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Design Note – DN05115/D

90W TYPE-C PD3.0 / QC4.0 Power Adapter Solution with WT6615F

ON's Device	Application	Input Voltage	Output Power	Topology	I/O Isolation
NCP1622AEC NCP1342ANDBDD1 NCP4306AADZZZA FCMT299N60 FQPF380N65 NTMFS6B03 ATP104	Smart phone, PAD and NB adapter supporting PD3.0, QC4.0,QC4.0+,PPS	90 Vac to 264 Vac	90 W	Flyback	Isolated (3 kV)

	PD Output Specification	QC Output Specification
Output Voltage	5 V, 9 V, 12 V, 15 V, 20 V	5 V, 9 V, 12 V
Nominal Current	5V/3A, 9V/3A, 12V/3A,15V3A, 20V/4.5A	5 V / 3 A, 9 V / 3 A, 12 V / 2.67 A
Max Current	5V/3A, 9V/3A, 12V/3A,15V3A, 20V/4.5A	5 V / 3 A, 9 V / 3 A, 12 V / 2.67 A
Min Current	zero	zero

Avg. Efficiency	>91%&92% @ 20 V 4.5 A at board end, 115 & 230 Vac
Ripple	<100mV @5V
Standby Power	<50mW @ 5 V & 230 Vac (No cable plug in)
Power Density	0.96W/cm^3
Protection	Adaptive UVP, OVP, OVP, SCP, OTP
Size	111mmx53mmx16mm

Circuit Description

This design note describes a 90 W, Type C interface PD3.0, universal AC input, constant voltage power supply intended for smart phone, PAD and NB adaptor supporting PD3.0 or QC4.0,QC4.0+,PPS protocol, where isolation from the AC mains is required, and low cost, high efficiency, and low standby power are essential.

The featured power supply is a simple QR flyback topology utilizing ON Semiconductor's NCP1342 HF PWM controller, NCP4306D synchronous rectified controller, NTMFS6B03 synchronous MOSFET and ATP104 Switch MOSFET. This Design Note provides the complete circuit schematic details, PCB and BOM for 90 W Type C Interface PD3.0 Power adapter solution which supports PD output (5 V / 3 A, 9 V / 3 A, 12 V / 3 A, 15 V / 3 A, 20 V / 4.5 A).

This design combined with Weltrend WT6615F PD3.0 protocol controller to provide PD3.0 and

QC3.0 functions. This design also proposes a dual auxiliary power supply to supply PWM controller, the PWM controller is supplied by high voltage auxiliary voltage at low output voltage and supplied by low voltage auxiliary voltage at high output voltage and also shuts down zener bias of high voltage Vcc while low voltage auxiliary voltage supplies controller.

This design also uses NCP4306 synchronous rectified controller to provide high efficiency and also has no external Vcc regulator to supply synchronous controller to ensure controller can works below 3.6 V.

Key Features

- Universal AC input range (90 – 264 Vac)
- Very low standby (5 V & 230 Vac) power consumption with no cable plug in
- Very low ripple and noise
- Inherent SCP and OCP protection
- High power density (0.96 W/cm^3)
- Quick switching off FET while unplugging cable and switching on FET at Vbus dropping to 5 V while plugging cable again
- Quasi-Resonant current mode control with Valley Switching
- Valley lockout avoids audible noise at valley jumping operation
- Support TYPE-C PD3.0 & QC4.0,QC4.0+,PPS protocol
- Adaptive Output OVP and UVP
- Two stage OCP for 15v and 20v output
- Open loop protection
- Board size: 111mmx53mmx16mm

Block Diagram and BOARD Photos

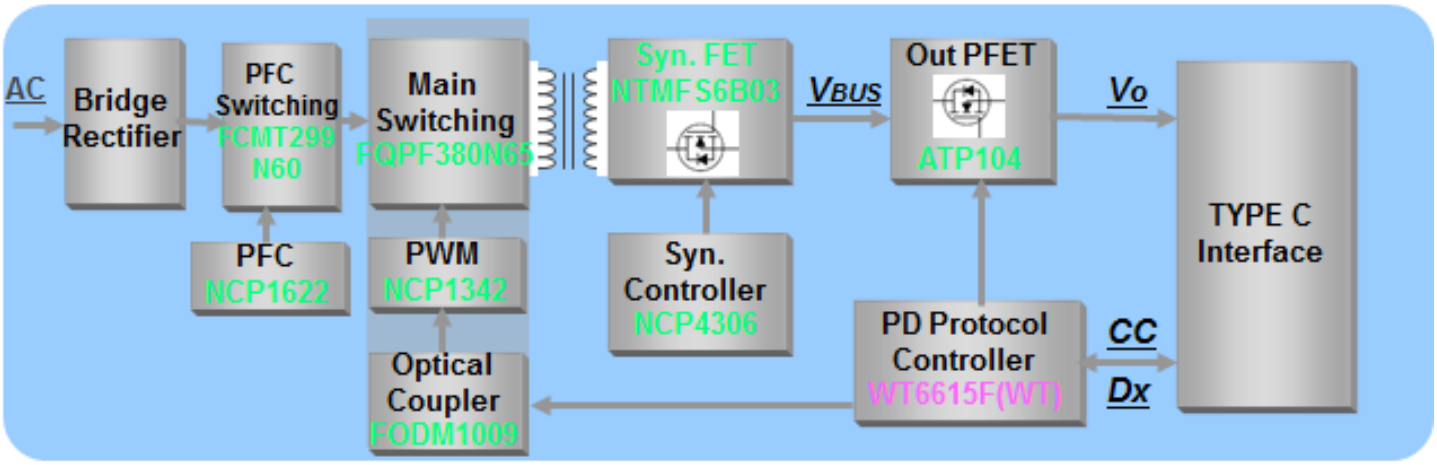


Figure 1, Overall cycle of 90 W TYPE-C PD Adapter Solution

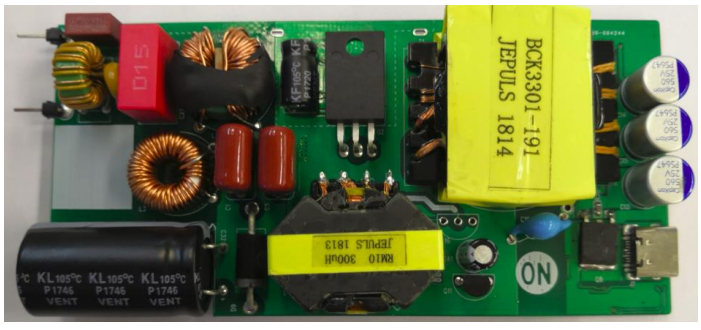
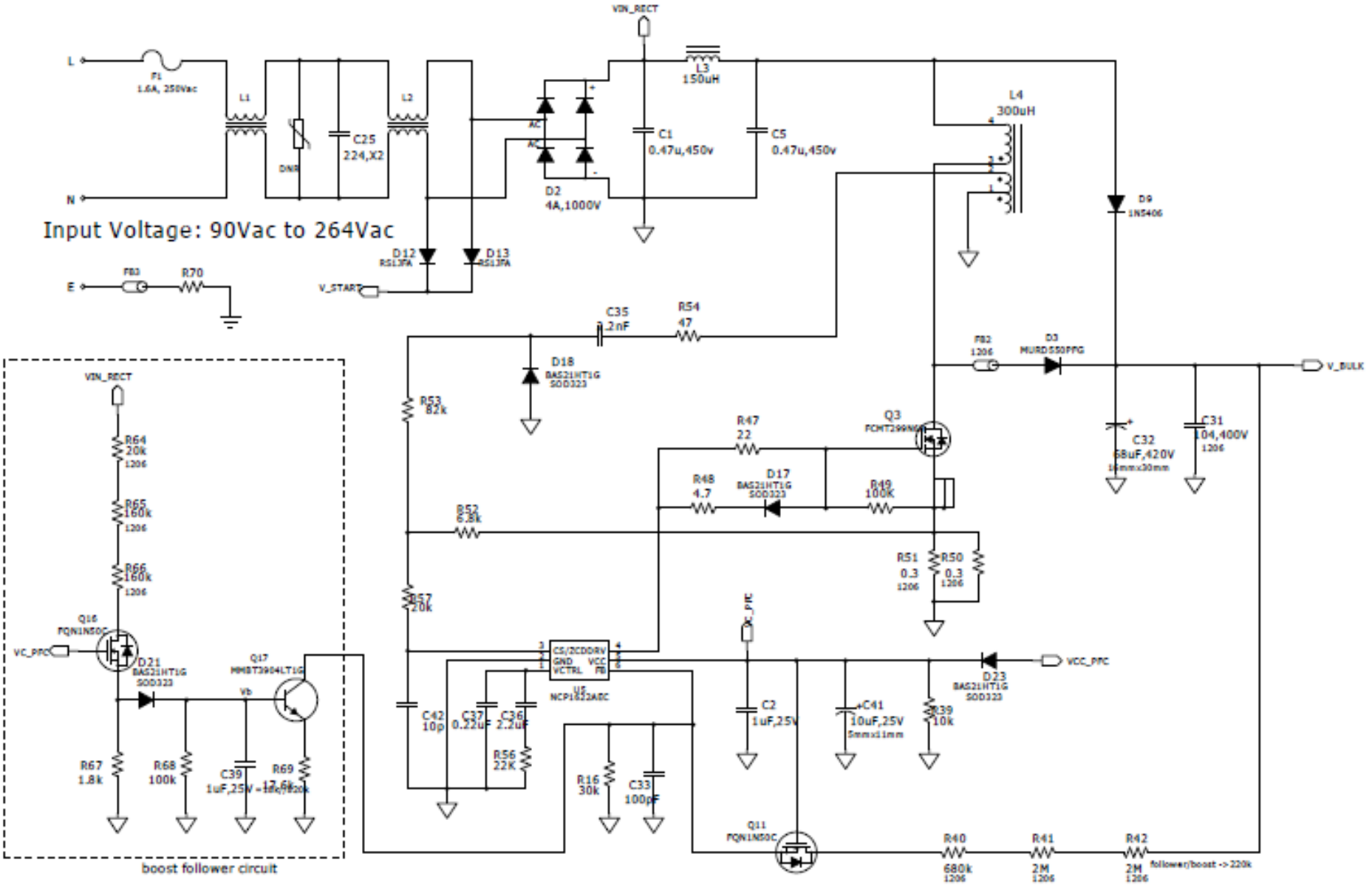


