

## 2A, 600V N-CHANNEL MOSFET

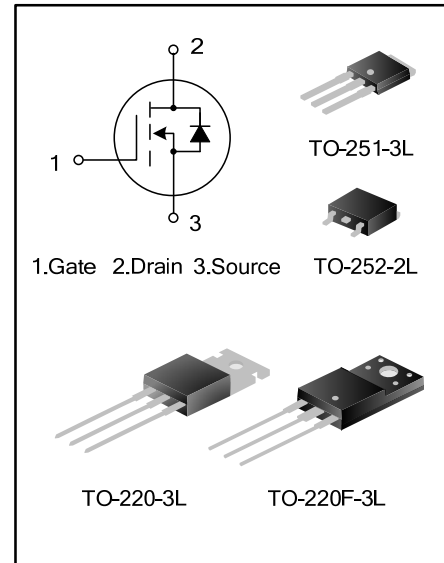
### GENERAL DESCRIPTION

SVF2N60M/F/T/D is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary F-cell™ structure DMOS 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.

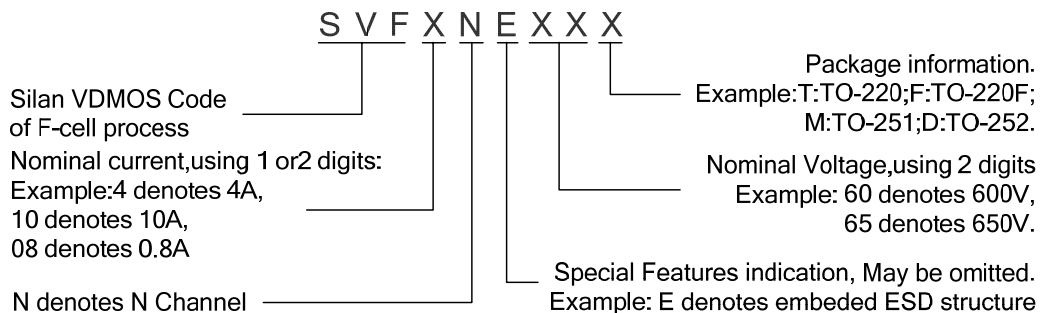
These devices are widely used in AC-DC power suppliers, DC-DC converters and H-bridge PWM motor drivers.

### FEATURES

- \* 2A,600V, $R_{DS(on)(typ.)}=3.7\Omega@V_{GS}=10V$
- \* Low gate charge
- \* Low Crss
- \* Fast switching
- \* Improved dv/dt capability



### NOMENCLATURE



### ORDERING SPECIFICATIONS

Part No.	Package Type	Marking	Material	Packing
SVF2N60M	TO-251-3L	SVF2N60M	Pb free	Tube
SVF2N60F	TO-220F-3L	SVF2N60F	Pb free	Tube
SVF2N60T	TO-220-3L	SVF2N60T	Pb free	Tube
SVF2N60D	TO-252-2L	SVF2N60D	Pb free	Tube
SVF2N60DTR	TO-252-2L	SVF2N60D	Pb free	Tape & Reel

**ABSOLUTE MAXIMUM RATINGS** ( $T_C=25^{\circ}\text{C}$  unless otherwise noted)

Parameter	Symbol	Rating			Unit
		SVF2N60M/D	SVF2N60T	SVF2N60F	
Drain-Source Voltage	$V_{DS}$	600			V
Gate-Source Voltage	$V_{GS}$	$\pm 30$			V
Drain Current	$I_D$	2.0			A
Drain Current Pulsed	$I_{DM}$	8			A
Power Dissipation( $T_C=25^{\circ}\text{C}$ ) -Derate above $25^{\circ}\text{C}$	$P_D$	34	44	23	W
		0.27	0.35	0.18	W/ $^{\circ}\text{C}$
Single Pulsed Avalanche Energy (Note 1)	$E_{AS}$	115			mJ
Operation Junction Temperature	$T_J$	$-55 \sim +150$			$^{\circ}\text{C}$
Storage Temperature	$T_{stg}$	$-55 \sim +150$			$^{\circ}\text{C}$

