

QODE/QODN_Series_Parallel_Evaluation_Board

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1 Description

The QODE/N Osprey™ series of dc-dc converters is a new generation of non-isolated, regulated DC/DC power modules designed to support 12V_{dc} intermediate bus applications. The QODE/N series module operate from an input voltage range of 40 to 60V_{dc} and 12V output in an industry-standard, modified DOSA digital quarter brick. The converter incorporates digital control, synchronous rectification technology, a regulated control topology, and innovative packaging techniques to achieve high efficiency. Standard features include a heat plate to attach external heat sinks or contact a cold wall, on/off control, remote sense, output overcurrent and over voltage protection, over temperature protection, input under and over voltage lockout and PMBus interface. For more details refer to the product datasheet.

QODE/N Series Parallel Evaluation Board (later refer as EVM) provides user a quick start for performance evaluation.

2 Precaution

The QODE/N Parallel EVM can deliver up to 750A DC output current. Any unintended connection can cause danger to both the EVM and user, user precaution is advised. QODE/N Parallel EVM can only be evaluated at room temperature of 25 degree Celsius, and is assumed to have proper air flow for heat dissipating. Do Not apply reverse voltage, larger than -0.5V, on the output terminal, this will damage the EVM.

3 Getting Started

3.1 Required Equipment and Accessory

QODE/N Parallel EVM is preconfigured which provides maximum ease to evaluate. See below list for required equipment and accessory.

- Power supply (Chroma 62050P-100-100 DC Power Supply is recommended, 54V/100A and up is recommended)
- DC Load (Chroma 63206A-150-600 DC Electronics Load is recommended)
- OmniOn Power™ USB to I²C dongle
- PC with OmniOn Power™ DPI-CLI Tool

3.2 Optional Equipment and Accessory

Standard probing technics can be performed, OmniOn Power™ encourages user to use co-axial cable for output signal measurement in order to examine the ideal performance of QODE/N series module. User is recommended to prepare following equipment and accessory for proper measurement and on-board pulse load control.

- SMA connector (Digikey PN: ARF1963-ND or equivalent)
- SMA to BNC cable (Digikey PN: ACX1717-ND or equivalent)
- 2.54mm 2x1 headers and jumpers
- Multimeter

3.3 EVM Board Terminals/Ports

Following diagram and table illustrate locations and purposes of main terminals/ports.

