N-Channel 20 V (D-S) MOSFET with Schottky Diode

MOSFET PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
20	0.125 at V_{GS} = 4.5 V	2.4
	0.200 at V_{GS} = 2.5 V	1.8

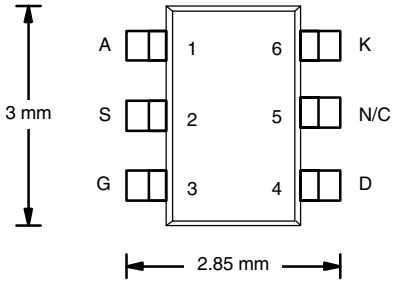
SCHOTTKY PRODUCT SUMMARY		
V_{KA} (V)	V_F (V) Diode Forward Voltage	I_F (A)
20	0.48 V at 0.5 A	0.5

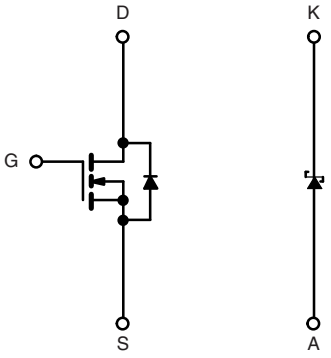
FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- LITTLE FOOT® *Plus*
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE

TSOP-6
Top View





N-Channel MOSFET

Ordering Information: Si3812DV-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °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		V
Gate-Source Voltage (MOSFET)		V_{GS}	± 12		
Continuous Drain Current (T_J = 150 °C) (MOSFET)[a]	T_A = 25 °C	I_D	2.4	2.0	A
	T_A = 85 °C		1.7	1.4	
Pulsed Drain Current (MOSFET)		I_{DM}	8		
Continuous Source Current (MOSFET Diode Conduction)[a]		I_S	1.05	0.75	
Average Foward Current (Schottky)		I_F	0.5	0.5	
Pulsed Foward Current (Schottky)		I_{FM}	8	8	
Maximum Power Dissipation (MOSFET)[a]	T_A = 25 °C	P_D	1.15	0.83	W
	T_A = 85 °C		0.59	0.53	
Maximum Power Dissipation (Schottky)[a]	T_A = 25 °C		1.0	0.76	
	T_A = 85 °C		0.52	0.48	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150		°C

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

THERMAL RESISTANCE RATINGS

Parameter		Device	Symbol	Typical	Maximum	Unit
Junction-to-Ambient[a]	t ≤ 5 s	MOSFET	R_{thJA}	93	110	°C/W
		Schottky		103	125	
	Steady State	MOSFET		130	150	
		Schottky		140	165	
Junction to Foot (MOSFET Drain, Schottky Cathode)	Steady State	MOSFET	R_{thJF}	75	90	
		Schottky		80	95	

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

MOSFET AND SCHOTTKY 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	0.6			V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 12 V			± 100	nA
Zero Gate Voltage Drain Current (MOSFET and Schottky)	I_{DSS}	V_{DS} = 16 V, V_{GS} = 0 V			1	µA
		V_{DS} = 16 V, V_{GS} = 0 V, T_J = 85 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≥ 5 V, V_{GS} = 4.5 V	5			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 2.4 A		0.100	0.125	Ω
		V_{GS} = 2.5 V, I_D = 1.0 A		0.160	0.200	
Forward Transconductance[a]	g_{fs}	V_{DS} = 5 V, I_D = 2.4 A		5		S
Schottky Diode Forward Voltage[a]	V_{SD}	I_S = 1.5 A, V_{GS} = 0 V		0.79	1.1	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 2.4 A		2.1	4.0	nC
Gate-Source Charge	Q_{gs}			0.3		
Gate-Drain Charge	Q_{gd}			0.4		
Gate Resistance	R_g		1		3.7	Ω
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		10	17	ns
Rise Time	t_r			30	50	
Turn-Off Delay Time	$t_{d(off)}$			14	25	
Fall Time	t_f			6	12	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 3.0 A, dI/dt = 100 A/µs		30	50	

