

1. General Description

HPTZ01X (HPTZ01-TTL, HPTZ01P-TTL) Serial ZigBee module is development designed by Ember ZigBee chip EM35x. It is a module base on IEEE 802.15.4-2003 standard for the 2.4G ISM band. HPTZ01X is low cost, high performance and ultra compact size module, had included the EmberZnet ZigBee protocol stack, the Mesh network software and the transparent transmission software with the 32-bit ARM® Cortex™- M3 processor.

HPTZ01X provides the TTL level UART standard communication port, and less communication command for network building or data transfer and data receive, it let the developer easy to use.

HPTZ01X is for all kind of the data transfer, data corrector, LED lamp control, home automation, smart building control, wireless Sensor network, energy monitor, secure wireless monitor.

Feature:

- Low consumption design, provide difference halt or sleep mode
- Provide simple and standard TTL level UART port, and the optional separable wake up PIN.
- Provide the flexible 300bps to 460800bps baud rate user setting feature.
- Provide Coordinator or Router and End Device type.
- Coordinator and Router are easy exchanged by command setting.
- End Device is low current designed; the standby current is less 1uA.
- Support the Point to Point or Mesh structure network. In theory it is up to 6500 nodes.
- 16 channels from channel 11 to 26 base on IEEE 802.15.4-2003 standard for the 2.4G ISM band.
Module automatic select the silence channel.
- Automatic keeps back the original network while power on or reset.
- Automatic self repair the network while interfered by noise.
- high secure network under the Link Key and independent PAN ID designed. Effective to prevent intruded into nodes and protects the user data.
- End-user easy to set up the ZigBee network, does not need the ZigBee technical knowledge, only need to know some commands of UART and related technical knowledge.
- Provide the RSSI level.
- provide transparent transmission data link for user data in the network.
- Small size designed, easy to install on the mother board.

2. Production type

Provide difference serial production according to the antenna type, transmit power and network action.

Table2-1 HPTZ01X type (note:the order production name see the last paper in file)

Name	Network Action	Connected way	Antenna type	Size
HPTZ01-TTL-A	Coordinator or Router	SMD	With SMD ceramics antenna With IPEX connector Without any radio connector, 50 ohm directly output	21X15X3.3mm
HPTZ01-TTL-B	End Device			
HPTZ01P-TTL-A	Coordinator or Router	SMD	With SMD ceramics antenna With IPEX connector Without any radio connector, 50 ohm directly output	25X15X3.3mm
HPTZ01P-TTL-B	End Device			

3. HPTZ01X Pin Assignment and Description

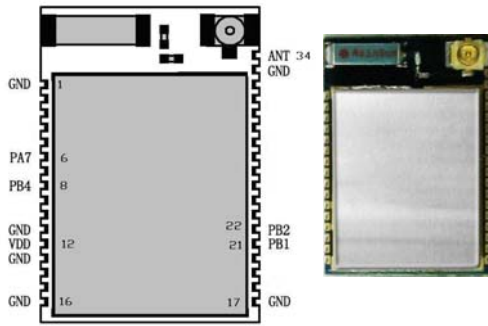


Figure3.1 HPTZ01-TTL

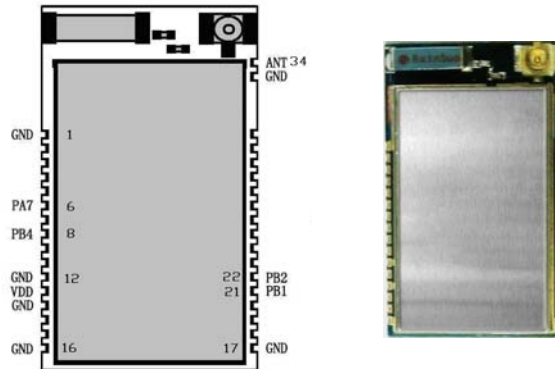


Figure3.2 HPTZ01P-TTL

Pin Description Table3-1

Pin#	Name	Direction	Description
1, 11, 13, 16, 17, 33	GND	ground	Power negative
6	PA7	O	Output rising edge signal to wake up hot MCU
8	PB4	I	Rising edge wake up signal input(notel)
12	VDD	Power	Power positive
21	PB1	O	HPTZ01X UART transmit data of serial port TX
22	PB2	I	HPTZ01X UART receive data of serial port RX

Notel: only the End Device with this Pin function.

