Leadtrend
通嘉科技

250 W PFC
LD7592GS & LD7932RG

By：Jason Liao

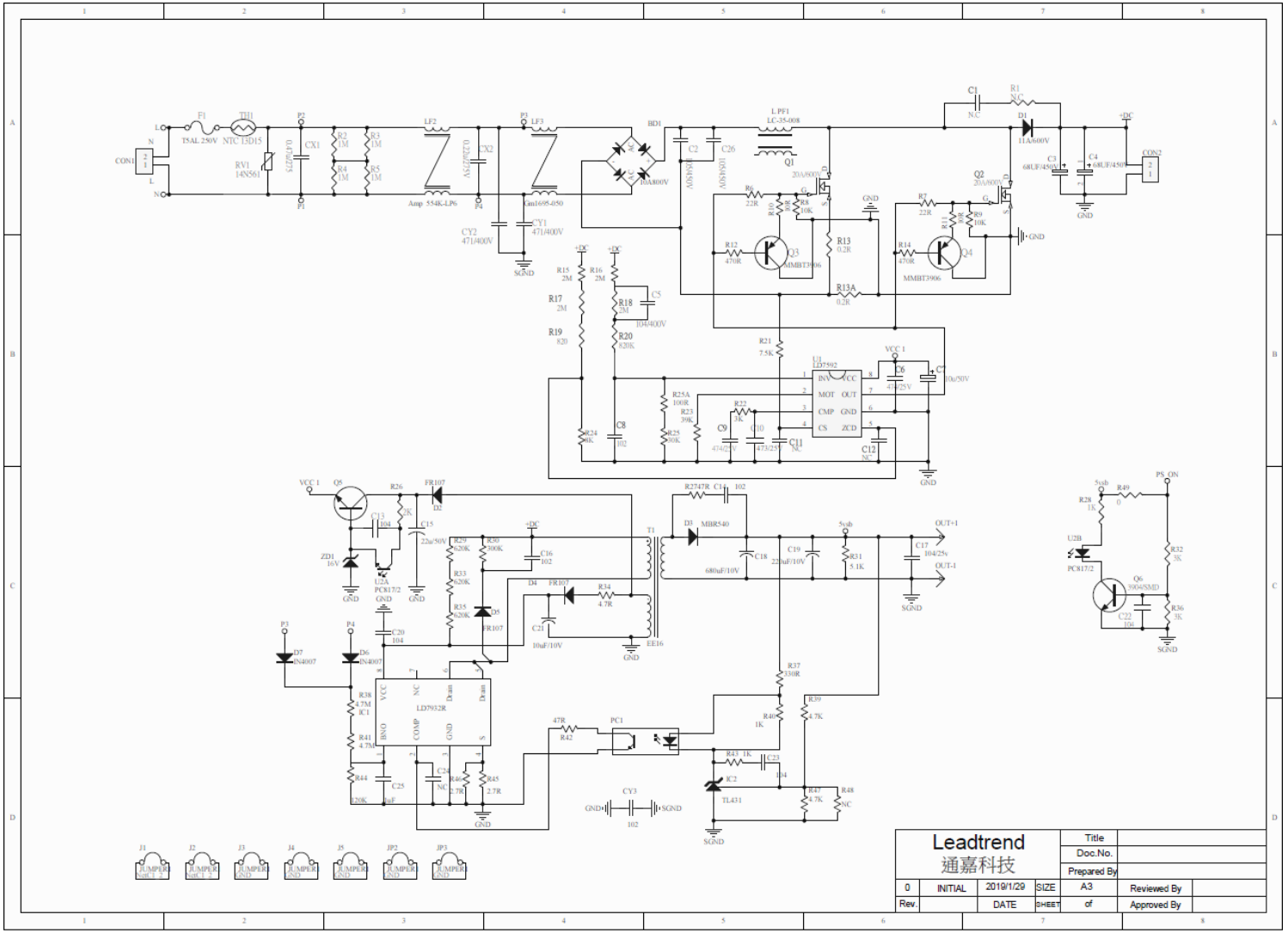
Date：2019/01/29

Contents

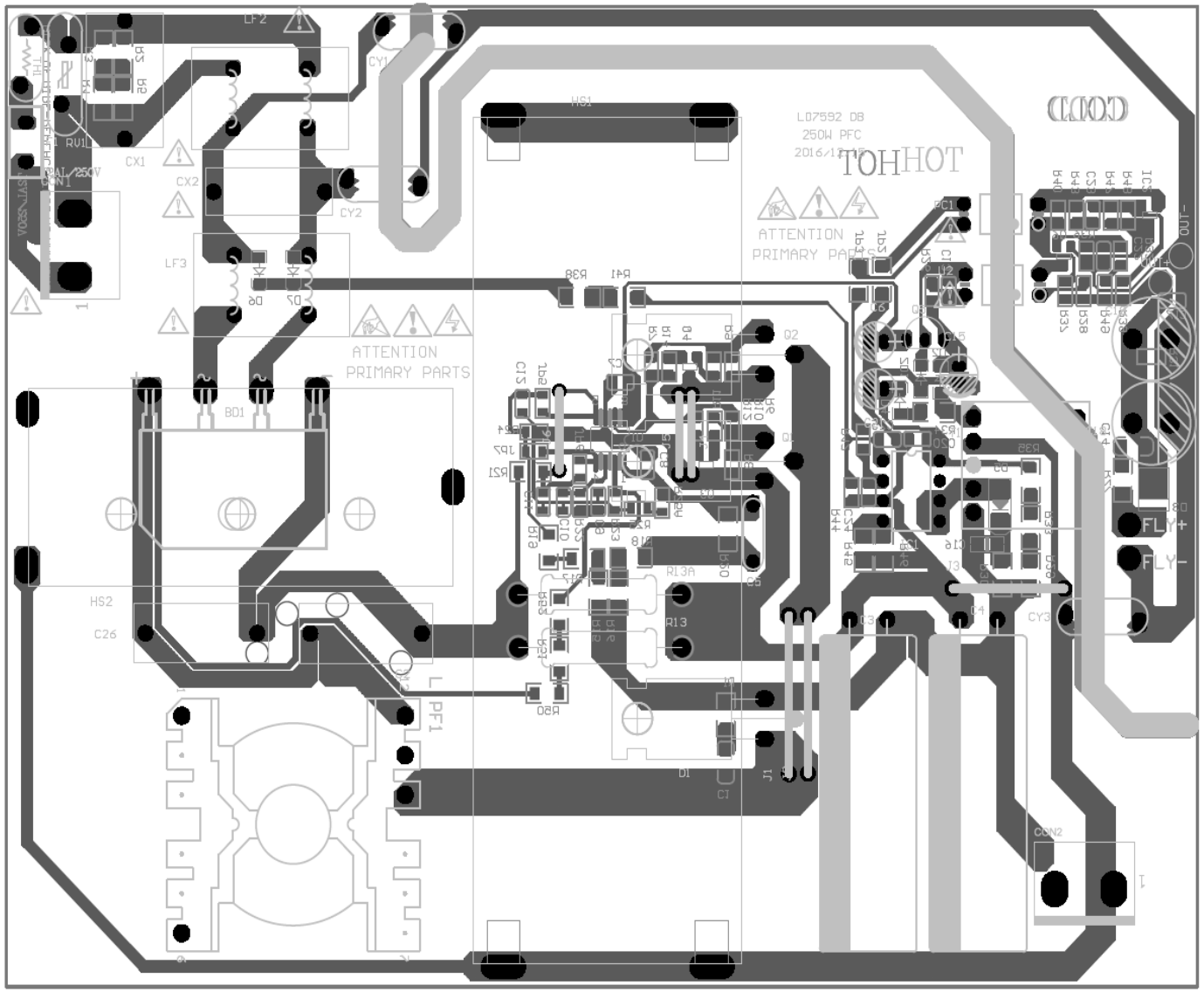
1. Specification

Item	Min.	Typ.		Max.	Test Result
Input Voltage (V_{AC})	90	115	230	264	—
Input Frequency (Hz)	47	60	50	63	—
Output Voltage & Current (V / A)	390V/0.62A		5V/2A		_
Efficiency	>90%				Pass
Power Factor	>0.9				Pass
Stress	<90%				Pass
Regulation	385V~405V				Pass

2. Schematic


Leadtrend
通嘉科技
Title
Doc.No.
Prepared By
0
INITIAL
2019/1/29
SIZE
A3
Reviewed By
Rev.
DATE
SHEET
of
Approved By

3. PCB Layout



4. Bill of Materials

Location	Description	Q'ty
TH1	SCK208R0	1
R2,R3,R4,R5	SMD RES 1206 1M 5%	4
R6,R7	SMD RES 0805 22R 5%	2
R8,R9	SMD RES 0805 10K 5%	2
R10,R11	SMD RES 0805 10R 5%	2
