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RF Exposure Evaluation Declaration

FCC ID: 2AC9MGPT2541GNAC

APPLICANT: Wuxi Mitrastar Technology Co., Ltd

Application Type: Certification

Product: Equipo para acceso Fibra Óptica

Model No.: GPT-2541GNAC

Trademark: MitraStar

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

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The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

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Revision History

Report No.	Version	Description	Issue Date	Note
1608RSU01803	Rev. 01	Initial report	09-19-2016	Valid

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name	Equipo para acceso Fibra Óptica
Model No.	GPT-2541GNAC
Brand Name	MitraStar
Wi-Fi Specification	802.11a/b/g/n/ac
Frequency Range	<p><u>2.4GHz:</u></p> <p>For 802.11b/g/n-HT20: 2412 ~ 2462 MHz</p> <p>For 802.11n-HT40: 2422 ~ 2452 MHz</p> <p><u>5GHz:</u></p> <p>For 802.11a/n-HT20: 5180~5240MHz</p> <p>For 802.11n-HT40: 5190~5230MHz</p> <p>For 802.11ac-VHT80: 5210MHz</p>
Type of Modulation	<p>802.11b: DSSS</p> <p>802.11g/a/n/ac: OFDM</p>
Maximum Average Output Power	<p><u>For 2.4GHz Band:</u></p> <p>802.11b: 20.22dBm</p> <p>802.11g: 20.18dBm</p> <p>802.11n-HT20: 23.08dBm</p> <p>802.11n-HT40: 22.82dBm</p> <p><u>For 5GHz Band:</u></p> <p>802.11a: 26.97dBm</p> <p>802.11n-HT20: 26.98dBm</p> <p>802.11n-HT40: 27.48dBm</p> <p>802.11ac-VHT80: 20.50dBm</p>

1.2. Antenna Description

Antenna Type	Frequency Band (MHz)	Tx Paths	Per Chain Max Antenna Gain (dBi)		CDD Directional Gain (dBi)		Beam Forming Directional Gain (dBi)
			Ant 0	Ant 1	Power	PSD	
PCB Antenna	2400 ~ 2483.5	2	1.0	1.0	1.0	4.01	4.01

Antenna Type	Frequency Band (MHz)	Tx Paths	Per Chain Max Antenna Gain (dBi)				CDD Directional Gain (dBi)		Beam Forming Directional Gain (dBi)
			Ant 0	Ant 1	Ant 0	Ant 1	Power	PSD	
PCB Antenna	5150 ~5250	4	1.0	1.0	1.0	1.0	1	7.02	7.02

1. The EUT supports Cyclic Delay Diversity (CDD) technology at 802.11a mode, and that CDD signal is correlated.
2. The EUT supports Beam Forming technology at 802.11n/ac mode, and that Beam Forming signal is correlated.
 - (1) *Correlated signals include, but are not limited to, signals transmitted in any of the following modes:*
 - Basic methodology with N_{ANT} transmit antennas, each with the same directional gain G_{ANT} dBi, being driven by N_{ANT} transmitter outputs of equal power. Directional gain is to be computed as follows:
Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi
For example: 5150 ~ 5250MHz Directional Gain = $1 + 10 \cdot \log_{10} 4 = 7.02$ dBi
 - (2) *If all antennas have the same gain, G_{ANT} , Directional gain = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows.*
 - For power spectral density (PSD) measurements on all devices,
Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB. Where $N_{SS} = 1$.
 - For power measurements on IEEE 802.11 devices,
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;
Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.

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: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d is the limit of MPE, 1mW/cm². 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	Equipo para acceso Fibra Óptica
Test Item	RF Exposure Evaluation

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.01dBi for 2.4GHz, 7.02dBi for 5GHz in logarithm scale.

For 2.4GHz ISM Band:

Test Mode	Frequency Band (MHz)	Maximum Average Output Power (dBm)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)
802.11b/g/n-HT20/n-HT40	2412 ~ 2462	23.08	0.1018	1

For 5GHz UNII Band:

Test Mode	Frequency Band (MHz)	Maximum Average Output Power (dBm)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)
802.11a/n-HT20/n-H40/ac-VHT80	5180 ~ 5240	27.48	0.5610	1

CONCULISON:

Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously. Therefore the Max Power Density at R (20 cm) = $0.1018\text{mW/cm}^2 + 0.5610\text{mW/cm}^2 = 0.6628 < 1\text{mW/cm}^2$.
So the EUT complies with the requirement.