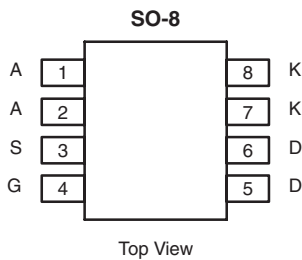


## P-Channel 30-V (D-S) MOSFET with Schottky Diode

MOSFET PRODUCT SUMMARY			
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>	$Q_g$ (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) <sup>a</sup>
30	0.53 V at 3 A	3.0



### FEATURES

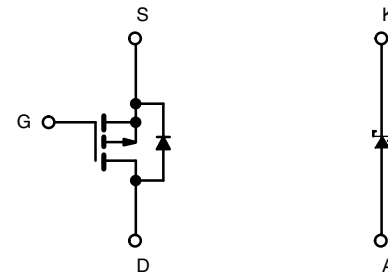
- Halogen-free According to IEC 61249-2-21 Available
- LITTLE FOOT<sup>®</sup> Plus Power MOSFET
- 100 %  $R_g$  Tested



**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)	$V_{GS}$	$\pm 20$	A
Continuous Drain Current ( $T_J = 150$ °C) (MOSFET)	$T_C = 25$ °C	- 6.6	
	$T_C = 70$ °C	- 5.2	
	$T_A = 25$ °C	- 5.1 <sup>b, c</sup>	
	$T_A = 70$ °C	- 3.9 <sup>b, c</sup>	
Pulsed Drain Current (MOSFET)	$I_{DM}$	- 30	W
Continuous Source Current (MOSFET Diode Conduction)	$T_C = 25$ °C	- 2.7	
	$T_A = 25$ °C	- 1.6 <sup>b, c</sup>	
Average Forward Current (Schottky)	$I_F$	- 3 <sup>b</sup>	
Pulsed Forward Current (Schottky)	$I_{FM}$	- 20	
Maximum Power Dissipation (MOSFET and Schottky)	$T_C = 25$ °C	3.3	°C
	$T_C = 70$ °C	2.1	
	$T_A = 25$ °C	2.0 <sup>b, c</sup>	
	$T_A = 70$ °C	1.2 <sup>b, c</sup>	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150	

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient (MOSFET and Schottky) <sup>b, c, d</sup>	$R_{thJA}$	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
<b>Static</b>						
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/ $^\circ\text{C}$
$V_{GS(th)}$ 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	$I_{GSS}$	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -30\text{ V}$ , $V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -30\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 75\text{ }^\circ\text{C}$			-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq -5\text{ V}$ , $V_{GS} = -10\text{ V}$	-10			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$ , $I_D = -5\text{ A}$		0.034	0.042	$\Omega$
		$V_{GS} = -4.5\text{ V}$ , $I_D = -3\text{ A}$		0.052	0.065	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\text{ V}$ , $I_D = -5\text{ A}$		11		S
<b>Dynamic<sup>b</sup></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	$\Omega$
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	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			-3.3	A
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				-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:

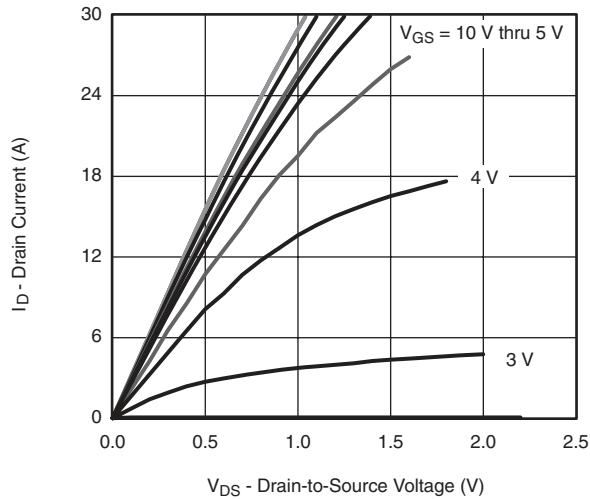
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
b. Guaranteed by design, not subject to production testing.



