SPECSENSORS

Quick Start Guide

Digital Sensor Developers Kit (DSDK)

Open-Source Firmware Programming

The D-ULPSM component of the DSDK ships from SPEC Sensors pre-loaded with firmware. The firmware initializes and maintains the gas sensor circuit operation, measures the gas sensor signal, measures the temperature sensor, implements temperature compensation algorithms, manages UART communication, and manages low-power operation. Through a sequence of user commands and/or the SPEC Sensors DSDK Tool (GUI), the firmware also allows the user to change many sensor parameters, such as the gas sensor type, calibration, and control circuit operation.

Users and developers with an open-source license agreement from SPEC Sensors may modify the firmware and re-flash the D-ULPSM module. Be advised, that many available settings and operation modes are not compatible with certain gas sensors. Applying incompatible settings to a sensor may cause temporary or permanent damage. Refer to the *Settings Table* distributed with the DSDK for more information.

1. **Required SPEC Sensor Hardware**

   - D-ULPSM Rev 0.3 (available individually or as part of DSDK)
   - One or more SPEC Sensors (in pinned package)
   - USB-to-UART Module with Pinout Adapter Board (included with purchase of D-ULPSM or DSDK)

2. **Required 3rd-Party Tools**

   *Software*
   - MPLAB X v3.20
   - MPLAB XC16 Compiler v1.25

   Hardware
   - Microchip PICkit 3: In-Circuit Debugger
   - Microchip AC164110: RJ-11 to ICSP Adapter
   - Tag-Connect TC2030-MCP-NL: Programming Cable

3. **Instructions**

   - Download and install MPLAB X v3.20, followed by MPLAB XC16 Compiler v1.25
     - Available on the Download Archive tab, here: http://www.microchip.com/mplab/mplab-x-ide
   - Connect the PICkit 3 to the computer via the USB cable.
   - Connect the TC2030-MCP-NL, RJ-11 to ICSP Adapter, and the PICkit 3 together.
     - The RJ-11 cable that ships with the RJ-11 adapter will not be utilized.
   - Unzip the open-source firmware: DULPSM_UART_2016_R01.zip
   - Open MPLAB X and open "DULPSM_UART_2016.X"
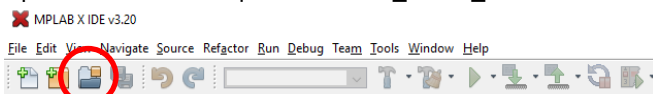
   - Perform a "Clean and Build". If all went well, a "BUILD SUCCESSFUL" message is displayed.
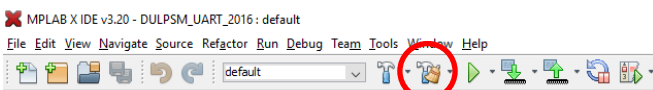
   - Connect the pogo-pins of the TC2030-MCP-NL to the J2 programming pads on the D-ULPSM and press Program.
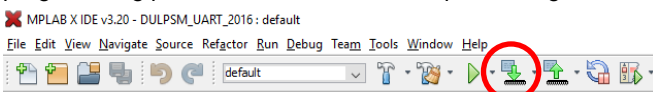
   TC2030-MCP-NL contacting the J2 programming pads