

APPROVAL SHEET

Chip Antenna

2.4~2.5 / 5.15~5.85 GHz Band Working

Frequency

P/N: ACM3-3216-P1-CC-S

Customer : 振曜

Customer 's Part No. : 5062-000009+191

Production : _____

Address : _____

佳邦科技股份有限公司

2023.10.06

天線事業部承認書專用

[illegible]

品名：ACM3-3216-P1-CC-S

1. Explanation of part number：

AC	M3	3216	P1	CC	S
Product Type	Center Frequency/Band Code	Product Code (Unit: mm)	Design Revision Code	Antenna Type	Special Code
Chip Antenna	A: 2.4GHz E: Cellular G: 868MHz H: 915MHz L: 5GHz M3: 2G+5GHz N: NFC	Per 2 digits of length, width e.g.: 3216 3.1*1.6 (Length * Width)	P1: Rev.1	CC: Coupling Ceramic GF: On Ground, FR4 LC: Loop ceramic MC: Monopole Ceramic MF: Monopole FR4 PF: PIFA FR4	S: RoHS Compliant

2. Electrical Specification：

Item	Specification
Working Frequency Range	2.4~2.5 / 5.15~5.85 GHz (Note-1)
Gain	3.91 / 3.41 dBi (Peak)
VSWR	2.1 max.
Polarization	Linear
Azimuth Bandwidth	Omni-directional
Impedance	50Ω

3. Other：

Item	Information
Address	桃園市楊梅區高獅路 566 之 1 號 . No. 566-1, Kao-Shi Rd., Yangmei Dist. Taoyuan City 32668, Taiwan (R.O.C.)
Antenna Type	Chip antenna

UNLESS OTHER SPECIFIED TOLERANCES ON：
X=N/A X.X=N/A X.XX=N/A
ANGLES=N/A HOLEDIA=N/A



INPAQ TECHNOLOGY CO., LTD.

SCALE：N/A

UNIT：mm

DRAWN BY：詹惠雯

CHECKED BY：詹惠雯

DESIGNED BY：

APPROVED BY：陳振榮

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NO.

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A2

4. Electrical Specification :

5. Antenna Drawing :

CONSTRUCTION



PIN	Connection
1	Feeding
2	Soldering terminal

DIMENSIONS

Figure	Symbol	Dimension (mm)
W = 1.6 ± 0.2 mm T = 0.6 ± 0.1 mm L = 3.1 ± 0.2 mm A = 0.25 ± 0.2 mm	L	3.10 ± 0.20
	W	1.60 ± 0.20
	T	0.60 ± 0.10
	A	0.25 ± 0.20

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 X = N/A X.X = N/A X.XX = N/A
 ANGLES = N/A HOLEDIA = N/A



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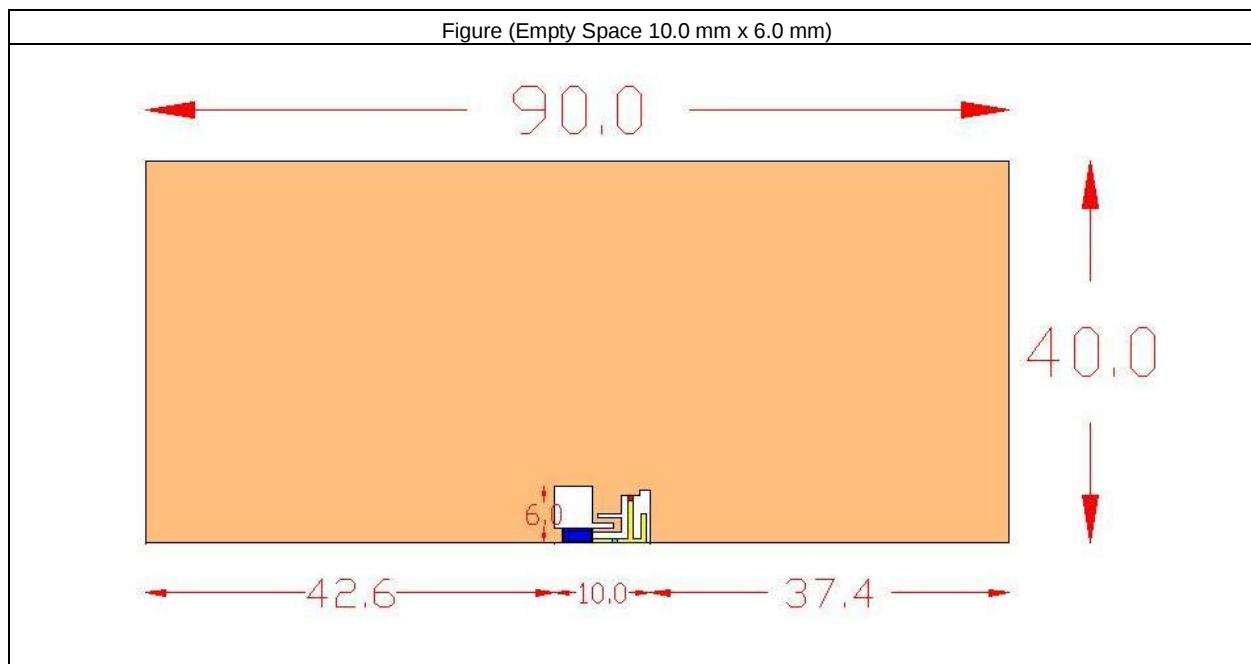
DOCUMENT
NO.

