

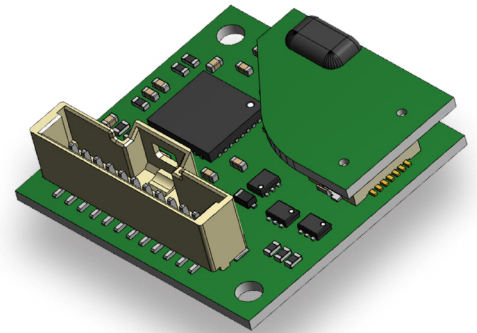
EBx7914

Incremental Sensor Module with optional Reference

The EBx7914 sensor module, with its various sensor variants in combination with a high resolution interpolation ASIC, offers a wide range of possible applications.

The sensor signals are processed differentially and are available as quadrature signals. In addition, the module offers an SPI-Interface.

The sensor module is very compact and can be easily integrated. In one variant the sensor module is equipped with a TMR FreePitch sensor and thus becomes a 360 degree absolute encoder for the shaft end.



Quick Reference Guide

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{CC}	Supply voltage	3.1	3.3	3.6	V
I_c	Current consumption	-	40	-	mA
F	Flanks per pitch	4	4096	1.048.576	-
T_{amb}	Ambient temperature	-25	-	+105	°C

Measurement Setup

Depiction	Configuration	Application
	EBI7914 with one linear magnetic scale	Incremental length measurement
	EBR7914 with two linear magnetic scales	Absolut length measurement with reference mark
	EBI7914 with one rotary magnetic scale	Incremental angle measurement
	EBR7914 with two rotary magnetic scales	Absolut angle measurement with reference mark
	EBI7914 with TA903 and a dipol magnet at the end of the shaft	360 degree measurement at the end of the shaft

Features

- Adjustable resolution up to 20 bit / 1.048.576 flanks/pitch
- A/B/Z differential output signal TTL
- Included RAW-signal interface for future extensions
- A reference extension board is available (reference signal once per revolution)
- Temperature range from -25 °C to +105 °C

Advantages

- High resolution
- Compact and well integrated design
- Auto calibration in field for high resolution and performance

Applications

Incremental encoder for linear or rotary movements in various industrial applications, for example:

- Motor integrated encoder
- Motor feedback system
- Linear position measurement

Especially TA903: Angle measurement 360 degree absolute at the end of shaft.



ESD

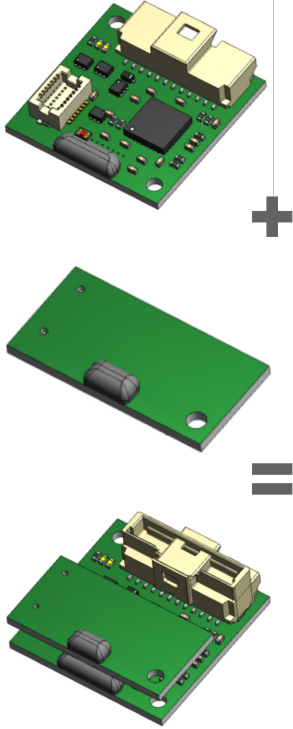


Product Overview

Article	Output Type	Reference	Description
EBI7914xxx-xx-xx	digital	-	Sensor module for different magnetic scales with a digital differential A-/B- Output and programmable resolution.
EBR7914xxx-xx-xx	digital	X	Sensor module for different magnetic scales with a digital A-/B- Output with programmable resolution and referenz signal (Z-Output). An additional magnetic scale with reference track is needed).

Article	Sensor	Pitch	Mechanical Working Distance Range	Typ. Mechanical Working Distance	Unit
EBx7914-AKx-Cx-xx	AL795	0.5	0.05 ... 0.2	0.15	mm
EBx7914-CKx-Cx-xx	AL798	1.0	0.3 ... 0.5	0.5	mm
EBx7914-EKx-Cx-xx	AL796	2.0	0.5 ... 1.5	0.7	mm
EBx7914-HKx-Cx-xx	AL797	2.5	0.5 ... 1.25	1.0	mm
EBx7914-IKx-Cx-xx	AL780	5.0	1.0 ... 3.0	2.0	mm
EBI7914-VKx-Cx-xx	TA903	FreePitch	-	-	-

Notice: Please note in use with a pole ring the ideal mechanical working distance depends on the resulting sensor pitch on the position of the sensor.



