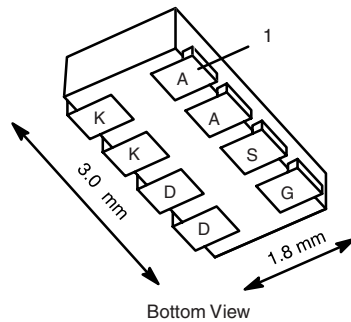


P-Channel 20-V (D-S) MOSFET With Schottky Diode

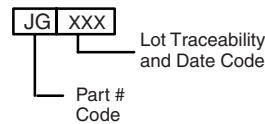
MOSFET PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
- 20	0.144 at $V_{GS} = -4.5$ V	- 3.7	4.1 nC
	0.180 at $V_{GS} = -2.5$ V	- 3.3	
	0.222 at $V_{GS} = -1.8$ V	- 3.0	

SCHOTTKY PRODUCT SUMMARY		
V_{KA} (V)	V_f (V) Diode Forward Voltage	I_F (A) ^a
20	0.375 at 1 A	1

1206-8 ChipFET®



Marking Code



Ordering Information: Si5855CDC-T1-E3 (Lead (Pb)-free)

FEATURES

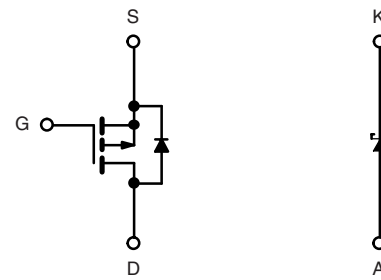
- LITTLE FOOT® Plus Power MOSFET
- Ultra Low V_F Schottky



RoHS
COMPLIANT

APPLICATIONS

- Charging Switch for Portable Devices
- With Integrated Low V_F Trench Schottky Diode



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted				
Parameter		Symbol	Limit	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 ($T_J = 150\text{ }^{\circ}\text{C}$) (MOSFET)	$T_C = 25\text{ }^{\circ}\text{C}$	I_D	- 3.7 ^a	A
	$T_C = 70\text{ }^{\circ}\text{C}$		- 3.0	
	$T_A = 25\text{ }^{\circ}\text{C}$		- 2.5 ^{b, c}	
	$T_A = 70\text{ }^{\circ}\text{C}$		- 2.0 ^{b, c}	
Pulsed Drain Current (MOSFET)		I_{DM}	- 10	
Continuous Source Current (MOSFET Diode Conduction)	$T_C = 25\text{ }^{\circ}\text{C}$	I_S	- 2.3 ^a	
	$T_A = 25\text{ }^{\circ}\text{C}$		- 1.1 ^{b, c}	
Average Forward Current (Schottky)		I_F	1	
Pulsed Forward Current (Schottky)		I_{FM}	7	
Maximum Power Dissipation (MOSFET)	$T_C = 25\text{ }^{\circ}\text{C}$	P_D	2.8	W
	$T_C = 70\text{ }^{\circ}\text{C}$		1.8	
	$T_A = 25\text{ }^{\circ}\text{C}$		1.3 ^{b, c}	
	$T_A = 70\text{ }^{\circ}\text{C}$		0.8 ^{b, c}	
Maximum Power Dissipation (Schottky)	$T_C = 25\text{ }^{\circ}\text{C}$	P_D	3.1	W
	$T_C = 70\text{ }^{\circ}\text{C}$		2.0	
	$T_A = 25\text{ }^{\circ}\text{C}$		1.9	
	$T_A = 70\text{ }^{\circ}\text{C}$		1.2	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	$^{\circ}\text{C}$
Soldering Recommendation (Peak Temperature) ^{d, e}			260	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient (MOSFET) ^{b, c, f}	R_{thJA}	82	99	°C/W
Maximum Junction-to-Foot (Drain) (MOSFET)	R_{thJF}	35	45	
Maximum Junction-to-Ambient (Schottky) ^{b, c, g}	R_{thJA}	54	65	
Maximum Junction-to-Foot (Drain) (Schottky)	R_{thJF}	30	40	

Notes:

a. Based on $T_C = 25^\circ\text{C}$.

b. Surface Mounted on FR4 board.

