

7A, 600V N-CHANNEL MOSFET

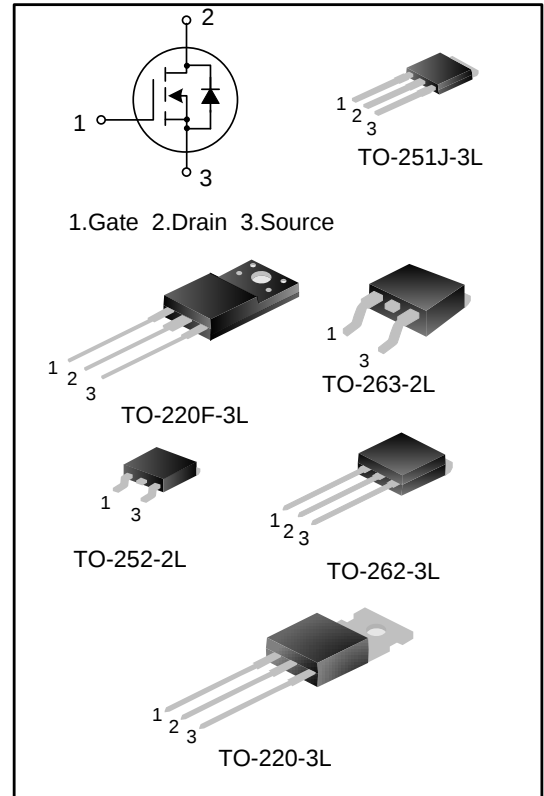
GENERAL DESCRIPTION

SVF7N60CF/S/K/MJ/D/T 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

- ◆ 7A, 600V, $R_{DS(on)} (typ) = 0.96\Omega @ V_{GS}=10V$
- ◆ Low gate charge
- ◆ Low C_{rss}
- ◆ Fast switching
- ◆ Improved dv/dt capability



ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVF7N60CF	TO-220F-3L	SVF7N60CF	Halogen free	Tube
SVF7N60CS	TO-263-2L	SVF7N60CS	Halogen free	Tube
SVF7N60CSTR	TO-263-2L	SVF7N60CS	Halogen free	Tape & Reel
SVF7N60CK	TO-262-3L	SVF7N60CK	Halogen free	Tube
SVF7N60CMJ	TO-251J-3L	SVF7N60C	Halogen free	Tube
SVF7N60CD	TO-252-2L	SVF7N60C	Halogen free	Tube
SVF7N60CDTR	TO-252-2L	SVF7N60C	Halogen free	Tape & Reel
SVF7N60CT	TO-220-3L	SVF7N60CT	Pb free	Tube

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

Characteristics		Symbol	Ratings					Unit
			SVF7N6 0CF	SVF7N6 0CS/K	SVF7N6 0CMJ	SVF7N6 0CD	SVF7N6 0CT	
Drain-Source Voltage		V _{DS}	600					V
Gate-Source Voltage		V _{GS}	±30					V
Drain Current	T _C =25°C	I _D	7.0					A
	T _C =100°C		4.0					
Drain Current Pulsed		I _{DM}	28					A
Power Dissipation(T _C =25°C) -Derate above 25°C		P _D	45	122	93	90	145	W
			0.36	0.98	0.74	0.72	1.16	W/°C
Single Pulsed Avalanche Energy(Note 1)		E _{AS}	490					mJ
Operation Junction Temperature Range		T _J	-55~+150					°C
Storage Temperature Range		T _{stg}	-55~+150					°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings					Unit
		SVF7N60 CF	SVF7N60 CS/K	SVF7N60 CMJ	SVF7N60 CD	SVF7N60 CT	
Thermal Resistance, Junction-to-Case	R _{θJC}	2.78	1.02	1.34	1.39	0.86	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	62.5	62.5	62.0	62.0	62.5	°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 =3.5A	--	0.96	1.2	Ω
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHZ	592	770	1001	pF
Output Capacitance	C _{oss}		--	96	--	
Reverse Transfer Capacitance	C _{rss}		--	8.7	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} =300V, I _D =7.0A, R _G =25Ω (Note 2,3)	--	15.5	--	ns
Turn-on Rise Time	t _r		--	32.7	--	
Turn-off Delay Time	t _{d(off)}		--	52.2	--	
Turn-off Fall Time	t _f		--	31.5	--	
Total Gate Charge	Q _g	V _{DS} =480V, I _D =7.0A, V _{GS} =10V (Note 2,3)	--	21.1	--	nC
Gate-Source Charge	Q _{gs}		--	4.53	--	
Gate-Drain Charge	Q _{gd}		--	10.0	--	

