



TX1S50N06LA4

Silicon N-Channel Power MOSFET

General Description :

The TX1S50N06LA4 uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge. It can be used in a wide variety of applications. The package form is TO-252, which accords with the RoHS standard.

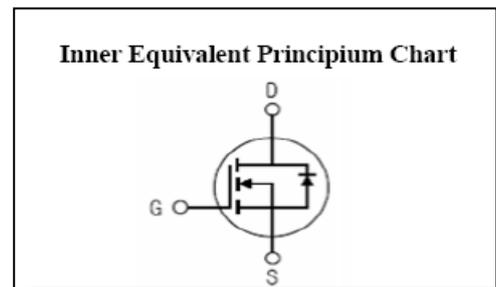
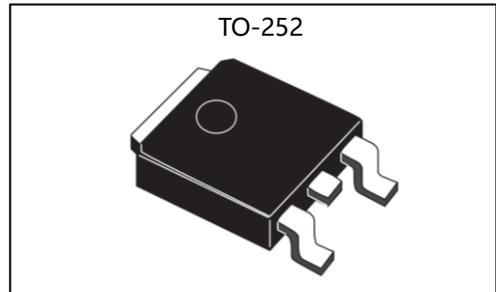
Features :

- Fast Switching
- Low Gate Charge and R_{dson}
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

Applications :

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

V_{DSS}	60	V
I_D	50	A
P_D	85	W
$R_{DS(ON)type}$	13.5	m Ω



Absolute ($T_c = 25^\circ\text{C}$ unless otherwise specified) :

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	60	V
I_D	Continuous Drain Current	50	A
	Continuous Drain Current $T_C = 100^\circ\text{C}$	35	A
I_{DM}	Pulsed Drain Current	200	A
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}^{a2}	Single Pulse Avalanche Energy	300	mJ
E_{AR}^{a1}	Avalanche Energy ,Repetitive	50	mJ
I_{AR}^{a1}	Avalanche Current	28	A
dv/dt^{a3}	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation	85	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	175 , -55 to 175	$^\circ\text{C}$
T_L	MaximumTemperature for Soldering	300	$^\circ\text{C}$



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Electrical Characteristics ($T_c = 25^\circ\text{C}$ unless otherwise specified) :

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Bvdss Temperature Coefficient	$I_D=250\mu A, \text{Reference } 25^\circ\text{C}$	--	0.1	--	V/ $^\circ\text{C}$
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=60V, V_{GS}=0V, T_a=25^\circ\text{C}$	--	--	1	μA
		$V_{DS}=48V, V_{GS}=0V, T_a=125^\circ\text{C}$	--	--	250	
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=+20V$	--	--	1	μA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-20V$	--	--	-1	μA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=20A$	--	13.5	18	m Ω
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.5	1.85	2.5	V
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{fs}	Forward Transconductance	$V_{DS}=5V, I_D=20A$	18	--	--	S
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=30V$ $f=1.0\text{MHz}$	--	2050	--	μF
C_{oss}	Output Capacitance		--	158	--	
C_{rss}	Reverse Transfer Capacitance		--	120	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=20A, V_{DD}=30V$ $V_{GS}=10V, R_G=3.0\Omega$	--	7.5	--	ns
t_r	Rise Time		--	5.0	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	28.0	--	
t_f	Fall Time		--	5.5	--	
Q_g	Total Gate Charge	$I_D=20A, V_{DD}=30V$ $V_{GS}=10V$	--	50	--	nC
Q_{gs}	Gate to Source Charge		--	6	--	
Q_{gd}	Gate to Drain ("Miller") Charge		--	15	--	



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Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	50	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	200	A
V_{SD}	Diode Forward Voltage	$I_S=50A, V_{GS}=0V$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S=20A, T_j = 25^\circ C$	--	30	--	ns
Q_{rr}	Reverse Recovery Charge	$di_F/dt=100A/us, V_{GS}=0V$	--	40	--	nC
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						

Symbol	Parameter	Typ.	Units
$R_{\theta JA}$	Junction-to-Ambient	1.8	$^\circ C/W$

a¹ : Repetitive rating; pulse width limited by maximum junction temperature

a² : EAS condition : $T_j=25^\circ C, V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25\Omega$

a³ : $I_{SD} = 20A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}, Start T_j=25^\circ C$

