

## 10A, 650V N-CHANNEL MOSFET

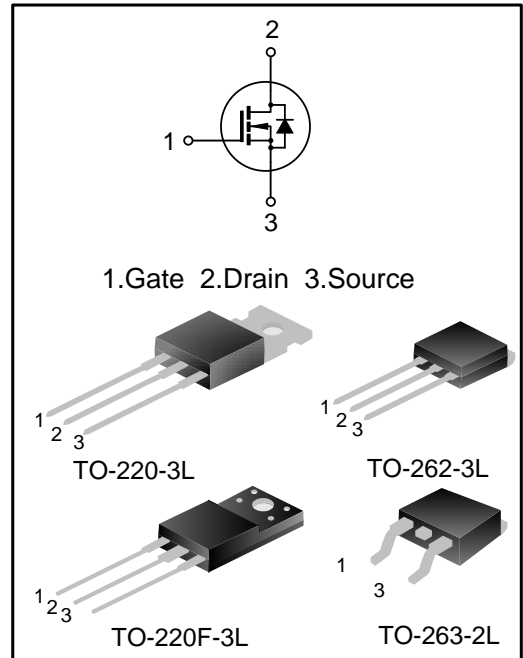
### GENERAL DESCRIPTION

SVF10N65T/F/K/S 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

- ◆ 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
SVF10N65T	TO-220-3L	SVF10N65T	Pb free	Tube
SVF10N65F	TO-220F-3L	SVF10N65F	Pb free	Tube
SVF10N65K	TO-262-3L	SVF10N65K	Pb free	Tube
SVF10N65S	TO-263-2L	SVF10N65S	Halogen free	Tube
SVF10N65STR	TO-263-2L	SVF10N65S	Halogen free	Tape&Reel

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

Characteristics	Symbol	Ratings				Unit
		SVF10N 65F	SVF10N 65T	SVF10N 65K	SVF10N 65S	
Drain-Source Voltage	V <sub>DS</sub>	650				V
Gate-Source Voltage	V <sub>GS</sub>	±30				V
Drain Current	I <sub>D</sub>	10				A
		6.3				
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	156	150	150	W
		0.4	1.25	1.20	1.20	W/°C
Single Pulsed Avalanche Energy (Note1)	E <sub>AS</sub>	618				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
		SVF10N 65F	SVF10N 65K	SVF10N 65T	SVF10N 65S	
Thermal Resistance,Junction-to-Case	R <sub>θJC</sub>	2.5	0.83	0.8	0.83	°C/W
Thermal Resistance,Junction-to-Ambient	R <sub>θJA</sub>	62.5	62.5	62.5	62.5	°C/W

## ELECTRICAL CHARACTERISTICS (T<sub>J</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
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 2,3)	--	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 2,3)	--	29	--	nC
Gate-Source Charge	Q <sub>gs</sub>		--	6.2	--	
Gate-Drain Charge	Q <sub>gd</sub>		--	13	--	

