

# APPROVAL SHEET

**PCB ANTENNA**

**2.4~2.5 / 5.15~5.85 GHz Band**

**Working Frequency**

**Halogens Free Product**

**P/N: RFPCA353046IMLB901**

Customer : 瑞軒科技

Customer 's Part No. : **0460-5001-9332**

Approval No. : \_\_\_\_\_

Issue Date : \_\_\_\_\_

\*Contents in this sheet are subject to change without prior notice



### 1.Explanation of part number :

RF	PCA	3530	46	I	M	L	B	9	01
Type Code	Product Code	PCB Dimension (Unit: mm)	Cable Length (unit: cm)	Connector Brand	Type of Connector	Application	Project status	Wire Diameter	Project
Walsin RF Device	PCB Antenna	Per 2 digits of length, width e.g.: 3530 Length 35.0mm, Width 30.0mm	2 digits for cable length e.g.:46 Length 46.5 cm	A: N C:MCX D:IPEX III E: IPEX IV F: IPEX A13 H: Hirose I: IPEX M: MMCX S: SMA T: TNC U:MURATA N: None	A: Reverse Female <b>B: Reverse Male</b> F: Female M: Male N: None	<b>0: 0GHz</b> <b>3: 3GHz</b> <b>6: 6GHz</b> <b>5: 5GHz</b> A: 2.4GHz ISM band B: GSM 900/1800 dual band G: GPS band L: 2.4/5.2/5.8 GHz tri-band <b>N: NFC</b> <b>T: LTE band</b> W: WCDMA band	B: MP <b>T:During Test</b> X: Pile Run	0:None 1:∅0.81 2:∅1.32 3:∅1.13 4:Low Loss ∅1.13 5:∅0.5 6:RG316 7: ∅1.37 8:RG178 9:Low Loss ∅1.37	01~99 series number

### 2.Electrical Specification :

Item	Specification
Working Frequency Range	2.4 ~ 2.5 / 5.15 ~5.85 GHz
Return Loss	-10 dB
VSWR	2 max.
Peak Gain	2.4 ~ 2.5 GHz 3.96 dBi
	5.15 ~5.85 GHz 4.97 dBi
Polarization	Linear Vertical
Radiation Pattern	Directional
Impedance	50Ω
Operation Temperature	-20°C ~ +65°C

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 : 劉兆倫

APPROVED BY : 陳振榮

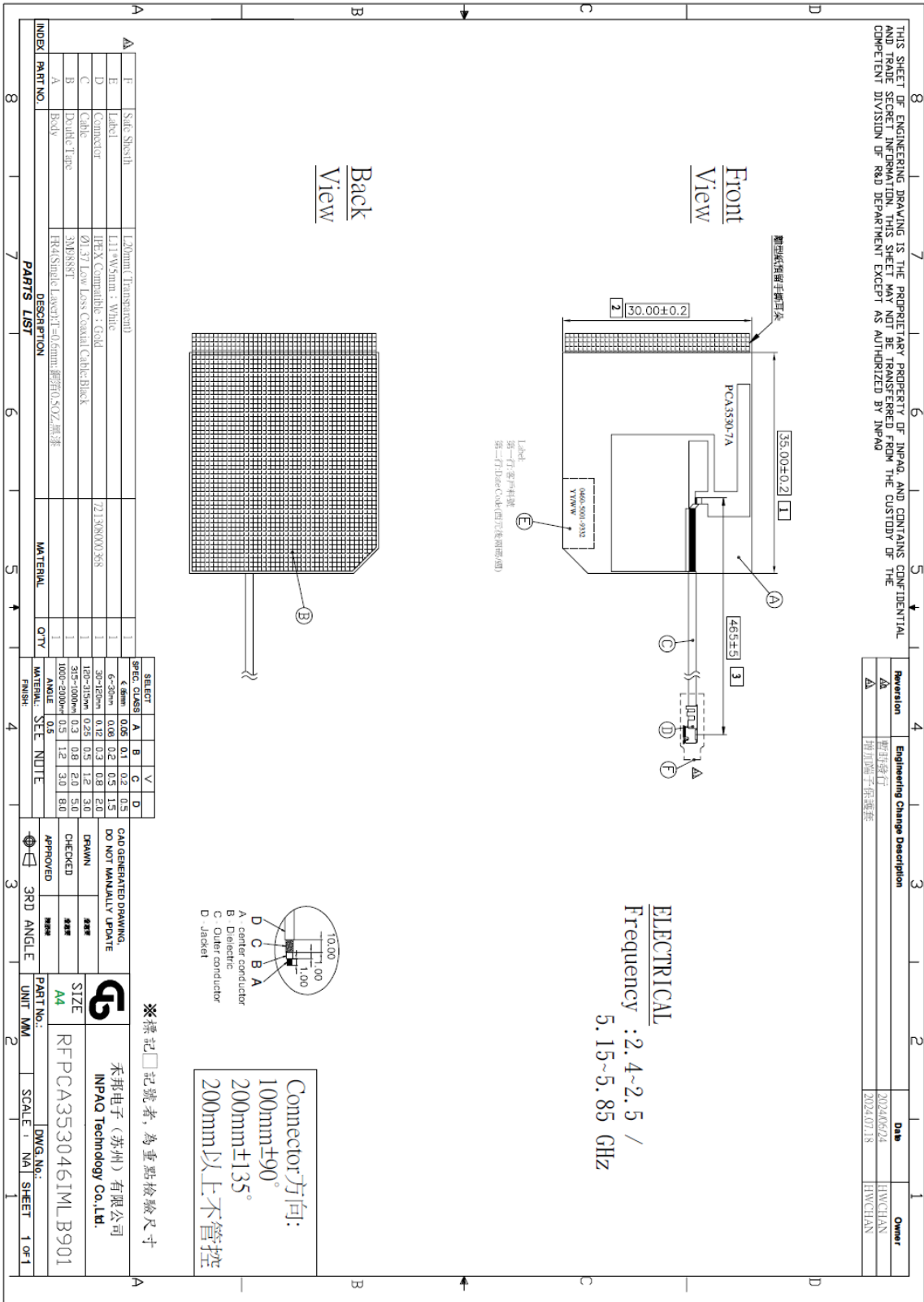
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TITLE : RFPCA353046IMLB901

DOCUMENT NO.

