

Subject**OB2150C Demo Board Manual**

Board Model: Car charger2150C 2132

Doc. No.: OB_DOC_DBM_2150C00

**Key features:**

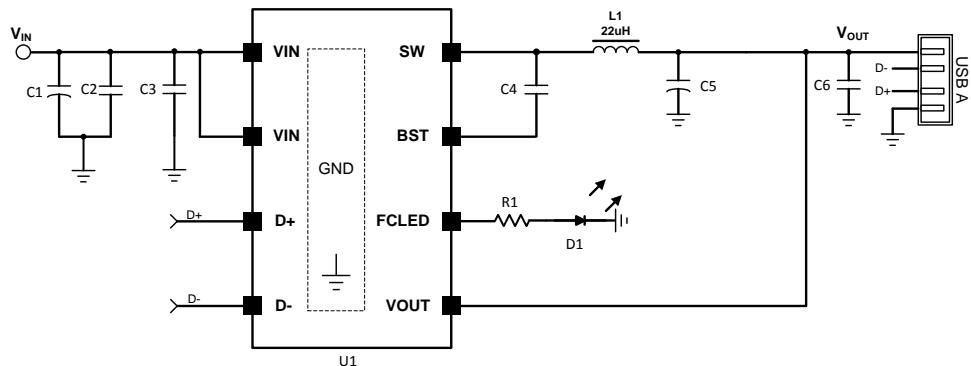
- Supports QC2.0/QC3.0, AFC, FCP1.0 Fast Charge protocols.
- Support Apple, Samsung, and BC1.2 protocols.
- Support 5V/3A, 9V/2A, 12V/1.5A.
- Up to 92% efficiency at V_{OUT} 5V 3A, V_{IN} 12V.
- Built-in Cable Compensation.
- Multi-Stage Short Circuit Protection and Hiccup Mode
- Vin/Vout Over Voltage Protection and Over Temperature Protection
- Radiation EMI requirement with more than 6dB margin

Revision History

Revise Date	Version	Reason/Issue
2021-8-12	00	First issue

1. Board Information

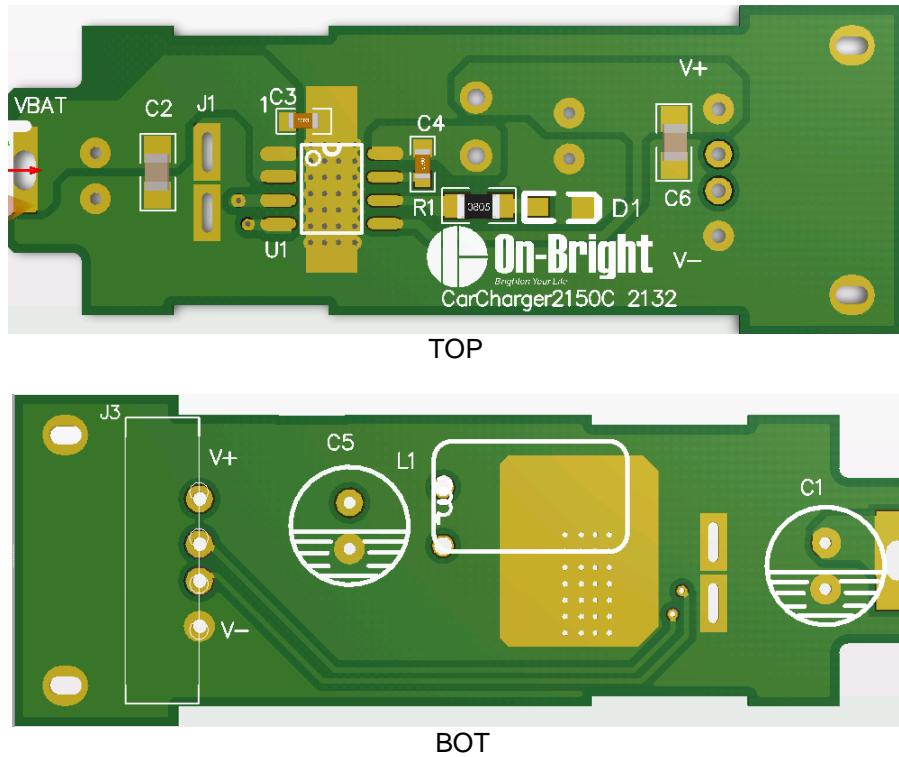
1.1 Board schematic

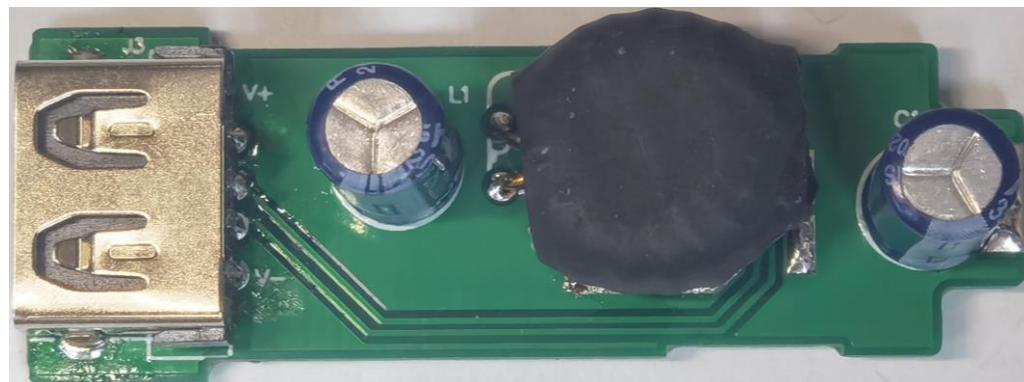
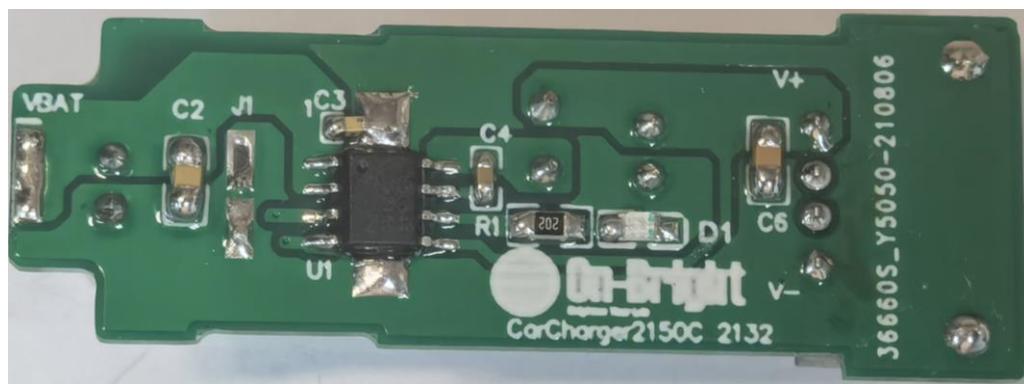