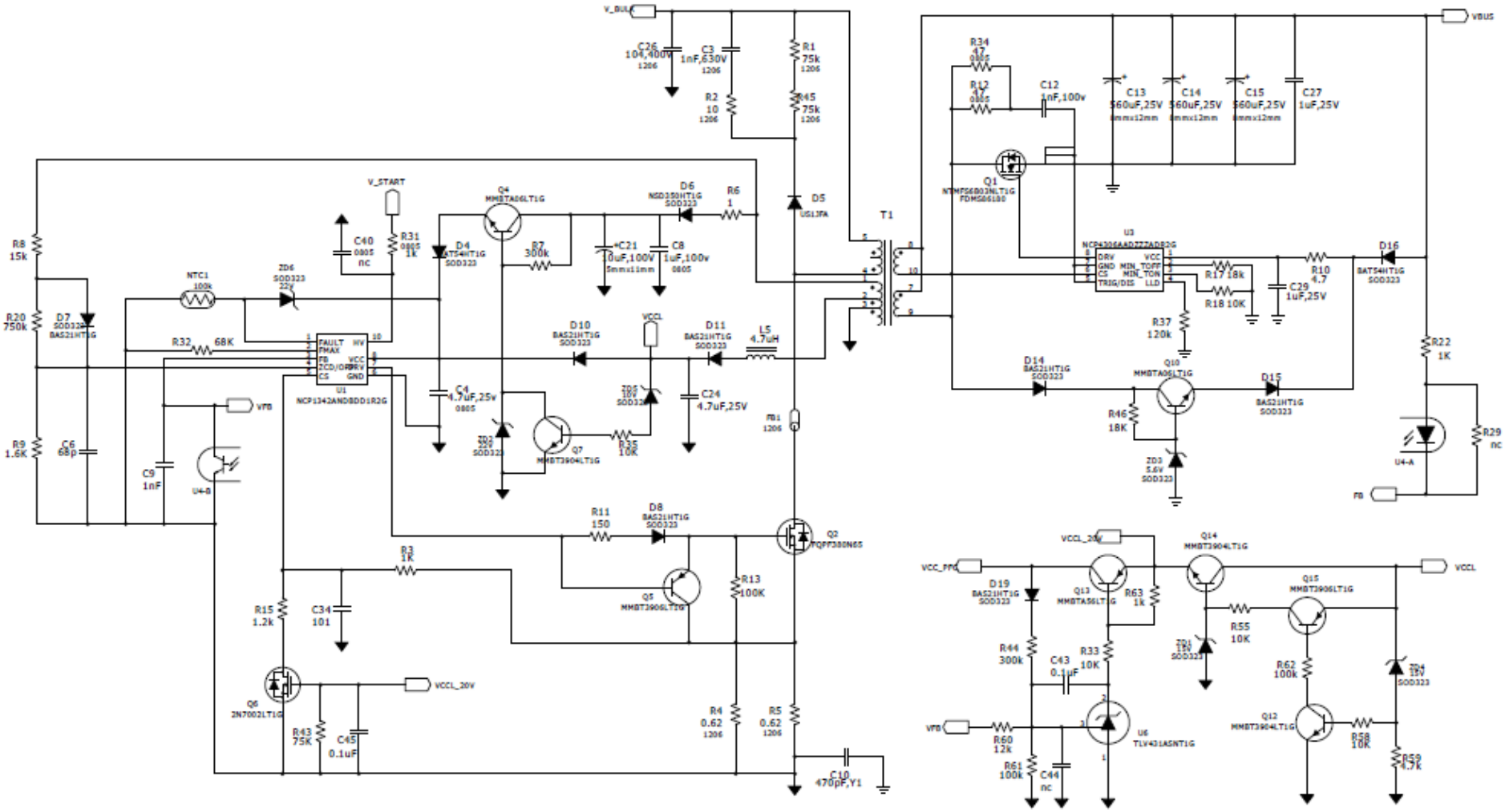
Figure 2, Side view 1 of demoboard

Figure 3, Side view 2 of demoboard

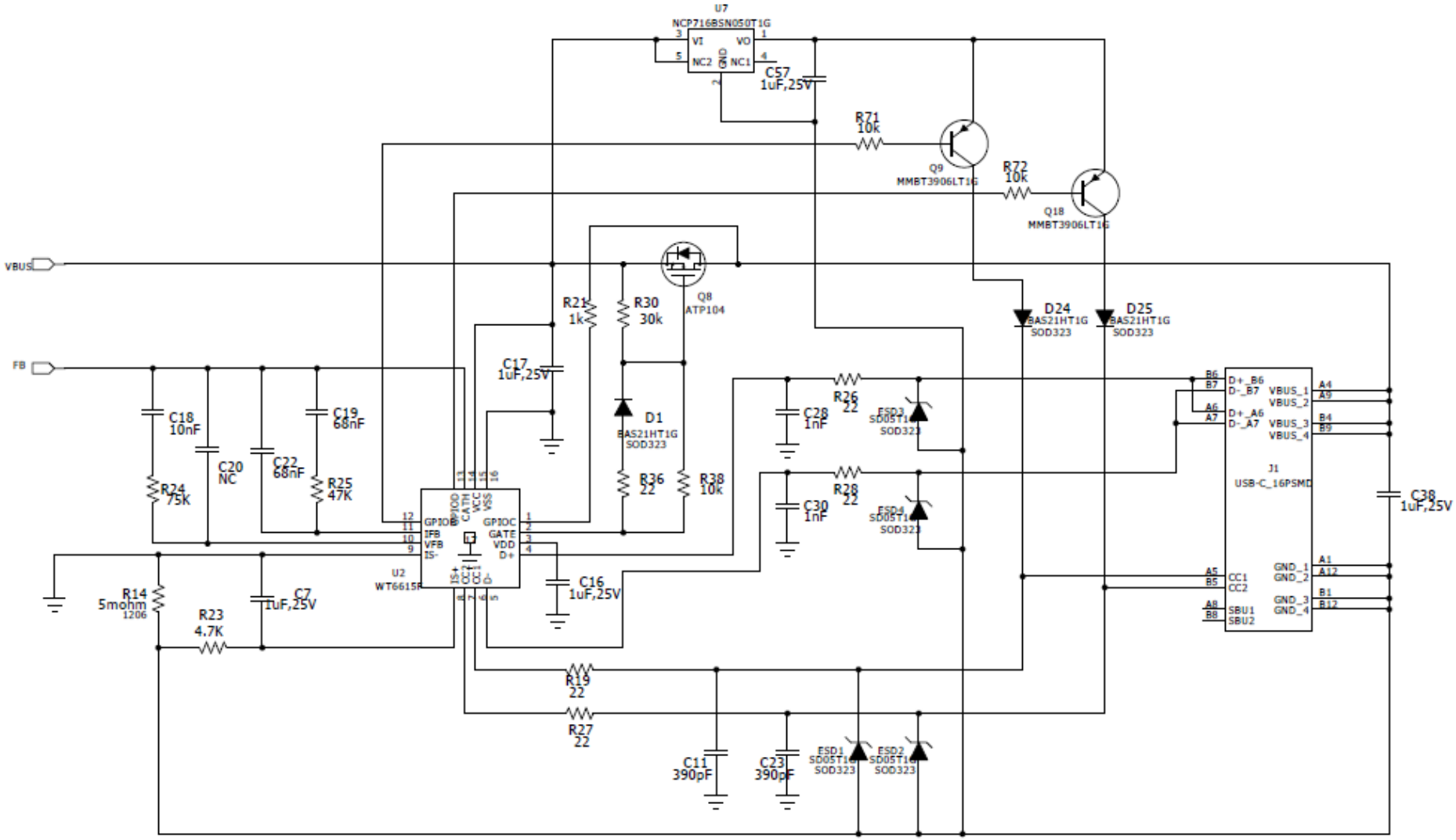
Circuit Schematic



Circuit Schematic (Continued)



Circuit Schematic (continued)



PCB

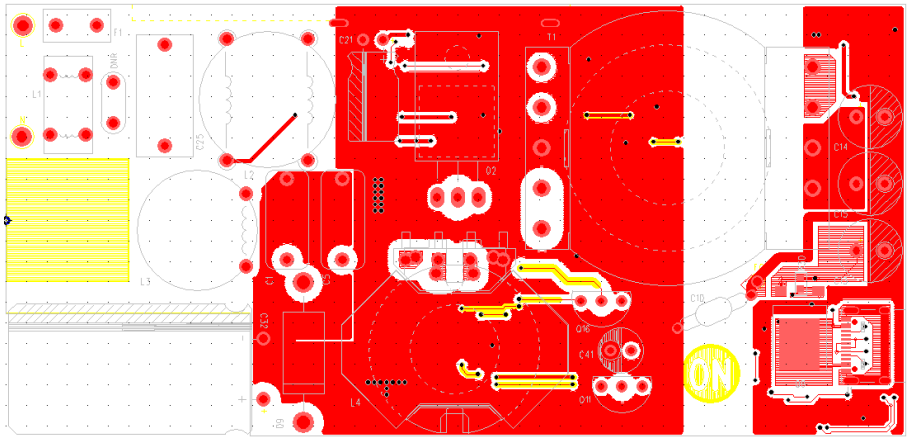


Figure 3, Top View of PCB

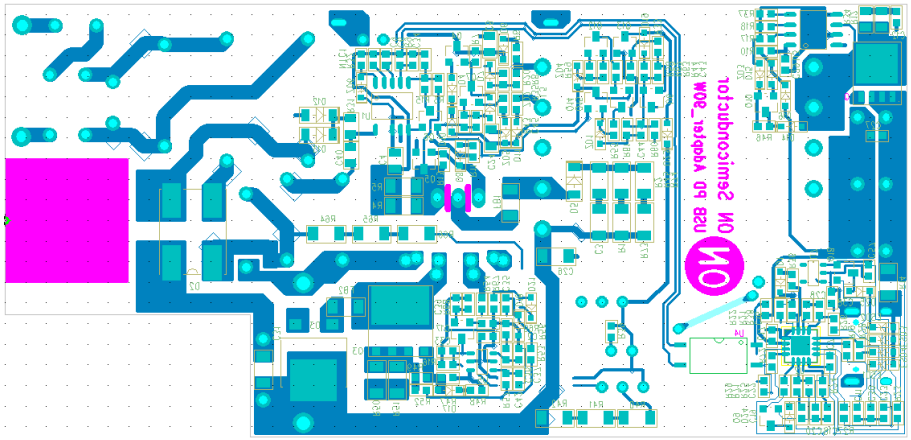


Figure 4, Bottom View of PCB

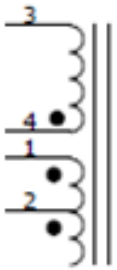
PFC Inductor Designs (Available from Wurth Electronics and Jepuls)

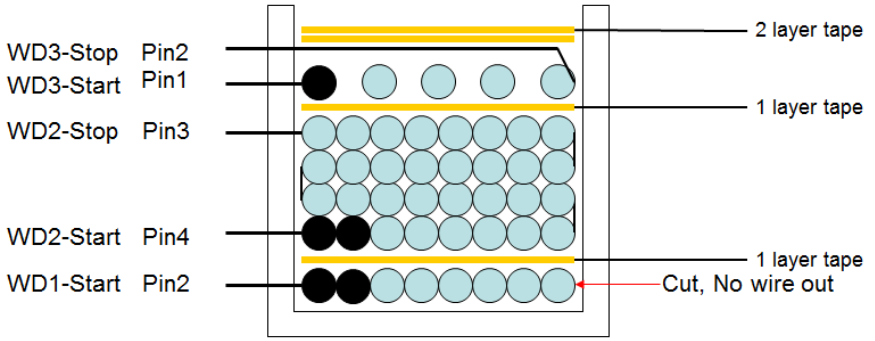
Core Type: RM10LP
Core material: PC95, TPW33 or equivalent
Bobbin: 4Pin TH type bobbin
Bobbin vendor: TBI-208-04481.12XX(RM10-12).

WD2=Primary, 31T, 25*0.1mm Litz

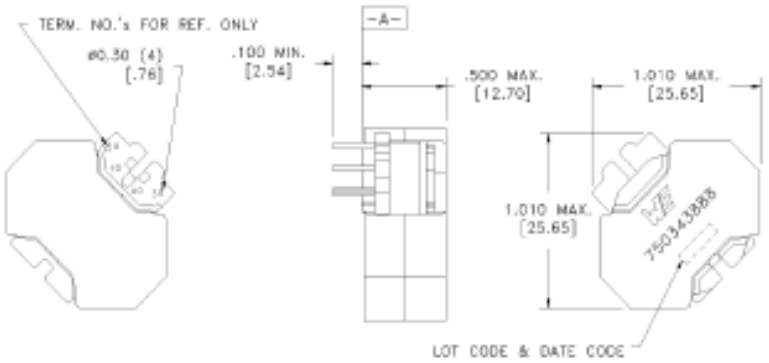
WD3=Auxiliary, 3T, 0.22mm

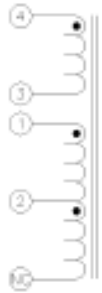
WD1=Shielding, 8T, 0.22mm x2

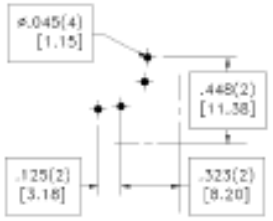




CUSTOMER TERMINAL	RoHS	LEAD(Pb)–FREE
Sn 96%, Ag 4%	Yes	Yes







RECOMMENDED
P.C. PATTERN, COMPONENT SIDE

ELECTRICAL SPECIFICATIONS @ 25° C unless otherwise noted:

PARAMETER		TEST CONDITIONS	VALUE
D.C. RESISTANCE	3-4	@20°C	0.16 ohms max.
D.C. RESISTANCE	1-2	@20°C	0.11 ohms max.
INDUCTANCE	3-4	10kHz, 1V, Ls	300.00µH ±10%
TURNS RATIO		(4-3):(1-2)	10.33:1, ±2%

GENERAL SPECIFICATIONS:

OPERATING TEMPERATURE RANGE: -40°C to +125°C including temp rise.

