# APPROVAL SHEET

## PCB ANTENNA

## 2.4~2.5 / 5.15~5.85 GHz Band

## Working Frequency

## Halogens Free Product

## P/N: RFPCA353038IMLB901

Customer：瑞軒科技

Customer ‘s Part No.：**0460-5001-9432**

Approval No.：

Issue Date：

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

品名：**RFPCA353038IMLB901**

**History List**

| 版本<br>**REV.** | 修訂者<br>**EDITOR** | 修訂頁次<br>**PAGE** | 修訂內容<br>**ITEMS OF CHANGE** | 申請日期<br>**DATE** | 生效日期<br>**VALID DATE** | **ECN 編號**<br>**ECN NO.** |
|---|---|---|---|---|---|---|
| A0 | Huiwenchan | ALL | Temporary Release | 2024/12/26 | According to the date of PLM Release | N/A |
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## 1.Explanation of part number：

| RF | PCA | 3530 | 38 | 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<br>e.g.: 3530 Length 35.0mm, Width 30.0mm | 2 digits for cable length<br>e.g.:38 Length 38.0 cm | A: N<br>C:MCX<br>D:IPEX III<br>E: IPEX IV<br>F: IPEX A13<br>H: Hirose<br>I: IPEX<br>M: MMCX<br>S: SMA<br>T: TNC<br>U:MURATA<br>N: None | A: Reverse Female<br>**B: Reverse Male**<br>F: Female<br>M: Male<br>N: None | **0: 0GHz**<br>**3: 3GHz**<br>**6: 6GHz**<br>**5: 5GHz**<br>A: 2.4GHz ISM band<br>B: GSM 900/1800 dual band<br>G: GPS band<br>L: 2.4/5.2/5.8 GHz tri-band<br>**N: NFC**<br>**T: LTE band**<br>W: WCDMA band | B: MP<br>**T:During Test**<br>X: Pile Run | 0:None<br>1:∅0.81<br>2:∅1.32<br>3:∅1.13<br>4:Low Loss ∅1.13<br>5:∅0.5<br>6:RG316<br>7: ∅1.37<br>8:RG178<br>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 | 4.68 dBi |
| | 5.15 ~5.85 GHz | 4.68 dBi |
| Polarization | Linear Vertical | |
| Radiation Pattern | Directional | |
| Impedance | 50Ω | |
| Operation Temperature | －20℃ ～ ＋65℃ | |



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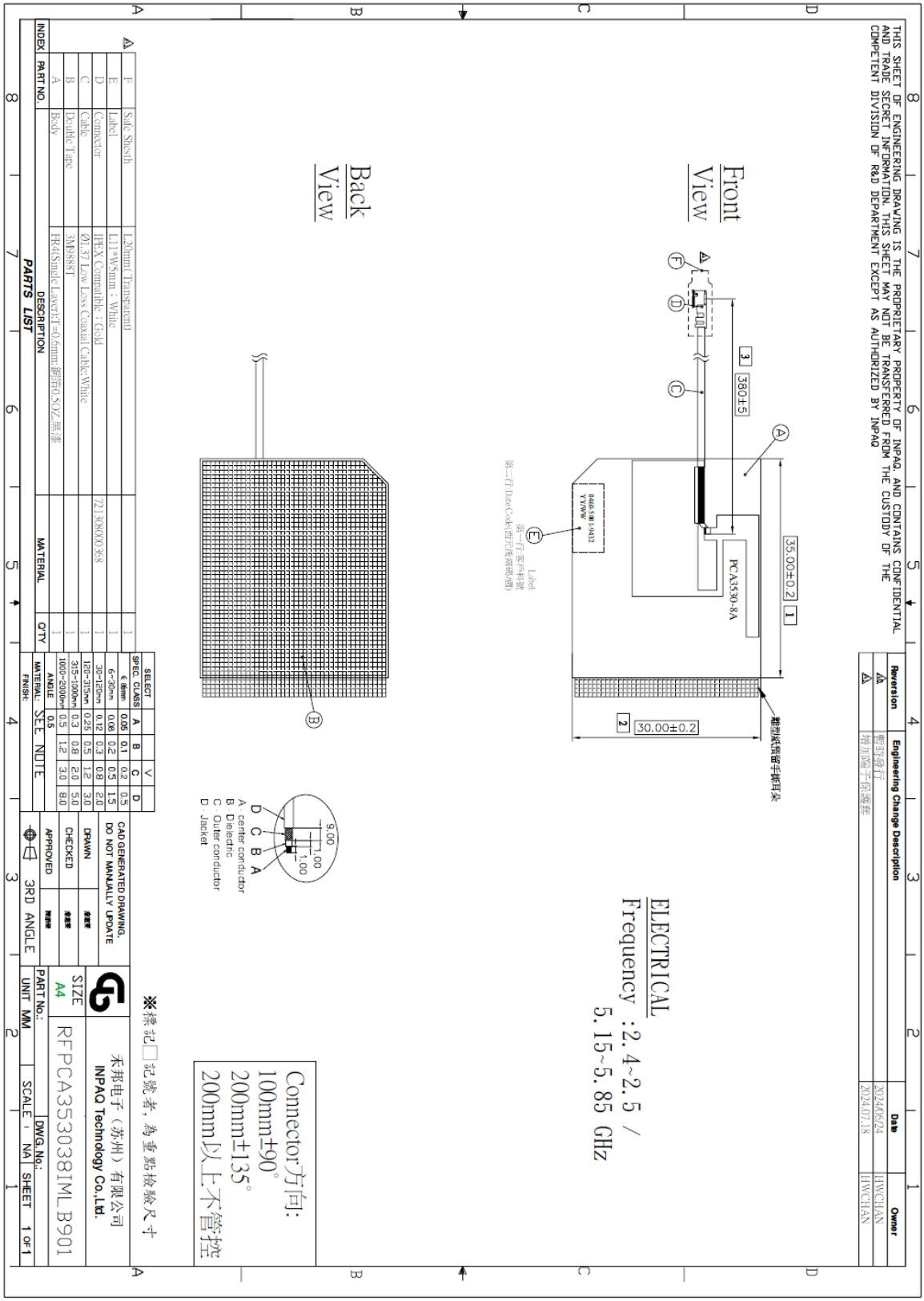
## 3. Antenna Drawing：

