RAISECOM

RC802/804-240B
8E1 Modular
Fiber-Optic Multiplexer
(Rev. M)

User Manual

Raisecom Technology Co., Ltd.
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1. Cautions

Please read the following notices carefully before installing and using the device, Raisecom does not respond to any loss that caused by violating safety notice.

This series fiber-optic multiplexer is integrated device that has precise elements, please avoid violent shakes and impacts, and do not disassemble or maintain the device yourself. If it is required, please do it under the guide of our technical staff following in the steps of anti static. Please contact us if there is any need.

There must be grounding protection for the sake of safety; do not disassemble the device yourself, we regard it as you waiver your rights of repair guarantee.

Contents

2. Overview

2.1. Introduction

RC800-240B series fiber-optic multiplexers are ideal fiber-optic transmission devices for point-to-point networks, medium-sized and small capacity networks, such as wireless communication base stations, private communication networks, and switching networks. The transmission capacity of RC800-240B is 8 E1 channels.

RC802-240B and RC804-240B fiber-optic multiplexers are the modular versions of RC800-240B. They can be installed into RC004-16 16-slot chassis to be deployed at the host site. The standalone multiplexers can be deployed at the remote site to work in pairs with the ones at host site, and be managed by network management software.

2.2. Main Features

- Very large scale ASIC chips ensures low power consumption; 4-layer PCB ensures high reliability
- Complete alarm indication that can display local and remote alarms simultaneously
- Alarm lock memory and E1 channel loop-back test capabilities implements convenient operation and maintenance
- Provides 1 optical interface and 8 E1 channels and support cascading RC802-240BS expansion sub-module to provide 16 E1 channels capacity.
- With modular design, it can be installed into any slot form 1st to 15th. If cascading connection is required, it can be only installed into odd slots.
- One modular multiplexer shall correspond to one standalone multiplexer at the remote site.
- Support SNMP management. It can be managed by the network management module in the MPU slot of RC004-16 chassis. It also support out-of-band management of standalone multiplexer at the remote site.

2.3. Part Number Introduction

RC800-240B series multiplexers include the following models.

Part Number	Description
RC802-240B-S1	Host-site module, 8 E1, 1 optical port, dual-strand single mode (DSC), 0-25 Km
RC802-240B-S2	Host-site module, 8 E1, 1 optical port, dual-strand single mode (DSC), 10-60 Km
RC802-240B-S3	Host-site module, 8 E1, 1 optical port, dual-strand single mode (DSC),15-120 Km
RC804-240B-S1	Host-site module, 8 E1, 1 optical port, single strand single mode (SC-PC), 1310 TX, dual-wavelength, 0-25 Km
RC804-240B-S2	Host-site module, 8 E1, 1 optical port, single strand single mode (SC-PC), 1310 TX, dual-wavelength, 10-60 Km
RC801-240B-S1	Remote-site standalone, max 8 E1, 2 expansion slots, 1 optical port, dual-strand single mode

	(DSC), 0-25 Km
RC801-240B-S2	Remote-site standalone, max 8 E1, 2 expansion slots, 1 optical port, dual-strand single mode (DSC), 10-60 Km
RC801-240B-S3	Remote-site standalone, max 8 E1, 2 expansion slots, 1 optical port, dual-strand single mode (DSC), 15-120 Km
RC803-240B-S1	Remote-site standalone, max 8 E1, 2 expansion slots, 1 optical port, single strand single mode (SC-PC), 1310 TX, dual-wavelength, 0-25 Km
RC803-240B-S2	Remote-site standalone, max 8 E1, 2 expansion slots, 1 optical port, single strand single mode (SC-PC), 1310 TX, dual-wavelength, 10-60 Km
RC805-240B-S1	Remote-site standalone, max 8 E1, 2 expansion slots, 1 optical port, single strand single mode (SC-PC), 1550 TX, dual-wavelength, 0-25 Km
RC805-240B-S2	Remote-site standalone, max 8 E1, 2 expansion slots, 1 optical port, single strand single mode (SC-PC), 1550 TX, dual-wavelength, 10-60 Km
RC802-240BS	Host-site module, cooperate with RC802/804-240B to provide the 9th – 16th E1 channels

The shaded texts in the above table indicate the models that are covered by this manual.

