

40V, 12A P-CHANNEL POWER MOSFET

GENERAL DESCRIPTION

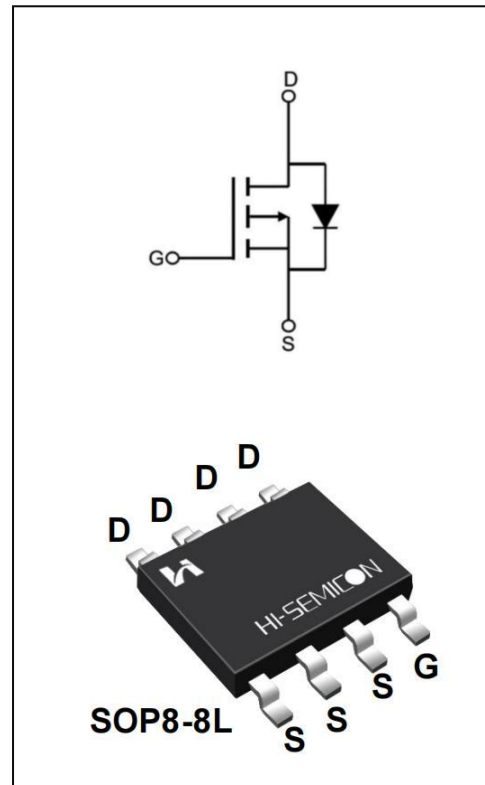
The SFS4001PT2 uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge. It can be used in a wide variety applications.

Features

- ◆ $V_{DS}=-40V, I_D=-12A$
- ◆ $R_{DS(on)}$
 TYP: $11.5m\Omega @ V_{GS}=10V$
 TYP: $14m\Omega @ V_{GS}=4.5V$

Applications

- ◆ DC-DC converter
- ◆ Power switching application
- ◆ Hard switched and high frequency circuits



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SFS4001PT2	SOP8-8L	SFS4001PT2	Pb Free	Reel

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

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V _{DS}	-40	V
Gate-Source Voltage		V _{GS}	±20	V
Drain Current	T _C = 25°C	I _D	-12	A
	T _C = 100°C		-8.4	
Drain Current Pulsed(Note 1)		I _{DM}	-48	A
Power Dissipation(T _C =25°C)		P _D	2.6	W
Single Pulsed Avalanche Energy (Note 2)		E _{AS}	272	mJ
Operation Junction Temperature Range		T _J	-55~+150	°C
Storage Temperature Range		T _{stg}	-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-Ambient	R _{θJA}	50	°C/W

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B _{VDS}	V _{GS} =0V, I _D =-250μA	-40	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =-40V, V _{GS} =0V	--	--	1	uA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =20V, V _{DS} =0V	--	--	100	nA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =-20V, V _{DS} =0V	--	--	-100	
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D =-250μA	-1.0	-1.5	-2.0	V
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-15A	--	11.5	15	mΩ
		V _{GS} =4.5V, I _D =-10A	--	14	17	
Forward Transconductance	g _{FS}	V _{DS} =-10V, I _D =-4A	--	17	--	S
Dynamic Characteristics						
Gate Resistance	R _g	V _{GS} =0V; f=1.0MHZ	--	5.6	--	Ω
Input Capacitance	C _{iss}	V _{DS} =-25V V _{GS} =0V f=1.0MHZ	--	3340	--	pF
Output Capacitance	C _{oss}		--	242	--	
Reverse Transfer Capacitance	C _{rss}		--	228	--	
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-20V, I _D =-10A V _{GS} =-10V, R _G =3.3Ω (Note 3.4)	--	12.5	--	ns
Turn-on Rise Time	t _r		--	10.6	--	
Turn-off Delay Time	t _{d(off)}		--	28.6	--	
Turn-off Fall Time	t _f		--	13.7	--	

