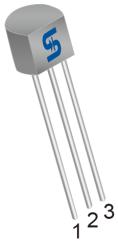
TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

TSM1N80

800V N-Channel MOSFET

TO-92



SOT-223

Pin Definition:
1. Gate
2. Drain
3. Source

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$(Ω)	I_D (A)
800	21.6 @ V_{GS} =10V	0.15

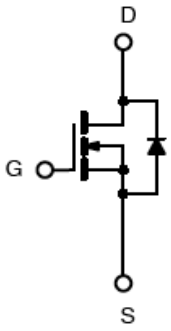
General Description

The TSM1N80 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

- $R_{DS(ON)}$=18Ω(Typ.) @ V_{GS}=10V, I_D=0.15A
- Low gate charge @ 5nC (Typ.)
- Low Crss @ 2.7pF (Typ.)
- Fast switching

Block Diagram



N-Channel MOSFET

Ordering Information

Part No.	Package	Packing
TSM1N80SCT B0	TO-92	1Kpcs / Bulk
TSM1N80SCT A3	TO-92	2Kpcs / Ammo
TSM1N80CW RP	SOT-223	2.5kpcs / 13” Reel

Absolute Maximum Rating (Ta = 25°C unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	800	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current		I_D	0.3	A
Pulsed Drain Current (Note 1)		I_{DM}	1	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	90	mJ
Avalanche Current, Repetitive or Not-Repetitive (Note 1)		I_{AR}	1	A
Total Power Dissipation @T_C = 25°C	TO-92	P_{DTOT}	3	W
	SOT-223		2.1	
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C
Lead Temperature (1/8” from case)		T_L	10	S

Thermal Performance

Parameter		Symbol	Limit	Unit
Thermal Resistance - Junction to Ambient	TO-92	$R\Theta_{JA}$	130	°C/W
	SOT-223		60	

Notes: Surface mounted on FR4 board t ≤ 10sec

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

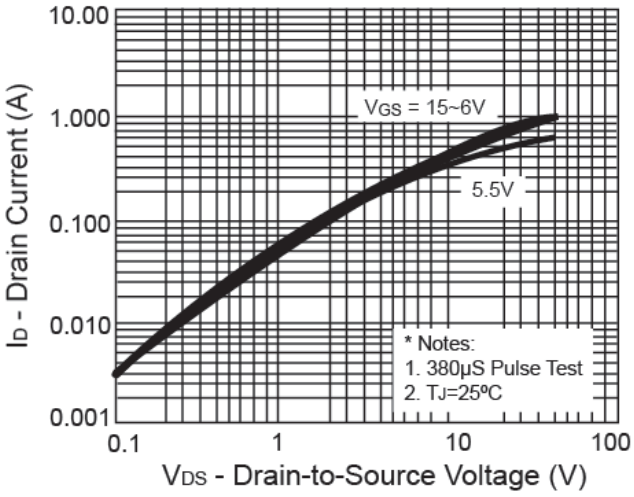
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 1mA	BV_{DSS}	800	--	--	V
Drain-Source On-State Resistance	V_{GS} = 10V, I_D = 0.15A	$R_{DS(ON)}$	--	18	21.6	Ω
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250uA	$V_{GS(TH)}$	3	--	5	V
Zero Gate Voltage Drain Current	V_{DS} = 800V, V_{GS} = 0V	I_{DSS}	--	--	25	uA
Gate Body Leakage	V_{GS} = ±30V, V_{DS} = 0V	I_{GSS}	--	--	±10	uA
Forward Transconductance	V_{DS} =40V, I_D = 0.1A	g_{fs}	--	0.36	--	S
Diode Forward Voltage	I_S = 0.2A, V_{GS} = 0V	V_{SD}	--	--	1.4	V
Dynamic [b]						
Total Gate Charge	V_{DS} = 640V, I_D = 0.3A, V_{GS} = 10V	Q_g	--	5	6	nC
Gate-Source Charge		Q_{gs}	--	1	--	
Gate-Drain Charge		Q_{gd}	--	2	--	
Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	155	200	pF
Output Capacitance		C_{oss}	--	20	26	
Reverse Transfer Capacitance		C_{rss}	--	2.7	4	
Switching [c]						
Turn-On Delay Time	V_{GS} = 10V, I_D = 0.3A, V_{DS} = 400V, R_G = 25Ω	$t_{d(on)}$	--	10	30	nS
Turn-On Rise Time		t_r	--	20	50	
Turn-Off Delay Time		$t_{d(off)}$	--	16	45	
Turn-Off Fall Time		t_f	--	25	60	

