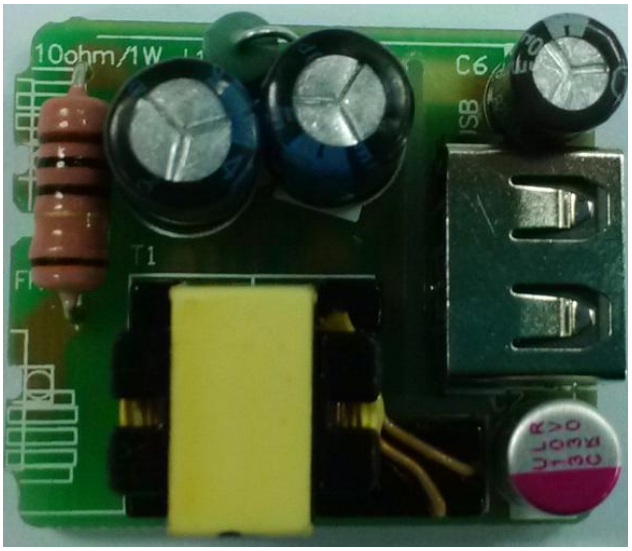
Subject

OB2500NCP Demo Board Manual

Board Model: CH5V1A2500NCP

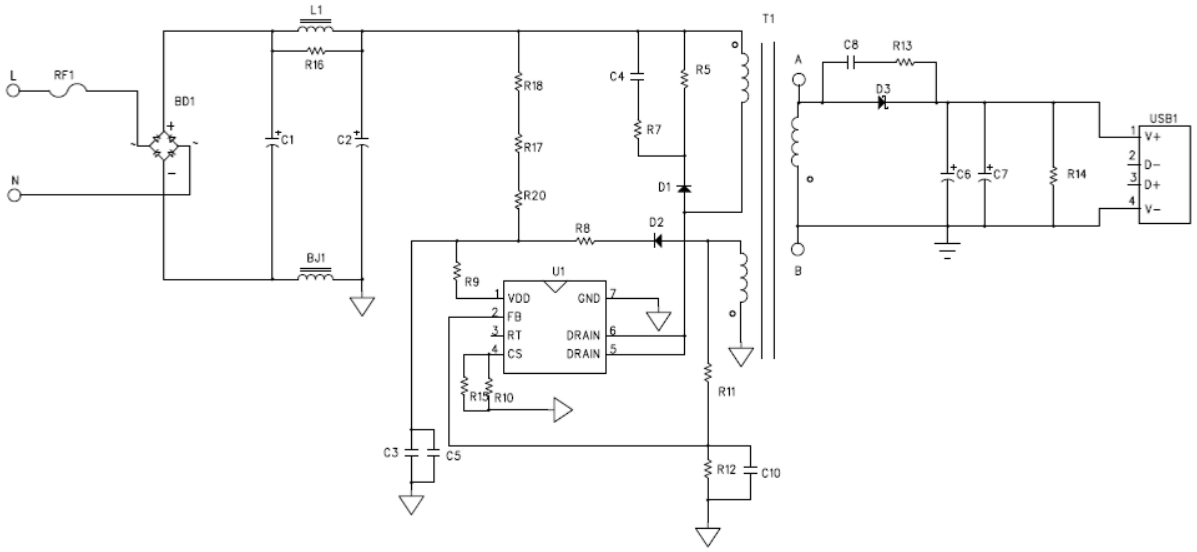
Doc. No.: OB_DOC_DBM_2500N01



Key features:

- Standby power less than 75mW@264Vac
- Precise CV/CC regulation
- Primary-side sensing and regulation without TL431 and opto-coupler
- Cost effective and simplified system design
- Average efficiency meet DOE/COC
- Intergrated Power MOSFET Switch
- No X & Y design
- Audio noised free operation
- Frequency shuffling technology to improve EMI performance
- Meet EN55022 EMI

Schematic



Performance Evaluation

This session presents the test results of OB2500NCP module up to date. Results on inrush current and safety test are not included and will be added when they become available.

Overall, the module meets design specifications. All data was measured at the end of 1.5m, 24 AWG output cable.

