

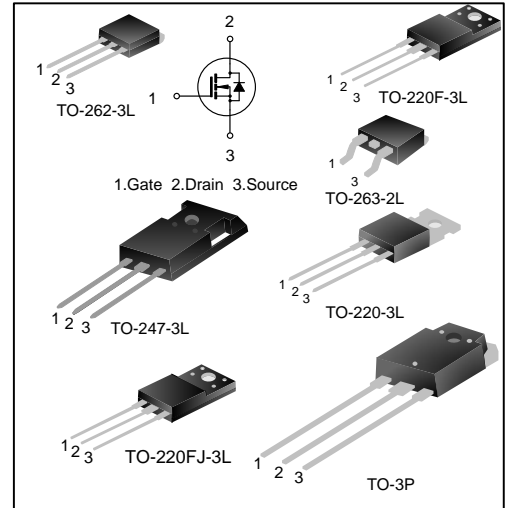
20A, 600V SUPER JUNCTION MOS POWER TRANSISTOR

GENERAL DESCRIPTION

SVS20N60FJ(K)(T)(PN)(S)(P7)(F)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, for example, it is suitable for hard and soft switching topologies.

FEATURES

- ◆ 20A, 600V, $R_{DS(on)(typ.)}=0.16\Omega@V_{GS}=10V$
- ◆ 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
SVS20N60FJD2	TO-220FJ-3L	20N60FJD2	Halogen free	Tube
SVS20N60KD2	TO-262-3L	20N60KD2	Halogen free	Tube
SVS20N60TD2	TO-220-3L	20N60TD2	Halogen free	Tube
SVS20N60PND2	TO-3P	20N60PND2	Pb free	Tube
SVS20N60SD2	TO-263-2L	20N60SD2	Halogen free	Tube
SVS20N60SD2TR	TO-263-2L	20N60SD2	Halogen free	Tape&Reel
SVS20N60P7D2	TO-247-3L	20N60P7D2	Pb free	Tube
SVS20N60FD2	TO-220F-3L	20N60FD2	Halogen free	Tube

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

Characteristics	Symbol	Ratings			Unit
		SVS20N60 FJD2/FD2	SVS20N60 KD2/TD2/SD2	SVS20N60 PN/P7D2	
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}	80			A
Power Dissipation(T _C =25°C) -Derate above 25°C	P _D	45	150	200	W
		0.36	1.2	1.6	W/°C
Single Pulsed Avalanche Energy (Note 1)	E _{AS}	967			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
		SVS20N60 FJD2/FD2	SVS20N60 KD2/TD2/SD2	SVS20N60 PN/P7D2	
Thermal Resistance, Junction-to-Case	R _{θJC}	2.78	0.83	0.63	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	62.5	62.5	50.0	°C/W

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

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 =10A	T _J =25°C	--	0.16	0.19	Ω
			T _J =125°C	--	0.30	--	
Gate Resistance	R _g	f=1.0MHz	--	2.6	--	Ω	
Input Capacitance	C _{iss}	V _{DS} =100V, V _{GS} =0V, f=1.0MHz	--	1174	--	pF	
Output Capacitance	C _{oss}		--	67	--		
Reverse Transfer Capacitance	C _{rss}		--	4.0	--		
Turn-on Delay Time	t _{d(on)}	V _{DD} =300V, V _{GS} =10V, R _G =25Ω, I _D =20A (Note 4,5)	--	20	--	ns	
Turn-on Rise Time	t _r		--	60	--		
Turn-off Delay Time	t _{d(off)}		--	105	--		
Turn-off Fall Time	t _f		--	42	--		
Total Gate Charge	Q _g	V _{DD} =480V, V _{GS} =10V, I _D =20A (Note 4,5)	--	39	--	nC	
Gate-Source Charge	Q _{gs}		--	9.6	--		
Gate-Drain Charge	Q _{gd}		--	20	--		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

