## 2A, 700V N-CHANNEL MOSFET

GENERAL DESCRIPTION

SVF2N70M/F/D is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary F-Cell^{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.

2
1
3
1.Gate 2.Drain 3.Source

TO-251-3L
TO-251D-3L
TO-252-2L
TO-220F-3L
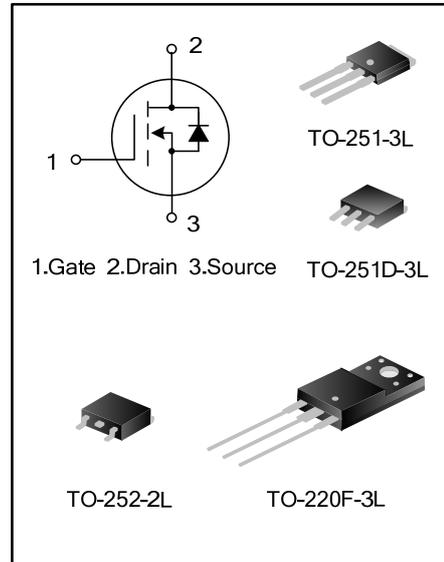
FEATURES

* 2A,700V,$R_{DS(on)(typ.)}$=5.0Ω@V_{GS}=10V
* Low gate charge
* Low Crss
* Fast switching
* Improved dv/dt capability

NOMENCLATURE

S V F X N E X X X

Silan VDMOS Code of F-Cell process

Nominal current,using 1 or 2 digits:
Example:4 denotes 4A,
10 denotes 10A,
08 denotes 0.8A

N denotes N Channel

Package information.
Example:F:TO-220F;D:TO-252;
M:TO-251,TO-251D.

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

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

ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SVF2N70M	TO-251-3L	SVF2N70M	Pb free	Tube
SVF2N70M	TO-251D-3L	SVF2N70M	Pb free	Tube
SVF2N70F	TO-220F-3L	SVF2N70F	Pb free	Tube
SVF2N70D	TO-252-2L	SVF2N70D	Pb free	Tube
SVF2N70DTR	TO-252-2L	SVF2N70D	Pb free	Tape & Reel

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

Characteristics		Symbol	Rating		Unit
			SVF2N70M/D	SVF2N70F	
Drain-Source Voltage		V_{DS}	700		V
Gate-Source Voltage		V_{GS}	±30		V
Drain Current	T_C=25°C	I_D	2.0		A
	T_C=100°C		1.3		
Drain Current Pulsed		I_{DM}	8.0		A
Power Dissipation(T_C=25°C)		P_D	39	28	W
-Derate above 25°C			0.31	0.22	W/°C
Single Pulsed Avalanche Energy (Note 1)		E_{AS}	118		mJ
Operation Junction Temperature Range		T_J	-55~+150		°C
Storage Temperature Range		T_{stg}	-55~+150		°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Rating		Unit
		SVF2N70M/D	SVF2N70F	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.21	4.46	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	110	120	°C/W

ELECTRICAL CHARACTERISTICS (T_C=25°C unless otherwise noted)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	B_{VDSS}	V_{GS}=0V, I_D=250μA	700	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=700V, V_{GS}=0V	--	--	1.0	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±30V, V_{DS}=0V	--	--	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}= V_{DS}, I_D=250μA	2.0	--	4.0	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=1.0A	--	5.0	6.5	Ω
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	--	260.1	--	pF
Output Capacitance	C_{oss}		--	32.2	--	
Reverse Transfer Capacitance	C_{rss}		--	1.3	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=350V, I_D=2.0A, R_G=25Ω	--	8.73	--	ns
Turn-on Rise Time	t_r		--	22.27	--	
Turn-off Delay Time	$t_{d(off)}$		--	12.53	--	
Turn-off Fall Time	t_f	(Note 2,3)	--	21.07	--	
Total Gate Charge	Q_g	V_{DS}=560V, I_D=2.0A, V_{GS}=10V	--	5.96	--	nC
Gate-Source Charge	Q_{gs}		--	1.77	--	
Gate-Drain Charge	Q_{gd}	(Note 2,3)	--	2.08	--	

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	--	--	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/µS	--	190	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.53	--	µC

Notes:

1. L=30mH, I_{AS}=2.58A, V_{DD}=95V, 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

Drain Current – I_D(A) vs Drain-Source Voltage – V_{DS}(V)

