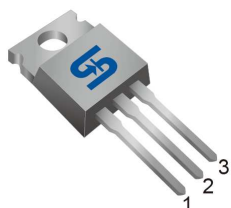
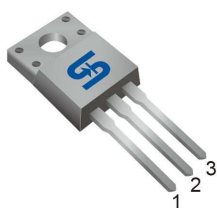




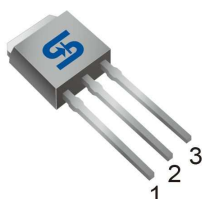
TO-220



ITO-220



TO-251
(IPAK)



TO-252
(DPAK)



Pin Definition:

1. Gate
2. Drain
3. Source

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
500	1.5 @ $V_{GS}=10V$	4.4

General Description

The TSM5NB50 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

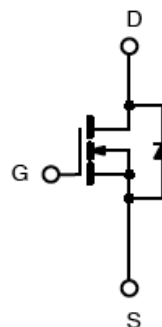
- Low $R_{DS(ON)}$ 1.2 Ω (Typ.)
- Low gate charge typical @ 12.4nC (Typ.)
- Low C_{rss} typical @ 18pF (Typ.)

Ordering Information

Part No.	Package	Packing
TSM5NB50CH C5G	TO-251	75pcs / Tube
TSM5NB50CP ROG	TO-252	2.5Kpcs / 13" Reel
TSM5NB50CZ C0	TO-220	50pcs / Tube
TSM5NB50CI C0	ITO-220	50pcs / Tube

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
		IPAK/DPAK	ITO-220	TO-220	
Drain-Source Voltage	V_{DS}	500			V
Gate-Source Voltage	V_{GS}	± 30			V
Continuous Drain Current	I_D	$T_C = 25^\circ C$			A
		$T_C = 100^\circ C$			A
Pulsed Drain Current *	I_{DM}	17.6			A
Single Pulse Avalanche Energy (Note 2)	E_{AS}	100			mJ
Total Power Dissipation @ $T_C = 25^\circ C$	P_{TOT}	54	33	70	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
		IPAK/DPAK	ITO-220	TO-220	
Thermal Resistance - Junction to Case	$R_{\theta_{JC}}$	2.3	3.8	1.78	$^\circ C/W$
Thermal Resistance - Junction to Ambient	$R_{\theta_{JA}}$	83	62.5	62.5	$^\circ C/W$

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

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	500	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 2.2A$	$R_{DS(ON)}$	--	1.2	1.5	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	$V_{DS} = 500V, V_{GS} = 0V$	I_{DSS}	--	--	1	μA
Gate Body Leakage	$V_{GS} = \pm 30V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Forward Transfer Conductance	$V_{DS} = 10V, I_D = 2.2A$	g_{fs}	--	3.5	--	S
Dynamic						
Total Gate Charge	$V_{DS} = 300V, I_D = 4.4A,$ $V_{GS} = 10V$ (Note 4,5)	Q_g	--	12.4	--	nC
Gate-Source Charge		Q_{gs}	--	2.9	--	
Gate-Drain Charge		Q_{gd}	--	5.5	--	
Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0MHz$	C_{iss}	--	552	--	pF
Output Capacitance		C_{oss}	--	83	--	
Reverse Transfer Capacitance		C_{rss}	--	18	--	
Switching						
Turn-On Delay Time	$V_{GS} = 10V, I_D = 4.4A,$ $V_{DD} = 300V, R_G = 25\Omega$ (Note 4,5)	$t_{d(on)}$	--	12	--	nS
Turn-On Rise Time		t_r	--	22	--	
Turn-Off Delay Time		$t_{d(off)}$	--	33	--	
Turn-Off Fall Time		t_f	--	21	--	
Source-Drain Diode Ratings and Characteristic						
Source Current	Integral reverse diode in the MOSFET	I_S	--	--	4.4	A
Source Current (Pulse)		I_{SM}	--	--	16	A
Diode Forward Voltage	$I_S = 4.4A, V_{GS} = 0V$	V_{SD}	--	0.9	1.5	V

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

Note 2: $V_{DD} = 50V, I_{AS} = 2.2A, L = 40mH, R_G = 25\Omega, \text{Starting } T_J = 25^\circ C$

