

7A, 650V N-CHANNEL MOSFET

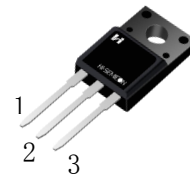
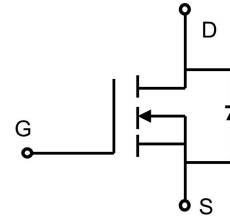
GENERAL DESCRIPTION

This power mosfet is an N-channel enhancement mode power MOS field effect transistor which is produced using Hi-semicon proprietary F-Cell™ structure VDMOS 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

- ◆ $V_{DS}=7A, I_D=650V$
- ◆ $R_{DS(on)}(typ)=1.13\Omega @ V_{GS}=10V, I_D=3.5A$
- ◆ Low $Cr_{ss}: 8.7pF @ V_{DS}=25V$
- ◆ Fast switching
- ◆ Improved dv/dt capability



1:Gate 2:Darin 3:Source

ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SFF7N65	TO-220F-3L	SFF7N65	Pb free	Tube

ABSOLUTE MAXIMUM RATINGS ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	± 30	V
Drain Current	$T_C = 25^{\circ}\text{C}$	I_D	7	A
	$T_C = 100^{\circ}\text{C}$		4.0	
Drain Current Pulsed(Note 1)		I_{DM}	28	A
Avalanche Current(Note 1)		I_{AR}	4.5	A
Power Dissipation($T_C=25^{\circ}\text{C}$) -Derate above 25°C		P_D	46	W
			0.37	W/ $^{\circ}\text{C}$
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	136	mJ
Operation Junction Temperature Range		T_J	$-55\sim+150$	$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	$-55\sim+150$	$^{\circ}\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		TL	300	$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.7	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^{\circ}\text{C/W}$

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
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	--	--	1.0	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =30V, V _{DS} =0V	--	--	50	nA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =-30V, V _{DS} =0V	--	--	-50	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D =250μA	2	2.7	4.0	V
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =3.5A	--	1.13	1.3	Ω
Forward Transconductance	g _{fs} /GMP	V _{DS} =15V, I _D =3A (Note 3)	--	4.47	10.0	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =25V V _{GS} =0V f=1.0MHZ	--	1.3	2.0	nF
Output Capacitance	C _{oss}		--	102	200	pF
Reverse Transfer Capacitance	C _{rss}		--	8.7	15	pF
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =325V, V _{GS} =10V R _G =10Ω I _D =7A (Note 3.4)	--	25	--	ns
Turn-on Rise Time	t _r		--	45	--	
Turn-off Delay Time	t _{d(off)}		--	35	--	
Turn-off Fall Time	t _f		--	30	--	

Total Gate Charge	Q_g	$V_{DS}=520V, I_D=7A$ $V_{GS}=10V$ (Note 3.4)	--	15	--	nC
Gate-Source Charge	Q_{gs}		--	5.2	--	
Gate-Drain Charge	Q_{gd}		--	5	--	

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	A
Pulsed Source Current	I_{SM}		--	--	28	
Diode Forward Voltage	V_{SD}	$I_S=3.5A, V_{GS}=0V$	--	0.9	1.4	V
Reverse Recovery Time	T_{rr}	$I_F=7A, V_R=520V,$ $dI_F/dt=100A/\mu S$	--	420	--	ns
Reverse Recovery Charge	Q_{rr}		--	3.4	--	μC

1. Pulse width limited by maximum junction temperature
2. $L=10mH, I_{AS}=4.5A, V_{DD}=50V, V_G=10V, R_G=25\Omega$, starting $T_J=25^\circ C$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1. On-Characteristics