Performance Highlights

- Standby power less than 75mW@264V
- Precise CV/CC regulation
- The average efficiency meet DOE Level 6/COC
- EMI passed EN55022 and FCC15 Class B test with more than 6dB margin

System Electrical Specification

Description		Symbol	Min	Typ	Max	Units	Comment
Input Section							
Input Voltage		V_{IN}	90		264	V	2 Wire
Line Frequency		f_{LINE}	47	50/60	63	Hz	
Standby Power					75	mW	230V
Output characteristics							
CV Section	Output Voltage	V_{OUT_CV}	4.75		5.25	V	
	Output Current	I_{OUT_CV}	0		1.0	A	
CC Section	Output Voltage	V_{OUT_CC}	3.0			V	
	Output Current	I_{OUT_CC}	1.1		1.3	A	
Ripple & Noise		V_{RIPPLE}			80	mV_{P-P}	
Continuous Output Power		P_{OUT}		5W			
Over Current Protection		I_{OUT_MAX}			1.30	A	
Active Mode Efficiency		η	73.77/ 64.59			%	Measured at Line End, V_{IN}=115V/230V
Time sequence							
Turn on delay time					2	s	
Environmental							
Conducted/Radiation EMI		Meets EN55022B\FCC 15					
Safety		Meets IEC950,UL1950,Class II					
ESD			18			kV	

Test Equipments

Item	Vender	Module
AC Source	WEST	WEW1010
Digital Power Meter	YOKOGAWA	WT210
Electrical Load	Chroma	63030
Oscilloscope	LeCroy	WS424
Multimeter	VICTORY	VC9807A

1. Input Characteristics

1.1 Standby power

Table. 1 Standby power

Input voltage	Pin(mW)	Vo(V)	Specification	Test result
90V/60HZ	34.4	5.022	<75mW	Pass
115V/60HZ	36.8	5.002		
230V/50HZ	54.5	4.959		
264V/50HZ	61.3	4.952		

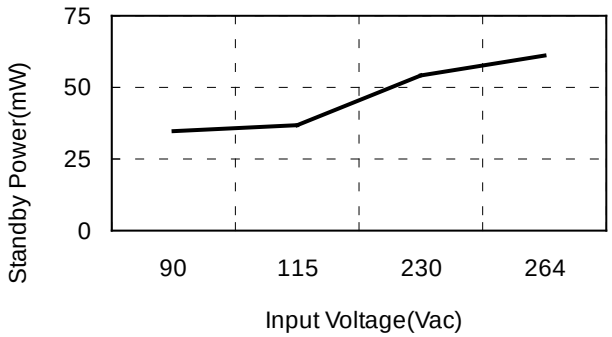


Fig. 1 Standby Power vs. Input Voltage

1.2 Efficiency

Table. 2 Efficiency Line end with 24AWG,1.5m（268mΩ） output line.

Input voltage	10%	25%	50%	75%	100%	25%~100 % Load Aver. Eff.	Standards DOE	Standards COC	Test Result
115V/60Hz	73.29%	76.64%	76.02%	74.90%	73.73%	75.32%	73.62%	64.59% (10%Load)	Pass
230V/50Hz	68.49%	74.55%	75.70%	75.35%	74.53%	75.03%		73.77%	

