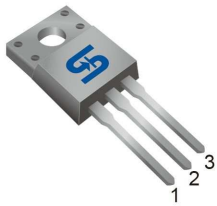


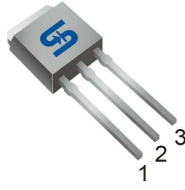
ITO-220



TO-252
(DPAK)



TO-251
(IPAK)



Pin Definition:

1. Gate
2. Drain
3. Source

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
500	1.4 @ $V_{GS}=10V$	2.8

General Description

The TSM6N50 N-Channel enhancement mode Power MOSFET is produced by planar stripe DMOS technology. 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.

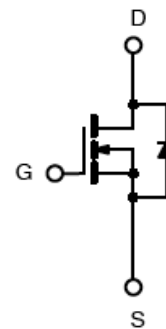
Features

- Low $R_{DS(on)}$ 1.4 Ω (Max.)
- Low gate charge typical @ 25nC (Typ.)
- Low C_{rss} typical @ 15pF (Typ.)
- Fast Switching

Ordering Information

Part No.	Package	Packing
TSM6N50CI C0	ITO-220	50pcs / Tube
TSM6N50CP RO	TO-252	2.5Kpcs / 13" Reel
TSM6N50CH C5	TO-251	75pcs / Tube

Block Diagram



N-Channel MOSFET

Absolute Maximum Rating ($T_a = 25^\circ\text{C}$ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V _{DS}	500	V
Gate-Source Voltage		V _{GS}	±30	V
Continuous Drain Current	Ta = 25°C	I _D	5.6	A
	Ta = 100°C		3	A
Pulsed Drain Current *		I _{DM}	15	A
Single Pulse Avalanche Energy (Note 2)		E _{AS}	180	mJ
Avalanche Current (Repetitive) (Note 1)		I _{AR}	5	A
Total Power Dissipation @ T _C = 25°C	ITO-220	P _{TOT}	25	W
	TO-252. TO-251		90	
Operating Junction Temperature		T _J	150	°C
Storage Temperature Range		T _{STG}	-55 to +150	°C

* Limited by maximum junction temperature

Thermal Performance

Parameter		Symbol	Limit	Unit
Thermal Resistance - Junction to Case	ITO-220	$R\theta_{JC}$	5	$^{\circ}\text{C/W}$
	TO-252, TO-251		2.78	
Thermal Resistance - Junction to Ambient		$R\theta_{JA}$	62.5	$^{\circ}\text{C/W}$

Notes: Surface mounted on FR4 board $t \leq 10\text{sec}$

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}	500	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 2.8A$	$R_{DS(ON)}$	--	1.15	1.4	Ω
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	2.0	--	4.0	V
Zero Gate Voltage Drain Current	$V_{DS} = 500V, V_{GS} = 0V$	I_{DSS}	--	--	1	μA
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	I_{GSS}	--	--	± 10	μA
Forward Transfer Conductance	$V_{DS} = 8V, I_D = 1A$	g_{fs}	--	2.6	--	S
Dynamic ^b						
Total Gate Charge	$V_{DS} = 400V, I_D = 5A,$ $V_{GS} = 10V$	Q_g	--	25	33	nC
Gate-Source Charge		Q_{gs}	--	5	--	
Gate-Drain Charge		Q_{gd}	--	10	--	
Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0MHz$	C_{iss}	--	680	900	pF
Output Capacitance		C_{oss}	--	85	110	
Reverse Transfer Capacitance		C_{rss}	--	15	20	
Switching ^c						
Turn-On Delay Time	$V_{GS} = 10V, I_D = 5A,$ $V_{DD} = 250V, R_G = 25\Omega$	$t_{d(on)}$	--	20	50	nS
Turn-On Rise Time		t_r	--	40	90	
Turn-Off Delay Time		$t_{d(off)}$	--	90	190	
Turn-Off Fall Time		t_f	--	45	100	
Source-Drain Diode Ratings and Characteristic						
Source Current	Integral reverse diode in the MOSFET	I_S	--	--	5	A
Source Current (Pulse)		I_{SM}	--	--	15	A
Diode Forward Voltage	$I_S = 5A, V_{GS} = 0V$	V_{SD}	--	--	1.6	V
Reverse Recovery Time	$V_{GS} = 0V, I_S = 5A,$	t_{fr}	--	430	--	nS
Reverse Recovery Charge	$dI_F/dt = 100A/us$	Q_{fr}	--	2	--	μC