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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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| DESIGNED BY：劉兆倫 | APPROVED BY：陳振榮 | |
| TITLE：RFPCA353038IMLB901 | DOCUMENT NO. | SPEC REV. A0 |

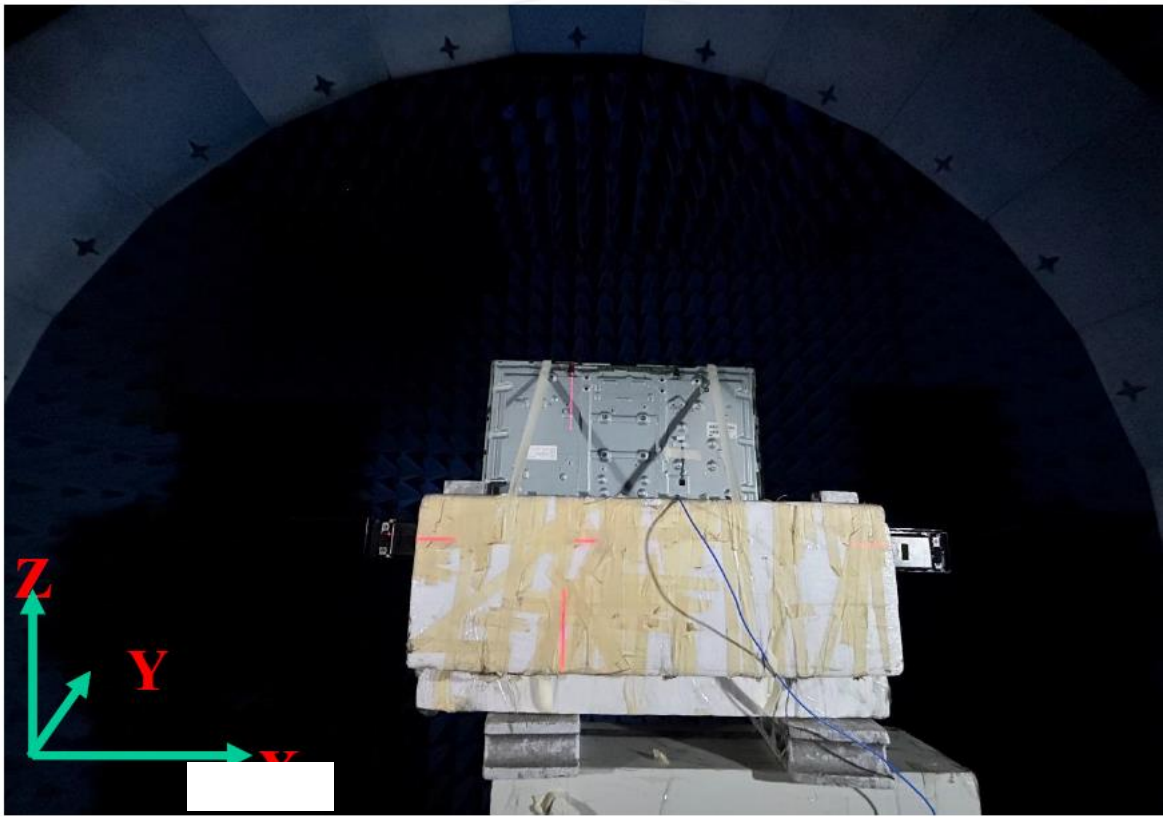
## 4. Performance Report：

# Test Report

## Experimental Setup

Test Equipment

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

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|---|---|---|
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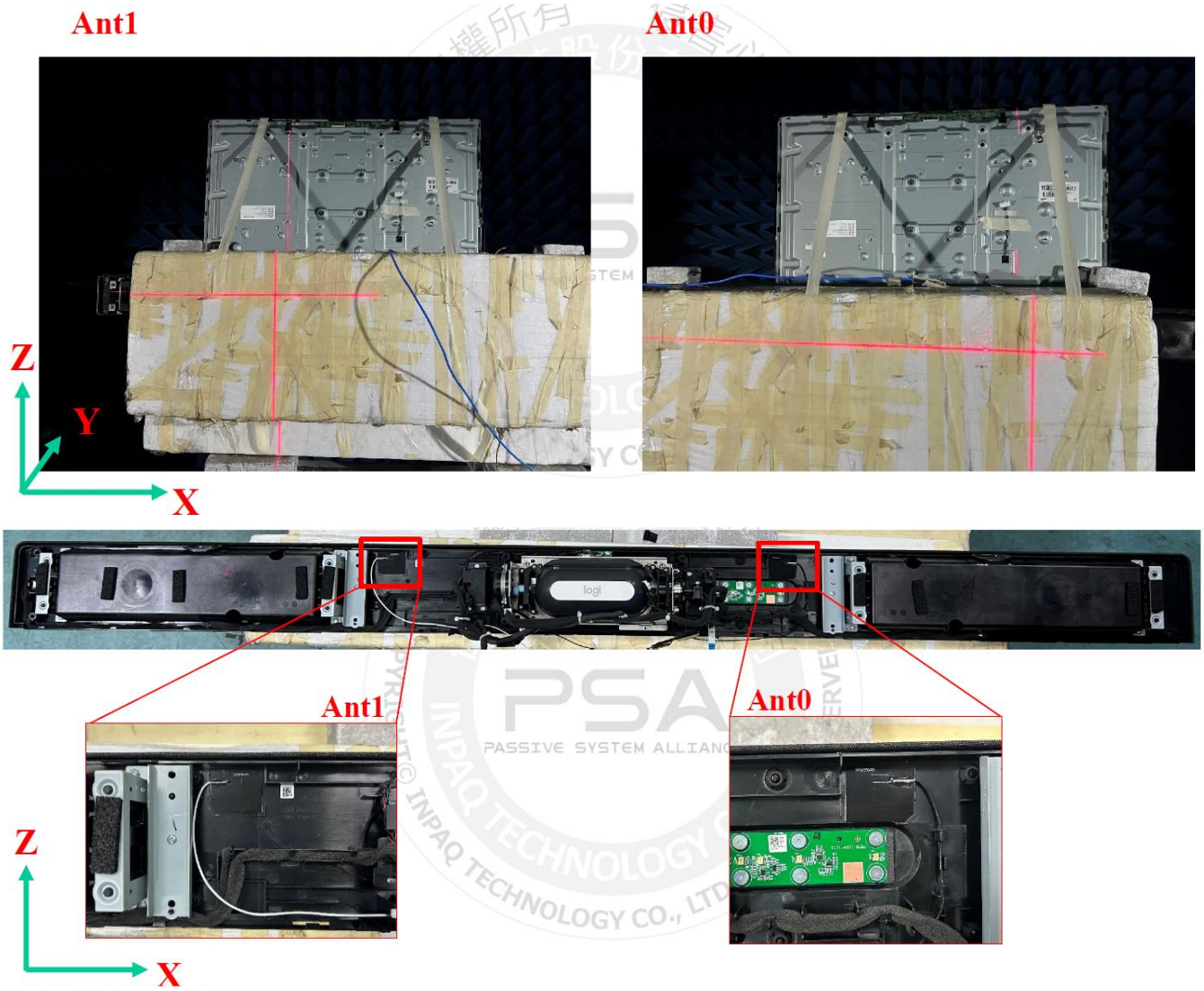


