

BDX Series Products Parallel and Dual Output Operation Application Note

1. Introduction

This document is an application note on the parallel and dual output operation of the BDX series products. By the use as the combinations of BDX12-1.0S100RM and BDX12-1.0S50R0S (Hereafter abbreviated as BDX-100M and BDX-50S respectively), the maximum output of 350A and 2-output operations are possible.

2. Combinations List

Table 1 shows the combinations for the parallel / 2-output operations using BDX series products.

See Chapter 3 in regard to the writing method on the settings and see Chapter 4 for the standard connection circuits on each combination.

For wiring and layout precautions, see the standard connection circuit and recommended layout in the "BDX Series Data Sheet" and the layout description in the "BDX Series Evaluation Board Instruction Manual".

Table 1. List of combinations

Combinations	Connection Circuit	VOUT1 Output Current	VOUT2 Output Current	File To Write
BDX-100M Master only	Section 4-1	0 ~ 100A	(None)	BDX100M.csv
BDX-100Mx1 // BDX-50Sx1	Section 4-2	0 ~ 150A	(None)	BDX150MS.csv
BDX-100Mx1 // BDX-50Sx2	Section 4-3	0 ~ 200A	(None)	BDX200MS.csv
BDX-100Mx1 // BDX-50Sx3	Section 4-4	0 ~ 250A	(None)	BDX250MS.csv
BDX-100Mx1 // BDX-50Sx4	Section 4-5	0 ~ 300A	(None)	BDX300MS.csv
BDX-100Mx1 // BDX-50Sx5	Section 4-6	0 ~ 350A	(None)	BDX350MS.csv
BDX-100Mx1(VOUT1) + BDX-50Sx1(VOUT2)	Section 4-7	0 ~ 100A	0 ~ 50A	BDX100M50D.csv
BDX-100Mx1 // BDX-50Sx1(VOUT1) + BDX-50Sx1(VOUT2)	Section 4-8	0 ~ 150A	0 ~ 50A	BDX150MS50D.csv
BDX-100Mx1 // BDX-50Sx2(VOUT1) + BDX-50Sx1(VOUT2)	Section 4-9	0 ~ 200A	0 ~ 50A	BDX200MS50D.csv
BDX-100Mx1 // BDX-50Sx3(VOUT1) + BDX-50Sx1(VOUT2)	Section 4-10	0 ~ 250A	0 ~ 50A	BDX250MS50D.csv
BDX-100Mx1 // BDX-50Sx4(VOUT1) + BDX-50Sx1(VOUT2)	Section 4-11	0 ~ 300A	0 ~ 50A	BDX300MS50D.csv

3. How to write settings

The factory default settings are for BDX-100M stand-alone operation. It is required to write the settings via PMBus communication if the parallel operation or dual output operation is performed.

Write into BDX-100M operating memory (volatile) via PMBus communication in accordance with Section 3-1 or 3-2. Special commands are required for the writing into the user store memory (non-volatile), so please contact us.

The files to write, listed in Table 1, can be downloaded from <http://www.bellnix.co.jp/BD6725/BDXCSV.zip>.

3-1 In the case of writing via USB-PMBusEVM-03 + Digital Mediator 2

When using the USB-PMBusEVM-03 + Digital Mediator 2, please follow the procedure below to write the settings. "USB-PMBusEVM-03 + Mediator 2 Instruction Manual" for details.

In the case of using USB-PMBusEVM-03 + Digital Mediator 2, write the settings along the following procedure. See the handling manual on "USB-PMBusEVM-03 + Digital Mediator 2" for the details on the usage.

1. Set the output setting to OFF by the ON/OFF control function (ON/OFFx pin or PMBus - OPERATION, ON_OFF_CONFIG command).
2. Import the file to write, listed in Table 1 by Digital Mediator 2.
3. In the case of using 2-output operation and AVSBus, use the AVSBus - TRANSITION_RATE command to set the output voltage change rate again.

3-2 In the case of writing from PMBus master device

In the case of using a PMBus master device other than USB-PMBusEVM-03 + Digital Mediator 2, write the settings along the following procedure.

follow the procedure below to write the settings. Refer to section 3-2-1 for the format of the write file.

1. Set the output setting to OFF by the ON/OFF control function (ON/OFFx pin or PMBus - OPERATION, ON_OFF_CONFIG command).
2. Write the data by PMBus communication according to the write file shown in Table 1. Execute the writing by PMBus communication in accordance with the files to write, listed in Table 1.
3. When using 2-output operation or AVSBus, use the AVSBus - TRANSITION_RATE instruction to reset the output voltage change rate. In the case of using 2-output operation and AVSBus, use the AVSBus - TRANSITION_RATE command to set the output voltage change rate again.

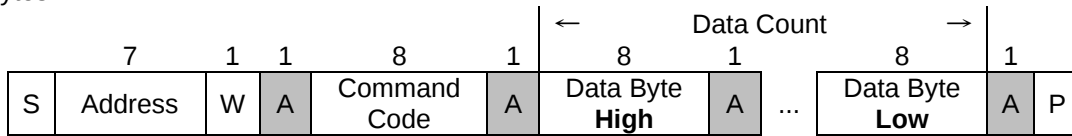
3-2-1 Write file format

The write file is a CSV file with one command per line. The format is as follows.