c. $t \leq 5$ s.

d. See Solder Profile (<http://www.vishay.com/doc?73257>). The PowerPAK 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.

e. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

f. Maximum under Steady State conditions for MOSFETS is 130°C/W .g. Maximum under Steady State conditions for Schottky is 115°C/W .**SPECIFICATIONS** $T_J = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		- 19		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			2		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 0.45		- 1	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			± 100	ns
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}, T_J = 55^\circ\text{C}$			- 10	
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	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -2.5\text{ A}$		0.120	0.144	Ω
		$V_{GS} = -2.5\text{ V}, I_D = -2.2\text{ A}$		0.150	0.180	
		$V_{GS} = -1.8\text{ V}, I_D = -2.0\text{ A}$		0.185	0.222	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -2.5\text{ A}$		18		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		276		pF
Output Capacitance	C_{oss}			60		
Reverse Transfer Capacitance	C_{rss}			43		
Total Gate Charge	Q_g	$V_{DS} = -10\text{ V}, V_{GS} = -5\text{ V}, I_D = -2.5\text{ A}$		4.5	6.8	nC
Gate-Source Charge	Q_{gs}	$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -2.5\text{ A}$		4.1	6.2	
Gate-Drain Charge	Q_{gd}			0.6		
Gate Resistance	R_g			1.0		
Turn-On Delay Time	$t_{d(on)}$	$f = 1\text{ MHz}$	1.1	5.5	11	Ω
Rise Time	t_r			11	17	
Turn-Off Delay Time	$t_{d(off)}$			34	51	
Fall Time	t_f			22	33	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 5\text{ }\Omega$ $I_D \cong -2\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		8	16	ns
Rise Time	t_r			5	10	
Turn-Off Delay Time	$t_{d(off)}$			14	21	
Fall Time	t_f			17	26	
		$V_{DD} = -10\text{ V}, R_L = 5\text{ }\Omega$ $I_D \cong -2\text{ A}, V_{GEN} = -5\text{ V}, R_g = 1\text{ }\Omega$		8	16	

SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			- 2.3	A
Pulse Diode Forward Current	I_{SM}				- 10	
Body Diode Voltage	V_{SD}	$I_S = -2\text{ A}$, $V_{GS} = 0\text{ V}$		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -2\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $T_J = 25\text{ }^\circ\text{C}$		23	35	ns
Body Diode Reverse Recovery Charge	Q_{rr}			13	20	nC
Reverse Recovery Fall Time	t_a			10		ns
Reverse Recovery Rise Time	t_b			13		

Notes:

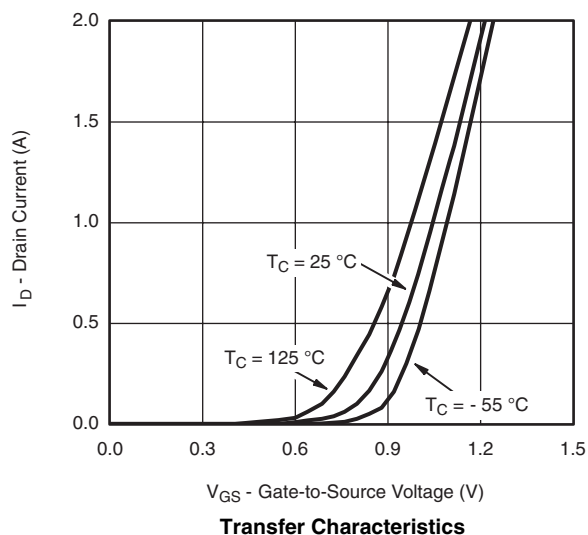
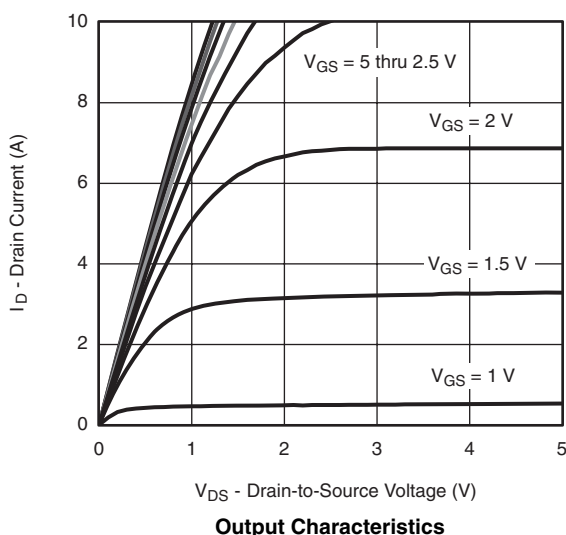
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

