



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.: KR21-SRF0230 Page (1) of (8)			
1. Client ◦ Name : CATCHFLOW Co.,Ltd ◦ Address : (13496) B1,322, Yanghyeon-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea ◦ Date of Receipt : 2021-08-27				
2. Use of Report : Certification				
3. Name of Product / Model : SRAY / CF-S100				
4. Manufacturer / Country of Origin : CATCHFLOW Co.,Ltd / Korea				
5. FCC ID : 2AXB3-CF-S100				
6. Date of Test : 2021-09-10 to 2021-09-14				
7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing (Address: 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)				
8. Test method used : 47 CRF Part 1.1310				
9. Test Result : Refer to the test result in the test report				
Affirmation	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> Tested by Name : Eunsung Lim (Signature) </td> <td style="width: 50%; padding: 5px;"> Technical Manager Name : Heesu Ahn (Signature) </td> </tr> </table>	Tested by Name : Eunsung Lim (Signature)	Technical Manager Name : Heesu Ahn (Signature)	2021-09-24
Tested by Name : Eunsung Lim (Signature)	Technical Manager Name : Heesu Ahn (Signature)			
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REPORT REVISION HISTORY

Date	Revision	Page No
2021-09-24	Originally issued	-

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General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ Statement not required by the standard or client used for type testing

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1. General information

Client : CATCHFLOW Co.,Ltd
 Address : (13496) B1,322, Yanghyeon-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
 Manufacturer : CATCHFLOW Co.,Ltd
 Address : (13496) B1,322, Yanghyeon-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of 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 : SRAY
 Model : CF-S100
 Frequency range : 2 402 MHz ~ 2 480 MHz (Bluetooth(BDR/EDR/BLE))
 Modulation technique : Bluetooth(BDR/EDR)_GFSK, π /4DQPSK, 8DPSK
 Bluetooth(BLE)_GFSK
 Number of channels : Bluetooth(BDR/EDR)_79ch / Bluetooth(BLE)_40ch
 Power source : AC 110 V / 60 Hz
 Antenna specification : FPCB Antenna
 Antenna gain : 3.71 dBi
 Software version : V1.0.5
 Hardware version : V2.0
 Test device serial No. : N/A
 Operation temperature : -10 °C ~ 50 °C

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
AC to DC Adapter	Dongguan Jinhuasheng Power Technology Co.,Ltd.	RS-300/120-S325	-	INPUT: 110 ~ 240 V / 50/60 Hz / 1.2 A OUTPUT: 12 V, 3.0 A
AUX Cable	-	-	-	-
TRIPOD	-	-	-	-

2.2. Frequency/channel operations

This device contains the following capabilities:

Bluetooth(BDR/EDR/BLE), Bluetooth Low Energy

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

Table 2.2.1. Bluetooth Low Energy

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

Table 2.2.2. Bluetooth(BDR/EDR)

3. Antenna requirement

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_{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	0.9 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).

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

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

4.1. Test results

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^2]

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]

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.

Antenna gain

Band	Ant Gain [dBi]
2.4 GHz	3.71

Calculation Result of RF exposure

Mode	Frequency [MHz]	Max Tune-up Power [dBm]	Ant Gain [dBi]	Power density at 20 cm [mW/cm^2]	Limit [mW/cm^2]
$\pi/4$ DQPSK-Highest	2 480	2.00	3.71	0.000 74	1.00
BLE_Highest	2 480	2.00	3.71	0.000 74	1.00

Note.

1. 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^2 .

2. Unequal antenna gains, with equal transmit powers. For antenna gains given by $G_1, G_2, \dots, G_N$ dBi (i) If transmit signals are correlated, then

Directional gain = $10 \log[(10G_1/20 + 10G_2/20 + \dots + 10G_N/20)^2/NANT]$ dB i [Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

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5. Measurement Equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV40	100989	21.12.23
Power Sensor	R&S	NRP-Z81	1137.9009.02-106225-JM	22.05.11
Attenuator	HP	8491A	42946	21.12.23

End of test report