

## 10A, 650V N-CHANNEL MOSFET

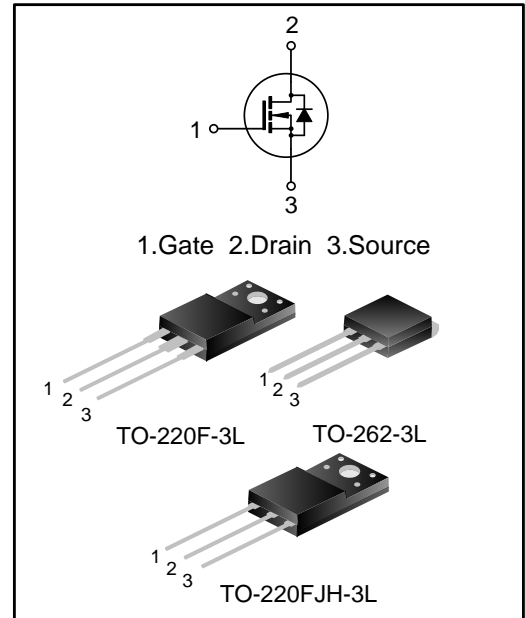
### GENERAL DESCRIPTION

SVF10N65CF/K/FJH is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary F-Cell™ high-voltage planar 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.

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

### FEATURES

- ◆ 10A,650V, $R_{DS(on)(typ.)}=0.80\Omega@V_{GS}=10V$
- ◆ Low gate charge
- ◆ Low Crss
- ◆ Fast switching
- ◆ Improved dv/dt capability



### ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVF10N65CF	TO-220F-3L	SVF10N65CF	Halogen free	Tube
SVF10N65CK	TO-262-3L	SVF10N65CK	Halogen free	Tube
SVF10N65CFJH	TO-220FJH-3L	10N65CFJH	Pb free	Tube

**ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub>=25°C UNLESS OTHERWISE NOTED)**

Characteristics	Symbol	Ratings		Unit
		SVF10N65CF/FJH	SVF10N65CK	
Drain-Source Voltage	V <sub>DS</sub>	650		V
Gate-Source Voltage	V <sub>GS</sub>	±30		V
Drain Current	I <sub>D</sub>	T <sub>C</sub> = 25°C		A
		T <sub>C</sub> = 100°C		
Drain Current Pulsed	I <sub>DM</sub>	40		A
Power Dissipation(T <sub>C</sub> =25°C) -Derate above 25°C	P <sub>D</sub>	50	150	W
		0.4	1.20	W/°C
Single Pulsed Avalanche Energy (Note 1)	E <sub>AS</sub>	618		mJ
Reverse diode dv/dt (Note 2)	dv/dt	4.5		V/ns
MOSFET dv/dt ruggedness (Note 3)	dv/dt	50		V/ns
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
		SVF10N65CF/FJH	SVF10N65CK	
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	2.5	0.83	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	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	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	--	--	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> =5.0A	--	0.8	1.0	Ω
Gate resistance	R <sub>g</sub>	f=1.0MHz	--	5.0	--	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz	--	1100	--	pF
Output Capacitance	C <sub>oss</sub>		--	130	--	
Reverse Transfer Capacitance	C <sub>rss</sub>		--	13	--	
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =325V, I <sub>D</sub> =10A, R <sub>G</sub> =25Ω  (Note 4,5)	--	21	--	ns
Turn-on Rise Time	t <sub>r</sub>		--	41	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	82	--	
Turn-off Fall Time	t <sub>f</sub>		--	43	--	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =520V, I <sub>D</sub> =10A, V <sub>GS</sub> =10V  (Note 4,5)	--	29	--	nC
Gate-Source Charge	Q <sub>gs</sub>		--	6.2	--	
Gate-Drain Charge	Q <sub>gd</sub>		--	13	--	

## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I <sub>S</sub>	Integral Reverse p-n Junction Diode in the MOSFET	--	--	10	A
Pulsed Source Current	I <sub>SM</sub>		--	--	40	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =10A, V <sub>GS</sub> =0V	--	--	1.3	V
Reverse Recovery Time	T <sub>rr</sub>	I <sub>S</sub> =10A, V <sub>GS</sub> =0V, dI <sub>F</sub> /dt=100A/μS (Note 4)	--	561	--	ns
Reverse Recovery Charge	Q <sub>rr</sub>		--	4.3	--	μC