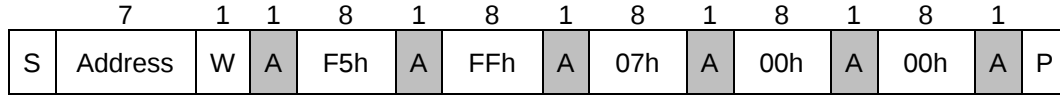
[Command Code], [Transaction type], [Data Count (Byte)], [Data], [Group]

- Do PMBus communication from the first line in order.
 - If [Transaction type] is a read type (Read Byte, Read Word, Read N Bytes, Block Read) and [Data] is designated, check that the value written to [Data] matches the value read out. If they do not match, turn off the power once and back it on again and retry from the procedure #1 of Section 3-2.
 - When [Transaction type] is Read Byte, Write Byte, Read Word, or Write Word, [Data Count (Byte)] will be omitted.
 - [Command Code] and [Data] are in hexadecimal notation.
 - Ignore [Group], which indicates that the Group Command Protocol is enabled (true) or disabled (false). It is always disabled in the configuration write process of BDX series product.
 - Ignore the last line "Read All", it is a special instruction for Digital Mediator 2.
- The protocol for Write N Bytes and Read N Bytes of [Transaction type] is as follows. (Symbols in the figures are compliant to SMBus 3.0.)

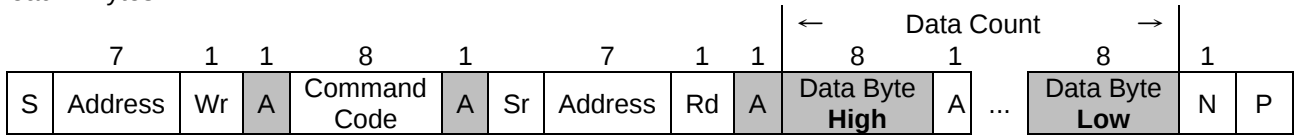
Write N Bytes:



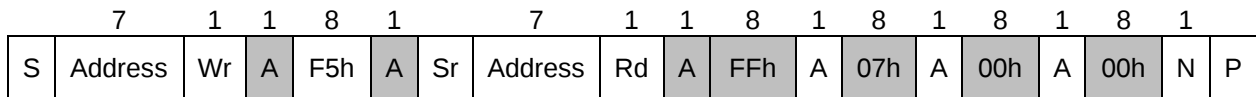
Example) If the write file line is "F5,Write N Bytes,4,FF070000,false"



Read N Bytes:

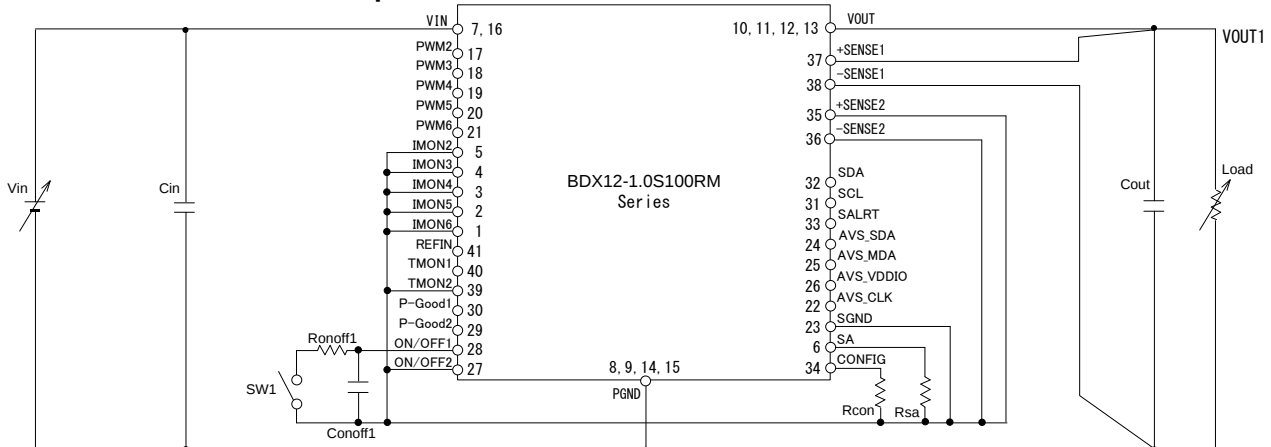


Example) If the write file line is "F5,Read N Bytes,4,FF070000,false" and the file is read successfully



