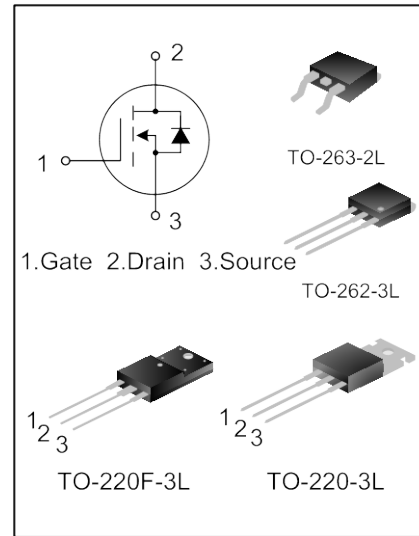


## 12A, 600V N-CHANNEL MOSFET

### GENERAL DESCRIPTION

SVF12N60T/F/FG/S/K is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary F-Cell™ structure VDMOS technology. The improved planar stripe cell and the improved guard ring terminal have been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

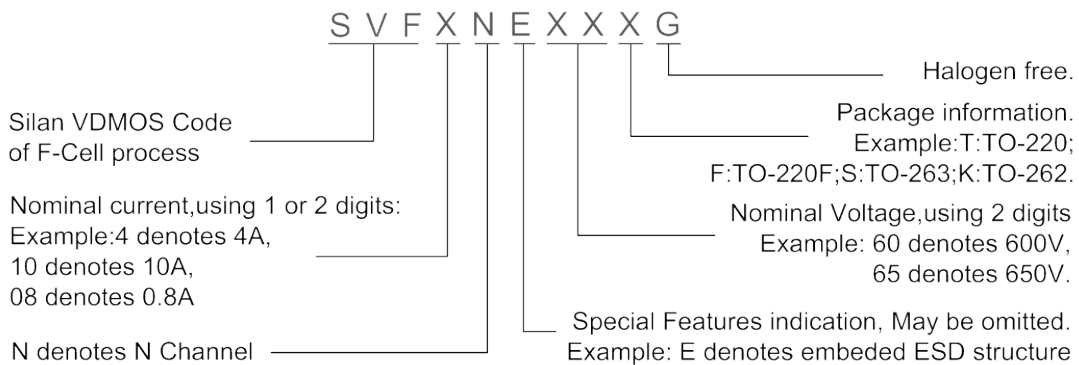
These devices are widely used in AC-DC power suppliers, DC-DC converters and H-bridge PWM motor drivers.



### FEATURES

- \* 12A,600V, $R_{DS(on)(typ)}=0.58\Omega@V_{GS}=10V$
- \* Low gate charge
- \* Low Crss
- \* Fast switching
- \* Improved dv/dt capability

### NOMENCLATURE



### ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SVF12N60T	TO-220-3L	SVF12N60T	Pb free	Tube
SVF12N60F	TO-220F-3L	SVF12N60F	Pb free	Tube
SVF12N60FG	TO-220F-3L	SVF12N60FG	Halogen free	Tube
SVF12N60S	TO-263-2L	SVF12N60S	Pb free	Tube
SVF12N60STR	TO-263-2L	SVF12N60S	Pb free	Tape&Reel
SVF12N60K	TO-262-3L	SVF12N60K	Pb free	Tube

## ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub>=25°C unless otherwise noted)

Characteristics	Symbol	Ratings				Unit
		SVF12N 60T	SVF12N 60F(G)	SVF12N 60S	SVF12N 60K	
Drain-Source Voltage	V <sub>DS</sub>	600				V
Gate-Source Voltage	V <sub>GS</sub>	±30				V
Drain Current	I <sub>D</sub>	12				A
		9				
Drain Current Pulsed	I <sub>DM</sub>	48				A
Power Dissipation(T <sub>C</sub> =25°C) -Derate above 25°C	P <sub>D</sub>	225	51	180	213	W
		1.8	0.41	1.44	1.7	W/°C
Single Pulsed Avalanche Energy (Note 1)	E <sub>AS</sub>	795				mJ
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	Ratings				Unit
		SVF12N 60T	SVF12N 60F(G)	SVF12N 60S	SVF12N 60K	
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	0.56	2.44	0.69	0.59	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	62.5	120	62.5	62.5	°C/W