EBI7914

The EBI7914 sensor module in its compact construction method can be used for incremental measurement at magnetic scales. It provides differential output signal A/B.

Reference board (optional)

The optional reference board can be used together with a suitable magnetic scale to detect an additional magnetic reference.

EBR7914

The reference board patch extends the sensor module to provide additional differential signals Z. This sensor module is called EBR7914.

Fig. 1: Comparison of EBI7914 and EBR7914.

Absolute Maximum Ratings

In accordance with the absolute maximum rating system (IEC60134).

Symbol	Parameter	Min.	Max.	Unit
V_{CC}	Supply voltage	-3.1	+3.6	V
T_{amb}	Ambient temperature	-25	+105	°C
T_{stg}	Storage temperature	-25	+85	°C

Stresses beyond those listed under "Absolute maximum ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Electrical Data

Digital Output Type, $T_{amb} = 25\text{ °C}$; $V_{CC} = 3.3\text{ V}$; unless otherwise specified.

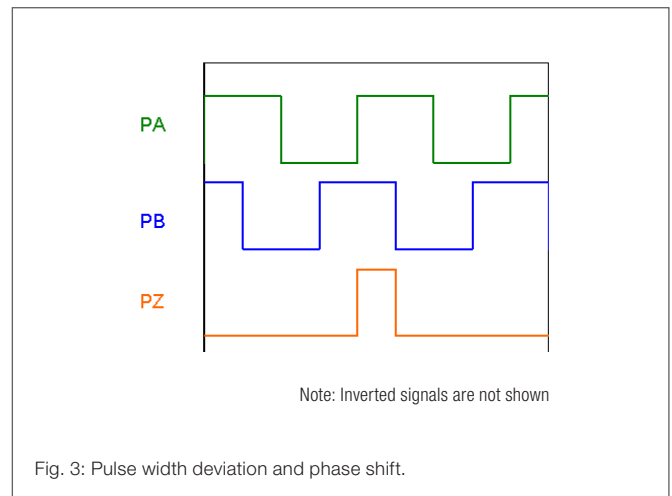
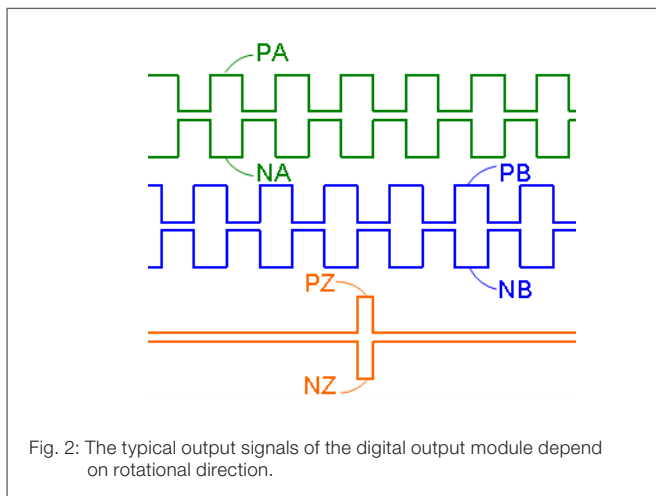
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{CC}	Supply voltage		3.1	3.3	3.6	V
I_C	Current consumption	No load	-	40	-	mA
F	Flanks per pitch ¹⁾		-	-	16384	-
f_{in}	Maximum input frequency ¹⁾		10	-	700	kHz
Hys	Hysteresis ²⁾		tbd	tbd	tbd	deg
$I_{out,pin}$	Current per output (source and sink)		0	-	50	mA
V_{outH}	Output high level	$I_{source} = 20\text{ mA}$	-	1.0	1.65	V
V_{outL}	Output low level	$I_{sink} = 20\text{ mA}$	0.0	-	0.4	V

¹⁾ Depends on programmed resolution.