**Notes:**

- L=30mH, I<sub>AS</sub>=6.0A, V<sub>DD</sub>=100V, R<sub>G</sub>=25Ω, starting T<sub>J</sub>=25°C;
- V<sub>DS</sub>=0~400V, I<sub>SD</sub>≤10A, T<sub>J</sub>=25°C;
- V<sub>DS</sub>=0~480V;
- Pulse Test: Pulse width ≤300μs, Duty cycles≤2%;
- Essentially independent of operating temperature.

**TYPICAL CHARACTERISTICS**

Figure 1. On-Region Characteristics

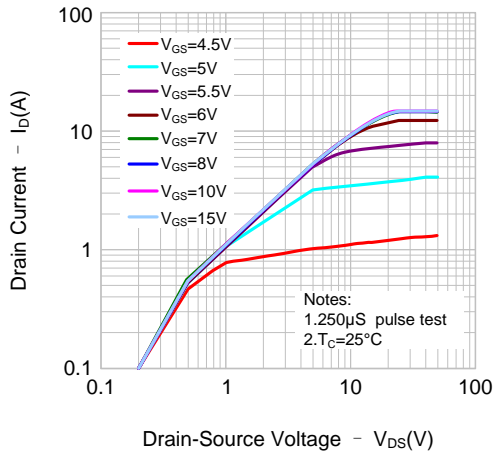


Figure 2. Transfer Characteristics

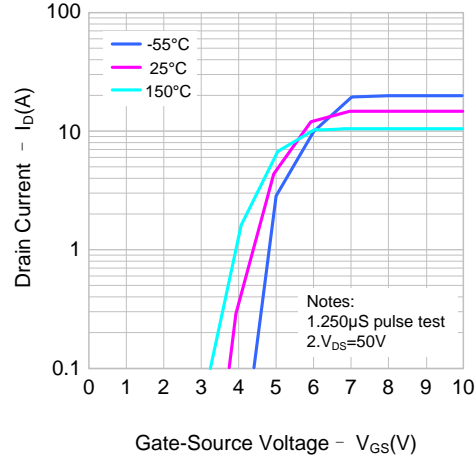


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

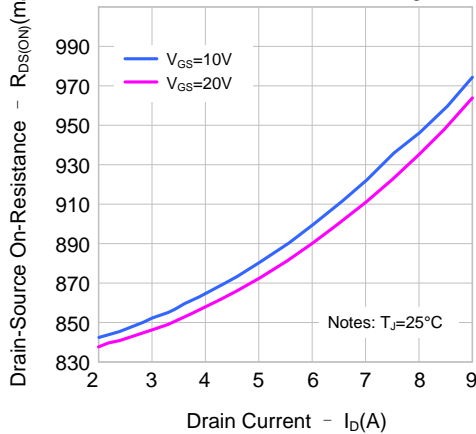