SPEC REV. A0

### 3. Antenna Drawing :



UNLESS OTHER SPECIFIED TOLERANCES ON : X=N/A      X.X=N/A      X.XX=N/A ANGLES=N/A      HOLEDIA=N/A		 <b>INPAQ TECHNOLOGY CO., LTD.</b>	
SCALE : N/A	UNIT : mm		
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DESIGNED BY : 劉兆倫	APPROVED BY : 陳振榮		
TITLE : RFPCA3530461MLB901		DOCUMENT NO.	SPEC REV. <b>A0</b>

4. Performance Report :


**Test Report**

**Experimental Setup**

Test Equipment

- Network Analyzer : ROHDE&SCHWARZ ZNB20
- 3D Antenna Chamber : SATIMO SG24 (Large)



UNLESS OTHER SPECIFIED TOLERANCES ON : X=N/A      X.X=N/A      X.XX=N/A ANGLES=N/A      HOLEDIA=N/A		 <b>INPAQ TECHNOLOGY CO., LTD.</b>	
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Ant1

Ant0




Ant1

Ant0



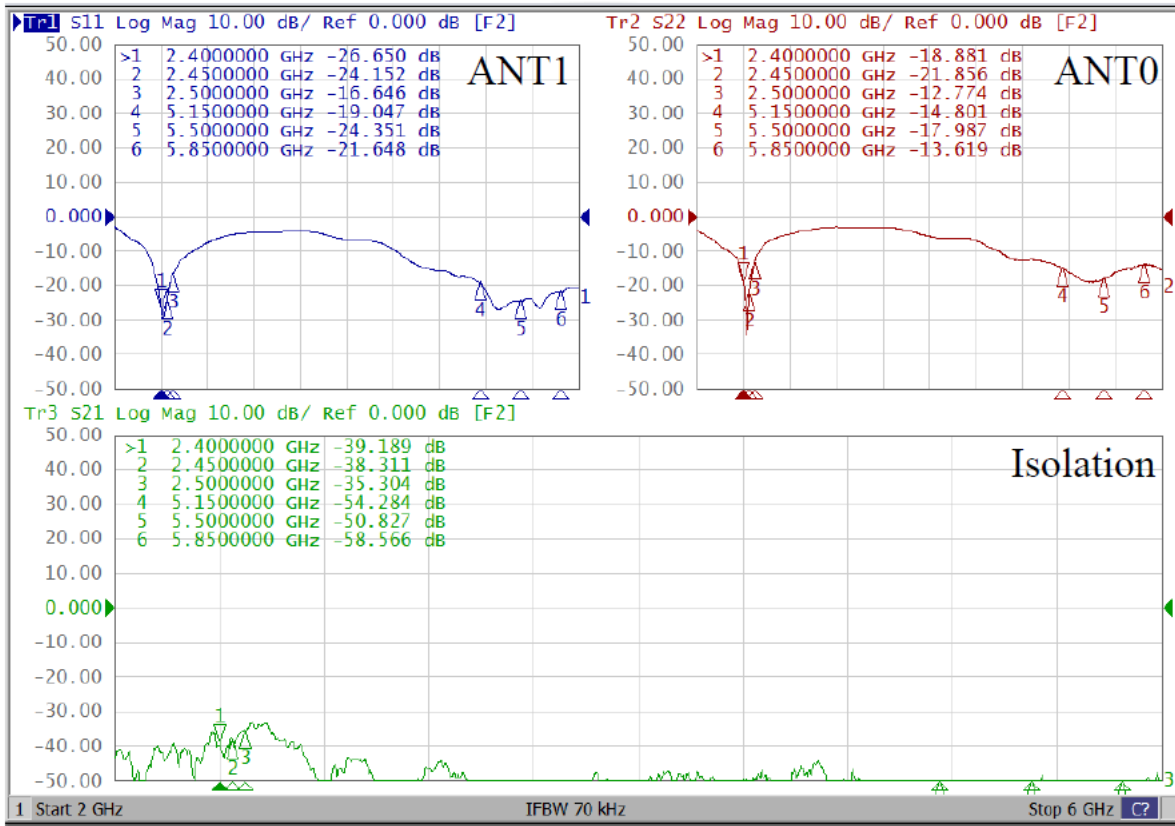
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**ANT1: RFPCA353046IMLB901**

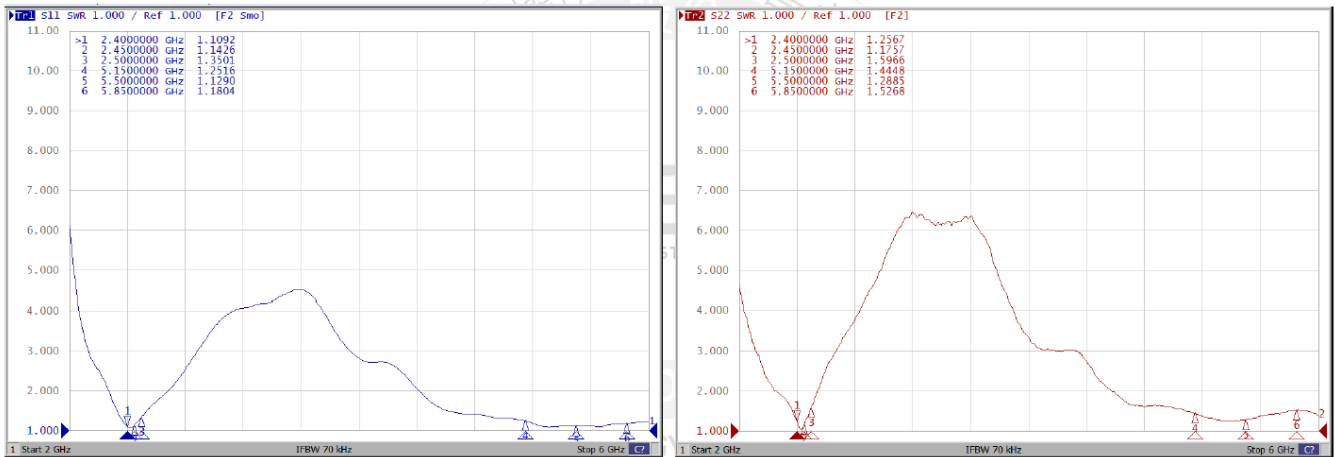
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		SPEC REV. <b>A0</b>

