



# TEST REPORT

## KCTL Inc.

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Report No.:  
KR20-SRF0083-A

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### 1. Client

- 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

2. Use of Report : Certification

3. Name of Product and Model : A1 / NRT-A1-01W

4. Manufacturer and Country of Origin : DLOGIXS CO., LTD. / Korea

5. FCC ID : 2APRMNRTA1

6. Date of Test : 2019-12-07 to 2019-12-24

7. Test Standards : 47 CFR Part 1.1310

8. Test Results : Refer to the test result in the test report

|             |                                                                                                                     |                                                                                                                    |
|-------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Affirmation | Tested by                                                                                                           | Technical Manager                                                                                                  |
|             | Name : Taekyong Nam  (Signature) | Name : Heesu Ahn  (Signature) |

2020-02-28

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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 The report No. KR20-SRF0083 is superseded by the report No. KR20-SRF0083-A.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 - NBSC00B10 | 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)<br>Bluetooth LE (1M_37 Packet length) | 2 480,<br>2 480 |

### 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 indicated a 95 % level of confidence. The measurement data shown herein meets or exceeds the  $U_{\text{CISPR}}$  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                        |

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## 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<br>(MHz)                                  | Electric Field<br>Strength<br>[V/m] | Magnetic Field<br>Strength<br>[A/m] | Power Density<br>[mW/cm <sup>2</sup> ] | Averaging<br>Time<br>[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 <sup>2</sup>                    | 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 <sup>2</sup>                    | 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/cm<sup>2</sup>]

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 <sup>2</sup> ] | Limit [mW/cm <sup>2</sup> ] |
|------|-----------------|-------------------------|------------------------|----------------|---------------|----------------------------------------------|-----------------------------|
| 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 <sup>2</sup> ] | Limit [mW/cm <sup>2</sup> ] |
|------|-----------------|-------------------------|------------------------|----------------|---------------|----------------------------------------------|-----------------------------|
| 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 <sup>2</sup> ] | Limit [mW/cm <sup>2</sup> ] |
|------|-----------------|-------------------------|------------------------|----------------|---------------|----------------------------------------------|-----------------------------|
| 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 <sup>2</sup> ] | Limit [mW/cm <sup>2</sup> ] |
|---------------------------------------------------------------------|-----------------|-------------------------|------------------------|----------------|---------------|----------------------------------------------|-----------------------------|
| 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 <sup>2</sup> ] | Limit [mW/cm <sup>2</sup> ] |
|----------------------------------------------------------------------|-----------------|-------------------------|------------------------|----------------|---------------|----------------------------------------------|-----------------------------|
| 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/cm<sup>2</sup>.

## 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<br>Dämpfungsglied<br>10 dB in<br>N-50 Ohm | 31212      | 20.05.13       |

**End of test report**

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