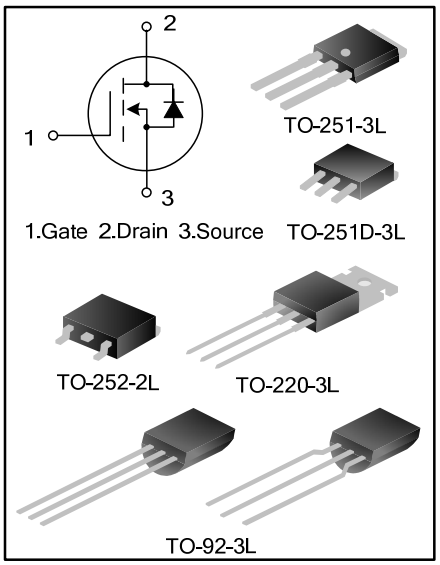
1A, 600V N-CHANNEL MOSFET

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^{TM} 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,$R_{DS(on)}$（typ.）=8.6Ω@V_{GS}=10V
* Low gate charge
* Low C_{rss}
* Fast switching
* Improved dv/dt capability

NOMENCLATURE

S V D X N E X X X

Silan VDMOS Code

Nominal current,using 1 or2 digits:
Example:4 denotes 4A,
10 denotes 10A,
08 denotes 0.8A

N denotes N Channel

Special Features indication, May be omitted.
Example: E denotes embeded ESD structure

Nominal Voltage,using 2 digits
Example: 60 denotes 600V,
65 denotes 650V.

Package information.
Example:B:TO-92;M:TO-251, TO-251D;
T:TO-220;D:TO-252.

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	VDS	600			V
Gate-Source Voltage	VGS	±30			V
Drain Current	ID	1.0			A
Drain Current Pulsed	IDM	4.0			A
Power Dissipation(TC=25°C)	PD	28	41	9	W
-Derate above 25°C		0.22	0.33	0.072	W/°C
Single Pulsed Avalanche Energy (Note 1)	EAS	47			mJ
Operation Junction Temperature Range	TJ	-55～+150			°C
Storage Temperature Range	Tstg	-55～+150			°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Rating			Unit
		SVD1N60M/D	SVD1N60T	SVD1N60B	
Thermal Resistance, Junction-to-Case	RθJC	4.55	3.03	13.9	°C/W
Thermal Resistance, Junction-to-Ambient	RθJA	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	BVDSS	VGS=0V, ID=250μA	600	--	--	V
Drain-Source Leakage Current	IDSS	VDS=600V, VGS=0V	--	--	1.0	μA
Gate-Source Leakage Current	IGSS	VGS=±30V, VDS=0V	--	--	±100	nA
Gate Threshold Voltage	VGS(th)	VGS= VDS, ID=250μA	2.0	--	4.0	V
Static Drain- Source On State	RDS(on)	VGS=10V, ID=0.5 A	--	8.6	11	Ω
Input Capacitance	Ciss	VDS=25V,VGS=0V, f=1.0MHZ	--	156	170	pF
Output Capacitance	Coss		--	16	25	
Reverse Transfer Capacitance	Crss		--	1.0	4.5	
Turn-on Delay Time	td(on)	VDD=300V,ID=1.0A, RG=25Ω (Note 2,3)	--	8.7	24	ns
Turn-on Rise Time	tr		--	9.9	52	
Turn-off Delay Time	td(off)		--	36	50	
Turn-off Fall Time	tf		--	9.0	64	
Total Gate Charge	Qg	VDS=480V,ID=1.0A, VGS=10V (Note 2,3)	--	5.2	6.2	nC
Gate-Source Charge	Qgs		--	1.2	--	
Gate-Drain Charge	Qgd		--	2.1	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	1.0	A
Pulsed Source Current	I_{SM}		--	--	4.0	
Diode Forward Voltage	V_{SD}	I_S=1.0A,V_{GS}=0V	--	--	1.5	V
Reverse Recovery Time	T_{rr}	I_S=1.0A,V_{GS}=0V, dI_F/dt=100A/μS (Note 2)	--	190	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.53	--	μC