ENS070001800-000824000238

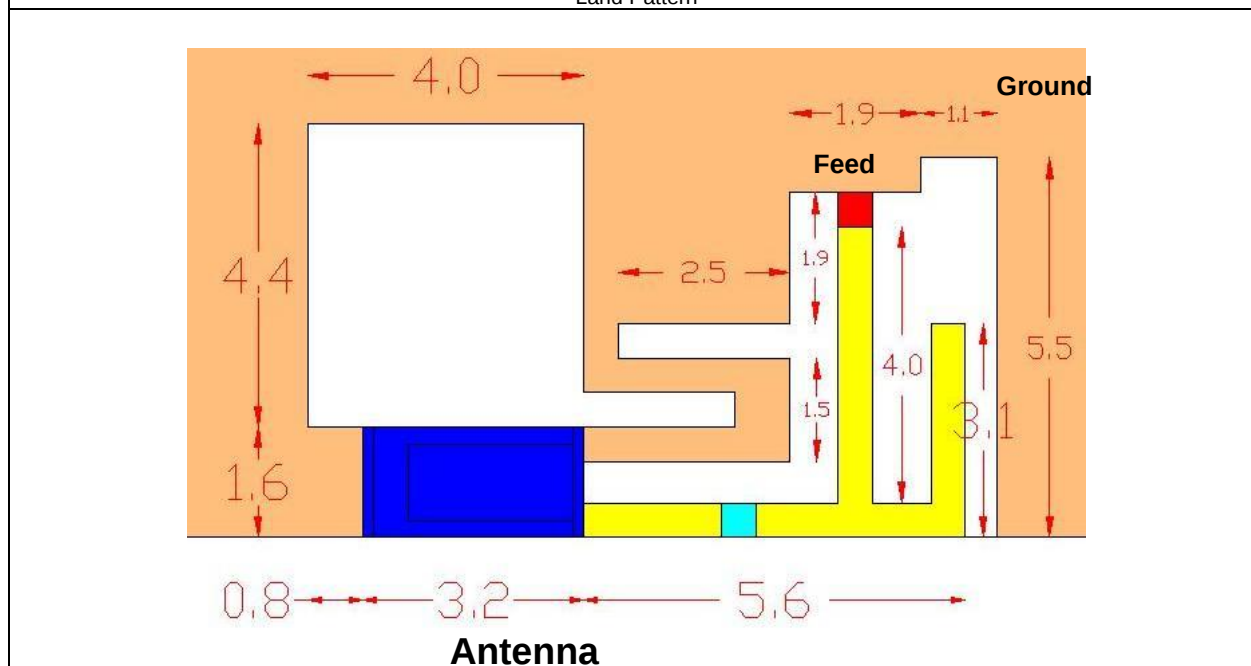
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6. Performance Report :

SOLDER LAND PATTERN DESIGN



Land Pattern



UNLESS OTHER SPECIFIED TOLERANCES ON :		
X=N/A	X.X=N/A	X.XX=N/A
ANGLES=N/A		HOLEDIA=N/A



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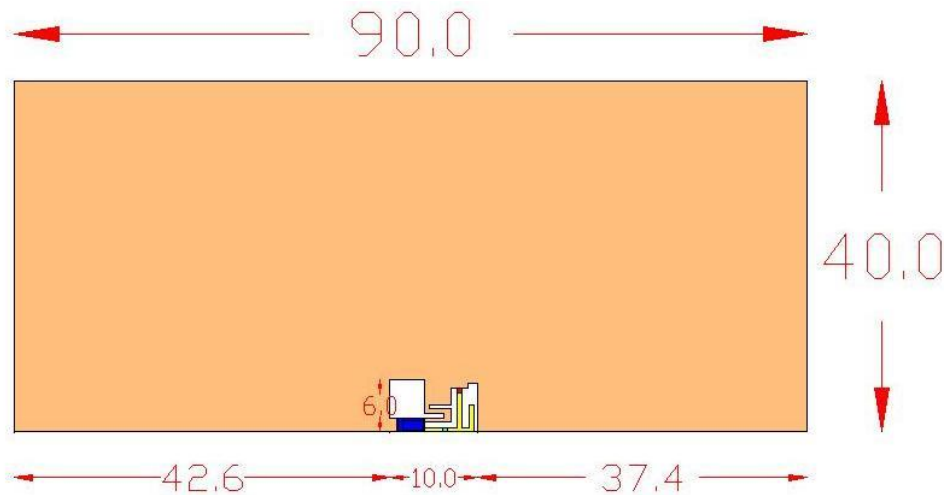
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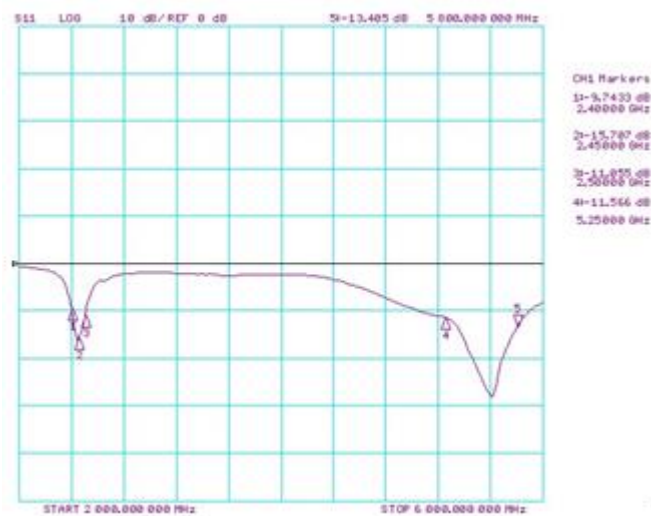
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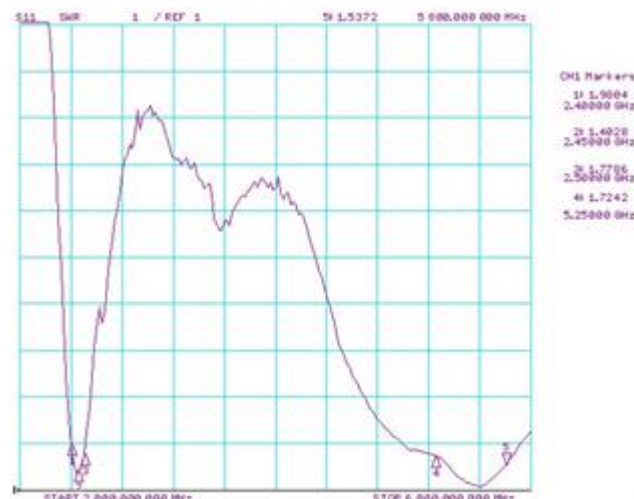
Antenna on Test Board (Thickness 0.8mm)



