YX5311 6-48V Input, 12V Output Isolated Power EVB Manual

1 Description and Features

The YX5311 is an isolated Flyback controller with high efficiency over a wide input voltage range of 2.7V to 100V. It directly measures output voltage from the primary side Flyback waveform and no needs opto-coupler or third winding for regulation. Only a single resistor required to set the output voltage. The YX5311 provides 5V gate drive voltage to drive external N-channel MOSFET or GaN. The internal compensation and soft-start functions decreases the number of external components. To maintain the high efficiency and minimize the output voltage ripple, the YX5311 operates in Burst Mode at light load.

The YX5311 features under voltage lockout (UVLO), short circuit protection (SCP) and over temperature protection (OTP) to help the device operate safely and reliably.

The YX5311 is available in 6-lead TSOT-23 package.

Features

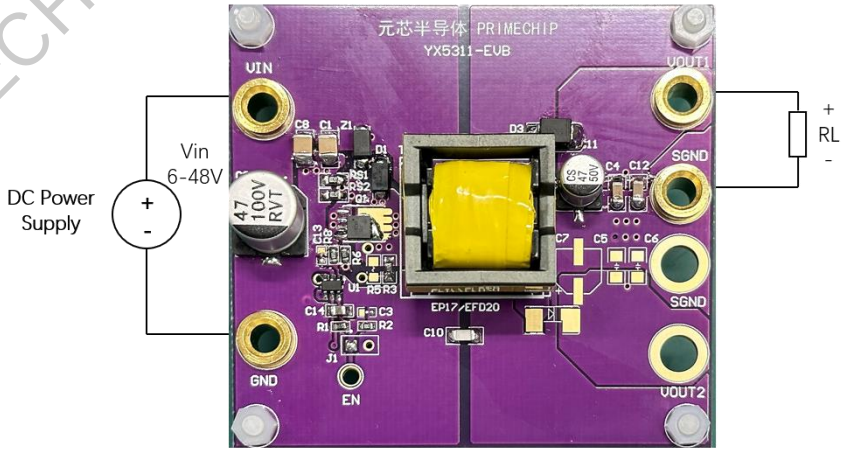
- Wide input voltage range of 2.7V to 100V
- Gate driver with 5V gate drive voltage for N-channel MOSFET or GaN
- Set VOUT with single external resistor
- No opto-coupler or third winding of transformer required for VOUT regulation
- High efficiency at light load mode (DCM)
- Low input quiescent current
- Internal compensation and soft-start function
- Shut down and Enable control
- Build-In UVLO and short circuit protection
- Over current and over temperature protection
- 6-Lead TSOT-23 Package

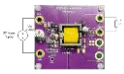
2 Board Specifications

Table 1 Board specification

Parameter	Value	Unite
Input Voltage	6 to 48	V
Output Voltage	12	V
Maximum Output Current	1(Vin=6V) 2(48≥Vin≥12)	A
Rated switching frequency	139 @12Vin,2A Load	kHz
Board Size	7.0x6.5	mm

