TEST REPORT

of

FCC CFR 47 part 1, 1.1307(b), 1.1310

FCC ID: RMN-CTS-HPIO-25

Equipment Under Test	:	Hybrid PIO
Model Name	:	CTS-HPIO-25
Applicant	:	CANTOPS CO., LTD.
Manufacturer	:	CANTOPS CO., LTD.
Date of Receipt	:	2018.05.08
Date of Test(s)	:	2018.08.29 ~ 2018.11.06
Date of Issue	:	2018.11.06

In the configuration tested, the EUT complied with the standards specified above.

Tested By: **Date:** **2018.11.06**

Nancy Park

Technical Manager: **Date:** **2018.11.06**

Harim Lee

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)
- Wireless Div. 2FL, 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx.

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1.2. Details of Applicant

Applicant : CANTOPS CO., LTD.
Address : A-1002~1006, Digital Empire BLDG,16, Deongyeong-daero 1556beon-gil, Yeongtong-gu, Suwon-si, Gyeonggi-do, South Korea
Contact Person : Park, Hyo-suk
Phone No. : +82 31 303 5233

1.3. Details of Manufacturer

Applicant : Same as applicant
Address : Same as applicant

1.4. Description of EUT

Kind of Product		Hybrid PIO
Model Name		CTS-HPIO-25
Power Supply		DC 24.0 V
Frequency Range		2 408 ㎒ ~ 2 471 ㎒, 5 747 ㎒ ~ 5 825 ㎒
Modulation Technique		GFSK
Number of Channels		64 channels (2 408 ㎒ ~ 2 471 ㎒), 79 channels (5 747 ㎒ ~ 5 825 ㎒)
Antenna Type		Internal Type, External Type
Antenna Gain	**Internal**	2 400 ㎒ ~ 2 483.5 ㎒: 2.10 ㏈i, 5 725 ㎒ ~ 5 875 ㎒: 2.40 ㏈i
	External	2 400 ㎒ ~ 2 483.5 ㎒: 1.40 ㏈i, 5 725 ㎒ ~ 5 875 ㎒: 2.90 ㏈i
H/W Version		1.0
S/W Version		1.0

1.5. Declaration by the manufacturer

- The EUT has 2 internal antennas and 1 external antenna. Antennas cannot be operating simultaneously.
- Internal antenna 2 and external antenna use same port.

1.6. Test report revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL013093	2018.10.15	Initial
1	F690501/RF-RTL013093-1	2018.11.06	Revised the power density

2. RF Exposure Evaluation

2.1. Environmental evaluation and exposure limit according to FCC CFR 47 part 1, 1.1307(b), 1.1310

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (㎒)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (㎽/㎠)	Average Time
(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 – 100 000	-	-	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/1500	30
1 500 – 100 000	-	-	**1.0**	**30**

2.1.1. Friis transmission formula: Pd = (Pout*G)/(4*pi*R^2)

Where Pd = power density in ㎽/㎠

Pout = output power to antenna in ㎽

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in ㎝

Pd the limit of MPE, 1 ㎽/㎠. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

2.1.2. Test Result of RF Exposure Evaluation

Test Item : RF Exposure Evaluation Data
Test Mode : Normal Operation

2.1.3. Output Power into Antenna & RF Exposure Evaluation Distance

GFSK
- Maximum tune up tolerance

Operating Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 30 ㎝ (㎽/㎠)	Limits (㎽/㎠)
2 408 ~ 2 471	7.05	1.40	0.000 619	1
5 747 ~ 5 825	3.02	2.90	0.000 346	1

Note;

- The power density Pd (5th column) at a distance of 30 ㎝ calculated from the friis transmission formula is far below the limit of 1 ㎽/㎠.
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed and operated with minimum 30 ㎝ between the radiator and your body.
- The antenna gain of this transmitter is less than 6 dBi and must not be collocated or operating in conjunction with any other antenna or transmitter unless authorized to do so by the FCC.

- End of the Test Report -