ZBA Inc.

1 Product Specification

ZBA Model Number: BT22K-2042

Bluetooth HID module, Class 2
Doc version: 1.0

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BT22K-2042

Description The BT22K-2042 is a Bluetooth 2.0 compliant Bluetooth Human Interface Device (HID) module, ideally suited to the integration of Bluetooth functionality in mouse and keyboard applications. The BT22K-2042 is designed on Broadcom BCM2042 chip solution.

Applications

- Wireless keyboards
- Wireless pointing devices: mice, trackballs
- Game controllers
- Joysticks
- Point of sale (POS) input devices
- Remote controls
- Remote sensors

Features

- Bluetooth 2.0 specification compliant
- Bluetooth HID profile version 1.0 compliant
- Integrated 8 Kbytes of non-volatile flash memory for storing Bluetooth address and configuration data.
- Programmable output power control which meets class 2 and class 3 requirements Excellent receiver sensitivity
- On-chip support for common keyboard and mouse interfaces eliminate using an external processor
- Programmable key-scan matrix interface, up to 8 x 20 key-scanning matrix.
- 3-axis quadrature signal decoder
- On-chip Power-On Reset (POR)
- Integrated 8051 microprocessor core
- Support for AFH

Functional Description The primary component on the module is the Broadcom BCM2042, which is a Bluetooth 2.0 compliant single-chip device. The baseband and radio are integrated into a single chip implemented in standard digital CMOS. The BCM2042 has an integrated 8051 microprocessor core that runs software from the link control layer up to the Host Control Interface (HCI). The baseband portion of the BCM2042 performs all time-critical functions required for high-performance Bluetooth operation. The radio incorporates complete receive and transmit functions, including PLL, VCO, LNA, PA, up-converter, down-converter, modulator, demodulator, and channel select filtering. The BCM2042 on-chip keyboard scanner is designed to sample the keys and store them into buffer registers without the need for the host micro controller to intervene. A state machine of three states – Idle, Scan, and Scan-End – controls the key scan block. The on-chip mouse signal decoder is designed to sample autonomously two quadrate signals commonly generated by opto-mechanical mouse apparatus. The GPIO signals can be used to control such items as LEDs and external ICs (eg. optical mouse sensor).

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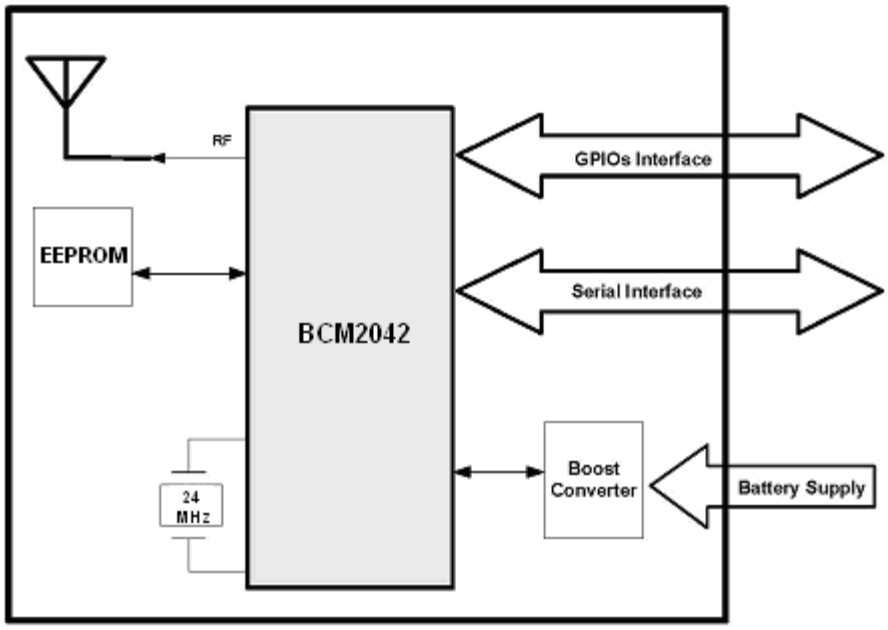

Bluetooth HID module Block Diagram

Specification

Product Name	Bluetooth HID module, Class 2
Model Number	BT22K-2042
Standard	Bluetooth V2.0
Frequency Band	2.402GHz ~ 2.480GHz unlicensed ISM band
Modulation Method	GFSK Spread Spectrum FHSS (Frequency Hopping Spread Spectrum)
RF Output Power	Class 2 (under 4 dBm)
Antenna	PCB printing antenna
DC power	Two battery cell, DC 3V
Dimension	15 x 30.8 mm

Physical Description

The BT-22K-2042 is a 15mm x 30.8 mm PCB with 48 pads located around the perimeter.