Generally, it is required to add a suffix to the standalone RC801/803/805 series equipment to indicate the type of power supply. For example, RC801-240B-S1/AC indicates AC 220V power supply; RC801-240B-S1/DC indicates DC -48V power supply.

When interconnecting the fiber-optic multiplexers, it is suggested that follow the rules below. The modular multiplexer shall be installed into host-site chassis.

Host-site module or standalone	Remote-site module
RC802-240B-S1	RC801-240B-S1
RC802-240B-S2	RC801-240B-S2
RC802-240B-S3	RC801-240B-S3
RC804-240B-S1	RC805-240B-S1
RC804-240B-S2	RC805-240B-S2
RC802-240B-S1 combined with RC802-240BS	RC801-480B-S1
RC802-240B-S2 combined with RC802-240BS	RC801-480B-S2
RC802-240B-S3 combined with RC802-240BS	RC801-480B-S3
RC804-240B-S1 combined with RC802-240BS	RC805-480B-S1
RC804-240B-S2 combined with RC802-240BS	RC805-480B-S2

Note: the above interconnection rules are the most common ones that modular multiplexers work in pairs with standalone versions.
The remote network management can also be implemented when standalone multiplexers are deployed at both sites.

3. Parameters

3.1. E1 Interface Specification

Bit rate: 2048Kbps±50ppm
Line code: HDB3
Impedance of interface: 75Ω (unbalanced) or 120Ω (balanced)
Electrical characteristics: complies with ITU-T G.703
Transfer characteristics: complies with ITU-T G.823, G.724
Input jitter tolerance: complies with ITU-T G.823, G.724

3.2. Optical Interface Specification

Bit rate: 100Mbps
Line code: 4B5B
Fiber connector: SC

Part Number	Connector Type	Wavelength (nm)	Launch Power (dBmW)	Receiving Sensitivity (dBmW)	Transmission Distance (Km)	Link Loss (dB/Km)
RC802-240B-S1	DSC	1310	-15 ~ -8	-34	0 ~ 25	0.5
RC802-240B-S2	DSC	1310	-5 ~ 0	-34	10 ~ 60	0.5
RC802-240B-S3	DSC	1550/DFB	-5 ~ 0	-36	15 ~ 120	0.25
RC804-240B-S1	SC/PC	1310	-12 ~ -3	-30	0 ~ 25	0.5
RC804-240B-S2	SC/PC	1310	-5 ~ 0	-32	10 ~ 50	0.5

RC804 series are equipped with single strand dual-wavelength optical ports. The "1310nm" is the TX wavelength, and the RX wavelength is "1550nm"

3.3. Ambience

Working temperature: 0 ~ 45
Relative humidity: ≤ 90% (25   )

4. How to use

4.1. Introduction of the Front Panel

Fixing Handle

Power (Green), ON when works properly

L line indicates local alarms, R for remote alarms

LOS1~8 E1 alarms (Red): ON when loss of signal in E1 channels

LOS optical alarm (Red): ON when loss of signal in optical link
LOF optical alarm (Red): ON when loss of frame in optical link
E-3 optical alarm (Red): flashing when severe BER exceeds 10^{-3}
E-6 optical alarm (Yellow): flashing when BER exceeds 10^{-6}

Fiber connector: DSC/PC for dual-strand fiber, TX for transmit and RX for receive; SC/PC for single strand fiber

