
Subject**OB2638+OB2613+2007 Demo Board Manual**

Board Model: PD20V3.25A OB2638+2613

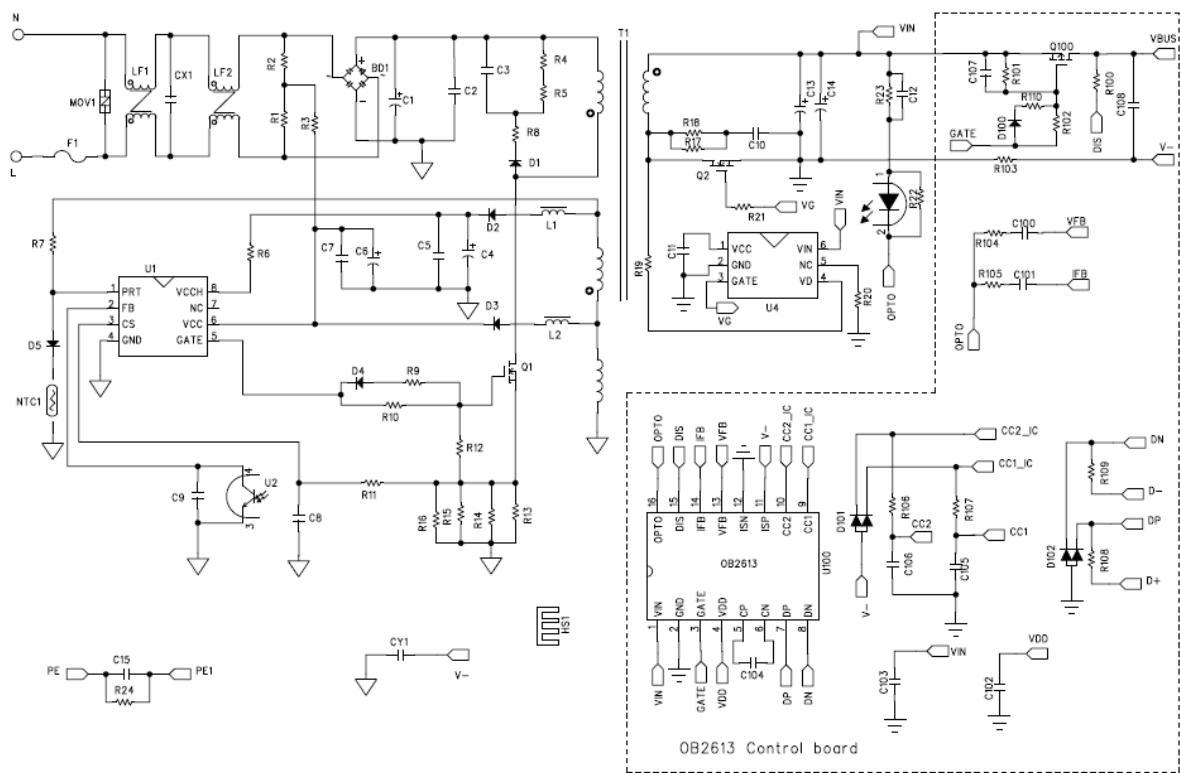
Doc. No.: OB_DOC_DBM_2638+261303



Key features:

- Support Power Delivery 3.0 Protocol@ Include PPS
 - Output voltage: 5V/9V/12V/15V/20V
 - Output current: 3A/3A/3A/3A/3.25A
 - Standby power less than 75mW
 - Average efficiency meet COC V tier2
 - Comprehensive protection coverage such as SCP、OCP、OLP、OVP、OTP
 - High precision OCP performance
 - Programmable cable drop compensation
 - Peak power function
 - Meet EN55022 Class B EMI
-

Schematic



Performance Evaluation

1. Input Characteristics

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)	1.4	1.2	0.82	0.71

Table 2 Standby power at no load

Input voltage	Pin(mW)	Vo(V)	Specification	Test result
90Vac/60HZ	27	4.957	<75mW	Pass
115Vac/60HZ	33	4.956		
230Vac/50HZ	56	4.957		
264Vac/50HZ	72	4.954		

1.2 Efficiency

Table 3 Efficiency @PCB End

5V3A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	89.77%	90.09%	90.15%	88.47%	89.62%	81.84%	85.2%	72.48%
230Vac	87.74%	88.42%	87.39%	83.19%	86.68%		81.23%	

