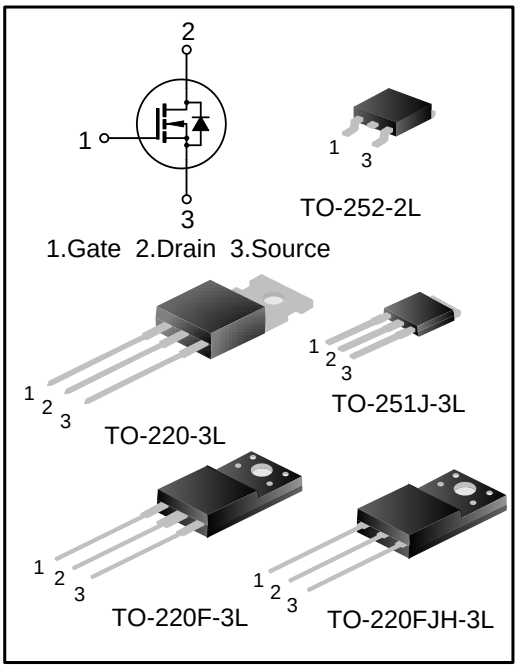
7A, 650V N-CHANNEL MOSFET

GENERAL DESCRIPTION

SVF7N65RD(MJ)(FJH)(F)(T) 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.

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



FEATURES

- 7A, 650V, $R_{DS(on)(typ.)}$=1.2Ω@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
SVF7N65RMJ	TO-251J-3L	7N65RMJ	Halogen free	Tube
SVF7N65RDTR	TO-252-2L	7N65RD	Halogen free	Tape&Reel
SVF7N65RFJH	TO-220FJH-3L	7N65RFJH	Halogen free	Tube
SVF7N65RF	TO-220F-3L	SVF7N65RF	Halogen free	Tube
SVF7N65RT	TO-220-3L	SVF7N65RT	Halogen free	Tube

ABSOLUTE MAXIMUM RATINGS (T_C=25°C UNLESS OTHERWISE NOTED)

Characteristics		Symbol	Ratings			Unit
			SVF7N65 RD/MJ	SVF7N65 RFJH/F	SVF7N65 RT	
Drain-Source Voltage		V_{DS}	650			V
Gate-Source Voltage		V_{GS}	±30			V
Drain Current	T_C = 25°C	I_D	7.0			A
	T_C = 100°C		4.4			
Drain Current Pulsed		I_{DM}	28			A
Power Dissipation(T_C=25°C)		P_D	90	46	145	W
-Derate above 25°C			0.72	0.31	1.16	W/°C
Single Pulsed Avalanche Energy (Note 1)		E_{AS}	317			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_J	-55～+150			°C
Storage Temperature Range		T_{stg}	-55～+150			°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings			Unit
		SVF7N65 RD/MJ	SVF7N65 RFJH/F	SVF7N65 RT	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.39	2.7	0.86	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.0	62.5	62.5	°C/W

ELECTRICAL CHARACTERISTICS (T_C=25°C UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	650	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V	--	--	1.0	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±30V, V_{DS}=0V	--	--	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}= V_{DS}, I_D=250μA	2.0	--	4.0	V
Gate resistance	R_g	f=1.0MHz	--	3.2	--	Ω
Static Drain- Source On State Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=3.5A	--	1.2	1.4	Ω
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	--	895	--	pF
Output Capacitance	C_{oss}		--	88	--	
Reverse Transfer Capacitance	C_{rss}		--	7.5	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=325V, R_G=25Ω, I_D=7.0A (注 4，5)	--	14	--	ns
Turn-on Rise Time	t_r		--	33	--	
Turn-off Delay Time	$t_{d(off)}$		--	58	--	
Turn-off Fall Time	t_f		--	36	--	
Total Gate Charge	Q_g	V_{DS}=520V, I_D=7.0A, V_{GS}=10V (注 4，5)	--	24	--	nC
Gate-Source Charge	Q_{gs}		--	6.0	--	
Gate-Drain Charge	Q_{gd}		--	11	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	7.0	A
Pulsed Source Current	I_{SM}		--	--	28	
Diode Forward Voltage	V_{SD}	I_S=7.0A,V_{GS}=0V	--	--	1.4	V
Reverse Recovery Time	T_{rr}	I_S=7.0A,V_{GS}=0V, dIF/dt=100A/μS (Note 4)	--	566	--	ns
Reverse Recovery Charge	Q_{rr}		--	3.2	--	μC

