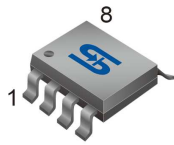




### SOP-8



#### Pin Definition:

- |             |            |
|-------------|------------|
| 1. Source 1 | 8. Drain 1 |
| 2. Gate 1   | 7. Drain 1 |
| 3. Source 2 | 6. Drain 2 |
| 4. Gate 2   | 5. Drain 2 |

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ (m $\Omega$ )	$I_D$ (A)
450	4.25 @ $V_{GS}=10V$	0.5

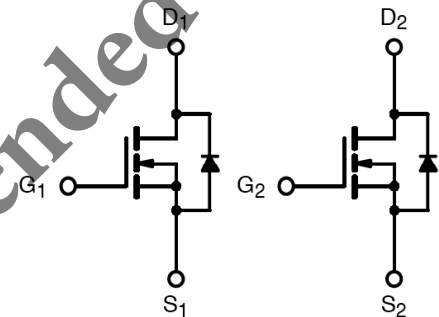
### General Description

The TSM1N45 is N-Channel enhancement mode power field effect transistors are produced using planar DMOS technology process. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand higher energy pulse in the avalanche and commutation mode. These devices are well suited for electronic ballasts base and half bridge configuration.

### Features

- Low gate charge @ typical 6.5nC
- Low  $C_{rss}$  @ typical 6.5pF
- Avalanche energy specified
- Improved dv/dt capability
- Gate-Source Voltage  $\pm 50V$  guaranteed

### Block Diagram



Dual N-Channel MOSFET

### Ordering Information

Part No.	Package	Packing
TSM1N45DCS RLG	SOP-8	2.5Kpcs / 13" Reel

Note: "G" denotes for Halogen Free

### Absolute Maximum Rating ( $T_a = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	450	V
Gate-Source Voltage	$V_{GS}$	$\pm 50$	V
Continuous Drain Current	$I_D$	0.5	A
Pulsed Drain Current (Note 1)	$I_{DM}$	4	A
Single Pulse Drain to Source Avalanche Energy (Note 2)	$E_{AS}$	108	mJ
Avalanche Current (Note 1)	$I_{AR}$	0.5	A
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	0.25	mJ
Peak Diode Recovery dv/dt (Note 3)	dv/dt	5.5	V/ns
Maximum Power Dissipation @ $T_a = 25^\circ C$	$P_D$	0.9	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ C$

### Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	80	$^\circ C/W$

Notes: Surface mounted on FR4 board  $t \leq 10sec$

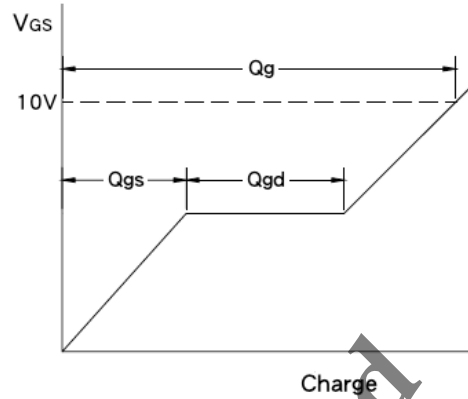
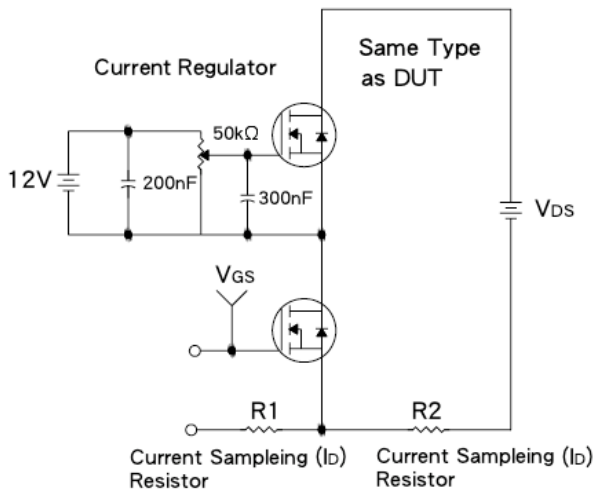
### Electrical Specifications (Ta=25°C, unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	450	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 0.25A$	$R_{DS(ON)}$	--	3.4	4.25	$\Omega$
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	2.3	3.0	3.7	V
	$V_{DS} = V_{GS}, I_D = 250mA$		3.1	4.2	4.9	
Zero Gate Voltage Drain Current	$V_{DS} = 450V, V_{GS} = 0V$	$I_{DSS}$	--	--	10	$\mu A$
Gate Body Leakage	$V_{GS} = \pm 50V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 100$	nA
Forward Transconductance	$V_{DS} = 50V, I_D = 0.25A$	$g_{fs}$	--	0.7	--	S
Diode Forward Voltage	$I_S = 1A, V_{GS} = 0V$	$V_{SD}$	--	--	1.5	V
<b>Dynamic</b>						
Total Gate Charge	$V_{DS} = 360V, I_D = 0.5A,$ $V_{GS} = 10V$ (Note 4,5)	$Q_g$	--	6.5	--	nC
Gate-Source Charge		$Q_{GS}$	--	0.9	--	
Gate-Drain Charge		$Q_{gd}$	--	3.2	--	
Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0MHz$	$C_{iss}$	--	185	--	pF
Output Capacitance		$C_{oss}$	--	29	--	
Reverse Transfer Capacitance		$C_{rss}$	--	6.5	--	
<b>Switching</b>						
Turn-On Delay Time	$V_{GS} = 25V, I_D = 0.5A,$ $V_{DS} = 225V, R_G = 25\Omega$ (Note 4,5)	$t_{d(on)}$	--	7.5	--	nS
Turn-On Rise Time		$t_r$	--	21	--	
Turn-Off Delay Time		$t_{d(off)}$	--	23	--	
Turn-Off Fall Time		$t_f$	--	36	--	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Maximum Continuous Drain-Source Diode Forward Current		$I_S$	--	--	0.5	A
Maximum Pulsed Drain-Source Diode Forward Current		$I_{SM}$	--	--	4.0	A
Drain-Source Diode Forward Voltage	$V_{GS} = 25V, I_S = 0.5A$	$V_{SD}$	--	--	1.4	V
Reverse Recovery Time	$V_{GS} = 25V, I_S = 0.5A,$ $di_F/dt = 100A/\mu S$	$t_{rr}$	--	102	--	nS
Reverse Recovery Charge	(Note 4)	$Q_{rr}$	--	0.26	--	$\mu C$

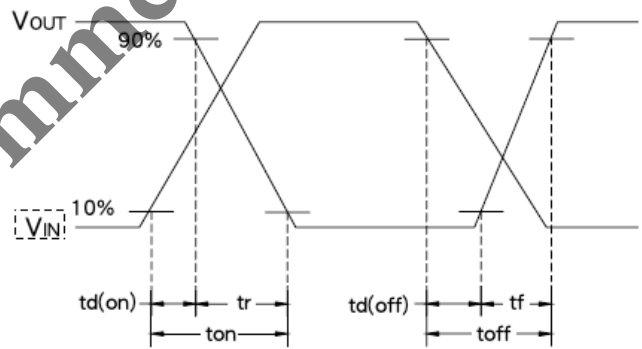
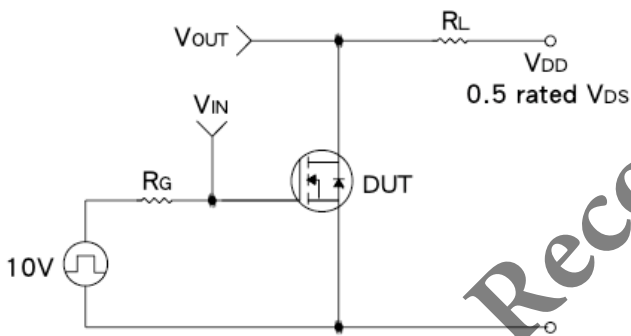
#### Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $L=75mH, I_{AS}=1.6A, V_{DD}=50V, R_G=25\Omega$ , Starting  $T_J=25^\circ C$
3.  $I_{SD} \leq 0.5A, di/dt \leq 300A/\mu S, V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^\circ C$
4. Pulse test: pulse width  $\leq 300\mu S$ , duty cycle  $\leq 2\%$
5. Essentially independent of operating temperature
6. a) Reference point of the is the drain  $R_{\theta_{JL}}$  lead  
b) When mounted on 3"x4.5" FR-4 PCB without any pad copper in a still air environment ( $R_{\theta_{JA}}$  is the sum of the junction-to-case and case-to-ambient thermal resistance.  $R_{\theta_{CA}}$  is determined by the user's board design)

