

**Subject**
**OB2105 Demo Board Manual**

Board Model: WIFI DCDC 5V1A2105CP.04 1929

Doc. No.: OB\_DOC\_DBM\_A\_210504

**Key features:**

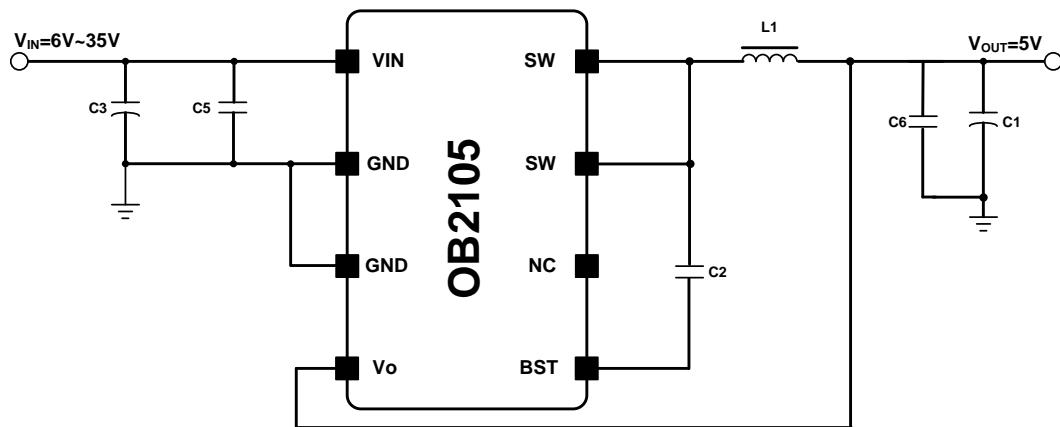
- Wide 6V to 35V Operating Input Range
- Synchronous Operating without External Schottky Diode
- Simplified External Device Requirement.
- Up to 90% efficiency at  $V_{OUT}$  5.0V 1A,  $V_{IN}$  12V.
- Fixed 160KHz Frequency
- Multi-Stage Short Circuit Protection and Hiccup Mode
- $V_{IN}/V_{OUT}$  Over Voltage Protection and Over Temperature Protection
- Good EMI Performance


**Revision History**

Revise Date	Version	Reason/Issue
2019-06-11	00	First issue
2019-6-28	01	Update BOM & PCB
2019-8-22	02	Cost down & Update BOM
2019-12-10	03	Cost down & add dynamic
2020-1-03	04	Update BOM

## 1. Board Information

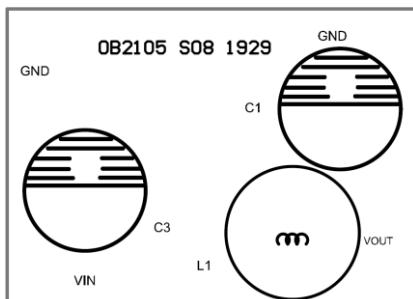
### 1.1 Board schematic



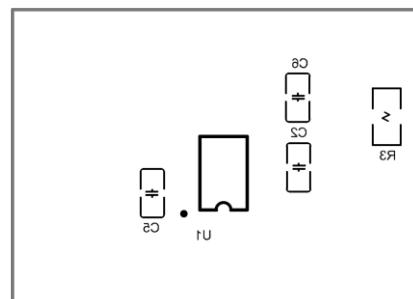
### 1.2 Bill of material

No.	Position	Description	Quantity
1	C1	E.C. 220uF/10V,10mm*6 mm, Jamicon ,RS105°C	1
2	C2	SMD CAP 100nF/50V 0805	1
3	C3	E.C., 100uF/50V,12mm*8mm,Aishi,1510JPET,RS105°C	1
4	C5	SMD CAP 3.3nF/50V 0805	1
5	C6	SMD CAP 100nF/10V 0805	1
6	L1	Inductor 33uH, DR8*10, Φ 0.5mm*32TS	1
7	U1	OB2105 SOP8	1
8	PCB	OB2105 SOP8 1929	1
	Total		7

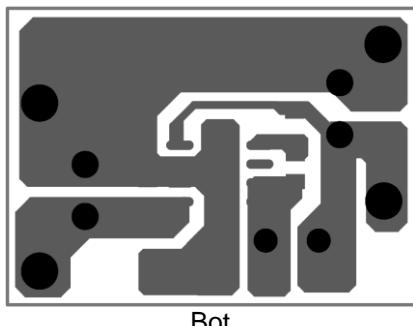
### 1.3 PCB Gerber File



Top Sil



TOP



Bot

### 1.3 Snapshot



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## 2. Converter Specification

