

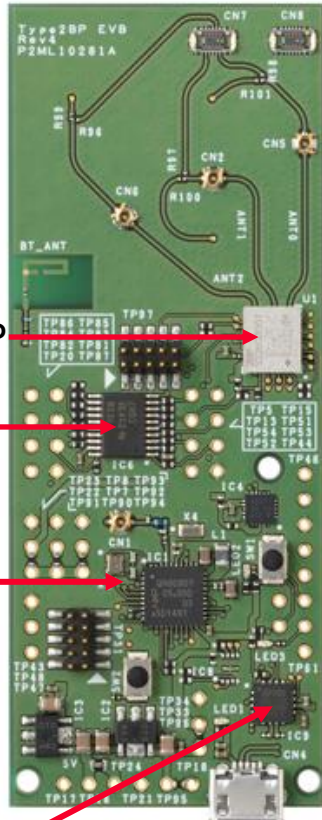
Murata UWB module Type-2BP (NXP SR150) Test guide using PnP mode

2021/7/29
2021/8/1 RevA
2021/10/1 RevB
2021/10/21 RevC
2021/11/11 RevD
2022/6/22 RevE
2023/10/12 RevF
2023/11/06 RevG



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Description (Stand alone mode / PnP mode)



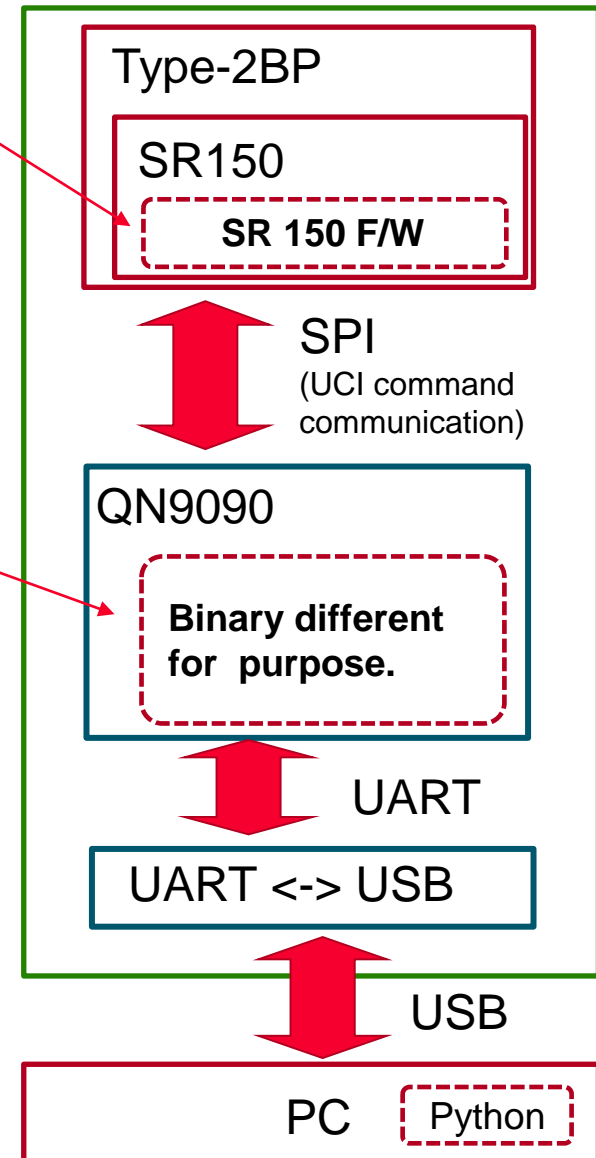
F/W is combined into the binary for QN9090. Downloaded automatically when EVK power on. Same F/W is used for stand alone mode and PnP mode.

There are two mode of binary.

1. Stand alone mode
2. PnP mode

1 is for the final product, SR150 controlled by the program in QN9090. Sample program of stand alone mode is in the SDK.

2 is to bypass the UCI command to UART, with this binary SR150 can be controlled from PC using UCI commands.



