QODE/QODN_Series_Parallel_Evaluation_Board

Contents

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 I^2C 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.

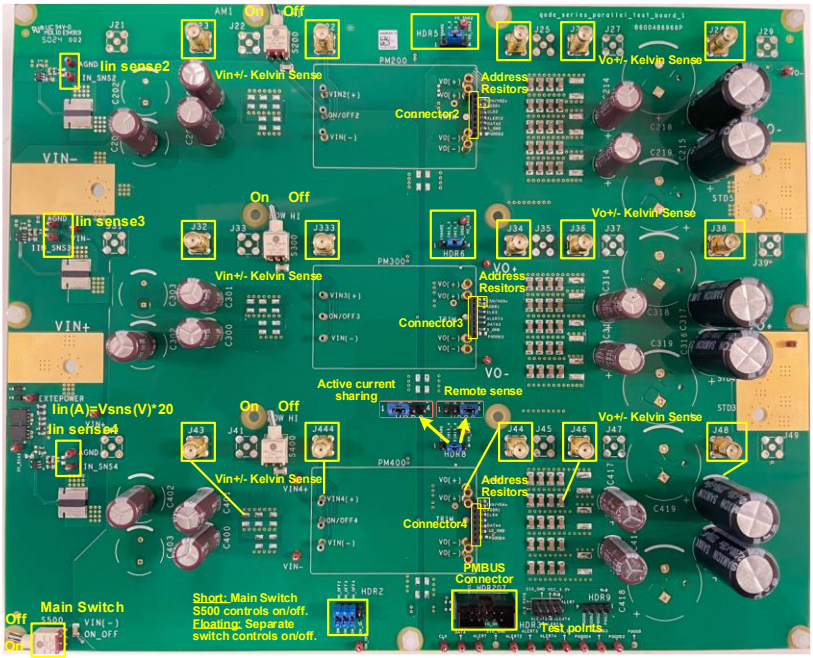


Figure 1. Top view of QODE/N Series Parallel EVM

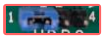
Name	Description
V_{IN}+	M5*0.8 stud, positive input voltage terminals
V_{IN}-	M5*0.8 stud, negative input voltage terminals
V_{out}+	M5*0.8 stud, positive output voltag terminals
V_{out}-	M5*0.8 stud, negative output voltage terminals
PM200, PM300, PM400	QODE/N series modules
S500	Main on/off switch
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^2C, 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).