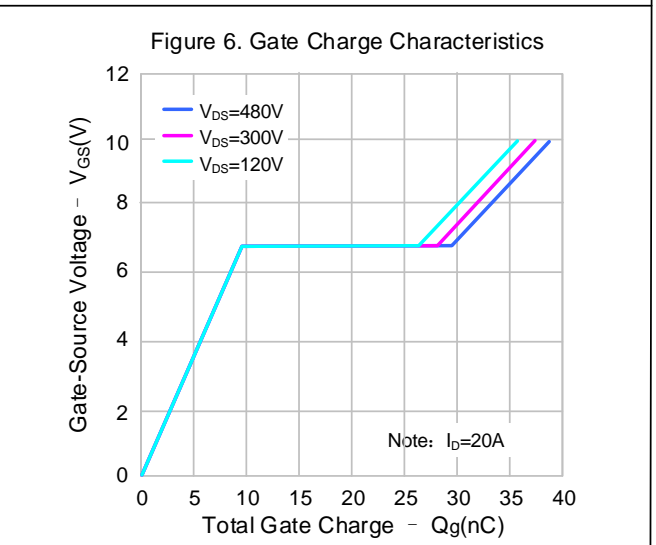
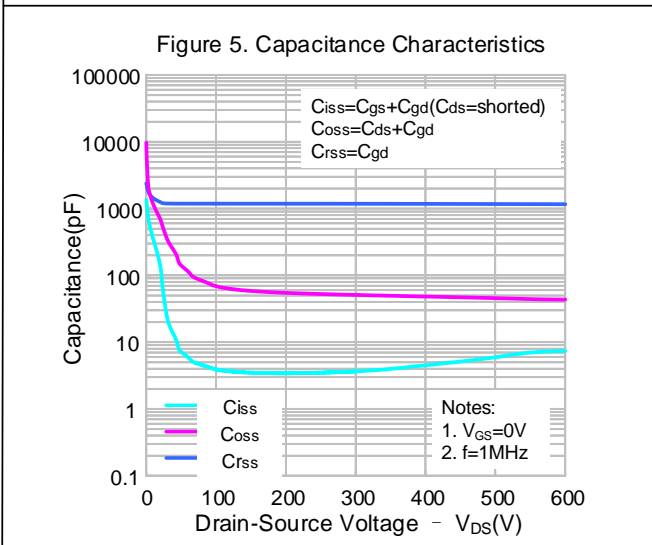
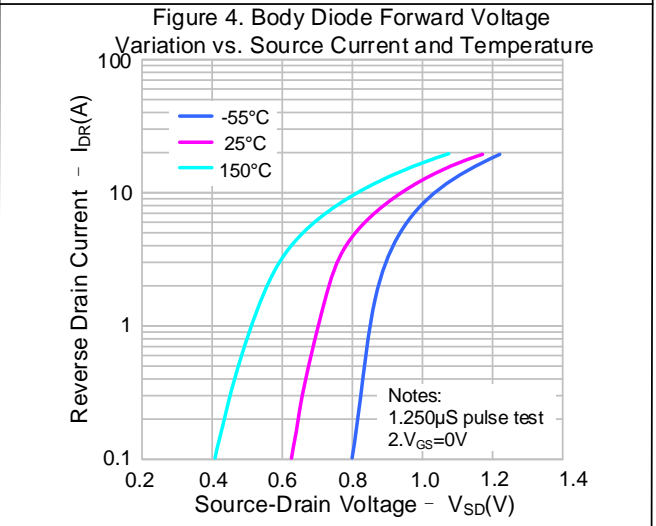
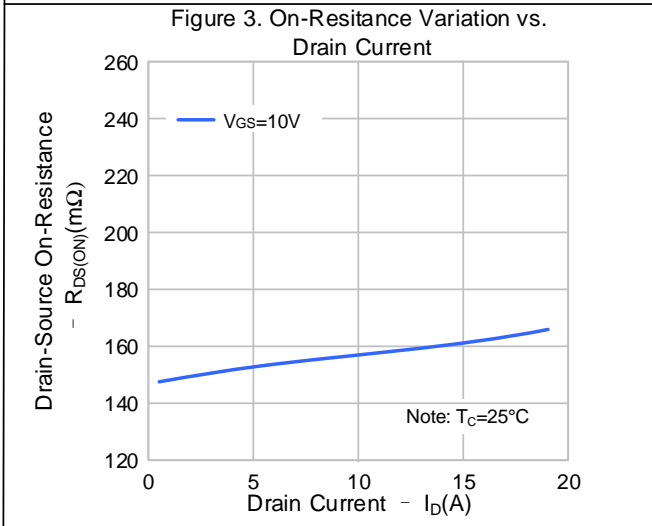
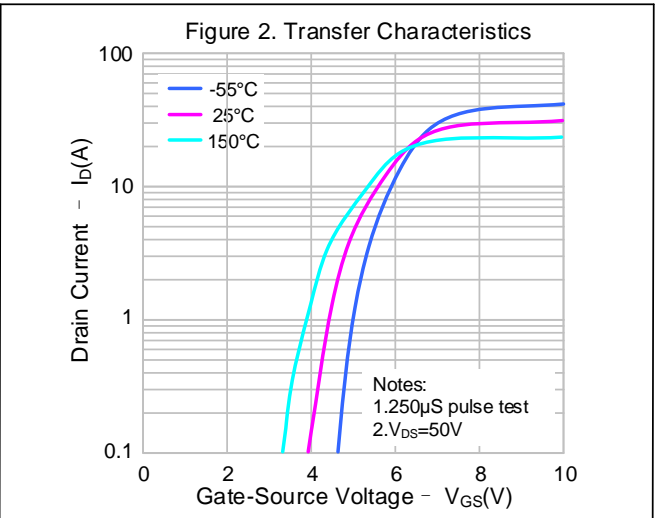
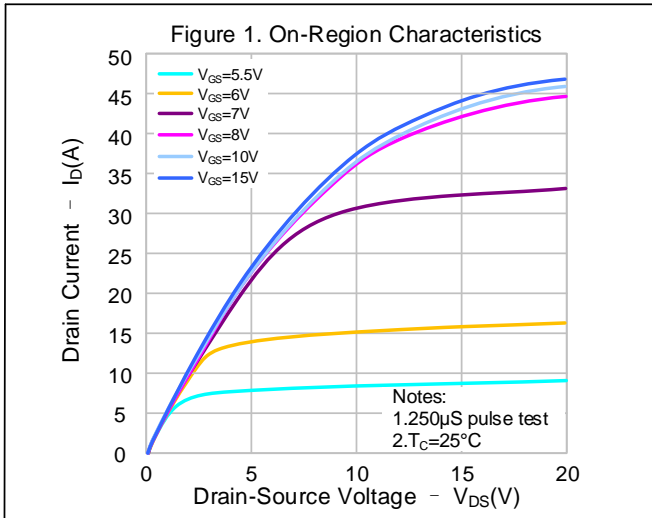
Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I _S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	20	A
Pulsed Source Current	I _{SM}		--	--	80	
Diode Forward Voltage	V _{SD}	I _S =20A, V _{GS} =0V	--	--	1.2	V
Reverse Recovery Time	T _{rr}	V _{DD} =50V, I _F =20A, dI _F /dt=100A/μs (Note 4)	--	426	--	ns
Reverse Recovery Charge	Q _{rr}		--	6.2	--	μC

