

S1R72U06

Evaluation Board Manual

NOTICE

No part of this material may be reproduced or duplicated in any form or by any means without the written permission of Seiko Epson. Seiko Epson reserves the right to make changes to this material without notice. Seiko Epson does not assume any liability of any kind arising out of any inaccuracies contained in this material or due to its application or use in any product or circuit and, further, there is no representation that this material is applicable to products requiring high level reliability, such as, medical products. Moreover, no license to any intellectual property rights is granted by implication or otherwise, and there is no representation or warranty that anything made in accordance with this material will be free from any patent or copyright infringement of a third party. This material or portions thereof may contain technology or the subject relating to strategic products under the control of the Foreign Exchange and Foreign Trade Law of Japan and may require an export license from the Ministry of Economy, Trade and Industry or other approval from another government agency.

All other product names mentioned herein are trademarks and/or registered trademarks of their respective companies.

Table of Contents

1. Overview	1
2. Connectors	2
3. Jumper Settings	3
3.1 Jumper switches	3
3.2 Soldered jumpers	4
4. LEDs	5
5. USB Interface Peripheral Circuit	6
6. Connection Example	7
7. Connection with Main CPU	8
7.1 Main CPU Connection Signal	8
7.1.1 UART mode connection example	9
7.1.2 SPI mode connection example	9
7.2 Connection cable example	10
8. Power Supply	11
9. Setting Example	12
9.1 Power supply input	12
9.2 VBUS-SW selection	12
9.3 LVDD and UVDD3 input settings	12
9.3.1 When using S1R72U06 internal regulator output for LVDD and UVDD3	12
9.3.2 When using external input for LVDD and UVDD3	13
9.4 UART/SPI settings	13
9.4.1 UART mode	13
9.4.2 SPI mode	13
9.5 CLKIN	13
10. Appendix	14
10.1 Exterior view diagram	14
10.2 Circuit diagram	15
10.3 Component list	15
10.4 Circuit board dimensions	15
Revision History	19

1. Overview

The S1R72U06 Evaluation Board is designed for use in evaluating S1R72U06 functions.

This manual describes how to use the S1R72U06 Evaluation Board.

2. Connectors

2. Connectors

Board connector list

No.	Name
CN1	Power connector
CN2	For connecting to PORT00 to PORT03 (not provided)
CN3	For connecting to PORT14 to PORT17 (not provided)
CN4	Power supply connector for external board
CN5	ICE connection connector (not provided)
CN6	USB connector (mini B)
CN7	USB connector (standard A)
CN8	RS232 interface connector
CN9	Main CPU connection connector

Note: Refer to “10.1 Exterior view diagram” for the connector layout.

3. Jumper Settings

The jumpers on the board are set as shown below. Items shown in gray are default settings.

3.1 Jumper switches

No.	Content	Setting	
JP1	+5 V input source power supply switching	1-2	+5 V (CN1) input
		2-3	VBUS (CN6) input
JP3	CVDD input source power supply switching	1-2	+5 V (JP1 selection)
		2-3	+3.3 V (regulator output)
JP4	VRIN (U06 internal regulator input) source switching	1-2	+5 V (JP1 selection)
		2-3	+3.3 V (regulator output)
JP5	VBUS_5V_IN input source switching	1-2	+5 V (JP1 selection)
		2-3	External input (TP5)
JP16	VBUS output (CN7) switching	1-2	MAX8586 output
		2-3	U06 internal VBUS-SW output
SW1	SPIxUART	1-2	UART mode
		2-3	SPI mode
SW2	HOSTxDEVICE	1-2	DEVICE mode
		2-3	HOST mode
		Open	-
SW3	WAKEUP	1-2	-
		2-3	Wakeup trigger
		Open	-
SW4	INIT_BAUD	1-2	300 bps
		2-3	9600 bps
SW5	RESET SW	PUSH	Forced reset
		-	Normal operation

Note: If the CVDD level is a value above +1.8 V and below +5 V, remove the JP3 short pin and direct the voltage to JP3 Pin 2. (+1.8 V to +5.0 V)

Note: If the VRIN level is a value above +3.3 V and below +5 V, remove the JP4 short pin and direct the voltage to JP4 Pin 2. (+3.3 V to +5.0 V)

Note: If the signal is low asserted when SW2 (HOSTxDEVICE) and SW3 (WAKEUP) are connected to the main CPU via CN9, SW2 and SW3 should be left open or R62 and R63 removed.

Note: Refer to “10.1 Exterior view diagram” for the jumper switch layout.

