

USB-SPI/I2C Analyzer

User's Manual

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Rev. 2.0



REX-USB62 USB-SPI/I2C Analyzer

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(1-1) Specifications

By using REX-USB62, you can do a sampling signal on the SPI/I2C bus, and analyze/display the signal by application software.

This product has both Monitor mode which monitor signal on the bus and Analyzer mode which analyze timing of signal on the bus. You can switch these modes by the bundled utility. (Default setting is Analyzer mode)

[Main features of the bundled application]

- * Refer to 3. How to use analyzer/monitor tool for a simple usage of the application, and refer to 4. Each function of analyzer/monitor tool for the detailed each function of the bundled application.
- Monitor bus data(One-shot/Free-run)
- Start capturing data by external trigger input
- Output external trigger, start capturing data by detecting specified data pattern
- Filter data display(I2C only)
- Search data
- Save data
- Switch analyzation of I2C with 2 channel

⁽Can not analyze 2 channel simultaneously)

	00	mmon functions and other funct	
		Common functions	Other functions for each mode
Fu	Monitor mode	 Display captured data with dump data One-shot capture 	 SPI can treat 24MHz bus I2C can treat 1MHz bus Free-run capture & display Capture by trigger
n c t i o n	Analyzer Mode	 Save capture data Search captured data Filter display(I2C only) External input trigger to start capture data Firmware update Compatible HS protocol (I2C only) 	 SPI can treat 16MHz bus I2C can treat 4MHz bus Can sample data on SPI/I2C bus by 50MHz(Max) and display sampling data by wave form Check characteristics of I2C bus signal

 Common functions and other functions for each mode

[The latest firmware program is available through our website]

To meet future addition to or change of specifications of this product, you can update firmware on this product. The latest firmware program is available through our website.

Item	Content of specifications
Interface	USB2.0 Hi-Speed Device
Connect	USB mini B connector
Voltage	5V (available from USB bus power)
Consumption current	150mA
Support interface	SPI: Max frequency 24MHz(Monitor mode)
	Max frequency 16MHz(Analyzer mode)
	I2C: Max frequency 1MHz(Monitor mode)
	Max frequency 4MHz(Analyzer mode)
Power supply	$1.8V(\pm 5\%), 2.5V(\pm 5\%), 3.3V(\pm 5\%)$
	5.0V(±5%, VBUS=5.0V)
Dimension	58(W) x 95(D) x 18(H) mm
	(Exclude the bundled cable / rubber foot)
Weight	Approx. 60g (Exclude the bundled cable)
Operating	Temperature: $5\sim55^{\circ}$ C
environment	Humidity:20~80%(Non-condensing)

Specifications on hardware

* If you use an external USB Hub, you need to use a self-powered USB Hub. (If you use bus-powered USB Hub, this product won't work.)

Item	Content of specifications	
Installer	REX-USB62 driver	
	Analyzer/Monitor tool	
	Switch tool between Analyzer/Monitor mode	
OS	Windows 8/7/Vista/XP * Also works on 64bit version	

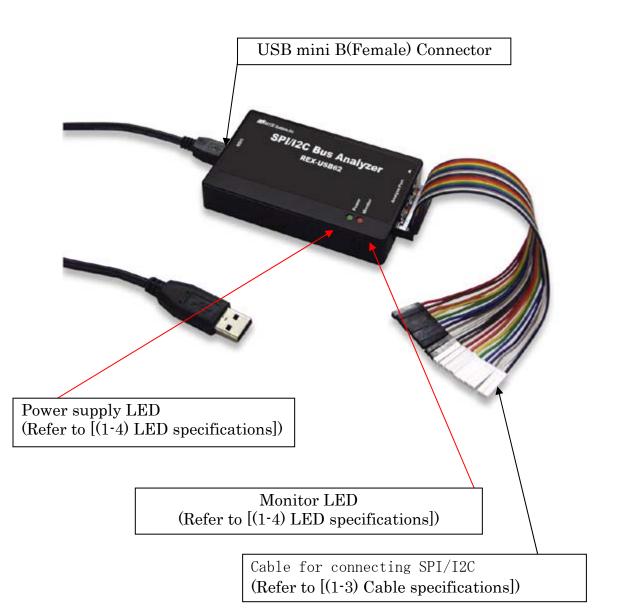
Specifications on software

Page.1-4

(1-2) Package contents

REX-USB62 package includes:

- REX-USB62
- CD-ROM
- 🗹 USB A mini B cable
- ☑ SPI/I2C cable
- 🗹 Warranty Card



(1-3) Cable specifications

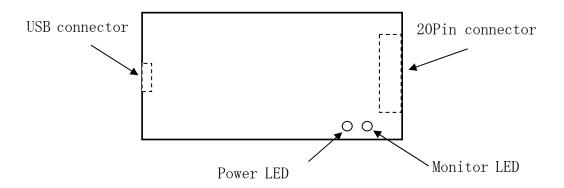
The below is an explanation of the specifications on the bundled cable to connect a target device.

Pin#	Housin g color	Cable Color	Signa	l name Usage				
1	Black	Brow	n Gl	GND Gro		und		
2	Black	Red	Rese	Reserved				
3	Black	Orang	ge TRO	TRGIN0		ger terminal to start to monitor *(N.B.)		
4	Black	Yellov	w TRG	OUT	I2C	2C Trigger output terminal		
5	Black	Green	n TRO	GIN1 Tri		Trigger terminal to start to monitor *(N.B.)		
6	Black	Blue	GI	ND	Gro	Ground		
7	Black	Purpl	e TRO	HN2	Trig	gger terminal to start to monitor *(N.B.)		
8	Black	Gray		2C Main)	Con	nect SCL terminal of a target		
		-	SP	I SS	Con	nect SS terminal of a target		
9	Black	White	e TRO	GIN3 Trig		ger terminal to start to monitor *(N.B.)		
10	Black	Black		I2C		Connect a SDA terminal of a target		
				SCK	Con	Connect a SCK terminal of a target		
Pin#	Housing	color	Cable Color	Signal name		Usage		
11	White(Gray)	Brown	rown TRGIN4		Trigger terminal to start to monitor *(N.B.)		
12	White(Gray)	Red	I2C SCL(Sub)		Connect a SCL terminal of a target		
12			кеа	SPI M	OSI	Connect a SDI(input) terminal of a target		
13	White(Gray)	Orange	Pow	er	Input/Output power supply for a target device		
14	White(Gray)	Yellow	I20 SDA(\$		Connect a SDA terminal of a target		
				SPI M	ISO	SDO(Output) terminal of a target		
15	White(Gray)	Green	GN	D	Ground		
16	White(Gray)	Blue	GN	D	Ground		
17	White(Gray)	Purple	GN	D	Ground		
18	White(Gray)	Gray	GN	D	Ground		
19	White(Gray)	White	GN	D	Ground		
20	White(Gray)	Black	Pow	er	Input/Output power supply for a target device		

* (Note) Threshold of trigger input (TRIGIN0~4) is as follows:
 Under 10% of voltage of power supply is recognized as Low.
 Over 90% of voltage of power supply is recognized as High.

(1-4) Specifications on LED

The below explains LED on REX-USB62.

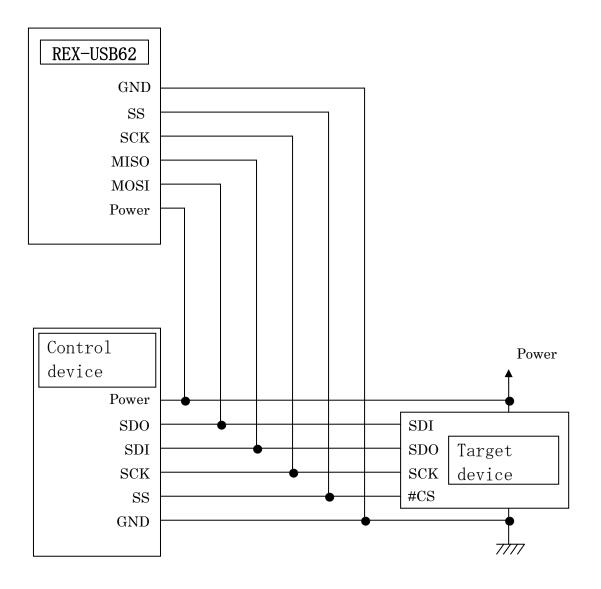


Name	Operation			
		Idle	Monitor/Analyzer (at sampling)	
Monitor LED	Monitor mode	Green comes on	Green blinks	
	Analyzer mode	Orange comes on	Orange blinks	
			ing stops, red LED comes on. g, red LED blinks.	
	The below shows the bus.	voltage when	the device provide power to	
	OFF	LED o	loesn't come on	
Power LED	1.8V	Red and Orange comes on alternately		
	2.5V	Red comes on		
	3.3V	0r	ange comes on	
	5.0V	Gr	ceen comes on	
	₩While firmware	e is updating	g, green LED blinks.	

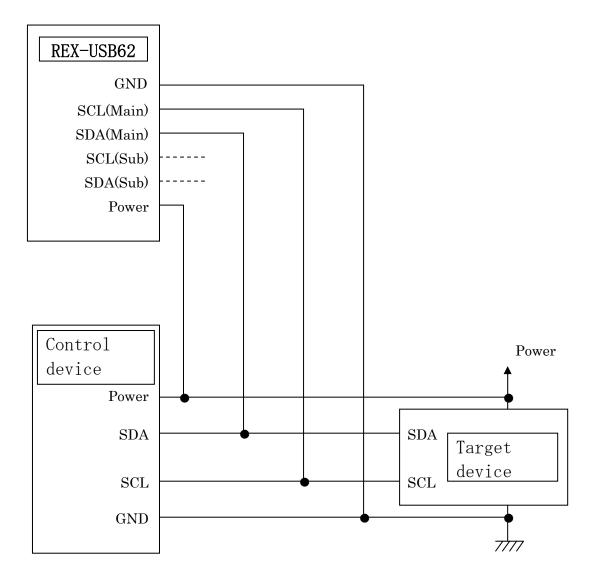
(1-5) Sample of connection

The below is a sample of connection for communication with a $\ensuremath{\mathsf{SPI}}/\ensuremath{\mathsf{I2C}}$ target device.

$\mathbf{SPI} \ \mathbf{connection}$



I2C connection



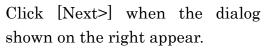


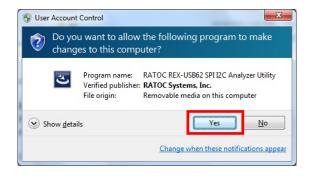
(2-1) Installing on Windows 8/7/Vista/XP

Before connecting this product, execute USB62_Setup.exe at the bundled CD-ROM and install necessary drivers by following the below procedure.

The [REX-USB62 device drivers] [Analyzer/Monitor tool][Switching tool for Analyzer and Monitor] will be installed.

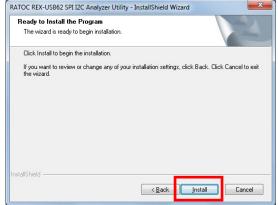
Click [Yes] if the dialog shown on the right appear.







Click [Install] when the dialog shown on the right appear.



••• W	indows Security
Wo	ould you like to install this device software?
	Name: RATOC Systems, Inc. Universal Serial Bus Publisher: RATOC Systems, Inc.
	Always trust software from "RATOC Systems, Inc.".
۲	You should only install driver software from publishers you trust. <u>How can I decide</u> which device software is safe to install?

Set up finished.

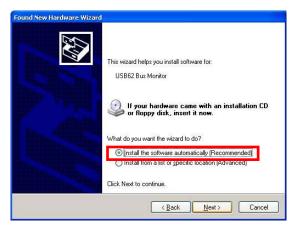


When connecting REX-USB62, installation will automatically finish. Proceed to [(2-2)Confirmation of installation] and confirm the installation finished properly.

* On Windows XP, after connecting REX-USB62, the below wizard will appear. Follow the below steps to install.

Select [No, not this time] and click [Next(<u>N</u>)>].





Click [Continue Anyway].

Installation finished.



