

---

## Secure Personalization with Transport Key Authentication

---

### ATSHA204A, ATECC108A, and ATECC508A

#### Introduction

---

The Atmel® CryptoAuthentication™ ATSHA204A, ATECC108A, and ATECC508A devices (crypto device) are state of the art Security IC hardware that has been developed for secure key storage. Often times, the end product that these devices are being used in are assembled and configured at third party test houses. For security reasons, one may not want to give the third party test houses secrets in the clear. The devices have the ability to securely transport these secrets to the subcontractor encrypted. Then internally to the device, it will decrypt the data and then program the information into the proper slots without being exposed to the outside.

#### Overview

---

The transport key allows for secure programming of the crypto devices without the third party programming company having access to the value of the Data zone. The programming company will be able to program and verify the content of these devices without having knowledge of the content.

The crypto devices have three different zones that can be programmed:

- Configuration Zone
- OTP Zone
- Data Zone

There are also two lock bits:

- One for the Configuration Zone
- One for both the Data and OTP Zones

The Configuration zone is always readable in the clear and once locked, is read-only. The Data and OTP zones are not writeable until after the Configuration zone is locked.

# 1 Acquiring a Transport Key

To obtain a transport key, contact Atmel at [cryptosecrets@atmel.com](mailto:cryptosecrets@atmel.com).

As part of the request, it is required to provide:

- A Public Encryption Key – to ensure that you and only you know the value of the transport key.

In response, the following is sent from Atmel:

- Encrypted Transport Key
- Transport Keys ID – the crypto device is used to select the correct internal Transport Key when programming.

## 2 Zones

### 2.1 Configuration Zone

The Configuration zone is always readable in the clear; therefore, there is no reason for using a transport key to program the crypto device's Configuration zone. The Configuration zone should be locked using a validation CRC in the Lock command. The content of the locked Configuration zone should be mixed into the encryption key, along with the transport key when programming the Data zone. This ensures the device was configured as expected in order to program the correct Data zone values.

### 2.2 Data Zone

The Data zone is the secure area of the device. Use of a transport key is recommended to ensure no one has gotten access to the internal data of that device. The transport key is used as the initial secret that only the customer and the device know when issuing an encrypted write command to the Data zone. The key steps in securing the secrets are to:

1. Generate a random number and mix in the configuration making the configuration part of the SHA calculation.
2. SHA in the current value of the slot that will be used for the session key.
3. SHA in the unique transport key.



As an option, mix in other non-secret OTP data to ensure proper programming of the OTP zone. The value should then be written back to the session slot.

4. Using the newly created session key, issue encrypted writes to each Data zone slot with the session key slot being the last slot programmed.

Once the device is programmed the Data and OTP zones should be locked.

### 2.3 OTP Zone

The OTP zone is always readable in the clear and therefore cannot contain secure information. In order to guarantee the value of the OTP zone:

1. Program the OTP zone.
2. Lock the OTP zone prior to encrypting the write to the Data zone.
3. The OTP zone content should then be mixed into the encryption key used for the Data zone.

## 2.4 Configuration

Use of a transport key only requires the Configuration zone to be locked prior to programming the Data zone. Until the Data zone is locked, the slot configuration information is not used, and no reads from the Data zone are allowed. Once the Configuration zone is locked, the Data zone becomes writable, and the encrypted data can be loaded into the crypto device with an internal transport key used for decryption.

## 3 Programming Flow

To setup the Session Key for programming the Data zone, the following commands are used:

**Table 3-1. Program and Lock the Configuration Zone Commands**

Command	Description
<b>Nonce</b> (Seed)	Load TempKey with the random number used during encryption.
<b>GenDig</b> (Config Zone 1)	Mix in the valid Configuration zone. This is recommended to ensure proper configuration of the slot security settings.
<b>GenDig</b> (OTP Zone 0)	Verify the OTP zone is programmed correctly. (Optional)
<b>GenDig</b> (OTP Zone 1)	Verify the OTP zone is programmed correctly. (Optional)
<b>GenDig</b> (Transport Key)	Add the transport key into the session key.
<b>GenDig</b> (Data Zone Slot Session)	Mix in the current value of the data slot.
<b>Write</b> (Data Zone Slot Session)	Store the session key to a slot.

**Table 3-2. Write Commands**

Commands	Description
<b>Nonce</b> (Seed)	
<b>GenDig</b> (Data Zone Slot Session)	Mix in the Session Key
<b>Write</b> (Data Zone Slot N)	Store the encrypted data into a slot

The slot used for the session key should be the last slot to be programming when writing the encrypted data to the device.

## 4 Revision History

Doc Rev.	Date	Comments
8860A	11/2015	Initial document release.



Atmel®, Atmel logo and combinations thereof, Enabling Unlimited Possibilities®, CryptoAuthentication™, and others are registered trademarks or trademarks of Atmel Corporation in U.S. and other countries. Other terms and product names may be trademarks of others.

DISCLAIMER: The information in this document is provided in connection with Atmel products. No license, express or implied, by estoppel or otherwise, to any intellectual property right is granted by this document or in connection with the sale of Atmel products. EXCEPT AS SET FORTH IN THE ATMEL TERMS AND CONDITIONS OF SALES LOCATED ON THE ATMEL WEBSITE, ATMEL ASSUMES NO LIABILITY WHATSOEVER AND DISCLAIMS ANY EXPRESS, IMPLIED OR STATUTORY WARRANTY RELATING TO ITS PRODUCTS INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT. IN NO EVENT SHALL ATMEL BE LIABLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE, SPECIAL OR INCIDENTAL DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS AND PROFITS, BUSINESS INTERRUPTION, OR LOSS OF INFORMATION) ARISING OUT OF THE USE OR INABILITY TO USE THIS DOCUMENT, EVEN IF ATMEL HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. Atmel makes no representations or warranties with respect to the accuracy or completeness of the contents of this document and reserves the right to make changes to specifications and products descriptions at any time without notice. Atmel does not make any commitment to update the information contained herein. Unless specifically provided otherwise, Atmel products are not suitable for, and shall not be used in, automotive applications. Atmel products are not intended, authorized, or warranted for use as components in applications intended to support or sustain life.

SAFETY-CRITICAL, MILITARY, AND AUTOMOTIVE APPLICATIONS DISCLAIMER: Atmel products are not designed for and will not be used in connection with any applications where the failure of such products would reasonably be expected to result in significant personal injury or death ("Safety-Critical Applications") without an Atmel officer's specific written consent. Safety-Critical Applications include, without limitation, life support devices and systems, equipment or systems for the operation of nuclear facilities and weapons systems. Atmel products are not designed nor intended for use in military or aerospace applications or environments unless specifically designated by Atmel as military-grade. Atmel products are not designed nor intended for use in automotive applications unless specifically designated by Atmel as automotive-grade.