



X-Wall MX+ Dev Board Quick Guide Rev 1.2

Ordering SKU:

MX+_DEV_R1

Product Description:

SATA-to-SATA real-time crypto module development board with selectable AES ECB/CBC/CBC with Tweak/XTS 256-bit encryption strength at SATA Generations 3 (6 Gb/second,) generation 2 (3 Gb/second,) and generation 1 (1.5 Gb/second) speed.

Revision History

Rev No.	Description	Author	Rev. Date
0.1	Draft release	Butz Huang Dr. C.Y Chiu	03/05/2015
1.0	General Editing	R. Wann	09/10/2015
1.1	General Editing; Add words of cautions; Add SKU	R. Wann	10/10/2015
1.2	Update Development Board arrangement; General editing	R. Wann/B. Huang	12/17/2015

Asia Pacific

Enova Technology Corporation

1st Floor, #11, Research & Development 2nd Rd.
Science-based Industrial Park, Hsin-Chu City
Taiwan 30076, Republic of China
P +886 3 577 2767 F +886 3 577 2770

www.enovatech.net; info@enovatech.net;

North America

Enova Technology

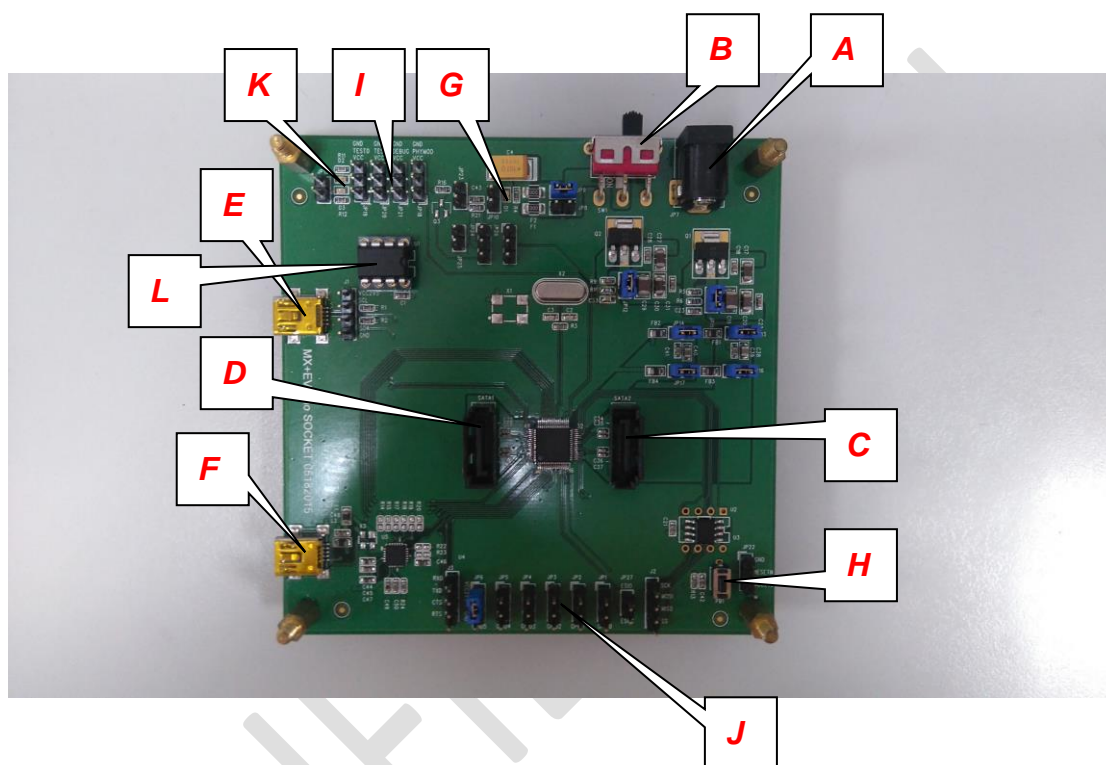
1918 Junction Avenue
San Jose, California 95131, USA
P +1 510 825 7900
<http://www.enovatech.com>

www.enovatech.com;

info@enovatech.com

Overview

The X-Wall MX+ Development Board has been categorized into several functional blocks from A to L with each representing different or combined functions. Detailed descriptions over various functional blocks are provided in Table one below. It's important that you read through the table descriptions prior to any operation of your MX+ Development Board.



This X-Wall MX+ development board facilitates engineering design effort integrating the X-Wall MX+ SATA real-time cryptographic module capable of performing up to 6Gb/sec cryptographic output in AES CBC/CBC with Tweaks/XTS/ECB mode of operation with 256-bit strength. The primary objective of using the X-Wall MX+ is to encrypt (Full Disk Encryption, or SED) entire connected SATA storage drive regardless of its geometry.

MX+ Converts Any Standard SATA Drive into Microsoft Hardware Encrypted Drive Specification (eDrive)

In addition to the Full Disk Encryption (FDE) function, with the addition of TCG OPAL 2.0¹ and IEEE1667 firmware, the MX+ solution can convert any standard SATA disk

¹ TCG OPAL2.0 is a sophisticated multi-tier authentication protocol capable of defining specific user's READ/WRITE access privilege over a specified range of a logical drive. Note that a logical drive may



drive to meet Microsoft Hardware Encrypted Drive specification (Microsoft eDrive) to allow fast and economic deployment using ANY standard SATA drive regardless of its geometry. The addition of TCG OPAL2.0 and IEEE1667 firmware is optional. Please consult with your sales representative for licensing information.

