

13A, 500V N-CHANNEL MOSFET

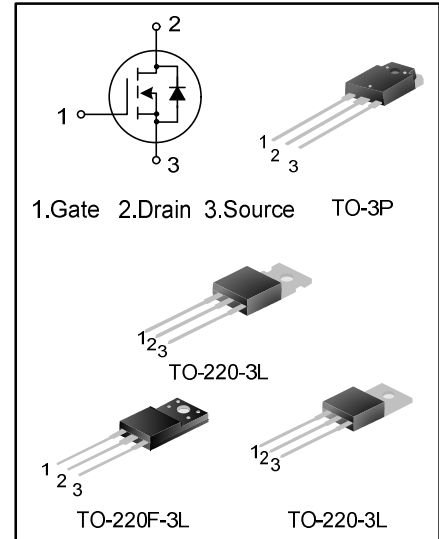
GENERAL DESCRIPTION

SVF13N50T/F/PN is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary F-Cell™ structure VDMOS technology. The improved process and cell structure have been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

This device is widely used in AC-DC power supplies, DC-DC converters and H-bridge PWM motor drivers.

FEATURES

- 13A, 500V, $R_{DS(on)}(typ.) = 0.44\Omega @ V_{GS}=10V$
- Low gate charge
- Low C_{rss}
- Fast switching
- Improved dv/dt capability



ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing
SVF13N50F	TO-220F-3L	SVF13N50F	Pb free	Tube
SVF13N50T	TO-220-3L	SVF13N50T	Pb free	Tube
SVF13N50PN	TO-3P	13N50	Pb free	Tube

ABSOLUTE MAXIMUM RATINGS ($T_C=25^{\circ}\text{C}$, unless otherwise noted)

Characteristics		Symbol	Ratings			Unit
			SVF13N50T	SVF13N50F	SVF13N50PN	
Drain-Source Voltage		V _{DS}	500			V
Gate-Source Voltage		V _{GS}	±30			V
Drain Current	T _C =25°C	I _D	13			A
	T _C =100°C		8.2			
Drain Current Pulsed		I _{DM}	52			A
Power Dissipation(T _C =25°C) - Derate above 25°C		P _D	190	51	218	W
			1.52	0.41	1.74	W/°C
Single Pulsed Avalanche Energy (Note 1)		E _{AS}	663			mJ
Operation Junction Temperature Rating		T _J	-55~+150			°C
Storage Temperature Rating		T _{stg}	-55~+150			°C

THERMAL CHARACTERISTICS

Characteristics		Symbol	Ratings			Unit
			SVF13N50T	SVF13N50F	SVF13N50PN	
Thermal Resistance, Junction-to-Case		$R_{\theta JC}$	0.66	2.45	0.57	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient		$R_{\theta JA}$	62.5	62.5	50	$^{\circ}\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain –Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$	500	--	--	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=500\text{V}$, $V_{GS}=0\text{V}$	--	--	1	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 30\text{V}$, $V_{DS}=0\text{V}$	--	--	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}$, $I_D=250\mu\text{A}$	2.0	--	4.0	V
On State Resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}$, $I_D=6.5\text{A}$	--	0.44	0.52	Ω
Input Capacitance	C_{iss}	$V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHZ}$	--	1340	--	pF
Output Capacitance	C_{oss}		--	170	--	
Reverse Transfer Capacitance	C_{rss}		--	13.0	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=250\text{V}$, $I_D=13\text{A}$, $R_G=4.7\Omega$, $V_{GS}=10\text{V}$ (Note 2,3)	--	25.53	--	ns
Turn-on Rise Time	t_r		--	48.80	--	
Turn-off Delay Time	$t_{d(off)}$		--	72.33	--	
Turn-off Fall Time	t_f		--	40.27	--	
Total Gate Charge	Q_g	$V_{DS}=400\text{V}$, $I_D=13\text{A}$, $V_{GS}=10\text{V}$ (Note 2,3)	--	29.5	--	nC
Gate-Source Charge	Q_{gs}		--	8.00	--	
Gate-Drain Charge	Q_{gd}		--	12.3	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction	--	--	13	A
Pulsed Source Current	I_{SM}	Diode in the MOSFET	--	--	52	
Diode Forward Voltage	V_{SD}	$I_S=13A$, $V_{GS}=0V$	--	--	1.3	V
Reverse Recovery Time	T_{rr}	$I_S=13A$, $V_{GS}=0V$,	--	495	--	ns
Reverse Recovery Charge	Q_{rr}	$dI_F/dt=100A/\mu S$ (Note 2)	--	5.0	--	μC