### 2.1 Input Characteristics

input voltage range	6-35Vdc
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### 2.2 Output Characteristics

output voltage & current	5V1A
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Operating frequency	160KHz
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### 2.3 Performance Function

Efficiency	UP to 90% /Vin 12V
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Ripple & Noise	<150mV
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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
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OCP	Shut down with auto-restart
-----	-----------------------------

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

#### 3.1 VIN UVLO

		Test result	Spec Typ.	Remark
UVLO	OFF	5.75V	5.8V	pass
	ON	5.46V	5.4V	pass

#### 3.2 VIN OVP

		Test result	Spec Typ.	Remark
OVP	OFF	36.1V	36.3V	pass
	ON	37.3V	37V	pass

#### 3.3 Efficiency

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

##### 3.3.1 Vo=5V1A

VIN (V)	25%	50%	75%	100%	AVG
8	95.04	94.51	93.04	90.98	93.39
12	91.43	93.59	92.10	90.55	91.91
24	87.48	89.85	89.35	88.49	88.79
32	85.57	89.21	88.40	86.95	87.53

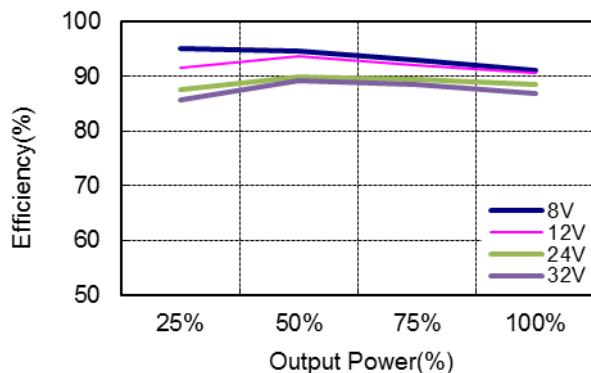


Figure 1. Efficiency @Buck CV mode 5V/1A

### 3.4 Output Voltage vs. Input Voltage

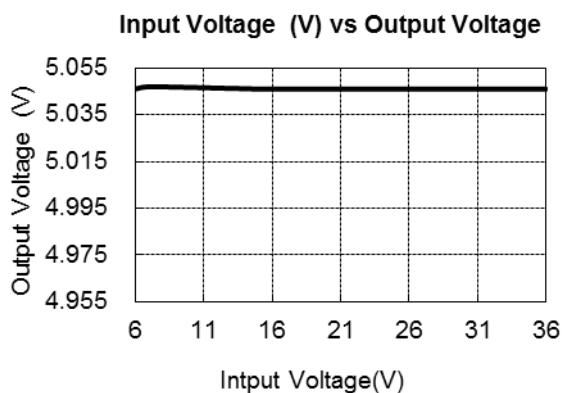


Figure 2. Input Voltage vs Output Voltage

### 3.5 Output Voltage vs. Output Current

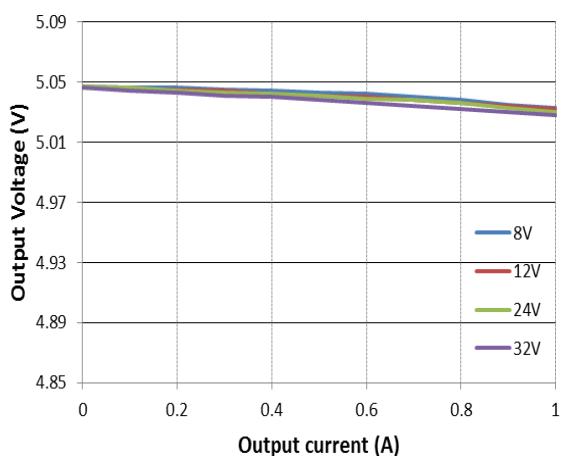


Figure 3. Output Voltage vs Output Current

### 3.6 Ripple & noise

20MHZ Bandwidth, PCB END

VIN (V)	LOAD=5V/0A	LOAD=5V/1A
8	21.1	69.1
12	32.6	81.9
24	65.9	99.2
32	71.7	97.3

Figure 4:  $V_{IN}=8V$ , no-load

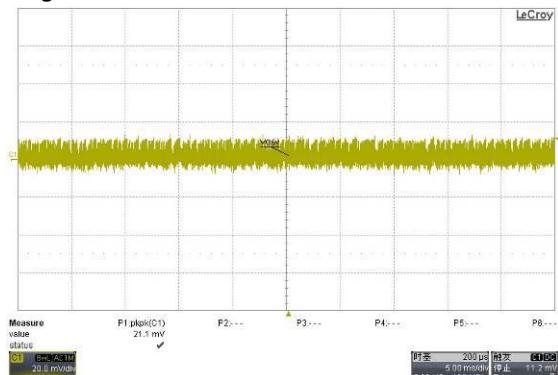


Figure 5:  $V_{IN}=8V$ , full load

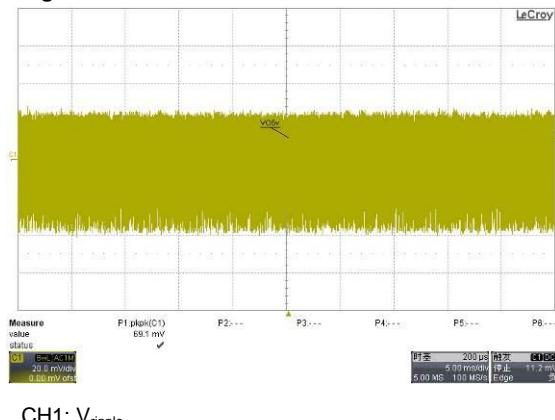


Figure 6:  $V_{IN}=12V$ , no-load

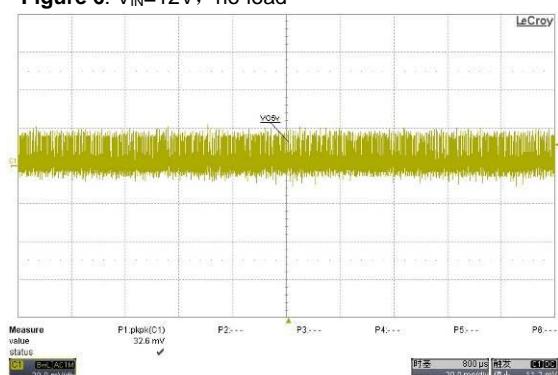


Figure 7:  $V_{IN}=12V$ , full load

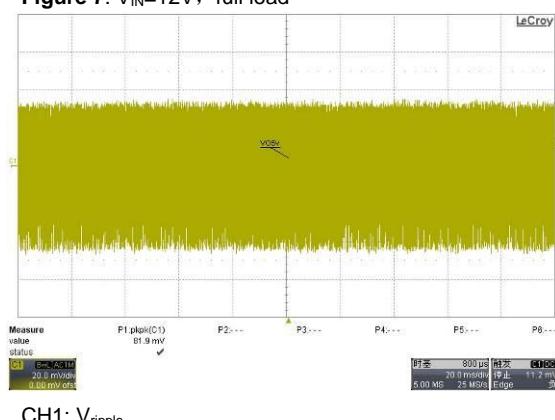


Figure 8:  $V_{IN}=24V$ , no-load

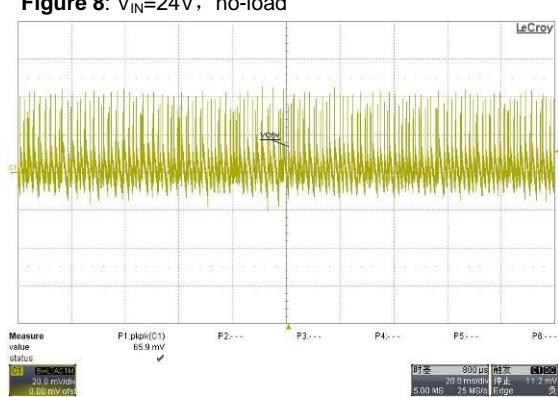
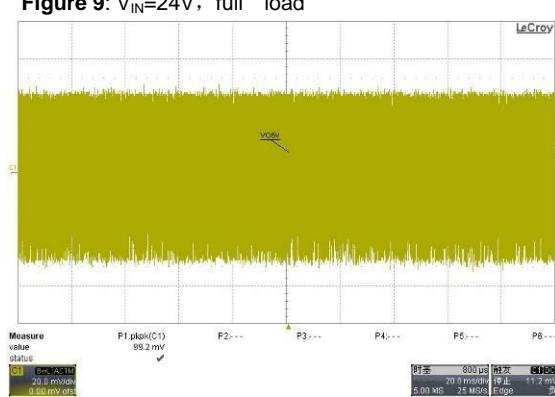
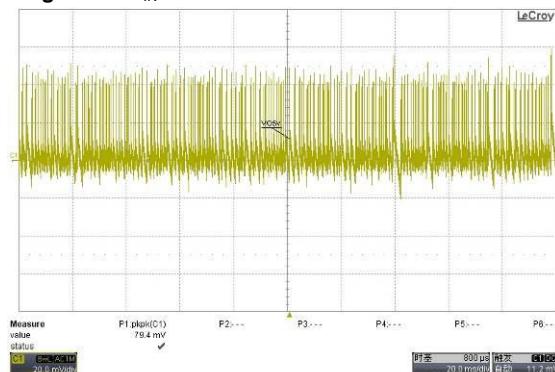
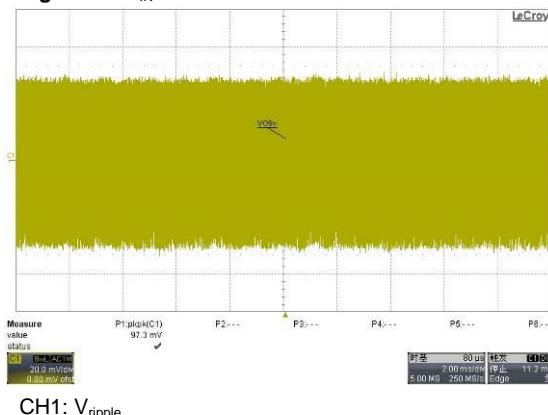


