

## 87A, 150V N-CHANNEL MOSFET

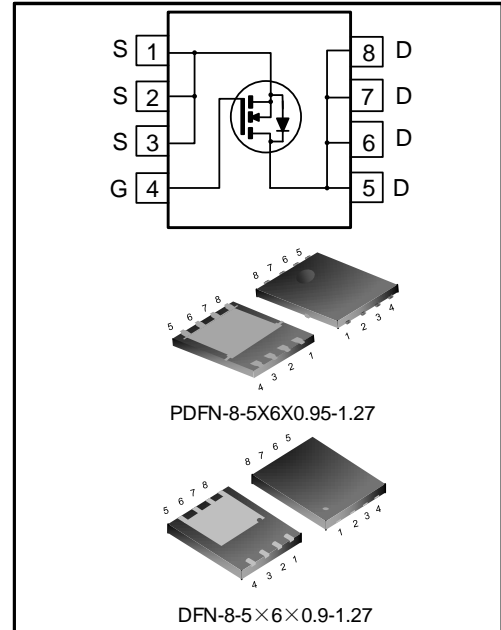
### DESCRIPTION

SVGP159R3NL5A(L5) is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan's LVMOS technology. The improved process and cell structure have been especially tailored to minimize on-state resistance, provide superior switching performance.

This device is widely used in power management for UPS and Inverter Systems.

### FEATURES

- ◆ 87A, 150V,  $R_{DS(on)(typ.)}=7.9m\Omega @ V_{GS}=10V$
- ◆ Low gate charge
- ◆ Low  $C_{rss}$
- ◆ Fast switching
- ◆ Extreme  $dv/dt$  rated
- ◆ 100% avalanche tested
- ◆ Pb-free lead plating
- ◆ RoHS compliant



### KEY PERFORMANCE PARAMETERS

Characteristics	Ratings	Unit
$V_{DS}$	150	V
$V_{GS(th)}$	3.0~4.6	V
$R_{DS(on),max.}$	9.3	$m\Omega$
$I_{D,pulse}$	87	A
$Q_{g,typ.}$	40	nC

### ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVGP159R3NL5ATR	DFN-8-5X6X0.9-1.27	P159R3N	Halogen free	Tape&reel
SVGP159R3NL5TR	PDFN-8-5X6X0.95-1.27	P159R3NL5	Halogen free	Tape&reel

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

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Drain-source Voltage	$V_{DS}$	--	150	--	--	V
Gate-source Voltage	$V_{GS}$	--	-20	--	20	V
Drain Current (Note 1)	$I_D$	$T_C=25^{\circ}\text{C}$	--	--	87	A
		$T_C=100^{\circ}\text{C}$	--	--	55	A
Drain Current Pulsed (Note 2)	$I_{DM}$	$T_C=25^{\circ}\text{C}$	--	--	348	A
Power Dissipation (Note 3)	$P_D$	$T_C=25^{\circ}\text{C}$	--	--	142	W
Single Pulsed Avalanche Energy	$E_{AS}$	$L=0.5\text{mH}$ , $V_{DD}=50\text{V}$ , $R_G=25\Omega$ , starting temperature $T_J=25^{\circ}\text{C}$	--	--	193	mJ
Single Pulsed Avalanche Current	$I_{AS}$	--	--	--	27.8	A
Operation Junction Temperature Range	$T_J$	--	-55	--	150	$^{\circ}\text{C}$
Storage Temperature Range	$T_{stg}$	--	-55	--	150	$^{\circ}\text{C}$

**THERMAL CHARACTERISTICS**

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Thermal Resistance, Junction-case, Bottom	$R_{\theta JC}$	--	--	--	0.88	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-ambient	$R_{\theta JA}$	--	--	--	50	$^{\circ}\text{C/W}$
Soldering Temperature (SMD)	$T_{sld}$	Reflow soldering: $10 \pm 1$ sec, 3times	--	--	260	$^{\circ}\text{C}$