Notes:

- L=79mH, I_{AS}=4.6A, V_{DD}=100V, R_G=25Ω, starting T_J=25°C;
- V_{DS}=0~400V, I_{SD}≤20A, T_J=25°C;
- V_{DS}=0~480V;
- Pulse Test: Pulse width ≤300μs, Duty cycle≤2%;
- Essentially independent of operating temperature.

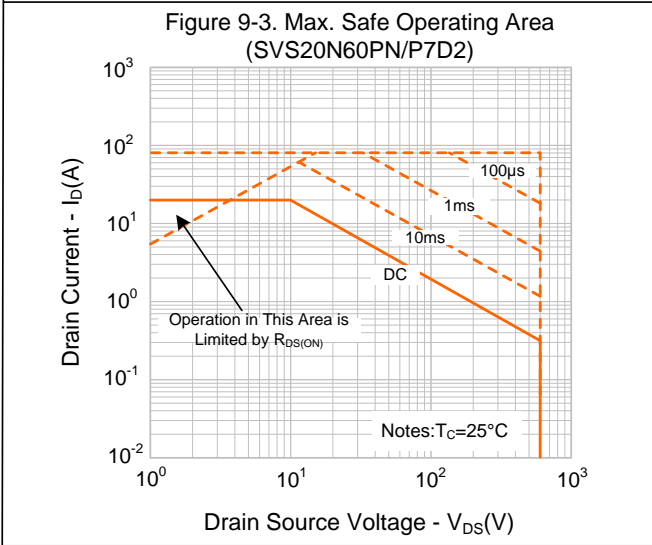
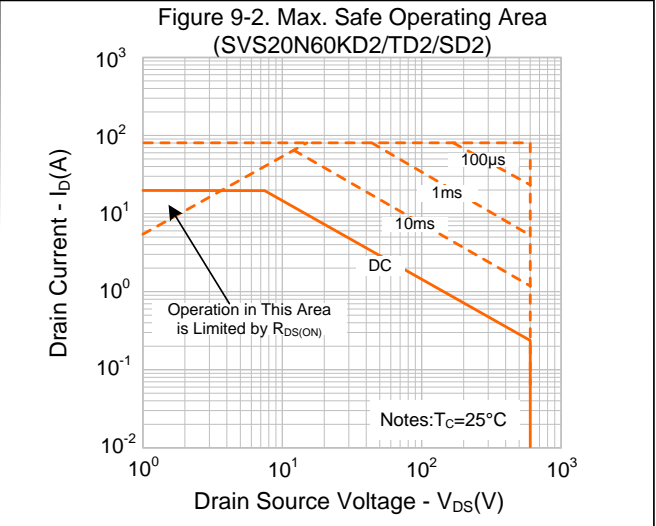