Antenna S11 on Test Board



Antenna VSWR on Test Board



UNLESS OTHER SPECIFIED TOLERANCES ON :
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ANGLES = N/A HOLEDIA = N/A



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UNIT : mm

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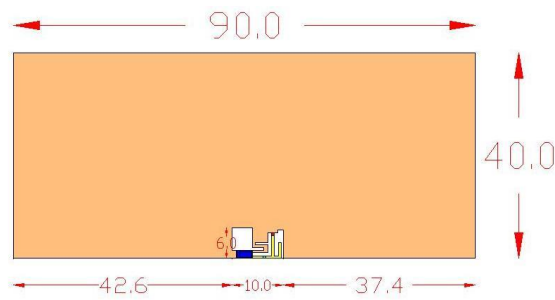
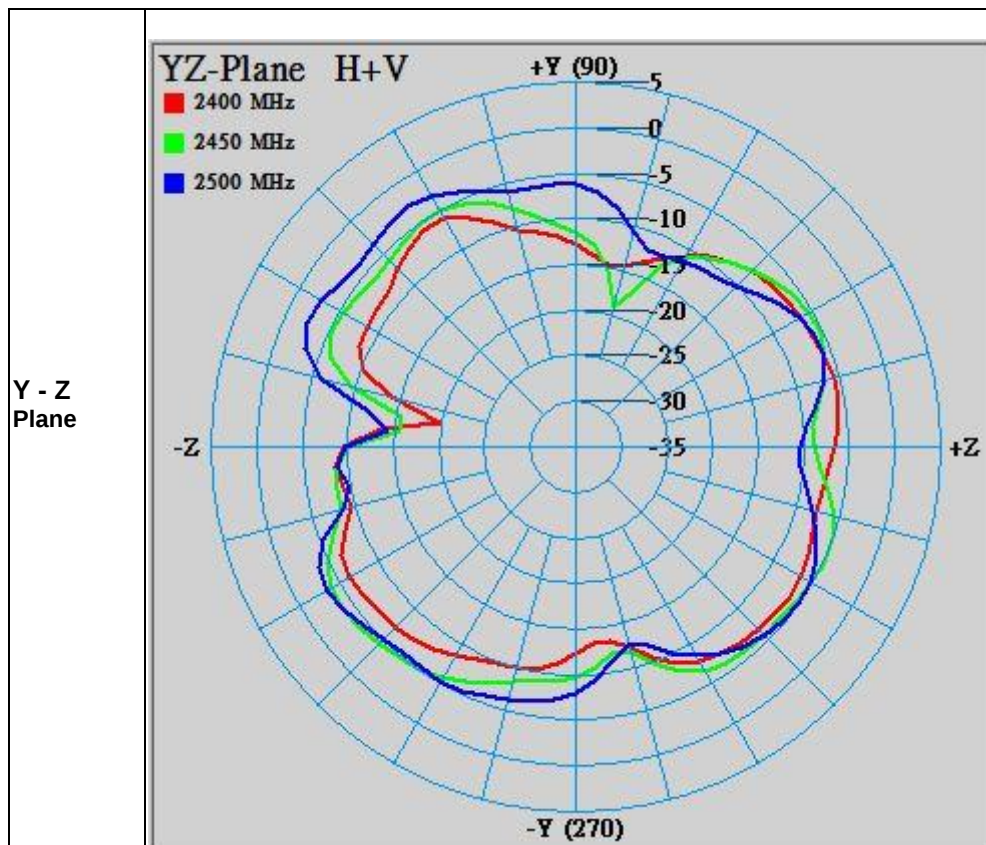
DOCUMENT
NO.

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RADIATION PATTERN

Radiation Pattern and Gain were dependent on measurement board design. The specification of ACM3-3216-P1-CC-S antenna was measured based on the PCB size and installation position as shown in the below figure Test Board.

**2.4GHz**

UNLESS OTHER SPECIFIED TOLERANCES ON :
X = N/A X.X = N/A X.XX = N/A
ANGLES = N/A HOLEDIA = N/A

**INPAQ TECHNOLOGY CO., LTD.**

SCALE : N/A

UNIT : mm

DRAWN BY : 詹惠雯

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DESIGNED BY :

