



RS-232 PROTOCOL for CTOUCH Laser^{air}⁺

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RS-232C PROTOCOL

INTRODUCTION

This document represents simple UART protocol for controlling system operation using RS-232C.

COMMUNICATION PROTOCOL

RS-232C Pin Map

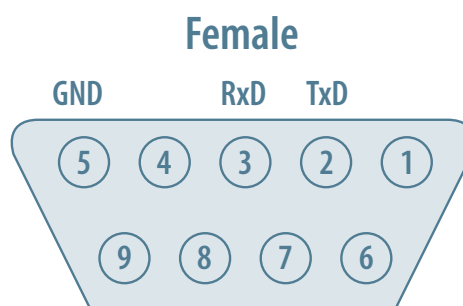
Communication parameter

baud rate : 9600

data : 8

parity : NONE stop bit : 1

1	N.C.
2	TxD
3	RxD
4	N.C.
5	GND
6	N.C.
7	N.C.
8	N.C.
9	N.C.



Communication general spec

- ID should show hexadecimal value of assigned ID.
- ID should be set on menu of the display
- If you want to control every mechanism connected with Serial Cable regardless of its ID, set ID to « 0x00 » and send commands. Then each SET will follow commands but it will not respond without ACK.
- Don't use 0x00, 0x8A(138) and 0xA9(168) for Set ID.

TRANSMISSION FORMAT

Start	Command	ID	Data	End
0xA9	0xFF		0xFF	0x8A

For example Power on & ID = 0x11

Start	Command	ID	Data	End
0xA9	0x11		0x01	0x8A

COMMAND DETAILED EXPLANATION

● Power Control

■ Function

RS-232 Controller turns display power ON/OFF

● Get Power ON/OFF status

Start	Command	ID	Data	End
0xA9	0x11		0xAA	0x8A

● Set Power ON/OFF

Start	Command	ID	Data 1	End
0xA9	0x11		Power	0x8A

Power: Power code to be set on display

0x1	Power ON
0x0	Power OFF

● Ack

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	A		0x11	Power	0x8A

A=0x41

Power: Power code to be set on display

0x1	Power ON
0x0	Power OFF

● Nak

Start	Ack/Nak	ID	r-CMD	Data 1	End
0xA9	N		0x11	ERR	0x8A

N=0x4E

ERR:

1	Invalid Command
2	Invalid Data
0xFF	Etc

● Panel Back Light Unit Control

■ Function RS-232 Controller turns display panel BLU power On/Off.

■ Get BLU Power ON/OFF status

Start	Command	ID	Data	End
0xA9	0x12		0xAA	0x8A

■ Set BLU Power ON/OFF

Start	Command	ID	Data 1	End
0xA9	0x12		BLU Power	0x8A

BLU Power: BLU Power code to be set on display

0x1	Power ON
0x0	Power OFF

■ Ack

Start	Ack/Nak	ID	r-CMD	Data 1	End
0xA9	A		0x12	BLU Power	0x8A

A=0x41

Power: Power code to be set on display

0x1	Power ON
0x0	Power OFF

■ Nak

Start	Ack/Nak	ID	r-CMD	Data 1	End
0xA9	N		0x12	ERR	0x8A

N=0x4E

ERR:

1	Invalid Command
2	Invalid Data
0xFF	Etc

● Volume control

■ Function Personal Computer changes volume of display

■ Get Volume status

Start	Command	ID	Data	End
0xA9	0x13		0xAA	0x8A

■ Set Volume

Start	Command	ID	Data 1	End
0xA9	0x13		Volume	0x8A

Volume:
Volume value code (0x0 (0) ~ 0x64 (100)) to be set on display

■ Ack

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	A		0x13	Volume	0x8A

A=0x41
Volume: Same as above

■ Nak

Start	Ack/Nak	ID	r-CMD	Data 1	End
0xA9	N		0x13	ERR	0x8A

N=0x4E

ERR:

1	Invalid Command
2	Invalid Data
0xFF	Etc

● Mute control

■ Function RS-232 Controller set mute On/Off.

■ Get Mute ON/OFF status

Start	Command	ID	Data	End
0xA9	0x14		0xAA	0x8A

■ Set Mute ON/OFF

Start	Command	ID	Data	End
0xA9	0x14		Mute	0x8A

Mute: Mute code to be set on display

0x1	Mute ON
0x0	Mute OFF

■ Ack

Start	Ack/Nak	ID	r-CMD	Data 1	End
0xA9	A		0x14	Mute	0x8A

A=0x41

Mute: Same as above

■ Nak

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	N		0x14	ERR	0x8A

N=0x4E

ERR:

1	Invalid Command
2	Invalid Data
0xFF	Etc

● Input source control

■ Function

RS-232 Controller changes input sources of display.