Pin #	Description		Pin #	Description
1	GND		25	P2_3
2	GND		26	P1_5
3	P4_4		27	3P0V
4	P4_3		28	P0_O
5	P1_4		29	P3_O

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6	P1_2		30	WP
7	P2_1		31	P0_5
8	P2_0		32	P0_4
9	P1_3		33	P0_7
10	P4_1		34	P0_6
11	P3_2		35	UP_TX
12	P3_3		36	UP_RX
13	3P0V_1		37	P0_2
14	P4_0		38	P2_5
15	p3_4		39	RESET_N
16	P3_5		40	P0_3
17	P1_7		41	P0_1
18	GND		42	P2_7
19	P1_6		43	P2_6
20	P2_2		44	P4_2
21	VBATT		45	P1_0
22	P2_4		46	P1-1
23	1P8V_1		47	P4-5
24	P3_1		48	GND

Table1:Pin Description

Table2a:GPIO PIN Description

Pin name	I/O	Power Domain	Description
uP_TX	O	VDD_MEM	Debug UART Transmit port
uP_RX	I	VDD_MEM	Debug UART Receiver port after
RESET_N	I	VDD_IO	A c t i v e low system reset-contains a weak pull up. Contains An internal POR hardware inside. No external reset monitor Needed.

Table2b:GPIO PIN Description(Cont.)

Pin name	Default Direction	POR State	After native Function Description
P0_0	input	floating	GPIO:P1_0 Keyboard Scan Input(ROW):KSO0 A/D CONVERTER Input
P0_1	input	floating	GPIO:P0_1 Keyboard Scan Input(ROW):KS11 A/D CONVERTER Input
P0_2	input	floating	GPIO:P0_2 Keyboard Scan Input(ROW):KS12 Quadrature:QDX0
P0_3	input	floating	GPIO:P0_3 Keyboard Scan Input(ROW):KS13 Quadrature:QDX1
P0_4	input	floating	GPIO:P0_4 Keyboard Scan Input(ROW):KS14 Quadrature:QDY0
P0_5	input	floating	GPIO:P0_5 Keyboard Scan Input(ROW):KS15 Quadrature:QDY1
P0_6	input	floating	GPIO:P0_6 Keyboard Scan Input(ROW):KS16 Quadrature:QDZ0
P0_7	input	floating	GPIO:P0_7 Keyboard Scan Input(ROW):KS17 Quadrature:QDZ1
P1_1	input	floating	GPIO:P1_1 Keyboard Scan Input(ROW):KSO1 A/D CONVERTER Input
P1_2	input	floating	GPIO:P1_2 Keyboard Scan Input(ROW):KSO2 A/D CONVERTER Input
P1_4	input	floating	GPIO:P1_4 Keyboard Scan Input(ROW):KSO4 A/D CONVERTER Input
P1_7	input	floating	GPIO:P1_7 Keyboard Scan Input(ROW):KSO7 A/D CONVERTER Input
P2_0	input	floating	GPIO:P2_0 Keyboard Scan Input(ROW):KSO8 A/D CONVERTER Input
p2_1	input	floating	GPIO:P2_1 Keyboard Scan Input(ROW):KSO9 A/D CONVERTER Input
p2_3	input	floating	GPIO:P2_1 Keyboard Scan Input(ROW):KSO11 A/D CONVERTER Input
P2_5	input	PD	GPIO: P2_5 Keyboard Scan Output

			(Column): KSO13 A/D CONVERTER Input SPI:MISO
P2_6	input	PU	GPIO: P2_6 Keyboard Scan Output (Column): KSO14 Auxiliary Clock output:ACLKO A/D CONVERTER Input SPI:SPI_CLK
P2_7	input	PU	GPIO: P2_7 Keyboard Scan Output (Column): KSO15 Auxiliary Clock output:ACLK1 A/D CONVERTER Input SPI: MISO
P3_2	input	floating	GPIO: P3_2 (Can do PWM output) Keyboard Scan Output:KSO18 Optical Control Output:QOC0
P3_3	input	floating	GPIO: P3_3 (Can do PWM output) Keyboard Scan Output (Column): KSO19 Optical Control Output:QOC1
P3_4	input	P U	GPIO: P3_4 (Can do PWM output) Optical Control Output:QOC2 A/D CONVERTER Input Infrared Channel External PA Ramp Control:PA_Ramp
P3_5	input	P U	GPIO: P3_5 (Can do PWM output) Optical Control Output:QOC3 A/D CONVERTER Input Infrared Channel
P4_0	output*	high	GPIO: P4_0 Quadrature:QDX0 External Regulator En:VREG_EN A/D CONVERTER Input External T/R switch control:RX_PU
P4_1	input	PD	GPIO: P4_1 Quadrature:QDX1 A/D CONVERTER Input External T/R switch control:TX_PU
P4_2	input	floating	GPIO: P4_2 Quadrature:QDY0 A/D CONVERTER Input SPI:SPI_CLK Battery Detect pin in Default FW
P4_3	input	floating	GPIO: P4_3 Quadrature:QDY1 A/D CONVERTER Input SPI:MISO
P4_4	input	PU	GPIO: P4_4 Quadrature:QDZ0 A/D CONVERTER Input SPI:MISO
P4_5	input	floating	GPIO: P4_5 Quadrature:QDZ1 A/D CONVERTER Input

