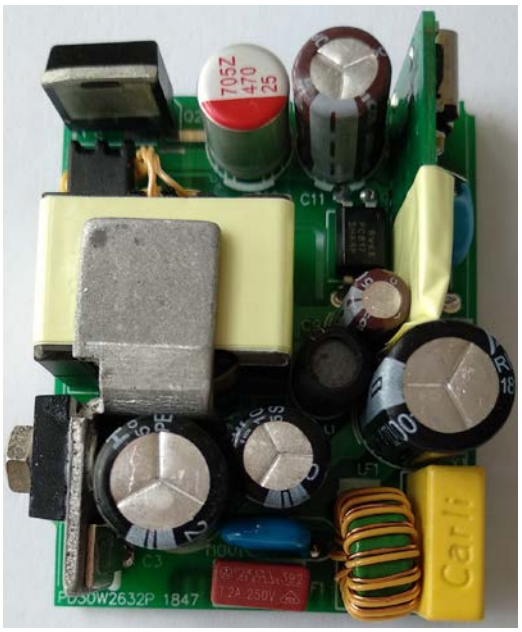
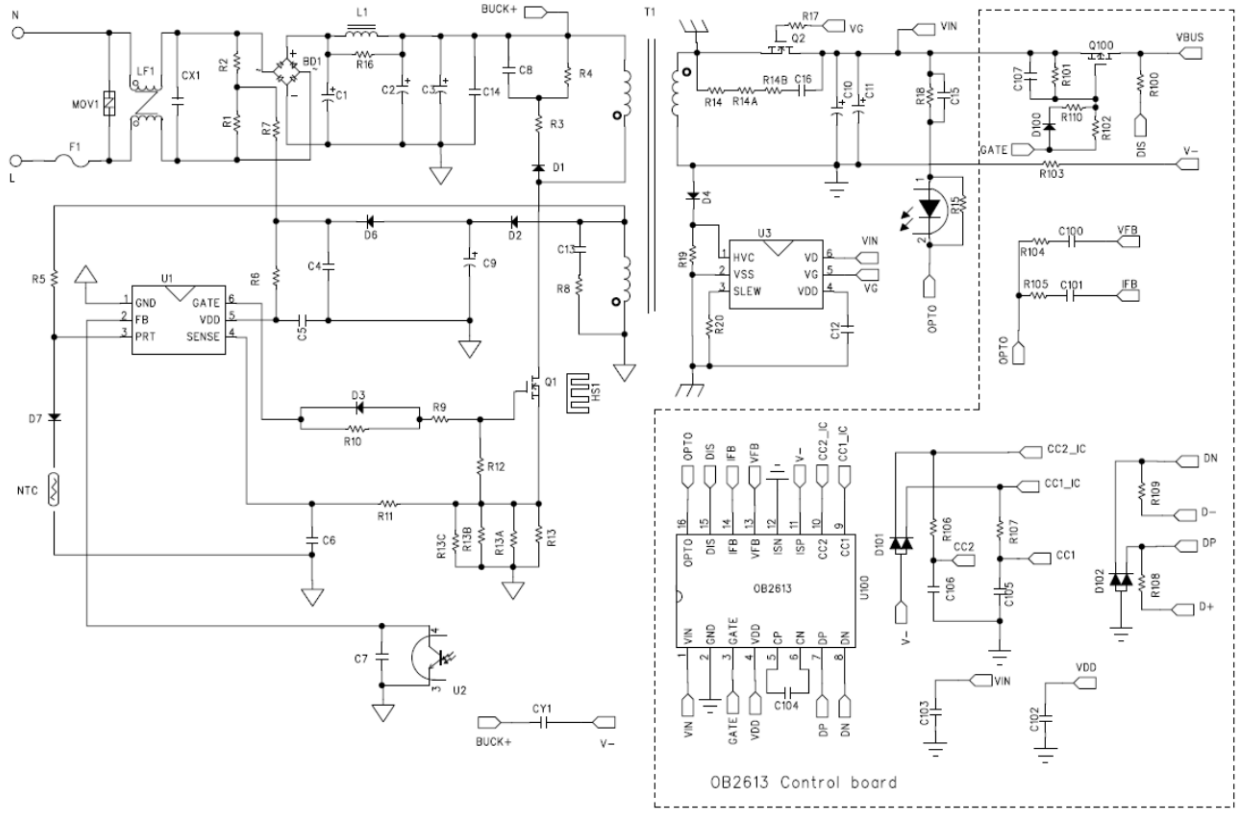
Subject	Board Model: PD30W OB2632P 1831
OB2632P+OB2613 Demo Board Manual	Doc. No.: OB_DOC_DBM_2632P+261303