Component list

No.	Position	Description	Quantity
1	R1	SMD RES 2kohm/25V 0805	1
2	D1	SMD LED 0805	1
3	C1	E.C., 100uF/35V,10*6,Aishi,1510JPET,RS105°C	1
4	C2	SMD CAP 100nF/50V 0805	1
5	C3	SMD CAP 3.3nF/50V 0603	1
6	C4	SMD CAP 470nF/25V 0603	1
7	C5	E.C. 220uF/25V,10*6, Aishi,1822JPET,RS105°C	1
8	C6	SMD CAP 100nF/25V 0805	1
9	L1	Inductor 22uH, 铁硅铝 044-125,12*6*4, Φ0.7*20TS,18mohm	1
10	U1	OB2150C,ESOP8	1
11	PCB	Carcharger2150C 2132	1
	Total		11

1.2 PCB Gerber File



1.3 Snapshot

2. Converter Specification

2.1 Input Characteristics

Input voltage range 8-30Vdc

2.2 Output Characteristics

Output voltage & current 5V3A/ 9V2A/ 12V1.5A

Operating frequency 125KHz

2.3 Performance Function

Efficiency UP to 97%

Ripple & Noise <300mV

2.4 Protection Function

Vin UVLO Shut down with auto-restart

Vin OVP Shut down with auto-restart

Output OVP Shut down with auto-restart

OTP Shut down with auto-restart

OCP Shut down with auto-restart

Output SCP Shut down with auto-restart

3. Performance Evaluation

3.1 VIN UVLO

		Test result	Spec	Remark
UVLO	OFF	7.4V	7.2-7.9V	pass
	ON	6.9V	6.65-7.35V	pass

3.2 VIN OVP

		Test result	Spec	Remark
OVP	OFF	28.56V	27.5-29.5V	pass
	ON	30.51V	29.5-31.5V	pass

3.3 Efficiency

Burn in 2 min., PCB End's Efficiency.

3.3.1 Vo=5V3A

VIN (V)	25%	50%	75%	100%	AVG
12	94.19%	94.59%	94.05%	93.29%	94.03%
24	90.12%	92.17%	92.24%	91.76%	91.57%

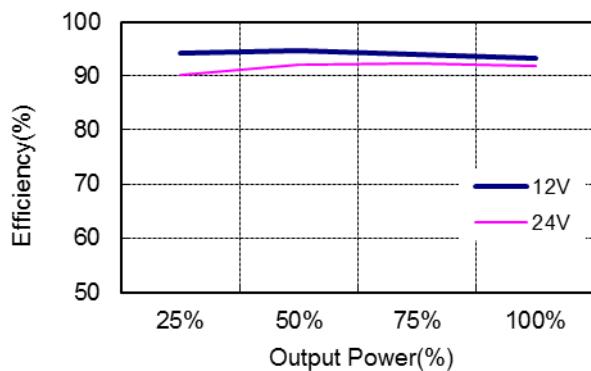


Figure 1. Efficiency @Buck CV mode 5V/3A

3.3.2 Vo=9V2A

VIN (V)	25%	50%	75%	100%	AVG
12	95.02%	96.49%	96.73%	96.66%	96.23%
24	90.58%	93.25%	94.18%	94.4%	93.1%

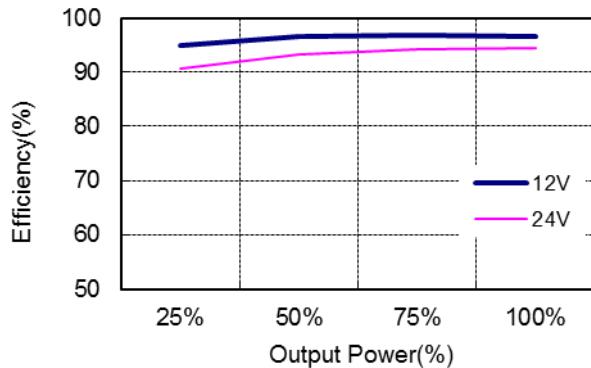


Figure 2: Efficiency @Buck CV mode 9V/2A

3.3.3 Vo=12V1.5A

VIN (V)	25%	50%	75%	100%	AVG
12	94.96	96.74	97.7	97.75	96.79%
24	92.72	94.22	95	95.44	94.35%

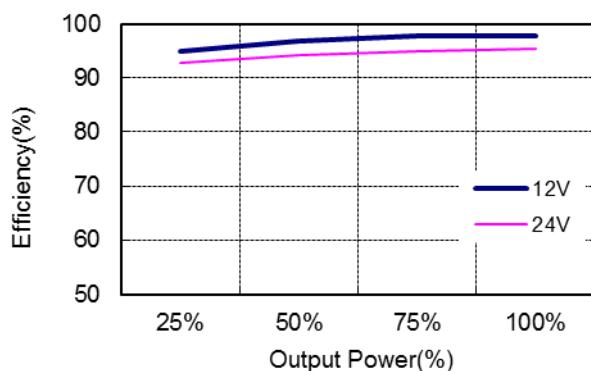


Figure 3: Efficiency @Buck CV mode 12V/1.5A

3.4 Output Voltage& Current

VIN=12V/24V, Vo=5V

Figure5 :CV

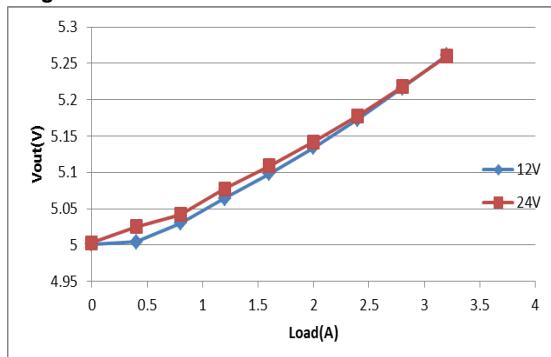
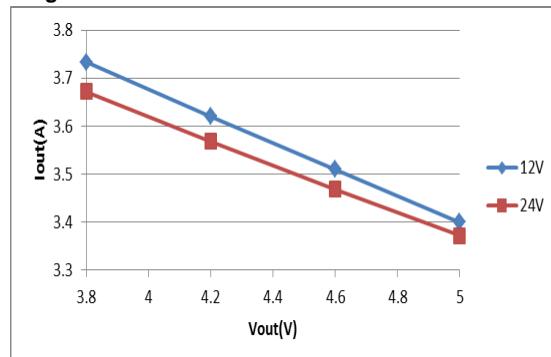


