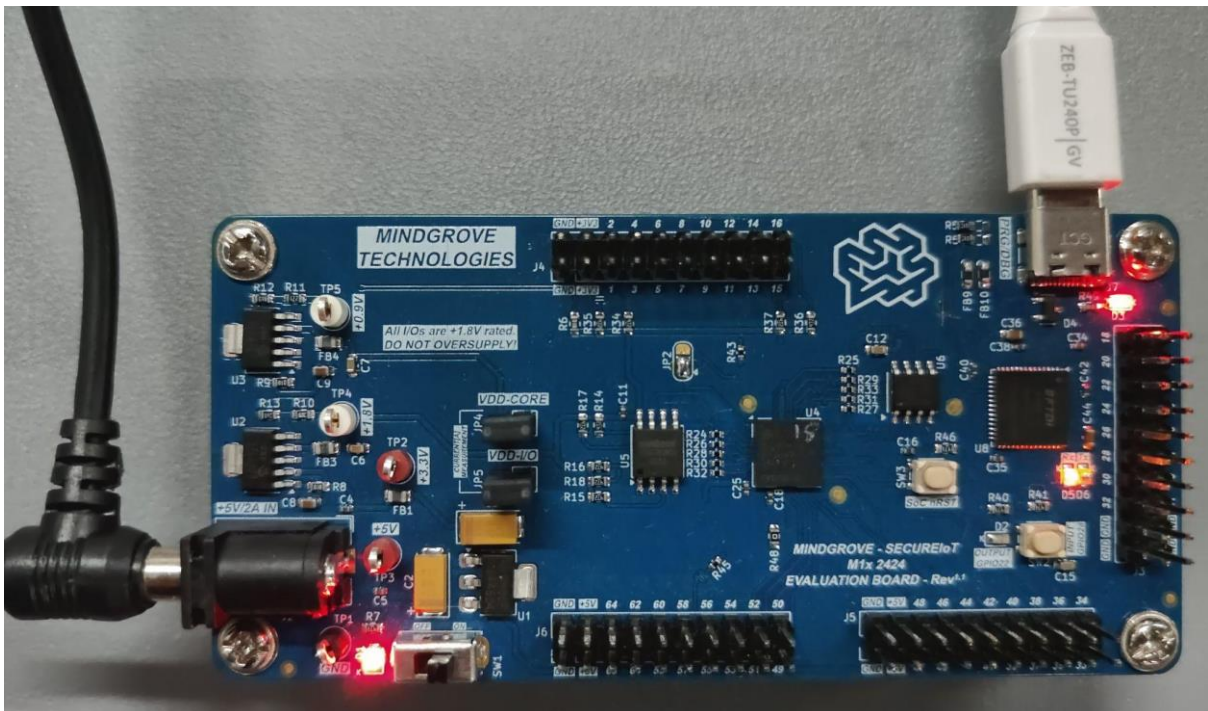




USER MANUAL

SecureIoT-SoCM1x 2424 Evaluation Board Rev1.2



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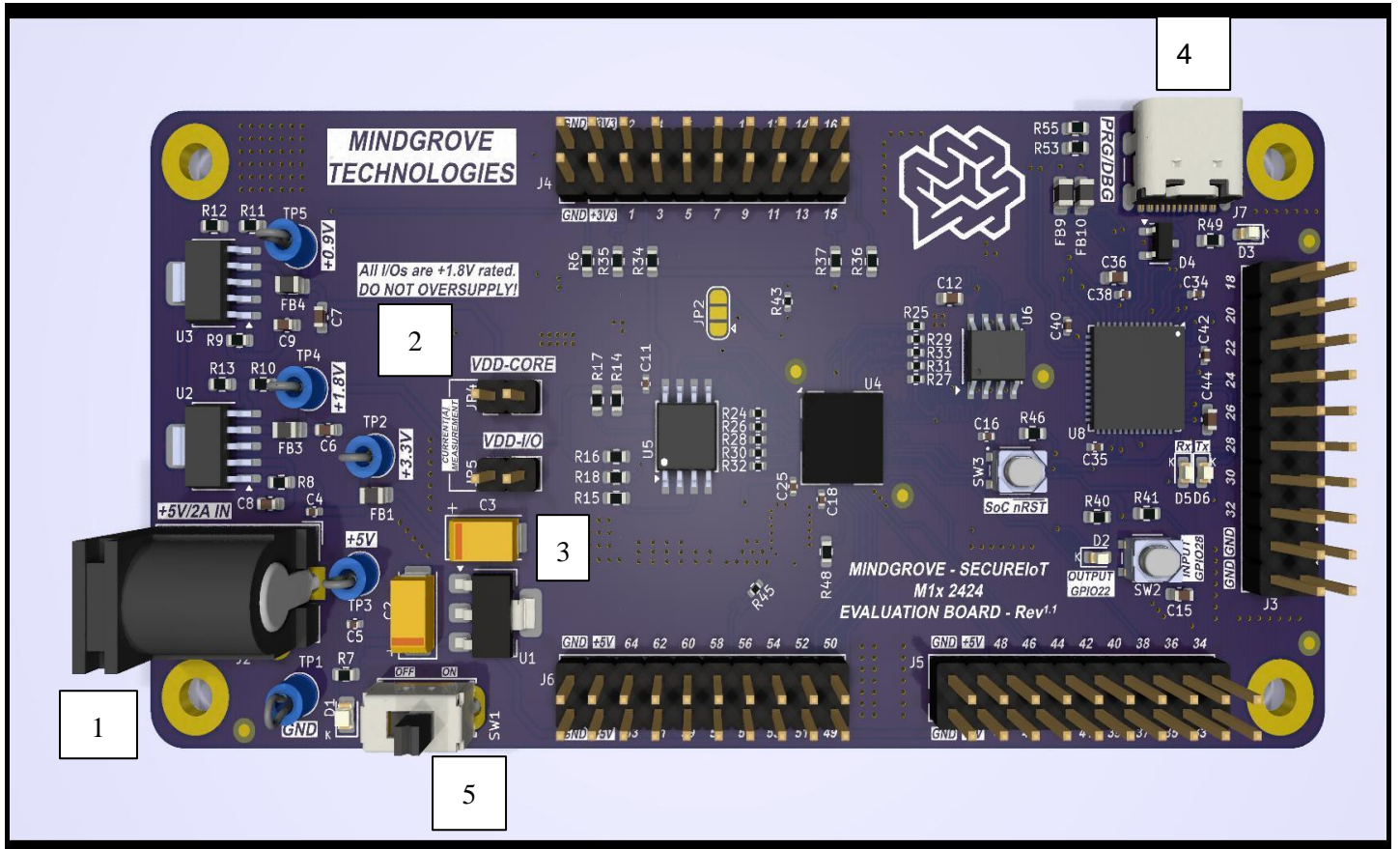
Introduction:

The SecureIoT-SoC M1x 2424 Evaluation Board Rev^{1,2} provides a hardware platform for users to develop and evaluate embedded control designs targeting Mindgrove's SecureIoT-SoC M1x 2424 device. The M1x 2424 Evaluation Board offers the following features:

- 128Mbit/16MB QSPI [Port#0] Flash Memory [Program Storage]
- 64Mbit/8MB QSPI PSRAM [Port#1] [Run-time Memory]
- On-board JTAG/UART interface to PC for programming and debugging purposes.
- MicroSD card slot [SPI Port#1].
- Current measurement jumpers of the Core [VDDCORE] & I/O [VDDIO] power supplies to the chip
- On-board GPIO test using a push button [GPIO22] and LED [GPIO28] interface.
- Two separate indication LEDs for the main power input and USB connectivity.
- The peripherals/connectivities offered are:
 1. 30 x GPIO [8 PWM pinmuxed]
 2. 2 x UART
 3. 2 x I²C
 4. 3 x SPI
 5. 4 x TIMER I/O
 6. 8 x ADC input channels

All are rated at +1.8V I/O. The 2.54mm pitched male headers around the evaluation board expose these interfaces. The pinout details can be viewed on the next pages.

Board Setup & Connections:

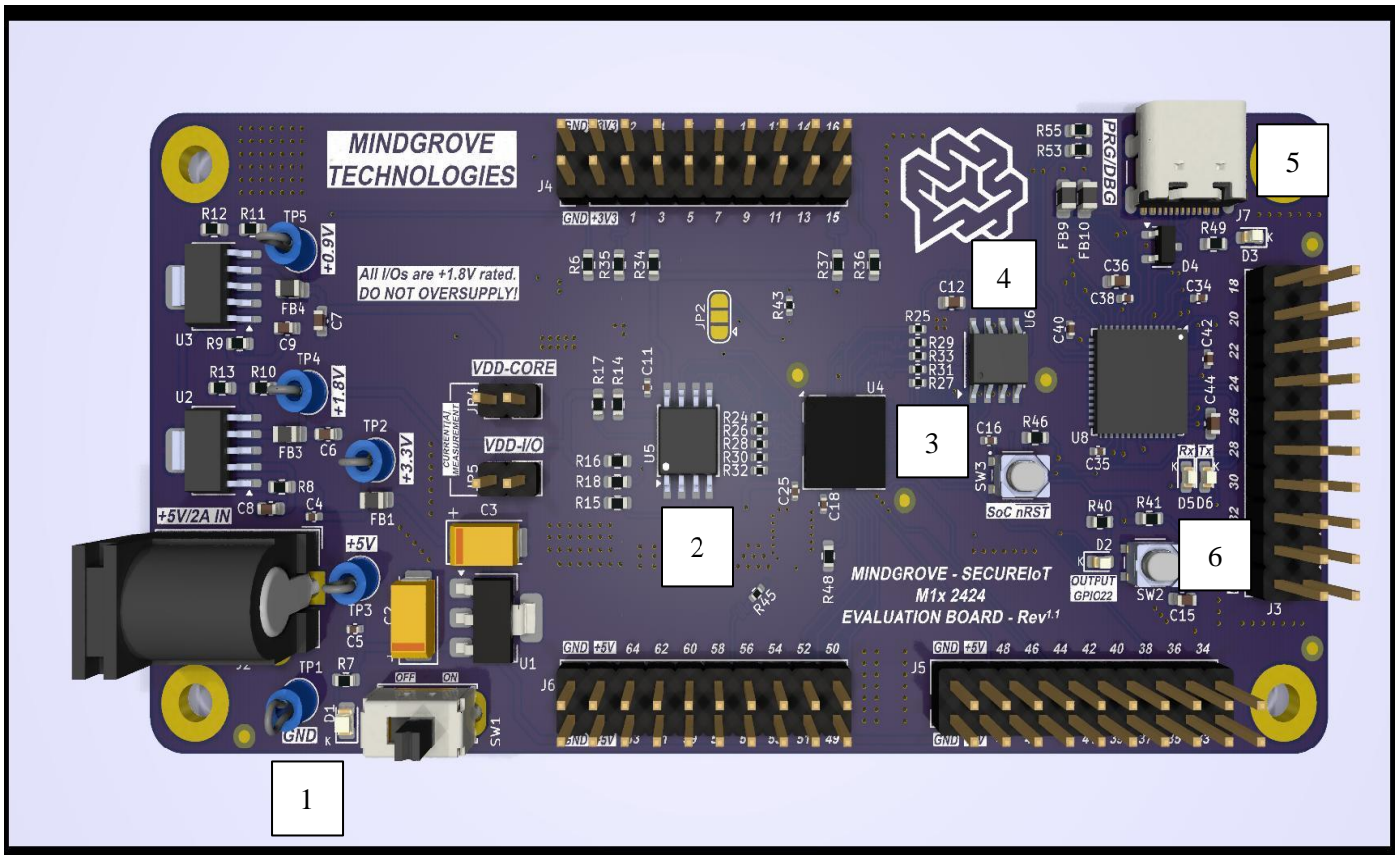


The board setup and Configuration is as follows:

- 1. DC Barrel Jack:** Plug the DC power adapter [+5V/2A] onto the barrel jack.
- 2. VDD-CORE Jumper:** The 2.54mm shunt jumper provided as an accessory shortens the two leads of the VDD-CORE connector. Upon receiving the evaluation kit, it will be placed on the connector by default. It should be removed only while measuring the SoC's core power current consumption.
- 3. VDD-I/O Jumper:** Short the two leads of the VDD-I/O connector with a 2.54mm shunt jumper provided as an accessory. By default, it will be placed on the connector upon receiving the evaluation kit. This is to be removed only while measuring the I/O power current consumption of the SoC.
- 4. USB Connector:** Plug the type-A to the type-C USB cable on the board and to the PC's respective slots. This is used for programming and debugging purposes.
- 5. Power On/Off Switch:** Once the above setup & configuration steps are done, slide the switch from left to right to supply power to the evaluation board. Make sure that the slider is on the left side before plugging the power adapter.

Board Components:

- **Top side:**

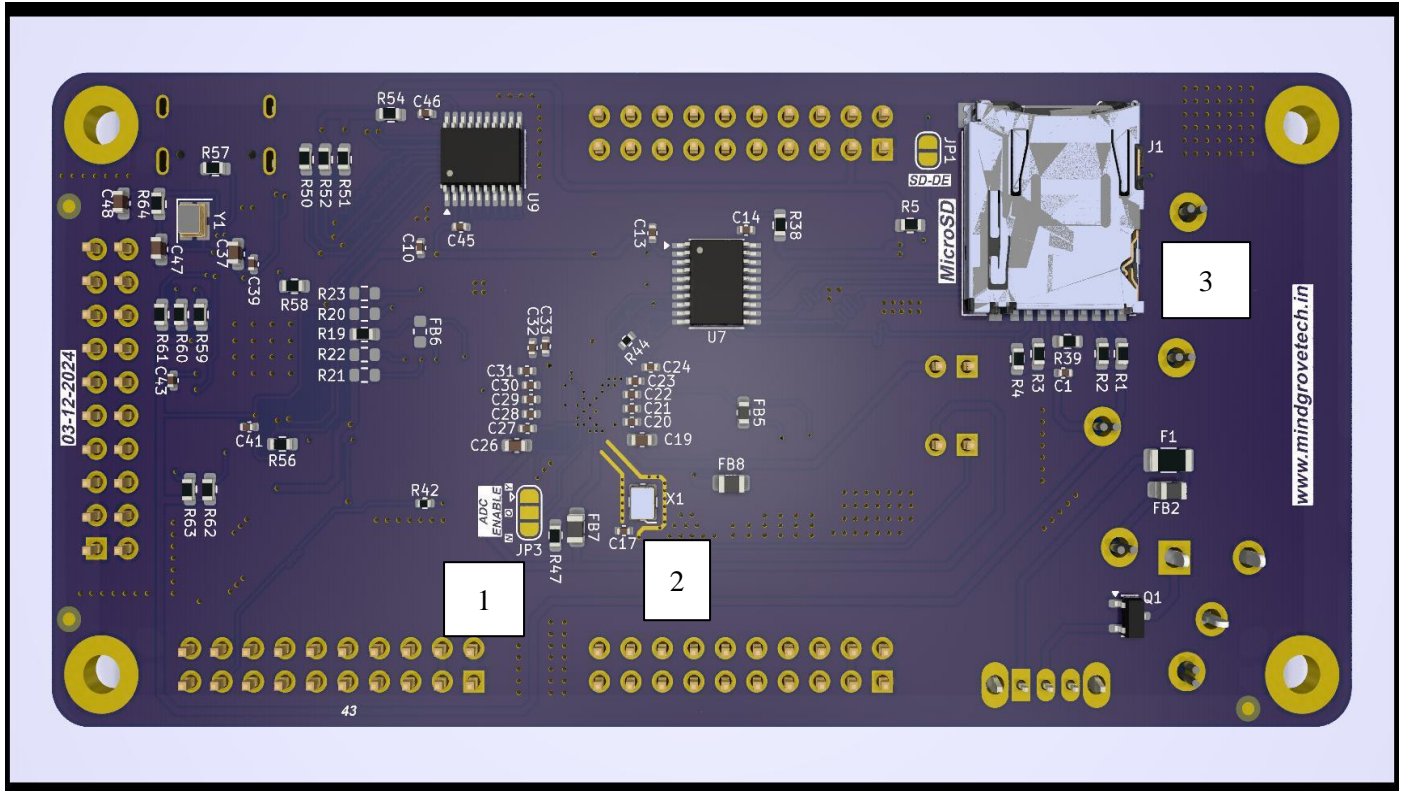


Board's Top Side

Components are as follows:

1. **Power Indicator LED:** An LED indicator is provided to notify the user about the active power being supplied to the board. It glows red when the switch is turned on.
2. **Storage memory:** A 128Mbit/16MB flash memory to store the program uploaded.
3. **Reset button:** A push button to reset the target SoC.
4. **RAM:** A 64Mbit/8MB PSRAM for the run-time memory access during program execution.
5. **USB Indicator LED:** An LED indicator to notify the user when the USB cable is plugged in properly. It glows red when there is a proper insertion.
6. **UART0 Link/Activity LEDs:** A Tx & Rx LED to notify the user about the UART0 serial communication with the PC.

- **Bottom side:**



Board's bottom side

Components are as follows:

1. **ADC Enable Selection:** A solder jumper to select the enable status of the on-chip 8-channel, 5Mps, 12-bit ADC. To enable it, bridge the centre pad to the pad being pointed by the arrow mark on the footprint. To disable it, bridge the centre pad to the other pad.
2. **Target Clock Oscillator:** A 20MHz LVCMOS oscillator to supply the chip with a clock input.
3. **SD Card Slot:** A MicroSD card interfaced with SPI [Port#1], for the user to store an RTOS or similar embedded OS.

