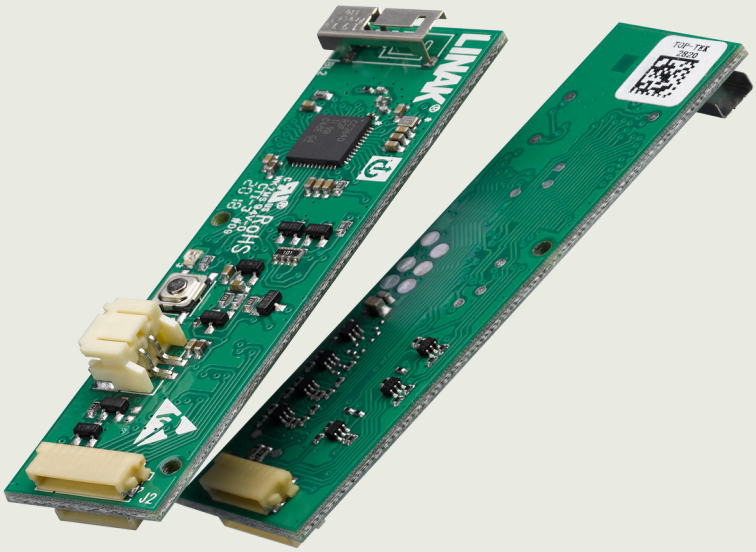
Analogue to Bluetooth® Low Energy - ABL
Data Sheet



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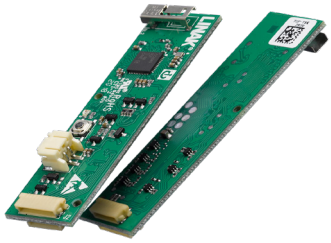
Introduction



With the small ABL print it is possible to convert analogue input to Bluetooth Low Energy. The ABL print can be used as attendant control or hand control integrated in side rails in for instance healthcare applications and offers easy access to different positioning functions.

The ABL is a 2-sided PCBA for conversion of switches into Bluetooth commands. This can be used in specific OEM controls, such as side rails, hand controls, foot controls, touch panels.

Another benefit is the high and easy adaption to customer applications for easy build-in.

The ABL print can be used for third party products. Specific software makes it possible to control applications where wireless control is preferable.

Features and options

Input number and type:	10 analogue inputs
Output number and type:	4 open collector outputs
Battery:	Prepared for battery operation (3-3.3V)
Battery lifetime:	CR2032: 2 years w. 140 seconds daily usage. 2 x AAA: 4 years w. 140 seconds daily usage.
Current consumption:	3.7 mA during activation
Housing:	Circuit board without housing
IP rating:	No IP rating as standard. The customer must ensure a proper application design and built-in of the PCBA to achieve the correct IP degree (e.g. IPX4)
Cables:	Not included To be ordered separately - see Ordering Example page
Number of connectors:	3
Pairing:	LINAK standard pairing procedure

Usage

Operation temperature:	+5 °C to +40 °C
Storage temperature:	-10 °C to +50 °C
Compatibility:	Compatible with LINAK Bluetooth Low Energy (BLE) control boxes. Please contact LINAK. See sales backup Chapter 3 Compatibility.
Relative humidity:	20% to 80% – non-condensing
Atmospheric pressure:	700 to 1060 hPa
Meters above sea level:	Max. 3000 meters
Approvals:	- IEC60601-1 - ANSI/AAMI ES60601-1 - CAN/CSA-22.2 No 60601-1

