

4A, 650V N-CHANNEL MOSFET

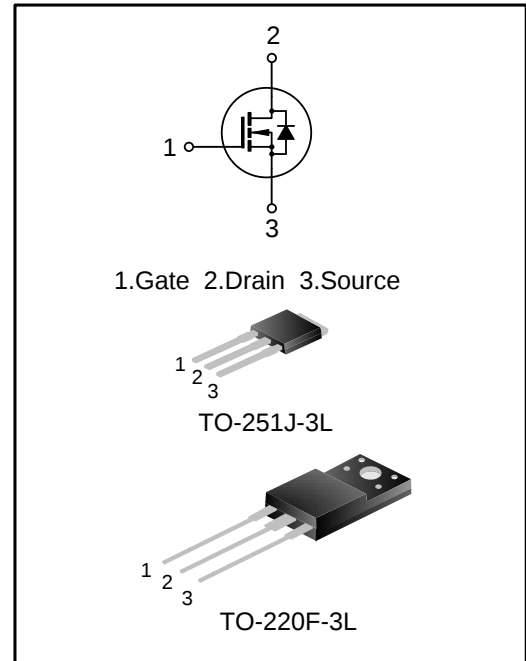
GENERAL DESCRIPTION

SVF4N65CF/MJ 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, 650V, $R_{DS(on)}(typ.)=2.3\Omega@V_{GS}=10V$
- ◆ Low gate charge
- ◆ Low C_{rss}
- ◆ Fast switching
- ◆ Improved dv/dt capability



ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVF4N65CF	TO-220F-3L	SVF4N65CF	Halogen free	Tube
SVF4N65CMJ	TO-251J-3L	SVF4N65C	Halogen free	Tube

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

Characteristics		Symbol	Ratings		Unit
			SVF4N65CF	SVF4N65CMJ	
Drain-Source Voltage		V _{DS}	650		V
Gate-Source Voltage		V _{GS}	±30		V
Drain Current	T _C =25°C	I _D	4.0		A
	T _C =100°C		2.5		
Drain Current Pulsed		I _{DM}	16		A
Power Dissipation(T _C =25°C) -Derate above 25°C		P _D	30	77	W
			0.24	0.62	W/°C
Single Pulsed Avalanche Energy(Note 1)		E _{AS}	215		mJ
Operation Junction Temperature Range		T _J	-55~+150		°C
Storage Temperature Range		T _{stg}	-55~+150		°C

THERMAL CHARACTERISTICS

Characteristics		Symbol	Ratings		Unit
			SVF4N65CF	SVF4N65CMJ	
Thermal Resistance, Junction-to-Case		R _{θJC}	4.17	1.62	°C/W
Thermal Resistance, Junction-to-Ambient		R _{θJA}	62.5	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	650	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =650V, 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	--	2.3	2.6	Ω
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHZ	--	467	--	pF
Output Capacitance	C _{oss}		--	60	--	
Reverse Transfer Capacitance	C _{rss}		--	4.8	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} =325V , V _{GS} =10V , R _G =25Ω , I _D =4A (Note2,3)	--	11	--	ns
Turn-on Rise Time	t _r		--	25	--	
Turn-off Delay Time	t _{d(off)}		--	28	--	
Turn-off Fall Time	t _f		--	25	--	
Total Gate Charge	Q _g	V _{DD} =520V, V _{GS} =10V, I _D =4A (Note 2,3)	--	13	--	nC
Gate-Source Charge	Q _{gs}		--	2.8	--	
Gate-Drain Charge	Q _{gd}		--	6.1	--	