Variable
- V_{GS}=4.5V
- V_{GS}=5V
- V_{GS}=5.5V
- V_{GS}=6V
- V_{GS}=7V
- V_{GS}=8V
- V_{GS}=10V
- V_{GS}=15V

Notes:
1.250μS pulse test
2.T_C=25°C
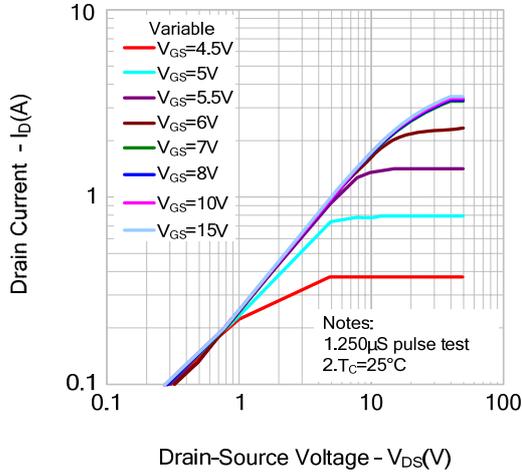
Figure 2. Transfer Characteristics

Drain Current – I_D(A) vs Gate-Source Voltage – V_{GS}(V)

- -55°C
- 25°C
- 150°C

Notes:
1.250μS pulse test
2.V_{DS}=50V

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

Drain-Source On-Resistance – $R_{DS(ON)}$(Ω) vs Drain Current – I_D(A)

- V_{GS}=10V
- V_{GS}=20V

Note: T_J=25°C
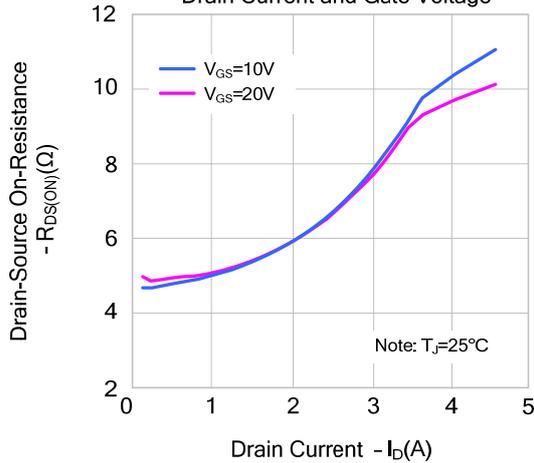
Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

Reverse Drain Current – I_{DR}(A) vs Source-Drain Voltage – V_{SD}(V)

- -55°C
- 25°C
- 150°C

Notes:
1.250μS pulse test
2.V_{GS}=0V
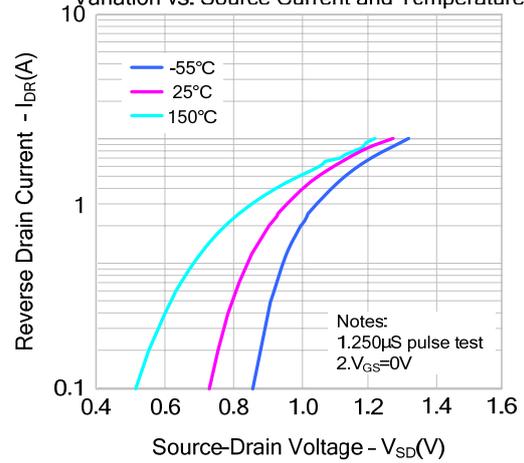
Figure 5. Capacitance Characteristics

Capasistance(pF) vs Drain-Source Voltage – V_{DS}(V)

Ciss=Cgs+Cgd(Cds=shorted)
Coss=Cds+Cgd
Crss=Cgd

- Ciss
- Coss
- Crss

Notes:
1. V_{GS}=0V
2. f=1MHz
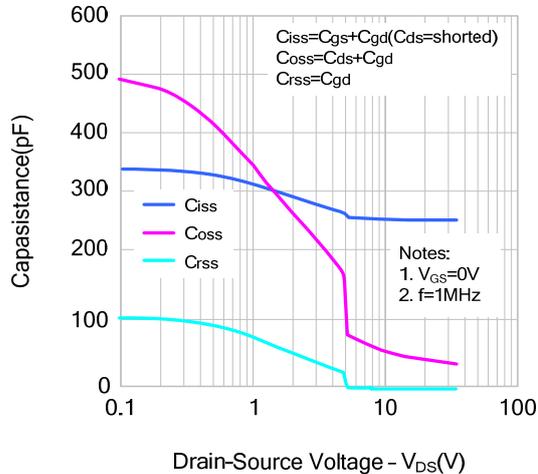
Figure 6. Gate Charge Characteristics

