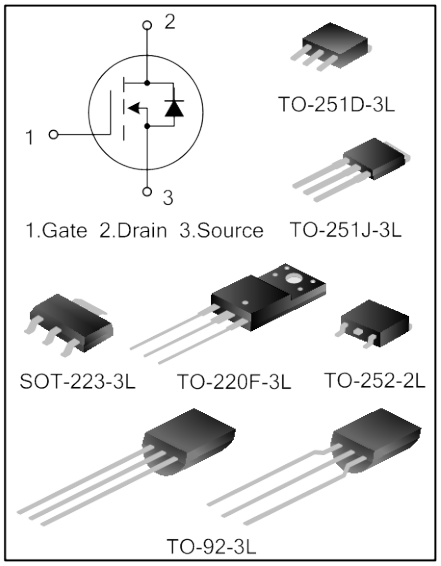
1A, 600V N-CHANNEL MOSFET

GENERAL DESCRIPTION

SVF1N60AM/MJ/B/D/F/H 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.

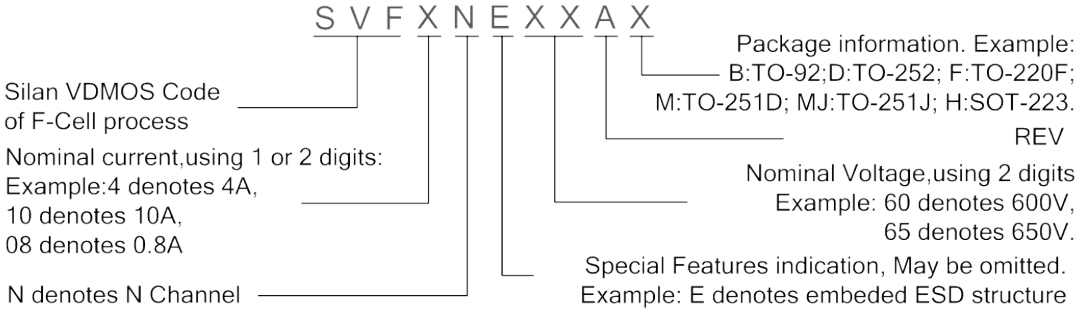
These devices are widely used in AC-DC power suppliers, DC-DC converters and H-bridge PWM motor drivers.



FEATURES

* 1A,600V,$R_{DS(on)}$ (typ.) =6.8Ω@V_{GS}=10V
* Low gate charge
* Low Crss
* Fast switching
* Improved dv/dt capability

NOMENCLATURE



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SVF1N60AM	TO-251D-3L	SVF1N60AM	Pb free	Tube
SVF1N60AMJ	TO-251J-3L	SVF1N60AMJ	Pb free	Tube
SVF1N60ABTR	TO-92-3L	1N60A	Pb free	AMMO
SVF1N60AD	TO-252-2L	SVF1N60AD	Pb free	Tube
SVF1N60ADTR	TO-252-2L	SVF1N60AD	Pb free	Tape & Reel
SVF1N60AF	TO-220F-3L	SVF1N60AF	Pb free	Tube
SVF1N60AH	SOT-223-3L	SVF1N60AH	Pb free	Tape & Reel

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

Characteristics		Symbol	Rating					Unit
			SVF1N 60AM/D	SVF1N 60MJ	SVF1N 60AB	SVF1N 60AF	SVF1N 60AH	
Drain-Source Voltage		V_{DS}	600					V
Gate-Source Voltage		V_{GS}	±30					V
Drain Current	T_C=25°C	I_D	1.0					A
	T_C=100°C		0.6					
Drain Current Pulsed		I_{DM}	4.0					A
Power Dissipation(T_C=25°C)		P_D	28	30	9	18	22	W
-Derate above 25°C			0.22	0.24	0.072	0.14	0.18	W/°C
Single Pulsed Avalanche Energy (Note 1)		E_{AS}	52					mJ
Operation Junction Temperature Range		T_J	-55～+150					°C
Storage Temperature Range		T_{stg}	-55～+150					°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Rating					Unit
		SVF1N 60AM/D	SVF1N 60MJ	SVF1N 60AB	SVF1N 60AF	SVF1N 60AH	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4.55	4.17	13.9	6.94	5.68	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	110	110	120	120	60	°C/W

ELECTRICAL CHARACTERISTICS (Tc=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	600	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=600V, 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=0.5 A	--	6.8	8.1	Ω
Input Capacitance	C_{iss}	V_{DS}=25V,V_{GS}=0V, f=1.0MHZ	--	139.0	170	pF
Output Capacitance	C_{oss}		--	23.4	25	
Reverse Transfer Capacitance	C_{rss}		--	0.6	4.5	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=300V,I_D=1.0A, R_G=25Ω (Note 2,3)	--	6.1	24	ns
Turn-on Rise Time	t_r		--	11.9	52	
Turn-off Delay Time	$t_{d(off)}$		--	8.3	50	
Turn-off Fall Time	t_f		--	15.3	64	
Total Gate Charge	Q_g	V_{DS}=480V,I_D=1.0A, V_{GS}=10V (Note 2,3)	--	3.37	6.2	nC
Gate-Source Charge	Q_{gs}		--	1.16	--	
Gate-Drain Charge	Q_{gd}		--	1.04	--	

