Creating UT32MR500 Project in the Keil IDE
UT32M0R500 32-bit Arm™ Cortex® M0+ Microcontroller

PRODUCT NAME	MANUFACTURER PART NUMBER	SMD #	DEVICE TYPE	INTERNAL PIC NUMBER
Arm Cortex M0+	UT32M0R500	5962-17212	Project Setup	QS30

Table 1: Cross Reference of Applicable Products

1.0 Overview

This document details the process of creating a **UT32M0R500**-based embedded software project using the **Keil ARM** development tools. For the purposes of this document, we will create a project named **helloworld** and configure the **Keil** tools to include all the source modules required for a successful build. Using this template, the user should be able to create projects using (a) their preferred application source directory structures and (b) the directory structure for the **Keil**-supplied files.

2.0 Creating a design project with Keil uVision IDE

1. Download **UT32M0R500_API_vx_x_x.zip** from www.cobhamaes.com/hirel
   Once the download has completed, unzip the files. Create a directory of your choice for the **helloworld** project.
2. Launch Keil uVision
3. From the Project menu, select New uVision Project….
4. Under the directory of choice, specify the project name as **helloword** and click **Save**, see Figure 1.

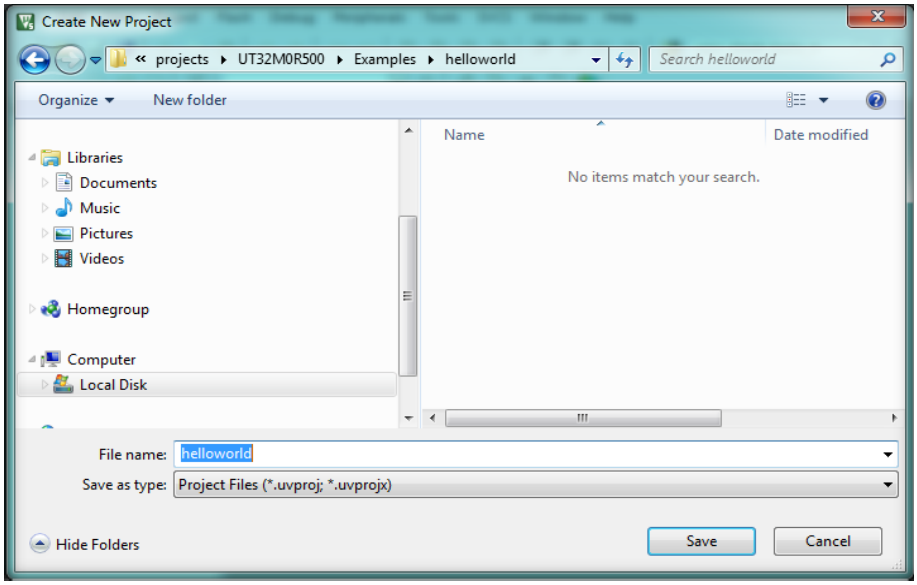

Figure 1: Project Setup

5. Select **Device** and click **OK**, see Figure 2.

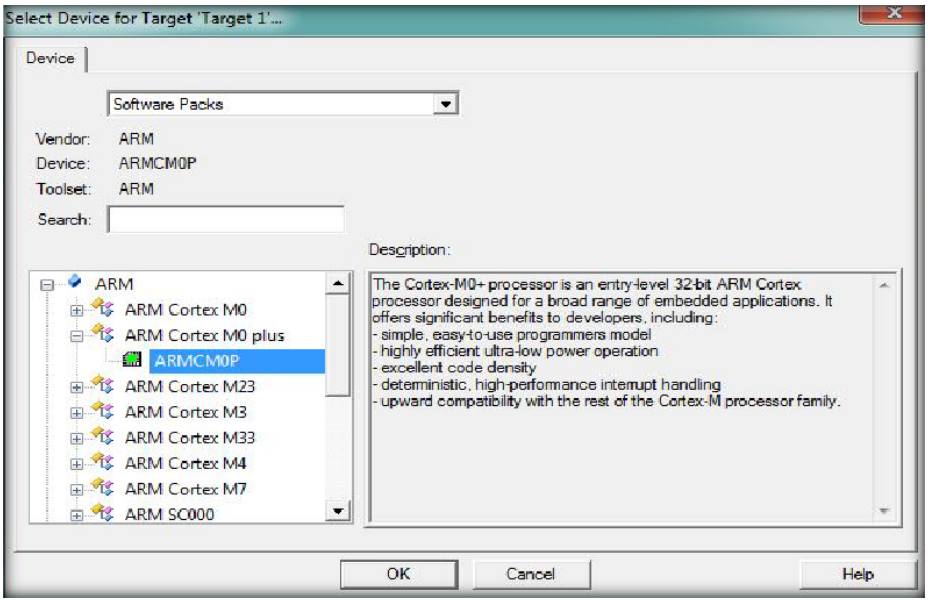

Figure 2: Select Device

6. Click the **Manage Run-Time Environment** symbol  and under **Software Component**, select the appropriate components and click **OK**, see Figure 3.