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

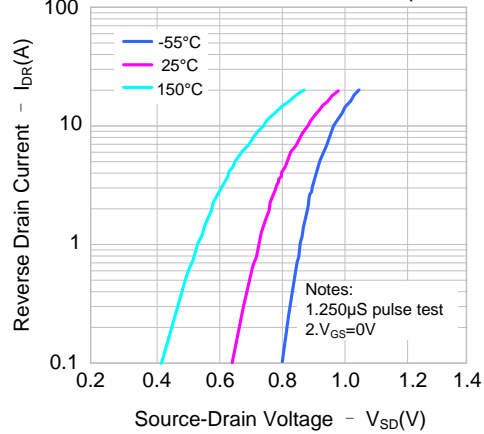


Figure 5. Capacitance Characteristics

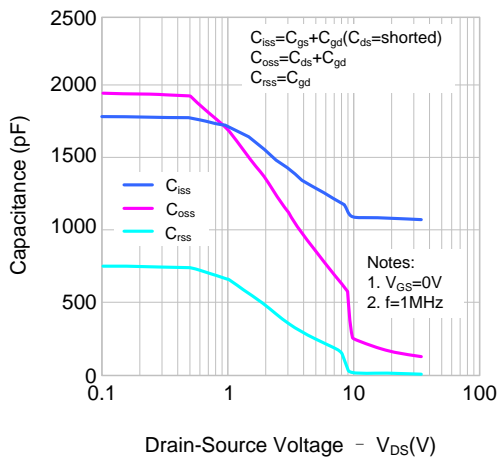
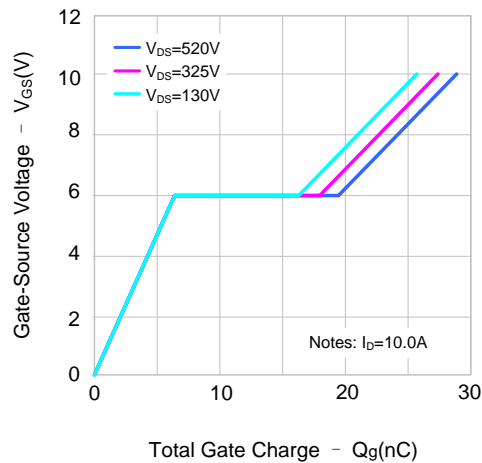


Figure 6. Gate Charge Characteristics



**TYPICAL CHARACTERISTICS (CONTINUED)**

Figure 7. Breakdown Voltage Variation vs. Temperature

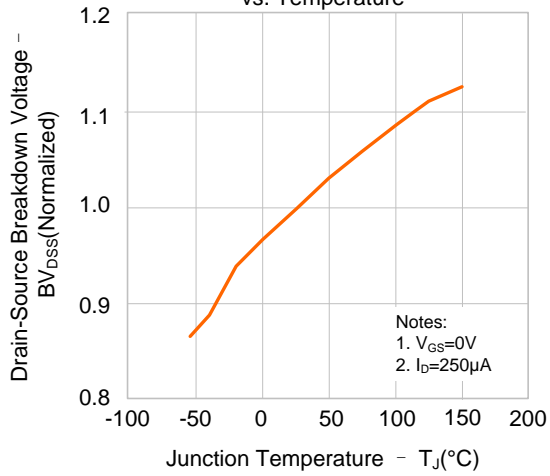


Figure 8. On-resistance vs. Temperature

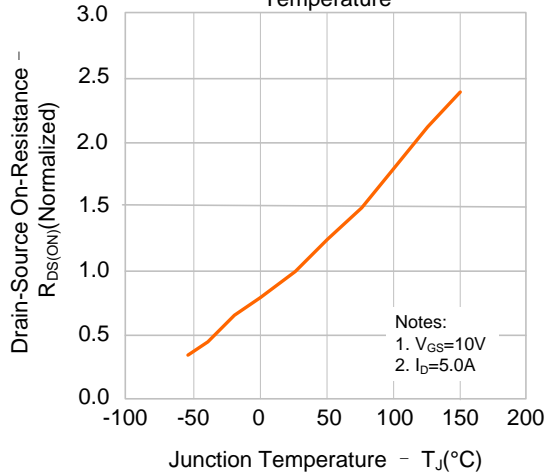


Figure 9-1. Max. Safe Operating Area(SVF10N65CF/FJH)

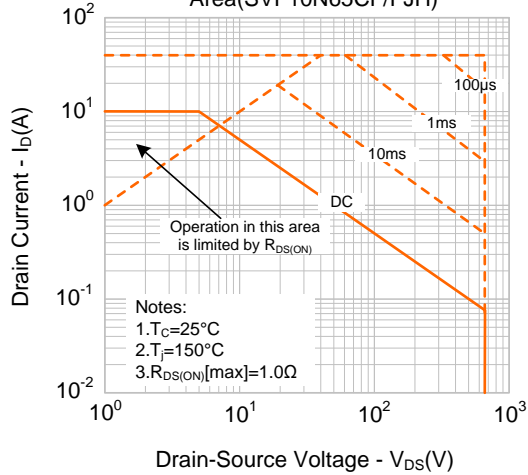


Figure 9-2. Max. Safe Operating Area(SVF10N65CK)

