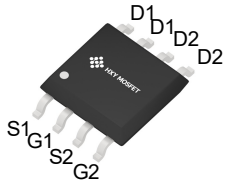
SI4946BEY-T1-E3

Dual N-Channel Enhancement Mode MOSFET

Description

The SI4946BEY-T1-E3 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.



SOP-8
(SOIC-8)

General Features

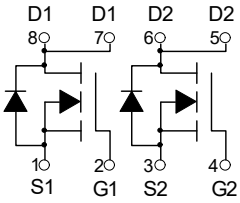
V_{DS} = 60V I_D = 6.5 A
$R_{DS(ON)}$ < 36mΩ @ V_{GS}=10 V
$R_{DS(ON)}$ < 48mΩ @ V_{GS}=4.5V

Application

Battery protection

Load switch

Uninterruptible power supply



Dual N-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
SI4946BEY-T1-E3	SOP-8(SOIC-8)	HXY MOSFET	3000

Absolute Maximum Ratings@T_j=25ºC(unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_A=25℃	Drain Current, V_{GS} @ 4.5V[3]	6.5	A
I_D@T_A=70℃	Drain Current, V_{GS} @ 4.5V[3]	5	A
I_{DM}	Pulsed Drain Current[1]	30	A
P_D@T_A=25℃	Total Power Dissipation	2.1	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
Rthj-a	Maximum Thermal Resistance, Junction-ambient[3]	60	℃/W

Electrical Characteristics (T_A=25℃unless otherwise noted)

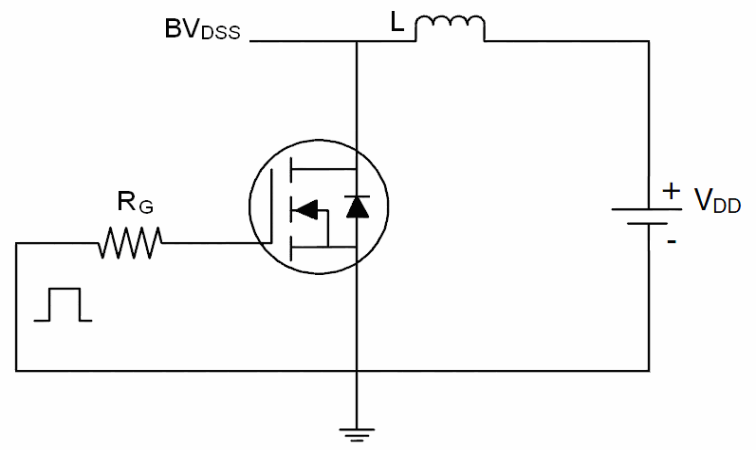
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	60	69	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1.0	1.4	2.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=6A		32	36	mΩ
		V_{GS}=4.5V, I_D=4A		34	48	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=6A		20	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=25V,V_{GS}=0V, F=1.0MHz		1920		PF
Output Capacitance	C_{oss}			155		PF
Reverse Transfer Capacitance	C_{rss}			116		PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=30V, R_L=4.7Ω V_{GS}=10V,R_{GEN}=3Ω	-	8	-	nS
Turn-on Rise Time	t_r		-	5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	29	-	nS
Turn-Off Fall Time	t_f		-	6	-	nS
Total Gate Charge	Q_g	V_{DS}=30V,I_D=6A, V_{GS}=10V	-	50	-	nC
Gate-Source Charge	Q_{gs}		-	8	-	nC
Gate-Drain Charge	Q_{gd}		-	16	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=6A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	7	A
Reverse Recovery Time	t_{rr}	TJ = 25°C, I_F =7A di/dt = 100A/μs(Note3)	-	35	-	nS
Reverse Recovery Charge	Qrr		-	43	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

