

EVAL-1000001

Evaluation Board for Isolated Converters Half, Quarter, Eighth, and Sixteenth Brick

Summary

SynQor has developed EVAL-1000001, an evaluation board to facilitate testing of our lower power isolated half-brick, quarter-brick, eighth-brick, and sixteenth-brick DC-DC converters rated to 100 V or less.

Introduction

This application note is a guide to the features, schematic, component placement, and BOM for this evaluation board. The applicable series of DC-DC converter modules include the following modules rated to less than 300 W with an input rated to 100 V or less: MCOTS-C-28/28V/28VE, MCOTS-C-48, PowerQor (PQ), InQor (IQ), RailQor (RQ), BusQor (BQ), Semi-Regulated BusQor (SQ) and CFQor (CF). For higher power modules with an input rated to 100 V or less see EVAL-1000008. For higher power modules with an input rated for high voltage see EVAL-1000005.

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”.

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Shock Warning: There are areas of this evaluation board that have exposed access to high voltage. Exercise caution to avoid contact with those voltages. This 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 “IN”. Output power is applied through connector “OUT”.

Control signals are applied through connectors “IN” and “OUT”.

See Table 1 and 2 for connector signal descriptions.

Table 1: Connector “IN”

Terminal #	Signal Name
1	Vin(+)
2	Vin(+)
3	Vin(+)
4	Vcap
5	On/Off
6	F_Syn
7	Start_S
8	Ishare
9	Vin(-)
10	Vin(-)
11	Vin(-)

Table 2: Connector “OUT”

Terminal #	Signal Name
1	Vout(+)
2	Vout(+)
3	Vout(+)
4	Vout(+)
5	Sense(+)
6	Trim
7	Sense(-)
8	Vout(-)
9	Vout(-)
10	Vout(-)
11	Vout(-)

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

Enable On/Off Switch

Toggling this switch to the ON (-N) position enables “N” type negative on/off logic converters. Toggling this switch to the ON (-P) position enables “P” type positive on/off logic converters. The enable signal is connected to the input connector “IN” for remote access.

Output Voltage Trim Switch

Toggling this switch to the “Up” or “Down” position connects the converter trim pin to Sense(+) or Sense(-) pin through the trim resistors, R1-R4. This allows for trimming the output voltage up or down by adjusting the trim resistors. Leaving the switch in the middle position will disable the output voltage trim function.

Description of Trim Resistors

Voltage Trim

Fixed resistor R1 and potentiometer R2 are used to adjust down the output voltage set-point of the non-isolated converter.

Fixed resistor R4 and potentiometer R3 are used to adjust up the output voltage set-point of the non-isolated converter.

The trim resistors R1 through R4 are not populated in this evaluation board. This is to allow the user to determine and install the needed trim resistance values based on the range of desired output voltage adjustment of the module being evaluated.