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, dIF/dt=100A/μS (Note 2)	--	190	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.53	--	μC

Notes:

1. L=30mH, I_{AS}=1.74A, V_{DD}=110V, 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

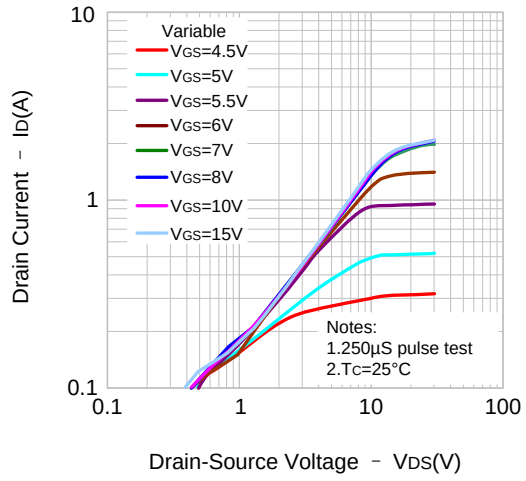


Figure 2. Transfer Characteristics

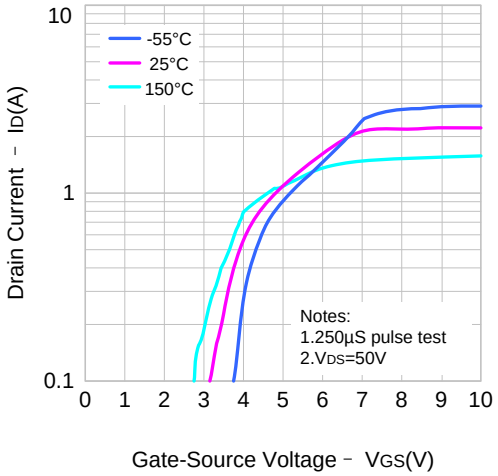


Figure 3. On-Resitance Variation vs. Drain Current and Gate Voltage

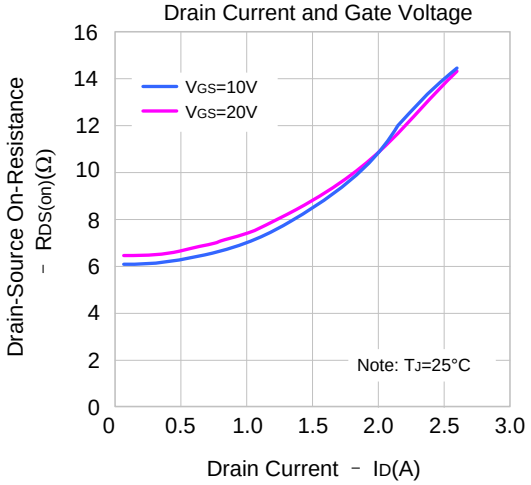
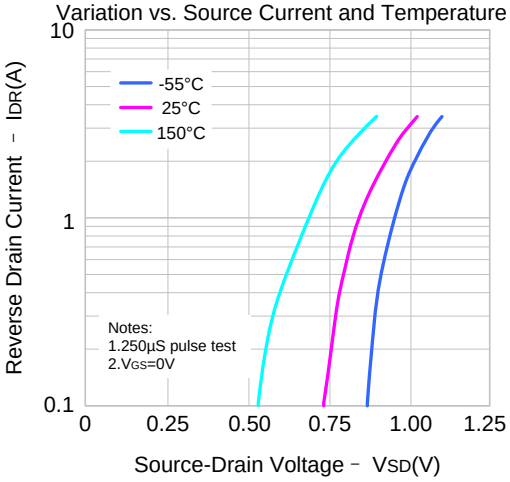


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature



TYPICAL CHARACTERISTICS (continued)

