

Dual P-Channel 20-V (D-S) MOSFET

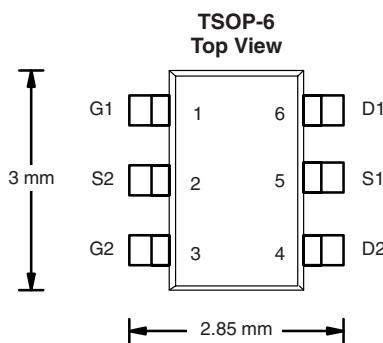
PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
- 20	0.115 at $V_{GS} = - 4.5$ V	- 2.7	3.2 nC
	0.205 at $V_{GS} = - 2.5$ V	- 2.0	

FEATURES

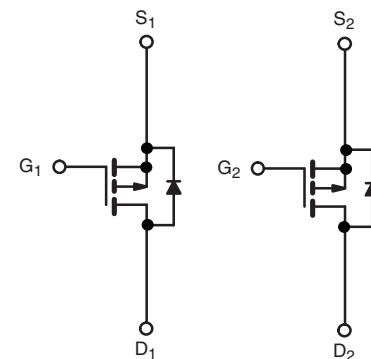
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- PWM Optimized
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available



Marking Code
MG XXX
Lot Traceability and Date Code
Part # Code



Ordering Information: Si3951DV-T1-E3 (Lead (Pb)-free)
Si3951DV-T1-GE3 (Lead (Pb)-free and Halogen-free)

P-Channel MOSFET P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V_{DS}	- 20	V	
Gate-Source Voltage	V_{GS}	± 12		
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	- 2.7	A	
	$T_C = 70$ °C	- 2.2		
	$T_A = 25$ °C	- 2.5 ^{b, c}		
	$T_A = 70$ °C	- 2.0 ^{b, c}		
Pulsed Drain Current	I_{DM}	10		
Continuous Source-Drain Diode Current	$T_C = 25$ °C	- 1.67		
	$T_A = 25$ °C	- 0.95 ^{b, c}		
Maximum Power Dissipation ^a	$T_C = 25$ °C	2.0		
	$T_C = 70$ °C	1.3		
	$T_A = 25$ °C	1.14 ^{b, c}		
	$T_A = 70$ °C	0.73 ^{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 ^{b, d}	$t \leq 5$ s	R_{thJA}	93	110
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	75	90 °C/W

Notes:

- a. Based on $T_C = 25$ °C.
- b. Surface Mounted on 1" x 1" FR4 board.
- c. $t = 5$ s.
- d. Maximum under Steady State conditions is 130 °C/W.

