

P-Channel 30 V (D-S) MOSFET with Schottky Diode

MOSFET PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
- 30	0.072 at V _{GS} = - 10 V	- 4.6	- 4.6
	0.110 at V _{GS} = - 4.5 V	- 3.4	

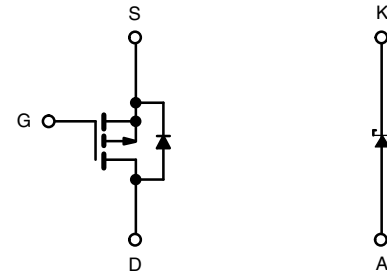
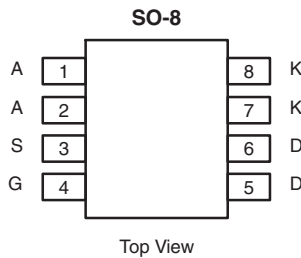
SCHOTTKY PRODUCT SUMMARY		
V _{KA} (V)	V _F (V) Diode Forward Voltage	I _D (A) ^a
30	0.50 V at 1 A	2.4

FEATURES

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



RoHS
COMPLIANT
HALOGEN
FREE
Available



P-Channel MOSFET

Ordering Information: Si4833ADY-T1-E3 (Lead (Pb)-free)
Si4833ADY-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)					
Parameter	Symbol	Limit	Unit		
Drain-Source Voltage (MOSFET)	V _{DS}	- 30	V		
Reverse Voltage (Schottky)	V _{KA}	- 30			
Gate-Source Voltage (MOSFET)	V _{GS}	± 20			
Continuous Drain Current (T _J = 150 °C) (MOSFET)	I _D	T _C = 25 °C	- 4.6	A	
		T _C = 70 °C	- 3.6		
		T _A = 25 °C	- 3.85 ^{b, c}		
		T _A = 70 °C	- 3.08 ^{b, c}		
Pulsed Drain Current (MOSFET)	I _{DM}	- 20	A		
Continuous Source Current (MOSFET Diode Conduction)	I _S	- 2.3			
		- 1.4 ^{b, c}			
Average Forward Current (Schottky)	I _F	- 1.4 ^b			
Pulsed Forward Current (Schottky)	I _{FM}	- 20	W		
Maximum Power Dissipation (MOSFET and Schottky)	P _D	T _C = 25 °C			2.75
		T _C = 70 °C			1.75
		T _A = 25 °C			1.93 ^{b, c}
		T _A = 70 °C	1.23 ^{b, c}		
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C		

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient (MOSFET and Schottky) ^{b, c, d}	R _{thJA}	60	65	°C/W
Maximum Junction-to-Foot (Drain) (MOSFET and Schottky)	R _{thJF}	35	45	

Notes:

- Based on T_C = 25 °C.
- Surface mounted on FR4 board.
- t ≤ 10 s.
- Maximum under steady state conditions is 120 °C/W.

MOSFET SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{DS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		-28		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			3.5		
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1	-2	-2.5	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 75\text{ }^\circ\text{C}$			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq -5\text{ V}, V_{GS} = -10\text{ V}$	-5			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -3.6\text{ A}$		0.059	0.072	Ω
		$V_{GS} = -4.5\text{ V}, I_D = -2.8\text{ A}$		0.090	0.110	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -3.6\text{ A}$		7		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		380	750	pF
Output Capacitance	C_{oss}			100		
Reverse Transfer Capacitance	C_{rss}			75		
Total Gate Charge	Q_g	$V_{DS} = -15\text{ V}, V_{GS} = -10\text{ V}, I_D = -3\text{ A}$		9.8	15	nC
				4.6	7.0	
Gate-Source Charge	Q_{gs}	$V_{DS} = -15\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -3\text{ A}$		1.4		
Gate-Drain Charge	Q_{gd}			2.4		
Gate Resistance	R_g	$f = 1\text{ MHz}$		8	16	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 7.5\text{ }\Omega$ $I_D \cong -2\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		20	30	ns
Rise Time	t_r			59	90	
Turn-Off Delay Time	$t_{d(off)}$			26	40	
Fall Time	t_f			19	30	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 7.5\text{ }\Omega$ $I_D \cong -2\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		7	14	
Rise Time	t_r			11	17	
Turn-Off Delay Time	$t_{d(off)}$			19	30	
Fall Time	t_f			8	15	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			-4.6	A
Pulse Diode Forward Current ^a	I_{SM}				-20	
Body Diode Voltage	V_{SD}	$I_S = -1.4\text{ A}, V_{GS} = 0\text{ V}$		-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	40	ns
Body Diode Reverse Recovery Charge	Q_{rr}			12	20	nC
Reverse Recovery Fall Time	t_a			10		ns
Reverse Recovery Rise Time	t_b			13		