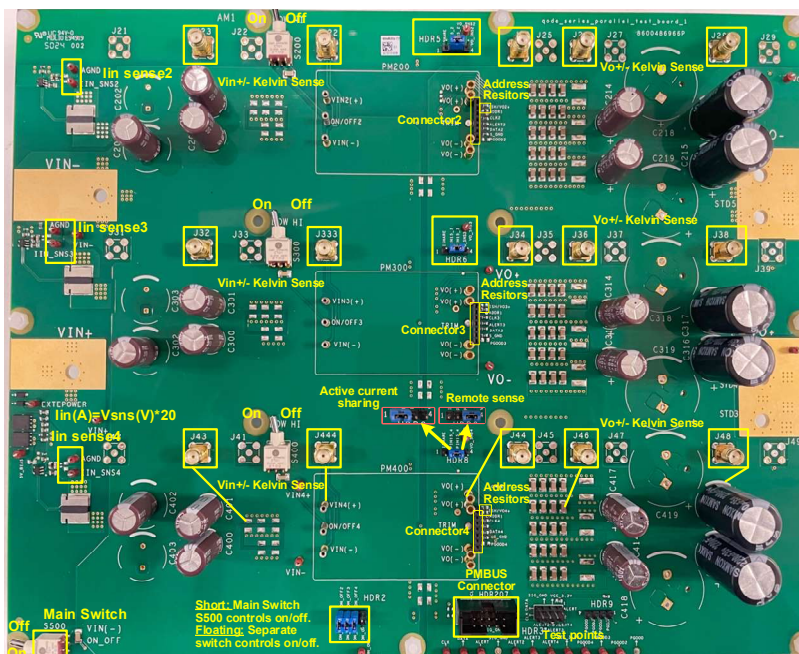


Figure 1. Top view of QODE/N Series Parallel EVM

Name	Description
V _{IN} +	M5*0.8 stud, positive input voltage terminals
V _{IN} -	M5*0.8 stud, negative input voltage terminals
V _{out} +	M5*0.8 stud, positive output voltage terminals
V _{out} -	M5*0.8 stud, negative output voltage terminals
PM200, PM300, PM400	QODE/N series modules
S500	Main on/off switch
S200, S300, S400	Slave on/off switch for module PM200, PM300, PM400 separately
J23, J32, J43	V _{IN} voltage kelvin sense pin, before C _{IN}
J222, J333, J444	V _{IN} voltage kelvin sense pin, connected to PM200, PM300, PM400 V _{IN} +/- power pins separately
J23, J34, J44	V _{out} voltage kelvin sense pin, connected to PM200, PM300, PM400 V _{out} +/- power pins separately
J26, J36, J46	V _{out} voltage kelvin sense pin, after output ceramic capacitors
J28, J38, J48	V _{out} voltage kelvin sense pin, after output electrolytic capacitors
HDR9	PGOOD test port
HDR3	SMBALERT, I ² C, SIG_GND and VCC_3.3V test port
HDR2	Jumper for ON/OFF switch control. Short: Main Switch S500 controls on/off. Floating: Separate switch controls on/off.
HDR5, 6, 8	Jumper for QODE/N series module PIN 15 functional selection. For active current sharing version modules, the left two test points should be shorted  . For droop or non-droop versions, the right two test points could be shorted to release the V _{out} remote sense function  .
IIN_SNS2, IIN_SNS3, IIN_SNS4	Input current senses pins for PM200, PM300, PM400 separately. Iin(A)=Vsns(V)*20
HDR207	PMBus port for connecting EVM board to OmniOn Power™ DPI-CLI tool
Connector2, 3, 4 ¹	PMBus port for connecting Power module to EVM board

Table 1. Footprint description

Note 1: The EVM board can be used for 6.35mm and 8.00mm pin lengths version module directly(See Fig 2). For 2.79mm,3.68mm,4.57mm short pin length version a transiting socket is required (See Fig 3).

Sockets on the Evaluation Board are provided for ease-of-use during preliminary testing. Long-term, commercial use of the module shall be implemented by directly soldering the module to the application board. The process instructions for soldering as per standards like JEDEC J-STD-020C are specifically mentioned in the datasheet

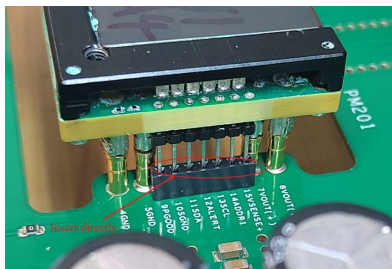


Figure 2. Inserting Pins

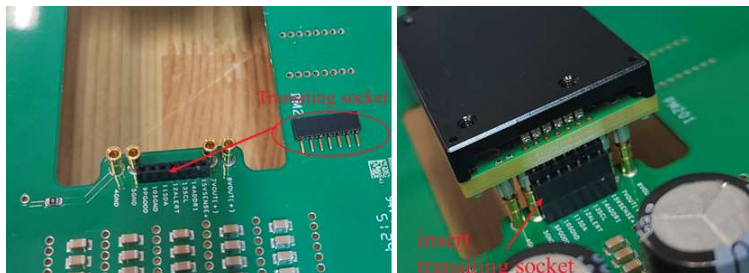


Figure 3. Inserting Transiting Socket

Characteristic	Character	Definition
Pin Length		Omit = Default Pin Length shown in Mechanical Outline : 6.35 mm $\pm$ 0.25mm, (0.250 in. $\pm$ 0.010 in.)
	8	8 = 2.79 mm $\pm$ 0.25mm, (0.110 in. $\pm$ 0.010 in.)
	6	6 = 3.68 mm $\pm$ 0.25mm, (0.145 in. $\pm$ 0.010 in.)
	5	5 = 4.57mm $\pm$ 0.25mm,(0.180 in. $\pm$ 0.010 in.)
	3	3 = 8.00mm $\pm$ 0.25mm, (0.315 in. $\pm$ 0.010 in.)