■ Get Input Source status

Start	Command	ID	Data	End
0xA9	0x15		0xAA	0x8A

■ Set Input Source

Start	Command	ID	Data	End
0xA9	0x15		Input	0x8A

Input: Input source code to be set on display

Data	Input
COMPONENT 1	0x03
VGA1	0x14
VGA2	0x24
VGA3	0x34
HDMI 1	0x05
HDMI 2	0x06
DP	0x07
INSIDE PC	0x09
USB	0x0B
Home	0x0C

■ Ack

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	A		0x15	Input	0x8A

A=0x41

Input: Same as above

■ Nak

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	N		0x15	ERR	0x8A

N=0x4E

ERR:

1	Invalid Command
2	Invalid Data
0xFF	Etc

● Remote key

■ Function

Command for same thing with remote controller

■ Command remote key

Start	Command	ID	Data	End
0xA9	0x16		Key Code	0x8A

Key Code : Remote key code as Annex B.

■ Ack

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	A		0x16	Key Code	0x8A

Key Code : Same as annex B.

■ Nak

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	N		0x16	ERR	0x8A

N=0x4E

ERR:

1	Invalid Command
2	Invalid Data
0xFF	Etc

● Key Lock

■ Function

RS-232 Controller set Key Lock On/Off.

■ Get Key Lock On/Off status

Start	Command	ID	Data	End
0xA9	0x17		0xAA	0x8A

■ Set Key Lock On/Off

Start	Command	ID	Data	End
0xA9	0x17		Lock	0x8A

Lock: Key Lock code to be set on display

0x 1	Key Lock ON
0x 0	Key Lock OFF

10

■ Ack

Start	Ack/Nak	ID	r-CMD	Data 1	End
0xA9	A		0x17	Lock	0x8A

A=0x41

Lock: Same as above

■ Nak

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	N		0x17	ERR	0x8A

N=0x4E

ERR:

1	Invalid Command
2	Invalid Data
0xFF	Etc

● Picture mode control

■ Function

RS-232 Controller changes picture mode of display.

■ Get Picture Mode status

Start	Command	ID	Data	End
0xA9	0x18		0xAA	0x8A

■ Set Picture Mode

Start	Command	ID	Data	End
0xA9	0x18		mode	0x8A

Picture Mode: Picture Mode code to be set on display

Data	Input
Dynamic	0x00
Standard	0x01
Soft	0x02
User	0x03
Gamer	0x04
Writing	0x06

■ Ack

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	A		0x18	Input	0x8A

A=0x41

Input: Same as above

■ Nak

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	N		0x18	ERR	0x8A

N=0x4E

ERR:

1	Invalid Command
2	Invalid Data
0xFF	Etc

● Sound mode control

■ Function

RS-232 Controller changes sound mode of display.

■ Get Sound Mode status

Start	Command	ID	Data	End
0xA9	0x19		0xAA	0x8A

■ Set Sound Mode

Start	Command	ID	Data	End
0xA9	0x19		mode	0x8A

Sound Mode: Sound Mode code to be set on display

Data	Input
Standard	0x00
Music	0x01
Movie	0x02
Sport	0x03
User	0x04

■ Ack

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	A		0x19	Input	0x8A

A=0x41

Input: Same as above

■ Nak

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	N		0x9	ERR	0x8A

N=0x4E

ERR:

1	Invalid Command
2	Invalid Data
0xFF	Etc

● Baud Rate Control

■ Function RS-232 Controller changes baud rate.

■ Get Baud Rate

Start	Command	ID	Data	End
0xA9	0x1A		0xAA	0x8A

■ Set Baud Rate

Start	Command	ID	Data	End
0xA9	0x1A		BaudRate	0x8A

BaudRate : Baud Rate code to be set on display.

Data	Input
BAUD_1200	0x00
BAUD_2400	0x01
BAUD_4800	0x02
BAUD_9600	0x03
BAUD_19200	0x04
BAUD_38400	0x05
BAUD_57600	0x06
BAUD_115200	0x07

■ Ack

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	A		0x1A	Input	0x8A

A=0x41

Input: Same as above

■ Nak

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	A		0x1A	ERR	0x8A

N=0x4E

ERR:

1	Invalid Command
2	Invalid Data
0xFF	Etc

● Freeze Control

■ Function

RS-232 Controller set Freeze Control On/Off.