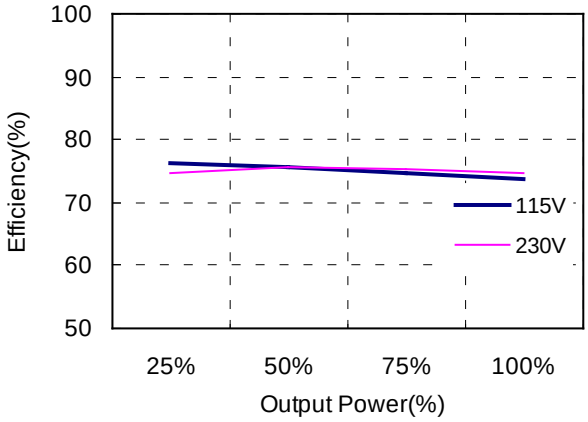


Fig. 2 Efficiency vs. Percent of Rated Output Power

1.3 I-V Curve

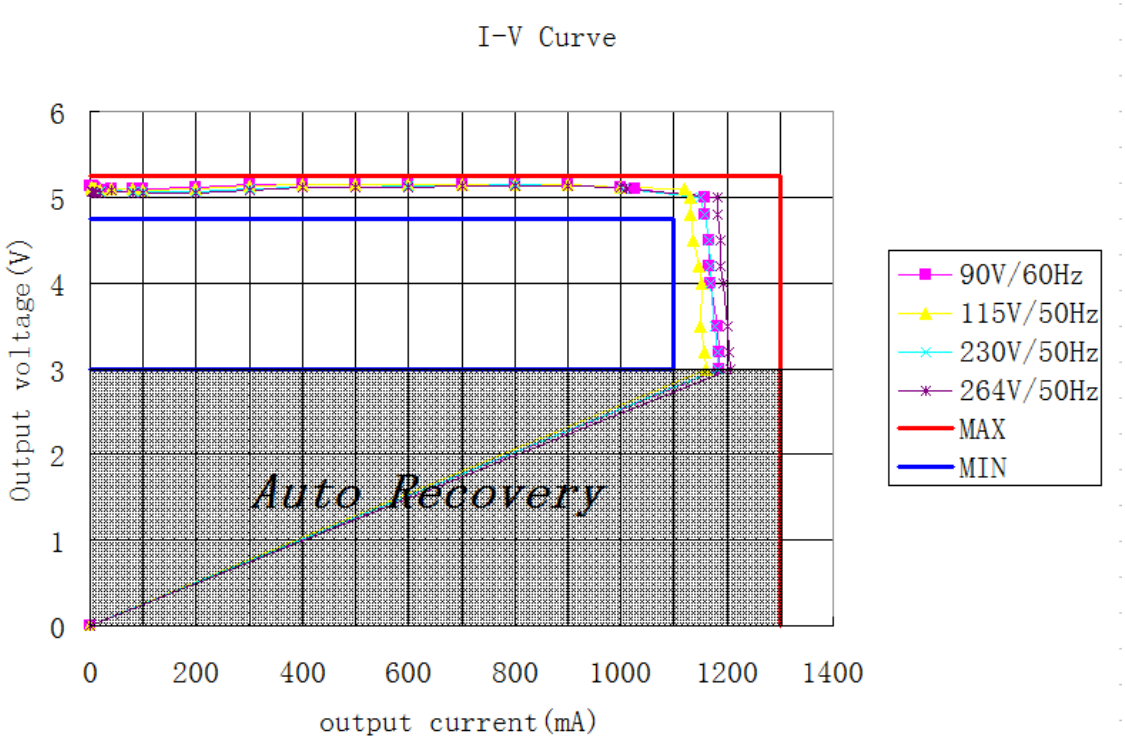


Fig. 3 I-V Curve

2. Output Characteristics

2.1 Line Regulation & Load Regulation

Table. 3 Line Regulation & Load Regulation

Input voltage	No load(V)	Half load(V)	Full load(V)	Specification(V)	Test result
90V/60Hz	5.022	5.003	4.965	4.75-5.25	Pass
115V/60Hz	5.002	5.000	4.970	4.75-5.25	
230V/50Hz	4.959	4.982	4.968	4.75-5.25	
264V/50Hz	4.952	4.976	4.965	4.75-5.25	
Line Regulation	±0.70%			<±2%	Pass
Load Regulation	±0.57%			<±5%	Pass

2.2 Ripple & Noise

Table. 4 Ripple & Noise

Input voltage	R&N (mV)		
	No load	Full load	Remark
90V/60Hz	13	71	Fig. 4,5
115V/60Hz	13	66	
230V/50Hz	15	56	
264V/50Hz	15	55	Fig. 6,7

