UART Output Chinese Character

Example Code Introduction for 32-bit NuMicro® Family

Information

Application	Demonstrate how to use UART output Chinese character on terminal.
BSP Version	M451 Series BSP CMSIS V3.01.003
Hardware	NuTiny-EVB-M451 LQFP100 V1.3

The information described in this document is the exclusive intellectual property of Nuvoton Technology Corporation and shall not be reproduced without permission from Nuvoton.

Nuvoton is providing this document only for reference purposes of NuMicro microcontroller based system design. Nuvoton assumes no responsibility for errors or omissions.

All data and specifications are subject to change without notice.

For additional information or questions, please contact: Nuvoton Technology Corporation.

www.nuvoton.com

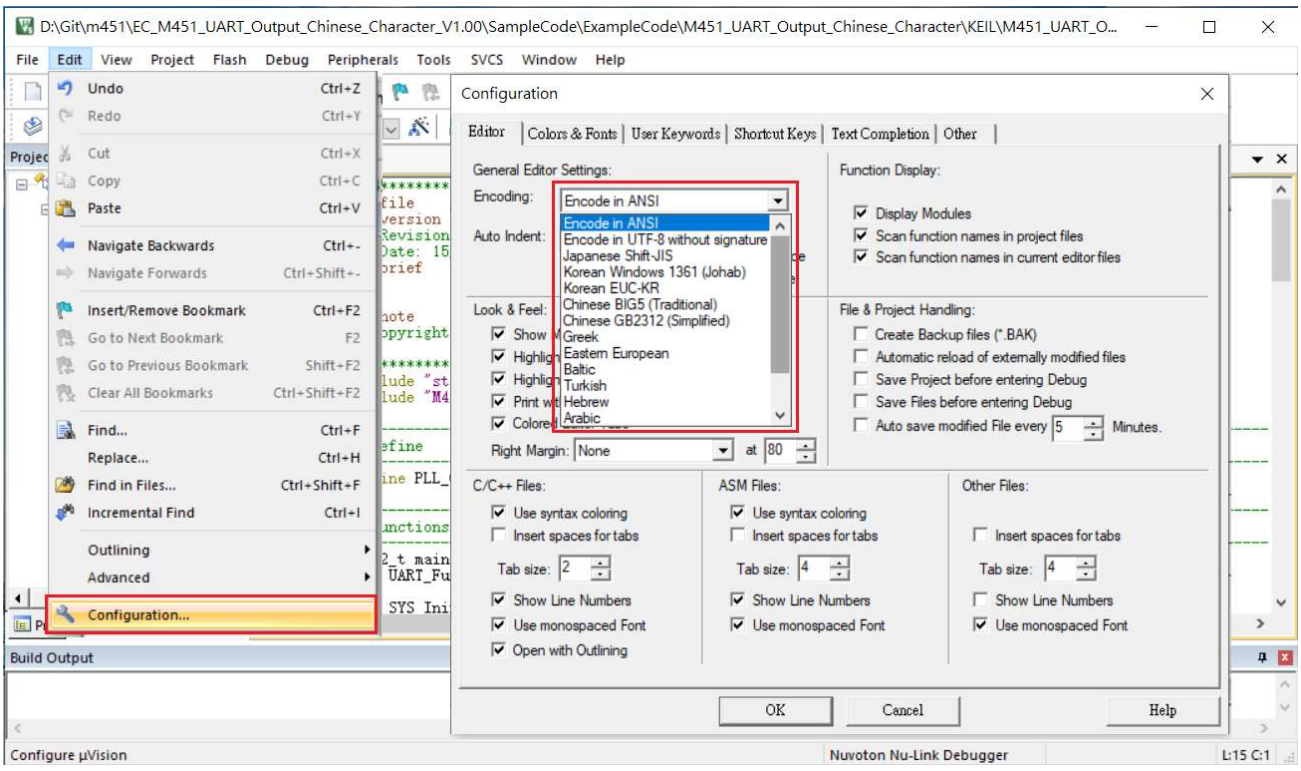
1 Function Description

1.1 Introduction

The serial port is a very familiar peripheral. We don't want to introduce more about the serial port but focus on the encoding topic of sending Chinese character. It solves the garbled problem when Chinese character is transmitted to terminal.

1.2 Principle

The encoding of Chinese character under Keil depends on the Keil->Edit->Configuration->Encoding option. When “Encode in ANSI” is selected, the Chinese character appearing in the program is compiled according to the system default encoding. If “Encode in UTF-8 without signature” is selected, the encoding is performed according to the standard UTF-8.