Notes:

1. $L=30mH$, $I_{AS}=7.5A$, $V_{DD}=100V$, $R_G=25\Omega$, starting $T_J=25^\circ C$;
2. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;
3. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

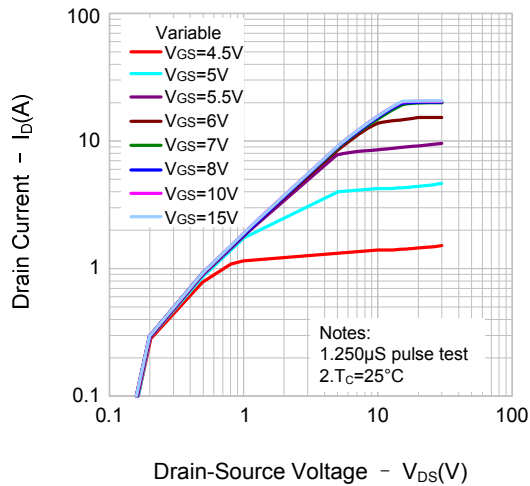


Figure 2. Transfer Characteristics

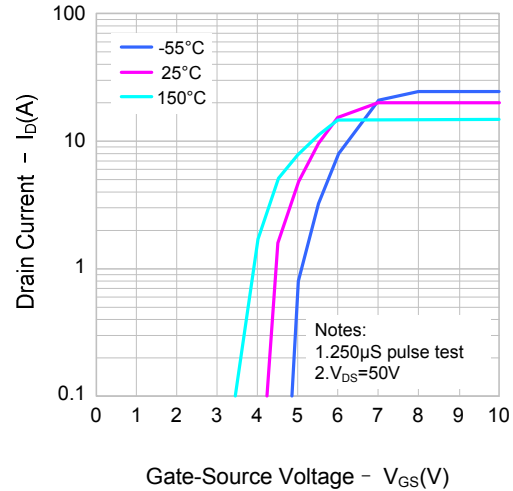


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

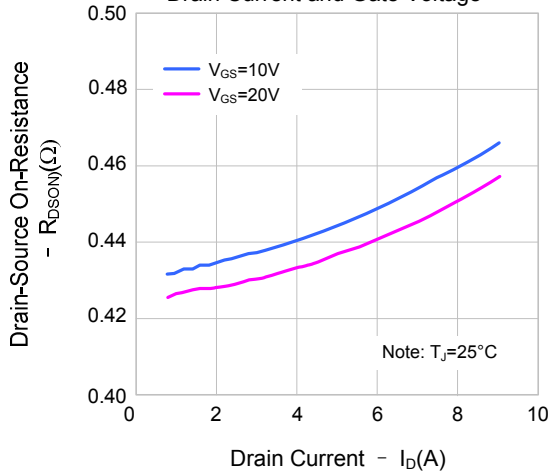
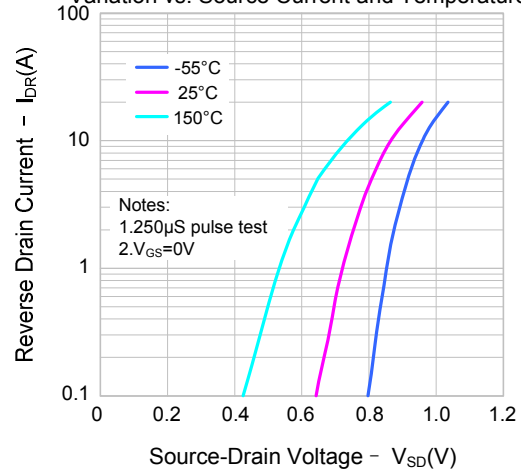