²⁾ Programmable feature.

Typical Performance Graphs

Digital Output Type



Pinning EBx7914

Pad	Symbol	Color ¹⁾
1	Z-	brown
2	Z+	white
3	B-	pink
4	B+	grey
5	A-	yellow
6	A+	green
7	GND	blue
8	V _{CC} (3V3)	red
9	xSS	blue / red
10	SO	pink / grey
11	SI	violett
12	SCLK	black

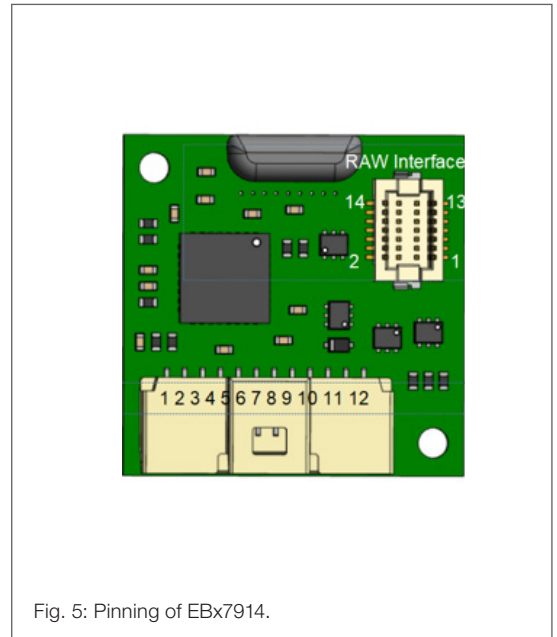


Fig. 5: Pinning of EBx7914.

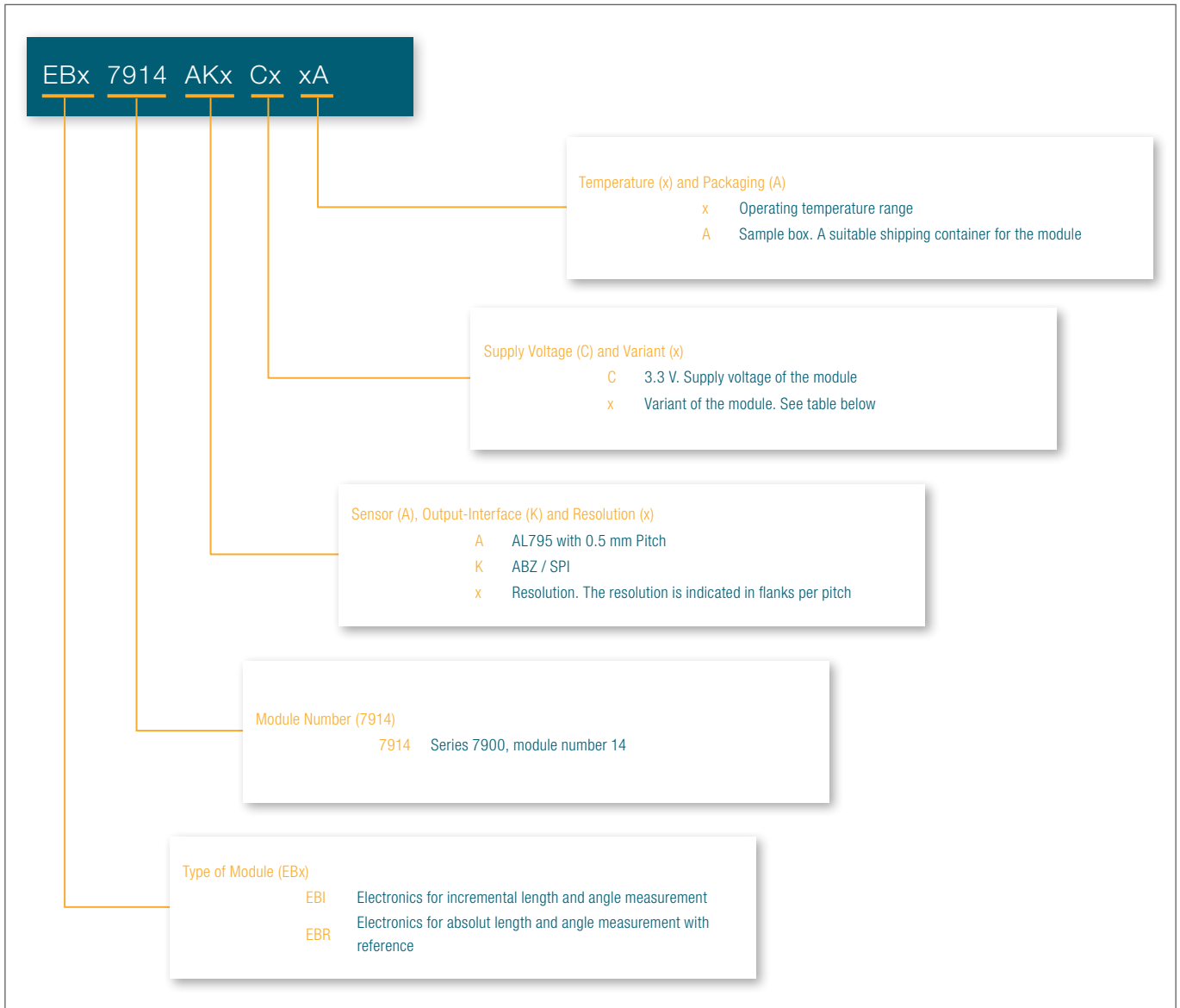
¹⁾ Color of our standard cable, Order number 5112.7010.0.

