

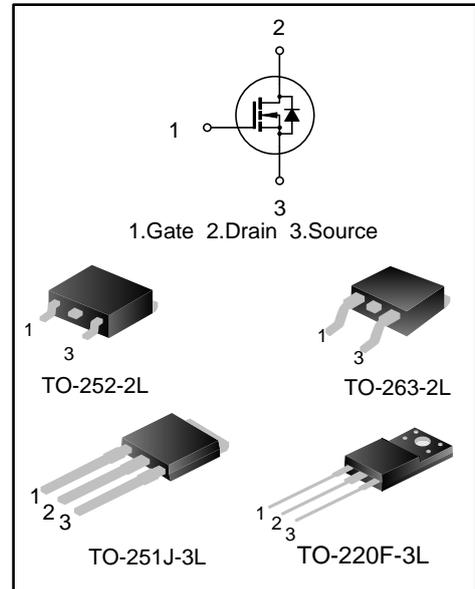
## 7A, 700V SUPER JUNCTION MOS POWER TRANSISTOR

### DESCRIPTION

SVS7N70F(D)(MJ)(S)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

- ◆ 7A, 700V,  $R_{DS(on)(typ.)}=0.52\Omega@V_{GS}=10V$
- ◆ 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
SVS7N70FD2	TO-220F-3L	7N70FD2	Halogen free	Tube
SVS7N70DD2TR	TO-252-2L	7N70DD2	Halogen free	Tape&reel
SVS7N70MJD2	TO-251J-3L	7N70MJD2	Halogen free	Tube
SVS7N70SD2	TO-263-2L	7N70SD2	Halogen free	Tube

**ABSOLUTE MAXIMUM RATINGS (UNLESS OTHERWISE NOTED, T<sub>A</sub>=25°C)**

Characteristics	Symbol	Ratings			Unit
		SVS7N70FD2	SVS7N70DD2/ MJD2	SVS7N70SD2	
Drain-Source Voltage	V <sub>DS</sub>	700			V
Gate-Source Voltage	V <sub>GS</sub>	±30			V
Drain Current	I <sub>D</sub>	T <sub>C</sub> =25°C			A
		T <sub>C</sub> =100°C			
Drain Current Pulsed	I <sub>DM</sub>	28			A
Power Dissipation (T <sub>C</sub> =25°C) - Derate above 25°C	P <sub>D</sub>	35	125	89	W
		0.3	1.0	0.7	W/°C
Single Pulsed Avalanche Energy (Note 1)	E <sub>AS</sub>	400			mJ
Body diode (Note 2)	dv/dt	15			V/ns
MOSFET dv/dt ruggedness (Note 3)	dv/dt	50			V/ns
Operation Junction Temperature Range	T <sub>J</sub>	-55~+150			°C
Storage Temperature Range	T <sub>stg</sub>	-55~+150			°C

**THERMAL CHARACTERISTICS**

Characteristics	Symbol	Ratings			Unit
		SVS7N70FD2	SVS7N70DD2/ MJD2	SVS7N70SD2	
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	3.7	1.0	1.4	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	62.5	62.0	62.5	°C/W

**ELECTRICAL CHARACTERISTICS (UNLESS OTHERWISE NOTED,  $T_J=25^{\circ}\text{C}$ )**

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	700	--	--	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=700V, V_{GS}=0V$	--	--	1.0	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	--	--	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2.0	--	4.0	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=3.5A$	--	0.52	0.6	$\Omega$
Gate Resistance	$R_g$	$f=1.0\text{MHz}$	--	4.9	--	$\Omega$
Input Capacitance	$C_{iss}$	$V_{DS}=100V, V_{GS}=0V,$ $f=1.0\text{MHz}$	--	494	--	pF
Output Capacitance	$C_{oss}$		--	27	--	
Reverse Transfer Capacitance	$C_{rss}$		--	1.7	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=350V, I_D=7.0A,$ $V_{GS}=10V, R_G=24\Omega$ (Note 4,5)	--	10	--	ns
Turn-on Rise Time	$t_r$		--	28	--	
Turn-off Delay Time	$t_{d(off)}$		--	53	--	
Turn-off Fall Time	$t_f$		--	26	--	
Total Gate Charge	$Q_g$	$V_{DS}=560V, I_D=7.0A,$ $V_{GS}=10V$ (Note 4,5)	--	18	--	nC
Gate-Source Charge	$Q_{gs}$		--	3.9	--	
Gate-Drain Charge	$Q_{gd}$		--	9.3	--	

