

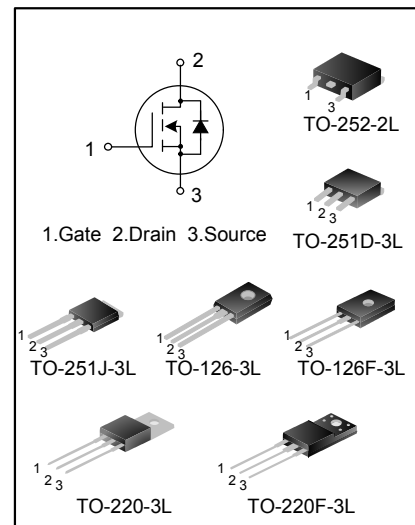
2A, 600V N-CHANNEL MOSFET

GENERAL DESCRIPTION

SVF2N60M(MJ)(N)(NF)(F)(T)(D) is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary F-Cell™ structure 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 suppliers, DC-DC converters and H-bridge PWM motor drivers.

FEATURES

- ◆ 2A,600V, $R_{DS(on)(typ.)}=3.7\Omega@V_{GS}=10V$
- ◆ Low gate charge
- ◆ Low Crss
- ◆ Fast switching
- ◆ Improved dv/dt capability



ORDERING INFORMATION

Part No.	Package Type	Marking	Hazardous substance control	Packing
SVF2N60M	TO-251D-3L	SVF2N60M	Halogen free	Tube
SVF2N60MJ	TO-251J-3L	SVF2N60MJ	Halogen free	Tube
SVF2N60N	TO-126-3L	SVF2N60N	Pb free	Tube
SVF2N60N	TO-126-3L	SVF2N60N	Pb free	Bulk
SVF2N60NF	TO-126F-3L	SVF2N60NF	Pb free	Tube
SVF2N60F	TO-220F-3L	SVF2N60F	Pb free	Tube
SVF2N60T	TO-220-3L	SVF2N60T	Pb free	Tube
SVF2N60DTR	TO-252-2L	SVF2N60D	Halogen free	Tape&Reel

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

Characteristics	Symbol	Ratings						Unit
		SVF2N 60N	SVF2N 60NF	SVF2N 60M/D	SVF2N 60MJ	SVF2N 60F	SVF2N 60T	
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}	8.0						A
Power Dissipation(T _C =25°C)	P _D	30	16	34	35	23	44	W
Derate above 25°C		0.24	0.13	0.27	0.28	0.18	0.35	W/°C
Single Pulsed Avalanche Energy(Note 1)	E _{AS}	115						mJ
Operation Junction Temperature Range	T _J	-55~+150						°C
Storage Temperature Range	T _{stg}	-55~+150						°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings						Unit
		SVF2N 60N	SVF2N 60NF	SVF2N 60M/D	SVF2N 60MJ	SVF2N 60F	SVF2N 60T	
Thermal Resistance, Junction-to-Case	R _{θJC}	4.17	7.81	3.7	3.57	5.56	2.86	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	62.5	120	62.0	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	--	--	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 =1.0A	--	3.7	4.2	Ω
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHZ	179	233	303	pF
Output Capacitance	C _{oss}		--	32	--	
Reverse Transfer Capacitance	C _{rss}		--	2.8	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} =300V, I _D =2.0A, R _G =25Ω	--	8.9	--	ns
Turn-on Rise Time	t _r		--	23.0	--	
Turn-off Delay Time	t _{d(off)}		(Note 2,3)	--	23.4	

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Turn-off Fall Time	t_f		--	24.9	--	
Total Gate Charge	Q_g	$V_{DS}=480V, I_D=2.0A, V_{GS}=10V$ (Note 2,3)	--	8.24	--	nC
Gate-Source Charge	Q_{gs}		--	1.64	--	
Gate-Drain Charge	Q_{gd}		--	4.44	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction	--	--	2.0	A
Pulsed Source Current	I_{SM}	Diode in the MOSFET	--	--	8.0	
Diode Forward Voltage	V_{SD}	$I_S=2.0A, V_{GS}=0V$	--	--	1.4	V
Reverse Recovery Time	T_{rr}	$I_S=2.0A, V_{GS}=0V,$	--	326	--	ns
Reverse Recovery Charge	Q_{rr}	$di_F/dt=100A/\mu S$	--	0.87	--	μC

Notes:

1. $L=30mH, I_{AS}=2.52A, V_{DD}=100V, R_G=25\Omega,$ starting $T_J=25^\circ C$;
2. Pulse Test: Pulse width $\leq 300\mu s,$ Duty cycles $\leq 2\%$;
3. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

