

低功率射頻電機試驗報告

申請廠商	鴻海精密工業股份有限公司
	新北市土城區中山路66號
製造廠商	鴻海精密工業股份有限公司
產品名稱	AIoT Module(BT+WLAN)
廠牌	SHARP
型號	FPWB-A001BBKZ
法規	LP0002, 3.10.1節，LP0002 4.7節

實驗室資訊

程智科技股份有限公司 五股實驗室

新北市五股區五工六路11號

認證有效期間：105年10月18日起至108年10月17日止

受理日期 民國108年04月12日

完成日期 民國108年06月27日



報告簽署人
蔡永譚 簽章

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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
T190412W04-MD	Rev.00	Initial creation of document	All	Jun. 27, 2019	Elle Chang

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測試標準

國家通訊傳播委員會低功率射頻電機技術規範

民國 107 年 1 月 10 日版本

待測裝置已於程智科技股份有限公司 五股實驗室，依據國家通訊傳播委員會於中華民國一百零七年一月頒佈之低功率射頻電機技術規範測試。

程智科技股份有限公司根據此條文規範項目測試，測試各項數據皆能符合此規範規定之限度值。

程智科技股份有限公司依低功率射頻電機技術規範審驗要點規範製作測試結果報告，測試結果評判為 合格。

備註：

1. 報告中所描述之測試結果和待測設備的架構組合，均根據實際量測情況作詳實的記錄，且本測試報告僅對上述待測設備樣品負責。
2. 此份報告未經本公司同意，不得部份摘錄複製使用。

測試人員：

李國豪

日期：

06/27/2019

李國豪 / 工程師

報告製作：

張瑜健

日期：

06/27/2019

張瑜健 / 行政

報告審核：

蔡永譚

日期：

06/27/2019

蔡永譚 / 副理

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測試實驗室資料:

實驗室認可登錄 : 中華民國實驗室認證體系

認可編號 : TAF 1309, 認可頻率範圍9kHz ~ 40GHz

認證有效期間 : 105年10月18日起至108年10月17日止

測試場地 : 新北市五股區五工六路11號

實驗室名稱 : 程智科技股份有限公司
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電話 : 886-2-22999720

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實驗室之量測不確定度

測試項目	測試場地 / 測試頻率	不確定度(dB)
傳導干擾電壓量測	Powerline Conducted Emission	+/-1.2575
輻射干擾場強量測 (測試距離: 3m)	3M Semi Anechoic Chamber / 30MHz ~ 200MHz	+/- 4.12
	3M Semi Anechoic Chamber / 200MHz ~ 1GHz	+/- 4.68
	3M Semi Anechoic Chamber / 1GHz ~ 8GHz	+/- 5.18
	3M Semi Anechoic Chamber / 8GHz ~ 18GHz	+/- 5.47
	3M Semi Anechoic Chamber / 18GHz ~ 26GHz	+/- 3.81
	3M Semi Anechoic Chamber / 26GHz ~ 40GHz	+/- 3.87

附註: K=2 即代表測試結果具有95%的量測可信度。

符合性判定僅依據試驗結果，不考慮其試驗結果的量測不確定度

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1 一般敘述

產品名稱	AIoT Module(BT+WLAN)
型號	FPWB-A001BBKZ
產品商標	SHARP
Hardware Version	DVT
Software Version	N/A
使用電源	3.3V / 5V from DC Power Supply

BLE

發射頻帶	2402MHz – 2480MHz
輸出功率	6.54 dBm (BLE) (Peak) / 6.92 dBm (BT 5.0) (Peak)
調變方式	BT V5.0 dual mode LE (GFSK)
頻道數	40

WLAN 2.4GHz:

Wi-Fi	發射頻帶	頻道數	輸出功率 (Peak)	Modulation Technology
11b/g	2412-2462	11	b: 20.33dBm g: 26.11dBm	DSSS, OFDM
11n	HT20 2412-2462	11	23.14dBm	OFDM
11n	HT40 2422-2452	7	23.46dBm	OFDM
調變方式:	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM			
Transition Rate:	802.11 b: up to 11 Mbps; 802.11 g: up to 54 Mbps 802.11 n_20MHz: 6.5 – 72.2Mbps 802.11 n_40MHz: 13.5 - 135Mbps			

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WLAN 5GHz

調變	發射頻帶 (MHz)		輸出功率 (dBm)	頻道數 (Channels)
802.11 a mode		5150 ~5250	13.95	4
		5250 ~5350	13.98	4
		5470 ~5725	13.94	12
		5725 ~5850	13.94	5
802.11n HT20 mode	HT20:	5150 ~5250	13.92	4
	HT20:	5250 ~5350	13.98	4
	HT20:	5470 ~5725	13.96	11
	HT20:	5725 ~5850	13.97	5
802.11n HT40 mode	HT40:	5150 ~5250	13.93	2
	HT40:	5250 ~5350	13.98	2
	HT40:	5470 ~5725	13.93	5
	HT40:	5725 ~5850	13.98	2
調變方式	64QAM, 16QAM, QPSK, BPSK for OFDM			

