

## P-Channel 1.8 V (G-S) MOSFET with Schottky Diode

MOSFET PRODUCT SUMMARY		
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
- 20	0.110 at V <sub>GS</sub> = - 4.5 V	- 3.6
	0.160 at V <sub>GS</sub> = - 2.5 V	- 3.0
	0.240 at V <sub>GS</sub> = - 1.8 V	- 2.4

SCHOTTKY PRODUCT SUMMARY		
V <sub>KA</sub> (V)	V <sub>f</sub> (V) Diode Forward Voltage	I <sub>F</sub> (A)
20	0.375 V at 1 A	1.0

### FEATURES

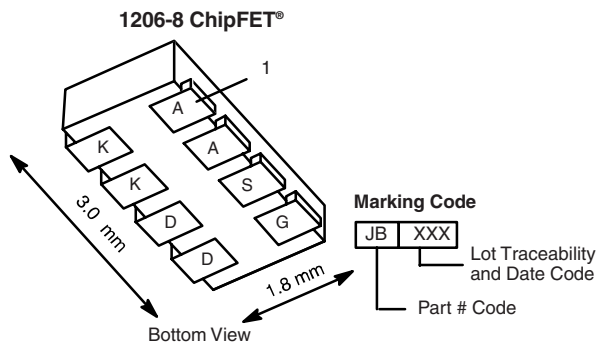
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFETs
- Ultra Low V<sub>f</sub> Schottky
- Si5853DC Pin Compatible
- Compliant to RoHS Directive 2002/95/EC



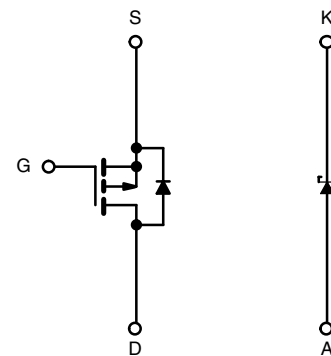
**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available

### APPLICATIONS

- Charging Circuit in Portable Devices



**Ordering Information:** Si5855DC-T1-E3 (Lead (Pb)-free)  
Si5855DC-T1-GE3 (Lead (Pb)-free and Halogen-free)



ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted					
Parameter	Symbol	5 s	Steady State	Unit	
Drain-Source Voltage (MOSFET)	V <sub>DS</sub>	- 20		V	
Reverse Voltage (Schottky)	V <sub>KA</sub>	20			
Gate-Source Voltage (MOSFET)	V <sub>GS</sub>	± 8			
Continuous Drain Current (T <sub>J</sub> = 150 °C) (MOSFET) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	- 3.6	- 2.7	
		T <sub>A</sub> = 85 °C	- 2.6	- 1.9	
Pulsed Drain Current (MOSFET)	I <sub>DM</sub>	- 10		A	
Continuous Source Current (MOSFET Diode Conduction) <sup>a</sup>	I <sub>S</sub>	- 1.8	- 0.9		
Average Forward Current (Schottky)	I <sub>F</sub>	1.0			
Pulsed Forward Current (Schottky)	I <sub>FM</sub>	7		W	
Maximum Power Dissipation (MOSFET) <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	2.1		1.1
		T <sub>A</sub> = 85 °C	1.1		0.6
Maximum Power Dissipation (Schottky) <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	1.9		1.1
		T <sub>A</sub> = 85 °C	1.0	0.56	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150		°C	
Soldering Recommendations (Peak Temperature) <sup>b, c</sup>		260			

Notes:

- Surface mounted on 1" x 1" FR4 board.
- See reliability manual for profile. The ChipFET 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 <sup>a</sup>	t ≤ 5 s	MOSFET	R <sub>thJA</sub>	50	60	°C/W
		Schottky		54	65	
	Steady State	MOSFET		90	110	
		Schottky		95	115	
Junction-to-Foot	Steady State	MOSFET	R <sub>thJF</sub>	30	40	
		Schottky		30	40	

Notes:

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

MOSFET SPECIFICATIONS T <sub>J</sub> = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = - 250 μA	- 0.45		- 1.0	V
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = - 20 V, V <sub>GS</sub> = 0 V			- 1	μA
		V <sub>DS</sub> = - 20 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 85 °C			- 5	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≤ - 5 V, V <sub>GS</sub> = - 4.5 V	- 10			A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 2.7 A		0.095	0.110	Ω
		V <sub>GS</sub> = - 2.5 V, I <sub>D</sub> = - 2.2 A		0.137	0.160	
		V <sub>GS</sub> = - 1.8 V, I <sub>D</sub> = - 1 A		0.205	0.240	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = - 10 V, I <sub>D</sub> = - 2.7 A		7		S
Diode Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>S</sub> = - 0.9 A, V <sub>GS</sub> = 0 V		- 0.8	- 1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = - 10 V, V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 2.7 A		5.1	7.7	nC
Gate-Source Charge	Q <sub>gs</sub>			1.2		
Gate-Drain Charge	Q <sub>gd</sub>			1.0		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = - 10 V, R <sub>L</sub> = 10 Ω I <sub>D</sub> ≅ - 1 A, V <sub>GEN</sub> = - 4.5 V, R <sub>g</sub> = 6 Ω		16	25	ns
Rise Time	t <sub>r</sub>			30	45	
Turn-Off Delay Time	t <sub>d(off)</sub>			30	45	
Fall Time	t <sub>f</sub>			27	40	
Source-Drain Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = - 0.9 A, di/dt = 100 A/μs		20	40	

Notes:

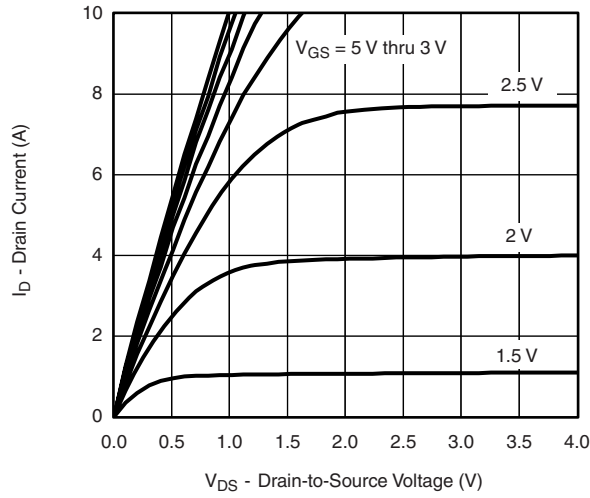
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.

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

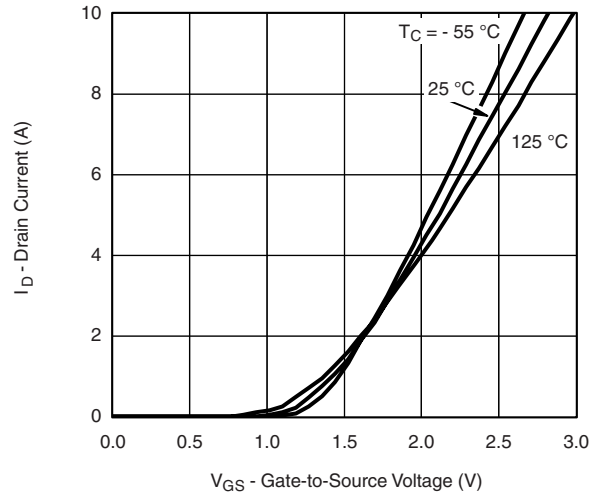
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

SCHOTTKY SPECIFICATIONS T <sub>J</sub> = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	V <sub>F</sub>	I <sub>F</sub> = 1 A		0.34	0.375	V
		I <sub>F</sub> = 1 A, T <sub>J</sub> = 125 °C		0.255	0.290	
Maximum Reverse Leakage Current	I <sub>rm</sub>	V <sub>r</sub> = 20 V		0.05	0.500	mA
		V <sub>r</sub> = 20 V, T <sub>J</sub> = 85 °C		2	20	
		V <sub>r</sub> = 20 V, T <sub>J</sub> = 125 °C		10	100	
Junction Capacitance	C <sub>T</sub>	V <sub>r</sub> = 10 V		90		pF

