# CB-OLX425 ELECTRICAL MECHANICAL DATA SHEET

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# 1 Table of Content

## 2 Introduction

> ⛔ The license could not be verified: There is no license certificate installed for CustomWare Scaffolding Plugin for Confluence.

**The connectBlue OLP425 is a Bluetooth low energy platform module with a unique set of features and functionality that provides customers with a turnkey complete solution. The OLP425 can either be delivered as is with digital and analog GPIOs or complete with battery holder, temperature sensor, 3-axis motion sensor/accelerometer, switch. There are also 4x1 through holes for solder wires or through hole components. Using the IAR Embedded Workbench, the customer embeds their own software and application in the OLP425 module. Such possible software includes Bluetooth low energy profiles/services/attributes and customer application such as machine/device access and asset management, data conversion, data acquisition, logic etc.**

The hardware of the cB-OLP425 product is referred as cB-0950 and the module is Type Approved with the type name cB-0950.

The module is available in different configuration (see Product Variants) with internal antennas or a U.FL. connector for connecting an external antenna.
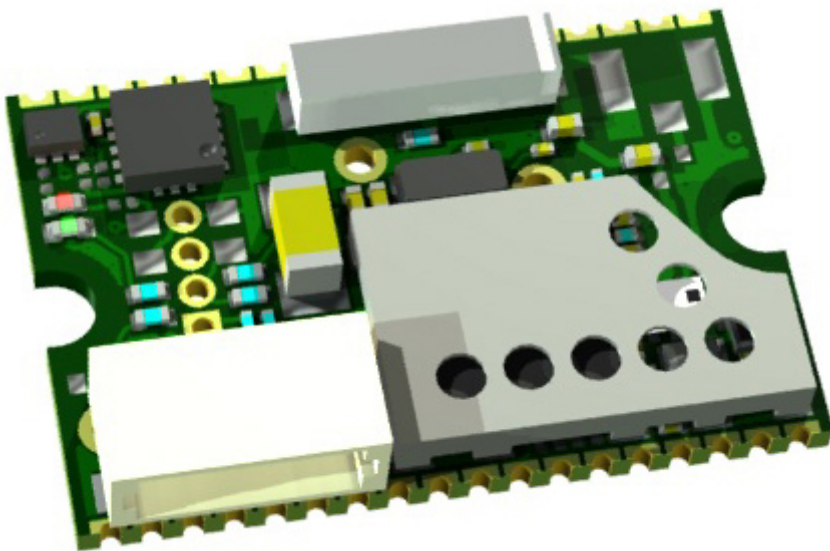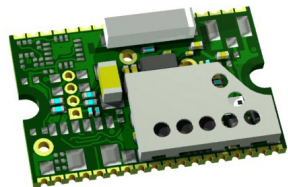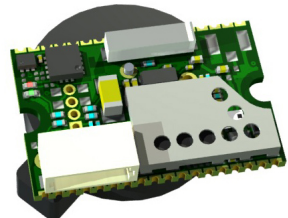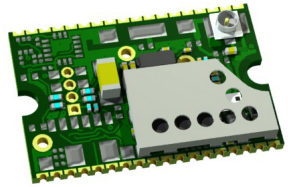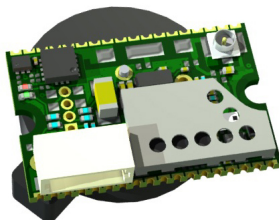
**Figure 1: cB-OLP425i OEM Low Energy Platform with internal antenna**.

## 2.1 Product Variants

The module is available in two antenna options (integrated antenna, or u.fl. connector for external antenna) and in different configurations of the mounting options.

**Table 1: Product variants**

| Product Name | Regulatory ID<br><br>FCC ID<br>IC ID | Bluetooth Type | Description | |
|---|---|---|---|---|
| cB-OLP425i-04 | cB-0950<br>PVH0950<br>5325A-0950 | Bluetooth Low Energy Output power: 3 dBm EIRP* Sensitivity: TBD dBm EIRP* | OEM Low Energy Platform 425 with internal antenna. No battery holder, no sensors, no JST connector, no LEDs. | |
| cB-OLP425i-26*** | cB-0950<br>PVH0950<br>5325A-0950 | Bluetooth Low Energy Output power: 3 dBm EIRP* Sensitivity: TBD dBm EIRP* | OEM Low Energy Platform 425 with internal antenna, JST connector, LEDs, Temperature Sensor, Accelerometer and CR1632 battery holder. | |
| cB-OLP425x-04 | cB-0950<br>PVH0950<br>5325A-0950 | Bluetooth Low Energy Output power: 3 to 6 dBm EIRP** Sensitivity: TBD to TBD dBm EIRP** | OEM Low Energy Platform 425 with external antenna. No battery holder, no sensors, no JST connector, no LEDs. | |

| cB-OLP425x-26*** | cB-0950 PVH0950 5325A-0950 | Bluetooth Low Energy Output power: 3 to 6 dBm EIRP** Sensitivity: TBD to TBD dBm EIRP** | OEM Low Energy Platform 425 with external antenna, JST connector, LEDs, Temperature Sensor, Accelerometer and CR1632 battery holder. |  |
| --- | --- | --- | --- | --- |

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# * EIRP is including antenna gain.
# ** EIRP is including antenna gain and cable loss and thus depends on the antenna selection.
# *** The JST connector is specified down to -25 ºC. See #Environmental for more information.

