

AN\_651X\_033

NOVEMBER 2010

## Development Tools

This Application Note describes the various development and programming tools available for the 71M651X, 71M652X, and 71M653X families of Energy Meter ICs.

## Compiler

Teridian recommends using the CA51 “Compiler Kit” by Keil ([www.keil.com](http://www.keil.com)), which contains the  $\mu$ Vision 3 Integrated Development Environment (IDE), complete with 8051 assembler, editor, C compiler, linker, and locator.

The Demo Code shipped with the Demo Kits for Teridian Energy Meter ICs is written using this tool. Keil offers the best support for the memory model of the 80515 core used in the 71M651X ICs. It is possible to use alternative compilers, but the code for these is not supported by Teridian.

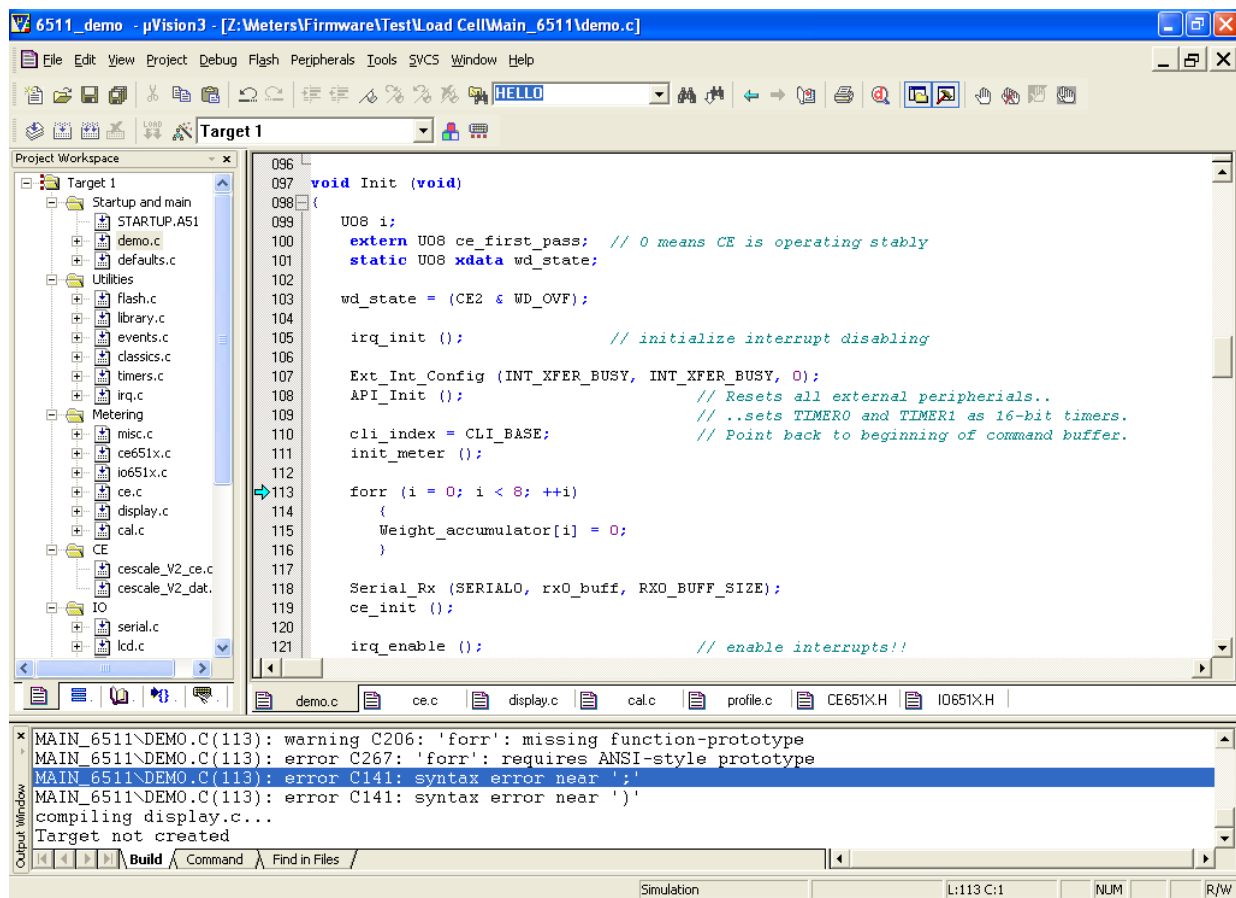


Figure 1: Keil  $\mu$ Vision3 User Interface

While all Demo Code is written using the standard CA51 tool by Keil, significant improvements in memory usage can be made by using the PK51 “Professional Developer’s Kit” by Keil. The PK51 contains the LX51 advanced linker that can reduce code size by up to 8%, using special optimization techniques.

