

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	0.375 V at 1 A	1.0

FEATURES

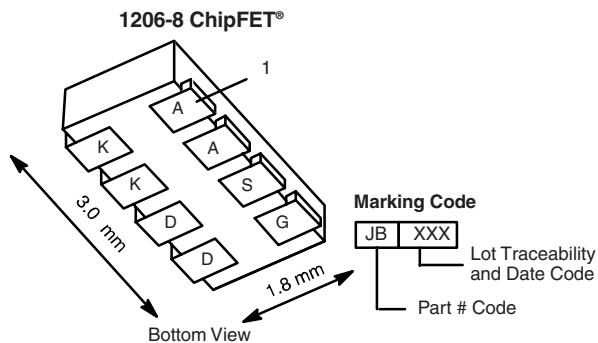
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFETs
- Ultra Low V_f Schottky
- Si5853DC Pin Compatible
- Compliant to RoHS Directive 2002/95/EC



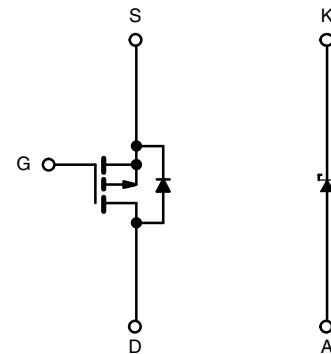
RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Charging Circuit in Portable Devices



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



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

Parameter		Symbol	5 s	Steady State	Unit
Drain-Source Voltage (MOSFET)		V _{DS}	- 20		V
Reverse Voltage (Schottky)		V _{KA}	20		
Gate-Source Voltage (MOSFET)		V _{GS}	± 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		1.9	1.1	
	T _A = 85 °C		1.0	0.56	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 150		°C
Soldering Recommendations (Peak Temperature) ^{b, c}			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 ^a	$t \leq 5 \text{ s}$	MOSFET	R_{thJA}	50	60	$^{\circ}\text{C/W}$
		Schottky		54	65	
	Steady State	MOSFET		90	110	
		Schottky		95	115	
Junction-to-Foot	Steady State	MOSFET	R_{thJF}	30	40	
		Schottky		30	40	

Notes:

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

MOSFET SPECIFICATIONS $T_J = 25^{\circ}\text{C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250 \mu\text{A}$	- 0.45		- 1.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0 \text{ V}$, $V_{GS} = \pm 8 \text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20 \text{ V}$, $V_{GS} = 0 \text{ V}$			- 1	μA
		$V_{DS} = -20 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 85^{\circ}\text{C}$			- 5	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq -5 \text{ V}$, $V_{GS} = -4.5 \text{ V}$	- 10			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5 \text{ V}$, $I_D = -2.7 \text{ A}$		0.095	0.110	Ω
		$V_{GS} = -2.5 \text{ V}$, $I_D = -2.2 \text{ A}$		0.137	0.160	
		$V_{GS} = -1.8 \text{ V}$, $I_D = -1 \text{ A}$		0.205	0.240	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10 \text{ V}$, $I_D = -2.7 \text{ A}$		7		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -0.9 \text{ A}$, $V_{GS} = 0 \text{ V}$		- 0.8	- 1.2	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -10 \text{ V}$, $V_{GS} = -4.5 \text{ V}$, $I_D = -2.7 \text{ A}$		5.1	7.7	nC
Gate-Source Charge	Q_{gs}			1.2		
Gate-Drain Charge	Q_{gd}			1.0		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10 \text{ V}$, $R_L = 10 \Omega$ $I_D \equiv -1 \text{ A}$, $V_{GEN} = -4.5 \text{ V}$, $R_g = 6 \Omega$		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}	$I_F = -0.9 \text{ A}$, $dI/dt = 100 \text{ A}/\mu\text{s}$		20	40	

Notes:

a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.