Notes:

1. L=30mH,I_{AS}=1.65A,V_{DD}=105V, R_G=25Ω, starting T_J=25°C;
2. Pulse Test: Pulse width ≤300μs,Duty cycle≤2%;
3. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

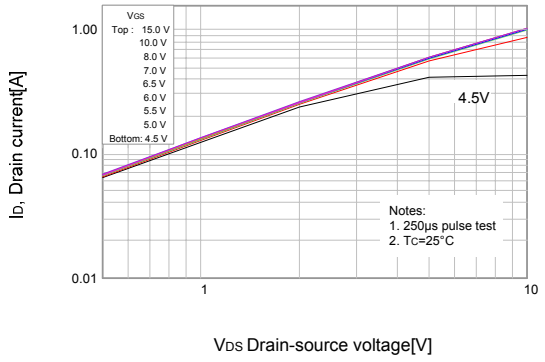


Figure 2. Transfer Characteristics

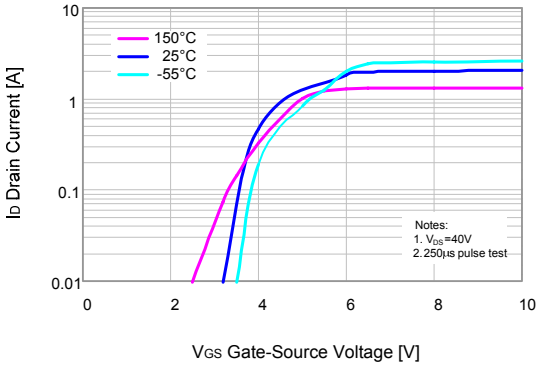


Figure 3. On-Resitance Variation vs. Drain Current and Gate Voltage

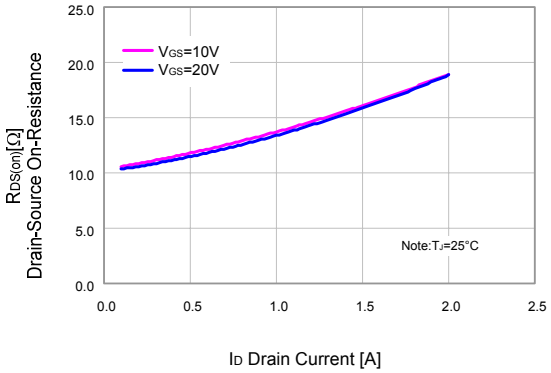


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

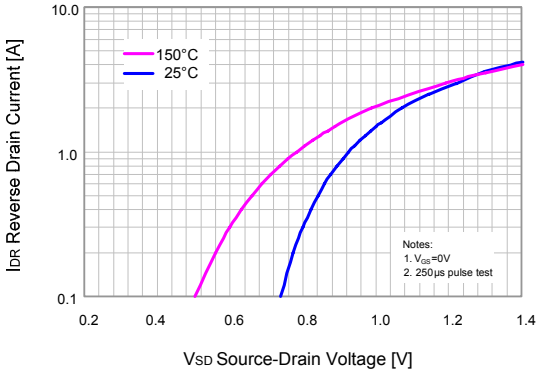


Figure 5. Capacitance Characteristics

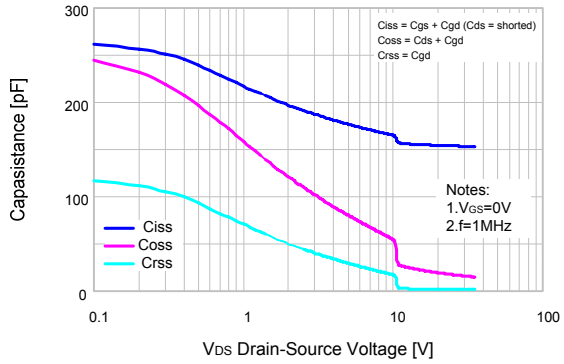
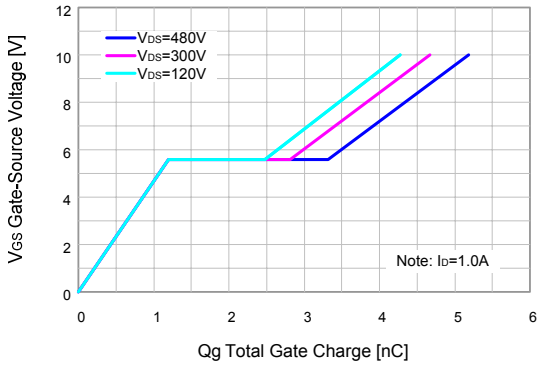


