



## 11A, 650V SUPER JUNCTION MOS POWER TRANSISTOR

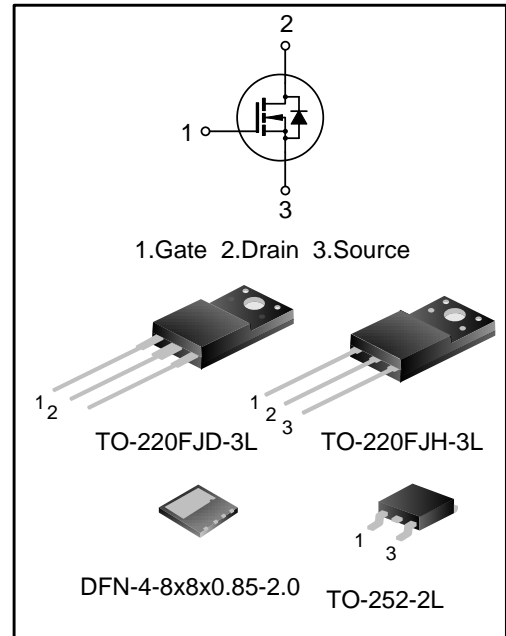
### DESCRIPTION

SVS65R400D(FJH)(FJD)(L8A)E3 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,650V, $R_{DS(on)(typ.)}=0.33\Omega@V_{GS}=10V$
- ◆ New revolutionary high voltage technology
- ◆ Ultra low gate charge
- ◆ Periodic avalanche rated
- ◆ Extreme dv/dt rated
- ◆ High peak current capability
- ◆ 100% avalanche tested
- ◆ Pb-free lead plating
- ◆ RoHS compliant



### KEY PERFORMANCE PARAMETERS

Characteristics	Ratings	Unit
$V_{DS}$	650	V
$V_{GS(th)}$	2.0~4.0	V
$R_{DS(on),max.}$	0.4	$\Omega$
$I_{D,pulse}$	44	A
$Q_{g,typ.}$	27	nC

### ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVS65R400DE3TR	TO-252-2L	65R40DE3	Halogen free	Tape&Reel
SVS65R400FJHE3	TO-220FJH-3L	6540FJHE3	Halogen free	Tube
SVS65R400FJDE3	TO-220FJD-3L	65R400FDE3	Halogen free	Tube
SVS65R400L8AE3TR	DFN-4-8x8x0.85-2.0	65R400E3	Halogen free	Tape&Reel



**ABSOLUTE MAXIMUM RATINGS (UNLESS OTHERWISE NOTED,  $T_A=25^{\circ}\text{C}$ )**

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Drain-source Voltage	$V_{DS}$	--	650	--	--	V
Gate-source Voltage (Static)	$V_{GS}$	--	-20	--	20	V
Gate-source Voltage (Dynamic)	$V_{GS}$	AC ( $f>1\text{Hz}$ )	-30	--	30	V
Drain Current	$I_D$	$T_C=25^{\circ}\text{C}$	--	--	11	A
		$T_C=100^{\circ}\text{C}$	--	--	7.0	A
Drain Current Pulsed (Note 1)	$I_{DM}$	$T_C=25^{\circ}\text{C}$	--	--	44	A
Power Dissipation(TO-252-2L) (DFN-4-8x8x0.85-2.0) (Note 2)	$P_D$	$T_C=25^{\circ}\text{C}$	--	--	96	W
Power Dissipation (TO-220FJH-3L) (TO-220FJD-3L) (Note 2)	$P_D$	$T_C=25^{\circ}\text{C}$	--	--	31	W
Single Pulsed Avalanche Energy	$E_{AS}$	$L=79\text{mH}$ , $V_{DD}=100\text{V}$ , $R_G=25\Omega$ , Starting temperature $T_J=25^{\circ}\text{C}$	--	--	356	mJ
Single Pulsed Avalanche Current	$I_{AS}$	--	--	--	2.8	A
Reverse Diode dv/dt	dv/dt	$V_{DS}=0\sim 400\text{V}$ , $I_{SD}\leq I_S$ , $T_J=25^{\circ}\text{C}$	--	--	15	V/ns
MOSFET dv/dt Ruggedness	dv/dt	$V_{DS}=0\sim 480\text{V}$	--	--	100	V/ns
Operation Junction Temperature Range	$T_J$	--	-55	--	150	$^{\circ}\text{C}$
Storage Temperature Range	$T_{stg}$	--	-55	--	150	$^{\circ}\text{C}$
Continuous Diode Forward Current	$I_S$	$T_C=25^{\circ}\text{C}$ , integral reverse P-N junction diode in the MOSFET	--	--	11	A
Diode Pulse Current	$I_{S,pulse}$		--	--	44	A
Maximum Diode Commutation Speed	di/dt	$V_{DS}=0\sim 400\text{V}$ , $I_{SD}\leq I_S$ , $T_J=25^{\circ}\text{C}$	--	--	250	A/ $\mu\text{s}$