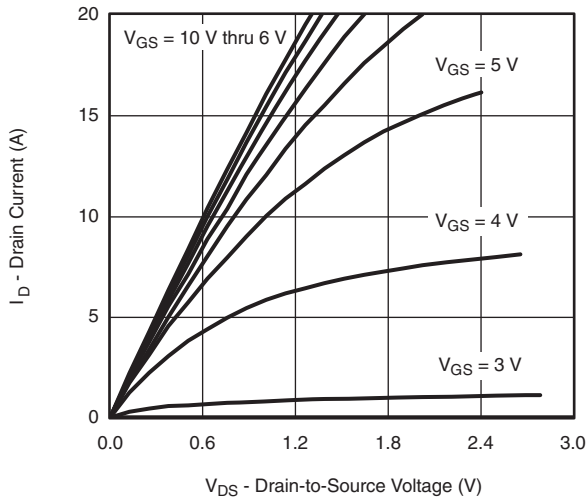
Notes:

- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

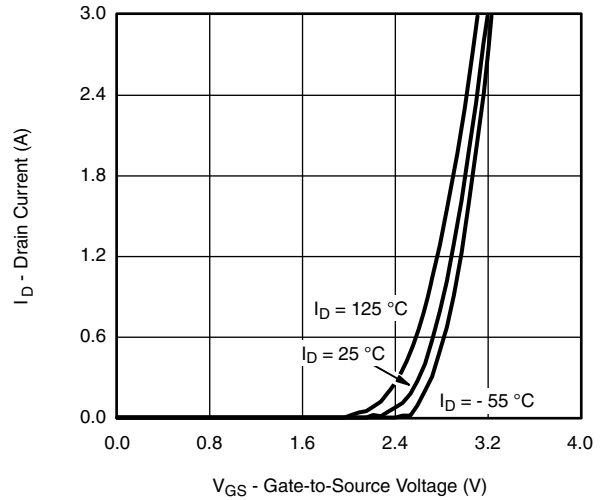
SCHOTTKY SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	V_F	$I_F = 1\text{ A}$		0.45	0.50	V
		$I_F = 1\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.36	0.42	
Maximum Reverse Leakage Current	I_{rm}	$V_R = 30\text{ V}$		0.004	0.1	mA
		$V_R = 30\text{ V}, T_J = 75\text{ }^\circ\text{C}$		0.1	2	
		$V_R = 30\text{ V}, T_J = 125\text{ }^\circ\text{C}$		3	20	
Junction Capacitance	C_T	$V_R = 10\text{ V}$		62		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.