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

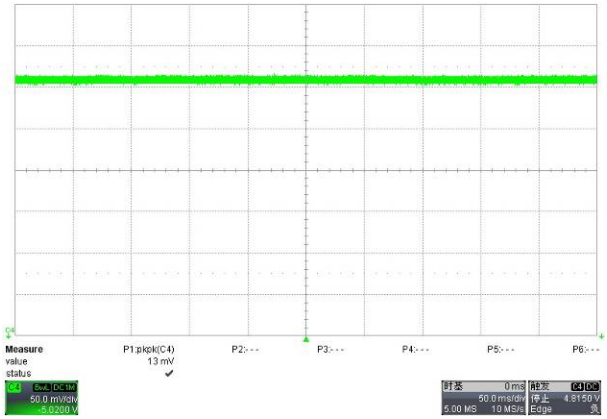


Fig. 4 Measured ripple& noise waveform@90V/60Hz, no load

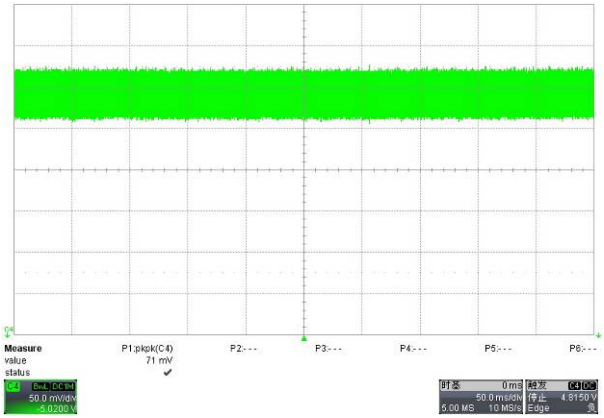


Fig. 5 Measured ripple& noise waveform@90V/60Hz, full load

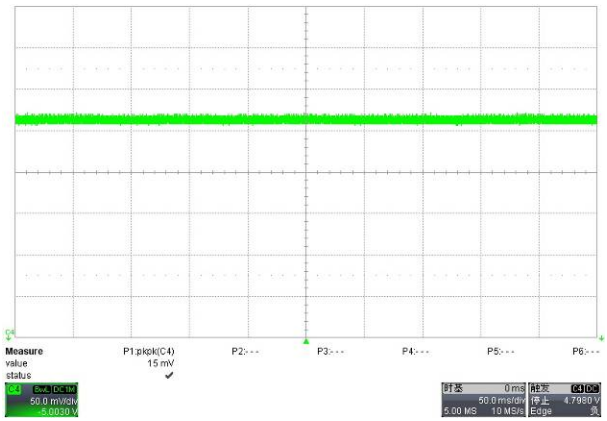


Fig. 6 Measured ripple& noise waveform@264V/50Hz, no load

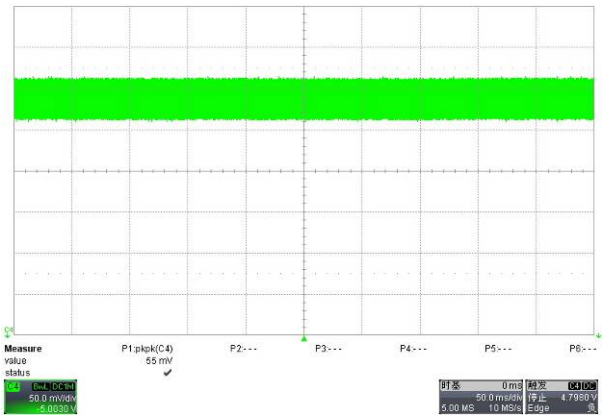


Fig. 7 Measured ripple& noise waveform@264V/50Hz, full load

2.3 Dynamic Test

A dynamic loading with low load lasting for 50ms/20ms and high load lasting for 50ms/20ms is added to output. The high load is 0.5A and the low load is 0A.The ramp is set at 0.125A/μs at transient. Measurement was taken at line end(Same as R&N measurement)

Table. 5 Output voltage under dynamic test(0.5A lasting for 50ms,0A lasting for 50ms)

Input	Vomin-Vomax(v)	Remark
90V/60Hz	5.42~4.06	
115V/60Hz	5.45~4.07	
230V/50Hz	5.53~4.22	
264V/50Hz	5.55~4.26	

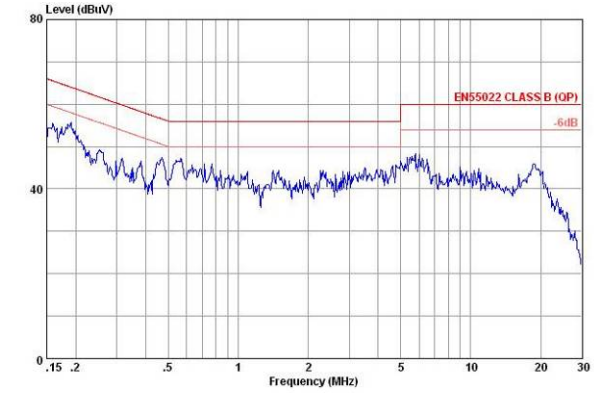
(0.5A lasting for 20ms,0A lasting for 20ms)

Input	Vomin-Vomax(v)	Remark
90V/60Hz	5.42~4.73	
115V/60Hz	5.43~4.75	
230V/50Hz	5.47~4.80	
264V/50Hz	5.49~4.76	

