

## 6A 600V N-CHANNEL MOSFET

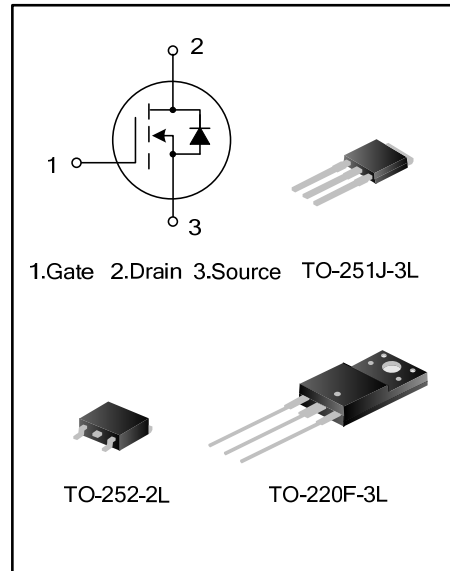
### GENERAL DESCRIPTION

SVF6N60MJ/F/D is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary F-Cell™ 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.

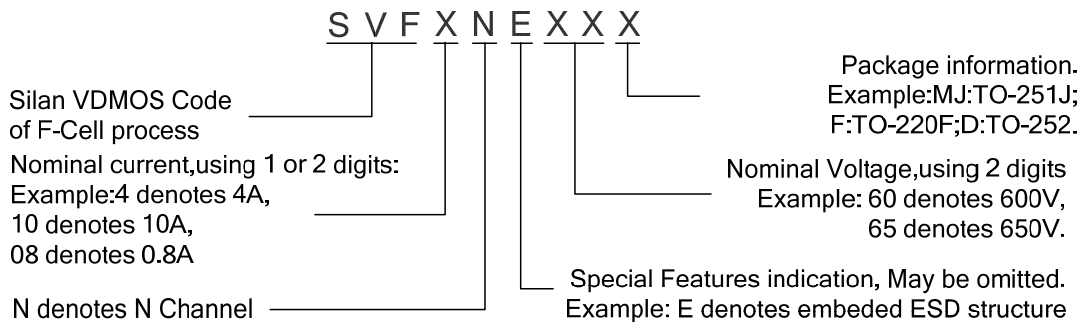
These devices are widely used in AC-DC power suppliers, DC-DC converters and H-bridge PWM motor drivers.

### FEATURES

- \* 6A,600V, $R_{DS(on)(typ)}=1.35\Omega@V_{GS}=10V$
- \* Low gate charge
- \* Low Crss
- \* Fast switching
- \* Improved dv/dt capability



### NOMENCLATURE



### ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SVF6N60MJ	TO-251J-3L	SVF6N60MJ	Pb free	Tube
SVF6N60F	TO-220F-3L	SVF6N60F	Pb free	Tube
SVF6N60D	TO-252-2L	SVF6N60D	Pb free	Tube
SVF6N60DTR	TO-252-2L	SVF6N60D	Pb free	Tape & Reel

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

Characteristics	Symbol	Ratings		Unit
		SVF6N60F	SVF6N60MJ/D	
Drain-Source Voltage	$V_{DS}$	600		V
Gate-Source Voltage	$V_{GS}$	$\pm 30$		V
Drain Current	$I_D$	$T_C=25^\circ\text{C}$		A
		$T_C=100^\circ\text{C}$		
Drain Current Pulsed	$I_{DM}$	24		A
Power Dissipation( $T_C=25^\circ\text{C}$ ) -Derate above $25^\circ\text{C}$	$P_D$	42	125	W
		0.34	1.00	W/ $^\circ\text{C}$
Single Pulsed Avalanche Energy (Note 1)	$E_{AS}$	343		mJ
Operation Junction Temperature Range	$T_J$	$-55 \sim +150$		$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	$-55 \sim +150$		$^\circ\text{C}$