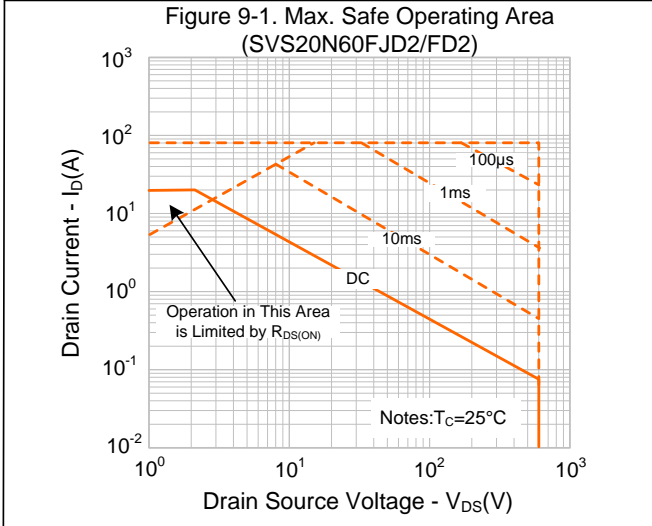
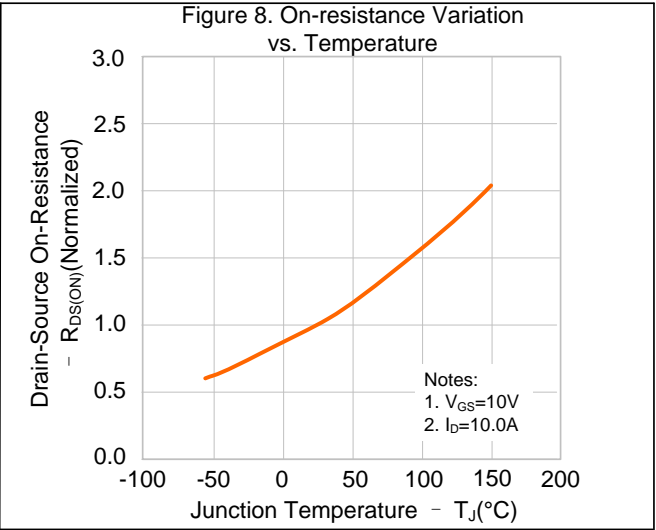
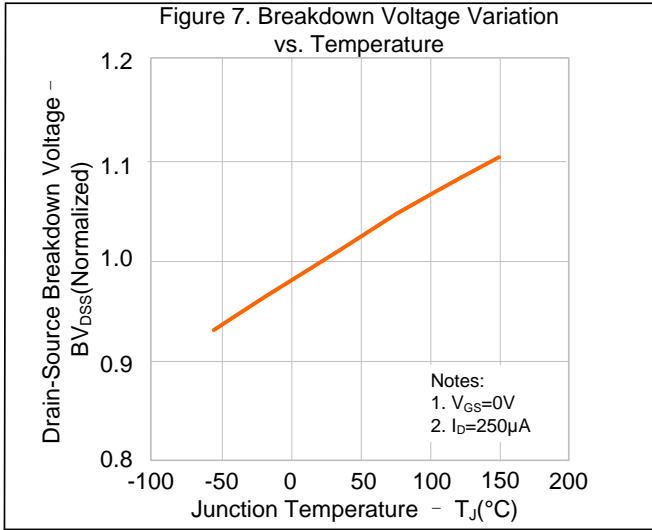


TYPICAL CHARACTERISTICS



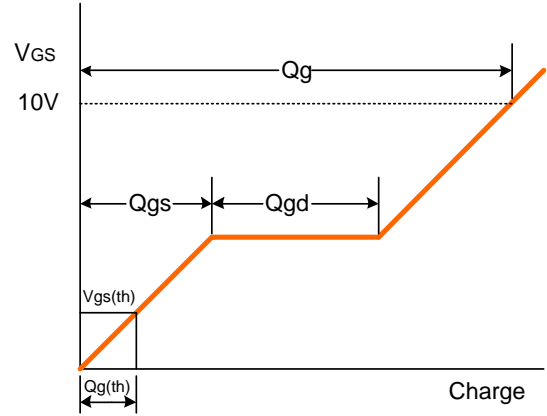
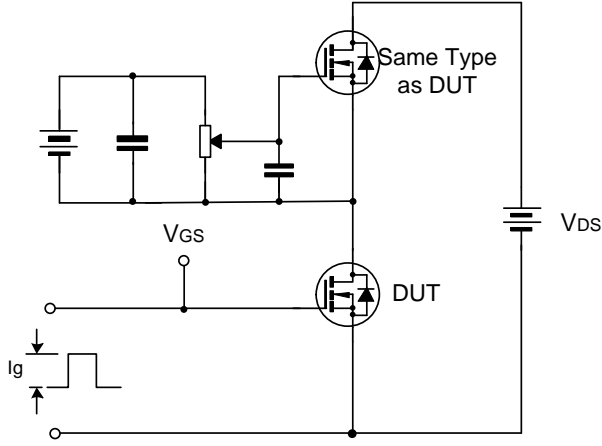


TYPICAL CHARACTERISTICS (CONTINUED)