4. Standard application circuit

4-1 BDX-100M stand-alone operation

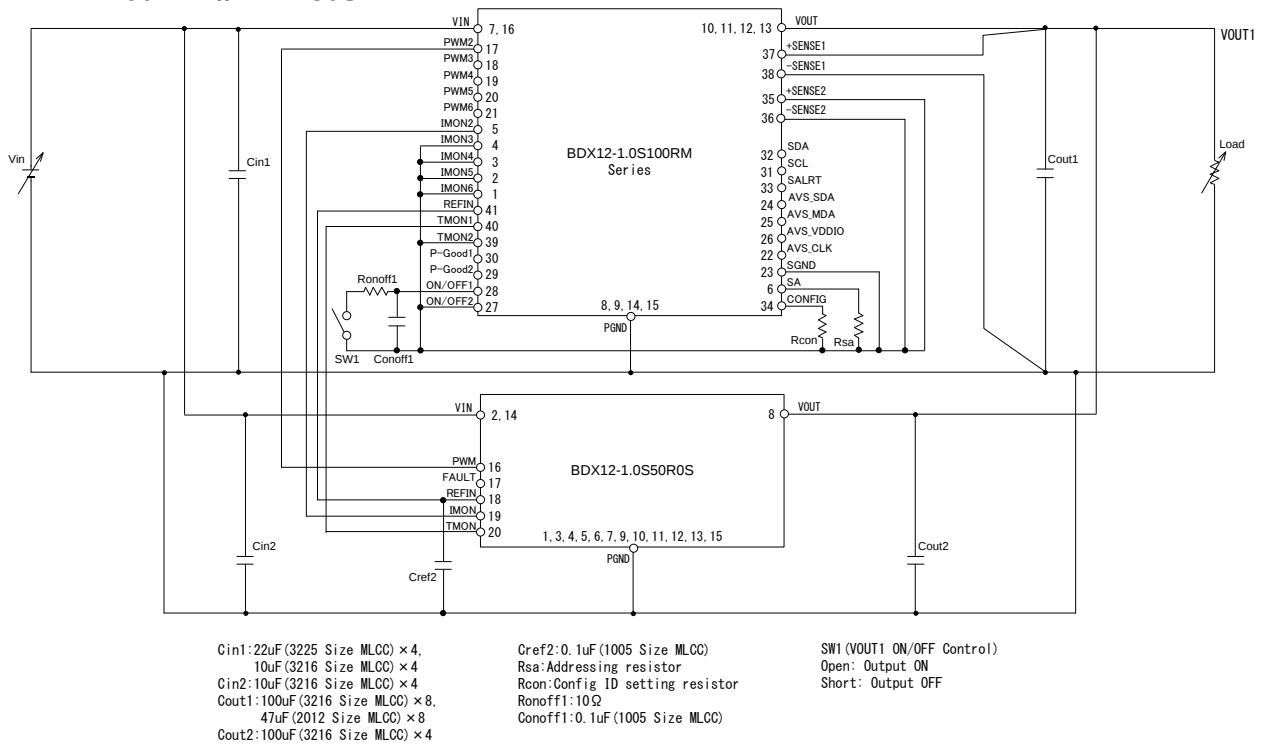


Cin: 22uF (3225 Size MLCC) × 4,
10uF (3216 Size MLCC) × 4
Cout: 100uF (3216 Size MLCC) × 8

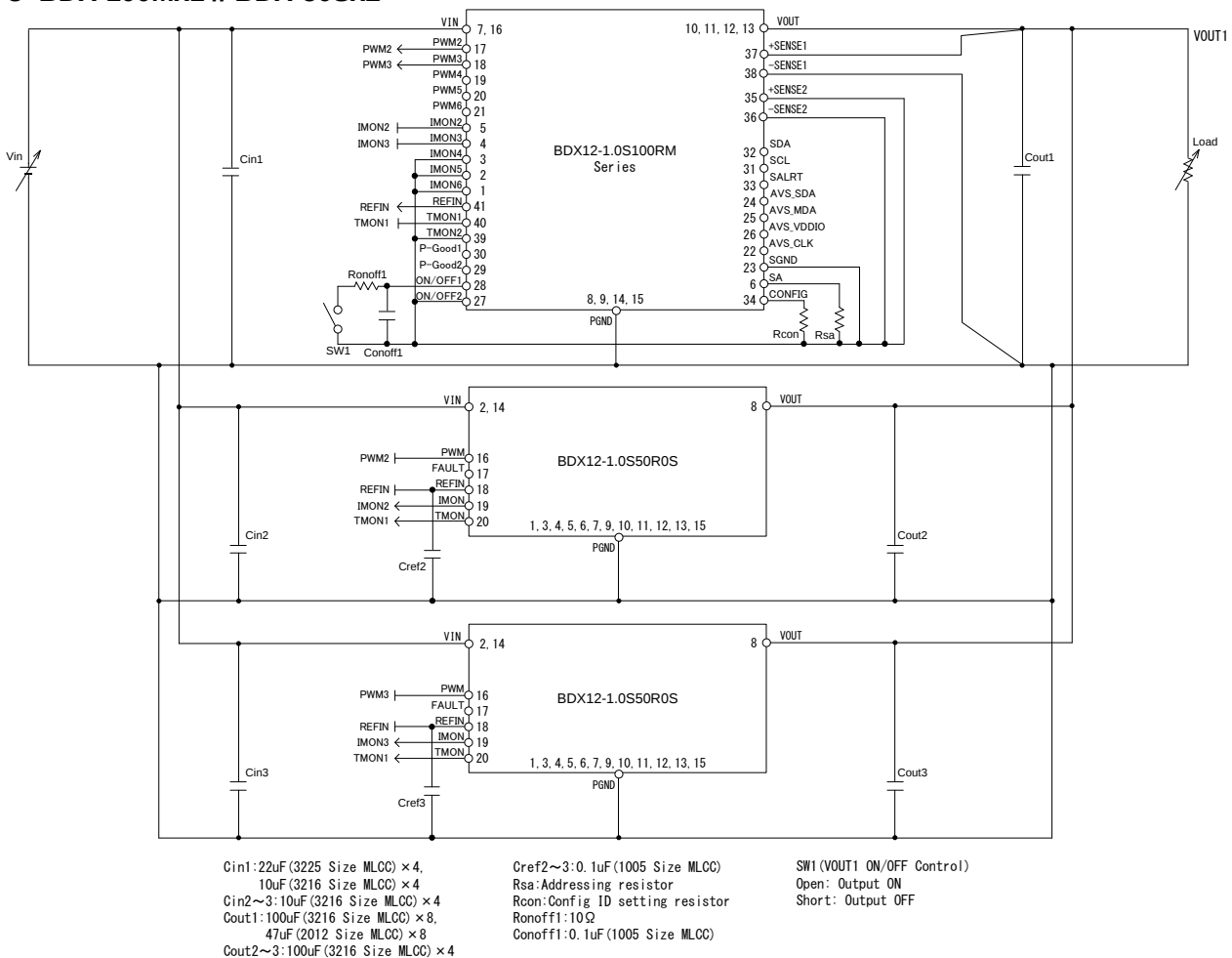
Rsa: Addressing resistor
Rcon: 5.6kΩ (Config ID setting resistor, Default setting)
Ronoff1: 10Ω
Conoff1: 0.1uF (1005 Size MLCC)