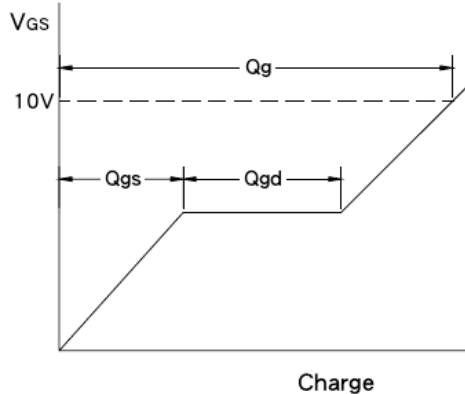
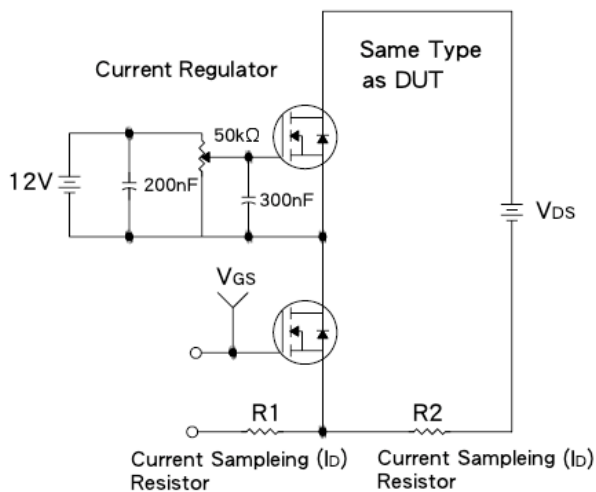
Note 3: $I_{SD} \leq 4A, di/dt \leq 200A/\mu S, V_{DD} \leq BV_{DSS}, \text{Starting } T_J = 25^\circ C$

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

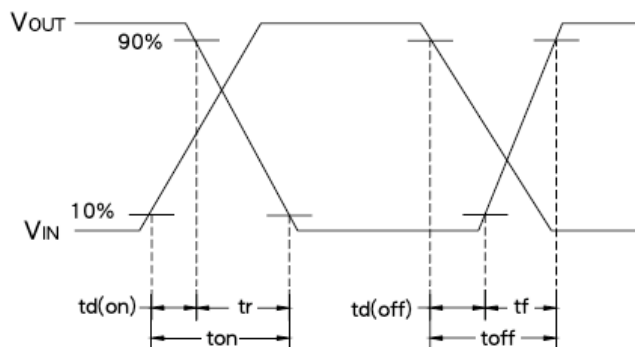
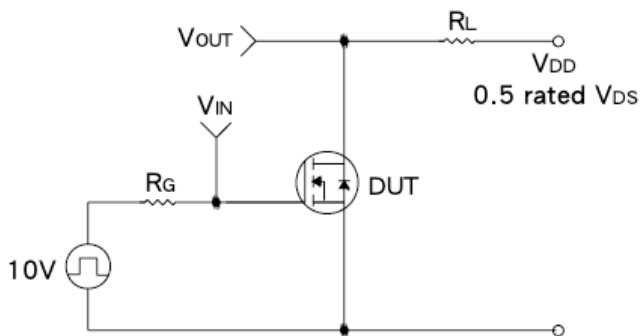
Note 5: Essentially Independent of Operating Temperature



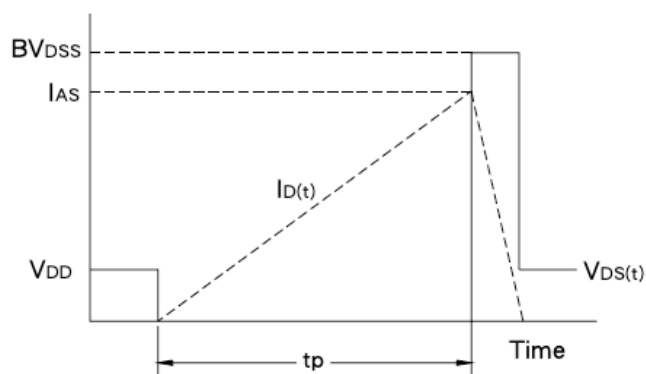
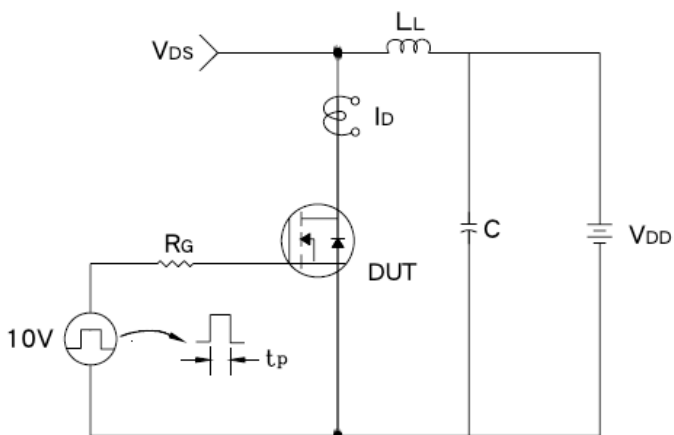
Gate Charge Test Circuit & Waveform