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	--	--	7.0	A
Pulsed Source Current	I_{SM}		--	--	28	
Diode Forward Voltage	V_{SD}	$I_S=7.0A, V_{GS}=0V$	--	--	1.4	V
Reverse Recovery Time	T_{rr}	$I_S=7.0A, V_{GS}=0V,$ $dI_F/dt=100A/\mu S$	--	482	--	ns
Reverse Recovery Charge	Q_{rr}		--	2.9	--	μC

Notes:

1. $L=30mH, I_{AS}=5.16A, V_{DD}=100V, R_G=25\Omega$, 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

Figure 1. On-Region Characteristics

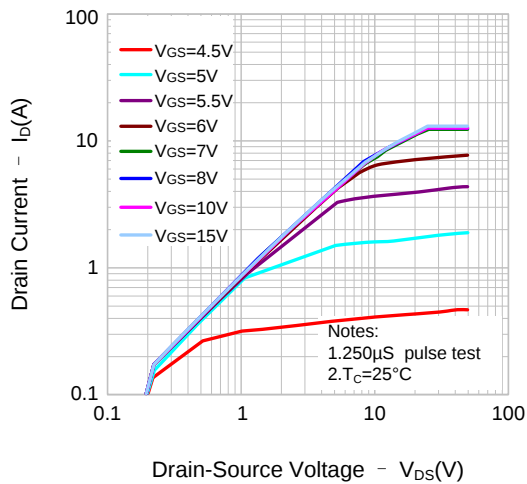


Figure 2. Transfer Characteristics

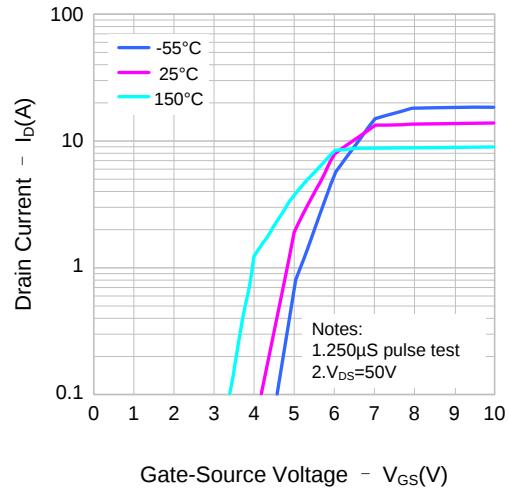


Figure 3. On-Resistance Variation vs. Drain Current

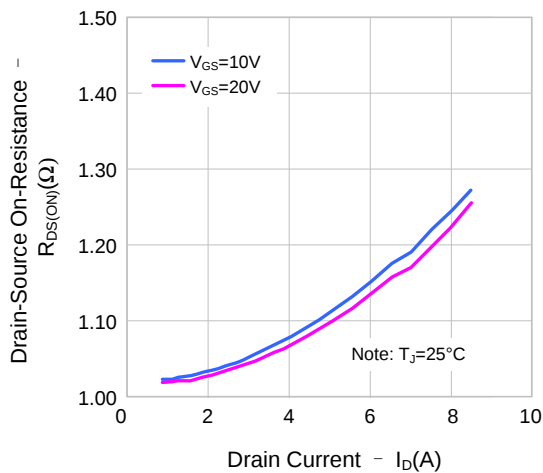
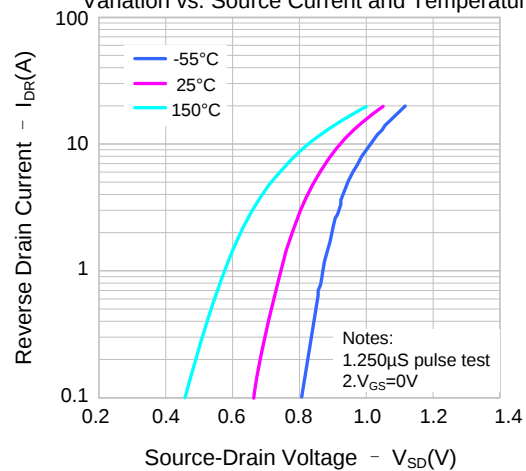


