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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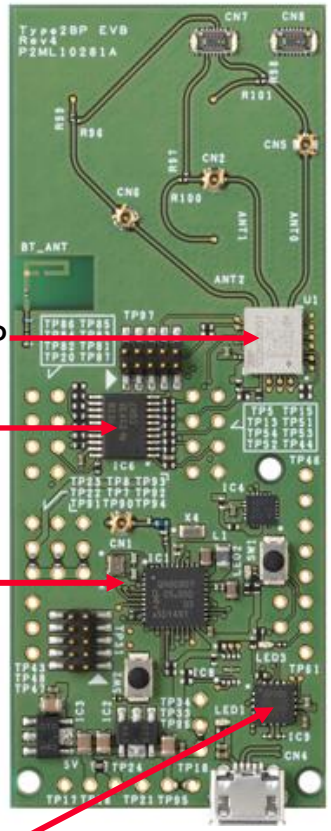
Description (Stand alone mode / PnP mode)

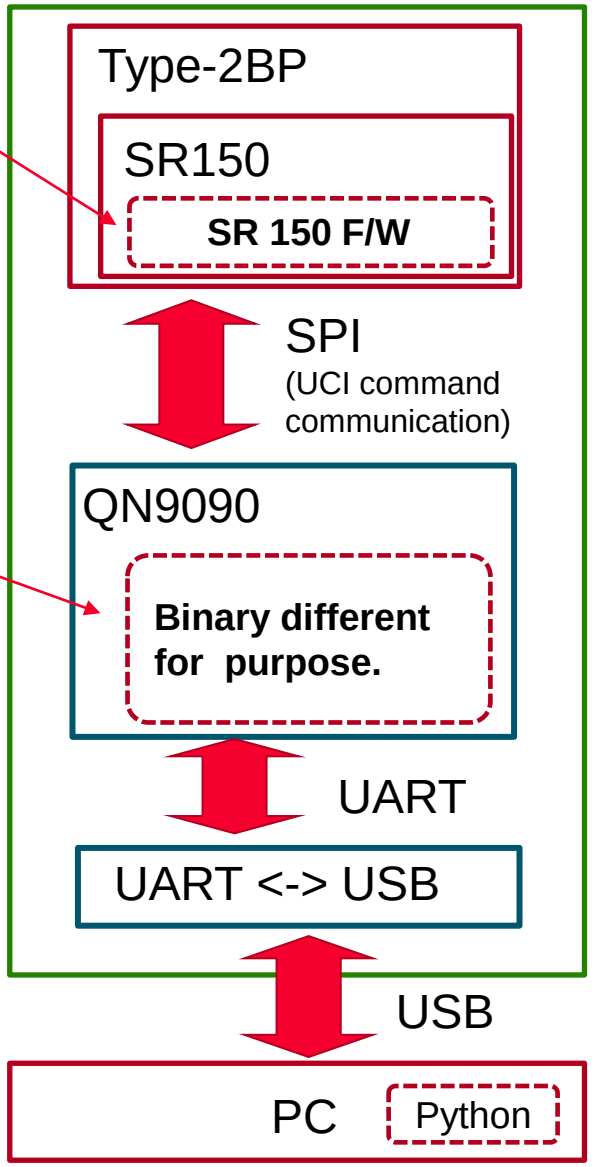


F/W is combined into the binary for QN9090. Downloaded automatically when EVK power on. Same F/W is used for stand alone mode and PnP mode.

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.

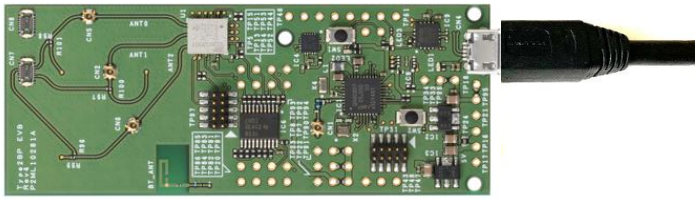
We recommend that you use the latest version of the SDK.

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

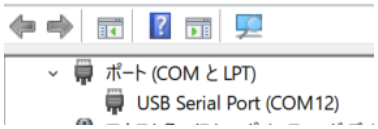
*1 Refer to the respective SDK sites for more information on PnP binary file information.
*2 Download it from the “Test Guide” section on the 2BP Document Site.