R12,R14	SMD RES 0805 470R 5%	2
R13,R13A	0.2Ω / DIP-2W MOF 5%	2
R15,R16,R17,R18	SMD RES 1206 2M 5%	4
R19,R20	SMD RES 1206 820K 5%	2
R21	SMD RES 1206 7.5K 5%	1
R22,R32,R36	SMD RES 0805 3K 5%	3
R23	SMD RES 0805 39K 5%	1
R24,R25	SMD RES 0805 30K 5%	2
R25A	SMD RES 0805 100R 5%	1
R26	SMD RES 0805 2K 5%	1
R27	SMD RES 1206 47R 5%	2
R28,R40,R43	SMD RES 0805 1K 5%	3
R29,R33,R35	SMD RES 1206 620K 5%	3
R30	SMD RES 1206 300K 5%	1
R31	SMD RES 0805 5.1K 5%	1
R34	SMD RES 1206 4.7R 5%	1
R37	SMD RES 0805 330R 5%	1
R38,R41	SMD RES 1206 4.7MF 1%	2
R39,R47	SMD RES 0805 4.7K 5%	2
R42	SMD RES 0805 4.7R 5%	1
R44	SMD RES 0805 120KF 1%	1
R44,R45	SMD RES 1206 2.7RF 1%	2
R49	SMD RES 0805 0R 5%	1
JP2,JP3,JP5,JP6	SMD RES 1206 0R 5%	4
CY1,CY2	470 pF (471) / 250V	2
CY3	Y1 CAP CD 102 250V P:10mm 20%,CD70ZU2GA102MYPKA,帶裝	1