Please contact connectBlue for discussion about customer specific mounting options. Components that are available for optional mountings are:

- CR1632 coin cell battery holder
- 3-axis motion sensor / accelerometers
- Temperature sensor
- Pushbutton
- JST connector
- 2x LEDs
- Internal antenna or u.fl. connector for external antenna
- Through hole mounted analog or digital discrete sensors (4x1 through holes at 1.27 mm pitch)
- PCB wings/flaps with holes for mounting of the module (module size including wings 16x36 mm)
- Voltage regulator for 3.0-6.0 VDC power supply

## 2.2 Block Diagram
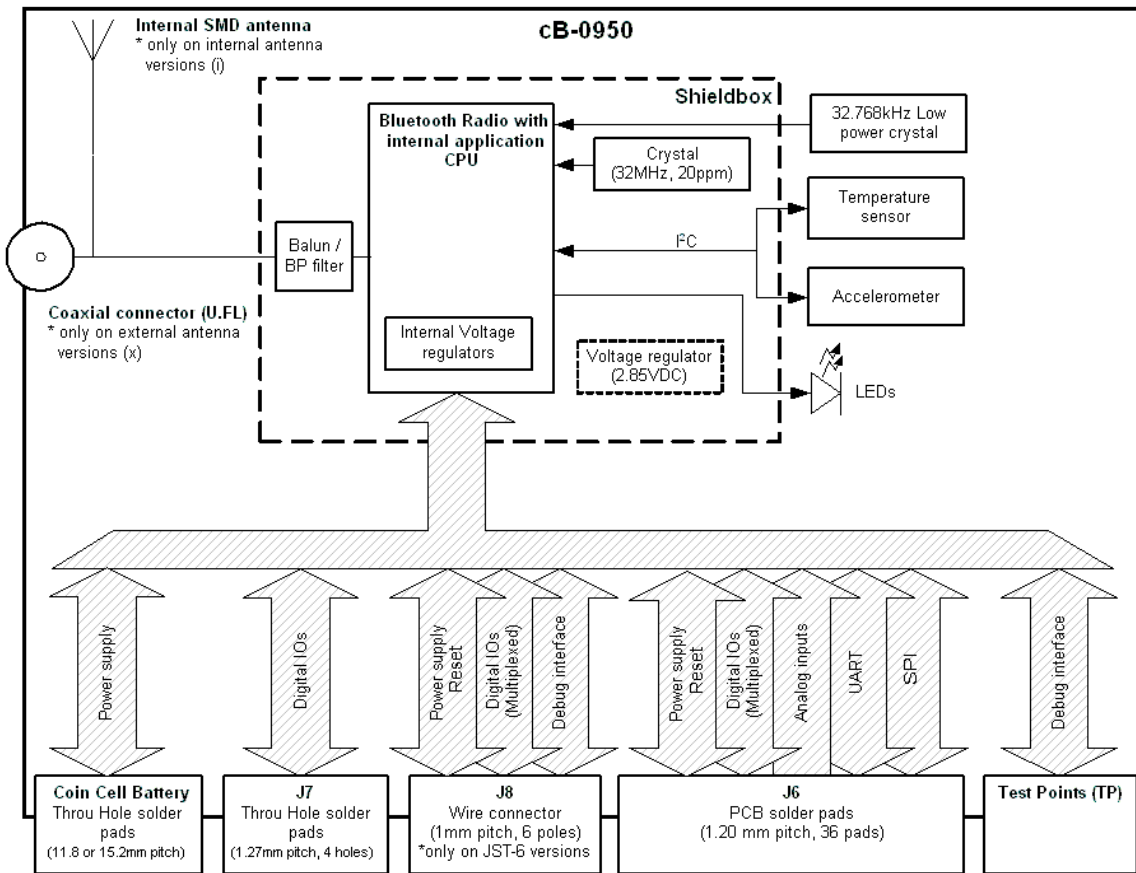


**Figure 2: Block diagram of cB-OBP425**

## 2.3 Bluetooth Stack and Application software

The platform module OLP425 is a hardware platform based on the _TI CC2540_ system-on-chip (256 kB flash memory and 8 kB SRAM).

The chip runs both application and the Bluetooth low energy protocol stack. The _TI Bluetooth low energy software stack and tools_ includes object code with the latest BLE protocol stack supporting multiple connections, sample projects and applications covering an extensive set of profiles with source code. Please note that this package is not provided by connectBlue.

The connectBlue OLP425 sample code package includes sample projects for accessing the LEDs, temperature sensor and accelerometers.

All embedded software is developed using _IAR Embedded Workbench for 8051_.

> ⚠ **NOTE**
>
> Software/firmware support is not included by connectBlue. To sign a support agreement for software support or to discuss a full implementation project please contact us.

> ☑ **TIP**
>
> For higher quantity orders the customer developed software/firmware may be loaded to the module during the production at connectBlue.

# 3 Electrical Interface and Connectors

## 3.1 Interfaces

This section describes the signals available on the module interface connectors. There are three ways to connect to the module:

- Via the PCB solder pads on the edge of the PCB, J6 (see Figure 3). See Section "#Using the J6 PCB solder pads" for more information.
- Via the JST connector, J8 (see Figure 4). The connector is a 6 poles wire connector. The pitch is 1mm. The manufacturer of the mounted connector is JST and the part number is SM06B-SRSS-TB. The SM06B-SRSS-TB connector is mated with the wire connector SHR-06V-S from JST. Other connector options are also available from JST.
- Via the 4x1 through holes row J7 (see Figure 4) for solder wires or through holes components to the board (1.27mm pitch).
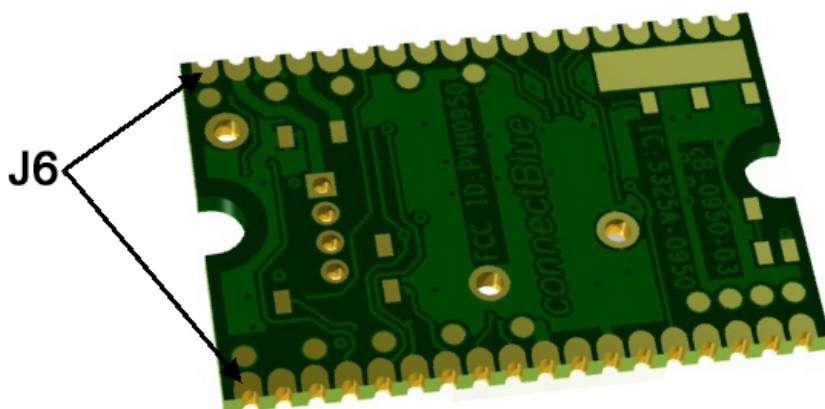


