

N-Channel 25-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
25	0.023 at $V_{GS} = 10$ V	8 ^a	5.5 nC
	0.028 at $V_{GS} = 4.5$ V	8 ^a	

FEATURES

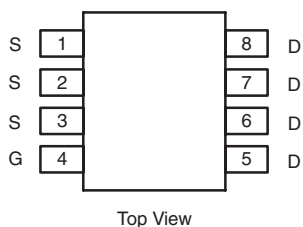
- TrenchFET[®] Power MOSFET
- 100 % R_g and UIS Tested

APPLICATIONS

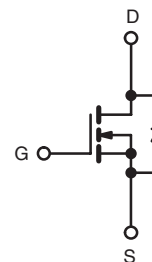
- DC/DC Converter
- Gaming
- Notebook System Power


RoHS
COMPLIANT

SO-8



Ordering Information: Si4778DY-T1-E3 (Lead (Pb)-free)



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	25	V
Gate-Source Voltage	V_{GS}	± 16	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	8 ^a	A
	$T_C = 70$ °C	8 ^a	
	$T_A = 25$ °C	8 ^{a, b, c}	
	$T_A = 70$ °C	6.4 ^{b, c}	
Pulsed Drain Current	I_{DM}	30	mJ
Continuous Source-Drain Diode Current	$T_C = 25$ °C	4.2	
	$T_A = 25$ °C	2 ^{b, c}	
Single Pulse Avalanche Current	I_{AS}	5	mJ
Single Pulse Avalanche Energy	E_{AS}	1.25	
Maximum Power Dissipation	$T_C = 25$ °C	5	W
	$T_C = 70$ °C	3.2	
	$T_A = 25$ °C	2.4 ^{b, c}	
	$T_A = 70$ °C	1.5 ^{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}	R_{thJA}	42	53	°C/W
Maximum Junction-to-Foot (Drain)	R_{thJF}	19	25	

Notes:

- Package Limited.
- Surface Mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- Maximum under Steady State conditions is 85 °C/W.