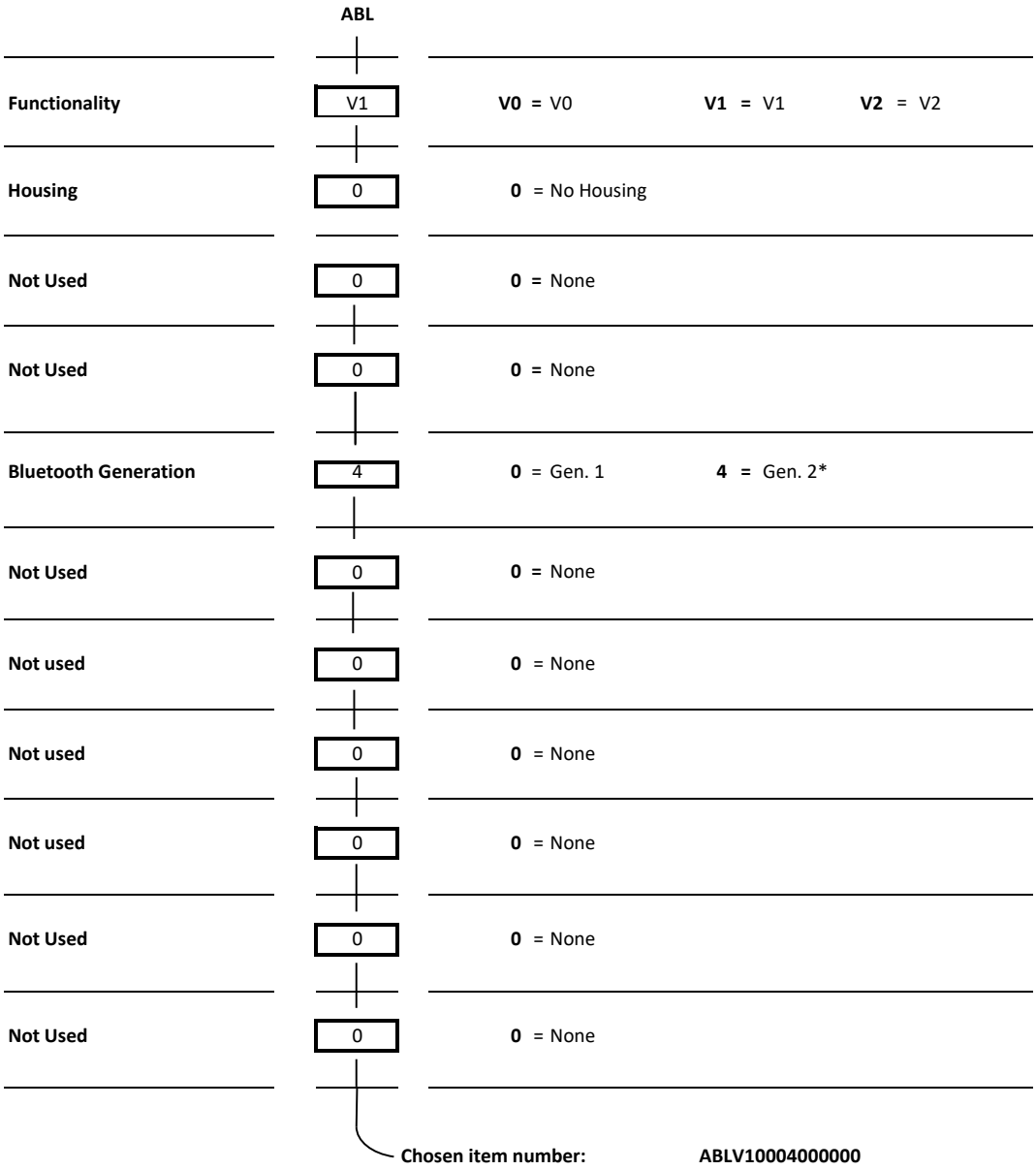
Liability Agreement

For ABL the following is applicable:

The OEM customer must sign a Liability agreement - QA-88-09-001. This agreement covers handling of LINAK PCBA in general.

The signed liability agreement must be added to the system specification.

Ordering Example



* For further BLE information, see sales backup ‘Chapter 11.02 Bluetooth Low Energy’.

Approvals and certifications

For approval documentation, LINAK recommends specifying the product type instead of individual item numbers to ensure broader approval coverage and simplify future product changes.

Listed LINAK item for application approval: ABL

If this is not possible, we advise being as non-specific as possible when specifying LINAK products in your approval application:

Listed LINAK item for application approval: ABL***SS*SSSSSS

" * " is not safety critical and we recommend including a non-specific signifier such as an asterisk.

" S " is safety critical and represents a listed critical component in the product and cannot be left out.

For more information, please refer to "Approvals and certifications" in LINAK Application Design Recommendations found under User Manual for any given product on LINAK.com

Cable ordering

10P inputs connector (J2):

On PCB:

- Manufacturer part number: CI1410M1HRI-NH
- Manufacturer: CVILUX

Mates with cables with PH-connector (housing and terminals):

- Housing part number: CI1410SL00C-NH
- Terminals: CI14T011 PEO

LINAK part number for 150mm open-end cable: 0965366

8P inputs/outputs connector (J3):

On PCB:

- Manufacturer part number: CI1408M1HRI-NH
- Manufacturer: CVILUX

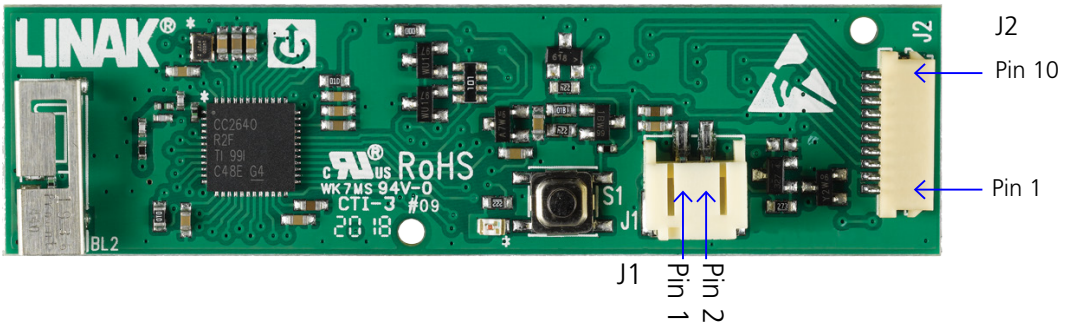
Mates with cables with PH-connector (housing and terminals):

- Housing part number: CI1408SL00C-NH
- Terminals: CI14T011 PEO

LINAK part number for 150mm open-end cable: 0965367

Connectors on PCBA

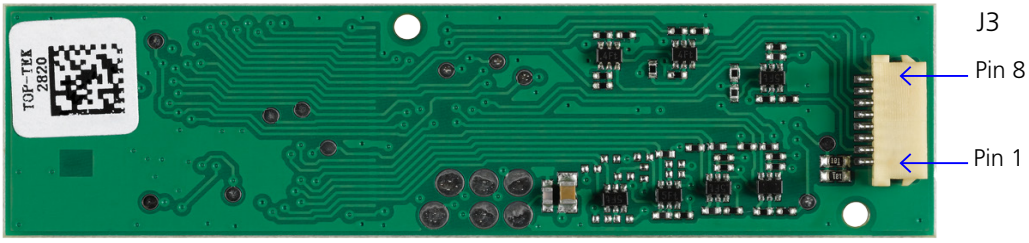
Top side



J2

Pin	Connection	Bluetooth Low Energy command (V0/V1/V2)
3 (input)	Active when connected to pin 2 (GND)	I0/I10/I20
4 (input)		I1/I11/I21
5 (input)		I2/I12/I22
6 (input)		I3/I13/I23
7 (input)		I4/I14/I24
8 (input)		I5/I15/I25
9 (input)		I6/I16/I26
10 (input)		I7/I17/I27

Bottom side



J3

Pin	Connection	Bluetooth Low Energy command (V0/V1/V2)
2 (input)	Active when connected to pin 8 (GND)	I8/I18/I28
3 (input)		I9/I19/I29
4 (output)	Voltage between this pin and pin 1 is equal to supply voltage on J1 when LED is active	LED1/LED11/LED21
5 (output)		LED2/LED12/LED22
6 (output)		LED3/LED13/LED23
7 (output)		LED4/LED14/LED24

External supply voltage

- Connect through J1
    - Pin 1: +
    - Pin 2: -
- Includes reverse polarity protection for J1
- Operational voltage:
    - Minimum: 2.2V
    - Absolute maximum voltage: 3.8V
- Current consumption: 3.7 mA during activation

Inputs

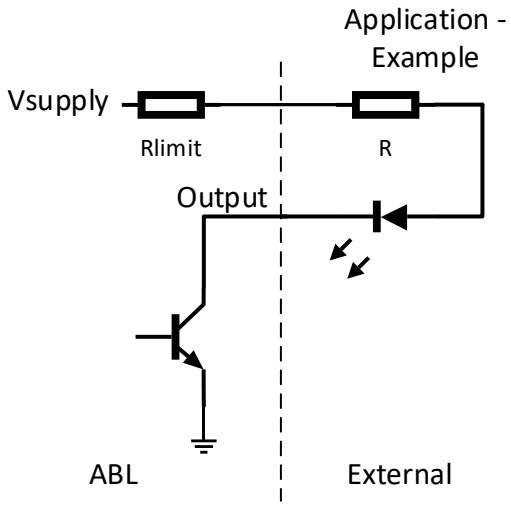
- 0 active-low inputs:
    - When input is active, it is connected to GND terminal (pin 2 on J2, pin 8 on J3)
    - Required impedance for activation of an input < 1kΩ

Outputs

- 4 open-collector outputs (active-low). Requires external pull-up to pin 1 on J3.
- Pin 1 on J3: Connection from supply voltage with output impedance: 50Ω.