9V3A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	91.53%	91.7%	92.13%	91.41%	91.69%	87.30%	89.94%	77.30%
230Vac	90.48%	91.34%	90.68%	88.98%	90.37%		84.87%	

12V3A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	91.88%	91.85%	92.45%	91.62%	91.95%	88.30%	89.26%	78.30%
230Vac	91.28%	92%	91.26%	90.01%	91.14%		87.33%	

15V3A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	92.04%	92.09%	92.7%	91.65%	92.12%	88.85%	89.03%	78.85%
230Vac	92.34%	92.45%	91.57%	90.09%	91.61%		87.05%	

20V3.25A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	91.78%	92%	92.83%	91.81%	92.1%	88.85%	89.2%	79%
230Vac	93.28%	93.09%	92.43%	90.71%	90.71%		87.14%	

2. Output Characteristics

2.1 Ripple & Noise

All data was measurement at @100mR CABLE end

Table 4 Ripple & Noise

Input voltage	5V R&N (mV)		Remark
	No load	Full load	
90Vac/60HZ	36.5mv	62.7mv	
264Vac/50HZ	56.3mv	72.3mv	Fig 1-4

Input voltage	9V R&N (mV)		Remark
	No load	Full load	
90Vac/60HZ	46.7mv	57.56mv	
264Vac/50HZ	64mv	66mv	

Input voltage	12V R&N (mV)		Remark
	No load	Full load	
90Vac/60HZ	46.1mv	77.4mv	
264Vac/50HZ	65mv	67mv	

Input voltage	15V R&N (mV)		
	No load	Full load	Remark
90Vac/60HZ	51.8mv	74.7mv	
264Vac/50HZ	62mv	78mv	

Input voltage	20V R&N (mV)		
	No load	Full load	Remark
90Vac/60HZ	44.2mv	110mv	
264Vac/50HZ	53.1mv	92.2mv	Fig 5-8

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

2.2 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 5 Output voltage under dynamic test

Input voltage	5V Output voltage (mV)	Waveform
90V/60HZ	±349	Fig.-2
264V/50HZ	±366	

Input voltage	9V Output voltage (mV)	Waveform
90V/60HZ	±357	
264V/50HZ	±357	

Input voltage	12V Output voltage (mV)	Waveform
90V/60HZ	±399	
264V/50HZ	±366	

Input voltage	15V Output voltage (mV)	Waveform
90V/60HZ	±399	
264V/50HZ	±382	

Input voltage	20V Output voltage (mV)	Waveform
90V/60HZ	±432	Fig.3-4
264V/50HZ	±415	

