Subject	Board Model: PD20V2.25A OB2632CP+2612
OB2632+OB2612 Demo Board Manual	Doc. No.: OB_DOC_DBM_B_2632+261201

Key features:

- Support Power Delivery 2.0 Protocol
- Output voltage: 5V/9V/12V/15V/20V
- Output current: 3A/3A/3A/3A/2.25A
- High voltage startup
- Standby power less than 75mW
- Average efficiency meet COC V tier2
- Comprehensive protection coverage such as SCP、OCP、OLP、OVP、OTP and Brownout etc.
- High precision OCP performance
- Programmable cable drop compensation
- Peak power function
- Meet EN55022 Class B EMI

Revision History

Revise Date	Version	Reason/Issue
2017/07/17	00	First issue
2017/09/08	01	Update Bill of material

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Table Index

Figure Index

1 Adapter Module Specification

1.1 Input Characteristics

- AC input voltage rating: 100Vac ~ 240Vac
- AC input voltage range: 90Vac ~ 264Vac
- AC input frequency range: 47Hz ~ 63Hz
- Input current: 1.5 Arms max.

1.2 Output Characteristics

- Output Voltage: 5V/9V/12V/15V/20V
- Output Tolerance: ±5%
- Min. load current: 0A
- Max. load current: 5V3A/9V3A/12V3A/15V3A/20V2.25A

1.3 Performance Specifications

- Max. Output Power: 45W
- Standby Power: <75mW @ 264V/50Hz, no load
- Efficiency: Meet COC Ⅴ tier2
- Line Regulation: ±2%
- Load Regulation: ±5%
- Ripple and Noise: <200mVpk-pk@20V
- Hold up Time: 10m Sec. Min. @100Vac with full load
- Turn on Delay Time: 2 Sec. Max. @90Vac with full load

1.4 Protection Features

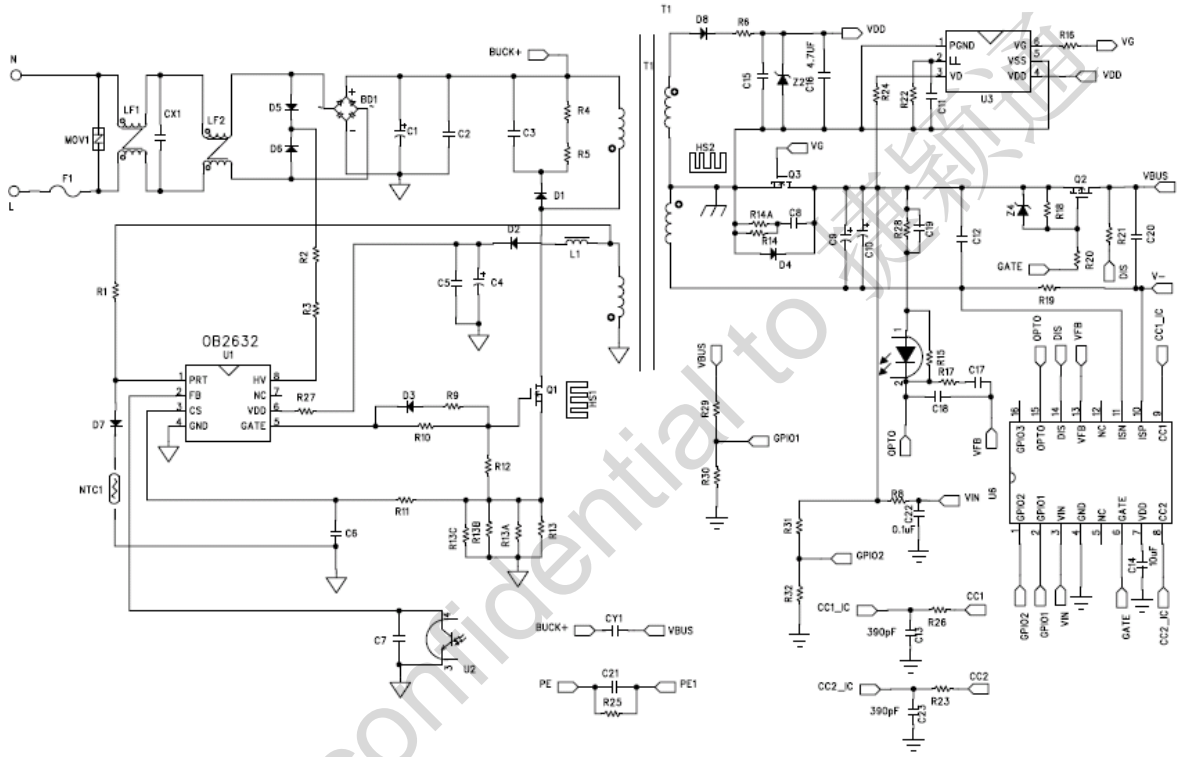
- Short Circuit Protection: Output shut down with auto-recovery
- Over Voltage Protection: Output shut down with auto-recovery
- Over Current Protection: Output shut down with auto-recovery
- Over Temperature Protection: Output shut down with latch

1.5 Environments

- Operating Temperature: 0℃ to +40℃
- Operating Humidity: 20% to 90% R.H.
- Storage Temperature: -40℃ to +60℃
- Storage Humidity: 0% to 95% R.H.

2 Adapter Module Information

2.1 Schematic

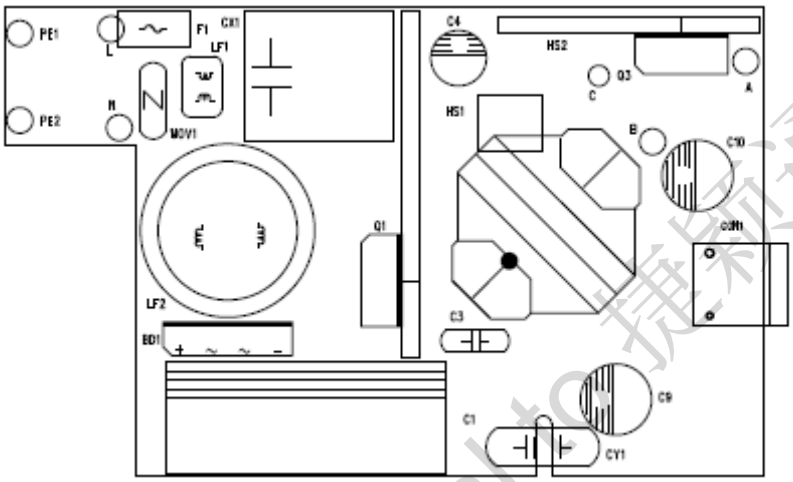


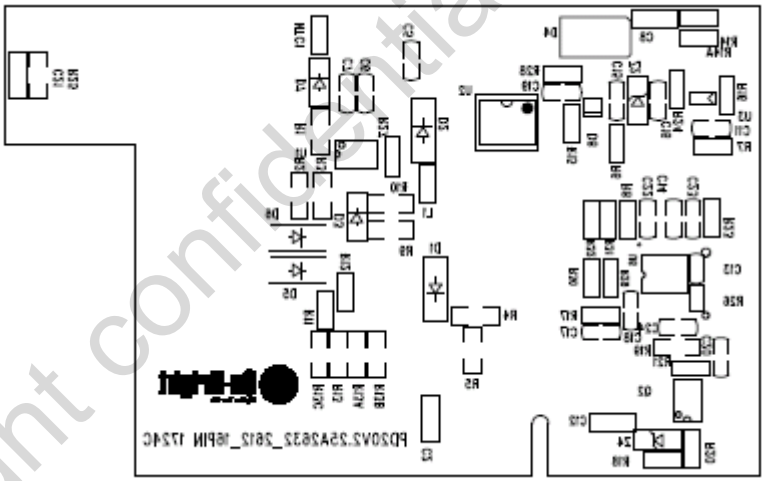
2.2 Bill of material

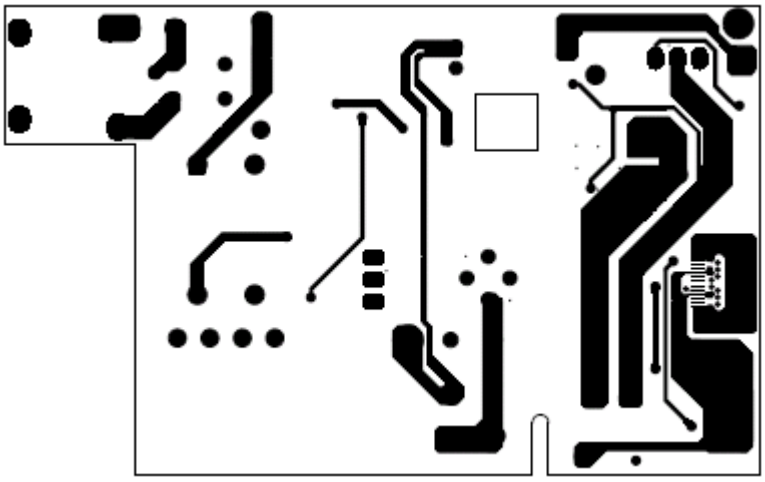
Position	Description	Quantity
BD1	Diode, bridge recovery, KBP308, 3A/ 800V	1
C1	Capacitor, aluminum electrolytic, Rubycon 82uF/400V,16*25mm, 105℃,±20%	1
C2	Capacitor, ceramic,10nF/1KV, X7R, ±10%,SMD1206	1
C3	Capacitor, CBB,2.2nF/630V, 105℃,±20%	1
C4	Capacitor, aluminum electrolytic, 10uF/100V, 105℃,±20%	1
C5,C22,C17	Capacitor, ceramic,100nf/50V, X7R, ±10%,SMD0805	3
C6	Capacitor, ceramic,200pF/50V, X7R, ±10%,SMD0805	1
C7	Capacitor, ceramic,1.5nF/50V, X7R, ±10%,SMD0805	1
C8	Capacitor, ceramic,1nF/250V, X7R, ±10%,SMD1206	1
C9,C10	Capacitor, aluminum electrolytic,LOW ESR, 470uF/25V, 105℃,	2
C11	Capacitor, ceramic,1nF/50V, X7R, ±10%,SMD0805	1
C12	Capacitor, ceramic,1uF/50V, X7R, ±10%,SMD1206	1
C13,C23	Capacitor, ceramic,330pF/50V, X7R, ±10%,SMD0805	2
C14	Capacitor, ceramic,2.2uF/50V, X7R, ±10%,SMD0805	1
C15,C16	Capacitor, ceramic,4.7uF/50V, X7R, ±10%,SMD0805	2
C18	Capacitor, ceramic,4.7nF/50V, X7R, ±10%,SMD0805	1
C19	Capacitor, ceramic,10nF/50V, X7R, ±10%,SMD0805	1
C20	Capacitor, ceramic,10uF/50V, X7R, ±10%,SMD0805	1
C21	Capacitor, ceramic,100pF/250V, X7R, ±10%,SMD0805	1
C24	Capacitor, ceramic,1uF/50V, X7R, ±10%,SMD0805	1
CX1	Capacitor, X2, 0.33uF/275VAC, 105℃,±20%	1
CY1	Capacitor,Y1,disk, 102 /250VAC, 105℃,±20%	1
D1,D2	Diode ,RS1M ,1A/1KV SMD	2
D3,D7	Diode , 1N4148 ,0.5A/75V SMD	2
D4	Diode , V12PM12, TO-277C	1
D5,D6	Diode , M7 ,1A/1KV SMD	2
D8	Diode ,R1G 400V/1A SOD-123FL	1
Z2	ZENER,27V, SMD1206	1
F1	Fuse, 3.15A/250V	1
L1	Be core,chip,10uH,1/8W,SMD0805	1
LF1	Inductor, choke, dual winding,400Uh min, core10*6*5mm, Φ0.55mm*2P*11Ts	1
LF2	Inductor, choke, dual winding,30mHmin, core8.5*9.5*18mm, Φ0.5mm*50Ts*2	1
MOV1	MOV 7D471	1
NTC1	Resistor, chip, 100K ,1/8W,±5%,SMD0805	1
Q1	MOSFET,MOS power N-channel, TK11A65D 11A/650V, TO-220	1
Q2	P-Channel MOSFET, FDS6681Z ,SOP8	1
Q3	MOSFET, IPI075N15N3G, 150V/100A/7.2mohm , TO-262	1
R1	Resistor, chip, 150K,1/4W,±1%,SMD1206	1
R2,R3, R4,R5	Resistor, chip, 100K,1/4W,±5%,SMD1206	4
R6	Resistor, chip, 10R,1/8W,±5%,SMD0805	1
R7	Resistor, chip, 240K ,1/8W,±5%,SMD0805	1
R8,R16	Resistor, chip, 0R,1/8W,±5%,SMD0805	2
R9	Resistor, chip, 20R ,1/4W,±5%,SMD1206	1