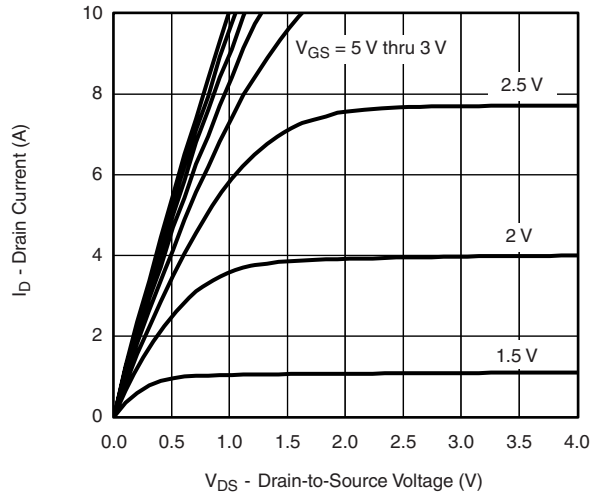
b. Guaranteed by design, not subject to production testing.

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.

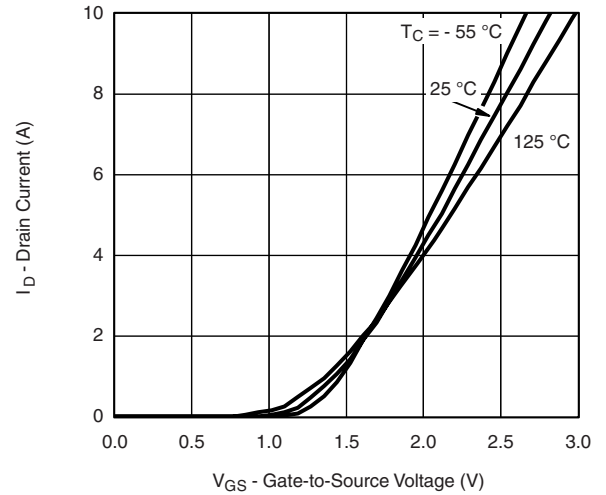
SCHOTTKY SPECIFICATIONS $T_J = 25^{\circ}\text{C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	V_F	$I_F = 1 \text{ A}$		0.34	0.375	V
		$I_F = 1 \text{ A}$, $T_J = 125^{\circ}\text{C}$		0.255	0.290	
Maximum Reverse Leakage Current	I_{rm}	$V_r = 20 \text{ V}$		0.05	0.500	mA
		$V_r = 20 \text{ V}$, $T_J = 85^{\circ}\text{C}$		2	20	
		$V_r = 20 \text{ V}$, $T_J = 125^{\circ}\text{C}$		10	100	
Junction Capacitance	C_T	$V_r = 10 \text{ V}$		90		pF

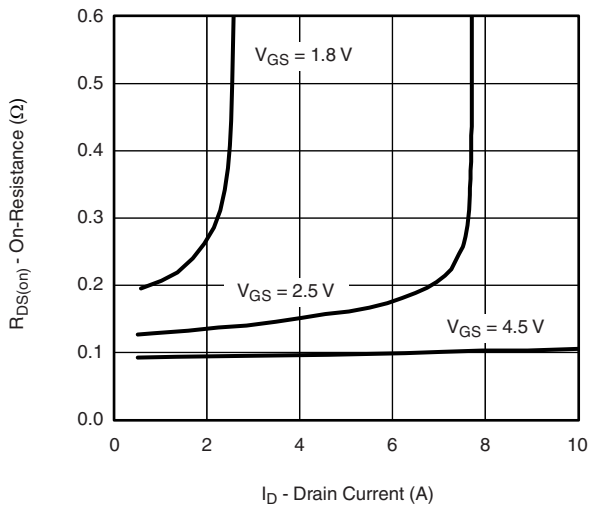
MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



