

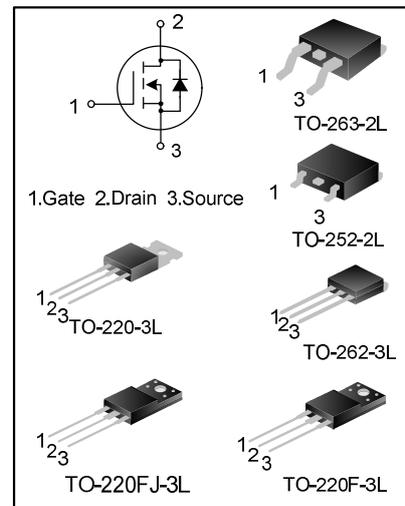
11A, 600V DP MOS POWER TRANSISTOR

DESCRIPTION

SVS11N60D/F/S/FJ/T/KD2 is an N-channel enhancement mode high voltage power MOSFETs produced using Silan's DP 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
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_C=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, $T_c=25^\circ\text{C}$)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit	
Drain -Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	600	--	--	V	
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V$	--	--	1.0	μA	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$	--	--	± 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	$R_{DS(on)}$	$V_{GS}=10V, I_D=5.5A$	$T_J=25^\circ\text{C}$	--	0.30	0.36	Ω
			$T_J=125^\circ\text{C}$		0.62		
Gate resistance	R_g	$f=1\text{MHz}$		5.2		Ω	
Input Capacitance	C_{iss}	$f=1\text{MHz}, V_{GS}=0V, V_{DS}=100V$	--	634	--	pF	
Output Capacitance	C_{oss}		--	38	--		
Reverse Transfer Capacitance	C_{rss}		--	2.6	--		
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=300V, V_{GS}=10V, R_G=10\Omega, I_D=11A$ (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	--	--	11	A
Pulsed Source Current	I_{SM}	Diode in the MOSFET	--	--	44	
Diode Forward Voltage	V_{SD}	$I_S=11A, V_{GS}=0V$	--	--	1.4	V
Reverse Recovery Time	T_{rr}	$V_{DD}=50V, I_F=11A,$	--	371	--	ns
Reverse Recovery Charge	Q_{rr}	$di_F/dt=100A/\mu s$	--	3.8	--	μC

Notes:

- $L=79\text{mH}, I_{AS}=2.6A, V_{DD}=100V, R_G=25\Omega$, starting temperature $T_J=25^\circ\text{C}$;
- $V_{DS}=0\sim 400V, I_{SD}\leq 11A, T_J=25^\circ\text{C}$;
- $V_{DS}=0\sim 480V$;
- Pulse Test: Pulse width $\leq 300\mu s$, Duty cycles $\leq 2\%$;
- Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

