SLR-434M
Test Board
TB-SLR-RS2

Operation guide
Version 1.0 (May 2020)

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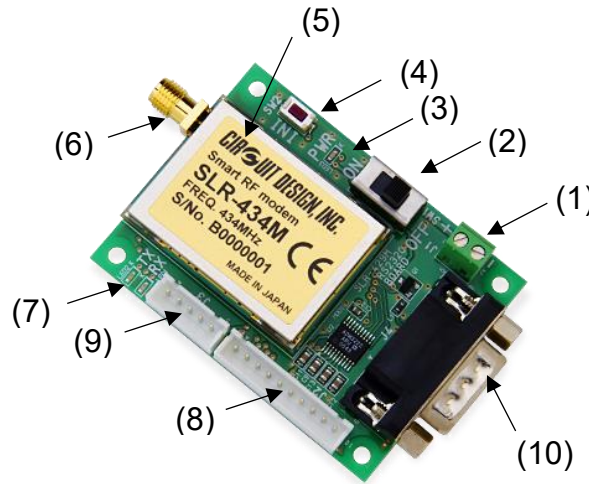Tel: 0263-82-1024
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Contents

Part functions

TB-SLR-RS2

Function name and description list

No.	Reference	Name	Description
(1)	J1	Terminal block for power supply	To connect DC supply
(2)	SW1	Power switch	Switch for power supply
(3)	LED3	Power indication LED	Comes ON when DC is supplied
(4)	SW2	INI switch	Switch to initialise the SLR-434M.
(5)	-	SLR-434M*	The SLR-434M is soldered onto the board.
(6)	-	RF connector	RF output/input connector. SMA female
(7)	LED2	TX LED	TX LED is ON during transmission.
	LED1	RX LED	RX LED is ON during reception.
(8)	J2	DIO connector	Connection for DIO
(9)	J3	Control connector	Connection for control
(10)	J4	D-SUB 9pin connector	Connector to allow communication using RS232. Male connector.

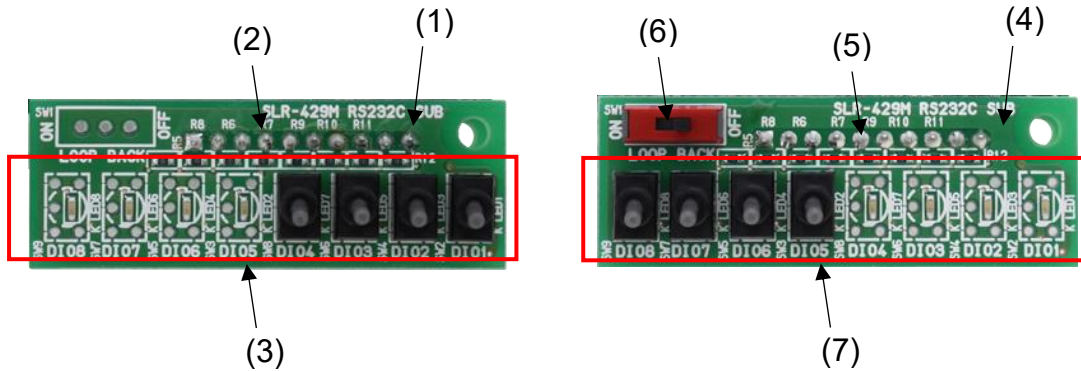* The SLR-434M modem is not included with the test board. Please order separately.

Connection list for J2

Terminal no.	Terminal name	Description
1	DIO8	Connected to DIO8 on SLR-434M
2	DIO7	Connected to DIO7 on SLR-434M
3	DIO6	Connected to DIO6 on SLR-434M
4	DIO5	Connected to DIO5 on SLR-434M
5	DIO4	Connected to DIO4 on SLR-434M
6	DIO3	Connected to DIO3 on SLR-434M
7	DIO2	Connected to DIO2 on SLR-434M
8	DIO1	Connected to DIO1 on SLR-434M
9	VCC	Outputs 3.6V. Do not exceed 50mA
10	GND	GND

Connection list for J3

Terminal no.	Terminal name	Description
1	TX-LED	Signal output for TX LED
2	RX-LED	Signal output for RX LED
3	RESET	Terminal for SLR-434M CPU reset.
4	INI	Terminal for initialising SLR-434M
5	GND	GND

