

6A, 600V N-CHANNEL MOSFET

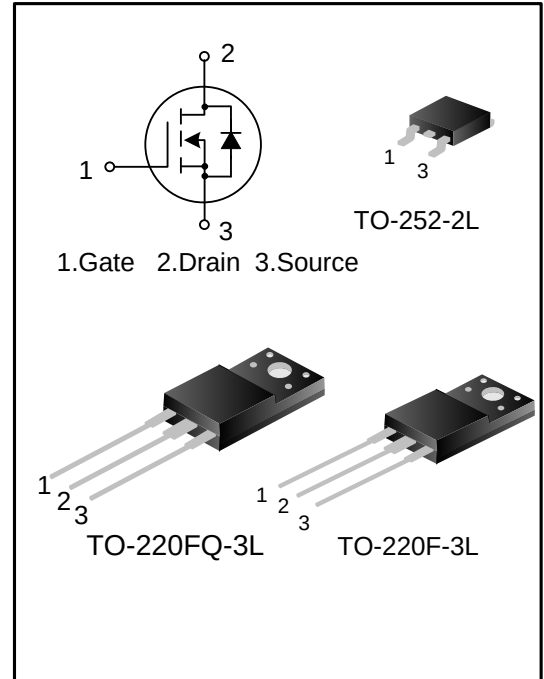
GENERAL DESCRIPTION

SVF6N60F/D/FQ 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

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



ORDERING INFORMATION

Part No.	Package	Marking	Hazardous substance control	Packing Type
SVF6N60F	TO-220F-3L	SVF6N60F	Pb free	Tube
SVF6N60DTR	TO-252-2L	SVF6N60D	Halogen free	Tape & Reel
SVF6N60FQ	TO-220FQ-3L	SVF6N60FQ	Pb free	Tube

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

Characteristics		Symbol	Ratings		Unit
			SVF6N60F/FQ	SVF6N60D	
Drain-Source Voltage		V _{DS}	600		V
Gate-Source Voltage		V _{GS}	±30		V
Drain Current	T _C =25°C	I _D	6		A
	T _C =100°C		3.8		
Drain Current Pulsed		I _{DM}	24		A
Power Dissipation(T _C =25°C) -Derate above 25°C		P _D	42	125	W
			0.34	1.00	W/°C
Single Pulsed Avalanche Energy(Note 1)		E _{AS}	343		mJ
Operation Junction Temperature Range		T _J	-55~+150		°C
Storage Temperature Range		T _{stg}	-55~+150		°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings		Unit
		SVF6N60F/FQ	SVF6N60D	
Thermal Resistance, Junction-to-Case	R _{θJC}	2.98	1.00	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	62.5	62.0	°C/W

ELECTRICAL CHARACTERISTICS (T_c=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	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 =3A	--	1.35	1.5	Ω
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz	--	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} =300V, I _D =6A, R _G =25Ω, (Note2,3)	--	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} =480V, I _D =6A, V _{GS} =10V, (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	--	--	6	A
Pulsed Source Current	I_{SM}	Diode in the MOSFET	--	--	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)	--	488	--	ns
Reverse Recovery Charge	Q_{rr}		--	3	--	μC

Notes:

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

Figure 1. On-Region Characteristics

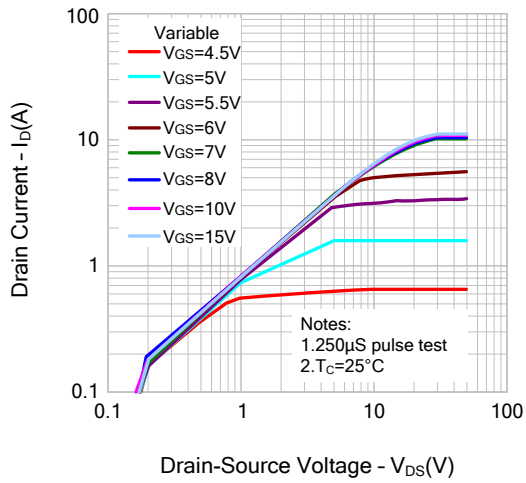


Figure 2. Transfer Characteristics

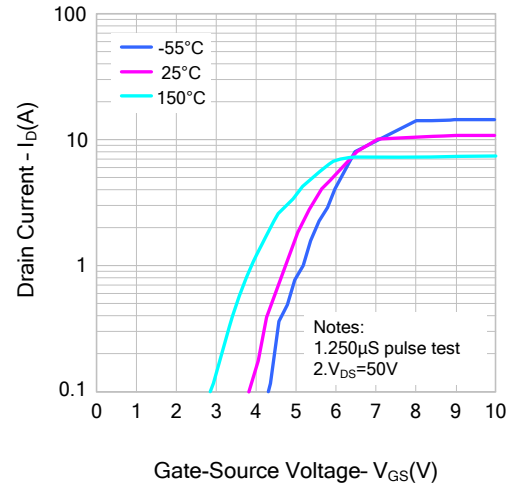


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

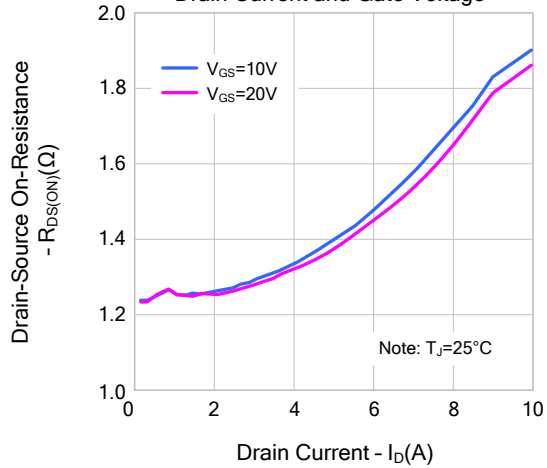


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

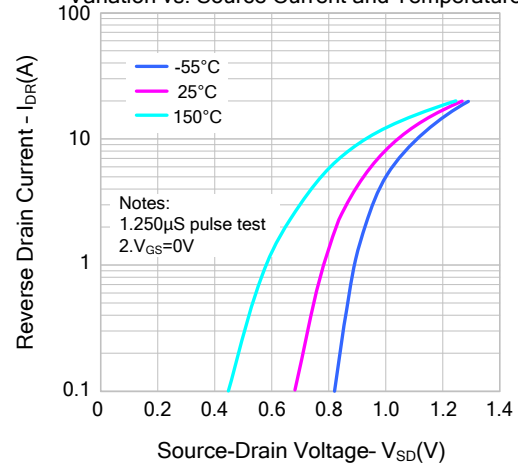


Figure 5. Capacitance Characteristics

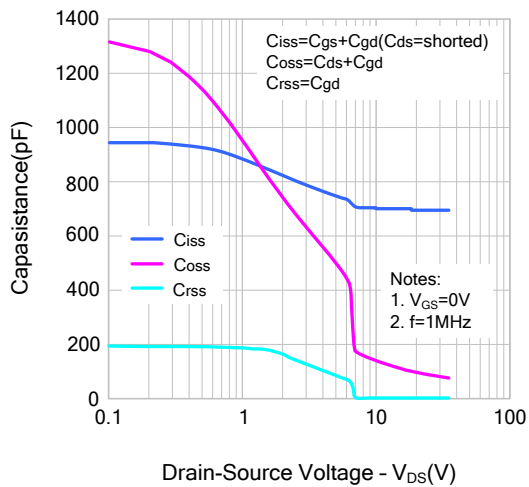
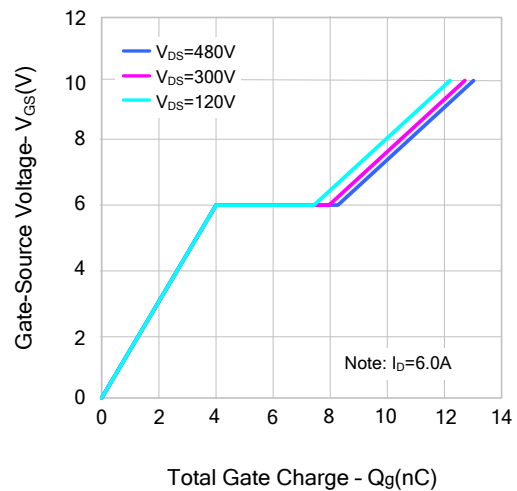