3. Jumper Settings

3.2 Soldered jumpers

No.	Content	Setting	
JP11	U06 internal regulator enable switching	1-2	Disable
		1-3	Enable
JP15	MAX8586 auto restart function selection (For more information, refer to MAX8586 data sheet.)	1-2	MAX8586-ENRESET pin = High
		1-3	MAX8586-ENRESET pin = Low
JP2	1.8 V circuit current measurement jumper	Open	-
		Short	Always shorted
JP6	CVDD current measurement jumper	Open	-
		Short	Always shorted
JP7	VRIN current measurement jumper	Open	-
		Short	Always shorted
JP17	VBUS_5V_IN current measurement jumper	Open	-
		Short	Always shorted
JP8	Clock frequency selection	Open	24 MHz
		Short	12 MHz
JP9	U06 internal regulator input capacitor (LVDD)	Open	With LVDD external input
		Short	When using U06 internal regulator
JP10	LVDD external input selection	Open	When using U06 internal regulator
		Short	With LVDD external input
JP12	U06 internal regulator input capacitor (UVDD3)	Open	With UVDD3 external input
		Short	When using U06 internal regulator
JP13	UVDD3 external input selection	Open	When using U06 internal regulator
		Short	With UVDD3 external input
JP14	122 μ F capacitor discharge resistance selection for USB host VBUS output	Open	No discharge resistance
		Short	With discharge resistance
JP18 (EP)	MAX8586 EP-PAD connection selection (For more information, refer to MAX8586 data sheet)	Open	-
		Short	Connect to GND

Note: JP18 (EP) is not noted in the circuit diagram.

Note: Refer to “10.1 Exterior view diagram” for the soldered jumper layout.

4. LEDs

The LEDs on the board illuminate as shown below.

No.	Name	ON/OFF	State
LED1	+5V	ON	+5 0 V is input to CN1.
		OFF	-
LED2	XIRQ_EVENT	ON	Event read request
		OFF	-
LED3	XIRQ_STATUS	ON	Status notification
		OFF	-
LED4	SIO_READY	ON	Transmission start ready notification
		OFF	-
LED5	VBUS_LED	ON	USB Host VBUS output
		OFF	-
LED9	TPL	ON	Unsupported Device
		OFF	-
LED10	ManyDEV	ON	Too many Devices
		OFF	-
LED11	ManyHub	ON	Too many Hubs
		OFF	-
LED12	VBUS_Cur	ON	VBUS Over Current
		OFF	-

Note: Refer to “10.1 Exterior view diagram” for the LED layout.

5. USB Interface Peripheral Circuit

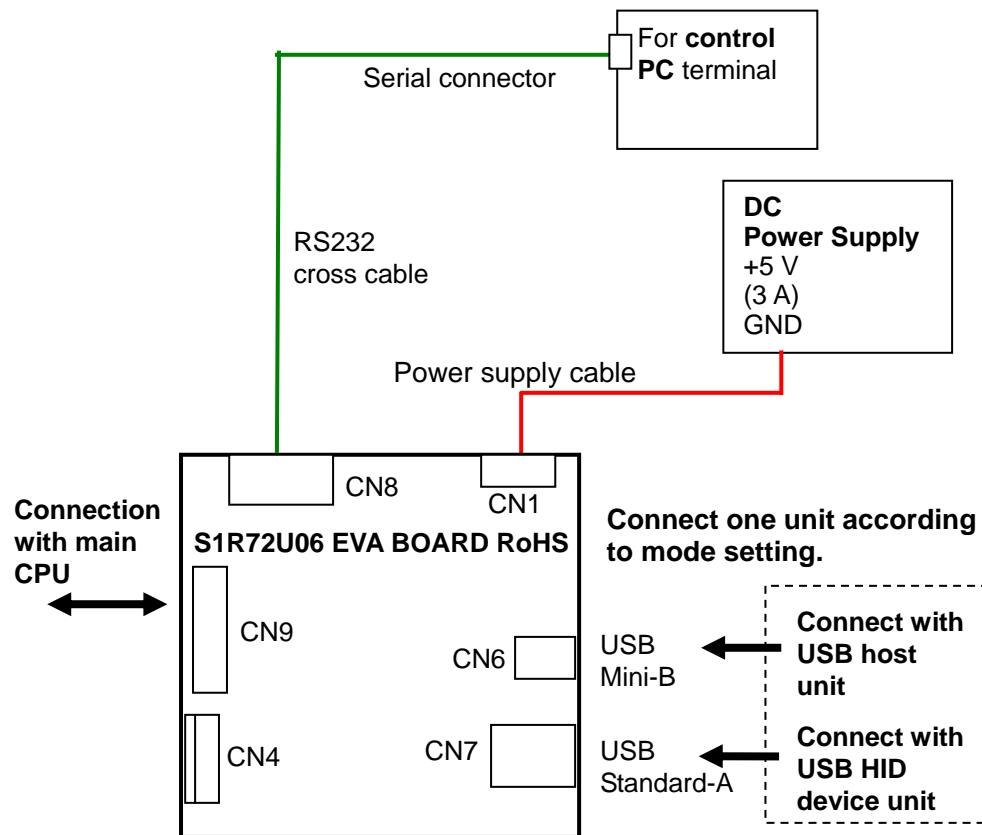
5. USB Interface Peripheral Circuit

This board includes the following two USB connectors:

- CN6 (USB Mini B) for device functions
- CN7 (USB Standard A) for host functions

The DP and DM pins for these connectors are also connected to the DP and DM pins on S1R72U06 for evaluation convenience, but such circuits are not recommended. Mounting components or using wiring patterns like this may upset impedance matching and reduce signal quality, resulting in communication problems. For more information, refer to the *S1R72V Series USB2.0 Hi-Speed PCB Design Guidelines*.

