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

MOSFET PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 20	0.110 at V_{GS} = - 4.5 V	- 3.6
	0.160 at V_{GS} = - 2.5 V	- 3.0
	0.240 at V_{GS} = - 1.8 V	- 2.4

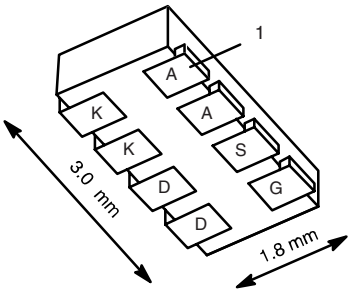
SCHOTTKY PRODUCT SUMMARY		
V_{KA} (V)	V_f (V) Diode Forward Voltage	I_F (A)
20	0.48 V at 0.5 A	1.0

FEATURES

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

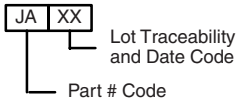
Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

1206-8 ChipFET®

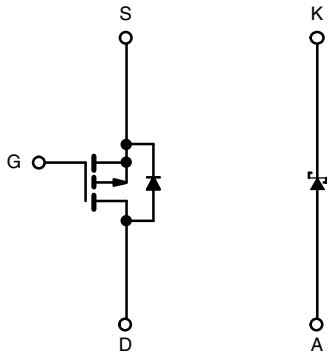


Bottom View

Marking Code



Ordering Information: Si5853DC-T1-E3 (Lead (Pb)-free)
Si5853DC-T1-GE3 (Lead (Pb)-free and Halogen-free)



P-Channel MOSFET

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}	- 20		V
Reverse Voltage (Schottky)		V_{KA}	20		V
Gate-Source Voltage (MOSFET)		V_{GS}	± 8	± 8	
Continuous Drain Current (T_J = 150 °C) (MOSFET)[a]	T_A = 25 °C	I_D	- 3.6	- 2.7	A
	T_A = 85 °C		- 2.6	- 1.9	
Pulsed Drain Current (MOSFET)		I_{DM}	- 10		
Continuous Source Current (MOSFET Diode Conduction)[a]		I_S	- 1.8	- 0.9	
Average Forward Current (Schottky)		I_F	1.0		
Pulsed Forward Current (Schottky)		I_{FM}	7		
Maximum Power Dissipation (MOSFET)[a]	T_A = 25 °C	P_D	2.1	1.1	W
	T_A = 85 °C		1.1	0.6	
Maximum Power Dissipation (Schottky)[a]	T_A = 25 °C		1.3	0.96	
	T_A = 85 °C		0.68	0.59	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150		°C
Soldering Recommendations (Peak Temperature)[b, c]			260		

Notes:
a. Surface mounted on 1" x 1" FR4 board.
b. 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.
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 ≤ 5 s	MOSFET	R_{thJA}	50	60	°C/W
		Schottky		77	95	
	Steady State	MOSFET		90	110	
		Schottky		110	130	
Junction-to-Foot	Steady State	MOSFET	R_{thJF}	30	40	
		Schottky		33	40	

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 = - 250 µA	- 0.45		- 1.0	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 8 V			± 100	nA
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]	$I_{D(on)}$	$V_{DS} \leq -5$ V, V_{GS} = - 4.5 V	- 10			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 4.5 V, I_D = - 2.7 A		0.095	0.110	Ω
		V_{GS} = - 2.5 V, I_D = - 2.2 A		0.137	0.160	
		V_{GS} = - 1.8 V, I_D = - 1 A		0.205	0.240	
Forward Transconductance[a]	g_{fs}	V_{DS} = - 10 V, I_D = - 2.7 A		7		S
Diode Forward Voltage[a]	V_{SD}	I_S = - 0.9 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 = - 2.7 A		5.1	7.7	nC
Gate-Source Charge	Q_{gs}			1.2		
Gate-Drain Charge	Q_{gd}			1.0		
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 10 Ω $I_D \cong$ - 1 A, V_{GEN} = - 4.5 V, R_g = 6 Ω		16	25	ns
Rise Time	t_r			30	45	
Turn-Off Delay Time	$t_{d(off)}$			30	45	
Fall Time	t_f			27	40	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = - 0.9 A, dI/dt = 100 A/µs		20	40	