Electrical Data

Pad	Symbol	Parameter	Additional information
1	Z-	Reference Output Z-	Differential signal output with push-pull driver. For optimal signal transmission. Signal Z is logically linked to signal A, B and the magnetic reference scale.
2	Z+	Reference Output Z+	
3	B-	Incremental Output B-	Differential signal output with push-pull driver. For optimal signal transmission. Signal B 90 degree phase shifted to signal A for direction detection.
4	B+	Incremental Output B+	
5	A-	Incremental Output A-	Differential signal output with push-pull driver. For optimal signal transmission. Signal A 90 degree phase shifted to signal B for direction detection.
6	A+	Incremental Output A+	
7	GND	Ground	Ground
8	V _{CC}	Supply voltage 3.3 V	Typically 3.3 V (3.1 V to 3.6 V)
9	xSS	SPI Slave Select Input	Connects to SPI master slave select output pin
10	SO	SPI Slave Output	Connect to SPI master MI pin
11	SI	SPI Slave Input	Connect to SPI master MO pin
12	SCLK	SPI Slave Clock Input	Connect to SPI master clock output pin

The Interface values are according to the RS422 Standard

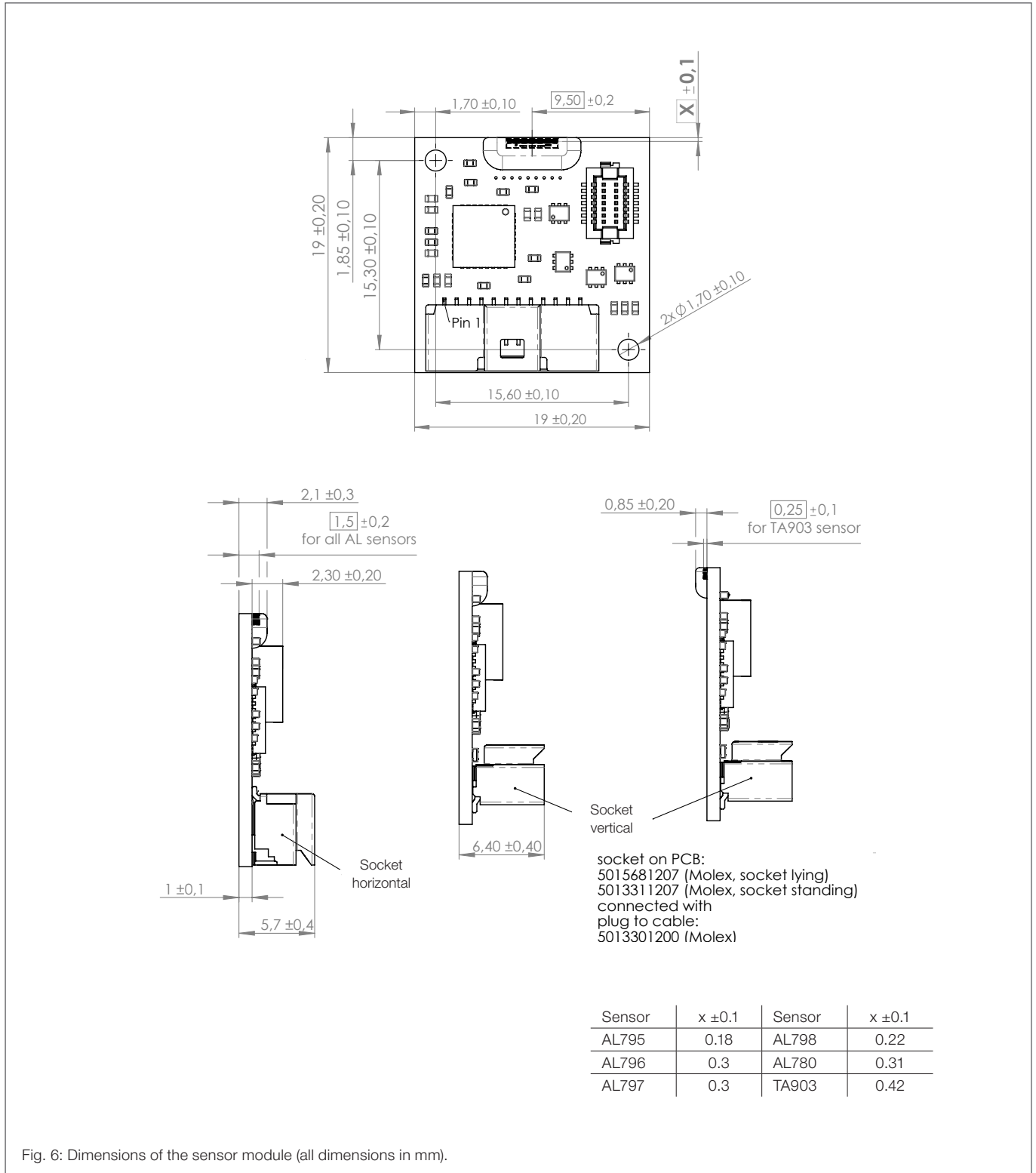
Additional Information on Ordering Code



Type	Type (Code)	Sensor Chip	Sensor (Code)
Incremental	EBI	AL795 (0.5 mm)	A
Incremental with reference	EBR	AL798 (1 mm)	C
		AL796 (2 mm)	E
		AL797 (2.5 mm)	H
		AL780 (5 mm)	I
		TA903 (FreePitch)	V

