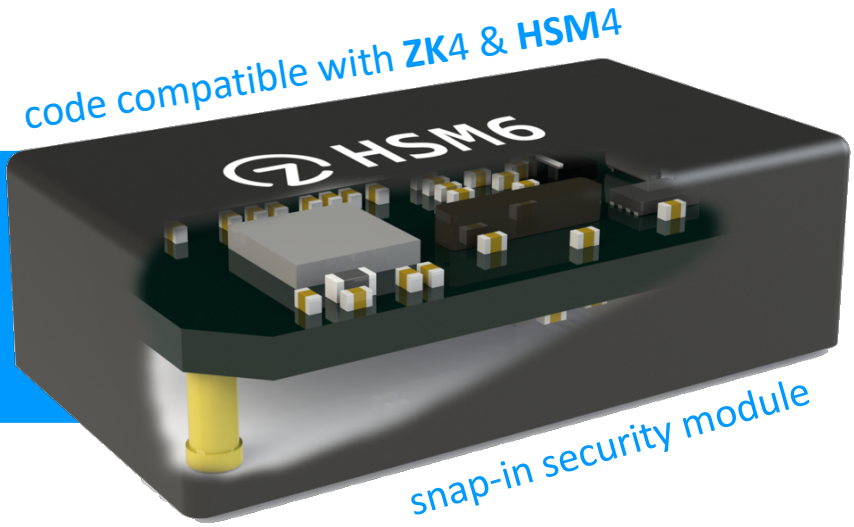
zymbit

ZYMBIT **HSM6**

HARDWARE WALLET FOR EMBEDDED LINUX COMPUTERS



Key Features

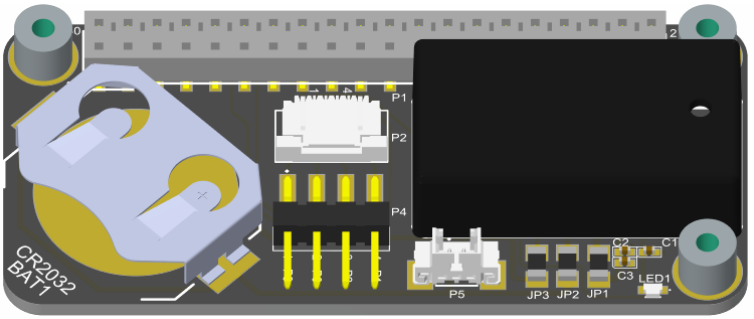
- BIP 32/39/44 HD wallet
- 654 private/public keys
- Multifactor device identity & authentication
- Data encryption & signing engine
- Physical tamper detection sensors
- Temperature & battery monitoring with last gasp

Applications

- Independent key management & sovereignty
- Embedded device wallets
- Cyberphysical security of single board computers
- Secure device registration with AWS IoT

Easy To Integrate Module

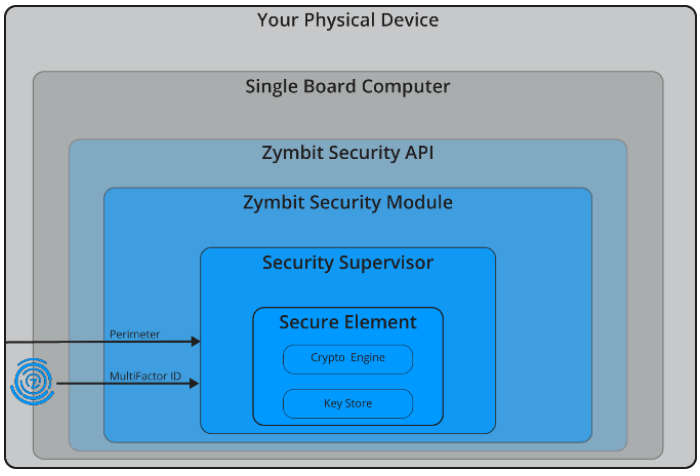
HSM6 is a 'snap in' security module designed for easy integration within a secure manufacturing environment. All connections are through a single, 30 pin connector that is hidden underneath the module. No soldering is required, which simplifies provisioning and supply chain management.



