



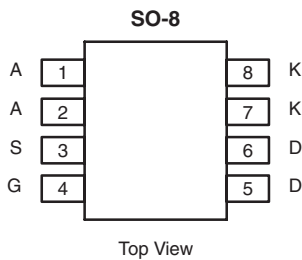
**THE DATASHEET OF
SI4831BDY-T1-E3**



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	0.042 at $V_{GS} = - 10$ V	- 6.6	7.8
	0.065 at $V_{GS} = - 4.5$ V	- 5.3	

SCHOTTKY PRODUCT SUMMARY		
V_{KA} (V)	V_F (V) Diode Forward Voltage	I_D (A) ^a
30	0.53 V at 3 A	3.0



FEATURES

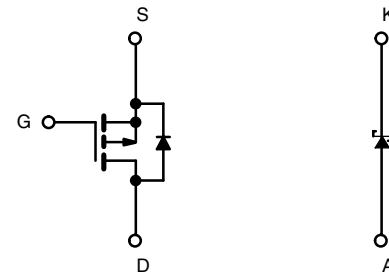
- Halogen-free According to IEC 61249-2-21 Available
- LITTLE FOOT[®] Plus Power MOSFET
- 100 % R_g Tested



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- HDD
- Asynchronous Rectification



P-Channel MOSFET

Ordering Information: Si4831BDY-T1-E3 (Lead (Pb)-free)
Si4831BDY-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	- 6.6	A
		$T_C = 70$ °C	- 5.2	
		$T_A = 25$ °C	- 5.1 ^{b, c}	
		$T_A = 70$ °C	- 3.9 ^{b, c}	
Pulsed Drain Current (MOSFET)	I_{DM}	- 30		
Continuous Source Current (MOSFET Diode Conduction)	I_S	$T_C = 25$ °C	- 2.7	
		$T_A = 25$ °C	- 1.6 ^{b, c}	
Average Forward Current (Schottky)	I_F	- 3 ^b		
Pulsed Forward Current (Schottky)	I_{FM}	- 20		
Maximum Power Dissipation (MOSFET and Schottky)	P_D	$T_C = 25$ °C	3.3	W
		$T_C = 70$ °C	2.1	
		$T_A = 25$ °C	2.0 ^{b, c}	
		$T_A = 70$ °C	1.2 ^{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}	53	62.5	°C/W
Maximum Junction-to-Foot (Drain) (MOSFET and Schottky)	R_{thJF}	30	37	

Notes:

- Based on $T_C = 25$ °C.
- Surface Mounted on FR4 board.
- $t \leq 10$ s.
- Maximum under Steady State conditions is 110 °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	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		-30		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			3.6		
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	-1		-3	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	$I_{D(on)}$	$V_{DS} \geq -5\text{ V}$, $V_{GS} = -10\text{ V}$	-10			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$, $I_D = -5\text{ A}$		0.034	0.042	Ω
		$V_{GS} = -4.5\text{ V}$, $I_D = -3\text{ A}$		0.052	0.065	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}$, $I_D = -5\text{ A}$		11		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		625		pF
Output Capacitance	C_{oss}			150		
Reverse Transfer Capacitance	C_{rss}			115		
Total Gate Charge	Q_g	$V_{DS} = -15\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -5\text{ A}$		17	26	nC
		$V_{DS} = -15\text{ V}$, $V_{GS} = -4.5\text{ V}$, $I_D = -5\text{ A}$		7.8	12	
Gate-Source Charge	Q_{gs}			1.6		
Gate-Drain Charge	Q_{gd}			3.5		
Gate Resistance	R_g	$f = 1\text{ MHz}$		7	14	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}$, $R_L = 3\text{ }\Omega$ $I_D \cong -5\text{ A}$, $V_{GEN} = -4.5\text{ V}$, $R_g = 1\text{ }\Omega$		35	55	ns
Rise Time	t_r			100	150	
Turn-Off Delay Time	$t_{d(off)}$			22	35	
Fall Time	t_f			12	20	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}$, $R_L = 3\text{ }\Omega$ $I_D \cong -5\text{ A}$, $V_{GEN} = -10\text{ V}$, $R_g = 1\text{ }\Omega$		8	16	
Rise Time	t_r			8	16	
Turn-Off Delay Time	$t_{d(off)}$			24	40	
Fall Time	t_f			7	14	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			-3.3	A
Pulse Diode Forward Current ^a	I_{SM}				-30	
Body Diode Voltage	V_{SD}	$I_S = -1.4\text{ A}$, $V_{GS} = 0\text{ V}$		-0.78	-1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -2\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^\circ\text{C}$		30	45	ns
Body Diode Reverse Recovery Charge	Q_{rr}			15	25	nC
Reverse Recovery Fall Time	t_a			14		ns
Reverse Recovery Rise Time	t_b			16		