Figure6 : CC



VIN=12V/24V, Vo=9V

Figure7 :CV

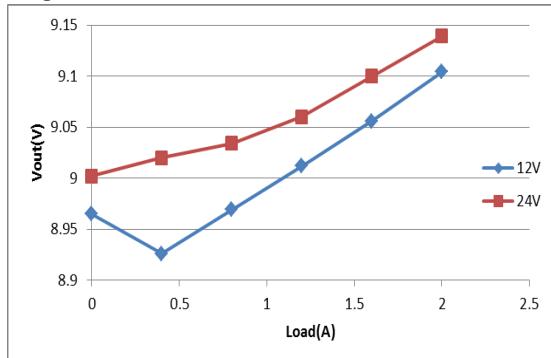
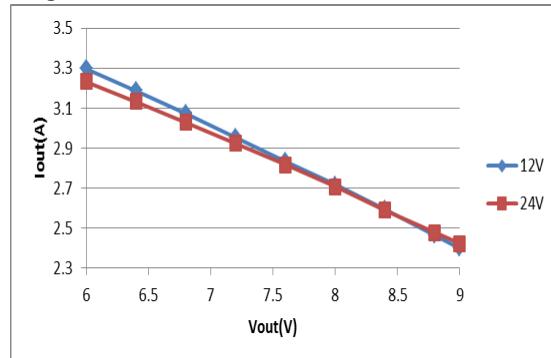


Figure8 : CC



VIN=12V/24V, Vo=12V

Figure9 :CV

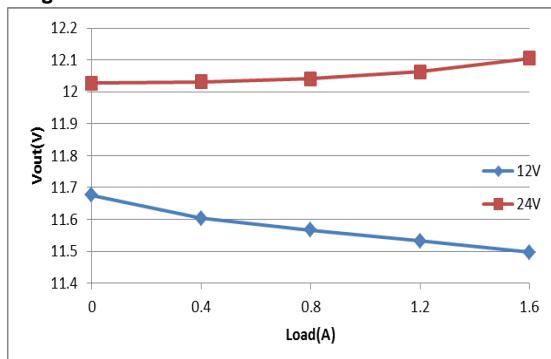
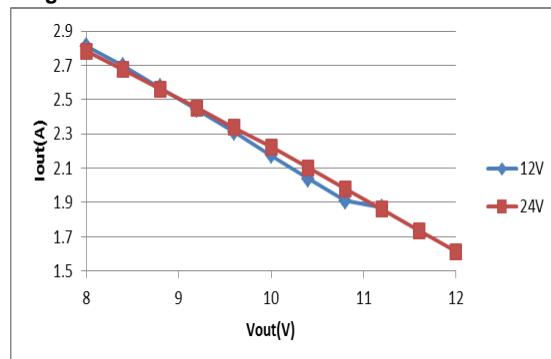


Figure10 : CC



3.5 Ripple & noise

PCB END with 104 cap

Vin=12V

	Ripple&noise (mv)	
Vo	0	100%
5V3A	22	133
9V2A	25	83
12V1.5A	17	27

Vin=24V

	Ripple&noise (mv)	
Vo	0	100%
5V3A	40	189
9V2A	35	223
12V1.5A	32	236

Vin 12V

Figure11: 5V/3A, Vin=12V, no-load

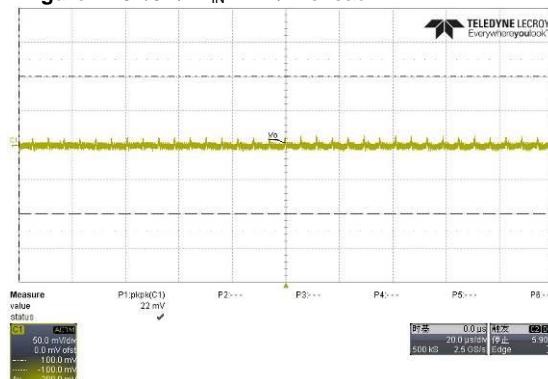
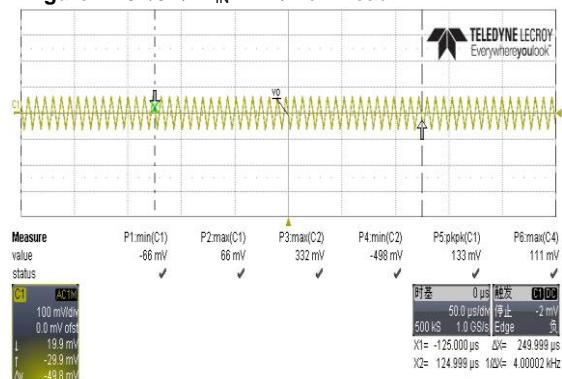


Figure12: 5V/3A, Vin=12V, full load



CH1: V_{ripple}

Figure13: 9V/2A, Vin=12V, no-load

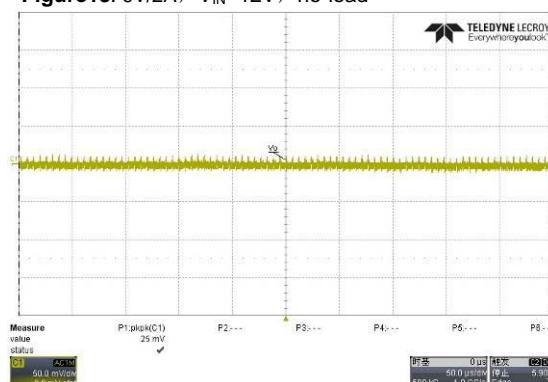
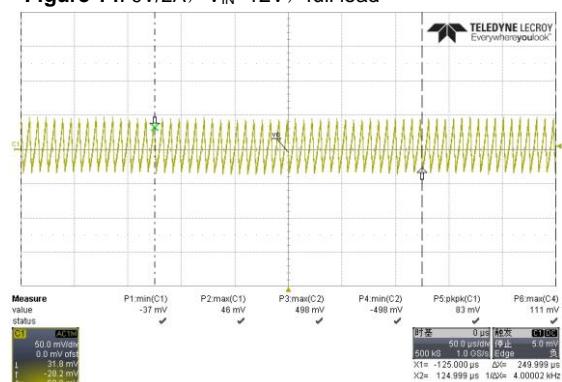