Location	Description	Q'ty
C6,C21	E CAP 10uF 50V SY 20% 5*11 P:2.0mm	2
C8	SMD CC 0805 471 50V X7R 10%	1
C9	SMD CC 0805 684 50V X7R 10%	1
C10	SMD CC 0805 473 50V X7R 10%	1
C13,C17,C20,C22,C23	SMD CC 0805 104 50V X7R 10%	5
C14	SMD CC 1206 102 1000V X7R 10%	1
C15	E CAP 22uF 50V SY 20% 5*11 P:2.0mm	1
C5,C16	DIP CC 222 1KV Y5P ±10%	2
C18,C19	E CAP 470uF 25V SC 10*12 P:5.0mm	2
C25	SMD CC 0805 105 50V Y5V	1
CX1	DIP X2 CAP HQX 0.47uF(474) ±10% 275V P:15mm(17*16*10.3mm)	1
CX2	DIP X2 CAP HQX 0.22UF(224) ±10% 275Vac 6*14*17mm P:15mm(腳長更正為3.5mm)	1
BD1	HY GBJ1008	1
D2,D4,D5,D6,D7	FRS1ME	5
D3	威倫 MBR1045ULPS	1
IC1	LD7932R / DIP-8	1
IC2	SMD IC LA431OCRPA SOT-23-3L	1
Q1,Q2	AUK SJMN190R65F	2
Q3,Q4	MMBT3906	2
Q5	UTC 2N5551	1
Q6	MMBT3904	1
U1	LD7592 / SOP-8	1
PC1,U2	DIP IC EL817C (CTR 200-400)	2
RV1	14N561	1
T1	EE-16加寬 / AE 38 / 65:4:15 / 1800 uH	1
LF2,LF3	ESQ2418GRP2L-802-E10	2
PF1	EQ40 / 0.1*70*38T L= 230uh	1
F1	DIP FUSE 5A 250V 2010 Time Lag 8.5*8.5*4mm 方型塑膠外殼	1
ZD1	BZT52-C16	1

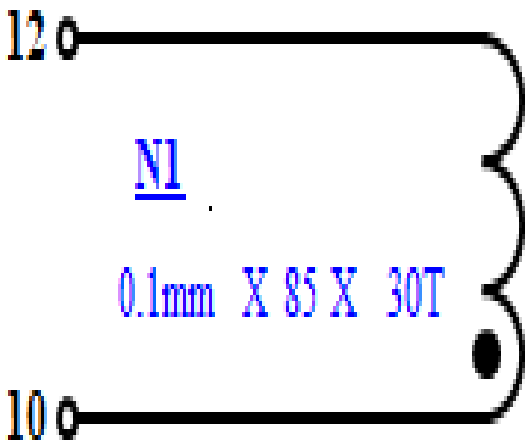
4. Bill of Materials

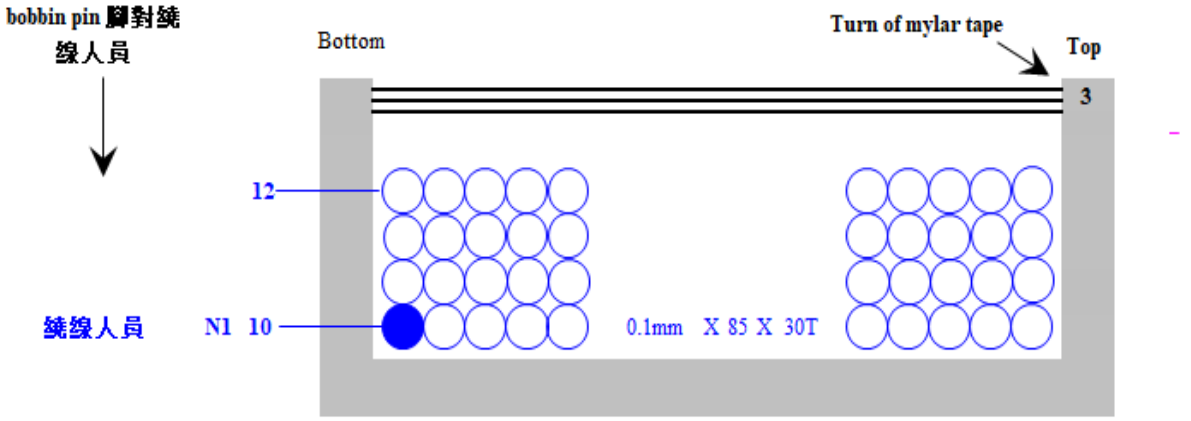
Location	Description	Q'ty
D1	TI STTH10LCD06FP	1
C3,C4	智寶 SQ 82uF/450V/12.5*40	2
PCB	160 x 124 x 2 mm / FR-4 / 2 oz	1
C2,C26	105/450V/朱肝電容/18*7.5*15mm	2
C7	SMD CC 0805 224 50V X7R 10%	1
J1,J2	JUMP / 20mm / 1 Φ	2
J3	JUMP / 15mm / 1 Φ	1
J4,J5	JUMP / 10mm / 1 Φ	2
HS1	散熱片 / 107*35*5mm /	1
HS2	散熱片 / 60*25*7mm /	1
CON1,CON2	Pitch = 3.96 mm (3 PIN Cut pin2)	2
FOR HS1,HS2	Screw, M3x10L ,I頭,機械牙,鍍鋅,加耐落膠	4

5. Transformer Design

PF1

Schematic of Winding





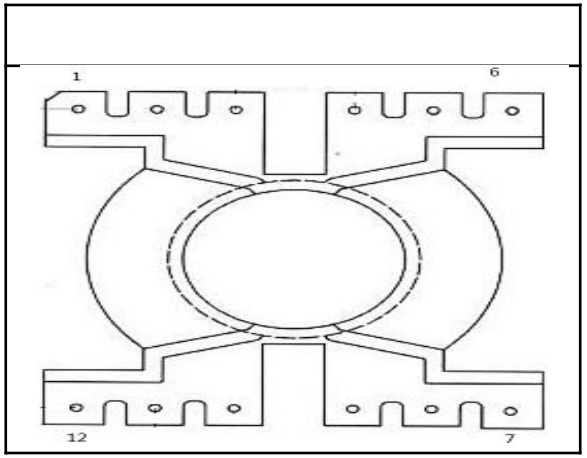
Note: 1) Dot ●: **Start point** of winding

2) Rotating direction of winding machine: **Clockwise**

3) Bobbin 頂部對繞線機

Winding No.	Pin No.		Winding Types	Number of Turns		Remarks	
	Start	Finish		Winding	Tape		
N1	10	12	0.1 mm X 85	30	3	N1	Pin 朝人順繞

