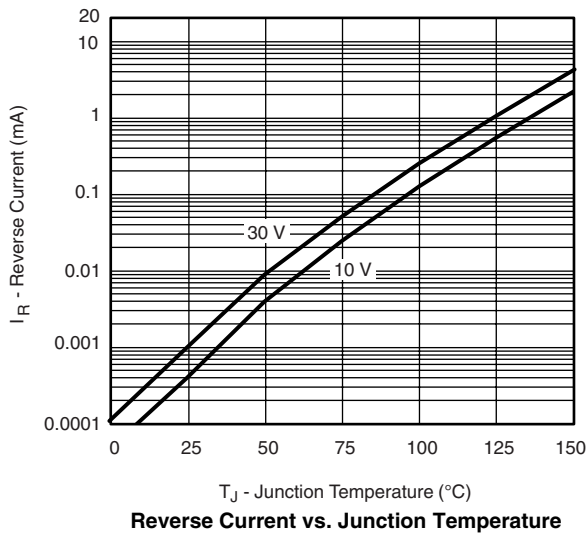
MOSFET TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



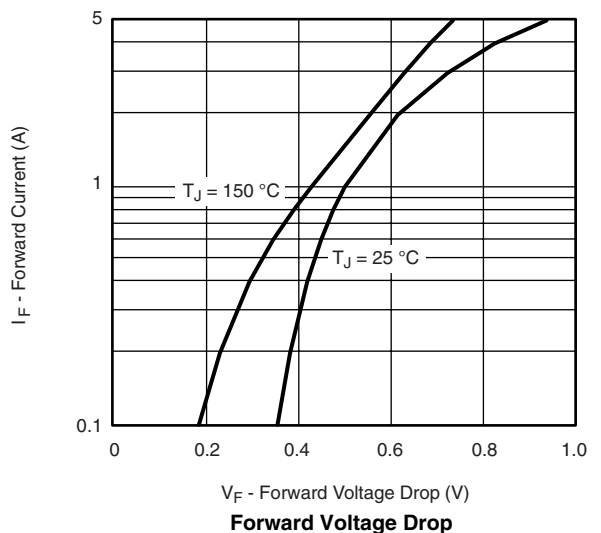
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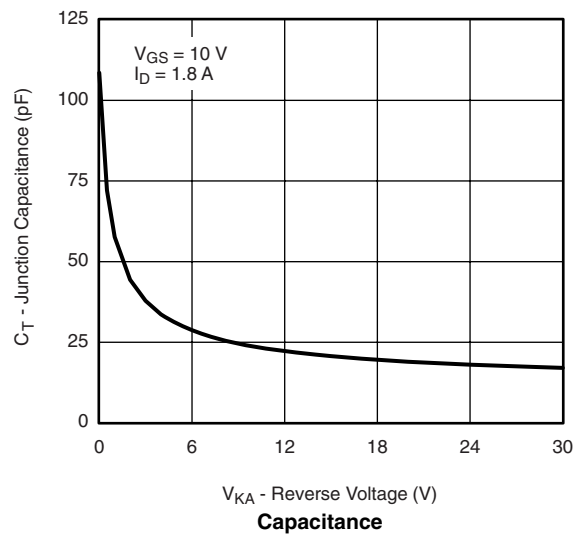
SCHOTTKY TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