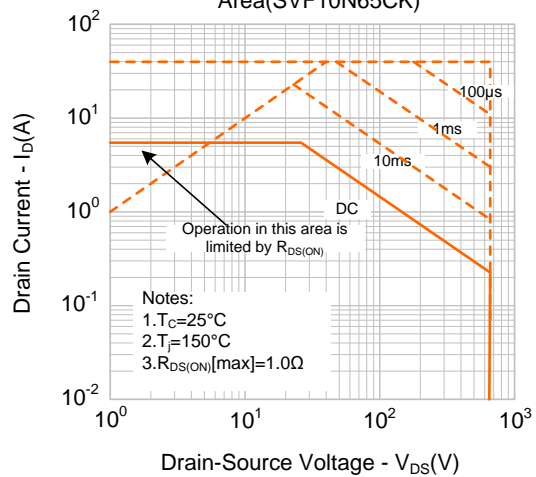
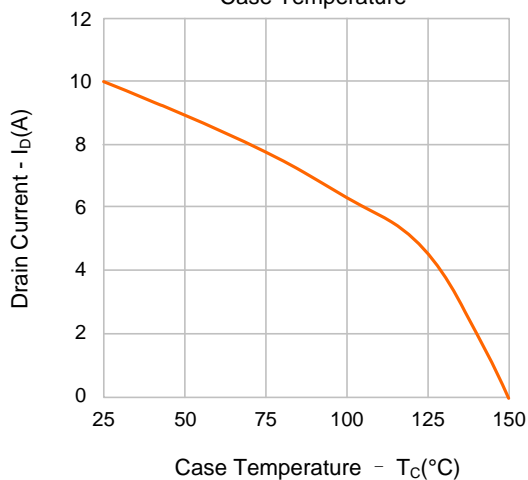
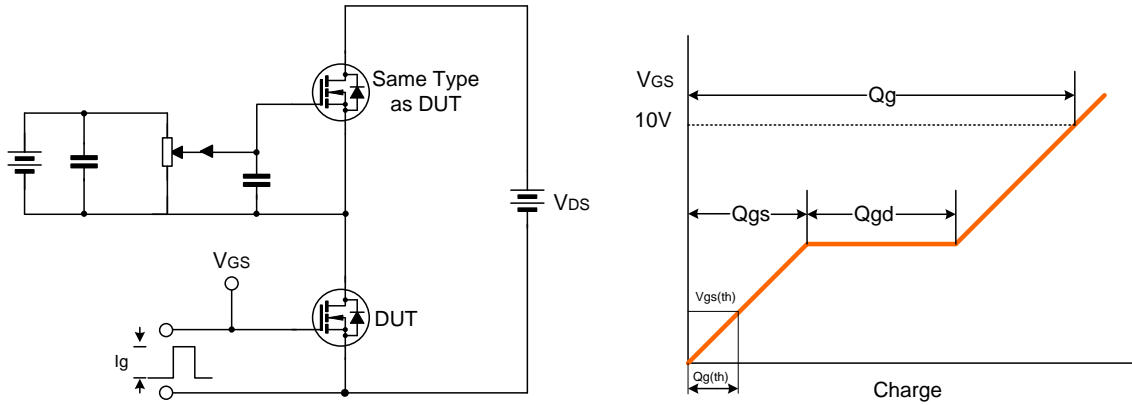