**ANT0: RFPCA353038IMLB901**

**ANT1: RFPCA353046IMLB901**

| | | |
|---|---|---|
| UNLESS OTHER SPECIFIED TOLERANCES ON：<br>X＝N/A X.X＝N/A X.XX＝N/A<br>ANGLES＝N/A HOLEDIA＝N/A | | INPAQ TECHNOLOGY CO., LTD. |
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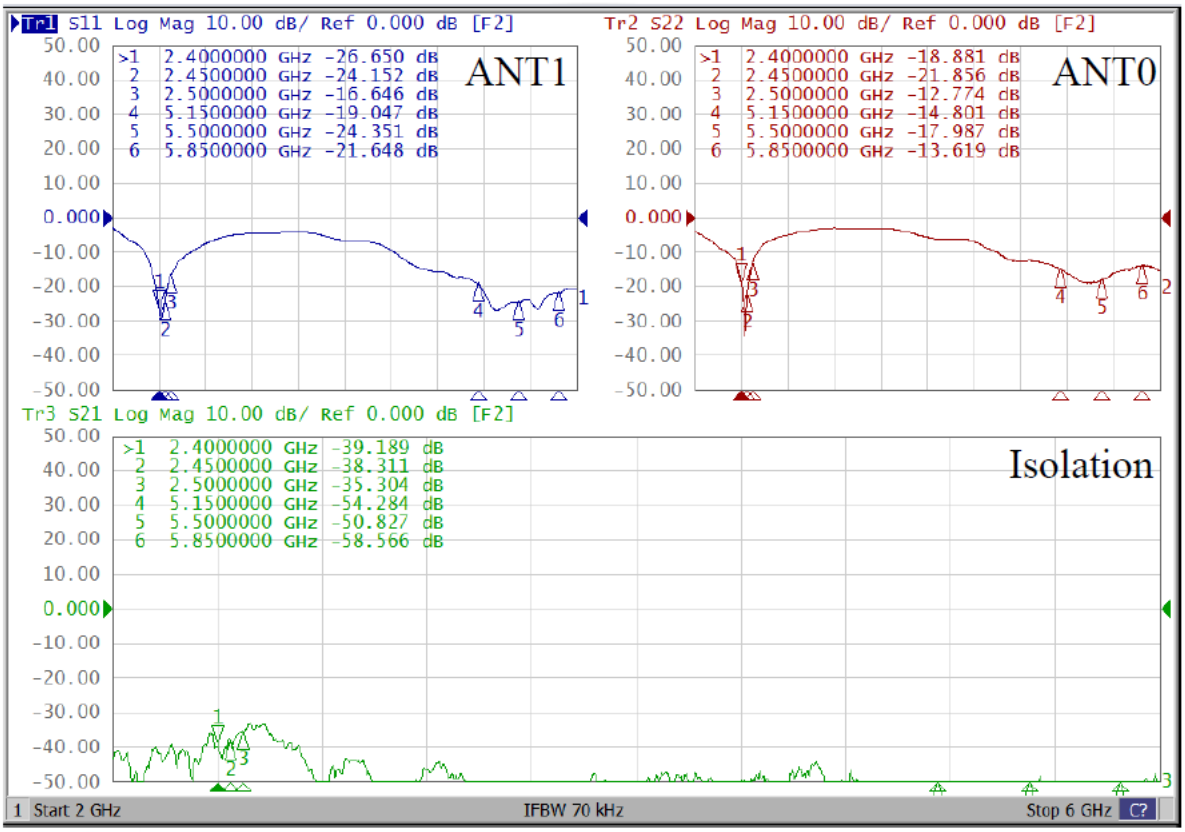
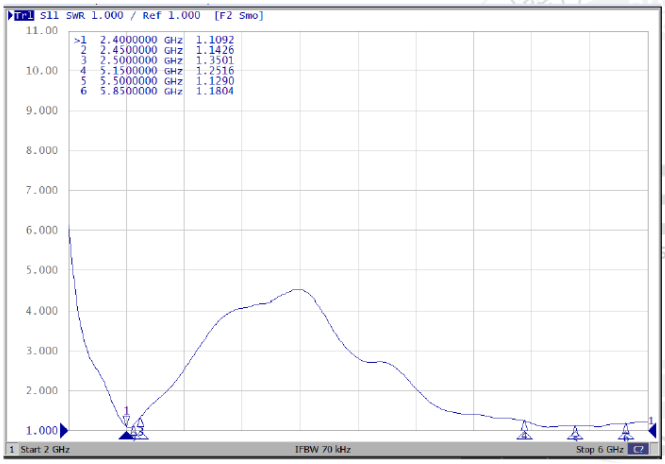
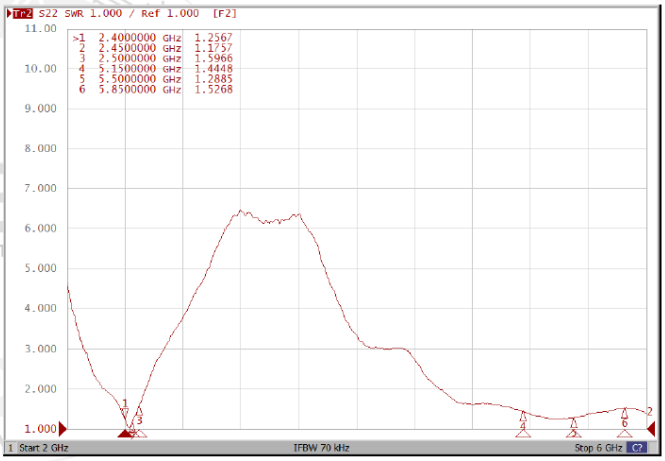
# ELECTRICAL CHARACTERISTICS

