承　　認　　書

APPROVAL SHEET

CUSTOMER: TATUNG CORP LTD;

FILE NO . :

DESCRIPTION : PIFA Antenna

經理 Manager	品保 Q C	工 程 師 Engieer

ANTENNIQUES P/N :FI-001-249-01

CUSTOMER P/N :

DATE : 中華民國 92年 07 月 28 日

Customer Approval

欣格科技股份有限公司 Antenniques Co.,Ltd

台北縣樹林市柑園街二段 122 巷 6 號 5 樓

TEL：02-2668-5793 FAX：02-2668-5795

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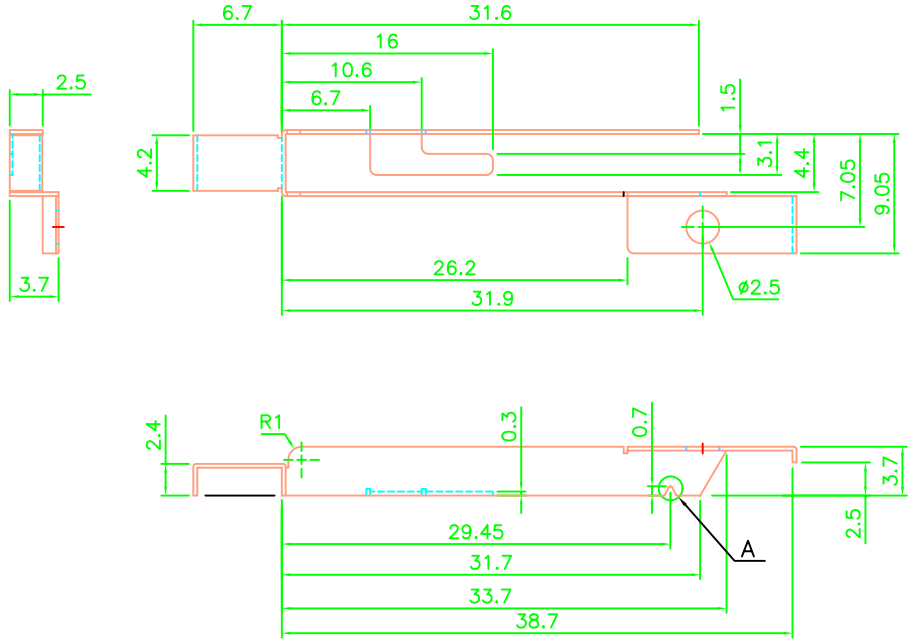
Taipei Hsien,238 Taiwan R.O.C.

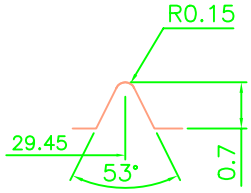
E-mail：anten.niques@msa.hinet.net

網 站：www.antenniques.com.tw

REVISIONS			
REV	BY	DESCRIPTION	DATE
1			



A部詳細圖 (5:1)



1.未標註之圓角皆為 R0.5

ITEM NO.	QTY REQD	PART NUMBER	DESCRIPTION
1			T=0.30 馬口鐵

PARTS LIST

TOLERANCE UNLESS OTHERWISE SPECIFIED (±)							
CLASS	A	B	C	D	E	F	G
< 8mm	0.05	0.1	0.1	0.2	0.2	0.4	0.4
8 ~ 25mm	0.08	0.15	0.15	0.3	0.3	0.6	0.6
25 ~ 80mm	0.12	0.2	0.25	0.4	0.5	0.8	1.0
80 ~ 250mm	0.25	0.3	0.4	0.6	0.8	1.2	1.5
250 ~ 800mm	0.5	0.6	0.8	1.0	1.5	2.0	3.0
> 800mm	1.0	1.0	1.5	1.7	3.0	4.0	6.0
ANGLE	0.5						

METRIC

THIRD ANGLE PROJECTION

MATERIAL: 1 FINISH: 2

DO NOT SCALE DRAWING

DRAWN / DATE
CHECK / DATE
DESIGN / DATE

REV A0 SIZE A4

SHEET 1 OF 1 SCALE 1/1

Antenniques Corp. Ltd.

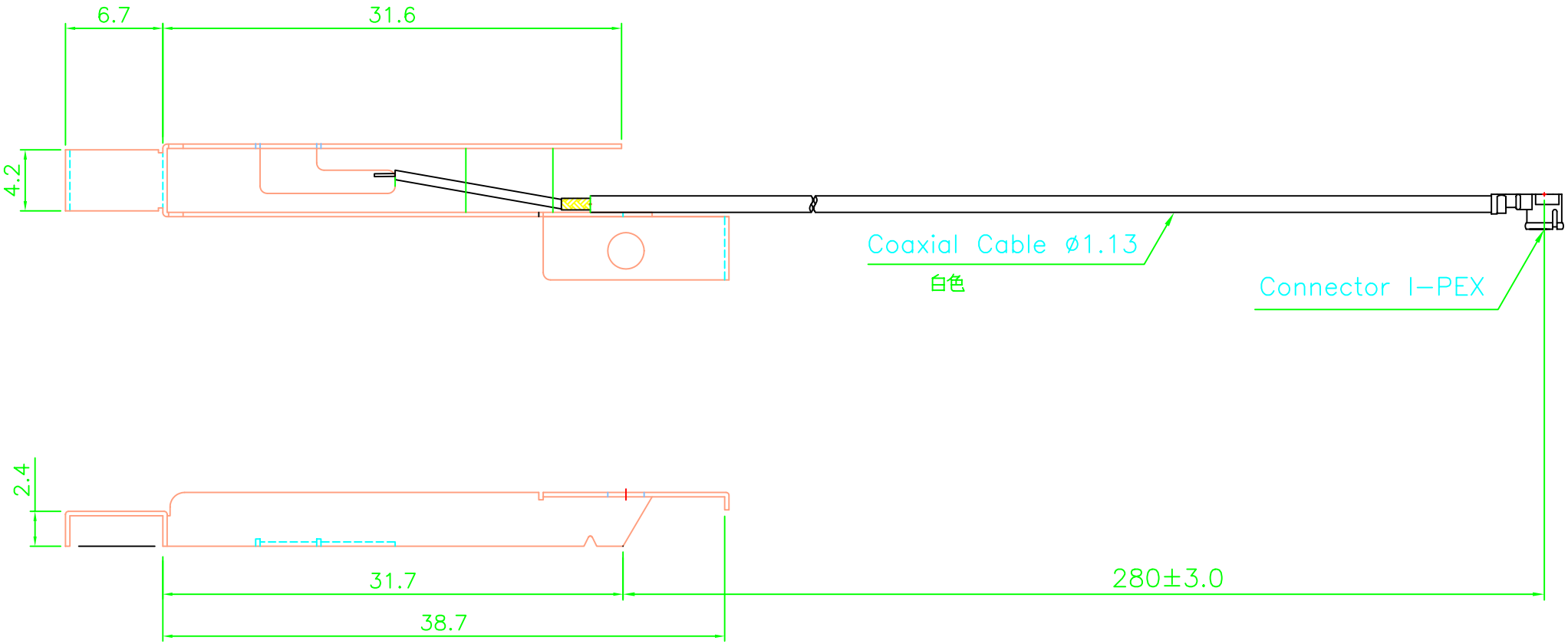
TITLE

PART NO.

DRAWING NO.

3 :1 2.5:1 2 and Settings\demo11\桌面\3-3-0.2

REVISIONS			
REV	BY	DESCRIPTION	DATE
1			



ITEM NO.	QTY REQD	PART NUMBER	DESCRIPTION
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25 ~ 80mm	0.12	0.2	0.25	0.4	0.5	0.8	1.0
80 ~ 250mm	0.25	0.3	0.4	0.6	0.8	1.2	1.5
250 ~ 800mm	0.5	0.6	0.8	1.0	1.5	2.0	3.0
> 800mm	1.0	1.0	1.5	1.7	3.0	4.0	6.0
ANGLE	0.5						

METRIC

THIRD ANGLE PROJECTION

MATERIAL: 1

FINISH: 2

DO NOT SCALE DRAWING

DRAWN		DATE	
CHECK		DATE	
DESIGN		DATE	
REV A0		SIZE A4	
SHEET 1 OF 1		SCALE 1/1	

Antenniques Corp. Ltd.

