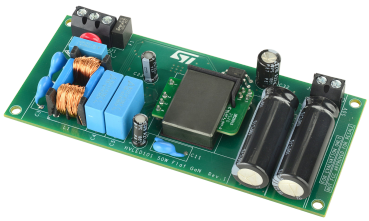
EVL101G50FLT

Data brief

Ultra Slim, GaN based, 50 W converter using HVLED101 HPF flyback controller



Product status link
EVL101G50FLT
HVLED101
SEA05LTR

Features

- Input voltage: VIN: 90 - 265 VRMS, f: 45-66 Hz
- Output voltage: 50 V (Iout < 1 A)
- Output current: 1 A (LED voltage between 20 V and 48 V)
- High power factor, low THD
  - PF > 0.99 / THD < 5% @ full load
  - PF > 0.99 / THD < 7% @ 1/3 load (230 Vac)
- Average efficiency (4 points) > 91%
- Efficiency > 50% in stand-by (Pout = 240 mW)
- Dual layer PCB (Size 5 x 10 x 1.8 cm), no heat sink

Application

- LED control gears
- AC to DC adapter
- Motor control pre-regulator

Description

The EVL101G50FLT is a 50 W high-power-factor (HPF) quasi-resonant flyback converter with isolated secondary-side regulation for both constant voltage (CV) and constant current (CC) modes. The board is based on HVLED101 and SEA05LTR. The use of sensor-less GaN transistor (ISG6107QA) and planar transformer ensures high efficiency and compactness. The board can be used as a 50 W single-stage LED driver or PSU.

1 Specifications

Table 1. EVL101G50FLT - Specifications

Parameter		Value
Supply voltage	Nominal	110 Vac – 230 Vac
	Full operating range	90 – 265 Vac
Output parameters	Output voltage	50 V
	Output current	1 A

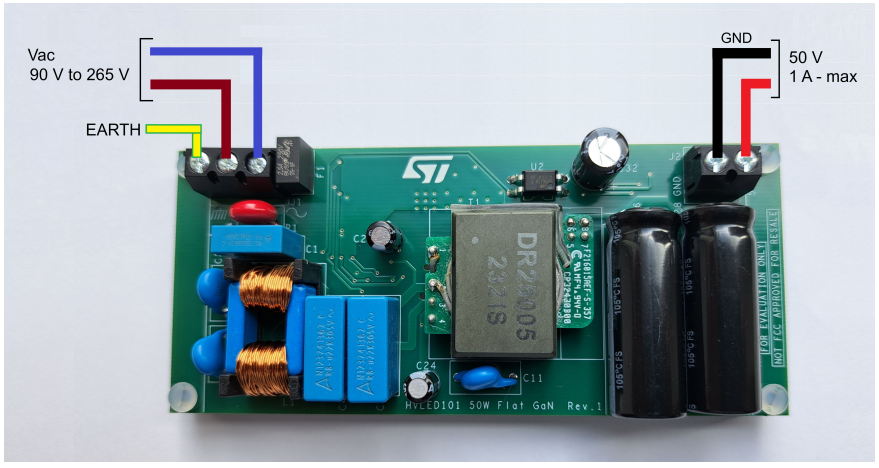
1.1 Board connection

This section provides an overview of the package's content:

Table 2. Description of connector signals

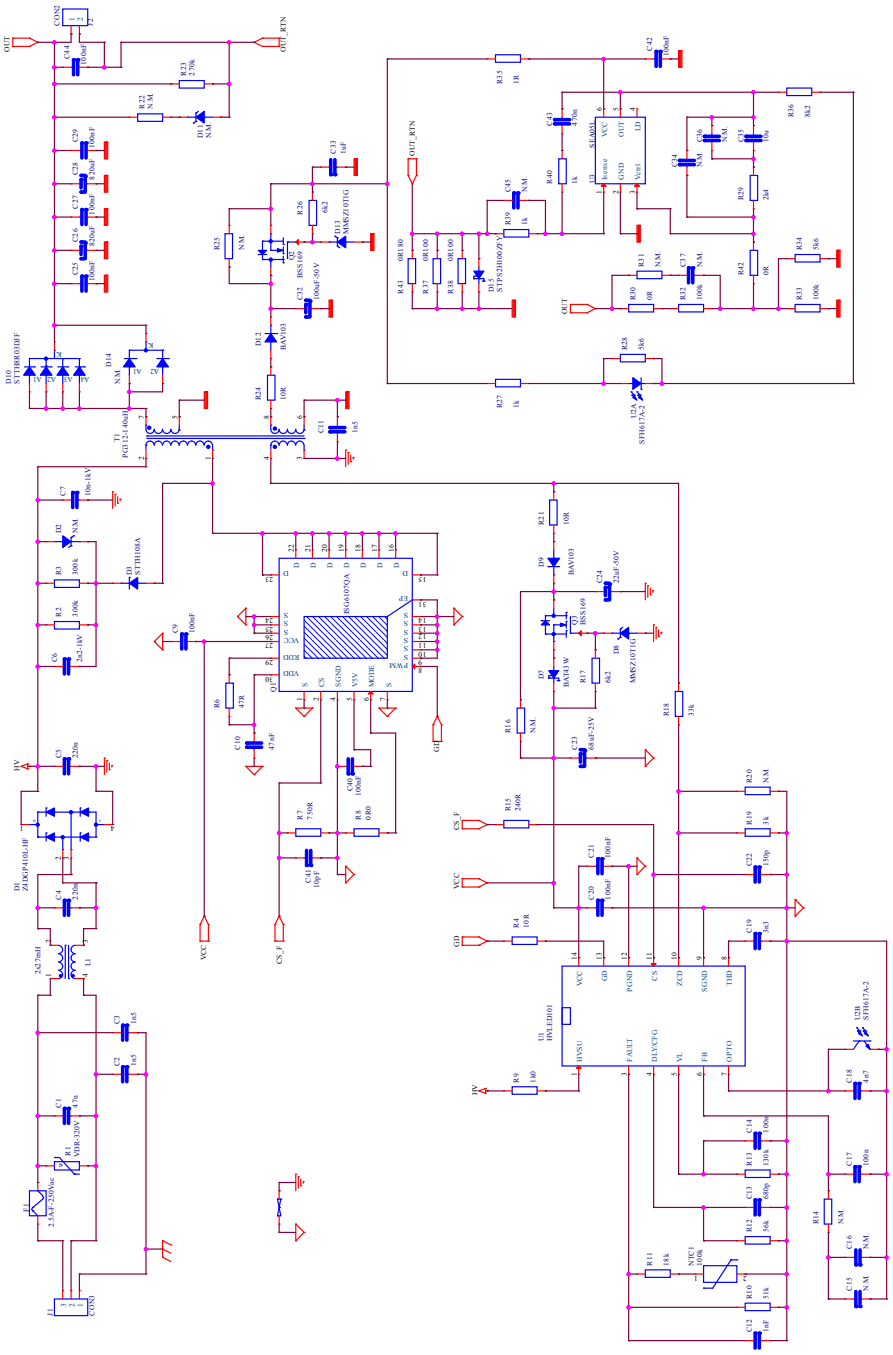
Con	Pin	Signal name	Dir	Description and use
J1	1	EARTH	Earth	Earth connection
	2	Vac	Input	First connection to AC Mains – Warning high voltage
	3	Vac	Input	Second connection to AC Mains – Warning high voltage
J2	1	50 V	Output	50 V output (isolated)
	2	RTN	Output	Output return (isolated)

