AN6380

Application note

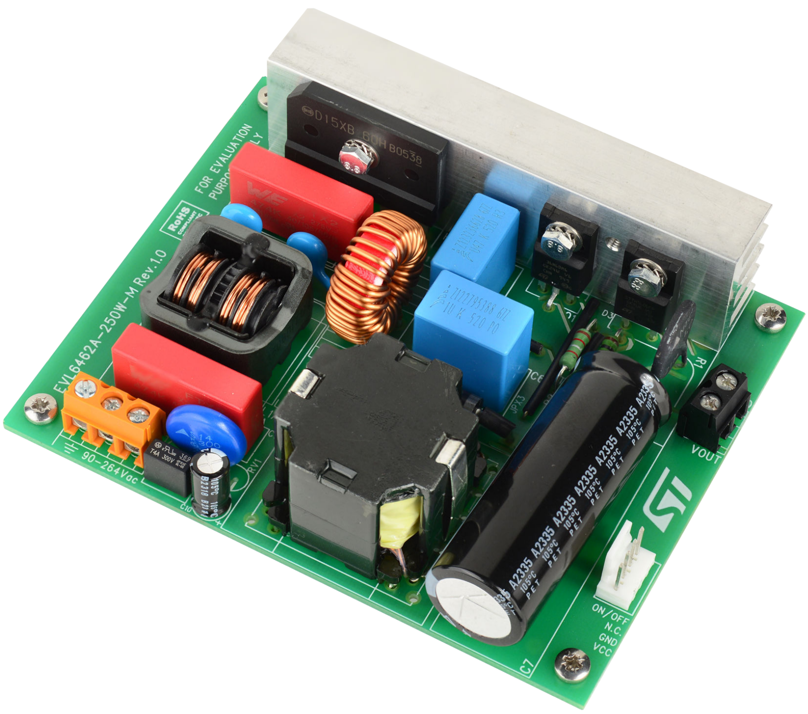
250 W transition mode PFC based on L6462A (with MOSFET)

Introduction

This application note describes the demonstration board EVL6462A-250W-M based on the new transition-mode (TM) power factor controller (PFC), the L6462A, and presents the main results of its bench evaluation. The board implements a 250 W wide-range input PFC pre-regulator suitable for all SMPS up to a few hundred watts (maximum power managed by a PFC boost operating in transition-mode) which must be compliant with IEC61000-3-2 and JEITA-MITI standards.

Thanks to the innovative IPs embedded on the L6462A [1], the main features of this design are the minimal component count, the simple and easy design, as well as its high efficiency and very low input current distortion (THD) under all operating conditions.

Figure 1. EVL6462A-250W-M evaluation board



1 Main characteristics and circuit description

The main characteristics of the evaluation board are listed below:

- Input mains range: 90-264 Vac (47/63 Hz)
- Regulated output voltage (V_{OUT}): 400 Vdc
- Rated output power (P_{OUT_MAX}): 250 W
- Input current distortion (THD): < 10% from full load to 30% load
- Power Factor (PF): > 0.9 from full load to 30% load
- Converter efficiency peak (η): 97.4%
- Mains harmonics: meets EN61000-3-2 Class-D and JEITA-MITI Class-D
- EMI: according to EN55022 Class-B
- PCB: single-sided, 70 µm, FR-4, 110 x 88 mm (active area 90 x 88 mm)

The power stage of the Power Factor Converter (PFC) is a traditional boost converter, connected to the output of the bridge rectifier D1. It is composed of the boost inductor L1, the power switch MOSFET Q1, the output diode D3, and the output electrolytic capacitor C7.

To meet EMC standards, the board is equipped with an input EMI filter that cuts the switching noise coming from the boost stage. In particular, L1 filters the common-mode emissions while L2, C5, C6 reduce the differential-mode emissions.

The 300 V varistor RV1, connected between the line and the neutral, protects the circuit against high input-voltage transients, while the fuse F1 disconnects the mains in case of short-circuit.

The NTC resistor R1 in series with the output diode limits the inrush current when the converter is plugged. The bypass diode D2 pre-charges the output capacitors, limiting the inrush current into the boost inductor/output diode.

The resistors R13, R14, R15 and R11//R12 are dedicated to sensing the output voltage and delivering the inverting input of the error amplifier (FB, pin #1) the feedback information necessary to keep the output voltage regulated. Between the COMP (#2) pin and ground, the components C15, R10 and C14 form the error amplifier compensation network to maintain the required loop stability.

The inductor peak current is sensed by resistors R2//R3, placed in series with the Q1 MOSFET's source and the derived signal is fed into the current sense pin (CS, #6) of the L6462A via a low-pass filter R9, C12.

A remote on/off control input is available at the J3 connector (ON/OFF input). Forcing 3.3V/5V at the ON/OFF input, the FB pin (#1) is tied below the V_{FB_DIS} threshold (0.3 V typ.) and the L6462A stops the switching activity immediately and reduces its power consumption. The operation is restarted once the FB pin is released (ON/OFF input tied to ground or left floating).

Figure 2. EVL6462A-250W-M evaluation board schematic

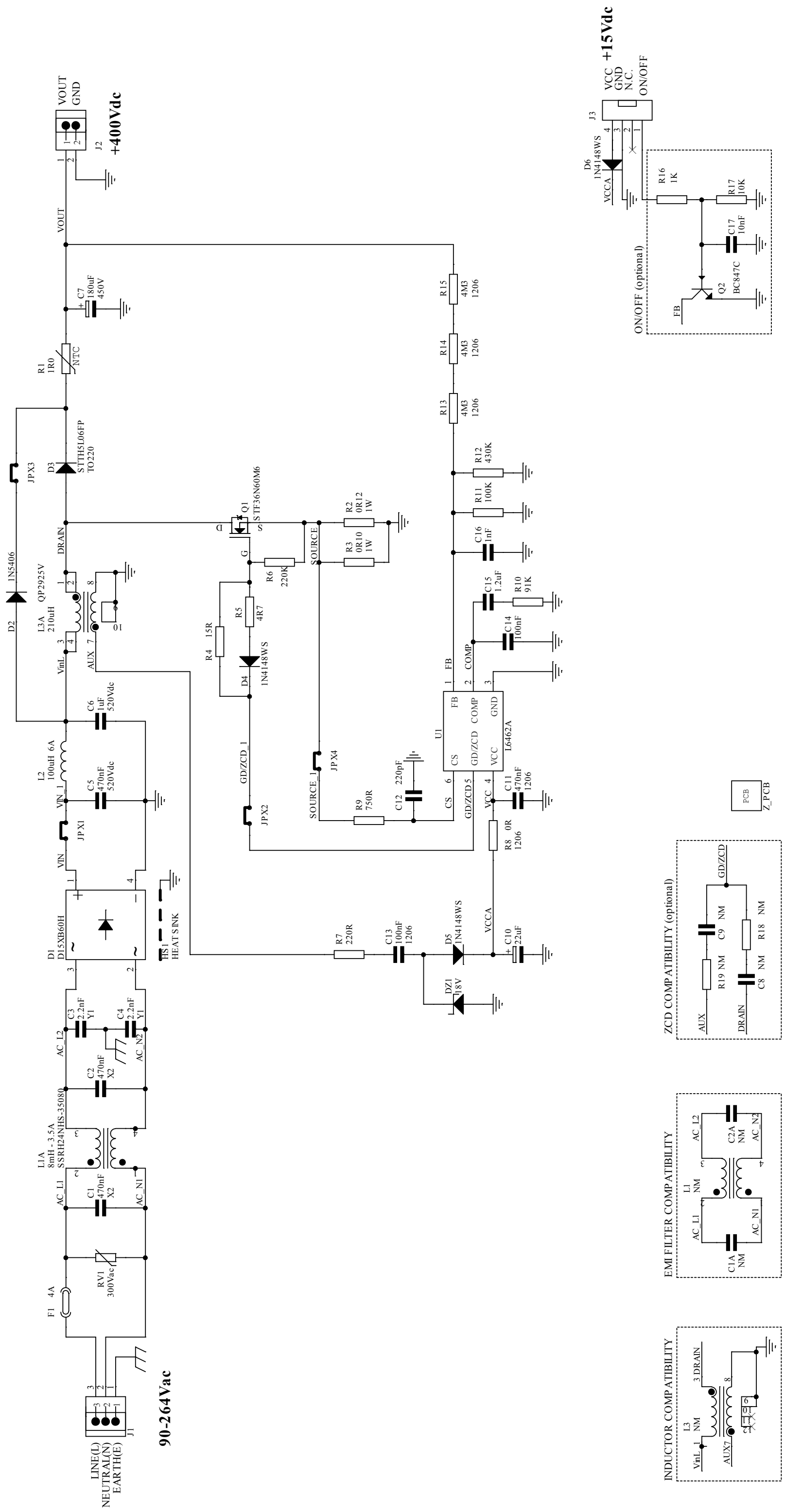


Table 1. EVL6462A evaluation board connectors

Schematic Reference	Description
JP1	AC input voltage (90-264 Vac)
JP2	DC regulated output voltage (+400 V)
JP3	1. VCC (supply voltage +15 V) 2. GND (signal ground) 3. NC 4. ON/OFF (enable/disable input – 0/+5 V)