UART-USB

EVK Rev 2.1: Cypress CY765215-32LTXI

EVK Rev 3.0 or later : FTDI FT230XQ

Flow to do pair ranging test with PnP mode



1. Prepare two Type-2BP EVKs. (Rev2.1 or later)
2. Write PnP binary in the flash of QN9090 (if not programmed)
3. Turn on both of EVK and run python script.
One is as initiator, another is as responder.
4. Check the log of python script, there is distance and AoA result appeared.

Detail of procedure (1)

*Advance confirmation

When operating in PnP mode, care must be taken with the combination of PnP binary file and python script file.
The following combination should work.

We recommend that you use the latest version of the SDK.

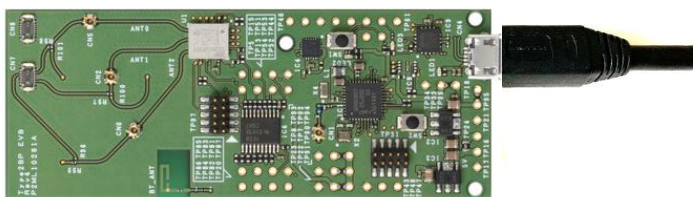
SDK ver	PnP binary *1	Python script file *2
V04.04.03	pnp3MFW_Rhodes4_SR150- ROW_PROD-v04.04.03.bin	MTD-SCP-071-A_DS- TWR_SR150_Unicast_v04.04.03.py
V04.02.01	2bp_v04_02_01_pnp.bin	MTD-SCP-067-B_DS- TWR_SR150_Unicast_v04.02.01.py
V03.15.11	2bp_pnp_v03.15.11.bin	MTD-SCP-026-A_DS- TWR_SR150_Unicast_v03.14.05.py
V03.14.05	2bp_pnp_v03.14.05.bin	
V03.13.03	2bp_pnp_v03.13.03.bin	MTD-SCP-025-A_DS- TWR_SR150_Unicast_FW32.py

*1 Refer to the respective SDK sites for more information on PnP binary file information.

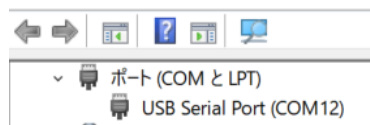
*2 Download it from the “Test Guide” section on the 2BP Document Site.

Detail of procedure (2)

*Write PnP binary in the flash of QN9090



Connect the EVK with PC through USB cable and check COM port number on Device Manager.



Open the DK6Programmer path in Command Prompt and run command below.

¥DK6Programmer.exe -V 0 -P 1000000 -s COM12 -Y -p pnp3MFW_Rhodes4_SR150-ROW_PROD-v04.04.03.bin

```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19044.1645]
(c) Microsoft Corporation. All rights reserved.

C:\>¥DK6ProductionFlashProgrammer>¥DK6Programmer.exe -V 0 -P 1000000 -s COM12 -Y -p 2bp_pnp_v03.13.03.bin
COM12: Connected at 115200
COM12: Detected QN9090 with MAC address FF:FF:FF:FF:FF:FF
COM12: Selected memory: FLASH
COM12: Programming FLASH at 0x0
COM12: Partial erase required on memory FLASH, addr=0x00000000, length=339020
COM12: The area to erase is not an exact multiple of the erase block size. Erase data from 0x00000000 to 0x00052e00?
COM12: Forcing operation due to command line argument
COM12: Completed
COM12: Memory programmed successfully

C:\>¥DK6ProductionFlashProgrammer>
```

path to the binary

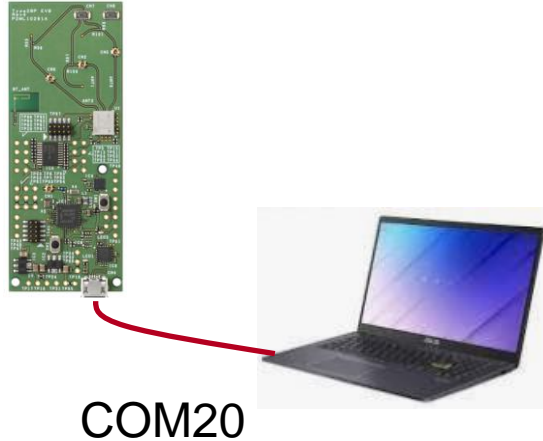
* See Appendix for installing DK6Programmer.