## In-Circuit Emulator (ICE)

The Signum Systems ADM51 ([www.signum.com](http://www.signum.com)) is compatible with the Keil symbolic output format and supports the 71M65XX ICs, including the 71M653X bank switching mechanism. It is useful to perform the following tasks:

- Code emulation with breakpoints, watch windows, etc., with support of source code symbols
- Memory monitoring and manipulation (SFRs, XRAM, I/O RAM)
- Flash erase and code loading into flash memory of the 71M651X

Teridian supplies the ADM51 to customers at a preferred price (P/N DB6510-ADM51).

Note: Since meters are sometimes tested with live voltages, isolation of the emulator is strongly recommended. USB isolators are available from various vendors. For example, the UISOHUB4 or UEF10M are available at B&B Electronics ([www.bb-elec.com](http://www.bb-elec.com), or <http://www.bb-europe.com/>).



**Figure 2: Signum ADM51 Emulator Pod**

Emulators are available from Signum Systems that support trace memory. Trace memory can only be used with the 71M6513 and 71M6513H ICs. Signum offers the following emulators with enhanced features:

- ADM51-Trace: Records PC, SFR, IRAM and XDATA transactions in real-time on devices with trace port (6513, 6534)
- ADM51-Trace-CE: Same as above, but with added complex events triggering

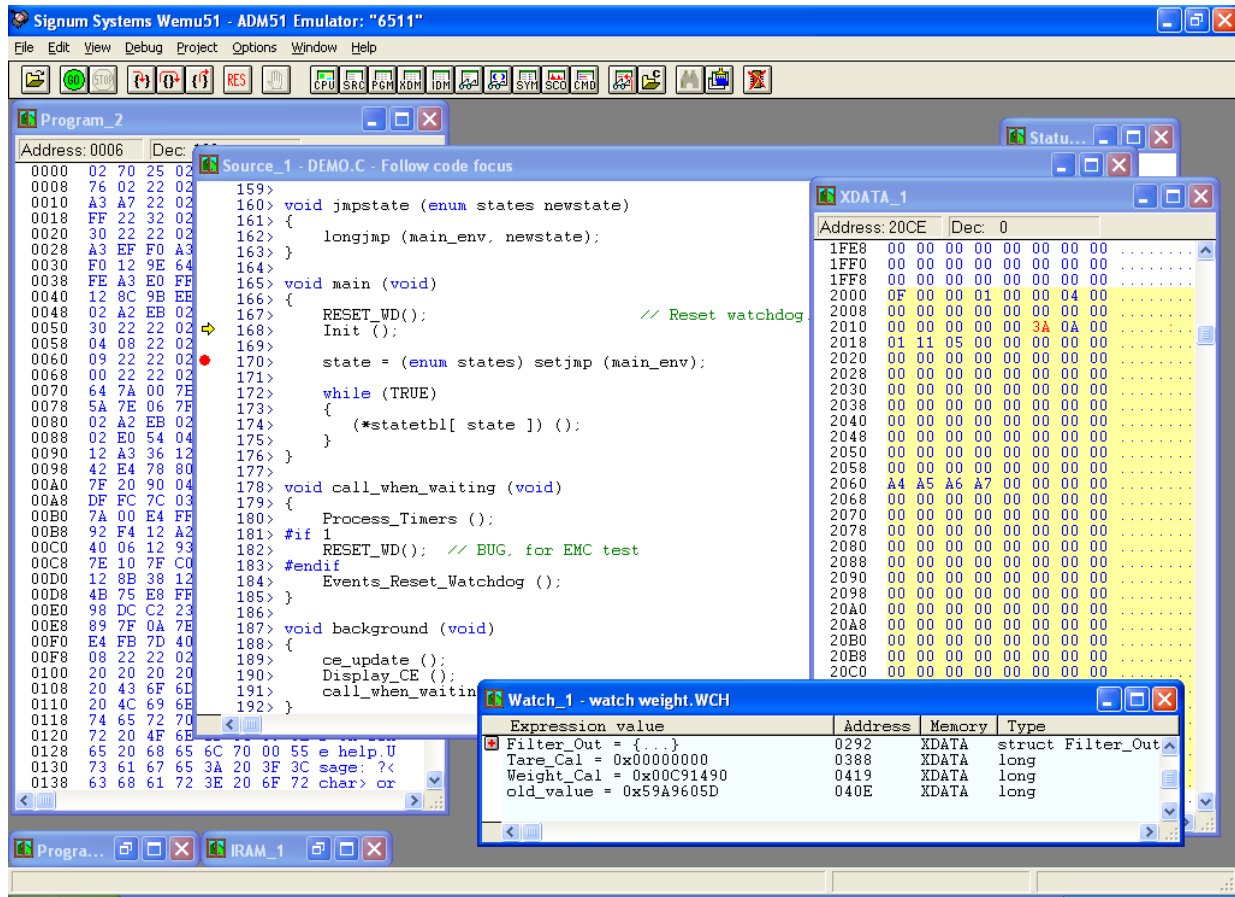


Figure 3: Signum WEMU51 User Interface

## Flash Programmer

The Signum ADM51 can serve as a programmer for prototyping and small quantities. For programming production quantities, Teridian offers the TFP2 Flash Programming Module (P/N 80515-FPBM-TFP2), which is a stand-alone programmer that can be operated manually or in an ATE environment (see Figure 4).