**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	$T_{rr}$	$I_S=7.0A, V_{GS}=0V,$ $dI_F/dt=100A/\mu s$ (Note 4)	--	317	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	2.8	--	$\mu C$

**Notes:**

- $L=79\text{mH}, I_{AS}=2.5A, V_{DD}=100V, R_G=25\Omega,$  starting  $T_J=25^{\circ}\text{C}$ ;
- $V_{DS}=0\sim 400V, I_{SD}\leq 7.0A, T_J=25^{\circ}\text{C}$ ;
- $V_{DS}=0\sim 480V$ ;
- Pulse Test: Pulse width  $\leq 300\mu s,$  Duty cycle  $\leq 2\%$ ;
- Essentially independent of operating temperature.

**TYPICAL CHARACTERISTICS**

Figure 1. On-Region Characteristics

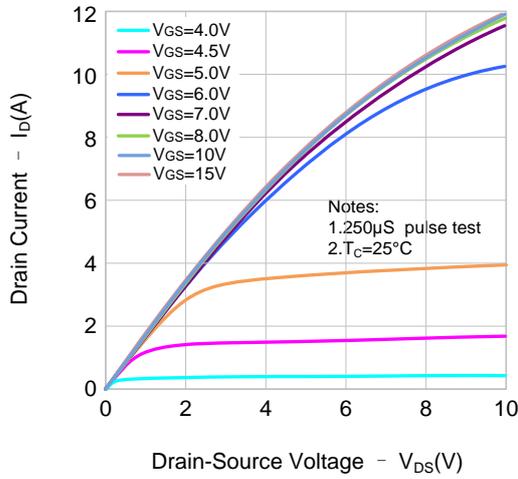


Figure 2. Transfer Characteristics

