

30V, 100A P-CHANNEL POWER MOSFET

GENERAL DESCRIPTION

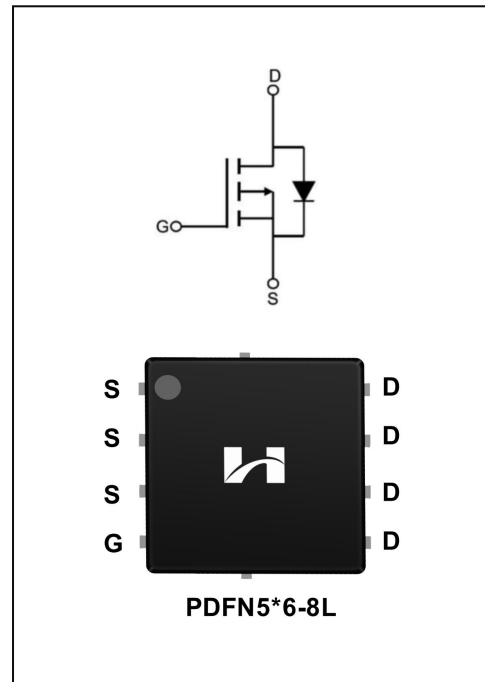
The SFM3010PT uses advanced trench technology and design to provide excellent  $R_{DS(on)}$  with low gate charge. It can be used in a wide variety applications.

Features

- ◆  $V_{DS}=-30V, I_D=-100A$
- ◆  $R_{DS(on)}$   
 TYP:  $3.7m\Omega @ V_{GS}=-10V$   
 TYP:  $5.5m\Omega @ V_{GS}=-4.5V$

Applications

- ◆ PWM Applications
- ◆ Load Switch
- ◆ Power Management



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SFM3010PT	PDFN5*6-8L	SFM3010PT	Pb Free	Reel

### ABSOLUTE MAXIMUM RATINGS (T<sub>J</sub>=25°C unless otherwise noted)

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V <sub>DS</sub>	-30	V
Gate-Source Voltage		V <sub>GS</sub>	±20	V
Drain Current	T <sub>C</sub> = 25°C	I <sub>D</sub>	-100	A
	T <sub>C</sub> = 100°C		-70	
Drain Current Pulsed(Note 1)		I <sub>DM</sub>	-400	A
Power Dissipation(T <sub>C</sub> =25°C) -Derate above 25°C		P <sub>D</sub>	52	W
			0.44	W/°C
Single Pulsed Avalanche Energy (Note 2)		E <sub>AS</sub>	363	mJ
Operation Junction Temperature Range		T <sub>J</sub>	-55~+150	°C
Storage Temperature Range		T <sub>stg</sub>	-55~+150	°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		TL	300	°C

### THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	2.4	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	43	°C/W

### ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B <sub>VDS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-30	--	--	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V	--	--	1	uA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =20V, V <sub>DS</sub> =0V	--	--	100	nA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V	--	--	-100	
On Characteristics						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> =2-50μA	-1.0	-1.6	-2.5	V
Static Drain- Source On State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-30A	--	3.7	4.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =-20A	--	5.2	6.5	
Dynamic Characteristics						
Gate Resistance	R <sub>g</sub>	V <sub>GS</sub> =0V; f=1.0MHZ	--	4.0	--	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-15V V <sub>GS</sub> =0V f=1.0MHZ	--	7996	--	pF
Output Capacitance	C <sub>oss</sub>		--	903	--	
Reverse Transfer Capacitance	C <sub>rss</sub>		--	818	--	
Switching Characteristics						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-20V, I <sub>D</sub> =-20A V <sub>GS</sub> =-10V, R <sub>G</sub> =3.0Ω (Note 3.4)	--	28	--	ns
Turn-on Rise Time	t <sub>r</sub>		--	83	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	76	--	
Turn-off Fall Time	t <sub>f</sub>		--	65	--	

Total Gate Charge	$Q_g$	$V_{DS}=-15V, I_D=-20A$ $V_{GS}=-10V$ (Note 3.4)	--	121	--	nc
Gate-Source Charge	$Q_{gs}$		--	24	--	
Gate-Drain Charge	$Q_{gd}$		--	18	--	

