



New Product

Si4438DY
Vishay Siliconix

N-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ)
30	0.0027 at $V_{GS} = 10$ V	36	41 nC
	0.004 at $V_{GS} = 4.5$ V	29	

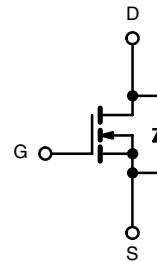
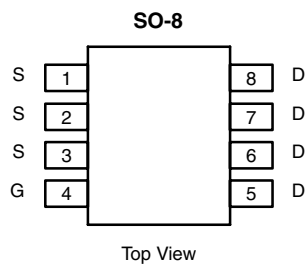
FEATURES

- TrenchFET® Power MOSFET
- 100 % R_g Tested
- RoHS Compliant



APPLICATIONS

- DC-to-DC and AC-to-DC oring diode applications



Ordering Information: Si4438DY-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}	30	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	36
		$T_C = 70$ °C	29
		$T_A = 25$ °C	24 ^{b, c}
		$T_A = 70$ °C	19 ^{b, c}
Pulsed Drain Current	I_{DM}	70	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	
		$T_A = 25$ °C	3.0 ^{b, c}
Maximum Power Dissipation	P_D	$T_C = 25$ °C	7.8
		$T_C = 70$ °C	5.0
		$T_A = 25$ °C	3.5 ^{b, c}
		$T_A = 70$ °C	2.2 ^{b, c}
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 150	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	29	35	°C/W	
Maximum Junction-to-Foot (Drain)	R_{thJF}	13	16		

Notes:

- Based on $T_C = 25$ °C.
- Surface mounted on 1" x 1" FR4 board.
- $t = 10$ sec.
- Maximum under steady state conditions is 80 °C/W.

SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	30			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		31		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			-6.7		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.4		2.6	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V			1	μA
		V _{DS} = 30 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	30			A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		0.0022	0.0027	Ω
		V _{GS} = 4.5 V, I _D = 15 A		0.0033	0.004	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 20 A		86		S
Dynamic^b						
Input Capacitance	C _{iss}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		4645		pF
Output Capacitance	C _{oss}			900		
Reverse Transfer Capacitance	C _{rss}			555		
Total Gate Charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 20 A		84	126	nC
		V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 20 A		41	62	
Gate-Source Charge	Q _{gs}	V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 20 A		14.6		nC
Gate-Drain Charge	Q _{gd}			16.5		
Gate Resistance	R _g	f = 1 MHz		1.3	2	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 1.5 Ω I _D ≅ 10 A, V _{GEN} = 4.5 V, R _g = 1 Ω		36	55	ns
Rise Time	t _r			210	320	
Turn-Off Delay Time	t _{d(off)}			39	60	
Fall Time	t _f			18	30	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 1.5 Ω I _D ≅ 10 A, V _{GEN} = 10 V, R _g = 1 Ω		17	26	ns
Rise Time	t _r			86	130	
Turn-Off Delay Time	t _{d(off)}			47	75	
Fall Time	t _f			10	16	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			7	A
Pulse Diode Forward Current ^a	I _{SM}				70	
Body Diode Voltage	V _{SD}	I _S = 3 A		0.73	1.1	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 20 A, di/dt = 100 A/μs, T _J = 25 °C		43	65	ns
Body Diode Reverse Recovery Charge	Q _{rr}			45	70	nC
Reverse Recovery Fall Time	t _a			22		ns
Reverse Recovery Rise Time	t _b			21		

