

TO-92



Pin Definition:

1. Gate
2. Drain
3. Source

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
600	10 @ $V_{GS}=10V$	0.25

General Description

The TSM1NB60S N-Channel Power MOSFET is produced by new advance planar process. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

Features

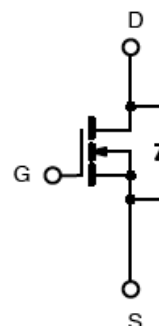
- Low $R_{DS(ON)}$ 8 Ω (Typ.)
- Low gate charge typical @ 6.1nC (Typ.)
- Low C_{rss} typical @ 4.2pF (Typ.)

Ordering Information

Part No.	Package	Packing
TSM1NB60SCT B0	TO-92	1Kpcs / Bulk
TSM1NB60SCT B0G	TO-92	1Kpcs / Bulk
TSM1NB60SCT A3	TO-92	2Kpcs / Ammo
TSM1NB60SCT A3G	TO-92	2Kpcs / Ammo

Note: "G" denotes for Halogen Free

Block Diagram



N-Channel MOSFET

Absolute Maximum Rating ($T_A=25^{\circ}C$ 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	$T_C=25^{\circ}C$	0.5
		$T_C=100^{\circ}C$	0.25
Pulsed Drain Current *	I_{DM}	2	A
Single Pulse Avalanche Energy (Note 2)	E_{AS}	5	mJ
Peak Diode Recovery dv/dt (Note 3)	dv/dt	4.5	V/ns
Total Power Dissipation @ $T_C = 25^{\circ}C$	P_{TOT}	2.5	W
Operating Junction Temperature	T_J	150	$^{\circ}C$
Storage Temperature Range	T_{STG}	-55 to +150	$^{\circ}C$

Note: Limited by maximum junction temperature

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Lead	$R_{\theta_{JL}}$	50	$^{\circ}C/W$
Thermal Resistance - Junction to Ambient	$R_{\theta_{JA}}$	110	$^{\circ}C/W$

Electrical Specifications ($T_a = 25^\circ\text{C}$ 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	$V_{GS} = 10V, I_D = 0.25A$	$R_{DS(ON)}$	--	8	10	Ω
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	2.5	3.5	4.5	V
Zero Gate Voltage Drain Current	$V_{DS} = 600V, V_{GS} = 0V$	I_{DSS}	--	--	10	μA
Gate Body Leakage	$V_{GS} = \pm 30V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Forward Transfer Conductance	$V_{DS} = 10V, I_D = 0.5A$	g_{fs}	--	0.8	--	S
Dynamic						
Total Gate Charge	$V_{DS} = 480V, I_D = 0.5A,$ $V_{GS} = 10V$ (Note 4,5)	Q_g	--	6.1	--	nC
Gate-Source Charge		Q_{gs}	--	1.4	--	
Gate-Drain Charge		Q_{gd}	--	3.3	--	
Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0MHz$	C_{iss}	--	138	--	pF
Output Capacitance		C_{oss}	--	17.1	--	
Reverse Transfer Capacitance		C_{rss}	--	4.2	--	
Switching						
Turn-On Delay Time	$V_{GS} = 10V, I_D = 0.5A,$ $V_{DD} = 300V, R_G = 25\Omega$ (Note 4,5)	$t_{d(on)}$	--	7.7	--	nS
Turn-On Rise Time		t_r	--	6.8	--	
Turn-Off Delay Time		$t_{d(off)}$	--	15.3	--	
Turn-Off Fall Time		t_f	--	14.9	--	
Source-Drain Diode Ratings and Characteristic						
Source Current	Integral reverse diode in the MOSFET	I_S	--	--	0.5	A
Source Current (Pulse)		I_{SM}	--	--	2	A
Diode Forward Voltage	$I_S = 0.5A, V_{GS} = 0V$	V_{SD}	--	0.9	1.4	V

Note 1: Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

Note 2: $V_{DD} = 50V, I_{AS} = 0.5A, L = 10mH, R_G = 25\Omega, \text{Starting } T_J = 25^\circ\text{C}$

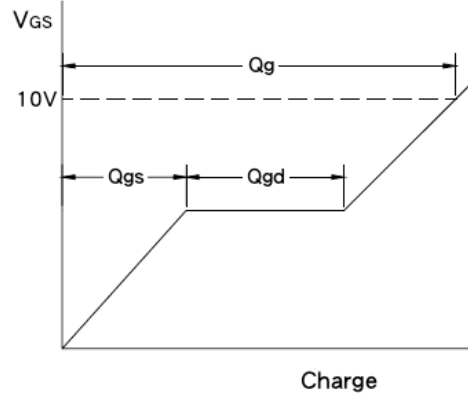
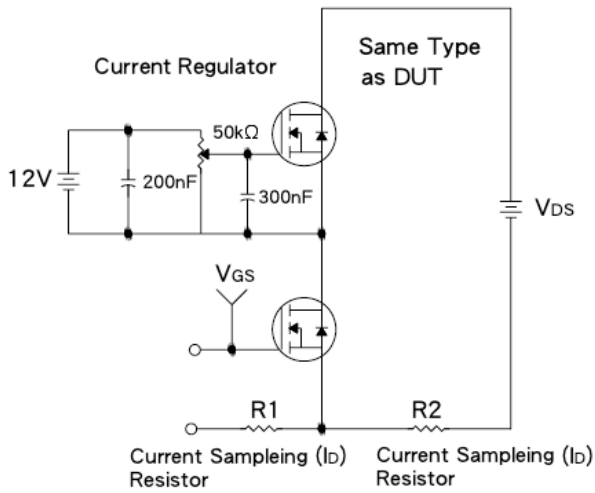
Note 3: $I_{SD} \leq 0.5A, di/dt \leq 200A/\mu S, V_{DD} \leq BV_{DSS}, \text{Starting } T_J = 25^\circ\text{C}$