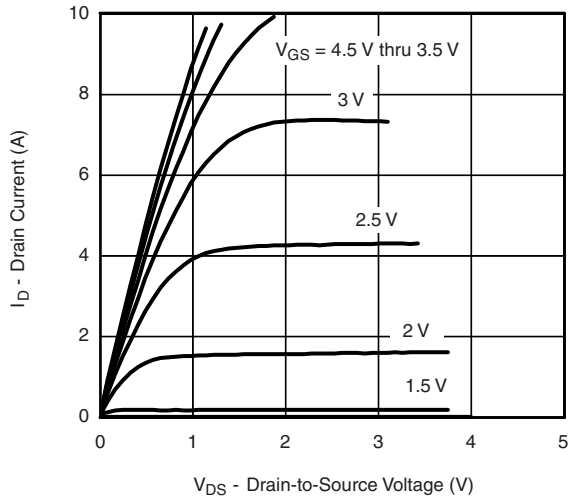
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

SCHOTTKY SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)

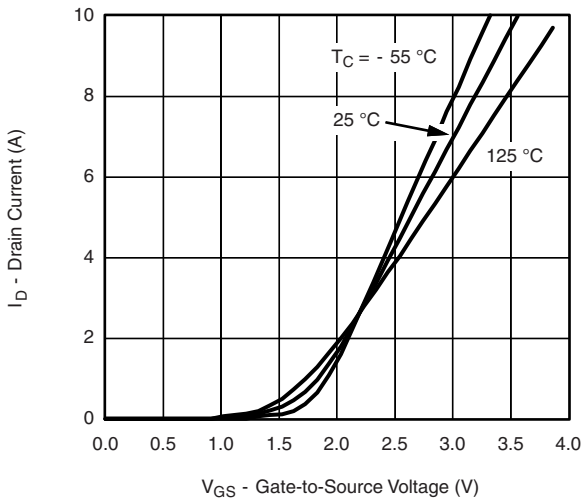
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	V_F	I_F = 0.5 A		0.42	0.48	V
		I_F = 0.5 A, T_J = 125 °C		0.33	0.4	
Maximum Reverse Leakage Current	I_{rm}	V_R = 20		0.002	0.100	mA
		V_R = 20 V, T_J = 75 °C		0.06	1	
		V_R = 20 V, T_J = 125 °C		1.5	10	
Junction Capacitance	C_T	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.

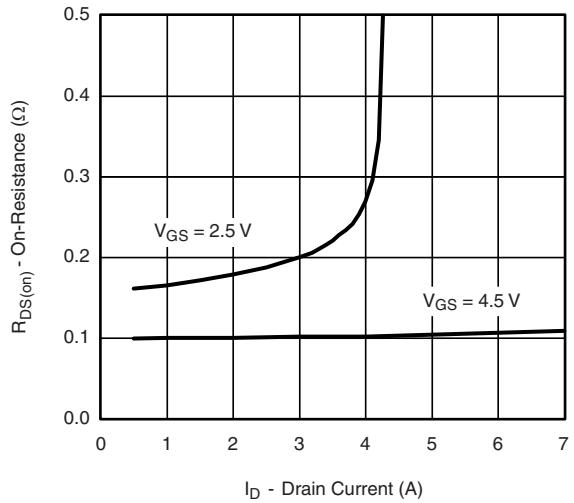
MOSFET TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