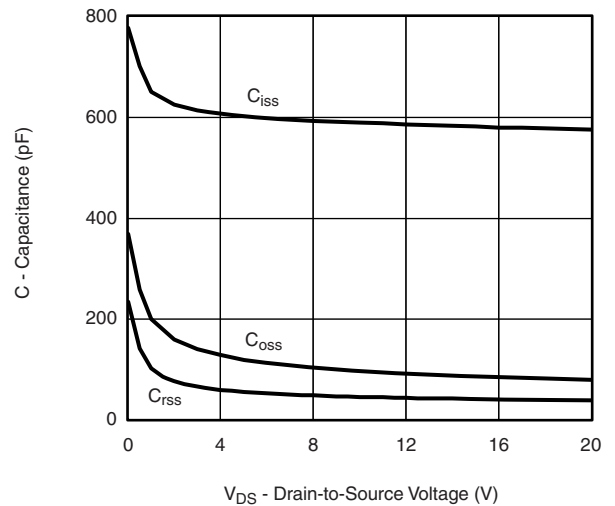
Output Characteristics



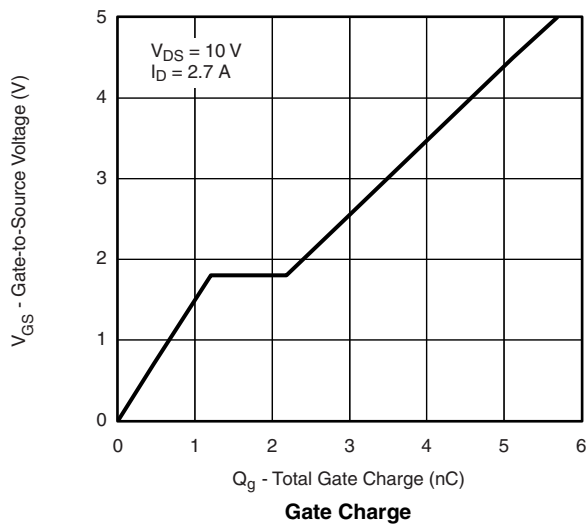
Transfer Characteristics



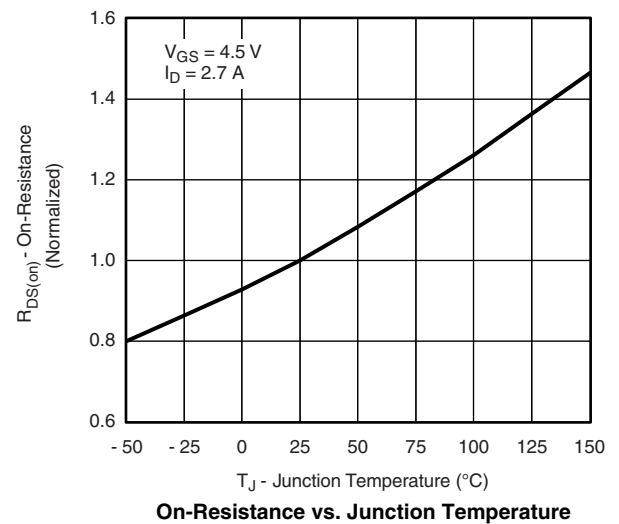
On-Resistance vs. Drain Current