**THERMAL CHARACTERISTICS**

Parameter	Symbol	Rating			Unit
		SVF2N60M/D	SVF2N60T	SVF2N60F	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.7	2.86	5.56	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	110	62.5	120	$^{\circ}\text{C}/\text{W}$

**ELECTRICAL CHARACTERISTICS** ( $T_C=25^{\circ}\text{C}$  unless otherwise noted)

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	$B_{VDSS}$	$V_{GS}=0V, I_D=250\mu\text{A}$	600	--	--	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=600V, V_{GS}=0V$	--	--	1.0	$\mu\text{A}$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	--	--	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu\text{A}$	2.0	--	4.0	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=1.0A$	--	3.7	4.2	$\Omega$
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHZ}$	--	250.1	--	pF
Output Capacitance	$C_{oss}$		--	35.7	--	
Reverse Transfer Capacitance	$C_{rss}$		--	1.1	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=300V, I_D=2.0A,$ $R_G=25\Omega$  (Note 2,3)	--	9.2	--	ns
Turn-on Rise Time	$t_r$		--	23.4	--	
Turn-off Delay Time	$t_{d(off)}$		--	15.3	--	
Turn-off Fall Time	$t_f$		--	20.1	--	
Total Gate Charge	$Q_g$	$V_{DS}=480V, I_D=2.0A,$ $V_{GS}=10V$  (Note 2,3)	--	5.67	--	nC
Gate-Source Charge	$Q_{gs}$		--	1.74	--	
Gate-Drain Charge	$Q_{gd}$		--	1.99	--	

## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	$I_S$	Integral Reverse P-N Junction Diode in the MOSFET	--	--	2.0	A
Pulsed Source Current	$I_{SM}$		--	--	8.0	
Diode Forward Voltage	$V_{SD}$	$I_S=2.0A, V_{GS}=0V$	--	--	1.4	V
Reverse Recovery Time	$T_{rr}$	$I_S=2.0A, V_{GS}=0V,$ $dI_F/dt=100A/\mu S$	--	230	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	1.0	--	$\mu C$

**Notes:**

1.  $L=30mH, I_{AS}=2.52A, V_{DD}=145V, R_G=25\Omega,$  starting  $T_J=25^\circ C;$
2. Pulse Test: Pulse width  $\leq 300\mu s,$  Duty cycle  $\leq 2\%;$
3. Essentially independent of operating temperature.