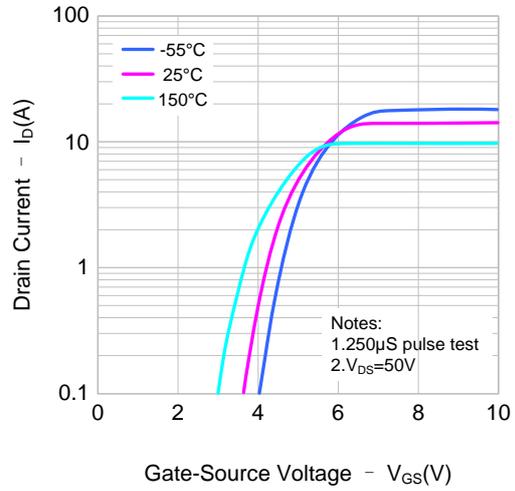


Figure 3. On-Resistance vs. Drain Current

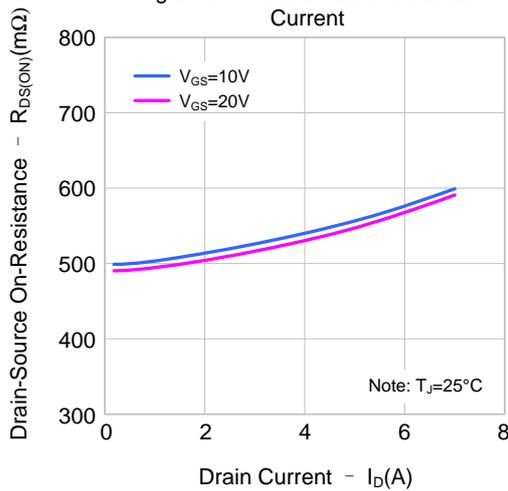


Figure 4. Body Diode Forward Voltage vs. Source Current and Temperature

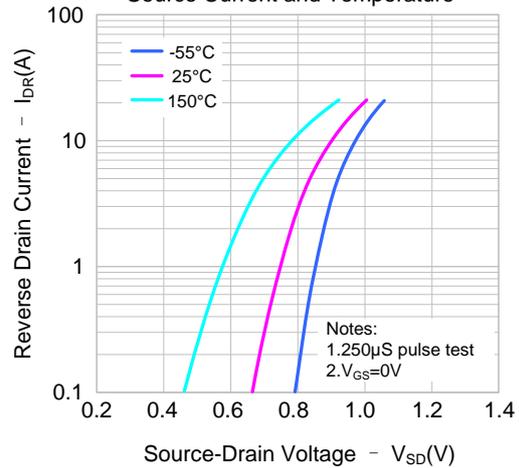


Figure 5. Capacitance Characteristics

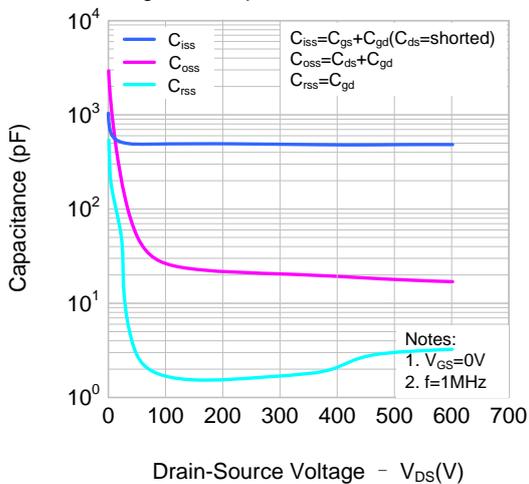
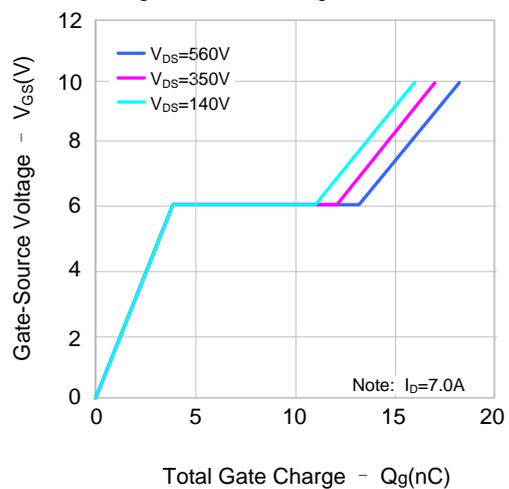


Figure 6. Gate Charge Characteristics



**TYPICAL CHARACTERISTICS (continued)**

Figure 7. Breakdown Voltage vs. Temperature

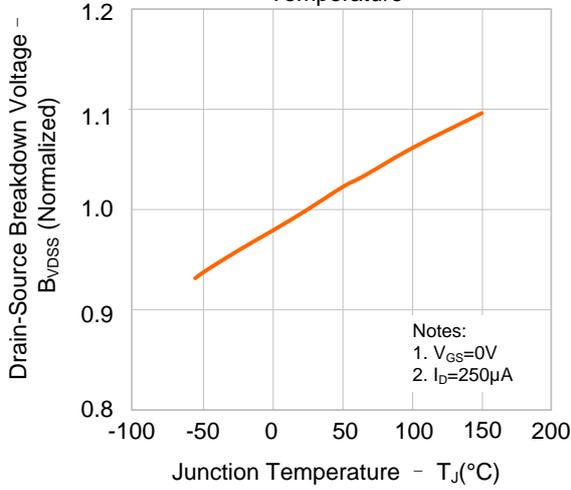


Figure 8. On-Resistance vs. Temperature

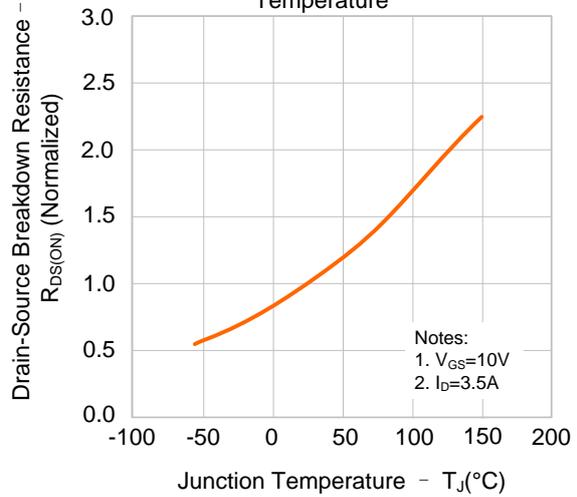


Figure 9-1. Max. Safe Operating Area(SVS7N70FD2)