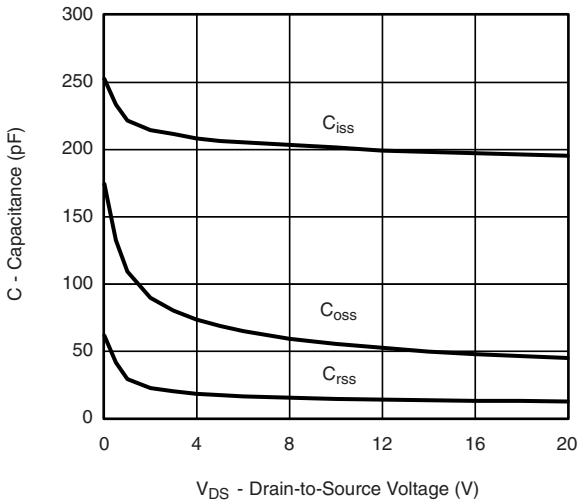
Output Characteristics



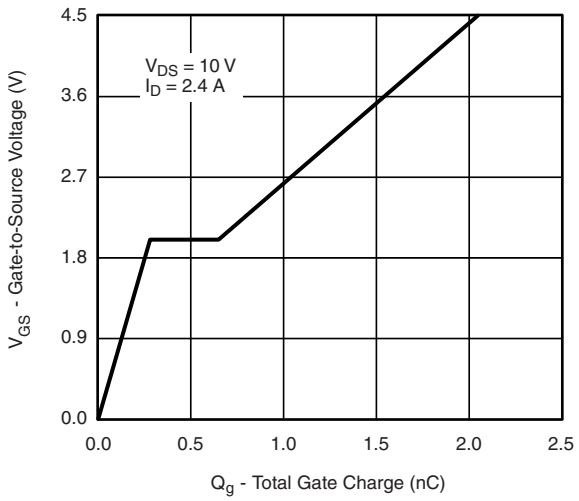
Transfer Characteristics



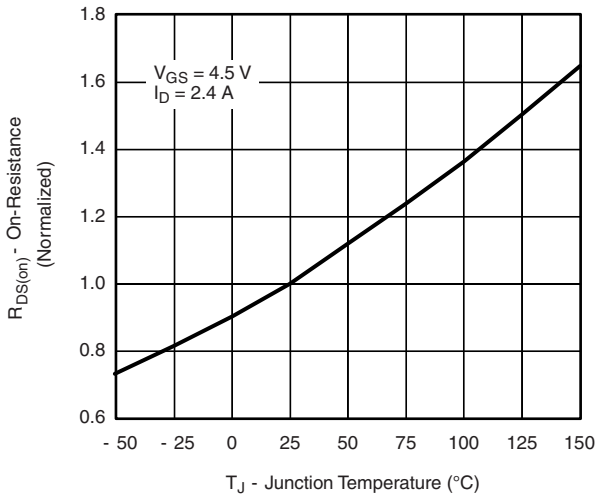
On-Resistance vs. Drain Current



Capacitance

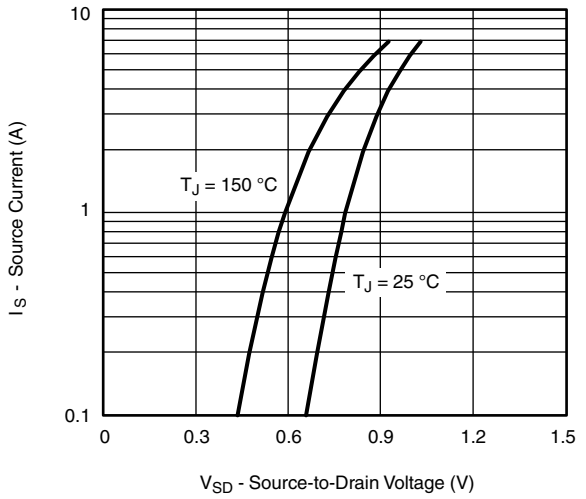


Gate Charge

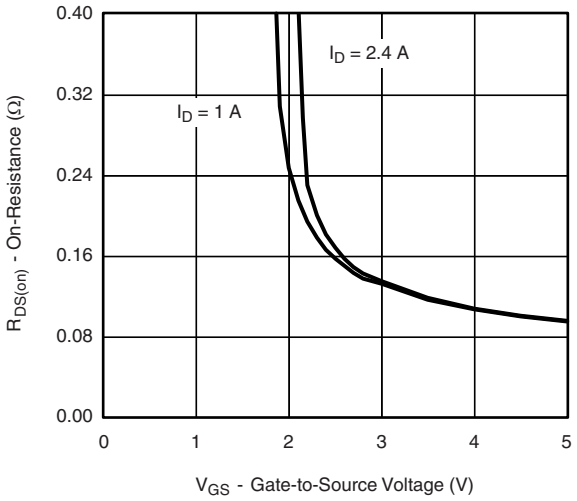


On-Resistance vs. Junction Temperature

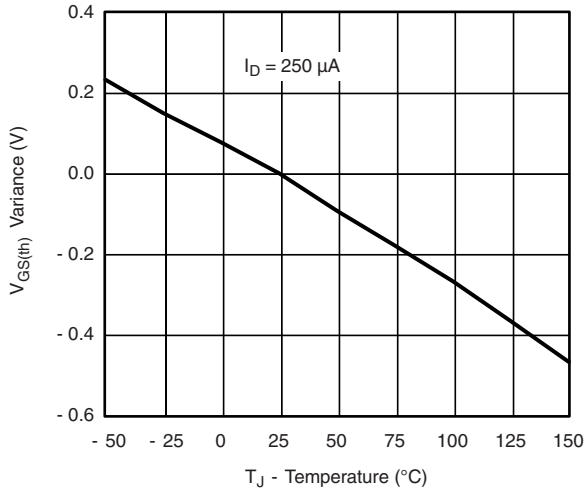
MOSFET TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