**THERMAL CHARACTERISTICS**

Table1. Thermal characteristics of TO-252-2L/ DFN-4-8x8x0.85-2.0 (SVS65R400D/L8AE3)

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Thermal Resistance, Junction-case, Bottom	R <sub>θJC</sub>	--	--	--	1.3	°C/W
Thermal Resistance, Junction-ambient	R <sub>θJA</sub>	--	--	--	62.5	°C/W
Soldering Temperature (SMD)	T <sub>sold</sub>	Reflow soldering: 10±1sec, 3times Wave soldering: 10 <sup>+2</sup> <sub>-0</sub> sec, 1time	--	--	260	°C

Table2. Thermal characteristics of TO-220FJH-3L/TO-220FJD-3L (SVS65R400FJH/FJDE3)

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Thermal Resistance, Junction-case, Bottom	R <sub>θJC</sub>	--	--	--	4.1	°C/W
Thermal Resistance, Junction-ambient	R <sub>θJA</sub>	--	--	--	62.5	°C/W
Soldering Temperature (in line)	T <sub>sold</sub>	15 <sup>+2</sup> <sub>-0</sub> sec, 1time	--	--	260	°C



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

**Static characteristics**

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Drain-source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	650	--	--	V
Drain-source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	--	--	1.0	μA
		V <sub>DS</sub> =650V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	--	1.5	--	
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> =5.5A	--	0.33	0.4	Ω
Gate Resistance	R <sub>G</sub>	f=1MHz	--	3.6	--	Ω

**Dynamic characteristics**

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Input Capacitance	C <sub>iss</sub>	f=1MHz, V <sub>GS</sub> =0V, V <sub>DS</sub> =100V	--	929	--	pF
Output Capacitance	C <sub>oss</sub>		--	34	--	
Reverse Transfer Capacitance	C <sub>rss</sub>		--	0.82	--	
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =325V, V <sub>GS</sub> =10V, R <sub>G</sub> =24Ω, I <sub>D</sub> =11A (Notes 3, 4)	--	18	--	ns
Turn-on Rise Time	t <sub>r</sub>		--	39	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	66	--	
Turn-off Fall Time	t <sub>f</sub>		--	33	--	
Total Gate Charge	Q <sub>g</sub>	V <sub>DD</sub> =520V, V <sub>GS</sub> =10V, I <sub>D</sub> =11A (Notes 3, 4)	--	27	--	nC
Gate-source Charge	Q <sub>gs</sub>		--	7.6	--	
Gate-drain Charge	Q <sub>gd</sub>		--	13	--	
Gate-plateau Voltage	V <sub>plateau</sub>		--	6.9	--	V

