

2A, 650V N-CHANNEL MOSFET

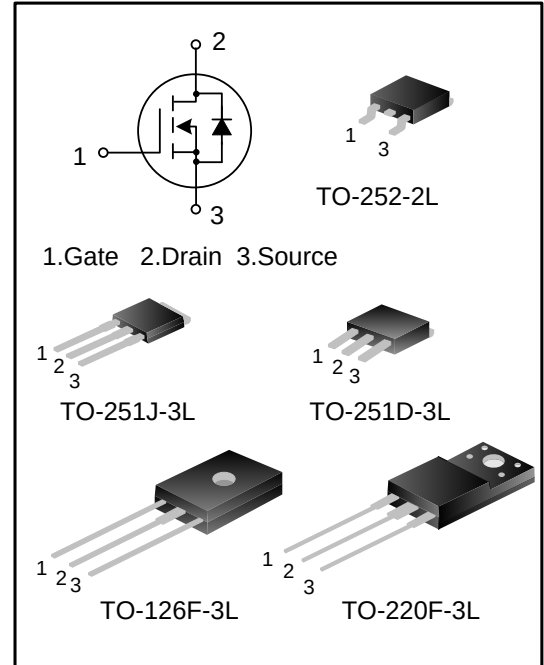
GENERAL DESCRIPTION

SVF2N65CF/M/MJ/D/NF 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 suppliers, DC-DC converters and H-bridge PWM motor drivers.

FEATURES

- ♦ 2A, 650V, $R_{DS(on)(typ.)}=4.3\Omega@V_{GS}=10V$
- ♦ Low gate charge
- ♦ Low C_{rss}
- ♦ Fast switching
- ♦ Improved dv/dt capability



ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVF2N65CF	TO-220F-3L	SVF2N65CF	Halogen free	Tube
SVF2N65CM	TO-251D-3L	SVF2N65C	Halogen free	Tube
SVF2N65CMJ	TO-251J-3L	SVF2N65C	Halogen free	Tube
SVF2N65CD	TO-252-2L	SVF2N65CD	Halogen free	Tube
SVF2N65CDTR	TO-252-2L	SVF2N65CD	Halogen free	Tape & Reel
SVF2N65CNF	TO-126F-3L	SVF2N65CNF	Pb free	Tube

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

Characteristics		Symbol	Ratings				Unit
			SVF2N 65CF	SVF2N 65CM/D	SVF2N 65CMJ	SVF2N 65CNF	
Drain-Source Voltage		V _{DS}	650				V
Gate-Source Voltage		V _{GS}	±30				V
Drain Current	T _C =25°C	I _D	2.0				A
	T _C =100°C		1.3				
Drain Current Pulsed		I _{DM}	8.0				A
Power Dissipation(T _C =25°C)		P _D	25	35	38	16	W
-Derate above 25°C			0.20	0.28	0.30	0.13	W/°C
Single Pulsed Avalanche Energy(Note 1)		E _{AS}	108				mJ
Operation Junction Temperature Range		T _J	-55~+150				°C
Storage Temperature Range		T _{stg}	-55~+150				°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings				Unit
		SVF2N 65CF	SVF2N 65CM/D	SVF2N 65CMJ	SVF2N 65CNF	
Thermal Resistance, Junction-to-Case	R _{θJC}	5.0	3.57	3.29	7.81	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	62.5	62.0	62.0	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
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =1.0A	--	4.3	5	Ω
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHZ	--	255	--	pF
Output Capacitance	C _{oss}		--	34	--	
Reverse Transfer Capacitance	C _{rss}		--	2.2	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} =325V, R _G =25Ω, I _D =2.0A (Note 2,3)	--	8.4	--	ns
Turn-on Rise Time	t _r		--	20.4	--	
Turn-off Delay Time	t _{d(off)}		--	15.1	--	
Turn-off Fall Time	t _f		--	24	--	
Total Gate Charge	Q _g	V _{DS} =520V, I _D =2.0A, V _{GS} =10V (Note 2,3)	--	8.2	--	nC
Gate-Source Charge	Q _{gs}		--	2.72	--	
Gate-Drain Charge	Q _{gd}		--	3.37	--	