Figure 1. Board connections



2 Schematics diagrams

Figure 2. **Schematic diagram**



3 Bill of material

Table 3. **List of parts**

Ref. Des.	Description	Value - rating	Part number	Package	Manufacturer
C1	Film capacitor X2 305 Vac (MKP)	47 nF – 305 Vac	B32921C3473K	5x13 mm - H=11 mm	TDK
C2	Ceramic capacitor X1-Y2 440 - 300 Vac CS series	1.5 nF – 300 Vac	CS75ZU2GA152MANKA	DWG	TDK
C3	Ceramic capacitor X1-Y2 440 - 300 Vac CS series	1.5 nF – 300 Vac	CS75ZU2GA152MANKA	DWG	TDK
C4	Film capacitor X2 305 Vac (MKP)	330 nF – 305 Vac	B32922C3224K	7x18 mm - H=12.5 mm	TDK
C5	Film capacitor X2 305 Vac (MKP)	330 nF – 305 Vac	B32922C3224K	7x18 mm - H=12.5 mm	TDK
C6	Multilayer ceramic capacitor X7R – 2.2 nF – 1 kV – 10%	2.2 nF – 1 kV	1206AC222KAT1A	SMD-1206	AVX
C7	Multilayer ceramic capacitor X7R – 10 nF – 1 kV – 10%	10 nF – 1 kV	1812AC103KAT1A	SMD-1812	AVX
C9	Multilayer ceramic capacitor X7R – 100 nF – 50 V – 10%	100 nF – 50 V	---	SMD-0805	---
C10	Multilayer ceramic capacitor X7R – 47 nF – 50 V – 10%	47 nF – 50 V	---	SMD-0805	---
C11	Ceramic capacitor X1-Y1 440 - 400 Vac CD series	1.5 nF – 400 Vac	CD45-E2GA152M-NKA	DWG	TDK
C12	Multilayer ceramic capacitor X7R – 1 nF – 50 V – 10%	1 nF – 50 V	---	SMD-0805	---
C13	Multilayer ceramic capacitor COG –680 pF – 50 V – 10%	680 pF – 50 V	---	SMD-0805	---
C14	Multilayer ceramic capacitor X7R – 100 nF – 50 V – 10%	100 nF – 50 V	---	SMD-0805	---
C15	N.M.	---	---	SMD-0805	
C16	N.M.	---	---	SMD-0805	
C17	Multilayer ceramic capacitor X7R – 100 nF – 50 V – 10%	100 nF – 50 V	---	SMD-0805	---
C18	Multilayer ceramic capacitor X7R – 4.7 nF – 50 V –10%	4.7 nF – 50 V	---	SMD-0805	---
C19	Multilayer ceramic capacitor X7R – 3.3 nF – 50 V – 10%	3.3 nF – 50 V	---	SMD-0805	---
C20	Multilayer ceramic capacitor X7R – 100 nF – 50 V – 10%	100 nF – 50 V	---	SMD-0805	---
C21	Multilayer ceramic capacitor X7R – 100 nF – 50 V – 10%	100 nF – 50 V	---	SMD-1206	---
C22	Multilayer ceramic capacitor COG – 150 pF – 50 V – 10%	150 pF – 50 V	---	SMD-0805	---
C23	Aluminium electrolytic 68 µF – 25 V – 105 °C – 20%	68 µF – 25 V	EEUFR1E680	DIA 5 mm X H 11mm	PANASONIC
C24	Aluminium electrolytic 22 µF – 50 V – 105 °C – 20%	22 µF – 50 V	50YXF22M5X11	DIA 5 mm X H 11 mm	RUBYCON
C25	Multilayer ceramic capacitor X7R – 100 nF – 100 V – 10%	100 nF – 100 V	CL21B104KCFWPNE	SMD-0805	SAMSUNG