Figure 6. Gate Charge Characteristics



TYPICAL CHARACTERISTICS(continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

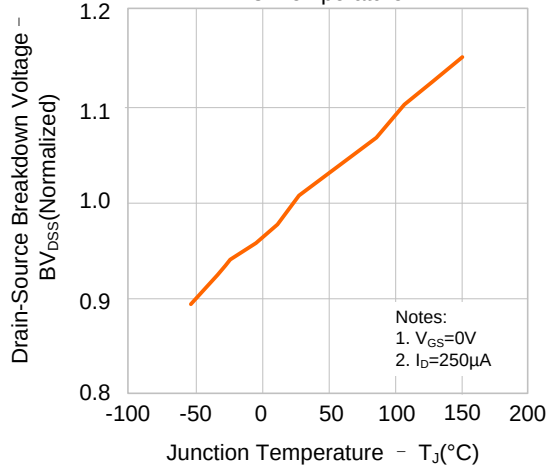


Figure 8. On-resistance Variation vs. Temperature

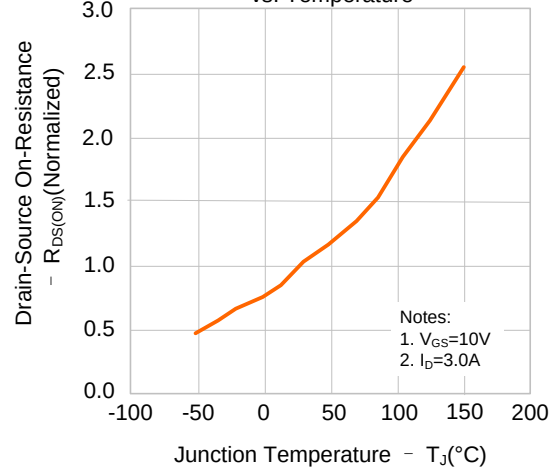


Figure 9-1. Max. Safe Operating Area(SVF6N60F/FQ)

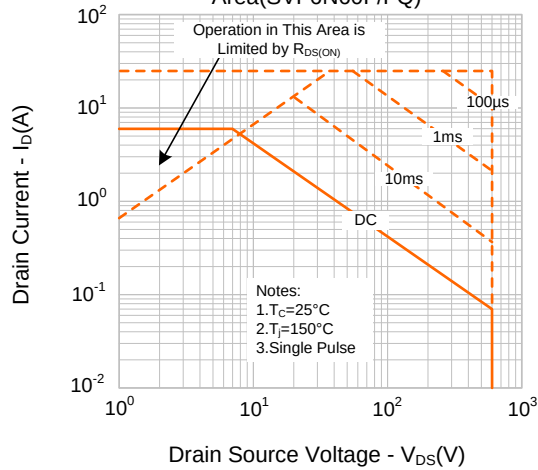


Figure 9-2. Max. Safe Operating Area(SVF6N60D)