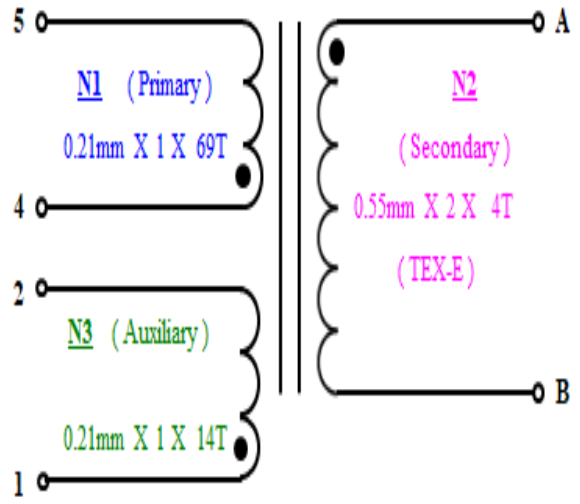
Bobbin Shape	Core Material	A_e (mm^2)	L_P (µH)
PQ3225	PC44	149	170 ± 5 % @ 65 kHz / 1 V

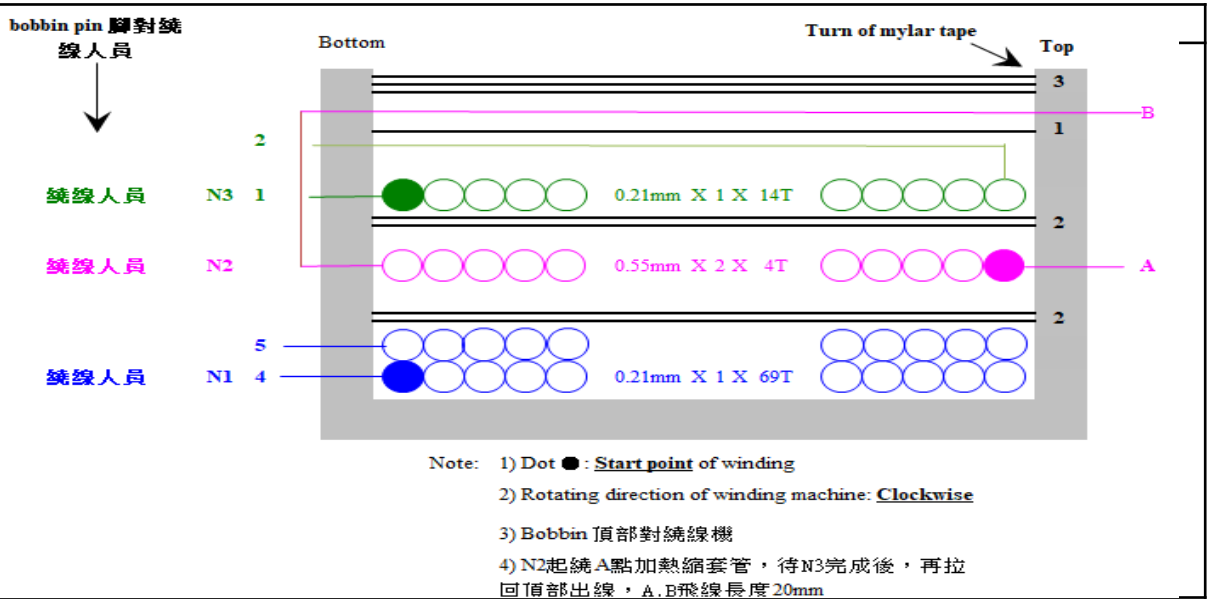


5. Transformer Design

T1

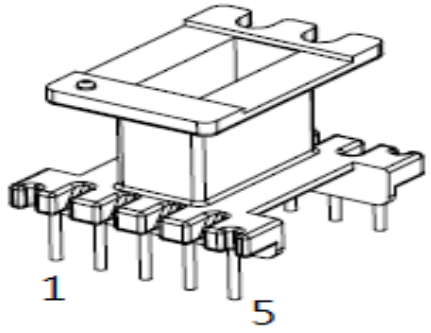
Schematic of Winding





Winding No.	Pin No.		Winding Types	Number of Turns		Remarks	
	Start	Finish		Winding	Tape		
N1	4	5	0.21 mm X 1	69	2	N_P	Pin 朝人順繞
N2	A	B	0.55 mm X 2	4	2	N_S	Pin 朝人順繞
N3	1	2	0.21 mm X 1	14	1	N_A	Pin 朝人順繞(疏繞)
二次側線由頂部凹槽出線，起繞A點加熱縮套管							

Bottom View of Bobbin



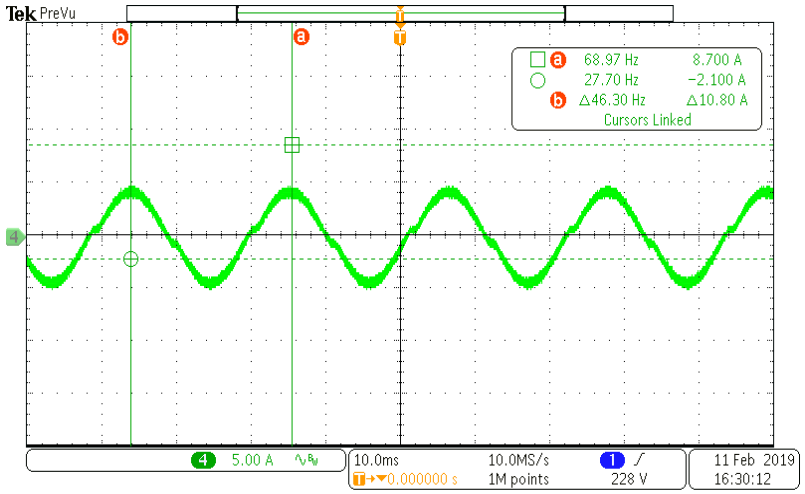
Bobbin Shape	Core Material	A_e (mm^2)	L_P (µH)
EE-16W	PC44	38	1800 ± 5 % @ 65 kHz / 1 V

