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電磁波曝露量之評估報告

產品名稱: Aruba 500 接入點
型號: APIN0504, APIN0505
廠牌: aruba / Hewlett Packard Enterprise
商標:  / 
申請者: 慧與科技股份有限公司
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測試標準: LP0002 (107 年版)
參考法規: ANSI C63.10-2013
測試結果: 符合
測試日期: 2019.06.03 ~ 2019.07.14
發行日期: 2019.09.24

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修訂紀錄

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1906TW0102-T6	1.0	Original Report	2019-09-24

1. 產品資訊

1.1. 待測物裝置資料

產品名稱	Aruba 500 接入點
產品型號	APIN0504, APIN0505
廠牌	aruba / Hewlett Packard Enterprise
商標	
無線規格	802.11a/b/g/n/ac/ax
藍牙規格	v4.2 single mode
Zigbee 規格	802.15.4
待測物額定電壓	AC Adapter or POE input
調變模式	802.11b: DSSS 802.11a/g/n/ac: OFDM 802.11ax: OFDMA
傳輸速率	802.11b: 1/2/5.5/11Mbps 802.11a/g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.6Mbps 802.11ax: up to 1201Mbps
配件	
POE Adapter	MFR: Microsemi Corp Analog Mixed Signal Group Model: PD-9001GR/AT/AC INPUT: 100 - 240V ~ 50/60Hz, 0.67A OUTPUT: 55VDC 0.6A
AC Adapter 1#	MFR: Asian Power Devices Inc. Model: DB-48A12 INPUT: 100 - 240V ~ 50/60Hz, 1.5A OUTPUT: 12VDC 4A
AC Adapter 2#	Model: ADH-36BR B INPUT: 100 - 240V ~ 50/60Hz, 1.0A OUTPUT: 12VDC 3A
AC Adapter 3#	MFR: Shenzhen ENG Electronics Co., Ltd. P/N: SDI30-12-U-P209-C1 Model: SDI30-12-U INPUT: 100 - 240V ~ 50/60Hz, 1.0A OUTPUT: 12VDC 2.5A

Note: The difference between models is that EUT use different antenna and appearance, APIN0504 use some external antennas, but APIN0505 use internal antenna, other hardware and software are the same.

1.2. 天線樣式

型號APIN0504 使用半固定式天線，使用Reverse SMA介面。

Antenna No.	Directionality/TYPE	Frequency Band (GHz)	Model No.	Max Peak Gain (dBi)	BF Dir Gain (dBi)	CDD Dir Gain (dBi)	
						For Power	For PSD
Wi-Fi External Antenna List (2.4GHz 2*2 MIMO, 5GHz 2*2 MIMO)							
1	Omni/Dipole	2.4	AP-ANT-1W	3.8	6.81	3.8	6.81
		5		5.8	8.81	5.8	8.81
2	Omni/Panel	2.4	AP-ANT-13B	2.3	5.31	2.3	5.31
		5		4.0	7.01	4.0	7.01
3	Omni/Dipole	2.4	AP-ANT-19	3.0	6.01	3.0	6.01
		5		6.0	9.01	6.0	9.01
4	Omni/Dipole	2.4	AP-ANT-20W	2.0	5.01	2.0	5.01
		5		2.0	5.01	2.0	5.01
5	Omni/Panel	2.4	AP-ANT-40	4.0	7.01	4.0	7.01
		5		5.0	8.01	5.0	8.01
6 (Note 3)	Directional/ Panel	2.4	AP-ANT-25A	5.0	5.0	5.0	8.01
		5		5.0	5.0	5.0	8.01
7 (Note 3)	Directional/ Panel	2.4	AP-ANT-28	7.5	7.5	7.5	10.51
		5		7.5	7.5	7.5	10.51
Bluetooth & ZigBee Internal Antenna							
PIFA		2.4		3.3			

型號APIN0505 使用全固定式天線

Directionality/ TYPE	Frequency Band (GHz)	Max Peak Gain (dBi)	BF Dir Gain (dBi)	CDD Dir Gain (dBi)	
				For Power	For PSD
Wi-Fi Internal Antenna List (2.4GHz 2*2 MIMO, 5GHz 2*2 MIMO)					
Omni/PIFA	2.4	4.29	7.08	4.29	7.08
Omni/PIFA	5	5.63	8.64	5.63	8.64
Bluetooth & ZigBee Internal Antenna					
PIFA	2.4	3.3			

Note:

1. 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 = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows.
 - For power spectral density (PSD) measurements on all devices,
Array Gain = $10 \log (N_{ANT} / N_{SS}) \text{ dB} = 3.01$;
 - For power measurements on IEEE 802.11 devices,
Array Gain = 0 dB for $N_{ANT} \leq 4$;
2. The EUT also supports Beam Forming mode, and the Beam Forming support 802.11n/ac/ax, not include 802.11a/b/g. Directional gain = $G_{ANT} + \text{Array Gain}$, BF Gain was declared by the applicant.
3. Two type antennas are cross polarized, the detail refer to antenna specification.