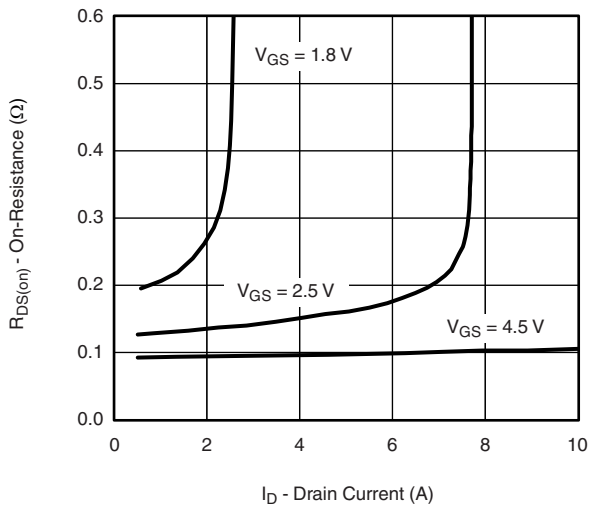
**MOSFET TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



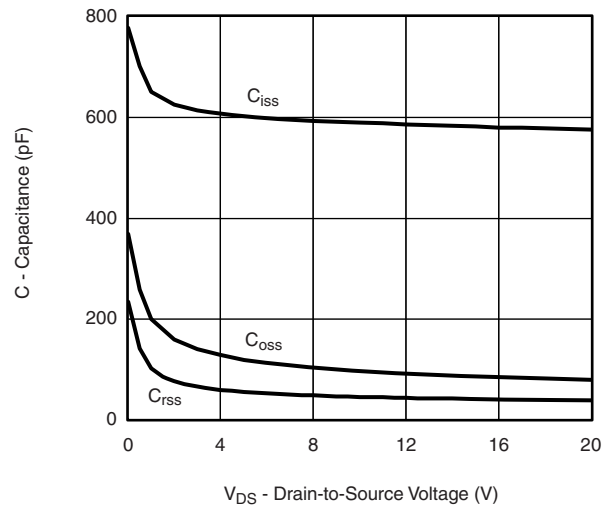
**Output Characteristics**



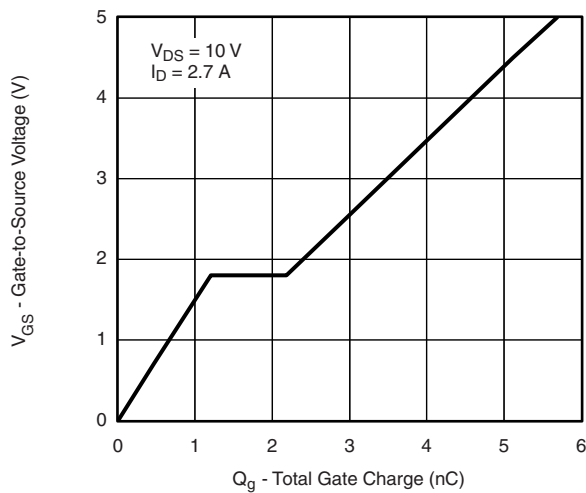
**Transfer Characteristics**



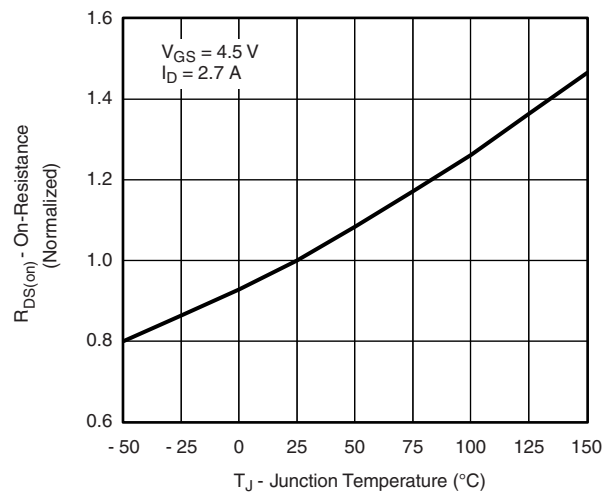