Figure 3. EVL6462A-250W-M PCB component placement - top view

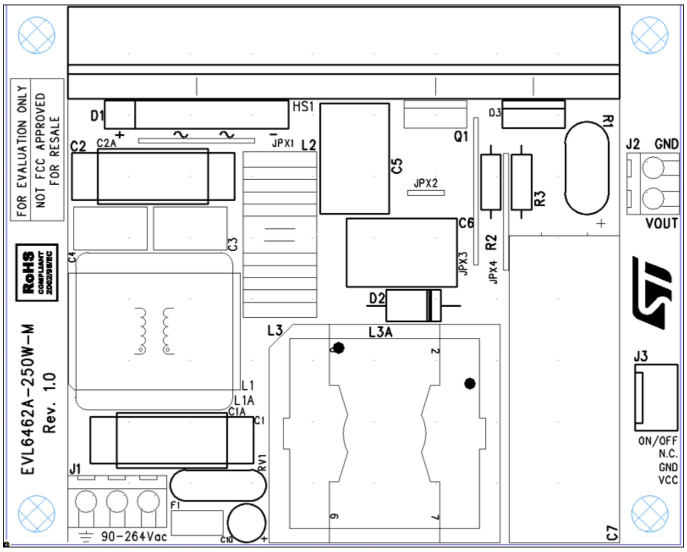


Figure 4. EVL6462A-250W-M PCB component placement - bottom view

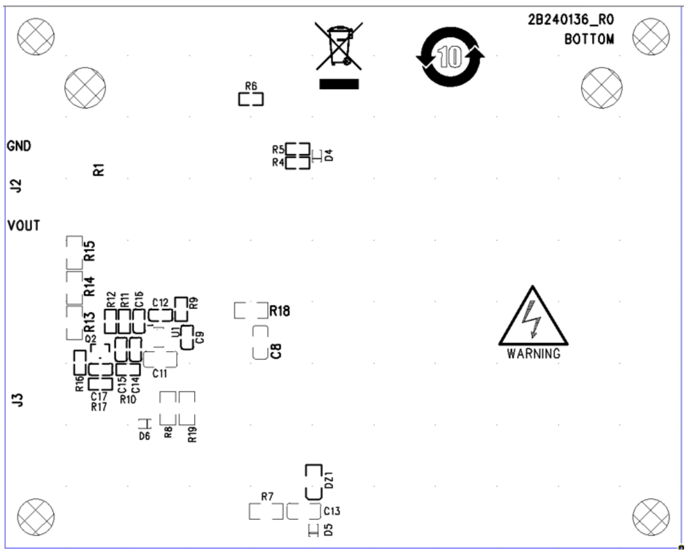


Figure 5. EVL6462A-250W-M PCB layout - top view

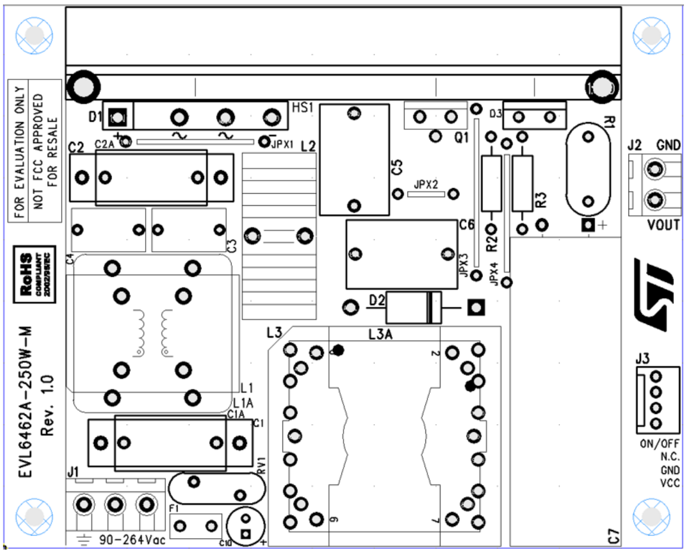
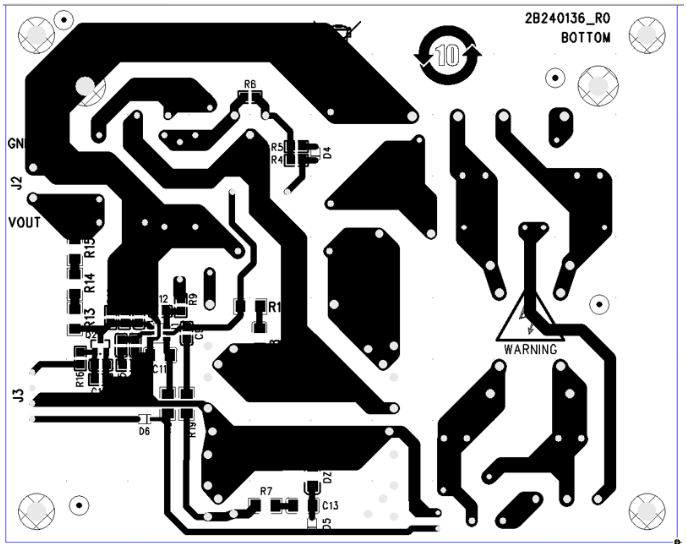


Figure 6. EVL6462A-250W-M PCB layout - bottom view



2 Test results and main waveforms

The following sections show the main results of the EVL6462A-250W-M evaluation board in terms of performance and waveforms at nominal input voltages and/or various load conditions.

2.1 Line and load regulation

The desired output voltage (V_{OUT} = 400 V) is set through the partitioning resistors connected between the output voltage V_{OUT} and the FB pin (#1):

$$V_{OUT} = V_{REF} \cdot \left(1 + \frac{R_{FB\_H}}{R_{FB\_L}}\right) \quad (1)$$

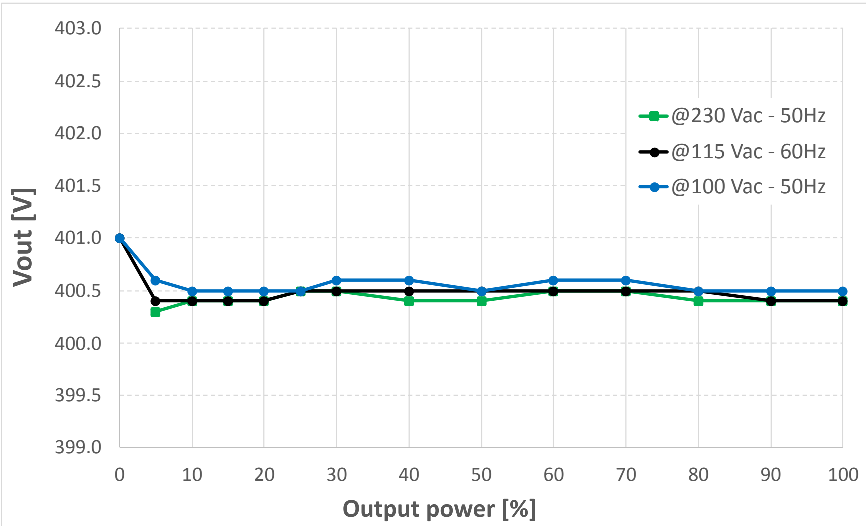
where V_{REF} is the internal reference voltage (2.5 V typ.), R_{FB_L} = R11//R12, R_{FB_H} = R13 + R14 + R15.

Considering R_{FB_H} = 3x4.2 MΩ = 12.9 MΩ, to limit the power dissipation of the whole resistor divider to 12 mW, the output voltage can be set by the R_{FB_L} resistor:

$$R_{FB\_L} = R_{FB\_H} \cdot \frac{V_{REF}}{V_{OUT} - V_{REF}} = 12.9M \cdot \frac{2.5V}{400V - 2.5V} = 81.13\ k\Omega \quad (2)$$

Figure 7 shows the average output voltage, measured across the J2 connector, versus the output power for the nominal input voltages. The results confirm that the output voltage is well regulated, regardless of the input and output load conditions.

Figure 7. Output voltage versus AC line and output load



2.2 Power factor and total harmonic distortion

Figure 8 and Figure 9 show the total harmonic distortion of the input current (THD) and the power factor (PF) versus the nominal input voltages under different load conditions. The results confirm that the new control integrated in the L6462A device is able to achieve very low THD under all operating conditions (TM at full-load and DCM operation with valley-skipping at medium-light load).

Figure 8. Total Harmonic Distortion (THD) versus output load

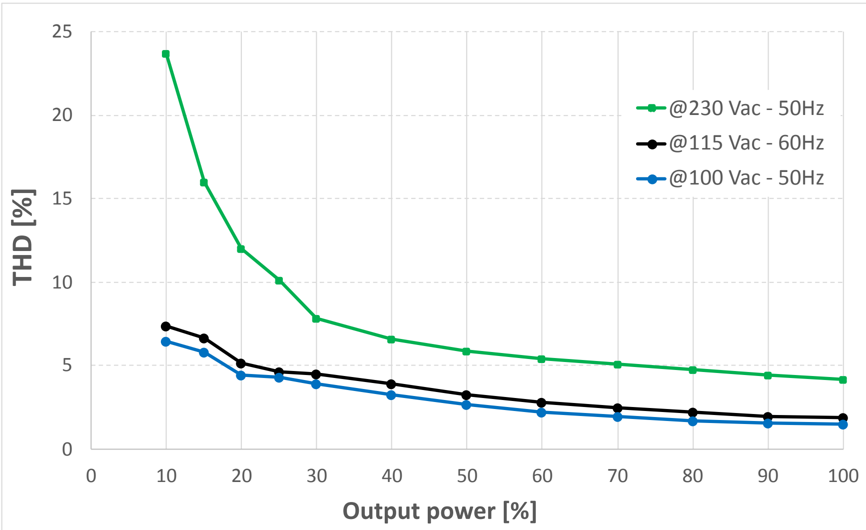
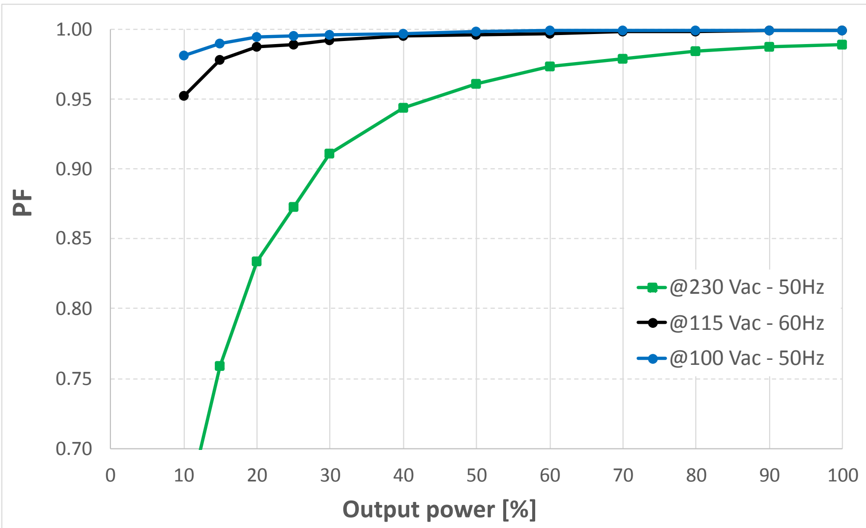


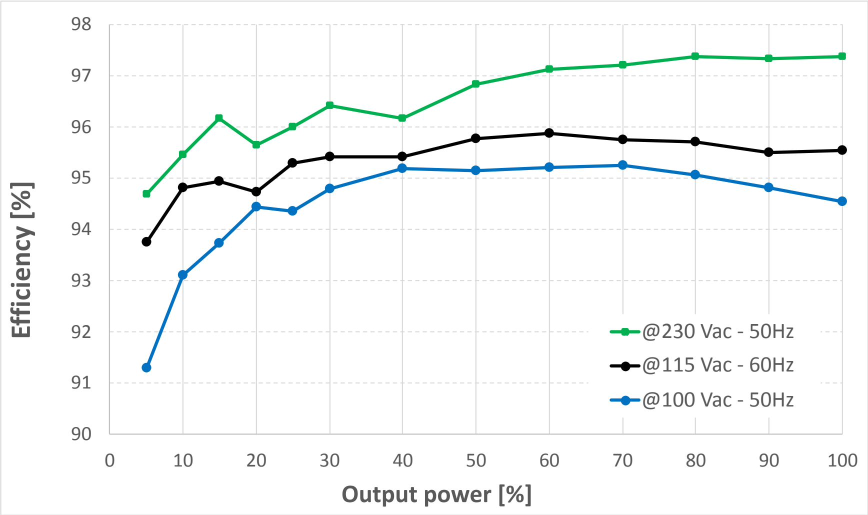
Figure 9. Power Factor (PF) versus output load



2.3 Converter efficiency

Figure 10 shows the efficiency of the converter at the nominal input voltages versus the output power. At full load, the converter efficiency is about 94.5% at 100 Vac and 97.4% at 230 Vac.

Figure 10. **Converter efficiency**



The following figures show the converter efficiency according to ES-2 test conditions.