Ref. Des.	Description	Value - rating	Part number	Package	Manufacturer
C26	Aluminium electrolytic 820 µF – 63 V – 105 °C – 20%	820 µF – 63 V	EEUFS1J821L	DIA 12.5 mm x H 35 mm	PANASONIC
C27	Multilayer ceramic capacitor X7R – 100 nF – 100 V – 10%	100 nF – 100 V	CL21B104KCFWPNE	SMD-0805	SAMSUNG
C28	Aluminium electrolytic 820 µF – 63 V – 105 °C – 20%	820 µF – 63 V	EEUFS1J821L	DIA 12.5 mm x H 35 mm	PANASONIC
C29	Multilayer ceramic capacitor X7R – 100 nF – 100 V – 10%	100 nF – 100 V	CL21B104KCFWPNE	SMD-0805	SAMSUNG
C32	Aluminium electrolytic 100 µF – 50 V– 105 °C – 20%	100 µF – 50 V	50YXF100M8X11.5	DIA 8 mm X H 11.5 mm	RUBYCON
C33	Multilayer ceramic capacitor X7R – 1 µF – 25 V – 10%	1 µF – 25 V	---	SMD-0805	---
C34	N.M.	---	---	SMD-0805	
C35	Multilayer ceramic capacitor X7R 10 µF – 25 V – 10%	10 µF – 25 V	---	SMD-1206	---
C36	N.M.	---	---	SMD-0805	
C37	N.M.	---	---	SMD-0805	---
C40	Multilayer ceramic capacitor X7R – 100 nF – 50 V – 10%	100 nF – 50 V	---	SMD-0805	---
C41	Multilayer ceramic capacitor X7R – 10 pF – 50 V – 10%	10 pF – 50 V	---	SMD-0805	---
C42	Multilayer ceramic capacitor X7R – 100 nF – 50 V – 10%	100 nF – 50 V	---	SMD-0805	
C43	Multilayer ceramic capacitor X7R – 470 nF – 25 V – 10%	470 nF – 25 V	---	SMD-1206	---
C44	Multilayer ceramic capacitor X7R 100 nF – 100 V – 10%	100 nF – 100 V	CL21B104KCFWPNE	SMD-0805	SAMSUNG
C45	N.M.	---	---	SMD-0805	---
D1	Low VF SMD bridge rectifiers 4 A 1 kV	4 A – 1 kV	Z4DGP410L-HF	Z4-D	Conchip
D2	N.M.	---	---	SMA	---
D3	High voltage ultrafast rectifier 1 A 800 V	1 A – 800 V	STTH108A	SMA	STMicroelectronics
D7	Small signal schottky diode 0.2 A 30 V	0.2 A – 30 V	BAT43W	SOD-123	VISHAY
D8	Zener voltage regulator 10 V 0.5 W	10 V – 0.5 W	MMSZ10T1G	SOD-123	ON Semiconductor
D9	Small signal switching diodes, high voltage 0.2 A 250 V	0.2 A – 250 V	BAV103	SOD80 (MiniMELF)	VISHAY
D10	Ultrafast recovery diode high efficiency 8 A 300 V	8 A – 300 V	STTH8R03DJF-TR	PowerFLAT 5 x 6	STMicroelectronics
D11	N.M.	---	---	SMB	---
D12	Small signal switching diodes, high voltage 0.2 A 250 V	0.2 A – 250 V	BAV103	SOD80 (MiniMELF)	VISHAY
D13	Zener voltage regulator 10 V 0.5 W	10 V – 0.5 W	MMSZ10T1G	SOD-123	ON Semiconductor
D14	N.M.	---	---	D2PAK-3	---
D15	Power schottky diode, 2 A 100 V	2 A – 100 V	STPS2H100ZFY	SOD-123Flat	STMicroelectronics

Ref. Des.	Description	Value - rating	Part number	Package	Manufacturer
F1	Subminiature fuses fast-acting 2.5 A-F-250 Vac	2.5 A – 250 Vac	SS-SF-25A	DWG	Bussman
J1	PCB connector 3 pin	15 A – 300 V	PM 5.08/03/90 3.5SN BK BX - 1760520000	DWG	WEIDMULLER
J2	PCB connector 2 pin	15 A – 300 V	PM 5.08/02/90 3.5SN BK BX - 1760510000	DWG	WEIDMULLER
L1	Current-compensated frame core double chokes 2x27 mH 0.9 A	27 mH – 0.9 A	B82732F2901B001	DWG	TDK
NTC1	NTC Thermistor, 100 kΩ	100 kΩ	NTCS0805E3104JXT	SMD-0805	VISHAY
Q1	700 V SolidGaN with Integrated current sense	700 V	ISG6107QA	PQFN6X8	Innoscience
Q2	Small signal N-channel depletion MOSFET 100 V	100 V	BSS169	SOT23	INFINEON
Q3	Small signal N-channel depletion MOSFET 100 V	100 V	BSS169	SOT23	INFINEON
R1	Metal-Oxide varistors, radial lead varistors	320 V	V320LA7P	DWG	Littelfuse
R2	Standard. Film resistor 300 kΩ – 0.25 W – 5%	300 kΩ – 0.25 W	---	SMD-1206	---
R3	Standard. Film resistor 300 kΩ – 0.25 W – 5%	300 kΩ – 0.25 W	---	SMD-1206	---
R4	Standard. Film resistor 10 Ω – 0.125 W – 5%	10 Ω – 0.125 W	---	SMD-0805	---
R6	Standard. Film resistor 47 Ω – 0.125 W – 5%	47 Ω – 0.125 W	---	SMD-0805	---
R7	Standard. Film resistor 750 Ω – 0.125 W – 1%	750 Ω – 0.125 W	---	SMD-0805	
R8	Standard. Film resistor 0 Ω – 5%	0 Ω	---	SMD-0805	---
R9	Standard. Film resistor 1 kΩ – 0.125 W – 5%	1 kΩ – 0.125 W	---	SMD-0805	---
R10	Standard. Film resistor 51 kΩ – 0.125 W – 5%	51 kΩ – 0.125 W	---	SMD-0805	---
R11	Standard. Film resistor 18 kΩ – 0.125 W – 5%	18 kΩ – 0.125 W	---	SMD-0805	---
R12	Standard. Film resistor 56 kΩ – 0.125 W – 1%	56 kΩ – 0.125 W	---	SMD-0805	---
R13	Standard. Film resistor 130 kΩ – 0.125 W – 1%	130 kΩ – 0.125 W	---	SMD-0805	---
R14	N.M.	---	---	SMD-0805	---
R15	Standard. Film resistor 240 Ω – 0.125 W – 5%	240 Ω – 0.125 W	---	SMD-0805	---
R16	N.M.	---	---	SMD-0805	
R17	Standard. Film resistor 6.2 kΩ – 0.125 W – 5%	6.2 kΩ – 0.125 W	---	SMD-0805	---
R18	Standard. Film resistor 33 kΩ – 0.125 W – 5%	33 kΩ – 0.125 W	---	SMD-0805	---
R19	Standard. Film resistor 3 kΩ – 0.125 W – 1%	3 kΩ – 0.125 W	---	SMD-0805	---
R20		---	---	SMD-0805	---