**On-Resistance vs. Drain Current**



**Capacitance**

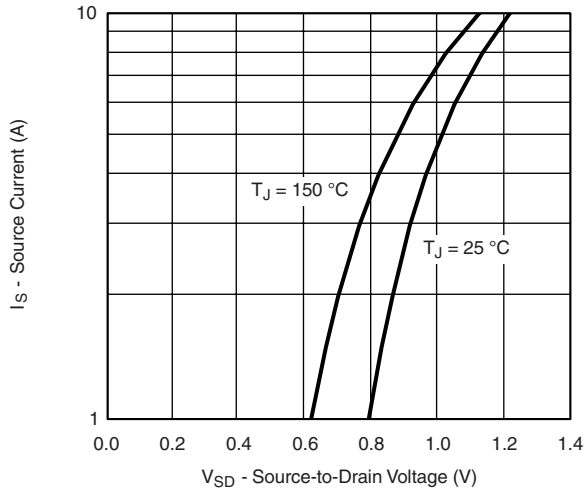


**Gate Charge**

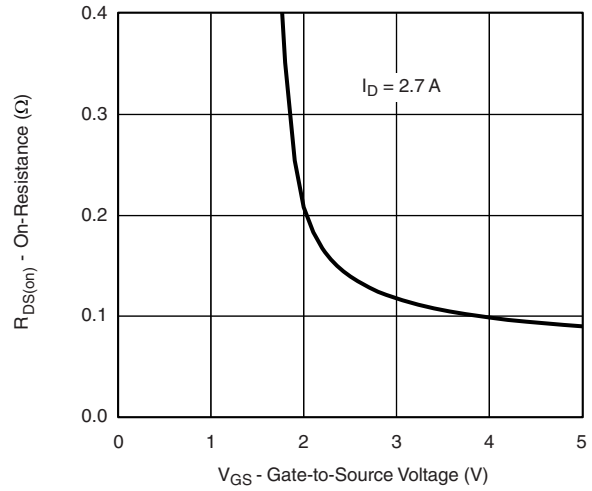


**On-Resistance vs. Junction Temperature**

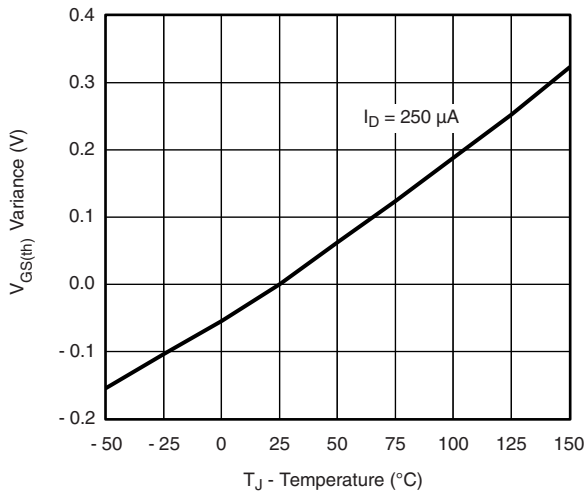
**MOSFET TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



