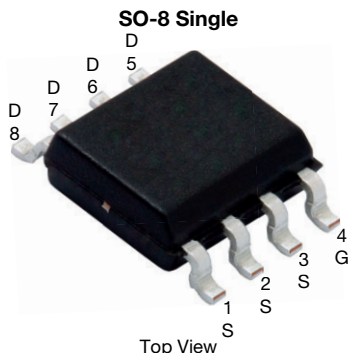


## P-Channel 30 V (D-S) MOSFET



### FEATURES

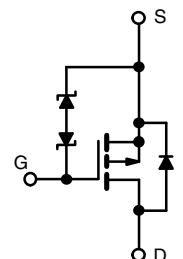
- Extended  $V_{GS}$  range ( $\pm 25$  V) for adaptor switch applications
- Extremely low  $R_{DS(on)}$
- TrenchFET® power MOSFET
- 100 %  $R_g$  and UIS tested
- Typical ESD performance: 4000 V (HBM)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### APPLICATIONS

- Adaptor switch, load switch
- Power management
- Notebook computers and portable battery packs



P-Channel MOSFET

### PRODUCT SUMMARY

$V_{DS}$ (V)	-30
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = -10$ V	0.0065
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = -6$ V	0.0082
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = -4.5$ V	0.0112
$Q_g$ typ. (nC)	66
$I_D$ (A) <sup>a</sup>	-29
Configuration	Single

### ORDERING INFORMATION

Package	SO-8
Lead (Pb)-free and halogen-free	Si4491EDY-T1-GE3

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	$V_{DS}$	-30	V
Gate-source voltage	$V_{GS}$	$\pm 25$	V
Continuous drain current ( $T_J = 150$ °C)	$I_D$	$T_C = 25$ °C	A
		$T_C = 70$ °C	
		$T_A = 25$ °C	
		$T_A = 70$ °C	
Pulsed drain current ( $t = 300$ $\mu$ s)	$I_{DM}$	-60	A
Continuous source-drain diode current	$I_S$	$T_C = 25$ °C	A
		$T_A = 25$ °C	
Single pulse avalanche current	$I_{AS}$	-40	A
Single pulse avalanche energy	$E_{AS}$	80	mJ
Maximum power dissipation	$P_D$	$T_C = 25$ °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 <sup>b, d</sup>	$R_{thJA}$	33	40	°C/W
Maximum junction-to-foot (drain)	$R_{thJF}$	15	17	

#### Notes

- Based on  $T_C = 25$  °C
- Surface mounted on 1" x 1" FR4 board
- $t = 10$  s
- Maximum under steady state conditions is 90 °C/W



SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 μA	-30	-	-	V
V <sub>DS</sub> temperature coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	I <sub>D</sub> = -250 μA	-	-24	-	mV/°C
V <sub>GS(th)</sub> temperature coefficient	ΔV <sub>GS(th)</sub> /T <sub>J</sub>		-	6	-	
Gate-source threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA	-1.2	-	-2.8	V
Gate-source leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 25 V	-	-	± 150	μA
		V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V	-	-	± 15	
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = -30 V, V <sub>GS</sub> = 0 V	-	-	-1	
		V <sub>DS</sub> = -30 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	-20	-	-	A
Drain-source on-state resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -13 A	-	0.0054	0.0065	Ω
		V <sub>GS</sub> = -6 V, I <sub>D</sub> = -10 A	-	0.0068	0.0082	
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -8 A	-	0.0093	0.0112	
Forward transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -15 V, I <sub>D</sub> = -13 A	-	44	-	S
Dynamic <sup>b</sup>						
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -15 V, V <sub>GS</sub> = 0 V, f = 1 MHz	-	4620	-	pF
Output capacitance	C <sub>oss</sub>		-	880	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	820	-	
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> = -15 V, V <sub>GS</sub> = -10 V, I <sub>D</sub> = -17.3 A	-	102	153	nC
		V <sub>DS</sub> = -15 V, V <sub>GS</sub> = -5 V, I <sub>D</sub> = -17.3 A	-	66	80	
Gate-source charge	Q <sub>gs</sub>		-	16	-	
Gate-drain charge	Q <sub>gd</sub>		-	28	-	
Gate resistance	R <sub>g</sub>	f = 1 MHz	0.3	1.3	2.6	Ω
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = 0 V, R <sub>L</sub> = 1.5 Ω, I <sub>D</sub> ≅ -10 A, V <sub>GEN</sub> = -4.5 V, R <sub>g</sub> = 1 Ω	-	70	105	ns
Rise time	t <sub>r</sub>		-	70	105	
Turn-off delay time	t <sub>d(off)</sub>		-	45	68	
Fall time	t <sub>f</sub>		-	27	41	
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = -15 V, R <sub>L</sub> = 1.5 Ω, I <sub>D</sub> ≅ -10 A, V <sub>GEN</sub> = -10 V, R <sub>g</sub> = 1 Ω	-	18	30	
Rise time	t <sub>r</sub>		-	15	25	
Turn-off delay time	t <sub>d(off)</sub>		-	52	80	
Fall time	t <sub>f</sub>		-	14	25	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	-	-	-5.8	A
Pulse diode forward current	I <sub>SM</sub>		-	-	-60	
Body diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = -10 A, V <sub>GS</sub> = 0 V	-	-0.78	-1.2	V
Body diode reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = -10 A, di/dt = 100 A/μs, T <sub>J</sub> = 25 °C		35	53	ns
Body diode reverse recovery charge	Q <sub>rr</sub>			25	38	nC
Reverse recovery fall time	t <sub>a</sub>			19		ns
Reverse recovery rise time	t <sub>b</sub>			16		

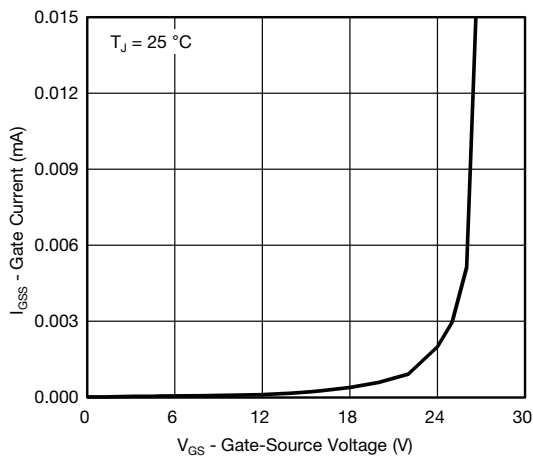
**Notes**

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

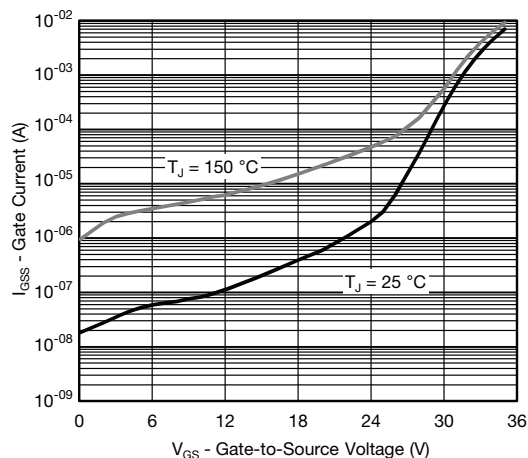
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



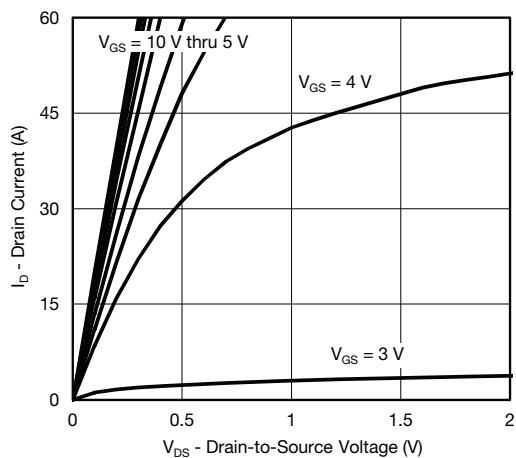
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



