TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

TSM1NB60S

600V N-Channel Power MOSFET

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

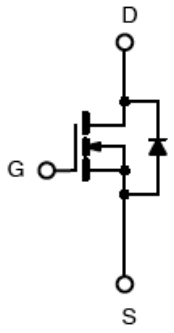
General Description

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

Block Diagram



N-Channel MOSFET

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

Absolute Maximum Rating (T_A=25°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	Tc=25ºC	I_D	0.5	A
	Tc=100ºC		0.25	A
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°C		P_{TOT}	2.5	W
Operating Junction Temperature		T_J	150	ºC
Storage Temperature Range		T_{STG}	-55 to +150	°C

Note: Limited by maximum junction temperature

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Lead	$R\Theta_{JL}$	50	°C/W
Thermal Resistance - Junction to Ambient	$R\Theta_{JA}$	110	°C/W

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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 = 250uA	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 = 250uA	$V_{GS(TH)}$	2.5	3.5	4.5	V
Zero Gate Voltage Drain Current	V_{DS} = 600V, V_{GS} = 0V	I_{DSS}	--	--	10	uA
Gate Body Leakage	V_{GS} = ±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 =25Ω (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

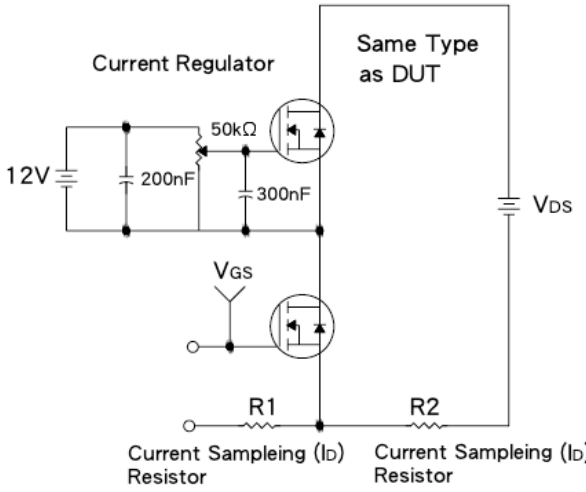
Note 2: V_{DD} = 50V, I_{AS}=0.5A, L=10mH, R_G =25Ω, Starting T_J=25ºC

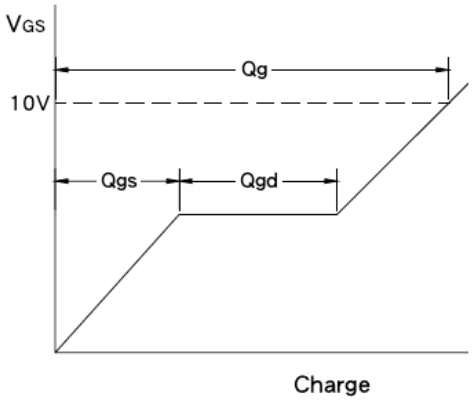
Note 3: I_{SD}≤0.5A, di/dt≤200A/uS, V_{DD}≤BV_{DSS}, Starting T_J=25ºC

Note 4: Pulse test: pulse width ≤300uS, duty cycle ≤2%

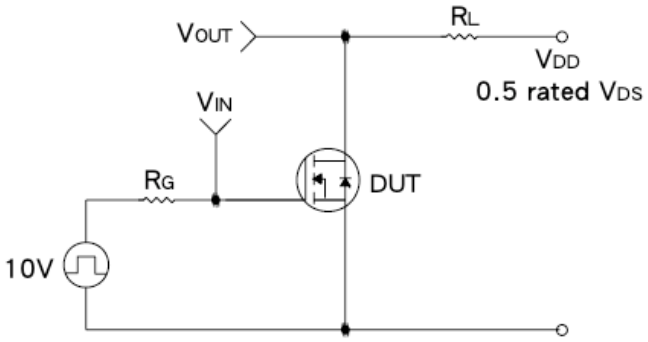
Note 5: Essentially Independent of Operating Temperature