Finish

lardware Installation

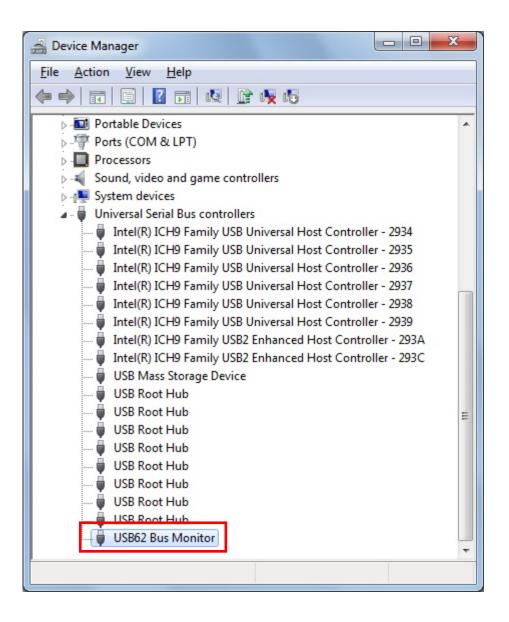
Proceed to [(2-2)Confirmation of installation] and confirm the installation finished properly.

(2-2) Confirmation of installation

Open [Device Manager].

(* On Windows XP, open [Control Panel] and then, [System]. And, doubleclick [System] and select the [Hardware] tab. And then, click the [Device Manager] button.)

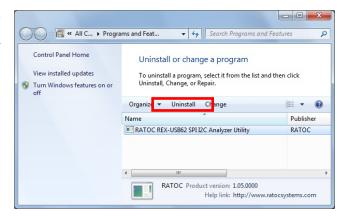
Confirm [USB62 Bus Monitor] is recognized properly under the [Universal Serial Bus Controller].



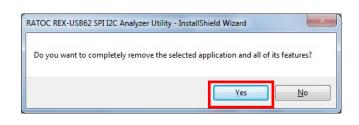
(2-3) How to uninstall

To uninstall REX-USB62, open [program and function] at the [Control Panel]. (On Windows XP, open [Add program and delete].

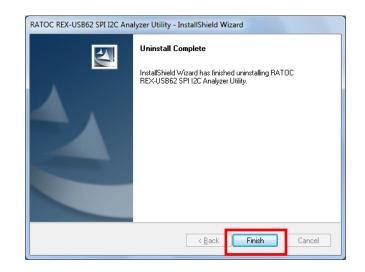
Select [RATOC REX-USB62 SPI I2C Analyzer Utility] and click [Uninstall].



Click [Yes(Y)].



Uninstall finished.





The below explains how to use Analyzer_Monitor tool installed in Chapter2.

This Analyzer_Monitor tool is installed at the [RATOC SPI_I2C Analyzer] of the [All programs] at the [Start] menu.

When Analyzer_Monitor tool start up,

the window shown in the right will appear.

(For each function, refer to (4-1)Explanation of each function of Analyzer_Monitor tool in Chapter 4.Each function of Analyzer_Monitor tool.

🖁 🖁 Ai	C SPI_I2C An nalyzer_Mon nalyzer_Mon	itor mod		hing tool
Ba Search	ck programs a	nd files		
SPUI2C Bus monitor File(F) Edit(E) Function(Edit(E) Function(Edit(E) Function(Tite(9:16:10))		o DateLen Mi	SD Data (Hex)	MOSI Data (Herr)
٠		11		

The below explains how to capture data at each mode of SPI/I2C and confirm the captured data.

Caution when you use application

- Never remove REX-USB62 during sampling.
 - (i.e. Never unplug the USB cable)
- Never remove other USB devices during sampling.
- While application is running, don't use sleep mode / hibernation mode.
- If you restart or go into sleep/hibernation mode while REX-USB62 is connected, you need to remove REX-USB62 and then, remove REX-USB62 and re-connect REX-USB62.
- When you start this application, you need to finish all the other running applications. Especially, never start all the other functions during sampling. Be careful not to start back ground process(including Virus scan, etc.).
- De careful not to start back ground process(including virus scali, etc.).
- If you use Analyzer_Monitor mode switching tool, close this application.

The below is an explanation for how to capture data in SPI analyzer mode and how to analyze captured data.

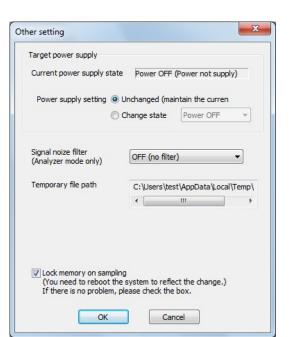
Refer to (4-2)How to use SPI analyzer mode in Chapter 4.Each function of Analyzer_Monitor tool for further information.

[Preparation]

Connect each cable and click it at the tool bar and set power supply.

If power is supplied from external, [Current power supply state] shows [PowerON].

If power is supplied to external or REX-USB62, select [Change state] at [Power supply setting] and set voltage level.



[Data capture]

If you click **R** at the tool bar, capture setting window will appear.

Select [SPI] at [Capture Bus] and click [Start Capture].

Captured data will sequentially appear on the application.

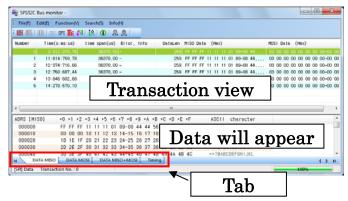
If you click *interview* at the tool bar, capture will end.

[Data analyzation]

Captured data will appear, as shown in the right, and selected transaction data will appear at the lower part.

You can select [DATA MISO], [DATA MOSI], [DATA MISO+MOSI], [Timing] to change display method.

Sampling frequency 50MHz	
John Jan Colored States	▼ SPI setting
Capture Data size (MB) 2	6 TRIGGER setting
Driver Buffer size (MB)	6 🚔 General setting



(3-2) How to use SPI monitor mode

The below is an explanation for how to capture data in SPI monitor mode and how to analyze captured data.

Refer to (4-2)How to use SPI monitor mode in Chapter 4.Each function of Analyzer_Monitor tool for further information.

[Preparation]

Connect each cable and click it at the tool bar and set power supply.

If power is supplied from external, [Current power supply state] shows [Power ON].

If power is supplied to external or REX-USB62, select [Change state] at [Power supply setting] and set voltage level.

Other setting			×
Target power supply			
Current power supply stat	e Power ON		
Power supply setting (Unchanged (ma	intain the curren	
C	Change state	Power OFF	-
Signal noize filter (Analyzer mode only) Temporary file path	OFF (no filte C:\Users\te	st\AppData\Local\	▼ Temp\
	•	III	•
✓ Lock memory on sampli (You need to reboot th If there is no problem,	e system to refle		
ОК	Car	ncel	

[Data capture]

If you click RE at the tool bar, capture setting window will appear.

Select [SPI] at [Capture Bus] and click [Start Capture].

Captured data will sequentially appear on the application.

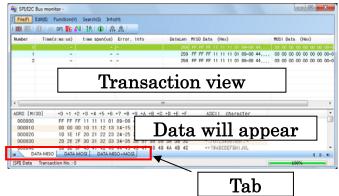
If you click *m* at the tool bar, capture will end.

[Data analyzation]

Captured data will appear, as shown in the right, and selected transaction data will appear at the lower part.

You can select [DATA MISO], [DATA MOSI], [DATA MISO+MOSI] to change display method.

Capture Bus	SPI 👻	
Capture Mode	Oneshot 🔻	I2C setting
captule Houe	Offestion	SPI setting
Capture Data size (MB)	32	TRIGGER setting
Driver Buffer size (MB)	2	General setting
(If there is no problem, pleas of driver buffer size.)	se use defa <mark>u</mark> lt value	



(3-3) How to use I2C analyzer mode

The below is an explanation for how to capture data in I2C analyzer mode and how to analyze captured data.

Refer to (4-4)How to use I2C analyzer mode in Chapter 4.Each function of Analyzer_Monitor tool for further information.

[Preparation]

Connect each cable and click \blacksquare at the tool bar and set power supply.

If power is supplied from external, [Current power supply state] shows [Power ON].

If power is supplied to external or REX-USB62, select [Change state] at [Power supply setting] and set voltage level.

Other setting	×
Target power supply	
Current power supply stat	e Power ON
Power supply setting ()	Unchanged (maintain the curren
O	Change state Power OFF -
Signal noize filter (Analyzer mode only)	OFF (no filter)
Temporary file path	C:\Users\test\AppData\Local\Temp\
	4 III +
	500 C
Lock memory on sampli (You need to reboot th If there is no problem,	e system to reflect the change.)
ОК	Cancel

[Data capture]

If you click **R** at the tool bar, capture setting window will appear.

Select [I2C #0(Main)] at [Capture Bus] and click [Start Capture].

* when a target is connected to I2C SCL(Main)/I2C SDA(Main)

Captured data will sequentially appear on the application.

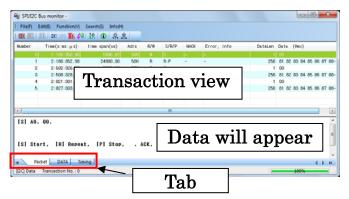
If you click is at the tool bar, capture will end.

[Data analyzation]

Captured data will appear, as shown in the right, and selected transaction data will appear at the lower part.

You can select [Packet],[DATA],[Timing] to change display method.

Capture Bus	[12C #0(Main)] -	
upui e bus		I2C setting
Sampling frequency	50MHz 💌	SPI setting
Capture Data size (MB)	256	TRIGGER setting
Driver Buffer size (MB)	16	General setting
(If there is no problem, pleas of driver buffer size.)	e use default value	



(3-4) How to use I2C monitor mode

The below is an explanation for how to capture data in I2C monitor mode and how to analyze captured data.

Refer to (4-5)How to use I2C monitor mode in Chapter 4.Each function of Analyzer_Monitor tool for further information.

[Preparation]

Connect each cable and click \blacksquare at the tool bar and set power supply.

If power is supplied from external, [Current power supply status] shows [Power ON].

If power is supplied to external or REX-USB62, select [Change state] at [Power supply setting] and set voltage level.

[Data capture]

If you click **R** at the tool bar, capture setting window will appear.

Select [I2C #0(Main)] at [Capture Bus] and click [Start Capture].

* when a target is connected to I2C SCL(Main)/I2C SDA(Main)

Captured data will sequentially appear on the application.

If you click **m** at the tool bar, capture will end.

[Data analyzation]

Captured data will appear, as shown in the right, and selected transaction data will appear at the lower part.

You can select [Packet],[DATA] to change display method.

Target power supply			
Current power supply stat	Power ON		
Power supply setting ()	Unchanged (ma	intain the curren	
C	Change state	Power OFF	-
Signal noize filter (Analyzer mode only)	OFF (no filte	r)	•
Temporary file path	C:\Users\tes	st\AppData\Local	\Temp
	•	III	
Lock memory on sampli	na		
(You need to reboot th If there is no problem,	e system to refle		

Capture Bus	I2C #0(Main) -	
		I2C setting
Capture Mode	Oneshot 🔻	SPI setting
Capture Data size (MB)	32	TRIGGER setting
Driver Buffer size (MB)	2	General setting
(If there is no problem, pleas of driver buffer size.)	se use default value	

-	Bus monitor - Edit(E) Function(V)	Search(S) Info(H	9									0	3
E REC NULL	🕕) 🗈 sei 🌇 🖇	18 0 🔒	<u>R</u>										
Number	Time(simsips)	time span(us)	Adre	R/#	S/R/P	NHCK	Error, Infe	10	DateLen	Do.to.	(Hex)		
0	-		50H 50H 50H	R	SI R:P S:		-		256		01 66 08	44 88	09
- 		Tra		a	cti	or	i vie	ew		~	00 04 06 83 84 85		
7 ([8] A0	-	-	50H	R	R:P	-	-		256	01 02	03 04 05	06 07	,
[5] XU		t, [P] Stop	A]	Da	ta	wi	ll a	pp	e	ar		
H Pr [27C] Data	Transaction No. : 0			1	Ta	b					100%	4 Þ	H I I

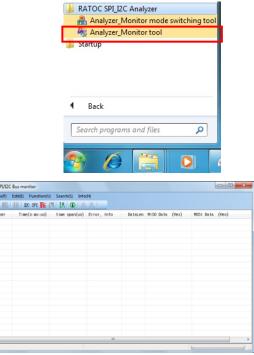
4. Each function of Analyzer Monitor tool



The below explains each function of Analyzer Monitor tool.

Analyzer Monitor tool is registered at [All programs]-[RATOC SPI_I2C Analyzer] at the [Start] menu.

When Analyzer Monitor tool start up, the window shown in the right will appear. For each function, refer to (4-1) Explanation of each function of Analyzer Monitor tool.



