N-Channel Power MOSFET

600V, 1A, 10Ω

FEATURES

- Advanced planar process
- 100% avalanche tested
- Low $R_{DS(ON)}$ 8Ω (Typ.)
- Low gate charge typical @ 6.1 nC (Typ.)
- Low Crss typical @4.2pF (Typ.)

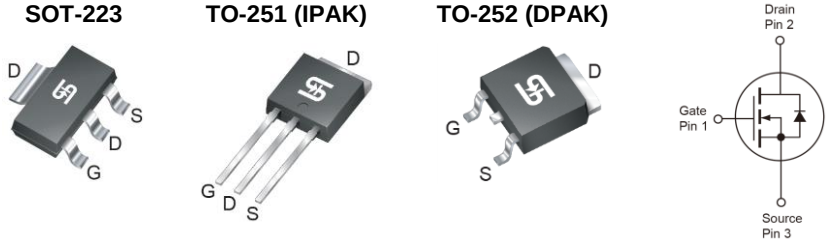
KEY PERFORMANCE PARAMETERS		
PARAMETER	**VALUE**	**UNIT**
V_{DS}	600	V
$R_{DS(on)}$ (max)	10	Ω
Q_g	6.1	nC

APPLICATION

- Power Supply
- Lighting
- Charger

Pb-Free RoHS COMPLIANT HALOGEN FREE

SOT-223 **TO-251 (IPAK)** **TO-252 (DPAK)**



Notes: MSL 3 (Moisture Sensitivity Level) for TO-252 (D-PAK), SOT-223 per J-STD-020

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

PARAMETER		SYMBOL	IPAK/DPAK	SOT-223	UNIT
Drain-Source Voltage		V_{DS}	600		V
Gate-Source Voltage		V_{GS}	±30		V
Continuous Drain Current (Note 1)	T_C = 25°C	I_D	1		A
	T_C = 100°C		0.7		
Pulsed Drain Current (Note 2)		I_{DM}	4		A
Total Power Dissipation @ T_C = 25°C		P_{DTOT}	39	2.1	W
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	5		mJ
Single Pulsed Avalanche Current (Note 3)		I_{AS}	1		A
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5		V/ns
Operating Junction and Storage Temperature Range		T_J, T_{STG}	- 55 to +150		°C

THERMAL PERFORMANCE

PARAMETER	SYMBOL	IPAK/DPAK	SOT-223	UNIT
Junction to Case Thermal Resistance	$R_{\Theta JC}$	2.87	--	°C/W
Junction to Ambient Thermal Resistance	$R_{\Theta JA}$	110	60	°C/W

Notes: $R_{\Theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistances. The case thermal reference is defined at the solder mounting surface of the drain pins. $R_{\Theta JA}$ is guaranteed by design while $R_{\Theta CA}$ is determined by the user's board design. $R_{\Theta JA}$ shown below for single device operation on FR-4 PCB in still air.

ELECTRICAL SPECIFICATIONS (T_A = 25°C unless otherwise noted)						
PARAMETER	**CONDITIONS**	**SYMBOL**	**MIN**	**TYP**	**MAX**	**UNIT**
Static (Note 5)						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	BV_{DSS}	600	--	--	V
Drain-Source On-State Resistance	V_{GS} = 10V, I_D = 0.5A	$R_{DS(ON)}$	--	8	10	Ω
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	$V_{GS(TH)}$	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} = ±30V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Forward Transfer Conductance	V_{DS} = 10V, I_D = 0.5A	g_{fs}	--	0.8	--	S
Dynamic (Note 6)						
Total Gate Charge	V_{DS} = 480V, I_D = 1A, V_{GS} = 10V	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	--	
Gate Resistance	F = 1MHz, open drain	R_g	--	12.5	--	Ω
Switching (Note 7)						
Turn-On Delay Time	V_{DD} = 300V, R_G =25Ω I_D = 1A, V_{GS} = 10V	$t_{d(on)}$	--	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 (Note 5)						
Diode Forward Voltage	I_S = 1A, V_{GS} = 0V	V_{SD}	--	0.9	1.4	V
Source Current	Integral reverse diode In the MOSFET	I_S	--	--	1	A
Source Current (Pulse)		I_{SM}	--	--	4	

Notes:

1. Current limited by package.
2. Pulse width limited by the maximum junction temperature.
3. L = 10mH, I_{AS} = 1A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C.
4. I_{SD}≤1A , V_{DD}≤BV_{DSS} , di/dt≤200A/us , Starting T_J = 25°C.
5. Pulse test: PW ≤ 300μs, duty cycle ≤ 2%.
6. For DESIGN AID ONLY, not subject to production testing.
7. Switching time is essentially independent of operating temperature.