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

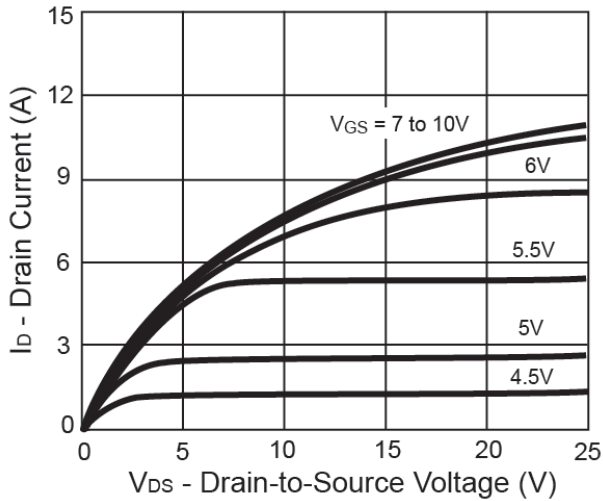
Note 2: $V_{DD} = 50V, I_{AS} = 5A, L = 10mH$, Starting $T_J = 25^\circ\text{C}$

Note 3: Pulse test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$

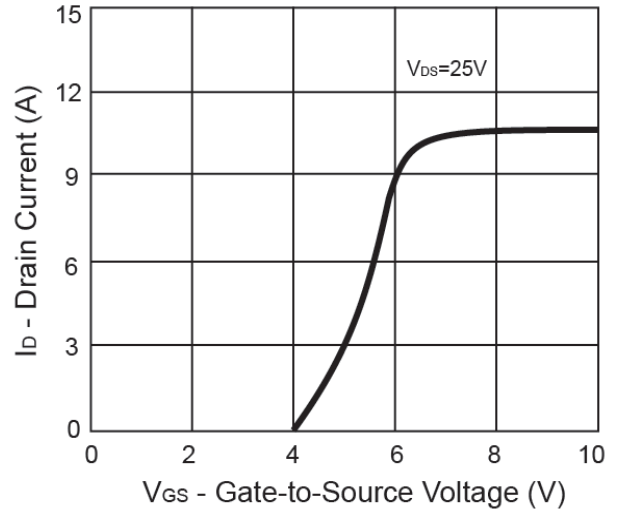
Note 4: Essentially Independent of Operating Temperature

Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

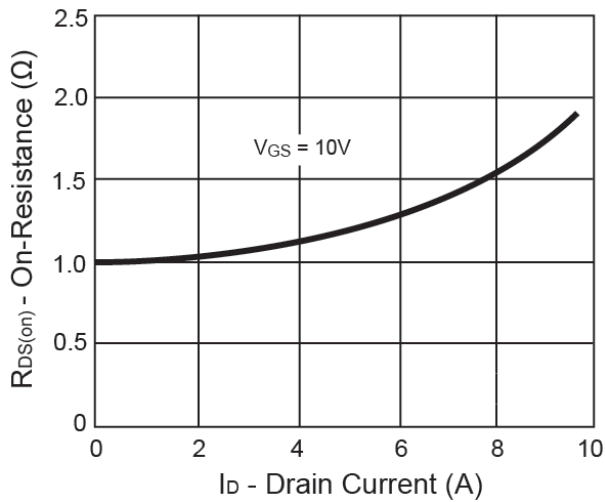
Output Characteristics



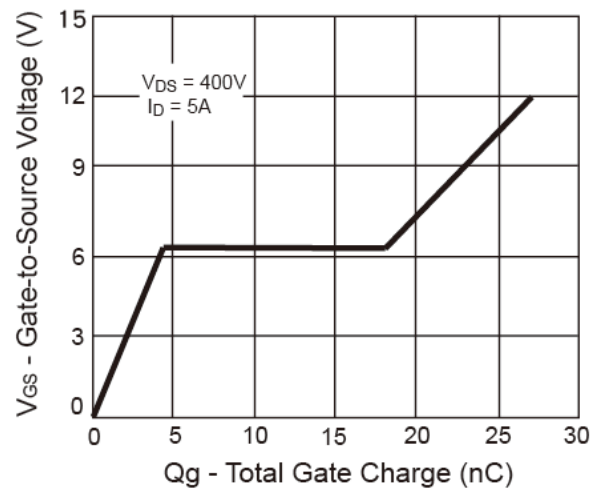
Transfer Characteristics



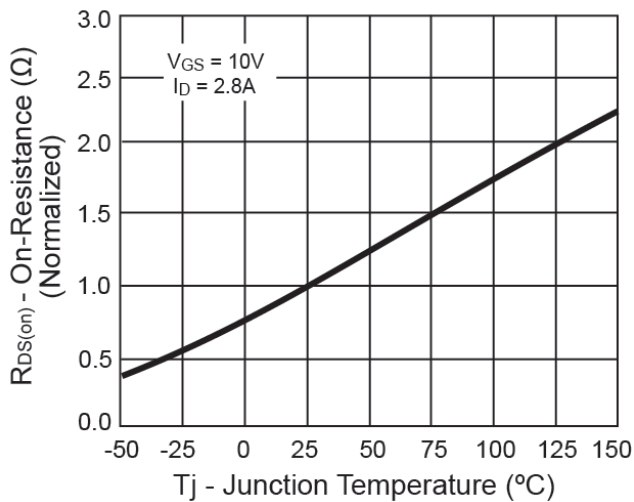
On-Resistance vs. Drain Current



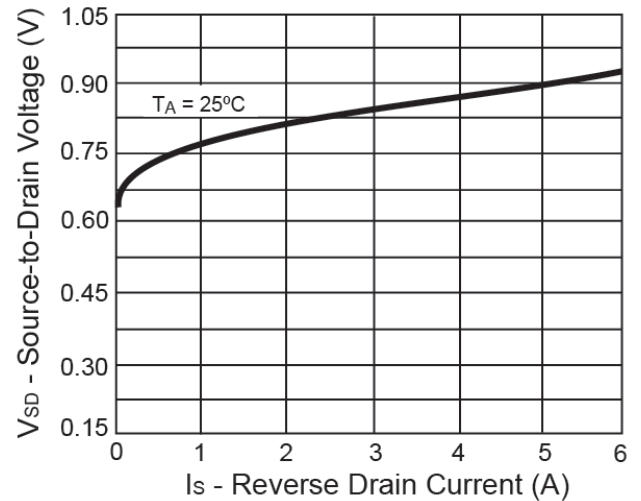
Gate Charge



On-Resistance vs. Junction Temperature

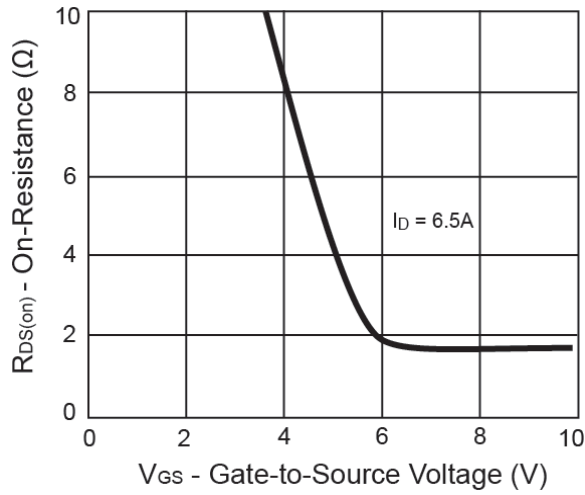


Source-Drain Diode Forward Voltage

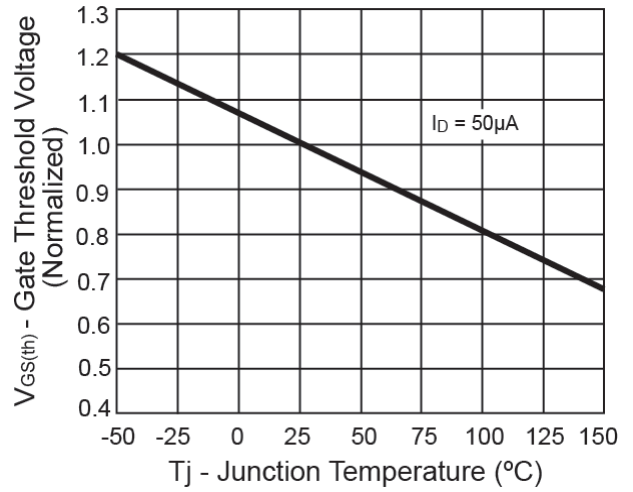


Electrical Characteristics Curve ($T_a = 25^\circ\text{C}$, unless otherwise noted)