Figure14: 9V/2A, Vin=12V, full load



CH1: V_{ripple}

CH1: V_{ripple}

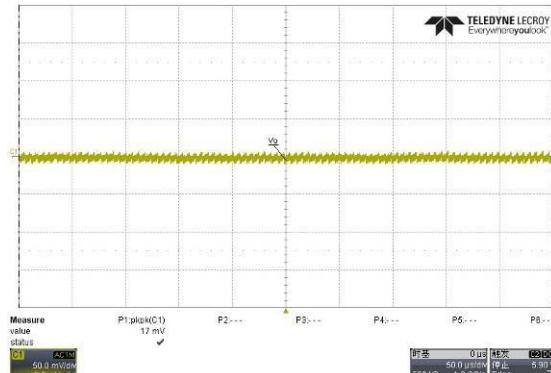
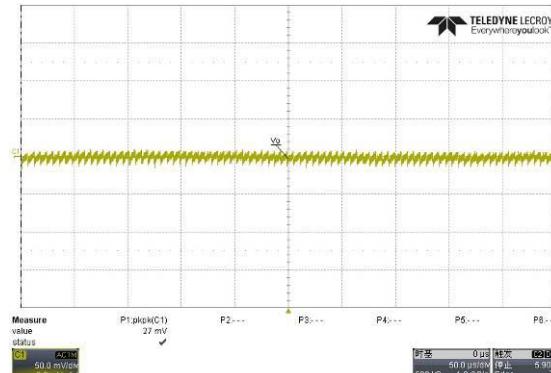
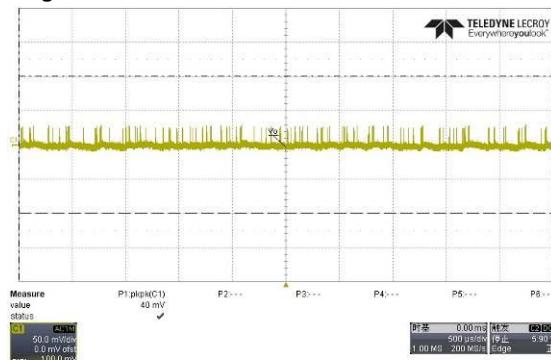
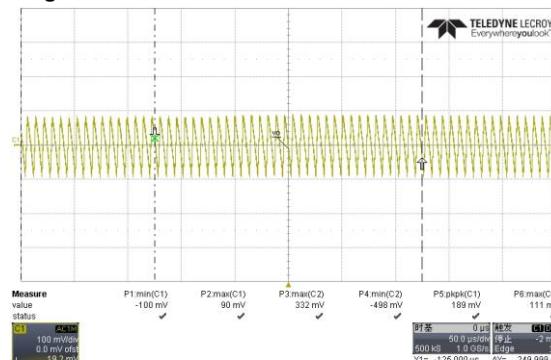
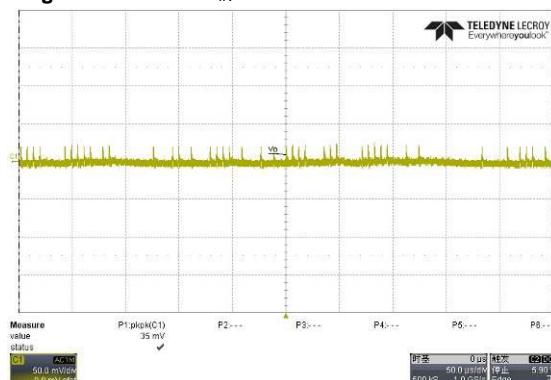
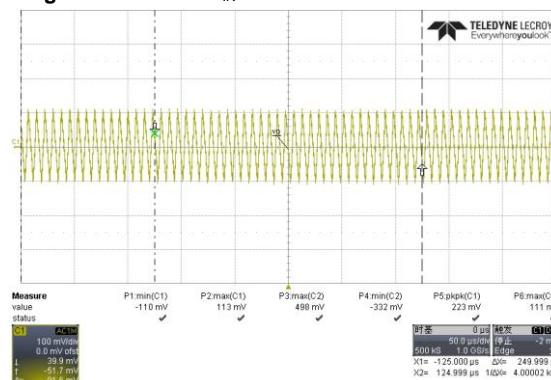
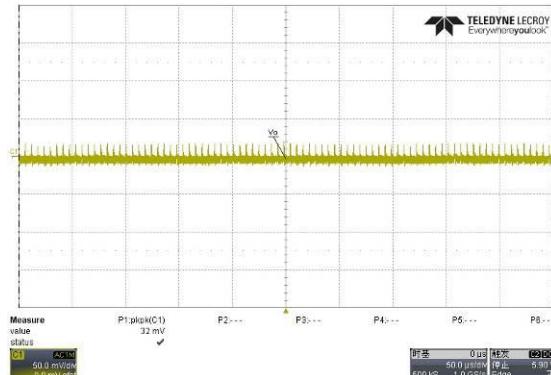
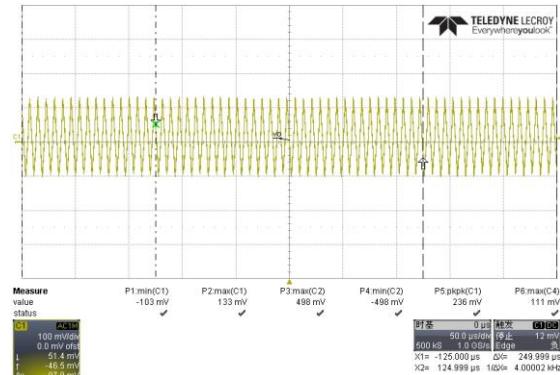
Figure 15: 12V/1.5A, $V_{IN}=12V$, no-load
CH1: V_{ripple}
Figure 16: 12V/1.5A, $V_{IN}=12V$, full load
CH1: V_{ripple} **VIN=24V**
Figure 17: 5V/3A, $V_{IN}=24V$, no-load
CH1: V_{ripple}
Figure 18: 5V/3A, $V_{IN}=24V$, full load
CH1: V_{ripple}
Figure 19: 9V/2A, $V_{IN}=24V$, no-load
CH1: V_{ripple}
Figure 20: 9V/2A, $V_{IN}=24V$, full load
CH1: V_{ripple}

Figure 21: 12V/1.5A, $V_{IN}=24V$, no-load

 CH1: V_{ripple}
Figure 22: 12V/1.5A, $V_{IN}=24V$, full load

 CH1: V_{ripple}

3.6 Waveforms

3.6.1 VO=5V start/normal/output short/CC mode waveforms

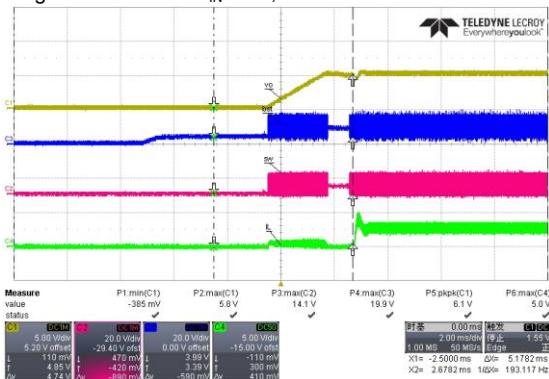
 Figure 23: 5V/3A, V_{IN}=12V, Start full load