Figure 11. **Converter "spot" efficiency**

according to ES-2 test conditions

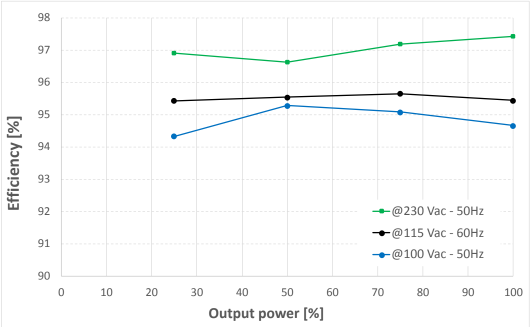
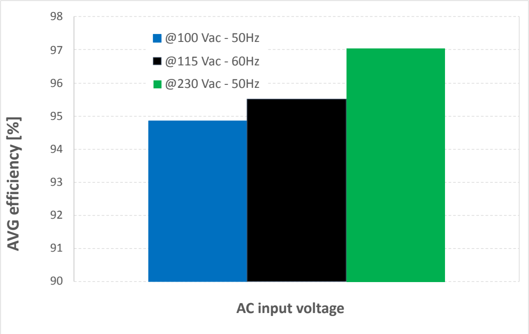


Figure 12. **Converter "average" efficiency**

according to ES-2 test conditions



2.4 Harmonics content

One of the main purposes of a PFC pre-regulator is the correction of input current distortion to ensure harmonics content remains within the limits of the relevant regulations.

This evaluation board has been tested according to the European standard EN61000-3-2 Class-D and Japanese standard JEITA-MITI class-D, at both the nominal input voltage mains, as shown in the following figures.

Figure 13. Harmonics content at full load (100 AC – 50 Hz)

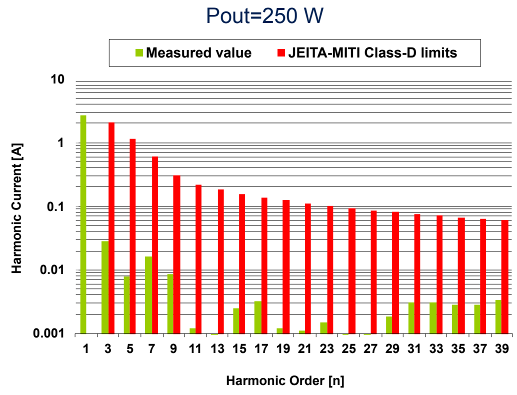
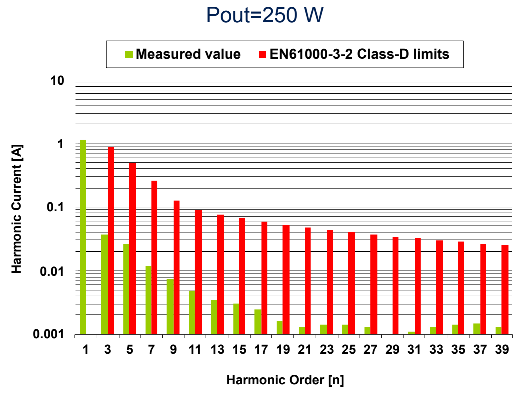


Figure 14. Harmonics content at full load (230 AC – 50 Hz)



The converter was also tested at 30% of the full load to highlight the performance under all operating conditions.

Figure 15. Harmonics content at full load (100 AC – 50 Hz)

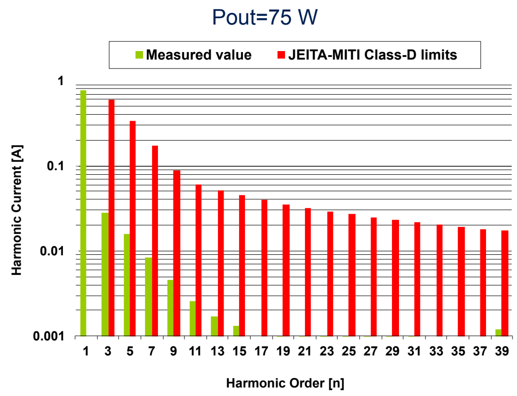
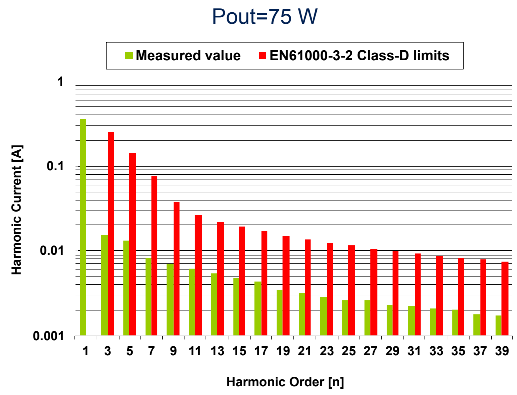


Figure 16. Harmonics content at full load (230 AC – 50 Hz)



2.5 Start-up

Figure 17 and Figure 18 show the main voltage waveforms during converter power-up. As soon as the VCC pin voltage is higher than the IC turn-on threshold (V_{CC_ON}= 11.5 V typ.), the device starts operation.

Figure 17. Start-up voltage waveforms (115 Vac)

CH1=V_{IN}, CH2=V_{OUT}, CH3=VCC pin#4, CH4=GD/ZCD pin#5

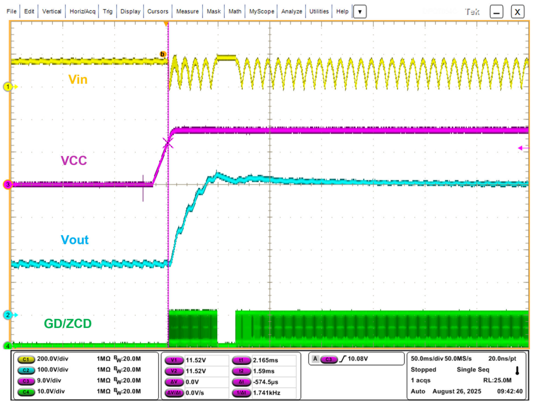
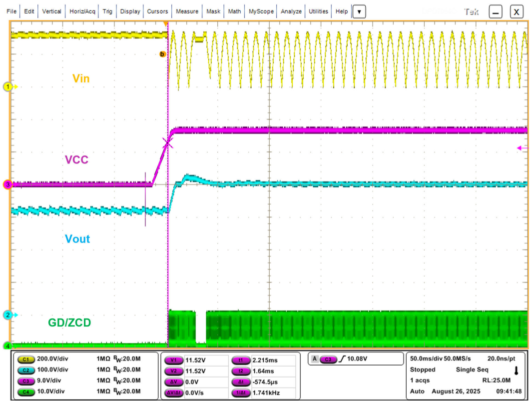


Figure 18. Start-up voltage waveforms (230 Vac)

CH1=V_{IN}, CH2=V_{OUT}, CH3=VCC pin#4, CH4=GD/ZCD pin#5



The images below show the converter behavior under different load conditions.

Figure 19. Start-up at full-load (115Vac)

CH1=V_{IN}, CH2=V_{OUT}, CH3=CS pin#6, CH4=GD/ZCD pin#5

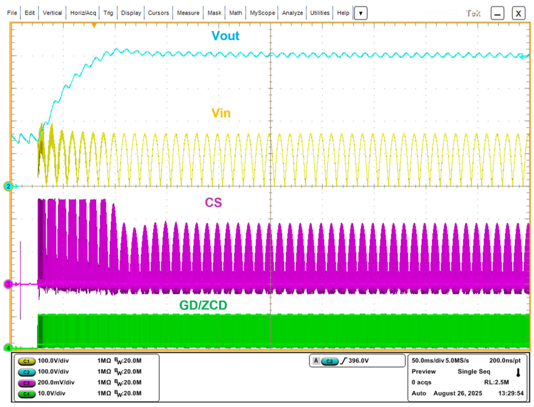


Figure 20. Start-up at full-load (230Vac)

CH1=V_{IN}, CH2=V_{OUT}, CH3=CS pin#6, CH4=GD/ZCD pin#5

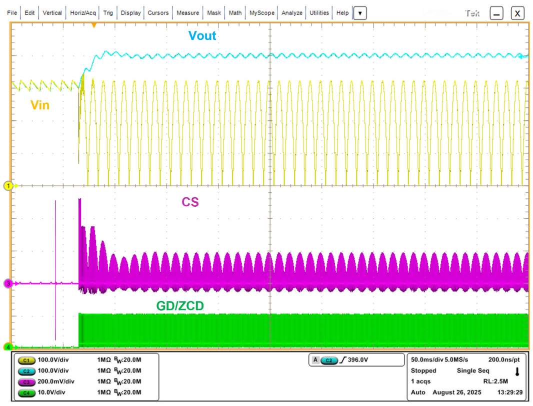


Figure 21. Start-up at 20% load (115Vac)

CH1=V_{IN}, CH2=V_{OUT}, CH3=CS pin#6, CH4=GD/ZCD pin#5

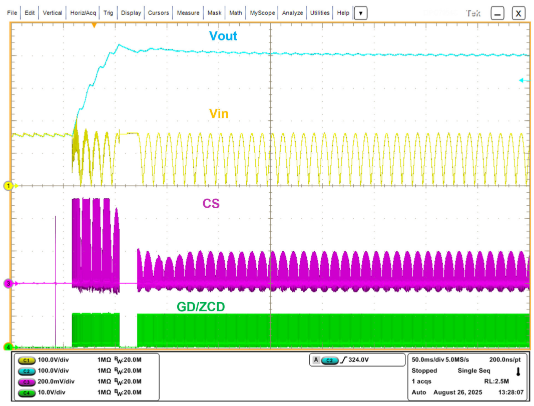
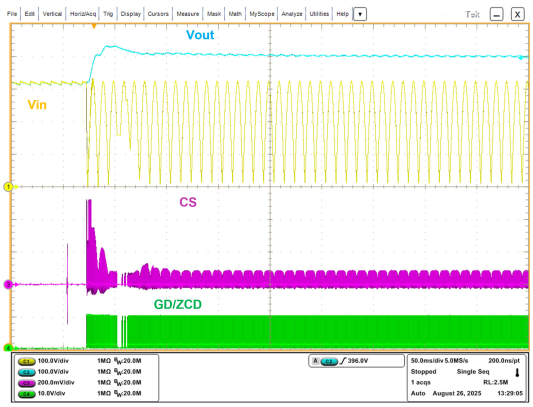


Figure 22. Start-up at 20% load (230Vac)

CH1=V_{IN}, CH2=V_{OUT}, CH3=CS pin#6, CH4=GD/ZCD pin#5



2.6 Steady-state operation

The following sections provide the main waveforms of the converter in steady-state operation.

2.6.1 Input current

Figure 23 to Figure 28 show the input current waveforms of the converter under different input and output load conditions. The waveforms confirm that the control integrated in the L6462A controller is able to achieve sinusoidal input current (extremely low THD), regardless of the operating conditions (input or output load, TM or DCM operation).

