



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

MOSFET PRODUCT SUMMARY

V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
-20	0.105 @ $V_{GS} = -4.5$ V	-2.7
	0.175 @ $V_{GS} = -2.5$ V	-1.38

SCHOTTKY PRODUCT SUMMARY

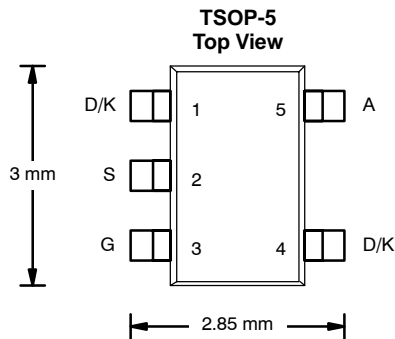
V_{KA} (V)	V_f (V) Diode Forward Voltage	I_F (A)
20	0.40 V @ 1.0 A	1.0

FEATURES

- TrenchFET® Power MOSFET
- LITTLE FOOT® Plus Integrated Low V_f Schottky
- Optimized for Fast Switching Portable Devices
- Shoot Thru Resistant

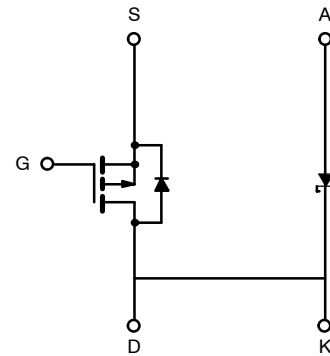
APPLICATIONS

- Low Voltage Synchronous Buck
- Low Voltage Inverter



Ordering Information: Si3871DV-T1—E3 (Lead Free)

Marking Code: IBxx



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter		Symbol	5 sec	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 ($T_J = 150^\circ\text{C}$) (MOSFET) ^a	$T_A = 25^\circ\text{C}$	I_D	-2.7	-2.3	A
	$T_A = 70^\circ\text{C}$		-2.1	-1.8	
Pulsed Drain Current (MOSFET)		I_{DM}	-7		
Continuous Source Current (MOSFET Diode Conduction) ^a		I_S	-1.13	-0.83	
Average Forward Current (Schottky)		I_F	1.0		
Pulsed Forward Current (Schottky)		I_{FM}	7		
Maximum Power Dissipation (MOSFET) ^a	$T_A = 25^\circ\text{C}$	P_D	1.25	0.92	W
	$T_A = 70^\circ\text{C}$		0.80	0.59	
Maximum Power Dissipation (Schottky) ^a	$T_A = 25^\circ\text{C}$		1.25	0.92	
	$T_A = 70^\circ\text{C}$		0.80	0.59	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150		$^\circ\text{C}$

Notes

a. Surface Mounted on 1" x 1" FR4 Board.

THERMAL RESISTANCE RATINGS						
Parameter		Device	Symbol	Typical	Maximum	Unit
Junction-to-Ambient ^a	$t \leq 5 \text{ sec}$	MOSFET	R_{thJA}	80	100	°C/W
		Schottky		80	100	
	Steady State	MOSFET		110	135	
		Schottky		110	135	
Junction-to-Foot	Steady State	MOSFET	R_{thJF}	70	85	
		Schottky	70	85		

Notes

a. Surface Mounted on 1" x 1" FR4 Board.

MOSFET SPECIFICATIONS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250 \mu\text{A}$	-0.6		-1.5	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 12 \text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20 \text{ V}, V_{GS} = 0 \text{ V}$			-1	μA
		$V_{DS} = -20 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 75^\circ\text{C}$			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq -5 \text{ V}, V_{GS} = -4.5 \text{ V}$	-5			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = -4.5 \text{ V}, I_D = -2.7 \text{ A}$		0.085	0.105	Ω
		$V_{GS} = -2.5 \text{ V}, I_D = -1.8 \text{ A}$		0.145	0.175	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -5 \text{ V}, I_D = -2.7 \text{ A}$		6		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -1.13 \text{ A}, V_{GS} = 0 \text{ V}$		-0.78	-1.10	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -10 \text{ V}, V_{GS} = -4.5 \text{ V}, I_D = -2.7 \text{ A}$		3.5	5.3	nC
Gate-Source Charge	Q_{gs}		0.9			
Gate-Drain Charge	Q_{gd}		0.9			
Gate Resistance	R_g			9.4		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10 \text{ V}, R_L = 10 \Omega$ $I_D \cong -1 \text{ A}, V_{GEN} = -4.5 \text{ V}, R_g = 6 \Omega$		35	55	ns
Rise Time	t_r		55	85		
Turn-Off Delay Time	$t_{d(off)}$		40	60		
Fall Time	t_f		29	36		
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = -1.13 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}$		15	30	

