

TSM2N60S

600V N-Channel Power MOSFET

SOT-223



Pin Definition:

1. Gate
2. Drain
3. Source

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
600	5 @ $V_{GS}=10V$	0.6

General Description

The TSM2N60S is used an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. In addition, this advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers a drain- to-source diode with a fast recovery time. Designed for high voltage, high speed switching applications in power supplies, converters and PWM motor controls, these devices are particularly well suited for bridge circuits where diode speed and commutating safe operating areas are critical and offer additional and safety margin against unexpected voltage transients.

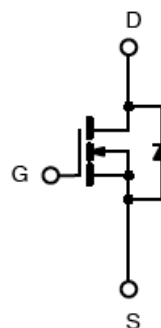
Features

- Robust high voltage termination
- Avalanche energy specified
- Diode is characterized for use in bridge circuits
- Source to Drain diode recovery time comparable to a discrete fast recovery diode.

Ordering Information

Part No.	Package	Packing
TSM2N60SCW RP	SOT-223	2.5Kpcs / 13" Reel

Block Diagram



N-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	600	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current	I_D	0.6	A
Pulsed Drain Current	I_{DM}	1.5	A
Continuous Source Current (Diode Conduction)	I_S	1	A
Drain Source Voltage Slope ($V_{DS} = 480V$, $I_D = 0.8A$, $T_J = 125^\circ\text{C}$)	dv/dt	50	V/ns
Total Maximum Power Dissipation @ $T_a = 25^\circ\text{C}$	P_{TOT}	2.5	W
Operating Junction Temperature	T_J	+150	$^\circ\text{C}$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R_{\theta JC}$	15	$^\circ\text{C/W}$
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	55.8	$^\circ\text{C/W}$

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

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

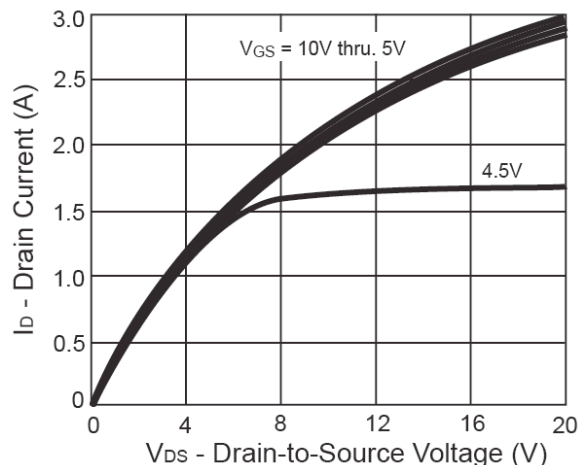
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	BV_{DSS}	600	--	--	V
Drain-Source On-State Resistance	$V_{GS}=10V, I_D=0.6A$	$R_{DS(ON)}$	--	3.6	5	Ω
Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	$V_{GS(TH)}$	2	--	4	V
Zero Gate Voltage Drain Current	$V_{DS}=600V, V_{GS}=0V$	I_{DSS}	--	--	1	μA
Gate Body Leakage	$V_{GS}=\pm 30V, V_{DS}=0V$	I_{GSS}	--	--	± 100	nA
Forward Transconductance	$V_{DS}=10V, I_D=0.2A$	g_{fs}	--	0.8	--	S
Diode Forward Voltage	$I_S=0.6A, V_{GS}=0V$	V_{SD}	--	0.85	1.15	V
Dynamic ^b						
Total Gate Charge	$V_{DS}=400V, I_D=0.6A,$ $V_{GS}=10V$	Q_g	--	13	--	nC
Gate-Source Charge		Q_{gs}	--	2	--	
Gate-Drain Charge		Q_{gd}	--	6	--	
Input Capacitance	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0MHz$	C_{iss}	--	435	--	pF
Output Capacitance		C_{oss}	--	56	--	
Reverse Transfer Capacitance		C_{rss}	--	9.2	--	
Switching ^c						
Turn-On Delay Time	$V_{GS}=10V, I_D=0.6A,$ $V_{DD}=300V, R_G=18\Omega$	$t_{d(on)}$	--	12	--	nS
Turn-On Rise Time		t_r	--	21	--	
Turn-Off Delay Time		$t_{d(off)}$	--	30	--	
Turn-Off Fall Time		t_f	--	24	--	

Notes:

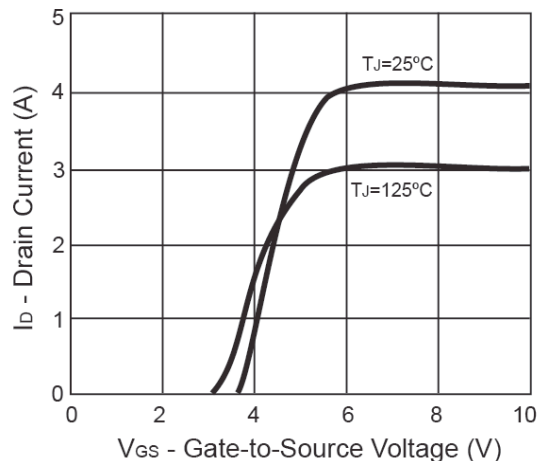
- Pulse test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- For design reference only, not subject to production testing.
- Switching time is essentially independent of operating temperature.

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

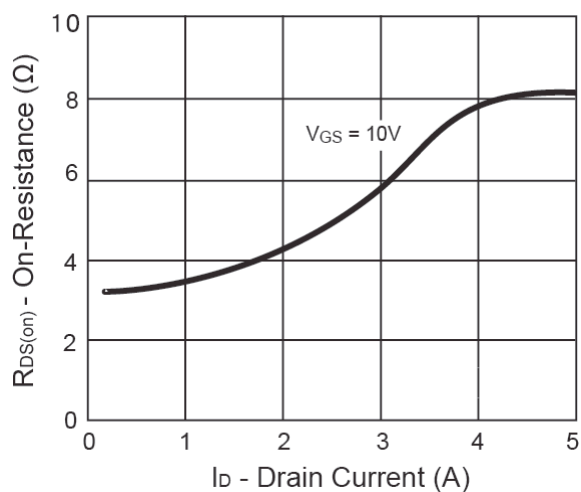
Output Characteristics



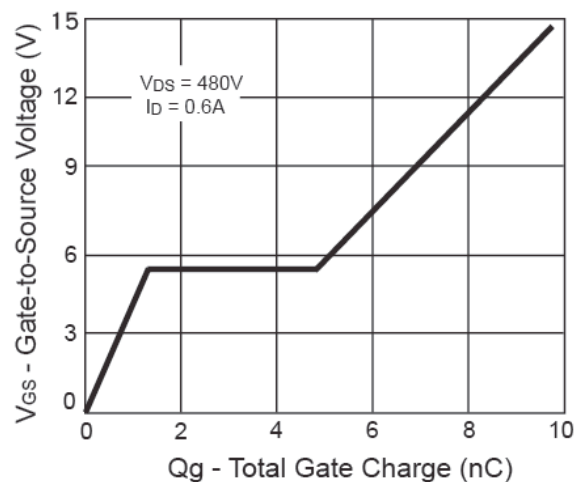