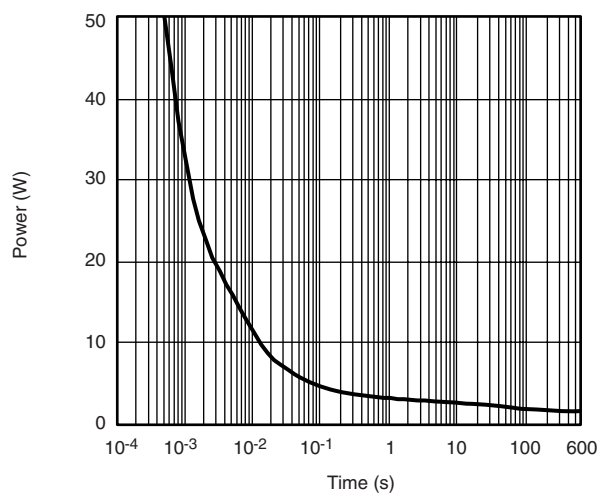
**Source-Drain Diode Forward Voltage**



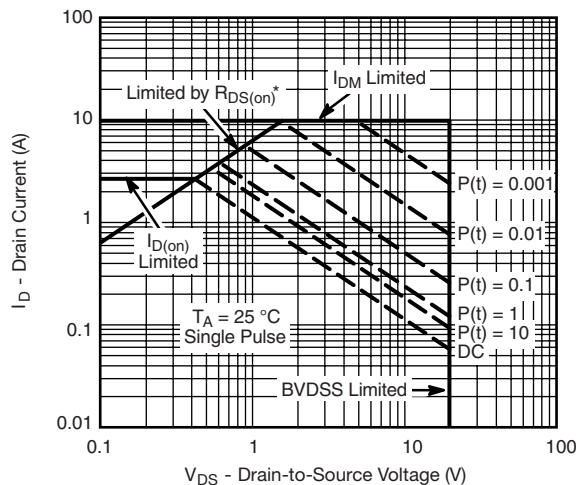
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



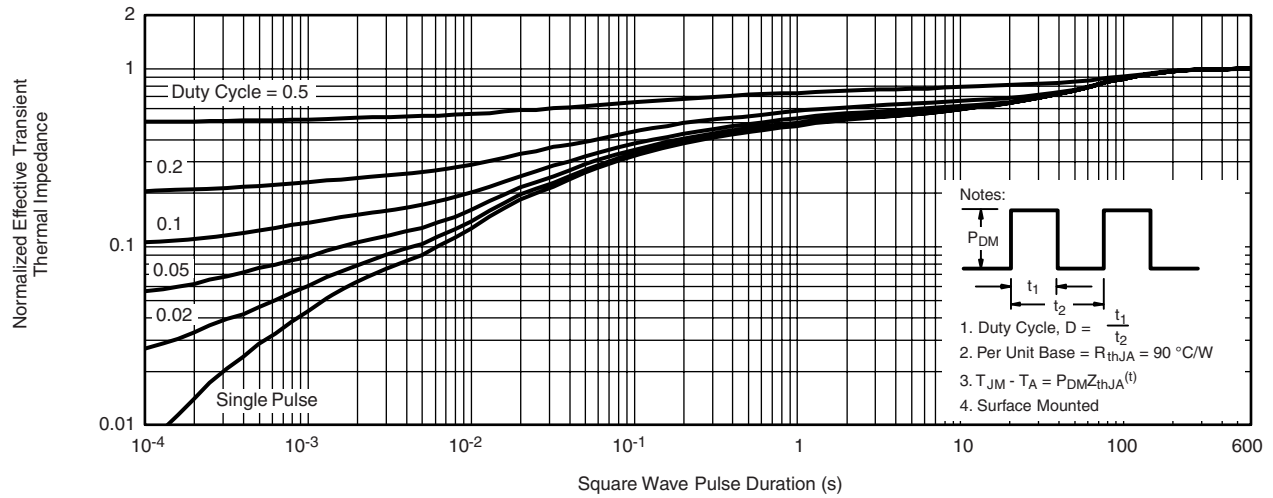
**Single Pulse Power**



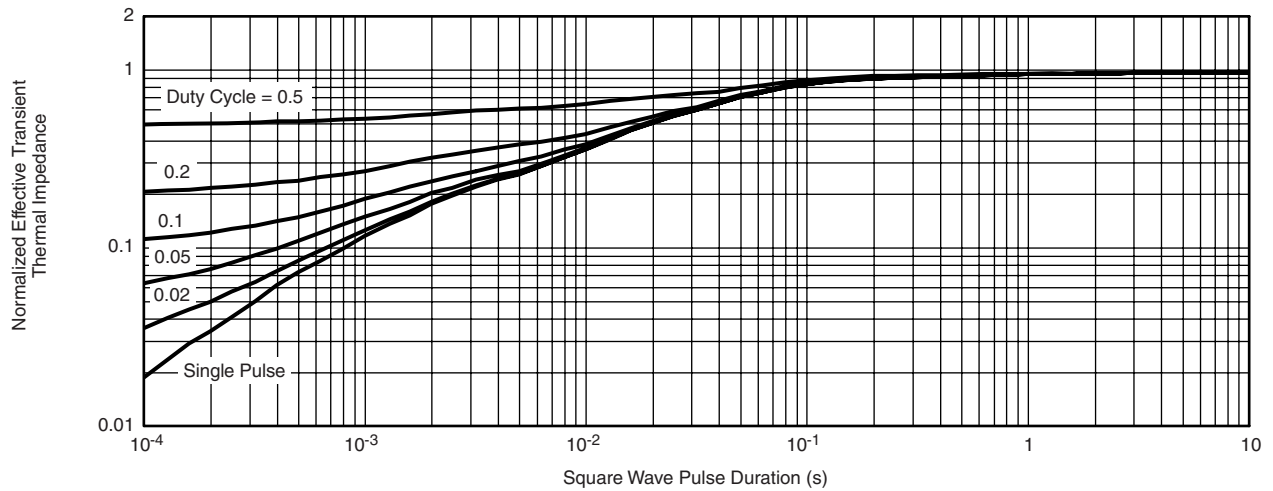
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