TITLE: 主天線

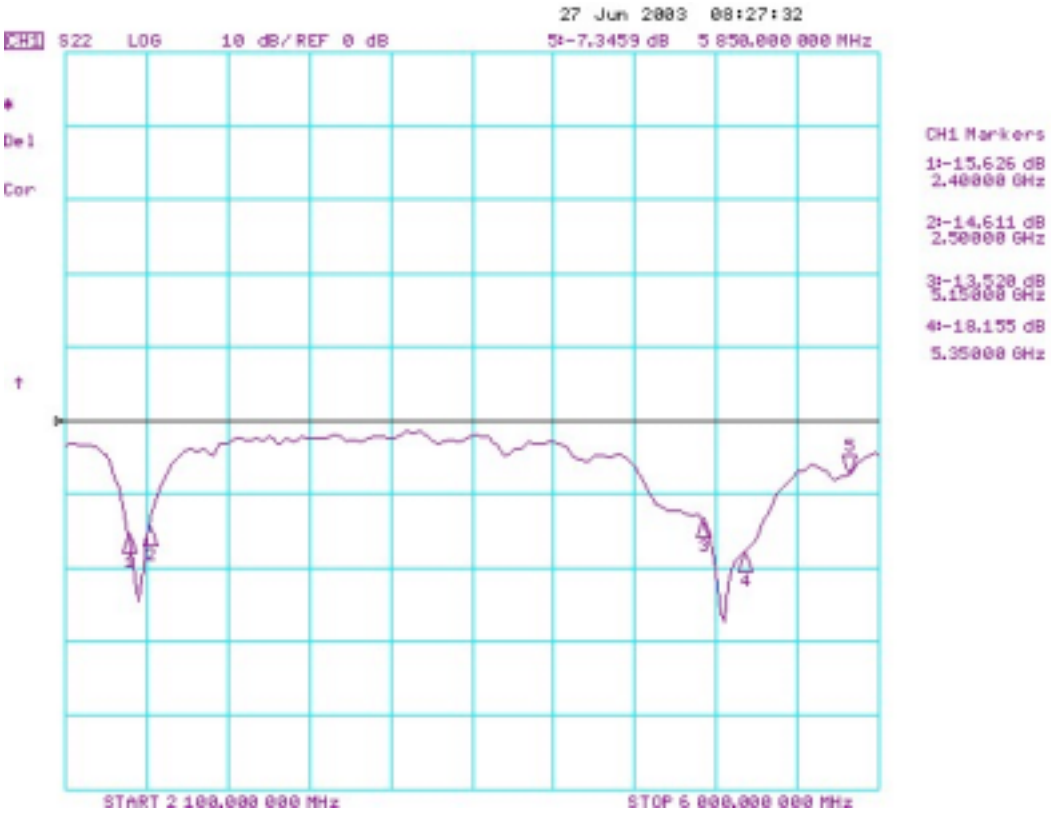
PART NO. FI-001249-01

DRAWING NO.

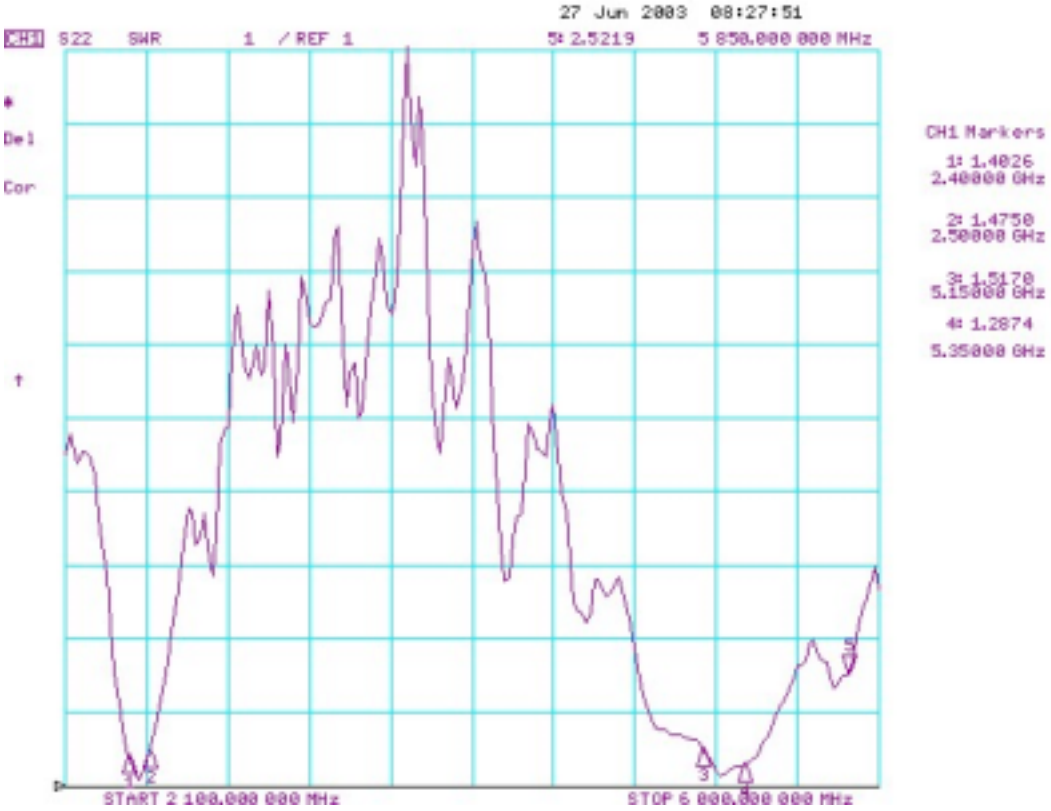
3 :1 2.5:1 2 and Settings\demo11\\3-3-0.2