Figure 23. Steady-state – input current at full load (115 Vac)

CH1=V_{IN}, CH2=V_{OUT}, CH3=I_{IN}

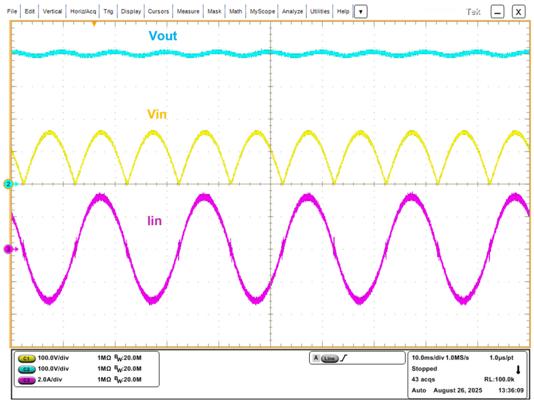


Figure 24. Steady-state – input current at full load (230 Vac)

CH1=V_{IN}, CH2=V_{OUT}, CH3=I_{IN}

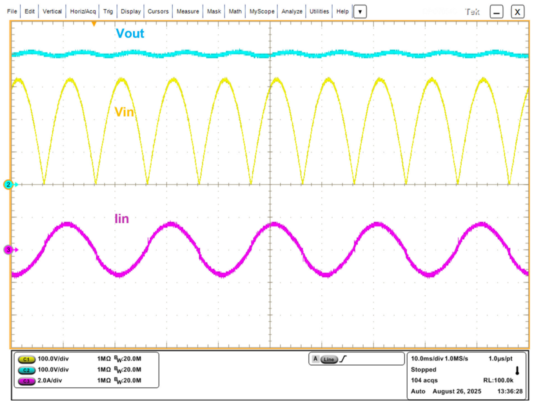


Figure 25. Steady-state – input current at 50% load (115 Vac)

CH1=V_{IN}, CH2=V_{OUT}, CH3=I_{IN}

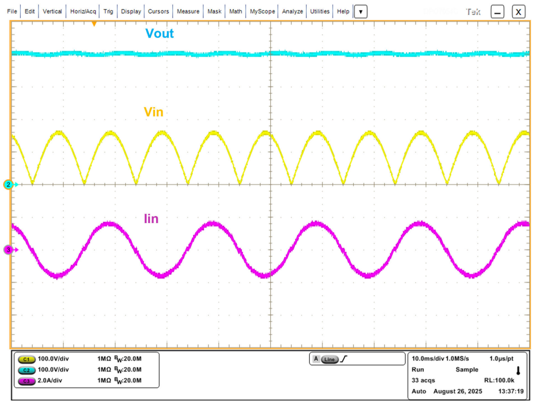


Figure 26. Steady-state – input current at 20% load (230 Vac)

CH1=V_{IN}, CH2=V_{OUT}, CH3=I_{IN}

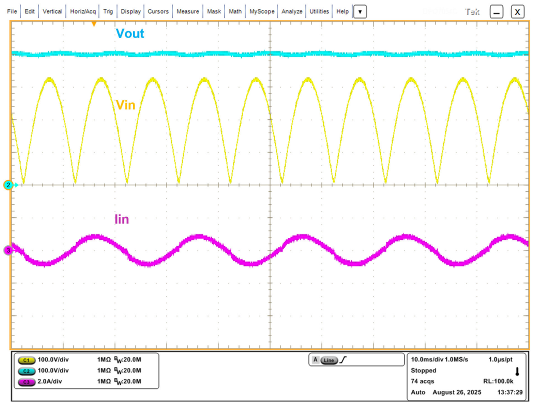


Figure 27. **Steady-state – input current at 20% load (115 Vac)**

CH1=V_{IN}, CH2=V_{OUT}, CH3=I_{IN}

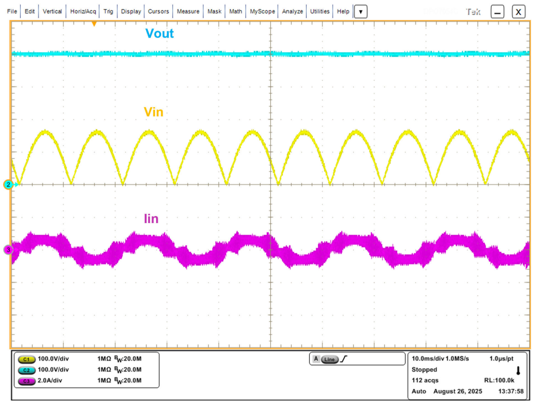
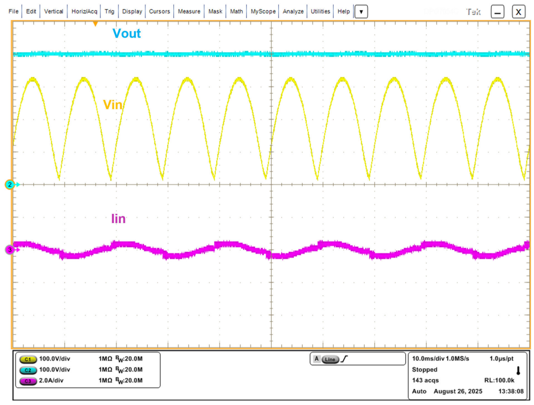


Figure 28. **Steady-state – input current at 20% load (230 Vac)**

CH1=V_{IN}, CH2=V_{OUT}, CH3=I_{IN}



2.6.2 Valley skipping

At full-load, the converter turns on the power switch on the first valley (TM operation) with a 115 Vac input voltage (low-line configuration) and, on the second valley, with a 230 Vac input voltage (high-line configuration) as shown in Figure 29 and Figure 30 respectively.

Figure 29. Steady-state – Valley turn-on at full load (115 Vac)

CH1=V_{IN}, CH2=Drain, CH3=CS pin#6

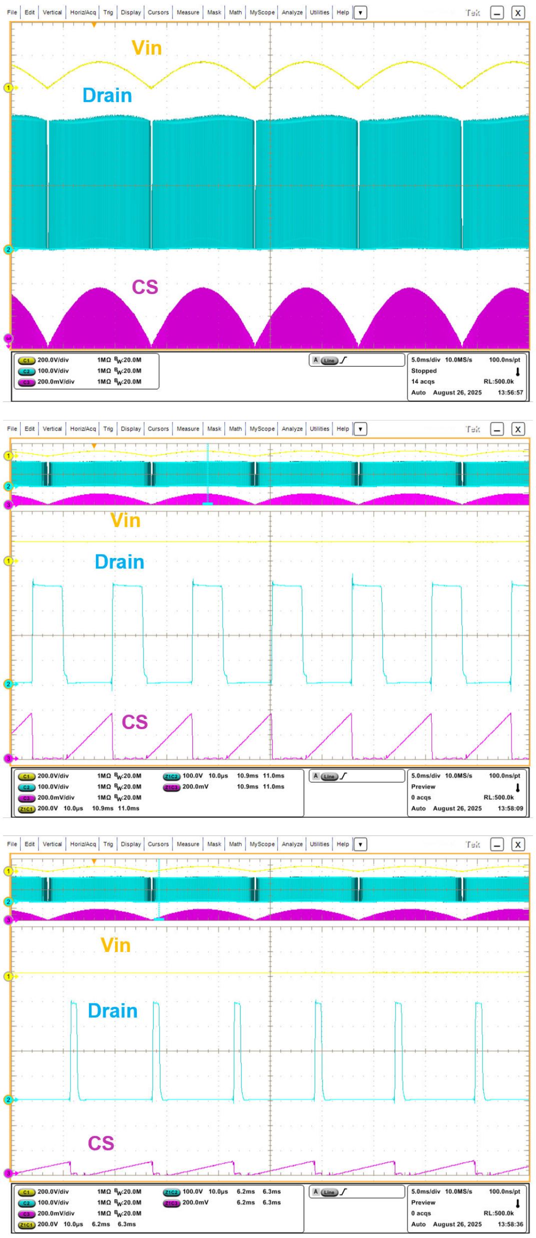
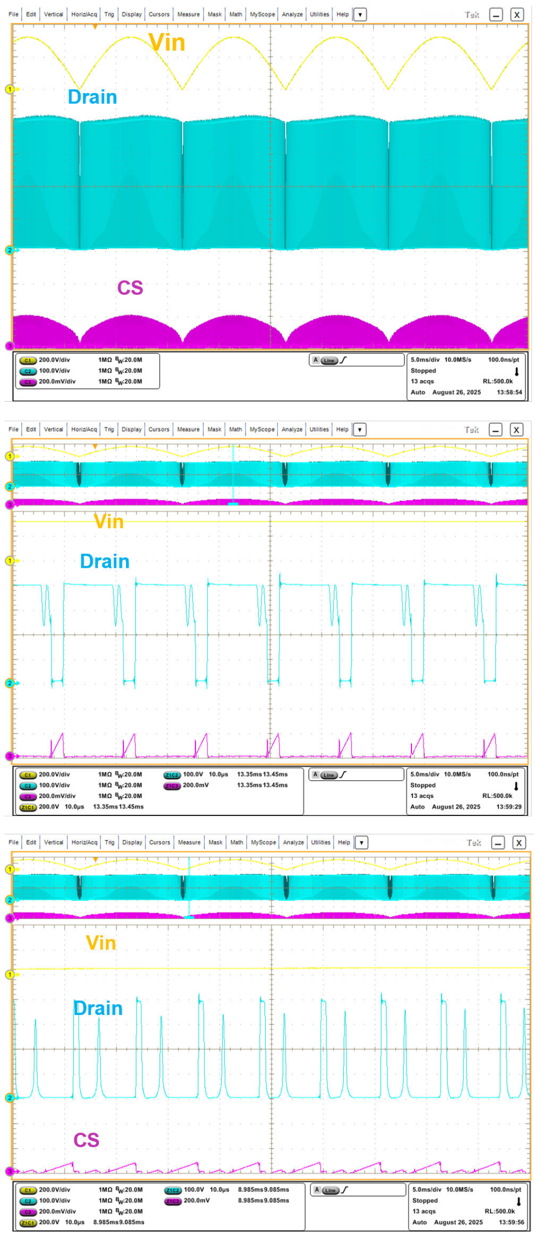


Figure 30. Steady-state – Valley turn-on at full load (230 Vac)

CH1=V_{IN}, CH2=Drain, CH3=CS pin#6



Reducing the output load, the controller skips more valleys (to reduce the switching frequency and increase converter efficiency) as shown in the images below.

Figure 31. Steady-state – Valley turn-on at 30% load (115 Vac)

CH1=V_{IN}, CH2=Drain, CH3=CS pin#6

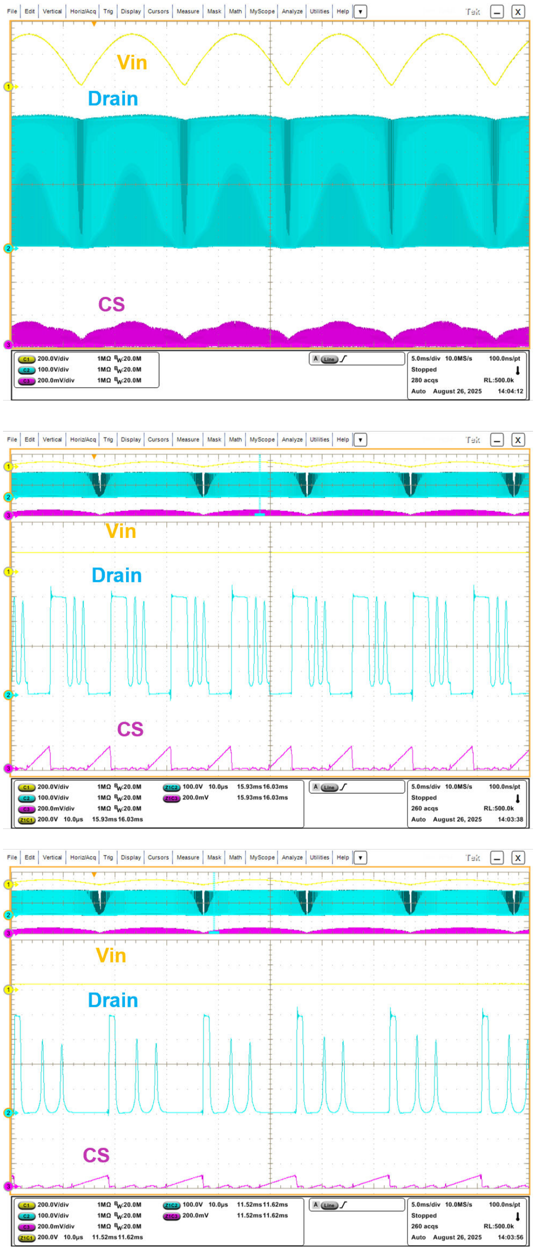


Figure 32. Steady-state – Valley turn-on at 30% load (230 Vac)

