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2019 – iMCP HT32SX

Evaluation Board User Manual

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Summary

1. INTRODUCTION

The iMCP Evaluation Board provide the necessary features to allow the users to start programming and test all the HT32SX functionalities. Through the Arduino™ Uno V3 connections, expansion boards can be used to add new components to user developments, improving the user experience.

2. FEATURES

- HT Micron Multicomponent Integrated Circuit (MCO) HT32SX, Sigfox™ Monarch enabled and multizone ready
- On-board ST-LINK/V2-1 debugger and programmer
- Arduino™ Uno V3 connectivity
- USB and external (2.7 ~ 5V) power supply
- User and Reset Buttons
- Power, user and communication LEDs
- USB re-enumeration capability. Three different interfaces supported on USB:
  - o Virtual COM port
  - o Mass storage
  - o Debug port

3. ENVIRONMENT INFO

3.1 System Requirements

- Windows® OS (7, 8 and 10), Linux® 64-bit, or macOS®
- USB Type-A to Mini-B cable

3.2 Development toolchains

- Arm® Keil®: MDK-ARM(a)
- IAR™: EWARM(a)
- GCC-based IDEs

3.3 iMCP Firmware Example

An application example is already loaded on the iMCP HT32SX which sends a message to Sigfox network when user button is pressed. Other examples can be found on HT Micron's GitHub repository (https://github.com/htmicron/ht32sx).

4. IMCP CONFIGURATION

4.1 iMCP options

Radio Configuration Zones	Modem type	Encryption Capability	Repeater	Monarch	Secure Element
RC1, RC2, RC3c, RC4, RC5	Uplink and Downlink	Yes	Not a repeater	Yes	No

4.2 Input Power supply

Input current supply of 300mA.

TABLE 1. INPUT POWER SUPPLY

Input power supply min (V)	Input power supply typical (V)	Input power supply max (V)
2.7	3.3	3.6

5. GETTING STARTED

Before start to use your iMCP Evaluation Board with the application example, check the following considerations:

- JP1 must be shorted between pins 1 and 2 for USB power source.
- JP3 and JP5 shorted.
- CN3 pins 1 and 2 shorted and pins 3 and 4 shorted.

6. VOLTAGE SOURCE

The iMCP Evaluation Board can be powered by an USB connection or by an external power source. Through an external power source, a voltage between 2.7 to 5V can be used and a minimum of 300mA must be provided by the power source. In this case, the jumper in JP1 must be changed from pins 1 and 2 to the pins 2 and 3. The power supply can be provided through "Vin" pin on CN5 connector. If needed to use USB for communication, programming or debugging, first the external power supply must be connected to Vin and then the USB connection between the iMCP Evaluation Board and the PC.

