

## 1A, 600V N-CHANNEL MOSFET

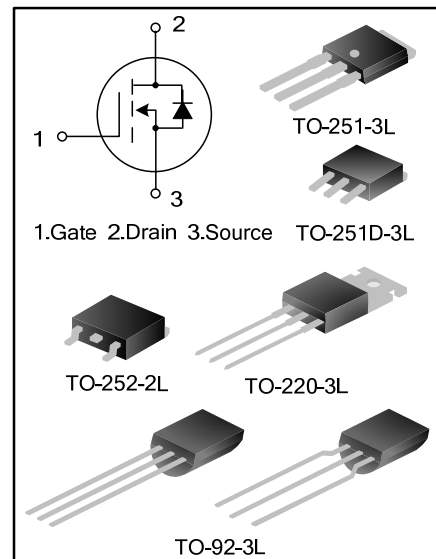
### GENERAL DESCRIPTION

SVD1N60M/T/B/D is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary S-Rin™ structure VDMOS technology. The improved planar stripe cell and the improved guard ring terminal have been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

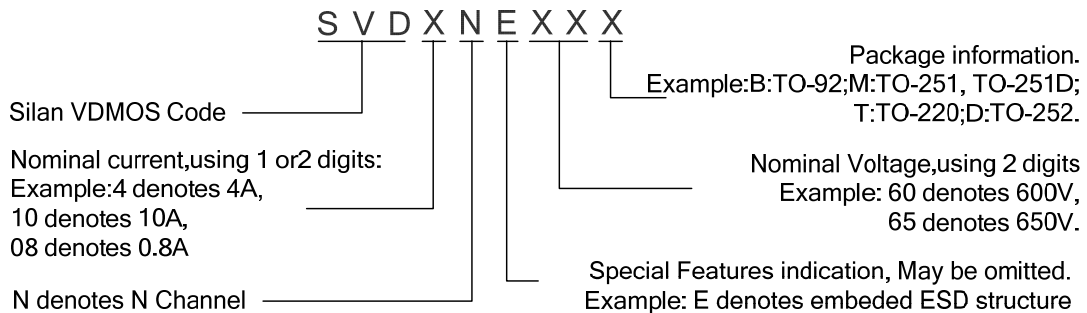
These devices are widely used in AC-DC power suppliers, DC-DC converters and H-bridge PWM motor drivers.

### FEATURES

- \* 1A,600V,RDS(on) (typ.) =8.6Ω@VGS=10V
- \* Low gate charge
- \* Low Crss
- \* Fast switching
- \* Improved dv/dt capability



### NOMENCLATURE



### ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SVD1N60M	TO-251-3L	SVD1N60M	Pb free	Tube
SVD1N60M	TO-251D-3L	SVD1N60M	Pb free	Tube
SVD1N60T	TO-220-3L	SVD1N60T	Pb free	Tube
SVD1N60B	TO-92-3L	1N60B	Pb free	Bulk
SVD1N60BTR	TO-92-3L	1N60B	Pb free	AMMO
SVD1N60D	TO-252-2L	SVD1N60D	Pb free	Tube
SVD1N60DTR	TO-252-2L	SVD1N60D	Pb free	Tape & Reel

**ABSOLUTE MAXIMUM RATINGS** (Tc=25°C unless otherwise noted)

Characteristics	Symbol	Rating			Unit
		SVD1N60M/D	SVD1N60T	SVD1N60B	
Drain-Source Voltage	V <sub>DS</sub>	600			V
Gate-Source Voltage	V <sub>GS</sub>	±30			V
Drain Current	I <sub>D</sub>	1.0			A
Drain Current Pulsed	I <sub>DM</sub>	4.0			A
Power Dissipation(Tc=25°C) -Derate above 25°C	P <sub>D</sub>	28	41	9	W
		0.22	0.33	0.072	W/°C
Single Pulsed Avalanche Energy (Note 1)	E <sub>AS</sub>	47			mJ
Operation Junction Temperature Range	T <sub>J</sub>	-55~+150			°C
Storage Temperature Range	T <sub>stg</sub>	-55~+150			°C

**THERMAL CHARACTERISTICS**

Characteristics	Symbol	Rating			Unit
		SVD1N60M/D	SVD1N60T	SVD1N60B	
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	4.55	3.03	13.9	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	110	62.5	120	°C/W