**Reverse diode characteristics**

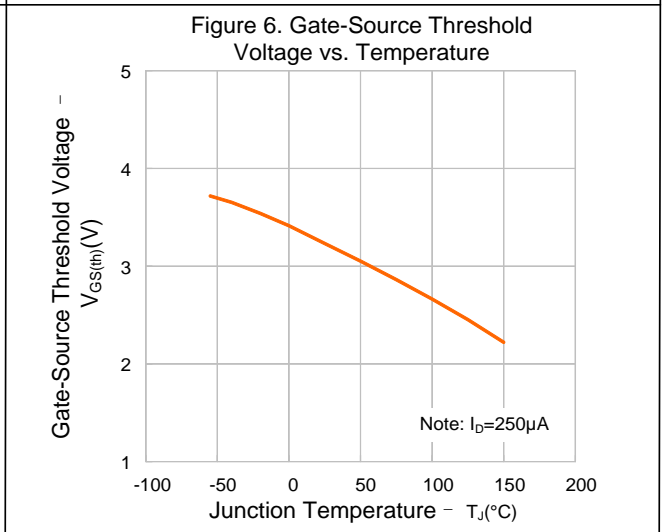
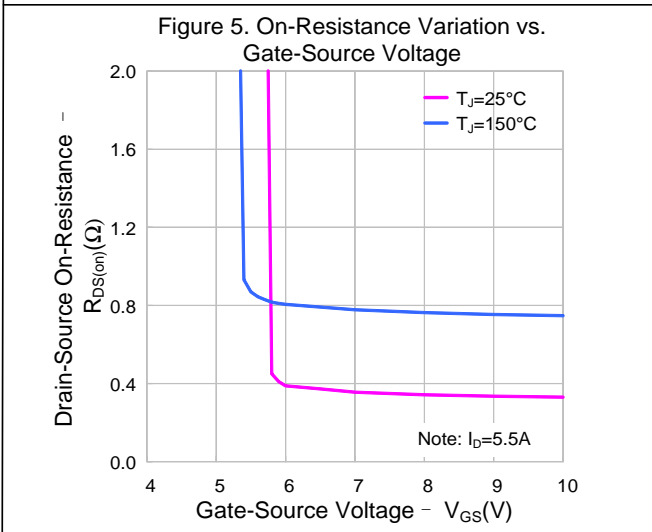
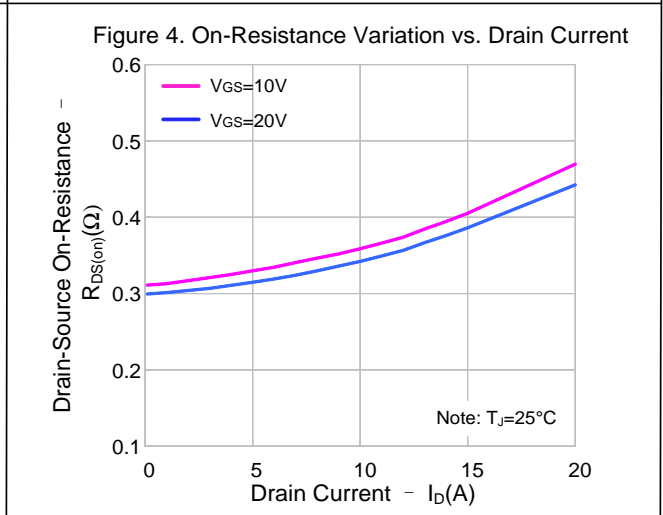
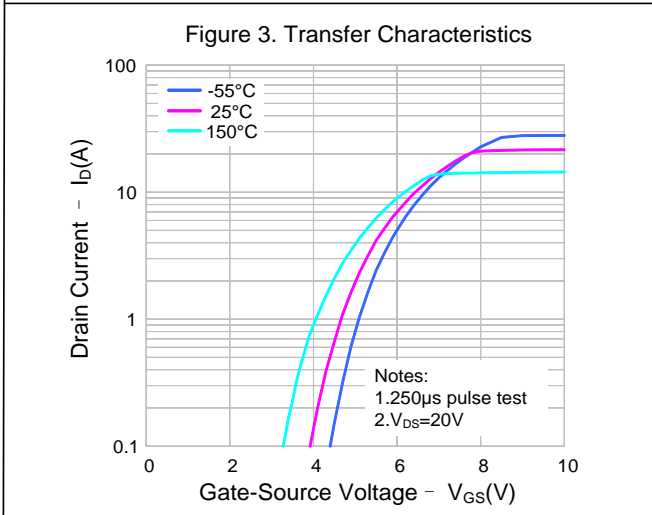
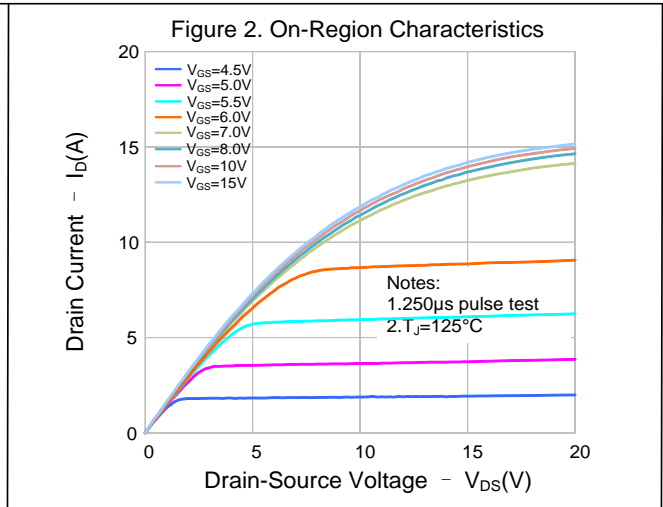
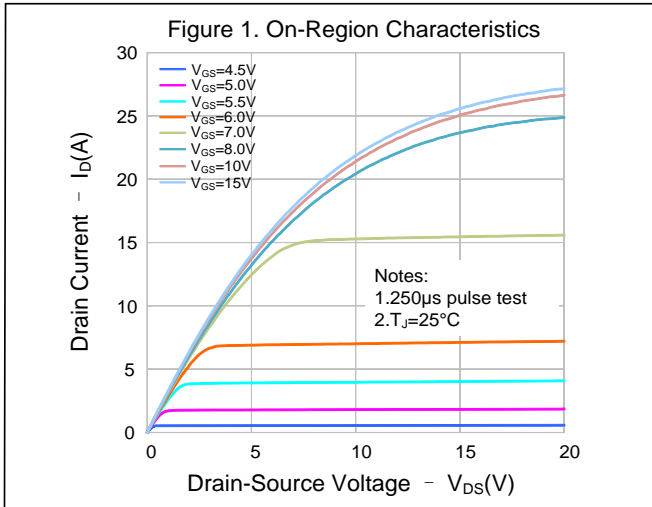
Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =11A, V <sub>GS</sub> =0V	--	--	1.4	V
Reverse Recovery Time	T <sub>rr</sub>	I <sub>S</sub> =11A, V <sub>GS</sub> =0V, dI <sub>F</sub> /dt=100A/μs (Note 3)	--	254	--	ns
Reverse Recovery Charge	Q <sub>rr</sub>		--	3.2	--	μC
Reverse Recovery Peak Current	I <sub>rrm</sub>		--	25	--	A

