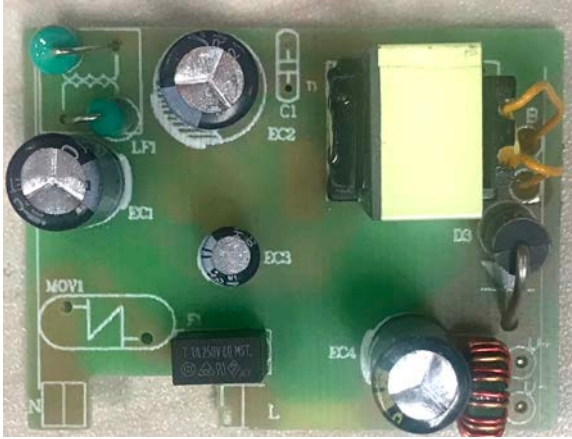


Subject
OB2576ALP Demo Board Manual

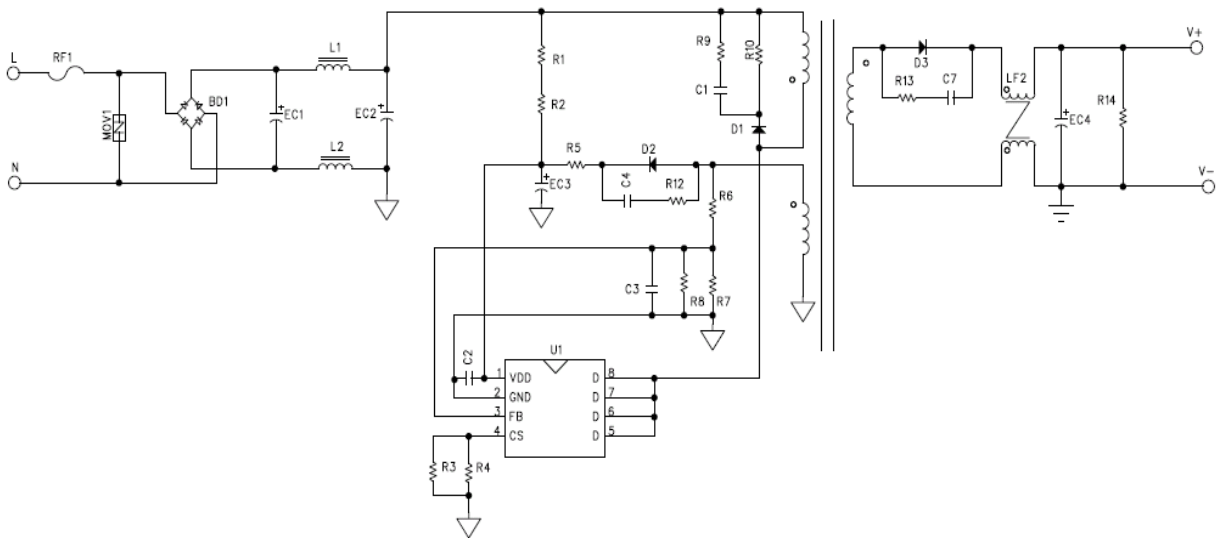
Board Model: CH12V1.0A0B2576ALP
Doc. No.: OB_DOC_DBM_2576ALP00



Key features:

- Standby power less than 75mW@264Vac
- Precise CV/CC regulation
- Primary-side sensing cc and cv regulation with TL431 and opto-coupler
- Cost effective and simplified system design
- Average efficiency meet DOE/COC
- Audio noised free operation
- Frequency shuffling technology to improve EMI performance
- Programmable input voltage Line OVP and Brownout protection

Schematic



Performance Evaluation

This session presents the test results of OB2576ALP 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 160ohm 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
- Programmable input voltage Line OVP and Brownout protection

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}		12	V	
	Output Current	I_{OUT_CV}	0		1.0	A
CC Section	Output Voltage	V_{OUT_CC}	7.0		V	
	Output Current	I_{OUT_CC}	1.15		1.45	A
Ripple & Noise	V_{RIPPLE}			150	mV _{P-P}	
Continuous Output Power	P_{OUT}		12		W	
Over Current Protection	I_{OUT_MAX}			1.45	A	
Active Mode Efficiency	η	83.26			%	Measured at Line End, $V_{IN}=115V/230V(COC)$
Time sequence						
Turn on delay time				2	s	
Environmental						
Conducted/Radiation EMI	Meets EN55032\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	44.1	12.159	<75mW	Pass
115V/60HZ	46.2	12.141		
230V/50HZ	66.2	12.074		
264V/50HZ	72.8	12.054		

