

BDX Series Evaluation Board User Manual

Bellnix

Ver. 1.0

Model Name: BDX12-EVM-01 to 08

1. Product Introduction

This is an evaluation board for BDX12-1.0S100RM and BDX12-1.0S50R0S. Output voltage and each setting value, such as sequence etc. can be changed and can get information of input voltage and output current etc. via PMBus serial communication interface. By using USB-PMBusEVM-03 (sold separately), this product can be controlled via PC.

2. Related Documents

To use this evaluation board, we have the following related documents to support your operation. If you need them, please contact with [Bellnix sales dept.](#)

1. Data sheet: BDX series
2. Application note for BDX series: Parallel and dual output operation

3. Specification

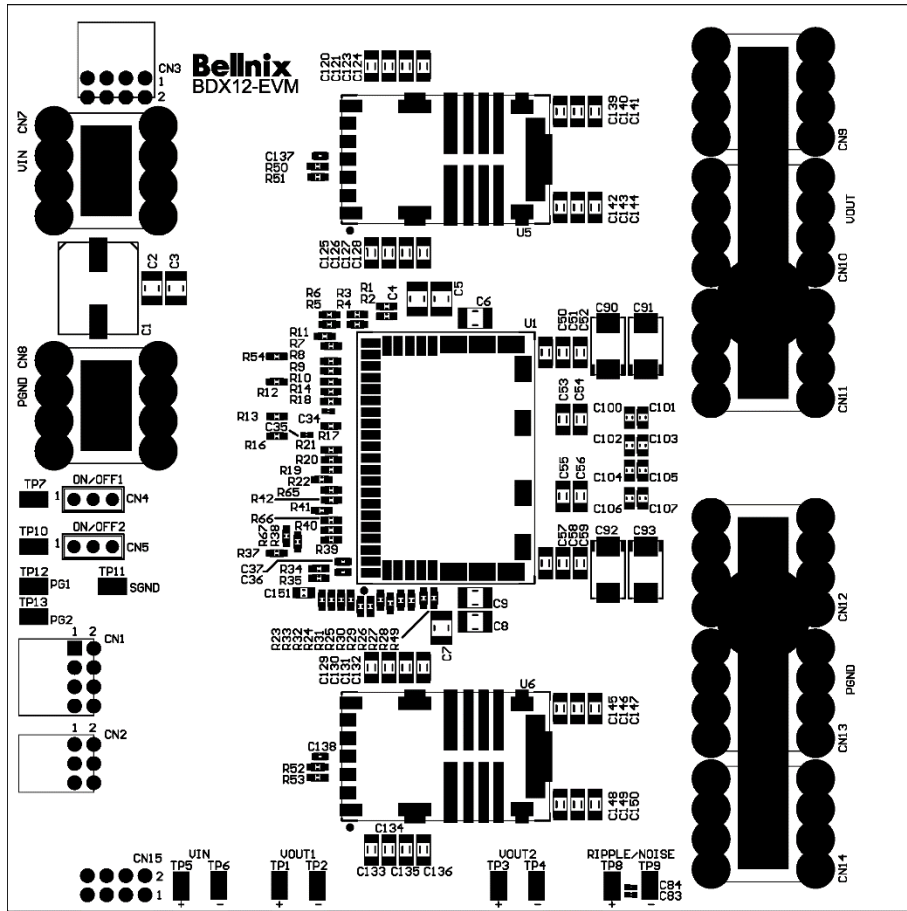
Please refer to Table 1: Electrical spec., Figure 1: PWB layout and Table 3: Pin assignments. The outline of each board are shown in Table 2. For the parts mounted on each board, please refer to the attached "BDX series Evaluation Board Components Table".

Table 1 Electrical spec.

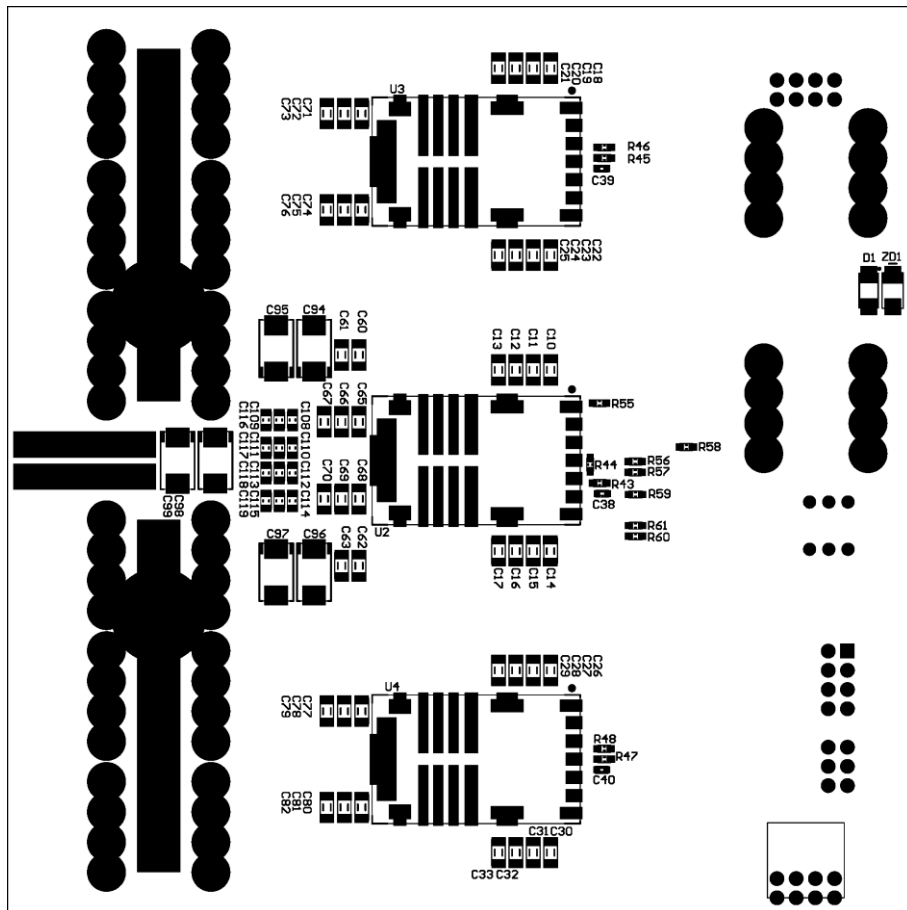
| | |
|-------------------------------|--|
| Operating Input Voltage range | 8V to 14V |
| Default Preset Output Voltage | 1.0V |
| Rated Output Voltage | 1.0V |
| Output Current | See Table 2 |
| Output Voltage range | 0.5 to 1.2V |
| Overcurrent protection | Operates at 105% or above (auto restart type) |
| Serial communication method | PMBus Specification Revision 1.3, AVSBus compliant |
| External Dimensions | See Figure 2 |