Notes

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

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

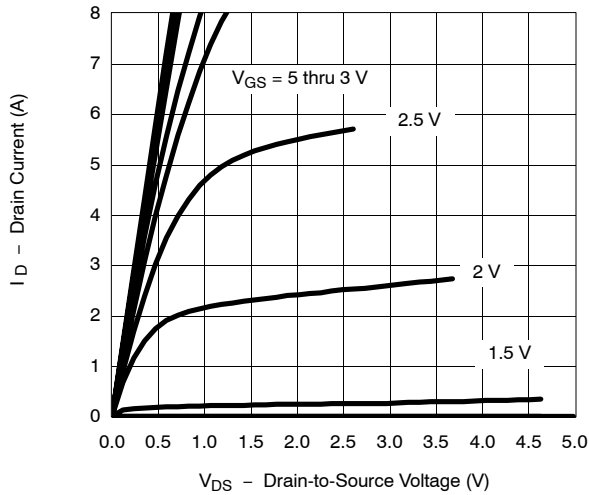
SCHOTTKY SPECIFICATIONS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Forward Voltage Drop	V_F	$I_F = 1.0 \text{ A}$		0.35	0.40	V
		$I_F = 1.0 \text{ A}, T_J = 125^\circ\text{C}$		0.28	0.32	
Maximum Reverse Leakage Current	I_{rm}	$V_r = 20 \text{ V}$		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



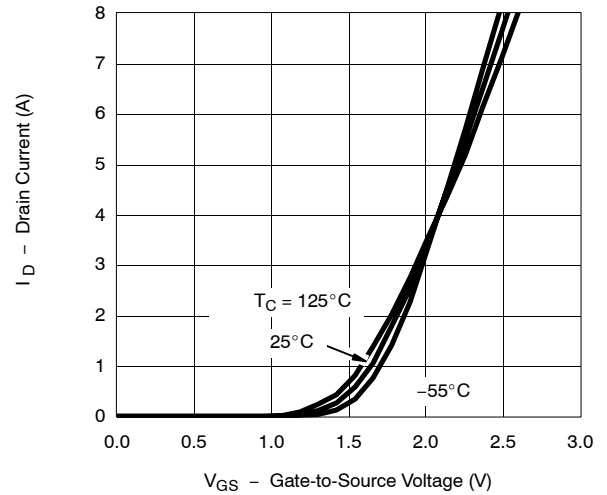
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

