

**40V, 10A DUAL N-CANNEL POWER MOSFET**

**GENERAL DESCRIPTION**

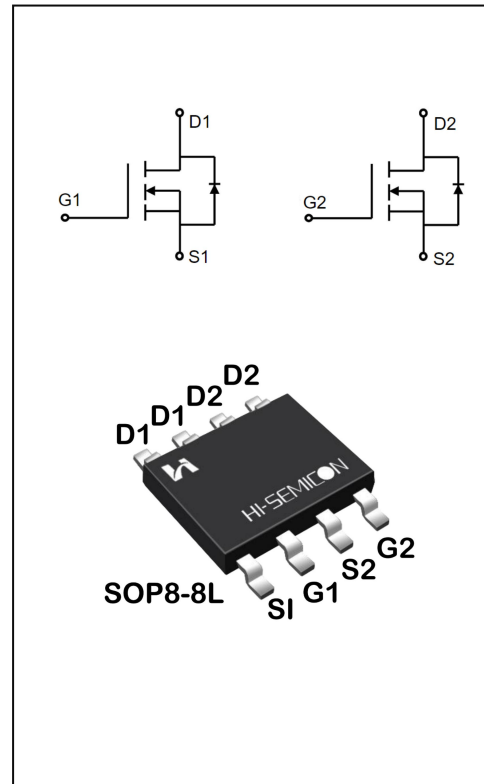
The SFS4010T2 uses advanced trench technology and design to provide excellent  $R_{DS(on)}$  with low Junction capacitance. It can be used in a wide variety applications.

**Features**

- ◆  $V_{DS}=40V, I_D=10A$
- ◆  $R_{DS(on)}$   
 TYP:  $12.5m\Omega @ V_{GS}=10V$   
 TYP:  $15.0m\Omega @ V_{GS}=4.5V$

**Applications**

- ◆ Power faction correction (PFC)
- ◆ Switched mode power supplies (SMPS)
- ◆ Uninterruptible power supply (UPS)
- ◆ LED lighting power



**ORDERING INFORMATION**

Part No.	Package	Marking	Material	Packing
SFS4010T2	SOP8-8L	SFS4010T2	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>	40	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Drain Current	I <sub>D</sub>	T <sub>C</sub> = 25°C	10
		T <sub>C</sub> = 100°C	6.8
Drain Current Pulsed(Note 1)	I <sub>DM</sub>	40	A
Power Dissipation(T <sub>C</sub> =25°C) -Derate above 25°C	P <sub>D</sub>	2.5	W
Single Pulsed Avalanche Energy (Note 2)	E <sub>AS</sub>	105	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>	28	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	86	°C/W

### ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain -Source Breakdown Voltage	B <sub>VDS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	40	--	--	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =40V, 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	
<b>On Characteristics</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> =250μA	1.0	1.45	1.8	V
Static Drain- Source On State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =10A	--	12.5	15	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A	--	15.0	20	
<b>Dynamic Characteristics</b>						
Gate Resistance	R <sub>g</sub>	V <sub>GS</sub> =0V, f=1.0MHZ	1	3.6	10	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =20V V <sub>GS</sub> =0V f=1.0MHZ	--	1115	--	pF
Output Capacitance	C <sub>oss</sub>		--	110	--	
Reverse Transfer Capacitance	C <sub>rss</sub>		--	90	--	
<b>Switching Characteristics</b>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =20V, V <sub>GS</sub> =10V R <sub>G</sub> =3.3Ω, I <sub>D</sub> =6A (Note 3.4)	--	6.5	--	ns
Turn-on Rise Time	t <sub>r</sub>		--	13.9	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	28.6	--	
Turn-off Fall Time	t <sub>f</sub>		--	14.2	--	

Total Gate Charge	$Q_g$	$V_{DS}=20V, I_D=6A$ $V_{GS}=10V$ (Note 3.4)	--	25.1	--	nc
Gate-Source Charge	$Q_{gs}$		--	3.1	--	
Gate-Drain Charge	$Q_{gd}$		--	5.4	--	