Notes:

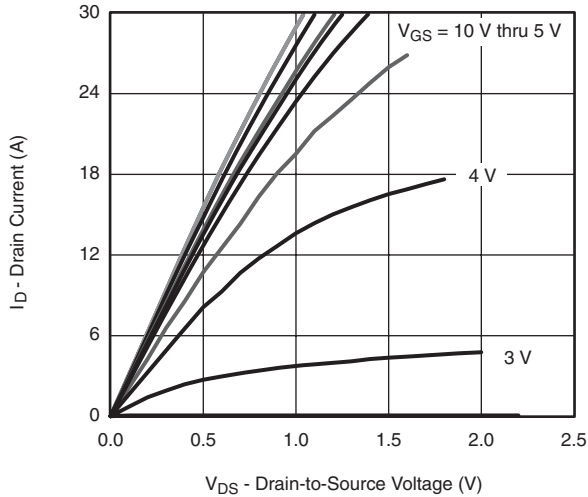
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.



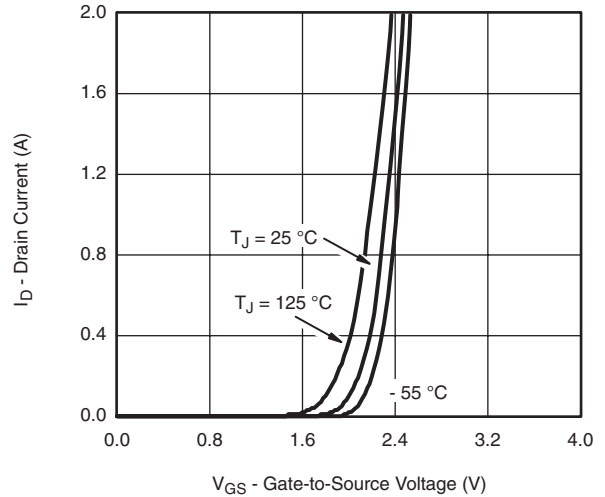
SCHOTTKY SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	V_F	$I_F = 3\text{ A}$		0.485	0.53	V
		$I_F = 3\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.42	0.47	
Maximum Reverse Leakage Current	I_{rm}	$V_R = 30\text{ V}$		0.008	0.1	mA
		$V_R = 30\text{ V}, T_J = 75\text{ }^\circ\text{C}$		0.4	5	
		$V_R = 30\text{ V}, T_J = 125\text{ }^\circ\text{C}$		6.5	20	
Junction Capacitance	C_T	$V_R = 15\text{ V}$		102		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.