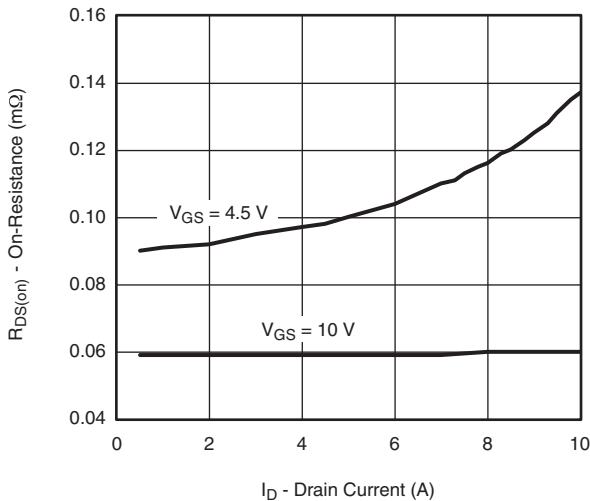
MOSFET TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



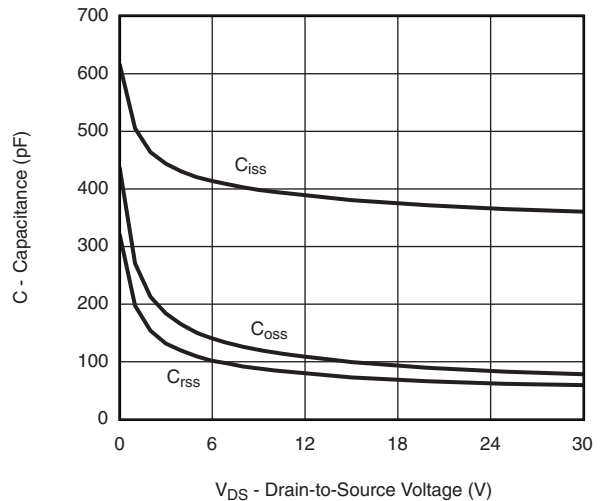
Output Characteristics



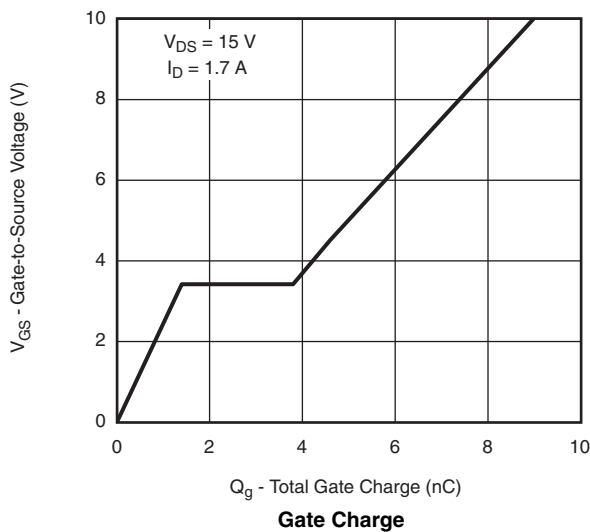
Transfer Characteristics



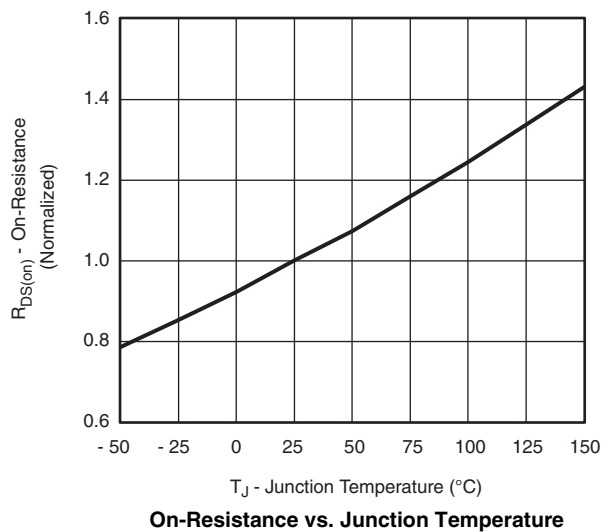
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

