

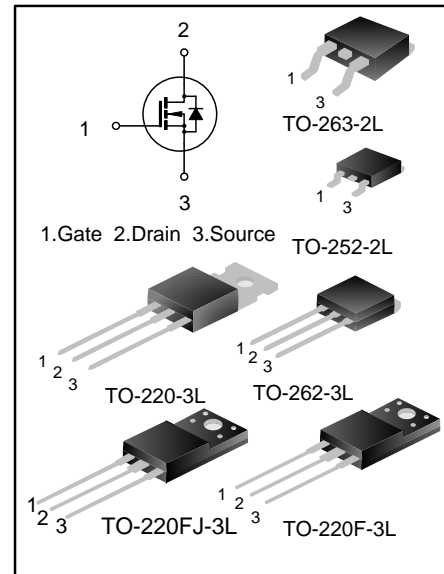
11A, 600V SUPER JUNCTION MOS POWER TRANSISTOR

DESCRIPTION

SVS11N60D/F/S/FJ/T/KD2 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

- ◆ 11A,600V, $R_{DS(on)(typ.)}=0.3\Omega@V_{GS}=10V$
- ◆ 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
SVS11N60DD2TR	TO-252-2L	11N60DD2	Halogen free	Tape & Reel
SVS11N60FD2	TO-220F-3L	11N60FD2	Halogen free	Tube
SVS11N60SD2	TO-263-2L	11N60SD2	Halogen free	Tube
SVS11N60SD2TR	TO-263-2L	11N60SD2	Halogen free	Tape & Reel
SVS11N60FJD2	TO-220FJ-3L	11N60FJD2	Halogen free	Tube
SVS11N60TD2	TO-220-3L	11N60TD2	Halogen free	Tube
SVS11N60KD2	TO-262-3L	11N60KD2	Halogen free	Tube

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

Characteristics	Symbol	Ratings			Unit
		SVS11N60 DD2	SVS11N60 F/FJD2	SVS11N60 S/T/KD2	
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}	44			A
Power Dissipation (T _C =25°C) - Derate above 25°C	P _D	89	35	94	W
		0.71	0.28	0.75	W/°C
Single Pulsed Avalanche Energy (Note1)	E _{AS}	310			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
		SVS11N60 DD2	SVS11N60 F/FJD2	SVS11N60 S/T/KD2	
Thermal Resistance, Junction-to-Case	R _{θJC}	1.40	3.57	1.33	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	62.0	62.50	62.50	°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	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 =5.5A	T _J =25°C	--	0.30	0.36	Ω
			T _J =125°C	--	0.62	--	
Gate resistance	R _g	f=1MHz	--	5.2	--	Ω	
Input Capacitance	C _{iss}	f=1MHz, V _{GS} =0V, V _{DS} =100V	--	634	--	pF	
Output Capacitance	C _{oss}		--	38	--		
Reverse Transfer Capacitance	C _{rss}		--	2.6	--		
Turn-on Delay Time	t _{d(on)}	V _{DD} =300V, V _{GS} =10V, R _G =10Ω, I _D =11A (Note 4,5)	--	10	--	ns	
Turn-on Rise Time	t _r		--	29	--		
Turn-off Delay Time	t _{d(off)}		--	37	--		
Turn-off Fall Time	t _f		--	23	--		
Total Gate Charge	Q _g	V _{DD} =480V, V _{GS} =10V, I _D =11A (Note 4,5)	--	22	--	nC	
Gate-Source Charge	Q _{gs}		--	5.0	--		
Gate-Drain Charge	Q _{gd}		--	11	--		

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	--	--	11	A
Pulsed Source Current	I _{SM}		--	--	44	
Diode Forward Voltage	V _{SD}	I _S =11A, V _{GS} =0V	--	--	1.4	V
Reverse Recovery Time	T _{rr}	V _{DD} =50V, I _F =11A, dI _F /dt=100A/μs (Note 4)	--	371	--	ns
Reverse Recovery Charge	Q _{rr}		--	3.8	--	μC