Figure 5. Capacitance Characteristics

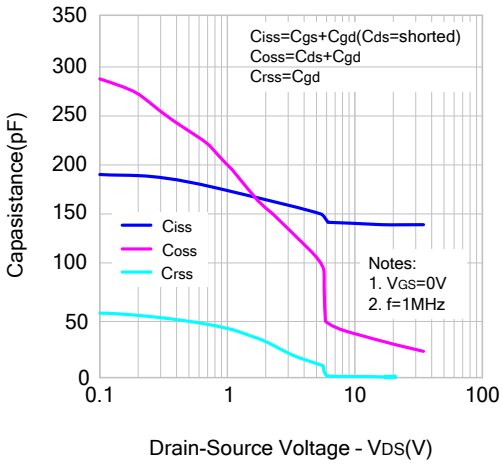


Figure 6. Gate Charge Characteristics

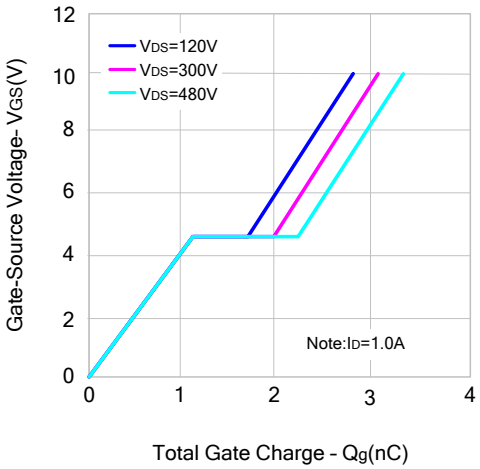


Figure 7. Breakdown Voltage Variation vs. Temperature

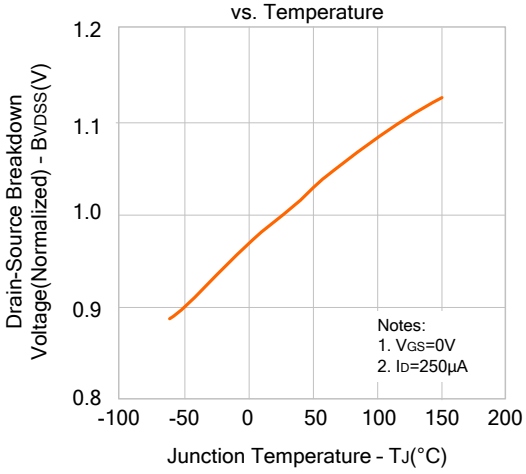


Figure 8. On-resistance Variation vs. Temperature

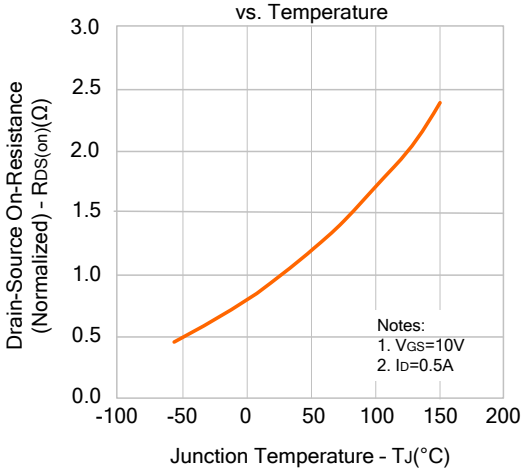


Figure 9-1. Max. Safe Operating Area(SVF1N60AM/D)

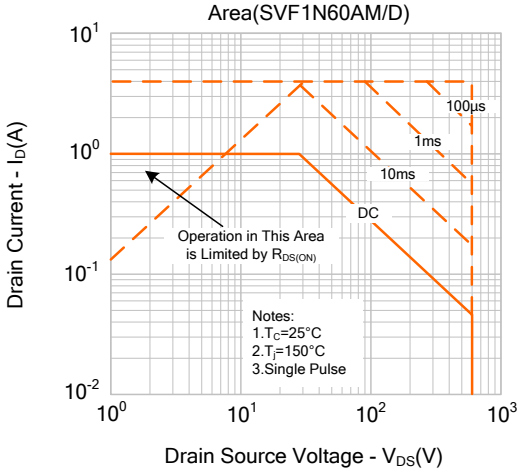
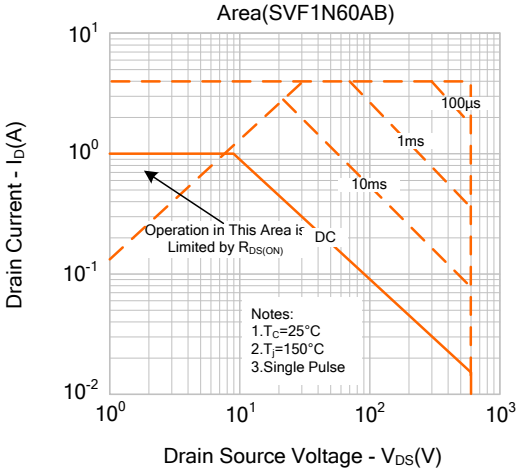


Figure 9-2. Max. Safe Operating Area(SVF1N60AB)



TYPICAL CHARACTERISTICS (continued)

Figure 9-3. Max. Safe Operating Area(SVF1N60AF)