■ Get Freeze Control On/Off Status

Start	Command	ID	Data	End
0xA9	0x1B		0xAA	0x8A

■ Set Freeze Control On/Off

Start	Command	ID	Data	End
0xA9	0x1B		Freeze	0x8A

Freeze : Freeze code to be set on display

0x1	Freeze ON
0x0	Freeze OFF

■ Ack

Start	Ack/Nak	ID	r-CMD	Data 1	End
0xA9	A		0x1B	Freeze	0x8A

A=0x41

Lock: Same as above

■ Nak

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	N		0x1B	ERR	0x8A

N=0x4E

ERR:

1	Invalid Command
2	Invalid Data
0xFF	Etc

● Source Info Visible Control

■ Function

RS-232 Controller set Source Info Visible Control On/Off.

■ Get Source Info Visible Control On/Off Status

Start	Command	ID	Data	End
0xA9	0x1C		0xAA	0x8A

■ Set Source Info Visible Control On/Off

Start	Command	ID	Data	End
0xA9	0x1C		Info	0x8A

Info: Source InfoVisible code to be set on display

0x1	Source Info Visible ON
0x0	Source Info Visible OFF

■ Ack

Start	Ack/Nak	ID	r-CMD	Data 1	End
0xA9	A		0x1C	Info	0x8A

A=0x41

Info: Same as above

■ Nak

Start	Ack/Nak	ID	r-CMD	Data	End
0xA9	N		0x1C	ERR	0x8A

N=0x4E

ERR:

1	Invalid Command
2	Invalid Data
0xFF	Etc

ANNEX A

No.	Command Type	Command	Value Range
1	Power control	0x11	
2	BLU Power Control	0x12	0x0 ~ 0x1
3	Volume control	0x13	0x0 ~ 0x64
4	Mute control	0x14	0x0 ~ 0x1
5	Input control	0x15	Input source
6	Remote control	0x16	Remote Key value
7	Key Lock Control	0x17	0x00~0x01
8	Picture Mode Control	0x18	0x00~0x06
9	Sound Mode Control	0x19	0x00~0x04
10	Baud Rate Control	0x1A	0x00~0x07
11	Freeze Control	0x1B	0x00~0x01
12	Source Info Visible Control	0x1C	0x00~0x01

ANNEX B

Key Name	Key Code	Description
RC_POWER	0xD7	Power
RC_NUM0	0xD9	Number 0
RC_NUM1	0x95	Number 1
RC_NUM2	0x99	Number 2
RC_NUM3	0x9D	Number 3
RC_NUM4	0xD6	Number 4
RC_NUM5	0xDA	Number 5
RC_NUM6	0xDE	Number 6
RC_NUM7	0x96	Number 7
RC_NUM8	0x9A	Number 8
RC_NUM9	0x9E	Number 9
RC_CH_PRE	0xDD	Previous Channel
RC_MENU	0x84	Menu
RC_EXIT	0xD4	Exit
RC_CURSOR_UP	0x92	Cursor Up
RC_CURSOR_DOWN	0xD8	Cursor Down
RC_CURSOR_RIGHT	0x9F	Cursor Right

Key Name	Key Code	Description
RC_CURSOR_LEFT	0x97	Cursor Left
RC_ENTER	0x9B	Enter
RC_COLOR_RED	0xB2	Color Red
RC_COLOR_GREEN	0xB3	Color Green
RC_COLOR_YELLOW	0xB4	Color Yellow
RC_COLOR_BLUE	0xB5	Color Blue
RC_MUTE	0xDF	Audio Mute
RC_VOL_UP	0x83	Volume Up
RC_VOL_DN	0x86	Volume Down
RC_CH_UP	0x80	Channel Up
RC_CH_DN	0x8E	Channel Down
RC_ARC	0x81	Screen Size
RC_PSM	0xC3	Picture Mode
RC_SSM	0xC2	Sound Mode
RC_SLEEP	0xCE	Sleep Timer
RC_INFO	0xB7	Program Information
RC_STILL	0xB8	Picture Freeze
RC_INPUT	0xC0	Input menu
RC_COMPONENT	0xC6	Discrete Input COMPONENT
RC_VGA1	0xCB	Discrete Input VGA1
RC_HDMI1	0xCA	Discrete Input HDMI1
RC_HDMI2	0xC9	Discrete Input HDMI2
RC_DP	0xC8	Discrete Input Display Port
RC_OPS	0xBA	Discrete OPS
RC_USB	0xBB	Discrete USB
RC_HOME	0xBC	Discrete HOME
RC_VOL_MUTE_ON	0x60	Discrete Volume Mute On
RC_VOL_MUTE_OFF	0x61	Discrete Volume Mute Off