Note 4: Pulse test: pulse width $\leq 300\mu S$, duty cycle $\leq 2\%$

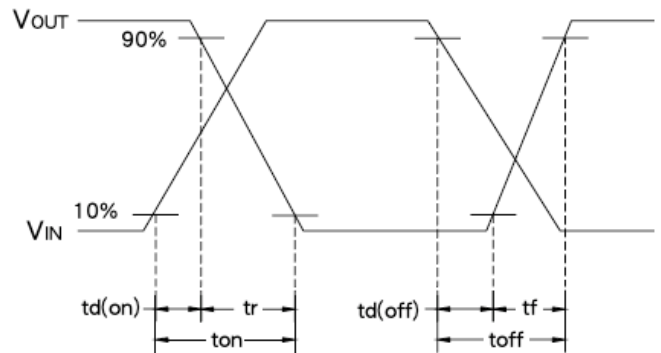
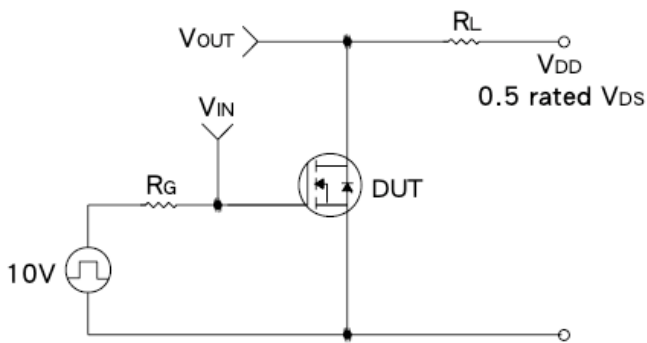
Note 5: Essentially Independent of Operating Temperature



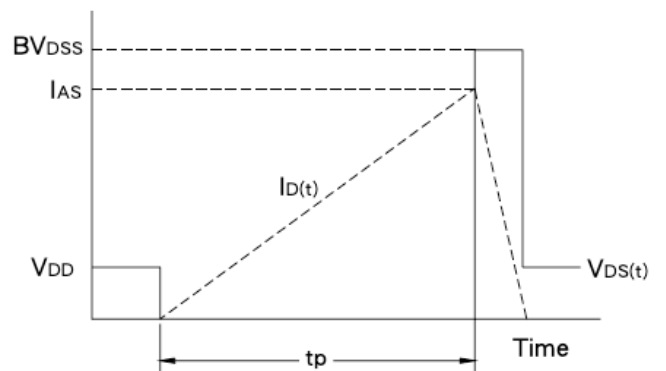
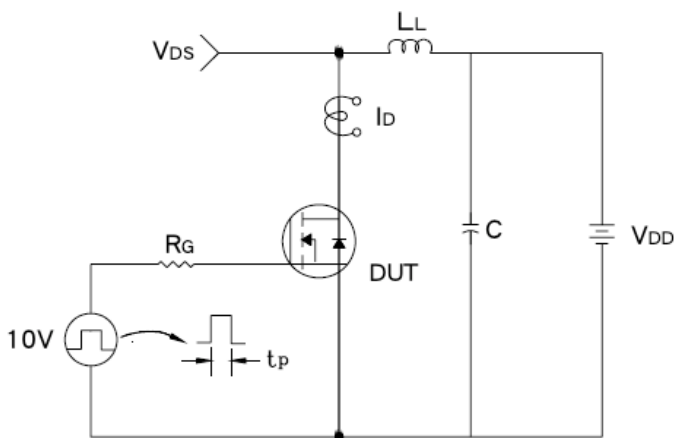
Gate Charge Test Circuit & Waveform



