

## Dual P-Channel 1.8-V (G-S) MOSFET

PRODUCT SUMMARY			
V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ)
- 8	0.542 at V <sub>GS</sub> = - 4.5 V	- 0.63	10.5 nC
	0.798 at V <sub>GS</sub> = - 2.5 V	- 0.52	
	1.2 at V <sub>GS</sub> = - 1.8 V	- 0.20	

### FEATURES

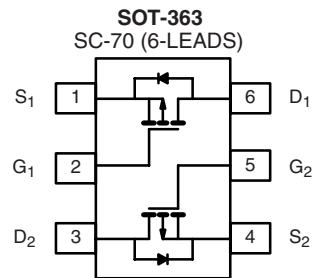
- TrenchFET® Power MOSFET

### APPLICATIONS

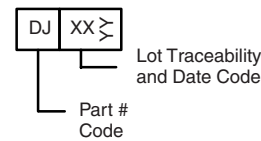
- Load Switch for Portable Devices



**RoHS**  
COMPLIANT



### Marking Code



Top View  
Ordering Information: Si1905BDH-T1-E3 (Lead (Pb)-free)

ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	- 8	V
Gate-Source Voltage	V <sub>GS</sub>	± 8	
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a, b</sup>	I <sub>D</sub>	T <sub>C</sub> = 25 °C	- 0.63
		T <sub>C</sub> = 70 °C	- 0.50
		T <sub>A</sub> = 25 °C	- 0.58 <sup>a, b</sup>
		T <sub>A</sub> = 70 °C	- 0.47 <sup>a, b</sup>
Pulsed Drain Current (10 μs Pulse Width)	I <sub>DM</sub>	- 1.8	A
Continuous Source-Drain Diode Current <sup>a, b</sup>	I <sub>S</sub>	T <sub>C</sub> = 25 °C	
		T <sub>A</sub> = 25 °C	- 0.25 <sup>a, b</sup>
Maximum Power Dissipation <sup>a, b</sup>	P <sub>D</sub>	T <sub>C</sub> = 25 °C	0.357
		T <sub>C</sub> = 70 °C	- 0.301
		T <sub>A</sub> = 25 °C	0.301 <sup>a, b</sup>
		T <sub>A</sub> = 70 °C	0.95 <sup>a, b</sup>
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C
Soldering Recommendations (Peak Temperature) <sup>c, d</sup>		260	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>a, c</sup>	R <sub>thJA</sub>	t ≤ 5 s	360	415	°C/W
		Steady State	400	460	
Maximum Junction-to-Foot (Drain)	R <sub>thJF</sub>	300	350		

Notes:

- a. Surface Mounted on 1" x 1" FR4 board.
- b. t = 5 s.
- c. Maximum under Steady State conditions is 400 °C/W.



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	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 8			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		7.15		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 1.66		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 0.45		- 1.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = -8\text{ V}$			- 100	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -8\text{ V}, V_{GS} = 0\text{ V}$			- 1	$\mu\text{A}$
		$V_{DS} = -8\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			- 10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \leq 5\text{ V}, V_{GS} = -4.5\text{ V}$	- 1.8			A
Drain-Source On-State Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -0.58\text{ A}$		0.450	0.542	$\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -0.47\text{ A}$		0.655	0.798	
		$V_{GS} = -1.8\text{ V}, I_D = -0.2\text{ A}$		0.950	1.2	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -4\text{ V}, I_D = -0.58\text{ A}$		1.2		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -4\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		62		$\mu\text{F}$
Output Capacitance	$C_{oss}$			30		
Reverse Transfer Capacitance	$C_{rss}$			12		
Total Gate Charge	$Q_g$	$V_{DS} = -4\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -0.58\text{ A}$		1.0	1.5	nC
Gate-Source Charge	$Q_{gs}$			0.19		
Gate-Drain Charge	$Q_{gd}$			0.20		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$		6.3		$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -4\text{ V}, R_L = 8.7\text{ }\Omega$ $I_D \cong -0.46\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		9	14	ns
Rise Time	$t_r$			40	60	
Turn-Off Delay Time	$t_{d(off)}$			50	75	
Fall Time	$t_f$			60	90	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			- 0.30	A
Pulse Diode Forward Current	$I_{SM}$				- 1.8	
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	$t_{rr}$	$I_F = -1.4\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		25	38	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			7	11	nC
Reverse Recovery Fall Time	$t_a$			9		ns
Reverse Recovery Rise Time	$t_b$			16		

Notes:

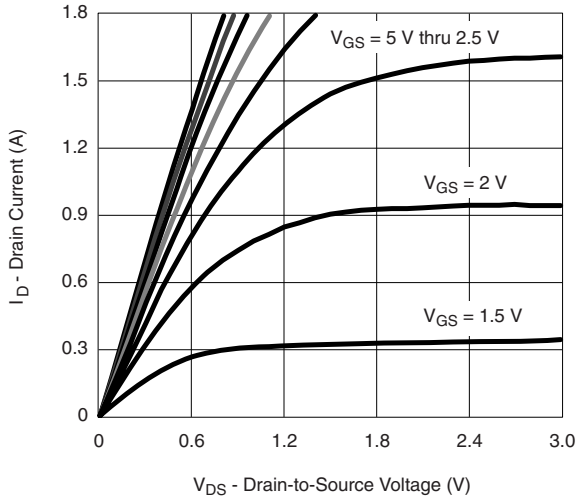
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

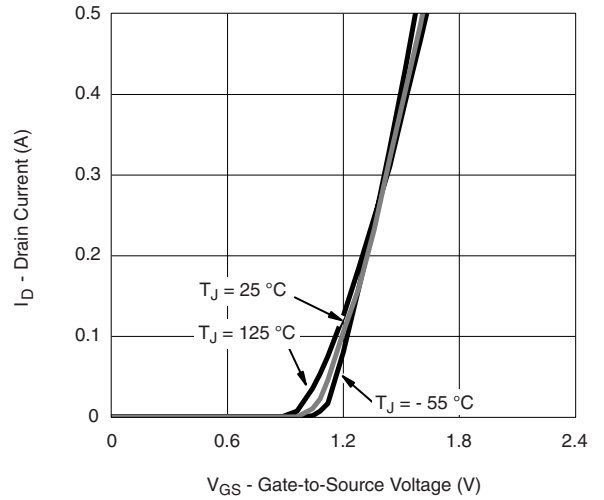
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



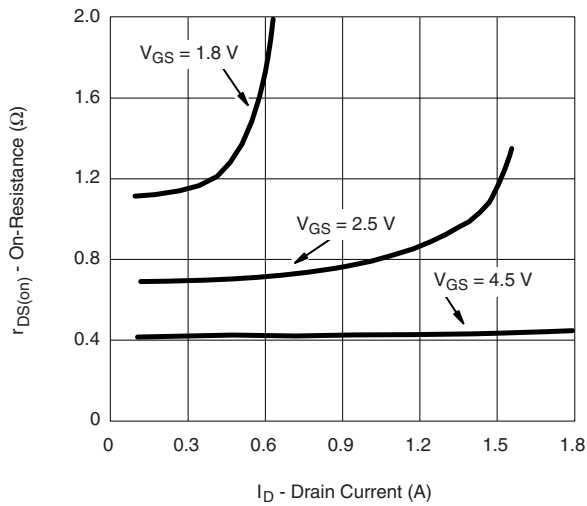
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