Table 2 Outline of each board

| Model name | Outline | Output current | ASSY No. |
|--------------|---|----------------|----------|
| BDX12-EVM-01 | BDX12-1.0S100RM Single operation board | 0 to 100A | 01 |
| BDX12-EVM-02 | BDX12-1.0S100RM × 1unit // BDX12-1.0S50R0S × 1unit Parallel operation board | 0 to 150A | 02 |
| BDX12-EVM-03 | BDX12-1.0S100RM × 1unit // BDX12-1.0S50R0S × 2units Parallel operation board | 0 to 200A | 03 |
| BDX12-EVM-04 | BDX12-1.0S100RM × 1unit // BDX12-1.0S50R0S × 3units Parallel operation board | 0 to 250A | 04 |
| BDX12-EVM-05 | BDX12-1.0S100RM × 1unit // BDX12-1.0S50R0S × 4units Parallel operation board | 0 to 300A | 05 |
| BDX12-EVM-06 | BDX12-1.0S100RM × 1unit // BDX12-1.0S50R0S × 5units Parallel operation board | 0 to 350A | 06 |
| BDX12-EVM-07 | BDX12-1.0S50R0S Dual output (VOUT2) board (For operation BDX12-EVM-08 is required) | 0 to 50A | 07 |
| BDX12-EVM-08 | BDX12-1.0S100RM board is for operating BDX12-EVM-07 | 0 to 100A | 08 |



(Top View)



(Bottom View)

Figure 1 PWB Layout

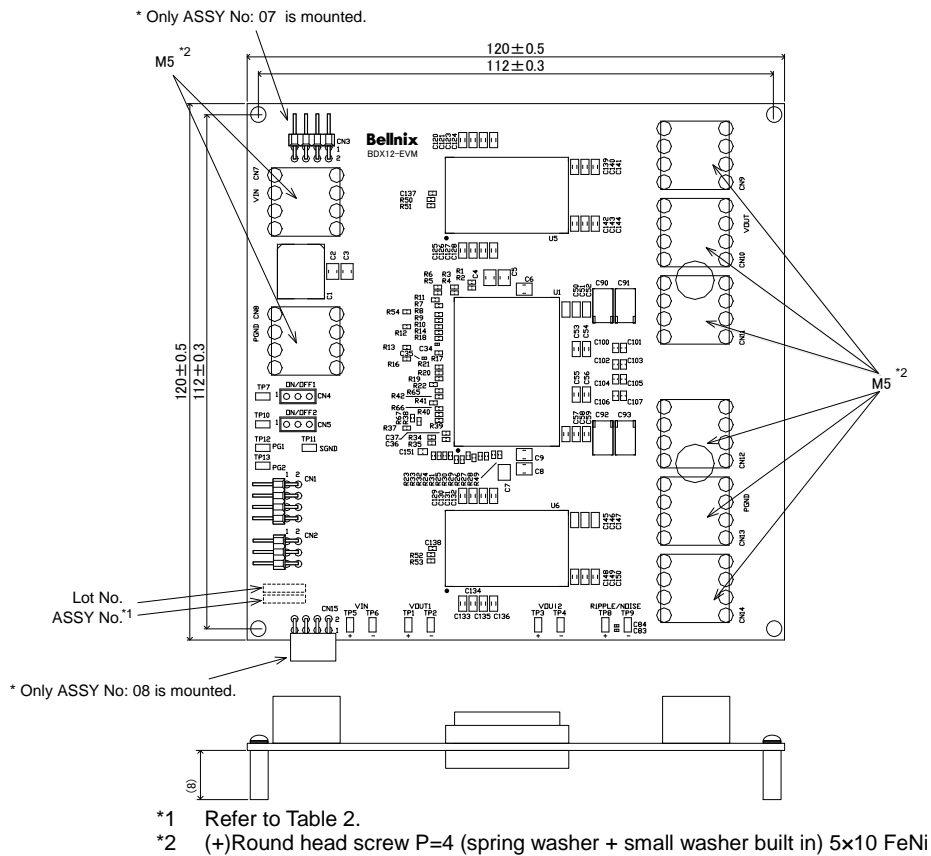


Figure 2 External dimensions

Table 3 Pin assignment

| Pin | Explanation |
|------------|---|
| CN1 | PMBus input/output pin (Male) |
| CN2 | AVSBus input/output pin (Male) |
| CN3 | Parallel input/output pin (Male) |
| CN4 | ON/OFF1 (VOUT1) control pin |
| CN5 | ON/OFF2 (VOUT2) control pin |
| CN7 | Input power pin (+) |
| CN8 | Input power pin (-) |
| CN9 to 11 | Load connection pin (+) |
| CN12 to 14 | Load connection pin (-) |
| CN15 | Parallel input/output pin (Female) |
| TP1 | Output voltage (VOUT1) measurement pin(+) |
| TP2 | Output voltage (VOUT1) measurement pin (-) |
| TP3 | Output voltage (VOUT2) measurement pin (+) |
| TP4 | Output voltage (VOUT2) measurement pin (-) |
| TP5 | Input voltage measurement pin (+) |
| TP6 | Input voltage measurement pin (-) |
| TP7 | Voltage measurement pin of ON/OFF1 pin *SGND pin shall be referred. |
| TP8 | Confirmation pin of Ripple noise wave form (+) |
| TP9 | Confirmation pin of Ripple noise wave form (-) |
| TP10 | Voltage measurement pin of ON/OFF2 pin *SGND pin shall be referred. |
| TP11 | SGND pin |
| TP12 | Confirmation pin of P-Good1 (VOUT1) signal *SGND pin shall be referred. |
| TP13 | Confirmation pin of P-Good2 (VOUT2) signal *SGND pin shall be referred. |

4. Handling Method

4-1. Connection

Connect DC power supply, load, voltmeter and USB-PMBusEVM-03 (or an equivalent PMBus/AVSBus master device) according to Figure 3 or Figure 4.