ORDERING INFORMATION

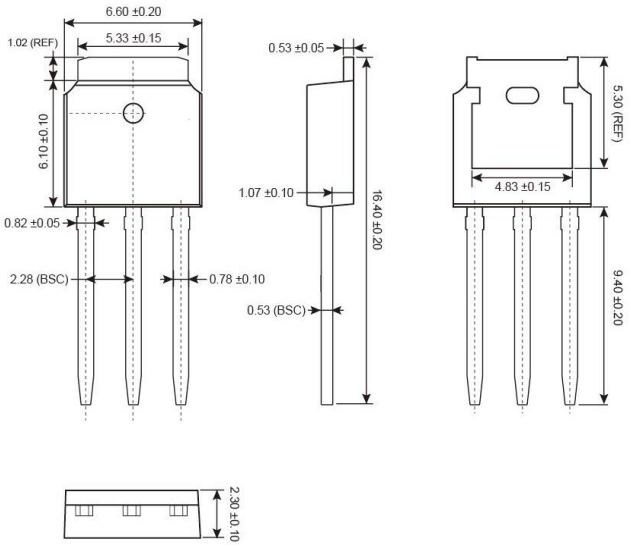
PART NO.	PACKAGE	PACKING
TSM1NB60CH C5G	TO-251	75 pcs / Tube
TSM1NB60CP ROG	TO-252	2,500 pcs / 13” Reel
TSM1NB60CW RPG	SOT-223	2,500 pcs / 13” Reel

Note:

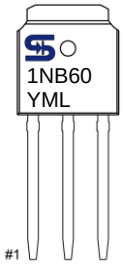
1. Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
2. Halogen-free according to IEC 61249-2-21 definition

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

TO-251



MARKING DIAGRAM



Y = Year Code

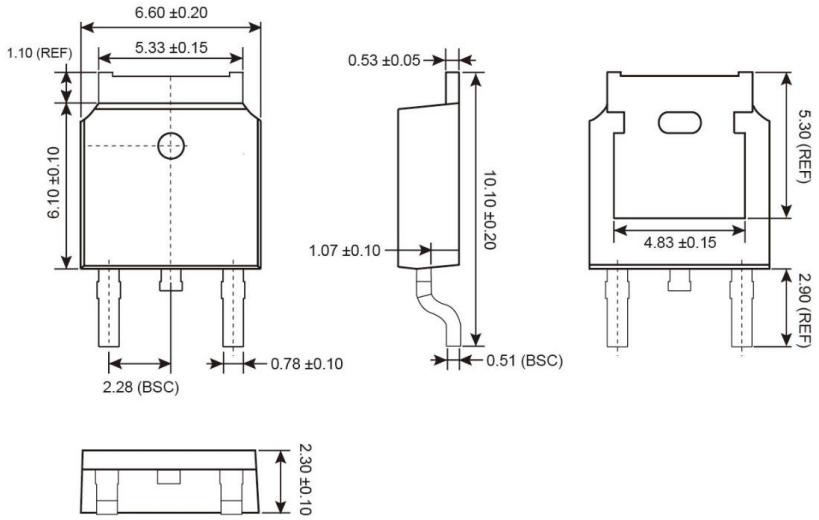
M = Month Code for Halogen Free Product

O	=Jan	**P**	=Feb	**Q**	=Mar	**R**	=Apr
S	=May	**T**	=Jun	**U**	=Jul	**V**	=Aug
W	=Sep	**X**	=Oct	**Y**	=Nov	**Z**	=Dec

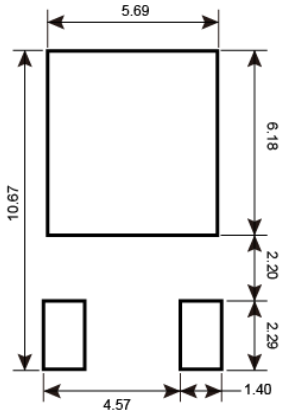
L = Lot Code (1~9, A~Z)