SW1 (VOUT1 ON/OFF Control)
Open = Output ON
Short = Output OFF

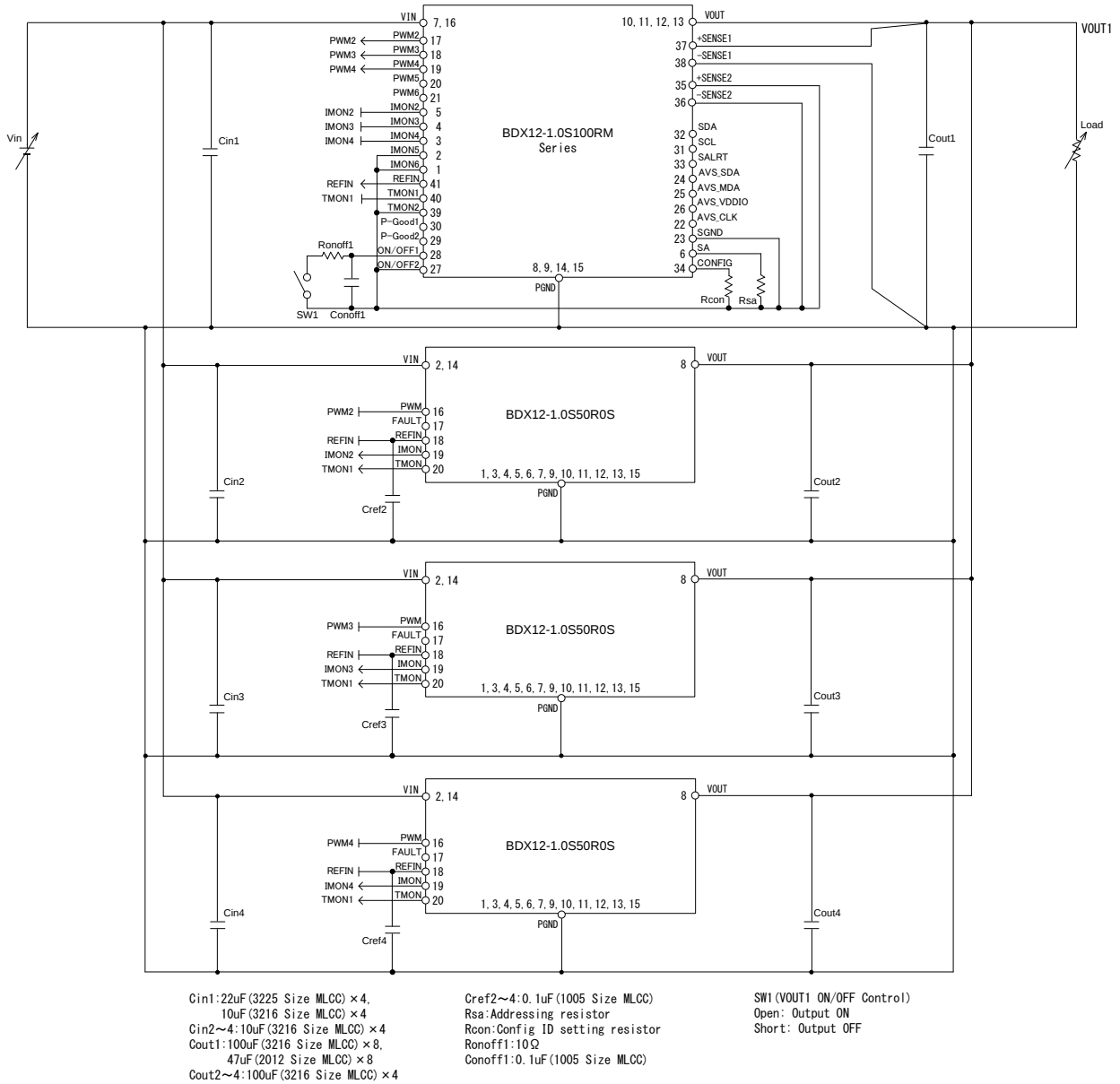
4-2 BDX-100Mx1 // BDX-50Sx1