Gate-Source Voltage – V_{GS}(V) vs Total Gate Charge – Q_g(nC)

- V_{DS}=140V
- V_{DS}=350V
- V_{DS}=560V

Note: I_D=2.0A

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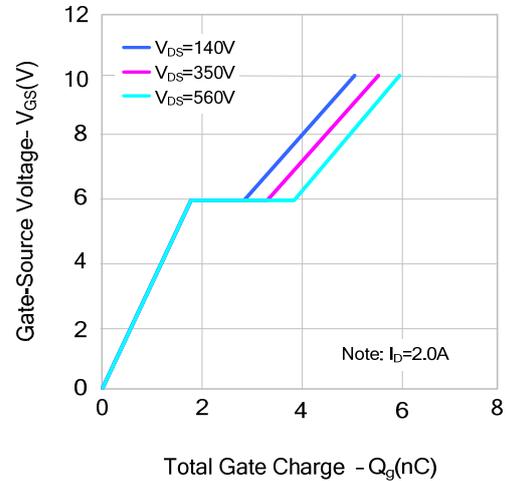
TYPICAL CHARACTERISTICS (continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

Notes:
1. V_{GS}=10V
2. I_D=250µA
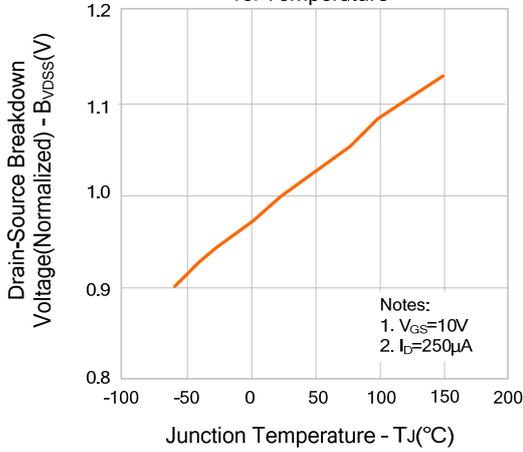
Figure 8. On-resistance Variation vs. Temperature

Notes:
1. V_{GS}=10V
2. I_D=1.0A
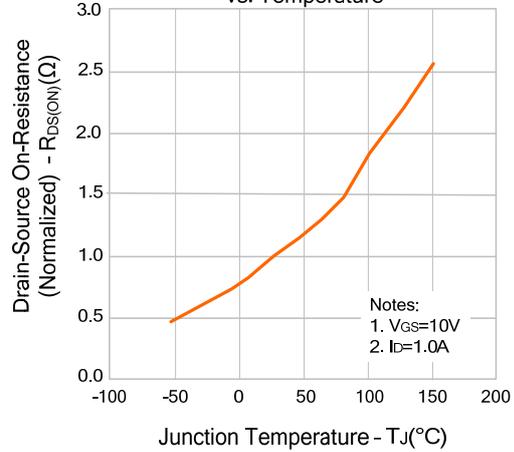
Figure 9-1. Max. Safe Operating Area(SVF2N70M/D)

Operation in This Area is Limited by $R_{DS(ON)}$

100µs
1ms
10ms
DC

Notes:
1.T_C=25°C
2.T_j=150°C
3.Single Pulse
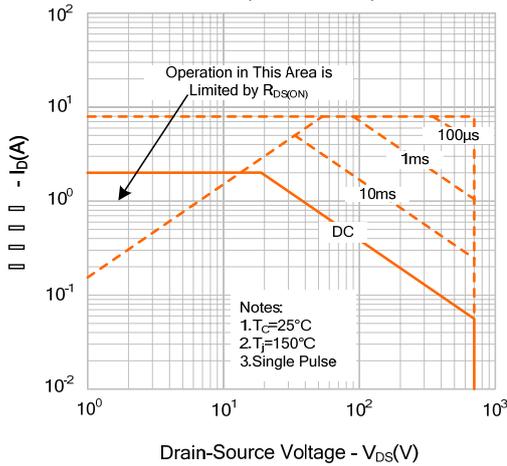
Figure 9-2. Max. Safe Operating Area(SVF2N70F)

