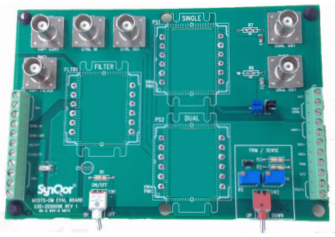
EVAL-1000020

Evaluation Board for Demi Brick Converter and Filter Modules



Summary

SynQor has developed EVAL-1000020, an evaluation board to facilitate testing of our Demi brick DC-DC converters and filter modules.

Introduction

This application note is a guide to the features, schematic, component placement, and BOM for this evaluation board. The applicable series of modules include the Demi brick single and dual converters and Demi brick filters.

For assistance with testing the performance of our DC-DC power converters, please refer to our application note “Guidelines for Testing SynQor DC-DC Converters”.

Contents

Shock Warning: There are areas of this evaluation board that have exposed access to high voltage. Exercise caution to avoid contact with those voltages. Also note that the evaluation board may retain high voltage temporarily after input power has been removed. Exercise caution when handling

Application of Input Power: Never apply input power to a converter with a switch closure, such as a knife switch or circuit breaker. That type of action applies input voltage with an uncontrolled very high rate of rise (dV/dt) that could be damaging to the converter and to external components before the converter. Instead, apply input voltage with a controlled rate of rise. Also, ensure input voltage is off before inserting or removing a converter module from the evaluation board

Thermal Considerations: When testing converters on an evaluation board, ensure adequate cooling. Apply cooling air with a fan blowing across the converter or across a heatsink attached to the converter. Monitor the converter temperature to ensure it doesn’t exceed the maximum rated per the datasheet specification

Sockets: This evaluation board uses sockets to provide the option of testing multiple converters. These sockets are not rated for continuous high currents. Short-term testing is fine, but be aware of this limitation for longer-term testing. The spring fingers in the sockets will add resistance in the power path, which will cause voltage drops at higher currents that could contribute significant errors in regulation and efficiency measurements. These spring fingers also do not provide the thermal cooling path from the module pins to PCB routing that is enabled by soldered connections. This may contribute to higher converter temperatures and error when performing thermal evaluations. For longer-term testing, thermal testing, and permanent installations use soldered connections.

Section 1 – Input and Output Connections

Input power is applied through connector J1 as VIN+ and VIN-.

Output power is applied through connector J2 as VOUT+, VOUT- and VOUT RTRN.

Control signals are available through connectors J1 and J2.

See Tables 1 and 2 below for input power, output power, and control signals.

Table 1: Input Signals (connector J1)

Terminal # of Connector	Signal Name
1	VIN- Converter
2	VIN- Filter
3	VIN- Filter
4	SYNC-IN
5	SYNC-OUT
6	ON/OFF
7	No Connection (N/C)
8	VIN+ Filter
9	VIN+ Filter
10	VIN+ Converter
11	VIN+ Converter

Table 2: Output Signals (connector J2)

Terminal # of Connector	Signal Name
1	VOUT+
2	VOUT+
3	No Connection (N/C)
4	TRIM
5	SENSE-
6	SENSE+
7	VOUT-
8	VOUT-
9	No Connection (N/C)
10	VOUT RTRN
11	VOUT RTRN

Note: *Please refer to the appropriate SynQor converter datasheet for descriptions of these features.*

Section 2 – Switches, Trim Resistors, and BNC Connectors

Description of Switches

ON/OFF Switch

ON/OFF switch SW1 provides manual on and off enable control of the converter. Toggling this switch to the "ON" position enables the converter. Toggling this switch to the "OFF" position disables the converter.

Trim Switch

Toggling switch SW2 to the "UP" or "DOWN" position connects the converter trim pin to the OUTPUT_RTN or OUTPUT+ pin through the trim resistors. This allows for trimming the output voltage up or down. Leaving the switch in the middle position will disable the output voltage trim function.

Description of Trim Resistors

Voltage Trim

Fixed resistor R1 or R11 and potentiometer R3 are connected to OUTPUT_RTN and are used to adjust up the output voltage set-point of the converter.

Fixed resistor R2 or R21 and potentiometer R4 are connected to OUTPUT+ and are used to adjust down the output voltage set-point of the converter.