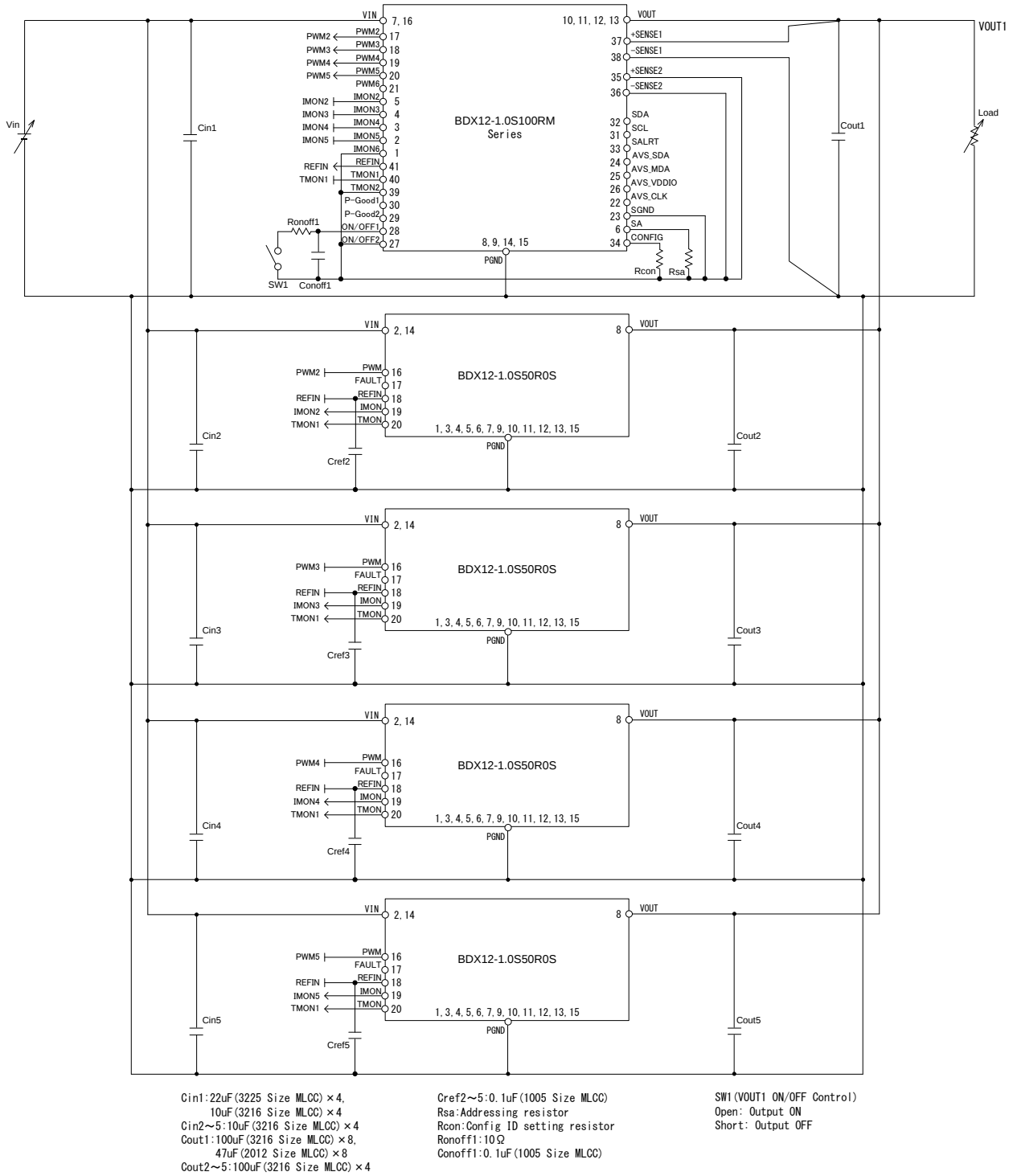
4-3 BDX-100Mx1 // BDX-50Sx2



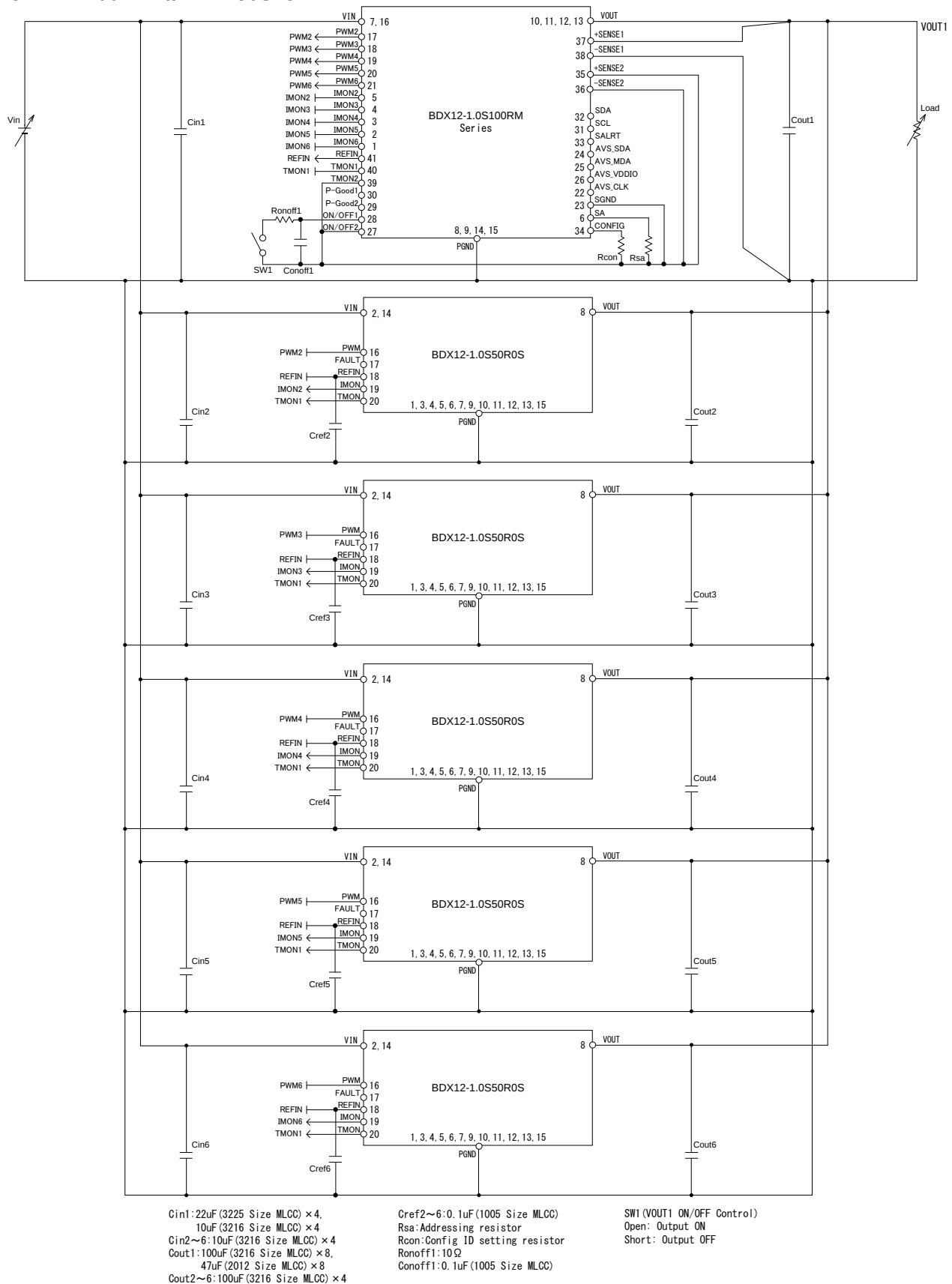