## 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	--	--	10	A
Pulsed Source Current	$I_{SM}$		--	--	40	
Diode Forward Voltage	$V_{SD}$	$I_S=10A, V_{GS}=0V$	--	0.8	1.2	V
Reverse Recovery Time	$T_{rr}$	$I_F=8A, V_R=15V,$ $dI_F/dt=100A/\mu S$	--	75	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	39	--	nC

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

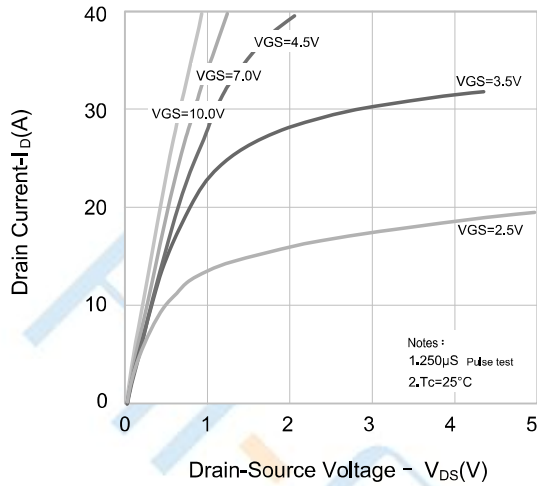