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature



TYPICAL CHARACTERISTICS(CONTINUED)

Figure 5. Capacitance Characteristics

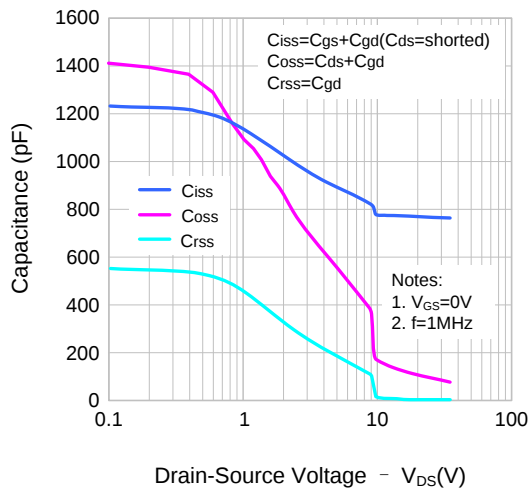


Figure 6. Gate Charge Characteristics

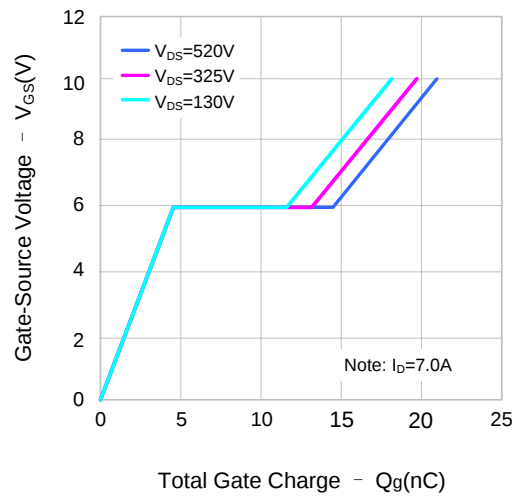


Figure 7. Breakdown Voltage Variation vs. Temperature

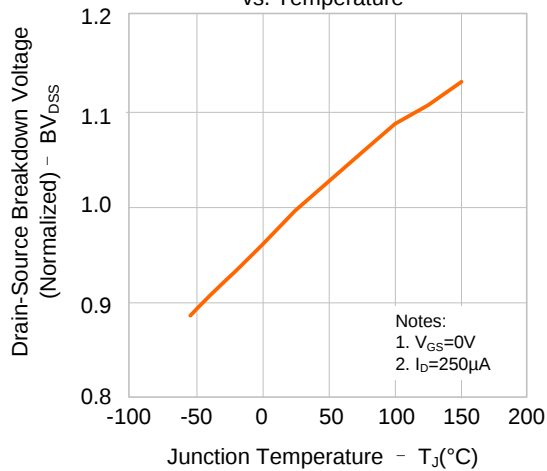


Figure 8. On-resistance vs. Temperature

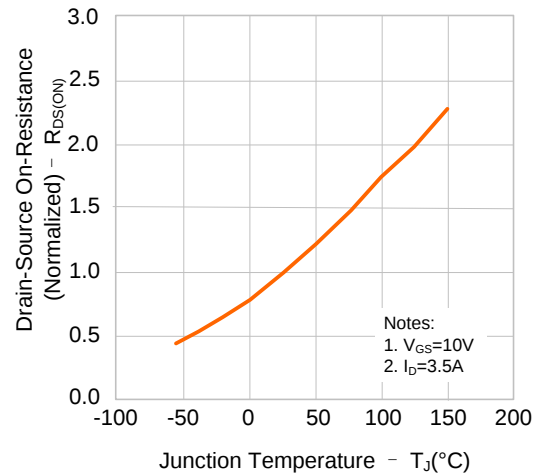


Figure 9-1. Max. Safe Operating Area(SVF7N60CF)

