

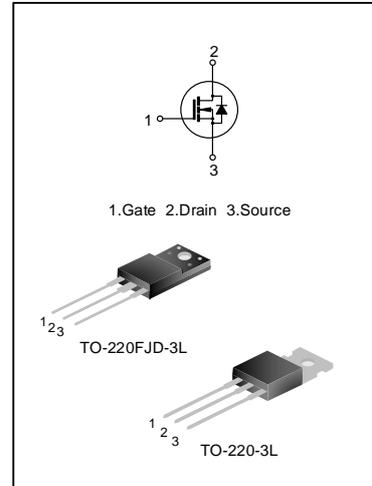
## 24A, 600V SUPER JUNCTION MOS POWER TRANSISTOR

### GENERAL DESCRIPTION

SVSP24N60FJD(T)D2 is an N-channel enhancement mode high voltage power MOSFET 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, for example. it is suitable for hard and soft switching topologies.

### FEATURES

- ◆ 24A, 600V,  $R_{DS(on)(typ.)}=0.14\Omega@V_{GS}=10V$
- ◆ 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
SVSP24N60FJDD2	TO-220FJD-3L	P24N60FJD	Halogen free	Tube
SVSP24N60TD2	TO-220-3L	P24N60TD2	Halogen free	Tube

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

Characteristics	Symbol	Ratings		Unit
		SVSP24N60FJDD2	SVSP24N60TD2	
Drain-Source Voltage	V <sub>DS</sub>	600		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>	96		A
Power Dissipation(T <sub>C</sub> =25°C) -Derate above 25°C	P <sub>D</sub>	47	208	W
		0.38	1.7	W/°C
Single Pulsed Avalanche Energy (Note 1)	E <sub>AS</sub>	1062		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 <sub>J</sub>	-55~+150		°C
Storage Temperature Range	T <sub>stg</sub>	-55~+150		°C

**THERMAL CHARACTERISTICS**

Characteristics	Symbol	Value		Unit
		SVSP24N60FJDD2	SVSP24N60TD2	
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	2.66	0.6	°C/W
Thermal Resistance, junction-to-Ambient	R <sub>θJA</sub>	62.5	62.5	°C/W

**ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, UNLESS OTHERWISE NOTED)**

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit.
Drain -Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	600	--	--	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =600V, V <sub>GS</sub> =0V	--	--	1.0	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	--	--	±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA	2.0	--	4.0	V
Static Drain-Source On State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =12A	--	0.14	0.16	Ω
Gate resistance	R <sub>g</sub>	f=1.0MHz	--	2.6	--	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, f=1.0MHz	--	1480	--	pF
Output Capacitance	C <sub>oss</sub>		--	84	--	
Reverse Transfer Capacitance	C <sub>rss</sub>		--	4.8	--	
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =300V, V <sub>GS</sub> =10V, R <sub>G</sub> =25Ω, I <sub>D</sub> =24A (Note 4,5)	--	21	--	ns
Turn-on Rise Time	t <sub>r</sub>		--	74	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	213	--	
Turn-off Fall Time	t <sub>f</sub>		--	65	--	
Total Gate Charge	Q <sub>g</sub>	V <sub>DD</sub> =480V, V <sub>GS</sub> =10V, I <sub>D</sub> =24A (Note 4,5)	--	49	--	nC
Gate-Source Charge	Q <sub>gs</sub>		--	12	--	
Gate-Drain Charge	Q <sub>gd</sub>		--	25	--	

