



New Product

Si4436DY  
Vishay Siliconix

## N-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY			
V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ)
60	0.036 at V <sub>GS</sub> = 10 V	8	10.5 nC
	0.043 at V <sub>GS</sub> = 4.5 V	8	

### FEATURES

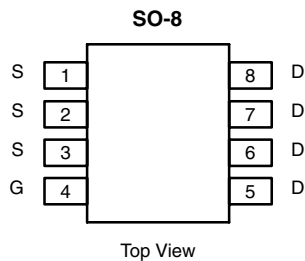
- TrenchFET® Power MOSFET
- Optimized for “Low Side” Synchronous Rectifier Operation
- 100 % R<sub>g</sub> and UIS Tested



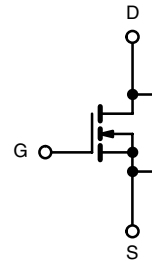
RoHS  
COMPLIANT

### APPLICATIONS

- CCFL Inverter



Ordering Information: Si4436DY-T1-E3 (Lead-(Pb)-free)



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V <sub>DS</sub>	60	V	
Gate-Source Voltage	V <sub>GS</sub>	± 20		
Continuous Drain Current (T <sub>J</sub> = 150 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	8 <sup>a</sup>	A
		T <sub>C</sub> = 70 °C	6.8	
		T <sub>A</sub> = 25 °C	6.1 <sup>b, c</sup>	
		T <sub>A</sub> = 70 °C	4.8 <sup>b, c</sup>	
Pulsed Drain Current	I <sub>DM</sub>	25		
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	4.2	
		T <sub>A</sub> = 25 °C	2.1 <sup>b, c</sup>	
Avalanche Current	I <sub>AS</sub>	15		
Single Pulse Avalanche Energy	E <sub>AS</sub>	11.2	mJ	
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	5	W
		T <sub>C</sub> = 70 °C	3.2	
		T <sub>A</sub> = 25 °C	2.5 <sup>b, c</sup>	
		T <sub>A</sub> = 70 °C	1.6 <sup>b, c</sup>	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150	°C	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>b, d</sup>	R <sub>thJA</sub>	38	50	°C/W	
Maximum Junction-to-Foot (Drain)	R <sub>thJF</sub>	20	25		

Notes:

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- t = 10 sec.
- Maximum under steady state conditions is 85 °C/W.

SPECIFICATIONS (T <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	60			V
V <sub>DS</sub> Temperature Coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	I <sub>D</sub> = 250 μA		55		mV/°C
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub> /T <sub>J</sub>			-6.3		
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1.5		2.5	V
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C			10	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 10 V	25			A
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 4.6 A		0.030	0.036	Ω
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 4.2 A		0.035	0.043	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 4.6 A		20		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, f = 1 MHz		1100		pF
Output Capacitance	C <sub>oss</sub>			90		
Reverse Transfer Capacitance	C <sub>rss</sub>			55		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 4.6 A		21	32	nC
		V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 4.6 A		10.5	16	
Gate-Source Charge	Q <sub>gs</sub>			3.5		
Gate-Drain Charge	Q <sub>gd</sub>		4.2			
Gate Resistance	R <sub>g</sub>	f = 1 MHz		3.3	5	Ω
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 30 V, R <sub>L</sub> = 5.4 Ω I <sub>D</sub> ≅ 5.6 A, V <sub>GEN</sub> = 4.5 V, R <sub>g</sub> = 1 Ω		20	30	ns
Rise Time	t <sub>r</sub>			150	225	
Turn-Off Delay Time	t <sub>d(off)</sub>			20	30	
Fall Time	t <sub>f</sub>			60	90	
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 30 V, R <sub>L</sub> = 5.4 Ω I <sub>D</sub> ≅ 5.6 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω		10	15	
Rise Time	t <sub>r</sub>			15	25	
Turn-Off Delay Time	t <sub>d(off)</sub>			25	40	
Fall Time	t <sub>f</sub>			10	15	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C			4.2	A
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				25	
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = 2 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 5.5 A, di/dt = 100 A/μs, T <sub>J</sub> = 25 °C		25	50	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			25	50	nC
Reverse Recovery Fall Time	t <sub>a</sub>			19		ns
Reverse Recovery Rise Time	t <sub>b</sub>			6		