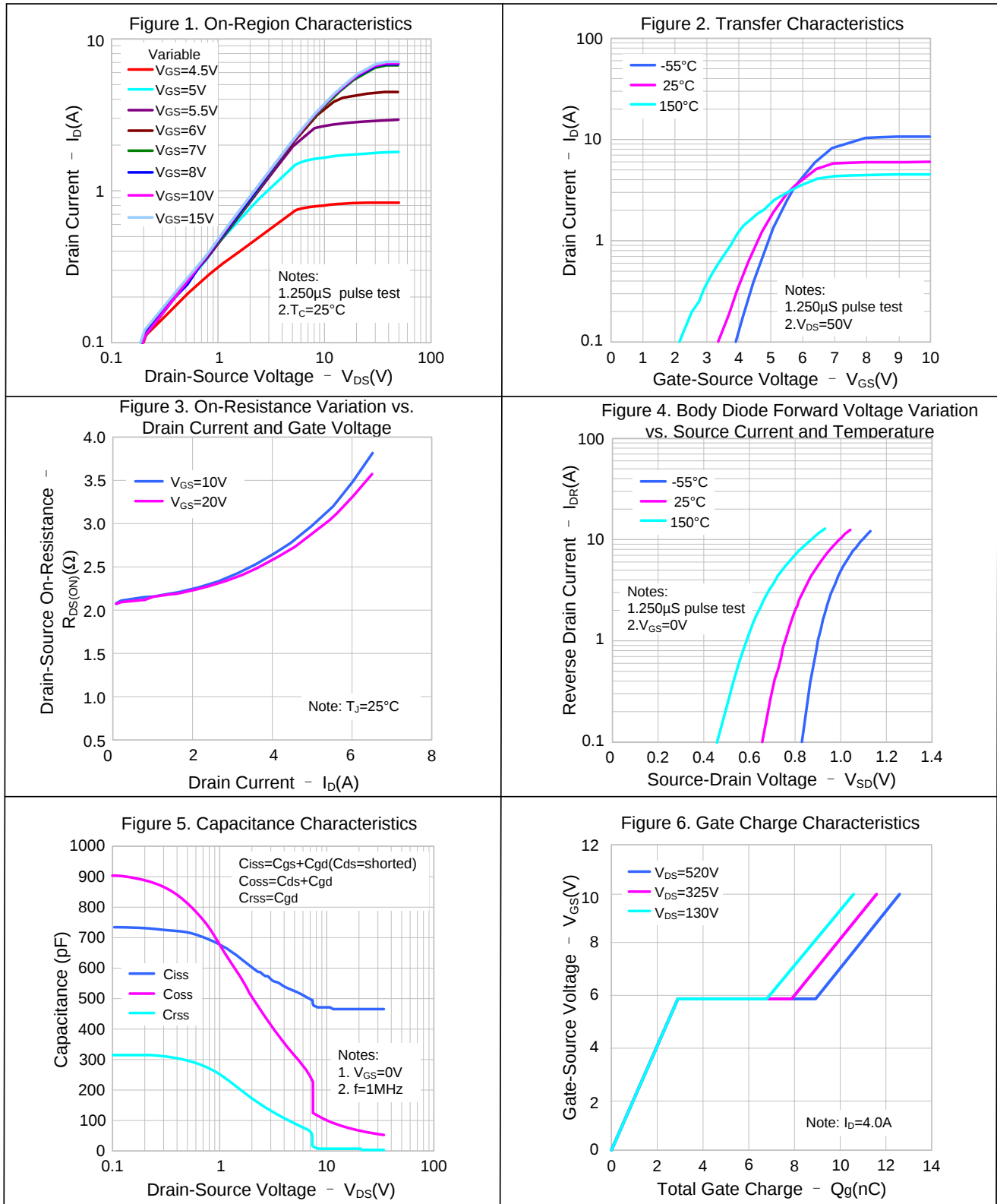
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction	--	--	4.0	A
Pulsed Source Current	I_{SM}	Diode in the MOSFET	--	--	16	
Diode Forward Voltage	V_{SD}	$I_S=4.0A, V_{GS}=0V$	--	--	1.4	V
Reverse Recovery Time	T_{rr}	$I_S=4.0A, V_{GS}=0V,$ $dI_F/dt=100A/\mu s$ (Note 2)	--	423	--	ns
Reverse Recovery Charge	Q_{rr}		--	2.0	--	μC

Notes:

1. $L=30mH, I_{AS}=3.6A, V_{DD}=100V, R_G=25\Omega$, starting $T_{BJB}=25^\circ C$;
2. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;
3. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS(CONTINUED)