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub>=25°C unless otherwise noted)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	B <sub>VDS</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> =6.0A	--	0.58	0.75	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHZ	--	1469.9	--	pF
Output Capacitance	C <sub>oss</sub>		--	161.2	--	
Reverse Transfer Capacitance	C <sub>rss</sub>		--	5.0	--	
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =300V, I <sub>D</sub> =12A, R <sub>G</sub> =25Ω  (Note 2,3)	--	37.0	--	ns
Turn-on Rise Time	t <sub>r</sub>		--	71.67	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	80.0	--	
Turn-off Fall Time	t <sub>f</sub>		--	43.67	--	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =480V, I <sub>D</sub> =12A, V <sub>GS</sub> =10V  (Note 2,3)	--	24.35	--	nC
Gate-Source Charge	Q <sub>gs</sub>		--	7.79	--	
Gate-Drain Charge	Q <sub>gd</sub>		--	7.34	--	



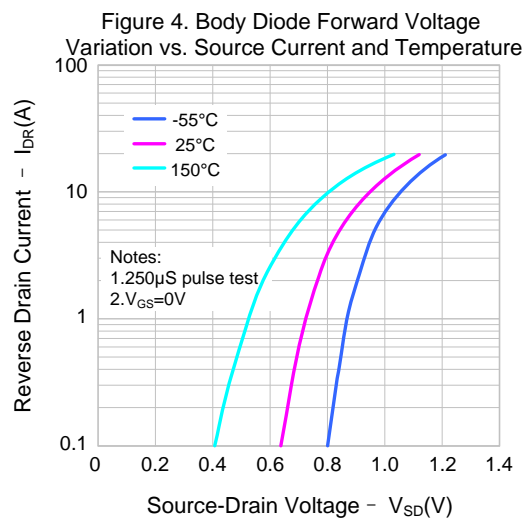
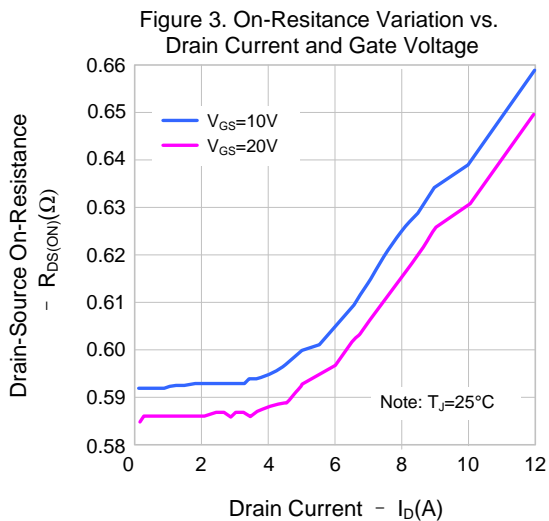
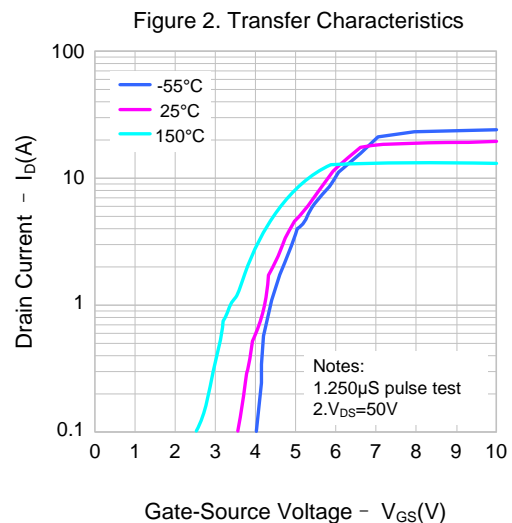
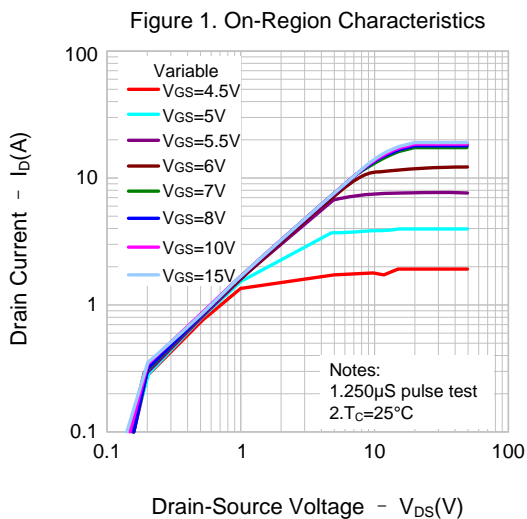
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	$I_S$	Integral Reverse p-n	--	--	12	A
Pulsed Source Current	$I_{SM}$	Junction Diode in the MOSFET	--	--	48	
Diode Forward Voltage	$V_{SD}$	$I_S=12A, V_{GS}=0V$	--	--	1.3	V
Reverse Recovery Time	$T_{rr}$	$I_S=12A, V_{GS}=0V,$	--	574.44	--	ns
Reverse Recovery Charge	$Q_{rr}$	$dl_F/dt=100A/\mu S$ (Note 2)	--	5.42	--	$\mu C$