SB-DIO-A / SB-DIO-B

Function name and description list

No.	Terminal name	Description
(1)	SB-DIO-A	Sub-board for operating DIO as local station.
(2)	Board connector	The connector on the underside connects to J2 on the TB-SLR-RS2.
(3)	Switches and LED	To control the DIO signals. DIO1-4 is used as inputs, DIO5-8 is used as outputs.
(4)	SB-DIO-B	Sub-board for operating DIO as target station.
(5)	Board connector	The connector on the underside connects to J2 on the TB-SLR-RS2.
(6)	LOOP BACK switch	Allows two way communication test by using the DIO input/output signals. When the LOOP BACK switch is ON, DIO1 (output) is shorted to DIO5 (input). When using the LOOP BACK switch to conduct two way communication test, the no. of times transmission mode (PM01) needs to be set to 1.
(7)	Switches and LED	To control the DIO signals. DIO1-4 is used as outputs, DIO5-8 is used as inputs.

Main Specifications

Item	Specification (typ.)	Units	Remarks
Supply voltage	DC +3.8 - 12V	V	
Rx current consumption	30	mA	TB-SLR-RS2 + SLR-434M DC5V and DIO not connected
Tx current consumption	44	mA	TB-SLR-RS2 + SLR-434M DC5V and DIO not connected
Operating temperature	-20 to +65	°C	
LED indicators	TX, RX, Power	-	
Power supply connection	Terminal block (2 pin)	-	
Switches	Power supply, Initialise	-	
Serial interface connection	D-SUB 9pin male	-	
Connector 1	B10B-XH-A	-	J2
Connector 2	B5B-XH-A	-	J3
External dimensions	47W x 64D x 25H	mm	TB-SLR-RS2
	18W x 50D x 18H	mm	SB-DIO-A / SB-DIO-B
	58W x 70D x 25H	mm	When assembled
Weight	37	g	TB-SLR-RS2 + SLR-434M
	43	g	For the above with SB-DIO-A or B

RS232C interface specifications

Item	Specification
Interface type	Serial communication (RS232C format)
Synchronisation	Asynchronous
Data rate	19200 bps
Flow control	RTS/CTS Hardware flow control
Data length	8 bits
Parity	None
Stop bits	1 or 2

J4 D-SUB 9 pin connector

| Terminal no.	Terminal name	Description
1	Vcc	Please be aware that power can be supplied without using the power supply terminal block, however the RS232C interface such as on the PC and PLC do not output power. To supply power from this terminal, it is necessary for the user to construct special cable and in the case of powering the board, please apply DC +4.5V to 12V. * To prevent back current, a rectification diode is present. For more details, refer to the block diagram.

