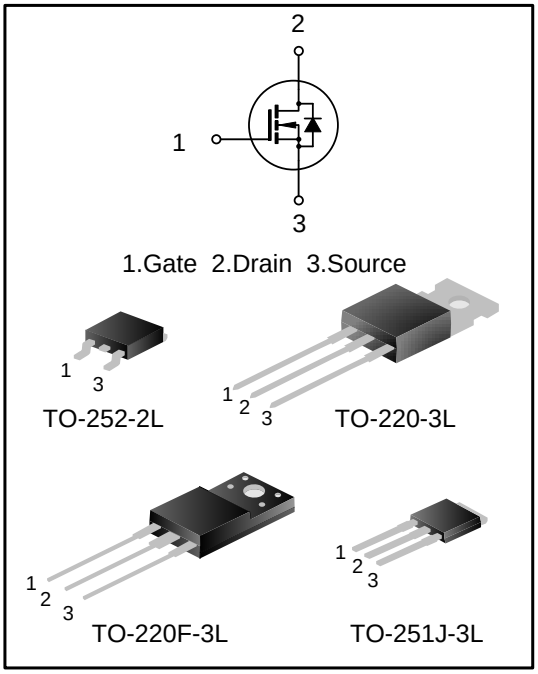
4A, 900V N-CHANNEL MOSFET

GENERAL DESCRIPTION

SVF4N90F/MJ/T/D is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary F-Cell™ high-voltage planar VDMOS technology. The improved process and cell structure 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 supplies, DC-DC converters and H-bridge PWM motor drivers.



FEATURES

- 4A,900V,$R_{DS(on)(typ.)}$=2.7Ω@V_{GS}=10V
- Low gate charge
- Low Crss
- Fast switching
- Improved dv/dt capability

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVF4N90F	TO-220F-3L	SVF4N90F	Pb free	Tube
SVF4N90MJ	TO-251J-3L	SVF4N90	Halogen free	Tube
SVF4N90T	TO-220-3L	SVF4N90T	Pb free	Tube
SVF4N90DTR	TO-252-2L	SVF4N90D	Halogen free	Tape&Reel

ABSOLUTE MAXIMUM RATINGS (T_A=25°C UNLESS OTHERWISE NOTED)

Characteristics		Symbol	Ratings			Unit
			SVF4N90F	SVF4N90MJ/D	SVF4N90T	
Drain-Source Voltage		V_{DS}	900			V
Gate-Source Voltage		V_{GS}	±30			V
Drain Current	T_C=25°C	I_D	4			A
	T_C=100°C		2.5			
Drain Current Pulsed		I_{DM}	16			A
Power Dissipation(T_C=25°C)		P_D	44	132	150	W
-Derate above 25°C			0.35	1.06	1.20	W/°C
Single Pulsed Avalanche Energy (Note 1)	L=30mH	E_{AS}	344			mJ
	L=10mH		84			mJ
Operation Junction Temperature Range		T_J	-55～+150			°C
Storage Temperature Range		T_{stg}	-55～+150			°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings			Unit
		SVF4N90F	SVF4N90MJ/D	SVF4N90T	
Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	2.84	0.95	0.83	°C/W
Thermal Resistance,Junction-to-Ambient	$R_{\theta JA}$	62.5	62.0	62.0	°C/W

ELECTRICAL CHARACTERISTICS (T_j=25°C UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	900	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=900V, 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=2A	--	2.7	3.5	Ω
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	--	707	--	pF
Output Capacitance	C_{oss}		--	68	--	
Reverse Transfer Capacitance	C_{rss}		--	3.0	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=450V, I_D=4A,R_G=25Ω (Note2,3)	--	15	--	ns
Turn-on Rise Time	t_r		--	26	--	
Turn-off Delay Time	$t_{d(off)}$		--	39	--	
Turn-off Fall Time	t_f		--	28	--	
Total Gate Charge	Q_g	V_{DS}=720V, I_D=4A,V_{GS}=10V (Note 2,3)	--	17	--	nC
Gate-Source Charge	Q_{gs}		--	4.1	--	
Gate-Drain Charge	Q_{gd}		--	7.6	--	
Gate resistance	R_G	f=1MHz, Drain Open, OSC Level: 20mV	--	4.2	--	Ω

