

# TSC 80251A1

## Extended 8-bit Microcontroller

### for applications with Analog Interfaces

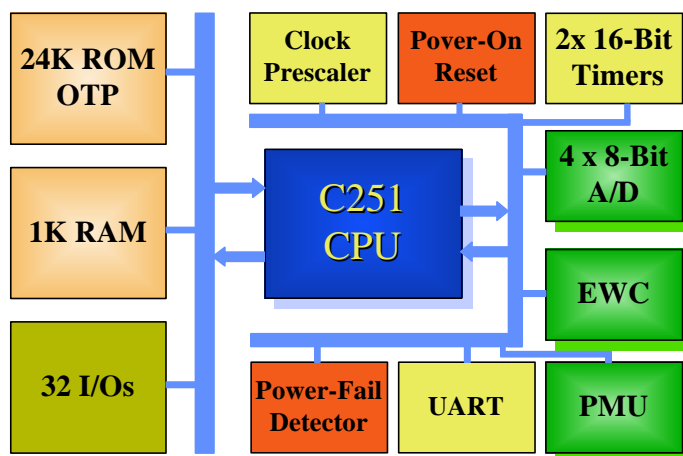
The TSC80251A1 is designed for microcontroller applications of industrial, automotive and computer-peripheral segments, requiring on-chip analog interface structures. The product combines a highly increased CPU performance with an optimized interface for controlling the analog application environment.

### Product Description

- New “extended 8-bit” CPU
- Extensive analog interface structure
- 24 Kbytes of internal ROM or OTP
- 1 Kbytes of internal RAM
- Full duplex UART
- Two 16-bit Timers
- Power Management & Monitoring
- 44 pin PLCC or TQFP
- 16 MHz at 5 Volts.

### Analog Interface Structure

- 4 input A/D Converter
  - 8-bit resolution
  - Accuracy +/- 1 LSB
  - Conversion time 36µs @ 16 MHz
- PMU (Pulse Measurement Unit)
  - 3 inputs for fast duty cycle measurement
  - Smart analog sensor interface
- EWC (Event Waveform Controller)
  - 5 independant modules
  - PWM outputs for D/A conversion
  - Compare / Capture modules



**Intel MCS®251  
CPU Core  
Compatible**

| Typical Application                                                              | Main Benefits                                                                                                                             |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Industrial control equipment</li> </ul> | <ul style="list-style-type: none"> <li>• A/D converter</li> <li>• Compare / Capture inputs</li> <li>• PWM for motor control</li> </ul>    |
| <ul style="list-style-type: none"> <li>• High-end Airbags</li> </ul>             | <ul style="list-style-type: none"> <li>• High instruction throughput and low RFI</li> <li>• Smart analog interface for sensors</li> </ul> |
| <ul style="list-style-type: none"> <li>• CD ROM drives</li> </ul>                | <ul style="list-style-type: none"> <li>• A/D &amp; D/A for spindle motor control</li> <li>• Large RAM</li> </ul>                          |
| <ul style="list-style-type: none"> <li>• Monitors</li> </ul>                     | <ul style="list-style-type: none"> <li>• PWM outputs</li> <li>• Power Management &amp; Monitoring</li> </ul>                              |