## ELECTRICAL CHARACTERISTICS (UNLESS OTHERWISE NOTED, $T_J=25^{\circ}\text{C}$ )

### Static characteristics

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Drain-source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	150	--	--	V
Drain-source Leakage Current	$I_{DSS}$	$V_{DS}=150V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	--	--	1.0	$\mu A$
		$V_{DS}=150V, V_{GS}=0V, T_J=125^{\circ}\text{C}$	--	5.0	--	
Gate-source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	3.0	--	4.6	V
Static Drain-source On State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=44A$	--	7.9	9.3	$m\Omega$
		$V_{GS}=8V, I_D=22A$	--	8.7	10.5	
Transconductance	$g_{fs}$	$V_{DS}=2V, I_D=20A$	--	41	--	S
Gate Resistance	$R_G$	$f=1\text{MHz}$	--	1.6	--	$\Omega$

### Dynamic characteristics

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Input Capacitance	$C_{iss}$	$f=1\text{MHz}, V_{GS}=0V, V_{DS}=75V$	--	2800	--	pF
Output Capacitance	$C_{oss}$		--	710	--	
Reverse Transfer Capacitance	$C_{rss}$		--	17	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=75V, V_{GS}=10V, R_G=3\Omega, I_D=44A$ (Notes 4,5)	--	24	--	ns
Turn-on Rise Time	$t_r$		--	91	--	
Turn-off Delay Time	$t_{d(off)}$		--	27	--	
Turn-off Fall Time	$t_f$		--	32	--	
Total Gate Charge	$Q_g$	$V_{DD}=75V, V_{GS}=10V, I_D=44A$ (Notes 4,5)	--	40	--	nC
Gate-source Charge	$Q_{gs}$		--	23	--	
Gate-drain Charge	$Q_{gd}$		--	6.6	--	
Gate-plateau Voltage	$V_{plateau}$		--	7.3	--	V