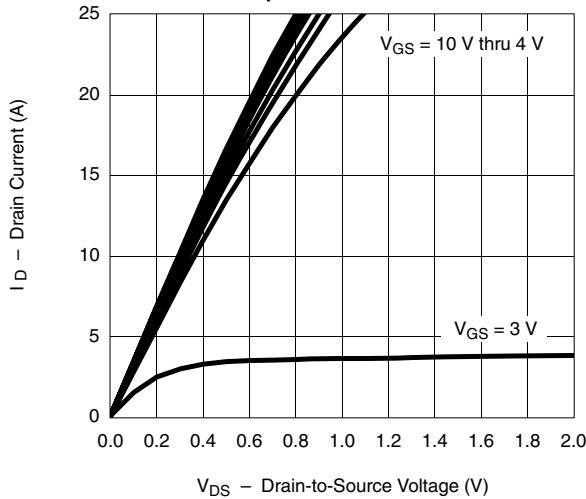
## Notes

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.  
b. Guaranteed by design, not subject to production testing.

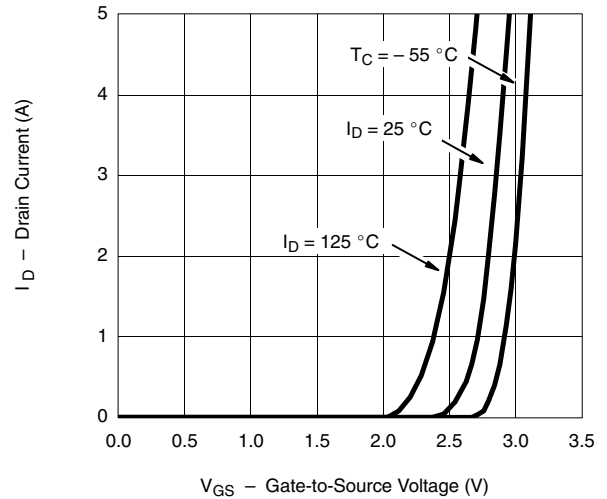
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**

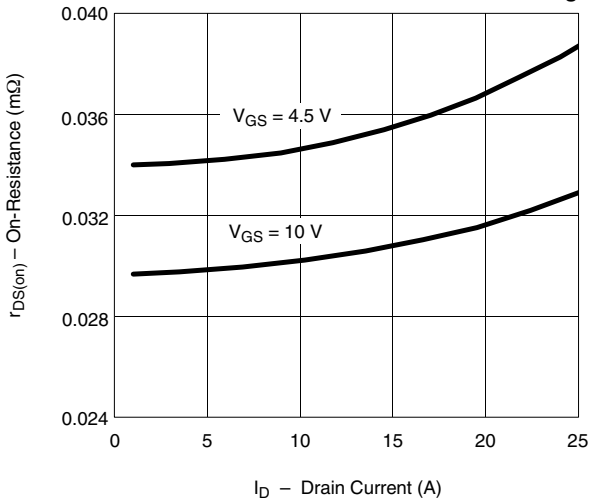
**Output Characteristics**



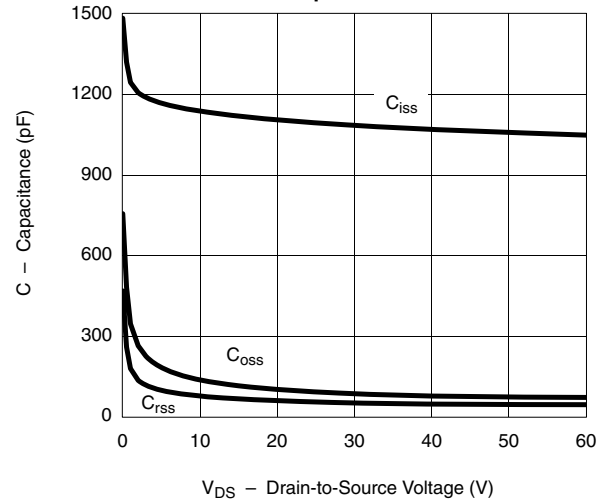
**Transfer Characteristics**



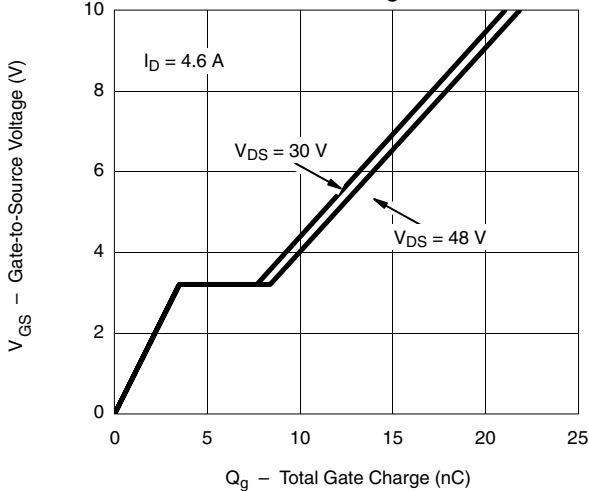
**On-Resistance vs. Drain Current and Gate Voltage**