R10	Resistor, chip, 47R ,1/4W,±5%,SMD1206	1
R11	Resistor, chip, 330R,1/8W,±5%,SMD0805	1
R12	Resistor, chip, 20K,1/8W,±5%, SMD0805	1
R13, R13A, R13B	Resistor, chip, 1.2R,1/4W,±1%,SMD1206	3
R14,R14A	Resistor, chip, 56R,1/8W,±5%,SMD0805	2
R15	Resistor, chip, 4.7K ,1/8W,±5%,SMD0805	1
R17	Resistor, chip, 30K,1/8W,±5%,SMD0805	1
R18	Resistor, chip, 100K ,1/8W,±5%,SMD0805	1
R19	Resistor, chip, 0.005R,1/4W,±1%,SMD1206	1
R20,R24	Resistor, chip, 1K ,1/8W,±5%,SMD0805	2
R21	Resistor, chip, 2K ,1/8W,±5%,SMD0805	1
R25	Resistor, chip, 1K,1/4W,±5%,SMD1206	1
R23,R26	Resistor, chip, 47R ,1/8W,±5%,SMD0805	2
R27	Resistor, chip, 68R ,1/8W,±5%,SMD0805	1
R28	Resistor, chip, 3K,1/8W,±5%,SMD0805	1
R29,R31	Resistor, chip, 1M,1/8W,±5%,SMD0805	2
R30,R32	Resistor, chip, 110K,1/8W,±5%,SMD0805	2
T1	Transformer,560uH 10KHz/1V,RM8 PC44	1
U1	IC,PWM controller, OB2632CP, SOP8	1
U2	IC, photo coupler ,PC817B	1
U3	IC,SR controller,MP6907	1
U6	IC,PD controller,OB2612,TSSOP16	1
PCB	PD20V2.25A2632_2612_16PIN 1724C	1
R13C,Z4	NC	2

2.3 PCB Gerber File

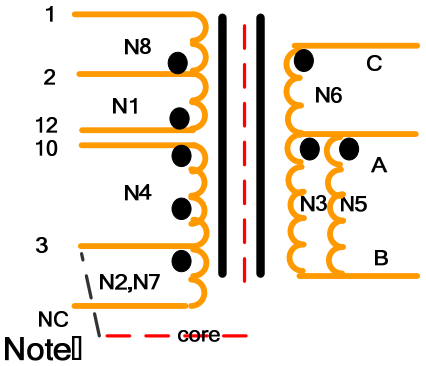






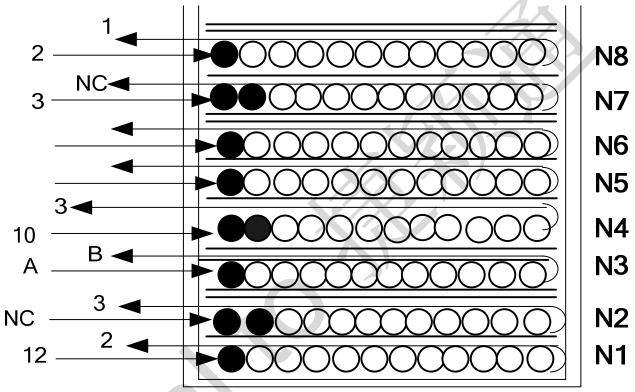
2.4 Transformer design

2.4.1 Transformer Specification



Note：

1. Bobbin: RM8
2. Core : TDK PC 44
3. L12-1=560UH +/-7%. (at: 10KHz/1V)



Pin end

2.4.2 Transformer Winding data

No.	Winging	Material	Start	Turns	Finish	Remark
1	N1	Φ0.27*1 2UEW	12	30	2	
2	TAPE	TAPE W=9.5mm (Y)		1		
3	N2	0.12*3	NC	12	3	
4	TAPE	TAPE W=9.5mm (Y)		2		
5	N3	Φ0.6*1 triple insulated wire	A	10	B	Tight winding
6	TAPE	TAPE W=9.5mm (Y)		2		
7	N4	Φ0.15*2 2UEW	10	19	3	
8	TAPE	TAPE W=9.5mm (Y)		2		
9	N5	Φ0.6*1 triple insulated wire	A	10	B	Tight winding
10	TAPE	TAPE W=9.5mm (Y)		1		
11	N6	Φ0.16 triple insulated wire	C	11	A	Space winding
12	TAPE	TAPE W=9.5mm (Y)		2		
13	N7	Φ0.12*3 2UEW	3	12	NC	Tight winding
14	TAPE	TAPE W=9.5mm (Y)		1		
15	N8	Φ0.27*1 2UEW	2	29	1	Tight winding
16	TAPE	TAPE W=9.5mm (Y)		2		

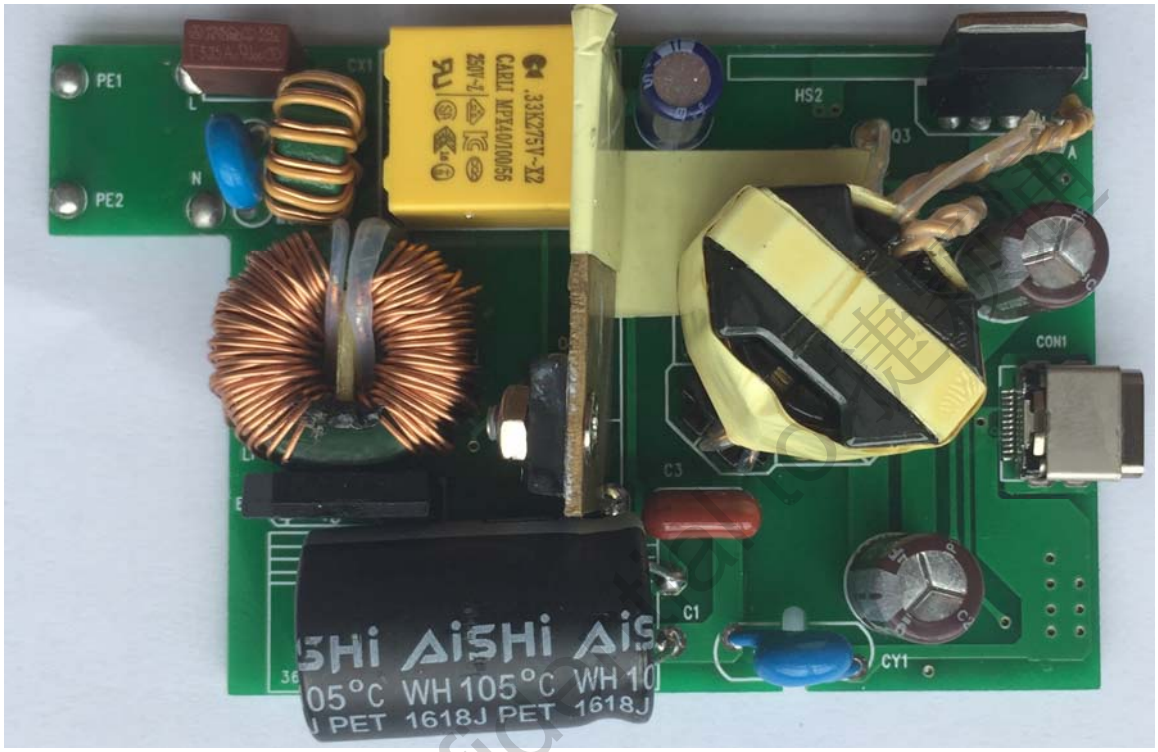
Remark：

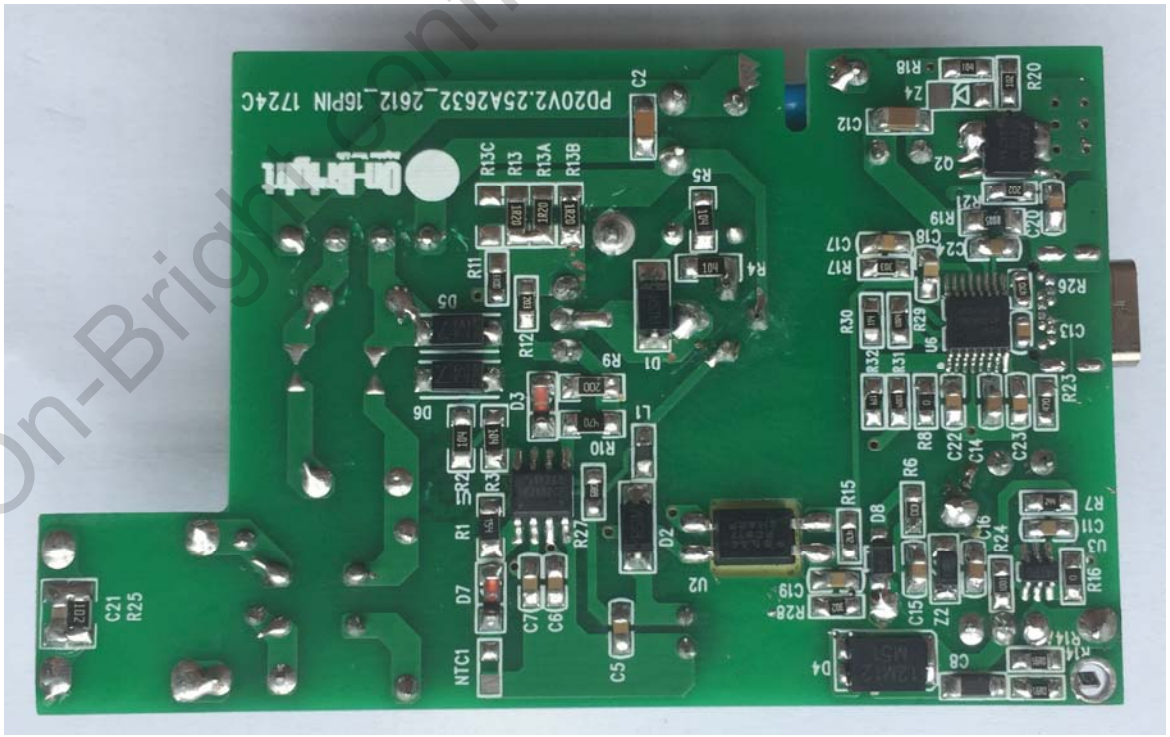
1, All winding don't interleave with each other.

2, Core is connected to pin 3.

