EVLHV101SSR50W

Data brief

50 W converter using HVLED101 quasi-resonant HPF flyback controller with secondary side regulation

Product status link
EVLHV101SSR50W

Features

- Input voltage: Vin: 90 - 265 Vrms, f: 45-66 Hz
- Output voltage 60 V / 833 mA
- High power factor, low THD
- Efficiency > 50% in stand-by (Pout = 240 mW)
- 4 points (25%, 50%, 75%, 100% load) average efficiency > 91%
- Frequency foldback with valley locking for noise-free operation
- $T_{AMB-MAX}$ = 60 °C
- Open load voltage limiting (< 65V)
- Short-circuit protection with auto restart
- NTC overtemperature protection for switching MOSFET
- Safety: Acc. to EN60065
- EMI: Acc. to EN55022 – conducted emissions
- RoHS compliant

Description

The EVLHV101SSR50W is intended to provide a stable and insulated 60 V voltage for a maximum power of 50W.

It can be used as a standalone power supply or as a front end stage in a dimmable (or non-dimmable) off line LED driver.

A very high power factor, low THD and low BOM cost are obtained from this demonstration board thanks to the features of the HVLED101, which adopts frequency foldback with valley locking operation to reduce the switching losses and minimize acoustic noise.

Extremely low input power is obtained at no-load.

Input voltage variations, excessive input voltage (overvoltage like surges or bursts) and insufficient input voltage are managed by the HVLED101 protections, which improve the reliability of the application.

Output short-circuit and overload protection with auto restart behavior is implemented.