Test Circuit and Waveform

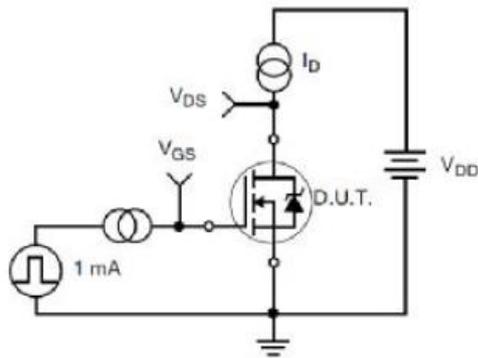


Figure 17. Gate Charge Test Circuit

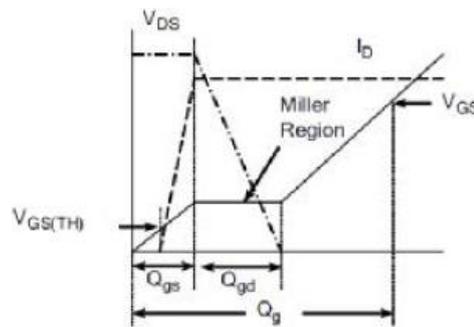


Figure 18. Gate Charge Waveform

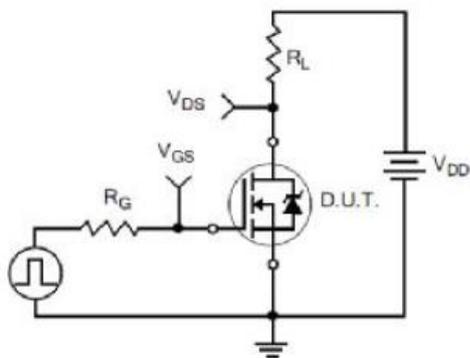


Figure 19. Resistive Switching Test Circuit

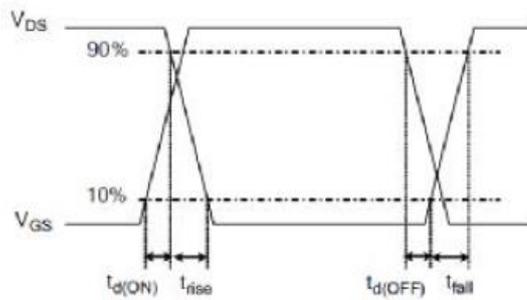


Figure 20. Resistive Switching Waveforms



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Characteristics Curve :