Notes:

- L=79mH, I_{AS}=2.6A, V_{DD}=100V, R_G=25Ω, starting temperature T_J=25°C;
- V_{DS}=0~400V, I_{SD}≤11A, T_J=25°C;
- V_{DS}=0~480V;
- Pulse Test: Pulse width ≤300μs, Duty cycle≤2%;
- Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

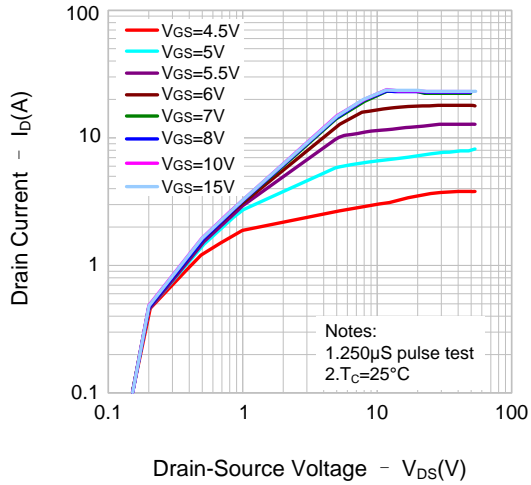


Figure 2. Transfer Characteristics

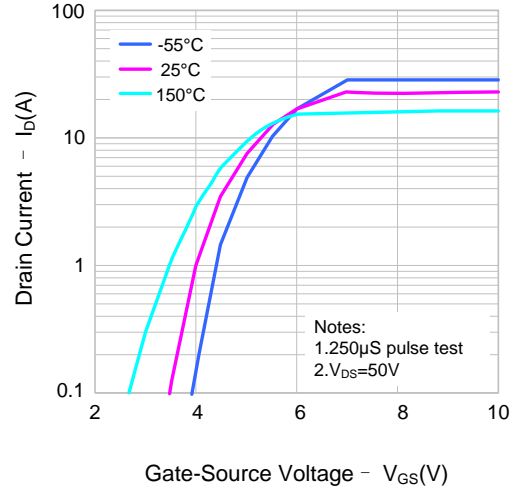


Figure 3. On-Resistance Variation vs. Drain Current

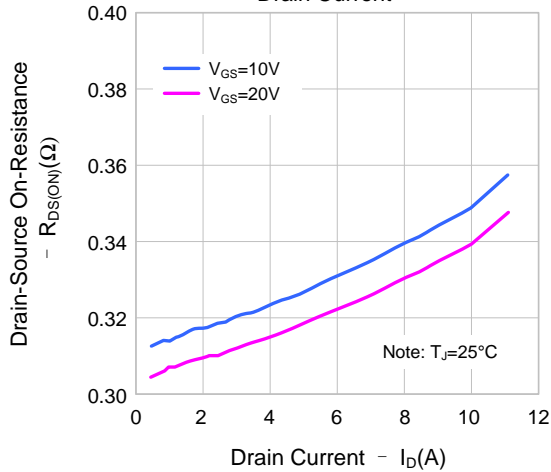


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