1 Components placement

Figure 1. **EVLHV101SSR50W – top components placement**

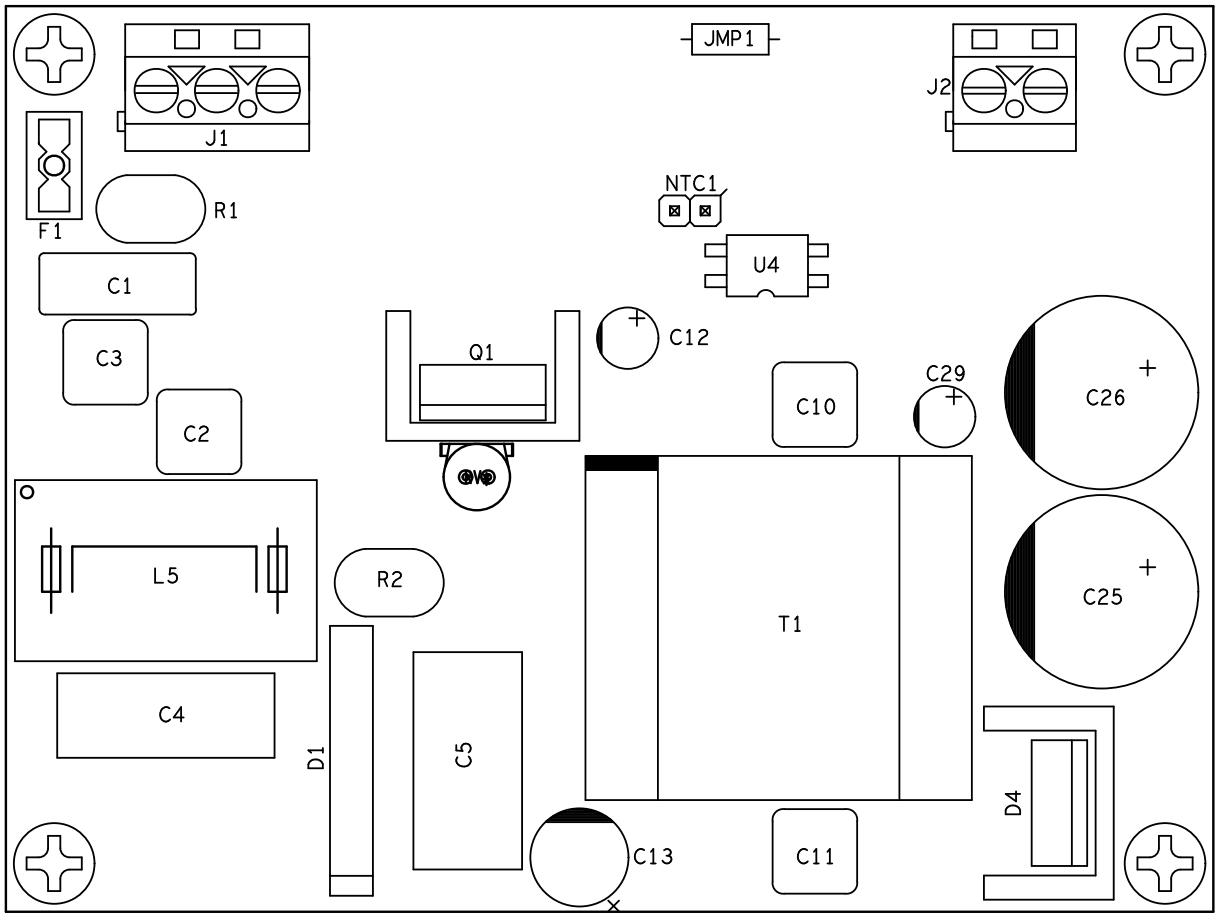
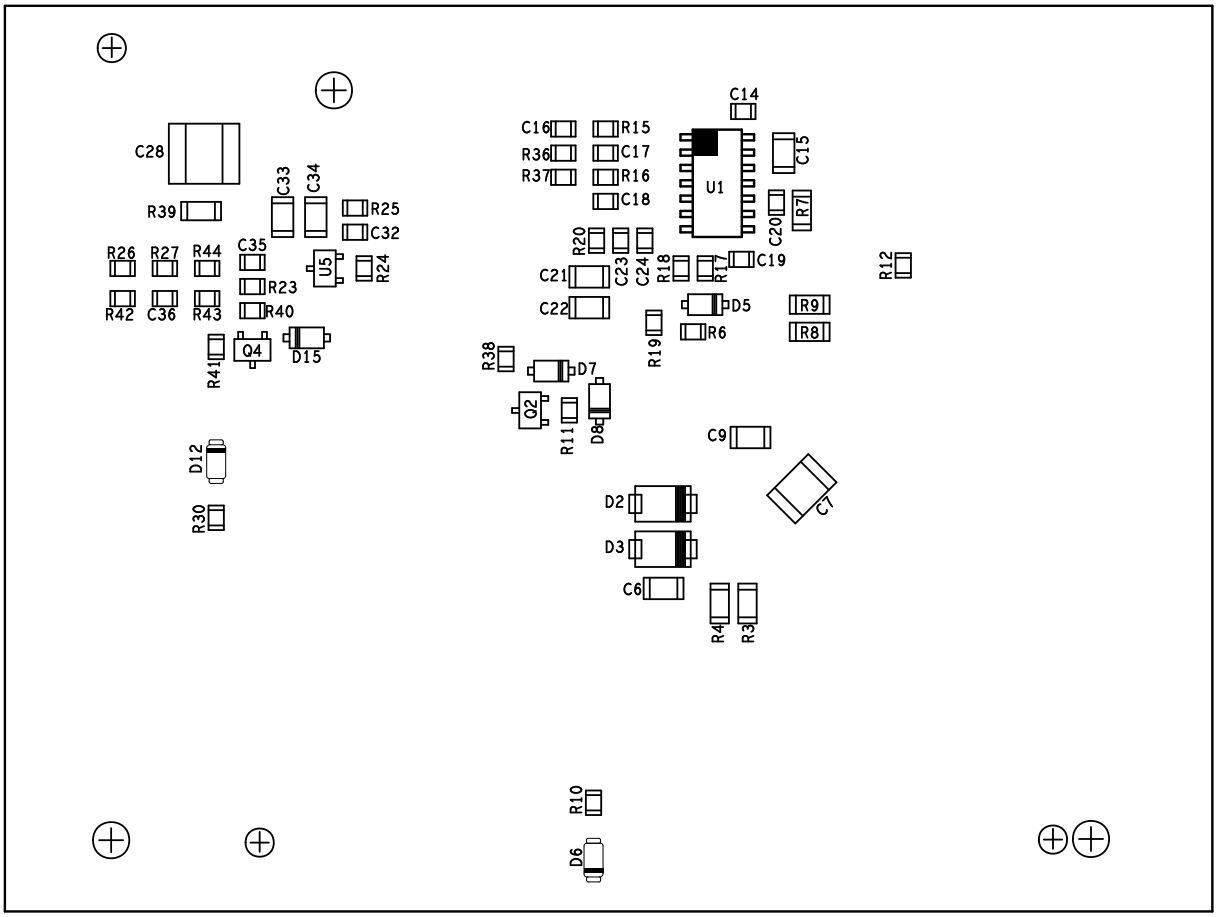