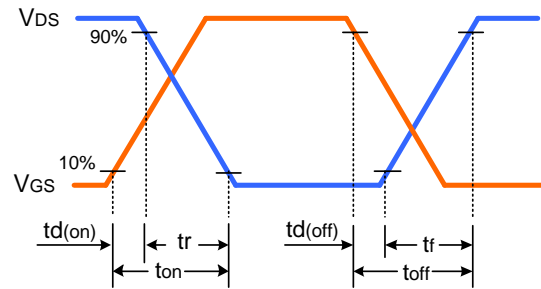
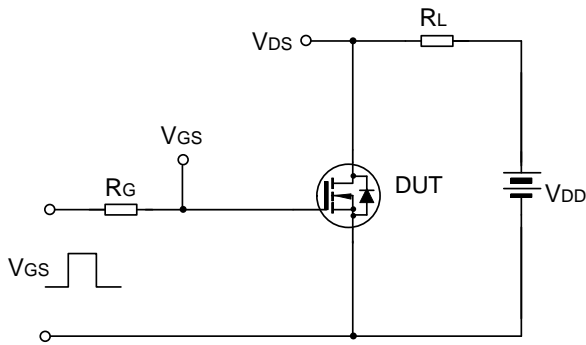


TYPICAL TEST CIRCUIT

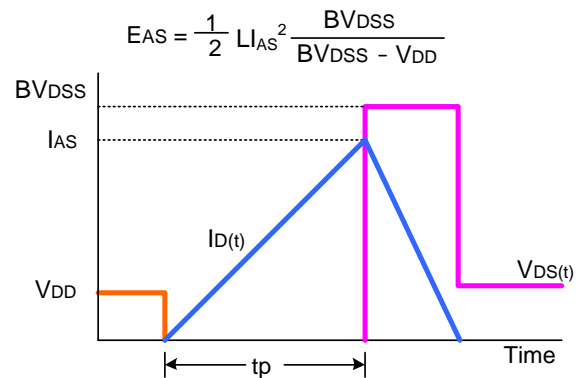
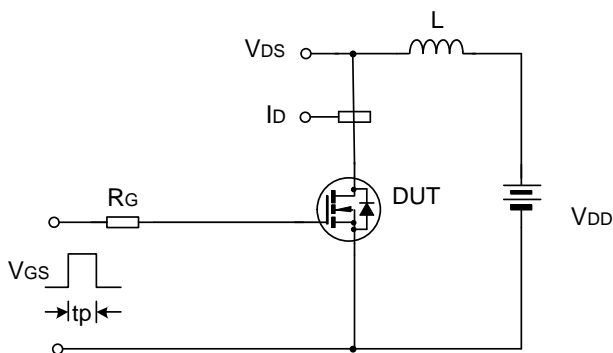
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



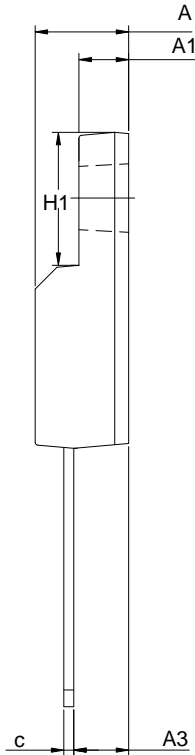
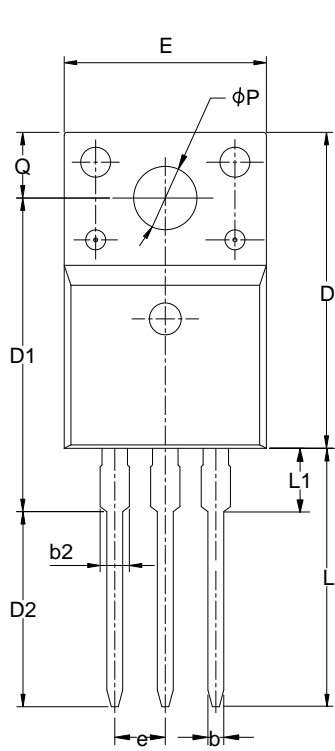
Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

TO-220FJ-3L

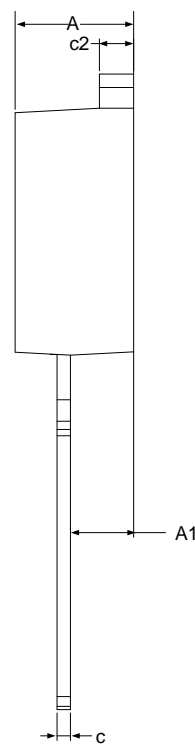
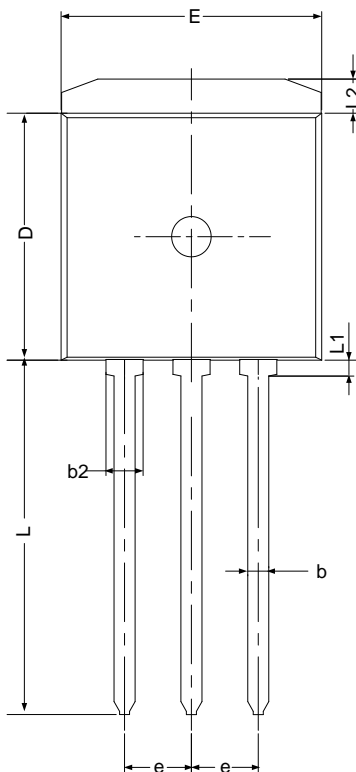
UNIT: mm