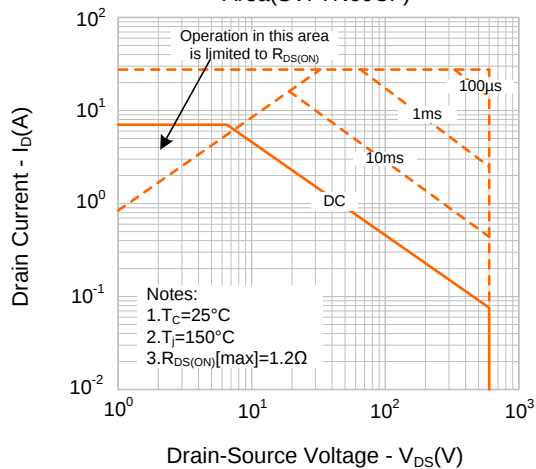
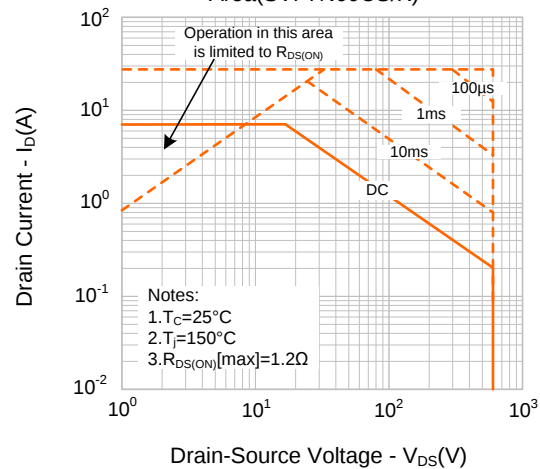


Figure 9-2. Max. Safe Operating Area(SVF7N60CS/K)



TYPICAL CHARACTERISTICS(CONTINUED)

Figure 9-3. Max. Safe Operating Area(SVF7N60CMJ)

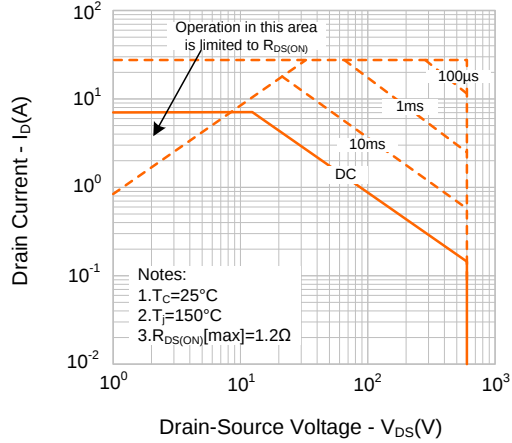


Figure 9-4. Max. Safe Operating Area(SVF7N60CD)

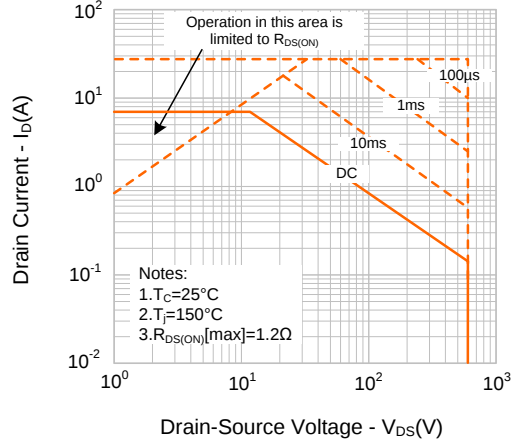


Figure 9-5. Max. Safe Operating Area(SVF7N60CT)