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature



TYPICAL CHARACTERISTICS(continued)

Figure 5. Capacitance Characteristics

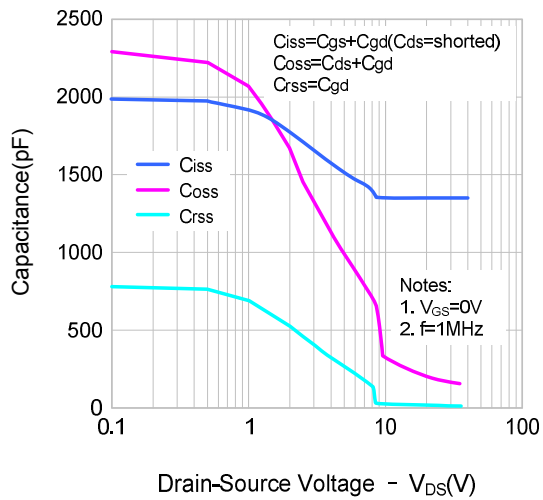


Figure 6. Gate Charge Characteristics

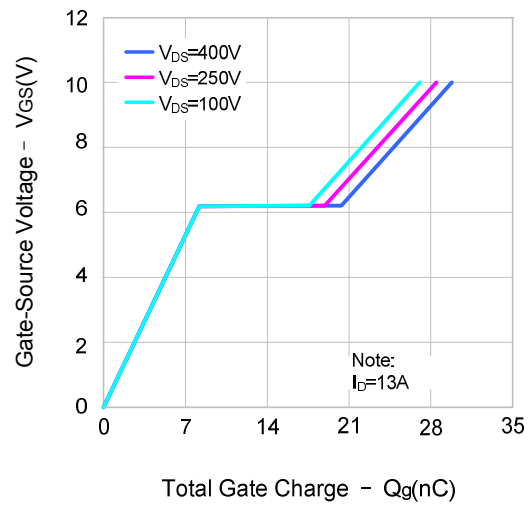


Figure 7. Breakdown Voltage Variation vs. Temperature

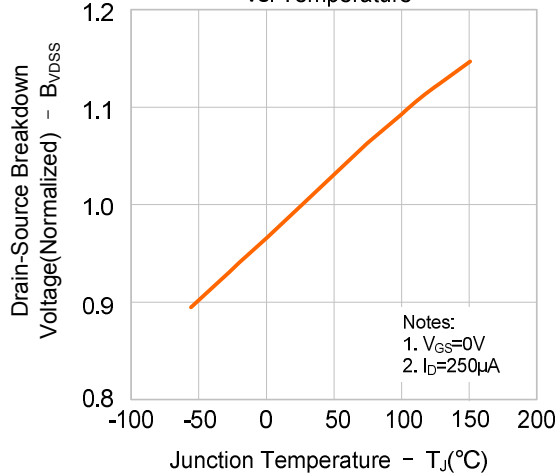


Figure 8. On-resistance Variation vs. Temperature

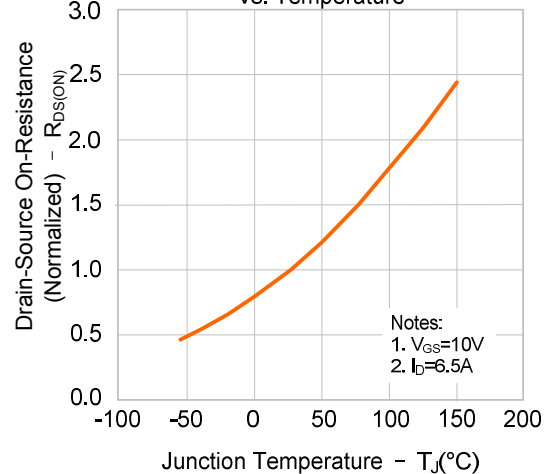


Figure 9-1. Max. Safe Operating Area(SVF13N50T)