MOSFET

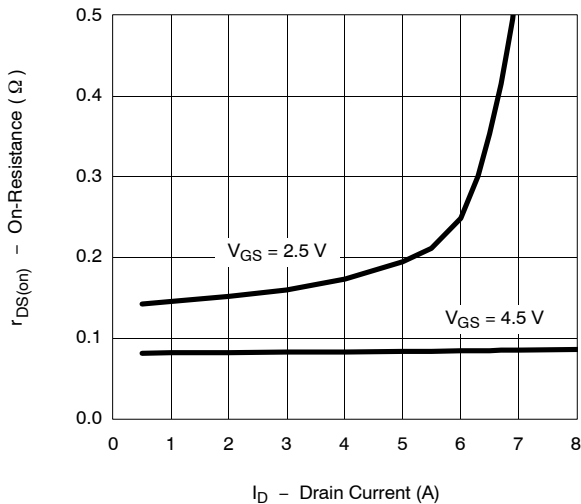
Output Characteristics



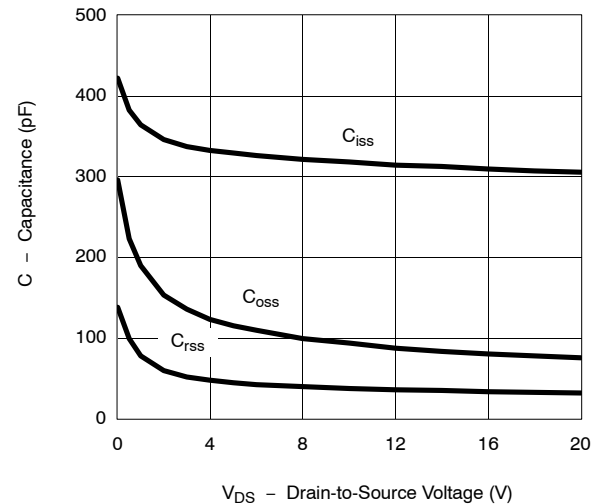
Transfer Characteristics



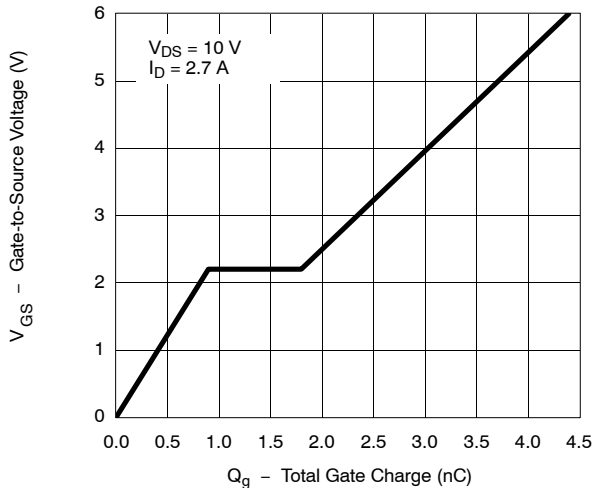
On-Resistance vs. Drain Current



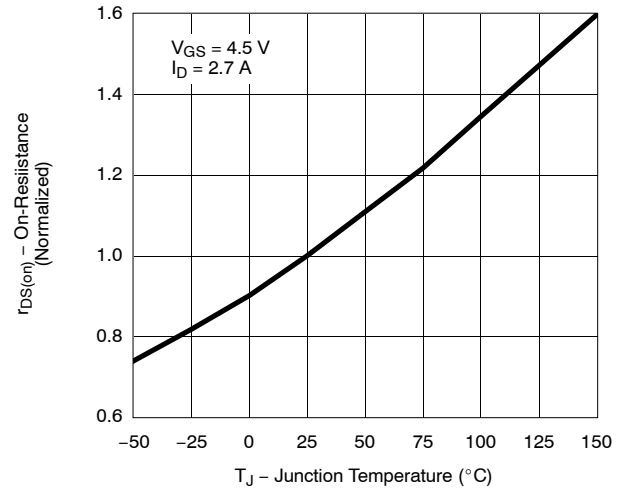
Capacitance



Gate Charge



On-Resistance vs. Junction Temperature