## S-Parameter



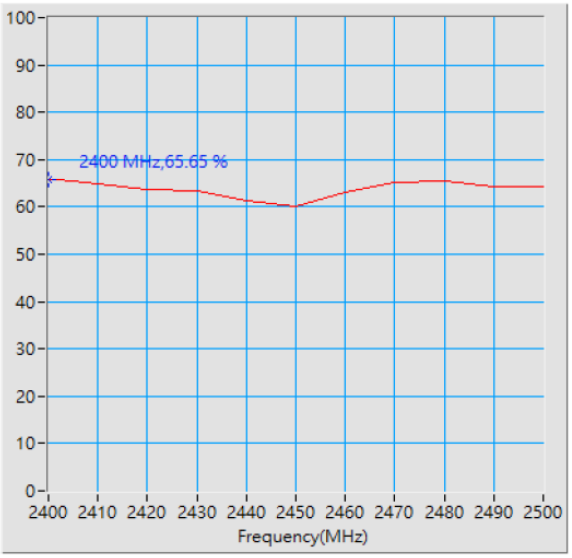

## VSWR



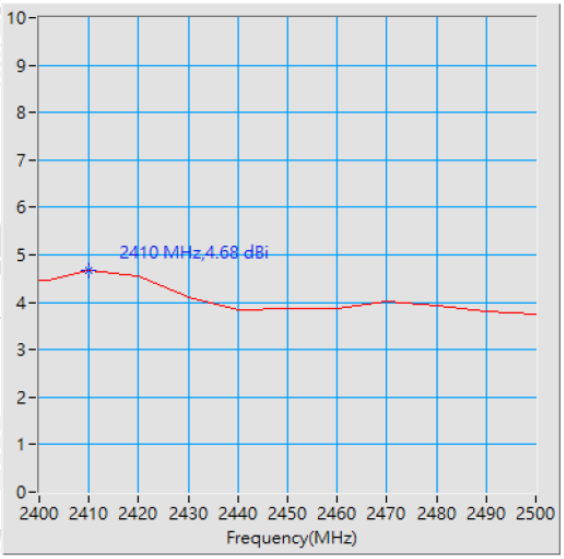



# Efficiency & Peak Gain

## ANT0@2G

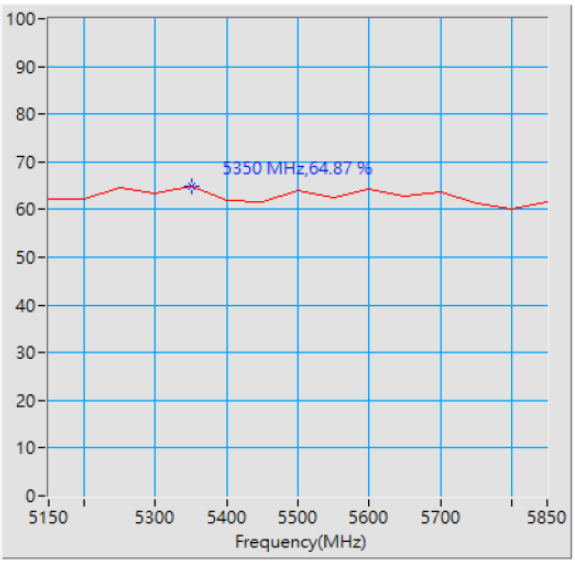



Maximum Efficiency at 2400 MHz : 65.65 %

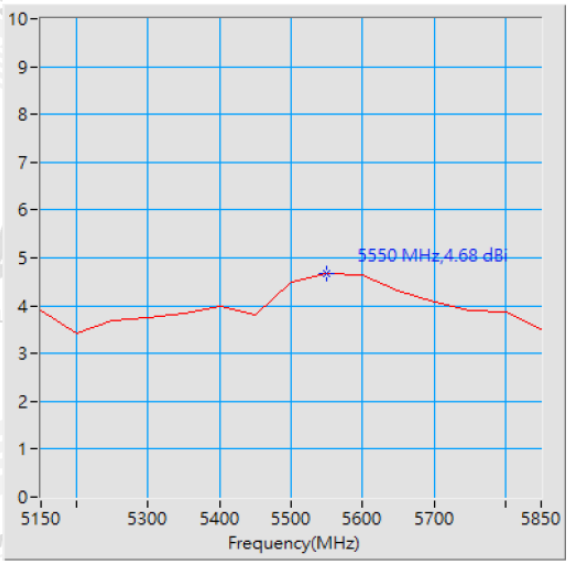



Maximum Peak Gain at 2410 MHz : 4.68 dBi

## ANT0@5G




Maximum Efficiency at 5350 MHz : 64.87 %




Maximum Peak Gain at 5550 MHz : 4.68 dBi

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|---|---|---|
| UNLESS OTHER SPECIFIED TOLERANCES ON：<br>X＝N/A X.X＝N/A X.XX＝N/A<br>ANGLES＝N/A HOLEDIA＝N/A | | INPAQ TECHNOLOGY CO., LTD. |
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| TITLE：RFPCA353038IMLB901 | DOCUMENT NO. | SPEC REV. A0 |