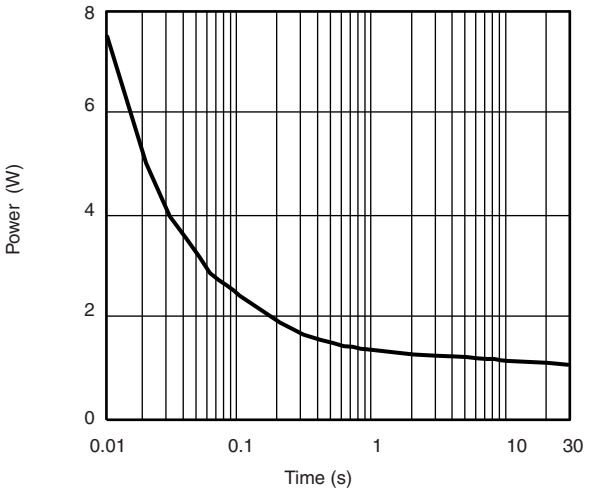
Source-Drain Diode Forward Voltage



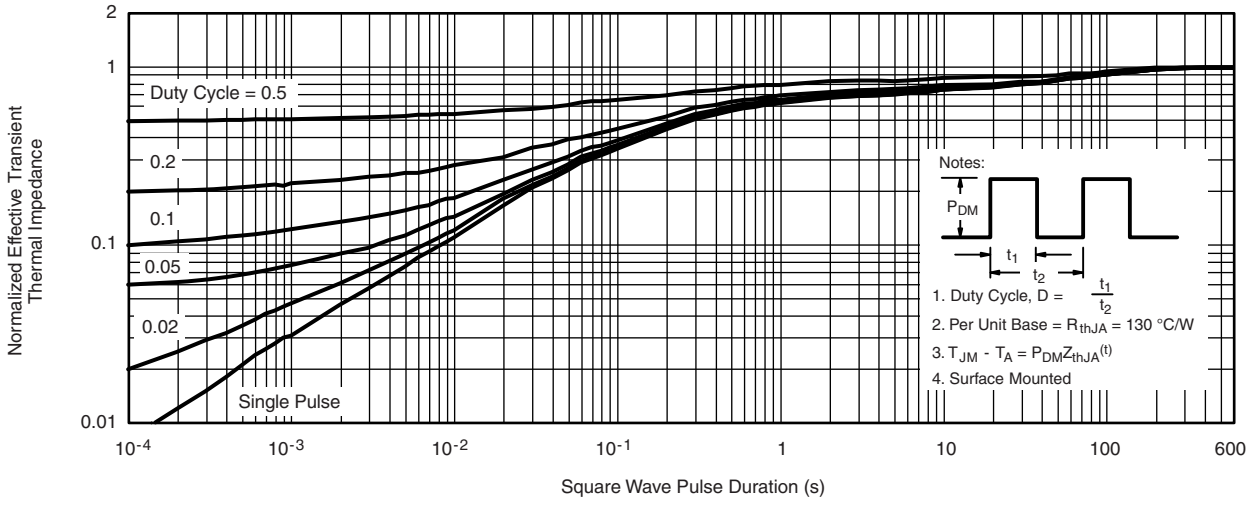
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