Notes:

1.  $L=30mH, I_{AS}=6.66A, V_{DD}=140V, R_G=25\Omega,$  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





TYPICAL CHARACTERISTICS(continued)

Figure 5. Capacitance Characteristics

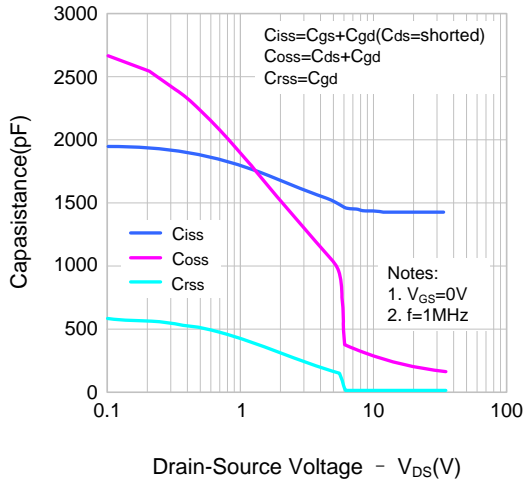


Figure 6. Gate Charge Characteristics

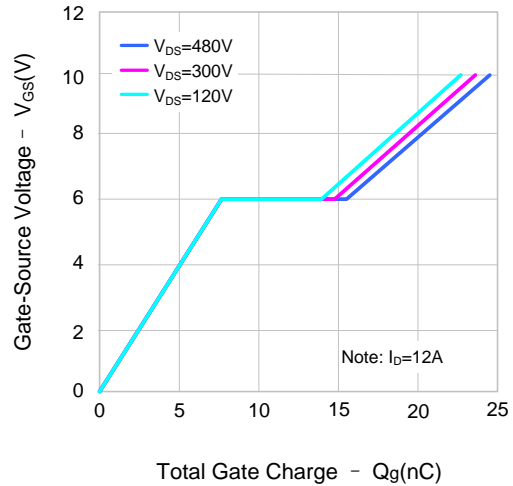


Figure 7. Breakdown Voltage Variation vs. Temperature

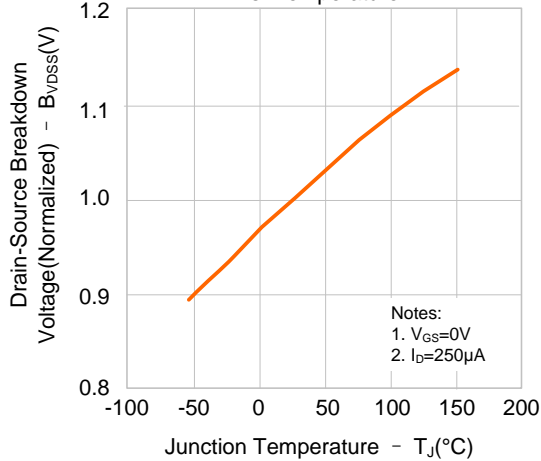


Figure 8. On-resistance Variation vs. Temperature

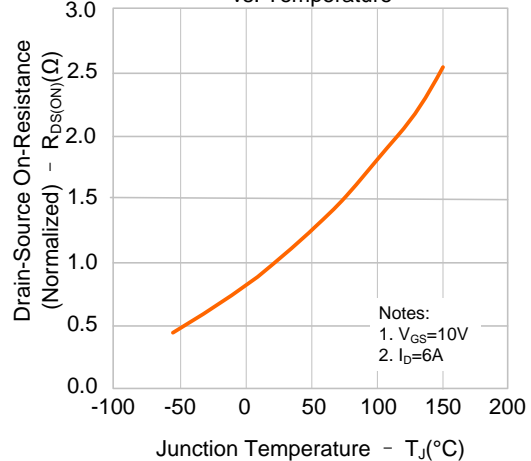


Figure 9-1. Max. Safe Operating Area(SVF12N60T)