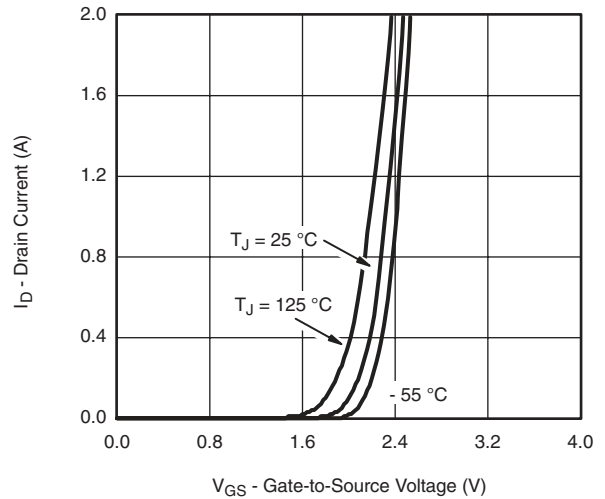
<b>SCHOTTKY SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	$V_F$	$I_F = 3\text{ A}$		0.485	0.53	V
		$I_F = 3\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.42	0.47	
Maximum Reverse Leakage Current	$I_{rm}$	$V_R = 30\text{ V}$		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.

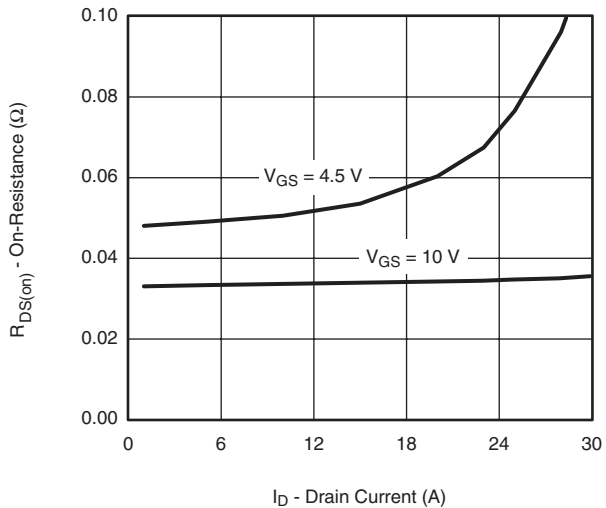
**MOSFET TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