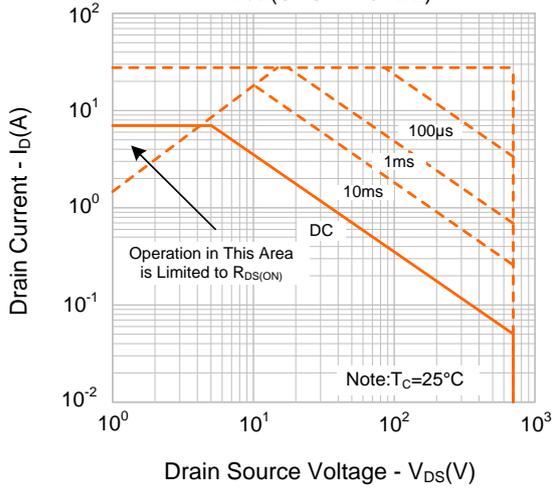


Figure 9-2. Max. Safe Operating Area(SVS7N70DD2/MJD2)

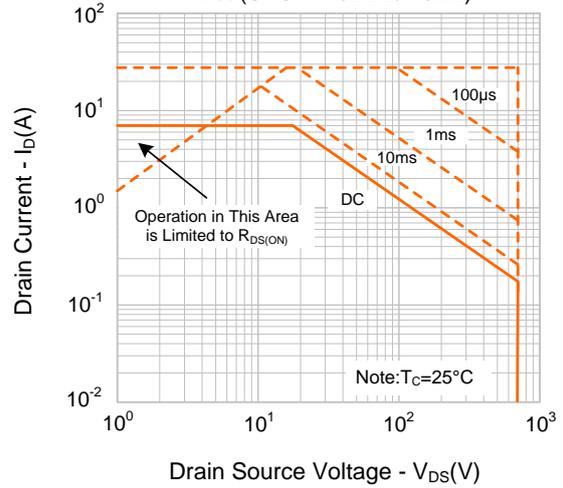
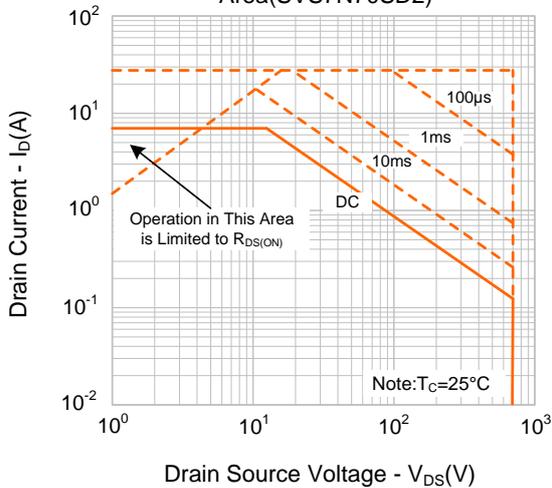
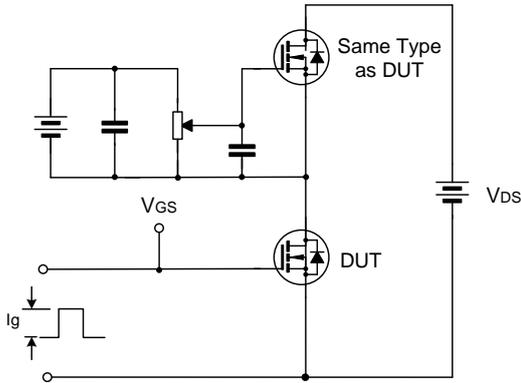