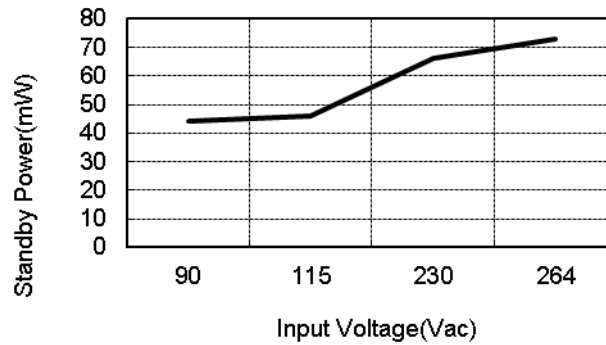


Fig. 1 Standby Power vs. Input Voltage

1.2 Efficiency

Table. 2 Efficiency Line end with 22# 1.5M (160mΩ) output line.

Input voltage	10%	25%	50%	75%	100%	25%~100% Load Aver. Eff.	Standards		Test Result
							DOE	COC	
115V/60Hz	78.30	82.86	84.58	84.86	84.62	84.23	82.96%	83.26%	Pass
230V/50Hz	75.41	81.94	83.90	84.35	85.13	83.82		73.26% (10%Load)	

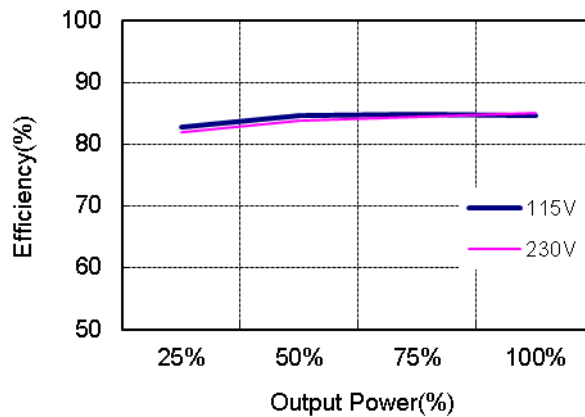


Fig. 2 Efficiency vs. Percent of Rated Output Power

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	12.159	12.000	12.049	11.4-12.6	Pass
115V/60Hz	12.141	12.008	12.054	11.4-12.6	
230V/50Hz	12.074	11.996	12.075	11.4-12.6	
264V/50Hz	12.054	11.990	12.083	11.4-12.6	
Line Regulation	$\pm 0.44\%$			$< \pm 2\%$	Pass
Load Regulation	$\pm 0.66\%$			$< \pm 5\%$	Pass

2.2 Ripple & Noise

Table. 4 Ripple & Noise

Input voltage	R&N (mV)		
	No load	Full load	Remark
90V/60Hz	10mV	106mV	Fig. 3,4
115V/60Hz	12mV	94mV	
230V/50Hz	12mV	90mV	
264V/50Hz	13mV	88mV	Fig. 5,6

Note: Ripple&noise was measured at line end without probe cap and ground clip, meanwhile with ceramic cap 0.1uF/100V and electrolytic cap 10uF/50V. Measurement bandwidth was limited to 20MHz.