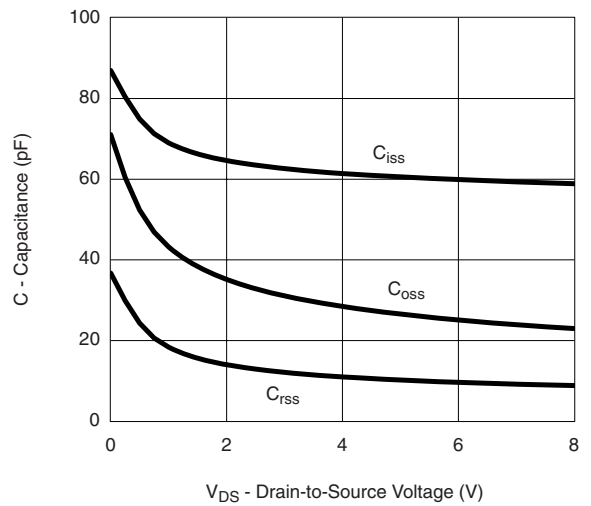
**Output Characteristics**



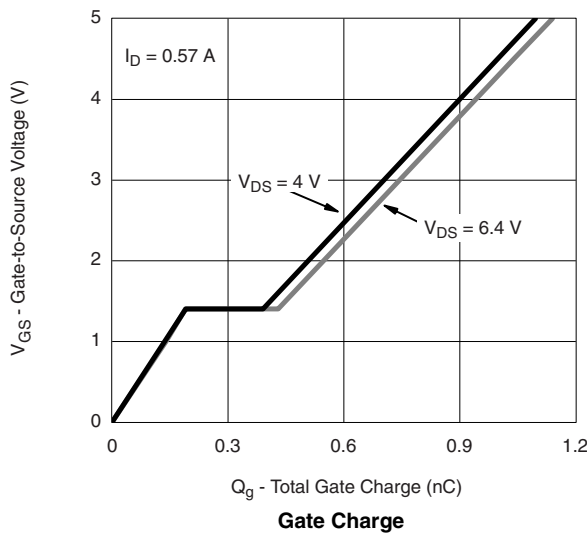
**Transfer Characteristics**



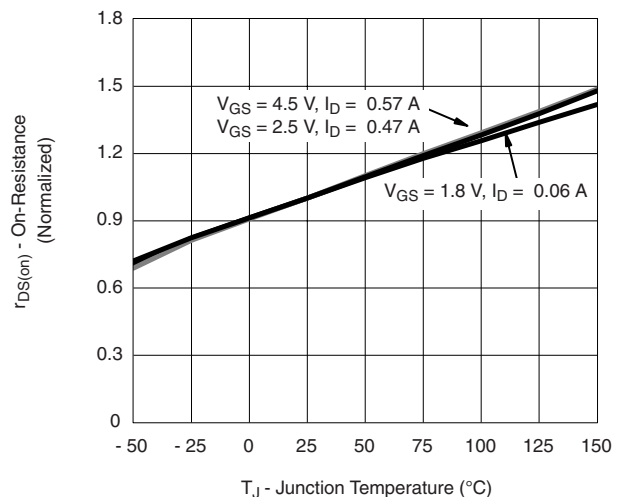
**On-Resistance vs. Drain Current and Gate Voltage**



**Capacitance**



**Gate Charge**



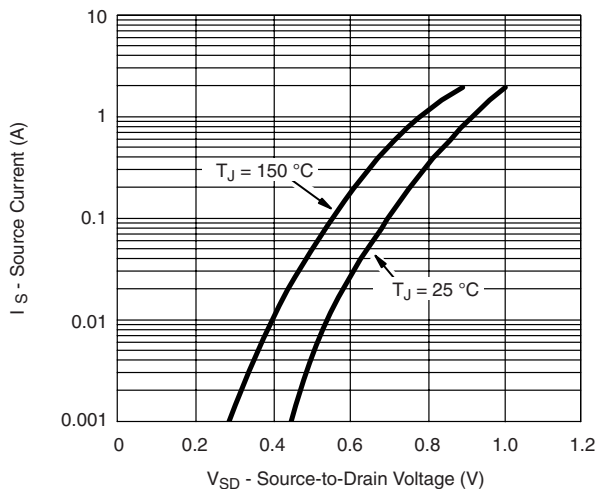
**On-Resistance vs. Junction Temperature**

# Si1905BDH

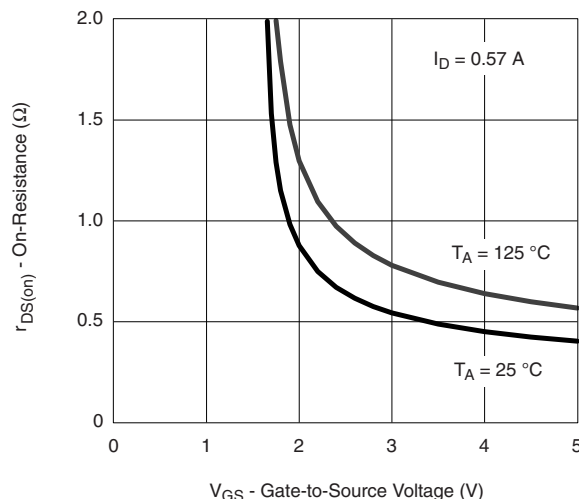
Vishay Siliconix



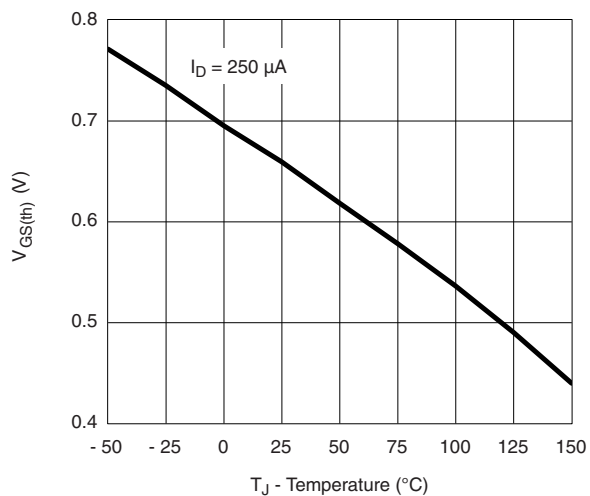
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