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	--	--	-100	A
Pulsed Source Current	$I_{SM}$		--	--	-400	
Diode Forward Voltage	$V_{SD}$	$I_S=-30A, V_{GS}=0V$	--	0.83	-1.4	V
Reverse Recovery Time	$T_{rr}$	$I_F=-20A, V_R=-15V,$ $dI_F/dt=100A/\mu S$	--	31	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	20.3	--	nC

1. Pulse width limited by maximum junction temperature
2.  $L=0.5mH, V_{DD}=-15V, V_G=-10V, R_G=25\Omega,$  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: Output Characteristics

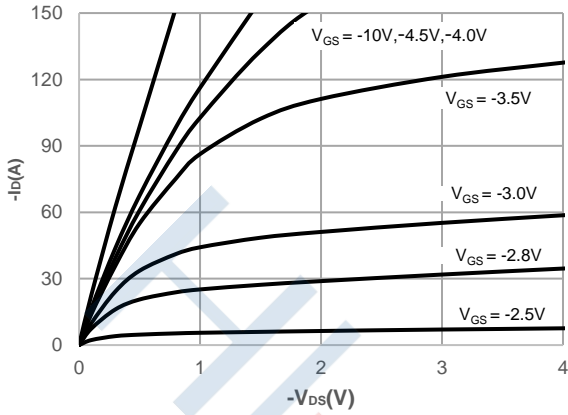


Figure 2: Typical Transfer Characteristics

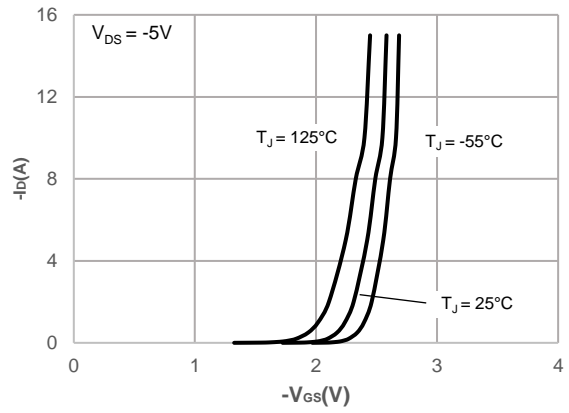


Figure 3: On-resistance vs. Drain Current

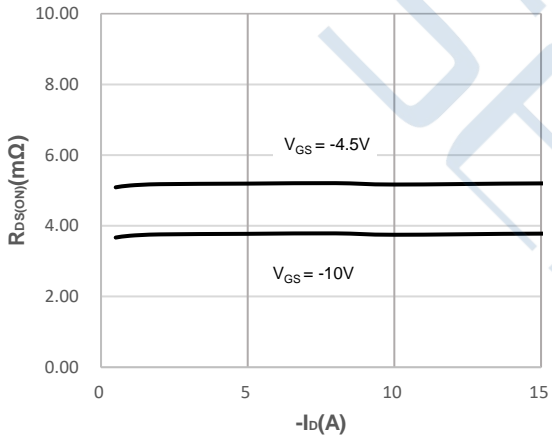


Figure 4: Body Diode Characteristics

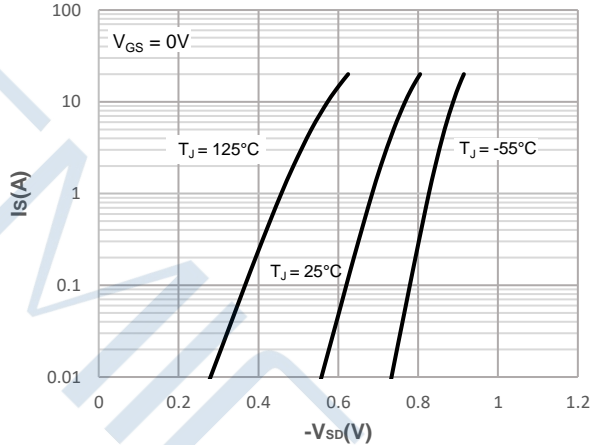


Figure 5: Gate Charge Characteristics

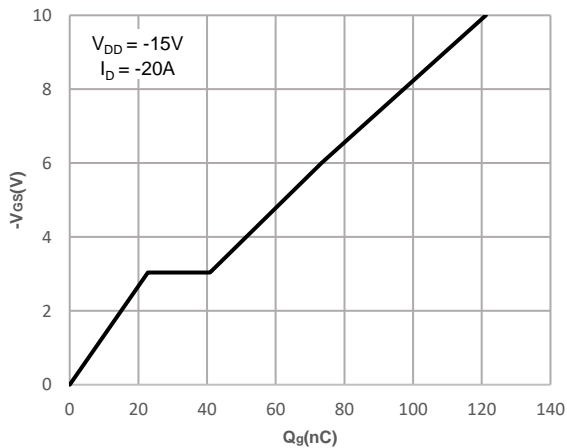
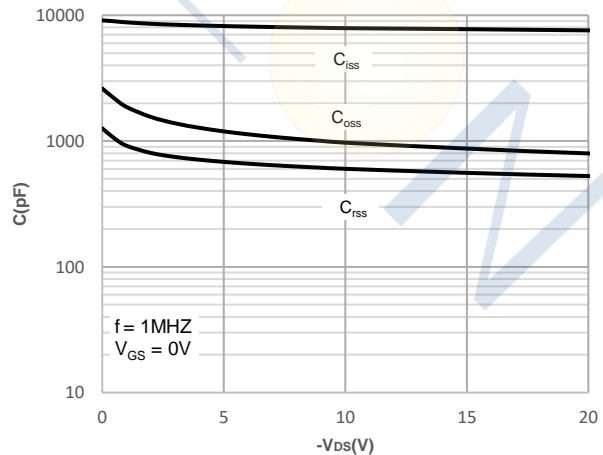