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	--	--	2.0	A
Pulsed Source Current	I_{SM}		--	--	8.0	
Diode Forward Voltage	V_{SD}	$I_S=2.0A, V_{GS}=0V$	--	--	1.4	V
Reverse Recovery Time	T_{rr}	$I_S=2.0A, V_{GS}=0V,$ $di_F/dt=100A/\mu S$	--	372	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.99	--	μC

Notes:

1. $L=30mH, I_{AS}=2.5A, V_{DD}=100V, R_G=25\Omega$, starting $T_{BJB}=25^\circ C$;
2. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycles $\leq 2\%$;
3. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

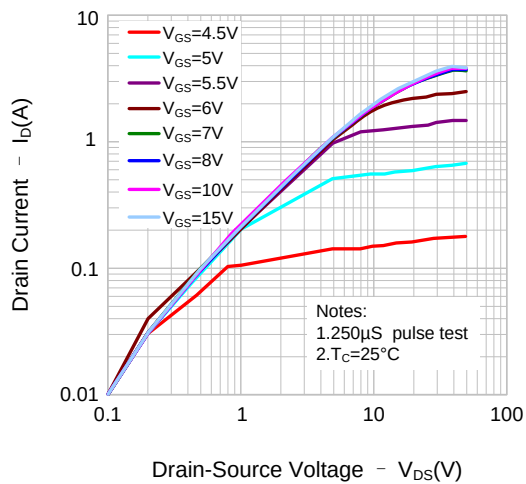


Figure 2. Transfer Characteristics

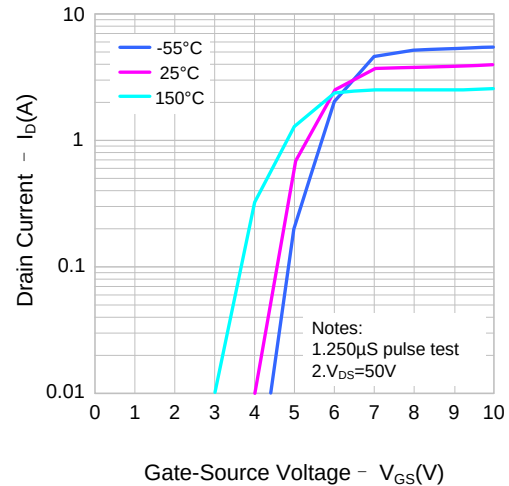


Figure 3. On-Resistance Variation vs. Drain Current

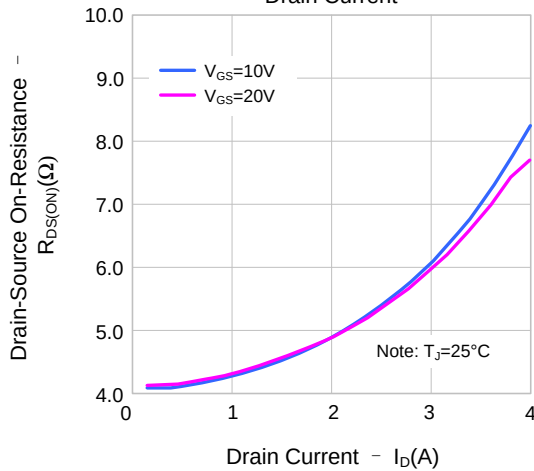
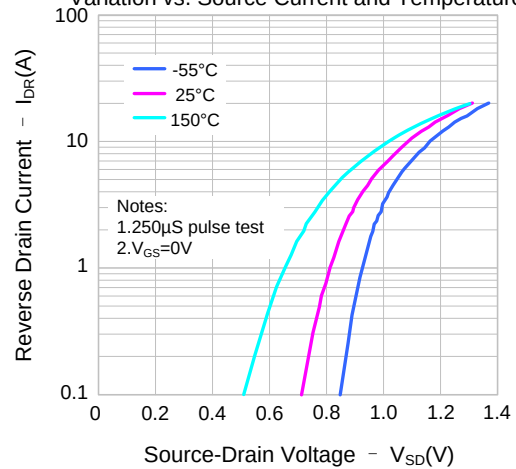


