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# dsPIC<sup>®</sup> Symmetric Key Embedded Encryption Library

## Summary

Microchip offers a reliable security solution for embedded applications built on the dsPIC30F platform. This solution is provided by means of two libraries – Symmetric Key and Asymmetric Key Embedded Encryption libraries. The Symmetric Key library features the following:

- Hash Functions
  - SHA-1 Secure Hash Standard
  - MD5 Message Digest
- Symmetric-Key Encryption/Decryption Functions
  - Advanced Encryption Standard (AES)
  - Triple Data Encryption Algorithm (Triple-DES)
- Random Number Generator Functions
  - Deterministic Random Bit Generator ANSI X9.82

## Typical Applications

The algorithms supported by this library have emerged as the de facto standard for many large-scale, secured applications like web access, e-mail, secure XML transactions and virtual private networks (VPN). These algorithms are also recommended by most Internet Engineering Task Force (IETF), Federal Information Processing Standards (FIPS) and IPsec Standards. Some typical applications for this library include:

- Mobile and Wireless Devices, PDAs
- Secure Banking
- Secure Web Transactions
  - Secure Socket Layer (SSL)
  - Transport Layer Security (TLS)
  - Secure Multipurpose Internet Mail Extensions (S/MIME)

## Typical Applications (Continued)

- ZigBee™ technology and other monitoring and control applications
- Smart Card Readers/Trusted Card Readers
- Friend/Foe Identification
- Secure devices and peripherals interoperating with TCG and NGSCB PC's

The Trusted Computing Group (TCG) and related Microsoft Next-generation Secure Computing Base (NGSCB) both specify RSA and Triple-DES. RSA and other asymmetric solutions are featured in the dsPIC30F Asymmetric Key Embedded Encryption Library (SW300055).

## Features

- C-callable library functions developed in MPLAB<sup>®</sup> ASM30 Assembly language
- Optimized for speed, code size and RAM usage:
  - RAM usage below 60 bytes
- Library functions extensively tested for adherence to applicable standards
- Symmetric Key Encryption/Decryption functions support multiple modes of operation:
  - Electronic Code Book (ECB) mode
  - Cipher Block Chaining with Message Authentication (CBC-MAC) mode
  - Counter (CTR) mode
  - Combined CBC-MAC and Counter (CCM) mode
- A comprehensive *dsPIC30F Embedded Encryption Libraries User's Guide* describing the required APIs for the library functions
- Several examples of use are provided for each library function

## Cryptographic Functions

Cryptographic Algorithm	Applicable Specification	Cryptographic Function <sup>(2)</sup>	Code Size (in bytes)	Data Rate <sup>(4)</sup> (Kbytes/sec)
RNG	ANSI X9.82, FIPS 180-2	Deterministic Random Bit Generator	1353	–
SHA-1	FIPS 180-2	Secure Hash Algorithm – 160 bit	909	423
MD5	RFC 1321	Message Digest – 128 bit	1428	656
T-DES	FIPS 46-3	Basic Encryption and Decryption	8892	49 <sup>(3)</sup>
	FIPS 46-3	ECB Wrapper <sup>(1)</sup>	123	
	NIST SP 800-38A	CBC Wrapper <sup>(1)</sup>	903	
	NIST SP 800-38A	CTR Wrapper <sup>(1)</sup>	348	
AES (128-bit)	FIPS 197	Basic Encryption	2505	232 <sup>(3)</sup>
	FIPS 197	Basic Decryption	2895	
	FIPS 197	ECB Wrapper <sup>(1)</sup>	234	
	FIPS 113	CBC-MAC Encryption Wrapper <sup>(1)</sup>	663	
	NIST SP 800-38A	CBC Decryption Wrapper <sup>(1)</sup>	357	
	NIST SP 800-38A	CTR Wrapper <sup>(1)</sup>	348	
	IEEE 802.11i	CCM Wrapper <sup>(1)</sup>	930	

### Notes:

1. Wrapper functions are used in combination with the underlying basic encryption and/or decryption functions for the respective algorithm (AES,T-DES).
2. All library functions use the stack and require input and output message buffers to be set up by the calling application. Stack usage is below 60 bytes of RAM.
3. AES and T-DES data rate represents the average of the data rates for performing basic encryption and decryption functions for a single block of data.
4. All data rate statistics shown here assume device operation of 30 MIPS.



