TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

Preliminary

TSM10N60

600V N-Channel Power MOSFET

ITO-220



Pin Definition:
1. Gate
2. Drain
3. Source

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$(Ω)	I_D (A)
600	0.75 @ V_{GS} =10V	4.75

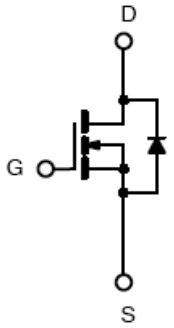
General Description

The TSM10N60 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. These devices are well suited for high efficiency switch mode power supply, power factor correction, electronic lamp ballast based on half bridge.

Features

- Low $R_{DS(ON)}$ 0.75Ω (Max.)
- Low gate charge typical @ 45nC (Typ.)
- Low Crss typical @ 20pF (Typ.)
- Fast Switching

Block Diagram



N-Channel MOSFET

Ordering Information

Part No.	Package	Packing
TSM10N60CI C0	ITO-220	50pcs / Tube

Absolute Maximum Rating (Ta = 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	Ta = 25ºC	I_D	9.5	A
	Ta = 100ºC		5.8	A
Pulsed Drain Current*		I_{DM}	38	A
Avalanche Current (Single) (Note 2)		I_{AS}	9.5	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	487	mJ
Avalanche Current (Repetitive) (Note 1)		I_{AR}	38	A
Repetitive Avalanche Energy (Note 1)		E_{AR}	14.5	mJ
Maximum Power Dissipation @Ta = 25°C		P_D	43	W
Operating Junction Temperature		T_J	150	ºC
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	$R\Theta_{JC}$	2.90	°C/W
Thermal Resistance - Junction to Ambient	$R\Theta_{JA}$	62.5	°C/W

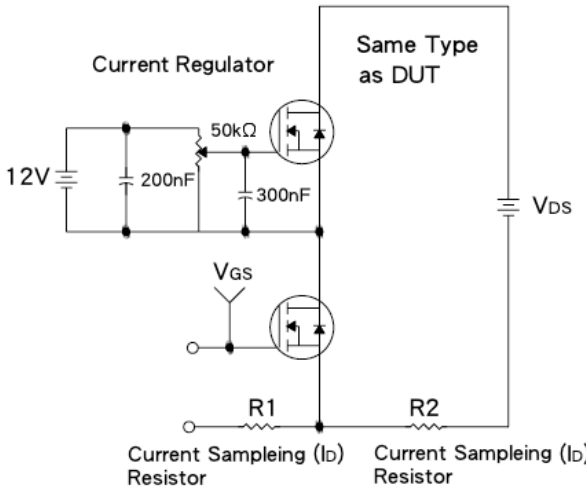
Notes: Surface mounted on FR4 board t ≤ 10sec

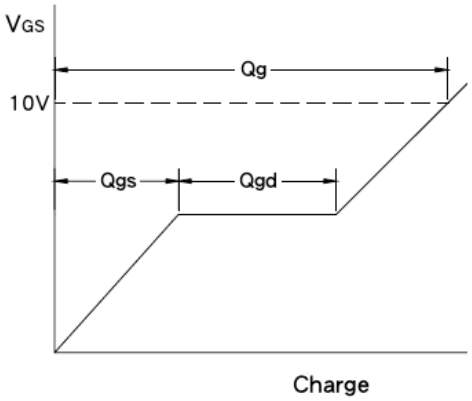
Electrical Specifications (Ta = 25°C unless otherwise noted)

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 = 4.75A	$R_{DS(ON)}$	--	0.65	0.75	Ω
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250uA	$V_{GS(TH)}$	2.0	--	4.0	V
Zero Gate Voltage Drain Current	V_{DS} = 600V, V_{GS} = 0V	I_{DSS}	--	--	1	uA
Gate Body Leakage	V_{GS} = ±30V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Forward Transfer Conductance	V_{DS} = 40V, I_D = 4.75A	g_{fs}	--	11	--	S
Diode Forward Voltage	I_S = 9.5A, V_{GS} = 0V	V_{SD}	--	--	1.4	V
Dynamic [b]						
Total Gate Charge	V_{DS} = 480V, I_D = 9.5A, V_{GS} = 10V	Q_g	--	45	57	nC
Gate-Source Charge		Q_{gs}	--	6.7	--	
Gate-Drain Charge		Q_{gd}	--	18.5	--	
Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	1380	1820	pF
Output Capacitance		C_{oss}	--	155	210	
Reverse Transfer Capacitance		C_{rss}	--	20	28	
Switching [c]						
Turn-On Delay Time	V_{GS} = 10V, I_D = 9.5A, V_{DD} = 300V, R_G = 25Ω	$t_{d(on)}$	--	25	--	nS
Turn-On Rise Time		t_r	--	72	--	
Turn-Off Delay Time		$t_{d(off)}$	--	145	--	
Turn-Off Fall Time		t_f	--	75	--	
Reverse Recovery Time	V_{GS} = 0V, I_S = 9.5A, dI_F/dt = 100A/us	t_{fr}	--	400	--	nS
Reverse Recovery Charge		Q_{fr}	--	4.0	--	uC