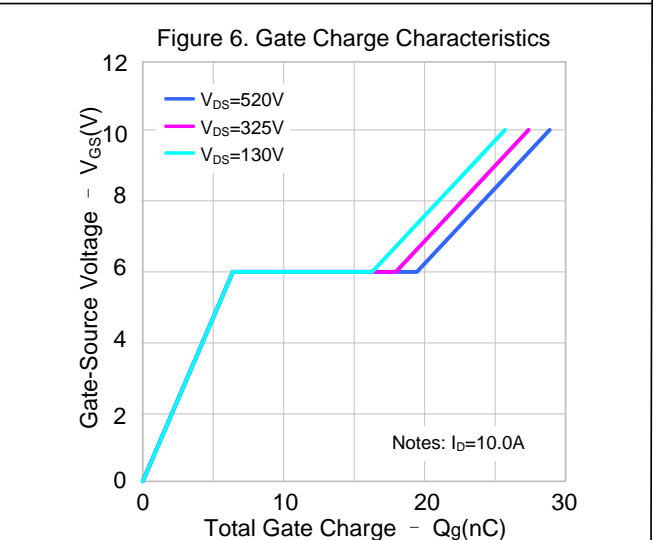
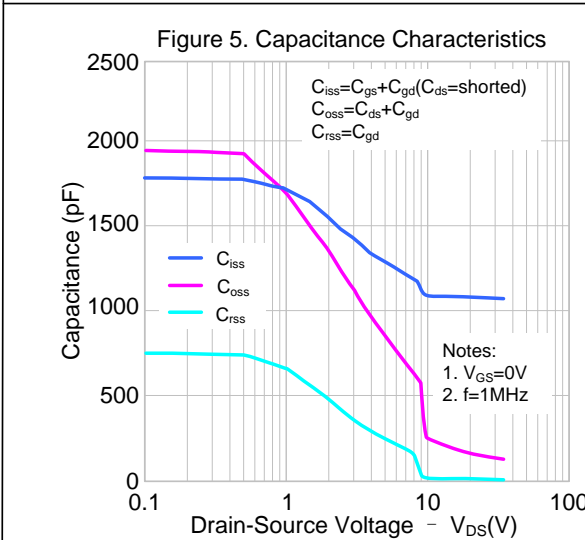
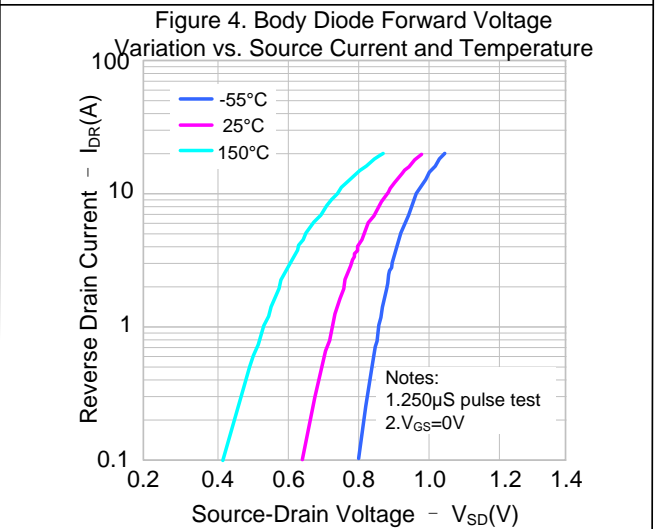
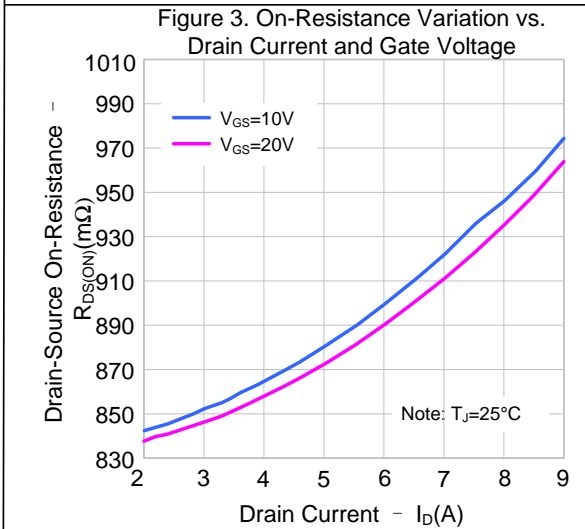
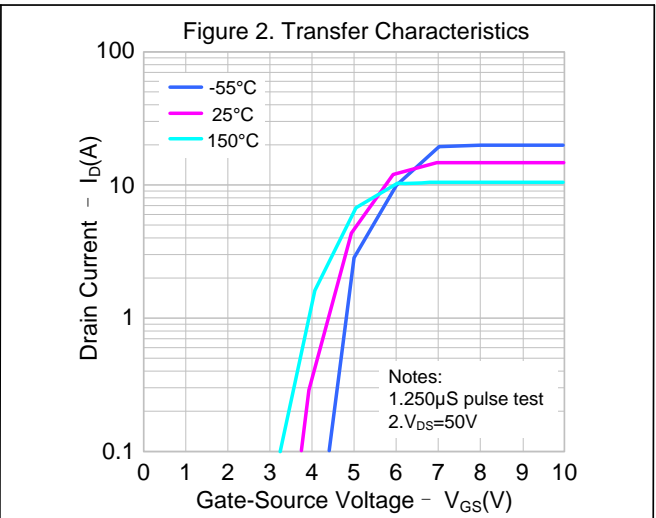
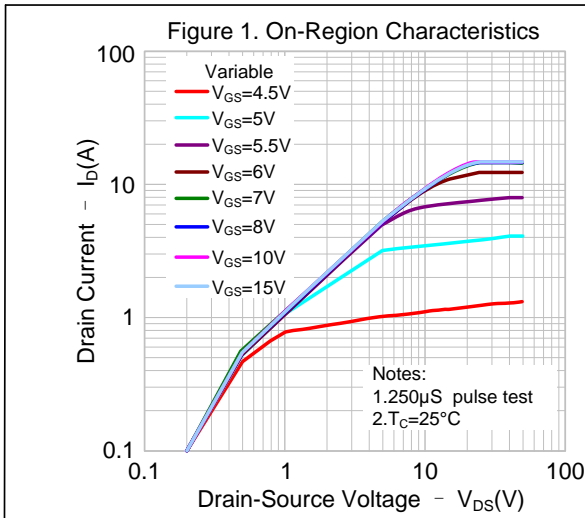
## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	$I_S$	Integral Reverse p-n Junction	--	--	10	A
Pulsed Source Current	$I_{SM}$	Diode in the MOSFET	--	--	40	
Diode Forward Voltage	$V_{SD}$	$I_S=10A, V_{GS}=0V$	--	--	1.3	V
Reverse Recovery Time	$T_{rr}$	$I_S=10A, V_{GS}=0V,$	--	561	--	ns
Reverse Recovery Charge	$Q_{rr}$	$di_F/dt=100A/\mu S$ (Note:2)	--	4.3	--	$\mu C$