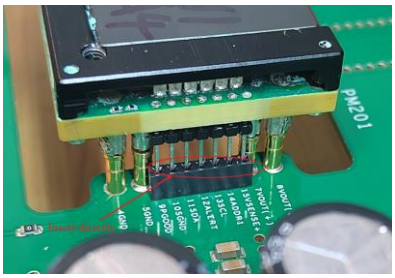


Figure 2. Inserting Pins

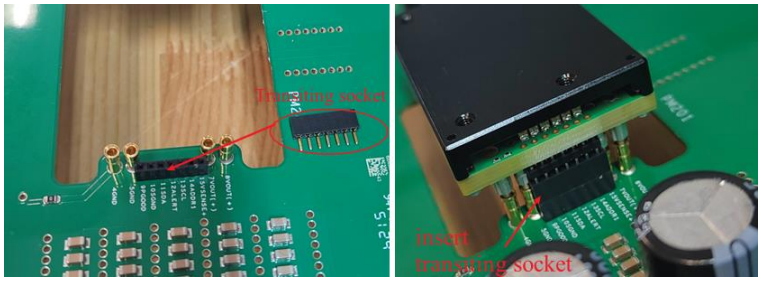


Figure 3. Inserting Transiting Socket

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

Table 2. Pin length Options

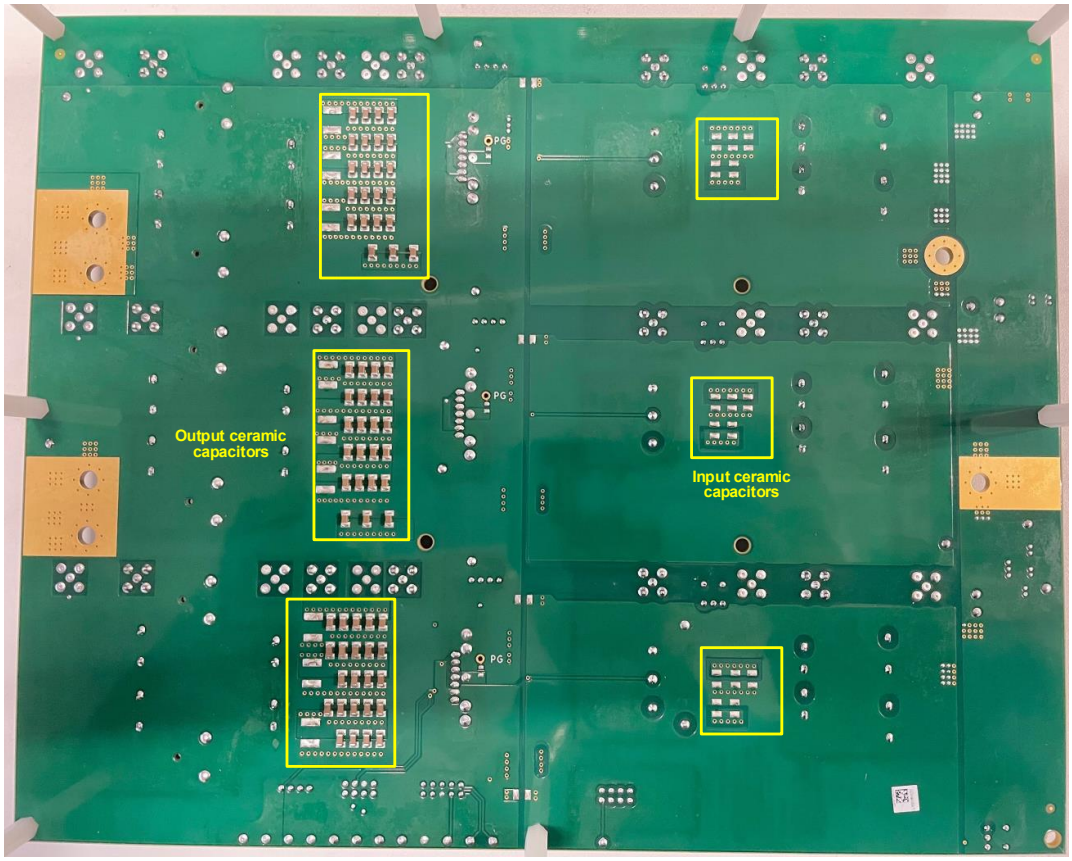


Figure 4. Bottom view of QODE/N Series Parallel EVM

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 Vo_Ripple. Ideally oscilloscope should use 50Ω input impedance for measuring output voltage ripple, or use a 50Ω attenuator in series with 1MΩ 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 10kΩ, 56.2kΩ, 130kΩ 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.

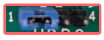
The initial capacitance values of each module on the EVM board are as follows:

- Input capacitor: 3 x 100µF (Aluminum Polymer)
- Output capacitor: 2 x 2200µF + 470µF + 100µF(Aluminum Polymer) + 43x10µF (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 

4 Start EVM

The input voltage for the EVM is from 40V to 60V, and the input voltage must not exceed 65V. The input current should be limited to 150A. The default output of QODE/N series module EVM is set to be 12V. Turn on the main switch S500 to start the module. Connect OmniOn Power™ DPI-CLI dongle to PMBus port to use PMBus commands. Upon complete, power the EVM to examine the performance.

All EVM boards are pre-configured in the factory, user doesn't require to perform any additional configuration before turning on the EVM. Refer to DPI-CLI User Guide and QODE/N series module datasheet for detailed PMBus commands.

