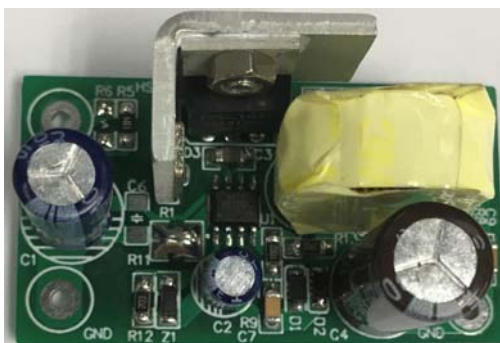


Subject

OB21085ZCP Demo Board Manual

Board Model: AD12V2.5A21085 2118

Doc. No.: OB_DOC_DBM_A_2108500



Key features:

- Lowest component counts
- Precise line /load regulation (<4%)
- Adjustable OCP point
- Comprehensive protection coverage: OCP/OVP /SCP/VIN UVP/OTP

Revision History

Revise Date	Version	Reason/Issue
2021-05-12	00	First issue

1. Specification

1.1. Input Characteristics

- DC input voltage range 25Vdc ~ 85Vdc

1.2. Output Characteristics

- Output Voltage 12.25V
- Min. load current 0mA
- Max. load current 2.5A

1.3. Performance Specifications

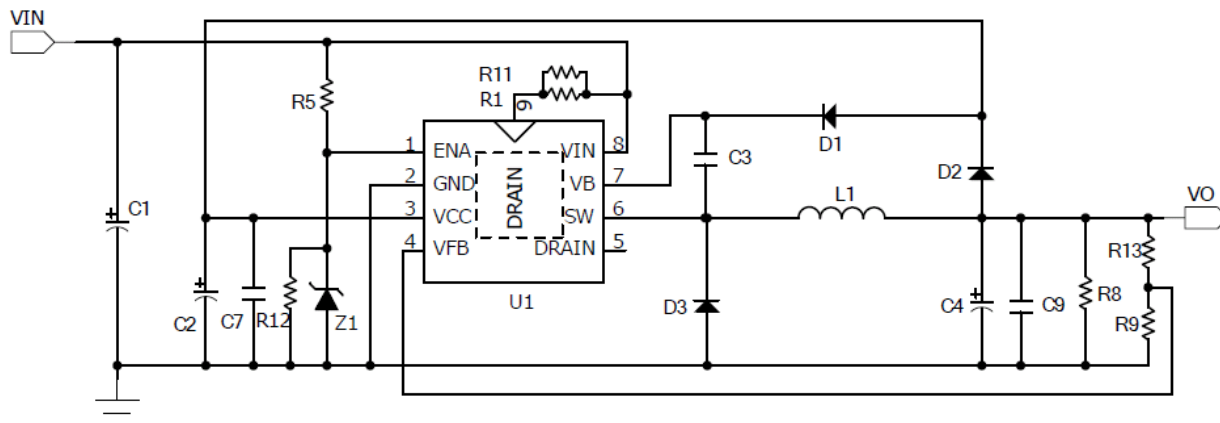
- Efficiency >90% 100% Load, normal line, 25°C
- Line Regulation $\pm 4\%$
- Load Regulation $\pm 4\%$
- Ripple & Noise 300mV Max

1.4. Protection Features

- Vin UVP Protection Output shut down with automatic recovery
- Short circuit Protection Output shut down with automatic recovery
- Over Current Protection Output shut down with automatic recovery
- Over Temperature Protection Output shut down with automatic recovery