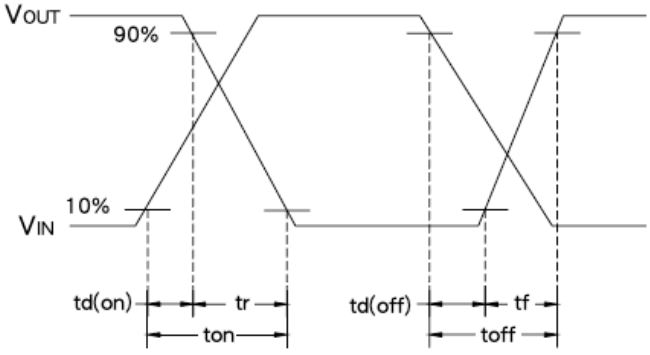
Gate Charge Test Circuit & Waveform



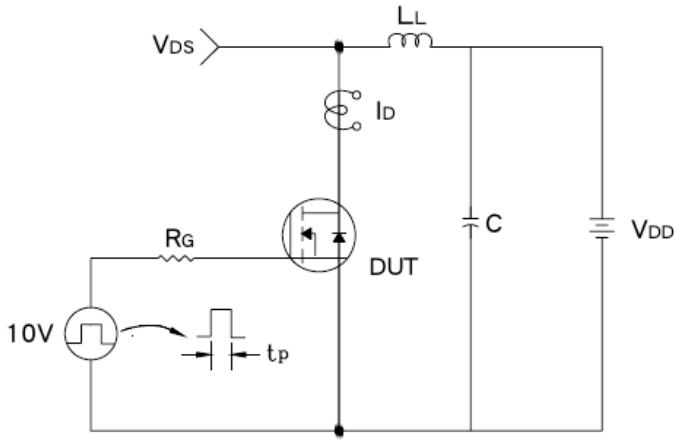


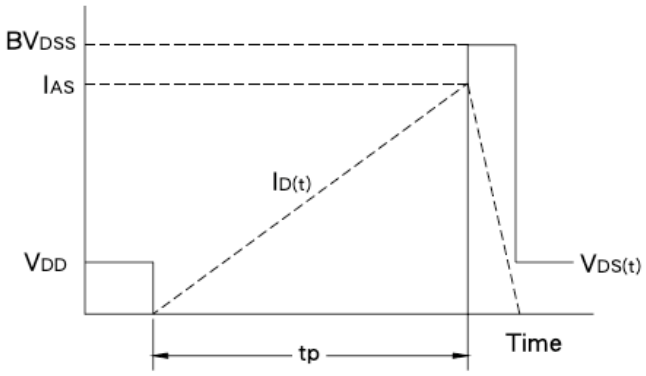
Resistive Switching Test Circuit & Waveform