4-4 BDX-100Mx1 // BDX-50Sx3



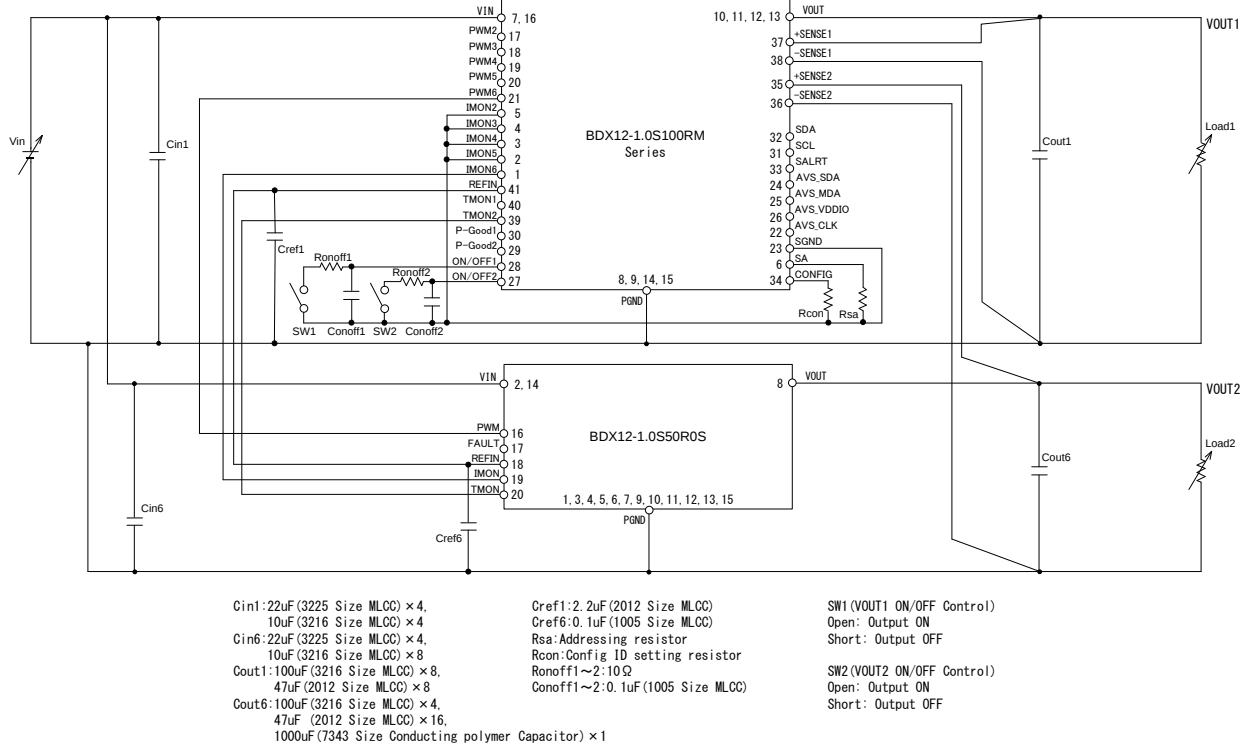
4-5 BDX-100Mx1 // BDX-50Sx4



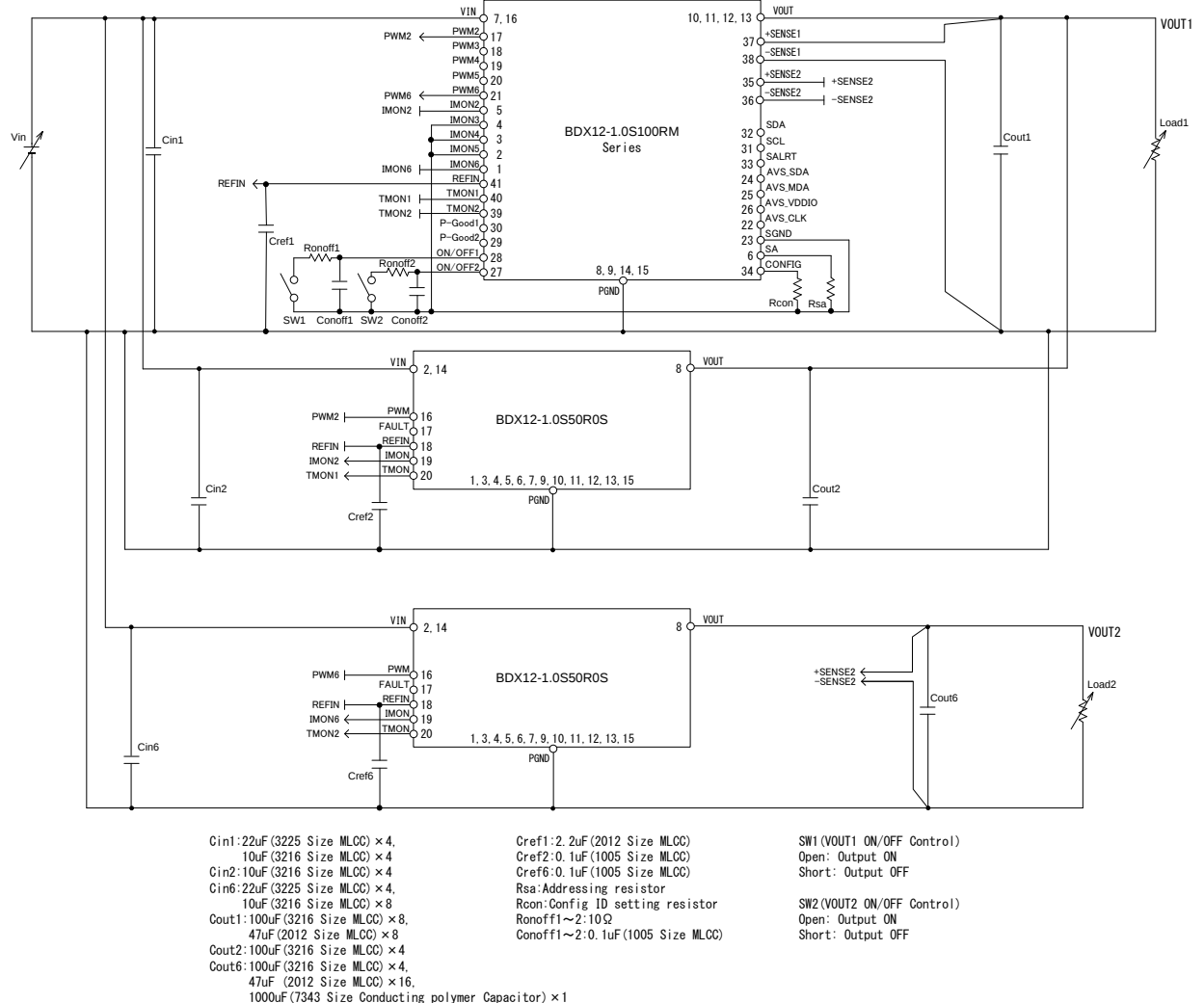