**Safe Operating Area**

**MOSFET TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

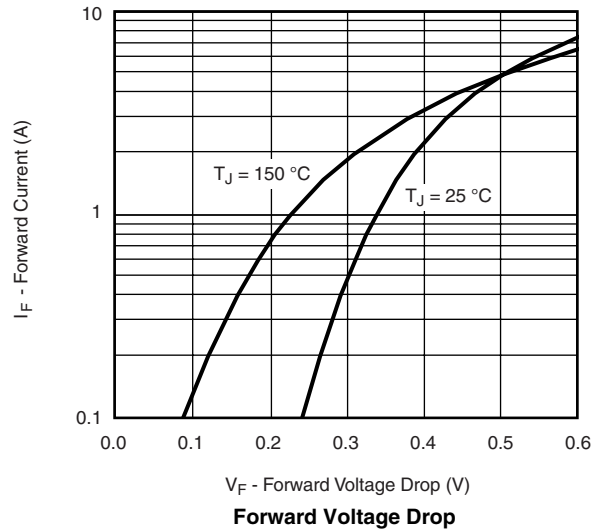
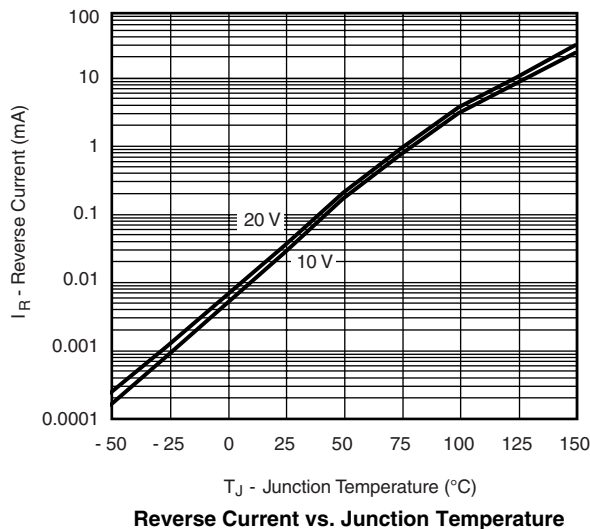