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	--	--	4	A
Pulsed Source Current	I_{SM}		--	--	16	
Diode Forward Voltage	V_{SD}	I_S=4A,V_{GS}=0V	--	--	1.4	V
Reverse Recovery Time	T_{rr}	I_S=4A,V_{GS}=0V, dI_F/dt=100A/μs (Note 2)	--	535	--	ns
Reverse Recovery Charge	Q_{rr}		--	2.5	--	μC

Notes:

1. V_{DD}=50V, R_G=25Ω, starting TB_{JB}=25°C;
2. Pulse Test: Pulse width ≤300μs,Duty cycle≤2%;
3. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

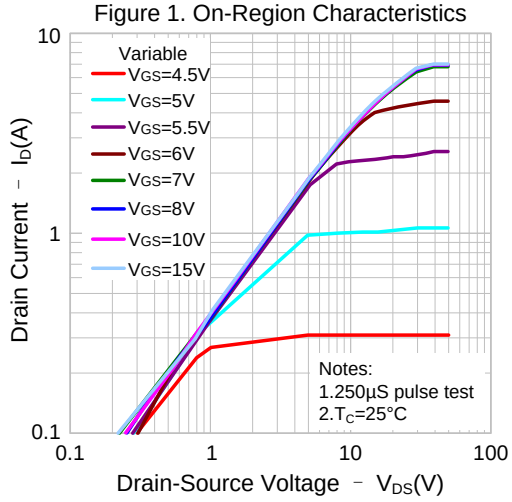


Figure 2. Transfer Characteristics

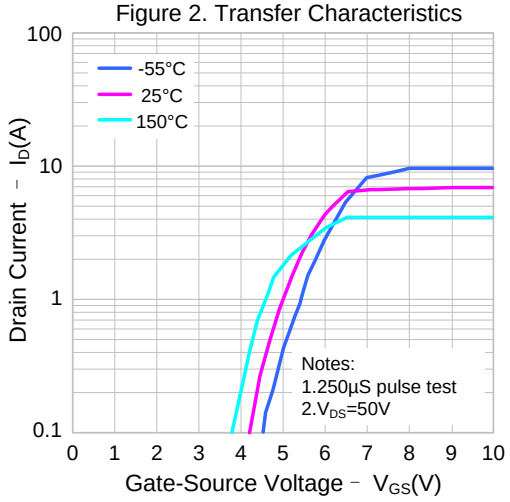


Figure 3. On-Resitance Variation vs. Drain Current and Gate Voltage