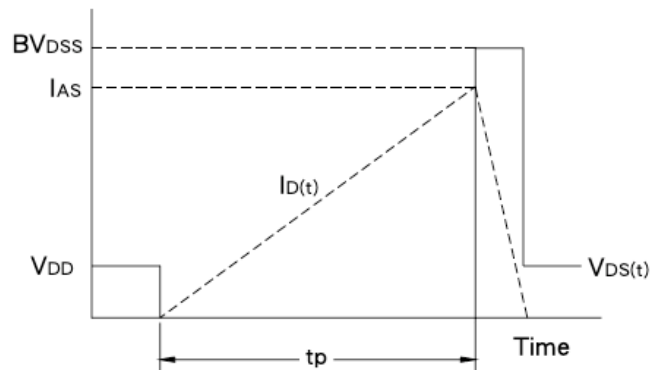
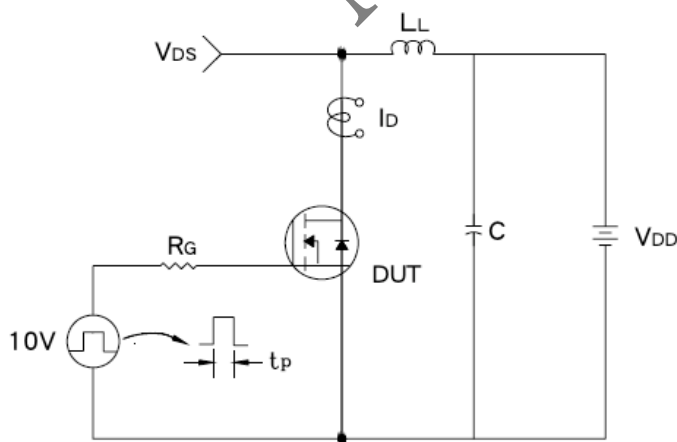
**Gate Charge Test Circuit & Waveform**