Connectors

Circuit output



Connector part names

- 2P Supply voltage connector (J1):

  On PCB: 2P PH-connector
  - Manufacturer part number: S2B-PH-SM4-TB
  - Manufacturer: JST

  Mates with cables with PH-connector (housing and terminals):

  - Housing part number: PHR-2
  - Terminals part number: SPH-002T-P0.5S, SPH-002T-P0.5L or SPH-004T-P0.5S, depending on cable dimensions

- 10P inputs connector (J2):

  On PCB:

  - Manufacturer part number: CI1410M1HRI-NH
  - Manufacturer: CVILUX

  Mates with cables with PH-connector (housing and terminals):

  - Housing part number: CI1410SL00C-NH
  - Terminals: CI14T011 PEO

  LINAK part number for 150mm open-end cable: 0965366

- 8P inputs/outputs connector (J3):

  On PCB:

  - Manufacturer part number: CI1408M1HRI-NH
  - Manufacturer: CVILUX

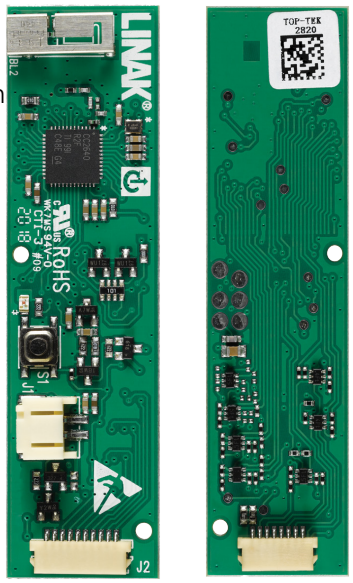
  Mates with cables with PH-connector (housing and terminals):

  - Housing part number: CI1408SL00C-NH
  - Terminals: CI14T011 PEO

  LINAK part number for 150mm open-end cable: 0965367

ABL pairing

Direct Pairing button
-
similar to FS3BLE



Direct Pairing can also be initiated by activating pin 3 and 4 on J2 and pin 2 on J3 simultaneously.
Confirm on pin 3, J2.

For details on LINAK® Bluetooth® Low Energy , please see Sales Backup Chapter 11.02.

ABL - commands and pairing

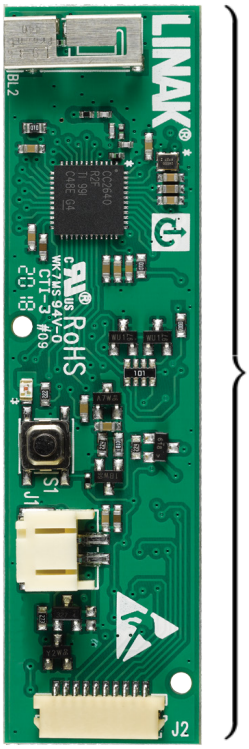
Function	Details	Default		
Direct Pairing Activation	To enter Direct Pairing mode.	S1 (Tactile switch next to battery connector)	OR	Pin 3 (J2) + Pin 4 (J2) + Pin 2 (J3) Connected simultaneously to GND
Direct Pairing Confirmation	To confirm Direct Pairing	S1 (Tactile switch next to battery connector)	OR	Pin 3 (J2)
OEM ID and type	Used to filter in CB whitelist	OEM ID: 000000001		
		OEM type: 2000 (ABL V0) 2001 (ABL V1) 2002 (ABL V2)		

Dimensions

All dimensions are in mm.

