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**Si4310BDY**  
 Vishay Siliconix

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

PRODUCT SUMMARY			
	V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
Channel-1	30	0.011 at V <sub>GS</sub> = 10 V	10
		0.016 at V <sub>GS</sub> = 4.5 V	8.2
0.0085 at V <sub>GS</sub> = 10 V		14	
0.0095 at V <sub>GS</sub> = 4.5 V		13	
Channel-2			

SCHOTTKY PRODUCT SUMMARY		
V <sub>DS</sub> (V)	V <sub>SD</sub> (V) Diode Forward Voltage	I <sub>F</sub> (A)
30	0.53 V at 3 A	2

### FEATURES

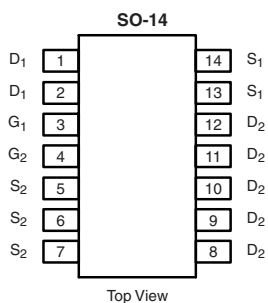
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- 100 % R<sub>g</sub> Tested
- Compliant to RoHS Directive 2002/95/EC



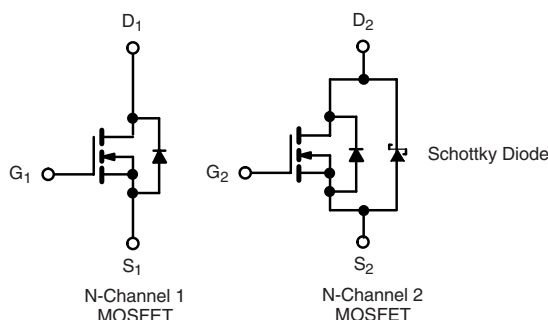
**RoHS**  
 COMPLIANT  
 HALOGEN  
**FREE**  
 Available

### APPLICATIONS

- DC/DC Converters
  - Game Stations
  - Video Equipment



Ordering Information: Si4310BDY-T1-E3 (Lead (Pb)-free)  
 Si4310BDY-T1-GE3 (Lead (Pb)-free and Halogen-free)



ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted							
Parameter	Symbol	Channel-1		Channel-2		Unit	
		10 s	Steady State	10 s	Steady State		
Drain-Source Voltage	V <sub>DS</sub>	30				V	
Gate-Source Voltage	V <sub>GS</sub>	± 20		± 20			
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	10	7.5	14	9.8	A
		T <sub>A</sub> = 70 °C	8	6	11	7.8	
Pulsed Drain Current	I <sub>DM</sub>	40		50		W	
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	1.8	1.04	2.73	1.33		
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	2	1.14	3.0	1.47	W
		T <sub>A</sub> = 70 °C	1.28	0.73	1.9	0.94	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150				°C	

THERMAL RESISTANCE RATINGS									
Parameter		Symbol	Channel-1		Channel-2		Schottky		Unit
			Typ.	Max.	Typ.	Max.	Typ.	Max.	
Maximum Junction-to-Ambient <sup>a</sup>	t ≤ 10 s	R <sub>thJA</sub>	53	62.5	34	35	40	48	°C/W
	Steady State		92	110	70	72	76	93	
Maximum Junction-to-Foot (Drain)	Steady State	R <sub>thJF</sub>	35	42	17	24	21	26	

Notes:

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

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MOSFET SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted									
Parameter	Symbol	Test Conditions		Min.	Typ. <sup>a</sup>	Max.	Unit		
<b>Static</b>									
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	Ch-1 Ch-2	1.0 1.0		3.0 3.0	V		
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	Ch-1 Ch-2			100 100	nA		
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	Ch-1 Ch-2			1 100	$\mu\text{A}$		
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$	Ch-1 Ch-2			15 4000			
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$	Ch-1 Ch-2	20 30			A		
Drain-Source On-State Resistance <sup>b</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$	Ch-1		0.009	0.011	$\Omega$		
		$V_{GS} = 10\text{ V}, I_D = 14\text{ A}$	Ch-2		0.0065	0.0085			
		$V_{GS} = 4.5\text{ V}, I_D = 8.2\text{ A}$	Ch-1		0.013	0.016			
		$V_{GS} = 4.5\text{ V}, I_D = 13\text{ A}$	Ch-2		0.0075	0.0095			
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 10\text{ A}$	Ch-1		30		S		
		$V_{DS} = 15\text{ V}, I_D = 14\text{ A}$	Ch-2		60				
Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$I_S = 1.8\text{ V}, V_{GS} = 0\text{ V}$	Ch-1		0.76	1.1	V		
		$I_S = 2.73\text{ V}, V_{GS} = 0\text{ V}$	Ch-2		0.485	0.53			
<b>Dynamic<sup>a</sup></b>									
Input Capacitance	$C_{iss}$	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	Ch-1 Ch-2	790 1530	1580 3060	2370 4590	$\mu\text{F}$		
Output Capacitance	$C_{oss}$		Ch-1 Ch-2	145 300	290 600	435 900			
Reverse Transfer Capacitance	$C_{rss}$		Ch-1 Ch-2	70 115	140 225	210 340			
Total Gate Charge	$Q_g$		Channel-1 $V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$  Channel-2 $V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 14\text{ A}$	Ch-1 Ch-2		12 19		18 30	nC
Gate-Source Charge	$Q_{gs}$			Ch-1 Ch-2		5.3 10			
Gate-Drain Charge	$Q_{gd}$			Ch-1 Ch-2		4.3 5			
Gate Resistance	$R_g$	$f = 1\text{ MHz}$	Ch-1 Ch-2	0.90 0.3	1.8 0.95	2.7 1.4	$\Omega$		
Turn-On Delay Time	$t_{d(on)}$	Channel-1 $V_{DD} = 15\text{ V}, R_L = 15\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$  Channel-2 $V_{DD} = 15\text{ V}, R_L = 15\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$	Ch-1 Ch-2		13 17	20 26	ns		
Rise Time	$t_r$		Ch-1 Ch-2		10 12	15 20			
Turn-Off Delay Time	$t_{d(off)}$		Ch-1 Ch-2		33 53	50 80			
Fall Time	$t_f$		Ch-1 Ch-2		10 17	15 26			
Source-Drain Reverse Recovery Time	$t_{rr}$		$I_F = 1.8\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	Ch-1		25		40	
			$I_F = 2.73\text{ V}, di/dt = 100\text{ A}/\mu\text{s}$	Ch-2		31		50	