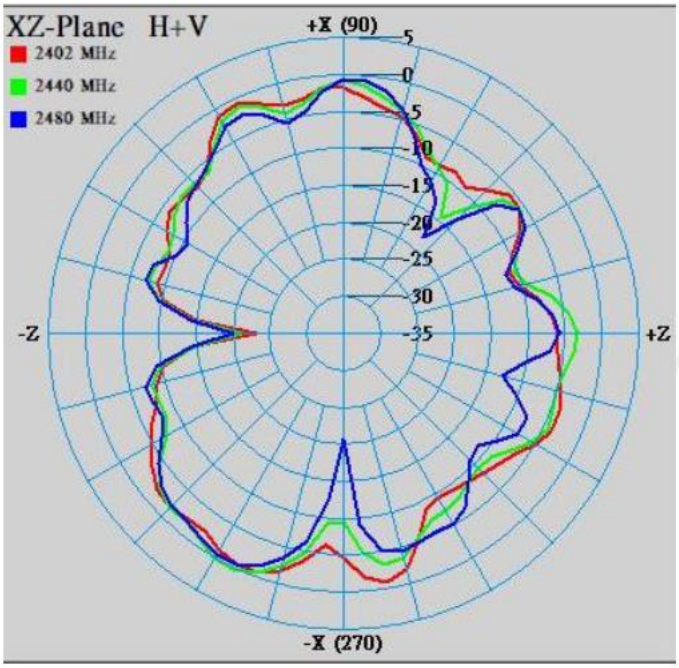
## Radiation Patterns

ANT0@2G

**X-Z Plane**

**Phi=0.00deg**

**Gain . dB**

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|---|---|---|---|
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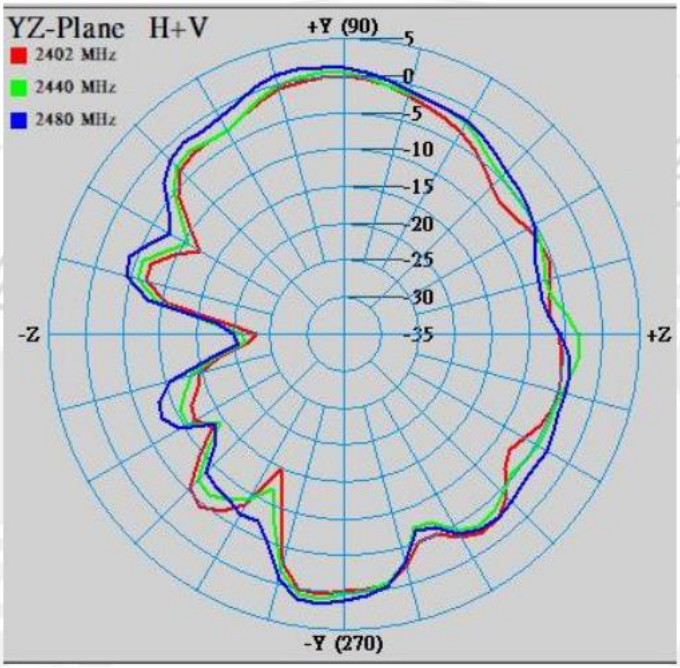
## Y-Z Plane

## Phi=90.00deg

### Gain . dB

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|---|---|---|---|
| UNLESS OTHER SPECIFIED TOLERANCES ON：<br>X＝N/A X.X＝N/A X.XX＝N/A<br>ANGLES＝N/A HOLEDIA＝N/A | | INPAQ TECHNOLOGY CO., LTD. | |
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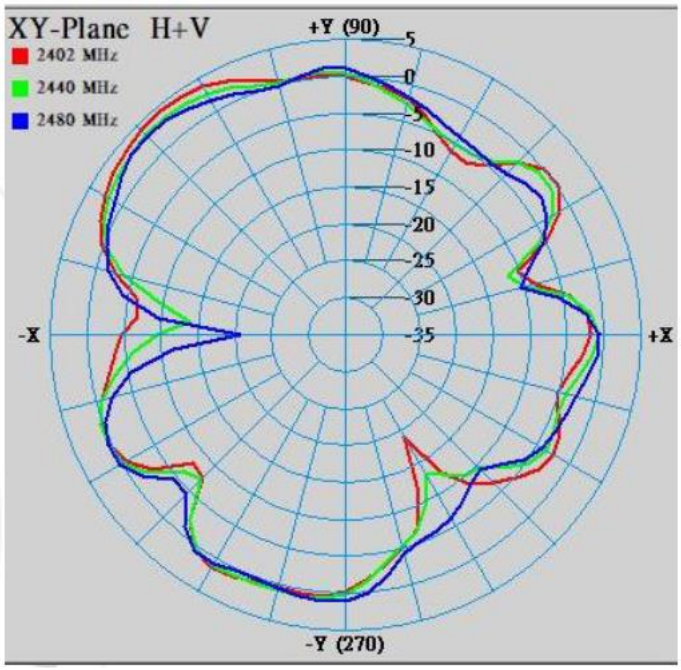
| TITLE：RFPCA353038IMLB901 | | DOCUMENT NO. | SPEC REV. A0 |