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

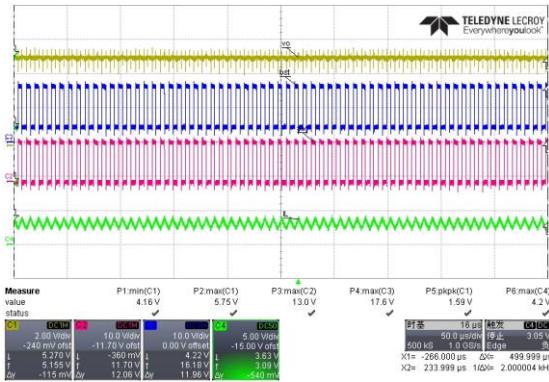
 Figure 25: 5V/3A, V_{IN}=12V, full load

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

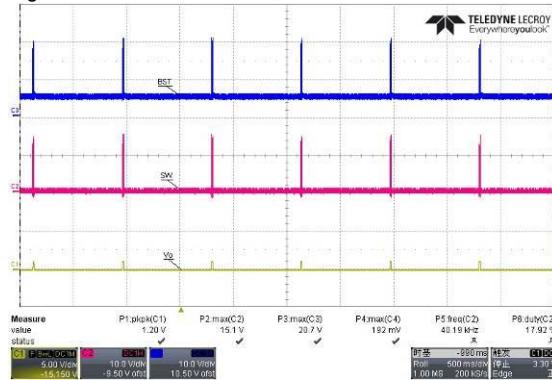
 Figure 27: 5V/3A, V_{IN}=12V,short

 CH1: V_{OUT} CH2: SW CH3: BST

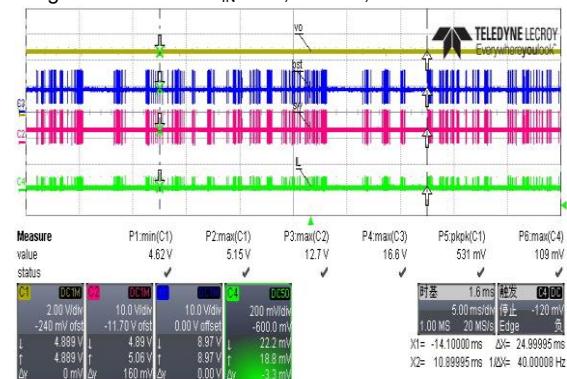
 Figure 24: 5V/3A, V_{IN}=12V, Normal, no load

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

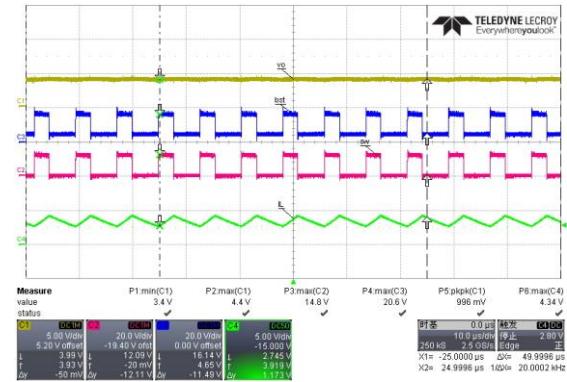
 Figure 26: 5V/3A, V_{IN}=12V, cc mode

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

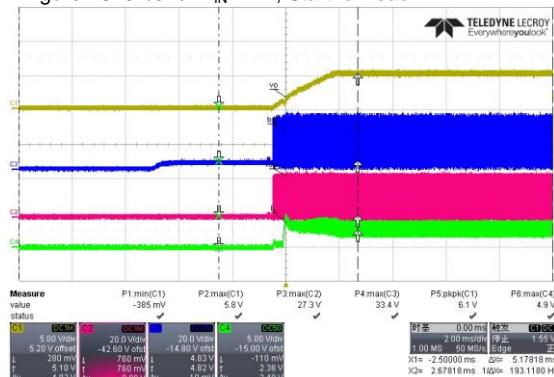
Figure 28: 5V/3A, V_{IN}=24V, Start full load

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

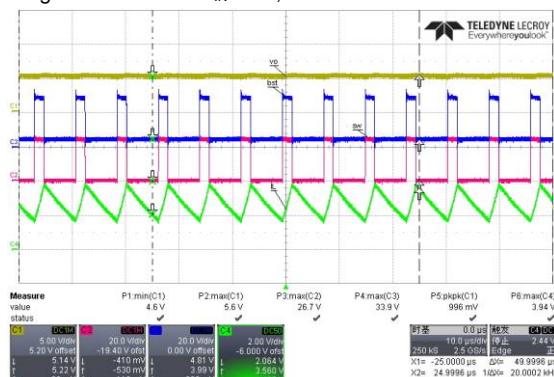
Figure 30: 5V/3A, V_{IN}=24V, full load

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

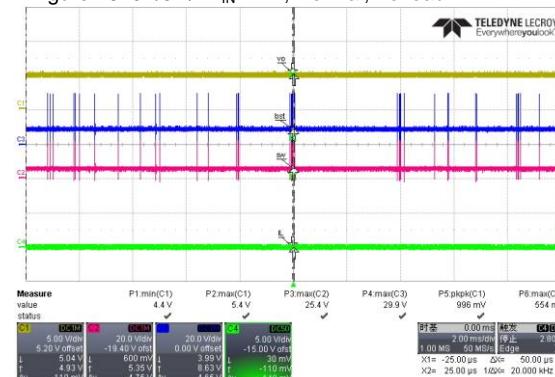
Figure 29: 5V/3A, V_{IN}=24V, Normal, no load