4-6 BDX-100Mx1 // BDX-50Sx5



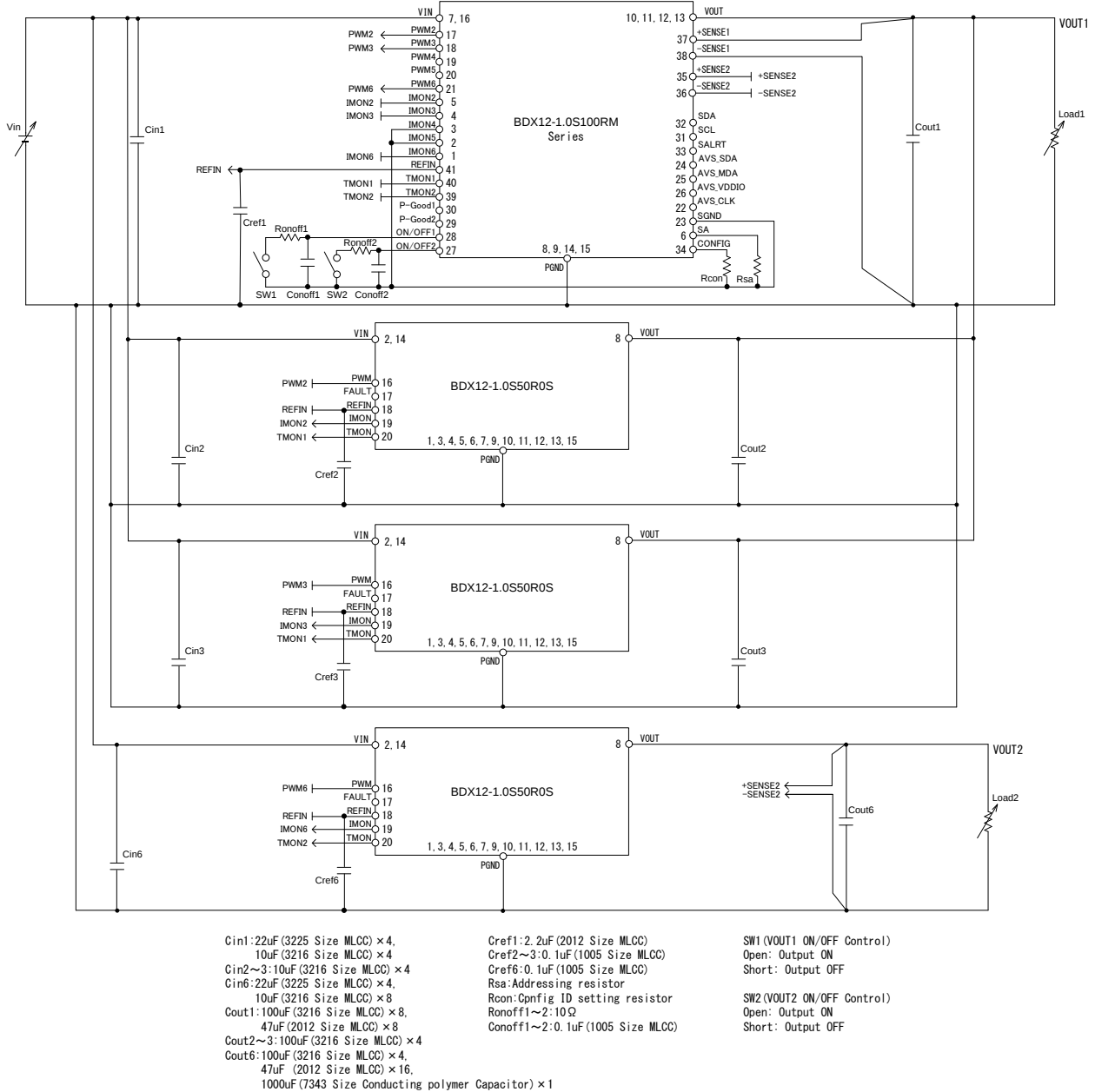
4-7 BDX-100Mx1(VOUT1) + BDX-50Sx1(VOUT2)