**Figure 3: The solder pads J6 are available on the long edges of the bottom side of the PCB.**
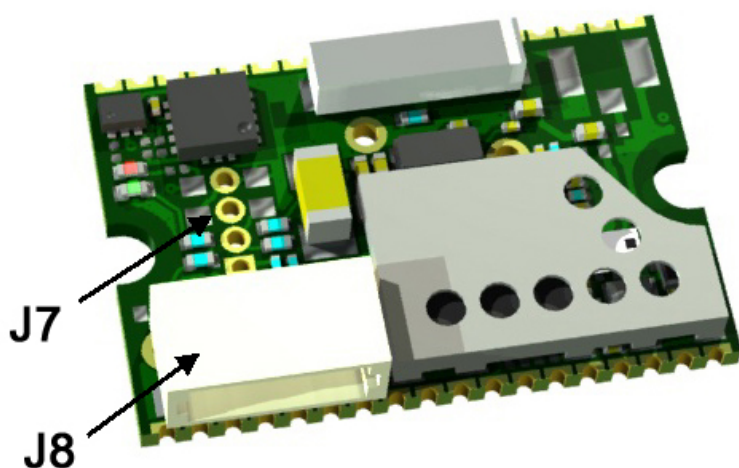


**Figure 4: The JST connector J8 mounted on the component side of the PCB.**

## 3.2 Peripherals

The OEM Low Energy Platform can be customized to suit an end application e.g. with the on board 3 axes motion sensor, the temperature sensor and two LEDs. There are also a 4x1 through holes (1.27mm pitch) available for solder wires or through holes components to the board (see Pin Numbering for more info).

### 3.2.1 Temperature Sensor

A Texas Instrument high accurate TMP112 temperature sensor is available on board on the platform version. The communication is via I²C with the device address 0x49. The communication interface is an software implemented I²C:

| Signal | CC2540 port | Description |
| --- | --- | --- |
| SDA | P1-6 | Serial Data |
| SCL | P1-5 | Clock |
| Alert | P0-7 | Interrupt signal (optional) |

### 3.2.2 Accelerometer

A ST Microelectronics LIS3DH 2/4/8/16 g accelerometer is available on board. The communication is via I²C with the device address 0x19. The communication interface is an software implemented I²C:

| Signal | CC2540 port | Description |
| --- | --- | --- |
| SDA | P1-6 | Serial Data |
| SCL | P1-5 | Clock |
| Interrupt1 | P1-3 | Interrupt signal (optional) |

### 3.2.3 LEDs

One green and one red LED are available on board:

| LED | CC2540 port | Description |
| --- | --- | --- |
| Green | P1-4 | Active Low green signal |
| Red | P1-7 | Active low red signal |

## 3.3 Pin Numbering

See Module Outlines for pin numbering.

## 3.4 Pin Description

**Table 2: OBP425 Signals description.**

| J6 Pin Nbr | J7 Pin Nbr | J8 Pin Nbr | CC2540 pin Nbr / Port name | Signal Level | Type | Description |
|---|---|---|---|---|---|---|
| 1 | - | 5 | 20 / Reset_N | CMOS | In | Hardware reset |
| 2 | 1 | - | 11 / P1_0 | 3.0 V | Out | IO pin capable of deliver 20 mA. For supplying external components. |
| 3, 25 | 4 | 1 | - | Ground | | GND |
| 4, 27 | - | 2 | - | 3.0 V | In | 2.0 - 3.6 VDC power supply. The module does not have an external voltage regulator mounted by default, but can be mounted for 3.0-6.0 VDC supply. Please contact connectBlue for more information. |
| 14-17, 19-22 | - | - | - | - | - | Reserved, do not connect. |
| 6 | - | - | 8 / P1_2 | CMOS | In | |
| 7 | - | - | 37 / P1_7 | CMOS | Out | |
| 8 | - | - | 6 / P1_4 | CMOS | In/Out | |
| 9 | - | - | 9 / P1_1 | CMOS | Out | |
| 10 | - | - | 15 / P0_4 | CMOS | In | UART0 (alt1) Clear To Send. Hardware flow control. Active low (multiplexed/connected with SPI-CS). |
| 11 | - | - | 16 / P0_3 | CMOS | Out | UART0 (alt1) Transmit Data. "0" : Low, "1" : High (multiplexed/connected with SPI-MOSI). |

| 12 | - | - | 14 / P0_5 | CMOS | Out | UART0 (alt1) Request To Send. Hardware flow control. Active low (multiplexed/connected with SPI-CLK) |
|----|---|---|-----------|------|-----|---|
| 13 | - | - | 17 / P0_2 | CMOS | In | UART0 (alt1) Receive Data. "0" : Low, "1" : High (multiplexed/connected with SPI-MISO) |
| 5 | - | 4 | 35 / P2_1 | CMOS | Out/ In/Out | Data Terminal Ready. Active low/ CC2540 Debug Data. |
| 18 | - | 3 | 34 / P2_2 | CMOS | In | Data Set Ready. Active low/ CC2540 Debug Clock. |
| 23 | - | - | 36 / P2_0 | CMOS | In | SPI interrupt signal. |
| 24 | - | - | 17 / P0_2 | CMOS | Master In/ Slave Out | SPI0 (alt2) master input slave output (multiplexed/connected with UART-RxD) |
| 26 | - | - | 14 / P0_5 | CMOS | Master Out/ Slave In | SPI0 (alt2) clock (multiplexed/connected with UART-RTS) |
| 28 | - | - | 16 / P0_3 | CMOS | Master Out/ Slave In | SPI0 (alt2) master output slave input (multiplexed/connected with UART-TxD) |
| 29 | - | - | 15 / P0_4 | CMOS | Master Out/ Slave In | SPI0 (alt2) chip select (multiplexed/connected with UART-CTS) |
| 30 | - | 4 | 35 / P2_1 | CMOS | In/Out | CC2540 Debug Data (multiplexed/connected with UART-DTR). |
| 31 | 2 | 6 | 19 / P0_0 | Analog (0-VCC) | In | Analog input. |
| 32 | 3 | - | 18 / P0_1 | Analog (0-VCC) | In | Analog input. |
| 33 | - | - | 13 / P0_6 | Analog (0-VCC) | In | Analog input. |
| 34 | - | - | 12 / P0_7 | Analog (0-VCC) | In | Analog input. |
| 35 | - | - | 5 / P1_5 | CMOS | Out | I²C-SCL: I²C clock. |
| 36 | - | - | 38 / P1_6 | CMOS | Out / Bidirectional | I²C-SDA: I²C Serial data. |