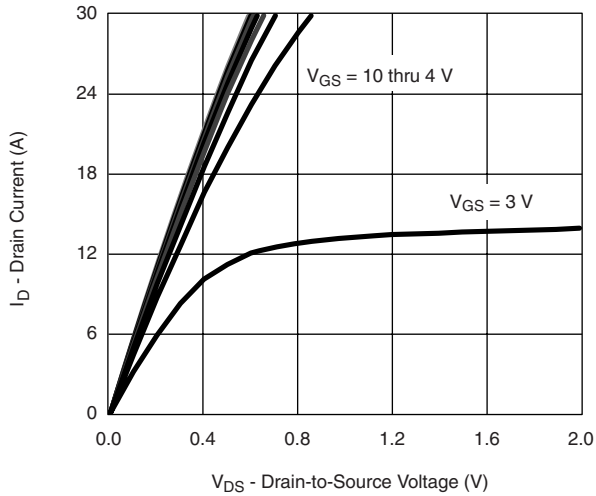
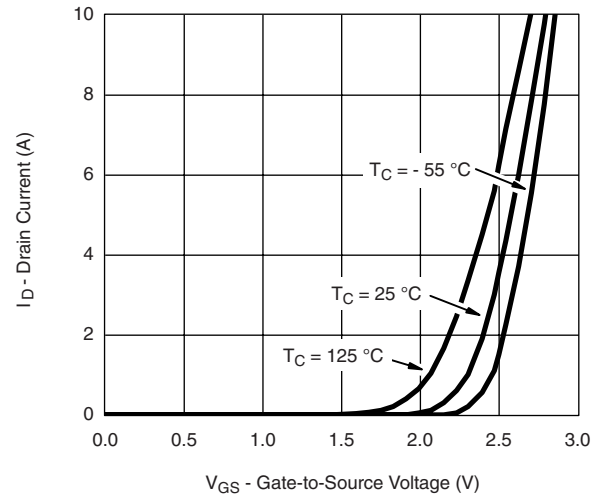
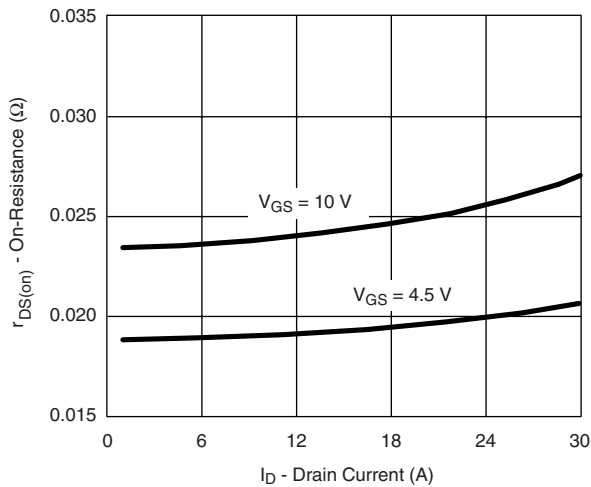
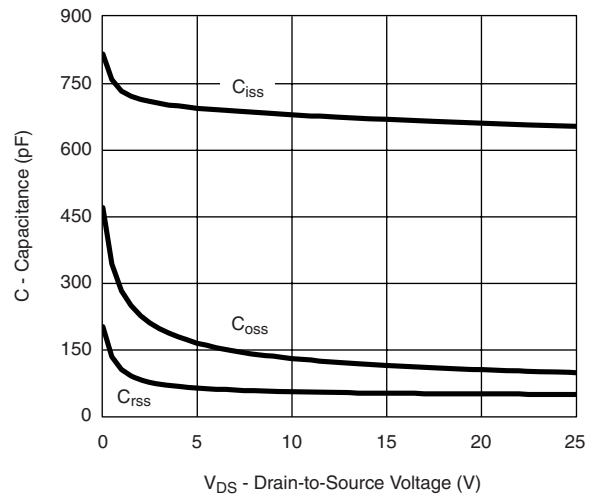
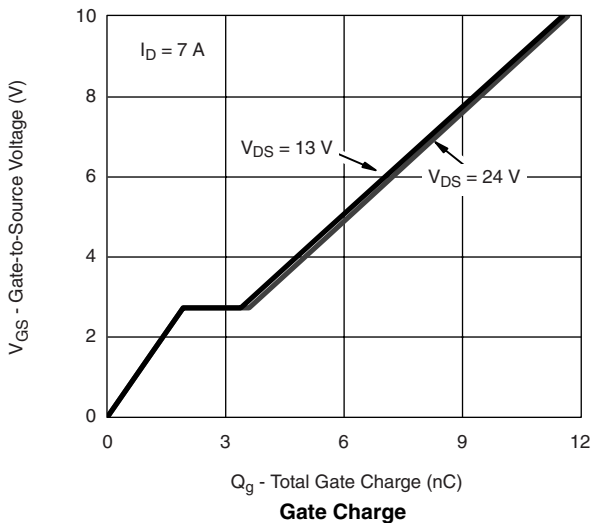
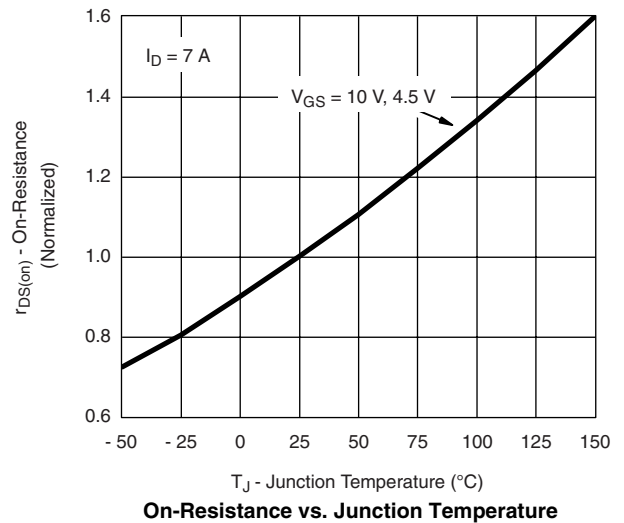
SPECIFICATIONS T _J = 25 °C, unless otherwise noted							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	25			V	
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		25		mV/°C	
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 4.7			
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.0		2.2	V	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 16 V			± 100	nA	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 25 V, V _{GS} = 0 V			1	μA	
		V _{DS} = 25 V, V _{GS} = 0 V, T _J = 55 °C			10		
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	20			A	
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 7 A		0.019	0.023	Ω	
		V _{GS} = 4.5 V, I _D = 6.3 A		0.023	0.028		
Forward Transconductance ^a	g _{fs}	V _{DS} = 10 V, I _D = 7 A		23		S	
Dynamic ^b							
Input Capacitance	C _{iss}	V _{DS} = 13 V, V _{GS} = 0 V, f = 1 MHz		680		pF	
Output Capacitance	C _{oss}			120			
Reverse Transfer Capacitance	C _{rss}			55			
Total Gate Charge	Q _g	V _{DS} = 13 V, V _{GS} = 10 V, I _D = 7 A		12	18	nC	
Gate-Source Charge	Q _{gs}	V _{DS} = 13 V, V _{GS} = 4.5 V, I _D = 7 A		5.5	8.5		
Gate-Drain Charge	Q _{gd}			2			
Gate Resistance	R _g			1.5			
Turn-On Delay Time	t _{d(on)}	f = 1 MHz		2.5	3.8	Ω	
Rise Time	t _r		V _{DD} = 13 V, R _L = 2.3 Ω I _D ≅ 5.6 A, V _{GEN} = 4.5 V, R _g = 1 Ω		15	25	ns
Turn-Off Delay Time	t _{d(off)}				50	75	
Fall Time	t _f				20	30	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 13 V, R _L = 2.3 Ω I _D ≅ 5.6 A, V _{GEN} = 10 V, R _g = 1 Ω			10	15	
Rise Time	t _r			10	15		
Turn-Off Delay Time	t _{d(off)}			12	20		
Fall Time	t _f			15	25		
Reverse Recovery Fall Time	t _a	I _F = 5.6 A, di/dt = 100 A/μs, T _J = 25 °C		10	15	ns	
Reverse Recovery Rise Time	t _b			8	16		
				8.5			
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			2.3	A	
Pulse Diode Forward Current	I _{SM}				30		
Body Diode Voltage	V _{SD}	I _S = 5.6 A, V _{GS} = 0 V		0.8	1.2	V	
Body Diode Reverse Recovery Time	t _{rr}	I _F = 5.6 A, di/dt = 100 A/μs, T _J = 25 °C		15	30	ns	
Body Diode Reverse Recovery Charge	Q _{rr}			8	16	nC	
Reverse Recovery Fall Time	t _a			6.5		ns	
Reverse Recovery Rise Time	t _b						