Table3: Maximum Electrical Rating

Rating	Symbol	Value	Unit
Voltage on the switching regulator #1 output pin	3PoV_1	3.3	V
Voltage on the switching regulator #2 output pin	1P8V_1	1.8 V	V
Voltage on input or output pin	-	V_{ss}-0.3toV_{DD}+0.3	V
Storage temperature range		-40 to 125	˚C pin - stg

Table4: Power Supply

Rating	Minimum	Typical	Maximum	Unit
DC Supply voltage for 3P0V	1.62		3.6	-V
DC Supply voltage for VBATT	1.8	2.9	3.6	V
Voltage on the switching regulator #1 output pin 3P0V_1	2.7	3.0	3. 3	V
Voltage on the switching regulator #1 output 1P8V_1	1.5	1.6	1.8	V
1.Overall performance degrades beyond Minimum and Maximum supply voltages.				

Table 5 :Typical Current Consumption

Operational Mode	Minimum	Typical	Maximum
Transmita	-	43mA	-
Receiveb	-	38mA	-
DM1(TZ mode)	-	28mA	-
DM1(RX mode)	-	25mA	-
Sniff mode. 10ma	-	2.35mA	-
Sniff mode,60ma	-	0.39mA	-
Sniff mode,100ma	-	0.24mA	-

Sniff mode,128s	-	0.018mA	-
Sleep (disconnected or Inter-Sniff.,state preserved)	-	50 ua	-
Deep sleep(disconnectd,wake on interrupt)		16u a	-

a.Max current when receiver and baseband are both operating,100%on.
b.Max current when transmitter and baseband are both operating,100% on.

Table 6 Receiver RF Specifications (VDD_RF=1.5V,T=25˚C)

Parameter	Minimum	Typical [3]	Maximum	Unit
Peceiver Section				
Frequency range	2402		2480	
Overall Rx sensitivity		-85	-80	dBm
Input IP3		-10		dBm
Maximum input	-20	-10		dBm
Input impedance		50		Ω
- Input Impedance for RF_IO:		- |S11|<-10dB		-
Interference Performance				
Co-Channel interference/I		9	11	dB
Adjacent (1 MHz) interference,C/I		-5	0	dB
Adjacent (2 MHz) interference,C/I		-35	-30	dB
Adjacent (>- 3 MHz)interference/I		-43	-40	dB
Image frequency interference C/I		-20	9 [2]	dB
Adjacent (1 MHz) interference,		-35	-20 [2]	dB
In-band image frequency, C/I				

1.The receiver sensitivity is measured at a BER of 0.1% on the device interface.
2.The maximum value represents the actual Bluetooth specification required for Bluetooth qualification as defined in the version 1.2 specification.
3.Typical operating conditions are 1.8V operating voltage and 25 ambient temperature.

Table 7 Receiver RF Specifications (VDD_RF=1.5V,T=25)

Parameter	Minimum	Typical	Maximum	Unit

Transmitter Section				
Frequency range	**2042**		2480	**Mhz**
Output power- at max power setting	**-2**	**0**	**4**	
Output power- at minimum power setting	**-26**	**-**	**-18**	**dBm**
Output power step size	**-**	**2**	**-**	
Output impedance	**-**	**50**	**-**	**Ω**
Output impedance for RF_IO	**-**	**| S 1 1|<-10dB**	**-**	
In-Band Spurious Emission				
±500Khz	**-**	**-**	**-20**	**dBc**
20dB bandwidth	**-**	**900**	**1000**	**kHz**
|M-N|=2	**-**		**-20**	**dBm**
|M-N|≥3	**-**		**-40**	**dBm**
Out-of-Band Spurious Emission				**dBm**
30Mhz- 1Ghz	**-**			**dBm**
1Ghz- 12.75Ghz	**-**		**-36**	**dBm**
1.8Ghz- 1.9Ghz	**-**		**-47**	**dBm**
5.15Ghz- 15.3Ghz	**-**		**-47**	**dBm**
LO Performance				
Lock time	**-**	**180**		**us**
Initial carrier frequency tolerance	**-**	**±25**	**±75**	**khz**
Frequency drift	**-**			
DH1 packet	**-**	**±20**	**±25**	**khz**
DH3 packet	**-**	**±20**	**±40**	**khz**
DH5 packet	**-**	**±20**	**±40**	**khz**
Drift rate Frequency deviation	**-**	**10**	**0**	**kHz/50us**
00001111	**-**	**175**	**kHz±**	