Notes:

1. L=30mH, I_{AS}=4.3A, V_{DD}=100V, R_G=25Ω,starting T_J=25°C;
2. V_{DS}=0~400V, I_{SD}<=7A, T_J=25°C;
3. V_{DS}=0~480V;
4. Pulse Test: Pulse width ≤300μs, Duty cycle≤2%;
5. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

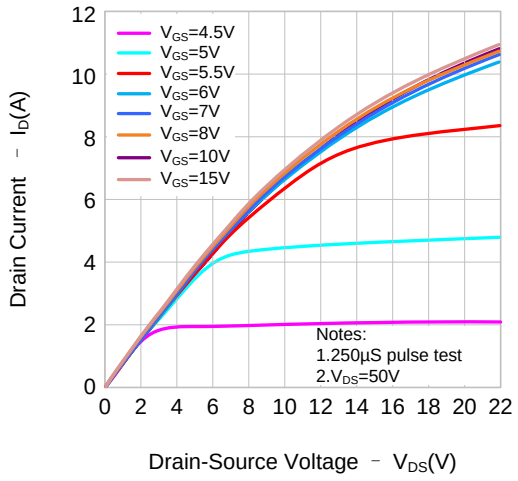


Figure 2. Transfer Characteristics

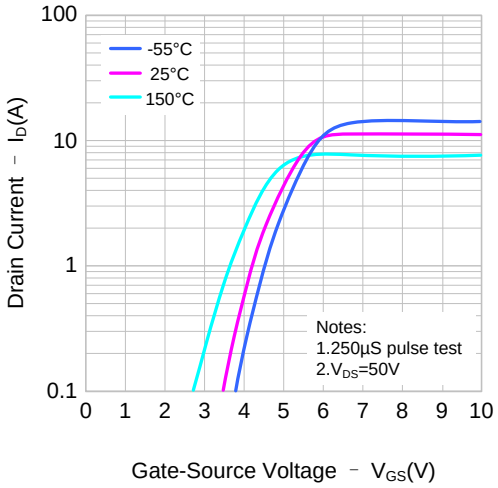


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

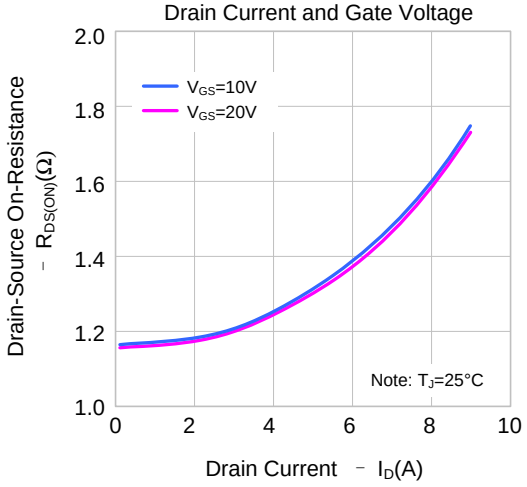


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