Wire Insulation & RoHS status not affected by wire color. Wire Insulation color may vary depending on availability.

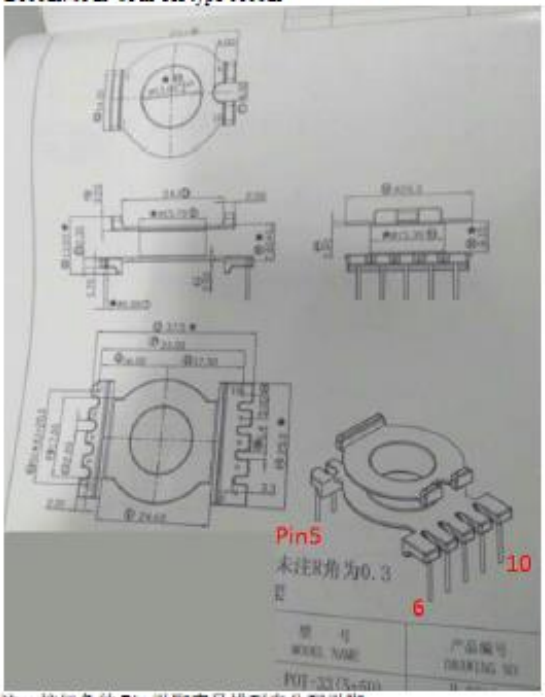
DFM		Packaging Specifications	CONVENTION PLACEMENT	Tolerances unless otherwise specified:	DRAWING TITLE	PART NO.
DATE		Method: Tray		Angles: ±1° Decimals: ±.005 [.13]	INDUCTOR	750343888
ENG	IYU	PKG-TBD		Fractions: ±1/64 Footprint: ± .001 [.03]		
REV.	01			This drawing is dual dimensioned. Dimensions in brackets are in millimeters.		SPECIFICATION SHEET 1 OF 1
DATE	6/1/2018	www.we-online.com/midcom				

T1 Transformer Designs (Available from Jepuls)

POT33 Transformer Specification

1. Core and Bobbin

Core Type: POT33
Core material: PC40/PC44, TP4/TP4A or equivalent
Bobbin: 5Pin+5Pin TH type bobbin

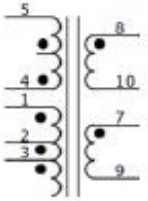


注：按红色的 Pin 引脚序号排列来分配引脚

2. Electrical diagram

WD8=Primary, 13T, 25x0.1mm Litz
WD1=Primary, 13T, 25x0.1mm Litz

WD7=Auxiliary, 8T, 0.17mm
WD6=Auxiliary, 4T, 0.17mm
WD2=Shielding, 13T, 2x0.17mm
WD5=Shielding, 4T, 0.17mm



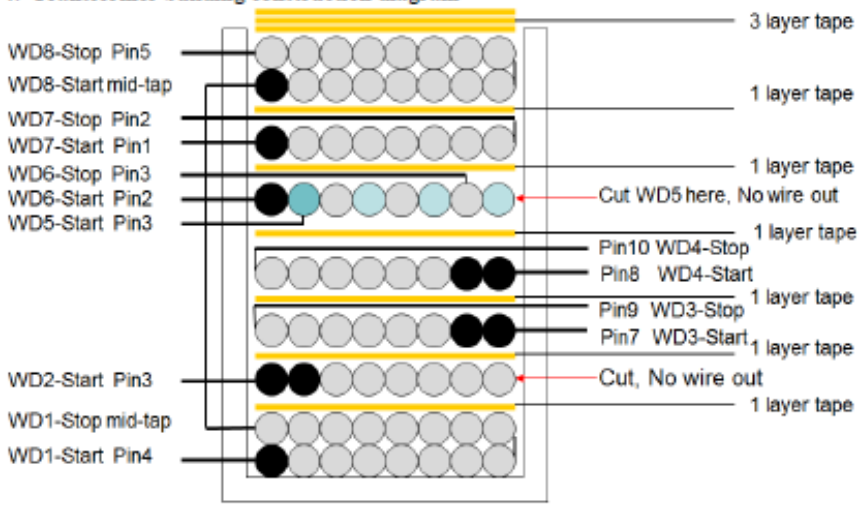
WD4=Output
4T, 2x0.45mm triple isolating wire

WD3=Output
4T, 2x0.45mm triple isolating wire

3. Electrical specification

Electrical Strength	Pin1, 2, 3, 4, 5 to Pin7, 8, 9, 10	3000V
Primary Inductance	Pins 4-5, all other windings open, measured at 10 kHz, 1V	310uH+/-10%

4. Transformer building construction diagram

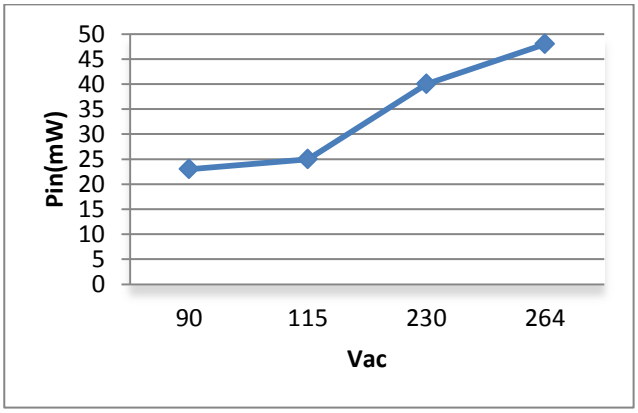


5. Note

a. WD1, WD8 绕组为两层，其余都为一层. WD1，WD8 中间抽头没有引脚端子可接，可在初级任意位置过渡, 不要剪断。
b. WD1,WD2,WD3,WD4,WD8 密绕，如有绕不满或绕不下的情况略微调整线径或股数。WD5,WD6,WD7 疏绕
c. WD5,WD6 绕组为双线并绕，WD5 结束端剪掉
d. 剪掉 Pin6

Standby Power at 5V Output (Cable unplug) @ 90 Vac to 264 Vac Input

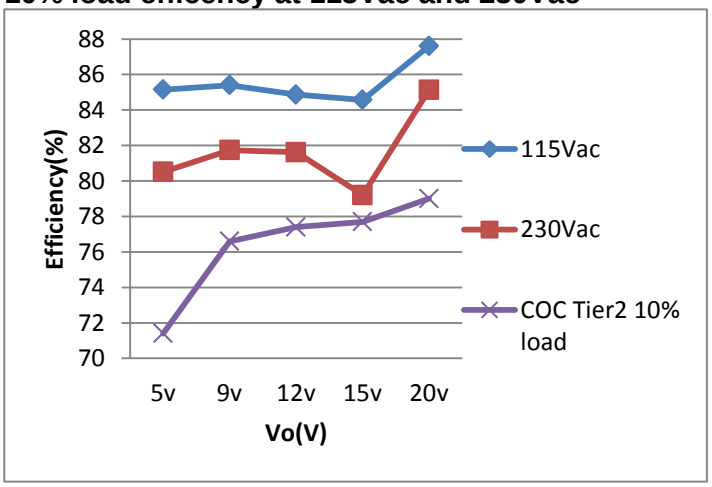
Test condition: all efficiency are tested at board end