Figure 9:  $V_{IN}=24V$ , full load



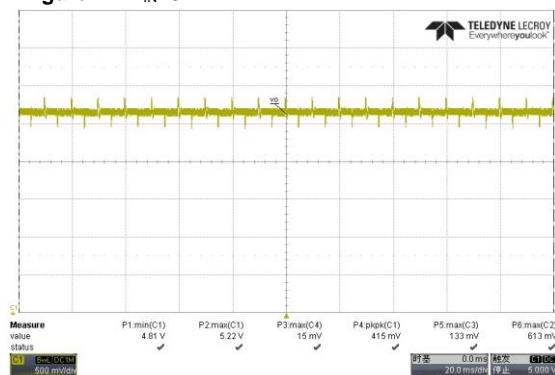
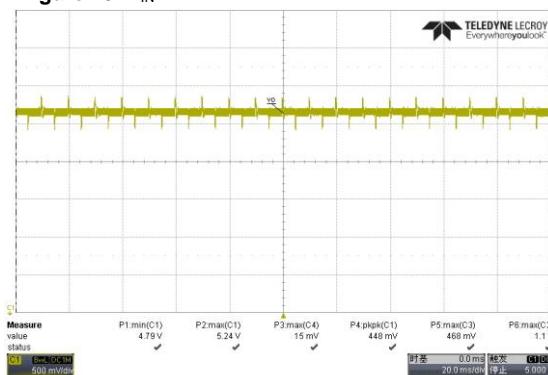
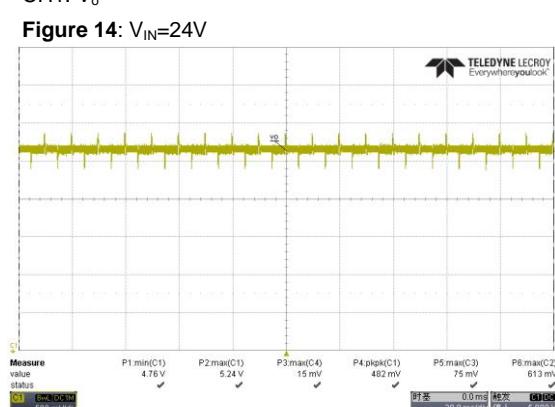
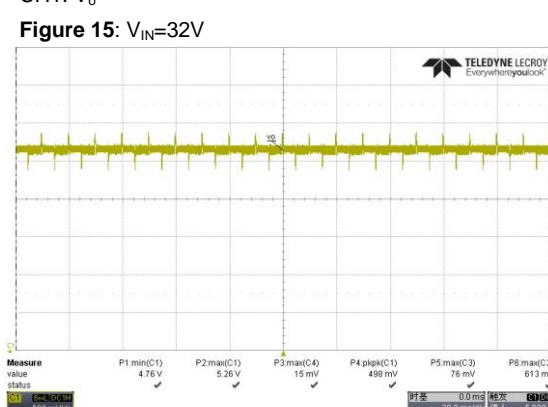
**Figure 10:**  $V_{IN}=32V$ , no-load

**Figure 11:**  $V_{IN}=32V$ , full load


### 3.7 Dynamic Test

A dynamic loading with low set at 10% load lasting for 5ms and high set at 90% load lasting for 5mS is added to output. The ramp is set at 0.25A/us at transient. Measurement was taken at Board end(Same as R&N measurement)

*Output voltage under dynamic test*

DC Input	Output (V)	Remark
8V	↓ 4.81-5.22 ↑	
12V	↓ 4.79-5.24 ↑	
24V	↓ 4.76-5.24 ↑	
32V	↓ 4.76-5.26 ↑	

