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

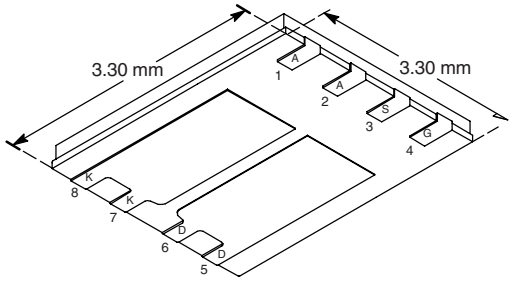
- **Halogen-free According to IEC 61249-2-21 Available**
- TrenchFET® Power MOSFETS: 1.8 V Rated
- ESD Protected: 4500 V
- Ultra-Low Thermal Resistance, PowerPAK® Package with Low 1.07 mm Profile

Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

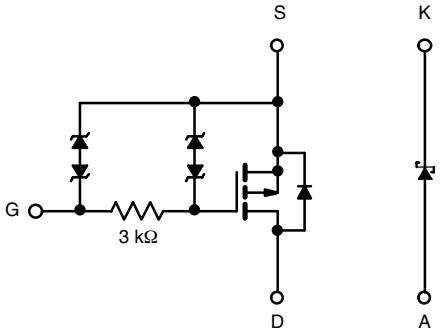
APPLICATIONS

- Charger Switching

PowerPAK 1212-8



Bottom View



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	
Continuous Drain Current (T_J = 150 °C) (MOSFET)[a]	T_A = 25 °C	I_D	- 6.3	- 4.3	A
	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 Foward Current (Schottky)		I_F	1.0		
Pulsed Foward Current (Schottky)		I_{FM}	7		
Maximum Power Dissipation (MOSFET)[a]	T_A = 25 °C	P_D	2.8	1.3	W
	T_A = 85 °C		1.5	0.7	
Maximum Power Dissipation (Schottky)[a]	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:
a. Surface Mounted on 1" x 1" FR4 board.
b. See Solder Profile (*www.vishay.com/ppg?73257*). 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.
c. 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	ns
Rise Time	t_r			4	6	
Turn-Off DelayTime	$t_{d(off)}$			15	23	
Fall Time	t_f			12	18	

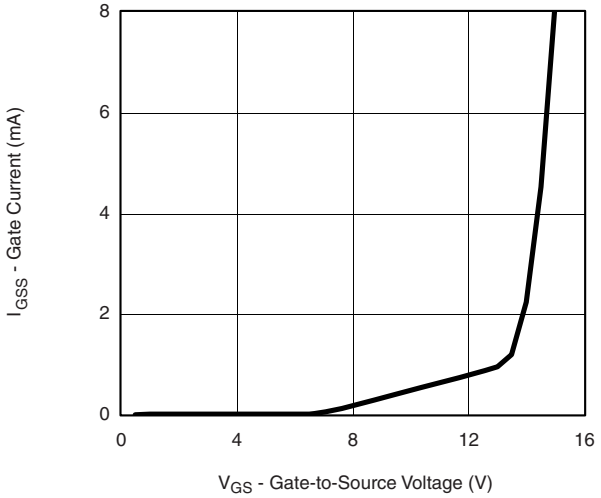
Notes
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

SCHOTTKY SPECIFICATIONS T_J = 25 °C, unless otherwise noted

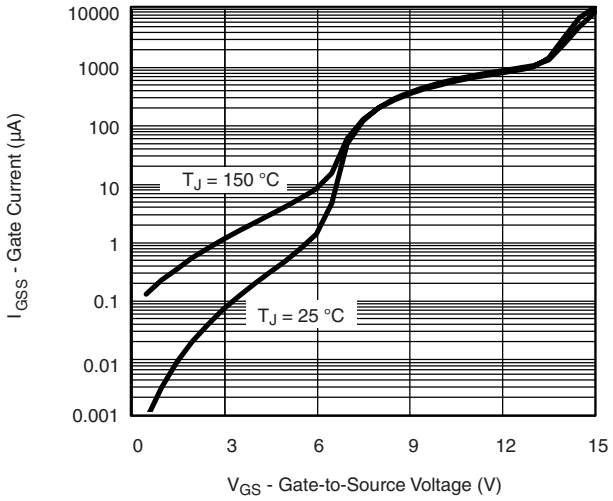
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	V_F	I_F = 0.5 A		0.42	0.48	V
		I_F = 0.5 A, T_J = 125 °C		0.33	0.4	
Maximum Reverse Leakage Current	I_{rm}	V_r = 20 V		0.002	0.100	mA
		V_r = 20 V, T_J = 85 °C		0.10	1	
		V_r = 20 V, T_J = 125 °C		1.5	10	
Junction Capacitance	C_T	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.