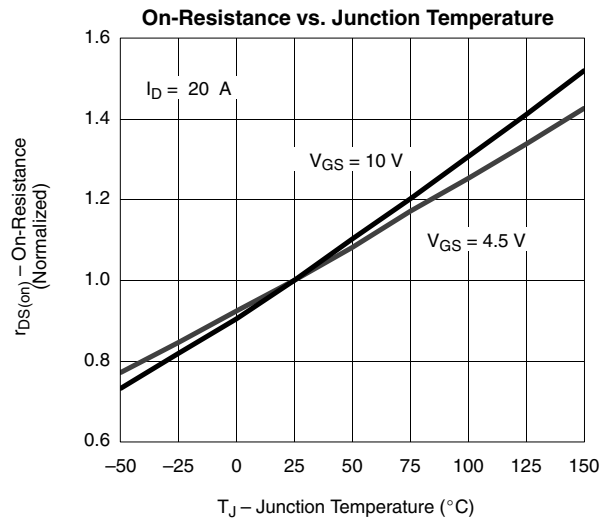
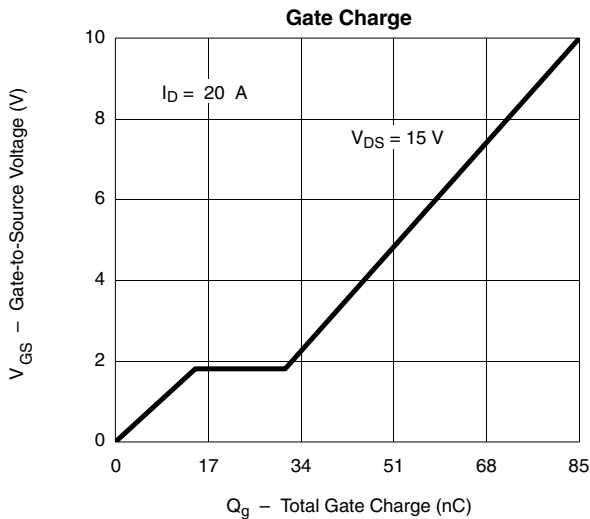
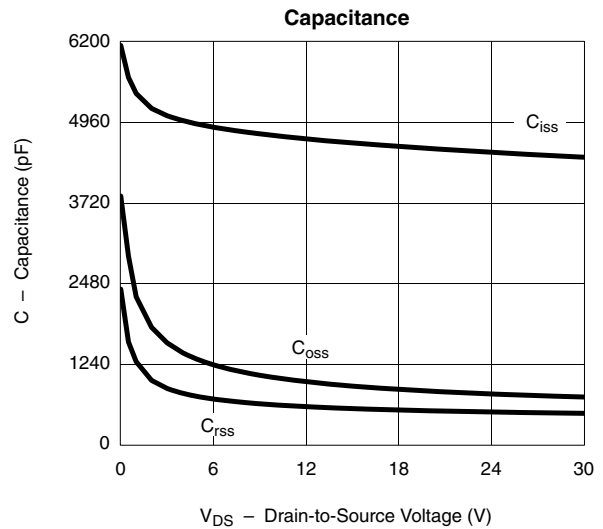
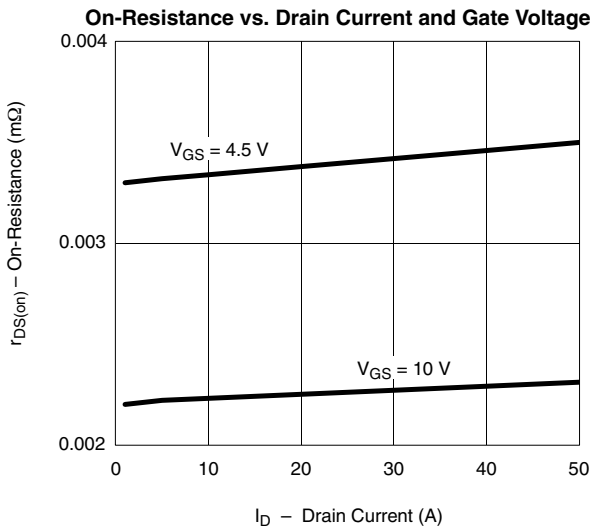
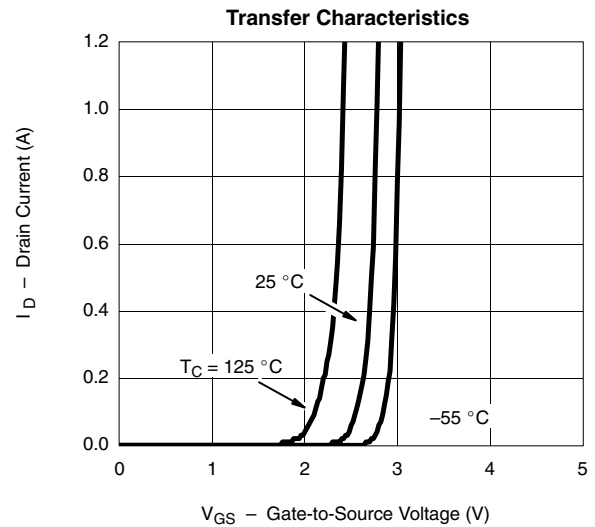
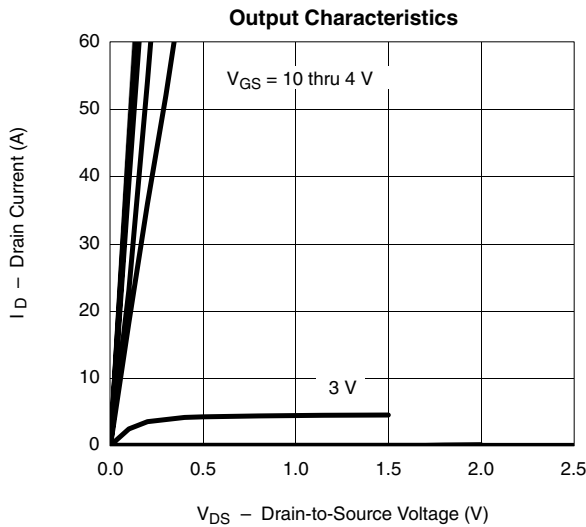
Notes

