

Subject
OB2633+OB2603A QC3.0
Demo Board Manual

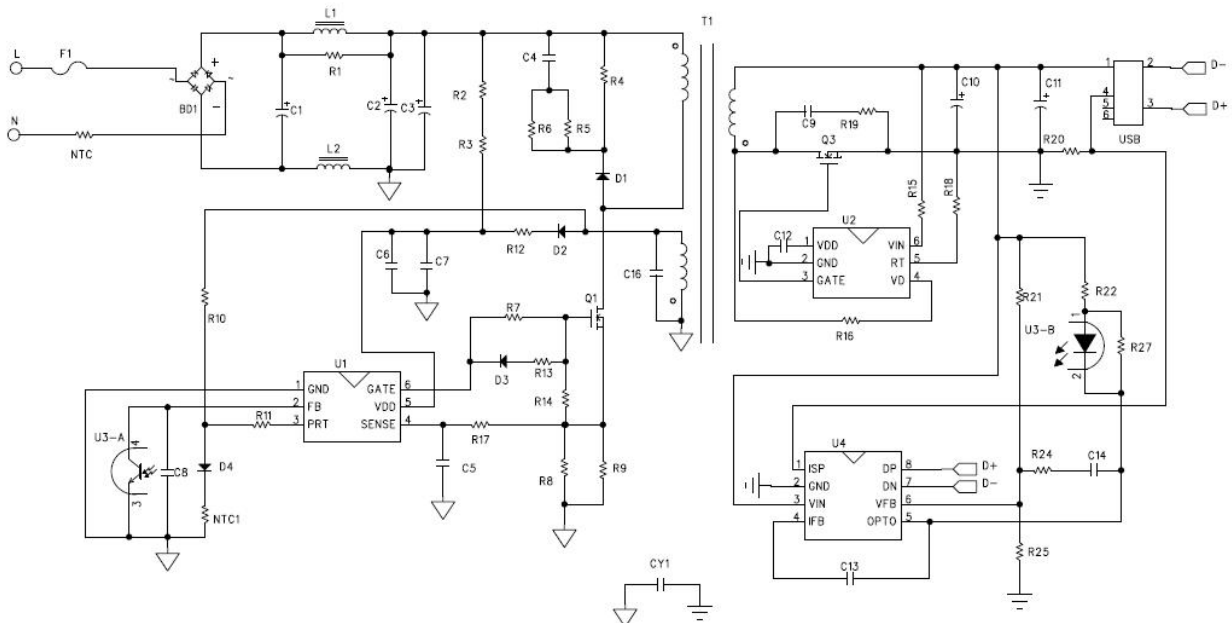
Board Model: CH12V2A 2633+2603A.00
Doc. No.: OB_DOC_DBM_2633+2603A01



Key features:

- Support BC1.2 protocol
- Support QC3.0 protocol
- SSR+ Synchronous rectification for high efficiency
- DC output: 5V/3A , 8V/3A , 12V/2A
- Standby power less than 75mW @264Vac
- Average efficiency meet DOE &COC
- Comprehensive protection coverage with auto-recovery, such as SCP、OLP、OVP、UVP、OTP etc.
- Meet EN55022 EMI

Schematic



Performance Evaluation

This session presents the test results of OB2633+OB2004A+OB2603A 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 100mR line end.

Performance Highlights

- Standby power less than 75mW@264Vac(5V output)
- Precise CV/CC regulation
- The average efficiency meet COC
- EMI passed EN55022 and FCC Part15 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_{AC}	2 Wire
Line Frequency		f_{LINE}	47	50/60	63	Hz	
Standby Power					75	mW	$V_{IN}=230V_{AC}$ $V_{OUT}=5V$
Output characteristics							
CV Section	Output Voltage	V_{OUT_CV}	4.75	5.0	5.25	V	Vout=5V
	Output Current	I_{OUT_CV}	0	3		A	
CV Section	Output Voltage	V_{OUT_CV}	7.6	8.0	8.4	V	Vout=8V
	Output Current	I_{OUT_CV}	0	3		A	
CV Section	Output Voltage	V_{OUT_CV}	11.40	12.0	12.60	V	Vout=12V
	Output Current	I_{OUT_CV}	0	2		A	
Ripple & Noise		V_{RIPPLE}			120	mV_{P_P}	
Continuous Output Power		P_{OUT}		24W			
Active Mode Efficiency (5V output)		η	81.84			%	Measured at PCB End, $V_{IN}=115V_{AC}/230V_{AC}$
Active Mode Efficiency (8V output)		η	86.80			%	Measured at PCB End, $V_{IN}=115V_{AC}/230V_{AC}$
Active Mode Efficiency (12V output)		η	86.80			%	Measured at PCB End, $V_{IN}=115V_{AC}/230V_{AC}$
Time sequence							
Turn on delay time					2	S	
Environmental							
Conducted/Radiation EMI		Meets CISPR22B/EN55022B					
Safety		Meets IEC950,UL1950,Class II					
ESD		8/15	15		18	kV	