Figure 2. **EVLHV101SSR50W – bottom components placement**



2 Connector map

Figure 3. **Connector map**

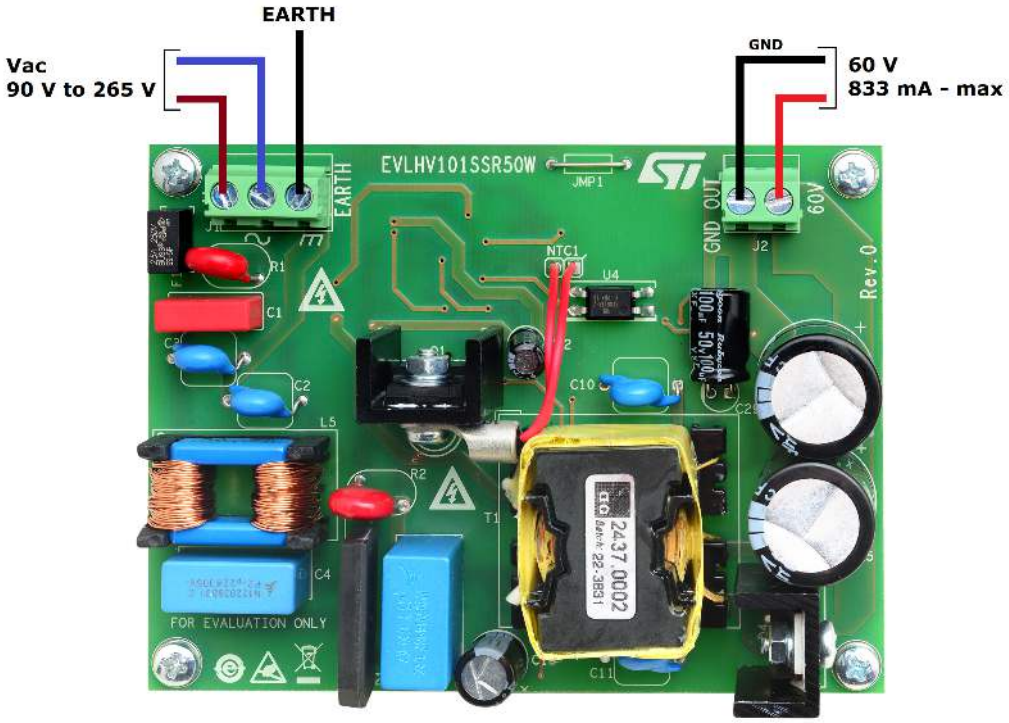
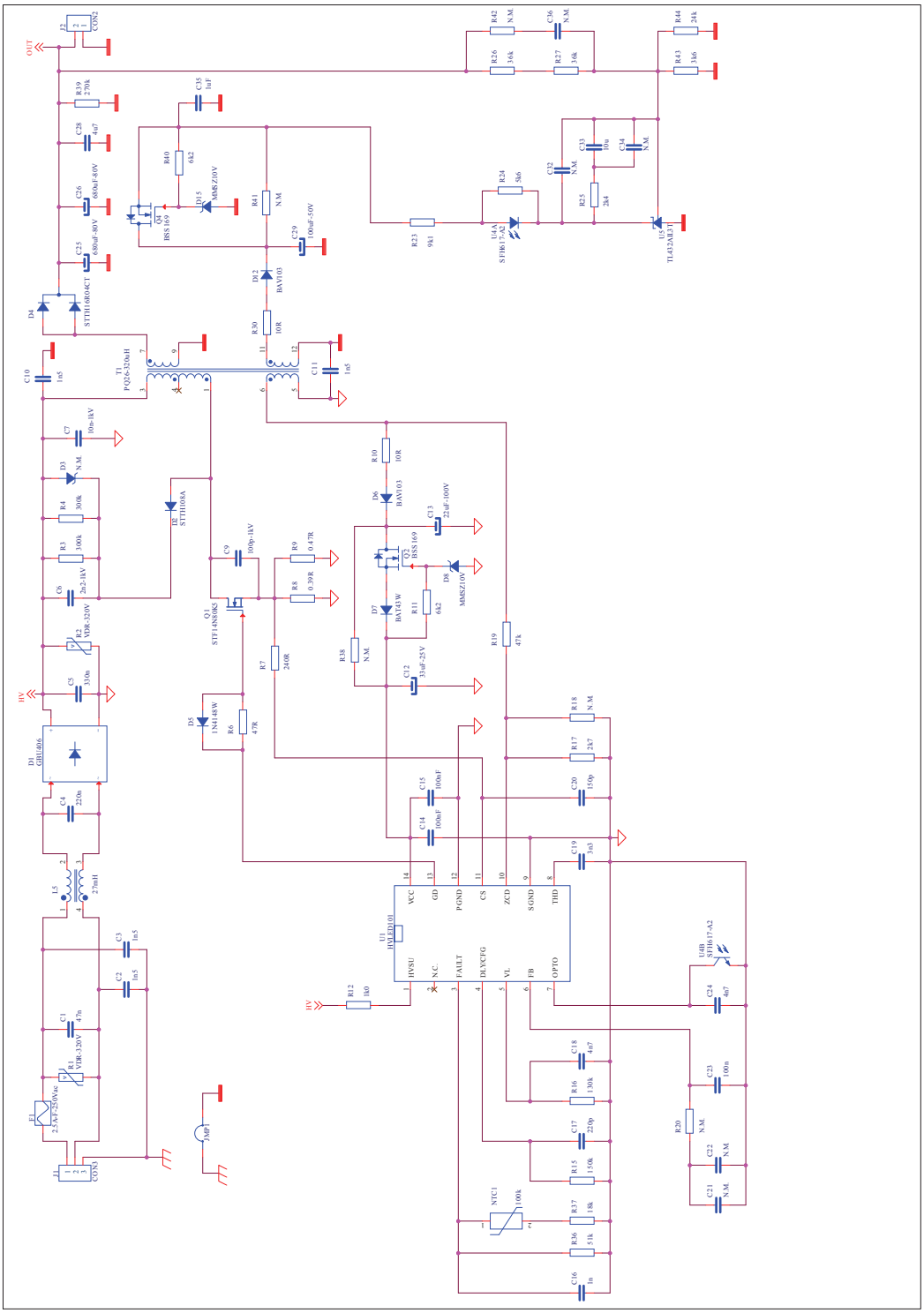


Table 1. **Connector map**

Ref.	Pin #	Name	Type	Description
J1	1	Vac	Input	First connection to AC mains – Warning high voltage
	2	Vac	Input	Second connection to AC mains – Warning high voltage
	3	EARTH	Input	Earth connection
J2	1	GND	Output	Ground
	2	60V	Output	60V output (isolated)