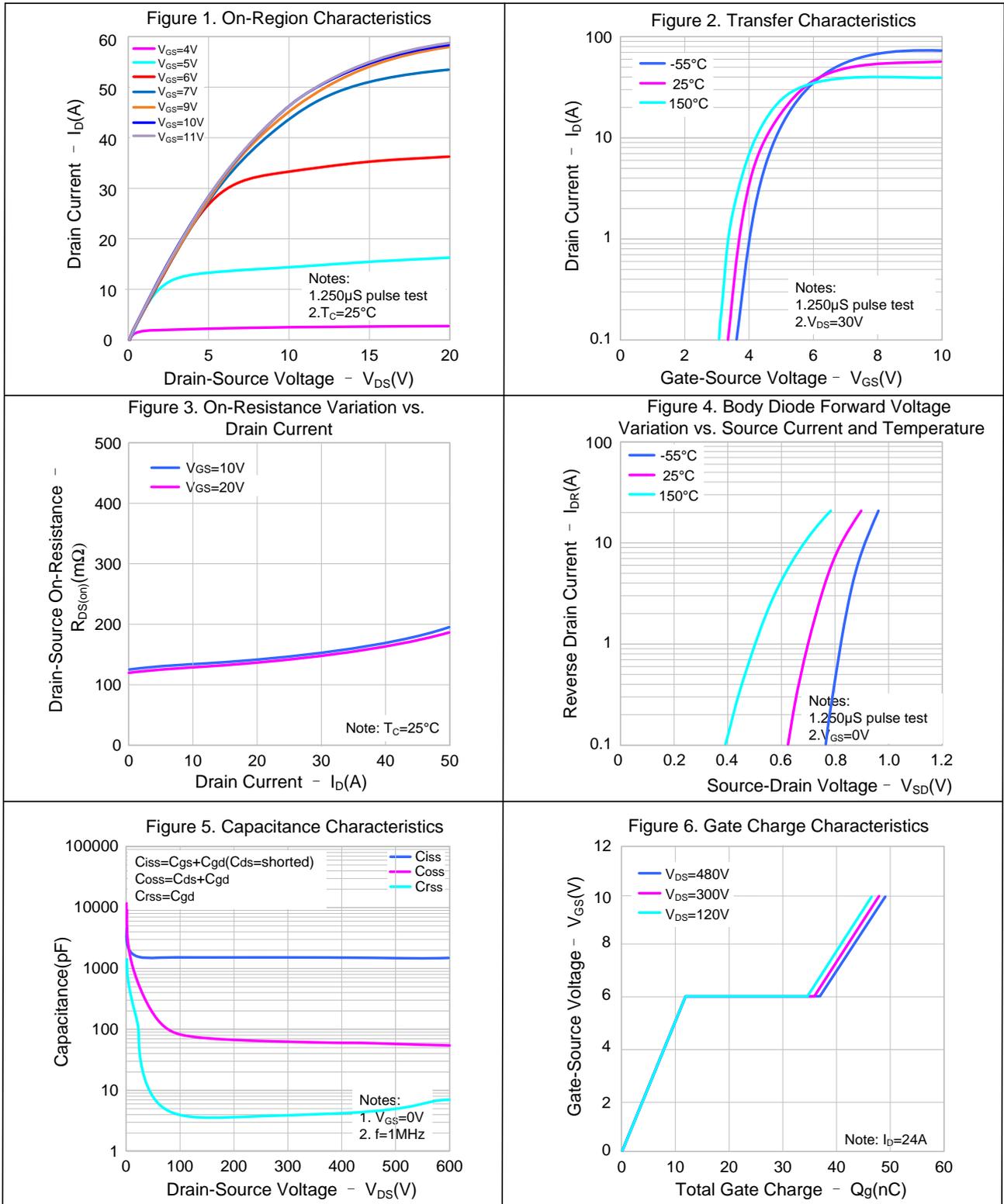
**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I <sub>S</sub>	Integral Reverse P-N Junction	--	--	24	A
Pulsed Source Current	I <sub>SM</sub>	Diode in the MOSFET	--	--	96	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =24A, V <sub>GS</sub> =0V	--	--	1.4	V
Reverse Recovery Time	T <sub>rr</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =24A,	--	442	--	ns
Reverse Recovery Charge	Q <sub>rr</sub>	dI <sub>F</sub> /dt=100A/μs (Note 4)	--	7.0	--	μC

