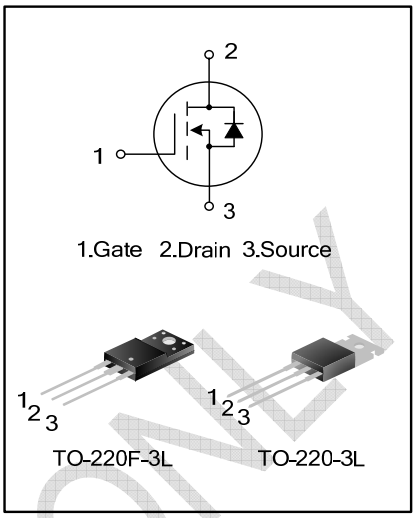
9A, 650V N-CHANNEL MOSFET

GENERAL DESCRIPTION

SVD9N65T/F is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary S-Rin^{TM} structure DMOS technology. The improved planar stripe cell and the improved guard ring terminal have been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

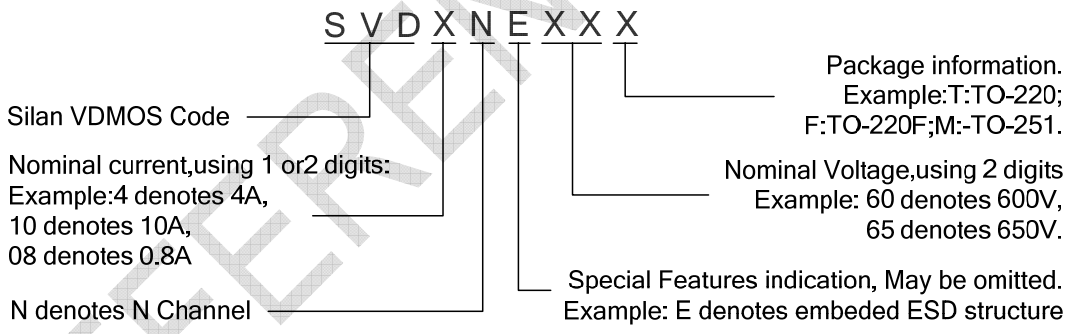
These devices are widely used in AC-DC power suppliers, DC-DC converters and H-bridge PWM motor drivers.



FEATURES

* 9A,650V,$R_{DS(on)(typ.)}$=0.98Ω@V_{GS}=10V
* Low gate charge
* Low Crss
* Fast switching
* Improved dv/dt capability

NOMENCLATURE



ORDERING SPECIFICATIONS

Part No.	Package	Marking	Material	Packing
SVD9N65T	TO-220-3L	SVD9N65T	Pb free	Tube
SVD9N65F	TO-220F-3L	SVD9N65F	Pb free	Tube

ABSOLUTE MAXIMUM RATINGS (T_C=25°C unless otherwise noted)

Parameter	Symbol	SVD9N65T	SVD9N65F	Unit
Drain-Source Voltage	V_{DS}	650		V
Gate-Source Voltage	V_{GS}	±30		V
Drain Current	I_D	9		A
Drain Pulsed Current	I_{DM}	36		A
Power Dissipation(T_C=25°C)	P_D	148	48	W
-Derate above 25°C		1.18	0.38	W/°C
Single Pulsed Avalanche Energy (Note 1)	E_{AS}	672		mJ
Operation Junction Temperature	T_J	150		°C
Storage Temperature	T_{stg}	-55～+150		°C

THERMAL CHARACTERISTICS

Parameter	Symbol	SVD9N65T	SVD9N65F	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.85	2.63	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	120	°C/W

ELECTRICAL CHARACTERISTICS (T_C=25°C unless otherwise noted)

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	B_{VDSS}	V_{GS}=0V, I_D=250μA	650	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V	--	--	10	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	--	0.98	1.2	Ω
Input Capacitance	C_{iss}	V_{DS}=25V,V_{GS}=0V, f=1.0MHZ	--	1338.2	--	pF
Output Capacitance	C_{oss}		--	113.8	--	
Reverse Transfer Capacitance	C_{rss}		--	9.4	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=325V, V_{GS}=10V, R_G=25Ω, I_D=9A (Note 2,3)	--	25.3	--	ns
Turn-on Rise Time	t_r		--	15.3	--	
Turn-off Delay Time	$t_{d(off)}$		--	105.2	--	
Turn-off Fall Time	t_f		--	22.6	--	
Total Gate Charge	Q_g	V_{DS}=520V,I_D=9A, V_{GS}=10V (Note 2,3)	--	34	--	nC
Gate-Source Charge	Q_{gs}		--	6.9	--	
Gate-Drain Charge	Q_{gd}		--	12.8	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter	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	--	--	36	
Diode Forward Voltage	V_{SD}	I_S=9A,V_{GS}=0V	--	--	1.4	V
Reverse Recovery Time	T_{rr}	I_S=9A,V_{GS}=0V,	--	450	--	ns
Reverse Recovery Charge	Q_{rr}	dI_F/dt=100A/μS (Note 2)	--	4.2	--	μC