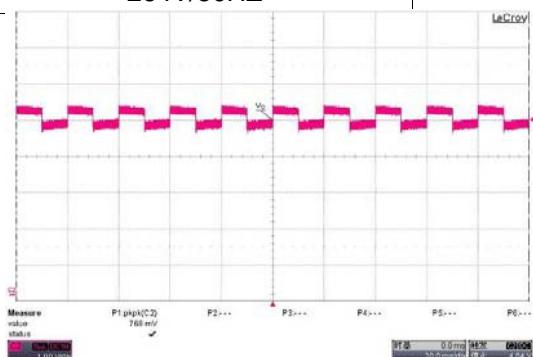


Fig. 1 Dynamic waveform @90Vac input

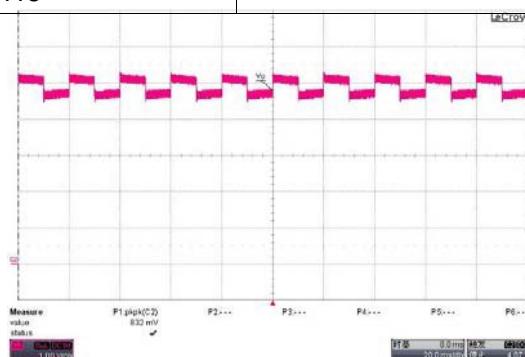


Fig. 1 Dynamic waveform @264Vac input

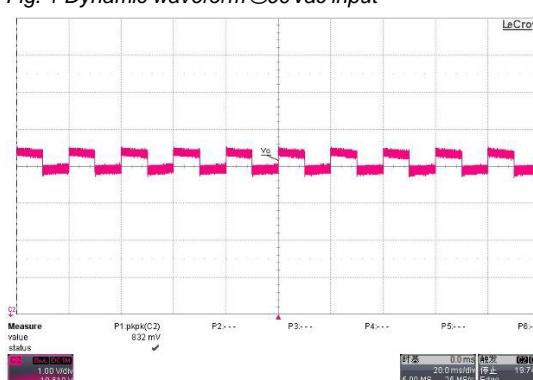


Fig. 2 Dynamic waveform @90Vac input

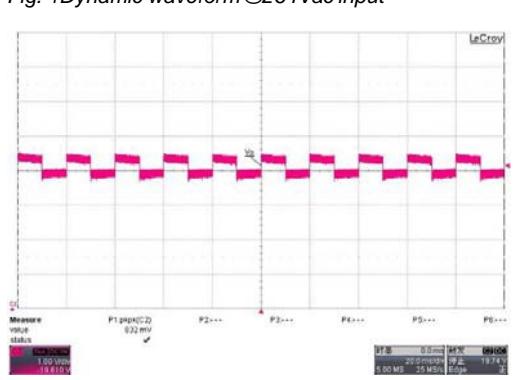
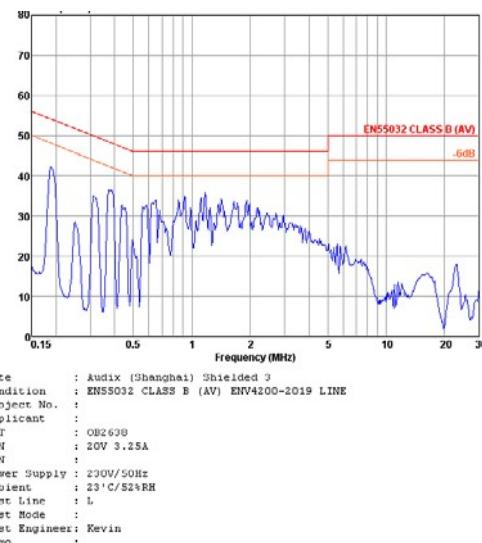
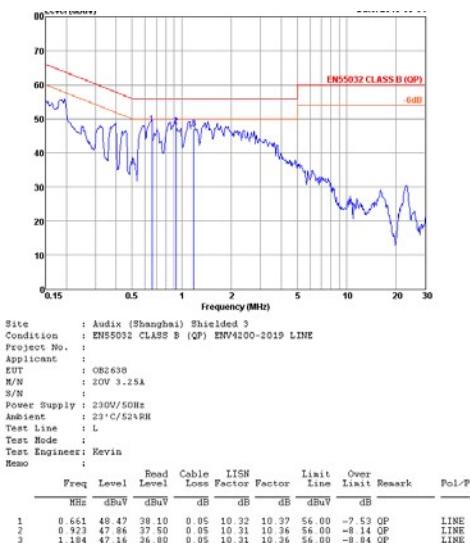


