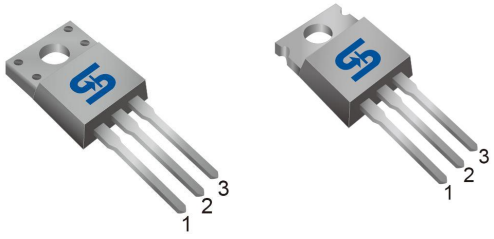
TAIWAN SEMICONDUCTOR

TSM13N50A

500V N-Channel MOSFET

Pb-Free RoHS COMPLIANT

ITO-220 **TO-220**



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

Key Parameter Performance

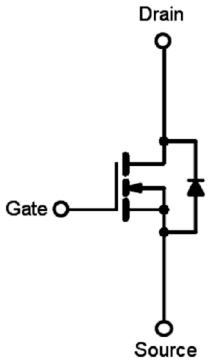
Parameter	Value	Unit
V_{DS}	500	V
$R_{DS(on)}$ (max)	0.48	q
Q_g	31	nC

Features

ð Improved dv/dt capability

ð 100% EAS Guaranteed

Block Diagram



N-Channel MOSFET

Ordering Information

Part No.	Package	Packing
TSM13N50ACI C0G	ITO-220	50pcs / Tube
TSM13N50ACZ C0G	TO-220	50pcs / Tube

Note: ñGòdenotes for Halogen- and Antimony-free as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds

Absolute Maximum Ratings (T_C=25°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 (Note 1)	T_C = 25°C	I_D	13	A
	T_C = 100°C		8	
Pulsed Drain Current (Note 1,2,3)		I_{DM}	52	A
Total Power Dissipation @ T_C=25°C		P_{DTOT}	52	W
Single Pulsed Avalanche Energy (Note 4)		E_{AS}	542	mJ
Operating Junction and Storage Temperature Range		T_J, T_{STG}	- 55 to +150	°C

Thermal Performance

Parameter	Symbol	Limit		Unit
		ITO220	TO-220	
Junction to Case Thermal Resistance	$R_{\theta JC}$	2.4	0.6	°C/W
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	65	62.5	°C/W

TSM13N50A

500V N-Channel MOSFET

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

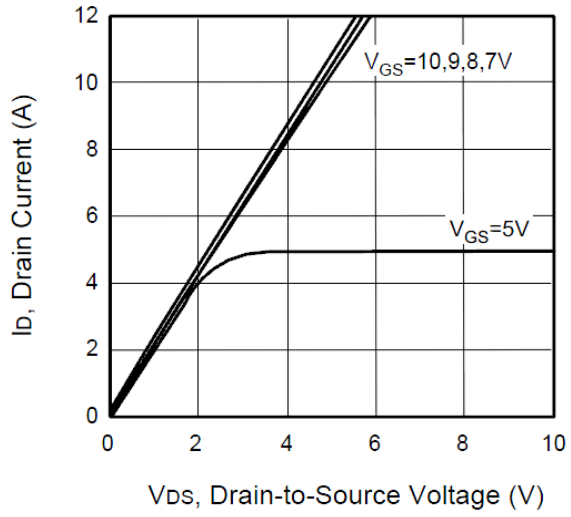
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static (Note 5)						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	BV_{DSS}	500	--	--	V
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	$V_{GS(TH)}$	2	--	4	V
Gate Body Leakage	V_{GS} = ±30V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V_{DS} = 500V, V_{GS} = 0V	I_{DSS}	--	--	1	μA
Drain-Source On-State Resistance	V_{GS} = 10V, I_D =6.5A	$R_{DS(ON)}$	--	0.38	0.48	q
Dynamic (Note 6)						
Total Gate Charge	V_{DS} = 400V, I_D = 13A, V_{GS} = 10V	Q_g	--	31	40	nC
Gate-Source Charge		Q_{gs}	--	11	--	
Gate-Drain Charge		Q_{gd}	--	7	--	
Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	1965	--	pF
Output Capacitance		C_{oss}	--	185	--	
Reverse Transfer Capacitance		C_{rss}	--	11	--	
Switching (Note 6)						
Turn-On Delay Time	V_{DD} = 200V R_{GEN} = 25q I_D = 13A, V_{GS} = 10V	$t_{d(on)}$	--	32	--	ns
Turn-On Rise Time		t_r	--	18	--	
Turn-Off Delay Time		$t_{d(off)}$	--	79	--	
Turn-Off Fall Time		t_f	--	16	--	
Source-Drain Diode						
Forward On Voltage	I_S=13A, V_{GS}=0V	V_{SD}	--	--	1.4	V