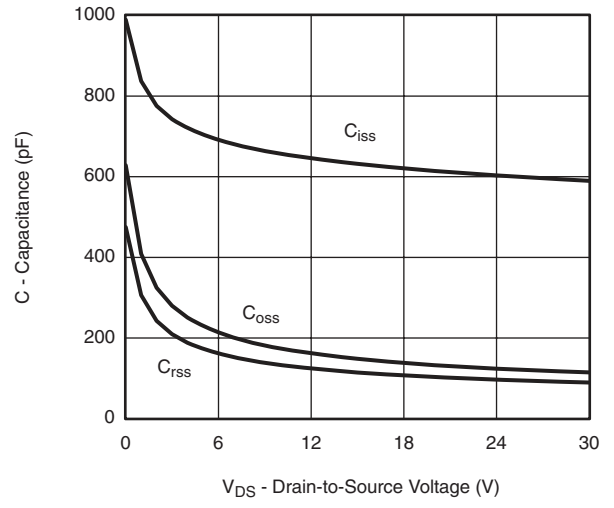
**Output Characteristics**



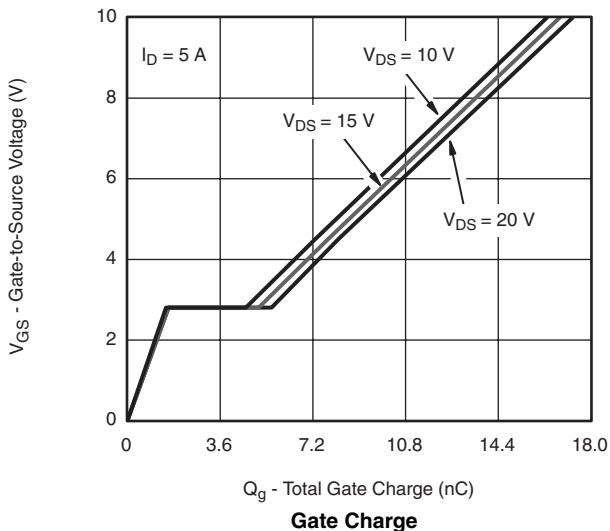
**Transfer Characteristics**



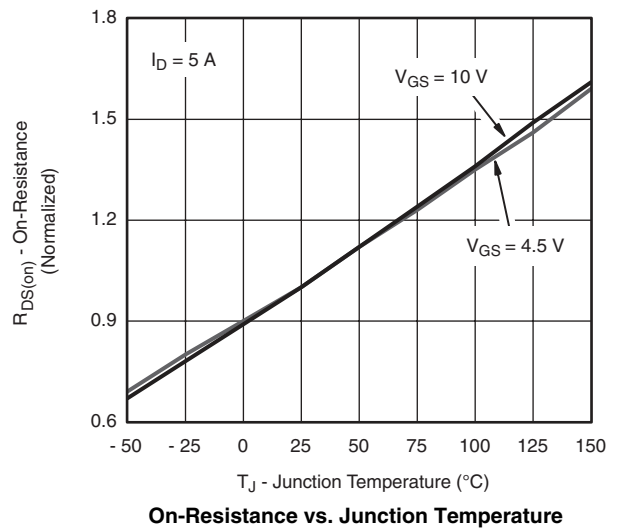
**On-Resistance vs. Drain Current and Gate Voltage**



**Capacitance**

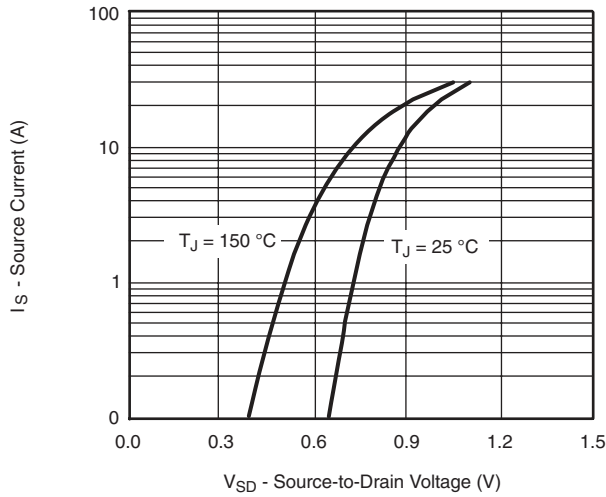


**Gate Charge**

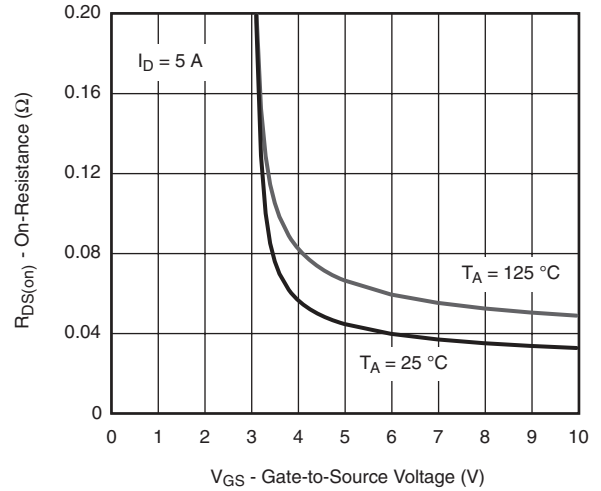


**On-Resistance vs. Junction Temperature**

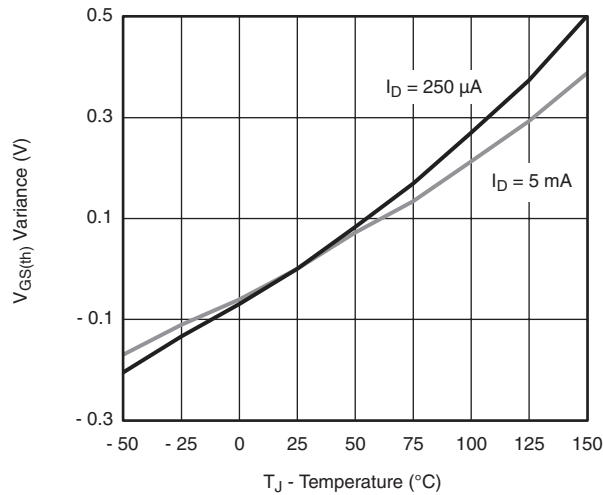
**MOSFET TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



