

RF Exposure Evaluation Declaration

FCC ID: 2ALJ3AP31X

Applicant: HAN Networks Co., Ltd.

Application Type: Certification

Product: HAN Access Point

Model No.: AP311

Brand Name: HAN NETWORKS; HANNETWORKS

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

Test Date: September 14, 2020

Reviewed By:



(Paddy Chen)

Approved By:



(Chenz Ker)



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
2010TW0002-U4	Rev. 01	Initial Report	11-09-2020	Valid

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General Information

Applicant:	HAN Networks Co., Ltd.
Applicant Address:	101-A16, 1st Floor, Building 3, No.9 compound, Yongfeng Road, Haidian District, Beijing, P.R. China
Manufacturer:	HAN Networks Co., Ltd.
Manufacturer Address:	101-A16, 1st Floor, Building 3, No.9 compound, Yongfeng Road, Haidian District, Beijing, P.R. China
Test Site:	MRT Technology (Taiwan) Co., Ltd
Test Site Address:	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Fuxing Rd., Taoyuan, Taiwan (R.O.C)

- MRT facility is an FCC registered (Reg. No. 291082 and 153292) test facility with the site description report on file and is designated by the FCC as an Accredited Test Film.
- MRT facility is an IC registered (MRT Reg. No. 21723-1) test laboratory with the site description on file at Industry Canada.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (TAF) under the American Association for Laboratory Accreditation Program (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, Taiwan, EU and TELEC Rules.

TAF certificate here



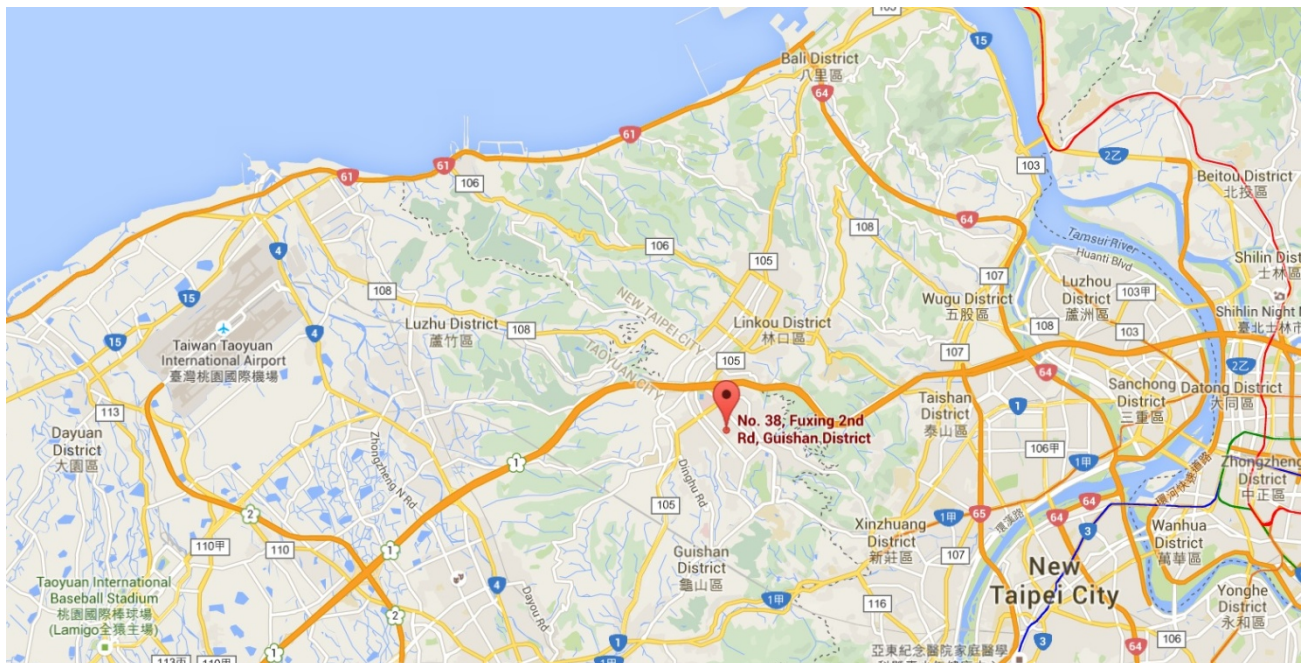
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada and Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