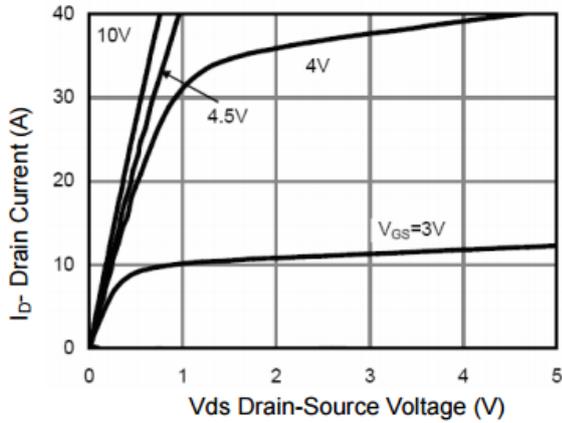


Figure 1 Output Characteristics

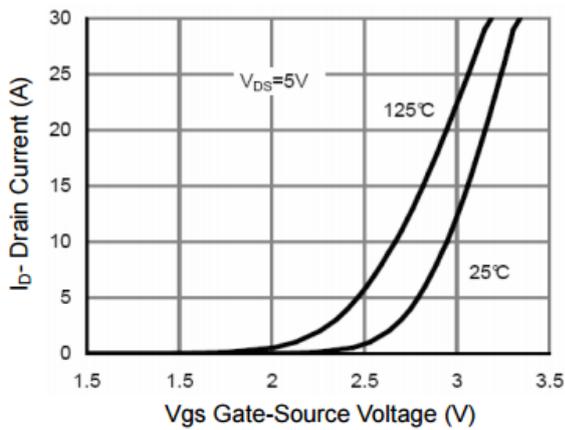


Figure 2 Transfer Characteristics

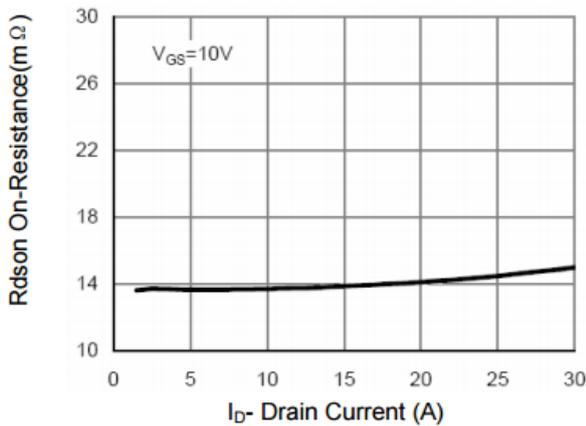


Figure 3 Rdson- Drain Current

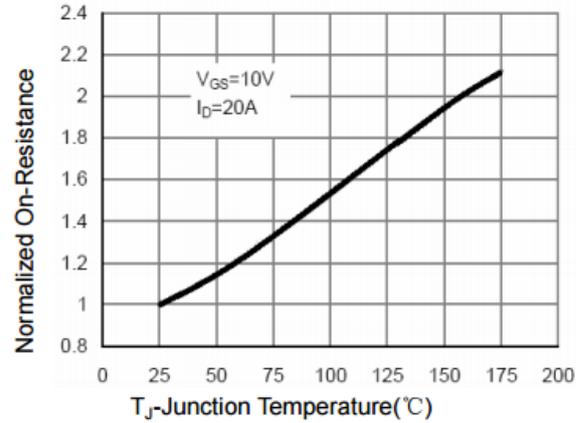


Figure 4 Rdson-Junction Temperature

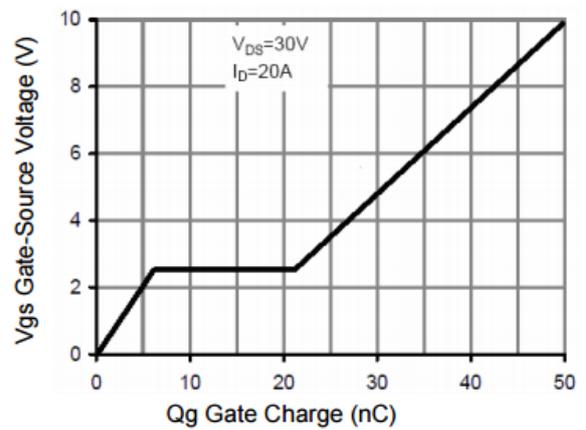


Figure 5 Gate Charge

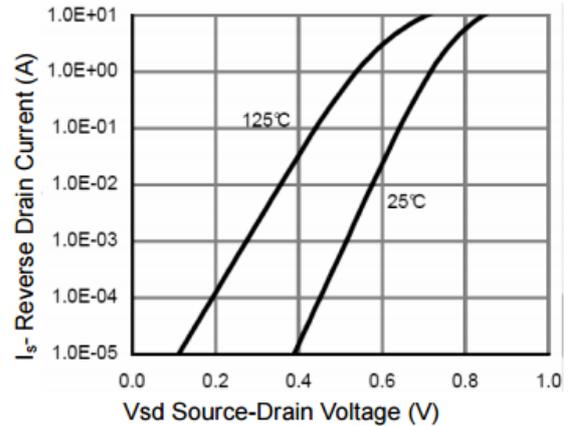


Figure 6 Source- Drain Diode Forward



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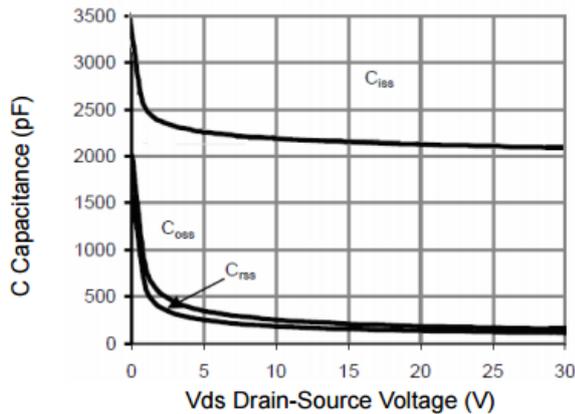