MAIN ANTENNA

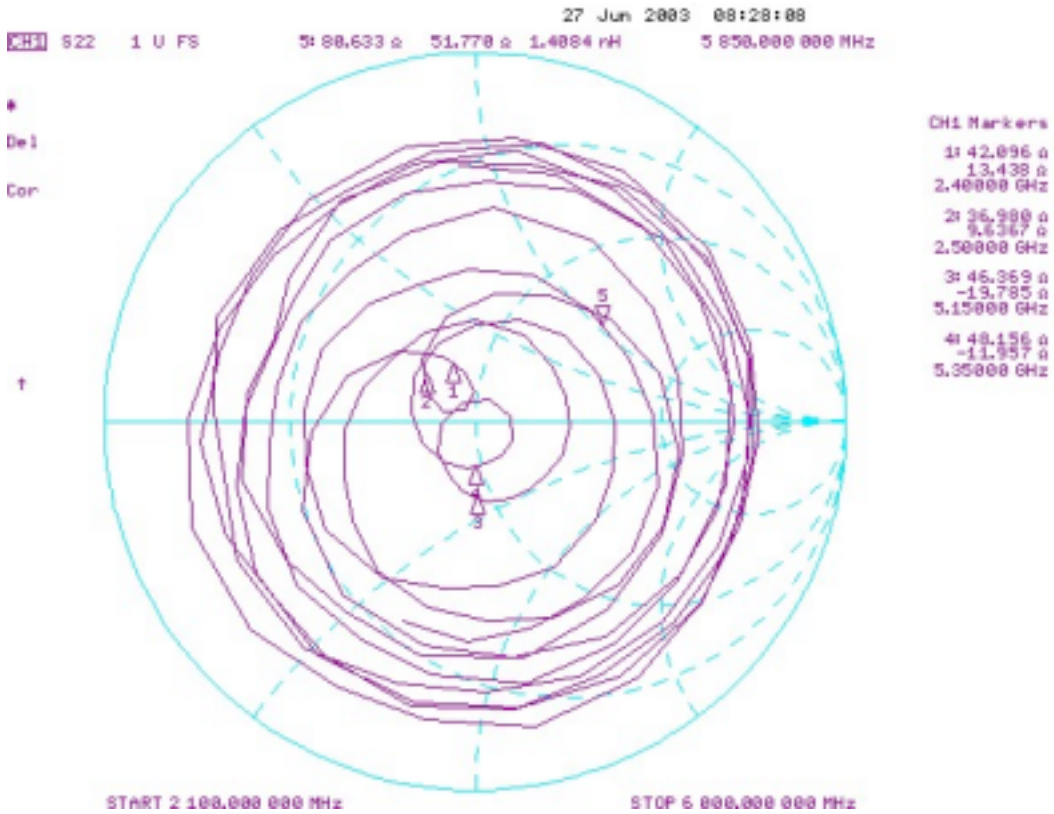
RETURN LOSS



V.S.W.R



SMITH CHART


27 Jun 2003 08:28:08
CH1 S22 1 U FS
5: 80.633 Ω 51.770 Ω 1.4084 nH
5 850.000 000 MHz
Del
Cor
CH1 Markers
1: 42.096 Ω
13.438 Ω
2.40000 GHz
2: 36.980 Ω
9.6367 Ω
2.50000 GHz
3: 46.369 Ω
-19.785 Ω
5.15000 GHz
4: 48.156 Ω
-11.957 Ω
5.35000 GHz
START 2 100.000 000 MHz
STOP 6 000.000 000 MHz

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PIFA
Antenna Test Report

Antenniques 2002 Antenniques 2002

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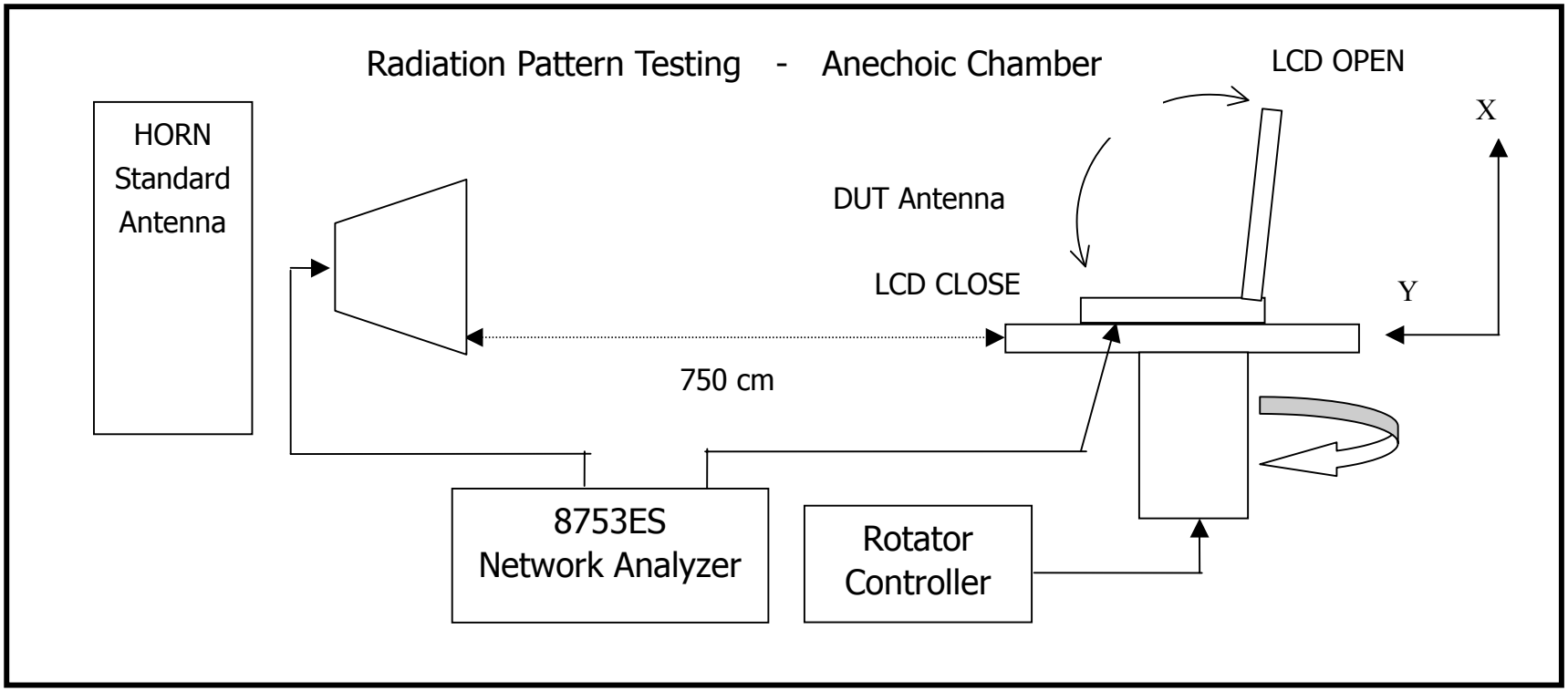
I. 802.11 and BLUETOOTH Antenna Testing Conditions:

1. Testing set up:



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2. Testing procedure description:

(1). Testing environment :

(a) Anechoic chamber: The simulated far field antenna gain measurement field.

(b) Standard Horn antenna: Using two standard horn antennas to do the standard calibration tool for the anechonic chamber space absorption.

(2). Testing concept:

(a) The antenna gain pattern is the 3D map. In general, using the two dimensions orthogonal plane measurement to approach the 3D gain pattern. The H-horizontal plane and V-vertical plane measured data are the two dimension orthogonal plane data to approach the 3D pattern.

(b) For notebook using method, the LCD panel is always opened or closed. So, the NB antenna gain testing is under the LCD panel closed and opened conditions.

(3). Antenna performance verification: According the IEEE 802.11b standard, the necessary communication distance is larger than 100m. The required antenna gain must be greater than –3.5dBi (H+V). For the bluetooth case, the required gain must be greater than –5dBi(H+V)

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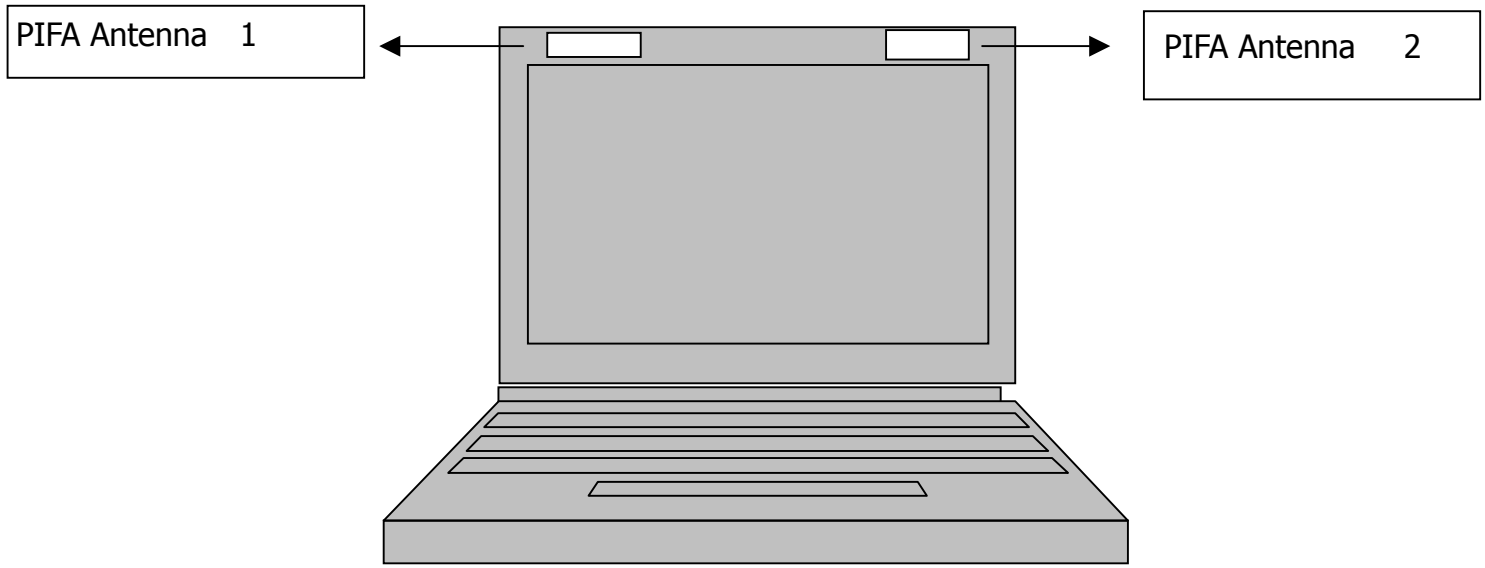
3. Mechanical dimensions