Figure 10. Max. Drain Current vs. Case Temperature

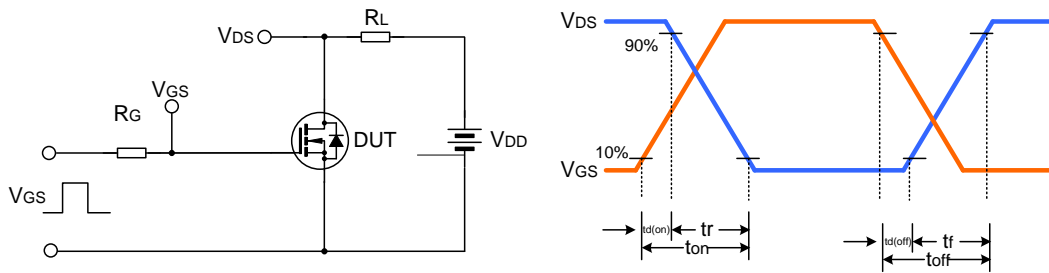


**TYPICAL TEST CIRCUIT**

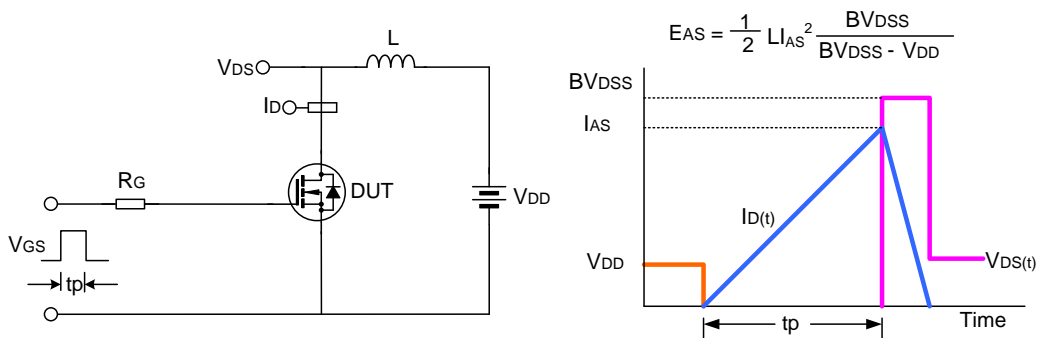
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



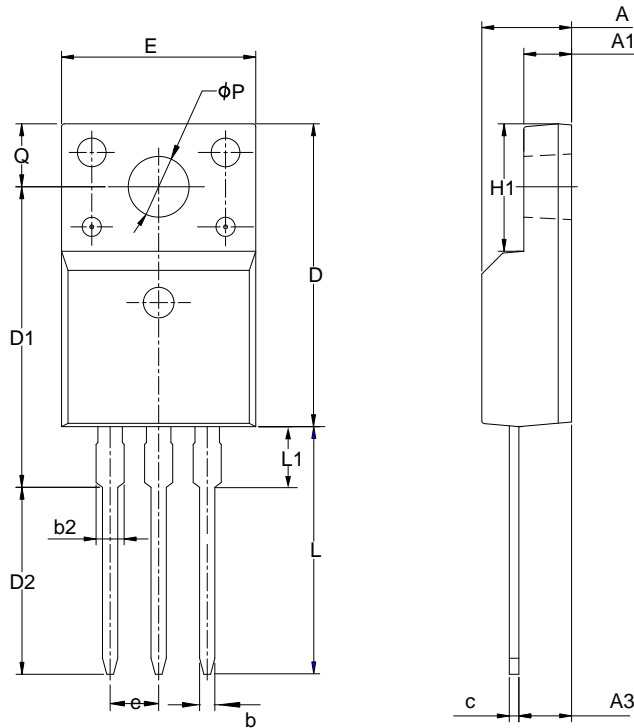
Unclamped Inductive Switching Test Circuit & Waveform