Transfer Characteristics



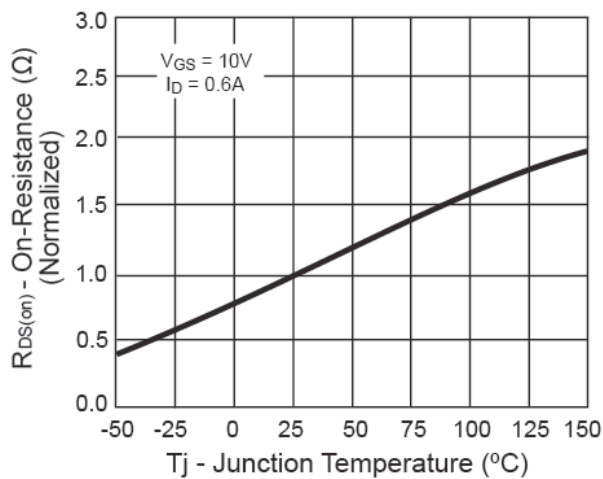
On-Resistance vs. Drain Current



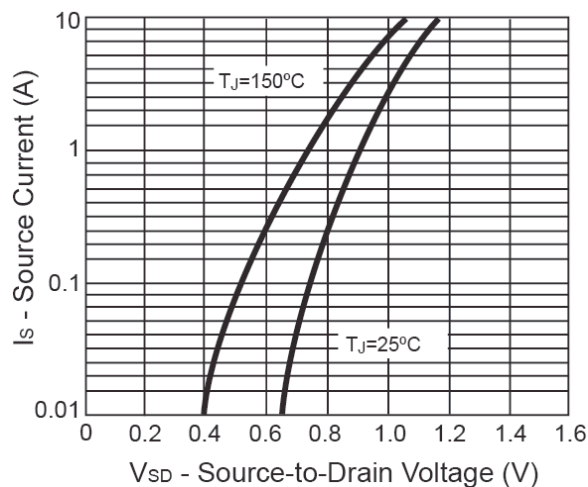
Gate Charge



On-Resistance vs. Junction Temperature

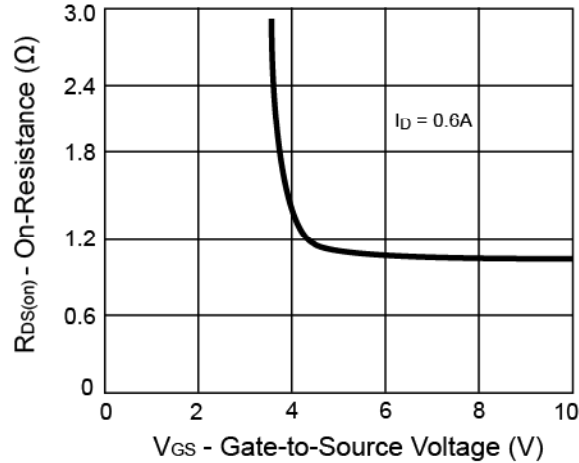


Source-Drain Diode Forward Voltage

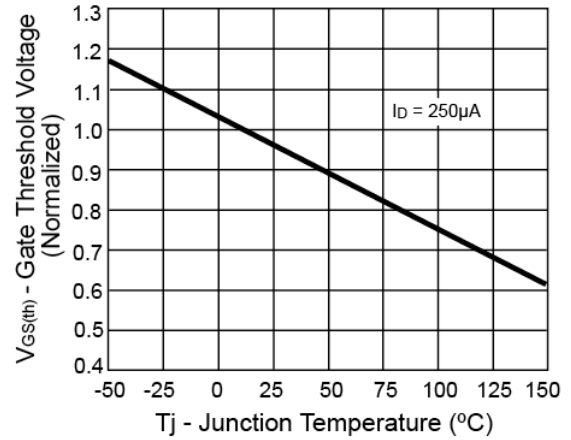


Electrical Characteristics Curve ($T_a = 25^\circ\text{C}$, unless otherwise noted)