3 Test Setup





4 Test Setup

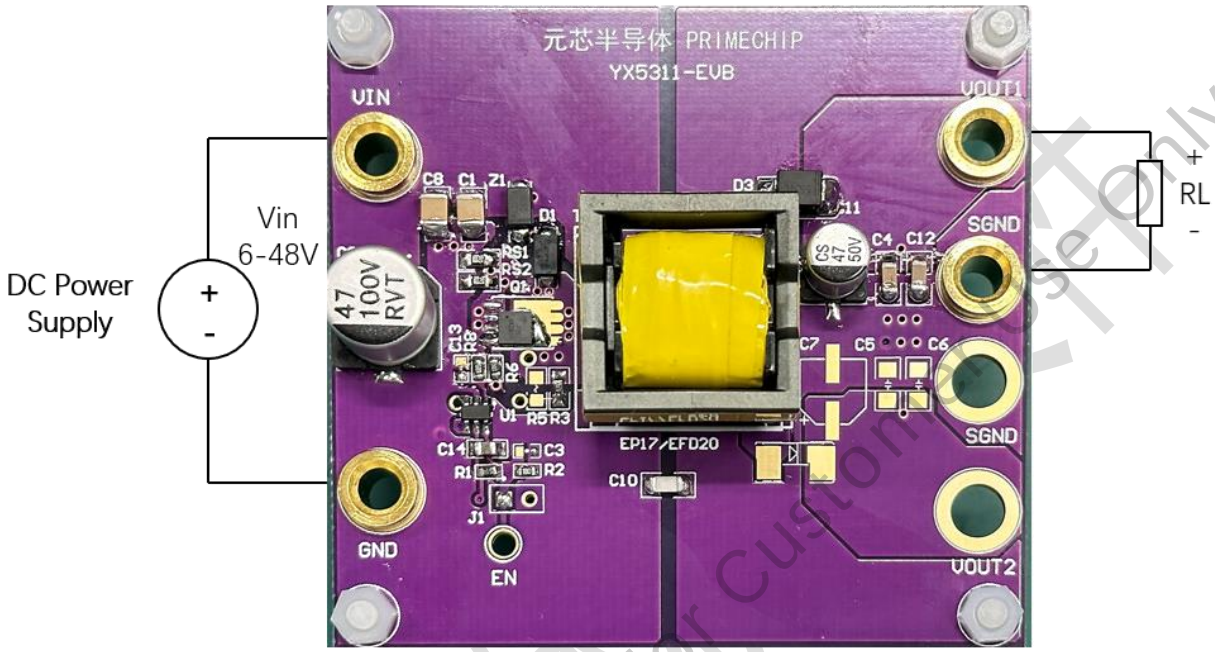


Figure 1. Demo Board Test Setup

4.1 Connector, Test point and Switch description

4.1.1 Connectors

V_{OUT1}: Regulated voltage output. Connect load between V_{OUT1} and SGND.

V_{IN}: Input voltage. Power supply should be connected between V_{IN} and GND.

SGND: Output ground.

GND: Input ground.

4.1.2 Test Point

EN: Enable and under voltage lockout (UVLO) programming pin.