4. Judge Conditions:

802.11：Peak Gain ≤ 3dBi，Average Gain more larger is better。

BLUETOOTH：Average Gain ≥ -5dBi

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II. Gain Pattern of Left Antenna：Test results 1

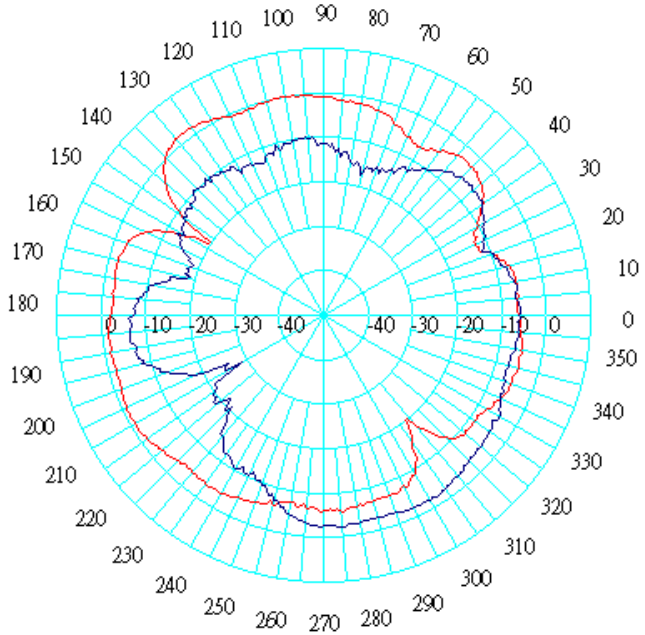
Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	NB Power
PIFA	**Wireless LAN**	LEFT	1.13	700	Off

1. Peak Gain and Average Gain

Antenna	Gain of XY Plane(Azimuth)-open		
	Frequency		2.45
1	H	Peak	1.12389
		Average	-4..5998
1	V	Peak	-2.5433
		Average	-8.657
1	V+H	Peak	1.12389
		Average	-2.9788

2. Radiation Pattern of **XY Plane(Azimuth)-open**

H-polarized V- polarized



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Test results 2

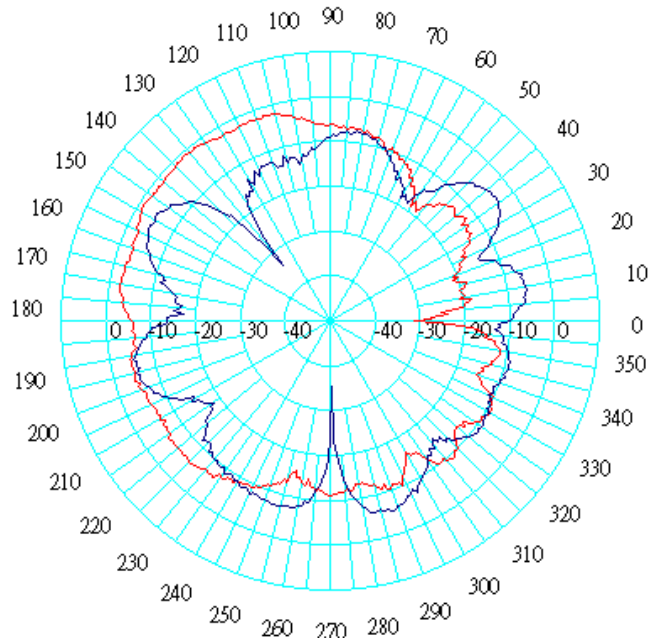
Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	NB Power
PIFA	**Wireless LAN**	LEFT	1.13	700	Off

1. Peak Gain and Average Gain

Antenna	Gain of XY Plane(Azimuth)-close-face up		
	Frequency		2.45
1	H	Peak	-3.959
		Average	-5.6045
1	V	Peak	-0.832
		Average	-7.354
1	V+H	Peak	-0.832
		Average	-3.456

2. Radiation Pattern of **XY Plane(Azimuth)-close-face up**

H-polarized V- polarized



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Test results 3

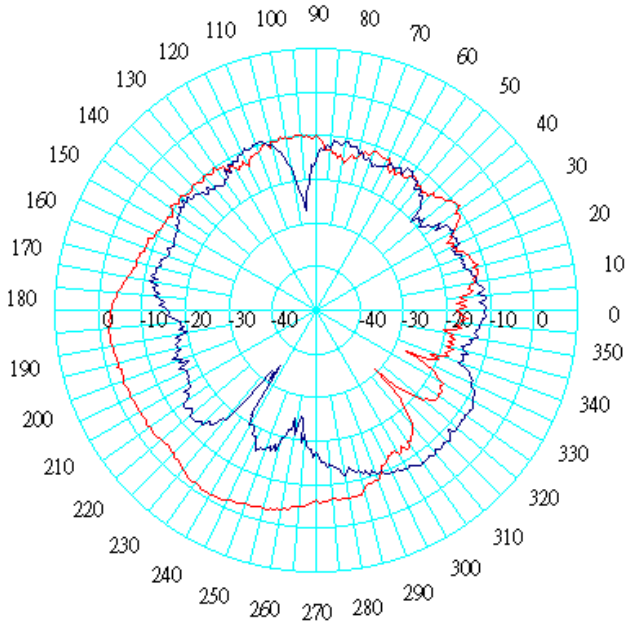
Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	NB Power
PIFA	**Wireless LAN**	LEFT	1.13	700	Off

1. Peak Gain and Average Gain

Antenna	Gain of XY Plane(Azimuth)-close-dowm		
	Frequency		2.45
1	H	Peak	-0.318
		Average	-6.0294
1	V	Peak	-5.059
		Average	-7.165
1	V+H	Peak	-0.318
		Average	-3.358

2. Radiation Pattern of **XY Plane(Azimuth)-close-face down**

H-polarized V- polarized



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III. Gain Pattern of Right Antenna：Test results 4

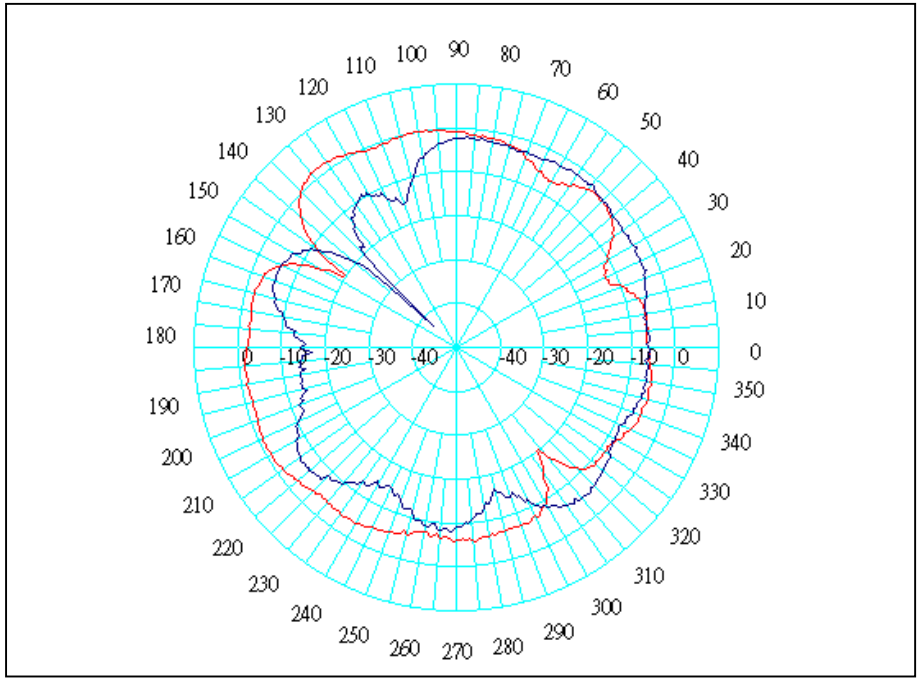
Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	NB Power
PIFA	**Bluetooth**	RIGHT	1.13	700	Off