Notes:

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

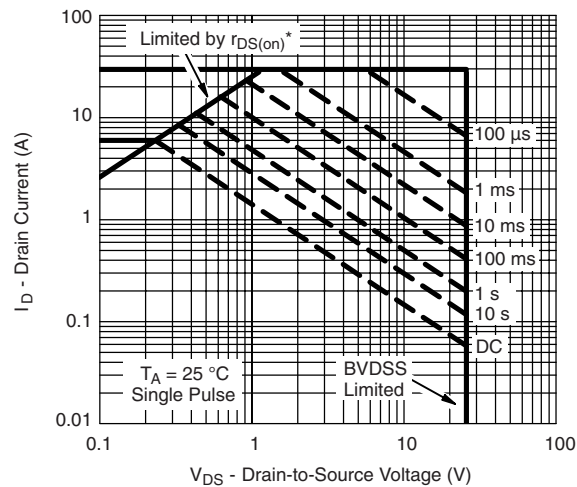
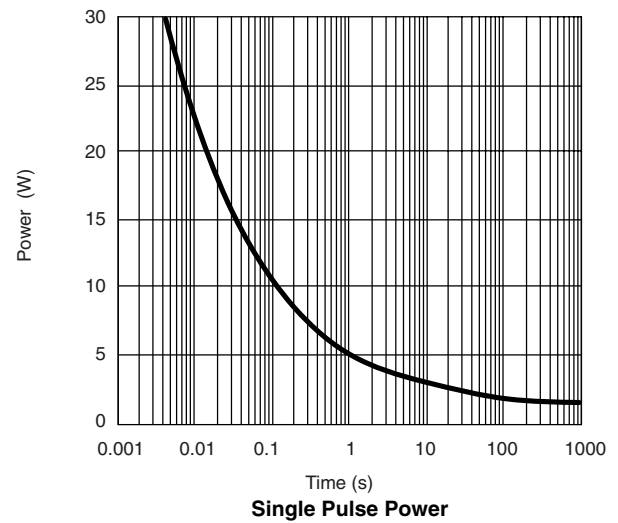
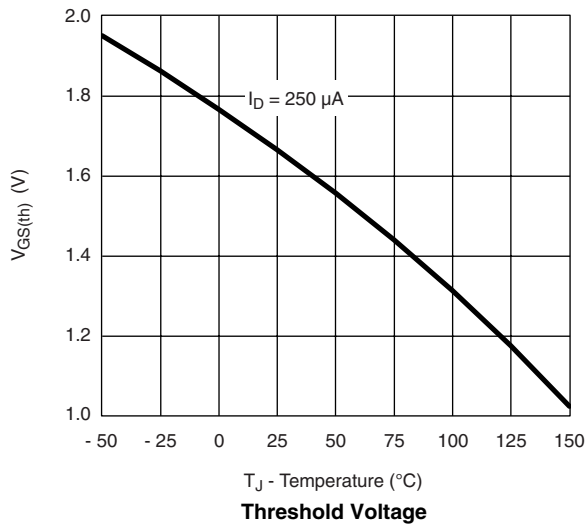
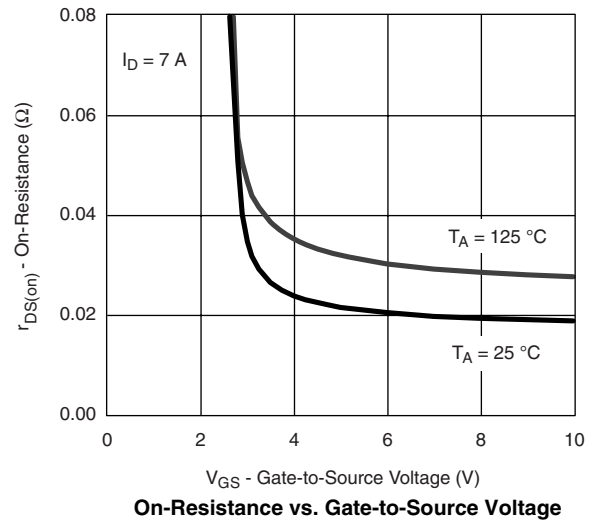
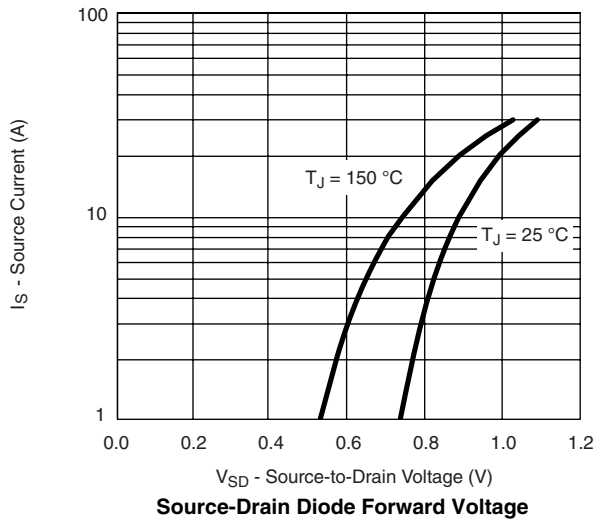
b. Guaranteed by design, not subject to production testing.