Notes:

1. L=30mH,I_{AS}=5.88A,V_{DD}=195V,R_G=25Ω,starting T_J=25°C;
2. Pulse Test: Pulse width ≤300μs,Duty cycle≤2%;
3. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

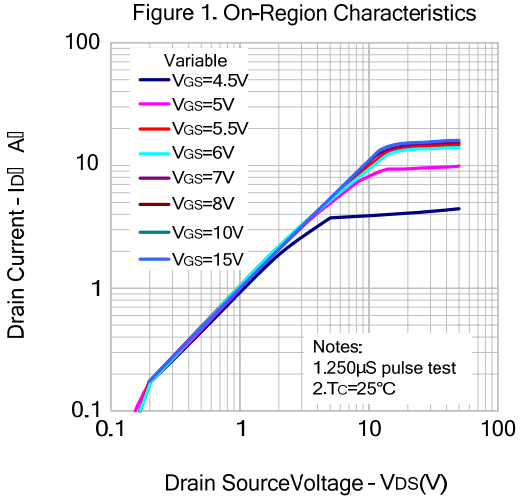


Figure 2. Transfer Characteristics

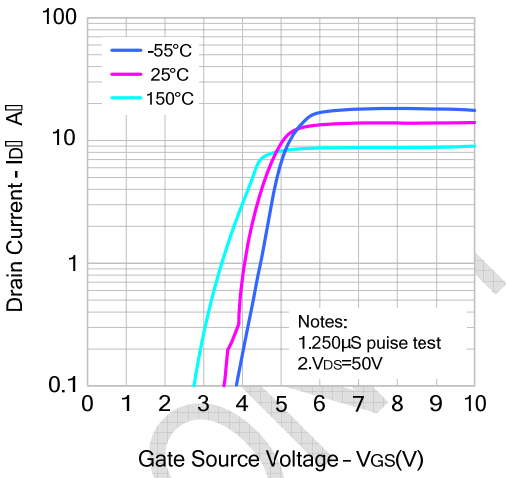


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

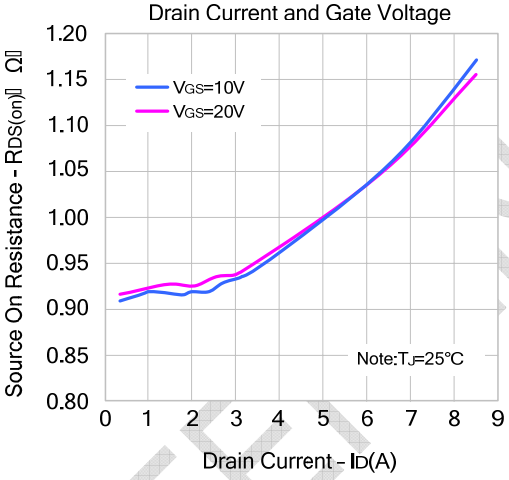


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

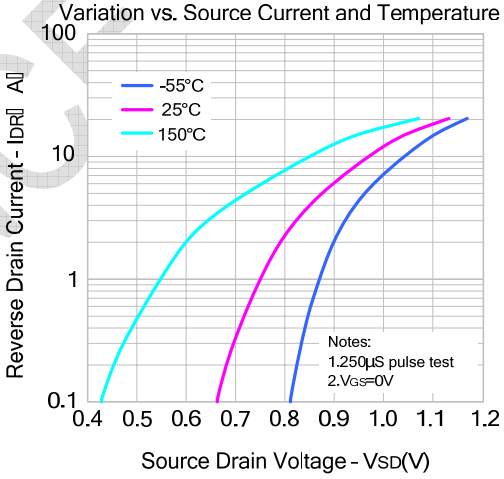