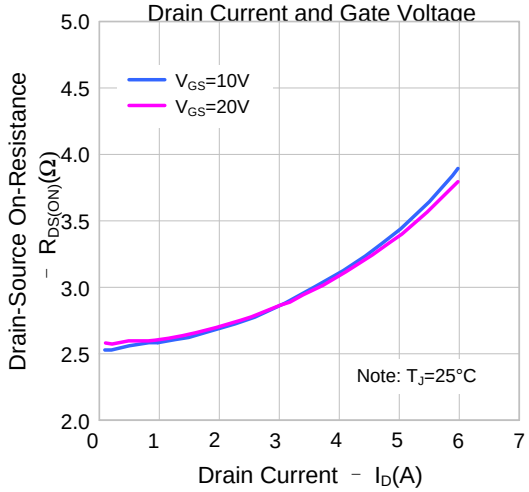


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

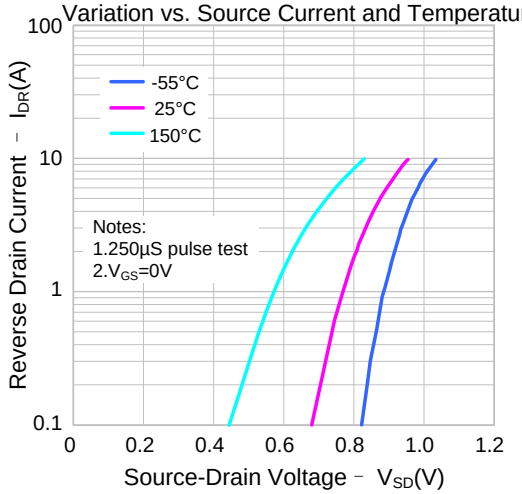


Figure 5. Capacitance Characteristics

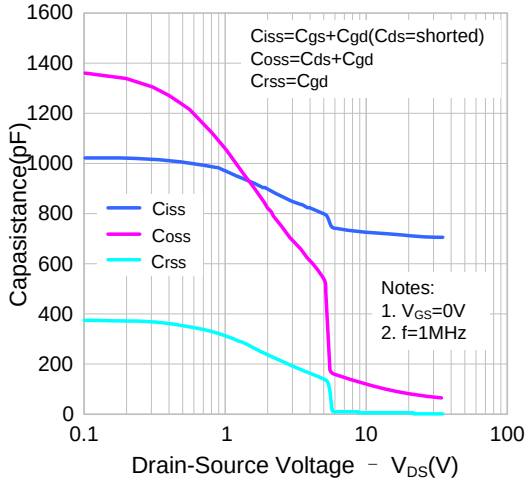
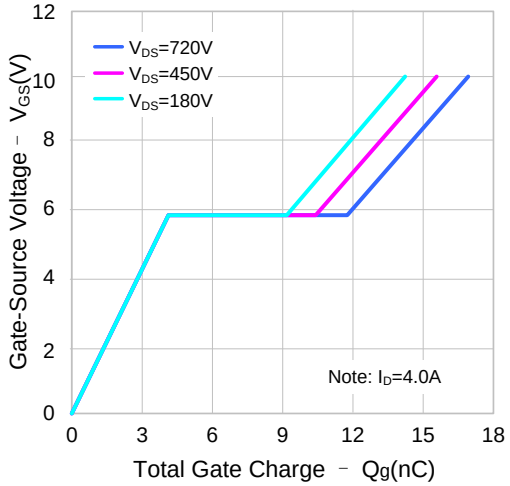


Figure 6. Gate Charge Characteristics



TYPICAL CHARACTERISTICS(CONTINUED)

Figure 7. Breakdown Voltage Variation vs. Temperature

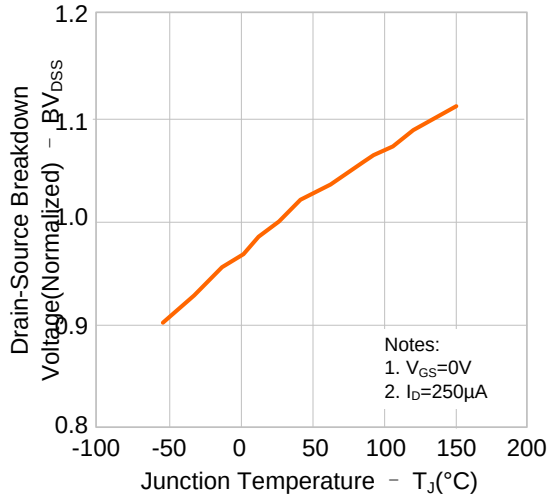


Figure 8. On-resistance Variation vs. Temperature

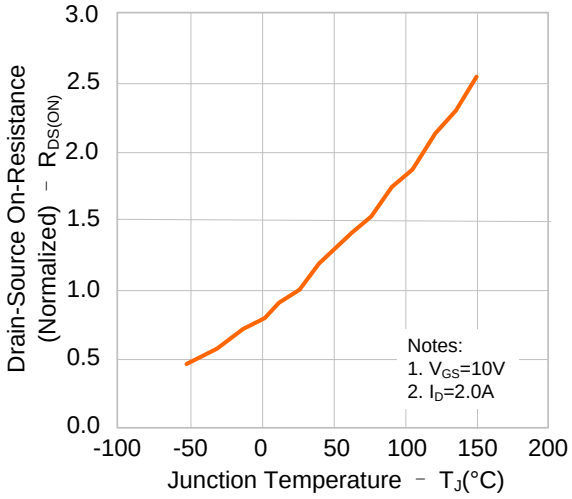


Figure 9-1. Max. Safe Operating Area(SVF4N90F)