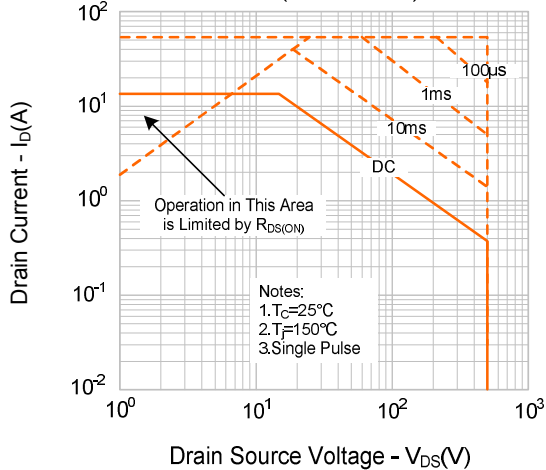
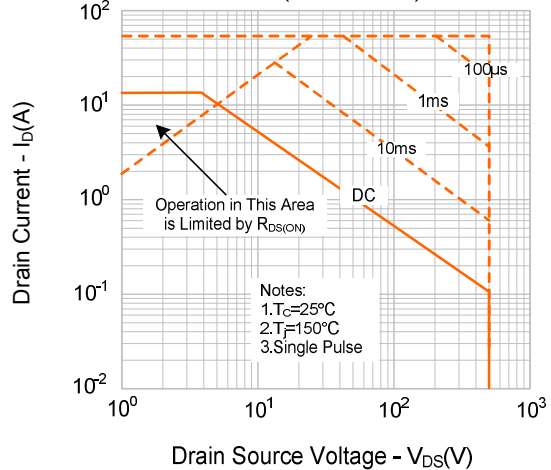
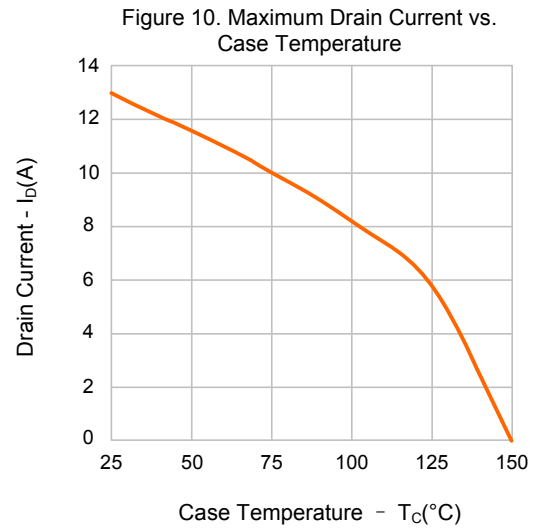
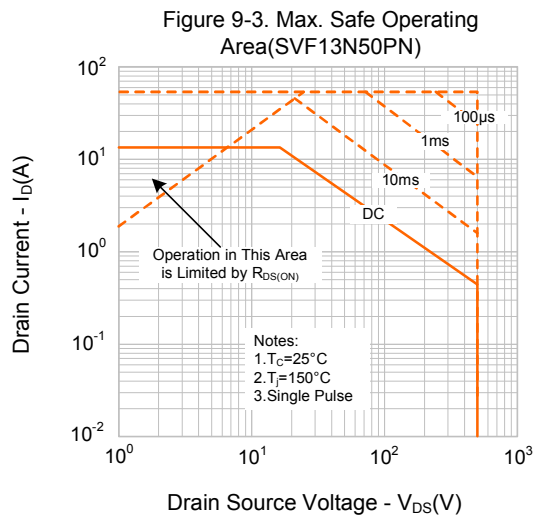