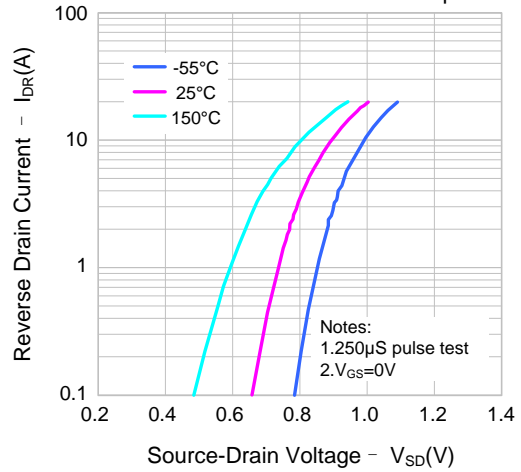


Figure 5. Capacitance Characteristics

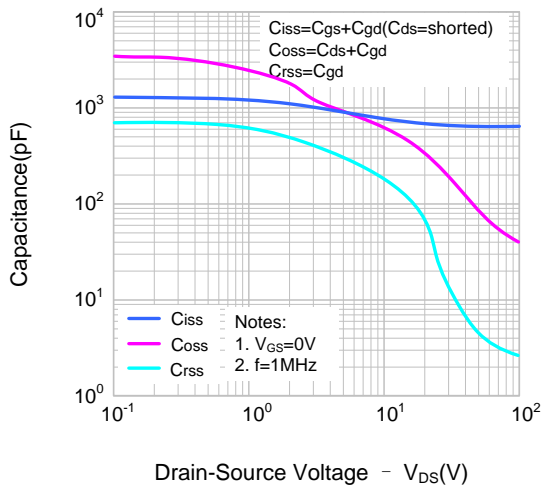
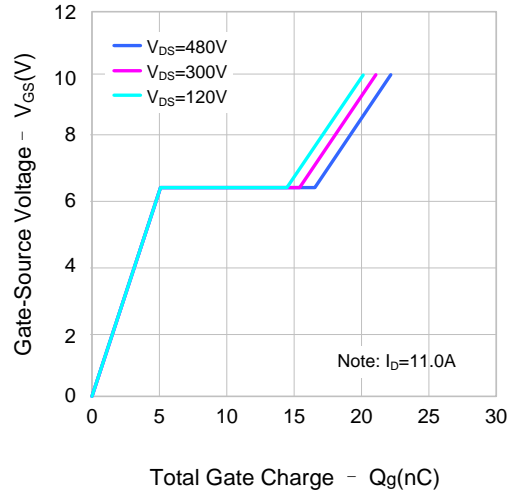


Figure 6. Gate Charge Characteristics



TYPICAL CHARACTERISTICS(CONTINUED)

Figure 7. Breakdown Voltage Variation vs. Temperature

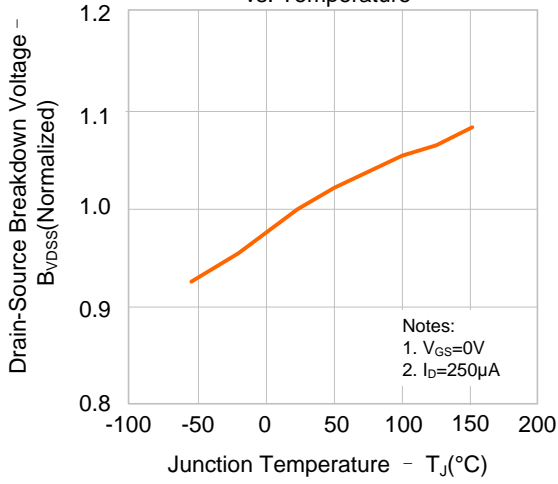


Figure 8. On-resistance Variation vs. Temperature

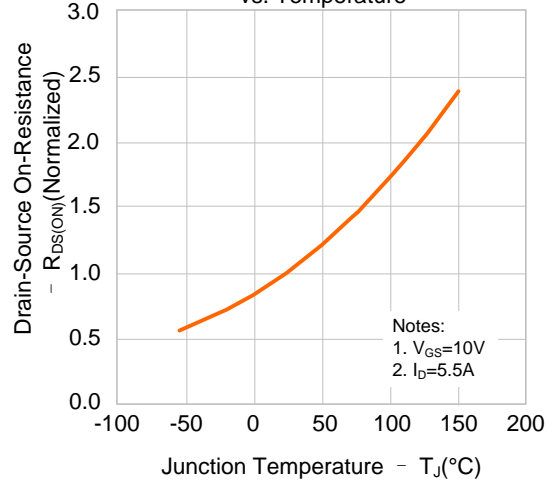


Figure 9.1 Max. Safe Operating Area (SVS11N60DD2)