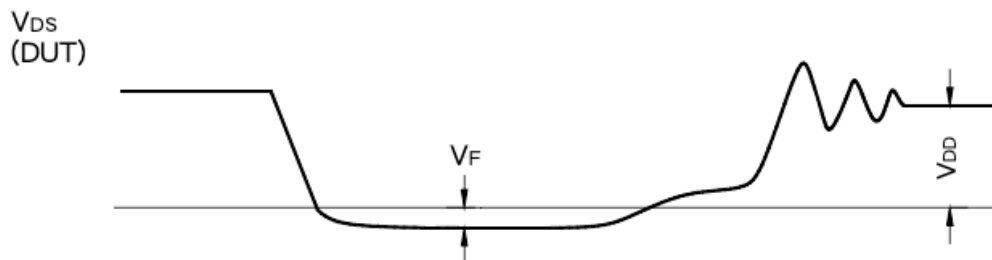
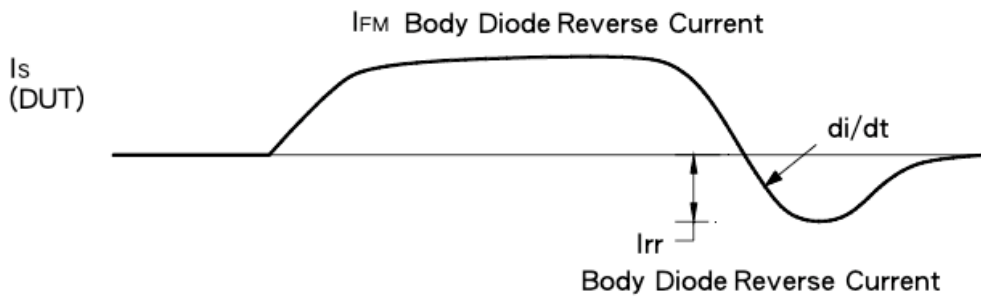
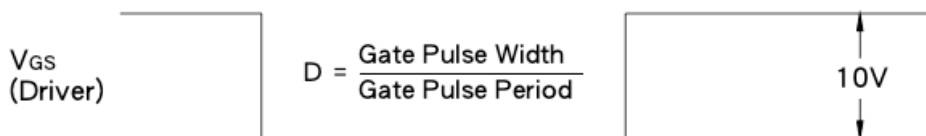
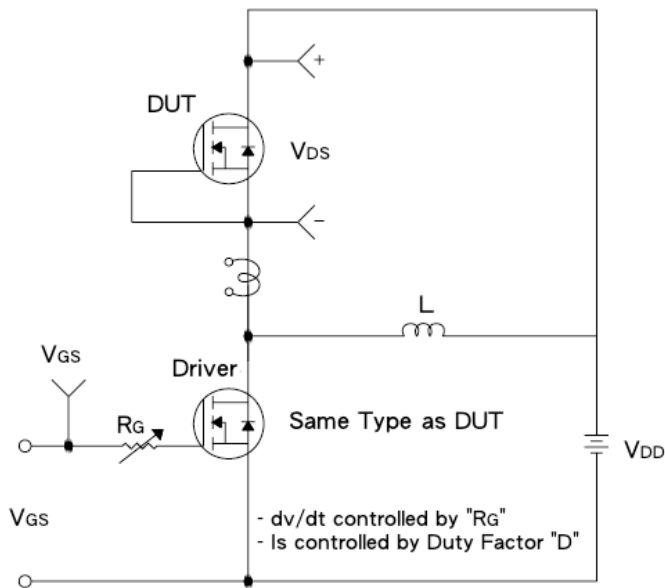
Resistive Switching Test Circuit & Waveform