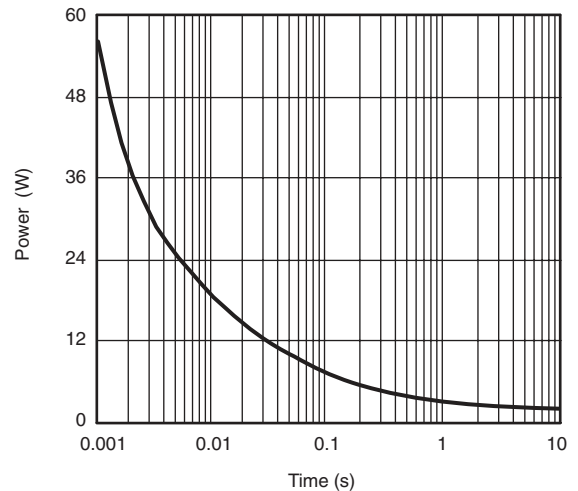
**Source-Drain Diode Forward Voltage**



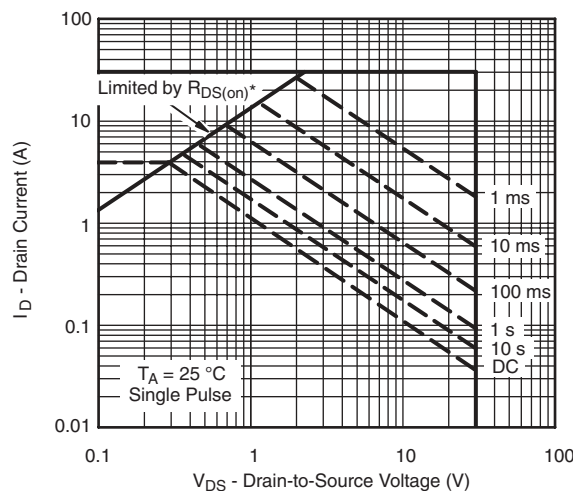
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



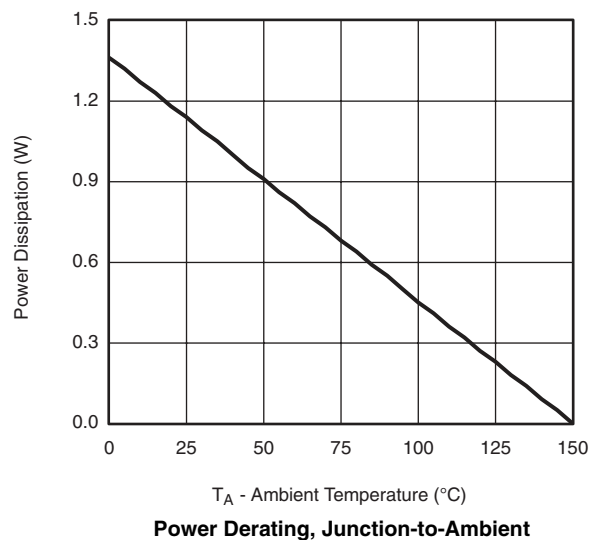
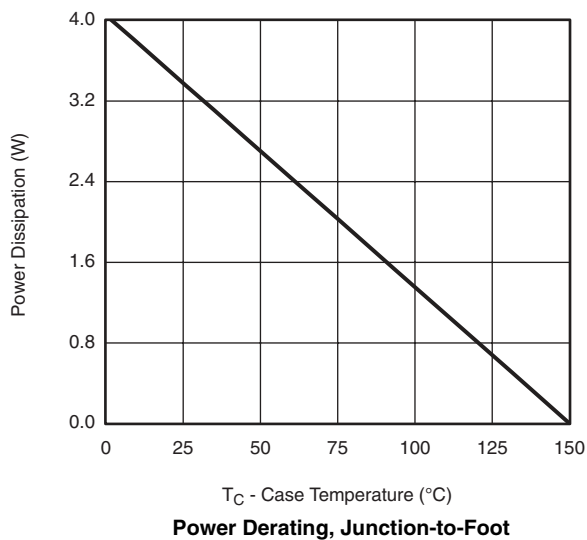
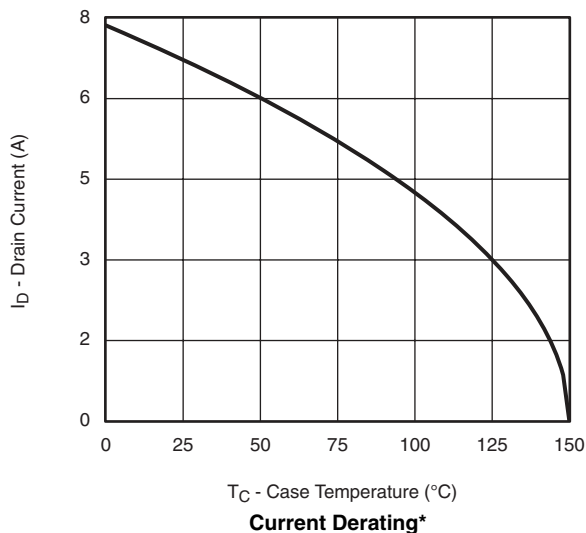
**Single Pulse Power, Junction-to-Ambient**