Notes:

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

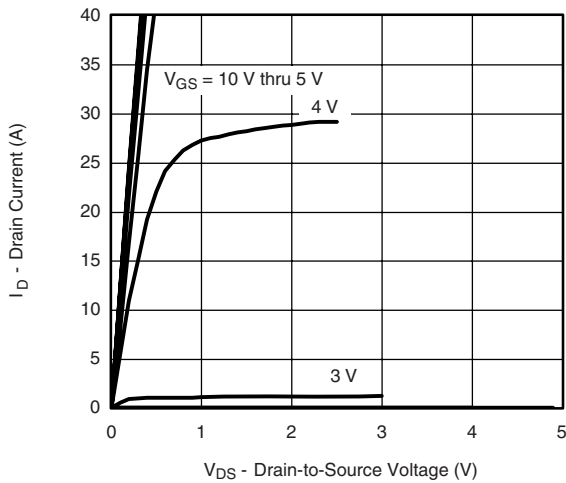


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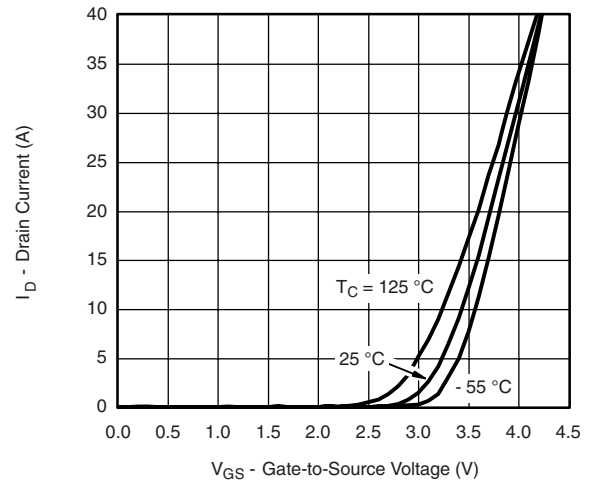
<b>SCHOTTKY SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward voltage Drop	$V_F$	$I_F = 3\text{ A}$		0.485	0.53	V
		$I_F = 3\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.42	0.42	
Maximum Reverse Leakage Current	$I_{rm}$	$V_R = 30\text{ V}$		0.008	0.100	mA
		$V_R = 30\text{ V}, T_J = 75\text{ }^\circ\text{C}$		0.4	5	
		$V_R = 30\text{ V}, T_J = 125\text{ }^\circ\text{C}$		0.5	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.

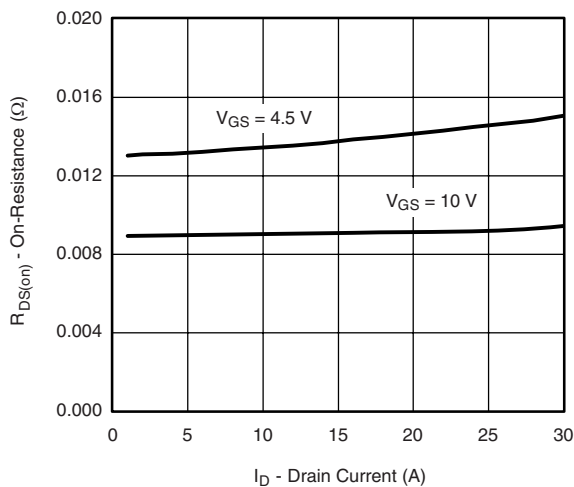
**CHANNEL-1 TYPICAL CHARACTERISTICS**  $25\text{ }^\circ\text{C}$ , unless otherwise noted