4. Application reference connected

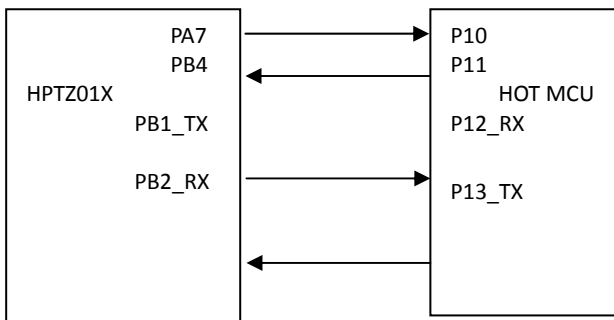


Figure4.1 End Device controlled by hot MCU

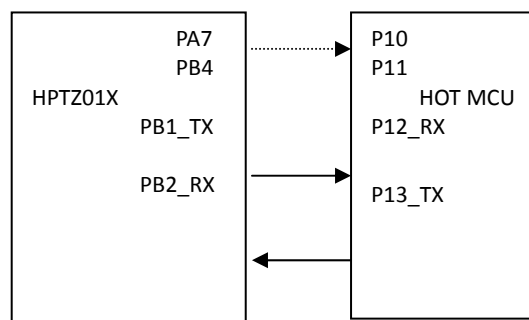


Figure4.2 coordinator or router controlled by hot MCU

5. Electrical Characteristics

5.1 Absolute Maximum Ratings

Table 5-1: Absolute Maximum Ratings

Parameter	Test Conditions	Min.	Max.	Unit
Regulator input voltage (VDD)		-0.3	+3.6	V
RF Input Power (for max level for correct packet reception)			+15	dBm
Voltage on any GPIO PA7, PB4, PB2, PB1		-0.3	VDD +0.3	V
Storage temperature		-40	+140	° C

5.2 Recommended Operating Conditions

Table 5-2: Operating Conditions

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Regulator input voltage (VDD)		2.1		3.6	V
Operating temperature range(notel)		-20		+70	° C

notel: -40° C to +85° C operational

5.3 Electrical Specifications

Table 5-3: Electrical Specifications

(VCC = 3.0V, Fo =2440MHZ, T=25° C, if nothing else stated)

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Operating frequency		2400		2500	MHZ
Supply voltage		2.1		3.6	V
Numbers of channels	For IEEE 802.15.4 compliance	-	16	-	
Channel spacing	For IEEE 802.15.4 compliance	-	5	-	MHz
Maximum output power	HPTZ01-TTL	-21	-	+3	dBm
	HPTZ01P-TTL	-	+20	-	dBm
Sensitivity	HPTZ01-TTL PER = 1% PER, 20byte packet		-102		dBm
	HPTZ01-TTL PER = 1% PER, 20byte packet		-100		dBm
	HPTZ01P-TTL PER = 1% PER, 20byte packet		-110		dBm
	HPTZ01-TTL +3dBm transmission power			29	mA
	HPTZ01P-TTL 20dBm transmission power			170	mA
	HPTZ01-TTL			27	mA
	HPTZ01P-TTL			38	mA
On-Air Data Rate			250		Kbps
Deep sleep current	END-Device	-	0.7	3	uA
Frequency stability				+/-40	ppm
RF Input/output impedance	IPEX connector output Unbalanced output		50		Ohm

5.4 Application Specifications

table5-4

User data payload maximum length		80 bytes			
Network structure		Point to point, mesh			
UART serial port defined		8bit, 1bit stop bit, 1bit start bit, no parity bit. Baud rate 300~460800bps, default is 9600bps			
	SEQ_NUM	CMD_ID	LEN	DATA	Check sum CODE
2 Bytes	1 Byte	1 Byte	1 Byte	N Bytes	1 Byte
0x6A, 0x95	Increased after each communication	See the 'command and ACK list', bit7=1, is the ACK	Data packet length	See the <communication protocol> file description. Low byte at the first, the high byte at the second.	Before it all bytes addition result without the carry bit.