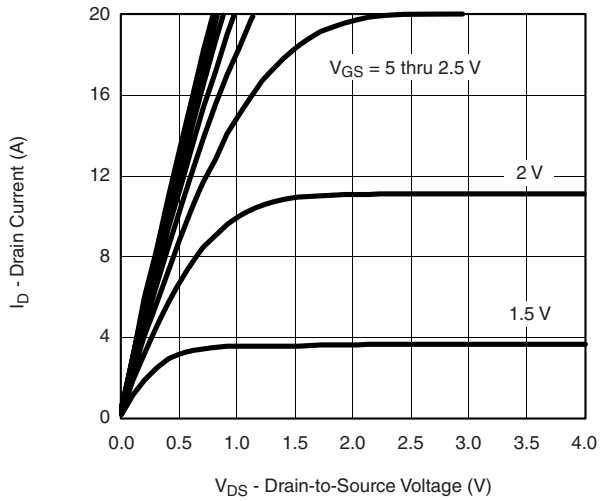
MOSFET TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



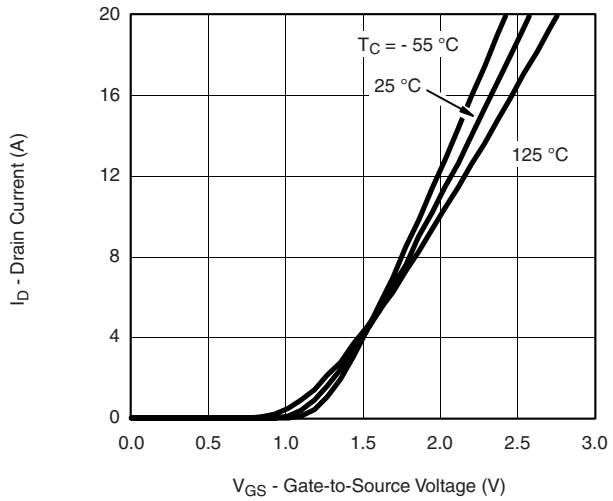
Gate-Current vs. Gate-Source Voltage



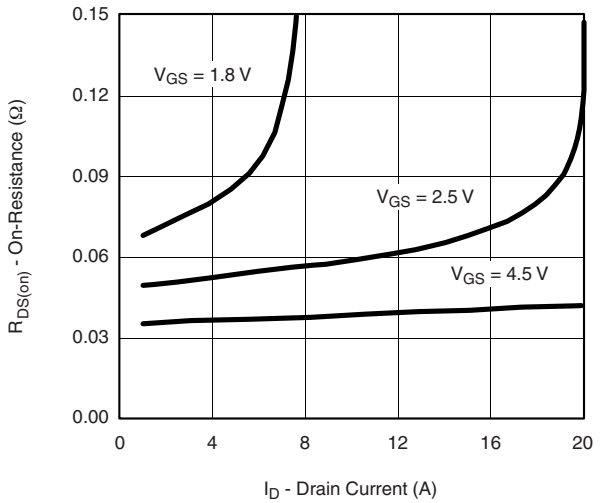
Gate Current vs. Gate-Source Voltage



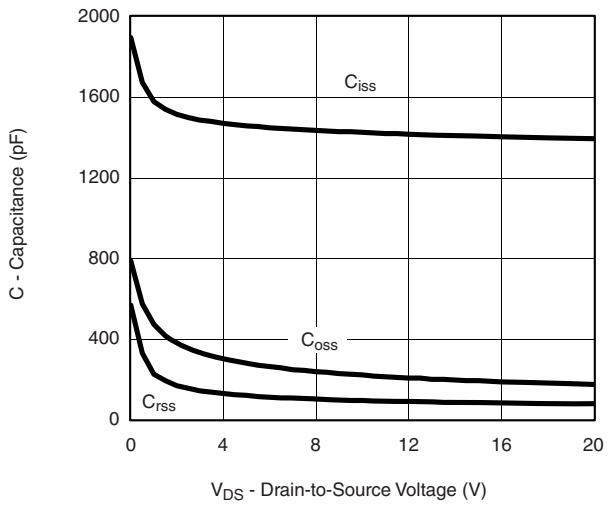