Figure 6. Gate Charge Characteristics



TYPICAL CHARACTERISTICS (continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

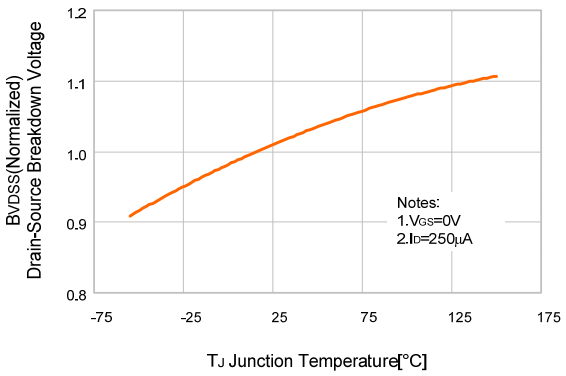


Figure 8. On-resistance Variation vs Temperature

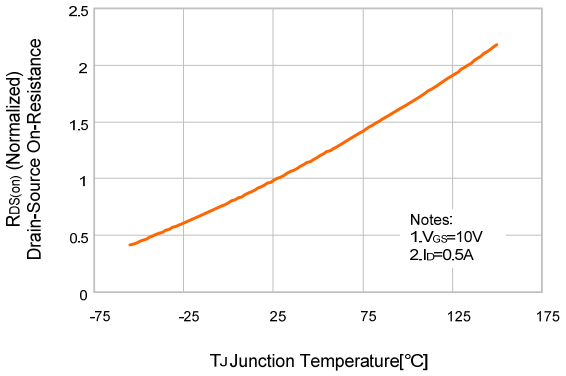


Figure 9-1. Max. Safe Operating Area(SVD1N60M/D)

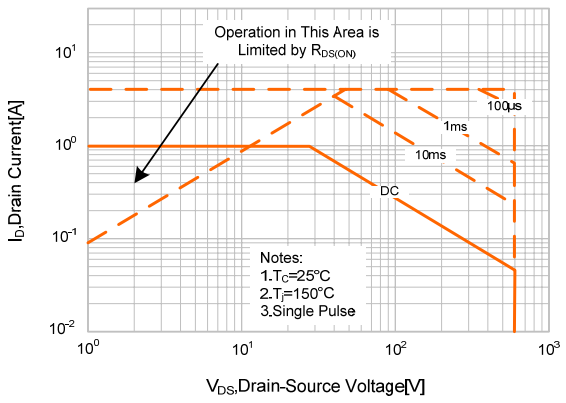


Figure 9-2. Max. Safe Operating Area(SVD1N60T)

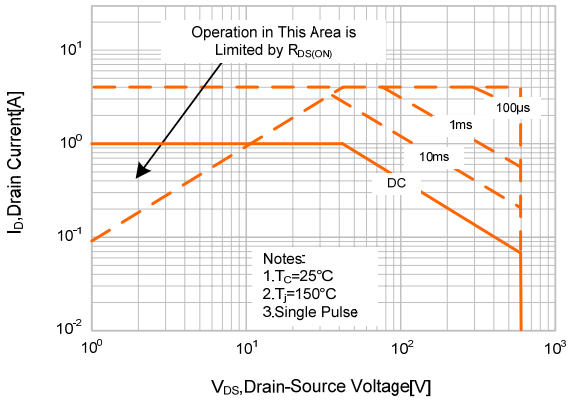


Figure 9-3. Max. Safe Operating Area(SVD1N60B)