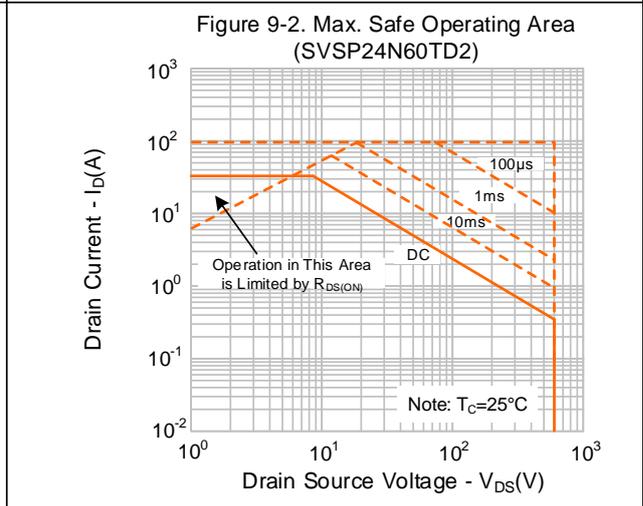
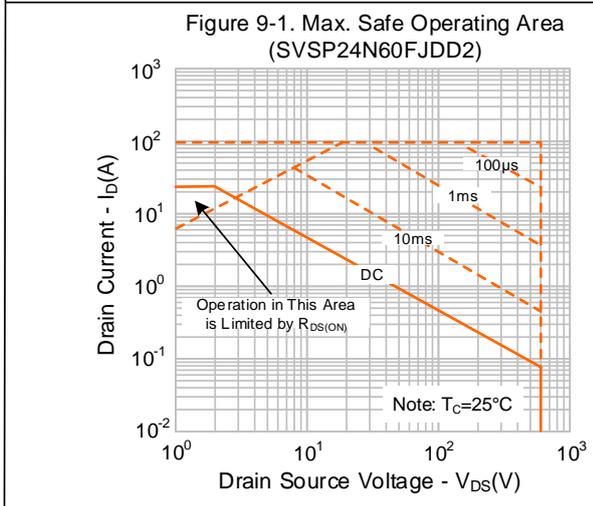
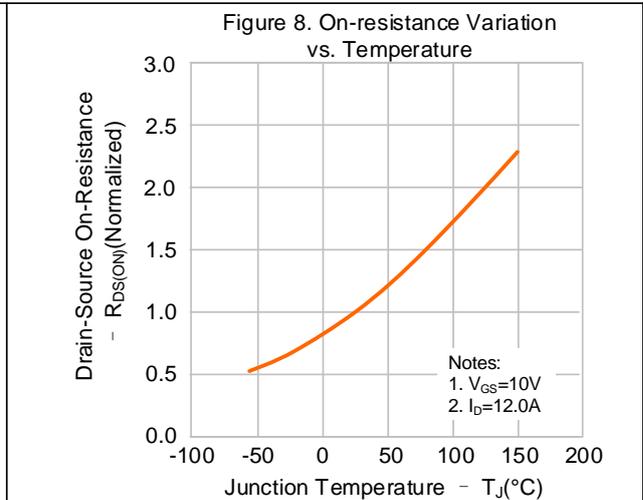
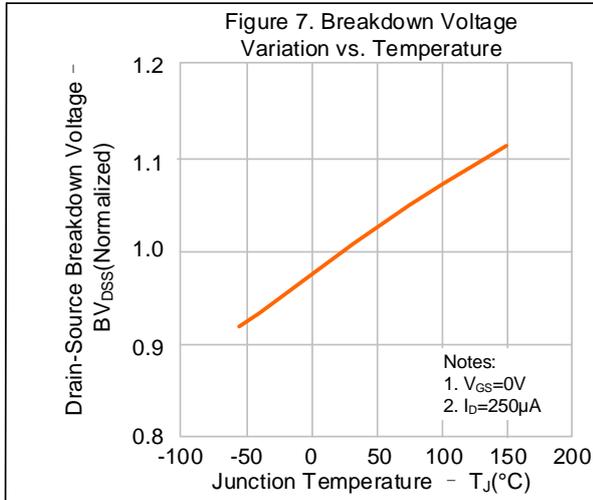
**Notes:**

1. L=79mH, I<sub>AS</sub>=4.8A, V<sub>DD</sub>=100V, R<sub>G</sub>=25Ω, starting T<sub>J</sub>=25°C;
2. V<sub>DS</sub>=0~400V, I<sub>SD</sub>≤24A, T<sub>J</sub>=25°C;
3. V<sub>DS</sub>=0~480V;
4. Pulse Test: Pulse width ≤300μs, Duty cycle≤2%;
5. Essentially independent of operating temperature.