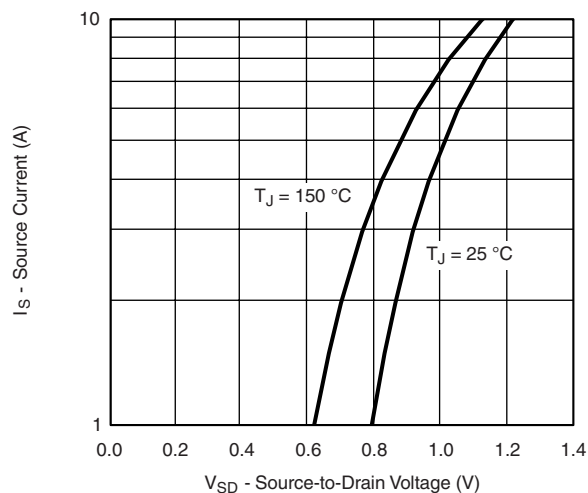
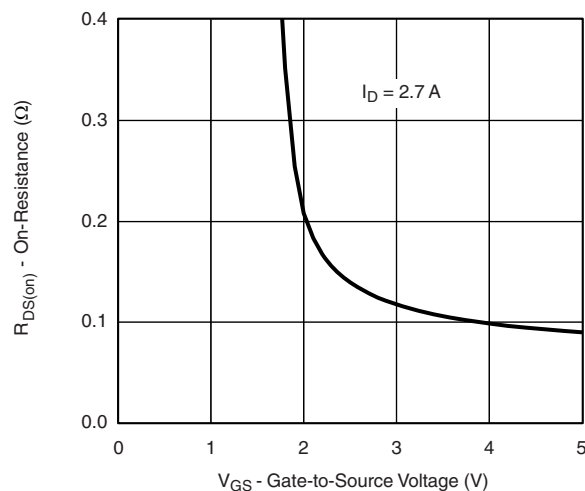
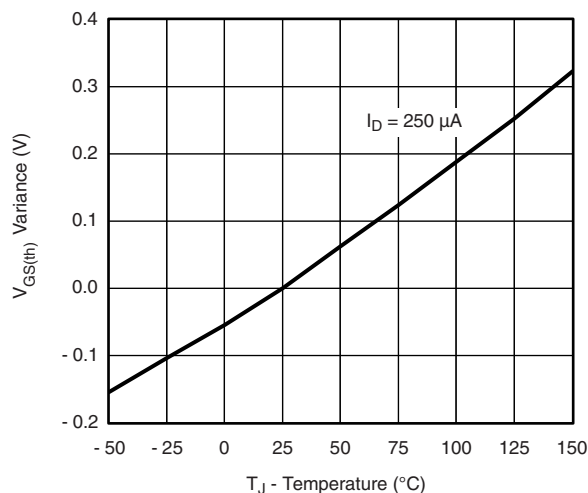
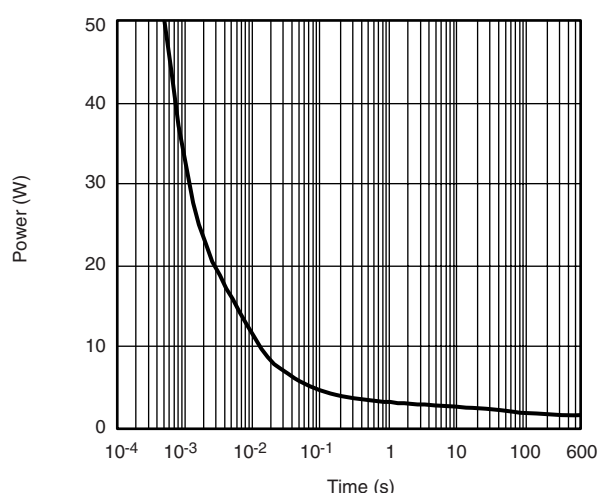
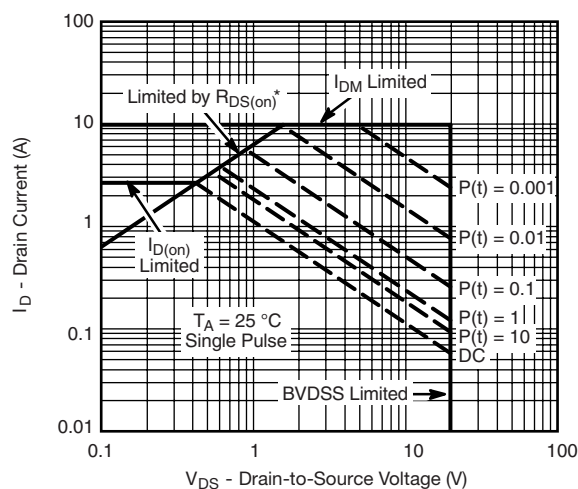
Capacitance