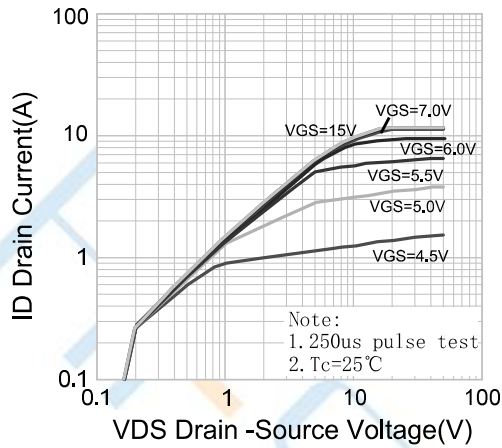


Figure 2. Transfer Characteristics

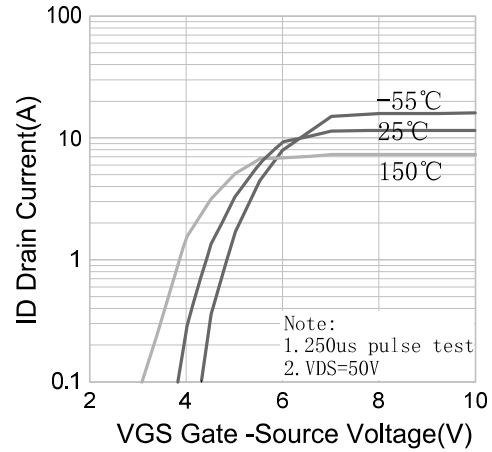


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

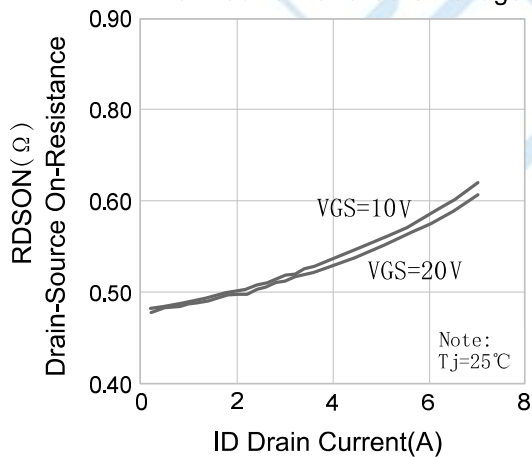


Figure 4. Body Diode Forward Voltage Variation vs Source Current and Temperature

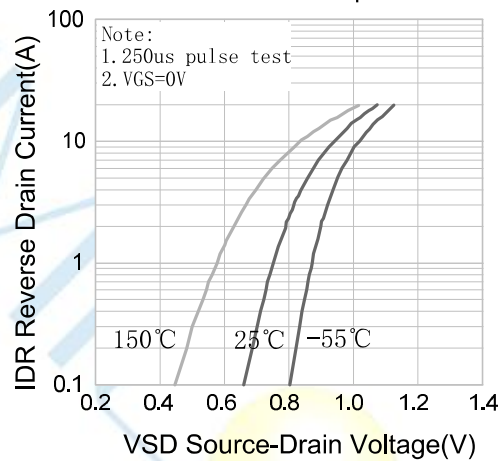


Figure 5. Capacitance Characteristics

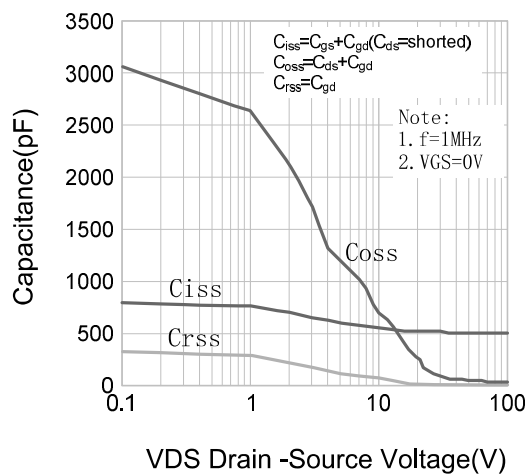
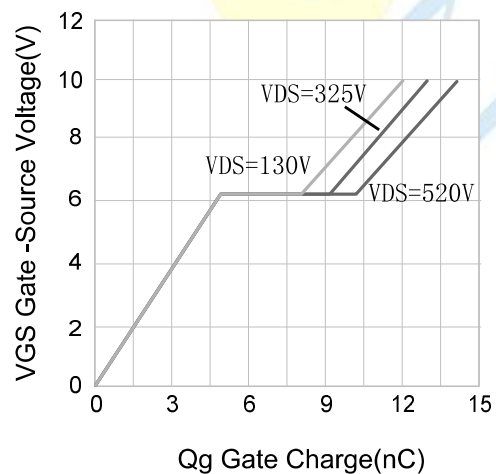