The following is an explanation of each function of this application and how to use each mode of SPI/I2C.

- (4-1) Explanation of each function of Analyzer Monitor tool
- (4-2) How to use SPI analyzer mode
- (4-3) How to use SPI monitor mode
- (4-4) How to use I2C analyzer mode
- (4-5) How to use I2C monitor mode
- (4-6) Other functions

Caution when you use the application

- Never remove REX-USB62 during sampling. (i.e. Never unplug the USB cable)
- Never remove other USB devices during sampling.
- While the application is running, don't use sleep/hibernation mode.
- If you restart or go into sleep/hibernation mode while REX-USB62 is connected, you need to remove REX-USB62 and then, re-connect REX-USB62.
- When you start the application, you need to finish all the other running applications. Especially during sampling, never start all the other applications. Be careful not to start background process (including virus scan, etc.).
- If you use Analyzer Monitor mode switching tool, close this application.

(4-1) Explanation of each function of Analyzer Monitor tool

<u>Menu bar</u>

File	e(I	F)			
-	, SP	I/I2C Bus mo	nitor -		
1	File	(F) Edit(E)	Function(V)	Search(S)	
:		Open(<u>O</u>)		Ctrl+O	
		Close(C)		Ctrl+N	
		Save(S)		Ctrl+S	
		Save as(A)			
		Write Transa	action Info to	Text	
		Write Transa	action Info to	CSV	
- 1		Recent File		۰,	
		Exit(X)			
ullet	0	pen(<u>O</u>)			: Open a file which this application saved.
ullet	C	$lose(\underline{C})$: Close a capture window.
•	Sa	ave(<u>S</u>)			: Overwrite current captured data.
ullet	Sa	ave as (<u>A</u>)		: Save current captured data as a new name.
ullet	W	rite Tra	ansactio	n Info	to Text:
					Write transaction information to a text file.
•	w	rite Tra	ansactio	n Info	to CSV:
-	•••	1100 110	libaotio		Write transaction view information to CSV file.
	ъ	(T)	•1		
•	R	ecent F	ile		: Open a file which this application used before.
					(The extension of a file is .SIC)
•	\mathbf{E}	$\operatorname{xit}(\underline{X})$			Close this application.

Edit(E)

🦛 SPI/120	C Bus m	onitor -		
: File(F)	Edit(E)	Functi	on(V)	Search(S)
: REC MIN	U	ndo(U)	Alt+	Backspace
Number	С	ut	Sh	ift+Delete
	C	opy(C)		CtrI+C
	P	aste(P)		CtrI+V

* This function doesn't work.

SPI/I2C Bus monitor -	
File(F) Edit(E) Function(V) Search(S) Info(H)	
REC MILL 12 Pause Transaction updating	
Number Time Tool bar	
1 2 12C Setting	
3 2 SPI SPI Setting	
4 2 5 2 V Transaction Filter Setting	
Forced display mode	
[S] AO. OO. REC Capture Setting (START Sampling) Stop Sampling/Stop Analyze	
Pause Transaction upd	ating : Pause to renew display of transaction.
Tool bar	: Display/hide the tool bar.
Status bar(<u>S</u>)	: Display/hide the status bar.
I2C Setting	: Each setting of I2C can be made.
	Refer to Page.4-19 for analyzer mode.
	Refer to Page.4-25 for monitor mode.
SPI Setting	: Each setting of SPI can be made.
	Refer to Page.4-7 for analyzer mode.
	Refer to Page.4-13 for monitor mode.
TRIGGER Setting	: Each trigger setting can be made.
	Refer to Page.4-9 for SPI analyzer mode.
	Refer to Page.4-15 for SPI monitor mode.
	Refer to Page.4-21 for I2C analyzer mode.
	Refer to Page.4-28 for I2C monitor mode.
Transaction Filter Sett	-
	: Display transaction information after filtering the
	(*Refer to (4-6) Other functions)
Forced display mode	: Display even invalid transaction forcefully.
i orecu unspiay mode	(*Refer to (4-6) Other functions)
Other Setting	: Set power supply, signal noise filter.
Other Detting	Display a path of a working folder this application
	uses. Pofer to Page 4-10 for SPI analyzon mode
	Refer to Page 4-10 for SPI analyzer mode.
	Refer to Page.4-17 for SPI monitor mode.
	Refer to Page.4-22 for I2C analyzer mode.
	Refer to Page.4-32 for I2C monitor mode.
Capture setting(STAR)	
	Start sampling
	Refer to Page.4-7 for SPI analyzer mode.
	Refer to Page.4-13 for SPI monitor mode.
	Refer to Page.4-19 for I2C analyzer mode.
	Refer to Page.4-25 for I2C monitor mode.

• Stop Sampling/Stop Analyze : Stop sampling or analyzation.

$Search(\underline{S})$

SPI/I2C	Bus monitor -			
: File(F)	Edit(E) Function(V)	Sea	rch(S) Info(H)	
: REC MIN I	🔟 12C SPI 🌇 🌾		Jump transaction number	Ctrl+J
Number	Time(s:ms:µs)		Jump Trigger transaction	
0	2:180:350,90		Search Data	Ctrl+F
1	2:186:352,98		Search I2C ADRS	
2	2:502:326,08		Search I2C SubADRS	
3	2:508:328,16			
4	2:821:301,48		Search I2C NACK	
5	2:827:303,56		Search Error transaction	
		⊕ ↓Î↓	Search Next	F3
			Search Previous	Ctrl+F3

• Jump transaction number...

: Jump a designated transaction number.

• Jump Trigger transaction

: Jump to) ค	transaction	where a	trigger o	ocurs
· oump to	'a	uansaction	where a	uisser	locurs.

- Search Data... : Search a designated data pattern.
- Search I2C ADRS... : Search a designated I2C address.
- Search I2C SubADRS...: Search a designated I2C sub-address.
- Search I2C NACK : Search I2C NACK.
- Search Error transaction

		Search failed transaction.
●	Search Next	: Search data in the forward direction.
-		

• Search Previous : Search data in the backward direction.

Info(H)

SPI/I2C	Bus monitor -			
: File(F)	Edit(E) Function(V)	Search(S)	Info)(H)
E REC RITE	🔟 12C SPI 🌇 🌾	<u> </u> 8 🛈	6	Version Info
Number	Time(s:ms:µs)	time spa		about SPI2C_Mon(A)

- Version Info...
 Display a current mode of REX-USB62(Monitor/ Analyzer), version such as firmware/CPLD/driver/ Application, path of working folder, remained physical memory.
- about SPI2C_Mon(<u>A</u>) : Display a version of this application.

<u>About Tool bar</u>

REC : Start sampling.

This is the same function as selecting [Function(V)]-[Capture setting(START sampling)] from the menu bar.

- -- Refer to Page.4-7 for SPI analyzer mode.
- -- Refer to Page.4-13 for SPI monitor mode.
- -- Refer to Page.4-19 for I2C analyzer mode.
- -- Refer to Page.4-25 for I2C monitor mode.
- Stop sampling or analyzation. This is the same function as selecting [Function(V)]-[Stop Sampling/Stop Analyze] from the menu bar.
- Pause to renew display of transaction. This is the same function as selecting [Function(V)]-[Pause Transaction updating] from the menu bar.
- Each setting of I2C can be made.
 This is the same function as selecting [Function(V)]-[I2C Setting] from the menu bar.
 - -- Refer to Page.4-20 for analyzer mode.
 - -- Refer to Page.4-26 for monitor mode.

SPI : Each setting of SPI can be made.

This is the same function as selecting [Function(V)]-[SPI Setting] from the menu bar.

- -- Refer to Page.4-8 for analyzer mode.
- -- Refer to Page.4-14 for monitor mode.
- **E** : Each trigger setting can be made.

This is the same function as selecting [Function(V)]-[TRIGGER Setting] from the menu bar.

- -- Refer to Page.4-9 for SPI analyzer mode.
- -- Refer to Page.4-15 for SPI monitor mode.
- -- Refer to Page.4-21 for I2C analyzer mode.
- -- Refer to Page.4-28 for I2C monitor mode.

 Display transaction information after filtering them. This is the same function as selecting [Function(V)]-[Transaction Filter
 Setting] from the menu bar.

Set power supply, signal noise filter.

Display a path of a working folder this application uses.

- -- Refer to Page.4-10 for SPI analyzer mode.
- -- Refer to Page.4-17 for SPI monitor mode.
- -- Refer to Page.4-22 for I2C analyzer mode.
- -- Refer to Page.4-32 for I2C monitor mode.

This is the same function as selecting [Function(V)]-[Other Setting] from the menu bar.

Display a current mode of REX-USB62 (Monitor/Analyzer), version such as firmware/CPLD/driver/application, path of working folder, remained physical memory.

This is the same function as selecting [Info(H)]-[Version Info] from the menu bar.

Search data in the forward direction. This is the same function as selecting [Search(S)]-[Search Next] from the menu bar.

 \Re : Search data in the backward direction.

This is the same function as selecting [Search(S)]-[Search Previous] from the menu bar.

(4-2) How to use SPI analyzer mode

If you click the **B** button or select [Function(V)]-[Capture setting(START sampling)], the following screen will appear.

Capture Bus	SPI 🔹	
		I2C setting
Sampling frequency	50MHz 💌	SPI setting
Capture Data size (MB)	256	TRIGGER setting
Driver Buffer size (MB)	16	General setting
(If there is no problem, pleas of driver buffer size.)	se use default value	

After confirming [BUS ANALYZER MODE] appears, set the following.

If [MONITOR MODE] appears, finish this application and refer to 5.Switching Analyzer/Monitor mode to switch modes from monitor mode to analyzer mode.

[Capture Bus] Select SPI.

[Sampling frequency]

Select a sampling frequency from 50MHz/20MHz/10MHz to capture data. (Select 50MHz to have a less margin of error on timing. Please note, the higher the frequency is, the bigger data size is.)

[Capture Data size(MB)] Set a maximum size of captured data. (1 - 480MB) If a default value of 256MB is insufficient, change this value. * If you select 480MB, more than 964MB of an available physical memory is required.

[Driver Buffer size(MB)] Set a buffer size secured in the driver. (1 - 16MB) (Sampled data will be sent to the buffer secured in the driver.) Next, set [SPI Settings] [TRIGGER Setting] [Other Setting].

[SPI Settings]

By clicking the [SPI setting] button, make each setting of SPI.

This setting is the same function as clicking the $\frac{SPI}{V}$ button at the tool bar or selecting [Function(V)]-[SPI Setting] from the menu bar.

Capture settings		×		
BUS ANALYZER MO	DDE		SPI Settings	
Capture Bus	SPI 🔹	I2C setting	Sampling edge (SCLK signal) Image: SCLK raining edge SCLK failing edge	Data bit order
Sampling frequency	50MHz 🔻	SPI setting	SS signal setting	End of transaction condition S signal: active -> inactive (Refer to SS signal setting about active/mactive)
Capture Data size (MB)	256	TRIGGER setting	Monitor SS signal O SS Active LOW O SS Active HIGH	SCLK signal variation time out
Driver Buffer size (MB)	16 💌	General setting		1000 ms (Monitor mode: accuracy of 1 second)
(If there is no problem, please of driver buffer size.)	e use default value			Deta length of transaction (Byte) 1024
			ОК	Cancel
Start	t Capture Canc	el		

[Sampling edge(SCLK signal)] Set a timing of sampling clock.

[SS signal setting]

If SS signal is required to decide whether transaction ends or not, this setting is necessary.

- SS Active LOW --- When SS signal changes from LOW to HIGH, transaction is taken as end.
- SS Active HIGH --- When SS signal changes from HIGH to LOW, transaction is taken as end.

[Data bit order]

- MSB first --- Data is processed in the order from MSB to LSB.
- LSB first --- Data is processed in the order from LSB to MSB.

[End of transaction condition]

- SS signal active -> inactive
 - (This is coordinated by the SS signal setting)
 - -- When SS signal changes from active to inactive, transaction is taken as end.
 - (The [SS signal setting] button described above need to be enabled.)
- SCLK signal variation time out
 - -- If SCLK signal doesn't change for a specified time (Unit: millisecond), transaction is taken as end.
- Data length of transaction(Byte)
 - -- If data length of transaction is longer than a specified length, transaction forcefully ends at the specified length.