Current Readback,60A step@10A/us

5 Schematic

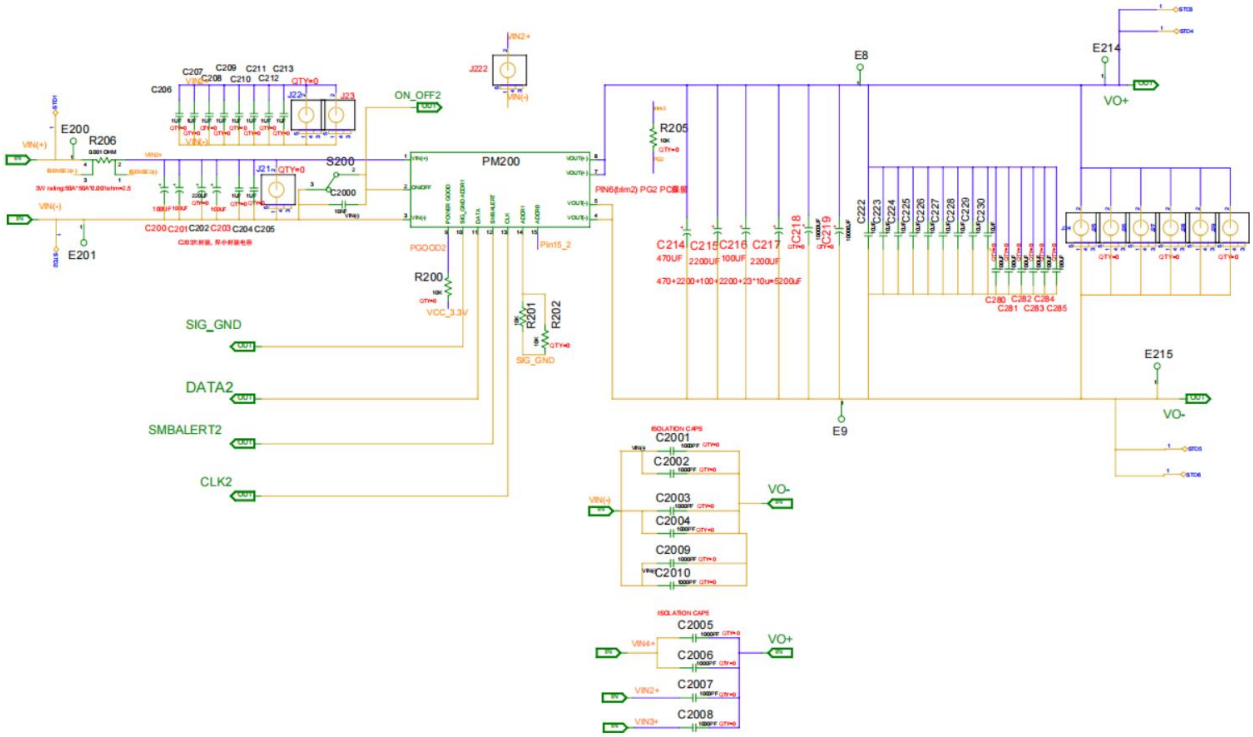


Figure 5. PM200 Power module external circuit

5 Schematic (continued)

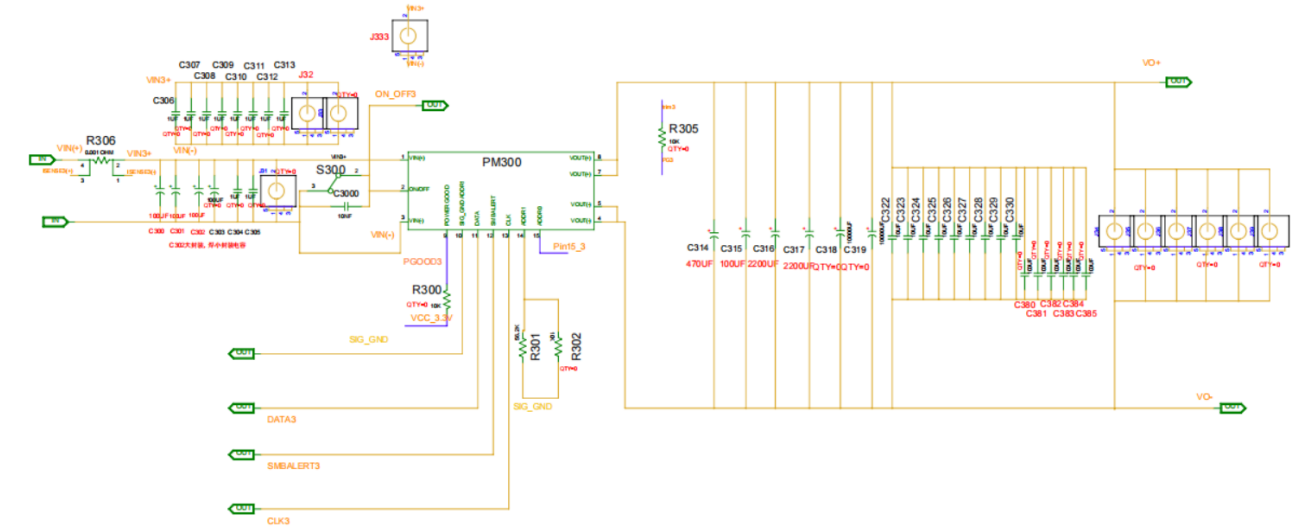