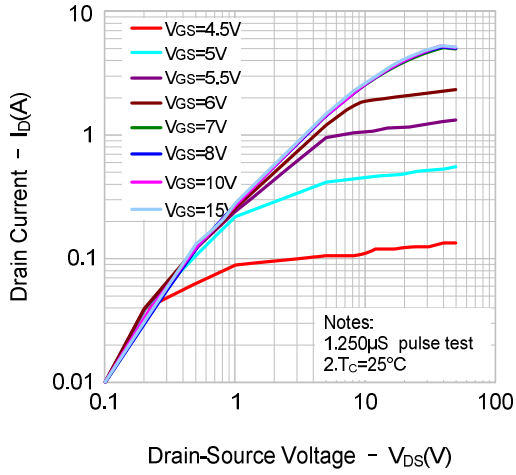


Figure 2. Transfer Characteristics

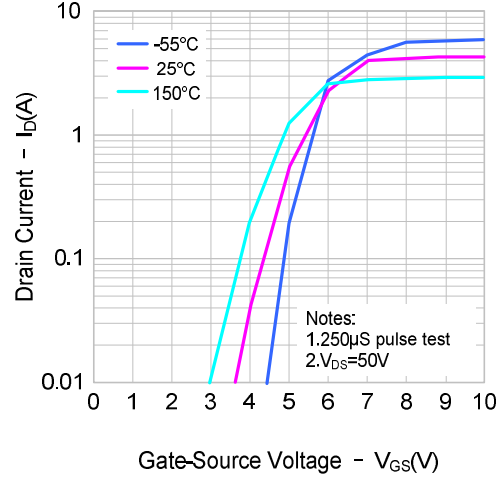


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

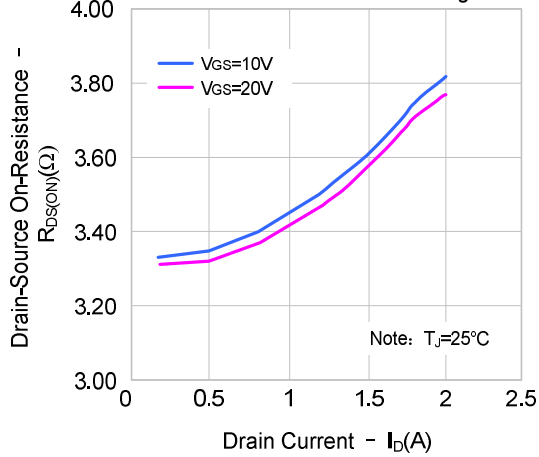
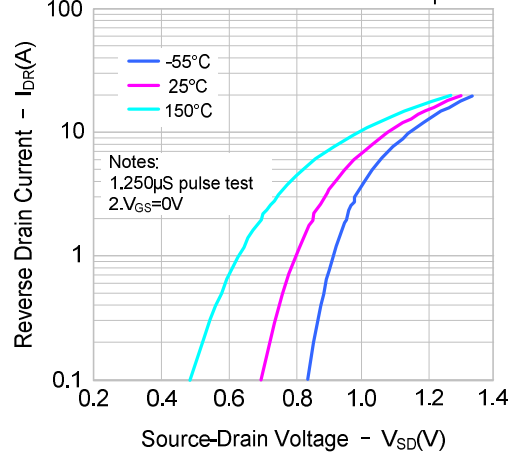


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature



TYPICAL CHARACTERISTICS(continued)