**Figure 12:**  $V_{IN}=8V$ 

**Figure 13:**  $V_{IN}=12V$ 

**Figure 14:**  $V_{IN}=24V$ 

**Figure 15:**  $V_{IN}=32V$ 


## 3.8 Waveforms

Figure 16:  $V_{IN}=8V$ , no load Normal

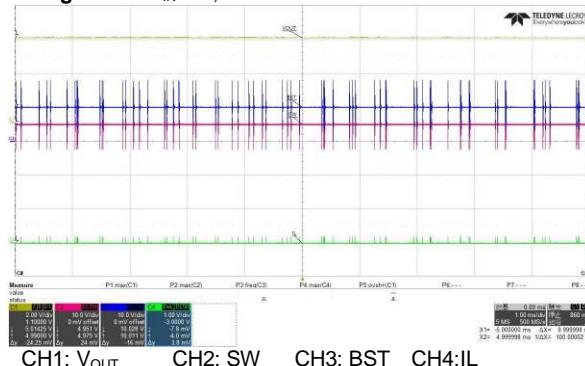


Figure 18:  $V_{IN}=12V$ , no load Normal

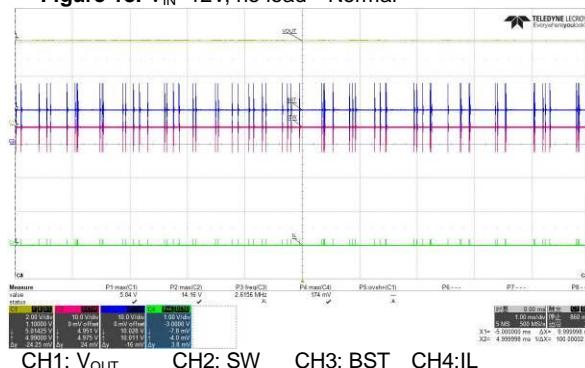


Figure 20:  $V_{IN}=24V$ , no load

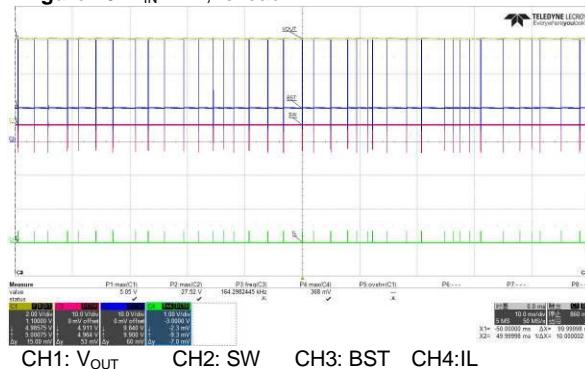


Figure 22:  $V_{IN}=32V$ , no load