**THERMAL CHARACTERISTICS**

Characteristics	Symbol	Ratings			Unit
		SVF6N60F	SVF6N60D	SVF6N60MJ	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.98	1.00	0.95	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	120	110	110	$^\circ\text{C}/\text{W}$

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

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	$B_{V_{DSS}}$	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	600	--	--	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=600\text{V}, V_{GS}=0\text{V}$	--	--	1.0	$\mu\text{A}$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30\text{V}, V_{DS}=0\text{V}$	--	--	$\pm 100$	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	$R_{DS(on)}$	$V_{GS}=10\text{V}, I_D=3\text{A}$	--	1.35	1.5	$\Omega$
Input Capacitance	$C_{iss}$	$V_{DS}=25\text{V}, V_{GS}=0\text{V},$ $f=1.0\text{MHZ}$	--	690.7	--	pF
Output Capacitance	$C_{oss}$		--	83.6	--	
Reverse Transfer Capacitance	$C_{rss}$		--	2.7	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=300\text{V}, I_D=6\text{A},$ $R_G=25\Omega$  (Note 2,3)	--	18.53	--	ns
Turn-on Rise Time	$t_r$		--	42.67	--	
Turn-off Delay Time	$t_{d(off)}$		--	33.20	--	
Turn-off Fall Time	$t_f$		--	28.13	--	
Total Gate Charge	$Q_g$	$V_{DS}=480\text{V}, I_D=6\text{A},$ $V_{GS}=10\text{V}$  (Note 2,3)	--	13.32	--	nC
Gate-Source Charge	$Q_{gs}$		--	4.13	--	
Gate-Drain Charge	$Q_{gd}$		--	4.19	--	

## 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	--	--	6	A
Pulsed Source Current	$I_{SM}$		--	--	24	
Diode Forward Voltage	$V_{SD}$	$I_S=6A, V_{GS}=0V$	--	--	1.4	V
Reverse Recovery Time	$T_{rr}$	$I_S=6A, V_{GS}=0V,$ $di_F/dt=100A/\mu s$ (Note 2)	--	190	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	0.53	--	$\mu C$

**Notes:**

1.  $L=30mH, I_{AS}=4.40A, V_{DD}=105V, R_G=25\Omega$ , 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