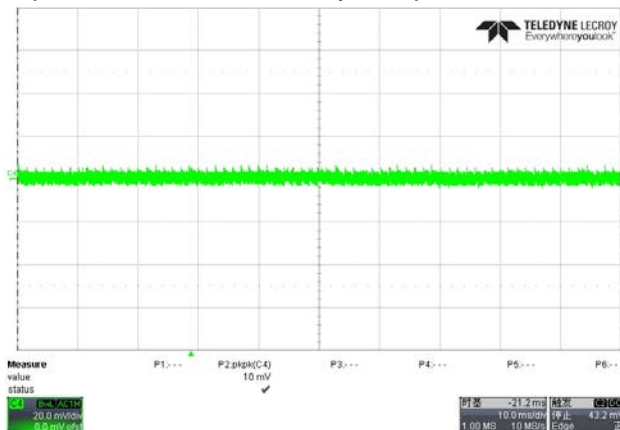


Fig. 3 Measured ripple& noise waveform@90V/60Hz, no load

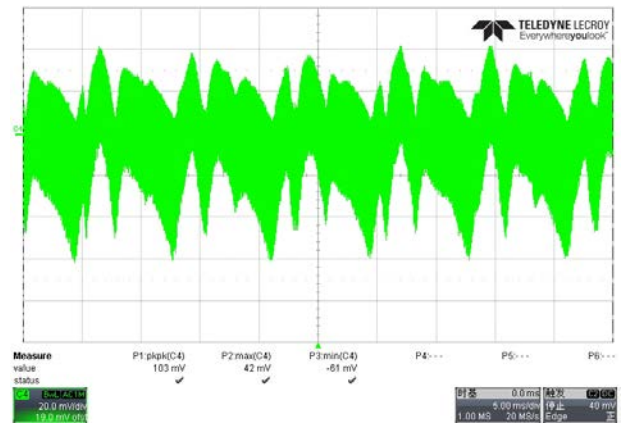


Fig. 4 Measured ripple& noise waveform@90V/60Hz, full load

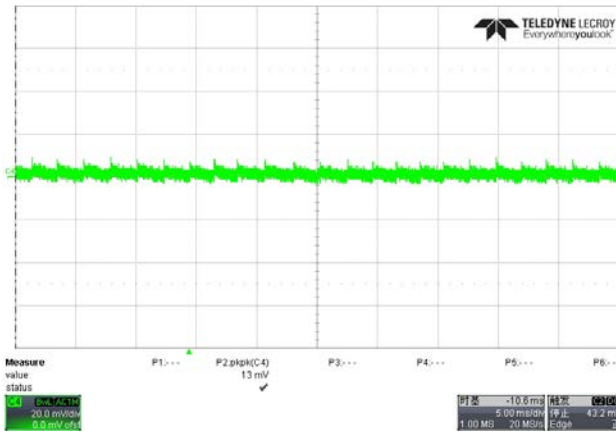


Fig. 5 Measured ripple & noise waveform @264V/50Hz, no load

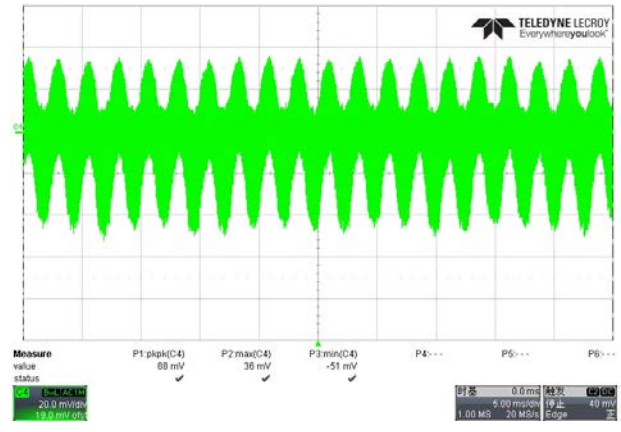


Fig. 6 Measured ripple & noise waveform @264V/50Hz, full load

2.3 Dynamic Test

A dynamic loading with low load lasting for 10ms/20ms and high load lasting for 10ms/20ms is added to output. The high load is 0.9A and the low load is 0.1A. The ramp is set at 0.125A/ μ s at transient. Measurement was taken at line end (Same as R&N measurement)

Table. 5 Output voltage under dynamic test (0.9A lasting for 10ms, 0.1A lasting for 10ms)

Input	Vomin-Vomax(v)	Remark
90V/60Hz	11.52-12.45	
115V/60Hz	11.59-12.45	
230V/50Hz	11.52-12.45	
264V/50Hz	11.52-12.49	

(0.9A lasting for 20ms, 0.1A lasting for 20ms)

Input	Vomin-Vomax(v)	Remark
90V/60Hz	11.49-12.52	
115V/60Hz	11.52-12.52	
230V/50Hz	11.45-12.52	
264V/50Hz	11.45-12.52	