Figure 5. Capacitance Characteristics

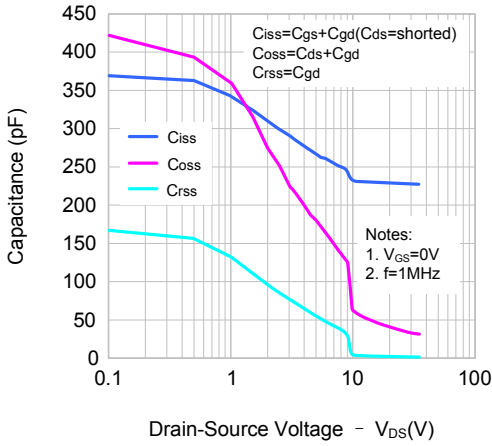


Figure 6. Gate Charge Characteristics

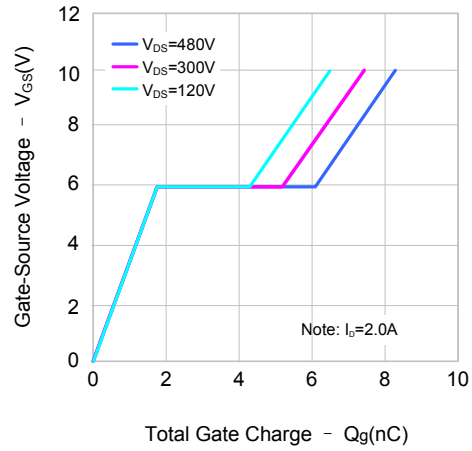


Figure 7. Breakdown Voltage Variation vs. Temperature

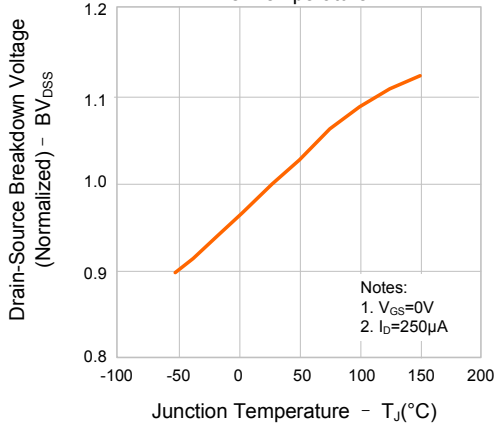


Figure 8. On-resistance vs. Temperature

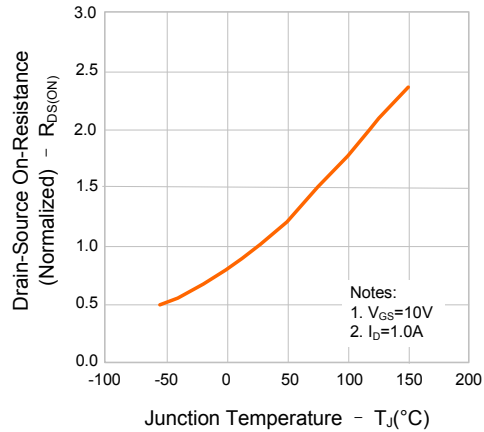


Figure 9-1. Max. Safe Operating Area(SVF2N60N)

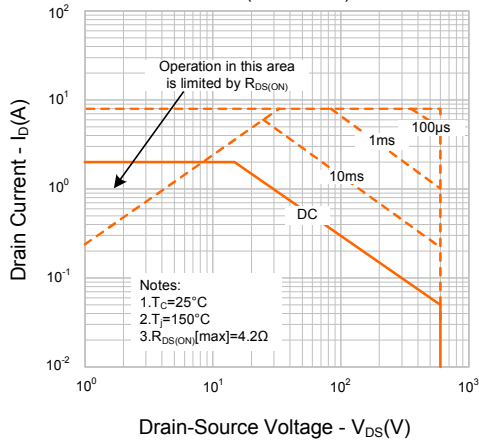
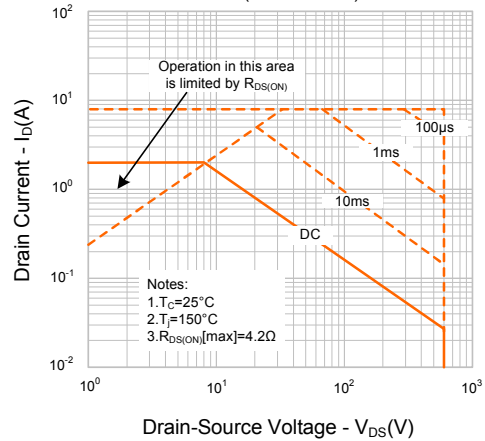
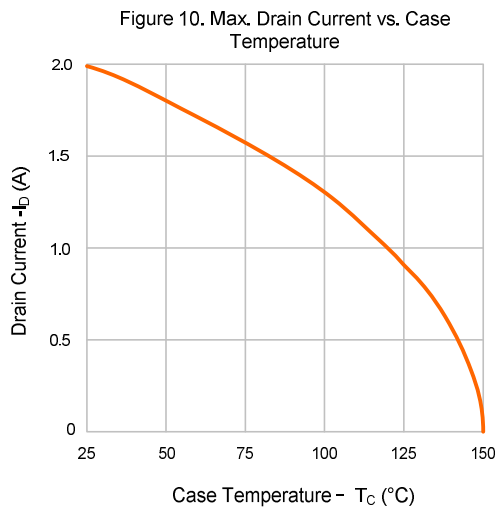
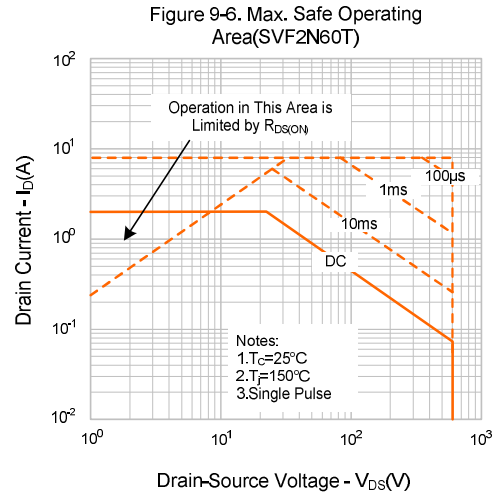
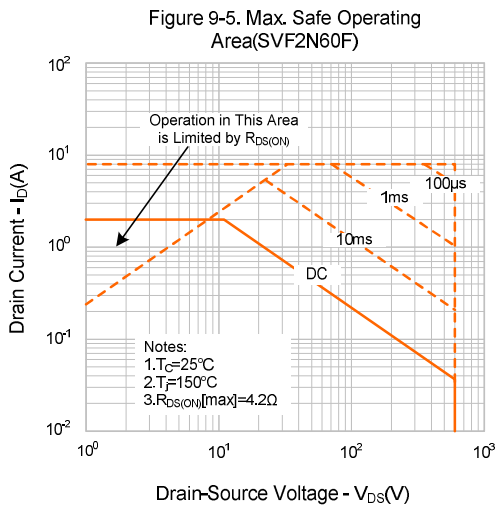
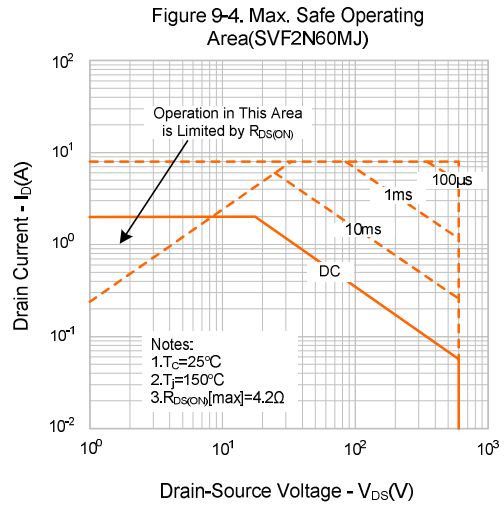
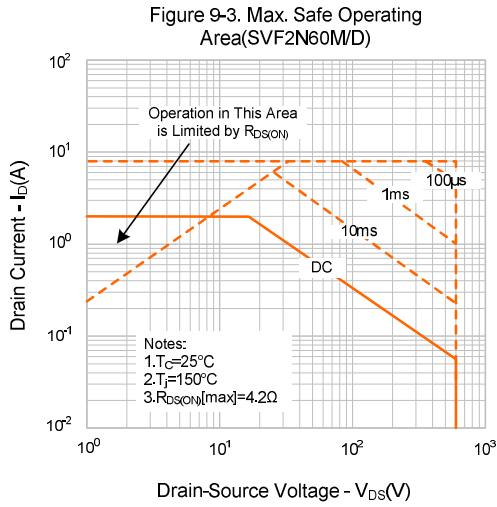


