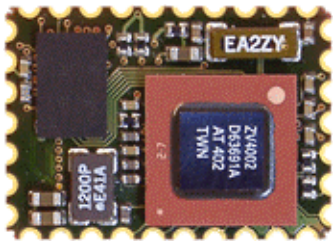
BlueMod+P24

BlueMod+P25

Hardware reference



Note

This device was developed for purposes of communication in an office environment. It is intended solely for our industrial clients who will physically integrate them into their own technical products after having them careful examined for their suitability for the intended purpose by experienced technical personnel. The device was not developed for or intended for use in any specific customer application. The firmware of the device may have to be adapted to the specific intended modalities of use or even replaced by other firmware in order to ensure flawless function in the respective field of applications. Performance data (range, power requirements, etc.) may depend on the operating environment, the field of application, the configuration, and method of control as well as other conditions of use; they may deviate from the technical specifications, the Design Guide specifications or other product documentation. The exact performance characteristics can be determined only by measurements subsequent to integration. Variations in the performance data of mass-produced devices may occur due to individual differences between such devices. Device samples were tested in a reference environment for compliance with the legal requirements applicable to the reference environment. No representation is made regarding the compliance with legal, regulatory, or other requirements in other environments. No representation can be made and no warranty can be assumed regarding the suitability of the device for a specific purpose as defined by our customers. Stollmann reserves the right to make changes to the hardware or firmware or to the specifications without prior notice or to replace the device with a successor model. Of course, any changes to the hardware or firmware of any devices for which we have entered into a supply agreement with our customers will be made only if, and only to the extent that, such changes can reasonably be expected to be acceptable to our customers. No general commitment will be made regarding periods of availability; these must be subject to individual agreement. All agreements are subject to our Terms and Conditions for Deliveries and Payments which you can request from us at any time.

Trademarks

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TABLE OF CONTENTS

1 Key Features

- Bluetooth specification v1.2
- Complete Co-location and Co-existence with 802.11 (AWMA, AFH and SFH)
- Fast Connection Setup
- Extended SCO Link
- RF output power class 2 with power control
- Supply Voltage 3.3V
- Internal crystal oscillator (12 MHz and 32 kHz for deep sleep)
- Surface mount type 13.34*22.75*2.13 mm³
- Built-in shielding
- Full Bluetooth data rate up to 723kbps asymmetric
- Support for very low-power modes (sleep and deep sleep)
- µ-law, A-law and CVSD transcoders on SCO channel
- Full 8- to 128-bit encryption
- High sensitivity design (-86 dBm typ.)
- USB, UART and SPI interface
- 16 GPIO's for individual usage for your embedded software
- ARM7TDMITM core for embedded profiles or application software
- Power control

2 Applications for the Modules

All Embedded Wireless Applications

- Access Points
- Printer Adapters
- Printers
- Scanners
- Wireless Sensors
- Industrial Control Applications
- Cable Replacement
- Personal Digital Assistants (PDAs)
- Access Points
- Computers and Peripherals
- Audio Equipment (PCM)
- Mono & Stereo Audio Equipment

3 Description of the Modules

BlueMod+P24/P25 are short-range class 2 modules for implementing Bluetooth functionality into various electronic devices. The modules consists of three major parts; a baseband controller, a flash memory and a radio that operates in the license-free 2.45 GHz ISM band.

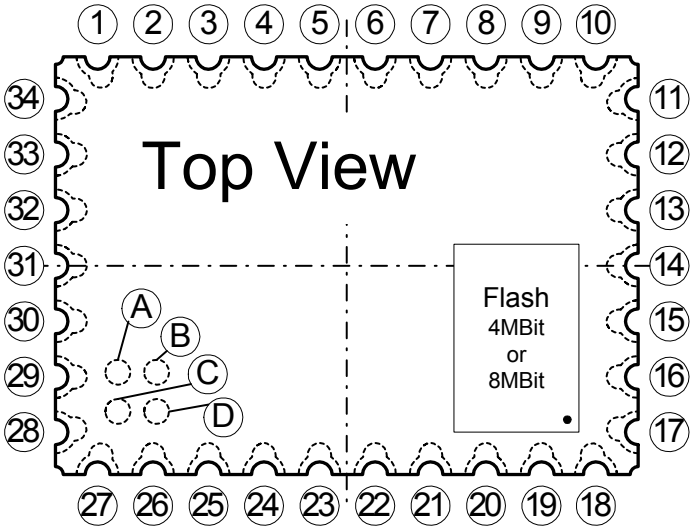
The BlueMod+P25 is equipped with an internal antenna whereas the BlueMod+P24 provides an 50Ω RF interface.

Both data and voice transmission are supported by the modules. Communication between the modules and the host controller is carried out normally via UART, USB and PCM interface.

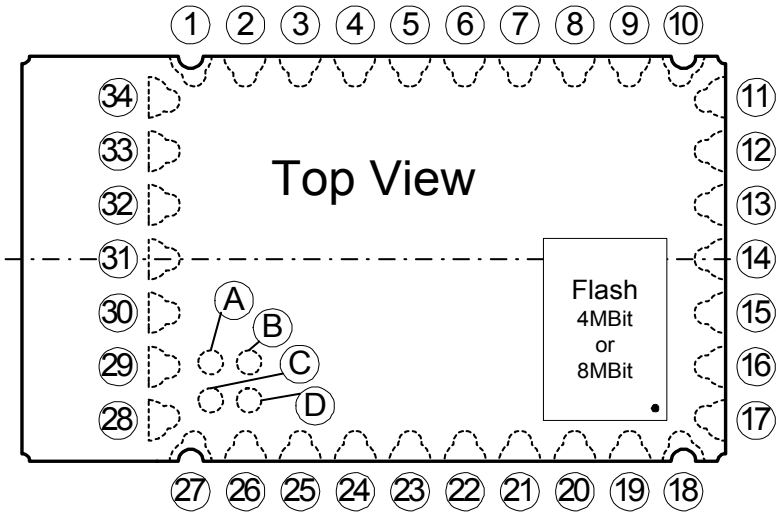
4 Scope of this Document

This product specification applies to the class 2 Bluetooth modules #52305 (BlueMod+P24) and #52287 (BlueMod+P25).