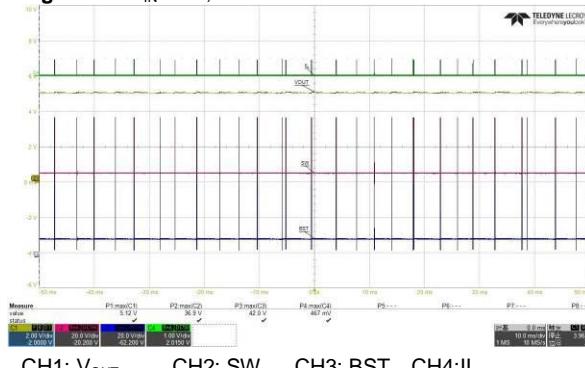


Figure 17:  $V_{IN}=8V$ , full load Normal

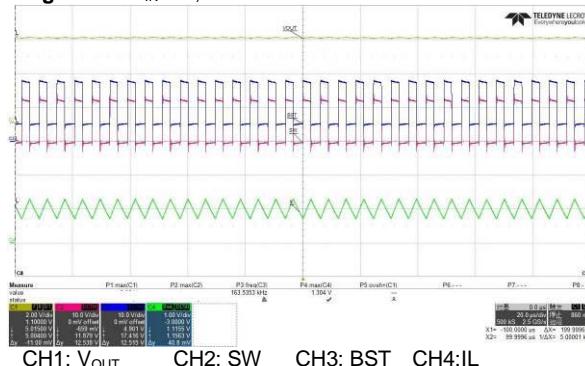


Figure 19:  $V_{IN}=12V$ , full load Normal

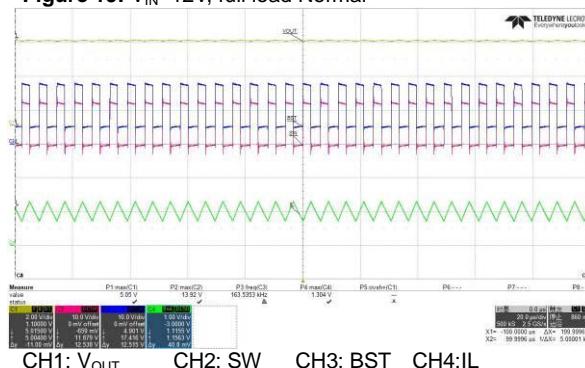


Figure 21:  $V_{IN}=24V$ , full load

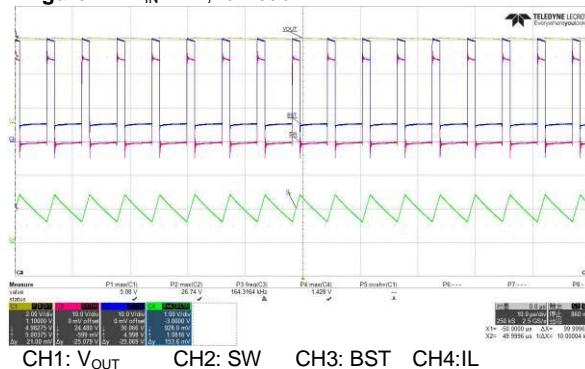
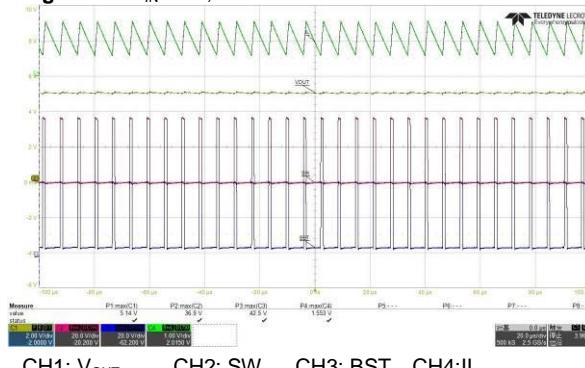
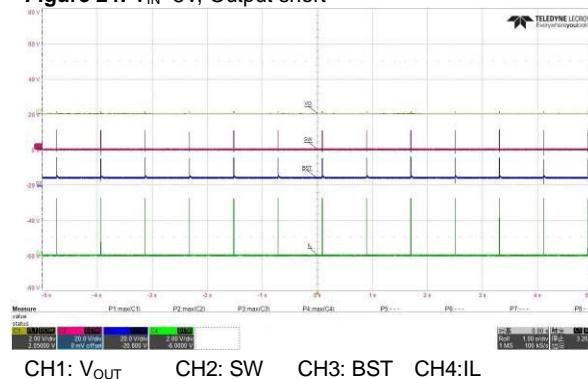
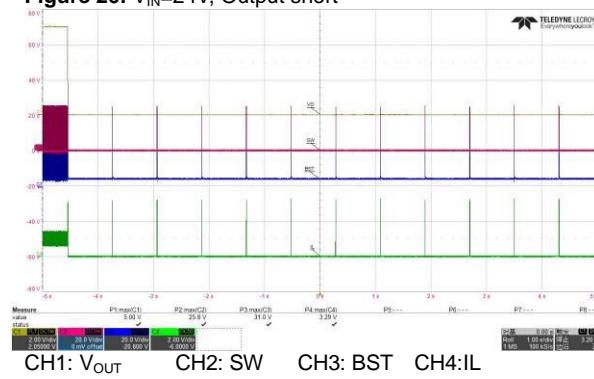