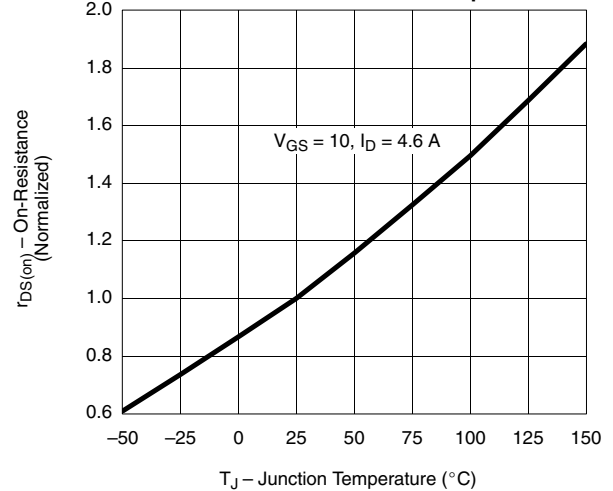
**Capacitance**



**Gate Charge**



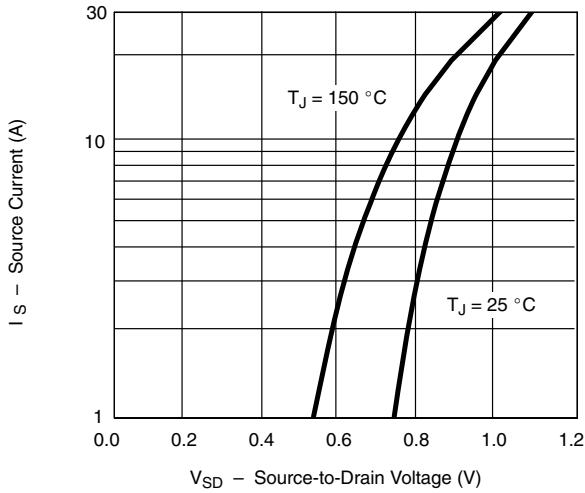
**On-Resistance vs. Junction Temperature**



