

5A, 600V N-CHANNEL MOSFET

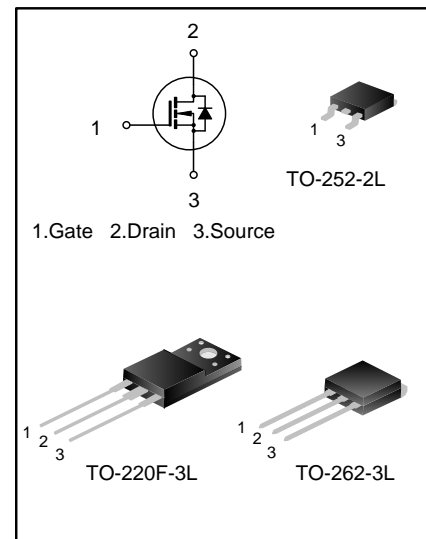
GENERAL DESCRIPTION

SVF5N60F/D/K 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.

This device is widely used in AC-DC power supplies, DC-DC converters and H-bridge PWM motor drivers.

FEATURES

- ◆ 5A, 600V, $R_{DS(on)(typ)}=1.8\Omega @ V_{GS}=10V$
- ◆ Low gate charge
- ◆ Low Crss
- ◆ Fast switching
- ◆ Improved dv/dt capability



ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVF5N60F	TO-220F-3L	SVF5N60F	Pb free	Tube
SVF5N60DTR	TO-252-2L	SVF5N60D	Halogen free	Tape&Reel
SVF5N60K	TO-262-3L	SVF5N60K	Pb free	Tube

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

Characteristics	Symbol	Ratings			Unit
		SVF5N60K	SVF5N60F	SVF5N60D	
Drain-Source Voltage	V _{DS}	600			V
Gate-Source Voltage	V _{GS}	±30			V
Drain Current	I _D	T _C =25°C			A
		T _C =100°C			
Drain Current Pulsed	I _{DM}	20			A
Power Dissipation(T _C =25°C) -Derate above 25°C	P _D	110	31	90	W
		0.88	0.32	0.72	W/°C
Single Pulsed Avalanche Energy(Note1)	E _{AS}	247			mJ
Operation Junction Temperature Range	T _J	-55~+150			°C
Storage Temperature Range	T _{stg}	-55~+150			°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings			Unit
		SVF5N60D	SVF5N60F	SVF5N60K	
Thermal Resistance,Junction-to-Case	R _{θJC}	1.39	4.03	1.14	°C/W
Thermal Resistance,Junction-to-Ambient	R _{θJA}	62.0	62.5	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	--	--	10	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 =2.5A	--	1.8	2.15	Ω
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz	--	463	--	pF
Output Capacitance	C _{oss}		--	58	--	
Reverse Transfer Capacitance	C _{rss}		--	5.0	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} =300V, I _D =5.0A, R _G =24Ω (Note2, 3)	--	13	--	ns
Turn-on Rise Time	t _r		--	31	--	
Turn-off Delay Time	t _{d(off)}		--	42	--	
Turn-off Fall Time	t _f		--	33	--	
Total Gate Charge	Q _g	V _{DS} =480V, I _D =5.0A, V _{GS} =10V (Note2, 3)	--	13	--	nC
Gate-Source Charge	Q _{gs}		--	2.9	--	
Gate-Drain Charge	Q _{gd}		--	6.7	--	

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	--	--	5	A
Pulsed Source Current	I _{SM}		--	--	20	
Diode Forward Voltage	V _{SD}	I _S =5.0A, V _{GS} =0V	--	--	1.4	V
Reverse Recovery Time	T _{rr}	I _S =5.0A, V _{GS} =0V, dI _F /dt=100A/μs (Note2)	--	450	--	ns
Reverse Recovery Charge	Q _{rr}		--	2.2	--	μC

Notes:

- L=30mH, I_{AS}=3.8A, V_{GS}=100V, R_G=25Ω, starting T_{B,JB}=25°C;
- Pulse Test: Pulse width ≤300μs, Duty cycle≤2%;
- Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