Note 1: Pulse test: pulse width <=300uS, duty cycle <=2%
Note 2: (V_{DD} = 50V, I_{AS}=0.8A, L=170mH, R_G=25Ω)
Note 3: For design reference only, not subject to production testing.
Note 4: Switching time is essentially independent of operating temperature.

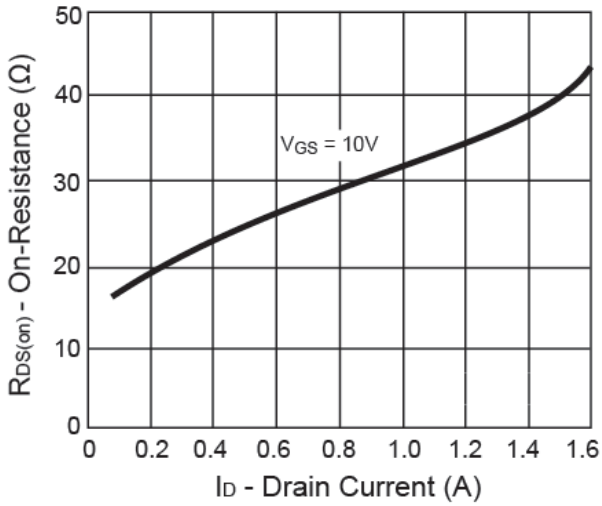
TSM1N80
800V N-Channel MOSFET

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

