

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

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^d	Q_g (Typ.)
- 20	0.66 at $V_{GS} = - 4.5$ V	- 0.5	0.86 nC
	0.86 at $V_{GS} = - 2.5$ V	- 0.4	

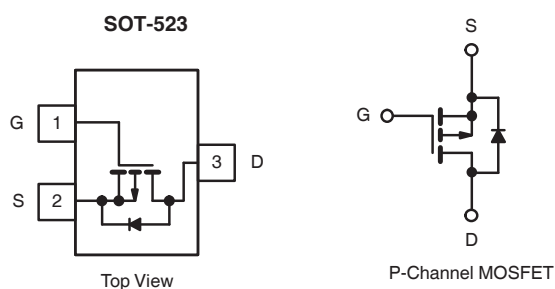
FEATURES

- DT-Trench Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC


RoHS
 COMPLIANT

APPLICATIONS

- Load Switch for Portable Devices
- DC/DC Converter



ABSOLUTE MAXIMUM RATINGS $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	- 20	V
Gate-Source Voltage	V_{GS}	± 12	
Continuous Drain Current ($T_J = 150\text{ }^{\circ}\text{C}$)	I_D	$T_C = 25\text{ }^{\circ}\text{C}$	A
		$T_C = 70\text{ }^{\circ}\text{C}$	
		$T_A = 25\text{ }^{\circ}\text{C}$	
		$T_A = 70\text{ }^{\circ}\text{C}$	
Pulsed Drain Current (10 μs Pulse Width)	I_{DM}	- 2	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$	
		$T_A = 25\text{ }^{\circ}\text{C}$	
Maximum Power Dissipation	P_D	$T_C = 25\text{ }^{\circ}\text{C}$	W
		$T_C = 70\text{ }^{\circ}\text{C}$	
		$T_A = 25\text{ }^{\circ}\text{C}$	
		$T_A = 70\text{ }^{\circ}\text{C}$	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^{\circ}\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{a, c}	R_{thJA}	100	130	$^{\circ}\text{C/W}$
Maximum Junction-to-Foot (Drain)	R_{thJF}	60	75	

Notes:

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

 b. $t = 5$ s.

 c. Maximum under Steady State conditions is 175 $^{\circ}\text{C/W}$.

 d. $T_C = 25\text{ }^{\circ}\text{C}$.

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 _{GS} = 0 V, I _D = - 250 μA	- 20			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 20		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 2.5		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 0.5		- 1.5	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 16 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 16 V, V _{GS} = 0 V, T _J = 55 °C			- 10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≤ - 5 V, V _{GS} = - 4.5 V	- 2			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 4.5 V, I _D = - 0.4 A		0.66	0.75	Ω
		V _{GS} = - 2.5 V, I _D = - 0.4 A		0.86	0.98	
		V _{GS} = - 1.8 V, I _D = - 0.3 A		0.95	1.15	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 10 V, I _D = - 0.4 A		7.5		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 10 V, V _{GS} = 0 V, f = 1 MHz		66		pF
Output Capacitance	C _{oss}			112		
Reverse Transfer Capacitance	C _{rss}			89		
Total Gate Charge	Q _g	V _{DS} = - 10 V, V _{GS} = - 4.5 V, I _D = - 0.4 A		0.86		nC
Total Gate Charge	Q _g	V _{DS} = - 10 V, V _{GS} = - 2.5 V, I _D = - 0.4 A		0.79		
Gate-Source Charge	Q _{gs}			0.67		
Gate-Drain Charge	Q _{gd}			0.5		
Gate Resistance	R _g	f = 1 MHz	2	10	20	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 10 V, R _L = 5 Ω I _D ≅ - 0.04 A, V _{GEN} = - 0.5 V, R _g = 1 Ω		20	40	ns
Rise Time	t _r			20	40	
Turn-Off Delay Time	t _{d(off)}			40	70	
Fall Time	t _f			10	20	
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 10 V, R _L = 5 Ω I _D ≅ - 0.04 A, V _{GEN} = - 400 mV, R _g = 1 Ω		8	16	
Rise Time	t _r			9	18	
Turn-Off Delay Time	t _{d(off)}			35	65	
Fall Time	t _f			9	18	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			- 0.5	A
Pulse Diode Forward Current	I _{SM}				- 2	
Body Diode Voltage	V _{SD}	I _S = - 0.5 A, V _{GS} = 0 V		- 0.79	- 1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 0.5 A, dI/dt = 100 A/μs, T _J = 25 °C		21	35	ns
Body Diode Reverse Recovery Charge	Q _{rr}			15	25	nC
Reverse Recovery Fall Time	t _a			9		ns
Reverse Recovery Rise Time	t _b			12		