# ELECTRICAL CHARACTERISTICS

## S-Parameter



## VSWR



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  
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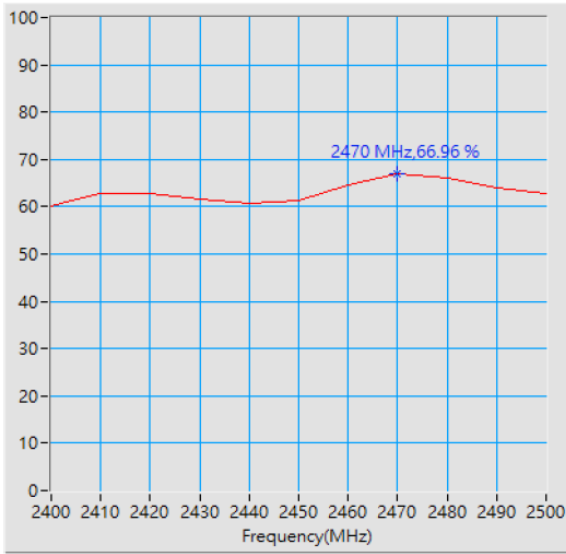
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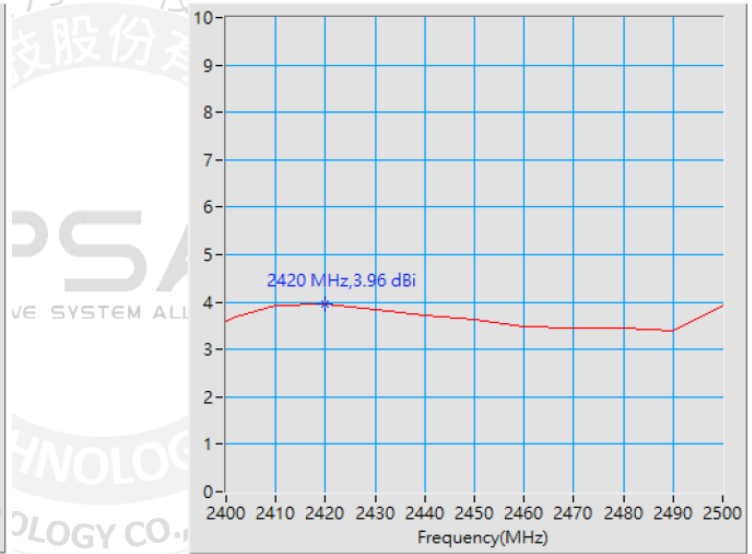


## Efficiency & Peak Gain

### ANT1@2G

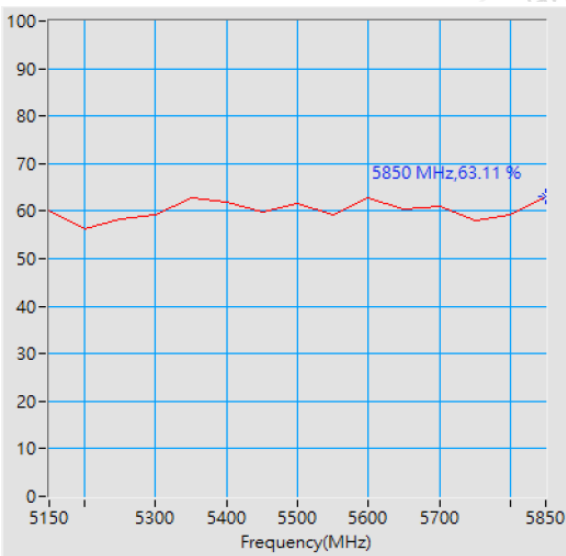


Maximum Efficiency at 2470 MHz : 66.96 %

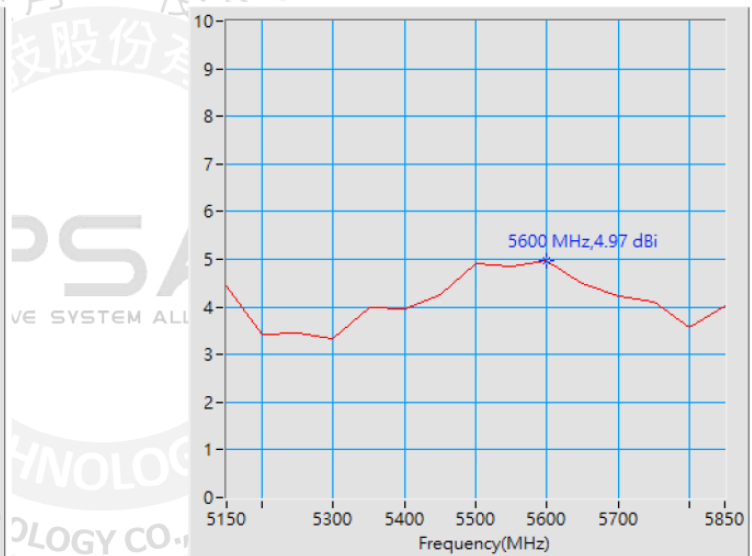


Maximum Peak Gain at 2420 MHz : 3.96 dBi


### ANT1@5G



Maximum Efficiency at 5850 MHz : 63.11 %



Maximum Peak Gain at 5600 MHz : 4.97 dBi

UNLESS OTHER SPECIFIED TOLERANCES ON :		 <b>INPAQ TECHNOLOGY CO., LTD.</b>
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ANGLES = N/A      HOLEDIA = N/A		THIS DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF INPAQ TECHNOLOGY CO.,LTD.AND SHALL NOT BE REPRODUCED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS OR DEVICES WITHOUT PERMISSION
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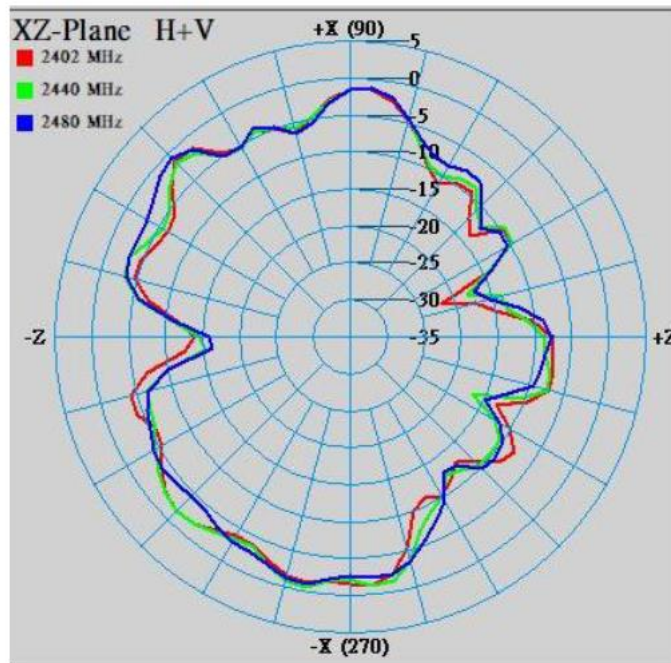
# Radiation Patterns


