



EVALUATION KIT  
AVAILABLE

## High-Speed Secure Microcontroller

DS5250

### General Description

The DS5250 is a highly secure, four clocks-per-machine cycle, 100% 8051-instruction-set-compatible microprocessor in Maxim's secure microcontroller family. It was designed to be the cryptographic engine of PIN pads, financial terminals, and any other application in which data security is paramount. A key feature of the device is that it encrypts its program memory and optionally its data memory with a hardware-based single- or triple-DES (data encryption standard) algorithm, making it almost impossible to extract information. It also implements block cipher encoding that uses block addresses to modify the encrypted data, further strengthening security. This makes the device ideal for storage and transmission of passwords, personal identification numbers, encryption keys, and other highly confidential information.

### Applications

PIN Pads  
Financial Terminals  
Data Security Applications

### Ordering Information

| PART         | TEMP RANGE     | PIN-PACKAGE |
|--------------|----------------|-------------|
| DS5250F-825  | 0°C to +70°C   | 80 MQFP     |
| DS5250F-825+ | 0°C to +70°C   | 80 MQFP     |
| DS5250F-8N5  | -40°C to +85°C | 80 MQFP     |
| DS5250F-8N5+ | -40°C to +85°C | 80 MQFP     |
| DS5250F-125  | 0°C to +70°C   | 100 MQFP    |
| DS5250F-125+ | 0°C to +70°C   | 100 MQFP    |
| DS5250F-1N5  | -40°C to +85°C | 100 MQFP    |
| DS5250F-1N5+ | -40°C to +85°C | 100 MQFP    |

+Denotes a lead-free/RoHS-compliant package.

**Pin Configurations and Selector Guide appear at end of data sheet.**

### Features

- ◆ **Feature-Rich, 8051-Compatible Microprocessor**  
Accesses Up to 4MB Program and 4MB Data Memory (All Nonvolatile)  
In-System Programmable Through Serial Port

In-Application Programmable Through User Software  
Allows Self-Modification of Program/Data Memory  
Four 8-Bit Ports/One 6-Bit Port  
Three 16-Bit Timer/Counters  
256 Bytes of Scratchpad RAM

#### ◆ Advanced Features

CRC-16/32 Generator  
5KB Internal SRAM (Optional 1KB Stack)  
Single or 3DES Engine  
Partitionable Memory Segments Variable from 4KB to 256KB

#### ◆ High-Speed Architecture

Four Clocks-per-Machine Cycle  
DC-to-25MHz Operation  
Single-Cycle Instruction in 160ns  
Dual Data Pointers Can Increment or Decrement Independently  
Automatic Data Pointer (DPTR) Selection Available  
Programmable Speed MOVX Instructions  
1KB On-Chip Instruction Cache

#### ◆ High-Reliability Operation

Power-Fail/Overvoltage Reset  
Early-Warning Power-Fail Interrupt  
Watchdog Timer

#### ◆ Nonvolatile Functions

On-Chip Real-Time Clock with Alarm Interrupt  
2KB Battery-Backed Internal SRAM

#### ◆ Interrupts

15 Interrupts with Seven External Sources

#### ◆ Security Features

Executes Single/3DES-Encrypted Programs to Prevent Observation  
Two Self-Destruct Inputs  
4096-Bit Modulo-Arithmetic Accelerator (MAA) for Public/Private Key Operations  
Tamper Sensors Detect Thermal/Voltage/Probe Attacks  
Programmable Attack Countermeasures  
Secure-Loader Mode  
True Random-Number Generator (RNG)  
Unique ID Number in Every Device  
Separate Program/Data Cryptograph  
Program Memory Integrity Checking

#### ◆ Evaluation Kit Available (DS5250-KIT)

**Note:** Some revisions of this device may incorporate deviations from published specifications known as errata. Multiple revisions of any device may be simultaneously available through various sales channels. For information about device errata, contact the factory.



# ABRIDGED DATA SHEET

## High-Speed Secure Microcontroller

DS5250

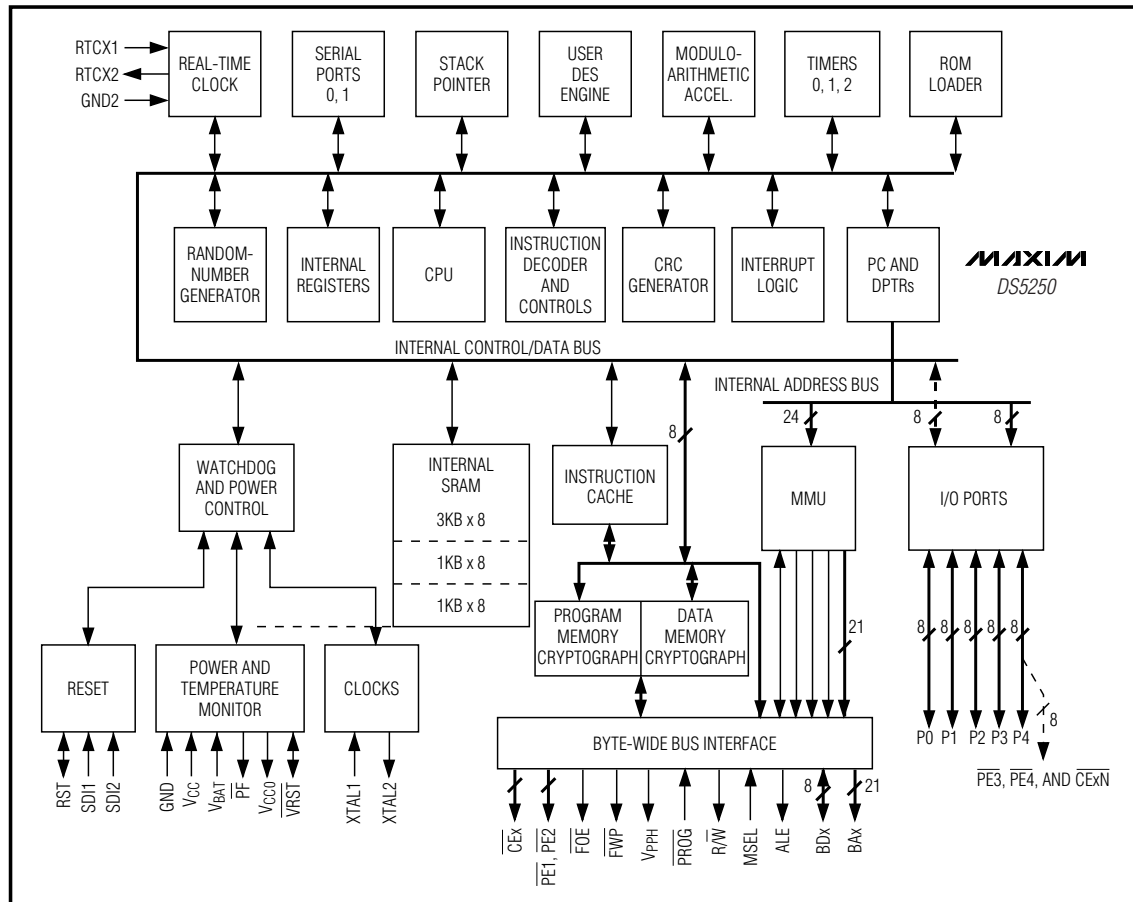


Figure 4. Block Diagram

**Note to readers:** This document is an abridged version of the full data sheet. To request the full data sheet, go to [www.maxim-ic.com/DS5250](http://www.maxim-ic.com/DS5250) and click on **Request Full Data Sheet**.