CH1=V_{IN}, CH2=Drain, CH3=CS pin#6

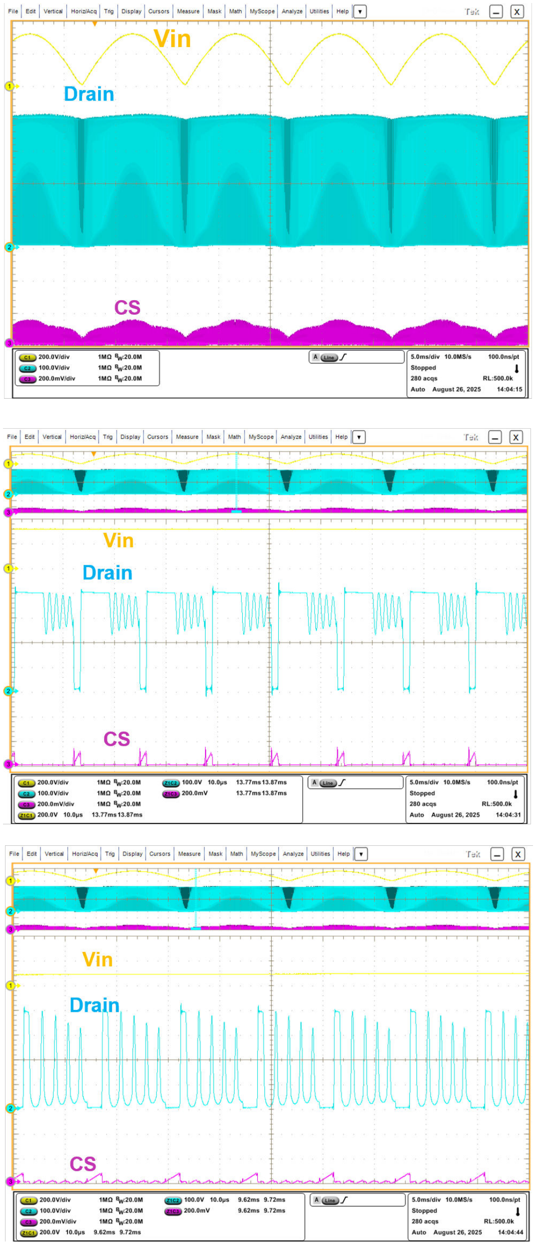


Figure 33. Steady-state – Valley turn-on at 15% load (115Vac)

CH1=V_{IN}, CH2=Drain, CH3=CS pin#6

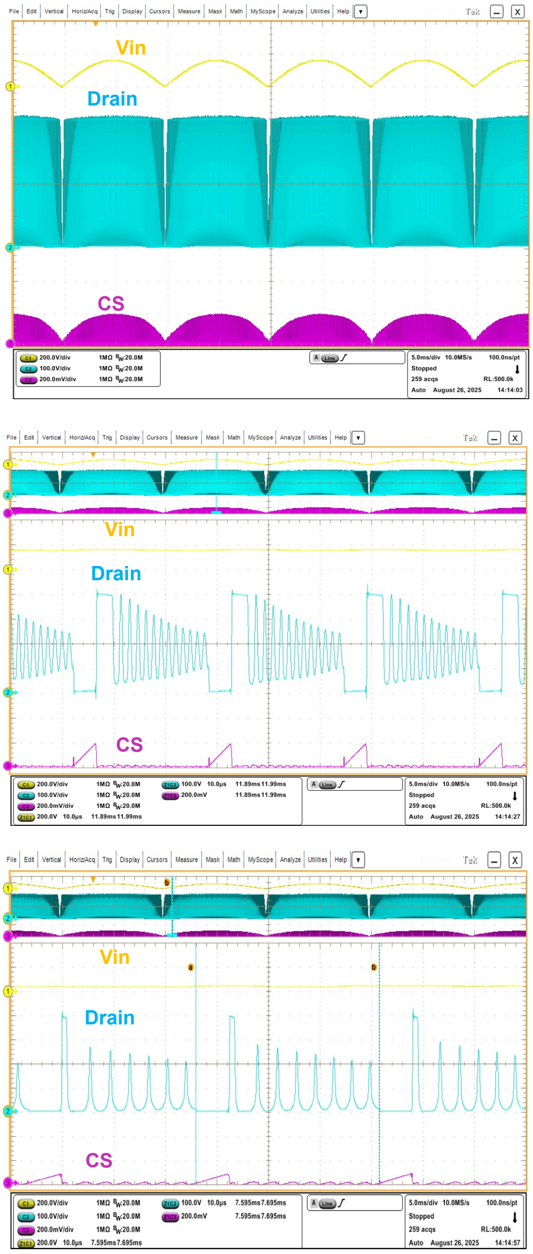
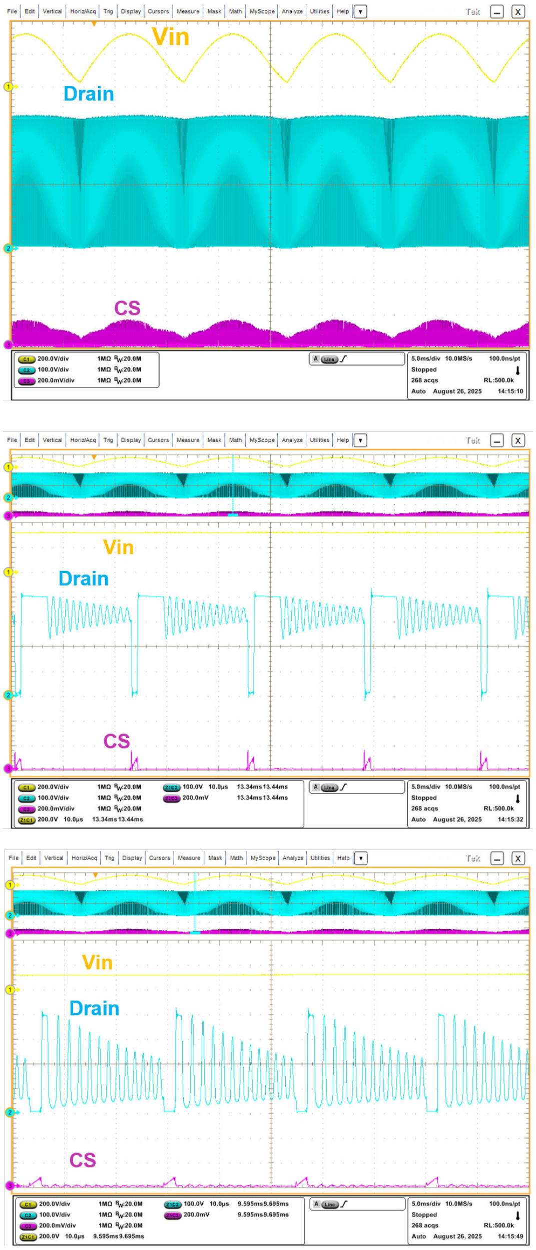


Figure 34. Steady-state – Valley turn-on at 15% load (230Vac)

CH1=V_{IN}, CH2=Drain, CH3=CS pin#6



2.7 Load step

Figure 35 to Figure 38 show the output voltage variation due to a load change.

Figure 35. Load variation – from 100% to 0% load (115 Vac)

CH1=I_{IN}, CH2=V_{OUT}, CH3=COMP pin#2, CH4=GD/ZCD pin#5

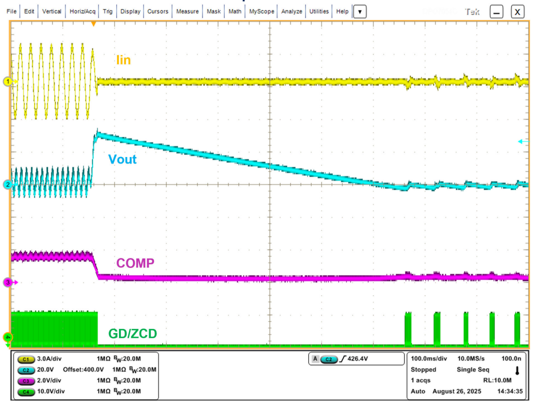


Figure 36. Load variation – from 100% to 0% load (230 Vac)

CH1=I_{IN}, CH2=V_{OUT}, CH3=COMP pin#2, CH4=GD/ZCD pin#5

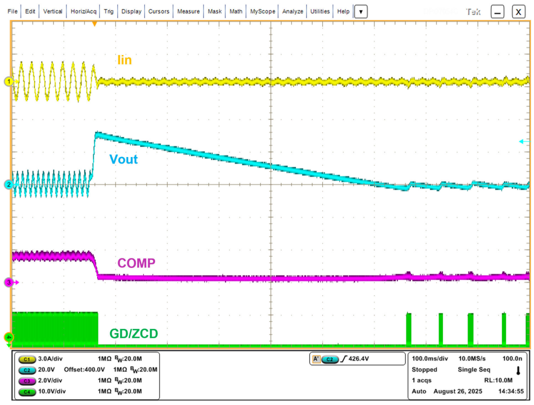


Figure 37. Load variation – from 10% to 100% load (115 Vac)

CH1=I_{IN}, CH2=V_{OUT}, CH3=COMP pin#2, CH4=GD/ZCD pin#5

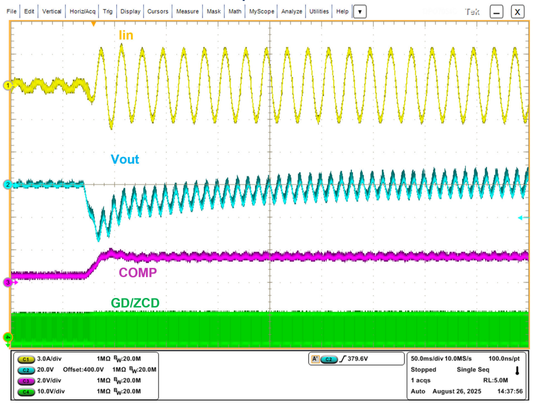
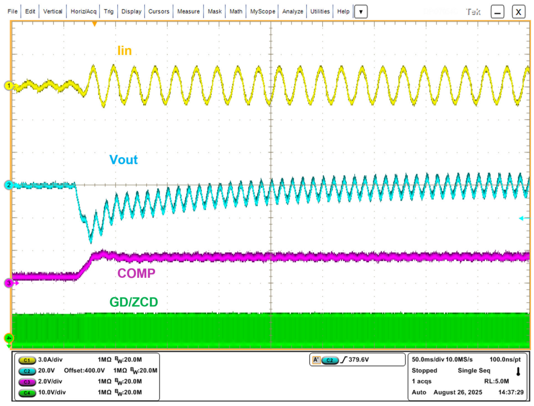


Figure 38. Load variation – from 10% to 100% load (230 Vac)

CH1=I_{IN}, CH2=V_{OUT}, CH3=COMP pin#2, CH4=GD/ZCD pin#5



2.8 Light-load burst-mode operation

Under light-load conditions, the converter maintains output voltage regulation by implementing burst-mode operation (the device enters burst mode once the COMP pin is below the threshold V_{COMP_BM} = 0.3 V typ.), as shown in the following figures.