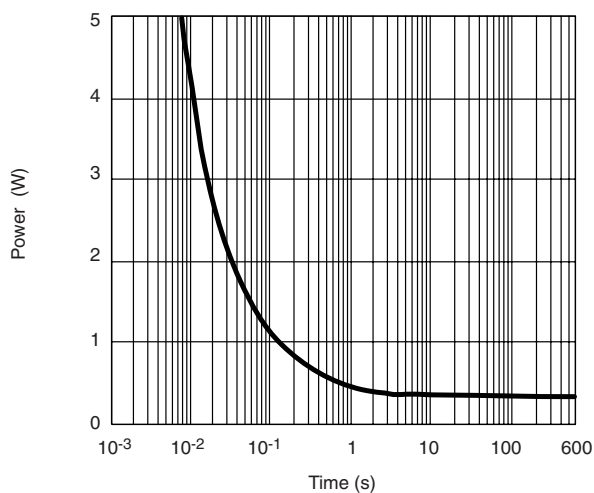
Source-Drain Diode Forward Voltage



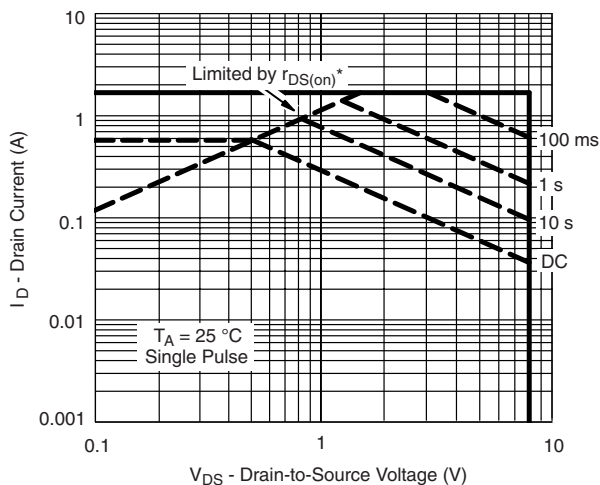
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient

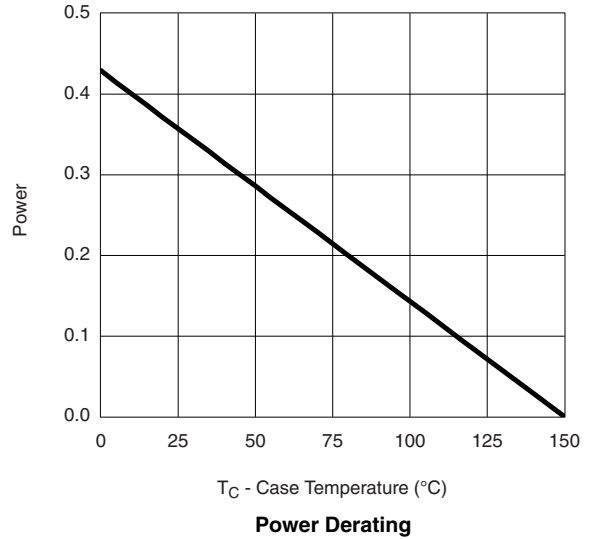
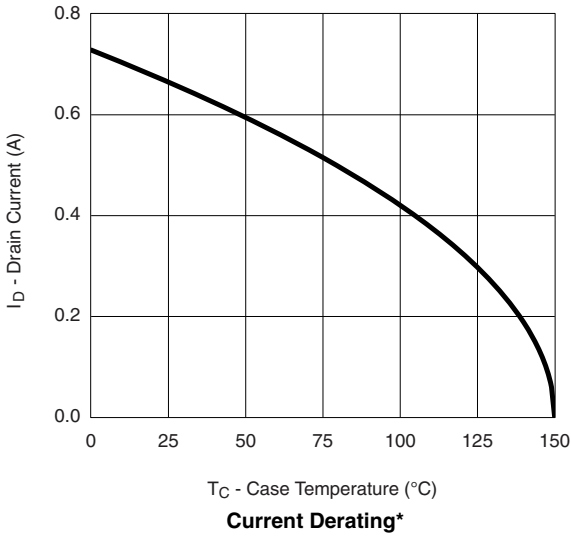


