

Subject
OB2158 Demo Board Manual

 Board Model: OB2158 TYPEC 2030
 Doc. No.: OB_DOC_DBM_B_215800

Key features:

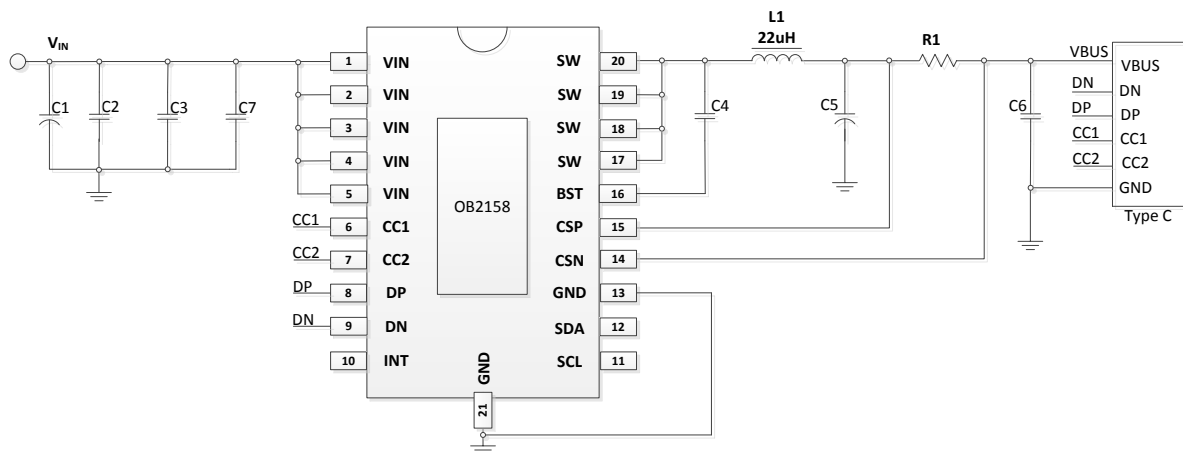
- Supports QC2.0/QC3.0, AFC, PE1.1/PE2.0, FCP1.0, HV SCP, LV SCP Fast Charge protocols.
- Support Apple, and BC1.2 protocols.
- Support 5V/4.5A, 9V/2A, 12V/2A.
- Support Type-C Interface.
- Support PD3.0: 5V/9V/12V protocols.
- Built-in Cable Compensation.
- Multi-Stage Short Circuit Protection and Hiccup Mode.
- Vin/Vcsn Over Voltage Protection and Over Temperature Protection.
- Good radiation EMI performance.