BNC Monitoring Point Descriptions

VIN-FILTER
Filter module positive input voltage, referenced to filter module input return

VIN-CONVERTER
Converter module positive input voltage, referenced to converter module input return

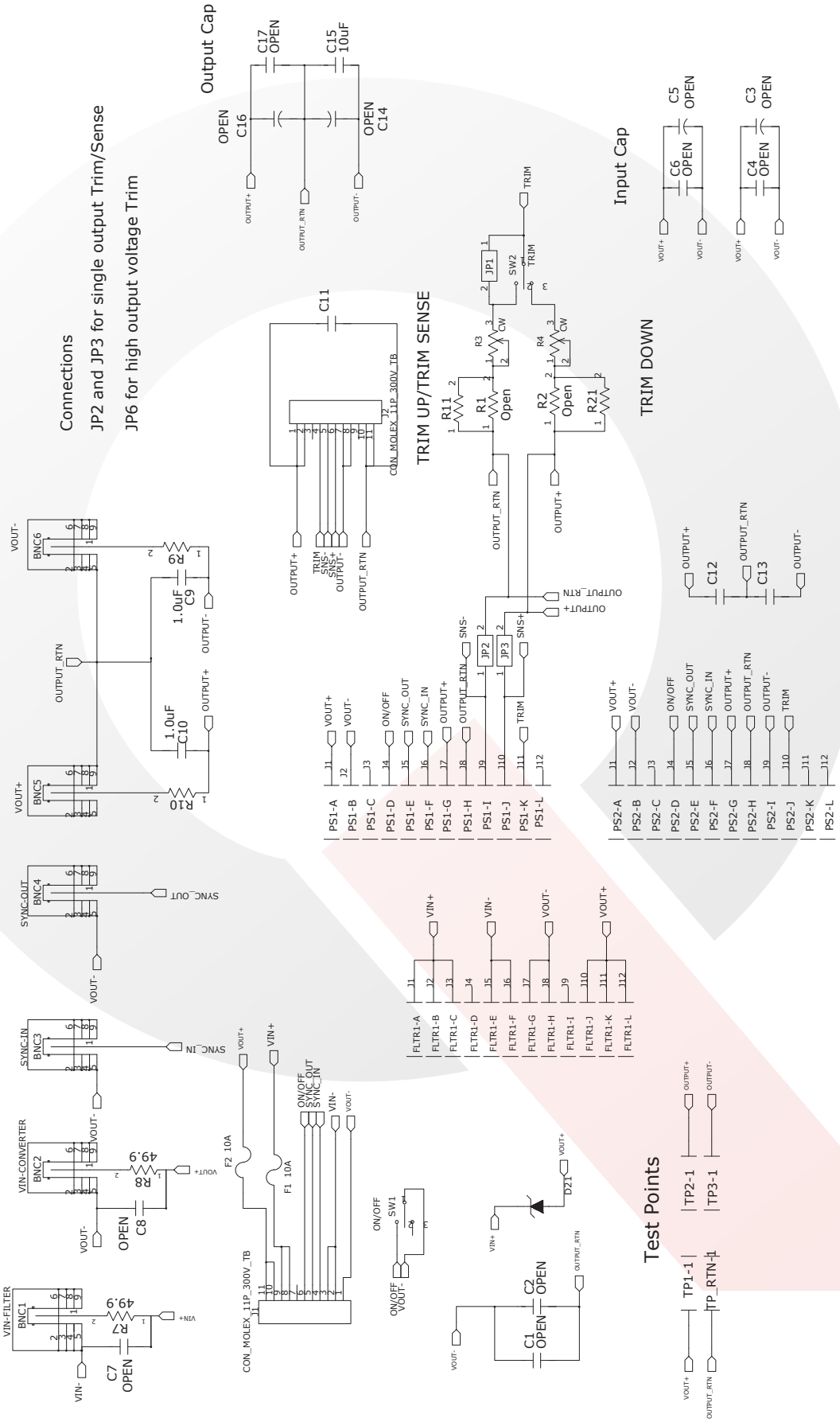
SYNC-IN
SYNC_IN synchronization input signal, referenced to converter module input return

SYNC-OUT
SYNC_OUT synchronization output signal, referenced to converter module input return