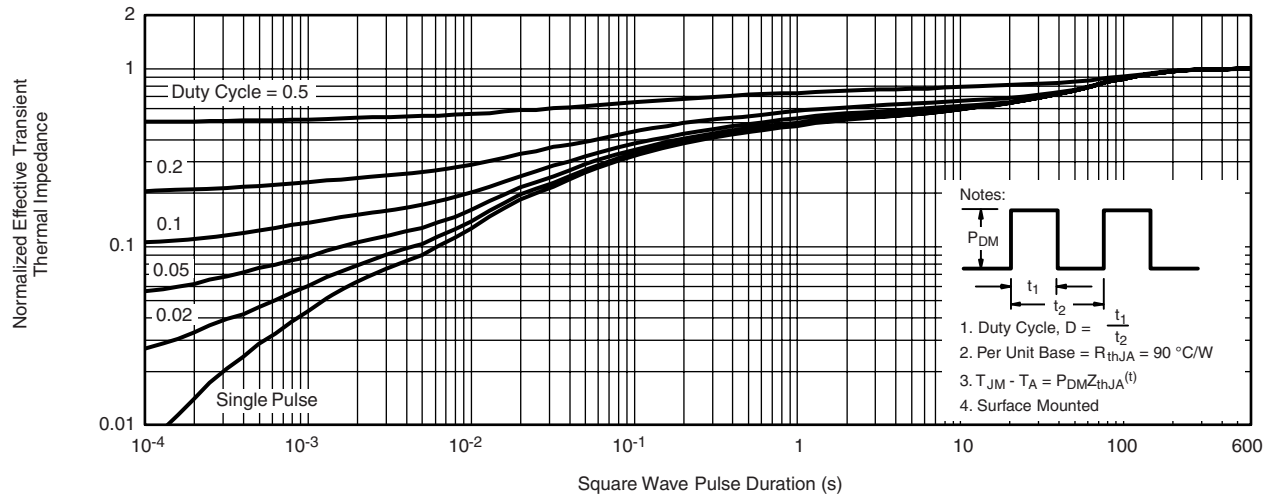
Gate Charge



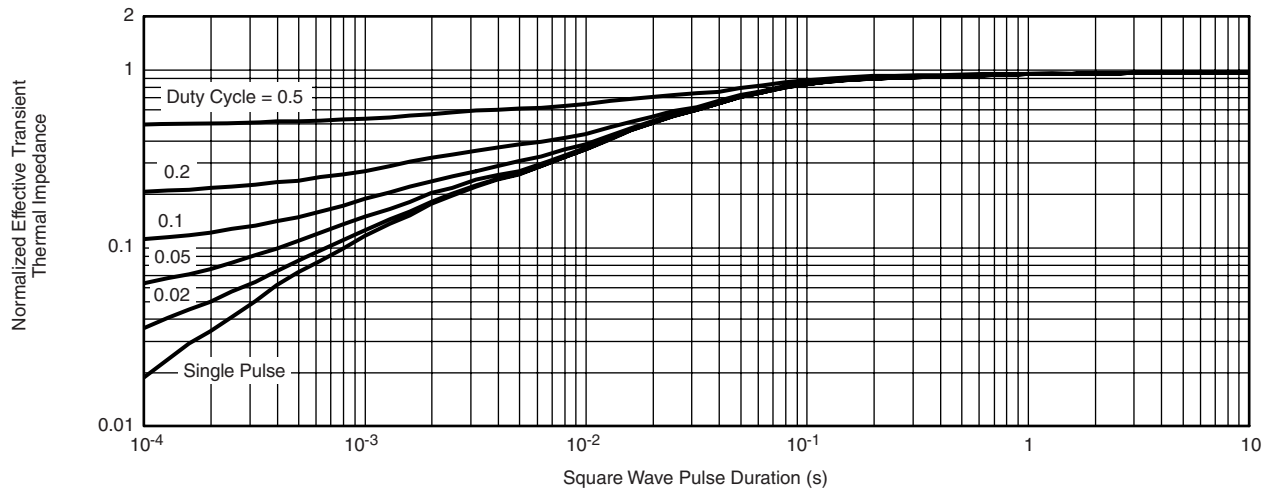
On-Resistance vs. Junction Temperature

