

Trax (WEM-200) series & Pilot parts Assembly update and FCC assessment

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Development Centre Sensors

Issue date: /02/2022

Document status: in work / under review / released / obsolete

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**Related reports /
References**

	Title	No.
[1]		
[2]		
[3]		
[4]		

Distribution list

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Revision index	Revision content	Release Date
Rev1.0	Initial release	/06/2021
Rev 2.0	Antenna gain comparison added between old and and new design Document title changed	27/10/2021
Rev 3.0	Document is also valid for pilot parts -> added in the change letter update	07/12/2021
Rev 4.0	Product Pictures added	09/02/2022

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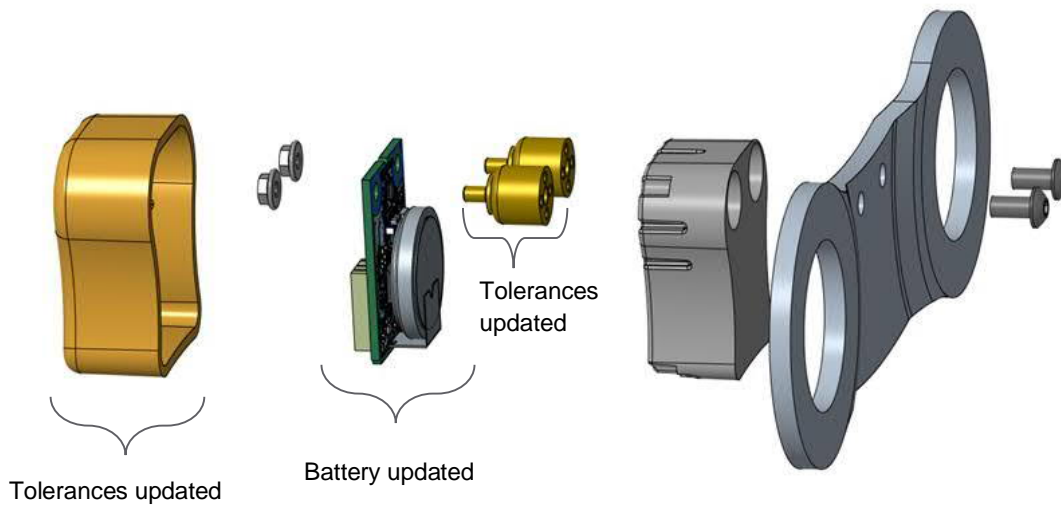
1 Introduction

Trax sensor (WEM-200) has been validated in 2019 at 7layers, Series production are planned for this summer 2021. During this industrialization phase we need to optimize some dimensions, to ensure better mechanical assembly, and change the battery reference for the former one is obsolete.

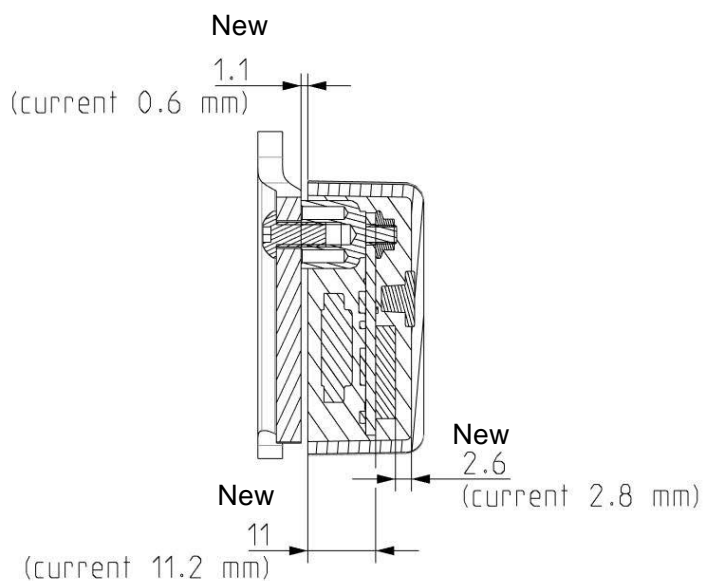
This request is also valid for pilot parts that have the same changes except for the algorithm.

none of the RF functions has been changed, as well s the PCB assembly.