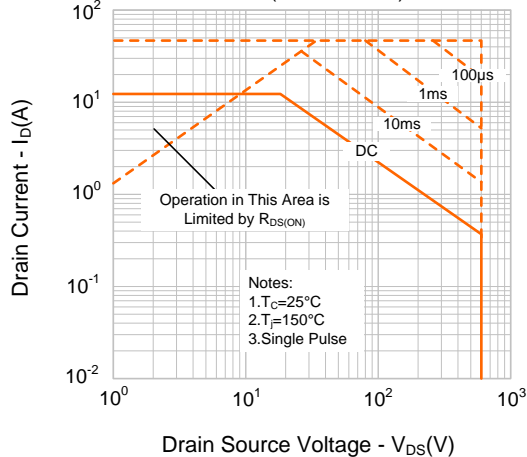
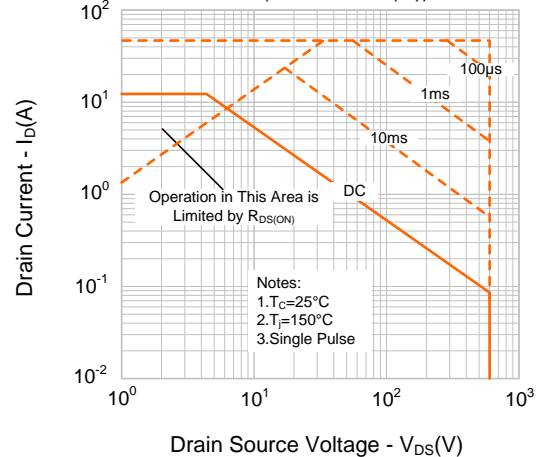


Figure 9-2. Max. Safe Operating Area(SVF12N60F(G))





## TYPICAL CHARACTERISTICS(continued)

Figure 9-3. Max. Safe Operating Area(SVF12N60S)

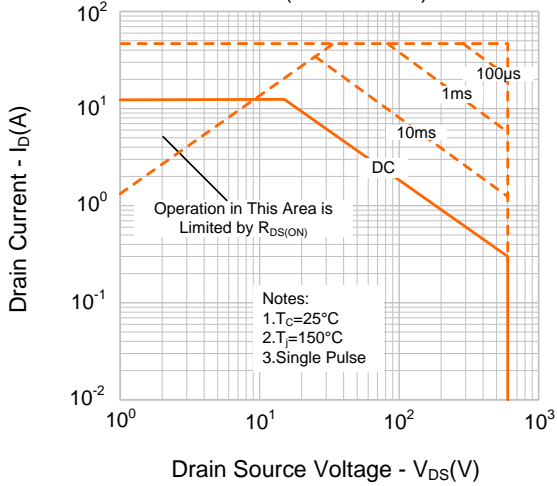


Figure 9-4. Max. Safe Operating Area(SVF12N60K)