Figure 5. Capacitance Characteristics

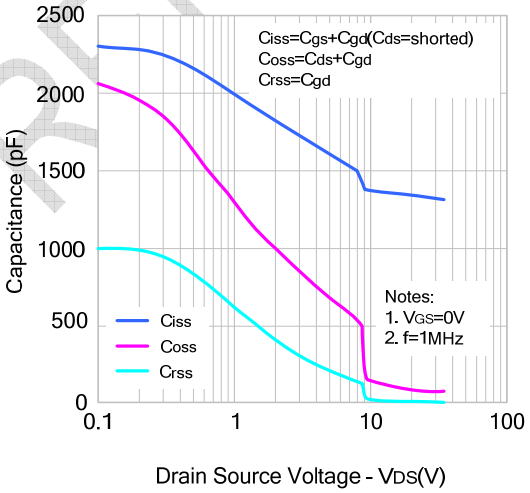
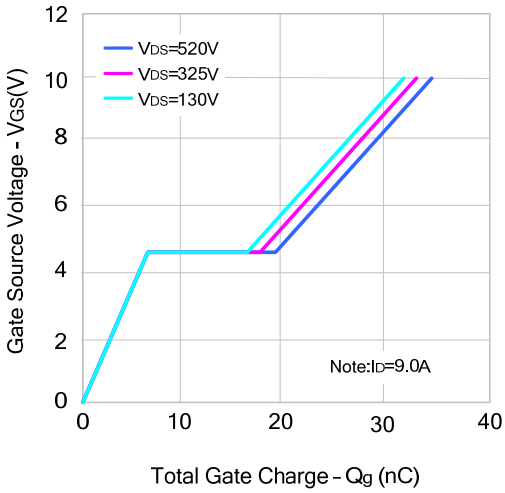


Figure 6. Gate Charge Characteristics



TYPICAL CHARACTERISTICS（continued）

Figure 7. Breakdown Voltage Variation vs. Temperature

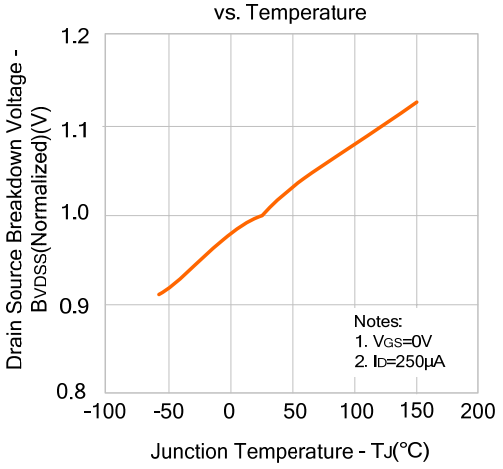


Figure 8. On-Resistance Variation

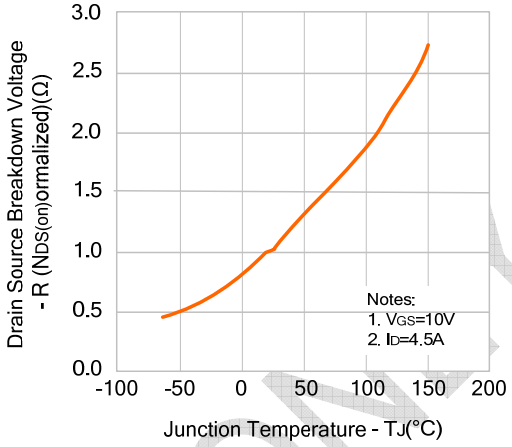


Figure 9-1. Max. Safe Operating Area(SVD9N65T)

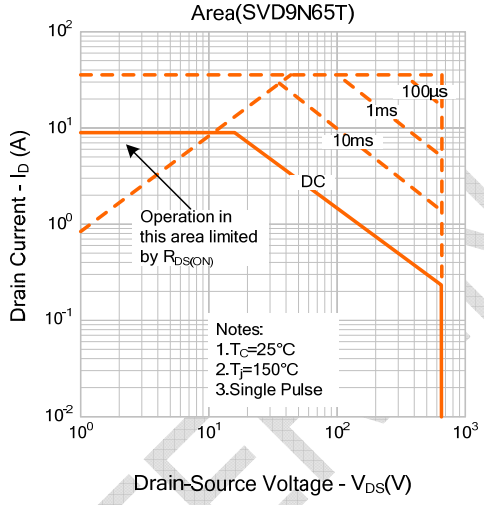


Figure 9-2. Max. Safe Operating Area(SVD9N65F)

