XDPL8221 100 W reference board engineering report

XDP™ digital power

Ordering code: REF-XDPL8221-U100W

About this document

Scope and purpose

This document contains the specification, schematic, Bill of Materials (BOM) and measurement results of the 100 W form-factor board as LED driver, using the Infineon XDPL8221 dual-stage multi-mode flyback + PFC combo controller.

Intended audience

This document is intended for anyone wishing to design high-performance dual-stage digital flyback AC-DC converters for LED lighting based on the PFC + flyback combo controller XDPL8221.

Table of contents

1 Introduction

The XDPL8221 100 W reference design is a digitally configurable LED driver that has a universal input of 90 to 305 V AC or V DC wide output load range of 16 to 48 V DC and isolated dimming interface (with CDM10VD). Please refer to the next page for the main design features of this board based on the XDPL8221 and CDM10VD.

Note: *The 100 W reference design is ready for evaluation without the need for any pre-programming by the user, as the XDPL8221 chip on the PCB has already been burned with the default full set of working configuration parameters. Please connect the AC input, LED output and dimming input as shown in **Figure 1**, for the test set-up. Once the XDPL8221 IC controller on the reference board is changed to a new one, the 100 W reference board parameters must be burned again because the default parameters in the XDPL8221 are for the 50 W reference board.*

Figure 1 XDPL8221 100 W reference board

2 Design features

The XDPL8221 100 W reference board as LED driver has the following design features:

- Dual-stage flyback and separated Power Factor Correction (PFC) with high-precision primary-side controlled Constant Voltage (CV), Constant Current (CC) and Limited Power (LP) output
- Excellent current accuracy of typically +/-2 percent across universal input voltage range (90 to 305 V AC or V DC) and wide output voltage range (from 16 V DC to 48 V DC)
- Integrated 600 V HV cell and PFC auxiliary winding charge pump power supply for fast start-up start time under 250 ms
- Flyback stage with multi-mode control (QR1 + DCM + ABM) enables high efficiency and low dimming output
- High Power Factor (PF more than 0.9) and low input current Total Harmonic Distortion (iTHD less than 15 percent) across universal input voltage range (90 to 305 V AC or V DC) and down to 30 percent load
- Low BOM
- Configurable dimming curve to either linear or quadratic (eye-adaptive)
- Configurable minimum dimming current down to 1 percent
- Intelligent thermal management with adaptive temperature protection
- Active bleeder for dim-to-off function
- UART command interface to control the operation of the LED driver as well as to read out the operating status information from the digital controller XDPL8221
- Output independent forward mode auxiliary power supply for an accurate primary-side regulation
- Isolated dimming interface with CDM10VD

Note: CDM10VD is a fully integrated 0 V to 10 V dimming interface IC from Infineon that transmits secondary auxiliary-side analog voltage-based signals from 0 V to 10 V dimmer to the primary side, by driving an external optocoupler with a 5 mA current-based PWM signal. For more details about CDM10VD, please visit the Infineon website: http://www.infineon.com/CDM10VD

3 Design specification

Table 1 and Table 2 list the electrical specification and system protections of this reference design.

Table 1 Electrical specification

Specification	Symbol	Value	Unit
AC input voltage range	V_{IN_AC}	90 to 305	V AC
DC input voltage range	V_{IN_DC}	90 to 305	V DC
Output LED load range (includes dimming) [1]	V_{LED}	16 to 48	V DC
Non-dimmed full output current setting[2]	I_{out_set}	2500	mA
Total line and load regulation tolerance	-	±2	%
Dimming input voltage range	V_{DIM}	0 to 10	V
PWM dimming frequency	f_{dim}	500 to 1500	Hz
Minimum output current setting[2]	$I_{out\_dim\_min}$	25	mA
Output current dimming curve[2]	C_{dim}	Linear or quadratic	–
Efficiency (V_{out}: 48 V DC, I_{out}: 2.08 A, non-dimming)	η	Less than 89	%
Power factor (V_{in}: 120 to 277 V AC +/-10 percent, V_{out}: 29 to 48 V DC, more than 30 percent load)	PF	More than 0.9	–
Input current total harmonic distortion (V_{in}: 120 to 277 V AC +/-10 percent, V_{out}: 29 to 48 V DC, more than 30 percent load)	iTHD	Less than 15	%

[1] Configurable in XPDL8221

[2] Configurable in XPDL8221

Table 2 System protections

Protection	Symbol	Value	Unit
Nominal input over-voltage protection level[1]	V_{in_OV}	320	V AC
Nominal input under-voltage protection level[1]	V_{in_UV}	76	V AC
Nominal output over-voltage protection level[2]	V_{out_OV}	53	V DC
Nominal output over-current (average) protection level[2]	$I_{out\_max\_avg}$	2500	mA
IC internal over-temperature detection threshold[1]	$T_{critical}$	119	°C
Input over-voltage protection reaction[3]	$Reaction_{\_OVP\_Vin}$	Auto-restart	–
Input under-voltage protection reaction[3]	$Reaction_{\_UVP\_Vin}$	Auto-restart	–
Bus over-voltage protection level 2	$Reaction_{\_OVP2\_Vbus}$	Auto-restart	–
Primary over-current protection level 2	$Reaction_{\_OCP2}$	Auto-restart	–
Output over-voltage (output open) protection reaction[3]	$Reaction_{\_OVP\_Vout}$	Auto-restart	–
Output under-voltage (output short) protection reaction[3]	$Reaction_{\_UVP\_Vout}$	Auto-restart	–
Output over-current (average) protection reaction[3]	$Reaction_{\_Iout\_max\_avg}$	Auto-restart	–
IC over-temperature protection reaction[3]	$Reaction_{\_TP}$	Auto-restart	–
Auto-restart idle time[4]	$t_{auto\_restart}$	1	s
Fast auto-restart idle time[5]	$t_{fast\_auto\_restart}$	400	ms

[1] Protection can be disabled and its level can be configured.
[2] Protection cannot be disabled and its level can be configured.
[3] Protection reaction can be configured as either auto-restart or latch mode.
[4] Auto-restart time can be configured.
[5] Fast auto-restart time can be configured.

4 Schematic and description

Figure 2 shows the complete schematic of the 100 W reference design.