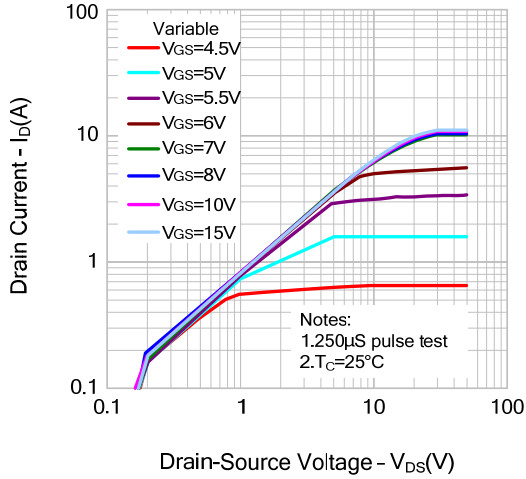


Figure 2. Transfer Characteristics

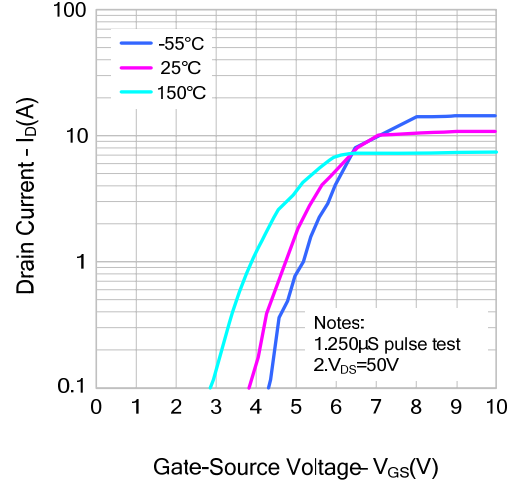


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

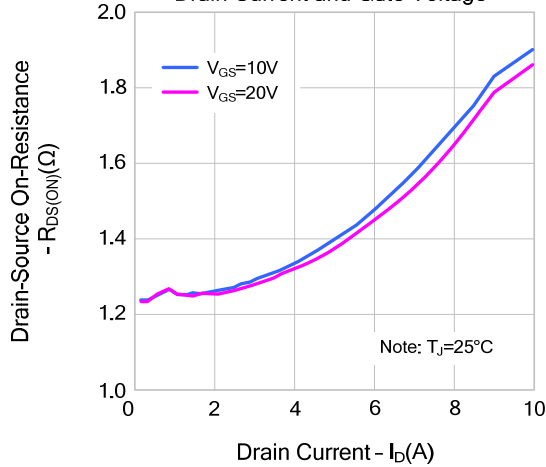


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

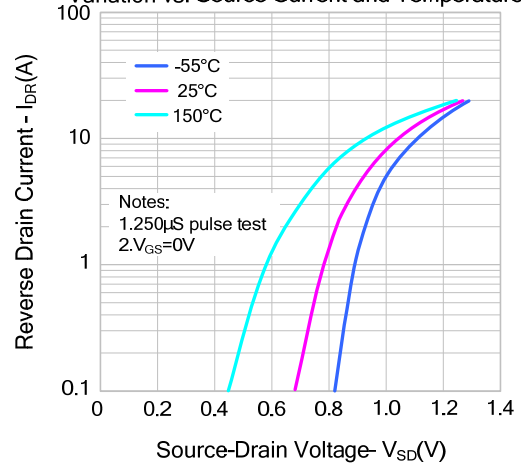


Figure 5. Capacitance Characteristics

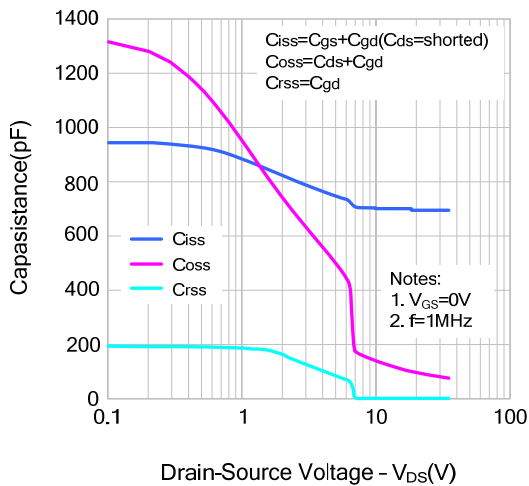
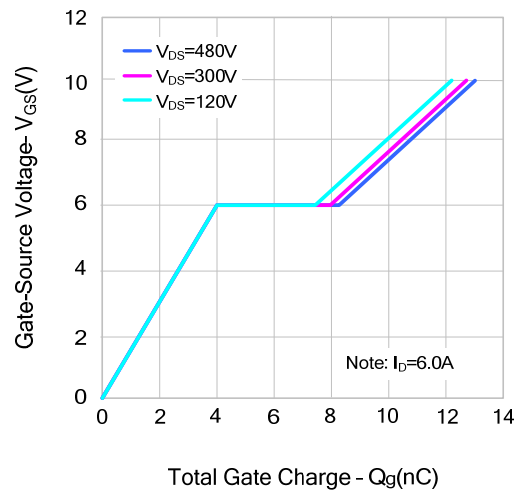


Figure 6. Gate Charge Characteristics





TYPICAL CHARACTERISTICS(continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