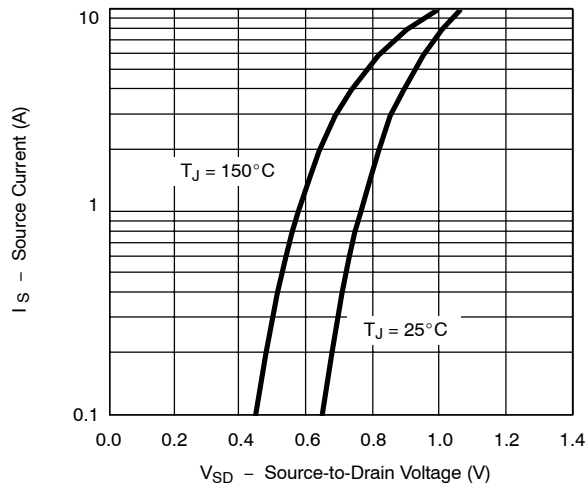




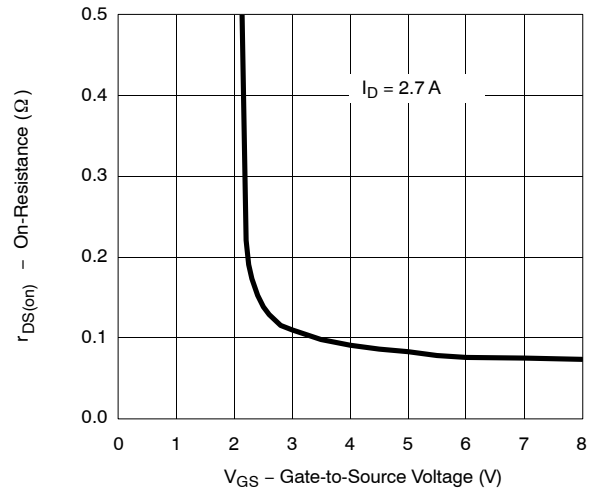
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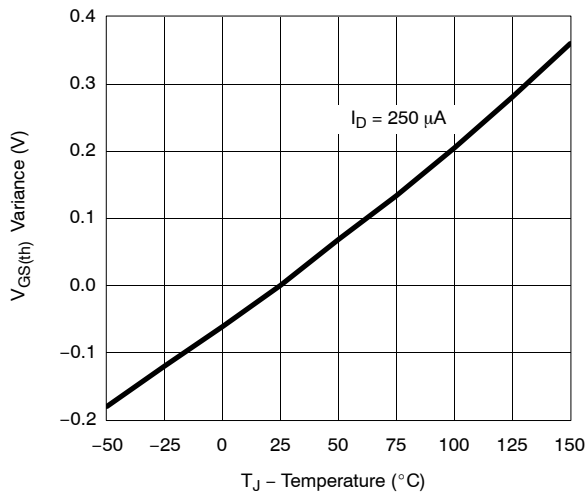
Source-Drain Diode Forward Voltage



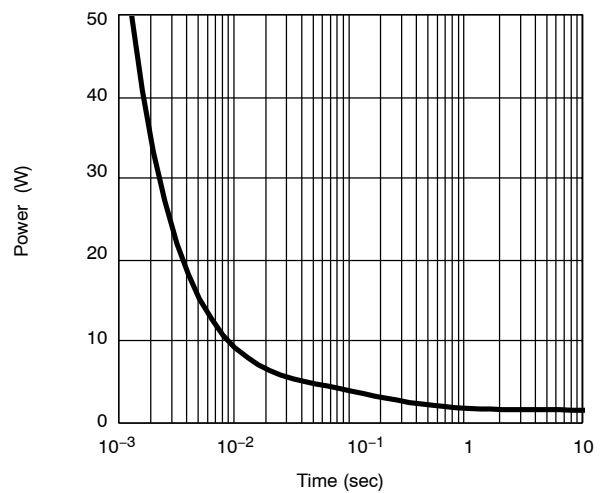
On-Resistance vs. Gate-to-Source Voltage