**TYPICAL CHARACTERISTICS**

Figure 1. On-Region Characteristics

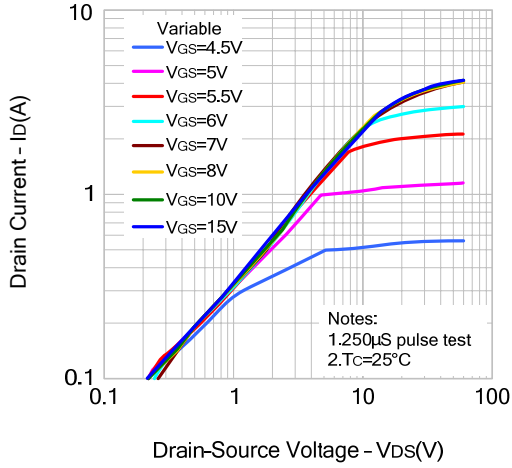


Figure 2. Transfer Characteristics

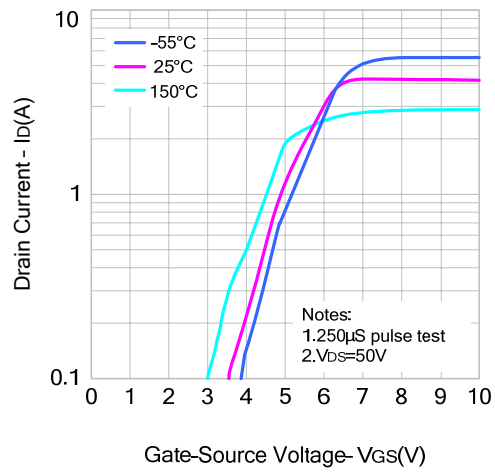


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

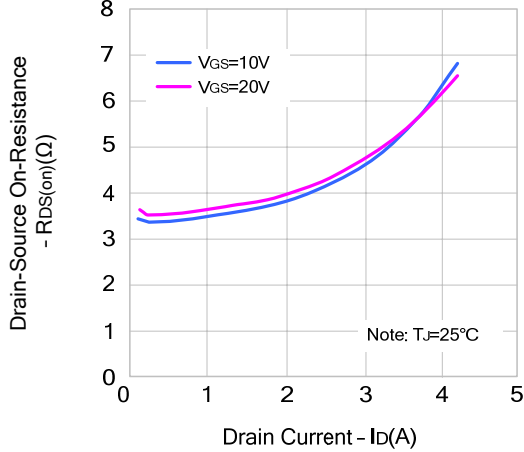


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

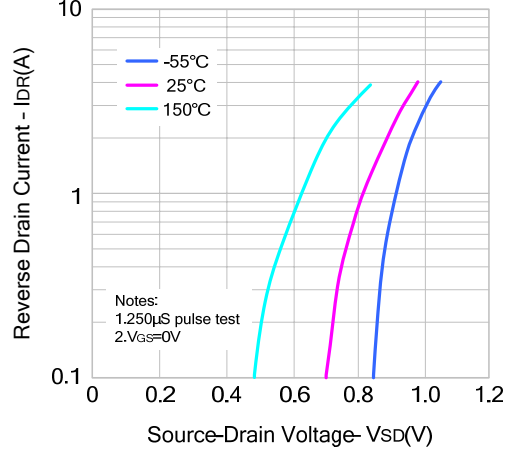


Figure 5. Capacitance Characteristics

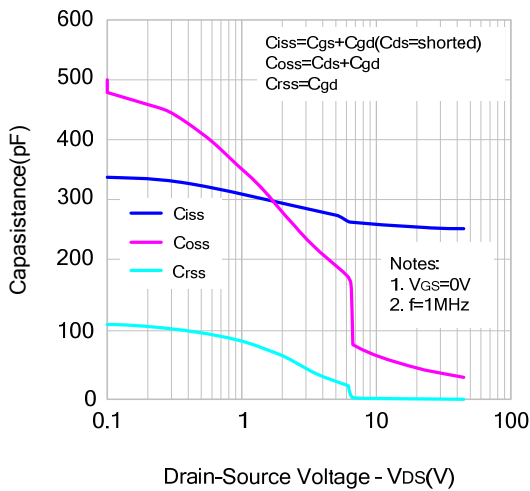
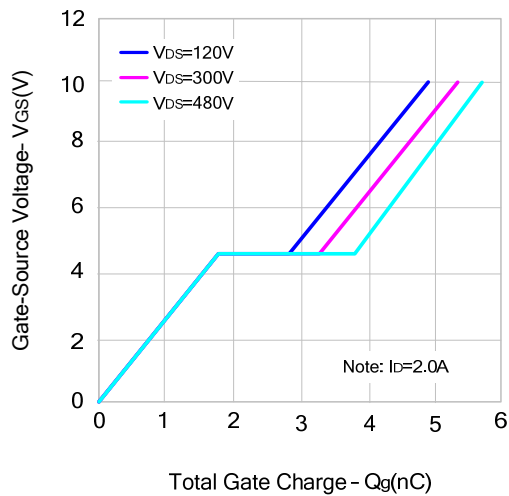