5 Terminal Layout



BlueMod+P24



BlueMod+P25

5.1 General Pin Assignment

Pin No.	Pin Name	Pin Type	Description
1	GND	PWR	ground connection (0Vdc)
2	BlueMod+P24: ANT [7.2]	RF I/O	50 Ohm RX/TX connection to Antenna
	BlueMod+P25: NC		Not used
3	UART_RTS [7.4]	I-PD	UART Request To Send (active low)
4	UART_TXD [7.4]	I-PD	UART Data Input, w/ weak internal Pull-Down
5	UART_RXD [7.4]	O	UART Data Output
6	UART_CTS [7.4]	O	UART Clear To Send (active low), w/ weak internal Pull-Down
7	GPIO [9] (1) PCM_CLK/INT2	I/O-PU	General Purpose Input/Output with prog. weak internal Pull-Up/PCM Data Clock Output/External Interrupt 2
8	GPIO [10] (1) PCM_OUT/CS2	I/O-PU	General Purpose Input/Output with prog. weak internal Pull-Up/PCM Data Output/External Chip Select 2
9	GPIO [7] (1) PCM_SYNC/INT1	I/O-PD	General Purpose Input/Output with prog. weak internal Pull-Down/PCM Data Sync Output/External Interrupt 1
10	GND	PWR	ground connection (0Vdc)
11	ATRST	I-PD	ARM JTAG reset (active low), Prog. Pull-Down
12	GPIO [8] (1) PCM_IN/CS1	I/O-PU	General Purpose Input/Output with prog. weak internal Pull-Up/PCM Data Input/External Chip Select 1
13	ATDI	I-PU	ARM JTAG test data input, Prog. Pull-Up
14	ATMS	I-PU	ARM JTAG mode select, Prog. Pull-Up
15	reserved	I	
16	VCC	I	Positive supply +3,3Vdc (typical)
17	RESET[7.3]	I	Reset input (active low for 5 ms); Schmitt triggered
18	GND	PWR	ground connection (0Vdc)
19	GPIO [14] (1)	I/O-PU	General Purpose Input/Output with prog. weak internal Pull-Up
20	GPIO [13] (1)	I/O-PU	General Purpose Input/Output with prog. weak internal Pull-Up
21	GPIO [15] (1)	I/O-PU	General Purpose Input/Output with prog. weak internal Pull-Up(2)
22	GPIO [6] (1)	I/O-PD	General Purpose Input/Output with prog. weak internal Pull-Down
23	ATDO	O	ARM JTAG test data output
24	ATCK	I-PD	ARM JTAG clock, Prog. Pull-Down
25	GPIO [3] (1) SPI_CLK	I/O-PD	General Purpose Input/Output with prog. weak internal Pull-Down/Serial Peripheral Interface Clock
26	GPIO [0] (1) SPI_DO	I/O-PD	General Purpose Input/Output with prog. weak internal Pull-Down/Serial Peripheral Interface Data Output
27	GND	PWR	Ground connection (0Vdc)
28	GPIO [2] (1) SPI_CS	I/O-PD	General Purpose Input/Output with prog. weak internal Pull-Down/Serial Peripheral Interface Chip Select
29	GPIO [1] (1) SPI_DI	I/O-PD	General Purpose Input/Output with prog. weak internal Pull-Down/Serial Peripheral Interface Data Input

Pin No.	Pin Name	Pin Type	Description
30	GPIO [5] DUART_TXD	I/O-PD	General Purpose Input/Output with prog. weak internal Pull-Down/Debug UART Data Output
31	GPIO [4] (1) DUART_RXD	I/O-PD	General Purpose Input/Output with prog. weak internal Pull-Down/Debug UART Data Input
32	USB_DM[7.5.1]	I/O	USB Data Minus terminal
33	USB_DP[7.5.1]	I/O	USB Data Plus terminal
34	INT_0 (4)	I	External Interrupt
A	reserved	O	
B	GPIO [12] (1)	I/O-PU	General Purpose Input/Output with prog. weak internal Pull-Up/
C	GPIO [11] (1)	I/O-PU	General Purpose Input/Output with prog. weak internal Pull-Up/
D	NC		Not used

Notes:

(1) The GPIO numbers refer to [1] chapter 25

(2) HCI Firmware: Pull up for USB or pull down for UART operation

(3) BlueMod+P25: All pins are land pattern pins, critical for hand soldering
BlueMod+P24: Pins A, B, C, D are land pattern pins, critical for hand soldering

(4) subject to firmware support, contact Stollmann for current status

5.2 Application specific pin multiplexing

5.2.1 SPP configuration

Pin No.	Pin Name	SPP function	Dir.	active	Description
1	GND				ground connection (0Vdc)
3	UART_RTS	/RTS	I	L	UART Request To Send (active low)
4	UART_TXD	TxD	I		UART Data Input, w/ weak internal Pull-Down
5	UART_RXD	RxD	O		UART Data Output
6	UART_CTS	/CTS	O	L	UART Clear To Send (active), w/ weak internal Pull-Down
7	GPIO [9] PCM_CLK/INT2	/LED2	O	L	Bluetooth connected. Active if a Bluetooth connection exists. Inactive in idle state. Flashes during startup.
8	GPIO [10] PCM_OUT/CS2	UA2 (2)	O		User Output 2
9	GPIO [7] PCM_SYNC/INT1	/LED1	O	L	Device ready
10	GND				ground connection (0Vdc)
12	GPIO [8] PCM_IN/CS1	/UE (2)	I	L	User Input
16	VCC		I		Positive supply +3,3Vdc (typical)

Pin No.	Pin Name	SPP function	Dir.	active	Description
17	RESET		I	L	Reset input (active low for 5 ms); Schmitt triggered
18	GND				ground connection (0Vdc)
19	GPIO [14]	/RTC-OUT	O	L	DSR in DCE mode, DTR in DTE mode
20	GPIO [13]	/RTC-IN	I	L	DTR in DCE mode, DSR in DTE mode
21	GPIO [15]	/DCD or /DCD-DTE	O or I	L	Data Carrier Detect , Input in DTE mode Output in DCE mode
22	GPIO [6]	/RI or /RI-DTE	O or I	L	Ring Indicator, Input in DTE mode Output in DCE mode
25	GPIO [3] SPI_CLK	reserved			
26	GPIO [0] SPI_DO	reserved	I		
27	GND				Ground connection (0Vdc)
28	GPIO [2] SPI_CS	reserved	O		
29	GPIO [1] SPI_DI	reserved	I		User Input #2, Break detect (1)
30	GPIO [5] DUART_TXD	reserved	O		
31	GPIO [4] DUART_RXD	DTE-/DCE select	I		DTE (high) DCE (low) mode selector
B	GPIO [12] TX_EN	reserved			
C	GPIO [11] RX_EN	reserved			

All other Pins do not have a dedicated functionality in SPP mode. See 5.1 General Pin Assignment for all other terminals.

Notes:

(1) Must be connected to RXD signal if break detection is needed (ask company Stollmann for software support)

(2) subject to firmware support, contact Stollmann for current status.

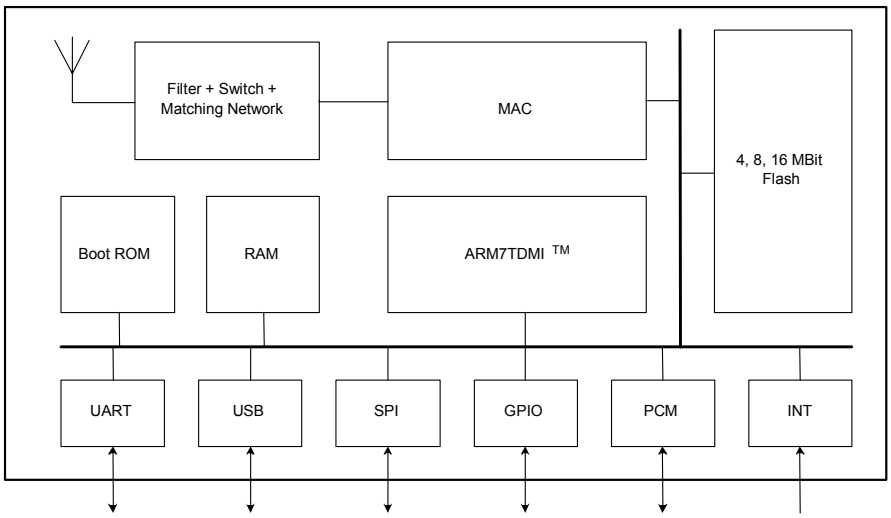
5.2.2 AudioGateway/Headset – SPP configuration

Pin No.	Pin Name	Function	Dir.	Active	Description
1	GND				ground connection (0Vdc)
3	UART_RTS	/RTS	I	L	UART Request To Send (active low) low), w/ weak internal Pull-Down
4	UART_TXD	TxD	I		UART Data Input, w/ weak internal Pull-Down
5	UART_RXD	RxD	O		UART Data Output
6	UART_CTS	/CTS	O	L	UART Clear To Send (active
7	GPIO [9] PCM_CLK/INT2	PCM_CLK	O		PCM Clock