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 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.



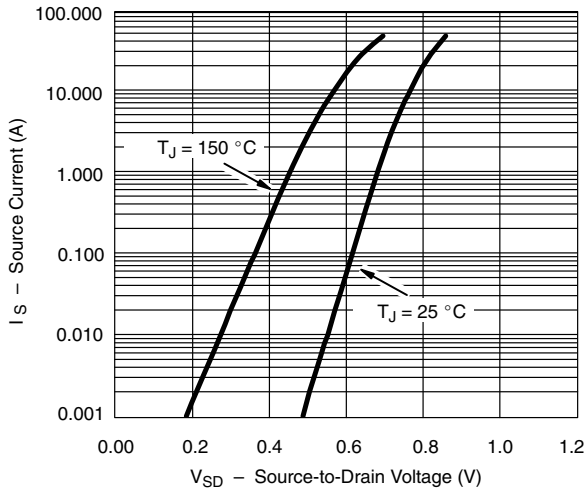
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)



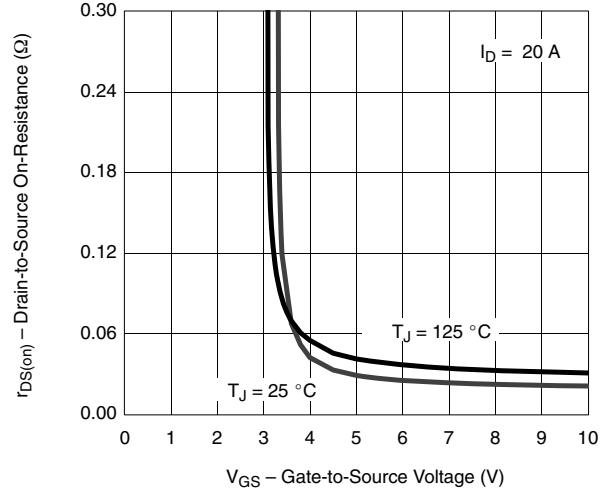


TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

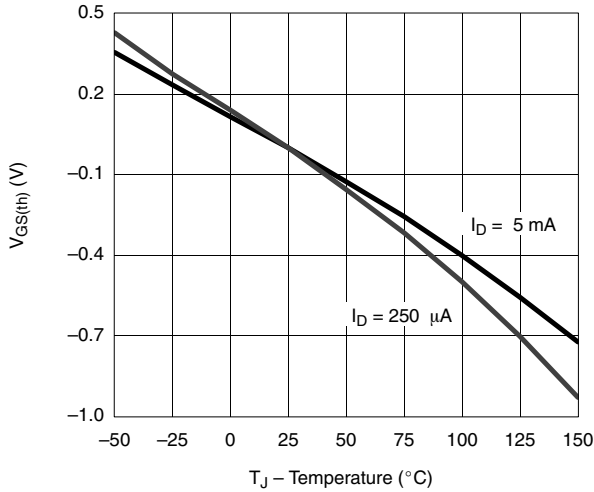
Source-Drain Diode Forward Voltage



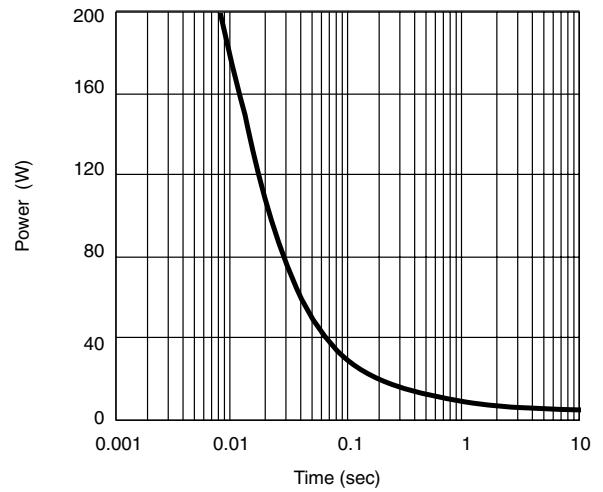
On-Resistance vs. Gate-to-Source Voltage