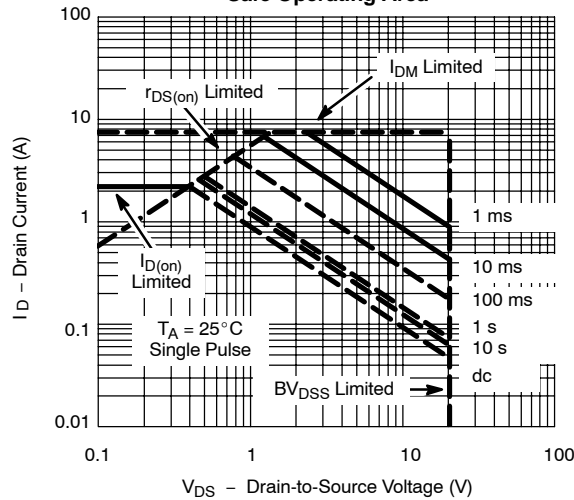
Threshold Voltage



Single Pulse Power, Junction-to-Ambient



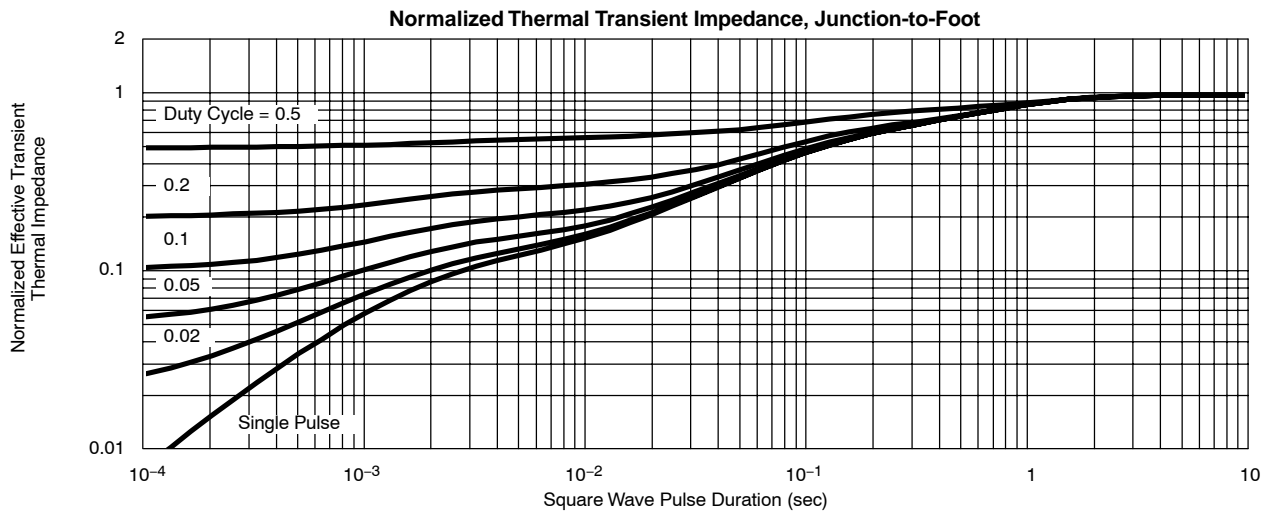
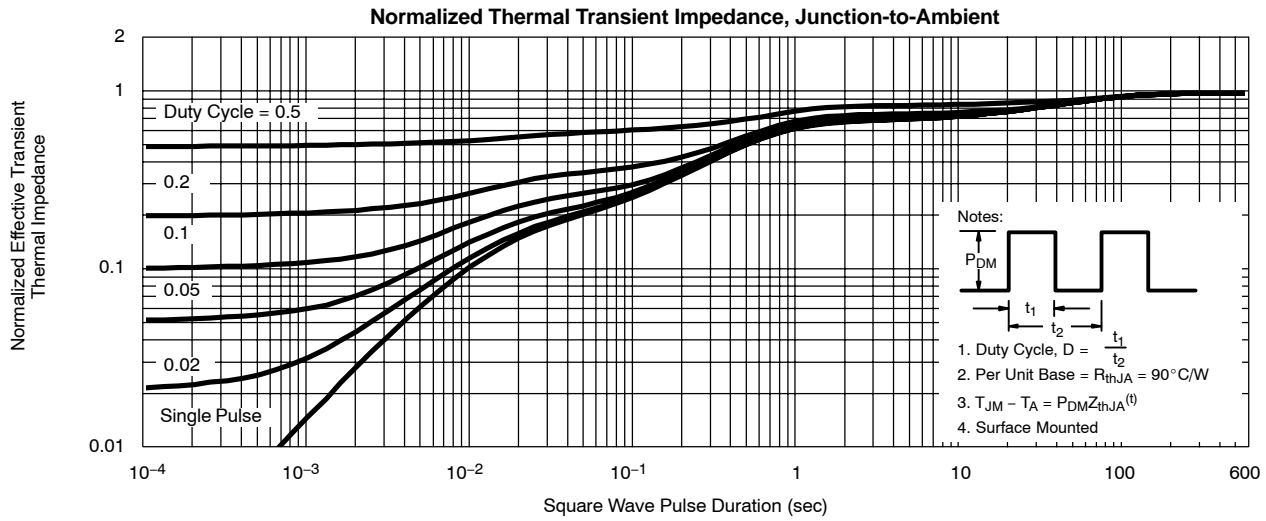
Safe Operating Area