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## 3.5 Characteristics

### 3.5.1 Power supply

> ⚠ **NOTE**
>
> Read the Guidelines for Efficient and Safe Use before using the modules.

**Table 3: Power supply**

| Symbol | Parameter | | Value | Unit |
|--------|-----------|-----|-------|------|
| VCC | Power supply | Min | 2.0* | VDC |
| | | Max | 3.6* | VDC |

* The module does not have an external voltage regulator mounted by default but can be mounted for 3.0-6.0 VDC supply. Please contact connectBlue for more info.

**Table 4: Current consumption**

| Symbol | Mode | | | Value | Unit |
|--------|------|---|---|-------|------|
| $I_{CC}$ @ VCC = 3.0V | Not connected | Connectable, discoverable | Average | TBD | mA |
| | | | Peak | TBD | mA |
| | Not connected, stop mode enabled | Not connectable, not discoverable | Average | TBD | mA |
| | | | Peak | TBD | mA |
| | | Connectable, not discoverable | Average | TBD | mA |
| | | | Peak | TBD | mA |
| | | Connectable, discoverable | Average | TBD | mA |
| | | | Peak | TBD | mA |
| | Connected | Idle or Receiving | Average | TBD | mA |
| | | | Peak | TBD | mA |

| | Transmitting @TBD kbit/s | | Average | TBD | mA |
|---|---|---|---|---|---|
| | | | Peak | TBD | mA |

### 3.5.2 Input/Output signals

**Table 5: Input/output signals. VCC = 3.0V**

| Symbol | Parameter | | Value | | Unit |
|---|---|---|---|---|---|
| $V_{IN}$ Low | Logic LOW level input voltage | Min | -0.3 | | V |
| | | Max | 0.5 | | V |
| $V_{IN}$ High | Logic HIGH level input voltage | Min | 2.5 | | V |
| | | Max | 3.3 | | V |
| $V_{OUT}$ Low | Logic LOW level output voltage | Max | 0.5 | | V |
| $V_{OUT}$ High | Logic HIGH level output voltage | Min | 2.4 | | V |
| $I_{IO}$ | Sink and source current VCC_Peripheral and Blue Signal | Max | 20 | | mA |
| | Sink and source current all other IO pins | Max | 4 | | mA |
| $R_{IN\_PULL-UP}$ | Input signals (including $\overline{RESET}$) internal pull-up | Typ | 20 | | kOhm |
| $t_{Reset}$ | Reset pulse length | Min | 1 | | s |

See the TI CC2540 Data sheet for more information.

### 3.5.3 Environmental

**Table 6: Temperatures characteristics**

| Parameter | | Model | Value | Unit |
|---|---|---|---|---|
| Storage temperature | Min | Without JST connector | -40 | °C |
| | | With JST connector | -25 | °C |
| | Max | Without JST connector | +125 | °C |
| | | With JST connector | +85 | °C |

| Operating temperature | Min | Without JST connector | -40 | °C |
|---|---|---|---|---|
| | | With JST connector | -25 | °C |
| | Max | All | +85 | °C |

## 3.6 Hardware Reset

A hardware $\overline{\text{RESET}}$ input is available on the J6 and J8 connectors (see #Pin Numbering). An external reset source must be open drain collector, see section #Reset for design examples. The $\overline{\text{RESET}}$ pin is internally pulled-up with 15kOhm.

# 4 Antennas

This chapter gives a quality overview of the different antenna options.
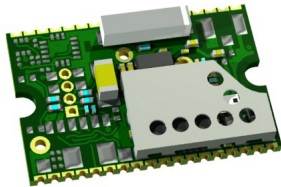
There are 2 different antenna options available:

- Internal surface mounted (SMD) antenna.
- An U.FL. connector for external antennas. Different types of external antennas are available.

The sections below lists the antennas that are included in the radio type approvals of the module. For each antenna the "Approvals" field defines in which test reports the antenna is included. Definitions of the "Approvals" field are:

- **FCC** - The antenna is included in the FCC test reports, and thus approved for use in countries that accept the FCC radio approvals, primarily US.
- **IC** - The antenna is included in the IC (Industrie Canada) test reports, and thus approved for use in countries that accept the IC radio approvals, primarily Canada.
- **R&TTE** - The antenna is included in the R&TTE test reports, and thus approved for use in countries that accept the R&TTE radio approvals, primarily the European countries.

In general, antennas with SMD antenna, Reverse Polarity SMA connector or U.FL connector are included in FCC, IC and R&TTE radio tests. Antennas with SMA connector are in general included in R&TTE radio tests but not FCC or IC due to FCC/IC regulations.