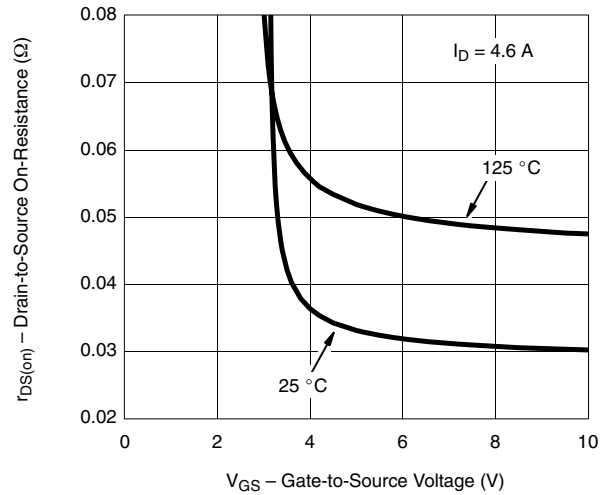


**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**

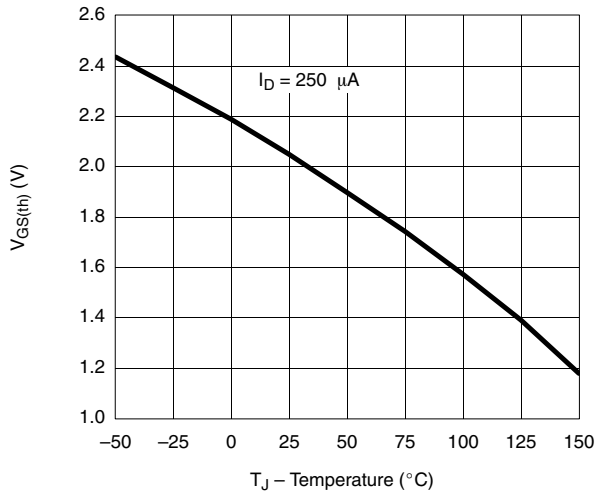
Source-Drain Diode Forward Voltage



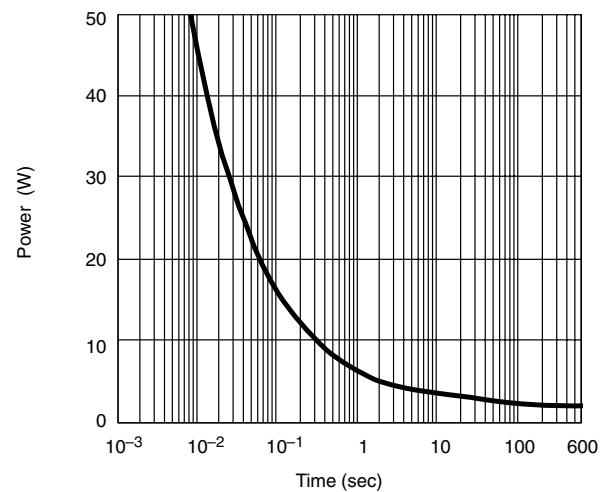
On-Resistance vs. Gate-to-Source Voltage



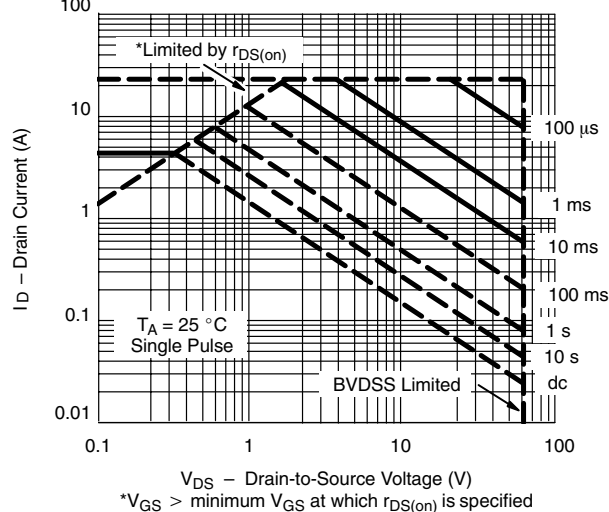
Threshold Voltage



Single Pulse Power

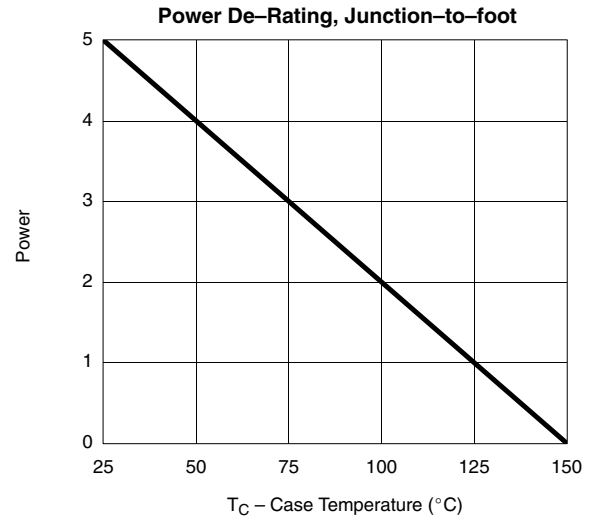
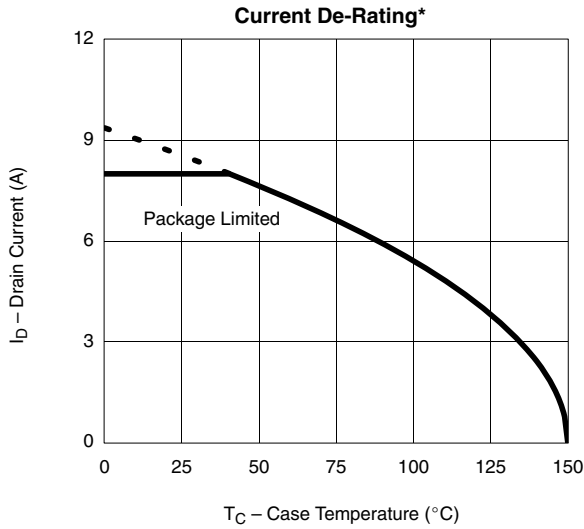


