




시험 성적서 TEST REPORT

페이지(page) : (1) / (총(Total) 8)

성적서 번호 Report No.		ICRT-TR-E222694-0A	
신청자 Client	기관명 Name	Monimoto UAB	
	주소 Address	Sauletekio al. 15, Vilnius LT-10224 Lithuania	
시험대상품목 Sample description		GPS tracker	
모델명 Type designation		Cycloop	
정격 Ratings		DC 3.7 V	
시험장소 Place of test		<input checked="" type="checkbox"/> 고정시험(Inside test) <input type="checkbox"/> 현장시험(Field test) 주소지(Address): 112, Hwanggeum 3-ro 7beon-gil, Hagun-ri, Yangchon-eup, Gimpo-si, Gyeonggi-do, Korea	
시험기간 Date of test		16. Sep. 2022 ~ 18. Oct. 2022	
시험방법/항목 Test Method/Item		FCC rule §1.1310	
시험결과 Test Results		Refer to 3. Maximum Permissible Exposure	
확인 Affirmation	작성자 Tested by	기술책임자 Technical Manager	
	성명 Name	Seong-Hun, Jeong	Min-Gi, Son
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2022. 10. 18 주식회사 아이씨알 대표이사 The head of INTERNATIONAL CERTIFICATION REGISTRAR			

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경기도 김포시 양촌읍 황금3로7번길 112 / Tel: 02-6351-9001 ~ 6



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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
ICRT-TR-E222694-0A	2022.10.18	Initial Issue	All



1. Applicant & Manufacturer & Test Laboratory Information

1.1 Applicant information

Applicant	Monimoto UAB
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Contact Person	Rolandas Dranseika
Telephone No.	+37067266478
Fax No.	-
E-mail	info@monimoto.com

1.2 Manufacturer Information

Manufacturer	Monimoto UAB
Address	Sauletekio al. 15, Vilnius LT-10224 Lithuania

1.3 Test Laboratory Information

Conducted tests were performed at	
Laboratory	ICR Co., Ltd.
Address	112, Hwanggeum 3-ro 7beon-gil, Hagun-ri, Yangchon-eup, Gimpo-si, Gyeonggi-do, Korea
Telephone No.	+82-2-6351-9002
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RRA No.	KR0165
KOLAS No.	KT652



2. Equipment under Test(EUT) Information

2.1 General Information

Product Name	GPS tracker
Brand Name	-
Model Name	Cycloop
Additional Model Name	-
FCC ID	2AU3K-CYCLOOP
Power Supply	DC 3.7 V

2.2 Additional Information

Equipment Class	DTS - Digital Transmission System	
Device Type	Stand-alone	
Operating Frequency	Bluetooth BDR/EDR/LE	2 402 MHz ~ 2 480 MHz
	802.11b/g/n(HT20)	2 412 MHz ~ 2 462 MHz
RF Output Power	802.11b	9.46 dBm
	802.11g	8.32 dBm
	802.11n(HT20)	8.15 dBm
	Bluetooth LE 1Mbps	-1.82 dBm
	Bluetooth LE 2Mbps	-1.41 dBm
	Bluetooth LE coded 500kbps	-1.85 dBm
	Bluetooth LE coded 125kbps	-1.96 dBm
Number of Channel	Bluetooth LE	40
	802.11b/g/n(HT20)	11
Modulation Type	Bluetooth LE, 802.11b: DSSS 802.11g/n(HT20) : OFDM	
Antenna Type	Chip Antenna	
Antenna Gain	802.11b/g/n(HT20)	5.2 dBi
	Bluetooth LE	-0.6 dBi
Antenna Operating Mode	Single antenna exists for each mode	



