

RF Exposure Evaluation Declaration

FCC ID: 2A38RDAP64X

APPLICANT: Belden Hirschmann Industries (Suzhou) Ltd.

Application Type: Certification

Product: HIT Dragonfly Access Point

Model No.: DAP645-RW, DAP645-ME, DAP645-US, DAP645-JP
DAP646-RW, DAP646-ME, DAP646-US, DAP646-JP
DAP647-RW, DAP647-ME, DAP647-US, DAP647-JP

Brand Name: HIRSCHMANN IT

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

Test Procedure(s): KDB 447498 D01v06

Reviewed By: _____



Approved By: _____

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
2201RSU009-U6	Rev. 01	Initial Report	03-23-2022	Valid

Note: This is a copy report based on MRT original report (report No.: 1911RSU003-U6). It changed the information of the applicant and the product. The hardware and software of the product are the same.

DAP645-RW/DAP646-RW/DAP647-RW corresponds to the three models in the original report respectively. Only a slight change in appearance, which has no impact on the test results.

General Information

Applicant:	Belden Hirschmann Industries (Suzhou) Ltd.			
Applicant Address:	333 Yanhu Road, Huaqiao Town, Kunshan City, Jiangsu Province, P. R. China			
Manufacturer:	Belden Hirschmann Industries (Suzhou) Ltd.			
Manufacturer Address:	333 Yanhu Road, Huaqiao Town, Kunshan City, Jiangsu Province, 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			
Test Device Serial No.:	N/A	<input type="checkbox"/> Production	<input checked="" type="checkbox"/> Pre-Production	<input type="checkbox"/> Engineering

Test Facility / Accreditations

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

- MRT facility is a FCC accredited (MRT Designation No. CN1166) 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:	HIT Dragonfly Access Point
Model No.:	DAP645-RW, DAP645-ME, DAP645-US, DAP645-JP DAP646-RW, DAP646-ME, DAP646-US, DAP646-JP DAP647-RW, DAP647-ME, DAP647-US, DAP647-JP
Brand Name:	HIRSCHMANN IT
Wi-Fi Specification:	802.11a/b/g/n/ac/ax
Bluetooth Specification:	v5.1
Operating Temperature:	-40 ~ 65 °C
Power Type:	PoE input or AC adapter input
Operating Environment:	Outdoor Use
Accessories	
PoE Injector	Model No.: PD-9501GC/AC Input Power: 100 - 240V ~ 50/60Hz, 1.5A Output Power: 55VDC/1.1A
Remark:	
1. PoE Injector is not sold with the product. 2. The difference between DAP645, DAP646 and DAP647 is that EUT use different antennas. The -RW, -ME, -US and -JP are only market requirements, all hardware and software are consistent. 3. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.2. Description of Available Antennas

Model No.: DAP645-RW

Antenna Type	Frequency Band (GHz)	Tx Paths	Bandwidth (MHz)	Max Peak Gain (dBi)				Directional Gain (dBi)			
				Ant 0	Ant 1	Ant 2	Ant 3	CDD	Beamforming		
Wi-Fi Internal Antenna List (2.4GHz 2*2 MIMO, 5GHz 4*4 MIMO)											
Omni Antenna	2400 ~ 2483.5	2	20, 40	4.72	4.85	--	--	4.85	7.86		
	5150 ~ 5850	4	20, 40, 80	6.48	6.31	6.26	6.12	6.48	12.50		
	5150 ~ 5250 30° elevation angle	4	20, 40, 80	-5.46	-4.22	-2.90	-3.84	--			
Bluetooth Internal Antenna											
Antenna Type		Frequency Band (GHz)				Max Peak Gain (dBi)					
Omni Antenna		2400 ~ 2483.5				4.64					
Scan Antenna											
Antenna Type		Frequency Band (GHz)				Max Peak Gain (dBi)					
Omni Antenna	2400 ~ 2483.5				4.58				--		
	5150 ~ 5850				6.00				--		
	5150 ~ 5250 30° elevation angle				-5.83				--		