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

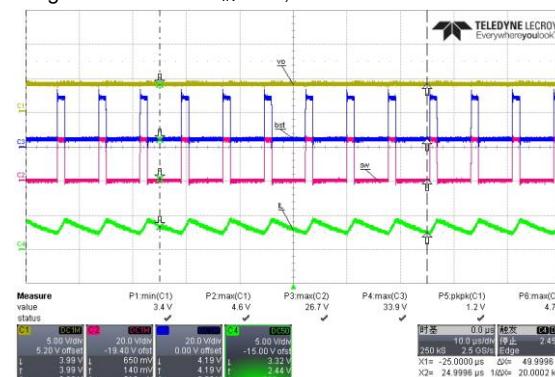
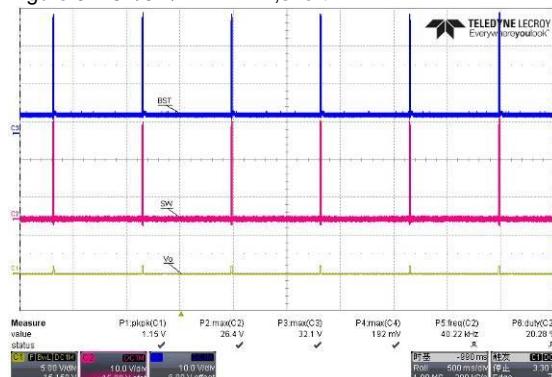
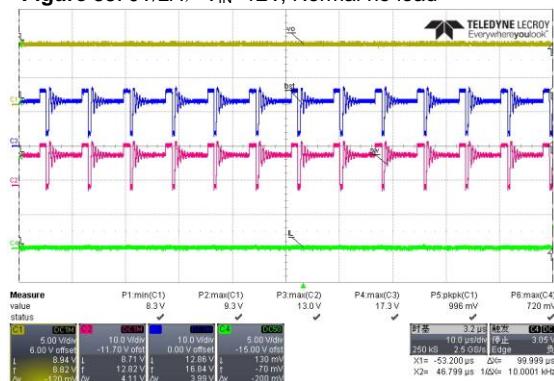
Figure 31: 5V/3A, V_{IN}=24V, cc mode

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

Figure 32: 5V/3A, VIN=24V, short

 CH1: V_{OUT} CH2: SW CH3: BST

3.6.2 Vo=9V start/normal/output short/CC mode waveforms

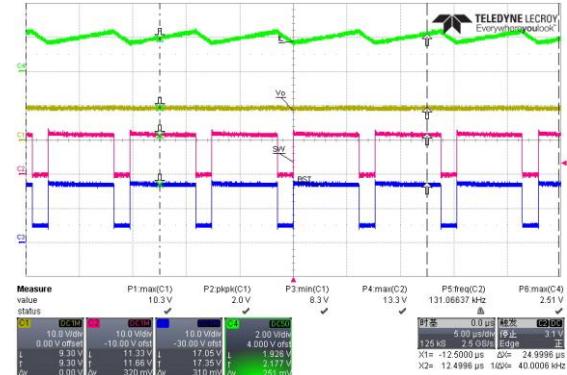
Figure 33: 9V/2A, V_{IN}=12V, Normal no load



CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

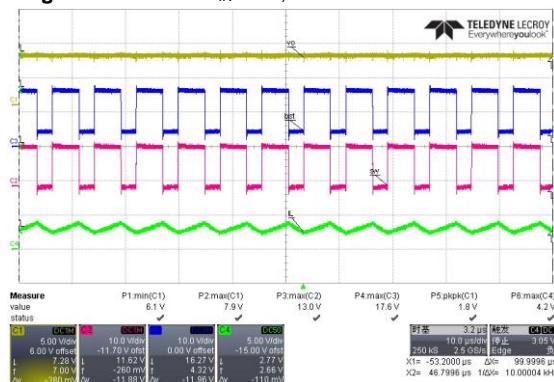
Figure 34: 9V/2A, V_{IN}=12V, full load

Figure 34: 9V/2A, V_{IN}=12V, full load



CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

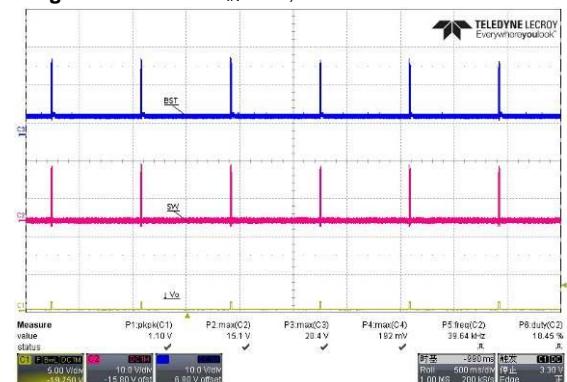
Figure 35: 9V/2A, V_{IN}=12V, cc mode



CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

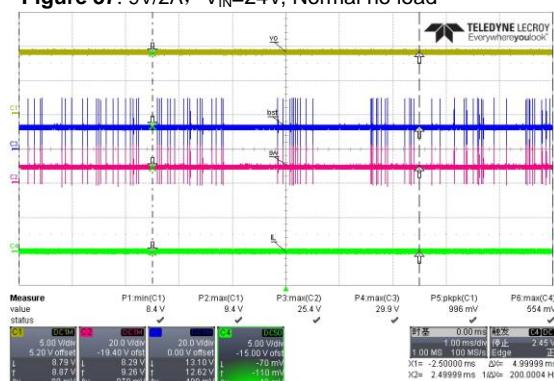
Figure 36: 9V/2A, V_{IN}=12V, short

Figure 36: 9V/2A, V_{IN}=12V, short



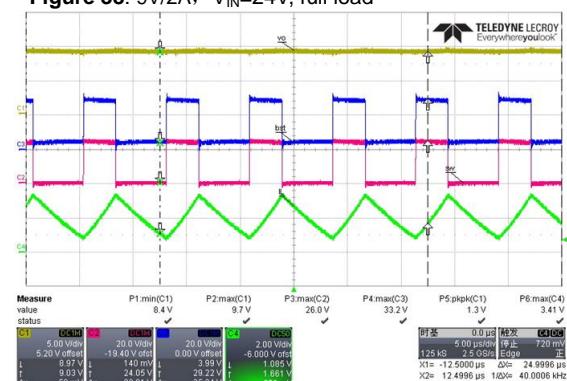
CH1: V_{OUT} CH2: SW CH3: BST

Figure 37: 9V/2A, V_{IN}=24V, Normal no load



CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

Figure 38: 9V/2A, V_{IN}=24V, full load



CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

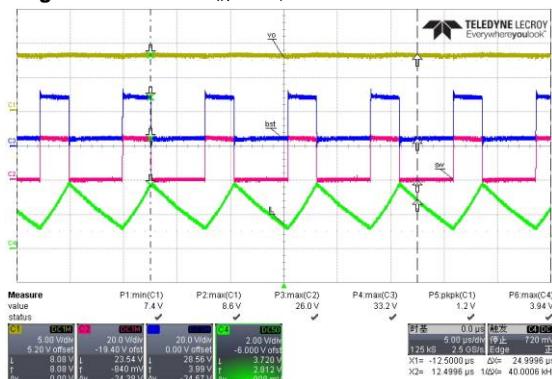
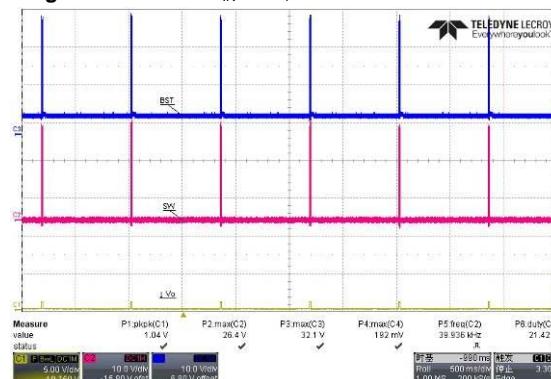
Figure 39: 9V/2A, $V_{IN}=24V$, cc mode