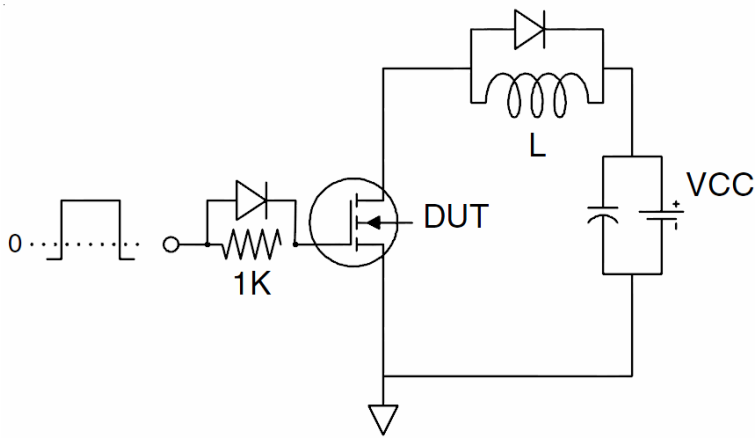
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

Test Circuit

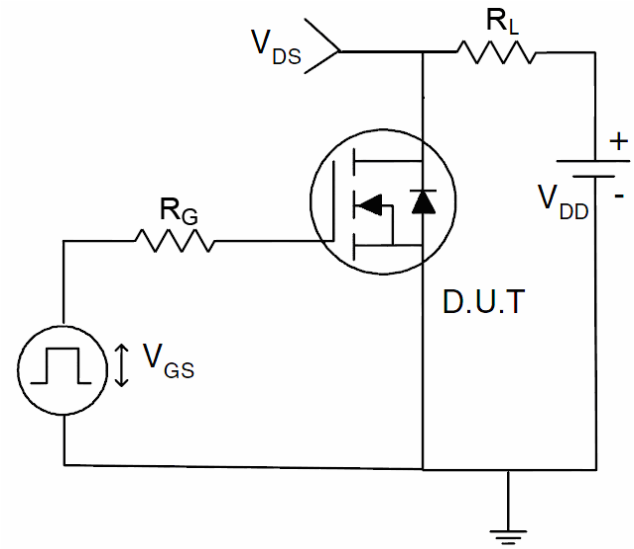
1) E_{AS} test Circuits



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

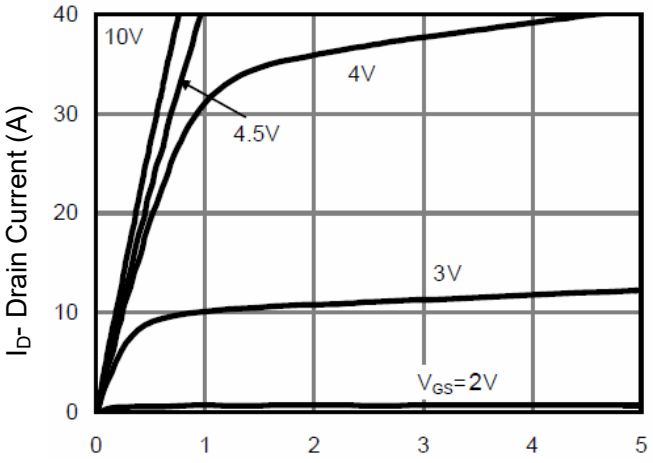


Figure 1 Output Characteristics

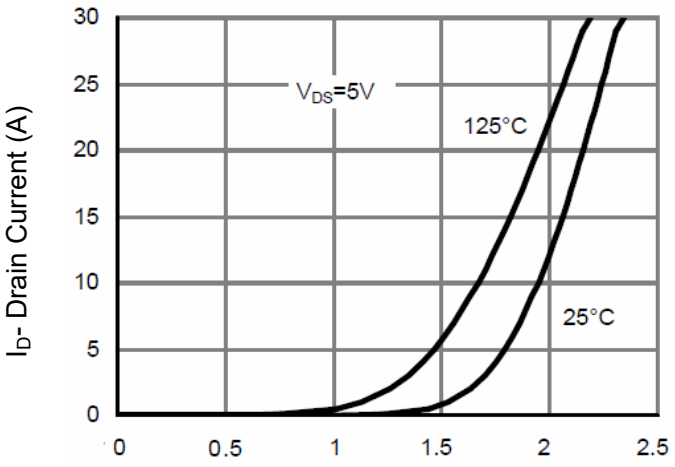