Mask fake alarm button:
Push-in, mask E1 fake alarms; push out, unmask.
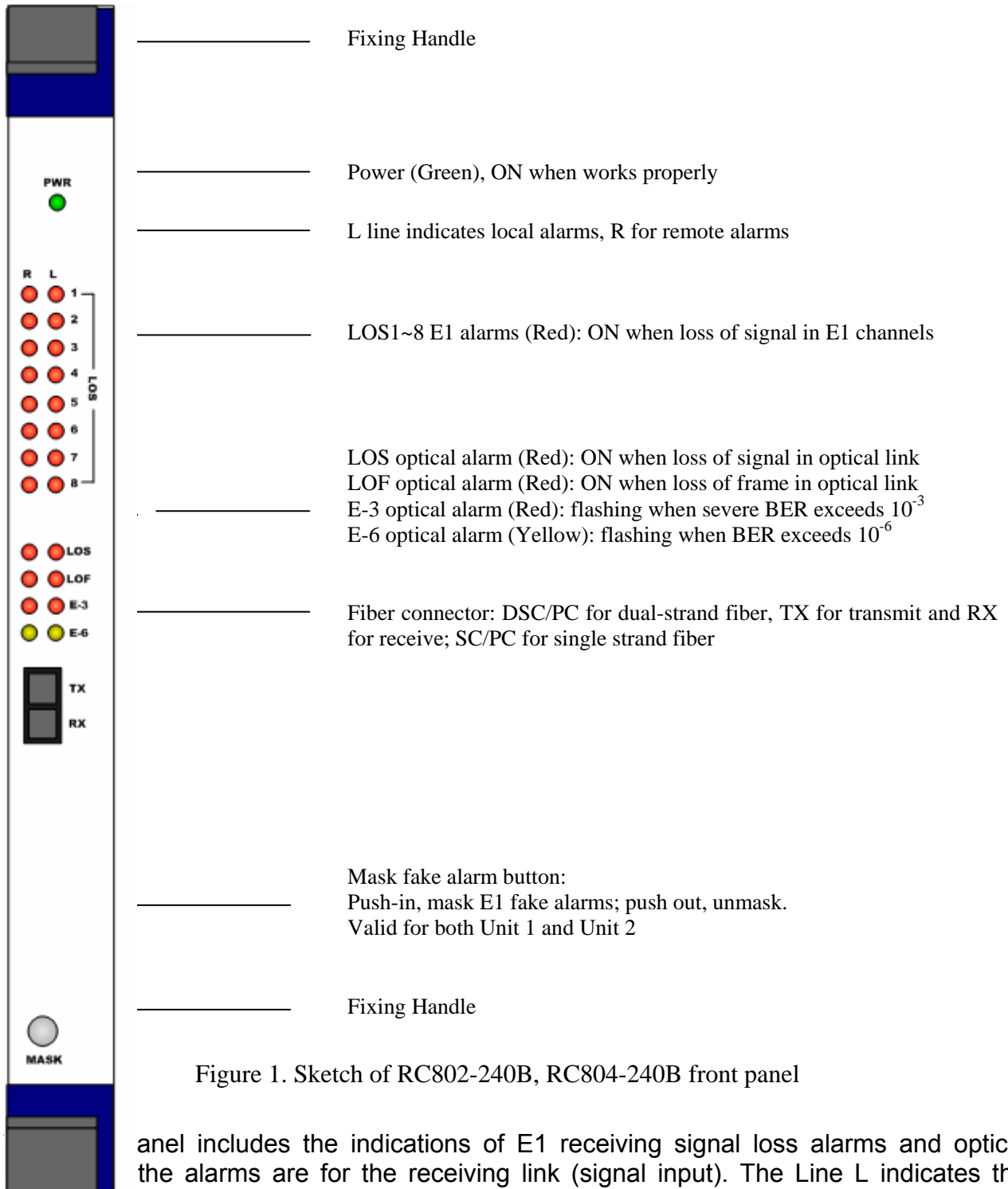Valid for both Unit 1 and Unit 2

Fixing Handle

Figure 1. Sketch of RC802-240B, RC804-240B front panel

anel includes the indications of E1 receiving signal loss alarms and optical the alarms are for the receiving link (signal input). The Line L indicates the alarms generated at the local site and Line R at the remote site. The remote alarms are

sent through the optical link, so that they are accurate only when the optical receiving is working in good condition.