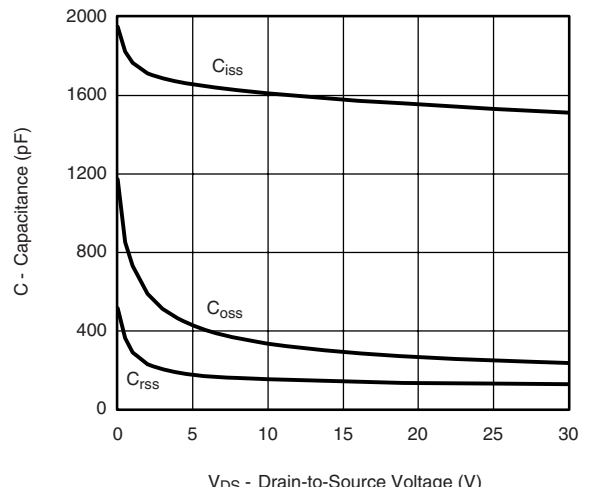
**Output Characteristics**



**Transfer Characteristics**



**On-Resistance vs. Drain Current**

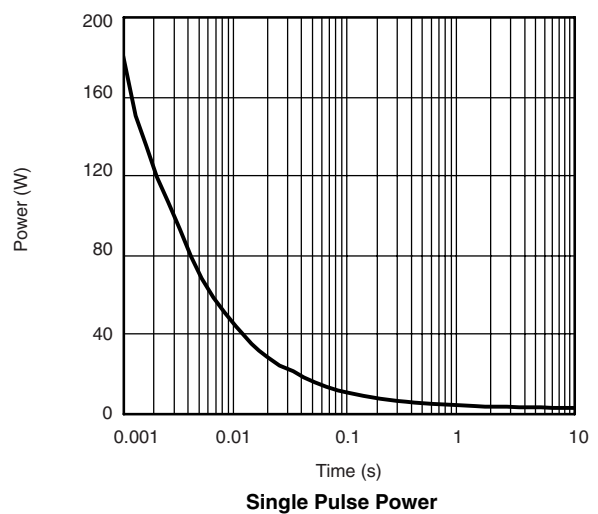
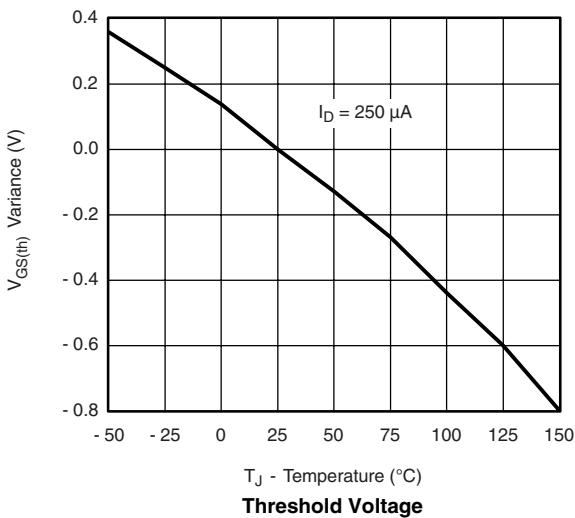
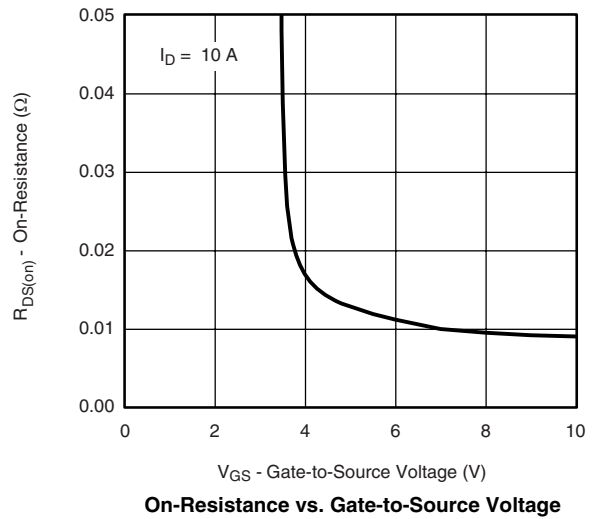
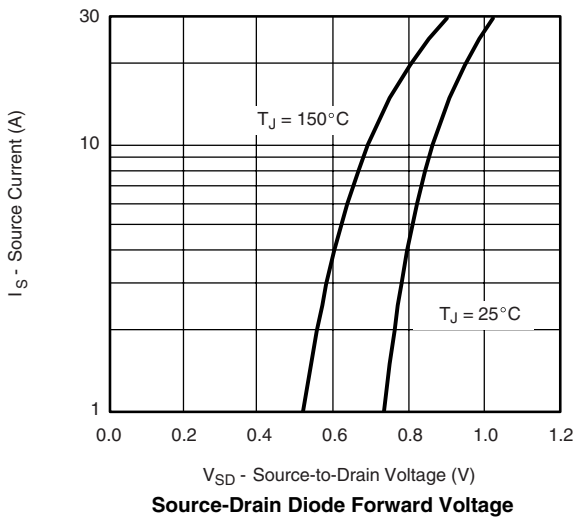
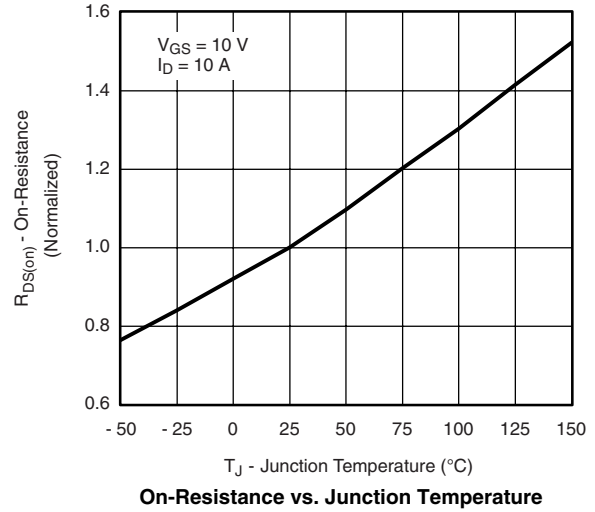
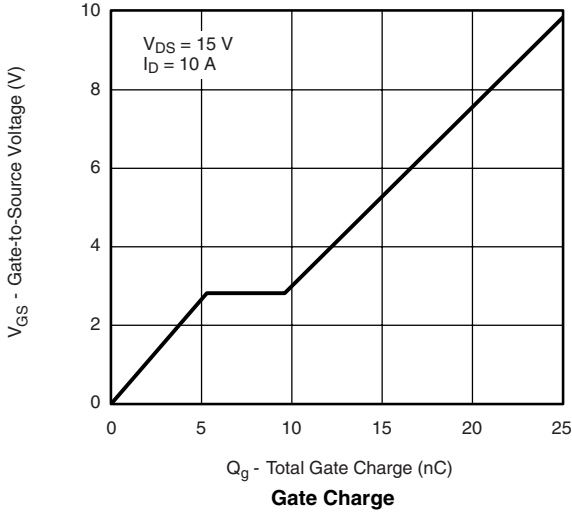