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## Getting Started

- Review the dsPIC30F Symmetric Key Embedded Encryption Library web page at [www.microchip.com](http://www.microchip.com)
- Download the dsPIC30F Embedded Encryption Libraries User's Guide from the Microchip web site
- Purchase part number SW300050
- If Asymmetric Key Embedded Encryption Library support is required (part number SW300055), please visit [www.microchip.com](http://www.microchip.com) and review the applicable information

## Host System Requirements

- PC-compatible system with an Intel Pentium® class or higher processor, or equivalent
- A minimum of 16 MB RAM
- A minimum of 40 MB available hard drive space
- Microsoft Windows® 98, Windows 2000 or Windows XP

## Part Numbers and Ordering Information:

### dsPIC® Symmetric Key Embedded Encryption Library

Part Number	Description	Availability
SW300050-EVAL	dsPIC Symmetric Key Embedded Encryption Library Software License (Evaluation Only) <sup>(4)</sup>	Now
SW300050-5K	dsPIC Symmetric Key Embedded Encryption Library Software License (Up to 5K units) <sup>(2)</sup>	Now
SW300050-25K	dsPIC Symmetric Key Embedded Encryption Library Software License (5K+ to 25K units) <sup>(2)</sup>	Now
SW300050-100K	dsPIC Symmetric Key Embedded Encryption Library Software License (25K+ to 100K units) <sup>(2)</sup>	Now

**Note 1:** The evaluation version offers the same functions and features as the other versions. The evaluation period is one year.

**2:** Quantities are per project, payable as a one-time license fee based on estimated lifetime volume for products resulting from the project. Please consult the factory for quantities above 100K.

### dsPIC® Development Tools from Microchip

MPLAB® IDE	Free
MPLAB® Visual Device Initializer (included in MPLAB® IDE)	
MPLAB® C30 C Compiler	SW006012
MPLAB® ICD 2 In-Circuit Debugger/Programmer	DV164005, DV164007
MPLAB® ICE 4000	ICE4000
MPLAB® PM3 Universal Device Programmer	DV007004
dsPIC30F Math Library (included in download of MPLAB® C30 C Compiler)	Free
dsPIC30F DSP Library	Free
dsPIC30F Peripheral Library	Free
dsPICworks™ Data Analysis and DSP Software	Free
dsPIC® Digital Filter Design	SW300001
dsPIC30F Soft-Modem Library	SW300002/3/4/5
dsPIC® Speech Recognition Library	SW300010/11/12
dsPIC® Symmetric Key Embedded Encryption Library	SW300050
dsPIC® Asymmetric Key Embedded Encryption Library	SW300055
dsPIC30F Acoustic Echo Cancellation Library	SW300060
dsPIC30F Noise Suppression Library	SW300040
CMX-RTX™ for dsPIC30F	SW300031
CMX-Tiny+™ for dsPIC30F	SW300032
CMX-Scheduler™ for dsPIC® Devices	Free at <a href="http://www.cmx.com">www.cmx.com</a>
dsPICDEM™ Starter Demonstration Board	DM300016
dsPICDEM™ 28-pin Starter Demonstration Board	DM300017
dsPICDEM™ 1.1 General Purpose Development Board	DM300014
dsPICDEM™ MC1 Motor Control Development System	DM300020
dsPICDEM.net™ 1 Connectivity Development Boards	DM300004-1
dsPICDEM.net™ 2 Connectivity Development Boards	DM300004-2

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