Key features:

- Support Power Delivery 3.0 Protocol@ Include PPS
- Output voltage: 5V/9V/12V/15V/20V
- Output current: 3A/3A/2.5A/2A/1.5A
- Standby power less than 75mW
- Average efficiency meet COCⅤtier2
- Comprehensive protection coverage such as SCP、OCP、OLP、OVP、OTP
- High precision OCP performance
- Programmable cable drop compensation
- 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)	0.64	0.55	0.36	0.35

Table 2 Standby power at no load

Input voltage	Pin(mW)	Vo(V)	Specification	Test result
90Vac/60HZ	28	4.97	**<75mW**	**Pass**
115Vac/60HZ	29	4.97		
230Vac/50HZ	58	4.97		
264Vac/50HZ	70	4.97		

1.2 Efficiency

Table 3 Efficiency @PCB End

5V3A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	86.46	87.64	88.65	88.59	87.84	81.84%	84.43	72.48%
230Vac	84.26	85.48	87.2	84.75	85.42		80.53	

9V3A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	88.92	89.43	89.44	90.01	89.45	87.30%	87.09%	77.30%
230Vac	88.17	87.79	89.33	87.8	88.27		84.76%	

12V2.5A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	89.82	89.94	90.98	89.77	90.13	87.70%	86.55%	77.70%
230Vac	89.22	90.02	89.73	87.77	89.19		83.75%	

15V2A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	90.11	89.99	90.95	89.07	90.03	87.70%	85.13%	77.7%
230Vac	91.43	90.74	89.56	87.28	89.75		82.76%	

20V1.5A								
	100%	75%	50%	25%	AVE	CoC Req	10%	CoC Req
115Vac	90.02	91.19	90.1	87.5	89.7	87.70%	84.43%	77.7%
230Vac	91.41	90.38	88.94	86.28	89.25		80.53%	

2. Output Characteristics

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	4.991	4.948	4.932		5V
115Vac/60HZ	4.99	4.949	4.932		
230Vac/50HZ	4.98	4.949	4.932		
264Vac/50HZ	4.986	4.949	4.932		
Line Regulation	0.22%			<2%	
Load Regulation	1.2%			<5%	

Input voltage	No load	Half load	Full load	Specification	Output Voltage
90Vac/60HZ	8.98	8.886	8.793		9V
115Vac/60HZ	8.98	8.88	8.793		
230Vac/50HZ	8.98	8.88	8.793		
264Vac/50HZ	8.973	8.878	8.789		
Line Regulation	0.1%			<2%	
Load Regulation	2.1%			<5%	

Input voltage	No load	Half load	Full load	Specification	Output Voltage
90Vac/60HZ	11.981	11.897	11.821		12V
115Vac/60HZ	11.98	11.896	11.82		
230Vac/50HZ	11.981	11.896	11.82		
264Vac/50HZ	11.98	11.896	11.821		
Line Regulation	0.03%			<2%	
Load Regulation	1.6%			<5%	

Input voltage	No load	Half load	Full load	Specification	Output Voltage
90Vac/60HZ	14.976	14.91	14.85		15V
115Vac/60HZ	14.976	14.91	14.85		
230Vac/50HZ	14.975	14.91	14.85		
264Vac/50HZ	14.976	14.91	14.848		
Line Regulation	0.02%			<2%	
Load Regulation	0.85%			<5%	

Input voltage	No load	Half load	Full load	Specification	Output Voltage
90Vac/60HZ	19.97	19.92	19.876		20V
115Vac/60HZ	19.97	19.92	19.877		
230Vac/50HZ	19.972	19.923	19.879		
264Vac/50HZ	19.973	19.923	19.88		
Line Regulation	0.02%			<2%	
Load Regulation	0.7%			<5%	

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	50.6mv	62.1mv	
264Vac/50HZ	60.8mv	49.3mv	

Input voltage	9V R&N (mV)		
	No load	Full load	Remark
90Vac/60HZ	55.7mv	83.8mv	
264Vac/50HZ	67.8mv	59.5mv	