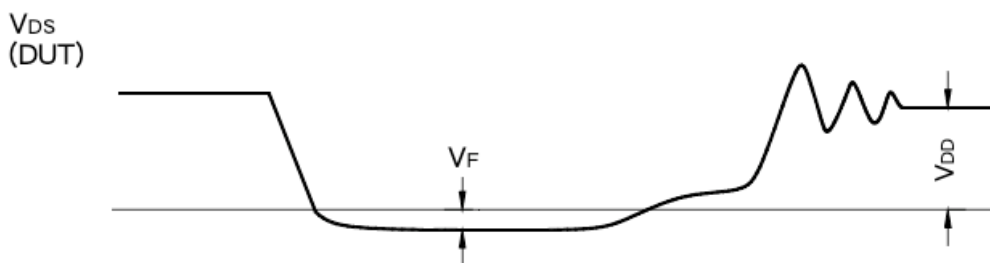
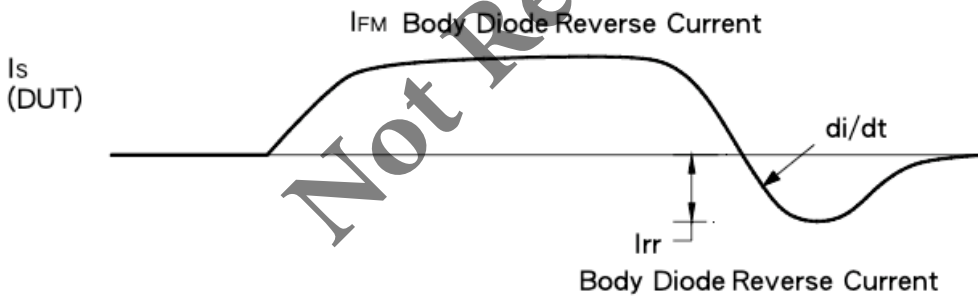
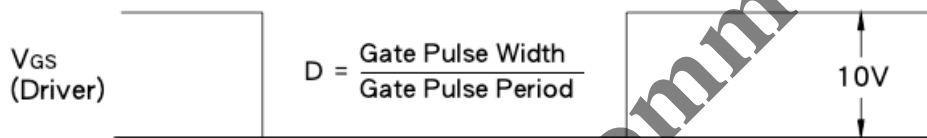
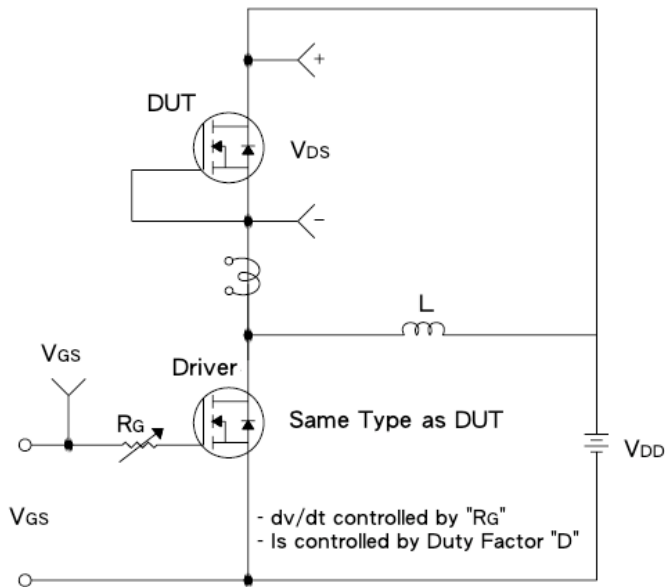
**Resistive Switching Test Circuit & Waveform**



**EAS Test Circuit & Waveform**



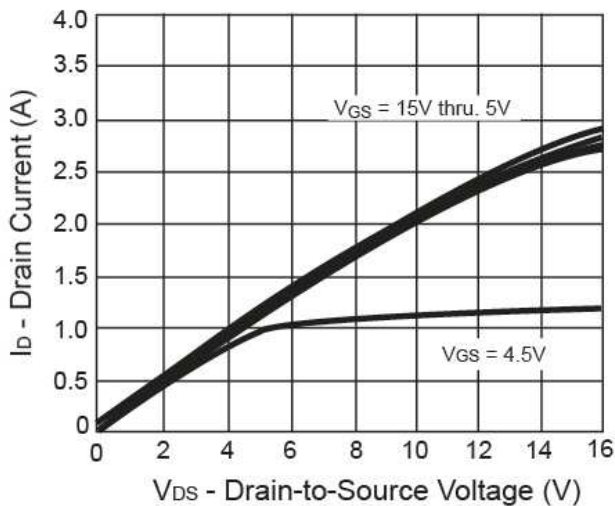
**Diode Reverse Recovery Time Test Circuit & Waveform**