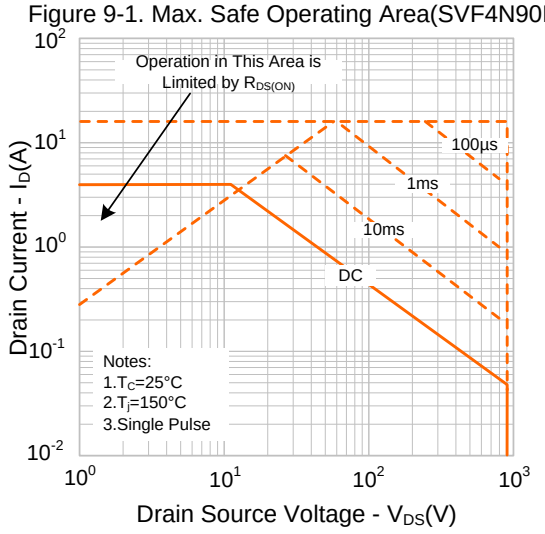


Figure 9-2. Max. Safe Operating Area(SVF4N90MJ/D)

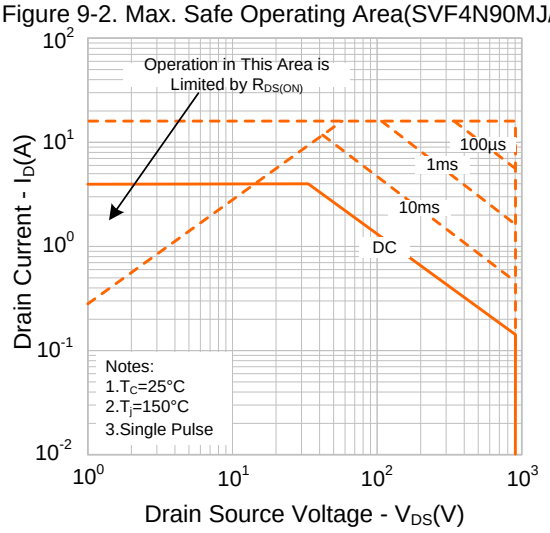


Figure 9-3. Max. Safe Operating Area(SVF4N90T)

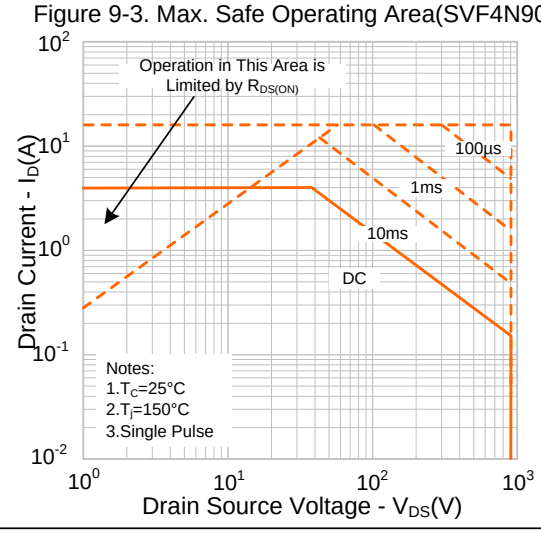
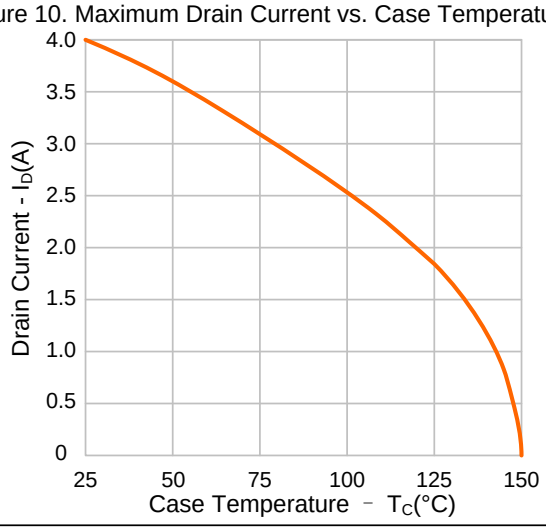
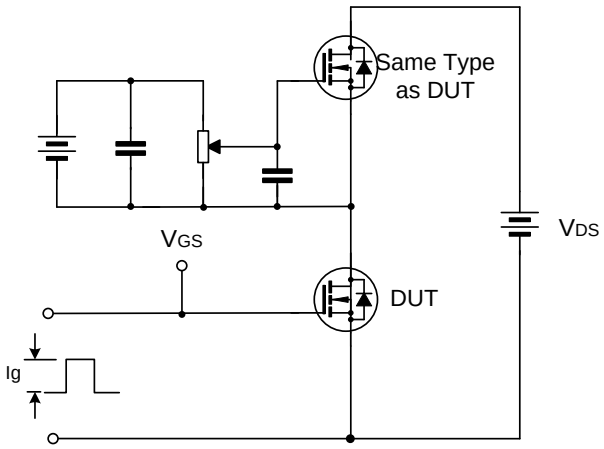