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

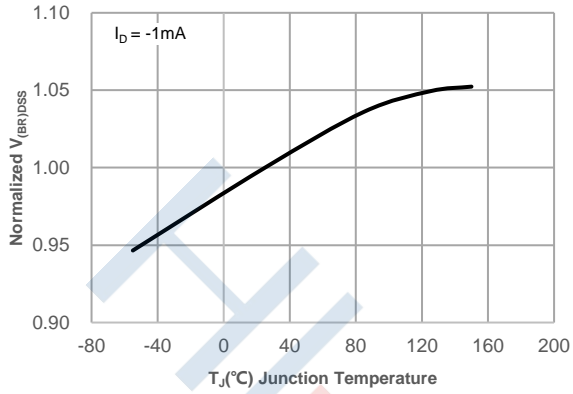


Figure 12: Normalized on Resistance vs. Junction Temperature

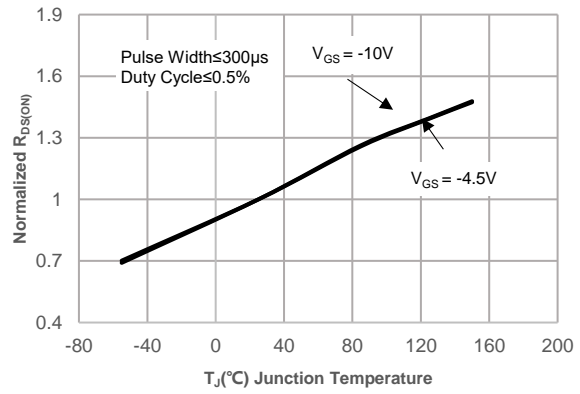


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

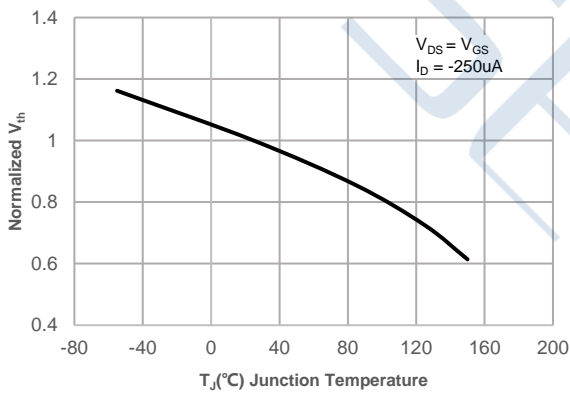


Figure 14: RDS(ON) vs. VGS

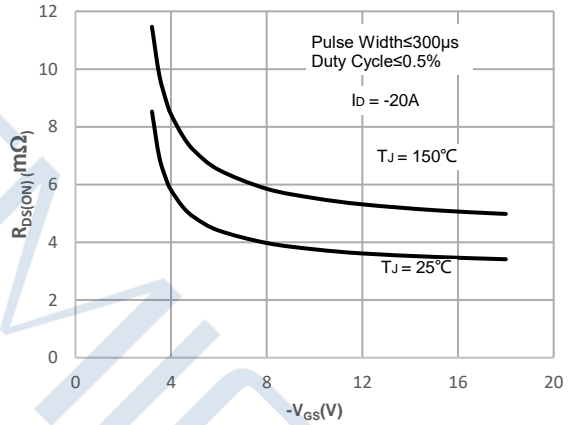
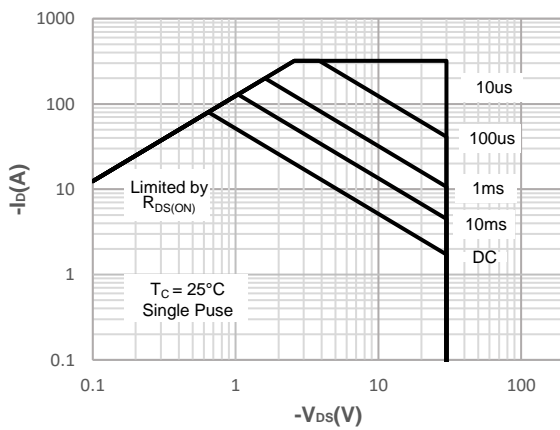