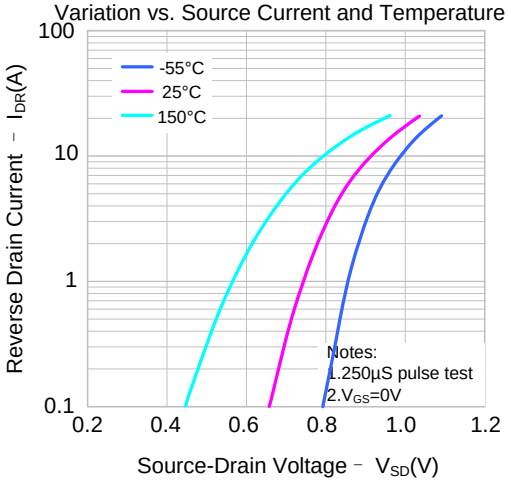


Figure 5. Capacitance Characteristics

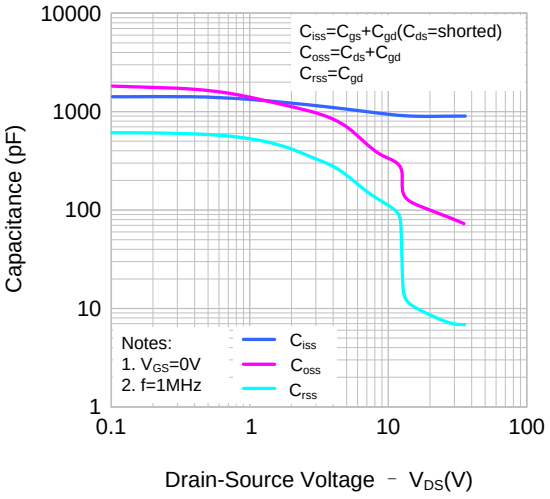
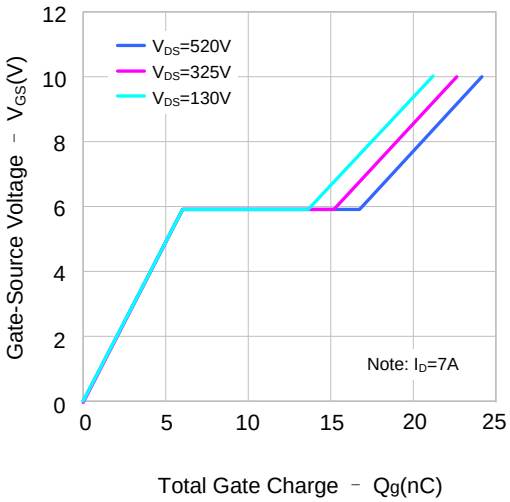


Figure 6. Gate Charge Characteristics



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 7. Breakdown Voltage vs. Temperature

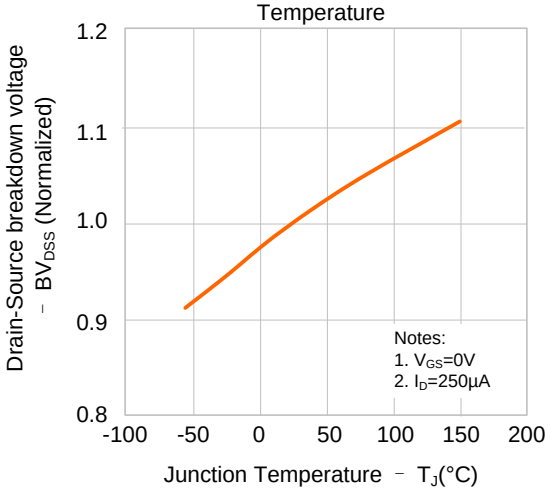


Figure 8. On-resistance Variation vs. Temperature

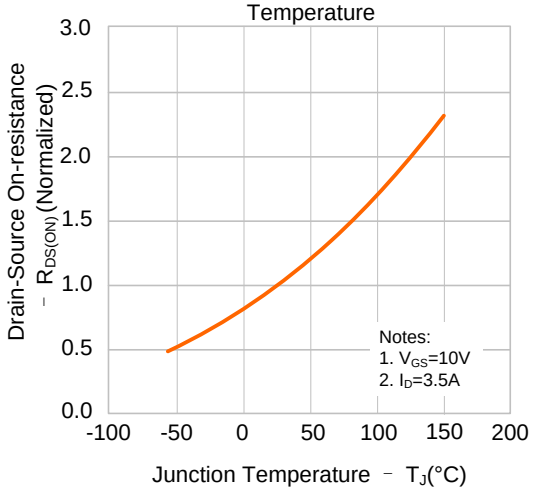


Figure 9-1. Max. Safe Operating Area SVF7N65RD/MJ)