Figure 6. Gate Charge Characteristics



**TYPICAL CHARACTERISTICS (CONTINUED)**

Figure 7. Breakdown Voltage Variation vs. Temperature

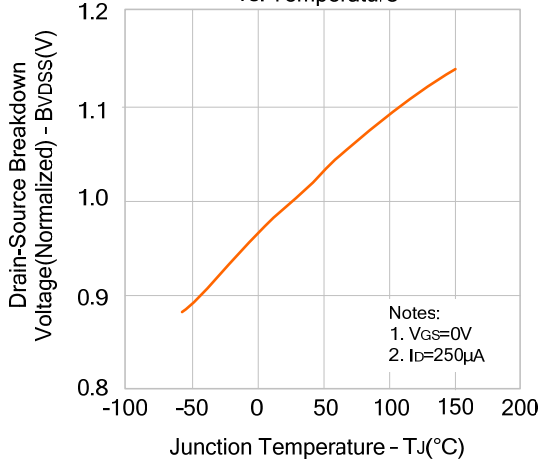


Figure 8. On-resistance Variation vs. Temperature

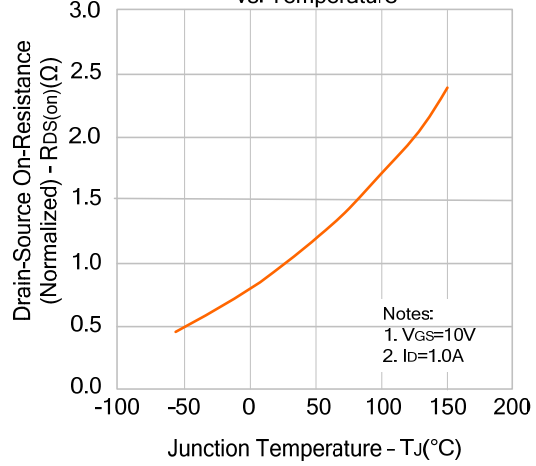


Figure 9-1. Max. Safe Operating Area(SVF2N60MD)

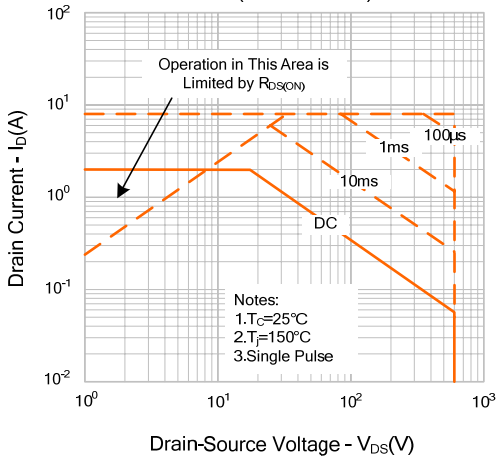


Figure 9-2. Max. Safe Operating Area(SVF2N60T)

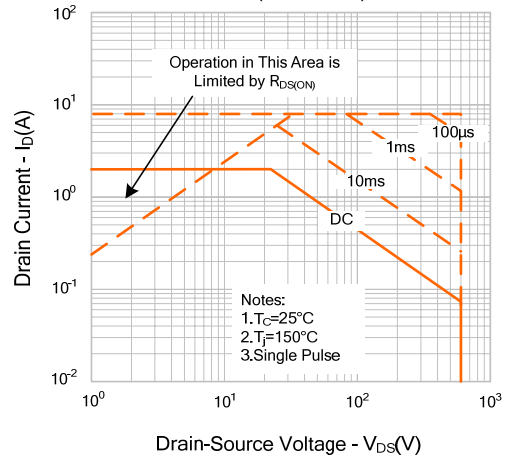


Figure 9-3. Max. Safe Operating Area(SVF2N60F)