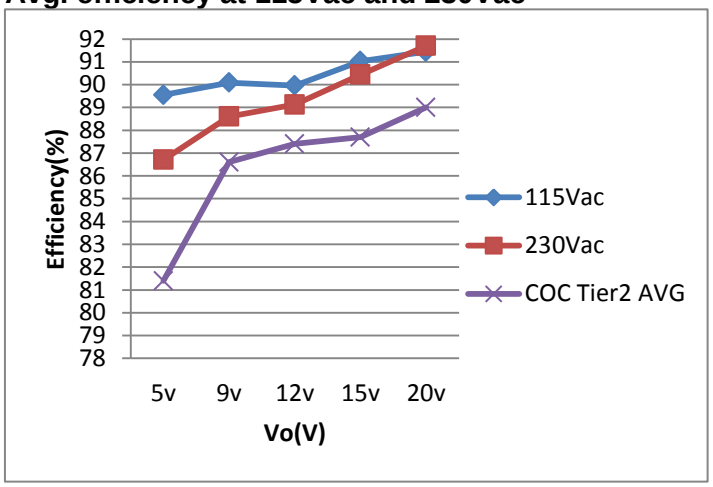
10% Load and Average Efficiency

Test condition: all efficiency are tested at board end

10% load efficency at 115Vac and 230Vac



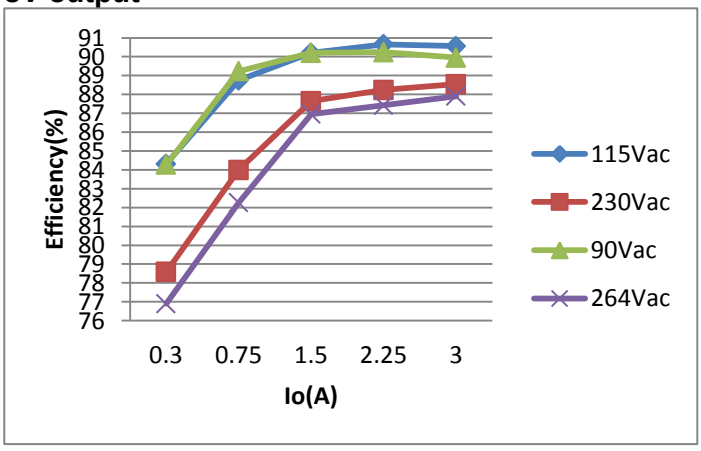
Avg. efficiency at 115Vac and 230Vac



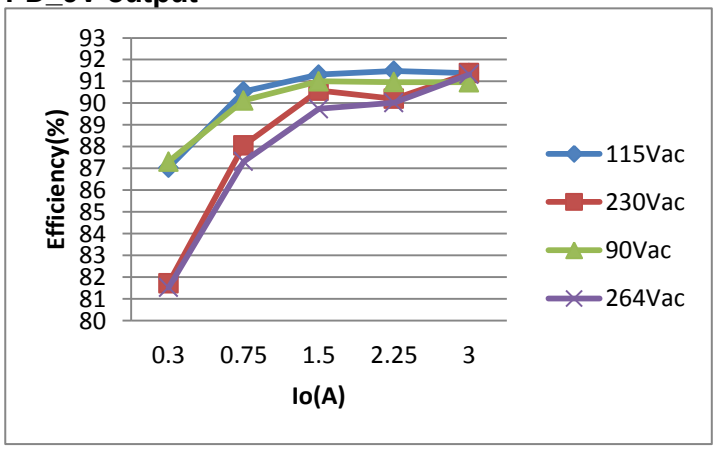
Efficiency vs Output Load Curves

Test condition: all efficiency are tested at board end

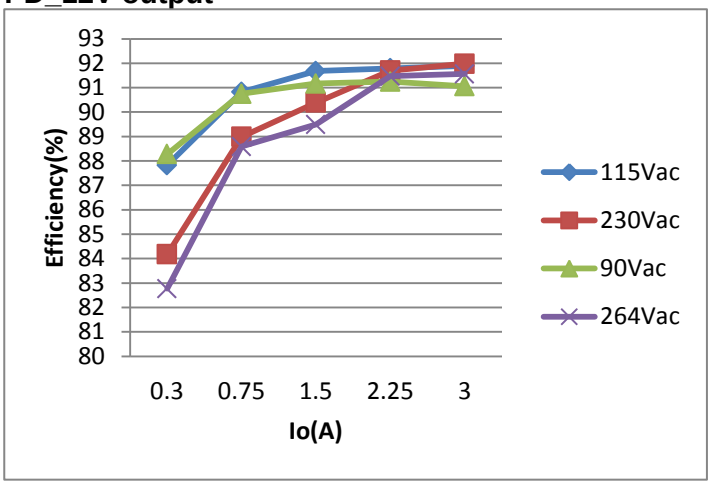
5V output



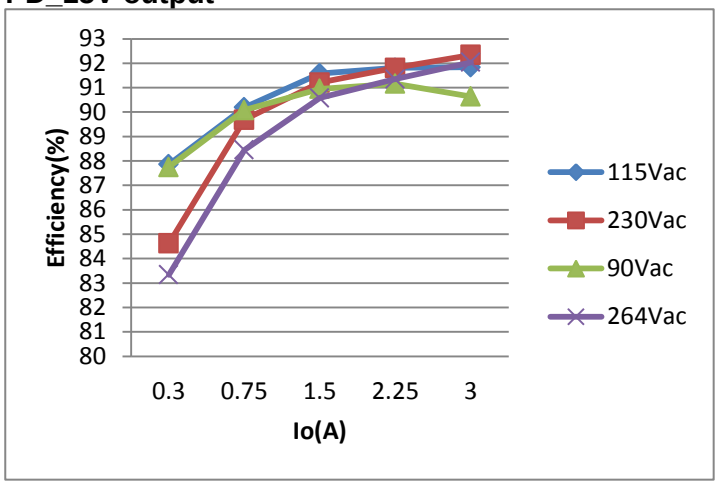
PD_9V output



PD_12V output



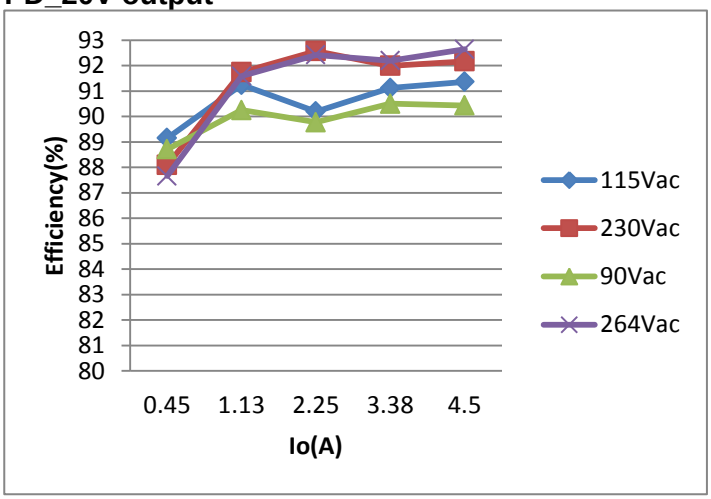
PD_15V output



Efficiency vs Output Load Curves(Continued)

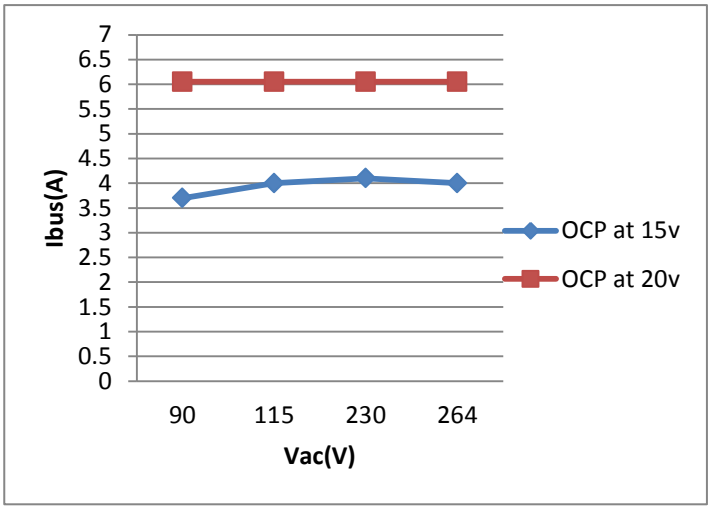
Test condition: all efficiency are tested at board end

PD_20V output

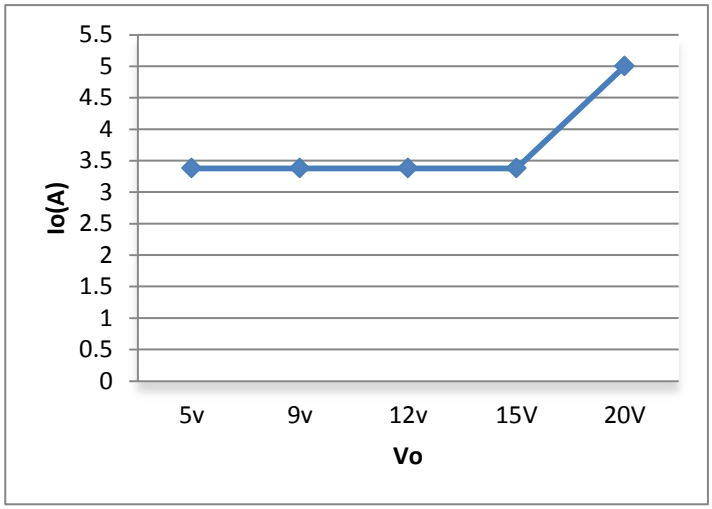


OCP

OCP for PWM at 15V and 20V

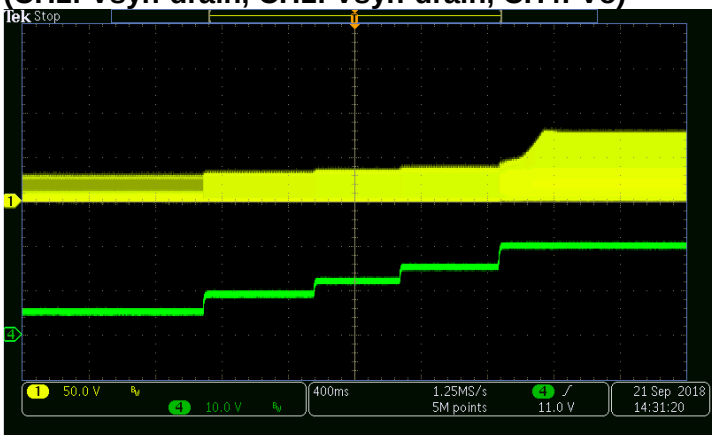


OCP for PD



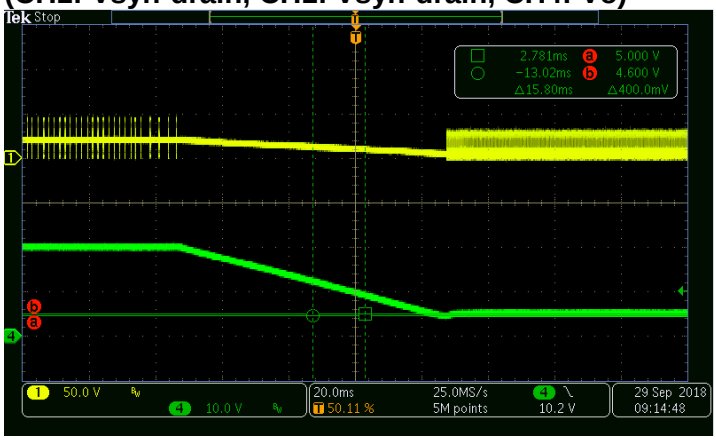
PD Volatge Change

(CH1: Vsyn-drain, CH1: Vsyn-drain, CH4: Vo)



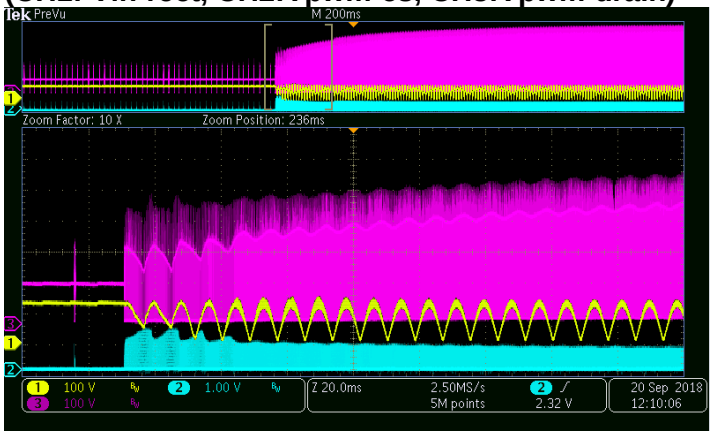
PD Voltage Change from 20v to 5v

(CH1: Vsyn-drain, CH1: Vsyn-drain, CH4: Vo)



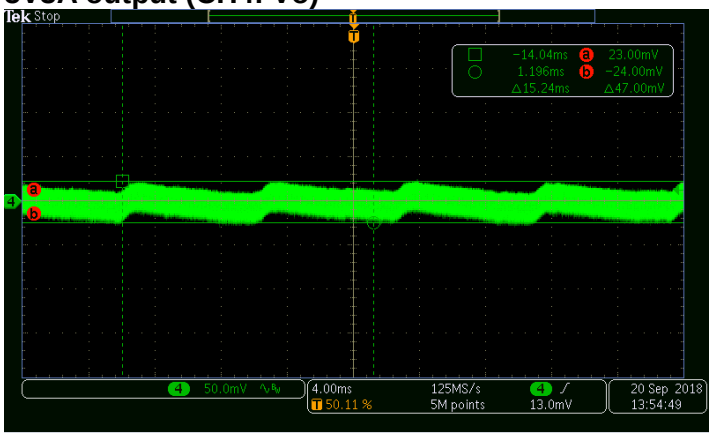
Apply load from 0 to full load at 20v

(CH1: Vin-rect, CH2:Vpwm-cs, CH3:Vpwm-drain)

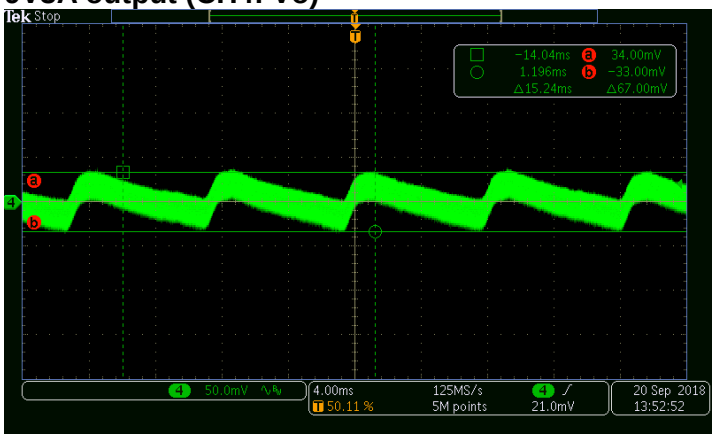


Output Ripple @ 90 Vac Input, 3A Output

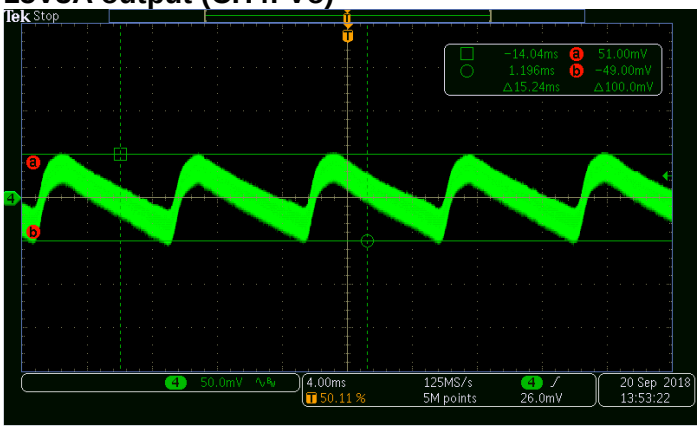
5V3A output (CH4: Vo)