Figure 9-2. Max. Safe Operating Area(SVF2N60NF)

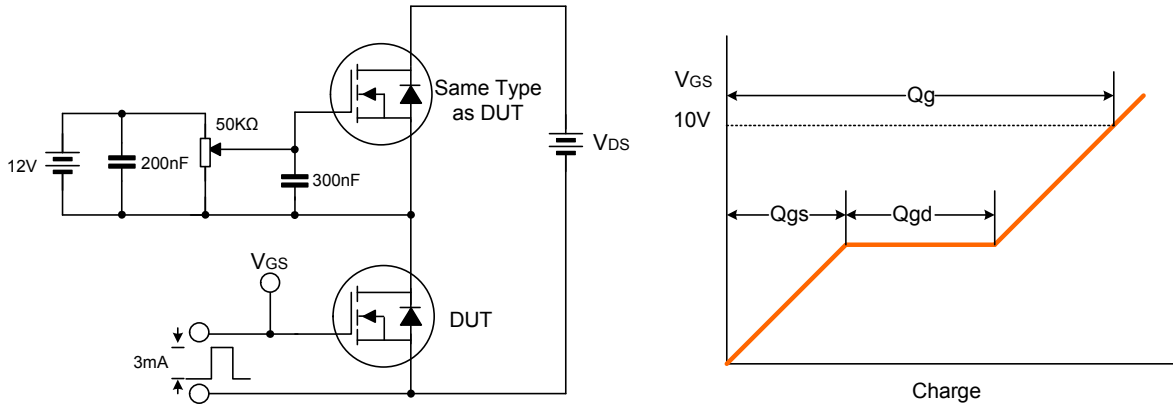


TYPICAL CHARACTERISTICS(continued)