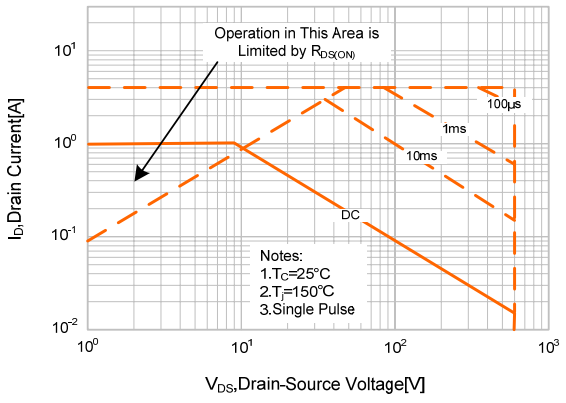
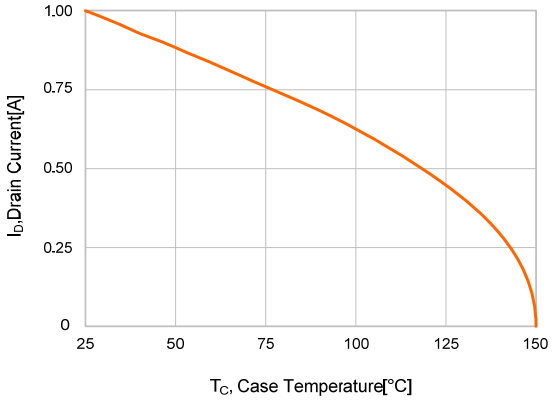
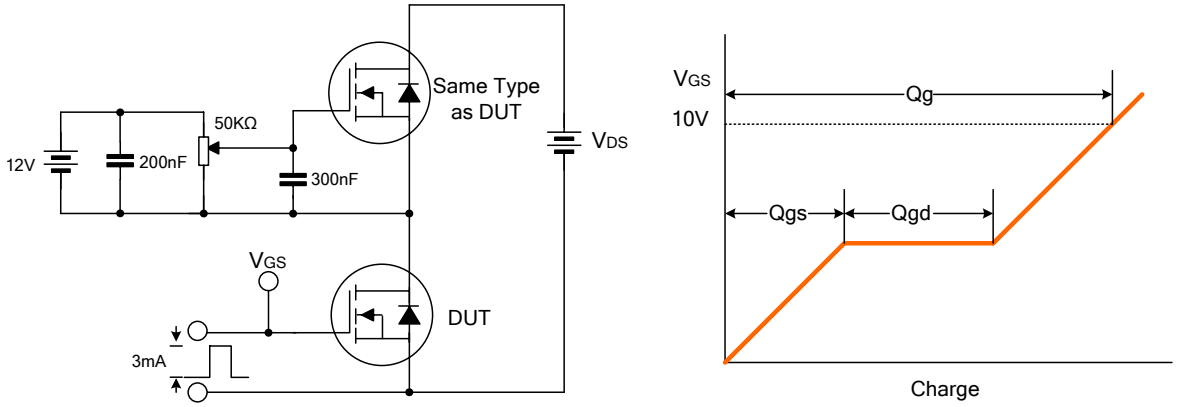