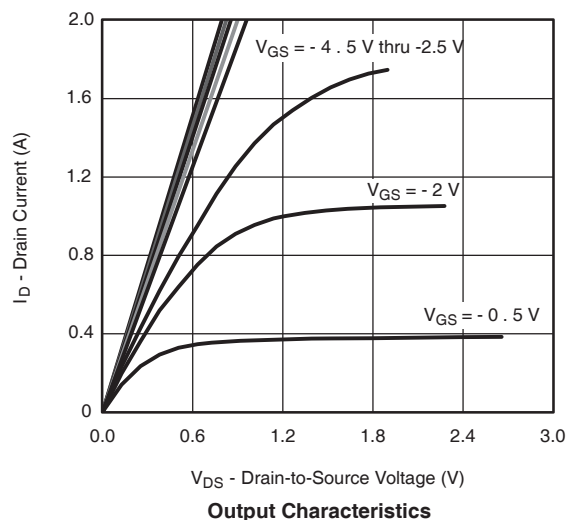
Notes:

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

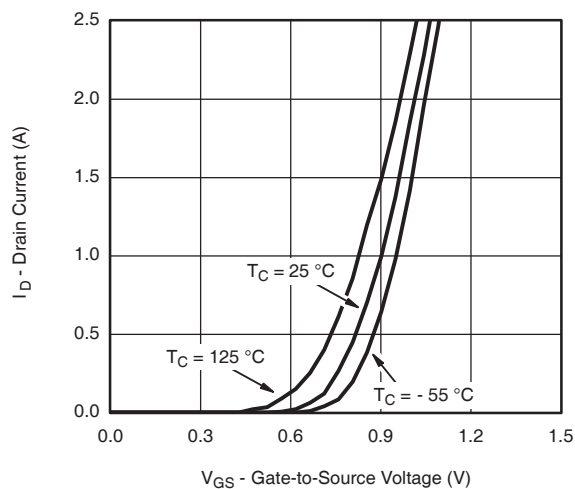
b. Guaranteed by design, not subject to production testing.

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.

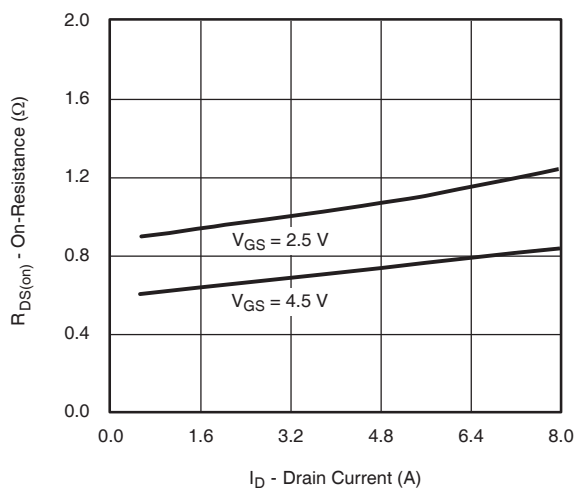
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