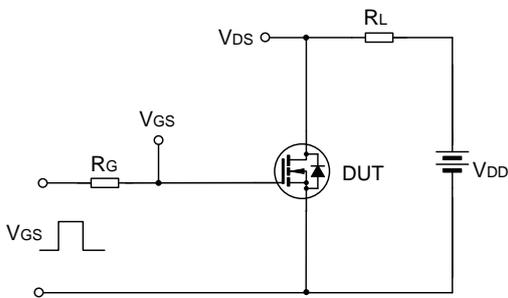
Figure 9-3. Max. Safe Operating Area(SVS7N70SD2)



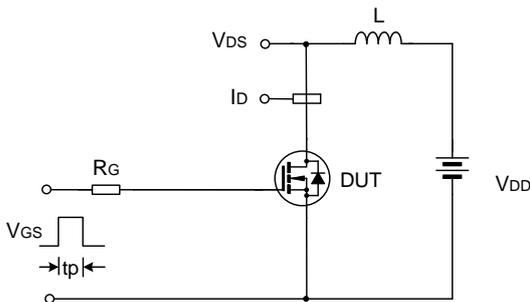
**TYPICAL TEST CIRCUIT**



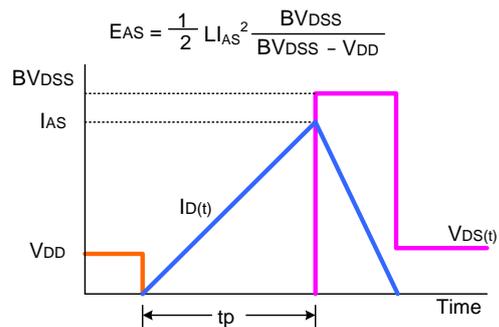
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



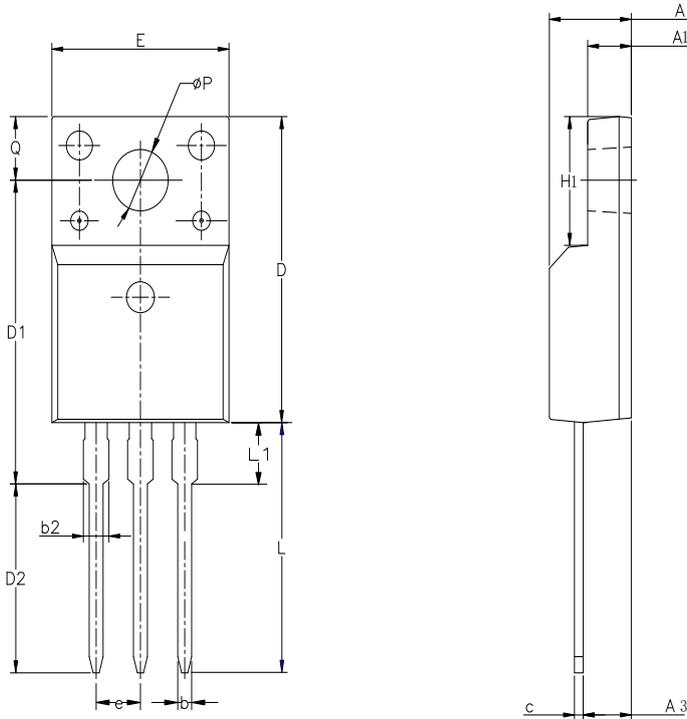
Unclamped Inductive Switching Test Circuit & Waveform