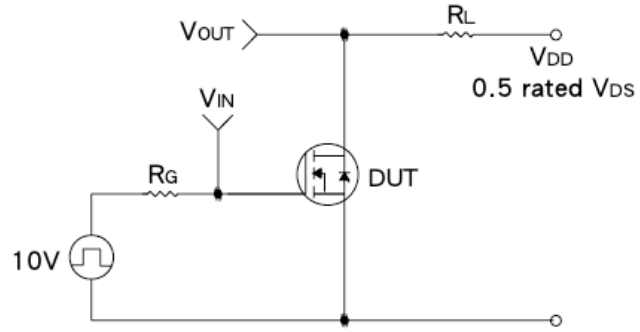
Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. V_{DD} = 50V, I_{AS}=9.5A, L=9.9mH, R_G=25Ω
3. Pulse test: pulse width ≤300uS, duty cycle ≤2%
4. Essentially Independent of Operating Temperature

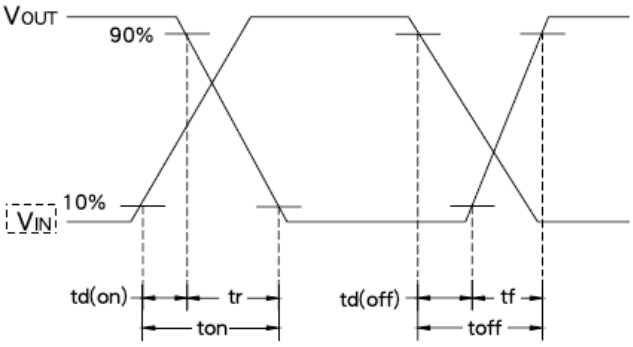
Gate Charge Test Circuit & Waveform



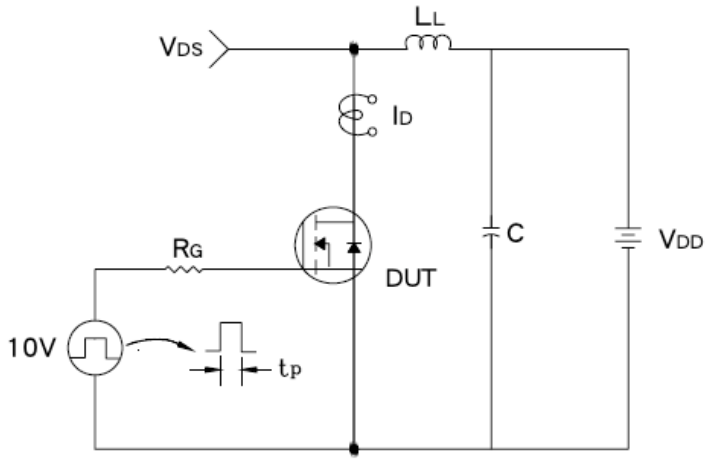


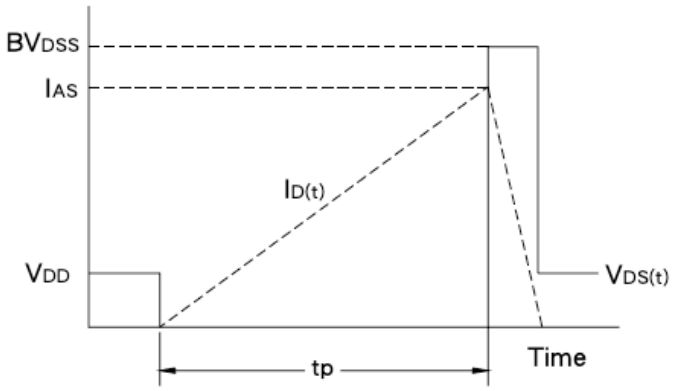
Resistive Switching Test Circuit & Waveform