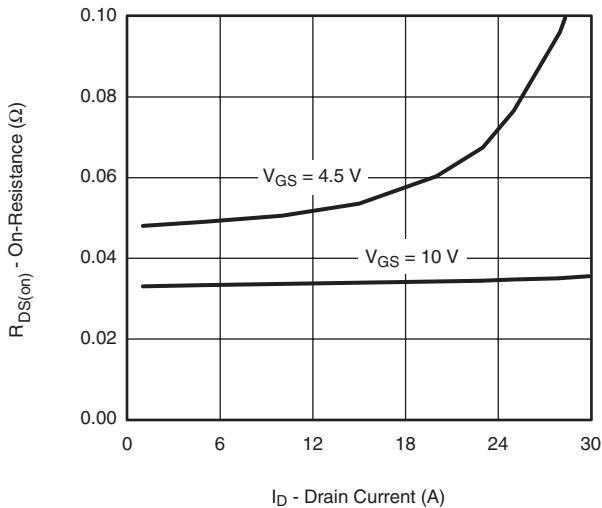
MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



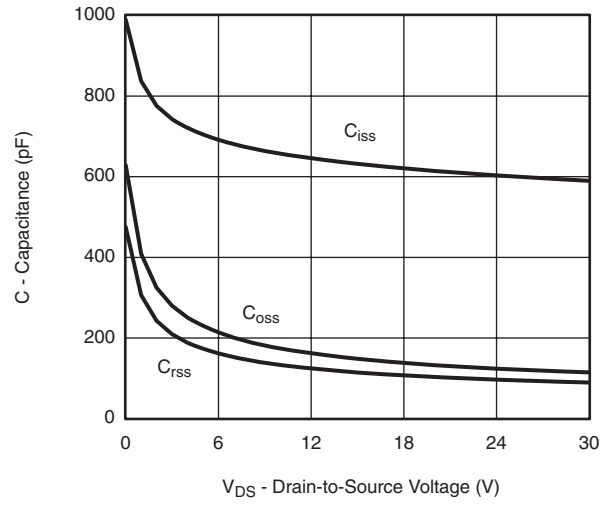
Output Characteristics



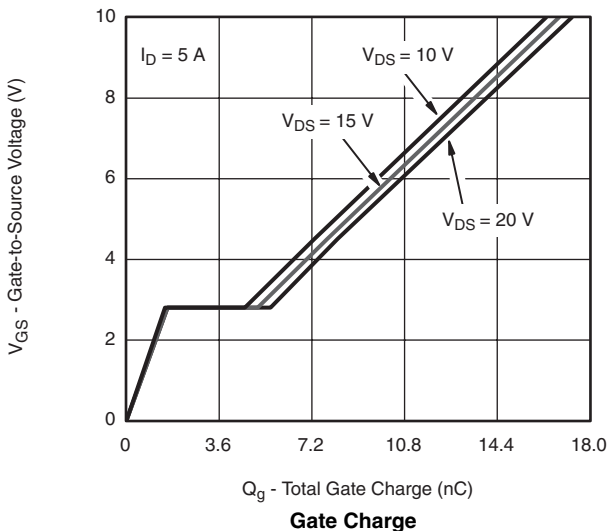
Transfer Characteristics



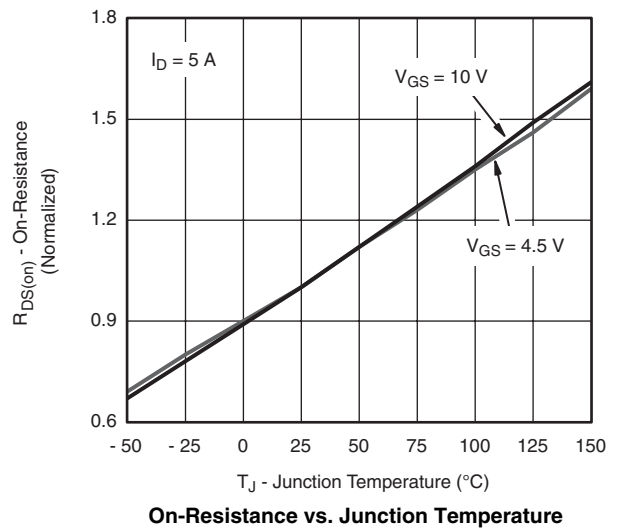
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