Fig. 4 Dynamic waveform @264Vac input

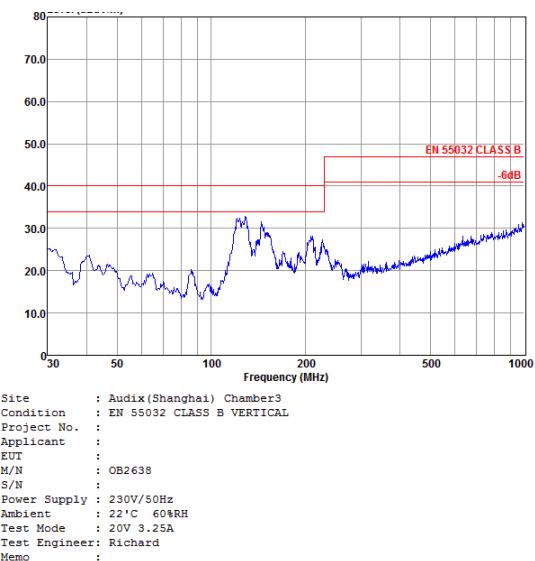
3. EMI Test

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

3.1 Conducted EMI Test



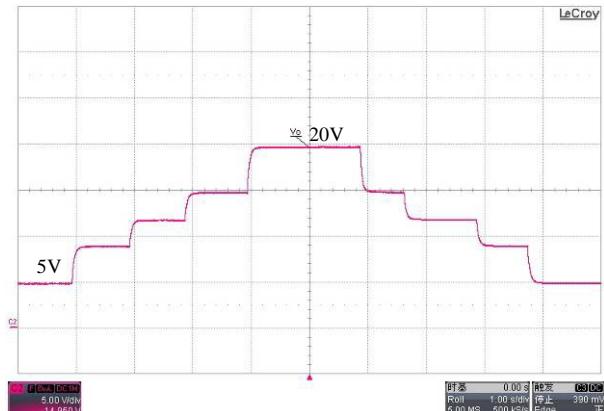
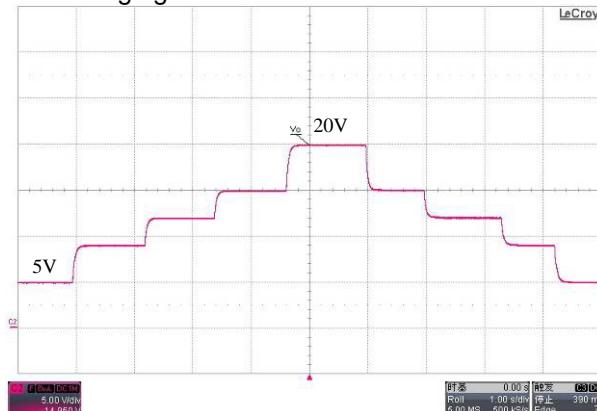
3.2 Radiation EMI Test



4 PD Specification Test

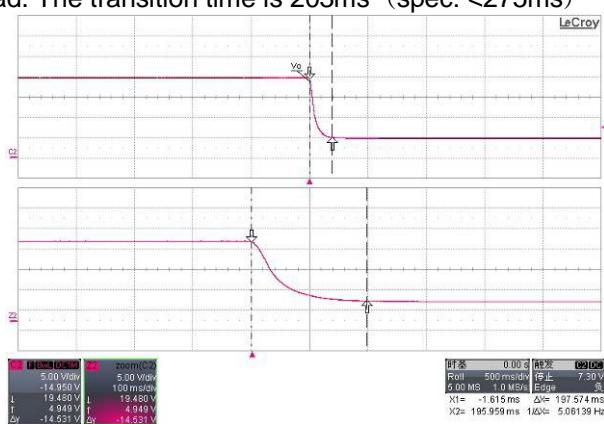
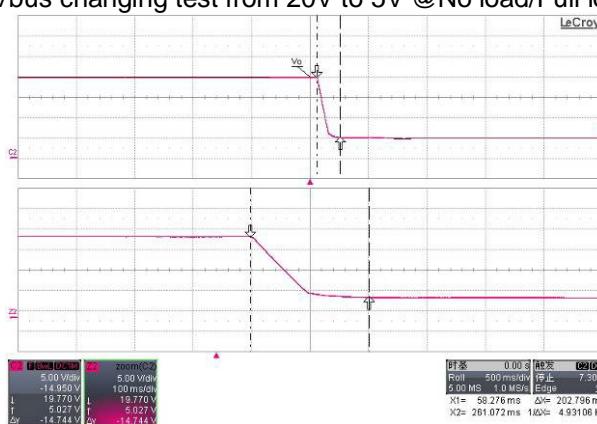
4.1 Vbus Change Test

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



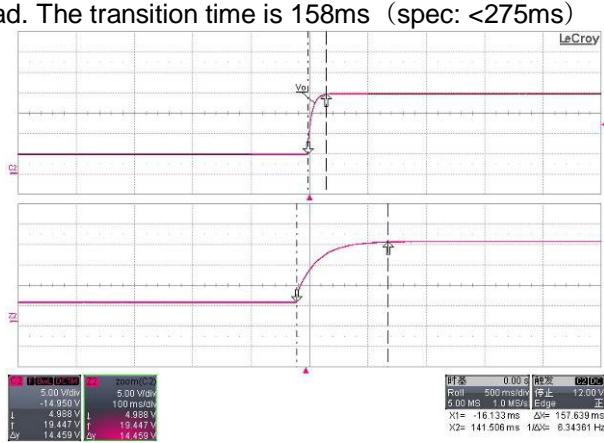
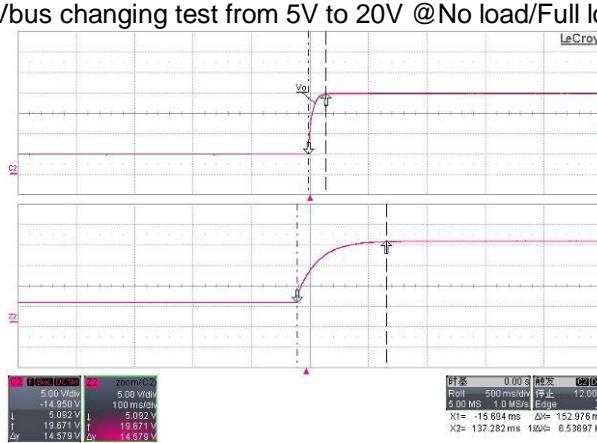
4.2 Negative Voltage Transitions