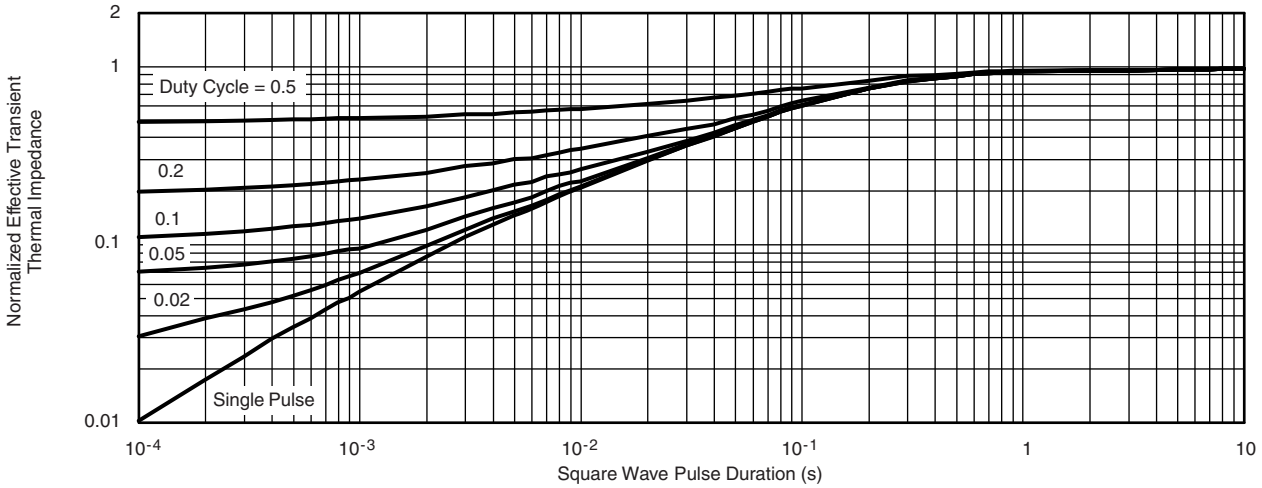


Single Pulse Power, Junction-to-Ambient



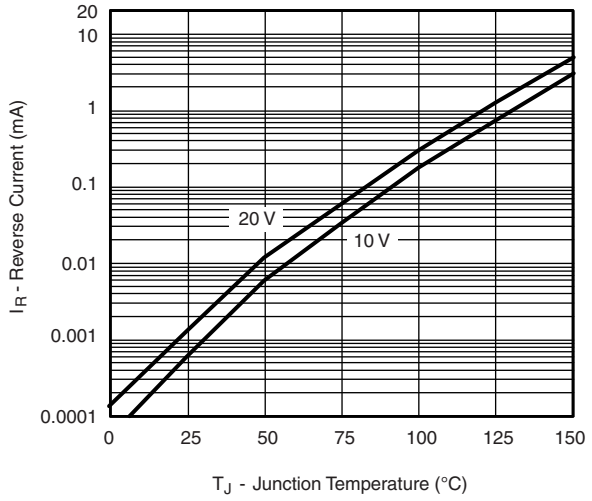
Normalized Thermal Transient Impedance, Junction-to-Ambient

MOSFET TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

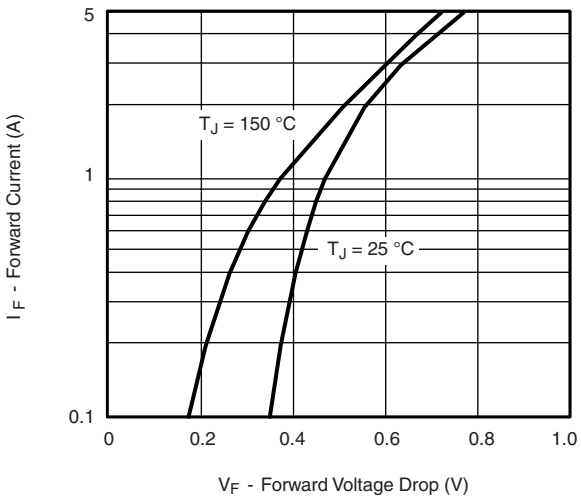


Normalized Thermal Transient Impedance, Junction-to-Foot

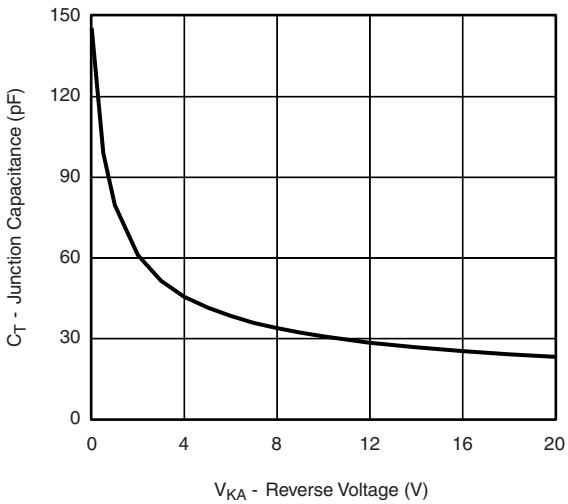
SCHOTTKY TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Reverse Current vs. Junction Temperature