**Notes:**

1. Pulse time 5μs;
2. The dissipation power will change with temperature, derating above 25°C:  
0.77W/°C(TO-252-2L) (DFN-4-8x8x0.85-2.0)/ 0.24W/°C(TO-220FJH-3L)(TO-220FJD-3L);
3. Pulse Test: Pulse width ≤300μs, Duty cycles≤2%;
4. Essentially independent of operating temperature.

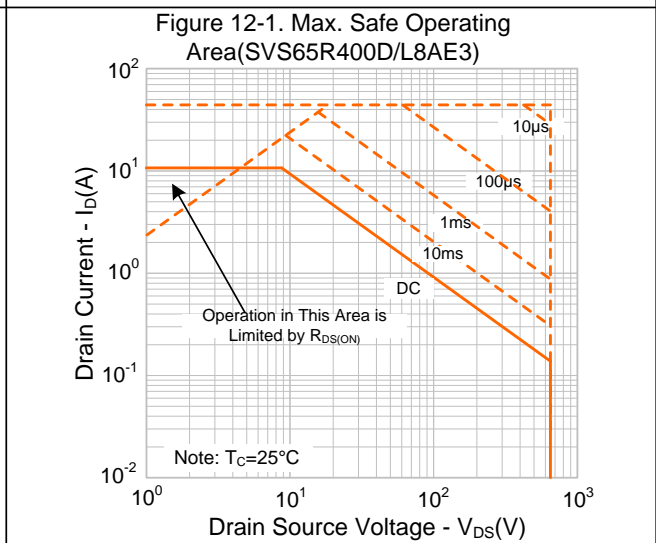
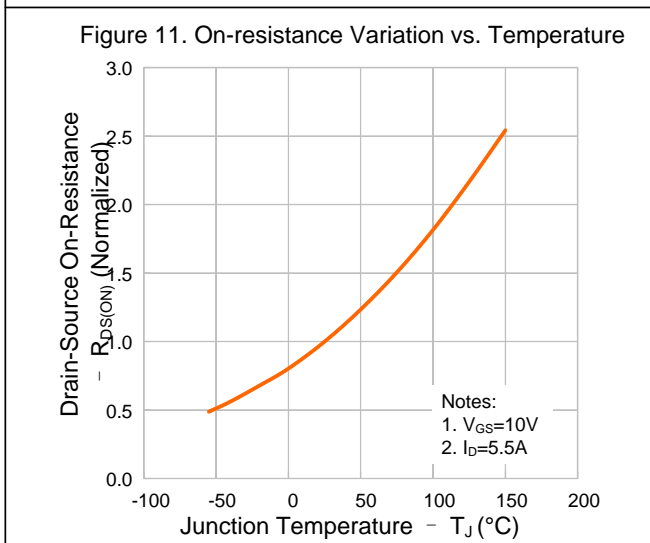
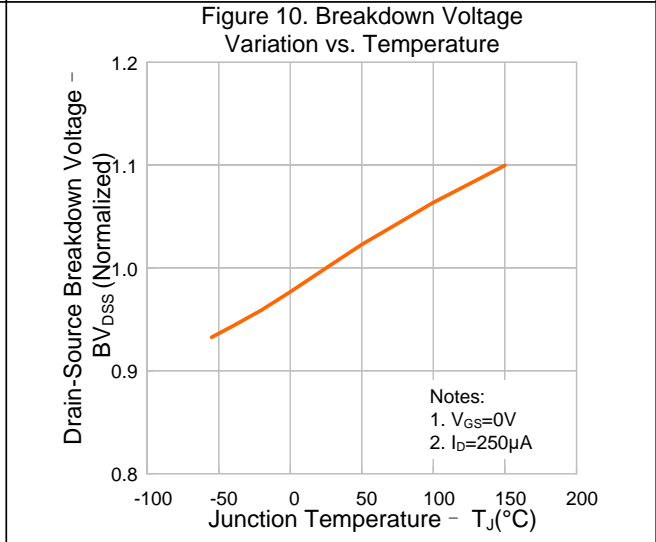
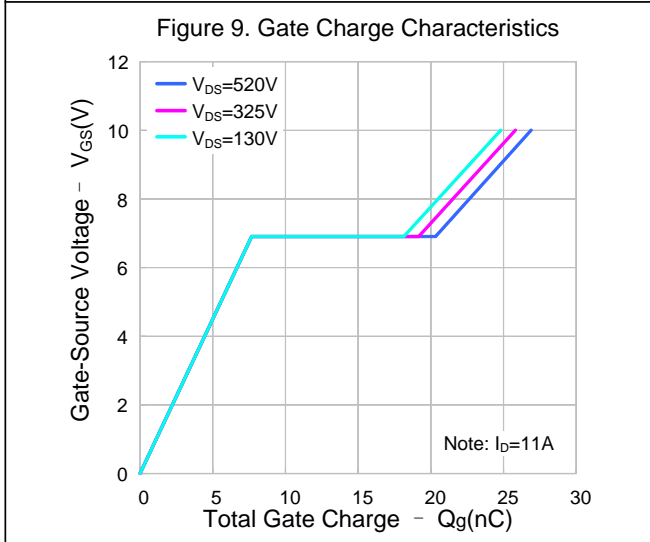
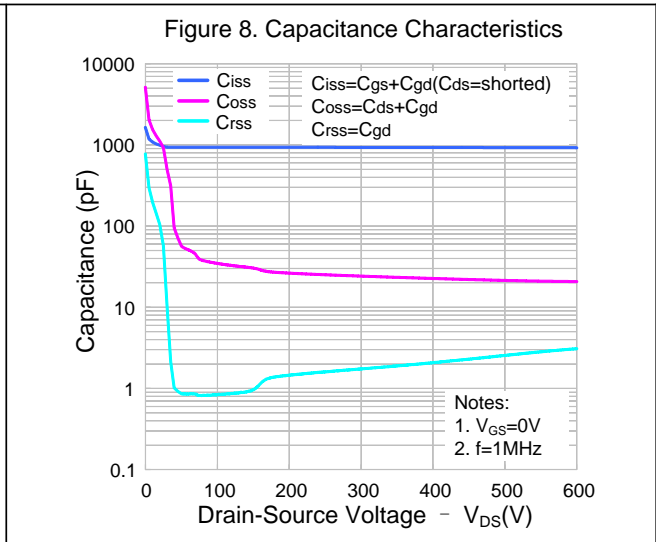
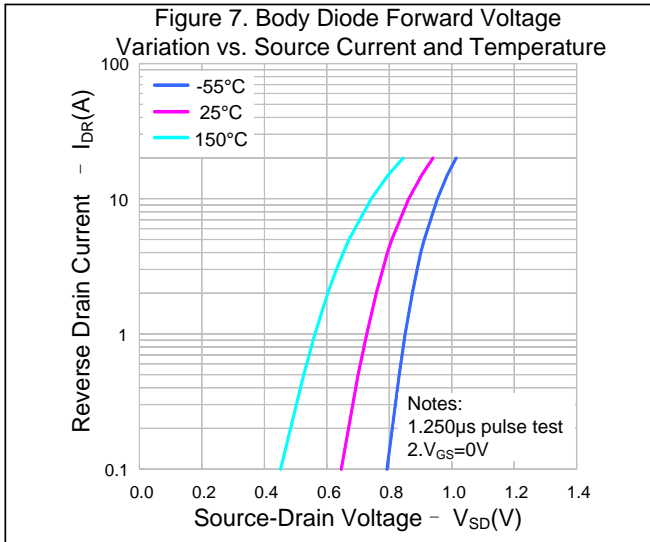


