

RAPPORTO DI PROVA

TEST REPORT

Rif. / Ref. n.	MPETR_181667-0	Data / Date:	28/10/2022	Pagine / Pages:	11
Scopo delle prove Test object	Prove di tipo in accordo alla Norma <i>Type test according to standards</i> FCC Cfr 47 part 2 - §2.1093 RSS-102:2015				
Richiedente Applicant	Italtractor ITM S.p.a. Via confortino 30, 40056 Valsamoggia (BO) loc. Crespellano				
Marchio commerciale Trade mark					
Fabbricante Manufacturer	Italtractor ITM S.p.a. Via confortino 30, 40053 Valsamoggia (BO) loc. Crespellano				
Prodotto Product	Sensor BLE				
Modello testato Testing model	TCKT50050				
Identificativo FCC & IC FCC & IC ID	2A845000TCKTX				
Data ricevimento campioni Date of test samples receipt	30/06/2022				
Campioni verificati No. of tested samples	1 – Sampled by the applicant				
Data verifiche Testing date	From 07/07/2022 to 30/08/2022				
Sito di prova Testing site	PRSLAB S.r.l. Unipersonale - Via Campagna 92 - 22020 Faloppio - Como - Italy				
Esito delle valutazioni Assessment results	CONFORME / COMPLIANT				
Verifiche effettuate da Verifications carried out by	Daniele AOSANI Tecnico Laboratorio Laboratory Engineer				
Approvato Approved by	Riccardo PFEIFFER Responsabile di Laboratorio Laboratory Manager				

The test results reported in this test report shall refer only to the samples tested.

The sample has been provided by the customer and the results apply to the sample as received

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PRS refuses any responsibility about information provided by the customer contained in this test report.

Conformity Assessment Body <i>Identifier (CABID)</i>	5347A
Identificativo FCC del sito di prova <i>FCC designation number</i>	IT0012

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0. RELEASE CONTROL RECORD

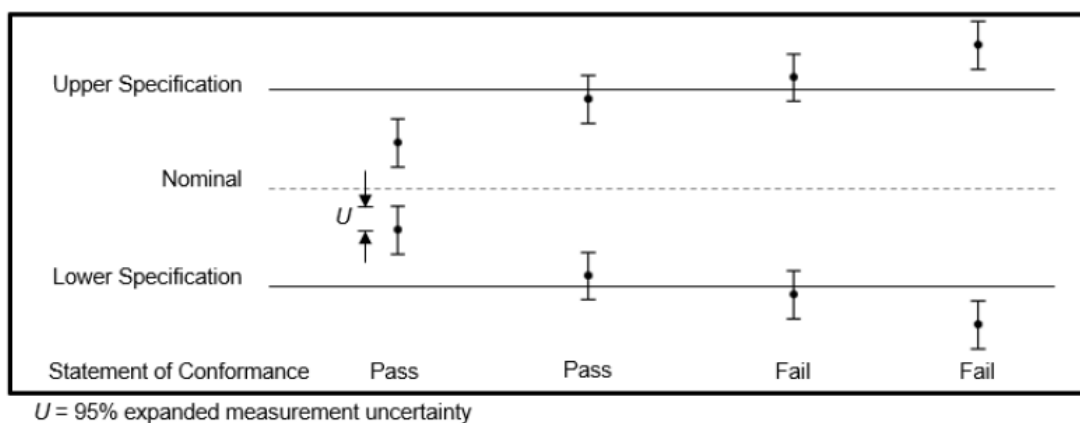
TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE
MPETR_181667-0	Original Release	28/10/2022

This document is valid in last revision that deletes and replaces the previous one

1. DECISION RULE

PRS LAB specifies that, if the decision rules of conformity of the test results are not indicated in detail in the standard/s object of tests, it takes as a decision rule for the declaration of conformity the simple binary system ($w = 0$) stated in the ILAC-G8-09:2019 document.

The decision rule is applicable for all parts of standard



Statements of conformity are reported as:

- Pass: the measured value is below the acceptance limit, $AL=TL$.
- Fail: the measured value is above the acceptance limit, $AL=TL$.

Definitions

- Guard Band (w): interval between a tolerance limit and a corresponding acceptance limit where length $w=|TL-AL|$.
- Tolerance Limit (TL) (Specification Limit): specified upper or lower bound of permissible values of a property.
- Acceptance Limit (AL): specified upper or lower bound of permissible measured quantity values.

2. GENERAL REMARKS

- None

3. INFORMATION PROVIDED BY CUSTOMER

According to Manufacturer declaration, the tested model is the most representative and the most complex. The differences between the tested one and his variants are described in the table below and are declared by Manufacturer.