Figure 10. Maximum Drain Current vs. Case Temperature

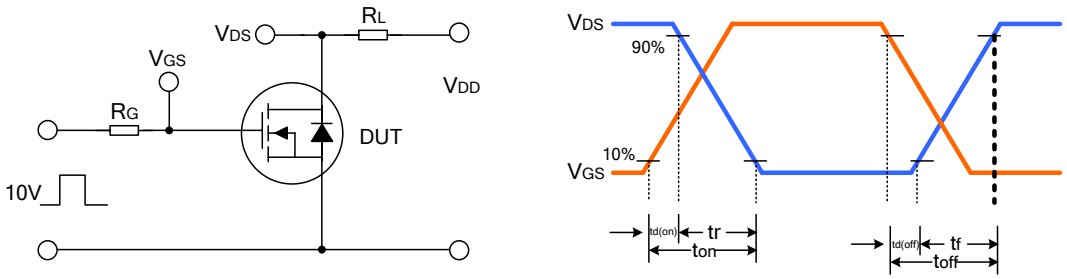


TYPICAL TEST CIRCUIT

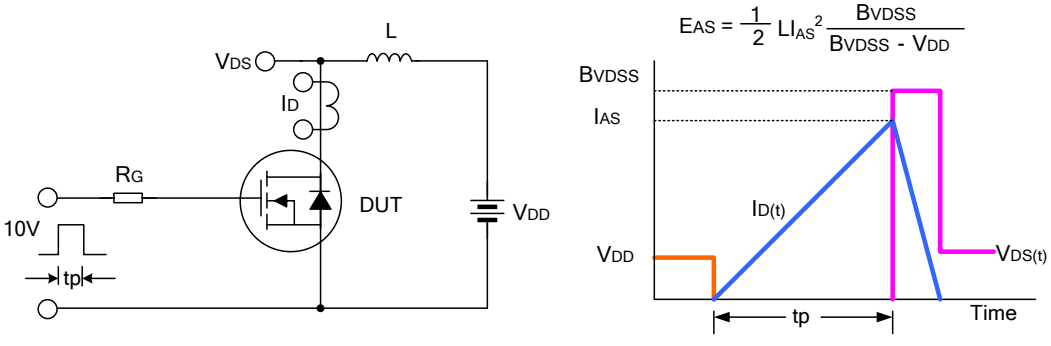
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