## 4.1 Surface Mounted Antennas (Internal)

| Part Number | OLx425i | |
|---|---|---|
| Antenna name | ANCG12G44SAA162 |  |
| Manufacture | muRata | |
| Gain | 0 dBi | |
| Antenna size (LxWxH) | 8.0 x 2.0 x 2.0 mm | |
| Comment | The antenna gain is very dependent of the mounting of the module.<br>See section Antenna Issues for mounting the module considering the antenna. | |

| Approval | FCC, IC and R&TTE | |
|----------|-------------------|---|

## 4.2 External antennas

The external antennas are connected to the board through a U.FL connector. Some of the antennas are connected directly to the U.FL connector of the board and some are connected using an SMA or reversed polarity SMA connector through a short U.FL to SMA or reversed polarity SMA adapter cable.

Antennas with a part number in the form "cB-ACC-XX" are available for orders via the connectBlue distribution network. For information about other antennas please contact connectBlue.

### 4.2.1 Antenna Accessories

| Part Number | cB-ACC-18 / cB-ACC-48 | |
|---|---|---|
| Name | U.FL to SMA adapter cable | |
| Connector | U.FL and SMA jack (outer thread and pin receptacle) | |
| Cable length | 120 mm | |
| Cable loss | Less than 0.5dB | |
| Comment | The SMA connector may be mounted in a panel. | |
| Approval | R&TTE | |

| Part Number | cB-ACC-38 | |
|---|---|---|
| Name | U.FL to reverse polarity SMA adapter cable | |
| Connector | U.FL and reverse polarity SMA jack (outer thread and pin) | |
| Cable length | 120 mm | |
| Cable loss | Less than 0.5dB | |
| Comment | The reverse polarity SMA connector may be mounted in a panel. | |

| Approval | FCC, IC and R&TTE | |
|----------|-------------------|--|

### 4.2.2 Recommended antennas

| Part Number | cB-ACC-61 | |
|---|---|---|
| Name | Ex-IT 2400 RP-SMA 28-001 | |
| Manufacture | ProAnt | |
| Polarization | Vertical | |
| Gain | +3.0 dBi | |
| Size | Ø 12.0 x 28.0 mm | |
| Connector | Reverse Polarity SMA plug (inner thread and pin receptacle) | |
| Comment | To be mounted on the U.FL to Reverse Polarity SMA adapter cable (cB-ACC-38). An SMA version antenna is also available but not recommended to use (Ex-IT 2400 SMA 28-001). | |
| Approval | FCC, IC and R&TTE | |

| Part Number | cB-ACC-63 | |
|---|---|---|
| Name | Ex-IT 2400 MHF 28 | |
| Manufacture | ProAnt | |
| Polarization | Vertical | |
| Gain | +2.0 dBi | |
| Size | Ø 12.0 x 28.0 mm | |
| Cable length | 100 mm | |

| Connector | U.FL. connector | |
|---|---|---|
| Comment | To be mounted on the U.FL connector on the PCB. | |
| Approval | FCC, IC and R&TTE | |

| Part Number | cB-ACC-64 | |
| --- | --- | --- |
| Name | Ex-IT 2400 RP-SMA 70-002 | |
| Manufacture | ProAnt | |
| Polarization | Vertical | |
| Gain | +3.0 dBi | |
| Size | Ø 10 x 83 mm | |
| Connector | Reverse Polarity SMA plug (inner thread and pin receptacle) | |
| Comment | To be mounted on the U.FL to Reverse Polarity SMA adapter cable (cB-ACC-38). An SMA version antenna is also available but not recommended to use (Ex-IT 2400 SMA 70-002). | |
| Approval | FCC, IC and R&TTE | |

| Part Number | cB-ACC-60 | |
| --- | --- | --- |
| Name | Ex-IT 2400 MHF 70-001 | |
| Manufacture | ProAnt | |
| Polarization | Vertical | |

| Gain | +3.0 dBi | |
|------|----------|---|
| Size | Ø 9.4 x 70.5 mm | |
| Cable length | 100 mm | |
| Connector | U.FL. connector | |
| Comment | To be mounted on the U.FL connector on the PCB. | |
| Approval | FCC, IC and R&TTE | |

| Part Number | cB-ACC-57 | |
|---|---|---|
| Name | InSide-2400 | |
| Manufacture | ProAnt | |
| Gain | +3.0 dBi | |
| Size | 27 x 12 mm (triangular) | |
| Cable length | 100 mm | |
| Connector | U.FL. connector | |
| Comment | To be mounted on the U.FL connector on the PCB. | |
| Approval | FCC, IC and R&TTE | |

| Part Number | cB-ACC-66 | |
|---|---|---|
| Name | FlatWhip-2400 | |
| Manufacture | ProAnt | |
| Gain | +3.0 dBi | |
| Size | Ø 50.0 x 30.0 mm | |
| Connector | SMA plug (inner thread and pin) | |
| Comment | To be mounted on the U.FL to SMA adapter cable. | |
| Approval | R&TTE | |

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| Part Number | cB-ACC-67 | |
|---|---|---|
| Name | Outside-2400 | |
| Manufacture | ProAnt | |
| Gain | +3.0 dBi | |
| Size | 36.0 x 18.0 x 16.0 mm | |
| Cable length | 70 mm | |
| Connector | U.FL. connector | |
| Comment | To be mounted on the U.FL connector on the PCB. | |
| Approval | FCC, IC and R&TTE | |

### 4.2.3 Alternative antennas

The alternative antennas are available for backward compatibility but not recommended for new designs.