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature



TYPICAL CHARACTERISTICS(CONTINUED)

Figure 5. Capacitance Characteristics

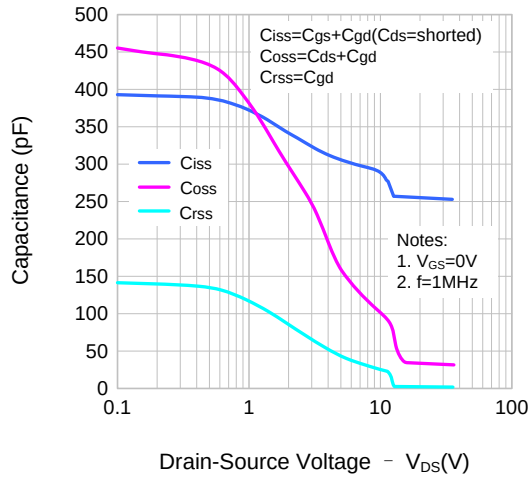


Figure 6. Gate Charge Characteristics

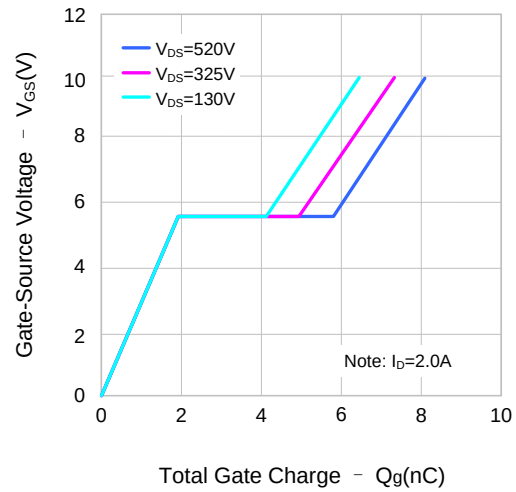


Figure 7. Breakdown Voltage Variation vs. Temperature

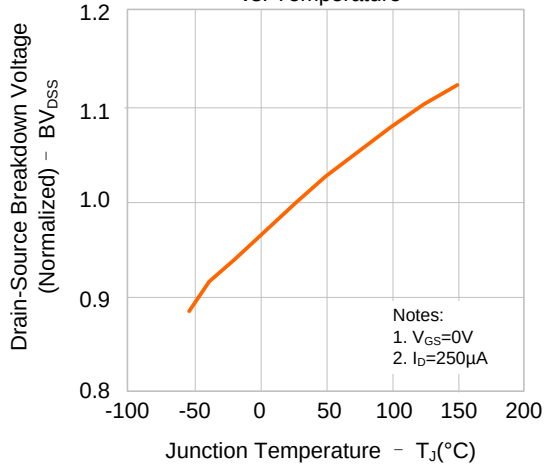


Figure 8. On-resistance vs. Temperature

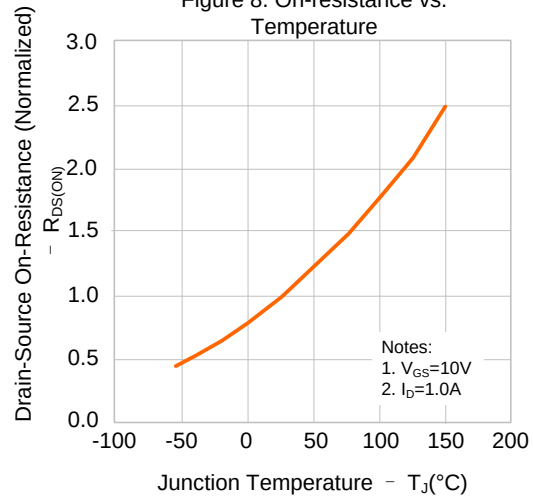


Figure 9-1. Max. Safe Operating Area(SVF2N65CF)