**ELECTRICAL CHARACTERISTICS** (Tc=25°C unless otherwise noted)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	600	--	--	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =600V, V <sub>GS</sub> =0V	--	--	1.0	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	--	--	±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> =250μA	2.0	--	4.0	V
Static Drain- Source On State	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =0.5 A	--	8.6	11	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHZ	--	156	170	pF
Output Capacitance	C <sub>oss</sub>		--	16	25	
Reverse Transfer Capacitance	C <sub>rss</sub>		--	1.0	4.5	
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =300V, I <sub>D</sub> =1.0A, R <sub>G</sub> =25Ω  (Note 2,3)	--	8.7	24	ns
Turn-on Rise Time	t <sub>r</sub>		--	9.9	52	
Turn-off Delay Time	t <sub>d(off)</sub>		--	36	50	
Turn-off Fall Time	t <sub>f</sub>		--	9.0	64	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =480V, I <sub>D</sub> =1.0A, V <sub>GS</sub> =10V  (Note 2,3)	--	5.2	6.2	nC
Gate-Source Charge	Q <sub>gs</sub>		--	1.2	--	
Gate-Drain Charge	Q <sub>gd</sub>		--	2.1	--	

## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	IS	Integral Reverse P-N Junction Diode in the MOSFET	--	--	1.0	A
Pulsed Source Current	ISM		--	--	4.0	
Diode Forward Voltage	VSD	IS=1.0A, VGS=0V	--	--	1.5	V
Reverse Recovery Time	Trr	IS=1.0A, VGS=0V, dIF/dt=100A/μS (Note 2)	--	190	--	ns
Reverse Recovery Charge	Qrr		--	0.53	--	μC

Notes:

1. L=30mH, IAS=1.65A, VDD=105V, RG=25Ω, starting T<sub>J</sub>=25°C;
2. Pulse Test: Pulse width ≤300μs, Duty cycle ≤2%;
3. Essentially independent of operating temperature.