Connector Pinout:



SecureIoT-SoCM1x 2424 Evaluation Board Rev1.2

| Reference | Function | Label |
|-----------------------|------------|-------|
| J3 [2x10 Male Header] | GND | GND |
| | GND | GND |
| | GND | GND |
| | GND | GND |
| | GPIO25 | 31 |
| | GPIO24 | 32 |
| | TIMER1 | 29 |
| | TIMER0 | 30 |
| | GPIO19 | 27 |
| | GPIO18 | 28 |
| | GPIO16 | 25 |
| | GPIO23 | 26 |
| | GPIO21 | 23 |
| | GPIO9 | 24 |
| | GPIO17 | 21 |
| | GPIO10 | 22 |
| | UART2_Tx | 19 |
| | UART2_Rx | 20 |
| | GPIO20 | 17 |
| GPIO8/SD-DE | 18 | |
| J4 [2x10 Male Header] | GND | GND |
| | GND | GND |
| | 3.3V+ | 3V3+ |
| | 3.3V+ | 3V3+ |
| | I2C0_SDA | 1 |
| | I2C0_SCL | 2 |
| | GPIO2/PWM2 | 3 |
| | GPIO4/PWM4 | 4 |



| | | |
|--|-----------------|-----|
| | GPIO3/PWM3 | 5 |
| | GPIO1/PWM1 | 6 |
| | GPIO0/PWM0_nCS1 | 7 |
| | TIMER2 | 8 |
| | UART0_Tx | 9 |
| | UART0_Rx | 10 |
| | SPI3_nCS | 11 |
| | SPI3_SCLK | 12 |
| | SPI3_MISO | 13 |
| | SPI3_MOSI | 14 |
| | I2C1_SCL | 15 |
| | I2C1_SDA | 16 |
| | GND | GND |
| | GND | GND |
| | 5V+ | 5V+ |
| | 5V+ | 5V+ |
| | GPIO15 | 47 |
| | GPIO7/PWM7 | 48 |
| | GPIO11 | 45 |
| | TIMER3 | 46 |
| | GPIO13 | 43 |
| | GPIO14 | 44 |
| | GPIO27 | 41 |
| | GPIO31 | 42 |
| | GPIO12 | 39 |
| | GPIO29 | 40 |
| | GPIO26 | 37 |
| | GPIO30 | 38 |
| | SPI0_SCLK | 35 |
| | SPI0_MISO | 36 |

J5 [2x10 Male Header]



| | | |
|--|-----------------------|----------|
| | SPI0_nCS | 33 |
| | SPI0_MOSI | 34 |
| J6 [2x10 Male Header] | GND | GND |
| | GND | GND |
| | 1V8+ | 1V8+ |
| | 1V8+ | 1V8+ |
| | UART1_Rx | 63 |
| | GPIO5/PWM5 | 64 |
| | GPIO6/PWM6 | 61 |
| | UART1_Tx | 62 |
| | SPI2_MISO | 59 |
| | SPI2_MOSI | 60 |
| | SPI2_SCLK | 57 |
| | SPI2_nCS | 58 |
| | ADC7 | 55 |
| | ADC1 | 56 |
| | ADC3 | 53 |
| | ADC5 | 54 |
| | ADC4 | 51 |
| | ADC2 | 52 |
| | ADC8 | 49 |
| | ADC6 | 50 |
| JP1 [SD card detection enable - NO] | Solder jumper short | SD-DE |
| | Short | |
| JP3 [ADC DISLVL Select Solder Jumper] | GND [ADC enable] | Y |
| | Output to SoC | Nil |
| | 1V8A+ [ADC disable] | N |
| JP4 [VDDCORE Current Measurement Jumper] | 0V9+ Input | VDD-CORE |
| | VDDCORE Output to SoC | Nil |
| JP5 [VDDIO Current Measurement Jumper] | VDDIO Output to SoC | VDD-I/O |
| | 1V8+ Input | Nil |

Safety Guidelines:

- It is recommended to wear ESD protection equipment like gloves or an earthing band on your body before operating the board to avoid any ESD spikes, preventing damage to the components.
- For proper connection of the peripherals, kindly follow the pinouts provided to identify the appropriate connector pins.
- Make sure that the power supply being provided from the AC mains is stable enough for safe operation.
- Avoid hot plugging of connectors when the board's power is live. For safety, kindly switch off the power supply and connect/remove any connectors.
- Read the user guidelines for both hardware and software before the operation of the board.
- Make sure that the I/O voltage range is within +1.8V. Do not overdrive the voltage whatsoever for the safety of the chip.
- If you encounter any abnormal heating of the chip, kindly switch off the power supply and check for any shorts between the power lines and the ground line with the help of test points exposed on the PCB with labels next to those.
- If the power LED doesn't glow red after switching ON, make sure the barrel jack adapter is inserted properly and switch it ON again.