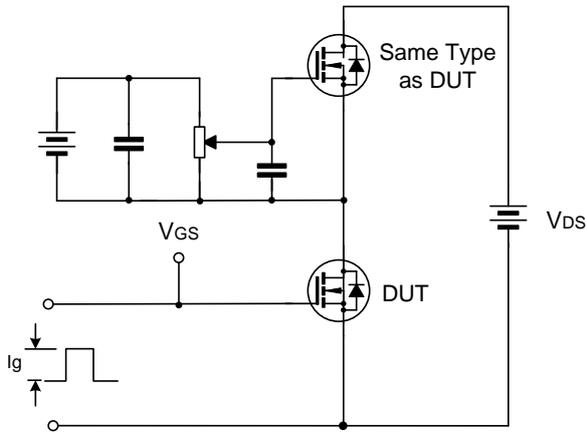
**TYPICAL CHARACTERISTICS**



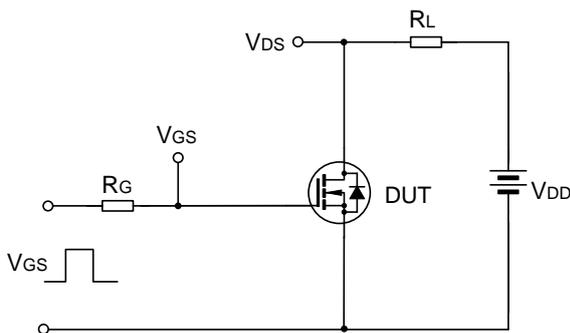
**TYPICAL CHARACTERISTICS (CONTINUED)**



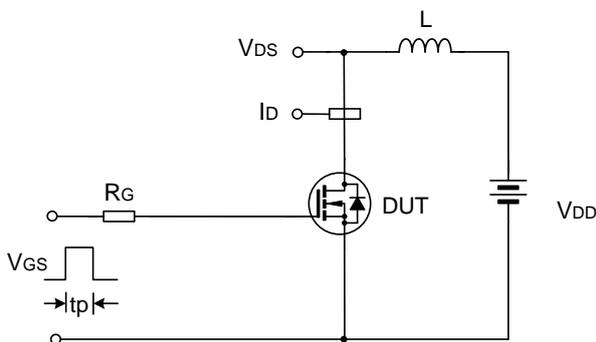
**TYPICAL TEST CIRCUIT**



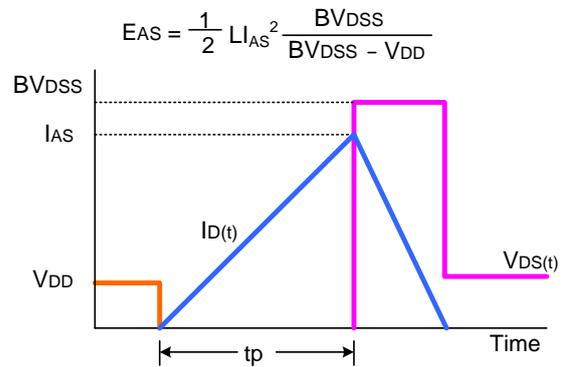
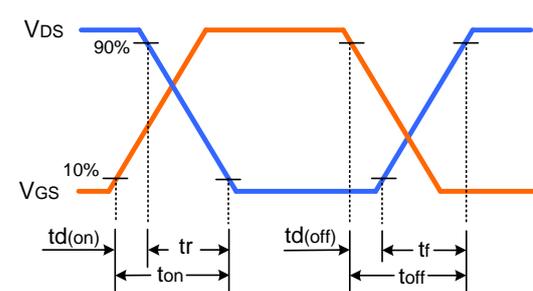
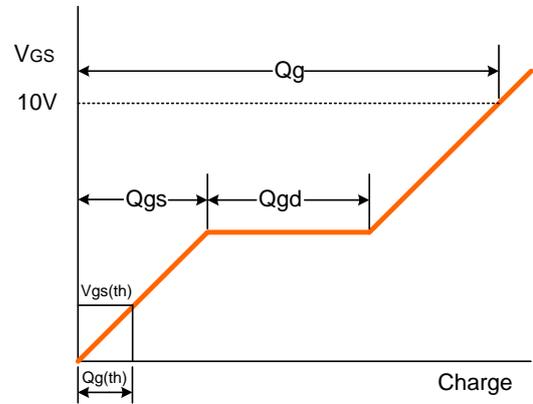
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