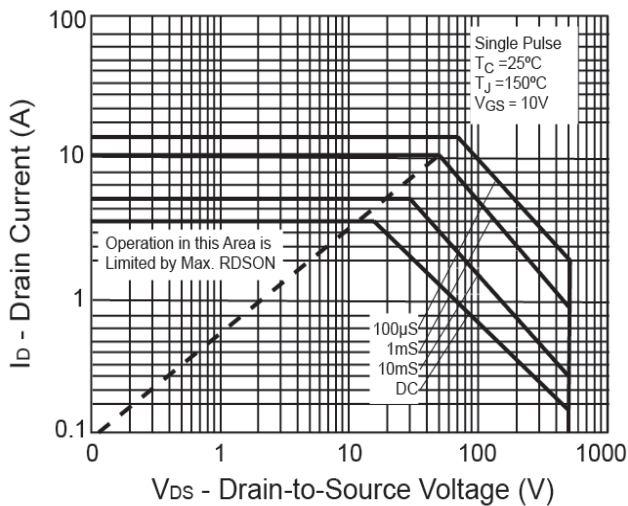
On-Resistance vs. Gate-Source Voltage



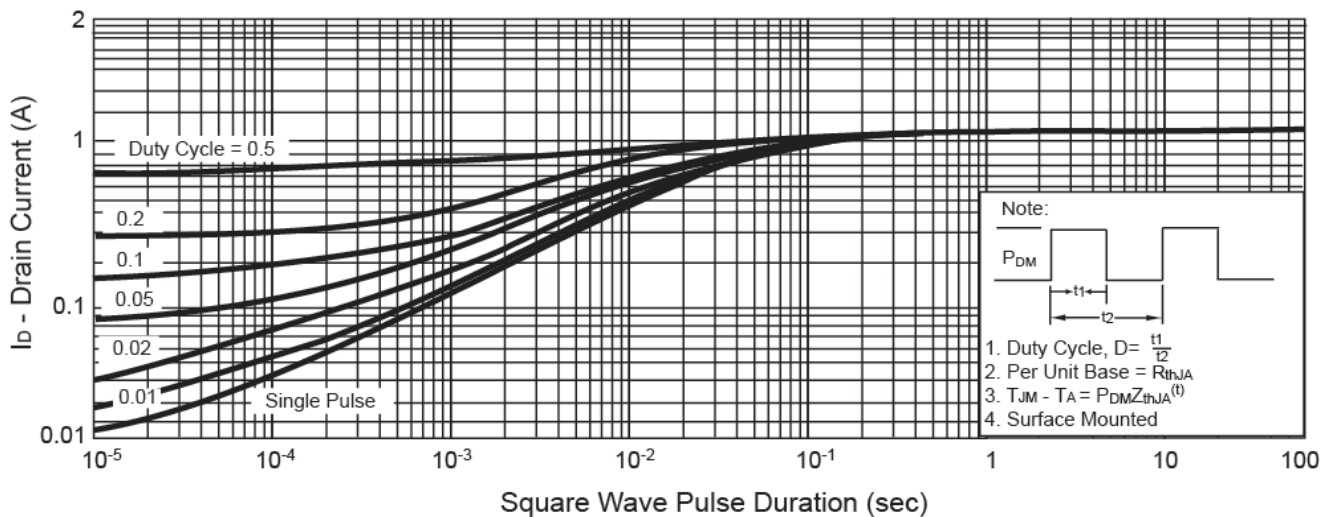
Threshold Voltage



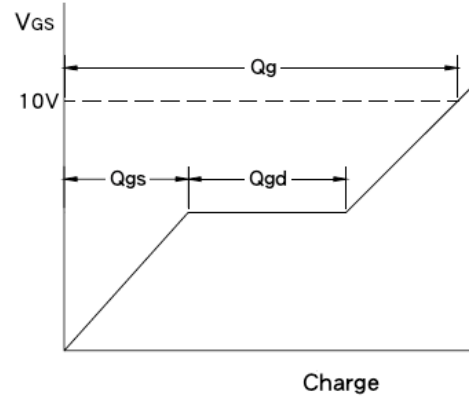
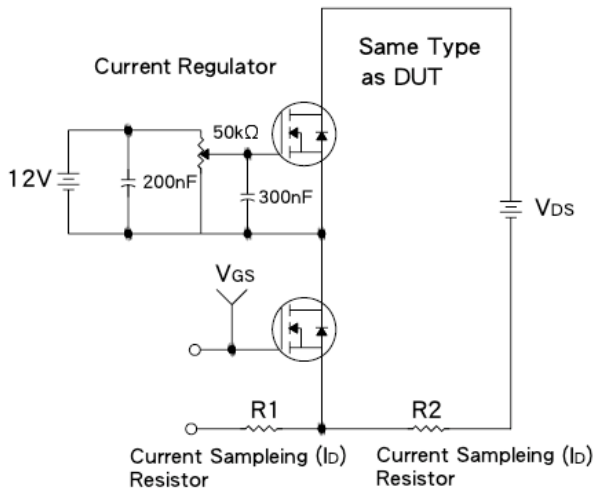
Maximum Safe Operating Area