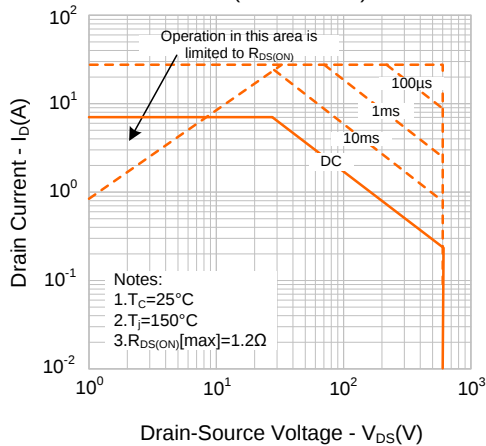
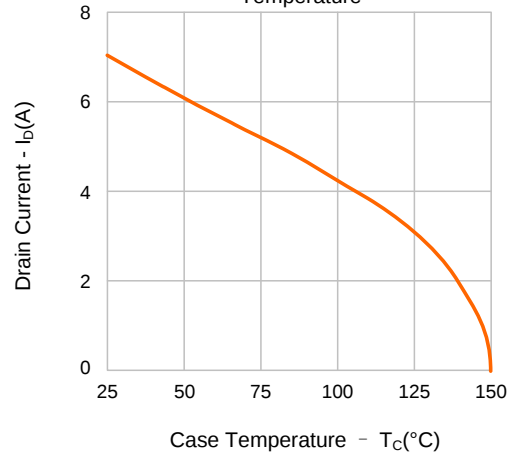
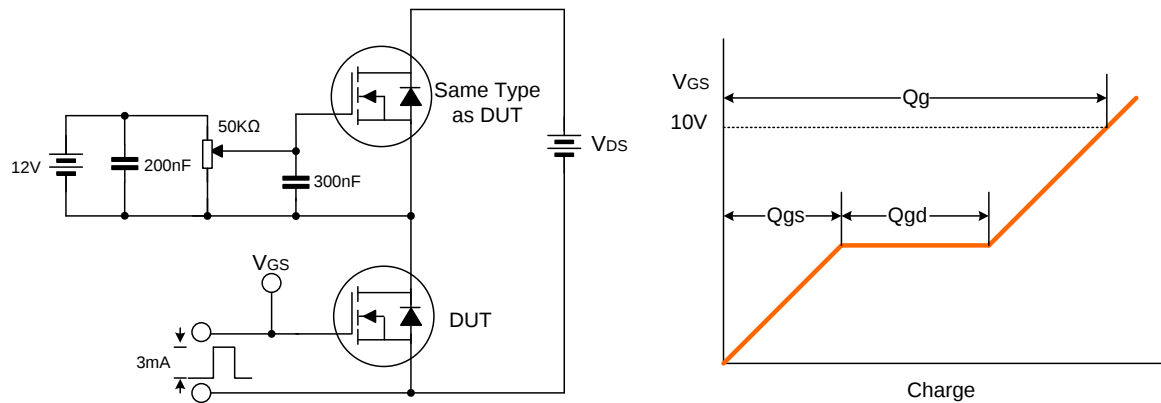