ANT1@2G

X-Z Plane

Phi=0.00deg

Gain . dB

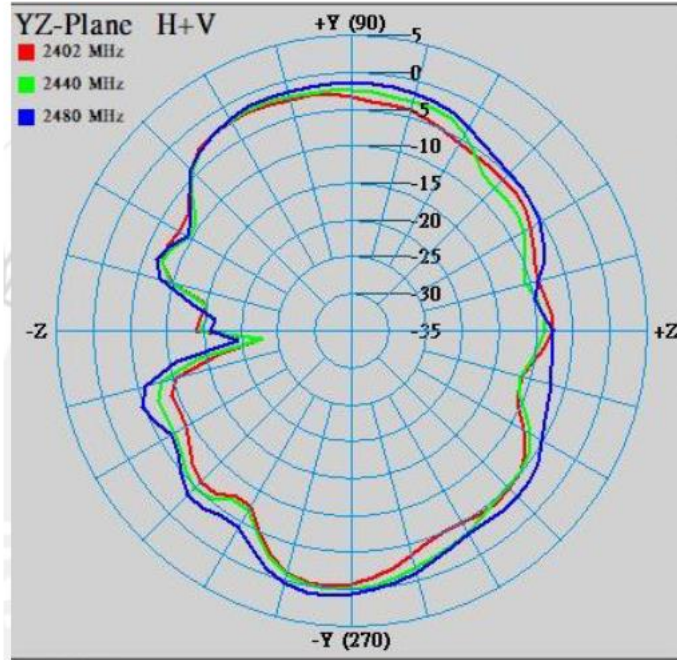



UNLESS OTHER SPECIFIED TOLERANCES ON :		 <b>INPAQ TECHNOLOGY CO., LTD.</b>	
X=N/A	X.X=N/A      X.XX=N/A		
ANGLES=N/A		THIS DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF INPAQ TECHNOLOGY CO.,LTD.AND SHALL NOT BE REPRODUCED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS OR DEVICES WITHOUT PERMISSION	
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DESIGNED BY : 劉兆倫	APPROVED BY : 陳振榮		
TITLE : RFPCA353046IMLB901		DOCUMENT NO.	SPEC REV.
			A0

Y-Z Plane

Phi=90.00deg

Gain . dB

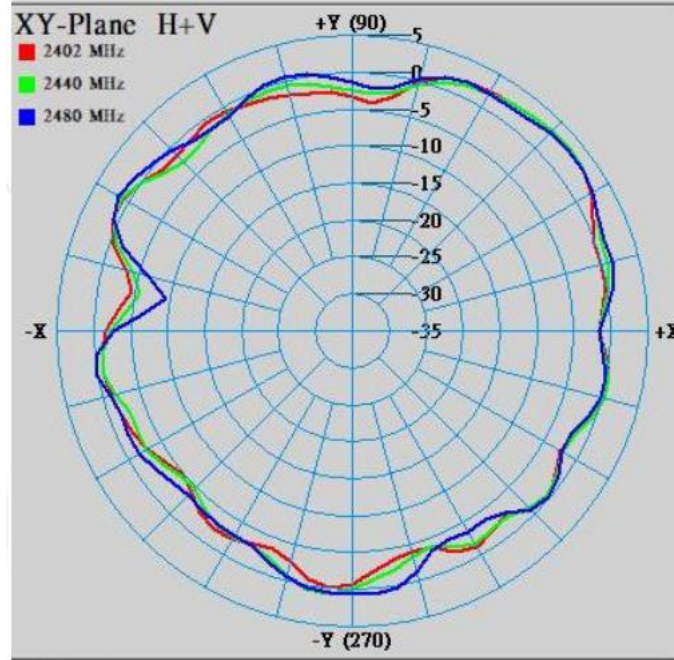


UNLESS OTHER SPECIFIED TOLERANCES ON :			<b>INPAQ TECHNOLOGY CO., LTD.</b>
X=N/A	X.X=N/A      X.XX=N/A		
ANGLES=N/A      HOLEDIA=N/A		THIS DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF INPAQ TECHNOLOGY CO.,LTD.AND SHALL NOT BE REPRODUCED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS OR DEVICES WITHOUT PERMISSION	
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DRAWN BY : 詹惠雯	CHECKED BY : 詹惠雯		
DESIGNED BY : 劉兆倫	APPROVED BY : 陳振榮	DOCUMENT NO.	
TITLE : RFPCA353046IMLB901			


# X-Y Plane

Theta=90.00deg

Gain . dB



Frequency [MHz]	ZX plane		ZY plane		XY plane	
	Max Value [dBi]	Average [dBi]	Max Value [dBi]	Average [dBi]	Max Value [dBi]	Average [dBi]
2402	-1.19	-5.33	-0.24	-5.22	3.44	-0.75
2440	-0.51	-5.17	0.05	-4.71	3.34	-0.66
2480	-0.71	-5.16	1.06	-3.62	3.12	-0.38