Revision History

Revise Date	Version	Reason/Issue
2019-08-11	00	First issue

1. Board Information

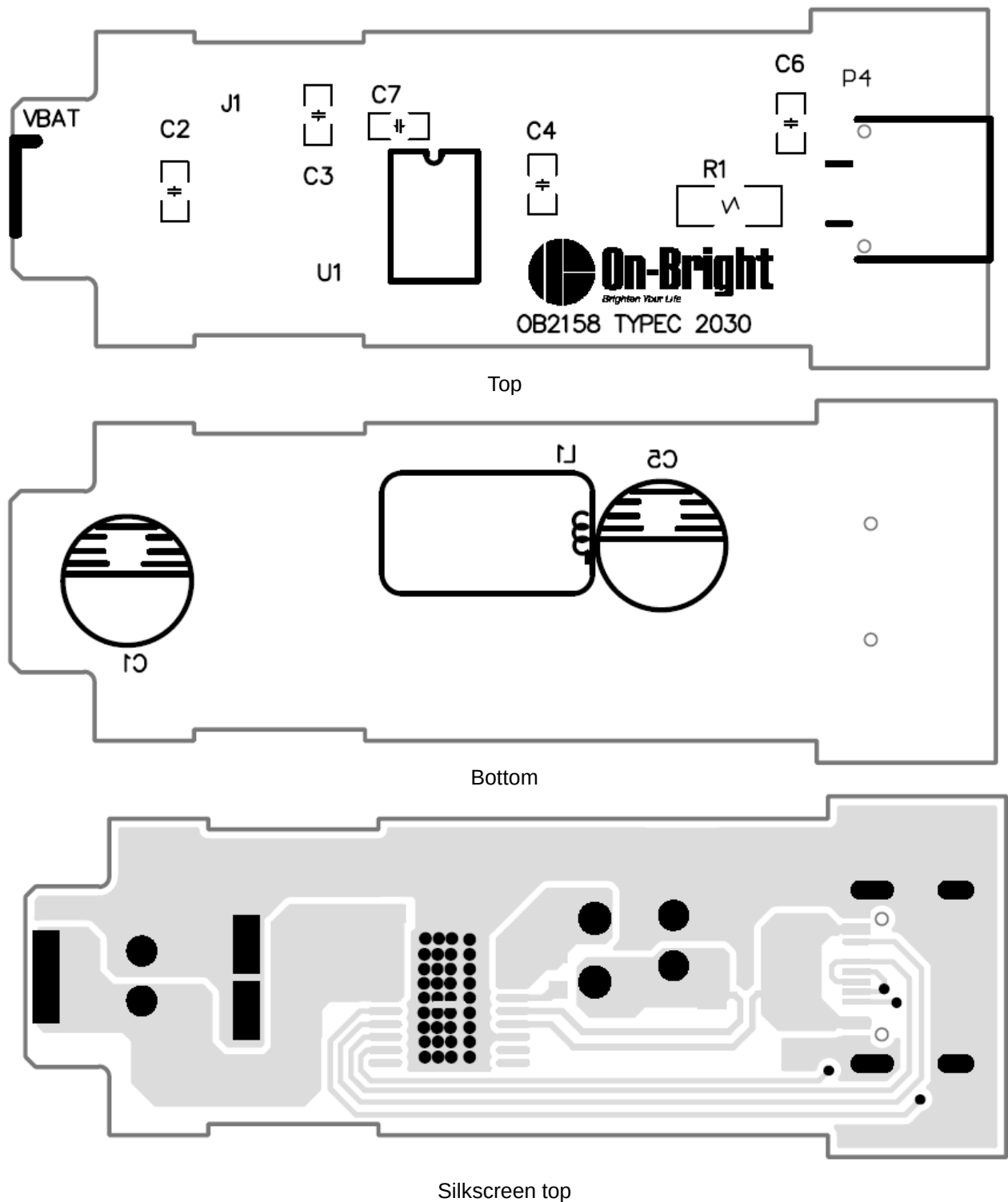
1.1 Board schematic



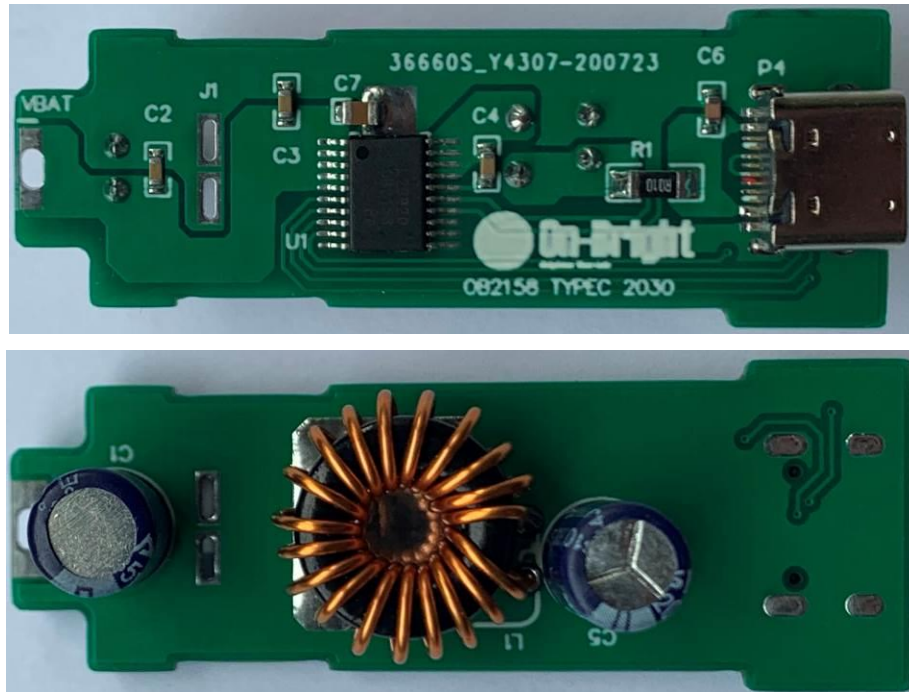
Component list

No.	Position	Description	Quantity
1	R1	SMD RES 0R005 /1% /1206 合金材质，双面黑色	1
2	C1	E.C. 100uF/35V,10*6,Aishi,1510JPET,RS105℃	1
3	C2	SMD CAP 3.3nF/25V 0603	1
4	C3	SMD CAP 100nF/25V 0603	1
5	C4	SMD CAP 100nF/25V 0603	1
6	C5	E.C. 220uF/25V,10*6,Aishi,1822JPET,RS105℃	1
7	C6	SMD CAP 100nF/25V 0603	1
8	C7	SMD CAP 10uF/25V 0603	1
9	L1	Inductor 22uH, 铁硅铝 044-125,12*6*4, Φ0.7*20TS,18mohm	1
10	U1	OB2158, ETSSOP20	1
11	PCB	OB2158 TYPEC 2030	1
	Total		11

1.2 PCB Gerber File



1.3 Snapshot



2. Converter Specification

2.1 Input Characteristics

Input Voltage Range	9-30Vdc (Typical)
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2.2 Output Characteristics

Output Voltage & Current	5V4.5A/ 9V2A/ 12V2A
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Operating Frequency	125KHz
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2.3 Performance Function

Efficiency	>85%
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Ripple & Noise	<300mV
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2.4 Protection Function

Vin UVLO	Shut down with auto-restart
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Vin OVP	Shut down with auto-restart
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Output OVP	Shut down with auto-restart
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OTP	Shut down with auto-restart
-----	-----------------------------

OCP	Shut down with auto-restart
-----	-----------------------------

Output SCP	Shut down with auto-restart
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3. Performance Evaluation

3.1 VIN UVLO

UVLO	Test result	Spec	Remark
OFF	8.6V	8.2-9.0V	pass
ON	8.1V	7.6-8.5V	pass

3.2 VIN OVP

OVP	Test result	Spec	Remark
OFF	29.9V	29-31V	pass
ON	28.3V	28.5V	pass

3.3 Efficiency

3.3.1 Vo=5V/4.5A

VIN (V)	Load=1.1A	Load=2.3A	Load=3.4A	Load=4.5A	AVG
12	93.83%	94.07%	93.89%	92.50%	93.57%
24	85.56%	88.49%	89.57%	89.44%	88.27%

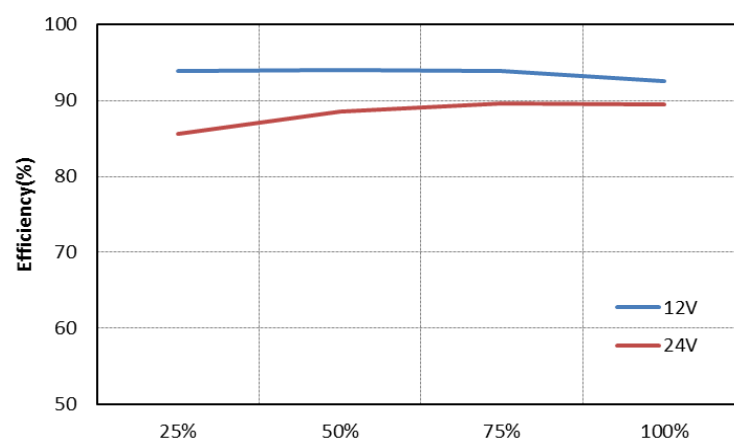


Figure 1. Efficiency--- Buck CV mode@5V/4.5A

3.3.2 Vo=9V2A

VIN (V)	Load=0.5A	Load=1.0A	Load=1.5A	Load=2.0A	AVG
12	94.09%	95.02%	95.60%	95.95%	95.17%
24	88.76%	90.63%	91.46%	91.63%	90.62%

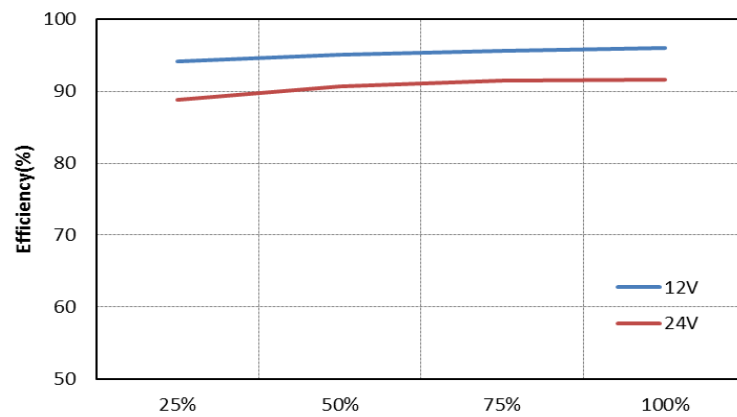


Figure 2: Efficiency---- Buck CV mode@ 9V/2A

3.3.3 Vo=12V2A

VIN (V)	Load=0.5A	Load=1.0A	Load=1.5A	Load=2.0A	AVG
12	94.97%	96.00%	97.01%	96.98%	96.24%
24	90.99%	93.04%	92.80%	93.08%	92.48%