Operation in This Area is Limited by $R_{DS(ON)}$

100µs
1ms
10ms
DC

Notes:
1.T_C=25°C
2.T_j=150°C
3.Single Pulse
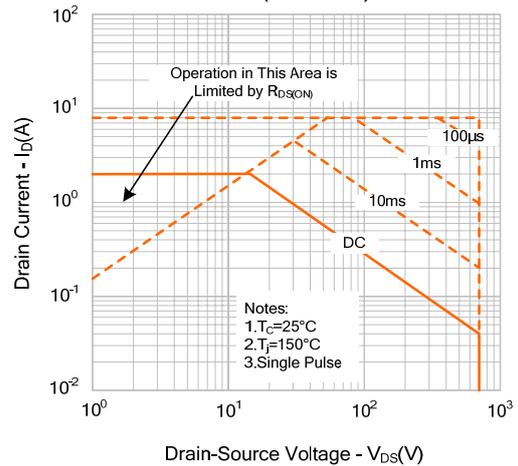
Figure 10. Max. Drain Current vs. Case Temperature
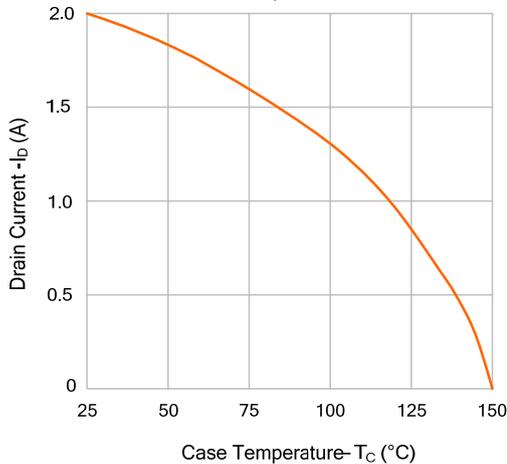
TYPICAL TEST CIRCUIT

Gate Charge Test Circuit & Waveform
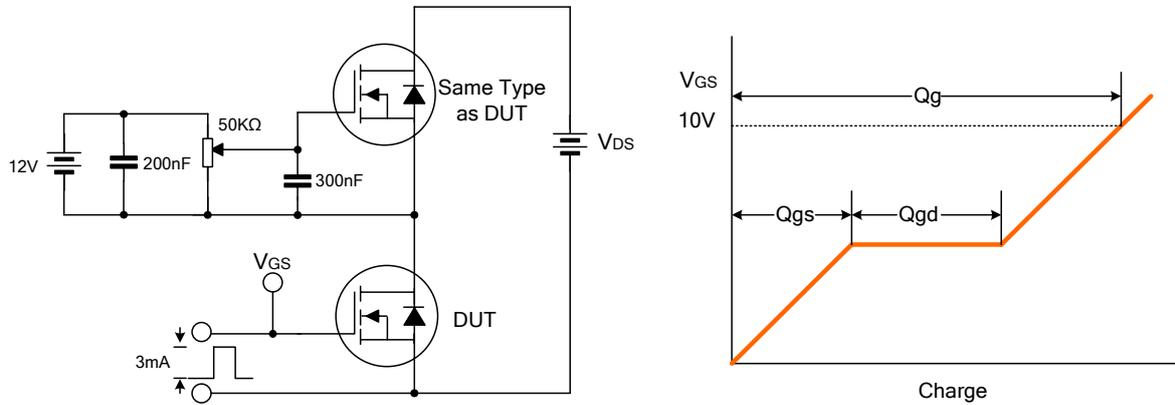
Resistive Switching Test Circuit & Waveform
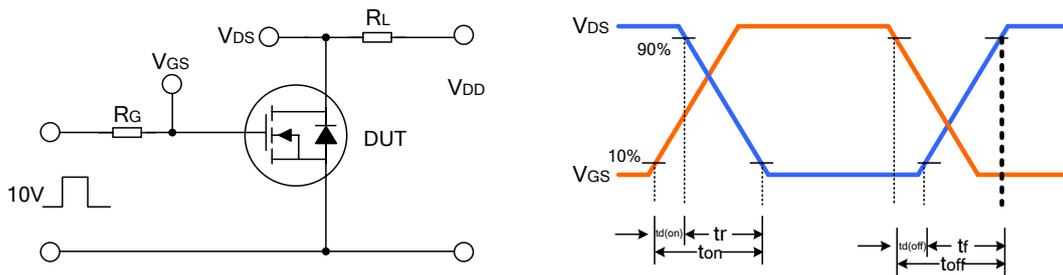
Unclamped Inductive Switching Test Circuit & Waveform