Input voltage	12V R&N (mV)		
	No load	Full load	Remark
90Vac/60HZ	52.5mv	87mv	
264Vac/50HZ	60.8mv	65.5mv	

Input voltage	15V R&N (mV)		
	No load	Full load	Remark
90Vac/60HZ	48mv	121mv	
264Vac/50HZ	48mv	73mv	

Input voltage	20V R&N (mV)		
	No load	Full load	Remark
90Vac/60HZ	43mv	80mv	
264Vac/50HZ	49.5mv	64.6mv	

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

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 6 Output voltage under dynamic test

Input voltage	5V Output voltage (mV)	Waveform
90V/60HZ	±376	Fig.15-16
264V/50HZ	±376	

Input voltage	9V Output voltage (mV)	Waveform
90V/60HZ	±360	
264V/50HZ	±352	

Input voltage	12V Output voltage (mV)	Waveform
90V/60HZ	±320	
264V/50HZ	±320	

Input voltage	15V Output voltage (mV)	Waveform
90V/60HZ	±272	
264V/50HZ	±264	

Input voltage	20V Output voltage (mV)	Waveform
90V/60HZ	±256	Fig.17-18
264V/50HZ	±240	

Dynamic waveform

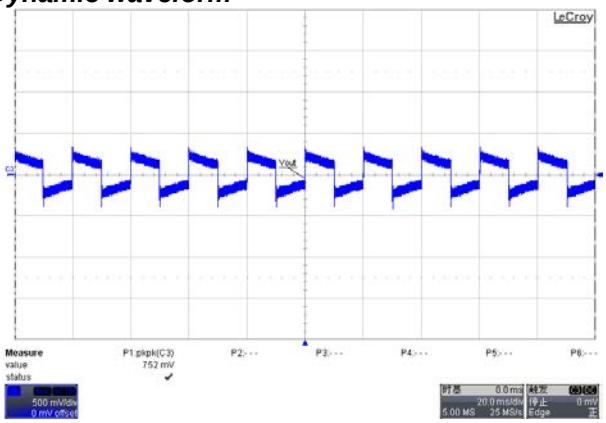


Fig. 1 Dynamic waveform@90Vac input

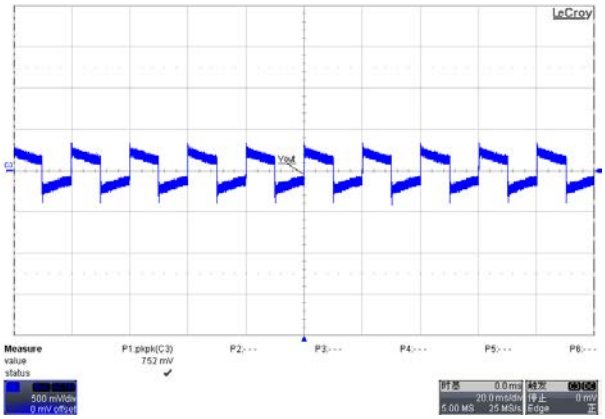


Fig. 2 Dynamic waveform@264Vac input

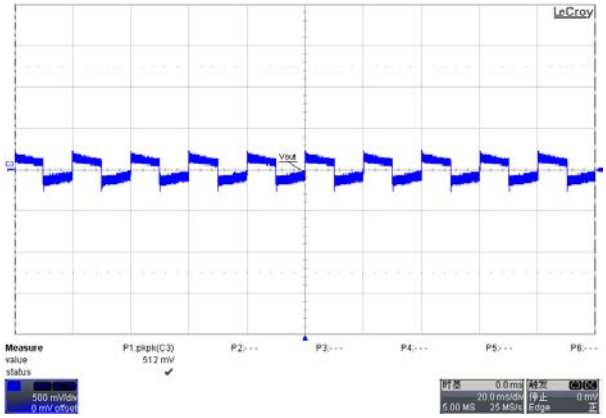


Fig. 3 Dynamic waveform@90Vac input

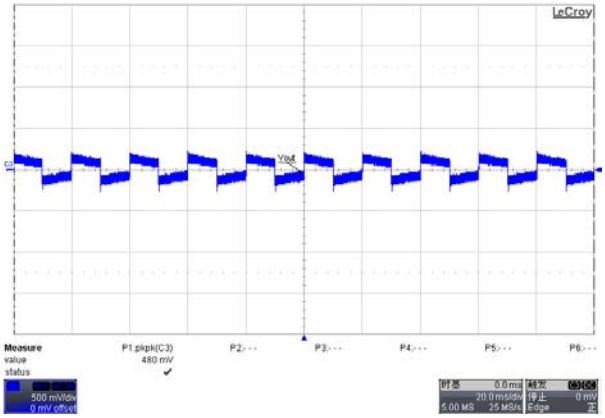
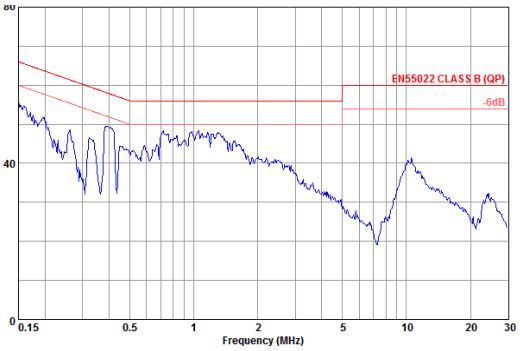