**24W CC/CV QC3.0 protocol Quick Charger
Module Using OB2633+OB2603A
CH12V2A 2633+2603A.00**

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(5V)

Input voltage	Pin(mW)	Vo(V)	Specification	Test result
90Vac/60HZ	18.7	5.0102	<75mW	Pass
115Vac/60HZ	22.1	5.0103		
230Vac/50HZ	47.2	5.0107		
264Vac/50HZ	61.9	5.0105		

1.2 Efficiency (Testing after working on 5 minutes)

5V/3.0A module

Table. 2 Efficiency with PCB End (5V)

Input voltage	10%	25%	50%	75%	100%	Aver. Eff.	DOE	COC
115Vac/60HZ	86.81	88.99	89.34	88.91	87.07	88.58	81.39%	72.48% (10% load)
230Vac/50HZ	83.68	87.00	88.11	88.46	88.50	88.02		81.84%

8V/3A module

Table. 3 Efficiency with PCB End (8V)

Input voltage	10%	25%	50%	75%	100%	Aver. Eff.	DOE	COC
115Vac/60HZ	87.35	89.72	90.15	89.82	88.61	89.58	86.2%	76.8% (10% load)
230Vac/50HZ	84.43	88.85	90.00	90.30	90.19	89.83		86.8%

12V/2A module

Table. 4 Efficiency with PCB End (12V)

Input voltage	10%	25%	50%	75%	100%	Aver. Eff.	DOE	COC
115Vac/60HZ	84.09	88.57	89.88	90.08	89.86	89.60	86.2%	76.8% (10% load)
230Vac/50HZ	81.43	87.92	89.88	90.62	90.87	89.82		86.8%