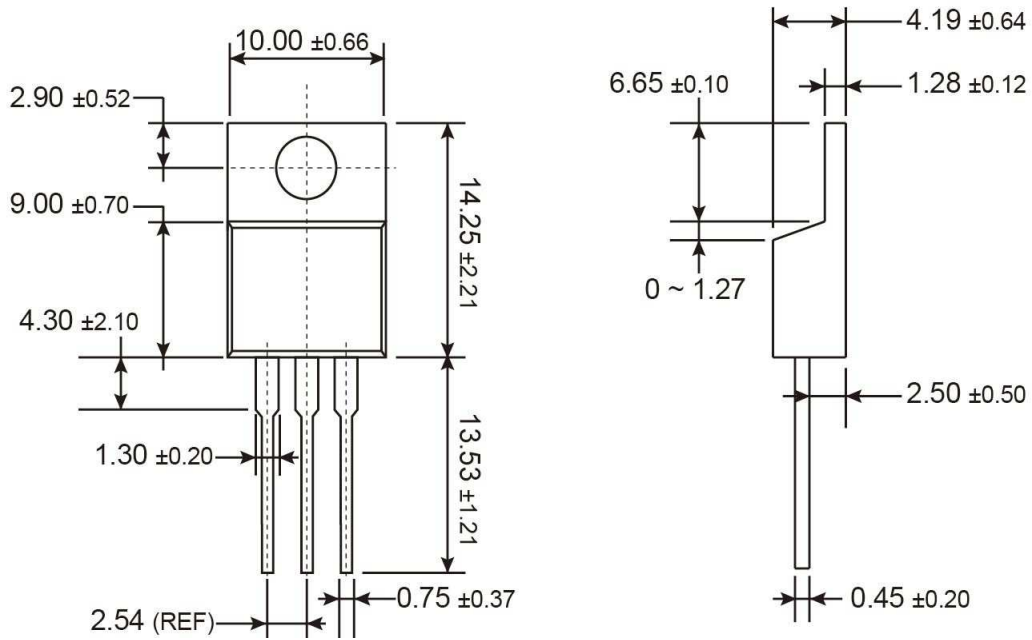
E_{AS} Test Circuit & Waveform



Diode Reverse Recovery Time Test Circuit & Waveform

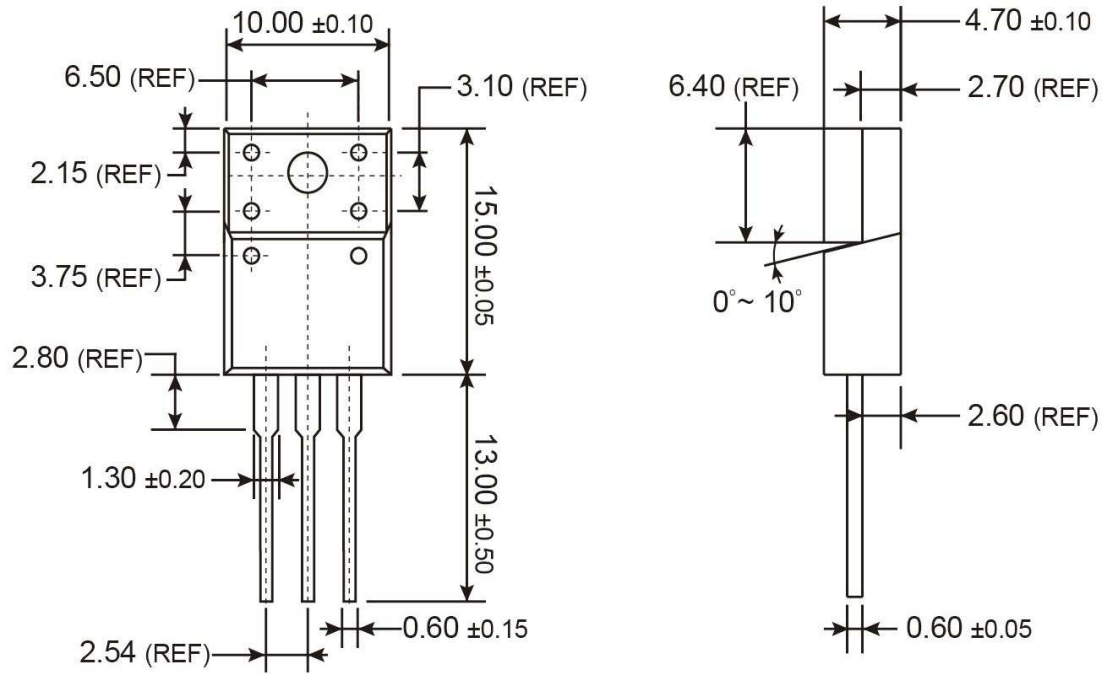


TO-220 Mechanical Drawing



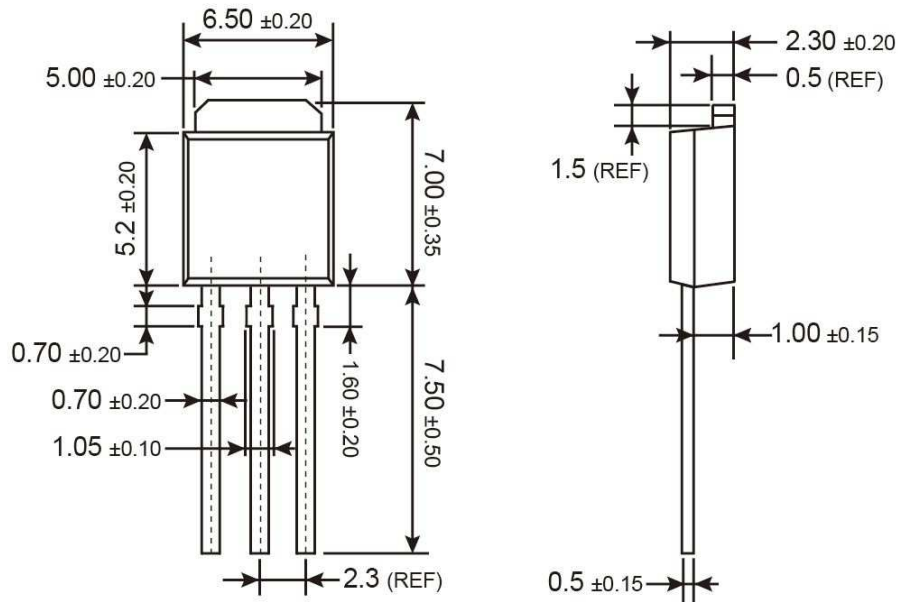