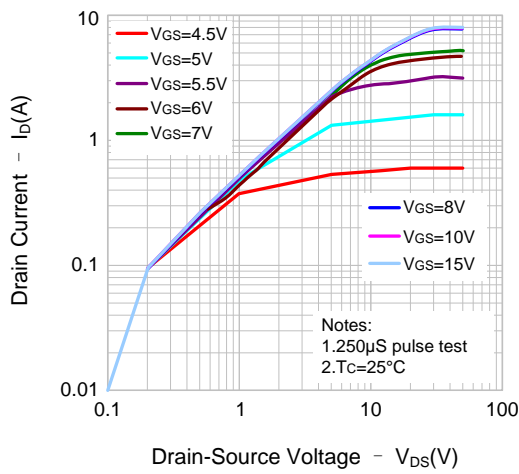


Figure 2. Transfer Characteristics

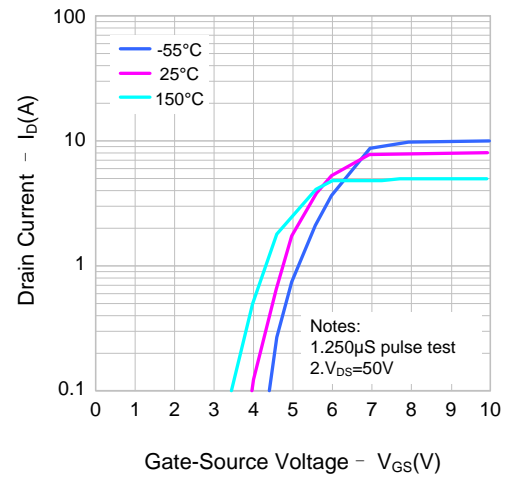


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

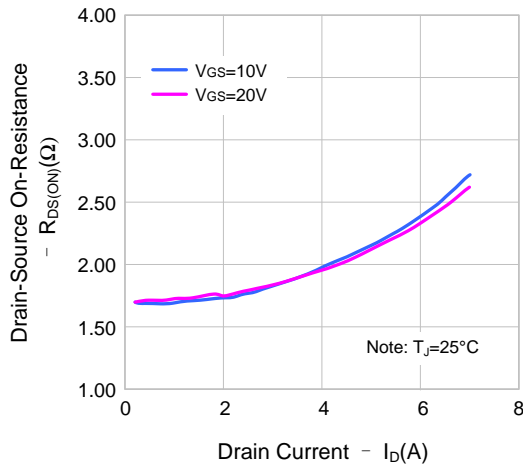


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

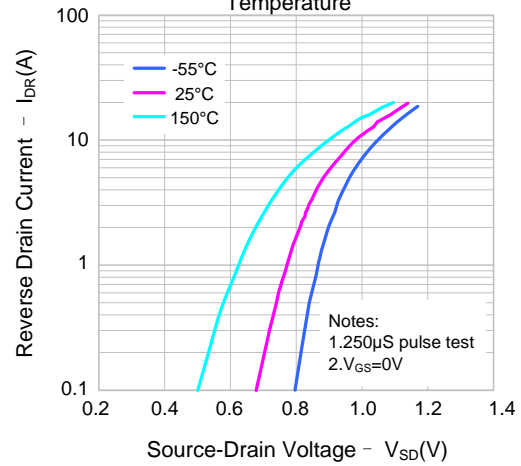


Figure 5. Capacitance Characteristics

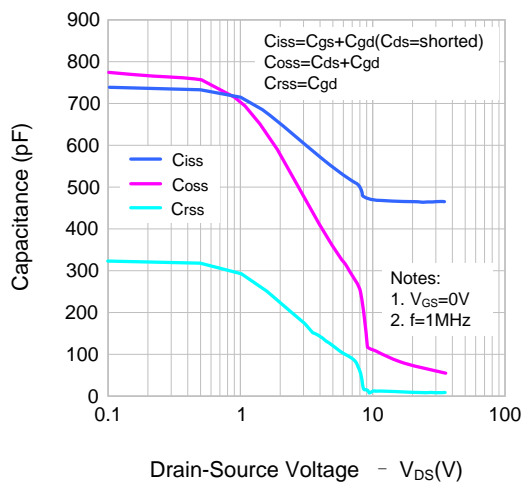
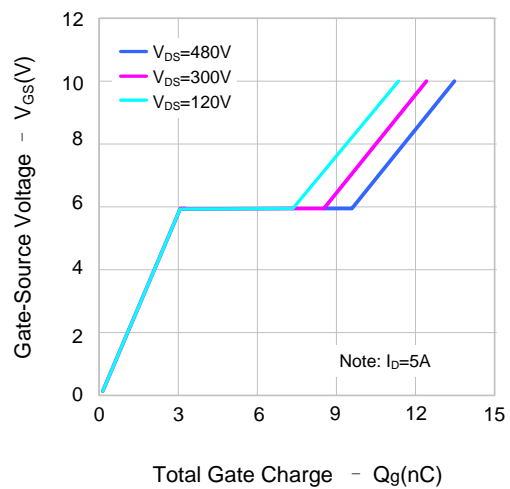