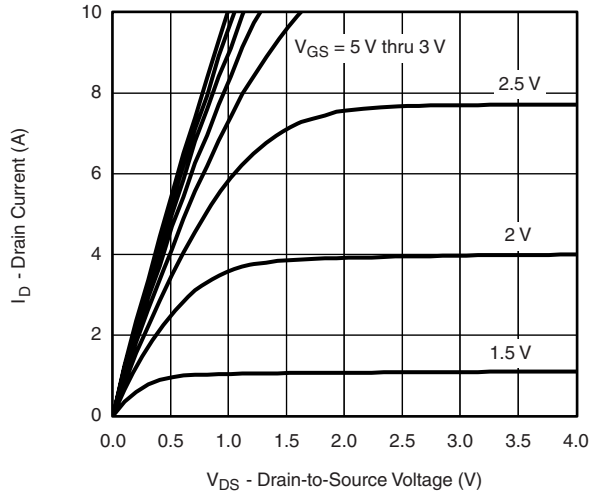
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

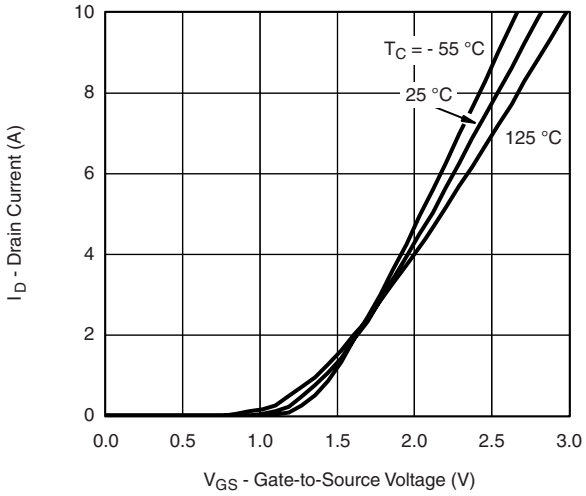
SCHOTTKY SPECIFICATIONS T_J = 25 °C, unless otherwise noted

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

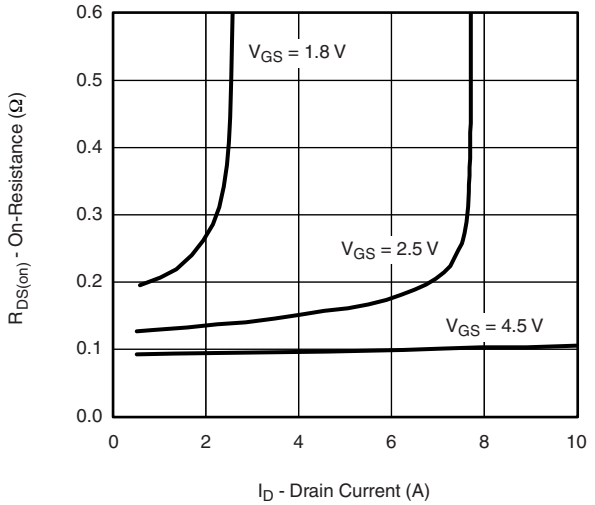
MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