Pin No.	Pin Name	Function	Dir.	Active	Description
8	GPIO [10] PCM_OUT/CS2	PCM_OUT	O		PCM data Out
9	GPIO [7] PCM_SYNC/INT1	PCM_SYNC	O		PCM Frame Sync
10	GND				ground connection (0Vdc)
12	GPIO [8] PCM_IN/CS1	PCM_IN	I		PCM Data input
16	VCC				Positive supply +3,3Vdc (typical)
17	RESET		I	L	Reset input (active low for 5 ms); Schmitt triggered
18	GND				ground connection (0Vdc)
19	GPIO [14]	/DSR	O	L	Data Set Ready
20	GPIO [13]	/DTR	I	L	Data Terminal Ready
21	GPIO [15]	/DCD	O	L	Data Carrier Detect
22	GPIO [6]	CCD	O	L	Codec Control Data
25	GPIO [3] SPI_CLK	HOOK_LED	O	L	
26	GPIO [0] SPI_DO	CCC	O		Codec Control Clock
27	GND				Ground connection (0Vdc)
28	GPIO [2] SPI_CS	STATE_LED	O	L	
29	GPIO [1] SPI_DI	CSE	O		Codec Signal Enable
30	GPIO [5] DUART_TXD	MEA	O		Mute External Audio
31	GPIO [4] DUART_RXD	CON-PAIR-CONTROL	I		Init connection / pairing
B	GPIO [12] TX_EN	/VDN	I	L	Volume down – role Headset only
C	GPIO [11] RX_EN	/VUP	I	L	Volume up - role Headset only

All other Pins do not have a dedicated functionality in Audio Gateway / Headset mode. See 5.1 General Pin Assignment for all other terminals.

6 Block Diagram



7 Terminal Specifics

7.1 Power supply

The BlueMod+P requires a power supply with the following characteristics:
3,3 V +- 9% low noise
100 mA peak

Due to the technological requirements and the pulsed radio transmission the supply needs to be fed by an ultra fast linear regulator placed as close as possible to the VCC pins. Functionality has been verified with the following types: **TOREX: XC6204B272MR or XC6401FF42MR**

NOTE: *You must ensure that the supply voltage never drops below 2.7 V. Otherwise the flash contents (firmware and/or configuration data) can get lost.*

7.2 RF-ANTENNA

The BlueMod+P24 presents a 50Ω impedance on the antenna pin.
The BlueMod+P25 presents an integrated ceramic antenna.

If the antenna performance fits not to your requirements or you need antenna support please contact Stollmann.

It is highly recommended that you follow the design rule given in the Stollmann Application Note on Antenna design [5].

7.2.1 Typical Radiation Pattern

7.2.2 BlueMod+P25

A first idea can be seen in [3], the radiation pattern from the total module will be delivered on request. Due to the compromise between module size and antenna performance, the radiation pattern is a little bit worse against the optimal circumstances, which are given in [3].

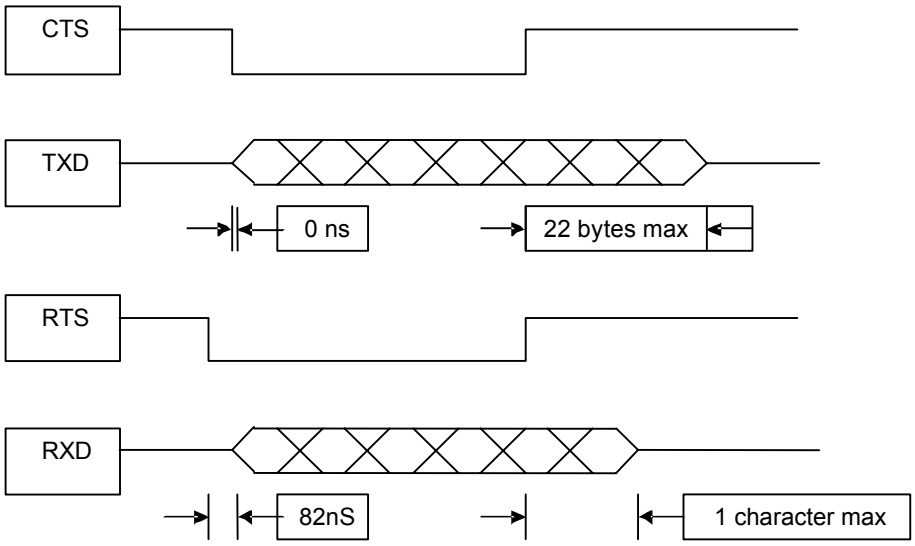
7.3 Reset

The RESET pin is an active low input that can be used to perform a full reset of the device from an external signal. This pin does not contain an internal pull-up, so it should be pulled-up externally if not used. The input is Schmitt triggered. A valid reset signal must be low for at least 5 ms.

7.4 UART Interface – TXD, RXD, CTS, RTS

***NOTE**: All signals of the serial interface are named according to the EIA232 DTE definition.*

The UART is compatible with the 16450 industry standard and supports 9600, 19.2 K, 38.4 K, 57.6 K, 115.2 K, 230.4 K, 460.8 K, and 921.6 K bits/s [1] rates. Four signals are provided with the UART interface. The TXD and RXD pins are used for data while the CTS and RTS pins are used for flow control.
The character representation can be 7 or 8 data bit; no, even or odd Parity; 1 or 2 stop bits.



[1] subject to firmware support, contact Stollmann for current status

Figure 1. UART Timing Diagram

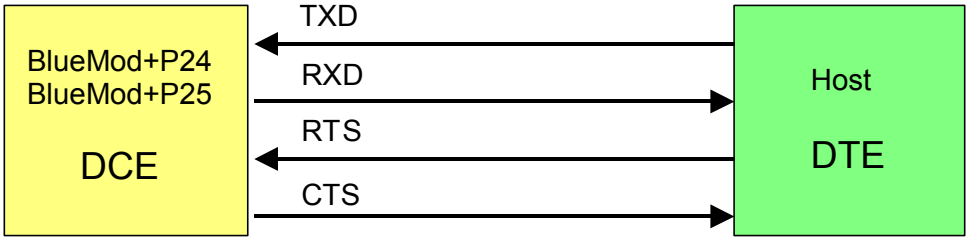


Figure 2. UART Signal Connections

7.5 USB Interface

7.5.1 D+, D-

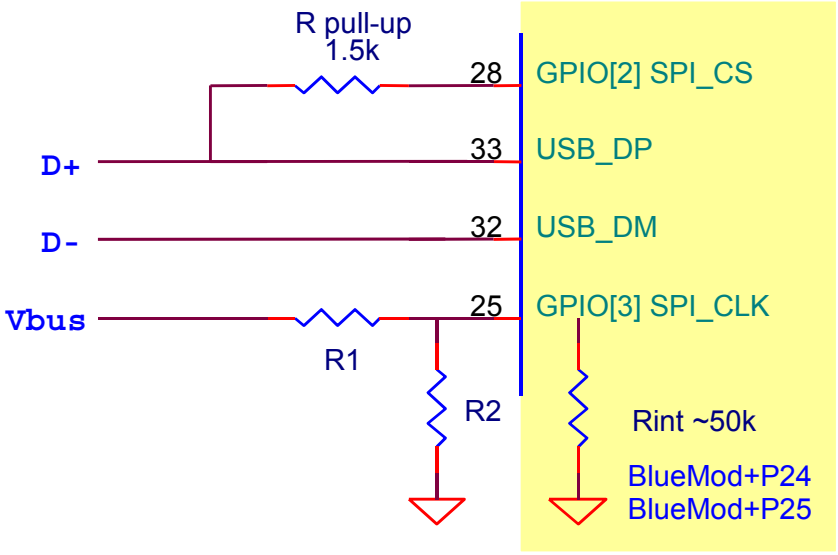
The BlueMod+P24/P25 contains a full speed USB version 2.0 compliant interface capable of directly driving a USB cable. The BlueMod+P24/P25 operates as a USB peripheral and responds to requests from a USB master host controller. For the BlueMod+P24/P25 to operate in USB mode, GPIO [15] must be pulled high.