**Notes:**

1.  $L=30mH, I_{AS}=6.0A, V_{DD}=100V, R_G=25\Omega$ , 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**



**TYPICAL CHARACTERISTICS (CONTINUED)**

Figure 7. Breakdown Voltage Variation vs. Temperature

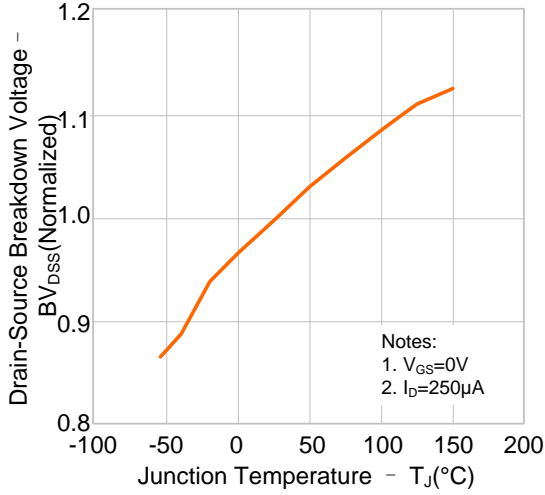


Figure 8. On-resistance vs. Temperature

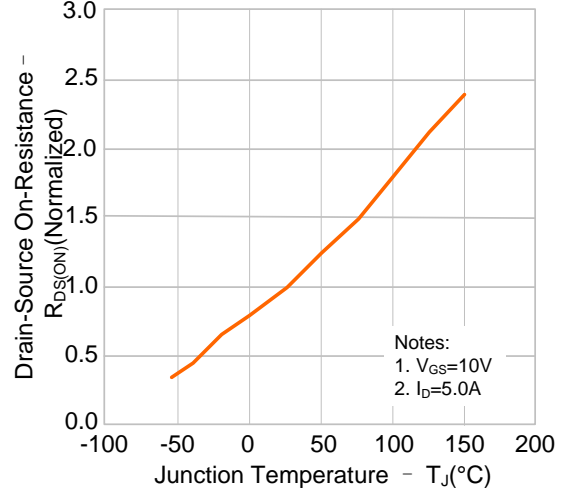


Figure 9-1. Max. Safe Operating Area(SVF10N65F)