* This is PnP binary of SDK v04.04.03 case, in case there is newer version, please use that.

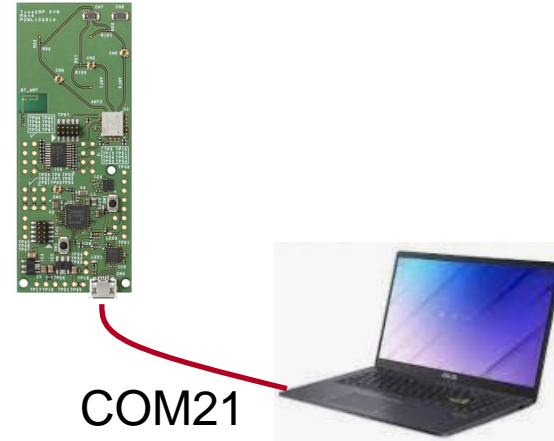
Detail of procedure (3)

*Ranging test using Python script

Initiator



Responder



Run Python script “MTD-SCP-071-A_DS-TWR_SR150_Unicast_v04.04.03.py”
One as initiator and another as responder.

*To run the python script, need to install additional library to Python as below.

pip install zmq

pip install pyserial matplotlib numpy pycryptodome PyYAML

*Rev2.1 EVK uses Cypress CY765215-32LTXI for UART <-> USB and it has two UART channels.

From PC, there are two COM port detected per EVK.

How to know which COM port should be used, please see appendix.

Detail of procedure (4)



```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19045.3448]
(c) Microsoft Corporation. All rights reserved.

C:\>py MTD-SCP-071-A_DS-TWR_SR150_Unicast_v04.04.03.py i COM20

C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19045.3448]
(c) Microsoft Corporation. All rights reserved.

C:\>py MTD-SCP-071-A_DS-TWR_SR150_Unicast_v04.04.03.py r COM21
```

“py MTD-SCP-071-A_DS-TWR_SR150_Unicast_v04.04.03.py **i** COM20” for initiator
(COM port number varies depend on environment)

“py MTD-SCP-071-A_DS-TWR_SR150_Unicast_v04.04.03.py **r** COM21” for responder
(COM port number varies depend on environment)

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Detail of procedure (5)