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****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

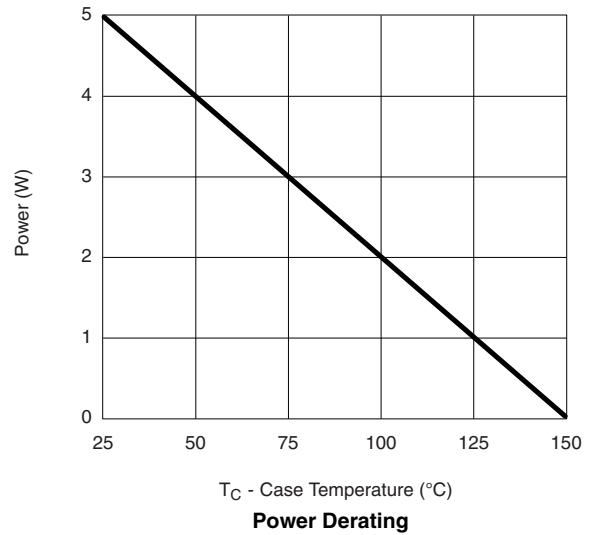
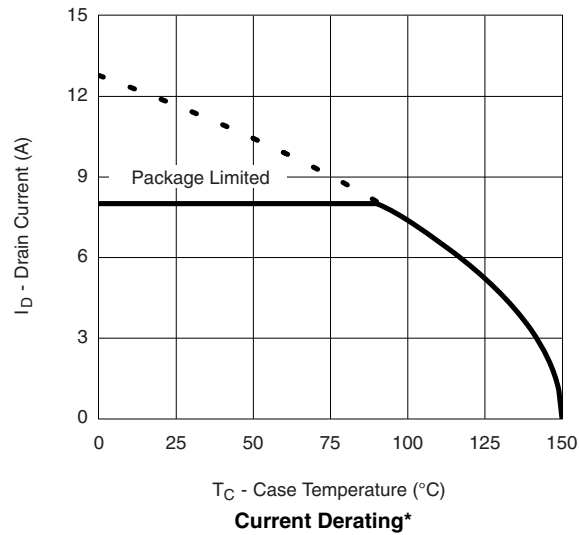
Si4778DY