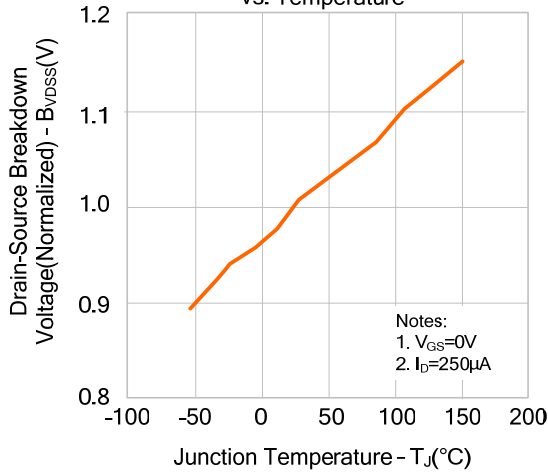


Figure 8. On-resistance Variation vs. Temperature

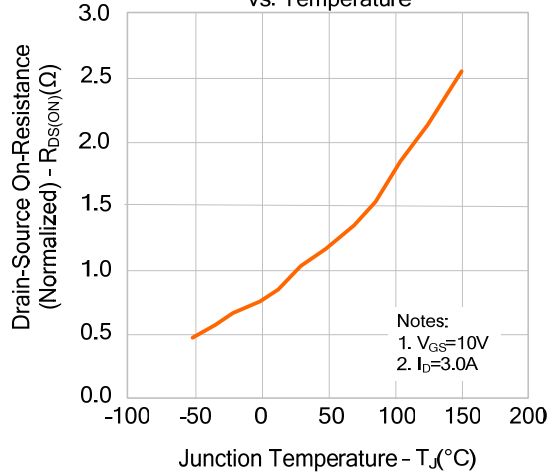


Figure 9-1. Max. Safe Operating Area(SVF6N60F)

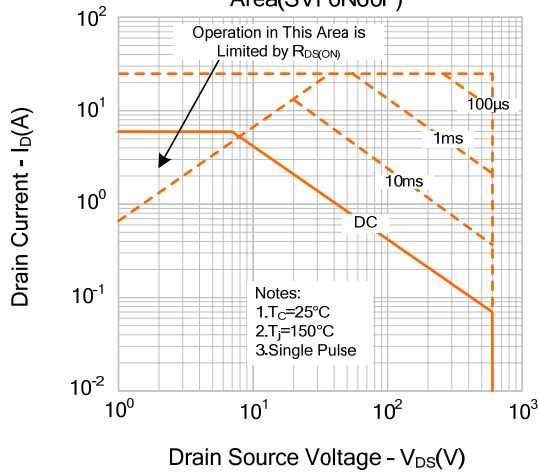


Figure 9-2. Max. Safe Operating Area(SVF6N60MJ/D)