**PACKAGE OUTLINE**

**TO-220F-3L**

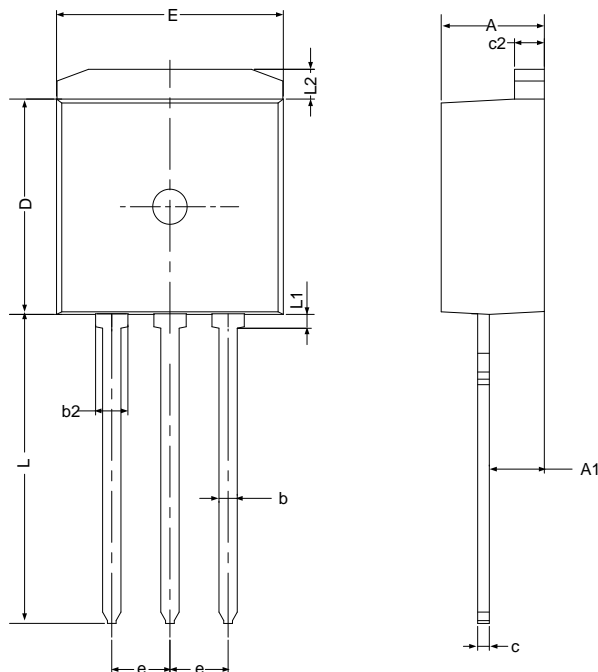
**UNIT: mm**



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
$\phi P$	3.00	3.18	3.40
Q	3.05	3.30	3.55

**TO-262-3L**

**UNIT: mm**

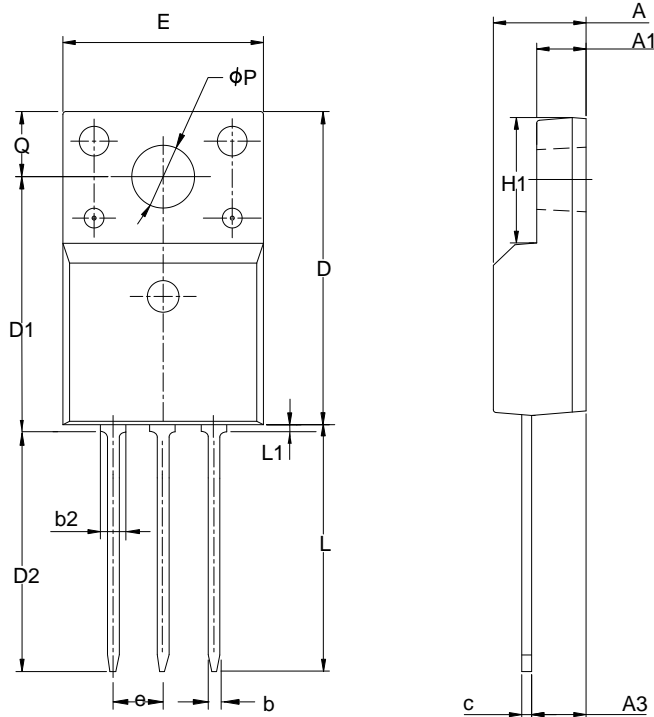


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.30	4.50	4.70
A1	2.20	—	2.92
b	0.71	0.80	0.90
b2	1.20	—	1.50
c	0.34	—	0.65
c2	1.22	1.30	1.35
D	8.38	—	9.30
E	9.80	10.16	10.54
e	2.54 BSC		
L	12.80	—	14.10
L1	—	—	0.75
L2	1.12	—	1.42

**PACKAGE OUTLINE(CONTINUED)**

TO-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	<b>0.80</b>
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
$\phi P$	3.00	3.18	3.40
Q	3.05	3.30	3.55

**Important notice :**

- The instructions are subject to change without notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
- Our products are consumer electronic products, and / or civil electronic products.
- 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.
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- Product promotion is endless, our company will wholeheartedly provide customers with better products!
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Rev.: 2.0

Revision History:

1. Deleted NOMENCLATURE
  2. Modify Important notice
- 

Rev.: 1.9

Revision History:

1. Add the package outline of TO-220FJH-3L
  2. Modify and add the parameter
  3. Modify Electrical schematic and TYPICAL TEST CIRCUIT
- 

Rev.: 1.8

Revision History:

1. Delete the package outline of TO-262L-3L
- 

Rev.: 1.7

Revision History:

1. Update the package outline of TO-262-3L
- 

Rev.: 1.6

Revision History:

1. Modify the Typical Characteristics
- 

Rev.: 1.5

Revision History:

1. Add the package information of TO-262L-3L
  2. Modify the package information of TO-262-3L
- 

Rev.: 1.4

Revision History:

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

Rev.: 1.3

Revision History:

1. Add information for TO-262-3L package
- 

Rev.: 1.2

Revision History:

1. Modify the thermal characteristics
- 

Rev.: 1.1

Revision History:

1. Modify the figure 6
- 

Rev.: 1.0

Revision History:

1. First release
- 
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