Figure 6. Gate Charge Characteristic



TYPICAL CHARACTERISTICS(continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

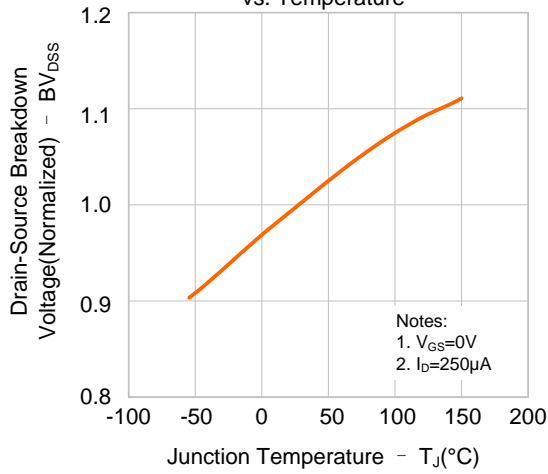


Figure 8. On-resistance Variation vs. Temperature

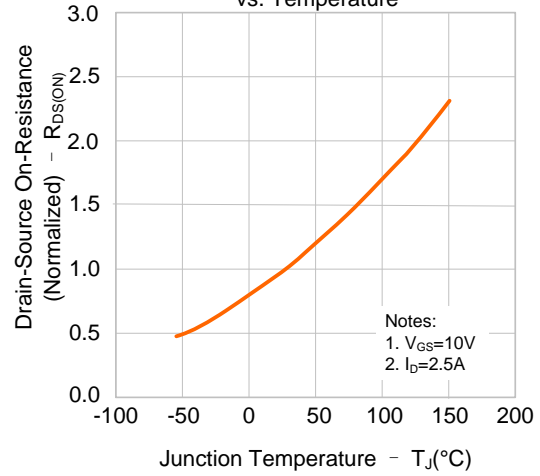


Figure 9-1. Max. Safe Operating Area (SVF5N60F)

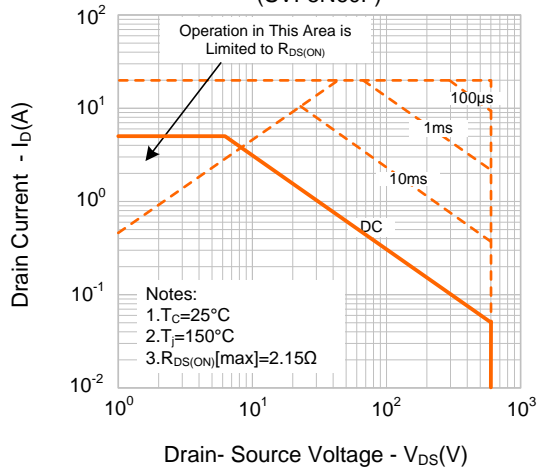


Figure 9-2. Max. Safe Operating Area (SVF5N60D)

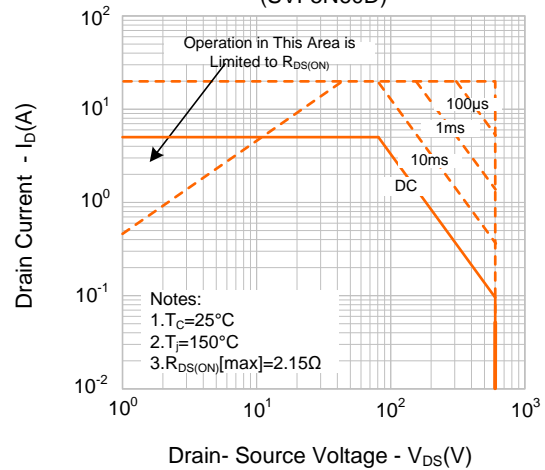


Figure 9-3. Max. Safe Operating Area (SVF5N60K)

