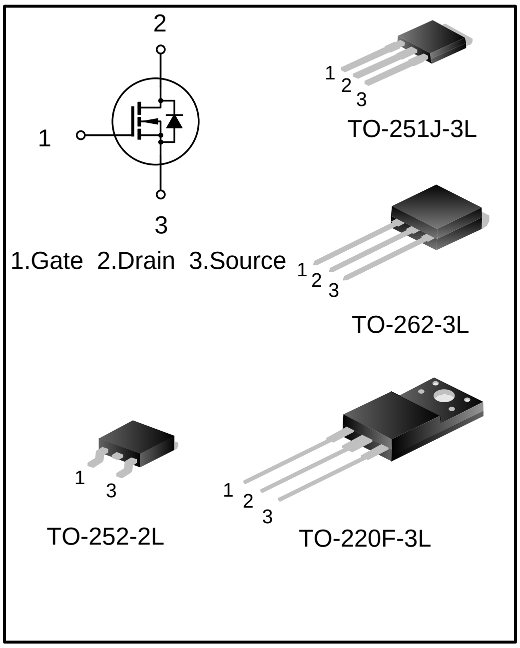
5A, 700V SUPER JUNCTION MOS POWER TRANSISTOR

DESCRIPTION

SVS5N70F(D)(MJ)(K)D2 is an N-channel enhancement mode high voltage power MOSFETs produced using Silan's super junction MOS technology. It achieves low conduction loss and switching losses. It leads the design engineers to their power converters with high efficiency, high power density, and superior thermal behavior. Furthermore, it's universal applicable, i.e., suitable for hard and soft switching topologies.



FEATURES

- 5A, 700V, $R_{DS(on)(typ.)}$=0.8Ω@V_{GS}=10V
- New revolutionary high voltage technology
- Ultra low gate charge
- Periodic avalanche rated
- Extreme dv/dt rated
- High peak current capability

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVS5N70FD2	TO-220F-3L	5N70FD2	Halogen free	Tube
SVS5N70DD2TR	TO-252-2L	5N70DD2	Halogen free	Tape & Reel
SVS5N70MJD2	TO-251J-3L	5N70MJD2	Halogen free	Tube
SVS5N70KD2	TO-262-3L	SVS5N70KD2	Halogen free	Tube

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

Characteristics		Symbol	Ratings			Unit
			SVS5N70FD2	SVS5N70DD2/MJD2	SVS5N70KD2	
Drain-Source Voltage		V_{DS}	700			V
Gate-Source Voltage		V_{GS}	±30			V
Drain Current	T_C=25°C	I_D	5.0			A
	T_C=100°C		3.2			
Drain Current Pulsed		I_{DM}	18			A
Power Dissipation (T_C=25°C)		P_D	31	52	89	W
- Derate above 25°C			0.2	0.35	0.71	W/°C
Single Pulsed Avalanche Energy (Note1)		E_{AS}	301			mJ
Reverse diode dv/dt (Note 2)		dv/dt	15			V/ns
MOSFET dv/dt ruggedness (Note 3)		dv/dt	50			V/ns
Operation Junction Temperature Range		T_J	-55～+150			°C
Storage Temperature Range		T_{stg}	-55～+150			°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings			Unit
		SVS5N70FD2	SVS5N70DD2/MJD2	SVS5N70KD2	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4.1	2.4	1.4	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	62.0	62.5	°C/W

ELECTRICAL CHARACTERISTICS (UNLESS OTHERWISE NOTED, T_J=25°C)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250µA	700	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=700V, 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=2.5A	--	0.8	0.9	Ω
Gate resistance	R_g	f=1.0MHz	--	6.0	--	Ω
Input Capacitance	C_{iss}	V_{DS}=100V, V_{GS}=0V, f=1.0MHz	--	334	--	pF
Output Capacitance	C_{oss}		--	20	--	
Reverse Transfer Capacitance	C_{rss}		--	1.8	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=350V, I_D=5.0A, V_{GS}=10V, R_G=24Ω (Note 4,5)	--	8.3	--	ns
Turn-on Rise Time	t_r		--	25	--	
Turn-off Delay Time	$t_{d(off)}$		--	35	--	
Turn-off Fall Time	t_f		--	24	--	
Total Gate Charge	Q_g	V_{DS}=560V, I_D=5.0A, V_{GS}=10V (Note 4,5)	--	13	--	nC
Gate-Source Charge	Q_{gs}		--	2.9	--	
Gate-Drain Charge	Q_{gd}		--	7.0	--	