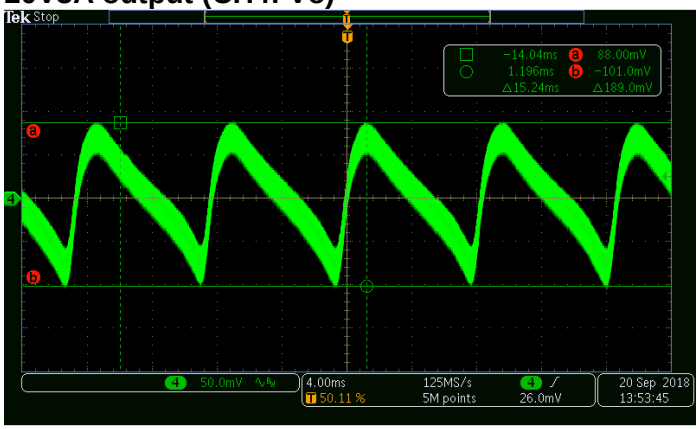
9V3A output (CH4: Vo)



15V3A output (CH4: Vo)

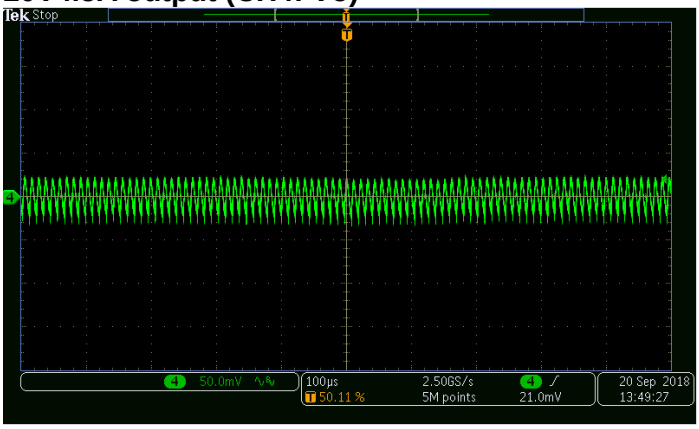


20V3A output (CH4: Vo)



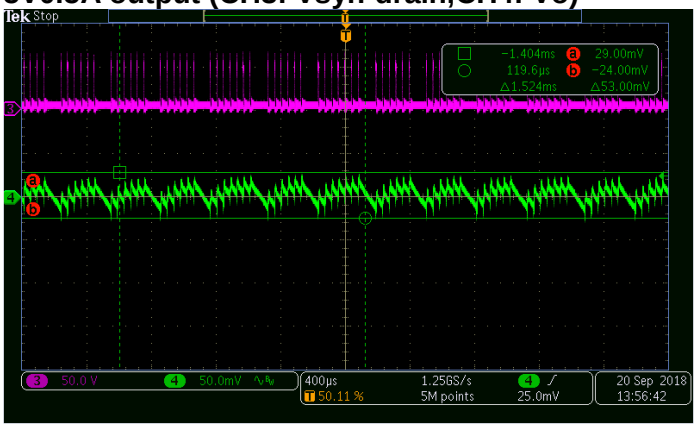
Output Ripple @ 90 Vac Input

20V4.5A output (CH4: Vo)

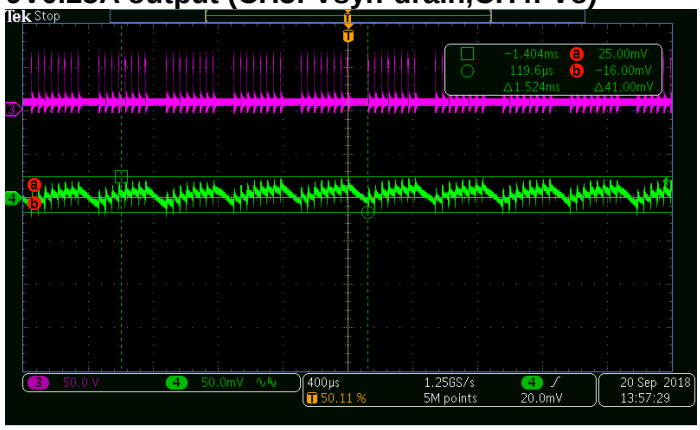


Output Skip Ripple @ 230 Vac Input

5V0.5A output (CH3: Vsyn-drain,CH4: Vo)

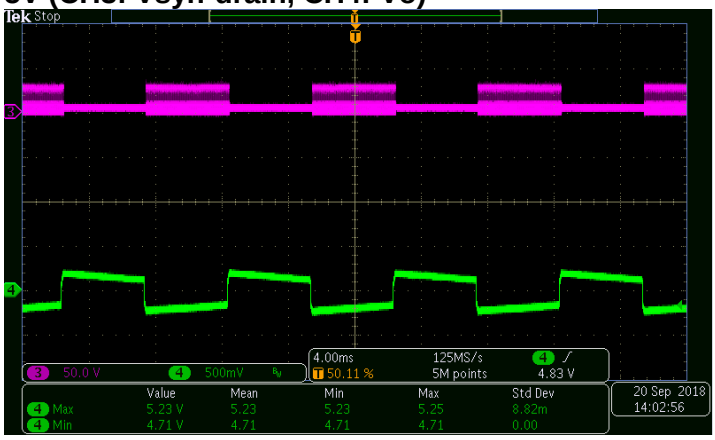


9V0.25A output (CH3: Vsyn-drain,CH4: Vo)



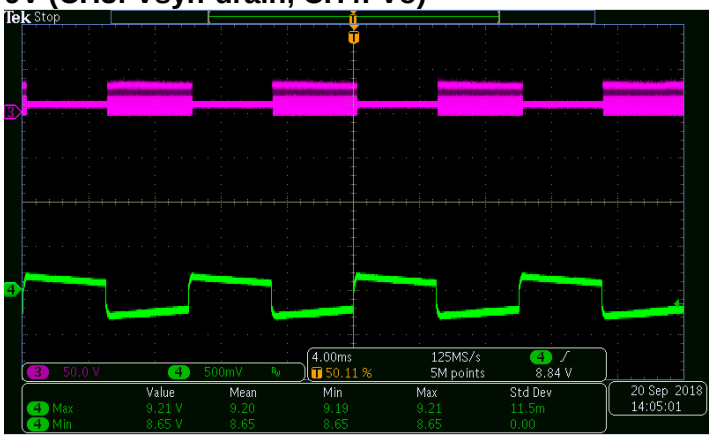
Dynamic Test Between 0-50% Load @ 115 Vac Input

5V (CH3: Vsyn-drain, CH4: Vo)



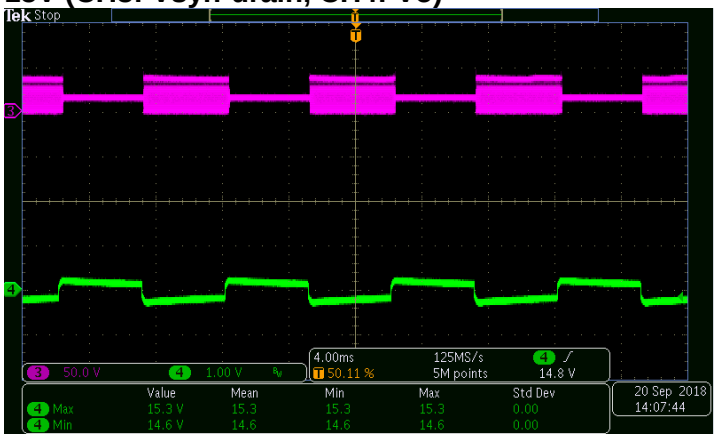
Test condition: 0-1.5A, 10mS cycle, 125mA/Us 1m cable, tested at E-load

9V (CH3: Vsyn-drain, CH4: Vo)



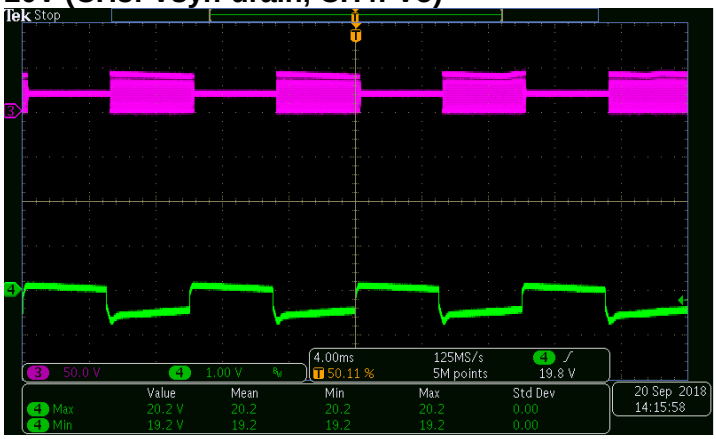
Test condition: 0-1.5A, 10mS cycle, 125mA/Us 1m cable, tested at E-load

15V (CH3: Vsyn-drain, CH4: Vo)



Test condition: 0-1.5A, 10mS cycle, 125mA/Us 1m cable, tested at E-load

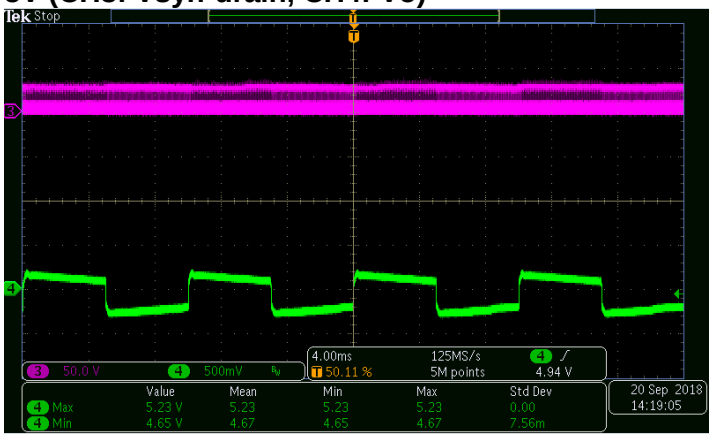
20V (CH3: Vsyn-drain, CH4: Vo)



Test condition: 0-2.25A, 10mS cycle, 125mA/Us 1m cable, tested at E-load

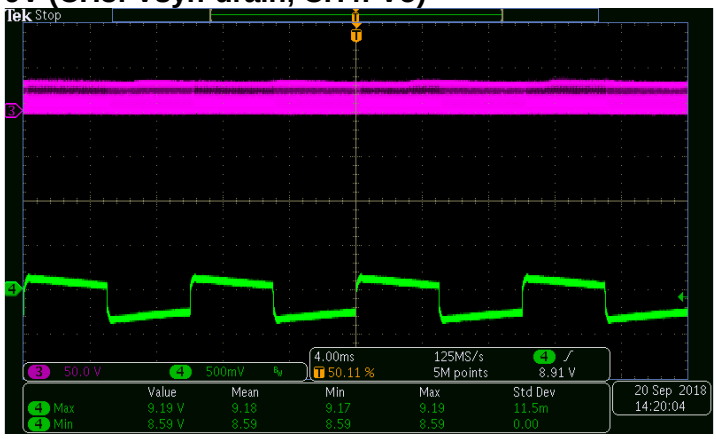
Dynamic Test Between 25%-75% Load @ 115 Vac Input