**TYPICAL CHARACTERISTICS**

Figure 1. On-Region Characteristics

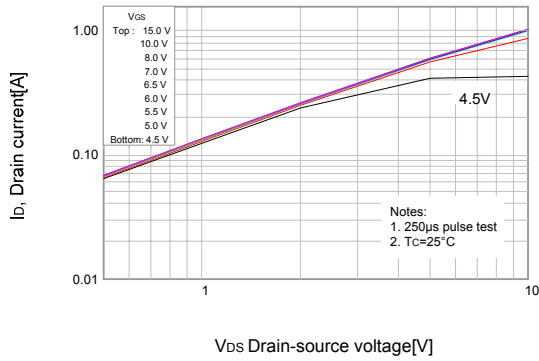


Figure 2. Transfer Characteristics

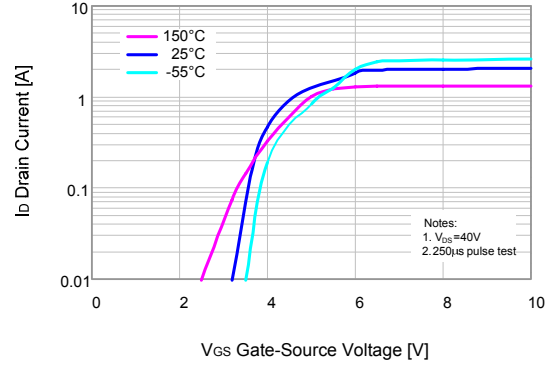


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

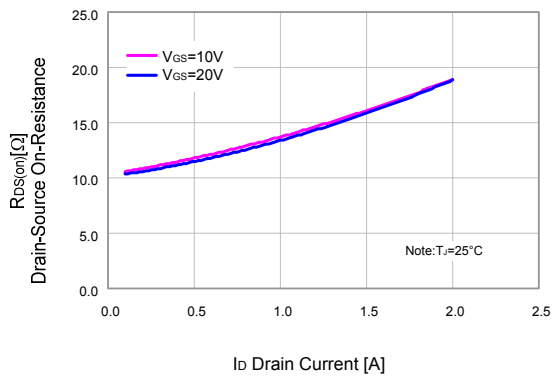


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

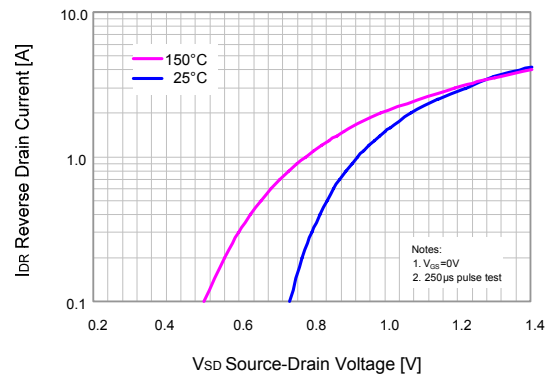