Figure 2 Transfer Characteristics

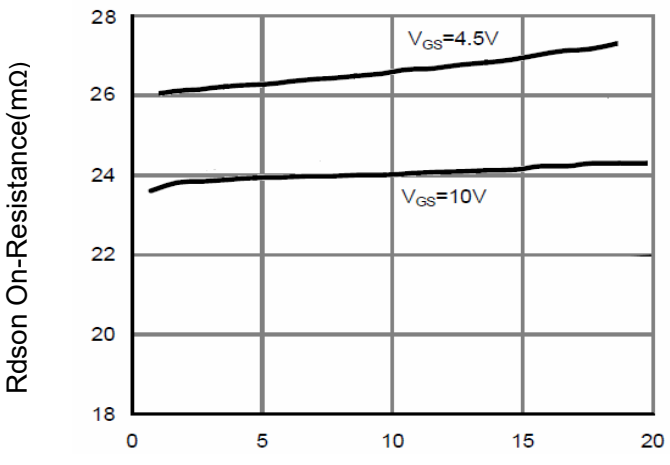


Figure 3 Rdson- Drain Current

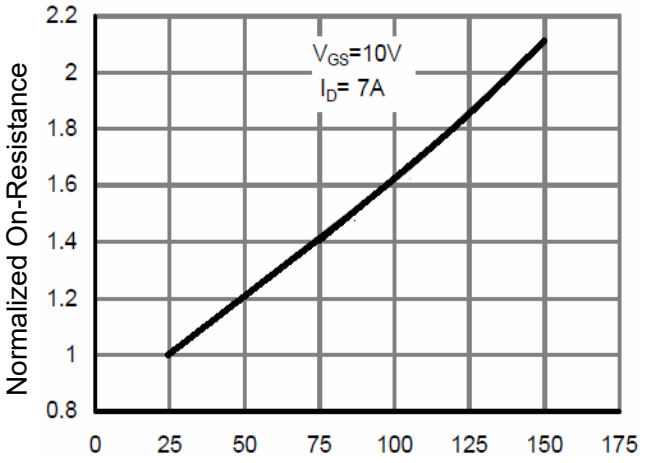


Figure 4 Rdson-JunctionTemperature

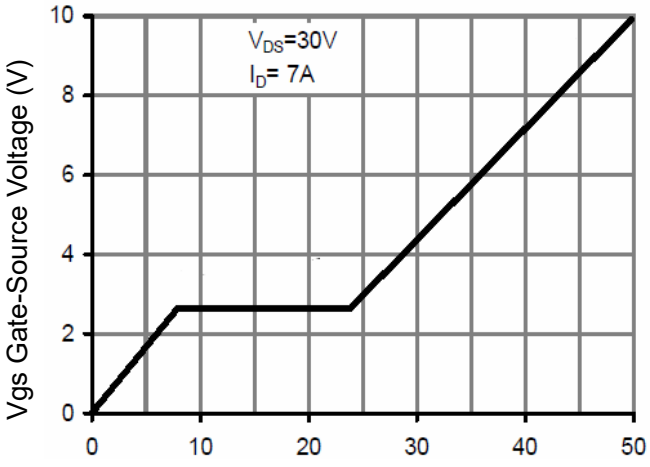


Figure 5 Gate Charge

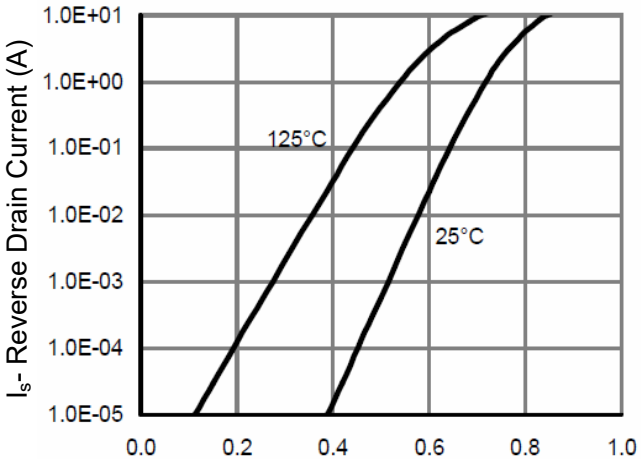


Figure 6 Source- Drain Diode Forward

