RF Exposure Evaluation Declaration

FCC ID: SFK-WB60

APPLICANT: CIG Shanghai Co., Ltd.

Application Type: Certification

Product: WF-630R1 Radio Module

Model No.: WF-630R1

FCC Classification: Digital Transmission System (DTS)
Unlicensed National Information Infrastructure (UNII)

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Revision History

Report No.	Version	Description	Issue Date
1506RSU01404	Rev. 01	Initial report	08-23-2015

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name	WF-630R1 Radio Module
Model No.	WF-630R1
Frequency Range	**2.4GHz:** 802.11b/g/n-HT20: 2412 ~ 2462 MHz 802.11n-HT40: 2422 ~ 2452 MHz **5GHz:** 802.11a/n-HT20/ac-VHT20: 5180~5240MHz, 5745~5825MHz 802.11n-HT40/ac-VHT40: 5190~5230MHz, 5755~5795MHz 802.11ac-VHT80: 5210MHz, 5775MHz
Type of Modulation	802.11b: DSSS 802.11g/a/n/ac: OFDM
Maximum Average Output Power	**For 2.4GHz:** 802.11b: 27.60dBm 802.11g: 27.11dBm 802.11n-HT20: 27.09dBm 802.11n-HT40: 27.21dBm **For 5GHz:** 802.11a: 27.44dBm 802.11n-HT20: 27.56dBm 802.11n-HT40: 26.24dBm 802.11ac-VHT20: 27.57dBm 802.11ac-VHT40: 26.28dBm 802.11ac-VHT80: 18.04dBm

1.2. Antenna Description

Antenna Type	Frequency Band (GHz)	Tx Paths	Max Peak Gain (dBi)	Beam Forming Directional Gain (dBi)	CDD Directional Gain (dBi)
PCB Antenna	2.4	2	10	10	10
	5	2	12	12	12

Note: The antenna is belong to cross-polarized antenna (horizontal and vertical polarizations) refer to antenna specification.

For a system in which the antennas have fixed orientations relative to one another that ensure that the antennas are cross-polarized regardless of any user actions, the directional gain is computed as follows.

- Cross-polarized antennas with NANT = 2. In the case of a transmitter with only two outputs driving a pair of antennas that are cross-polarized (e.g., vertical and horizontal), directional gain is the gain of an individual antenna. If the two antennas have different gains, the larger gain applies.

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	f/1500	6
1500-100,000	--	--	1	30

f= Frequency in MHz

Calculation Formula: $Pd = (Pout*G)/(4*pi*r^2)$

Where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

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

Pd is the limit of MPE, $1mW/cm^2$. 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 r where the MPE limit is reached.

2.2. Test Result of RF Exposure Evaluation

Product	WF-630R1 Radio Module
Test Item	RF Exposure Evaluation

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 10dBi for 2.4GHz, 12dBi for 5.2GHz, and 12dBi for 5.8GHz in logarithm scale.

For 2.4GHz ISM Band:

Test Mode	Frequency Band (MHz)	Maximum Average Output Power (dBm)	Limit of Power Density S(mW/cm^2)	Safety Distance (cm)
802.11b/g/n-HT20	2412 ~ 2462	27.60	1	21.40
802.11n-HT40	2422 ~ 2452	27.21	1	20.46

For 5GHz UNII Band:

Test Mode	Frequency Band (MHz)	Maximum Average Output Power (dBm)	Limit of Power Density S(mW/cm^2)	Safety Distance (cm)
802.11a/n-HT20/ ac-VHT20	5180 ~ 5240	27.57	1	26.85
	5745 ~ 5825	27.44	1	26.45
802.11n-HT40/ ac-VHT40	5190 ~ 5230	25.41	1	20.94
	5755 ~ 5795	26.28	1	23.14
802.11ac-VHT80	5210	18.04	1	8.96
	5775	14.81	1	6.18

CONCULISON:

Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously. The Safety Distance of the **WF-630R1 Radio Module FCC ID: SFK-WB60** was 48.25 cm.

So the EUT complies with the requirement.

The End