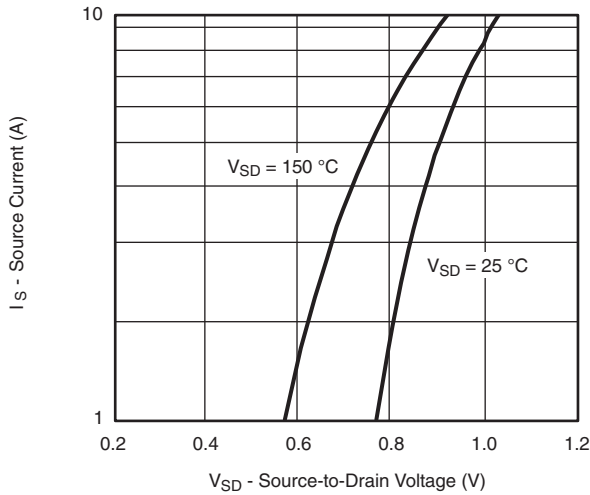


Gate Charge

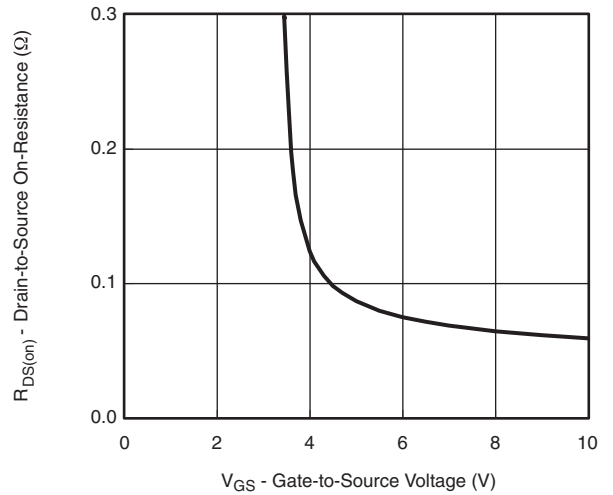


On-Resistance vs. Junction Temperature

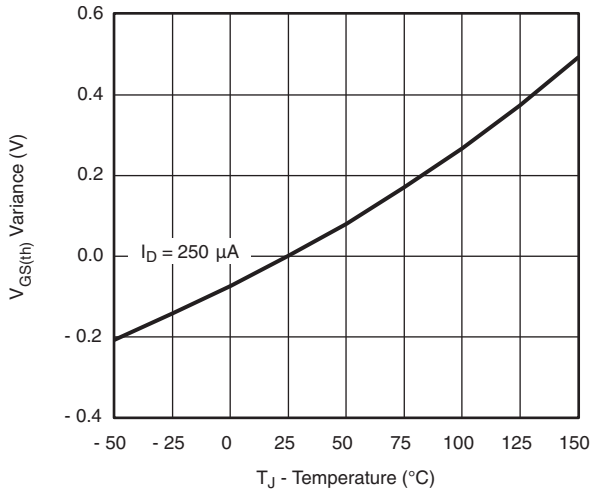
MOSFET TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