6. Efficiency & Power Factor

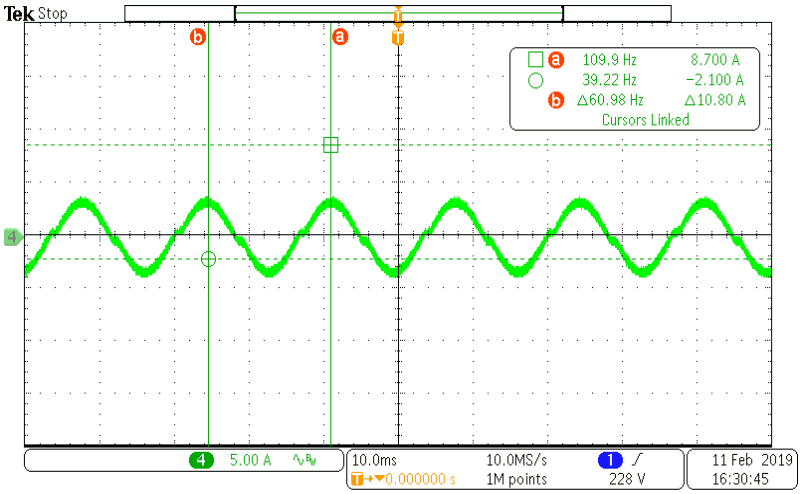
Input Voltage	90 V_{AC} / 47 Hz 115 V_{AC} / 60Hz 230 V_{AC} / 50 Hz 264 V_{AC} / 63 Hz
Output Current	Full Load
Measured Point of Output Voltage	End of PCB

Voltage (V)	Efficiency (%)	Power Factor
90	-	0.998
115	93.06%	0.996
230	97.45%	0.944
264	-	0.922