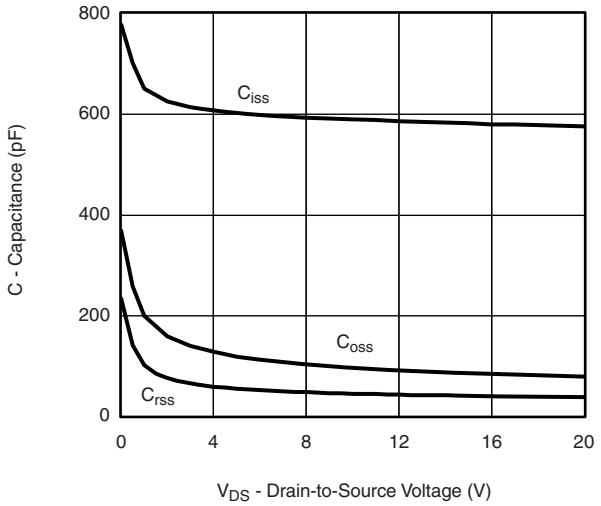
Output Characteristics



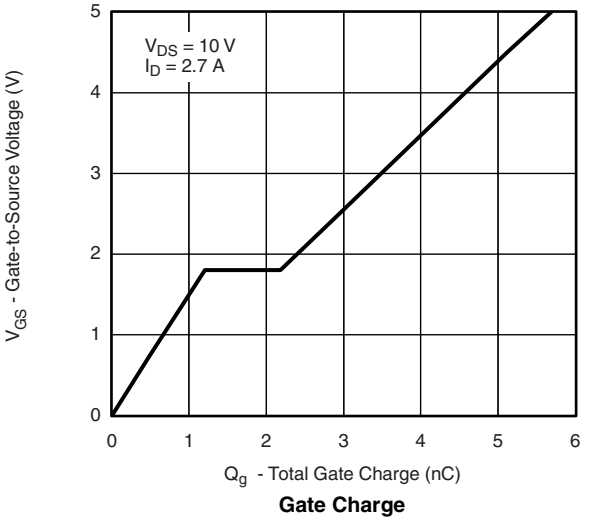
Transfer Characteristics



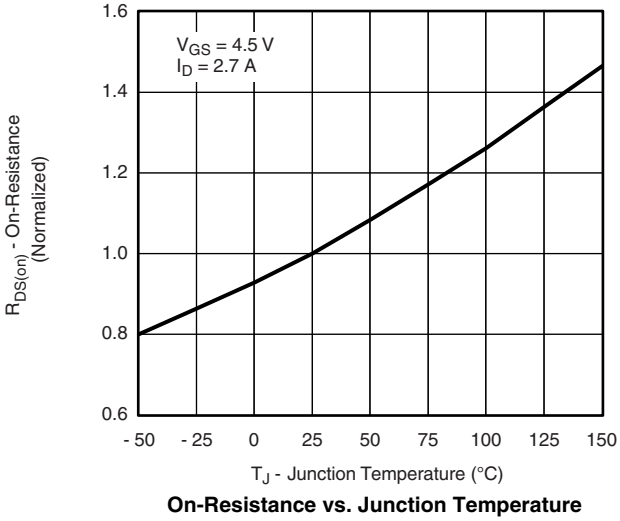
On-Resistance vs. Drain Current



Capacitance

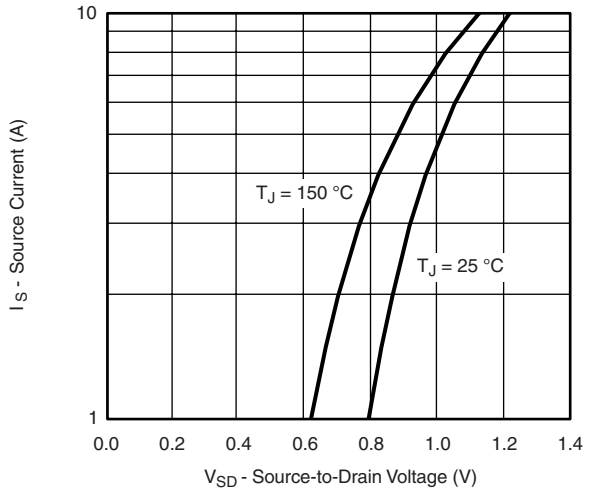


Gate Charge

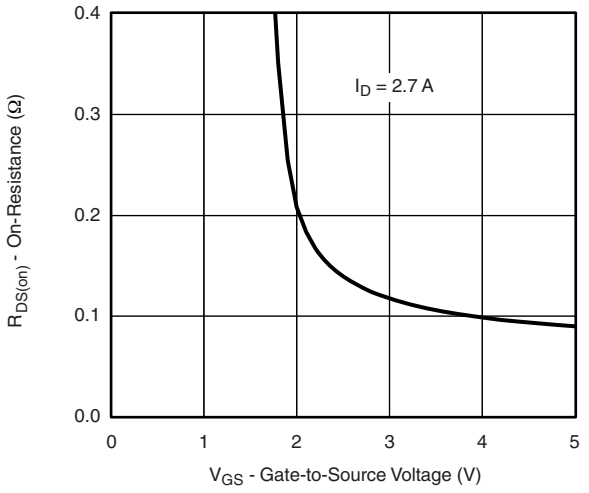


On-Resistance vs. Junction Temperature

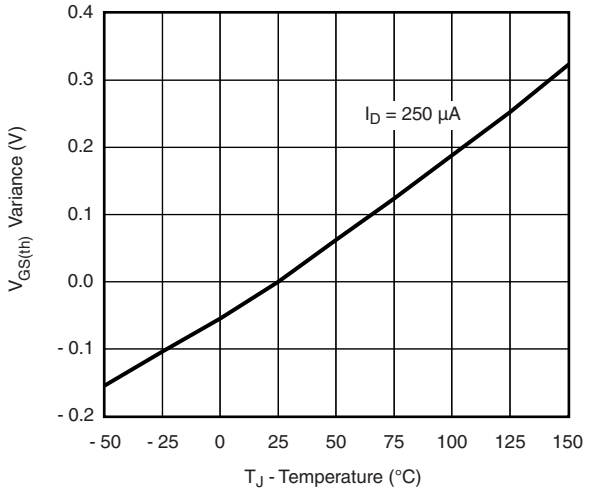
MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