Ref. Des.	Description	Value - rating	Part number	Package	Manufacturer
	N.M.				
R21	Standard. Film resistor 10 Ω – 0.125 W – 5%	10 Ω – 0.125 W	---	SMD-0805	---
R22	N.M.	---	---	SMD-1206	---
R23	Standard. Film resistor 270 kΩ – 0.125 W – 5%	270 kΩ – 0.125 W	---	SMD-1206	---
R24	Standard. Film resistor 10 Ω – 0.125 W – 5%	10 Ω – 0.125 W	---	SMD-0805	---
R25	N.M.	---	---	SMD-1206	---
R26	Standard. Film resistor 6.2 kΩ – 0.125 W – 5%	6.2 kΩ – 0.125 W	---	SMD-0805	---
R27	Standard. Film resistor 1 kΩ – 0.125 W – 5%	1 kΩ – 0.125 W	---	SMD-0805	---
R28	Standard. Film resistor 5.6 kΩ – 0.125 W – 5%	5.6 kΩ – 0.125 W	---	SMD-0805	---
R29	Standard. Film resistor 2.4 kΩ – 0.125 W – 5%	2.4 kΩ – 0.125 W	---	SMD-0805	---
R30	Standard. Film resistor 0 Ω – 5%	0 Ω	---	SMD-0805	---
R31	N.M.	---	---	SMD-0805	---
R32	Standard. Film resistor 100 kΩ – 0.125 W – 1%	100 kΩ – 0.125 W	---	SMD-0805	---
R33	Standard. Film resistor 100 kΩ – 0.125 W – 1%	100 kΩ – 0.125 W	---	SMD-0805	---
R34	Standard. Film resistor 5.6 kΩ – 0.125 W – 5%	5.6 kΩ – 0.125 W	---	SMD-0805	---
R35	Standard. Film resistor 1 Ω – 0.125 W – 5%	1 Ω – 0.125 W	---	SMD-0805	---
R36	Standard. Film resistor 8.2 kΩ – 0.125 W –5%	8.2 kΩ – 0.125 W	---	SMD-0805	---
R37	Current sense resistor 0.1 Ω – 1 W – 1%	0.1 Ω – 1 W	UR73VH2BTTDR100F	SMD-1206	KOA Speer
R38	Current sense resistor 0.1 Ω – 1 W – 1%	0.1 Ω – 1 W	UR73VH2BTTDR100F	SMD-1206	KOA Speer
R39	Standard. Film resistor 1 kΩ – 0.125 W – 5%	1 kΩ – 0.125 W	---	SMD-0805	---
R40	Standard. Film resistor 1 kΩ – 0.125 W – 5%	1 kΩ – 0.125 W	---	SMD-0805	---
R42	Standard. Film resistor 0 Ω – 5%	0 Ω	---	SMD-0805	---
R43	Current sense resistor 0.18 Ω – 1 W – 1%	0.18 Ω – 1 W	UR73VH2BTTDR180F	SMD-1206	KOA Speer
T1	Planar flyback transformer 140 µH	140 µH	DR25005	DWG	Sunlord
U1	Advanced high power factor flyback controller	---	HVLED101/TR	SOP14	STMicroelectronics
U2	Optocoupler, phototransistor output, high reliability, 5300 VRMS, 110 °C	---	SFH617A-2	DIP4, 400 mils	VISHAY
U3	Advanced constant voltage and constant current controller	---	SEA05LTR	SOT23-6L	STMicroelectronics