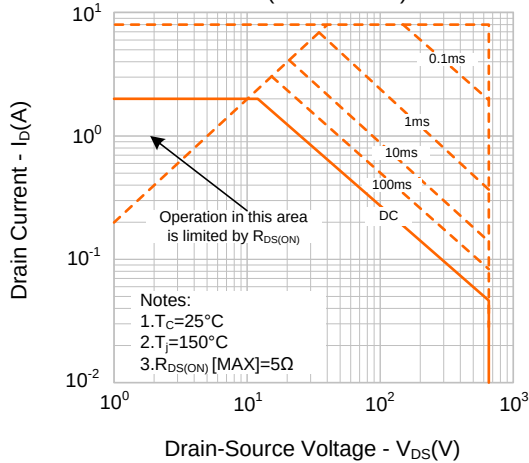
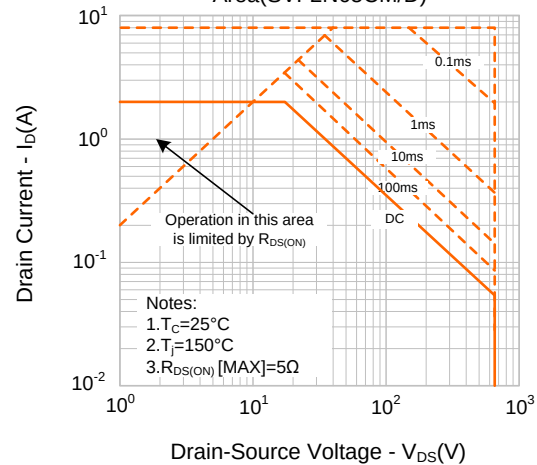
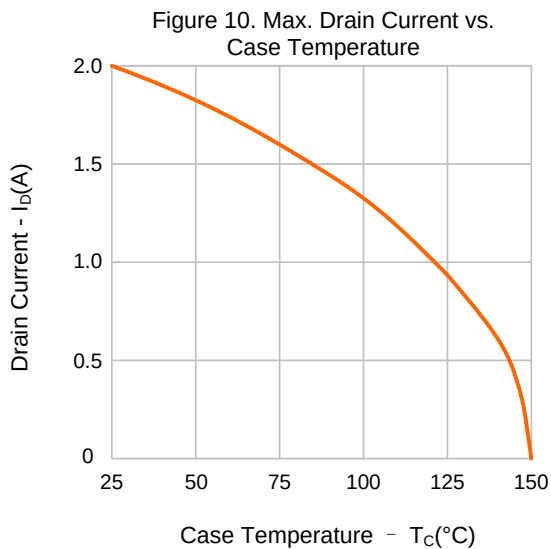
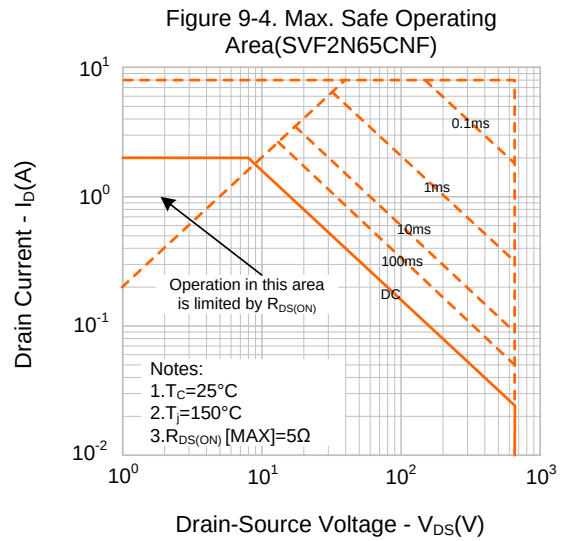
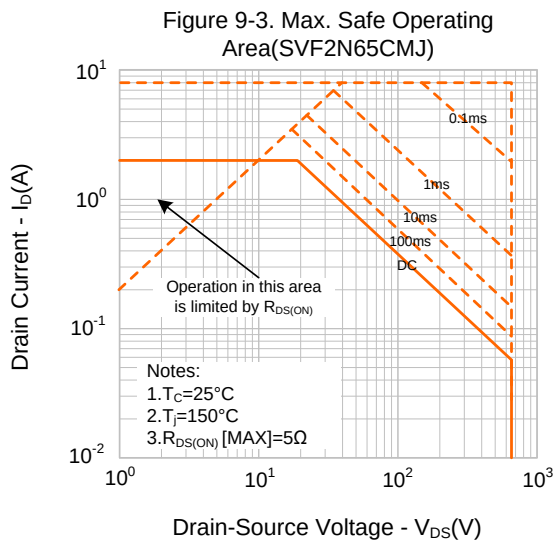