Output Characteristics



Transfer Characteristics

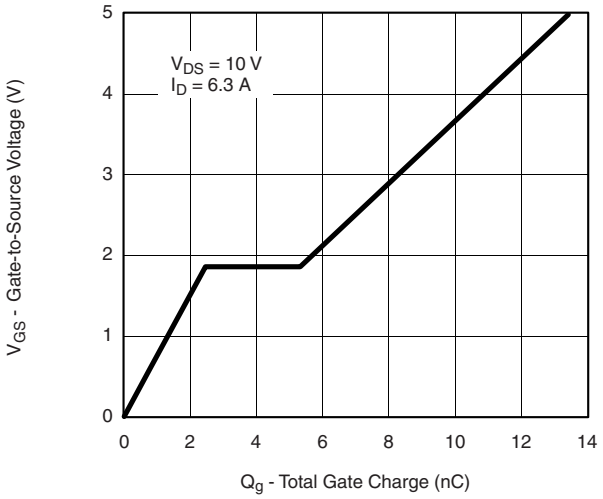


On-Resistance vs. Drain Current

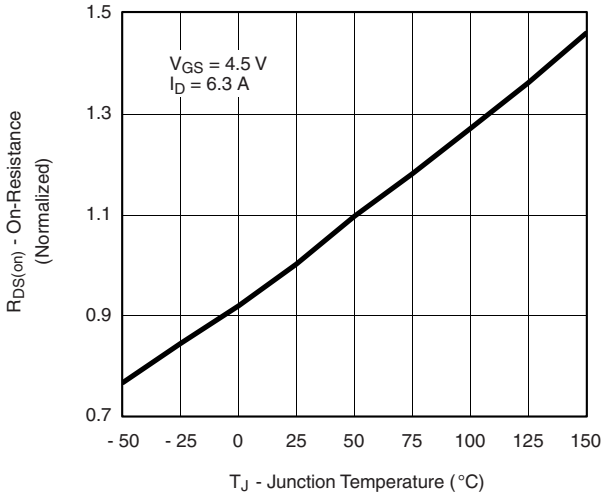


Capacitance

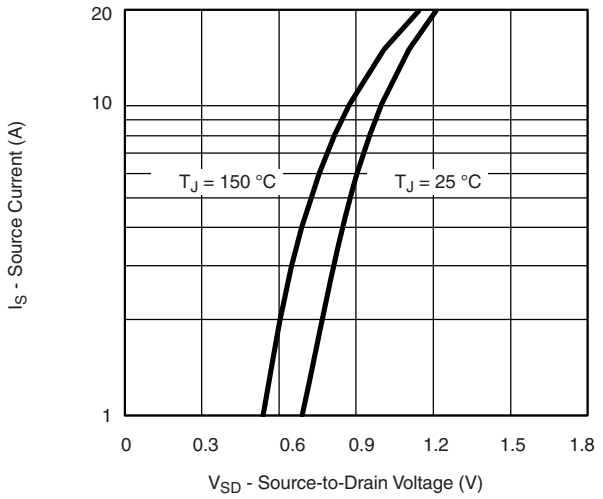
MOSFET TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