Connector Layout	Type (Code)
Connector horizontal	L
Connector vertical	S

Dimensions EBx7914 with AL7xx or TA903



Dimensions EBR7914 with AL7xx and Reference Board

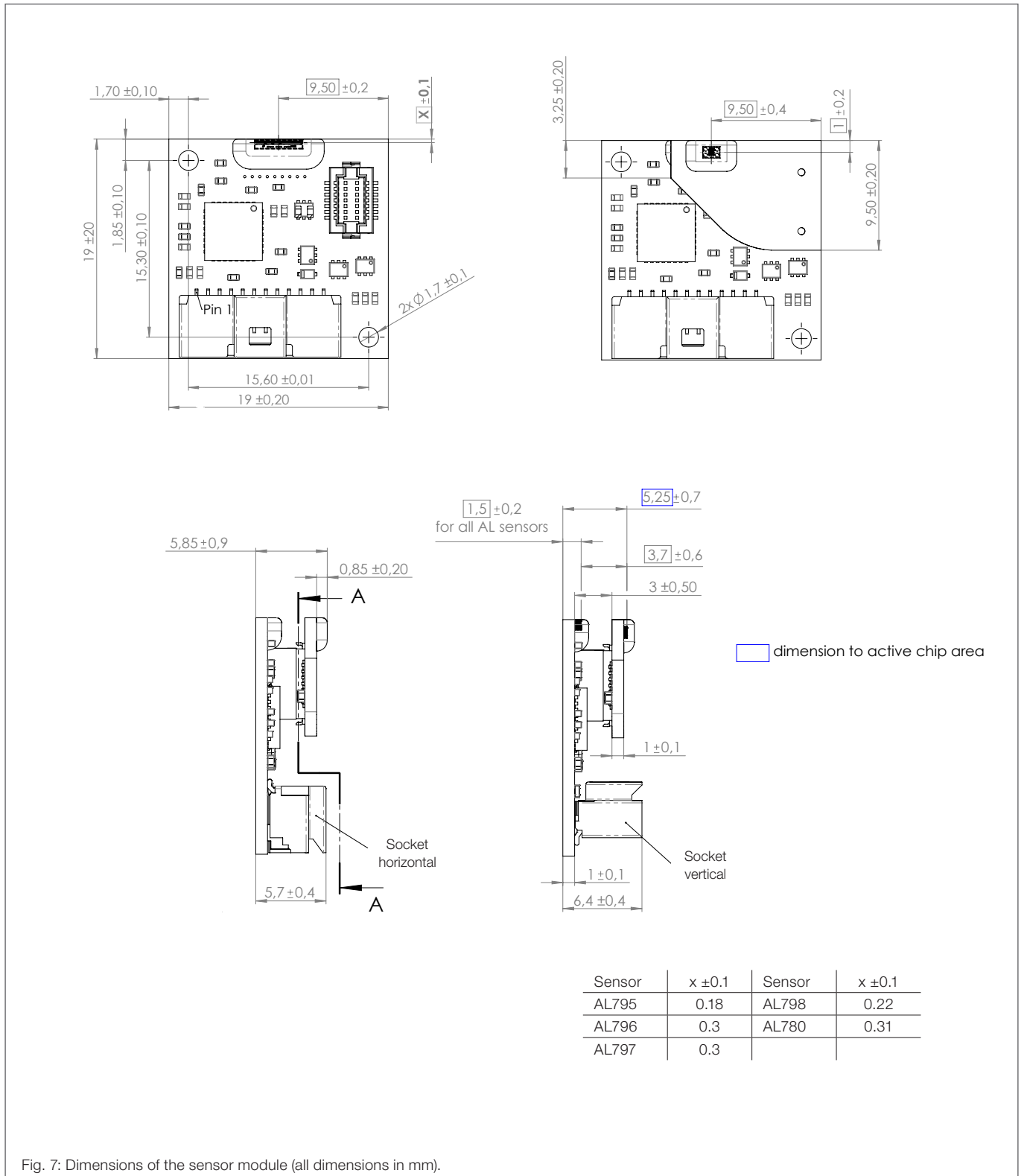


Fig. 7: Dimensions of the sensor module (all dimensions in mm).

General Information

Product Status

Phase	Status
EBx7914	The product is under development, qualification is on going. Deliverables have a sample status. The datasheet is preliminary.
Note	The status of the product may have changed since this data sheet was published. The latest information is available on the internet at www.sensitec.com .

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Changelist

Version	Description of the Change	Date
EBx7914.DSE.04	Disclaimer supplement	06/2022
EBx7914.DSE.03	Product Overview 1-9	03/2022
EBx7914.DSE.00	Original (pp. 1-9)	11/2020

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