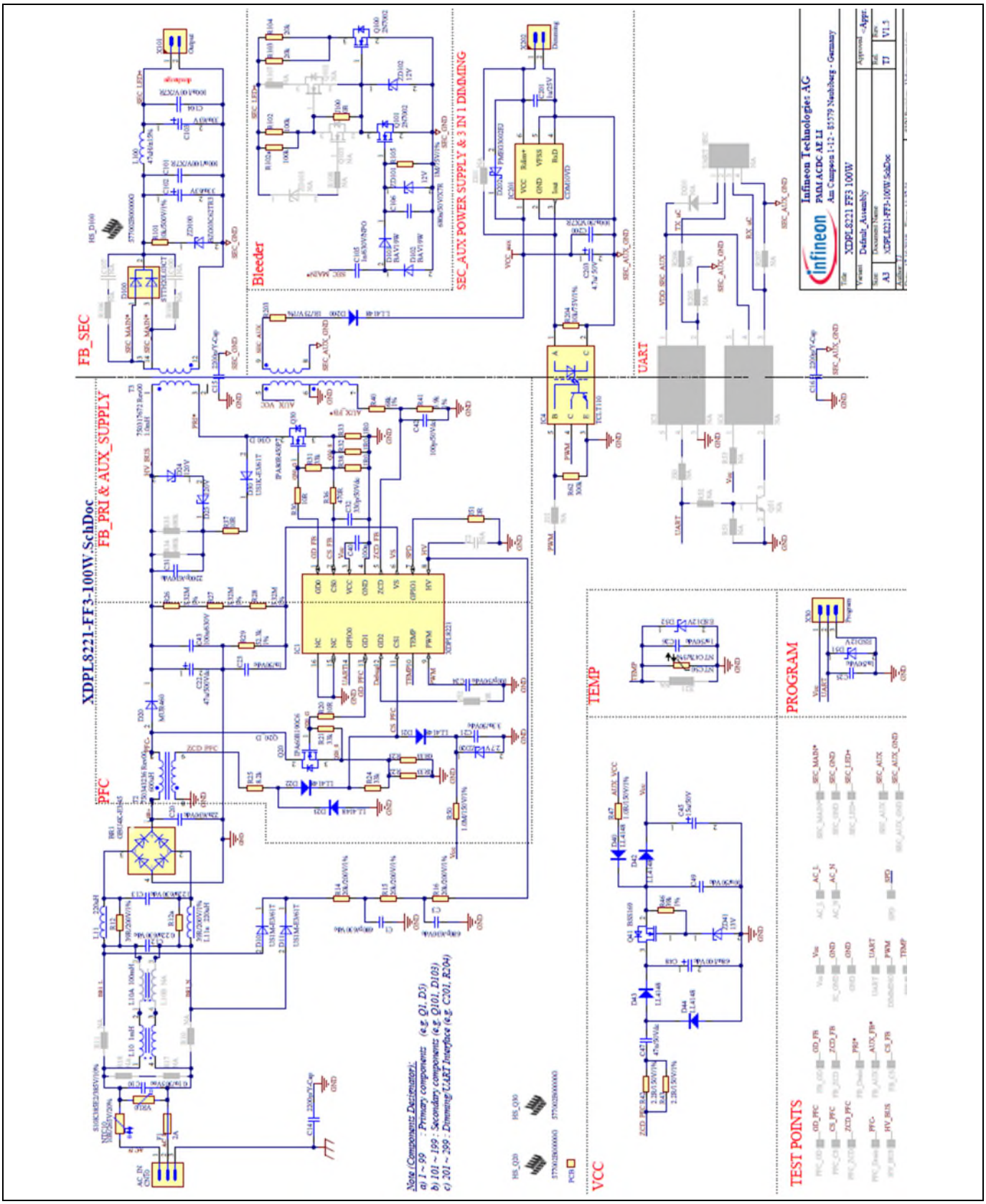


Figure 2 Schematic of the 100 W reference design

5 PCB layout

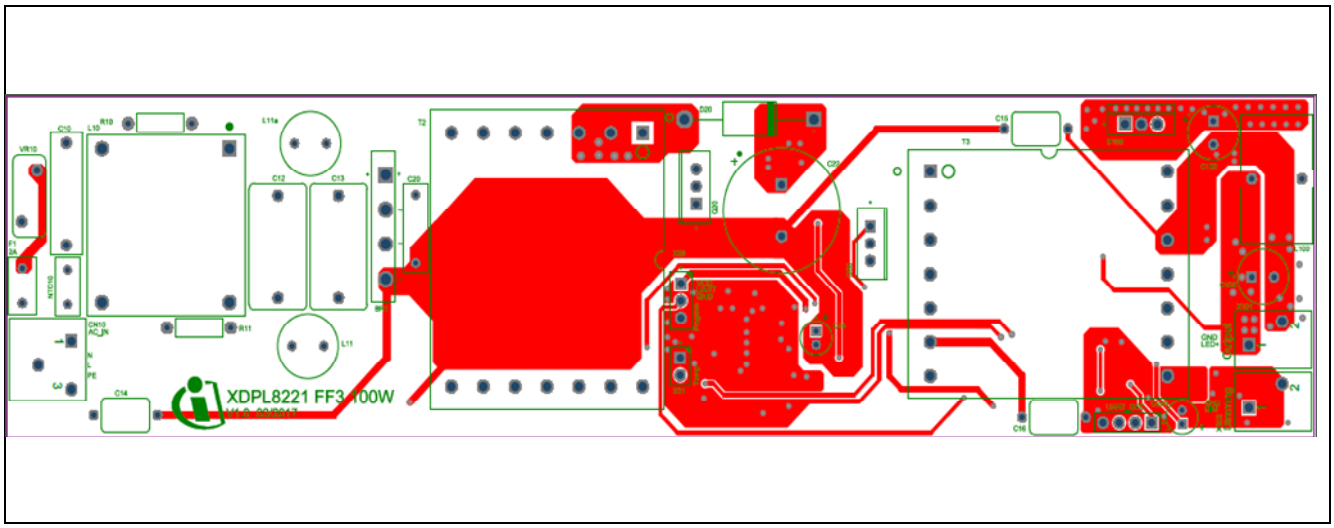


Figure 3 PCB top side

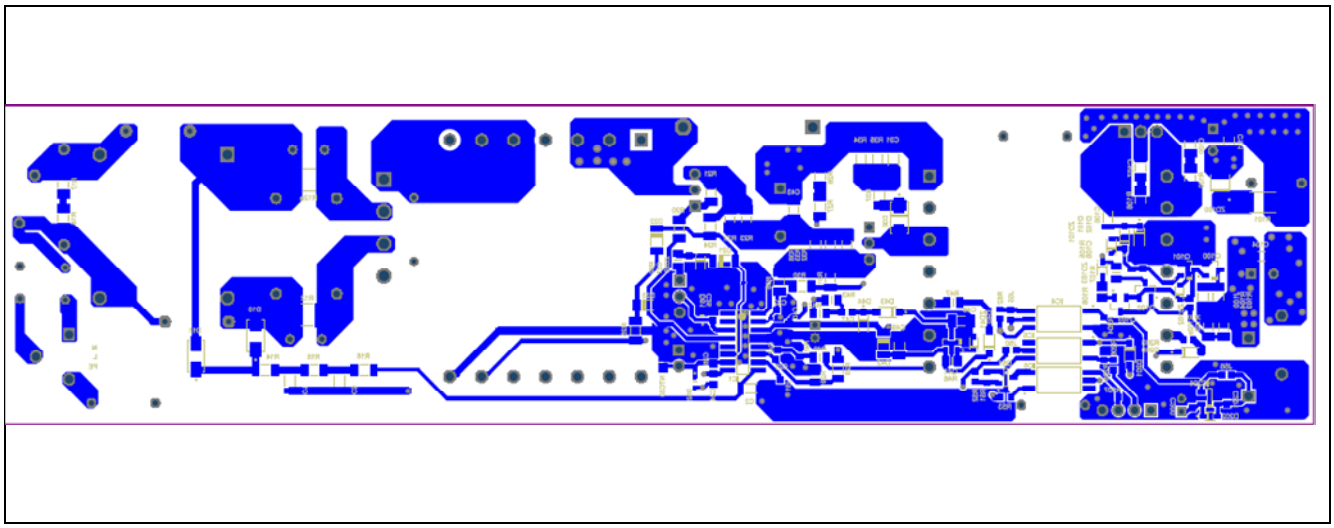


Figure 4 PCB bottom side

6 XDPL8221 100 W reference board measurement results

6.1 Operating window

The operating window of the XDPL8221 100 W reference board is measured with an electronic load V AC = 230 V/50 Hz at room temperature.

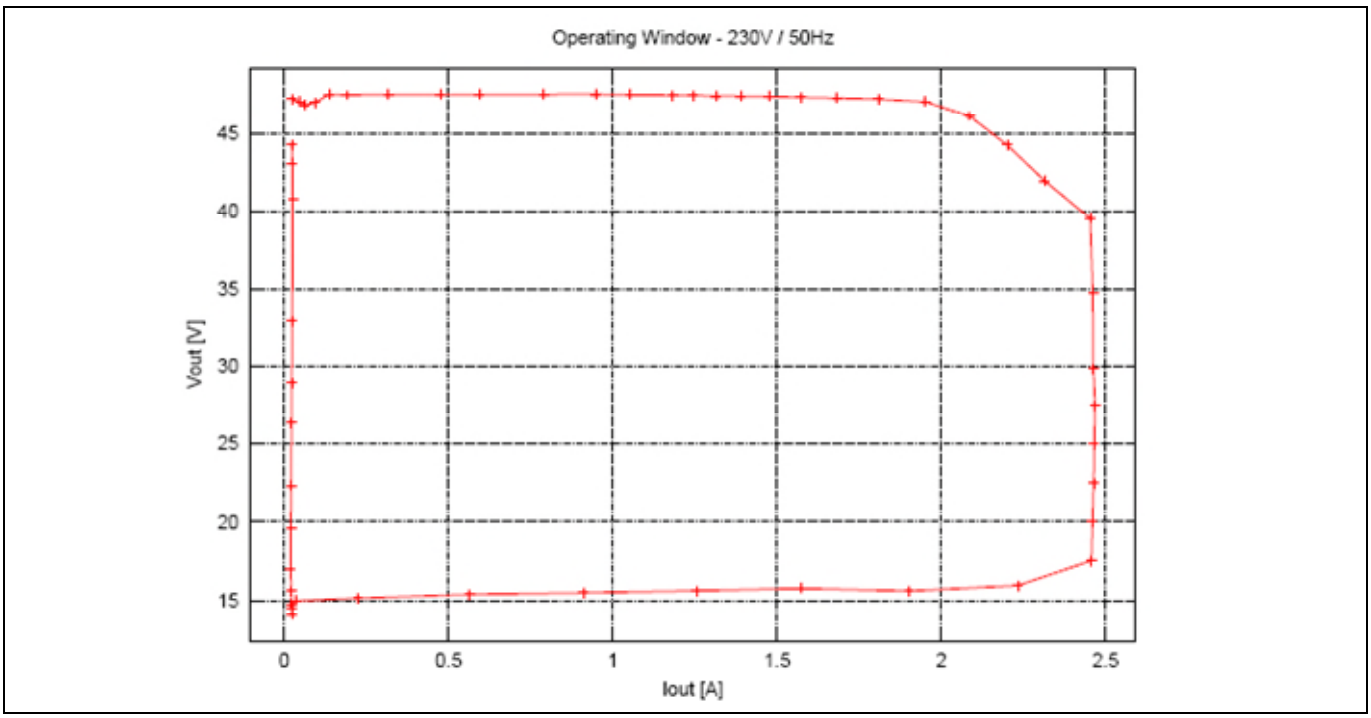


Figure 5 XDPL8221 100 W reference board operating window

6.2 Performance

Table 3 Measurement results with five LEDs

V_{IN} (V AC)	P_{IN} (W)	V_{OUT} (V)	I_{OUT} (A)	Ripple (PK) (mA)	PF	THD (%)	η (%)
120	52	16.83	2.49 (100 percent)	63.7	0.993	9.98	80.8
140	51.5	16.80	2.49	63.4	0.993	8.32	81.3
200	50.9	16.75	2.49	63.8	0.983	6.12	82.2
220	50.8	16.73	2.49	64.0	0.977	5.98	82.3
230	50.6	16.71	2.49 (100 percent)	64.3	0.973	5.8	82.4
240	50.6	16.69	2.49	64.0	0.969	5.83	82.36
264	50.4	16.67	2.49	64.4	0.956	5.1	82.7
277	50.34	16.65	2.49 (100	64.8	0.948	5.2	82.6

V_{IN} (V AC)	P_{IN} (W)	V_{OUT} (V)	I_{OUT} (A)	Ripple (PK) (mA)	PF	THD (%)	η (%)
			percent)				

Table 4 Measurement results with 10 LEDs

V_{IN} (V AC)	P_{IN} (W)	V_{OUT} (V)	I_{OUT} (A)	Ripple (PK) (mA)	PF	THD (%)	η (%)
120	95.9	32.72	2.49 (100 percent)	44.2	0.997	7.3	82.7
	47.3	30.8	1.25 (50 percent)	56.2	0.994	8.1	82.2
140	97.4	32.76	2.49	44.3	0.996	7.9	84.2
200	95.6	32.79	2.49	44.0	0.994	5.7	85.8
220	95.6	32.83	2.5	43.9	0.992	4.7	85.9
230	95.6	32.87	2.50 (100 percent)	43.5	0.991	4.6	86.1
	46.3	30.8	1.26 (50 percent)	59.3	0.967	6.2	84.1
240	95.5	32.95	2.50	43.8	0.990	4.5	86.2
264	95.6	33.01	2.50	43.6	0.986	4.6	86.5
277	95.9	33.16	2.50 (100 percent)	43.3	0.983	4.7	86.6
	46.3	30.7	1.27 (50 percent)	58.4	0.937	5.6	84.3

Table 5 Measurement results with 14 LEDs

V_{IN} (V AC)	P_{IN} (W)	V_{OUT} (V)	I_{OUT} (A)	Ripple (PK) (mA)	PF	THD (%)	η (%)
120	120.2	45.31	2.20 (100 percent)	42.8	0.997	6.8	83.9
	56.3	42.15	1.10 (50 percent)	55.9	0.993	9.8	82.9
	28.3	40.02	0.56 (25 percent)	26.3	0.987	11.1	80.2
140	117.8	45.15	2.20	42.7	0.996	7.4	84.8

200	114.9	45.02	2.21	42.9	0.995	5.5	86.7
220	114.5	44.87	2.22	43.1	0.994	5.3	87.1
230	114.3	44.82	2.22 (100 percent)	43.2	0.993	5.2	87.3
	54.9	42.23	1.10 (50 percent)	56.1	0.977	5.8	85.1
	27.9	40.07	0.56 (25 percent)	26.7	0.924	6.6	81.0 percent
240	114.2	44.73	2.22	43.1	0.992	5.2	87.3
265	114.0	44.69	2.23	43.1	0.989	4.4	87.5
277	113.7	44.63	2.23 (100 percent)	43.0	0.984	4.6	87.6
	54.3	42.26	1.12 (50 percent)	43.8	0.956	5.2	85.6
	27.0	39.21	0.57 (25 percent)	27.2	0.867	7.5	81.2

Note: Due to LP mode, the current is limited so that the output power does not exceed the defined 100 W.