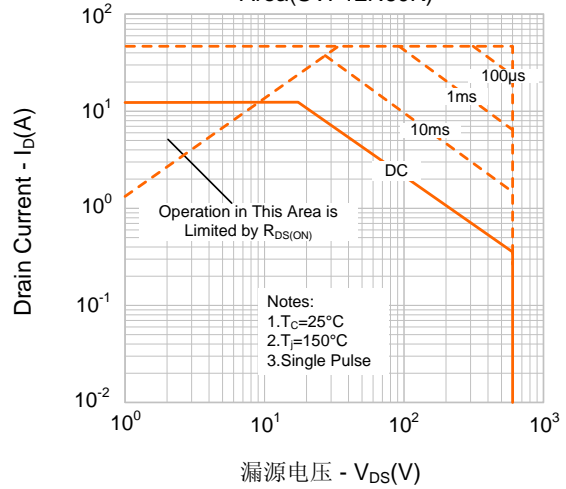
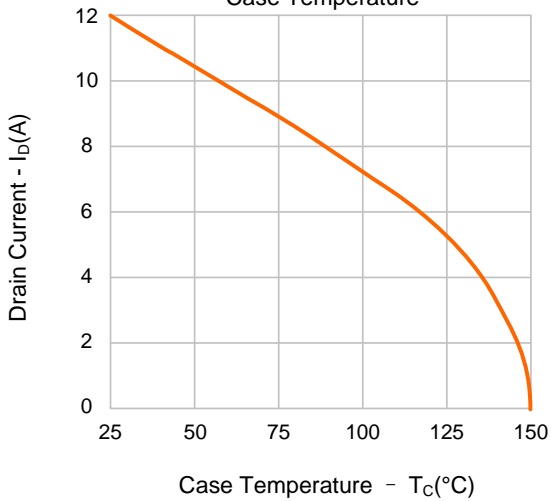
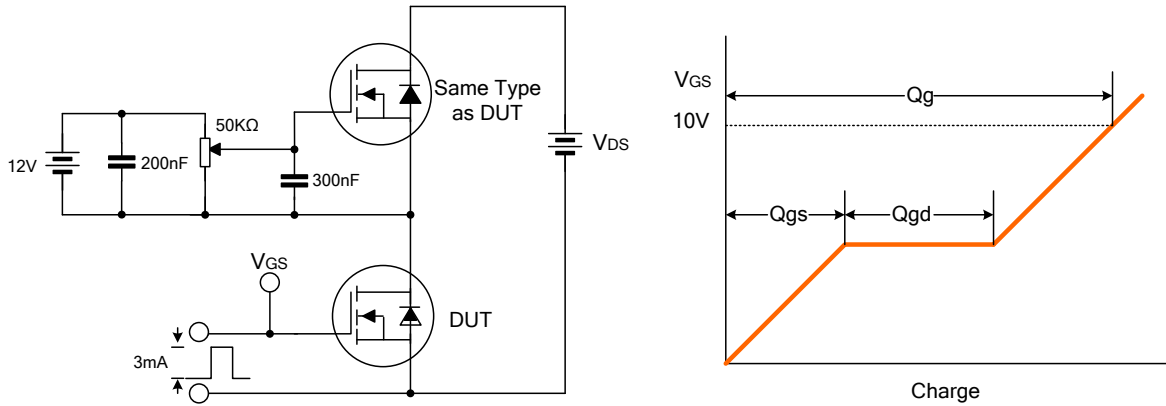


Figure 10. Maximum Drain Current vs. Case Temperature

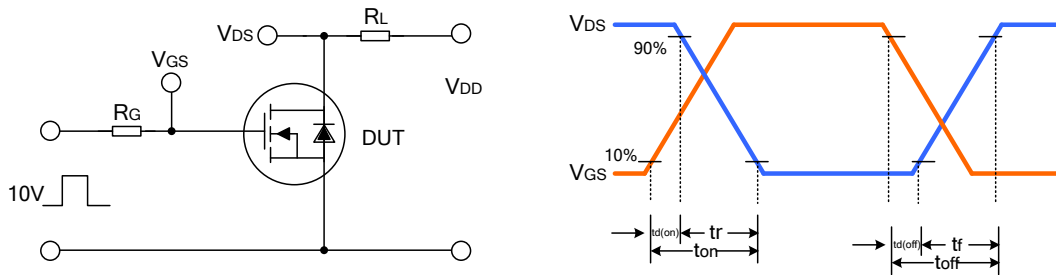


**TYPICAL TEST CIRCUIT**

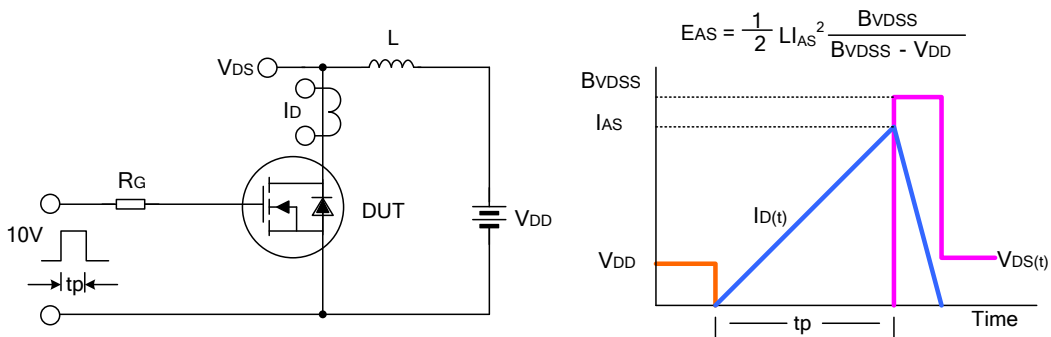
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform

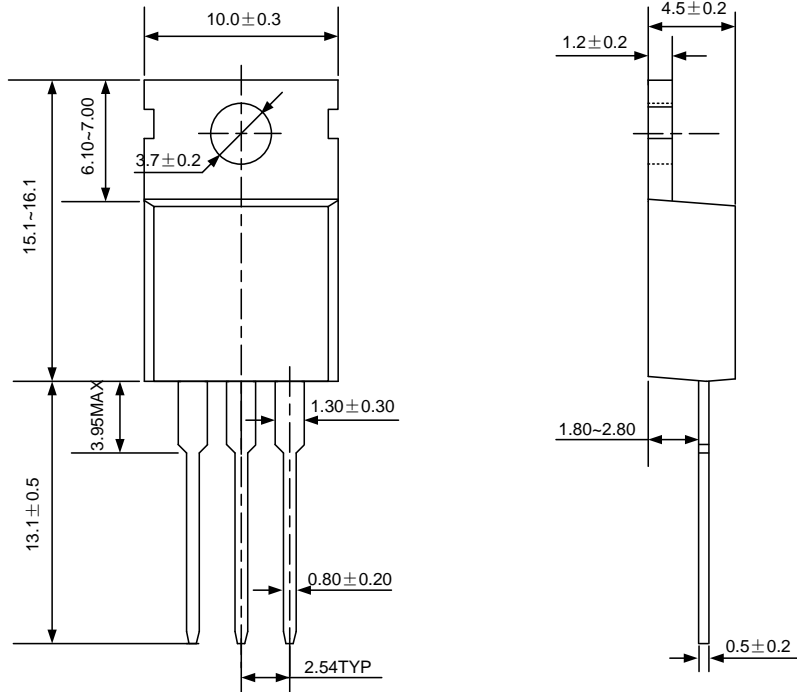




## PACKAGE OUTLINE

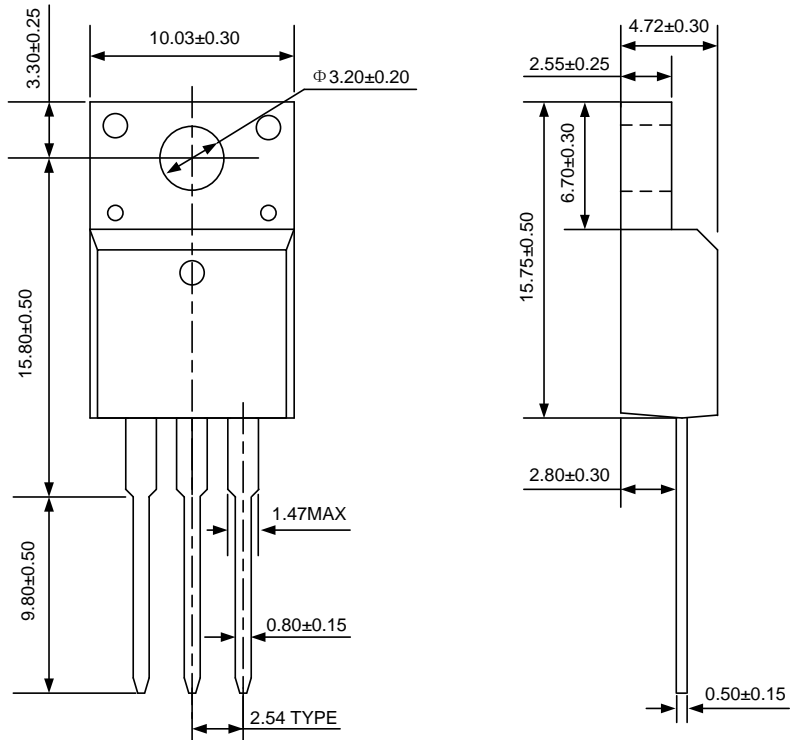
TO-220-3L

UNIT: mm



TO-220F-3L

UNIT: mm

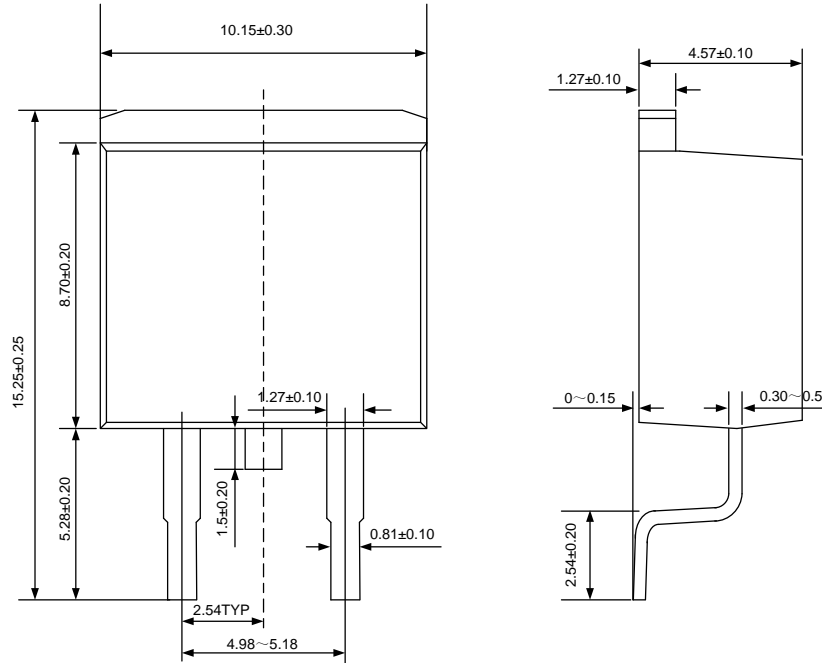




## PACKAGE OUTLINE(continued)

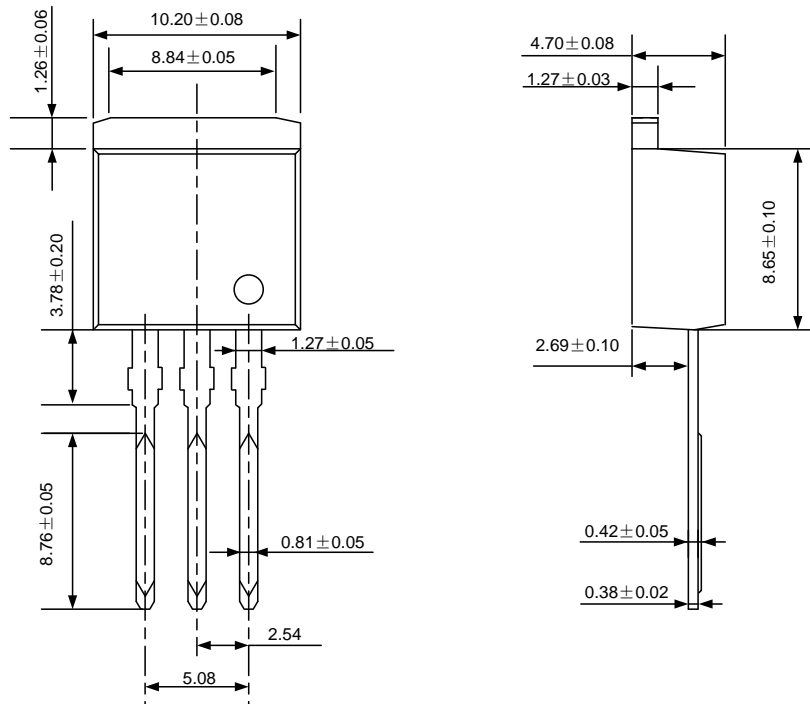
TO-263-2L

UNIT: mm



TO-262-3L

UNIT: mm







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- Silan will supply the best possible product for customers!

## ATTACHMENT

### Revision History

Date	REV	Description	Page
2011.01.19	1.0	Original	
2011.08.30	1.1	Modify "PACKAGE OUTLINE"	
2012.04.11	1.2	Add the halogen free information of SVF12N60F	
2012.05.31	1.3	Modify the value of $T_{rr}$ and $Q_{rr}$ ; Modify the value of capacitance; Modify the figure 5	
2012.06.15	1.4	Modify the typ. value of $R_{DS(on)}$	
2012.08.23	1.5	Add the package of TO-262-3L	