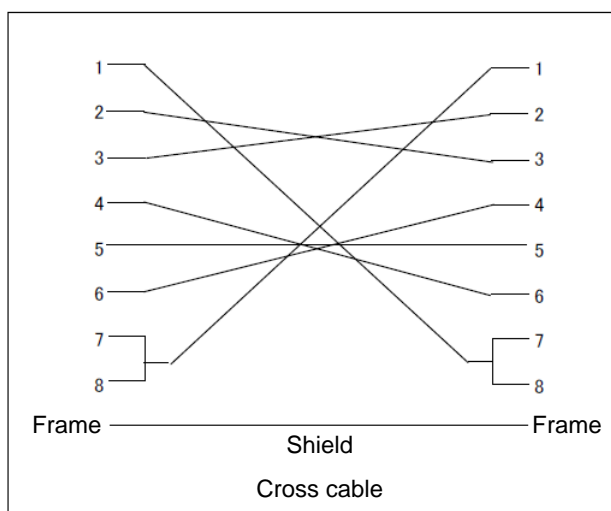
6. Connection Example



Use the cable shown below or another cable satisfying the following specifications for connecting this board to the control PC.

- RS-232C cross cable/Dsub 9-pin female – Dsub 9-pin female
Example: KR-EC99R-2 (Sanwa Supply)

<Connection specifications>



7. Connection with Main CPU

7. Connection with Main CPU

7.1 Main CPU Connection Signal

This board can be connected to the main CPU via CN9.

The interface with the main CPU uses the S1R72U06 SIO (UART/SPI) function.

For more information on the SIO function, refer to the *S1R72U06 Technical Manual*.

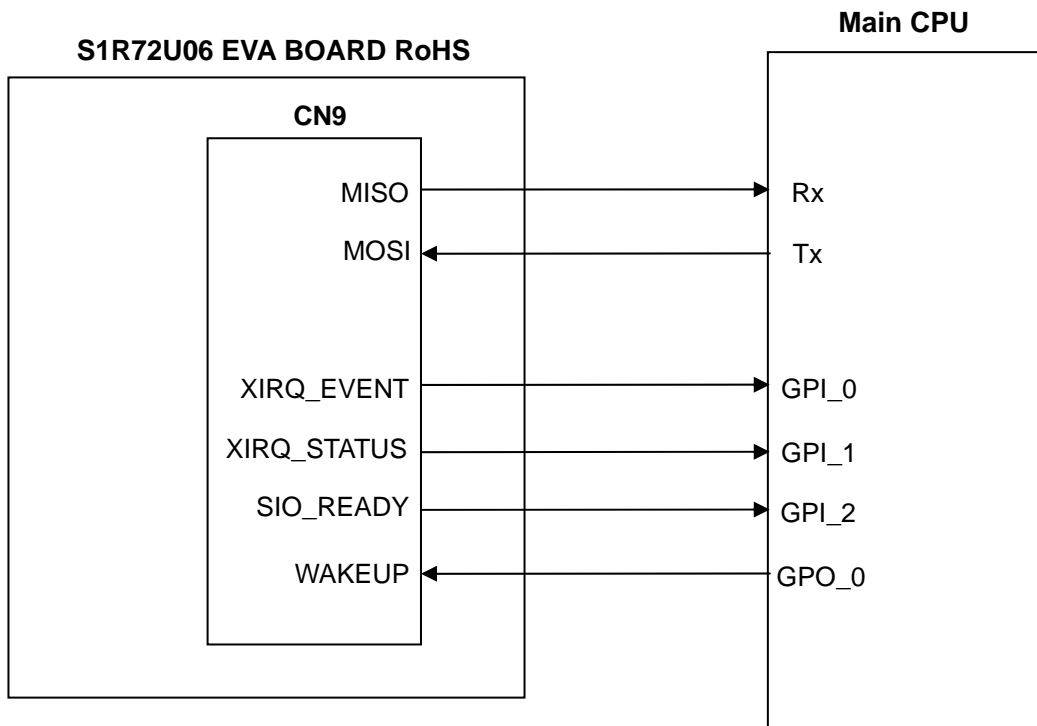
CN9 signal	I/O	Signal description	Main CPU connected to
MISO	Tri	Serial data output	Rx (in UART mode) MISO (in SPI mode)
MOSI	I	Serial data input	Tx (in UART mode) MOSI (in SPI mode)
SCK	I	Serial clock input	SCK (in SPI mode)
SS	I	Slave select input	CS (in UART mode) SS (in SPI mode)
XIRQ_EVENT	O	Event read request output	General input port (GPI)
XIRQ_STATUS	O	Status notification output	General input port (GPI)
SIO_READY	O	Transmission start ready notification output	General input port (GPI)
CLKOUT	O	Clock output	Clock input
HOSTxDEVICE	I	Host/Device mode setting input (S1R72U06 is reset when settings are switched)	General output port (GPO)
WAKEUP	I	Wakeup input (Wakeup triggered at rising edge)	General output port (GPO)

Note: I/O Tri means that three states (H level, L level, and Hi-Z) are possible.