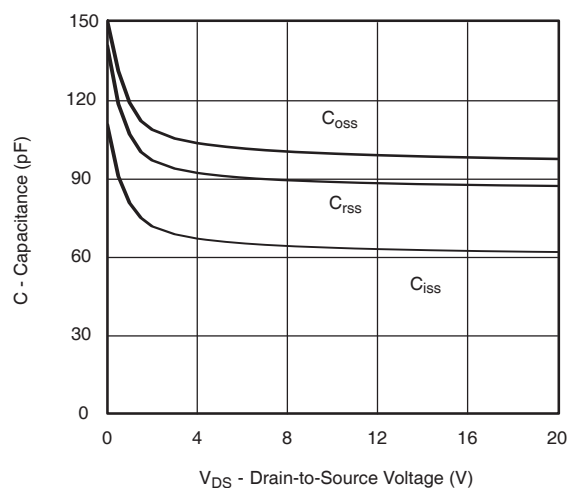
Output Characteristics



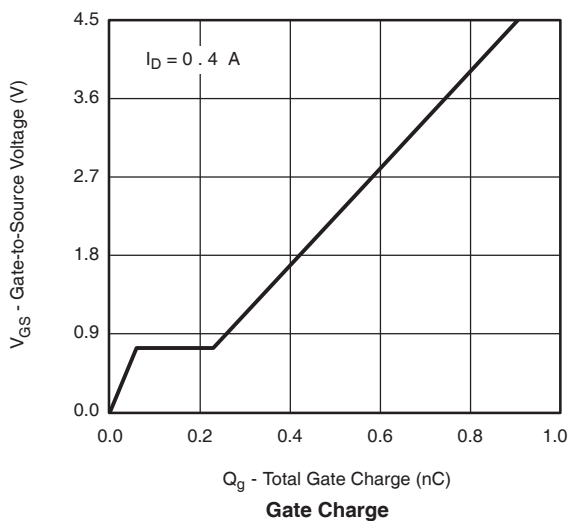
Transfer Characteristics



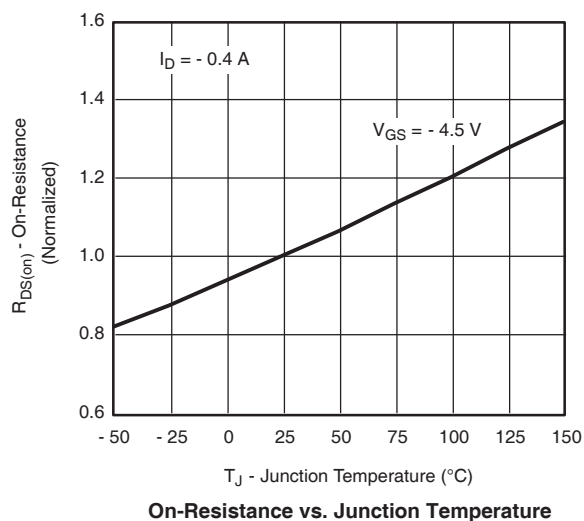
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

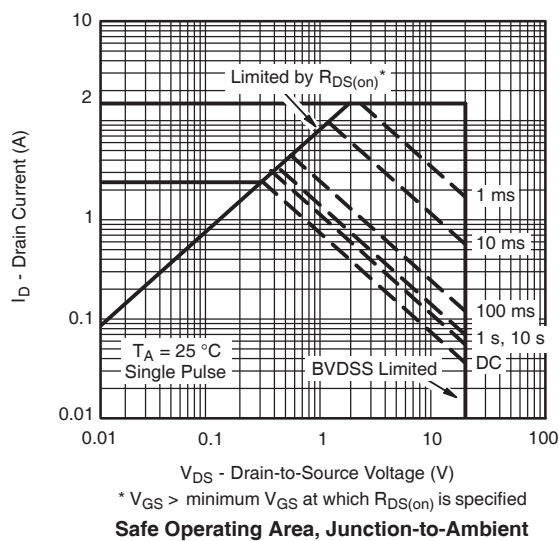
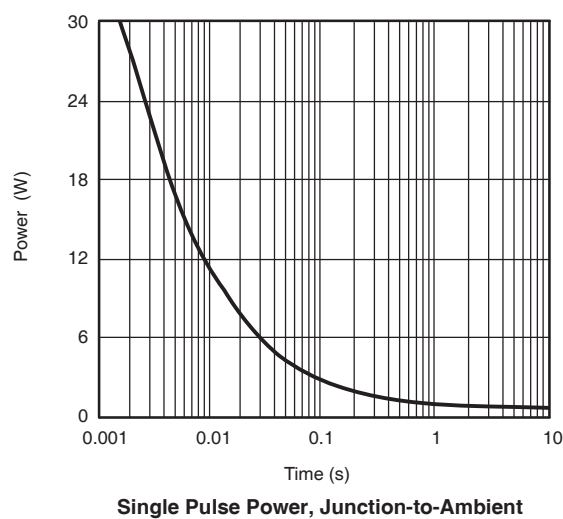
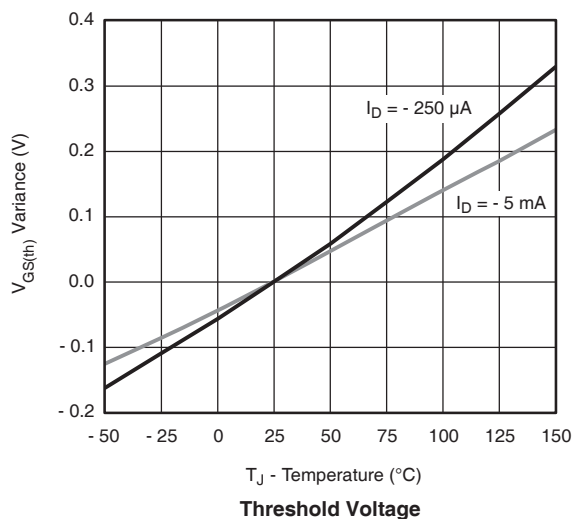
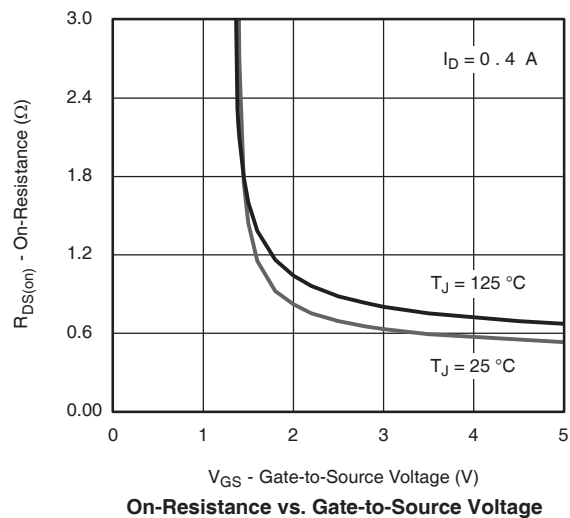
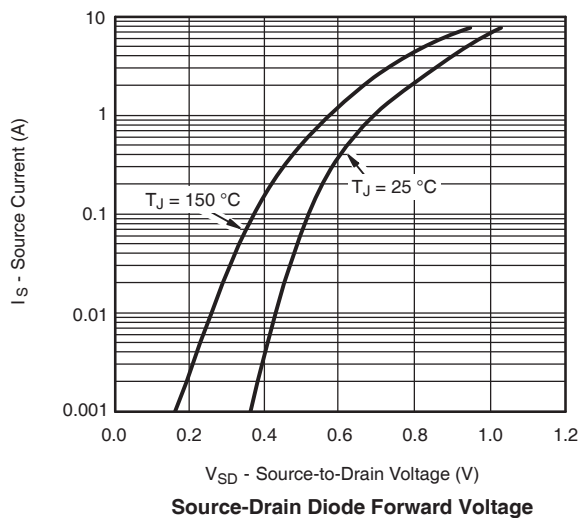