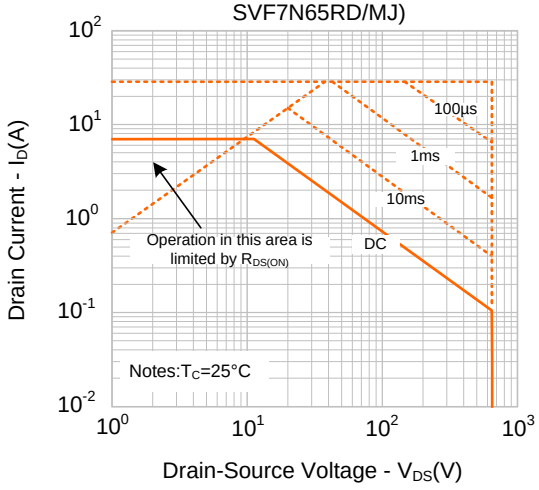


Figure 9-2. Max. Safe Operating Area (SVF7N65RFJH/F)

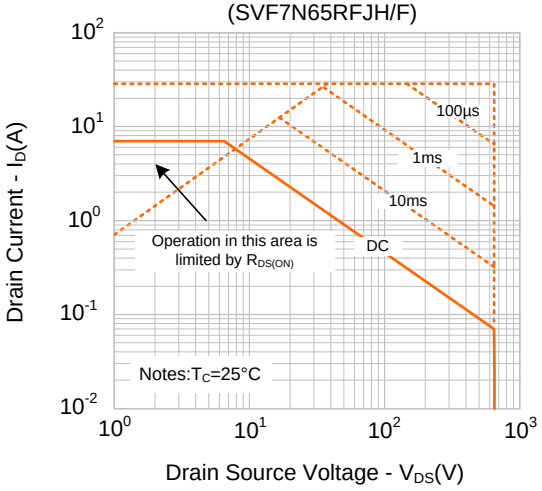
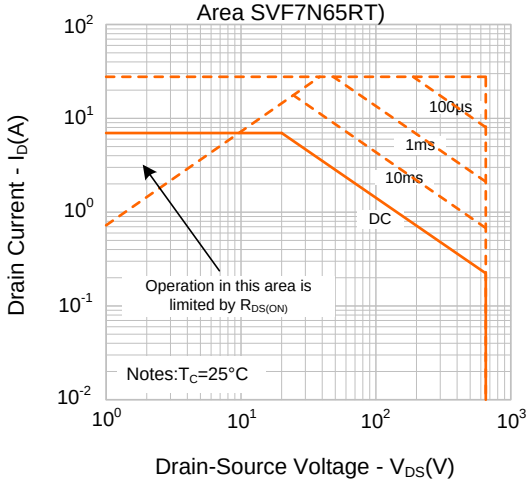
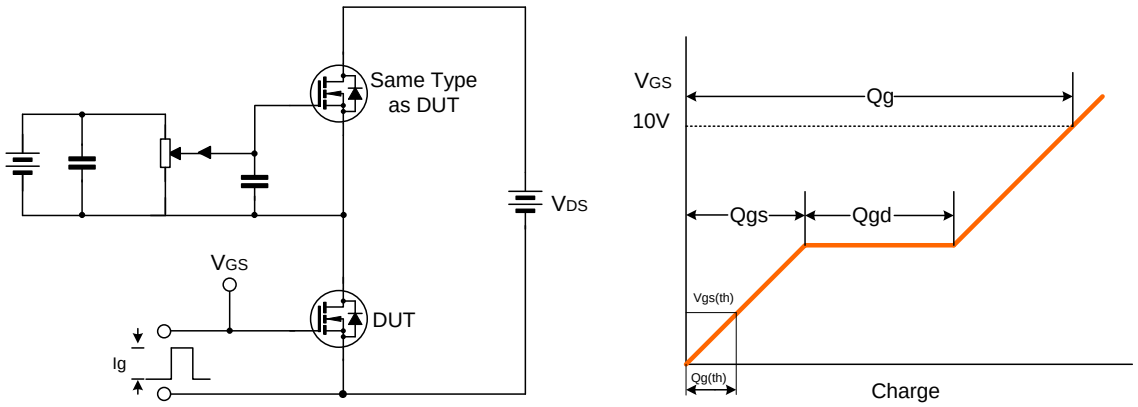