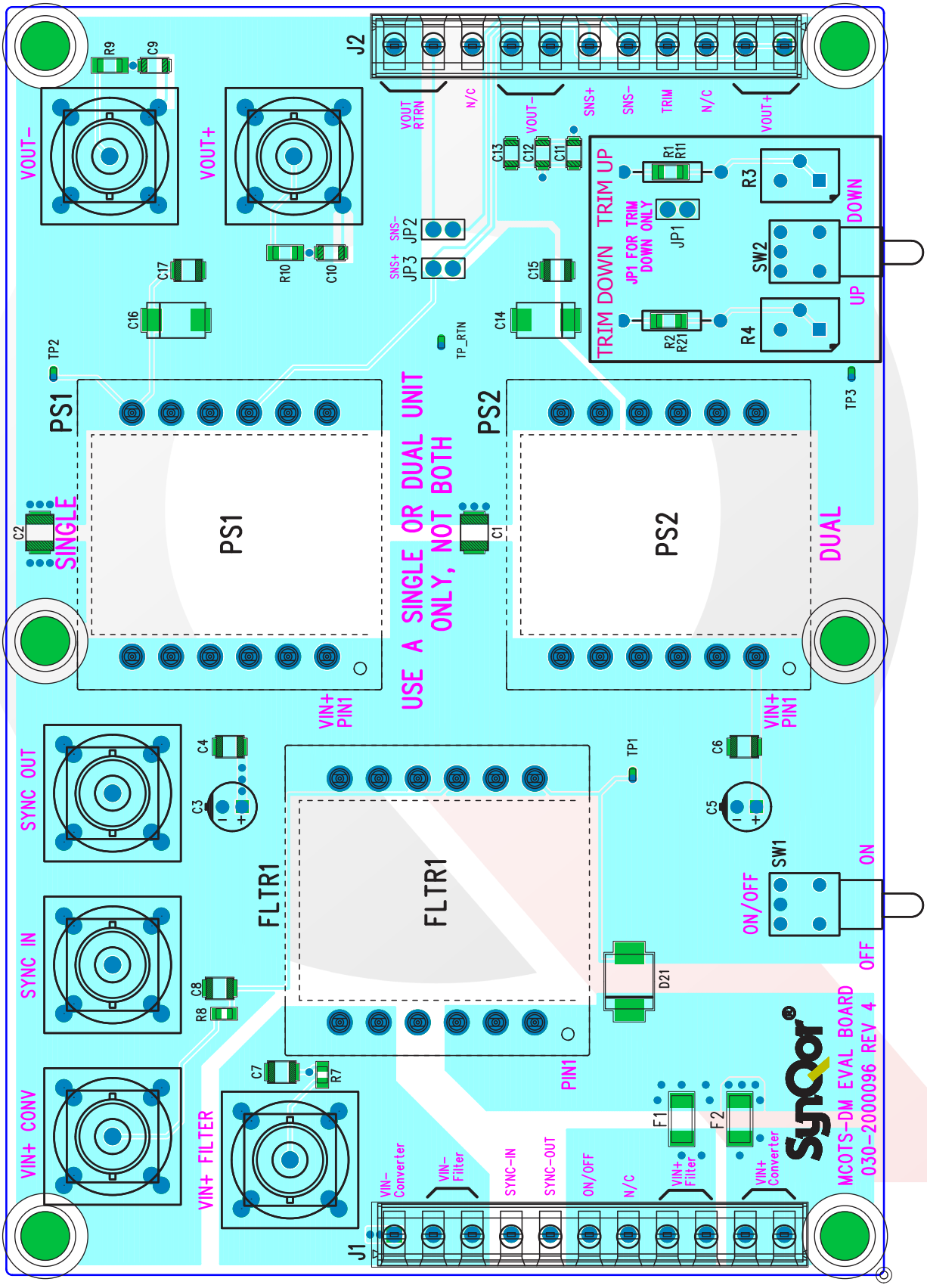
VOUT+
Converter module positive output voltage, referenced to converter module output return

VOUT-
Converter module negative output voltage, referenced to converter module output return

Section 3 – Schematic



Section 4 – Component Placement



Section 5 – Bill of Materials (BOM)

Table 3: EVAL-1000020

Ref Des	Value	Tolerance	Package	Description
C2	1 uF	10 %	1206	Capacitor, X7R, 50 V
C3	1 uF	10 %	1206	Capacitor, X7R, 50 V
C4	OPEN	10 %	1812	Capacitor, X7R, 2000 V
C5	OPEN	10 %	1210	Capacitor, X7R, 100 V
C6	4.7 uF	10 %	1206	Capacitor, X7R, 50 V
C7	4.7 uF	10 %	1206	Capacitor, X7R, 50 V
C8	4.7 uF	10 %	1206	Capacitor, X7R, 50 V
C9	OPEN	10 %	1210	Capacitor, X7R, 100 V
C12	OPEN			
C13	OPEN	20 %	1210	Capacitor, X7R, 25 V
C14	OPEN			
C15	10 uF	20 %	1210	Capacitor, X7R, 25 V
C16	OPEN	20 %	1210	Capacitor, X7R, 25 V
C17	OPEN			Capacitor, aluminum electrolytic
D21	OPEN		SMC	Diode, TVS, bidirectional, 1.5SMC130CA
F1	10 A		2410	Fuse, R451 010. MR
R1	OPEN		Through-hole	Resistor
R2	OPEN		Through-hole	Resistor
R3	20K	10 %		Resistor, Trim Potentiometer, 3299Y-1-203 LF
R4	20K	10 %		Resistor, Trim Potentiometer, 3299Y-1-203 LF
R7	0	5 %	1206	Resistor
R8	0	5 %	1206	Resistor
R9	0	5 %	1206	Resistor
R10	0	5 %	1206	Resistor
R11	OPEN	5 %	1206	Resistor
R21	OPEN	5 %	1206	Resistor