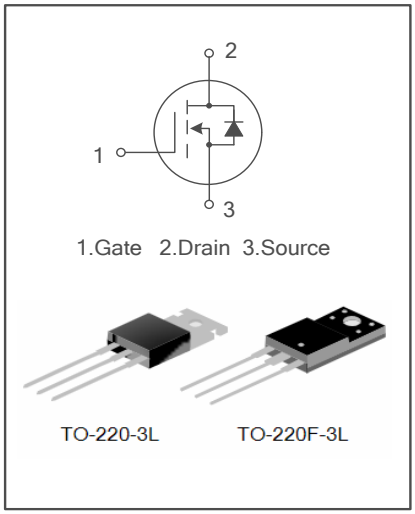
59A, 100V N-CHANNEL MOSFET

GENERAL DESCRIPTION

SFP59N10 is an N-channel enhancement mode power MOS field effect transistor which is produced using Hi-semicon's 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.

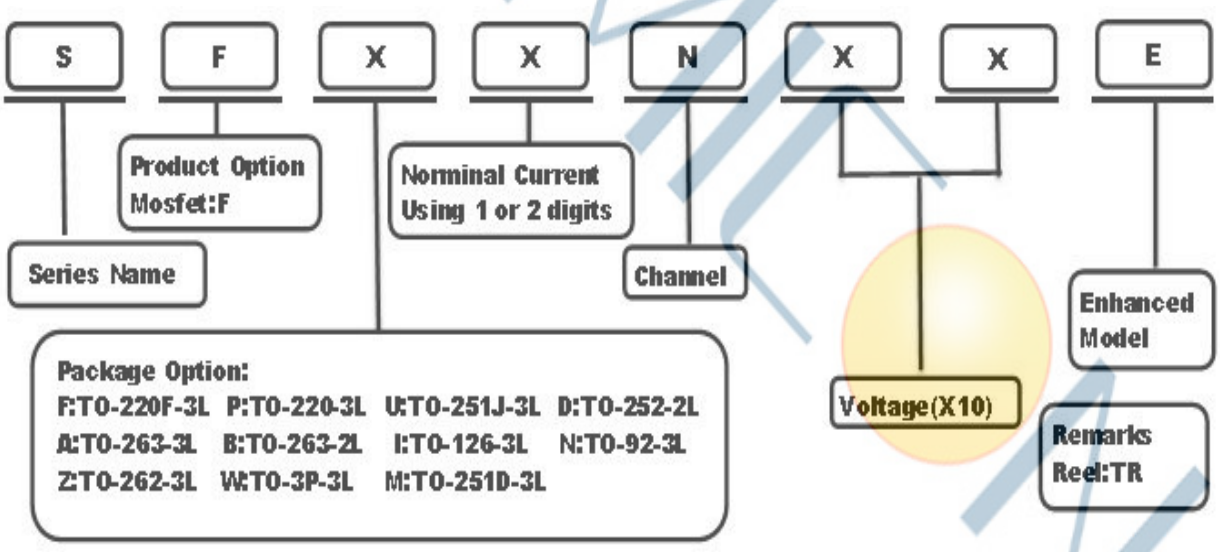
These devices are widely used in AC-DC power suppliers, DC-DC converters and H-bridge PWM motor drivers.



FEATURES

- 59A, 100V, $R_{DS(on(typ)}$=18mΩ@V_{GS}=10V
- Low gate charge
- Low Crss
- Fast switching
- Improved dv/dt capability

NOMENCLATURE



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SFP59N10	TO-220-3L	SFP59N10	Pb free	Tube

