






TEST REPORT

KCTL Inc. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: KR20-SRF0083-A Page (1) of (9)	
<p>1. Client</p> <ul style="list-style-type: none"> ◦ Name : DLOGIXS CO., LTD. ◦ Address : Dlogixs Building, 18, Beolmal-ro 118beon-gil Dongan-gu Anyang-si, Gyeonggi-do, South Korea ◦ Date of Receipt : 2019-12-03 <p>2. Use of Report : Certification</p> <p>3. Name of Product and Model : A1 / NRT-A1-01W</p> <p>4. Manufacturer and Country of Origin : DLOGIXS CO., LTD. / Korea</p> <p>5. FCC ID : 2APRMNRTA1</p> <p>6. Date of Test : 2019-12-07 to 2019-12-24</p> <p>7. Test Standards : 47 CFR Part 1.1310</p> <p>8. Test Results : Refer to the test result in the test report</p>		
Affirmation	Tested by Name : Taekyong Nam  (Signature)	Technical Manager Name : Heesu Ahn  (Signature)
2020-02-28		
<h2>KCTL Inc.</h2>		
As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by KCTL Inc.		

Report revision history

Date	Revision	Page No
2020-02-25	Initial report	-
2020-02-28	Updated model name	1,4,5

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Note. The report No. KR20-SRF0083 is superseded by the report No. KR20-SRF0083-A.



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1. General information

Client : DLOGIXS CO., LTD.
 Address : Dlogixs Building, 18, Beolmal-ro 118beon-gil Dongan-gu Anyang-si, Gyeonggi-do, South Korea
 Manufacturer : DLOGIXS CO., LTD.
 Address : Dlogixs Building, 18, Beolmal-ro 118beon-gil Dongan-gu Anyang-si, Gyeonggi-do, South Korea
 Laboratory : KCTL Inc.
 Address : 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
 Accreditations : FCC Site Designation No: KR0040, FCC Site Registration No: 687132
 VCCI Registration No. : R-20080, G-20078, C-20059, T-20056
 Industry Canada Registration No. : 8035A
 KOLAS No.: KT231

2. Device information

Equipment under test : A1
 Model : NRT-A1-01W
 Derivative model : NRT-A1-01B, NRT-A1-01G, NRT-A1-01D, NRT-A1-01I
 Frequency range : 2 402 MHz ~ 2 480 MHz (Bluetooth(BDR/EDR), Bluetooth LE)
 Modulation technique : Bluetooth(BDR/EDR)_ GFSK, $\pi/4$ DQPSK, 8DPSK
 Bluetooth LE_GFSK
 Number of channels : 79 ch (Bluetooth(BDR/EDR))
 40 ch (Bluetooth LE)
 Power source : DC 3.7 V
 Antenna specification : PCB Antenna 1 (Bluetooth(BDR/EDR))
 PCB Antenna 2 (Bluetooth(BDR/EDR) + Bluetooth LE)
 Antenna gain : 1.83 dBi_Ant 1(Bluetooth(BDR/EDR))
 1.14 dBi_Ant 2(Bluetooth(BDR/EDR) + Bluetooth LE)
 Software version : 1.0.4
 Hardware version : 0.7
 Test device serial No. : N/A
 Operation temperature : -5 °C ~ 40 °C

2.1. Accessory information

Equipment	Manufacturer	FCC ID	Model	Serial No.	Power source
TWS Bluetooth Earphone	ALON INC.	2APRM - NBCS00B10	User's TWS	-	Lithium polymer SL501012 3.7V / 40m Ah

2.2. Information about derivative model

The difference between basic model and derivative models is:

The basic and derivative model are electrically identical.

The derivative models are only for the simplified derivation based on buyer's model name.