Block Diagram
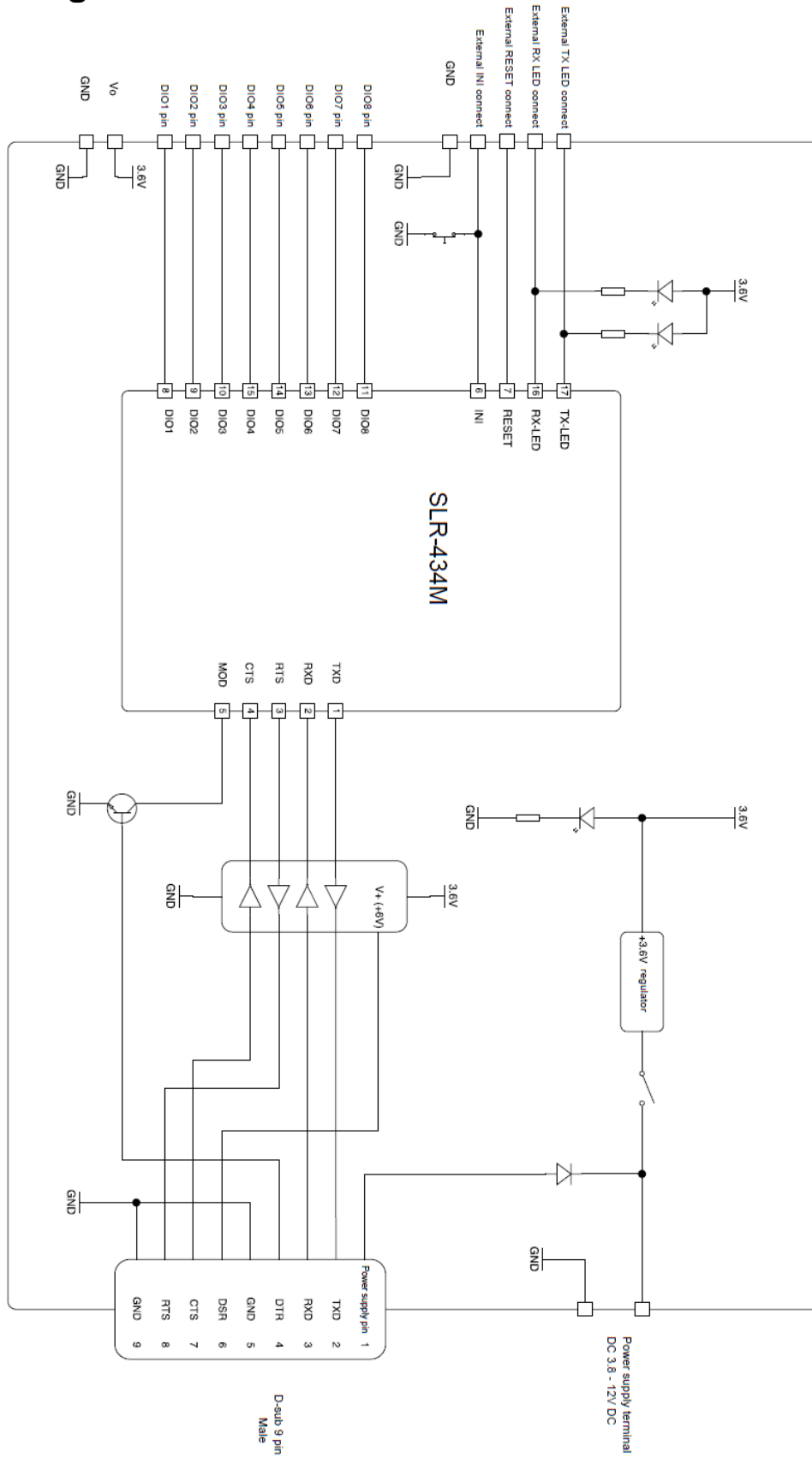
External view
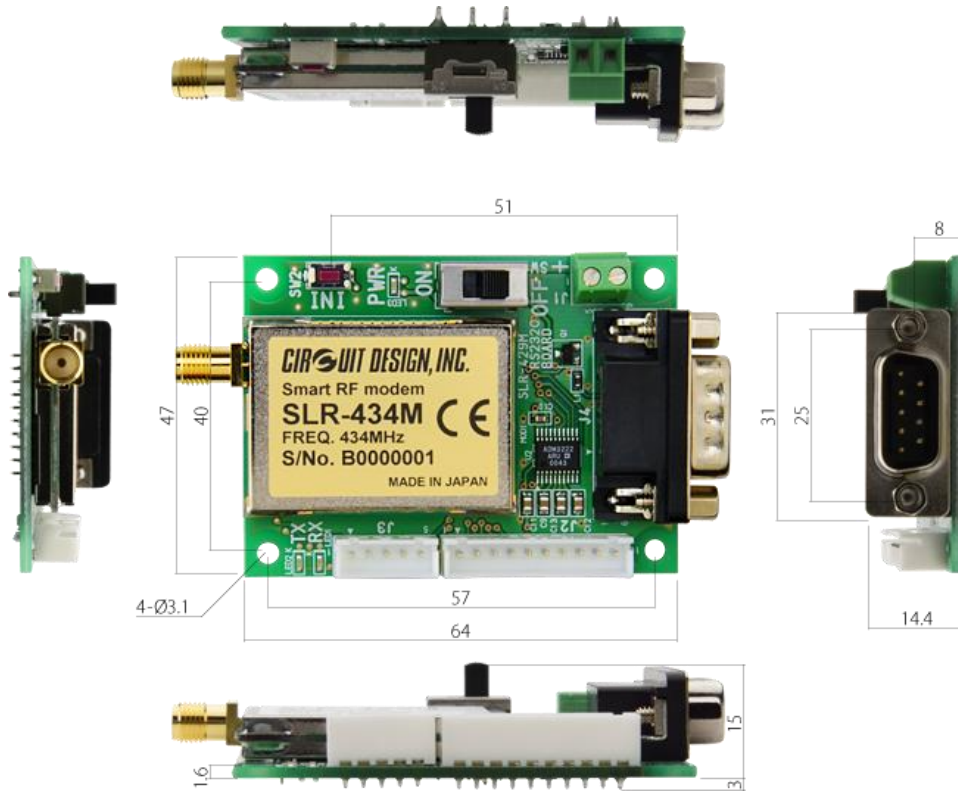
Connection with control equipment

Communication with control equipment uses RS232C interface.