Figure 10. Max. Drain Current vs. Case Temperature

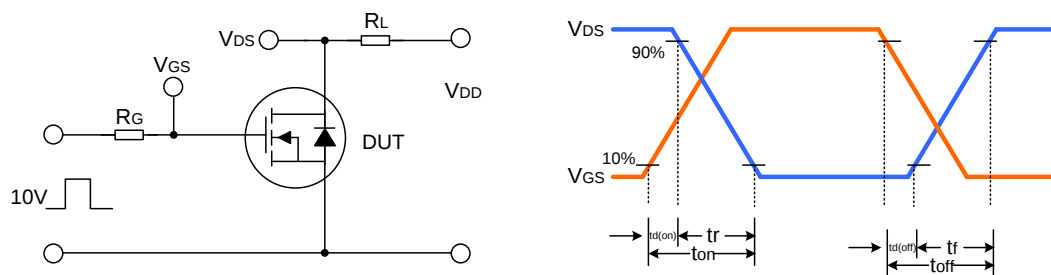


TYPICAL TEST CIRCUIT

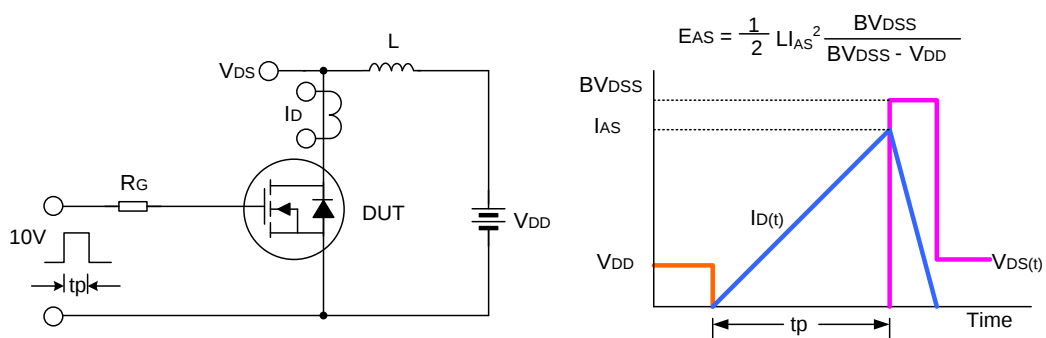
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



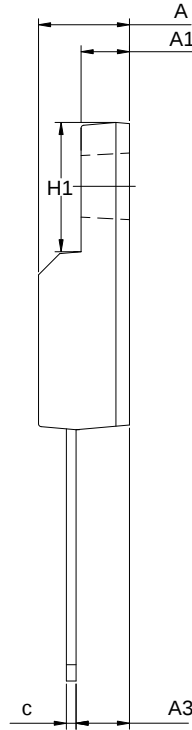
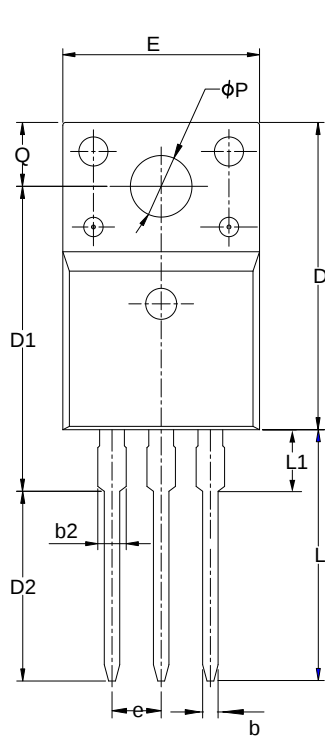
Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

TO-220F-3L

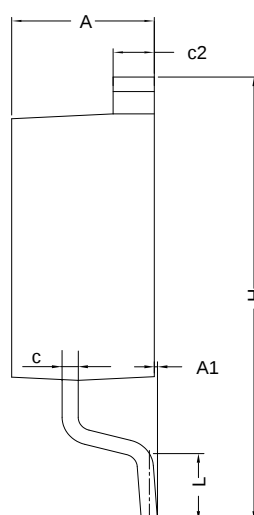
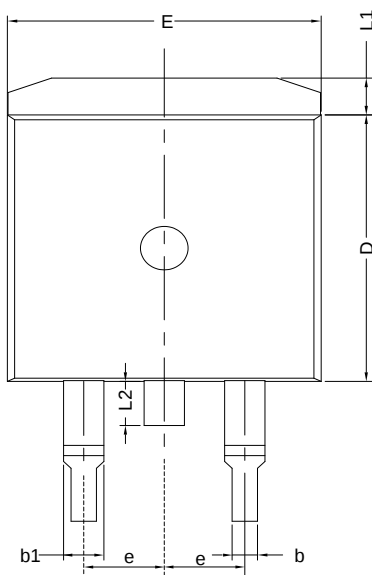
UNIT: mm