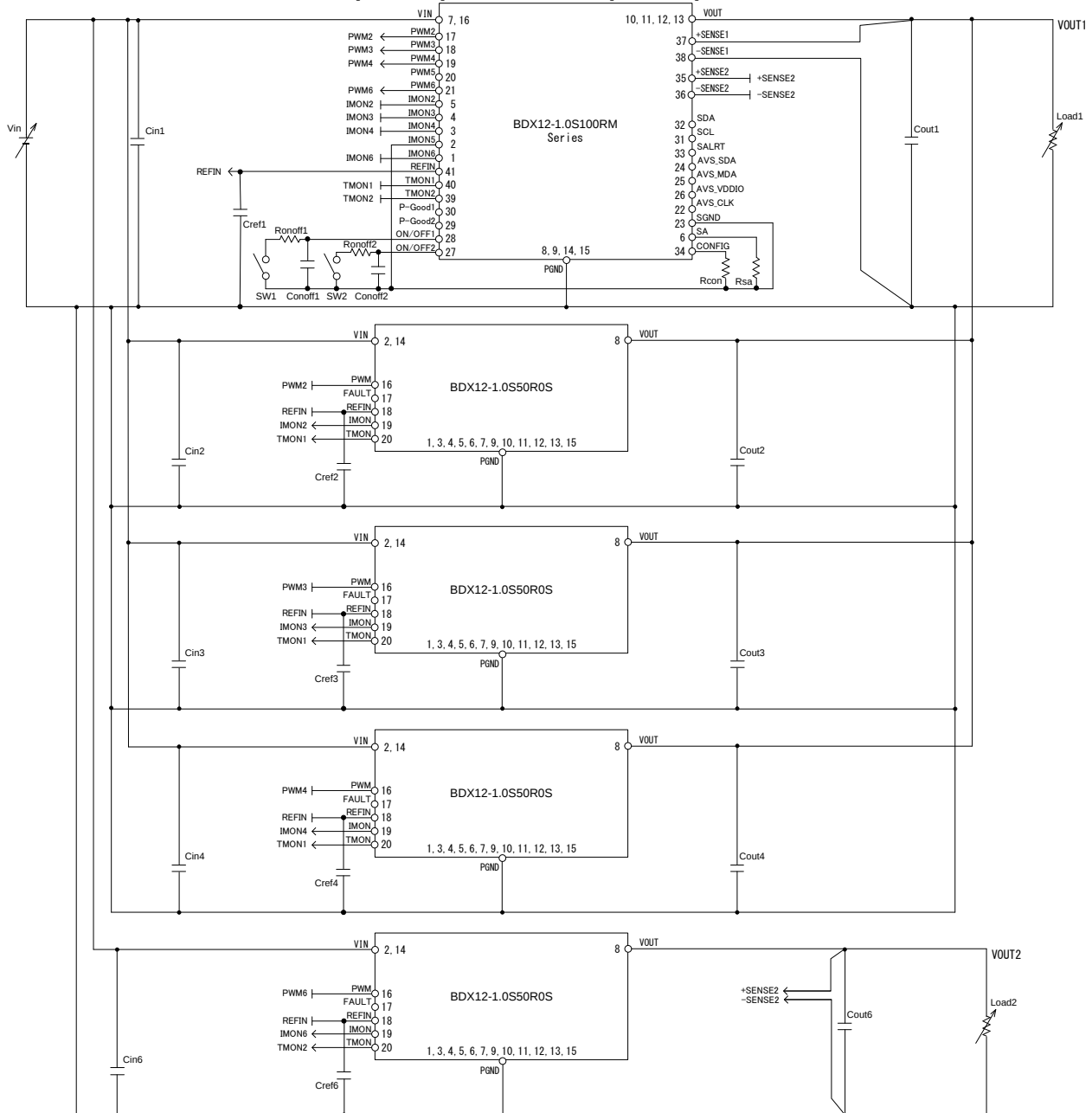
4-8 BDX-100Mx1 // BDX-50Sx1(VOUT1) + BDX-50Sx1(VOUT2)



4-9 BDX-100Mx1 // BDX-50Sx2(VOUT1) + BDX-50Sx1(VOUT2)



4-10 BDX-100Mx1 // BDX-50Sx3(VOUT1) + BDX-50Sx1(VOUT2)



Cin1: 22uF (3225 Size MLCC) × 4,
 10uF (3216 Size MLCC) × 4
 Cin2~4: 10uF (3216 Size MLCC) × 4
 Cin6: 22uF (3225 Size MLCC) × 4,
 10uF (3216 Size MLCC) × 8
 Cout1: 100uF (3216 Size MLCC) × 8,
 47uF (2012 Size MLCC) × 8
 Cout2~4: 100uF (3216 Size MLCC) × 4
 Cout6: 100uF (3216 Size MLCC) × 4,
 47uF (2012 Size MLCC) × 16,
 1000uF (7343 Size Conducting polymer Capacitor) × 1

Cref1: 2.2uF (2012 Size MLCC)
 Cref2~4: 0.1uF (1005 Size MLCC)
 Cref6: 0.1uF (1005 Size MLCC)
 Rsa: Addressing resistor
 Rcon: Config ID setting resistor
 Ronoff1~2: 0.1uF (1005 Size MLCC)

SW1 (VOUT1 ON/OFF Control)
 Open: Output ON
 Short: Output OFF
 SW2 (VOUT2 ON/OFF Control)
 Open: Output ON
 Short: Output OFF

4-11 BDX-100Mx1 // BDX-50Sx4(VOUT1) + BDX-50Sx1(VOUT2)