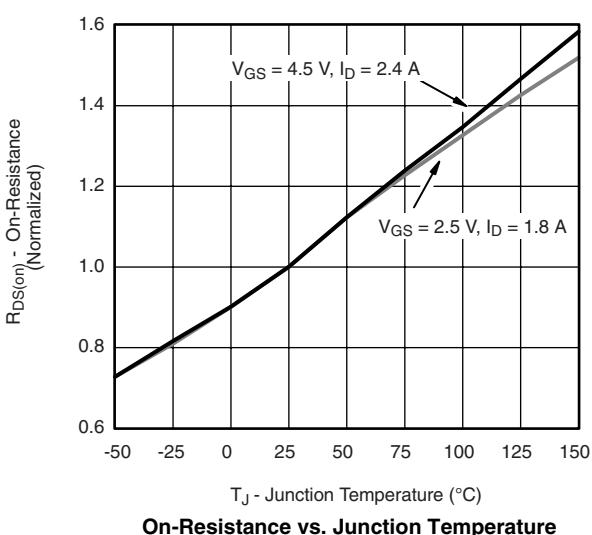
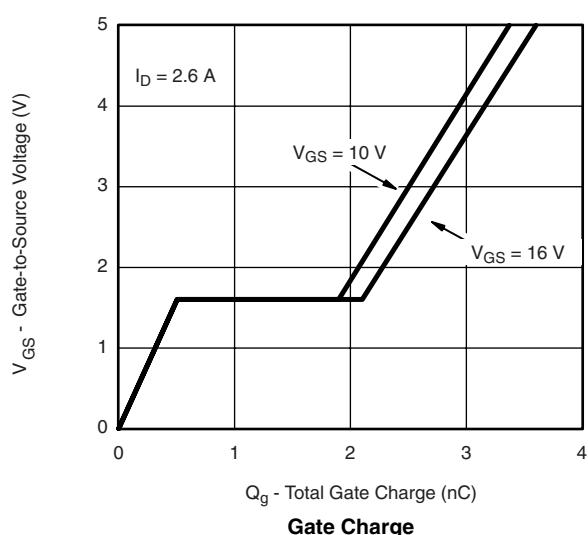
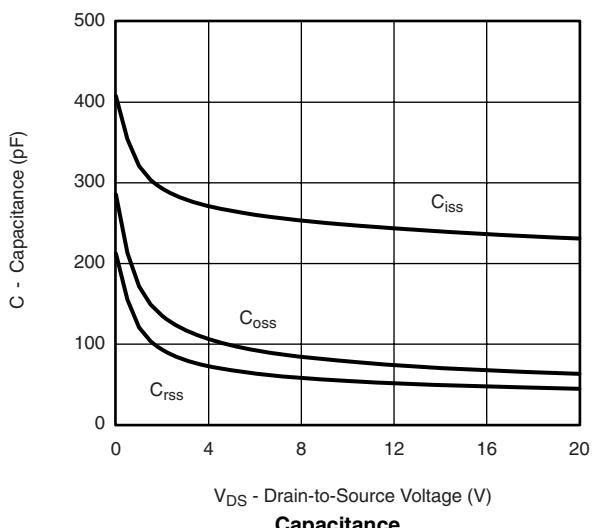
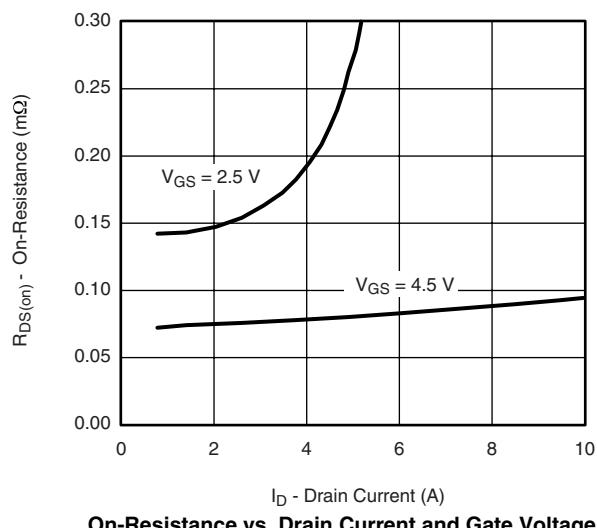
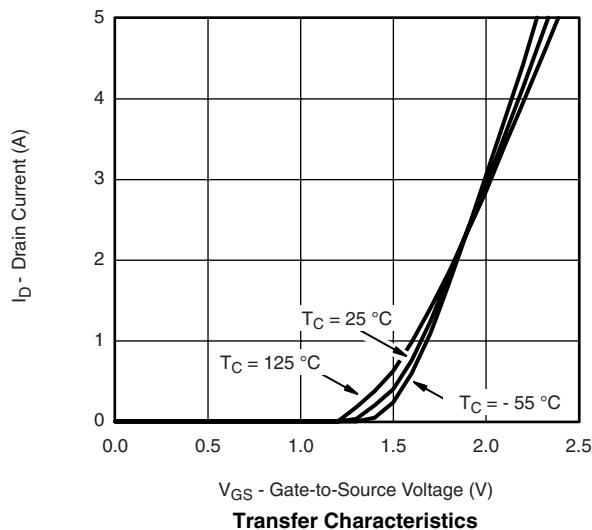
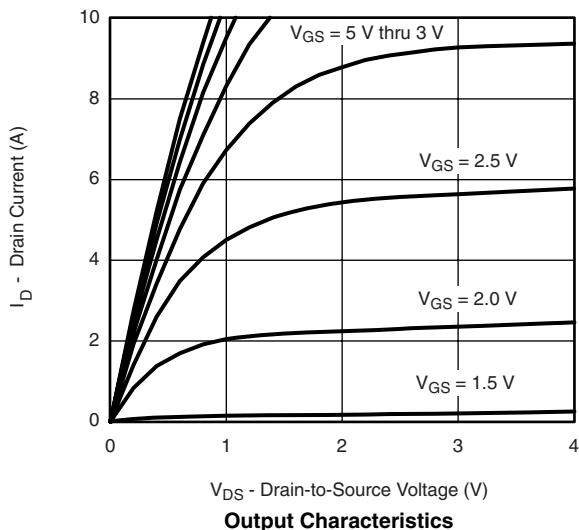
SPECIFICATIONS $T_J = 25^\circ\text{C}$, unless otherwise noted