Gate Charge



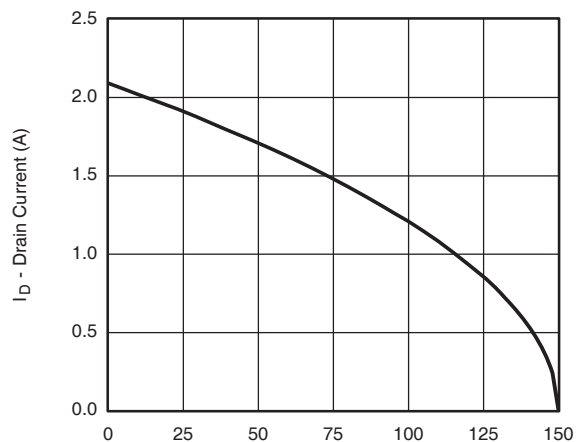
On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

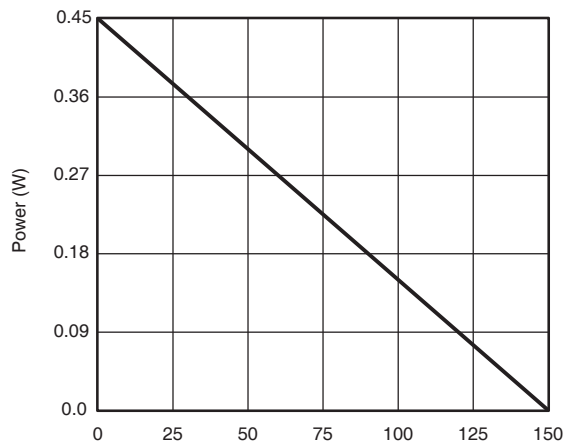


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

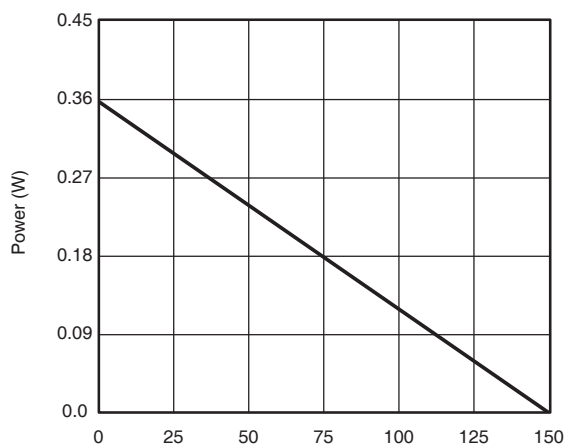
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