Figure 9-2. Max. Safe Operating Area(SVF13N50F)

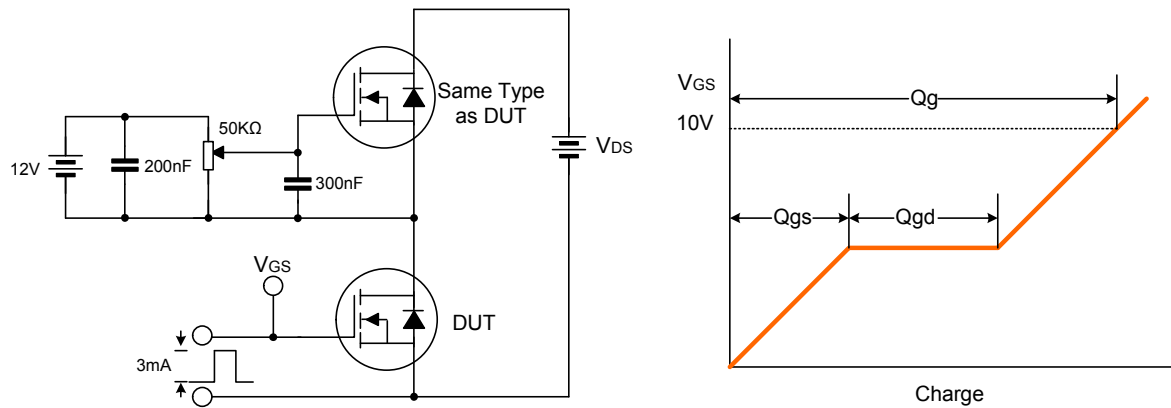


TYPICAL CHARACTERISTICS(continued)

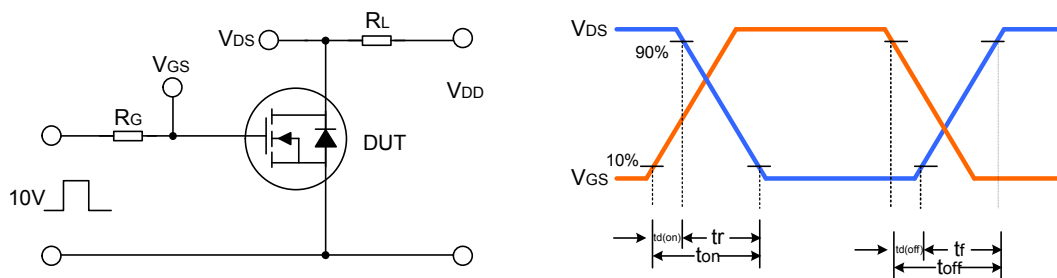


TYPICAL TEST CIRCUIT

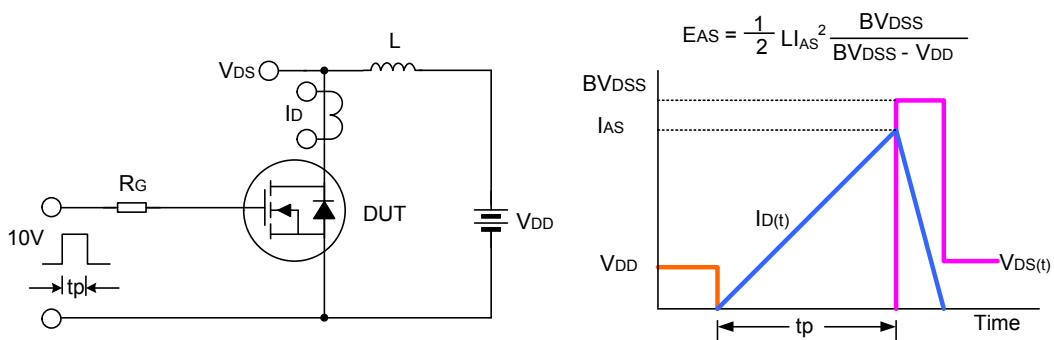
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