2 Product overview



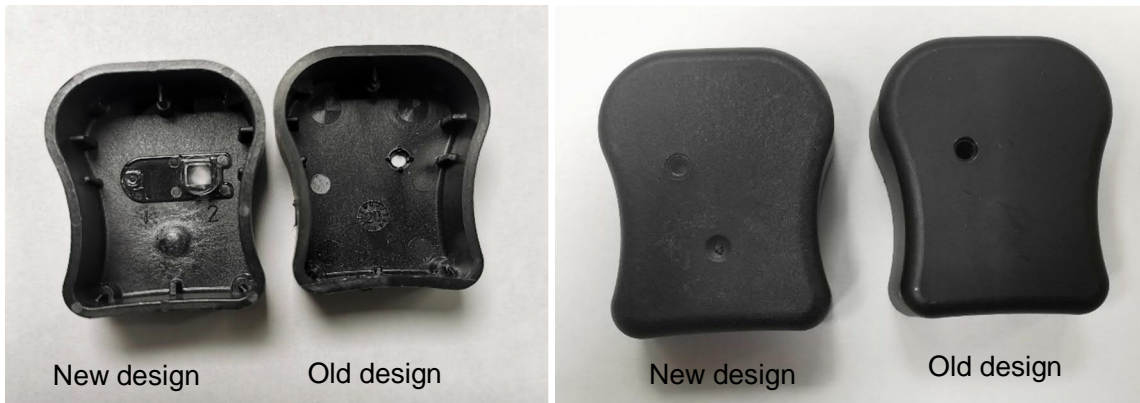
3 Mechanical assembly update



New design

Old design





4 Battery replacement

4.1 RENATA Battery

The current battery is RENATA CR2450HTRH-LF:

- 3V, 490mAh
- Operational temperature -40°_125°C
- Weight 6.3g

Battery Life Time Calculation

START ANALYSIS

Battery Capacity: 490 mAh
Driving Duration: 8 h/day

SKF

OPERATIONS	FREQUENCY (s)	DURATION (s)	CURRENT (mA)	CONS for Flight Mode (mAh)
Battery SelfDischarge			0.00128	
Flight Mode		10713600.000	0.00377	1.12E+001

OPERATIONS	FREQUENCY (s)	DURATION (s)	CURRENT (mA)	CONSUMPTION (mAh/day)
Acquisition Accelerometer	1800.00	0.82	1.1776	5.36E-004
Advertising Frame	1800.00	0.187	3.45	1.19E-004
Communication	1800.00	0.000	2.7675	0.00E+000
Internal Flash Writing	28800.00	0.0416	6.055	2.92E-006
LED On	3.00	0.0	1.384	0.00E+000
Piezo Test	172800.00	4.738	3.774	3.45E-005
Piezo Vibration	3600.00	2.75	9.532	2.43E-003
Self Test	86400.00	1.600	1.265	7.81E-006
Sleep Mode			0.003	9.86E-004
Software Upgrade	0.00	0.000	0.000	0.00E+000
Temperature	300.00	0.0107	3.591	4.27E-005

Configured
 Damage Detected
 Driven
 Telematic

Battery Capacity Left: 474,9712 mAh
 Daily Consumption: 0.0075 mAh
 Battery Life Time: 7.28 Years