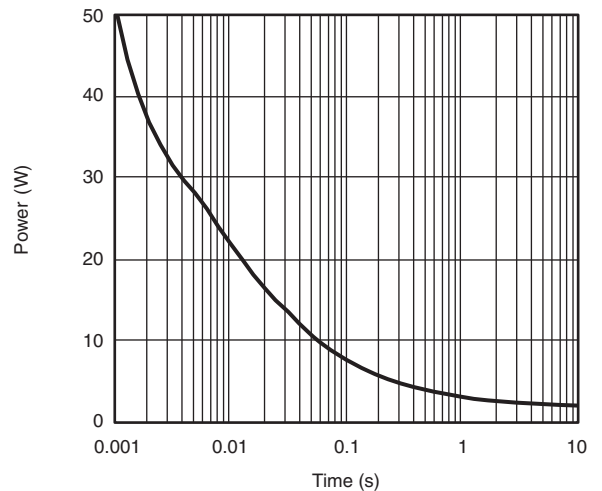
Source-Drain Diode Forward Voltage



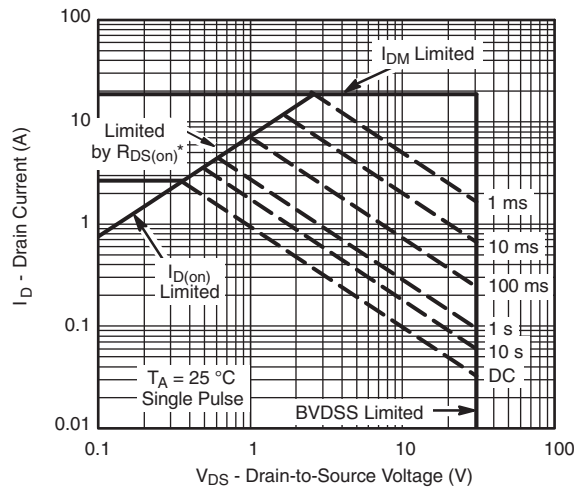
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



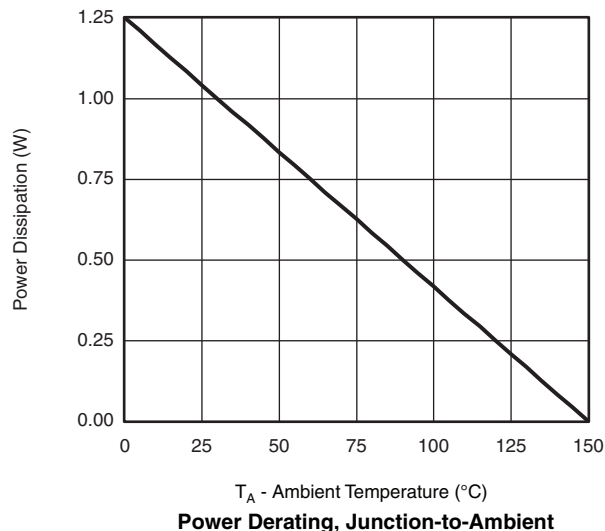
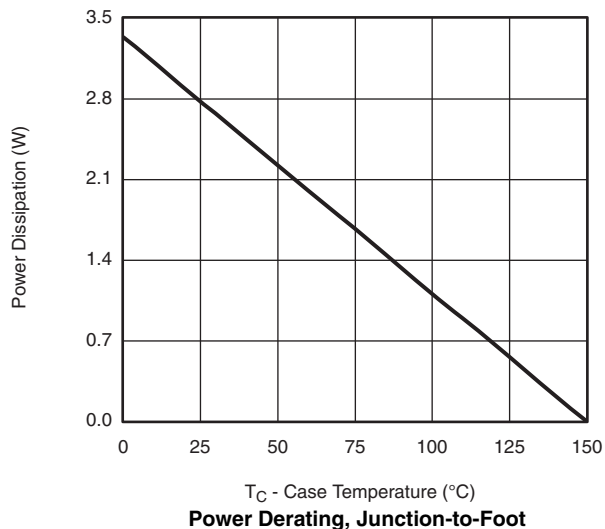
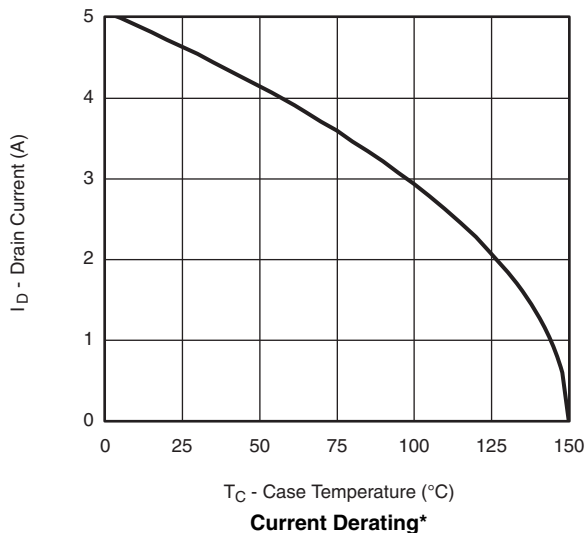
Single Pulse Power, Junction-to-Ambient