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	--	--	5.0	A
Pulsed Source Current	I_{SM}		--	--	18	
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 (Note 4)	--	302	--	ns
Reverse Recovery Charge	Q_{rr}		--	2.0	--	µC

Notes:

1. L=79mH, I_{AS}=2.6A,V_{DD}=100V, R_G=25Ω, starting T_J=25°C;；
2. V_{DS}=0~400V，I_{SD}<=5A, T_J=25°C；
3. V_{DS}=0~480V；
4. Pulse Test: Pulse width ≤300µs,Duty cycle≤2%；
5. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

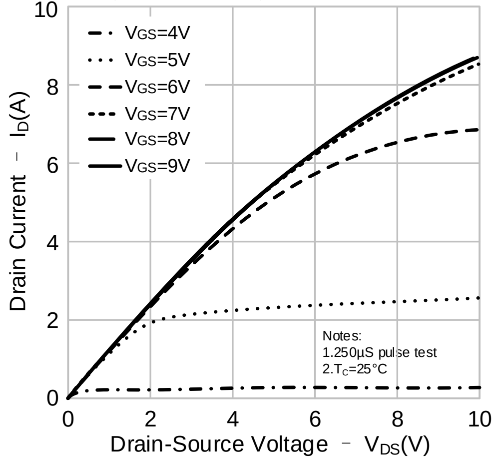


Figure 2. Transfer Characteristics

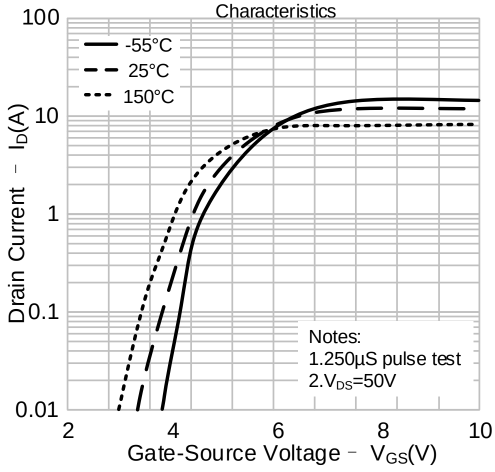


Figure 3. On-Resistance Variation vs. Drain Current, Gate Voltage

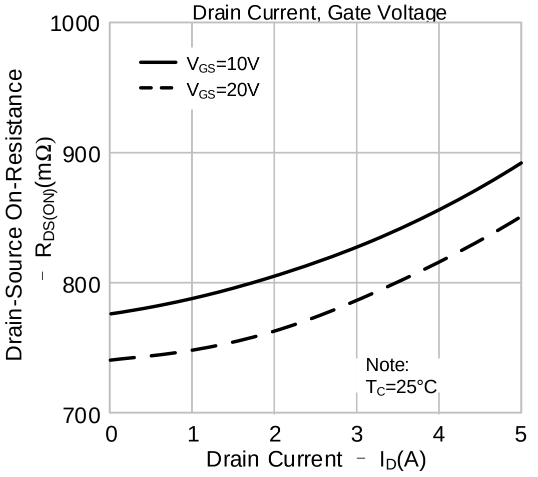


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

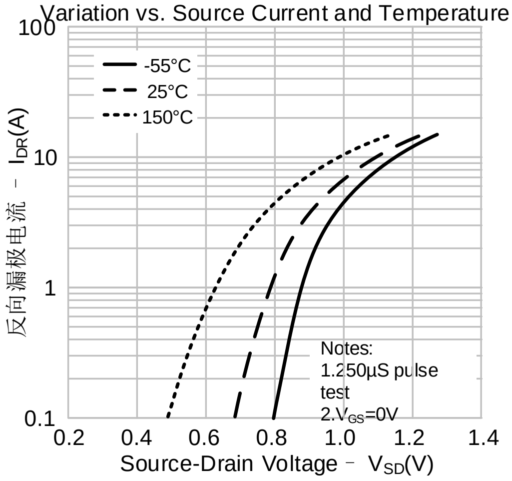


Figure 5. Capacitance Characteristics

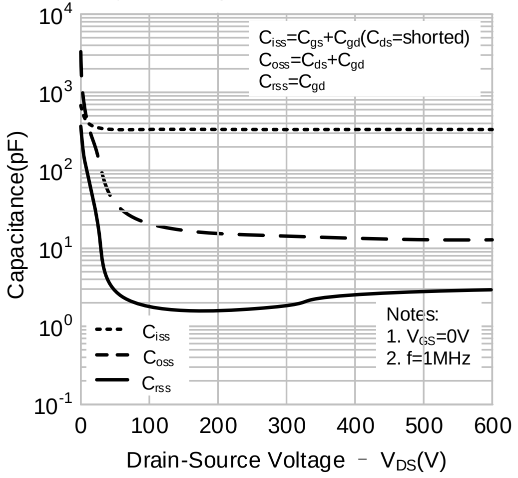
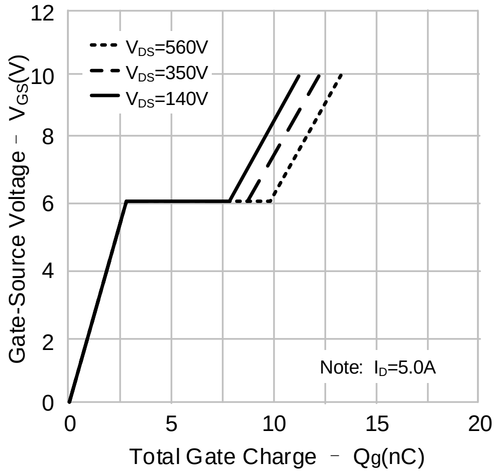


Figure 6. Gate Charge Characteristics



TYPICAL CHARACTERISTICS(CONTINUED)