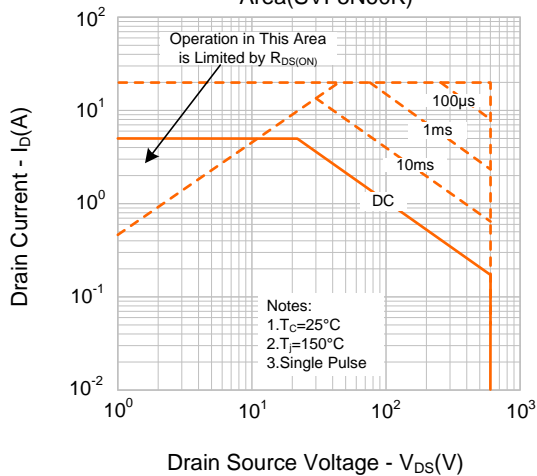
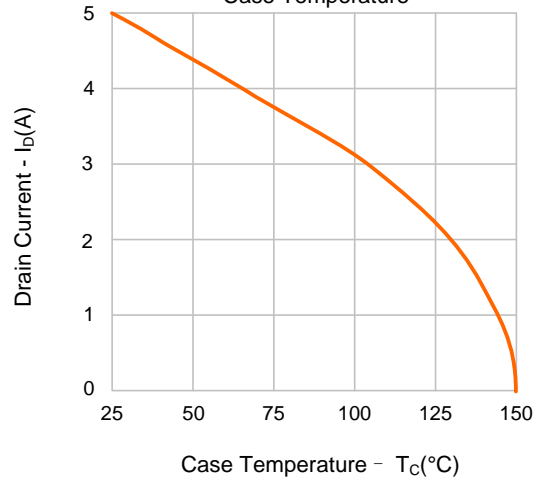
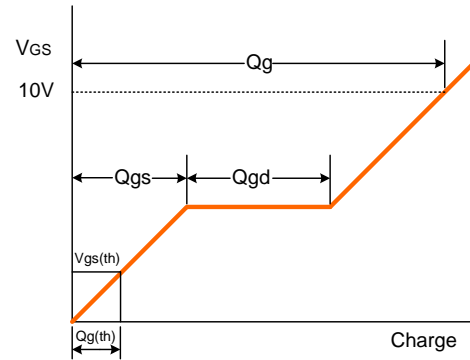
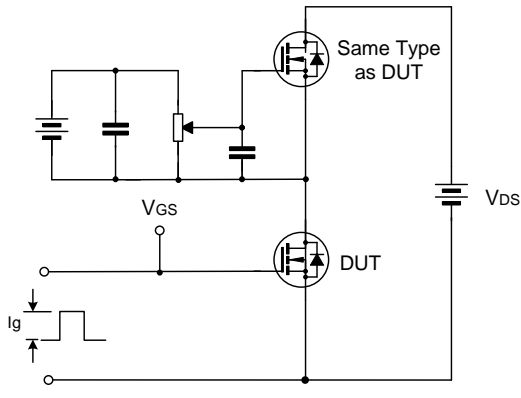


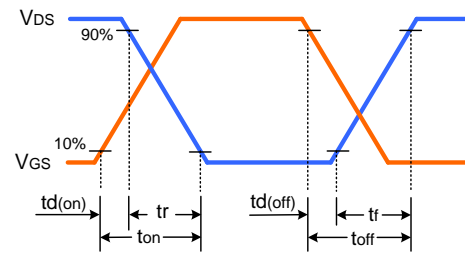
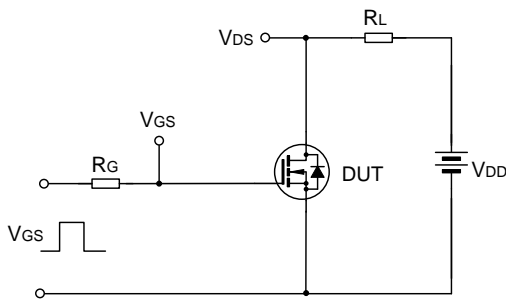
Figure 10. Maximum Drain Current vs. Case Temperature