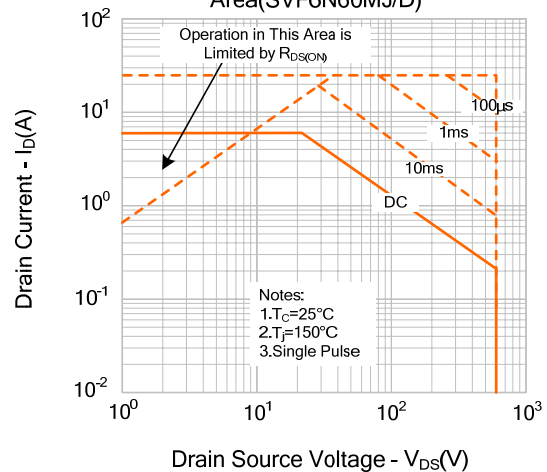
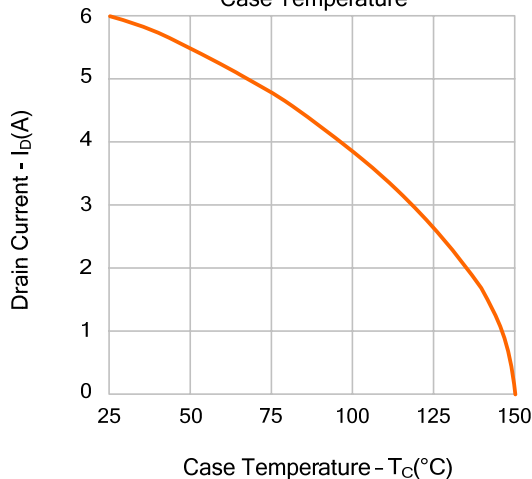
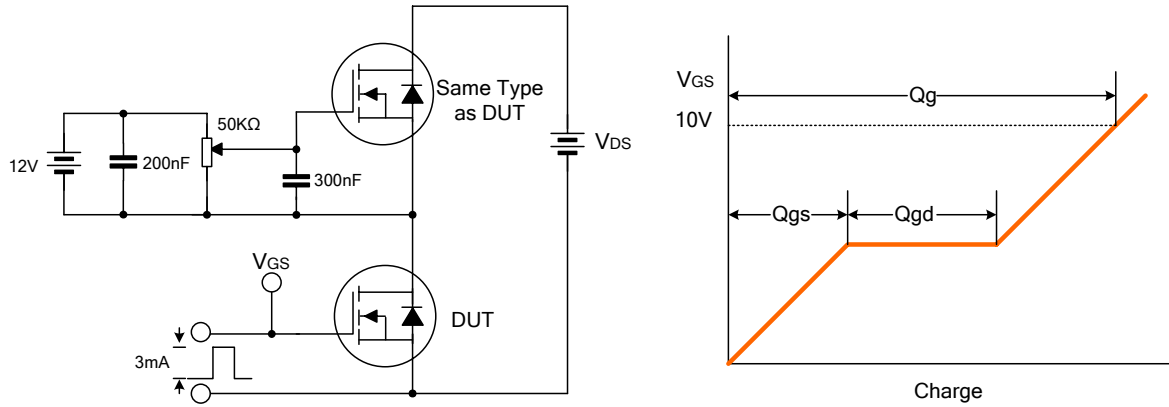


Figure 10. Maximum Drain Current vs. Case Temperature

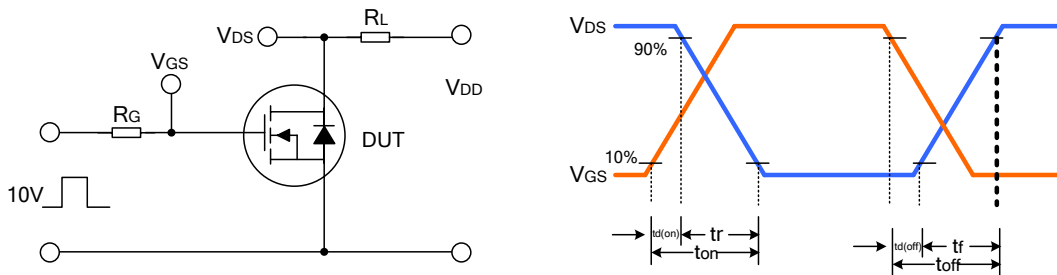


**TYPICAL TEST CIRCUIT**

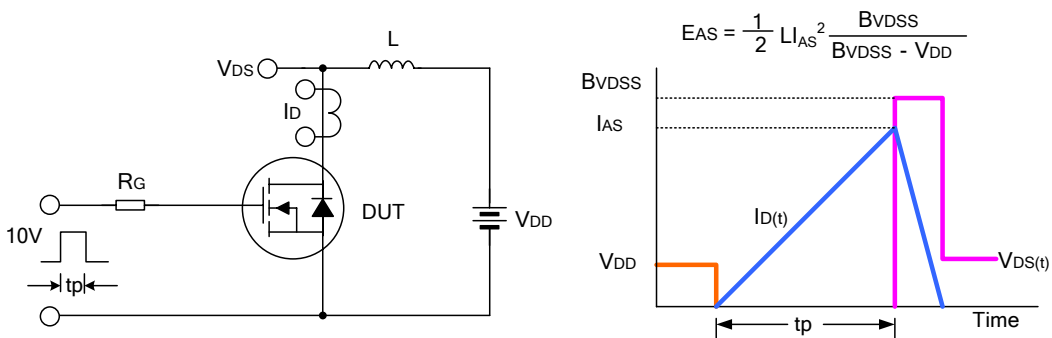
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