| Part Number | cB-ACC-16 / cB-ACC-36 | |
|---|---|---|
| Name | WCR2400-SMA / WCR2400-SMRP | |
| Manufacture | Laird Technologies/ Centurion | |
| Polarization | Vertical | |
| Gain | +2.0 dBi | |
| Size | 100 mm (Straight) | |
| Connector | cB-ACC-16: SMA plug (inner thread and pin)<br>cB-ACC-36: Reverse Polarity SMA plug (inner thread and pin receptacle) | |
| Comment | cB-ACC-16 is to be used together with the U.FL to SMA adapter cable (cB-ACC-18 or cB-ACC-48).<br>cB-ACC-36 is to be used together with the U.FL to Reverse Polarity SMA adapter cable (cB-ACC-38). | |
| Approval | cB-ACC-36: FCC, IC and R&TTE<br>cB-ACC-16: R&TTE | |

| Part Number | cB-ACC-27 / cB-ACC-29 | |
|---|---|---|
| Name | WCR-2400-IP04 / WCR-2400-IP10 | |
| Manufacture | Laird Technologies/ Centurion | |
| Polarization | Vertical | |
| Gain | +2.0 dBi | |

| Size | 108 mm (Straight) | |
|---|---|---|
| Cable length | cB-ACC-27: 100 mm<br>cB-ACC-29: 250 mm | |
| Connector | U.FL. connector | |
| Comment | To be mounted on the U.FL connector on the PCB. | |
| Approval | FCC, IC and R&TTE | |

| Part Number | cB-ACC-23 | |
|---|---|---|
| Name | PSTG0-2400HS |  |
| Manufacture | Mobile Mark Communications Antennas | |
| Polarization | Vertical | |
| Gain | 0 dBi | |
| Size | Ø 9.5 x 26 mm | |
| Connector | SMA plug (inner thread and pin) | |
| Comment | To be used together with the U.FL to SMA adapter cable (cB-ACC-18 or cB-ACC-48).<br>An alternative Reverse Polarity SMA version antenna is available (PSTG0-2400HRS). | |
| Approval | R&TTE | |

| Part Number | cB-ACC-28 | |
|---|---|---|
| Name | NanoBlue-IP04 |  |
| Manufacture | Laird | |
| Polarization | Linear | |
| Gain | +2.0 dBi | |
| Size | 47.8 x 12.7 x 0.9 mm | |
| Cable length | 100 mm | |

| Connector | U.FL. connector | |
|---|---|---|
| Comment | To be mounted on the U.FL connector on the PCB. | |
| Approval | FCC, IC and R&TTE | |

| Part Number | cB-ACC-17 / cB-ACC-37 | |
|---|---|---|
| Name | Reel planTec Bluetooth m70 | |
| Manufacture | REEL | |
| Gain | +1.0 dBi | |
| Size | Ø 75 x 20 mm | |
| Mounting | M16 x 13.6 mm | |
| Connector | cB-ACC-17: SMA plug (inner thread and pin)<br>cB-ACC-37: Reverse Polarity SMA plug (inner thread and pin receptacle) | |
| Cable length | 300 cm. Other cable lengths are available on request. | |
| Comment | cB-ACC-17 is to be used together with the U.FL to SMA adapter cable (cB-ACC-18 or cB-ACC-48).<br>cB-ACC-37 is to be used together with the U.FL to Reverse Polarity SMA adapter cable (cB-ACC-38). | |
| Approval | cB-ACC-37: FCC, IC and R&TTE.<br>cB-ACC-17: R&TTE. | |

| Part Number | cB-ACC-21 | |
|---|---|---|
| Name | R380.500.127 | |
| Manufacture | Pulse | |
| Polarization | Vertical | |

| Gain | +2.0 dBi | |
| --- | --- | --- |
| Size | Ø 14.3 x 61.4 mm | |
| Connector | SMA plug (inner thread and pin) | |
| Comment | To be mounted on the U.FL to SMA adapter cable (cB-ACC-18 or cB-ACC-48).<br>A Reverse Polarity SMA version is also available (R380.500.125). | |
| Approval | R&TTE | |

| | | |
| --- | --- | --- |
| Gain | +2.0 dBi | |
| Size | Ø 14.3 x 61.4 mm | |

| Part Number | — | |
|---|---|---|
| Name | R380.500.139 | |
| Manufacture | Pulse | |
| Polarization | Vertical | |
| Gain | +2.0 dBi | |
| Size | Ø 14.3 x 61.1 mm | |
| Connector | Reverse Polarity SMA plug (inner thread and pin receptacle) | |
| Comment | The difference compared to the R380.500.125 antenna is that the R380.500.139 antenna has a seal ring.<br>To be mounted on the U.FL to Reverse Polarity SMA adapter cable (cB-ACC-38).<br>An SMA version antenna is also available (R380.500.124). | |
| Approval | FCC, IC and R&TTE | |

| Part Number | — | |
|---|---|---|
| Name | IHF-242 | |
| Manufacture | Joymax | |
| Polarization | Vertical | |
| Gain | +2.0 dBi | |

| Size | Ø 9.2 x 82.5 mm | |
|------|-----------------|---|
| Cable length | 150 cm | |
| Connector | MCX male connector | |
| Comment | To be mounted on a MCX to U.FL adapter cable. | |
| Approval | FCC, IC and R&TTE | |