Table5-5 Command and ACK list(In detail please read the <communication protocol> file)

CMD_HELLO	0x00
CMD_HELLO_RSP	0x80
CMD_RESET	0x01
CMD_SET_BAUD	0x02
CMD_SET_BAUD_RSP	0x82
CMD_SET_POWER	0x03
CMD_SET_POWER_RSP	0x83
CMD_SET_HEARTBEAT	0x04
CMD_SET_HEARTBEAT_RSP	0x84
CMD_GET_VDD	0x05
CMD_GET_VDD_RSP	0x85
CMD_BUILD_NETWORK	0x06
CMD_BUILD_NETWORK_RSP	0x86
CMD_PERMIT_JOINING	0x07
CMD_PERMIT_JOINING_RSP	0x87
CMD_SCAN_NETWORK	0x08
CMD_SCAN_NETWORK_RSP	0x88
CMD_JOIN_NETWORK	0x09
CMD_JOIN_NETWORK_RSP	0x89
CMD_AUTOJOIN_NETWORK	0x0A
CMD_AUTOJOIN_NETWORK_RSP	0x8A
CMD_LEAVE_NETWORK	0x0B
CMD_LEAVE_NETWORK_RSP	0x8B
CMD_DELETE_DEVICE	0x0C
CMD_DELETE_DEVICE_RSP	0x8C
CMD_GET_INFO	0x0D
CMD_GET_INFO_RSP	0x8D
CMD_GET_KEY	0x0E
CMD_GET_KEY_RSP	0x8E
CMD_SEND_DATA	0x0F
CMD_SEND_DATA_RSP	0x8F
CMD_RECEIVED_DATA	0x10
ACK	0xFF

6. Network Structure

HPTZ01X ZigBee provide the P2P(Point to Point) and the Mesh network and provide the transparent data link on the network between each nodes and the coordinator. In one network only has one center nodes which is coordinator, coordinator is connected to data and control center to coordinate all the router and end device network parameter or status. The router will function as the data link path and a working node. The End Device is the nodes which only a working node for sleeping requested and battery power supplied, so End Device does not provide the data path.

Easy to set up the ZigBee network on the HPTZ01X module by the “CMD_AUTOJOIN_NETWORK” command, and only need the ‘CMD_SEND_DATA’ for the data transmitted and the ‘CMD_RECEIVED_DATA’ for the data received.