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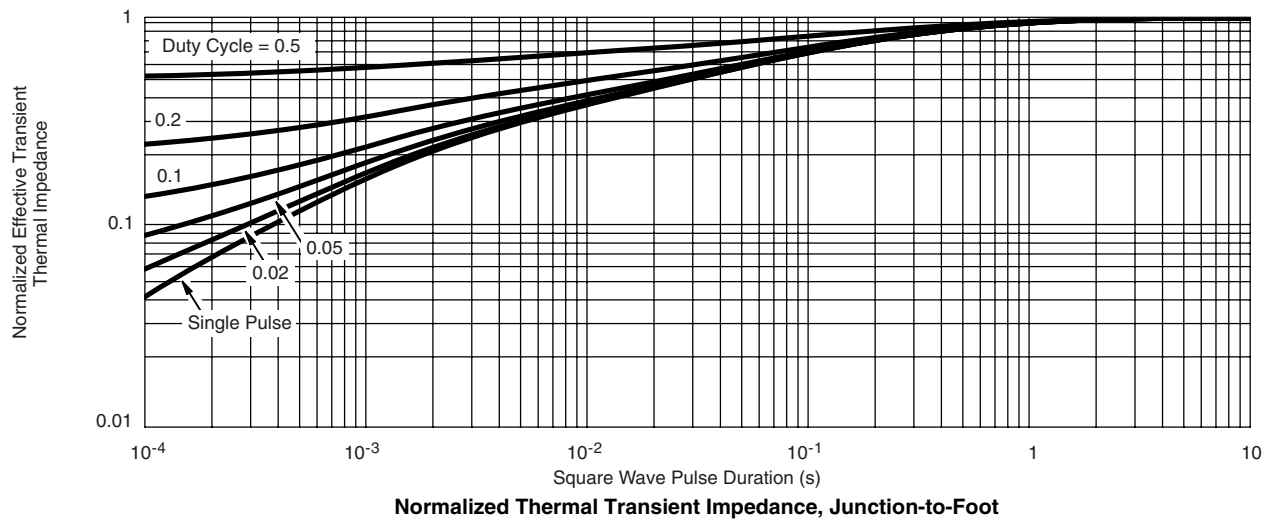
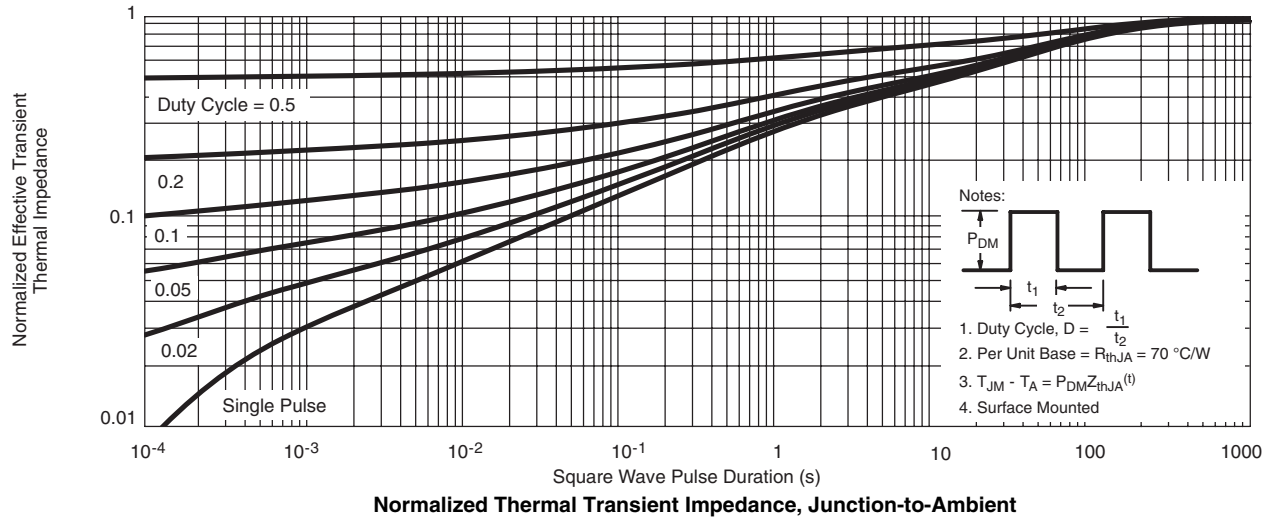
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted* $V_{GS} >$ minimum V_{GS} at which $r_{DS(on)}$ is specified**Safe Operating Area, Junction-to-Ambient**



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

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see <http://www.vishay.com/ppg?69817>.



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