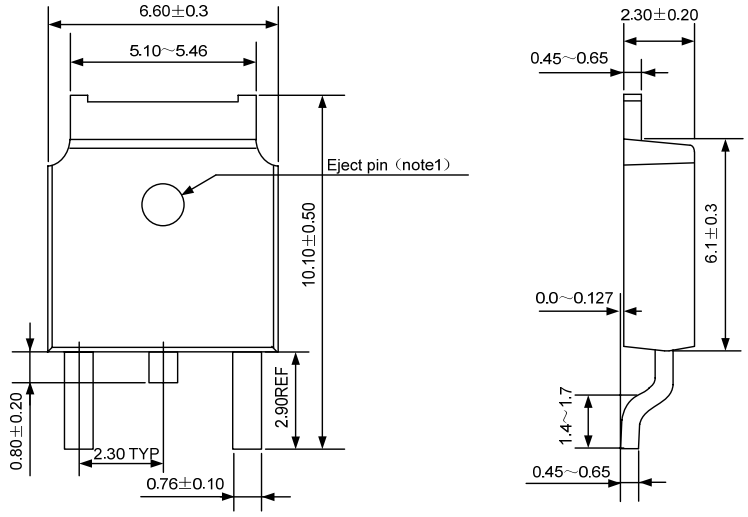


Unclamped Inductive Switching Test Circuit & Waveform



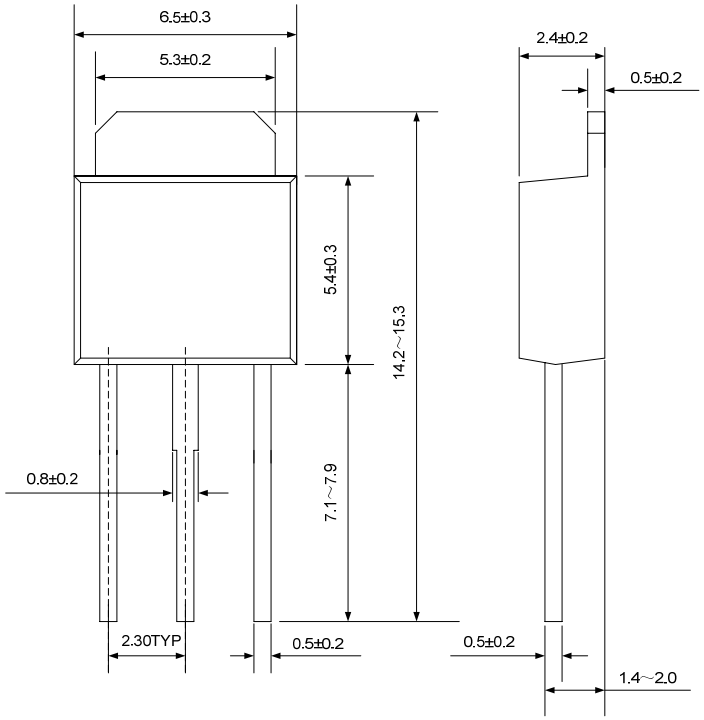
PACKAGE OUTLINE

TO-252-2L UNIT: mm



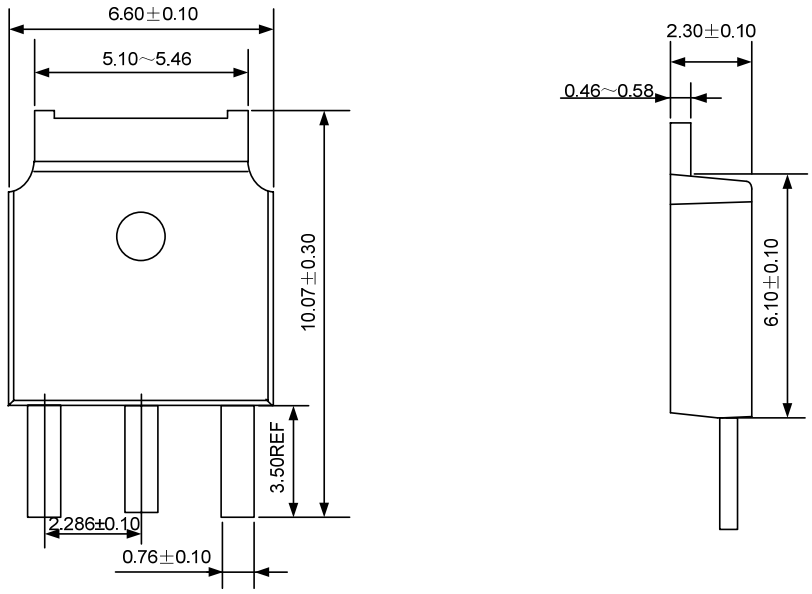
NOTE1 : There are two conditions for this position:has an eject pin or has no eject pin.