1. Case where the control equipment has RS232C communication port

   For the case where the control equipment has RS232C communication port, it's possible to connect using a straight cable. The TB-SLR-RS2 D-SUB is a male connector, so take care to use the straight cable with the correct mating connector.


   RS232C straight cable
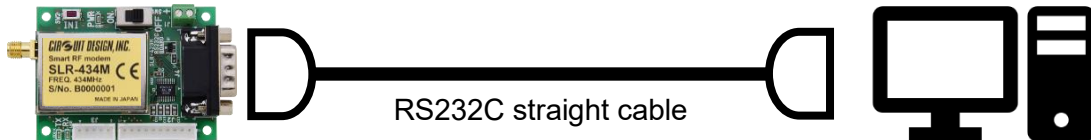
2. Case where the control equipment does not have RS232C communication port

   For the case where the control equipment does not have RS232C communication port, it is possible to use commercially available USB-RS232C conversion cable. As the USB-RS232C conversion cable can come with either male or female D-SUB connector, if necessary, please use the corresponding connector/cable converter when connecting.

Product example:
  USB-RS232C serial conversion cable
    Buffalo BSUSRC0605BS or BSUSRC0610BS
  Connection conversion:
    Sanwa AD9-FF

USB - RS232C
Serial conversion cable

RS232C straight cable
or
conversion connector

USB - RS232C
serial conversion cable
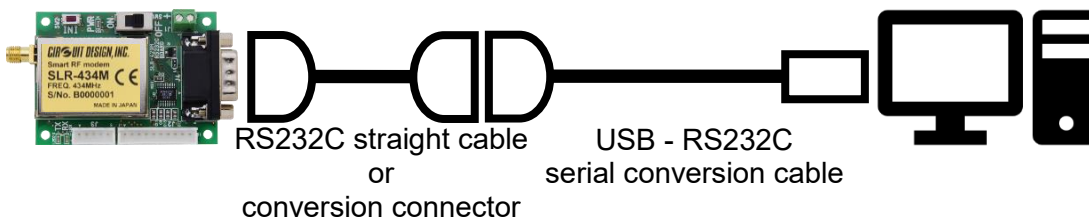
The various IDs and how to set them

Explanation of each ID

"@EI##" Setting value is ID of station (local station).
The ID of the local station chosen by the user can be set to 01 - FF (up to 255 values).
Default is 01.

"@DI##" Setting value is target station ID
Use the ID of the target station as the setting.
Setting values 00-FF (up to 256 values) must match the ID of the desired target station.
The value 00 is used as broadcast to all stations in the same group. Default value is 01.

"@GI##" Group ID setting
Use group ID when operating multiple systems in the same area. Values from 00 - FF (up to 256 values) can be used. Default value is 00.

"@UI####" User ID setting
The ID assigned to the user. This prevents interference to other user systems. User IDs are issued and managed by Circuit Design. To obtain user ID please contact Circuit Design. The default setting is 0000.

- Password is needed to change the User ID.

ID settings
For switching signal test only, all the IDs can be left as their default values. For use in actual application the IDs should be set to avoid interference.

Setting for switching signal function

"@PM##" To enable the switching signal function and mode settings
DIO terminals used for switching signal function is enabled by using @PM## command. The way the functions are enabled differ depending on whether LoRa or FSK command mode is selected. The default setting is 00 (switching signal function not enabled), so setting is required to use the switching signal function.

Values that can be set using @PM are listed below:

"00"   Switching signal function not enabled.
"01"   Transmit once
"02"   Transmit twice
"03"   Transmit three times
"04"   Transmit four times
"05"   Transmit five times

"10"   One way continuous transmission mode
"20"   Two way continuous transmission mode

"10" and "20" are valid only during FSK command mode.

