

N-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)	Q _g (Typ.)
20	0.049 at V _{GS} = 4.5 V	6.1 ^a	6.0
	0.056 at V _{GS} = 2.5 V	5.7	
	0.065 at V _{GS} = 1.8 V	5.3	

FEATURES

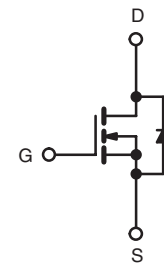
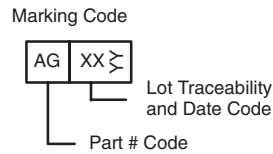
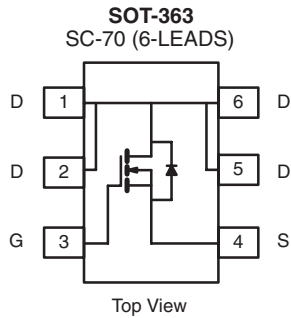
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Load Switch for Portable Devices



Ordering Information: Si1488DH-T1-E3 (Lead (Pb)-free)
Si1488DH-T1-GE3 (Lead (Pb)-free and Halogen-free)

N-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}	± 8	
Continuous Drain Current (T _J = 150 °C) ^a	I _D	T _C = 25 °C	A
		T _C = 70 °C	
		T _A = 25 °C	
		T _A = 70 °C	
Pulsed Drain Current	I _{DM}	20	
Avalanche Current	I _{AS}	10	
Repetitive Avalanche Energy			
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	A
		T _A = 25 °C	
Maximum Power Dissipation ^a	P _D	T _C = 25 °C	W
		T _C = 70 °C	
		T _A = 25 °C	
		T _A = 70 °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}	R _{thJA}	60	80	°C/W	
Maximum Junction-to-Foot (Drain)	R _{thJF}	34	45		

Notes:

- Based on T_C = 25 °C.
- Surface mounted on 1" x 1" FR4 board.
- t = 5 s.
- Maximum under steady state conditions is 125 °C/W.

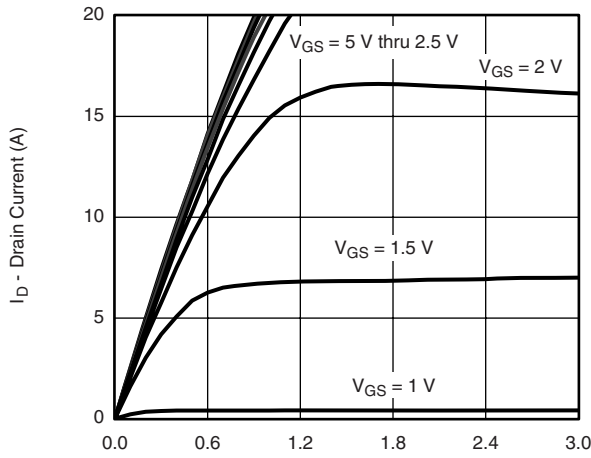
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		20.2		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/$			- 2.75		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.45		0.95	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$			10	μA
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 4.5\text{ V}$	20			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 4.6\text{ A}$		0.041	0.049	Ω
		$V_{GS} = 2.5\text{ V}, I_D = 4.3\text{ A}$		0.047	0.056	
		$V_{GS} = 1.8\text{ V}, I_D = 3.9\text{ A}$		0.054	0.065	
Forward Transconductance	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 4.6\text{ A}$		15		mS
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		530		pF
Output Capacitance	C_{oss}			100		
Reverse Transfer Capacitance	C_{riss}			48		
Total Gate Charge	Q_g	$V_{DS} = 10\text{ V}, V_{GS} = 5\text{ V}, I_D = 4.6\text{ A}$		6.6	10	pC
		$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 4.6\text{ A}$		6	9	
Gate-Source Charge	Q_{gs}			1.5		
Gate-Drain Charge	Q_{gd}		0.9			
Gate Resistance	R_g	$f = 1\text{ MHz}$		7.3	11	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 2.7\text{ }\Omega$ $I_D \cong 3.7\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		8.5	13	ns
Rise Time	t_r			45	68	
Turn-Off Delay Time	$t_{d(off)}$			35	53	
Fall Time	t_f			82	123	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			2.3	A
Pulse Diode Forward Current ^a	I_{SM}				20	
Body Diode Voltage	V_{SD}	$I_S = 2.2\text{ A}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 3.2\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		10.6	16	nC
Body Diode Reverse Recovery Charge	Q_{rr}			3.7	5.7	ns
Reverse Recovery Fall Time	t_a			6.2		
Reverse Recovery Rise Time	t_b			4.4		