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

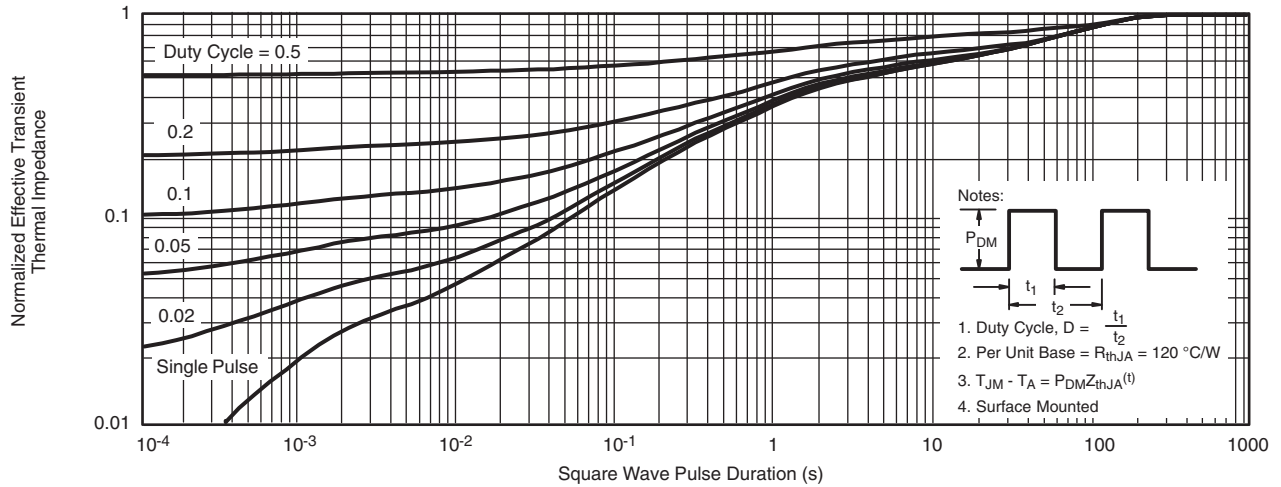
Safe Operating Area, Junction-to-Case

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

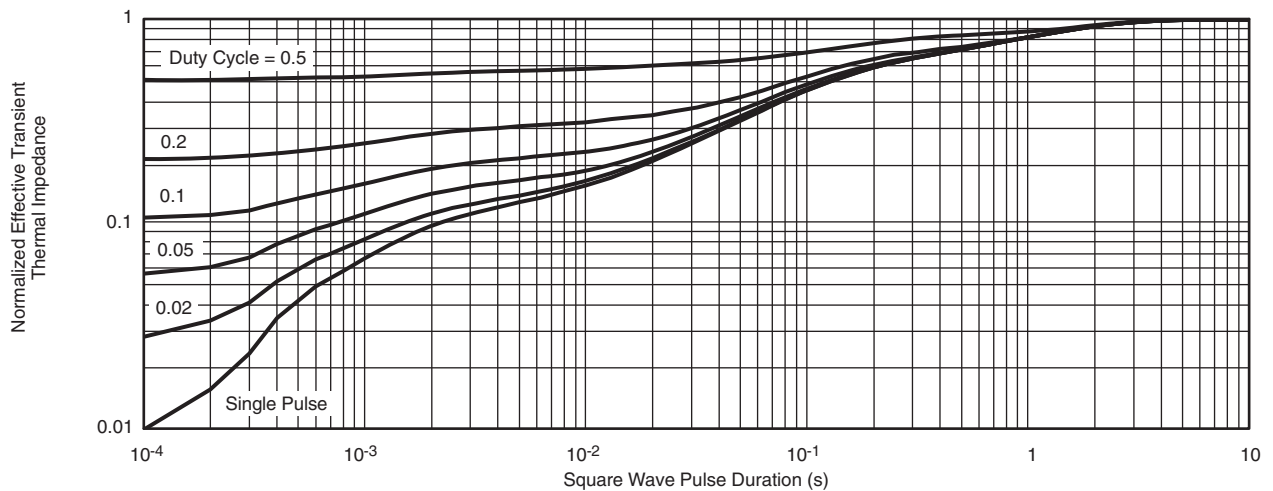


* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

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

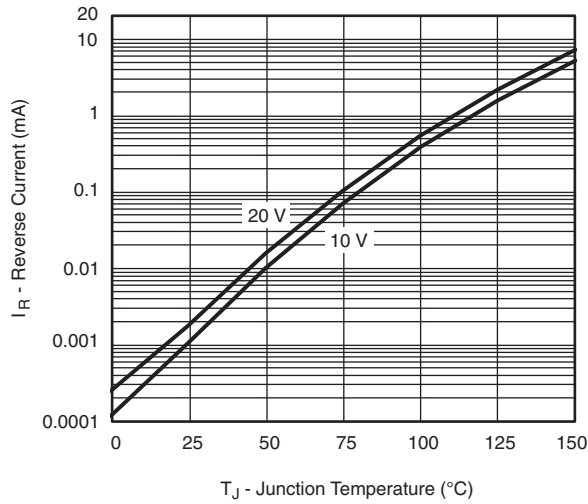