Note: If your application requires operation in UART only mode, then connecting the USB D+ pin to VCC and the USB D- to GND using 10k ohm resistors will ensure that the USB circuit remains in an idle mode.

7.5.2 USB Pull-Up Resistor

A 1.5KΩ pull up resistor needs to be connected between GPIO [2] and the USB D+ line. This pulls the USB D+ line high when the BlueMod+P24/P25 is ready for enumeration, signaling to the host controller that the BlueMod+P24/P25 is a full speed (12Mbps) USB device.

7.5.3 USB Self-Powered Mode



In USB self-powered mode, the BlueMod+P24/P25 is powered from its own power supply and not from the USB Vbus line. In order to detect when the USB Vbus line is powered up, the USB Vbus line is monitored by GPIO [3] through a voltage divider formed by R1 and Rint as shown in Figure 4. A 20KΩ series resistor (R1) with a 50KΩ shunt resistor (Rint) will generate close to +3.3Vdc at the GPIO [3] pin. This will produce around 55uA of leakage current through the voltage divider. If less leakage current is desired, the internal pull down resistor can be disabled and an external voltage divider (formed by R1 and R2) can be used to minimize the leakage current.

Figure 3. Typical USB connection for Self Powered Mode

7.5.4 USB Bus-Powered Mode

In USB bus-powered mode, the BlueMod+P24/P25 is powered from the USB Vbus line by means of a Low Drop Out (LDO) Voltage Regulator. When choosing the LDO Voltage Regulator for supplying the +3.3V power to the BlueMod+P24/P25 , some factors that need to be considered are:

1. The voltage specification for the USB Vbus line is +4.75V to +5.25V.
2. The total current required (average and peak) for the design.
3. The voltage regulator's drop out voltage vs. output current.
4. The voltage regulator's power dissipation over the operating temperature range.
5. Filtering requirements on the USB Vbus line to attenuate noise above the voltage regulator's bandwidth.
6. The suspend state current draw.

7.6 GPIO Interface

All GPIOs are capable of sinking and sourcing 2mA of I/O current. These terminals are 5V tolerant.

NOTE: *The designer should avoid applying a voltage to the GPIOs prior to powering-up the device, this can cause reset stability issues with the ZV4002/ZV4301 device.*

GPIO [0] to GPIO [7] are internally pulled down with 50KΩ (nominal) resistors.

GPIO [8] to GPIO [15] are internally pulled up with 50KΩ (nominal) resistors.

The GPIO pins of the BlueMod+P24/P25 may be multiplexed with other functions as described in chapter 0. This multiplexing is based on the application code loaded into the BlueMod+P24/P25. In addition, certain GPIO pins have special functionality based on the application.

GPIO [0] is used as the CODEC control clock for applications using an external audio CODEC.

GPIO [1] is used as the CODEC signal enable for applications using an external audio CODEC.

GPIO [2] is used for the USB D+ pull up through a 1.5 k Ohm resistor in USB mode.

GPIO [3] is the USB VBUS detect pin in USB mode.

GPIO [6] is the CODEC control data signal in applications using an external audio CODEC.

GPIO [7] is the PCM SYNC signal in applications when an external CODEC is used.

GPIO [8] is the PCM IN signal in applications when an external CODEC is used.

GPIO [9] is the PCM CLK signal in applications when an external CODEC is used.

GPIO [10] is the PCM OUT signal in applications when an external CODEC is used.

7.7 PCM Interface

PCM or Pulse Code Modulation is a sampling technique for digitizing analog signals. The PCM interface for voice applications is provided via the PCM_OUT, PCM_IN, PCM_CLK and PCM_SYNC pins.

The PCM interface always acts as the master and uses a 1MHz bit clock. The Clock duty cycle is 5% / 95%. The Frame Clock is 8Khz. The data format is 14bit linear 2th complement

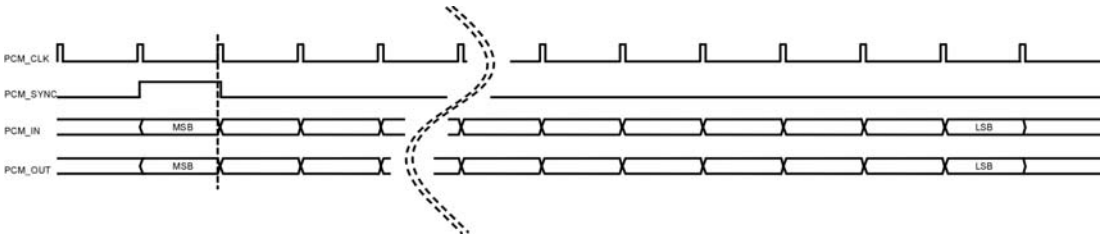


Figure 4. PCM timing

The BlueMod+P24/P25 interfaces directly with the following CODECs:

OKI Semiconductor MSM 7732-01
OKI Semiconductor MSM 7716

In this scenario the use of GPIO [0], GPIO [1] and GPIO [6] is required to control/program the CODEC.

Interface examples can be seen in [1] Figure 8 and 9.

8 Test Conditions

Measurements shall be made under room temperature and humidity unless otherwise specified.

Temperature	25 ± 10°C	Humidity	40 to 85%RH

9 Absolute Maximum Ratings (1)

The maximum ratings may not be exceeded under any circumstances, not even momentarily and individually, as permanent damage to the module will result.

No.	Item	Symbol	Absolute Maximum Ratings	Unit
1	Supply voltage	V_{cc}	-0.1 to +3.6	V
2	Voltage on any pin	V_{Pin}	-0.3 to Vcc+0.3	V
3	Storage temperature range	T_{stg}	-40 to +105	°C
4	Operating temperature range	T_{op}	-25 to +85	°C
5	Input RF level	P_{max}	15	dBm
6	Lead temperature	T_{Death}	See chapter 16.2	°C
7	ESD on any pin	V_{ESD}	Max 2000 V (C_{Load} = 150 pF, R_{Load} = 330Ω)	V

Note:

(1) Absolute Maximum Ratings indicate limits beyond which damage to the device may occur.

10 Electrical Requirements

Vcc = 3.3V, T_{amb} = 25°C if nothing else stated

No	Item	Condition	Limit			Unit
			Min	Typ	Max	
1	Frequency Range		2400		2483.5	MHz
2	Load impedance	Measured with network analyzer in the frequency range at antenna pin		50		Ω
3	Output return loss	Receive Mode to 50Ω load Transmit Mode to 50Ω load	-10 -10			dBm
4	Supply voltage.	The typical voltage is recommended Vcc at voltage pin	2.7[2] (3.0)	3.3	3.6	Vdc
5	Ripple on Vcc	Ripple frequency ≥200kHz Ripple frequency <200kHz			tbd tbd	mVpp

[2] valid for devices delivered since March 2006, the 2.7 V devices are labeled ENW89805J for BlueMod+P25 and EN89803J for BlueMod+P24