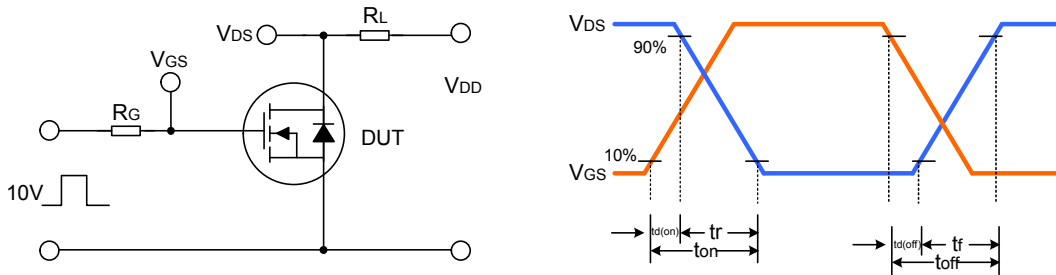


TYPICAL TEST CIRCUIT

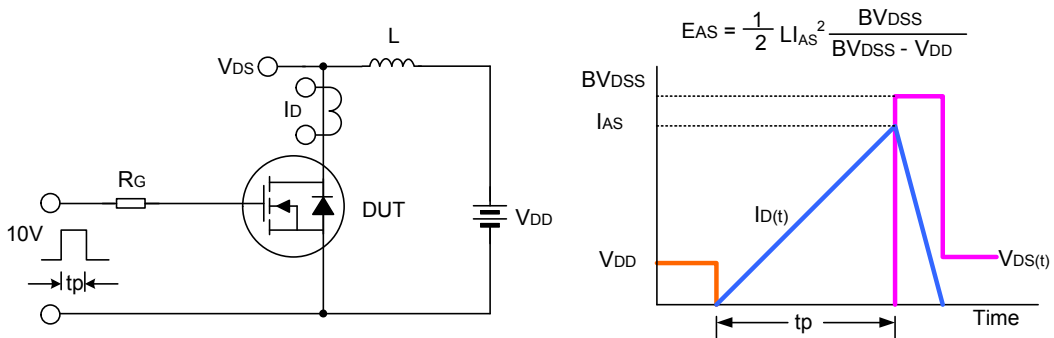
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



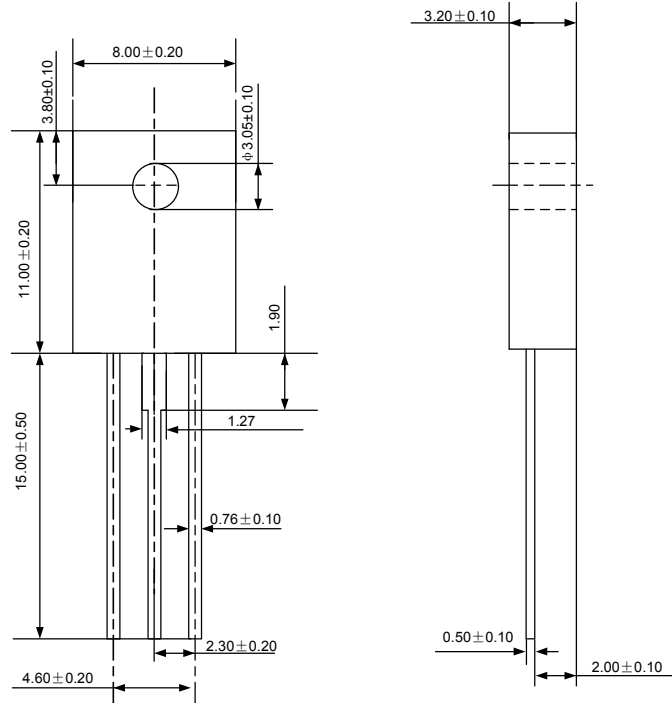
Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

