

N-Channel Power MOSFET

600V, 1A, 10Ω

FEATURES

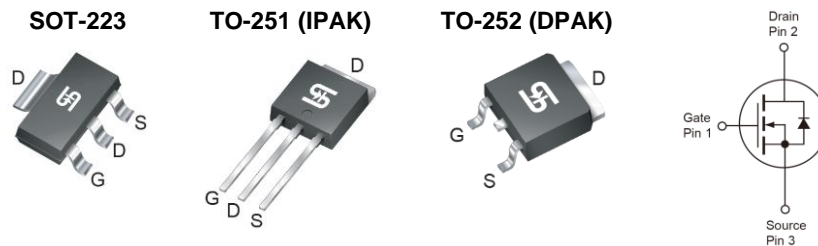
- Advanced planar process
- 100% avalanche tested
- Low $R_{DS(ON)}$ 8Ω (Typ.)
- Low gate charge typical @ 6.1 nC (Typ.)
- Low Crss typical @4.2pF (Typ.)

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



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

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ 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)	I_D	$T_C = 25^\circ\text{C}$		A
		$T_C = 100^\circ\text{C}$		
Pulsed Drain Current ^(Note 2)	I_{DM}	4		A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	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 ($T_A = 25^\circ\text{C}$ unless otherwise noted)						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static (Note 5)						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	600	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 0.5A$	$R_{DS(ON)}$	--	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 (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	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$	C_{iss}	--	138	--	pF
Output Capacitance		C_{oss}	--	17.1	--	
Reverse Transfer Capacitance		C_{rss}	--	4.2	--	
Gate Resistance	$F = 1\text{MHz}, \text{open drain}$	R_g	--	12.5	--	Ω
Switching (Note 7)						
Turn-On Delay Time	$V_{DD} = 300V, R_G = 25\Omega$ $I_D = 1A, V_{GS} = 10V$	$t_{d(on)}$	--	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:

- Current limited by package.
- Pulse width limited by the maximum junction temperature.
- $L = 10\text{mH}, I_{AS} = 1A, V_{DD} = 50V, R_G = 25\Omega, \text{Starting } T_J = 25^\circ\text{C}.$
- $I_{SD} \leq 1A, V_{DD} \leq BV_{DSS}, di/dt \leq 200A/\mu s, \text{Starting } T_J = 25^\circ\text{C}.$
- Pulse test: $PW \leq 300\mu s, \text{duty cycle} \leq 2\%.$
- For DESIGN AID ONLY, not subject to production testing.
- Switching time is essentially independent of operating temperature.

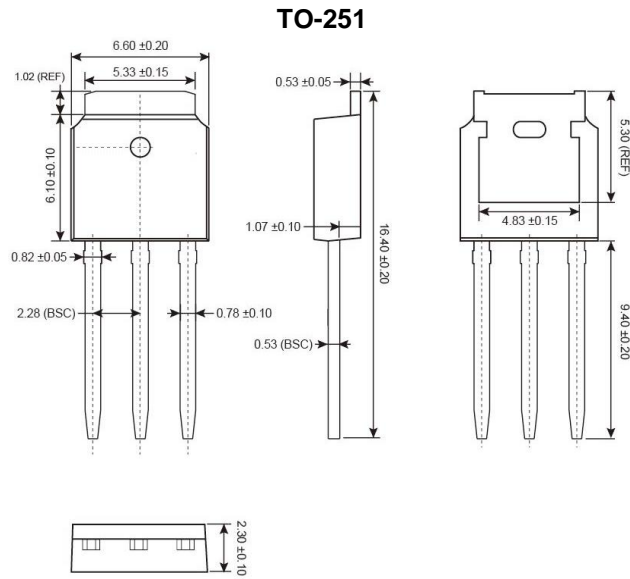
ORDERING INFORMATION

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

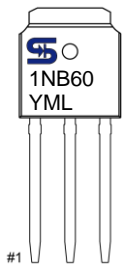
Note:

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)



MARKING DIAGRAM



Y = Year Code

M = Month Code for Halogen Free Product

O =Jan **P** =Feb **Q** =Mar **R** =Apr

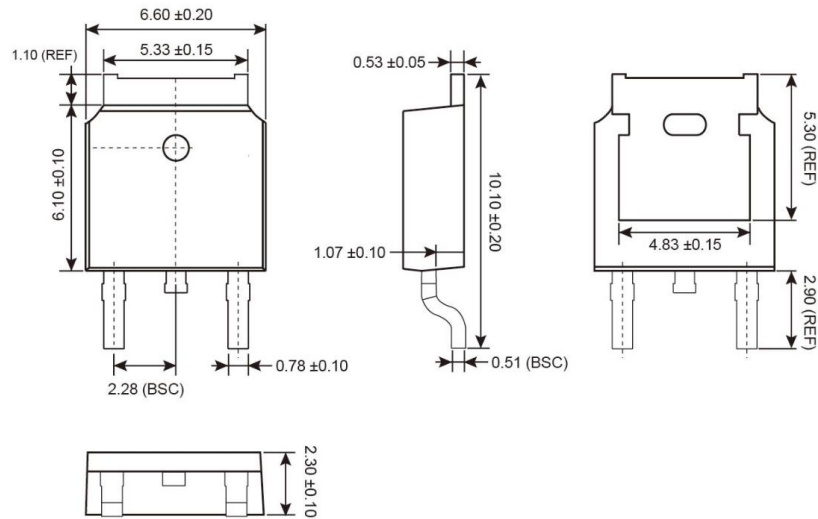
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L = Lot Code (1~9, A~Z)