Detail of procedure (2)

***Write PnP binary in the flash of QN9090**

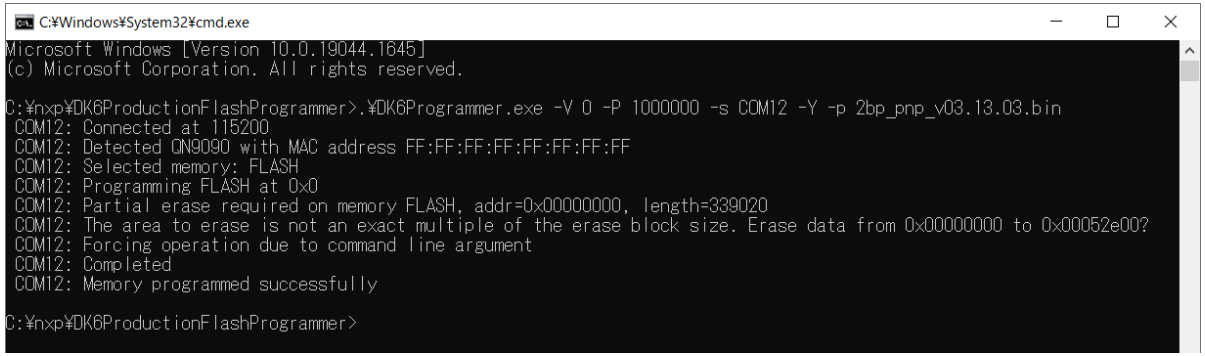


Connect the EVK with PC through USB cable and check COM port number on Device Manager.



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



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.

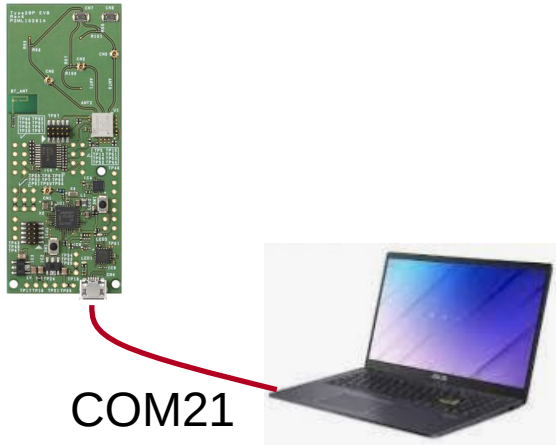
Detail of procedure (3)