3 Schematic diagram

Figure 4. **EVLHV101SSR50W schematic**



4 Bill of material

Table 2. **Bill of material**

Item	Q.ty	Ref. Des.	Value - Rating	Description	Manufacturer	Part Number
1	1	C1	47n - 305VAC	X2 film capacitor 305VAC (MKP)	Wurth	890334023015CS
2	2	C2,C3	1n5	X1-Y2 ceramic capacitor 440-300VAC CS series	TDK	CS75ZU2GA152MANKA
3	1	C4	220n - 305VAC	X2 film capacitor 305VAC (MKP)	TDK	B32922C3224K
4	1	C5	330n	Polypropylene film capacitor 630VDC-310VAC	TDK	B32672Z6334K000
5	1	C6	2n2-1kV	Multilayer ceramic capacitor X7R 1kV	AVX	1206AC222KAT1A
6	1	C7	10n-1kV	Multilayer ceramic capacitor X7R 1kV	AVX	1812AC103KAT1A
7	1	C9	100p-1kV	Multilayer ceramic capacitor C0G 1kV	AVX	1206AA101JAT1A
8	2	C10,C11	1n5 - 400VAC	X1-Y1 ceramic capacitor 440-400VAC CD series	TDK	CD45-E2GA152M-NKA
9	1	C12	33uF-25V	Aluminium ELCAP - 105°C	Rubycon	25YXF33M5X11
10	1	C13	22uF-100V	Aluminium ELCAP - YXF series - 105°C	Rubycon	100YXF22M8X11
11	1	C14	100nF - 50V	Cercap X7R - SMD-0805	---	---
12	1	C15	100nF - 50V	Cercap X7R - SMD-1206	---	---
13	1	C16	1nF – 50V	Cercap X7R - SMD-0805	---	---
14	1	C17	220p - 50V	Cercap C0G - SMD-0805	---	---
15	2	C18,C24	4n7 - 50V	Cercap X7R - SMD-0805	---	---
16	1	C19	3n3 - 50V	Cercap X7R - SMD-0805	---	---
17	1	C20	150p - 50V	Cercap C0G - SMD-0805	---	---
18	1	C23	100n - 50V	Cercap X7R - SMD-0805	---	---
19	2	C25,C26	680uF-80V	Aluminium ELECAP FS series 105°C	Panasonic	EEUFS1K681
20	1	C28	4u7 - 100V	Cercap X7R - SMD-2020	AVX	22201C475KAT2A
21	1	C29	100uF-50V	Aluminium ELCAP - 105°C	Rubycon	50YXF100M8X11.5
22	1	C33	10u - 25V	Cercap X7R - SMD-1206	---	---
23	1	C35	1uF - 25V	Cercap X7R - SMD-0805	---	---
24	1	D1	---	4A glass passivated brodge rectifier - GBU	Diodes Incorporated	GBU406
25	1	D2	---	High voltage ultrafst rectifier 800V - SMA	STMicroelectronics	STTH108A
26	1	D4	---	2X ultrafast recovery diode 400V - TO220AB	STMicroelectronics	STTH16R04CT
27	1	D5	---	Small signal switching diode - SOD-123	Vishay	1N4148W