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



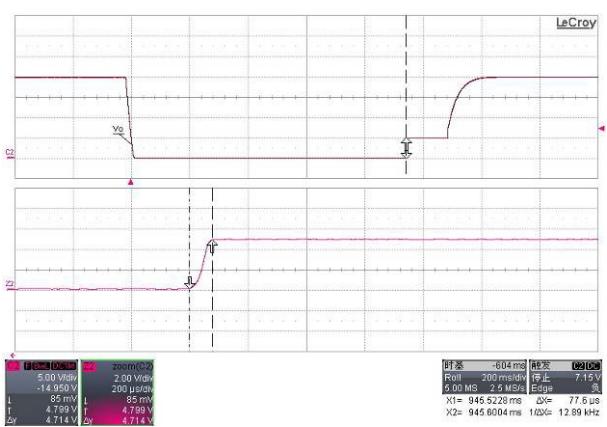
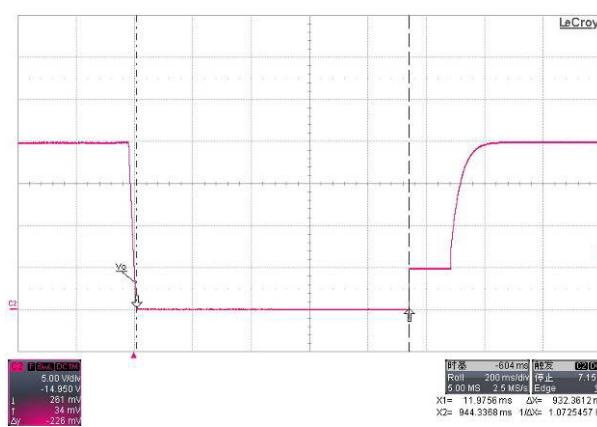
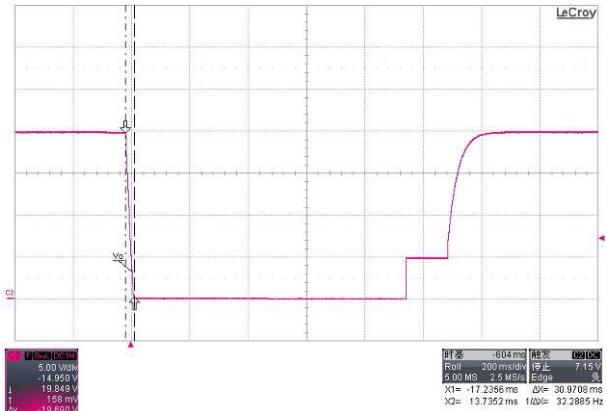
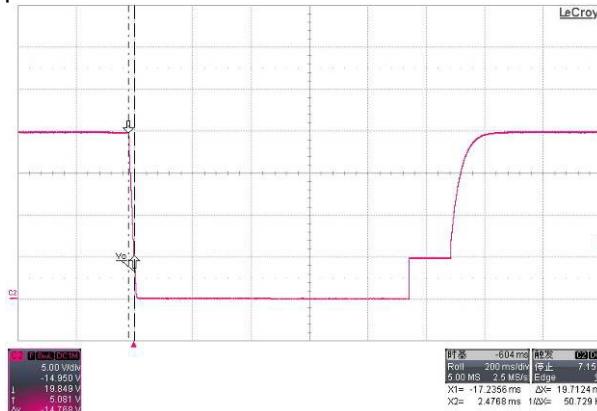
4.3 Positive Voltage Transitions

Vbus changing test from 5V to 20V @No load/Full load. The transition time is 158ms (spec: <275ms)



4.4 Response to Hard Resets

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



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