2. Information

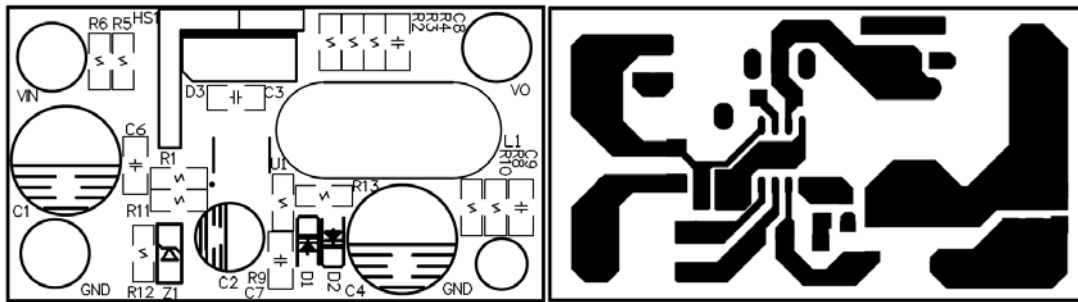
2.1. Schematic



2.2. Bill of Material

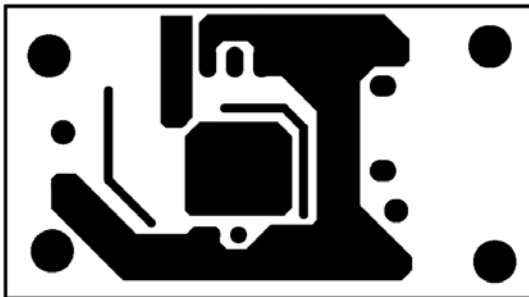
No.	Position	Description	Quantity	Remark
1	R5	RES SMD 1206 180K 5%	1	
2	R8	RES SMD 1206 1.5K 5%	1	
3	R9	RES SMD 1206 10K 1%	1	
4	R12	RES SMD 1206 20K 5%	1	
5	R13	RES SMD 1206 39K 1%	1	
6	C1	EC 47uF 100V	1	
7	C2	EC 33uF 50V	1	
8	C3,C9	SMD 1206 1uF 25V	2	
9	C4	EC 680uF 25V	1	
10	C7	SMD 1206 100nF 25V	1	
11	D1	DIODE R1G 1A/400V SOD123	1	
12	D2	DIODE 1N4148 0.15A/100V SOD123	1	
13	D3	DIODE MBR10100CT 10A/100V TO-220	1	
14	U1	IC OB21081ZCP ESOP8	1	
15	L1	Inductor 铁硅铝 KS068125A 150uH	1	
16	Z1	Zener,MMZJ 5.1,5.1V 500mW SOD123	1	
17	HS1	For D3	1	
18	PCB	AD12V2.5A21085 2118	1	
19	R1,R11	Short		
	Total		19	

2.3. PCB Gerber File



Top silkscreen

Top



Bottom

2.4. Board Snapshot



2.5. Inductor design

1) Core material:Kool M μ ,toroidal,KS068125A .

2) $L = 150\mu\text{H} \pm 10\%$ (10KHz,1V,25°C)



Material	Turns
$\Phi 0.6 * 1$ 2UEW	41

3. Performance Evaluation

3.1. Efficiency(@board end)

Input voltage	25V	45V	65V	85V	Specification
Efficiency	93.06%	92.05%	91.81%	91.07%	>90%