"@PS##" DIO terminal input/output settings

Each terminal for DIO needs to be set as an input port or output port. This setting needs to be performed on both the local and target stations. Default is FF (All DIO terminals as input), so setting is required to set terminals as outputs.

Value	DIO terminal								Remark
	8	7	6	5	4	3	2	1	
'F''F'	Input				Input		Input	Input	Local
'0''0'	Output				Output		Output	Output	Target
'F''E'	Input				Input		Input	Output	Local
'0''1'	Output				Output		Output	Input	Target
'F''D'	Input				Input		Output	Input	Local
'0''2'	Output				Output		Input	Output	Target
'F''C'	Input				Input		Output	Output	Local
'0''3'	Output				Output		Input	Input	Target
'F''3'	Input				Output		Input	Input	Local
'0''C'	Output				Input		Output	Output	Target
'F''2'	Input				Output		Input	Output	Local
'0''D'	Output				Input		Output	Input	Target
'F''1'	Input				Output		Output	Input	Local
'0''E'	Output				Input		Input	Output	Target
'F''0'	Input				Output		Output	Output	Local
'0''F'	Output				Input		Input	Input	Target

(Each bit inside the value is either 1: Input or 0: Output. Terminals DIO8-5 and DIO4,3 cannot be set individually.)

"@PF####" Output holding time setting

The output holding time can be set. Available holding times can be from 0.1 - 6553.5s in 0.1s step. When the input port status is sent using no. of times transmission setting (@PM01 to @PM05) or by using the @PT command, the holding time can be set.
The default is "0000", no time restriction. When specifying value for @PF, enter the hex value as 4 byte ASCII characters.

Example. Holding time of 30s. 30s is 0.1s x 300, the hex value would be "012C". The command to set this value is therefore "@PF012C".

Function setting command list

ID setting command

Command	Setting value	Description
@EI	"01" to "FF"	Equipment ID (Local station ID)
@DI	"00" to "FF"	Target ID
@GI	"00" to "FF"	Group ID
@UI	"0000" to "FFFF"	User ID

Switching signal operation command list

Command	Setting value	Description
@PM	"00"	Disable DIO switching signal function
	"01" to "05"	No. of times transmission mode (by value)
	"10"	One way continuous mode (FSK command mode only)
	"20"	Two way continuous mode (FSK command mode only)
@PS	"00" to "FF"	Set input/output port
@PO	"00" to "FF"	Set and acquire the local station port status
@PF	"0000" to "FFFF"	Output holding time setting (0.1 to 6553.5s)

Recommended setting for switching signal test

Basic setting
To perform switching signal test without connection to PC, setting values can be saved by appending each command with "/W". You can setup switching signal test by following the command settings below.
* Test is setup with the default values for the ID, so these settings are not required to be performed.