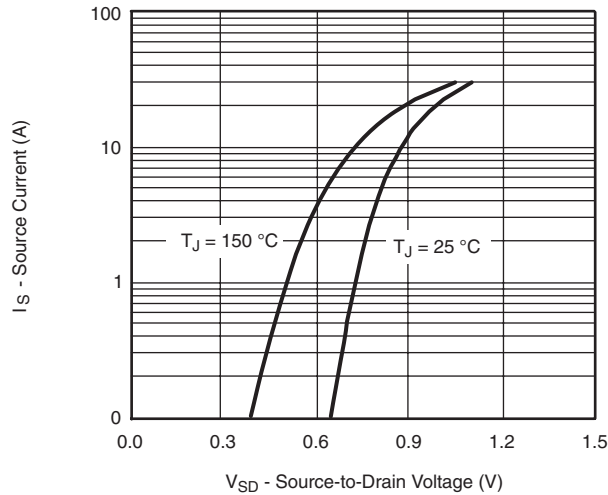


Gate Charge

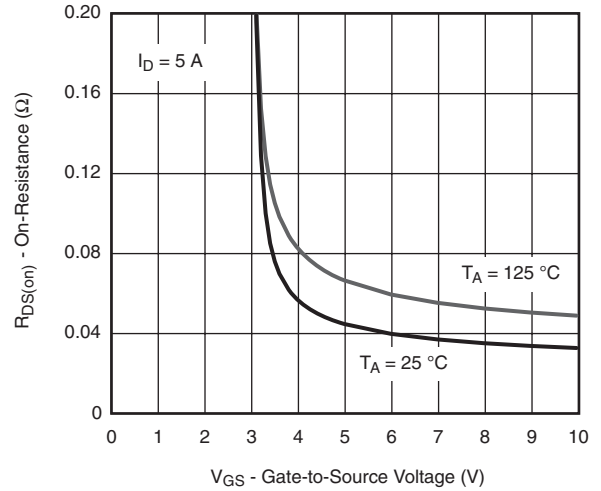


On-Resistance vs. Junction Temperature

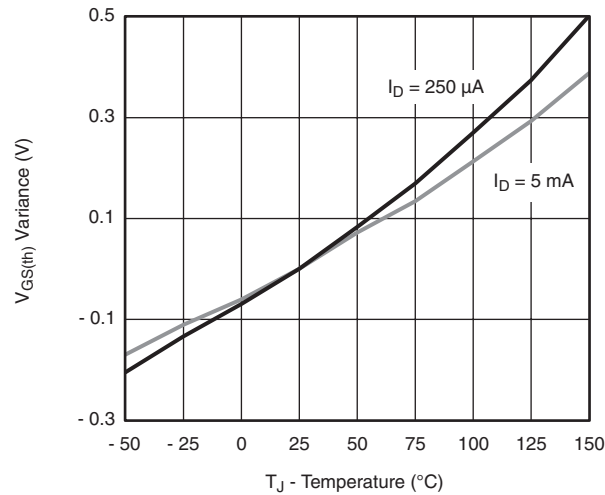
MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