UTF-8 Encoding Mode

First, user needs to set the encoding to UTF-8 and create a new program file containing Chinese characters in Keil. The created file will be compiled according to the new encoding.

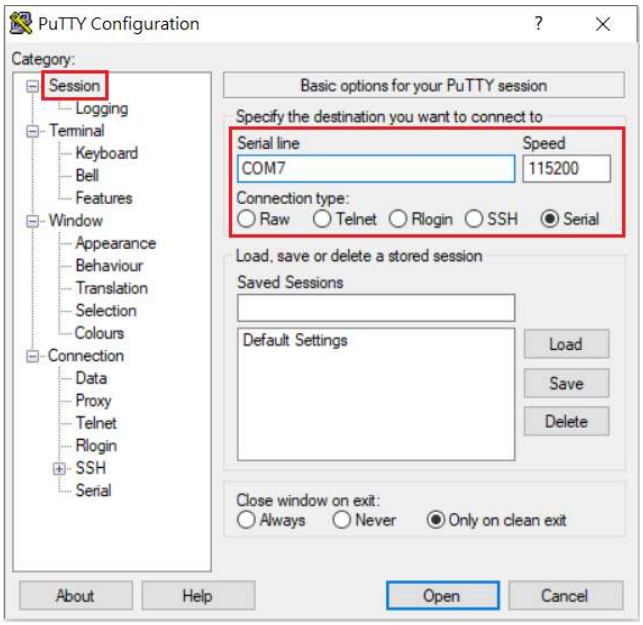
The example code defines the string char c[]=” @芯唐SZ” . When the encoding is UTF-8, the ”@芯唐SZ” code should be %40%E8%8A%AF%E5%94%90%53%5A:

The compiled binary as below

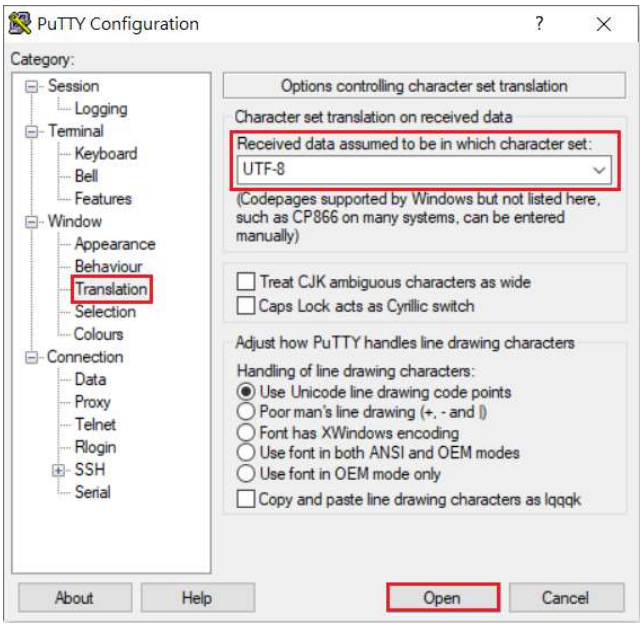
```
000012b0h: 40 E8 8A AF E5 94 90 53 5A 00 00 00 00 00
           @  芯        唐     S  Z
```

The serial port tool of the PC also needs to consider the coding problem. You can use the PuTTY tool that can adjust the encoding for serial port reading.

Setting serial port COM7 baud rate 115200.



Adjust the PuTTY encoding to UTF-8 and open the serial port.



GBK Encoding Mode

User needs to set the encoding to GBK and create a new program file containing Chinese characters in Keil. The created file will be compiled according to the new encoding.