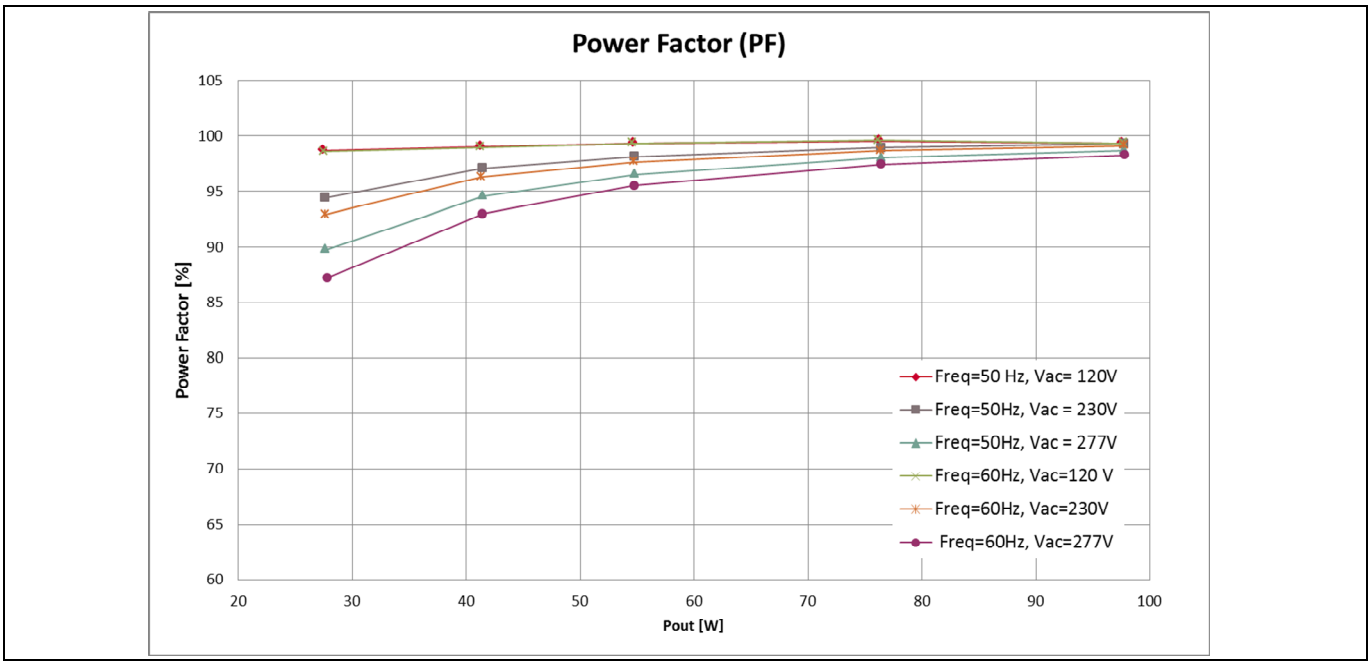


Figure 6 XDPL8221 100 W reference board power factor with 13 LEDs

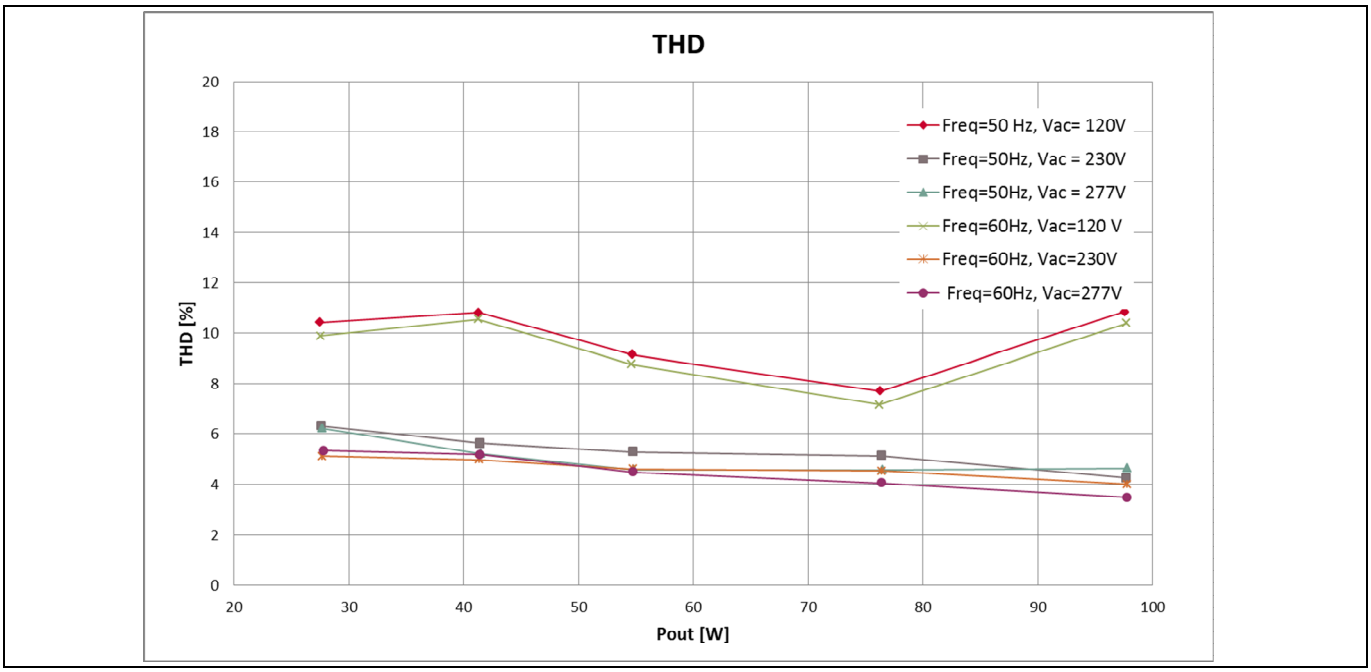


Figure 7 XDPL8221 100 W reference board THD with 13 LEDs

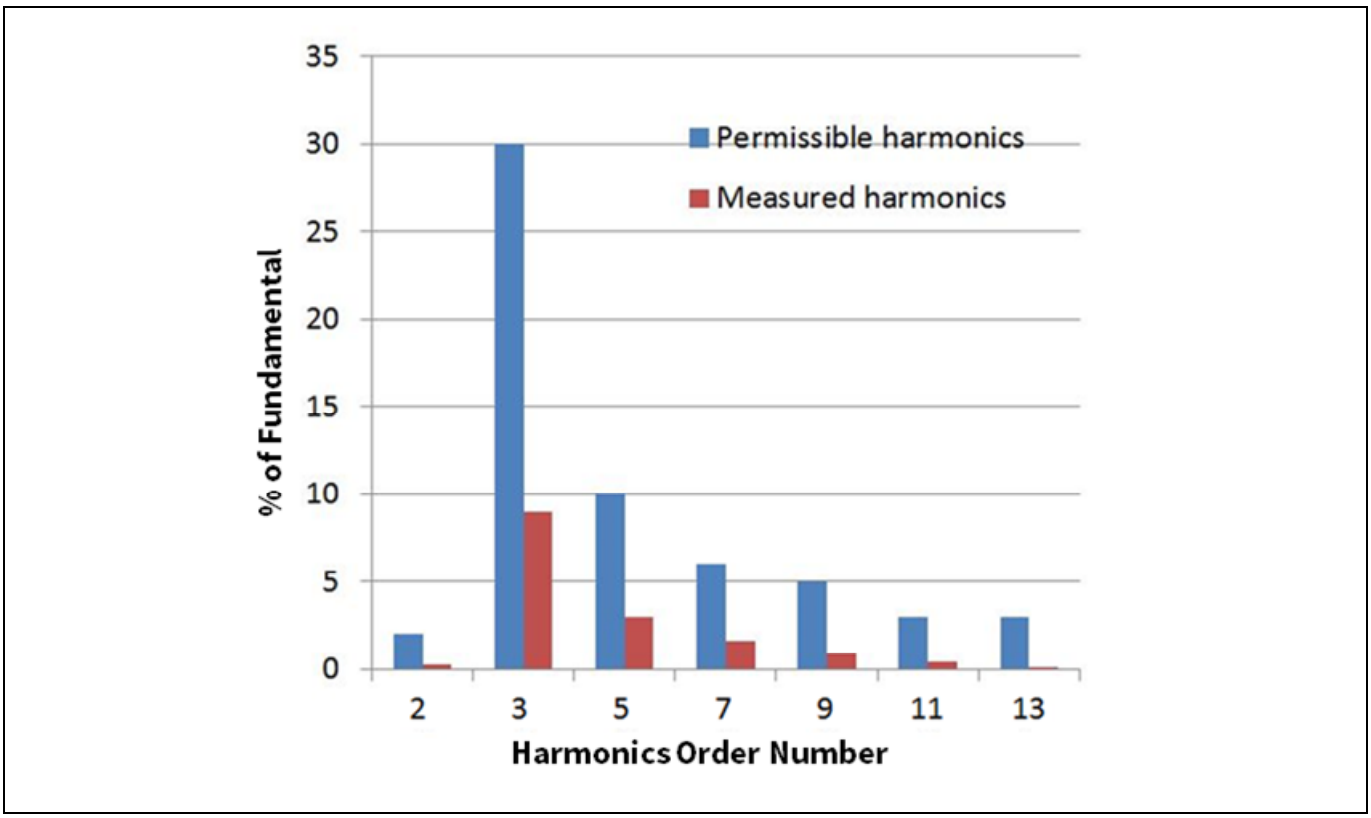


Figure 8 Line current harmonics V AC = 90 V/60 Hz, 100 percent dimming

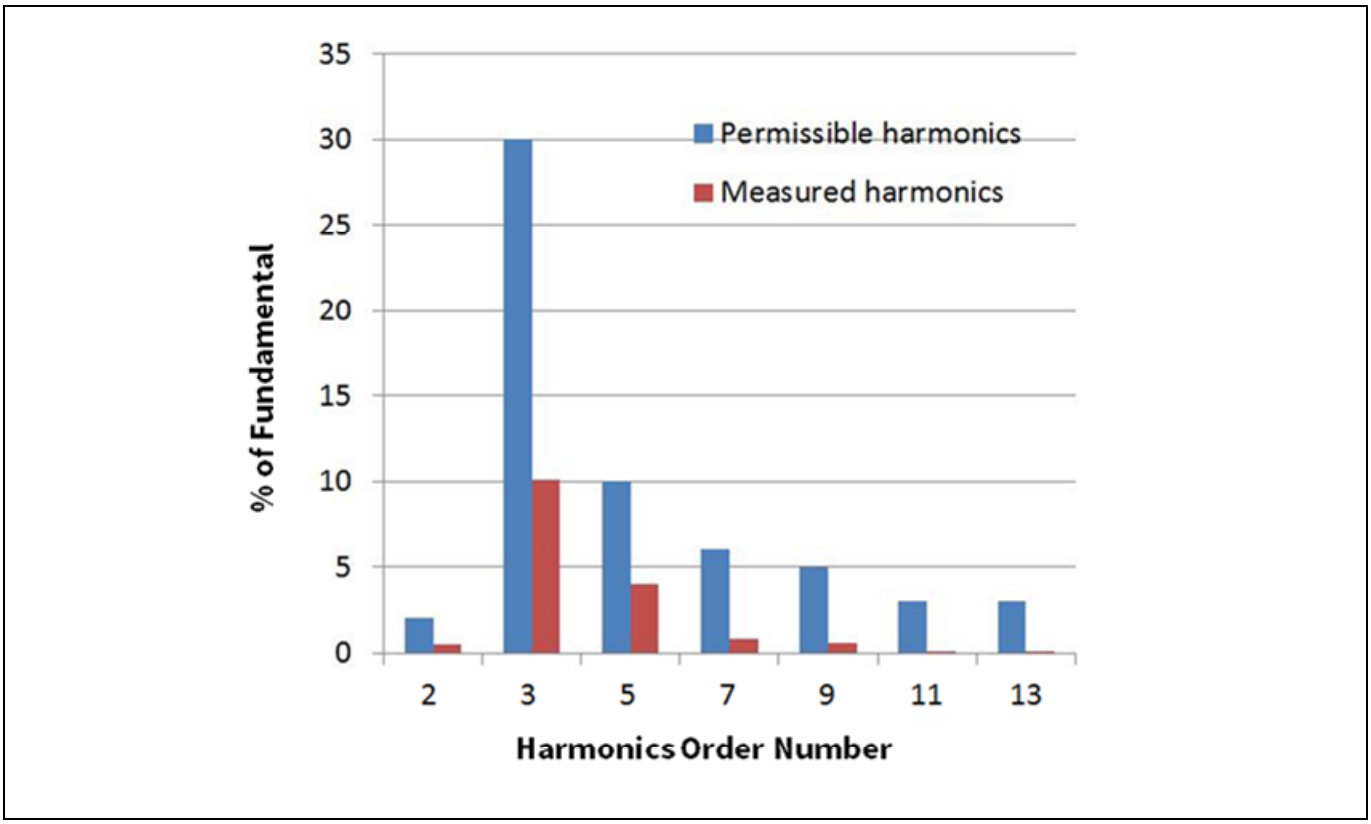


Figure 9 Line current harmonics V AC = 90 V/60 Hz, 30 percent dimming

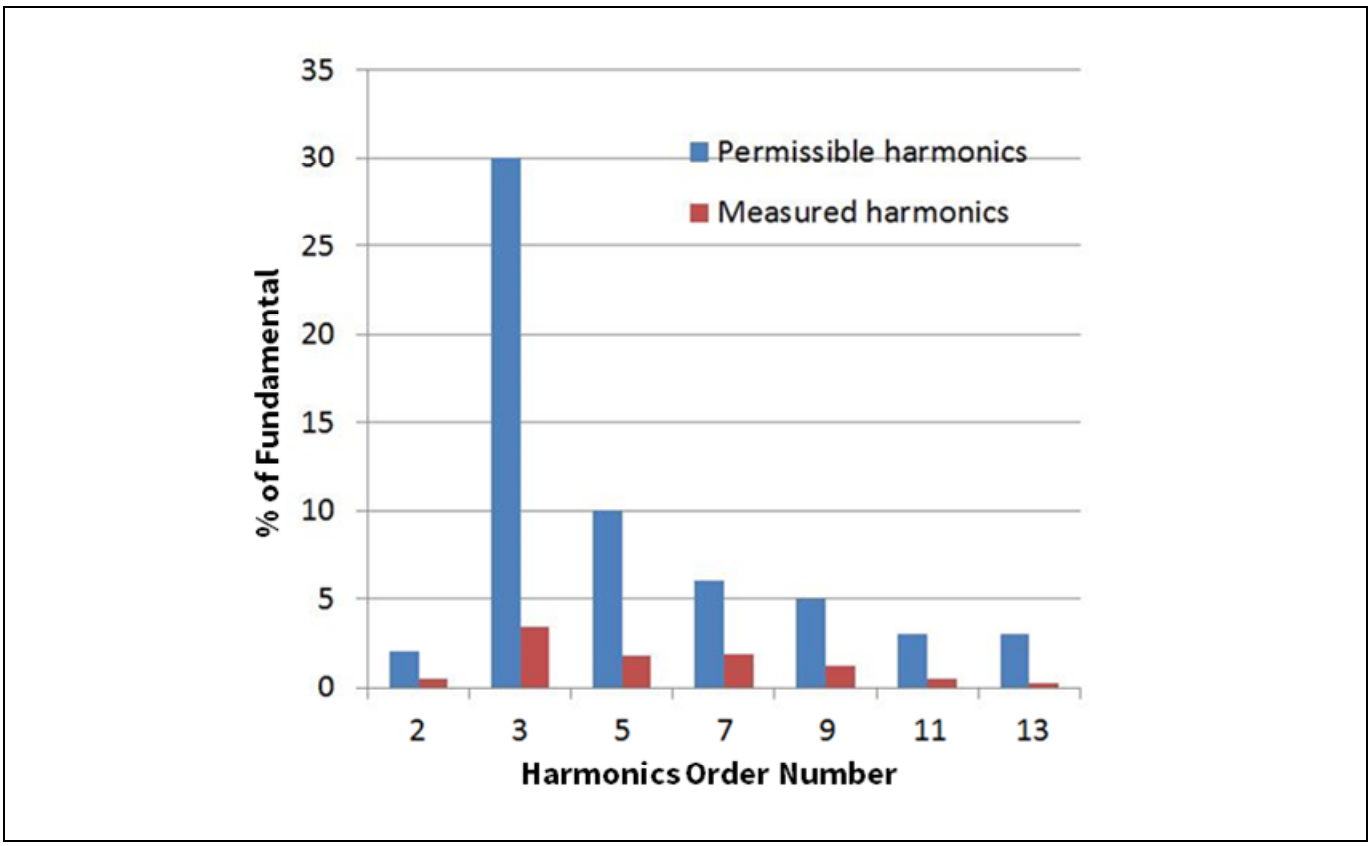


Figure 10 Line current harmonics V AC = 230 V/50 Hz, 100 percent dimming

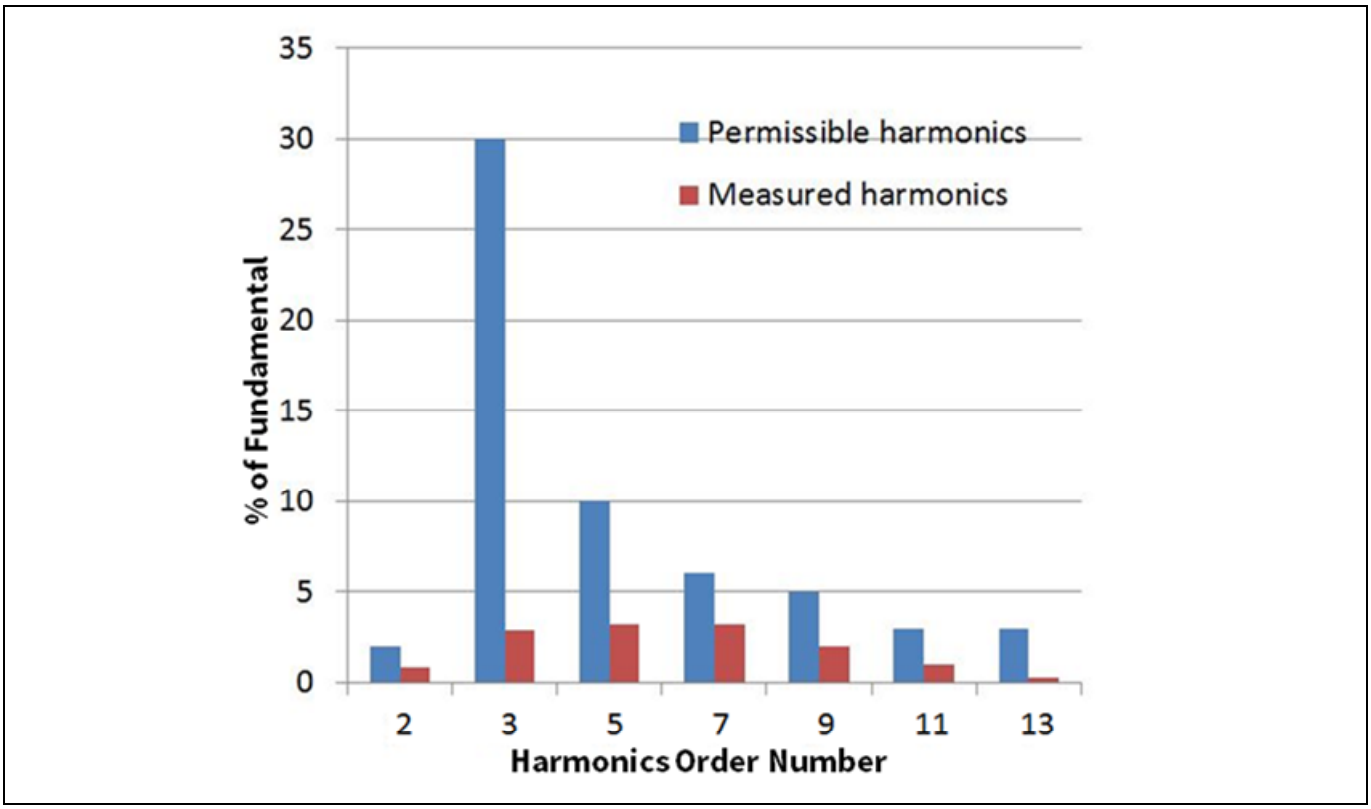


Figure 11 Line current harmonics V AC = 230 V/50 Hz, 30 percent dimming

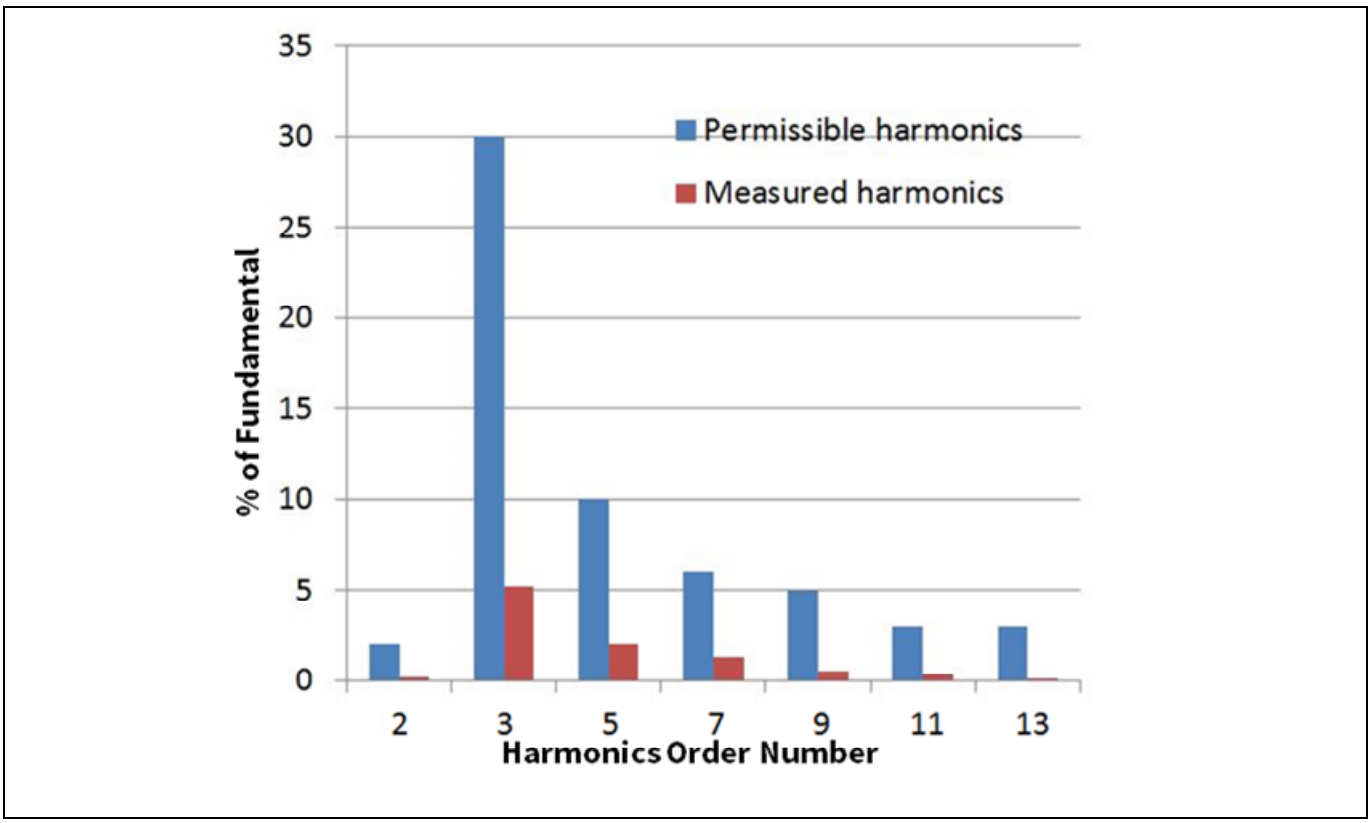


Figure 12 Line current harmonics V AC = 277 V/60 Hz, 100 percent dimming

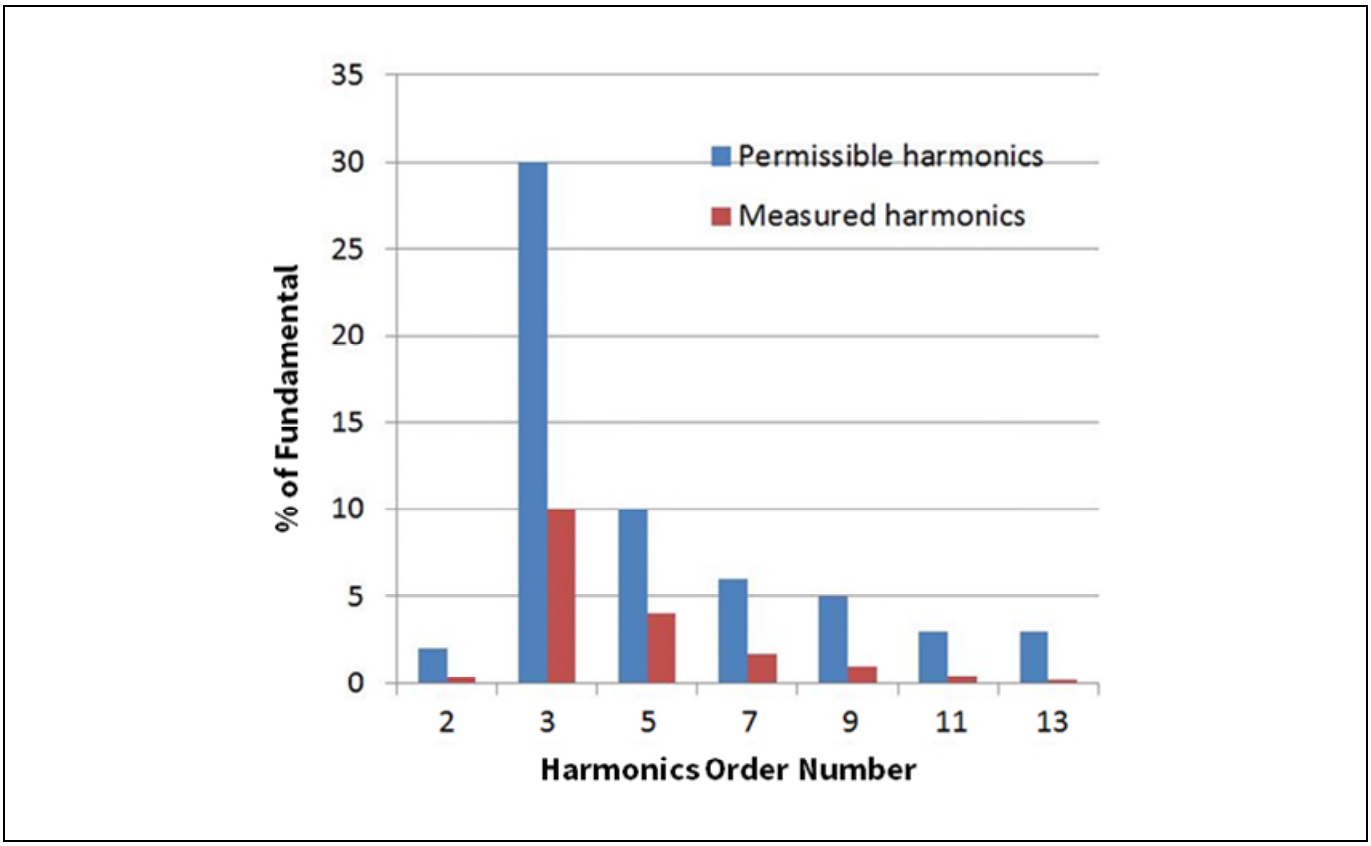


Figure 13 Line current harmonics V AC = 277 V/60 Hz, 30 percent dimming