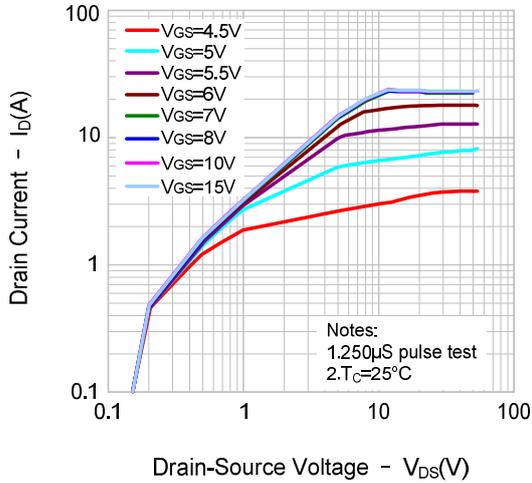


Figure 2. Transfer Characteristics

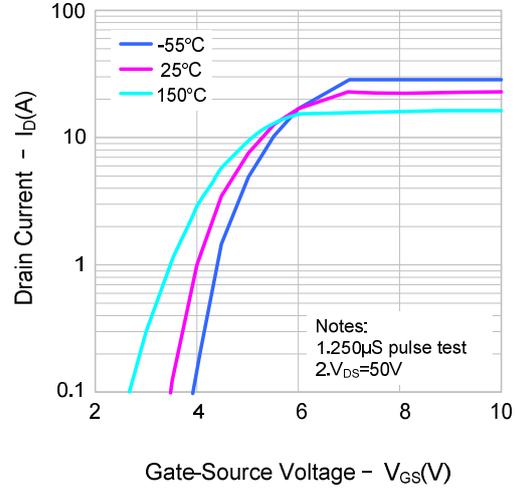


Figure 3. On-Resistance Variation vs. Drain Current

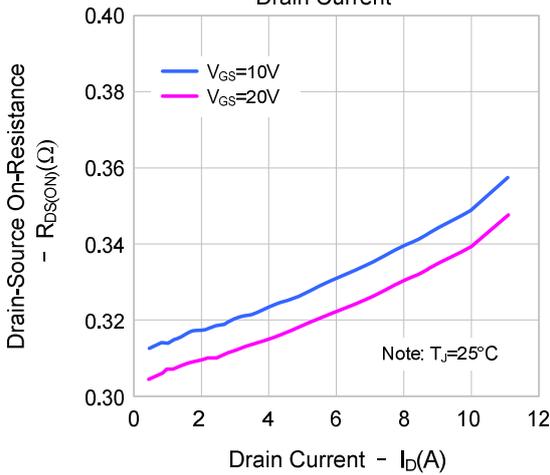


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

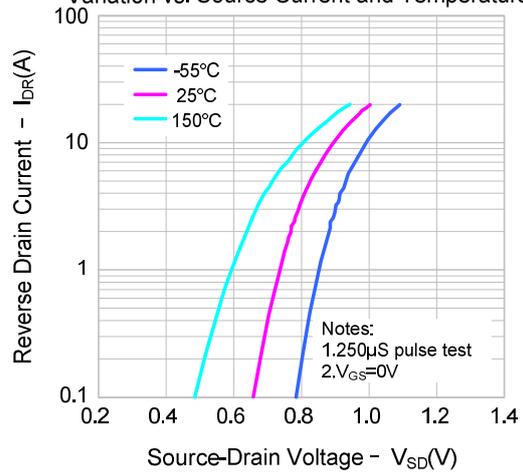


Figure 5. Capacitance Characteristics

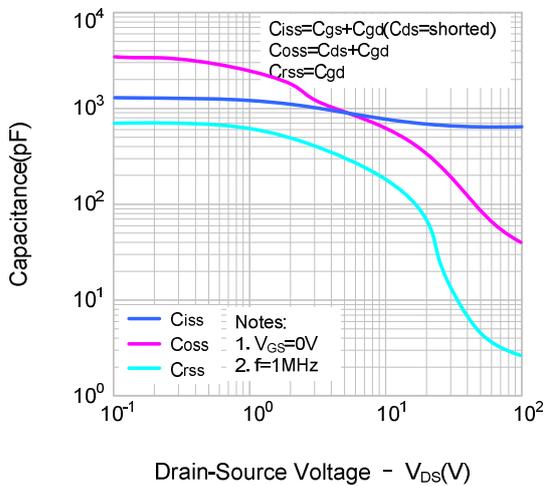
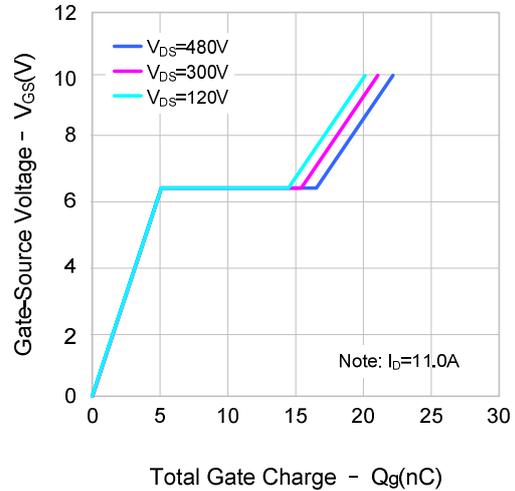