1. Peak Gain and Average Gain

Antenna	Gain of XY Plane(Azimuth)-open		
	Frequency		2.45
2	H	Peak	1.0045
		Average	-3..5998
2	V	Peak	-2.736
		Average	-6.4338
2	V+H	Peak	1.0045
		Average	-0.564

2. Radiation Pattern of **XY Plane(Azimuth)-open**

H-polarized V- polarized



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Test results 5

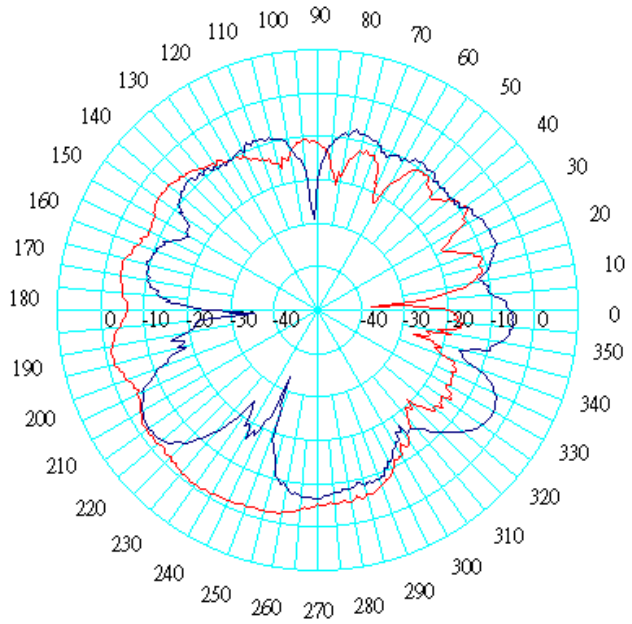
Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	NB Power
PIFA	**Bluetooth**	RIGHT	1.13	700	Off

1. Peak Gain and Average Gain

ntenna	Gain of XY Plane(Azimuth)-close-face up		
	Frequency		2.45
2	H	Peak	-1.318
		Average	-5.7490
2	V	Peak	-1.832
		Average	-7.847
2	V+H	Peak	-1.318
		Average	-3.821

2. Radiation Pattern of **XY Plane(Azimuth)-close-face up**

H-polarized V- polarized



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Test results 6

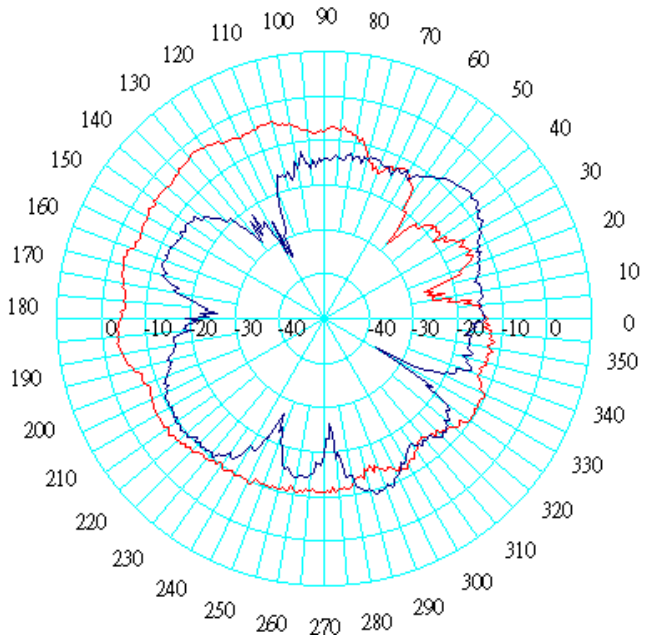
Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	NB Power
PIFA	**Bluetooth**	RIGHT	1.13	700	Off

1. Peak Gain and Average Gain

ntenna	Gain of XY Plane(Azimuth)-close-face down		
	Frequency		2.45
2	H	Peak	-1.218
		Average	-5.8390
2	V	Peak	-6.432
		Average	-8.683
2	V+H	Peak	-1.218
		Average	-4.117

2. Radiation Pattern of **XY Plane(Azimuth)-close-face down**

H-polarized V- polarized



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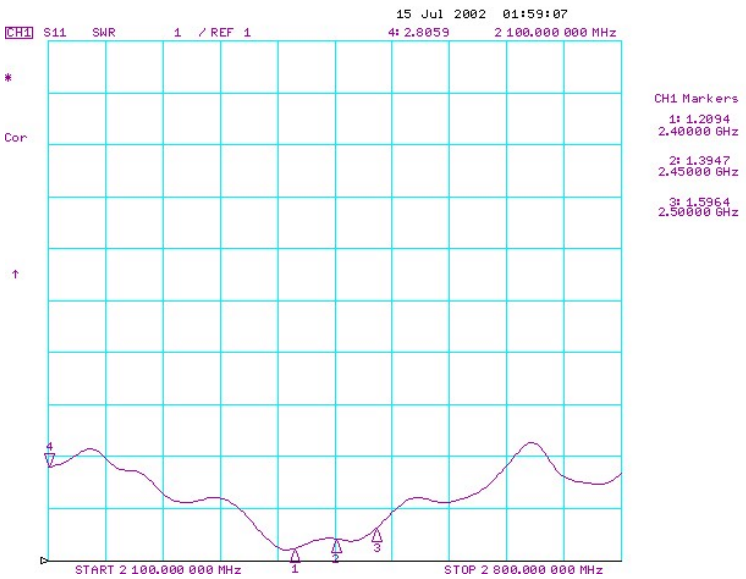
IV. Electronic Characteristic of Left Antenna：Test results7

Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	NB Power
PIFA	**Wireless LAN**	LEFT	1.13	700	Off

1.V.S.W.R



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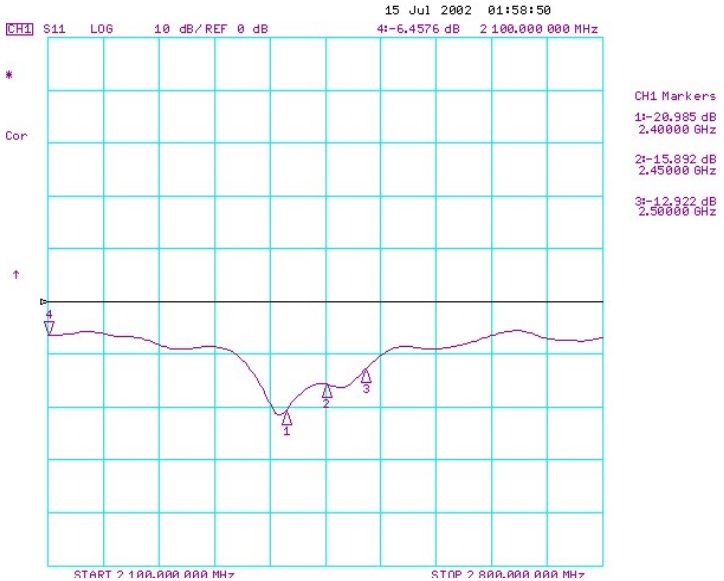