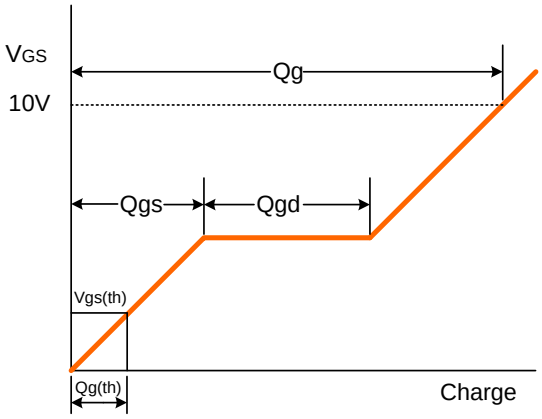
Figure 10. Maximum Drain Current vs. Case Temperature



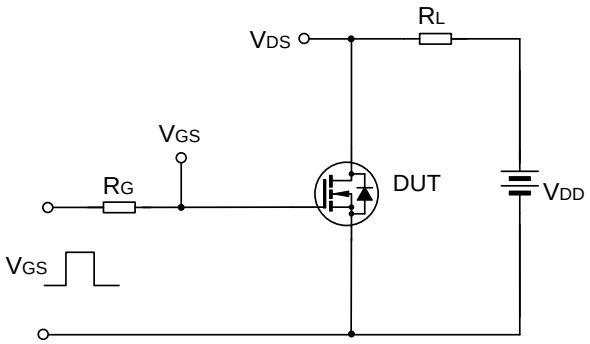
TYPICAL TEST CIRCUIT

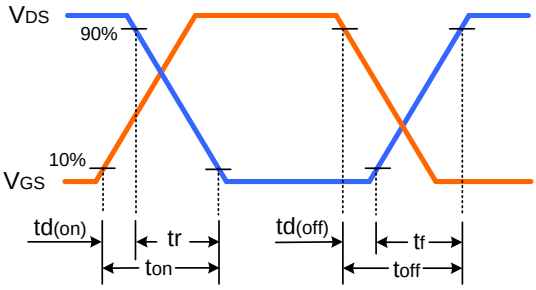
Gate Charge Test Circuit & Waveform



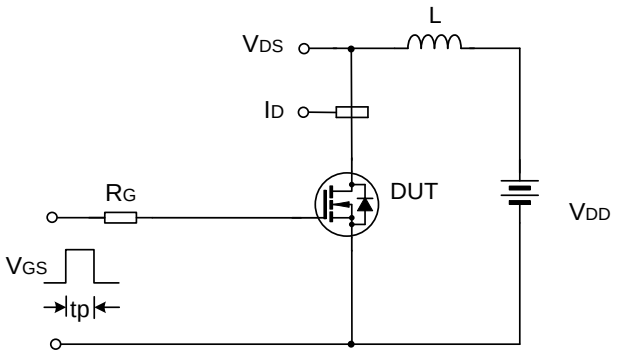


Resistive Switching Test Circuit & Waveform

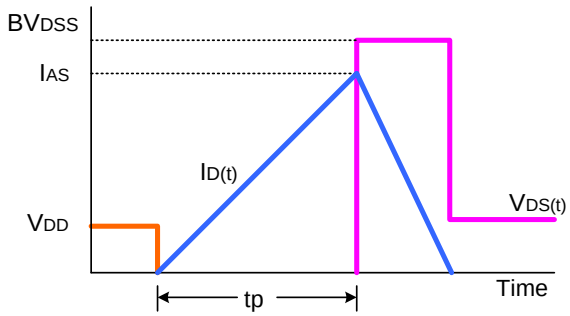




Unclamped Inductive Switching Test Circuit & Waveform