Notes:

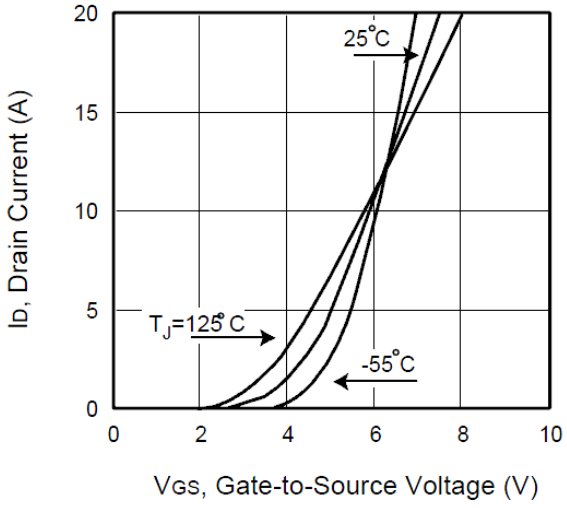
1. Current limited by package
2. Pulse width limited by the maximum junction temperature
3. Pulse width limited by safe operating area
4. L=15mH, I_{AS}=8.5A, V_{DD}=50V, R_G=25q , Starting T_J=25°C
5. Pulse test: pulse width Ò800μS, duty cycle Ò2%
6. Guaranteed by design, not subject to production testing.