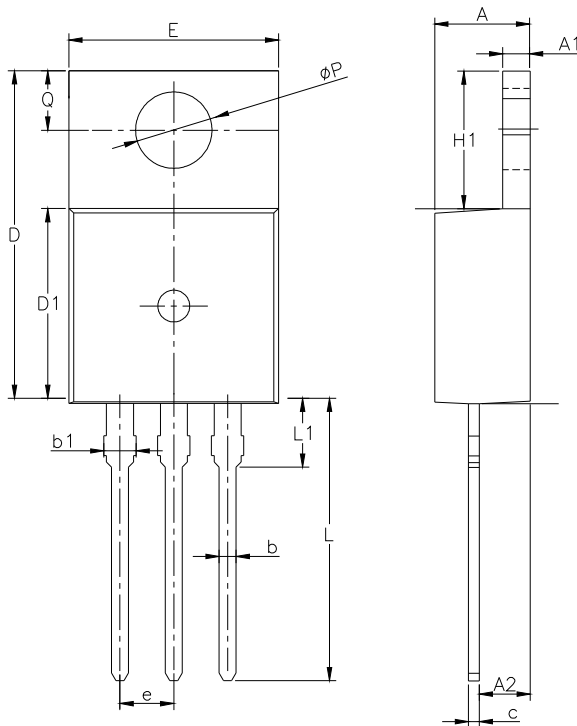
TO-126F-3L

UNIT: mm



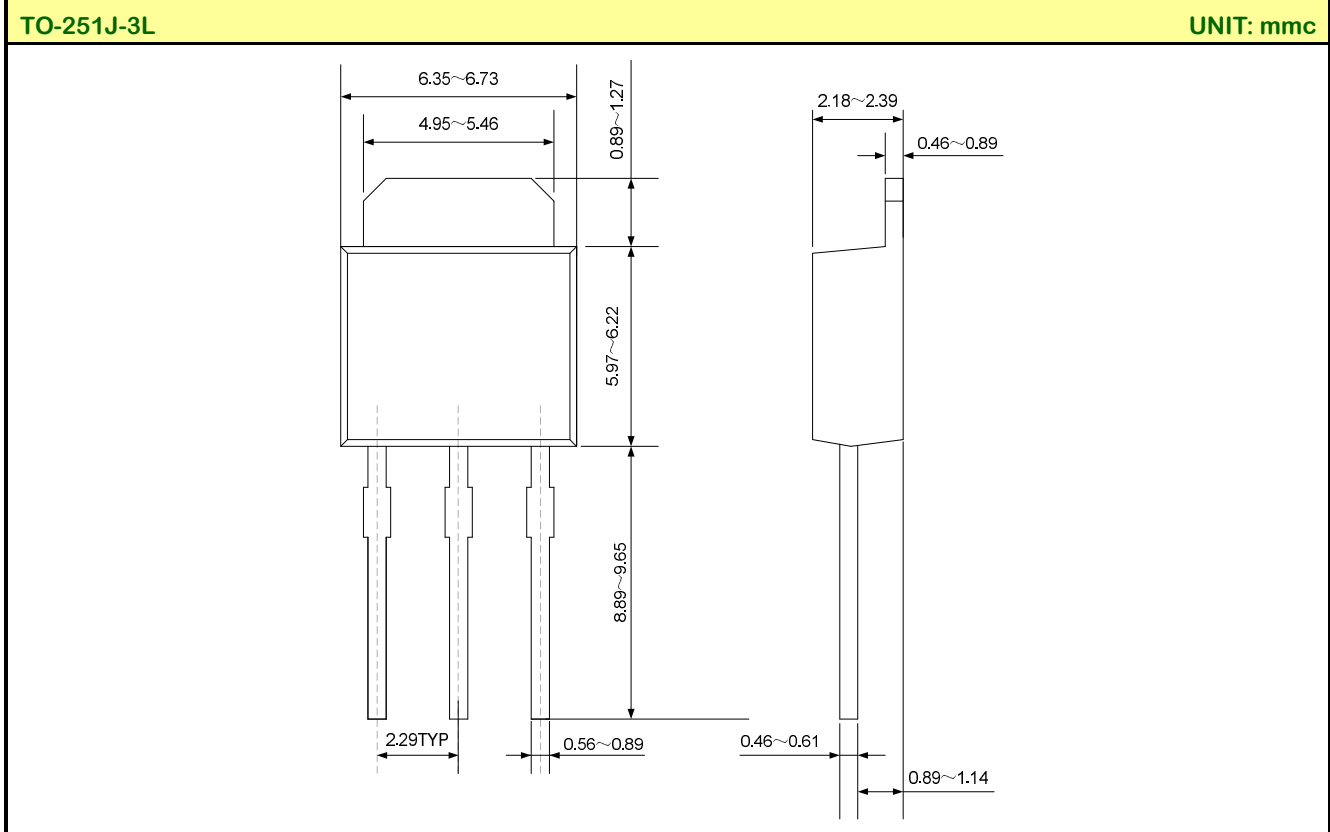
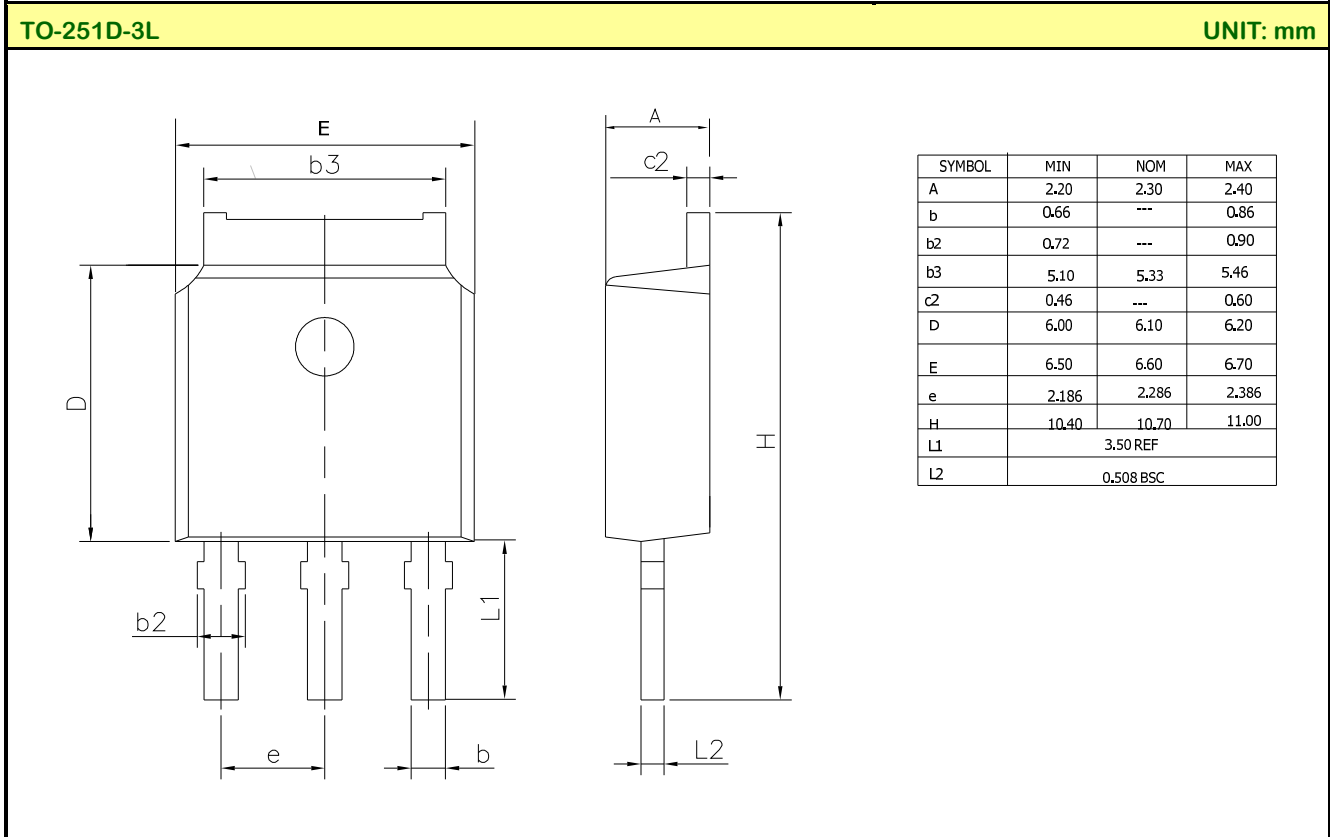
TO-220-3L