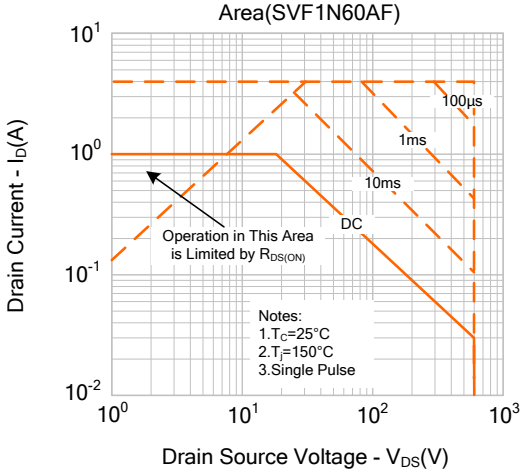


Figure 9-4. Max. Safe Operating Area(SVF1N60AH)

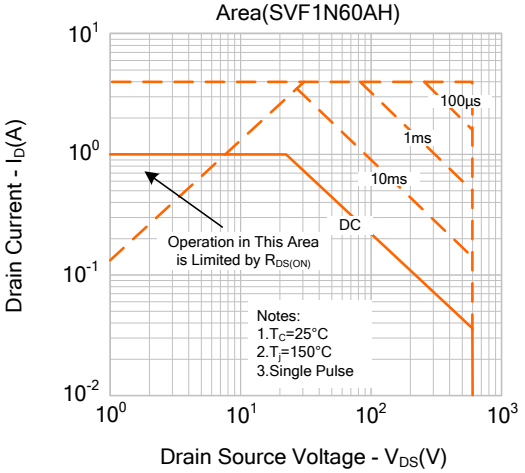


Figure 9-5. Max. Safe Operating Area(SVF1N60AMJ)

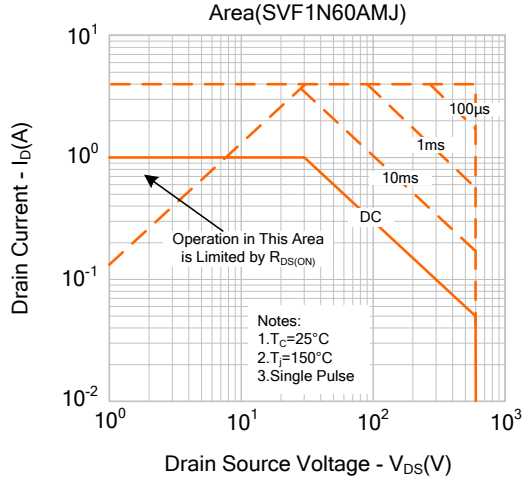
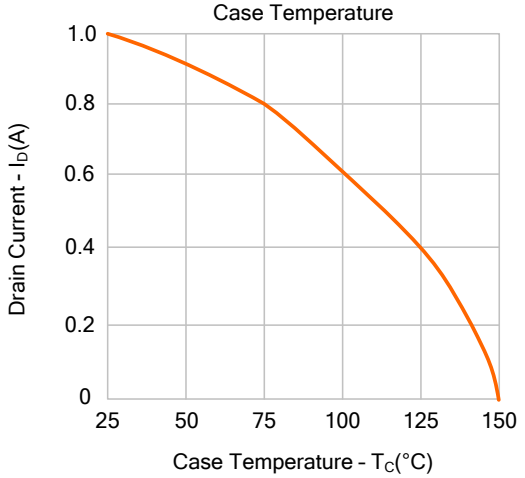
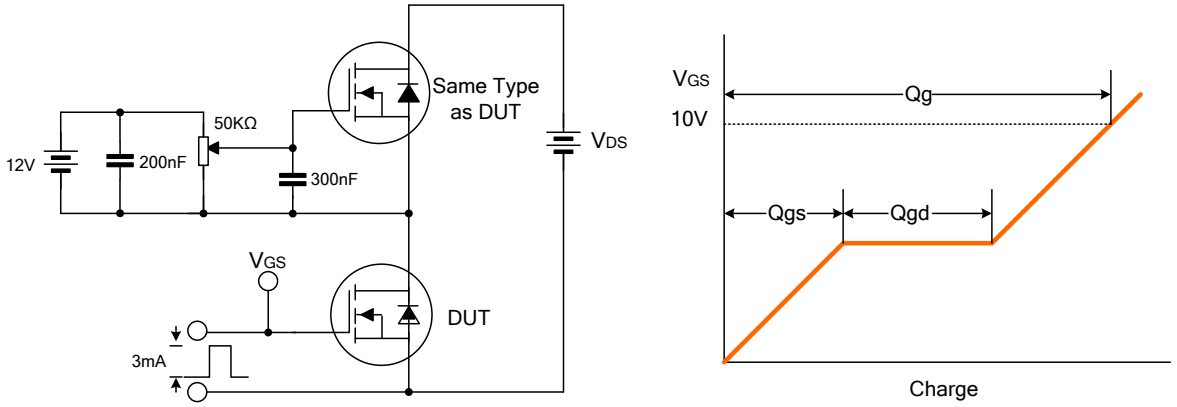