Figure 7. Breakdown Voltage Variation vs. Temperature

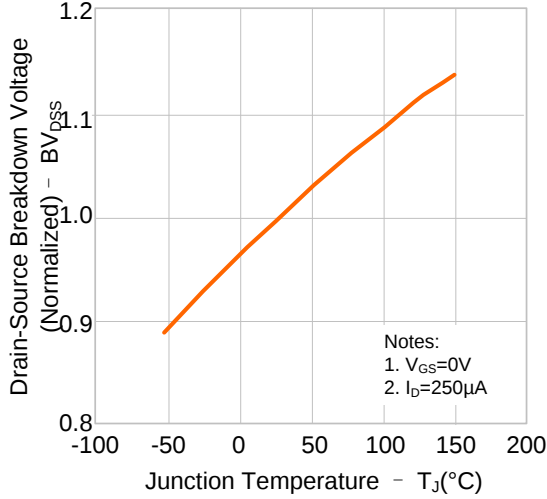


Figure 8. On-resistance vs. Temperature

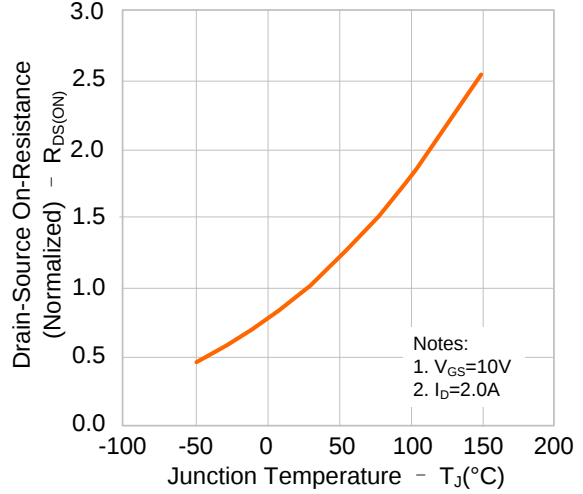


Figure 9-1. Max. Safe Operating Area(SVF4N65CF)

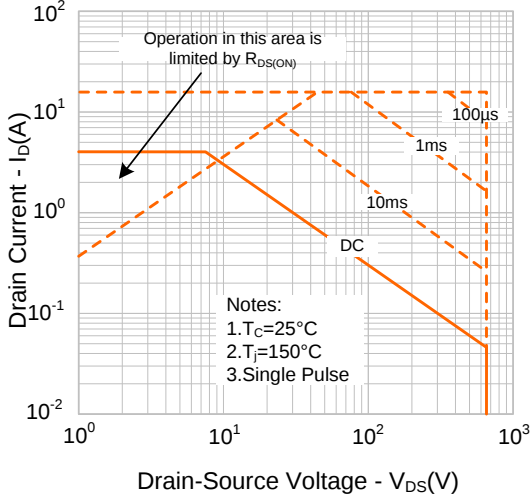


Figure 9-2. Max. Safe Operating Area(SVF4N65CMJ)

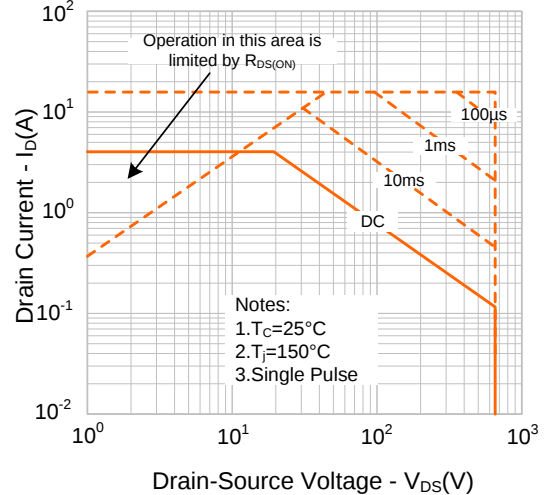
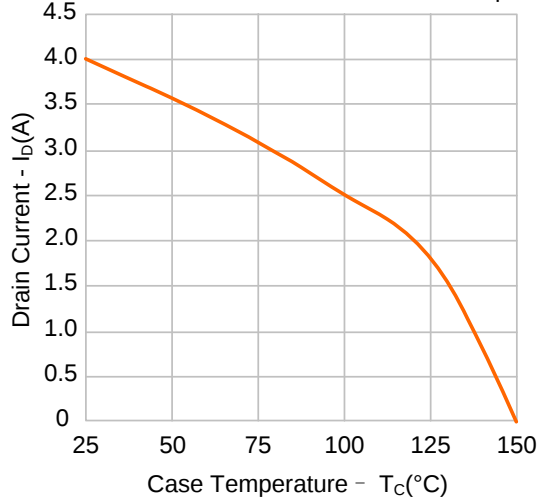
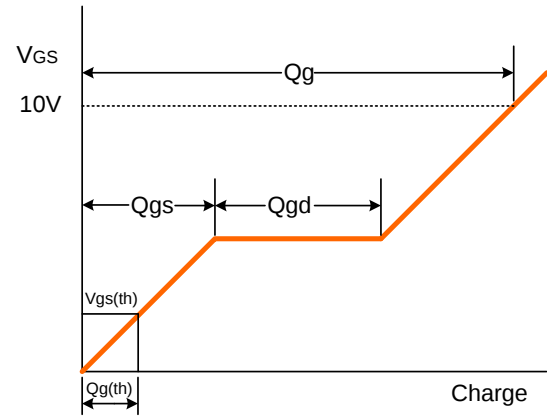
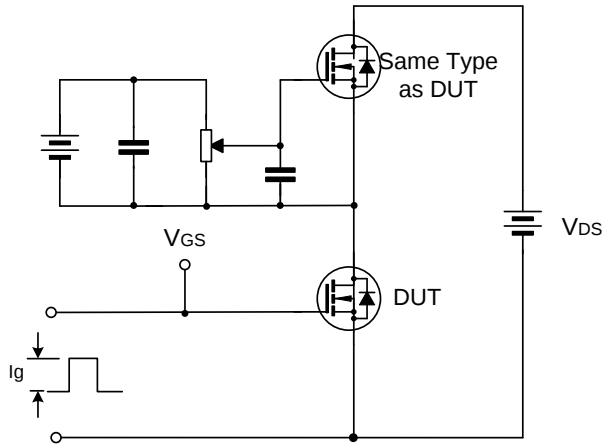