5 Test Performance

5.1 Efficiency

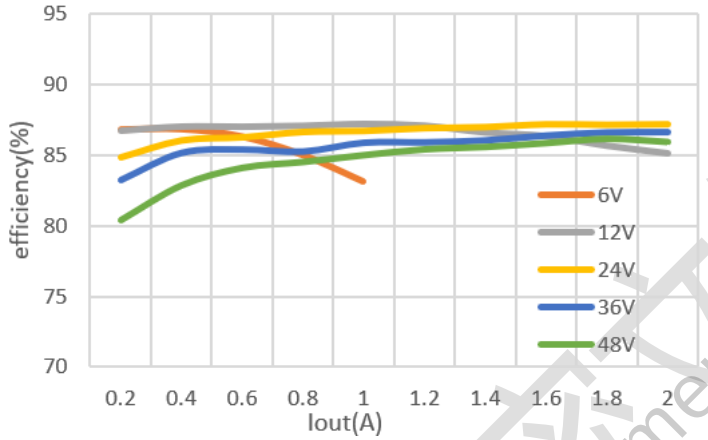


Figure 2. Efficiency vs load

5.2 Regulation

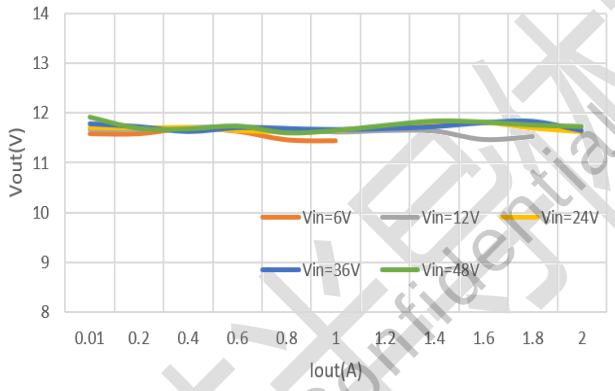


Figure 3. Load Regulation

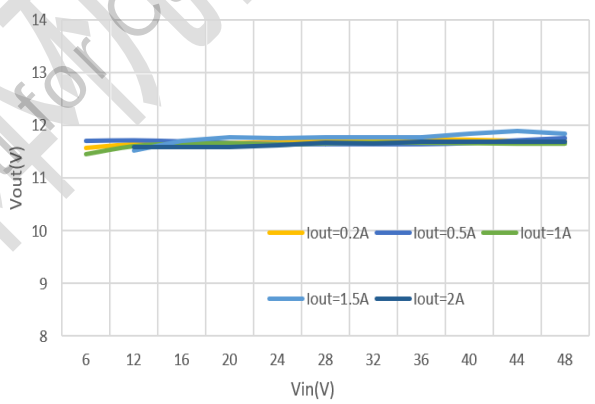
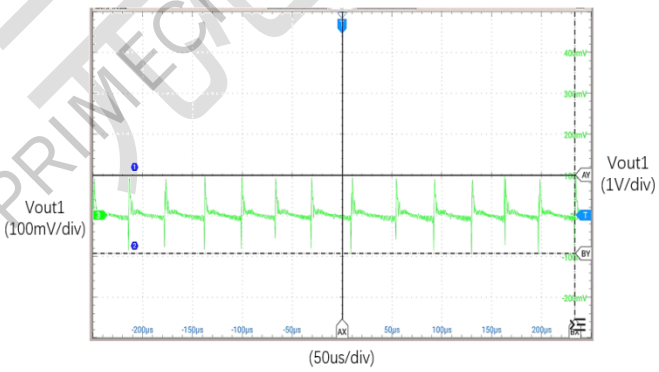