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
ϕP	3.00	3.18	3.40
Q	3.05	3.30	3.55

TO-262-3L

UNIT: mm

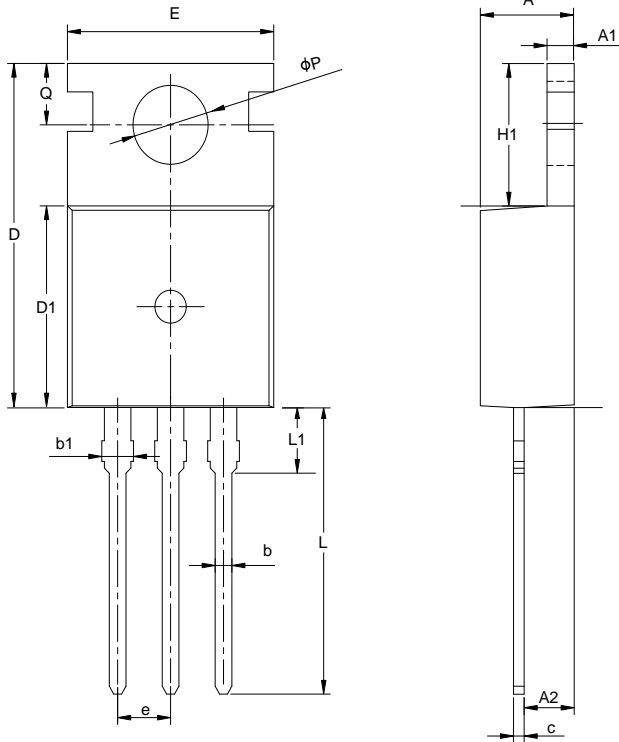


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.30	4.50	4.70
A1	2.20	—	2.92
b	0.71	0.80	0.90
b2	1.20	—	1.50
c	0.34	—	0.65
c2	1.22	1.30	1.35
D	8.38	—	9.30
E	9.80	10.16	10.54
e	2.54 BSC		
L	12.80	—	14.10
L1	—	—	0.75
L2	1.12	—	1.42

PACKAGE OUTLINE(CONTINUED)

TO-220-3L

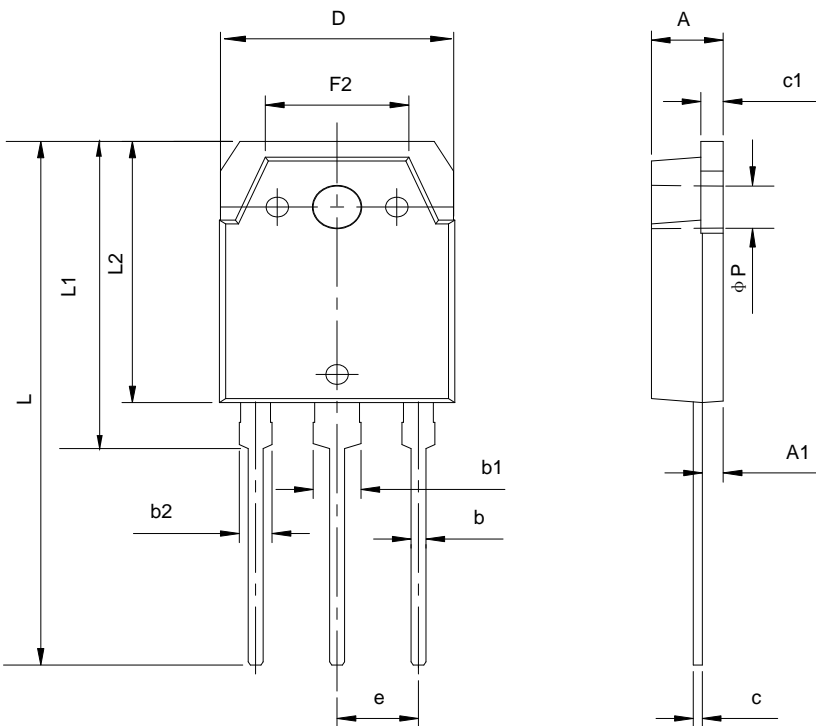
UNIT: mm



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
ϕP	3.40	3.70	3.90
Q	2.60	—	3.20