$$E_{AS} = \frac{1}{2} LI_{AS}^2 \frac{B_{VDSS}}{B_{VDSS} - V_{DD}}$$
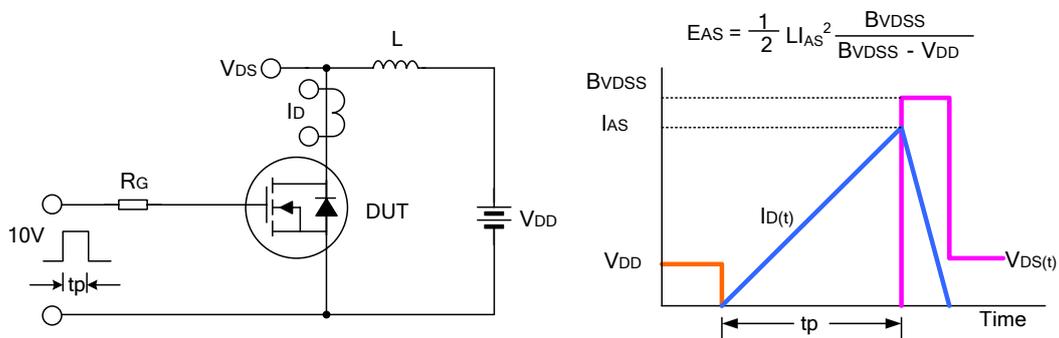
PACKAGE OUTLINE

TO-251-3L　　　　　　　　　　　　　　　　　　　　　　　　　　　　　UNIT: mm
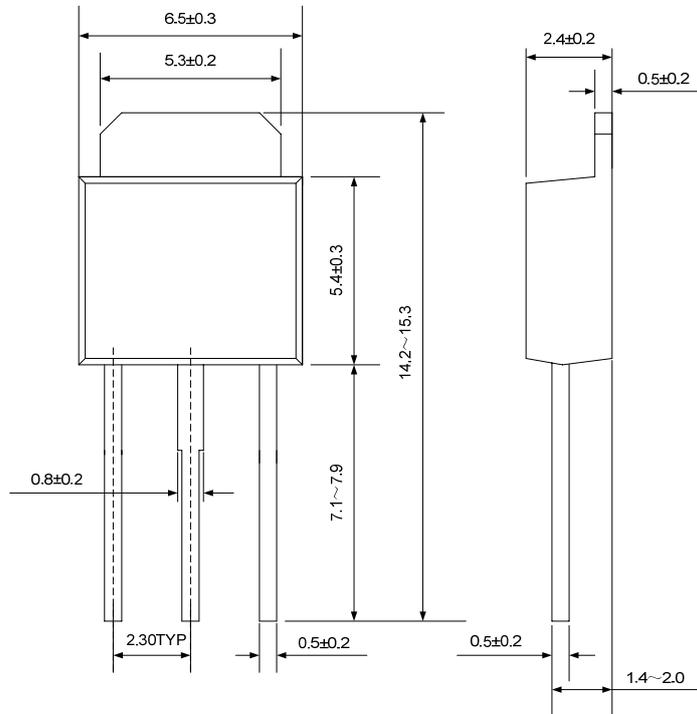
TO-251D-3L　　　　　　　　　　　　　　　　　　　　　　　　　　　　　UNIT: mm
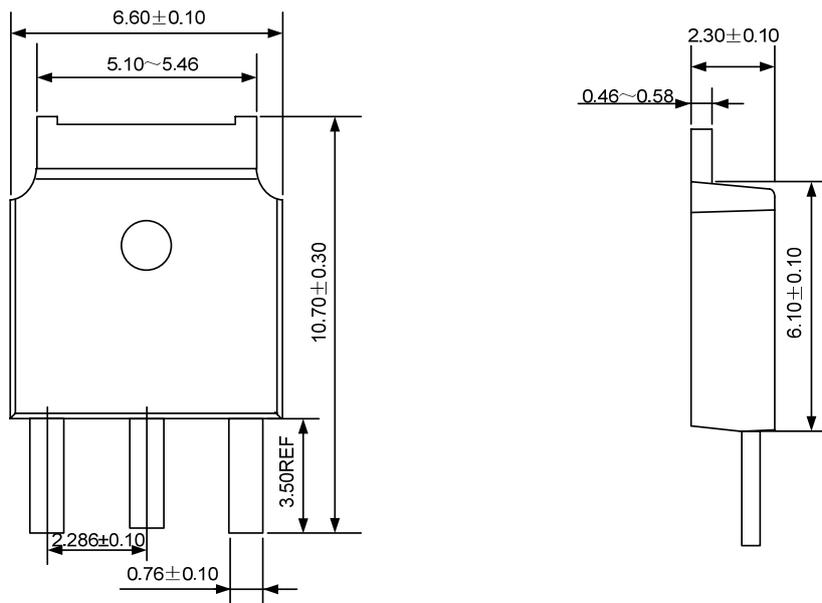
## PACKAGE OUTLINE (continued)

