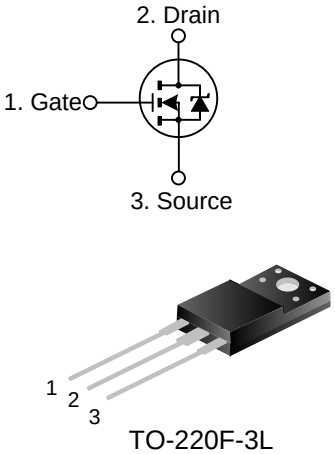
9A, 900V N-CHANNEL MOSFET

GENERAL DESCRIPTION

SVF9N90F is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary F-Cell™ structure VDMOS technology. The improved cell and guard ring 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.



TO-220F-3L

FEATURES

- 9A,900V,$R_{DS(on)(typ.)}$=1.10Ω@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
SVF9N90F	TO-220F-3L	SVF9N90F	Pb free	Tube

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

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	900	V
Gate-Source Voltage		V_{GS}	±30	V
Drain Current	T_C=25°C	I_D	9.0	A
	T_C=100°C		5.7	
Drain Current Pulsed		I_{DM}	36	A
Power Dissipation(T_C=25°C)		P_D	68	W
-Derate above 25°C			0.54	W/°C
Single Pulsed Avalanche Energy(Note 1)		E_{AS}	823	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
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.84	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	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	900	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=900V, 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=4.5A	--	1.1	1.4	Ω
Input Capacitance	R_g	f=1.0MHz	--	5.0	--	Ω
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	--	1690	--	pF
Output Capacitance	C_{oss}		--	142	--	
Reverse Transfer Capacitance	C_{rss}		--	7.4	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=450V, I_D=9.0A, R_G=25Ω, (Note3,4)	--	28	--	ns
Turn-on Rise Time	t_r		--	40	--	
Turn-off Delay Time	$t_{d(off)}$		--	111	--	
Turn-off Fall Time	t_f		--	48	--	
Total Gate Charge	Q_g	V_{DS}=720V, I_D=9.0A, V_{GS}=10V, (Note 3,4)	--	38	--	nC
Gate-Source Charge	Q_{gs}		--	11	--	
Gate-Drain Charge	Q_{gd}		--	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	--	--	9.0	A
Pulsed Source Current	I_{SM}	Diode in the MOSFET	--	--	36	
Diode Forward Voltage	V_{SD}	I_S=9.0A,V_{GS}=0V	--	--	1.4	V
Reverse Recovery Time	T_{rr}	I_S=9.0A,V_{GS}=0V,	--	649	--	ns
Reverse Recovery Charge	Q_{rr}	dI_F/dt=100A/μs (Note 4)	--	5.3	--	μC

Notes:

1. L=30mH, I_{AS}=7.1A, V_{DD}=50V, R_G=25Ω, starting temperature T_J=25°C;
2. V_{DS}=0~400V, I_{SD}<=9.0A, 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