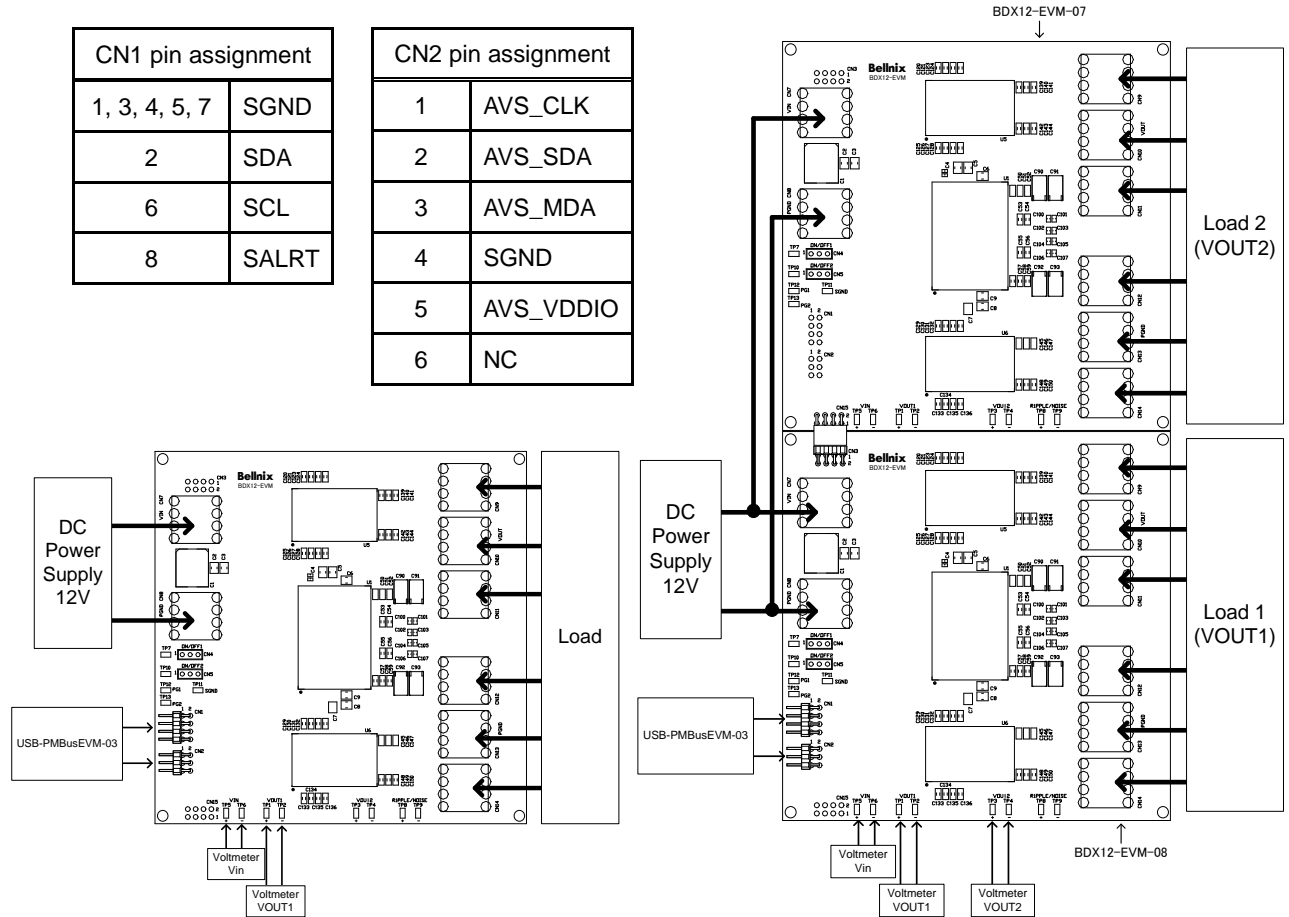


Figure 3 Connection method (BDX12-EVM-01 to 06)

Figure 4 Connection method (BDX12-EVM-07, 08)

Note1: Wire between the input power - board and the load - board in order to lower the impedance.

Note2: If the line impedance between the input power - board gets high, the input voltage of the converter (U1 to U6) may become unstable. In that case, mount a capacitor which has appropriate capacity to operate stable input voltage to C1, C2 and C3.

5. Function List

The function, default setting and the setting change method are mentioned as Table 4.

Table 4 Function List

| Function | Default setting | Setting change method |
|-------------------------------------|--|-------------------------------|
| Device address setting | 1011 101b | By the setting resistor R49 |
| ON/OFF pin setting | ON | By CN4, CN5, JP1 and JP2 |
| ON/OFF control operation setting | ON/OFF pin : enabled Serial communication: disabled | Based on serial communication |
| Output voltage limit | 1.2V | Based on serial communication |
| Output voltage setting | 1.0V | Based on serial communication |
| Output voltage trimming setting | 0V | Based on serial communication |
| Margin voltage setting | High : 1.2V Low : 0.5V | Based on serial communication |
| Switching margin voltage | Margin OFF | Based on serial communication |
| Turn-on delay setting | 0.2ms | Based on serial communication |
| Turn-on rise setting | 1ms | Based on serial communication |
| Turn-off delay setting | 0ms | Based on serial communication |
| P-Good signal output | Yes | Based on serial communication |
| Remote sensing | Yes | — |
| Output overvoltage protection | 1.35V | Based on serial communication |
| Output undervoltage detection | 0V | Based on serial communication |
| Output overcurrent protection | Operates at 105% or above (auto restart type) | |
| Undervoltage lock out | Start-up: 7.5V typ. Stop: 6.8V typ. | — |
| Read STATUS register | Yes | — |
| Clear STATUS register | Yes | — |
| Input voltage monitor | Yes | — |
| Output voltage monitor | Yes | — |
| Output current monitor | Yes | — |
| Storing/restoring the setting value | Yes | — |

Note: Refer to BDX series data sheet for enable PMBus or AVSBus commands.

5-1. ON/OFF Function

As shown in Table 5, the ON/OFF of the output can be controlled by replacing the jump socket (JP1, JP2) of CN4, CN5.

Table 5 ON/OFF Function

| CN4, CN5 | Output | Default setting |
|-------------------------|--------|-----------------|
| Short between pin 1 - 2 | ON | ● |
| Short between pin 2 - 3 | OFF | |

5-2. Device Address Setup

The device address can be set by the address setting resistor R49. Table 6 shows the resistor value and the device addresses.

Table 6 Device address setup

| Device address | Rsa [Ω] | Device address | Rsa [Ω] |
|----------------|------------------|----------------|------------------------|
| 1100 000 | 0 | 1010 000 | 1500 |
| 1100 001 | 180 | 1010 001 | 1800 |
| 1100 100 | 330 | 1010 100 | 2200 |
| 1100 101 | 470 | 1010 101 | 2700 |
| 1000 000 | 680 | 1011 000 | 3300 |
| 1000 001 | 820 | 1011 001 | 3900 |
| 1000 100 | 1000 | 1011 100 | 4700 |
| 1000 101 | 1200 | 1011 101 | 5600 (default setting) |

5-3. Output Voltage Setup

Output voltage can be changed in the range between 0.5 to 1.2V via serial communication. The default preset output voltage is 1.0V. Output voltage needs to be changed by serial communication. Refer to BDX series data sheet for output voltage setups.