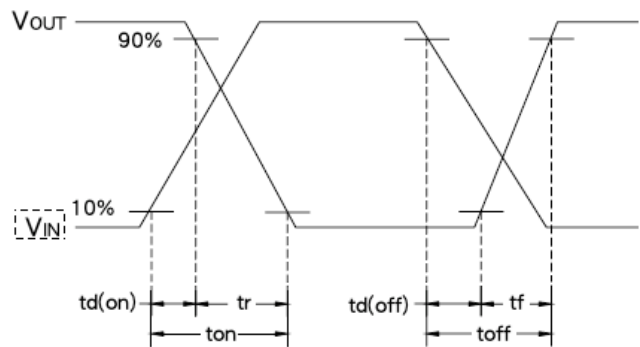
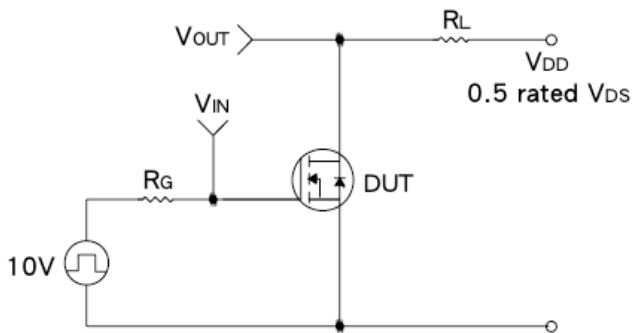
Normalized Thermal Transient Impedance, Junction-to-Ambient



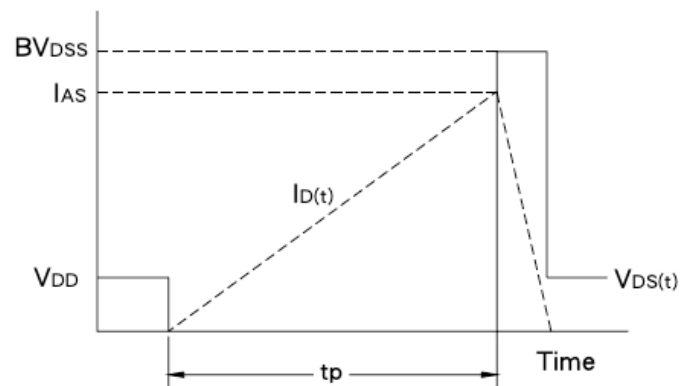
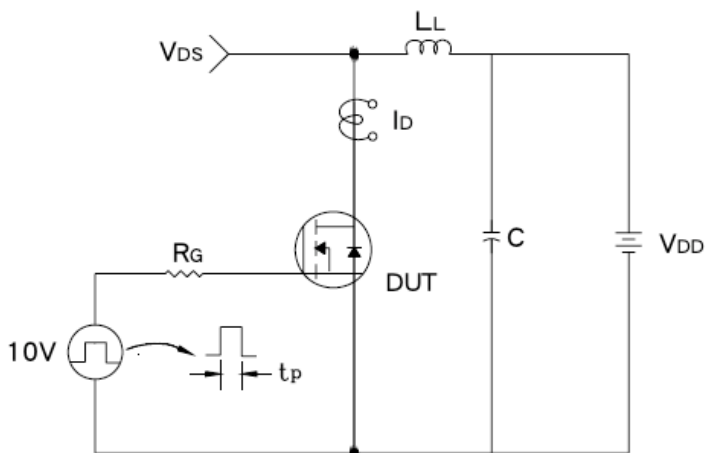
Gate Charge Test Circuit & Waveform