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2 最大暴露允許值 (MAXIMUM PERMISSIBLE EXPOSURE, MPE)

規範要求

依據 NCC 低功率射頻電機技術規範之 5.20.2，其發射機距離人體 20 公分以上者，需證明其符合電波暴露量之要求，限制值如下：

(1) 職業性/可控制之暴露

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：百萬赫(MHz)。

(2) 一般人/不可控制之暴露

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：百萬赫(MHz)。

適用種類

此待測物，為一般市面上販售，固適用表 2)之限制值

最大暴露允許值之評估

僅以最差模式進行評估，評估結果請見下頁。

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天線種類:

2.4GHz

天線型式/天線增益	PCB Antenna, Gain: 3.46dBi Model No.: N/A; Supplier: Foxconn
-----------	---

5GHz

天線型式	Supplier	Model No.	發射頻帶(MHz)	天線增益(dBi)
PCB	Foxconn	N/A	5150~5250	1.30
			5250~5350	2.14
			5470~5725	2.74
			5725~5850	3.26

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BLE mode (最差模式)

BLE mode:			
CH	Frequency (MHz)	Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit
Low	2402	5.62	1 Watt = 30 dBm
Mid	2442	4.41	1 Watt = 30 dBm
High	2480	2.95	1 Watt = 30 dBm

導入之公式: page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

S = 功率密度 P = 傳導功率 G = 天線增益值 R = 人體與天線之距離

Max. output power including tune-up tolerancel:	5.62	(dBm)
Max. output power including tune-up tolerancel:	3.647539469	(mW)
Duty cycle:	100	(%)
Maximum Pav :	3.647539469	(mW)
Peak Antenna gain (Maximum):	3.46	(dBi)
Peak Antenna gain (linear):	2.21819642	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2402	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
Power density at predication frequency at 20 (cm) distance	0.002	(mW/cm ²)

運算之結果:

當功率密度在 20 cm，其最大暴露值為 0.002 mW/cm².

註:工作頻率為頻率範圍1,500-100,000 (MHz), 固其對應之限制值為1.0mW/cm².

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WLAN_2.4GHz SISO (最差模式)

802.11b Ch0						
CH	Freq. (MHz)	Data Rate	Avg. Output Power (dBm)	Limit		RESULT
1	2412	1	17.81	1 Watt =	30.00 dBm	PASS
6	2437	1	17.79	1 Watt =	30.00 dBm	PASS
11	2462	1	17.86	1 Watt =	30.00 dBm	PASS

導入之公式: page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

S = 功率密度 P = 傳導功率 G = 天線增益值 R = 人體與天線之距離

Max. output power including tune-up tolerancel:	17.86	(dBm)
Max. output power including tune-up tolerancel:	61.09420249	(mW)
Duty cycle:	100	(%)
Maximum Pav :	61.09420249	(mW)
Peak Antenna gain (Maximum):	3.46	(dBi)
Peak Antenna gain (linear):	2.21819642	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2462	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
Power density at predication frequency at 20 (cm) distance	0.027	(mW/cm ²)
運算之結果: 當功率密度在 20 cm · 其最大暴露值為 0.027 mW/cm ² . 註:工作頻率為頻率範圍1,500-100,000 (MHz), 固其對應之限制值為1.0mW/cm ² .		

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WLAN_5GHz SISO (最差模式)

802.11a_Ch0

CH	Freq. (MHz)	Data Rate	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	13.92	23.98	PASS
44	5220	6	13.86	23.98	PASS
48	5240	6	13.95	23.98	PASS
52	5260	6	13.97	23.98 or $11+10\log(B) = 24.21$	PASS
60	5300	6	13.89	23.98 or $11+10\log(B) = 24.22$	PASS
64	5320	6	13.98	23.98 or $11+10\log(B) = 24.19$	PASS
100	5500	6	13.92	23.98 or $11+10\log(B) = 24.38$	PASS
116	5580	6	13.84	23.98 or $11+10\log(B) = 24.36$	PASS
140	5700	6	13.94	23.98 or $11+10\log(B) = 24.22$	PASS
149	5745	6	13.92	30	PASS
157	5785	6	13.90	30	PASS
165	5825	6	13.94	30	PASS

導入之公式: page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

S = 功率密度 P = 傳導功率 G = 天線增益值 R = 人體與天線之距離

Max. output power including tune-up tolerancel:	13.98	(dBm)
Max. output power including tune-up tolerancel:	25.00345362	(mW)
Duty cycle:	100	(%)
Maximum Pav :	25.00345362	(mW)
Peak Antenna gain (Maximum):	2.14	(dBi)
Peak Antenna gain (linear):	1.636816521	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5320	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
Power density at predication frequency at 20 (cm) distance	0.008	(mW/cm ²)

運算之結果:

當功率密度在 20 cm · 其最大暴露值為 0.008 mW/cm².

註:工作頻率為頻率範圍1,500-100,000 (MHz), 固其對應之限制值為1.0mW/cm².

~ End of Report ~

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