11 I/O Operating Characteristics

Vcc = 3.3V, T_{amb} = 25°C if nothing else stated

No	Symbol	Item	Condition	Limit Min	Limit Max	Unit Einheit
1	V_{IL}	Low-Level Input Voltage		-	0.8	V
2	V_{IH}	High-Level Input Voltage		2.0	-	V
3	V_{OL}	Low-Level Output Voltage	I_{OL} = 2mA	-	0.3	V
4	V_{OH}	High-Level Output Voltage	I_{OH} = 2mA	2.8	3.6	V
5	I_{OL}	Low -Level Output Current	V_{OL} = 0.4V	-	2.2	mA
6	I_{OH}	High-Level Output Current	V_{OH} = 2.4V	-	3.1	mA
7	V_{T+}	Schmitt Trigger Low to High Threshold Pt.		1.47	1.50	V
8	V_{T-}	Schmitt Trigger High to Low Threshold Pt.		0.89	0.95	V

12 USB I/O Operating Characteristics

Vcc = 3.3V, T_{amb} = 25°C if nothing else stated

No	Symbol	Item	Condition	Limit Min	Limit Max	Unit
1	V_{IL}	Low-Level Input Voltage		-	0.8	V
2	V_{IH}	High-Level Input Voltage		2.0	-	V
3	V_{OL}	Low-Level Output Voltage	I_{OL} = 2mA	-	0.3	V
4	V_{OH}	High-Level Output Voltage	I_{OH} = 2mA	2.8	3.6	V
5	V_{DI}	Differential input sensitivity		0.2	-	V
6	V_{CM}	Differential common-mode range		0.8	2.5	V
7	V_{SE}	Single-ended receiver threshold		0.8	2.0	V
8	V_{CRS}	Output Signal cross voltage		0.8	2.0	V
9	R_{PU}	Pull-up resistor		1.425	1.575	kΩ
10	R_{PD}	Pull-down resistor		1.425	1.575	kΩ
11	V_{TRM}	Termination voltage for upstream port pull up (R_{PU})		3.0	3.6	V
12	Z_{DRV}	Driver output resistance	Steady State drive,		10 (typ)	Ω
13	C_{in}	Input Capacitance	DP or DM to GND		20	pF

13 Typical Current Consumption

13.1 HCI Configuration

Vcc = 3.3V, T_{amb} = 25°C, F = 2402 – 2480GHz, 50Ω antenna

No	Modes	Average	Unit
1	ACL data over 115K Baud UART at maximum throughput (Master)	33.3	mA
2	ACL data over 115K Baud UART at maximum throughput (Slave)	30.26	mA
3	ACL data over USB at maximum throughput (Master)	43	mA
4	ACL data over USB at maximum throughput (Slave)	43.6	mA
5	SCO connection HV1, master	40	mA
6	SCO connection HV1, slave	40	mA
7	SCO connection HV3, master	34.0	mA
8	SCO connection HV3, slave	31.0	mA
9	Connection, no data traffic, master	20	mA
10	Connection, no data traffic, slave	28.5	mA
11	Connection in sniff (Tsniff=100ms), no data traffic, master	7.5	mA
12	Connection in sniff (Tsniff=100ms), no data traffic, slave	7.6	mA
13	Connection in sniff (Tsniff=375ms), no data traffic, master	2.1	mA
14	Connection in sniff (Tsniff=375ms), no data traffic, slave	2.2	mA
15	No scan, deep sleep (including on-die regulator)	0.140	mA
16	Page/Inquiry scan	0.5	mA
17	Peak current	50	mA

13.2 SPP configuration

13.2.1 Deep Sleep state

The Bluetooth RF is completely deactivated, no paging requests from other Bluetooth devices will be recognized. Only rising control line DTR will activate the BlueMod+P24/P25 and may initiate a Bluetooth link dependent on other parameters.

Note: In Deep Sleep state the AT command set is not active, CTS line is low.

13.2.2 Power down state

The Bluetooth RF is activated every 1.25 seconds, paging requests from other Bluetooth devices will be recognized after that intervals and accepted if allowed. Additionally rising control line DTR will activate the BlueMod+P24/P25 and may initiate a Bluetooth link dependent on other parameters.

Note: In Power down state the AT command set is not active, CTS line is low.

13.2.3 Idle state

No power down mode activated.

All functionality is available immediately including connection control using AT command set.

13.2.4 Power consumption

The following values are approximate power consumption values in the different states:

Condition	Current Consumption average
Deep sleep [1]	~ 0.7 mA
Power down (average)	~1.8 mA
Idle, all functions available, no Bluetooth link	19 mA
Bluetooth connected, no data traffic, (master/slave)	19/32 mA
Bluetooth connected, data traffic 115 kbit/s	44 mA

[1] RXD,TXD,RTS,CTS lines connected - parameters cdcd=0, bpsm=0, pwd=1

14 Electrical RF-Characteristics

Vcc = 3.3V, T_{amb} = 25°C, 50Ω antenna

No	Receiver	Frequency [GHz]	Limit Min	Limit Typ	Limit Max	BT Spec	Unit
1	Sensitivity at 0.1% BER	2.402	-	-85	-	≤-70	dBm
2		2.441	-	-85	-		
3		2.480	-	-85	-		
4	Maximum received signal at 0.1% BER with DH1		-	-5	-	≥-20	dBm

No	Transmitter	Frequency [GHz]	Limit Min	Limit Typ	Limit Max	BT Spec	Unit
5	RF transmit power 50 Ω load, at antenna Class 2 device	2.402	-	0	4	-6 to +4	dBm
6		2.441	-	0	4		
7		2.480	-	0	4		
8	RF power control range		-	30	-	≥16	dB
9	RF power range control resolution		-	4	-	2 to 8	dB
10	20 dB bandwidth for modulated carrier		-	930	-	≤1000	kHz
11	Initial carrier frequency tolerance		-10	0	+12	≤ ±75	kHz
12	Carrier frequency drift (packet DH1)		-	±4	±8	≤ ±25	kHz
13	Drift Rate		-	60	210	400	Hz/µs
14	$\Delta f1_{avg}$ “Maximum Modulation”		145	166	170	≥140 to ≤175	kHz
15	$\Delta f2_{avg}$ “Minimum Modulation”		110	160	-	≥ 115	kHz
16	C/I co-channel		<11	-	(1)	≤ 11	dB
17	Adjacent channel selectivity C/I f = f_0 ± 1MHz		0	-	(1)	≤ 0	dB
18	Adjacent channel selectivity C/I f = f_0 ± 2MHz		<-30	-	(1)	≤ -30	dB
19	Adjacent channel selectivity C/I f ≥ f_0 +3MHz		<-40	-	(1)	≤ -40	dB
20	Adjacent channel selectivity C/I f ≤ f_0 -3MHz		<-40	-	(1)	≤ -40	dB
21	Adjacent channel selectivity C/I f = f_{image}		<-9	-	(1)	≤ -9	dB
22	Adjacent channel Transmit power f = f_0 ± 2MHz		-39	-43	-47	≤ -20	dBc
23	Adjacent channel Transmit power f = f_0 ± 3MHz		-45	-48	-52	≤ -40	dBc

Note:

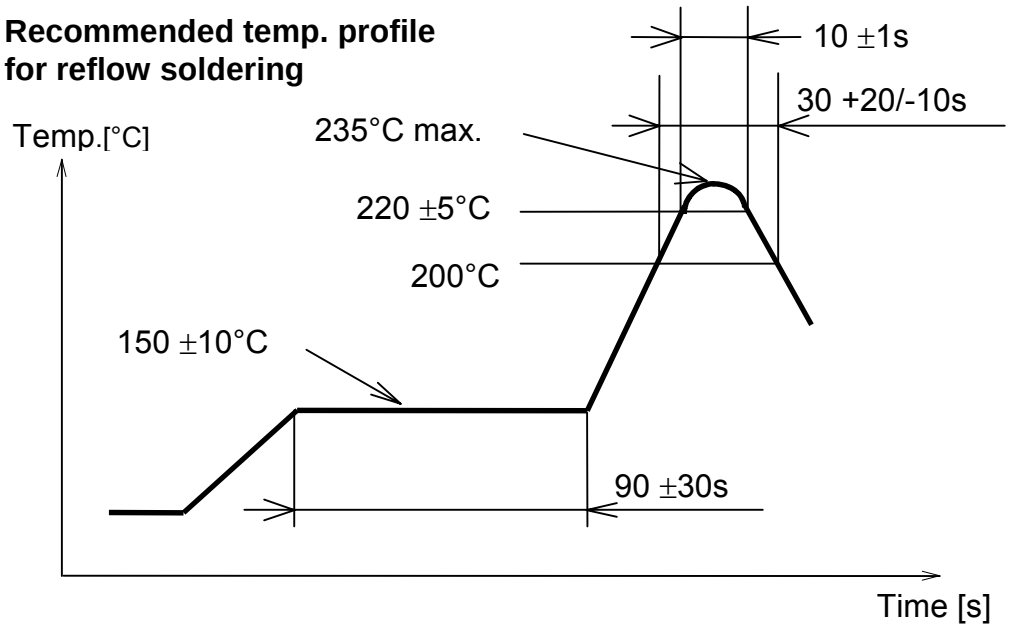
(1) The tests was made to the bluetooth regulation, with the BER limit of 0,1%. With the output limits given as a minimum value, there was no bit error failure and the test was pass. Therefore the maximum values are not measured.

15 Mechanical Requirements

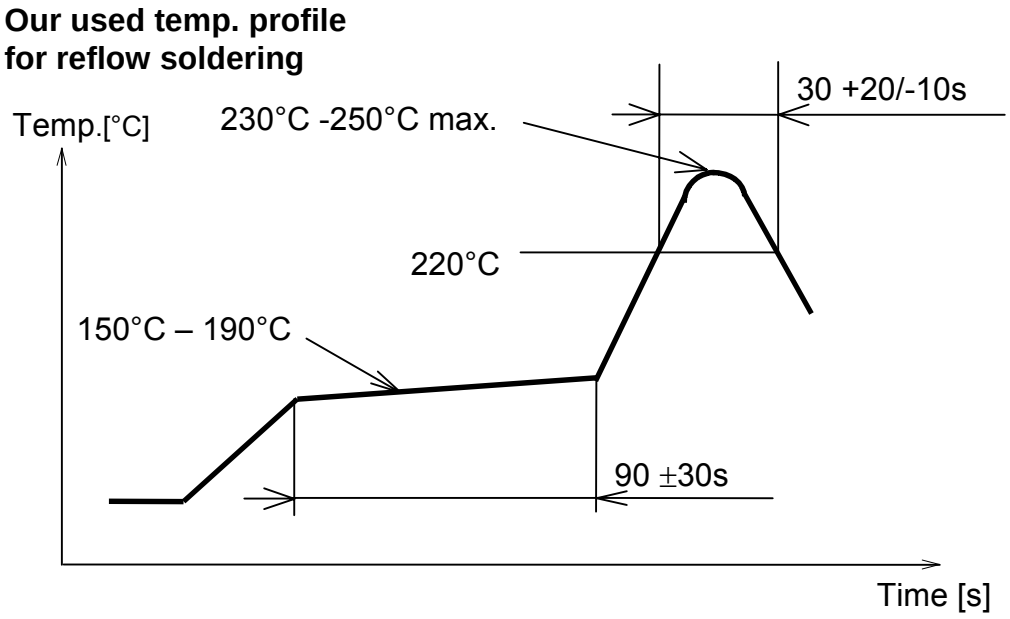
No.	Item	Limit	Condition
1	Solderability	More than 75% of the soldering area shall be coated by solder	Reflow soldering with recommendable temperature profile
2	Resistance to soldering heat	It shall be satisfied electrical requirements and not be mechanical damage	See chapter 16.2

16 Soldering Temperature-Time Profile (for reflow soldering)

16.1 For lead solder



16.2 For lead-free solder



Reflow permissible cycle: 2
Opposite side reflow is prohibited due to module weight.
The critical componet is the Zeevo chip, if you are not able to use our temperature profile please check [4] page 5 in chapter 30.

17 Module Dimension

No.	Item	Dimension	Tolerance	Remark
1	Width	13.34	± 0.1	
2	Lenght	18.65	± 0.1	
3	Hight	2.13	± 0.05	

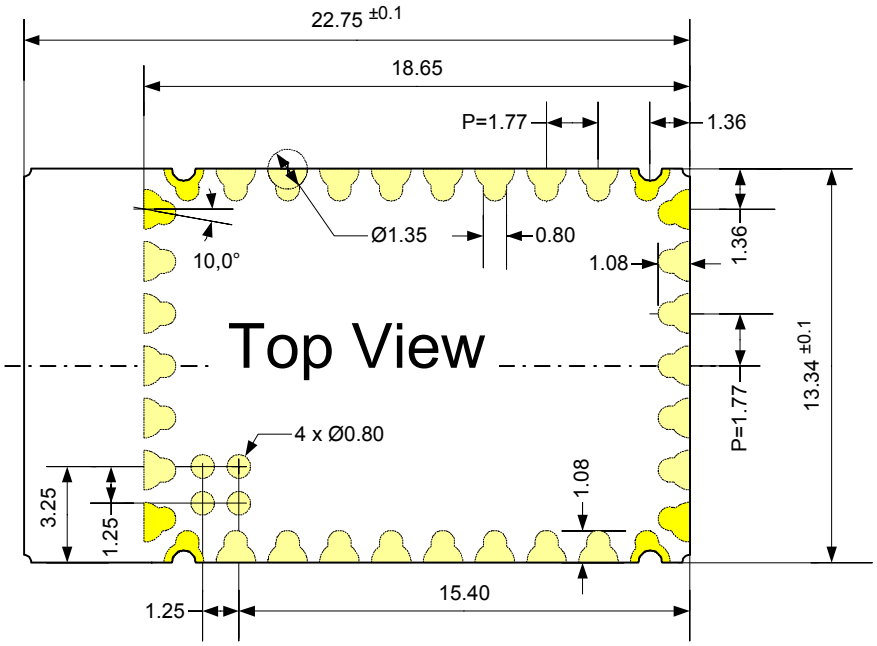
BlueMod+P24

No.	Item	Dimension	Tolerance	Remark
1	Width	13.34	± 0.1	
2	Lenght	22.75	± 0.1	
3	Hight	2.13	± 0.05	Without casing