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

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current	T_C = 25°C	I_D	59	A
	T_C = 100°C		40	
Drain Current Pulsed		I_{DM}	230	A
Power Dissipation(T_C=25°C)		P_D	200	W
-Derate above 25°C			1.3	W/°C
Repetitive Avalanche Energy (Note 1)		E_{AR}	20	mJ
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	$R_{\theta JC}$	0.75	°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	B_{VDSS}	V_{GS}=0V, I_D=250μA	100	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=100V, V_{GS}=0V	--	--	1.0	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V, 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=28.0A	--	18	23	mΩ
Input Capacitance	C_{iss}	V_{DS}=25V,V_{GS}=0V, f=1.0MHZ	--	3120	--	pF
Output Capacitance	C_{oss}		--	408	--	
Reverse Transfer Capacitance	C_{rss}		--	73	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=50V, I_D=28A, R_G=25Ω (Note 2,3)	--	12	--	ns
Turn-on Rise Time	t_r		--	60	--	
Turn-off Delay Time	$t_{d(off)}$		--	46	--	
Turn-off Fall Time	t_f		--	47	--	
Total Gate Charge	Q_g	V_{DS}=80V,I_D=28A, V_{GS}=10V (Note 2,3)	--	130	--	nC
Gate-Source Charge	Q_{gs}		--	28	--	
Gate-Drain Charge	Q_{gd}		--	45	--	

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	--	--	59.0	A
Pulsed Source Current	I_{SM}		--	--	230.0	
Diode Forward Voltage	V_{SD}	I_S=28A,V_{GS}=0V	--	--	1.2	V
Reverse Recovery Time	T_{rr}	I_S=28A,V_{GS}=0V, dI_F/dt=100A/μS(Note 2)	--	150	--	ns
Reverse Recovery Charge	Q_{rr}		--	680	--	μC

Notes:

1. L=0.7mH, I_{AS}=28.0A, V_{GS}=10V, 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

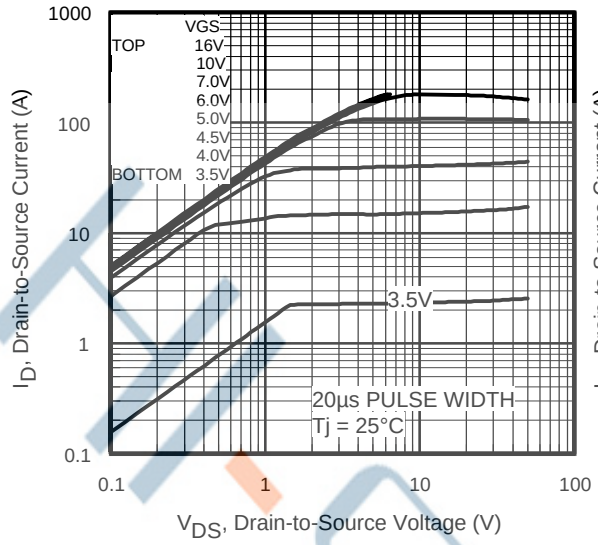


Fig 1. Typical Output Characteristics

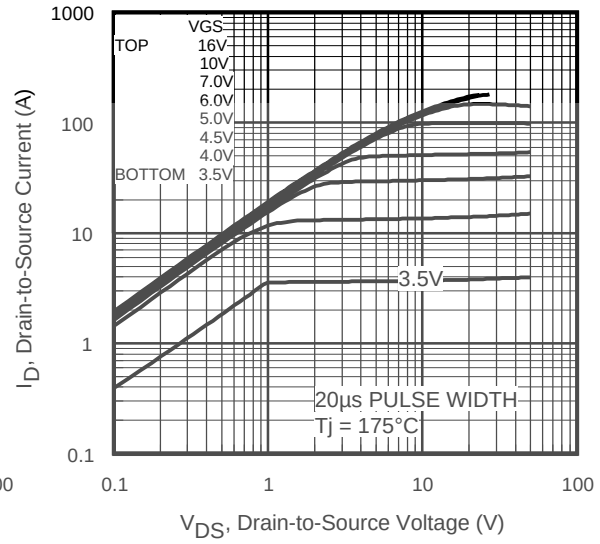


Fig 2. Typical Output Characteristics

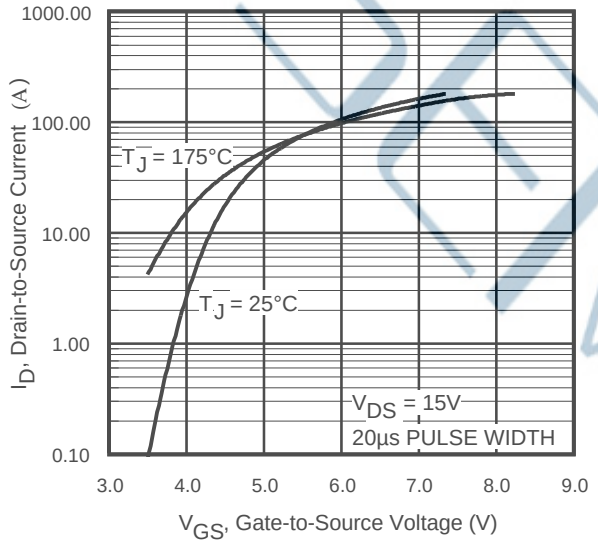


Fig 3. Typical Transfer Characteristics

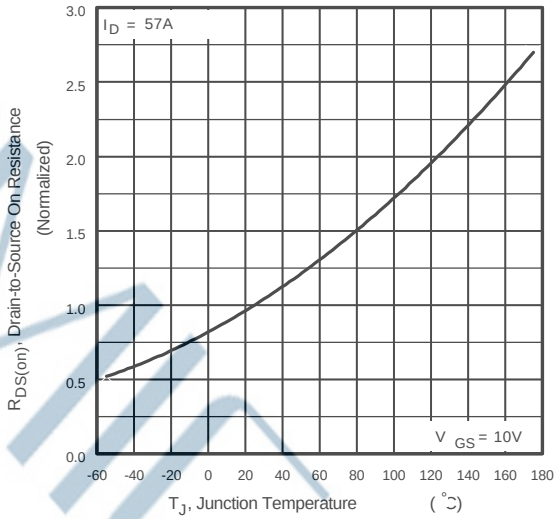


Fig 4. Normalized On-Resistance Vs. Temperature

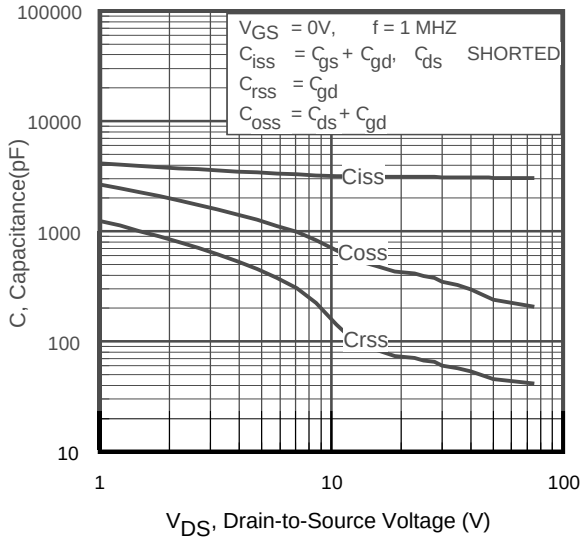


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

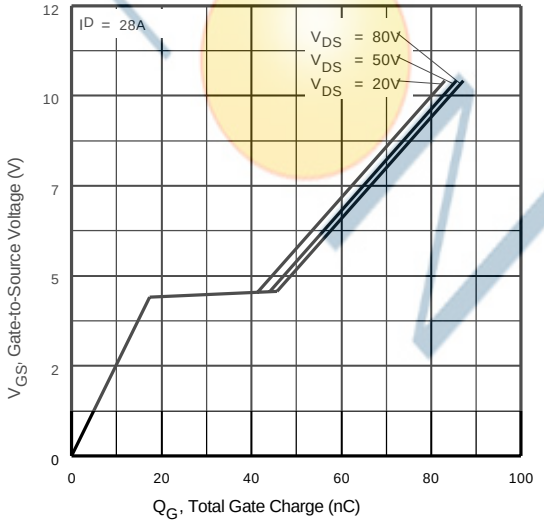


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS (continued)