Figure 2. Transfer Characteristics

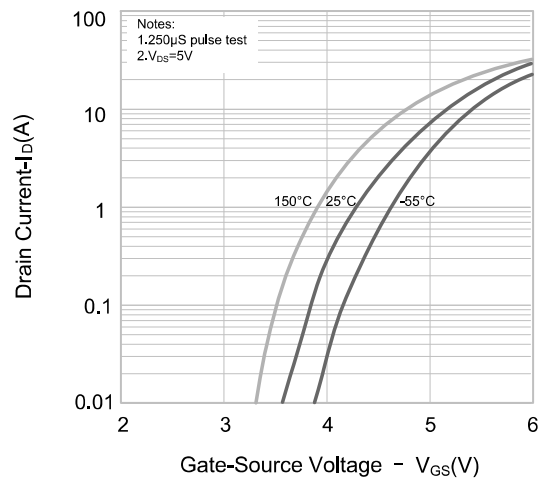


Figure 3. On-Resistance Variation vs. Drain-Current, Gate Voltage

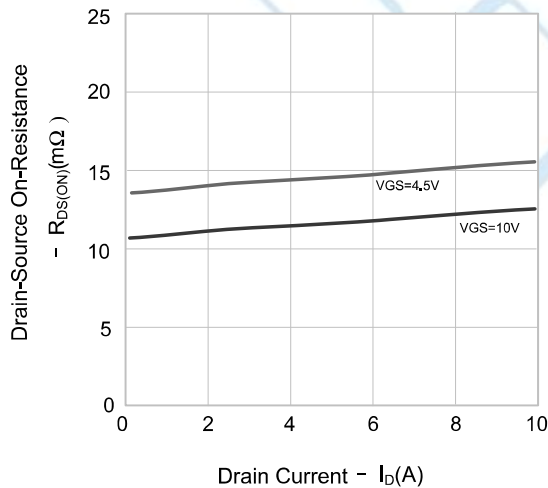


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

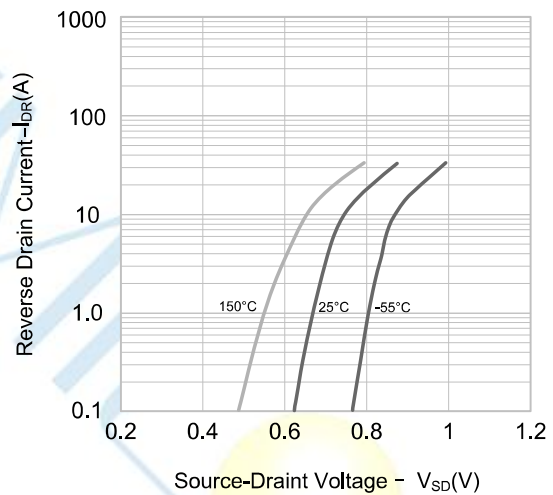


Figure 5. Capacitance Characteristics

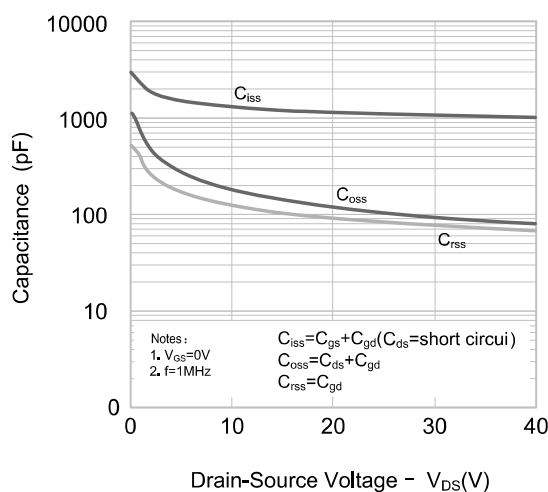
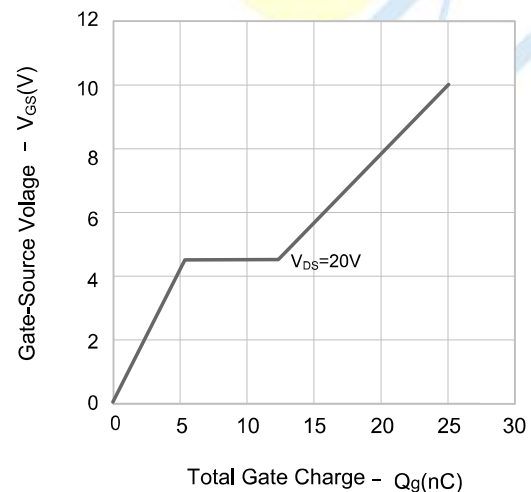