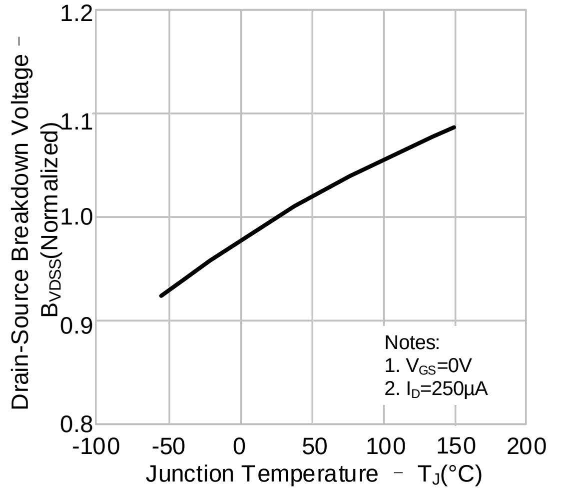


Figure 7. Breakdown Voltage Variation vs. Temperature

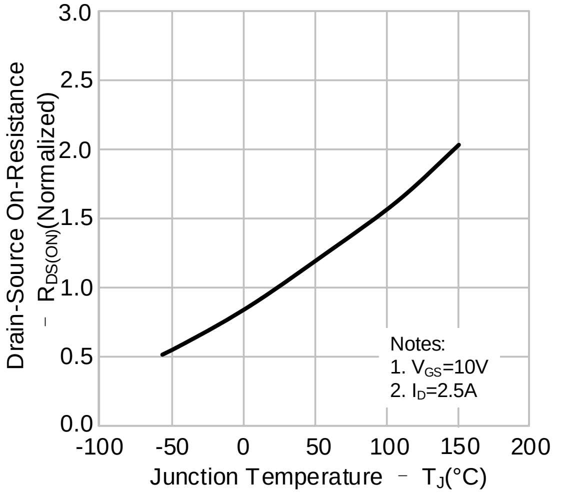


Figure 8. On-resistance Variation vs. Temperature

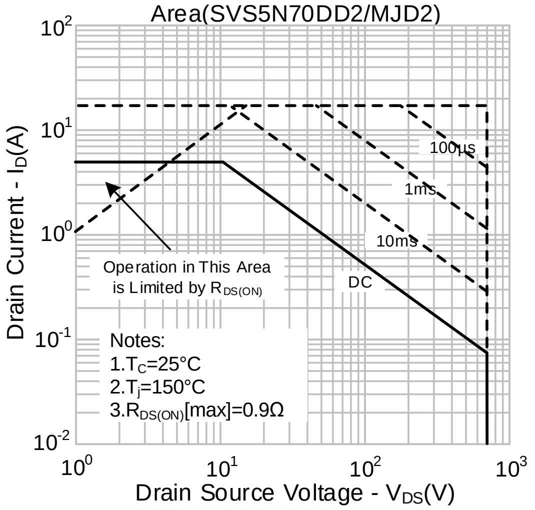