Notes:

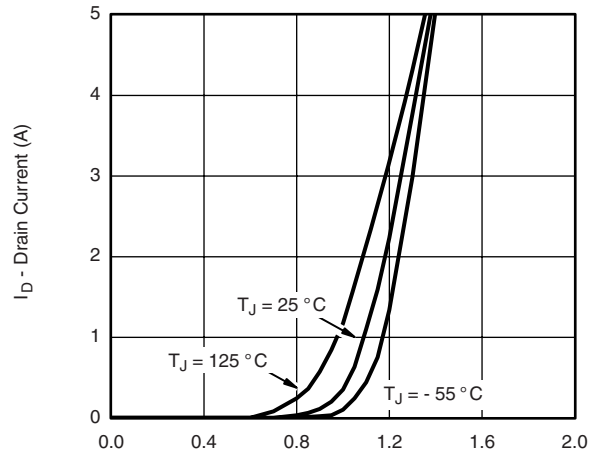
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

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.

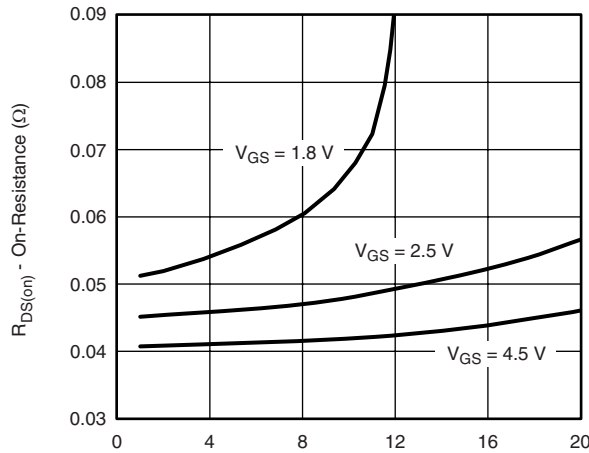
TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



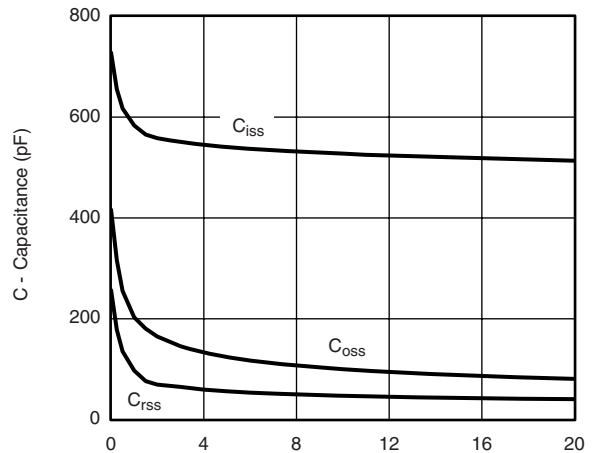
Output Characteristics



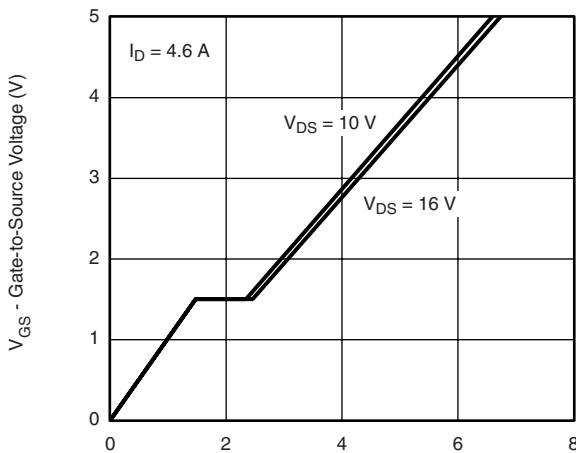
Transfer Characteristics Curves vs. Temperature