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

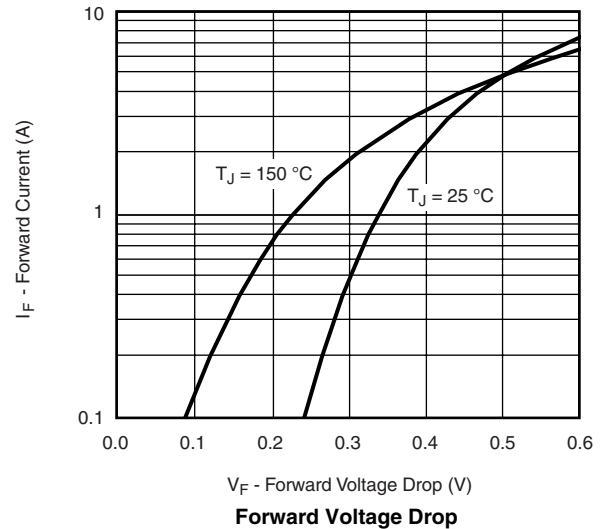
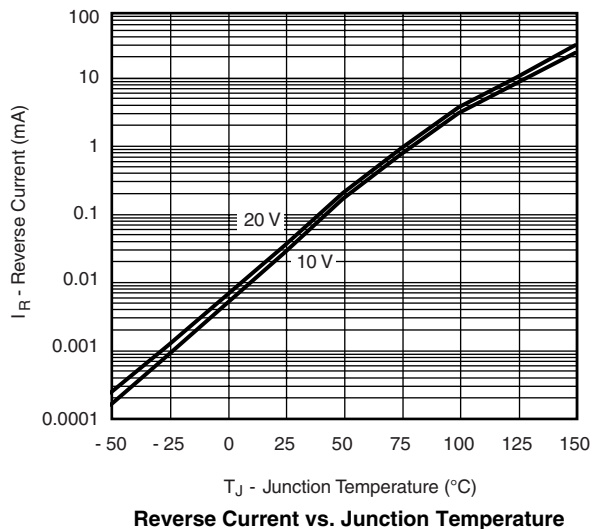