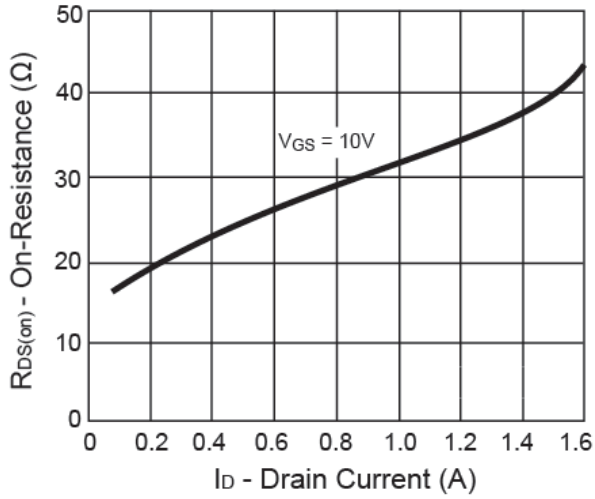
Output Characteristics



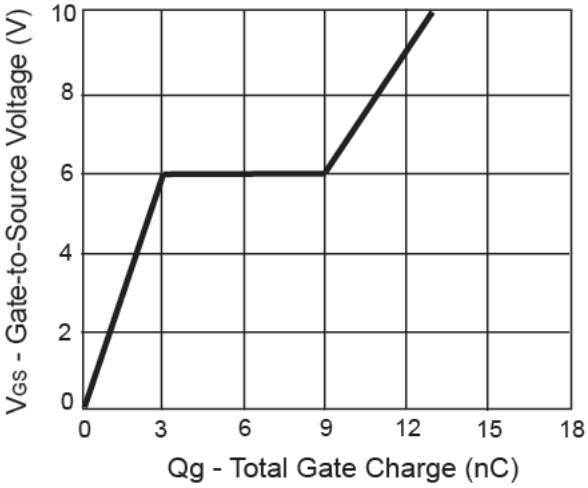
Transfer Characteristics



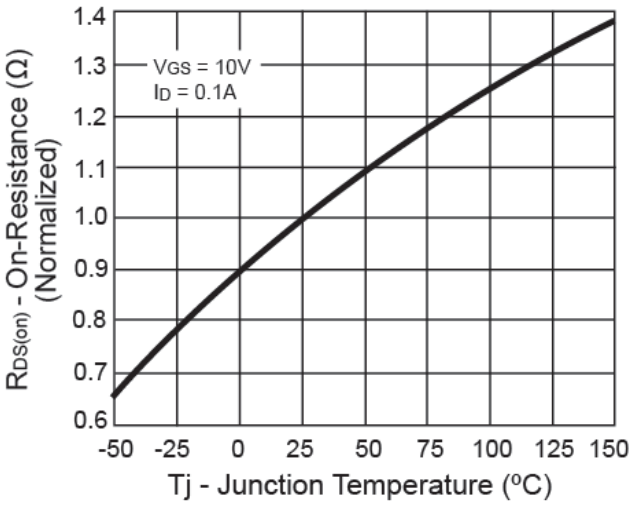
On-Resistance vs. Drain Current



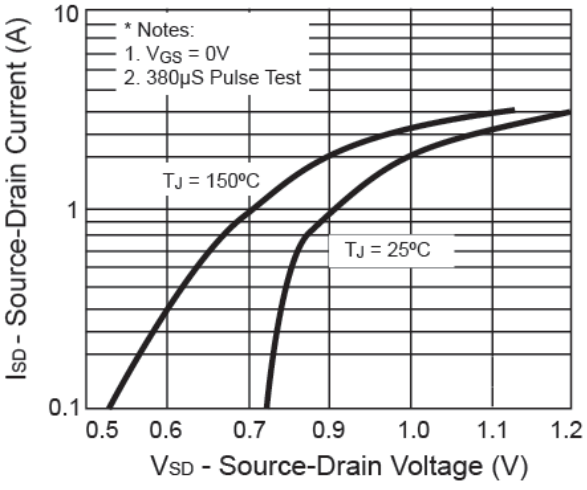
Gate Charge



On-Resistance vs. Junction Temperature

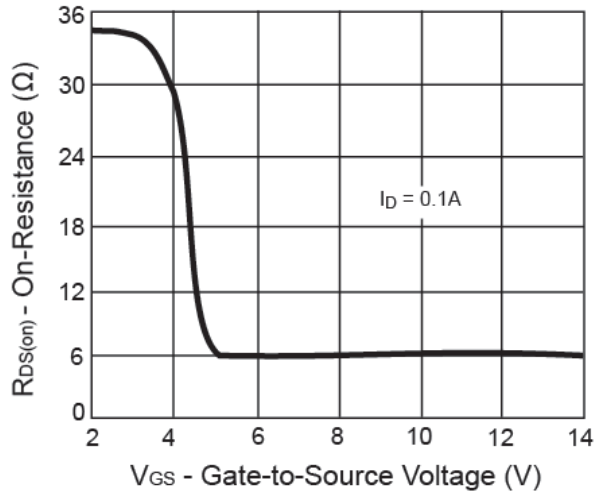