Total Gate Charge	Q_g	$V_{DS}=-20V, I_D=-10A$ $V_{GS}=-10V$ (Note 3.4)	--	32.5	--	nc
Gate-Source Charge	Q_{gs}		--	6.1	--	
Gate-Drain Charge	Q_{gd}		--	7.5	--	

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	--	--	-12	A
Pulsed Source Current	I_{SM}		--	--	-48	
Diode Forward Voltage	V_{SD}	$I_S=-10A, V_{GS}=0V$	--	0.83	-1.2	V
Reverse Recovery Time	T_{rr}	$I_F=-10A, V_R=-15V,$ $dI_F/dt=100A/\mu S$	--	68	--	ns
Reverse Recovery Charge	Q_{rr}		--	37	--	nC

1. Pulse width limited by maximum junction temperature
2. $L=0.5mH, V_{DD}=20V, V_G=10V, R_G=25\Omega,$ 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

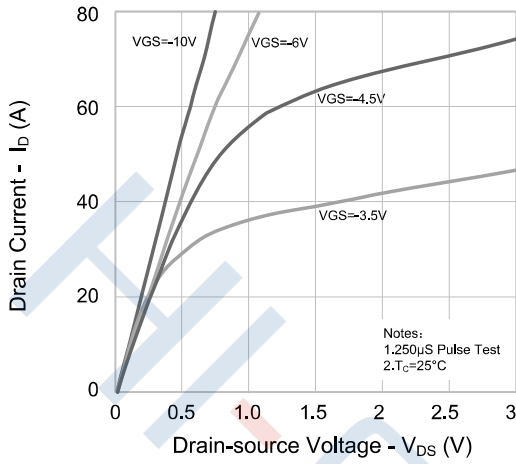


Figure 2. Transfer Characteristics

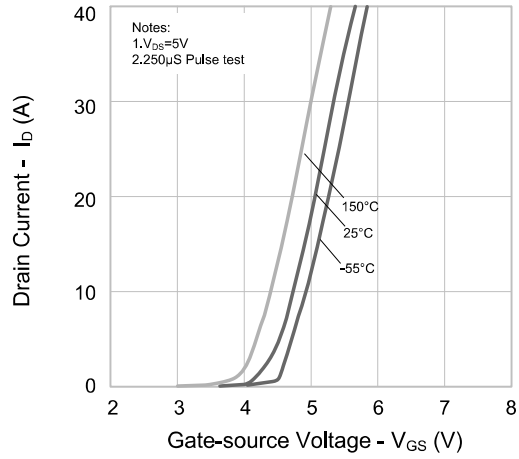


Figure 3. On-resistance vs. Drain Current

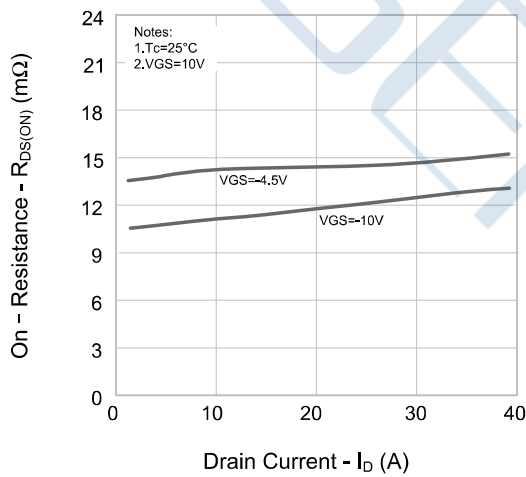


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

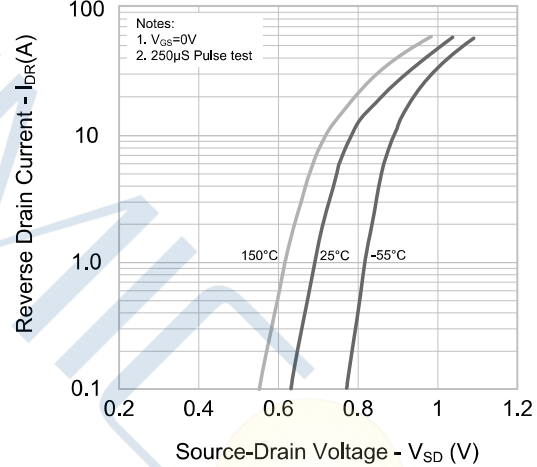


Figure 5. Capacitance Characteristics

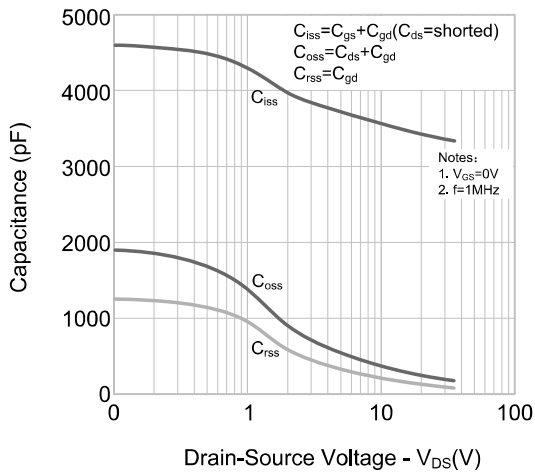
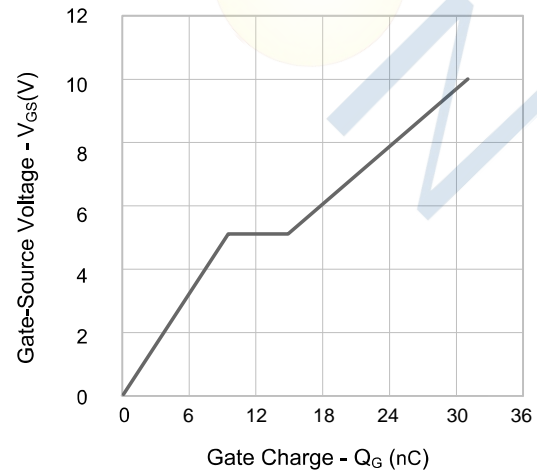