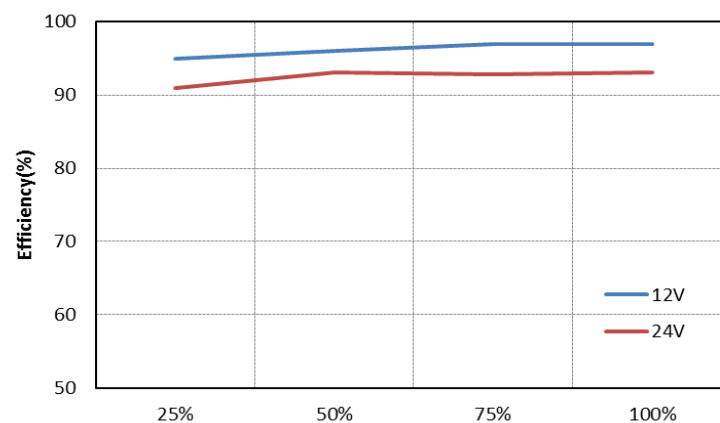


Figure 3: Efficiency---- Buck CV mode@ 12V/2A

3.3 Output Voltage & Current

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

Figure5 : CV

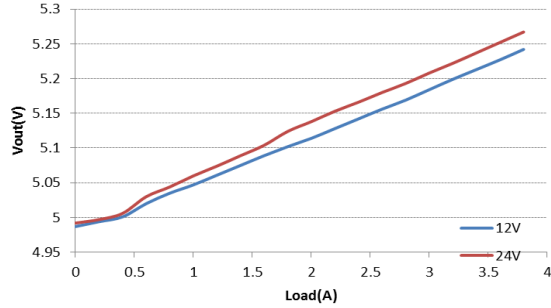
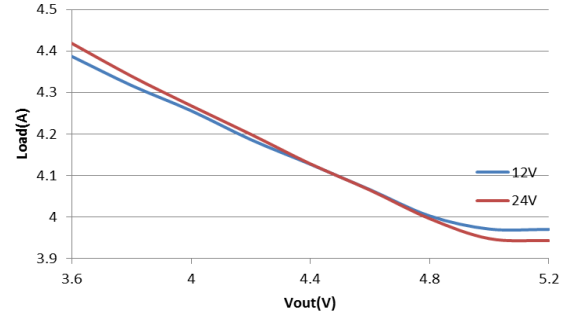


Figure6 : CC



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

Figure7 : CV

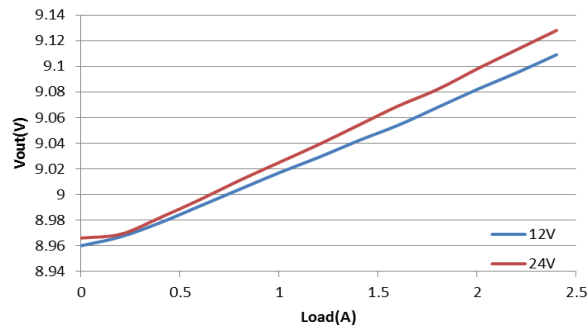
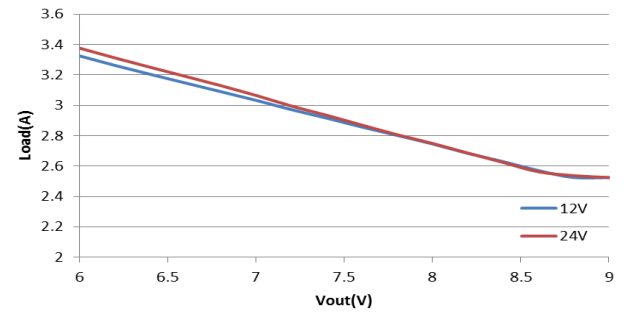


Figure8 : CC



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

Figure9 : CV

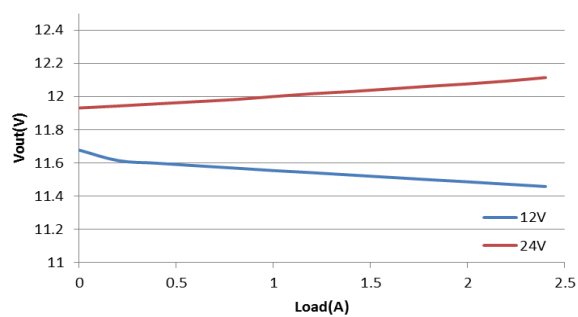
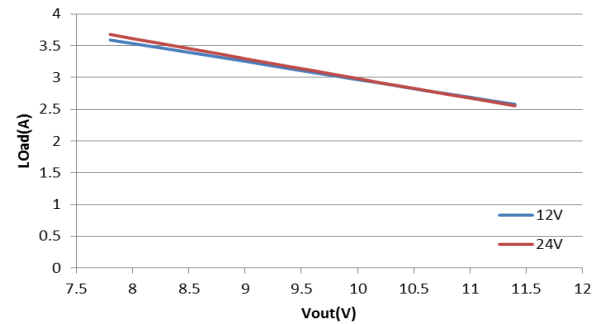


Figure10 : CC



3.4 Ripple & noise

V_{in}=12V

V _o	Ripple&noise (mv)	
	No Load	Full Load
5V/4.5A	23	185
9V/2A	31	92
12V/2A	41	25

V_{in}=24V

V _o	Ripple&noise (mv)	
	No Load	Full Load
5V/4.5A	40	231
9V/2A	35	185
12V/2A	40	217

Figure11: 5V/4.5A, V_{IN}=12V, no-load

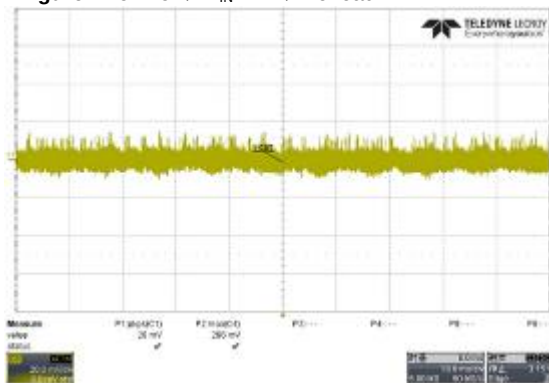
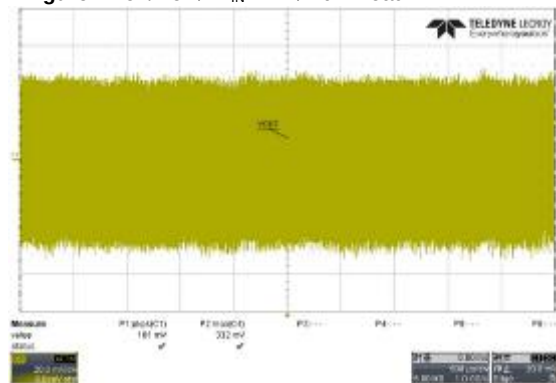
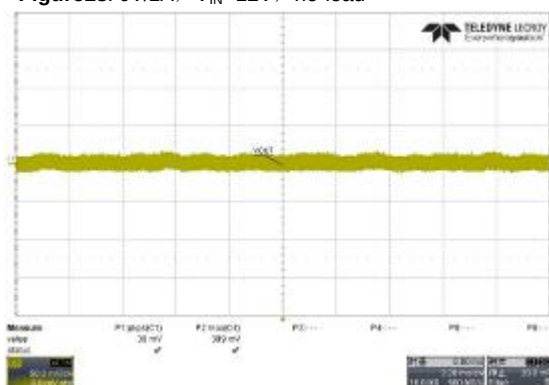