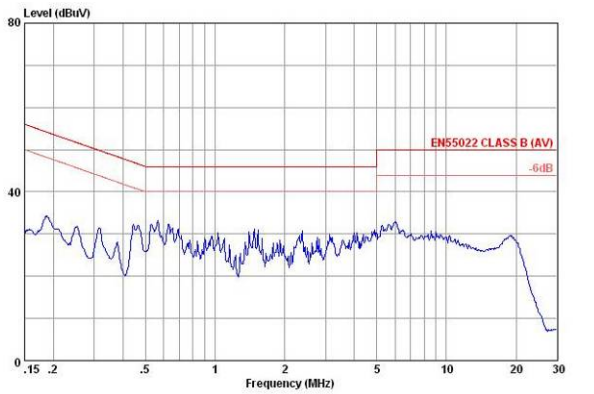
3. EMI Test

The Power supply passed EN55022 Class B EMI requirement with more than 6dB margin

3.1 Conducted EMI Test




```
Site            : Audix(Shanghai) Shielded1
Condition       : EN55022 CLASS B (QP) ESH2-Z5-2014 LINE
Project No.     :
Applicant       :
EUT             : OB2500N
M/N             : 5V 1A
S/N             :
Power Supply    : 230V/50Hz
Ambient         : 22'C 48%RH
Test line       : L
Test Mode       :
Test Engineer   : Eric
Memo            :
```

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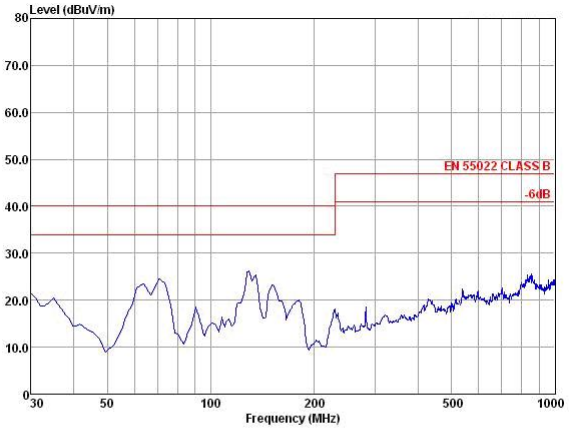
Site            : Audix(Shanghai) Shielded1
Condition       : EN55022 CLASS B (AV) ESH2-Z5-2014 LINE
Project No.     :
Applicant       :
EUT             : OB2500N
M/N             : 5V 1A
S/N             :
Power Supply    : 230V/50Hz
Ambient         : 22'C 48%RH
Test line       : L
Test Mode       :
Test Engineer   : Eric
Memo            :
```

3.2 Radiation EMI Test




```
Site          : Audix(Shanghai) Chamber3
Condition     : EN 55022 CLASS B HORIZONTAL
Project No.   :
Applicant     :
EUT           : OB2500N
M/N           : 5V 1A
S/N           :
Power Supply  : 230V/50Hz
Ambient       : 22'C  60%RH
Test Mode     :
Test Engineer: Bill
Memo          :
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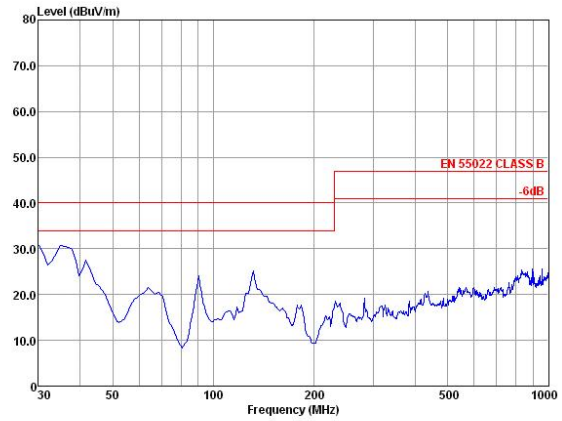


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Site          : Audix(Shanghai) Chamber3
Condition     : EN 55022 CLASS B VERTICAL
Project No.   :
Applicant     :
EUT           : OB2500N
M/N           : 5V 1A
S/N           :
Power Supply  : 230V/50Hz
Ambient       : 22'C  60%RH
Test Mode     :
Test Engineer: Bill
Memo          :
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