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

TO-252



SUGGESTED PAD LAYOUT



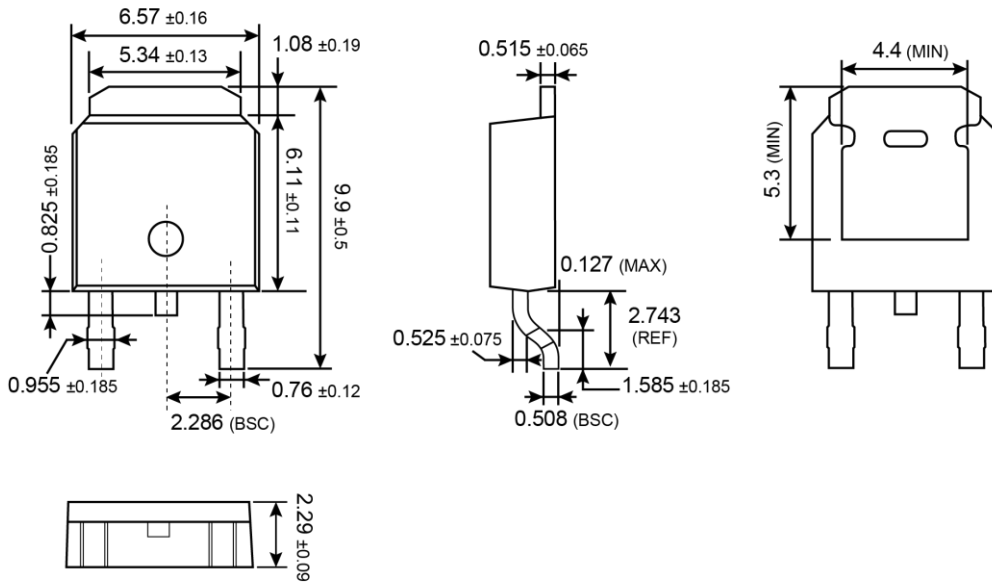
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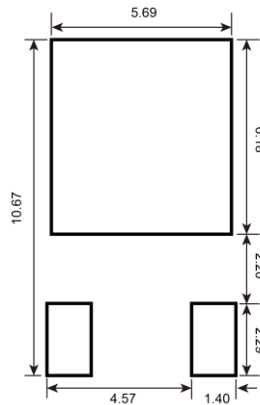
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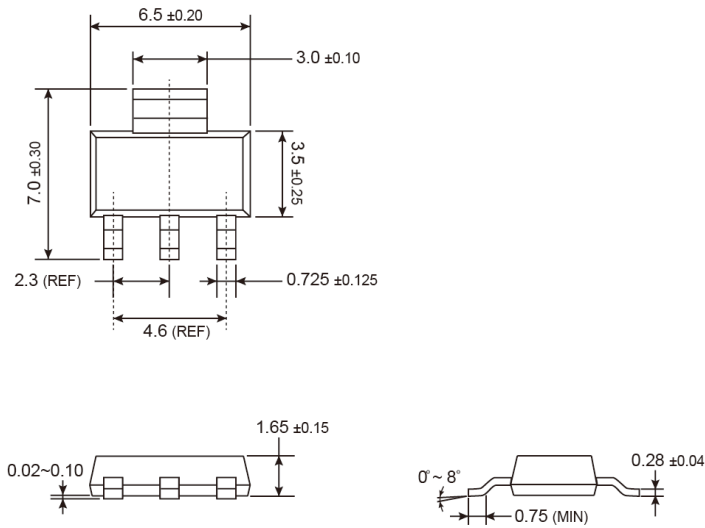
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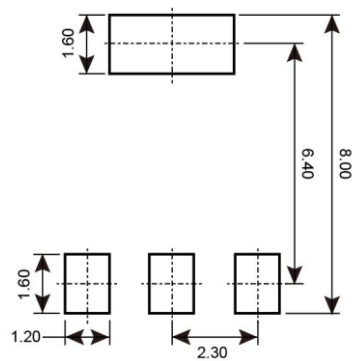
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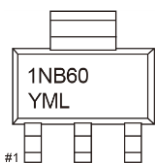
SOT-223



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