Figure 10. Maximum Drain Current vs. Case Temperature

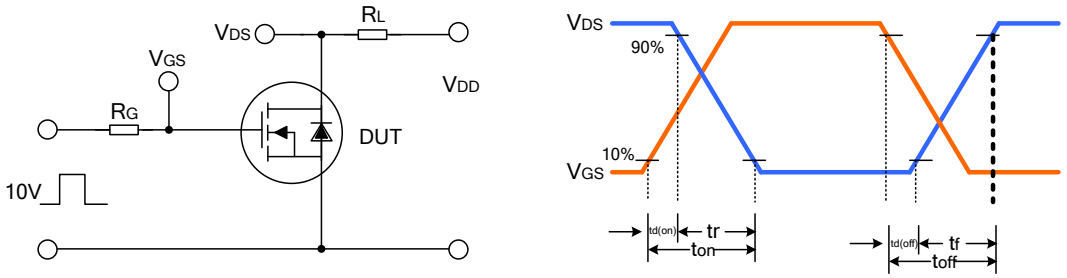


TYPICAL TEST CIRCUIT

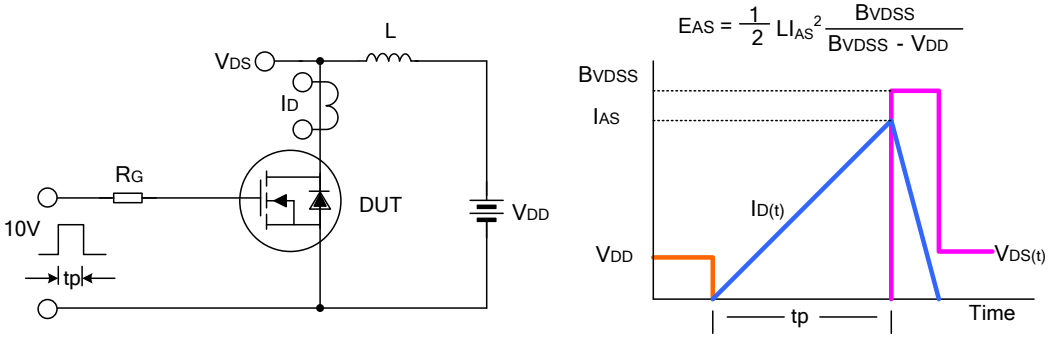
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