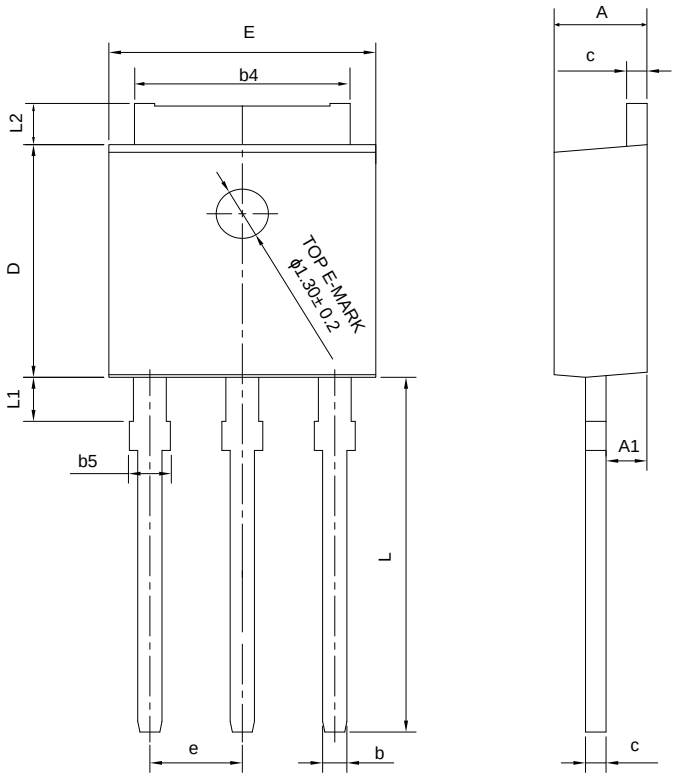


$$E_{AS} = \frac{1}{2} LI_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



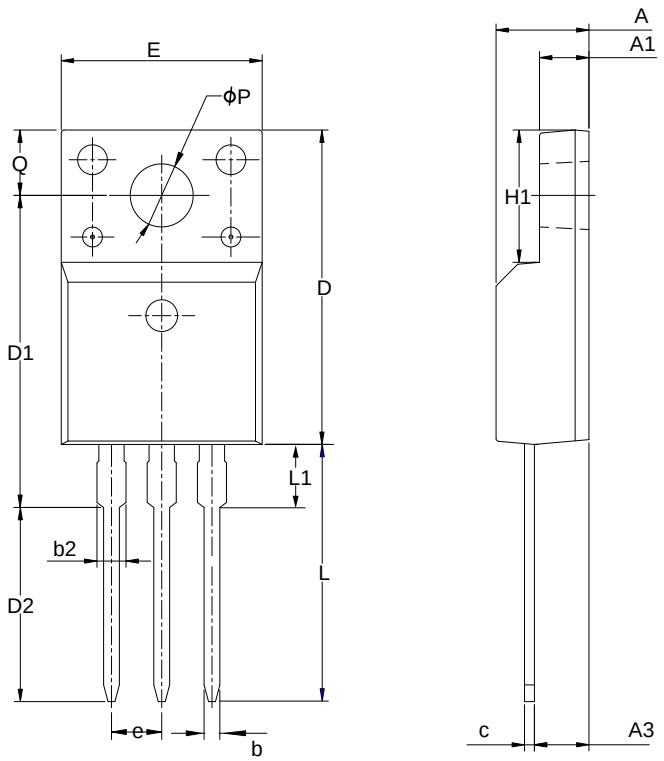
PACKAGE OUTLINE

TO-251J-3L **UNIT: mm**



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.18	2.30	2.39
A1	0.89	1.00	1.14
b	0.56	—	0.89
b4	4.95	5.33	5.46
b5	—	—	1.05
c	0.46	—	0.61
D	5.97	6.10	6.27
E	6.35	6.60	6.73
e	2.29 BCS		
L	8.89	9.30	9.65