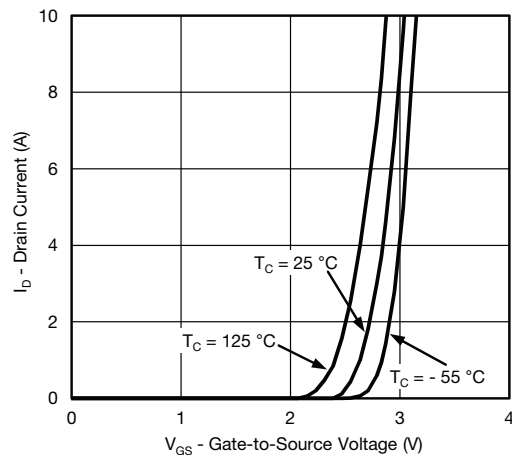
**Gate Current vs. Gate-Source Voltage**



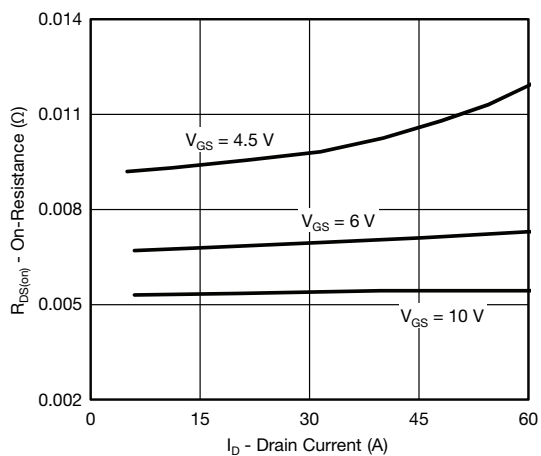
**Gate Current vs. Gate-Source Voltage**