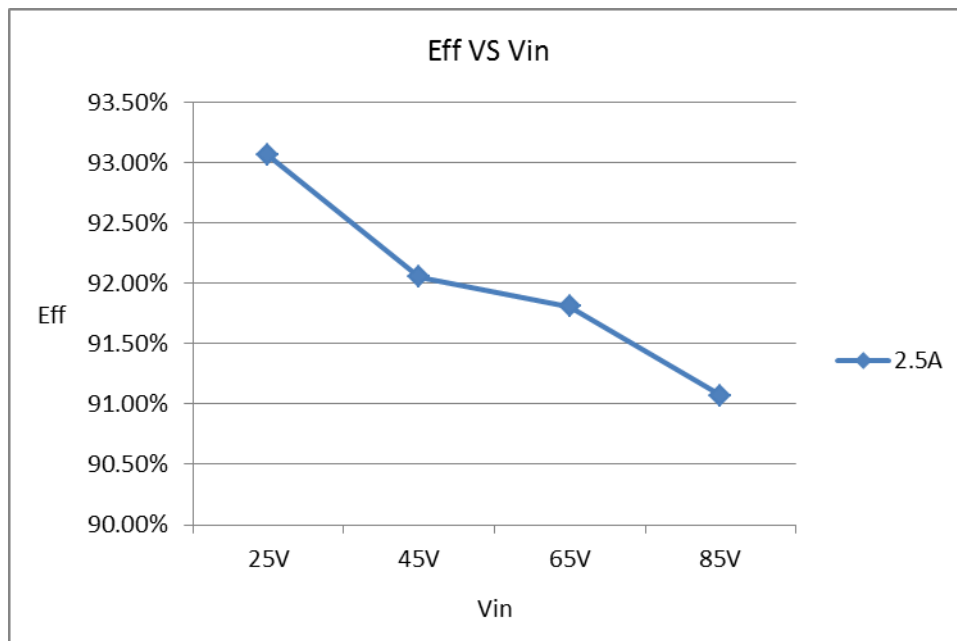


Fig. 1 Efficiency vs. Vin

3.2. Line Regulation & Load Regulation

Input voltage	No load	Full load	Specification
25Vdc	12.48V	12.41V	12.25V ± 0.5V
45Vdc	12.49V	12.43V	
65Vdc	12.49V	12.43V	
85Vdc	12.49V	12.42V	

3.3. Ripple & Noise

Input voltage	No load	Full load	Specification	Remark
25Vdc	186mV	209mV	<300mV	Fig. 2,3
45Vdc	213mV	236mV		
65Vdc	219mV	239mV		
85Vdc	226mV	252mV		Fig. 4,5

Note: Ripple& noise was measured at load end with probe cap, and bandwidth was limited to 20MHZ.

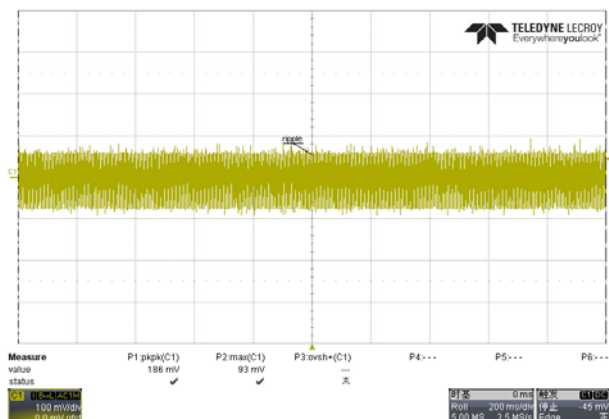


Fig. 2 Measured ripple& noise @25Vdc, no load.

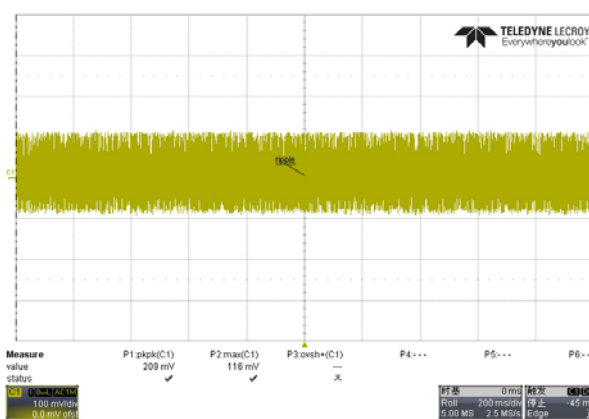


Fig.3 Measured ripple& noise @25Vdc, full load.