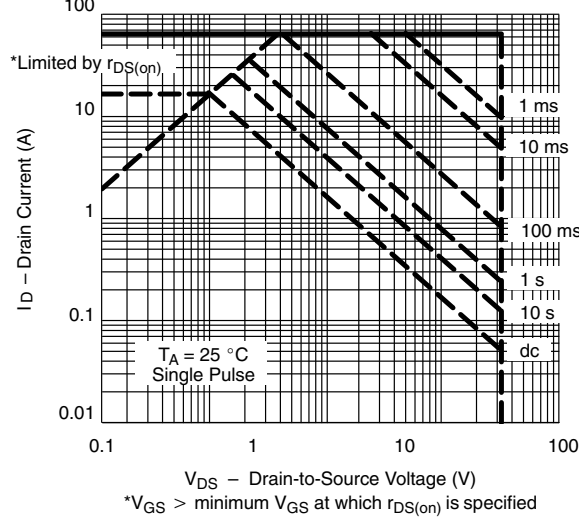
Threshold Voltage



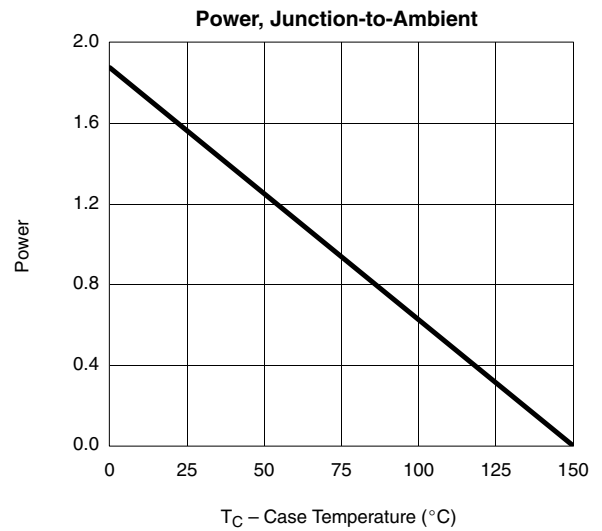
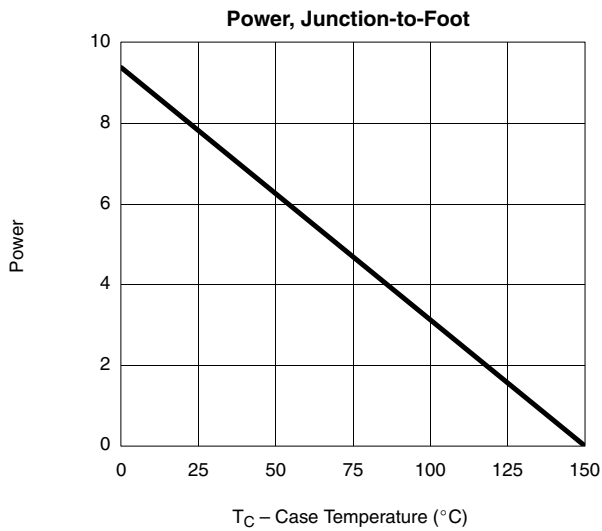
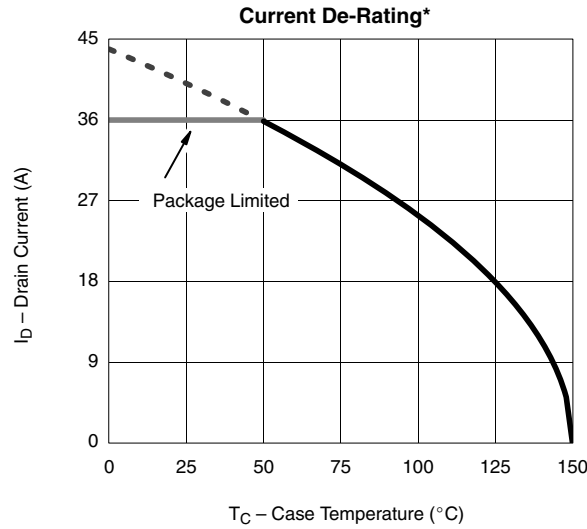
Single Pulse Power, Junction-to-Ambient