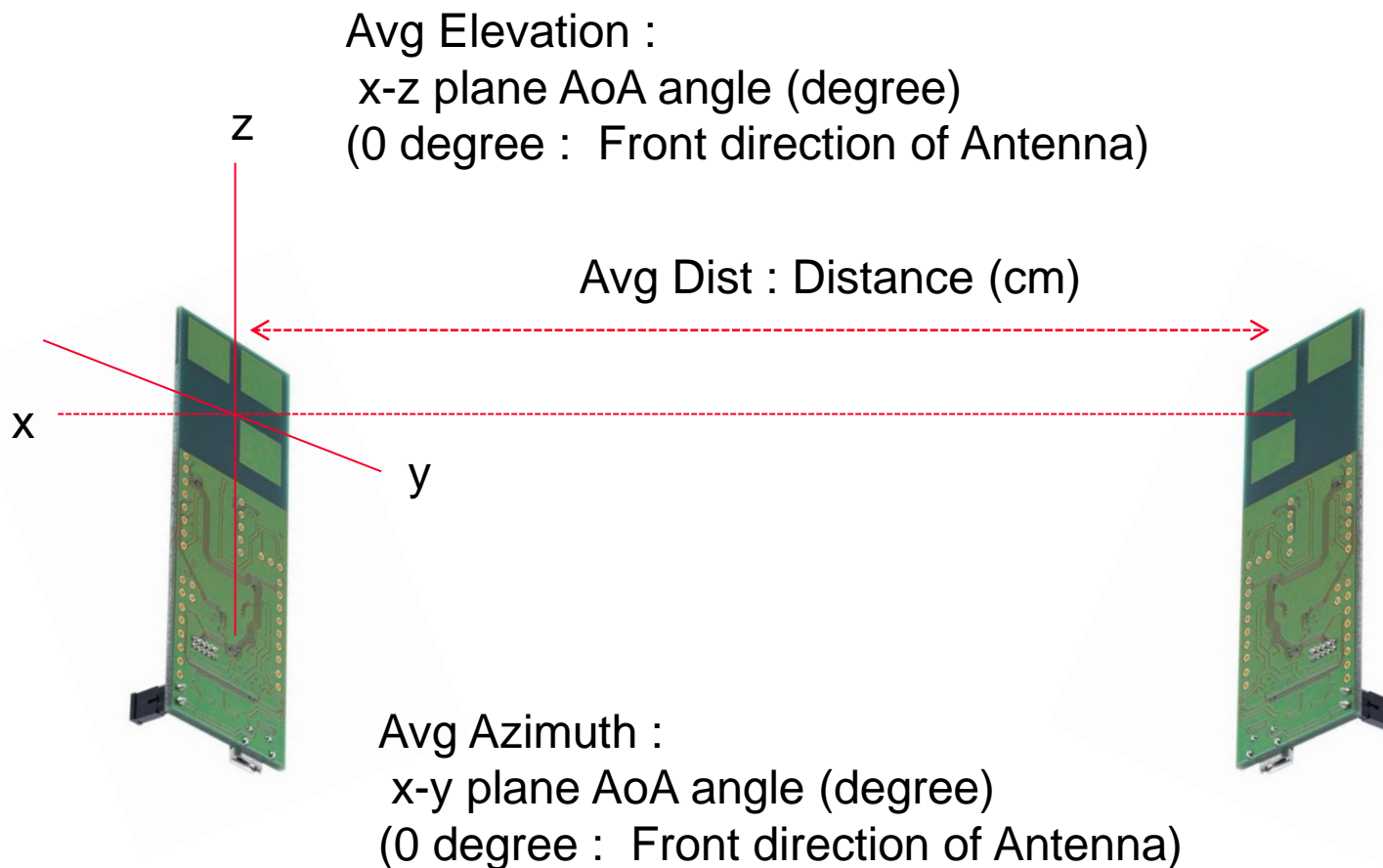
Log of Python script

```
コマンドプロンプト - py DS-TWR_Unicast_A25_pair34_Murata_EVB.py i COM20
2021-07-29 19:55:42.078NXPUCIR <= 62 00 00 4d 6c 00 00 00 57 04 00 00 00 d8 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 01
01 00 00 00 5a 00 00 ee 64 00 1e 64 00 00 00 00 00 00 05 00 00 00 00 00 00 00 00 00 00 00 00 13 00 0f 8f ae f2 b2 00 00
02 72 48 40 03 62 49 41 03 04 00 00
*** (108) NLos:0 Dist:90 Azimuth:-36.000000 (FOM:100) Elevation:60.000000 (FOM:100) PDoA1:144.890625 PDoA2:146.7
65625
*** Avg Dist:93 Avg Azimuth:-39.700000 Avg Elevation:36.000000 Avg_PDoA1:140.693750 Avg_PDoA2:97.678125
2021-07-29 19:55:42.334NXPUCIR <= 62 00 00 4d 6d 00 00 00 57 04 00 00 00 d8 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 01
01 00 00 00 5e 00 00 e2 64 00 1e 64 00 00 00 00 00 05 00 00 00 00 00 00 00 00 00 00 00 00 00 13 00 0f d1 b0 dd b2 00 00
02 38 47 41 03 84 40 41 03 04 00 00
*** (109) NLos:0 Dist:94 Azimuth:-60.000000 (FOM:100) Elevation:60.000000 (FOM:100) PDoA1:142.437500 PDoA2:129.0
81250
*** Avg Dist:92 Avg Azimuth:-44.500000 Avg Elevation:36.000000 Avg_PDoA1:141.675000 Avg_PDoA2:87.759375
2021-07-29 19:55:42.515NXPUCIR <= 62 00 00 4d 6e 00 00 00 57 04 00 00 00 d8 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 01
01 00 00 00 5b 00 00 e2 64 00 1e 64 00 00 00 00 00 05 00 00 00 00 00 00 00 00 00 00 00 00 00 13 00 0f d7 b0 04 b1 00 00
02 98 48 41 03 72 31 41 03 04 00 00
*** (110) NLos:0 Dist:91 Azimuth:-60.000000 (FOM:100) Elevation:60.000000 (FOM:100) PDoA1:145.187500 PDoA2:98.89
0625
*** Avg Dist:92 Avg Azimuth:-49.300000 Avg Elevation:36.000000 Avg_PDoA1:143.665625 Avg_PDoA2:74.803125

コマンドプロンプト - py DS-TWR_Unicast_A25_pair34_Murata_EVB.py r COM21
00 00 00 00 5a 00 ff 09 64 15 0a 64 00 00 00 00 00 00 05 00 00 00 00 00 00 00 00 00 00 00 00 13 00 0f 9e ad 4f b2 00 00
02 88 df 40 03 88 10 40 03 04 00 00
*** (86) NLos:0 Dist:90 Azimuth:20.000000 (FOM:100) Elevation:20.200000 (FOM:100) PDoA1:-64.937500 PDoA2:33.0625
00
*** Avg Dist:93 Avg Azimuth:20.800000 Avg Elevation:19.680000 Avg_PDoA1:-67.206250 Avg_PDoA2:31.403125
2021-07-29 19:55:42.284NXPUCIR <= 62 00 00 4d 57 00 00 00 57 04 00 00 00 d8 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 01
00 00 00 00 5e 00 8c 09 64 d5 0a 64 00 00 00 00 00 05 00 00 00 00 00 00 00 00 00 00 00 00 00 13 00 0f 74 ae 22 b3 00 00
02 08 e1 41 03 c0 12 41 03 04 00 00
*** (87) NLos:0 Dist:94 Azimuth:19.100000 (FOM:100) Elevation:21.700000 (FOM:100) PDoA1:-61.937500 PDoA2:37.5000
00
*** Avg Dist:92 Avg Azimuth:20.520000 Avg Elevation:19.980000 Avg_PDoA1:-66.334375 Avg_PDoA2:32.328125
2021-07-29 19:55:42.509NXPUCIR <= 62 00 00 4d 58 00 00 00 57 04 00 00 00 d8 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 01
00 00 00 00 5b 00 11 09 64 fe 0b 64 00 00 00 00 00 05 00 00 00 00 00 00 00 00 00 00 00 00 00 13 00 0f cb ae 65 b0 00 00
02 ce e2 40 03 2e 16 41 03 04 00 00
*** (88) NLos:0 Dist:91 Azimuth:18.100000 (FOM:100) Elevation:24.000000 (FOM:100) PDoA1:-58.390625 PDoA2:44.3593
75
*** Avg Dist:92 Avg Azimuth:20.240000 Avg Elevation:21.340000 Avg_PDoA1:-64.950000 Avg_PDoA2:36.209375
```