Figure 6. Gate Charge Characteristics



TYPICAL CHARACTERISTICS(continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

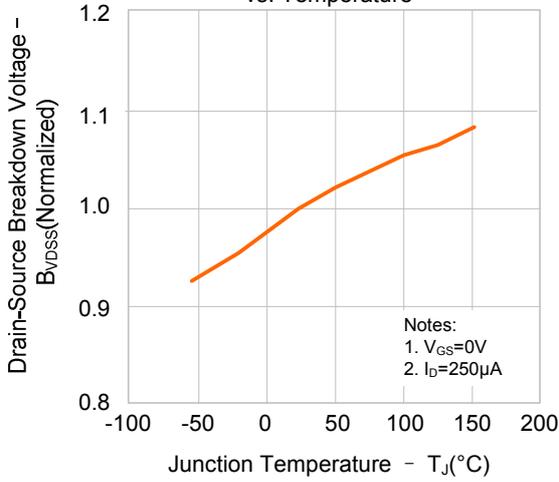


Figure 8. On-resistance Variation vs. Temperature

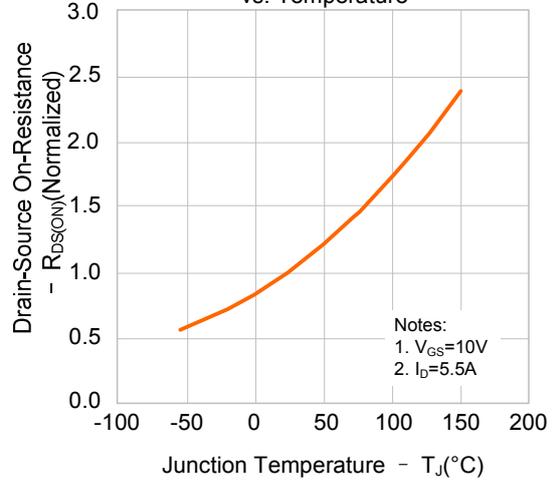


Figure 9.1 Max. Safe Operating Area (SVS11N60DD2)

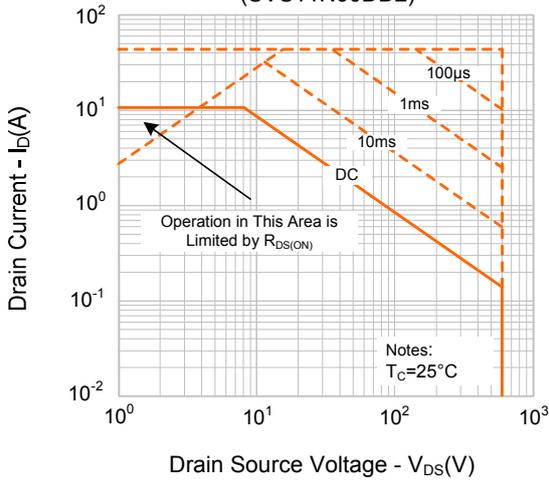


Figure 9.2 Max. Safe Operating Area (SVS11N60F/FJD2)