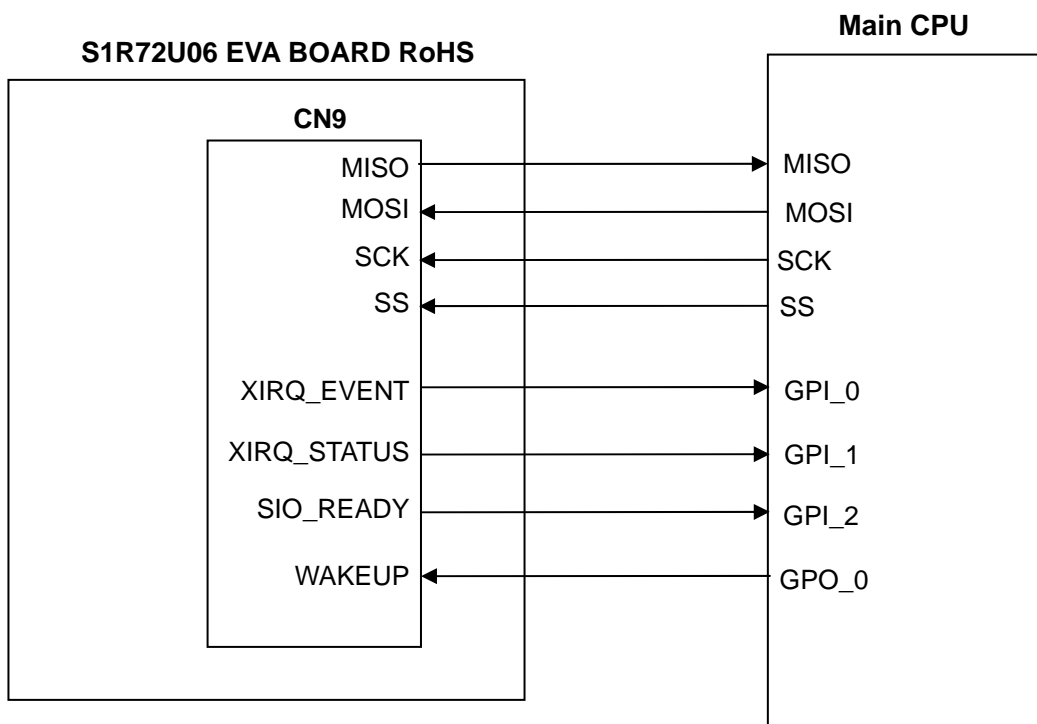
Note: The input/output levels for each signal will be the CVDD levels for S1R72U06.

Note: The SS signal can be used for MISO pin output control in UART mode. It should be fixed to Low when Hi-z output is not required. (For more information on the SS signal, refer to the *S1R72U06 Data Sheet*.)