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics

Figure 7. Breakdown Voltage Variation vs. Temperature

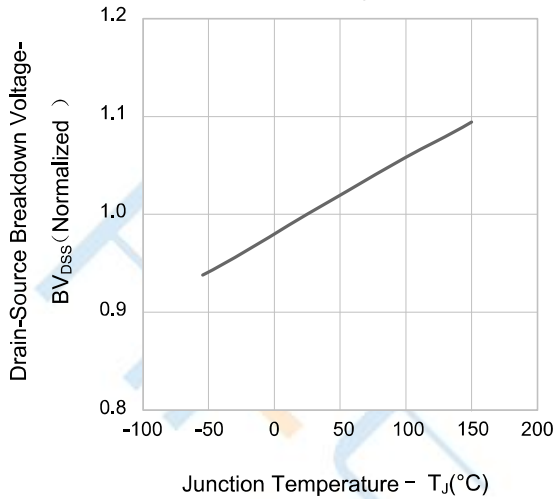


Figure 8. On-resistance Variation vs. Temperature

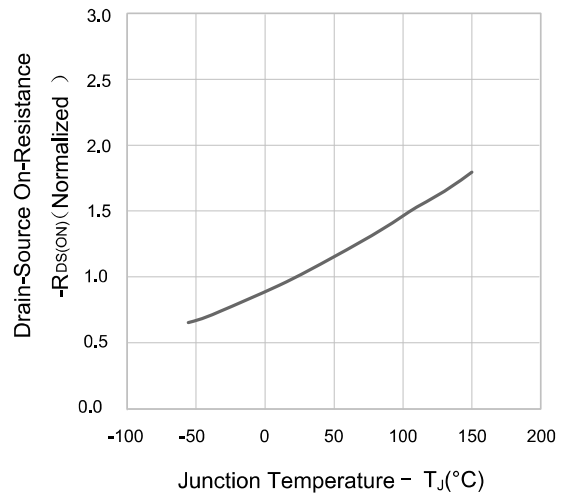
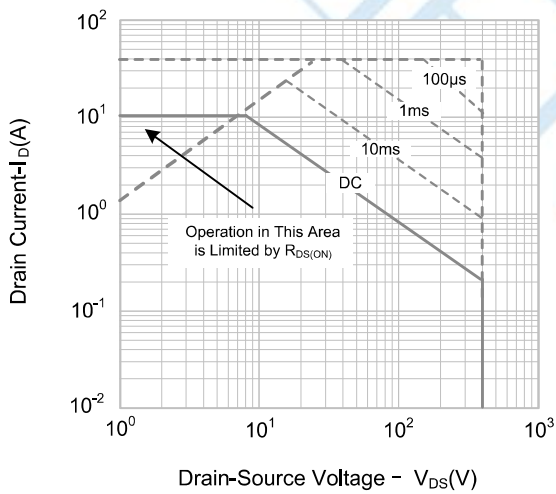
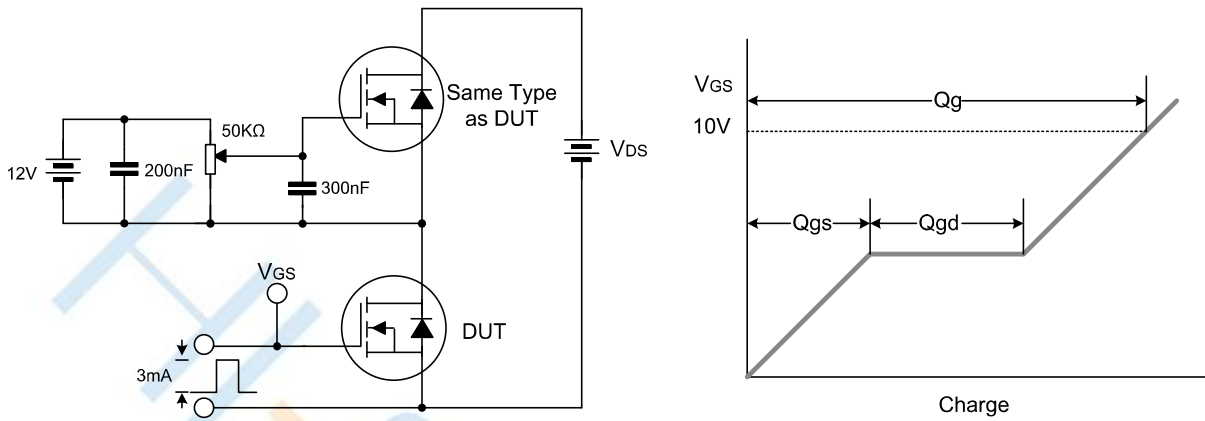