Figure 6. Gate Charge



Typical Performance Characteristics

Figure 7. Breakdown Voltage vs. Temperature Characteristics

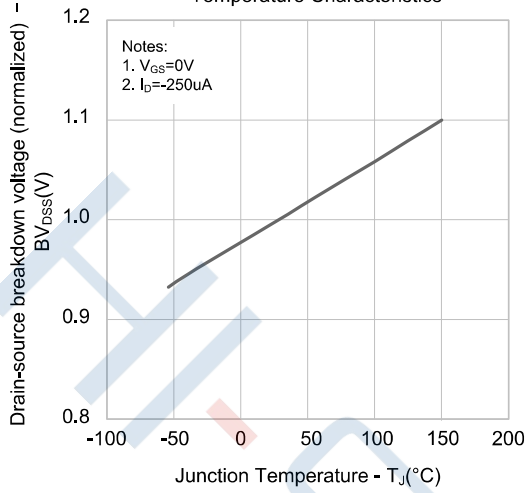


Figure 8. On-resistance vs. Temperature Characteristics

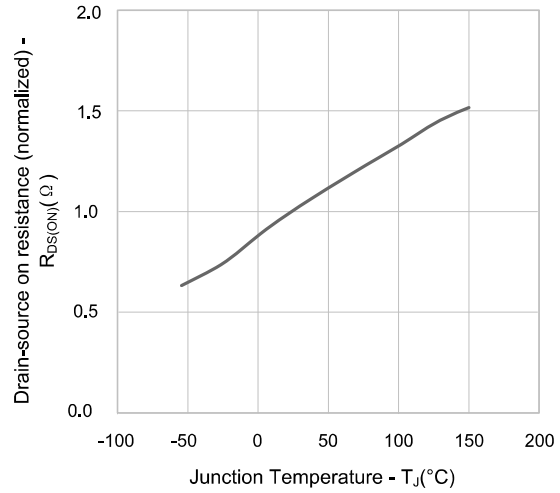
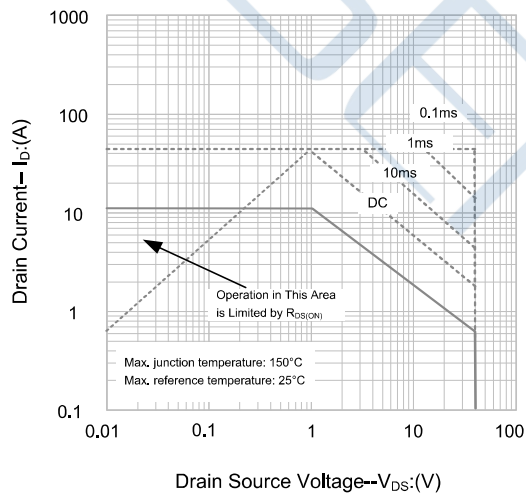
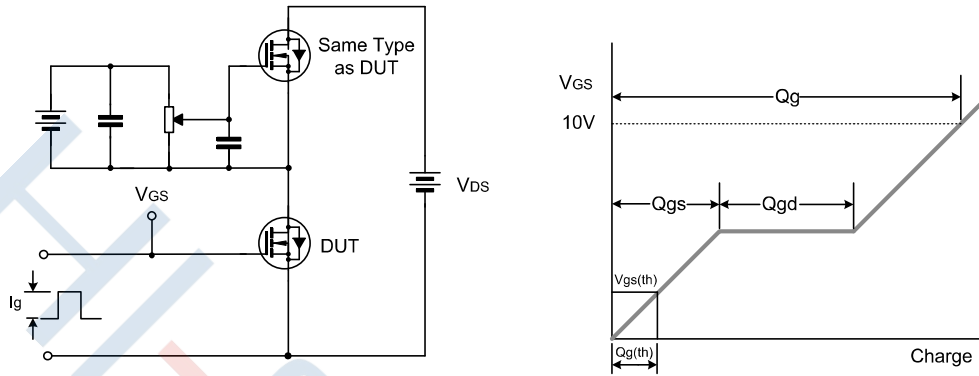