**Figure 4: Teridian TFP-2 Flash Programmer**

The TFP2 offers the following features:

- Stand-alone or PC-controlled programming
- Variable flash memory size selectable
- LEDs and signal outputs for PASS and FAIL
- Pushbutton and digital control inputs compatible with ATE
- Can erase and re-program ICs that have the *SECURE* bit set
- Controls ICE\_E for 71M652X and 71M653X ICs

## Gang Programmers and Production Programmers

Single and gang programmers for lab quantities as well as high-volume programmers providing device handlers and feeders are available from BPM Microsystems ([www.bpmmicro.com](http://www.bpmmicro.com)).

### Discontinued Devices

The gang programmer that was available from Teridian has been discontinued.



All production programming should be based on the devices available at BPM Microsystems (Houston, TX, USA).

## Software/Firmware

The complete set of sources for the MPU Demo Code is available to the customer as well as images of CE code and CE data. The source modules can be combined to quickly implement a working meter. Software development is supported by documentation in form of a Software User's Guide (SUG). The SUG contains:

- HW and SW requirements
- Description of SW utilities
- Command line interface description
- Tool installation guide
- Demo Code description
- 80515 Core Reference

## Demo Boards and Demo Kits

Demo Kits are the quickest way to get familiar with the Teridian 71M65XX family of energy metering ICs. They are very useful to evaluate the performance of the ICs without having to write any software, and they can serve as a prototyping platform for software development.

Each Demo Kit contains the following:

- 1) One Teridian energy metering IC on a Demo Board implementing a pre-programmed demonstration meter, complete with resistor dividers, connectors for voltage and current sensor inputs, EEPROM, pulse LEDs, AC power supply, DC power supply and LCD display. In addition, various test points, configuration headers and access to the emulator interface of the IC are provided.
- 2) Debug Board. This board provides isolation and translation to RS-232 voltage levels. It enables the user to control various parameters of the Demo Board via a simple serial command line interface.
- 3) Two power supplies (for Demo Board and Debug Board).
- 4) Serial cable for connection of the Debug Board to a terminal or PC (COM port).
- 5) CD-ROM with documentation (Data Sheet, User's Manual, Software User's Guide), Demo Code (executable files and source files), and various utilities.



**Figure 5: 71M6513 Demo Board with Debug Board**

After the evaluation phase, the Demo Board can serve as a platform for code development, which can be done simultaneously with schematic design and layout.

## Application Notes

Application Notes are provided by Teridian to help with general or special applications and tools, with interfacing to sensors and peripherals, design for EMI/EMC, or to explain procedures, algorithms and mechanisms used in conjunction with the 71M651X Family of metering ICs.

Below is a partial list of the available Application Notes:

- 1) Connecting the V3 pin
- 2) Rogowski Coil
- 3) Optical Port
- 4) Temperature Compensation
- 5) EMC/EMI Design Guidelines
- 6) LCD
- 7) Chop Enable
- 8) RX Pin
- 9) Infrequent Temperature Measurements
- 10) RTM Tool
- 11) Boot Loader
- 12) Crystal Frequency Variations
- 13) Current Shunt
- 14) Weigh Scale – Load Cell
- 15) Migration from 6511 to 6521
- 16) Calibration for Shunt and CT
- 17) Neutral Current
- 18) Harmonics Performance
- 19) Broadband VAR Harmonics Performance

Teridian constantly adds documents to this list of Application Notes. Check the Teridian Web Site for the latest Application Notes.

## Revision History

Revision	Date	Description
Rev. 1.0	6/22/2006	First publication.
Rev. 1.1	4/6/2007	Added description of gang programmer
Rev. 1.2	9/26/2007	Updated flash programmer description (TFP2)
Rev. 1.3	4/9/2008	Added description of non-standard types of in-circuit emulators available from Signum Systems. Added part numbers for TGP1 and socket adapters.
Rev. 1.4	3/20/2009	Added link to BPM Microsystems for production programmer products. Removed ordering numbers for TGP1 programmer and added note that the TGP1 has been discontinued.

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