L1	0.95	—	1.50
L2	0.89	—	1.27

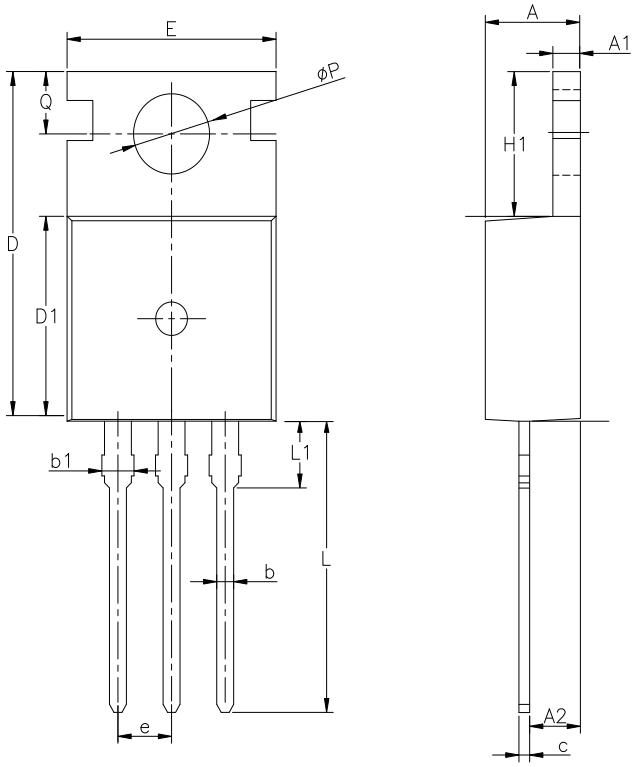
TO-220F-3L **UNIT: mm**



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.42	4.70	5.02
A1	2.30	2.54	2.80
A3	2.50	2.76	3.10
b	0.70	0.80	0.90
b2	–	–	1.47
c	0.35	0.50	0.65
D	15.25	15.87	16.25
D1	15.30	15.75	16.30
D2	9.30	9.80	10.30
E	9.73	10.16	10.36
e	2.54BSC		
H1	6.40	6.68	7.00
L	12.48	12.98	13.48
L1	–	–	3.50
ϕP	3.00	3.18	3.40
Q	3.05	3.30	3.55