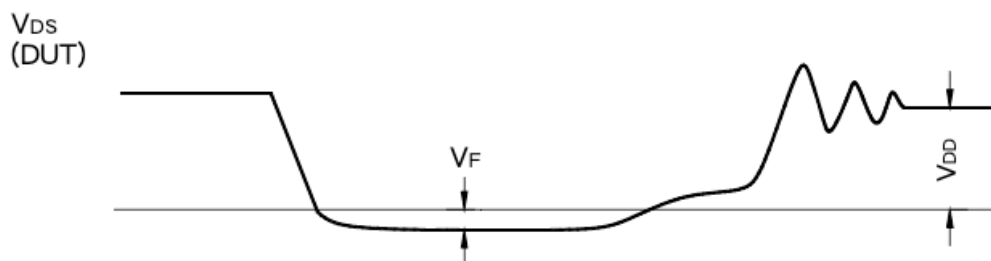
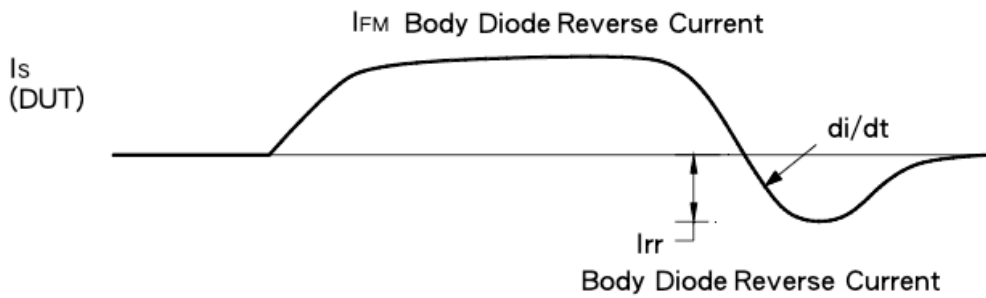
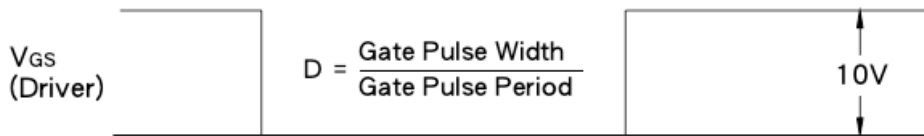
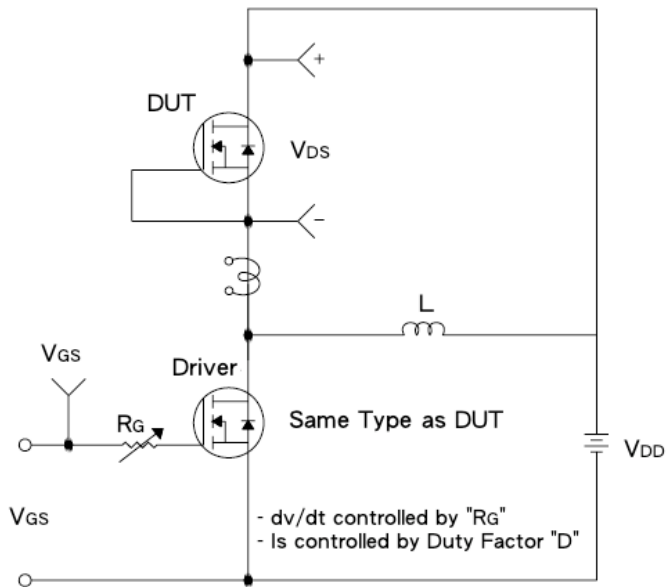
Resistive Switching Test Circuit & Waveform



