RF Exposure Evaluation Declaration

FCC ID:	2ALJ3AP211
APPLICANT:	HAN Networks Co., Ltd
Application Type:	Certification
Product:	HAN Access Point
Model No.:	AP211
Brand Name:	HAN NETWORKS
FCC Classification:	Digital Transmission System (DTS) Unlicensed National Information Infrastructure (NII)
Test Procedure(s):	KDB 447498 D01v06
Test Date:	September 06 ~ October 19, 2018

Reviewed By: Sunny Sun
(Sunny Sun)

Approved By: Robin Wu
(Robin Wu)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

Revision History

Report No.	Version	Description	Issue Date	Note
1808RSU025-U8	Rev. 01	Initial Report	11-22-2018	Valid

§2.1033 General Information

Applicant:	HAN Networks Co., Ltd
Applicant Address:	5/F, Building 37, No. 8 Dongbeiwang West Road, Haidian District Beijing 100194, P.R. China
Manufacturer:	HAN Networks Co., Ltd
Manufacturer Address:	5/F, Building 37, No. 8 Dongbeiwang West Road, Haidian District Beijing 100194, P.R. China
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
FCC Registration No.:	893164
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC registered (MRT Reg. No. 893164) test facility with the site description report on file and has met all the requirements specified in ANSI C63.4-2014.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications, Radio and SAR testing.**

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name:	HAN Access Point
Model No.:	AP211
Brand Name:	HAN NETWORKS
Wi-Fi Specification	802.11a/b/g/n/ac
Bluetooth Specification:	v5.0
Operating Temperature:	0 ~ 45 °C
Power Type:	POE input or AC adapter input
Operating Environment:	Indoor Use

1.2. Description of Available Antennas

Antenna Type	Frequency Band (GHz)	Tx Paths	Per Chain Max Antenna Gain (dBi)		Beam-Forming Directional Gain (dBi)	CDD Directional Gain(dBi)	
			Ant 0	Ant 1		For Power	For PSD
Wi-Fi Internal Antenna							
PCB	2412 ~ 2462	2	4.70	3.70	7.22	4.70	7.71
	5150 ~ 5250	2	3.80	3.00	6.42	3.80	6.81
	5250 ~ 5350	2	3.80	3.00	6.42	3.80	6.81
	5470 ~ 5725	2	4.60	3.80	7.22	4.60	7.61
	5725 ~ 5850	2	4.60	3.00	6.85	4.60	7.61
Bluetooth Internal Antenna							
PCB	2402 ~ 2480	1	3.70		--		

Note:

1. The EUT supports SISO technology for 802.11b mode only.
2. The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.
   For CDD transmissions, directional gain is calculated as follows, N_{ANT} = 2, N_{SS} = 1.
   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.

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

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	HAN Access Point
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Maximum EIRP (dBm)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
Bluetooth	2402 ~ 2480	23.60	0.0456	1
Wi-Fi	2412 ~ 2462	28.06	0.1273	1
	5260 ~ 5320	29.72	0.1865	1
	5500 ~ 5720	29.61	0.1819	1

CONCLUSION:

The max Power Density at R (20 cm) = 0.0456mW/cm^2 + 0.1273 mW/cm^2 + 0.1865 mW/cm^2 = 0.3594 mW/cm^2 < 1 mW/cm^2.

Therefore, the Min Safety Distance is 20cm.

The End

Appendix A – Test Setup Photograph

Refer to “1808RSU025-UT” file.

Appendix B – EUT Photograph

Refer to “1808RSU025-UE” file.