**Capacitance**

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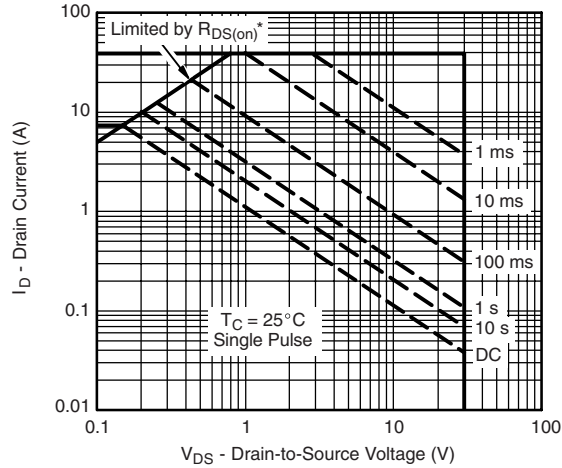
**CHANNEL-1 TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



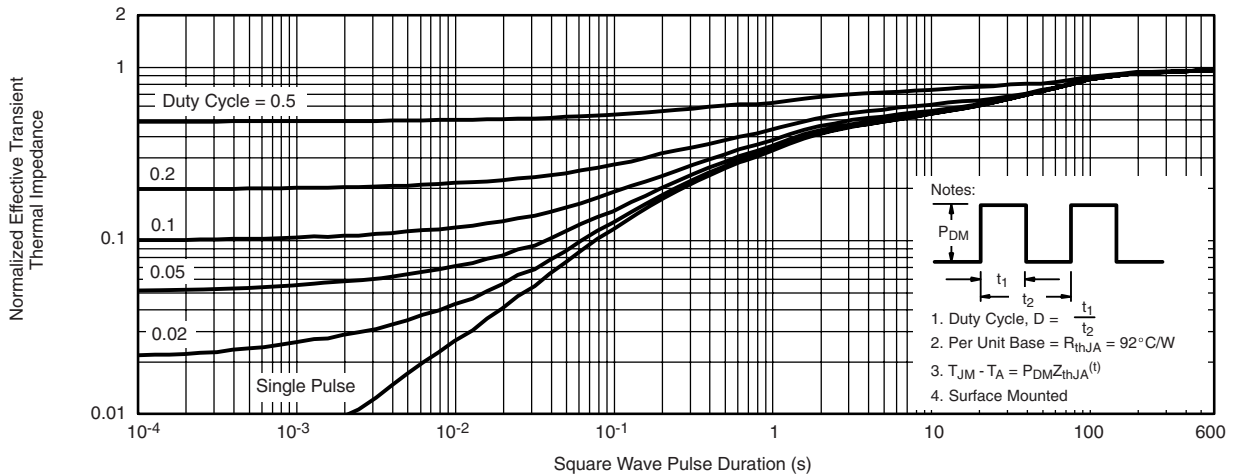


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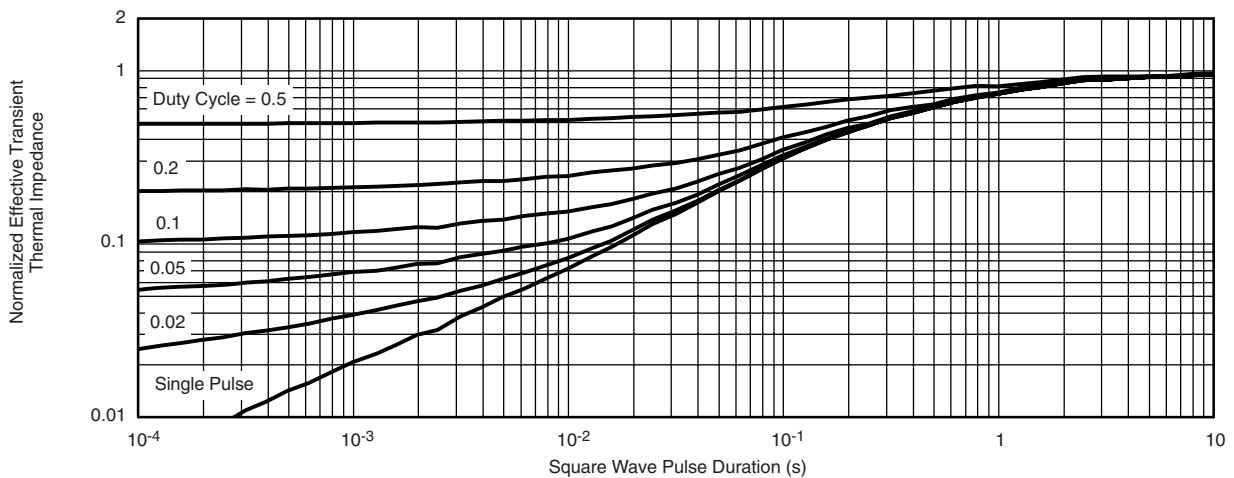
**CHANNEL-1 TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified  
**Safe Operating Area, Junction-to-Case**