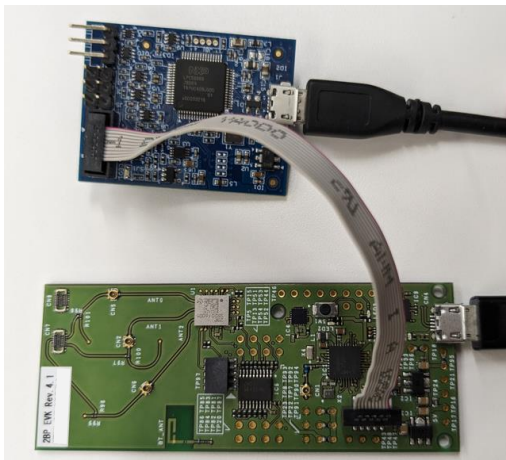
Ranging result of initiator

Ranging result of responder



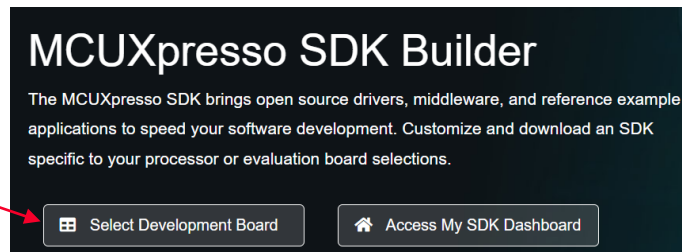
There are several ways for programming QN9090.

