

AN14733

Using TX and RX Swap Feature of LPUART in MCX A Series

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Application note

Document information

Information	Content
Keywords	AN14733, MCX A series, LPUART, TX and RX swap, FRDM-MCXA346
Abstract	This application note describes how to use the TX and RX swap feature of the LPUART on the MCX A series and test on the FRDM-MCXA346 board.



1 Introduction

The MCX A series microcontrollers are powered by the Arm Cortex-M33. These microcontrollers are general-purpose MCUs designed to address a wide range of applications with scalable device options, low power, and intelligent peripherals. The MCX A series provides multiple LPUARTs. This application note introduces the TX and RX swap feature of LPUART on MCX A series.

The LPUART TX and RX swap feature targets to solve the LPUART hardware layout issue. If you connect the LPUART TX MCU with LPUART TX target and LPUART RX MCU with LPUART RX target, the LPUART port may not communicate. The user can easily modify the software to solve these issues with the TX and RX swap feature of LPUART.

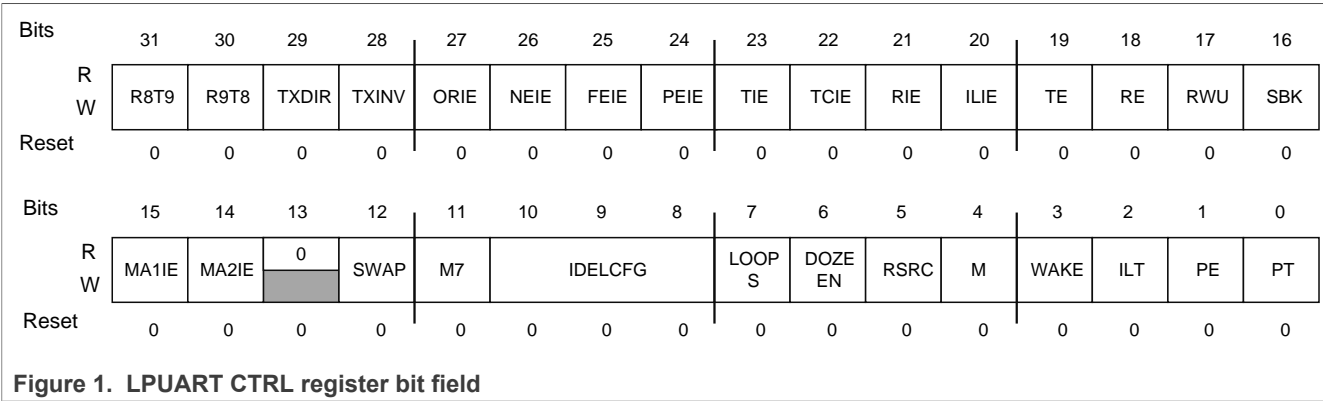
[Table 1](#) lists the NXP MCX A series MCU integrated with TX and RX swap feature on LPUART status. The MCU launched after 2024 supports this swap feature.

Table 1. MCX A series LPUART TX and RX swap feature support list.

Part number	Support TX and RX swap feature
MCX A13x	No
MCX A14x	No
MCX A15x	No
MCX A34x	Yes

2 Overview of TX and RX pin swap of LPUART

The LPUART module provides a TX/RX pin swap option in the Control (CTRL) register, bit 12. The CTRL register controls various optional features of the LPUART system. [Figure 1](#) shows the LPUART CTRL register bit-filed description.



Bit 12 in CTRL register can swap TX and RX pins. The software sets and clears this bit. If this field is 0, TX and RX are used in the standard way. For more details on pinout table definition, see the *MCXA345/346 data sheet* (document [MCXAP144M240F60](#)). If this field is 1, TX and RX are swapped, enabling an external LPUART module to work in a crossed-wired fashion. [Figure 2](#) shows the details of the bit 12.

Field	Function
12 SWAP	<p>TXD and RXD Pin Swap</p> <p>Swaps TXD and RXD pins(set and cleared by software). If this field is 0, TX and RX are used in the standard way. If this field is 1, TX and RX are swapped, enabling an external UART module to work in a crossedwired fashion.</p> <p>0b - Use the standard way 1b - Swap</p>

Figure 2. Bit 12 SWAP description in LPUART CTRL register

For example: In LPUART2 of MCX A346, as default the P2_2 and P2_3 are the TX and RX respectively. If the user requires the P2_2to act as LPUART2 RX and P2_3 act as TX, set the LPUART2 -> CTRL register bit12 (SWAP) as 1. Then the TX is assigned from P2_2 to P2_3 and the RX is assigned from P2_3 to P2_2.