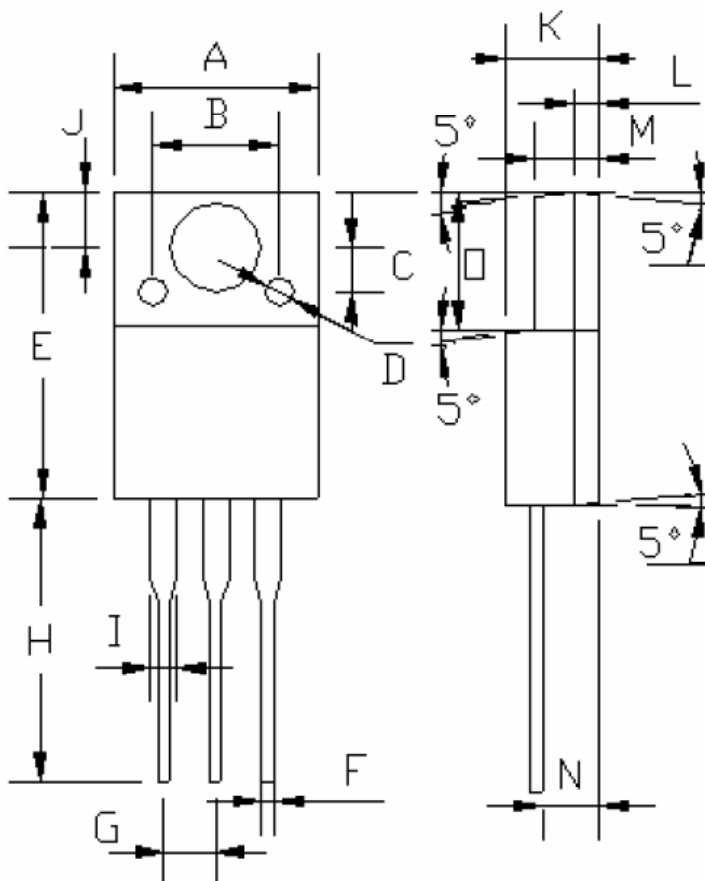
E_{AS} Test Circuit & Waveform



Diode Reverse Recovery Time Test Circuit & Waveform

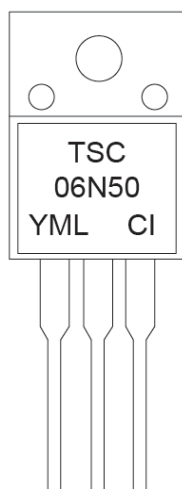


ITO-220 Mechanical Drawing



ITO-220 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	10.04	10.07	0.395	0.396
B	6.20 (typ.)		0.244 (typ.)	
C	2.20 (typ.)		0.087 (typ.)	
D	Ø 1.40 (typ.)		Ø 0.055 (typ.)	
E	15.0	15.20	0.591	0.598
F	0.52	0.54	0.020	0.021
G	2.35	2.73	0.093	0.107
H	13.50	13.55	0.531	0.533
I	1.11	1.49	0.044	0.058
J	2.60	2.80	0.102	0.110
K	4.49	4.50	0.176	0.177
L	1.15 (typ.)		0.045 (typ.)	
M	3.03	3.05	0.119	0.120
N	2.60	2.80	0.102	0.110
O	6.55	6.65	0.258	0.262