6.3 0 V to 10 V linear dimming

This section provides measurement results for the 0 V to 10 V dimming feature. A linear curve was configured for this measurement using the .dp Vision Graphical User Interface (GUI). The measurement was done for an input voltage of 230 V AC, 50 Hz and an output load of 14 LEDs.

Table 6 Output current at different dimming voltages with 14 LEDs

V_{dim} (V)	**0.50**	**1.00**	**1.50**	**2.00**	**2.50**	**3.00**	**3.50**	**4.00**	**4.50**	**5.00**
I_o (A)	0.023	0.023	0.023	0.25	0.39	0.59	0.75	0.91	1.08	1.23
V_{dim} (V)	**5.50**	**6.00**	**6.50**	**7.00**	**7.50**	**8.00**	**8.50**	**9.00**	**9.50**	**10.00**
I_o (A)	1.37	1.53	1.67	1.80	1.93	2.07	2.19	2.21	2.21	2.21

Note: Due to LP mode, the current is limited so that the output power does not exceed the defined 100 W.

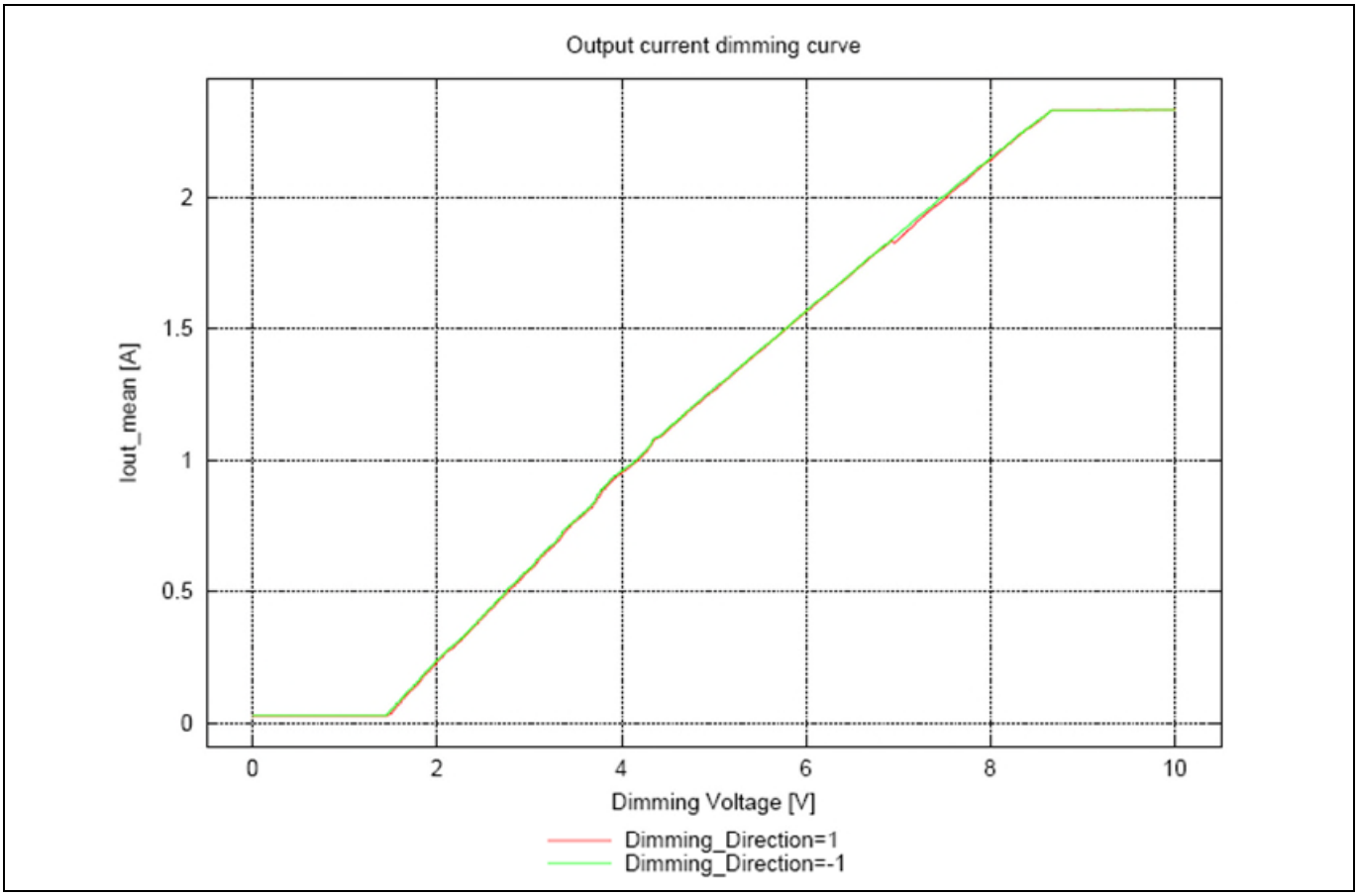


Figure 14 XDPL8221 100 W reference board linear dimming curve with V AC = 230 V/50 Hz, 13 LEDs

6.4 0 V to 10 V eye-adapted dimming

This section provides measurement results for the 0 V to 10 V dimming feature with an eye-adapted (quadratic) curve. The measurement was done for an input voltage of 230 V AC, 50 Hz and an output load of 14 LEDs (48 V at maximum limited current).

Table 7 Output current at different dimming voltages

V_{dim} (V)	**0.50**	**1.00**	**1.50**	**2.00**	**2.50**	**3.00**	**3.50**	**4.00**	**4.50**	**5.00**
I_o (A)	0.023	0.023	0.023	0.033	0.086	0.143	0.254	0.354	0.490	0.654
V_{dim} (V)	**5.50**	**6.00**	**6.50**	**7.00**	**7.50**	**8.00**	**8.50**	**9.00**	**9.50**	**10.00**
I_o (A)	0.831	1.02	1.23	1.42	1.67	1.90	2.17	2.21	2.21	2.21

Note: Due to LP mode, the current is limited so that the output power does not exceed the defined 100 W.