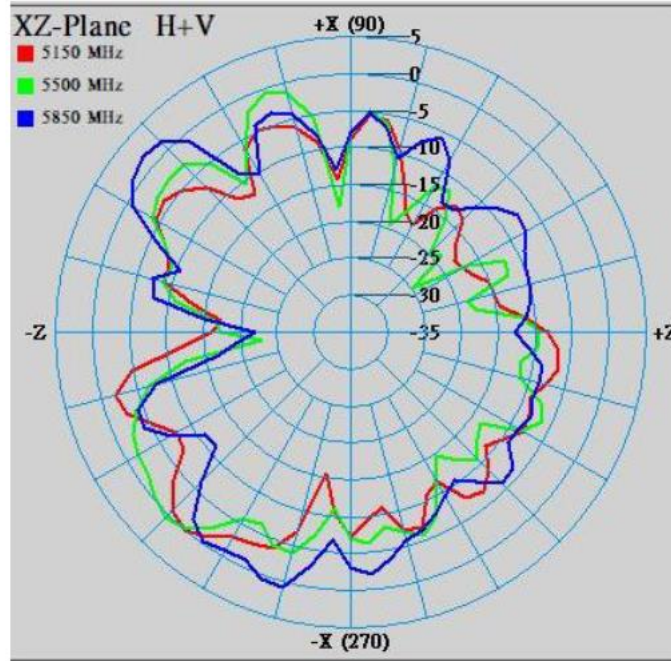
UNLESS OTHER SPECIFIED TOLERANCES ON : X=N/A      X.X=N/A      X.XX=N/A ANGLES=N/A      HOLEDIA=N/A		 INPAQ TECHNOLOGY CO., LTD.	
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ANT1@5G

X-Z Plane

Phi=0.00deg

Gain . dB

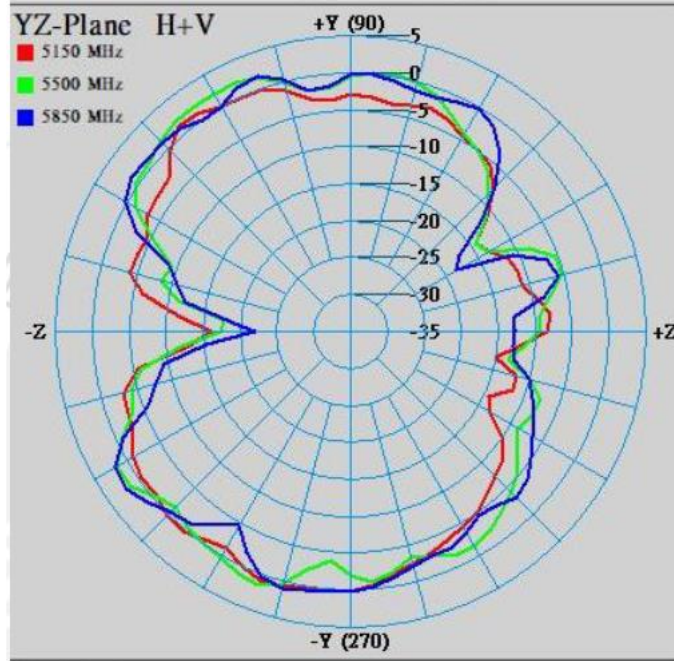



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Y-Z Plane

Phi=90.00deg

Gain . dB



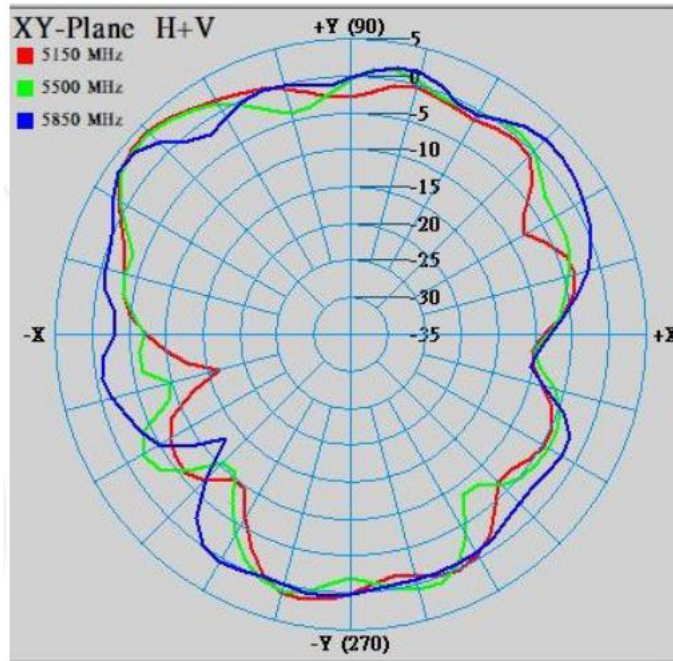
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# X-Y Plane