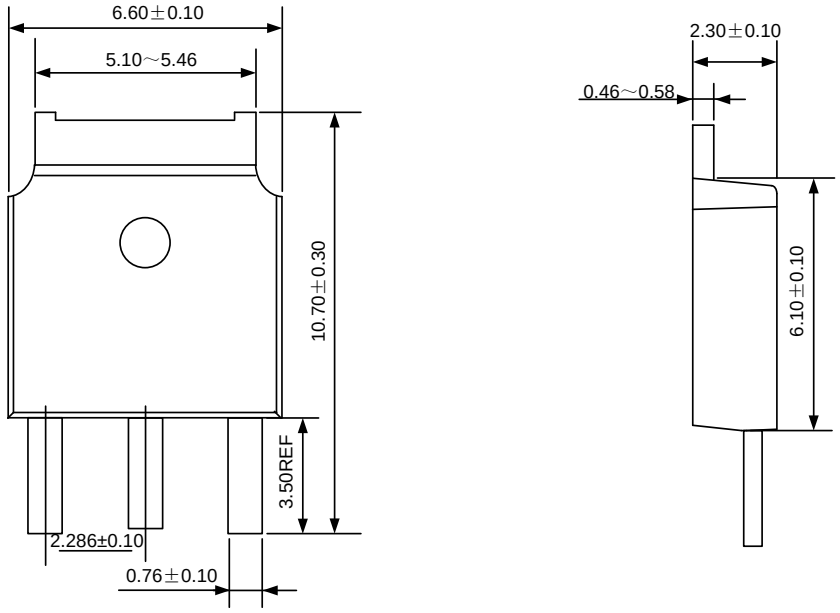


Unclamped Inductive Switching Test Circuit & Waveform

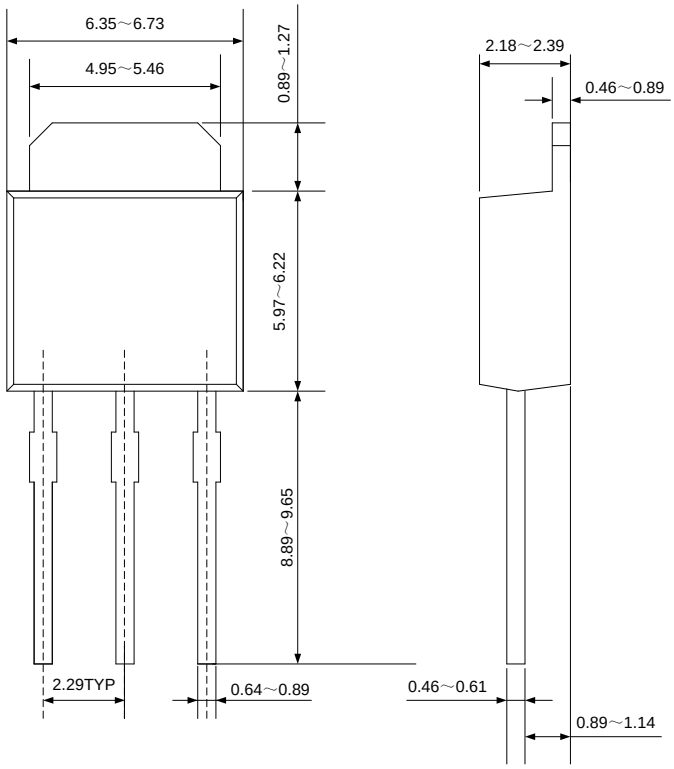


PACKAGE OUTLINE

TO-251D-3L UNIT: mm

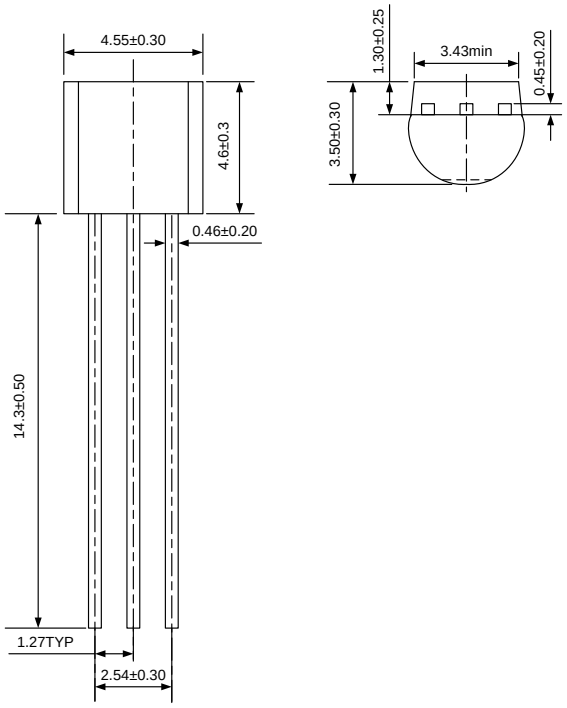


TO-251J-3L UNIT: mm

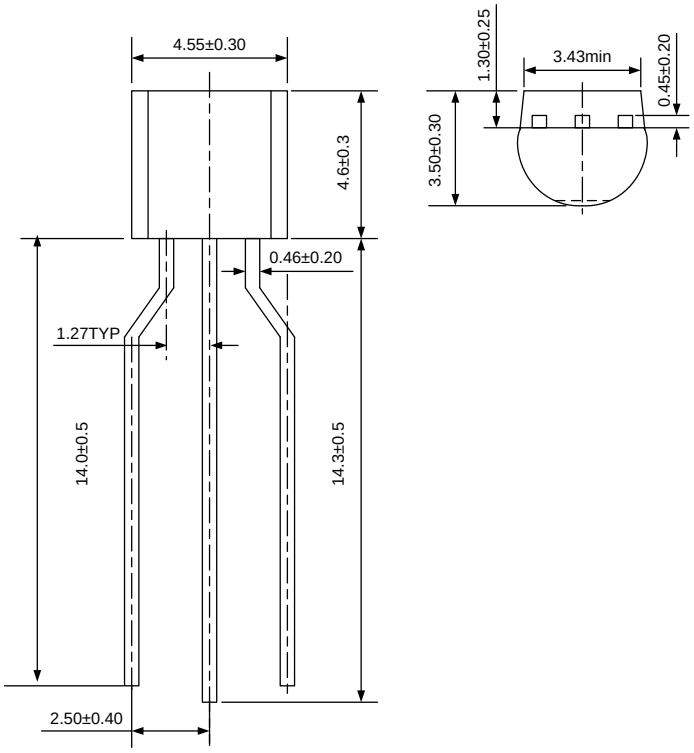


PACKAGE OUTLINE (continued)