Figure 15: Maximum Safe Operating Area



Test Circuit

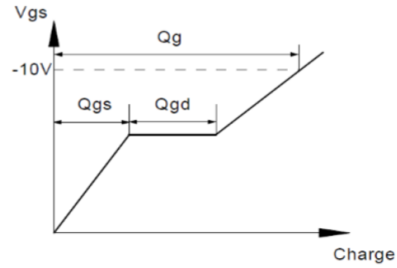
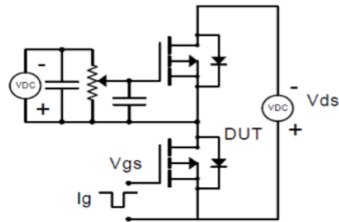


Figure 1: Gate Charge Test Circuit & Waveform

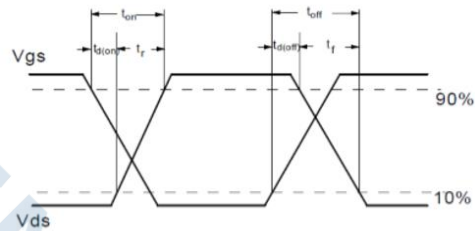
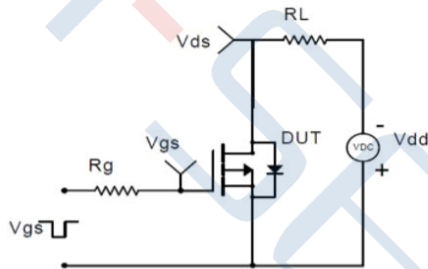


Figure 2: Resistive Switching Test Circuit & Waveform

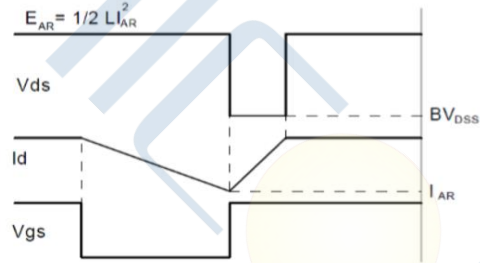
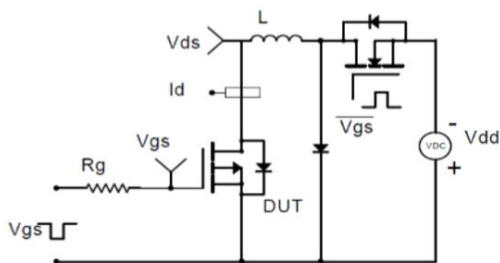