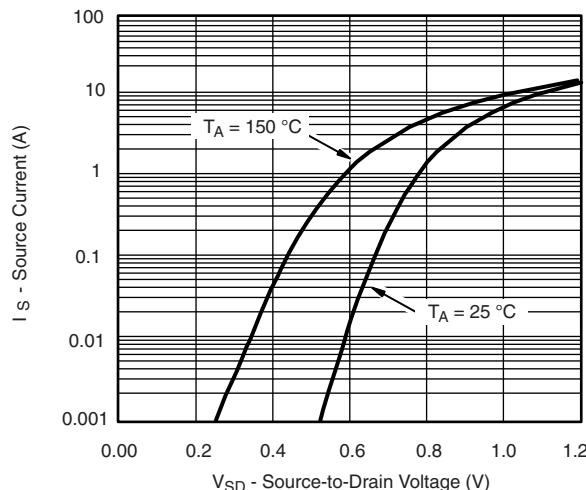
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = -250\text{ }\mu\text{A}$	- 20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		- 16.7		mV/°C
$V_{GS(\text{th})}$ Temperature Coefficient	$\Delta V_{GS(\text{th})}/T_J$			2.1		
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	- 0.6		- 1.5	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 12\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20\text{ V}$, $V_{GS} = 0\text{ V}$		- 1		μA
		$V_{DS} = -20\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 55^\circ\text{C}$			- 10	
On-State Drain Current ^a	$I_{D(\text{on})}$	$V_{DS} \geq -5\text{ V}$, $V_{GS} = -4.5\text{ V}$	- 10			A
Drain-Source On-State Resistance ^a	$R_{DS(\text{on})}$	$V_{GS} = -4.5\text{ V}$, $I_D = -2.5\text{ A}$		0.092	0.115	Ω
		$V_{GS} = -2.5\text{ V}$, $I_D = -1.8\text{ A}$		0.164	0.205	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}$, $I_D = -2.5\text{ A}$		5.5		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		250		pF
Output Capacitance	C_{oss}			80		
Reverse Transfer Capacitance	C_{rss}			55		
Total Gate Charge	Q_g	$V_{DS} = -10\text{ V}$, $V_{GS} = -5.0\text{ V}$, $I_D = -2.5\text{ A}$		3.4	5.1	nC
Gate-Source Charge	Q_{gs}			3.2	5	
Gate-Drain Charge	Q_{gd}			0.5		
Gate Resistance	R_g		$f = 1\text{ MHz}$	1.4		
Turn-On Delay Time	$t_{d(\text{on})}$	$V_{DD} = -10\text{ V}$, $R_L = 5\text{ Ω}$ $I_D \approx -2\text{ A}$, $V_{GEN} = -4.5\text{ V}$, $R_g = 1\text{ Ω}$		8.5	13	Ω
Rise Time	t_r			9	14	ns
Turn-Off Delay Time	$t_{d(\text{off})}$			30	45	
Fall Time	t_f			32	48	
				16	24	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25^\circ\text{C}$			- 1.7	A
Pulse Diode Forward Current	I_{SM}				- 10	
Body Diode Voltage	V_{SD}	$I_S = -2.0\text{ A}$		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -2.0\text{ A}$, $dl/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25^\circ\text{C}$		17	26	ns
Body Diode Reverse Recovery Charge	Q_{rr}			5	8	nC
Reverse Recovery Fall Time	t_a			14		
Reverse Recovery Rise Time	t_b			3		ns