Source-Drain Diode Forward Voltage

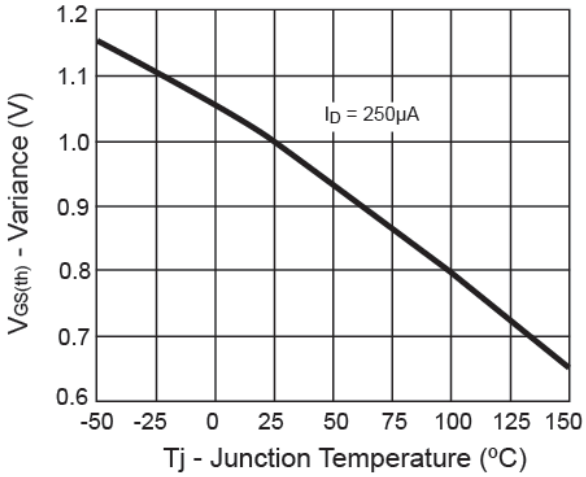


Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

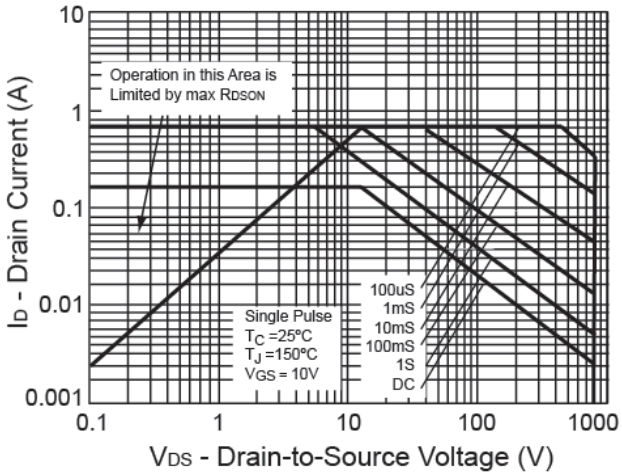
On-Resistance vs. Gate-Source Voltage



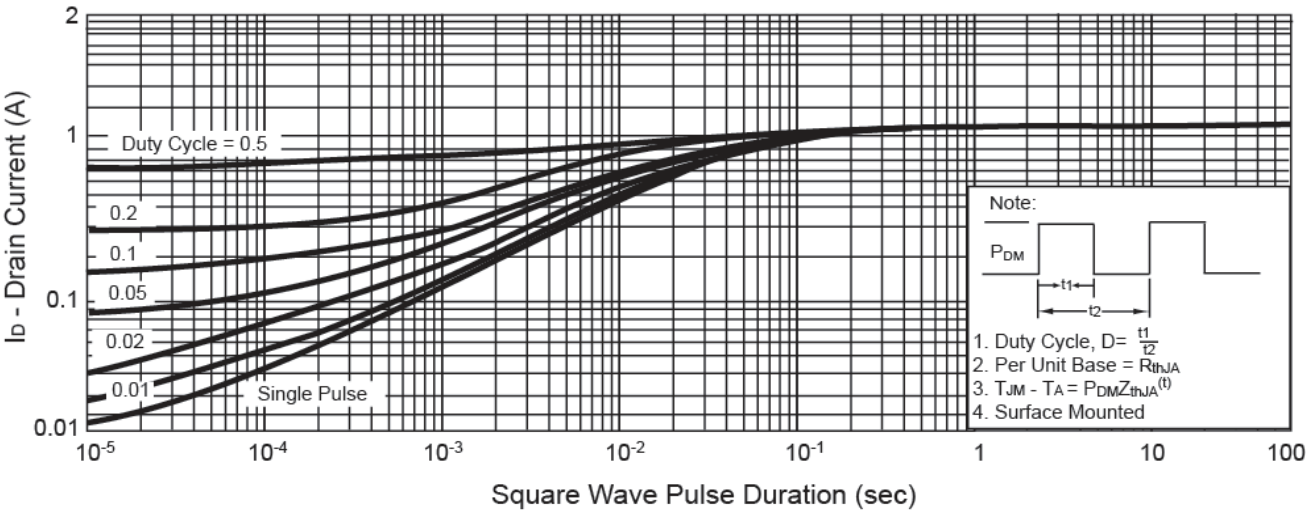
Threshold Voltage



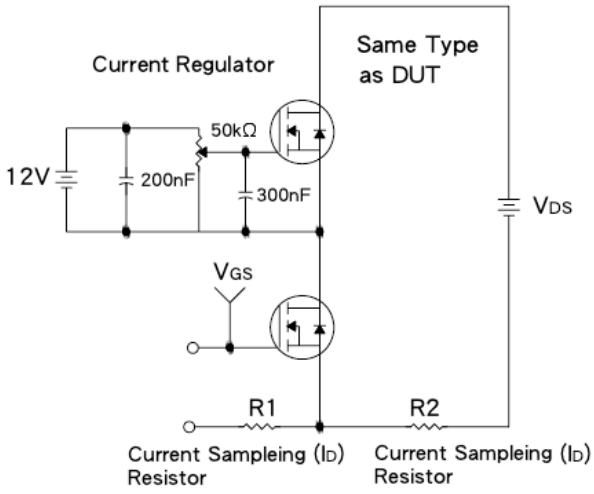
Maximum Safe Operating Area