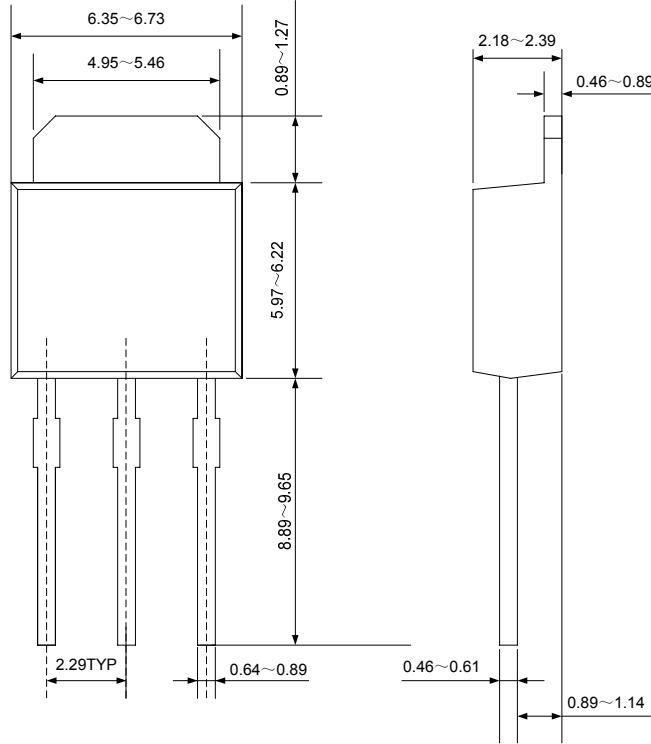
Unclamped Inductive Switching Test Circuit & Waveform