7.1.1 UART mode connection example



7.1.2 SPI mode connection example



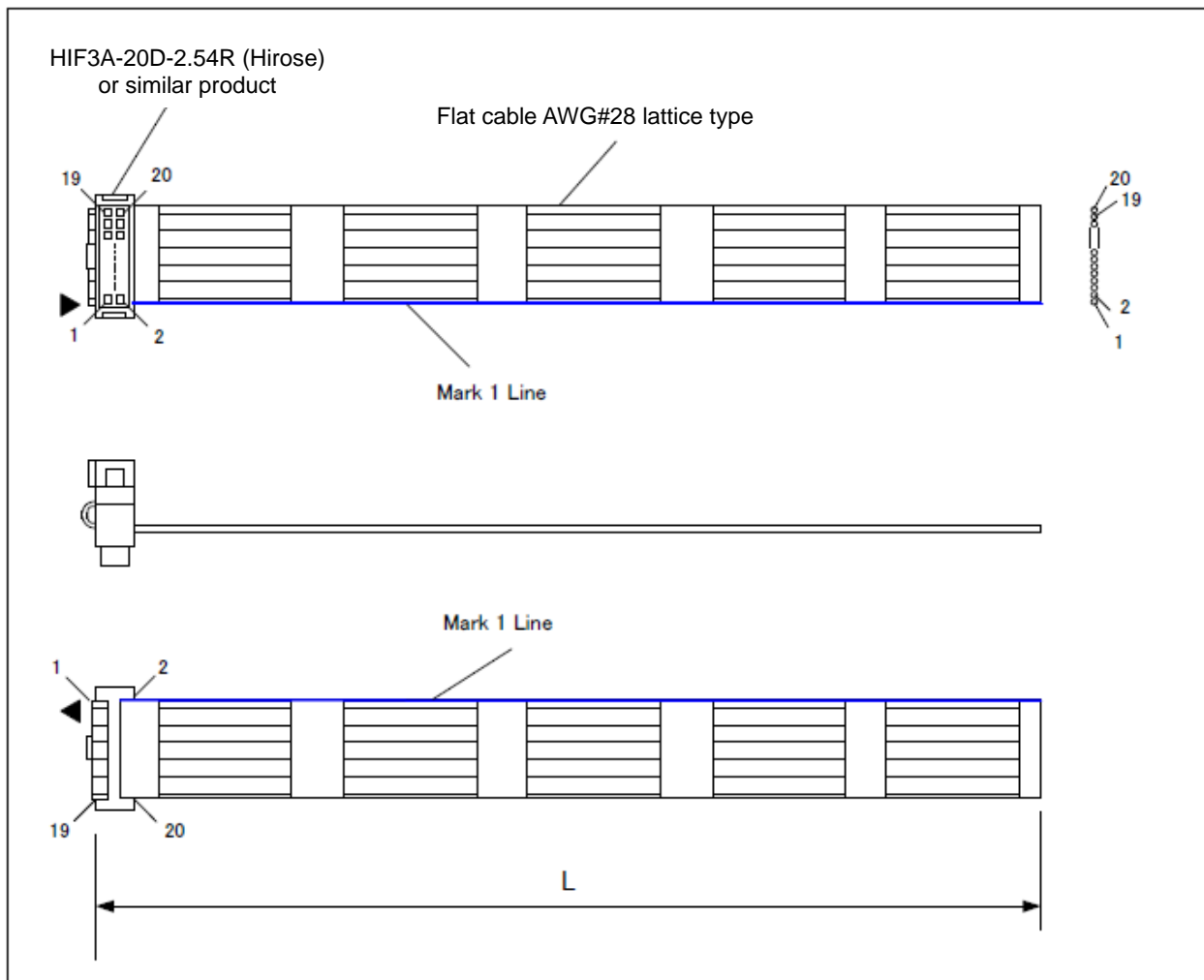
7. Connection with Main CPU

7.2 Connection cable example

This is a typical cable for connecting to CN9.

Connect the connector end to CN9. The main CPU end should be modified as required to suit the client's configuration.

(L= desired length)



8. Power Supply

The power supply for this board should be supplied to CN1, as shown below.

1 pin	+5 V
2 pin	GND
3 pin	N.C.
4 pin	N.C.

Note: When inputting a different voltage to CVDD or VRIN, refer to “3. Jumper Settings.”

9. Setting Example

9. Setting Example

9.1 Power supply input

When inputting +5 V from CN1, +5 V to CVDD, +3.3 V to VRIN, and CN1 +5 V to VBUS_5V_IN.

(Select blue settings)

No.	Content	Setting	
JP1	+5 V input source power supply switching	1-2	+5 V (CN1) input
		2-3	VBUS (CN6) input
JP3	CVDD input source power supply switching	1-2	+5 V (JP1 selection)
		2-3	+3.3 V regulator output
JP4	VRIN (U06 internal regulator input) source switching	1-2	+5 V (JP1 selection)
		2-3	+3.3 V regulator output
JP5	VBUS_5V_IN input source switching	1-2	+5 V (JP1 selection)
		2-3	External input (TP5)

9.2 VBUS-SW selection

When U06 internal VBUS-SW output is selected for VBUS output.

(Select blue settings)

No.	Content	Setting	
JP16	VBUS output (CN7) switching	1-2	MAX8586 output
		2-3	U06 internal VBUS-SW output

9.3 LVDD and UVDD3 input settings

9.3.1 When using S1R72U06 internal regulator output for LVDD and UVDD3

(Select blue settings)

No.	Content	Setting	
JP9	U06 internal regulator input capacitor	Open	With LVDD external input
		Short	When using U06 internal regulator
JP10	LVDD external input selection	Open	When using U06 internal regulator
		Short	With LVDD external input
JP11	U06 internal regulator enable switching	1-2	Disable
		1-3	Enable
JP12	U06 internal regulator input capacitor	Open	With UVDD3 external input
		Short	When using U06 internal regulator
JP13	UVDD3 external input selection	Open	When using U06 internal regulator
		Short	With UVDD3 external input

9.3.2 When using external input for LVDD and UVDD3

(Select blue settings)

No.	Content	Setting	
JP9	U06 internal regulator input capacitor	Open	With LVDD external input
		Short	When using U06 internal regulator
JP10	LVDD external input selection	Open	When using U06 internal regulator
		Short	With LVDD external input
JP11	U06 internal regulator enable switching	1-2	Disable
		1-3	Enable
JP12	U06 internal regulator input capacitor	Open	With UVDD3 external input
		Short	When using U06 internal regulator
JP13	UVDD3 external input selection	Open	When using U06 internal regulator
		Short	With UVDD3 external input

Note: External input will be +3.3 V for UVDD3 and +1.8 V for LVDD.