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-263-2L

UNIT: mm

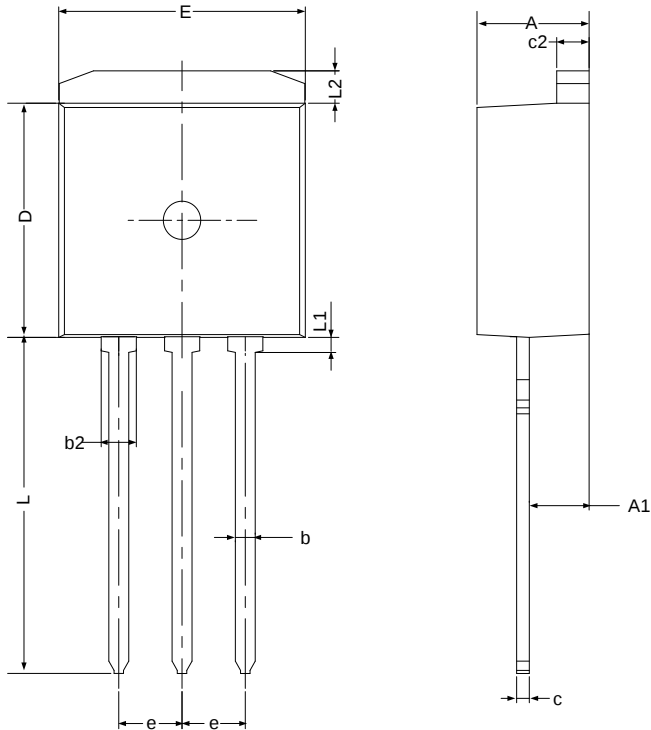


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.30	4.57	4.72
A1	0	0.10	0.25
b	0.71	0.81	0.91
c	0.30	—	0.60
c2	1.17	1.27	1.37
D	8.50	—	9.35
E	9.80	—	10.45
e	2.54BSC		
H	14.70	—	15.75
L	2.00	2.30	2.74
L1	1.12	1.27	1.42
L2	—	—	1.75

PACKAGE OUTLINE(CONTINUED)

TO-262-3L

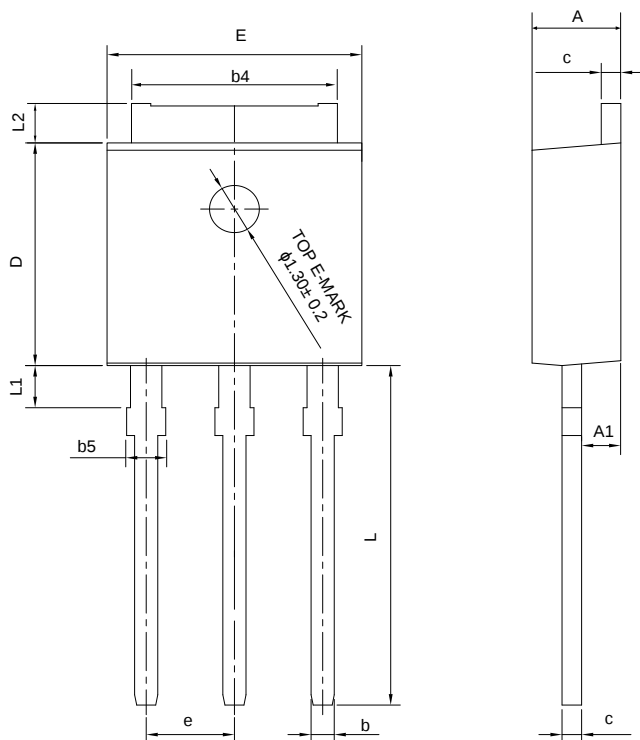
UNIT: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.30	4.50	4.70
A1	2.20	—	2.92
b	0.71	0.80	0.90
b2	1.20	—	1.50
c	0.34	—	0.65
c2	1.22	1.30	1.35
D	8.38	—	9.30
E	9.80	10.16	10.54
e	2.54 BSC		
L	12.80	—	14.10
L1	—	—	0.75
L2	1.12	—	1.42