5-4. P-Good Output

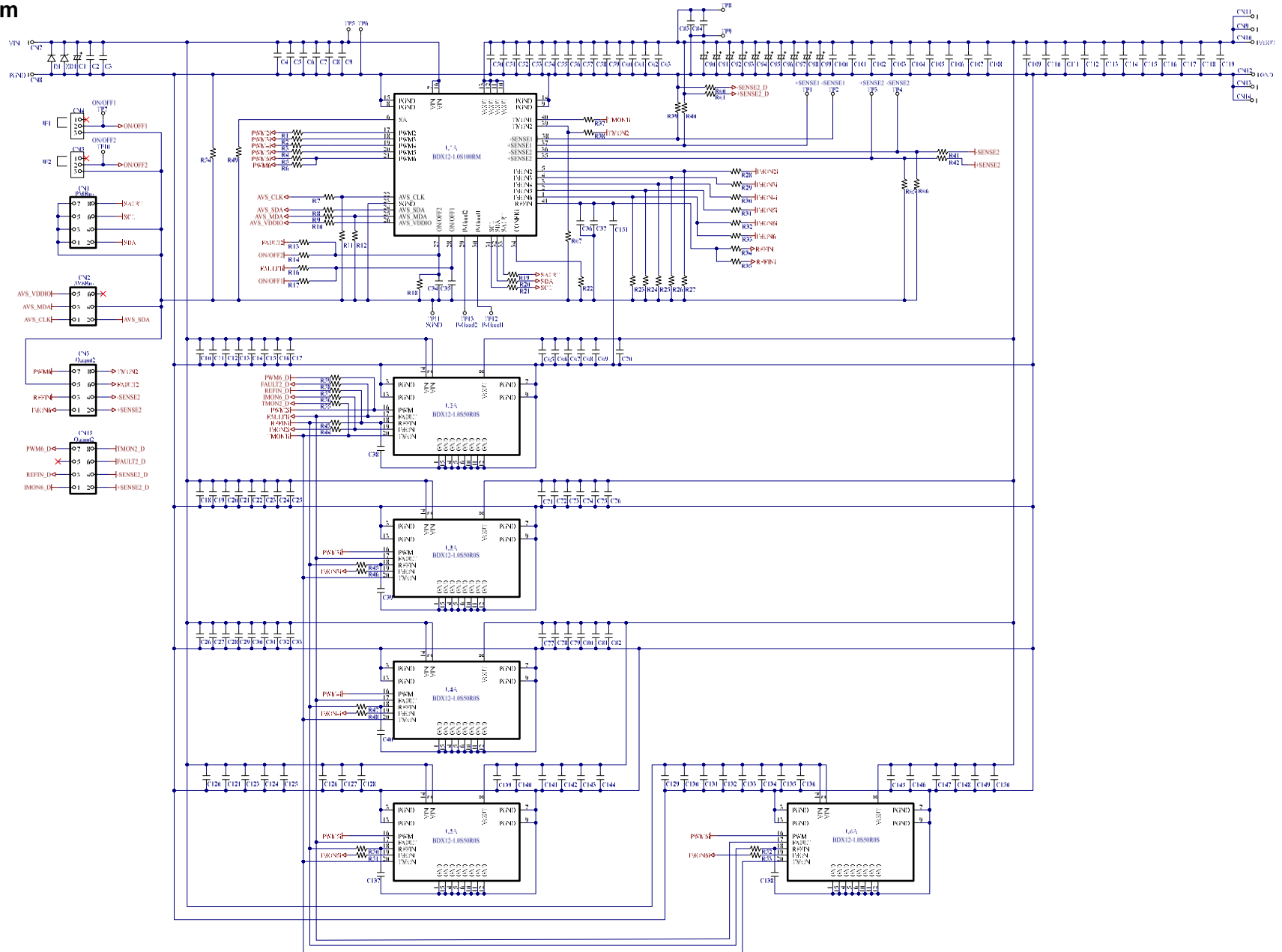
P-Good1 and P-Good2 pins allow monitoring the status of VOUT1 and VOUT2 respectively.

P-Goodx pin outputs High when the converter is performing the assumed regulation, and Low when it is under the following conditions.

- When the output is set to OFF by ON/OFFx pin or PMBus communication
- During turn-on delay
- During turn-on rise
- When protection function such as overcurrent protection, under voltage lock out, output overvoltage protection etc. are in operation.

Note 1: P-Goodx pin may output High when input voltage turn-on up to operation starting voltage.

6. Circuit Diagram



7. Pattern Layout Description

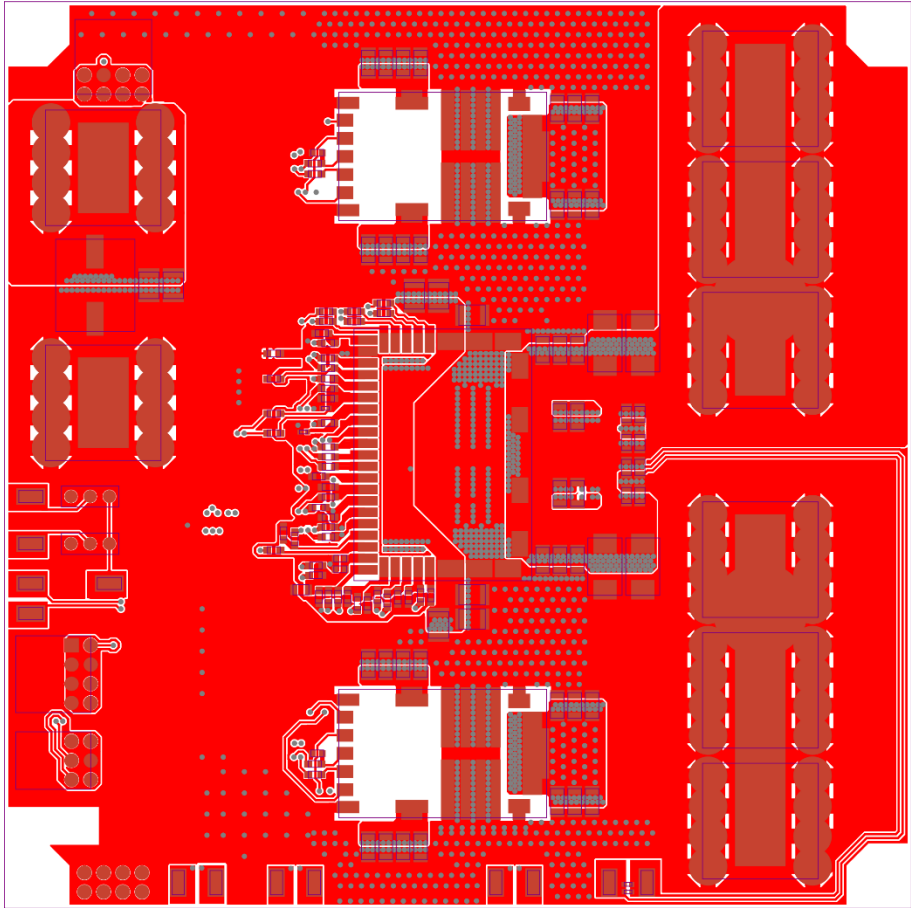
The product name will be abbreviated as follows.