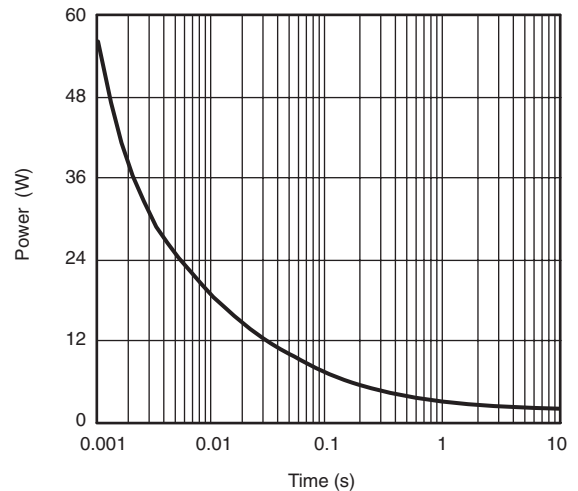
Source-Drain Diode Forward Voltage



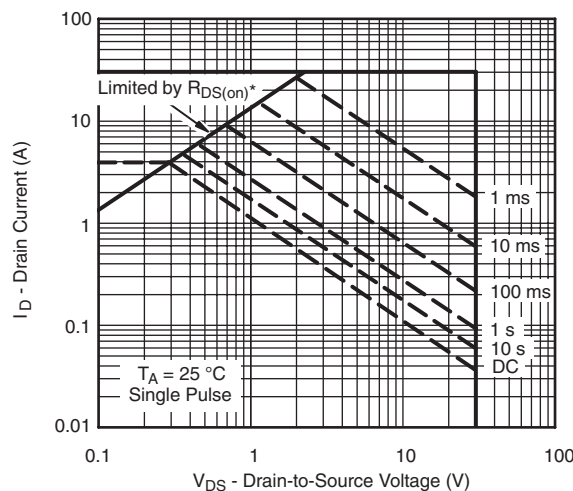
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



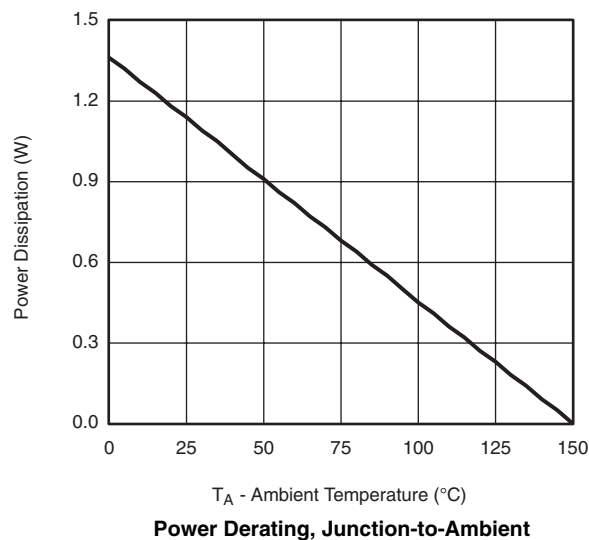
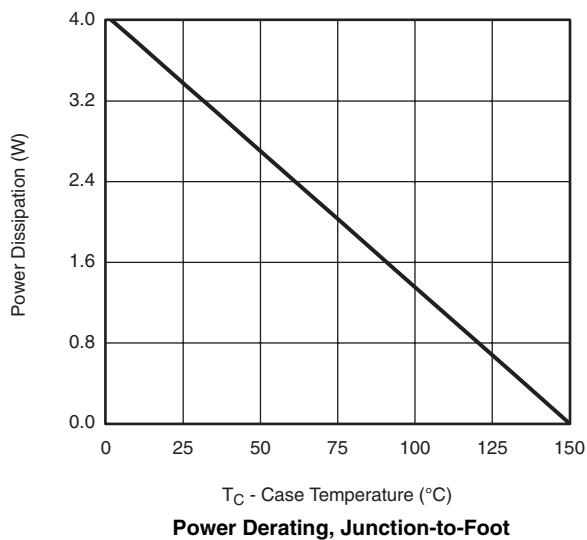
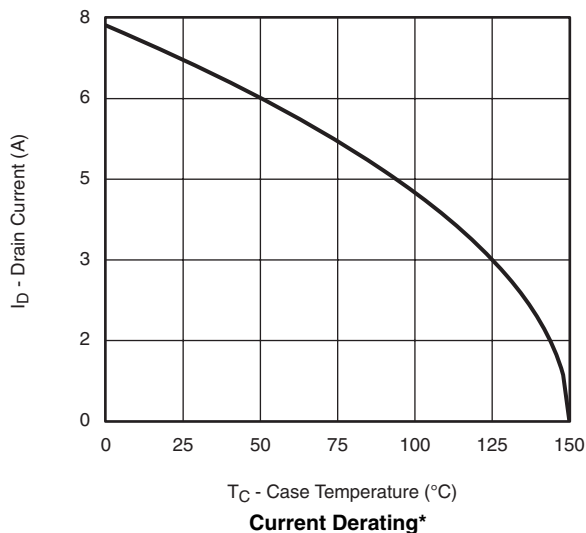
Single Pulse Power, Junction-to-Ambient