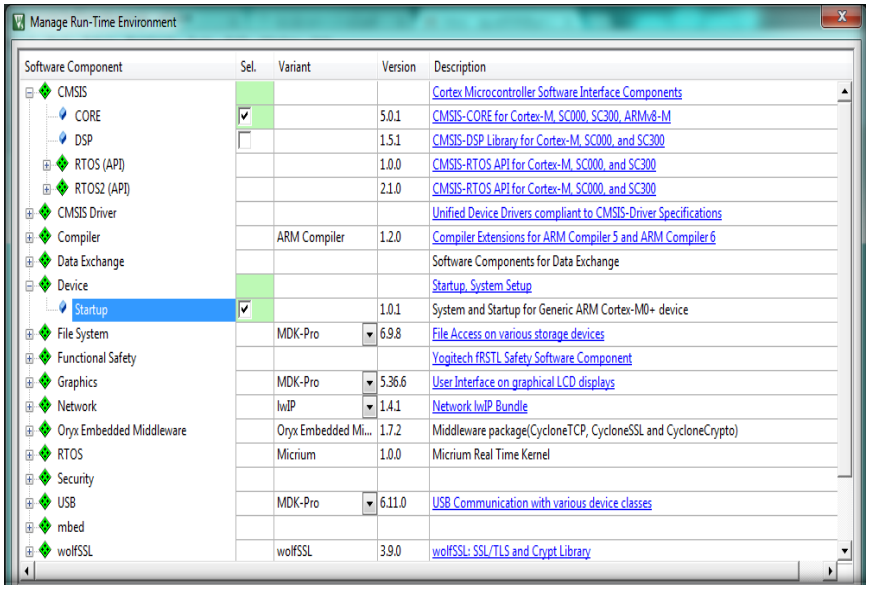

Figure 3: Software Components

7. Under the folder where the project was created, browse to RTE\Device\ARMCM0P and replace startup_ARMCM0plus.s and system_ARMCM0plus.c with the files from UT32M0R500_API_vx_x_x\UT32M0SpecificARM\src\.
NOTE: Files under UT32M0R500_API_vx_x_x\UT32M0SpecificARM\src are specific startup files for CAES' UT32M0R500.

8. Under the folder where the project was created, create a **src** folder for the **.c** files. In the **Project**, double-click **Source Group 1** and rename it to **hello_src**.
9. Right-click on **hello_src** and click on **Add New Item to Group 'hello_src'...**. Add a new **C** source file, **hello_test.c** and copy the source code from Code 1.

```
#include <stdio.h>
#include "UT32M0R500.h"
#include "ut32m0_uart.h"

UART_TypeDef *UART0 = (UART_TypeDef *) UART0_BASE;
UART_InitTypeDef UART_InitStruct;
uint32_t ActualBaudRate;

int main (void){
        UART_StructInit (&UART_InitStruct);
        ActualBaudRate=UART_Init (UART0, &UART_InitStruct);
        UART_Cmd (UART0, ENABLE, ENABLE);

        for(;;){
                printf("Hello World!!!\r\n");
        }
}
```

Code 1: Hello World Source Code

10. Right-click on **Target1** and select **Add Group...** to create groups for source and include files from Cobham's Standard Peripheral Library, <your working dir>\StdPeriphLib\src and <your working dir>\StdPeriphLib\inc. Add sources and include files to their respective directories, see Figure 4.