Table 2. Pin length Options

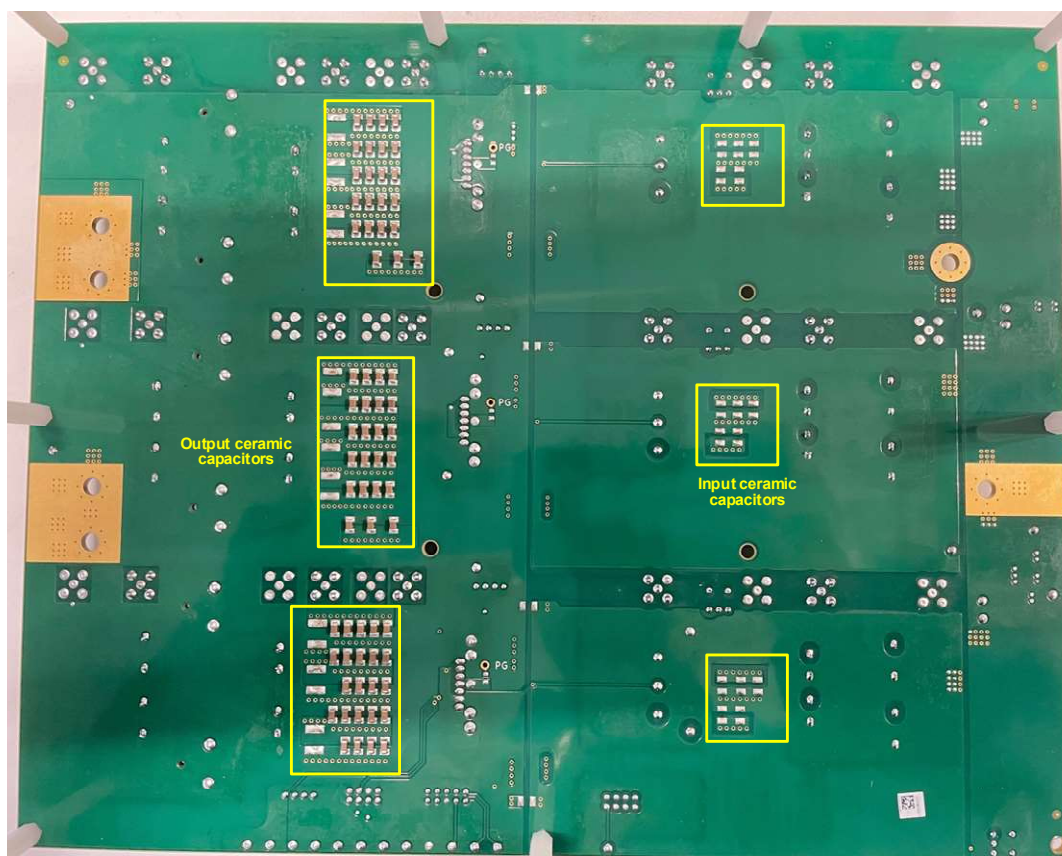


Figure 4. Bottom view of QODE/N Series Parallel EVM

3.4 Input/Output Cable

The EVM provides M5x0.8 stud for external connections. The maximum input current for EVM can go over 200A, user must choose proper input cable size. The output voltage of the EVM can range from 9.5V to 12.5V, and is capable of delivering up to 750A. Cable voltage drop must be controlled in this application. In general, output connection should be kept as short as possible by means of reducing voltage drop on each cable.

3.5 Input/Output Measurement

To measure Input/Output voltage properly, co-axial cable are recommended to be populated at V_{IN} and V_{O_Ripple} . Ideally oscilloscope should use 50Ω input impedance for measuring output voltage ripple, or use a 50Ω attenuator in series with $1M\Omega$ input impedance. Set the oscilloscope to 10mV/div or below to examine ultra-low ripple performance of QODE/N series modules.

3.6 Address Resistor

By default, the PMBus address resistors are set to 10k Ω , 56.2k Ω , 130k Ω for PM200, PM300, PM400 modules separately. Any need to change the address must be done prior powering up the EVM. For PMBus address resistor selection, please refer to QODE/N series module datasheet.