T_C - Case Temperature (°C)
Current Derating*



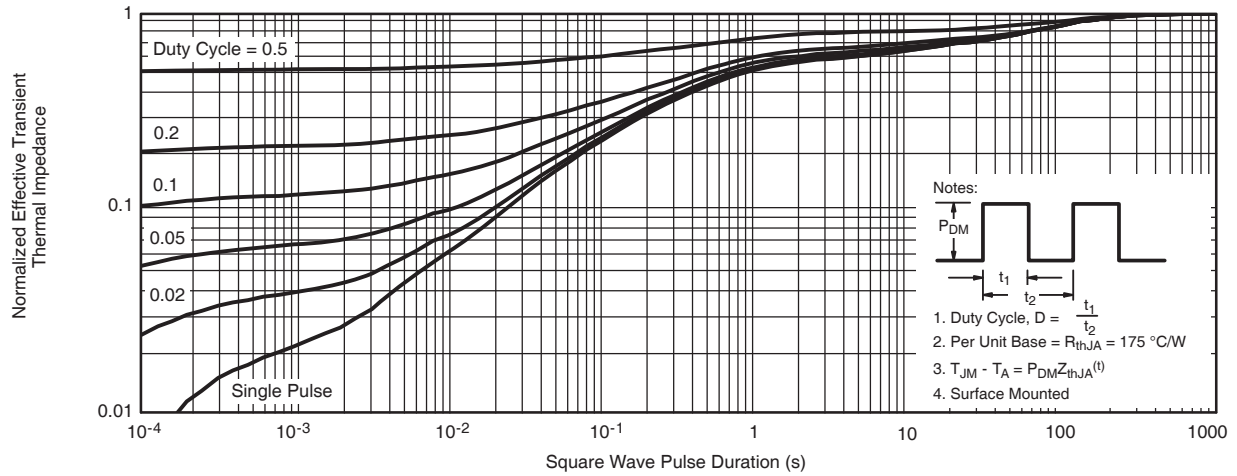
T_C - Case Temperature (°C)
Power Derating, Junction-to-Foot



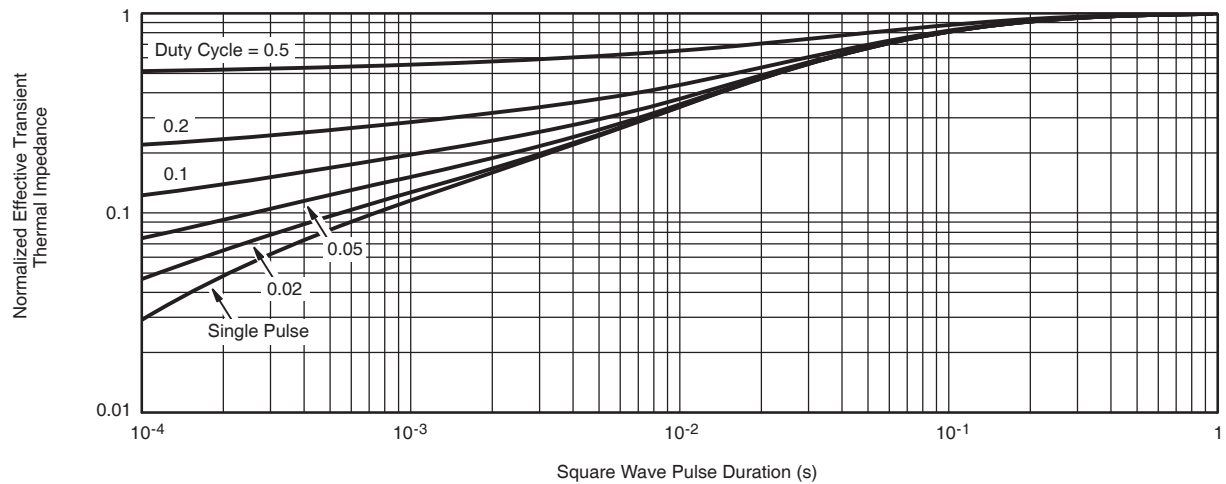
T_A - Ambient Temperature (°C)
Power, Junction-to-Ambient

* 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-Foot

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