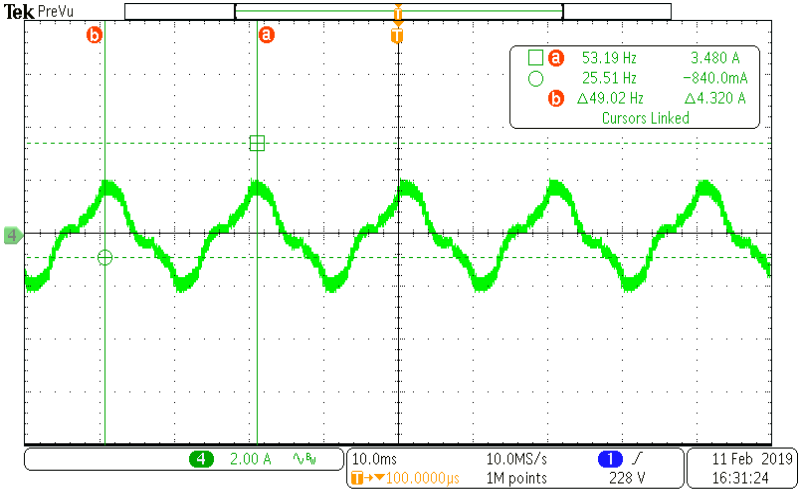
7. Key Waveform



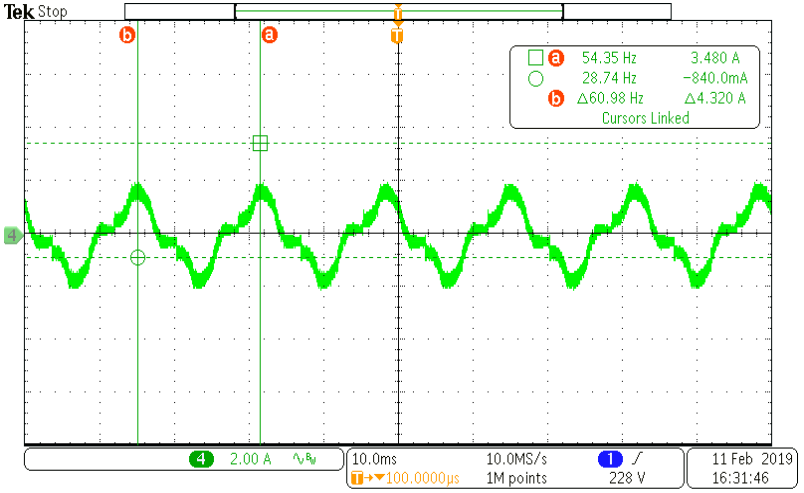
90Vac AC Current Waveform



115Vac AC Current Waveform

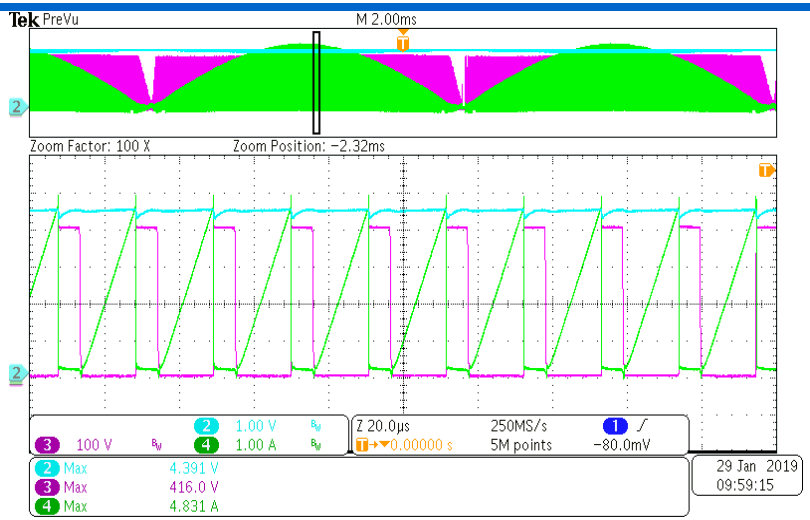


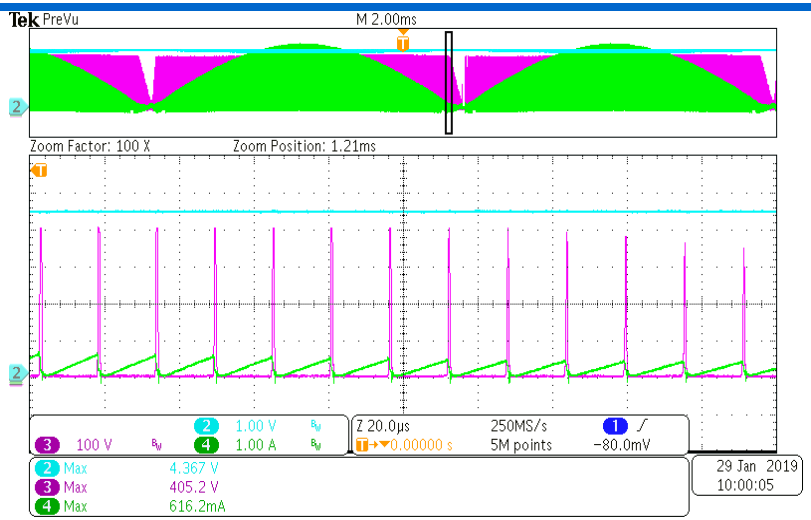
230Vac AC Current Waveform



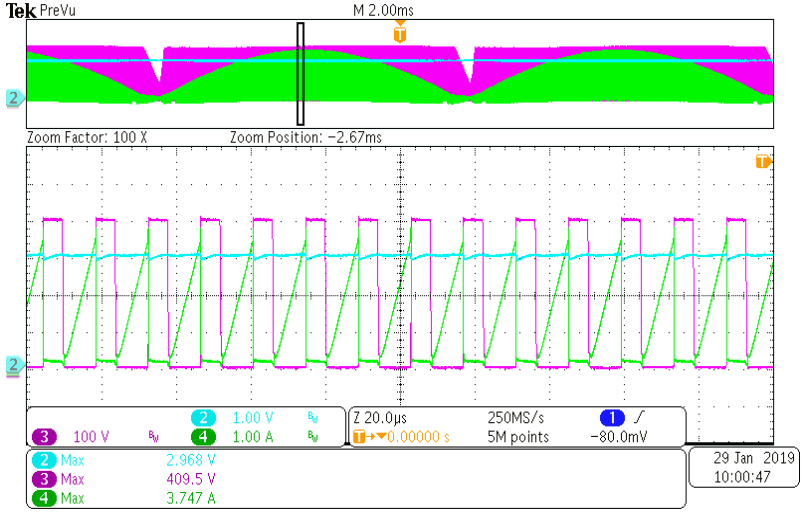
264Vac AC Current Waveform

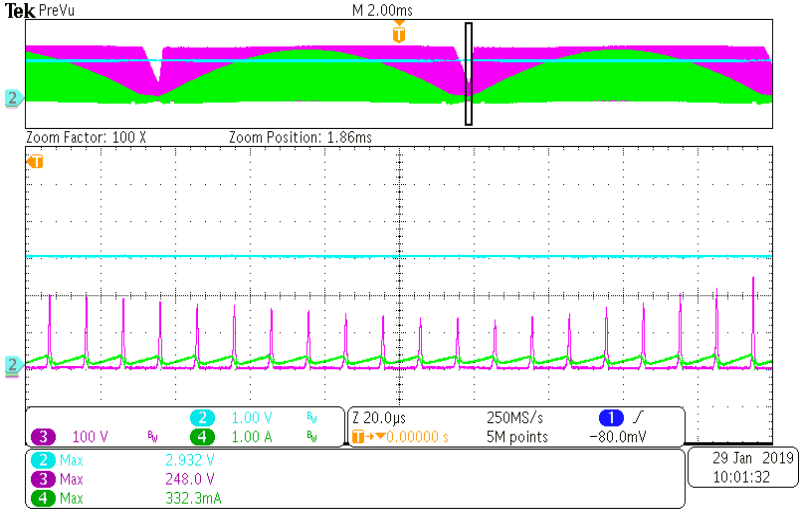
7. Key Waveform





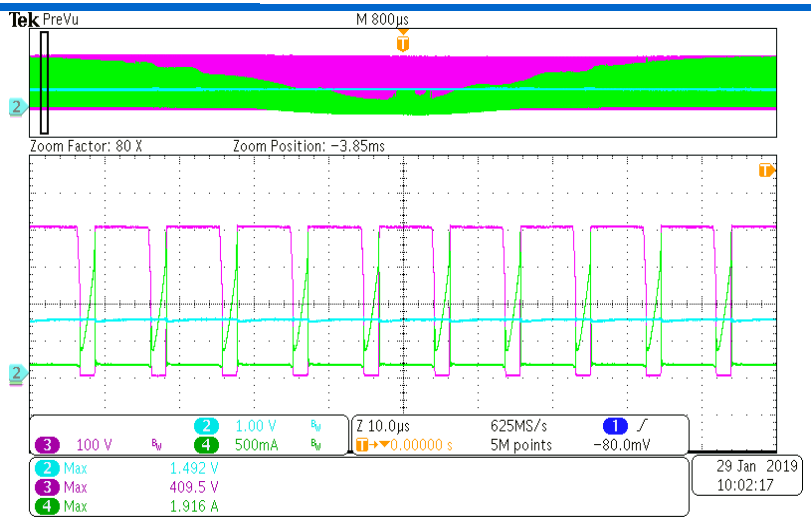
90Vac 390V/0.62A , CH2 Comp . CH3 V_{DS} . CH4 I_{DS}

