

FCC MPE REPORT

Certification

Applicant Name:

FRTEK CO., LTD.

Address:

11-25, Simin-daero 327beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, Republic of Korea

Date of Issue:

May 27, 2019

Test Site/Location:

HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-RF-1904-FC016-R2

FCC ID:

2AFEG-24BT

APPLICANT:

FRTEK CO., LTD.

Model:

FR-RLWFDL24UC

EUT Type:

INOVA ERU

Frequency Range:

2402 MHz - 2480 MHz (Bluetooth)

The measurements shown in this report were made in accordance with the procedures specified in §2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998, 21 U.S.C. 853(a)



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Approved by : Jong Seok Lee
Manager of Telecommunication testing center

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1904-FC016	April 12, 2019	- First Approval Report
HCT-RF-1904-FC016-R1	May 02, 2019	- Revised the Average output Power on Page 4
HCT-RF-1904-FC016-R2	May 27, 2019	- Added the Simultaneous Transmission on page 10.

RF Exposure Statement

1. Limit

According to §1.1310, §2.1091 RF exposure is calculated.

(B) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)		Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
0.3	-				
1.34.....					
1.34	-	614	1.63	*(100)	30
30.....		824/f	2.19/f	*(180/ f ²)	30
30 - 300.....		27.5	0.073	0.2	30
300	-	f/1500	30
1500.....		1.0	30
1500	-				
100.000.....					

F = frequency in MHz

* = Plane-wave equivalent power density

2. Maximum Permissible Exposure Prediction

Prediction of MPE limit at a given distance

$$S = PG/4\pi R^2$$

S = Power density

P = Power input to antenna

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

R = Distance to the center of radiation of the antenna

3. RESULTS

3-1. Bluetooth (FCC ID : 2AFEG-24BT/ IC ID : 20471-24BT)

Average output Power at antenna input terminal	5.000	dBm
Average output Power at antenna input terminal	3.16	mW
Prediction distance	20.00	cm
Prediction frequency	2402 – 2480	MHz
Antenna Gain(typical)	1.00	dBi
Antenna Gain(numeric)	1.259	-
Power density at prediction frequency(S)	0.001	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

2.1091

EIRP	6.000 (dBm)
ERP	3.85 (dBm)
ERP	0.00 (W)
ERP Limit	1.50 (W)
MARGIN	27.91 (dB)

3-2. License Band (FCC ID : 2AFEG-700-850-21/ IC ID : 2AFEG-700-850-21IC)

- Lower 700 MHz (MBS)

Max Peak output Power at antenna input terminal	22.00	dBm
Max Peak output Power at antenna input terminal	158.49	mW
Prediction distance	20.00	cm
Prediction frequency	730.50	MHz
Antenna Gain(typical)	3.000	dBi
Antenna Gain(numeric)	1.995	-
Power density at prediction frequency(s)	0.063	mW/cm2
MPE limit for uncontrolled exposure at prediction frequency	0.487	mW/cm2

- Upper 700 MHz (MBS)

Max Peak output Power at antenna input terminal	22.00	dBm
Max Peak output Power at antenna input terminal	158.49	mW
Prediction distance	20.00	cm
Prediction frequency	748.50	MHz
Antenna Gain(typical)	3.000	dBi
Antenna Gain(numeric)	1.995	-
Power density at prediction frequency(s)	0.063	mW/cm2
MPE limit for uncontrolled exposure at prediction frequency	0.499	mW/cm2

- Cellular

Max Peak output Power at antenna input terminal	22.00	dBm
Max Peak output Power at antenna input terminal	158.49	mW
Prediction distance	20.00	cm
Prediction frequency	870.25	MHz
Antenna Gain(typical)	3.000	dBi
Antenna Gain(numeric)	1.995	-
Power density at prediction frequency(s)	0.063	mW/cm2
MPE limit for uncontrolled exposure at prediction frequency	0.580	mW/cm2

3-3. License Band (FCC ID : 2AFEG-2100-24/ IC ID : 2AFEG-2100-24IC)

- AWS

Max Peak output Power at antenna input terminal	25.000	dBm
Max Peak output Power at antenna input terminal	316.23	mW
Prediction distance	20.00	cm
Prediction frequency	2 112.500	MHz
Antenna Gain(typical)	6.000	dBi
Antenna Gain(numeric)	3.981	-
Power density at prediction frequency(S)	0.251	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

3-4. License Band (FCC ID : 2AFEG-1900-24/ IC ID : 2AFEG-1900-24IC)**- PCS**

Max Peak output Power at antenna input terminal	25.00	dBm
Max Peak output Power at antenna input terminal	316.23	mW
Prediction distance	20.00	cm
Prediction frequency	1 932.50	MHz
Antenna Gain(typical)	6.000	dBi
Antenna Gain(numeric)	3.981	-
Power density at prediction frequency(S)	0.251	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

3-5. License Band (FCC ID : 2AFEG-23-25-21-24)

- WCS

Max Peak output Power at antenna input terminal	22.000	dBm
Max Peak output Power at antenna input terminal	158.49	mW
Prediction distance	20.00	cm
Prediction frequency	2 355.00	MHz
Antenna Gain(typical)	6.000	dBi
Antenna Gain(numeric)	3.981	-
Power density at prediction frequency(S)	0.126	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm2

- BRS

Max Peak output Power at antenna input terminal	25.00	dBm
Max Peak output Power at antenna input terminal	316.23	mW
Prediction distance	20.00	cm
Prediction frequency	2 593.00	MHz
Antenna Gain(typical)	6.000	dBi
Antenna Gain(numeric)	3.981	-
Power density at prediction frequency(S)	0.251	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm2

3-6. License Band (IC ID: 20471-23262124IC)

- WCS

Max peak output power at antenna input terminal (dBm)	22.00	dBm
Max peak output power at antenna input terminal (mW)	0.158	W
Prediction distance	0.20	m
Prediction frequency	2 352.50	MHz
Antenna gain (typical)	6.000	dBi
Antenna gain (numeric)	3.981	-
Power density at prediction frequency	1.255	W/m ²
MPE limit for uncontrolled exposure at prediction frequency	5.275	W/m ²

- BRS

Max peak output power at antenna input terminal (dBm)	25.00	dBm
Max peak output power at antenna input terminal (mW)	0.316	W
Prediction distance	0.20	m
Prediction frequency	2 622.50	MHz
Antenna gain (typical)	6.000	dBi
Antenna gain (numeric)	3.981	-
Power density at prediction frequency	2.505	W/m ²
MPE limit for uncontrolled exposure at prediction frequency	5.682	W/m ²

3-7. MPE Calculation for Simultaneous Transmission Operations

FCC

FCC ID	MPE Ratio (Power density / Limit)	Sum of MPE Ratio
2AFEG-700-850-21	0.129	0.883
2AFEG-2100-24	0.251	
2AFEG-1900-24	0.251	
2AFEG-23-25-21-24	0.251	
2AFEG-24BT	0.001	

IC

IC ID	MPE Ratio (Power density / Limit)	Sum of MPE Ratio
2AFEG-700-850-21IC	0.129	0.883
2AFEG-2100-24IC	0.251	
2AFEG-1900-24IC	0.251	
20471-23262124IC	0.251	
20471-24BT	0.001	

Note:

1. Limit : 1mW/cm²
2. The results of each modules were applied to the worst value.
3. MPE ratios are calculated as

$$[(\text{Power density}_1 / \text{MPE Limit}) + [(\text{Power density}_2 / \text{MPE Limit}) + \dots] \leq 1$$