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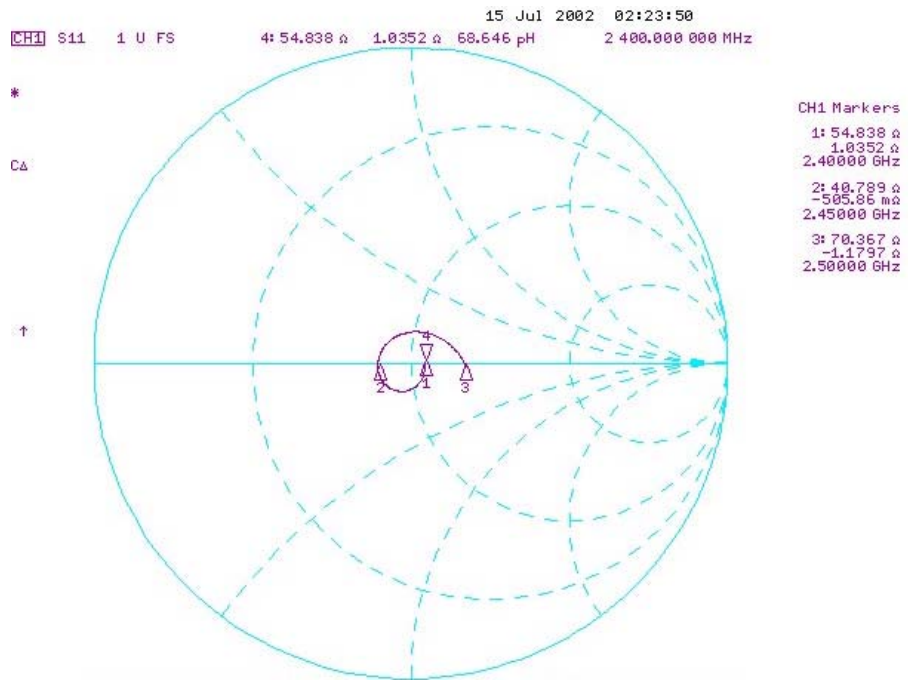
Test results 8

Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	Power
PIFA	**Wireless LAN**	LEFT	1.13	700	Off

1. SMITH CHART



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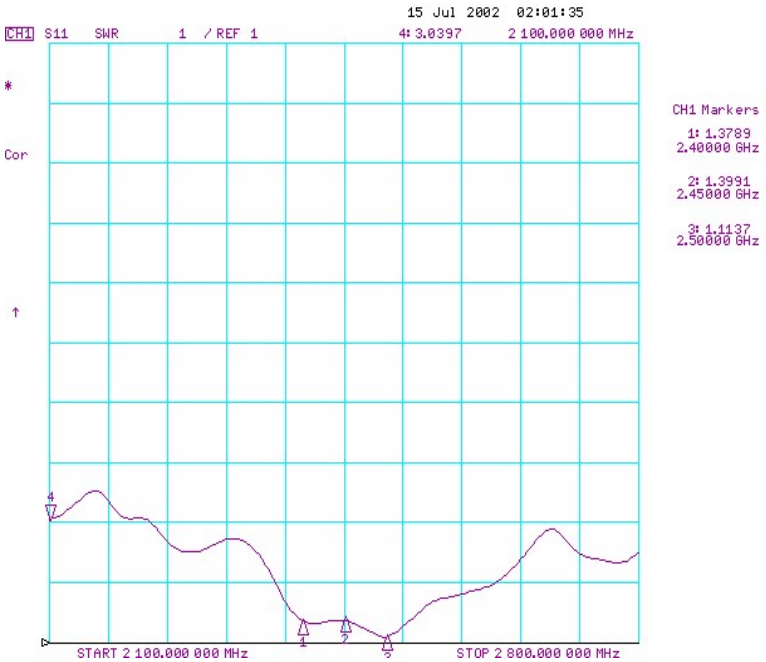
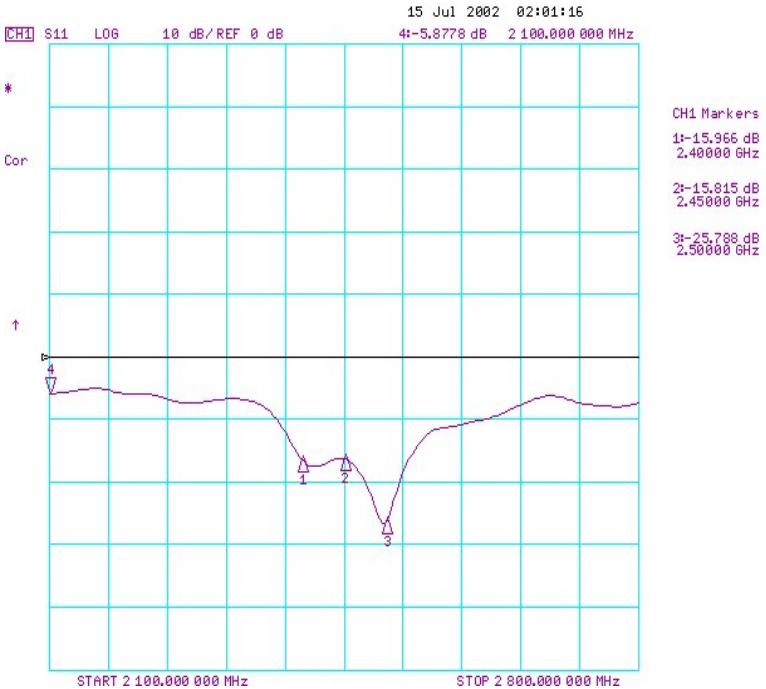
V. Electronic Characteristic of Left Antenna：Test results 9

Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	Power
PIFA	**Wireless LAN**	RIGHT	1.13	700	Off

1.V.S.W.R



2.RETURN LOSS



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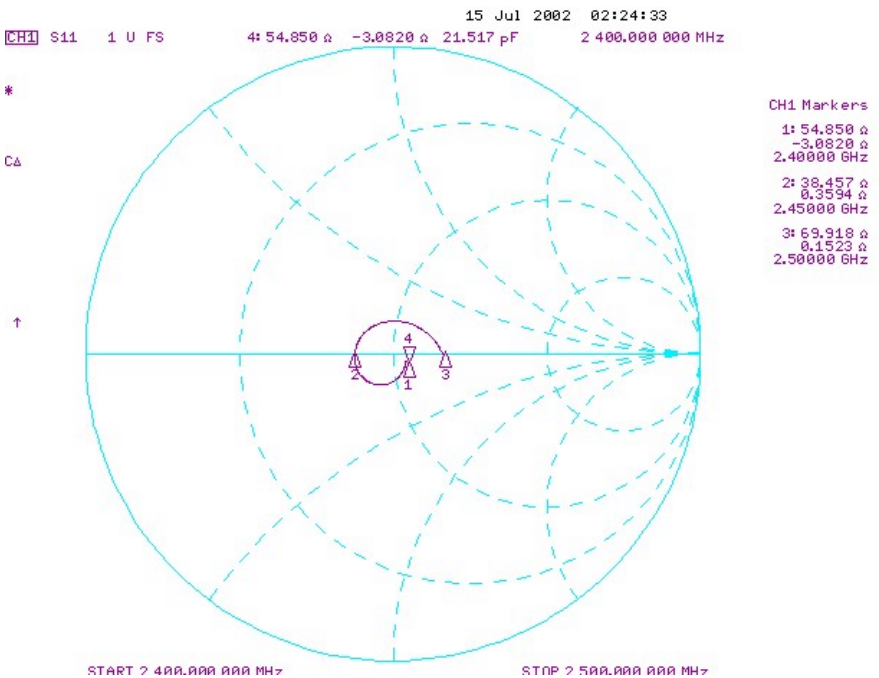
Test results 10

Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	Power
PIFA	**Wireless LAN**	RIGHT	1.13	700	Off

1. SMITH CHART



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VI. Conclusions:

1. **According the results 7,8,9 and 10, the PIFA antenna that on the right or left position has good matching to the 50 ohms.**
2. **According the results 1,2, and 3, the PIFA antenna has enough gain –0.56, -3.82, and –4.11 dBi to achieve the 802.11b standard.**
3. **According the results 4,5, and 6, the PIFA antenna has enough gain –2.97, -3.45, and –3.35 dBi to achieve the Bluetooth standard.**

QUALIFICATION TEST REPORT

Document No. TR-1037

MHF series micro coaxial connector

Product Specification No. PRS-1180

					Prepared by	Reviewed by	Approved by
2	T2020	K.O	MAY/17/'02	K.K	K.Ohbayashi Nov/16/'01	E.Kawabe Nov/20/'01	K.Katabuchi Nov/21/'01
1	T1040	K.O	Dec/25/'01	K.K			
0	T1036	K.O	Nov/16/'01				
REV.	ECN	BY	DATE	APP.			
REVISION RECORD							

Form Rev. 0

DOCUMENT CLASSIFICATION	TITLE	DOCUMENT No.
Qualification Test Report	MHF series micro coaxial connector	TR-1037

1.Purpose

Testing was performed on the MHF series micro coaxial connector to determine meets the requirement of I-PEX specfication,PRS-1180

2.Conclusion

All the specimen met the requirements of PRS-1180.