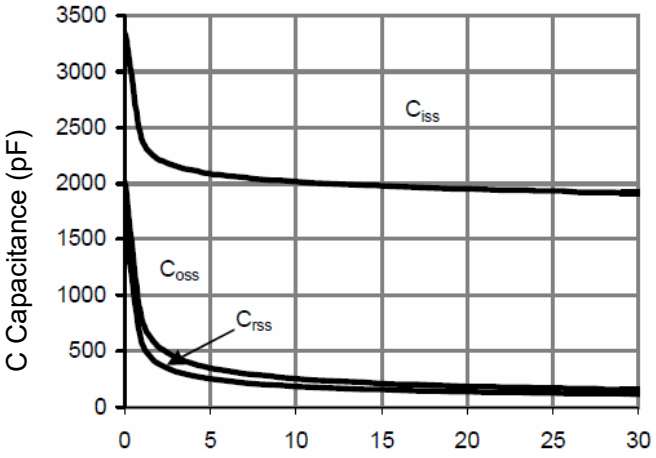


Figure 7 Capacitance vs Vds

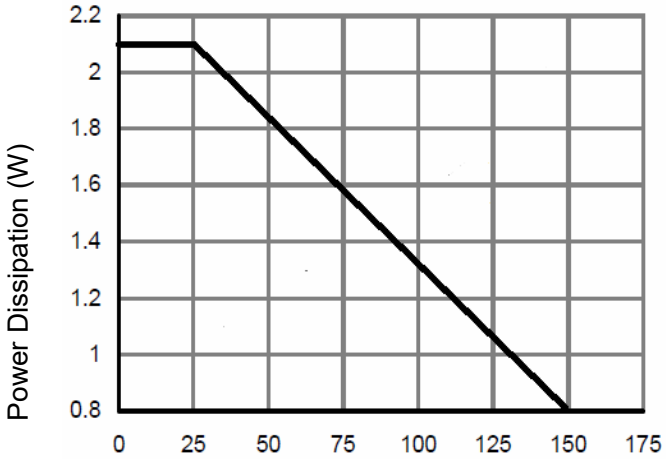


Figure 9 Power De-rating

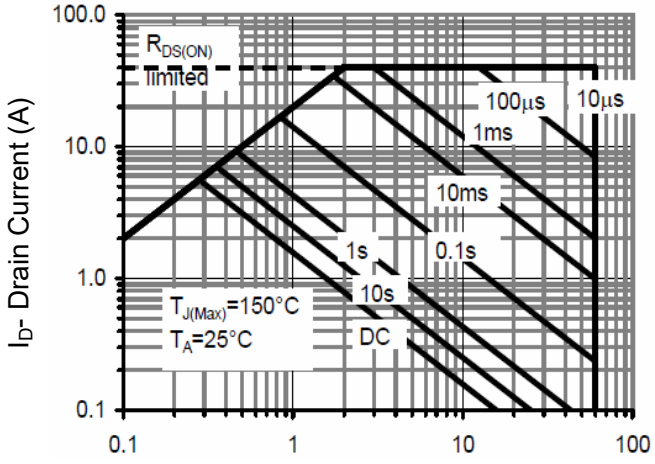


Figure 8 Safe Operation Area

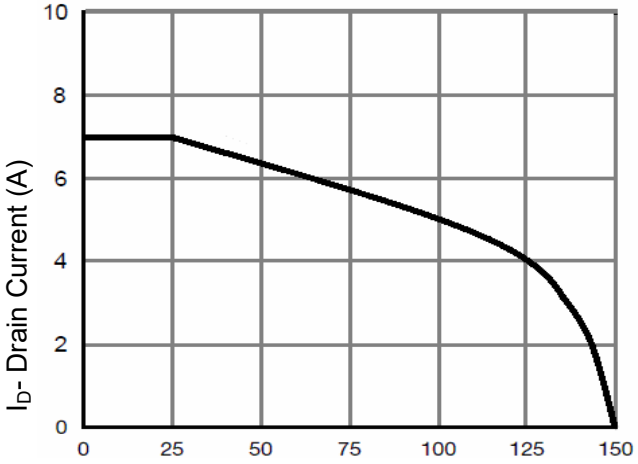


Figure 10 Current De-rating

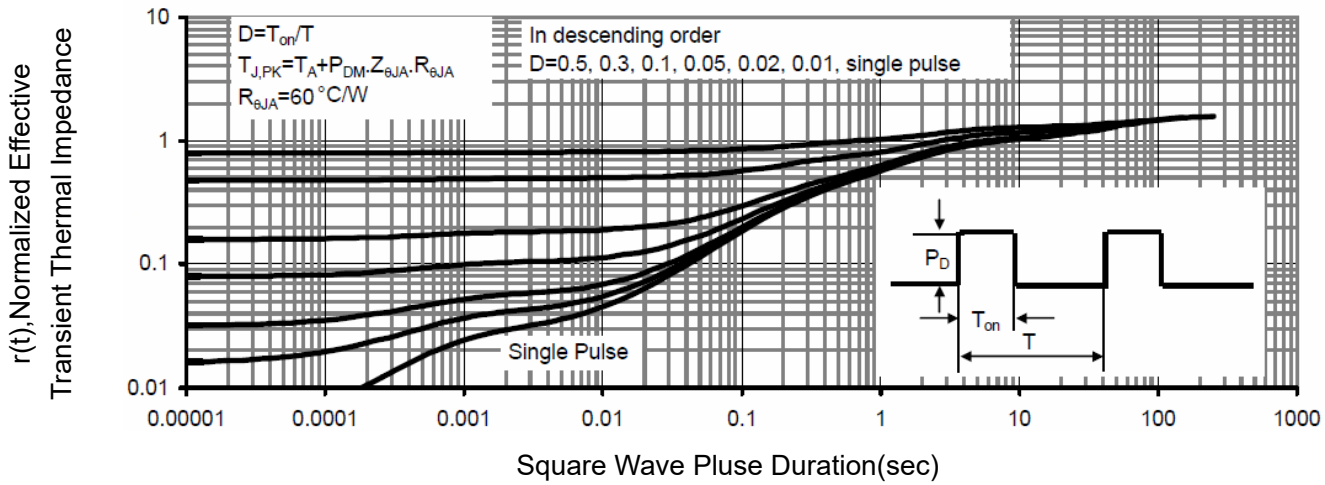