Figure 6. Charge Quantity Characteristics



Typical Performance Characteristics

Figure 7. Breakdown Voltage Variation vs. Temperature

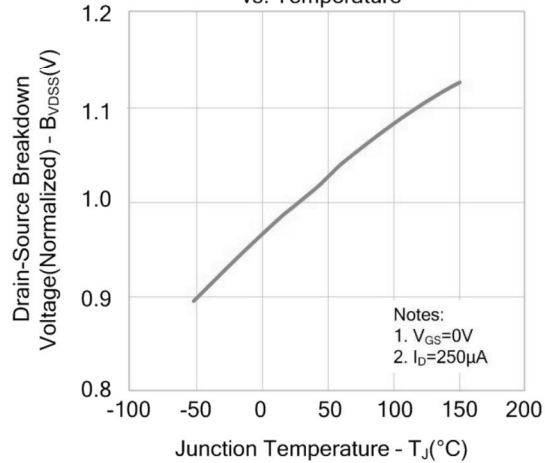


Figure 8. On-resistance Variation vs. Temperature

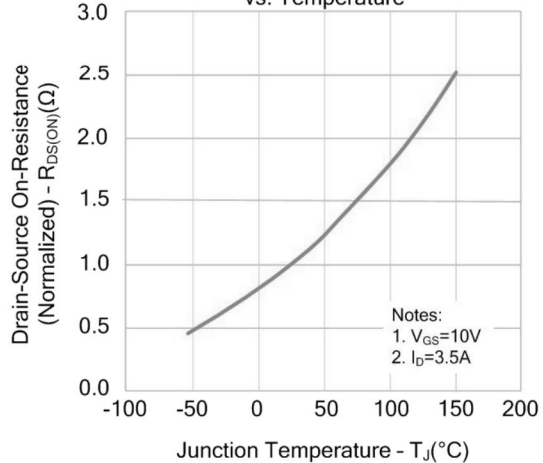


Figure 9-1. Max. Safe Operating Area(SVF7N65T)

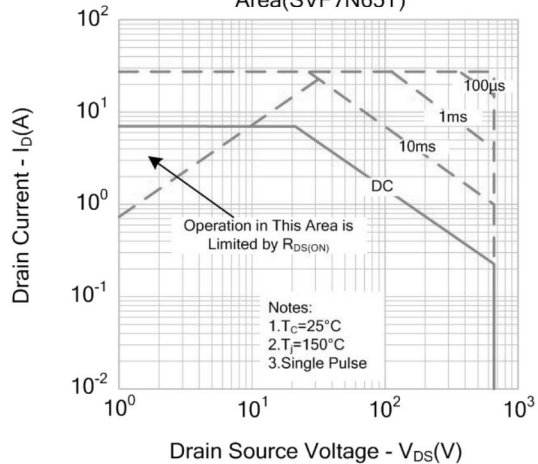


Figure 9-2. Max. Safe Operating Area(SVF7N65F(G))