3, Wrap core with 2 layer of tape

2.5 Adapter Module Snapshot





3 Performance Evaluation

Test Equipments

Item	Vender	Module
AC Source:	WEST	WEW1010
Digital Power Meter	YOKOGAWA	WT210
Electrical Load	Prodigit	3315C
Oscilloscope	LeCroy	WS424
Multimeter	VICTORY	VC9807A
Thermal	FLUKE	HS 2

3.1 Input Characteristics

3.1.1 Input current and Standby power

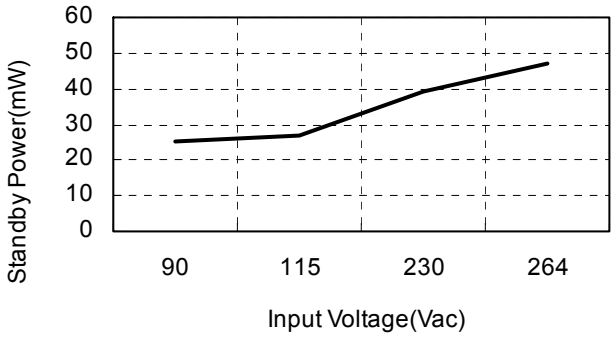
The module was tested at different input voltages (from 90Vac to 264Vac)

Table 1 Input current at full load

Input Voltage	90V/60Hz	115V/60Hz	230V/50Hz	264V/50Hz
Input Current(A)	1.04	0.85	0.62	0.55

Table 2 Standby power at no load

Input voltage	Pin(mW)	Vo(V)	Specification	Test result
90Vac/60HZ	25	4.97	**<75mW**	**Pass**
115Vac/60HZ	27	4.97		
230Vac/50HZ	39	4.97		
264Vac/50HZ	47	4.97		



3.1.2 Efficiency

Table 3 Efficiency @PCB End

5V3A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	88.63%	89.33%	89.33%	88.75%	89.01%	81.84%	84.62%	72.48%
230Vac	87.27%	86.88%	86.48%	83.43%	86.01%		76.98%	

9V3A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	89.72%	89.78%	90.46%	90.09%	90.01%	87.30%	86.52%	77.30%
230Vac	89.08%	88.77%	89.48%	87.00%	88.58%		81%	

12V3A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	89.91%	90.63%	90.44%	89.98%	90.24%	88.30%	86.64%	78.30%
230Vac	90.88%	90.28%	89.18%	87.82%	89.54%		82.7%	

15V3A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	89.89%	90.77%	90.26%	90.20%	90.28%	88.85%	86.95%	78.85%
230Vac	90.32%	90.65%	90.98%	89.00%	90.24%		83.9%	

20V2.25A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	90.45%	90.37%	89.97%	89.09%	89.97%	88.85%	85.27%	79%
230Vac	90.35%	90.54%	90.65%	88.12%	89.92%		82.95%	

3.2 Output Characteristics

3.2.1 Line Regulation & Load Regulation

All data was measurement at @100mR CABLE end

Table 4 Line Regulation & Load Regulation

Input voltage	No load	Half load	Full load	Specification	Output Voltage
90Vac/60HZ	4.967	4.949	4.939		5V
115Vac/60HZ	4.965	4.946	4.93		
230Vac/50HZ	4.966	4.946	4.928		
264Vac/50HZ	4.969	4.947	4.929		
Line Regulation	0.06%			<2%	
Load Regulation	0.35%			<5%	

Input voltage	No load	Half load	Full load	Specification	Output Voltage
90Vac/60HZ	8.933	8.918	8.911		9V
115Vac/60HZ	8.933	8.917	8.906		
230Vac/50HZ	8.904	8.917	8.904		
264Vac/50HZ	8.904	8.917	8.904		
Line Regulation	0.03%			<2%	
Load Regulation	0.2%			<5%	

Input voltage	No load	Half load	Full load	Specification	Output Voltage
90Vac/60HZ	11.898	11.86	11.883		12V
115Vac/60HZ	11.897	11.886	11.881		
230Vac/50HZ	11.897	11.888	11.881		
264Vac/50HZ	11.897	11.888	11.882		
Line Regulation	0.00%			<2%	
Load Regulation	0.3%			<5%	

Input voltage	No load	Half load	Full load	Specification	Output Voltage
90Vac/60HZ	14.866	14.861	14.862		15V
115Vac/60HZ	14.866	14.86	14.86		
230Vac/50HZ	14.865	14.86	14.855		
264Vac/50HZ	14.866	14.86	14.855		
Line Regulation	0.03%			<2%	
Load Regulation	0.12%			<5%	

Input voltage	No load	Half load	Full load	Specification	Output Voltage
90Vac/60HZ	19.82	19.823	19.821		20V
115Vac/60HZ	19.82	19.821	19.822		
230Vac/50HZ	19.82	19.821	19.823		
264Vac/50HZ	19.82	19.821	19.823		
Line Regulation	0.02%			<2%	
Load Regulation	0.7%			<5%	

3.2.2 Ripple & Noise

All data was measurement at @100mR CABLE end

Table 5 Ripple & Noise

Input voltage	5V R&N (mV)		
	No load	Full load	Remark
90Vac/60HZ	62mv	86mv	Fig 1-8
264Vac/50HZ	88mv	86mv	

Input voltage	9V R&N (mV)		
	No load	Full load	Remark
90Vac/60HZ	62mv	91mv	Fig 1-8
264Vac/50HZ	78mv	86mv	

Input voltage	12V R&N (mV)		
	No load	Full load	Remark
90Vac/60HZ	58mv	102mv	Fig 1-8
264Vac/50HZ	69mv	93mv	

Input voltage	15V R&N (mV)		
	No load	Full load	Remark
90Vac/60HZ	59mv	114mv	Fig 1-8
264Vac/50HZ	67mv	101mv	

Input voltage	20V R&N (mV)		
	No load	Full load	Remark
90Vac/60HZ	51mv	114mv	Fig 1-8
264Vac/50HZ	66mv	86mv	

Note: Ripple& noise was measured at DC cord end without probe cap and ground clip. Measurement bandwidth was limited to 20MHZ.

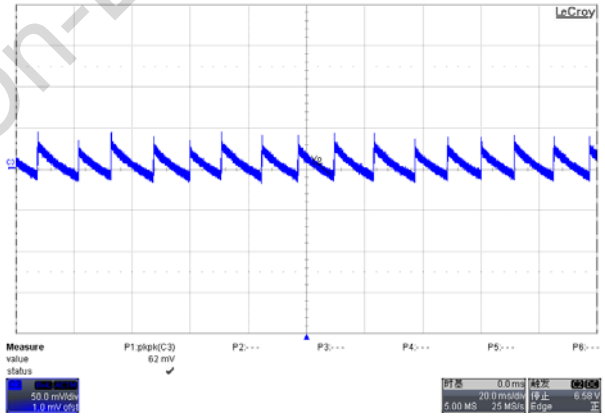


Fig. 1 Measured ripple& noise waveform@90Vac/60HZ, no load.

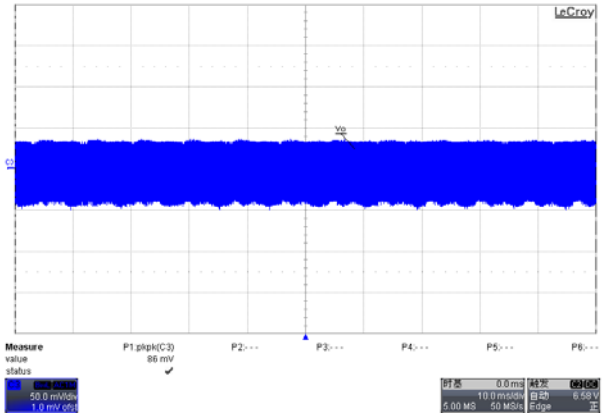


Fig. 2 Measured ripple& noisewaveform@90Vac/60HZ,full load.

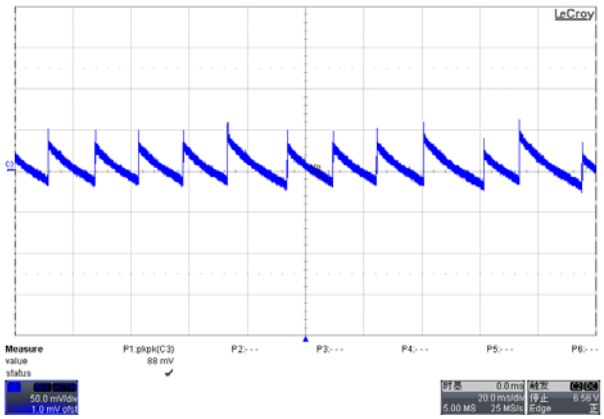


Fig. 3 R&N waveform@264Vac; no load

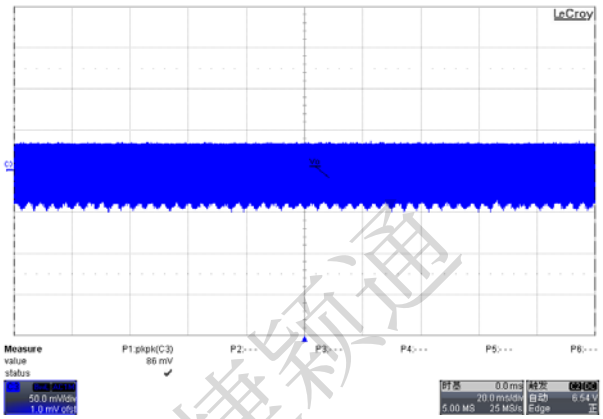


Fig. 4 R&N waveform@264Vac; full load

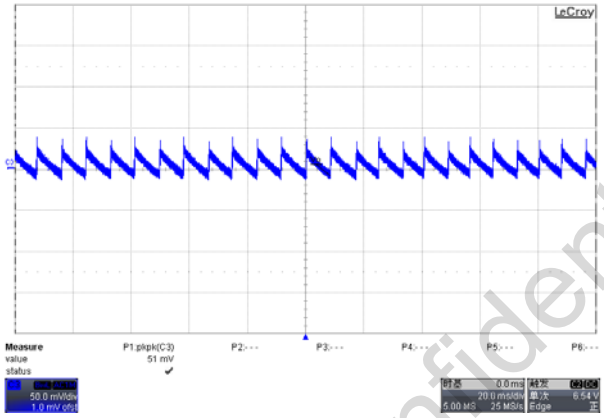


Fig. 5 Measured ripple& noise waveform@90Vac/60HZ, no load.

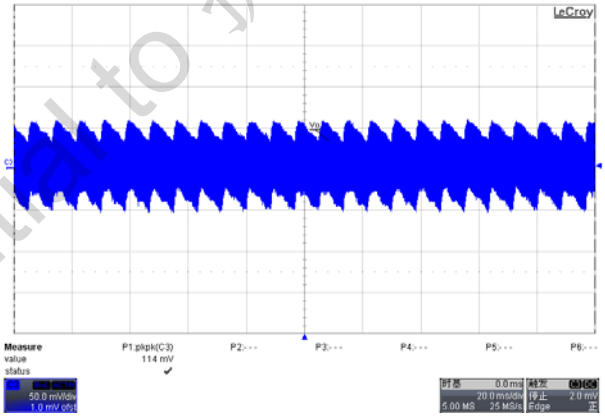


Fig. 6 Measured ripple& noisewaveform@90Vac/60HZ,full load.

