

4A, 900V N-CHANNEL MOSFET

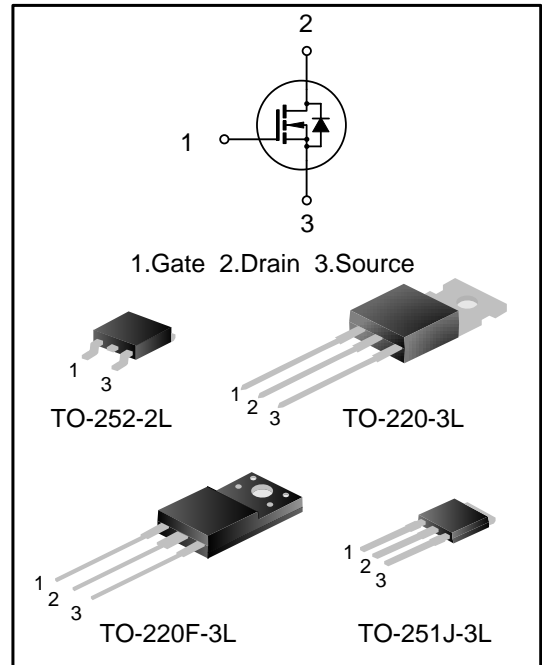
GENERAL DESCRIPTION

SVF4N90F/MJ/T/D 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,900V, $R_{DS(on)(typ.)}=2.7\Omega@V_{GS}=10V$
- ◆ Low gate charge
- ◆ Low Crss
- ◆ Fast switching
- ◆ Improved dv/dt capability



ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVF4N90F	TO-220F-3L	SVF4N90F	Pb free	Tube
SVF4N90MJ	TO-251J-3L	SVF4N90	Halogen free	Tube
SVF4N90T	TO-220-3L	SVF4N90T	Pb free	Tube
SVF4N90DTR	TO-252-2L	SVF4N90D	Halogen free	Tape&Reel

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

Characteristics	Symbol	Ratings			Unit
		SVF4N90F	SVF4N90MJ/D	SVF4N90T	
Drain-Source Voltage	V _{DS}	900			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}	16			A
Power Dissipation(T _C =25°C) -Derate above 25°C	P _D	44	132	150	W
		0.35	1.06	1.20	W/°C
Single Pulsed Avalanche Energy (Note 1)	E _{AS}	L=30mH			mJ
		L=10mH			mJ
Operation Junction Temperature Range	T _J	-55~+150			°C
Storage Temperature Range	T _{stg}	-55~+150			°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings			Unit
		SVF4N90F	SVF4N90MJ/D	SVF4N90T	
Thermal Resistance,Junction-to-Case	R _{θJC}	2.84	0.95	0.83	°C/W
Thermal Resistance,Junction-to-Ambient	R _{θJA}	62.5	62.0	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	900	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =900V, 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	--	2.7	3.5	Ω
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz	--	707	--	pF
Output Capacitance	C _{oss}		--	68	--	
Reverse Transfer Capacitance	C _{rss}		--	3.0	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} =450V, I _D =4A, R _G =25Ω (Note2,3)	--	15	--	ns
Turn-on Rise Time	t _r		--	26	--	
Turn-off Delay Time	t _{d(off)}		--	39	--	
Turn-off Fall Time	t _f		--	28	--	
Total Gate Charge	Q _g	V _{DS} =720V, I _D =4A, V _{GS} =10V (Note 2,3)	--	17	--	nC
Gate-Source Charge	Q _{gs}		--	4.1	--	
Gate-Drain Charge	Q _{gd}		--	7.6	--	
Gate resistance	R _G	f=1MHz, Drain Open, OSC Level: 20mV	--	4.2	--	Ω