5V (CH3: Vsyn-drain, CH4: Vo)



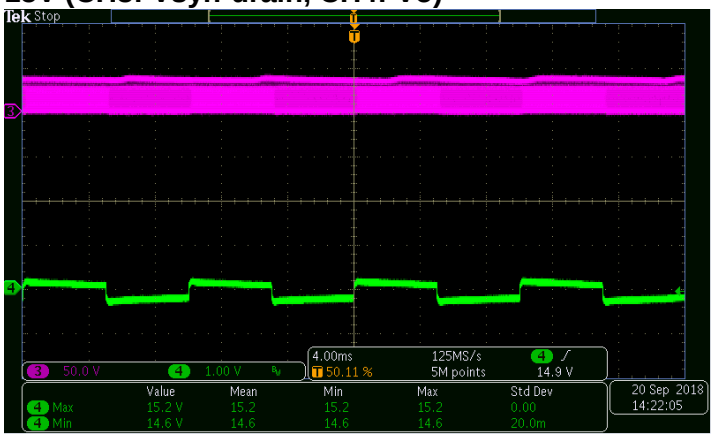
Test condition: 0.75A-2.25A, 10mS cycle, 125mA/uS, 1m cable, tested at E-load

9V (CH3: Vsyn-drain, CH4: Vo)



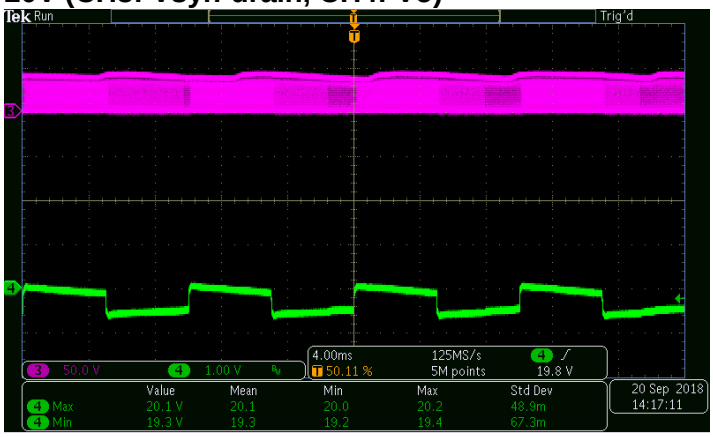
Test condition: 0.75A-2.25A, 10mS cycle, 125mA/uS, 1m cable, tested at E-load

15V (CH3: Vsyn-drain, CH4: Vo)



Test condition: 0.75A-2.25A, 10mS cycle, 125mA/uS,1m cable, tested at E-load

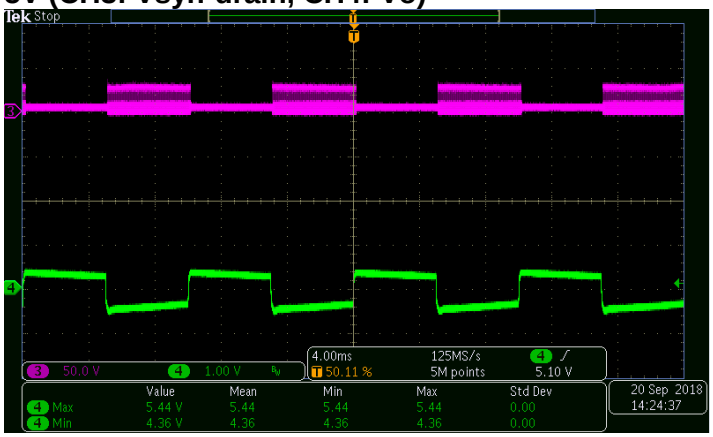
20V (CH3: Vsyn-drain, CH4: Vo)



Test condition: 1.13A-3.38A, 10mS cycle, 125mA/uS,1m cable, tested at E-load

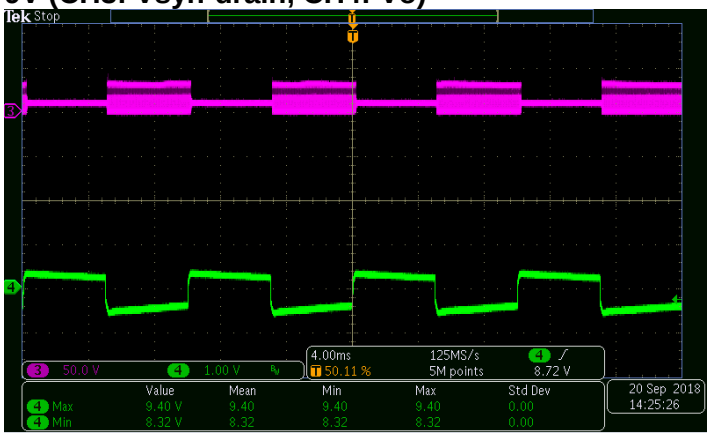
Dynamic Test Between 0%-100% Load @ 115 Vac Input

5V (CH3: Vsyn-drain, CH4: Vo)



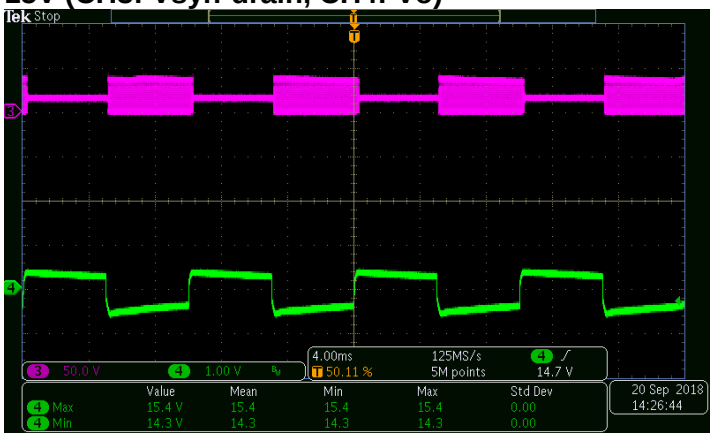
Test condition: 0A-3A, 10mS cycle, 125mA/uS, 1m cable, tested at E-load

9V (CH3: Vsyn-drain, CH4: Vo)



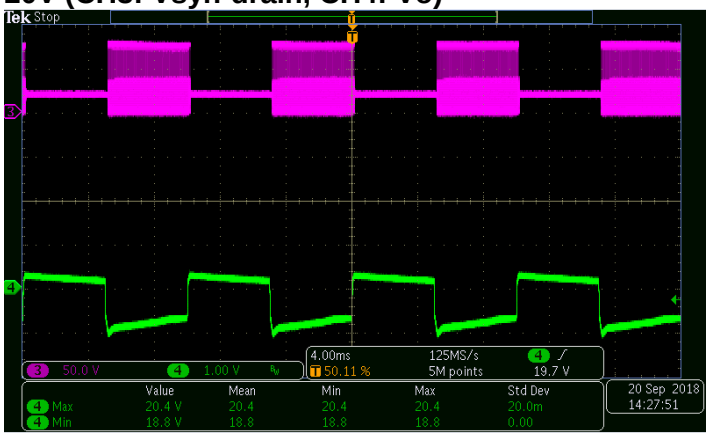
Test condition: 0A-3A, 10mS cycle, 125mA/uS, 1m cable, tested at E-load

15V (CH3: Vsyn-drain, CH4: Vo)



Test condition: 0A-3A, 10mS cycle, 125mA/uS,1m cable, tested at E-load

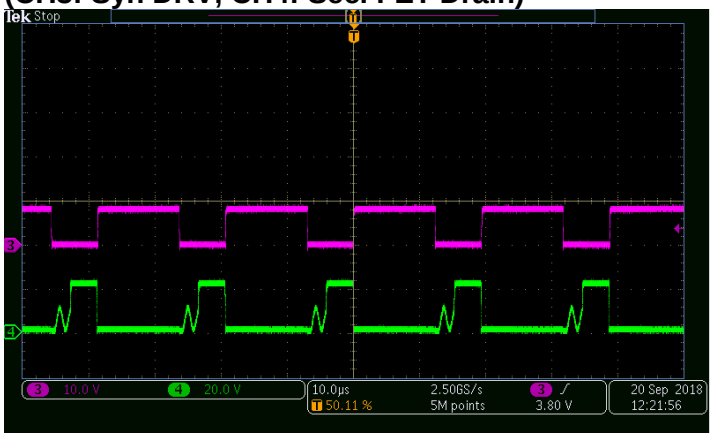
20V (CH3: Vsyn-drain, CH4: Vo)



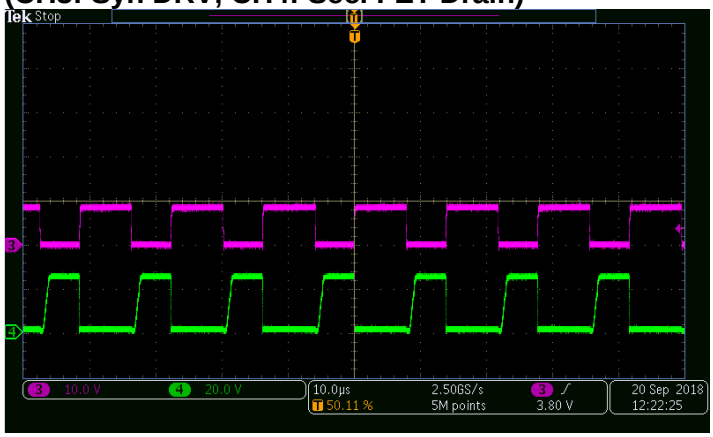
Test condition: 0A-4.5A, 10mS cycle, 125mA/uS,1m cable, tested at E-load

Synchronic Drive

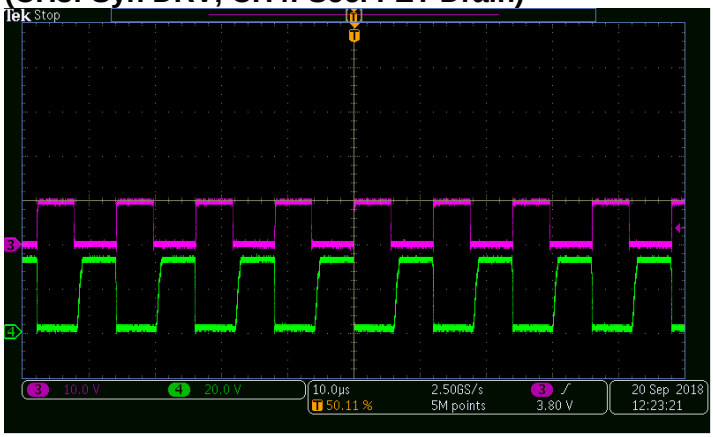
90 Vac input, 5V3A output
(CH3: Syn DRV, CH4: Sec. FET Drain)