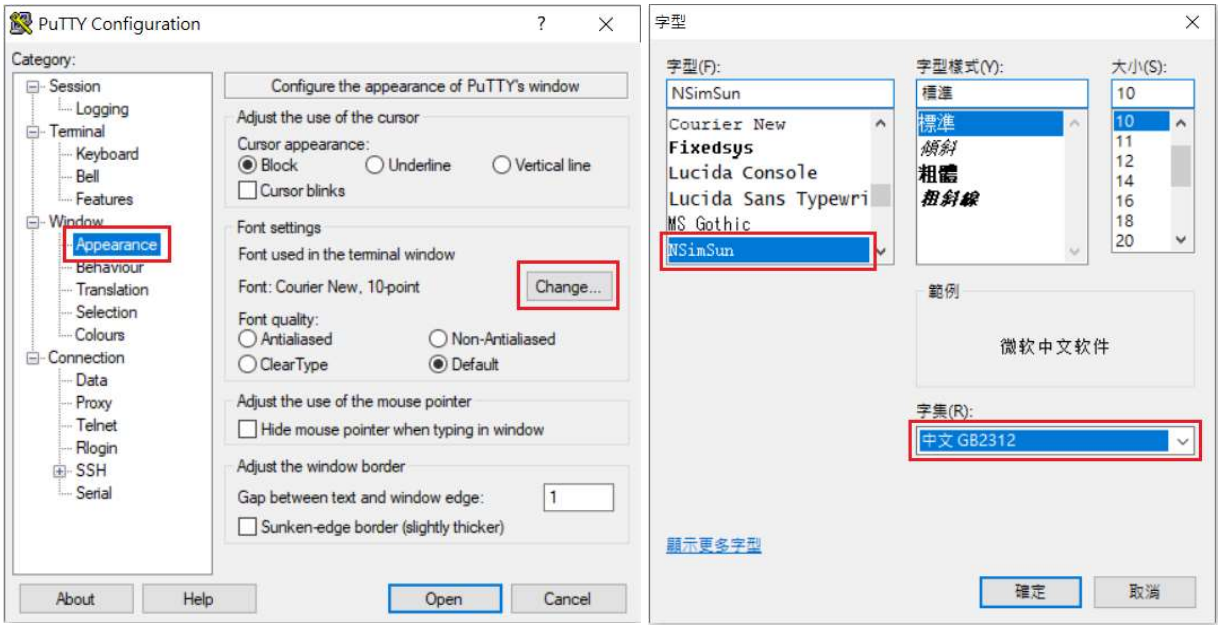
The example code defines the string char c[]=" @芯唐SZ" . When the encoding is GBK, the "@芯唐SZ" code should be %40%D0%BE%CC%C6%53%5A:

The compiled binary as below

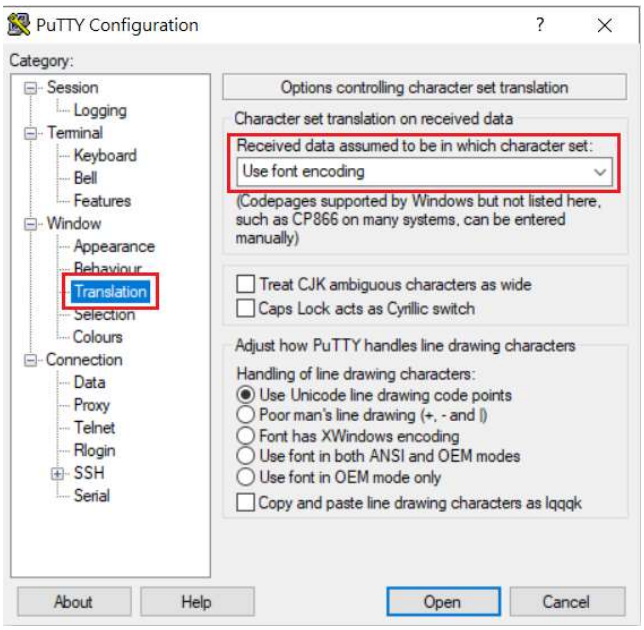
```
000012b0h: 40 D0 BE CC C6 53 5A 00 00 00 00 00
           @  芯    唐    S  Z
```

Setting serial port COM7 baud rate 115200. Since there is no GBK encoding option in the PuTTY, the choice of encoding is slightly different.

Select the display font for NSimSun and Chinese GB2312.

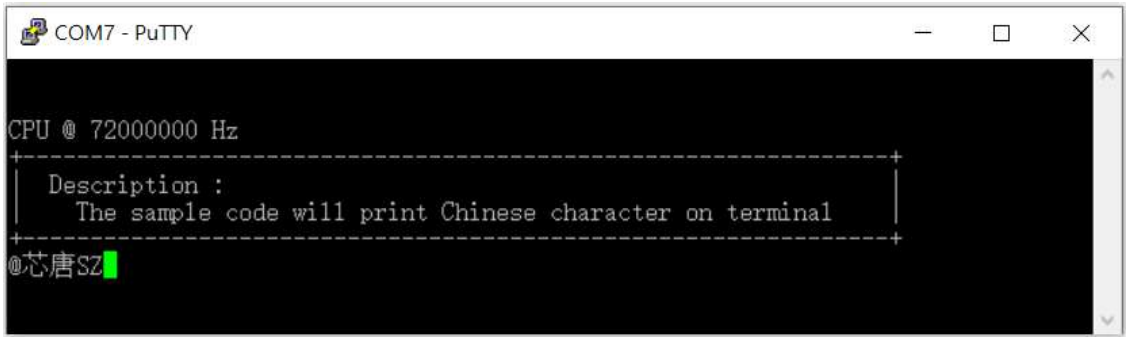


Select the encoding option to "Use font encoding".