7. HARDWARE LAYOUT
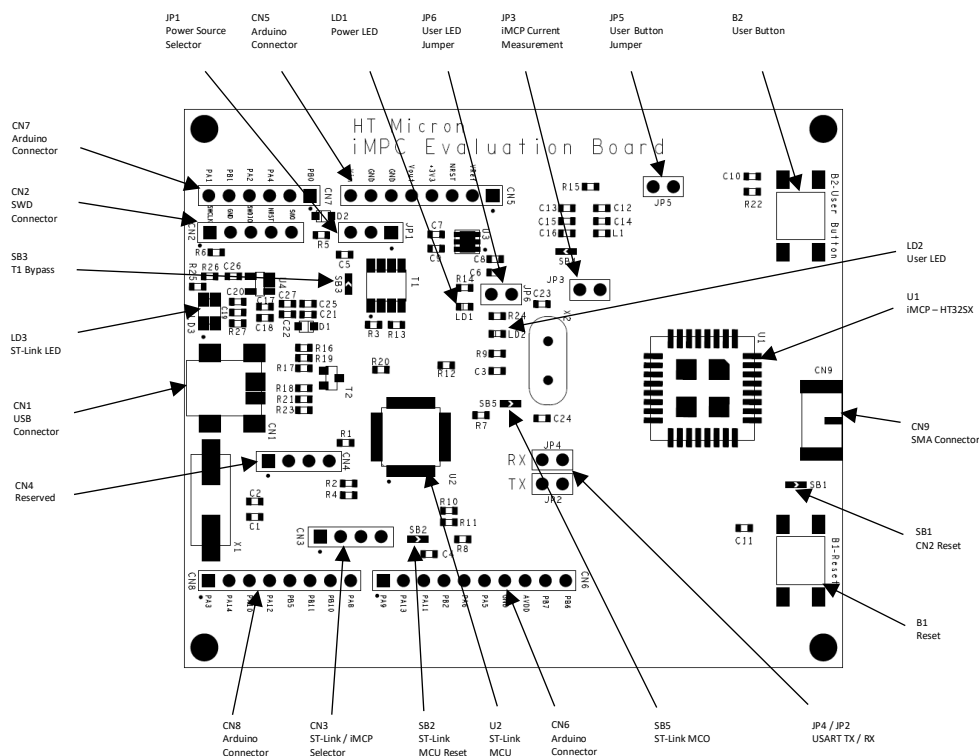
7.1 Jumpers identification and description

Jumper	Position/State	Description
JP1	1-2	USB power source selected.
	2-3	External power source selected.
JP2	Open	RX serial port can be used for external communication.
	Closed	RX serial port connected to the iMCP.
JP3	Open	iMCP current consumption can be measured.
	Closed	iMCP powered.
JP4	Open	TX serial port can be used for external communication.
	Closed	TX serial port connected to the iMCP.
JP5	Open	User button disconnected.
	Closed	User button connected.
JP6	Open	User LED disconnected.
	Closed	User LED connected.

7.2 Connections

Connector	Name	Description
CN1	USB connector	Provides ST-Link access for programming and debugging the iMCP or an external device. Allows serial communication with the iMCP or external application. Supplies the power source for the iMCP Evaluation Board.
CN2	Debug and Program connector	Used to programming and debugging external applications.
CN3	SWD jumpers	Pins 1-2 and 3-4 must be closed to programming and debugging iMCP's MCU. Pins opened allows the user to programming and debugging external applications.
CN4	Reserved	
CN5	Arduino connector	Power source can be obtained or supplied through those pins. Reset signal can be obtained or provided in this connector.
CN6	Arduino connector	Access to iMCP pins.
CN7	Arduino connector	Access to iMCP pins.
CN8	Arduino connector	Access to iMCP pins.
CN9	SMA connector	Antenna connection.

7.3 Solder Bridges

Bridge	State	Description
SB1	On	CN2 reset is connected to reset button.
	Off	CN2 reset is not connected to reset button.
SB2	On	ST-Link MCU NRST signal is connected to GND.
	Off	ST-Link MCU NRST signal not connected.
SB3	On	USB power management disabled.
	Off	USB power management enabled.
SB4	On	AVDD is connected to VDD.
	Off	AVDD is not connected.
SB5	On	ST-Link MCO is connected to iMCP OSC32in pin.
	Off	ST-Link MCO is not connected to iMCP OSC32in pin.

8. ST-LINK/V2-1

The iMCP Evaluation Board is provided with an integrated ST-Link/V2-1 programming and debugging tool. ST-Link/V2-1 driver must be installed before connecting the iMCP Evaluation Board through USB for Windows 7, Windows 8 or Windows XP operational systems. ST-Link/V2-1 driver and utility can be downloaded from www.st.com website.

8.1 Programming and debugging the iMCP HT32SX

Pins 1 and 2 must be shorted and pins 3 and 4 also from CN3 connector. Do not connect any application on CN2 while programming the iMCP HT32SX.

8.2 Programming and debugging an external application

Pins 1 and 2 must be opened and pins 3 and 4 also from CN3 connector. The external application must be connected to CN2 connector according to following table:

Pin	CN2	Designation
1	SWCLK	SWD clock
2	GND	Ground
3	SWDIO	SWD data input/output
4	NRST	Reset
5	SWO	Reserved

9. USART COMMUNICATION

The USART communication with the iMCP HT32SX is enabled when JP2 and JP4 are shorted. If need a serial communication with an external application, open the jumpers JP2 and JP4 and use the pins RX and TX to have access to the USART interface.

Arduino connectors

Connector	Pin Number	Pin Name
CN5	1	NC
	2	Vref
	3	NRST
	4	+3v3
	5	+Vout
	6	GND
	7	GND
	8	Vin
CN6	1	PA9
	2	PA13
	3	PA11
	4	PB2
	5	PA6
	6	PA5
	7	GND
	8	AVDD
	9	PB7
	10	PB6

	1	PB0
	2	NC
CN7	3	PA4
	4	PA2
	5	PB1
	6	PA1
	1	PA3
	2	PA14
	3	PA10
CN8	4	PA12
	5	PB5
	6	PB11
	7	PB10
	8	PA8

10. REVISION

Version	History	Date	Authors
00	- Initial draft	11/19/2019	Bárbara Souza