APPROVED BY : 陳振榮

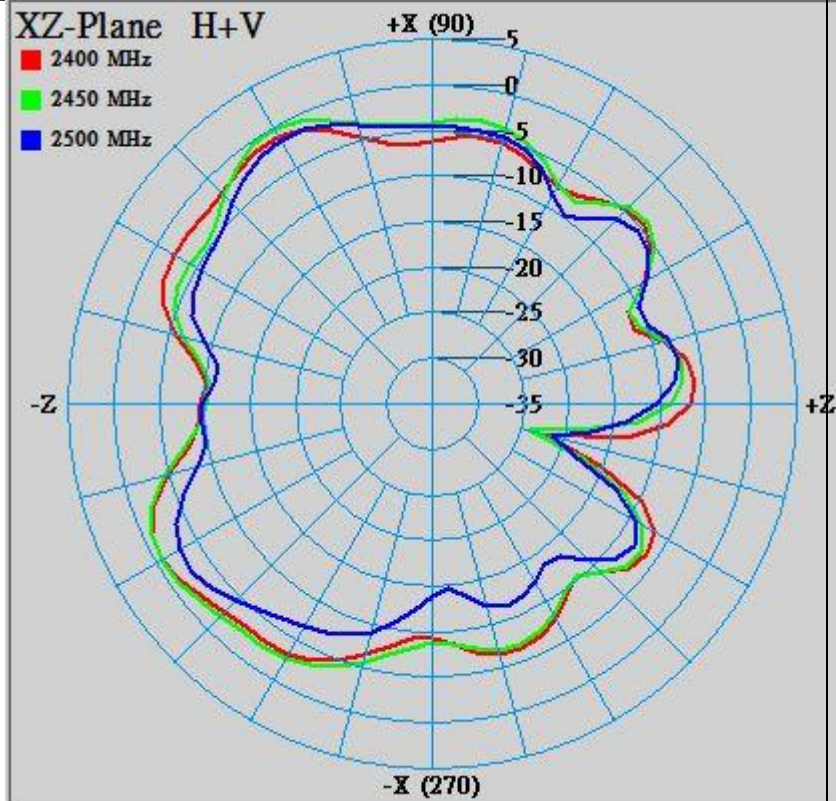
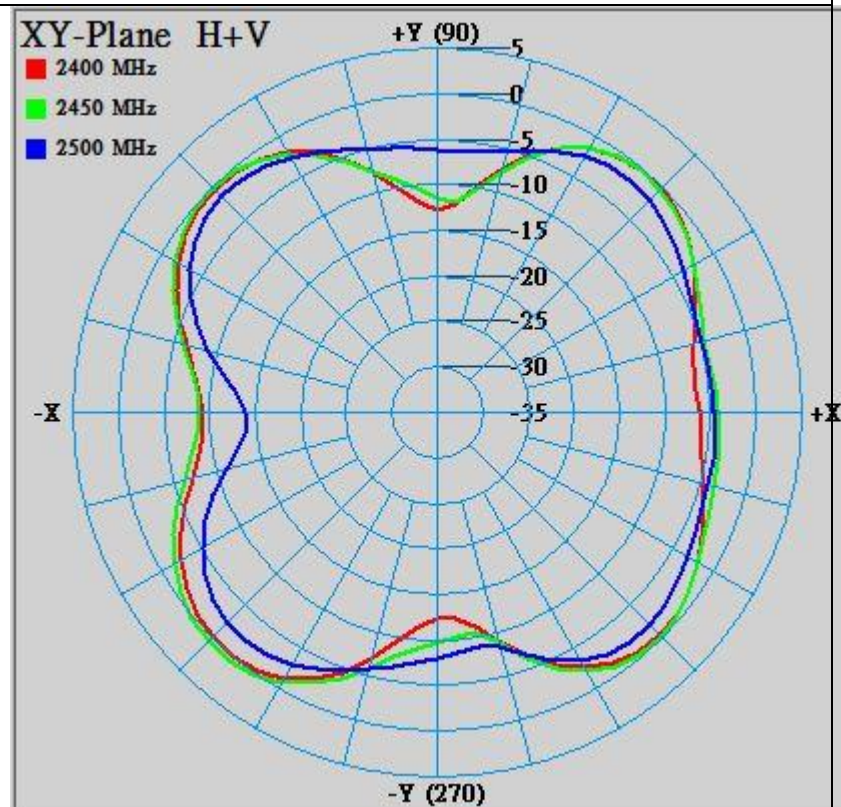
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X - Z
PlaneX - Y
Plane

UNLESS OTHER SPECIFIED TOLERANCES ON :
X = N/A X.X = N/A X.XX = N/A
ANGLES = N/A HOLEDIA = N/A



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UNIT : mm

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YZ-Plane	Peak EIRP (dBi)	Efficiency (dB)
2400 MHz	-5.749	-8.337
2450 MHz	-3.907	-7.099
2500 MHz	-2.591	-6.392

XZ-Plane	Peak EIRP (dBi)	Efficiency (dB)
2400 MHz	-0.862	-5.121
2450 MHz	-0.247	-4.904
2500 MHz	-1.658	-6.644

XY-Plane	Peak EIRP (dBi)	Efficiency (dB)
2400 MHz	-0.034	-3.447
2450 MHz	0.6	-3.029
2500 MHz	-1.521	-4.32

UNLESS OTHER SPECIFIED TOLERANCES ON :
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ANGLES = N/A HOLEDIA = N/A



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SCALE : N/A

UNIT : mm

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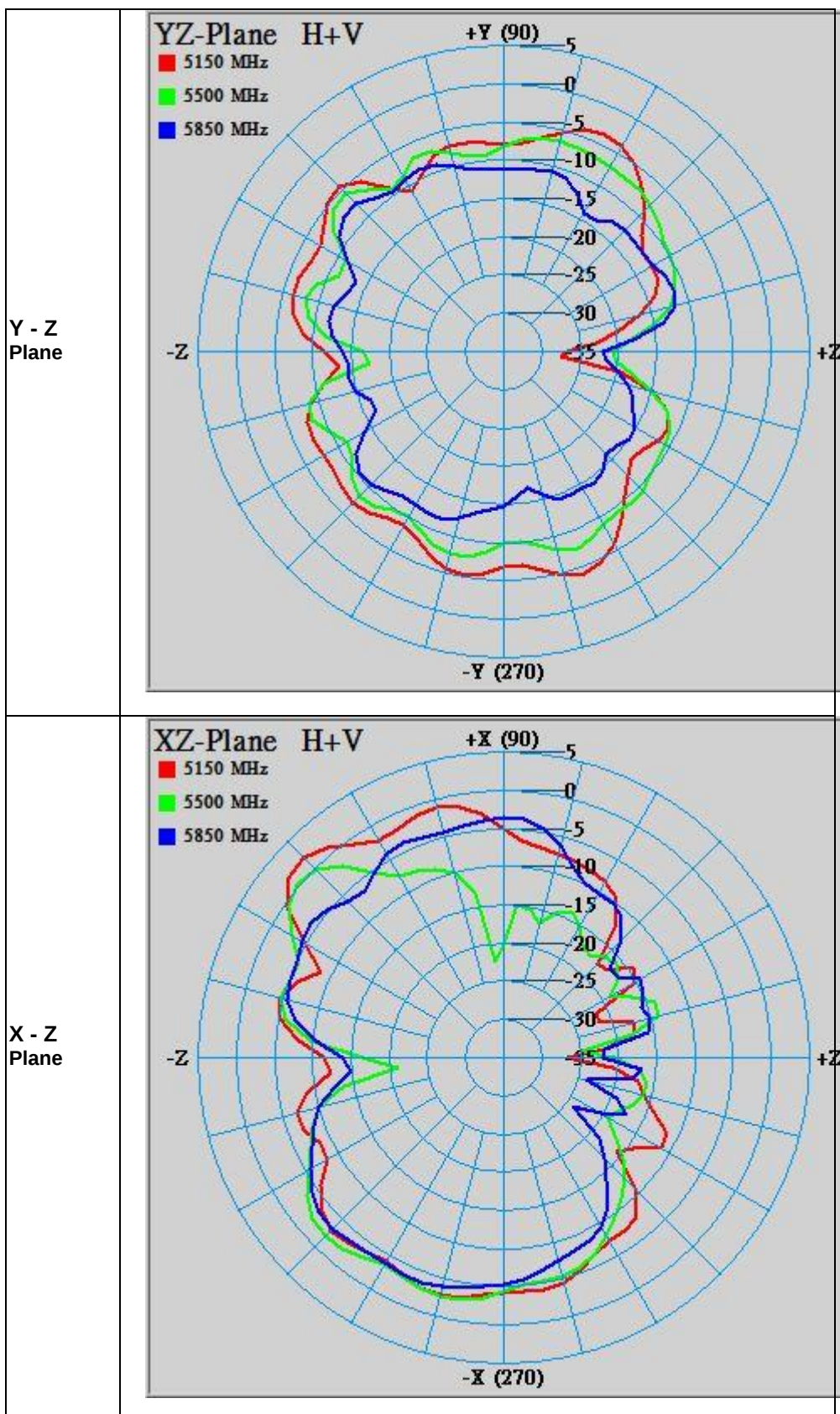
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DOCUMENT
NO.