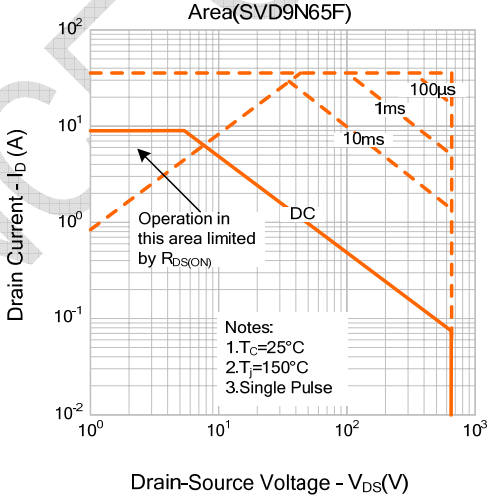
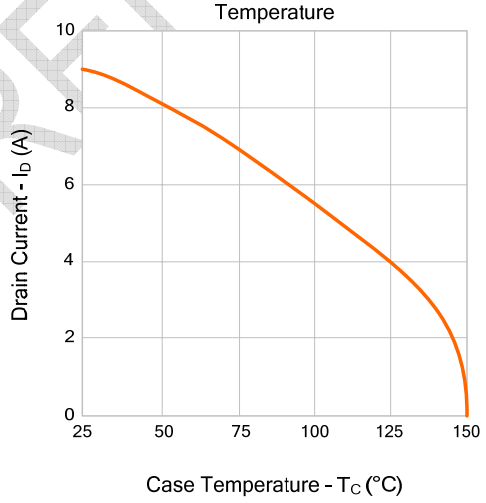
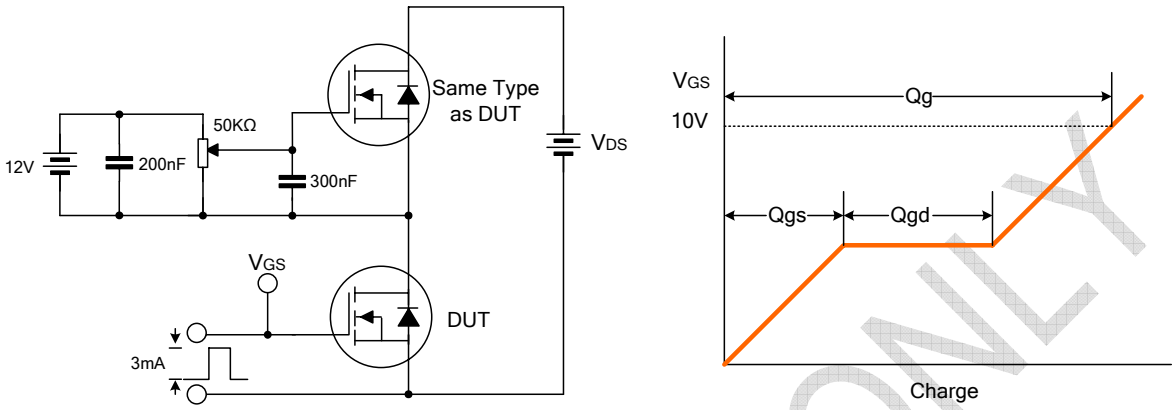


Figure 10. Max. Drain Current vs. Case Temperature

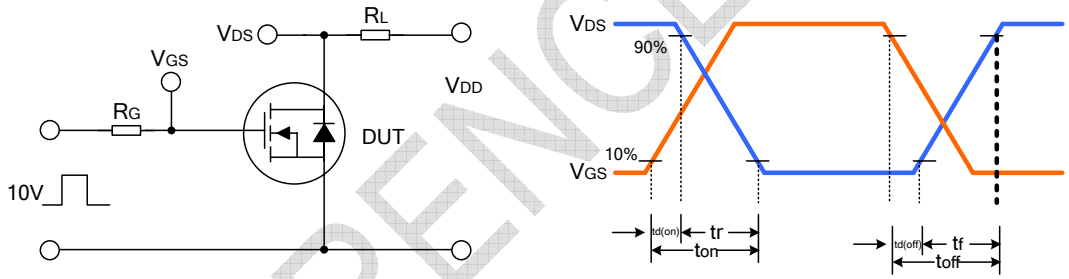


TYPICAL TEST CIRCUIT

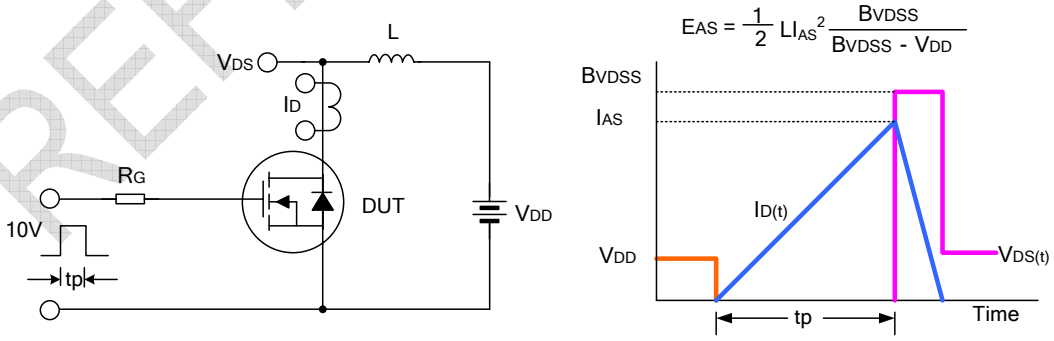
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