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

Figure 40: 9V/2A, $V_{IN}=24V$, short

 CH1: V_{OUT} CH2: SW CH3: BST

3.6.3 $V_o=12V$ start/normal/output short/CC mode waveforms

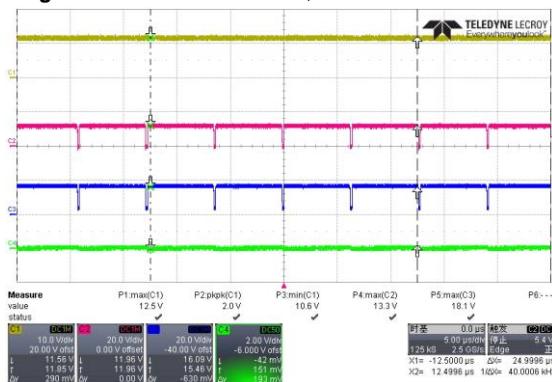
Figure 41: 12V/1.5A, $V_{IN}=12V$, Normal no load

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

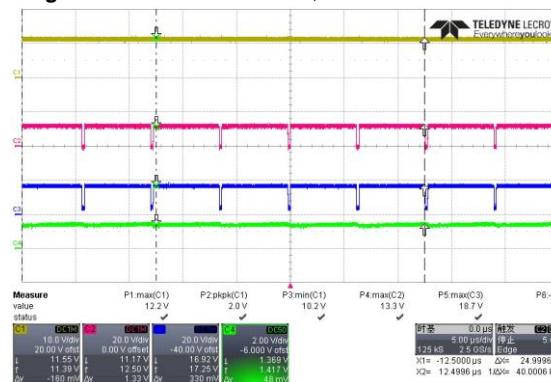
Figure 42: 12V/1.5A, $V_{IN}=12V$, full load

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

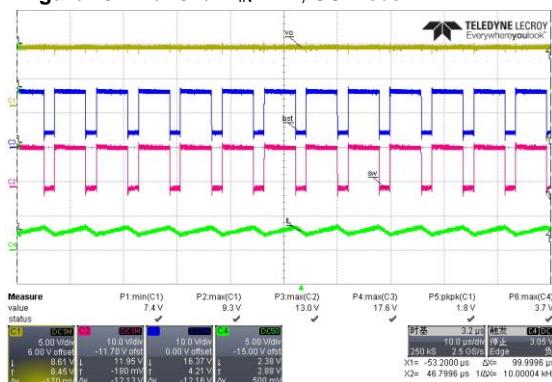
Figure 43: 12V/1.5A, $V_{IN}=12V$, CC mode

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

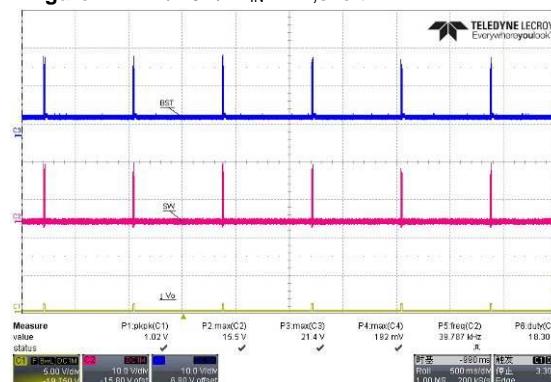
Figure 44: 12V/1.5A, $V_{IN}=12V$, short

 CH1: V_{OUT} CH2: SW CH3: BST

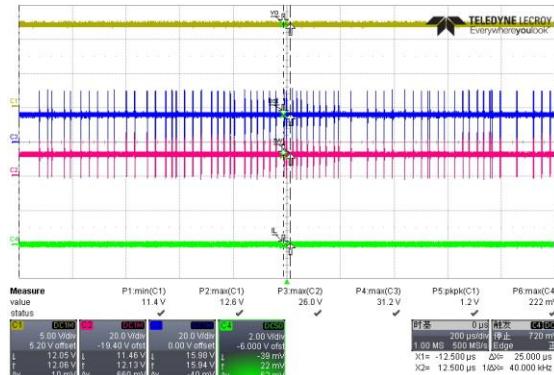
Figure 45: 12V/1.5A, V_{IN}=24V, no load

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

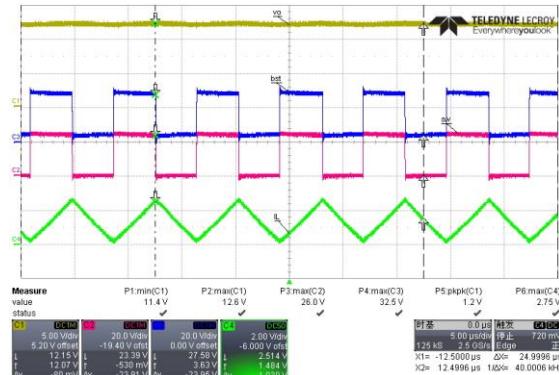
Figure 46: 12V/1.5A, V_{IN}=24V, full load

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

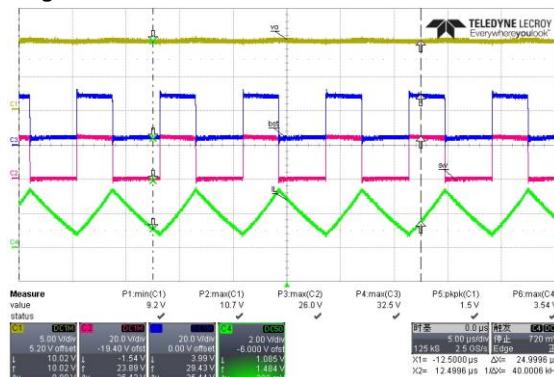
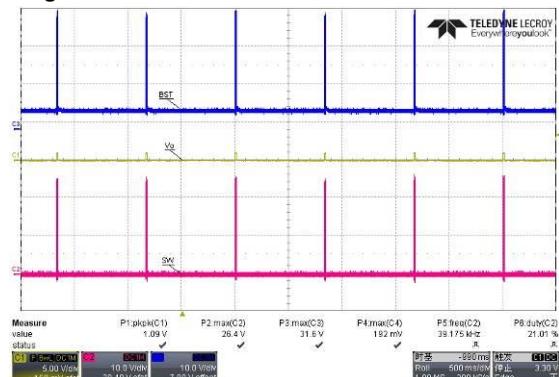
Figure 47: 12V/1.5A, V_{IN}=24V, cc mode