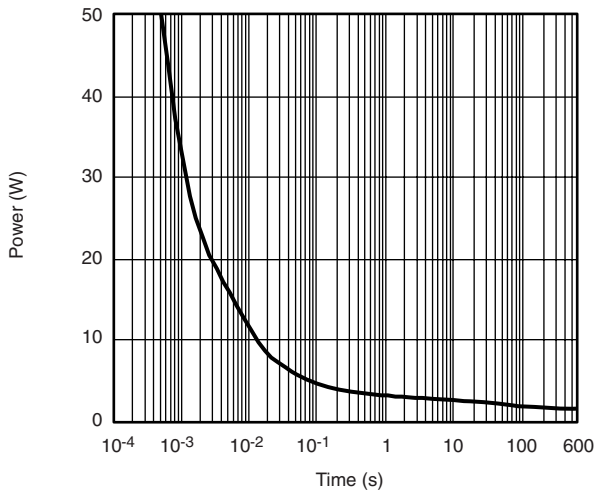
Source-Drain Diode Forward Voltage



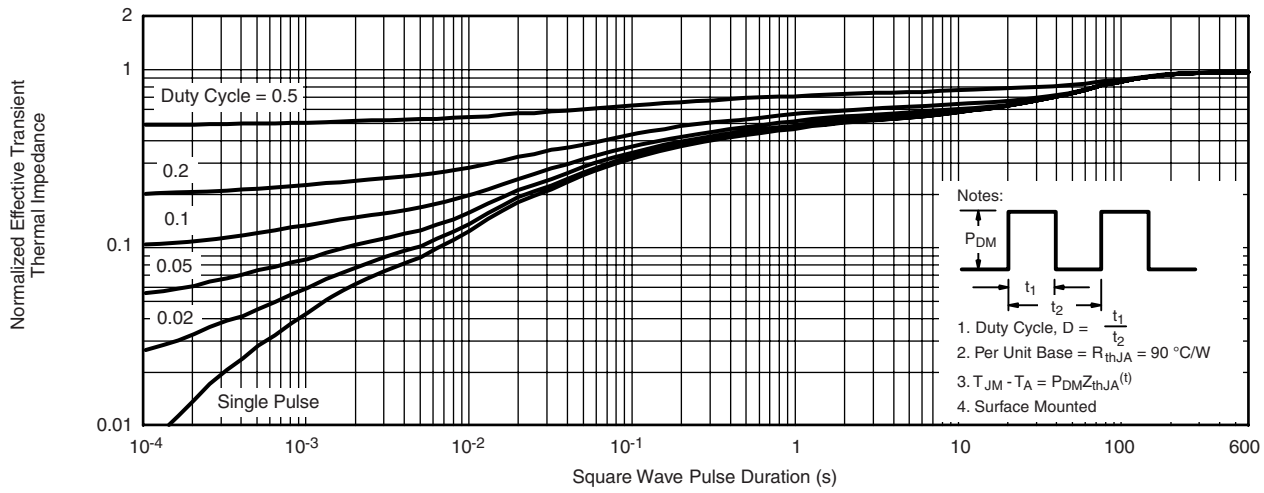
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