4.2 PANASONIC Battery

The new battery is PANASONIC CR2540A/GBN

- 3V, 550mAh
- Operational T° -40°C_125°C
- Weight 6.7g

Battery Life Time Calculation

START ANALYSIS

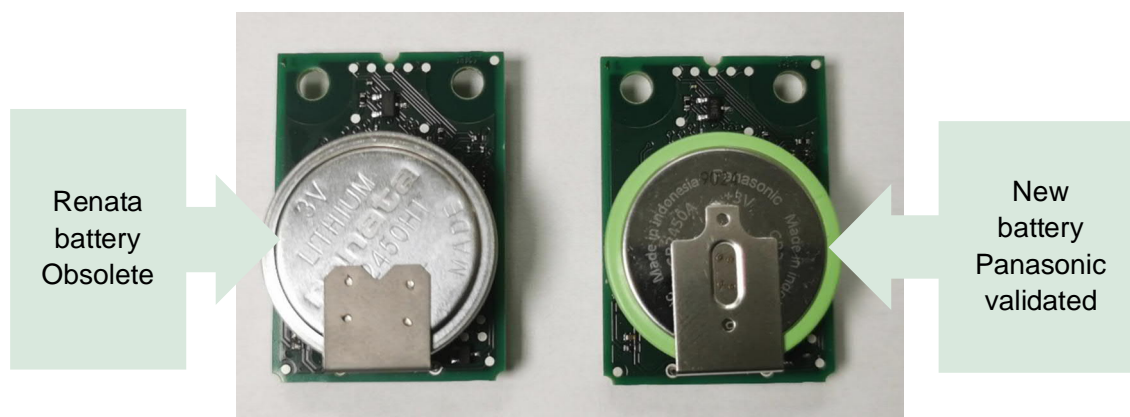
Battery Capacity mAh
 Driving Duration h/day

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Flight Mode		<input type="text" value="10713600.000"/>	<input type="text" value="0.00377"/>	<input type="text" value="1.12E+001"/>
OPERATIONS	FREQUENCY (s)	DURATION (s)	CURRENT (mA)	CONSUMPTION (mAh/day)
Acquisition Accelerometer	<input type="text" value="1800.00"/>	<input type="text" value="0.82"/>	<input type="text" value="1.1776"/>	<input type="text" value="5.36E-004"/>
Advertising Frame	<input type="text" value="1800.00"/>	<input type="text" value="0.187"/>	<input type="text" value="3.45"/>	<input type="text" value="1.19E-004"/>
Communication	<input type="text" value="1800.00"/>	<input type="text" value="0.000"/>	<input type="text" value="2.7675"/>	<input type="text" value="0.00E+000"/>
Internal Flash Writing	<input type="text" value="28800.00"/>	<input type="text" value="0.0416"/>	<input type="text" value="6.055"/>	<input type="text" value="2.92E-006"/>
LED On	<input type="text" value="3.00"/>	<input type="text" value="0.0"/>	<input type="text" value="1.384"/>	<input type="text" value="0.00E+000"/>
Piezo Test	<input type="text" value="172800.00"/>	<input type="text" value="4.738"/>	<input type="text" value="3.774"/>	<input type="text" value="3.45E-005"/>
Piezo Vibration	<input type="text" value="3600.00"/>	<input type="text" value="2.75"/>	<input type="text" value="9.532"/>	<input type="text" value="2.43E-003"/>
Self Test	<input type="text" value="86400.00"/>	<input type="text" value="1.600"/>	<input type="text" value="1.265"/>	<input type="text" value="7.81E-006"/>
Sleep Mode			<input type="text" value="0.003"/>	<input type="text" value="9.66E-004"/>
Software Upgrade	<input type="text" value="0.00"/>	<input type="text" value="0.000"/>	<input type="text" value="0.000"/>	<input type="text" value="0.00E+000"/>
Temperature	<input type="text" value="300.00"/>	<input type="text" value="0.0107"/>	<input type="text" value="3.591"/>	<input type="text" value="4.27E-005"/>