Unit: Millimeters

ITO-220 Mechanical Drawing



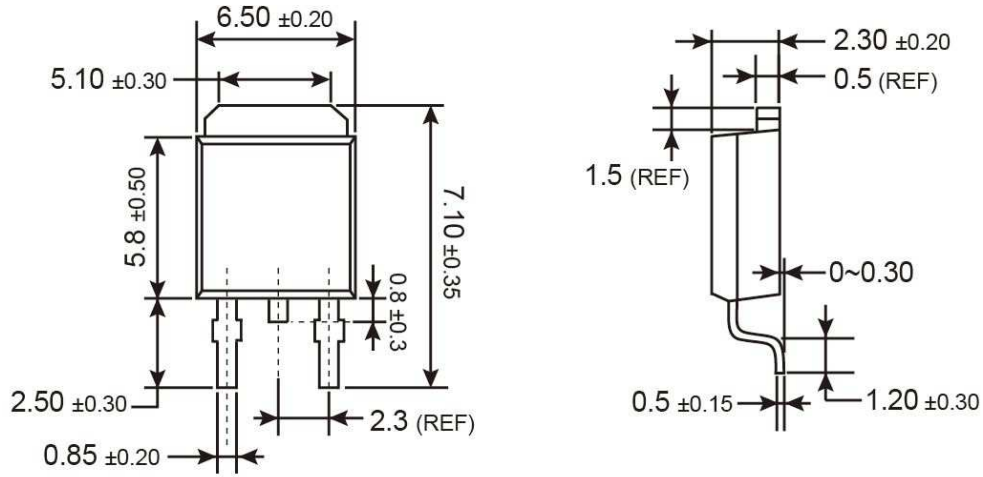
Unit: Millimeters

TO-251 Mechanical Drawing



Unit: Millimeters

TO-252 Mechanical Drawing



Unit: Millimeters

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