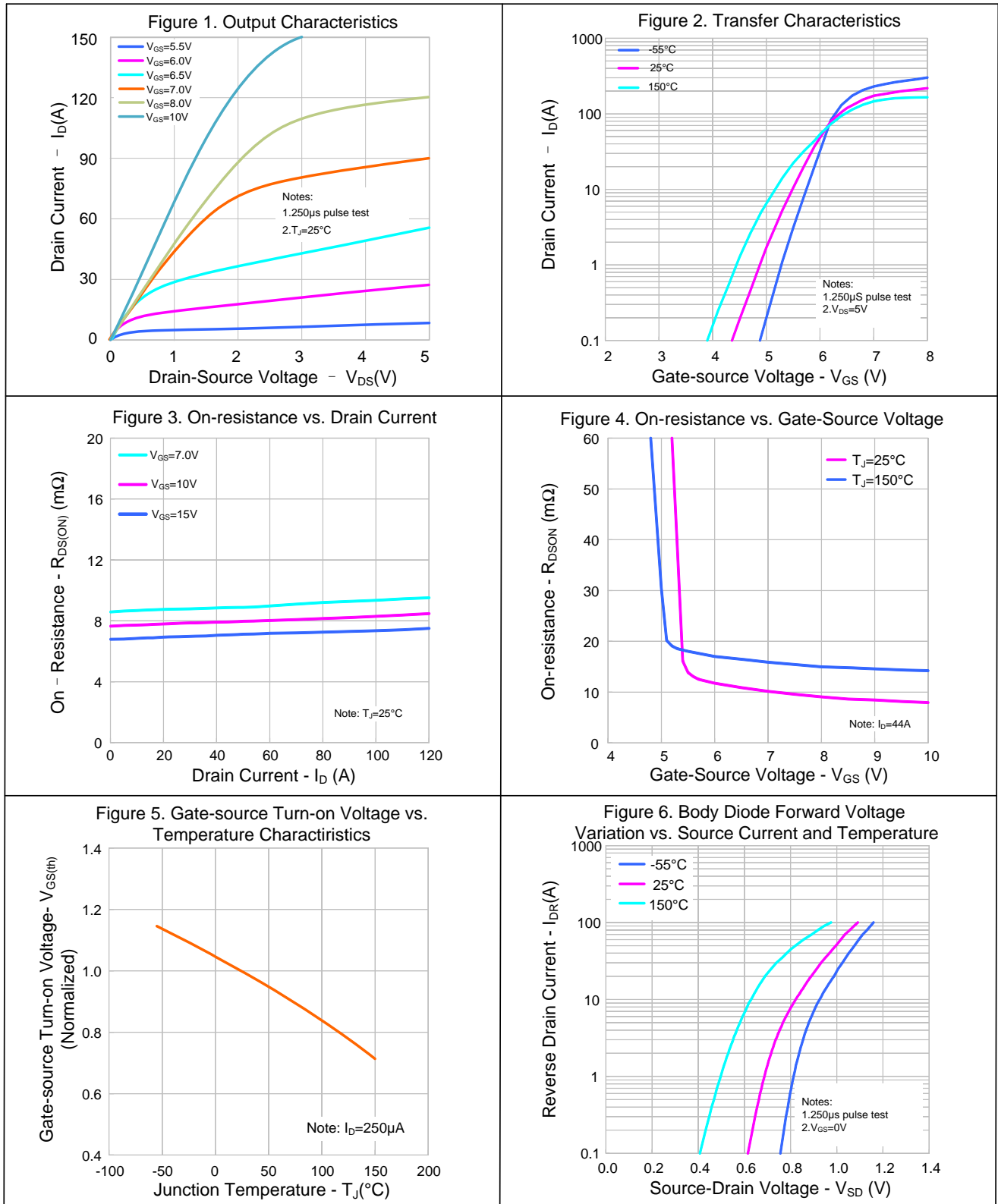
### Reverse diode characteristics

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Continuous Source Current	$I_S$	$T_C=25^{\circ}\text{C}$ , Integral Reverse P-N Junction Diode in the MOSFET	--	--	87	A
Diode pulse current	$I_{S,pulse}$		--	--	348	
Diode Forward Voltage	$V_{SD}$	$I_S=44A, V_{GS}=0V$	--	--	1.4	V
Reverse Recovery Time	$T_{rr}$	$I_S=44A, V_{GS}=0V,$ $dI_F/dt=100A/\mu s$ (Note 4)	--	48	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	58	--	nC