BlueMod+P25

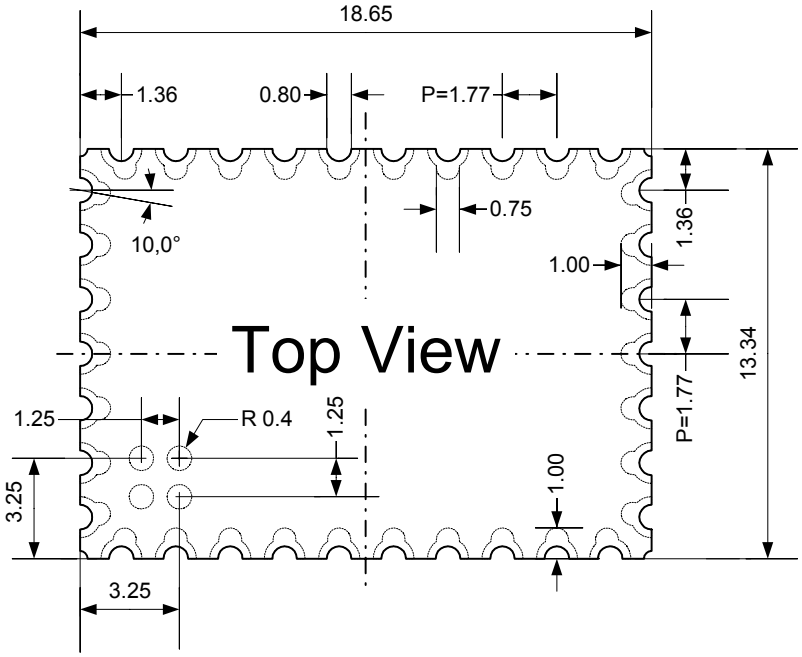
18 Foot Print of the Modules

18.1 Engineering sample status

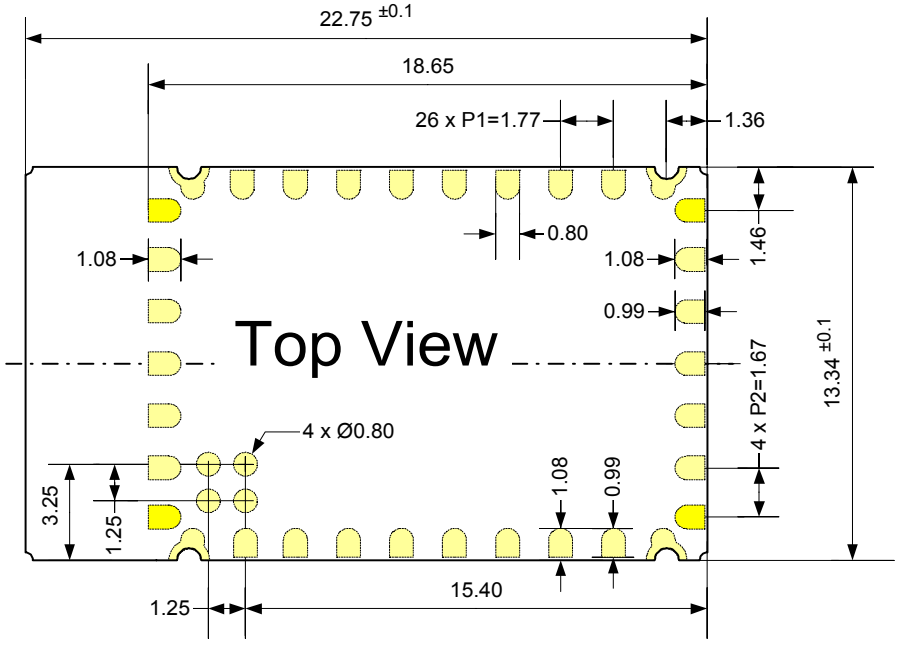


BlueMod+P25, Dimension in mm

18.2 Mass production status

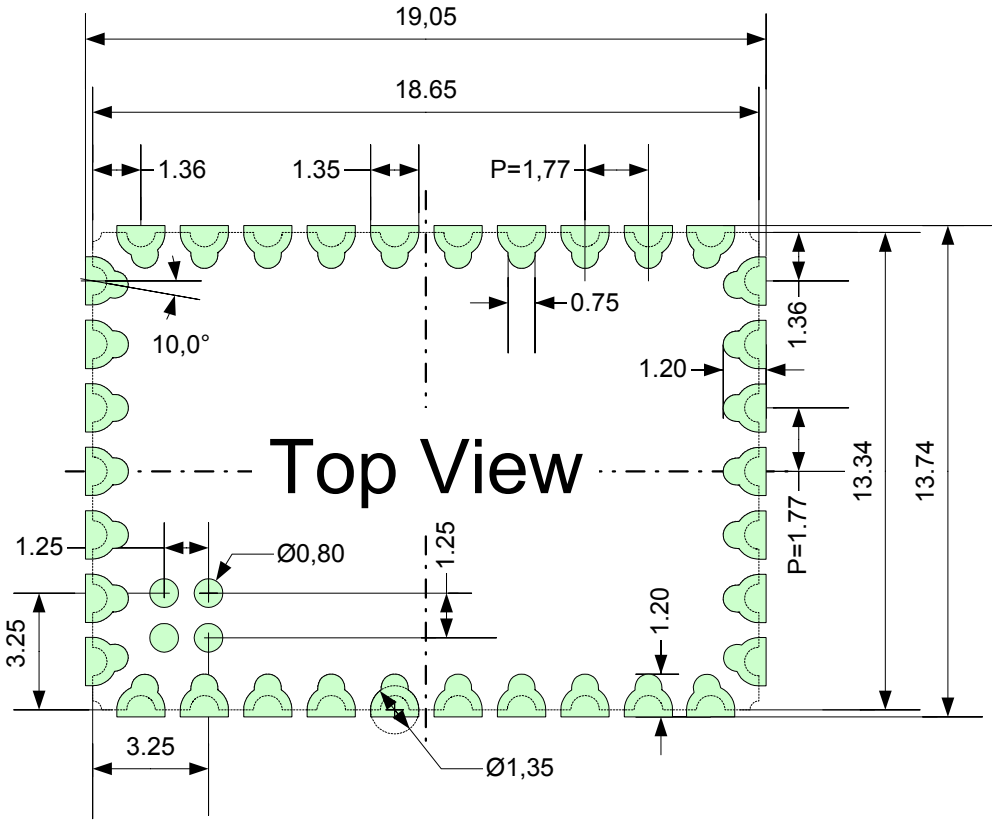


BlueMod+P24, Dimension in mm

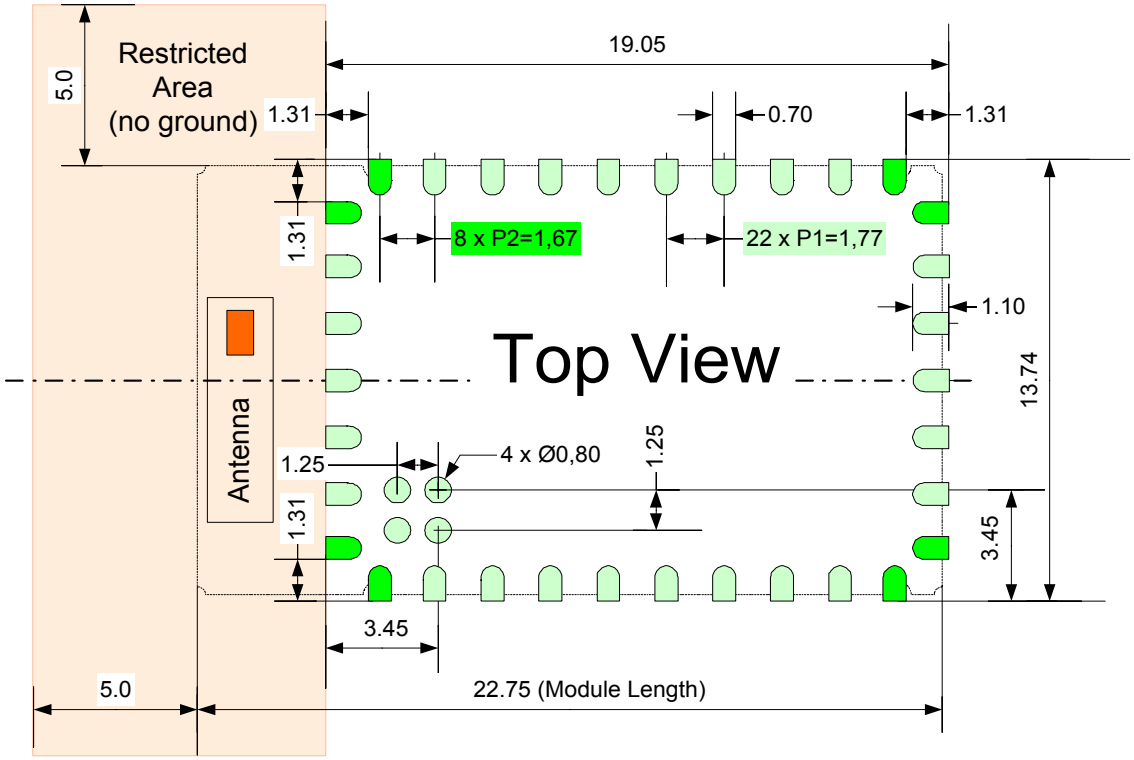


BlueMod+P25, Dimension in mm

19 Recommended Foot Pattern



BlueMod+P24 Foot Pattern



BlueMod+P25 Foot Pattern

If you have no experience about the land pattern, this figure can guide you, but this information is given without any legal responsibility.