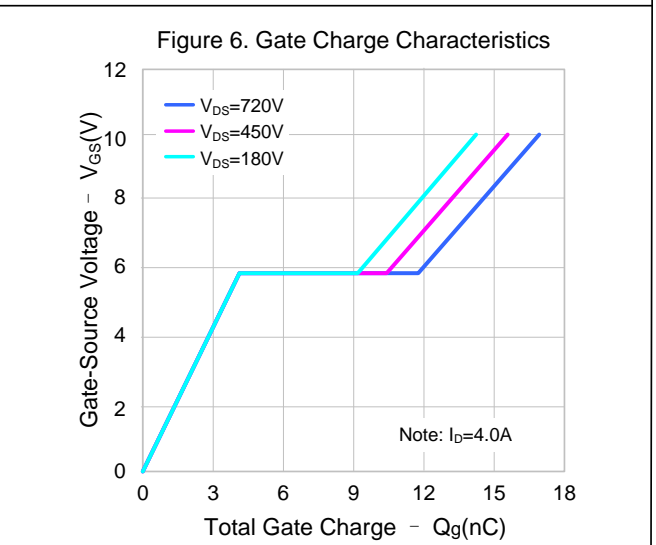
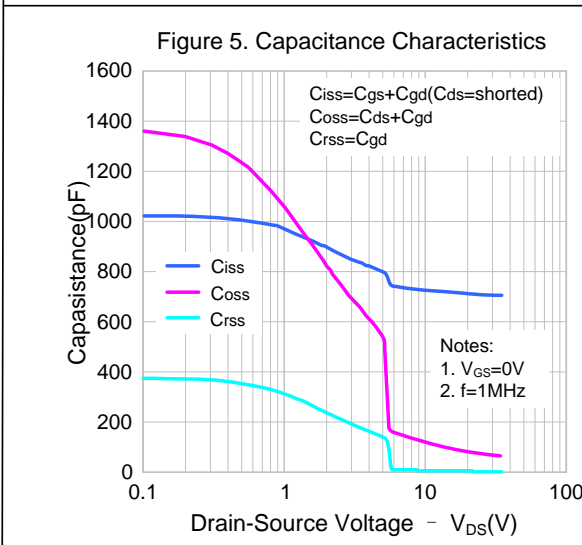
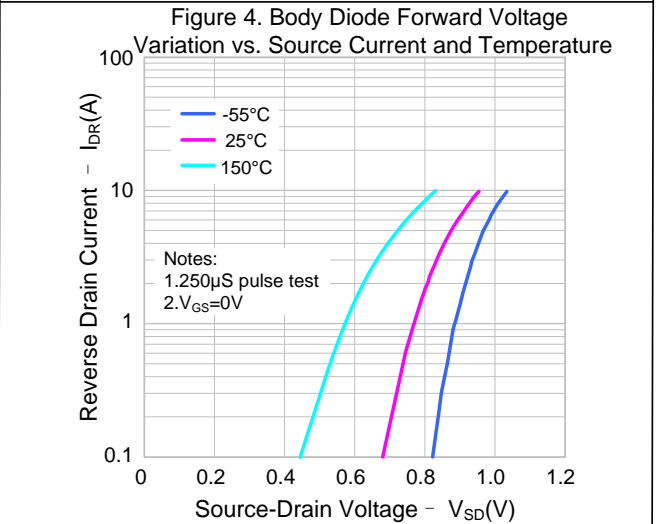
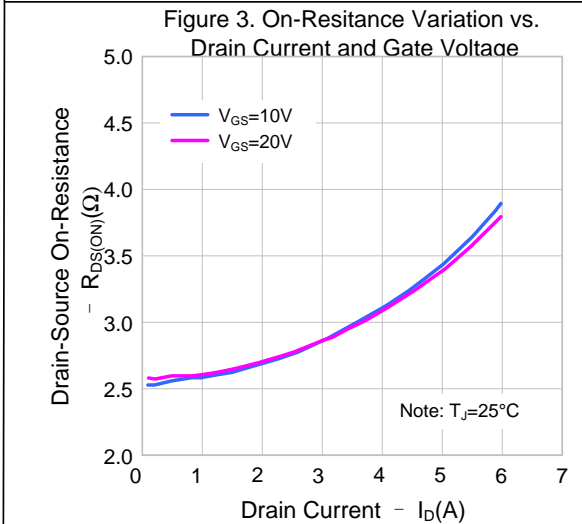
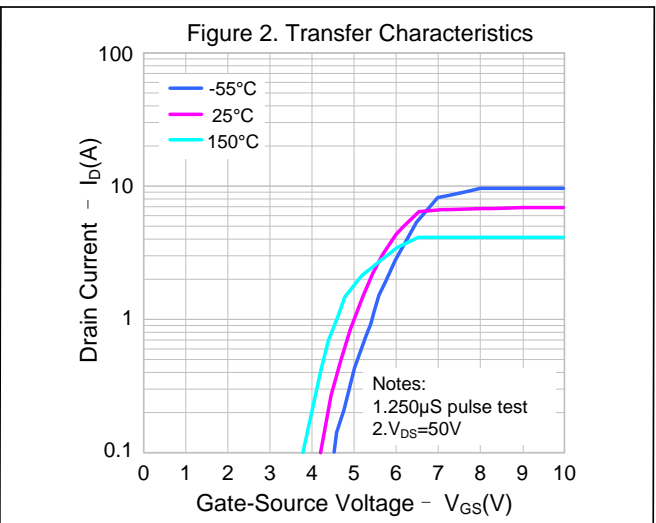
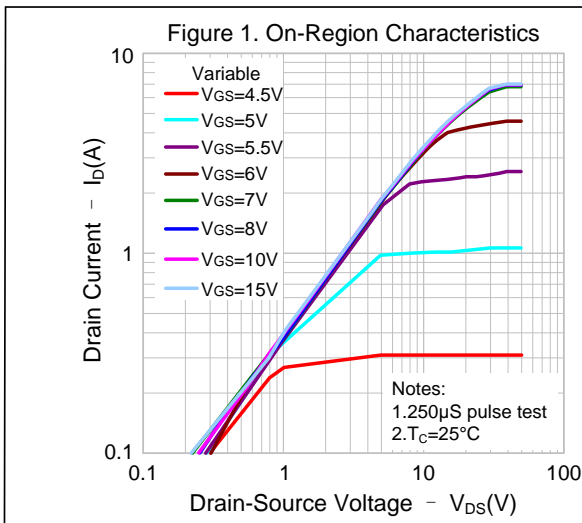
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I _S	Integral Reverse P-N Junction	--	--	4	A
Pulsed Source Current	I _{SM}	Diode in the MOSFET	--	--	16	
Diode Forward Voltage	V _{SD}	I _S =4A, V _{GS} =0V	--	--	1.4	V
Reverse Recovery Time	T _{rr}	I _S =4A, V _{GS} =0V,	--	535	--	ns
Reverse Recovery Charge	Q _{rr}	dI _F /dt=100A/μs (Note 2)	--	2.5	--	μC