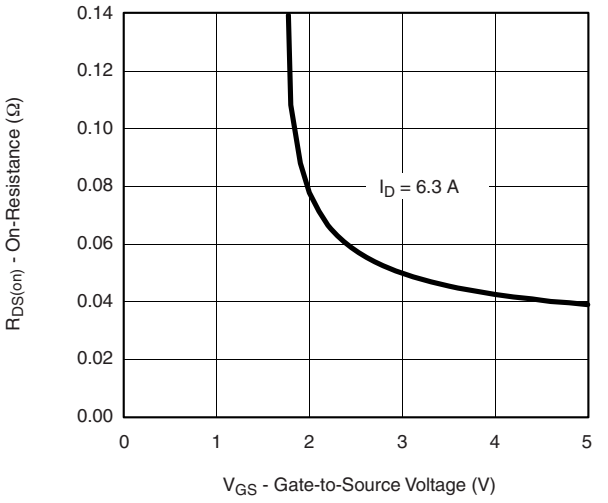
Gate Charge



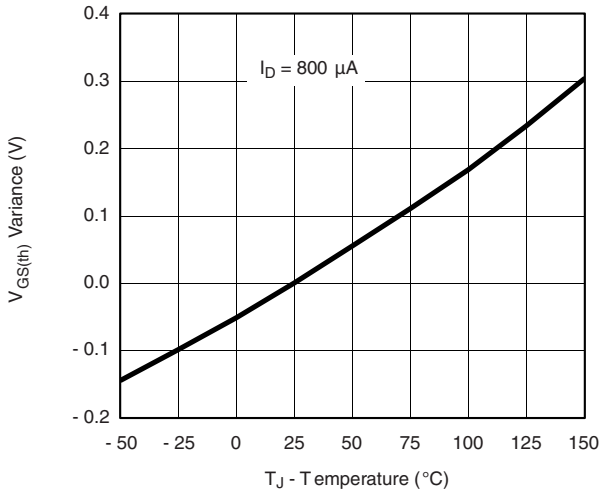
On-Resistance vs. Junction Temperature



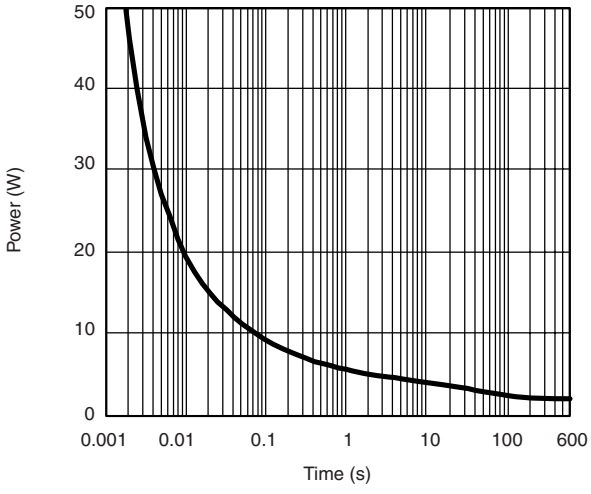
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