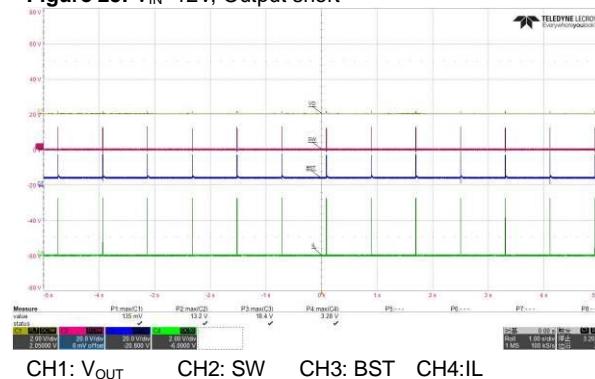
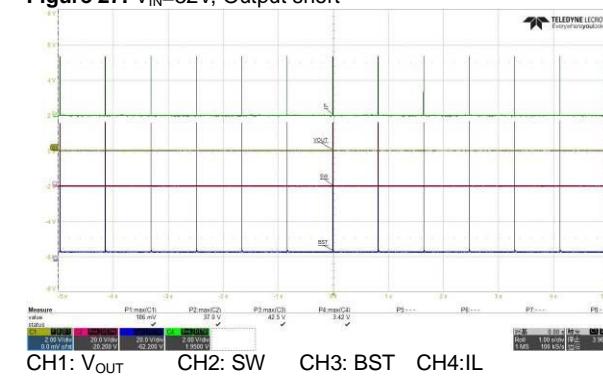
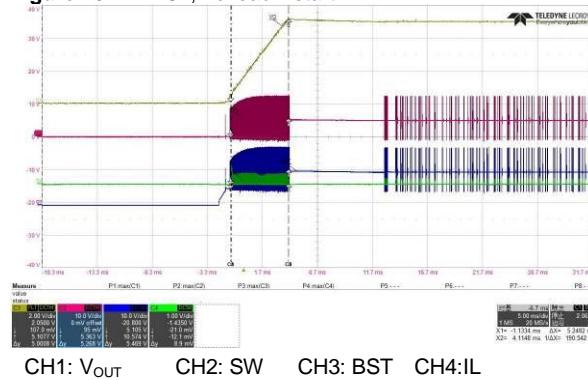
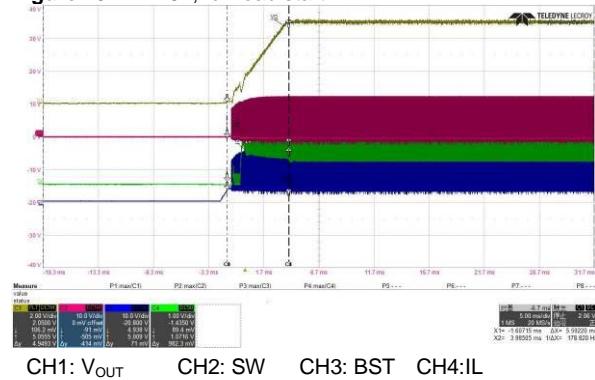
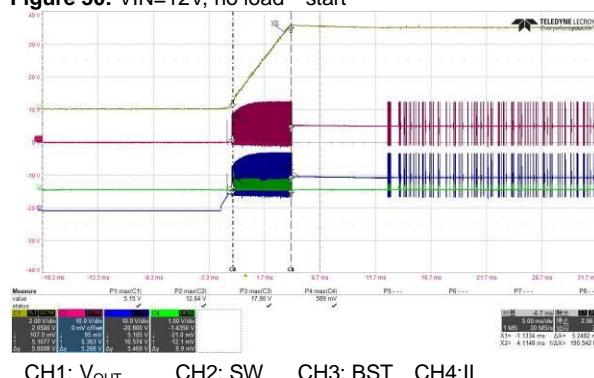
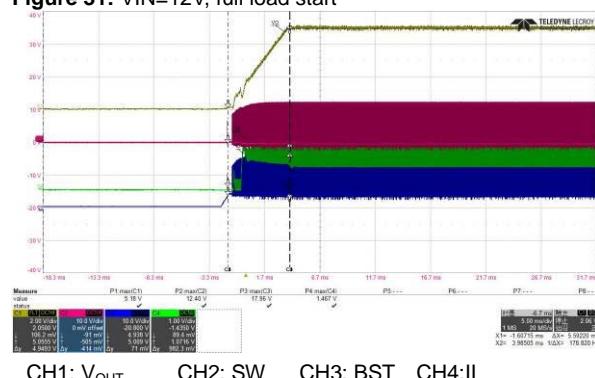
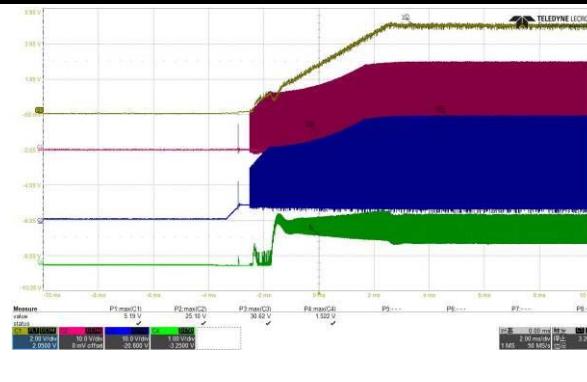
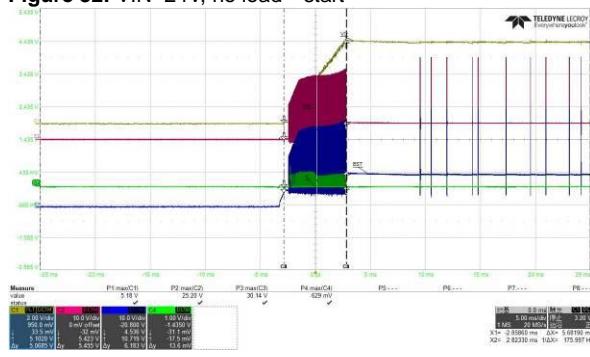
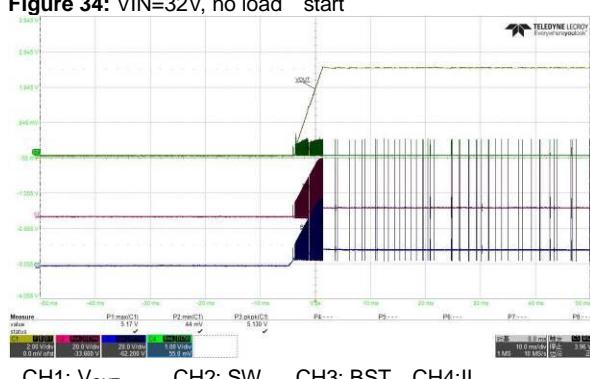
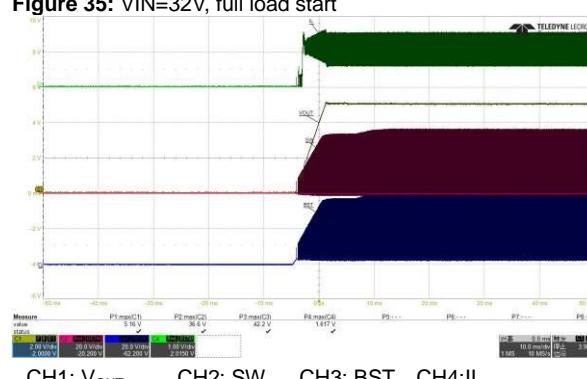