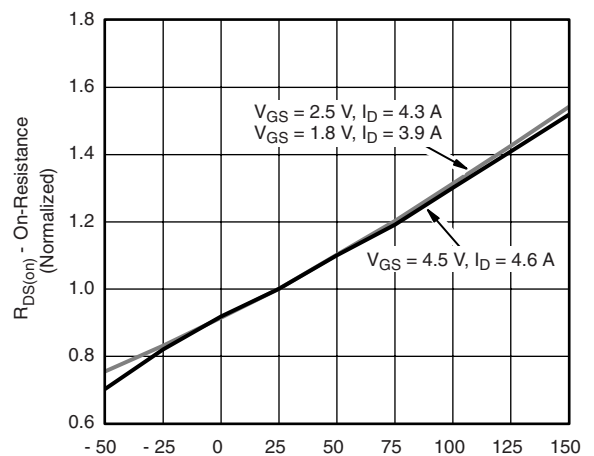
On-Resistance vs. Drain Current



Capacitance

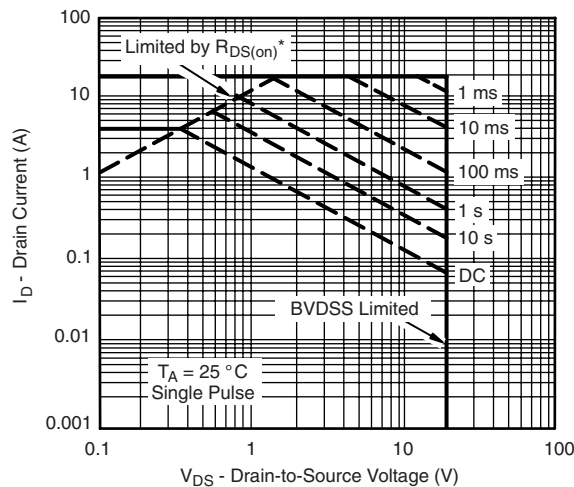
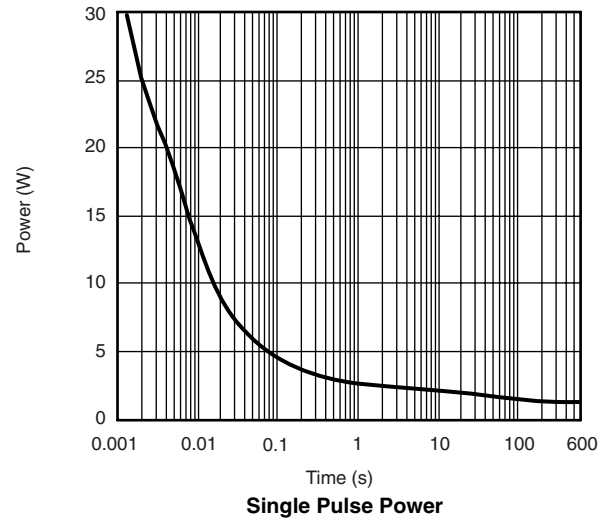
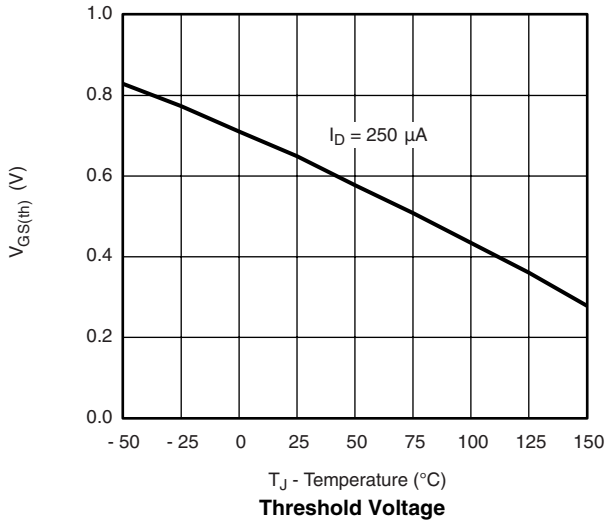
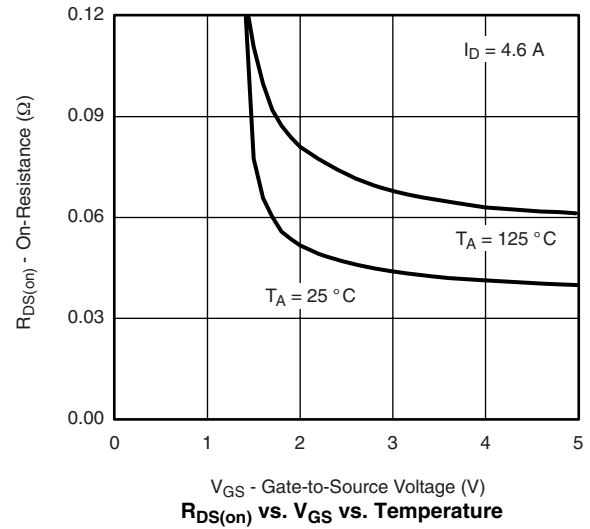
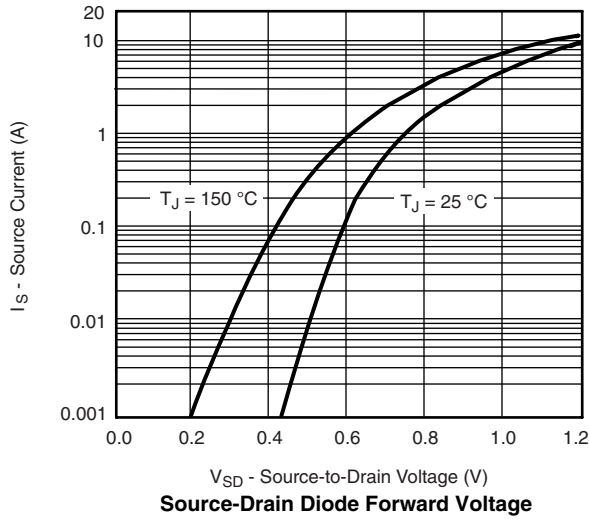