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

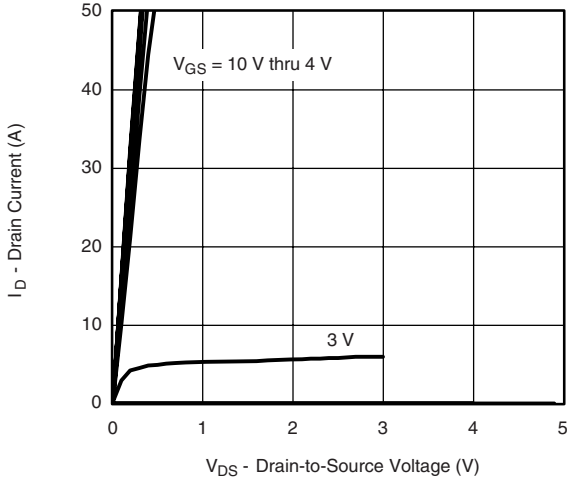


**Normalized Thermal Transient Impedance, Junction-to-Foot**

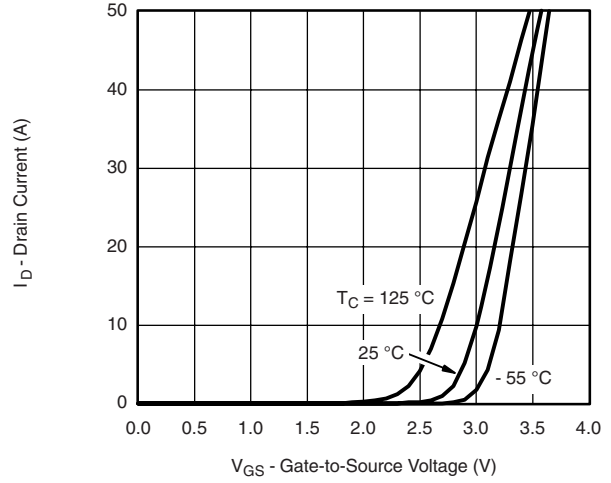
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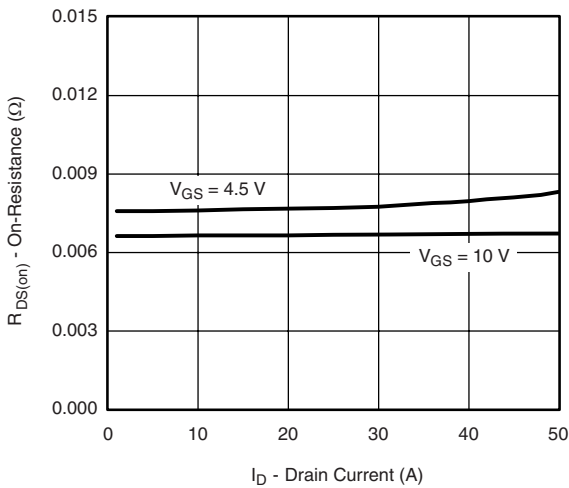
**CHANNEL-2 TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