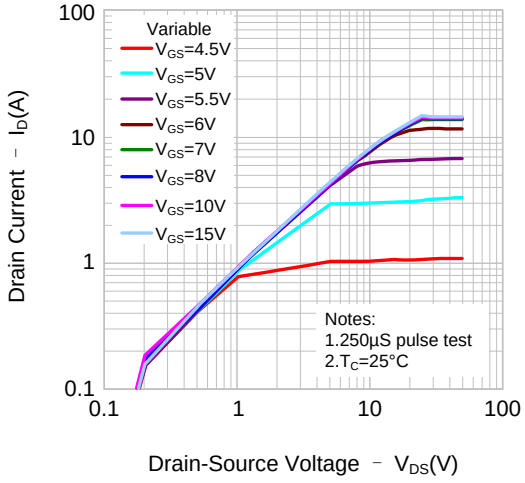


Figure 2. Transfer Characteristics

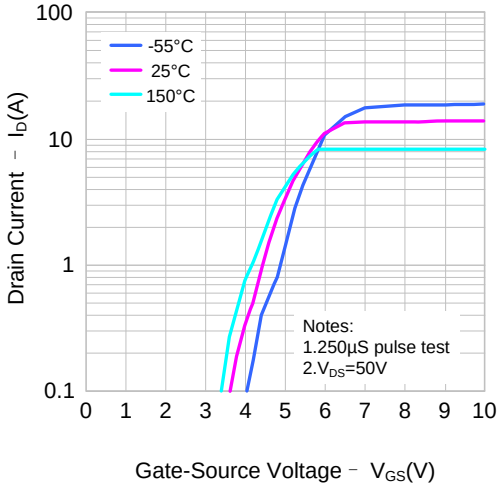


Figure 3. On-Resitance Variation vs. Drain Current and Gate Voltage

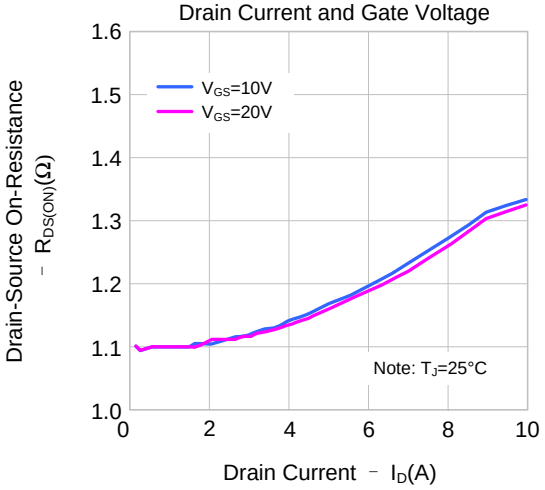


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

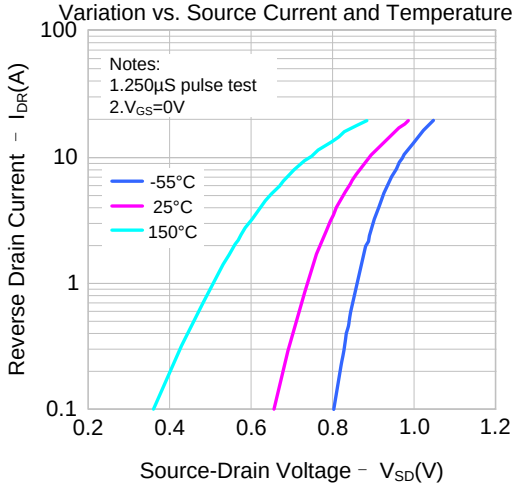


Figure 5. Capacitance Characteristics

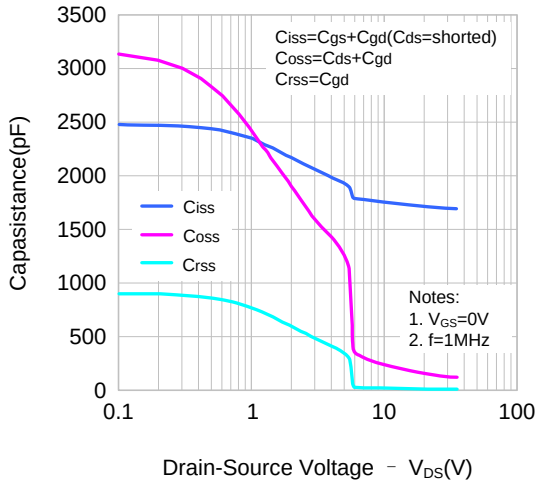
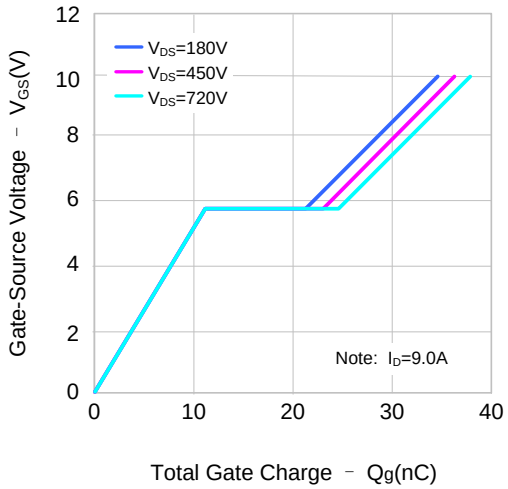


Figure 6. Gate Charge Characteristics



TYPICAL CHARACTERISTICS(CONTINUED)