Figure6.1 P2P

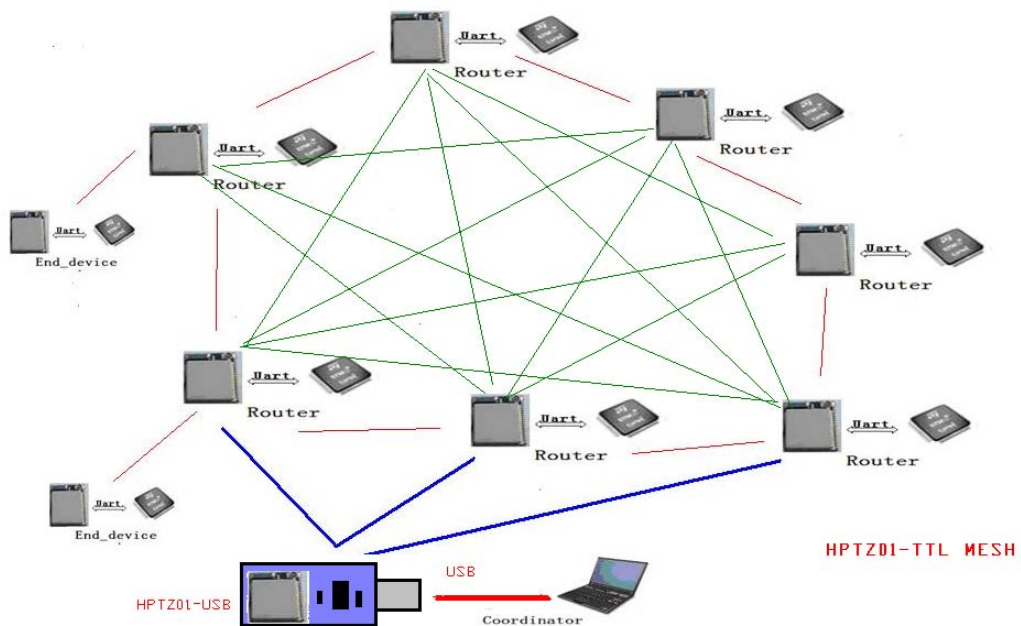


Figure6.2 Mesh

7 Mechanical Dimensions

All dimensions in MM

Figure 7.1: HPTZ01-TTL Mechanical Dimensions

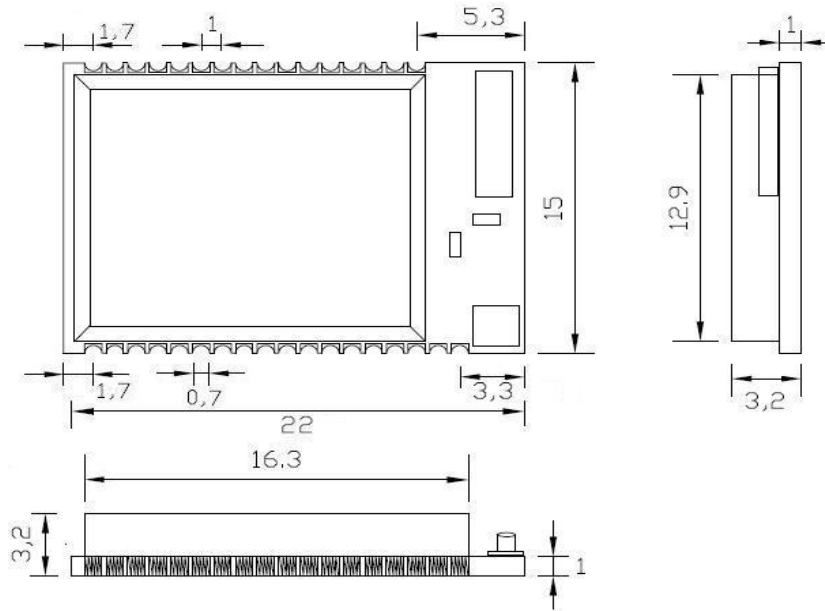
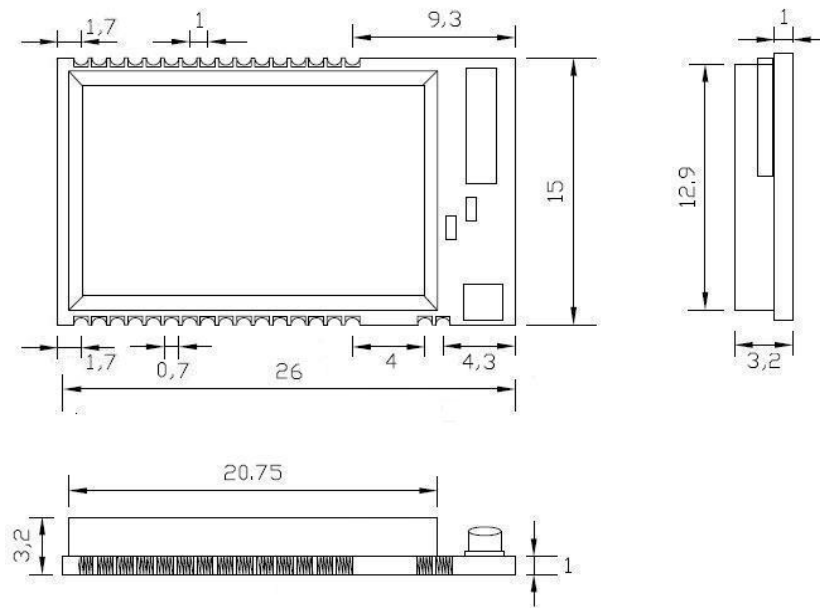


Figure 7.2: HPTZ01P-TTL Mechanical Dimensions



8 Mounting Information

The below diagrams show the PCB footprint recommended for the modules.
All dimensions in MM

Figure8.1:
HPTZ01(P)-ANT and HPTZ01(P)X-IPEX module Recommended PCB footprint ,Top View