4 Component placement

Figure 3. **EVL101G50FLT top side assembly**

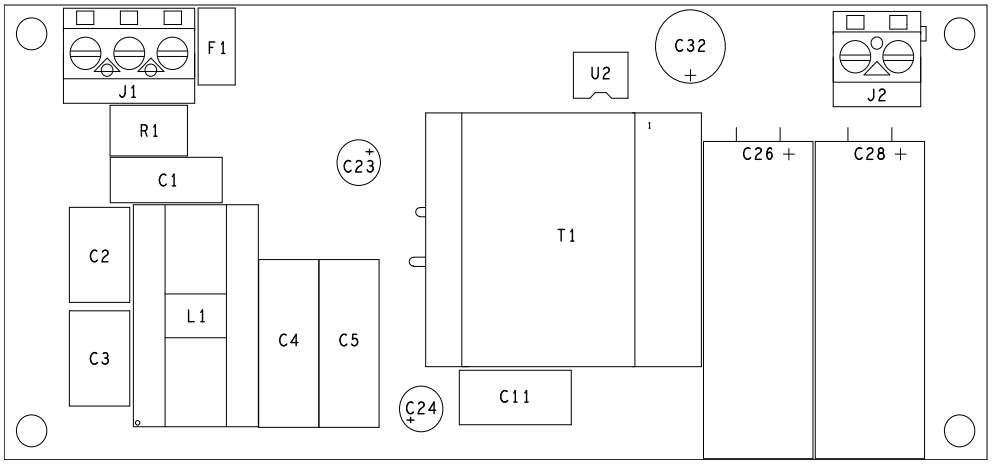
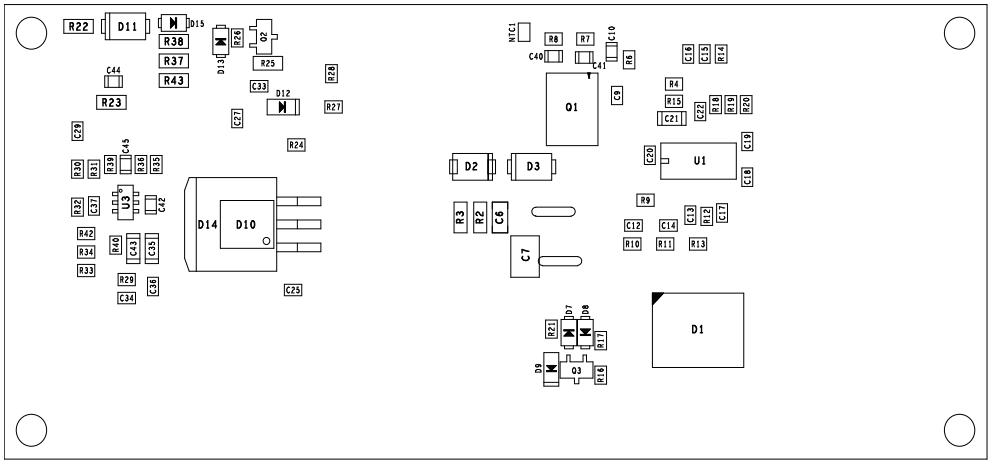


Figure 4. **EVL101G50FLT bottom side assembly**



5 Board performance

Figure 5. Efficiency vs load (CV output)