Theta=90.00deg

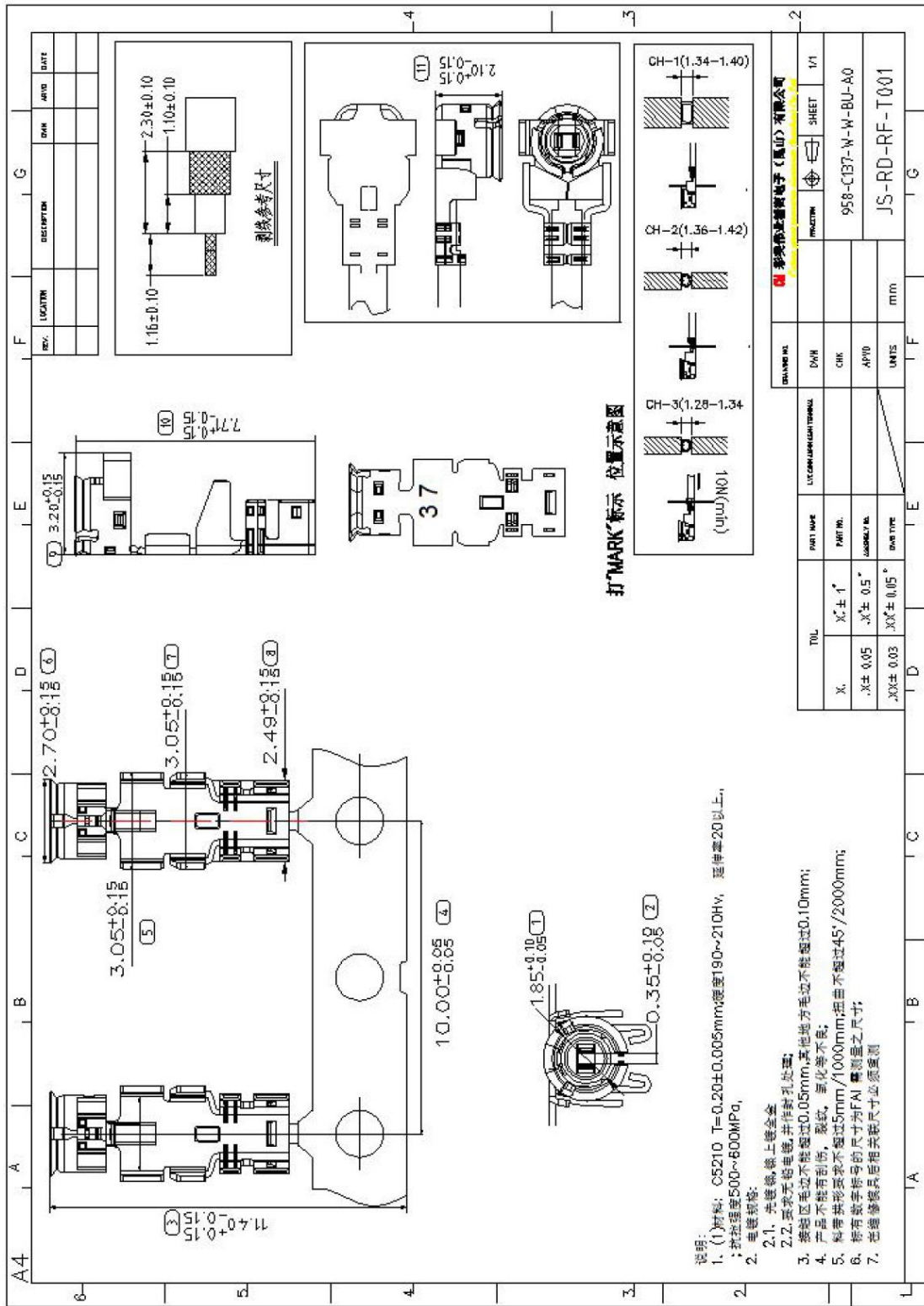
Gain . dB



Frequency [MHz]	ZX plane		ZY plane		XY plane	
	Max Value [dBi]	Average [dBi]	Max Value [dBi]	Average [dBi]	Max Value [dBi]	Average [dBi]
5150	0.03	-7.09	1.38	-3.13	3.88	-1.85
5500	0.51	-6.30	2.16	-2.17	3.56	-1.68
5850	1.80	-5.12	2.16	-2.22	3.47	-0.64


UNLESS OTHER SPECIFIED TOLERANCES ON :			<b>INPAQ TECHNOLOGY CO., LTD.</b>
X=N/A      X.X=N/A      X.XX=N/A ANGLES=N/A      HOLEDIA=N/A			
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TITLE : RFPCA3530461MLB901		DOCUMENT NO.	SPEC REV. <b>A0</b>

# Connector Specification



说明:  
 1. (1)材料: C5210 T=0.20±0.005mm;硬度190~210HV, 延伸率20以上, ;抗拉强度500~600MPa,  
 2. 电镀处理:  
 2.1. 电镀镍, 镀上镀金  
 2.2. 电镀无铅电镀, 并作镀孔处理;  
 3. 插接区毛边不能超过0.05mm,其他地方毛边不能超过0.10mm;  
 4. 产品不能有刮伤, 裂纹, 氧化等不良;  
 5. 标带异形面积不能超过5mm/1000mm;担当不超过45°/2000mm;  
 6. 标有数字符号的尺寸为FAI 量测量之尺寸;  
 7. 若需翻模后请标注尺寸必须重测

DRAWING NO.	DWG	CHK	APP'D	UNITS	mm
PART NAME	LYCORN LIGHT TERMINAL				
PART NO.	958-C197-W-W-BU-A0				
LABORER NO.	JS-RD-RF-T001				
DWG TYPE	mm				

UNLESS OTHER SPECIFIED TOLERANCES ON : X=N/A      X.X=N/A      X.XX=N/A ANGLES=N/A      HOLEDIA=N/A			<b>INPAQ TECHNOLOGY CO., LTD.</b>
SCALE : N/A	UNIT : mm		
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DESIGNED BY : 劉兆倫	APPROVED BY : 陳振榮		
TITLE : RFWA353046IMLB901		DOCUMENT NO.	SPEC REV. <b>A0</b>



# Cable Specification

型号 Type	RF-1.37L/50	料号 P/N	SY137L/50-005(Black)
结构图 Structure drawing			
结构特性 Structure characteristics			
结构 Structure	项目 Item	标准值 Standard value	
①内导体 Inner conductor	材料 Material	镀银铜线 Silverplated copper wire	
	组成:总根数/单根外径(mm) Makeup:total / O.D. of every wire(mm)	7/0.105	
	(绞合)标称外径(mm) (Intertwist)NOM.O.D.(mm)	0.315±0.02	
②绝缘层 Insulation	材料 Material	聚全氟乙丙烯 FEP	
	颜色 Color	透明 Clarity	
	标称外径(mm) NOM.O.D.(mm)	0.925±0.03	
③外导体 Outer conductor	材料 Material	铜塑箔 Cu-plastic composite tape	
	组成:厚度(mm)×宽度(mm) Makeup:thickness(mm)×width(mm)	0.012×3.2	
	标称外径(mm) NOM.O.D.(mm)	0.95±0.03	
	覆盖率(%) Coverage ratio(%)	100	
④外导体 Outer conductor	材料 Material	镀锡铜线 Tinned copper wire	
	组成:总根数/单根外径(mm) Makeup:total / O.D. of every wire(mm)	5/0.05	
	标称外径(mm) NOM.O.D.(mm)	1.15±0.05	
	覆盖率(%) Coverage ratio(%)	90±5	
⑤护套层 Jacket	材料 Material	聚全氟乙丙烯 FEP	
	颜色 Color	黑 Black	
	标称外径(mm) NOM.O.D.(mm)	1.37±0.05	
电性能特性 Electrical characteristics			
项目 Item	标准值 Standard value	项目 Item	标准值 Standard value 单位 Unit:dB/m
电容(pF/m) Capacitance(pF/m)	96	衰减 Attenuation	1GHz
速率(%) Velocity(%)	70		2GHz
阻抗(Ω) Impedance(Ω)	50±2		2.45GHz
驻波比 Standing wave ratio	≤1.3@0-6GHz		3GHz
最大工作电压(V) Max.operating.voltage(V)	1000		4GHz
最大工作频率(GHz) Max.operating.frequency(GHz)	6		5GHz
			5.2GHz
			5.8GHz
			6GHz
可靠性 Dependability			
项目 Item	单位 Unit	标准值 Standard value	
最小弯曲半径(一次) Min.bending radius static	mm	5	
最小弯曲半径(重复) Min.bending radius repeated	mm	—	
工作温度范围 Operating temperature	℃	-55~+200	
包装 Packing			
项目 Item	单位 Unit	标准值 Standard value	
包装方式 Packing mode	/	纸盘 Papery plate	
每盘长度 The length of each plate	m	500	
每盘接头数 Each connector plate number	/	≤3	
每段最短长度 The shortest length of each root	m	≥10	
使用提示 Use tips			
存储环境 Storage environment	温度: 30℃以下; 湿度: 20%~65%		
最佳保存周期 The best save cycle	2个月; 2个月以上作业性下降, 如上锡效果变差,但电性能不受影响。夏季高温高湿环境开剥后需尽快流转		
加工温度 Processing temperature	260℃的极限情况下, 可知短时间承受; 300℃以上分子通常带有的等端基会分解; 400℃以上发生显著的热分解		
铁氟龙收缩 Teflon Shrink	固有材料特性。绝缘: 0.2mm以下; 护套: 0.3mm以下		
护套窜动 Jacket traverse	加工长度(护套残留长度) 低于5cm易发生		
其他 Other			
特殊加工工艺, 请与供方协商后使用			