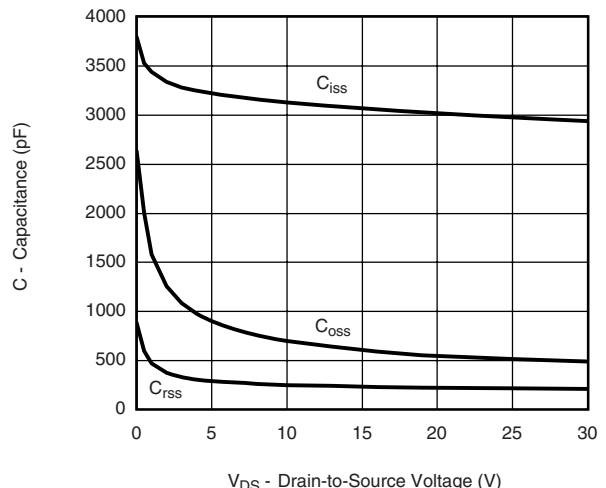
**Output Characteristics**



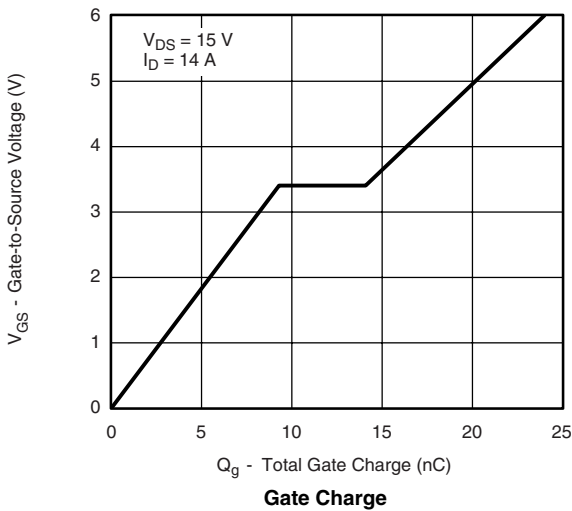
**Transfer Characteristics**



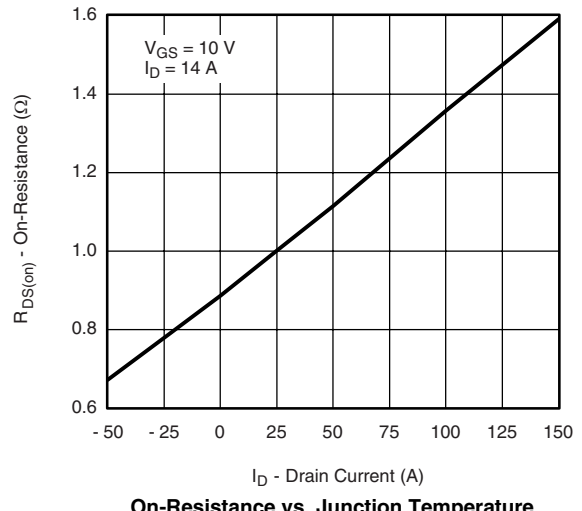
**On-Resistance vs. Drain Current**



**Capacitance**



**Gate Charge**

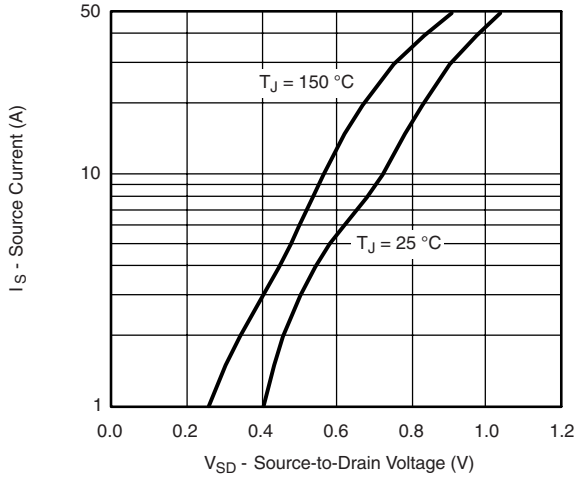


**On-Resistance vs. Junction Temperature**

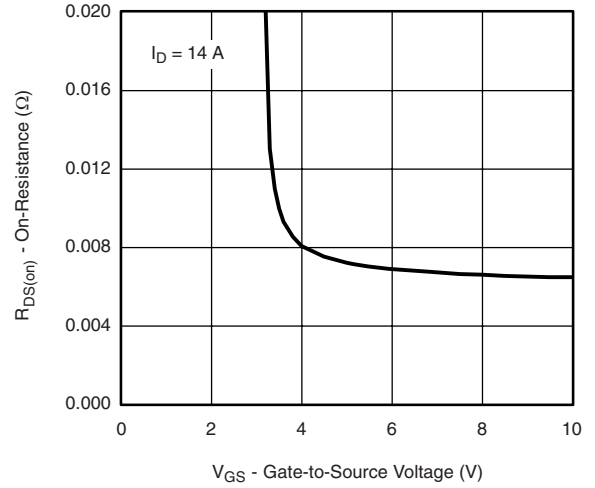


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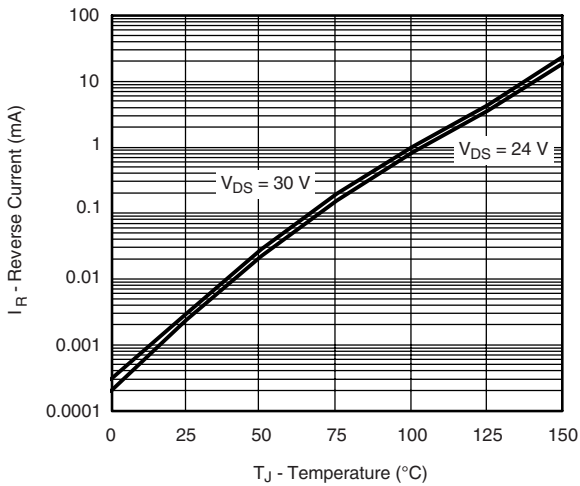
**CHANNEL-2 TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



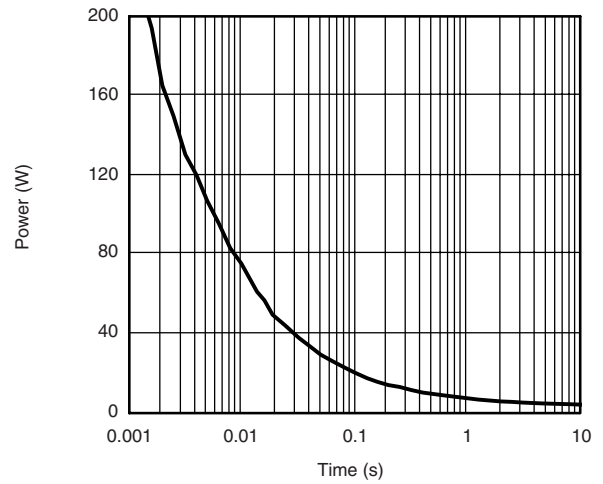
**Source-Drain Diode Forward Voltage**



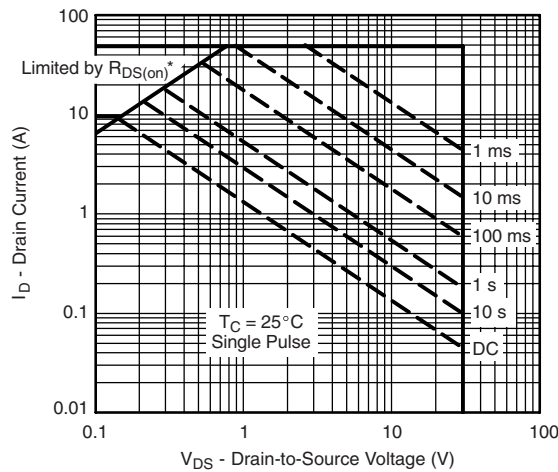
**On-Resistance vs. Gate-to-Source Voltage**