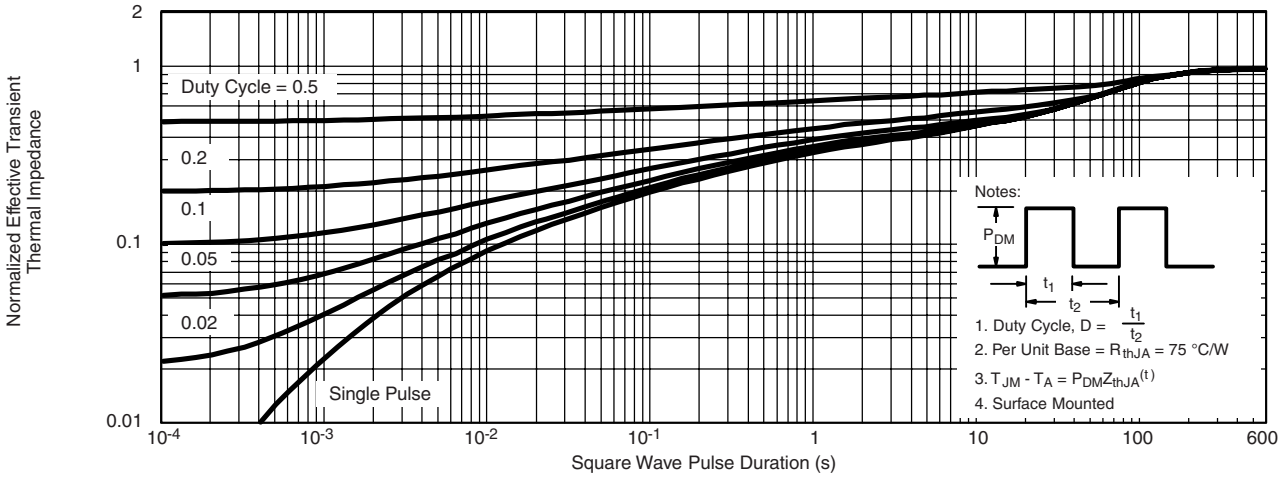


Threshold Voltage

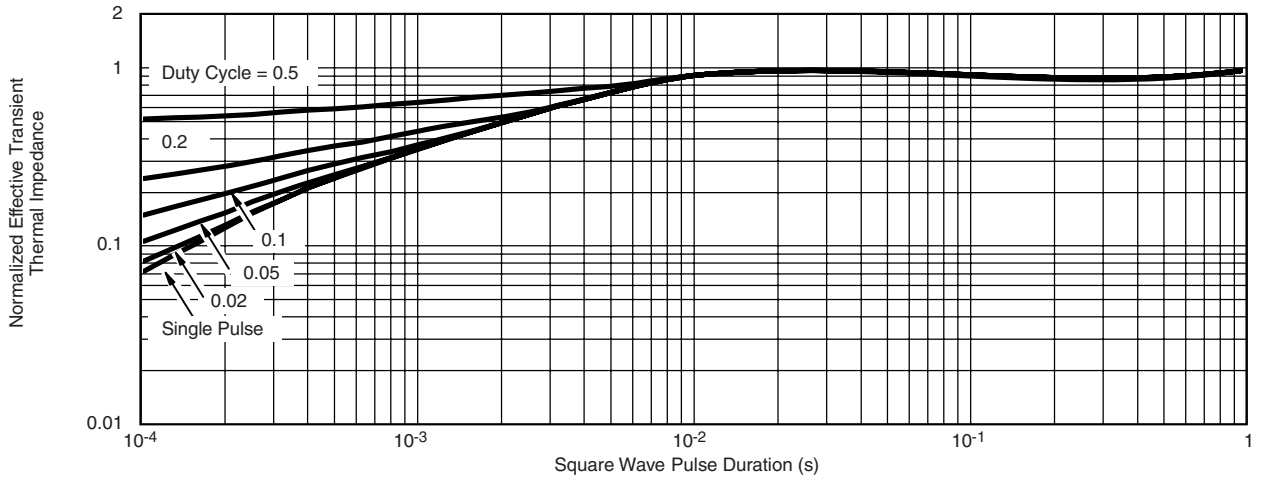


Single Pulse Power, Junction-to-Ambient

MOSFET TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted

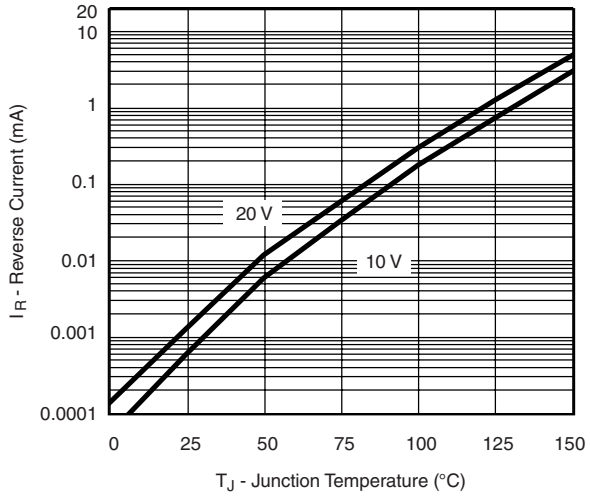


Normalized Thermal Transient Impedance, Junction-to-Ambient

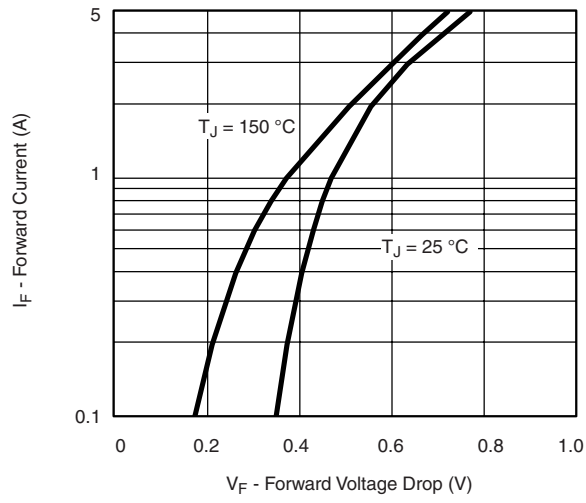


Normalized Thermal Transient Impedance, Junction-to-Case