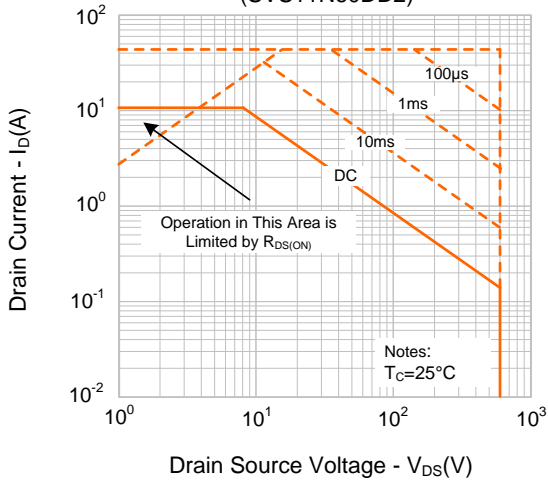


Figure 9.2 Max. Safe Operating Area (SVS11N60F/FJD2)

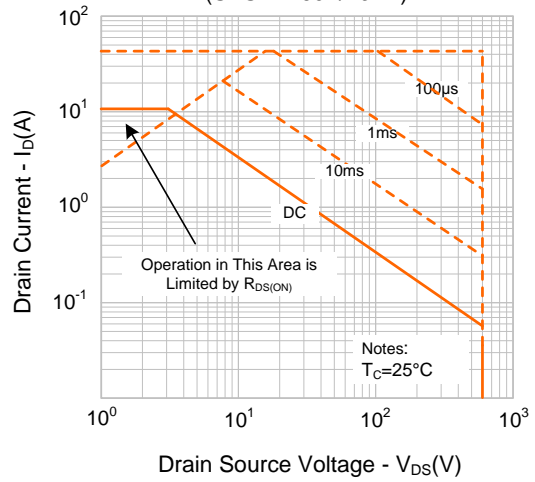
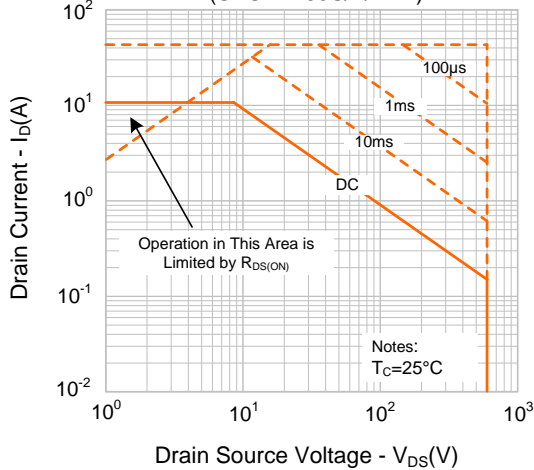
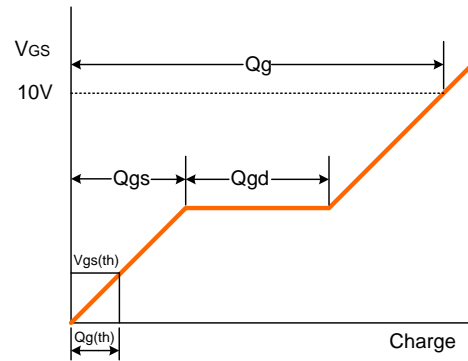
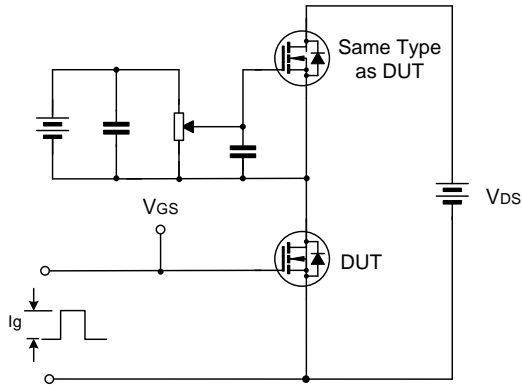