We recommend the same dimension for the solder paste screen.
The solder screen thickness depends on your production standard, we recommend 120µm to 150µm.

IMPORTANT:

Please be careful with the area under the module to avoid short cuts.

Engineering Sample Status:
The bottom side from the BlueMod+P24/P25 is fully coated, **except** the vias!

Mass Production Status:
The bottom side from the BlueMod+P25 is fully coated, **also** the vias!

To give an optimized antenna performance the restricted area should have no ground and the minimum dimension should be carry out, depending on your possible space.

If you have any questions on this point, we are open to discuss your individual situation.

20 Reliability Tests

The measurement should be done after exposed to room temperature and humidity for 1hour.

No.	Item	Limit	Condition
1	Vibration test	Electrical parameter should be in specification	a) Freq.:10~50Hz,Amplitude:1.5mm a) 20min. / cycle,1hrs. each of XYZ axis b) Freq.:30~100Hz, 6G b) 20min. / cycle,1hrs. each of XYZ axis
2	Shock test	the same as the above	Dropped onto hard wood from height of 50cm for 3 times
3	Heat cycle test	the same as the above	-40°C for 30min. and +85°C for 30min.; each temperature 300 cycles
4	Moisture test	the same as the above	+60°C, 90% RH, 300h
5	Low temp. test	the same as the above	-40°C, 300h
6	High temp. test	the same as the above	+85°C, 300h

21 Regulatory Information

21.1 Declaration of conformity

21.2 FCC Compliance

21.2.1 FCC Statement

This device complies with Part 15 of the FCC Rules and with RSS-210 of Industry Canada.

Operation is subject to the following two conditions:

(1) this device my not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

21.2.2 Caution

Warning: Changes or modifications made to this equipment not expressly approved by Stollmann Entwicklungs und Vertriebs may void the FCC authorization to operate this equipment.

21.2.3 FCC Warning

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

The radiated output power of BlueMod+P24/P25 is far below the FCC radio frequency exposure limits. Nevertheless, the BlueMod+P24/P25 shall be used in such a manner, that the potential for human contact during normal operation is minimized.

21.2.4 RF-exposure Statement

The BlueMod+P24/P25 contains a portable modular transmitter. Thus it must have a separation of at least 2.5 cm between the antenna and the body of the user or nearby persons, excluding hands, wrists, feet, and ankles.

Any notification to the end user of installation or removal instructions about the integrated radio module is **not** allowed.

21.2.5 Labelling requirements for the End Product

Any End Product integrating the BlueMod+P24/P25 must be labeled with at least the following information:

This device contains transmitter with FCCID: RFR-BRSI2 /IC: 4957A-BRSI2

22 RoHS Declaration

Declaration of environmental compatibility for supplied products:
Hereby we declare to our best present knowledge based on declaration of our suppliers that this product do not contain by now the following substances which are banned by Directive 2002/95/EC (RoHS) or if contain a maximum concentration of 0,1% by weight in homogeneous materials for

- Lead and lead compounds
- Mercury and mercury compounds
- Chromium (VI)
- PBB (polybrominated biphenyl) category
- PBDE (polybrominated biphenyl ether) category

And a maximum concentration of 0,01% by weight in homogeneous materials for

- Cadmium and cadmium compounds

23 Data Sheet Status

Supplementary data will be published at a later date. Stollmann reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
Please consult the most recently issued data sheet before initiating or completing a design.

24 Ordering Information

Ordering part number	Description	MOQ
# 52305	BlueMod+P24 Bluetooth module, class 2, without antenna	1
# 52287	BlueMod+P25 Bluetooth module, class 2, integrated antenna	1

25 Related Documents

[1] ZV4002 Hardware Design Guide APP-1034 Version 2.1 08 Jul 2004
[2] Data Sheet ZV4002 Preliminary Release Version 3.1 Feb. 05, 2004
[3] Data Sheet 2.45 GHz Antenna Part Number: 2450AT43A100, Johanson Technology, 12/21/03
[4] AN-01 Soldering Reflow and Rework Guidelines Zeevo Rev. 3.2 29. November 2004
[5] Application note Antenna Design AN_B0601_Antenna_Design V1.0, Stollmann GmbH

26 General Information

If we deliver samples to the customer, these samples have the status Engineering Samples. This means, the design of this product is not yet concluded. Engineering Samples may be partially or fully functional, and there may be differences to be published Data Sheet.

Engineering Samples are not qualified and are not to be used for reliability testing or series production.

Waiver:
Customer acknowledges that samples may deviate from the Data Sheet and may bear defects due to their status of development and the lack of qualification mentioned above.
Stollmann rejects any liability or product warranty for Engineering Samples. In particular, Stollmann waives liability for damages caused by

- the use of the Engineering Sample other than for Evaluation Purposes, particularly the installation or integration in an other product to be sold by Customer,
- deviation or lapse in function of Engineering Sample,
- improper use of Engineering Samples.

Stollmann waives any liability for consequential and incidental damages.
In case of any questions, please contact your local sales partner or the related product manager.

27 Life Support Policy

This Stollmann product is not designed for use in life support appliances, devices, or systems where malfunction can reasonably be expected to result in a significant personal injury to the user, or as a critical component in any life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness. Stollmann customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Stollmann for any damages resulting.

28 History

Ver	Date	by	Changes since last Version
1.1	24.05.2005	jw	Adopted chap. 5 Terminal Layout to Stollmann Conventions and Firmware
1.1	26.05.2005	jw	Chap. 5 Terminal Layout correct wrong pin type for Pin9 – GPIO[7] Correct the mistake for the voltage in chapter Key Features. Add chapter Ordering Information Combined with BlueMod+P24
1.2	16.09.2005	jw	Enhanced chap. 5.2.1 SPP configuration and 5.2.2 AudioGateway/Headset – SPP configuration Chapt. 14 Electrical RF-Characteristics sensivity lowered + -85 dBm, all tbd values defined. Add chap.16.2 For lead-free solder, chap. 18.2 Mass production status, chap. 20 Reliability Tests, chap. 21 RoHS Declaration
1.3	28.09.2005	jw	chap. 5.2.2 AudioGateway/Headset – SPP configuration corrected definition for pin 22 – GPIO 6 pin B – GPIO 11 and pin C – GPIO 12 functions were interchanged, corrected
1.4	24.01.2006	jw	introduced new pin type pwr chap 7.5.1 D+, D- added not for unused USB pins chap 5.1 General Pin Assignment changed pin 15 to reserved chap 5.2.1 SPP configuration corrected wrong description for GPIO 1 and GPIO 5 enhanced chap 7.3 Reset new chap 7.1 Power supply
1.5	31.03.2006	jw	added chap 21.2 FCC Compliance Min VCC reduced to 2.7V added serial port character representation added hint on AN_B0601_Antenna_Design removed HCI specifics from GPIO chapter