Model No.: DAP646-RW

Antenna Type	Frequency Band (GHz)	Tx Paths	Bandwidth (MHz)	Max Peak Gain (dBi)				Directional Gain (dBi)			
				Ant 0	Ant 1	Ant 2	Ant 3	CDD	Beamforming		
Wi-Fi Internal Antenna List (2.4GHz 2*2 MIMO, 5GHz 4*4 MIMO)											
Directional Antenna	2400 ~ 2483.5	2	20, 40	7.5	7.0	--	--	7.5	10.51		
	5150 ~ 5850	4	20, 40, 80	7.4	7.0	6.9	7.2	7.4	13.42		
	5150 ~ 5250 30° elevation angle	4	20, 40, 80	3.12	2.98	3.24	3.65	--			
Bluetooth Internal Antenna											
Antenna Type		Frequency Band (GHz)				Max Peak Gain (dBi)					
Omni Antenna		2400 ~ 2483.5				3.30					
Scan Antenna											
Antenna Type		Frequency Band (GHz)				Max Peak Gain (dBi)					
Omni Antenna	2400 ~ 2483.5				7.20				--		
	5150 ~ 5850				9.40				--		
	5150 ~ 5250 30° elevation angle				2.88				--		

Model No.: DAP647-RW

Antenna Type	Frequency Band (GHz)	Tx Paths	Bandwidth (MHz)	Max Peak Gain (dBi)	Directional Gain (dBi)	
					CDD	Beamforming
Wi-Fi Internal Antenna List (2.4GHz 2*2 MIMO, 5GHz 4*4 MIMO)						
Omni Antenna	2400 ~ 2483.5	2	20, 40	5	5	8.01
	5150 ~ 5850	4	20, 40, 80	7	7	13.02
	5150 ~ 5250 30° elevation angle	4	20, 40, 80	-0.3	--	
Bluetooth Internal Antenna						
Antenna Type		Frequency Band (GHz)		Max Peak Gain (dBi)		
Omni Antenna		2400 ~ 2483.5		4.06		
Scan Antenna						
Antenna Type		Frequency Band (GHz)		Max Peak Gain (dBi)		
Omni Antenna			2400 ~ 2483.5	4.58		
			5150 ~ 5850	6.00		
			5150 ~ 5250	2.88		
			30° elevation angle			

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 = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,
 $\text{Array Gain} = 10 \log (N_{ANT}/N_{SS}) \text{ dB} = 3.01$;
- For power measurements on IEEE 802.11 devices,
 $\text{Array Gain} = 0 \text{ dB for } N_{ANT} \leq 4$;

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, Directional gain = $G_{ANT} + 10 \log(N_{ANT}/N_{SS}) \text{ dBi}$, 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.

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: $Pd = (Pout \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

Pd = power density in mW/cm²

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/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	HIT Dragonfly Access Point				
Test Item	RF Exposure Evaluation				

Test Mode	Frequency Band (MHz)	Maximum EIRP (dBm)	Safety Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	
DAP645-RW						
Bluetooth	2402 ~ 2480	24.11	30	0.0228	1	
Wi-Fi	2412 ~ 2462	32.75		0.1666		
	5180 ~ 5825	35.89		0.3432		
Scan Wi-Fi	2412 ~ 2462	16.50		0.0039		
	5180 ~ 5240	16.87		0.0043		
	5745 ~ 5825					
DAP646-RW						
Bluetooth	2402 ~ 2480	22.77	30	0.0167	1	
Wi-Fi	2412 ~ 2462	35.92		0.3456		
	5180 ~ 5825	35.68		0.3270		
	2412 ~ 2462	19.12		0.0072		
Scan Wi-Fi	5180 ~ 5240	20.27		0.0094		
	5745 ~ 5825					
DAP647-RW						
Bluetooth	2402 ~ 2480	23.53	30	0.0199	1	
Wi-Fi	2412 ~ 2462	32.90		0.1724		
	5180 ~ 5825	35.79		0.3354		
	2412 ~ 2462	16.50		0.0039		
Scan Wi-Fi	5180 ~ 5240	16.87		0.0043		
	5745 ~ 5825					

Note 1: The 2.4G & 5G can't work simultaneously of Scan Wi-Fi.

Note 2: The DAP645-RW max Power Density at R (30 cm) = 0.0228 + 0.1666 + 0.3432 + 0.0043 mW/cm² = 0.5369 mW/cm² < 1 mW/cm².

Note 3: The DAP646-RW max Power Density at R (30 cm) = 0.0167 + 0.3456 + 0.3270 + 0.0094 mW/cm² = 0.6987 mW/cm² < 1 mW/cm².

Note 3: The DAP647-RW max Power Density at R (30 cm) = 0.0199 + 0.1724 + 0.3354 + 0.0043 mW/cm² = 0.5320 mW/cm² < 1 mW/cm².

Therefore, the Min Safety Distance is 30cm.

Appendix A – EUT Photograph

Refer to “2201RSU009-UE” file.