Fig. 4 Dynamic waveform@264Vac input

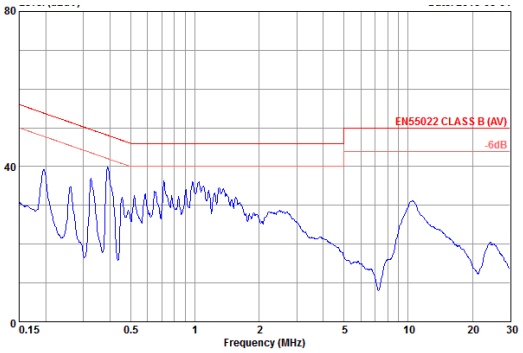
3. EMI Test

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

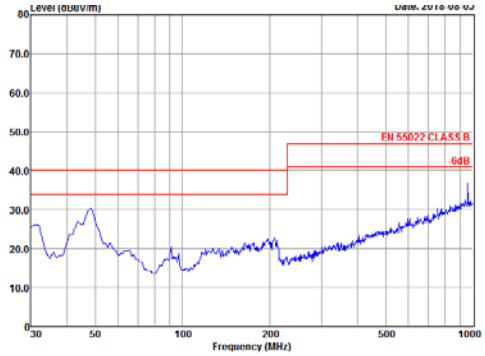


Site	: Audix(Shanghai) Shielded1
Condition	: EN55022 CLASS B (QP) ESH2-Z5-2018 LINE
Project No.	:
Applicant	:
EUT	: OB2632P
M/N	: 20V 1.5A
S/N	:
Power Supply	: 230V/50Hz
Ambient	: 22'C 48%RH
Test line	: L
Test Mode	:
Test Engineer	: Kevin
Memo	:

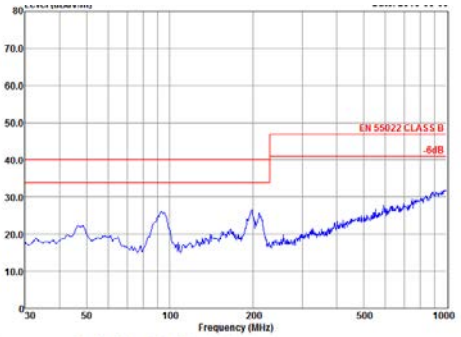


Site	: Audix(Shanghai) Shielded1
Condition	: EN55022 CLASS B (AV) ESH2-Z5-2018 LINE
Project No.	:
Applicant	:
EUT	: OB2632P
M/N	: 20V 1.5A
S/N	:
Power Supply	: 230V/50Hz
Ambient	: 22'C 48%RH
Test line	: L
Test Mode	:
Test Engineer	: Kevin
Memo	:

3.2 Radiation EMI Test



Site	: Audix(Shanghai) Chamber3
Condition	: EN 55022 CLASS B VERTICAL
Project No.	:
Applicant	:
EUT	: OB2632P
M/N	: 20V 1.5A
S/N	:
Power Supply	: 230V/50Hz
Ambient	: 22'C 60%RH
Test Mode	:
Test Engineer	: Keith
Memo	:



Site	: Audix(Shanghai) Chamber3
Condition	: EN 55022 CLASS B HORIZONTAL
Project No.	:
Applicant	:
EUT	: OB2632P
M/N	: 20V 1.5A
S/N	:
Power Supply	: 230V/50Hz
Ambient	: 22'C 60%RH
Test Mode	:
Test Engineer	: Keith
Memo	:

4. PD Specification Test

4.1 Vbus Change Test

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

Fig. 5 Vbus Changing Test @no load

Fig. 6 Vbus Changing Test @full load

4.2 Negative Voltage Transitions

Vbus changing test from 20V to 5V @No load/Full load. The transition time is 167ms（spec: <275ms）

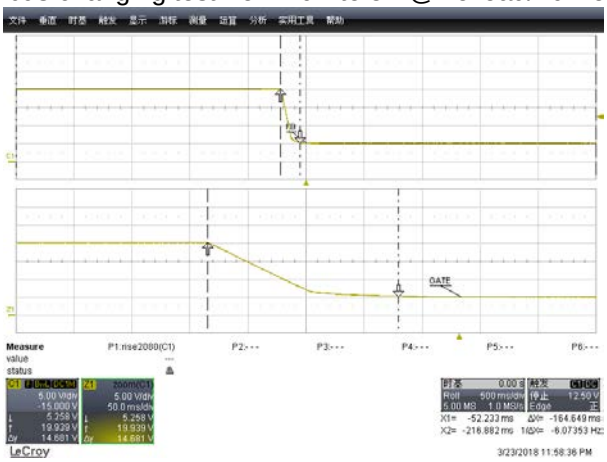


Fig. 7 Vbus Change From 20V to 5V @no load

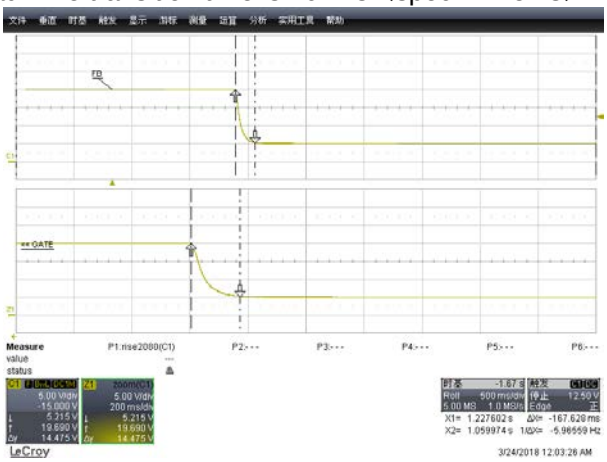


Fig. 8 Vbus Change From 20V to 5V @full load

4.3 Positive Voltage Transitions

Vbus changing test from 5V to 20V @No load/Full load. The transition time is 140ms（spec: <275ms）