Local station setting

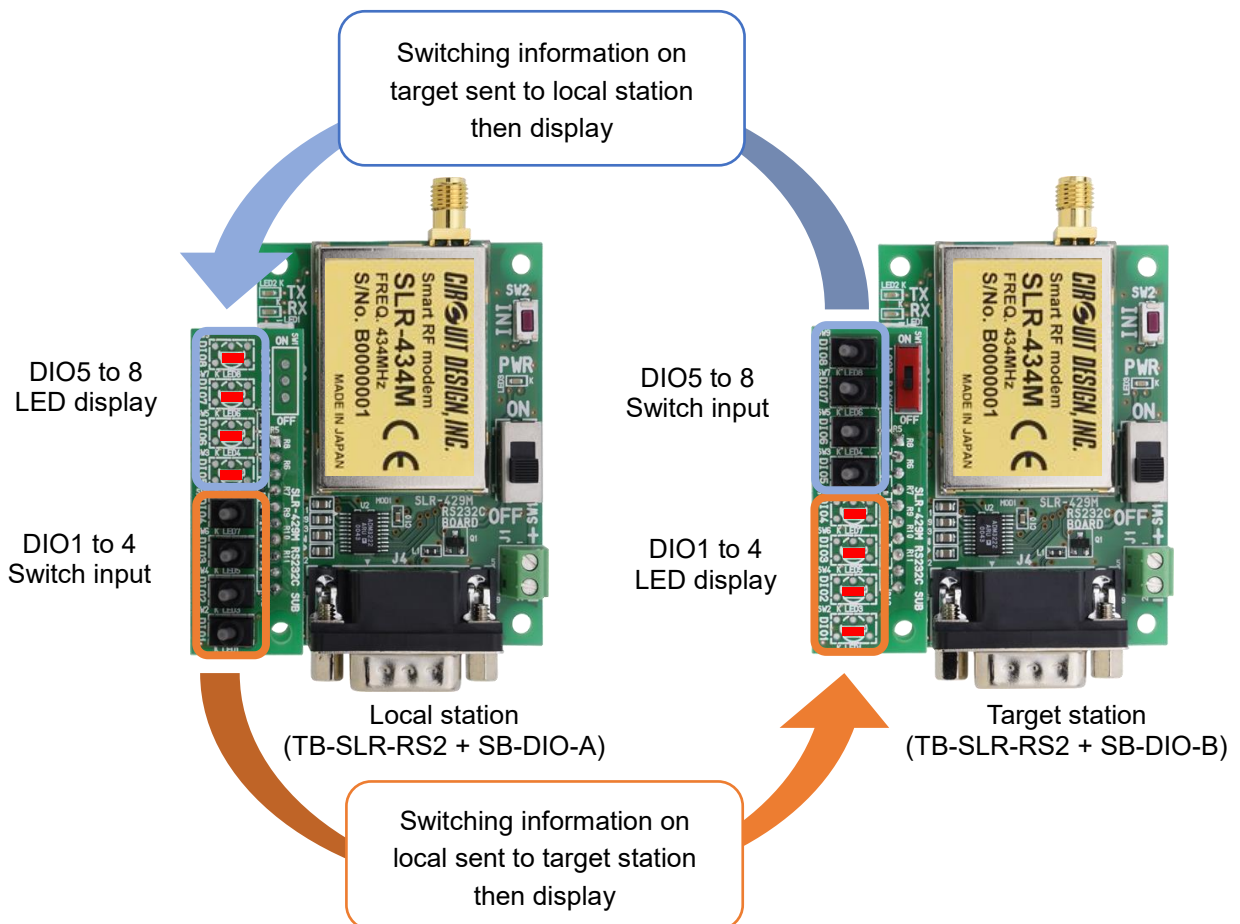| No.	Command	Description
1	@EI01/W	Equipment ID of station is 01 (default)
2	@DI01/W	Use target station with ID 01 (default)
3	@GI00/W	Group ID is set to 00 (default)
4	@PM01/W	No. of times transmission set to 1.
5	@PS0F/W	DIO1-4 set to input, DIO5-8 set as output.
6	@PO00/W	Initial level on ports set as output to be Lo. (default)

Target station setting

No.	Command	Description
1	@EI01/W	Equipment ID of station is 01 (default)
2	@DI01/W	Use target station with ID 01 (default)
3	@GI00/W	Group ID is set to 00 (default)
4	@PM01/W	No. of times transmission set to 1.
5	@PSF0/W	DIO1-4 set to output, DIO5-8 set as input.
6	@PO00/W	Initial level on ports set as output to be Lo. (default)

Testing with the DIO terminals.

By assembling SB-DIO-A and SB-DIO-B with the TB-SLR-RS2, you can easily perform switching signal test using the DIO terminals. There are 2 methods you can do that are shown below.

- Two way switching signal communication test
  When operating the switches on the local station, transmission of switching information to the target station is confirmed with the LED. Also operating the switches on the target station with the information sent to the local station is confirmed with the LED.

- Switching signal test with loopback.
  When switching information is sent to the target from the local, the target returns the switching information back to the local station. By using this function, range test can be performed.

Two way switching signal communication test method

Switching information on target sent to local station then display

DIO5 to 8 LED display

DIO1 to 4 Switch input

Local station (TB-SLR-RS2 + SB-DIO-A)

DIO5 to 8 Switch input

DIO1 to 4 LED display

Target station (TB-SLR-RS2 + SB-DIO-B)