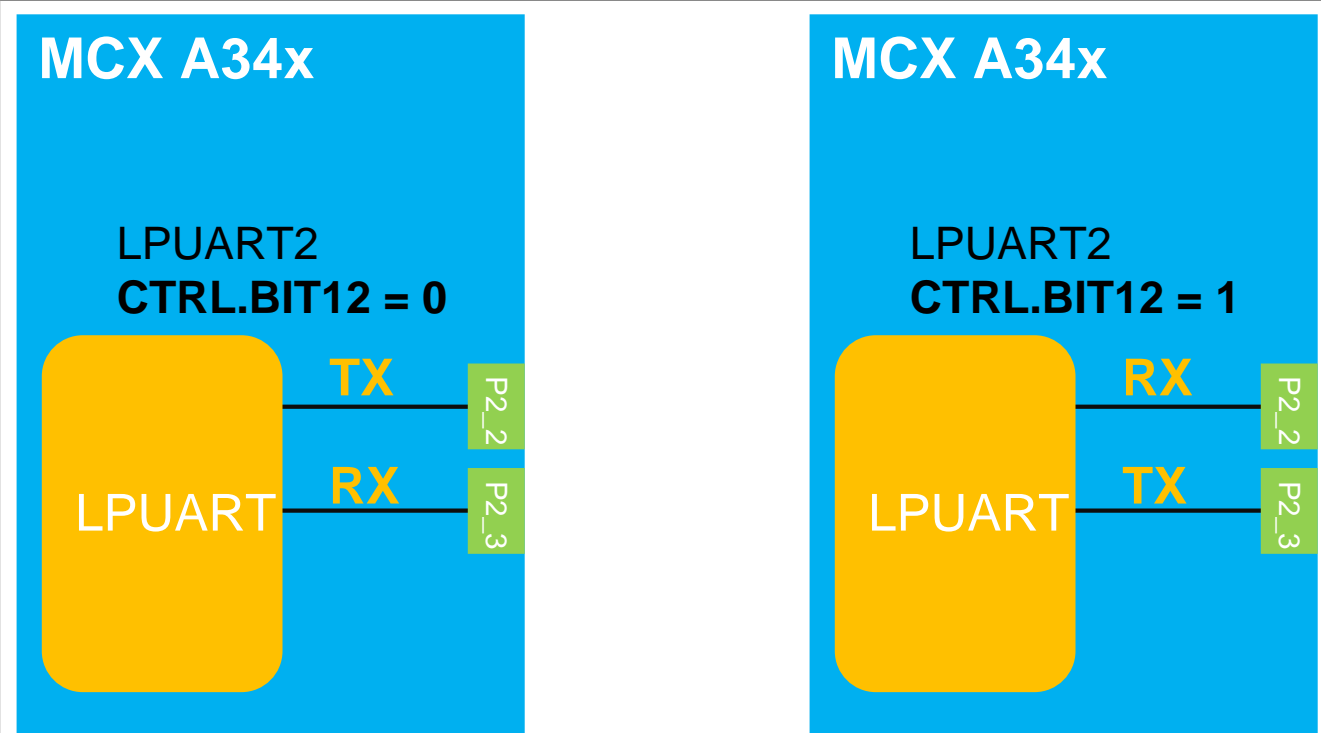


Figure 3. TXD and RXD swap by LPUART CTRL bit

3 Development platform

The hardware required for this document is as follows:

- FRDM-MCXA346
- 1x Type-C USB cable
- 1x USB-to-LPUART dongle

The connection between the FRDM-MCXA346 and PC is shown in [Figure 4](#).

The following connections are the default setting:

- J1 pin 2 of the FRDM-MCXA346 is LPUART2_RXD and connects with TXD of USB-to-LPUART.
- J1 pin 4 of the FRDM-MCXA346 is LPUART2_TXD and connects with RXD of USB-to-LPUART.
- GND pin of USB-to-LPUART connects with GND of the FRDM-MCXA346.