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

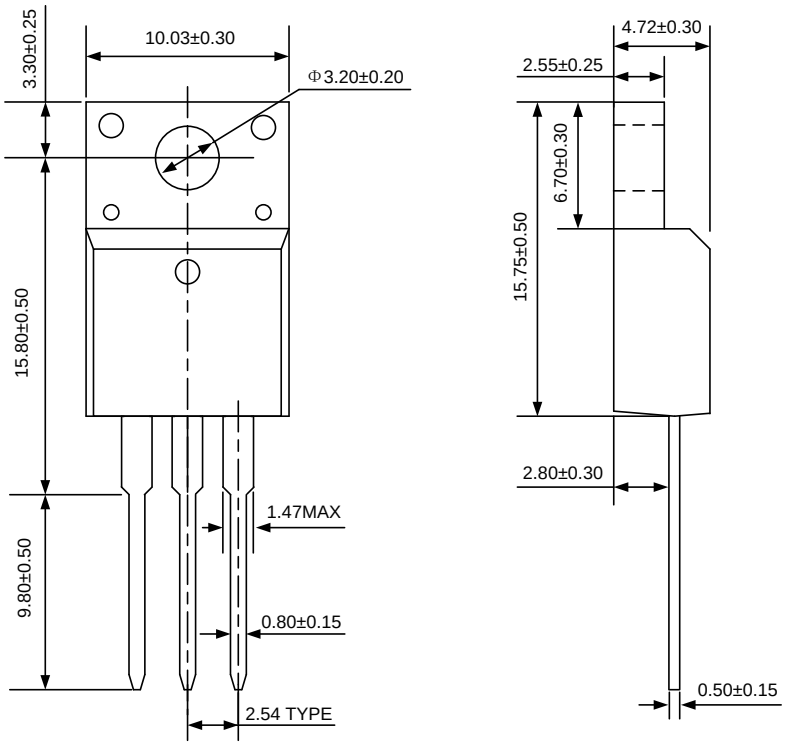


TO-92-3L(2) UNIT: mm

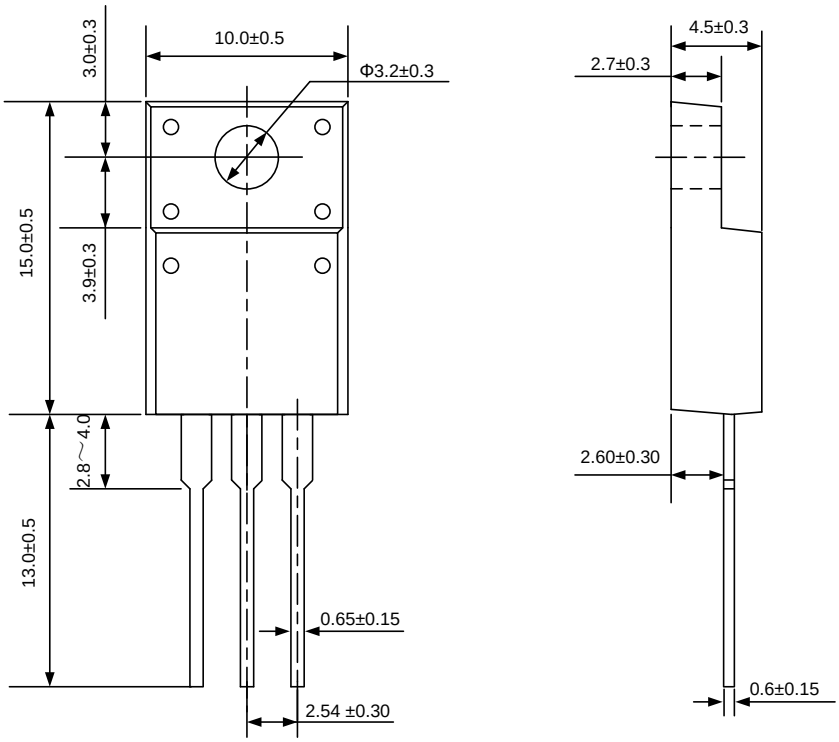


PACKAGE OUTLINE (continued)