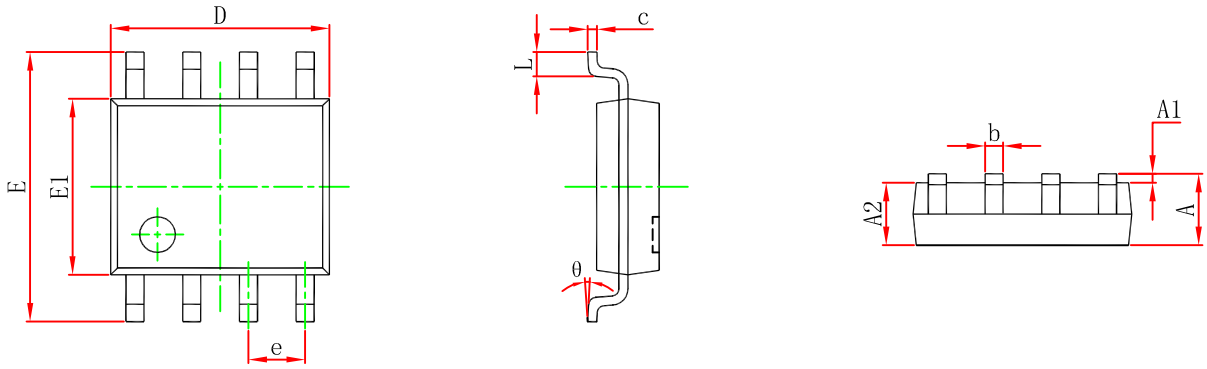
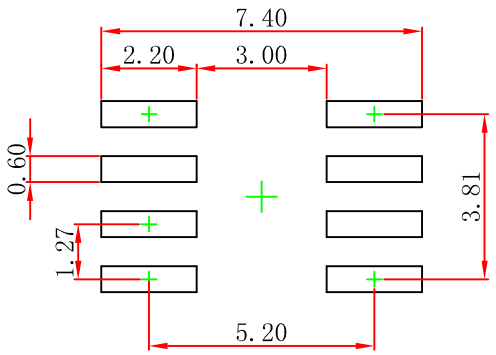


Figure 11 Normalized Maximum Transient Thermal Impedance

SOP-8(SOIC-8) Package Outline Dimensions



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	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.

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