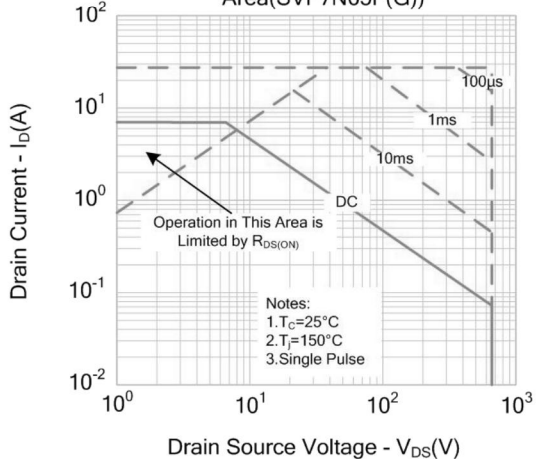
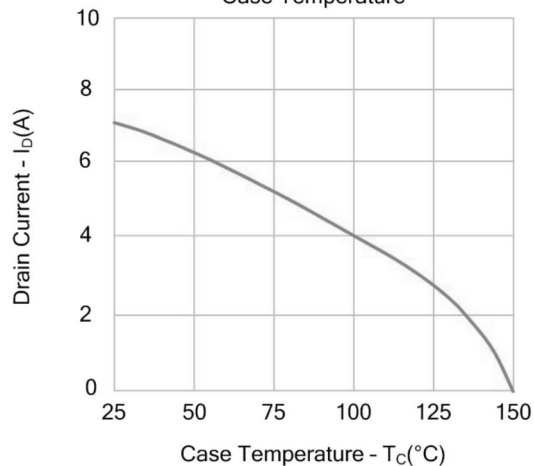
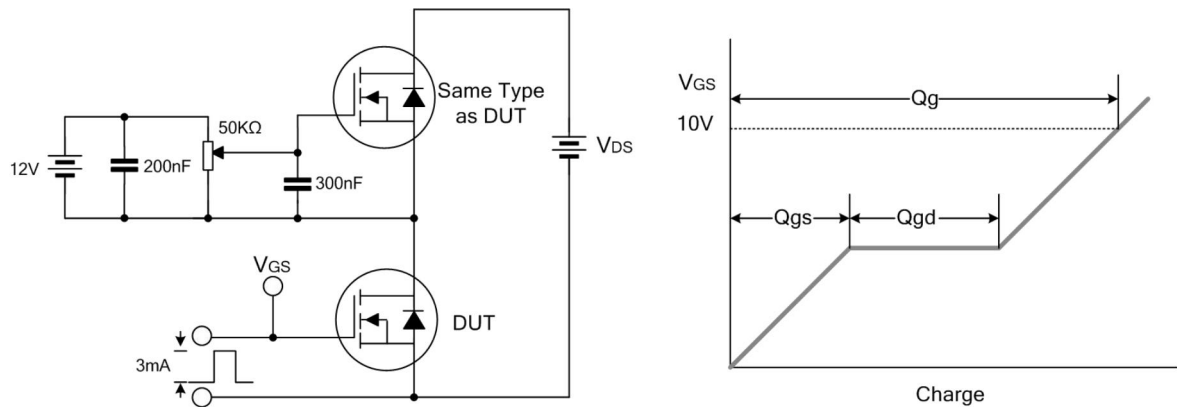