UNIT: mm



SYMBOL	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

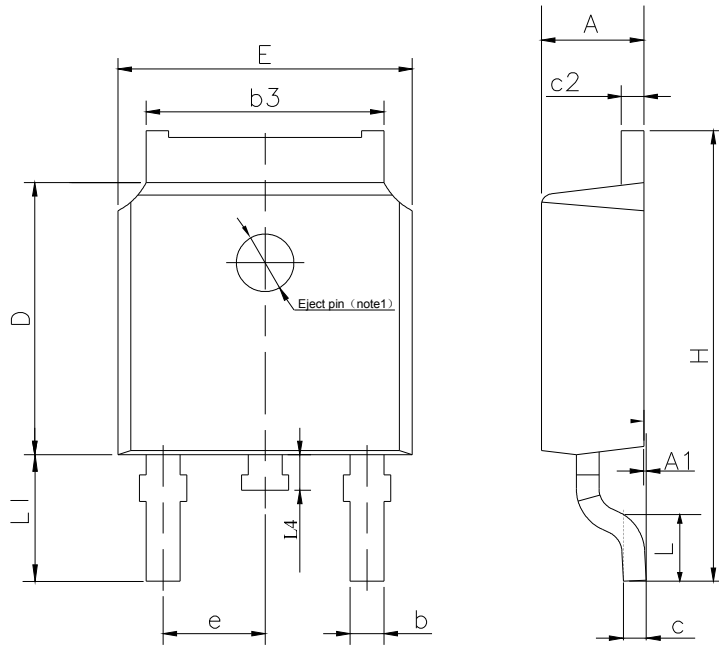
PACKAGE OUTLINE(continued)



PACKAGE OUTLINE(continued)