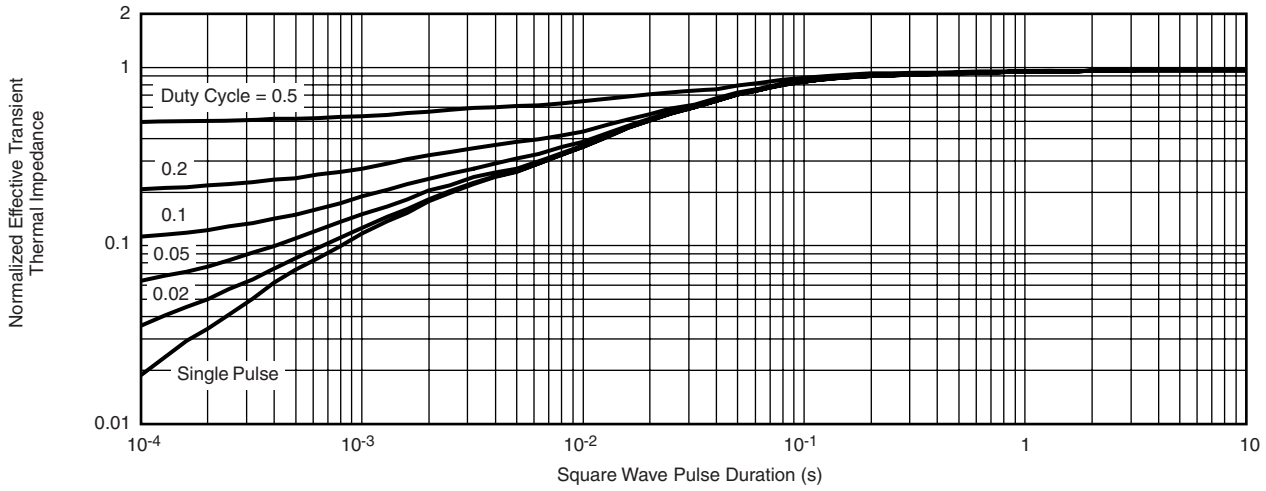


Single Pulse Power



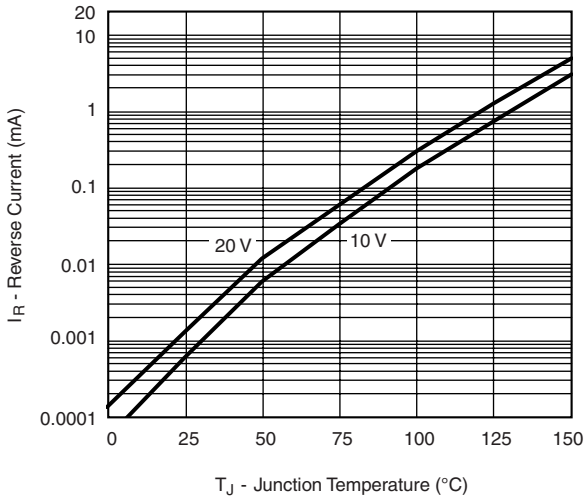
Normalized Thermal Transient Impedance, Junction-to-Ambient

MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

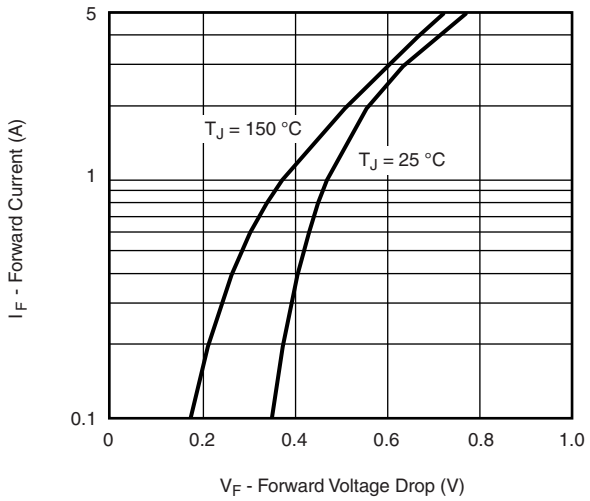


Normalized Thermal Transient Impedance, Junction-to-Foot

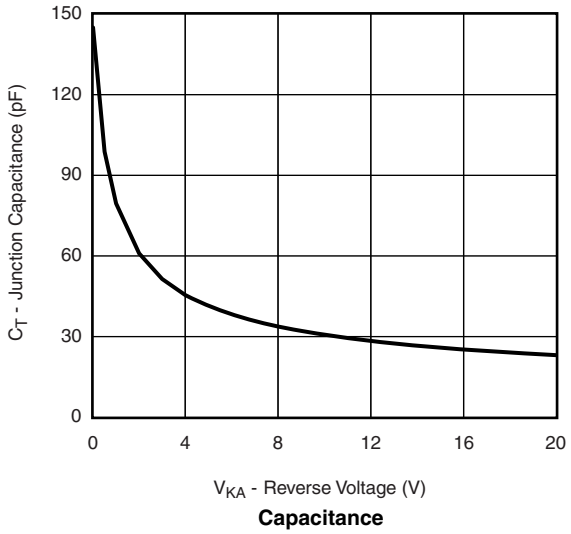
SCHOTTKY TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Reverse Current vs. Junction Temperature