Figure 6. PM300 Power module external circuit

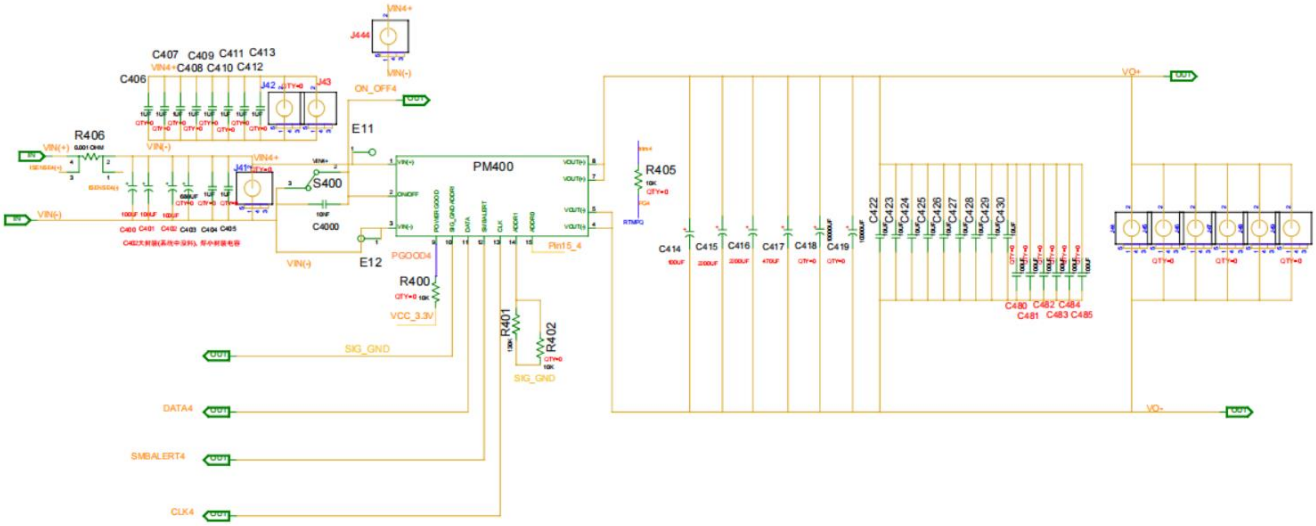


Figure 7. PM400 Power module external circuit

5 Schematic (continued)

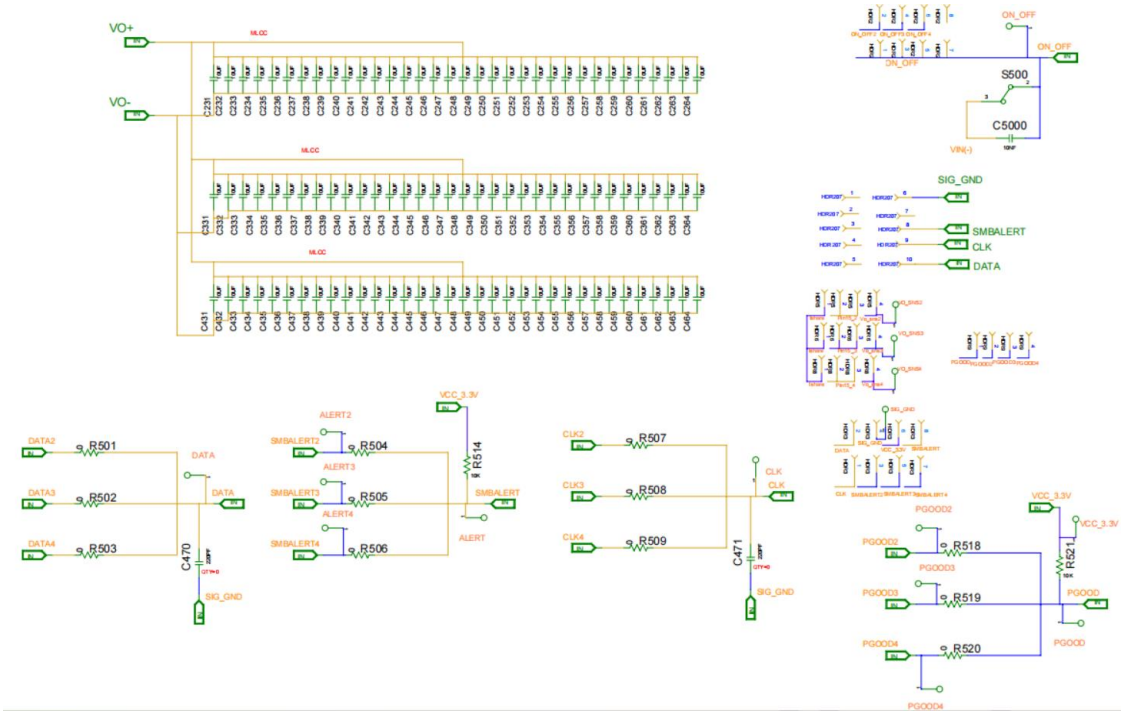