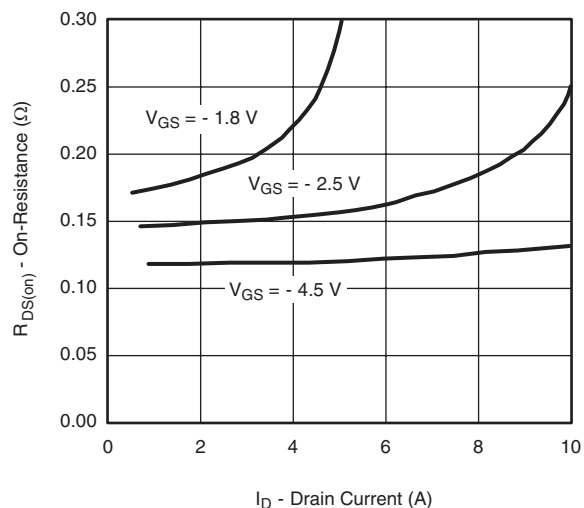
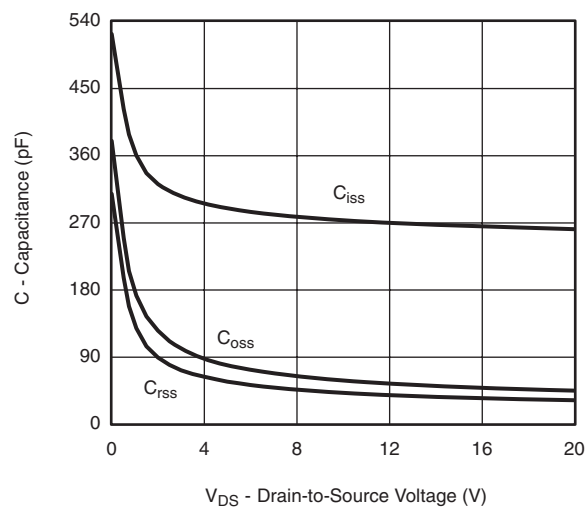
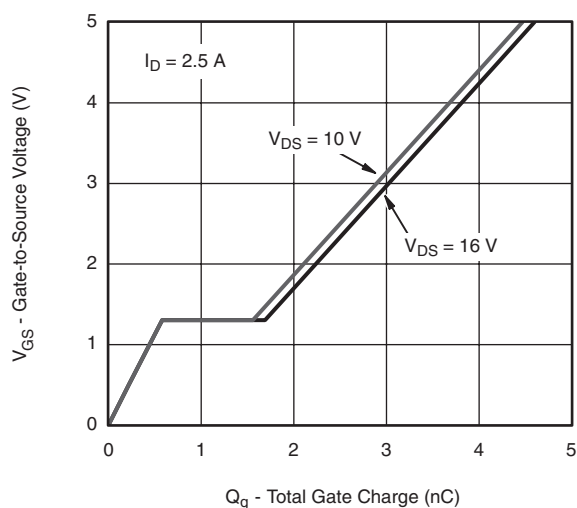
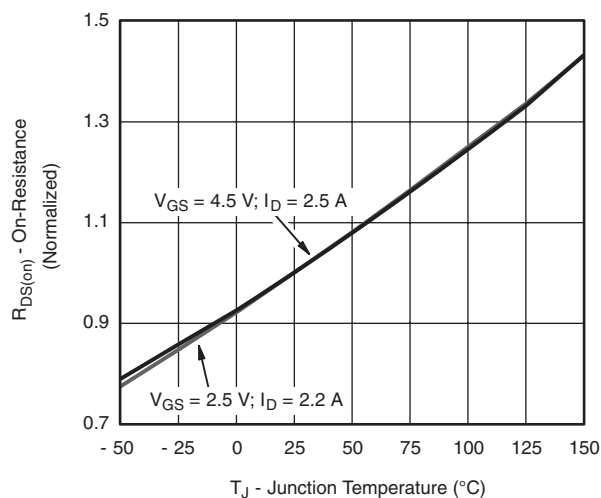
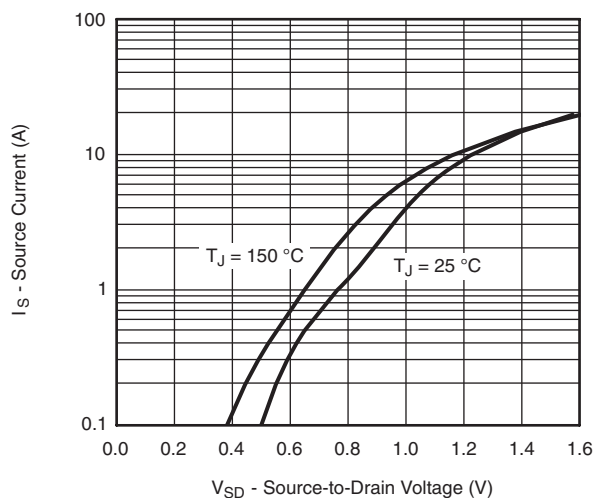
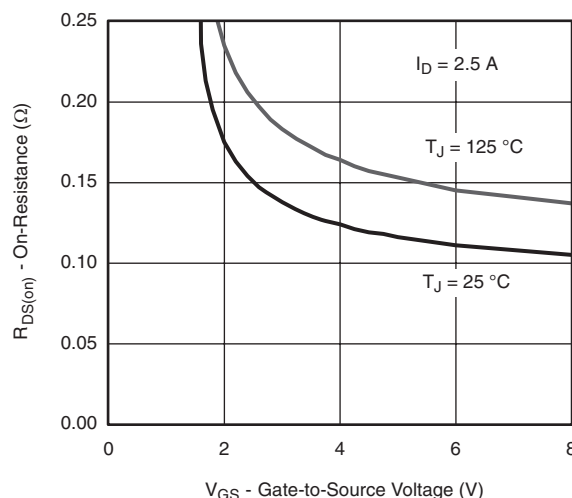
b. Guaranteed by design, not subject to production testing.