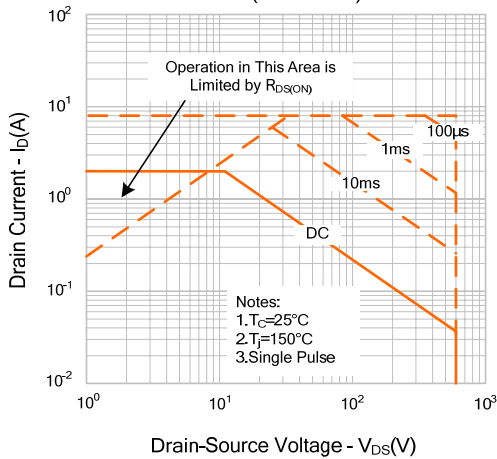
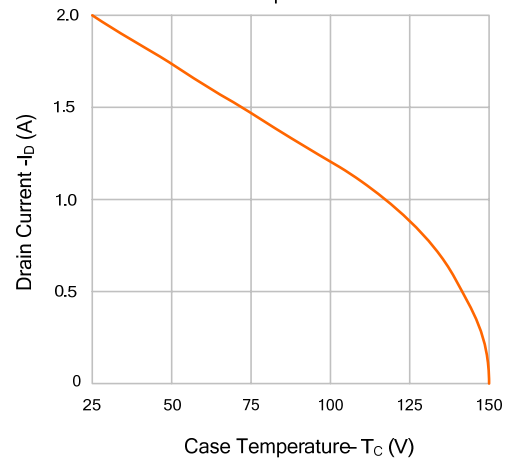
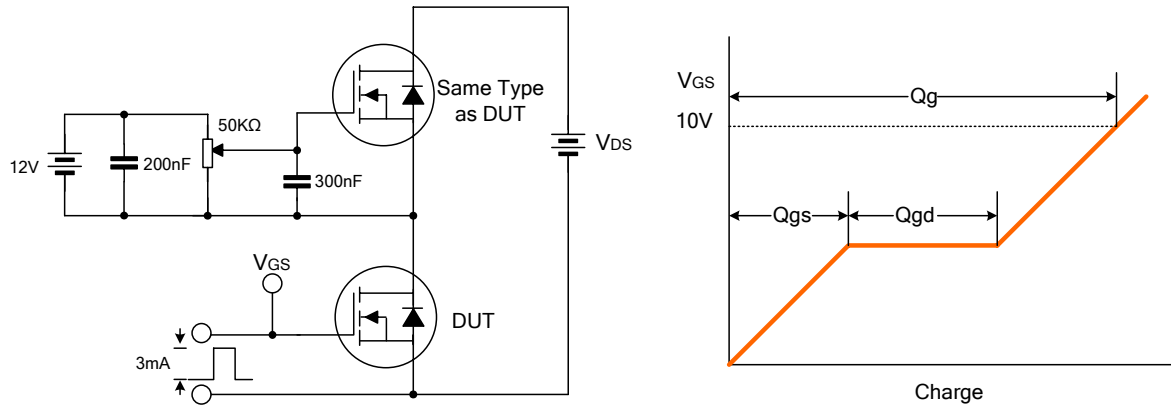


Figure 10. Max. Drain Current vs. Case Temperature

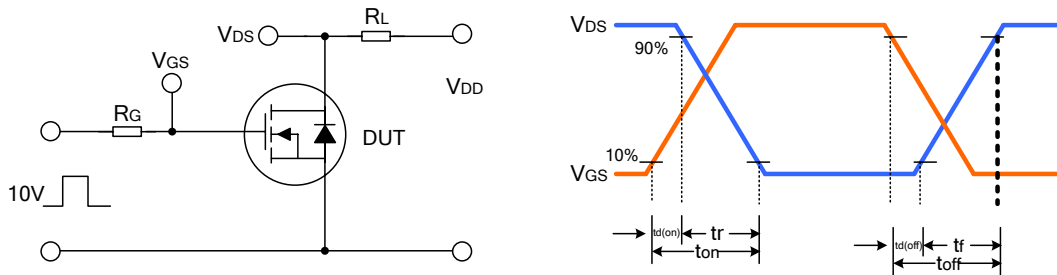


**TYPICAL TEST CIRCUIT**

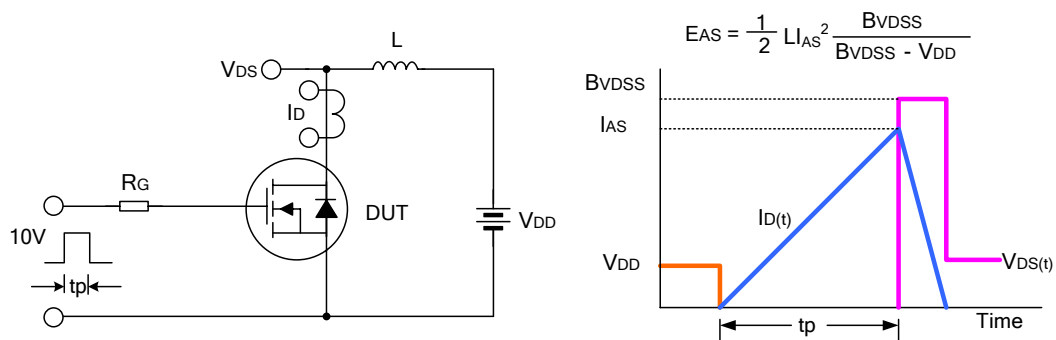
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