[TRIGGER setting]

By clicking the [TRIGGER setting] button, you can set conditions of external input trigger to start capturing.

This setting is the same function as clicking the ^{IB6} button at the tool bar or selecting [Function(V)]-[TRIGGER Setting] from the menu bar.

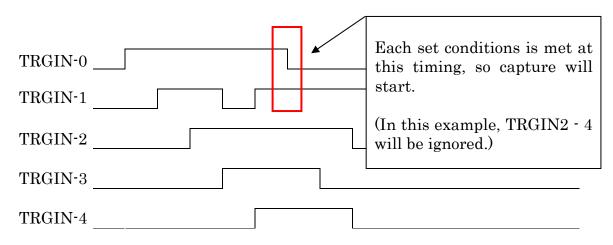
Capture settings	Ext,IN Trigger(TRGIN) Settings
BUS ANALYZER MODE	☑ Enable external input trigger (TRGIN: 0-4)
Capture Bus	✓ TRGIN-0 Enable ✓ TRGIN-1 Enable condition LOW ✓ condition
Sampling frequency 50MHz	Condition LOW Condition LOW Condition LOW Condition LOW
Capture Data size (MB) 256 TRIGGER setting Driver Buffer size (MB) 16 General setting	TRGIN-4 Enable
(If there is no problem, please use default value of driver buffer size.) Start Capture Cancel	Trigger Setting (Monitor/Mode (Monitor/Mode
Start Capture Cancel	

In case of using the external input trigger, enable the check box at [Enable external input trigger(TRGIN:0-4)] and enable TRGIN0 - TRGIN4 which is necessary.

Once each set conditions is met at the same time, capture will start. (Threshold of trigger input(TRIGIN0 - 4) is as follows: Below 10% of power voltage is recognized as Low.

Over 90% of power voltage is recognized as High.)

Eg: If TRGIN-0(Condition LOW), TRGIN-1(Condition HIGH) is set



[General setting]

By clicking the [General setting] button, make a setting of power supply, signal noise filter, temporary file path.

This setting is the same function as clicking the $\frac{12}{100}$ button at the tool bar or selecting [Function(V)]-[Other setting] from the menu bar.

Capture settings	X	Other setting
BUS ANALYZER MODE		Target power supply Current power supply state Power ON
Capture Bus SPI	▼ I2C setting	Power supply setting Unchanged (maintain the curren Change state Power OFF
Sampling frequency 50MHz	▼ SPI setting	Signal noize filter (Analyzer mode only)
Capture Data size (MB) 2	TRIGGER setting	Temporary file path C:\Users\test\AppData\Local\Temp\ < III
Driver Buffer size (MB) (If there is no problem, please use default va of driver buffer size.)	16 General setting	
		☑ Lock memory on sampling (You need to reboot the system to reflect the change.) If there is no problem, please check the box.
Start Capture	Cancel	OK Cancel

[Current power supply state]

In case of [Power ON], REX-USB62 is powered.

In case of [Power OFF (Power not supply)], REX-USB62 isn't powered.

(In this case, data capture can not work)

[Power supply setting]

- Unchanged(maintain the current)--- REX-USB62 works at the setting shown at [Current power supply state].
- Change state --- Select power voltage to supply external or REX-USB62 from Power OFF / 1.8V / 2.5V / 3.3V / 5.0V.

[Signal noise filter(Analyzer mode only)]

This function is to reduce a signal noise.

- OFF(no filter) --- This doesn't use the function of signal noise reduction.
- 2 clock --- This removes change (noise) of signal under 2 clock.
- 3 clock --- This removes change (noise) of signal under 3 clock.
- 4 clock --- This removes change (noise) of signal under 4 clock.

[Temporary file path] This shows a temporary file path.

[Lock memory on sampling]

• Please try to uncheck the check box when memory error happens during sampling even if there is enough space of memory available. In this way, this memory error may not appear. But, if you uncheck the check box, please note some data may not be treated, buffer overrun may happen, or an unexpected error may happen. So, if there is no problem, please check the check box.

[Display and analyzation of captured data]

SP		Bus monitor - Edit(E) Function(V) Search(S) Inf	o(H)					Tran	sacti	ion view list
÷ REC	STE I	🔟 120 SPI 🌇	N <u> </u> 🕄 🕄	≩, ₽₽,							
Numb	er	Time(s:ms:us)	time span(us)	Error, Info	DataLen	MISO Data (Hex)		MOSI Da	ta (Hex)		
	0	3:912:370,76	36370,0	0 -	259	FF FF FF 11 11 11	01 89-08 44	03 00 0	0 00 00 00 00	00-00 00	
	1	11:814:759,78	36370,0	0 -	259	FF FF FF 11 11 11	01 89-08 44	03 00 0	0 00 00 00 00	00-00 00	
	2	12:374:716,66	36370,0	0 -	259	FF FF FF 11 11 11					
	3			Trans	otion		89-08 44				
	4	13:846:602,68		Trans	action	i view	89-08 44				
	5	14:270:570,10		5			 89-08 44	03 00 0	0 00 00 00 00	00 00-00 00	
	۲ (۲ (۲ (۲ (۲ (۲ (۲ (۲ (۲ (۲ (
ADRS	[M I	S0] +0 +1 +	-2 +3 +4 +5 +6	+7 +8 +9 +A	+B +C +D +E	+F ASCII	character			*	
00	000000 FF FF FF 11 11 11 01 89-00-04 44 55 00 00 00 00 00 00 00 00 00 00 00 00										
	000010 00 00 00 10 11 12 13 14 Data will appear										
	0020		1F 20 21 22 23								140
	000030 2D 2E 2F 30 31 32 33 34-35 36 37 38 39 3A 3B 3C/UI23455/2022+										
		ATA MISO DATA				8 4C ->?@ABC	DEFGHIJKL			-	
					ining			10			
[SPI] I	Data	Transaction No. : C)						100%		

[Transaction view list]

[Number] Serial number for transaction.

[Time(sec:ms:us)] Time from the time when capture starts until the time each transaction starts.

[time span(us)] Necessary time for each transaction (micro-second :unit).

[Error] Displays whether error is detected or not.

[DataLen] Data length of each transaction.

[MISO Data (Hex)] Data of slave output or master input is displayed in Hexadecimal.

[MOSI Data (Hex)] Data of slave input or master output is displayed in Hexadecimal.

[Each Tab]

[DATA MISO]

MISO data is displayed in the data window. (ASCII code is also displayed)

[DATA MOSI]

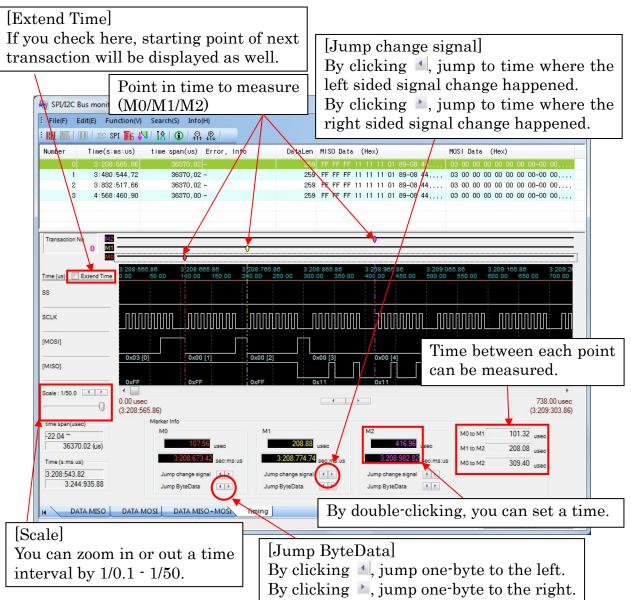
MOSI data is displayed in the data window. (ASCII code is also displayed)

[DATA MISO+MOSI]

MISO data and MOSI data is displayed in the data window. (ASCII code is also displayed)

[Timing]

The window will change from the data window to the below window, and you can confirm each status on signal. And you can set 3 points in time where you can measure time, so that you can measure time between these 3 points.



(4-3) How to use SPI monitor mode

If you click **R** at the tool bar, or select [Function(V)]-[Capture setting(START capturing)], the following window will appear.

MONITOR MODE		
Capture Bus	SPI 💌	I2C setting
Capture Mode	Oneshot 👻	12C Setung
		SPI setting
Capture Data size (MB)	32 🛋	TRIGGER setting
Driver Buffer size (MB)	2	General setting
(If there is no problem, please of driver buffer size.)	use default value	
(If there is no problem, please		General sett

Please confirm [MONITOR MODE] is displayed and confirm the below:

(If [BUS ANALYZER MODE] is displayed, finish this application and switch modes to [MONITOR MODE]. Refer to Chapter 5.Analyzer_Monitor switching tool to switch modes.)

[Capture Bus] Select SPI.

[Capture Mode]

- One shot --- Capturing will automatically finish when the captured data size reach the size specified at [Capture Data size(MB)].
- Free Run --- In this mode, keep capturing until pause or detection of trigger set before. If captured data size is over the size specified at [Capture Data size(MB)], data will be overwritten from the beginning.

[Capture Data size(MB)]

Specify data size to be captured. (1 - 192MB)

* Available physical memory size over 388MB is required to specify data size over 192MB. If the default value (32MB) isn't enough, please set another value.

[Driver Buffer size(MB)] Specify buffer size secured in the driver. (1 - 16MB)

(Sampled data will be sent to the buffer secured in the driver.)

Next, make a setting for [SPI setting] [TRIGGER setting] [General setting].

[SPI setting]

By clicking [SPI setting], make a setting for SPI.

This setting is the same function as clicking the $\frac{SPI}{SPI}$ button at the tool bar, or [Function(V)]-[SPI setting] from the menu bar.

Capture settings		X		
MONITOR MODE				
Capture Bus	SPI 👻		SPI Settings	×
Capture Mode	Oneshot 🔹	I2C setting	Sampling edge (SCLK signal) ScLK rising edge SCLK fall	Data bit order ng edge MSB first LSB first
Capture Data size (MB)	32 🔺	TRIGGER setting	SS signal setting	End of transaction condition S signal: active -> inactive (Refer to SS signal setting about active/inactive)
Driver Buffer size (MB)	2	General setting	Monitor SS signal SS Active LOW SS Active	e HIGH
(If there is no problem, please of driver buffer size.)	e use <mark>default</mark> value			1000 ms (Monitor mode: accuracy of 1 second)
				Deta length of transaction (Byte) 1024
Start	Capture Cance	4		Cancel

[Sampling edge(SCLK signal)]

Set a timing where sampling clock is set.

[SS signal setting]

If SS signal is required to decide whether transaction ends or not, this setting is necessary.

- SS Active LOW --- When SS signal changes from LOW to HIGH, transaction is taken as end.
- SS Active HIGH --- When SS signal changes from HIGH to LOW, transaction is taken as end.

[Data bit order]

- MSB first --- Data is processed in the order from MSB to LSB.
- LSB first --- Data is processed in the order from LSB to MSB.

[End of transaction condition]

- SS signal active -> inactive (This is coordinated by the SS signal setting)
 - -- When SS signal changes from active to inactive, transaction is taken as end. (The [SS signal setting] button described above need to be enabled.)
- SCLK signal variation time out
 - -- If SCLK signal doesn't change for a specified time (Unit: millisecond), transaction is taken as end.
- Data length of transaction(Byte)
 - -- If data length of transaction is longer than a specified length, transaction forcefully ends at the specified length.

[TRIGGER setting]

By clicking the [TRIGGER setting] button, you can set conditions of external input trigger to start capturing.

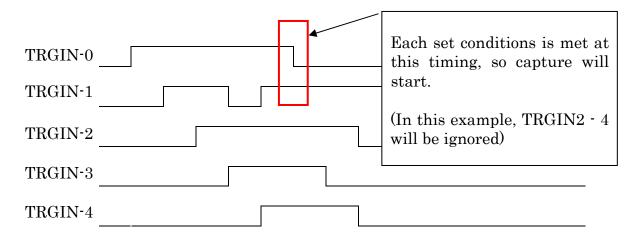
This setting is the same function as clicking the ^{III6} button at the tool bar or selecting [Function(V)]-[TRIGGER Setting] from the menu bar.

Condition	TRGIN-1 Enable
	condition HIGH -
TRGIN-2 Enable	TRGIN-3 Enable
TRGIN-4 Enable	
	OUT Setting
	condition LOW

In case of using the external input trigger, enable the check box at [Enable external input trigger(TRGIN:0-4)] and enable TRGIN0 - TRGIN4 which is necessary.