Figure 39. Light load operation (115 Vac)

CH2=V_{OUT}, CH3=COMP pin#2, CH4= GD/ZCD pin#5

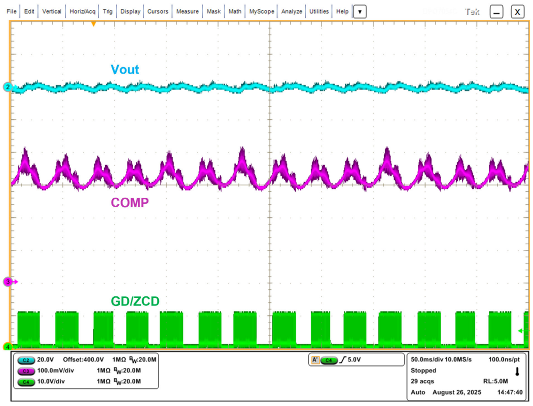
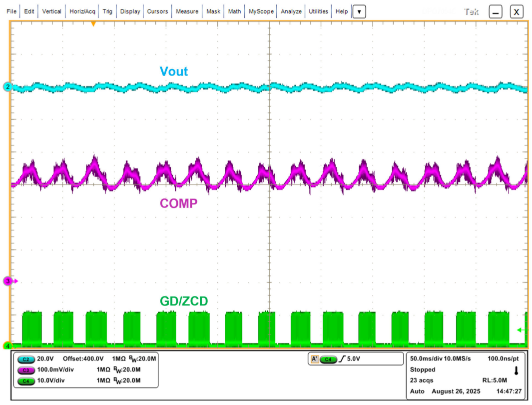


Figure 40. Light load operation (230 Vac)

CH2=V_{OUT}, CH3=COMP pin#2, CH4= GD/ZCD pin#5

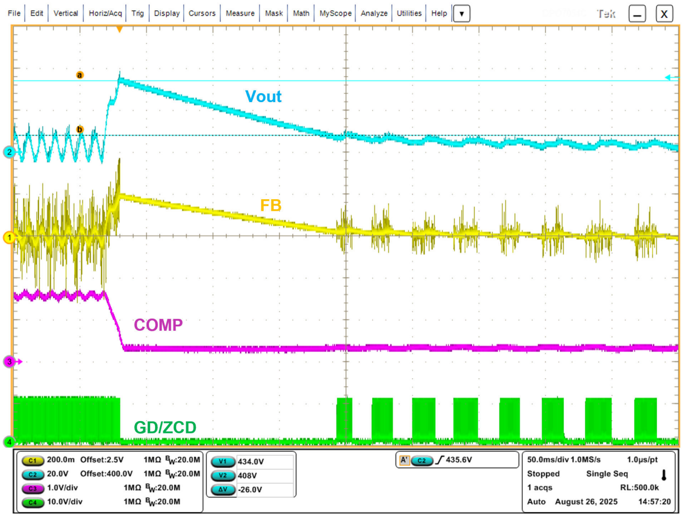


2.9 Overvoltage protection (OVP)

If the output voltage monitored by the FB pin rises above 108% of the regulated voltage, the controller turns off the power MOSFET (GD/ZCD=0) until the voltage is close to the desired value (102% of the target value), as shown in the figure below.

Figure 41. Overvoltage protection (OVP)

CH1= FB pin#1, CH2=V_{OUT}, CH3=COMP pin#2, CH4= GD/ZCD pin#5



2.10 Mains dip

The evaluation board was also tested for the mains voltage dip at full load, as shown in the following figures.

Figure 42. Mains dip 0% - 1 cycle (115 Vac)

CH1=Vac, CH2=V_{OUT}, CH4= GD/ZCD pin#5

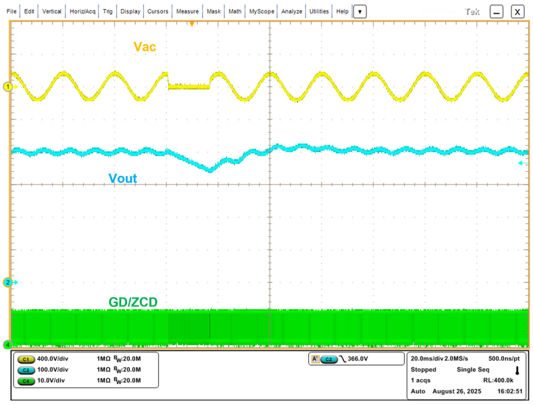


Figure 43. Mains dip 0% - 1 cycle (230 Vac)

CH1=Vac, CH2=V_{OUT}, CH4= GD/ZCD pin#5

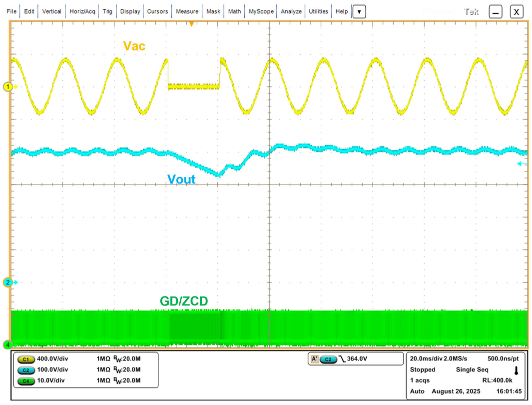


Figure 44. Mains dip 40% - 10 cycle (115 Vac)

CH1=Vac, CH2=V_{OUT}, CH4= GD/ZCD pin#5

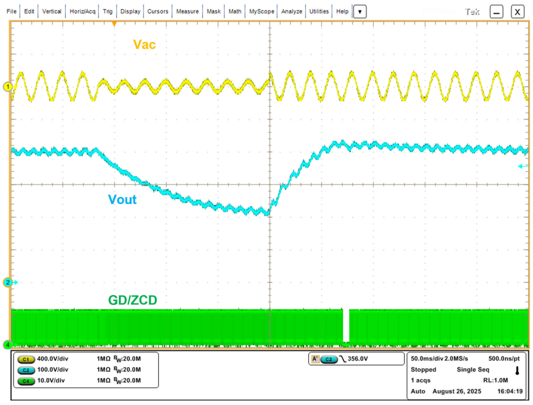


Figure 45. Mains dip 40% - 10 cycle (230 Vac)

CH1=Vac, CH2=V_{OUT}, CH4= GD/ZCD pin#5

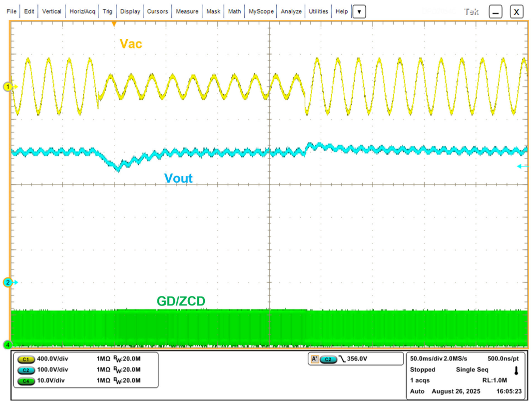


Figure 46. Mains dip 70% - 25 cycle (115 Vac)

CH1=Vac, CH2=V_{OUT}, CH4= GD/ZCD pin#5

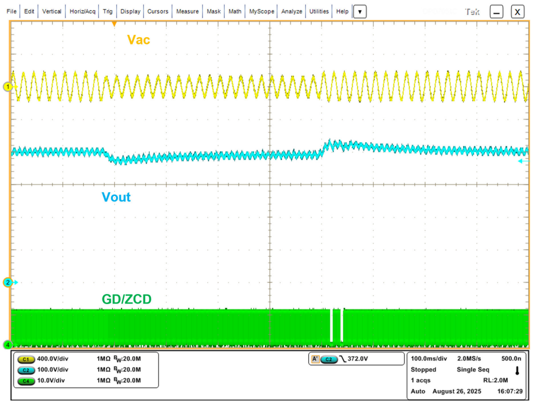
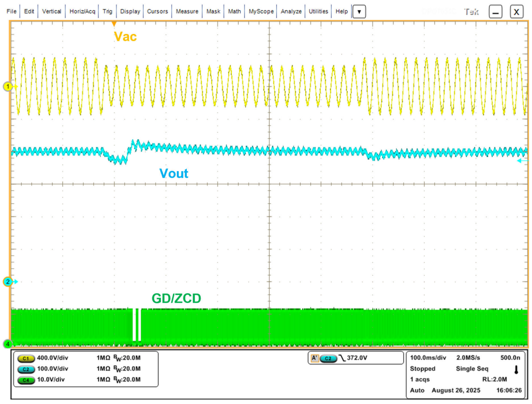


Figure 47. Mains dip 70% - 25 cycle (230 Vac)

CH1=Vac, CH2=V_{OUT}, CH4= GD/ZCD pin#5

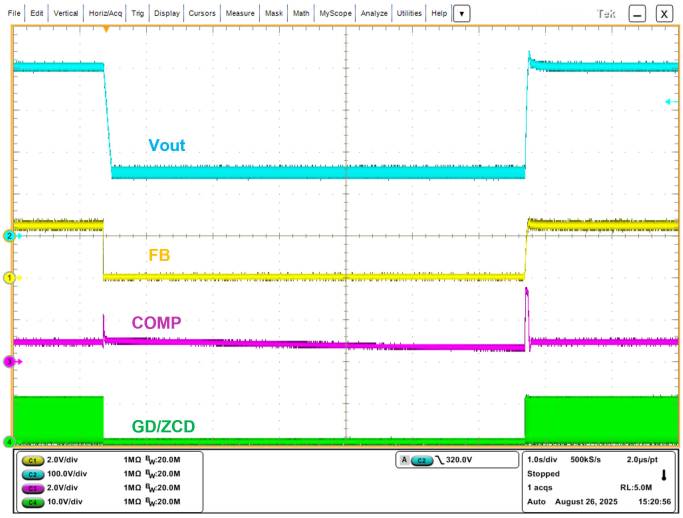


2.11 Disable

The device can be disabled by forcing the FB pin below the threshold V_{FB_DIS} (0.3 V typ.). It restarts once the FB pin is released and rises above the threshold V_{FB_EN} (0.45 V typ.), as shown in the figure below.

Figure 48. Disable

CH1=FB pin#1, CH2=V_{OUT}, CH3=COMP pin#2, CH4=GD/ZCD pin#5



2.12 Output overload

Figure 49 and Figure 50 show the main waveforms in the event of an output overload during normal operation. The input power is limited by the overcurrent protection (OCP), which turns off the power switch as soon as the CS rises above the V_{CS_OCP1} threshold (0.5 V typ at 115 AC and 0.33 V typ. at 230 AC).

Figure 49. Output overload (115 Vac)

CH1=CS pin#6, CH2=V_{OUT}, CH3=COMP pin#2, CH4= GD/ZCD pin#5

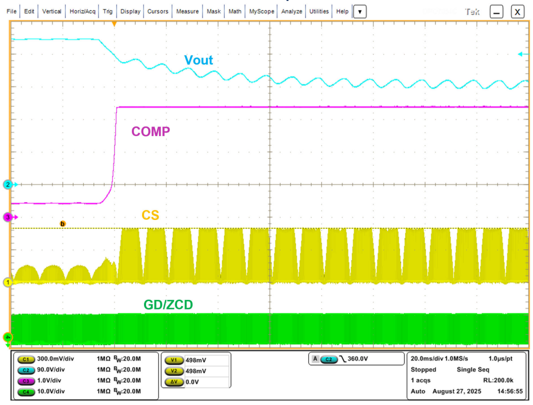
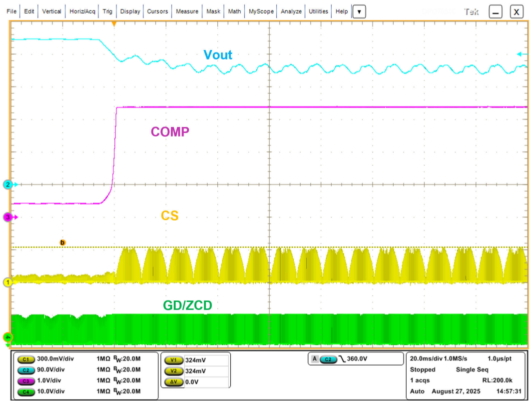


Figure 50. Output overload (230 Vac)

CH1=CS pin#6, CH2=V_{OUT}, CH3=COMP pin#2, CH4= GD/ZCD pin#5



2.13 Line variation

The following figures show the main converter waveforms after a variation of the line input voltage at full load and light load respectively.