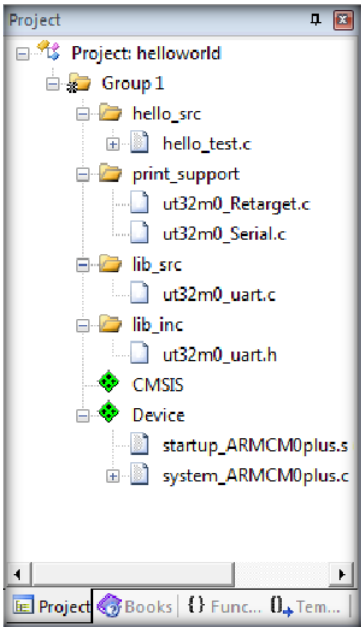

Figure 4: Add source and include files

11. Right-click on **Target1** and select **Options for Target 'Target 1'….** see Figure 6-11 for basic settings—Change settings according to the particular project. For **C/C++** and **Asm** tabs, click  and setup the compiler include paths; see Figure 6 and Figure 7.

    NOTE: the **System Viewer File** path in Figure 5 is:
    <your working dir>\UT32M0R500_SpecificARM\SVD\Wolverine_BasiCAN.SFR

    If your project requires the use of **PeliCAN**, set the path to:
    <your working dir>\UT32M0R500_SpecificARM\SVD\Wolverine_PeliCAN.SFR