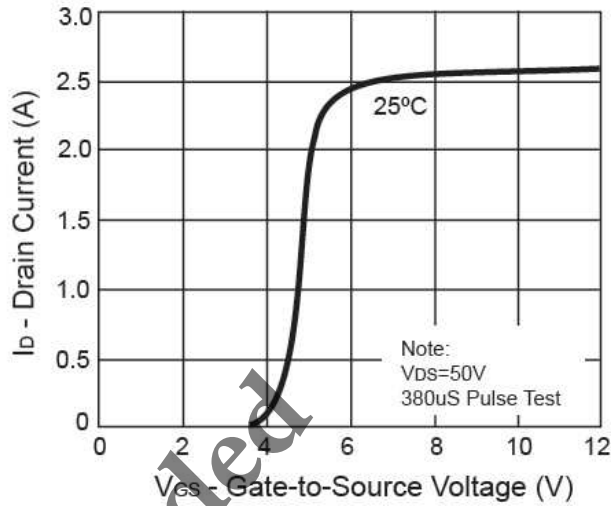
Not Recommended

**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

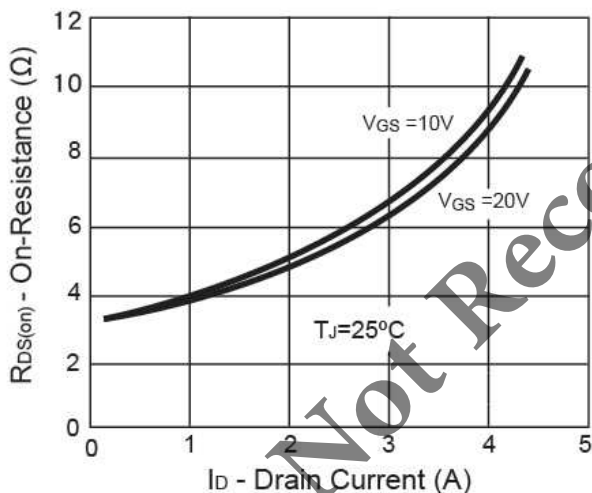
**Output Characteristics**



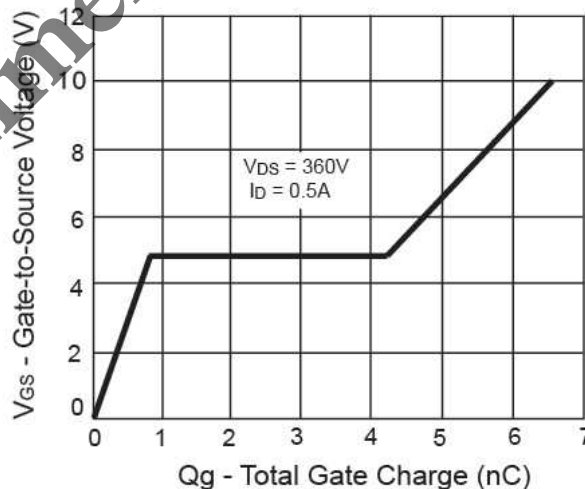
**Transfer Characteristics**



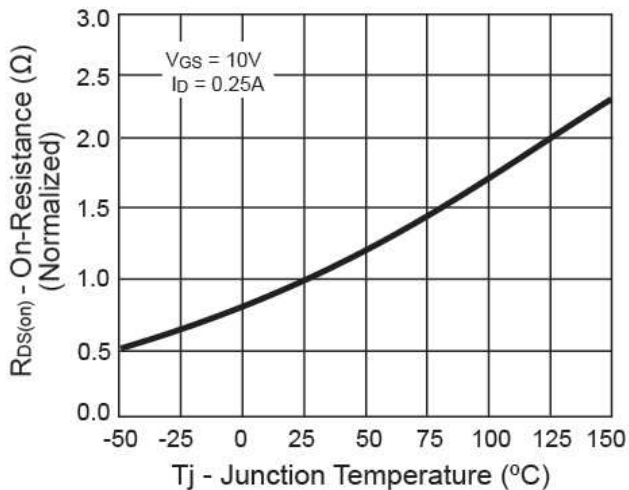
**On-Resistance vs. Drain Current**



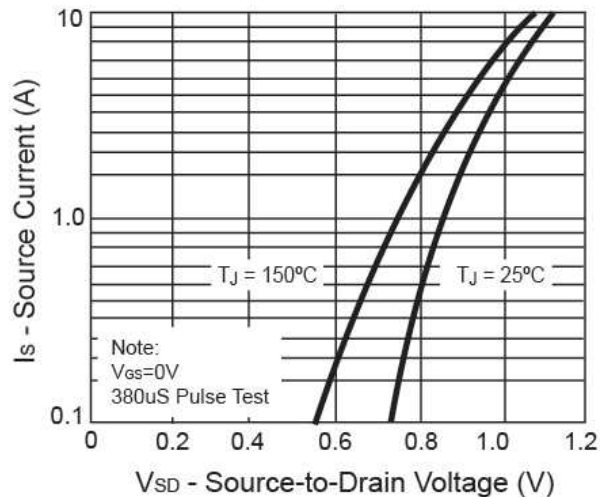
**Gate Charge**



**On-Resistance vs. Junction Temperature**

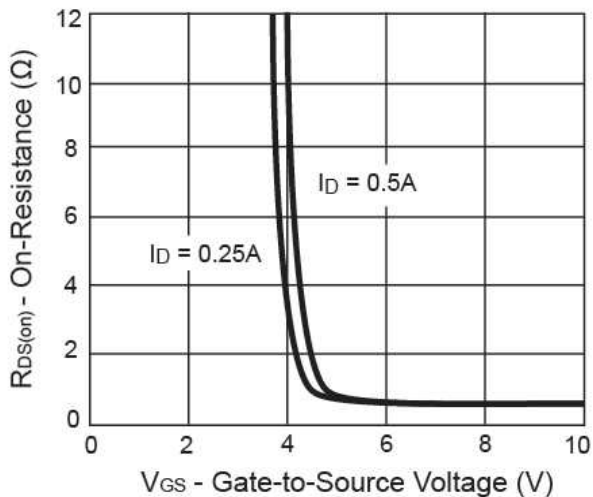