Figure 9-3. Max. Safe Operating Area SVF7N65RT)

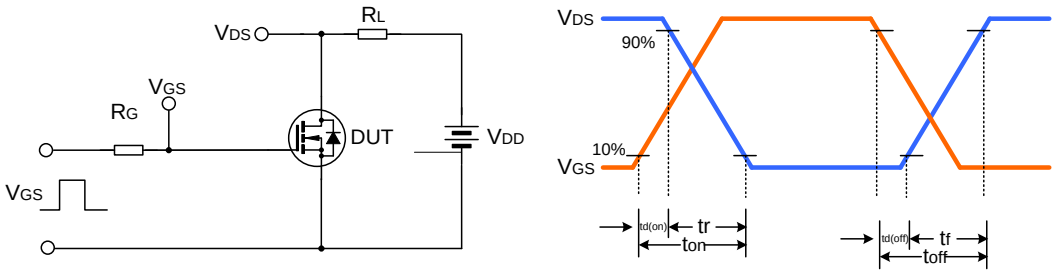


TYPICAL TEST CIRCUIT

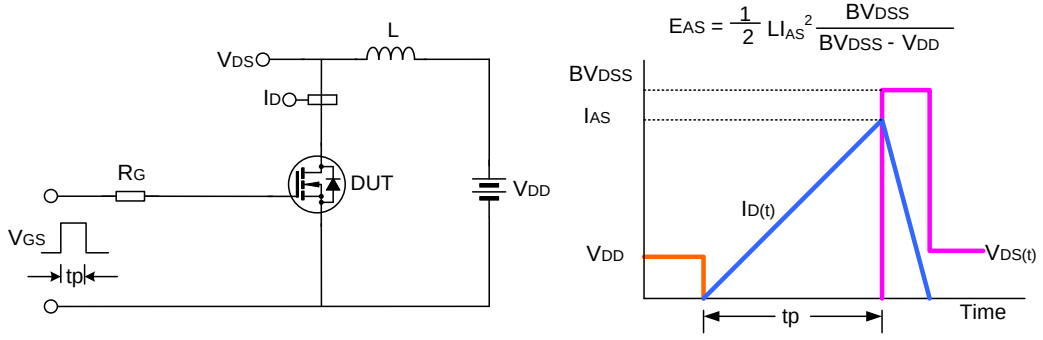
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



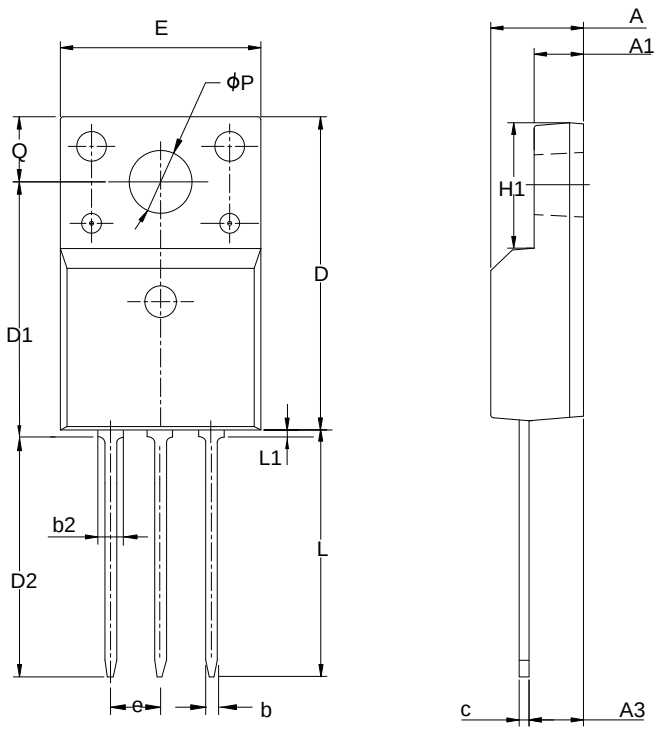
Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