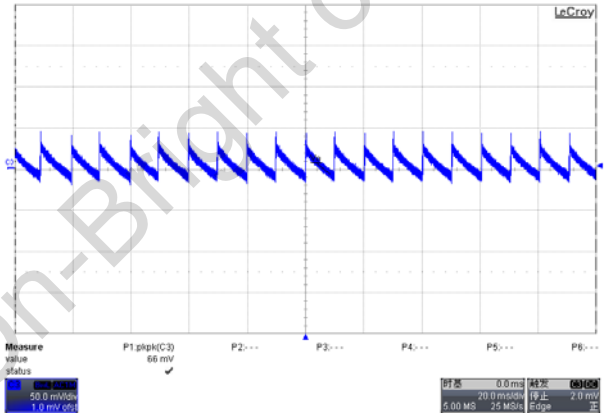


Fig. 7 R&N waveform@264Vac; no load

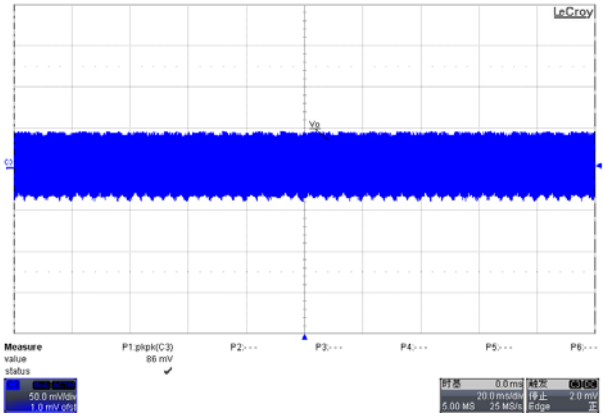


Fig. 8 R&N waveform@264Vac; full load

Overshoot & Undershoot

AC input switches ON for overshoot and OFF for undershoot, All data was measurement at @100mR CABLE end.

Table 6 Overshoot/undershoot measurement results

Input Voltage	Load	Item	Measure Data (%)	Waveform
90V/60Hz	Full load	overshoot	1.2	Fig 9-14
		undershoot	3.3	
	No load	overshoot	4.0	
		undershoot		
264V/50Hz	Full load	overshoot	3.3	
		undershoot	3.9	
	No load	overshoot	3.2	
		undershoot		

Overshoot and undershoot waveform

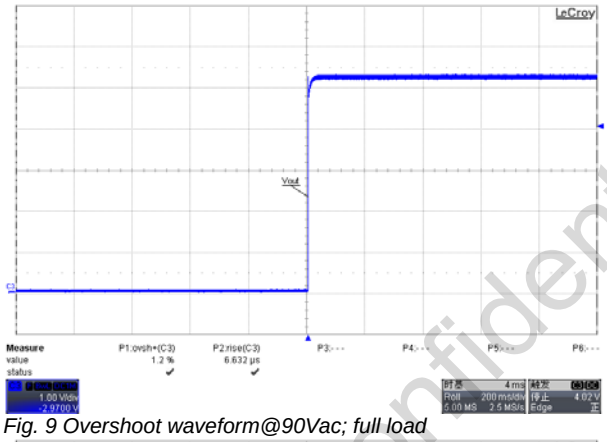


Fig. 9 Overshoot waveform@90Vac; full load

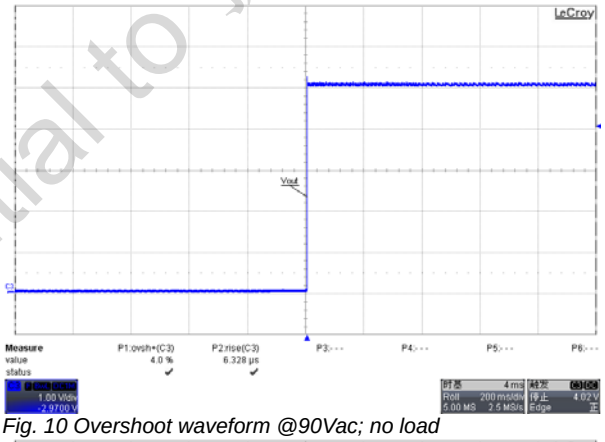


Fig. 10 Overshoot waveform @90Vac; no load

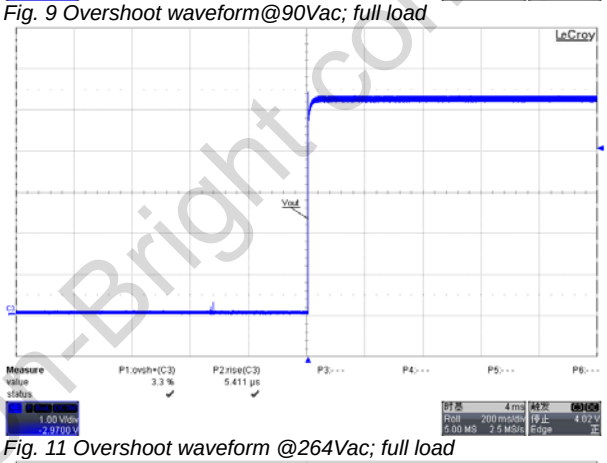


Fig. 11 Overshoot waveform @264Vac; full load

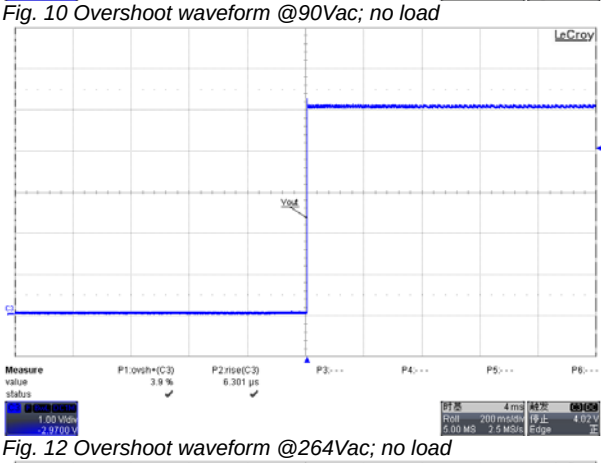


Fig. 12 Overshoot waveform @264Vac; no load

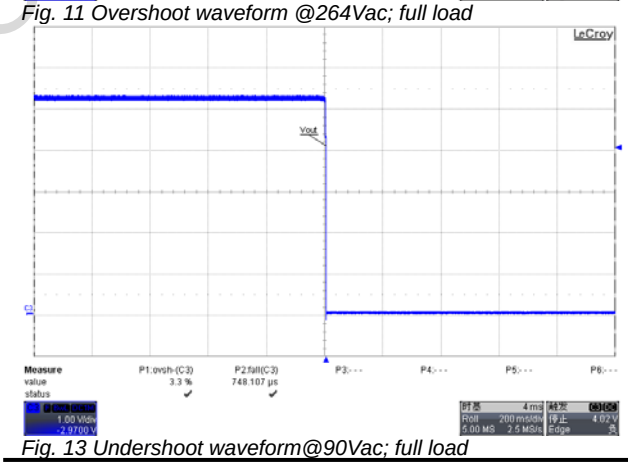


Fig. 13 Undershoot waveform@90Vac; full load

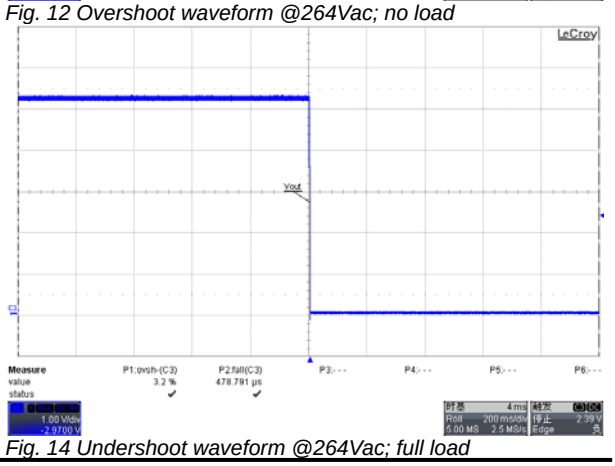


Fig. 14 Undershoot waveform @264Vac; full load

3.2.3 Dynamic Test

A dynamic loading with low set at 10% full load lasting for 10mS and high set at 90% full load lasting for 10mS is added to output. The ramp is set at 0.25A/uS at transient.
All data was measurement at @100mR CABLE end.

Table 7 Output voltage under dynamic test

Input voltage	5V Output voltage (mV)	Waveform
90V/60HZ	±517	Fig.15-18
264V/50HZ	±513	

Input voltage	9V Output voltage (mV)	Waveform
90V/60HZ	±497	Fig.15-18
264V/50HZ	±505.5	

Input voltage	12V Output voltage (mV)	Waveform
90V/60HZ	±516	Fig.15-18
264V/50HZ	±479	

Input voltage	15V Output voltage (mV)	Waveform
90V/60HZ	±517	Fig.15-18
264V/50HZ	±496.5	

Input voltage	20V Output voltage (mV)	Waveform
90V/60HZ	±537	Fig.15-18
264V/50HZ	±519	

Dynamic waveform

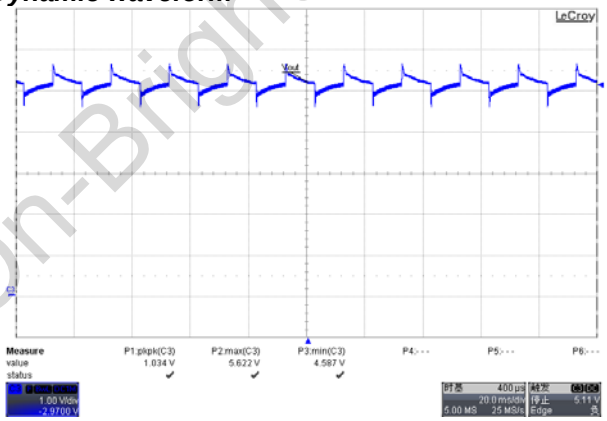


Fig. 15 Dynamic waveform@90Vac input

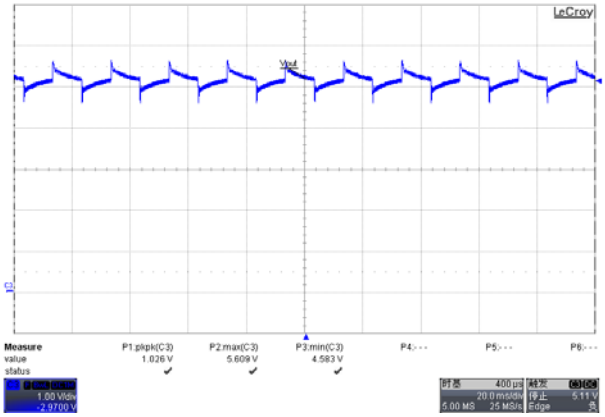


Fig. 16 Dynamic waveform@264Vac input

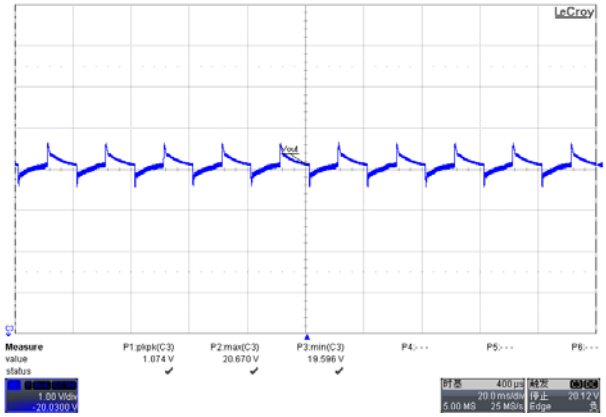


Fig. 17 Dynamic waveform@90Vac input

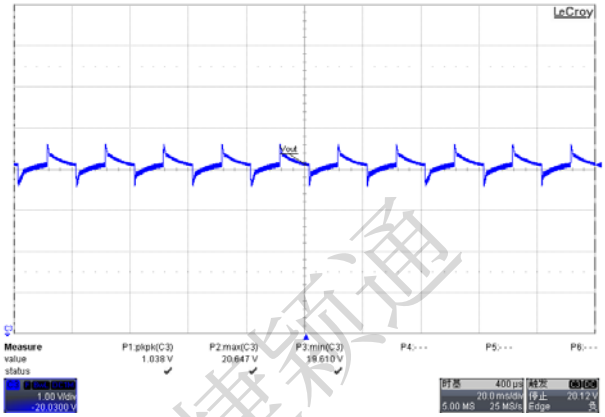


Fig. 18 Dynamic waveform@264Vac input

3.2.4 Time Sequence

Load condition: Full load

Table 8 Turn-on delay /hold-up/Rise time measurement results

Item	Input voltage	Meas. Data	Test spec.	Test results	Remark
Turn-on delay time	90V/60HZ	1.224s	<2s	Pass	Fig 19-26
	100V/50HZ	1.11s		Pass	
Hold-up time	100V/60HZ	29.6ms	>10ms	Pass	
	240V/50HZ	39.6ms		Pass	
Rise Time	100V/60HZ	0.07ms		Pass	
	240V/50HZ	0.07ms		Pass	
Fall Time	100V/60HZ	0.456ms		Pass	
	240V/50HZ	0.465ms		Pass	