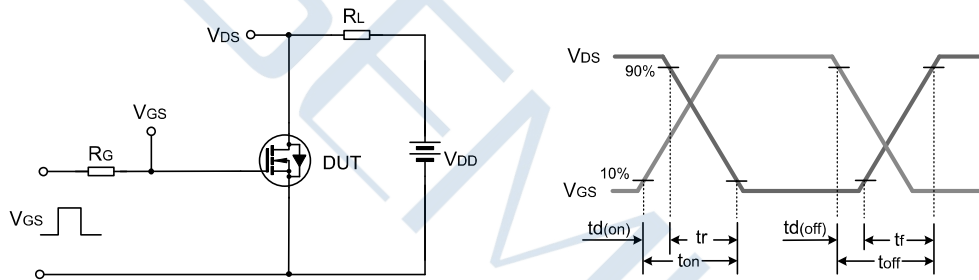
Figure 9. Max. Safe Operating



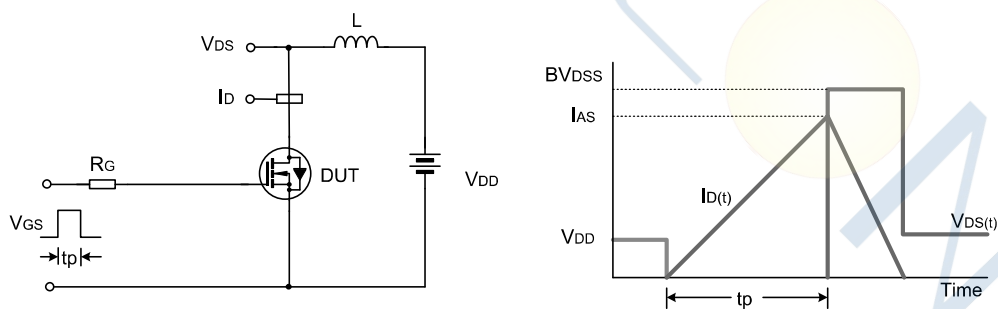
Test Circuit



Gate Charge Test Circuit & Waveform

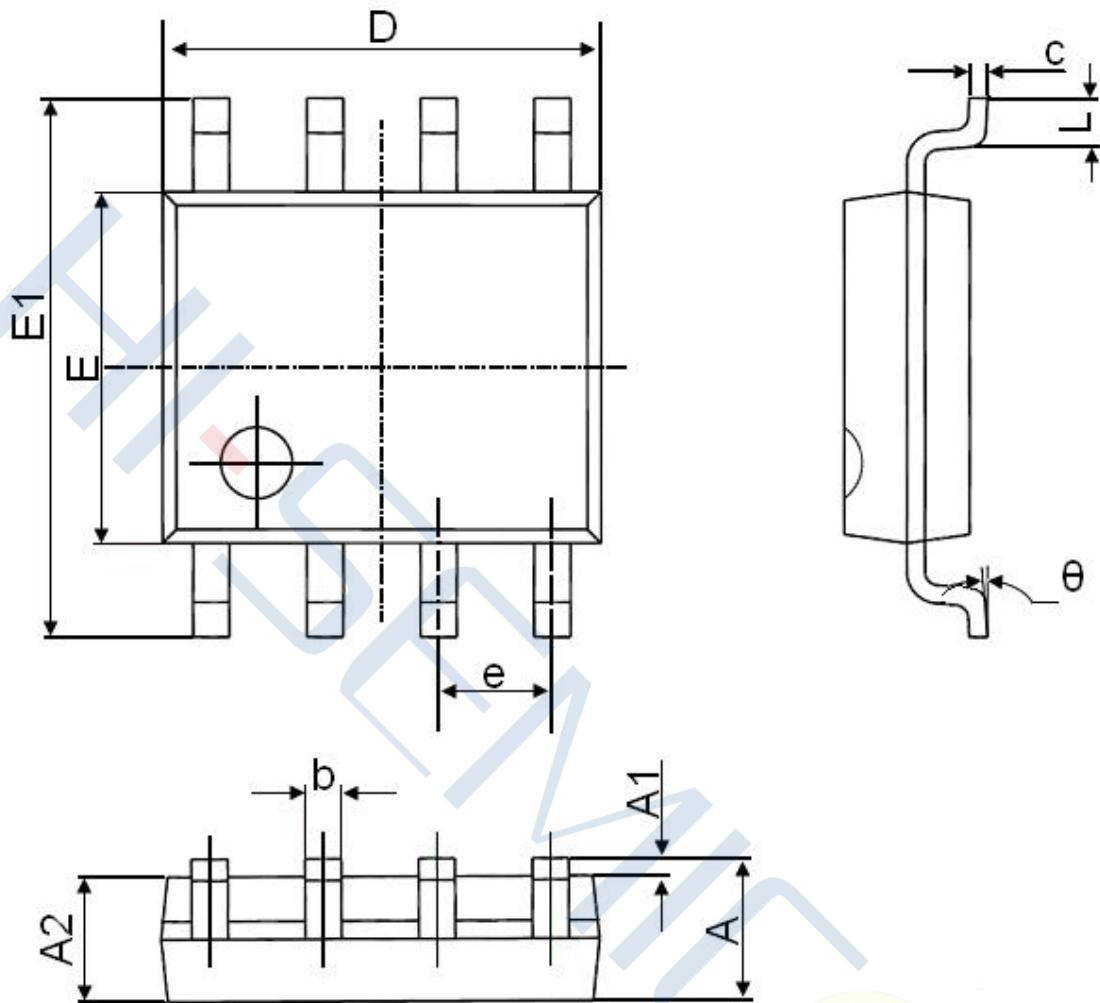


Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform

Package Dimensions of SOP8-8L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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