***Ranging test using Python script**

Initiator

COM20

Responder



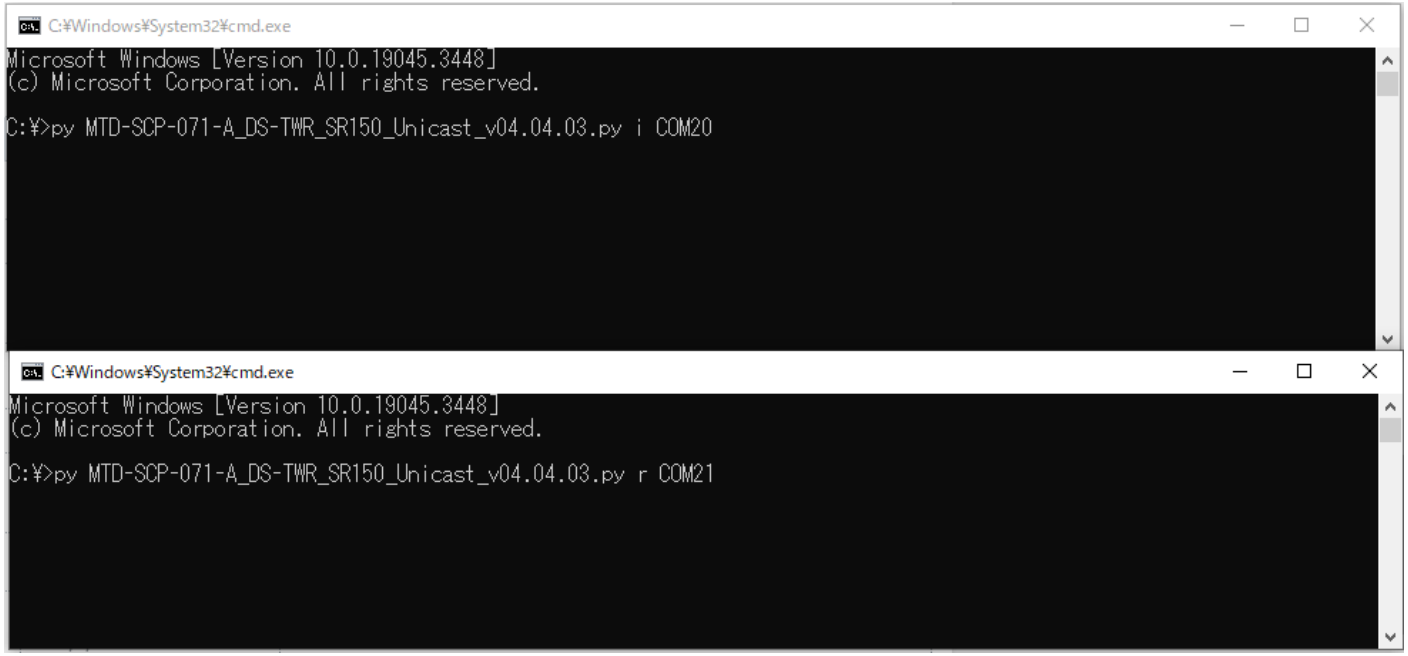
COM21

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)

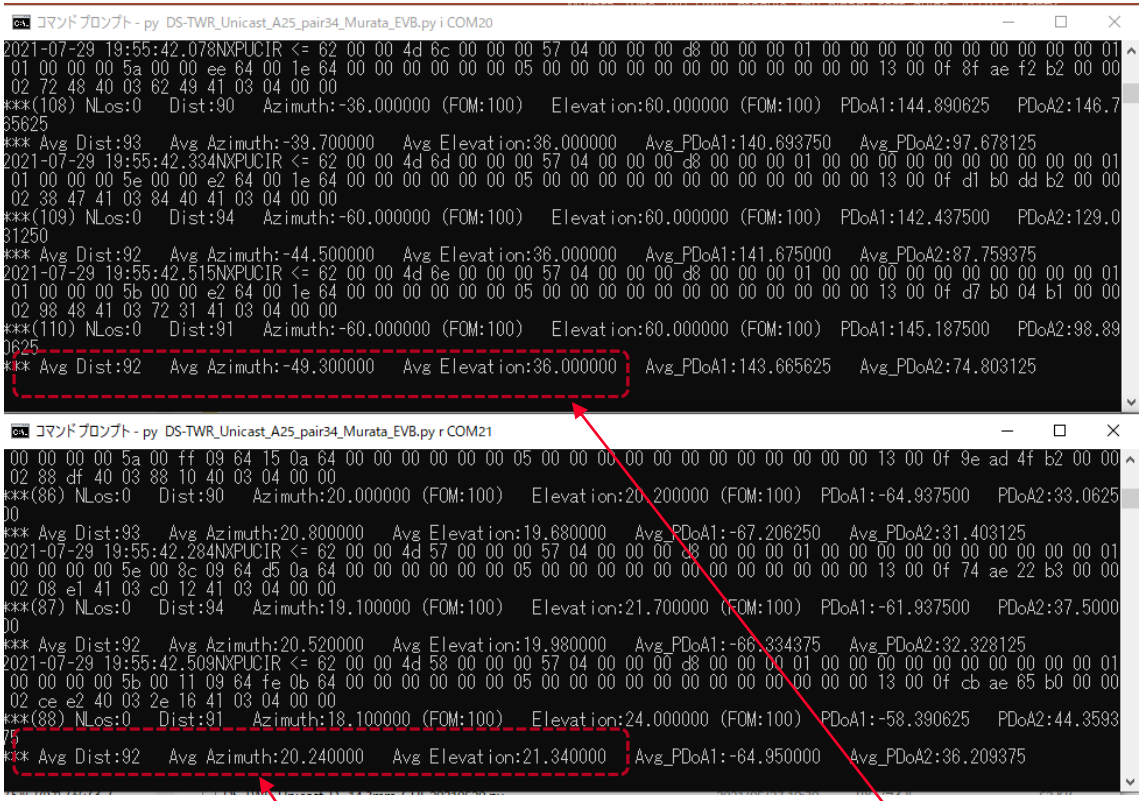


“py MTD-SCP-071-A_DS-TWR_SR150_Unicast_v04.04.03.py **i** COM20” for initiator
(COM port number varies depend on environment)