9.4 UART/SPI settings

Set UART/SPI mode as shown below when connected to the main CPU.

For more information, refer to the *S1R72U06 Technical Manual*.

9.4.1 UART mode

- (1) Mode setting : Set SW1 (SPIxUART) to 1-2 (Low).
- (2) Initial baud rate : Set SW4 (INIT_BAUD) to 1-2 (300 bps) or 2-3 (9,600 bps).
- (3) Other : Set CN9-5-pin (SCK) to Low. The CN9-7-pin (SS) can be used to control MISO pin output.

9.4.2 SPI mode

- (1) Mode setting : Set SW1 (SPIxUART) to 2-3 (High).
- (2) Other : Set SW4 (INIT_BAUD) to 1-2 (Low).

Note: SW4 (INIT_BAUD) is not used in SPI mode, since this is a dedicated UART setting. We recommend setting this to Low.

9.5 CLKIN

The following procedures are required when feeding clock input to the S1R72U06 CLKIN pin with this board:

- (1) Remove CR1.
- (2) Set JP8 to Open. (When CLKSEL = 24 MHz)
- (3) Remove C23, C24, R30, R22, R23.
- (4) Mount 100 kΩ on R64.
- (5) Connect CR1-1 pin side (IC4 XI pin side) of C23 to GND via a jumper. Leave the XO pin open.
- (6) Input clock to TP6 (CLKIN).

Note: Set the input clock amplitude for the CLKIN pin to the same voltage as selected for CVDD with JP3.

10.2 Circuit diagram

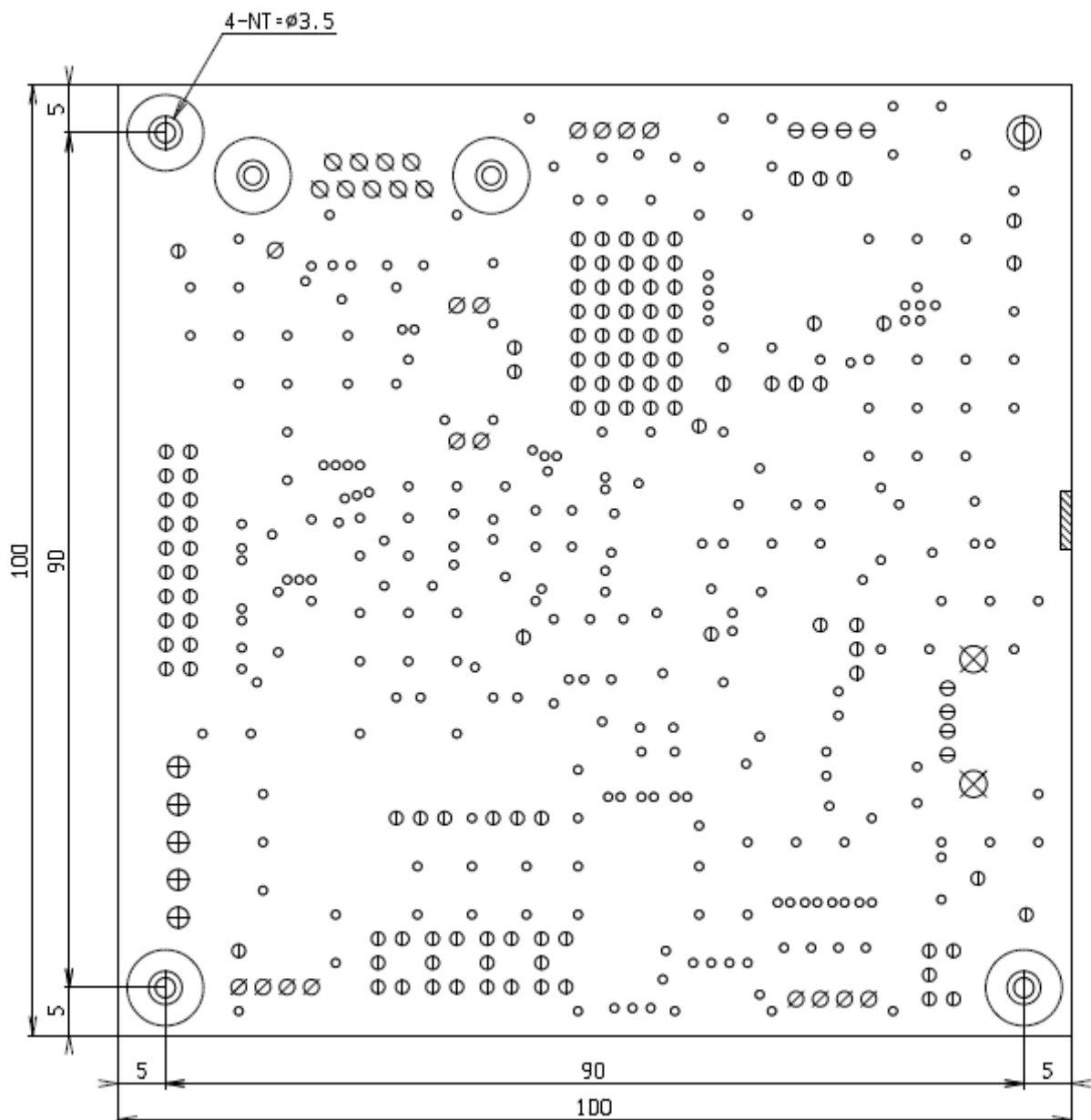
Refer to attachments.