Software APIs are available in Python, C and C++. Example code and online documentation provide a simple low-risk way to integrate Zymbit security features into your application running on standard Raspbian and Ubuntu.

Tough to Infiltrate

HSM6 delivers multiple layers of security to protect against cyber and physical threats. A secure element (SE) with micro-grid protected silicon stores the most sensitive resources. A security supervisor isolates the SE from the host computer and provides additional functions of multi-factor identity/authentication for devices, and multi-sensor physical security.



SPECIFICATIONS

BIP 32/39/44 HD Wallet

HSM6 with BIP 32/39/44 Hierarchical Deterministic Wallets feature:

- Create master seeds and derive child keys
- Ability to recover master seeds
- Ability to index wallet nodes with ZYMKEY key slots

Multifactor Device ID and Authentication

HSM6 enables remote attestation of host device hardware configuration:

- Unique ID token created using multiple device specific measurements
- Cryptographically derived ID token never exposed
- Custom input factors available to OEMs
- ID tokens bound to host permanently for production, or temporarily for development
- Changes in host configuration trigger local hardware & API responses, policy dependent

Data Integrity Encryption & Signing

HSM6's cryptographic engine utilizes strong cipher functions to encrypt, sign and authenticate data:

- Strong cipher suite includes ECDSA, ECDH, AES-256, SHA256
- AES-256 encrypt/decrypt data service
- Integration with TLS client certificate, PKCS11
- TRNG - true random number generator, suitable seed for FIPS PUB 140-2, 140-3 DRNG.

Key Security Generation & Storage

HSM6 generates and stores key pairs in tamper resistant silicon to support a variety of secure services:

- 14 key slots, factory-defined, user available
- 512 empty key pair slots, user available
- 128 foreign public key slots, user defined
- Cryptographic primitives
  - ECC KOBLITZ P-256 (secp256k1), ECC NIST P-256 (secp256r1)
  - ECDSA (FIPS186-3), ECDH (FIPS SP800-56A)
  - AES-256 (FIPS 197), TRNG (NIST SP800-22)
- Private keys never exposed outside of silicon; keys destruction available, user selectable

Physical Tamper Detection

HSM6 monitors the physical environment for symptoms of physical tampering:

- Power quality monitor detects anomalies like brown-out events
- Optional accelerometer detects shock and orientation change events
- Optional perimeter integrity circuits detect breaks in user defined wire loops/mesh
- Event reporting and response according to pre-defined policies
- Temperature & battery monitoring with 'last gasp' key protection

Real Time Clock

HSM6 includes a battery-backed real time clock to support off grid applications:

- 2-10 years operation, dependent upon external battery size.
- RTC clock service, available to client applications
- RTC/UTC anamoly alerts available with Zymbit security services
- 20ppm accuracy (standard). Optional 5ppm accuracy (OEM feature, MOQ apply)

Secure Element Hardware Root of Trust

HSM6 provides multiple layers of hardware security:

- Hard to penetrate dual secure-processor architecture
- Secure microcontroller isolates secure element from host
- Secure elements from Microchip - ATECC608
- Hardware based cryptoengine and keystore

Ultra-Low Power Operation

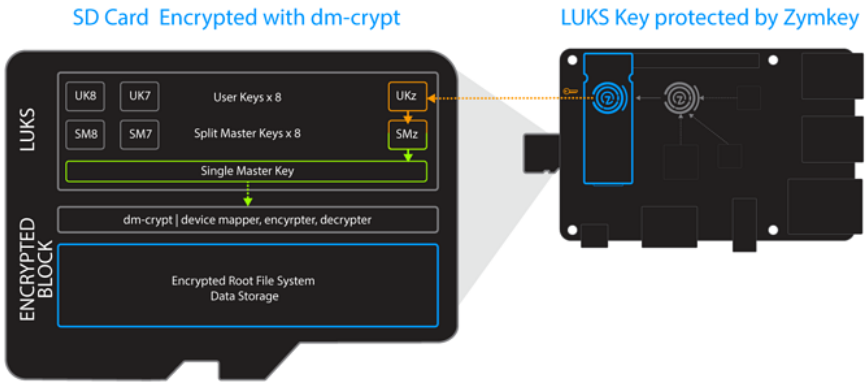
HSM6 delivers long term autonomous security from a battery:

- ARM Cortex-M0 microcontroller
- Years of secure operation from a coin cell - optional larger battery
- Secure operation autonomous from host

APPLICATIONS

Protect Digital Assets with SD Card Encryption

There are many reasons to encrypt the Root File System (RFS) on the Raspberry Pi, from keeping Wi-Fi credentials private to protecting proprietary software and sensitive data from cloning. HSM6 integrates seamlessly with dm-crypt & LUKS open standards. Learn how > https://community/zymbit/com/t/970

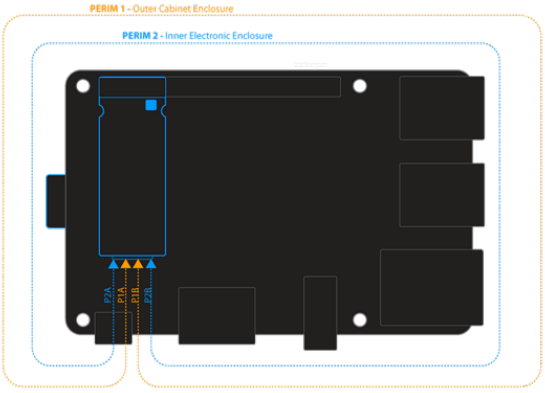


HSM6 and Digital Wallet

The digital wallet provided by the HSM6 is a BIP32/39/44 HD wallet, or Hierarchical Deterministic wallet. A HD wallet derives all new addresses/keys from a master seed, thus creating a hierarchical wallet structure. Learn how > https://community.zymbit.com/t/1132

Physically Secured Enclosure with Tamper Detection

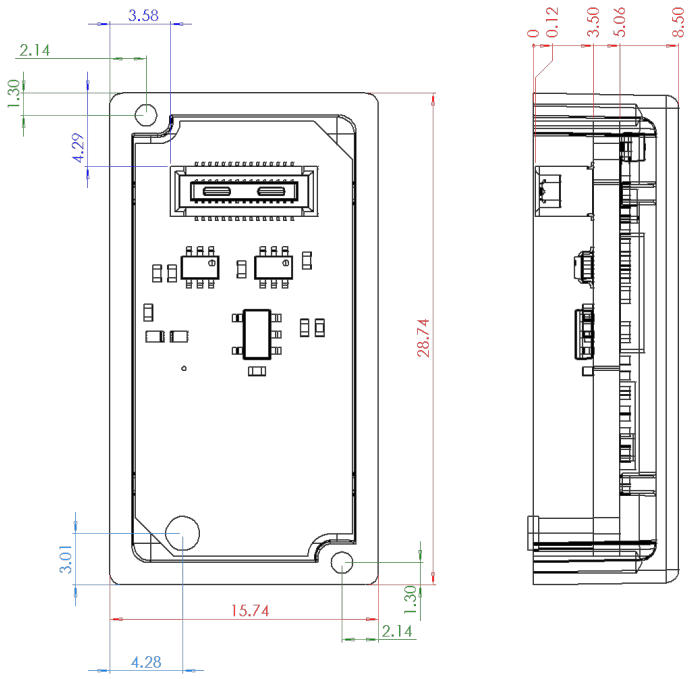
HSM6 provides multiple layers of physical tamper detection that protect unattended devices from threats in the real world. Learn how > https://community.zymbit.com/t/912



MECHANICAL / ELECTRICAL

Dimensions (mm)