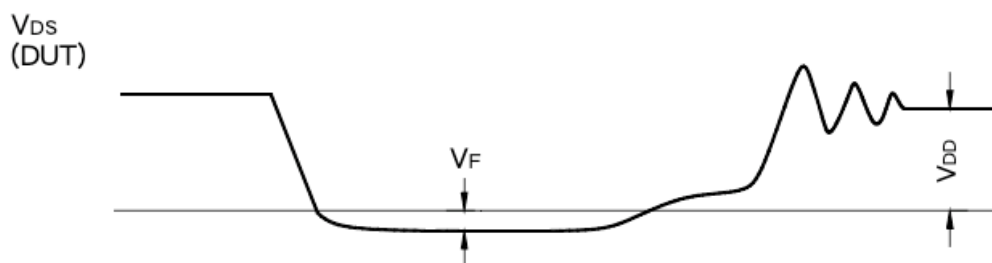
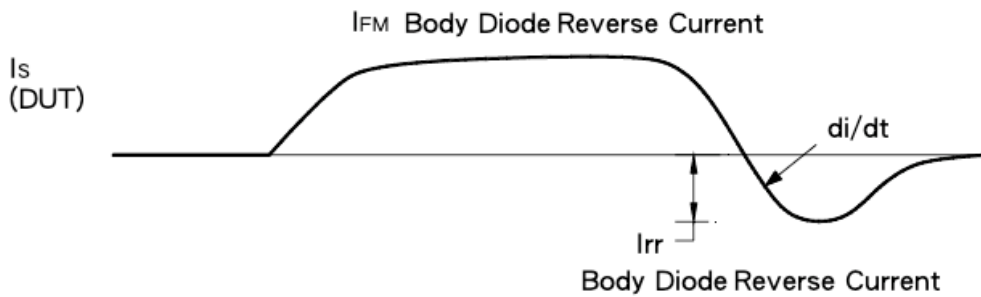
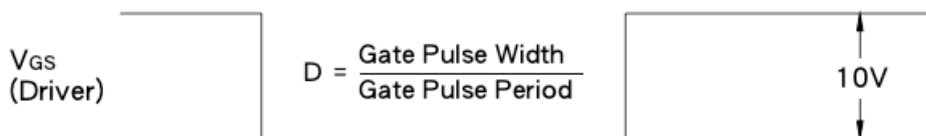
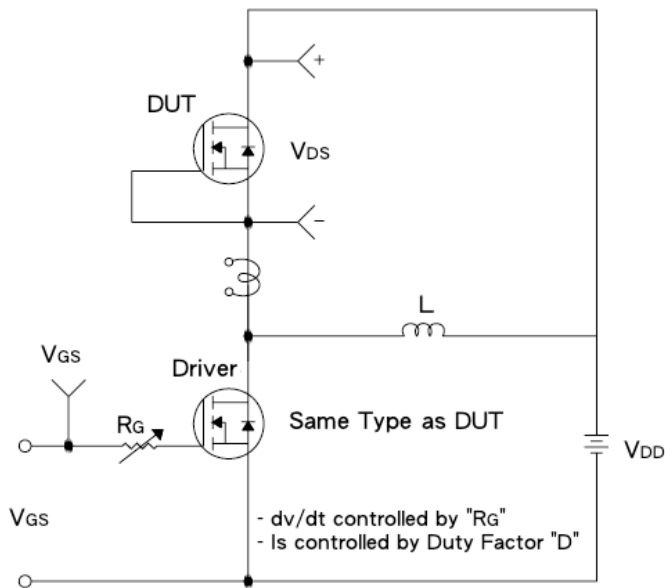
Resistive Switching Test Circuit & Waveform



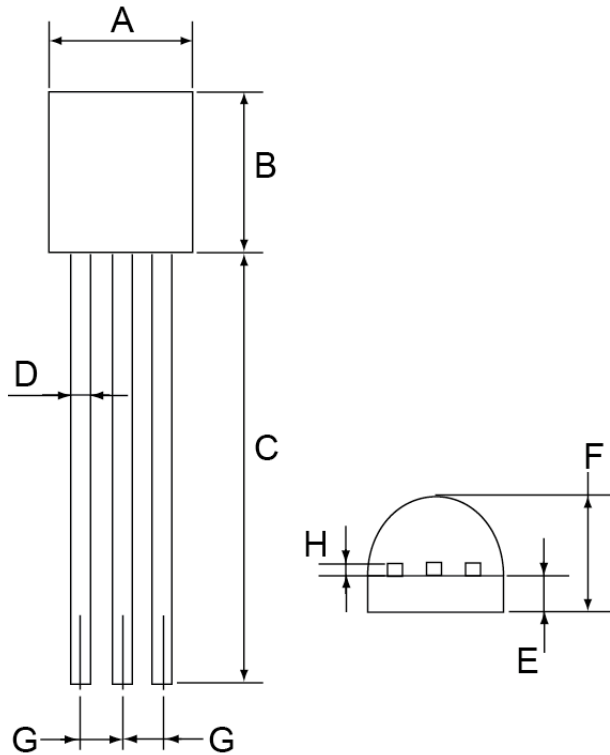
E_{AS} Test Circuit & Waveform



Diode Reverse Recovery Time Test Circuit & Waveform

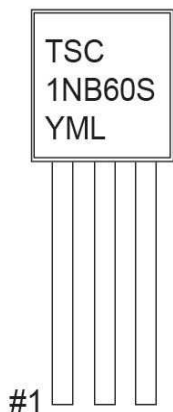


TO-92 Mechanical Drawing



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=Apr, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
 = Month Code for Halogen Free Product
 (O=Jan, P=Feb, Q=Mar, R=Apr, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)
- L** = Lot Code

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