Figure 9-2. Max. Safe Operating Area(SVF2N65CM/D)

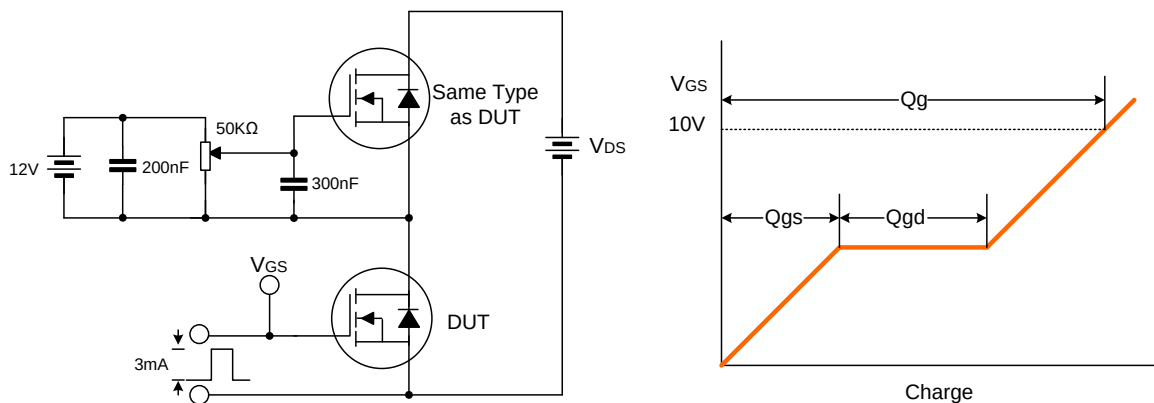


TYPICAL CHARACTERISTICS(CONTINUED)