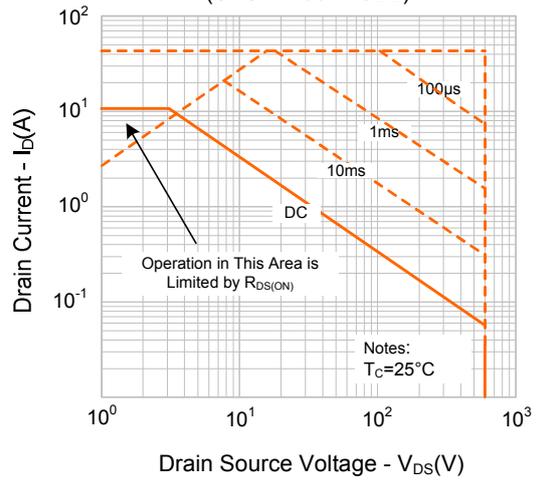
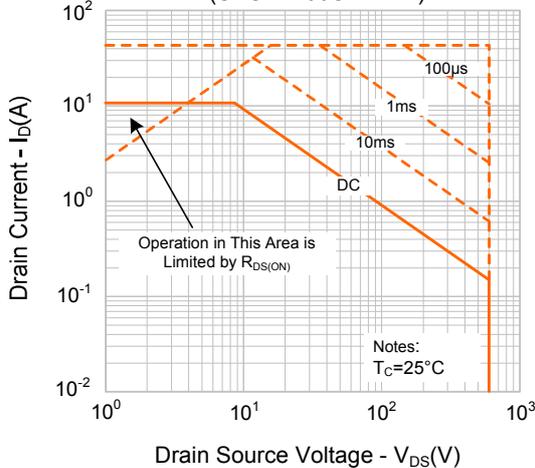
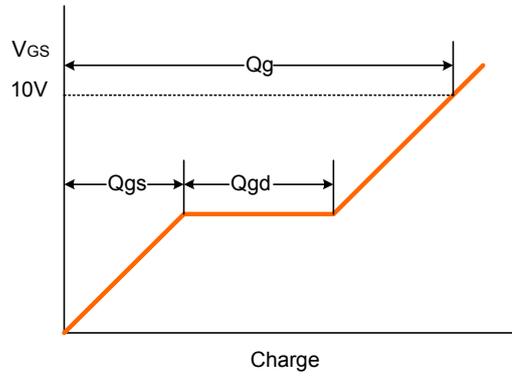
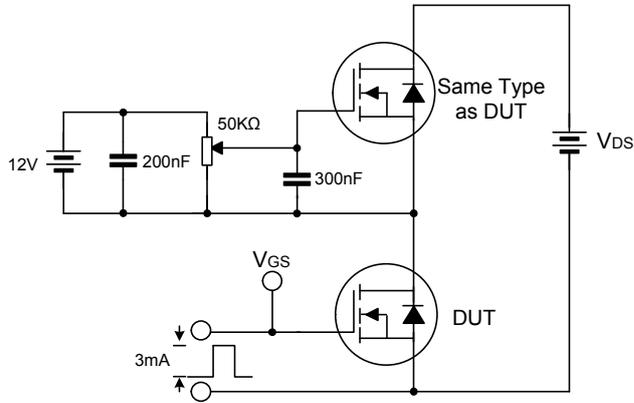


Figure 9.3 Max. Safe Operating Area (SVS11N60S/T/KD2)

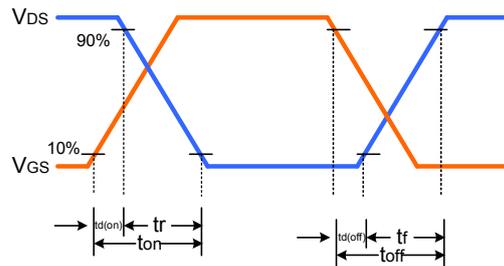
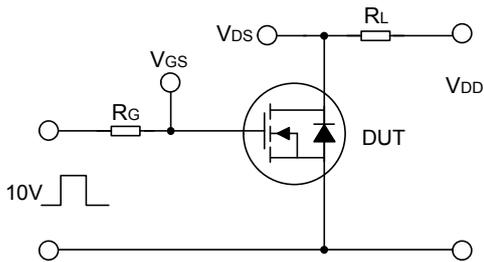