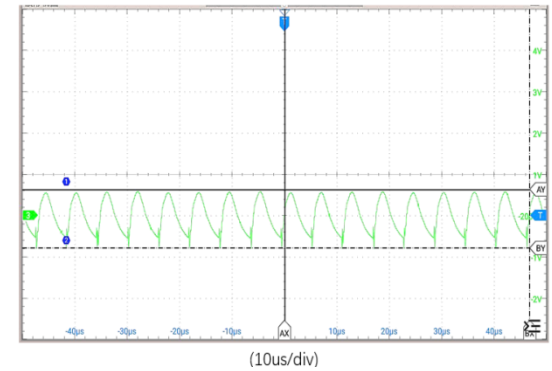
Figure 4. Line Regulation

5.3 Steady State Waveform



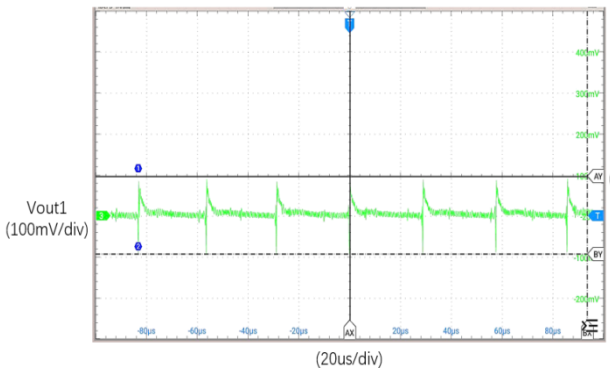
(a)V_{IN}=12V, I_{OUT}=0.001A

Δ pk-pk= 193.7mV



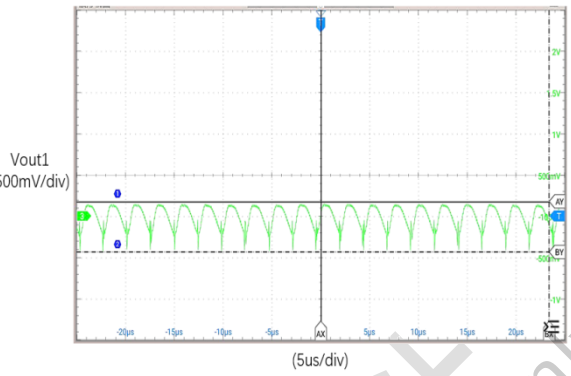
(b)V_{IN}=12V, I_{OUT}=2A

Δ pk-pk=1.421V



(a)V_{IN}=48V, I_{OUT}=0.001A

Δpk-pk= 190.6mV

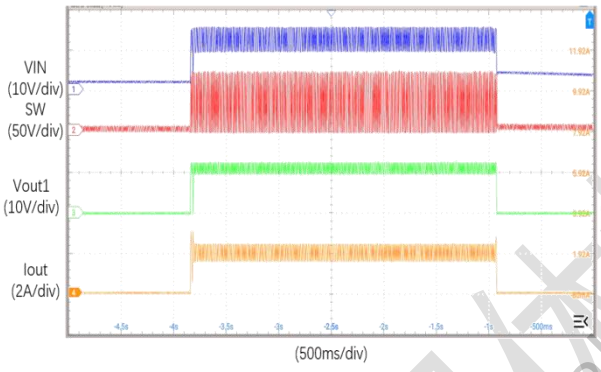


(b)V_{IN}=48V, I_{OUT}=2A

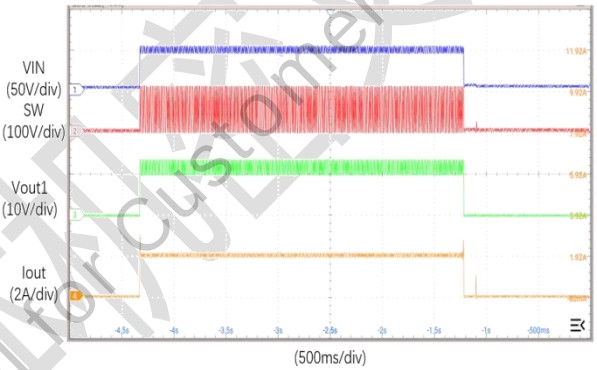
Δpk-pk=617.1mV

5.4 Start up & Shutdown

Power Start up & Shutdown

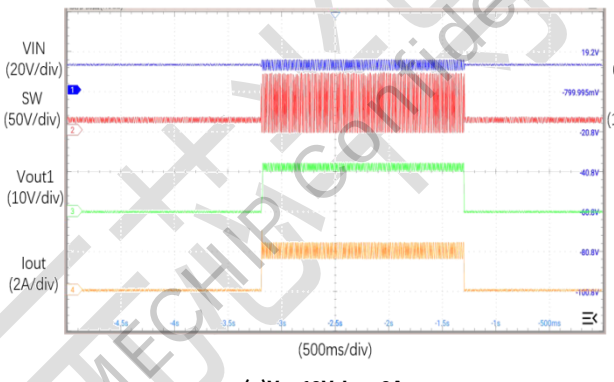


(a)V_{IN}=12V, I_{OUT}=2A

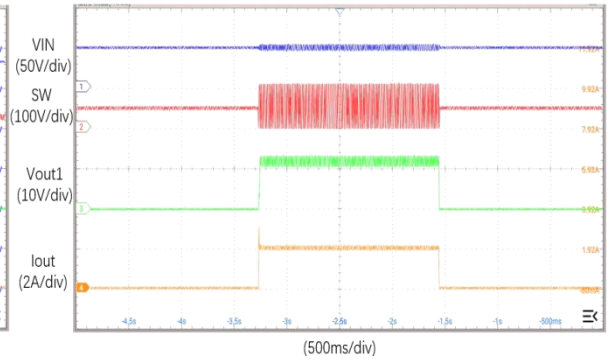