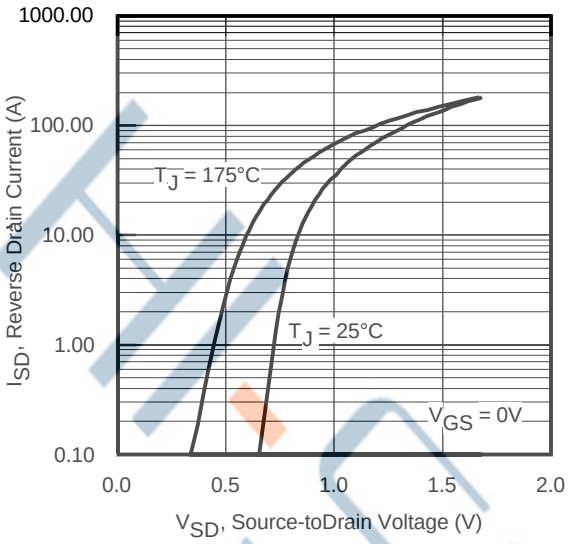


Fig 7. Typical Source-Drain Diode Forward Voltage

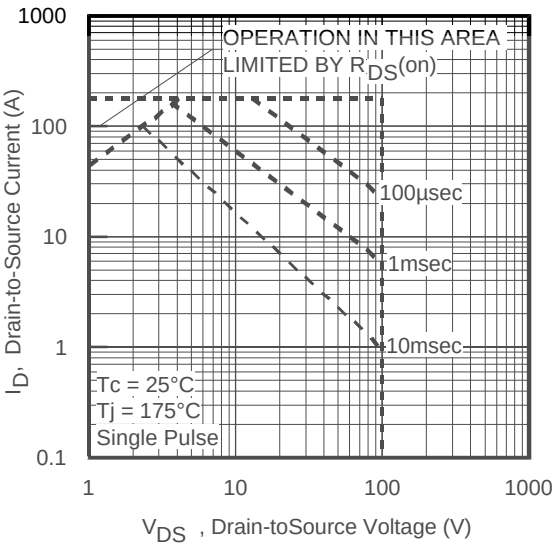


Fig 8. Maximum Safe Operating Area

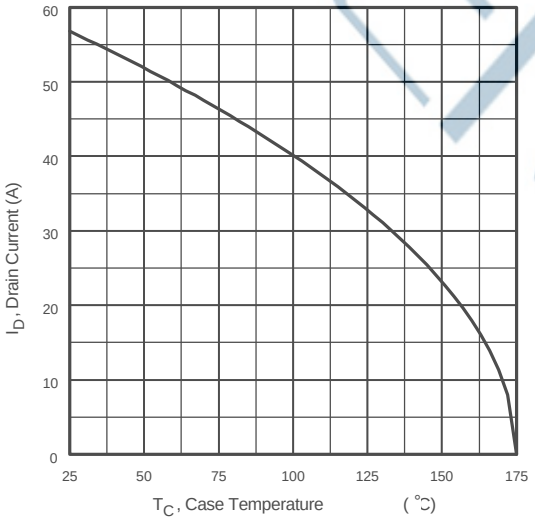
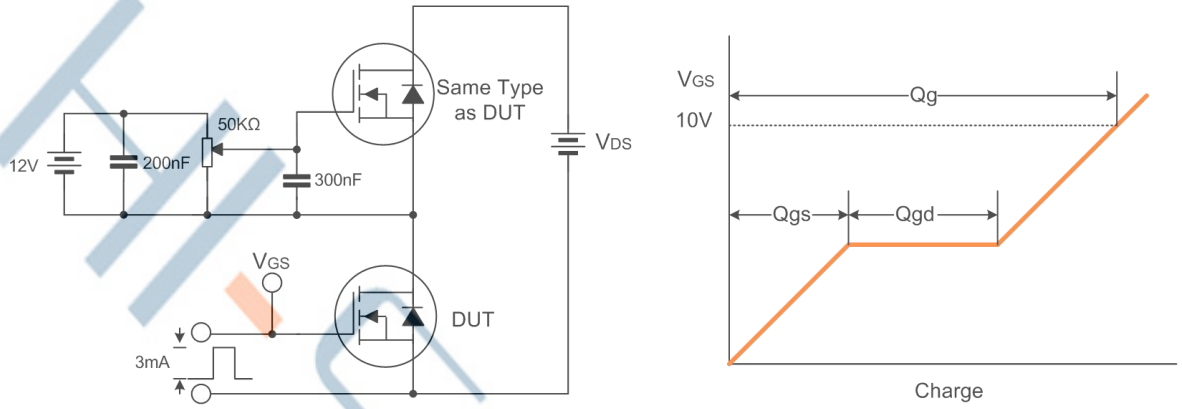