Gate Charge



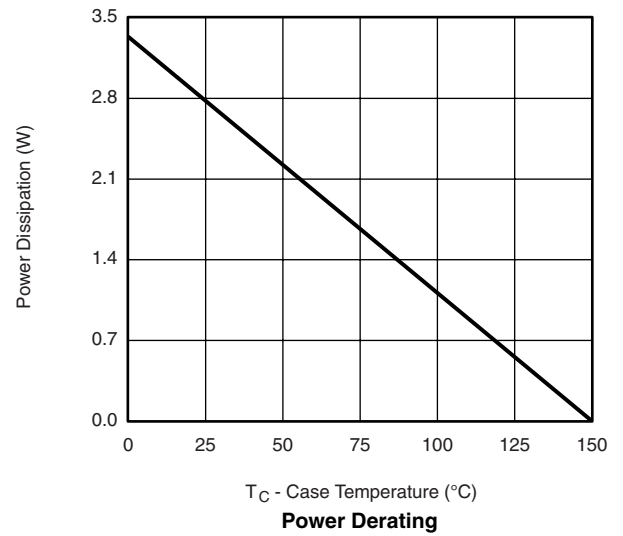
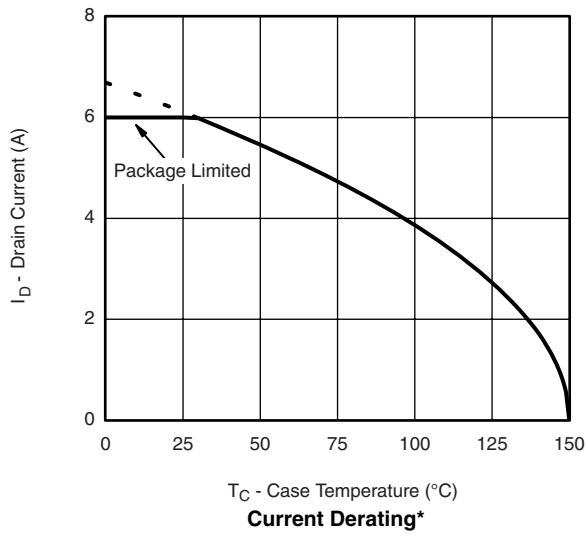
On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