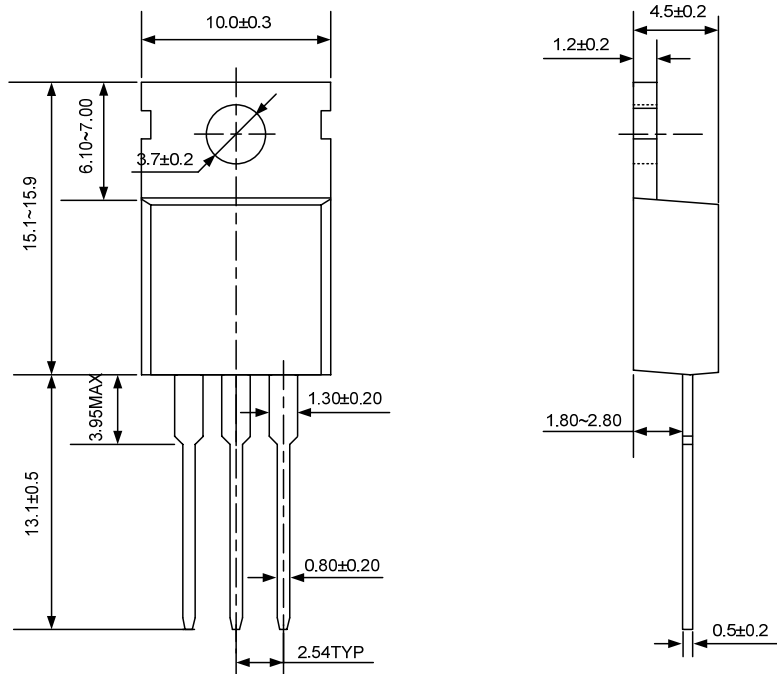
Unclamped Inductive Switching Test Circuit & Waveform