SCHOTTKY SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, 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
		$I_F = 1\text{ A}$, $T_J = 125\text{ }^\circ\text{C}$		0.255	0.290	
Maximum Reverse Leakage Current	I_{rm}	$V_r = 20\text{ V}$		0.05	0.500	mA
		$V_r = 20\text{ V}$, $T_J = 85\text{ }^\circ\text{C}$		2	20	
		$V_r = 20\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$		10	100	
Junction Capacitance	C_T	$V_r = 10\text{ V}$		90		pF

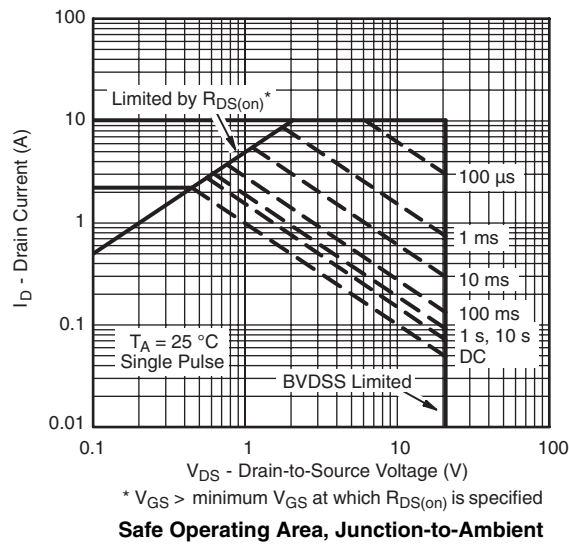
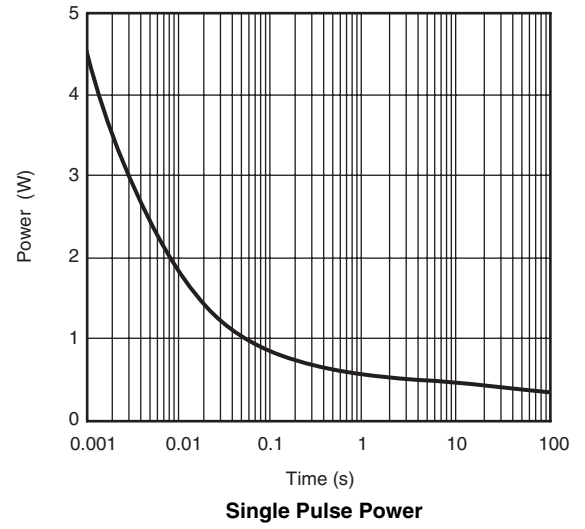
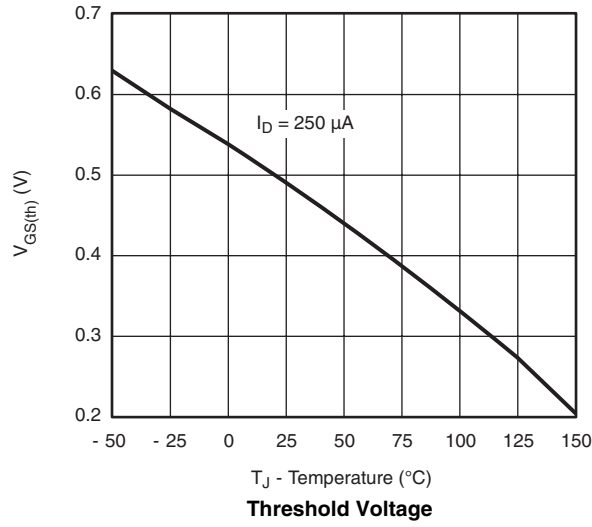
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

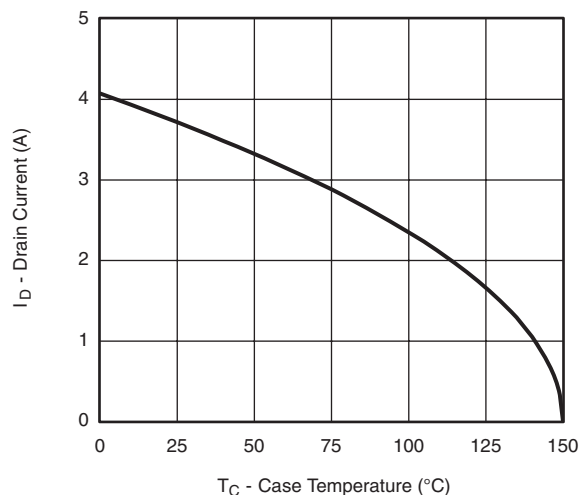
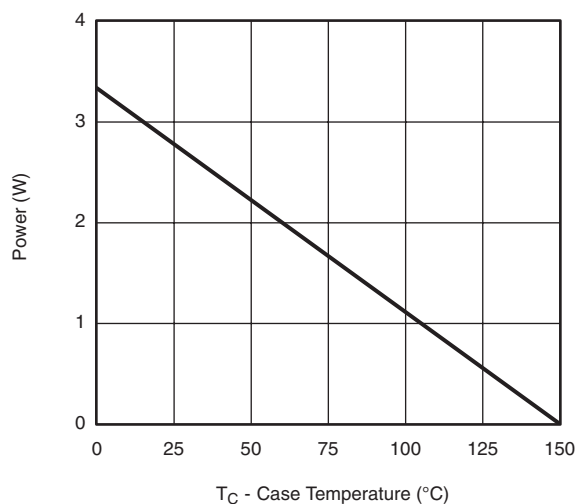
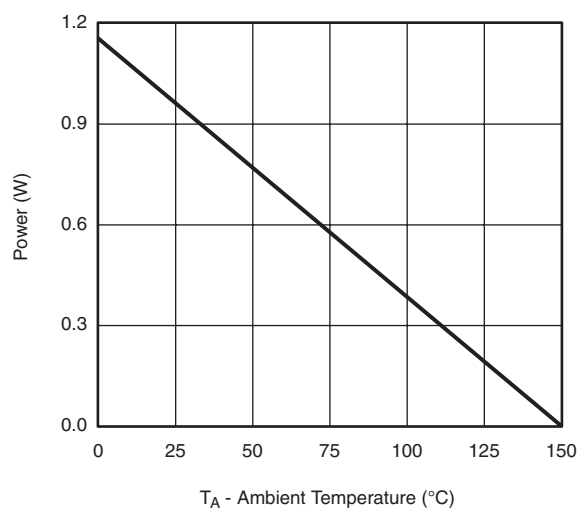
TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$, unless otherwise noted



TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**On Resistance vs. Drain Current****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature****Forward Diode Voltage vs. Temp.****On-Resistance vs. Gate-to-Source Voltage**

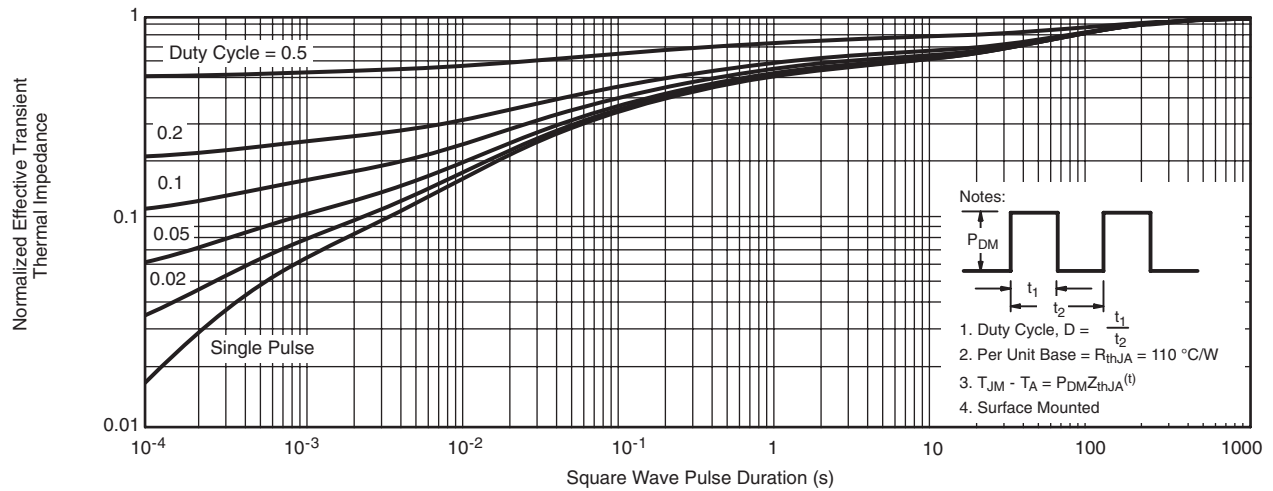
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



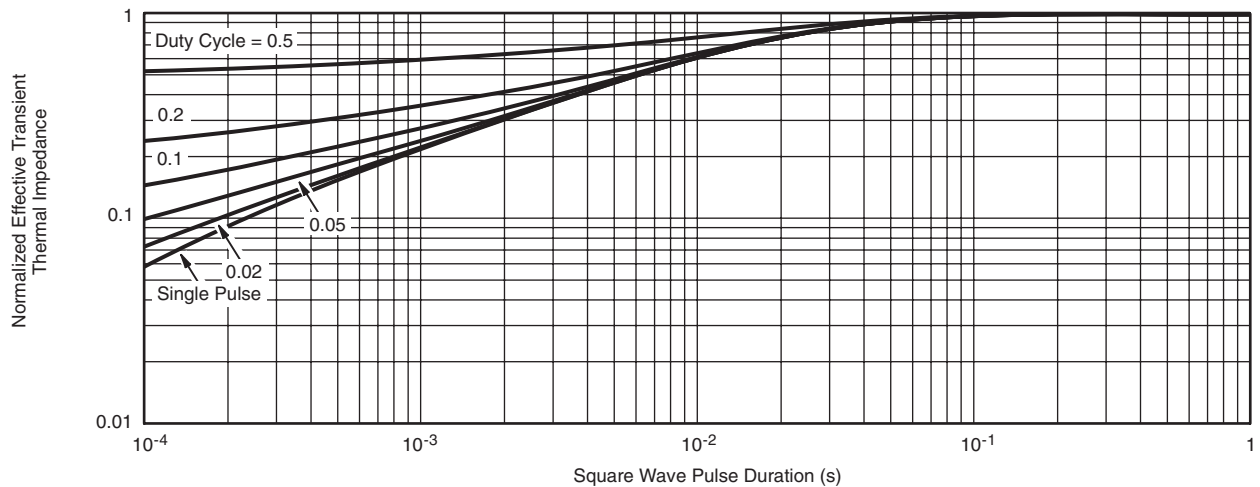
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**Current Derating*****Power, Junction-to-Foot****Power, Junction-to-Ambient**

* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

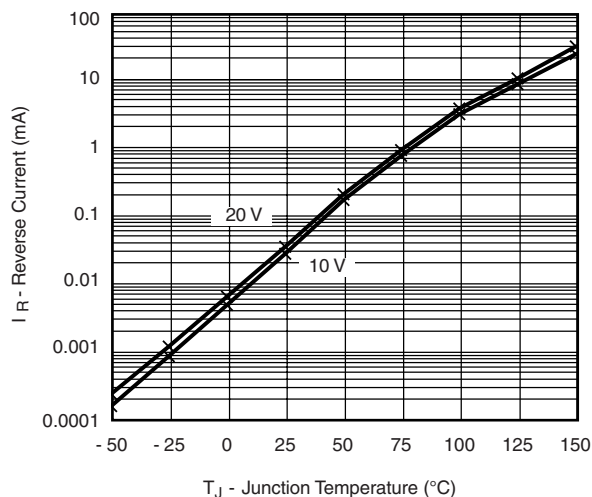


Normalized Thermal Transient Impedance, Junction-to-Ambient

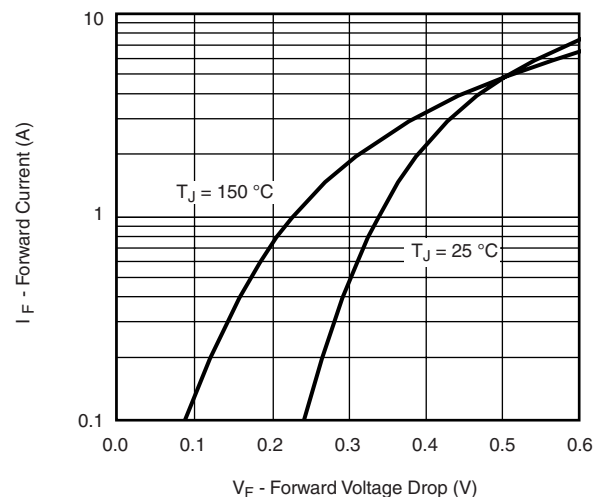


Normalized Thermal Transient Impedance, Junction-to-Foot

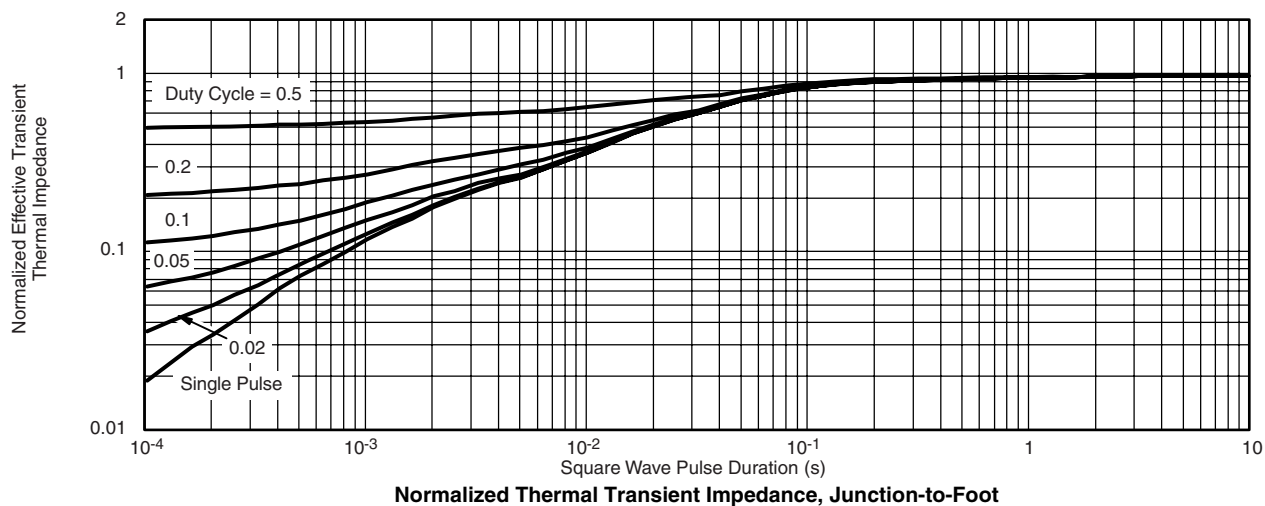