Notes:

- V_{DD}=50V, R_G=25Ω, starting T_{B,JB}=25°C;
- Pulse Test: Pulse width ≤300μs, Duty cycle≤2%;
- Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS(CONTINUED)

Figure 7. Breakdown Voltage Variation vs. Temperature

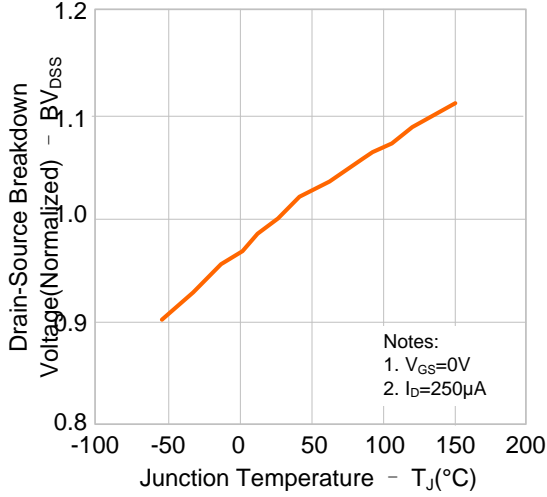


Figure 8. On-resistance Variation vs. Temperature

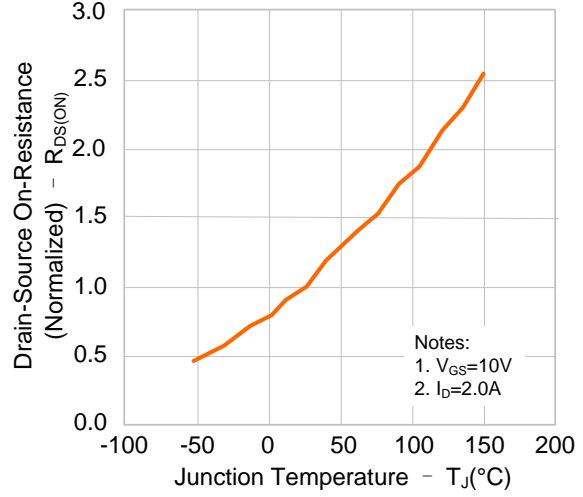


Figure 9-1. Max. Safe Operating Area(SVF4N90F)