Figure 23:  $V_{IN}=32V$ , full load



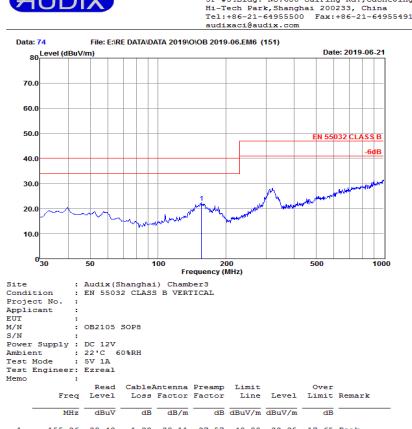
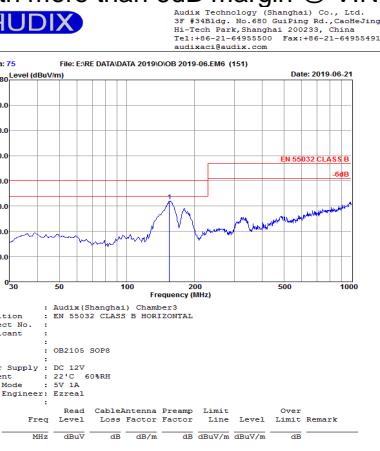
**Figure 24:**  $V_{IN}=8V$ , Output short

**Figure 26:**  $V_{IN}=24V$ , Output short

**Figure 25:**  $V_{IN}=12V$ , Output short

**Figure 27:**  $V_{IN}=32V$ , Output short

**Figure 28:**  $V_{IN}=8V$ , no load start

**Figure 29:**  $V_{IN}=8V$ , full load start

**Figure 30:**  $V_{IN}=12V$ , no load start

**Figure 31:**  $V_{IN}=12V$ , full load start

**Figure 33:**  $V_{IN}=24V$ , full load start

**Figure 32: VIN=24V, no load start**

**Figure 34: VIN=32V, no load start**

**Figure 35: VIN=32V, full load start**


### 3.7 Radiation EMI Test

EN55022 CLASS B @ full load report

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

**AUDIX**

**AUDIX**


### 3.8 Thermal Test

Test method: Input Voltage 8V/12V/24V/32V, Output power 5V/1A, Ambient temperature 40°C.

In the box of 11.4cm\*8.5cm\*4.3cm.

IC Temperature rise as follows:

Input Voltage (V)	IC Temperature rise $\Delta T$ (°C) @ LOAD=5V/1A
8	45.8
12	47.5
24	56.8
32	62.8

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