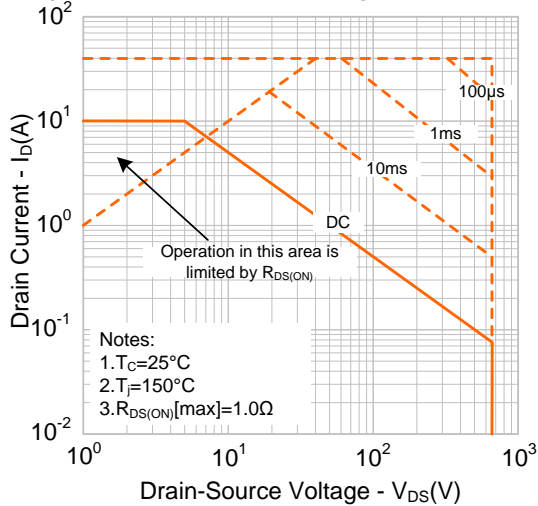


Figure 9-2. Max. Safe Operating Area(SVF10N65K)

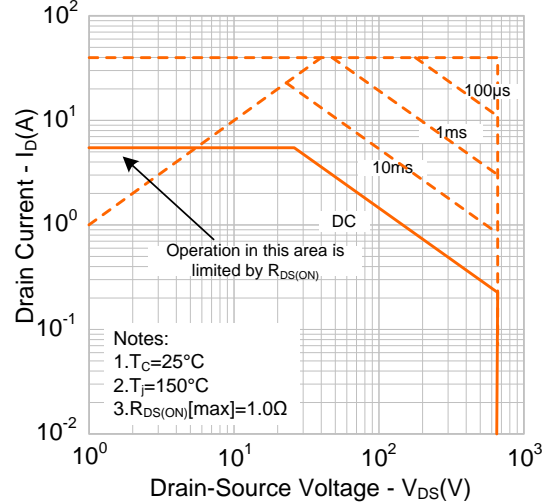


Figure 9-3. Max. Safe Operating Area(SVF10N65T)