Figure12: 5V/4.5A, V_{IN}=12V, full load



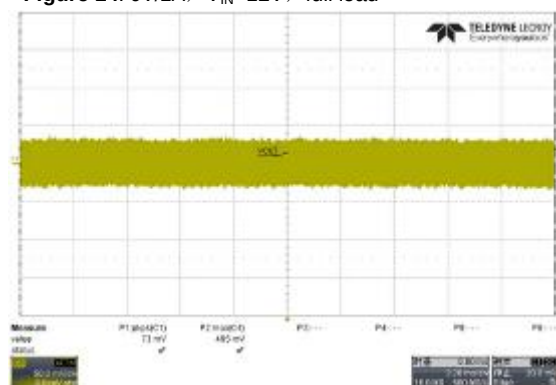
CH1: V_{ripple}

Figure13: 9V/2A, V_{IN}=12V, no-load



CH1: V_{ripple}

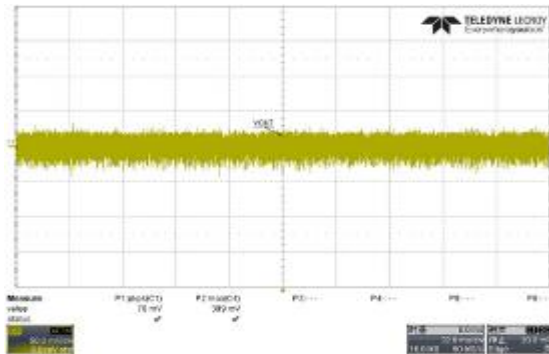
Figure 14: 9V/2A, V_{IN}=12V, full load



CH1: V_{ripple}

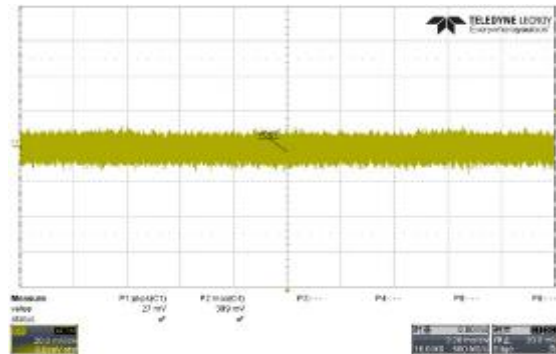
CH1: V_{ripple}

Figure 15: 12V/2A, $V_{IN}=12V$, no-load



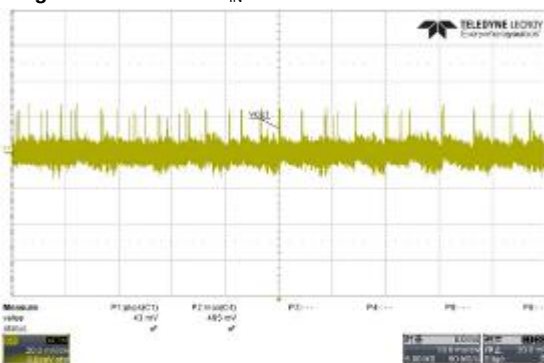
CH1: V_{ripple}

Figure 16: 12V/2 A, $V_{IN}=12V$, full load



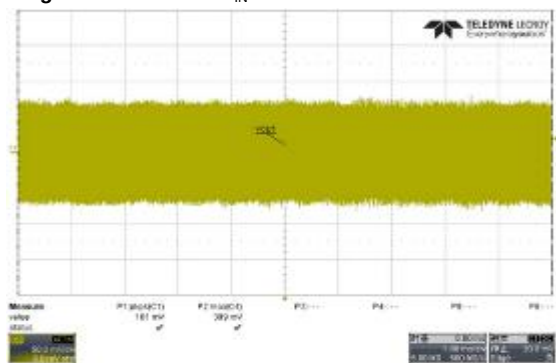
CH1: V_{ripple}

Figure 17: 5V/4.5A, $V_{IN}=24V$, no-load



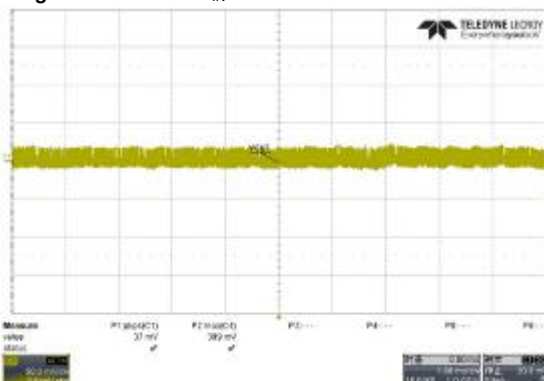
CH1: V_{ripple}

Figure 18: 5V/4.5A, $V_{IN}=24V$, full load



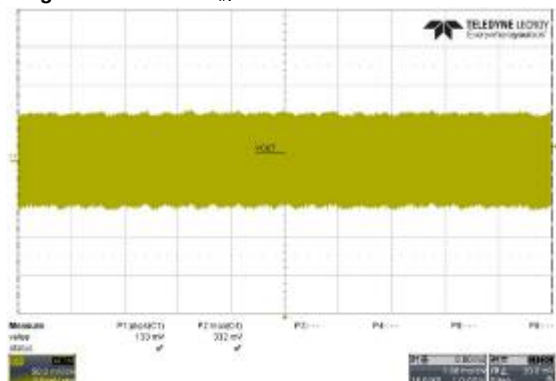
CH1: V_{ripple}

Figure 19: 9V/2A, $V_{IN}=24V$, no-load



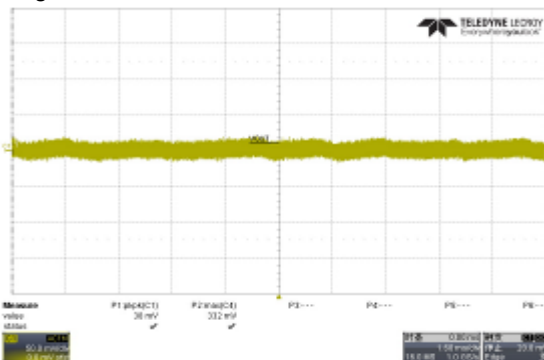
CH1: V_{ripple}

Figure 20: 9V/2A, $V_{IN}=24V$, full load



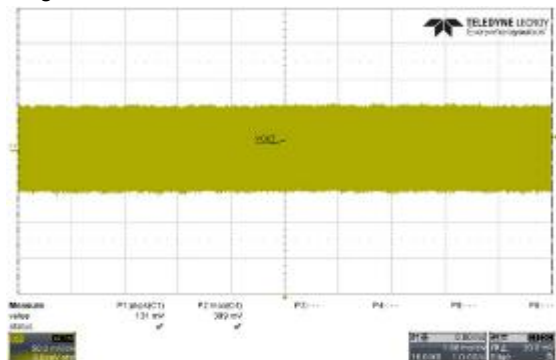
CH1: V_{ripple}

Figure 21: 12V/2A, $V_{IN}=24V$, no-load



CH1: V_{ripple}

Figure 22: 12V/2A, $V_{IN}=24V$, full load

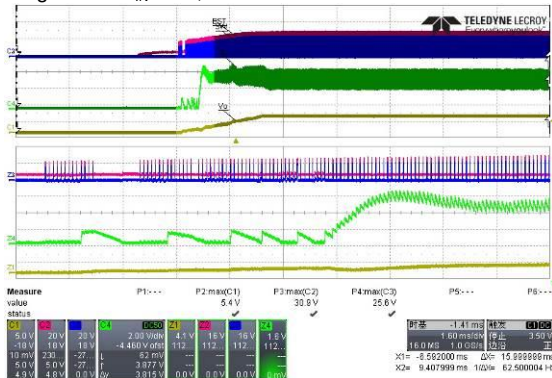


CH1: V_{ripple}

3.5 Waveforms

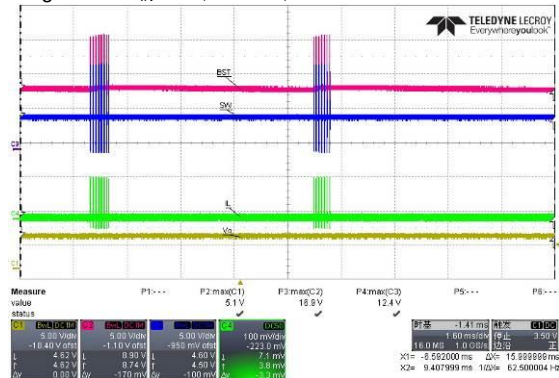
3.5.1 VO=5V start/normal/output short/CC mode waveforms