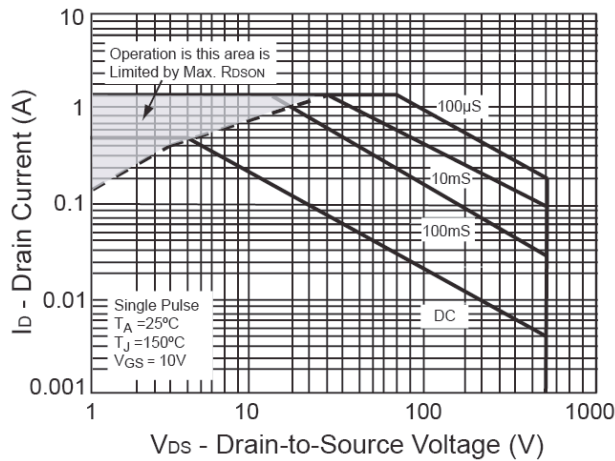
On-Resistance vs. Gate-Source Voltage



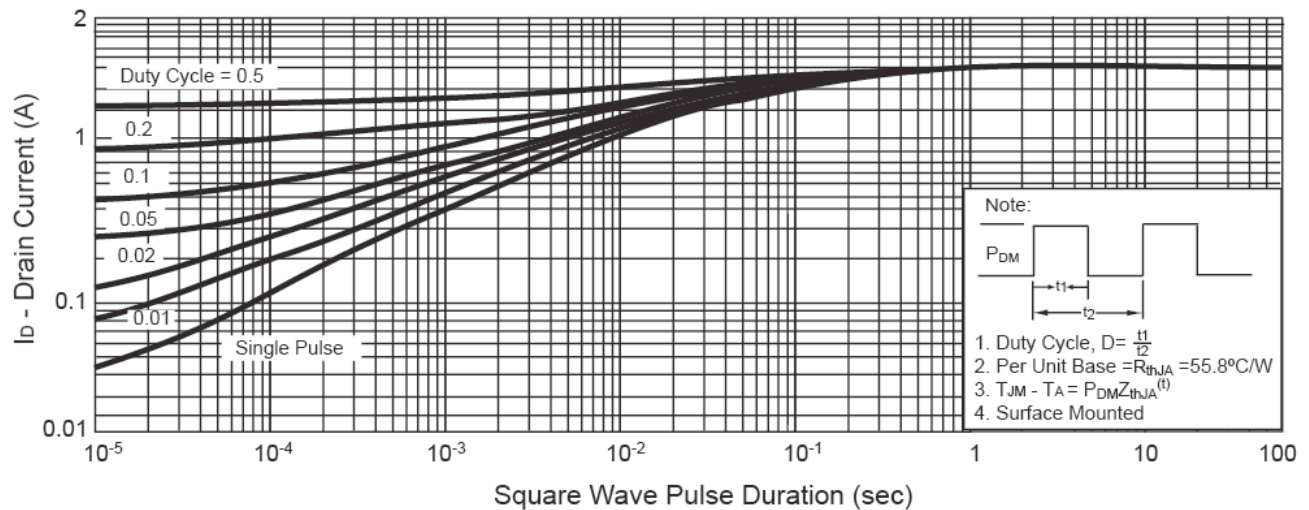
Threshold Voltage



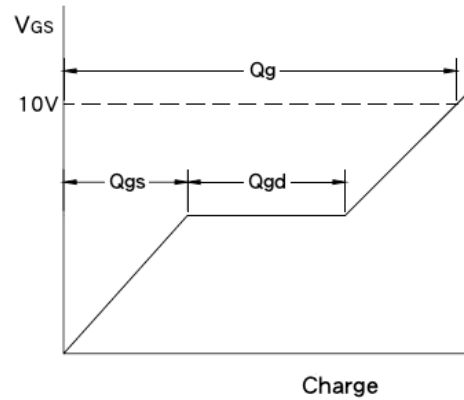
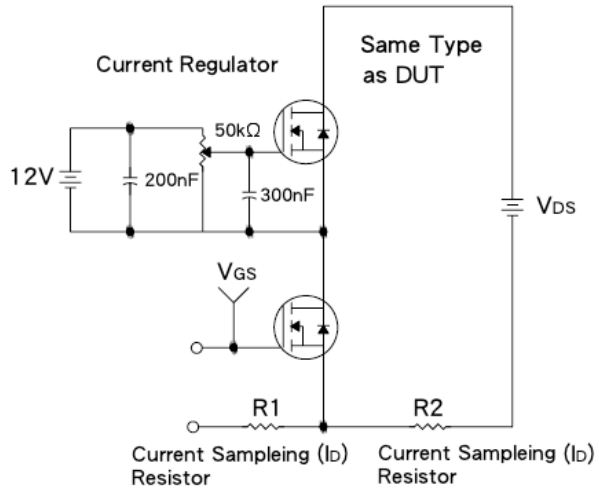
Maximum Safe Operating Area



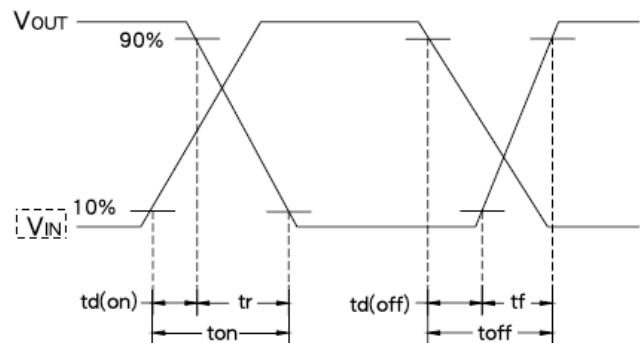
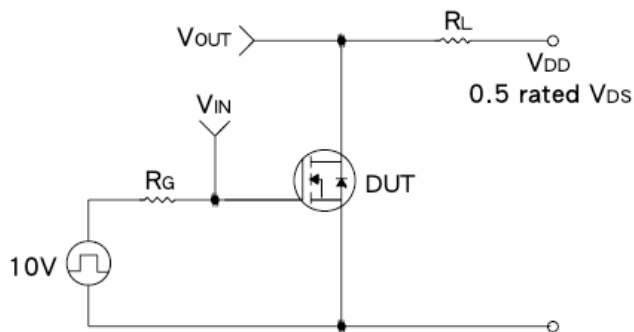
Normalized Thermal Transient Impedance, Junction-to-Ambient