6.5 Time-to-light

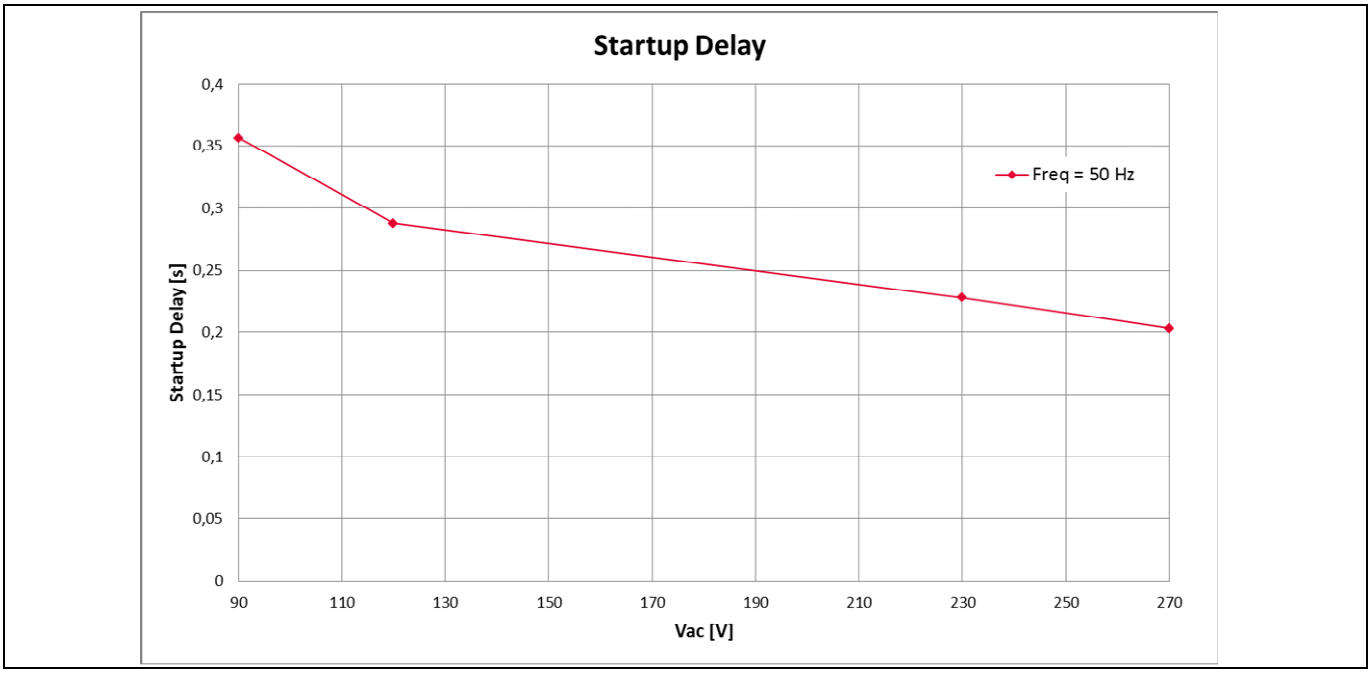


Figure 15 XDPL8221 100 W reference board time-to-light

6.6 Standby power consumption

The standby power consumption is measured including CDM10VD and bleeder.

Table 8 Standby power

Input	Dim-to-off	Output open
120 V AC	83 mW	182 mW
230 V AC	123 mW	192 mW
277 V AC	142 mW	240 mW

6.7 EMI performance

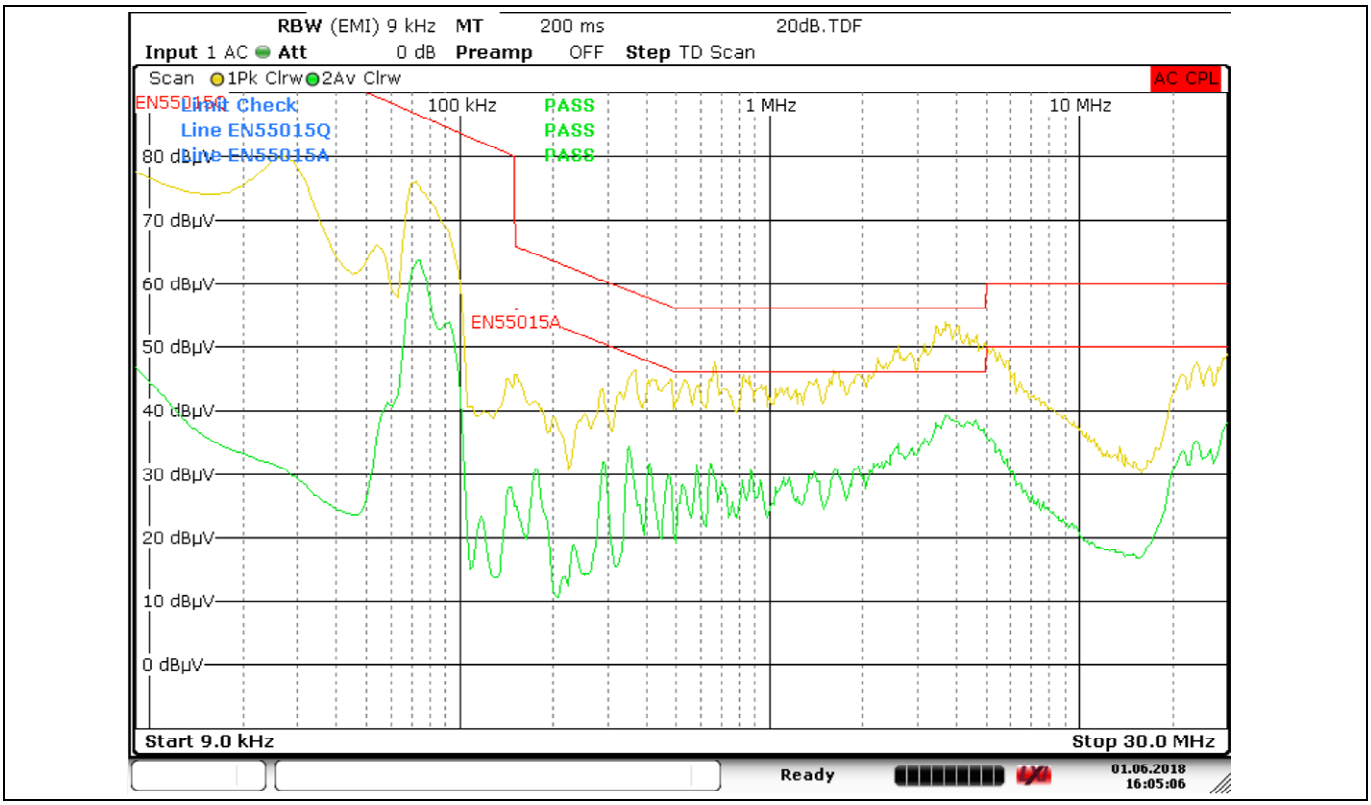


Figure 16 EMI measurement at 230 V AC with full load

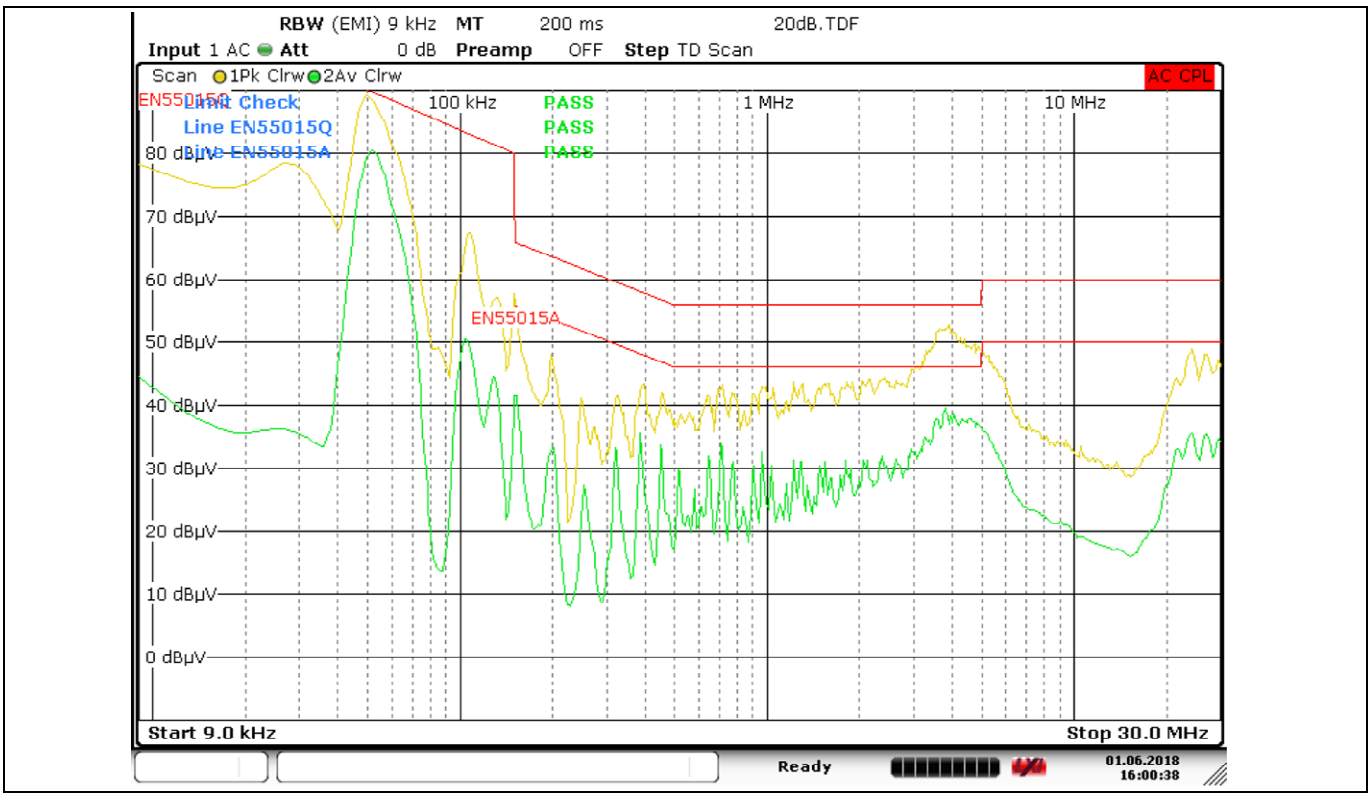


Figure 17 EMI measurement at 110 V AC with full load

7 Bill of Materials

Table 9 XDPL8221 100 W reference board BOM

Quan-tity	Designator	Value	Description	Manufacturer	Manufacturer Part number
1	BR1	GBU4K-E3/45	4 A, 800 V, SIP4	Diodes Inc.	GBU4K-E3/45
2	C1, C3	680 p	Cap-1206-680p/630V/5 percent/U2J	Murata	GRM31A7U2J681JW31D
1	C10	0.1 µ	EMI cap 100 n/305 V/X2/10 percent	TDK	B32922C3104K
2	C12, C13	0.22 µ	Metallized polyester film capacitor	Panasonic	ECQE6224JF
3	C14, C15, C16	2200 p/Y-cap	Y-cap 2200 pF/250 V/pitch 10	Murata	DE1E3KX222MA5B
1	C20	22 n	MKT, 22 nF/630 V/±10 percent, 15 mm, 4 x 12.5 mm	Vishay General Semiconductor	BFC237261223
1	C21	3.3 n	GCM series general-purpose monolithic ceramic capacitor for automotive	Murata	GCM188R71H332KA37#
1	C22	47 µ	Miniature aluminum electrolytic capacitor	Rubycon	500BXC47MEFC18X31.5
3	C23, C25, C26	1 n	GCM series general-purpose monolithic ceramic capacitor for automotive	Murata	GCM1885C1H102JA16#
2	C24, C42	100 p	GRM series general-purpose monolithic ceramic capacitor	Murata	GRM1885C1H101JA01#
1	C31	2200 p	Cap-1206-2200 p/630 V/10 percent/X7R	Murata	GRM31BR72J222KW01L
1	C32	330 p	GRM series general-purpose monolithic	Murata	GRM1885C1H331JA01#