Marking Diagram



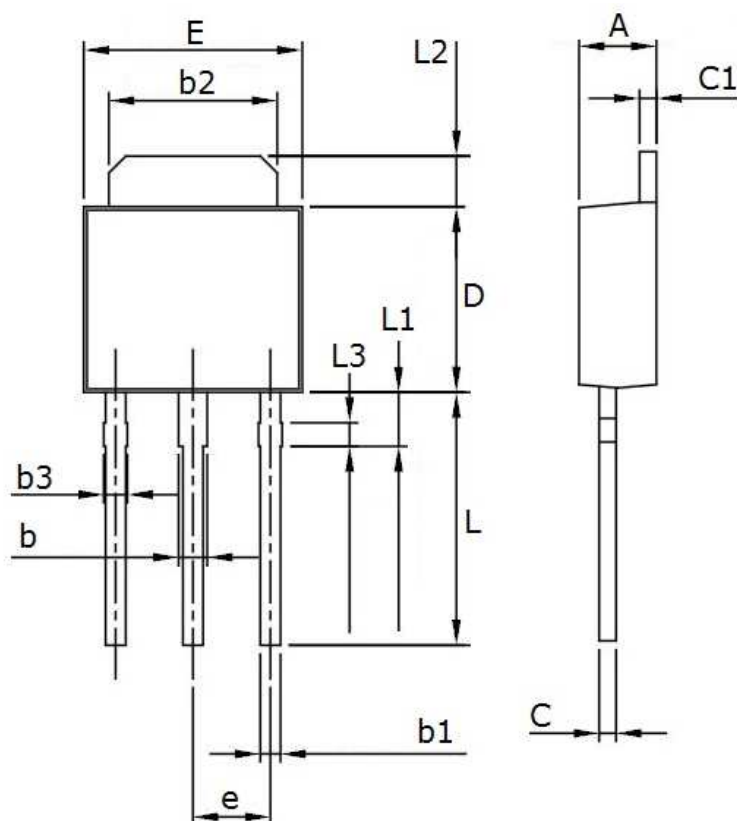
Y = Year Code

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)

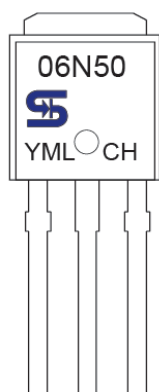
L = Lot Code

TO-251 Mechanical Drawing



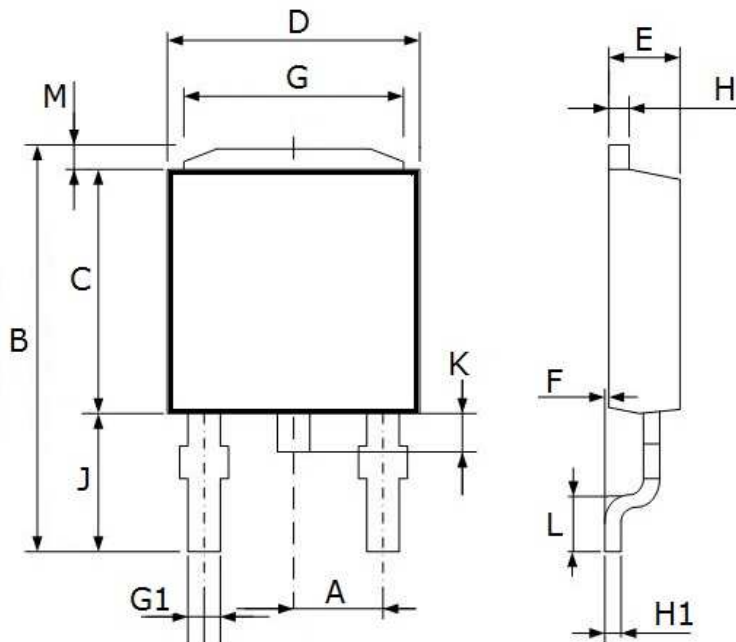
TO-251 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.10	2.50	0.083	0.098
b	0.65	1.05	0.026	0.041
b1	0.58	0.62	0.023	0.024
b2	4.80	5.20	0.189	0.205
b3	0.68	0.72	0.027	0.028
C	0.35	0.65	0.014	0.026
C1	0.40	0.60	0.016	0.024
D	5.30	5.70	0.209	0.224
E	6.30	6.70	0.248	0.264
e	2.30 BSC		0.09 BSC	
L	7.00	8.00	0.276	0.315
L1	1.40	1.80	0.055	0.071
L2	1.30	1.70	0.051	0.067
L3	0.50	0.90	0.020	0.035

Marking Diagram



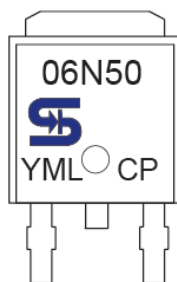
- Y** = Year Code
- M** = Month Code for Halogen Free Product
(O=Jan, P=Feb, Q=Mar, R=Apl, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)
- L** = Lot Code

TO-252 Mechanical Drawing



TO-252 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.30 BSC		0.090 BSC	
B	10.20	10.80	0.402	0.425
C	5.30	5.70	0.209	0.224
D	6.30	6.70	0.248	0.264
E	2.10	2.50	0.083	0.098
F	0.00	0.20	0.000	0.008
G	4.80	5.20	0.189	0.205
G1	0.40	0.80	0.016	0.031
H	0.40	0.60	0.016	0.024
H1	0.35	0.65	0.014	0.026
J	3.35	3.65	0.132	0.144
K	0.50	1.10	0.020	0.043
L	0.90	1.50	0.035	0.059
M	1.30	1.70	0.051	0.067

Marking Diagram



Y = Year Code

M = 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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