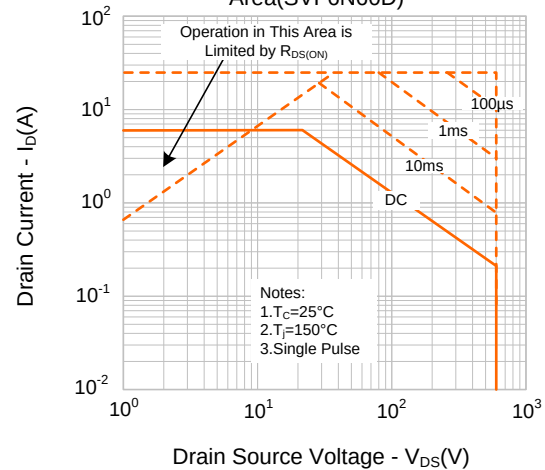
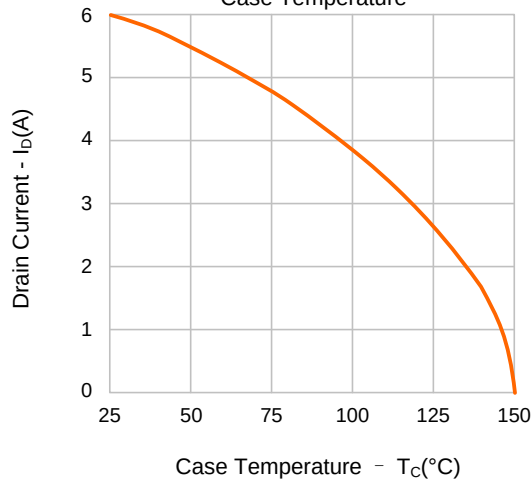
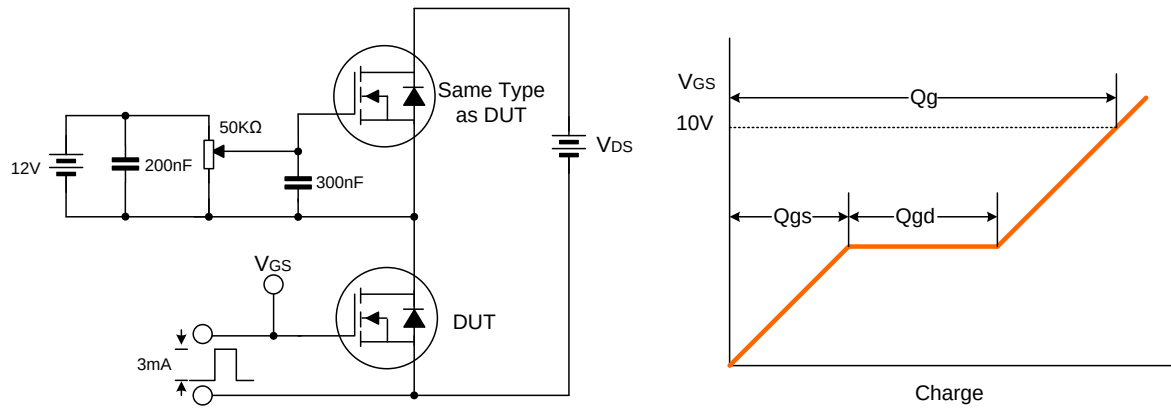