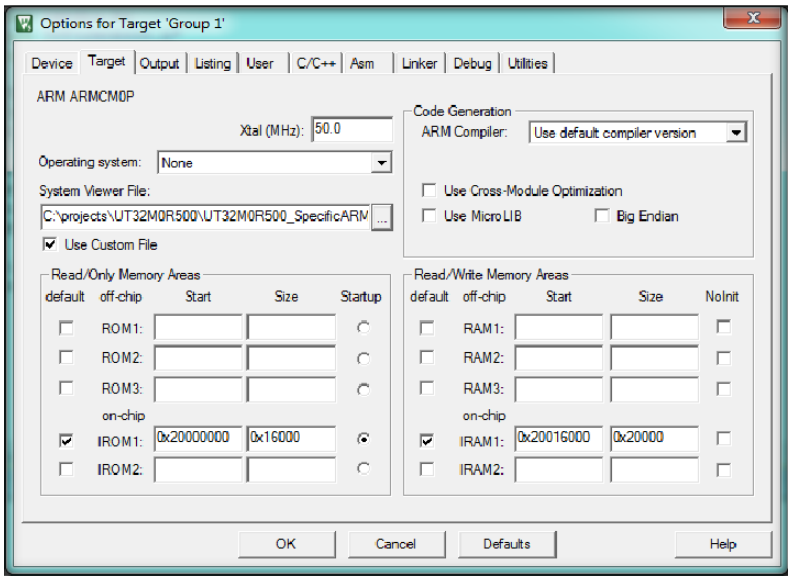

Figure 5: Target

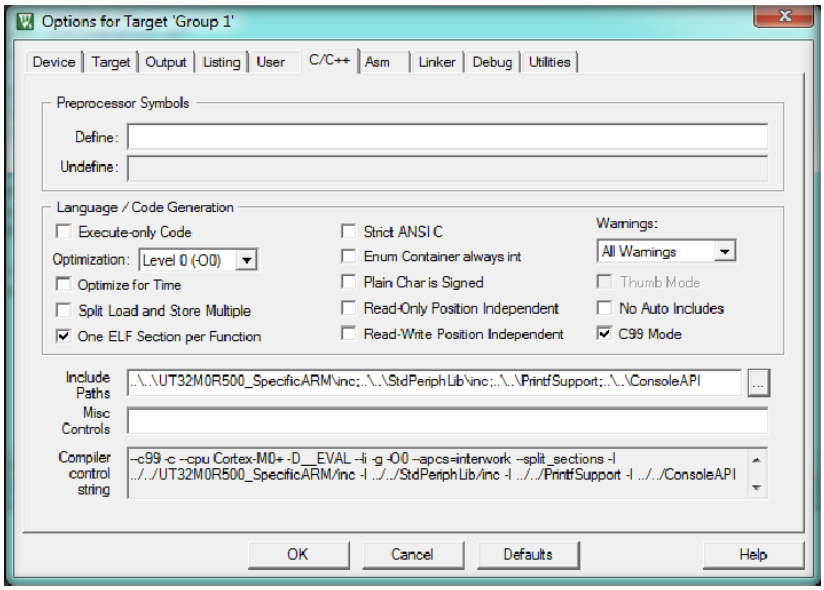

Figure 6: C/C++ Include Paths

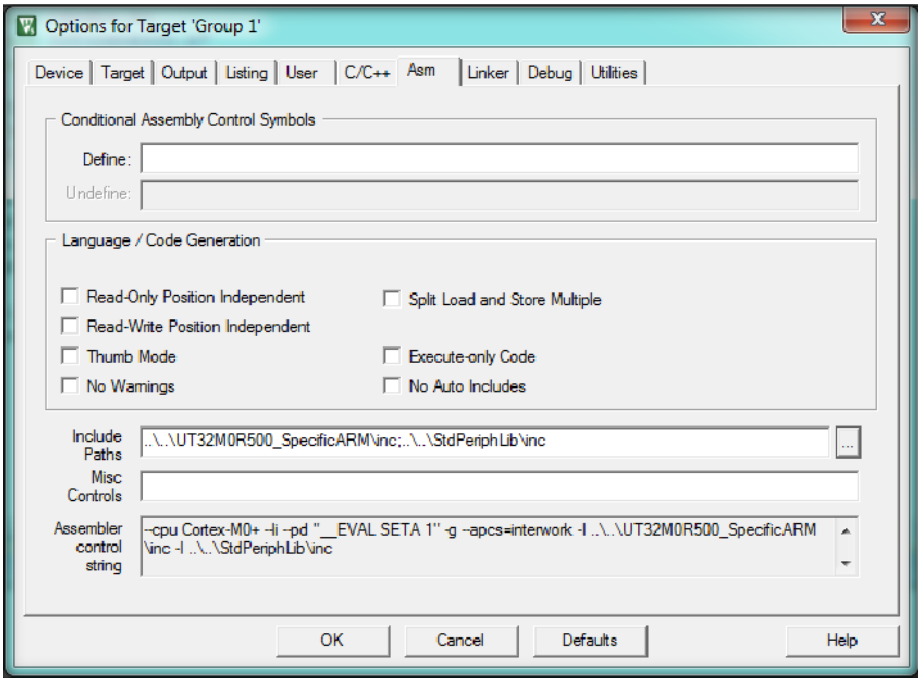

Figure 7: ASM Include Paths

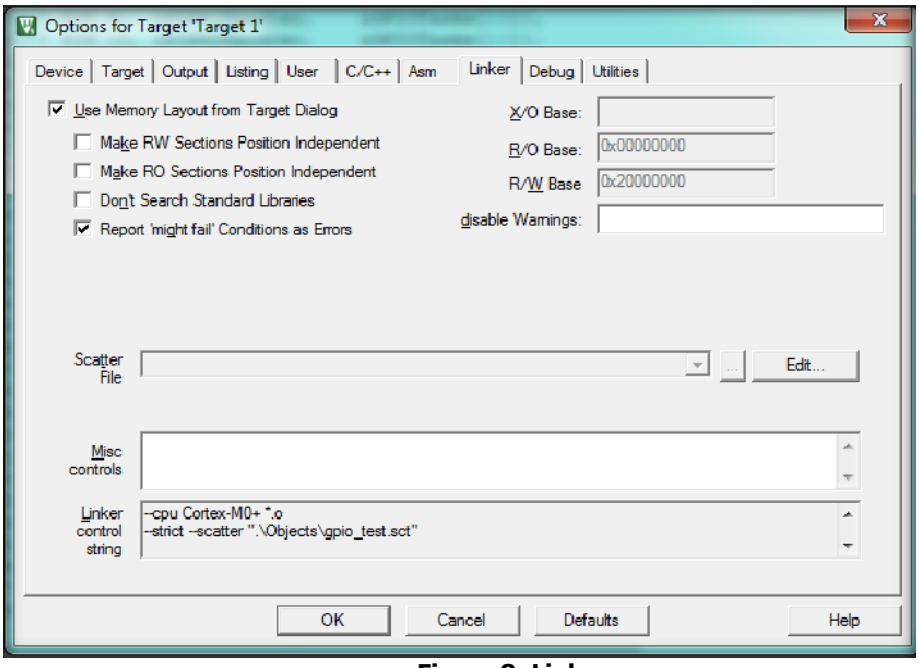

Figure 8: Linker

NOTE: the Initialization File path is: <your working dir>\UT32M0R500_SpecificARM\Wolv_SRAM_Debug.ini