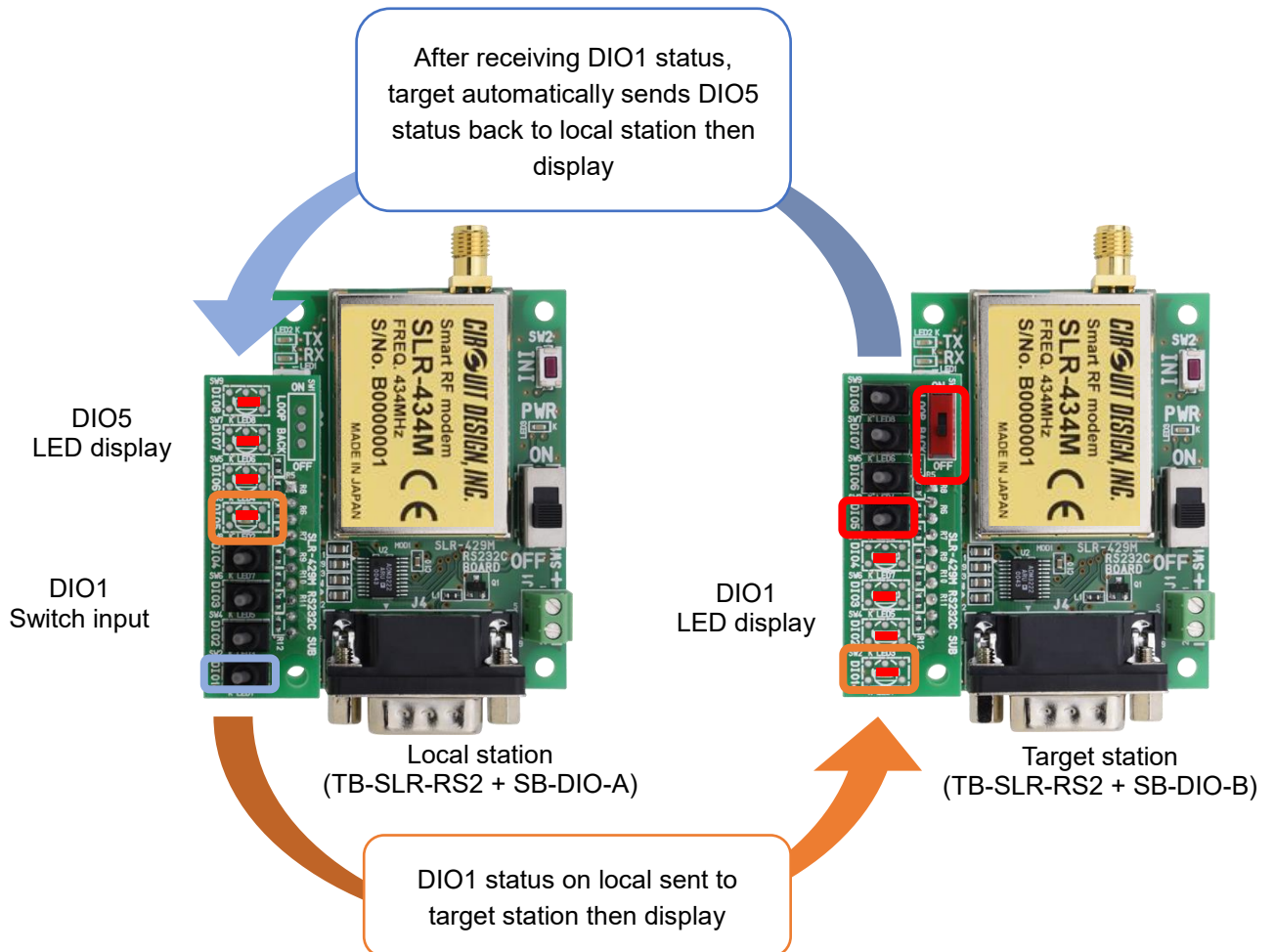Switching information on local sent to target station then display

Switching signal test with loopback method

Move the LOOP BACK switch to ON.

For the loopback feature only the DIO1 (switch) and DIO5 (LED) on the local and DIO1 (LED0) with DIO5 (switch) on the target are used.

* When the LOOP BACK switch is ON, DIO1 and DIO5 are shorted.

After receiving DIO1 status, target automatically sends DIO5 status back to local station then display

DIO5 LED display

DIO1 Switch input

Local station
(TB-SLR-RS2 + SB-DIO-A)

DIO1 LED display

Target station
(TB-SLR-RS2 + SB-DIO-B)

DIO1 status on local sent to target station then display

Version History

Version	Date	Description	Remark
1.0	21st May 2020	1st version	