TYPICAL TEST CIRCUIT

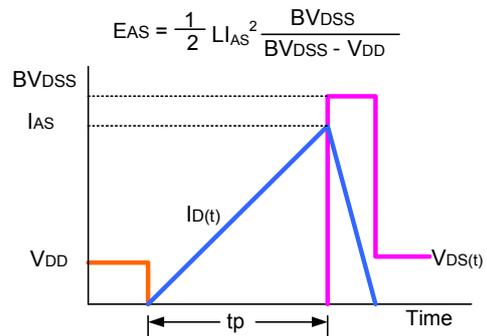
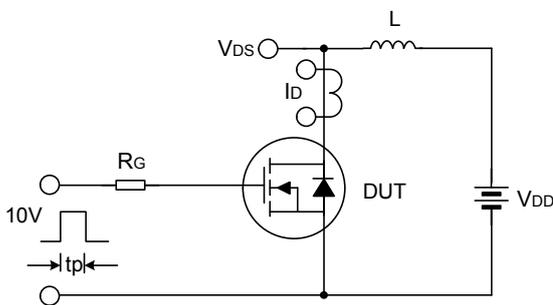
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



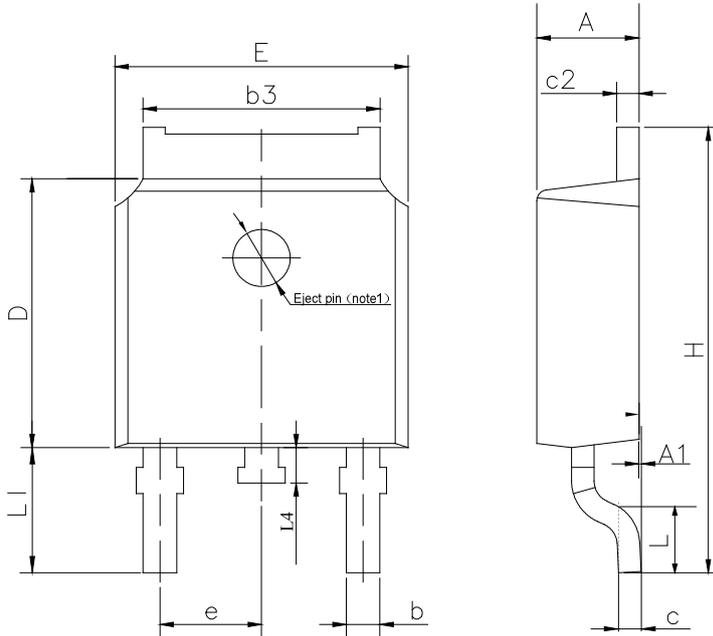
Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