Notes:

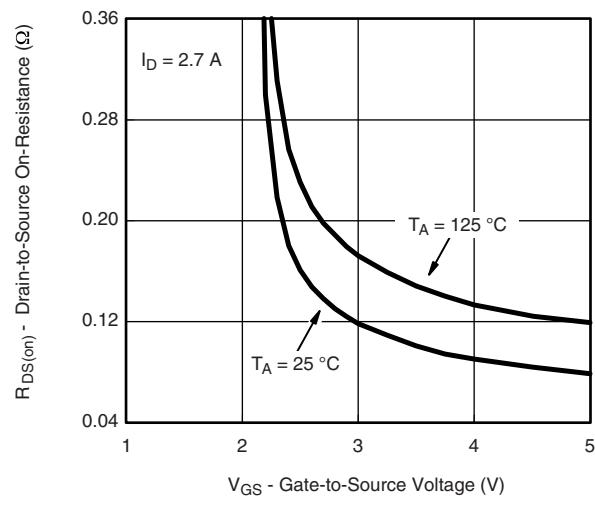
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
- b. Guaranteed by design, not subject to production testing.

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.

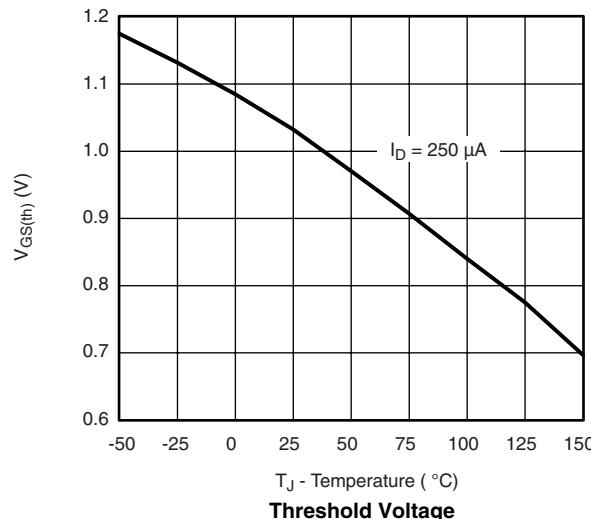
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted


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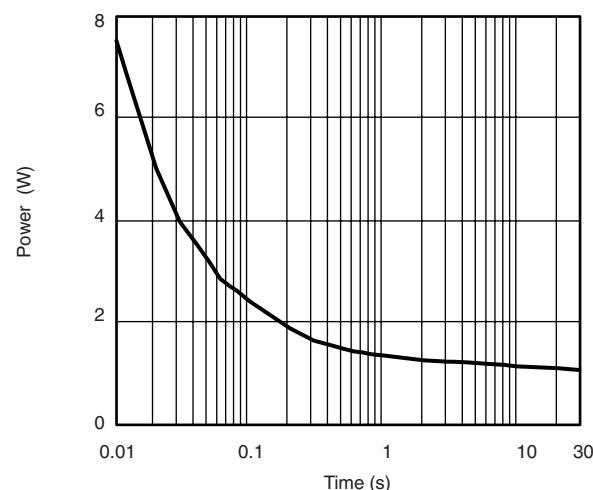
Source-Drain Diode Forward Voltage