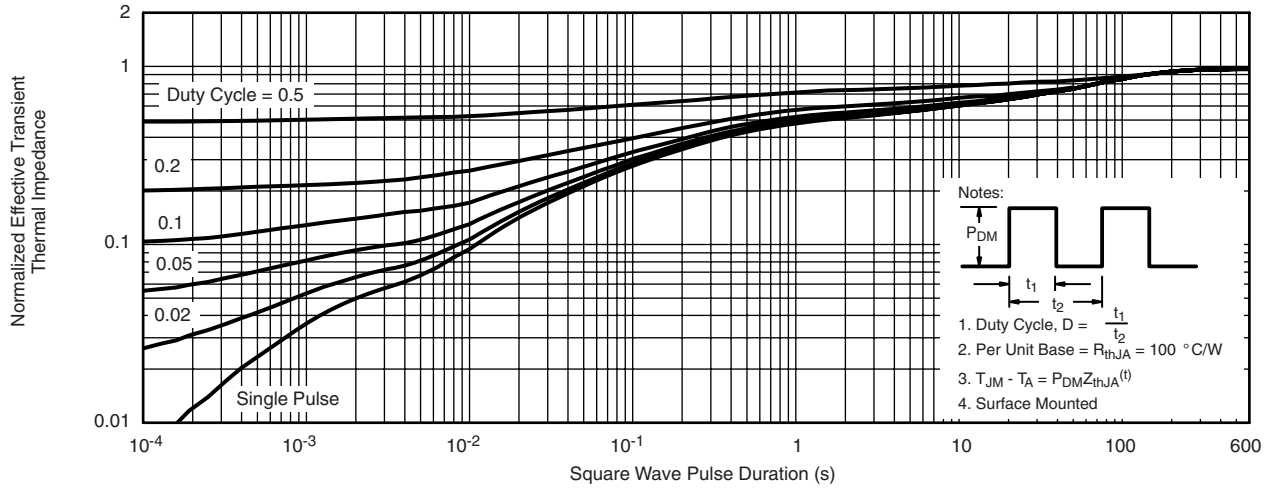
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted

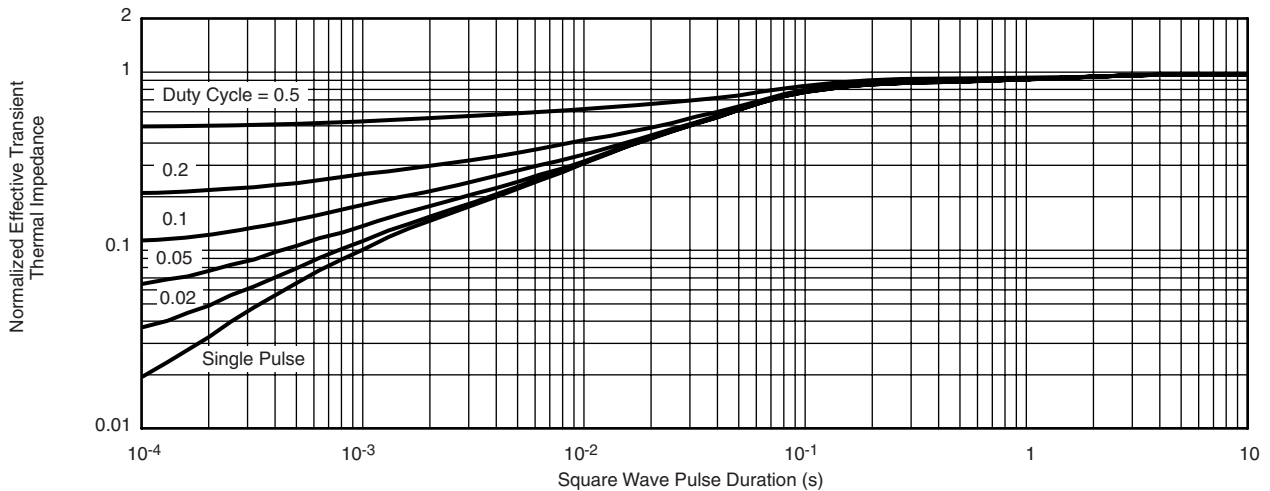


* The power dissipation P_D is based on $T_{J(max)} = 150\text{ }^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below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

TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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