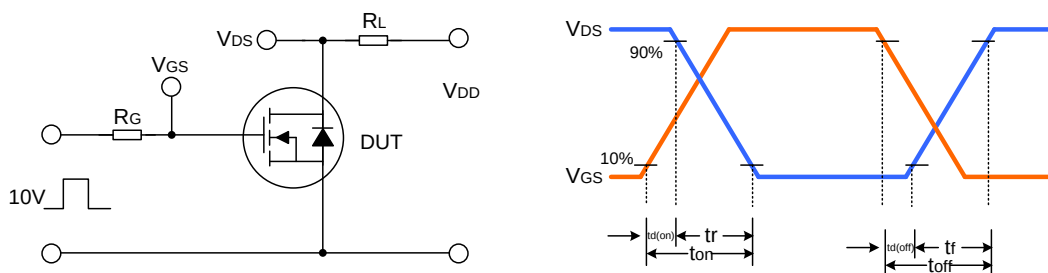


TYPICAL TEST CIRCUIT

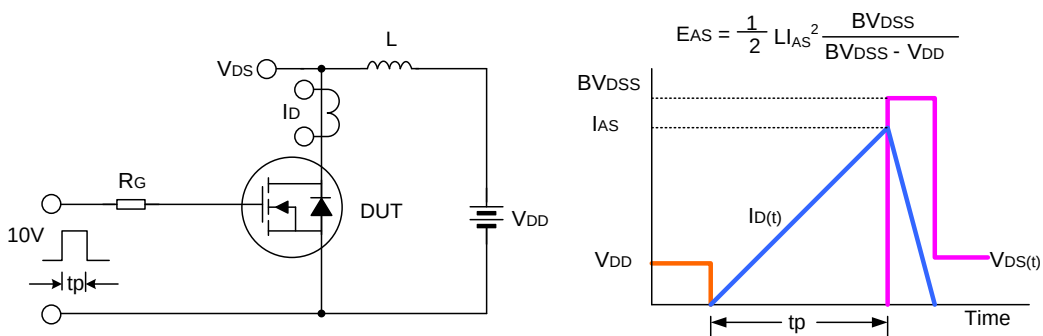
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



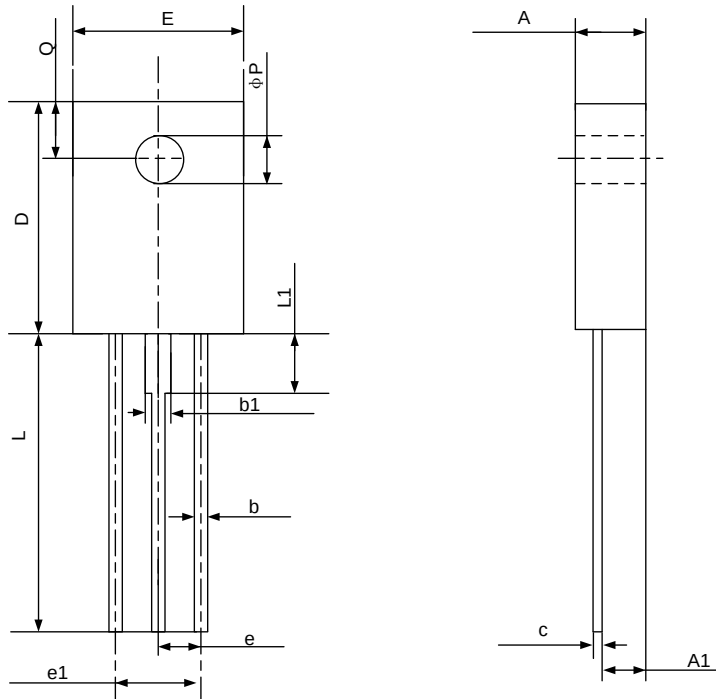
Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

TO-126F-3L

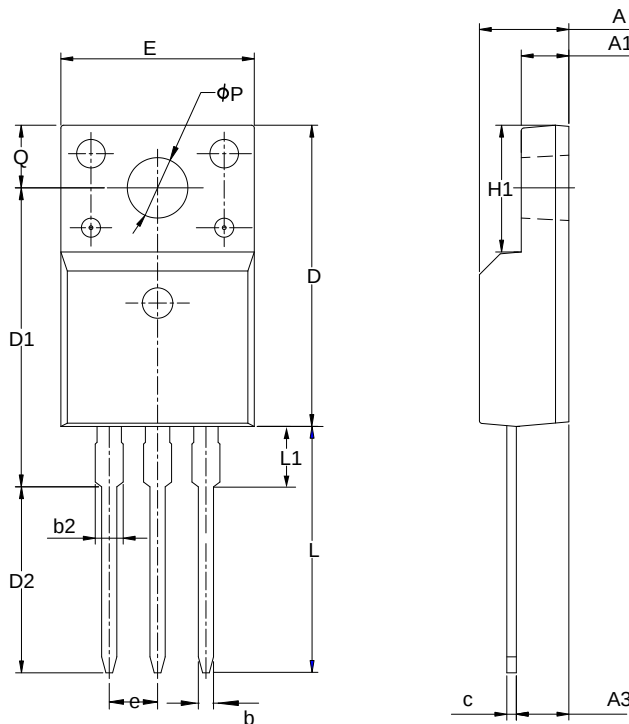
UNIT: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	3.10	3.20	3.30
A1	1.90	2.00	2.10
b	0.66	0.76	0.86
b1	—	1.27	—
c	0.40	0.50	0.60
D	10.80	11.00	11.20
E	7.80	8.00	8.20
e	2.10	2.30	2.50
e1	4.40	4.60	4.80
L	14.50	15.00	15.50
L1	—	1.90	—
ϕP	2.95	3.05	3.15
Q	3.70	3.80	3.90