TO-252-2L

UNIT: mm

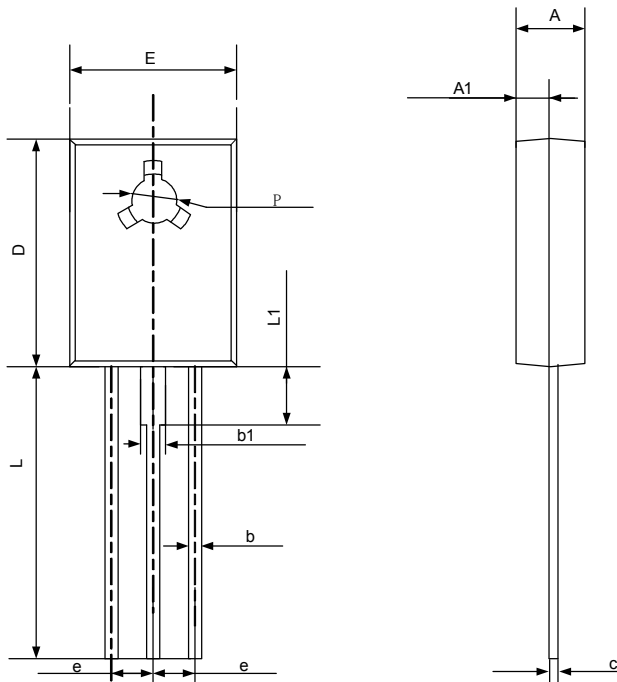


SYMBOL	MIN	NOM	MAX
A	2.10	2.30	2.50
A1	0	---	0.127
b	0.66	0.76	0.89
b3	5.10	5.33	5.46
c	0.45	---	0.65
c2	0.45	---	0.65
D	5.80	6.10	6.40
E	6.30	6.60	6.90
e	2.30TYP		
H	9.60	10.10	10.60
L	1.40	1.50	1.70
L1	2.90REF		
L4	0.60	0.80	1.00

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

TO-126-3L

UNIT: mm

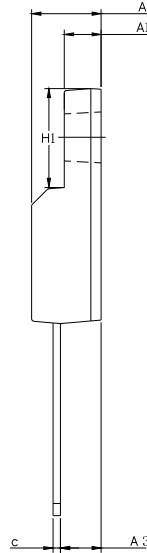
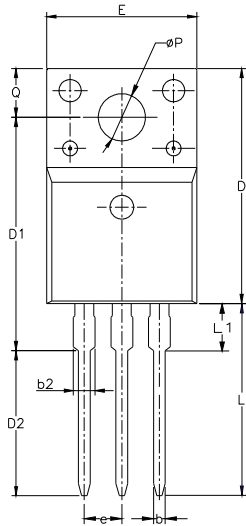


SYMBOL	MIN	NOM	MAX
A	2.48	2.70	2.90
A1	1.00	---	1.50
b	0.66	0.76	0.86
b1	1.17	1.37	1.45
c	0.40	---	0.60
D	10.60	11.00	11.40
E	7.40	---	8.20
e	2.29TYP		
L	14.50	---	15.80
L1	2.10	---	2.35
P	2.90	3.10	3.30

PACKAGE OUTLINE(continued)

TO-220F-3L(1)

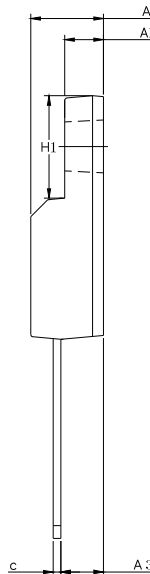
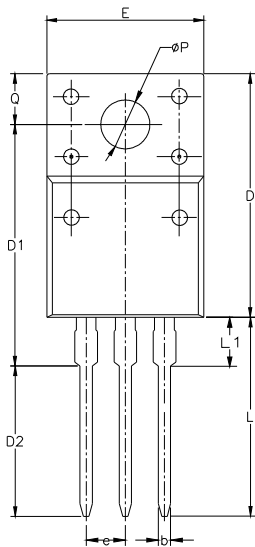
单位：毫米



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	254BCS		
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-220F-3L(2)

单位：毫米



SYMBOL	MIN	NOM	MAX
A	4.20	4.50	4.80
A1	2.40	2.70	3.00
A3	2.30	2.60	2.90
b	0.50	0.65	0.80
c	0.45	0.60	0.75
D	14.50	15.00	15.50
D1	14.90	15.40	15.90
D2	9.10	9.60	10.10
E	9.50	10.00	10.50
e	254BCS		
H1	6.60	6.90	7.20
L	12.50	13.00	13.50
L1	2.90	3.40	3.90
φP	2.90	3.20	3.50
Q	2.70	3.00	3.30

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Rev.:	2.4	Author:	Yin Zi
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1. Modify the ordering information			

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1. Change the schematic diagram of MOS			
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1. Add the halogen free information of SVF2N60M			
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1. Modify "PACKAGE OUTLINE"			
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1. Add the package of TO-126F-3L			
Rev.:	1.6	Author:	Yin Zi
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1. Modify the values of T_{rr} and Q_{rr} ; Update the package outline of TO-251D-3L			
Rev.:	1.5	Author:	Yin Zi
Revision History:			
1. Add the halogen free information of SVF2N60F			
Rev.:	1.4	Author:	Yin Zi
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1. Delete the package of TO-251-3L			
Rev.:	1.3	Author:	Yin Zi
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1. Modify "PACKAGE OUTLINE"			
Rev.:	1.2	Author:	Yin Zi
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Rev.:	1.0	Author:	Yin Zi

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