4.2. DIP-switches Configuration

4.2.1. Dip-switches for E1 Interface Impedance

There are 8 groups of 4-bit dip-switches, SW1 to SW8. These switches cannot be managed by network management software, so they must be set manually.

ON

OFF   1 2 3 4
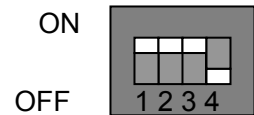
Definition as shown below

1st	2nd	3rd	4th		1st	2nd	3rd	4th
ON	ON	ON	OFF	Or	OFF	OFF	OFF	ON
75Ω unbalanced signal effective					120Ω balanced signal effective			

As shown in figure above, the default status is set as "75Ω unbalanced signal BNC interface effective".

- When adopting 75 Ohm unbalanced signal, it is required to plug a DB37 to 8 CC3 coaxial adapter, which is of CC4B-8G type. This adapter can convert DB37 connector to 8 CC3 coaxial connectors, for input and output of 4 E1 channels.
- When adopting 120 Ohm balanced signal, it is required to first set the dip-switches as per the above tables. 37-pin connector shall be used to connect the twisted-pair cables for DB37 connector. Please refer to Appendix A for details of sequence of twisted-pair and cable making.

4.2.2. DIP-switch for Function Configuration

There is a 6-bit dip-switch SW10 on the PCB.

ON

OFF   1 2 3 4 5 6
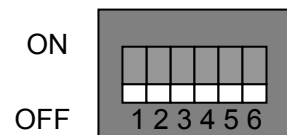
- $1^{st} \sim 4^{th}$: Loop-back control

1st bit	2nd bit	3rd bit	4th bit	Loop-back
OFF	OFF	OFF	OFF	No loop-back
OFF	OFF	OFF	ON	1st E1
OFF	OFF	ON	OFF	2nd E1
OFF	OFF	ON	ON	3rd E1
OFF	ON	OFF	OFF	4th E1
OFF	ON	OFF	ON	5th E1
OFF	ON	ON	OFF	6th E1
OFF	ON	ON	ON	7th E1
ON	OFF	OFF	OFF	8th E1
ON	ON	ON	ON	All E1 links

Note: Only two test method can be set: single E1 channel loop-back or all E1 channels loop-back. When single E1 channel loop-back is testing, the other channels are working normally without disturbance.
The network management software can send out the loop-back enable/disable command, and they have high priority to the settings by hardware.

- 5th bit: loop-back type options
  This switch is used to choose "remote loop-back" or "local loop-back" when performing the E1 loop-back operations.

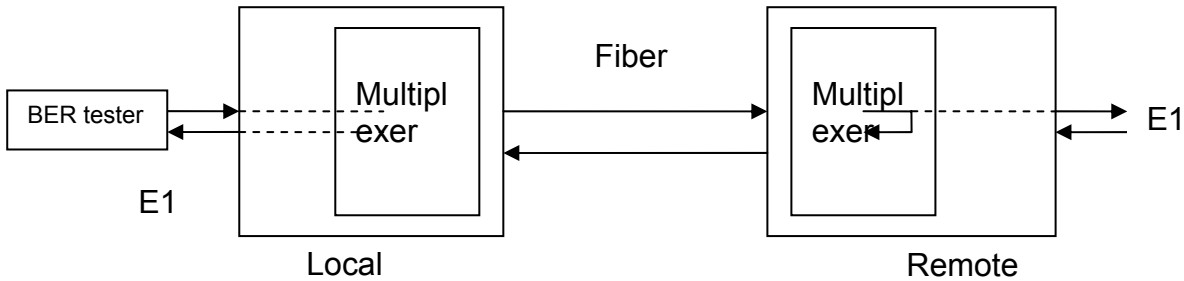| 5th bit	Loop-back type option
OFF	Remote loop-back enable
ON	Local loop-back enable