TO-220F-3L

UNIT: mm

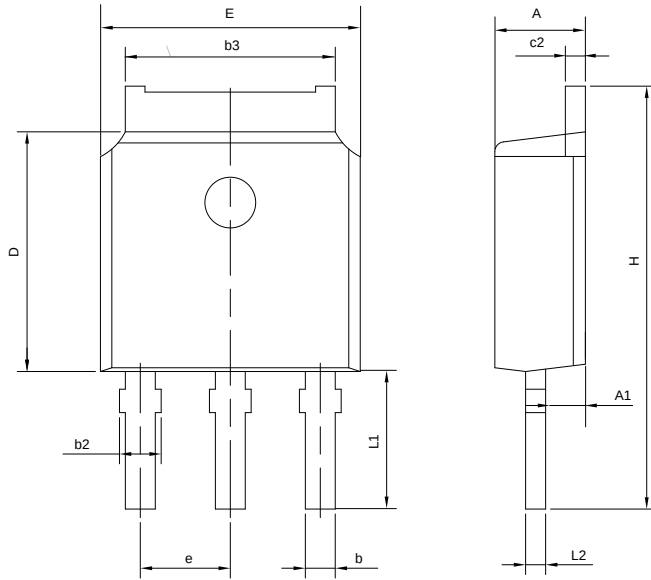


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.42	4.70	5.02
A1	2.30	2.54	2.80
A3	2.50	2.76	3.10
b	0.70	0.80	0.90
b2	—	—	1.47
c	0.35	0.50	0.65
D	15.25	15.87	16.25
D1	15.30	15.75	16.30
D2	9.30	9.80	10.30
E	9.73	10.16	10.36
e	2.54BSC		
H1	6.40	6.68	7.00
L	12.48	12.98	13.48
L1	—	—	3.50
ϕP	3.00	3.18	3.40
Q	3.05	3.30	3.55

PACKAGE OUTLINE(CONTINUED)

TO-251D-3L

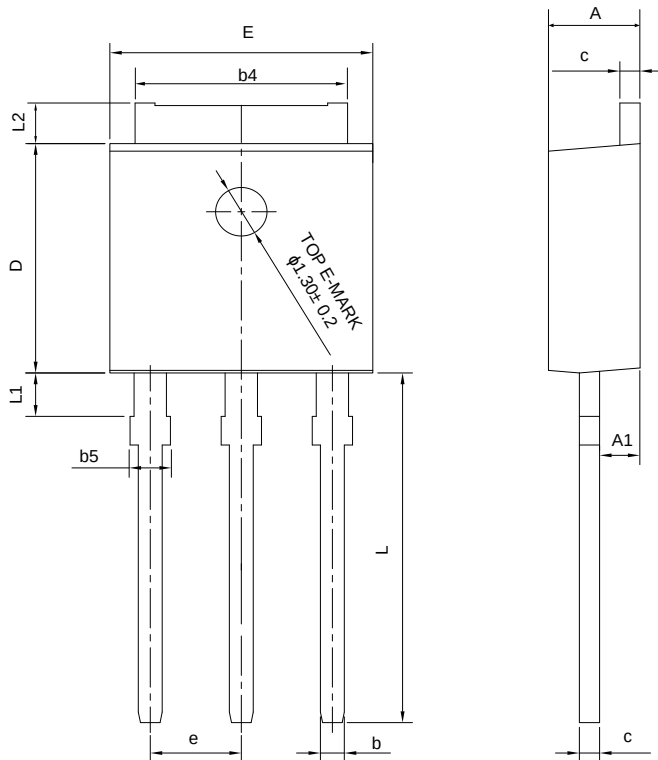
UNIT: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.20	2.30	2.40
b	0.66	—	0.86
b2	0.72	—	0.90
b3	5.10	5.33	5.46
c2	0.46	—	0.60
D	6.00	6.10	6.20
e	2.186	2.286	2.386
H	10.40	10.70	11.00
L1	3.50 REF		
L2	0.508 BSC		