2.4 Input voltage line ovp and brownout Test

Table. 6 Input voltage line ovp and brownout

	Input voltage	Remark
Line OVP	315Vac	Fig. 7
Brownout	72Vac	Fig. 8

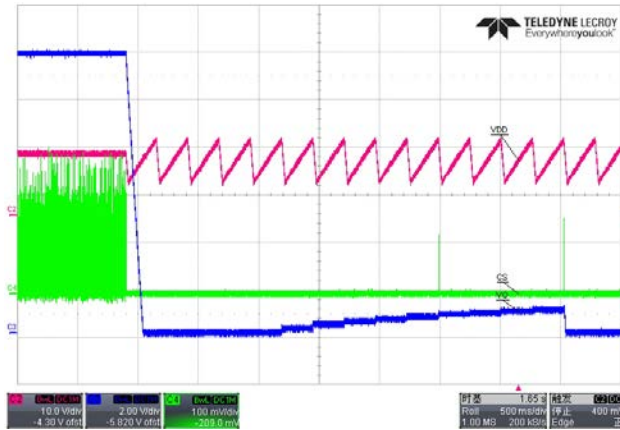


Fig. 7 Input Voltage > 315Vac Line OVP

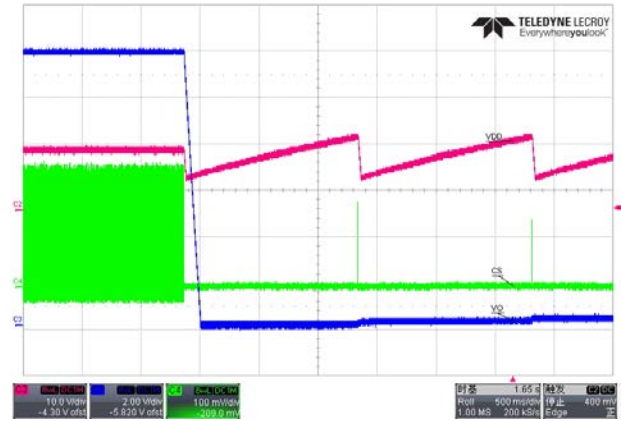
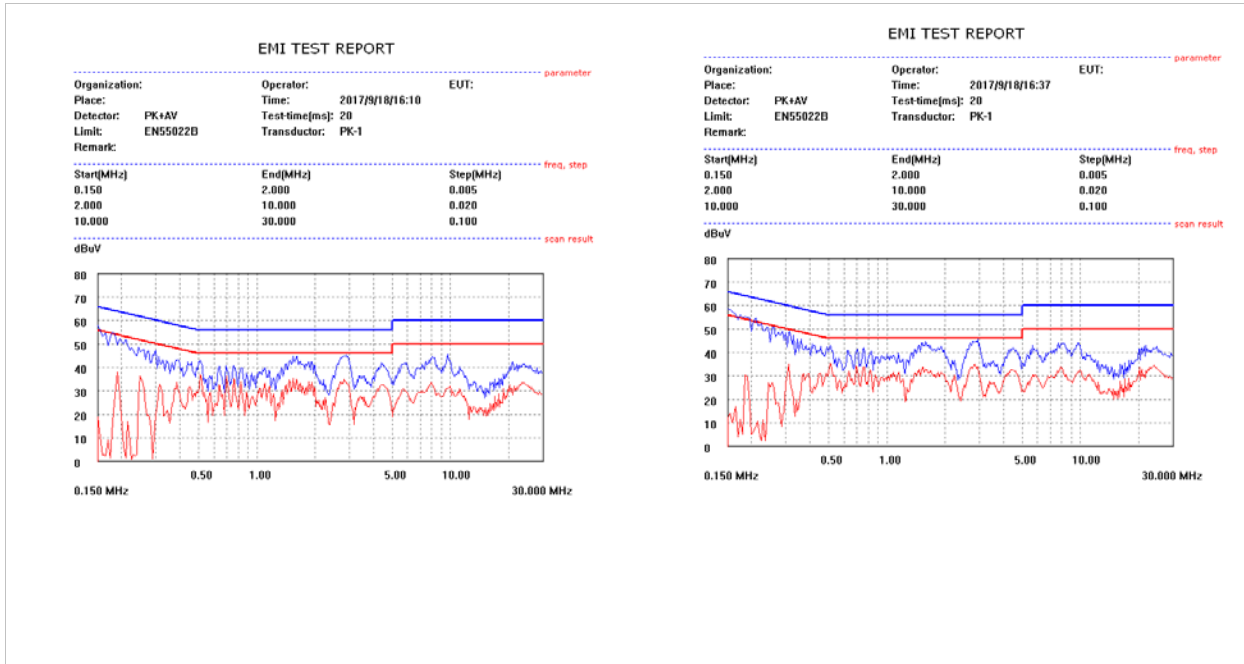