Figure 10. Maximum Drain Current vs. Case Temperature

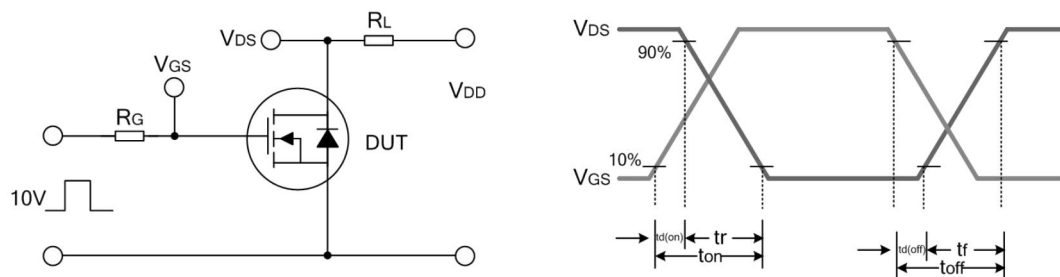


Test Circuit

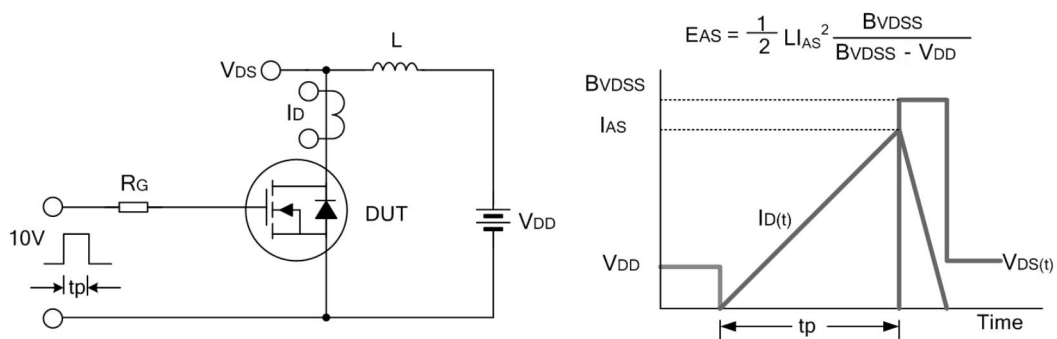
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

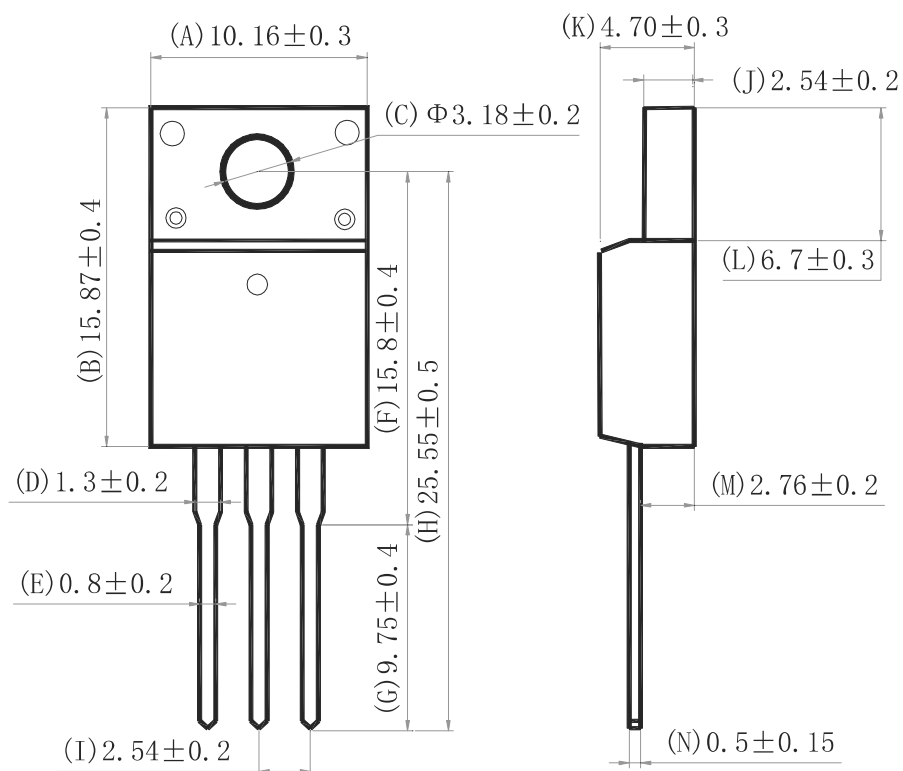


Unclamped Inductive Switching Test Circuit & Waveform



Package Mechanical T0-220F-3L

Unit:mm



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