Safe Operating Area, Junction-to-Ambient



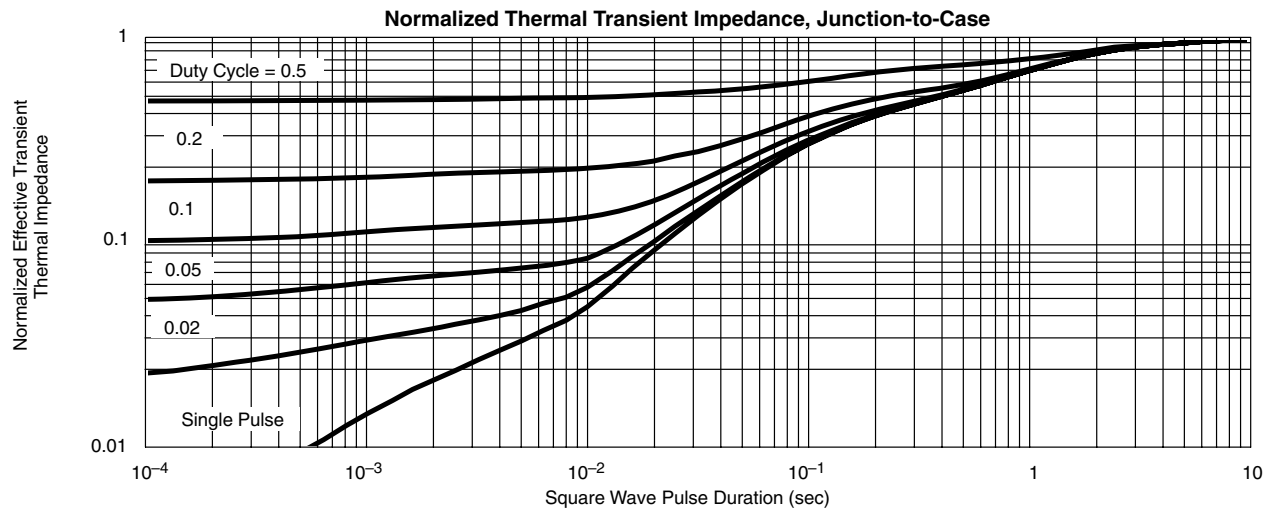
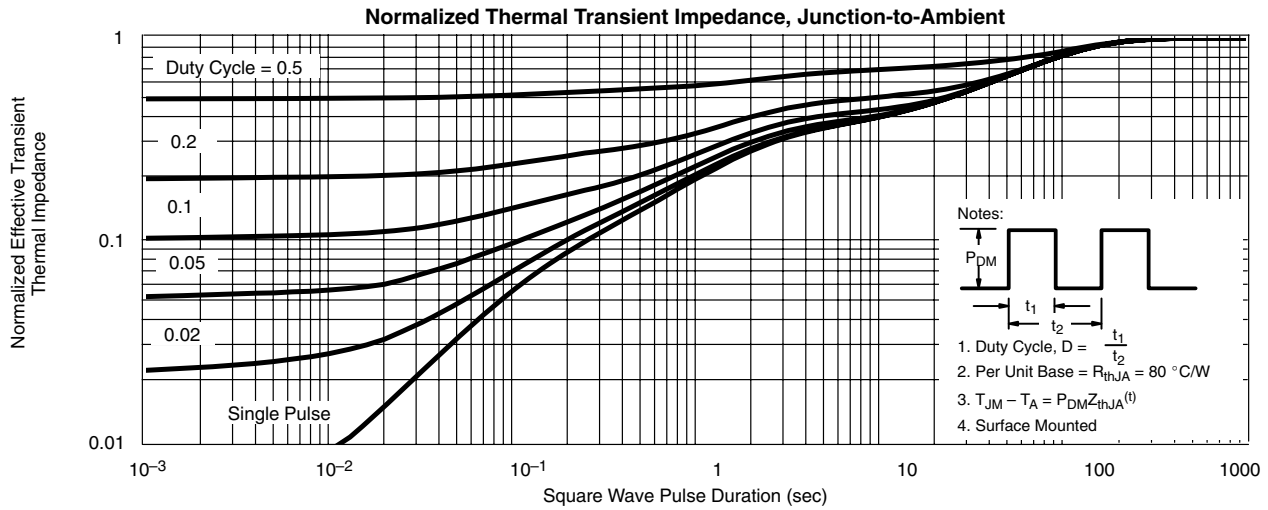
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)



*The power dissipation P_D is based on $T_{J(max)} = 175\text{ °C}$, 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 (25 °C UNLESS 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?73581>.



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