ENS070001800-000824000238

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A2

5.55GHz



UNLESS OTHER SPECIFIED TOLERANCES ON :
X=N/A X.X=N/A X.XX=N/A
ANGLES=N/A HOLEDIA=N/A



INPAQ TECHNOLOGY CO., LTD.

SCALE : N/A

UNIT : mm

DRAWN BY : 詹惠雯

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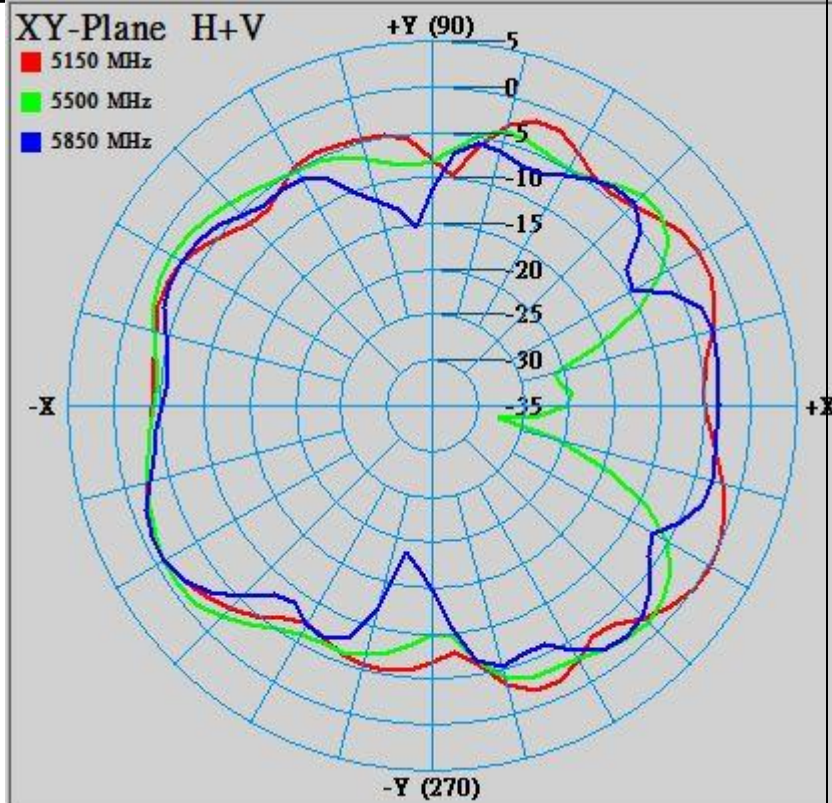
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X - Y
Plane

YZ-Plane	Peak EIRP (dBi)	Efficiency (dB)
5150 MHz	-3.80	-7.81
5500 MHz	-5.75	-9.10
5850 MHz	-7.53	-12.33

XZ-Plane	Peak EIRP (dBi)	Efficiency (dB)
5150 MHz	2.00	-5.22
5500 MHz	0.30	-6.73
5850 MHz	-3.30	-7.02

XY-Plane	Peak EIRP (dBi)	Efficiency (dB)
5150 MHz	0.31	-3.41
5500 MHz	-0.80	-4.52
5850 MHz	-0.92	-5.01

UNLESS OTHER SPECIFIED TOLERANCES ON :
 X = N/A X.X = N/A X.XX = N/A
 ANGLES = N/A HOLEDIA = N/A



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7. RELIABILITY TEST

Test item	Test condition / Test method	Specification
Solderability JIS C 0050-4.6 JESD22-B102D	*Solder bath temperature : $235 \pm 5^{\circ}\text{C}$ *Immersion time : 2 ± 0.5 sec *Solder : Sn3Ag0.5Cu for lead-free	At least 95% of a surface of each terminal electrode must be covered by fresh solder.
Leaching (Resistance to dissolution of metallization) IEC 60068-2-58	*Solder bath temperature : $260 \pm 5^{\circ}\text{C}$ *Leaching immersion time : 30 ± 0.5 sec *Solder : SN63A	Loss of metallization on the edges of each electrode shall not exceed 25%.
Resistance to soldering heat JIS C 0050-5.4	*Preheating temperature : $120\sim 150^{\circ}\text{C}$, 1 minute. *Solder temperature : $270\pm 5^{\circ}\text{C}$ *Immersion time : 10 ± 1 sec *Solder : Sn3Ag0.5Cu for lead-free Measurement to be made after keeping at room temperature for 24 ± 2 hrs	No mechanical damage. Samples shall satisfy electrical specification after test. Loss of metallization on the edges of each electrode shall not exceed 25%.
Drop Test JIS C 0044	*Height : 75 cm *Test Surface : Rigid surface of concrete or steel. *Times : 6 surfaces for each units ; 2 times for each side.	No mechanical damage. Samples shall satisfy electrical specification after test.
Adhesive Strength of Termination JIS C 0051- 7.4.3	*Pressurizing force : $5\text{N}(\leq 0603)$; $10\text{N}(>0603)$ *Test time : 10 ± 1 sec	No remarkable damage or removal of the termination.
Bending test JIS C 0051- 7.4.1	The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5 ± 1 sec. Measurement to be made after keeping at room temperature for 24 ± 2 hours	No mechanical damage. Samples shall satisfy electrical specification after test.