Figure 9. Max. Safe Operating Area

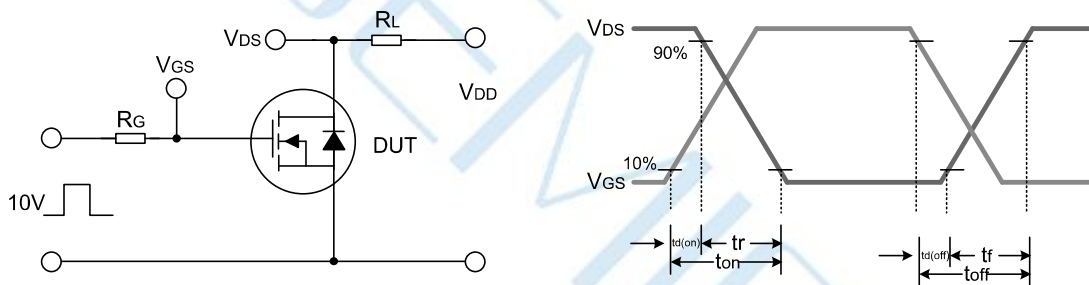


Test Circuit

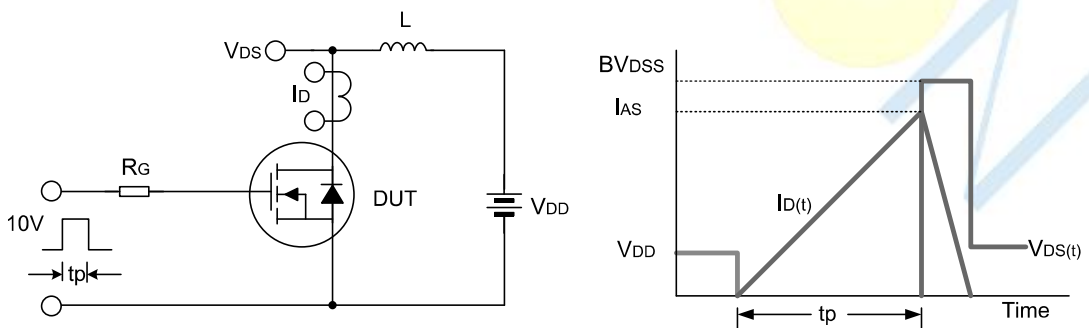
Gate Charge Test Circuit & Waveform



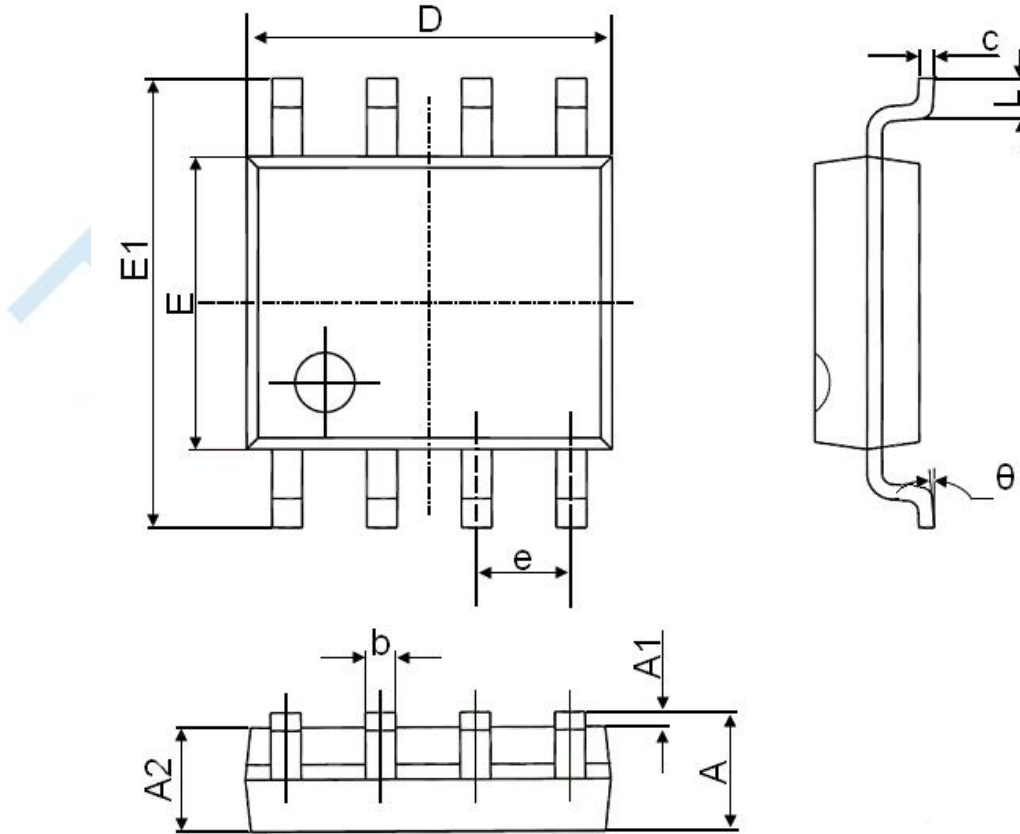
Resistive Switching Test Circuit & Waveform



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
theta	0°	8°	0°	8°

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