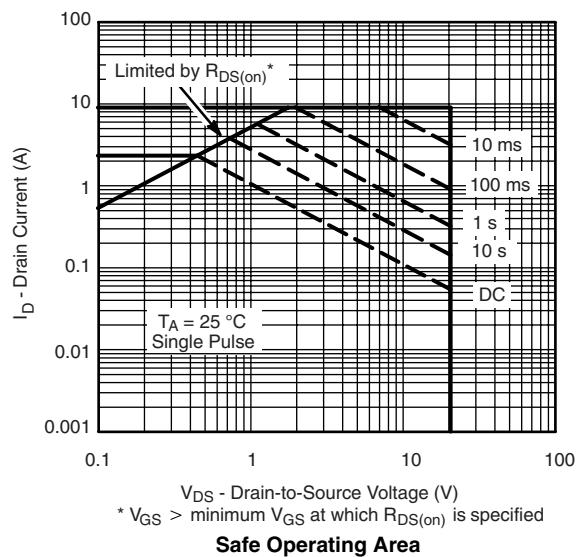
On-Resistance vs. Gate-to-Source Voltage



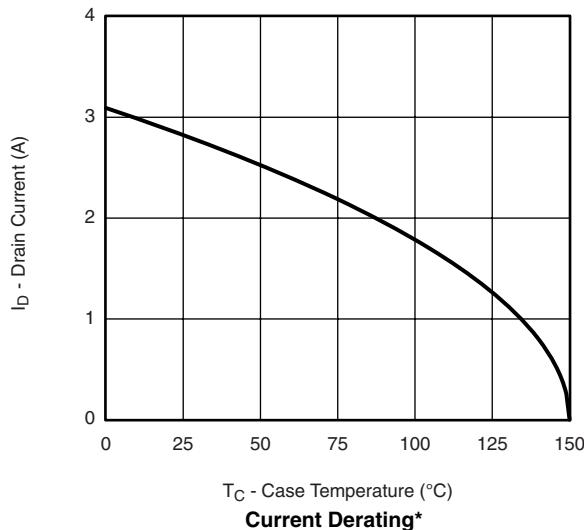
Threshold Voltage



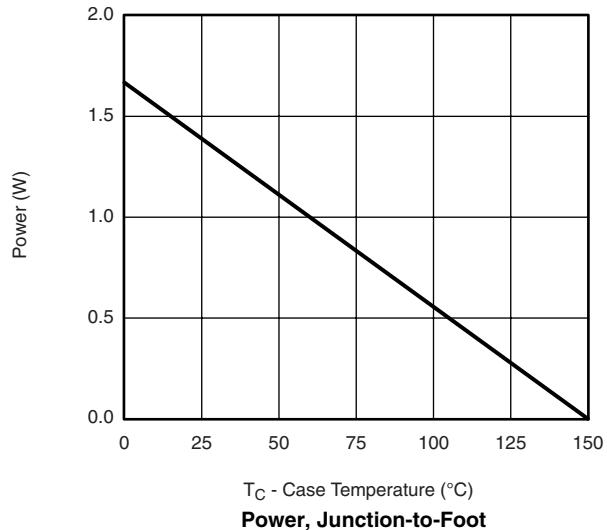
Single Pulse Power (Junction-to-Ambient)