Figure 7. Breakdown Voltage Variation vs. Temperature

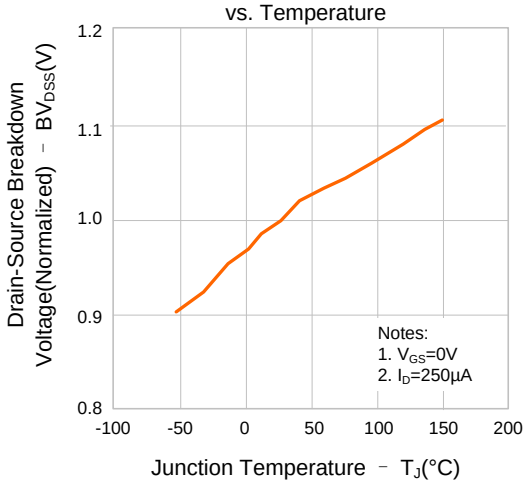


Figure 8. On-resistance Variation vs. Temperature

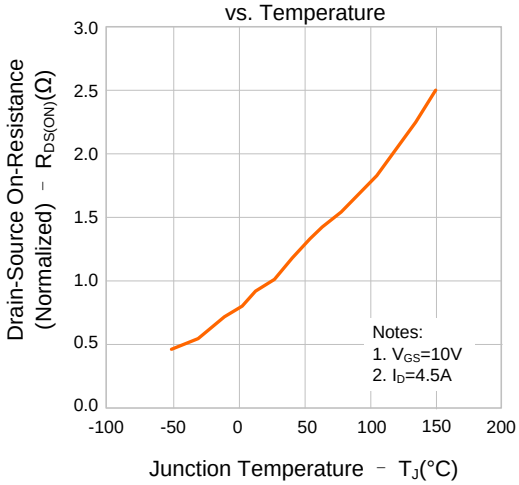


Figure 9. Max. Safe Operating Area

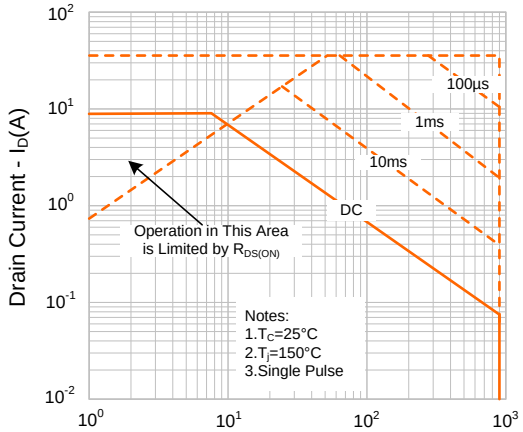
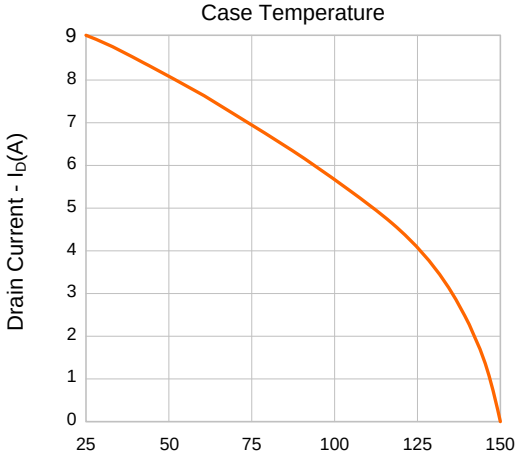
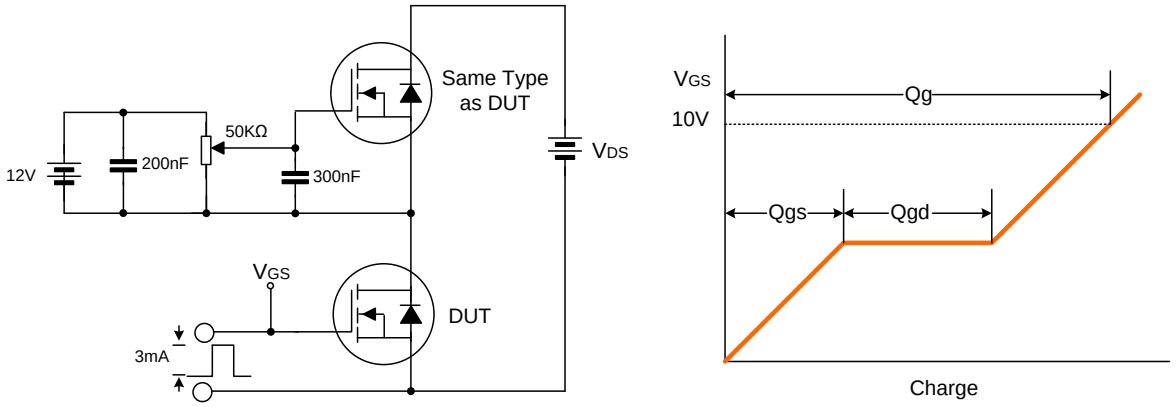