\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $r_{DS(on)}$  is specified

Safe Operating Area, Junction-to-Ambient



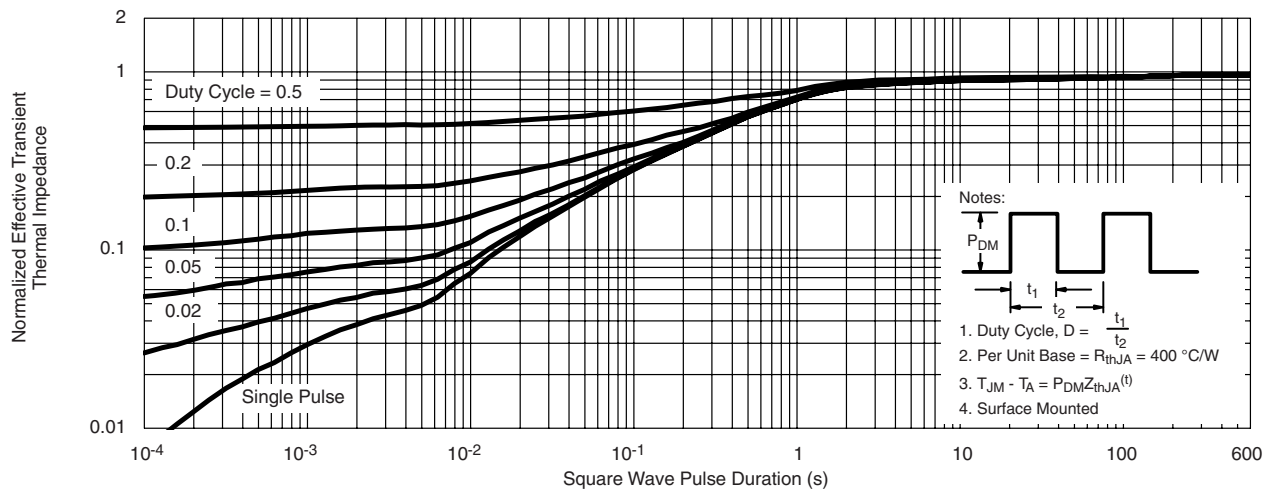
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



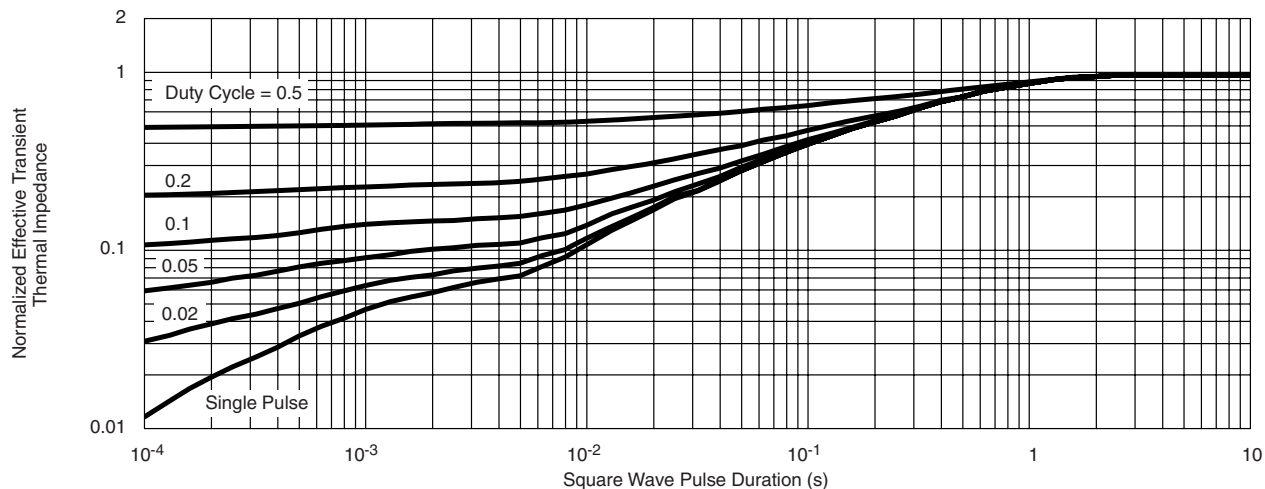
\* The power dissipation  $P_D$  is based on  $T_{J(max)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package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



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



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



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

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