Figure 23: $V_{IN}=12V$, Start full load



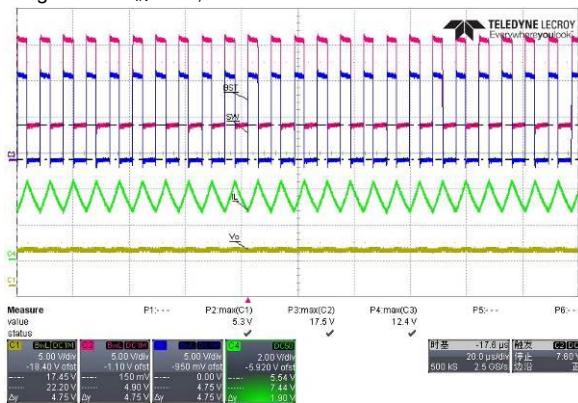
CH1:V_{OUT},CH2:BST,CH3:SW,CH4:IL

Figure 24: $V_{IN}=12V$, Normal, no load



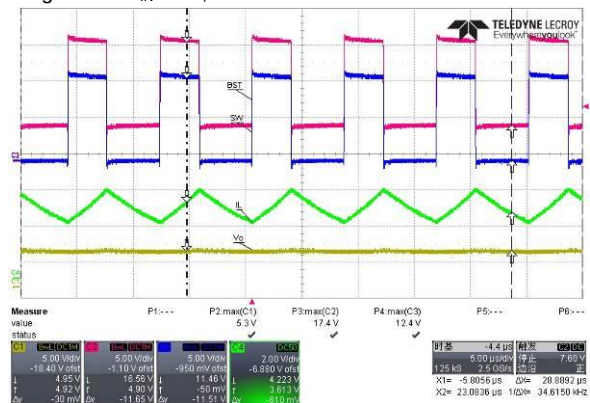
CH1:V_{OUT},CH2:BST,CH3:SW,CH4:IL

Figure 25: $V_{IN}=12V$, full load



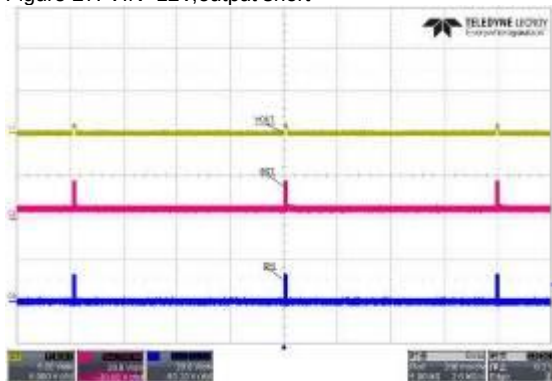
CH1:V_{OUT},CH2:BST,CH3:SW,CH4:IL

Figure 26: $V_{IN}=12V$, cc mode

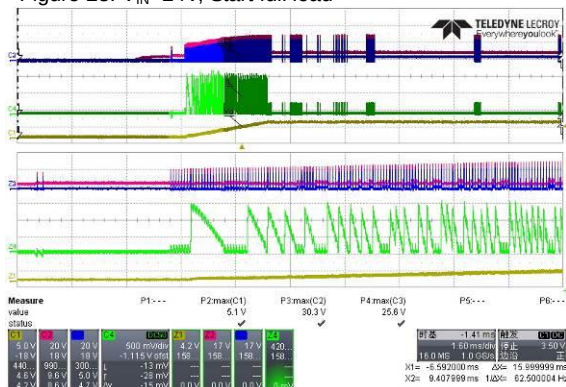


CH1:V_{OUT},CH2:BST,CH3:SW,CH4:IL

Figure 27: $V_{IN}=12V$, output short



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

Figure 28: $V_{IN}=24V$, Start full load

CH1:V_{OUT},CH2:BST,CH3:SW, CH4:I_L

Figure 30: $V_{IN}=24V$,full load

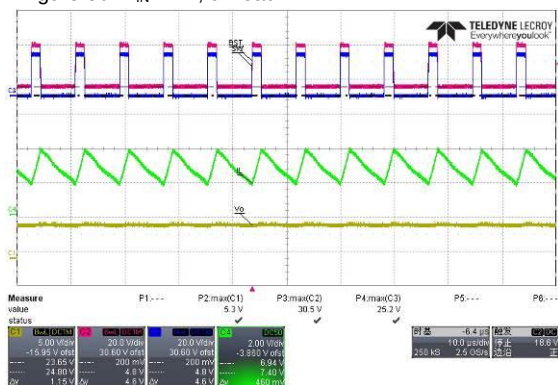
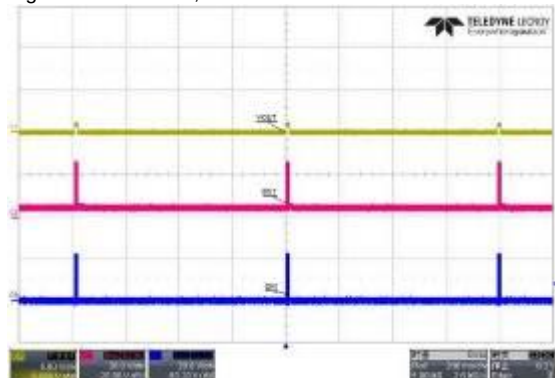
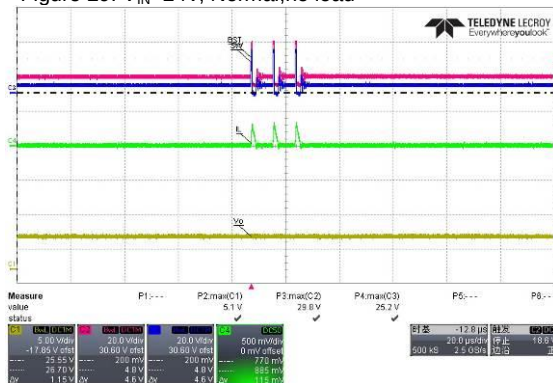
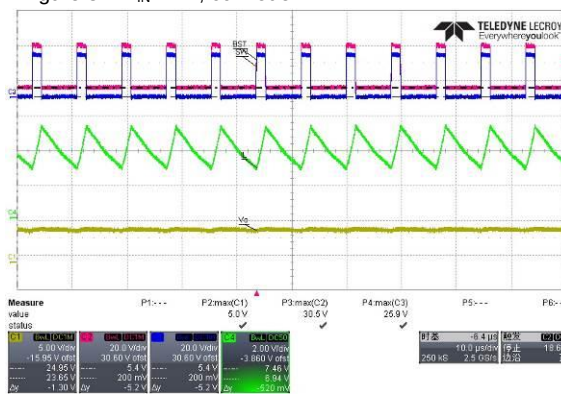
CH1:V_{OUT},CH2:BST,CH3:SW, CH4:I_L