UNLESS OTHER SPECIFIED TOLERANCES ON :
 X = N/A X.X = N/A X.XX = N/A
 ANGLES = N/A HOLEDIA = N/A



INPAQ TECHNOLOGY CO., LTD.

SCALE : N/A

UNIT : mm

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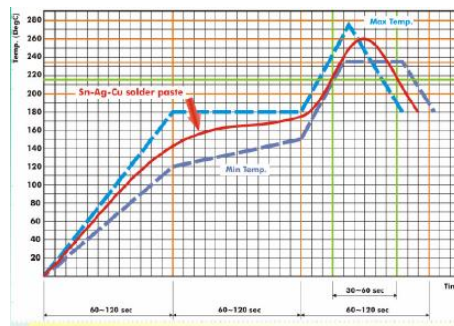
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Temperature cycle JIS C 0025	1. 30±3 minutes at -40°C±3°C, 2. 10~15 minutes at room temperature, 3. 30±3 minutes at +85°C±3°C, 4. 10~15 minutes at room temperature, Total 100 continuous cycles Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage. Samples shall satisfy electrical specification after test.
Vibration JIS C 0040	*Frequency : 10Hz~55Hz~10Hz(1min) *Total amplitude : 1.5mm *Test times : 6hrs.(Two hrs each in three mutually perpendicular directions)	No mechanical damage. Samples shall satisfy electrical specification after test.
High temperature JIS C 0021	*Temperature : 85°C±2°C *Test duration : 1000+24/-0 hours Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage. Samples shall satisfy electrical specification after test.
Humidity (steady conditions) JIS C 0022	*Humidity : 90% to 95% R.H. *Temperature : 40±2°C *Time : 1000+24/-0 hrs. Measurement to be made after keeping at room temperature for 24±2 hrs ※ 500hrs measuring the first data then 1000hrs data	No mechanical damage. Samples shall satisfy electrical specification after test.
Low temperature JIS C 0020	*Temperature : -40°C±2°C *Test duration : 1000+24/-0 hours Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage. Samples shall satisfy electrical specification after test.

SOLDERING CONDITION

Typical examples of soldering processes that provide reliable joints without any damage are given in Fig 2



UNLESS OTHER SPECIFIED TOLERANCES ON :
 X=N/A X.X=N/A X.XX=N/A
 ANGLES=N/A HOLEDIA=N/A



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UNIT : mm

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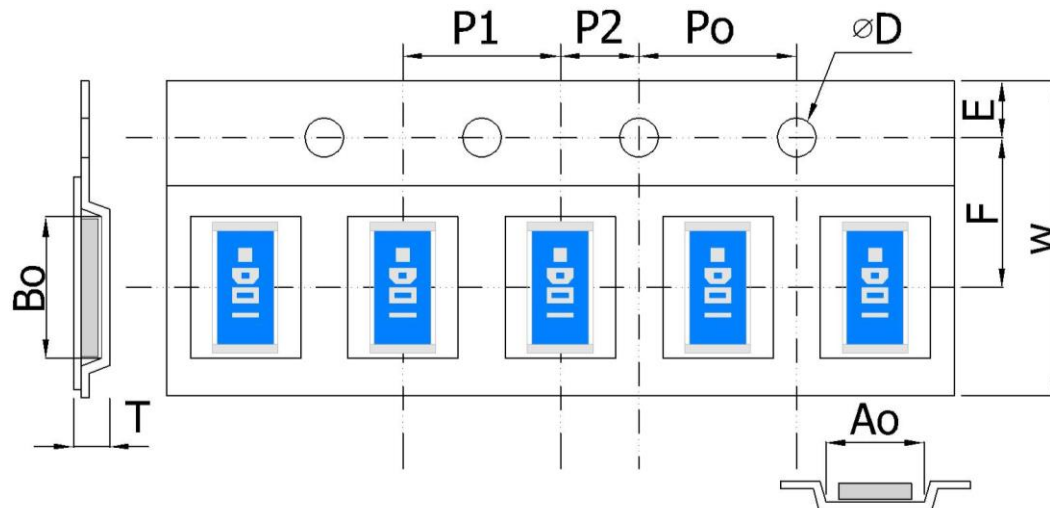
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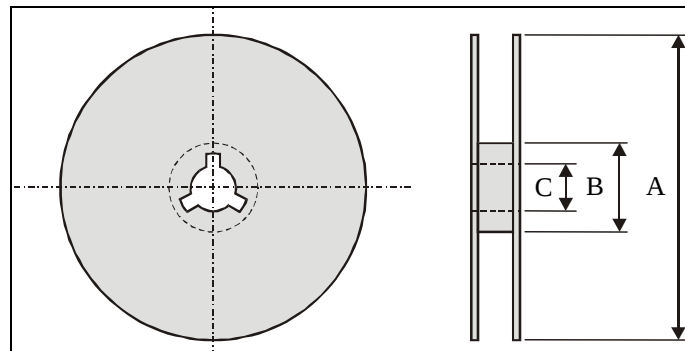
8. Package



Plastic Tape specifications (unit :mm)

Index	Ao	Bo	ΦD	T	W
Dimension (mm)	1.85 ± 0.10	3.45 ± 0.10	1.55 ± 0.05	0.75 ± 0.10	8.20 ± 0.30
Index	E	F	Po	P1	P2
Dimension (mm)	1.75 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.10