Time sequence waveform

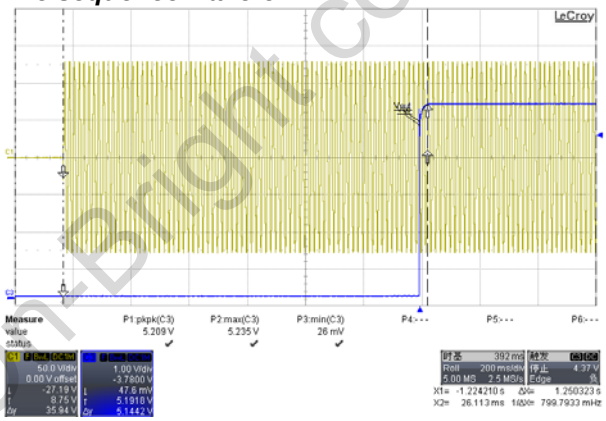


Fig. 19 Turn on delay waveform @90Vac; full load

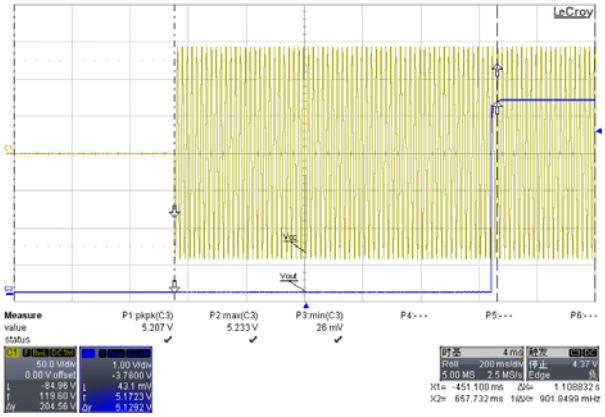


Fig. 20 Turn on delay waveform @264Vac; full load

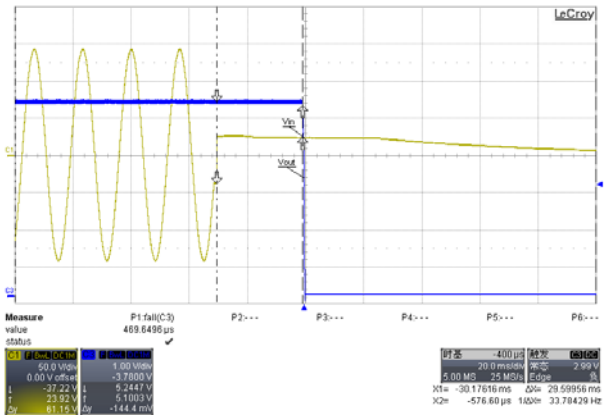


Fig. 21 Hold up time waveform @100Vac; full load

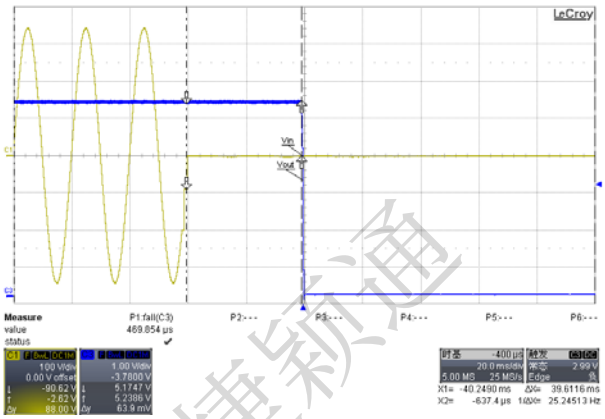


Fig. 22 Hold up time waveform @264Vac; full load

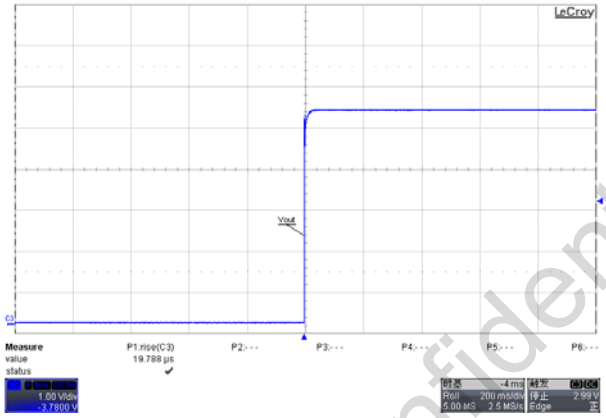


Fig. 23 Rise time measured waveform@100Vac/60HZ,full load

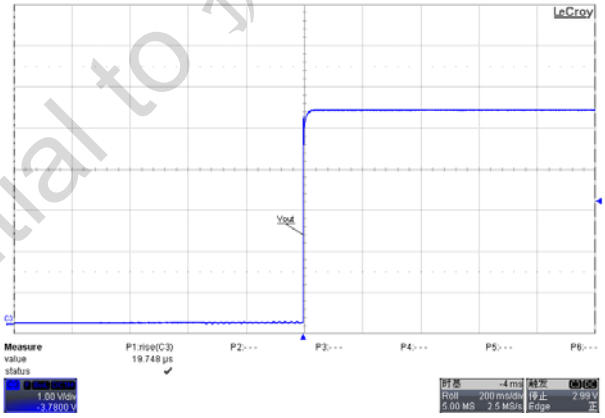


Fig. 24 Rise time measured waveform@240Vac/50HZ,full load

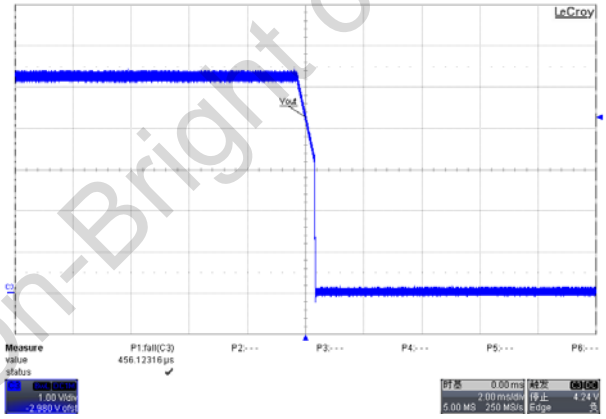


Fig. 25 Fall time measured waveform@100Vac/60HZ,full load

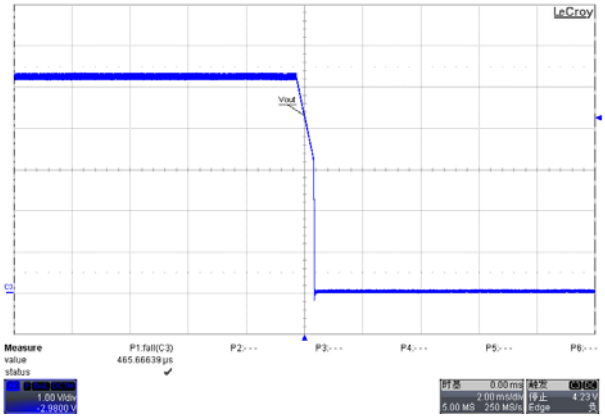
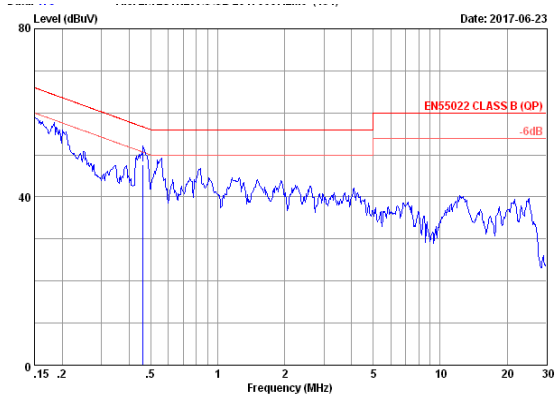


Fig. 26 Fall time measured waveform@240Vac/50HZ,full load

3.3 Output Characteristics

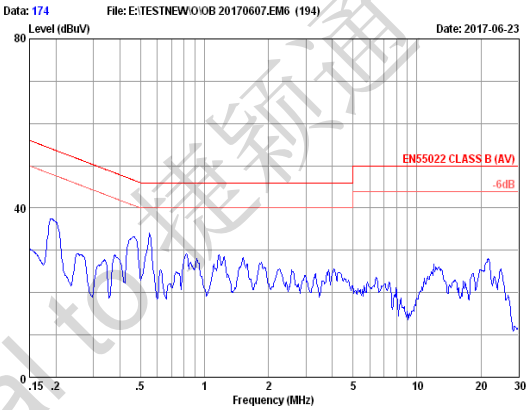
The Power supply passed EN55022 Class B & FCC class B EMI requirement with more than 6dB margin tested with shield。

EN55022 CLASS B @ full load report

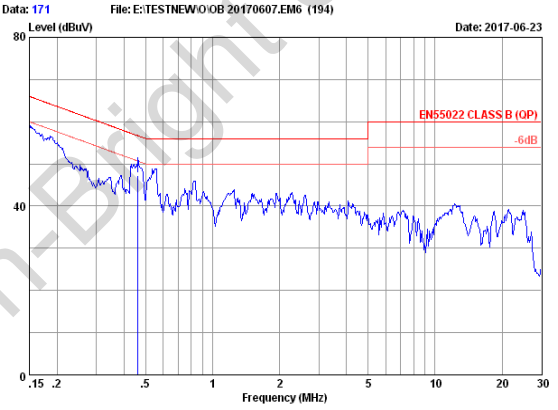


Site : Audix(Shanghai) Shielded1
Condition : EN55022 CLASS B (QP) ESH2-Z5-2017 LINE
Project No. :
Applicant :
EUT : OB2632
M/N : 20V 45W
S/N :
Power Supply : 230V/50Hz
Ambient : 22'C 48%RH
Test line : L
Test Mode : Full Load
Test Engineer : Avalon
Memo : 11A COOLMOS

	Freq	Level	Read Level	Cable Loss	LISN Factor	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dB	dBuV	dB	
1	0.461400	47.70	47.60	0.05	0.05	0.10	56.67	-8.97	QP