1.3 QC3.0 protocol Quick charger I-V Curve

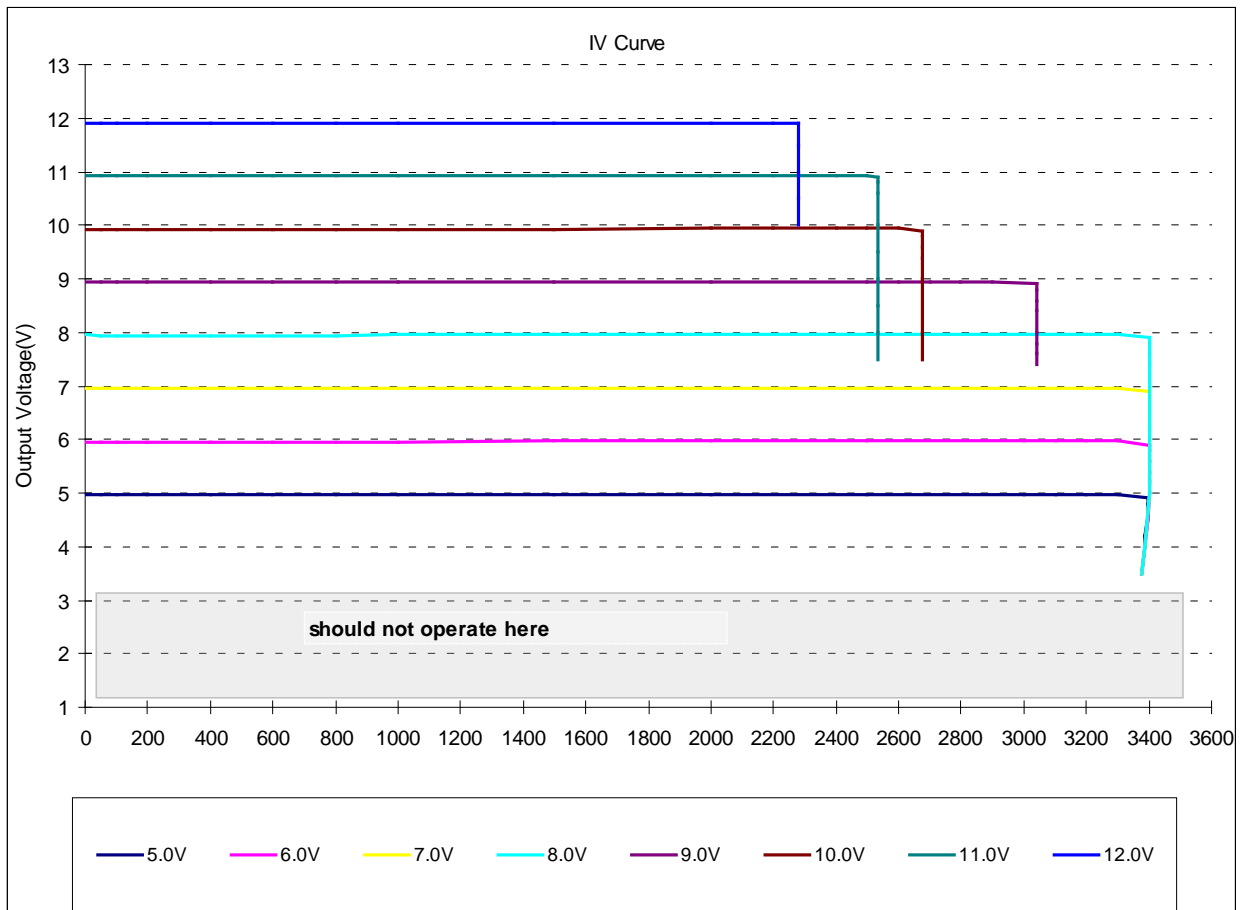


Fig. 1 QC3.0 quick charger I-V Curve

Note: All data were measured by line END (100mR)

2. Output Characteristics

2.1 Ripple & Noise

Table. 5 Ripple & Noise

Input voltage	R&N (mV)						Specification
	5V		8V		12V		
	No load	Full load	No load	Full load	No load	Full load	
90Vac/60HZ	22	83	27	96	23	90	<120mV
264Vac/50HZ	18	55	27	76	27	56	

Note: Ripple& noise was measured at line (100mR) end with probe cap and ground clip. Measurement bandwidth was limited to 20MHZ.

2.2 Dynamic Test

A dynamic loading with low set lasting for 1s and high load set lasting for 1s is added to output.

The ramp is set at 0.125A/us at transient. Measurement was taken at line end

(Same as R&N measurement)

Table. 6 Output voltage under dynamic test (5V)

(High load: 3.0A Low load: 0A)

Input	Vomax-Vomin(v)	Remark
90V/60HZ	5.427V-4.619V	
264V/50HZ	5.420V-4.673V	

Table. 7 Output voltage under dynamic test (8V)

(High load: 3.0A Low load: 0A)

Input	Vomax-Vomin(v)	Remark
90V/60HZ	8.49V-7.55V	
264V/50HZ	8.47V-7.61V	

Table. 8 Output voltage under dynamic test (12V)

(High load: 2.0A Low load: 0A)

Input	Vomax-Vomin(v)	Remark
90V/60HZ	12.29V-11.66V	
264V/50HZ	12.26V-11.67V	

2.3 QC 3.0 protocol certification

2.3.1 QC2.0 output voltage transition

The output voltage levels can be programmable:5V;9V;12V with Qualcomm QC2.0 protocol.The output voltage is 5V as default voltage after startup, and change output voltage by detecty different D+/D- voltage.