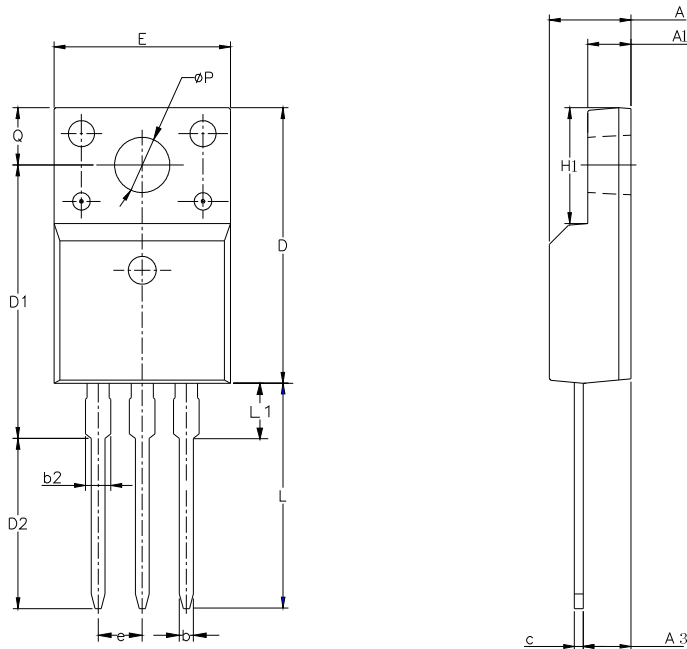
Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