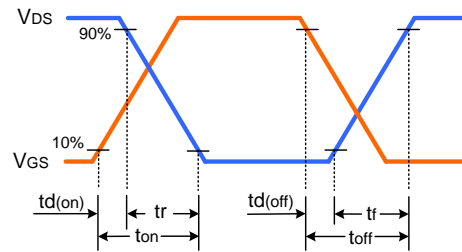
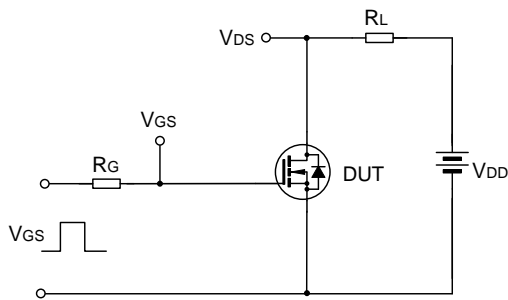
Figure 9.3 Max. Safe Operating Area (SVS11N60S/T/KD2)



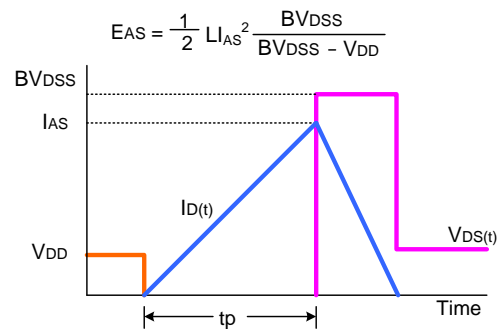
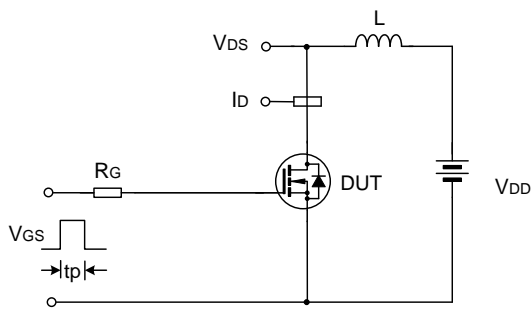
TYPICAL TEST CIRCUIT



Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

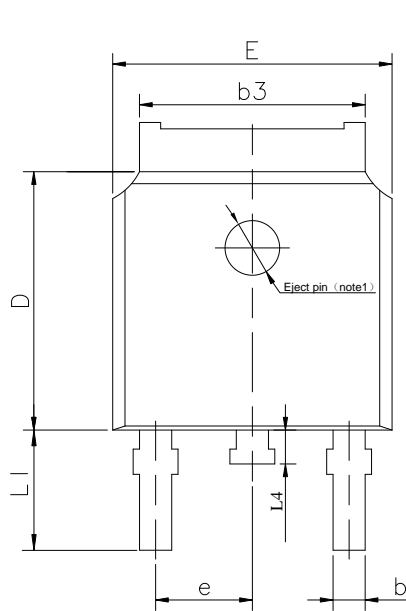


Unclamped Inductive Switching Test Circuit & Waveform

PACKAGE OUTLINE

TO-252-2L

UNIT: mm

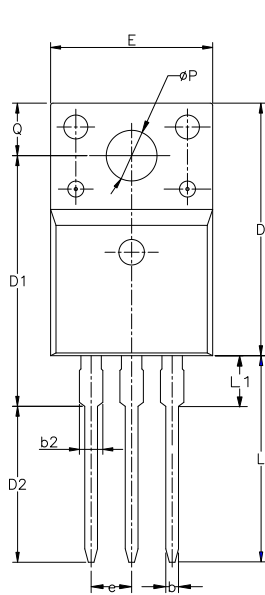


SYMBOL	MIN	NOM	MAX
A	2.10	2.30	2.50
A1	0	---	0.127
b	0.66	0.76	0.89
b3	5.10	5.33	5.46
c	0.45	---	0.65
c2	0.45	---	0.65
D	5.80	6.10	6.40
E	6.30	6.60	6.90
e	2.30TYP		
H	9.60	10.10	10.60
L	1.40	1.50	1.70
L1	2.90REF		
L4	0.60	0.80	1.00

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

TO-220F-3L

UNIT: mm

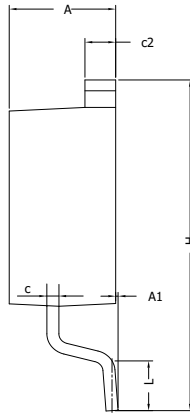
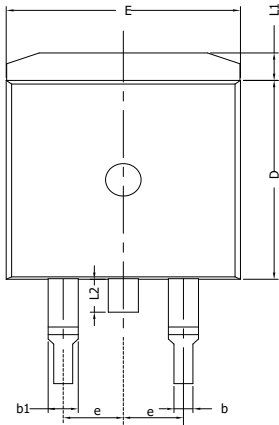


SYMBOL	MIN	NOM	MAX
A	4.42	4.70	5.02
A1	2.30	2.54	2.80
A3	2.50	2.76	3.10
b	0.70	0.80	0.90
b2	—	—	1.47
c	0.35	0.50	0.65
D	15.25	15.87	16.25
D1	15.30	15.75	16.30
D2	9.30	9.80	10.30
E	9.73	10.16	10.36
e	2.54BSC		
H1	6.40	6.68	7.00
L	12.48	12.98	13.48
L1	/	/	3.50
øP	3.00	3.18	3.40
Q	3.05	3.30	3.55

PACKAGE OUTLINE(continued)

TO-263-2L

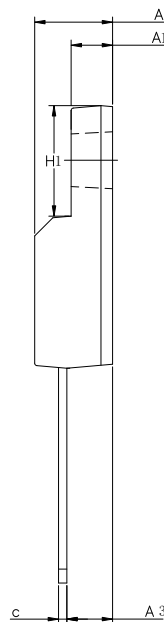
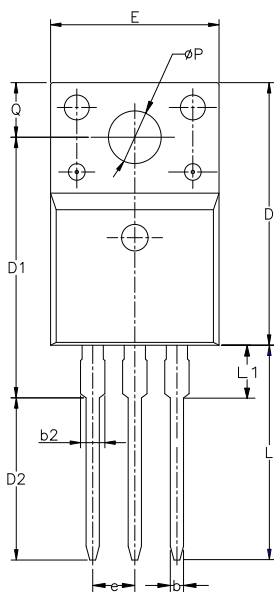
UNIT: mm