Figure 32: VIN=24V,short

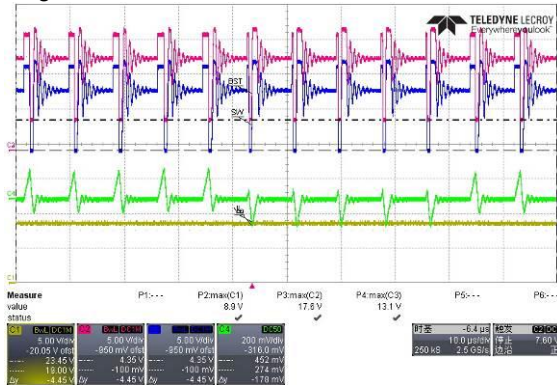
CH1:V_{OUT},CH2:BST,CH3:SWFigure 29: $V_{IN}=24V$, Normal, no load

CH1:V_{OUT},CH2:BST,CH3:SW,CH4:I_L

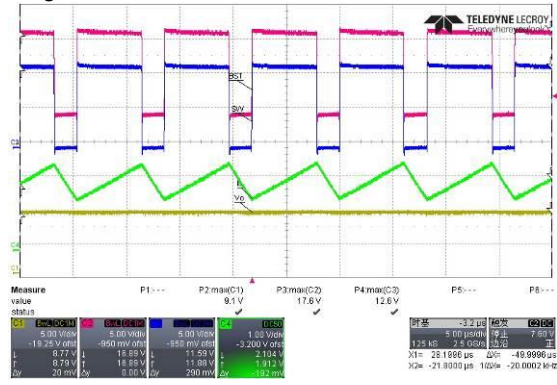
Figure 31: $V_{IN}=24V$, cc mode

CH1:V_{OUT},CH2:BST,CH3:SW,CH4:I_L

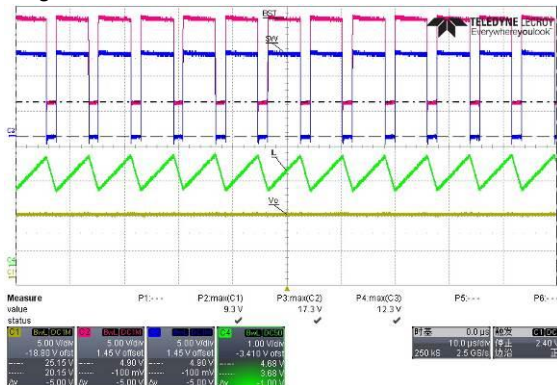
3.5.2 $V_o=9V$ normal/output short/CC mode waveforms

Figure 33: $V_{IN}=12V$, Normal no load


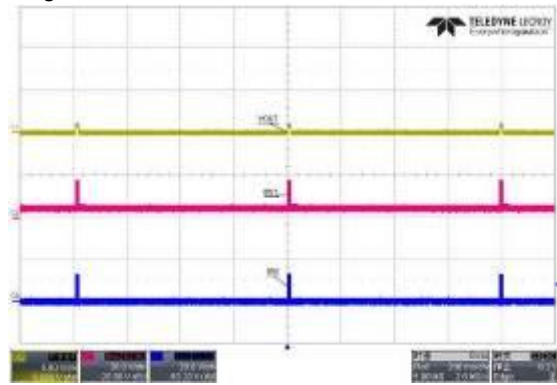
CH1: V_{OUT} , CH2: BST, CH3: SW, CH4: I_L

Figure 34: $V_{IN}=12V$, full load


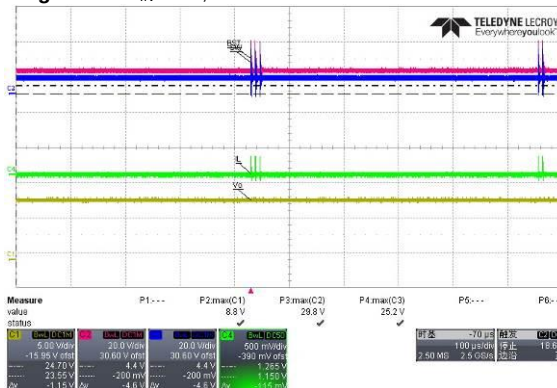
CH1: V_{OUT} , CH2: BST, CH3: SW, CH4: I_L

Figure 35: $V_{IN}=12V$, cc mode


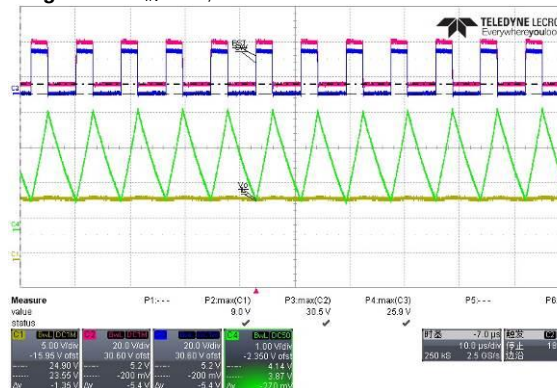
CH1: V_{OUT} , CH2: BST, CH3: SW, CH4: I_L

Figure 36: $V_{IN}=12V$, short


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

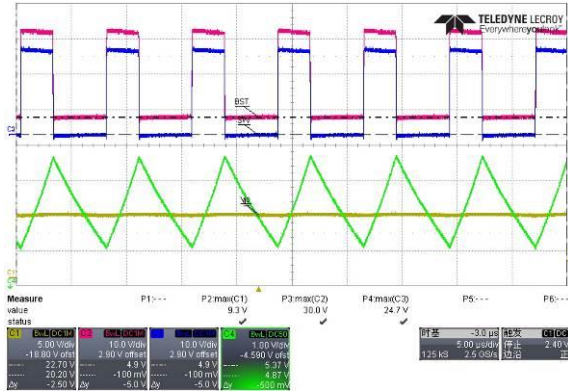
Figure 37: $V_{IN}=24V$, Normal no load


CH1: V_{OUT} , CH2: BST, CH3: SW, CH4: I_L

Figure 38: $V_{IN}=24V$, full load


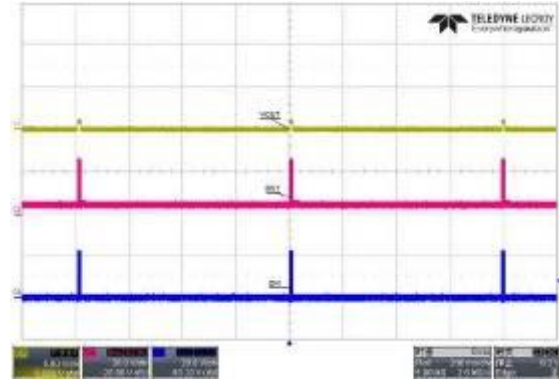
CH1: V_{OUT} , CH2: BST, CH3: SW, CH4: I_L