## X-Y Plane

## Theta=90.00deg

### Gain . dB



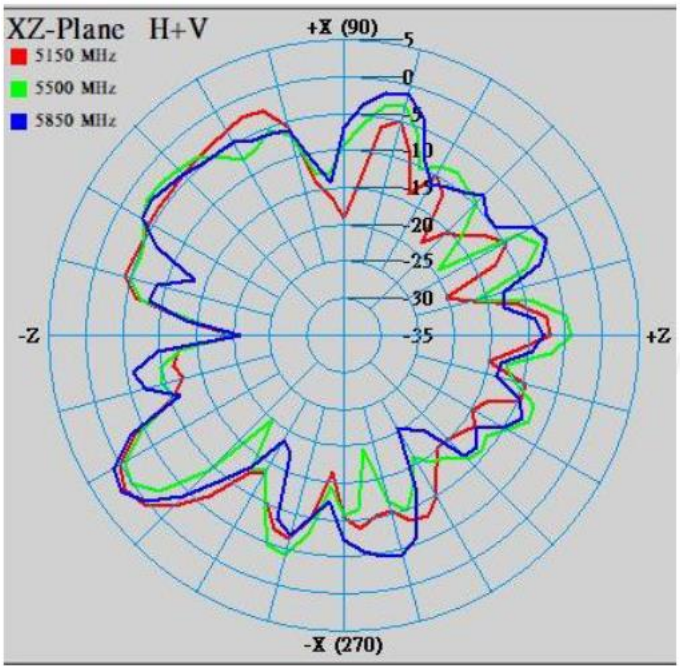

| | ZX plane | | ZY plane | | XY plane | |
|---|---|---|---|---|---|---|
| Frequency [MHz] | Max Value [dBi] | Average [dBi] | Max Value [dBi] | Average [dBi] | Max Value [dBi] | Average [dBi] |
| 2402 | -0.48 | -4.80 | 0.44 | -4.25 | 4.36 | -0.94 |
| 2440 | 0.24 | -4.91 | 1.05 | -3.80 | 3.25 | -1.30 |
| 2480 | -0.39 | -5.71 | 1.70 | -3.00 | 3.06 | -1.31 |

ANT0@5G

## X-Z Plane

## Phi=0.00deg

**Gain . dB**




| | | | |
|---|---|---|---|
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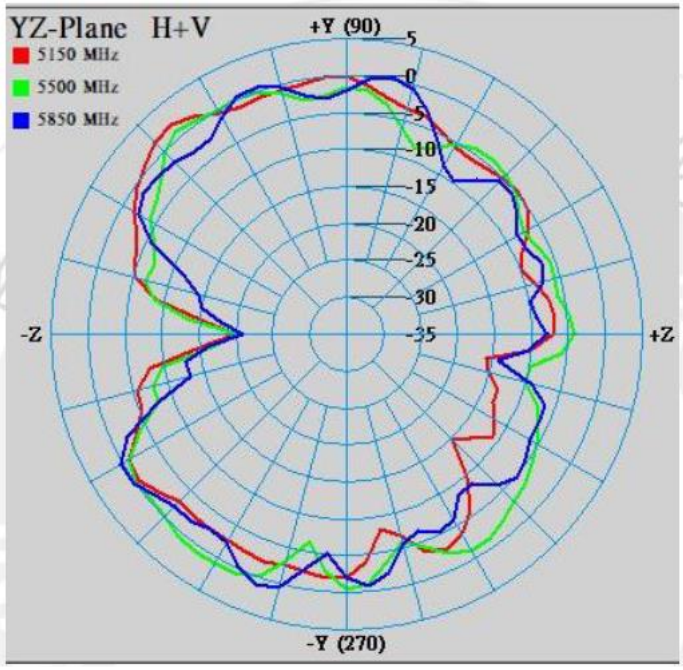
| TITLE：RFPCA353038IMLB901 | | DOCUMENT NO. | SPEC REV. A0 |

## Y-Z Plane

## Phi=90.00deg

### Gain . dB




| | | |
|---|---|---|
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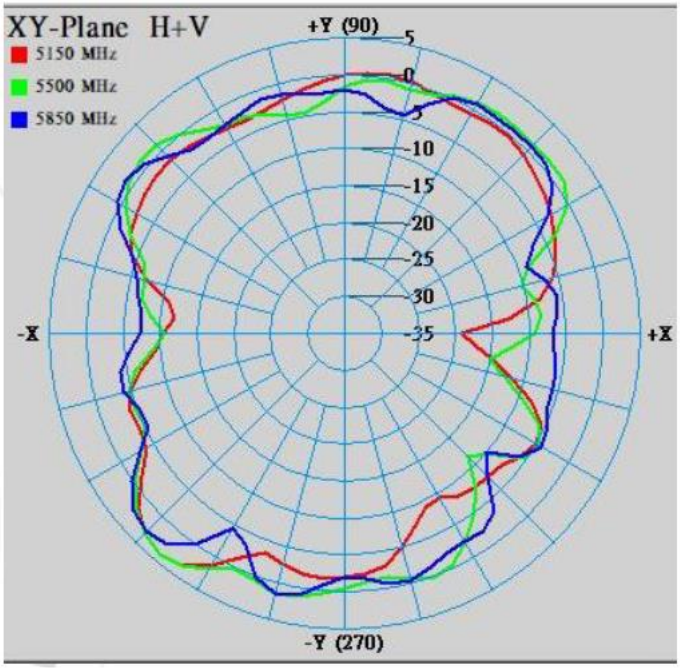
| TITLE：RFPCA353038IMLB901 | DOCUMENT NO. | SPEC REV. A0 |

## X-Y Plane

## Theta=90.00deg

### Gain . dB




| | ZX plane | | ZY plane | | XY plane | |
|---|---|---|---|---|---|---|
| Frequency [MHz] | Max Value [dBi] | Average [dBi] | Max Value [dBi] | Average [dBi] | Max Value [dBi] | Average [dBi] |
| 5150 | 1.25 | -7.03 | 2.13 | -3.53 | 3.88 | -2.51 |
| 5500 | 0.12 | -7.01 | 0.86 | -3.02 | 3.96 | -1.45 |
| 5850 | 1.96 | -6.29 | 1.15 | -3.68 | 3.02 | -1.93 |