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

TO-220FJ-3L

UNIT: mm

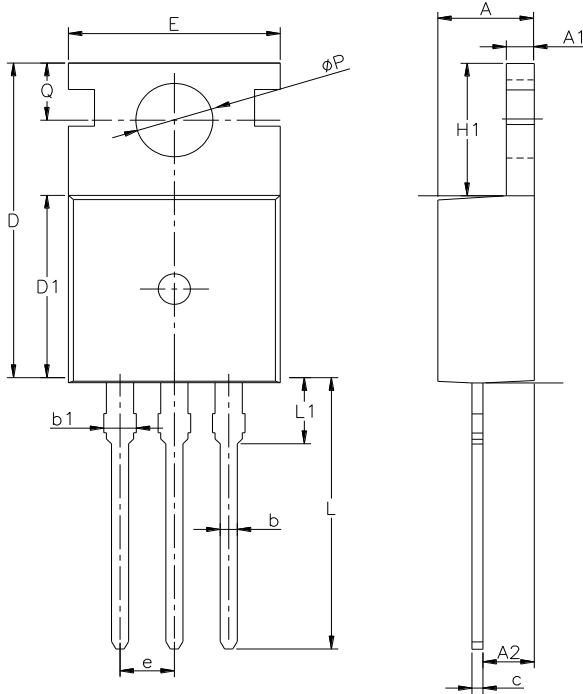


SYMBOL	MIN	NOM	MAX
A	4.42	4.70	5.02
A1	2.30	2.54	2.80
A3	2.50	2.76	3.10
b	0.55	0.70	0.85
b2	---	---	1.29
c	0.35	0.50	0.65
D	15.25	15.87	16.25
D1	13.97	14.47	14.97
D2	10.58	11.08	11.58
E	9.73	10.16	10.36
e	2.54BSC		
H1	6.40	6.68	7.00
L	12.48	12.98	13.48
L1	---	---	2.00
∅P	3.00	3.18	3.40
Q	3.05	3.30	3.55

PACKAGE OUTLINE(CONTINUED)

TO-220-3L

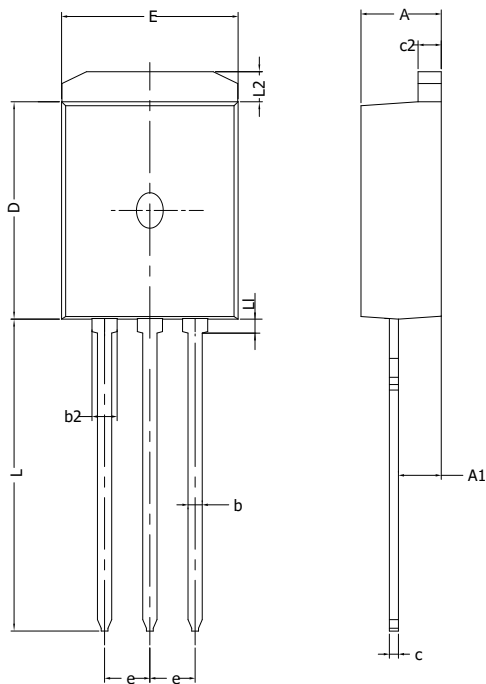
UNIT: mm



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

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

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.
- Our products are consumer electronic products, and / or civil electronic products.
- 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.
- It is strongly recommended to identify the trademark when buying our products. Please contact us if there is any question.
- When exporting, using and reselling our products, buyer must comply with the international export control laws and regulations of China, the United States, the United Kingdom, the European Union and other countries & regions.
- Product promotion is endless, our company will wholeheartedly provide customers with better products!
- Website: <http://www.silan.com.cn>

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Rev.: 2.1

Revision History:

1. Modify Electrical schematic and TYPICAL TEST CIRCUIT
-

Rev.: 2.0

Revision History:

1. Add TO-262-3L
-

Rev.: 1.9

Revision History:

1. Modify ABSOLUTE MAXIMUM RATINGS
-

Rev.: 1.8

Revision History:

1. Add TO-220-3L
-

Rev.: 1.7

Revision History:

1. Add TO-220FJ-3L
 2. Modify the value of Rg
-

Rev.: 1.6

Revision History:

1. Add $R_{DS(ON)}$ @ $T_j=125^\circ\text{C}$
-

Rev.: 1.5

Revision History:

1. Modify the thermal characteristics
-

Rev.: 1.4

Revision History:

1. Modify the electrical characteristics and curve
-

Rev.: 1.3

Revision History:

1. Modify the ordering information
-

Rev: 1.2

Revision History:

1. Add the package information of TO-263-2L
-

Rev: 1.1

Revision History:

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

Rev: 1.0

Revision History:

1. First release
-
-