Underside view of HSM6

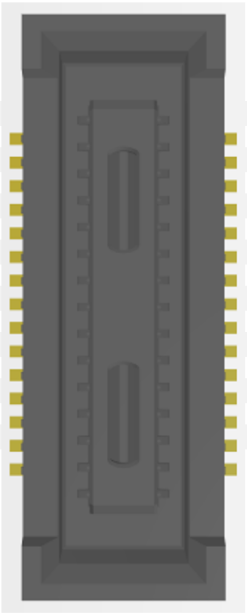


HSM6 Underside

HSM6 Connector

Hirose Header DF40HC(3.5)-30DS-0.4V(51)

HSM4, HSM6 MODULE CONNECTOR
underside view



Module

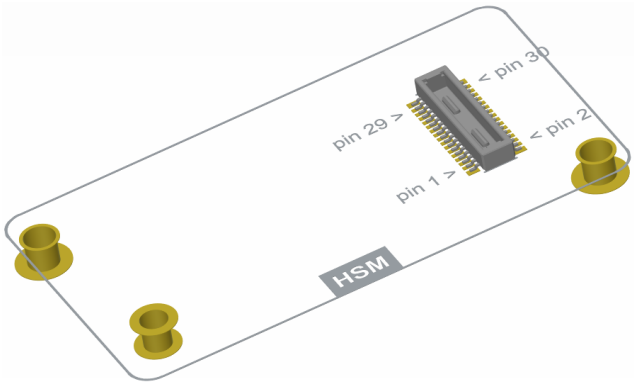
HSM6	HSM4	Pin
USB/DP	NC	1
USB/DM	NC	3
GND	GND	5
I2C1_SCL	I2C1_SCL	7
I2C1_SDA	I2C1_SDA	9
GND	GND	11
ZIO_2	NC	13
ZIO_1	NC	15
ZIO_4	NC	17
ZIO_3	NC	19
GND	GND	21
ZIO_5	NC	23
PERIM_2	PERIM_2	25
PERIM_1	PERIM_1	27
PERIM_0	PERIM_0	29

Pin	HSM4	HSM6
2	GND	GND
4	RESERVED	RESERVED
6	RESERVED	RESERVED
8	RESERVED	RESERVED
10	NC	NC
12	NC	PI_RUN
14	NC	NC
16	LED	LED
18	GPIO_4	GPIO_4
20	NC	NC
22	GND	GND
24	VBAT	VBAT
26	GND	GND
28	+5V	+5V
30	+5V	+5V

Rev C2

Mating Connector

Hirose Receptacle DF40C-30DP-0.4V(51)



Note: The four larger corner pads of the mating connector are mounting pads. Only the middle 30 pins are used.

OTHER ZYMBIT SECURITY MODULES

The smaller dimensions of both HSM4 and HSM6, as well as the new form, single connector, and external battery are designed for embedded and OEM applications. HSM6 is code compatible with ZYMKEY4.

For a full list of features for ZYMKEY4, HSM4, and HSM6 visit www.zymbit.com/security-modules

ELECTROMECHANICAL SPECIFICATIONS	**ZYMKEY**4	**HSM**4	**HSM**6
Mechanical format	RPi GPIO	Module	Module
Connectors	2	1	1
I2C	●	●	●
SPI			○
USB			○
Lock function (enter production mode)	Lock Tab	via API	via API
ACCESSORIES	**ZYMKEY**4	**HSM**4	**HSM**6
Developer Kit	●	●	●
HAT for RPi		●	●
Application Reference Kits		●	●
OTHER FEATURES & HIGHLIGHTS	**ZYMKEY**4	**HSM**4	**HSM**6
Backup battery – (for RTC and perimeter breach during loss of power)	Internal	External	External
Backup battery monitoring			●
"Last gasp" feature and user policies			●
Perimeter breach detection circuits - standard	2	2	
Perimeter breach detection - enhanced			2
Unique key slots, user available	3	3	654
Digital wallet			●

● = standard feature
○ = OEM feature

DOCUMENTATION

HSM6 is designed to be easy to integrate into embedded applications. For full and detailed information on how to integrate HSM6 in your application, visit https://community.zymbit.com/

- Getting Started
- Software APIs
- Applications
- Compliance Documentation
- CAD Footprint and Mechanical Files

For more information, visit www.zymbit.com/HSM6/