Quan-tity	Designator	Value	Description	Manufacturer	Manufacturer Part number
			ceramic capacitor		
2	C40, C200	100 n	Cap-0603-100 n/50 V/0.1/X7R	AVX	06035C104K4Z2A
1	C43	0.10 µ	Cap-1210-100 n/630 V/10 percent/X7T	TDK	CGA6L1X7T2J104K160AC
1	C45	15 µ	Aluminum electrolytic capacitor, NHG series, type A, 15 µ, 50 V, pitch 2 mm	Panasonic	EEU-FC1H150
1	C47	47 n	GCM series general-purpose monolithic ceramic capacitor for automotive	Murata	GCM188R71H473KA55#
1	C48	68 µ	Aluminum electrolytic capacitor, UHE series	Nichicon	UHE2A680MPD1TD
1	C49	10 µ	Cap-1206-10 µ/50 V/10 percent/X5R	Murata	GRM31CR61H106KA12#
2	C101, C104	100 n	Cap-1206-100 n/100 V/0.1/X7R	TDK	C3216X7R2A104K160AA
2	C102, C103	33 µ	Al-Cap 33 µF/63 V/pitch 3.5/DxH8, 00 x 12.00 mm	Nichicon	RNU1J330MDN1KX
1	C105	1 n	Cap-1206-1 n/630 V/0.5/NPO	TDK	CGA5F4C0G2J102J085AA
1	C106	680 n	Cap-0603-680 n/50 V/0.1/X5R	TDK	C1608X5R1H684K080AB
1	C201	1 µ	Multi-layer ceramic chip capacitor, C series, commercial grade, general	TDK	C1608X7R1E105K080AB
1	C203	4.7 µ	Al-Cap 4.7 µF/50 V/pitch 2 mm	Panasonic	EEUFC1H4R7

Bill of Materials

Quantity	Designator	Value	Description	Manufacturer	Manufacturer Part number
1	CN10	691412120003MB	7.92 mm contact pitch, right-angle header	Würth Electronik	691412120003MB
2	D10, D11	US1M-E3/61T	Surface-mount ultra-fast rectifier 1.0 A/1000 V	Vishay General Semiconductor	
1	D20	MUR460	Ultra-fast switch-mode power rectifier 4.0 A/600 Vrrm	ON Semiconductor	MUR460G
8	D21, D22, D23, D40, D42, D43, D44, D200	LL4148	Small signal diode/100 V	Fairchild Semiconductor	LL4148
2	D24, D25	120 V	Zener voltage regulators/120 V	ON Semiconductor	1SMB5951BT3
1	D30	US1K-E3/61T	Ultra-fast diode 800 V/1.0 A/DO-214AC	Vishay General Semiconductor	US1K-E3/61T
2	D51, D52	PESD12VS1UB	Uni-directional ESD protection diode/12 V	NXP Semiconductors	PESD12VS1UB
1	D100	STTH20L03CT	Dual diode, TO220AB, 100 V, CC	ST	STTH20L03CT
2	D101, D102	BAV19W	Diode 100 V, 400 mA, SOD123	Diodes Inc.	BAV19W
1	D202	PMEG3002EJ	Schottky diode/30 V, 200 mA, SOD323	NXP Semiconductors	PMEG3002EJ
1	F1	2 A	Radial lead fuse rectangular – slow blow, 2 A, 250 V	Multicomp	MST 2A 250V
3	HS_D100, HS_Q20, HS_Q30	577002B00000G	Slim low-cost channel-style heatsink	Aavid Thermalloy	577002B00000G
1	IC1	XDPL8221	LED combo control IC for PFC and FB	Infineon Technologies	XDPL8221

Quan-tity	Designator	Value	Description	Manufacturer	Manufacturer Part number
			conversion		
1	IC4	TCLT110	Optocoupler, phototransistor output, CTR 100 percent – 200 percent at 10 mA (operating temp. -55°C to 100°C)	Vishay General Semiconductor	TCLT1103
1	IC201	CDM10VD	Dimming interface IC SOT-23-6	Infineon Technologies	CDM10VD-3
2	J51, J100	0 R	0 R/50 V	Bourns JW Miller	CR0603-J/-000ELF
1	L10	1 mH	WE-CMB common mode power line choke, type XS, 1 mH	'Wurth Elektronik	'744821201
1	L10A	100 mH	WE-FCL common mode power line choke, size ET35, 100/100 mH, 1.25 A	Würth Elektronik	744866104
2	L11, L11a	220 µH	IND 220 µH, 1.6 ARMS, 0R26, pitch 5 mm, 13 x 10 x 15 mm	Würth Elektronik	7447480221
1	L100	47 µH	Tor choke 47 µH/3.6 A/15 percent, vertical	Bourns JW Miller	2109-V-RC
1	NTC10	10 R	10 R/265 V/20 percent	Epcos	B57235S0100M0
1	NTC50	NTC47 k	NTC47k/5 percent/0805	Epcos	B57471V2473J062
1	PCB	PCB	PCB, 205 x 50 mm^2, 2 layer, 35 µm, FR4, 1.55 mm standard, solder-mask green both sides, silk-screen white both sides		
1	Q20	IPA60R190C6	CoolMOS™ C6, 650 V, 0.19 Ω, TO220FP	Infineon Technologies	IPA60R190C6

Bill of Materials

Quantity	Designator	Value	Description	Manufacturer	Manufacturer Part number
1	Q30	IPA80R450P7	CoolMOS™ P7, 800 V, 0.45 Ω, TO220FP	Infineon Technologies	IPA80R450P7
1	Q41	BSS169	MOSFET N-Ch, 100 V, 90 mA, 12 Ω, SOT-23	Infineon Technologies	BSS169
2	Q100, Q101	2N7002	OptiMOS™ transistor 60 V, 3 Ω, 300 mA, SOT-23	Infineon Technologies	2N7002
2	R12, R12a	39 R	39 R/200 V/1 percent	TE Connectivity	352039RJT
5	R14, R15, R16, R103, R104	20 k	20 k/200 V/1 percent	Vishay General Semiconductor	CRCW120620K0FKEA
3	R20, R30, R37	10 R	10 R/200 V/1 percent	Vishay General Semiconductor	CRCW120610R0FKEA
3	R21, R24, R31	33 k	33 k/200 V/1 percent	Vishay General Semiconductor	CRCW120633K0FKEA
2	R22, R23	0R33	0.33/675 mV/1 percent	Bourns JW Miller	CRM1206-FX-R330 E LF
1	R25	8.2 k	8.2 k/200 V/1 percent	Vishay General Semiconductor	CRCW12068K20FKEA
3	R26, R27, R28	3.32 M	3.32 M/200 V/1 percent	Vishay General Semiconductor	CRCW12063M32FKEA
1	R29	52.3 k	52.3 k/150 V/1 percent	Panasonic	ERJP06F5232V
3	R32, R33, R38	1R0	1.0 R/200 V/1 percent	Vishay General Semiconductor	CRCW12061R00FKEA
1	R36	470 R	470 R/200 V/1 percent	Vishay General Semiconductor	CRCW1206470RFKEA
1	R40	68 k	68 k/150 V/1 percent	Vishay General Semiconductor	CRCW080568K0FKEA
1	R41	3.9 k	3.9 k/75 V/1 percent	Vishay General Semiconductor	CRCW06033K90FKEA

Bill of Materials

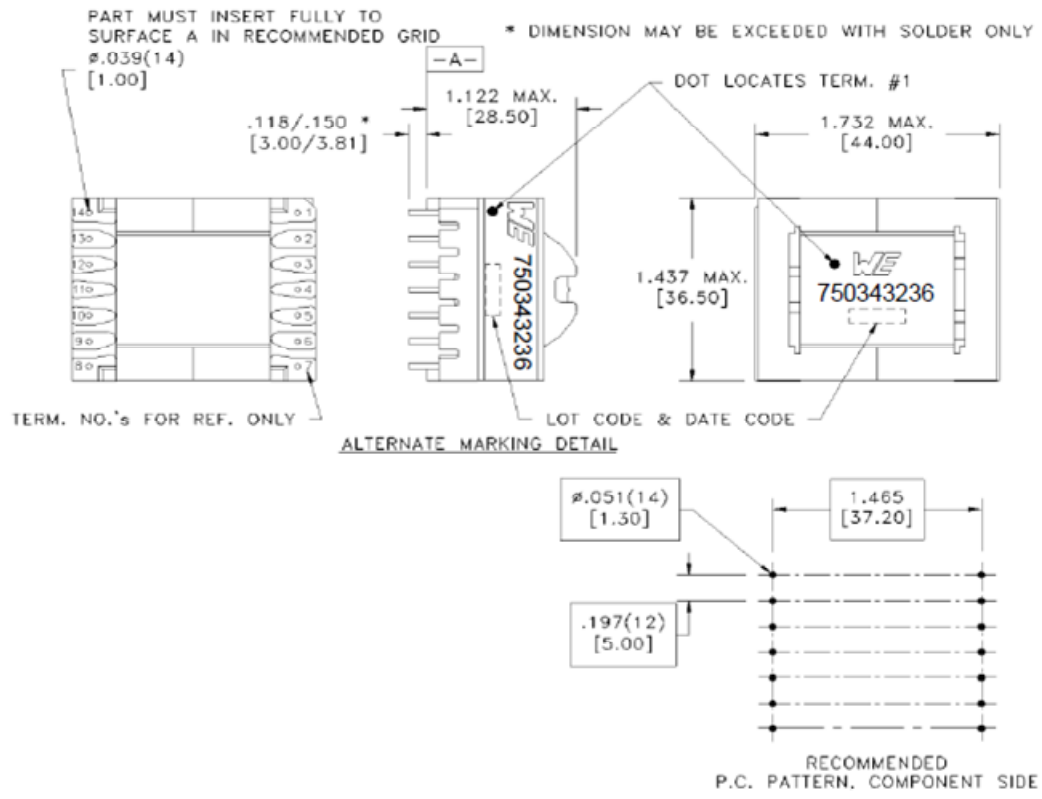
Quan-tity	Designator	Value	Description	Manufacturer	Manufacturer Part number
2	R42, R43	2.2 R	2.2 R/150 V/1 percent	Vishay General Semiconductor	CRCW08052R20FKEA
1	R46	39 k	39 k/150 V/1 percent	Vishay General Semiconductor	CRCW080539K0FKEA
1	R47	1.0 R	1.0 R/150 V/1 percent	Vishay General Semiconductor	CRCW08051R00FKEA
1	R50	1.0 M	1.0 M/150 V/1 percent	Vishay General Semiconductor	CRCW08051M00FKEA
1	R62	300 k	300 k/75 V/1 percent	Vishay General Semiconductor	CRCW0603300KFKED
1	R101	10 k	10 k/500 V/1 percent	Vishay General Semiconductor	CRCW251210K0FKEG
2	R102, R102a	100 k	100 k/200 V/1 percent	Vishay General Semiconductor	CRCW1206100KFKEA
1	R105	1 M	1 M/75 V/1 percent	Yageo/Phycomp	RC0603FR-071ML
1	R203	1 R	1 R/75 V/1 percent	Vishay General Semiconductor	CRCW06031R00FKED
1	R204	10 k	10 k/75 V/1 percent	Yageo/Phycomp	RC0603FR-0710KL
1	T2	600 µH	ERL35, 14-pin 1600 µH, 1.16 A, N87, Gab 0.4 mm	Würth Electronik	750343236 Rev00
1	T3	1.0 mH	ERL35, 14-pin, N87, 1000 µH, 3.2 A	Würth Electronik	750317672 Rev00
1	VR10	S10K385E2K1	S10K385E2K1/385 V/10 percent	Epcos	B72210S0381K101
1	X30	HTSW-103-07-G-S	Through-hole .025" SQ post header, 2.54 mm pitch, 3-pin, vertical, single row	Samtec	HTSW-103-07-G-S