TO-251J-3L

UNIT: mm

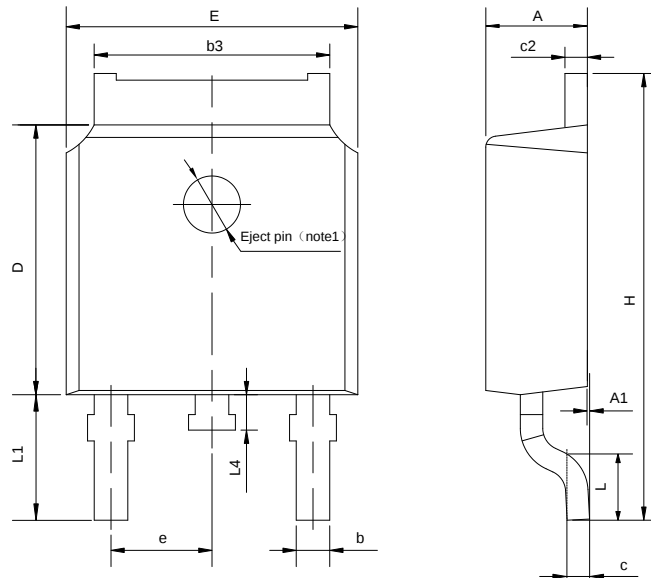


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.18	2.30	2.39
A1	0.89	1.00	1.14
b	0.56	—	0.89
b4	4.95	5.33	5.46
b5	—	—	1.05
c	0.46	—	0.61
D	5.97	6.10	6.27
E	6.35	6.60	6.73
e	2.29 BCS		
L	8.89	9.30	9.65
L1	0.95	—	1.50
L2	0.89	—	1.27

PACKAGE OUTLINE(CONTINUED)

TO-252-2L

UNIT: mm

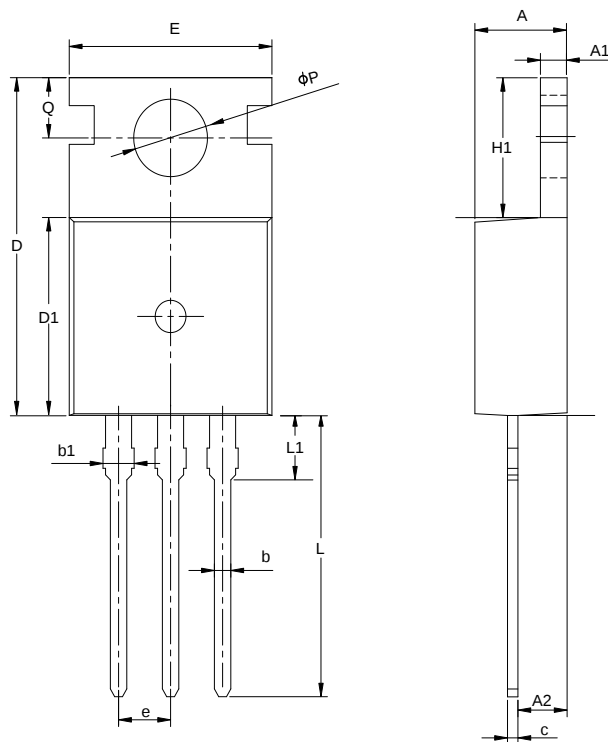


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.10	2.30	2.50
A1	0	—	0.127
b	0.66	0.76	0.89
b3	5.10	5.33	5.46
c	0.45	—	0.65
c2	0.45	—	0.65
D	5.80	6.10	6.40
E	6.30	6.60	6.90
e	2.30TYP		
H	9.60	10.10	10.60
L	1.40	1.50	1.70
L1	2.90REF		
L4	0.60	0.80	1.00

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

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

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.: **SVF7N60CF/S/K/MJ/D/T**Document Type: **Datasheet**Copyright: **HANGZHOU SILAN MICROELECTRONICS CO.,LTD**Website: **<http://www.silan.com.cn>**Rev.: **1.8**

Revision History:

1. Deleted NOMENCLATURE
2. Modify Important notice

Rev.: **1.7**

Revision History:

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

Rev.: **1.6**

Revision History:

1. Add the package information of TO-220-3L

Rev.: **1.5**

Revision History:

1. Add the package information of TO-220F-3L
2. Modify the package information of TO-262-3L
3. Modify the package information of TO-263-2L

Rev.: **1.4**

Revision History:

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

Rev.: **1.3**

Revision History:

1. Add the packages of TO-252-2L

Rev.: **1.2**

Revision History:

1. Add the packages of TO-263-2L, TO-262-3L and TO-251J-3L

Rev.: **1.1**

Revision History:

1. Modify the thermal characteristics



Rev.: 1.0

Revision History:

1. First release