	Model	Microprocessor	Accelerometer	Battery	Resin	Shell type	Position	Magnet	Connector #1 & Pins number	Connector #2	NTC & len
Tested model	TCKT50050	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	2	✗	50 mm
Variant	TCKT00000	nRF52811	✗	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	2	✗	✗
Variant	TCKT00050	nRF52811	✗	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	2	✗	50 mm
Variant	TCKT00110	nRF52811	✗	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	2	✗	110 mm
Variant	TCKT00170	nRF52811	✗	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	2	✗	170 mm
Variant	TCKT00230	nRF52811	✗	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	2	✗	230 mm
Variant	TCKT00260	nRF52811	✗	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	2	✗	260 mm
Variant	TCKT10000	nRF52811	✗	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	✗	✗	SMD
Variant	TCKT20000	nRF52811	✗	3V CR2450	Elan-tron_PU314_PH114	✗	Inside Roller	✗	✗	✗	SMD
Variant	TCKT30000	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	2	✗	✗
Variant	TCKT40000	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	2	✗	✗
Variant	TCKT50000	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	2	✗	✗
Variant	TCKT50110	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	2	✗	110 mm
Variant	TCKT50170	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	2	✗	170 mm
Variant	TCKT50230	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	2	✗	230 mm
Variant	TCKT50260	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	2	✗	260 mm
Variant	TCKT60000	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	Rubber	Inside Roller	✗	3	2	✗
Variant	TCKT70000	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	Aluminium	Outside Roller	✓	✗	2	35 mm
Variant	TCKT80000	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	✗	Inside Roller	✗	✗	✗	✗
Variant	TCKT80050	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	✗	Inside Roller	✗	✗	✗	50 mm
Variant	TCKT80110	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	✗	Inside Roller	✗	✗	✗	110 mm
Variant	TCKT80170	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	✗	Inside Roller	✗	✗	✗	170 mm
Variant	TCKT80230	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	✗	Inside Roller	✗	✗	✗	230 mm
Variant	TCKT80260	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	✗	Inside Roller	✗	✗	✗	260 mm
Variant	TCKT90000	nRF52811	✓	3V CR2450	Elan-tron_PU314_PH114	✗	Inside Roller	✗	✗	✗	35 mm

4. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

4.1 EUT Identification

DESCRIPTION	Sensor BLE
TESTED MODEL	TCKT50050
SERIAL NO.	Prototype
PRS LAB INTERNAL REFERENCE	BC 205/2022 2/3
TRADEMARK	
MANUFACTURER	Italtractor ITM S.p.a
COUNTRY OF MANUFACTURER	Italy
SINGLE UNIT OR SYSTEM	Single
POWER SOURCE	Internal battery (CR2450A, Lithium battery)
POWER SUPPLY NOMINAL VOLTAGE	3Vdc
BATTERY CAPACITY	560mAh
OPERATING TEMPERATURE	-40°C ÷ +85°C
FW VERSION (Information provided by Customer)	1.3V
MAX FREQUENCY	>1GHz
DIMENSIONS	See photographic section.
EUT STANDING	Vehicle

4.2 Bluetooth Low Energy module technical data

CHIP MANUFACTURER	 NORDIC SEMICONDUCTOR
CHIP TYPE	nRF52811
ETS CATEGORY	Bluetooth Low Energy
FREQUENCY BAND	Unlicensed 2.4GHz ISM band at 2400-2483.5 MHz
NUMBER OF CHANNELS	40
CHANNEL BANDWIDTH	2MHz
CHANNEL SEPARATION	2MHz
TRANSFER RATE	1Mbps
SENSITIVITY	-97dBm
TYPE OF MODULATION	Frequency-shift Keying (FSK) modulation
ANTENNA	ACAG0301-2450-T
ANTENNA GAIN (Information provided by Customer)	5.19dBi
ANTENNA TYPE	SMD
ANTENNA MANUFACTURER	 ABRACON

5. REFERENCE STANDARDS

REFERENCE STANDARD	
Title 47 Part 1 Subpart I § 1.1310	Procedures Implementing the National Environmental Policy Act of 1969. Radiofrequency radiation exposure limits.
Title 47 Part 2 Subpart J § 2.1091	Radiofrequency radiation exposure evaluation: mobile devices.
ANSI C63.4	American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz
RSS 102:2015	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

6. MEASUREMENTS AND CALCULATION RESULTS

6.1 SAR exemption

This device has been excluded from SAR testing based on source-based time-averaged conducted output power and KDB 447498 D01 section 4.3.1 1). This document serves as the RF exposure exhibit in the FCC Form 731 application in lieu of a SAR report.

6.2 Operational Description

The Sensor BLE is a powerful omni-directional reader. It is necessary a calculation for portable use demonstrating that the transmitter can be excluded from SAR testing.

6.3 RF Exposure Conditions:

The device is intended for use in the portable exposure condition and the General Population / Uncontrolled RF exposure environment.

6.4 RF Output Power:

Tx frequency range: 2402 – 2480 MHz
Maximum Output Power Channel 0: -4.93dBm (0.32mW)
Maximum Output Power Channel 12: -4.08dBm (0.39mW)
Maximum Output Power Channel 39: -2.94dBm (0.51mW)
Tolerance: ±1dB

6.5 FCC Calculation method and limits

SAR Test Exclusion Thresholds:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ (for 1-g body SAR) or } 7.5 \text{ (for 10-g extremity SAR)}$

where respectively

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

6.6 FCC Calculation results

Measured Output Power, including tune-up tolerance: 0.51mW
Min Test separation distance: 5mm
f: 2.480GHz (as worst case)
Exclusion Threshold Limb: 7.5 (10-g extremity SAR)

$$\frac{0.51mW}{5mm} * \sqrt{2.480} = 0.16 \leq 7.5$$

Exclusion Threshold body: 3 (10-g extremity SAR)

$$\frac{0.51mW}{5mm} * \sqrt{2.480} = 0.16 \leq 3$$

RESULT: The device is excluded from SAR testing.

6.7 ISED Calculation method and limits

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance^{4,5}

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in Table 1, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.

For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.

6.8 ISED Calculation results

Frequency (MHz)	Maximum measured output Power (mW)	Limit for limb (mW)	Result
2480	0.51	10	SAR exempt

END OF TEST REPORT