Figure 51. Line variation – "Low line" and full load (90 Vac to 140 Vac)

CH1=Vac, CH2=V_{OUT}, CH3=I_{IN}, CH4= GD/ZCD pin#5

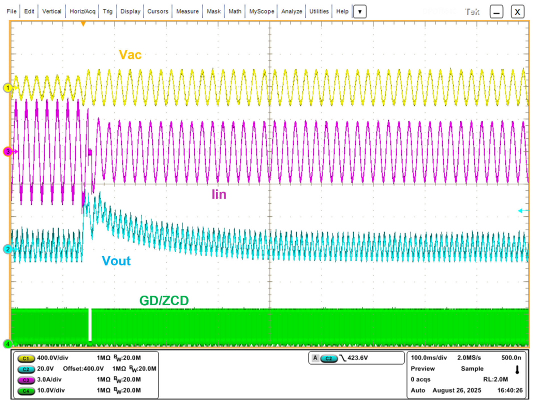


Figure 52. Line variation – "Low line" and full load (140 Vac to 90 Vac)

CH1=Vac, CH2=V_{OUT}, CH3=I_{IN}, CH4= GD/ZCD pin#5

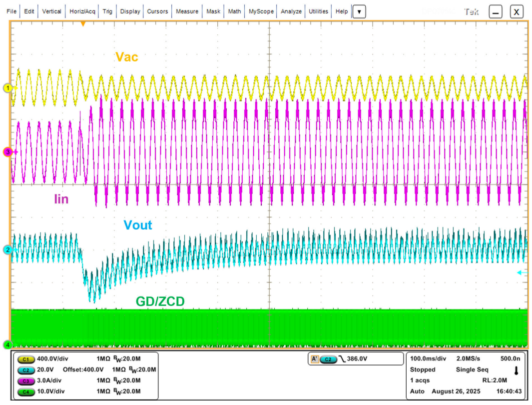


Figure 53. Line variation – "Low line" and 10% load (90 Vac to 140 Vac)

CH1=Vac, CH2=V_{OUT}, CH3=I_{IN}, CH4= GD/ZCD pin#5

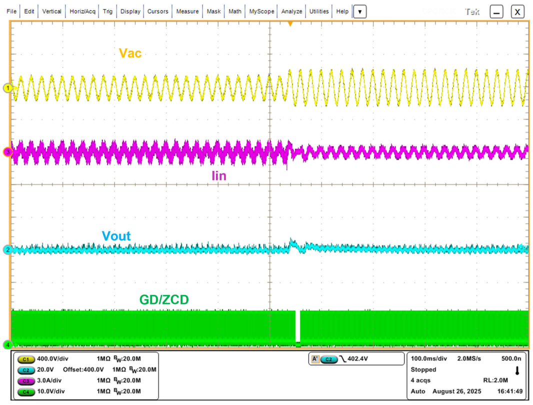


Figure 54. Line variation – "Low line" and 10% load (140 Vac to 90 Vac)

CH1=Vac, CH2=V_{OUT}, CH3=I_{IN}, CH4= GD/ZCD pin#5

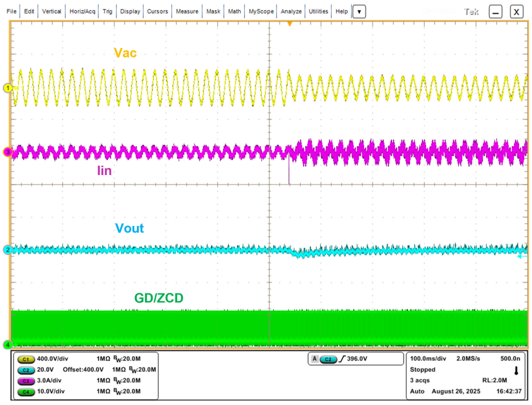


Figure 55. Line variation – "High line" and full load (175 Vac to 265 Vac)

CH1=Vac, CH2=V_{OUT}, CH3=I_{IN}, CH4= GD/ZCD pin#5

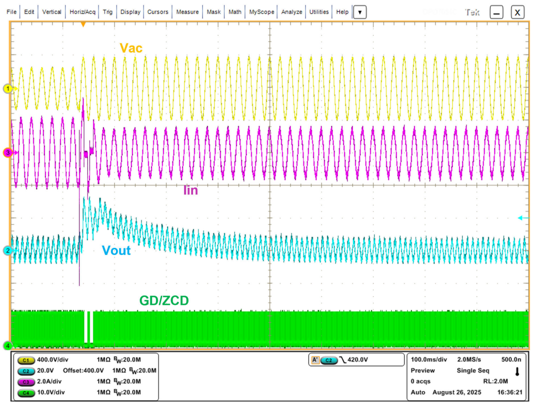


Figure 56. Line variation – "High line" and full load (265 Vac to 175 Vac)

CH1=Vac, CH2=V_{OUT}, CH3=I_{IN}, CH4= GD/ZCD pin#5

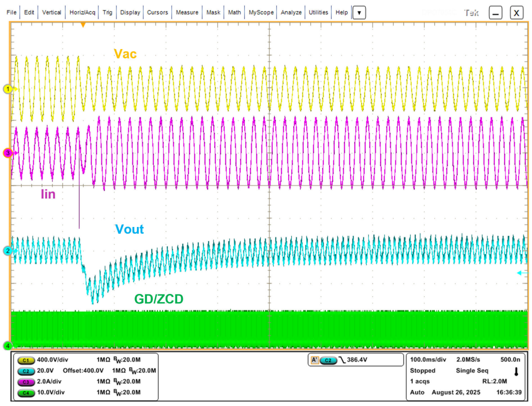


Figure 57. **Line variation – “High line” and 10% load (175 Vac to 265 Vac)**

CH1=Vac, CH2=V_{OUT}, CH3=I_{IN}, CH4= GD/ZCD pin#5

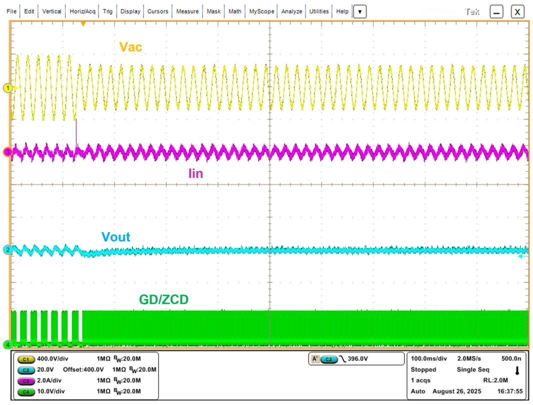
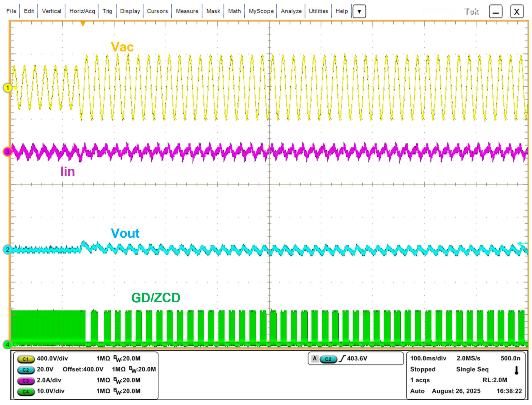


Figure 58. **Line variation – “High line” and 10% load (265 Vac to 175 Vac)**

CH1=Vac, CH2=V_{OUT}, CH3=I_{IN}, CH4= GD/ZCD pin#5



3 Thermal results

In order to verify design reliability, thermal mapping was performed using an IR camera.

Figure 59 to Figure 64 show thermal measurements of the on-board components at nominal input voltages and full load. Some markers visible on the pictures placed across key components show the relevant temperature. The ambient temperature during measurements was 25°C.

Figure 59. **Thermal measurements at 100 Vac - full load (top side)**

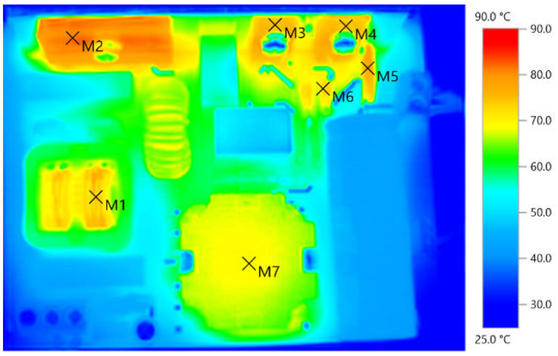


Figure 60. **Thermal measurements at 100 Vac - full load (bottom side)**

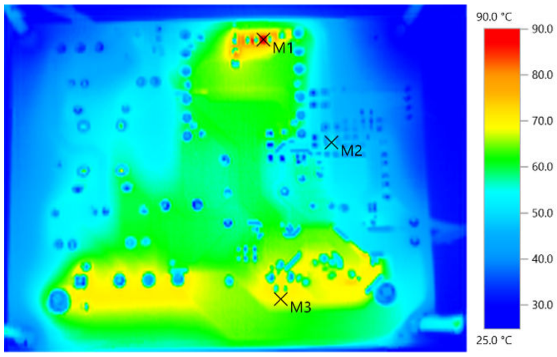


Figure 61. **Thermal measurements at 115 Vac - full load (top side)**

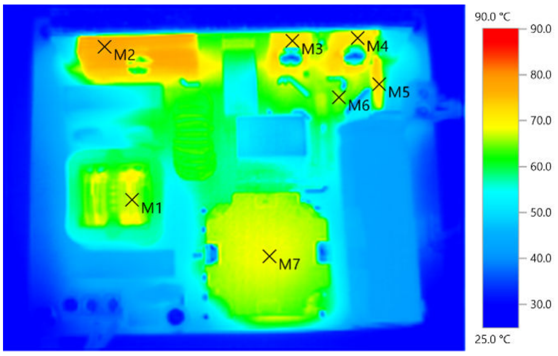


Figure 62. **Thermal measurements at 115 Vac - full load (bottom side)**

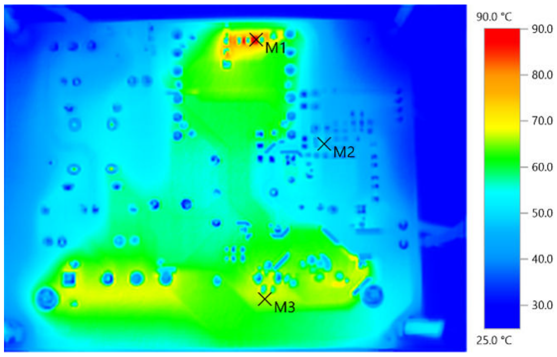


Figure 63. **Thermal measurements at 230 Vac - full load (top side)**

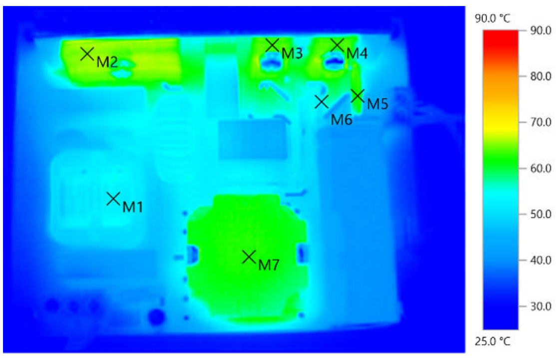


Figure 64. **Thermal measurements at 230 Vac - full load (bottom side)**

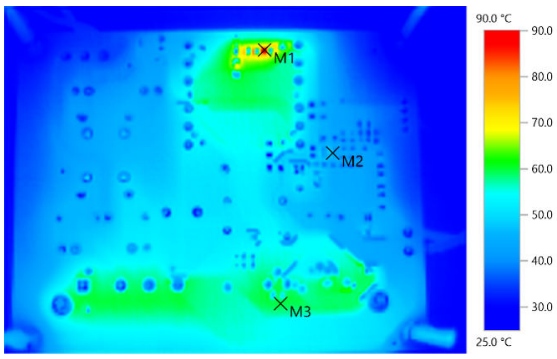


Table 2 and Table 3 provide the correlation between the measured points and components for both thermal maps.