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

Detail of procedure (5)

Log of Python script



Ranging result of initiator

Ranging result of responder

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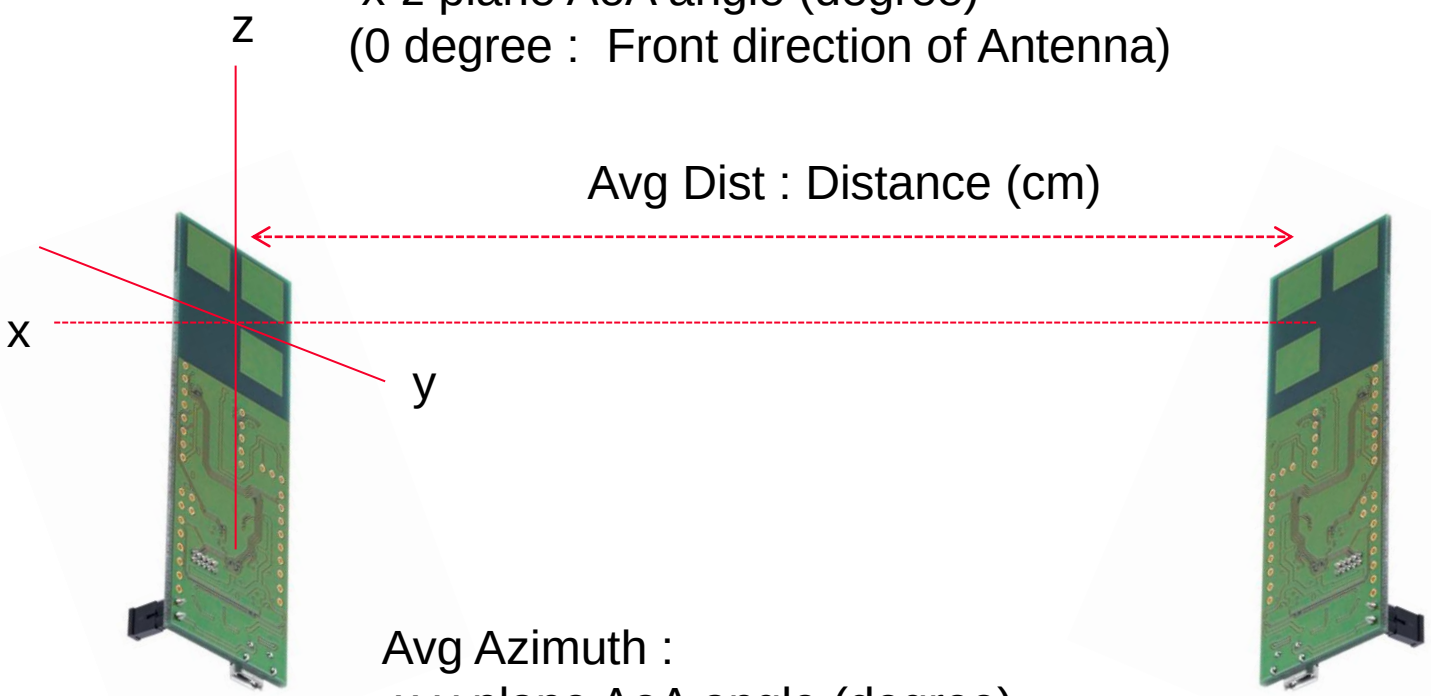
Result

Avg Elevation :
x-z plane AoA angle (degree)
(0 degree : Front direction of Antenna)



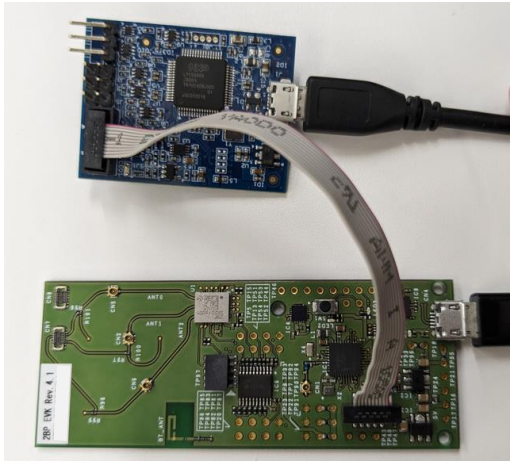
Avg Azimuth :
x-y plane AoA angle (degree)
(0 degree : Front direction of Antenna)

Appendix - QN9090 Programming -

There are several ways for programming QN9090.