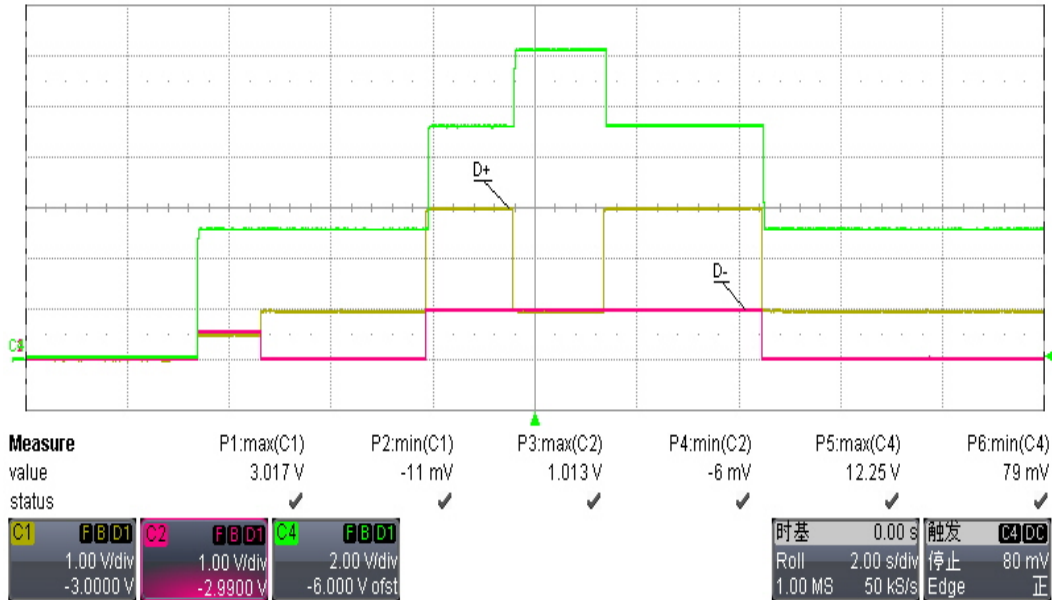


Fig. 2 QC2.0 output voltage transition

2.3.2 QC3.0 output voltage transition

The output voltage levels can be programmable:3.6V-12V with Qualcomm QC3.0 protocol. The output voltage is 5V as default voltage after startup, and change output voltage by detecting different D+/D- voltage.

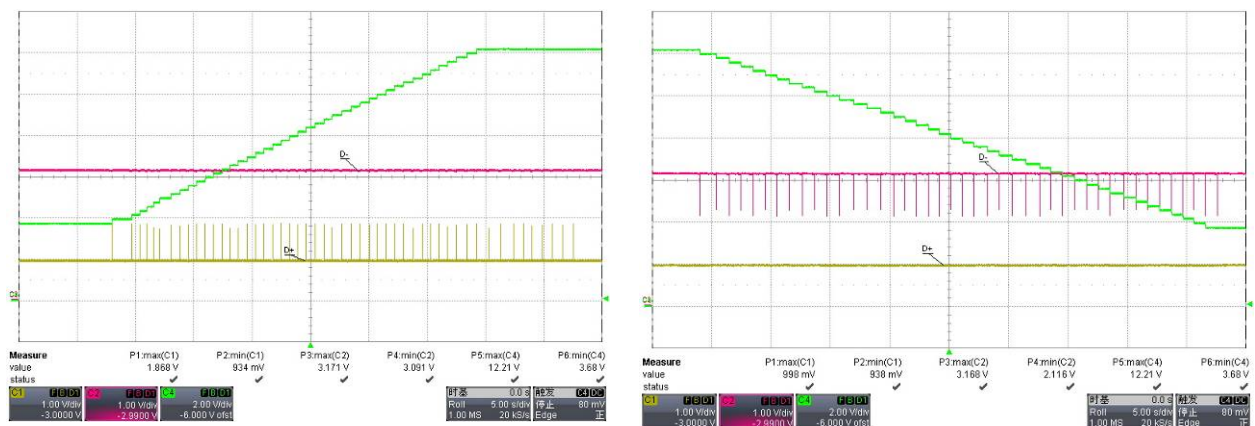
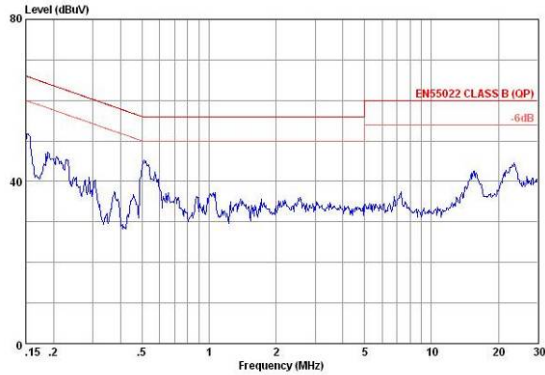