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



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

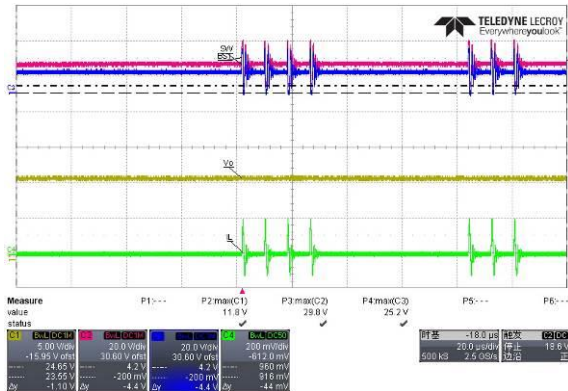
Figure 40: 9V/2A, $V_{IN}=24V$, short



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

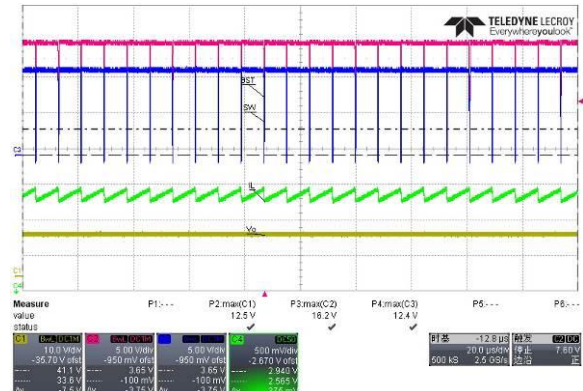
3.6.3 Vo=12V start/normal/output short/CC mode waveforms

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



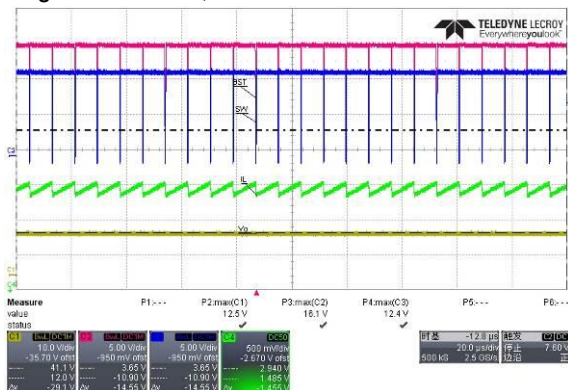
CH1:V_{OUT},CH2:BST,CH3:SW,CH4:IL

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



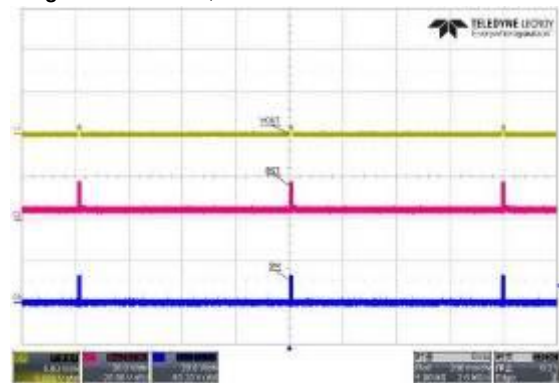
CH1:V_{OUT},CH2:BST,CH3:SW,CH4:IL

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

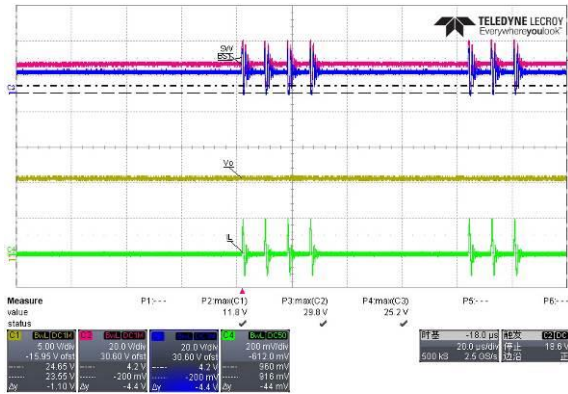
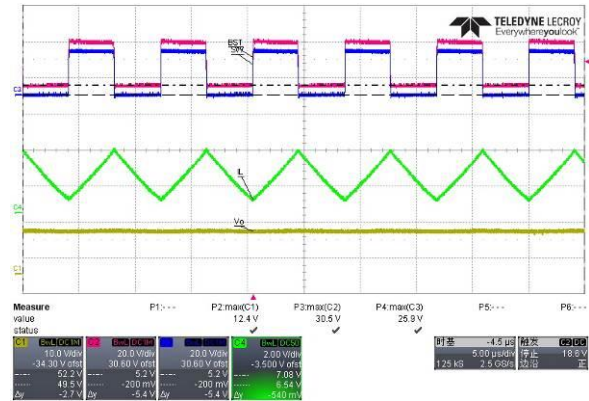
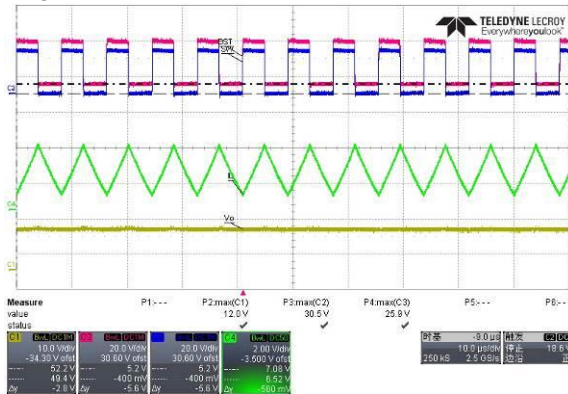
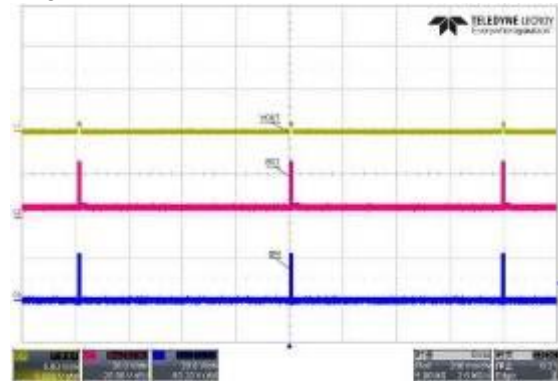