Once each set conditions is met at the same time, capture will start. (Threshold of trigger input(TRIGIN0 - 4) is as follows: Below 10% of power voltage is recognized as Low. Over 90% of power voltage is recognized as High.)

Example : If TRGIN-0(Condition LOW) and TRGIN-1(Condition HIGH) is set



[Trigger Settings(Monitor mode only)]

By clicking [Trigger Setting(Monitor Mode only)], the following window will appear. (* Only free run mode is valid)

Ext,IN Trigger(TRGIN) Settings	×	Trable trigger (Monitor mode only)
Enable external input trigger (TRGIN: TRGIN-0 Enable condition LOW	Condition HIGH	Clock regist verter model 30 € Toger periodic coptore from 30 € unit the red of the coptore from 50 € Clock periodic coptore from 50 € Data partime mobile 50 € Data bantem 100 01012010100 Victor 25 # 25 # 25 # 25 # 25 # 25 # 25 # 25
TRGIN-2 Enable	TRGIN-3 Enable	12C only
condition LOW	condition LOW -	Cendbell ZC & ddiese Cendbell ZC & dd
Trigger Setting (MonitorMode only) TRGOUT 12C or	Mode	AACK detection (CR * (Data pattern (OR *) (12C address (OR *) Sub-address)) OK Cancel

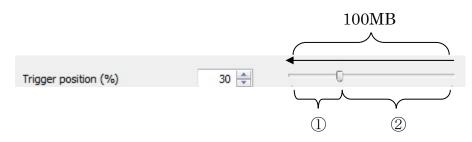
[Enable trigger(Monitor mode only)]

Data specified by [Data pattern] will be detected and capture will finish when captured data reach the size specified by [Trigger position(%)].

[Trigger position(%)]

Specify buffer size of which data is from trigger detection until end of capturing. Buffer size is specified by percentage.

Example : If capture data size is 100MB, and trigger position(%) is 30%



- ① Capture will finish after approx 30MB data is captured from trigger detection.
- ② Capture data before trigger detection is approx 70MB.

[Data pattern enable]

- Data length(Byte) --- Specify data length of data pattern to detect trigger.
- Data pattern --- Specify data pattern to detect trigger.
- Mask pattern --- AND OPERATION for a value specified at [Mask pattern] and [capture data], and trigger at a value specified at [Data pattern].

<u>Example</u> : Mask pattern	01110001	
capture data	10110101	This value is triggered at a value
		specified at [Data pattern].
AND OPERATION	00110001	

[General setting]

By clicking [General setting], make a setting of power supply, signal noise filter, temporary file path.

This setting is the same function as clicking the \mathbb{R} button at the tool bar or selecting [Function(V)]-[Other setting] from the menu bar.

			Uther setting	
			Target power supply	
Capture settings		X	Current power supply state	e Power ON
capture settings			Power supply setting ()	Unchanged (maintain the curren
MONITOR MODE			O	Change state Power OFF 💌
Capture Bus	SPI 🔻	I2C setting	Signal noize filter (Analyzer mode only)	OFF (no filter)
Capture Mode	Oneshot 🔻			
		SPI setting	Temporary file path	C:\Users\test\AppData\Local\Temp\
				< >
Capture Data size (MB)	32	TRIGGER setting		
Driver Buffer size (MB)	2	General setting		
(If there is no problem, please u of driver buffer size.)	ise default value		Lock memory on samplin (You need to reboot the If there is no problem, p	e system to reflect the change.)
Start C	apture Cancel		ОК	Cancel

[Current power supply state]

If status is [Power ON], REX-USB62 is powered.

If status is [Power OFF(Power not supply)], REX-USB62 is not powered.

(In this case, data capture can not work)

[Power supply setting]

- Unchanged(maintain the current) --- REX-USB62 works at the setting shown at [Current power supply state].
- Change state --- Select power voltage to supply external or REX-USB62 from Power OFF / 1.8V / 2.5V / 3.3V / 5.0V.

[Signal noise filter(Analyzer mode only)] Monitor mode doesn't use this filter.

[Temporary file path]

This shows a temporary file path.

[Lock memory on sampling]

• Please try to uncheck the check box when memory error happens during sampling even if there is enough space of memory available. In this way, this memory error may not appear. But, if you uncheck the check box, please note some data may not be treated, buffer overrun may happen, or an unexpected error may happen. So, if there is no problem, please check the check box.

~

[Display and analyzation of captured data]

A SPL	/I2C Bu:	monitor -									00	×			
File(t(E) Function(I20 SPI 16									Tr	ans	action	ı view	list
Numbe	r	Time(s:ms:us)	time	span(us)	Error, Info	DataLen	MISO Date	(Hex)		MOSI Dat	a (Hex)				
	0				-	259	FF FF FF	11 11 11 01	89-08 44	03 00 0	0 00 00 0	0 00 00-0			
	1	-		-	-				89-08 44						
	2	-		-	-	259	FF FF FF	11 11 11 01	89-08 44	03 00 0	0 00 00 0	0 00 00-0			
				[Tr	ansac	tion v	riew					Þ			
ADRS	[MISO) +0 +1	+2 +3 +	4 +5 +6 -	+7 +8 +9 +A +	B +C +D +E +F	AS	CII chara	ster			^			
000				1 11 01	89-08 44 44 5	6 00 00 00 00		DDV.							
000	020	00 00 1D 1E 2D 2E	1F 20 2F 30	Dat	ta wil	l appe	ar	!"#\$%&`() 0123456789	±+,						
IN [SPI] D	DATA	MISO DATA	A MOSI	DATA MIS	50+MOSI	49 4A 4B 4C		20ABCDEFGHI	JKL		100%	▲ ▷ ►	Tab		

[Transaction view list]

[Number] Serial number for transaction.

[Time(sec:ms:us)] Time from the time when capture starts until the time each transaction starts.

[time span(us)] Necessary time for each transaction(micro-second :unit).

[Error] Displays whether error is detected or not.

[DataLen] Data length of each transaction.

[MISO Data (Hex)] Data of slave output or master input is displayed in Hexadecimal.

[MOSI Data (Hex)] Data of slave input or master output is displayed in Hexadecimal.

[Each Tab]

[DATA MISO] MISO data is displayed in the data window. (ASCII code is also displayed)

[DATA MOSI] MOSI data is displayed in the data window. (ASCII code is also displayed)

[DATA MISO+MOSI] MISO data and MOSI data is displayed in the data window. (ASCII code is also displayed)

(4-4) How to use I2C analyzer mode

If you click **R** at the tool bar, or selecting [Function(V)]-[Capture setting(START sampling)], the following window will appear.

BUS ANALYZER MO	DDE	
Capture Bus	I2C #0(Main) 🔻	I2C setting
Sampling frequency	50MHz 🔹	SPI setting
Capture Data size (MB)	256	TRIGGER setting
Driver Buffer size (MB)	16	General setting
(If there is no problem, please of driver buffer size.)	e use default value	

Confirm [BUS ANALYZER MODE] is displayed and make the following setting. (If [MONITOR MODE] is displayed, finish this application and switch modes to [BUS ANALYZER MODE]. Refer to Chapter 5.Analyzer_Monitor switching tool to switch modes.)

[Capture Bus]

Select I2C #0(Main). (With I2C interface, you can connect 2 bus lines at most. If I2C SCL(Sub)/I2C SDA(Sub) is used, please select I2C #1(Sub))

[Sampling frequency]

Select a sampling frequency from 50MHz/20MHz/10MHz to capture data. (To make error of timing judgment less, select 50MHz. Please note, the higher the frequency is, the bigger data size is.)

[Capture Data size(MB)]

Specify data size to be captured. (1 - 480MB)

If the default value (256MB) isn't enough, please set another value.

* Available physical memory size over 964MB is required to specify data size over 480MB.

[Driver Buffer size(MB)]

Specify buffer size secured in the driver. (1 - 16MB) (Sampled data will be sent to the buffer secured in the driver.) Next, make a setting for [I2C setting] [TRIGGER setting] [General setting].

[I2C setting]

By clicking [I2C setting], make a setting for I2C.

This setting is the same function as clicking the ¹² button at the tool bar, or [Function(V)]-[I2C setting] from the menu bar.

		I2C Settings			<u> </u>
		I2C Signal Timing Pameter ((Analyzer mode only)		
			AST/STANDARD MODE Timing	HS-MODE Timing	
		tHD_STA (min.)	60 🔹 x10(ns)	15 * ×10(ns)	Hold time (repeated)START condition.
		tSU_STA (min.)	60 🚔 x10(ns)	15 x ×10(ns)	Setup time for repeated START condition.
ture settings	×	tSU_STO (min.)	60 📩 x10(ms)	16 🗼 ×10(ns)	Setup time for STOP condition.
		tBUF (min.)	130 ÷ x10(ns)		Bus free time between a STOP and START condition.
US ANALYZER MODE		tLOW (min.)	130 🔹 x10(ns)	16 👘 ×10(ns)	LOW period of the SCL clock
pture Bus I2C #0(Main) 🔻		tHIGH (min.)	60 📩 x10(ns)	6 📩 ×10(nd)	HIGH period of the SCL clock
	I2C setting	HD_DAT (max.)	90 🐳 x10(ns)	7 📩 ×10(ns)	Data hold time.
	SPI setting	tSU_DAT(min.)	10 🐺 x 10(ns)	1 × ×10(ns)	Data set-up time.
ampling frequency 50MHz -		**[WARNING!]**	mended that the sampling frequ	ency set to \$7 Mile	
apture Data size (MB) 256 🚔	TRIGGER setting	Otherwise, may not be pr	operly judged.		
river Buffer size (MB)	General setting	FAST-MODE default value	STANDARD-MODE default value	HS-MODE(100pF) default value	HS-MODE(400pF) default value
(If there is no problem, please use default value of driver buffer size.)		enable HS-MODE			
or unver burrer size.)		✓ Ignore NACK before S	TOP. played on the packet viewer, ar	nd is always innered on "TDC	0(77)
		(NOIC: It is amays as		no is aways ignored on Tiku	001)
Start Capture Ca	ancel		TRGOUT Setting (MonitorMode only)	ОК Са	ncel

[I2C Signal Timing Parameter(Analyzer mode only)]

This can detect part which is not sufficient to AC characteristic value. The default value can be changed.

Symbol	Explanation
tHD_STA *1	Hold time(repeated) [START] conditions
thD_SIA I	After this period, the first clock pulse will be created.
tSU_STA *1	Set-up time for repeated [START] conditions
tSU_STO *1	Set-up time for [STOP] conditions
tBUF	Bus free time between [STOP] conditions and [START]
tDUT	conditions
tLOW *2	"L" period of SCL clock
tHIGH *2	"H" period of SCL clock
tHD_DAT *2	Data hold time
tSU_DAT *2	Data set-up time

Conditions of the above setting are not met, a message at the error section of the transaction view(Page.4-23) will be shown.

*1 --- will highlight appropriate part of the shown wave with color(Page.4-24)

*2 --- will highlight appropriate part of the shown wave with color(Page.4-24) (You need to check [Show Error Timing](Page.4-24))

[FAST-MODE Default value] –If I2C bus mode is fast mode, this setting is valid.

[STANDARD-MODE Default value] --- If I2C bus mode is standard mode,

this setting is valid.

[HS-MODE(100pF) Default value] --- If I2C bus mode is HS-MODE(100pF), this setting is valid. [HS-MODE(400pF) Default value] --- If I2C bus mode is HS-MODE(400pF), this setting is valid. [Enable HS-MODE] --- If this setting is checked, HS-MODE setting is enabled.

[Ignore "NACK" before [STOP]] --- NACK before STOP conditions aren't treated as error.

[Trigger Settings]

By clicking the [TRIGGER setting] button, you can set conditions of external input trigger to start capturing.

This setting is the same function as clicking the \mathbb{B} button at the tool bar, or [Function(V)]-[TRIGGER setting] from the menu bar.