10.3 Component list

Refer to attachments.

10.4 Circuit board dimensions

External dimensions: 100.00 mm x 100.00 mm (excluding protrusions)



S1R72U06 Evaluation Board RoHS Component Lis

Note: Quantities include components not mounted. For unmounted components, refer to "Output for Unmounted Components"

Revised: 2009/02/03

Revision: 1.0

partName	Quantity	Maker	value	rating	tolerance	reference	Remarks
C3225JB1A106M	4	TDK	10u	10V	20%	C3,C4,C5,C6	An item with identical specifications may be substituted.
10SVP47M	4	SANYO	47u	10V	20%	C9,C13,C14,C15	
GRM188F11A105ZA01	5	Murata	1u	10V	+80/-20%	C7,C18,C19,C20,C21	An item with identical specifications may be substituted.
GRP155B11A104ZA	7	Murata	0.1u	10V	10%	C8,C10,C11,C12,C16,C17,C22	An item with identical specifications may be substituted.
UMK107CH090DZ	2	Taiyo Yuden	9p	50V	0.5pF	C23,C24	An item with identical specifications may be substituted.
UWT1C220MCL	1	Nichicon	22u	16V	20%	C25	
UWT1V101MCL	1	Nichicon	100u	35V	20%	C26	
GRM31MF11E105ZA01L	3	Murata	1u	25V		C27,C28,C31	An item with identical specifications may be substituted.
GRM188R11H104JA01	5	Murata	0.1u	50V	5%	C29,C30,C32,C33,C34	An item with identical specifications may be substituted.
C1608CH1H102J	2	TDK	1000p	50V	5%	C35,C36	An item with identical specifications may be substituted.
171825-4	1	AMP				CN1	
B5P-VH	1	JST				CN4	
WL-8-4	3	Mac8				CN2,CN3,CN5	
54819-0572	1	MOLEX				CN6	
DUSB-ARA42-T11A-FA	1	DDK				CN7	
17LE-23090-27(D3BB)	1	DDK				CN8	
HIF3FC-20PA-2.54DSA	1	Hirose				CN9	
FA-128(24MHz)	1	Epson Toyocom 24MHz	CL=10pF		±50ppm	CR1	
HRW0202B	1	Hitachi				DM1	
BU4218FVE	1	ROHM				IC1	
R1170H181B-F	1	RICOH				IC2	
R1170H331B-F	1	RICOH				IC3	
S1R72U06F12E10C	1	EPSON				IC4	
MAX8586ETA+	1	Maxim				IC5	
ST3232CD	1	ST Micro				IC6	
JP-2-A	10					JP2,JP6,JP7,JP8,JP9,JP10,JP12,JP13,JP14,JP17	Soldered jumper
JP-3-L	2					JP11,JP15	Soldered jumper
XJ8D-0311	9	OMRON				JP1,JP3,JP4,JP5,JP16,SW1,SW2,SW3,SW4	
XJ8A-0211	9	OMRON				JP1,JP3,JP4,JP5,JP16,SW1,SW2,SW3,SW4	XJ8D-0311 shorting pin
DLW21SN900SQ2L	2	Murata	90			L1,L4	
BLM21PG600SN1	7	Murata	60			L2,L3,L5,L6,L7,L8,L9	
SML-310MTT86	8	ROHM				LED1,LED2,LED3,LED4,LED9,LED10,LED11,LED12	
SML-310LTT86	1	ROHM				LED5	
DTC144EUA	10	ROHM				Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10	
MCR03EZHZJ102	3	ROHM	1k	1/16W	5%	R13,R14,R30	An item with identical specifications may be substituted.
MCR03EZHZJ000	31	ROHM	0	1/16W	5%	R15,R16,R23,R26,R27,R32,R33,R34,R36,R37,R38,R39,R40,R41,R43,R44,R45,R46,R47,R48,R49,R54,R55,R56,R57,R58,R59,R60,R61,R62,R63	An item with identical specifications may be substituted.
MCR03EZHZJ104	14	ROHM	100k	1/16W	5%	R6,R7,R8,R9,R18,R19,R20,R21,R22,R24,R29,R64,R65,R67	An item with identical specifications may be substituted.
MCR03EZHZJ103	1	ROHM	10k	1/16W	5%	R25	An item with identical specifications may be substituted.
MCR03EZHZJ330	1	ROHM	33	1/16W	5%	R28	An item with identical specifications may be substituted.
MCR03EZHZJ393	1	ROHM	39k	1/16W	5%	R31	An item with identical specifications may be substituted.
MCR03EZHZJ100	1	ROHM	10	1/16W	5%	R35	An item with identical specifications may be substituted.
MCR03EZHZJ471	9	ROHM	470	1/16W	5%	R3,R4,R5,R12,R42,R50,R51,R52,R53	An item with identical specifications may be substituted.
MCR03EZHZJ105	1	ROHM	1M	1/16W	5%	R66	An item with identical specifications may be substituted.
A9P13-0011	1	OMRON				SW5	
LC-33-S-Red	3	Mac8				TP1,TP3,TP4	
LC-33-S-Yellow	8	Mac8				TP2,TP5,TP6,TP7,TP8,TP9,TP10,TP11	
LC-33-S-Black	4	Mac8				TP12,TP13,TP14,TP15	
Round_Pattern	5	no_maker				TP16,TP17,TP18,TP19,TP20	Hole diameter 1.1 mm, land diameter 1.6 mm TH
AVRL161A6R8GBA	2	TDK				ZD1,ZD2	
RSB6.8S	1	ROHM				ZD3	