TO-220F-3L

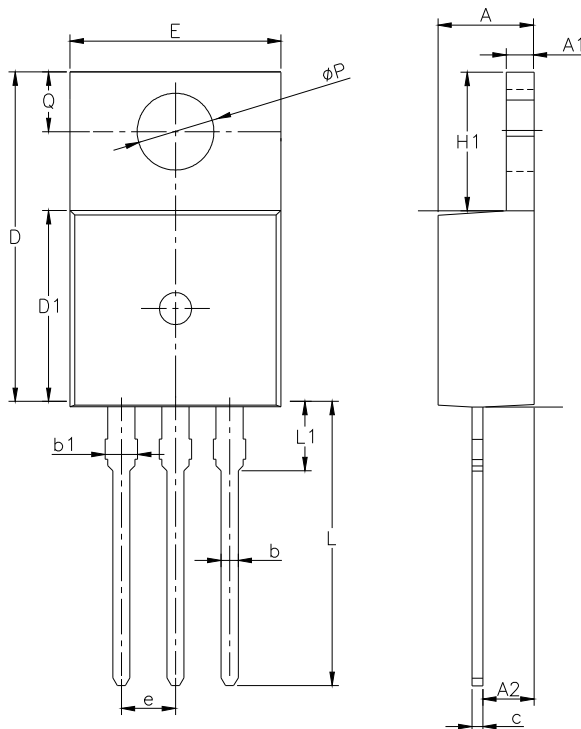
UNIT: mm



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

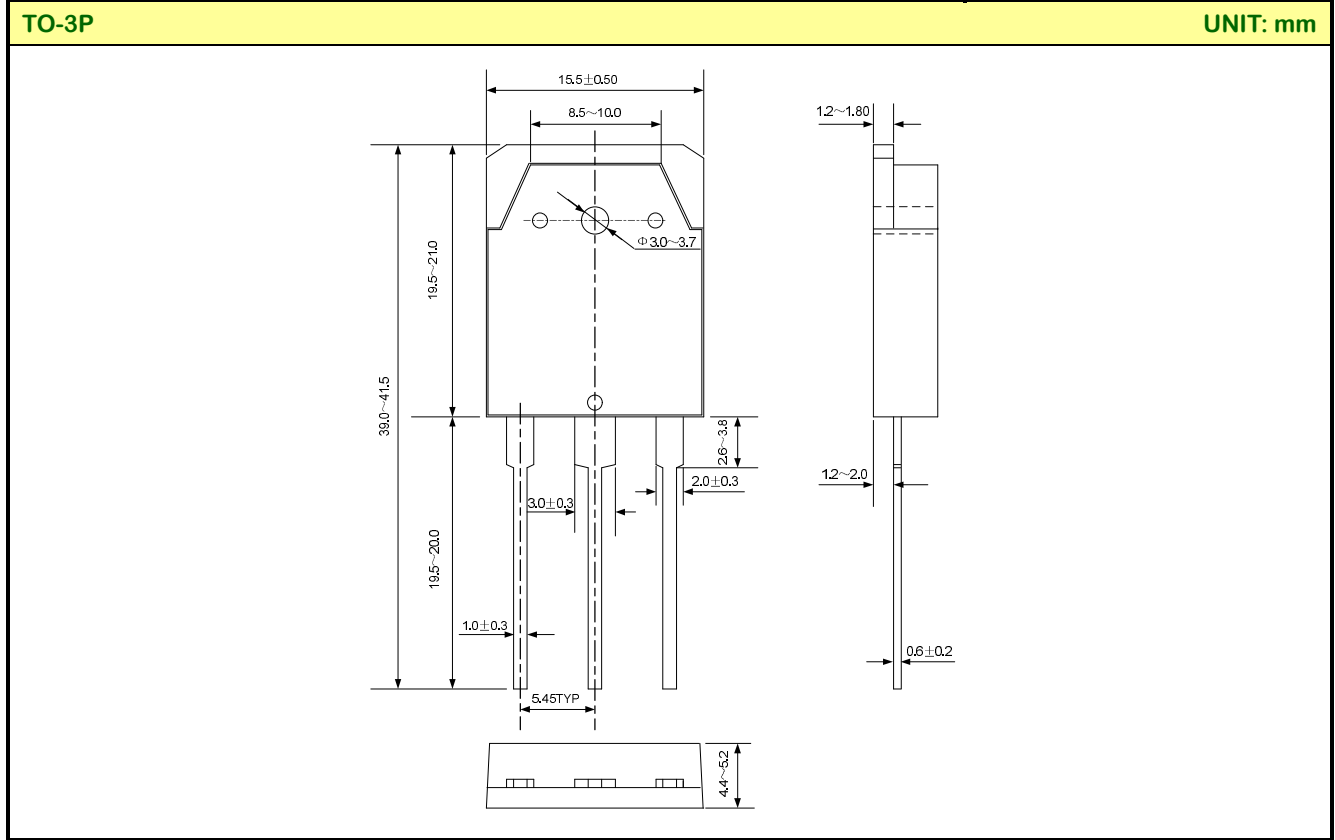
TO-220-3L

单位: 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

PACKAGE OUTLINE



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.:	SVF13N50T/F/PN	Document Type:	Datasheet
Copyright:	HANGZHOU SILAN MICROELECTRONICS CO.,LTD	Website:	http://www.silan.com.cn

Rev.: 2.0

Revision History:

1. Add another solid figure of TO-220-3L
-

Rev.: 1.9

Revision History:

1. Modify the Electrical characteristics
-

Rev.: 1.8

Revision History:

1. Modify the package information of TO-220F-3L
 2. Modify the package information of TO-220-3L
-

Rev.: 1.7

Revision History:

1. Modify the thermal characteristics
-

Rev.: 1.6

Revision History:

1. Modify the ordering information
-

Rev.: 1.5

Revision History:

1. Change the schematic diagram of MOS
-

Rev.: 1.4

Revision History:

1. Modify "ELECTRICAL CHARACTERISTICS"
-

Rev.: 1.3

Revision History:

1. Modify the values of T_{rr} and Q_{rr}
-

Rev.: 1.2

Revision History:

1. Add the halogen free information of SVF13N50F
-

Rev.: 1.1

Revision History:

1. Modify "PACKAGE OUTLINE"
-

Rev.: 1.0

Revision History:

1. Original
-
-