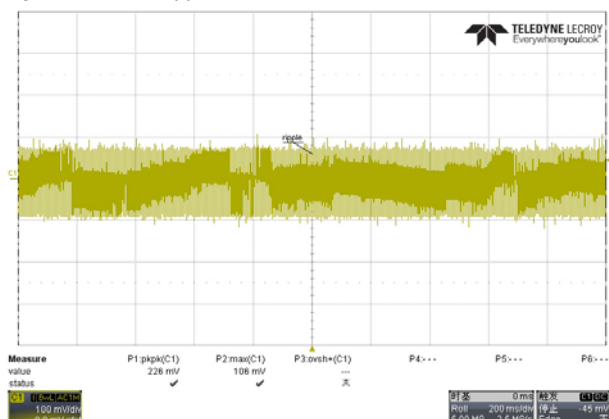


Fig.4 Measured ripple& noise @85Vdc, no load

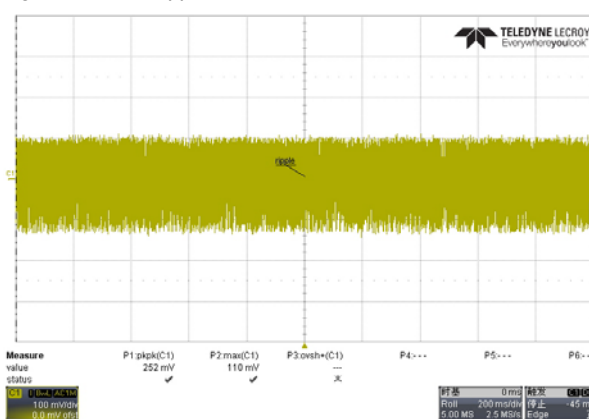


Fig.5 Measured ripple& noise @85Vdc, full load

3.4. Dynamic Test

A dynamic loading with low set at no load lasting for 50ms and high set at 2.5A load lasting for 50ms 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)

Input	Output voltage		Remark
	V _{MAX} (V)	V _{MIN} (V)	
25Vdc	12.68	12.01	Fig.6
45Vdc	12.68	12.01	
65Vdc	12.69	12.05	
85Vdc	12.68	12.10	Fig.7

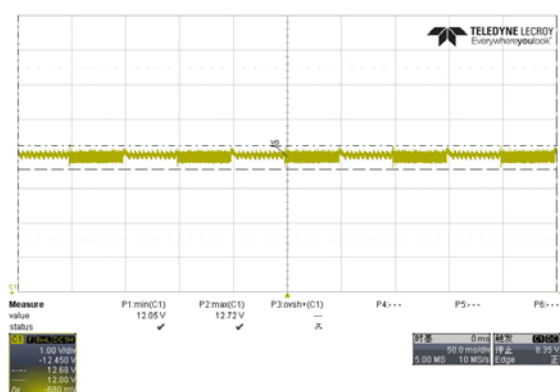


Fig.6 Output voltage under Dynamic test @ 25Vdc

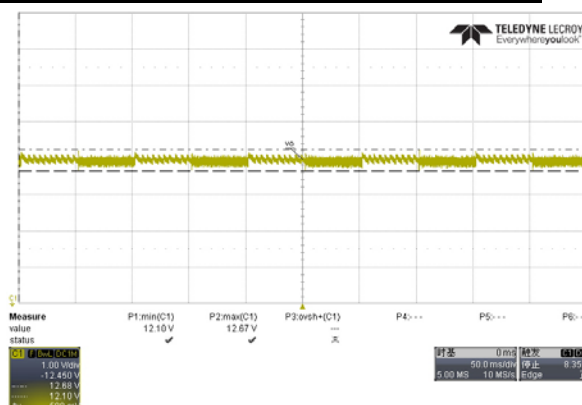


Fig.7 Output voltage under Dynamic test @ 85Vdc

4. Protection

4.1. Short Circuit Protection

The system is protected during output short circuit condition and recovered all the time until short released.