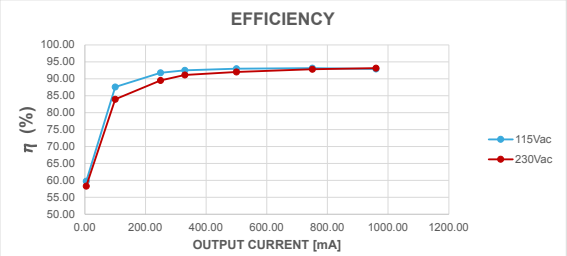


Figure 6. Efficiency vs Vout (LED output)

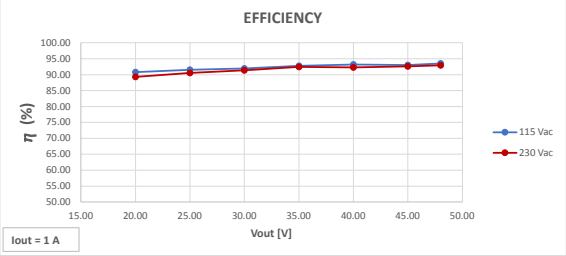


Figure 7. THD (CV output)

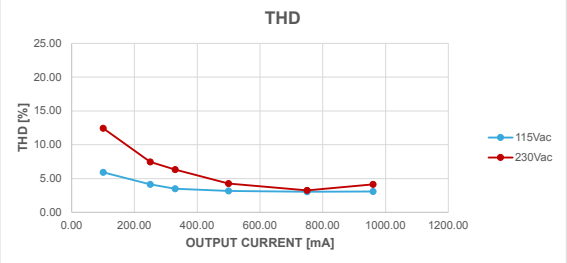


Figure 8. THD (LED output)

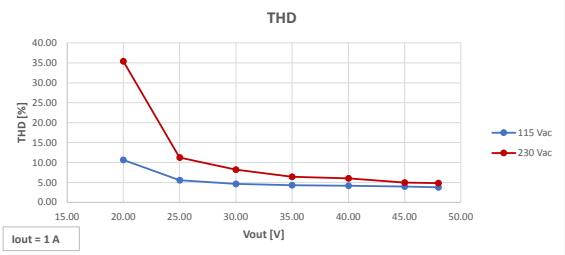


Figure 9. Power factor (CV output)

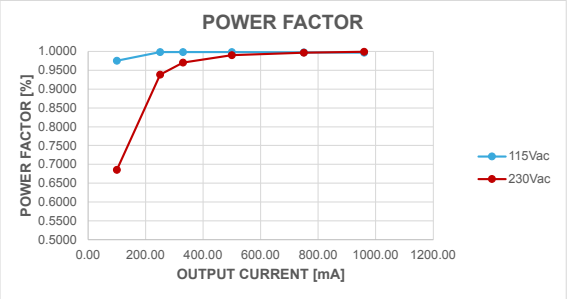
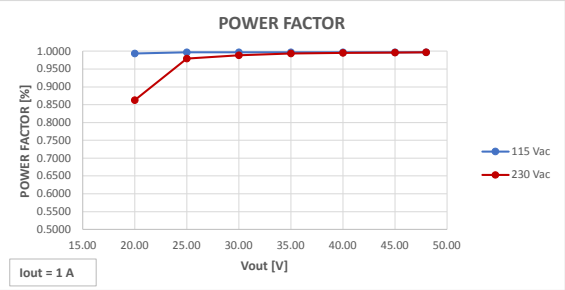


Figure 10. Power factor (LED output)



6 WASTE and RECYCLING

The evaluation board is not to be disposed as an urban waste. At the end of its life cycle, differentiated waste collection must be followed. Consult the local authorities for more information on the proper disposal channels and recycling centers. It is mandatory to collect the evaluation board separately and make sure it is delivered to the appropriate waste management and recycling centers. As of 15 August 2018, in all the countries belonging to the European Union, the evaluation board is subject to the requirements of WEEE Directive 2012/19/EU, and therefore it is forbidden to dispose the evaluation board as undifferentiated waste or with other domestic waste. Incorrect disposal of the evaluation board may cause damage to the environment and may incur fines based on specific countries' rules, regulations, and laws.

Revision history

Table 4. **Document revision history**

Date	Version	Changes
06-May-2026	1	Initial release.

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