Figure 4. The FRDM-MCXA346 board connects with the PC through a USB-to-LPUART dongle

The software tools required for this document are as follows:

- Latest MCUXpresso IDE
- Latest MCX A346 SDK. To download, see [MCUXpresso SDK Builder](#)
- LPUART terminal tool, like Tera Term

4 Implementation of LPUART TXD and RXD swap

This section describes the implementation of TXD and RXD swap with LPUART.

4.1 Import LPUART example code from SDK

The project template used in this document is `lpuart_polling`, an example code of the SDK. Import the project to your MCUXpresso IDE first. The `lpuart_polling` example code under “`driver_examples\lpuart`”, see [Figure 5](#).

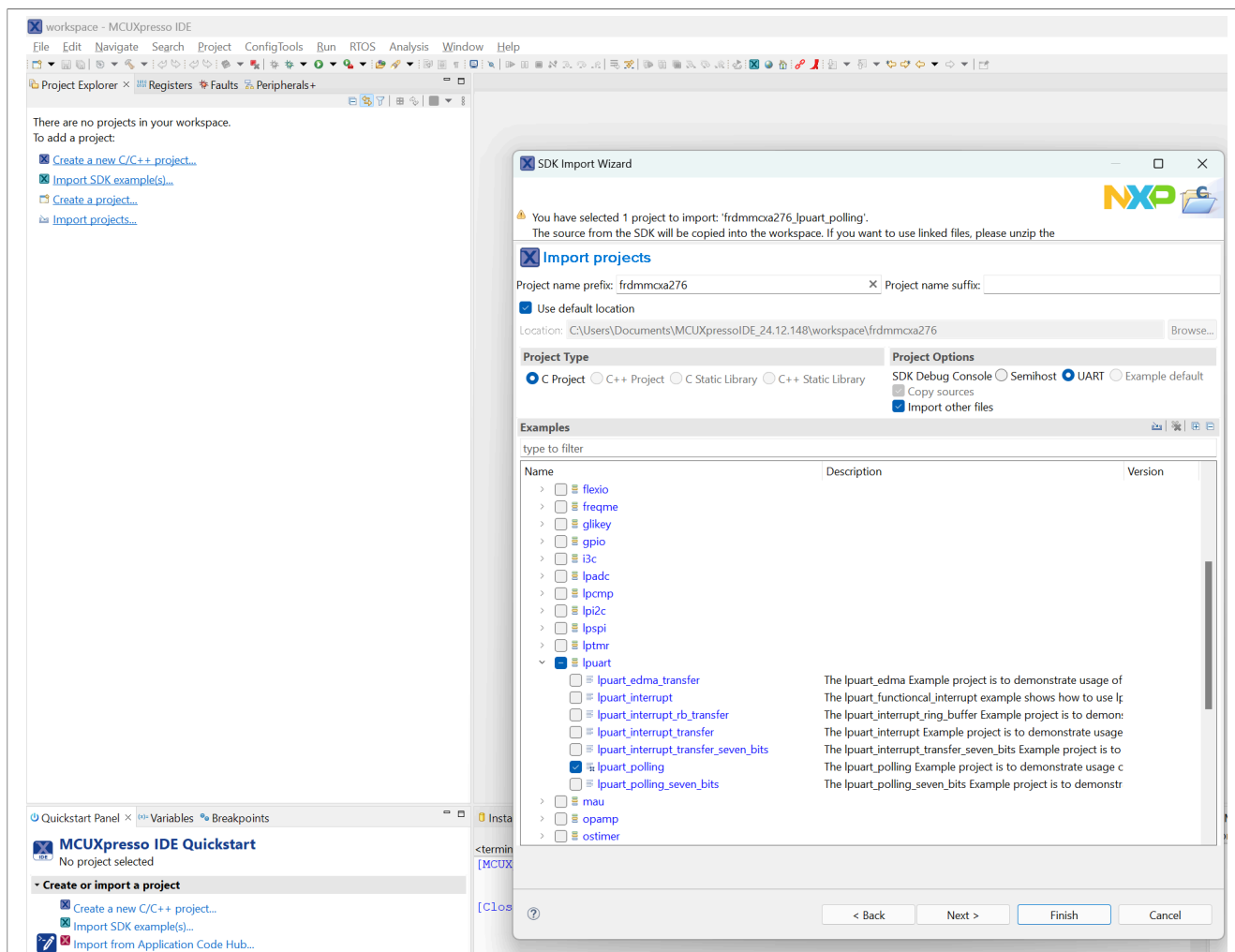


Figure 5. Import the lpuart_polling example project to the MCUXpresso IDE

4.2 Setup test environment

Set up the test environment as follows:

1. Compile the lpuart_polling project and download to the FRDM-MCXA346 board.
2. Connect the J1 LPUART port of the FRDM-MCXA346 board with the PC through a USB-to-LPUART dongle.
3. Configure the LPUART terminal tool as shows in [Figure 6](#):
 - Speed: 115200
 - Data: 8 bit
 - Parity: none
 - Stop bits: 1 bit

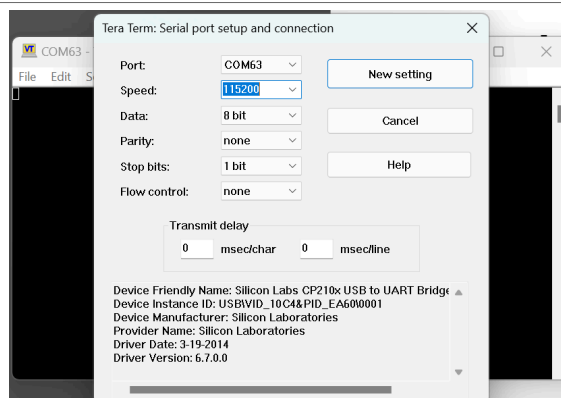


Figure 6. LPUART terminal setting

To see the promoted information on the terminal tool, click the SW1 reset button on the FRDM-MCXA346. To display the information on terminal, enter any character, see [Figure 7](#).

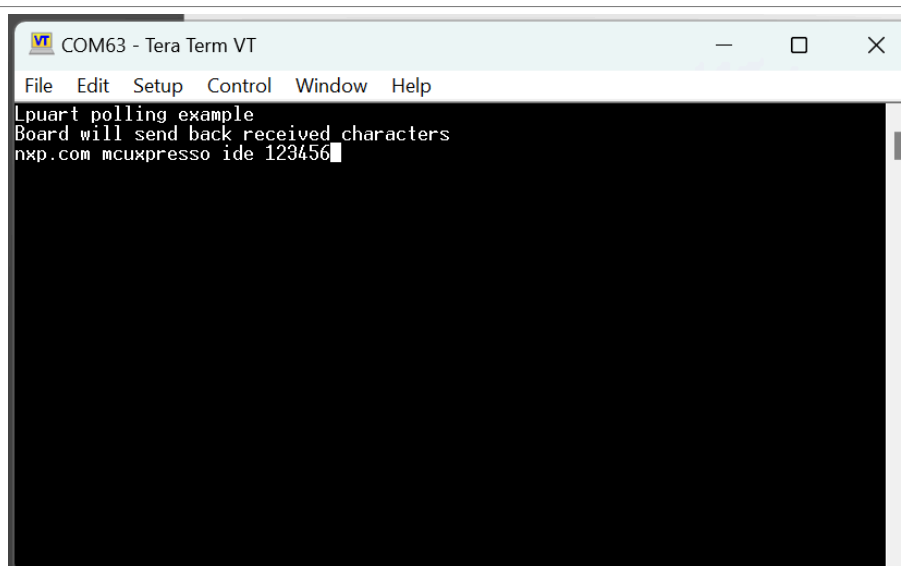


Figure 7. LPUART polling demo displays information in terminal tool

4.3 Swap TXD and RXD by SDK API

The SDK LPUART API already provides a definition to swap TXD and RXD: swapTxdRxd under structure lpuart_config_t. By setting swapTxdRxd as true, can swap the LPUART TXD and RXD. Follow line 55 of [Figure 8](#):

1. Update the code.
2. Compile and download the code to the FRDM-MCXA346.
3. Swap the TXD and RXD connection between the FRDM-MCXA346 and USB-to-LPUART dongle.
4. Reset the board.