**Reverse Current vs. Junction Temperature**



**Single Pulse Power**



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

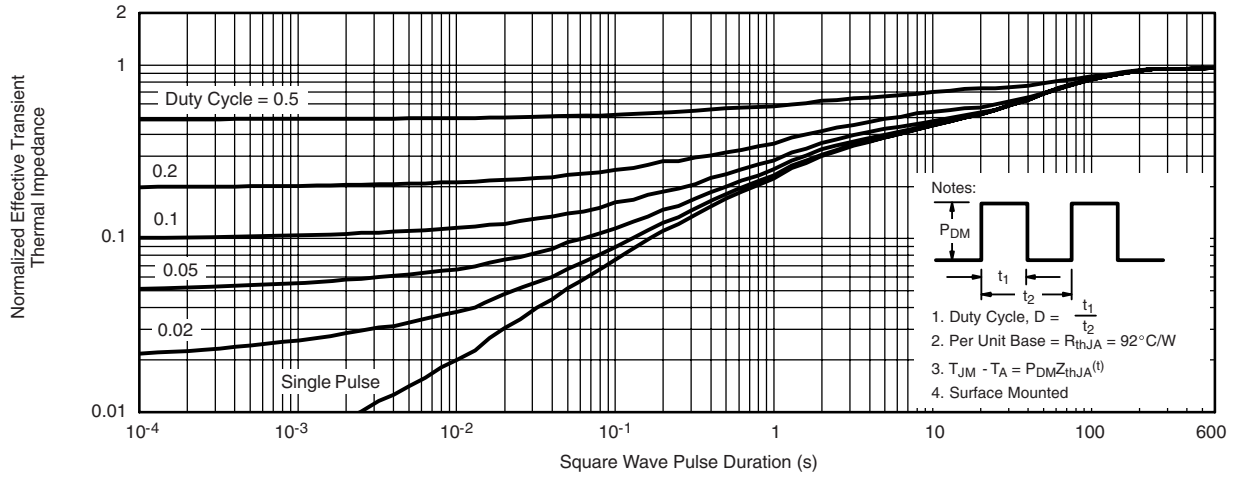
**Safe Operating Area, Junction-to-Case**



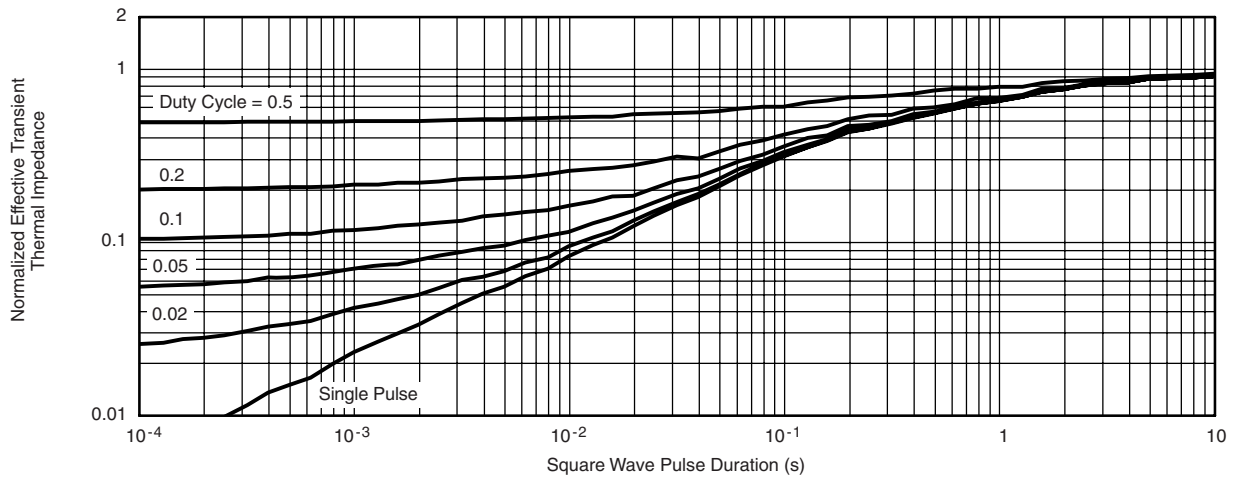
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**CHANNEL-2 TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