Electrical Characteristics Curves

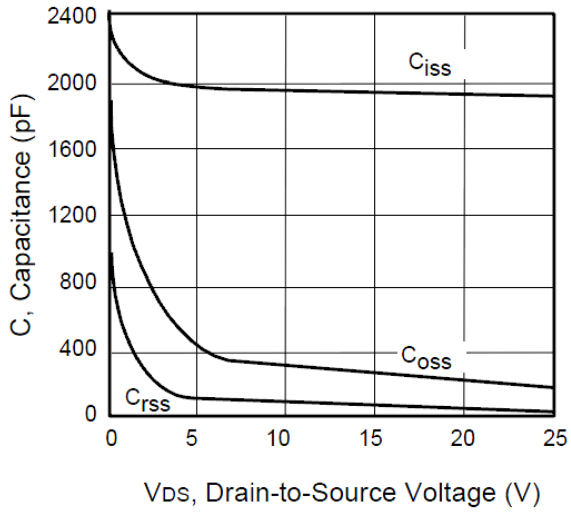
Output Characteristics



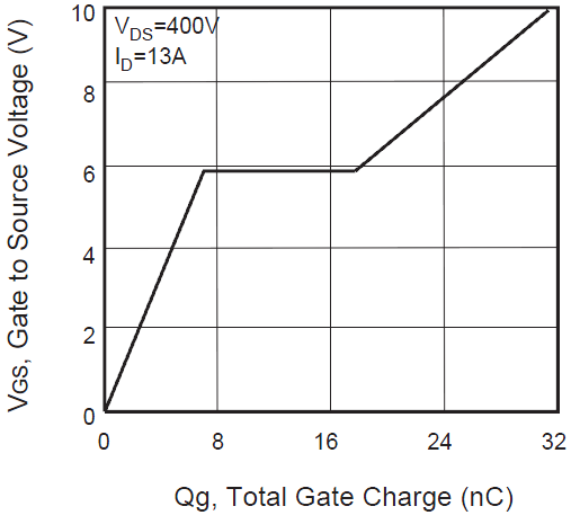
Transfer Characteristics



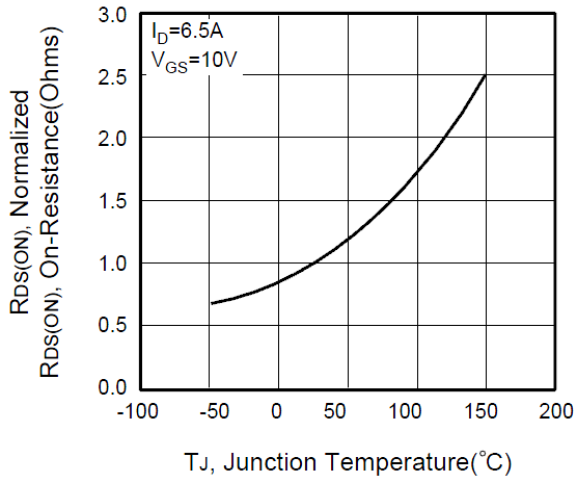
Capacitance



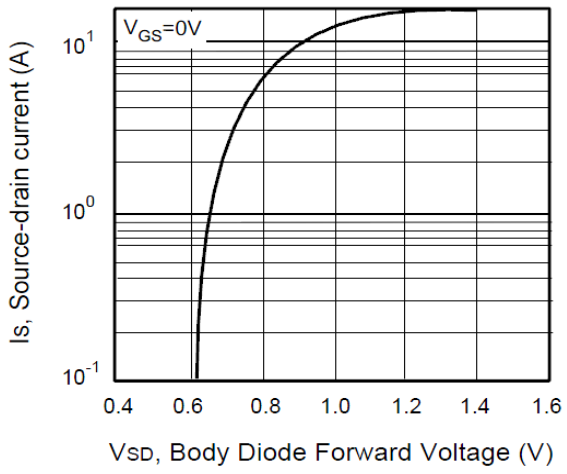
Gate Charge