**TO-220F-3L(One)**   UNIT: mm
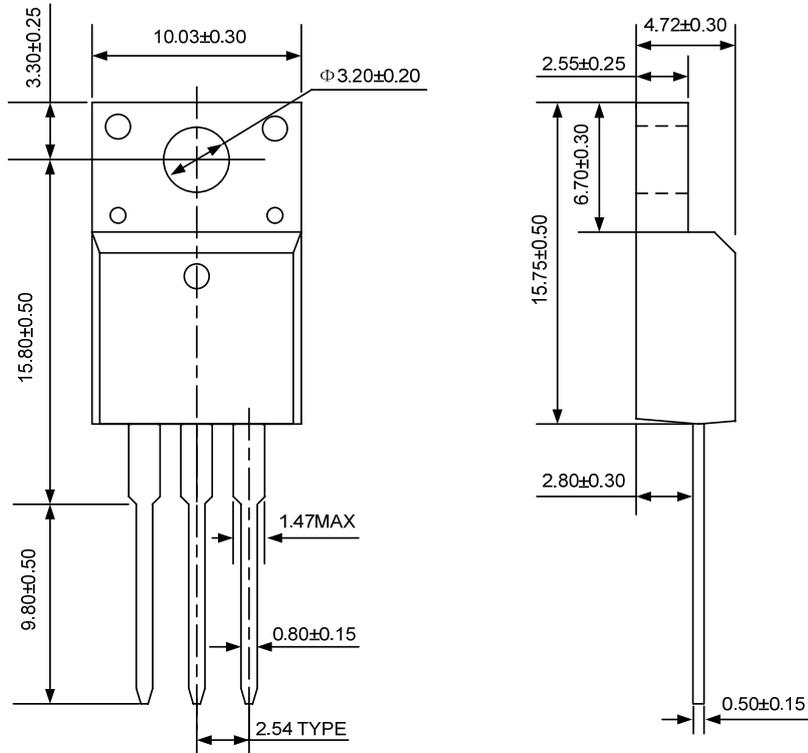
**TO-220F-3L(Two)**   UNIT: mm
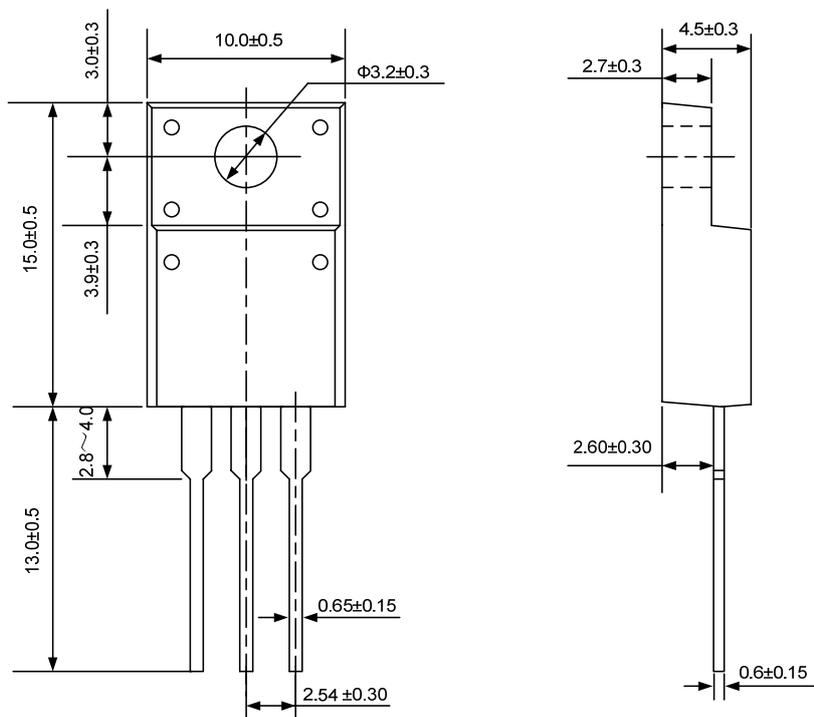
PACKAGE OUTLINE(continued)