**Source-Drain Diode Forward Voltage**

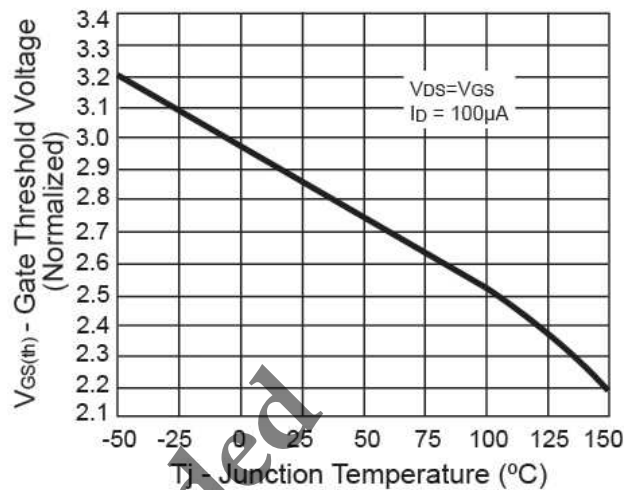


**Electrical Characteristics Curve** (Ta = 25°C, unless otherwise noted)

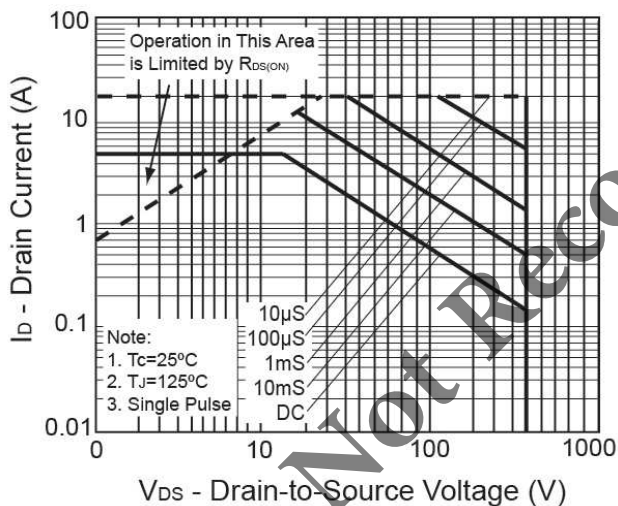
**On-Resistance vs. Gate-Source Voltage**



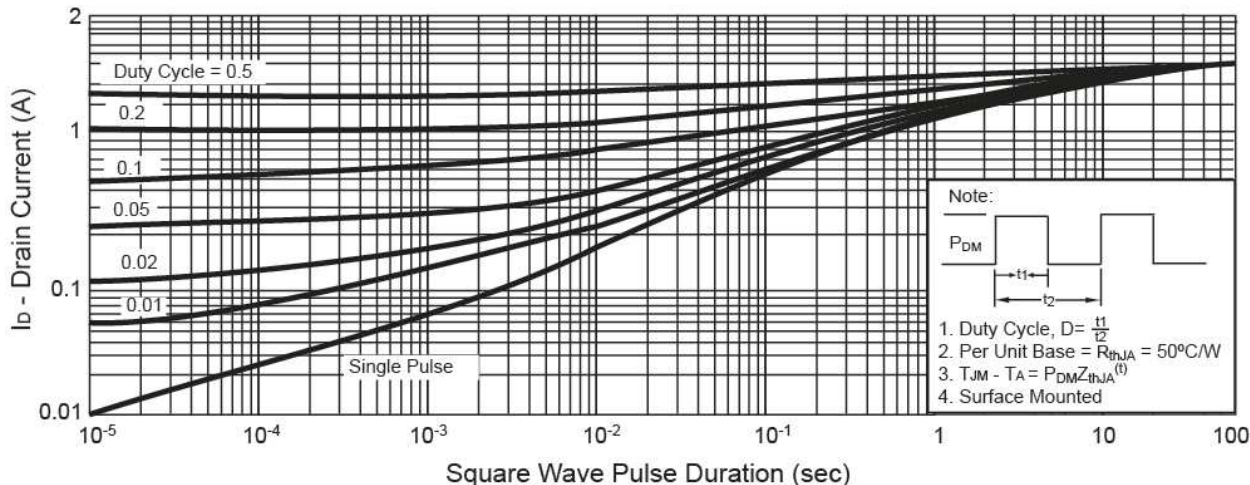
**Threshold Voltage**



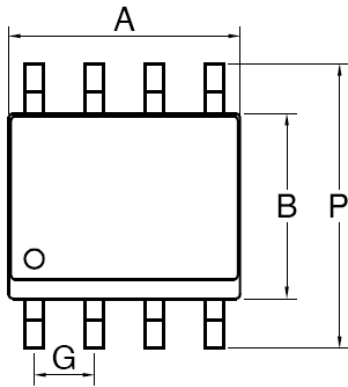
**Maximum Safe Operating Area**



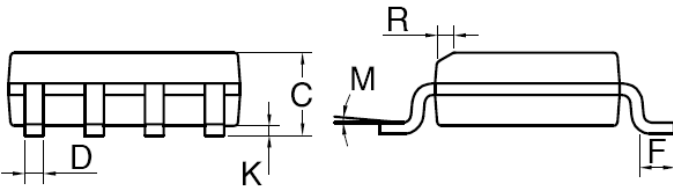
**Normalized Thermal Transient Impedance, Junction-to-Ambient**



**SOP-8 Mechanical Drawing**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX.
A	4.80	5.00	0.189	0.196
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27BSC		0.05BSC	
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019



*Not Recommended*



**Not Recommended**

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