Safe Operating Area, Junction-to-Ambient





**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**

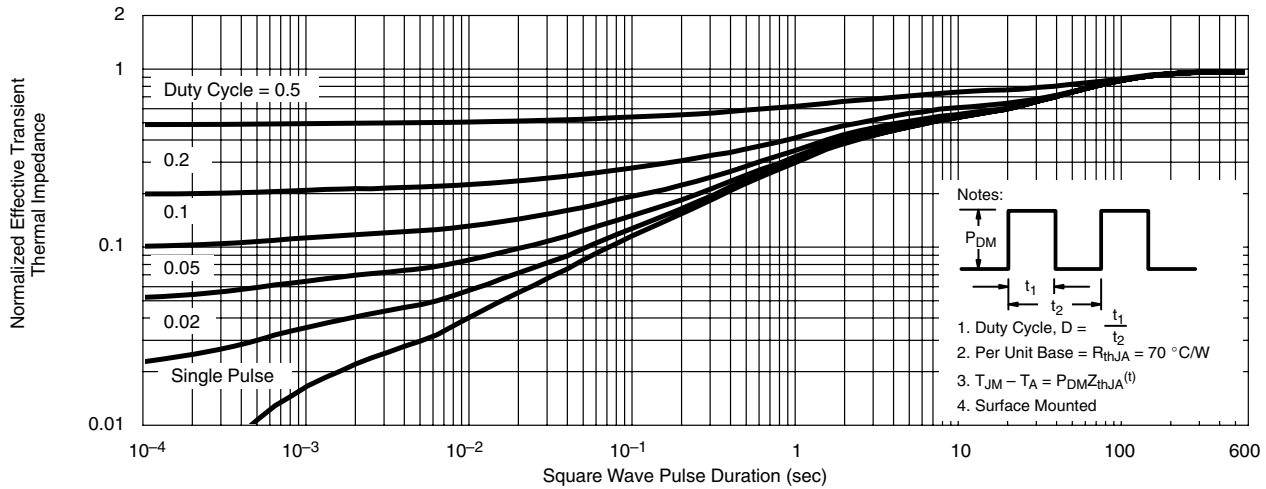


\*The power dissipation P<sub>D</sub> is based on T<sub>J(max)</sub> = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

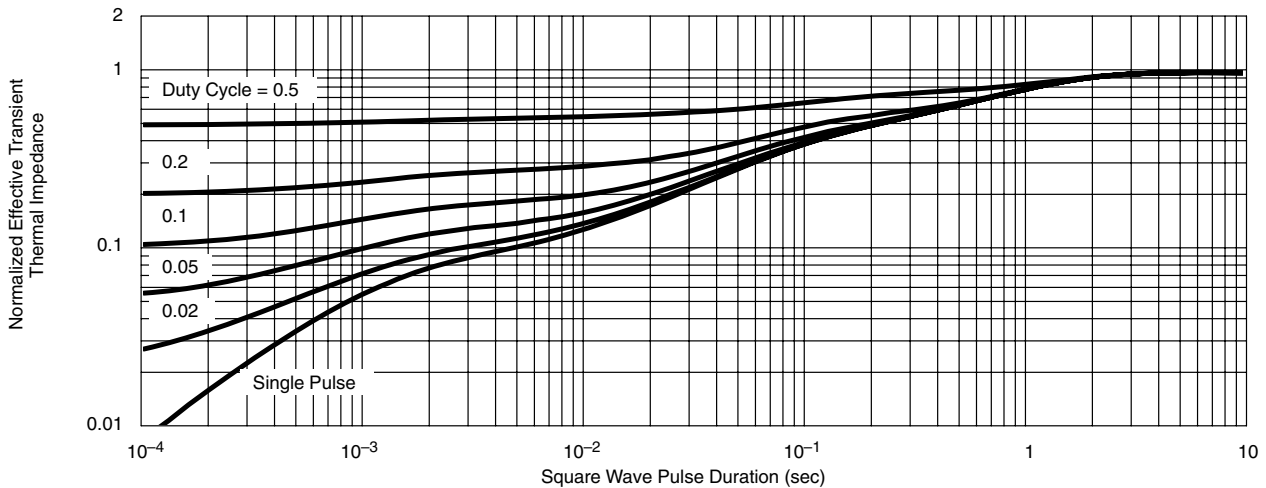


**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**

Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot



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