Figure 10. Maximum Drain Current vs. Case Temperature

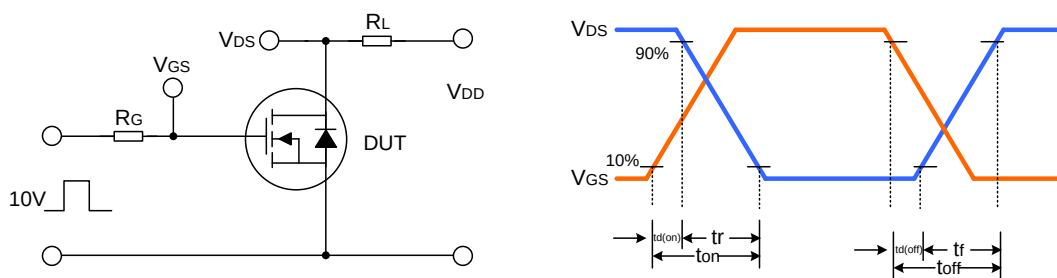


TYPICAL TEST CIRCUIT

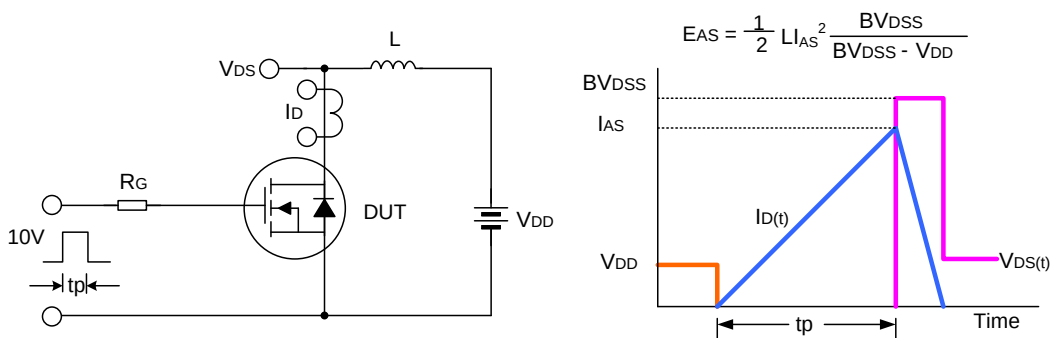
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



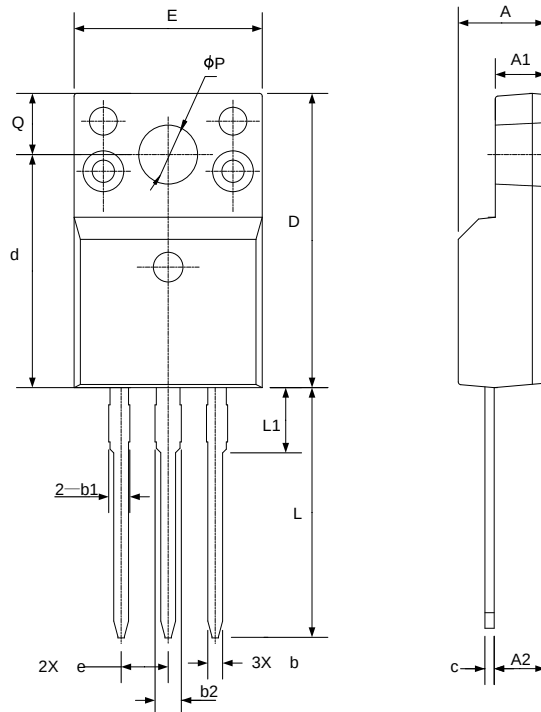
Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

TO-220FQ-3L

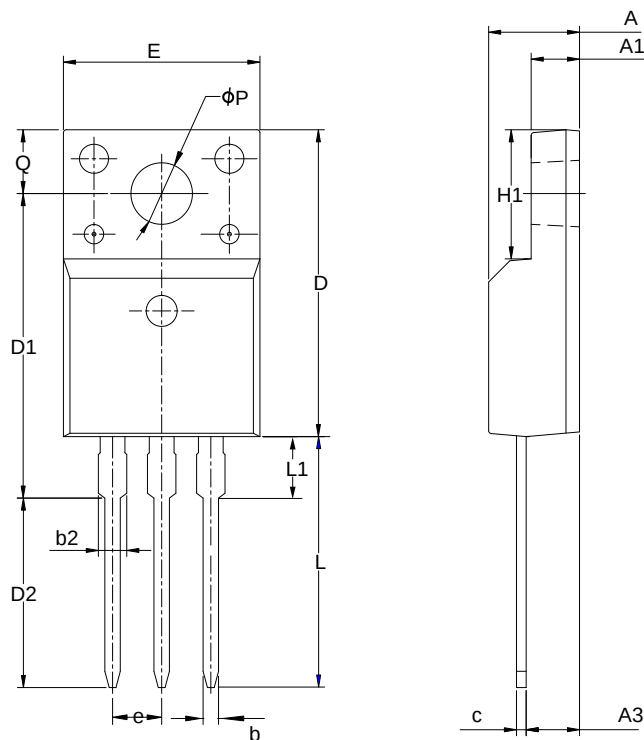
UNIT: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.57	4.70	4.83
A1	2.57	2.70	2.83
A2	2.56	2.76	2.93
b	0.76	—	0.90
b1	0.96	—	1.19
b2	1.24	—	1.47
c	0.46	—	0.60
D	15.80	15.87	16.13
d	12.30	12.57	12.87
E	9.96	10.16	10.36
e	2.54BSC		
L	13.20	13.50	13.70
L1	3.37	3.52	3.67
ϕP	3.08	3.18	3.28
Q	3.20	3.30	3.40