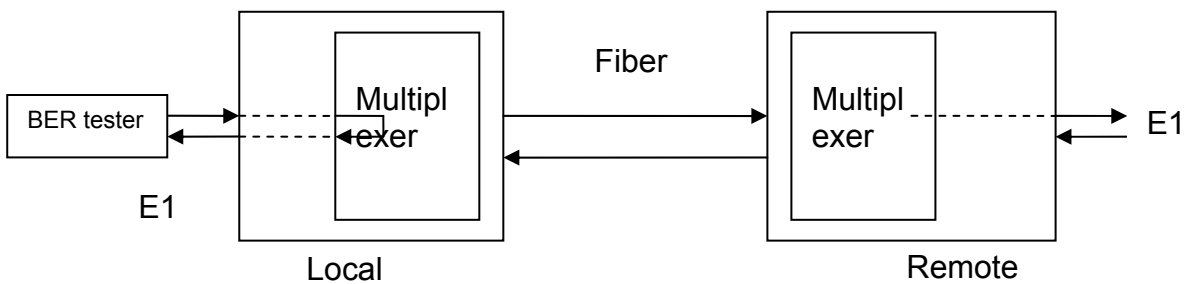Figure2: sketch map of setting remote loop-back on local site

Figure3: sketch map of setting local loop-back on local site

Note: When any loop-back is set on local site, 1st ~ 4th loop- back DIP-switch of remote site must be all off (not loop-back).

- 6th bit: Vacant.

4.2.3. DIP-switch for Manufactures Setup

The 4-bit dip-switch SW11 is used by the manufacturer to configure the module during manufacturing. Users are not advised to change its default status.

5. Installation and Test

5.1. Inspect after Opening

Please first check if the models and part numbers are in consistence, and also check if the equipments are damaged.

5.2. Preparation before Installation

- Carefully read this manual
- Prepare all kinds of the cable. Ensure that they are not short-circuited. Refer to Appendix A for cable making.
- Ensure RC004-16 is properly installed, and the chassis is well connected with the ground.
- Prepare the BERT and optical power meter for test of line quality.
- Change the dip-switch setting on the bottom panel if 120 Ohm balanced signal interface is required.
- Set up the fault-pass-through enabled if using the function.
- This module does not support hot-swapping

5.3. Installation Procedure

5.3.1. Installing the Module into the Chassis

Insert the module into any service slot from 1st to 15th, with PWR indicator upside. The MPU slot is particular for the network management module, thus cannot be inserted with service modules.

Installing fiber-optic multiplexer in MPU slot will cause damage to the module itself or the back panel of the chassis.

When combining with RC802-240BS expansion slave module, RC800-240B module will act as the master. The master module shall be installed into odd-number slots, for example, Slot 1, 3, 5… and 13. The slave module shall be installed into even-number slots, for example, Slot 2, 4, 6… and 14. Slot 15 does not support combining.

5.3.2. Connecting Cables

- E1 port
    The upside of RC004-16 chassis, corresponding to fiber-optic module, has 2 groups of DB37 male interfaces. The upper one is for the $1^{st} – 4^{th}$ E1 channels, and the lower one for the 5th -8th channels.
    It is suggested that users use SYV75-2-2 coaxial cables to connect the BNC connector. Users can connect a CC4B-8G adapter on DB37 male interface to connect CC3-K3 coaxial cables.

   If using 120 Ohm balanced interface, users can connect the DB37 male interface with DB37 female-connector twisted-pair.
● Optical interface
   Plug the SC fiber tail into optical interface (push hard until to the deep end). If not sure about transmission direction, it's advised first to turn on the power of device and then plug in the fiber cable.