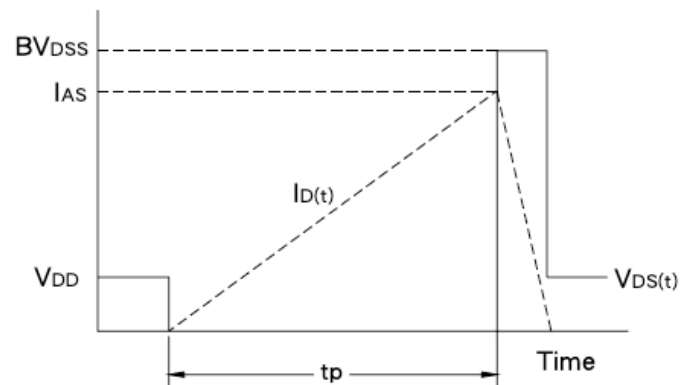
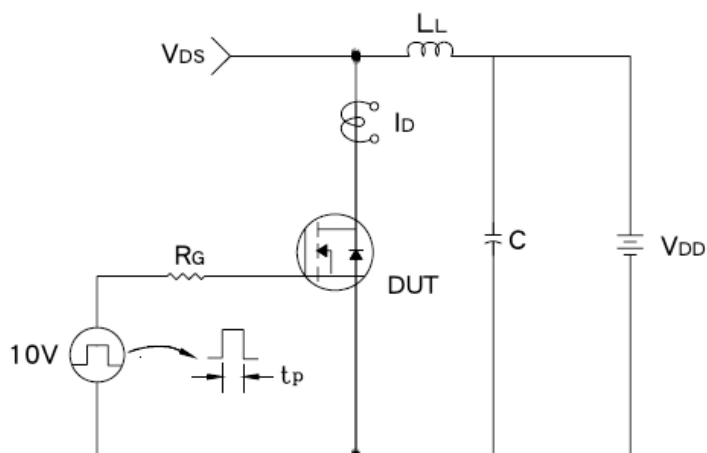
Gate Charge Test Circuit & Waveform



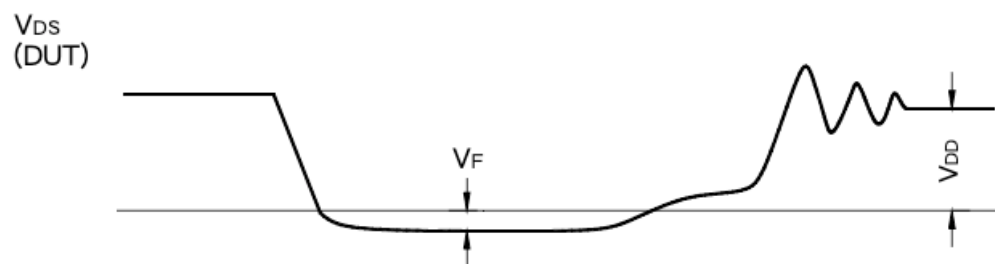
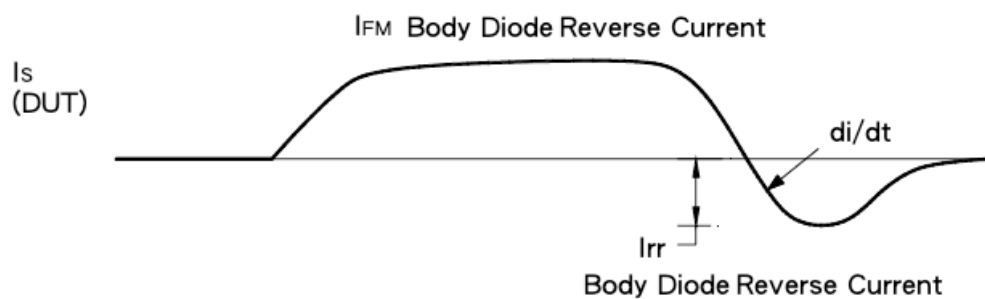
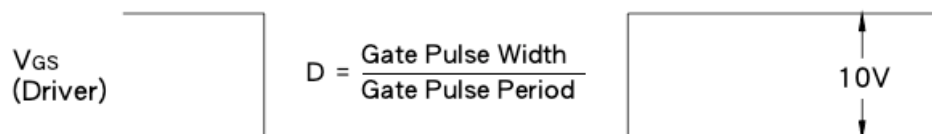
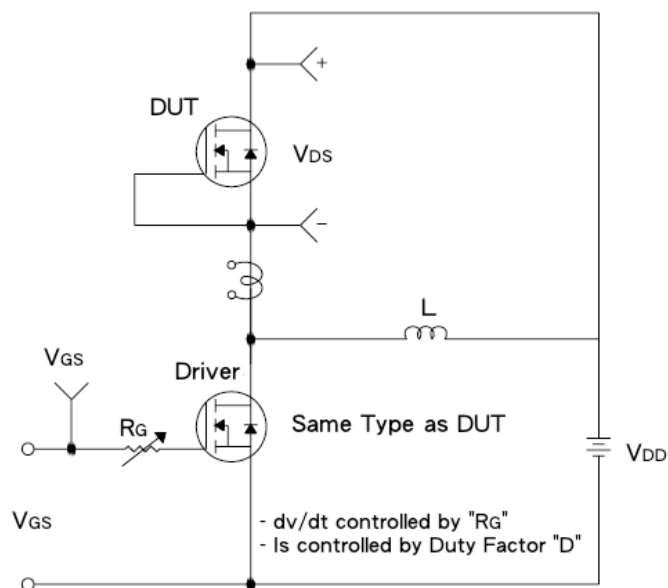
Resistive Switching Test Circuit & Waveform