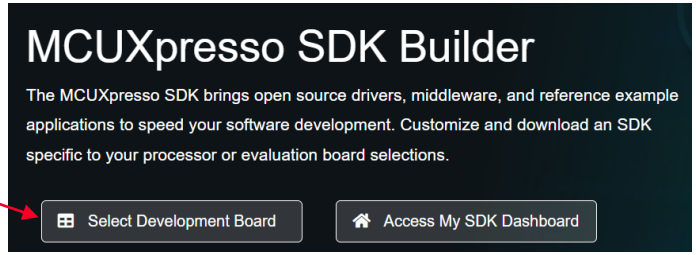
- DK6Programmer.exe (Rev 3 and later EVB required)
  - Command usage is described earlier in this guide.
  - Installation is described in this appendix.

- MCU-Link Debug Probe
  - Rev 2.1 EVK is not compatible with DK6Programmer, in this case please use debugger



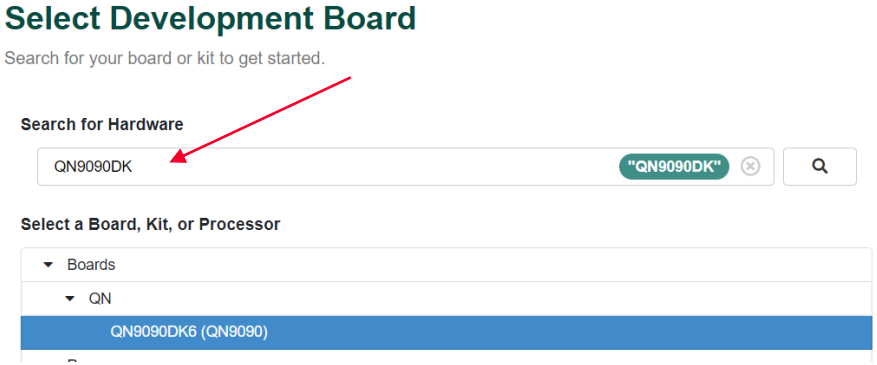
DK6Programmer Installation (1/2)

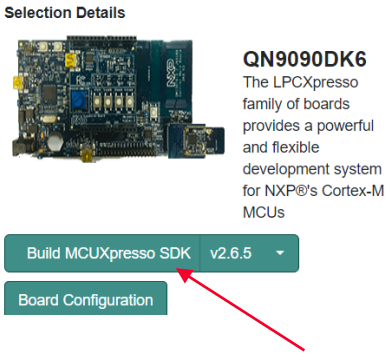
*Install DK6Programmer



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





Click Build MCUXpresso SDK

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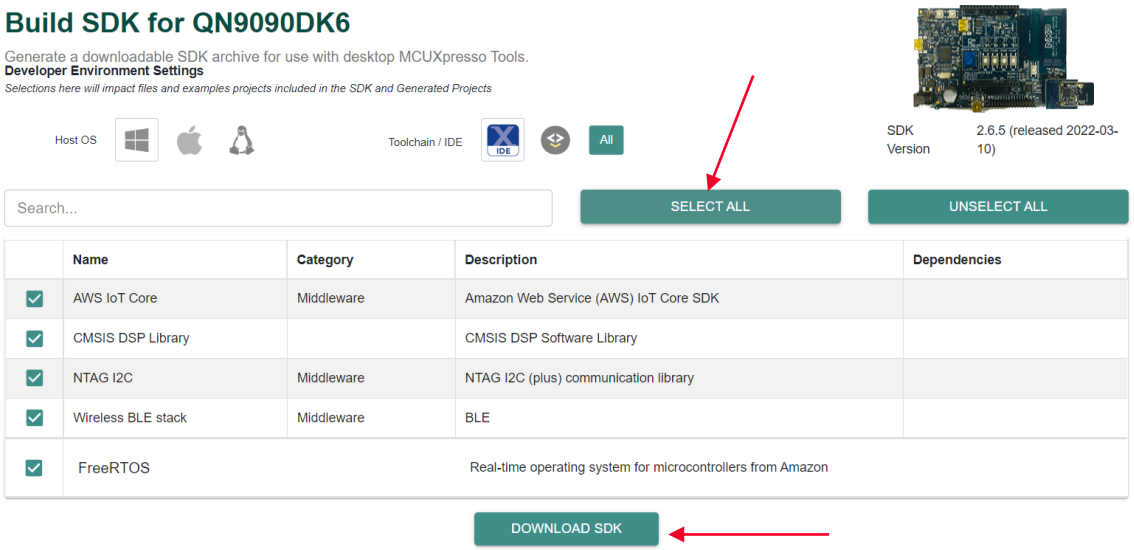
DK6Programmer Installation (2/2)