**Normalized Thermal Transient Impedance, Junction-to-Ambient**

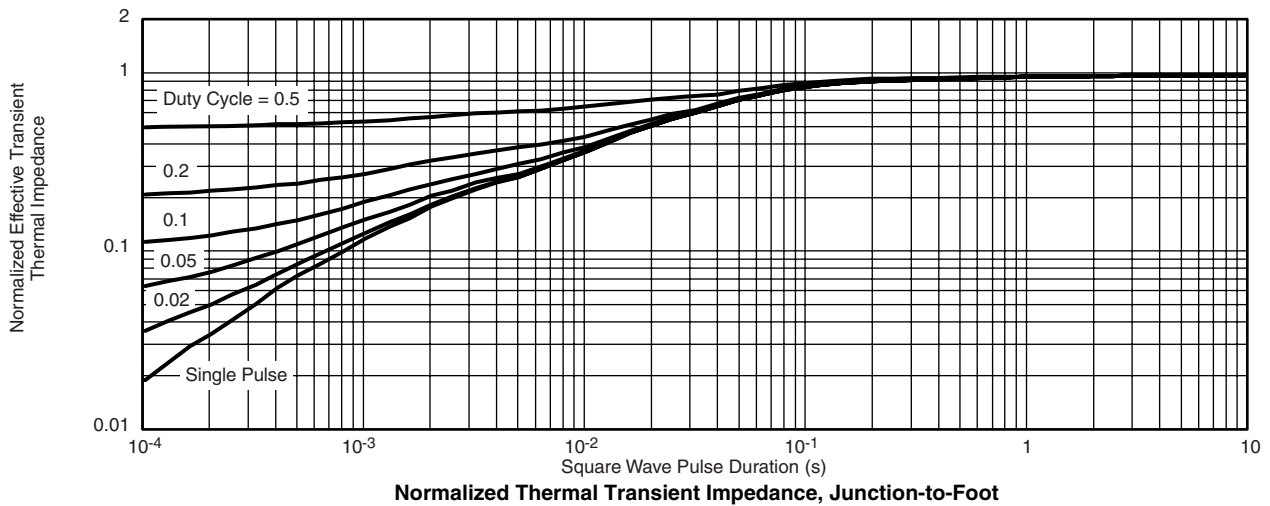
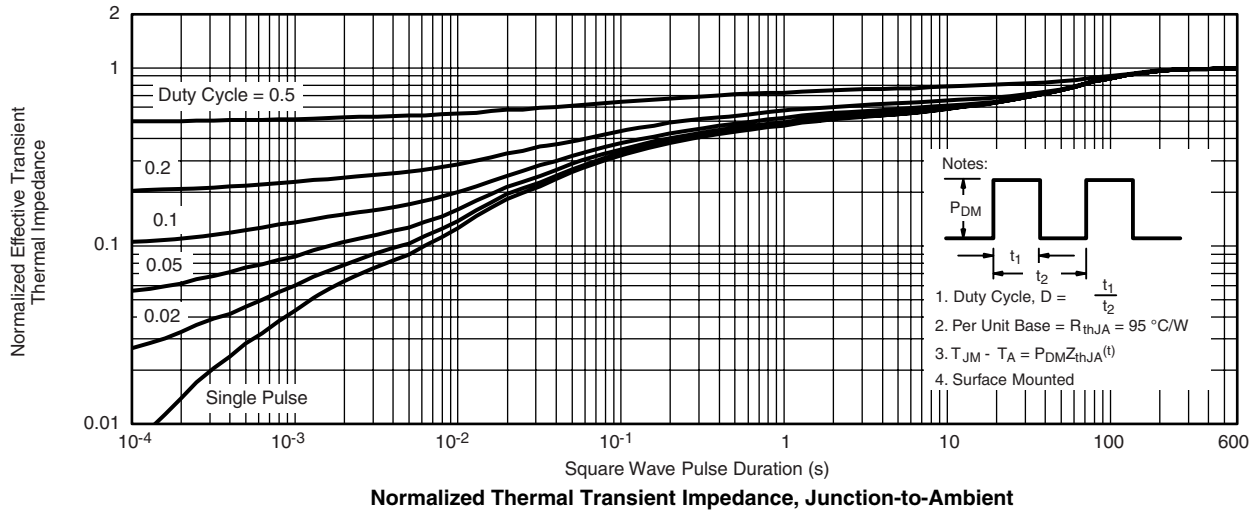
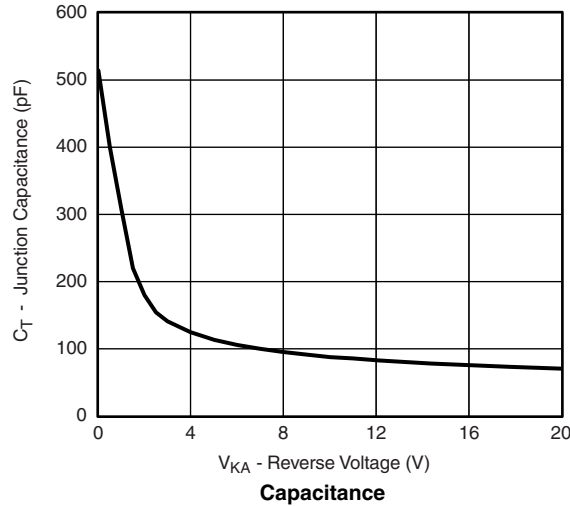


**Normalized Thermal Transient Impedance, Junction-to-Foot**

**SCHOTTKY TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



**SCHOTTKY TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



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