TYPICAL CHARACTERISTICS



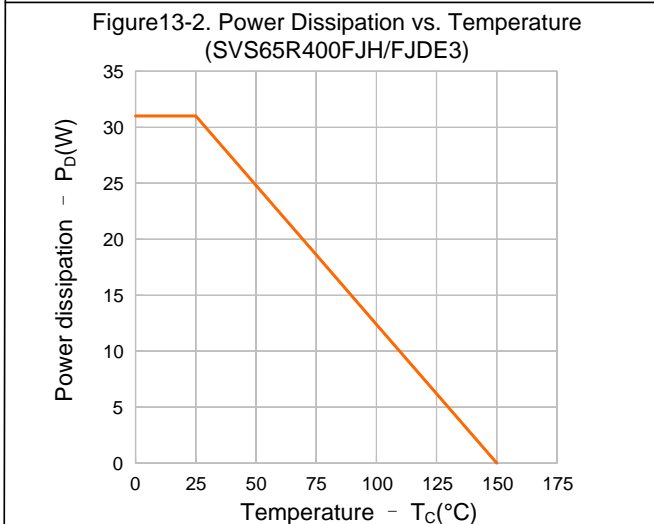
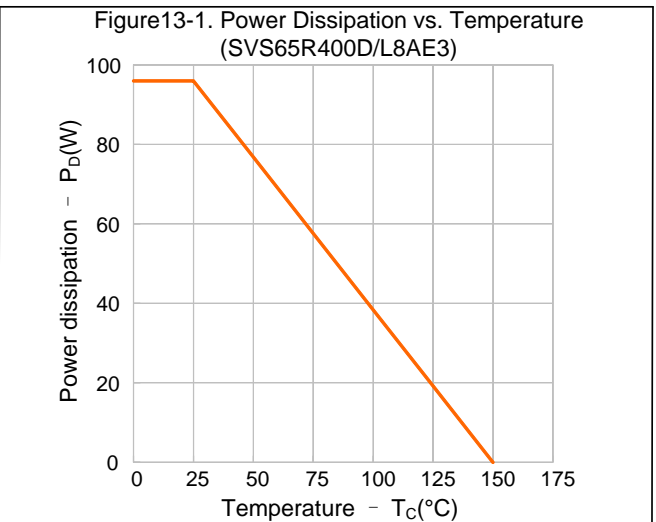
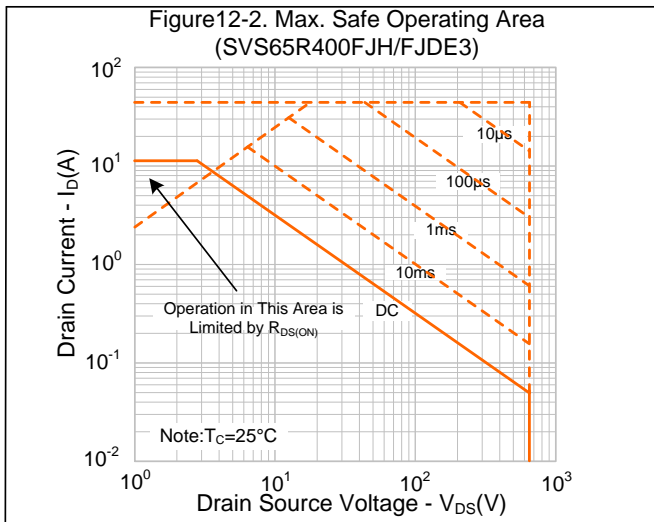


TYPICAL CHARACTERISTICS (CONTINUED)





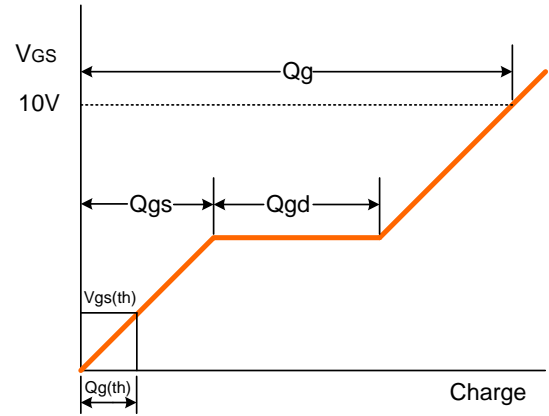
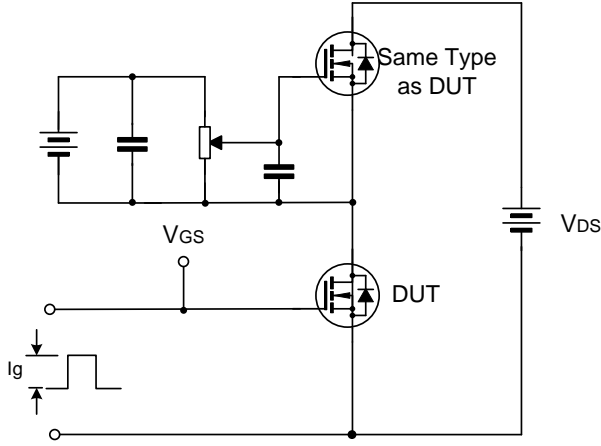
**TYPICAL CHARACTERISTICS (CONTINUED)**



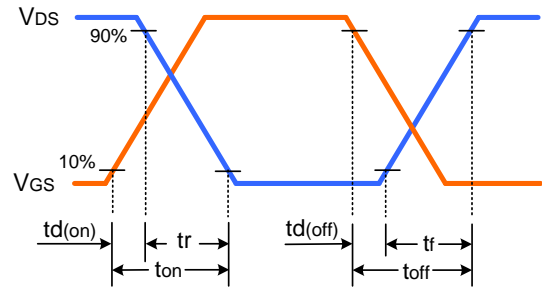
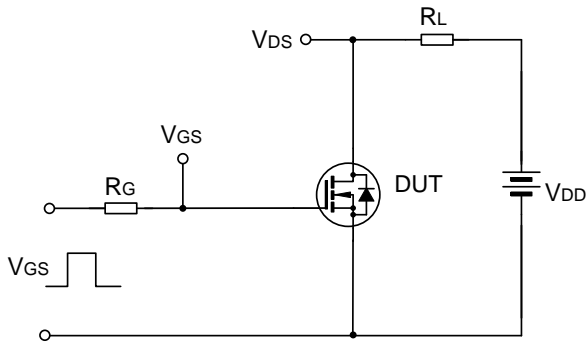