On-Resistance vs. Junction Temperature

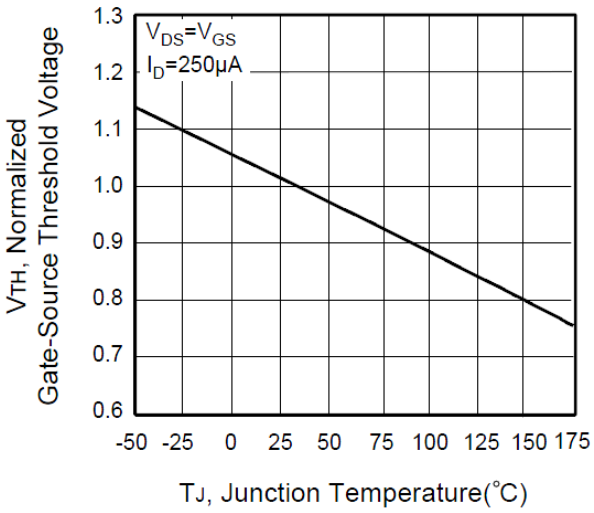


Source-Drain Diode Forward Voltage

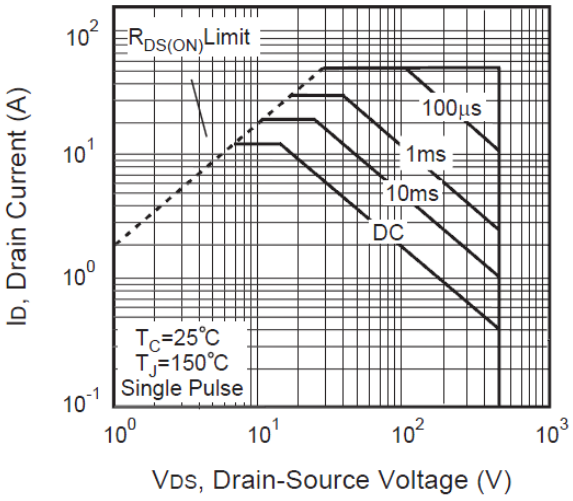


Electrical Characteristics Curves

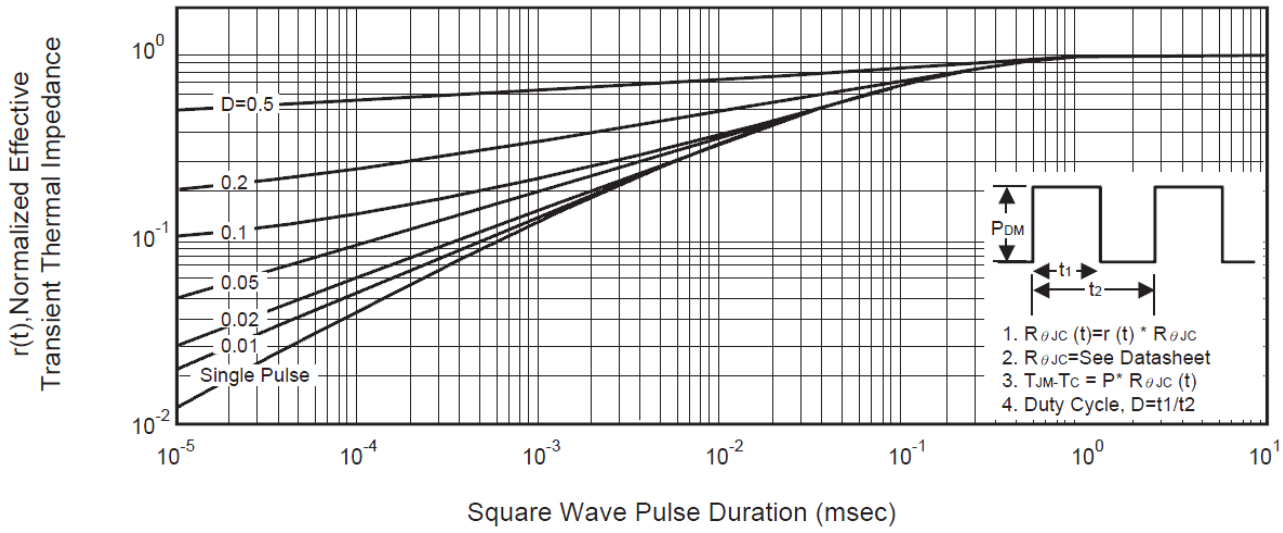
Threshold Voltage vs. Junction Temperature