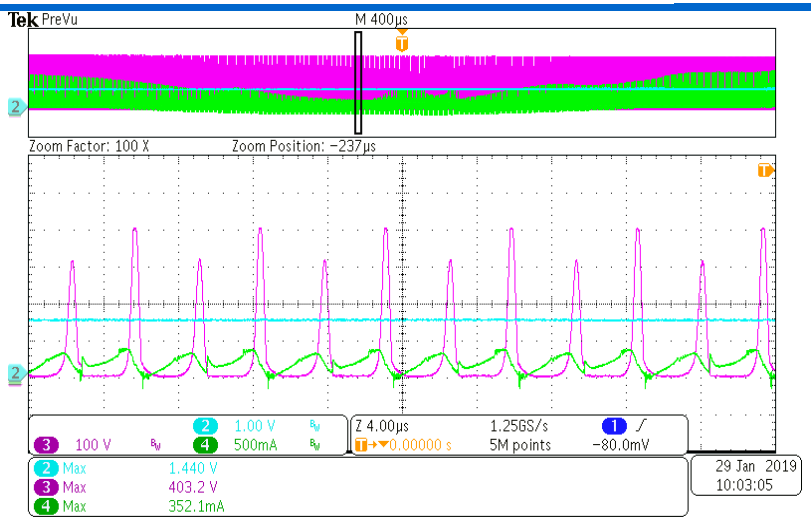




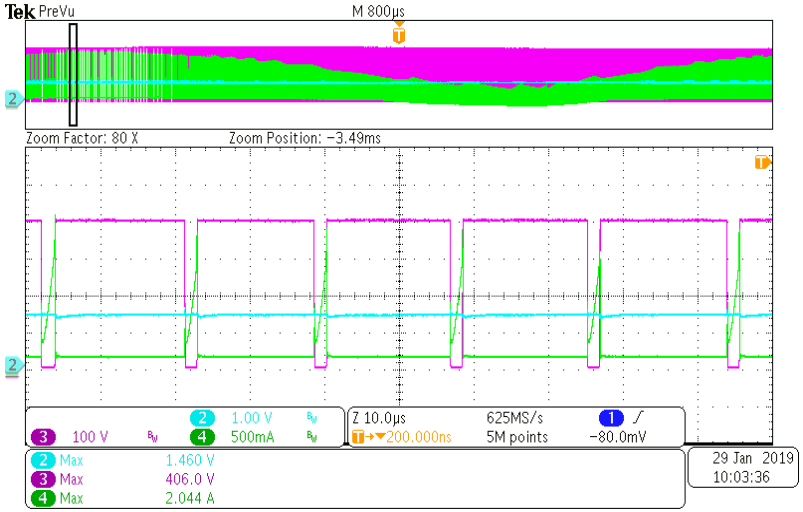
115Vac 390V/0.62A , CH2 Comp . CH3 V_{DS} . CH4 I_{DS}

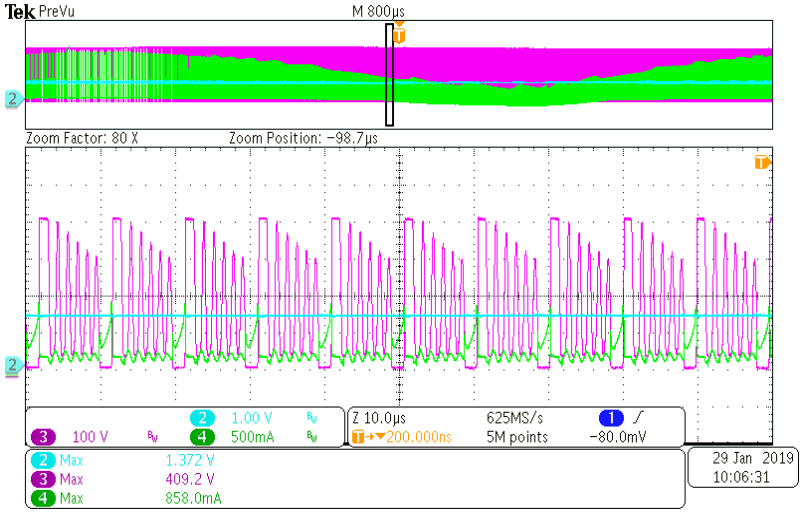
7. Key Waveform





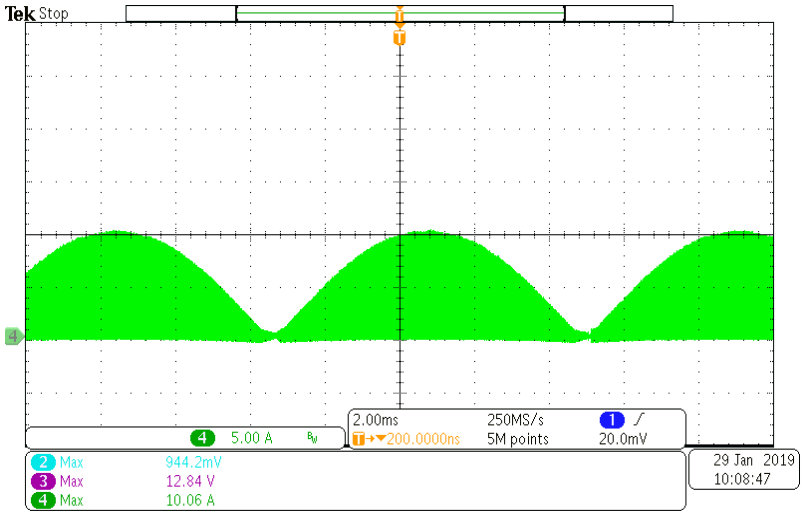
230Vac 390V/0.62A , CH2 Comp . CH3 V_{DS} . CH4 I_{DS}