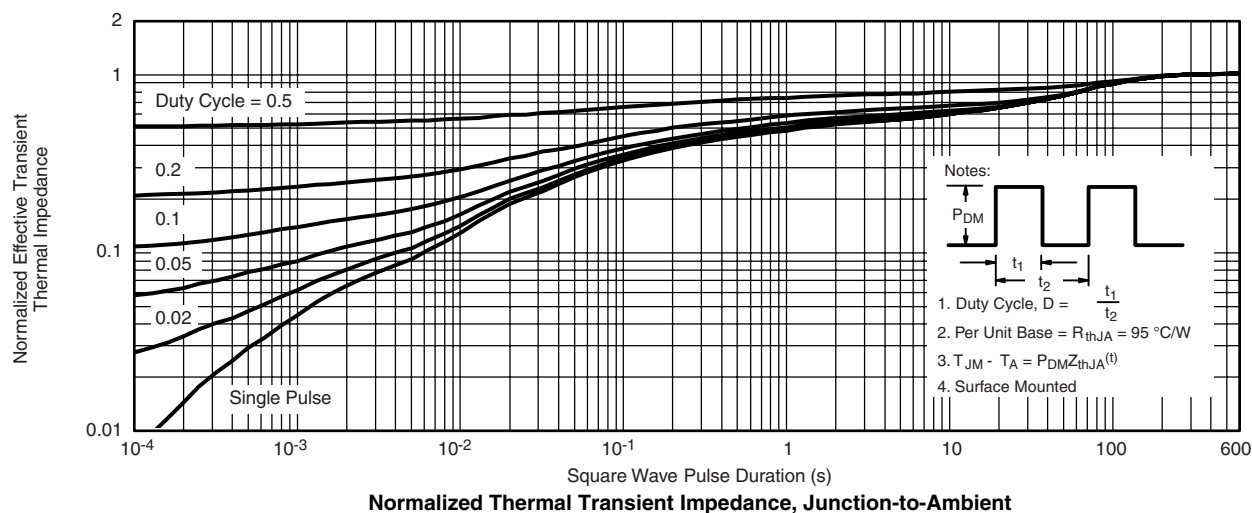
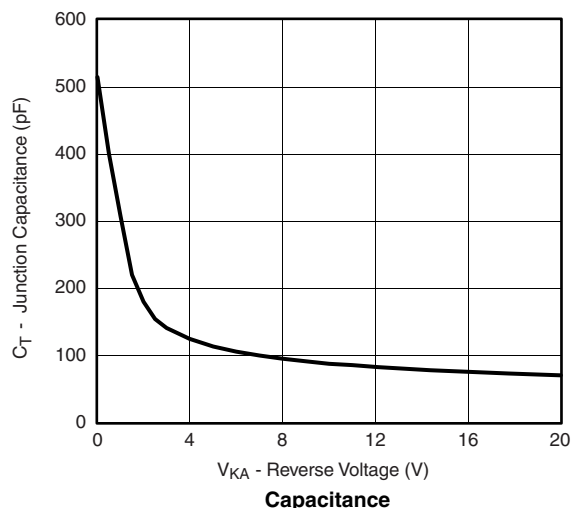
SCHOTTKY TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Reverse Current vs. Junction Temperature



Forward Voltage Drop

SCHOTTKY TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

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