Figure 10. Maximum Drain Current vs. Case Temperature

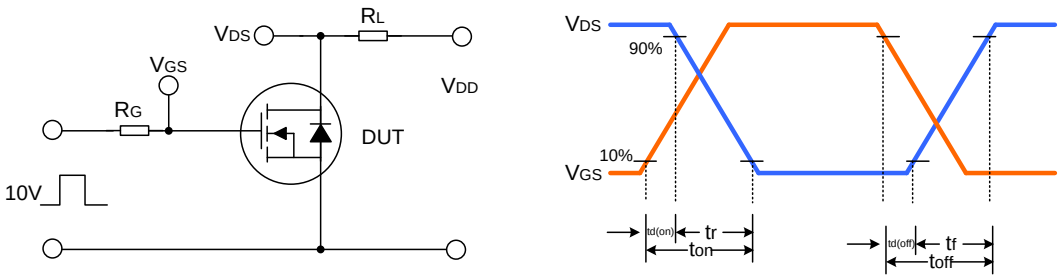


TYPICAL TEST CIRCUIT

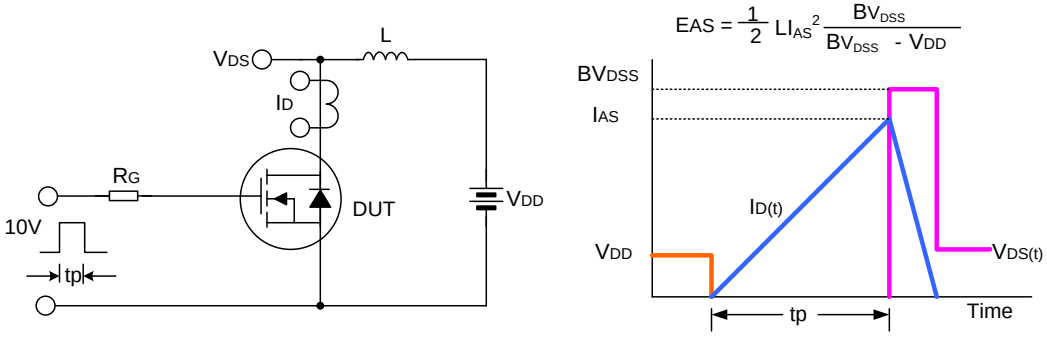
Gate Charge Test Circuit & Waveform



Switching Test Circuit & Waveform

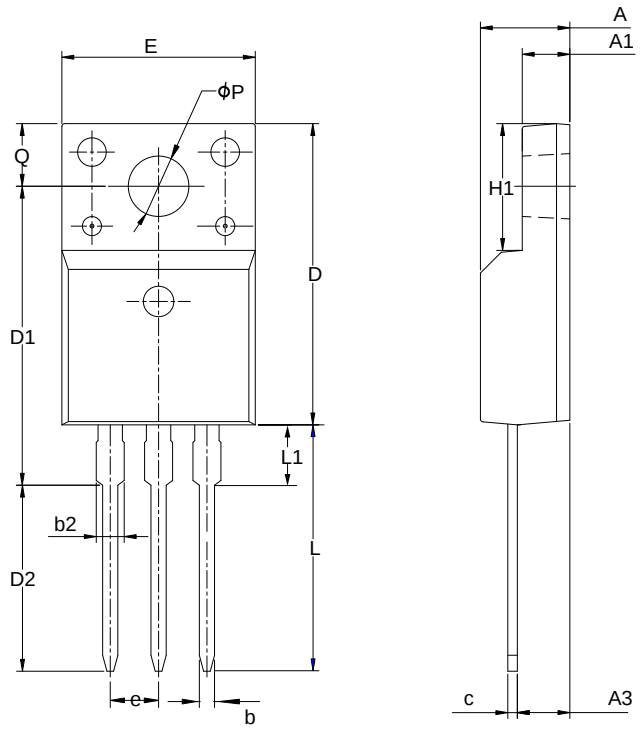


EAS Test Circuit & Waveform



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
ϕP	3.00	3.18	3.40
Q	3.05	3.30	3.55

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Part No.:	SVF9N90F	Document Type:	Datasheet
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Rev.: 2.0
Revision History:
1. Deleted NOMENCLATURE
2. Modify Important notice

Rev.: 1.9
Revision History:
1. Add RG and dv/dt

Rev.: 1.8
Revision History:
1. Modify the value of Coss

Rev.: 1.7
Revision History:
1. Delete the package outline of TO-220FQ-3L

Rev.: 1.6
Revision History:
1. Update characteristics and Fig 5 and 6

Rev.: 1.5
Revision History:
1. Delete the package information of TO-3P

Rev.: 1.4
Revision History:
1. Add the package information of TO-220FQ-3L

Rev.: 1.3
Revision History:
1. Modify the package information of TO-220F-3L

Rev.: 1.2
Revision History:
1. Modify the thermal characteristics

Rev.: 1.1
Revision History:
1. Modify the ordering information

Rev.: 1.0
Revision History:
1. Initial release