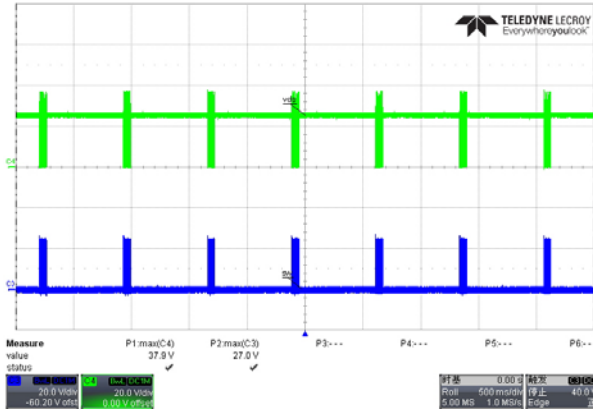


Fig.12 Output short, V_{DS} , V_{SW} @25Vdc

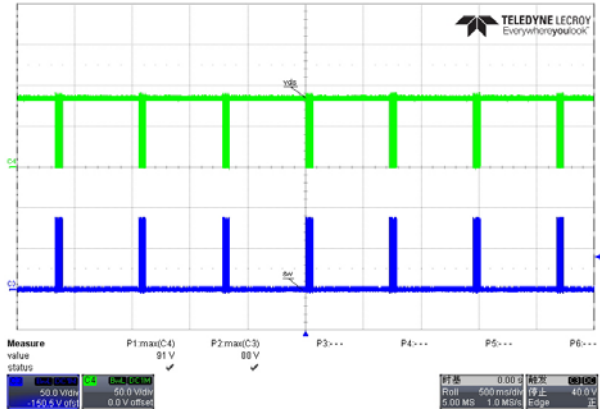


Fig.13 Output short, V_{DS} , V_{SW} @85Vdc

4.2. Over Current Protection

Input Voltage	25Vdc	45Vdc	65Vdc	85Vdc
OCP	4.56A	4.74A	4.72A	4.87A

4.3. Input Under Voltage Protection

		Test Result	Specification	Remark
Vin UVP	ON	14.3V	13V-15V	PASS
	OFF	15.2V	14V-16V	PASS

4.4. Over Temperature Protection

		Test Result	Specification	Remark
OTP	ON	155°C	140°C-160°C	PASS
	OFF	136°C	125°C-145°C	PASS

5. Thermal Testing

Ambient temperature 40°C, 31W load

Vin	IC (U1)	diode (D3)	core (L1)	coil (L1)	Spec
25Vdc	97.6°C	87.3°C	80.2°C	82.4°C	115°C
80Vdc	110°C	107.3°C	96°C	97.8°C	