## TYPICAL TEST CIRCUIT

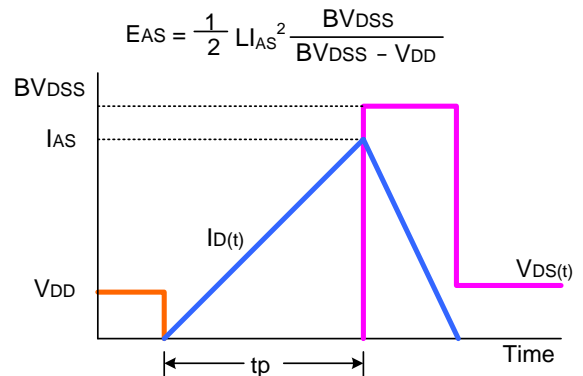
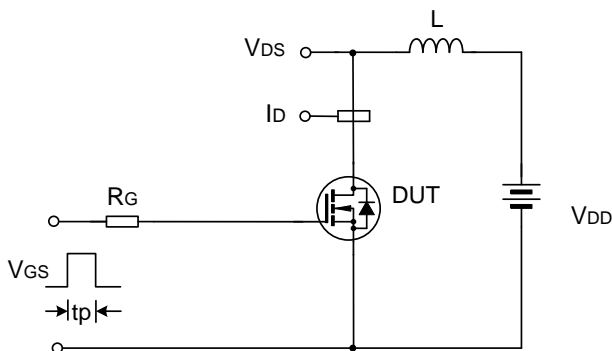
### Gate Charge Test Circuit & Waveform