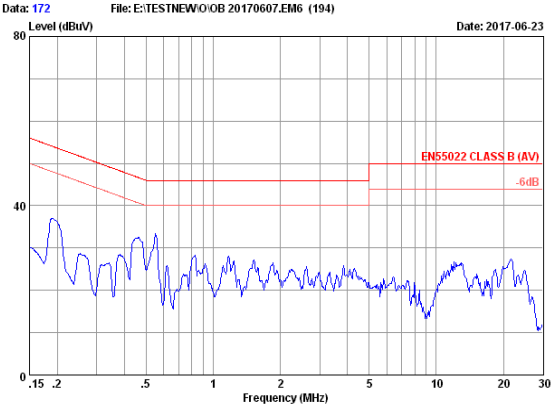


Site : Audix(Shanghai) Shielded1
Condition : EN55022 CLASS B (AV) ESH2-Z5-2017 LINE
Project No. :
Applicant :
EUT : OB2632
M/N : 20V 45W
S/N :
Power Supply : 230V/50Hz
Ambient : 22'C 48%RH
Test line : L
Test Mode : Full Load
Test Engineer : Avalon
Memo : 11A COOLMOS



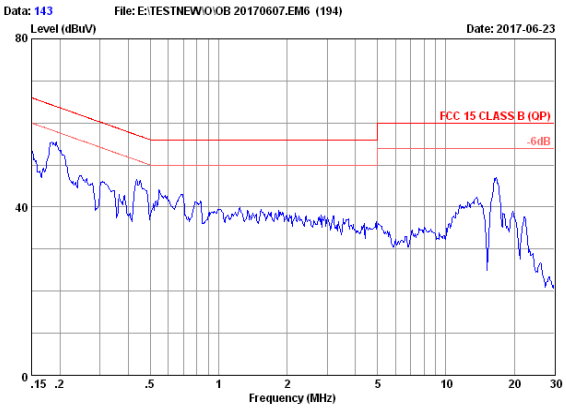
Site : Audix(Shanghai) Shielded1
Condition : EN55022 CLASS B (QP) ESH2-Z5-2017 NEUTRAL
Project No. :
Applicant :
EUT : OB2632
M/N : 20V 45W
S/N :
Power Supply : 230V/50Hz
Ambient : 22'C 48%RH
Test line : N
Test Mode : Full Load
Test Engineer : Avalon
Memo : 11A COOLMOS

	Freq	Level	Read Level	Cable Loss	LISN Factor	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dB	dBuV	dB	
1	0.461800	47.20	47.10	0.05	0.05	0.10	56.66	-9.46	QP

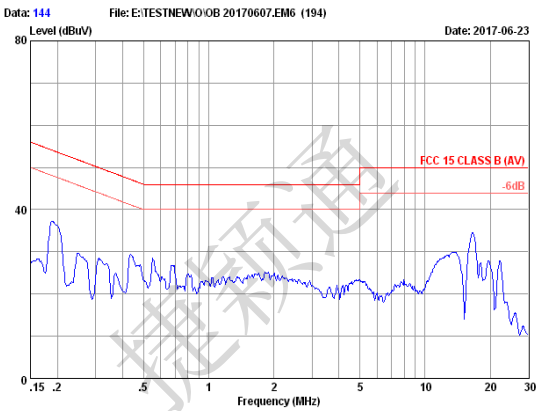


Site : Audix(Shanghai) Shielded1
Condition : EN55022 CLASS B (AV) ESH2-Z5-2017 NEUTRAL
Project No. :
Applicant :
EUT : OB2632
M/N : 20V 45W
S/N :
Power Supply : 230V/50Hz
Ambient : 22'C 48%RH
Test line : N
Test Mode : Full Load
Test Engineer : Avalon
Memo : 11A COOLMOS

FCC CLASS B @ full load report




```
Site                : Audix(Shanghai) Shielded1
Condition           : FCC 15 CLASS B (QP) ESH2-Z5-2017 LINE
Project No.         :
Applicant           :
EUT                 : OB2632
M/N                 : 20V 45W
S/N                 :
Power Supply        : 120V/60Hz
Ambient             : 22'C 48%RH
Test line           : L
Test Mode           : Full Load
Test Engineer       : Avalon
Memo                : 11A COOLMOS
```

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Site                : Audix(Shanghai) Shielded1
Condition           : FCC 15 CLASS B (AV) ESH2-Z5-2017 LINE
Project No.         :
Applicant           :
EUT                 : OB2632
M/N                 : 20V 45W
S/N                 :
Power Supply        : 120V/60Hz
Ambient             : 22'C 48%RH
Test line           : L
Test Mode           : Full Load
Test Engineer       : Avalon
Memo                : 11A COOLMOS
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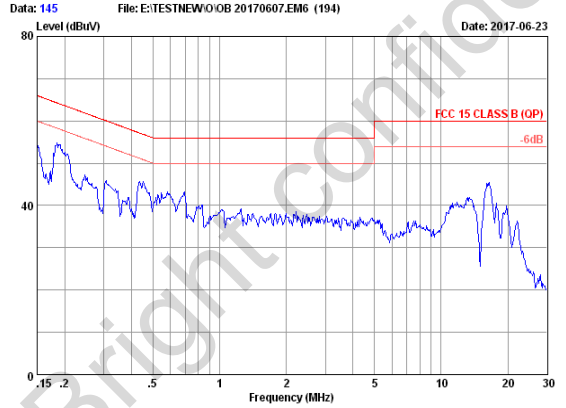


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Site                : Audix(Shanghai) Shielded1
Condition           : FCC 15 CLASS B (QP) ESH2-Z5-2017 NEUTRAL
Project No.         :
Applicant           :
EUT                 : OB2632
M/N                 : 20V 45W
S/N                 :
Power Supply        : 120V/60Hz
Ambient             : 22'C 48%RH
Test line           : N
Test Mode           : Full Load
Test Engineer       : Avalon
Memo                : 11A COOLMOS
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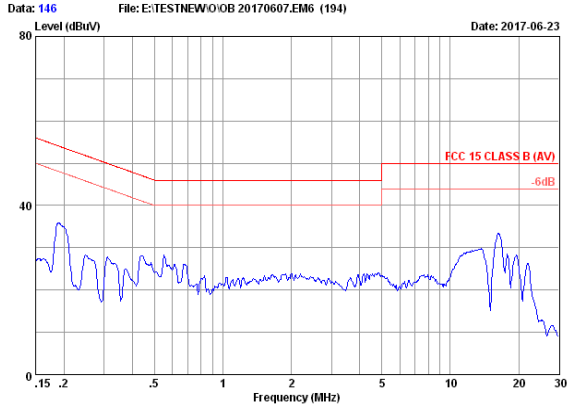


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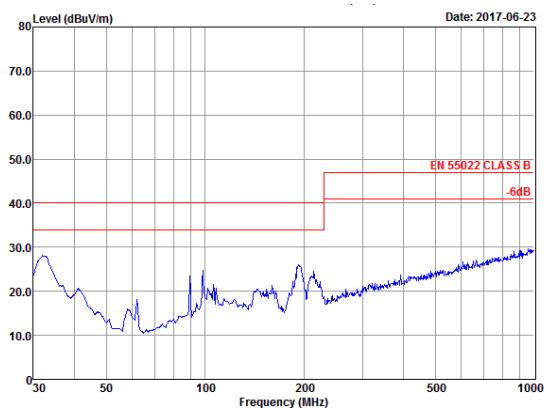
ite                 : Audix(Shanghai) Shielded1
ondition            : FCC 15 CLASS B (AV) ESH2-Z5-2017 NEUTRAL
roject No.          :
pplicant            :
UT                  : OB2632
/N                  : 20V 45W
/N                  :
ower Supply         : 120V/60Hz
mbient              : 22'C 48%RH
est line            : N
est Mode            : Full Load
est Engineer        : Avalon
emo                 : 11A COOLMOS
```

EN55022 CLASS B @ full load report

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Condition     : EN 55022 CLASS B VERTICAL
Project No.   :
Applicant     :
EUT           :
M/N           : OB2632
S/N           : 20V 45W
Power Supply  : 230V/50Hz
Ambient       : 22'C  60%RH
Test Mode     :
Test Engineer: Sunny
Memo          :
```
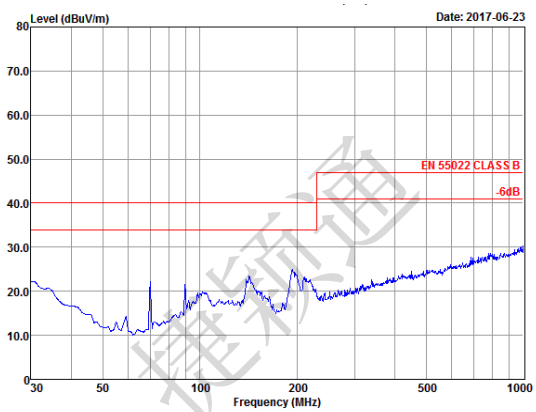
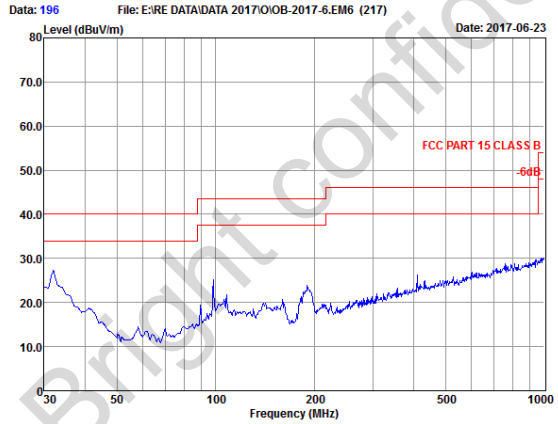




```
Site          : Audix(Shanghai) Chamber3
Condition     : EN 55022 CLASS B HORIZONTAL
Project No.   :
Applicant     :
EUT           :
M/N           : OB2632
S/N           : 20V 45W
Power Supply  : 230V/50Hz
Ambient       : 22'C  60%RH
Test Mode     :
Test Engineer: Sunny
Memo          :
```

FCC CLASS B @ full load report

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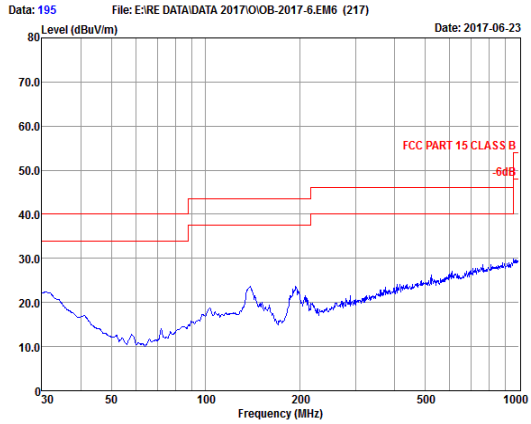
Site          : Audix(Shanghai) Chamber3
Condition     : FCC PART 15 CLASS B VERTICAL
Project No.   :
Applicant     :
EUT           :
M/N           : OB2632
S/N           : 20V 45W
Power Supply  : 120V/60Hz
Ambient       : 22'C  60%RH
Test Mode     :
Test Engineer: Sunny
Memo          :
```

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Site          : Audix(Shanghai) Chamber3
Condition     : FCC PART 15 CLASS B HORIZONTAL
Project No.   :
Applicant     :
EUT           :
M/N           : OB2632
S/N           : 20V 45W
Power Supply  : 120V/60Hz
Ambient       : 22'C  60%RH
Test Mode     :
Test Engineer: Sunny
Memo          :
```

3.4 Thermal Test

The thermal test is under 40℃ ambiance after 4hour full load ruining with 90Vac & 264Vac input
In the box 60CM*60CM*60CM.