TO-220F-3L(1) UNIT: mm

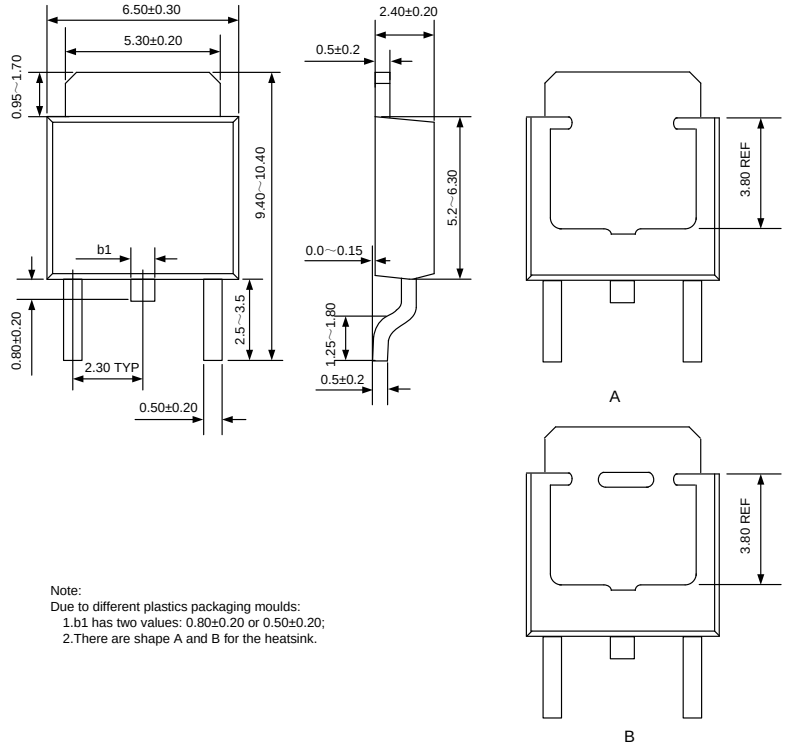


TO-220F-3L(2) UNIT: mm



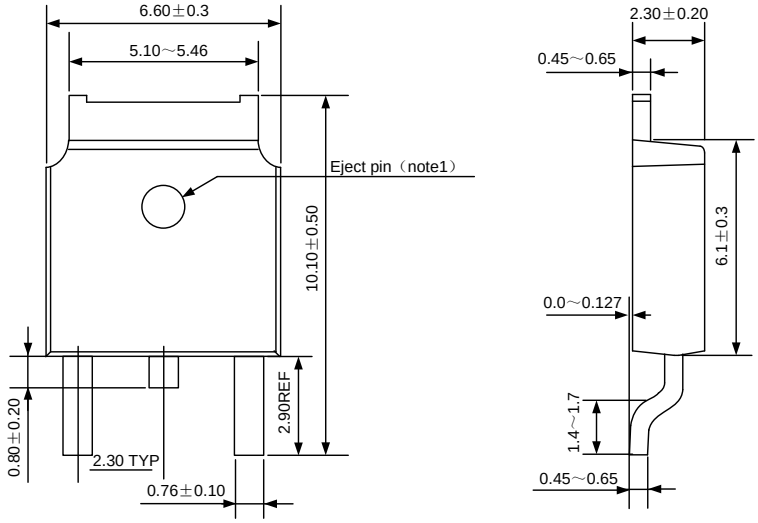
PACKAGE OUTLINE (continued)

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.

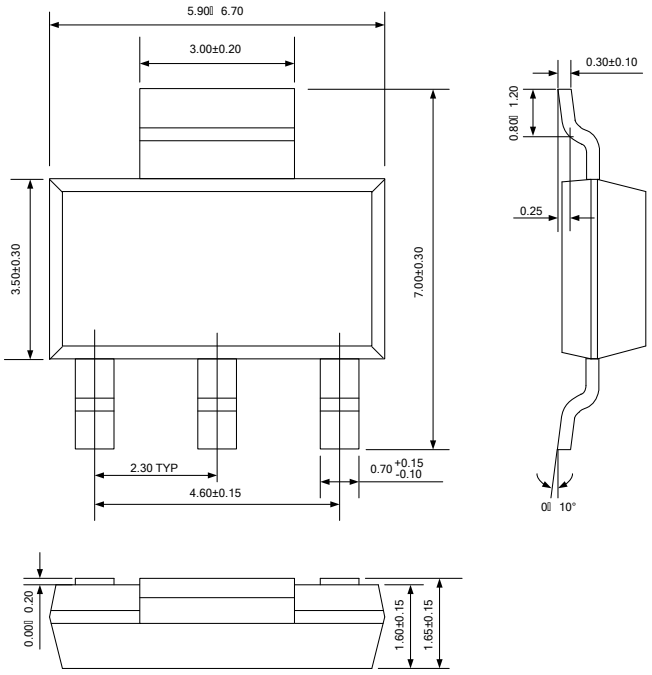
TO-252-2L(2) UNIT: mm



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

PACKAGE OUTLINE (continued)

SOT-223-3L UNIT: mm



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- **Silan reserves the right to make changes to the information herein for the improvement of the design and performance without further notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.**
- **All semiconductor products malfunction or fail with some probability under special conditions. When using Silan products in system design or complete machine manufacturing, it is the responsibility of the buyer to comply with the safety standards strictly and take essential measures to avoid situations in which a malfunction or failure of such Silan products could cause loss of body injury or damage to property.**
- **Silan will supply the best possible product for customers!**

ATTACHMENT

Revision History

Date	REV	Description	Page
2010.09.01	1.0	Original	
2010.10.21	1.1	Modify the template of Datasheet	
2010.11.05	1.2	Modify the part No.; Add SOA and I_D-T_C	
2010.11.19	1.3	Omit the Package of TO-220-3L	
2011.01.24	1.4	Modify “Package Outline”	
2011.04.26	1.5	Add the Package of TO-220F-3L	
2011.09.16	1.6	Modify “PACKAGE OUTLINE” ; Add the package of TO-251D-3L	
2011.12.27	1.7	Add the package of SOT-223-3L; Delete the package of TO-251-3L	
2012.03.22	1.8	Add the package of TO-251J-3L	
2012.07.27	1.9	Modify “ELECTRICAL CHARACTERISTICS”	