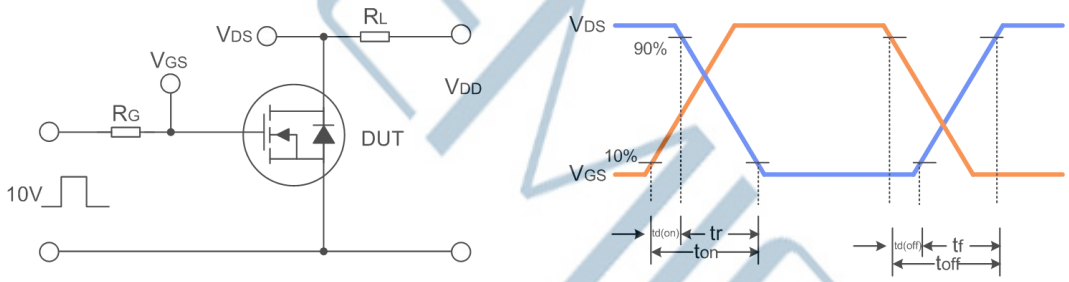
Fig 9. Maximum Drain Current Vs. Case Temperature

TYPICAL TEST CIRCUIT

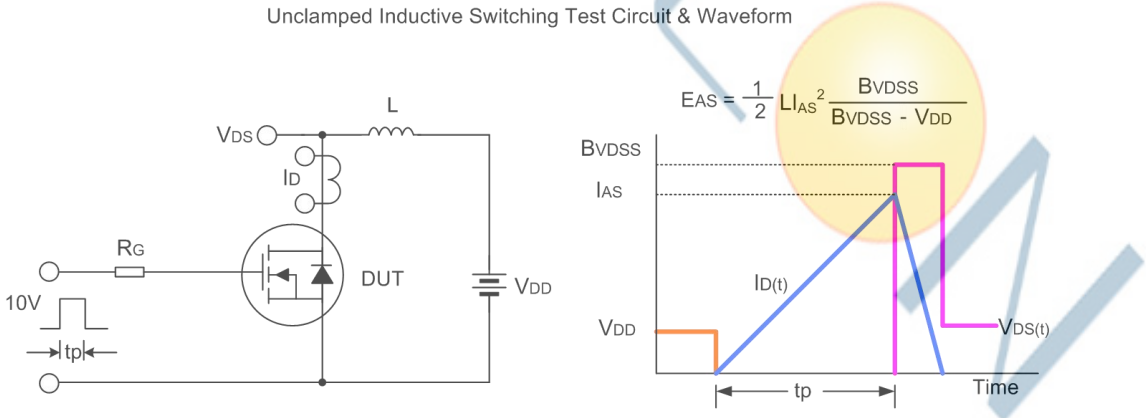
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

TO-220-3L **UNIT: mm**