TO-220FJH-3L

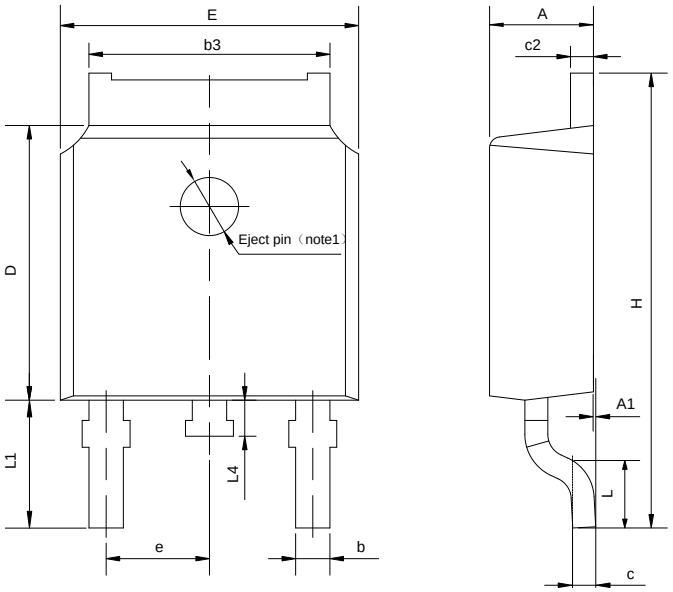
单位：毫米



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

单位：毫米



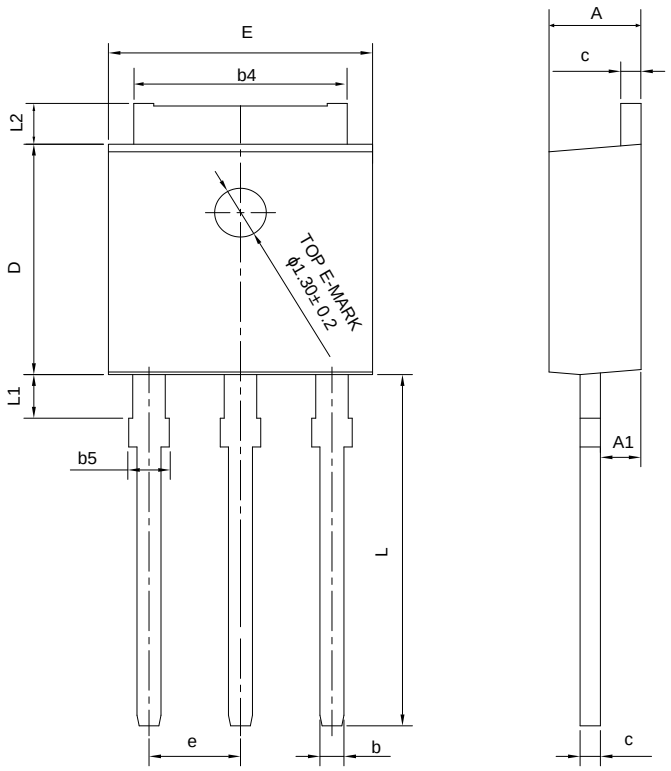
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.10	2.30	2.50
A1	0	—	0.127
b	0.66	0.76	0.89
b3	5.10	5.33	5.46
c	0.45	—	0.65
c2	0.45	—	0.65
D	5.80	6.10	6.40
E	6.30	6.60	6.90
e	2.30TYP		
H	9.60	10.10	10.60
L	1.40	1.50	1.70
L1	2.90REF		
L4	0.60	0.80	1.00

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

PACKAGE OUTLINE(continued)