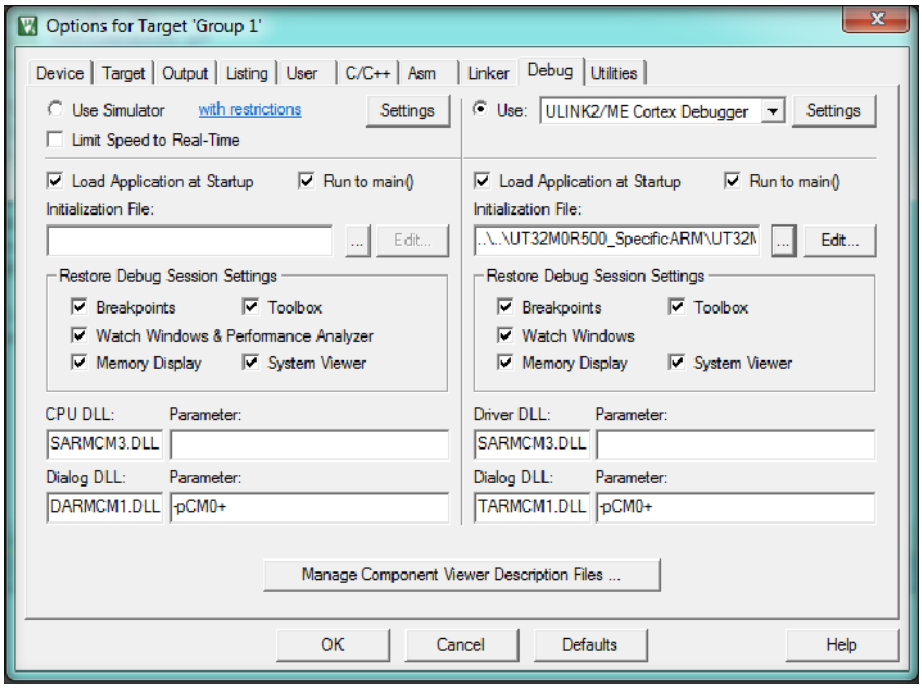

Figure 9: Debugger

NOTE: the serial for your **JTAG** pod will appear in the **Serial No:** box.