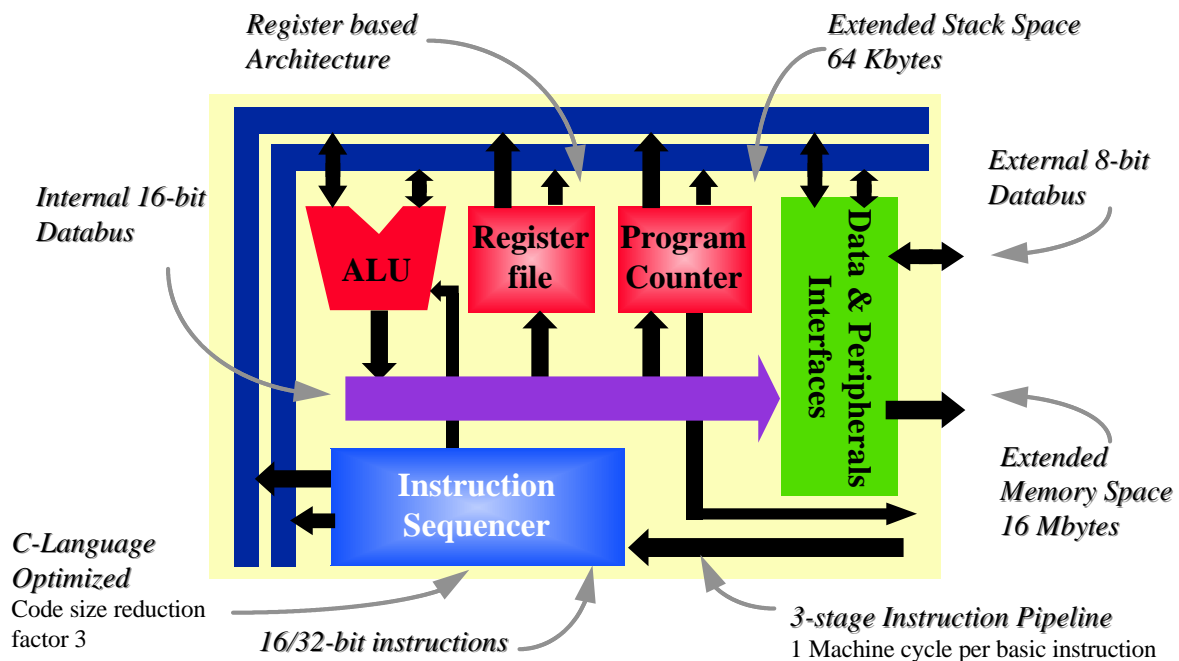
**TEMIC**  
Semiconductors

# About the “Extended 8-bit” Architecture

The new Intel License C251 architecture at its lowest performance level, is binary code compatible with the 80C51 family, hence, attaining an increase in performance has never been easier. Due to its 3-stage pipeline, the CPU performance is increased by a factor 5 compared to existing 80C51. Using the new C251 instruction set, performance will increase up to 15 times at the same clock rate.

This performance enhancement is based on the internal 16-bit instruction bus, allowing for more powerful instructions such as 16x16 multiplication and 16/16 division, as well as on some additional internal 8 and 16 bit data-busses. The 24-bit address-bus will allow for an extension of linear addressable memory space to a maximum of 16 Mbytes. Programming flexibility and C-code efficiency are both increased through the register based architecture, the 64 Kbytes extended stack space combined with the new instruction set.

The TSC80251 ANSI C-Compilers are some of the most efficient available, coupled with the final code size, which could be a factor of three down, when compared to an 80C51 implementation.



## Application Fields

Due to the high instruction throughput, this microcontroller family focus on high-end 8-bit to 16 bit applications, such as Airbag- and Brake systems, Navigation systems, Monitors, CD-ROM, Card- and Bar-code readers and complex industrial control equipment. It is also well suited to systems, where a lowered operating frequency is needed to reduce the power-consumption or Radio Frequency Interference (RFI), while maintaining a high level of CPU-power.

# Design your application around the TSC80251A1

TEMIC offers a complete set of development and debug tools around the TSC80251A1, designed to allow applications to be realized in the shortest possible time and in the most efficient way.

Working with leading tool vendors, the designer will migrate with ease and cost effectively to the new TSC80251 architecture.

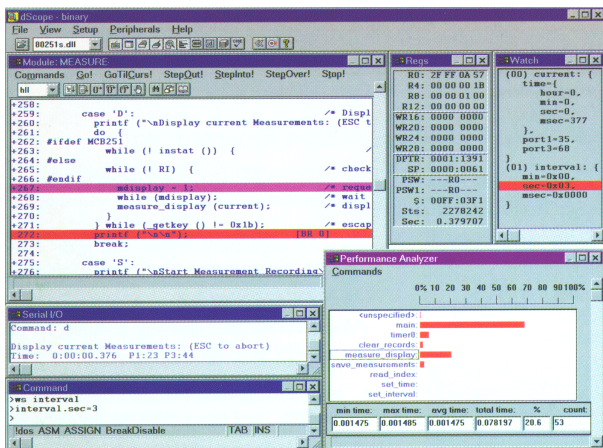
## Optimized Compiler

As the TSC80251 in binary mode is fully code compatible with the 80C51, an existing code can be transferred without any risk.

An optimized compiler is needed to take the architecture benefits and to get advantage of the new powerful instruction set of the TSC80251 (189 new instructions).

Two new ANSI C-Compiler are available for this family:

- KEIL C251 C-Compiler and Assembler/Linker
- TASKING C251 C-compiler and Assembler/Linker



## Simulator

The dScope-251 instruction simulator from KEIL simulates the exact behavior of the TSC80251A1 including all peripherals.

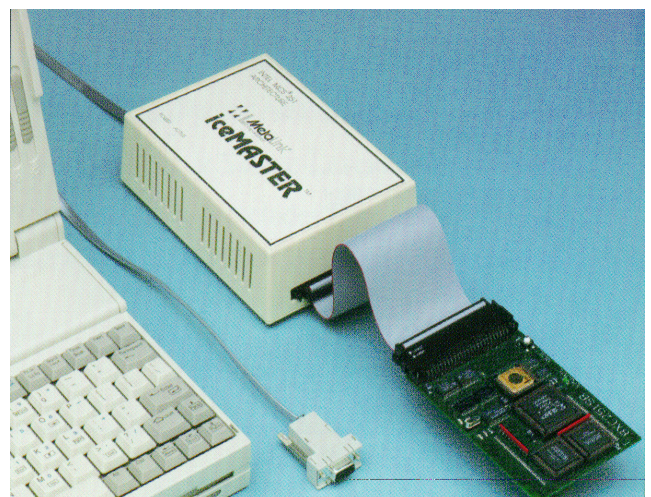
To debug your code in a real hardware environment, a TSC80251A1 evaluation board can be connected to the simulator supported by a ROM monitor.