6. Other Waveforms

6.1. V_{SW} , V_{DS} & V_{CC} wave form @ no load / full load

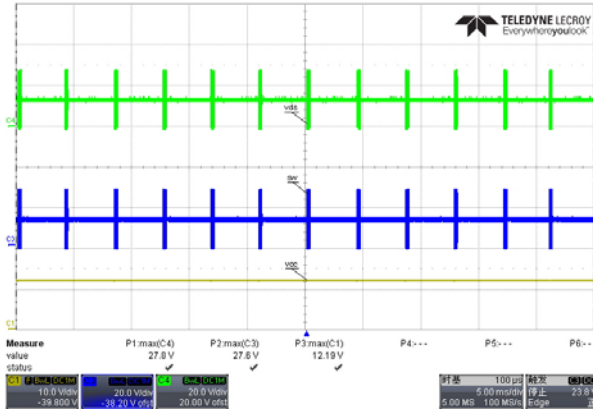


Fig.14 V_{SW} , V_{DS} & V_{CC} waveform @25Vdc, no load

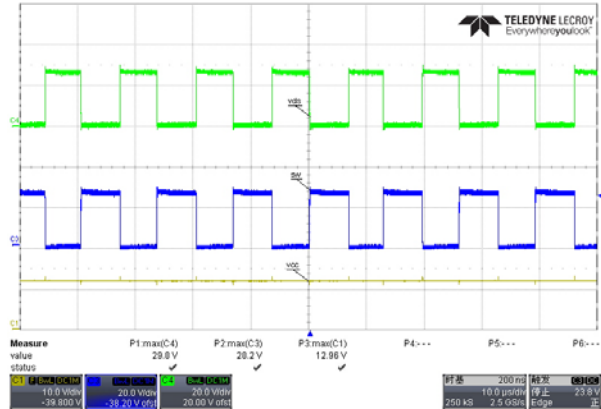


Fig.15 V_{SW} , V_{DS} & V_{CC} waveform @25Vdc, full load

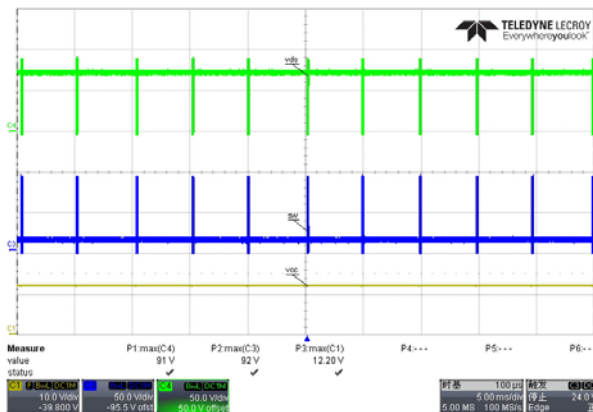


Fig.16 V_{SW} , V_{DS} & V_{CC} waveform @85Vdc, no load

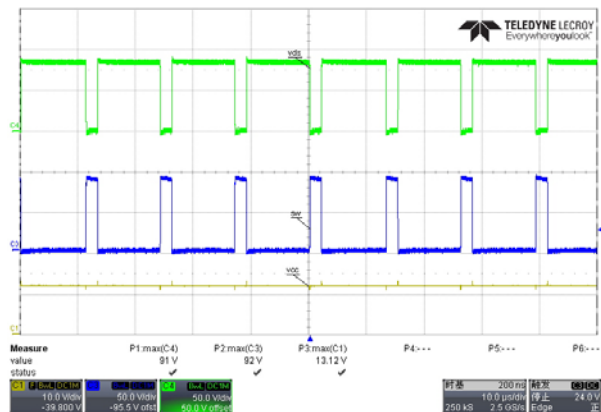


Fig.17 V_{SW} , V_{DS} & V_{CC} waveform @85Vdc, full load

6.2. MOSFET V_{DS} , V_{SW} waveform @ start / normal / short

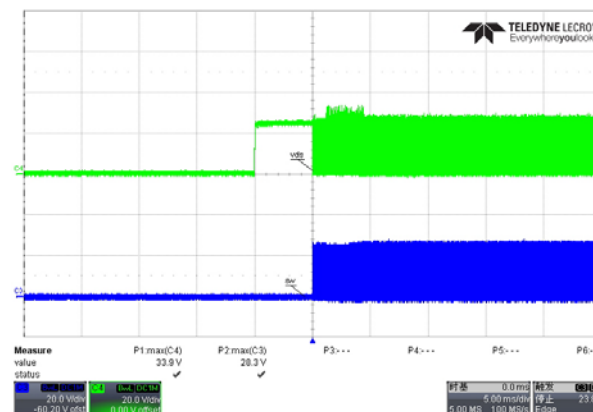


Fig.18 Start, V_{DS} , V_{SW} @25Vdc, full load start

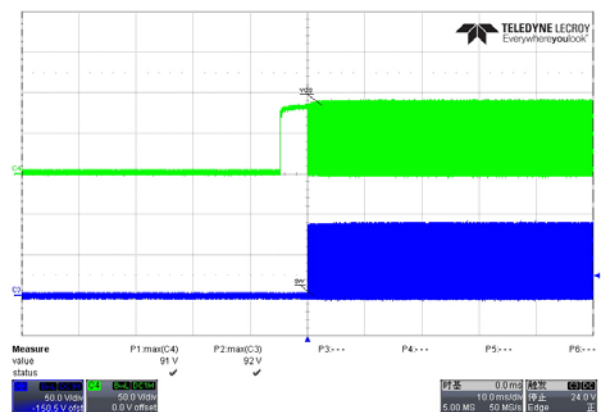


Fig.19 Start, V_{DS} , V_{SW} @85Vdc, full load start

 V_{DS_MAX} , V_{SW_MAX} @ Full load / Start / Short

Input	$V_{DS_MAX}(V)$	$V_{SW_MAX}(V)$
85Vdc @ No load	91	91
85Vdc @ Full load	93	92
85Vdc @ Start	91	92
85Vdc @ Short	91	88

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