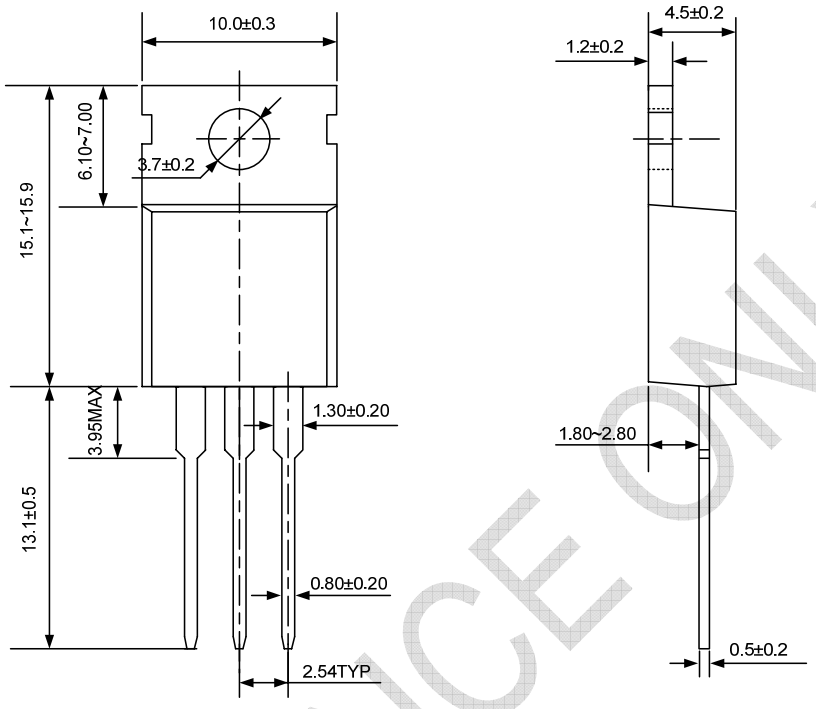


Unclamped Inductive Switching Test Circuit & Waveform

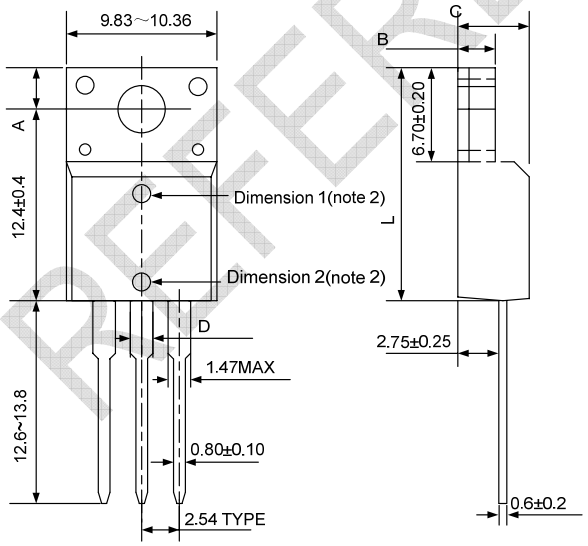


PACKAGE OUTLINE

TO-220-3L UNIT: mm



TO-220F-3L UNIT: mm



Symbol(note1)	Dimension1	Dimension2
A	3.30±0.15	2.70±0.15
B	2.55±0.20	3.0±0.20
C	4.72±0.2	4.50±0.20
D	1.47MAX	1.75MAX
L	15.75±0.30	15.00±0.30

Note1: There may be two values for some products due to different plastic mould machine, so two dimensions of the same position are listed;
Note2: When the product size is Dimension1, the thimble hole is on top of the surface; when the size is Dimension2, the center hole is on bottom of the surface.

Disclaimer:

- Silan reserves the right to make changes to the information herein for the improvement of the design and performance without further notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
- All semiconductor products malfunction or fail with some probability under special conditions. When using Silan products in system design or complete machine manufacturing, it is the responsibility of the buyer to comply with the safety standards strictly and take essential measures to avoid situations in which a malfunction or failure of such Silan products could cause loss of body injury or damage to property.
- Silan will supply the best possible product for customers!