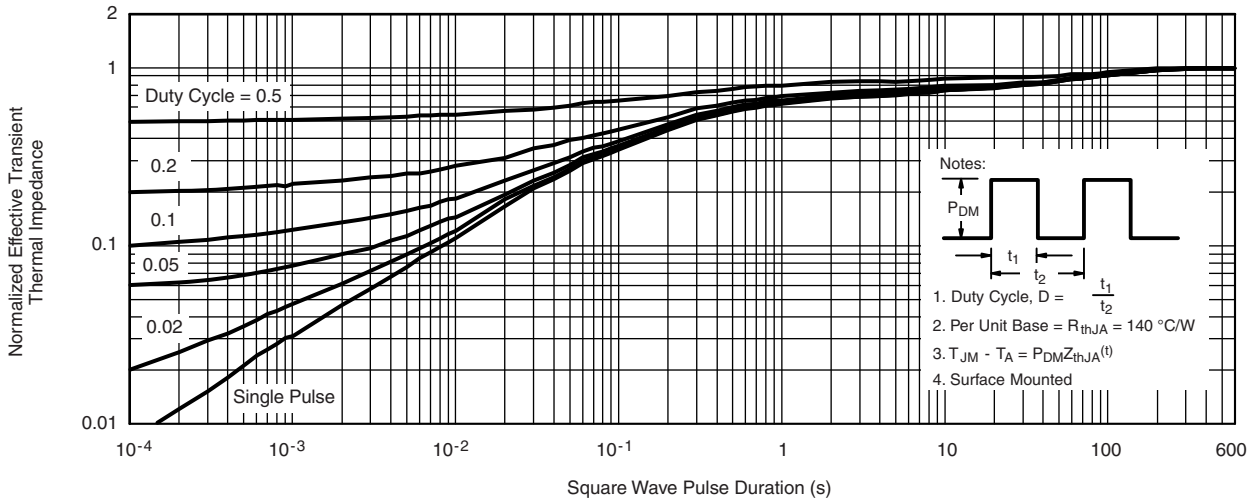


Forward Voltage Drop

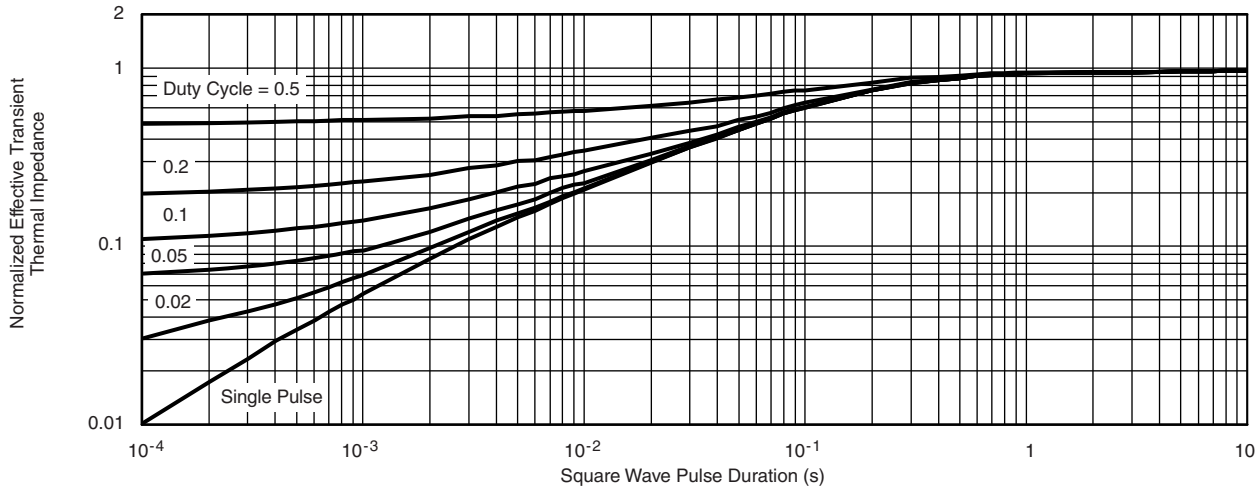


Capacitance

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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