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

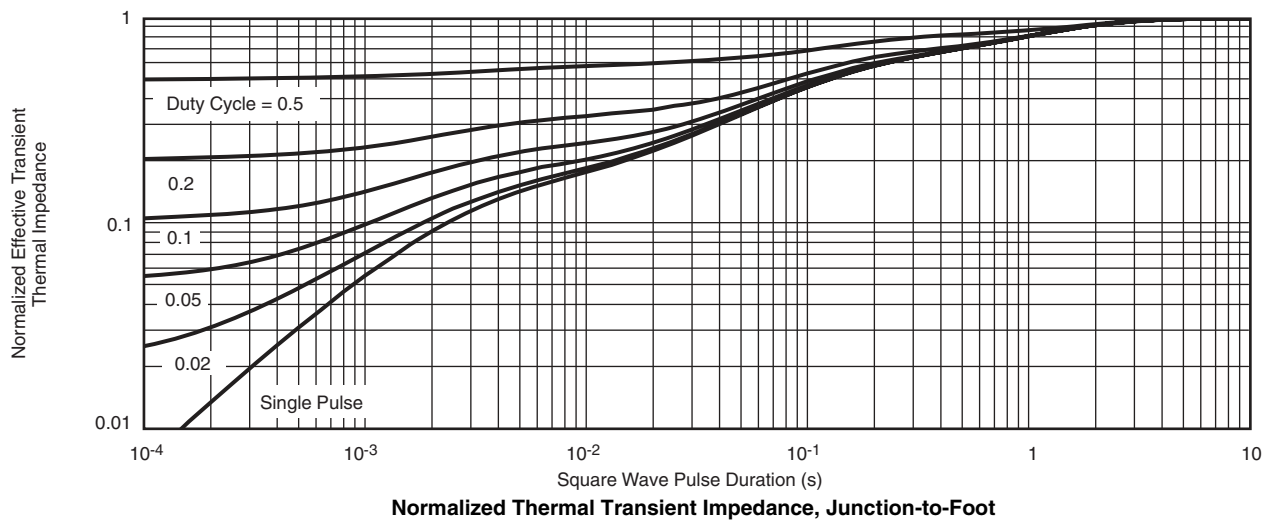
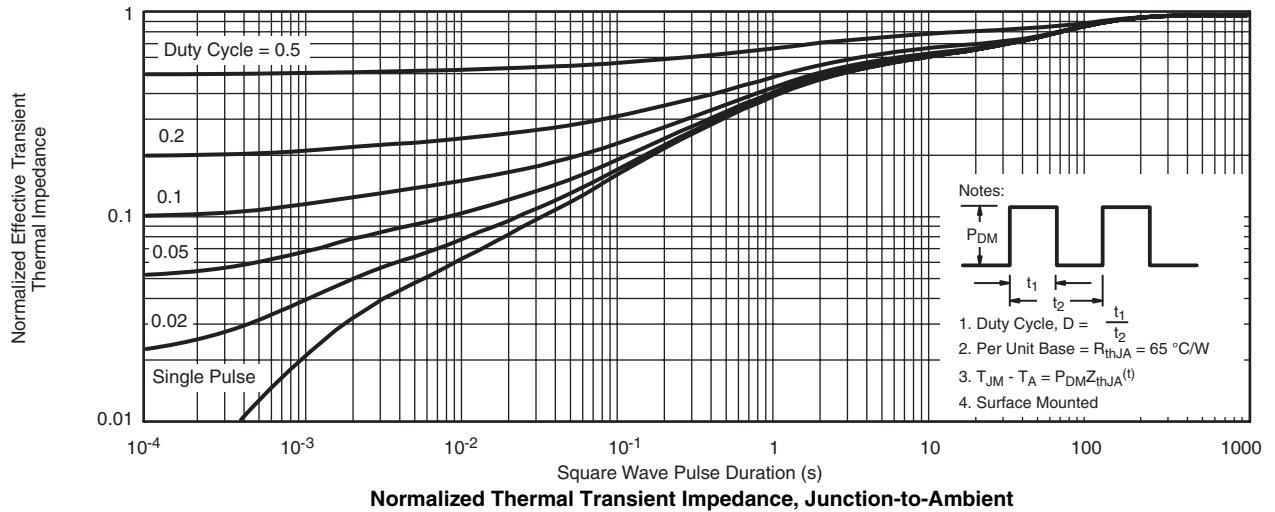
**Safe Operating Area, Junction-to-Case**