MX+ Converts Any Standard SATA Drive into OPAL2.0 Drive

More, in addition to the Full Disk Encryption (FDE) function and Microsoft eDrive specification, with the addition of TCG OPAL2.0 firmware, the *MX+* solution can convert any standard SATA disk drive to meet with TCG OPAL2.0 drive specification. The addition of the TCG OPAL2.0 firmware is optional. Please consult with your sales representative for licensing information.

MX+ Equips With the Following Hardware Crypto Modules Enhancing the Power of Authentication

Furthermore, the new *MX+* has equipped with other essential FIPS certified hardware crypto modules and software services including:

- ✓ **RSA 2048 bits PKI** – hardware crypto module for Private/Public key pair generation, sign and verify;
- ✓ **DRBG RNG** – hardware crypto module for seeding material and random number generation;
- ✓ **HMAC** – hardware crypto module for Hashed Message Authentication Code;
- ✓ **SHA256** – hardware crypto module for hardware hash;
- ✓ **AES CBC/CBC with Tweaks/XTS/ECB block ciphers** – hardware crypto module with selectable AES mode of operation for real-time block ciphering;
- ✓ **TCG OPAL 2.0** – software service for secure authentication through OPAL; and
- ✓ **IEEE1667** – software service for authentication in host attached transient storage device.

Interfaces Used to Set the Key(s)

Like its predecessor *MX*, the new *MX+* provides two interfaces, which are mutually exclusive for accessing, to perform authentication: 1.) built-in two wires serial interface in either Master or Slave mode; and 2.) SATA API command sets and

contain up to a total of 8 user ranges, in addition to the Global range, with each range taking up specified LBA starting and ending address.

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libraries² via SATA host adapter. For those designs that have onboard micro controller or FPGA with I2C capability can choose *MX+* built-in 2-wire serial interface. Alternatively, for those designs that have control over their system kernel and/or BIOS may opt for the *MX+* SATA API command set and libraries as an integral solution.

Communications using both interfaces may be encrypted using one or more of available built-in hardware cryptographic modules or software services as an option. Noted however, the default of this development board uses clear text communication.

Table 1 – Description for various partitions

Partition	Description
A	5V DC Jack. Connect to power adaptor with center pin 2mm and output 5V/1A (min).
B	Power switch.
C	SATA#2 Connector – Connect to SATA Host using premium quality SATA cable.
D	SATA#1 Connector – Connect to SATA storage device using premium quality SATA cable.
E	Mini-USB Connector – Connect to Enova standard I2C key fob that supplies AES Secret Key.
F	Mini-USB connector for UART output – Connect to a PC USB port through an on-board USB-to-UART controller SiliconLab CP2104.
G	5V power LED indicator.
H	RESET button.
I	Jumper Setting Group 1 (Reserved for manufacturer. DO NOT TOUCH.).
J	Jumper Setting Group 2 (See detailed description below).
K	Error indicator (D2). Data transfer indicator (D3).
L	Pre-programmed SEEPROM that contains the functional AES Secret Key.

All jumpers may be set to 1 or 0 by shorting to Vcc or ground.

Table 2 - Jumper Setting Group 1

	NAME	Default	Description
JP18	PHYMOD	0	Reserved for Manufacturer. DO NOT TOUCH.
JP19	TEST0	0	
JP20	TEST1	0	
JP21	DEBUG	0	

² SDK for developers is available in both Windows and Linux. A valid Software License Agreement is required.



Table 3 - Jumper Setting Group 2

	NAME	Default	Description
JP1	GPIO0	0	Reserved
JP2	GPIO1	0	Reserved
JP3	GPIO2	0	Reserved
JP4	GPIO3	0	Reserved
JP5	GPIO4	0	Reserved
JP6	GPIO5	0	Close/Set to Vcc: MX+ boots from external SPI flash. Open/Set to Ground (default): MX+ boots from internal ROM.

Words of Cautions

To avoid unpredicted operational behavior and to enhance user's experience of the MX+ development board, please observe the following critical requirements:

1. Use a reliable external power supply with 5 Volts and 3 Amps at least; A qualified external power supply unit is enclosed;
2. Use premium SATA cables for a stable 6Gbps connection; A pair of qualified SATA cable is enclosed;
3. Do not apply the power to your host and storage drive; and
4. **Ensure the following power on sequences are followed exactly:**
 - 4a. **properly attach the power supply and use SW1 to power on the development board;**
 - 4b. **Press and hold PB1 for at least a period of 3 seconds the release it; and**
 - 4c. **Power on your host and storage drive**

For occasion that the storage drive connected after the MX+ development board isn't properly recognized after you had performed above steps 1 through 4, power down your host and storage drive then repeat the steps 1-4. Alternatively, contact your sales representatives to arrange for technical support.

Quick installation with the default SEEPROM³

1. Connect power adaptor;

³ Note that key format of the X-Wall MX+ differs from that of the X-Wall MX. The old key format is not compatible with the new X-Wall MX+. Consult Enova sales at info@enovatech.com for the utility program that generates new MX+ key format and writes the key directly to the connected key fob.



2. Connect SATA#2 connector to your motherboard SATA host adapter;
3. Connect SATA#1 connector to your SATA storage device (SSD and/or Hard Drive);
4. Insert Enova I2C key fob to the connector E;
5. Power on the power switch B;
6. Manually reset MX+ by pushing reset button H;
7. Power on your system. The SATA disk drive should be recognized under OS.

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