Table 11 Thermal test result

Position	Description	20V/45W		15V/45W	
		90Vac input	264Vac Input	90Vac input	264Vac Input
T1	T1(wire)	104.1	96.3	107.6	100
T1	T1(core)	92.4	83	96.3	88.4
BD1	KBP308	105.5	84.7	106.5	89.5
D1	RS1M	98.3	86.6	100.2	89.2
Q1	K11A65D	104.8	93.4	106.6	95.4
Q3	IPI075N15N3G,	97.8	90.8	106.5	98.8

Case:85(L) x 60(W) x 20(H)mm

4 Protection

4.1 Over voltage protection

Table 9 OVP @ no load

Item	Input Voltage	Vo=5V(V)	Vo=9V(V)	Vo=12(V)	Vo=15V(V)	Vo=20V(V)
OVP	90V/60Hz	7.16	11.22	14.65	18.33	24.49
	264V/50Hz	7.1	11.18	14.61	18.33	24.41

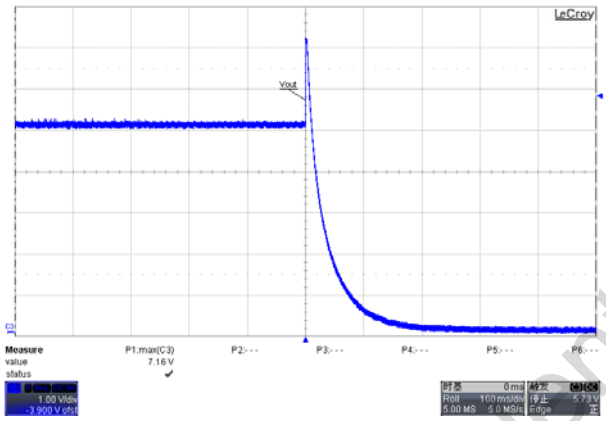

Fig. 27 OVP waveform @90Vac,Vo=5V; no load

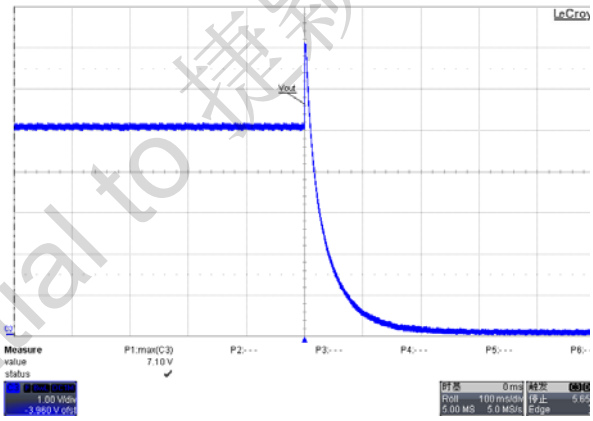

Fig. 28 OVP waveform @264Vac,Vo=5V;no load

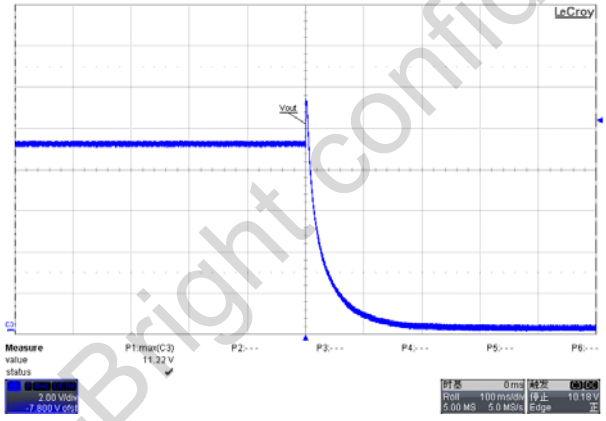

Fig. 29 OVP waveform @90Vac,Vo=9V; no load

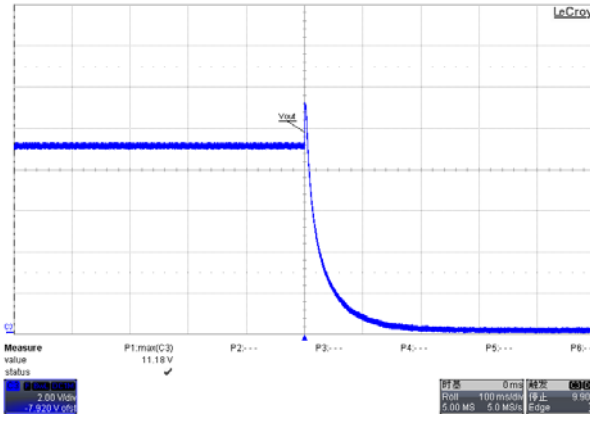

Fig. 30 OVP waveform @264Vac,Vo=9V;no load

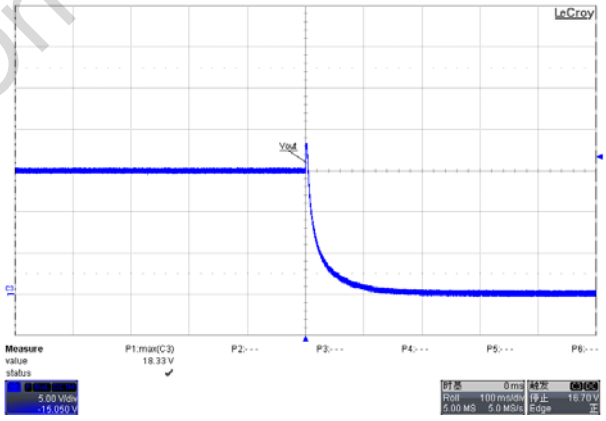

Fig. 31 OVP waveform @90Vac,Vo=15V; no load

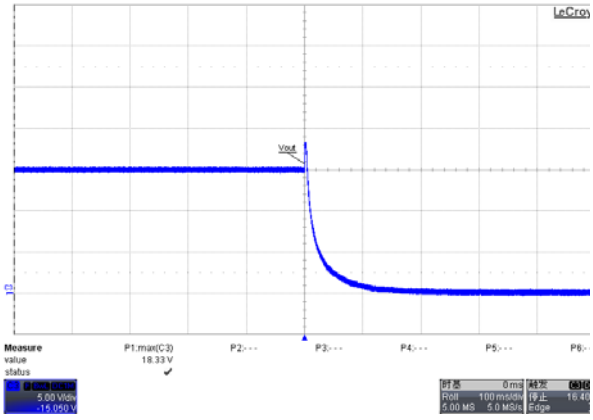

Fig. 32 OVP waveform @264Vac,Vo=15V;no load

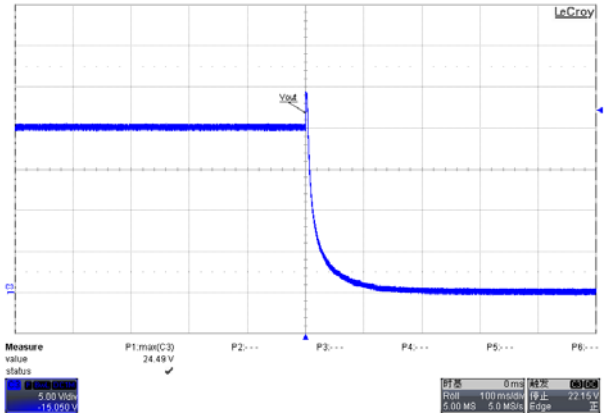

Fig. 33 OVP waveform @90Vac,Vo=20V; no load

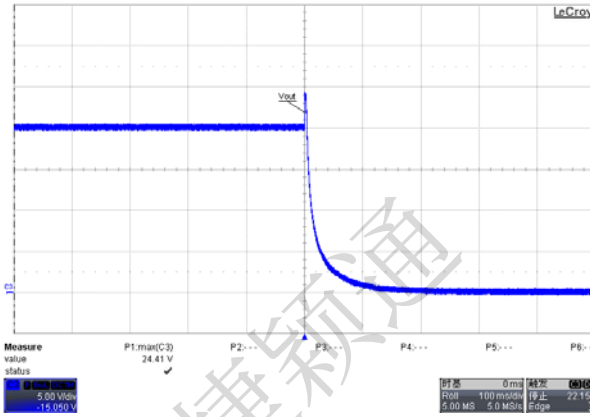

Fig. 34 OVP waveform @264Vac,Vo=20V;no load

4.2 Over Load Protection

Table 10 OLP @ Full load

Input	OLP Protection
115Vac/60Hz	OK
230Vac/50Hz	OK

4.3 Over Current Protection

Table 11 Over current Protection

Input Voltage	90V/60Hz	115V/60Hz	230V/50Hz	264V/50Hz
5V3A OCP (A)	3.57	3.56	3.57	3.55
9V3A OCP (A)	3.57	3.57	3.57	3.57
12V3A OCP (A)	3.58	3.58	3.58	3.56
15V3A OCP (A)	3.58	3.58	3.58	3.58
20V2.25A OCP (A)	2.69	2.7	2.68	2.68

4.4 Over Temperature Protection (OTP)

The power supply will shut down and latch when the voltage of RT pin is under 1.0V(OTP), and the unit should recover when the protection condition is removed and restart input.