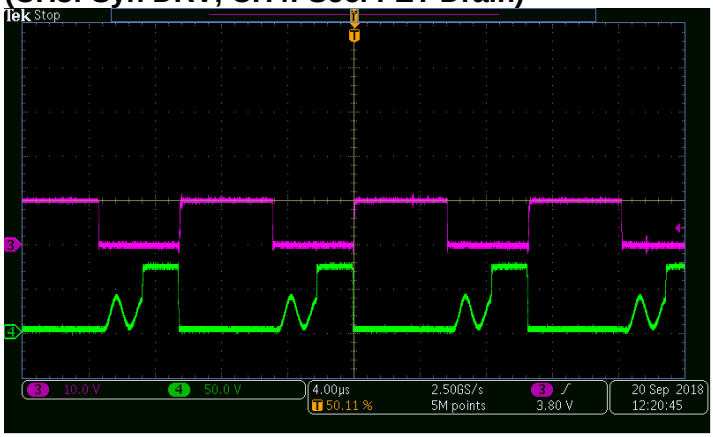
90 Vac input, 9V3A output
(CH3: Syn DRV, CH4: Sec. FET Drain)



90 Vac input, 15V3A output
(CH3: Syn DRV, CH4: Sec. FET Drain)

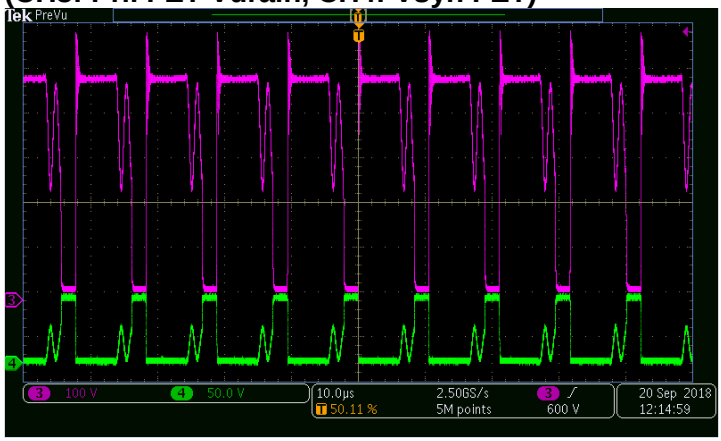


90 Vac input, 20V4.5A output
(CH3: Syn DRV, CH4: Sec. FET Drain)

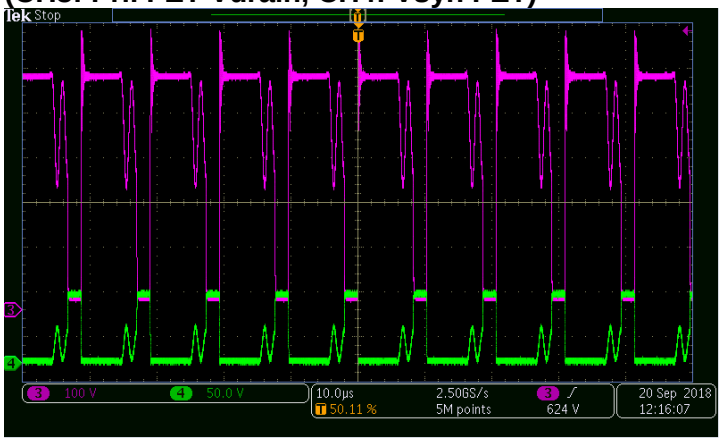


Primary and syn. FET Drain Voltage @ 90Vac&264Vac input, 20V4.5A output

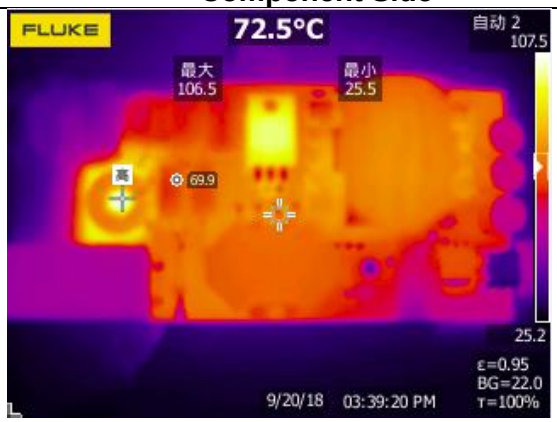
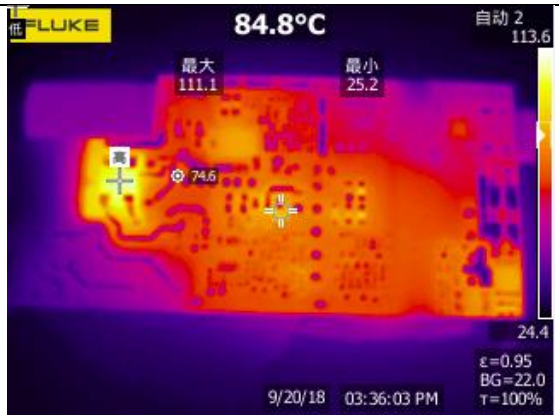
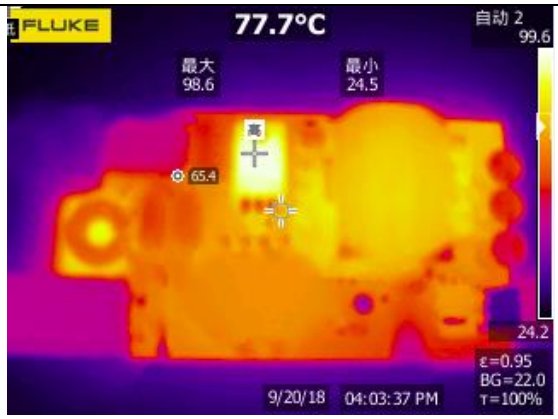
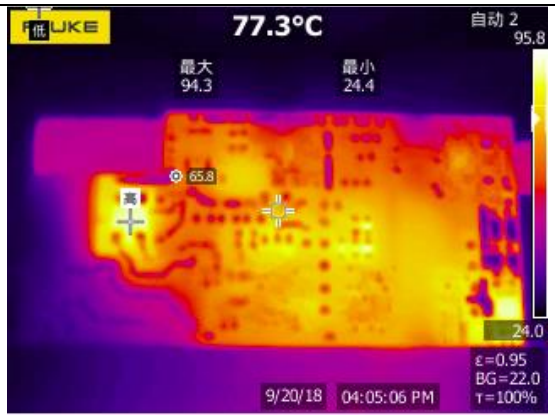
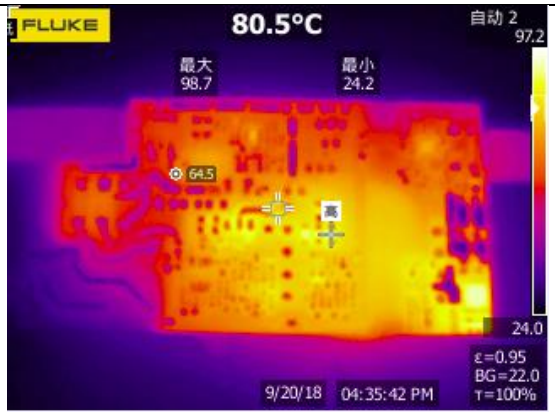
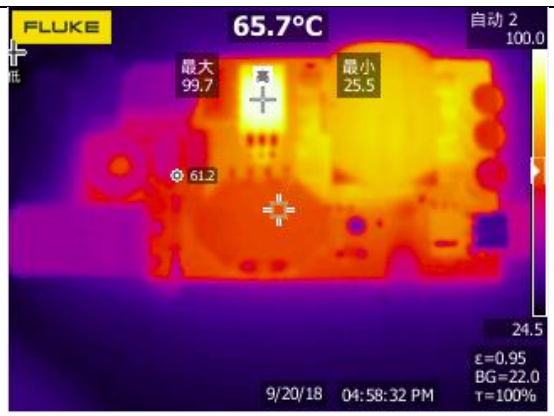
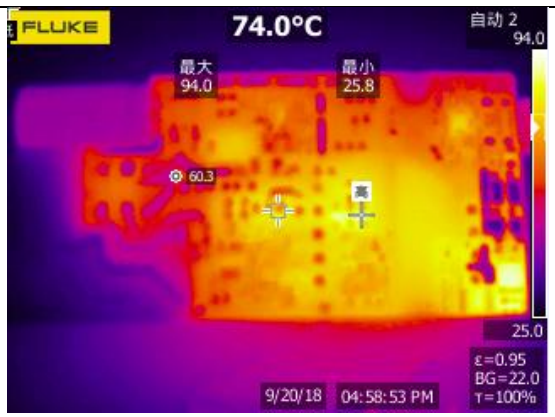
90 Vac input, 20V4.5A output
(CH3: Pri. FET Vdrain, CH4: Vsyn FET)



264 Vac input, 20V4.5A output
(CH3: Pri. FET Vdrain, CH4: Vsyn FET)



Thermal Image @ 20V4.5A Output

Input	Component Side	Back side
90 Vac		
115 Vac		
230 Vac		
264 Vac		

DN05115/D
BOM

Item	Qty	Reference	Type	Part Name	MFR	Value	Package	Description
1	1	Q6	NMOSFET	2N7002LT1G	ON	0.2A, 60V	SOT23	NMOSFET
2	2	C43 C45	Ceramic Capacitor	/885012206095	Wueth	0.1uF	603	Capacitor, Ceramic, 50V, 10%
3	1	C37	Ceramic Capacitor	/885012106019	Wueth	0.22uF	603	Capacitor, Ceramic, 25V, 10%
4	2	C1 C5	Film Capcitor	ECWFD2W684Q	Panason	0.68u, 450v	THT, 10mm, 13mmx6mmx12mm	
5	1	C33	Ceramic Capacitor	/885012206077	Wueth	100pF	603	Capacitor, Ceramic, 50V, 10%
6	1	C34	Ceramic Capacitor	/885012206077	std	100pF	603	Capacitor, Ceramic, 50V, 10%
7	2	C26 C31	Ceramic Capcitor	C3216X7T2W104K	TDK	104, 400V	1206	Capacitor, Ceramic, SMD, 5%
8	1	C18	Ceramic Capacitor	/885012206089	Wueth	10nF	603	Capacitor, Ceramic, 50V, 10%
9	1	C42	Ceramic Capacitor	/885012006051	Wueth	10pF	603	Capacitor, Ceramic, 50V, 10%
10	3	C9 C28 C30	Ceramic Capacitor	/885012206083	Wueth	1nF	603	Capacitor, Ceramic, 50V, 10%
11	1	C12	Ceramic Capacitor	C1608C0G2A102J	TDK	1nF, 100v	603	Capacitor, Ceramic, SMD, 5%
12	1	C3	Ceramic Capcitor	C3216C0G2J471J	TDK	1nF, 630V	1206	Capacitor, Ceramic, Chip, 5%
13	1	C8	Ceramic Capacitor	C2012X7S2A105K	TDK	1uF, 100V	805	Capacitor, Ceramic, 100V, 10%
14	8	C2 C7 C16-17	Ceramic Capacitor	/885012206076	Wueth	1uF, 25V	603	Capacitor, Ceramic, 25V, 10%
15	1	C39	Ceramic Capacitor	/885012206076	Wueth	1uF, 25V	603	Capacitor, Ceramic, 25V, 10%
16	1	C35	Ceramic Capacitor	/885012206085	Wueth	2.2nF	603	Capacitor, Ceramic, 50V, 10%
17	1	C36	Ceramic Capacitor	/885012106018	Wueth	2.2uF	603	Capacitor, Ceramic, 16V, 10%
18	1	C25	X2 Capcitor	/890324024002	Wueth	224, X2	THT, 12.	X2 capacitor, Safety standard approved, 10
19	2	C11 C23	Ceramic Capacitor	/885012206080	Wueth	330pF	603	Capacitor, Ceramic, 50V, 10%
20	1	C24	Ceramic Capacitor	C2012X7R1E475K	TDK	4.7uF, 25V	805	Capacitor, Ceramic, 25V, 10%
21	1	C4	Ceramic Capacitor	C2012X7R1E475K	TDK	4.7uF, 25v	805	Capacitor, Ceramic, 25V, 10%
22	1	C10	Ceramic Capcitor	CS65-B2GA471KYNF	TDK	470pF, Y1	Lead typ	HV Ceramic Capacitor, safety standard appro
23	2	C19 C22	Ceramic Capacitor	/885012206094	Wueth	68nF	603	Capacitor, Ceramic, 50V, 10%
24	1	C6	Ceramic Capacitor	/885012006056	std	68pF	603	Capacitor, Ceramic, 50V, 10%
25	1	C20	Ceramic Capacitor	NC	std	NC	603	Capacitor, Ceramic, 50V, 10%
26	1	C40	Ceramic Capcitor	/885342207016	WE	nc	805	Capacitor, Ceramic, Chip, 5%
27	1	D2	Bridge rectifier	Z4GP40MH	ZOWIE	4A, 1000V	Z4PAK	Bridge Rectifier, 1000V, 4A
28	1	D9	Rectifier	S3J	ON	3A, 600V	SMC	General Rectifier
29	1	DNR	Varistor	/820573011	Wurth	10D471K	TH	Varistor, 10D471K
30	9	D1 D7 D10-11	Switching diode	BAS21HT1G	ON	0.2A, 250V	SOD323	Switching diode, SMD
31	2	D4 D16	Switching diode	BAT54HT1G	ON	0.2A, 30V	SOD323	Switching diode, SMD
32	1	D6	Switching diode	NSD350HT1G	ON	0.2A, 350V	SOD323	Switching diode, SMD
33	1	D5	Ultrafast rectifi	US1JFA	ON(FSC)	0.8A, 600V	SOD123FL	Standard Rectifier, 0.8A, 600V
34	2	D12-13	Standard rectifie	RS1JFA	ON(FSC)	0.8A, 600V	SOD123FL	Standard Rectifier, 0.8A, 600V
35	5	D8 D17-18 D21	Switching diode	BAS21HT1G	ON	0.2A, 250V	SOD323	Switching diode, SMD
36	1	FB3	Ferrite bead	nc	nc		1206	nc
37	1	FB2	Ferrite bead	/742792121	Wueth	300ohm@100	1206	300ohm@100MHz
38	1	FB1	Ferrite bead	/74279218	Wueth	600ohm@100	1206	600ohm@100MHz
39	1	L2	Common filter	std	std	18mH	TH type	CM Filter, T12*8*7, 18mH
40	1	L1	Common filter	std	std	500uH	TH	T type, 9x5x3, 500uH
41	1	F1	Fuse	20T-016H	Hollyfu	1.6A, 250V	Axial le	Micro Fuse, 1.6A/250V
42	1	Q4	NPN Transistor	MMBTA06LT1G	ON		SOT23	General NPN Transistor, SMD
43	4	Q7 Q12 Q14 Q1	NPN Transistor	MMBT3904LT1G	ON		SOT23	General NPN Transistor, SMD