Fig. 3 QC3.0 output voltage transition

3 EMI Test

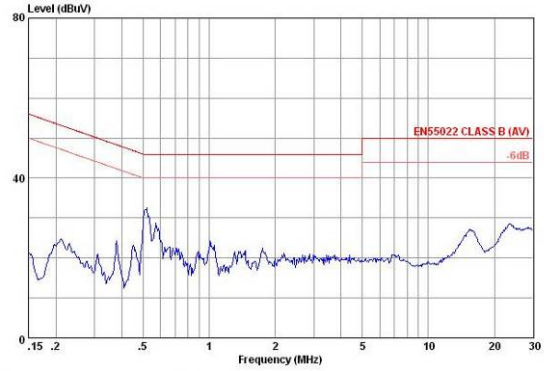
The Power supply passed EN55022 Class B EMI requirement with more than 6dB margin

3.1 Conducted EMI Test (12V/2A)



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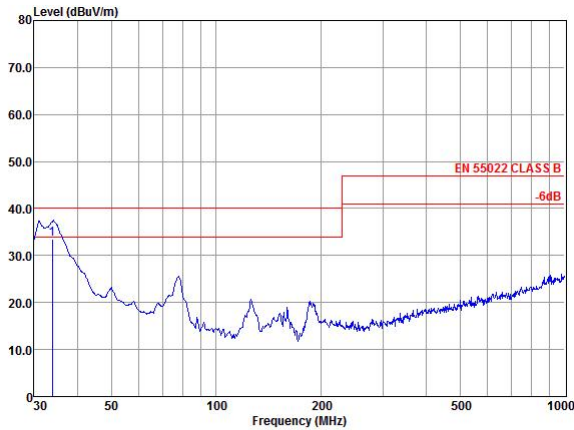
Site       : Audix(Shanghai) Shielded1
Condition  : EN55022 CLASS B (OP) ESH2-25-2016 LINE
T         :
Applicant  :
EUT       : OB2633
M/N       : 12V 2A
S/N       :
Power Supply : 230V/50Hz
Ambient    : 22°C 48%RH
Test line  : L
Test Mode  : Charge
Test Engineer: Kalsi
Memo       :
  
```



```

Site       : Audix(Shanghai) Shielded1
Condition  : EN55022 CLASS B (AV) ESH2-25-2016 LINE
T         :
Applicant  :
EUT       : OB2633
M/N       : 12V 2A
S/N       :
Power Supply : 230V/50Hz
Ambient    : 22°C 48%RH
Test line  : L
Test Mode  : Charge
Test Engineer: Kalsi
Memo       :
  
```

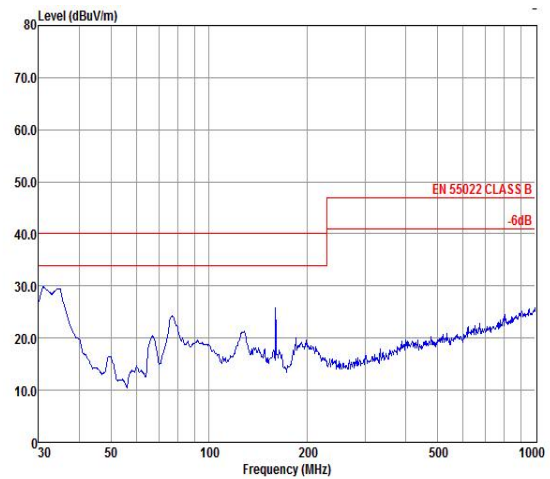
3.2 Radiation EMI Test (12V/2A)



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Site       : Audix(Shanghai) Chamber3
Condition  : EN 55022 CLASS B VERTICAL
Project No. :
Applicant  :
EUT       :
M/N       : OB2633
S/N       : 12V 2A
Power Supply : 230V/50Hz
Ambient    : 22°C 60%RH
Test Mode  :
Test Engineer: Bright
Memo       :
  
```

Freq	Read Level	Cable Loss	Antenna Factor	Limit Line	Level	Over Limit	Remark
MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	33.80	16.50	0.59	16.41	40.00	33.50	-6.50 QP



```

Site       : Audix(Shanghai) Chamber3
Condition  : EN 55022 CLASS B HORIZONTAL
Project No. :
Applicant  :
EUT       :
M/N       : OB2633
S/N       : 12V 2A
Power Supply : 230V/50Hz
Ambient    : 22°C 60%RH
Test Mode  :
Test Engineer: Bright
Memo       :
  
```




**24W CC/CV QC3.0 protocol Quick Charger
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CH12V2A 2633+2603A.00**

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