2.3. Frequency/channel operations

This device contains the following capabilities:

Bluetooth(BDR/EDR), Bluetooth Low Energy

Ch.	Frequency (MHz)
00	2 402
.	.
39	2 441
.	.
78	2 480

Table 2.3.1. Bluetooth(BDR/EDR) mode

Ch.	Frequency (MHz)
00	2 402
.	.
19	2 440
.	.
39	2 480

Table 2.3.2. Bluetooth Low Energy

2.4. Simultaneously transmission condition

Antenna	Modulation	Test mode	Frequency (MHz)
1	GFSK	Bluetooth (BDR)	2 480
2	GFSK	Bluetooth (BDR) Bluetooth LE (1M_37 Packet length)	2 480, 2 480

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3. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded uncertainty (\pm)
Conducted RF power	1.76 dB



4. RF Exposure

Regulation

This document is prepared to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC rules and Regulations.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b).

Limit

Table 1 – Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm ²]	Averaging Time [minute]
(A) Limits for Occupational / Controlled Exposure				
0.3 ~ 3.0	614	1.63	*100	6
3.0 ~ 30	1842/f	4.89/f	*900/f ²	6
30 ~ 300	61.4	0.163	1.0	6
300 ~ 1 500	/	/	f/300	6
1 500 ~ 15 000	/	/	5	6
(B) Limits for General Population / Uncontrolled Exposure				
0.3 ~ 1.34	614	1.63	*100	30
1.34 ~ 30	824/f	2.19/f	*180/f ²	30
30 ~ 300	27.5	0.073	0.2	30
300 ~ 1 500	/	/	f/1 500	30
1 500 ~ 15 000	/	/	1.0	30

f=frequency in MHz, * = plane-wave equivalent power density

Test procedure

Per the guidance of KDB 680106, the E-field and H-field limits shown in the table above are extended down to 100 kHz

Test settings

MPE (Maximum Permissible Exposure) Prediction

Predication of MPE limit at a given distance: Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2 \quad (\Rightarrow R = \sqrt{PG/4\pi S})$$

S = power density [mW/cm²]

P = Power input to antenna [mW]

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna [cm]

4.1. Test results

RF Exposure Compliance Issue

The information should be included in the user's manual:

This appliance and its antenna must not be co-located or operation is conjunction with any other antenna or transmitter. A minimum separation distance of 20 cm must be maintained between the antenna and the person for this appliance to satisfy the RF exposure requirements.

Calculation Result of RF exposure

- Bluetooth_(ANT 1)

Mode	Frequency [MHz]	Max Tune-up Power [dBm]	Max Tune-up Power [mW]	Ant Gain [dBi]	Ant Gain [mW]	Power density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
GFSK	2 480	5.00	3.16	1.83	1.52	0.000 96	1.000 00

- Bluetooth_(ANT 2)

Mode	Frequency [MHz]	Max Tune-up Power [dBm]	Max Tune-up Power [mW]	Ant Gain [dBi]	Ant Gain [mW]	Power density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
GFSK	2 480	8.00	6.31	1.14	1.30	0.001 63	1.000 00

- Bluetooth_LE_(ANT 2)

Mode	Frequency [MHz]	Max Tune-up Power [dBm]	Max Tune-up Power [mW]	Ant Gain [dBi]	Ant Gain [mW]	Power density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
GFSK	2 480	7.00	5.01	1.14	1.30	0.001 30	1.000 00

- Simultaneous Transmission

Mode	Frequency [MHz]	Max Tune-up Power [dBm]	Max Tune-up Power [mW]	Ant Gain [dBi]	Ant Gain [mW]	Power density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
BT,GFSK Highest(2 480 MHz)_ANT 1 + BT,GFSK Highest(2 480 MHz)_ANT 2						0.002 59	1.000 00

Mode	Frequency [MHz]	Max Tune-up Power [dBm]	Max Tune-up Power [mW]	Ant Gain [dBi]	Ant Gain [mW]	Power density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
BT,GFSK Highest(2 480 MHz)_ANT 1 + BLE,GFSK Highest(2 480 MHz)_ANT 2						0.002 26	1.000 00

Note.

- The power density P_d (5th column) at a distance of 20 cm calculated from the friis transmission Formula is far below the limit of 1 mW/cm².

5. Measurement Equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Wideband Power Sensor	R&S	NRP-Z81	102398	20.01.25
ATTENUATOR	R&S	DNF Dämpfungsglied 10 dB in N-50 Ohm	31212	20.05.13

End of test report