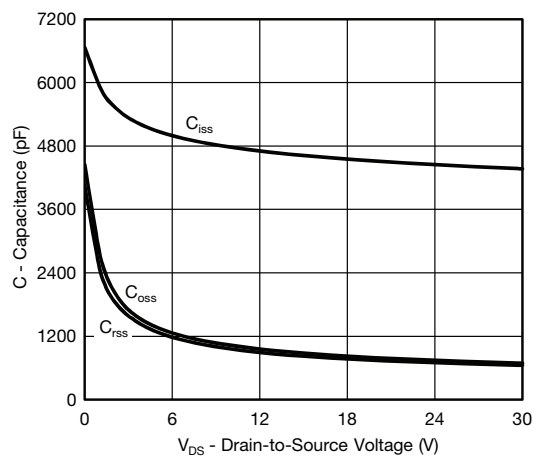
**Output Characteristics**



**Transfer Characteristics**



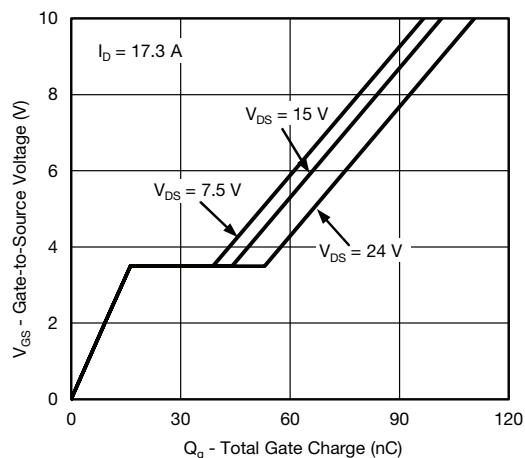
**On-Resistance vs. Drain Current**



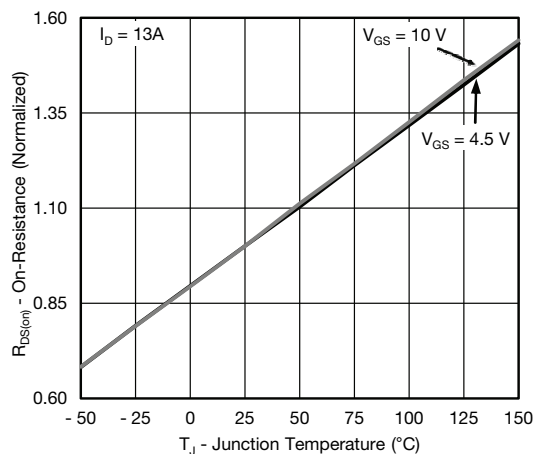
**Capacitance**



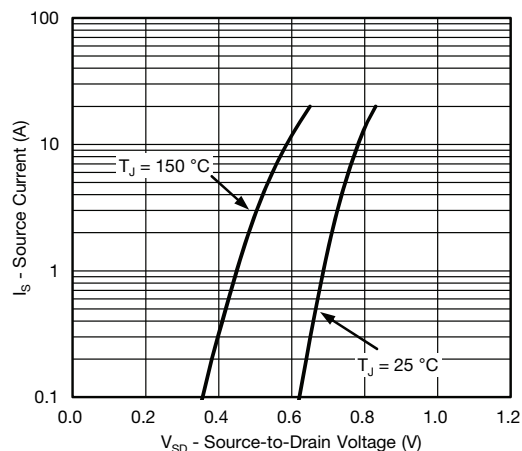
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



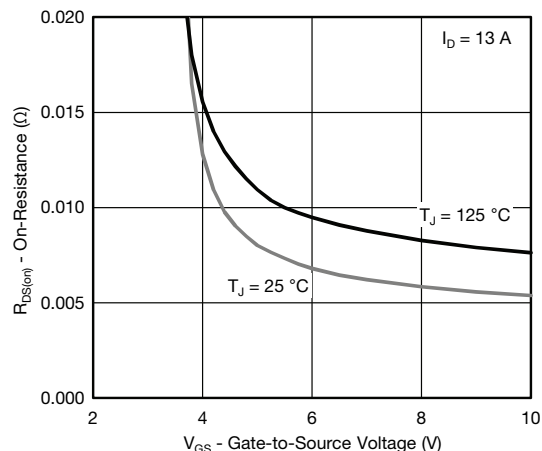
**Gate Charge**



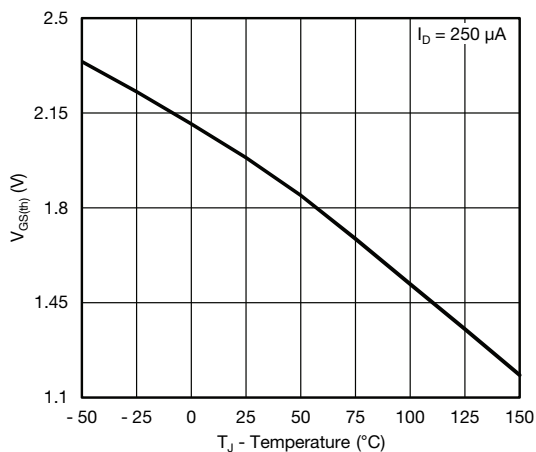
**On-Resistance vs. Junction Temperature**