TO-3P

UNIT: mm

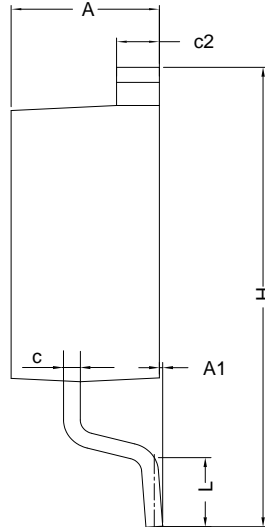
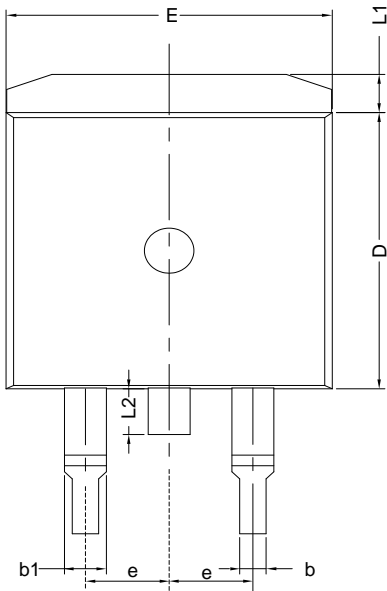


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.4	—	5.2
c1	1.2	—	1.8
A1	1.2	—	2.0
b	0.7	1.0	1.3
b1	2.7	3.0	3.3
b2	1.7	2.0	2.3
D	15.0	15.5	16.0
c	0.4	0.6	0.8
F2	8.5	—	10.0
e	5.45 TYP		
L1	22.6	—	23.6
L	39.0	—	41.5
L2	19.5	—	21.0
P	3.0	—	3.4

PACKAGE OUTLINE(CONTINUED)

TO-263-2L

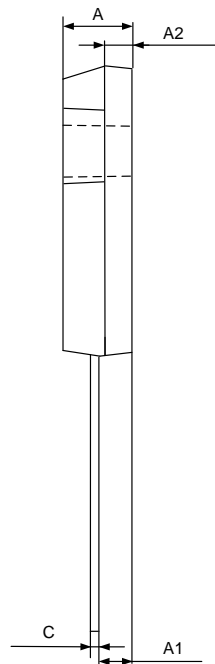
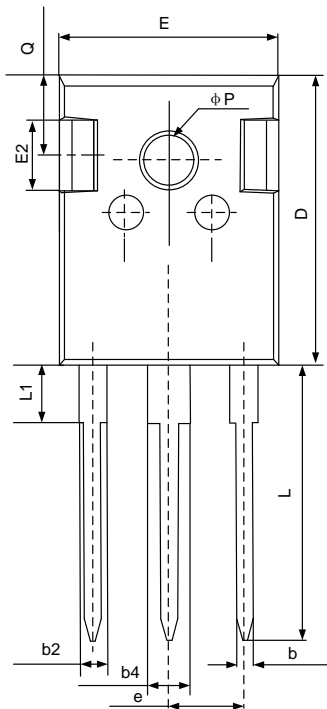
UNIT: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.30	4.57	4.72
A1	0	0.10	0.25
b	0.71	0.81	0.91
b1	1.17	—	1.50
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-247-3L

UNIT: mm

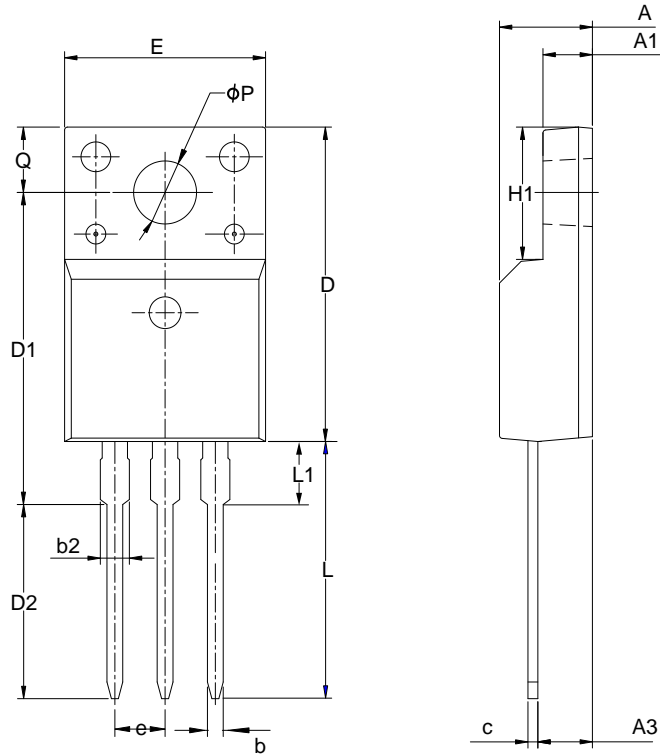


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	—	1.36
b2	1.91	—	2.25
b4	2.91	—	3.25
c	0.51	—	0.75
D	20.80	21.00	21.30
E	15.50	15.80	16.10
E2	4.40	5.00	5.20
e	5.44 BSC		
L	19.72	19.92	20.22
L1	—	—	4.30
Q	5.60	5.80	6.00
P	3.40	—	3.80