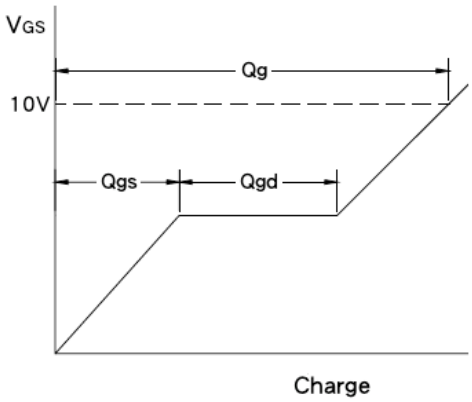


Normalized Thermal Transient Impedance, Junction-to-Ambient

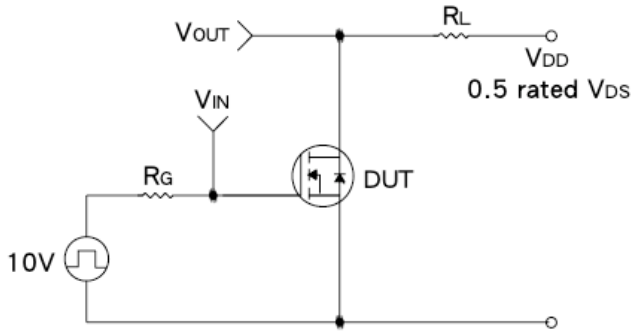


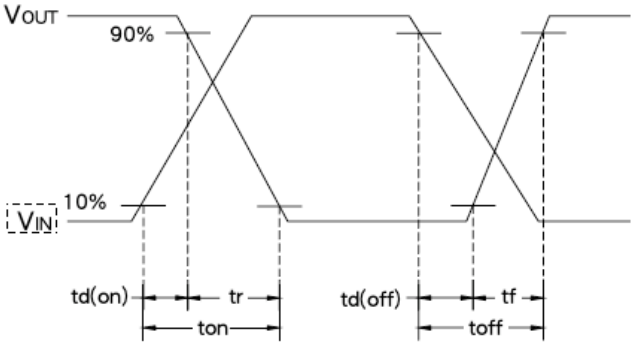
Gate Charge Test Circuit & Waveform



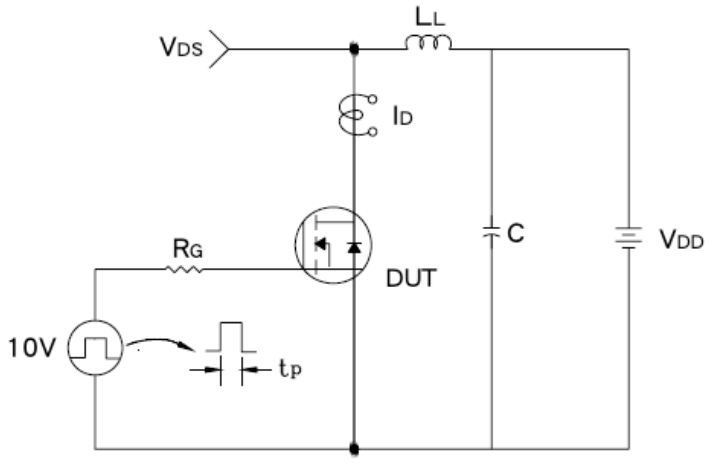


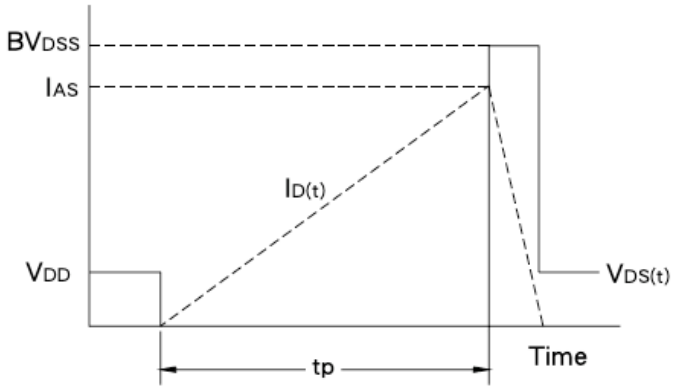
Resistive Switching Test Circuit & Waveform