**PACKAGE OUTLINE(continued)**

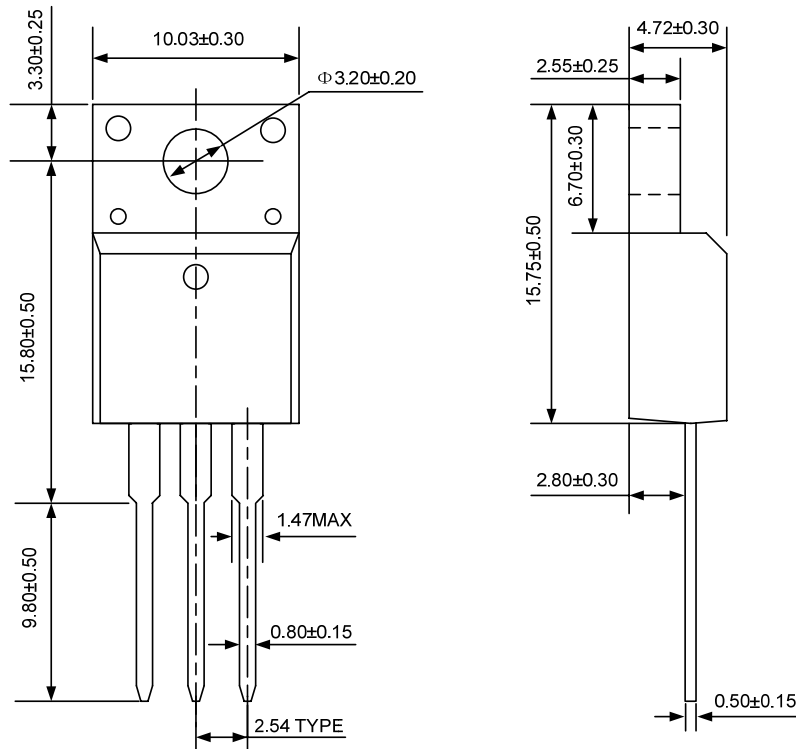
**TO-251J-3L**

**UNIT: mm**

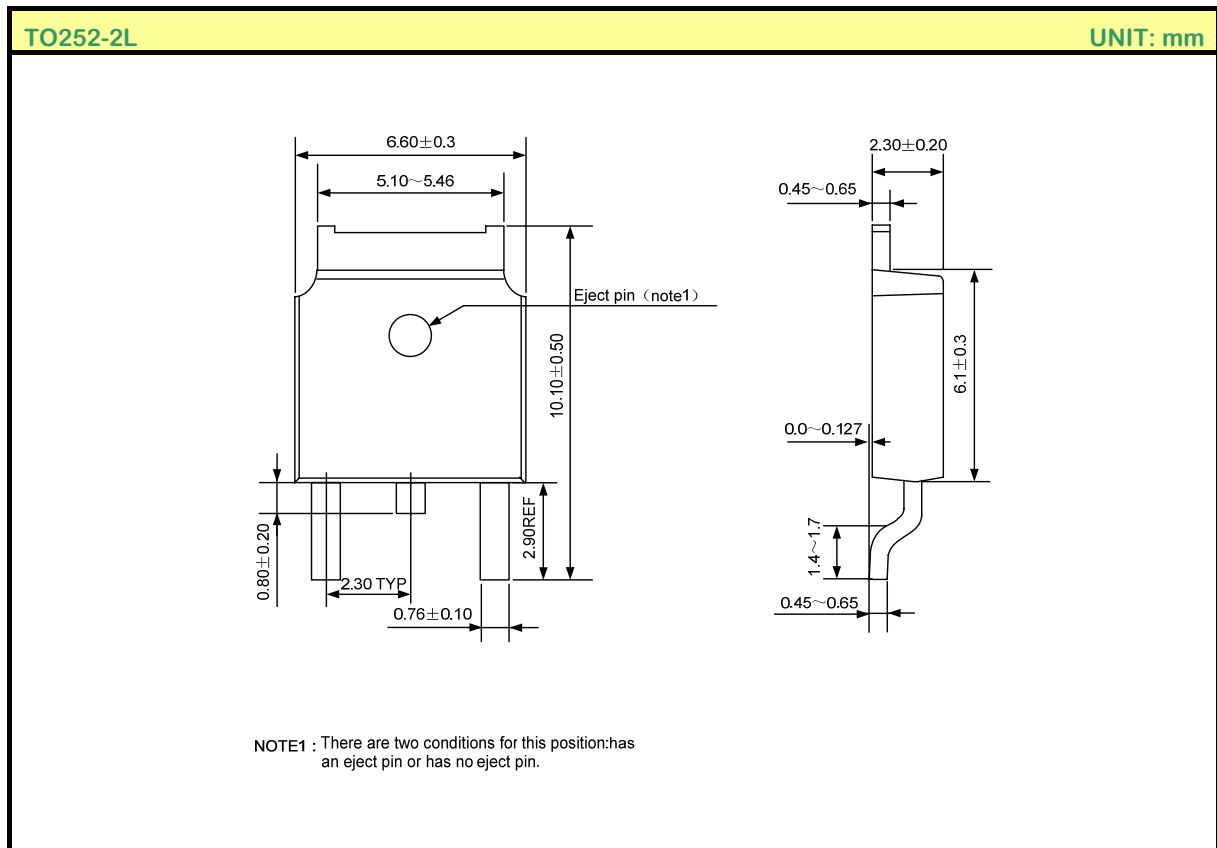


**TO-220F-3L**

**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
2011.02.23	1.0	Original	
2011.07.04	1.1	Add the package of TO-251D-3L and TO-251J-3L Update the package outline of TO-220F-3L and TO-252-2L	
2011.09.09	1.2	Delete the package of TO-251-3L and TO-251D-3L	