SCHOTTKY TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted

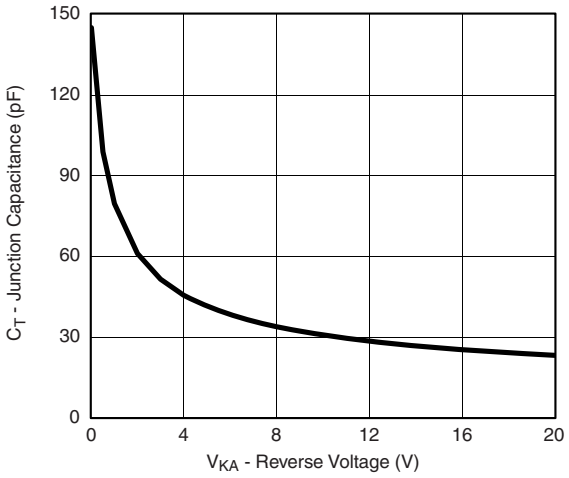


Reverse Current vs. Junction Temperature

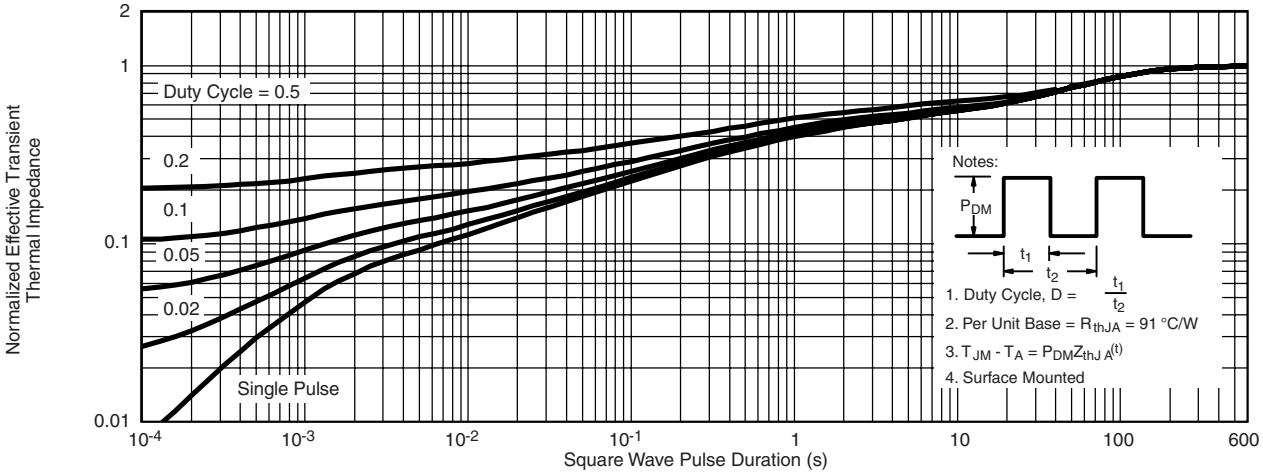


Forward Voltage Drop

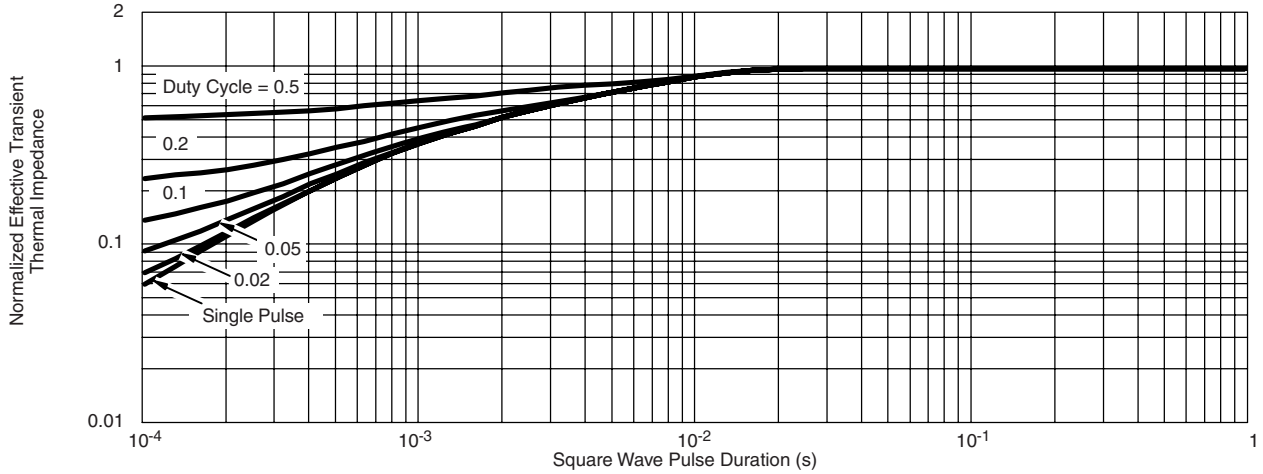
SCHOTTKY TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



Capacitance



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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