2. PRODUCT INFORMATION

2.1. Feature of Equipment under Test

Product Name	HAN Access Point
Model No.	AP311
Brand Name:	HAN NETWORKS; HANNETWORKS
Wi-Fi Specification:	802.11a/b/g/n/ac/ax
Bluetooth Specification:	v5.1 BLE only
Operating Temperature:	0 ~ 50 °C
Power Type:	PoE input or AC adapter input
Operating Environment:	Indoor Use
EUT Identification No.:	20200824Sample#01 (Conducted) 20200824Sample#02 (Radiated & AC conducted emission)

2.2. Description of Available Antennas

Antenna Type	Frequency Band (GHz)	Tx Paths	Bandwidth (MHz)	Max Peak Gain (dBi)		Directional Gain (dBi)		Beamforming Directional Gain (dBi)
				Ant 0	Ant 1	Power	PSD	
Wi-Fi Internal Antenna List (2.4GHz 2*2 MIMO, 5GHz 2*2 MIMO)								
PIFA Antenna	2412 ~ 2462	2	20, 40	3.20	3.30	3.30	6.31	6.26
	5150 ~ 5850	2	20, 40, 80	3.10	3.30	3.30	6.31	6.21
Bluetooth Internal Antenna								
Antenna Type		Frequency Band (GHz)				Max Peak Gain (dBi)		
PIFA Antenna		2400 ~ 2483.5				3.20		
Scan Antenna (1Tx)								
Antenna Type		Frequency Band (GHz)				Max Peak Gain (dBi)		
PIFA Antenna		2412 ~ 2462				3.20		
		5150 ~ 5250				3.30		
		5725~5850				3.30		

Note 1: The EUT supports Cyclic Delay Diversity (CDD) technology for 802.11a/b/g/n/ac/ax and Beam Forming technology for 802.11n/ac/ax.

Note 2: When the EUT supports Cyclic Delay Diversity (CDD) and it is correlated.

If all antennas have the same gain, G_{ANT} , Directional gain = G_{ANT} + 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 = 3.01;
- For power measurements on IEEE 802.11 devices,
Array Gain = 0 dB for $N_{ANT} \leq 4$;

If antenna gains are not equal, Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

Note 3: The EUT also supports Beam Forming mode, and the Beam Forming support 802.11n/ac/ax, not include 802.11a/b/g. The directional gain = $10 \cdot \log [(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ dBi.

Note 4: Antenna type and antenna gain are provided by the manufacturer.

3. RF Exposure Evaluation

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

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.

3.2. Test Result of RF Exposure Evaluation

Product	HAN Access Point,AP311
Test Item	RF Exposure Evaluation

Antenna Gain: Refer to clause 2.2.

Test Mode	Frequency Band (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)
802.11b/g/n/VHT/ax	2412 ~ 2462	22.74	3.30	26.04
802.11a/n/ac/ax	5180~ 5825	23.11	3.30	26.41
802.11 b/g Scan antenna	2412 ~ 2462	17.77	3.20	20.97
802.11a Scan antenna	5180~ 5825	11.59	3.30	14.89
BLE	2400~2483.5	17.41	3.20	20.61

Test Mode	Frequency Band (MHz)	Maximum EIRP (dBm)	Safety Distance (cm)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
802.11b/g/n/ax	2412 ~ 2462	26.04	20	0.0799	1
802.11a/n/ac/ax	5180 ~ 5825	26.41	20	0.0870	1
802.11 b/g Scan antenna	2412 ~ 2462	20.97	20	0.0249	1
802.11a Scan antenna	5180~ 5825	14.89	20	0.0061	1
BLE 1Mbps&2Mbps	2400~2483.5	20.61	20	0.0229	1

CONCLUSION:

The 2.4G & 5G can't work simultaneously with Scan Wi-Fi.

The max Power Density at R (20 cm) = 0.0799mW/cm² + 0.0870mW/cm² +0.0229 mW/cm² = 0.1898 mW/cm² < 1mW/cm².

So the safety distance is 20cm for device installed without any other radio equipment.

The End

Appendix A - EUT Photograph

Refer to "2010TW0002-UE" file.