Figure 9-1 Max. Safe Operating Area(SVS5N70DD2/MJD2)

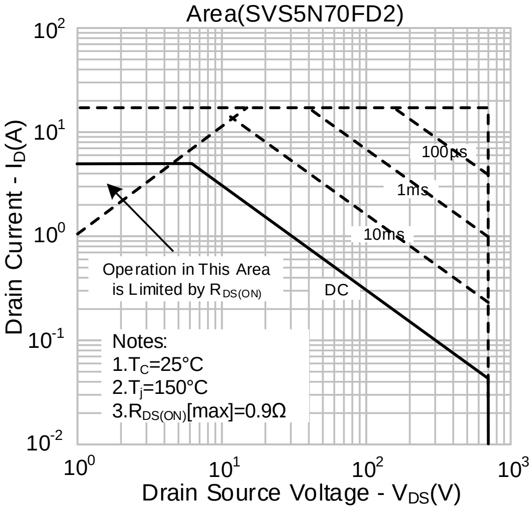


Figure 9-2 Max. Safe Operating Area(SVS5N70FD2)

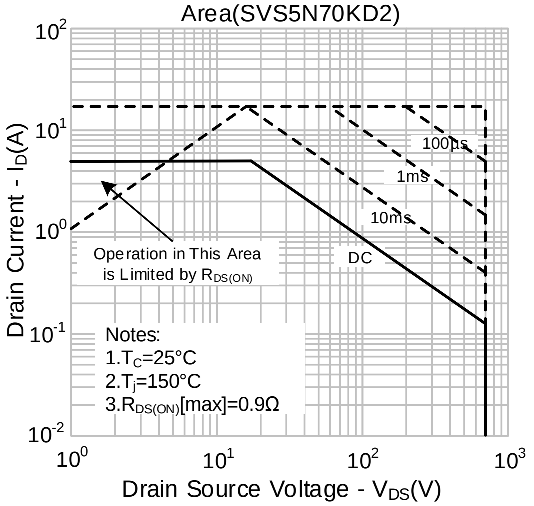
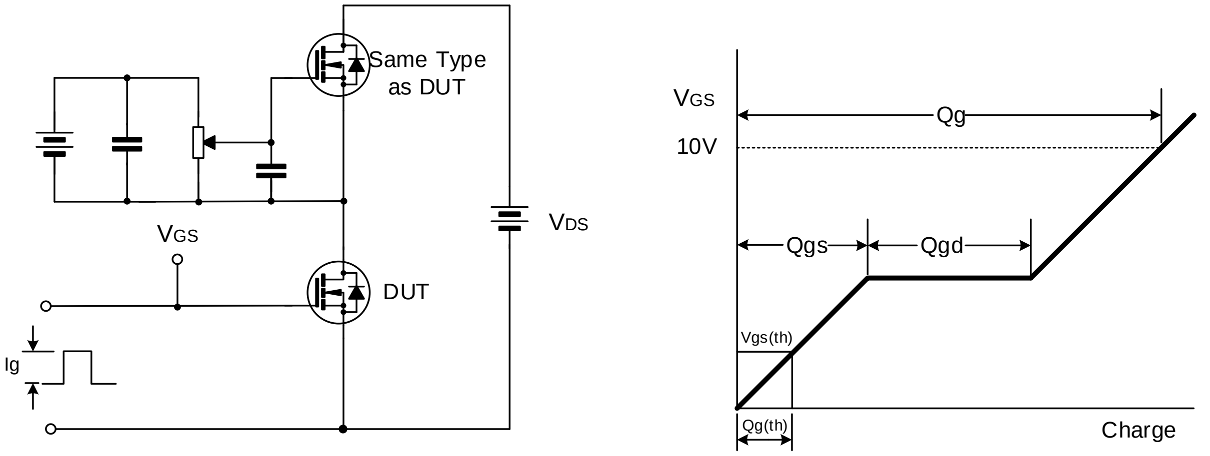