(b)V_{IN}=48V, I_{OUT}=2A

Enable Start up & Shutdown



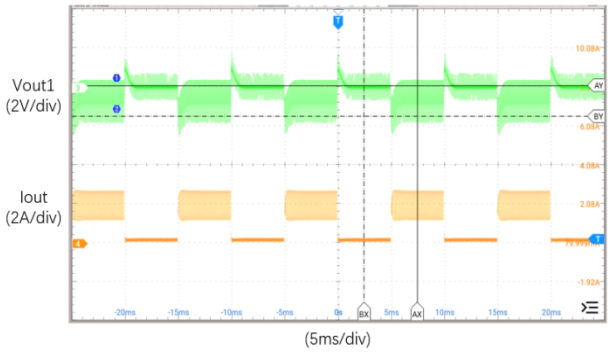
(a)V_{IN}=12V, I_{OUT}=2A



(b)V_{IN}=48V, I_{OUT}=2A

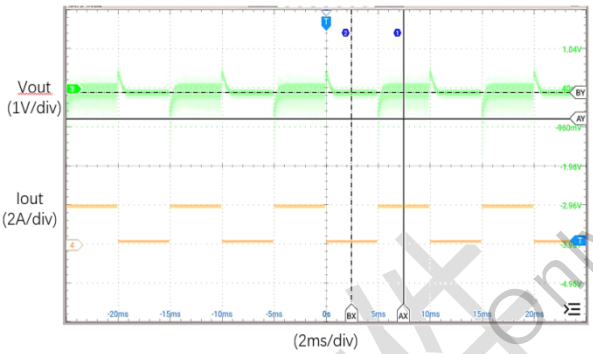
5.5 Transient

Load transient



(a)V_{IN}=12V, I_{OUT}=0.2A-2A

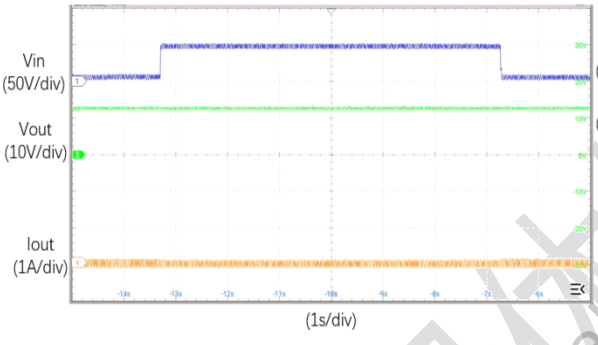
Overshoot:1V,undershoot:1.593V



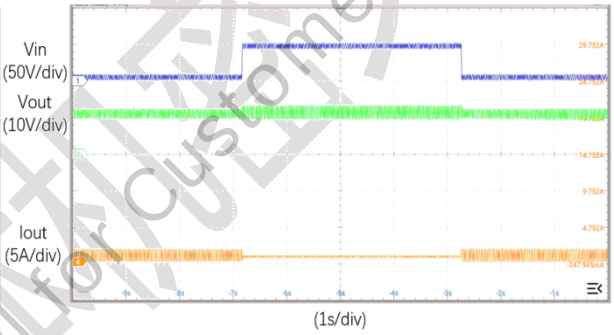
(b)V_{IN}=48V, I_{OUT}=0.2A-2A

Overshoot:625mV,undershoot:671.8mV

Line transient



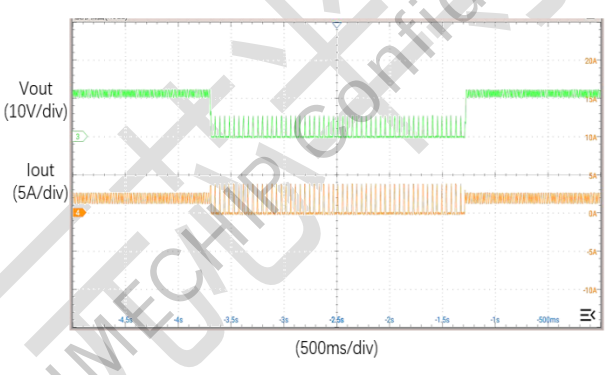
(a)V_{IN}=6-48V, I_{OUT}=10mA



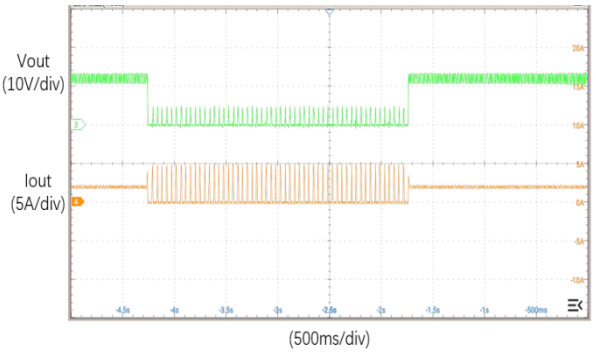