Figure 5. Capacitance Characteristics

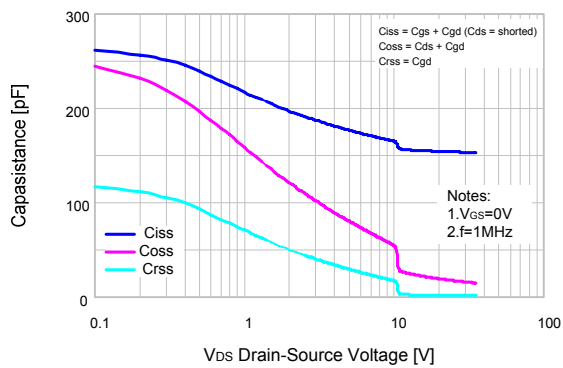
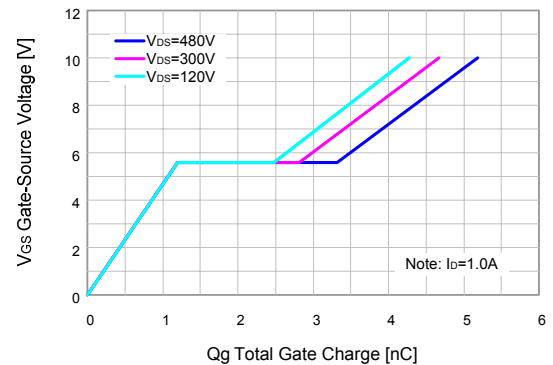
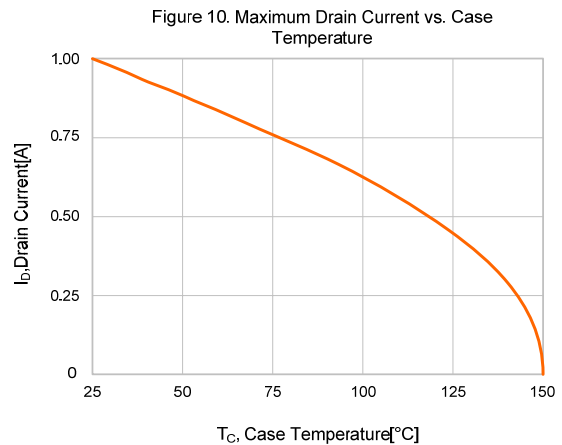
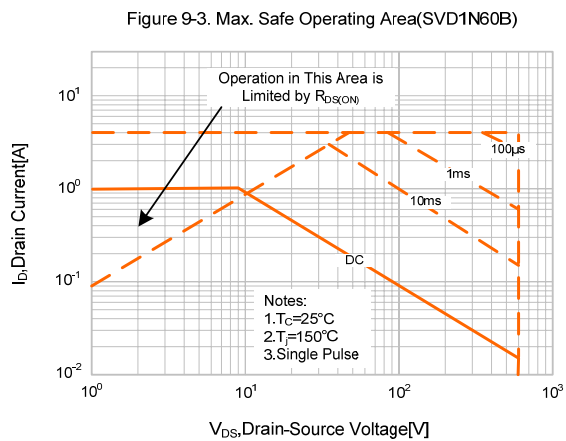
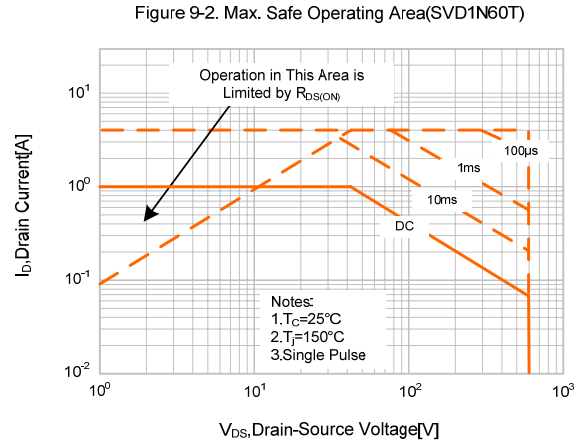
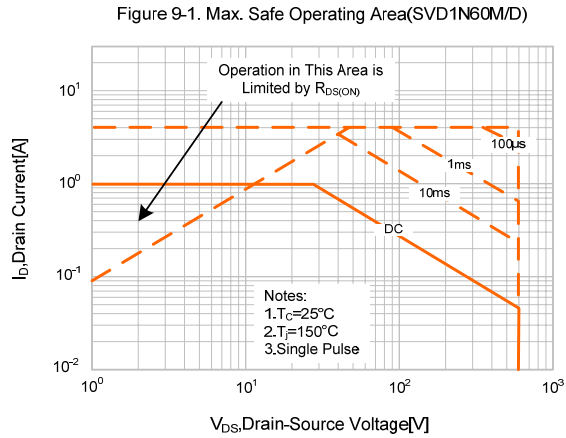
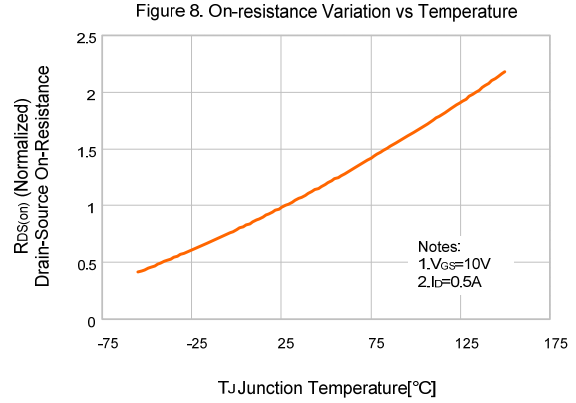
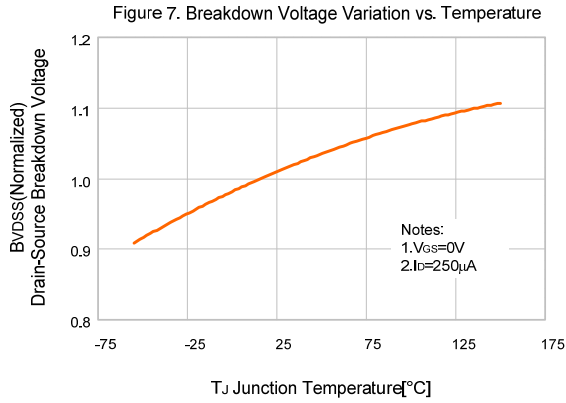