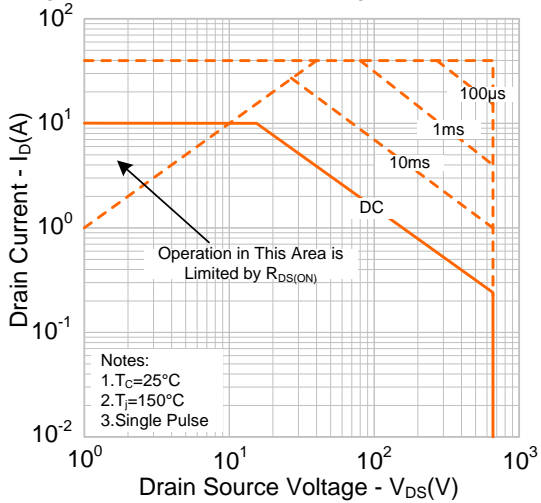
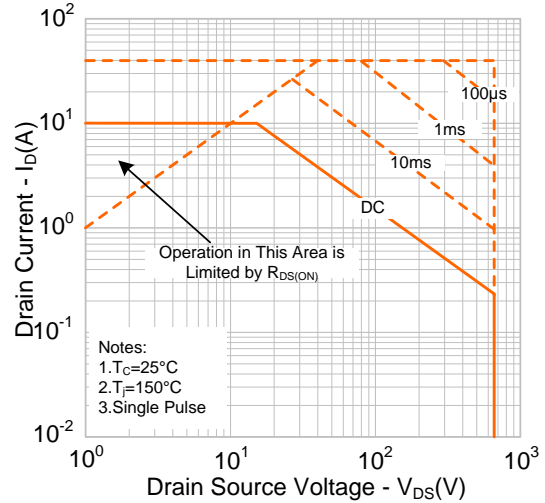
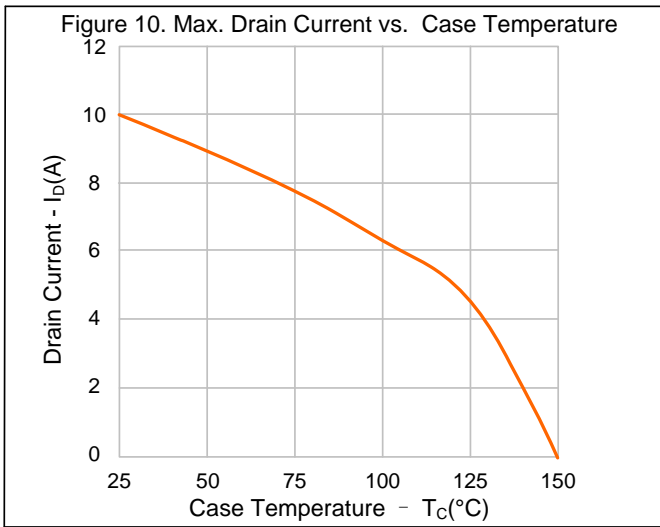


Figure 9-4. Max. Safe Operating Area(SVF10N65S)