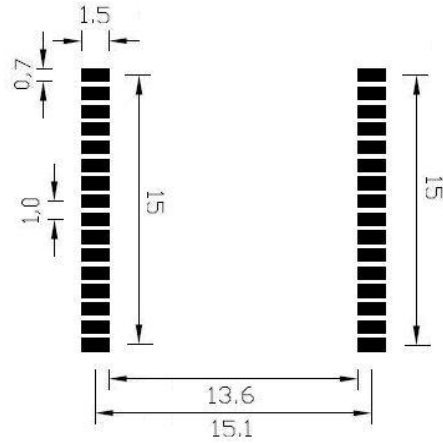


Figure8.2: HPTZ01X-U0 module Recommended PCB footprint, Top View

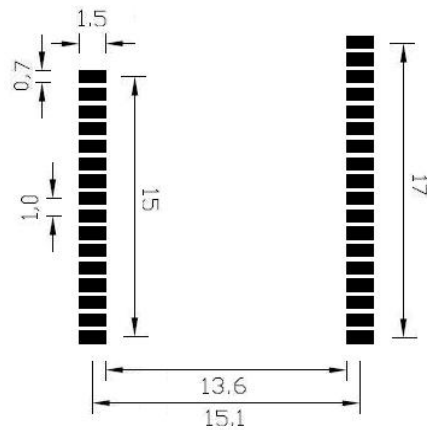
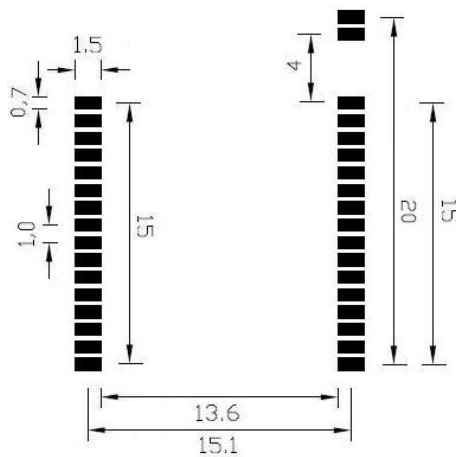


Figure8.3: HPTZ01P-U0 module Recommended PCB footprint, Top View



9 Soldering Profile

Table9-1: Soldering Profile

Profile Feature	Green Package
Average ramp-up rate(217° C to peak)	3° C/s max
Preheat temperature 175° C +/-25° C	180s max
Temperature maintained above 217° C	60S to 150S
Time within 5° C of actual peak temperature	20s to 40s
Peak temperature rang	260° C
Ramp-down rate	6° C/s max
Time within 25° C to peak temperature	8 minutes max

10 Ordering Information

Table10-1: Ordering Information

Part Number	Description
HPTZ01-TTL-A-ANT	Coordinator or Router, +3dBm output power, -102dBm sensitivity, With built-in SMD antenna.
HPTZ01-TTL-B-ANT	End device, +3dBm output power, -102dBm sensitivity, With built-in SMD antenna.
HPTZ01P-TTL-A-ANT	Coordinator or Router, +20dBm output power, -110dBm sensitivity, With built-in SMD antenna
HPTZ01P-TTL-B-ANT	End device, +20dBm output power, -110dBm sensitivity, With built-in SMD antenna
HPTZ01-TTL-A-IPEX	Coordinator or Router, +3dBm output power, -102dBm sensitivity, With Built-in IPEX connector for external antenna
HPTZ01-TTL-B-IPEX	End Device, +3dBm output power, -102dBm sensitivity, With Built-in IPEX connector for external antenna
HPTZ01P-TTL-A-IPEX	Coordinator or Router, +20dBm output power, -110dBm sensitivity, With Built-in IPEX connector for external antenna
HPTZ01P-TTL-B-IPEX	End Device, +20dBm output power, -110dBm sensitivity, With Built-in IPEX connector for external antenna
HPTZ01-TTL-A-UO	Coordinator or Router, +8dBm output power, -102dBm sensitivity, With unbalanced RF output for external antenna
HPTZ01-TTL-B-UO	End Device, +8dBm output power, -102dBm sensitivity, With unbalanced RF output for external antenna
HPTZ01P-TTL-A-UO	Coordinator or Router, +20dBm output power, -110dBm sensitivity, With unbalanced RF output for external antenna
HPTZ01P-TTL-B-UO	End Device, +20dBm output power, -110dBm sensitivity, With unbalanced RF output for external antenna

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