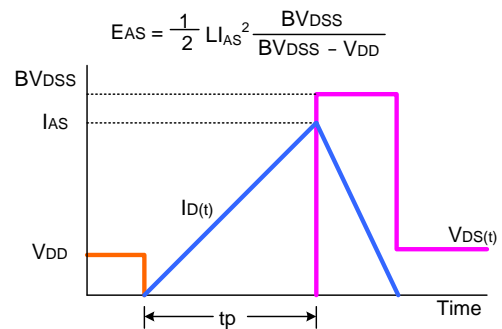
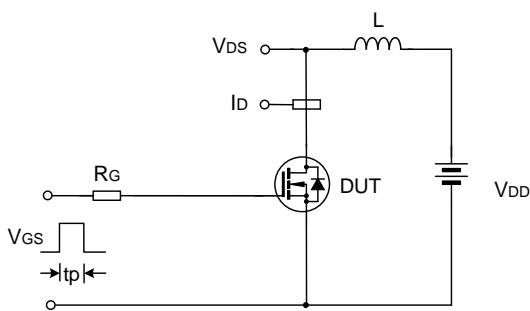
TYPICAL TEST CIRCUIT



Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

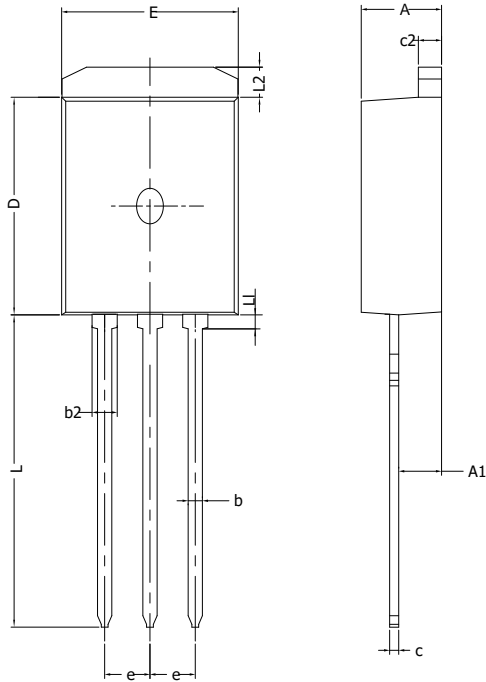


Unclamped Inductive Switching Test Circuit & Waveform

PACKAGE OUTLINE

TO-262-3L

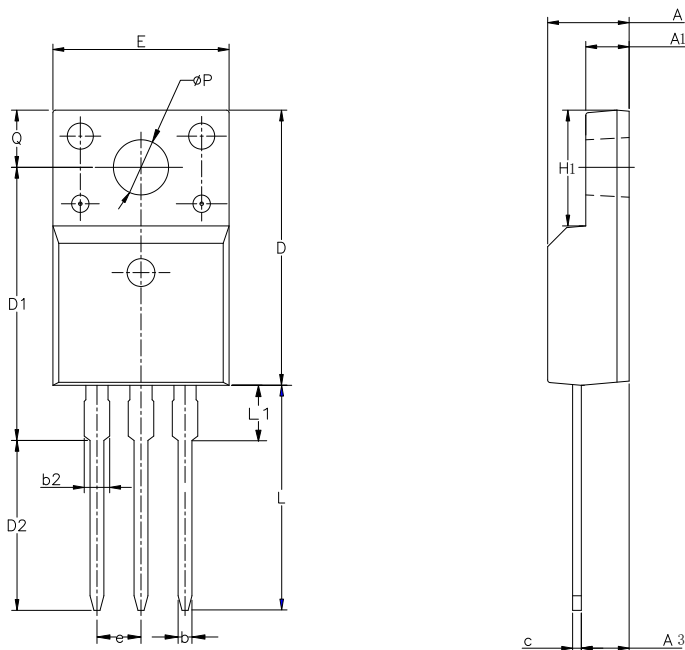
UNIT: mm



SYMBOL	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

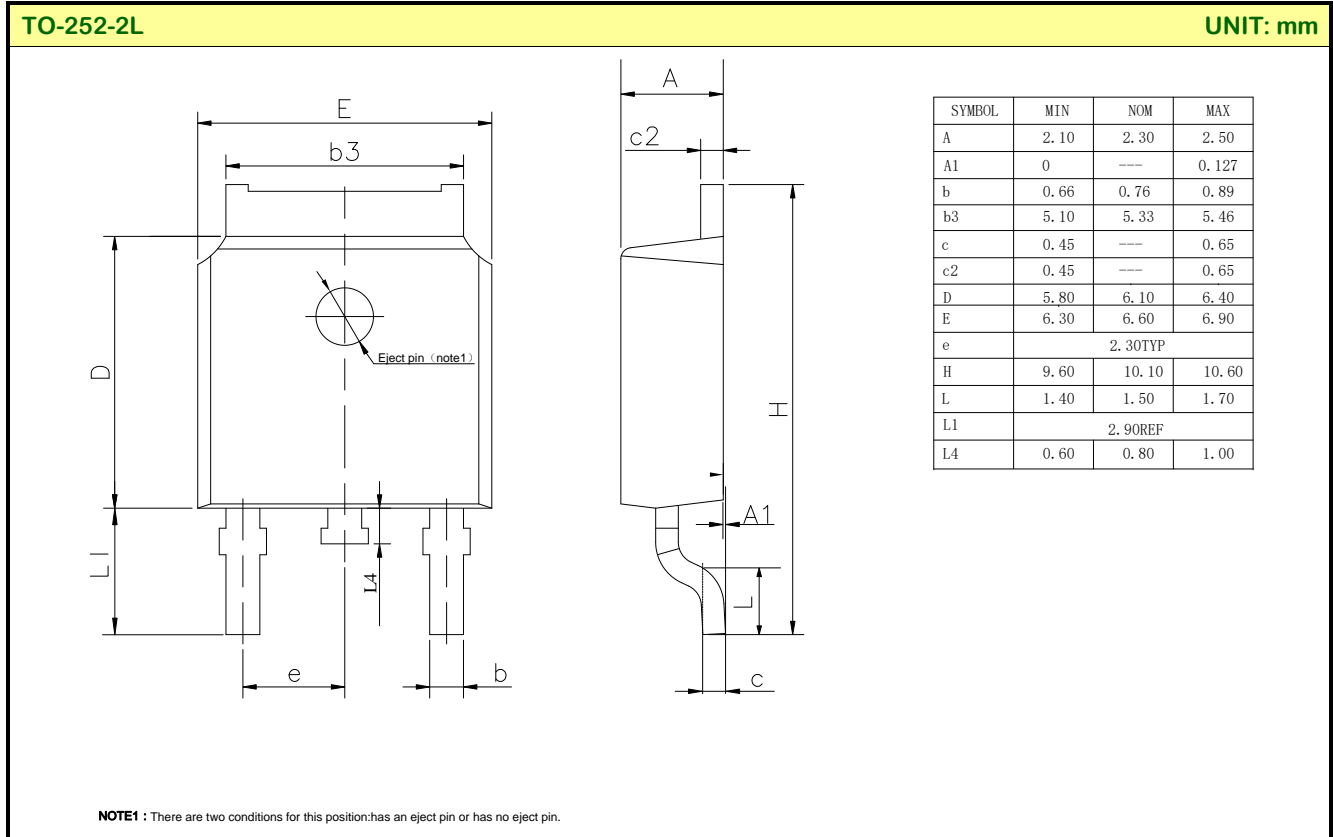
TO-220F-3L

UNIT: mm



SYMBOL	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	2.54 BCS		
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)



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- 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.
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- Product promotion is endless, our company will wholeheartedly provide customers with better products!
- Website: <http://www.silan.com.cn>

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Rev.: 2.6

Revision History:

1. Update Electrical schematic
-

Rev.: 2.5

Revision History:

1. Delete the package outline of TO-251J-3L and TO-220-3L
-

Rev.: 2.4

Revision History:

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

Rev.: 2.3

Revision History:

1. Update characteristics
-

Rev.: 2.2

Revision History:

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

Rev.: 2.1

Revision History:

1. Modify key characteristics
-

Rev.: 2.0

Revision History:

1. Modify characteristics of THERMAL CHARACTERISTICS
-

Rev.: 1.9

Revision History:

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

Rev.: 1.8

Revision History:

1. Modify ordering information
-

Rev.: 1.7

Revision History:

1. Modify schematic diagram of MOS tube symbol
-

Rev.: 1.6

Revision History:

1. Modify packageoutline
-

Rev.: 1.5

Revision History:

1. Modify packageoutline
-

Rev.: 1.4

Revision History:

1. Add Halogen free information of SVF5N60F
-

Rev.: 1.3

Revision History:

1. Modify values of T_{rr} and Q_{rr}
-

Rev.: 1.2

Revision History:

1. Update packageoutline of TO-220-3L
-

Rev.: 1.1

Revision History:

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

Rev.: 1.0

Revision History:

1. First release
-
-