

### Getting Started and Blinky Example

This **Quick Start Guide** introduces the MCBTMPM330 board for the Toshiba **TMPM330** family of Cortex-M3 based devices. It shows how to install Keil software development tools for ARM-based microcontrollers and run the example projects provided.

#### Installing the Software

To install the evaluation version of the MDK-ARM Microcontroller Development Kit from a CD-ROM

- Insert the CD-ROM into your PC.

If the opening screen does not appear, run SETUP from the CD root directory

- Click Install Evaluation Software, then ARM Compiler (Eval Tools)
- Follow the setup program instructions



**Note:** The first MCBTMPM330 boards shipped without a CD-ROM. An evaluation version of MDK-ARM is available for download from <https://www.keil.com/demo/eval/arm.htm>.



#### Blinky Example

This example demonstrates the ease of downloading and debugging an application on a target board.

It can be found at:

**C:\Keil\ARM\Boards\Keil\MCBTMPM330\Blinky**

To use this example

-  Start µVision
- Open the Blinky.uv2 project file  
**Project - Open**
- Compile and link the Blinky application  
 **Project - Build**
- Program the application into on-chip Flash ROM  
 **Flash - Download**

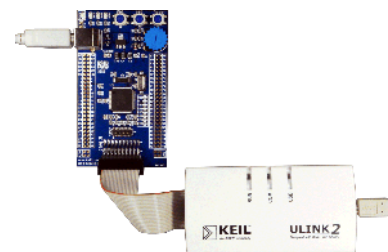
#### Connecting to your Target

The target is powered via your PC, through its USB port. The Keil ULINK family of adapters connect the USB port of your PC to the JTAG port of your target board, allowing you to download and debug embedded programs running on your target hardware.

ULINK2 and ULINK-ME support JTAG and Serial-Wire Debug (SWD) for debugging of ARM-based targets.

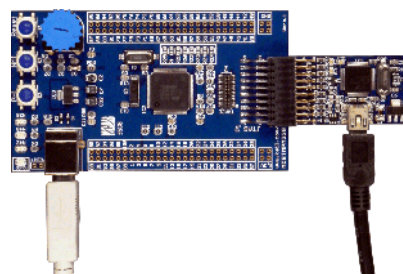
#### Using ULINK2


The ULINK2 Adapter connects to the MCBTMPM330 using the 20-pin ribbon cable.









#### Using ULINK-ME

The ULINK-ME Adapter connects directly to the 20-pin JTAG connector on the MCBTMPM330.



- The LEDs on the target are controlled by the potentiometer setting. As the setting increases, the LEDs scroll faster.
-  Start debug mode

Using the debugger commands, you may:

-  Single step through code
-  Set breakpoints
-  Run the application
-  Review variables in the watch window
-  Reset the device to re-run the application
-  Use the yellow arrow (program counter) to view the current assembler or C statement

## Real-Time Trace using SWV

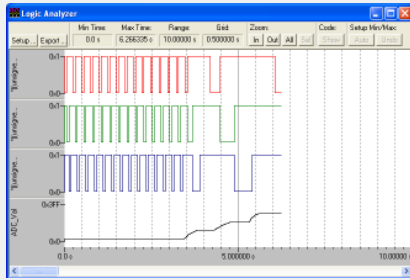
This example demonstrates the value of Real-Time Trace using the Serial Wire Viewer (SWV) features of TPM330 microcontrollers.

It can be found at:

**C:\Keil\ARM\Boards\Keil\MCBTMPM330\Blinky**

To use this example:

- Connect to the MCBTMPM330 board with ULINK2 or ULINK-ME
  - Select target build option - TPM330 Flash
- TPM330 Flash
- Compile and download to Flash.
  - Start Debug mode.
  - Open a Logic Analyzer Window
- View - Logic Analyzer Window**
- The A/D converter output and the status of the LEDs are displayed in the Logic Analyzer Window. These values change as you move the potentiometer.



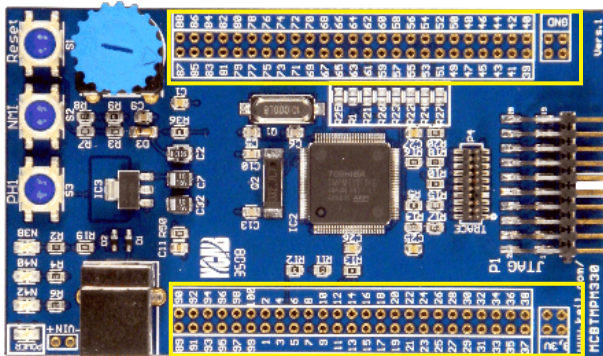
## Prototyping with MCBTMPM330

The MCBTMPM330 routes all the peripheral ports of the TPM330 device to a 0.1inch prototyping grid with a DIP form factor.

The numbers next to the prototyping holes match the numbers of the device pins they connect to.

The board schematics can be downloaded from

<http://www.keil.com/mcbtmpm330/mcbtmpm330-schematics.pdf>



The preferred way to access the TPM330 peripheral ports is to solder rows of pins to the prototyping grid.

This way the board may be stacked onto:

- A breadboard, for rapid, flexible prototyping of TPM330-based designs
- A custom PCB populated with peripheral connectors

## Running Blinky in Simulation

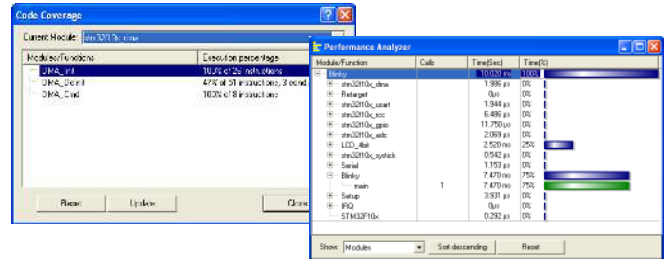
The Simulator Target of the Blinky example demonstrates the extra debug features of μVision when running in simulation.

It can be found at:

**C:\Keil\ARM\Boards\Keil\MCBTMPM330\Blinky**

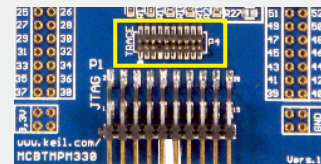
To use this example in simulation:

- Select target build option - Simulator
- Simulator
- Compile project
  - Start Debug mode
  - Open the Performance Analyzer and Logic Analyzer Windows
- View - Performance Analyzer Window**  
**View - Code Coverage Window**
- Step through the code
- The Code Coverage Window shows what percentage of the instructions of each function have been executed
  - The Performance Analyzer Window shows how much time the processor has spent in each function



## Instruction Trace on MCBTMPM330

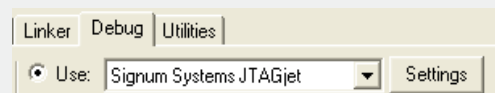
The TPM330DFG device on the MCBTMPM330 implements an Embedded Trace Macrocell (ETM) and a 4-bit trace port. This port is connected to the P4 TRACE connector.



MDK-ARM supports ETM instruction trace on Cortex-M3 devices via the Signum JTAGjet-Trace emulator.

To do instruction trace on MCBTMPM330:

- Connect JTAGjet-Trace to the P4 connector
  - Connect μVision to JTAGjet-Trace
- Project - Options for Target**  
**Debug Tab - Select Signum Systems JTAGjet**



- Start Debug mode.
- Enable Trace Recording
- Debug - Enable/Disable Trace Recording**
- Run the application
  - Halt the execution
  - Display the trace records in the disassembly window
- Debug - View Trace Records**