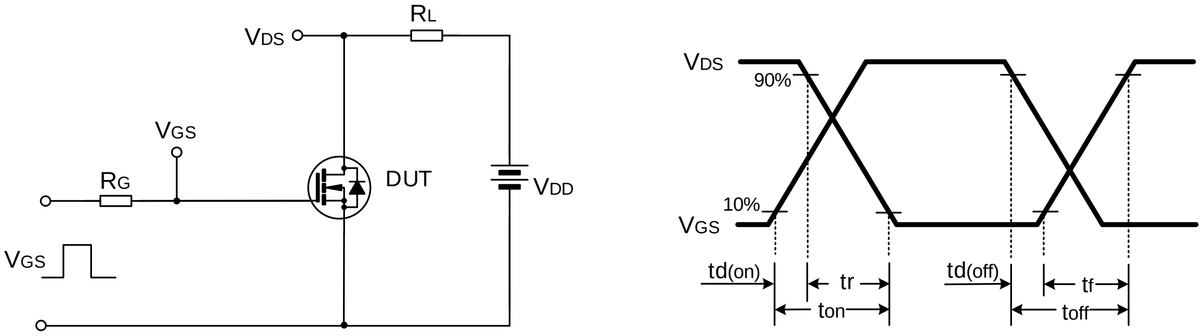
Figure 9-3 Max. Safe Operating Area(SVS5N70KD2)

TYPICAL TEST CIRCUIT

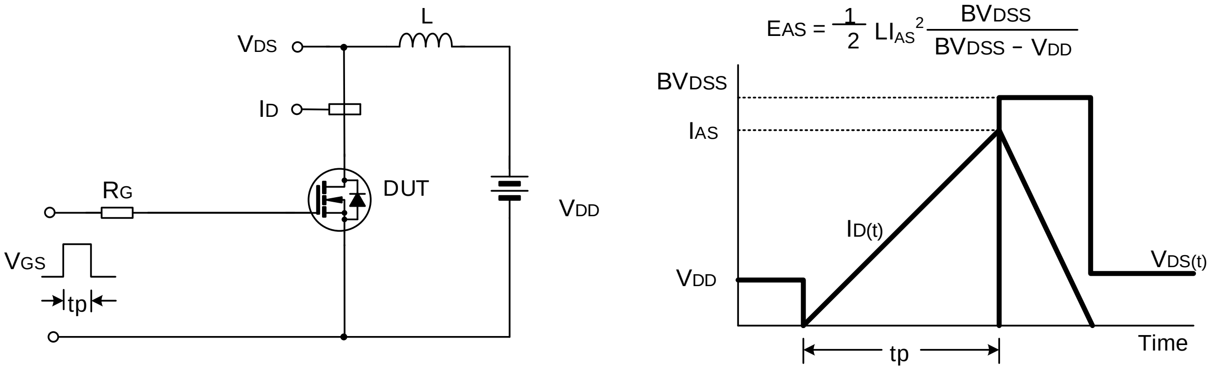
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