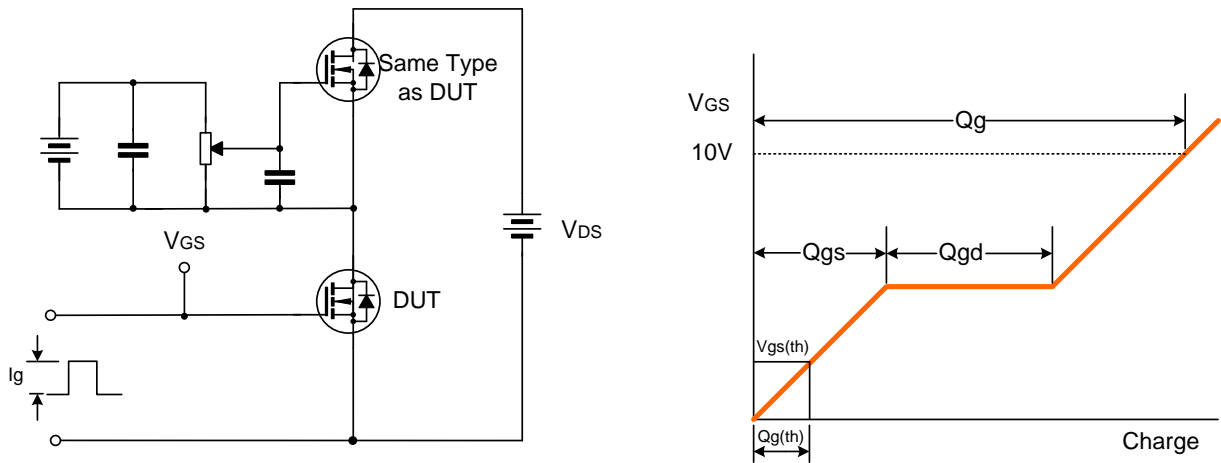


**TYPICAL CHARACTERISTICS (CONTINUED)**

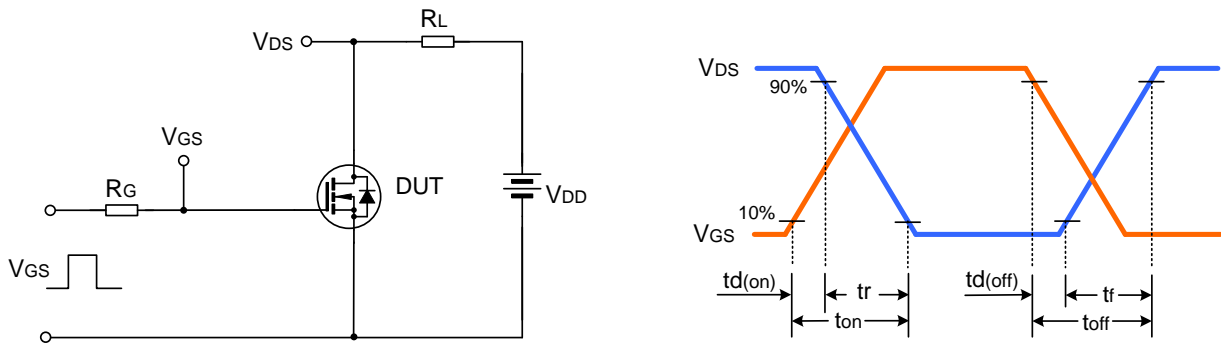


**TYPICAL TEST CIRCUIT**

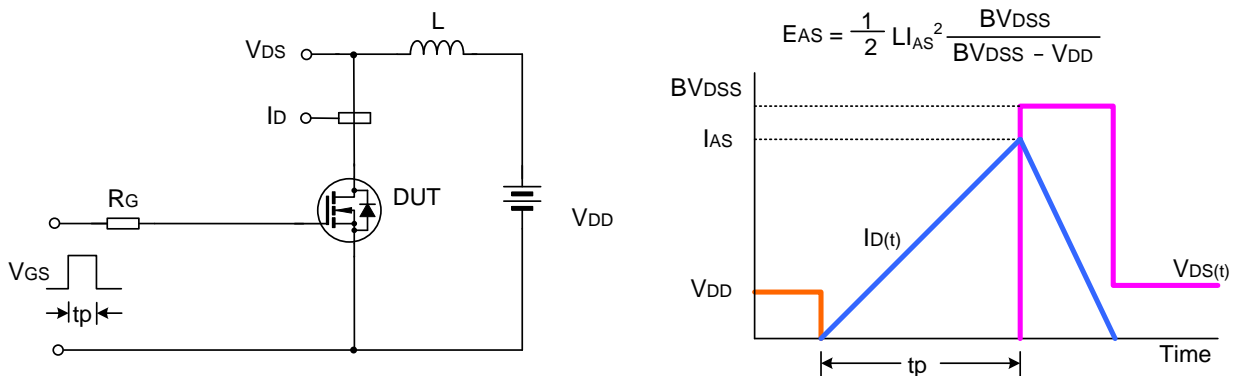
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