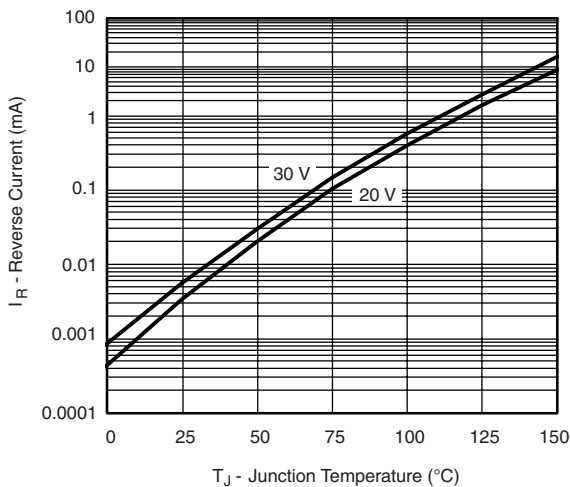


**Normalized Thermal Transient Impedance, Junction-to-Ambient**

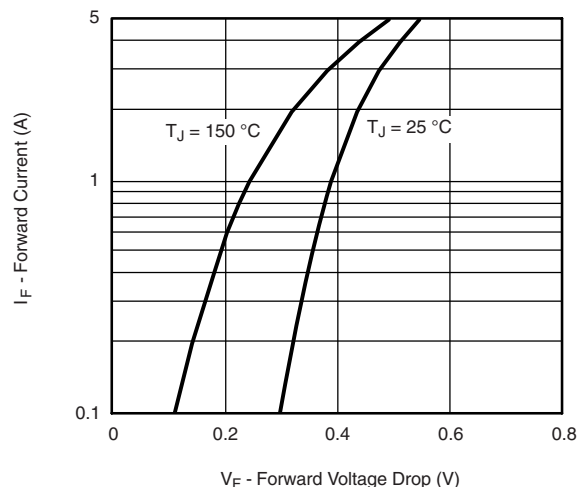


**Normalized Thermal Transient Impedance, Junction-to-Foot**

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



**Reverse Current vs. Junction Temperature**

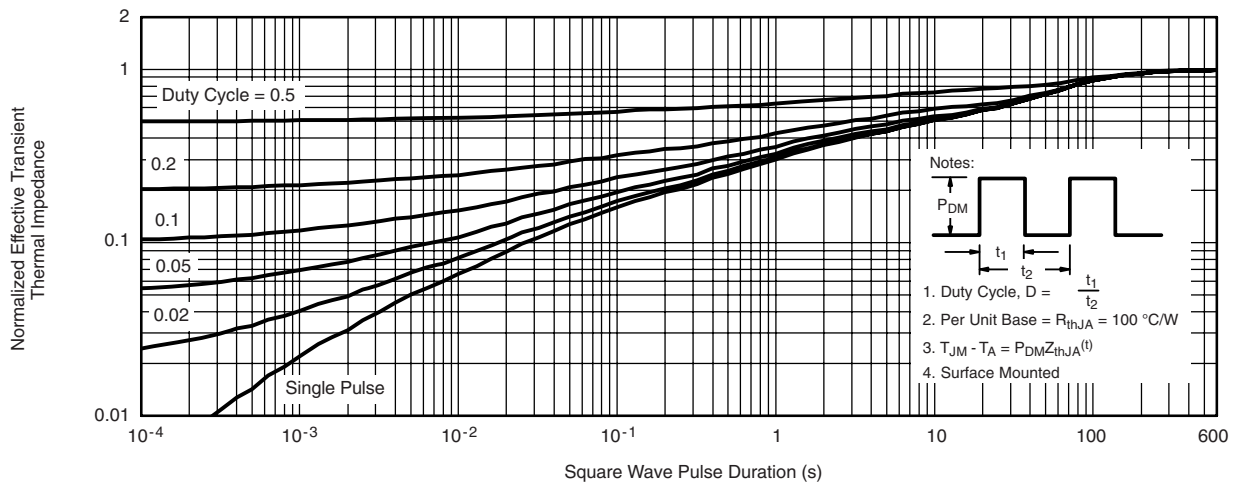
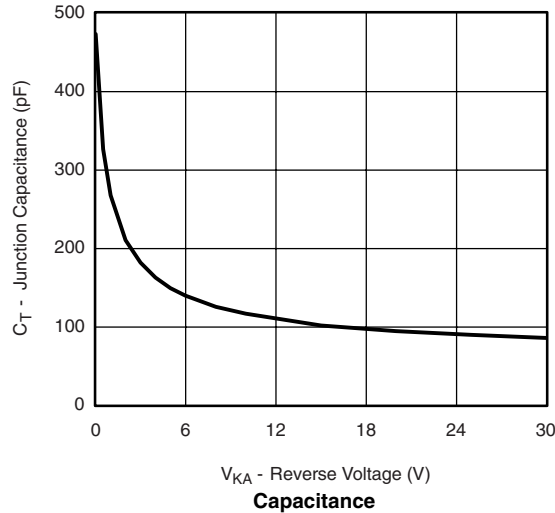


**Forward Voltage Drop**

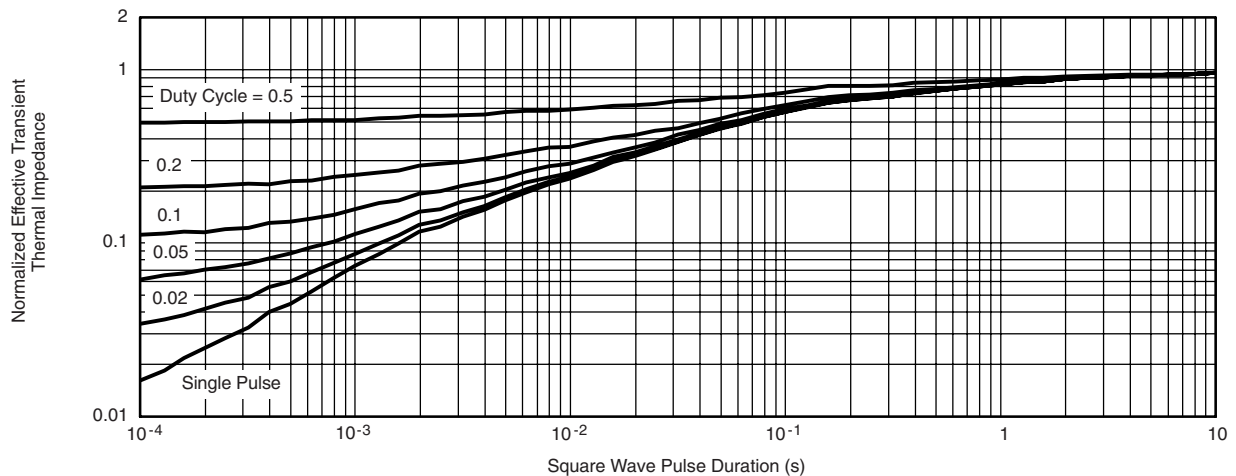


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**SCHOTTKY TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



**Normalized Thermal Transient Impedance, Junction-to-Ambient**



**Normalized Thermal Transient Impedance, Junction-to-Foot**

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