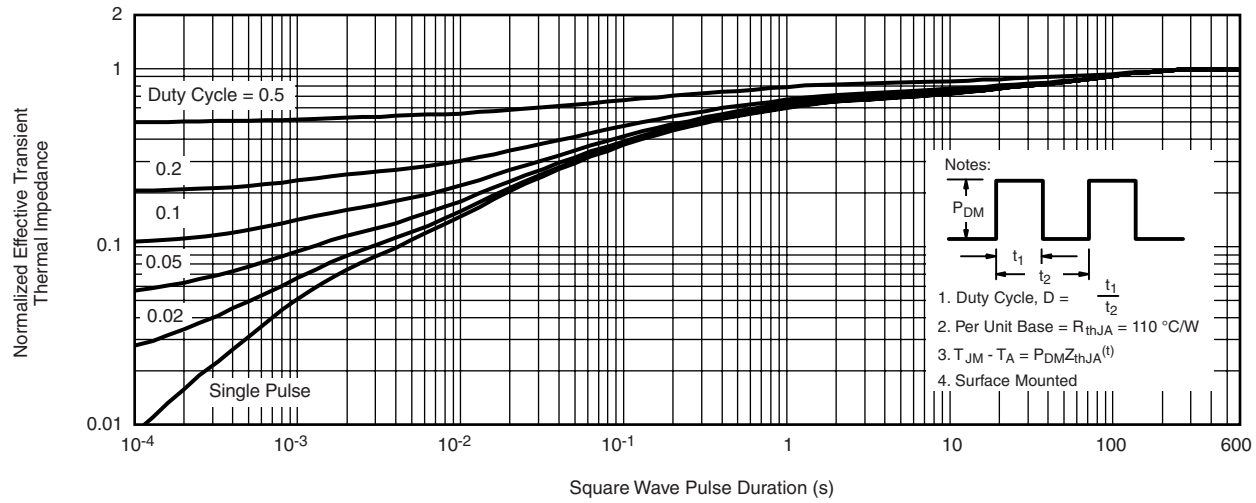


Forward Voltage Drop

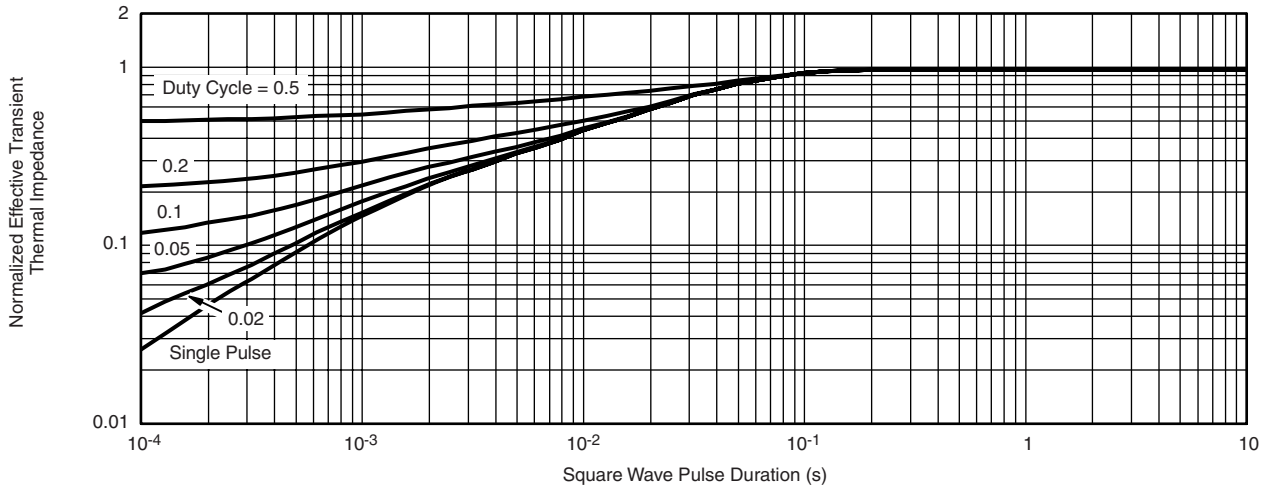


Capacitance

SCHOTTKY 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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