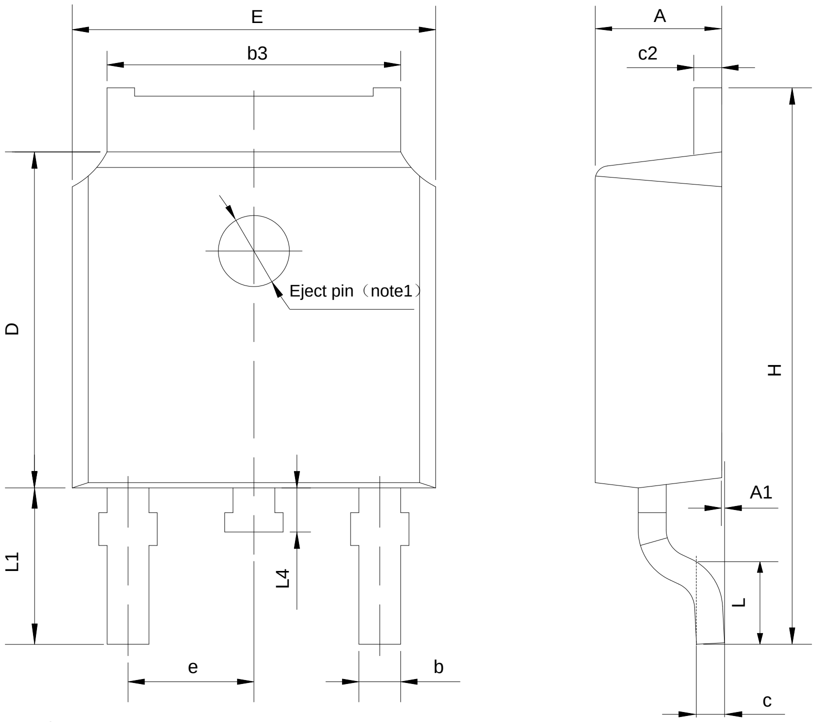


Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

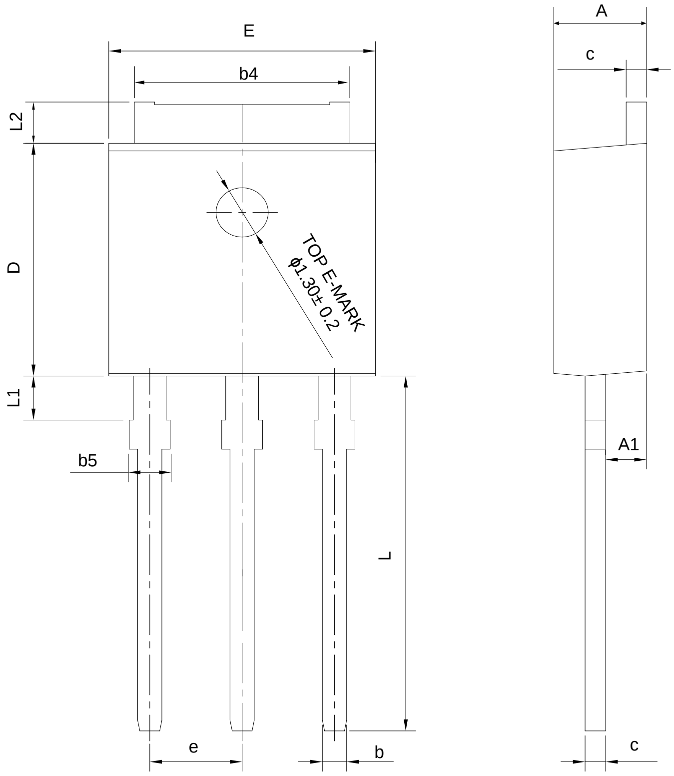
TO-252-2L **UNIT: mm**



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

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

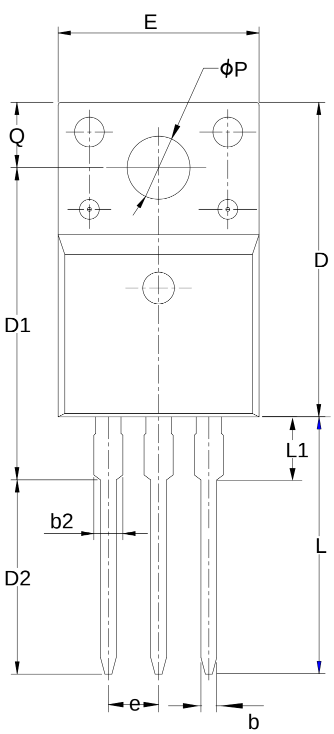
TO-251J-3L **UNIT: mm**

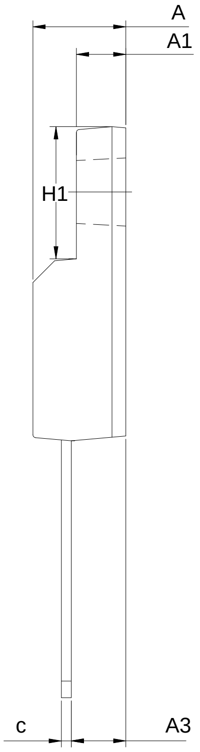


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.18	2.30	2.39
A1	0.89	1.00	1.14
b	0.56	—	0.89
b4	4.95	5.33	5.46
b5	—	—	1.05
c	0.46	—	0.61
D	5.97	6.10	6.27
E	6.35	6.60	6.73
e	2.29 BCS		
L	8.89	9.30	9.65
L1	0.95	—	1.50
L2	0.89	—	1.27

PACKAGE OUTLINE(CONTINUED)

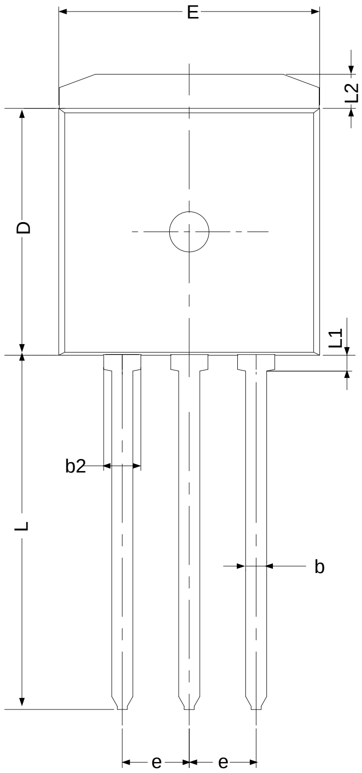
TO-220F-3L **UNIT: mm**

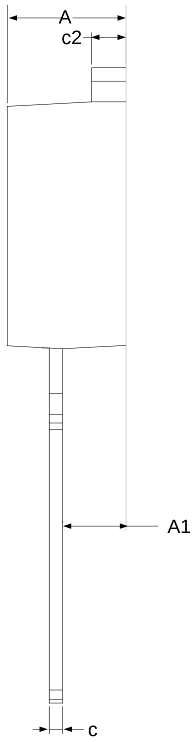




SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.42	4.70	5.02
A1	2.30	2.54	2.80
A3	2.50	2.76	3.10
b	0.70	0.80	0.90
b2	–	–	1.47
c	0.35	0.50	0.65
D	15.25	15.87	16.25
D1	15.30	15.75	16.30
D2	9.30	9.80	10.30
E	9.73	10.16	10.36
e	2.54BSC		
H1	6.40	6.68	7.00
L	12.48	12.98	13.48
L1	–	–	3.50
ϕP	3.00	3.18	3.40
Q	3.05	3.30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

TO-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

Important notice :

1. The instructions are subject to change without notice！
2. Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current. Please read the instructions carefully before using our products, including the circuit operation precautions.
3. Our products are consumer electronic products or the other civil electronic products.
4. 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.
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Rev.: 1.2

Revision History:

1. Add TO-262-3L
2. Update important notice

Rev.: 1.1

Revision History:

1. Update Electrical schematic and typical test circuit
2. Update Fig 5

Rev.: 1.0

Revision History:

1. First release