BDX12-1.0S100RM: BDX-100M

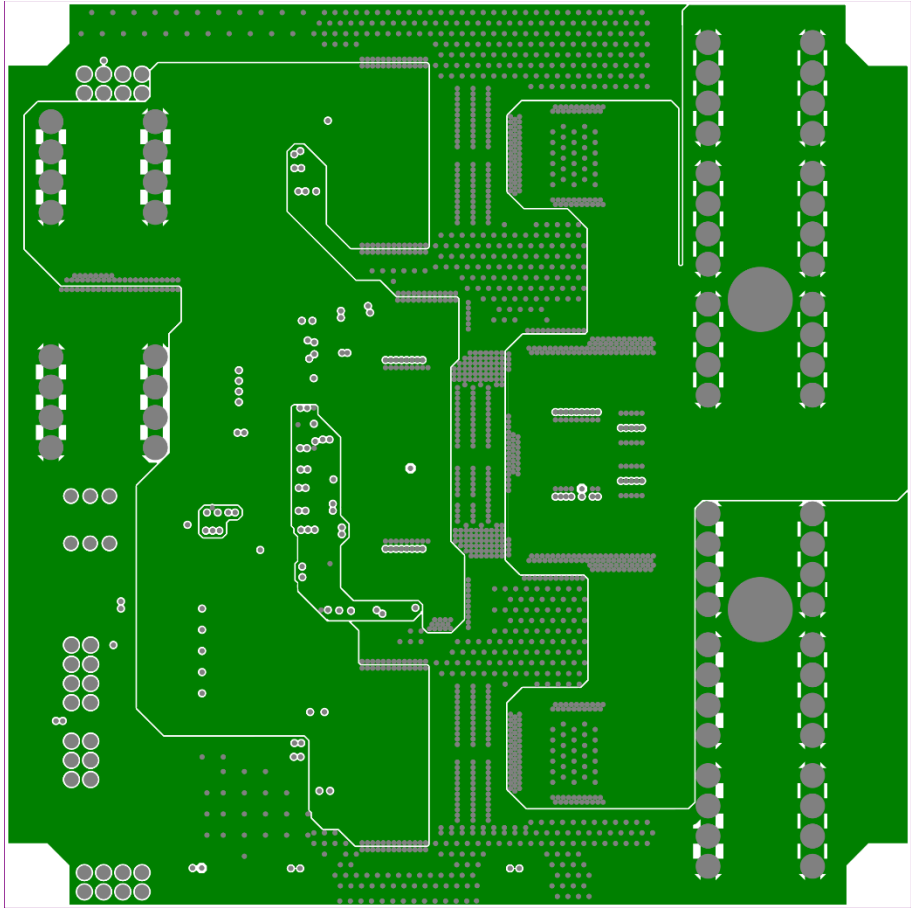
BDX12-1.0S50R0S: BDX-50S

7-1. Pattern Diagram

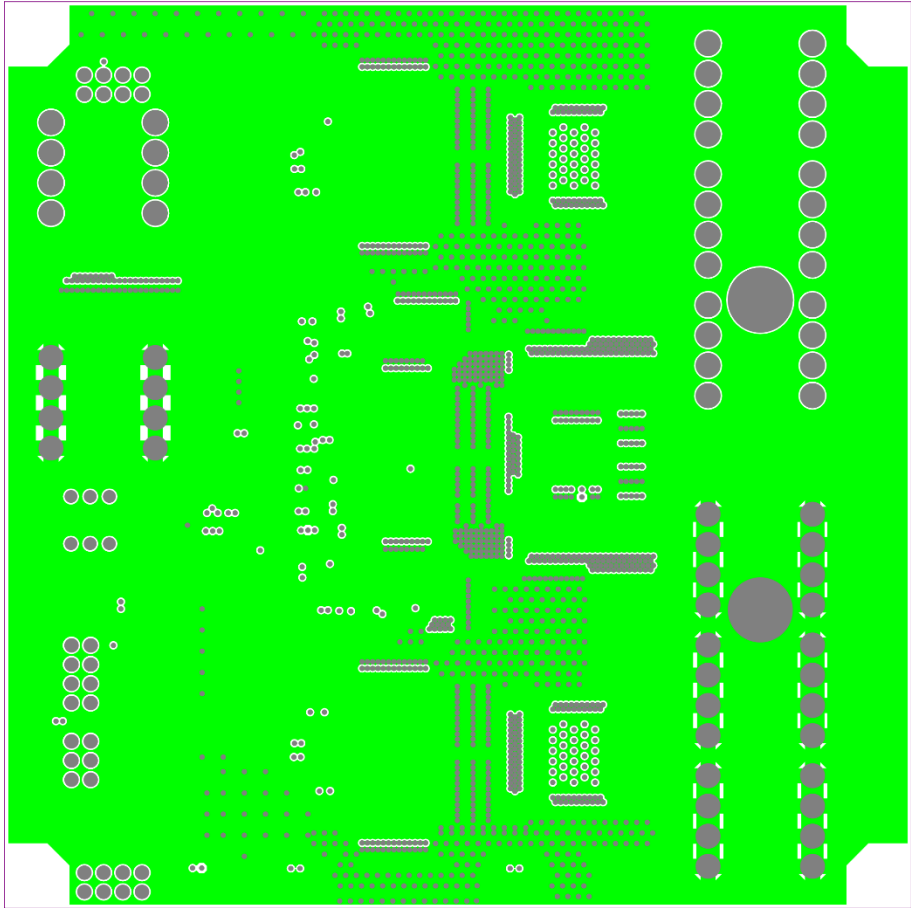
Please refer to the following pages.



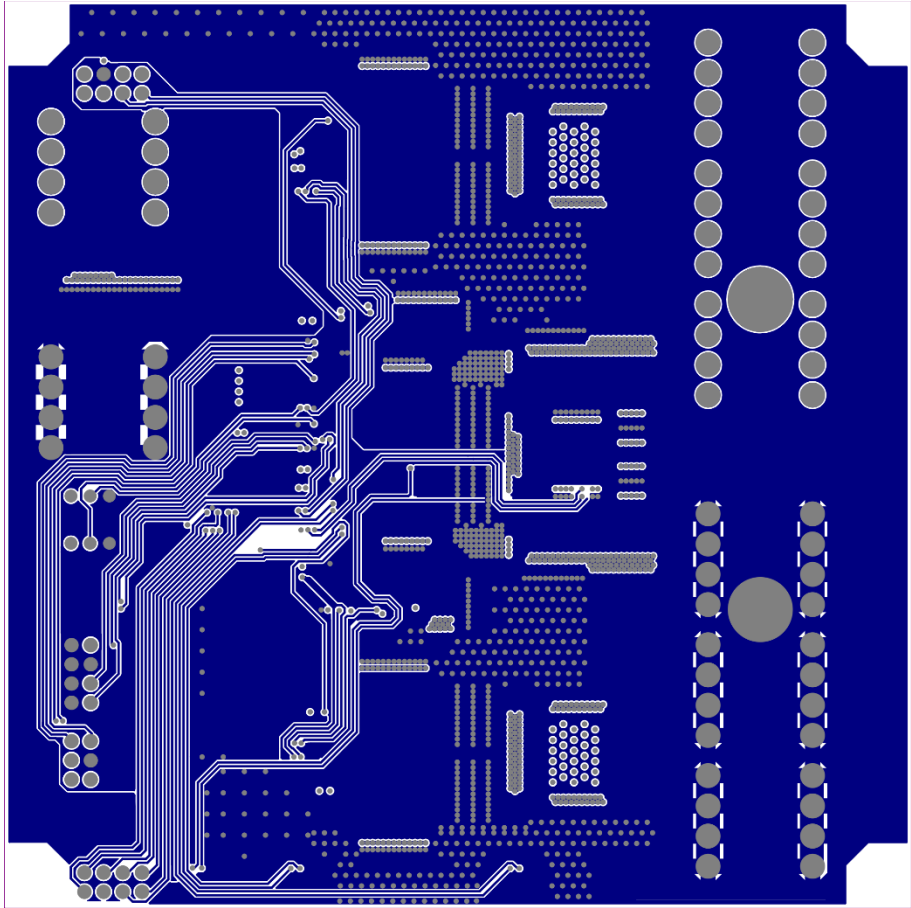
Surface- First layer (Top View)