Figure 6. Gate Charge Characteristics

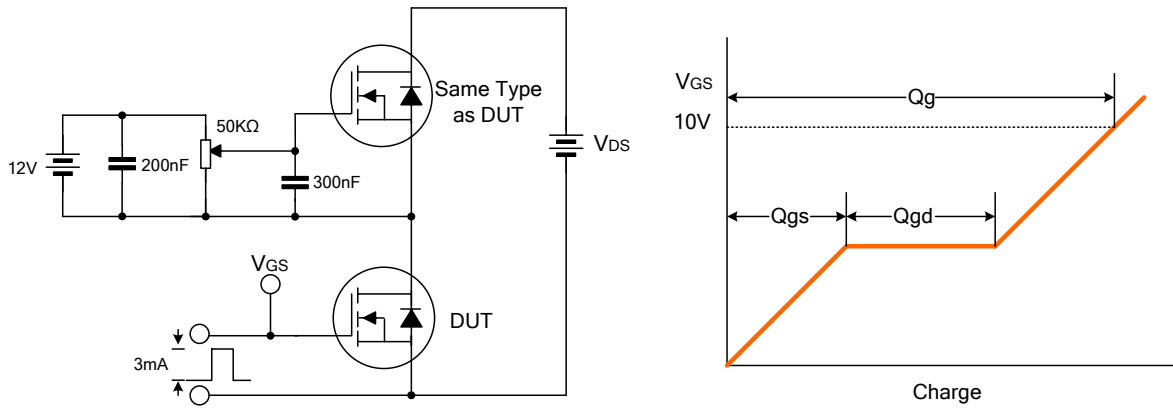


**TYPICAL CHARACTERISTICS (continued)**

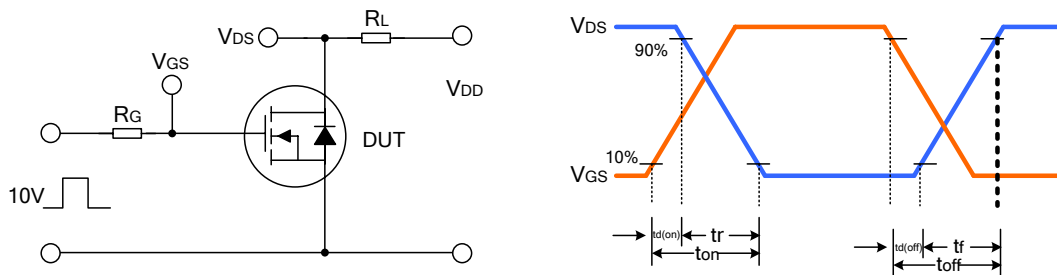


**TYPICAL TEST CIRCUIT**

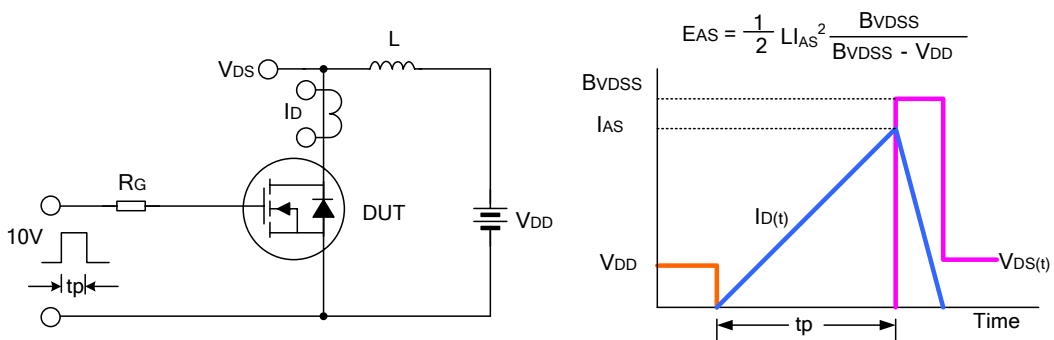
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



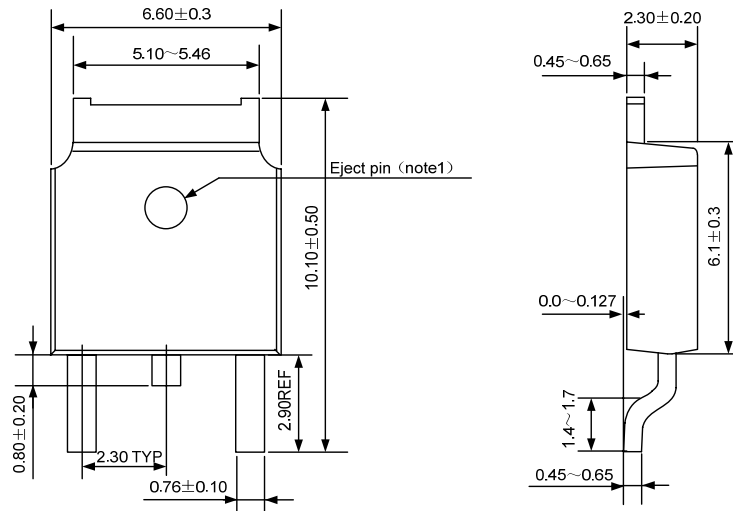
Unclamped Inductive Switching Test Circuit & Waveform