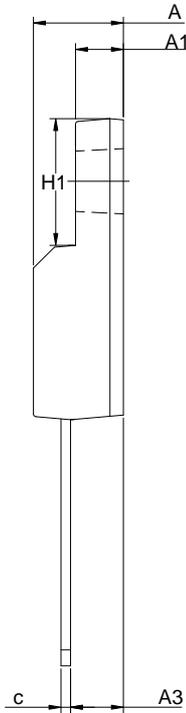
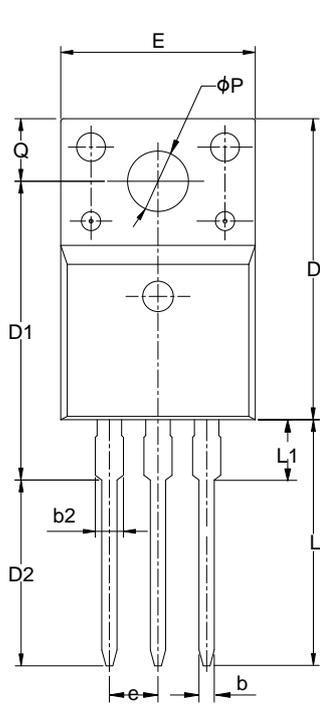
Unclamped Inductive Switching Test Circuit & Waveform



**PACKAGE OUTLINE**

**TO-220FJD-3L**

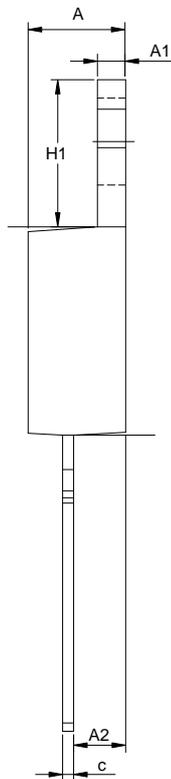
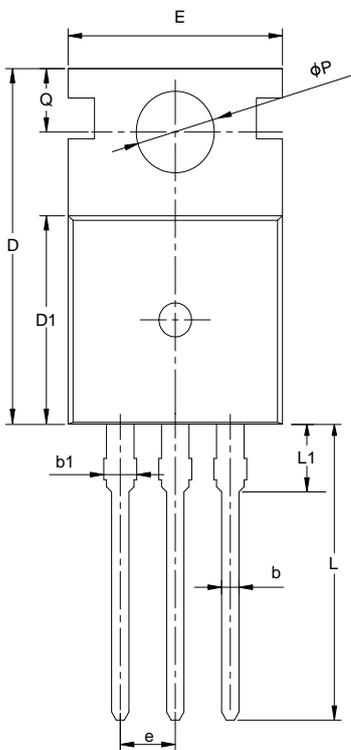
**UNIT: mm**



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	0.55	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
$\phi P$	3.00	3.18	3.40
Q	3.05	3.30	3.55

**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
$\phi P$	3.40	3.70	3.90
Q	2.60	—	3.20



## MOS DEVICES OPERATE NOTES:

Electrostatic charges may exist in many things. Please take following preventive measures to prevent effectively the MOS electric circuit as a result of the damage which is caused by discharge:

- The operator must put on wrist strap which should be earthed to against electrostatic.
- Equipment cases should be earthed.
- All tools used during assembly, including soldering tools and solder baths, must be earthed.
- MOS devices should be packed in antistatic/conductive containers for transportation.

**Important notice :**

1. Silan reserves the right to make changes of this instruction without notice.
2. Customers should obtain the latest relevant information when purchasing and should verify whether such information is latest and complete. Please read this instruction and application manual and related materials carefully before using products, including the circuit operation precautions, etc.
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Rev.: 1.6

Revision History:

1. Add SVSP24N60TD2 (TO-220-3L)
  2. Update typical characteristics curve
  3. Update important notice
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Rev.: 1.5

Revision History:

1. Modified to SVSP24N60FJDD2 and delete all other packages
  2. Update curve template
  3. Update important notice
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Rev.: 1.4

Revision History:

1. Modify the capacitance curve in figure 5 to 600V
  2. Modify the corresponding electrical and typical circuit diagrams
  3. Modify ORDERING INFORMATION
  4. Modify TYPICAL TEST CIRCUIT
  5. Modify Important notice
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Rev.: 1.3

Revision History:

1. Modify the value of  $P_D$  and  $R_{JC}$
- 

Rev.: 1.2

Revision History:

1. Add TO-262-3L
- 

Rev.: 1.1

Revision History:

1. Add TO-220-3L
- 

Rev.: 1.0

Revision History:

1. First release
- 
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