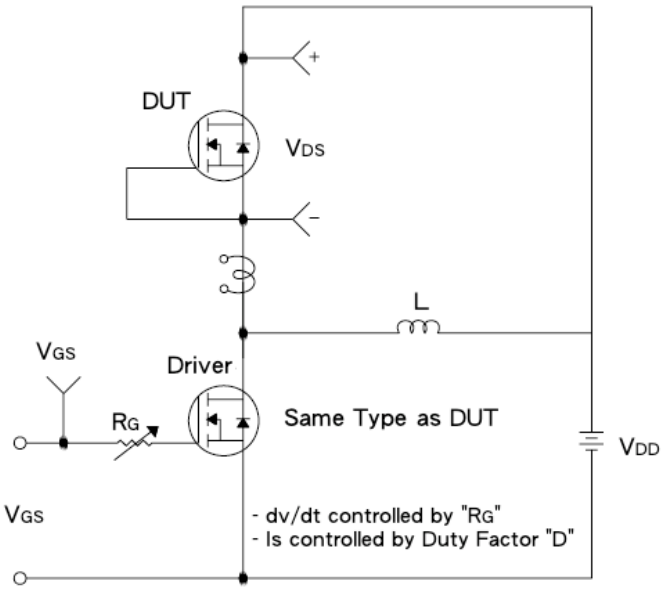


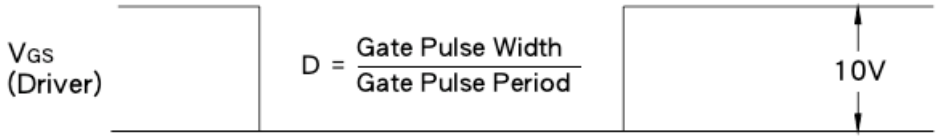
E_{AS} Test Circuit & Waveform

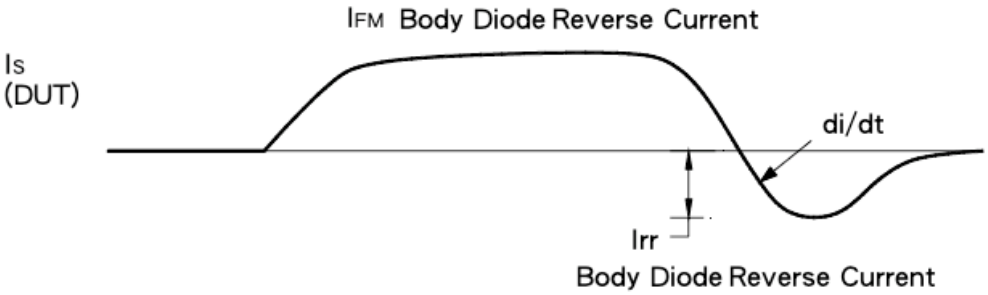


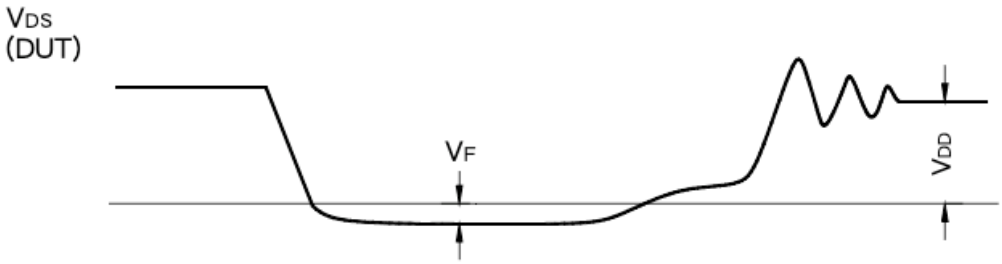


Diode Reverse Recovery Time Test Circuit & Waveform

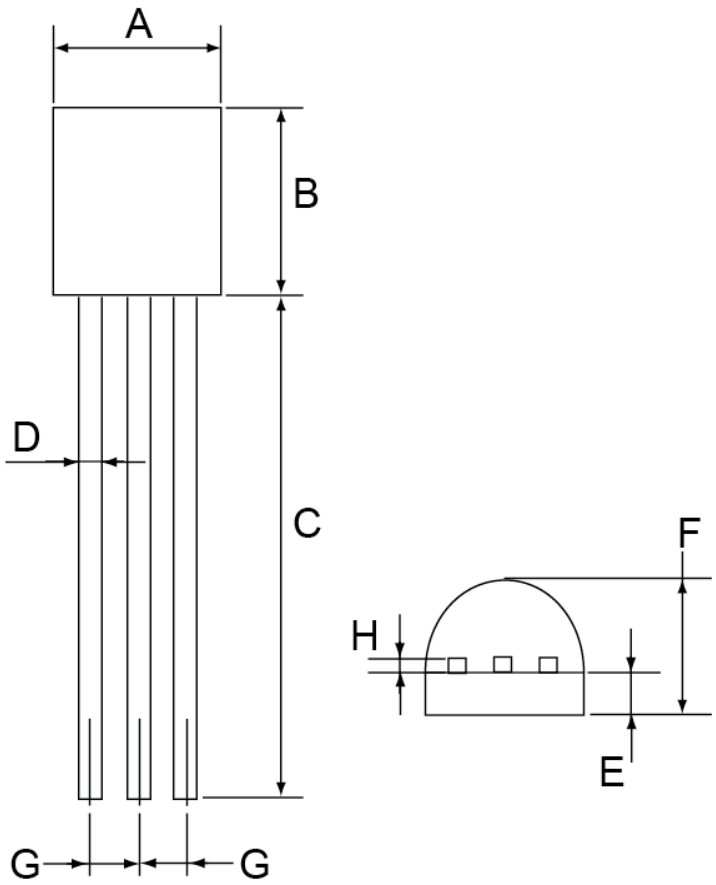






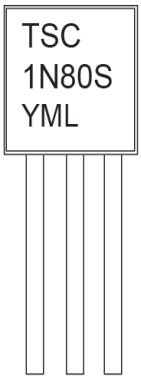


TO-92 Mechanical Drawing



TO-92 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.70	0.169	0.185
B	4.30	4.70	0.169	0.185
C	13.53 (typ)		0.532 (typ)	
D	0.39	0.49	0.015	0.019
E	1.18	1.28	0.046	0.050
F	3.30	3.70	0.130	0.146