**PACKAGE OUTLINE**

**TO-252-2L**

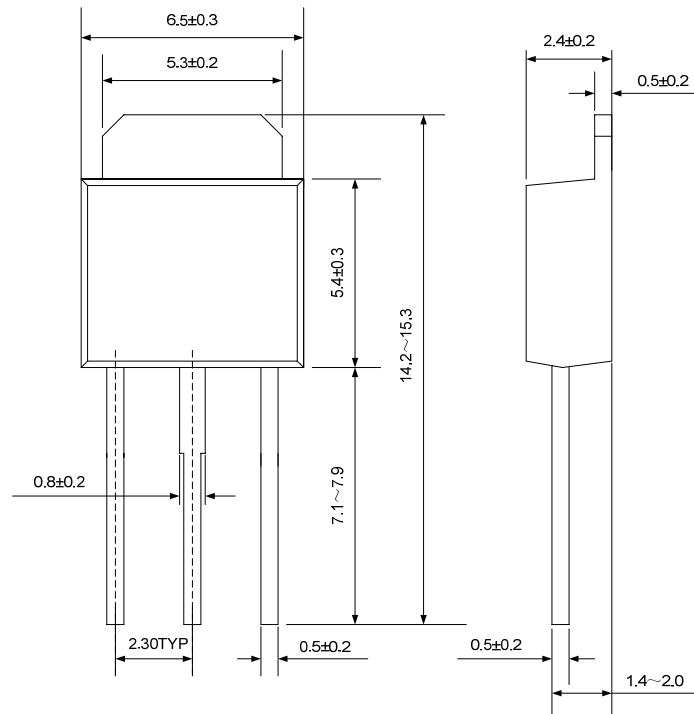
**UNIT: mm**



NOTE1 : There are two conditions for this position:has an eject pin or has no eject pin.