Configured
 Damage Detected
 Driven
 Telematic

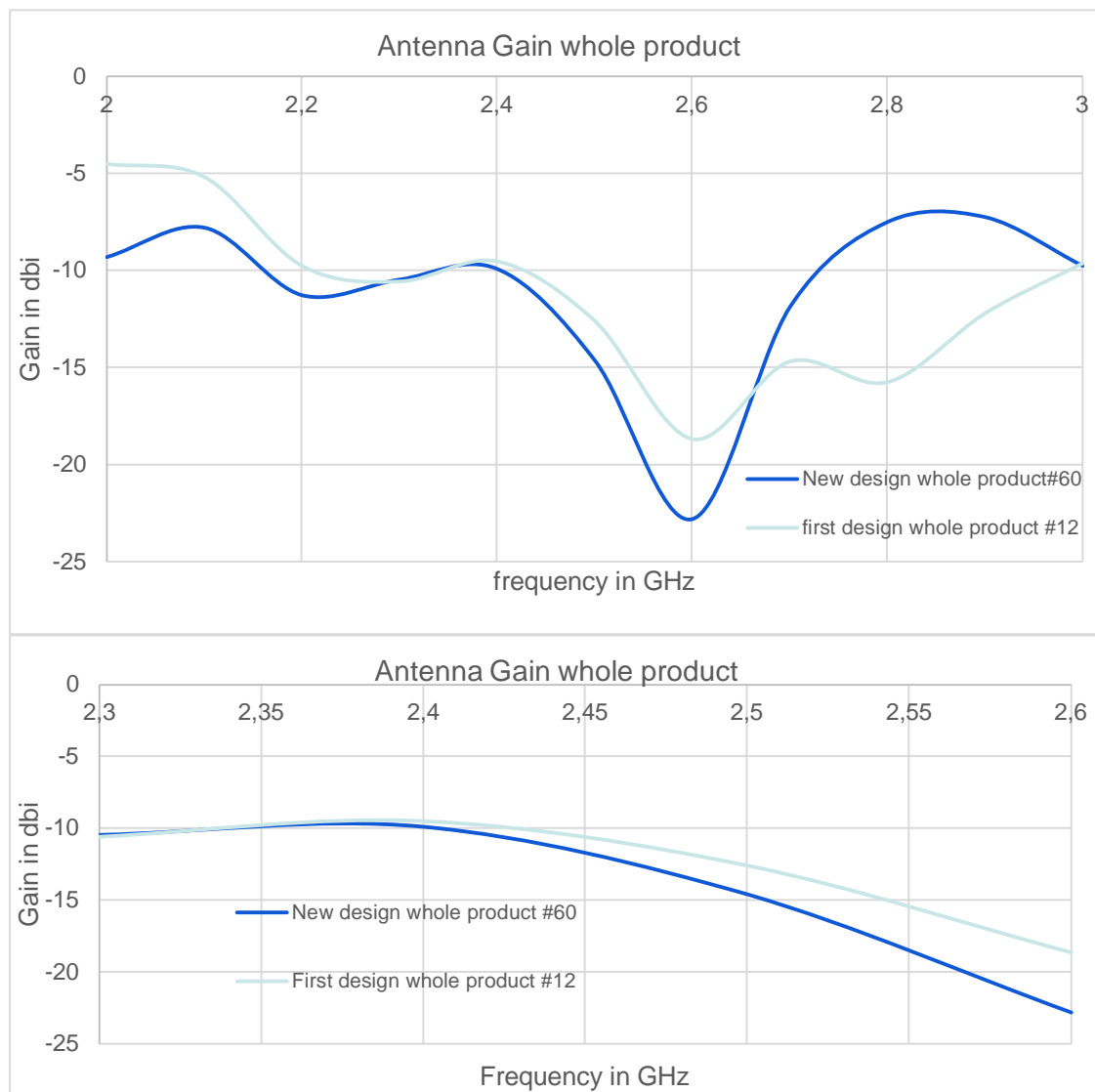
Battery Capacity Left mAh
 Daily Consumption mAh
 Battery Life Time Years

The impact of the battery replacement is on the product lifetime as shown in the table above the battery lifetime evolves from 7.28 years to 8.2 years and this is the only impact on the whole product.



5 Antenna Gain

The gain of the antenna on the whole product has been measured for comparison between the old and the new design.



Conclusion

The measurement of the antenna gain on old and new design are similar within the band 2.4GHz and 2.485GHz. No difference seen so far due to mechanical changes

6 Suggested tests update

According to the modifications only radiated performances could be modified

- frequency resonance shift on the antenna due to gap modification between antenna and plastic case
- antenna gain due to battery change (RF coupling) and to gap modification between antenna and plastic case

for these reasons we suggest redoing all radiated tests done on report MDF_SKF_1903_FCC01 as follow

- Transmitter spurious radiated emission (FCC part 15 Subpart C according to ANSI C63.10)
- Band Edge Radiated (FCC part 15 Subpart C according to ANSI C63.10)