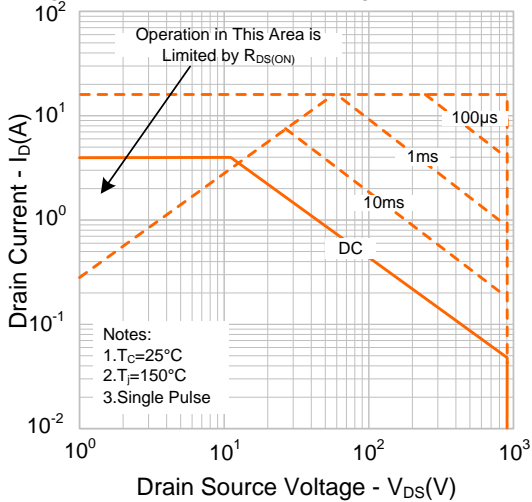


Figure 9-2. Max. Safe Operating Area(SVF4N90MJ/D)

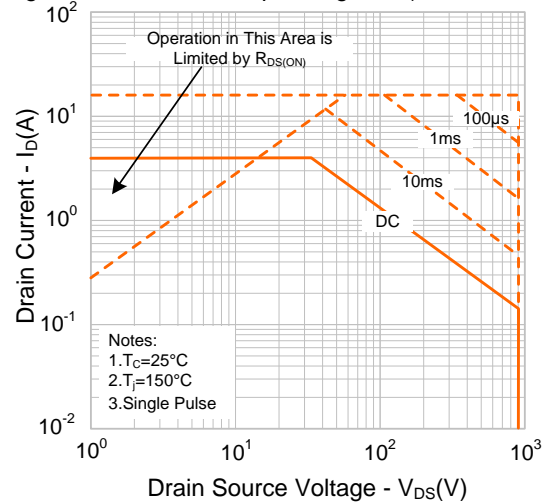


Figure 9-3. Max. Safe Operating Area(SVF4N90T)

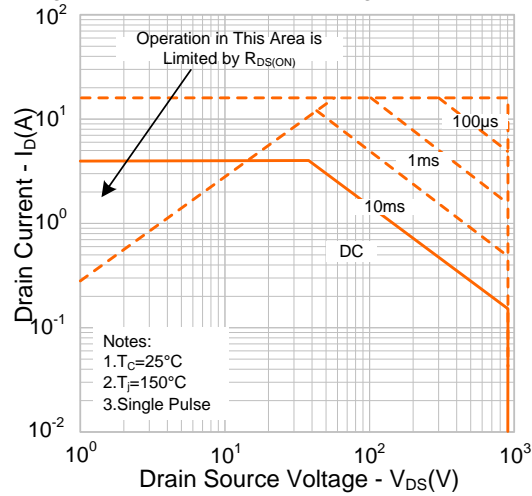
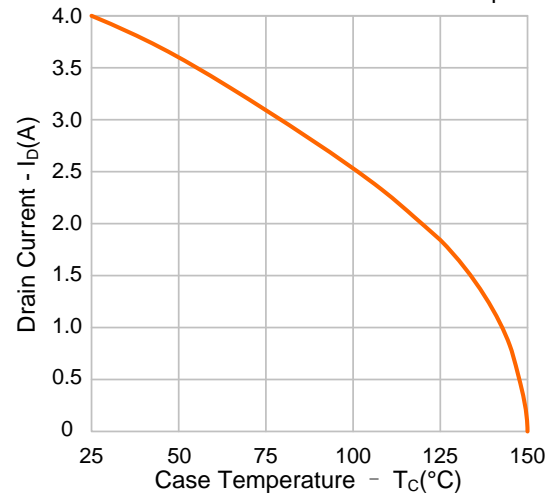
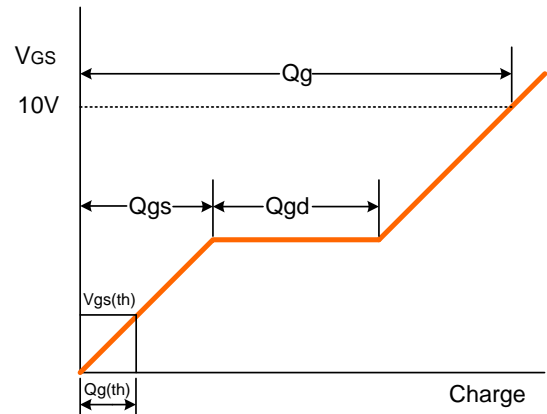
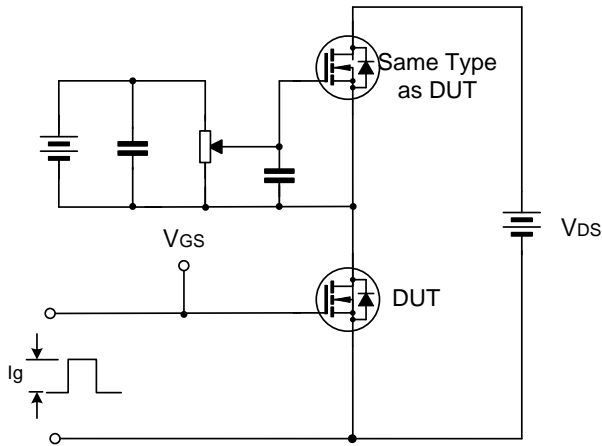