## In-Circuit Emulators

Three In-Circuit Emulators are available for the TEMIC TSC80251A1 family to support the debugging of your final application:

- HITEX ICE-251
- NOHAU EMUL-251
- METALINK iceMASTER

All emulators support the Microsoft user interface and fully support Keil and Tasking compiler tools (OMF251 format). For each TEMIC derivative product family, a dedicated probecard is available to be adapted to the master-ICE board.

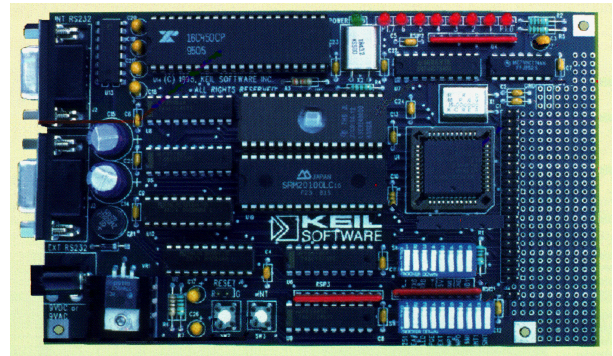


## TSC80251A1 Starter Kit

To allow a quick and cost effective first evaluation of the new architecture, TEMIC offers a "Starter Kit" including the following items:

- ANSI C-Compiler (limited to 2k of code)
- Assembler / Linker
- Instruction Simulator
- Optionally TSC80251A1 Evaluation Board with ROM Monitor

Please visit TEMIC World Wide Web for updated software package



| ORDERING INFORMATION |                                                   |
|----------------------|---------------------------------------------------|
| Part Number          | Description                                       |
| TSC80251A1-A12CB     | ROMless, Source Mode, 12MHz, PLCC 44, 0 to 70°C   |
| TSC80251A1-B16IB     | ROMless, Binary Mode, 16MHz, PLCC 44, -40 to 85°C |
| TSC80251A1-A12CD     | ROMless, Source Mode, 12MHz, TQFP 44, 0 to 70°C   |
| TSC251A1XXX-A12CB    | Mask ROM, Source Mode, 12MHz, PLCC 44, 0 to 70°C  |
| TSC251A1XXX-B12CB    | Mask ROM, Binary Mode, 12MHz, PLCC 44, 0 to 70°C  |
| TSC87251A1-A12CB     | OTP ROM, 12MHz, PLCC 44, 0 to 70°C                |
| TSC87251A1-A12CC     | EPROM, 12MHz, Window UV CQPJ 44, 0 to 70°C        |

For other requests and pricing information, please contact your sales office.

### On-line Support



TSC80251 E-mail hot-line: C251@temic.fr  
World Wide Web ( <http://...>):  
TEMIC: [www.temic.de](http://www.temic.de)  
Keil: [www.keil.com](http://www.keil.com)  
Tasking: [www.tasking.com](http://www.tasking.com)  
Hitex: [www.hitex.com](http://www.hitex.com)  
Nohau: [www.nohau.com](http://www.nohau.com)

### Available Documentation



- TSC80251 Brochure
- TSC80251A1 Datasheet
- TSC80251 Programmers Guide
- TSC80251A1 Starter Kit Package

For more information on our products:

TEMIC Semiconductors Sales offices:

**Europe :** France Tel: (33) 1 30 60 7000 Fax: (33) 1 30 60 7111 / Germany Tel: (49) 7131 67 0 Fax: (49) 7131 67 2100 /

Italy Tel: (39) 2 332 12 332 Fax: (39) 2 332 12 234 / Spain Tel: (34) 1 564 5181 Fax: (34) 1 562 7514 /

Scandinavia Tel: (46) 8 733 0090 Fax: (46) 8 733 0558 / United Kingdom Tel: (44) 1 344 70 73 00 Fax: (44) 1 344 42 73 71

**North America:** Central Tel.: (810) 244 06 10 Fax.: (810) 244 08 48 / Eastern Tel.: (908) 735 61 00 Fax.: (908) 735 22 58 /

Western Tel.: (408) 970 57 00 Fax.: (408) 970 39 50 / Mexico Tel.: (52) 5 546 92 76 Fax.: (52) 5 566 08 400

**Japan :** Tel.: (81) 35 562 33 21 Fax.: (81) 35 562 33 16

**Asia :** China Tel.: (86) 21 5677 5946 Fax.: (86) 21 5677 3403 / Hong Kong Tel.: (852) 2 37 89 789 Fax.: (852) 2 37 55 733 /

Korea Tel.: (822) 785 1136 Fax.: (822) 785 1137 / Singapore Tel.: (65) 788 66 68 Fax.: (65) 788 00 31 /

Taiwan Tel.: (886) 2 755 61 08 Fax.: (886) 2 755 47 77

TEMIC Semiconductors World Wide Web : <http://www.temic.de>