			Enable external input trigger (T	RGIN: 0-4)
BUS ANALYZER M	ODE		TRGIN-0 Enable	TRGIN-1 Enable
Capture Bus	I2C #0(Main) 🔻	I2C setting	condition LOW -	
Sampling frequency	50MHz 🔻	SPI setting	Condition	Condition LOW V
Capture Data size (MB) Driver Buffer size (MB)		TRIGGER setting	TRGIN-4 Enable	
(If there is no problem, pleas of driver buffer size.)	t Capture Cancel		(MonitorMode only)	SOUT Setting IonitorMode IZC only) OK Cancel

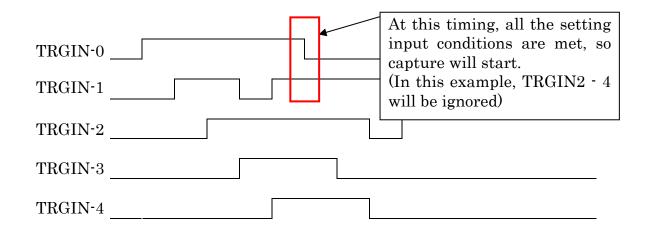
To use an external input trigger, check the check box at [Enable external input trigger(TRGIN:0-4)] and also check the check box for TRGIN0 - TRGIN4.

Once all the setting input conditions are met at the same time, capture will start. (Threshold of trigger input(TRIGIN0 - 4) is as follows:

Under 10% of voltage of power supply will be low.

Over 90% of voltage of power supply will be High)

Example : If TRGIN-0(Condition LOW) and TRGIN-1(Condition HIGH) is set



[General setting]

By clicking [General setting], make a setting of power supply, signal noise filter, temporary file path.

This setting is the same function as clicking the \mathbb{R} button at the tool bar, or [Function(V)]-[Other setting] from the menu bar.

Capture settings	Other setting
BUS ANALYZER MODE	Target power supply Current power supply state Power ON
Capture Bus I2C #0(Main) I2C setting	Power supply setting (a) Unchanged (maintain the curren Change state Power OFF *
Sampling frequency 50MHz	Signal noize filter (Analyzer mode only) OFF (no filter) •
Capture Data size (MB) 256 🚔 TRIGGER setting	Temporary file path C:\Users\test\AppData\Loca\\Temp\ < III
Driver Buffer size (MB) 16 🔔 General setting	
(If there is no problem, please use default value of driver buffer size.)	✓ Lock memory on sampling (You need to reboot the system to reflect the change.)
Start Capture Cancel	If there is no problem, please check the box.

[Current power supply state]

If status is [Power ON], REX-USB62 is powered.

If status is [Power OFF(Power not supply)], REX-USB62 is not powered. (In this case, to capture data don't work)

[Power supply setting]

- Unchanged(maintain the current) --- REX-USB62 works at the setting shown at [Current power supply state].
- Change state --- Select power voltage to supply external or REX-USB62 from Power OFF / 1.8V / 2.5V / 3.3V / 5.0V.

[Signal noise filter(Analyzer mode only)]

This is a function to reduce signal noise filter.

- OFF(No filter) --- This doesn't use a function to reduce signal noise.
- 2 clock --- This removes a signal change(noise) under 2 clock.
- 3 clock--- This removes a signal change(noise) under 3 clock.
- 4 clock --- This removes a signal change(noise) under 4 clock.

[Temporary file path]

This shows a temporary file path.

[Lock memory on sampling]

• Please try to uncheck the check box when memory error happens during sampling even if there is enough space of memory available. In this way, this memory error may not appear. But, if you uncheck the check box, please note some data may not be treated, buffer overrun may happen, or an unexpected error may happen. So, if there is no problem, please check the check box.

[Display and analyzation of captured data]



[Transaction view list]

[Number] Serial number for transaction.

[<u>Time(sec:ms:us)</u>] Time from the time when capture starts until the time each transaction starts.

 $\label{eq:lime_span} \underbrace{[time \ span(us)]}_{Necessary \ time \ for \ each \ transaction(\mu \ second \ `unit).}$

[Adrs] Address of I2C device.

[R/W] Read/Write is displayed.

[S/R/P] S: Start conditions. R: Repeat start conditions. P: Stop conditions.

[NACK] Displays whether NACK is detected or not.

[Error] Displays whether error is detected or not.

[DataLen] Data length of each transaction.

[Data (Hex)] Each transaction data in Hexadecimal.

[Each Tab]

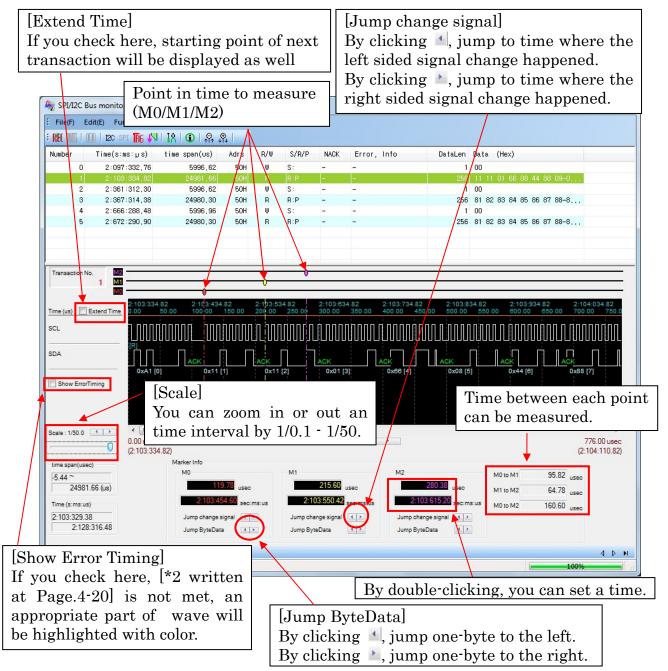
[Packet] I2C packet data is displayed.

[DATA]

Captured data is dumped in Hexadecimal and ASCII character.

[Timing]

The window will change from the data window to the below window, and you can confirm each status on signal. And you can set 3 points in time where you can measure time, so that you can measure time between these 3 points.



(4-5) How to use I2C monitor mode

If you click **R** at the tool bar, or selecting [Function(V)]-[Capture setting(START sampling)], the following window will appear.

Capture Bus	I2C #0(Main) ▼	
		I2C setting
Capture Mode	Oneshot 💌	SPI setting
Capture Data size (MB)	32	TRIGGER setting
Driver Buffer <mark>size (</mark> MB)	2 🛋	General setting
(If there is no problem, pleas of driver buffer size.)	se use default value	

Confirm [MONITOR MODE] is displayed and make the following setting. (If [BUS ANALYZER MODE] is displayed, finish this application and switch modes to [MONITOR MODE]. Refer to Chapter 5.Analyzer_Monitor switching tool to switch modes.)

[Capture Bus]

Select I2C #0(Main). (With I2C interface, you can connect 2 bus lines at most. If I2C SCL(Sub)/I2C SDA(Sub) is used, please select I2C #1(Sub))

[Capture Mode]

- One shot --- Capturing will automatically finish when the captured data size reach the size specified at [Capture Data size(MB)].
- Free Run --- In this mode, keep capturing until pause or detection of trigger set before. If captured data size is over the size specified at [Capture Data size(MB)], data will be overwritten from the beginning.

[Capture Data size(MB)]

Specify data size to be captured. (1 - 192MB)

If the default value(192MB) isn't enough, please set another value.

- $\bullet~$ Available physical memory size over 388MB is required to specify data size over
- 192MB.

[Driver Buffer size(MB)] Specify buffer size secured in the driver. (1 - 16MB) (Sampled data will be sent to the buffer secured in the driver.) Next, make a setting for [I2C setting] [TRIGGER setting] [General setting].

[I2C setting]

By clicking [I2C setting], make a setting for I2C.

This setting is the same function as clicking the $\stackrel{\mathbb{P}}{\cong}$ button at the tool bar, or [Function(V)]-[I2C setting] from the menu bar.