Table 2. Measured temperature - PCB top side

Point	Part no.	Component	Temperature (°C) at 100 Vac	Temperature (°C) at 115 Vac	Temperature (°C) at 230 Vac
M1	L1	Input common choke	73.8	67.4	52.5
M2	D1	Bridge diode	81.5	77.2	65.3
M3	Q1	Power switch	74.9	71.7	63.5
M4	D3	Output diode	74.0	71.5	63.4
M5	R1	NTC resistor	76.3	72.1	61.9
M6	R2,R3	Current sense resistors	72.0	65.8	52.5
M7	L3	Boost inductor	69.1	57.9	63.3

Table 3. Measured temperature - PCB bottom side

Point	Part no.	Component	Temperature (°C) at 100 Vac	Temperature (°C) at 115 Vac	Temperature (°C) at 230 Vac
M1	R7	Auxiliary supply resistor	95.4	99.2	91.4
M2	U1	IC controller (L6462A)	51.0	49.7	46.1
M3		Copper PCB	69.3	66.5	59.5

4 Conducted EMI emissions

Figure 65 and Figure 66 show the measurements of the conducted noise at full load and nominal mains voltages, with the “quasi-peak” (QP) and “average” (AV) setup. The limits shown in the diagrams relate to EN55022 Class-B, which is the most common standard for European equipment using a two-wire mains connection.

Figure 65. Conducted EMI - full load at 115 Vac

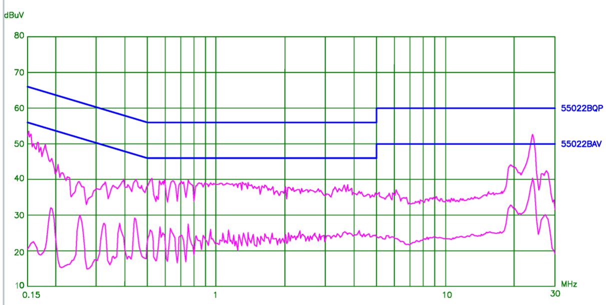
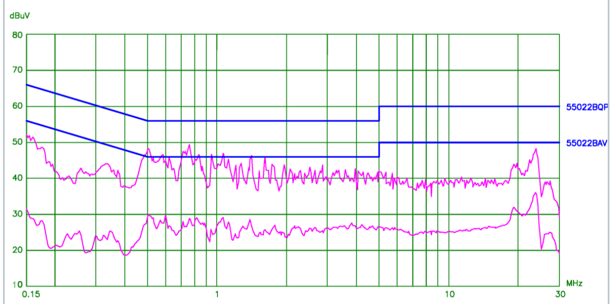


Figure 66. Conducted EMI - full load at 230 Vac



5 Boost inductor specification

The main characteristics of the boost inductor are:

- Core type: QP2925 - 3C95
- Coil former: Vertical type, 8 pins
- Ferrite grounding: grounded by two clamps fixed to core and soldered to PCB
- Min. operating frequency: 40 kHz
- Primary inductance (pin 1,2 – 3,4): 210 μH ±10%
- Maximum primary peak current: 9.6 A
- Maximum primary rms current: 3.9 A
- Maximum temperature rise: 45°C
- Maximum operating ambient temperature: 60°C

Figure 67. **Boost inductor – electrical diagram**

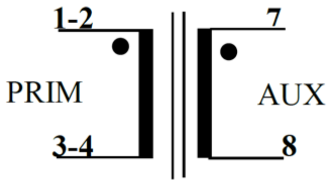
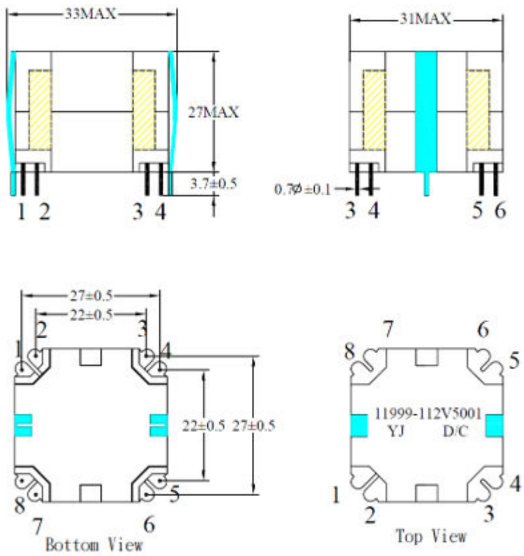


Table 4. **Boost inductor - winding characteristic**

Winding	Start pins	End pins	Number of turns
1,2 - 3,4	1,2	3,4	40
7 - 8	7	8	4

Figure 68. **Boost inductor – mechanical drawing**



6 Bill of materials

Table 5. EVL6462A-250W-M - Bill of material

Reference	Value	Description	Package	Manufacturer	Part number
C1, C2	470nF	Polypropylene, 275Vac	Radial p.22.5mm	Würth Elektronik	890324026014
C1A, C2A	NM		Radial p.15mm		
C3, C4	2.2nF	Y1 safety	Radial p.10mm	Murata	DE1E3KX222MN4AP01F
C5	470nF	Polyprop. film, 520Vdc	Radial p.15	Epcos	B32672Z5474K000
C6	1uF	Polyprop. film, 520Vdc	Radial p.15	Epcos	B32672Z5105K000
C7	180uF	Electrolytic, 450V	Radial p.7.5mm	Rubycon	450BXW180MEFR18X50
C8	NM		SMD1206		
C9	NM		SMD0805		
C10	22uF	Electrolytic	Radial p.2.5mm	Nichicon	UVZ2A220MED
C11	470nF	Electrolytic	SMD1206	AVX	12061C474KAT2A
C12	220pF	MLCC, X7R	SMD0805	Kemet	C0805C221J5GACTU
C13	100nF	MLCC, X7R	SMD1206	TDK	CGA5H2X8R2A104K115
C14	100nF	MLCC, X7R	SMD0805	Kemet	C0805C104K5RACTU
C15	1.2uF	MLCC, X7R	SMD0805	Kemet	C0805C125K4RACTU
C16	1nF	MLCC, X7R	SMD0805	Kemet	C0805C102K5RACTU
C17	10nF	MLCC, X7R	SMD0805	Kemet	C0805C103K5RACTU
D1	600V/15A	Bridge rectifier	5S	Shindengen	D15XB60H
D2	600V/3A	Rectifier diode	DO-201A	Vishay	1N5406
D3	600V/5A	Ultrafast diode	TO-220FP	STMicroelectronics	STTH5L06FP
D4, D5, D6	100V/0.3A	Signal switching diode	SOD-323	onsemi	1N4148WS
DZ1	18V/0.5W	Signal Zener diode	Minimelf	Nxp	BZV55-C18
F1	330V/4A	Time-lag fuse	Radial p.7.5mm	Littelfuse	36914000000
HS1	-	Heat sink for D1, D3, Q1	DWG length 90mm	Tecnoal	2B-MEC-044
J1	-	PCB screw terminal - 3	p. 5.08mm	Weidmüller	1760500000
J2	-	PCB screw terminal - 2	p. 5.08mm	Weidmüller	1760510000
J3	-	PCB screw terminal - 4	p. 2.54mm	Molex	22-27-2041
JPX1, JPX2, JPX3, JPX4	Short	Isolated wire jumper			
L1	NM	CM Filter			
L1A	8mH/3.5A	CM Filter	DWG	Kemet	SSRH24NHS-35080

Reference	Value	Description	Package	Manufacturer	Part number
L2	100uH/6A	DM Filter	Radial p.8mm	Würth Elektronik	7447070
L3	NM				
L3A	210uH	PFC inductor	DWG QP2925V	Yujing	11999-112V500110
Q1	600V/99m	PFC switch	TO-220FP	STMicroelectronics	STF36N60M6
Q2	-	General purpose BJT	SOT23	onsemi	BC847C
R1	1R0	NTC thermistor, 3W	Radial p. 7.5mm	Epcos	B57237S0109M
R2	0R120	Metal film resistor, 1W	PTH	Stackpole	RSMF1JTR120
R3	0R100	Metal film resistor, 1W	PTH	Stackpole	RSMF1JTR100
R4	15R0	Resistor, 1/8W	SMD 0805	Yageo	RC0805FR-0715RL
R5	4R7	Resistor, 1/8W	SMD 0805	Multicomp	MC01W080514R7
R6	220k	Resistor, 1/8W	SMD 0805	Yageo	RC0805FR-07220KL
R7	220	Resistor, 1/4W	SMD 1206	Yageo	RC1206FR-07220RL
R8	0	Resistor, 1/4W	SMD 1206	Yageo	RC1206JR-070RL
R9	750	Resistor, 1/8W	SMD 0805	Yageo	RC0805FR-07750RL
R10	91k	Resistor, 1/8W	SMD 0805	Yageo	RC0805FR-0791KL
R11	100k	Resistor, 1/8W – 1%	SMD 0805	Yageo	RC0805FR-07100KL
R12	430k	Resistor, 1/8W – 1%	SMD 0805	Yageo	RC0805FR-07430KL
R13, R14, R15	4M3	Resistor, 1/4W - 1%	SMD 1206	Yageo	RC1206FR-074M3L
R16	1k	Resistor, 1/8W	SMD 0805	Yageo	RC0805FR-071KL
R17	10k	Resistor, 1/8W	SMD 0805	Yageo	RC0805FR-0710KL
R18, R19	NM	Resistor, 1/8W	SMD 0805		
RV1	300Vac	Varistor 300Vac	Radial p.7.5mm	Epcos	B72214S0301K101
U1	-	TM PFC controller	SOT23-6L	STMicroelectronics	L6462A
Z_PCB	-	Printed circuit board	88 x110 mm		EVL6462A-250W-M R1.0

NM=Not Mounted

7 References

[1] L6462A: “Current mode six-pin boost PFC controller” datasheet on www.st.com

Revision history

Table 6. **Document revision history**

Date	Version	Changes
07-Jan-2026	1	Initial release.

Contents

List of tables

List of figures