BOM (Continued)

Item	Qty	Reference	Type	Part Name	MFR	Value	Package	Description
44	1	Q10	NPN Transistor	MMBTA06LT1G	ON	80v	SOT23	General NPN Transistor, SMD
45	4	Q5 Q9 Q15 Q18	PNP Transistor	MMBT3906LT1G	ON		SOT23	General PNP Transistor, SMD
46	1	Q13	PNP Transistor	MMBTA56LT1G	ON		SOT23	General PNP Transistor, SMD
47	1	D3	Ultrafast Rectifi	MURD550PFG	ON	5A, 520V	DPAK	Ultrafast Rectifier, 5A, 520V
48	1	U6	Programmable prec	TLV431ASNT1G	ON		SOT23	PROGRAMMABLE PRECISION REFERENCE
49	1	U5	PFC controller	NCP1622AEC	ON		TSOP6	
50	1	U3	Syn. rectified co	NCP4306AADZZZADI	ON		SO8	Syn. Rectified Controller
51	1	U1	PWM Controller	NCP1342ANDBDD1R2	ON		SOP9	QR PWM controller
52	1	U7	LDO	NCP716BSN050T1G	ON		SOT23-5	
53	1	Q2	NMOSFET	FQPF380N65	ON	6A, 650V	TO-220FP	NMOS, 6A, 650V, TO-220FP
54	2	Q11 Q16	NMOSFET	FQN1N50C	ON	0.35A, 500	TO-92	NMOSFET, 0.35A, 500V
55	1	NTC1	NTC	SDNT1608X104J42	Sunloar	100k	603	
56	1	U4	Optical coupler	FODM1009	ON(FSC)		LSOP4	optical coupler, standard SOP package
57	1	Q8	PMOS	ATP104	ON	-30V, 8.4m	ATPAK	PMOS
58	1	L3	Toroidal Line Cho	/7447021	Wurth	100uH		Toroidal Line Choke, 15.8x8.5
59	1	L5	SMD inductor	MCL1608S4R7MT	Sunlord	4.7uH	603	SMD fixed inductor
60	1	T1	Transformer	BCK3301-191	Jepuls		TH type	POT33, 10Pin
61	1	Q3	MOSFET	FCMT299N60	ON		THINKPAK	MOSFET, NChan, 600V
62	1	R6	Resistor	Std	Std	1	603	Resistor, Chip, 1/8W, 1%
63	1	R15	Resistor	Std	Std	1.2k	603	Resistor, Chip, 1/8W, 1%
64	1	R9	Resistor	Std	Std	1.6K	603	Resistor, Chip, 1/8W, 1%
65	1	R67	Resistor	Std	Std	1.8k	603	Resistor, Chip, 1/8W, 1%
66	5	R13 R49 R61-6	Resistor	Std	Std	100K	603	Resistor, Chip, 1/8W, 1%
67	9	R18 R33 R35 F	Resistor	Std	Std	10K	603	Resistor, Chip, 1/8W, 1%
68	1	R37	Resistor	Std	Std	120k	603	Resistor, Chip, 1/8W, 1%
69	1	R60	Resistor	Std	Std	12k	603	Resistor, Chip, 1/8W, 1%
70	1	R11	Resistor	Std	Std	150	603	Resistor, Chip, 1/8W, 1%
71	1	R8	Resistor	Std	Std	15k	603	Resistor, Chip,1/8W, 1%
72	1	R69	Resistor	Std	Std	17.6k	603	Resistor, Chip, 1/8W, 1%
73	2	R17 R46	Resistor	Std	Std	18K	603	Resistor, Chip, 1/8W, 1%
74	1	R3	Resistor	Std	Std	1K	603	Resistor, Chip, 1/8W, 1%
75	1	R22	Resistor	Std	Std	1K	603	Resistor, Chip, 1/8W, 1%,
76	2	R21 R63	Resistor	Std	Std	1k	603	Resistor, Chip, 1/8W, 1%
77	1	R57	Resistor	Std	Std	20k	603	Resistor, Chip, 1/8W, 1%
78	6	R19 R26-28 R3	Resistor	Std	Std	22	603	Resistor, Chip, 1/8W, 1%
79	1	R56	Resistor	Std	Std	22K	603	Resistor, Chip, 1/8W, 1%

BOM (Continued)

Item	Qty	Reference	Type	Part Name	MFR	Value	Package	Description
80	2	R7 R44	Resistor	Std	Std	300k	603	Resistor, Chip, 1/8W, 1%
81	2	R16 R30	Resistor	Std	Std	30k	603	Resistor, Chip, 1/8W, 1%
82	2	R10 R48	Resistor	Std	Std	4.7	603	Resistor, Chip, 1/8W, 1%
83	2	R23 R59	Resistor	Std	Std	4.7K	603	Resistor, Chip, 1/8W, 1%
84	1	R54	Resistor	Std	Std	47	603	Resistor, Chip, 1/8W, 1%
85	1	R25	Resistor	Std	Std	47K	603	Resistor, Chip, 1/8W, 1%
86	1	R52	Resistor	Std	Std	6.8k	603	Resistor, Chip, 1/8W, 1%
87	1	R32	Resistor	Std	Std	68K	603	Resistor, Chip, 1/8W, 1%
88	1	R20	Resistor	Std	Std	750k	603	Resistor, Chip, 1/8W, 1%
89	2	R24 R43	Resistor	Std	Std	75K	603	Resistor, Chip, 1/8W, 1%
90	1	R53	Resistor	Std	Std	82k	603	Resistor, Chip, 1/8W, 1%
91	1	R29	Resistor	Std	Std	nc	603	Resistor, Chip, 1/8W, 1%,
92	2	R50-51	Resistor	ERJ8BQFR030V	Panason	0.3	1206	Resistor, Chip, 1/2W, 1%
93	2	R4-5	Resistor	ERJ8BQFR062V	Panason	0.62	1206	Resistor, Chip, 1/2W, 1%
94	1	R2	Resistor	Std	Std	10	1206	Resistor, Chip, 1/4W, 1%
95	2	R65-66	Resistor	Std	Std	160k	1206	Resistor, Chip, 1/2W, 1%
96	1	R31	Resistor	Std	Std	1k	805	Resistor, Chip, 1/5W, 1%
97	1	R70	Resistor	Std	Std	1k	1206	Resistor, Chip, 1/2W, 1%
98	1	R64	Resistor	Std	Std	20k	1206	Resistor, Chip, 1/2W, 1%
99	2	R41-42	Resistor	Std	Std	2M	1206	Resistor, Chip, 1/2W, 1%
100	2	R12 R34	Resistor	Std	Std	47	805	Resistor, Chip, 1/5W, 1%
101	1	R14	Resistor	ERJ8BWFR005V	Panason	5mohm	1206	Resistor, Chip, 1/2W, 1%
102	1	R40	Resistor	Std	Std	680k	1206	Resistor, Chip, 1/2W, 1%
103	2	R1 R45	Resistor	Std	Std	75k	1206	Resistor, Chip, 1/4W, 1%
104	1	L4	PFC Inductor	Jepuls/750343888	Jepuls/	300uH	TH type	RM10LP, 5Pin
105	1	C21	Electrolytic soli	PS681M025F080P	CapXon	10uF,100V	5mmx11mm	size:8mmx16mm
106	1	C41	Electrolytic soli	std	std	10uF,25V	5mmx11mm	size:5mmx11mm
107	3	C13-15	Electrolytic soli	PS561M025F080P	CapXon	560uF,25V	8mmx12mm	size:8mmx12mm
108	1	C32	Electrolytic elec	KL680M420J300A0(	CapXon	68uF,420V	16mmx30m	size:13mmx25mm
109	1	Q1	MOSFET	NTMFS6B03NLT1G	ON		SO8FL	MOSFET, NChan, 100V
110	1	J1	USB Type C connec	CUS31738616001	CSCONN		SMD	Type C connector, SMT
111	1	U2	PD Controller	WT6615F-UG16CWT-	Weltrend		DFN16	PD Controller
112	1	ZD5	Zener	MM3Z10VT1G	ON	10V	SOD323	GENERIC ZENER-DIODE
113	2	ZD1 ZD4	Zener	MM3Z15VT1G	ON	15V	SOD323	GENERIC ZENER-DIODE
114	2	ZD2 ZD6	Zener	MM3Z22VT1G	ON	22V	SOD323	GENERIC ZENER-DIODE
115	1	ZD3	Zener	MM3Z5V6T1G	ON	5.6V	SOD323	GENERIC ZENER-DIODE
116	4	ESD1-4	ESD	SD05T1G	ON	5V	SOD323	ESD protection device

References

ON Semiconductor datasheet for NCP1342/4306/,FCMT299N60,FQPF380N65,NTMFS6B03,ATP104

ON Semiconductor Design Notes DN05043

Weltrend semiconductor datasheet for WT6615F

Design note created by; e-mail: david.dou@onsemi.com