- DK6Programmer.exe (Rev 3 and later EVB required)
 - Command usage is described earlier in this guide.
 - Installation is described in this appendix.
- MCU-Link Debug Probe
 - Rev 2.1 EVK is not compatible with DK6Programmer, in this case please use debugger



DK6Programmer Installation (1/2)

*Install DK6Programmer



Visit <https://mcuxpresso.nxp.com> and click “Select Development Board” (login may be required)

Type QN9090DK in Search for Hardware, then select QN9090DK6 under Boards

Select Development Board

Search for your board or kit to get started.

Search for Hardware

QN9090DK

QN9090DK



Select a Board, Kit, or Processor

Boards

QN

QN9090DK6 (QN9090)

Selection Details



QN9090DK6

The LPCXpresso family of boards provides a powerful and flexible development system for NXP's Cortex-M MCUs

Build MCUXpresso SDK v2.6.5

Board Configuration

Click Build MCUXpresso SDK

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DK6Programmer Installation (2/2)

*Install DK6Programmer

Click SELECT ALL

Build SDK for QN9090DK6

Generate a downloadable SDK archive for use with desktop MCUXpresso Tools.
Developer Environment Settings

Selections here will impact files and examples projects included in the SDK and Generated Projects

Host OS: Toolchain / IDE:

SDK Version: 2.6.5 (released 2022-03-10)

Search...

SELECT ALL **UNSELECT ALL**

	Name	Category	Description	Dependencies
<input checked="" type="checkbox"/>	AWS IoT Core	Middleware	Amazon Web Service (AWS) IoT Core SDK	
<input checked="" type="checkbox"/>	CMSIS DSP Library		CMSIS DSP Software Library	
<input checked="" type="checkbox"/>	NTAG I2C	Middleware	NTAG I2C (plus) communication library	
<input checked="" type="checkbox"/>	Wireless BLE stack	Middleware	BLE	
<input checked="" type="checkbox"/>	FreeRTOS		Real-time operating system for microcontrollers from Amazon	

DOWNLOAD SDK

Click DOWNLOAD SDK (may need to accept the license)

After downloading, unzip the SDK zip file and run the installer in tools¥JN-SW-4407-DK6-Flash-Programmer and follow the instructions.

> tools > JN-SW-4407-DK6-Flash-Programmer

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DK6-RN-0065-Production-Flash-Programmer.pdf



JN-SW-4407 DK6 Production Flash Programmer v4564.exe

Appendix – How to change the baudrate

Starting with SDK v04.04.03 for SR150, the Baudrate for UART has been changed from 115200bps to 3Mbps.

The default setting is 3Mbps, but if you want to change to 115200bps, change the following settings.

Standalone mode:

Change "BOARD_DEBUG_UART_BAUDRATE" in boards/Host/Rhodes4_SPI/board.h

```
205 #else
206 // #define BOARD_DEBUG_UART_BAUDRATE 3000000U
207 #define BOARD_DEBUG_UART_BAUDRATE 115200U
208 #endif
209 /* doc-end:uart_logging */
210 #endif
```

PnP mode:

Change "DEMO_USART_BAUDRATE" in demos/pnp/Rhodes4/pnp_usart.c

```
78 // #define DEMO_USART_BAUDRATE 3000000
79 #define DEMO_USART_BAUDRATE 115200
```

Change "serial_port.baudrate" in MTD-SCP-071-A_DS-TWR_SR150_Unicast_v04.04.03.py

```
1242 serial_port.baudrate = 115200
1243 # serial_port.baudrate = 3000000
```

Appendix - COM port detection for Rev2.1 EVK -

Two COM port detected.



Check: device manager -> USB serial device -> Property -> Event : Information.
“MI_00 (SCB0 in below)” is connected to QN9090 UART.
In this case, COM13 is the target of connection.

#	Part Number	SCB 0			SCB 1			MFG Interface
		Mode	Protocol	MI #	Mode	Protocol	MI #	MI #
4	CY7C65215-32LTXI	UART	CDC	00	UART	CDC	02	04
		UART	CDC	00	UART / SPI / I2C / JTAG	Vendor / PHDC	02	03
		UART / SPI / I2C	Vendor / PHDC	00	UART	CDC	01	03
		UART / SPI / I2C	Vendor / PHDC	00	UART / SPI / I2C / JTAG	Vendor / PHDC	01	02