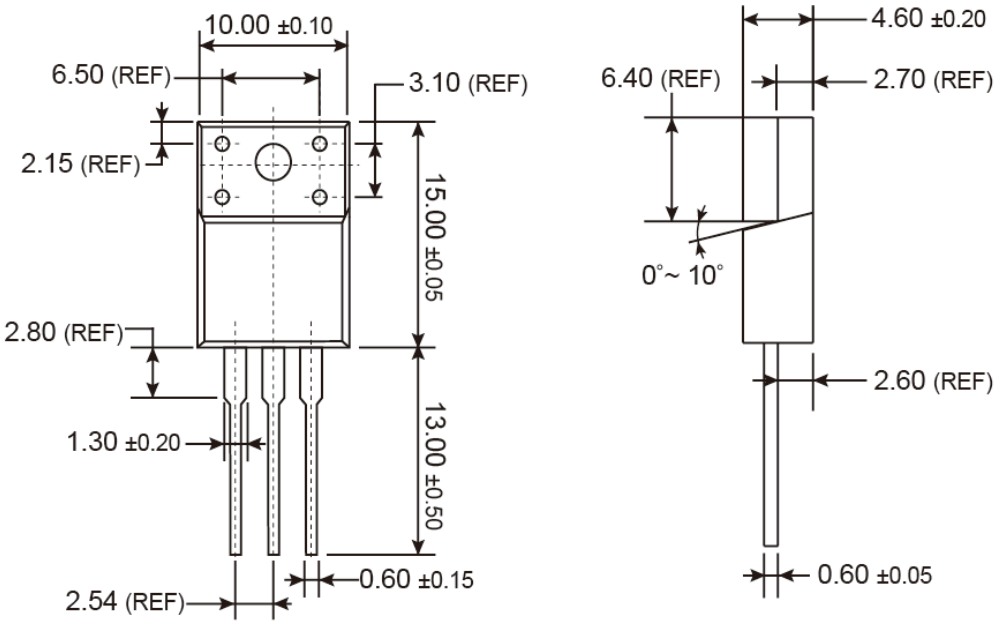
Maximum Safe Operating Area



Normalized Thermal Transient Impedance Curve

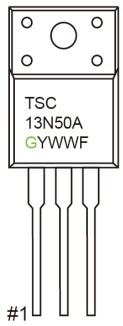


ITO-220 Mechanical Drawing



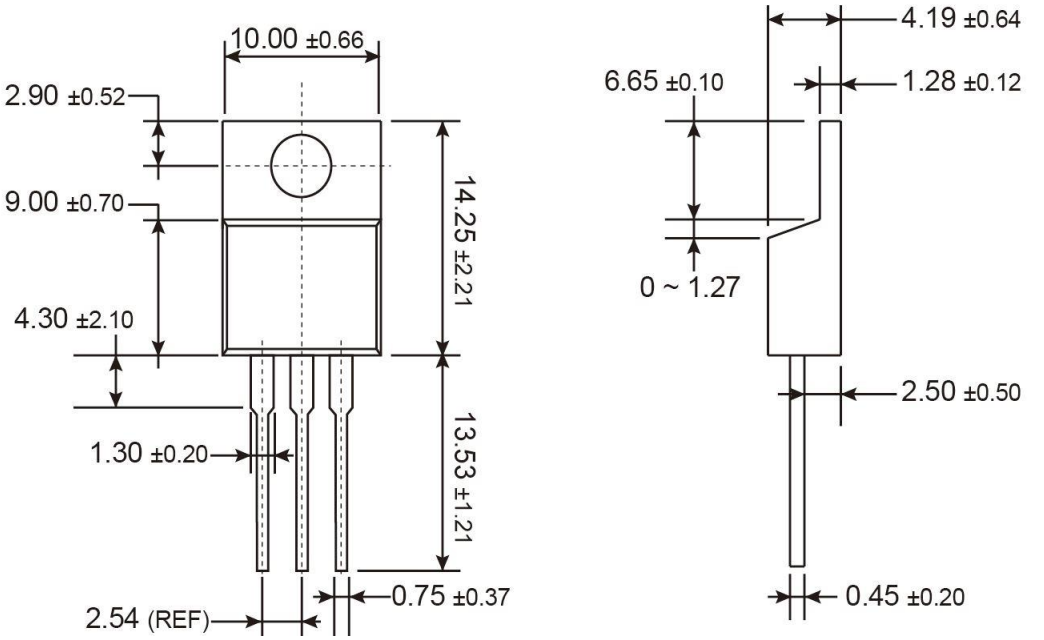
Unit: Millimeters

Marking Diagram



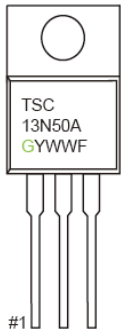
G = Halogen Free
Y = Year Code
WW = Week Code (01~52)
F = Factory Code

TO-220 Mechanical Drawing



Unit: Millimeters

Marking Diagram



G = Halogen Free
Y = Year Code
W = Week Code (01~52)
F = Factory Code

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