**MOSFET TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

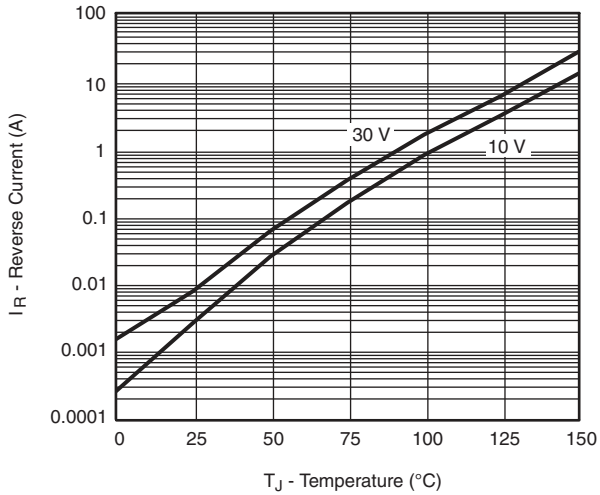


\* The power dissipation PD is based on T<sub>J(max)</sub> = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package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

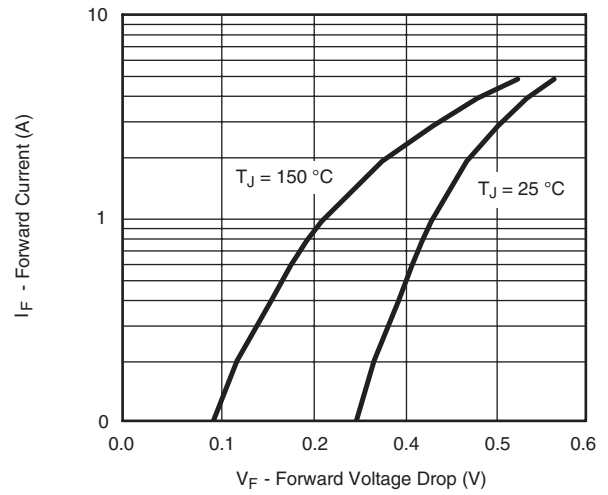
**MOSFETS TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



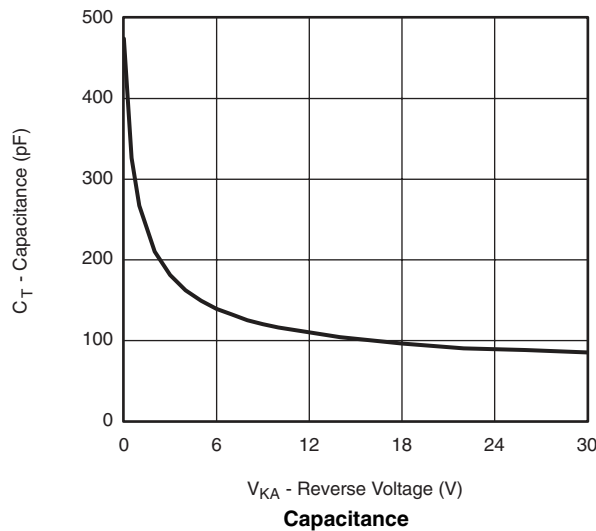
**SCHOTTKY TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



Reverse Current vs. Junction Temperature



Forward Voltage Drop



Capacitance

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