**PACKAGE OUTLINE**

**TO-220F-3L**

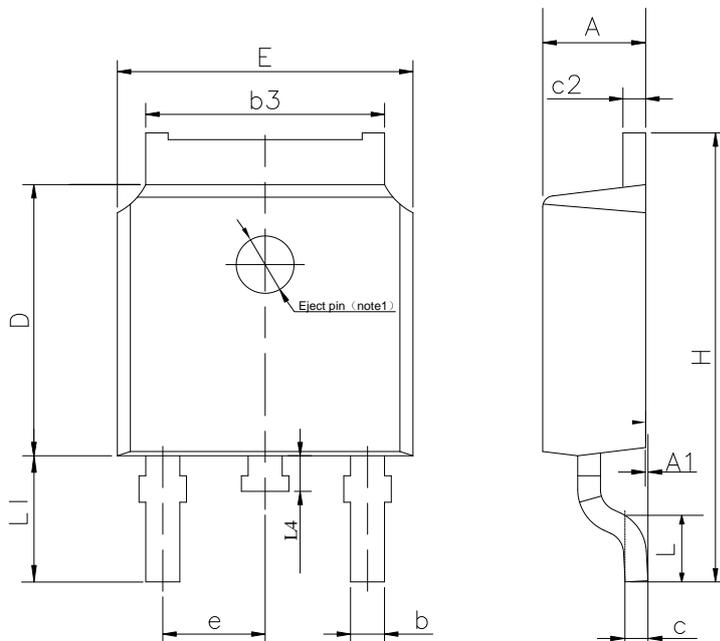
**UNIT: mm**



SYMBOL	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	2.54BCS		
H1	6.40	6.68	7.00
L	12.48	12.98	13.48
L1	/	/	3.50
$\phi P$	3.00	3.18	3.40
Q	3.05	3.30	3.55

**TO-252-2L**

**UNIT: mm**



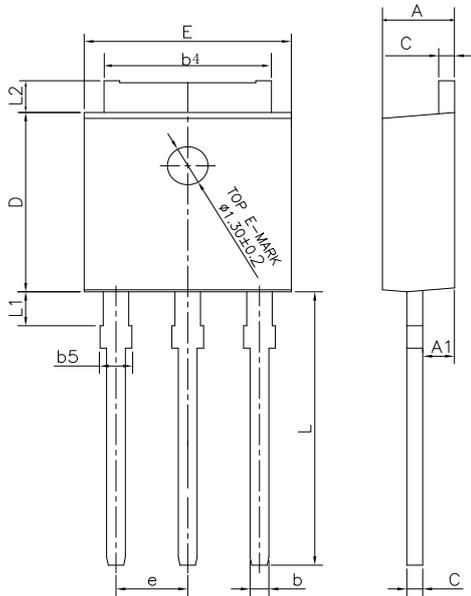
SYMBOL	MIN	NOM	MAX
A	2.10	2.30	2.50
A1	0	---	0.127
b	0.66	0.76	0.89
b3	5.10	5.33	5.46
c	0.45	---	0.65
c2	0.45	---	0.65
D	5.80	6.10	6.40
E	6.30	6.60	6.90
e	2.30TYP		
H	9.60	10.10	10.60
L	1.40	1.50	1.70
L1	2.90REF		
L4	0.60	0.80	1.00

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

**PACKAGE OUTLINE**

**TO-251J-3L**

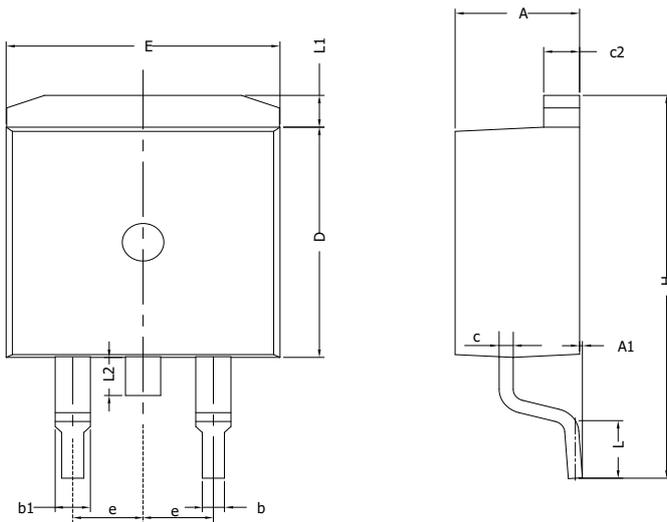
**UNIT: mm**



SYMBOL	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-263-2L**

**UNIT: mm**



SYMBOL	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

**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.
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Rev.: 1.2

Revision History:

1. Update Electrical schematic and typical test circuit
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Rev.: 1.1

Revision History:

1. Add TO-263-2L
- 

Rev.: 1.0

Revision History:

1. First release
- 
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