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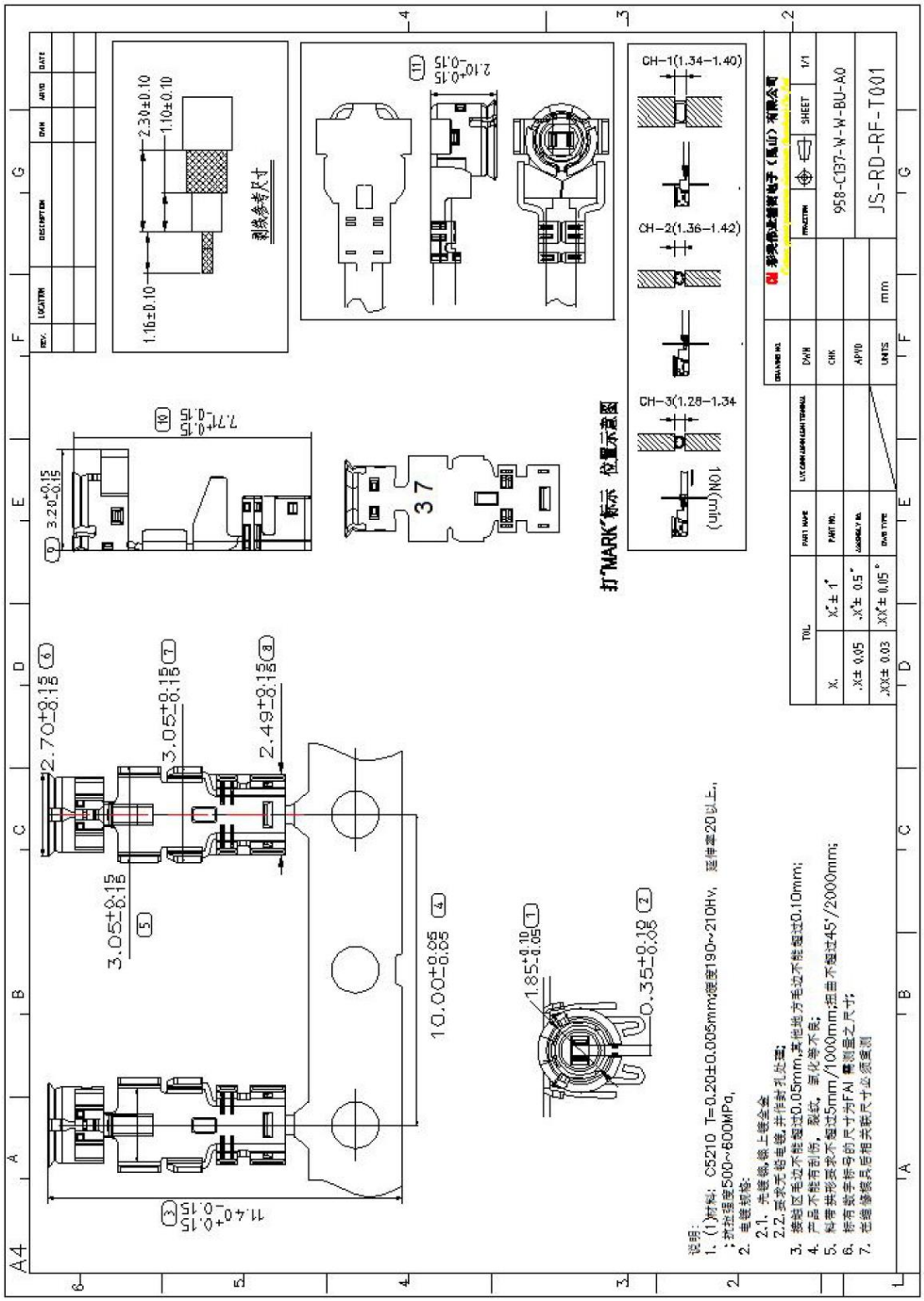
# Connector Specification

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|---|---|---|---|
| UNLESS OTHER SPECIFIED TOLERANCES ON：<br>X＝N/A X.X＝N/A X.XX＝N/A<br>ANGLES＝N/A HOLEDIA＝N/A | | INPAQ TECHNOLOGY CO., LTD. | |
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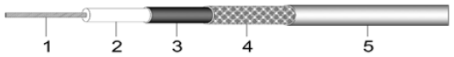
| TITLE：RFPCA353038IMLB901 | | DOCUMENT NO. | SPEC REV. A0 |

# Cable Specification

| 型号 Type | RF-1.37L/50 | 料号 P/N | SY137L/50-003(White) |
|---|---|---|---|
| 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)<br>Makeup:total / O.D. of every wire(mm) | 7/0.105 |
| | (绞合)标称外径(mm)<br>(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)<br>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)<br>Makeup:thickness(mm)×width(mm) | 0.012×3.2 |
| | 标称外径(mm)<br>NOM.O.D.(mm) | 0.95±0.03 |
| | 覆盖率(%)<br>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)<br>Makeup:total / O.D. of every wire(mm) | 5/0.05 |
| | 标称外径(mm)<br>NOM.O.D.(mm) | 1.15±0.05 |
| | 覆盖率(%)<br>Coverage ratio(%) | 90±5 |
| ⑤护套层 Jacket | 材料 Material | 聚全氟乙丙烯 FEP |
| | 颜色 Color | 白 White |
| | 标称外径(mm)<br>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 | 频率 Frequency | 标准值 Standard value<br>单位 Unit:dB/m |
|---|---|---|---|---|
| 电容(pF/m)<br>Capacitance(pF/m) | 96 | 衰减 Attenuation | 1GHz | ≤1.6 |
| 速率(%)<br>Velocity(%) | 70 | | 2GHz | ≤2.1 |
| 阻抗(Ω)<br>Impedance(Ω) | 50±2 | | 2.45GHz | ≤2.35 |
| 驻波比<br>Standing wave ratio | ≤1.3@0~6GHz | | 3GHz | ≤2.6 |
| 最大工作电压(V)<br>Max.operating voltage(V) | 1000 | | 4GHz | ≤3 |
| 最大工作频率(GHz)<br>Max.operating frequency(GHz) | 6 | | 5GHz | ≤3.4 |
| | | | 5.2GHz | ≤3.5 |
| | | | 5.8GHz | ≤3.6 |
| | | | 6GHz | ≤3.7 |