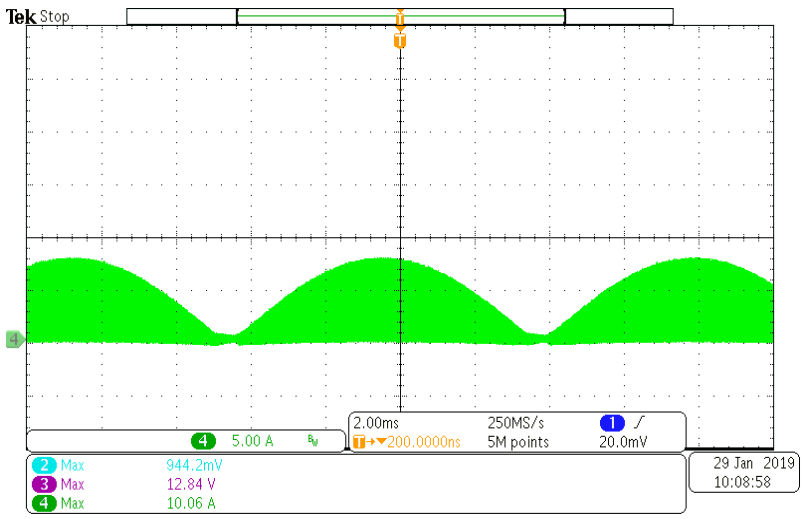


264Vac 390V/0.62A , CH2 Comp . CH3 V_{DS} . CH4 I_{DS}

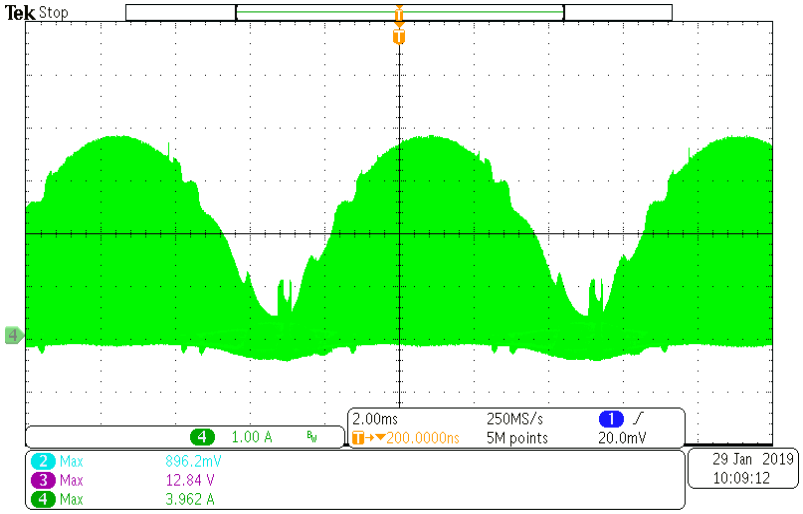
7. Key Waveform



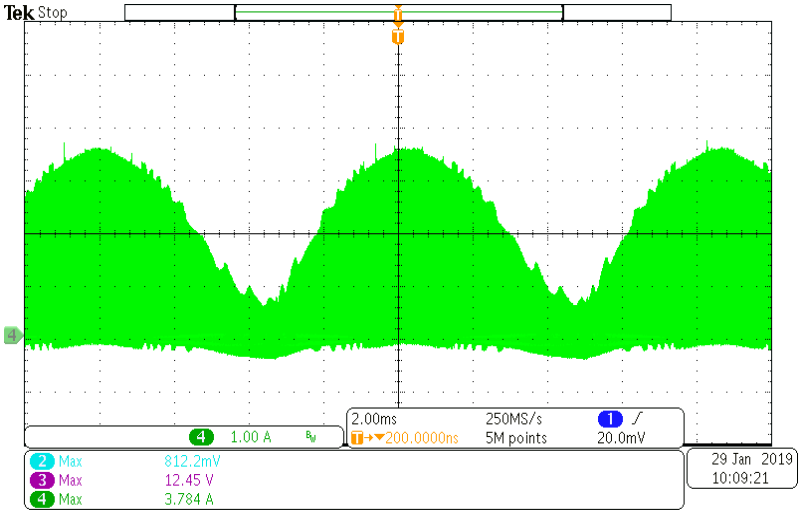
90Vac PFC Current Waveform



115Vac PFC Current Waveform



230Vac PFC Current Waveform



264Vac PFC Current Waveform

8. Stress on Switching Parts

Input Voltage	264 V_{AC} / 63 Hz
Output Current	Full Load
Requirement	<90 %

NO.	Location	Voltage	Normal (264/60Hz)	
			Measurement	Derating
			V	%
1	Q1	600	446	74.3
2	D1	600	430	71.6

NO.	Location	Voltage	Turn on (264V/60Hz)	
			Measurement	Derating
			V	%
1	Q1	600	462	77.0
2	D1	600	438	73.0

9. Load Regulation

Input Voltage	90 V_{AC} / 47 Hz	115 V_{AC} / 60 Hz	230 V_{AC} / 50 Hz	264 V_{AC} / 63 Hz
Output Current	No Load & Full Load			
Requirement	385~405V			

(V / Hz)	**(V)**		**Requirement (V)**
	No Load	**Full Load**	
90 / 47	400	399	385~405V
115 / 60	400	399	
230 / 50	400	399	
264 / 63	400	399	

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THANK YOU