Figure 10. Maximum Drain Current vs. Case Temperature

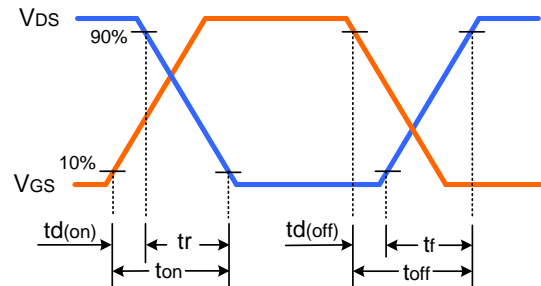
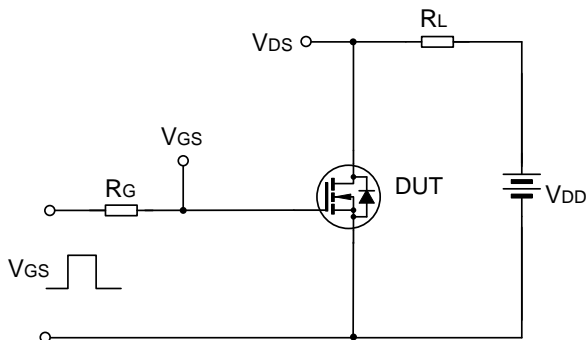


TYPICAL TEST CIRCUIT

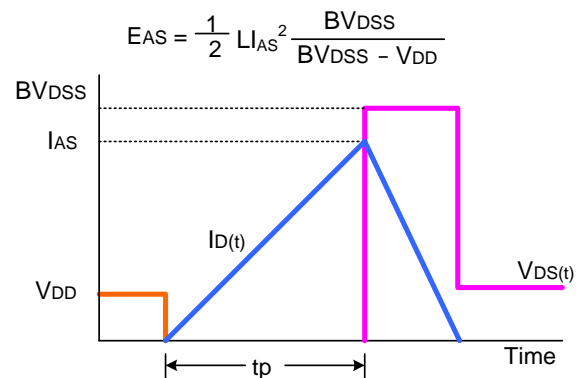
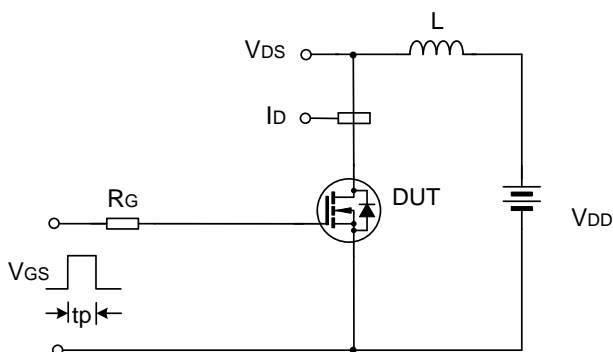
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