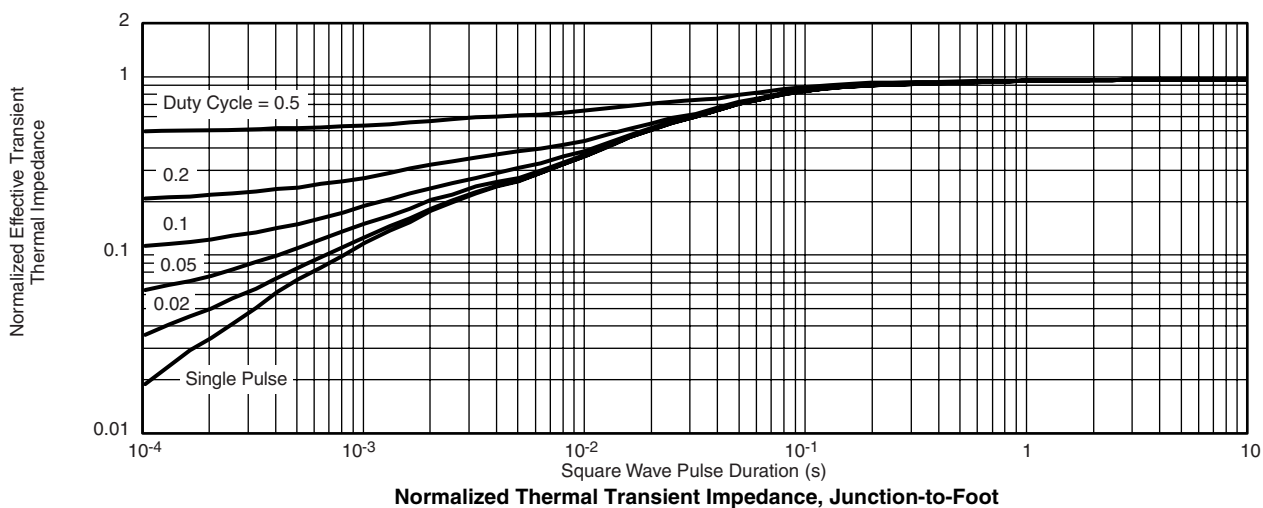
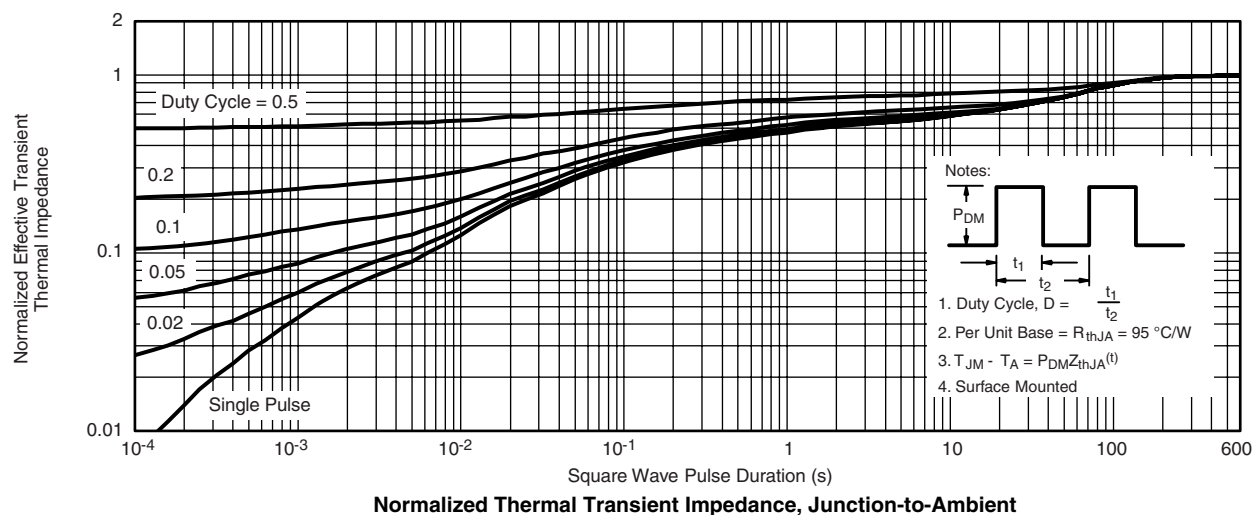
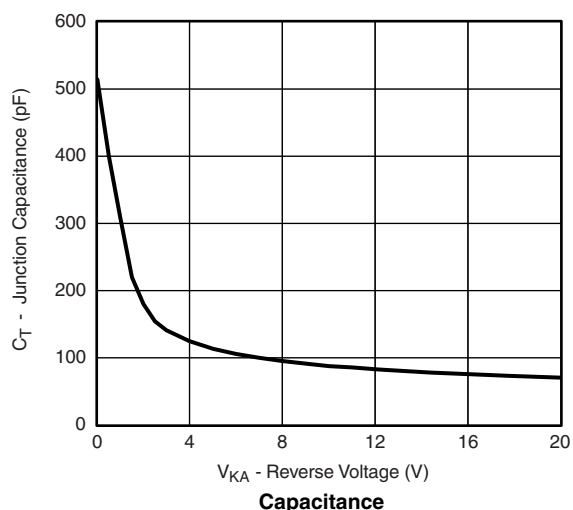
Normalized Thermal Transient Impedance, Junction-to-Ambient



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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