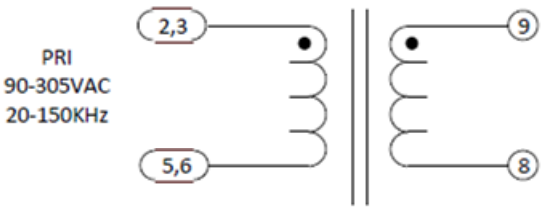
Quan-tity	Designator	Value	Description	Manufacturer	Manufacturer Part number
2	X101, X202	691412120002MB	Through-hole shrouded header, top entry, vertical, 2.5 mm pitch, 2-pin, single row, white	Würth Electronik	691412120002MB
1	ZD20	BZX384-C2V7	Zener diode/2.7 V/SOD-323	NXP	BZX384-C2V7
1	ZD41	BZX384-C13	Zener diode/13 V/SOD-323	NXP	BZX384-C13
1	ZD100	BZG03C62TR3	Zener diode/62 V/SMA	Vishay General Semiconductor	BZG03C62TR3
2	ZD101, ZD102	BZX384-C12	Zener diode/12 V/SOD-323	NXP	BZX384-C12
0	AC_L, AC_N, DIMMING, FB_AUX, FB_CS, FB_Drain, FB_ZCD, GND, HV_BUS, IC_GND, PFC_CS, PFC_Drain, PFC_GD, PFC_ZCD, SEC_AUX, SEC_AUX_GND, SEC_GND, SEC_LED+, SEC_MAIN*, SPD, TEMP, UART, Vcc	TP SMD	Test pad not assembled		
0	C2	–	Cap-1206-470 p/630 V/5 percent/C0G	TDK	C3216C0G2J471J085AA
0	C100, C107	–	Cap-1206-1 n/100 V/0.1/X7R	AVX	12061C102KAT2A
0	D201	–	Small signal	Fairchild	LL4148

Quan-tity	Designator	Value	Description	Manufacturer	Manufacturer Part number
			diode/100 V	Semiconductor	
0	FB_GD	TP SMD	Test pad not assembled		
0	IC5, IC6	–	Optocoupler, phototransistor output, CTR 100 percent – 200 percent at 10 mA (operating temp. -55°C to 100°C)	Vishay General Semiconductor	TCLT1103
0	J50, J55, J201	–	0 R/50 V	Bourns JW Miller	CR0603-J/-000ELF
0	J52	0 R	0 R/50 V	Bourns JW Miller	CR0603-J/-000ELF
0	L10B	–	Power line choke	Epcos	
0	Q51	–	NPN silicon AF transistor	Nexperia	BC847C,215
0	Q102, Q103	–	OptiMOS™ transistor 60 V, 3 Ω, 300 mA, SOT-23	Infineon Technologies	2N7002
0	R10, R11	–	510 k/350 V/5 percent	Welwyn Components Limited	MFP1-510KJI
0	R17, R18	–	1 M/200 V/1 percent	Yageo/Phycomp	RC1206FR-071M0L
0	R34, R35	680 k	680 k/200 V/1 percent	Vishay General Semiconductor	CRCW1206680KFKEA
0	R51, R52, R53, R205, R206, R207	–	10 k/75 V/1 percent	Yageo/Phycomp	RC0603FR-0710KL
0	R100, R106	–	47 R/200 V/1 percent	Yageo/Phycomp	RC1206FR-0747RL
0	R107, R108	–	100 k/150 V/1 percent	Vishay General Semiconductor	CRCW0805100KFKEA

Quantity	Designator	Value	Description	Manufacturer	Manufacturer Part number
0	UART_SEC	–	Through-hole .025" SQ post header, hi-temp strip, 2.54 mm pitch, 4-pin, vertical, single row	Samtec	HTSW-104-07-G-S
0	X21	–	Through-hole .025" SQ post header, 2.54 mm pitch, 2-pin, vertical, single row	Samtec	TSW-102-07-L-S
0	ZD103	–	Zener diode/24 V/SOD-323	NXP	BZX384-C12

7.1 Transformer specification





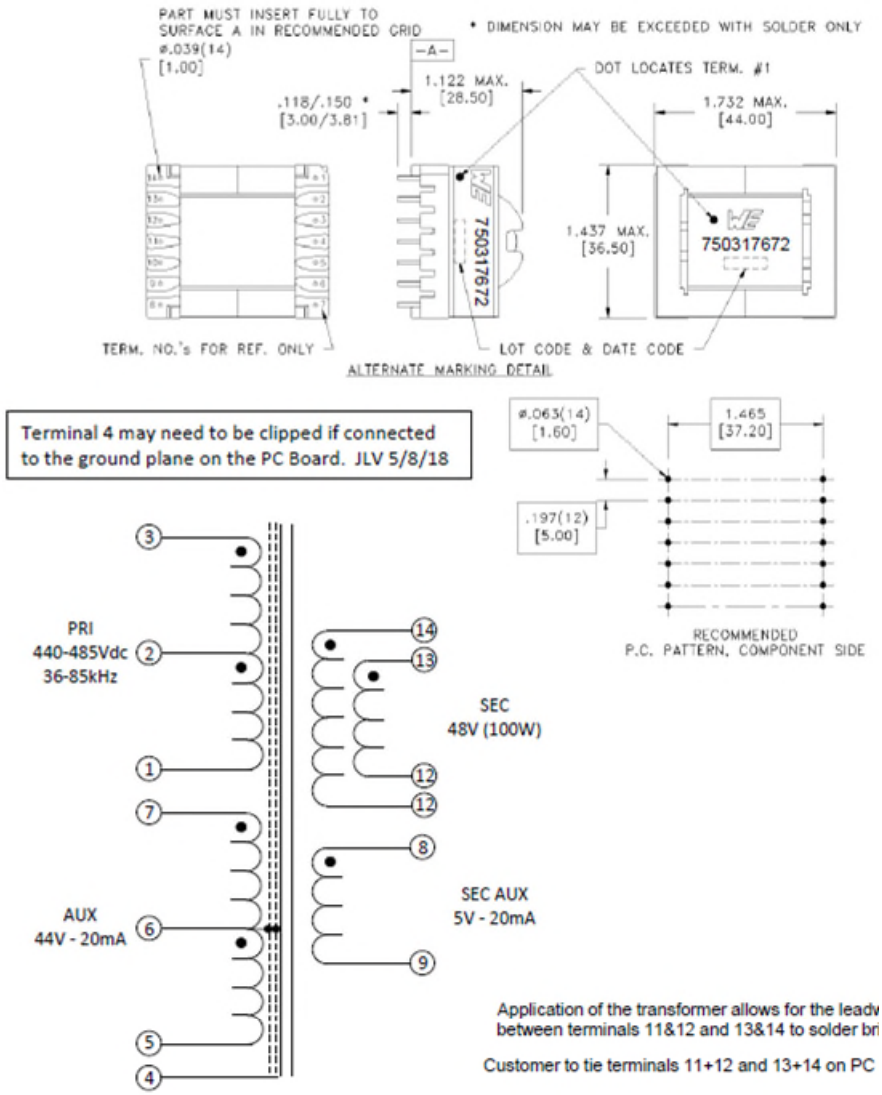
Customer to tie terminals 2&3 and 5&6 on PC board.

WÜRTH ELEKTRONIK

ELECTRICAL SPECIFICATIONS @ 25° C unless otherwise noted:

PARAMETER		TEST CONDITIONS	VALUE
D.C. RESISTANCE	2-5	tie(2+3.5+6), @20ºC	0.130 ohms max.
D.C. RESISTANCE	9-8	@20ºC	0.033 ohms max.
INDUCTANCE	2-5	tie(2+3,5+6),10kHz, 100mV, Ls	600.0µH ±10%
SATURATION CURRENT	2-5	tie(2+3,5+6), 20% rolloff from initial	3.7A
DIELECTRIC	2-8	4300VAC, 1 second	
DIELECTRIC	2-core	2150VAC, 1 second	
DIELECTRIC	8-core	2150VAC, 1 second	
TURNS RATIO		(2-5):(9-8)	10:1, ±2%

Figure 18 Würth Elektronik PFC choke 750343236 rev00 specification



WÜRTH ELEKTRONIK

ELECTRICAL SPECIFICATIONS @ 25° C unless otherwise noted:

PARAMETER		TEST CONDITIONS	VALUE
D.C. RESISTANCE	3-1	@20ºC	0.815 ohms ±10%
D.C. RESISTANCE	5-6	@20ºC	0.040 ohms ±20%
D.C. RESISTANCE	6-7	@20ºC	0.205 ohms ±10%
D.C. RESISTANCE	8-9	@20ºC	0.092 ohms ±10%
D.C. RESISTANCE	12-14	tie(13+14), @20ºC	0.067 ohms ±10%
INDUCTANCE	3-1	10kHz, 100mV, Ls	1.00mH ±10%
SATURATION CURRENT	3-1	20% rolloff from initial	3.25A
LEAKAGE INDUCTANCE	3-1	tie(5+7, 8+9, 12+13+14),100kHz, 100mV, Ls	15µH typ., 30µH max.
DIELECTRIC	1-14	tie(3+5, 9+12), 5900VAC, 1 second	4720VAC, 1 minute
DIELECTRIC	1-7	625VAC, 1 second	
DIELECTRIC	8-14	625VAC, 1 second	
TURNS RATIO		(3-2):(2-1)	1:1, ±1%
TURNS RATIO		(3-1):(14-12), tie(13+14)	3.23:1, ±1%
TURNS RATIO		(3-1):(7-6)	4:1, ±1%
TURNS RATIO		(3-1):(6-5)	28:1, ±1%
TURNS RATIO		(3-1):(8-9)	28:1, ±1%

Figure 19 Würth Elektronik flyback transformer 750317672 rev00 specification

Revision history

Document version	Date of release	Description of changes
1.0	2018-10-23	First release

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