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

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.
3. The products belong to consumer electronic products. Silan does not give any warranties as to the suitability of the Silan's product for any specific use. The design intent, design definition and design of the product are not intended for application (the application stated in this instruction includes use, etc.) in transportation equipment, medical equipment, life-saving equipment, aerospace equipment, , non-civil equipment or non-civil use, etc. (the equipment stated in this instruction includes systems, devices, etc., all referred to as equipment).The product should not be used in any equipment or system whose manufacture, use or sale is prohibited under any applicable laws or regulations ("unintended use"). If the product is used for unintended use, therefore the full risks of such products application are borne by the customer and Silan assumes no liability for the product used for the unintended use. If the customer intends to use the Silan's product in a application where malfunction or failure can be reasonably be expected to result in personal injury, or serious property, or environment damage, the customer shall make adequate assessment, testing and verification, and Silan shall not be liable for such applications.
4. The application of the product described in this instruction, the application manual of the product and related materials is for illustrative purposes only, and Silan makes no warranty that such application can be used directly without further testing, verification or modification. Silan is not responsible for any assistance in product application or customers' product design. Customer shall be responsible for the application of Silan's products and the design, manufacture and use of customers' products using Silan's products (in this document, "use products", "apply Silan's products", "product application" and "customers' products using Silan's products" are synonymous). It is the sole responsibility of the customer to take the following actions: 1) Verify and determine whether Silan's products are suitable for the customers' applications and customers' products; 2) All applicable standards of the customers' industry shall be complied with and fully tested and verified when applying Silan's product or using Silan's product to develop and design customers' products; 3) Although Silan is constantly committed to improve product's quality and reliability, semiconductor products have possibility to malfunction or fail in various application environments. Customers are responsible for complying with safety standards and for providing adequate designs and safeguards for customers' products using Silan's product to minimize risks and avoid situations in which a malfunction or failure could cause bodily injury or damage to property; 4) When using the products, please do not exceed the maximum rating of the products, Stress above one or more limiting values will cause damage to the product and the equipment or affect the reliability to the equipment (customers' product); 5) Ensure customers' product using Silan's product are designed, manufactured and used in full compliance with all applicable standards, safety standards and other requirements of the customers' industry. The parameters stated in this instruction may and do vary in different applications, actual performance may vary over time, and customers must use the products within their effective static storage period (within one year from the delivery date of Silan). Customer should confirm the effective static storage period of the product if purchasing from a third party. Silan does not assume any responsibility if the product has exceeded the static storage period when it is used.
5. Do not disassemble, reverse-engineer, alter, modify, decompile or copy product, without Silan's prior written consent.
6. Please identify Silan's trademark when purchasing our product. Please contact us if there is any question. Our products are not sold through TAOBAO or any other third-party e-commerce platforms. If customers purchase from such platforms, please contact us in writing before purchasing to confirm whether the product is authentic and original from Silan.
7. Please use and apply product in compliance with all applicable laws and regulations, including but not limited to trade control regulations etc. The product is civil electronic product, please do not use it in non-civil fields.
8. Product promotion is endless, our company will wholeheartedly provide customers with better products!
9. Website: <http://www.silan.com.cn>



Part No.: SVS20N60FJ(K)(T)(PN)(S)(P7)(F)D2 Document Type: Datasheet
Copyright: HANGZHOU SILAN MICROELECTRONICS CO.,LTD Website: <http://www.silan.com.cn>

Rev.: 1.7

Revision History:

1. Update package outline of TO-263-2L
 2. Modify typical test circuit
 3. Update the important notice
-

Rev.: 1.6

Revision History:

1. Add TO-220F-3L
 2. Update the template of datasheet
-

Rev.: 1.5

Revision History:

1. Modify Electrical schematic and TYPICAL TEST CIRCUIT
 2. Update the package outline of TO-247-3L
 3. Update the package outline of TO-3P
-

Rev.: 1.4

Revision History:

1. Add dv/dt of ABSOLUTE MAXIMUM RATINGS
-

Rev.: 1.3

Revision History:

1. Add the package outline of TO-247-3L
 2. Modify Electrical characteristics and all curves
-

Rev.: 1.2

Revision History:

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

Rev.: 1.1

Revision History:

1. Update characteristics and Fig5, Fig6
 2. Update the package outline of TO-262-3L
-

Rev.: 1.0

Revision History:

1. First release
-