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sequence in payload				
10101010 sequence in payload	**--**	**-**	**kHz**	
Channel spacing	**-**	**1**		**MHz**

1. Maximum value represents the actual Bluetooth specification required for Bluetooth qualification as defined in the version 1.2 specifications.
2. The spurious emissions during Idle Mode are the same as specified in Table 1: Receiver therefore Specifications.
3. The RF characteristics are measured at the chip interface.
4. Average deviation in payload.
5. Max deviation in payload for 99.9% of all frequency deviations.

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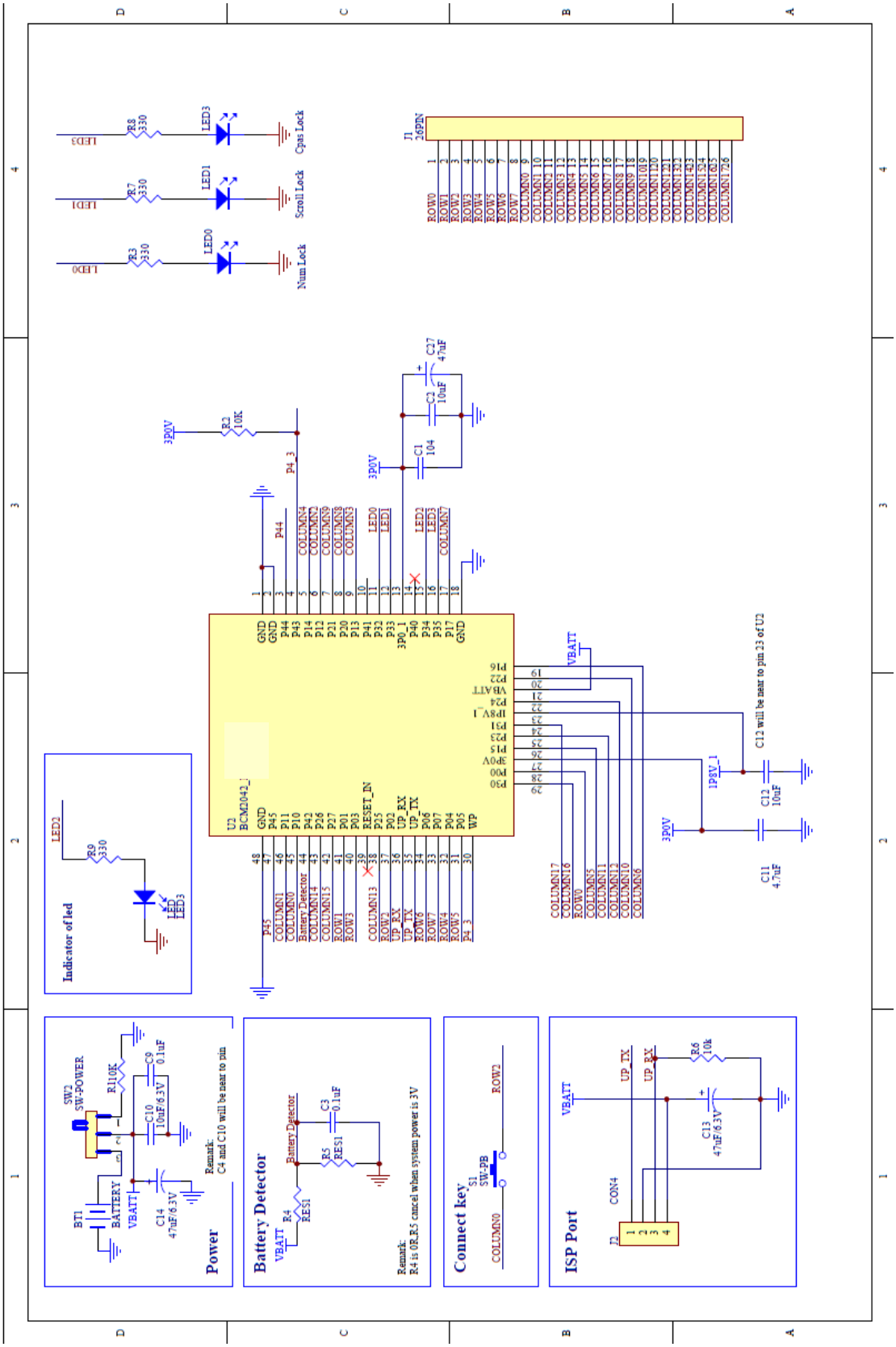