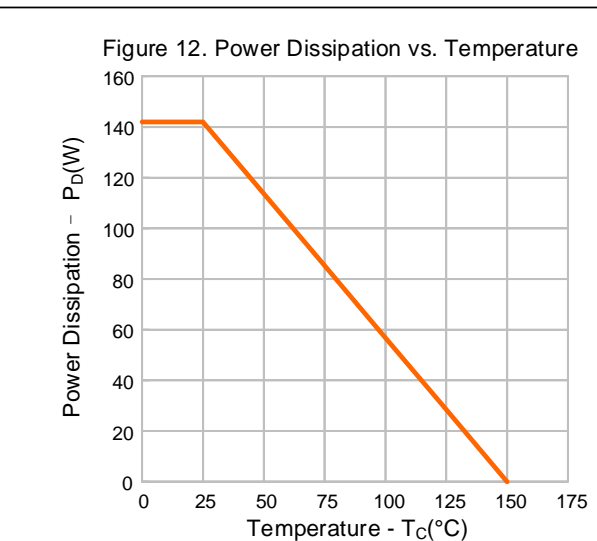
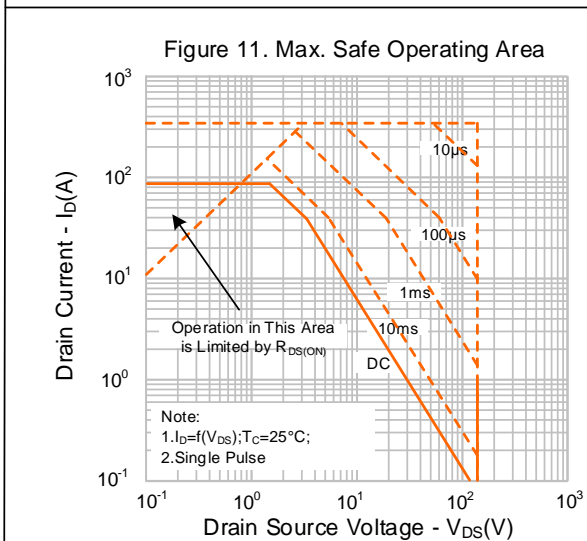
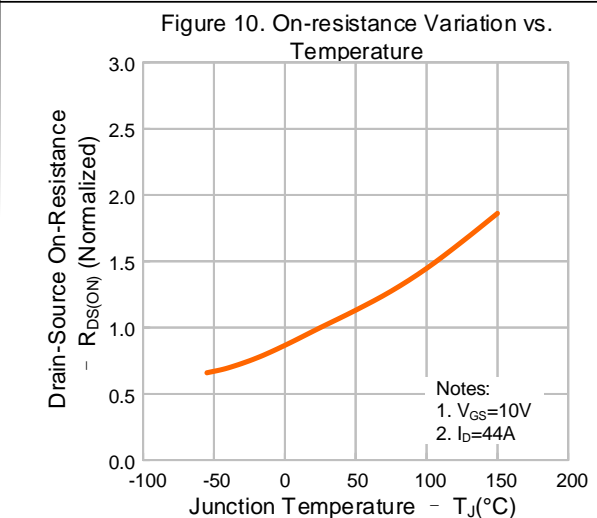
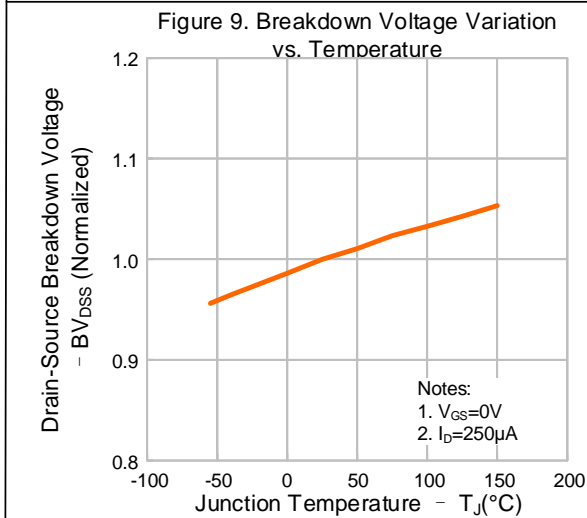
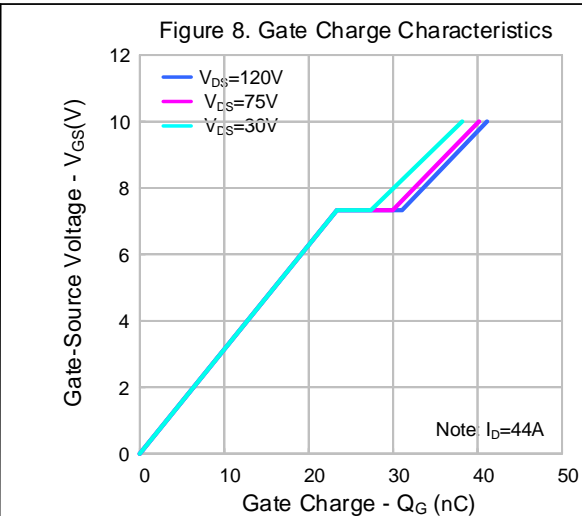
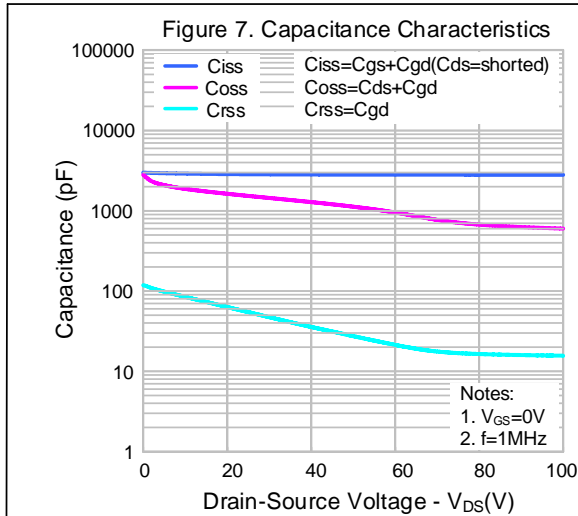
### Notes:

1. The rated value only refers to the maximum absolute value at the case temperature of  $25^{\circ}\text{C}$  in the specification. If the case temperature is higher than  $25^{\circ}\text{C}$ , it should be derated according to the actual environmental conditions;
2. Pulse time  $5\mu s$ , pulse width is limited by the maximum junction temperature;
3. The dissipation power will change with temperature, derating above  $25^{\circ}\text{C}$ :  $1.14W/^{\circ}\text{C}$ ;
4. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ ;
5. Essentially independent of operating temperature.

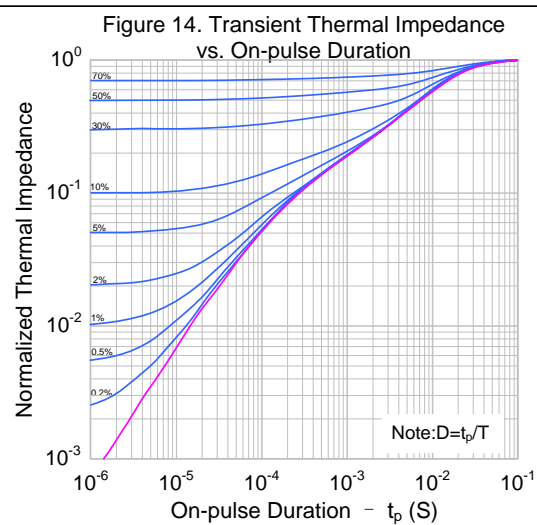
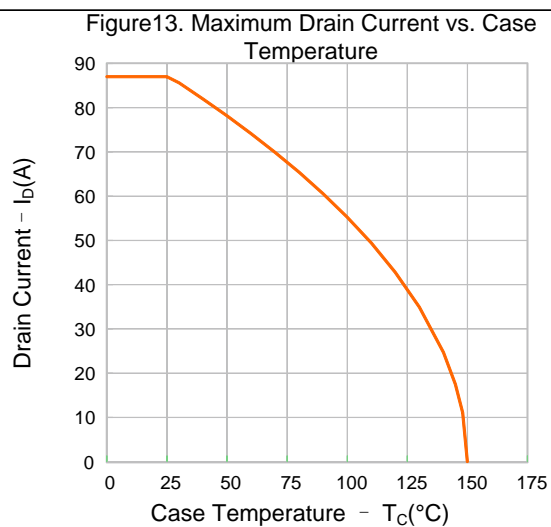
## TYPICAL CHARACTERISTICS