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

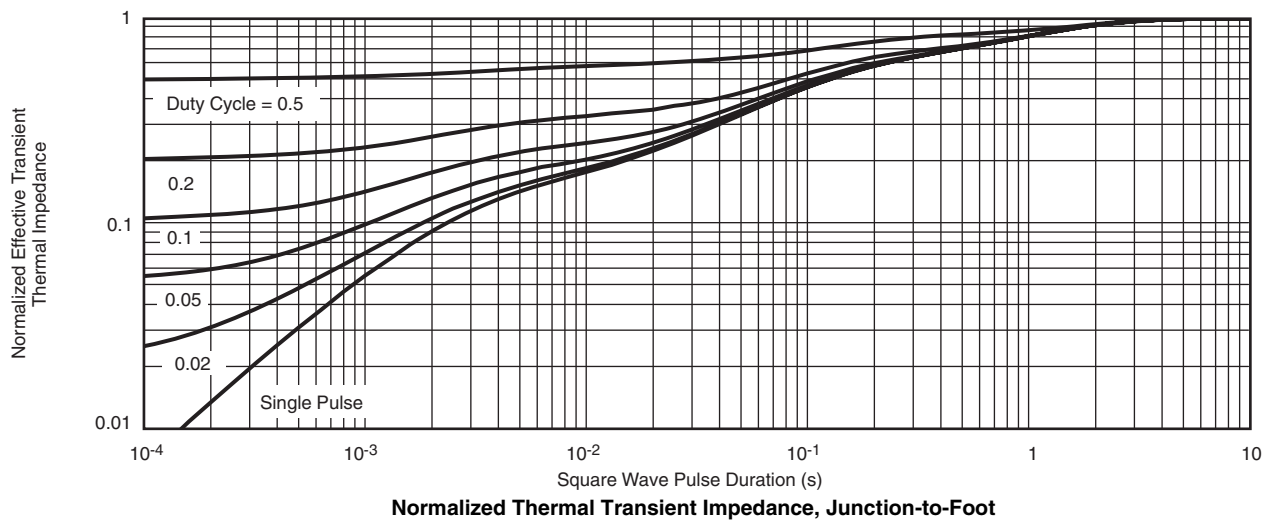
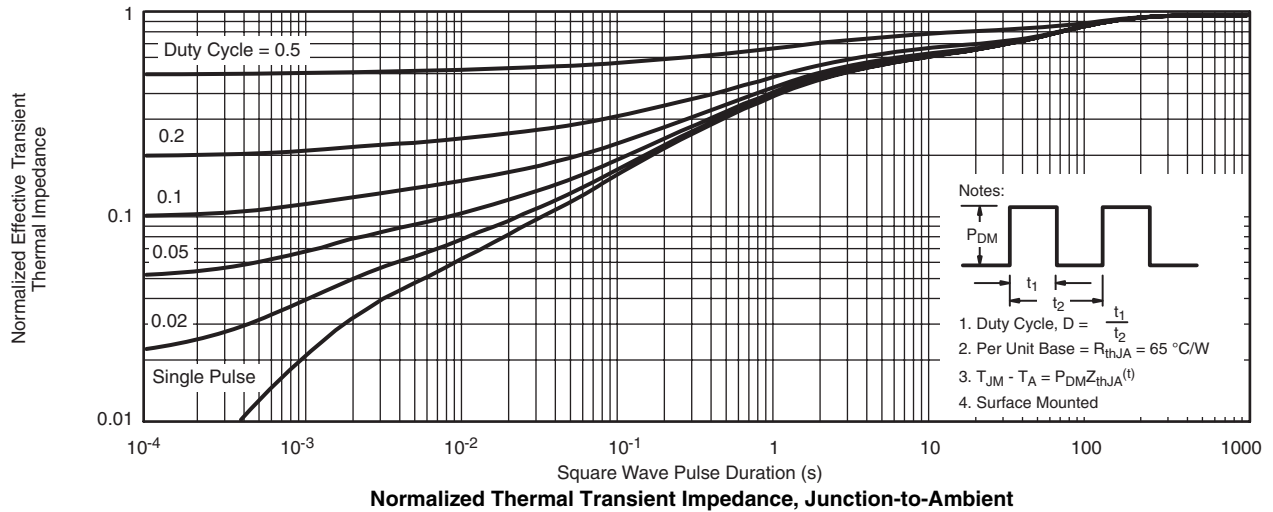
Safe Operating Area, Junction-to-Case

MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

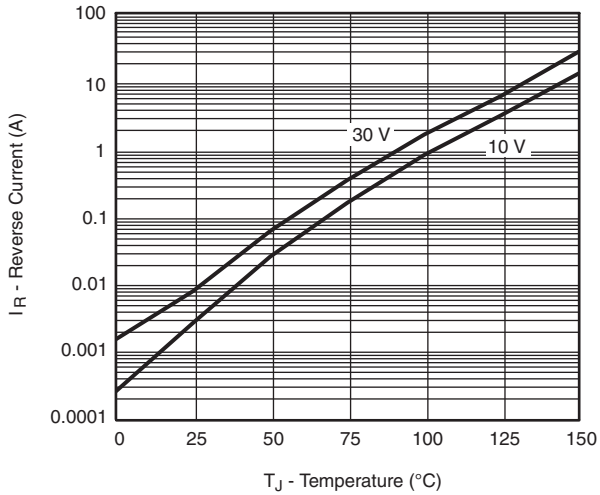


* The power dissipation PD is based on T_{J(max)} = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

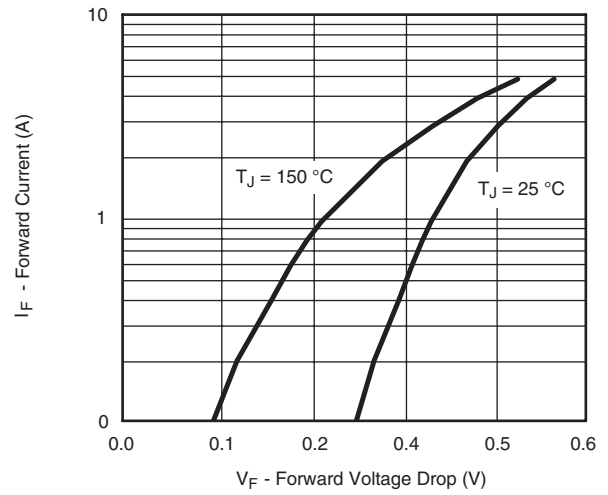
MOSFETS TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



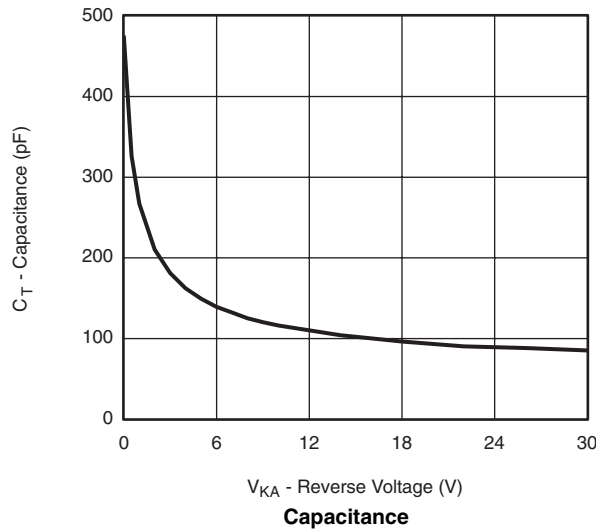
SCHOTTKY TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Reverse Current vs. Junction Temperature



Forward Voltage Drop



Capacitance

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