G	1.27	1.31	0.050	0.051
H	0.33	0.43	0.013	0.017

Marking Diagram



Y = Year Code
M = Month Code
(**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apl, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug, **I**=Sep, **J**=Oct, **K**=Nov, **L**=Dec)
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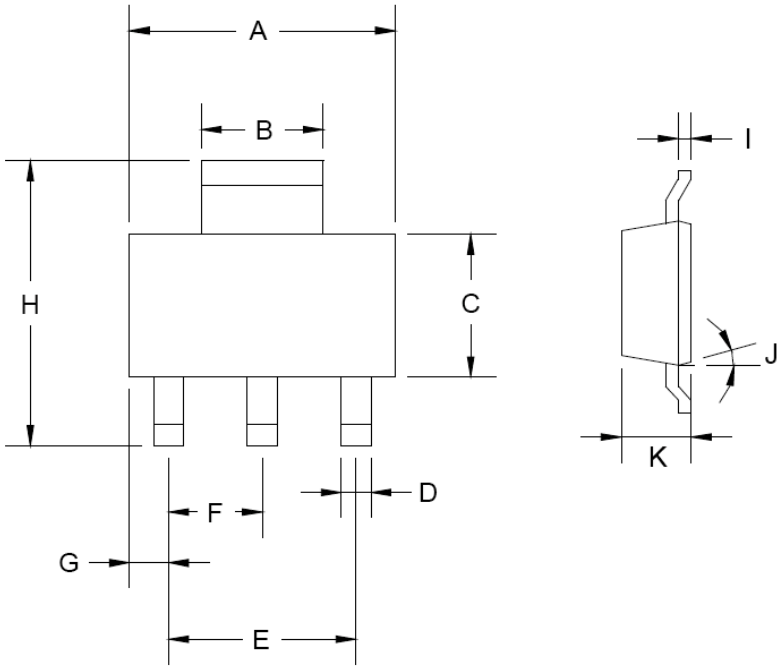
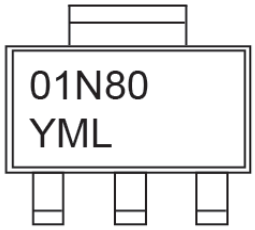
SOT-223 Mechanical Drawing



SOT-223 DIMENSION				
DIM	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



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