# 5 Mechanics

## 5.1 Module Outlines
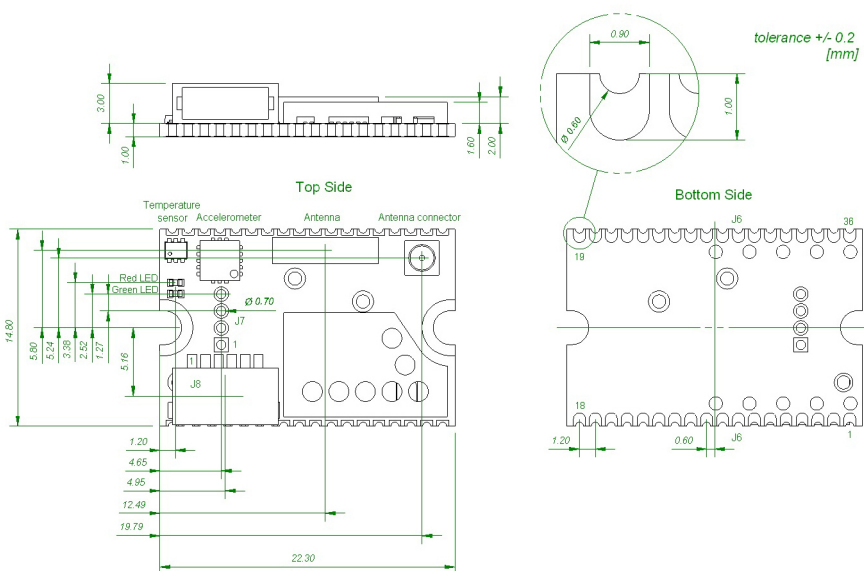
### 5.1.1 Module dimensions



**Figure 7: cB-OLx425 module dimensions.**

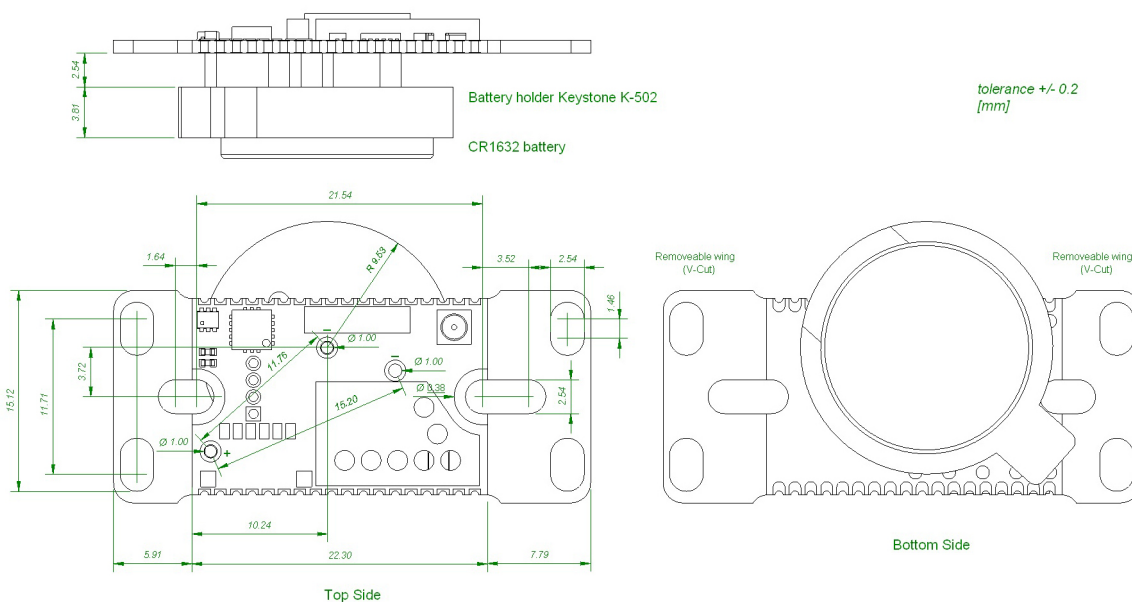### 5.1.2 Battery holder and mounting wings dimensions



**Figure 8: cB-OLx425 dimensions with mounting wings (optional) and CR1632 battery holder.**

Weight: <1 g

### 5.1.3 Using the J6 PCB solder pads

### 5.1.4 Host Board

The host PCB footprint should not contain any traces or vias under the module except the pads interfacing the J6 pads to avoid contact with traces/vias on the module. The host pads which are soldered to the J6 pads should have the same size as the module and can be extended some mm outside the module for manual soldering or inspection purpose. No other pads than the J6 should be soldered to the host PCB.

### 5.1.5 Mounting process

We strongly recommend the modules not being soldered more than 1 time after shipping from connectBlue and that the modules are mounted just before the host product is being soldered the last time. Although, connectBlue devices will withstand up to two reflows to an absolute maximum temperature of 250°C.

- The PCB in our modules is made of FR4-type with Chemical Gold Pads.
- The modules are produced in a lead-free process with a lead-free soldering paste.
- It is recommended that the customers make their own electrical, climate, stress and vibration tests on the final assembled product to secure that the manufacturing process hasn't damaged or affected the Bluetooth module in any way.
- The modules are normally delivered without labels on each module when packaged on tape-and-reel or tray since the labels do not withstand soldering. However, if they are delivered with labels on each module, the labels should be removed before the module is processed since the labels do not withstand the heat of soldering.
- The device recommended maximum re-flow temperature is 245°C for 10 sec.
- The device absolute maximum re-flow temperature is 250°C for 3 sec.

## 5.2 Antenna Issues

The unit cannot be mounted arbitrary, because of the radio communication. The unit with an internal surface mounted antenna (cB-OLx425i) cannot be mounted in a metal enclosure. No metal casing or plastics using metal flakes should be used, avoid also metallic based paint or lacquer. Keep a minimum clearance of 5 mm between the antenna and the casing. Keep minimum 10 mm free space from metal around the antenna including under and above. If a metal enclosure is required, one of the external antenna options has to be used. See Surface Mounted Antenna (Internal) for more information on the antenna options available.

# 6 Bluetooth Information

## 6.1 General information

In the tables below you can find information about Bluetooth properties. The conducted output power of the cB-OLx425 device is ~3 dBm (2mW).

**Table 10: Bluetooth information cB-OLx425**

| Parameter | Data |
|---|---|
| Bluetooth Low Energy radio | Texas Instrument CC2540F256 |
| RF output power (conducted - excluding antenna gain) | ~3dBm |
| Receive sensitive level | TBD dBm |
| Output frequency | 2.402 - 2.480 GHz, ISM band. |
| Bluetooth standard | 4.0 (single mode / Bluetooth Smart) |

# 7 Regulatory Information

> ⊖ **WARNING**
>
> Radio type approvals and certifications are currently in progress and not yet completed. The information in this section is provided only for reference of what approvals are to be available when the approval process is completed.