				12C S	ignal Timing Pameta	r (Analyzer mode only)		
						FAST/STANDARD MODE Timing	HS-MODE Timing	
				x 100,	_STA (min.)	60 × ×10(ns)		Hold time (repeated) condition.
ture settings					_STA (min.)	60 × x10(ns)	16 × ×10(rs)	Setup time for repeat START condition.
IONITOR	MODE			630,	_STO (min.)	60 × x10(ns)	16 × ×10(ns)	Setup time for STOP condition.
				UBUF	F (min.)	130 x x10(ns)		Bus free time betwee STOP and START con
pture Bus		I2C #0(Main) 🔻		ELO1	W (min.)	130 × ×10(ns)	15 × ×10(ns)	LOW period of the 50
oture Mode	r	Oneshot 🔻	I2C setting	BHIG	SH (min.)	60 ×10(ns)	6 📩 ×10(ns)	HIGH period of the SC
itul e Mode	l	Oneshot 🔹	SPI setting	HD,	_DAT (max.)	90 👘 ×10(ns)	7 * ×10(nd)	Data hold time.
				- 50,	_DAT(min.)	10 💌 ×10(ns)	1 📩 ×10(ns)	Data set-up time.
ture Data size	e (MB)	32 🛋	TRIGGER setting.	11 A	WARNING(1]** nalyzer mode, Reci erwise, may not be	mmended that the sampling fre properly judged.	quency set to 50 MHz.	
ver Buffer size	(MB) roblem, please use d	2 📄	General setting.		FAST-MODE default valu	e STANDARD-MODE default value	HS-MODE(100pF) default value	HS-MODE(400pF) default value
	Start Captu	re	Cancel			TRGOUT Setting (MonitorMode only)		ncel
-								
Signal Timing Pameter (A	inalyzer mode only) ST/STANDARD MODE Timing	HS-MODE Timing						
ignal Timing Pameter (A		HS-MODE Timing 16 x 10(ns)	Hold time (repeated)START condition.					
ignal Timing Pameter (A FA STA (min.)	ST/STANDARD MODE Timing	Timing	Hold time (repeated)START condition. Setup time for repeated START condition.					
ignal Timing Pameter (A FA I STA (min.)	ST/STANDARD MODE Timing 60 * x10(ns) 60 * x10(ns) 60 * x10(ns)	Timing 16 × ×10(ns)	Hold time (repeated)START condition. Safup time for repeated START condition. Setup time for STOP condition.					
gnal Timing Pameter (Å FA STA (min.)	5T/STANDARD MODE Timing 60 + x10(ns) 60 + x10(ns)	16 x 16 x 16 x x10(ns) x	Hold time (repeated)START condition. Setup time for repeated START condition. Setup time for STOP					
ignal Timing Pameter (Å FA FA fi STA (min.)	ST/STANDARD MODE Timing 60 * x10(ns) 60 * x10(ns) 60 * x10(ns)	16 x 16 x 16 x x10(ns) x	Hold time (repeated)START condition. Setup time for repeated START condition. Setup time for STOP condition. Dus free time between a					
Final Timing Pameter (A FA FIA fi STA (min.) STA (min.) STA (min.) STA (min.) STO (min.) STO (min.) (min.) (min.)	ST/STANDARD MODE Timing 60 ± x10(ns) 60 ± x10(ns) 60 ± x10(ns) 130 ± x10(ns)	16 _x x10(ns) 16 _x x10(ns) 16 _x x10(ns) 16 _x x10(ns)	Hold time (repeated)START condition. Setup time for repeated START condition. Setup time for STOP condition. But free time between a STOP and START condition.					
STA (min.)	ST/STANDARD MODE Timing 60 * * 100 * *	Timing 16 x x10(ns) 15 x x10(ns) x10(ns) 15 x x10(ns) x10(ns) 16 x x10(ns) x10(ns) 16 x x10(ns) x10(ns)	Hold time (repeated)START condition. Setup time for repeated START condition. Setup time for STOP condition. Bus free time between a STOP and START condition. LOW period of the SCL clock.					
Signal Timing Pameter (A FA FA FA 2_STA (min.) [] 1_STA (min.) [] U_STO (min.) [] W(min.) [] O_DAT (max.) []	ST/STANDARD 100E Timing 60 * x10(ns) 60 * x10(ns) 60 * x10(ns) 130 * x10(ns)	Timing 16 ± x10(ns) 15 ± x10(ns) x10(ns) 16 ± x10(ns) x10(ns) 16 ± x10(ns) x10(ns) 6 ± x10(ns) x10(ns)	Hold time (repeated)START condition. Setup time for repeated START condition. Setup time for STOP condition. Bus: free time between a STOP and START condition. LOW period of the SCL clock. HtGH period of the SCL clock.					
Signal Timing Pameter (P FA FA FA J_STA (min.) [] J_STA (min.) [] J_STO (min.) [] GF (min.) [] J_STA (min.) [] J_STA (min.) [] J_STA (min.) [] J_GAT (min.) [] J_DAT (min.) [] J_DAT (min.) [] J_DAT (min.) []	ST/STANDARD 100E Timing 60 * x10(ns) 60 * x10(ns) 130 * x10(ns) 130 * x10(ns) 60 * x10(ns) 130 * x10(ns) 130 * x10(ns) 60 * x10(ns) 60 * x10(ns) 60 * x10(ns) 10 * x10(ns)	Timing 16 x 16 x 16 x x10(ns) x10(ns) 16 x x10(ns) x10(ns) 16 x x10(ns) x10(ns) 1 x x10(ns) x10(ns) 1 x x10(ns) x10(ns)	Hold time (repeated)START condition. Setup time for repeated START condition. Setup time for STOP condition. Dus free time between a STOP and START condition. LOW period of the SCL clock. HIGH period of the SCL clock. Data hold time.					
Signal Timing Pameter (Jr FA FA FA D_STA (min.) Image: Comparison of the second	ST/STANDARD 400E Timing 60 * 100 *	Timing 16 x 16 x 16 x x10(ns) x10(ns) 16 x x10(ns) x10(ns) 16 x x10(ns) x10(ns) 1 x x10(ns) x10(ns) 1 x x10(ns) x10(ns)	Hold time (repeated)START condition. Setup time for repeated START condition. Setup time for STOP condition. Dus free time between a STOP and START condition. LOW period of the SCL clock. HIGH period of the SCL clock. Data hold time.					
Signal Timing Pameter (k FA 2_5TA (min.) FA 1_5TA (min.) F 1_5TO (min.) F 0_5TA (max.) F	ST/STANDARD 400E Timing 60 * 100 *	Timing 16 x 16 x 16 x x10(ns) x10(ns) 16 x x10(ns) x10(ns) 16 x x10(ns) x10(ns) 1 x x10(ns) x10(ns) 1 x x10(ns) x10(ns)	Hold time (repeated)START condition. Setup time for repeated START condition. Setup time for STOP condition. Dus free time between a STOP and START condition. LOW period of the SCL clock. HIGH period of the SCL clock. Data hold time.					
Signal Timing Pameter (Jr FA FA FA D_STA (min.) Image: Comparison of the second	ST/STANDARD 400E Timing 60 * 100 *	Timing 16 x 16 x 16 x x10(ns) x10(ns) 16 x x10(ns) x10(ns) 16 x x10(ns) x10(ns) 1 x x10(ns) x10(ns) 1 x x10(ns) x10(ns)	Hold time (repeated)START condition. Setup time for repeated START condition. Setup time for STOP condition. Dus free time between a STOP and START condition. LOW period of the SCL clock. HIGH period of the SCL clock. Data hold time.					
	ST/STANDARD 100E Timing 60 * x10(ns) 60 * x10(ns) 100 * x10(ns) 110 * x10(ns) 100 * x10(ns	Timing 10 (ns) 16 ± x10(ns) 1 ± x10(ns) HIS-MODE(100pF)	Hold time (repeated)START condition. Setup time for repeated START condition. Setup time for STOP condition. Bus: free time between a STOP and START condition. LOW period of the SCL clock. HIGH period of the SCL clock. Data hold time. Data set-up time.					
Signal Timing Pameter (A FA FA FA D_STA (mn.) C U_STA (mn.) C U_STO (mn.) C U_DAT (max.) C U_DAT (max.) C U_DAT (mn.) C EAST-MODE FASHADE Isange MACK Elefore STI C	ST/STANDARD 100E Timing 60 ± x10(ns) 60 ± x10(ns) 60 ± x10(ns) 100 ± x10(ns) 100 ± x10(ns) 100 ± x10(ns) 00 ± x10(ns) 00 ± x10(ns) 10 ± x10(ns) 10 ± x10(ns) ended that the sampling frequeently ladged. STANDARD-MODE default value	Timing Timing 16 x x10(ns) 1 x10(ns) x10(ns) 7 x10(ns) x10(ns) 1 x10(ns) x10(ns) H5-MODE(100pF) x10(ns)	Hold time (repeated)START condition. START condition. START condition. Statu time for repeated START condition. Due free time between a STOP and START condition. LOW period of the SCL clock. HIGH period of the SCL clock. Data hold time. Data set-up time. HIS-HODE(HODP) default value					
Signal Timing Pameter (A FA FA FA D_STA (mn.) C U_STA (mn.) C U_STO (mn.) C U_DAT (max.) C U_DAT (max.) C U_DAT (mn.) C EAST-MODE FASHADE Isange MACK Elefore STI C	ST/STANDARD 400E Timing 60 x10(ns) 60 x10(ns) 60 x10(ns) 130 x10(ns) 130 x10(ns) 130 x10(ns) 90 x10(ns) 130 x10(ns) 90 x10(ns) 90 x10(ns) 910 x10(ns) 92 x10(ns) 93 x10(ns) 94 x10(ns) 95 x10(ns) 96 x10(ns)	Timing Timing 16 x x10(ns) 1 x10(ns) x10(ns) 7 x10(ns) x10(ns) 1 x10(ns) x10(ns) H5-MODE(100pF) x10(ns)	Hold time (repeated)START condition. START condition. START condition. Statu time for repeated START condition. Due free time between a STOP and START condition. LOW period of the SCL clock. HIGH period of the SCL clock. Data hold time. Data set-up time. HIS-HODE(HODP) default value					
Signal Timing Pameter (A FA FA FA ID_STA (nin.) ID U_STA (nin.) ID U_STA (nin.) ID U_STA (nin.) ID UG (nin.) ID UG (nin.) ID UG (nin.) ID ULDAT (ninc.) ID VU_DAT(min.) ID VU_DAT(min.) ID EAST-MODE EAST-MODE EAST-MODE EAST-MODE Imable HS-MODE Image NAACK before STI	ST/STANDARD 100E Timing 60 ± x10(ns) 60 ± x10(ns) 60 ± x10(ns) 100 ± x10(ns) 100 ± x10(ns) 100 ± x10(ns) 00 ± x10(ns) 00 ± x10(ns) 10 ± x10(ns) 10 ± x10(ns) ended that the sampling frequeently ladged. STANDARD-MODE default value	Timing 16 x 16 x 16 x 16 x x10(ns) x 16 x x10(ns) x 16 x x10(ns) x 16 x x10(ns) x 1 x x10(ns) x 1 x x10(ns) x 1 x x10(ns) x 1 x x10(ns) x H5-MODE(100pf) default value dis always ignored on "TRG	Hold time (repeated)START condition. START condition. START condition. Statu time for repeated START condition. Due free time between a STOP and START condition. LOW period of the SCL clock. HIGH period of the SCL clock. Data hold time. Data set-up time. HIS-HODE(HODP) default value					

[Ignore "NACK" before [STOP]] --- NACK before STOP conditions aren't treated as error.

2C Signal Timing Pame	eter (Analyzer mode only)		
	FAST/STANDARD MODE Timing	HS-MODE Timing	
tHD_STA (min.)	60 🔺 ×10(ns)	16 × ×10(ns)	Hold time (repeated)START condition.
tSU_STA (min.)	60 × ×10(ns)	16 × ×10(ns)	Setup time for repeated START condition.
tSU_STO (min.)	60 × ×10(ns)	16 × ×10(ns)	Setup time for STOP condition.
tBUF (min.)	130 × ×10(ns)		Bus free time between a STOP and START condition.
tLOW (min.)	130 × ×10(ns)	16 🔺 ×10(ns)	LOW period of the SCL clock.
tHIGH (min.)	60 × ×10(ns)	6 🔺 ×10(ns)	HIGH period of the SCL clock.
tHD_DAT (max.)	90 × ×10(ns)	7 × ×10(ns)	Data hold time,
tSU_DAT(min.)	10 × ×10(ns)	1 📩 ×10(ns)	Data set-up time.
F**[WARNING!]** If Analyzer mode, Re Otherwise, may not FAST-MC default va	DE STANDARD-MODE	quency set to 50 MHz. HS-MODE(100pF) default value	HS-MODE(400pF) default value
enable HS-MODE			
Ignore NACK befo	ore STOP.		

[Trigger output(TRGOUT) setting(Monitor Mode only)]

If you click this button, the following window will appear.

Enable I2C address	Enable I2C sub address
I2C address value 0x50	Sub-address length 2 💌
	:+0:+1:+2:+3
10bit ADRS mode	Sub-address data :00:00:00:00
NACK detection (Ignore NAC	K hafera a STOD)

[Enable trigger output(TRGOUT)(I2C Monitor mode only)

If data set is triggered, LOW signal will be output from I2C trigger output terminal (TRGOUT).(When STOP conditions are detected, it will change to HIGH)

[Enable I2C address] Use a set I2C address as trigger.

[Enable I2C sub address] Use a set I2C sub address as trigger.

[NACK detection(Ignore NACK before a STOP)] Use a NACK for trigger.

[TRIGGER setting]

By clicking the [TRIGGER setting] button, you can set conditions of external input trigger to start capturing.

This setting is the same function as clicking the $\mathbb{I}_{1}^{\mathbb{E}}$ button at the tool bar, or [Function(V)]-[TRIGGER setting] from the menu bar.

MONITOR MODE			Enable external input trigger (T	RGIN: 0-4)
			TRGIN-0 Enable	TRGIN-1 Enable
Capture Bus	I2C #0(Main) -	I2C setting	condition LOW -	condition (HIGH -
Capture Mode	Oneshot 💌	SPI setting	TRGIN-2 Enable	TRGIN-3 Enable
			condition LOW ~	condition LOW -
Capture Data size (MB)	32 🚔	TRIGGER setting	TRGIN-4 Enable	
Driver Buffer size (MB)	2 🚔	General setting		
(If there is no problem, please of driver buffer size.)	e use default value		condition LOW -	
			Trigger Setting TRG	OUT Setting

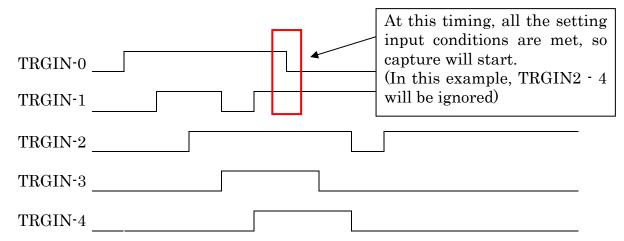
To use an external input trigger, check the check box at [Enable external input trigger(TRGIN:0-4)] and also check the check box for TRGIN0 - TRGIN4.

Once all the setting input conditions are met at the same time, capture will start. (Threshold of trigger input(TRIGIN0 - 4) is as follows:

Under 10% of voltage of power supply will be Low.

Over 90% of voltage of power supply will be High)

Example : If TRGIN-0(Condition LOW) and TRGIN-1(Condition HIGH) is set



[Trigger Setting(Monitor mode only)]

(* This is valid only for free run mode)

Ext,IN Trigger(TRGIN) Settings	×
Enable external input trigger	(TRGIN: 0-4)
TRGIN-0 Enable	TRGIN-1 Enable
condition LOW	▼ condition HIGH ▼
TRGIN-2 Enable	TRGIN-3 Enable
condition LOW	▼ condition LOW ▼
TRGIN-4 Enable	
condition LOW	
	200175.0.11-2
	RGOUT Setting (MonitorMode I2C only) OK Cancel

If you click [Trigger Setting(Monitor Mode only)], the following window will appear.

Trigger Settings (Monitor mode only)	×
Enable trigger (Monitor mode only)	
Trigger position (%) (Percentage of the capture buffer until the end of the capture from the trigger detection.)	30 👘
🔽 Data pattern enable	
Data length (Byte)	
:+0:+1:+2:+3:+ Data pattern :00:01:02:03:0 Mask pattern :FF:FF:FF:FF:FF:FF:FF:FF:FF:FF:FF:FF:FF	0:00:00:00
I2C only	
enable I2C address	enable I2C sub address
I2C address 0x50 value	Sub-address length (Byte) 2
Mask value 0x3FF 10bit address mode	Sub-address data Mask
Condition == (equal) 🔹	Condition == (equal)
NACK detection (Whether NACK before a STOP is	included or not depends on I2C settings.)
Combination of trigger conditions (I2C c	only)
NACK detection OR 🔻	
{ Data pattern OR 🔻	(I2C address OR V Sub-address) }
	OK Cancel

[Enable trigger(Monitor mode only)]

Data specified by [Data pattern] will be detected and capture will finish when captured data reach the size specified by [Trigger position(%)].