W = 20 mm

H = 10 mm



L = 75 mm

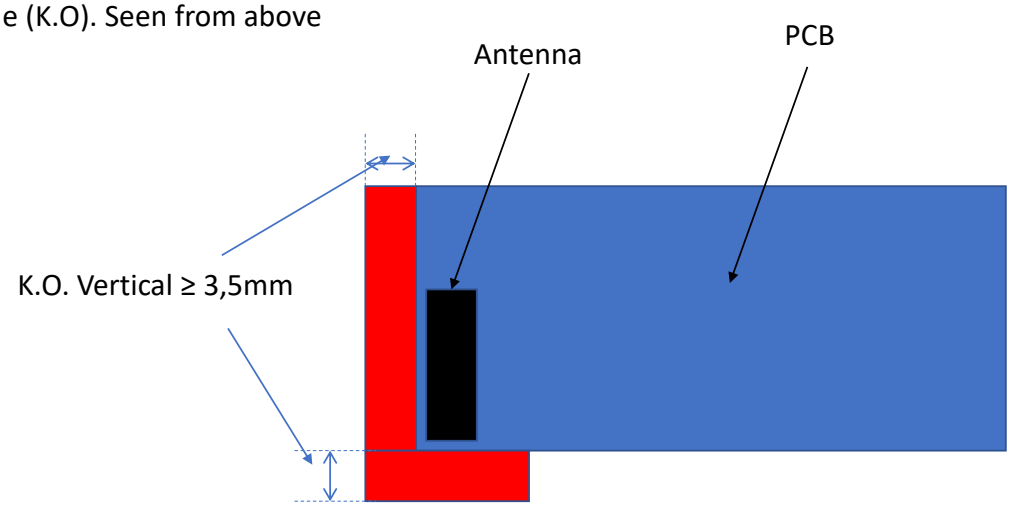
Mounting

When mounting the PCBA print in a housing be aware of the minimum recommended distance between antenna and housing – see drawings below.

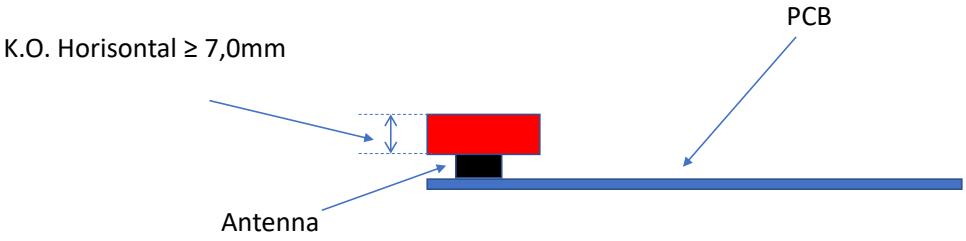
The housing material should be non-conducting due to the BLE signal.

The customer is responsible for testing and ensuring the BLE performance/range of the final system.

Keep out zone (K.O). Seen from above



Keep out zone (K.O). Side view



Recommendations

- The customer responsibility includes making a proper design of the cable strain relief inside the side rail panel.
- The customer should consider the existence of vibrations when defining and specifying the housing, i.e. we recommend the customer to carry out a vibration test on the final product.
- The customer must ensure a proper IP rating/test.
- The customer must ensure proper drop testing according to IEC60601-2-52.
- §201.15.3.4.1. In this clause there is an additional reference to IEC60601-2-31.
- The customer is responsible for correct mounting of the PCBA. Among other things, it means
    - ensuring proper and safe mounting of the PCBA into for instance the side rail.
    - ensuring proper and correct mounting between key pad connection tails and the ABL PCBA.
    - ensuring proper and correct mounting of the key pad.
    - the customer should consider proper precautions against ESD (Electrostatic discharge).
- When handling ESDS (Electrostatic Discharge Sensitive) devices – e.g. during trans- port, storage, handling, production or mounting in an application - exposure to harmful ESD must be avoided.
- Consider proper creepage and clearance measures to fulfil IEC 60601. With One MOPP (One Means Of Patient Protection / Secondary side of the actuator system)
- It is not recommended to dismount the membrane front cover after mounting as this may cause damage.

Wireless risks and recommendations

Due to some customer concerns regarding the range of BLE, LINAK decided to set the RF sensitivity and the transmit power settings to a maximum. In addition to that, LINAK Standard BLE allows pairing all the time.

Risk 1

If a BLE hand control is to be paired with an application, this can be done without coming closer to the application, as the above-mentioned settings are at a maximum. In such a scenario, there is a risk of pairing with another application from a longer distance as opposed to the distance of the application you want to pair with. The rule is that a BLE hand control is paired with the closest BLE device that it detects, however, the BLE device is not always physically closest.

Recommendation for Risk 1

The pairing process must always be made in near proximity to the application. It must also be ensured that the pairing is done with the correct application by simply operating the application after the pairing process.

Risk 2

In case that there are more LINAK BLE applications in a building and the BLE hand controls are accidentally swapped, there is a risk of operating another BLE application if within range. This can cause unintended movement and can have severe consequences for the patients' health.

Recommendation for Risk 2

When intending to operate an application with LINAK BLE, it must be ensured that the correct BLE hand control is used. Otherwise, there is a risk of unintended movement of the application that has been paired with the BLE control.

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