Figure 10. Maximum Drain Current vs. Case Temperature

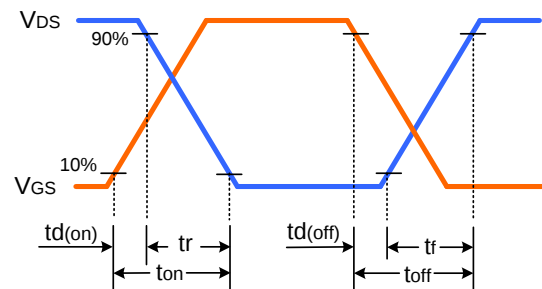
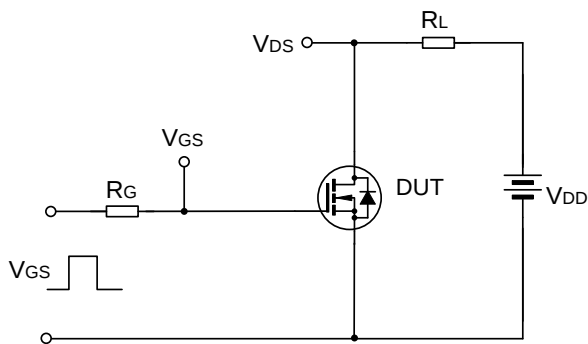


TYPICAL TEST CIRCUIT

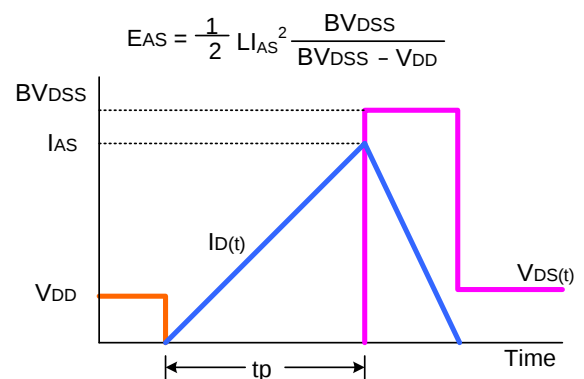
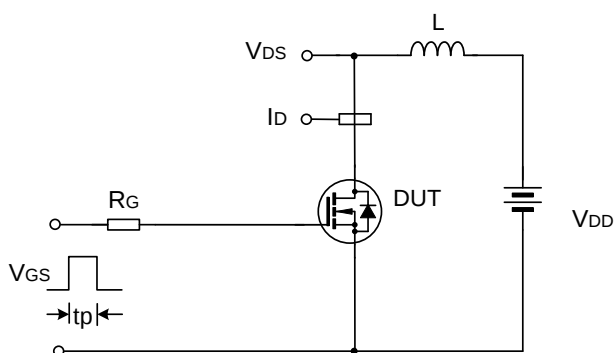
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