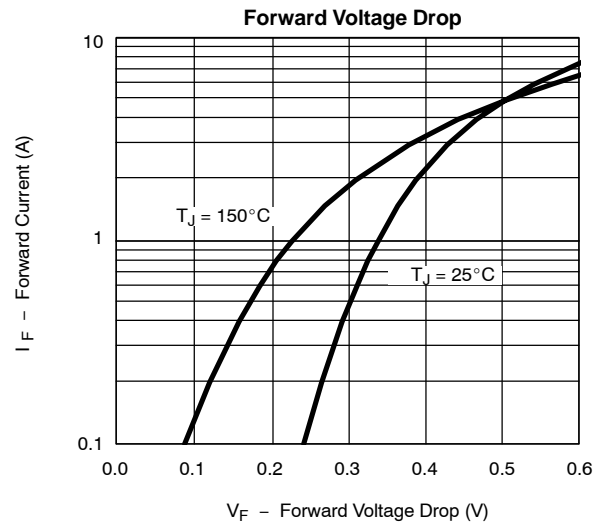
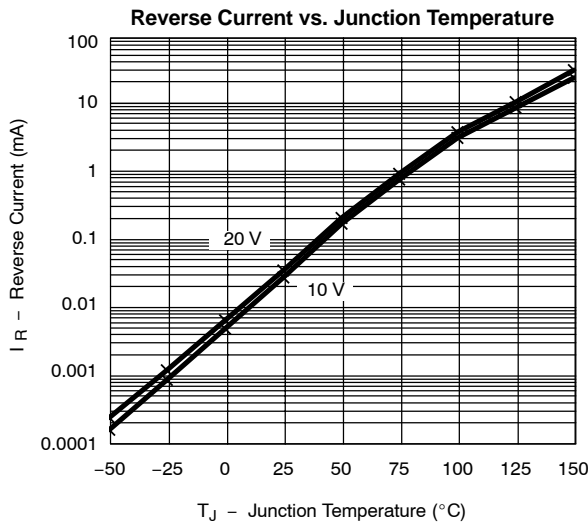
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