Reverse Current vs. Junction Temperature

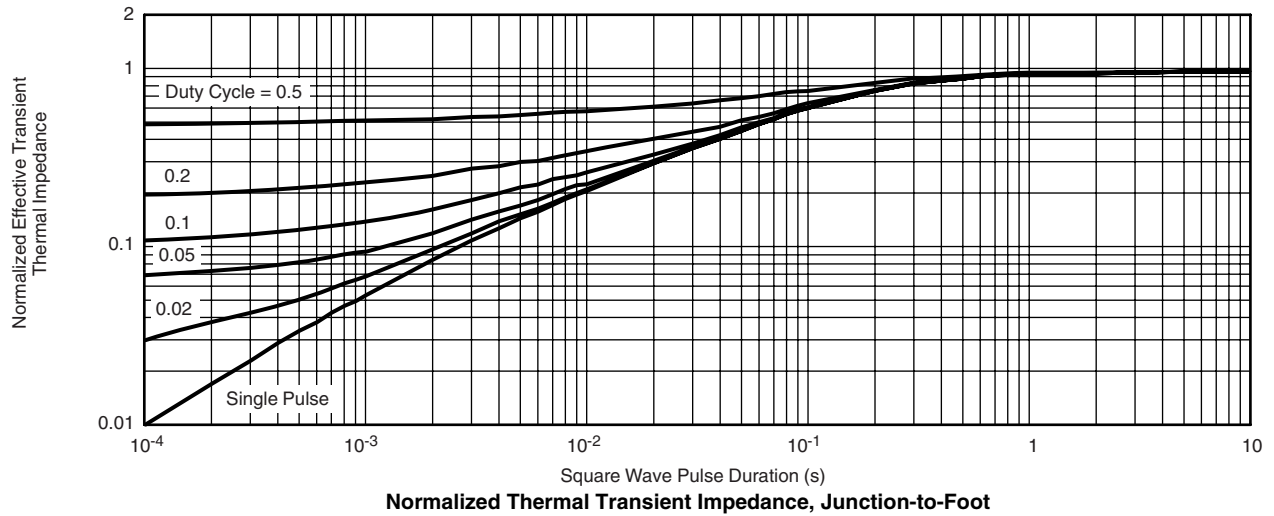
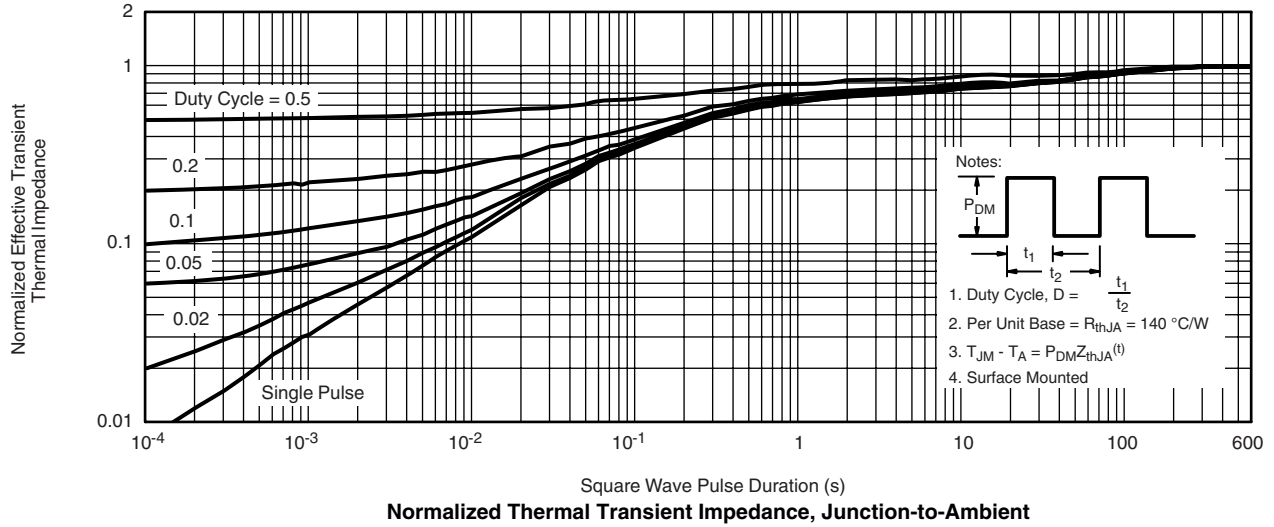


Forward Voltage Drop



Capacitance

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



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