### Resistive Switching Test Circuit & Waveform



### Unclamped Inductive Switching Test Circuit & Waveform



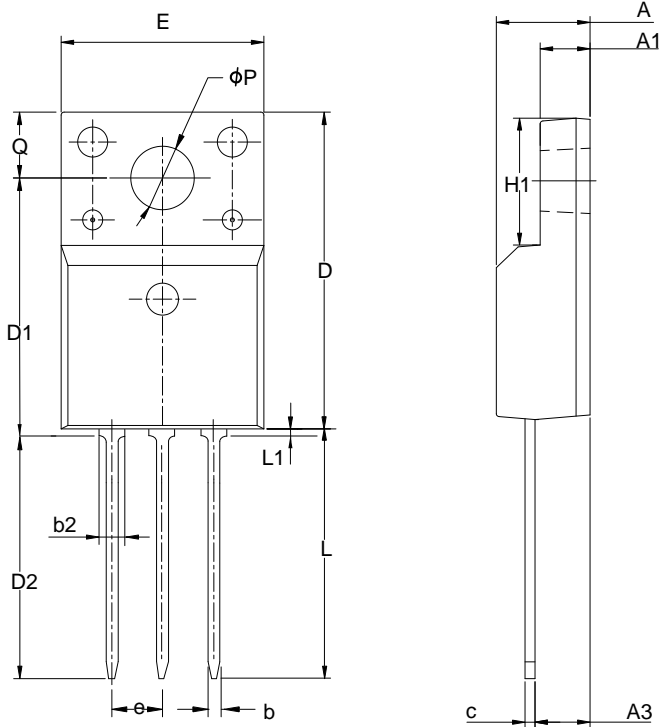




PACKAGE OUTLINE

TO-220FJH-3L

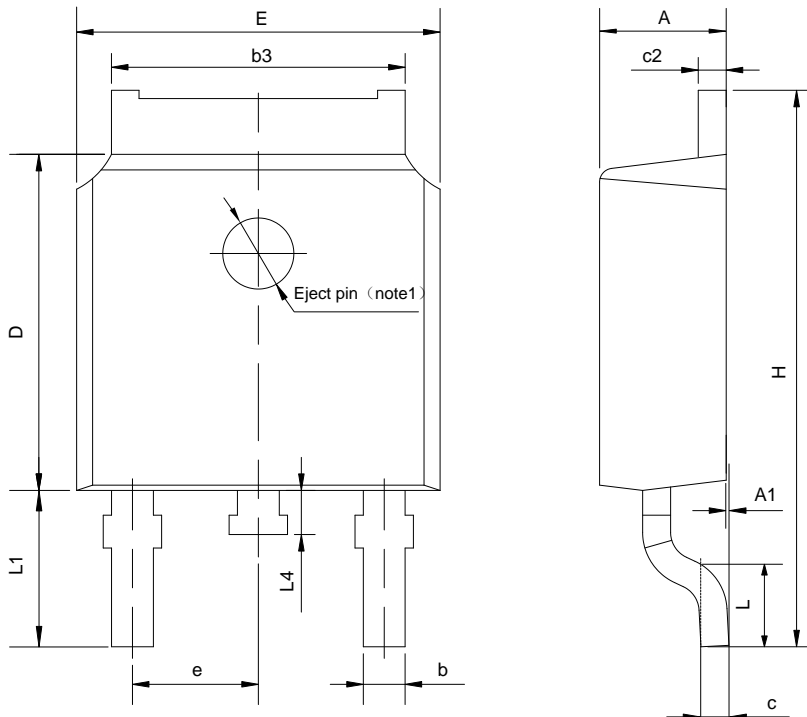
UNIT: mm



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	0.80
b2	—	—	1.29
c	0.35	0.50	0.65
D	15.25	15.87	16.25
D1	12.87	13.07	13.27
D2	12.28	12.48	12.68
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	—	—	0.85
φP	3.00	3.18	3.40
Q	3.05	3.30	3.55

TO-252-2L

UNIT: mm



SYMBOL	MILLIMETER		
	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

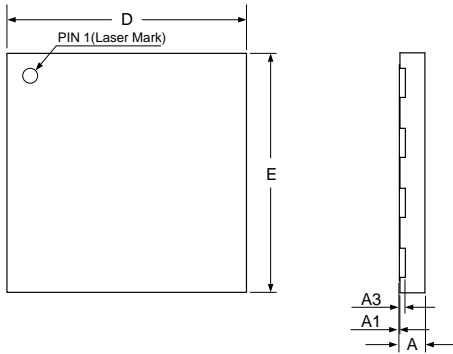
NOTE1 : There are two conditions for this position:has an eject pin or has no eject pin.



**PACKAGE OUTLINE(CONTINUED)**

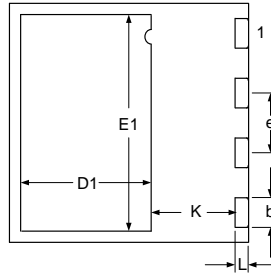
**DFN-4-8x8x0.85-2.0**

**UNIT: mm**

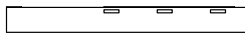


Top View

Side View



Bottom View

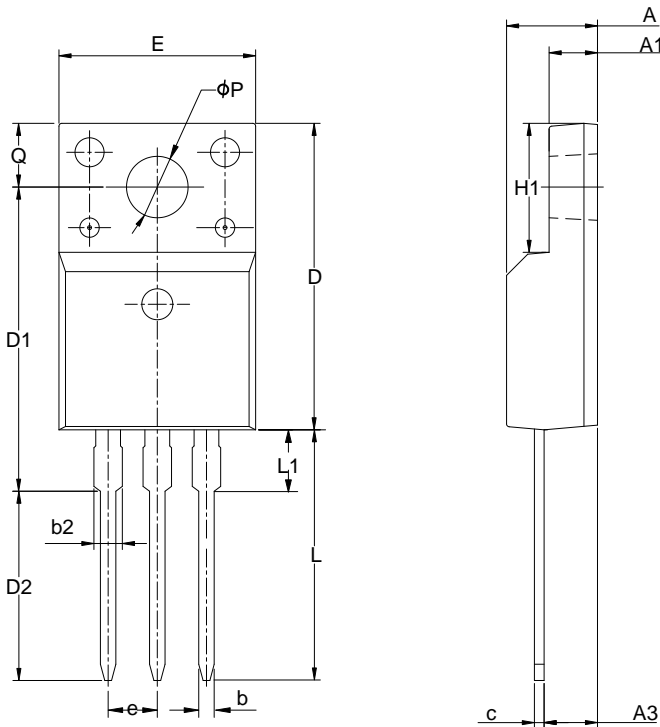


Side View

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.80	0.85	0.90
A1	0.00	0.02	0.05
A3	0.20 REF		
b	0.90	1.00	1.10
D	7.90	8.00	8.10
D1	7.10	7.20	7.30
E	7.90	8.00	8.10
E1	4.25	4.35	4.45
e	1.90	2.00	2.10
K	2.65	2.75	2.85
L	0.40	0.50	0.60

**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



**Important notice :**

1. The instructions are subject to change without notice!
2. Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current. Please read the instructions carefully before using our products, including the circuit operation precautions.
3. Our products are consumer electronic products or the other civil electronic products.
4. 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.
5. It is strongly recommended to identify the trademark when buying our products. Please contact us if there is any question.
6. Product promotion is endless, our company will wholeheartedly provide customers with better products!
7. Website: <http://www.silan.com.cn>

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Rev.: 1.2

Revision History:

1. SVS65R400L8AE3(DFN-4-8x8x0.85-2.0) packagefigures

Rev.: 1.0

Revision History:

1. First release
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