MOSFET



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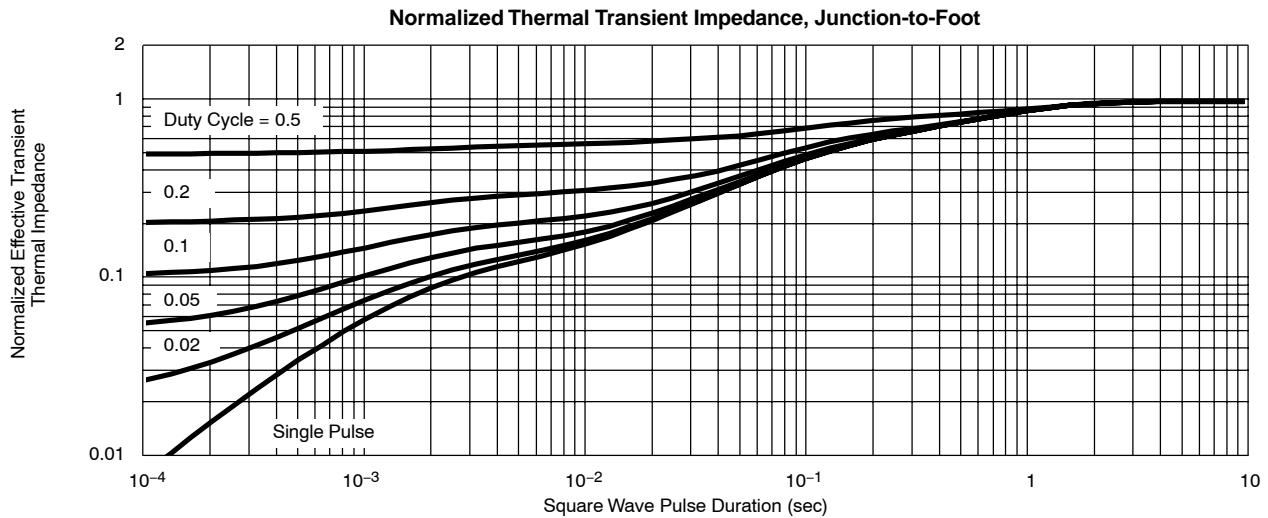
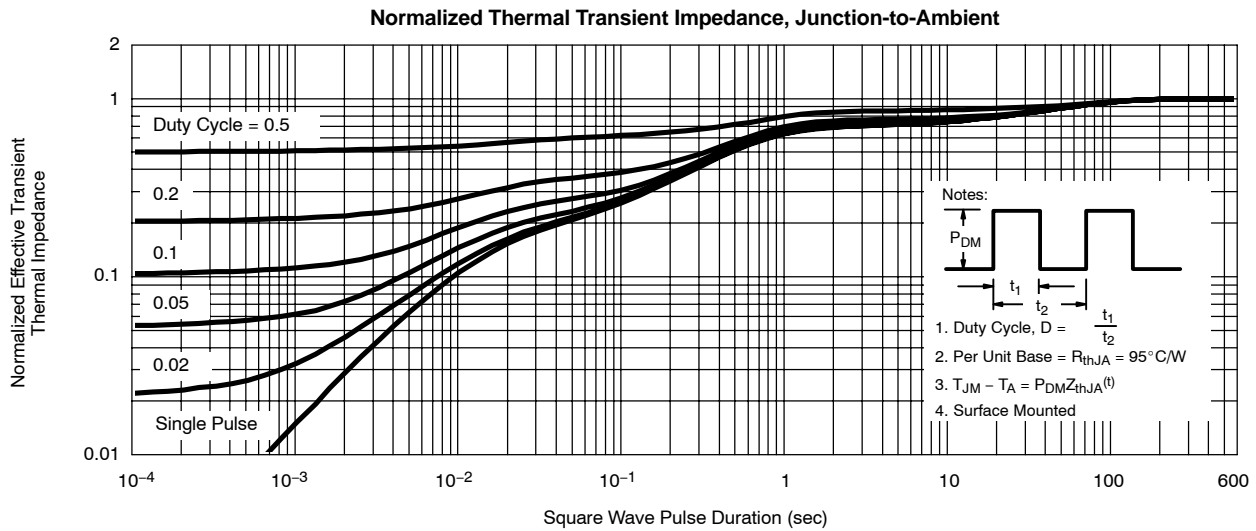
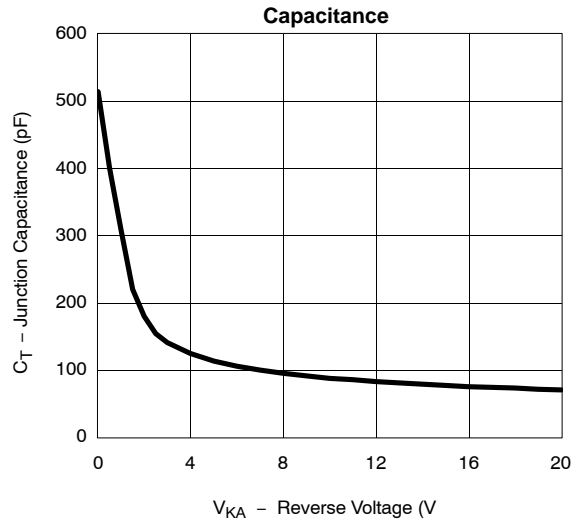
SCHOTTKY





TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

SCHOTTKY





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