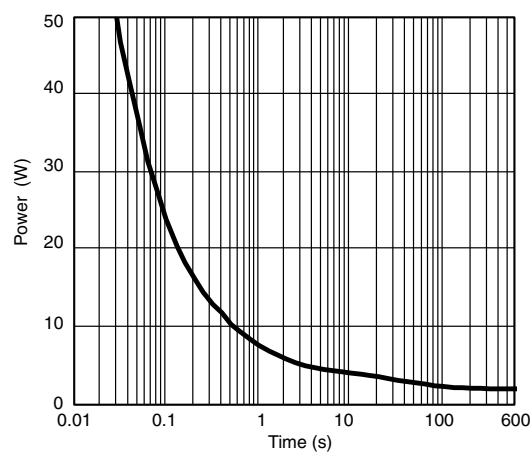
**Source-Drain Diode Forward Voltage**



**On-Resistance vs. Gate-to-Source Voltage**



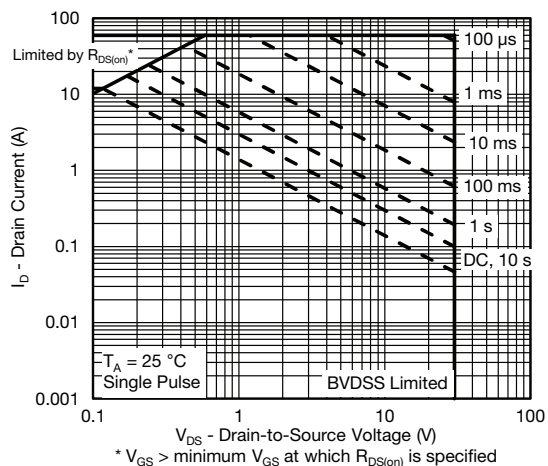
**Threshold Voltage**



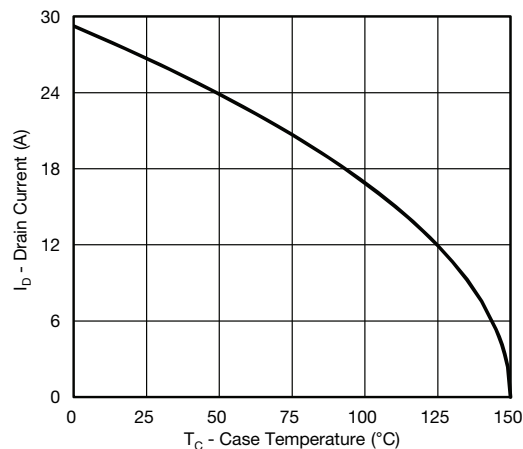
**Single Pulse Power, Junction-to-Ambient**



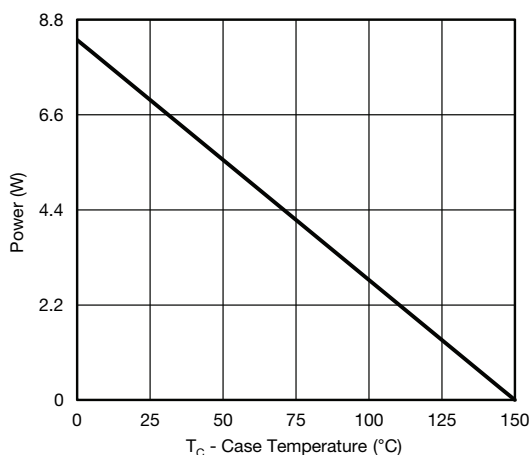
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



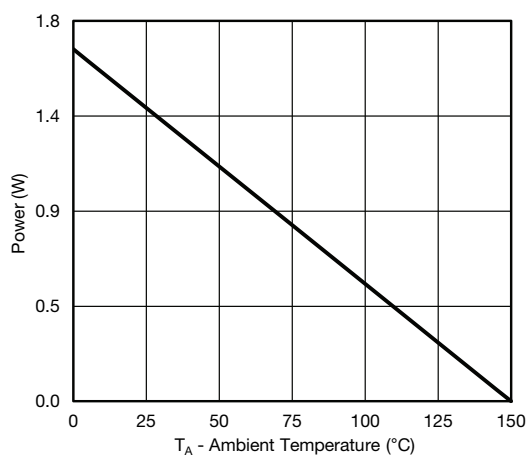
**Safe Operating Area, Junction-to-Ambient**