TO-251-3L UNIT: mm

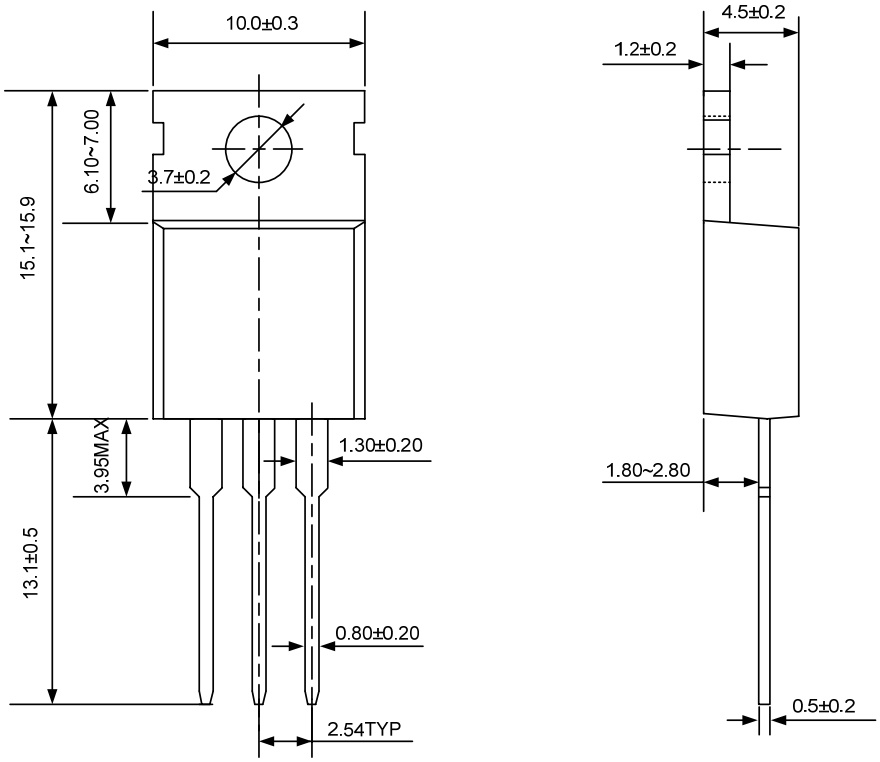


PACKAGE OUTLINE (continued)

TO-251D-3L UNIT: mm

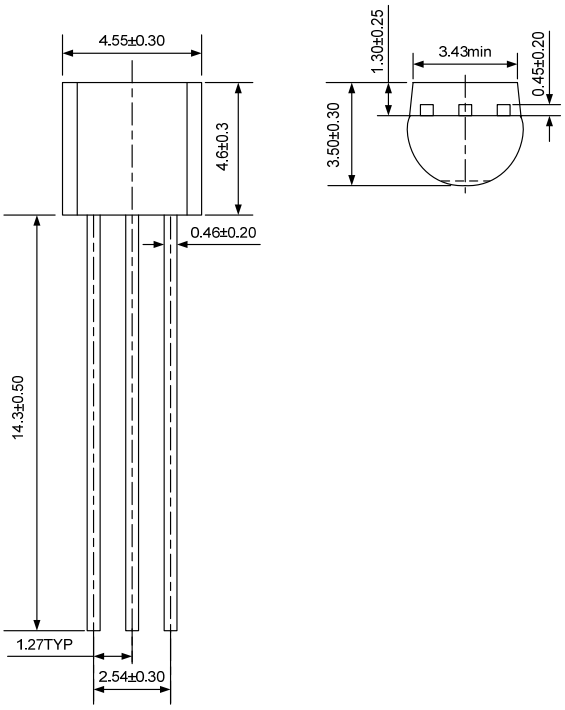


TO-220-3L UNIT: mm

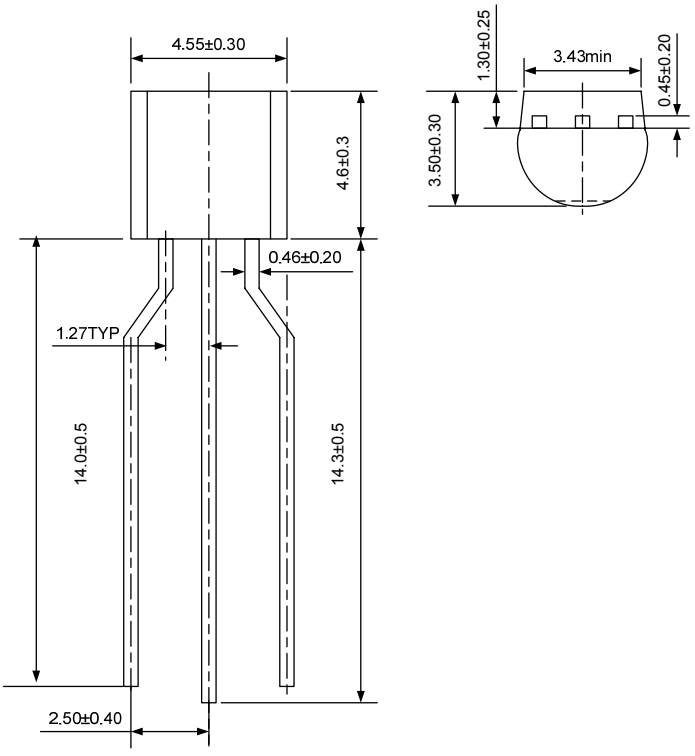


PACKAGE OUTLINE (continued)

TO-92-3L(1) UNIT: mm



TO-92-3L(2) UNIT: mm



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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	