Item	Q.ty	Ref. Des.	Value - Rating	Description	Manufacturer	Part Number
28	2	D6,D12	---	Small signal switching diode - SOD80 (Minimelf)	Vishay	BAV103-GS18
29	1	D7	---	Small signal schottky diode - SOD-123	Vishay	BAT43W
30	2	D8,D15	---	Zener diode MMSZ series 0.5W 5% - SOD-123	ON-Semi	MMSZ10T1G
31	1	F1	2.5A-250VAC	FUSE SS-5F series 2.5A-250VAC fast acting	Bussmann	SS-5F-2.5A
32	1	J1	---	PCB connector 3 PIN	Weidmuller	PM 5.08/03/90 3.5SN BK BX - 1760520000
33	1	J2	---	PCB connector 2 PIN	Weidmuller	PM 5.08/02/90 3.5SN BK BX - 1760510000
34	1	JMP1	---	Tinned copper wire jumper DIA 0.7MM	---	---
35	1	L5	27mH	27mH common mode choke filter	Epcos	B82732F2901B001
36	1	NTC1	100k	NTC - 100k - 1% - wired thermostat with metallic ring	Vishay	NTCALUG01A104FA
37	1	Q1	---	N-channel power MOSFET 800V 0.4OHM	STMicroelectronics	STF14N80K5
38	2	Q2,Q4	---	Small signal N-channel depletion MOSFET 100V	Infineon	BSS169
39	2	R1,R2	VDR-320V	Metal-oxide varistor la series	LittelFuse	V320LA7P
40	2	R3,R4	300k - 200V	Stand. filmRES - 1/4W - 5% - SMD-1206	---	---
41	1	R6	47R - 150V	Stand. filmRES - 1/8W - 5% - SMD-0805	---	---
42	1	R7	240R - 200V	Stand. filmRES - 1/4W - 1% - SMD-1206	---	---
43	1	R8	0.39R - 200V	Stand. filmRES - 1/4W - 1% - SMD-1206	---	---
44	1	R9	0.47R - 200V	Stand. filmRES - 1/4W - 1% - SMD-1206	---	---
45	2	R10,R30	10R	Stand. filmRES - 1/8W - 5% - SMD-0805	---	---
46	2	R11,R40	6k2 - 150V	Stand. filmRES - 1/8W - 5% - SMD-0805	---	---
47	1	R12	1k0 - 150V	Stand. filmRES - 1/8W - 5% - SMD-0805	---	---
48	1	R15	150k - 150V	Stand. filmRES - 1/8W - 1% - SMD-0805	---	---
49	1	R16	130k - 150V	Stand. filmRES - 1/8W - 1% - SMD-0805	---	---
50	1	R17	2k7 - 150V	Stand. filmRES - 1/8W - 1% - SMD-0805	---	---
51	1	R19	47k - 150V	Stand. filmRES - 1/8W - 1% - SMD-0805	---	---
52	1	R23	9k1 - 150V	Stand. filmRES - 1/8W - 5% - SMD-0805	---	---

Item	Q.ty	Ref. Des.	Value - Rating	Description	Manufacturer	Part Number
53	1	R24	5k6 - 150V	Stand. filmRES - 1/8W - 5% - SMD-0805	---	---
54	1	R25	2k4 - 150V	Stand. filmRES - 1/8W - 5% - SMD-0805		
55	2	R26,R27	36k - 150V	Stand. filmRES - 1/8W - 1% - SMD-0805	---	---
56	1	R36	51k - 150V	Stand. filmRES - 1/8W - 5% - SMD-0805	---	---
57	1	R37	18k - 150V	Stand. filmRES - 1/8W - 5% - SMD-0805	---	---
58	1	R39	270k – 200V	Stand. filmRES - 1/4W - 1% - SMD-1206	---	---
59	1	R43	3k6 - 150V	Stand. filmRES - 1/8W - 1% - SMD-0805	---	---
60	1	R44	24k - 150V	Stand. filmRES - 1/8W - 1% - SMD-0805	---	---
61	1	T1	---	PQ26/22.5 flyback transformer 320uH	Magnetica	CUSTOM
62	1	U1	---	High power factor flyback controller	STMicroelectronics	HVLED101
63	1	U4	---	HR optocoupler 400 MIL (OPT 6)	Vishay	SFH617-A2
64	1	U5	---	Adjustable 1% shunt voltage reference	STMicroelectronics	TL432AIL3T

5 Board performance

Table 3. Efficiency table (Vout = 60 V)

Load [%]	Iout [mA]	@ V_{IN} = 115 V_{AC}	@ V_{IN} = 230 V_{AC}
25	208	89.6%	88.8%
33	278	90.7%	90.4%
50	416	91.5%	91.4%
75	625	91.8%	92.1%
100	833	91.7%	92.4%
4 points avg.		91.1%	91.2%

Table 4. No-load & standby consumption

Condition	@ V_{IN} = 115 V_{AC}	@ V_{IN} = 230 V_{AC}
No load	135 mW	140 mW
Stand-by (Pout=240mW)	450 mW	440 mW

Revision history

Table 5. **Document revision history**

Date	Version	Changes
24-Nov-2022	1	Initial release.

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