TO-252-2L

UNIT: mm

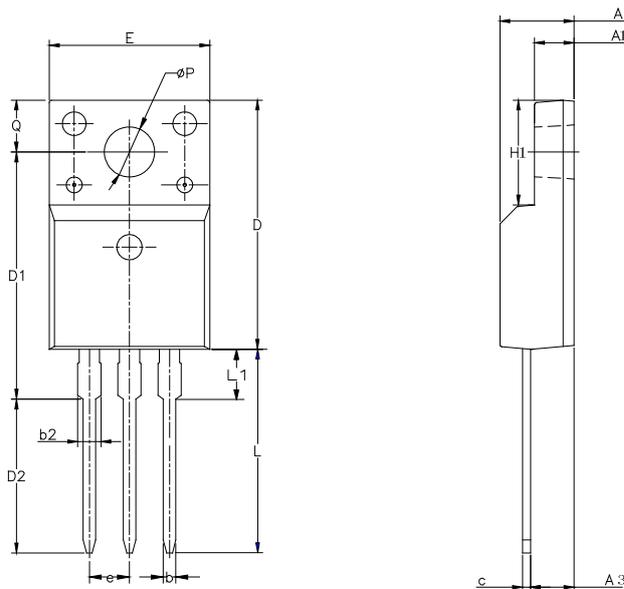


SYMBOL	MIN	NOM	MAX
A	2.10	2.30	2.50
A1	0	---	0.127
b	0.66	0.76	0.89
b3	5.10	5.33	5.46
c	0.45	---	0.65
c2	0.45	---	0.65
D	5.80	6.10	6.40
E	6.30	6.60	6.90
e	2.30TYP		
H	9.60	10.10	10.60
L	1.40	1.50	1.70
L1	2.90REF		
L4	0.60	0.80	1.00

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

TO-220F-3L

UNIT: mm

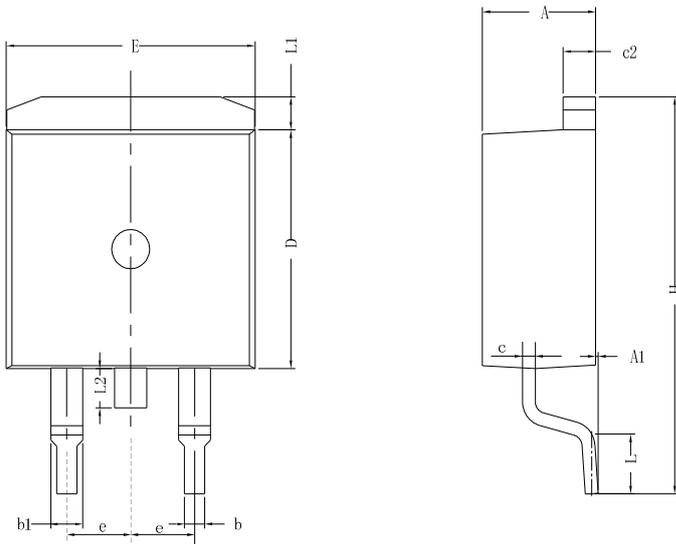


SYMBOL	MIN	NOM	MAX
A	4.42	4.70	5.02
A1	2.30	2.54	2.80
A3	2.50	2.76	3.10
b	0.70	0.80	0.90
b2	—	—	1.47
c	0.35	0.50	0.65
D	15.25	15.87	16.25
D1	15.30	15.75	16.30
D2	9.30	9.80	10.30
E	9.73	10.16	10.36
e	2.54BCS		
H1	6.40	6.68	7.00
L	12.48	12.98	13.48
L1	/	/	3.50
ϕP	3.00	3.18	3.40
Q	3.05	3.30	3.55

PACKAGE OUTLINE(continued)