**Current Derating <sup>a</sup>**



**Power Junction-to-Foot**



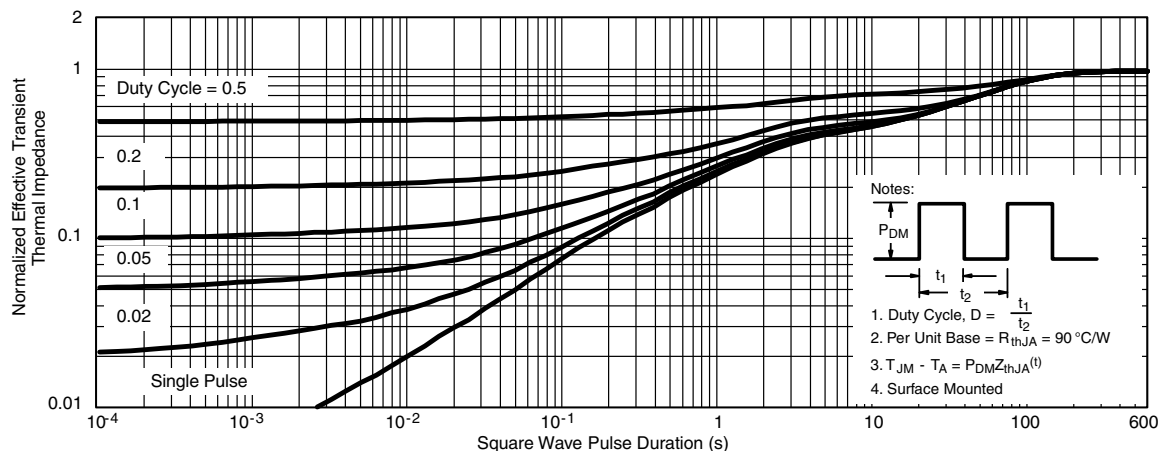
**Power Junction-to-Ambient**

**Note**

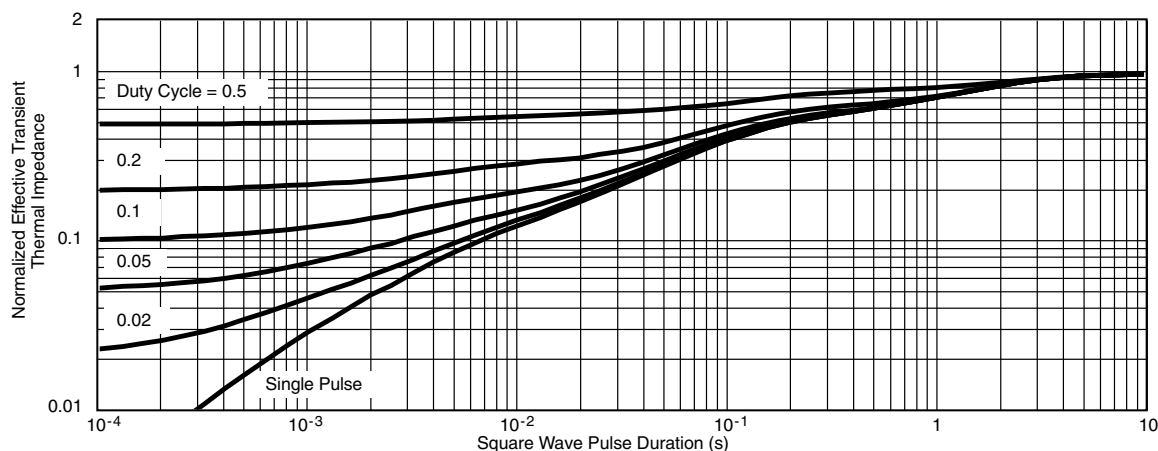
- a. The power dissipation  $P_D$  is based on  $T_J \text{ max.} = 150^\circ\text{C}$ , using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls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



**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



**Normalized Thermal Transient Impedance, Junction-to-Ambient**



**Normalized Thermal Transient Impedance, Junction-to-Foot**

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## SOIC (NARROW): 8-LEAD

JEDEC Part Number: MS-012



DIM	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A <sub>1</sub>	0.10	0.20	0.004	0.008
B	0.35	0.51	0.014	0.020
C	0.19	0.25	0.0075	0.010
D	4.80	5.00	0.189	0.196
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.020
L	0.50	0.93	0.020	0.037
q	0°	8°	0°	8°
S	0.44	0.64	0.018	0.026
ECN: C-06527-Rev. I, 11-Sep-06				
DWG: 5498				

## RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads  
Dimensions in Inches/(mm)

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