Page.4-30

[Trigger position(%)]

Specify data size of which data is from trigger detection until end of capturing. Data size is specified by percentage.

Example : If capture data size is 100MB, and trigger position(%) is 30%



- 1 Capture will finish after approx 30MB data is captured from trigger detection.
- ② Capture data before trigger detection is approx 70MB.

[Data pattern enable]

- Data length(Byte) --- Specify data length of data pattern to detect trigger.
- Data pattern --- Specify data pattern to detect trigger.
- Mask pattern --- AND OPERATION for a value specified at [Mask pattern] and [capture data], and trigger at a value specified at [Data pattern]. Example : Mask pattern 01110001

ample : Mask pattern	01110001	
capture data	10110101	This value is triggered at a value specified at [Data pattern].
		speemed at [Data pattern]:
AND OPERATION	00110001	

[enable I2C address]

- I2C address value --- Specify an I2C address for trigger detection.
- Mask value --- AND OPERATION for a value specified at [Mask value] and captured I2C address, and trigger at a value specified at [I2C address value].(Refer to [Data pattern enable].)
- Condition --- Select trigger conditions.

[enable I2C sub address]

- Sub-address length --- Specify a length of I2C sub-address for trigger detection.
- Sub-address data --- Specify an I2C sub-address for trigger detection.
- Mask --- AND OPERATION for a value specified at [Mask] and captured I2C sub-address, and trigger at a value specified at [sub-address]
 - data].(Refer to [Data pattern enable].)
- Condition --- Select trigger conditions.

[Whether NACK before a STOP is included or not depends on I2C settings]

Use a NACK as trigger detection. (For NACK before a [STOP], set it at ²² of the tool bar, or from [Function(V)]-[I2C setting].

[Combination of trigger conditions(I2C only)] AND OPERATION • OR OPERATION for each trigger conditions.

xt,IN Trigger(TRGIN) Settings	×
Enable external input trigger (TRGIN:	0-4)
TRGIN-0 Enable	TRGIN-1 Enable
condition LOW -	condition HIGH
TRGIN-2 Enable	TRGIN-3 Enable
condition LOW -	condition LOW -
TRGIN-4 Enable condition LOW	
Trigger Setting (MonitorMode only) I2C or	Mode

[Trigger output setting(Monitor mode I2C only)]

If you click [TRGOUT Setting(Monitor Mode I2C only)], the following window will appear.

TRGOUT settings (I2C Monitor mode	only)
Enable trigger output (TRGOUT)	(I2C Monitor mode only)
Enable I2C address	Enable I2C sub address
I2C address value 0x50	Sub-address length 2 💌
10bit ADRS mode	:+0:+1:+2:+3 Sub-address data :00:00:00:00
NACK detection (Ignore NACK	before a STOP)
	OK Cancel

Refer to Page.4-27 at [Trigger output(TRGOUT) setting(Monitor Mode only)].

[General setting]

By clicking [General setting], make a setting of power supply, signal noise filter, temporary file path.

This setting is the same function as clicking the ketter button at the tool bar, or [Function(V)]-[Other setting] from the menu bar.

Capture settings		x	Other setting Target power supply	
MONITOR MODE			Current power supply state Power ON Power supply setting Change dimaintain the curr Change state Power OFF	
Capture Bus	I2C #0(Main) ▼	I2C setting	Circulation filtra	
Capture Mode	Oneshot 🔻	SPI setting	Signal noize mitter (Analyzer mode only) OFF (no filter) Temporary file path C:\Users\test\AppData\Lo	▼ ocal\Temp\
Capture Data size (MB)	32 💌	TRIGGER setting	<	Þ
Driver Buffer size (MB)	2 🚔	General setting		
(If there is no problem, please of driver buffer size.)	e use default value		✓ Lock memory on sampling You need to reboot the system to reflect the change If there is no problem, please check the box.	e.)
Start	Capture Can	cel	OK Cancel	

[Current power supply state]

If status is [Power ON], REX-USB62 is powered.

If status is [Power OFF(Power not supply)], REX-USB62 is not powered. (In this case, to capture data don't work)

[Power supply setting]

- Unchanged(maintain the current) --- REX-USB62 works at the setting shown at [Current power supply state].
- Change state --- Select power voltage to supply external or REX-USB62 from Power OFF / 1.8V / 2.5V / 3.3V / 5.0V.

[Signal noise filter(Analyzer mode only)]

Monitor mode doesn't use this filter.

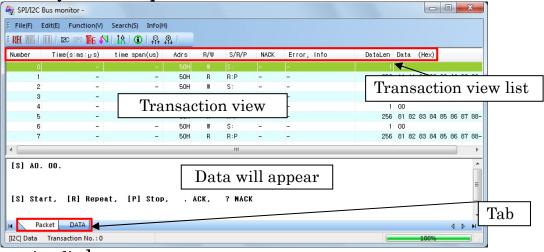
[Temporary file path]

This shows a temporary file path.

[Lock memory on sampling]

• Please try to uncheck the check box when memory error happens during sampling even if there is enough space of memory available. In this way, this memory error may not appear. But, if you uncheck the check box, please note some data may not be treated, buffer overrun may happen, or an unexpected error may happen. So, if there is no problem, please check the check box.

[Display and analyzation of captured data]



[Transaction view list]

[Number]

Serial number for transaction.

[Time(sec:ms:us)]

Time from the time when capture starts until the time each transaction starts.

 $\label{eq:lime_span} \underbrace{[time \; span(us)]}_{Necessary \; time \; for \; each \; transaction(\mu \; second \; :unit).}$

[Adrs] Address of I2C device.

[R/W] Read/Write is displayed.

[S/R/P] S : Start conditions. R : Repeat start conditions. P : Stop conditions.

[NACK] Displays whether NACK is detected or not.

[Error] Displays whether error is detected or not.

[DataLen] Data length of each transaction.

[Data (Hex)] Each transaction data in Hexadecimal.

[Each Tab]

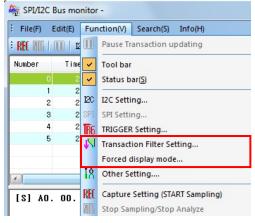
[Packet] I2C packet data is displayed.

[DATA]

Captured data is dumped in Hexadecimal and ASCII character.

(4-6) Other functions

The below is an explanation of other functions of analyzer monitor tool.



[Transaction filter setting]

This function enables filter view of captured data.

Enable filter view	
Transaction range	
Start no. 0	End no. 5
IC only	
I2C address filter	Sub-address filter
I2C address 0x000	Sub-address length(Byte) 1 💌
Mask value 0x3FF	:+0:+1:+2:+3
10bit ADRS mode	Sub-address data :00:00:00:00 Mask data :FF:FF:FF:FF
	✓ Include from sub address detection to STOP condition
Read packet	✓ Write packet
Indude write packet for read	☐ Include from write detection to STOP condition
	Exclude write packet for read
orced display mode only	
Only transaction of signal v	variation

[Enable filter view]

If you check this check box, you enable filter function you set.

[Transaction range]

Specify a transaction number to be displayed.

[I2C address filter]

- I2C address value --- Specify I2C address to be displayed.
- Mask value --- AND OPERATION for a value specified at [Mask value] and a value specified at [I2C address value], and make a filter view at a value specified at [I2C address].

[Sub-address filter]

- Sub-address length(Byte) --- Specify an I2C sub-address length to be displayed.
- Sub-address data --- Specify an I2C sub-address to make a filter view.
- Mask data --- AND OPERATION for a value specified at [Mask data] and a captured [Sub-address data], and make a filter view at a value specified at [Sub-address data].
- Include from sub address detection to STOP condition-- If you check this check box, filter is ranging from detection part of sub-address to STOP condition.

[Read packet]

At this section, you can make the following filter view setting:

• Include write packet for read

[Write packet]

At this section, you can make the following filter view setting:

- Include from write detection to STOP condition
- Exclude write packet for read

[Forced display mode only]

At this forced display mode(analyzer mode), you can make the following filter view setting:(If you check this check box, transaction without any signal change will not be displayed.)

• Only transaction of signal variation

[Forced display mode]

At this mode, you can forcefully display only signal data from sampled data by ignoring SPI/I2C protocol(This mode is valid for analyzer mode only).

Without analyzing protocol, this mode displays waveform by separating transaction at an interval of specified time.

Waveform display settings (AnalyzerMode)
Forced display mode (SPI/I2C protocol is ignored.)
Approximate time of transaction delimited
200 milli second
Please set time within a range 1 to 4000(msec)
OK Cancel

If you check the check box at [Forced display mode(SPI/I2C protocol is ignored)], data will be displayed at an interval of specified time.



This chapter explains [Switching tool for Analyzer and Monitor] installed at Chapter 2. (Default setting is Analyzer mode.)

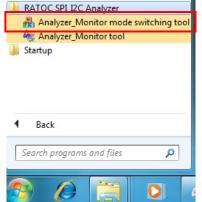
Warning when you switch modes

- If you use Analyzer_Monitor mode switching tool, finish Anayzer_Monitor tool.
- Don't remove the USB cable except the instruction prompted by this application. If you mistakenly remove the USB cable and an unexpected error happens, you may need to send REX-USB62 to us to repair it.

USB62ModeChange

(5-1) How to switch Analyzer mode and Monitor mode

Analyzer_Monitor mode switching tool is registered at [RATOC SPI_I2C Analyzer] from [Programs] at the Windows start menu.



When Analyzer_Monitor mode switching tool starts up, the window shown in the right will appear. Remove the USB cable and connect it again. Then, click [OK].

Select the mode and click [Update].

		ОК
62 Mode change tool		
you want to switch the	node. Id click [Update] button.	
you want to switch the lease select the mode a	node, Id click [Update] button. node selection	Current mode
you want to switch the lease select the mode a	nd click [Update] button. mode selection	Current mode Monitor Mode
you want to switch the lease select the mode a Switching	nd click [Update] button. mode selection	

Never remove the USB cable during switching modes.

Confirm [Current mode] will be changed.

Click [Exit].

Remove the USB cable and connect it again. Then, click [OK].

Don't disconnect the USB cab	ole.	
Switching mod	de selection C Monitor mode	- Current mode - Monitor Mode
Analyzer mode	(Monitor mode	
Serial EEPROM	Flash ROM	CPLD-
Ver 1.00	Ver 1.02	Ver 20.07
Update		Exit
Management of the second se		
SB62 Mode change tool		
Switching has been completed	d Please evit	
	3. T 10000 0XIV.	
Switching mod	de selection	Current mode
Analyzer mode	C Monitor mode	Analyzer Mode
Serial EEPROM	Flash ROM	CPLD
Ver 1.00	Ver 1.02	Ver 30.08
J		
Update		Exit
JSB62ModeChange		L
Start the Anal	yzer Mode operation.	
	yzer Mode operation. SB cable, and insert ag	ain, please click [OK].

Now, switching modes has completed.

- * The first time switching mode is made on Windows XP, Found New Hardware Wizard will appear. Please follow the below steps to make an installation.
- Select [No, not this time] at the Found New Hardware Wizard and click [Next>].

Found New Hardware Wizard	
	Welcome to the Found New Hardware Wizard Windows will search for cutrent and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). Read our privacy policy
	Can Windows connect to Windows Update to search for software? Yes, this time only Note your and automatical cooperate Note your and automatical cooperate Note this time
	Click Next to continue.
-	< Back Next > Cancel

5. Switching of Analyzer/Monitor mode

Select [Install software automatically (Recommended)] and click [Next>].

Windows Logo warning window will

appear and click [Continue Anyway].

 Found New Hardware Vitized

 Final New Hardware Vitized

 Final New Hardware Vitized

 Final New Hardware came with an installation CD

 State Bus Monitor Final

 Final He software came with an installation CD

 Final He software automatically (Recommended)

 Final He software automatically (Recommended)

 Cick New to continue.

 Cick New to continue.

 Cistal He software prove to prove to prove to software prove to prove to software prove to software prove to prove to prove to software prove to prove to prove to prove to software prove to software prove to prove to prove to prove to prove to software prove to software prove to prove

Click Finish to close the wizard.

KBack Finish Cano

Click [Finish]. Now, the installation of the driver for switching tool has completed.



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