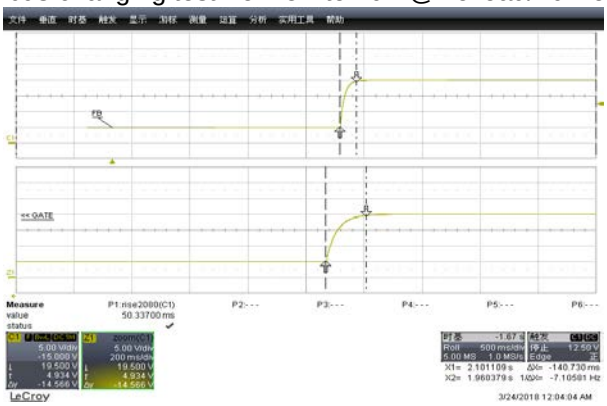


Fig. 9 Vbus Change From 5V to 20V @no load

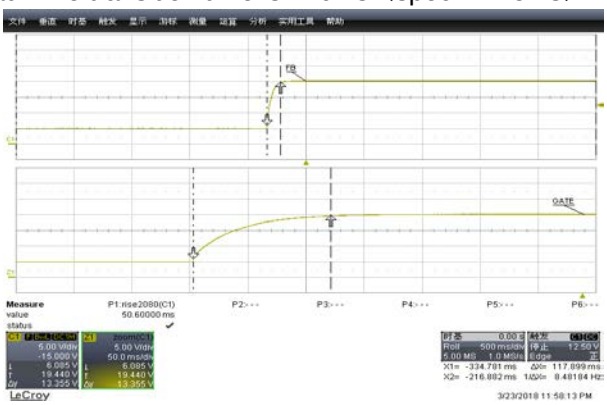


Fig. 10 Vbus Change From 5V to 20V @full load

4.4 Response to Hard Resets

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

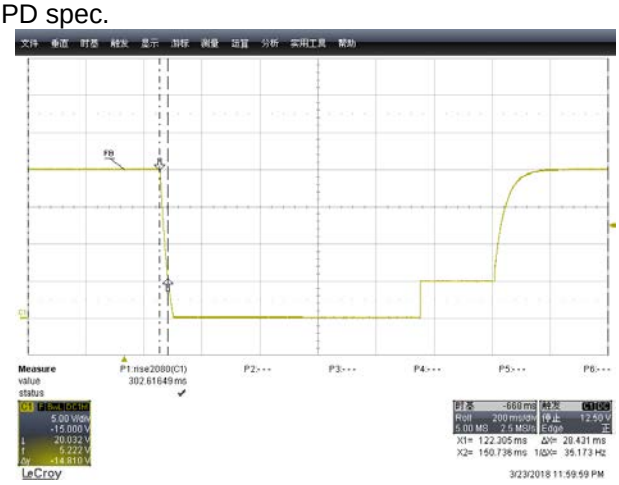


Fig. 11 Hard Reset t0-tSafe5V（spec: <275ms）

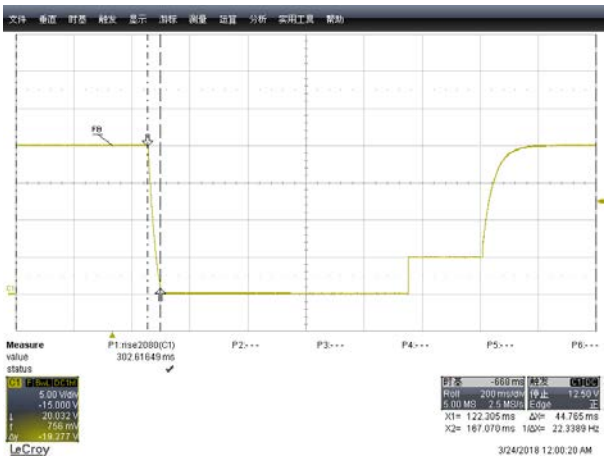


Fig. 12 Hard Reset t0-tSafe0V（spec: <650ms）

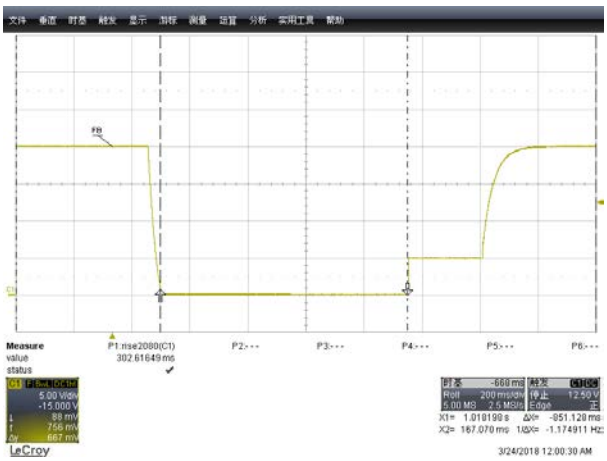


Fig. 13 Hard Reset tSrcRecover（660ms<spec<1s）

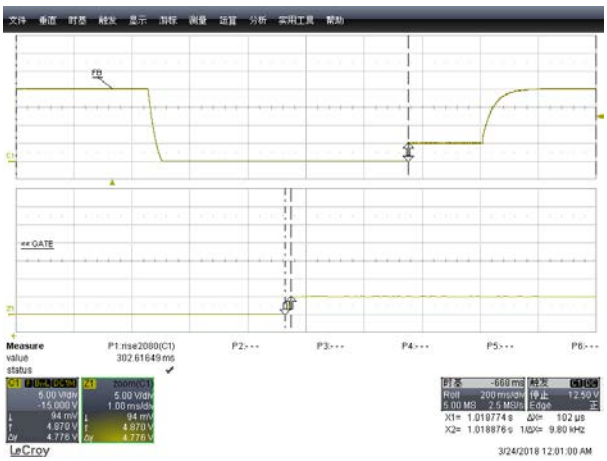


Fig. 14 Hard Reset tSrcTurnon（spec: <275ms）

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