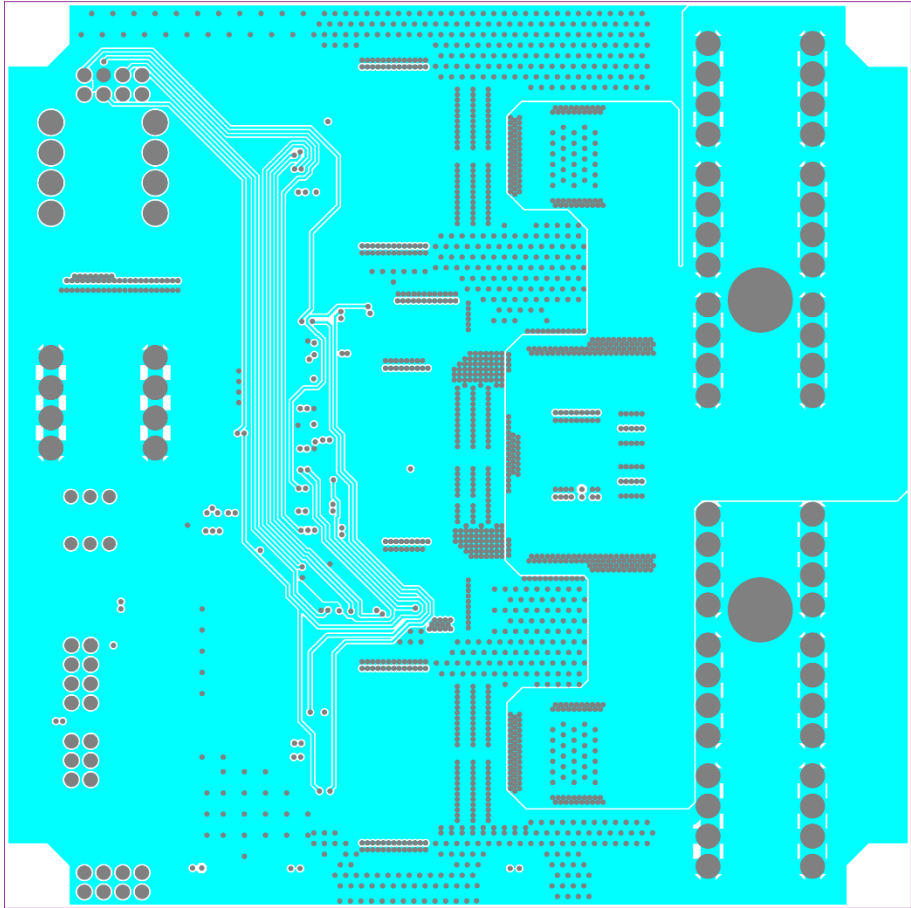
Inner layer- Second layer (Top View)



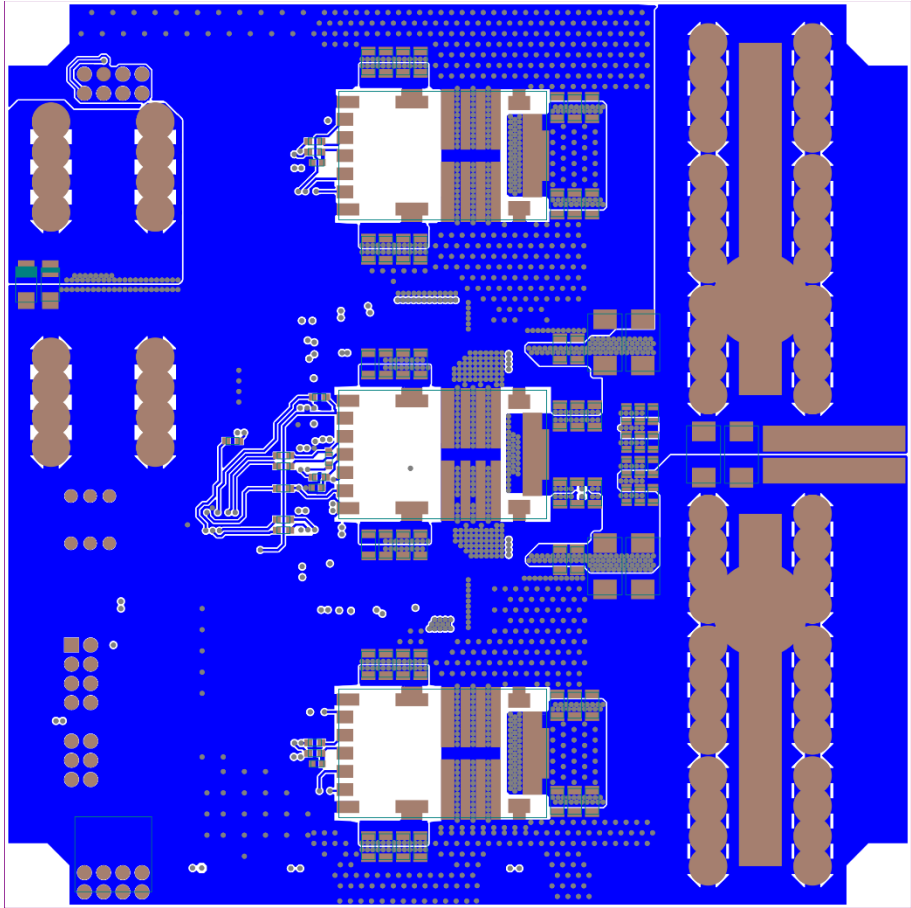
Inner layer- Third layer (Top View)



Inner layer- Fourth layer (Top View)



Inner layer- Fifth layer (Top View)



Back side- Sixth layer (Top View)

7-2. Layout Description

7-2-1. Power Line

When performing parallel operation, it is necessary to layout so that the line impedance between BDX12-1.0S100RM and BDX12-1.0S50R0S is as low as possible so that the current balance does not collapse. VIN, PGND and VOUT pins of BDX12-1.0S100RM and BDX12-1.0S50R0S are placed in line symmetry to facilitate parallel connection.

When placing BDX12-1.0S50R0S on the back side of BDX12-1.0S100RM, it is recommended to match the positions of the VOUT and GND pins especially where large current flows, as shown in Figure 5.