The prompt messages must be printed on the terminal tool screen. If not, swap the TXD and RXD connection, there must be no messages.

```

21/*
22 * Prototypes
23 */
24
25uint8_t txbuff[] = "LPUART polling example\r\nBoard will send back received characters\r\n";
26uint8_t rxbuff[20] = {0};
27
28/*
29 * Code
30 */
31
32/*
33 * @brief Main function
34 */
35int main(void)
36{
37    uint8_t ch;
38    lpuart_config_t config;
39    BOARD_InitHardware();
40
41    /*
42     * config.baudRate_Bps = 115200U;
43     * config.parityMode = kLPUART_ParityDisabled;
44     * config.stopBitCount = kLPUART_OneStopBit;
45     * config.txFifoWatermark = 0;
46     * config.enableTx = false;
47     * config.enableRx = false;
48     * config.enableRxD = false;
49     */
50    LPUART_GetDefaultConfig(&config);
51    config.baudRate_Bps = BOARD_DEBUG_UART_BAUDRATE;
52    config.enableTx = true;
53    config.enableRx = true;
54    config.swapTxD = true;
55
56    LPUART_Init(DEMO_LPUART, &config, DEMO_LPUART_CLK_FREQ);
57    LPUART_WriteBlocking(DEMO_LPUART, txbuff, sizeof(txbuff) - 1);
58    while (1)
59    {
60        LPUART_ReadBlocking(DEMO_LPUART, &ch, 1);
61        LPUART_WriteBlocking(DEMO_LPUART, &ch, 1);
62    }
63}

```

Figure 8. swapTxDRxd definition in SDK

4.4 Swap TXD and RXD by LPUART register LPUARTn -> CTRL

To swap the TXD and RXD, set the CTRL register bit 12 of LPUART to 1. Follow the code in line 58 of [Figure 9](#):

1. Compile and download the code to the FRDM-MCXA346.
2. Swap the TXD and RXD connection between the FRDM-MCXA346 and USB-to-LPUART dongle.
3. Reset the board.

The prompt messages must be printed on the terminal tool screen. If not, swap the TXD and RXD connection, there must be no messages.

```

21/*
22 * Variables
23 */
24
25uint8_t txbuff[] = "LPUART polling example\r\nBoard will send back received characters\r\n";
26uint8_t rxbuff[20] = {0};
27
28/*
29 * Code
30 */
31
32/*
33 * @brief Main function
34 */
35int main(void)
36{
37    uint8_t ch;
38    lpuart_config_t config;
39    BOARD_InitHardware();
40
41    /*
42     * config.baudRate_Bps = 115200U;
43     * config.parityMode = kLPUART_ParityDisabled;
44     * config.stopBitCount = kLPUART_OneStopBit;
45     * config.txFifoWatermark = 0;
46     * config.enableTx = false;
47     * config.enableRx = false;
48     * config.enableRxD = false;
49     */
50    LPUART_GetDefaultConfig(&config);
51    config.baudRate_Bps = BOARD_DEBUG_UART_BAUDRATE;
52    config.enableTx = true;
53    config.enableRx = true;
54    config.swapTxD = true;
55
56    LPUART_Init(DEMO_LPUART, &config, DEMO_LPUART_CLK_FREQ);
57    DEMO_LPUART->CTRL |= 1<<12;
58    LPUART_WriteBlocking(DEMO_LPUART, txbuff, sizeof(txbuff) - 1);
59    while (1)
60    {
61        LPUART_ReadBlocking(DEMO_LPUART, &ch, 1);
62        LPUART_WriteBlocking(DEMO_LPUART, &ch, 1);
63    }
64}

```

Figure 9. Swap TXD and RXD by config LPUART register CTRL

5 Conclusion

This document provides information and code to help the user with the TX and RX swap feature of the LPUART on the MCX A series and do a test to verify this feature with the FRDM-MCXA346 board. If your hardware is linked with the wrong LPUART TX and RX, you could use this feature to solve the layout issues without extra cost.

6 Abbreviations

Table 2 lists the acronyms used in this document.

Table 2. Abbreviations

Acronym	Description
LPUART	Low-power universal asynchronous receiver/transmitter
PC	Personal computer
SDK	Software development kit

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8 Revision history

[Table 3](#) summarizes the revisions to this document.

Table 3. Revision history

Document ID	Release date	Description
AN14733 v.1.0	28 July 2025	Initial public release

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