Reel dimensions



Index	A	B	C
Dimension (mm)	Φ178.0	Φ60.0	Φ13.0

Taping Quantity:2000 pieces per 7" reel

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ANGLES=N/A HOLEDIA=N/A



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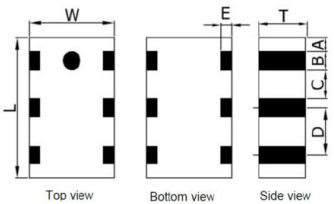
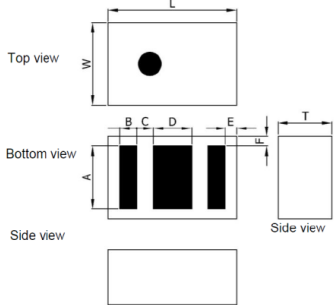
6. Inspection Standard

機密等級：□一般 ■保密 □機密 □極機密

No.37-S-028 AT

RF 入庫出貨檢驗工程表

產品外觀	規格		允收標準	判定工具
	一般產品 (產品有側電極)	LGA 產品 (產品無側電極)		
Mark不良 Mark不良 Mark不良	1. 與噴電極相連 2. 反白無法辨識 3. 圖形完整度<60% 任一項符合，判退	1. 偏移貼邊 2. 反白無法辨識 3. 圖形完整度<60% 任一項符合，判退	A/R=0/1	顯微鏡
電極尺寸異常 電極尺寸異常	不可超出規格 (參照附圖電極尺寸)	不可超出規格 (參照附圖電極尺寸)	A/R=0/1	顯微鏡
電極不完整 電極不完整 電極不完整	1. 側面電極：側邊電極面積 >90%，允收 2. 上下電極：電極面積 >70%，允收 (參照附圖電極尺寸)	底部電極：電極面積 >70%，允收 (參照附圖電極尺寸)	A/R=0/1	顯微鏡
電極斷開	不可有	不可有	A/R=0/1	顯微鏡
電極凸起	不可有	不可有	A/R=0/1	顯微鏡
電極沾污	不可有	不可有	A/R=0/1	顯微鏡
電極偏移 電極偏移	偏移 >1/3 電極寬度 (參照附圖電極尺寸)	不可超出規格 (參照附圖電極尺寸)	A/R=0/1	顯微鏡
電極連接	不可有	不可有	A/R=0/1	顯微鏡
電極掀起	不可有	不可有	A/R=0/1	顯微鏡
電極未鍍錫	不可有	不可有	A/R=0/1	顯微鏡
電極氧化	不可有	不可有	A/R=0/1	顯微鏡
內電極外露 內電極外露	1. 側電極旁：ST / LD >75um 2. 其他區域：不可有 任一項符合，判退	不可有	A/R=0/1	顯微鏡
陶瓷體沾污	$L \geq 1/4L$ (長) or $W \geq 1/3W$ (寬) 任一項符合，判退。	$L \geq 1/4L$ (長) or $W \geq 1/3W$ (寬) 任一項符合，判退。	A/R=0/1	顯微鏡
陶瓷體破損 * 陶瓷體破損 * 陶瓷體破損 * 陶瓷體破損 *	1. 見內電極； 2. $L \geq 1/4L$ (長) or $W \geq 1/3W$ (寬) or $T \geq 1/2T$ (厚) 任一項符合，判退。 *針對特定料號之檢驗規格，請參考 37-S-175 [HF客戶特殊需求表]。	1. 見內電極； 2. $L \geq 1/4L$ (長) or $W \geq 1/3W$ (寬) or $T \geq 1/2T$ (厚) 任一項符合，判退。	A/R=0/1	顯微鏡
陶瓷體裂痕 [正面&底部]	不可有	不可有	A/R=0/1	顯微鏡
陶瓷體裂痕 [側邊]	不可有	不可有	A/R=0/1	顯微鏡
陶瓷體顏色異常	不可有	不可有	A/R=0/1	顯微鏡

產品說明	一般產品 (產品有側電極)	LGA 產品 (產品無側電極)	
			

產品、包裝、出貨外觀

第 1 頁，共 2 頁

UNLESS OTHER SPECIFIED TOLERANCES ON :
X = N/A X.X = N/A X.XX = N/A
ANGLES = N/A HOLEDIA = N/A



INPAQ TECHNOLOGY CO., LTD.

SCALE : N/A

UNIT : mm

DRAWN BY : 詹惠雯

CHECKED BY : 詹惠雯

DESIGNED BY :

APPROVED BY : 陳振榮

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NO.

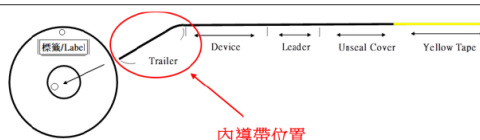
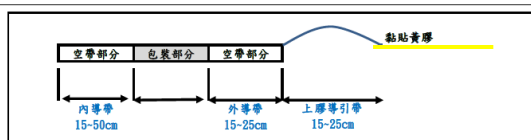
ENS070001800-000824000238