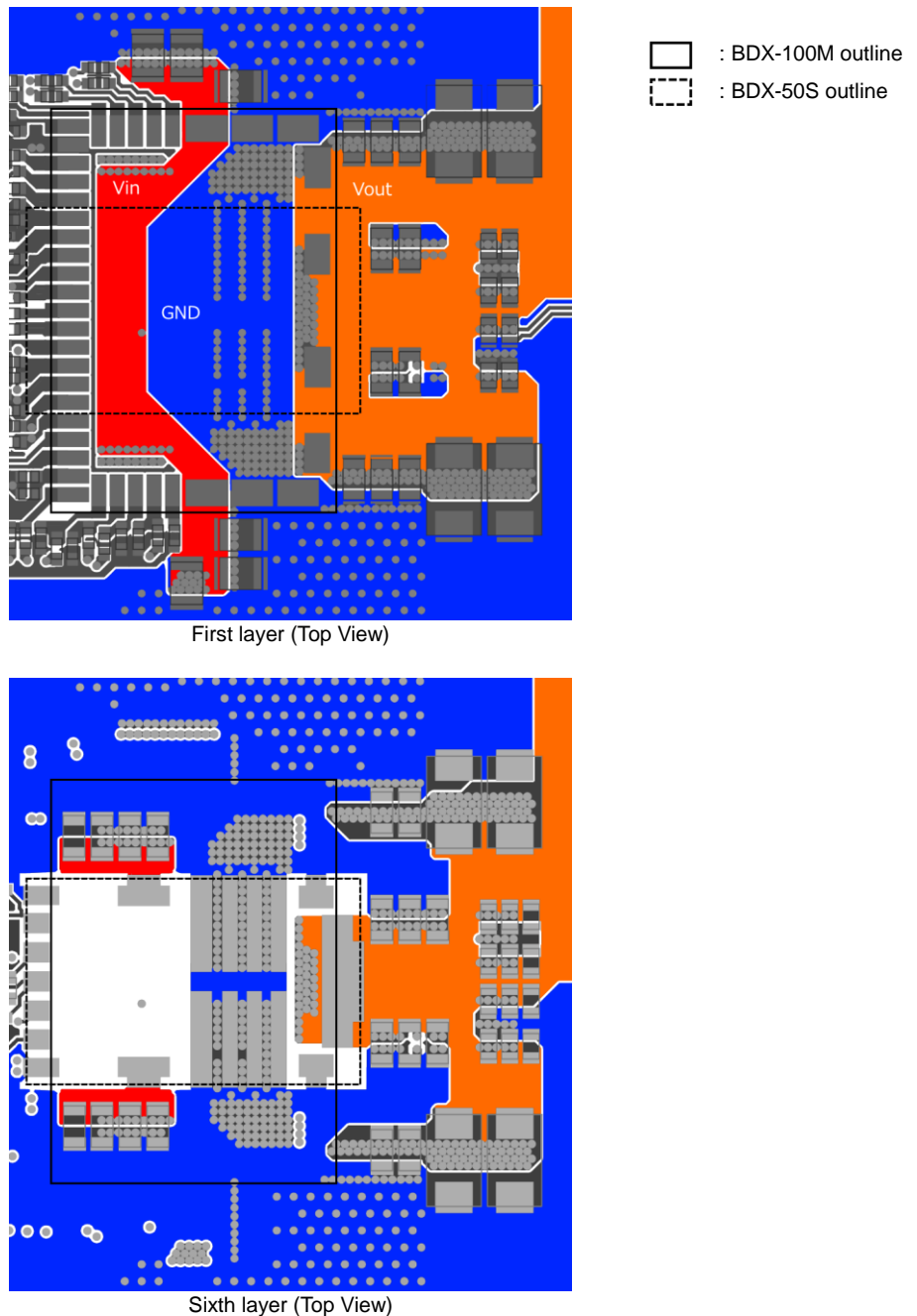


Figure 5 Power Line Layout Enlarged View

7-2-2. SENSE Line

SENSE line (the line from +SENSE1, -SENSE1 pin to the both sides of Cout) is related to the feedback loop. Since the SENSE line is sensitive to noise, do not route the wiring long as much as possible and wire it in parallel. (Figure 6)

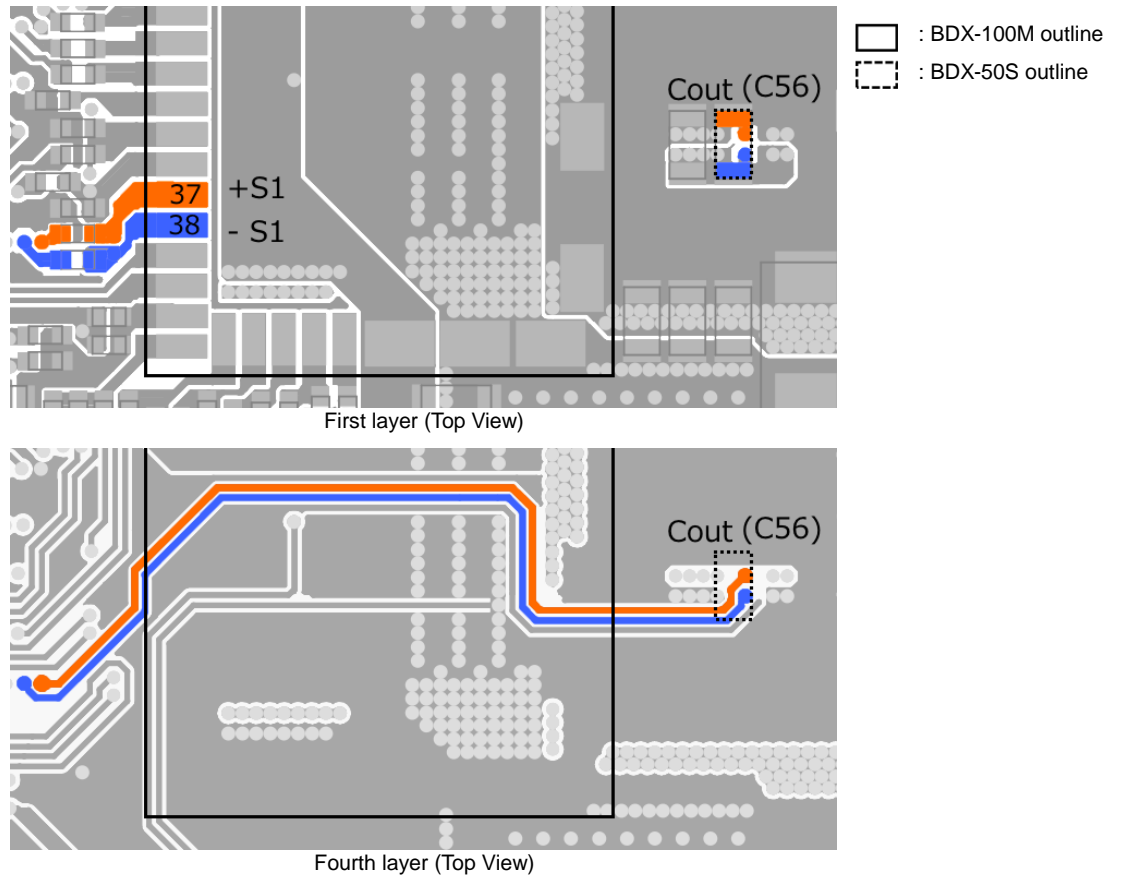


Figure 6 SENSE Line Layout Enlarged View

7-2-3. IMON-REFIN Line

IMON-REFIN line (the line from IMONx and REFIN pin of BDX-100M to IMON and REFIN pin of BDX12-50S) is strongly related to the feedback loop and current monitor accuracy. Since the IMON-REFIN line is sensitive to noise, do not route the wiring long as much as possible as and wire it in parallel, as shown in Figure 7.