TO-251J-3L

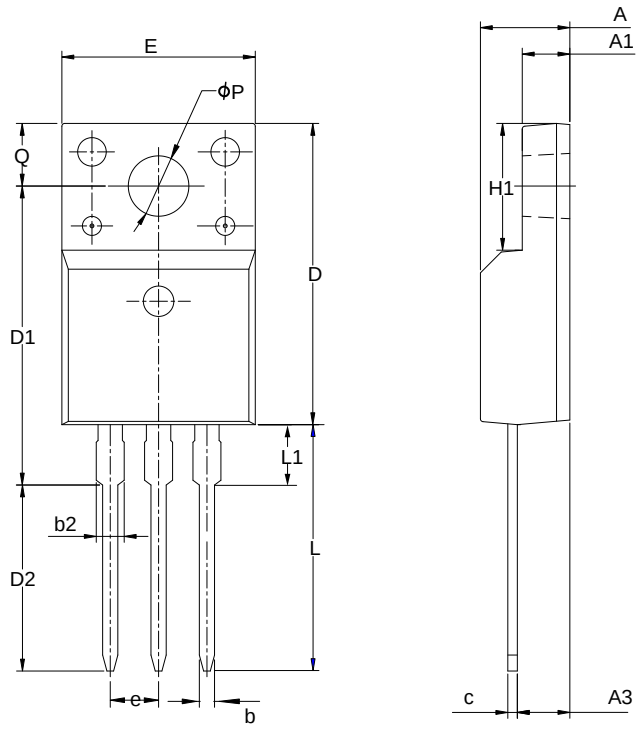
UNIT: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.18	2.30	2.39
A1	0.89	1.00	1.14
b	0.56	—	0.89
b4	4.95	5.33	5.46
b5	—	—	1.05
c	0.46	—	0.61
D	5.97	6.10	6.27
E	6.35	6.60	6.73
e	2.29 BCS		
L	8.89	9.30	9.65
L1	0.95	—	1.50
L2	0.89	—	1.27

TO-220F-3L

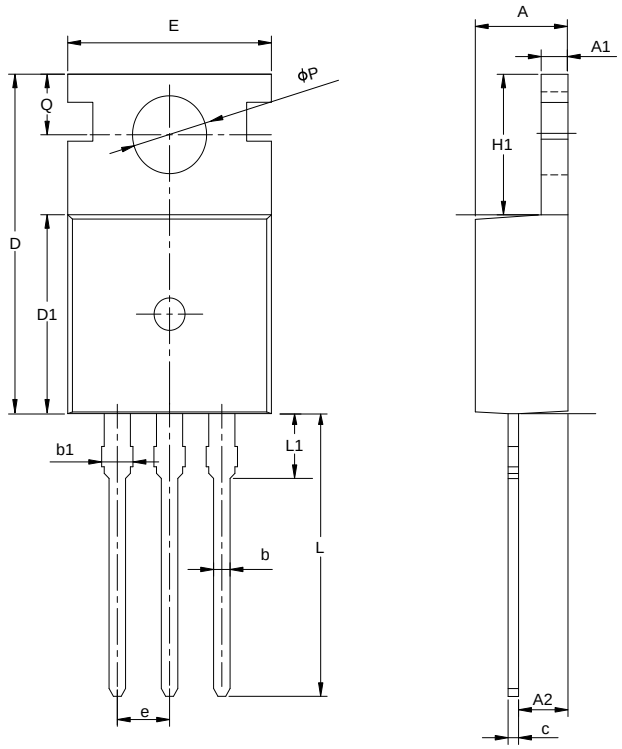
UNIT: mm



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
ϕP	3.00	3.18	3.40
Q	3.05	3.30	3.55

PACKAGE OUTLINE(continued)

TO-220-3L **UNIT: mm**



SYMBOL	MILLIMETER		
	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

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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Rev.: 1.3

Revision History:

1. Deleted NOMENCLATURE
2. Modify Important notice

Rev.: 1.2

Revision History:

1. Add SVF7N65RT
2. Update Important Notice

Rev.: 1.1

Revision History:

1. Delete SVF7N65RFJ
2. Add SVF7N65RFJH
3. Add SVF7N65RF

Rev.: 1.0

Revision History:

1. Preliminary