TO-263-2L

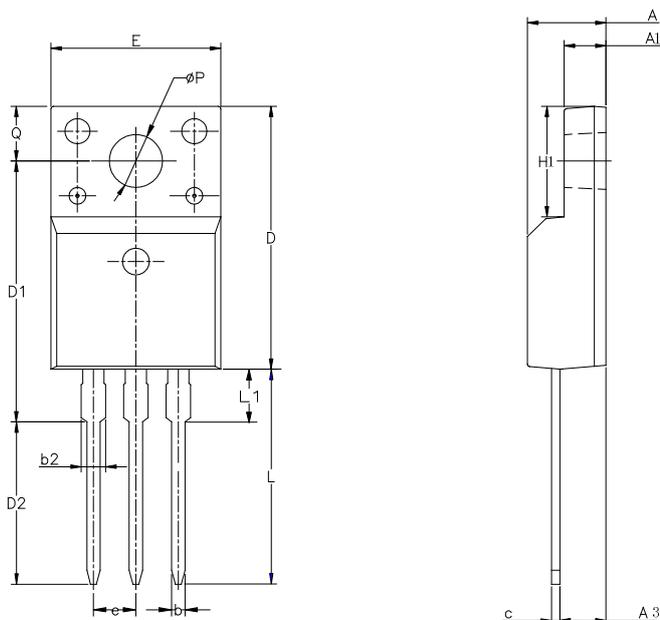
UNIT: mm



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

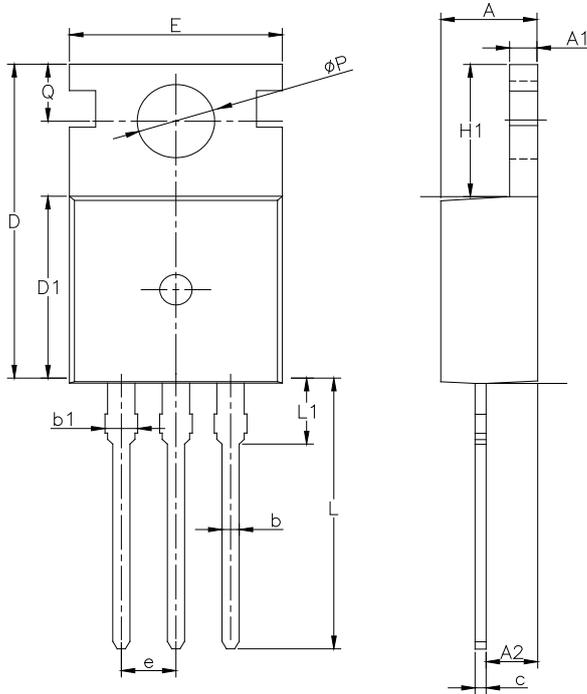


SYMBOL	MIN	NOM	MAX
A	4.42	4.70	5.02
A1	2.30	2.54	2.80
A3	2.50	2.76	3.10
b	0.55	0.70	0.85
b2	---	---	1.29
c	0.35	0.50	0.65
D	15.25	15.87	16.25
D1	13.97	14.47	14.97
D2	10.58	11.08	11.58
E	9.73	10.16	10.36
e	2.54BCS		
H1	6.40	6.68	7.00
L	12.48	12.98	13.48
L1	---	---	2.00
∅P	3.00	3.18	3.40
Q	3.05	3.30	3.55

PACKAGE OUTLINE(continued)

TO-220-3L

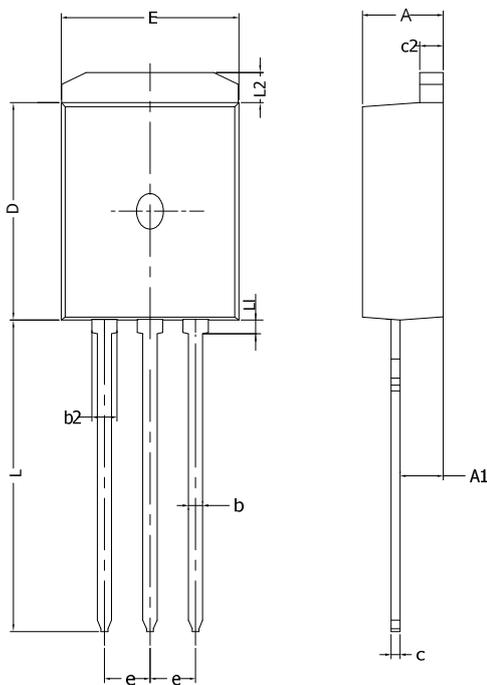
UNIT: mm



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

Disclaimer :

- Silan reserves the right to make changes to the information herein for the improvement of the design and performance without prior notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
- All semiconductor products malfunction or fail with some probability under special conditions. When using Silan products in system design or complete machine manufacturing, it is the responsibility of the buyer to comply with the safety standards strictly and take essential measures to avoid situations in which a malfunction or failure of such Silan products could cause loss of body injury or damage to property.
- Silan will supply the best possible product for customers!

Part No.:	SVS11N60D/F/S/FJ/T/KD2	Document Type:	Datasheet
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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
-