Note: All substitute items must comply with RoHS requirements

Output for Unmounted Components

Ref	Part name	Mounted flag
L1	DLW21SN900SQ2L	No_Mount
L4	DLW21SN900SQ2L	No_Mount
ZD2	AVRL161A6R8GBA	No_Mount
ZD3	RSB6.8S	No_Mount
CN5	WL-8-4	No_Mount
CN3	WL-8-4	No_Mount
CN2	WL-8-4	No_Mount
ZD1	AVRL161A6R8GBA	No_Mount
R43	MCR03EZHJ00C	No_Mount
R64	MCR03EZHJ104	No_Mount
R66	MCR03EZHJ10E	No_Mount
R26	MCR03EZHJ00C	No_Mount
R27	MCR03EZHJ00C	No_Mount
R28	MCR03EZHJ33C	No_Mount
R36	MCR03EZHJ00C	No_Mount
R37	MCR03EZHJ00C	No_Mount
R40	MCR03EZHJ00C	No_Mount
R41	MCR03EZHJ00C	No_Mount

AMERICA

EPSON ELECTRONICS AMERICA, INC.

2580 Orchard Parkway,
San Jose, CA 95131, USA
Phone: +1-800-228-3964 FAX: +1-408-922-0238

EUROPE

EPSON EUROPE ELECTRONICS GmbH

Riesstrasse 15, 80992 Munich,
GERMANY
Phone: +49-89-14005-0 FAX: +49-89-14005-110

ASIA

EPSON (CHINA) CO., LTD.

7F, Jinbao Bldg., No.89 Jinbao St.,
Dongcheng District,
Beijing 100005, CHINA
Phone: +86-10-6410-6655 FAX: +86-10-6410-7320

SHANGHAI BRANCH

7F, Block B, Hi-Tech Bldg., 900 Yishan Road,
Shanghai 200233, CHINA
Phone: +86-21-5423-5522 FAX: +86-21-5423-5512

SHENZHEN BRANCH

12F, Dawning Mansion, Keji South 12th Road,
Hi-Tech Park, Shenzhen 518057, CHINA
Phone: +86-755-2699-3828 FAX: +86-755-2699-3838

EPSON HONG KONG LTD.

20/F, Harbour Centre, 25 Harbour Road,
Wanchai, Hong Kong
Phone: +852-2585-4600 FAX: +852-2827-4346
Telex: 65542 EPSCO HX

EPSON TAIWAN TECHNOLOGY & TRADING LTD.

14F, No. 7, Song Ren Road,
Taipei 110, TAIWAN
Phone: +886-2-8786-6688 FAX: +886-2-8786-6660

EPSON SINGAPORE PTE., LTD.

1 HarbourFront Place,
#03-02 HarbourFront Tower One, Singapore 098633
Phone: +65-6586-5500 FAX: +65-6271-3182

SEIKO EPSON CORP.**KOREA OFFICE**

50F, KLI 63 Bldg., 60 Yoido-dong,
Youngdeungpo-Ku, Seoul 150-763, KOREA
Phone: +82-2-784-6027 FAX: +82-2-767-3677

SEIKO EPSON CORP.**SEMICONDUCTOR OPERATIONS DIVISION****IC Sales Dept.****IC International Sales Group**

421-8, Hino, Hino-shi, Tokyo 191-8501, JAPAN
Phone: +81-42-587-5814 FAX: +81-42-587-5117