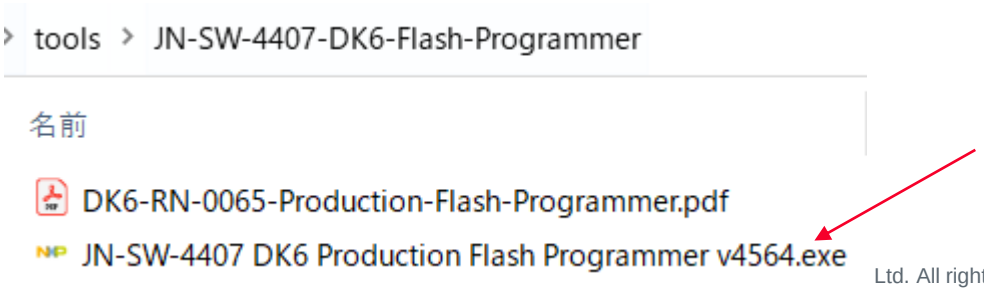
*Install DK6Programmer

Click SELECT ALL



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.



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

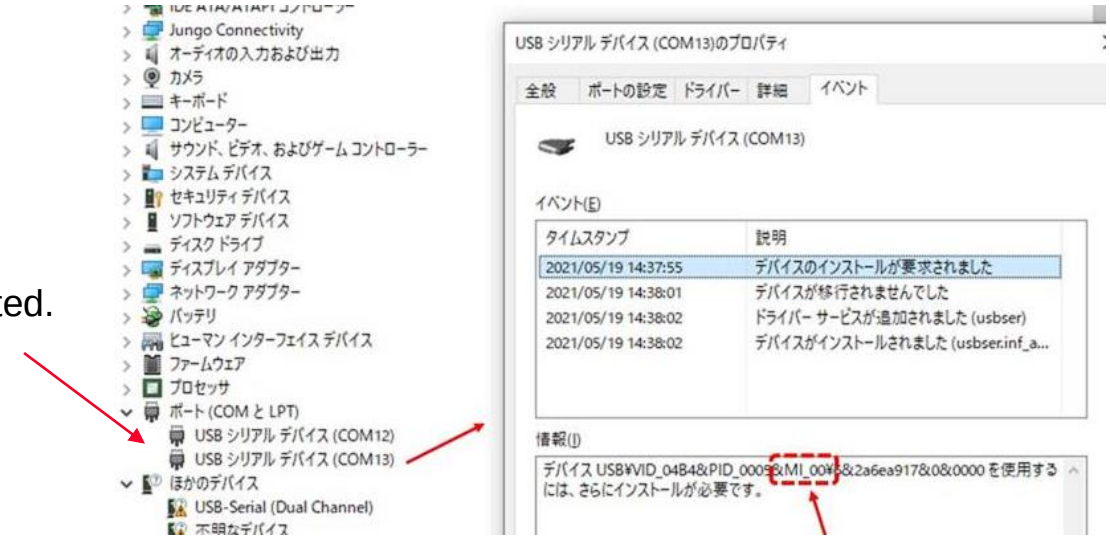
```
78 //#define DEMO_USART_BAUDRATE 3000000
79 #define DEMO_USART_BAUDRATE 115200
```

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