**TYPICAL CHARACTERISTICS (CONTINUED)**

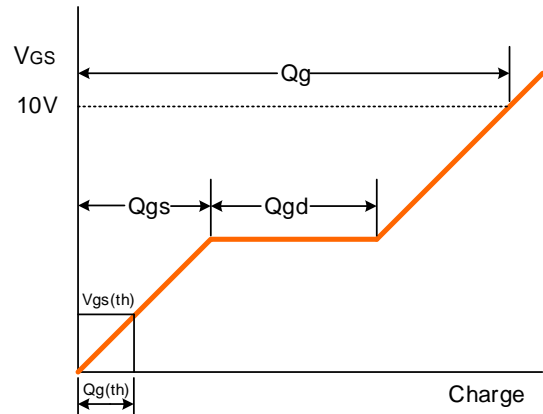
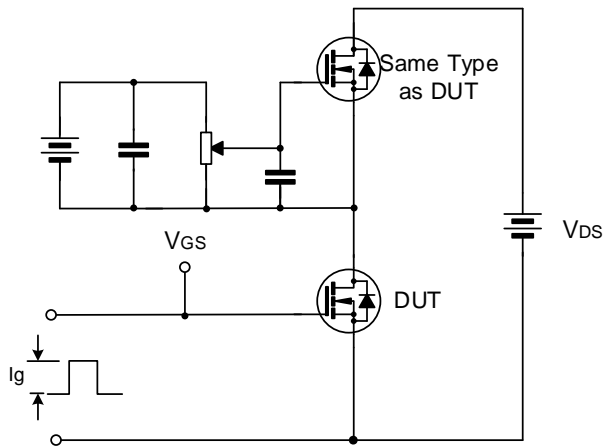


## TYPICAL CHARACTERISTICS (CONTINUED)

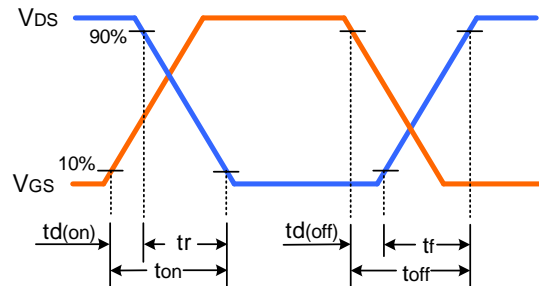
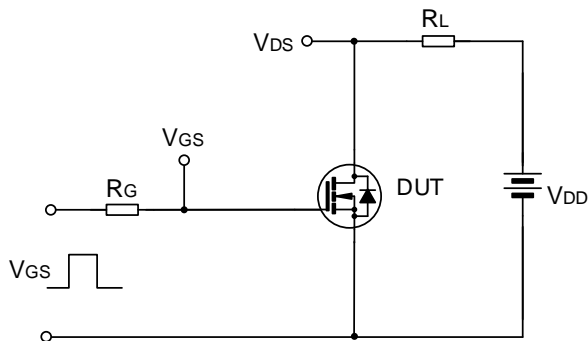


## TYPICAL TEST CIRCUIT

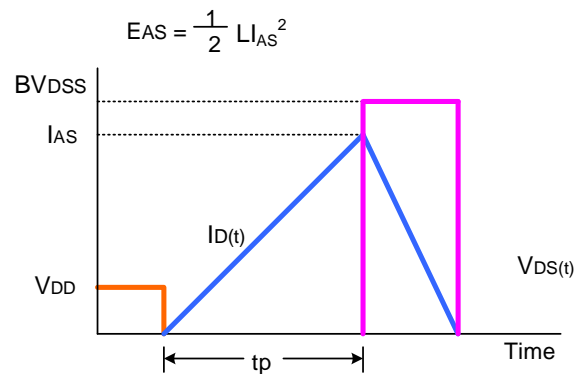
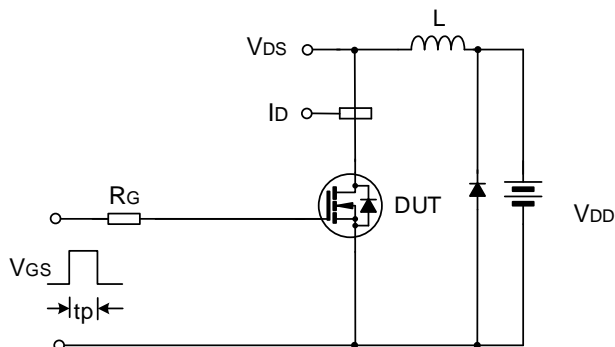
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