1.3 Demo Result

Use M451 board and connect PD.0(UART RX) and PD.1(UART TX) to NuBridge. Open the terminal in the computer and set the corresponding encoding option to receive the print message from UART0.



2 Code Description

Output Chinese character to UART0

```
/* UART Function Test */
void UART_FunctionTest()
{
    static char c[]="@芯唐 SZ";
    int i = 0;

    printf("+-----------------------------------------------------------------+\n");
    printf("|  Description :                                                  |\n");
    printf("|    The sample code will print Chinese character on terminal     |\n");
    printf("+-----------------------------------------------------------------+\n");

    for(i=0; i<(sizeof(c)-1); i++)
    {
        /* Wait Tx is not full to transmit data */
        while(UART_IS_TX_FULL(UART0));
        UART_WRITE(UART0, c[i]);
    }
}
```

3 Software and Hardware Environment

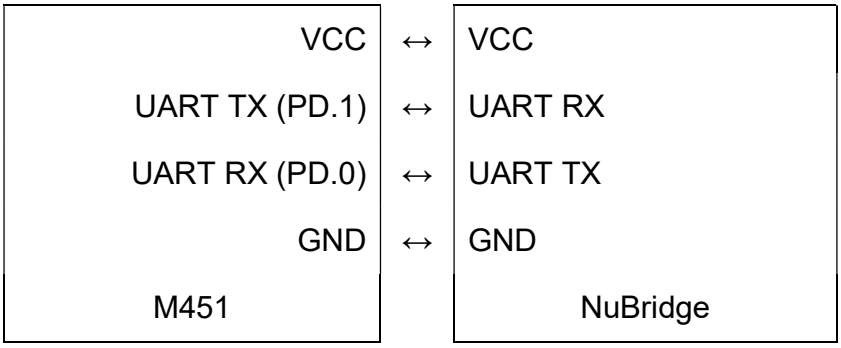
Software Environment

- BSP version
  - M451 Series BSP CMSIS V3.01.003
- IDE version
  - Keil uVersion 5.24

Hardware Environment

- Circuit components
  - NuTiny-EVB-M451 LQFP100 V1.3
  - NuBridge
- Diagram

M451 board PD.0(UART RX) and PD.1(UART TX) is connected to NuBridge.



4 Directory Information

- EC_M451_UART_Output_Chinese_Character_V1.00
  - Library — Sample code header and source files
    - CMSIS — Cortex® Microcontroller Software Interface Standard (CMSIS) by Arm® Corp.
    - Device — CMSIS compliant device header file
    - StdDriver — All peripheral driver header and source files
  - SampleCode
    - ExampleCode — Source file of example code

5 How to Execute Example Code

1. Browsing into sample code folder by Directory Information (section 4) and double click M451_UART_Output_Chinese_Character.uvproj.
2. Enter Keil compile mode
   a. Build
   b. Download
3. Enter debug mode
   a. Run

6 Revision History

Date	Revision	Description
Sep. 25, 2019	1.00	1. Initially issued.

Important Notice

Nuvoton Products are neither intended nor warranted for usage in systems or equipment, any malfunction or failure of which may cause loss of human life, bodily injury or severe property damage. Such applications are deemed, "Insecure Usage".

Insecure usage includes, but is not limited to: equipment for surgical implementation, atomic energy control instruments, airplane or spaceship instruments, the control or operation of dynamic, brake or safety systems designed for vehicular use, traffic signal instruments, all types of safety devices, and other applications intended to support or sustain life.

All Insecure Usage shall be made at customer's risk, and in the event that third parties lay claims to Nuvoton as a result of customer's Insecure Usage, customer shall indemnify the damages and liabilities thus incurred by Nuvoton.

Please note that all data and specifications are subject to change without notice.
All the trademarks of products and companies mentioned in this datasheet belong to their respective owners.