3.7 Input/Output Capacitor

The EVM comes with limited amount of input and output capacitors. Although the amount of capacitors is sufficient to evaluate the basic performance, user needs to decide whether to change/add more capacitors to unleash superior performance of QODE/N series module. For output impedance matching purposes, capacitors should be placed symmetrically. POSCAP is recommended.

The initial capacitance values of each module on the EVM board are as follows:

- Input capacitor: 3 x 100 μ F (Aluminum Polymer)
- Output capacitor: 2 x 2200 μ F + 470 μ F + 100 μ F (Aluminum Polymer) + 43x10 μ F (Ceramic)

3.8 HDR2 ON/OFF Jumper

Jumper HDR2 is for ON/OFF switch control. When the HDR2 points are shorted together: All of the parallel modules on/off are controlled by the main switch S500(Default). When the HDR2 points are left floating: the on/off of module PM200, PM300 and PM400 can be controlled by switch S200, S300, S400 separately.

3.9 HDR5, 6, 8 Active current control/ Remote sense Jumper

HDR5, 6 and 8 are jumpers for QODE/N series module PIN 15 functional selection. For active current sharing version modules, the left two test points should be shorted . For droop or non-droop versions, the right two test points could be shorted to realize the V_{out} remote sense function .

5 Schematic (continued)

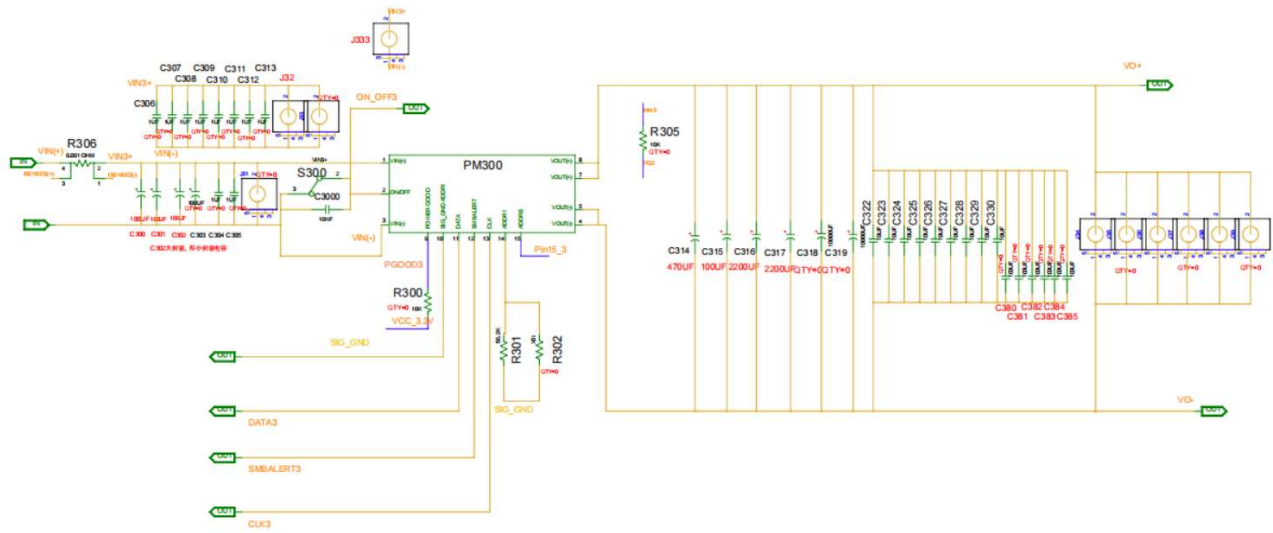


Figure 6. PM300 Power module external circuit

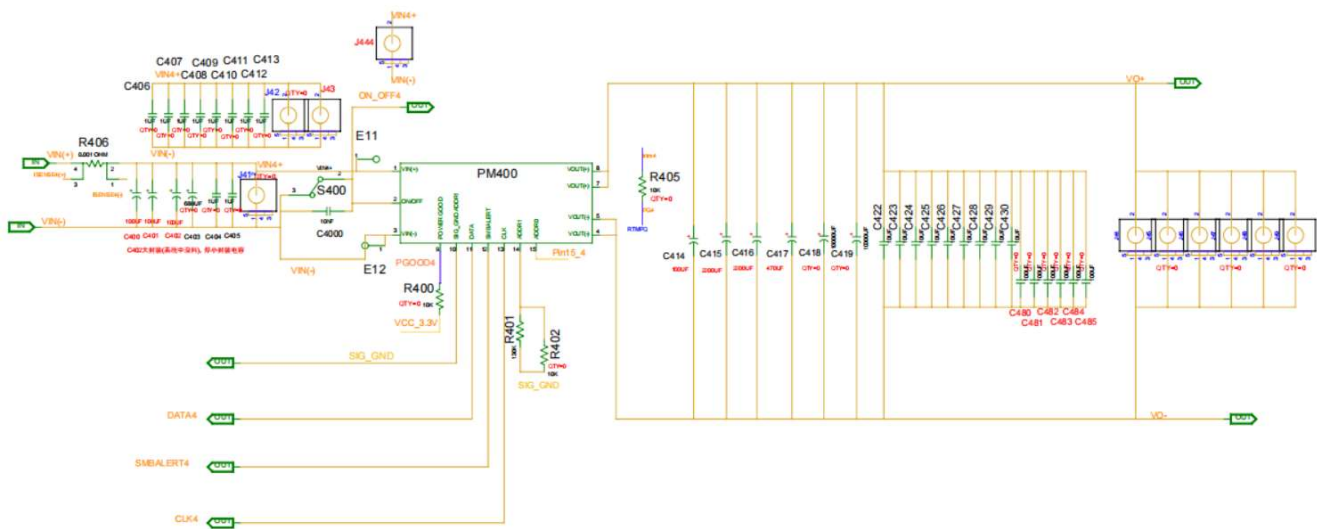


Figure 7. PM400 Power module external circuit

5 Schematic (continued)

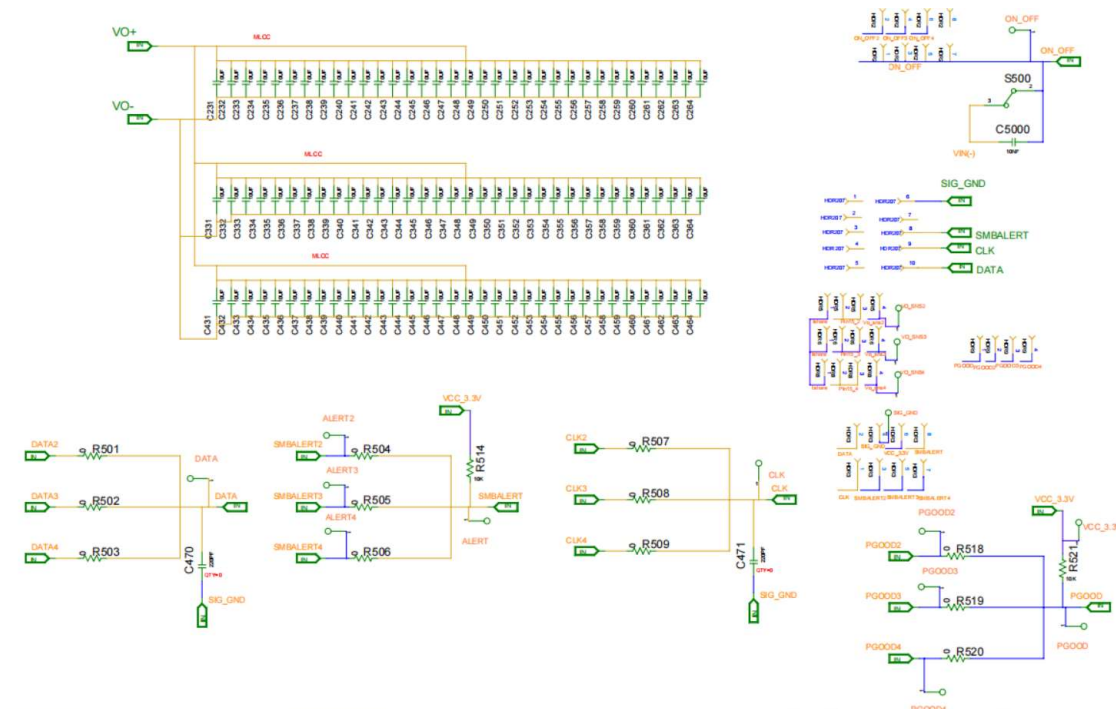


Figure 8. Terminals/Ports and output ceramic capacitors

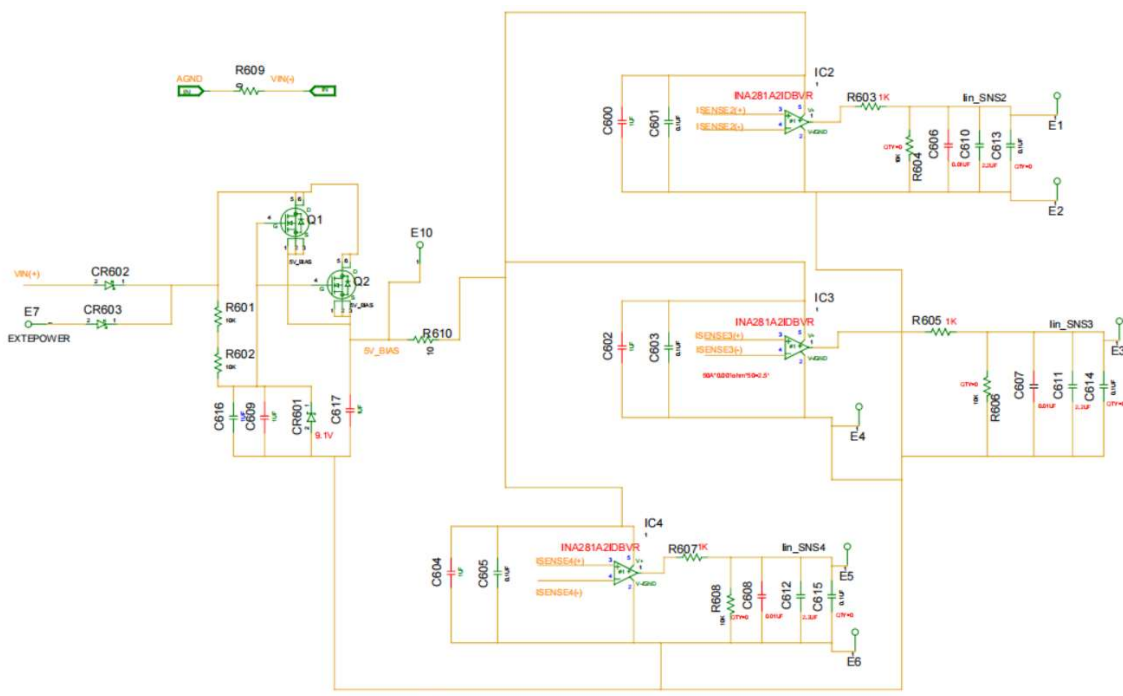


Figure 9. Input current sense circuit

Orderable accessories

Manufacturer Part Number	Ordering Code	Description
EVAL QODN and QODE series single	1600486584A	Single module Evaluation Board
EVAL QODN and QODE series 3x parallel	1600486585A	Three module Evaluation Board
I2C_USB_DONGLE_2.X	1600218857A	USB dongle needed to use Digital Power Insights software. Cables or evaluation board are not included.
I2C_USB_DONGLE_2.X_WITH_CABLES	150036482	USB dongle and cables (PC to dongle and dongle to eval board) to use Digital Power Insights software. Evaluation board is not included.
I2C_USB_DONGLE_2.X_WITH_CABLES_AND_POL_EVAL_BOARD	CC109164430	Digital Power Insights (DPI) kit with USB dongle, needed cables, a digital POL evaluation board (PDT012 or PJT020) and quick guide.

Change History (excludes grammar & clarifications)

Revision	Date	Description of the change
1.0	01/6/2025	Initial Release
2.0	01/28/2026	Add pin length descriptions
2.1	06/03/2026	Updated as per OmniOn Power template
2.2	07/29/2026	Added note of socket intended for lab use only and evaluation board MPNs

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