TO-252-2L(1)	UNIT: mm

Note:
Due to different plastics packaging moulds:
1.b1 has two values: 0.80±0.20 or 0.50±0.20;
2.There are shape A and B for the heatsink.
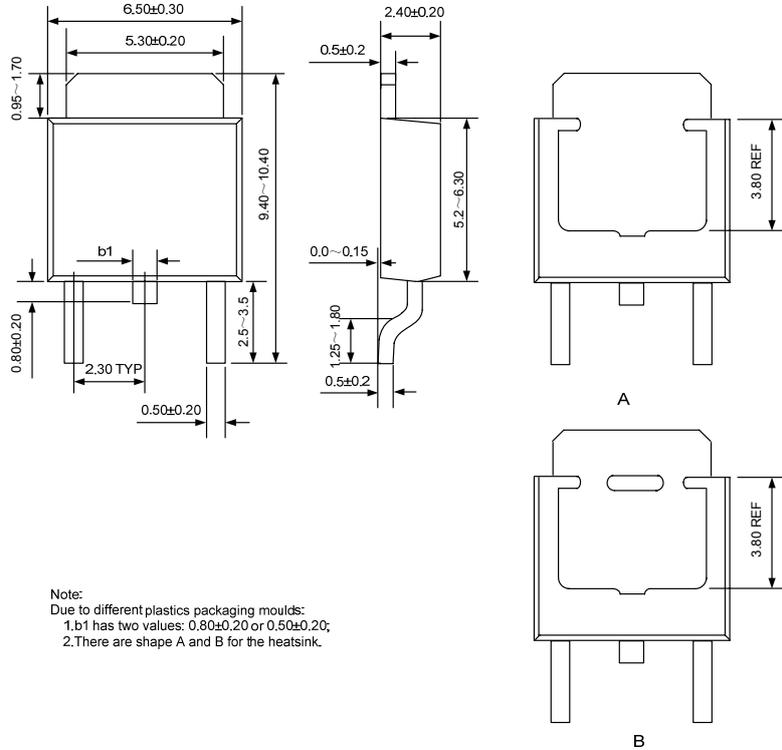
TO-252-2L(2)	UNIT: mm
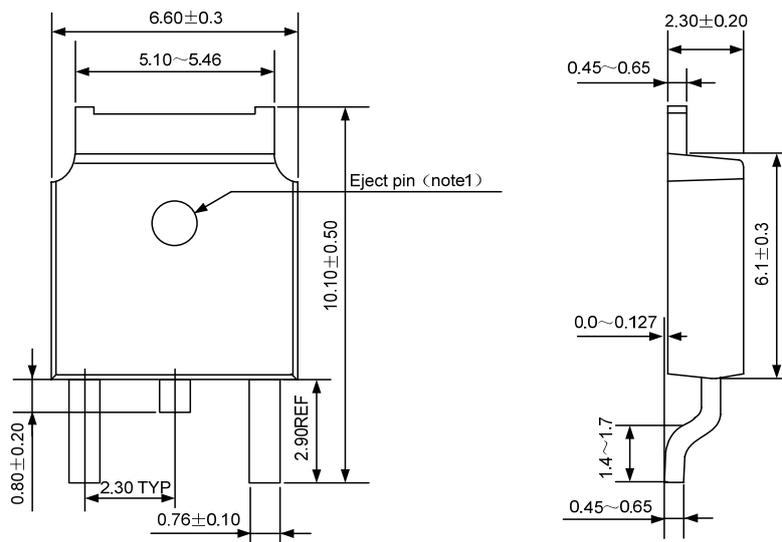
Eject pin（note1）

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

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- Silan will supply the best possible product for customers!

ATTACHMENT

Revision History

Date	REV	Description	Page
2011.02.18	1.0	Original	
2011.08.31	1.1	Modify "PACKAGE OUTLINE"	