2.3 Pre-certified Module Information

Module Name	SARA-R510M8S	
FCC ID	XPYUBX19KM01	
Classification 1	Type & Date	LTE CAT-M1 Data Module / 07.23.2020
	Test Method/Item	FCC Part 22, 24, 27, 90
	Mode	CAT-M1 eFDD2, eFDD4, eFDD5, eFDD12, eFDD13, eFDD25, eFDD26
Classification 2	Type & Date	LTE CAT-M1 & NB2 Data only Module / 08.11.2021
	Test Method/Item	FCC Part 22, 24, 27
	Mode	CAT-M1 eFDD2, eFDD4, eFDD5, eFDD8, eFDD12, eFDD13, eFDD25, eFDD26, eFDD66, eFDD71 NB-IoT eFDD2, eFDD4, eFDD5, eFDD8, eFDD12, eFDD13, eFDD66, eFDD71, eFDD85

2.4 Mode of operation during the test

- The EUT is continuous transmission mode during the test with set at Low Channel, Middle Channel, and High Channel.
To get a maximum radiated emission levels from the EUT, the EUT was moved throughout the XY, YZ, XZ planes.

2.5 Modifications of EUT

- None



3. Maximum Permissible Exposure

3.1 RF Exposure calculation

According to the FCC rule §1.1310 the limit for General Population/Uncontrolled exposure is 1 mW/cm² for the device operating 1 500 MHz ~ 100 000 MHz.

The electric field generated for a 1 mW/cm² exposure is calculated as follows:

$$E = \sqrt{(30 * P * G) / D}, \text{ and } S = E^2 / Z = E^2 / 377, \text{ because } 1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$$

S = Power density in mW/cm², Z = Impedance of free space, 377 Ω

P = Power input to the external antenna

(Output power from the EUT antenna port (dBm) – cable loss (dB)),

E = Electric field strength in V/m, G = Numeric antenna gain, and D = distance in meter

Combining equations and rearranging the terms to express the distance as a function of the remaining variable

$$D = \sqrt{(30 * P * G) / (377 * 10 S)}$$

Changing to units of mW and cm, using P (mW) = P (W) / 1 000, d (cm) = 0.01 * d (m)

$$D = 0.282 * \sqrt{(P * G) / S}$$



3.2 Result

According to above equation, the following result was obtained.

Operating Mode	Target Power W / tolerance	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
		(dBm)	(mW)	Log	Linear			
802.11b	9.46 ± 1.0	10.46	11.12	5.2	3.31	1.71	1.00	0.007 3
802.11g	8.32 ± 1.0	9.32	8.55			1.50		0.005 6
802.11n (HT20)	8.15 ± 1.0	9.15	8.22			1.47		0.005 4
Bluetooth LE 1Mbps	-1.82 ± 1.0	-0.82	0.83	-0.6	0.87	0.24		0.000 1
Bluetooth LE 2Mbps	-1.41 ± 1.0	-0.41	0.91			0.25		0.000 2
Bluetooth LE coded 500kbps	-1.85 ± 1.0	-0.85	0.82			0.24		0.000 1
Bluetooth LE coded 125kbps	-1.96 ± 1.0	-0.96	0.80			0.24		0.000 1
CAT-M1 eFDD 5 QPSK (Note 1)	23.0 ± 1.0	24.00	251.20	5.00	3.16	4.17		0.158 1

Note 1 : The band with the highest output of the pre-certified LTE module (SARA-R510M8S) test report

According to above table, for Band(802.11b), safe distance,

$$D = 0.282 * \sqrt{(11.12 * 3.31)/1.00} = 1.71 \text{ cm.}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = (11.12 * 3.31 / (4 * \pi * 20^2)) = 0.007 3$$



3.3 Conclusion of Simultaneous Transmitter

Operating Freq. Band	Operating Mode	Max tune up power		Antenna Gain		Power Density (mW/cm ²) @ 20 cm Separation	Conclusion MPE	Limit
		(dBm)	(mW)	Log	Linear			
WLAN + Bluetooth + LTE	802.11b	10.46	11.12	5.20	3.31	0.007 3	0.17	1.00
	Bluetooth LE 2M	-0.41	0.91	-0.6	0.87	0.000 2		
	CAT-M1 eFDD 5 QPSK (Note 1)	24.00	251.2	5.00	3.16	0.158 1		

Note 1 : The band with the highest output of the pre-certified LTE module (SARA-R510M8S) test report

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