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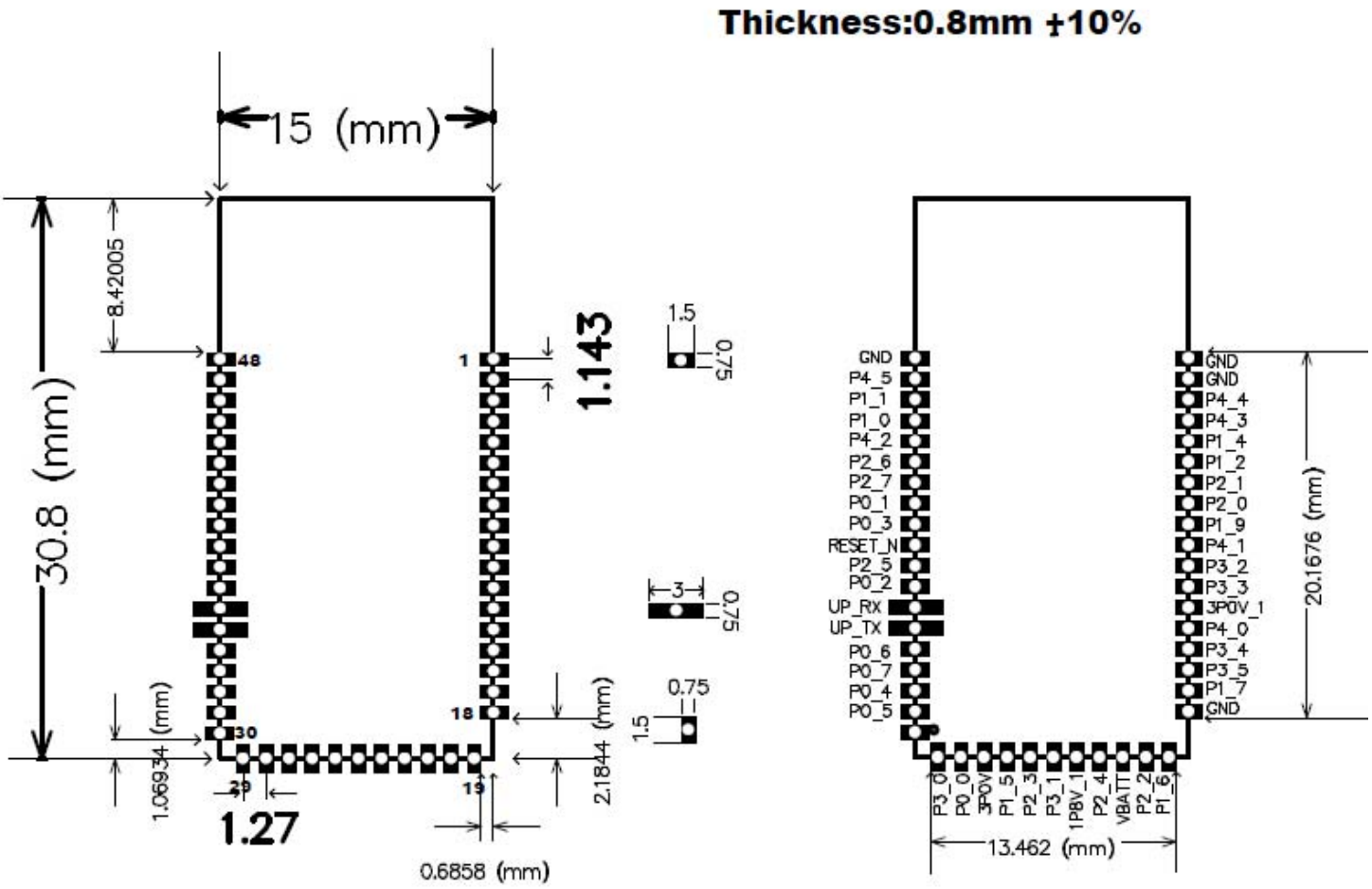
Recommended PCB layout



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