**PACKAGE OUTLINE**

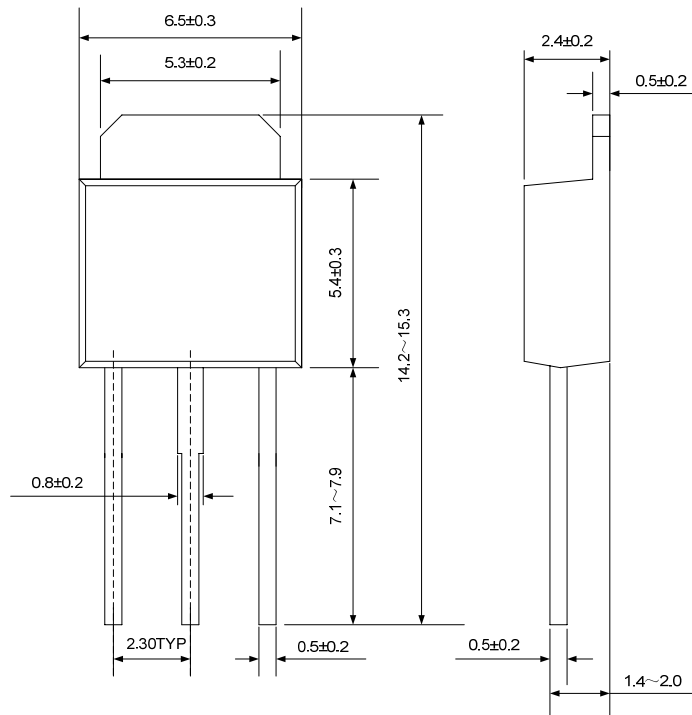
**TO-220-3L**

**UNIT: mm**



**TO-251-3L**

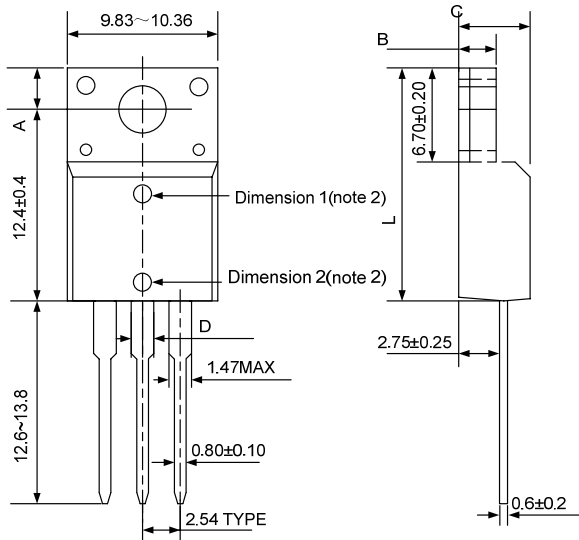
**UNIT: mm**



**PACKAGE OUTLINE (continued)**

**TO-220F-3L(One)**

**UNIT: mm**



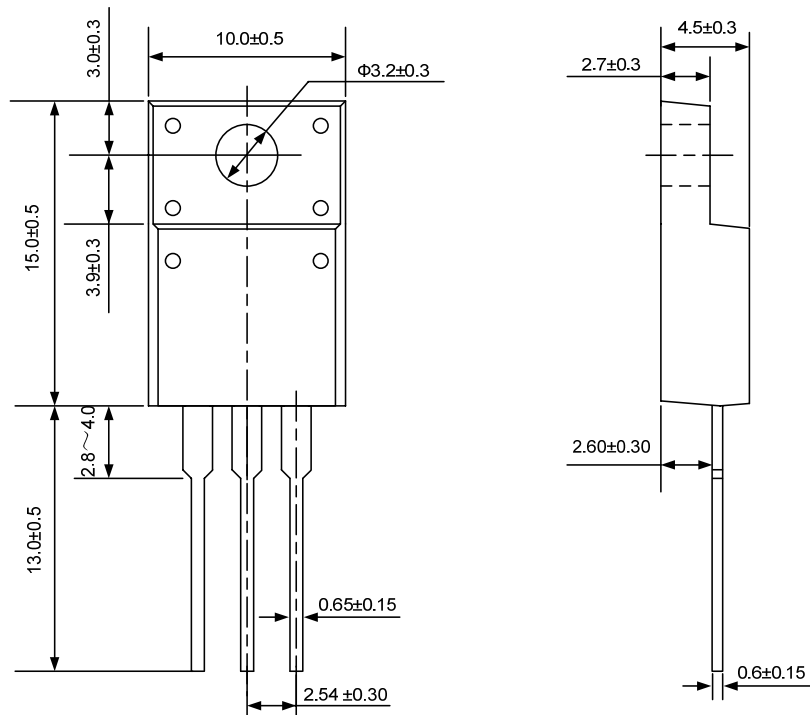
Symbol(note1)	Dimension1	Dimension2
A	3.30±0.15	2.70±0.15
B	2.55±0.20	3.0±0.20
C	4.72±0.2	4.50±0.20
D	1.47MAX	1.75MAX
L	15.75±0.30	15.00±0.30

Note1: There may be two values for some products due to different plastic mould machine, so two dimensions of the same position are listed;

Note2: When the product size is Dimension1, the thimble hole is on top of the surface; when the size is Dimension2, the center hole is on bottom of the surface.