(b)V_{IN}=6-48V, I_{OUT}=1A

5.6 Protection

Overload protection

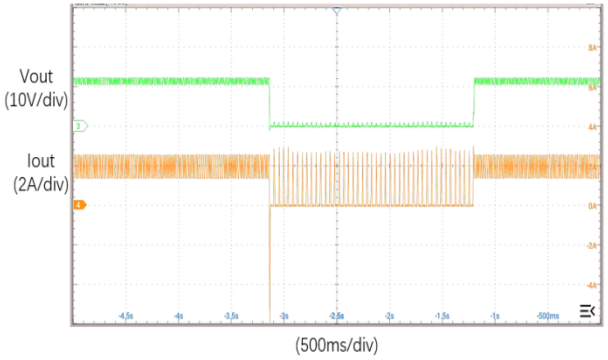


(a)V_{IN}=12V

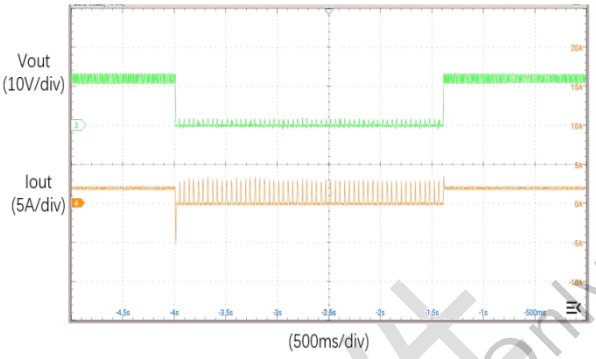


(b)V_{IN}=48V

Short-circuit protection

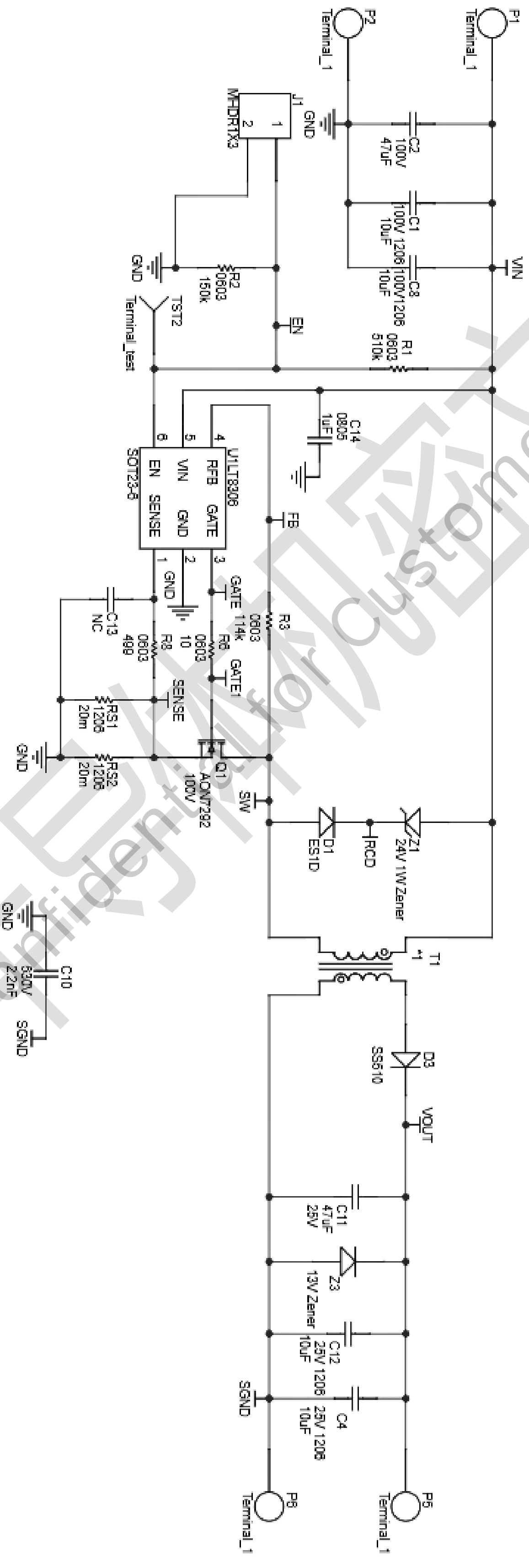


(a)V_{IN}=12V, I_{OUT}=2A

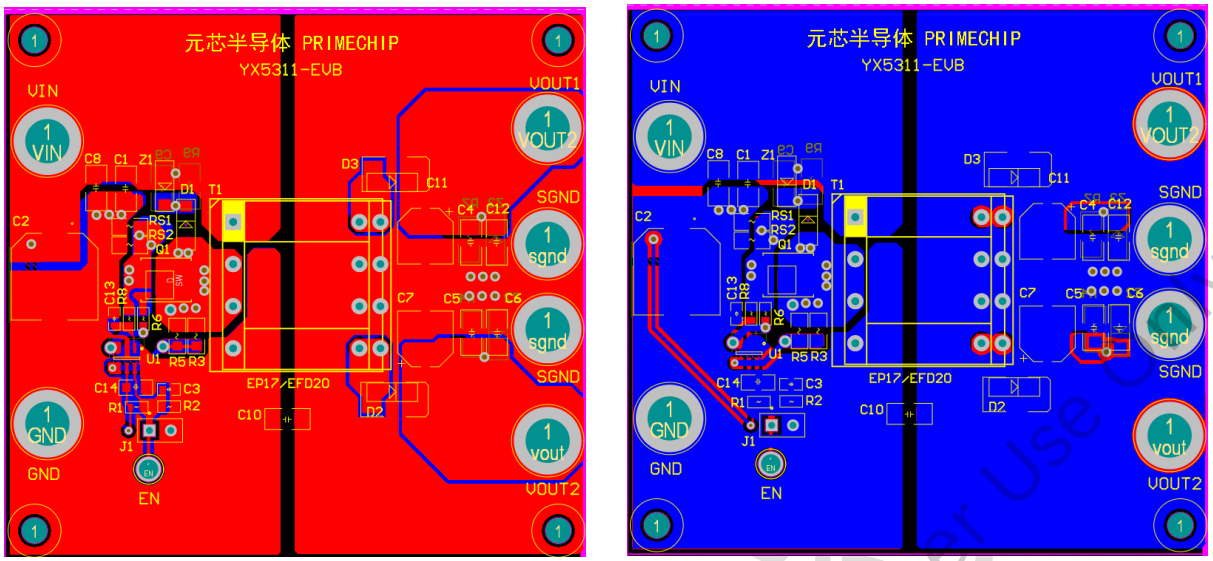


(b)V_{IN}=48V, I_{OUT}=2A

6 Schematic



7 PCB Layout



(a)Top layer (b) Bottom Layer

Figure 5. Demo Board PCB Layout

8 Bill of Materials

item	Designator	Quantity	Footprint	Description	Part Number
1	C1, C8	2	1206	CAP,10μF,X7R,100V,10%,1206	
2	C4,C12	2	1206	CAP,10μF,X7R,25V,10%,1206	
3	C10	1	1206	CAP,2.2nF,X7R,630V,1206	
4	C13	1	0603	CAP,100pF,X7R,0603	
5	C14	1	0805	CAP,1μf,100V,0805	
6	C2	1	CAP	CAP,ALUM,47μF,100V,d=10mm	
7	C11	1	CAP	CAP,ALUM,47μF,25V,d=6.3mm	
8	D1	1	SMA	ES1D	
9	D3	1	SMA	SS510	
10	J1	1	1x2P	P=2.54mm	
11	Q1	1	DFN-8-EP(3.3*3.3)	NMOS	AON7292
12	R1	1	0603	RES,510KΩ,0603	
13	R2	1	0603	RES,150 KΩ,0603	
14	R3	1	0603	RES,114KΩ,0603	
15	R6	1	0603	RES,10Ω,0603	
16	R8	1	0603	RES,499Ω,0603	
17	RS1,RS2	2	1206	RES,20mΩ,1206	
18	T1	11	EFD20	Transformer,5μH	
19	U1	1	TSOT23-6	YX5311	
20	Z1	1	SOD-123	Zener,24V,500mW	1SMA4749
21	Z3	2	SMA	Zener,13V,500mW	1SMA5928B