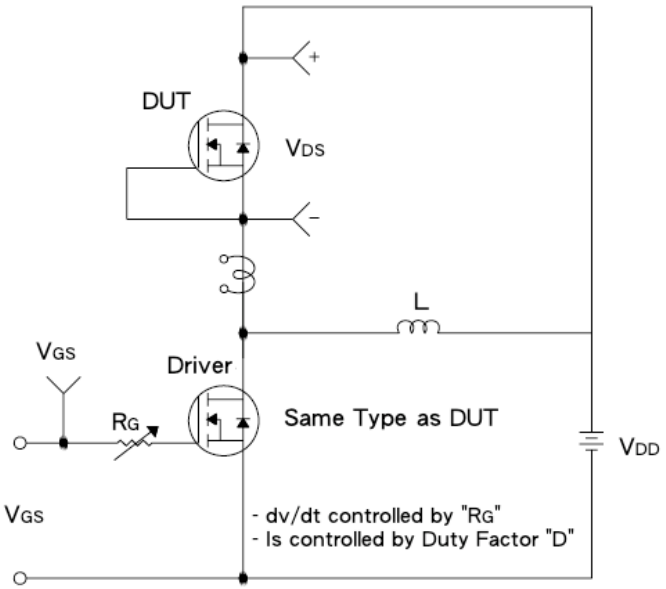


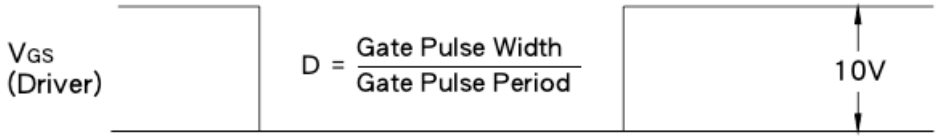
E_{AS} Test Circuit & Waveform

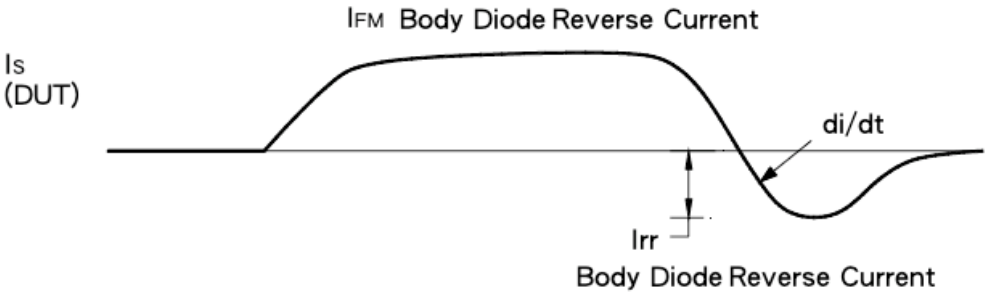


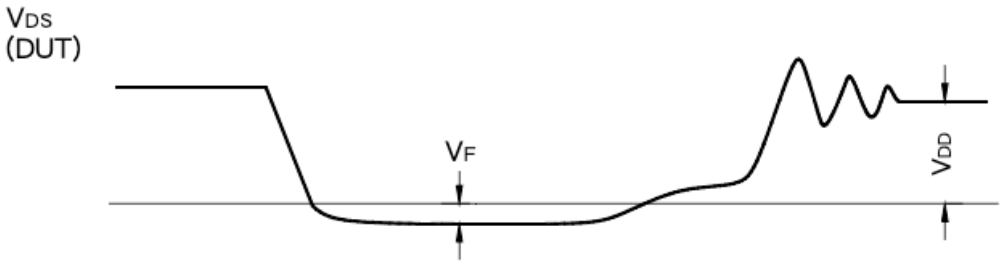


Diode Reverse Recovery Time Test Circuit & Waveform

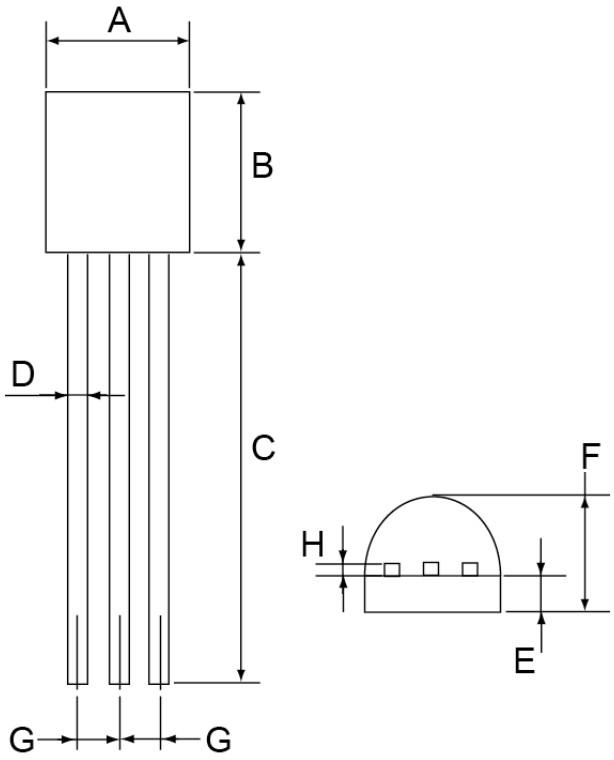






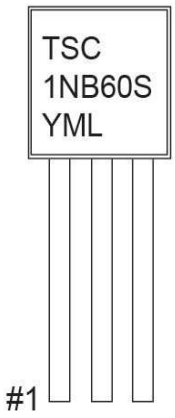


TO-92 Mechanical Drawing



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**=Apl, **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**=Apl, **S**=May, **T**=Jun, **U**=Jul, **V**=Aug, **W**=Sep, **X**=Oct, **Y**=Nov, **Z**=Dec)
L = Lot Code

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