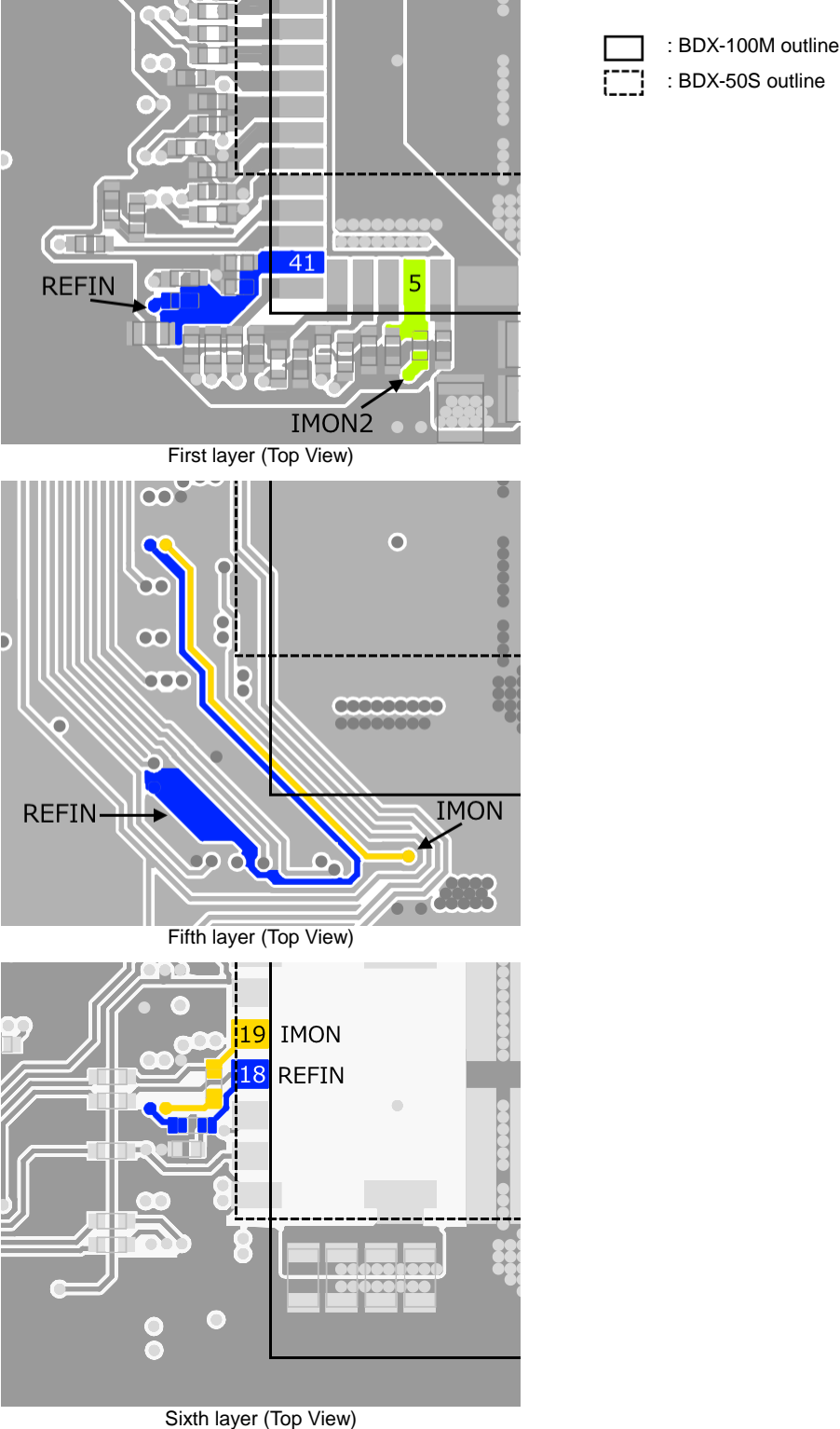


Figure 7 IMON-REFIN Line Layout Enlarged View (1)

When connecting BDX-100M and multiple BDX-50S units, branch off REFIN in the vicinity of BDX-100M and wire IMON and REFIN in parallel, as shown in Figure 8.

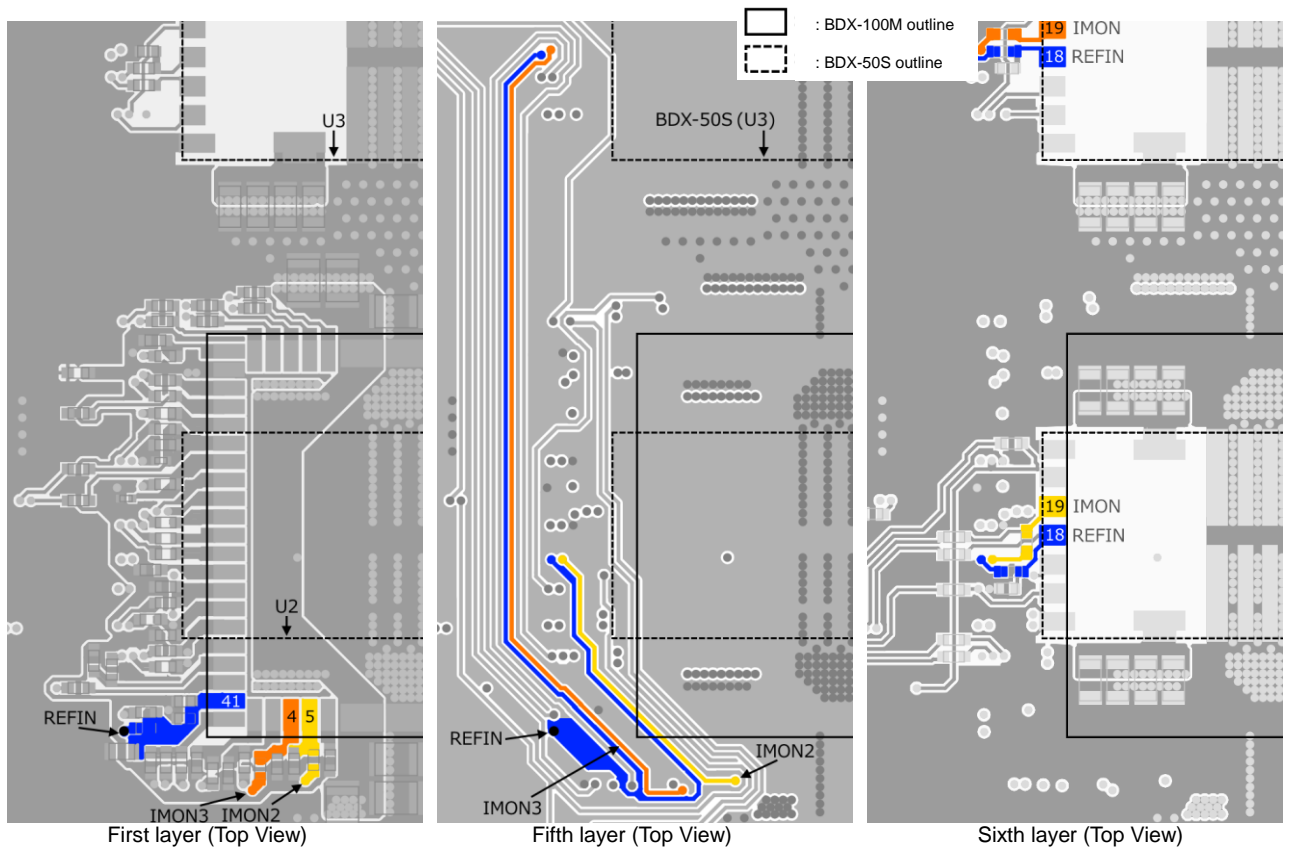


Figure 8 IMON-REFIN Line Layout Enlarged View (2)

8. BOM

To view a BOM list, please click the URL below.

http://www.bellnix.com/pdf/BDX12-EVM_BOM.pdf