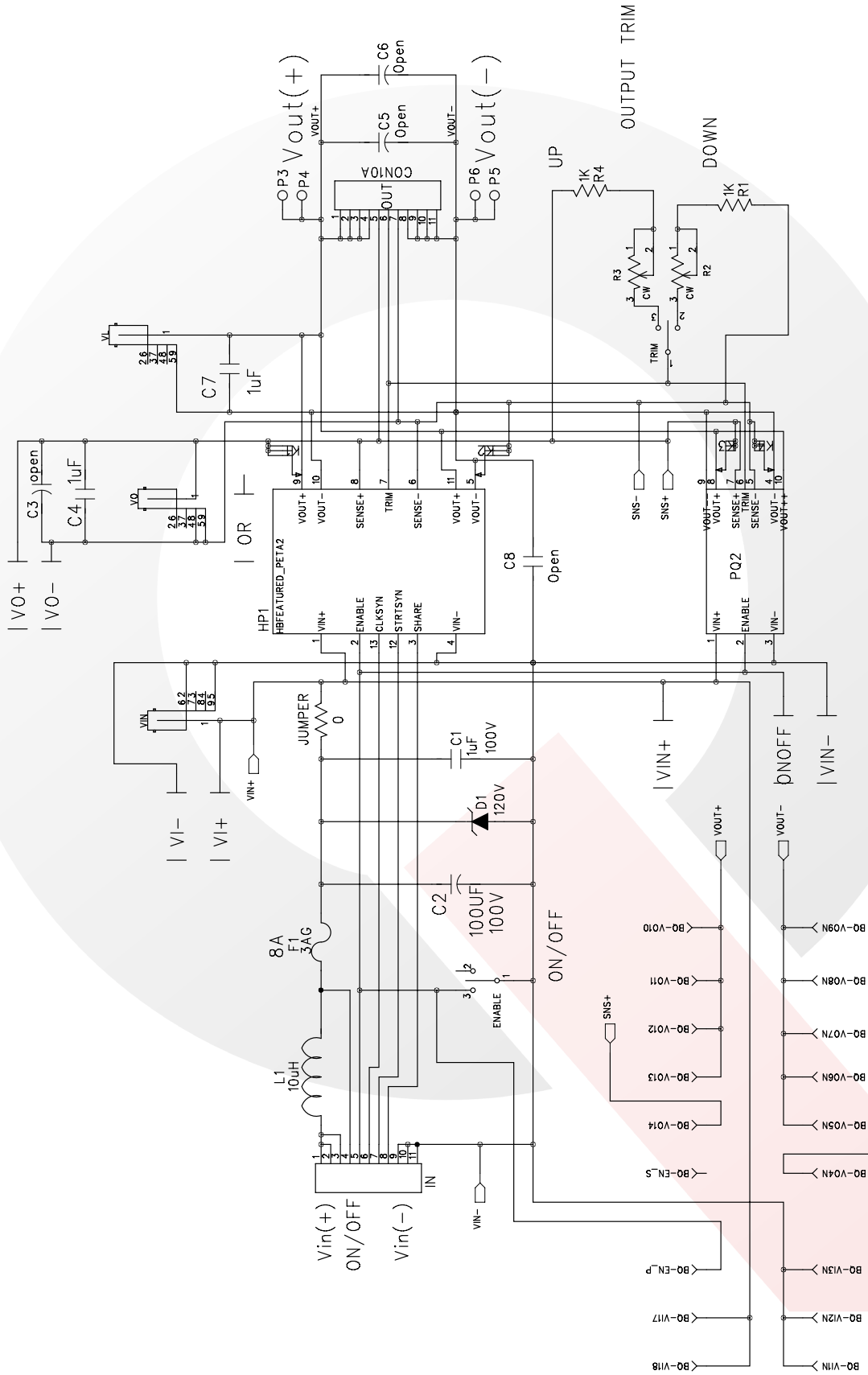
BNC Monitoring Point Descriptions

VIN – Converter Input Voltage

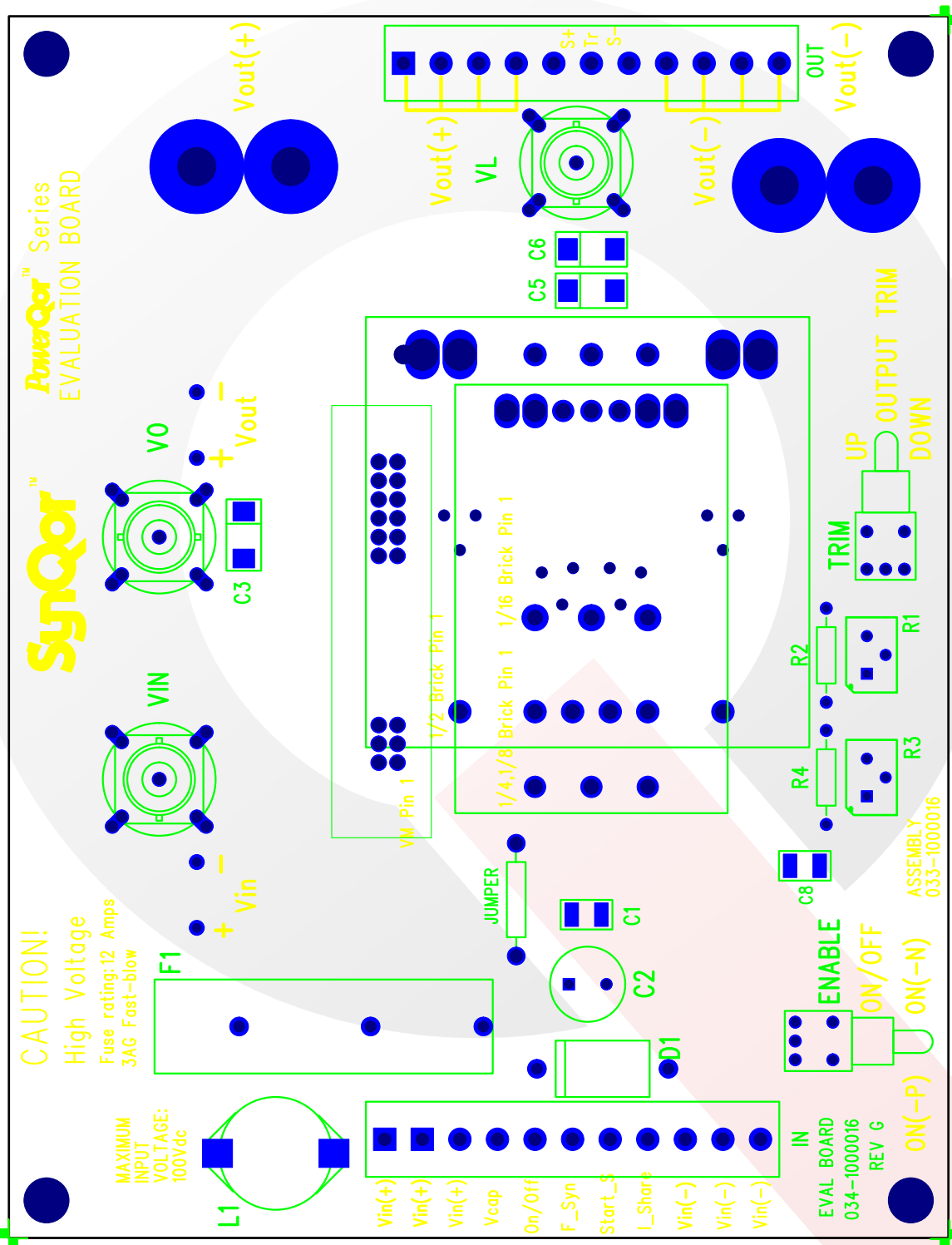
VOUT – Converter Output Voltage

VL – Output ripple voltage measurement point. Use this BNC with AC coupling on the oscilloscope.

Section 3 – Schematic



Section 4 – Component Placement



Section 5 – Bill of Materials (BOM)

Table 3: EVAL-1000001

Ref Des	Value	Tolerance	Package	Description
C1	1 uF	10 %	1812	Cap, ceramic, X7R, 100V
C2	100 uF	20 %		Cap, alum. elec., 100 V, Nichicon UPR2A101MHH
C3	OPEN		D case	Capacitor
C4	1 uF	10 %	1812	Cap, ceramic, X7R, 100V
C5	OPEN		D case	Capacitor
C6	OPEN		D case	Capacitor
C7	1 uF	10 %	1812	Cap, ceramic, X7R, 100V
C8	OPEN		1812	Capacitor
D1	120 V		DO41	TVS, axial
F1			3AG	Fuse, Littelfuse 345 series
L1	10 uH			Inductor, SMT
R1	1K			Resistor
R2	OPEN			Resistor, Trim Potentiometer, 3299Y-1-xxx LF (xxx = value)
R3	OPEN			Resistor, Trim Potentiometer, 3299Y-1-xxx LF (xxx = value)
R4	1K			Resistor