Fig. 8 Input Voltage < 72Vac Brownout

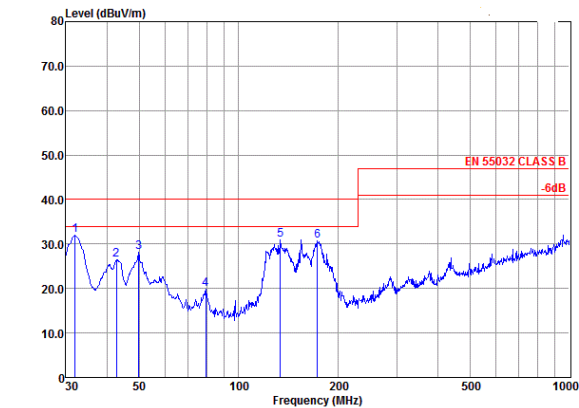
3. EMI Test

3.1 Conducted EMI Test

The Power supply passed EN55022 Class B

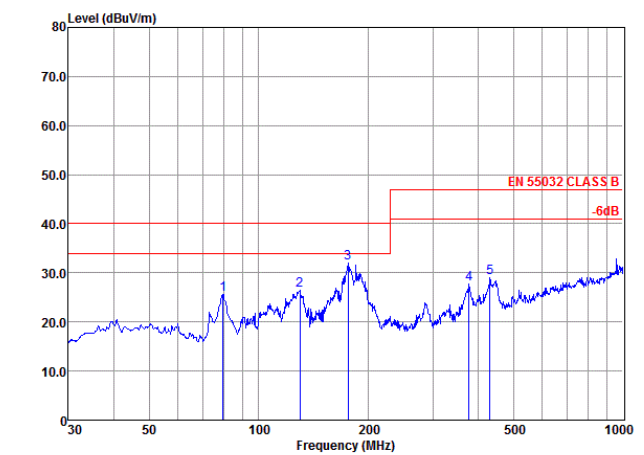


3.2 Radiation EMI Test



Site : Audix(Shanghai) Chamber3
 Condition : EN 55032 CLASS B VERTICAL
 Project No. :
 Applicant :
 EUT :
 M/N :
 S/N :
 Power Supply : 230V/50Hz
 Ambient : 22°C 60%RH
 Test Mode :
 Test Engineer: Richard

	Read	CableAntenna	Preamp	Limit	Over		
Freq	Level	Loss Factor	Factor	Line	Level	Limit	Remark
MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB
1	31.95	40.82	0.67	18.15	27.63	40.00	32.01 -7.99 Peak
2	42.60	33.92	0.75	19.40	27.61	40.00	26.46 -13.54 Peak
3	49.88	35.01	0.80	19.87	27.60	40.00	28.08 -11.92 Peak
4	79.52	29.94	1.01	16.58	27.60	40.00	19.93 -20.07 Peak
5	133.62	38.69	1.30	18.26	27.35	40.00	30.90 -9.10 Peak
6	173.21	36.71	1.47	19.66	27.12	40.00	30.72 -9.28 Peak



Site : Audix(Shanghai) Chamber3
 Condition : EN 55032 CLASS B HORIZONTAL
 Project No. :
 Applicant :
 EUT :
 M/N :
 S/N :
 Power Supply : 230V/50Hz
 Ambient : 22°C 60%RH
 Test Mode :
 Test Engineer: Richard

	Read	CableAntenna	Preamp	Limit	Over		
Freq	Level	Loss Factor	Factor	Line	Level	Limit	Remark
MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB
1	79.80	35.65	1.01	16.60	27.60	40.00	25.66 -14.34 Peak
2	129.47	34.51	1.28	17.94	27.38	40.00	26.35 -13.65 Peak
3	175.65	38.47	1.48	19.26	27.11	40.00	32.10 -7.90 Peak
4	377.26	31.41	2.19	21.41	27.34	47.00	27.67 -19.33 Peak
5	431.03	32.04	2.32	22.40	27.65	47.00	29.11 -17.89 Peak

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