Safe Operating Area

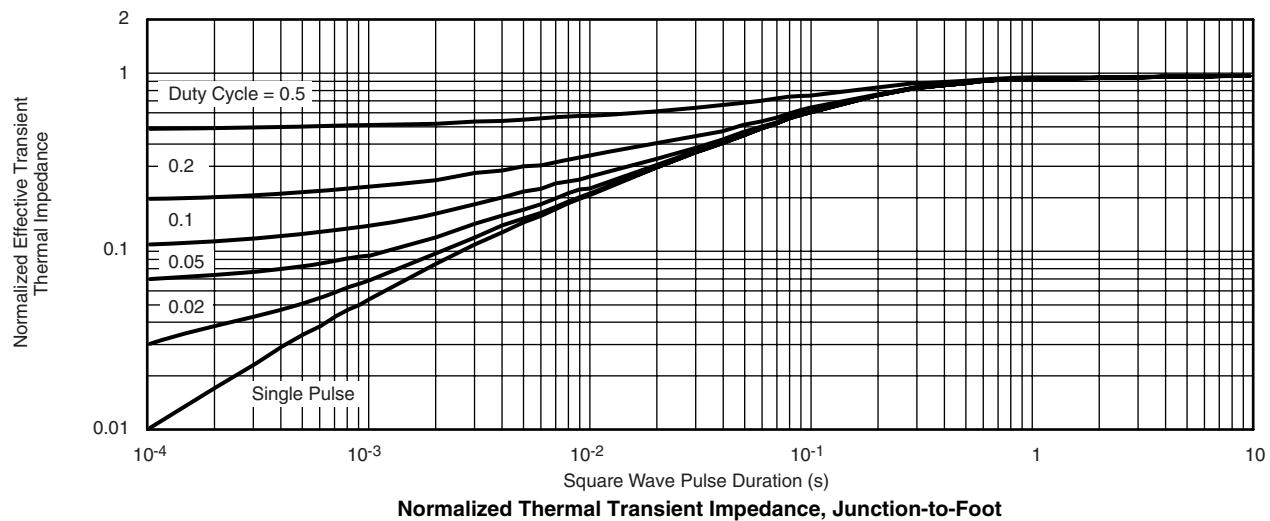
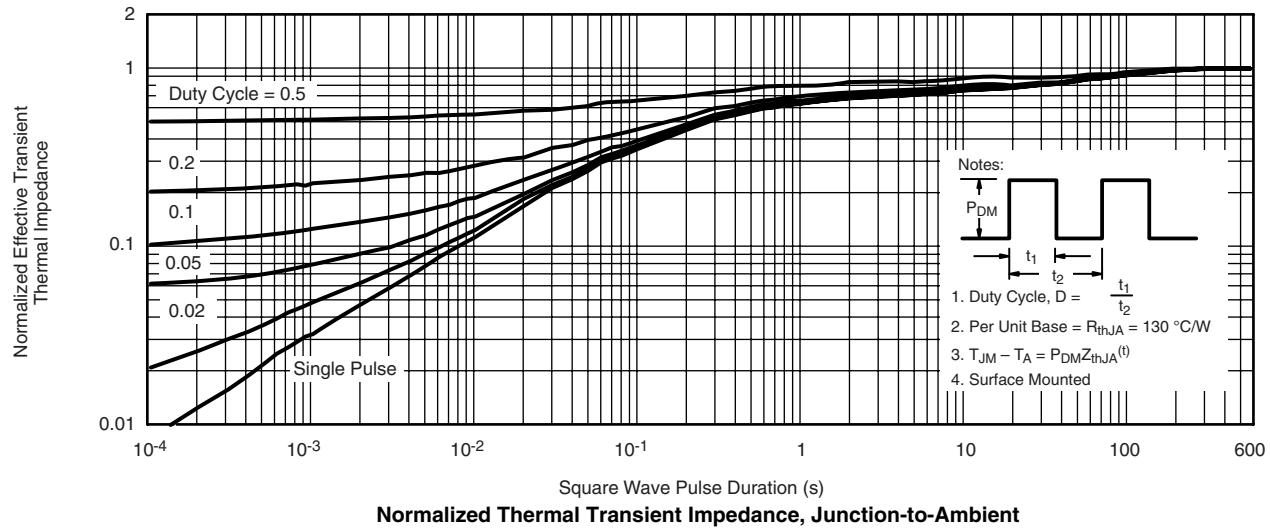
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted


Current Derating*



Power, Junction-to-Foot

* 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


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