Normalized Thermal Transient Impedance, Junction-to-Ambient

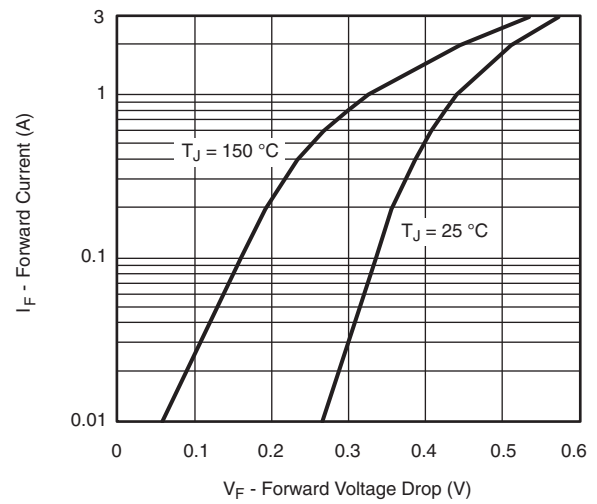


Normalized Thermal Transient Impedance, Junction-to-Foot

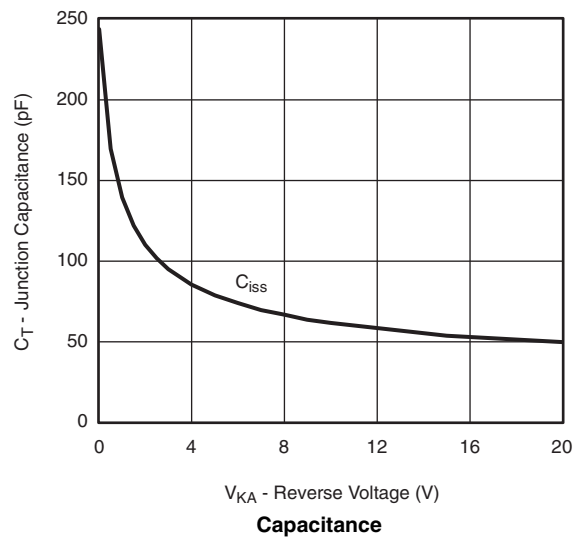
SCHOTTKY TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Reverse Current vs. Junction Temperature



Forward Voltage Drop



Capacitance

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