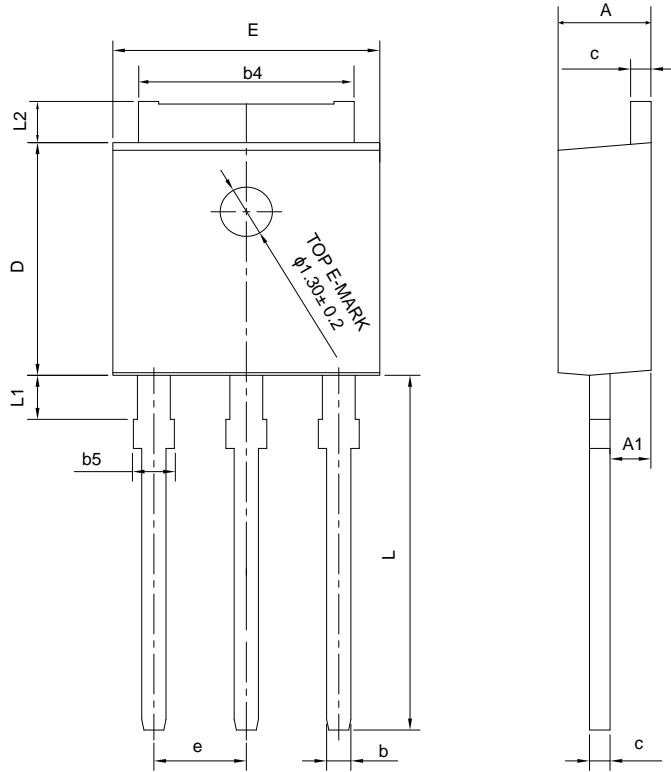


Unclamped Inductive Switching Test Circuit & Waveform



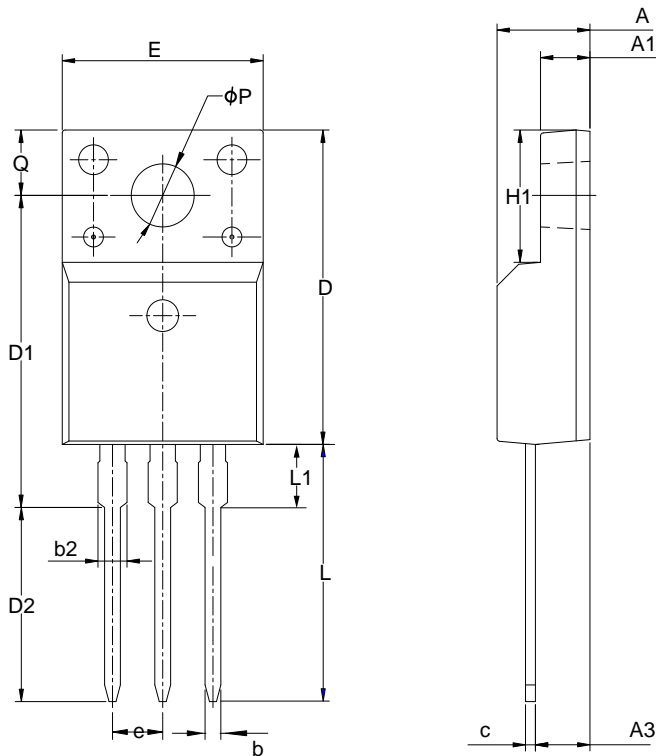
PACKAGE OUTLINE

TO-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

TO-220F-3L **UNIT: mm**

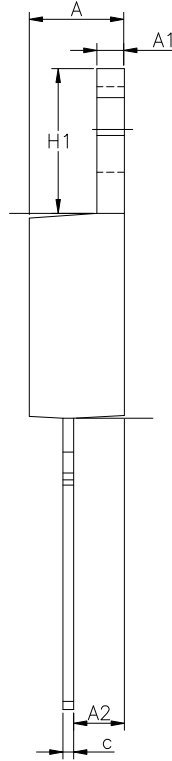
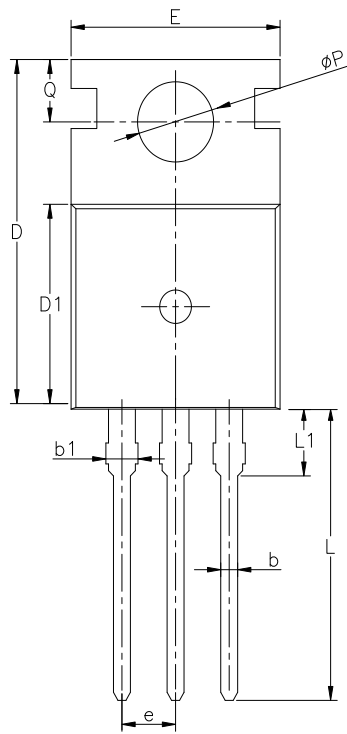


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.42	4.70	5.02
A1	2.30	2.54	2.80
A3	2.50	2.76	3.10
b	0.70	0.80	0.90
b2	—	—	1.47
c	0.35	0.50	0.65
D	15.25	15.87	16.25
D1	15.30	15.75	16.30
D2	9.30	9.80	10.30
E	9.73	10.16	10.36
e	2.54BSC		
H1	6.40	6.68	7.00
L	12.48	12.98	13.48
L1	—	—	3.50
φP	3.00	3.18	3.40
Q	3.05	3.30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

PACKAGE OUTLINE

TO-220-3L

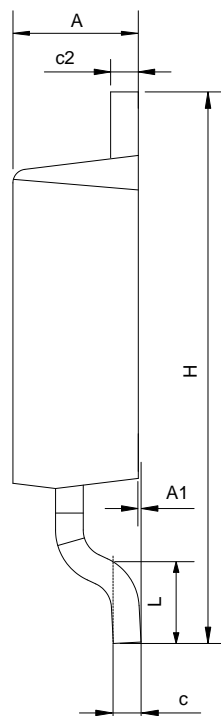
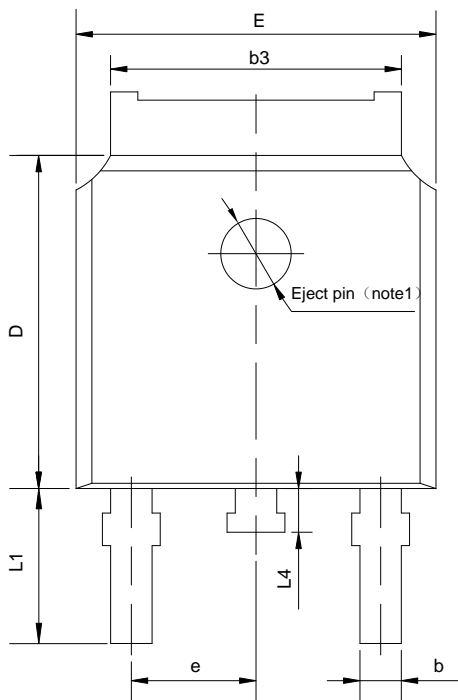
UNIT: mm



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

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

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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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Rev.: 2.2

Revision History:

1. Update the template of the datasheet
-

Rev.: 2.1

Revision History:

1. Add the EAS value under L=10mH
-

Rev.: 2.0

Revision History:

1. Add the package outline of TO-252-2L
-

Rev.: 1.9

Revision History:

1. Add another space figure of TO-220-3L
-

Rev.: 1.8

Revision History:

1. Add TO-220-3L
-

Rev.: 1.7

Revision History:

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

Rev.: 1.6

Revision History:

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

Rev.: 1.5

Revision History:

1. Modify the thermal characteristics
-

Rev.: 1.4

Revision History:

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

Rev.: 1.3

Revision History:

1. Modify the ordering information
-

Rev.: 1.2

Revision History:

1. Change the schematic diagram of MOS
-

Rev.: 1.1

Revision History:

1. Modify "PACKAGE OUTLINE"
-

Rev.: 1.0

Revision History:

1. Initial release
-
-