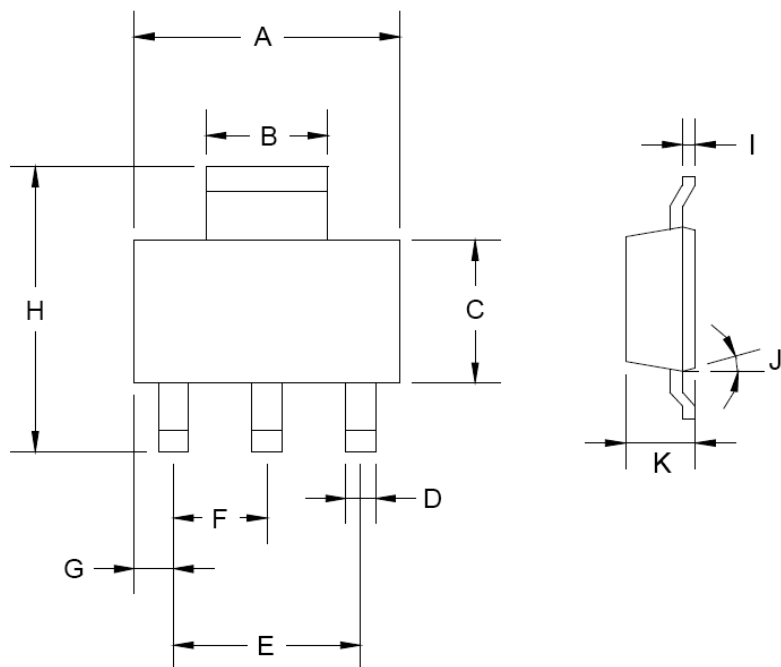
E_{AS} Test Circuit & Waveform



Diode Reverse Recovery Time Test Circuit & Waveform

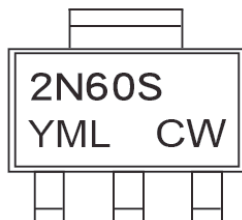


SOT-223 Mechanical Drawing



DIM	SOT-223 DIMENSION			
	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	6.350	6.850	0.250	0.270
B	2.900	3.100	0.114	0.122
C	3.450	3.750	0.136	0.148
D	0.595	0.635	0.023	0.025
E	4.550	4.650	0.179	0.183
F	2.250	2.350	0.088	0.093
G	0.835	1.035	0.032	0.041
H	6.700	7.300	0.263	0.287
I	0.250	0.355	0.010	0.014
J	10°	16°	10°	16°
K	1.550	1.800	0.061	0.071

Marking Diagram



- Y** = Year Code
M = Month Code
 (A=Jan, B=Feb, C=Mar, D=Apr, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
L = Lot Code

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