Figure 8. Terminals/Ports and output ceramic capacitors

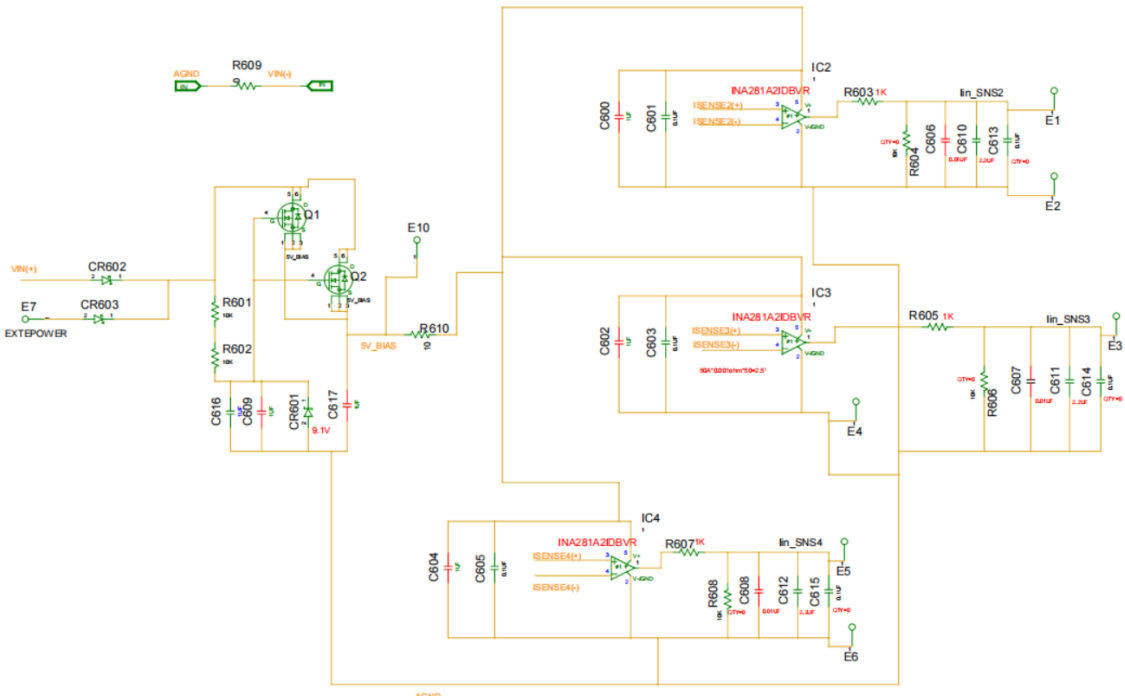


Figure 9. Input current sense circuit

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

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