TO-251J-3L

UNIT: mm

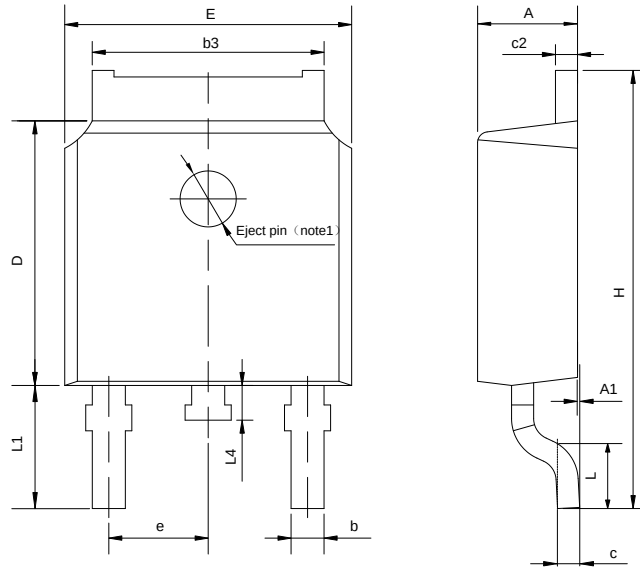


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.18	2.30	2.39
A1	0.89	1.00	1.14
b	0.56	—	0.89
b4	4.95	5.33	5.46
b5	—	—	1.05
c	0.46	—	0.61
D	5.97	6.10	6.27
E	6.35	6.60	6.73
e	2.29 BCS		
L	8.89	9.30	9.65
L1	0.95	—	1.50
L2	0.89	—	1.27

PACKAGE OUTLINE(CONTINUED)

TO-252-2L

UNIT: mm



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.

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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- When exporting, using and reselling our products, buyer must comply with the international export control laws and regulations of China, the United States, the United Kingdom, the European Union and other countries & regions.
- Product promotion is endless, our company will wholeheartedly provide customers with better products!
- Website: <http://www.silan.com.cn>

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Rev.: 1.7

Revision History:

1. Deleted NOMENCLATURE
 2. Modify Important notice
-

Rev.: 1.6

Revision History:

1. Delete the package outline of TO-220F-3L(2)
-

Rev.: 1.5

Revision History:

1. Update the package outline of TO-251J-3L
-

Rev.: 1.4

Revision History:

1. Modify the ordering information
 2. Modify the package outline of TO-251D-3L
-

Rev.: 1.3

Revision History:

1. Modify the package information of TO-220F-3L and TO-252-2L
 2. Modify the ordering information
 3. Modify the electrical characteristics, C_{ISS} , C_{OSS} , C_{RSS} , $t_{d(on)}$, t_r , $t_{d(off)}$, t_f , Q_g , Q_{gs} , Q_{gd}
 4. Modify the Source-Drain diode ratings and characteristics, T_{rr} , Q_{rr}
 5. Modify the figure 5, figure 6
-

Rev.: 1.2

Revision History:

1. Add the package of TO-126F-3L
-

Rev.: 1.1

Revision History:

1. Modify the thermal characteristics
-

Rev.: 1.0

Revision History:

1. First release
-