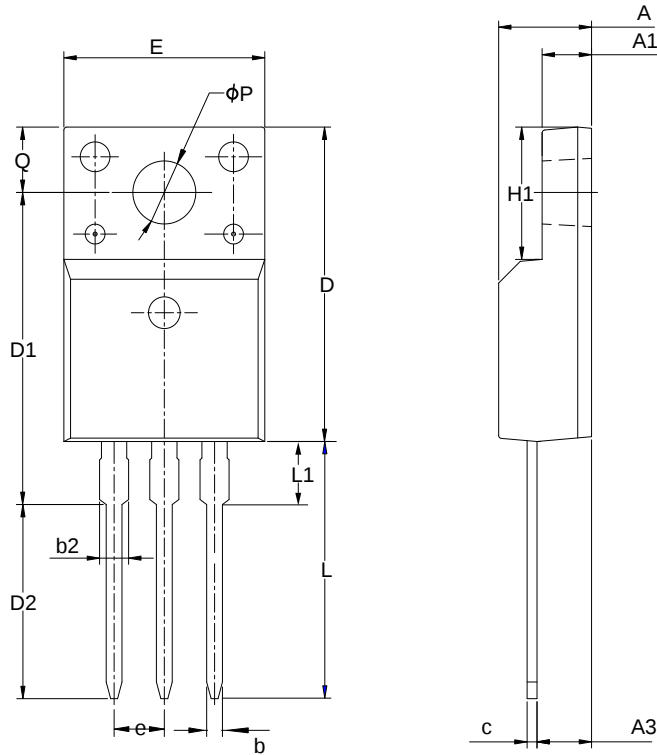
Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

TO-220F-3L

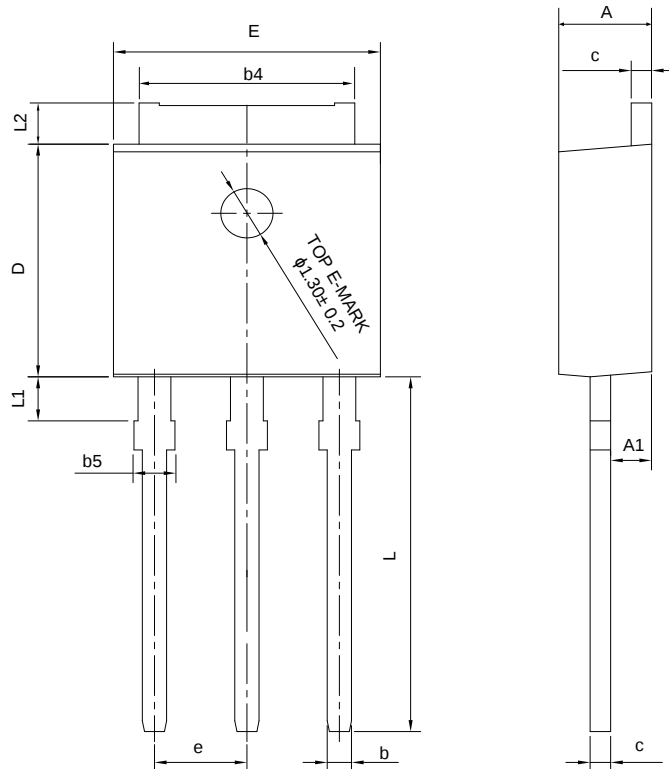
UNIT: mm



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

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

Important notice :

1. The instructions are subject to change without notice!
2. Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current. Please read the instructions carefully before using our products, including the circuit operation precautions.
3. Our products are consumer electronic products or the other civil electronic products.
4. 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.
5. It is strongly recommended to identify the trademark when buying our products. Please contact us if there is any question.
6. Product promotion is endless, our company will wholeheartedly provide customers with better products!
7. Website: <http://www.silan.com.cn>

Part No.: SVF4N65CF/MJ

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Rev.: 1.7

Revision History:

1. Update the template of datasheet

Rev.: 1.6

Revision History:

1. Delete the package outline of TO-251D-3L

Rev.: 1.5

Revision History:

1. Update the package outline of TO-251J-3L
2. Delete the package outline of TO-220F-3L(2)

Rev.: 1.4

Revision History:

1. Modify the Typical Characteristics

Rev.: 1.3

Revision History:

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

Rev.: 1.2

Revision History:

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

Rev.: 1.1

Revision History:

1. Modify the thermal characteristics

Rev.: 1.0

Revision History:

1. First release