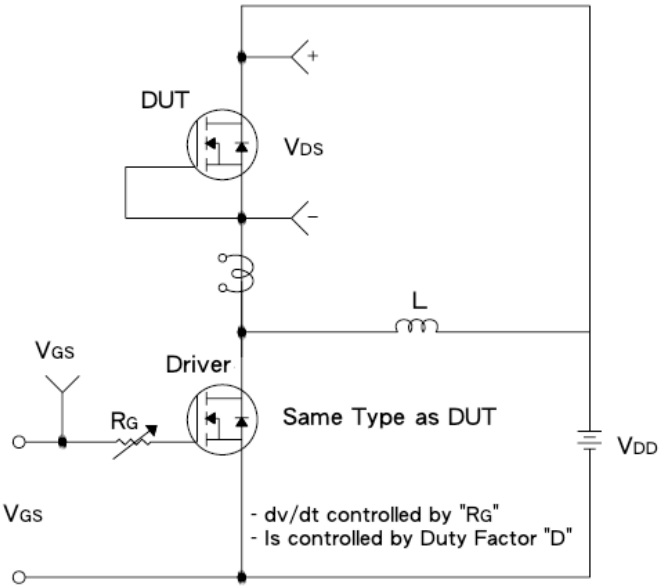


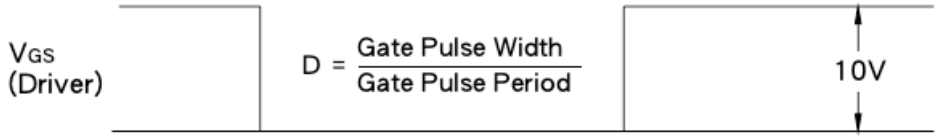
E_{AS} Test Circuit & Waveform

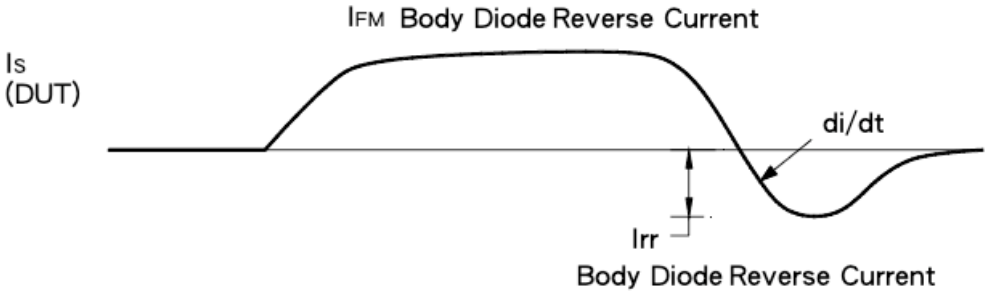


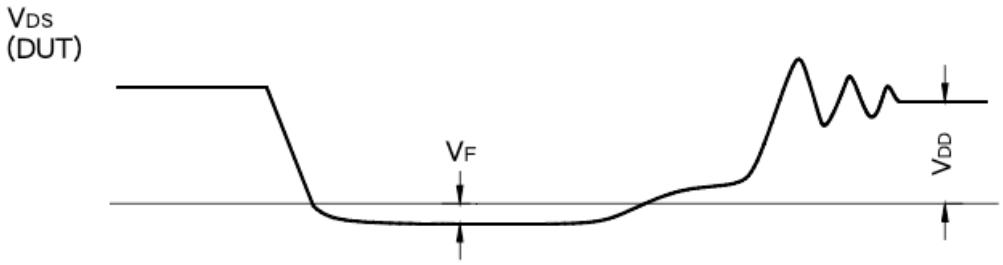


Diode Reverse Recovery Time Test Circuit & Waveform

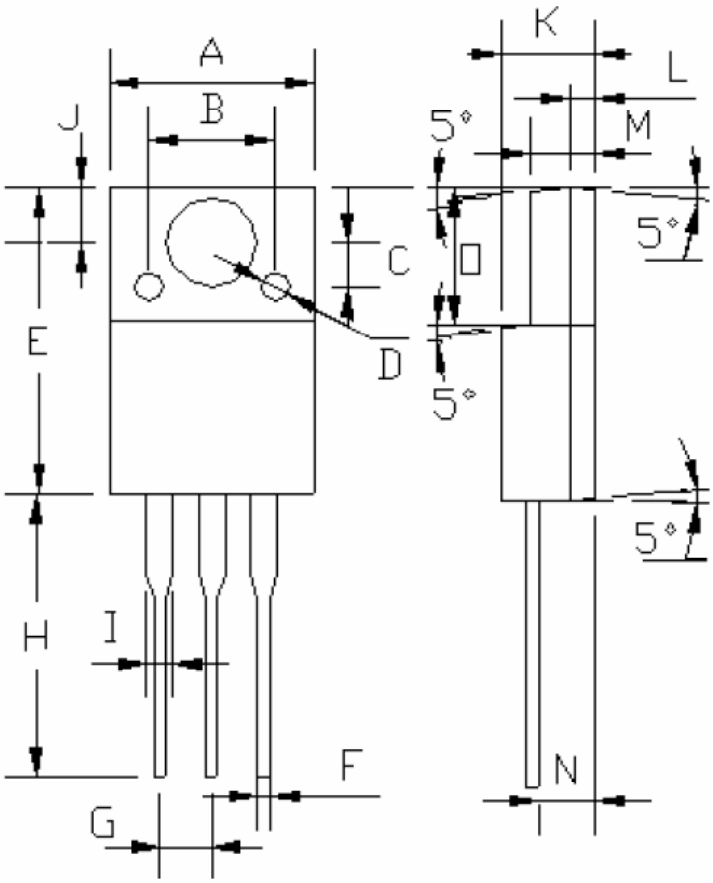








ITO-220 Mechanical Drawing



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	∮ 1.40 (typ.)		∮ 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

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