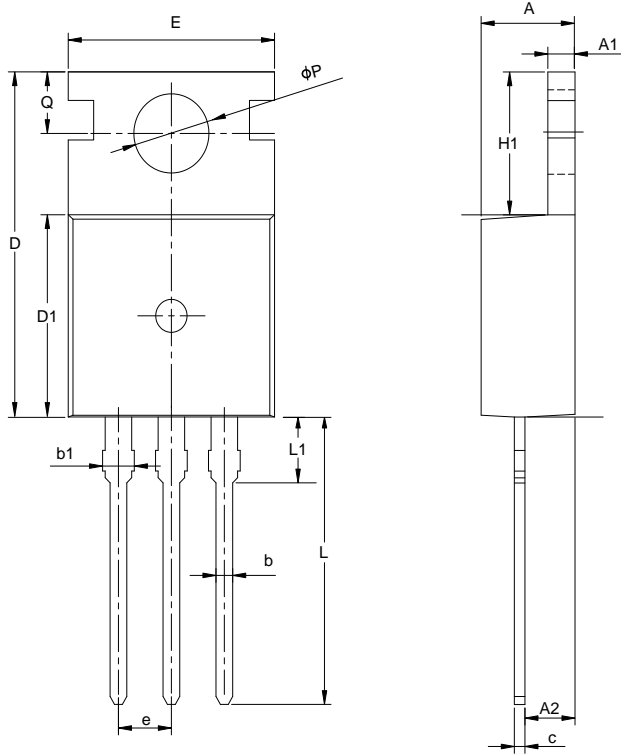




**PACKAGE OUTLINE(CONTINUED)**

**TO-220-3L**

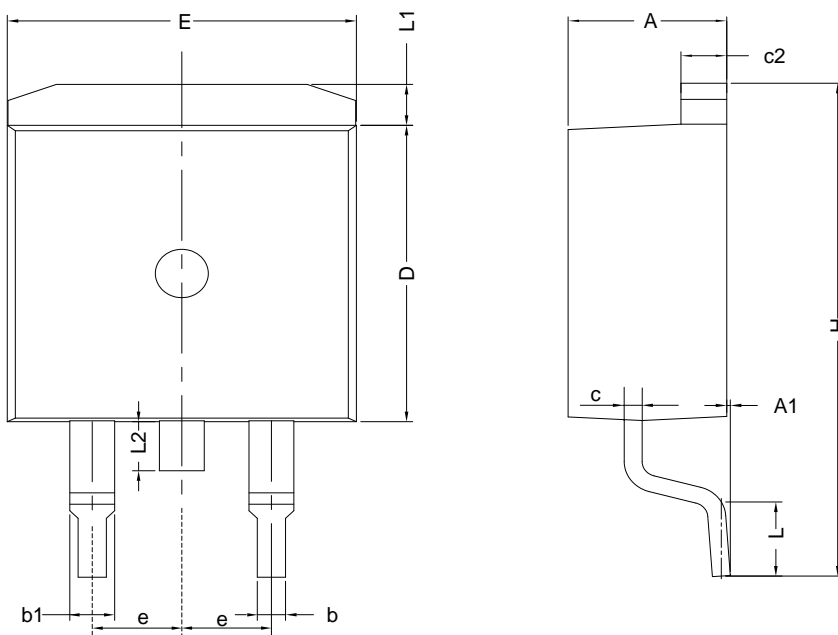
**UNIT: mm**



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
$\phi P$	3.40	3.70	3.90
Q	2.60	—	3.20

**TO-263-2L**

**UNIT: mm**



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.30	4.57	4.72
A1	0	0.10	0.25
b	0.71	0.81	0.91
c	0.30	—	0.60
c2	1.17	1.27	1.37
D	8.50	—	9.35
E	9.80	—	10.45
e	2.54BSC		
H	14.70	—	15.75
L	2.00	2.30	2.74
L1	1.12	1.27	1.42
L2	—	—	1.75

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Rev.: 2.5

Revision History:

1. Update the template of the datasheet
- 

Rev.: 2.4

Revision History:

1. Add another solid figure of TO-220F-3L
  2. Update the package outline of TO-262-3L
- 

Rev.: 2.3

Revision History:

1. Modify the Electrical characteristics
- 

Rev.: 2.2

Revision History:

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

Rev.: 2.1

Revision History:

1. Modify the thermal characteristics
- 

Rev.: 2.0

Revision History:

1. Modify the ordering information
- 

Rev.: 1.9

Revision History:

1. Modify the ordering information
- 

Rev.: 1.8

Revision History:

1. Change the schematic diagram of MOS
- 

Rev.: 1.7

Revision History:

1. Modify "PACKAGE OUTLINE"
-

Rev.: 1.6

Revision History:

1. Add the package of TO-263-2L
- 

Rev.: 1.5

Revision History:

1. Add the package of TO-262-3L
- 

Rev.: 1.4

Revision History:

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

Rev.: 1.3

Revision History:

1. Add the halogen free information of SVF10N65F
- 

Rev.: 1.2

Revision History:

1. Modify "PACKAGE OUTLINE"
- 

Rev.: 1.1

Revision History:

1. Modify "ELECTRICAL CHARACTERISTICS"
- 

Rev.: 1.0

Revision History:

1. Original
-