**TO-251-3L**

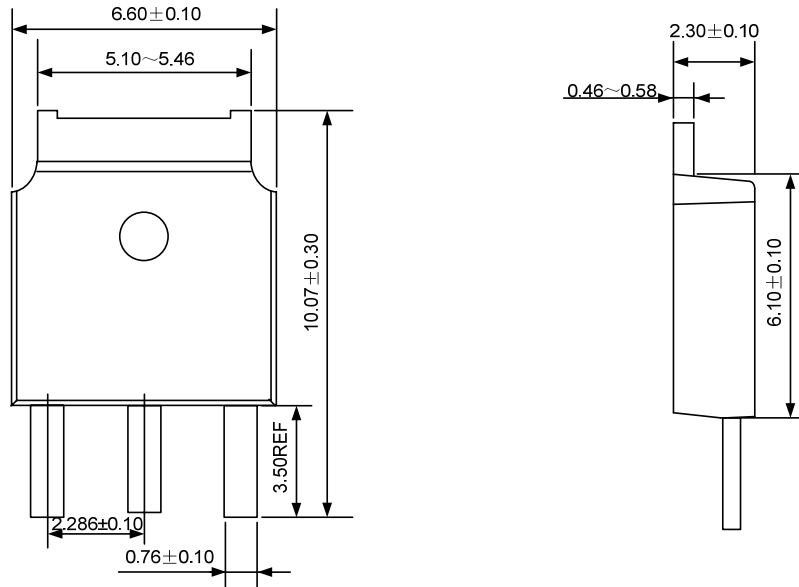
**UNIT: mm**



**PACKAGE OUTLINE (continued)**

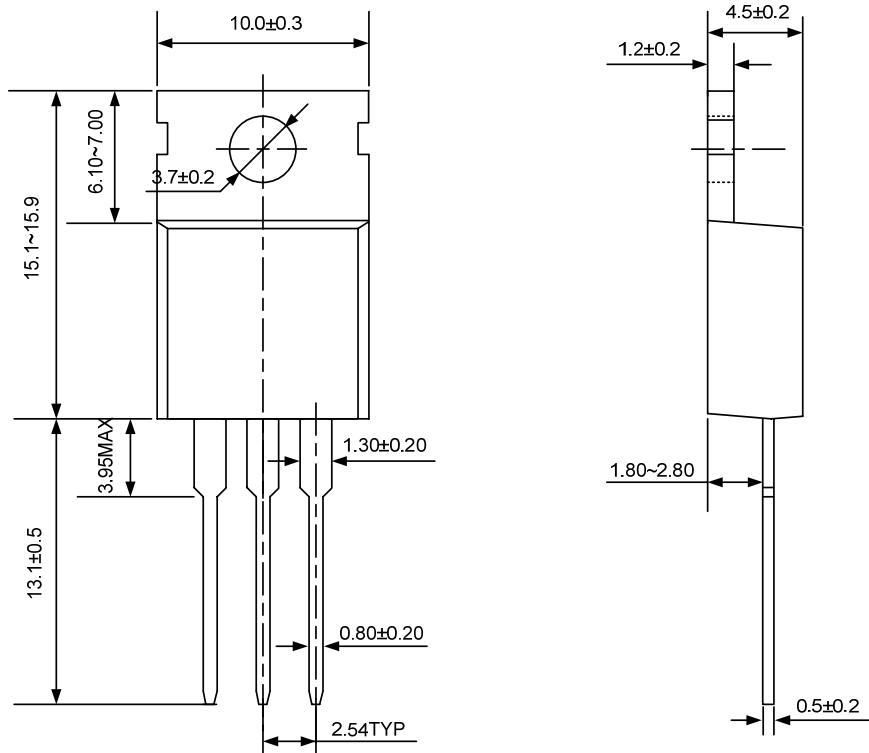
**TO-251D-3L**

**UNIT: mm**



**TO-220-3L**

**UNIT: mm**

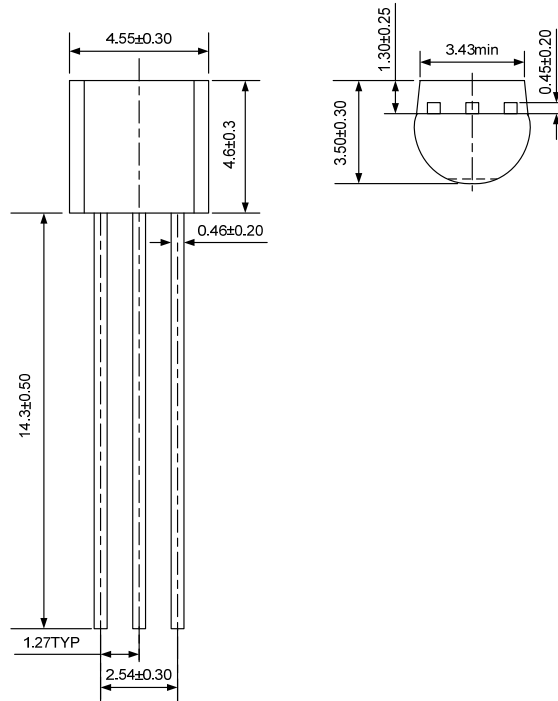




**PACKAGE OUTLINE (continued)**

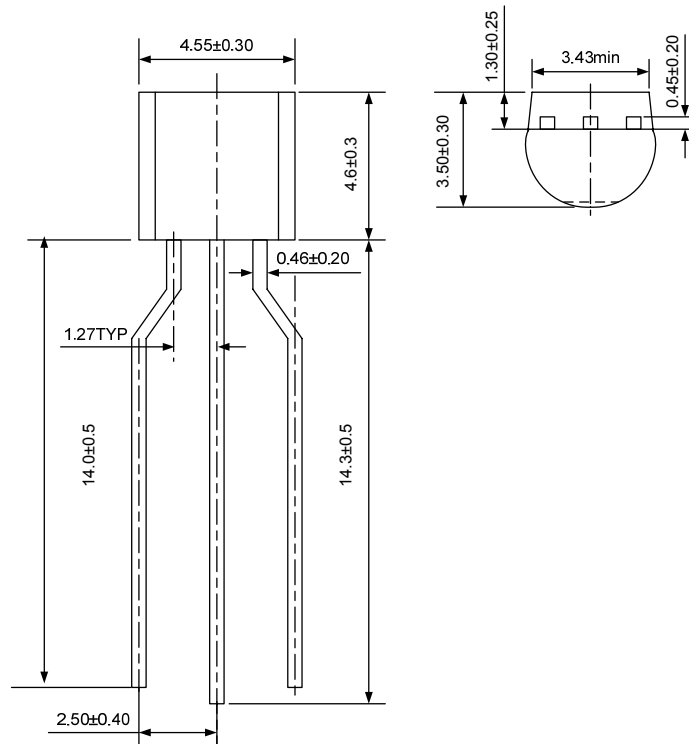
**TO-92-3L(1)**

**UNIT: mm**



**TO-92-3L(2)**

**UNIT: mm**





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- Silan will supply the best possible product for customers!

## ATTACHMENT

### Revision History

Date	REV	Description	Page
2010.08.11	1.0	Original	
2010.08.20	1.1	Modify" THERMAL CHARACTERISTICS", Add SOA	
2010.10.15	1.2	Modify" TYPICAL CHARACTERISTICS"	
2010.10.19	1.3	Modify the template of Datasheet	
2011.06.28	1.4	Add the package of TO-251D-3L	