5 Mosfet Vds Stress Test

5.1 Vds waveform at full load

5.1.1 Vds at full load

Table 12 Pri_MOSFET measurement results

Item	Input voltage	Meas. Data	Remark
Normal full load	264V/50HZ	585V	Fig. 43

Table 13 SR_MOS measurement results

Item	Input voltage	Meas. Data	Remark
Normal full load	264V/50HZ	135V	Fig. 44

5.1.2 Vds at full load, normal waveform

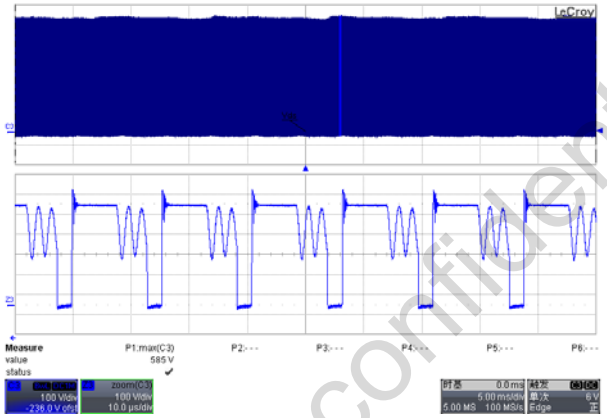

Fig. 35 Vds normal wave form@264Vac 20Vdc; full load

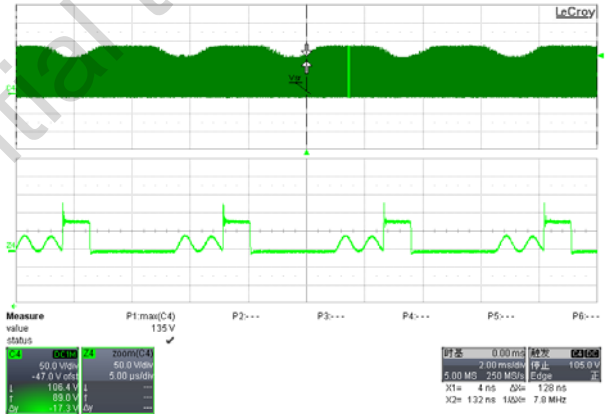

Fig. 36 Vsr_mos normal wave form@264Vac 20Vdc; full load

6 PD Specification Test

6.1 Vbus Change Test

Vbus changing test between 5V/9V/12V/15V/20V under No load/Full load conditions

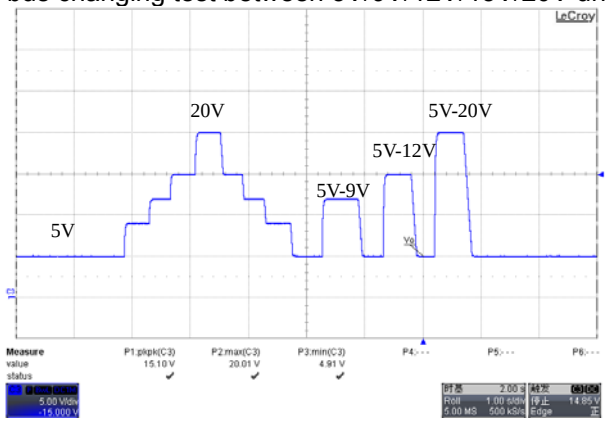

Fig. 37 Vbus Changing Test @no load

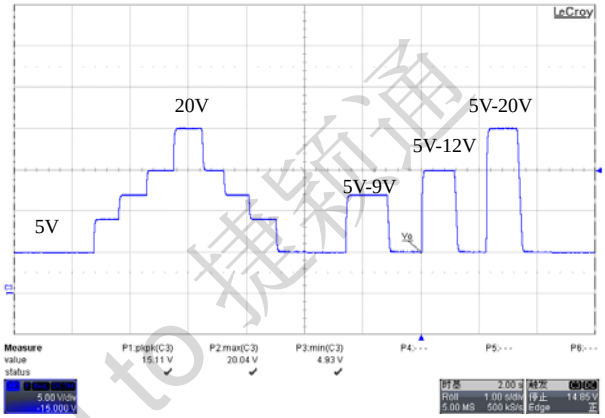

Fig. 38 Vbus Changing Test @full load

6.2 Negative Voltage Transitions

Vbus changing test from 20V to 5V @No load/Full load. The transition time is 203ms（spec: <275ms）

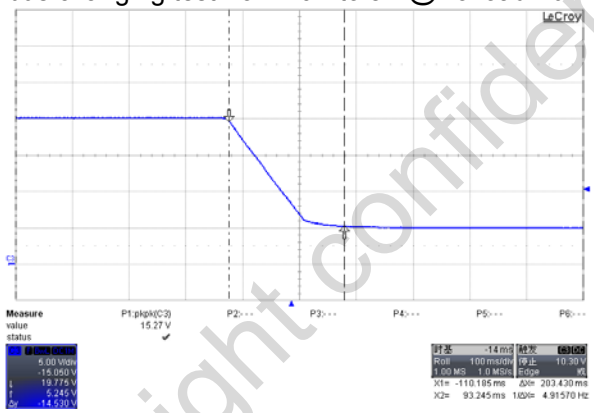

Fig. 39 Vbus Change From 20V to 5V @no load

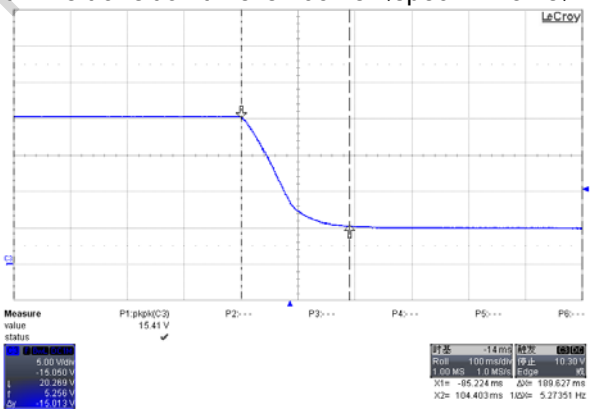

Fig. 40 Vbus Change From 20V to 5V @full load

6.3 Positive Voltage Transitions

Vbus changing test from 5V to 20V @No load/Full load. The transition time is 72ms（spec: <275ms）

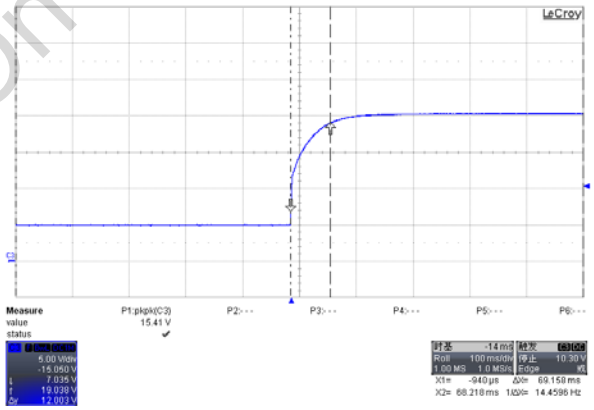

Fig. 41 Vbus Change From 5V to 20V @no load

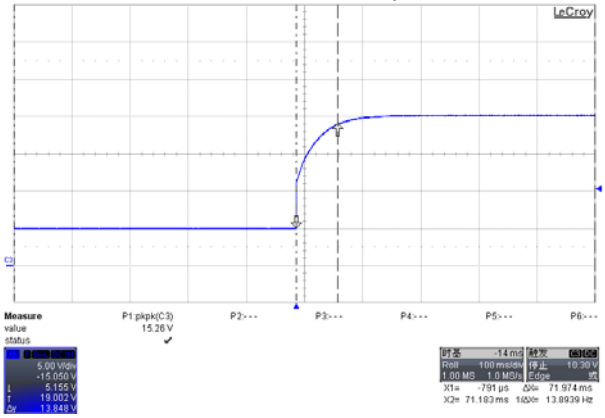

Fig. 42 Vbus Change From 5V to 20V @full load

6.4 Response to Hard Resets

When responding to hard reset, the time of tSafe5V/tSafe0V/tSrcRecover/tSrcTurnon are strict following PD spec.

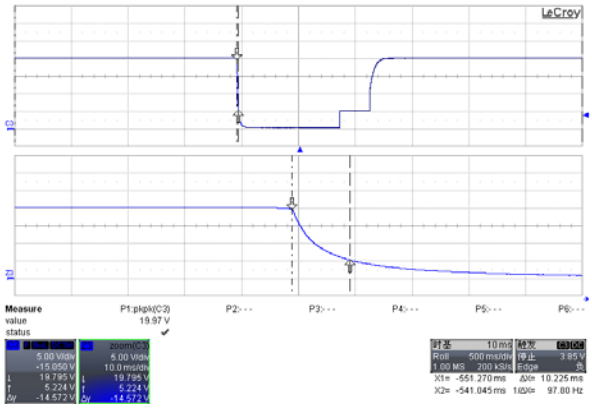

Fig. 43 Hard Reset t0-tSafe5V（spec: <275ms）

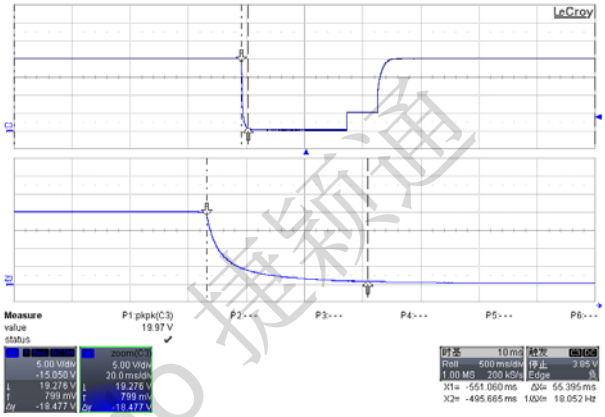

Fig. 44 Hard Reset t0-tSafe0V（spec: <650ms）

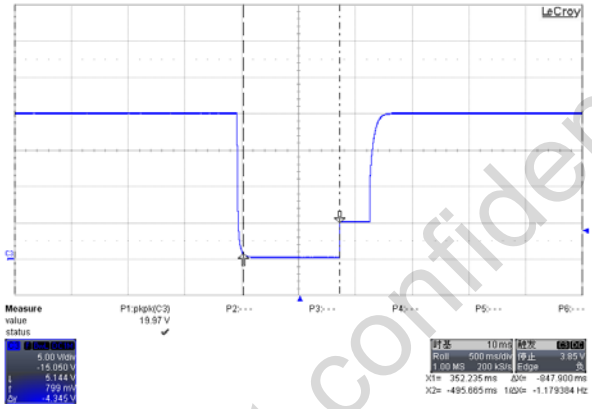

Fig. 45 Hard Reset tSrcRecover（660ms<spec<1s）

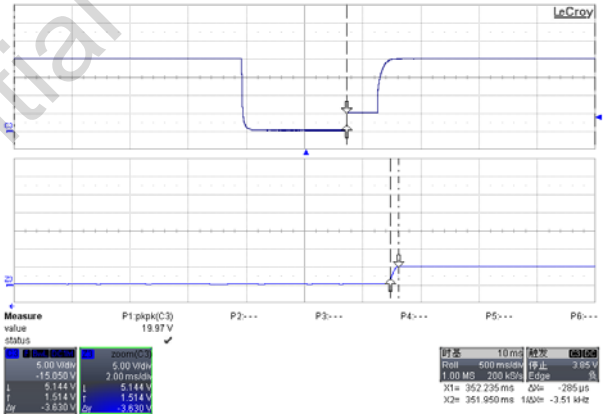

Fig. 46 Hard Reset tSrcTurnon（spec: <275ms）

6.5 Insert and Unplug Type-C Test

The insert type-c delay responding time is 145ms（spec: 100ms-150ms）.

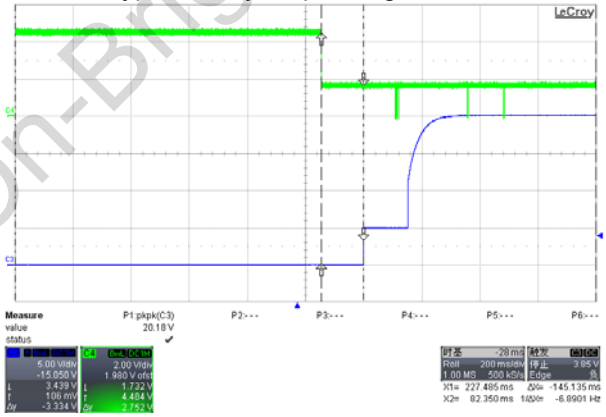

Fig. 47 Insert Plug Vo to Vbus Delay

6.6 tSnkTransition Time Test

The tSnkTransition time is 30ms while Vbus or Io changing. (spec: 25ms-35ms)

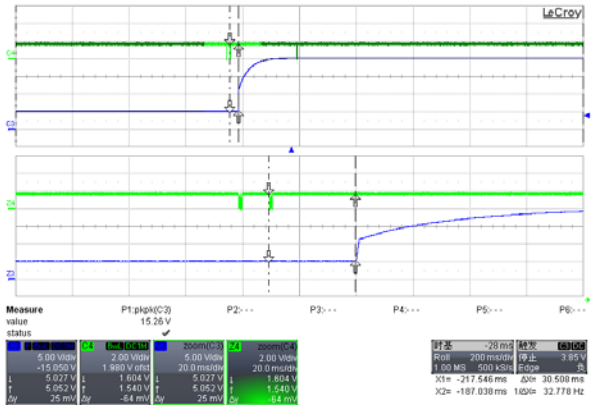

Fig. 48 tSnkTransition

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