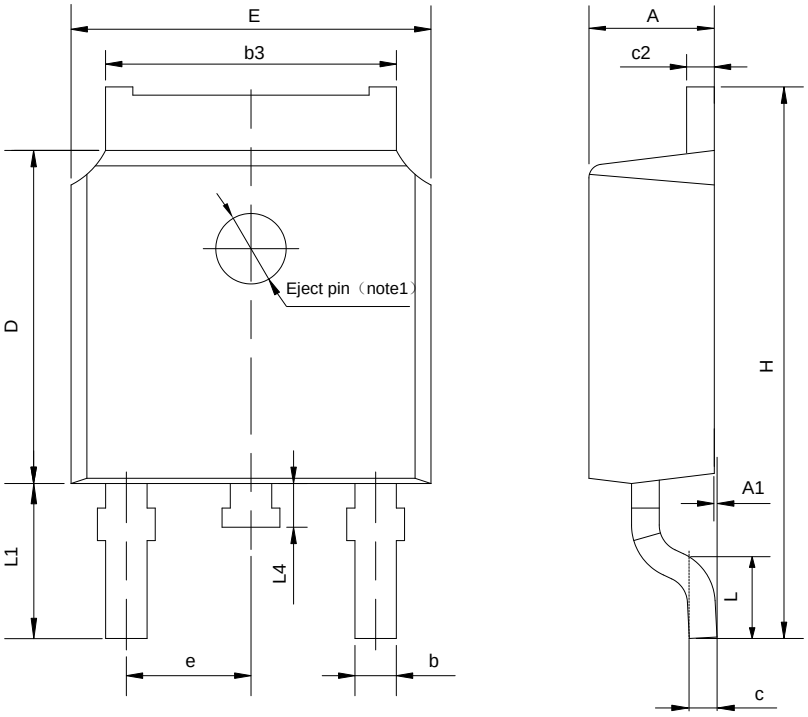
PACKAGE OUTLINE

TO-220-3L **UNIT: mm**



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.30	4.50	4.70
A1	1.00	1.30	1.50
A2	1.80	2.40	2.80
b	0.60	0.80	1.00
b1	1.00	—	1.60
c	0.30	—	0.70
D	15.10	15.70	16.10
D1	8.10	9.20	10.00
E	9.60	9.90	10.40
e	2.54BSC		
H1	6.10	6.50	7.00
L	12.60	13.08	13.60
L1	—	—	3.95
ϕP	3.40	3.70	3.90
Q	2.60	—	3.20

TO-252-2L **UNIT: mm**



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.10	2.30	2.50
A1	0	—	0.127
b	0.66	0.76	0.89
b3	5.10	5.33	5.46
c	0.45	—	0.65
c2	0.45	—	0.65
D	5.80	6.10	6.40
E	6.30	6.60	6.90
e	2.30TYP		
H	9.60	10.10	10.60
L	1.40	1.50	1.70
L1	2.90REF		
L4	0.60	0.80	1.00

Important notice :

- **The instructions are subject to change without notice！ Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.**
- **Our products are consumer electronic products, and / or civil electronic products.**
- **When using our products, please do not exceed the maximum rating of the products, otherwise the reliability of the whole machine will be affected. There is a certain possibility of failure or malfunction of any semiconductor product under specific conditions. The buyer is responsible for complying with safety standards and taking safety measures when using our products for system design, sample and whole machine manufacturing, so as to avoid potential failure risk that may cause personal injury or property loss.**
- **It is strongly recommended to identify the trademark when buying our products. Please conatus us if there is any question.**
- **When exporting, using and reselling our products, buyer must comply with the international export control laws and regulations of China, the United States, the United Kingdom, the European Union and other countries & regions.**
- **Product promotion is endless, our company will wholeheartedly provide customers with better products!**
- **Website: http: //www.silan.com.cn**

Part No.:	SVF4N90F/MJ/T/D	Document Type:	Datasheet
Copyright:	HANGZHOU SILAN MICROELECTRONICS CO.,LTD	Website:	http: //www.silan.com.cn

Rev.: 2.2

Revision History:

1. Update the template of the datasheet

Rev.: 2.1

Revision History:

1. Add the EAS value under L=10mH

Rev.: 2.0

Revision History:

1. Add the package outline of TO-252-2L

Rev.: 1.9

Revision History:

1. Add another space figure of TO-220-3L

Rev.: 1.8

Revision History:

1. Add TO-220-3L

Rev.: 1.7

Revision History:

1. Update the package outline of TO-251J-3L

Rev.: 1.6

Revision History:

1. Modify the package information of TO-220F-3L

Rev.: 1.5

Revision History:

1. Modify the thermal characteristics

Rev.: 1.4

Revision History:

1. Add the package of TO-251J-3L

Rev.: 1.3

Revision History:

1. Modify the ordering information

Rev.: 1.2

Revision History:

1. Change the schematic diagram of MOS

Rev.: 1.1

Revision History:

1. Modify “PACKAGE OUTLINE”

Rev.: 1.0

Revision History:

1. Initial release