## 7.1 Declaration of Conformity

# $C\,\epsilon\,0678$ ①

We, **connectBlue AB**, of **Norra Vallgatan 64 3V**
**SE-211 22 Malmö, Sweden**

declare under our sole responsibility that our products:

cB-OLP425 and cB-OLS425 (cB-0950), OEM Module Adapter III (cB-0068).

to which this declaration relates, conforms to the following product specifications:

**R&TTE Directive 1999/5/EC:**

Effective use of frequency spectrum:
  EN 300 328 V1.7.1 (2006-10)

EMC:
  EN 301 489-1 V1.8.1 (2008-04)
  EN 301 489-17 V2.1.1 (2009-05)
  EN 61000-6-2 (2005)

Health and safety:
  EN 50371:2002
  EN 60950-1:2006 + A11:2009 and/or IEC 60950-1:2005 ($2^{nd}$ Edition)

**Medical Electrical Equipment**

  IEC 60601-1-2 (2007)

> ⊖ The license could not be verified: There is no license certificate installed for CustomWare Scaffolding Plugin for Confluence.

## 7.2 Safety Compliance

In order to fulfill the safety standard EN 60950-1 the unit must be supplied by a limited power source.

# 7.3 FCC and IC Compliance

See the #Product Variants section for information about the different product variants.

## 7.3.1 Compliance for cB-0950

### 7.3.1.1 FCC Statement for cB-0950

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

> ⚠️ **NOTE**
>
> 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.

### 7.3.1.2 Antenna

Our module type cB-0950 is for OEM integrations only. The end-user product will be professionally installed in such a manner that only the authorized antennas are used.

### 7.3.1.3 Caution

Any changes or modifications NOT explicitly APPROVED by connectBlue AB could cause the module to cease to comply with FCC rules part 15, and thus void the user's authority to operate the equipment.

### 7.3.1.4 IC Compliance

Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This device has been designed to operate with an antenna having a maximum gain of 3.5 dBi.
Having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.
To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website www.hc-sc.gc.ca/rpb

### 7.3.1.5 Labeling Requirements for End Product

For an end product using the product cB-0950 there must be a label containing, at least, the following information:

> This device contains
> FCC ID: PVH0950
> IC: 5325A-0950

The label must be affixed on an exterior surface of the end product such that it will be visible upon inspection in compliance with the modular approval guidelines developed by the FCC.

In accordance with 47 CFR § 15.19 the end product shall bear the following statement in a conspicuous location on the device:

"This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions;

(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation."

When the device is so small or for such use that it is not practicable to place the statement above on it, the information shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC ID label must be displayed on the device.

In case, where the final product will be installed in locations where the end-user is not able to see the FCC ID and/or this statement, the FCC ID and the statement shall also be included in the end-product manual.

## 7.4 UL listing information

If a customer intends to UL list a product including any of the Bluetooth modules based on the PCB cB-0950 this information is useful:

The printed circuit board if produced according to the following specification:

- UL recognized ZPMV2 min. 105 °C flame class V-0 or better.

## 7.5 Compliance with RoHS directive

All products based on the PCB cB-0950 are produced according to the RoHS (Restriction of the use of certain Hazardous substances in electrical and electronic equipment) directive and complies with the directive.

# 8 Guidelines for Efficient and Safe Use

## 8.1 General

Read this information before using your module.

For any exceptions when using your Bluetooth module, due to national requirements or limitations, please visit www.bluetooth.org.

> ⛔ **WARNING**
>
> Changes or modifications to the product not expressly approved by connectBlue AB will void the user's authority to operate the equipment.

## 8.2 Product Care

- Do not expose your product to liquid or moisture.
- Do not expose you product to extreme hot or cold temperature (see section #Environmental for further information).
- Do not expose your product to lit candles, cigarettes, cigars, open flames, etc.
- Do not drop, throw or try to bend your product since rough treatment could damage your product.
- Do not attempt to disassemble your product. Doing so will void warranty. The product does not contain consumer serviceable or replaceable components. Service should only be performed by connectBlue AB.
- Do not paint your product as the paint could prevent normal use.
- If you will not be using your product for a while, store it in a place that is dry, free from damp, dust and extreme heat and cold.
- The clearance and creepage distances required by the end product must be withheld when the module is installed.
- The cooling of the end product shall not negatively be influenced by the installation of the module when the module is installed.

## 8.3 Radio Frequency Exposure

The module contains a small radio transmitter and receiver. During communication with other Bluetooth products the module receives and transmits radio frequency (RF) electromagnetic fields (microwaves) in the frequency range 2400 to 2500 MHz. The output power of the radio transmitter is very low.

When using the module, you will be exposed to some of the transmitted RF energy. This exposure is well below the prescribed limits in all national and international RF safety standards and regulations.

## 8.4 Electronic Equipment

Most modern electronic equipment, for example, in hospitals and cars, is shielded from RF energy. However, certain electronic equipment is not. Therefore:

> ⚠️ **NOTE**
>
> This equipment emits RF energy in the ISM (Industrial, Scientific, Medical) band. Please insure that all medical devices used in proximity to this device meet appropriate susceptibility specifications for this type of RF energy.

## 8.5 Potentially Explosive Atmospheres

Turn off your electronic device before entering an area with potentially explosive atmosphere. It is rare, but your electronic device could generate sparks. Sparks in such areas could cause an explosion or fire resulting in bodily injury or even death.

Areas with a potentially explosive atmosphere are often, but not always, clearly marked. They include fuelling areas, such as petrol station, below deck on boats, fuel or chemical transfer or storage facilities, and areas where the air contains chemicals or particles, such as grain, dust, or metal powders.

## 8.6 Power Supply

The OEM module must be supplied by a limited power source according to EN 60950-1.

- Connect your power supply only to designated power-sources as marked on the product.
- Make sure all cords and cable are positioned so that they will not be stepped on, tripped over or otherwise subject to damage or stress.
- To reduce risk of electric shock, unplug the unit from any power source before attempting to clean it.