Figure 7 Capacitance vs Vds

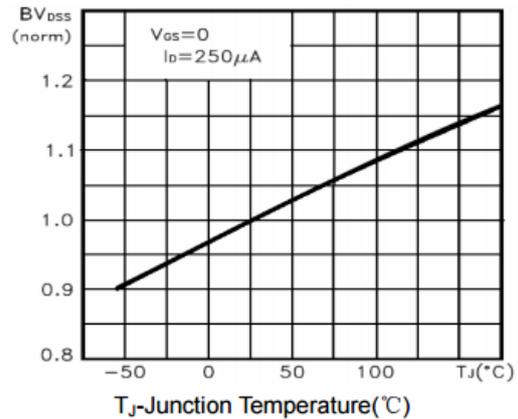


Figure 9 BV_{DSS} vs Junction Temperature

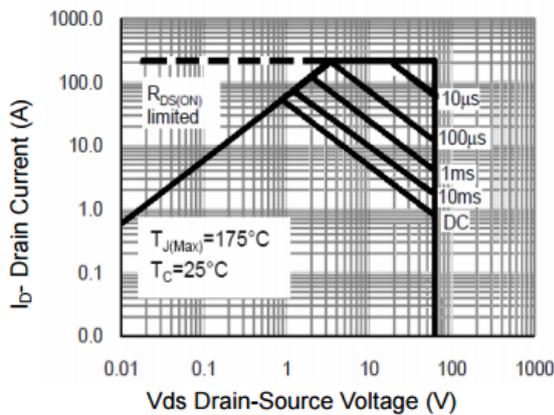


Figure 8 Safe Operation Area

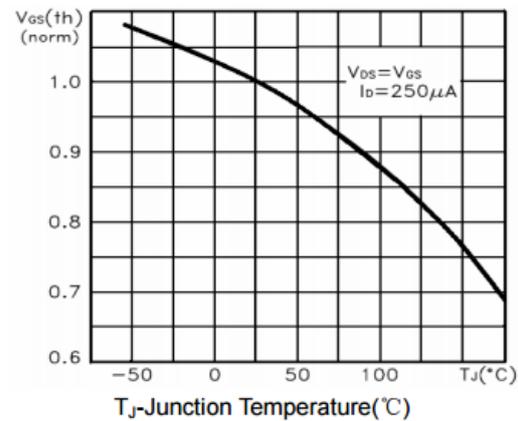


Figure 10 $V_{GS(th)}$ vs Junction Temperature

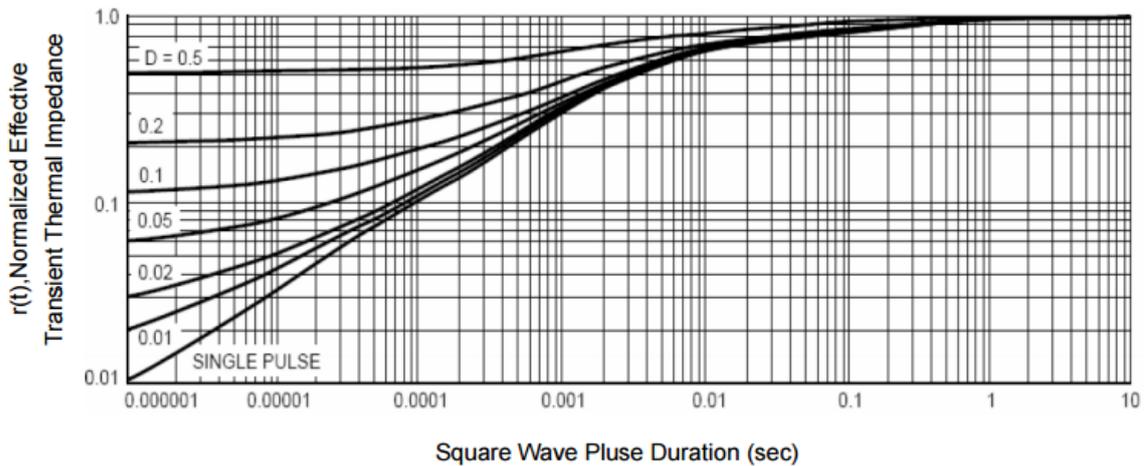


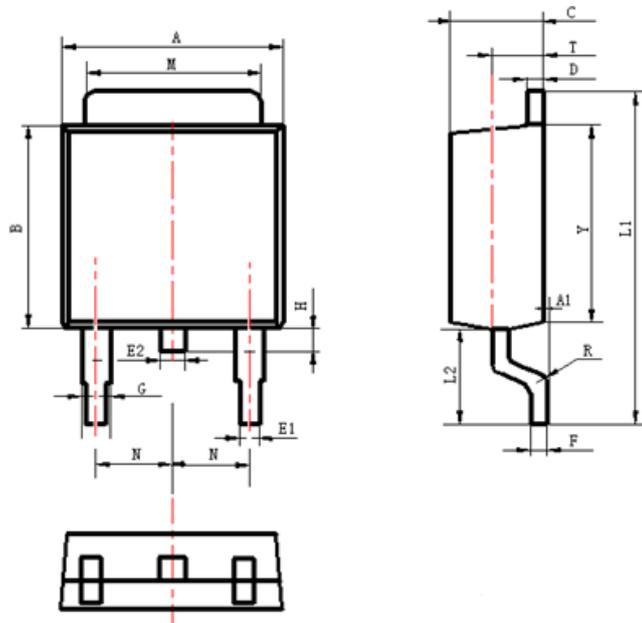
Figure 11 Normalized Maximum Transient Thermal Impedance



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Package Information



Items	Values(mm)	
	MIN	MAX
A	6.30	6.90
A1	0	0.16
B	5.70	6.30
C	2.10	2.50
D	0.30	0.70
E1	0.60	0.90
E2	0.70	1.00
F	0.30	0.60
G	0.70	1.20
L1	9.60	10.50
L2	2.70	3.10
H	0.40	1.00
M	5.10	5.50
N	2.09	2.49
R	0.3	
T	1.40	1.60
Y	5.10	6.30

TO-252 Package

Tongxin wei (Shenzhen) Semiconductor Co.,Ltd