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

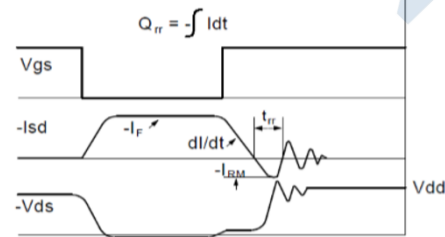
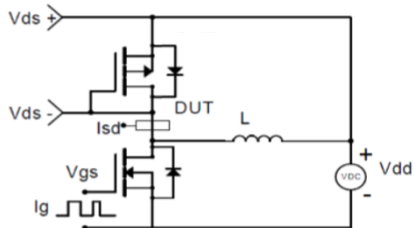
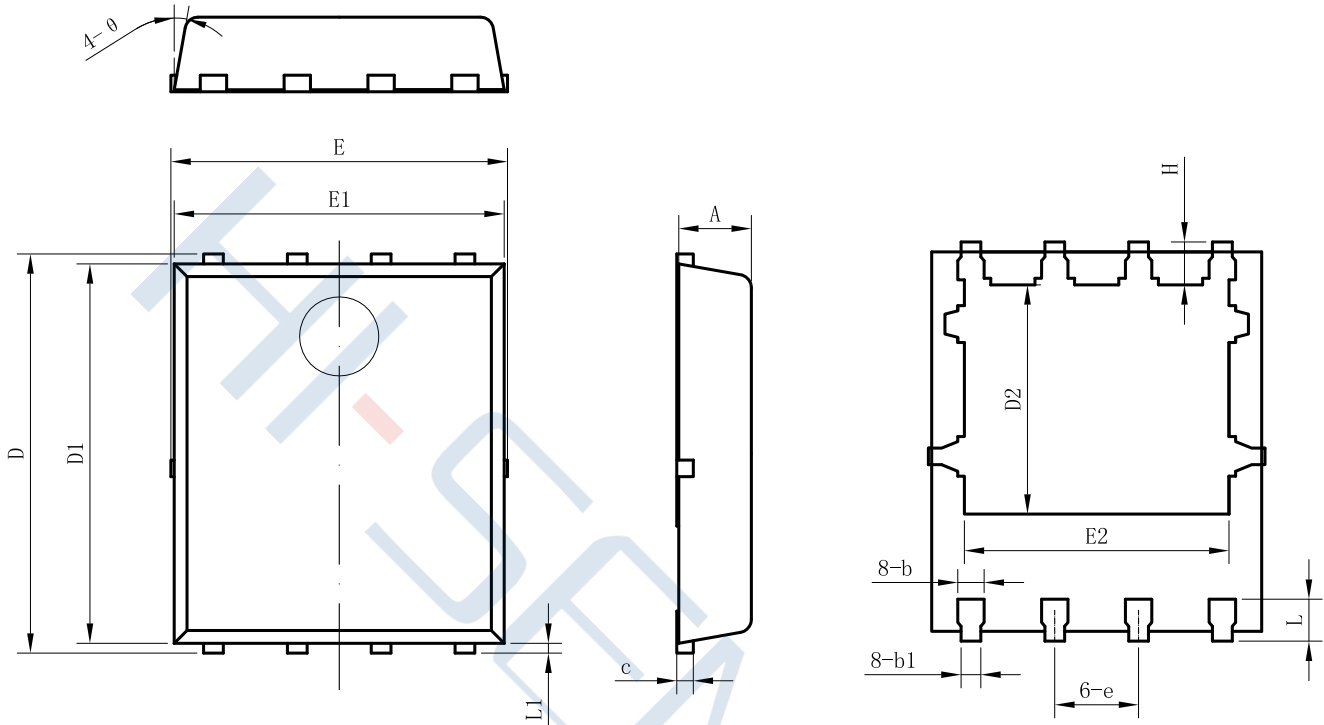


Figure 4: Diode Recovery Test Circuit & Waveform

Package Dimensions of PDFN5\*6-8L



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.0	1.1	1.2
b	0.35	0.4	0.45
b1		(0.3)	
c	0.2	0.25	0.35
D	5.9	6.05	6.2
D1	5.65	5.75	5.85
D2		(3.475)	
E			5.2
E1	4.9	5	5.1
E2		(4.01)	
e		1.27BSC	
H	0.5	0.65	0.75
L	0.51	0.635	0.75
L1		0.15	
θ		10°	

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