5.3.3. Applying the Power Supply

   When PS is turned on, the PWR indicator shall be on.
   After applying the power supply, first please ensure there is no alarm at the optical port. If the optical port is connected properly, there shall not be LOS alarm. When just applying the power supply, the E-6 (yellow) indicator shall be on. This is because of the few error bits generated by the jitters. It shall be out after 10 – 20 seconds.

5.3.4. Mask/No Mask Button

If the connected E1 links are working in good condition without any signal loss, while there is still another unused E1 link, the LOS alarm for unused E1 link may occur, which is called "unused E1 alarm". Press MASK/NO MASK button "on" to clear all the unused E1 alarm and all the E1 LOS alarm indicators will be off.
In the case unused E1 link alarm being masked, if the connected E1 sub-channel is disconnected, the LOS indicator of this sub-channel will still be on.
If power supply is cut off and turned on again, then the mask function will be disabled. Press button to "off" and then pressed to "on" again.
If after a period of operation, a new E1channel is needed, first disable the mask function and then connect E1 link.
Chapter 4 Troubleshooting
If there are any problems during installation and using, try the following proposals. If the problems still can not be solved, please contact distributors/agents for help.

The following explanations and solutions for alarms at optical ports and LOS alarms at E1 ports are used to handling local alarm problems. For remote-end alarms, please handle them at remote site.

● Green PWR indicator not on
Answer: PS faults or PWR indicator is not functioning. Check the power supply of RC004-16.

● LOS red indicator of optical port is on
Answer: Loss of receiving signal occurs at optical port. Check whether the input fiber (RX) is connected well and ensure not reversed. Or check the receiving optical power with optical power test-meter; it should be greater than receiving sensitivity specification.

● E-6 yellow indicator of optical port is on
Answer: The bit error of optical RX signal is greater than $10^{-6.}$ It is normal that E-6 alarm occurs for 10 seconds just after turning on the power, after 10 seconds the E-6 indicator will be off. If E-6 alarm occurs during operation, check whether optical RX port connects well and RX optical power.

● LOS red indicator of E1 sub-channel is on

Answer: Loss alarm of RX signal at E1 sub-channel, no HDB3 signal is received. Check whether all E1 ports are connected well, or whether 75Ω cables are reversely connected, or whether the wires of 120Ω cables are in correct sequence. If LOS alarm occurs at unused E1 sub-channel, press "mask" button to "on" to musk the alarm after finishing the configuration of device.

● Mask button is on, but there is still alarm in unused E1 sub-channel.

Answer: probably the mask function is disabled if power supply is cut off and then turned on. To solve is by pressing the mask button to "OFF", and then pressing to "on" to enable mask function.

• How to unplug the coaxial cable from the coaxial connector.

Answer: push the thickest part of the connector without turning, and then pull out the coaxial cable.
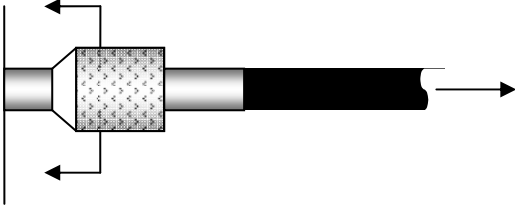
6. Appendix A Introduction of Cable Making

A.1 E1 Cable

- 75 Ohm signal adopts DB37 coaxial adapter:
  SYV 75-2-2 coax cable, the distance shall not be longer than 200m.

  First pick out the CC3-K3 connector from the accessories, and release the tail protecting jack. Secondly, separate the core from the shield, and put the tail protecting jack on it. Solder the strand with the core of the CC3-K3 connector. Solder the cable shield with the shield of the CC3-K3 connector. Finally, fix the jack at the end of the connector.

- 120 Ohm signal adopts DB37 male connector:

DB37 Pin Definition	1st Channel	2nd Channel	3rd Channel	4th Channel
OUT	3, 4	7, 8	11, 12	15, 16
IN	21, 22	25, 26	29, 30	33, 34

Others - GND

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