 CH1: V_{OUT} CH2: SW CH3: BST CH4: IL

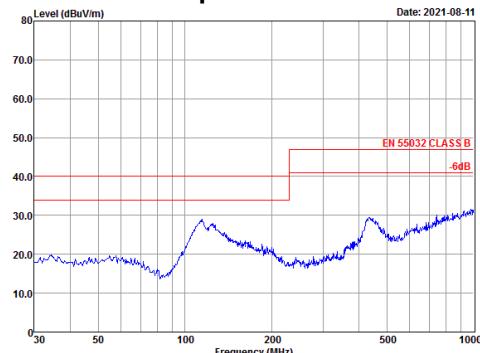
Figure 48: 12V/1.5A, V_{IN}=24V, short

 CH1: V_{OUT} CH2: SW CH3: BST

3.7 Radiation EMI Test

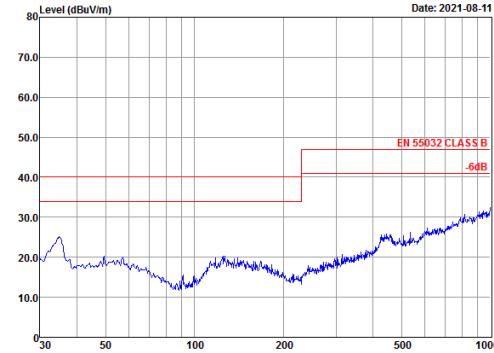
EN55022 CLASS B @ full load report

The Power supply passed EN55022 Class B EMI requirement with more than 6dB margin @ VIN 12V

Vo 5V3A @ full load report

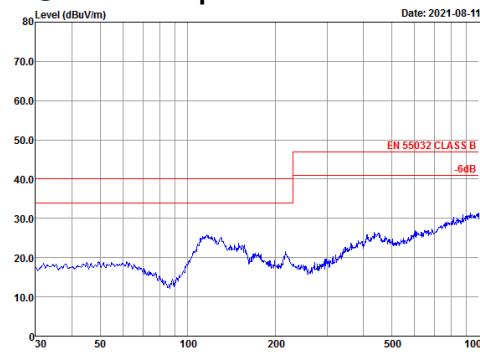


Site : Audix(Shanghai) Chamber3
 Condition : EN 55032 CLASS B HORIZONTAL
 Project No. :
 Applicant :
 EUT : OB 2150C
 M/N : 5V 3A
 S/N :
 Power Supply : DC 12V
 Ambient : 22°C 60%RH
 Test Mode :
 Test Engineer: Avalon
 Memo :

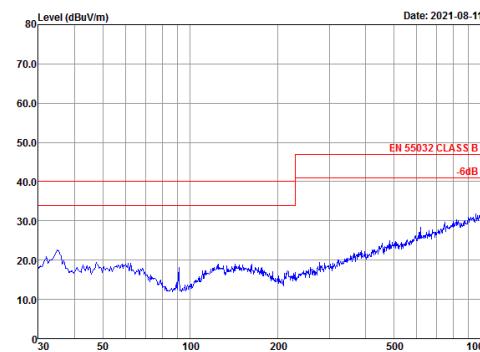


Site : Audix(Shanghai) Chamber3
 Condition : EN 55032 CLASS B VERTICAL
 Project No. :
 Applicant :
 EUT : OB 2150C
 M/N : 5V 3A
 S/N :
 Power Supply : DC 12V
 Ambient : 22°C 60%RH
 Test Mode :
 Test Engineer: Avalon
 Memo :

Vo 9V2A @ full load report

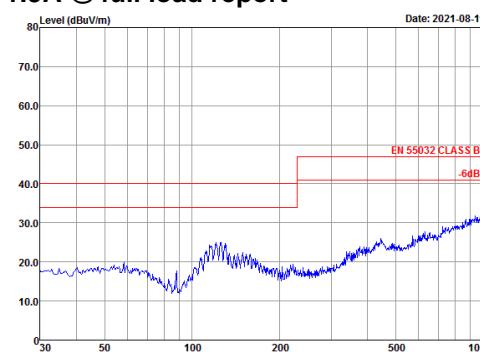


Site : Audix(Shanghai) Chamber3
 Condition : EN 55032 CLASS B HORIZONTAL
 Project No. :
 Applicant :
 EUT : OB 2150C
 M/N : 9V 2A
 S/N :
 Power Supply : DC 12V
 Ambient : 22°C 60%RH
 Test Mode :
 Test Engineer: Avalon
 Memo :

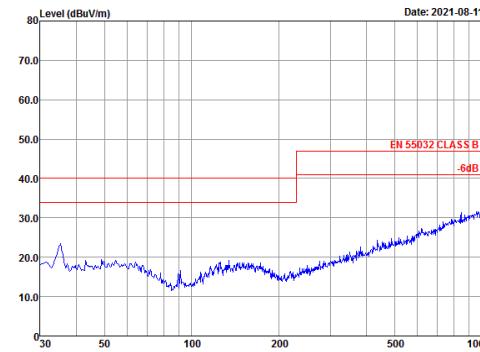


Site : Audix(Shanghai) Chamber3
 Condition : EN 55032 CLASS B VERTICAL
 Project No. :
 Applicant :
 EUT : OB 2150C
 M/N : 9V 2A
 S/N :
 Power Supply : DC 12V
 Ambient : 22°C 60%RH
 Test Mode :
 Test Engineer: Avalon
 Memo :

Vo 12V1.5A @ full load report



Site : Audix(Shanghai) Chamber3
 Condition : EN 55032 CLASS B HORIZONTAL
 Project No. :
 Applicant :
 EUT : OB 2150C
 M/N : 12V 1.5A
 S/N :
 Power Supply : DC 12V
 Ambient : 22°C 60%RH
 Test Mode :
 Test Engineer: Avalon
 Memo :



Site : Audix(Shanghai) Chamber3
 Condition : EN 55032 CLASS B VERTICAL
 Project No. :
 Applicant :
 EUT : OB 2150C
 M/N : 12V 1.5A
 S/N :
 Power Supply : DC 12V
 Ambient : 22°C 60%RH
 Test Mode :
 Test Engineer: Avalon
 Memo :

3.8 Thermal Test

Test method: Input Voltage 12V/24V, Output power 5V/3A, Ambient temperature 34°C.

IC Temperature rise as follows:

Input Voltage (V)	IC Temperature rise (°C) @ LOAD=5V/3A
12	44
24	57

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