2. 電磁波曝露量評估

2.1. 限制值

根據低功率射頻電機技術規範(107 年 1 月 10 日) 第 5.20 章節，電磁波曝露量之評估：本規範有規定需進行電磁波曝露量之評估者，應符合以下之要求：

職業性/可控制之電磁波曝露量

頻率範圍 (MHz)	電場強度 (V/m)	磁場強度 (A/m)	功率密度 (mW/cm ²)	平均時間 (minutes)
0.3-3.0	614	1.63	*100	6
3-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500	-----	-----	f/300	6
1,500-100,000	-----	-----	5.0	6

註 1：標記*表平面波等效功率密度。

註 2：f 表測試頻率，單位：(MHz)。

一般人/不可控制之電磁波曝露量

頻率範圍 (MHz)	電場強度 (V/m)	磁場強度 (A/m)	功率密度 (mW/cm ²)	平均時間 (minutes)
0.3-3.0	614	1.63	*100	30
3-30	1842/f	4.89/f	*180/f ²	30
30-300	27.5	0.073	1.0	30
300-1,500	-----	-----	f/1500	30
1,500-100,000	-----	-----	1.0	30

註 1：標記*表平面波等效功率密度。

註 2：f 表測試頻率，單位：(MHz)。

P_d is the limit of MPE (1 mW/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. 電磁波曝露量評估之計算結果

待測物名稱	Aruba 500 接入點
測試項目	電磁波曝露量評估

天線增益: 參考報告第 1.2 章節描述

Maximum EIRP for each model

Test Mode	Frequency Band (MHz)	Max Conducted Power (dBm)	Antenna Gain (dBi)	Max EIRP (dBm)
APIN0504				
BLE	2402 ~ 2480	6.77	3.3	10.07
ZigBee	2405 ~ 2480	7.56	3.3	10.86
802.11b/g/n/ax	2412 ~ 2462	21.41	2.0	23.41
802.11a/n/ac/ax	5180 ~ 5240 5745 ~ 5825	21.43	2.0	23.43
APIN0505				
BLE	2402 ~ 2480	7.07	3.3	10.37
ZigBee	2405 ~ 2480	7.88	3.3	11.18
802.11b/g/n/ax	2412 ~ 2462	21.39	4.29	25.68
802.11a/n/ac/ax	5180 ~ 5240 5745 ~ 5825	21.37	5.63	27.00

APIN0504

Test Mode	Frequency Band (MHz)	Maximum EIRP (dBm)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)
BLE	2402 ~ 2480	10.07	0.0020	1
ZigBee	2405 ~ 2480	10.86	0.0024	1
802.11b/g/n/ax	2412 ~ 2462	23.41	0.0436	1
802.11a/n/ac/ax	5180 ~ 5240 5745 ~ 5825	23.43	0.0438	1

CONCULISON:

Both of the WLAN 2.4GHz Band, WLAN 5GHz Band, BLE or ZigBee Band can transmit simultaneously.

The max Power Density at R (20 cm) = $0.0024\text{mW/cm}^2 + 0.0436\text{mW/cm}^2 + 0.0438\text{mW/cm}^2 = 0.0898\text{mW/cm}^2 < 1\text{mW/cm}^2$.

Therefore, the Min Safety Distance is 20cm.

APIN0505

Test Mode	Frequency Band (MHz)	Maximum EIRP (dBm)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)
BLE	2402 ~ 2480	10.37	0.0022	1
ZigBee	2405 ~ 2480	11.18	0.0026	1
802.11b/g/n/ax	2412 ~ 2462	25.68	0.0736	1
802.11a/n/ac/ax	5180 ~ 5240 5745 ~ 5825	27.00	0.0997	1

CONCULISON:

Both of the WLAN 2.4GHz Band, WLAN 5GHz Band, BLE or ZigBee band can transmit simultaneously.

The max Power Density at R (20 cm) = $0.0026\text{mW/cm}^2 + 0.0736\text{mW/cm}^2 + 0.0997\text{mW/cm}^2 = 0.1759\text{mW/cm}^2 < 1\text{mW/cm}^2$.

Therefore, the Min Safety Distance is 20cm.

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