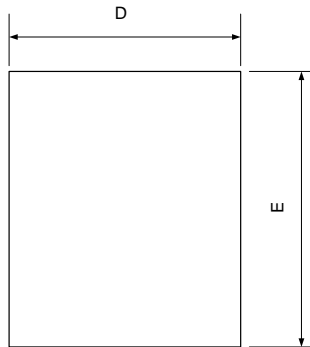
Unclamped Inductive Switching Test Circuit & Waveform



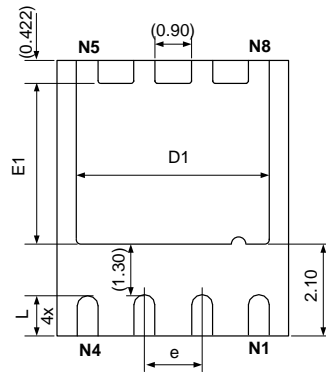
## PACKAGE OUTLINE

DFN-8-5x6x0.9-1.27

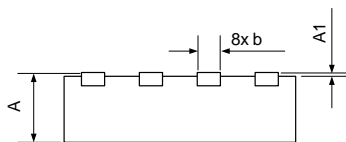
UNIT: mm



Top View



Bottom View

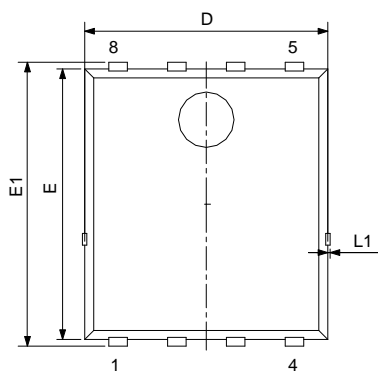


Side View

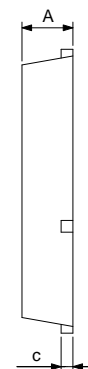
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.800	0.900	1.000
A1	0.000	0.020	0.050
b	0.350	0.400	0.450
D	5.00 BSC		
D1	4.030	4.180	4.280
E	6.00 BSC		
E1	3.328	3.478	3.578
e	1.27 BSC		
L	0.700	0.800	0.900

PDFN-8-5x6x0.95-1.27

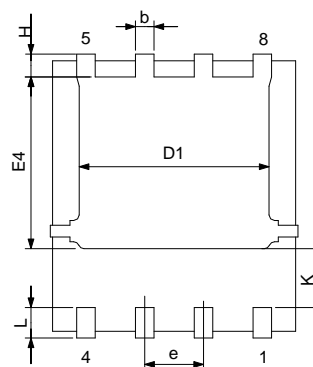
UNIT: mm



Top View



Side View



Bottom View

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.90	—	1.20
c	0.154	0.25	0.354
D	4.80	—	5.40
E	5.66	—	6.06
D1	3.76	—	4.30
E1	5.90	—	6.35
b	0.30	—	0.55
K	1.10	1.30	1.50
e	1.07	1.27	1.37
E4	3.34	—	3.92
L	0.30	0.60	0.71
L1	—	—	0.12
H	0.40	—	0.71

**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.
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Rev.: 1.5

Revision History:

1. Delete the wave soldering condition
  2. Update the typical test circuit
  3. Update the important notice
- 

Rev.: 1.4

Revision History:

1. Update SOA
  2. Update important notice
- 

Rev.: 1.3

Revision History:

1. Add package of SVGP159R3NL5(PDFN-8-5x6x0.95-1.27)
- 

Rev.: 1.2

Revision History:

1. Update package outline
- 

Rev.: 1.1

Revision History:

1. Update electrical characteristics
  2. Update figure 5 and figure13
- 

Rev.: 1.0

Revision History:

1. First release
-