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RF 入庫出貨檢驗工程表

包裝外觀	規格				允收標準	判定工具
	判定	1	2	3		
產出數與工單數不符	不可有	總數錯誤	料盤數錯誤		A/R=0/1	目視
捲軸外觀異常	不可有	破損	變形	髒污	A/R=0/1	目視
標籤內容與實物不符	不可有	標籤錯誤	整捲實物錯誤		A/R=0/1	目視
標籤異常	不可有	黏貼方向錯誤	髒污	破損	A/R=0/1	目視
上膠帶外觀異常	不可有	破損	髒污		A/R=0/1	目視
上膠帶偏移	不可超過 規定長度	需 <0.2mm	蓋到圓孔	超出料帶邊緣	A/R=0/1	顯微鏡
上膠帶未黏合	不可超過 規定長度	未接合處，縫隙不得超出 2/3 料寬		有摺痕導致未黏合	A/R=0/1	目視
上膠帶剝離異常	不可有	上膠帶有牽絲 (絲狀殘膠)	無法撕開	撕開時，料帶表皮黏在上膠帶	A/R=0/1	目視
導帶長度異常	不可超過 / 小於 規定長度	[內導帶] 16 ~ 50 cm	[外導帶] 16 ~ 25 cm	[上膠帶導引帶] 15 ~ 25 cm	A/R=0/1	直尺
料帶外觀異常	變形 / 破損 不可有	破損	變形 (含摺痕)	髒污	A/R=0/1	直尺
料帶洞孔反向	不可有	料帶洞孔朝下			A/R=0/1	目視
站料	不可有	看到產品側面，而非正面 (Mark)；需確認是否有無摺痕，以便釐清導致異常的原因			A/R=0/1	目視
反料	不可有	Mark在正面，但 Mark 背向料帶洞孔			A/R=0/1	放大鏡
錯料	不可有	看不到產品正面 (Mark)，只看到產品底部			A/R=0/1	放大鏡
缺料	不可有	料帶內，缺少產品			A/R=0/1	放大鏡
混料	不可有	料帶內，單一物料的外觀與其他物料不同			A/R=0/1	放大鏡
疊料	不可有	同一格料槽內有兩顆物料疊在一起			A/R=0/1	放大鏡
黏料	不可有	上膠帶撕開時，產品黏在上膠帶上，而不在料帶內			A/R=0/1	放大鏡

導帶說明



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DESIGNED BY :

APPROVED BY : 陳振榮

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7. Outgoing Inspection Report

PSA

WALSIN Technology Corporation

Outgoing Inspection Report

CUSTOMER : 佳邦科技(股)公司竹南分公司

PART NO. : RFECA3216060L1T

DATE : 2022/1/5

LOT NO. : 8A0L021889

QTY (KPS) : 60 KPS

Outgoing Inspection :

TEST ITEM	SPEC LIMIT	SAMPLES	RESULT
ELECTRICAL	WTC NO. 37-S-019	32 pcs / lot	PASS
DIMENSION	WTC NO. 37-S-028	32 pcs / lot	PASS
VISUAL	WTC NO. 37-S-028	512 pcs / lot	PASS
SOLDERABILITY	WTC NO. 37-S-028	12 pcs / lot	PASS
PACKING	No defect	1 reel / 10 reels	PASS
LABELING	No defect	1 reel / 10 reels	PASS

☒ ACC. ☐ REJ.

Prepared By : Bella Hung

Approved By : Elaine Weng

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PSA

華新科技 出貨檢驗報告
WALSIN Outgoing Inspection Report

LOT NO.

8A0L021889

Walsin Patr No.

RFECA3216060L1T

Date

2022/1/5

QA Inspector

12210091

Customer Part No.

Approved

Elaine Weng

SPEC	Return Loss		Judgement
	2.09GHz	2.15GHz	
	S11	S11	
	< -9	< -9	
UNIT	dB	dB	
1	-13.38	-10.69	OK
2	-17.22	-20.09	OK
3	-14.72	-17.67	OK
4	-16.63	-16.57	OK
5	-15.71	-18.57	OK
6	-9.67	-23.02	OK
7	-18.85	-20.34	OK
8	-15.62	-11.99	OK
9	-18.14	-11.61	OK
10	-16.08	-11.08	OK
11	-19.46	-10.74	OK
12	-14.01	-16.85	OK
13	-10.26	-14.07	OK
14	-19.25	-11.05	OK
15	-11.97	-21.39	OK
16	-10.59	-13.90	OK
17	-15.85	-21.17	OK
18	-9.55	-23.51	OK
19	-18.72	-18.20	OK
20	-16.53	-18.61	OK
21	-13.70	-14.80	OK
22	-14.96	-13.33	OK
23	-18.49	-15.22	OK
24	-19.06	-17.53	OK
25	-18.82	-15.50	OK
26	-17.85	-12.08	OK
27	-19.49	-19.84	OK
28	-11.36	-20.83	OK
29	-11.51	-23.17	OK
30	-10.67	-16.80	OK
31	-10.05	-23.43	OK
32	-18.86	-21.84	OK
USL	-9.00	-9.00	
LSL			
Max	-9.55	-10.69	
Min	-19.49	-23.51	
Average	-15.22	-17.05	
Std Dev	3.40	4.17	

MEAS	L	W	T	Judgement
SPEC	3.1	1.6	0.6	
TOL +	0.2	0.2	0.1	
TOL -	0.2	0.2	0.1	
UNIT	mm	mm	mm	
1	3.082	1.568	0.562	OK
2	3.079	1.578	0.608	OK
3	3.071	1.578	0.593	OK
4	3.066	1.583	0.569	OK
5	3.084	1.595	0.596	OK
6	3.085	1.586	0.594	OK
7	3.061	1.605	0.595	OK
8	3.075	1.596	0.552	OK
9	3.096	1.599	0.575	OK
10	3.062	1.586	0.586	OK
11	3.071	1.581	0.590	OK
12	3.073	1.550	0.557	OK
13	3.095	1.609	0.577	OK
14	3.086	1.576	0.552	OK
15	3.095	1.580	0.577	OK
16	3.068	1.603	0.597	OK
17	3.086	1.569	0.606	OK
18	3.097	1.575	0.589	OK
19	3.095	1.553	0.567	OK
20	3.093	1.604	0.599	OK
21	3.081	1.563	0.552	OK
22	3.094	1.596	0.582	OK
23	3.079	1.573	0.574	OK
24	3.093	1.557	0.603	OK
25	3.081	1.596	0.585	OK
26	3.082	1.594	0.594	OK
27	3.062	1.586	0.603	OK
28	3.062	1.595	0.586	OK
29	3.086	1.561	0.602	OK
30	3.096	1.598	0.598	OK
31	3.086	1.601	0.601	OK
32	3.072	1.570	0.590	OK
USL	3.30	1.80	0.70	
LSL	2.90	1.40	0.50	
Max	3.097	1.609	0.608	
Min	3.061	1.550	0.552	
Average	3.081	1.583	0.585	
Std Dev	0.01	0.02	0.02	

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