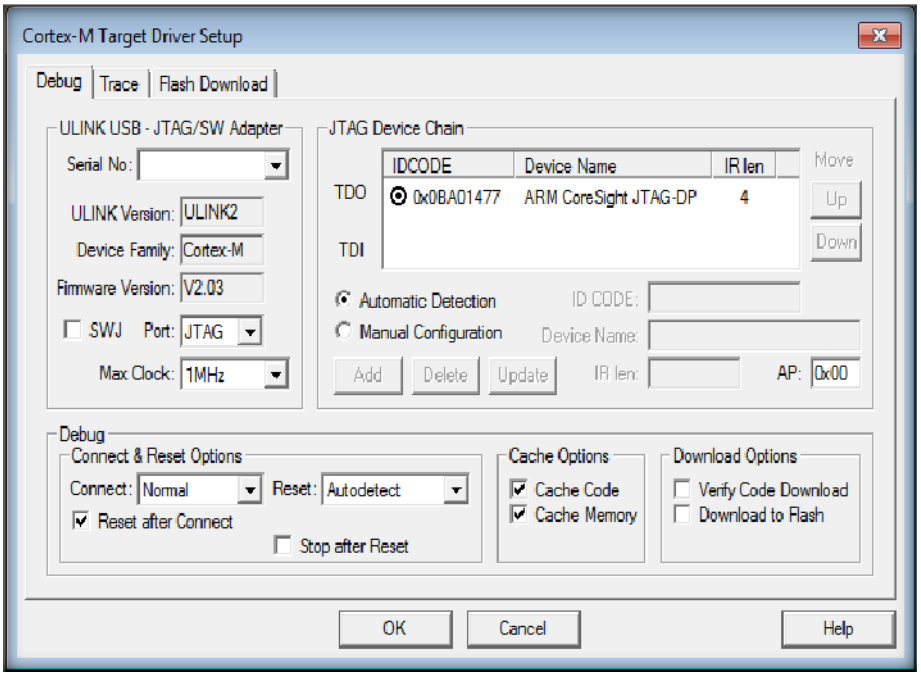

Figure 10: Debugger Settings

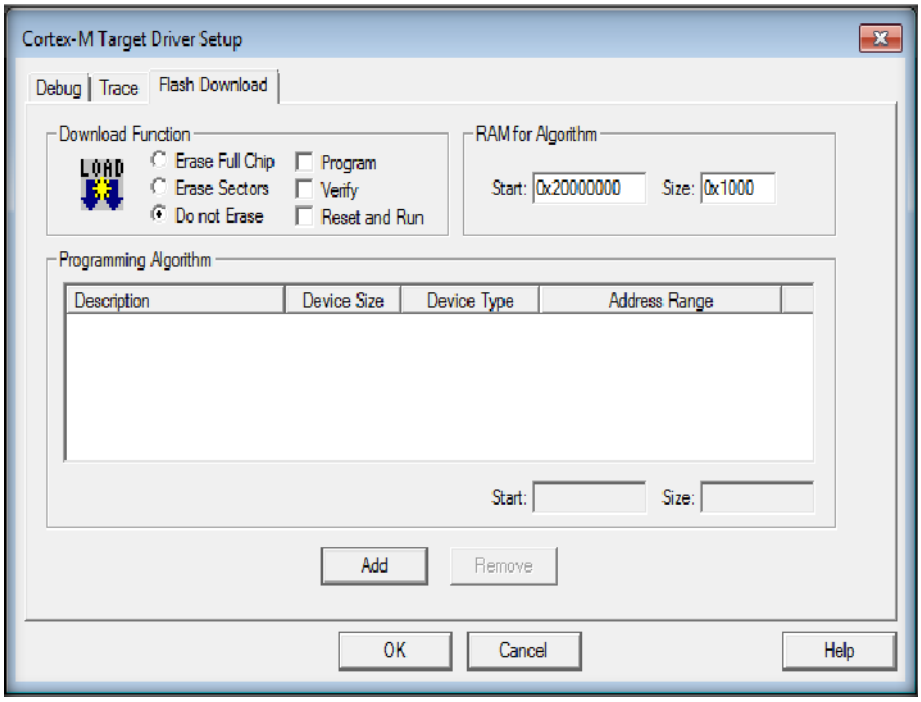

Figure 11: Flash Download

12. In the Project Explorer view, click on  and Build Project.
13. Start the debugger  and run  the application. Display the output using your favorite Terminal, see Figure 12.

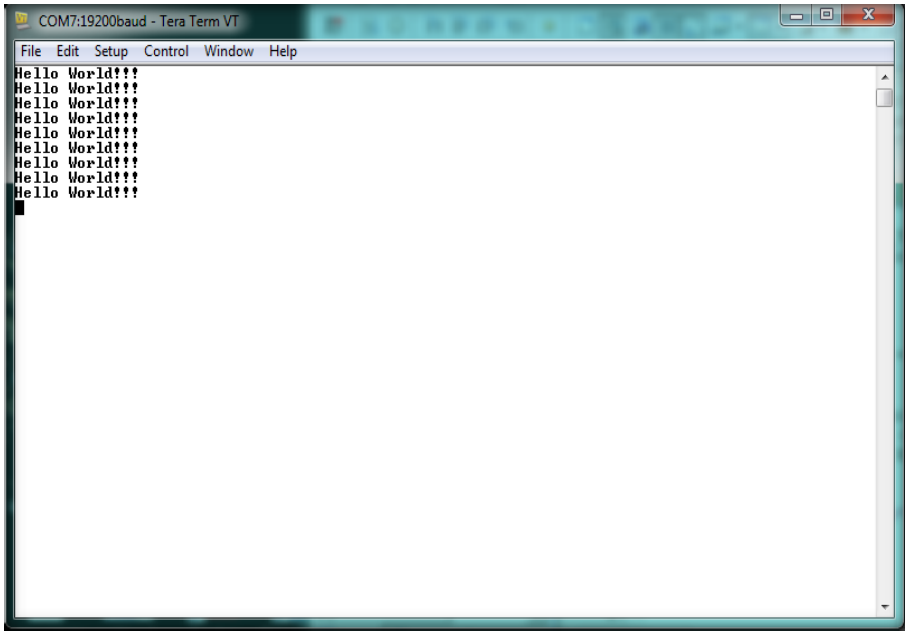

Figure 12: Hello World Display

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3.0 Revision History

Date	Rev. #	Author	Change Description
May 2017	1.0.0	SW	Initial Release
Dec 2017	1.0.1	AW	Minor edits for directory names
Feb 2018	1.0.2	AW	Additional edits for directory names and dialog settings box
08/15/2018	1.1.0	JA	Second release

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