<p>UNLESS OTHER SPECIFIED TOLERANCES ON :</p> <p>X = N/A      X.X = N/A      X.XX = N/A</p> <p>ANGLES = N/A      HOLEDIA = N/A</p>		<p><b>INPAQ TECHNOLOGY CO., LTD.</b></p>
<p>SCALE : N/A      UNIT : mm</p> <p>DRAWN BY : 詹惠雯      CHECKED BY : 詹惠雯</p> <p>DESIGNED BY : 劉兆倫      APPROVED BY : 陳振榮</p>	<p>THIS DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF INPAQ TECHNOLOGY CO.,LTD.AND SHALL NOT BE REPRODUCED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS OR DEVICES WITHOUT PERMISSION</p>	
<p>TITLE : RFPKA353046IMLB901</p>	<p>DOCUMENT NO.</p>	<p>SPEC REV.</p> <p style="font-size: 1.2em; font-weight: bold;">A0</p>

# PCB Specification



金安国纪科技股份有限公司

GOLDENMAX INTERNATIONAL TECHNOLOGY LTD.

## GF53 系列 A1 级覆铜箔板技术质量指标

### GF53(H/F) A1 Grade Laminate Property Values

试验项目 Test item	试样处理 Test Condition	标准值 Standard Value	典型值 Typical value
1. Peel strength lb/inch, minimum (H OZ) 抗剥强度 磅/英寸, 最小值(H OZ) Receiving status 接收状态 After thermal stress 热应力后 Increase temperature 提高温度下	A A 125°C	≥6.0 ≥6.0 ≥4.0	6.0-8.0 6.0-8.0 5.0
2. Volume resistance, minimum, 体积电阻, 最小值 MΩ.CM At elevated temperatures 在提高温度下	E-24/125	≥10 <sup>3</sup>	3×10 <sup>6</sup>
3. Surface resistance, minimum, 表面电阻, 最小, MΩ At elevated temperatures 在提高温度下	E-24/125	≥10 <sup>3</sup>	3×10 <sup>6</sup>
4. Absorption, maximum 吸水性, 最大值(%)	E-1/105+des	≤0.80	0.20-0.40
5. Breakdown voltage, minimum value 击穿电压, 最小值(KV) step (thickness ≥ 0.50 mm) 步进(厚度≥0.50 mm)	D-48/50 D-0.5/23	≥40	65
6. Bending strength, minimum 抗弯强度, 最小值(N/mm2) (thickness ≥ 0.50 mm) (厚度≥0.50 mm) vertical 经向 Zonal 纬向	A A	≥415 ≥345	470 380
7. Arc resistance, minimum, second 抗电弧性, 最小值, 秒	D-48/50 D-0.5/23	≥50	90
8. Flame retardancy 阻燃性	A	UL94V0	UL94V0
9. Solderability 可焊性	A	Solderable 可焊	Solderable 可焊
10. Dielectric constant, 1MHZ Max 介电常数, 1MHZ 下	A	≤ 5.4	4.5-4.8
11. Loss tangent, 1MHZ Max 损耗角正切, 1MHZ 下	A	≤0.035	0.020-0.030
12. Bow and Twis, 弯曲和翘曲(%) Double sides (thickness > 0.78mm; 300×300mm) Single sides (thickness > 0.78mm; 300×300mm) Double sides (thickness 0.5~0.78 mm; 300×300mm) Single sides (thickness 0.5~0.78 mm; 300×300mm)	A A A A	≤1.0 ≤1.5 ≤1.5 ≤2.0	0.15-0.50 0.25-0.60 0.20-0.55 0.30-0.70
13. Thermal stress, 288°C, Tin drift 10 seconds 热应力, 288°C, 漂锡 10 秒 Unetched sample 未蚀刻试样	A	NO DEFECT	60-100sec.
14. Glass transition temperatu 玻璃化转变温度, TG(DSC, °C)	A	≥145	150±5
15. Z 轴膨胀系数 (CTE) Z-axis expansion coefficient	Before Tg (μ m/m°C)	TMA	50
	After Tg (μ m/m°C)	TMA	260
	50~260°C (%)	TMA	4.0
16. Thermal decomposition temperature 热分解温度	10°C/min, N <sub>2</sub> , 5% weightlessness	—	350
17. T-260	TMA	—	≥100
18. T-288	TMA	—	≥60
19. Tracking index 相比漏电起痕指数, CTI	IEC60112method	≥175	200
20. 工艺适应性: 基板较脆, 适合钻孔、铣外形, 不适合冲压工艺。不宜绿油返洗。Process adaptability: The substrate is relatively brittle, suitable for drilling, milling appearance, not suitable for stamping process. Do not wash with green oil.			
21. 适用范围: 绿色电子产品。溴及氯元素含量均小于 900ppm, 溴+氯总含量小于 1500 ppm。 Scope of application: Green electronic products. The content of bromine and chlorine is less than 900ppm, and the total content of bromine and chlorine is less than 1500ppm.			
22. 适用线路: 孔径>0.3mm, 孔壁间距>0.6mm, 线间距>0.1mm。 Applicable lines: Aperture>0.3mm, hole wall spacing>0.6mm, line spacing>0.1mm.			
23. 适用板面: 面积≤300×300mm, 长宽比≤5。Applicable board surface: area ≤ 300 × 300mm, aspect ratio ≤ 5.			