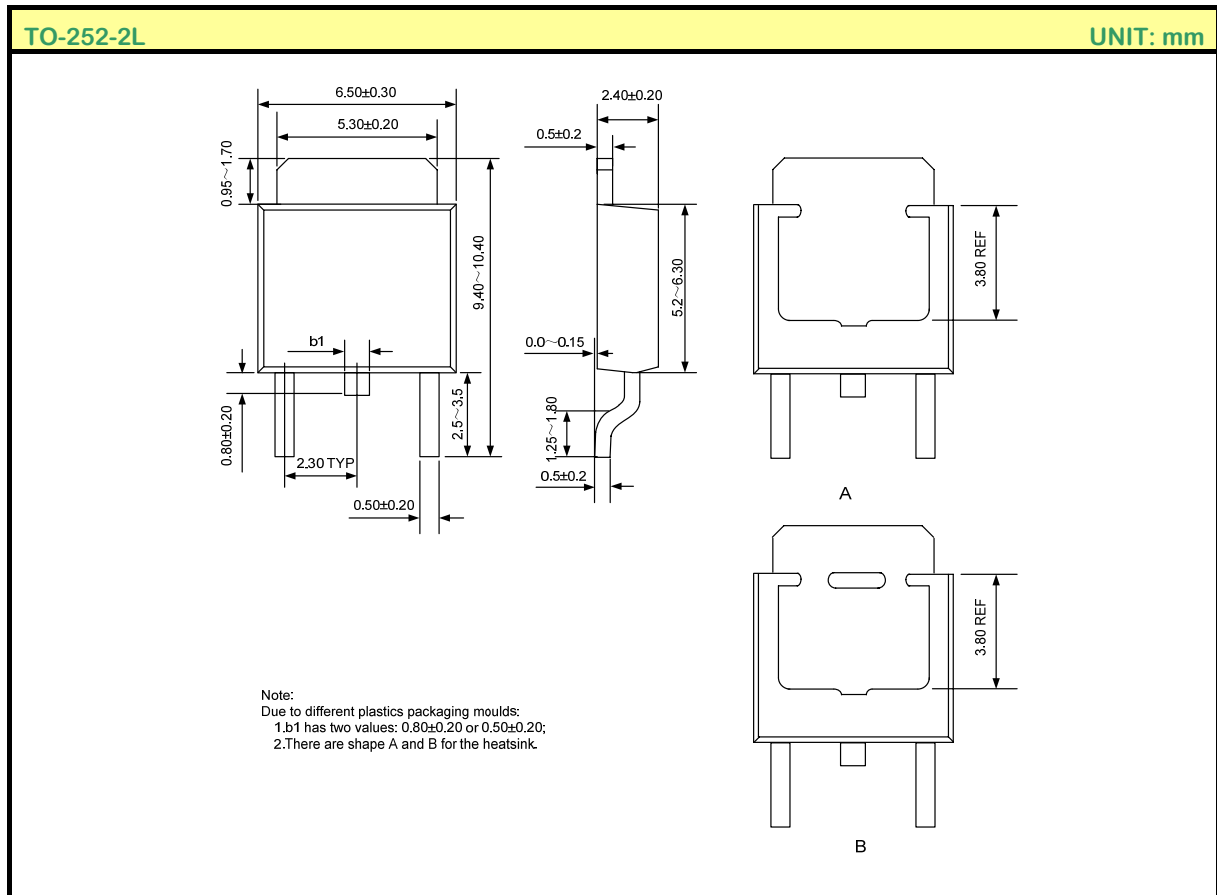
**TO-220F-3L(Two)**

**UNIT: mm**





**PACKAGE OUTLINE (continued)**



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- Silan will supply the best possible product for customers!



## ATTACHMENT

### Revision History

Date	REV	Description	Page
2010.09.20	1.0	Original	
2010.10.21	1.1	Modify "TYPICAL CHARACTERISTICS", "PACKAGE OUTLINE", the template of Datasheet	

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[TK16J60W,S1VQ\(O](#) [2SK2614\(TE16L1,Q\)](#) [DMN1017UCP3-7](#) [DMN1053UCP4-7](#) [SQJ469EP-T1-GE3](#) [NTE2384](#) [DMC2700UDMQ-7](#)  
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[STF5N65M6](#) [IRF40H233XTMA1](#) [STU5N65M6](#) [DMN6022SSD-13](#) [DMN13M9UCA6-7](#) [DMTH10H4M6SPS-13](#) [DMN2990UFB-7B](#)  
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