## 可靠性 Dependability

| 项目 Item | 单位 Unit | 标准值 Standard value |
|---|---|---|
| 最小弯曲半径(一次)<br>Min.bending radius static | mm | 5 |
| 最小弯曲半径(重复)<br>Min.bending radius repeated | mm | — |
| 工作温度范围<br>Operating temperature | ℃ | -55~+200 |

## 包装 Packing

| 项目 Item | 单位 Unit | 标准值 Standard value |
|---|---|---|
| 包装方式<br>Packing mode | / | 纸盘<br>Papery plate |
| 每盘长度<br>The length of each plate | m | 500 |
| 每盘接头数<br>Each connector plate number | / | ≤3 |
| 每段最短长度<br>The shortest length of each root | m | ≥10 |

## 使用提示 Use tips

| | |
|---|---|
| 存储环境<br>Storage environment | 温度：30℃以下；湿度：20%~65% |
| 最佳保存周期<br>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<br>Processing temperature | 260℃的极限情况下，可短时间承受；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<br>Teflon Shrink | 固有材料特性。绝缘：0.2mm以下；护套：0.3mm以下 |
| 护套窜动<br>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

| | | |
|---|---|---|
| UNLESS OTHER SPECIFIED TOLERANCES ON：<br>X＝N/A X.X＝N/A X.XX＝N/A<br>ANGLES＝N/A HOLEDIA＝N/A | | INPAQ TECHNOLOGY CO., LTD. |
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| TITLE：RFPCA353038IMLB901 | DOCUMENT NO. | SPEC REV. A0 |

# 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<br>Test item | 试样处理<br>Test Condition | 标准值<br>Standard Value | 典型值<br>Typical value |
|---|---|---|---|
| 1.Peel strength lb/inch, minimum (H OZ)<br>抗剥强度 磅/英寸，最小值(H OZ)<br>Receiving status 接收状态<br>After thermal stress 热应力后<br>Increase temperature 提高温度下 | <br>A<br>A<br>125℃ | <br>≥6.0<br>≥6.0<br>≥4.0 | <br>6.0-8.0<br>6.0-8.0<br>5.0 |
| 2.Volume resistance, minimum,体积电阻,最小值 MΩ.CM<br>At elevated temperatures 在提高温度下 | E-24/125 | $\geq 10^3$ | $3\times10^6$ |
| 3.Surface resistance, minimum,表面电阻,最小,MΩ<br>At elevated temperatures 在提高温度下 | E-24/125 | $\geq 10^3$ | $3\times10^6$ |
| 4.Absorption, maximum 吸水性,最大值(%) | E-1/105+des | ≤0.80 | 0.20-0.40 |
| 5.Breakdown voltage, minimum valu 击穿电压,最小值(KV)<br>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)<br>(thickness ≥ 0.50 mm) (厚度≥0.50 mm)<br>vertical 经向<br>Zonal 纬向 | <br>A<br>A | <br>≥415<br>≥345 | <br>470<br>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(%)<br>Double sides（thickness > 0.78mm；300×300mm）<br>Single sides（thickness > 0.78mm；300×300mm）<br>Double sides（thickness 0.5~0.78 mm；300×300mm）<br>Single sides（thickness 0.5~0.78 mm；300×300mm） | <br>A<br>A<br>A<br>A | <br>≤1.0<br>≤1.5<br>≤1.5<br>≤2.0 | <br>0.15-0.50<br>0.25-0.60<br>0.20-0.55<br>0.30-0.70 |
| 13. . Thermal stress, 288°C, Tin drift 10 seconds<br>热应力,288℃，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，℃) | A | ≥145 | 150±5 |
| 15.Z 轴膨胀系数（CTE）<br>Z-axis expansion coefficient — Before Tg (μm/m℃) | TMA | — | 50 |
| After Tg (μm/m℃) | TMA | — | 260 |
| 50～260℃（%） | TMA | — | 4.0 |
| 16. Thermal decomposition temperature 热分解温度 | 10℃/min，$N_2$，<br>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。<br>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。<br>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(℃) 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(℃) 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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# 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 Days Weeks | 120°C 85°C | 120°C 80°C | 120°C 80°C | 150°C 93°C | 150°C 93°C | 200°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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| | |
|---|---|
| **Format** | Available in 12mm, 18mm, 24mm, 36mm, 48mm and 300mm x 50m rolls<br>55256 is also available in 30m long rolls<br>Custom width rolls are available upon request |
| **Application Technique** | • Apply between $10^0$ and $40^0$C.<br>• Ensure surfaces to be bonded are clean, dry and well unified.<br>• Firm application pressure helps develop better adhesive contact and improves bond strength. |
| **Application ideas** | • Lamination of foams, fabrics and papers<br>• Web splicing for paper and corrugated board<br>• Core starting<br>• Attaching lightweight signs, nameplates and plaques<br>• Production of promotional signage or sample boards<br>• Attaching plastic extrusions |
| **Testing** | Always test the suitability of the product for your application before use. |
| **Shelf life** | Store in a dry location out of direct sunlight and away from all sources of heat. Ideal conditions are $20^0$C and 50% relative humidity. Use within 2 years from date of manufacture. |
| **Health and Safety Information** | 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 www.3M.com/msds and entering the product number or 3M stock number. Alternatively, contact 3M Customer Services. |
| **Further information** | Further information is available at www.3M.com or by contacting 3M Customer Services on free phone 0800 200 713 or free fax 0800 508 980. |
| **Note** | **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
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**Industrial Adhesives &Tapes**

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