CH1:V_{OUT},CH2:BST,CH3:SW,CH4:IL

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



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

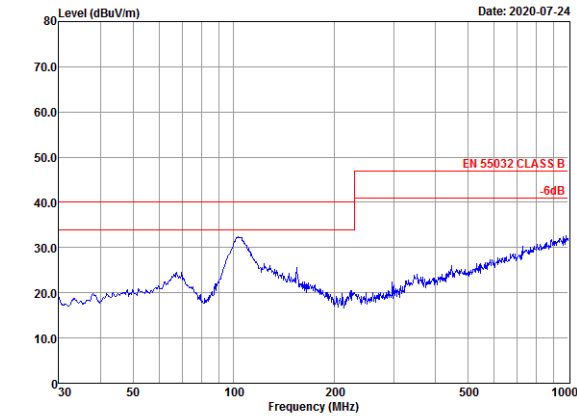
Figure 45: $V_{IN}=24V$, no load

 CH1:V_{OUT},CH2:BST,CH3:SW,CH4:I_L
Figure 46: $V_{IN}=24V$, full load

 CH1:V_{OUT},CH2:BST,CH3:SW,CH4:I_L
Figure 47: $V_{IN}=24V$, cc mode

 CH1:V_{OUT},CH2:BST,CH3:SW,CH4:I_L
Figure 48: $V_{IN}=24V$, short

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

3.7 Radiation EMI Test

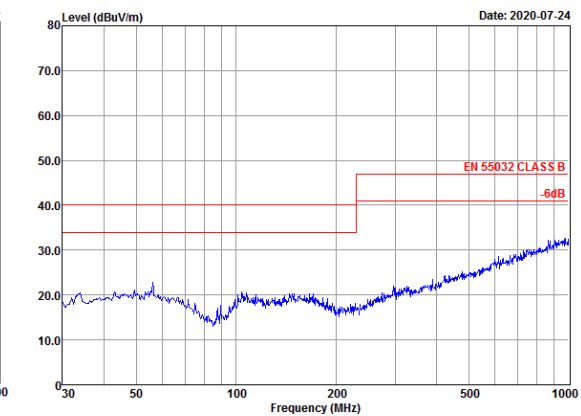
EN55032 CLASS B @ full load report

The Power supply passed EN55032 Class B EMI requirement with more than 6dB margin @ VIN 12V

Vo 5V3.4A @ full load report

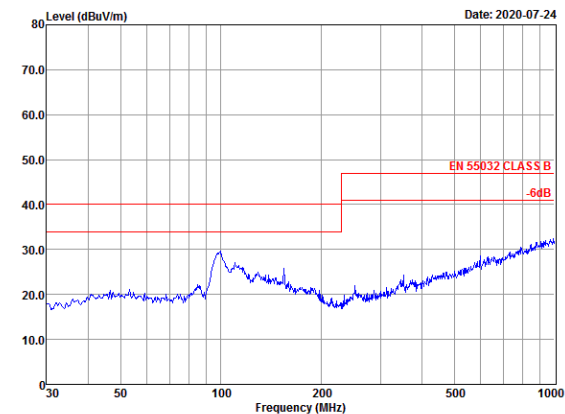


Site : Audix(Shanghai) Chamber3
 Condition : EN 55032 CLASS B HORIZONTAL
 Project No. :
 Applicant :
 EUT : OB2158
 M/N :
 S/N :
 Power Supply : DC 12V
 Ambient : 22'C 60%RH
 Test Mode : 5V 3.4A
 Test Engineer: Tobia

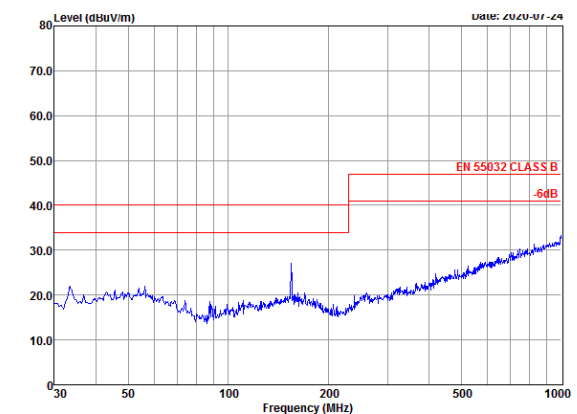


Site : Audix(Shanghai) Chamber3
 Condition : EN 55032 CLASS B VERTICAL
 Project No. :
 Applicant :
 EUT : OB2158
 M/N :
 S/N :
 Power Supply : DC 12V
 Ambient : 22'C 60%RH
 Test Mode : 5V 3.4A
 Test Engineer: Tobia

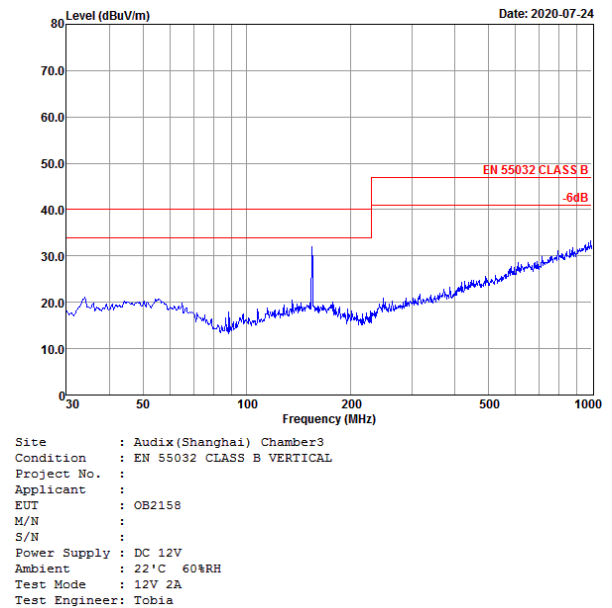
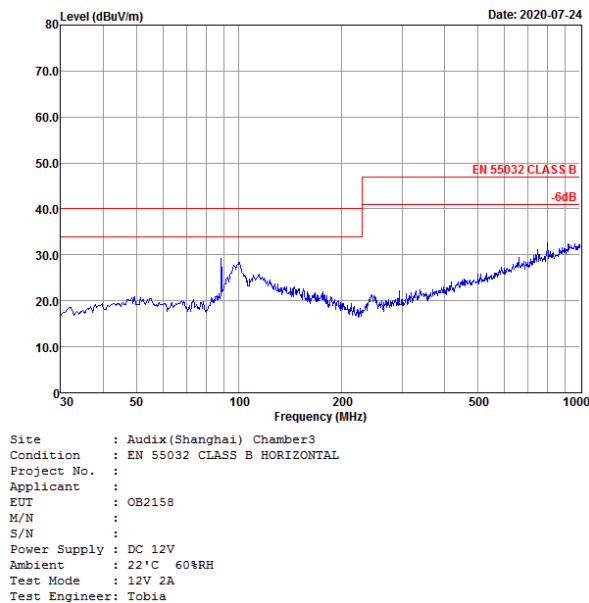
Vo 9V2A @ full load report



Site : Audix(Shanghai) Chamber3
 Condition : EN 55032 CLASS B HORIZONTAL
 Project No. :
 Applicant :
 EUT : OB2158
 M/N :
 S/N :
 Power Supply : DC 12V
 Ambient : 22'C 60%RH
 Test Mode : 9V 2A
 Test Engineer: Tobia



Site : Audix(Shanghai) Chamber3
 Condition : EN 55032 CLASS B VERTICAL
 Project No. :
 Applicant :
 EUT : OB2158
 M/N :
 S/N :
 Power Supply : DC 12V
 Ambient : 22'C 60%RH
 Test Mode : 9V 2A
 Test Engineer: Tobia

Vo 12V2A @ full load report


3.8 Thermal Test

Test method: Input Voltage 12V/24V, Output power 5V/4.5A, Ambient temperature 40°C.
 IC Temperature rise as follows:

Input Voltage (V)	IC Temperature (°C) @ LOAD=5V/4.5A
12	Δ T=57.5

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