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

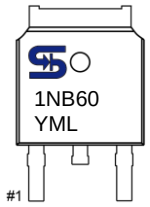
TO-252



SUGGESTED PAD LAYOUT



MARKING DIAGRAM



Y = Year Code

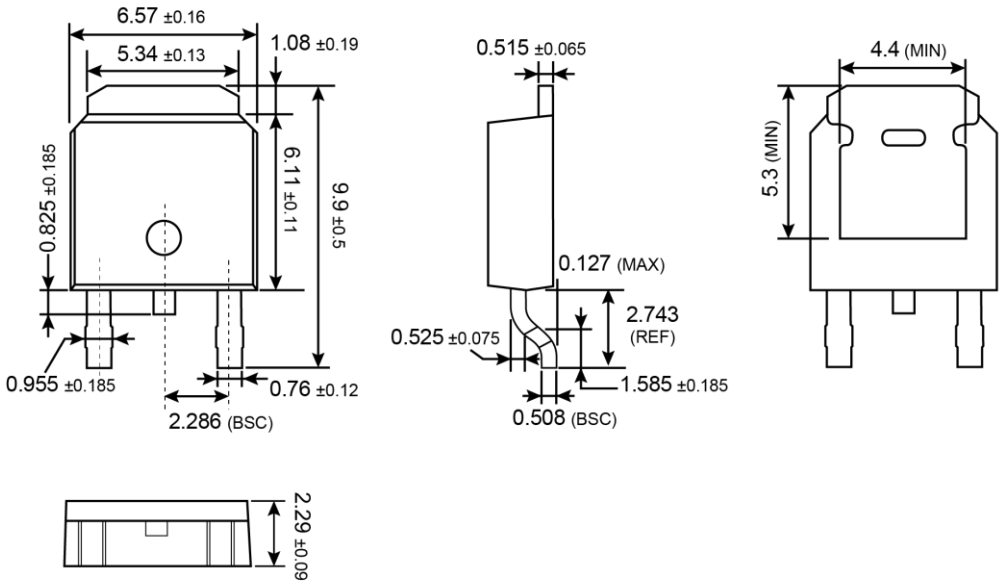
M = Month Code for Halogen Free Product

O	=Jan	**P**	=Feb	**Q**	=Mar	**R**	=Apr
S	=May	**T**	=Jun	**U**	=Jul	**V**	=Aug
W	=Sep	**X**	=Oct	**Y**	=Nov	**Z**	=Dec

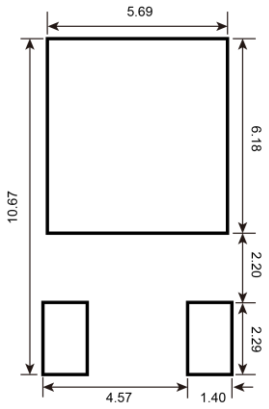
L = Lot Code (1~9, A~Z)

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

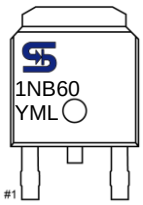
TO-252



SUGGESTED PAD LAYOUT (Unit: Millimeters)



MARKING DIAGRAM



Y = Year Code

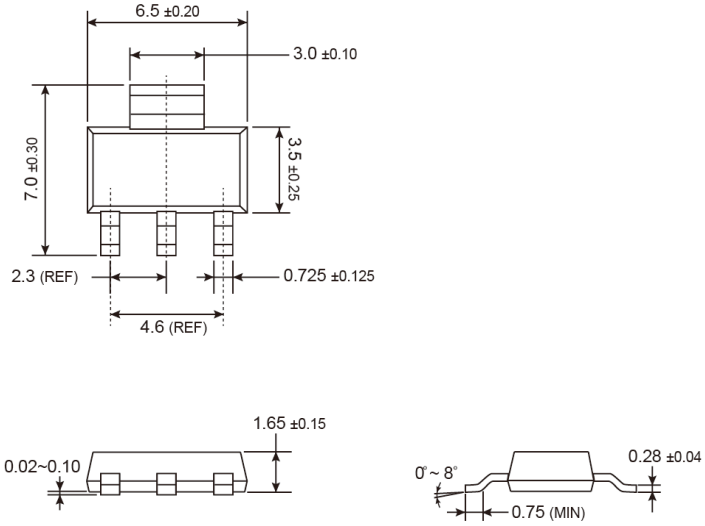
M = Month Code for Halogen Free Product

O	=Jan	**P**	=Feb	**Q**	=Mar	**R**	=Apr
S	=May	**T**	=Jun	**U**	=Jul	**V**	=Aug
W	=Sep	**X**	=Oct	**Y**	=Nov	**Z**	=Dec

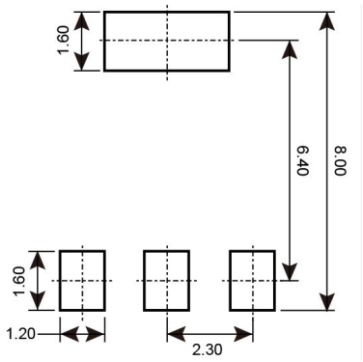
L = Lot Code (1~9, A~Z)

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

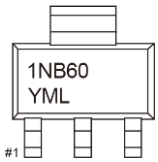
SOT-223



SUGGESTED PAD LAYOUT



MARKING DIAGRAM



Y = Year Code

M = 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 (1~9, A~Z)

Notice

Specifications of the products displayed herein are subject to change without notice. TSC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in TSC's terms and conditions of sale for such products, TSC assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of TSC products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify TSC for any damages resulting from such improper use or sale.