TO-220F-3L

UNIT: mm

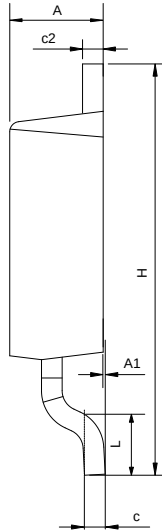
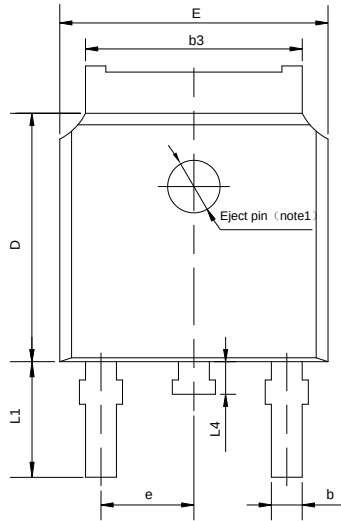


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.42	4.70	5.02
A1	2.30	2.54	2.80
A3	2.50	2.76	3.10
b	0.70	0.80	0.90
b2	—	—	1.47
c	0.35	0.50	0.65
D	15.25	15.87	16.25
D1	15.30	15.75	16.30
D2	9.30	9.80	10.30
E	9.73	10.16	10.36
e	2.54BSC		
H1	6.40	6.68	7.00
L	12.48	12.98	13.48
L1	—	—	3.50
ϕP	3.00	3.18	3.40
Q	3.05	3.30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

PACKAGE OUTLINE(CONTINUED)

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

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

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 contact 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.:	SVF6N60F/D/FQ	Document Type:	Datasheet
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Rev.: 2.6

Revision History:

1. Deleted NOMENCLATURE
 2. Modify Important notice
-

Rev.: 2.5

Revision History:

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

Rev.: 2.4

Revision History:

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

Rev.: 2.3

Revision History:

1. Add TO-220FQ-3L
-

Rev.: 2.2

Revision History:

1. Modify the General description
 2. Modify the ordering information
-

Rev.: 2.1

Revision History:

1. Modify the package information of TO-220F-3L
 2. Modify the package information of TO-252-2L
-

Rev.: 2.0

Revision History:

1. Modify the thermal characteristics
-

Rev.: 1.9

Revision History:

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

Rev.: 1.8

Revision History:

1. Modify the ordering information
-

Rev.: 1.7

Revision History:

1. Change the schematic diagram of MOS
-

Rev.: 1.6

Revision History:

1. Add the pin no. in stereogram
-

Rev.: 1.5

Revision History:

1. Modify "ORDERING INFORMATION"

Rev.: 1.4

Revision History:

1. Modify "SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS"

Rev.: 1.3

Revision History:

1. Add the halogen free information of SVF6N60F

Rev.: 1.2

Revision History:

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

Rev.: 1.1

Revision History:

1. Add the package of TO-251D-3L and TO-251J-3L
2. Update the package outline of TO-220F-3L and TO-252-2L

Rev.: 1.0

Revision History:

1. Original