Remark: 1. 处理方法中字母及数值的含义: A-板材交货阶段 D-恒温水浴 E-高温烘培 数1/数2: 1-时间(小时) 2-温度(°C) des-干燥 10分钟以上或干燥状态下冷却至室温./The meaning of letter and date about treat condition :A-normal condition D-thermostatic water-bath E-bake in high temperature date1/date2: 1-time(hour) 2-temperature(°C) des-dry sample and fall on nature temperature.  
2. 上表所定翘曲度标准仅适用于覆铜箔板交货验收。The specification of twist and bow is just suitable for CCL.

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DESIGNED BY : 劉兆倫	APPROVED BY : 陳振榮		
TITLE : RFPCA353046IMLB901		DOCUMENT NO.	SPEC REV. A0

# Double Tape Specification

## 3M Double-Sided Tapes

9086 · 9888T · CT6348 · 9088 · 9088FL · 55256

**Product Information**


**April 2010**

**Description** 3M™ Double-Sided Tissue Tapes, 9086, 9888T and CT6348 consist of an acrylic adhesive coated on both sides of a thin tissue carrier. 3M Double-Sided Film Tapes, 9088, 9088FL and 55256 consist of an acrylic adhesive coated on both sides of a thin polyester film. A release liner is added to one side. The aggressive acrylic adhesive provides high initial adhesion to a wide range of surfaces including wood, metal, paper and most plastics including polyethylene and polypropylene.

- Features**
- Excellent adhesion to most surfaces
  - Flexible to conform to irregular surfaces
  - Hand tearable
  - High tack level offers high immediate adhesion
  - Easily converted by die-cutting
  - Dimensionally stable

Physical Properties/Typical Performance Characteristics*						
Tape	Double Sided Tissue Tapes			Double Sided Film Tapes		
	9086	9888T	CT6348	9088	9088FL	55256
Carrier	Tissue	Tissue	Tissue	Polyester 0.012mm	Polyester 0.012mm	Polyester 0.012mm
Adhesive	375 Acrylic	Acrylic	Acrylic	375 Acrylic	375 Acrylic	Acrylic
Liner	White paper with black 3M Logo	White paper with red 3M Logo	White paper	White paper with red 3M Logo	Red Polypropylene film	Off-white paper
Liner Thickness	0.07mm	0.15mm	0.12mm	0.07mm	0.08mm	0.076mm
Tape Colour	Translucent	Translucent	White	Clear	Clear	Clear
Tape Thickness	0.19mm	0.15mm	0.09mm	0.21mm	0.21mm	0.048mm
Adhesion to steel	160 N/100mm	125 N/100mm	118 N/100mm	150 N/100mm	150 N/100mm	76 N/100mm
Adhesion to Polypropylene	70** N/100mm	86 N/100mm	67 N/100mm	70** N/100mm	70** N/100mm	45 N/100mm
Temperature Resistance						
Min/Hours	120°C	120°C	120°C	150°C	150°C	200°C
Days/Weeks	85°C	80°C	80°C	93°C	93°C	80°C
UV Resistance	Excellent	Good	Good	Excellent	Excellent	Good
Plasticiser resistance	Good	NR	NR	Good	Good	NR
Solvent Resistance	Very good	Good	Good	Very Good	Very Good	Good

\*Not recommended for specification purposes; \*\*Adhesion to polyethylene; NR Not Recommended  
 Adhesion Test Method: 180° Peel Adhesion: 72 hours room temperature dwell, Peel speed 305mm/min


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<b>Format</b>	Available in 12mm, 18mm, 24mm, 36mm, 48mm and 300mm x 50m rolls 55256 is also available in 30m long rolls Custom width rolls are available upon request
<b>Application Technique</b>	<ul style="list-style-type: none"> <li>• Apply between 10° and 40°C.</li> <li>• Ensure surfaces to be bonded are clean, dry and well unified.</li> <li>• Firm application pressure helps develop better adhesive contact and improves bond strength.</li> </ul>
<b>Application ideas</b>	<ul style="list-style-type: none"> <li>• Lamination of foams, fabrics and papers</li> <li>• Web splicing for paper and corrugated board</li> <li>• Core starting</li> <li>• Attaching lightweight signs, nameplates and plaques</li> <li>• Production of promotional signage or sample boards</li> <li>• Attaching plastic extrusions</li> </ul>
<b>Testing</b>	Always test the suitability of the product for your application before use.
<b>Shelf life</b>	Store in a dry location out of direct sunlight and away from all sources of heat. Ideal conditions are 20°C and 50% relative humidity. Use within 2 years from date of manufacture.
<b>Health and Safety Information</b>	This product is an “article” and does not require a Material Safety Data Sheet. However MSDSs have been produced for most articles and may be accessed by going to <a href="http://www.3M.com/msds">www.3M.com/msds</a> and entering the product number or 3M stock number. Alternatively, contact 3M Customer Services.
<b>Further information</b>	Further information is available at <a href="http://www.3M.com">www.3M.com</a> or by contacting 3M Customer Services on free phone 0800 200 713 or free fax 0800 508 980.
<b>Note</b>	The user is responsible for determining whether the 3M product, surface preparation, and method of assembly are suitable for their particular purpose. Failure to determine the suitability of all factors involved in the application may result in bond failure.

**3M**

 3M New Zealand Ltd  
 Industrial Adhesives & Tapes

 PO Box 33-246 Takapuna 0740  
 Phone: 0800 474 787  
 Fax: 0800 508 980  
 Email: [\\_3mnzib1@mmm.com](mailto:_3mnzib1@mmm.com)  
[www.3M.com/industrial](http://www.3M.com/industrial)

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