3.Sample

(1) Connector Plug : part No.20278-111R-13
Receptacle : part No.20279-001E-01

(2) Cable AWG#32 coaxial cable (jacket diameter 1.13mm)

3.Method

Refer to product specfication,PRS-1180

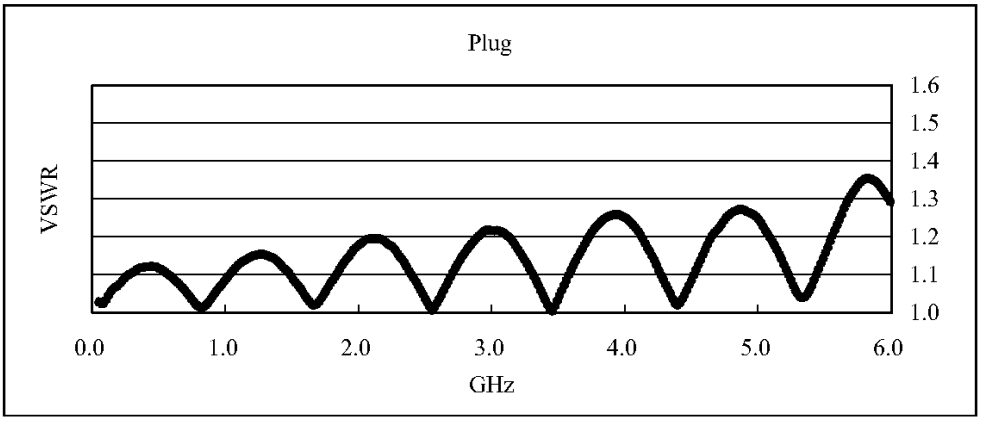
4. Results

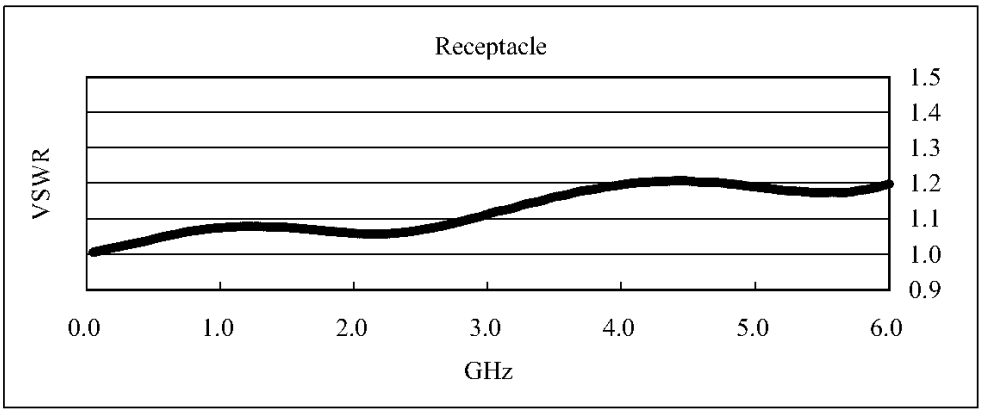
(1) Dielectric withstanding voltage

Results	No abnormality
Sample quantity	10pcs.
Judge	OK

(2) VSWR

	Plug		Receptacle	
	0.1~3GHz	3~6GHz	0.1~3GHz	3~6GHz
AVE.	1.240	1.370	1.120	1.216
MAX.	1.25	1.39	1.13	1.24
MIN.	1.23	1.35	1.11	1.20
Specification	1.3 MAX.	1.5 MAX.	1.3 MAX.	1.4 MAX.
Sample quantity	5pcs.	5pcs.	5pcs.	5pcs.
Judge	OK	OK	OK	OK

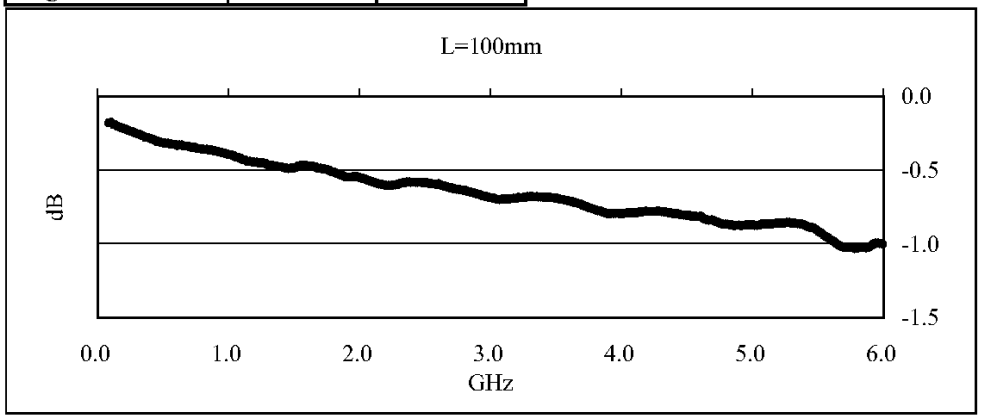




DOCUMENT CLASSIFICATION	TITLE	DOCUMENT No.
Qualification Test Report	MHF series micro coaxial connector	TR-1037

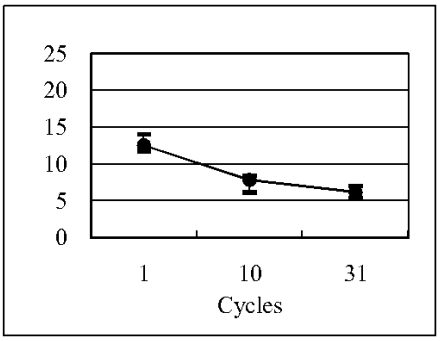
(3) Insertion loss

	Plug cable length 100mm	
	0.1~3GHz	3~6GHz
AVE.	-0.682	-0.990
MAX.	-0.66	-0.96
MIN.	-0.71	-1.02
Specification	-1.0 MIN.	-1.6 MIN.
Sample quantity	5pcs.	5pcs.
Judge	OK	OK

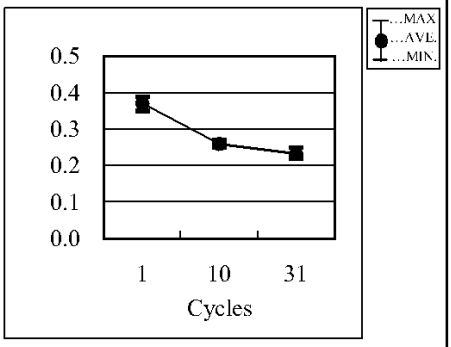


(3) Unmating force(抜去力)

Total unmating force (総合抜去力)	Initial (初期)	After 30cycles (30回後)
AVE.	12.6	6.2
MAX.	14	7
MIN.	12	5
S	0.8	0.6
Specification(規格)	5 MIN.	3 MIN.
Units(単位)	N	N
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK



Unmating force of inner contact (中心導体抜去力)	Initial (初期)	After 30cycles (30回後)
AVE.	0.372	0.233
MAX.	0.39	0.25
MIN.	0.35	0.22
S	0.015	0.012
Specification(規格)	0.15 MIN.	0.1 MIN.
Units(単位)	N	N
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK

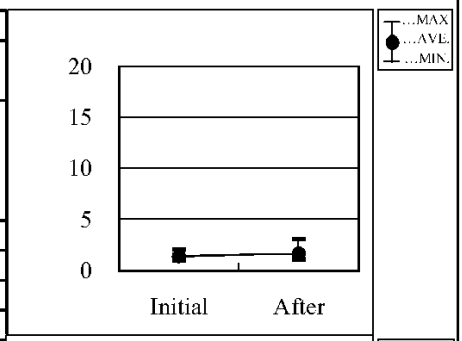


DOCUMENT CLASSIFICATION	TITLE	No.
Qualification Test Report テストレポート	MHF series micro coaxial connector	TR-1037

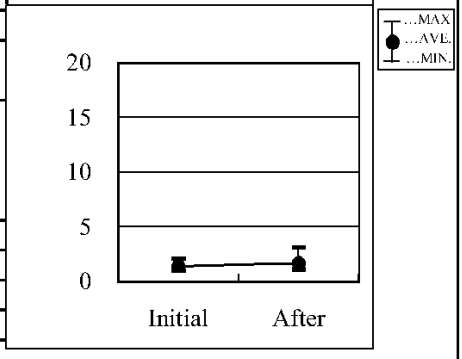
(4) Durability(耐久性)

Appearance(外観) : No abnormality(異常無し)

Contact resistance of inner contact (中心導体接触抵抗)	Initial (初期)	After testing (試験後)
AVE.	1.41	1.70
MAX.	2.1	3.1
MIN.	1.0	1.1
S	0.37	0.58
Specification(規格)	20 MAX.	25 MAX.
Units(単位)	mille-ohm	mille-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK



Contact resistance of ground contact (外部導体接触抵抗)	Initial (初期)	After testing (試験後)
AVE.	1.49	2.51
MAX.	1.8	3.0
MIN.	0.9	1.3
S	0.30	0.59
Specification(規格)	10 MAX.	15 MAX.
Units(単位)	mille-ohm	mille-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK

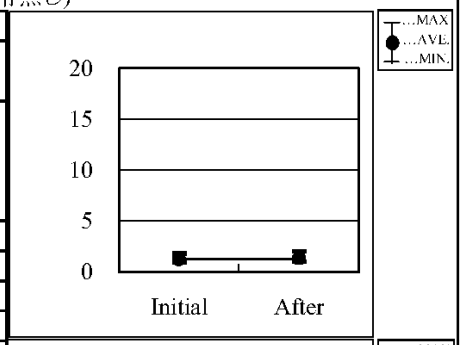


(5) Cable retention force(ケーブル保持力)

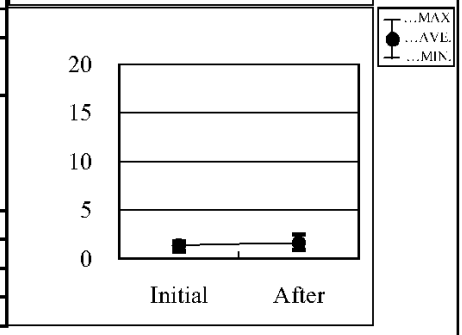
Appearance(外観) : No abnormality(異常無し)

Electrical discontinuity(電気瞬断) : No abnormality(異常無し)

Contact resistance of inner contact (中心導体接触抵抗)	Initial (初期)	After testing (試験後)
AVE.	1.23	1.35
MAX.	1.8	2.0
MIN.	0.9	1.0
S	0.35	0.37
Specification(規格)	20 MAX.	25 MAX.
Units(単位)	mille-ohm	mille-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK



Contact resistance of ground contact (外部導体接触抵抗)	Initial (初期)	After testing (試験後)
AVE.	1.41	1.69
MAX.	1.8	2.5
MIN.	0.8	0.9
S	0.35	0.46
Specification(規格)	10 MAX.	15 MAX.
Units(単位)	mille-ohm	mille-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK



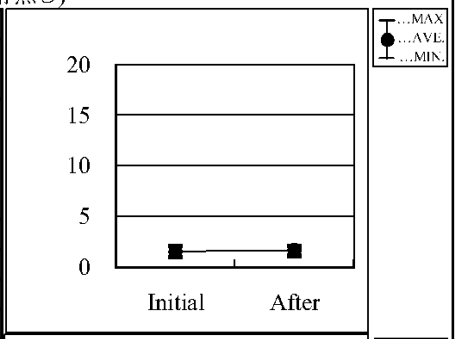
DOCUMENT CLASSIFICATION	TITLE	No.
Qualification Test Report テストレポート	MHF series micro coaxial connector	TR-1037

(6) Vibration(振動)

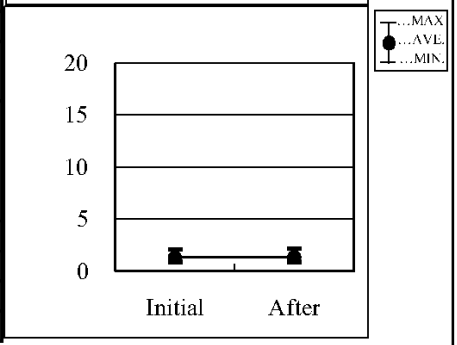
Appearance(外観) : No abnormality(異常無し)

Electrical discontinuity(電気瞬断) : No abnormality(異常無し)

Contact resistance of inner contact (中心導体接触抵抗)	Initial (初期)	After testing (試験後)
AVE.	1.55	1.72
MAX.	2.1	2.1
MIN.	1.0	1.1
S	0.44	0.46
Specification(規格)	20 MAX.	25 MAX.
Units(単位)	mille-ohm	mille-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK



Contact resistance of ground contact (外部導体接触抵抗)	Initial (初期)	After testing (試験後)
AVE.	1.35	1.39
MAX.	2.1	2.2
MIN.	0.9	0.9
S	0.41	0.46
Specification(規格)	10 MAX.	15 MAX.
Units(単位)	mille-ohm	mille-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK

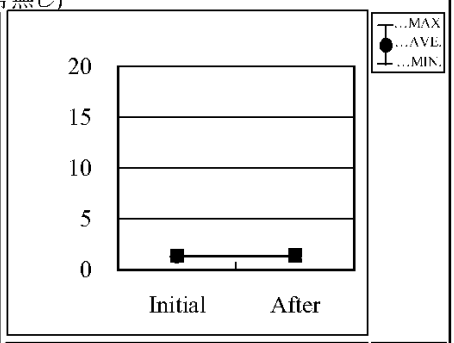


(7) Shock(衝撃)

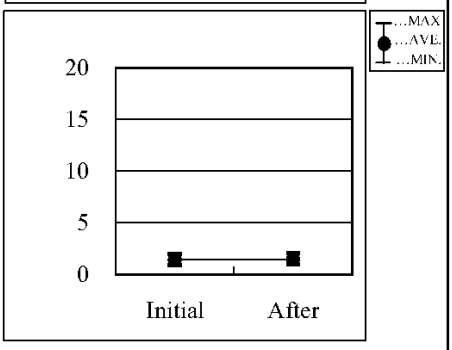
Appearance(外観) : No abnormality(異常無し)

Electrical discontinuity(電気瞬断) : No abnormality(異常無し)

Contact resistance of inner contact (中心導体接触抵抗)	Initial (初期)	After testing (試験後)
AVE.	1.32	1.45
MAX.	1.8	1.9
MIN.	0.9	0.9
S	0.30	0.35
Specification(規格)	20 MAX.	25 MAX.
Units(単位)	mille-ohm	mille-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK



Contact resistance of ground contact (外部導体接触抵抗)	Initial (初期)	After testing (試験後)
AVE.	1.45	1.53
MAX.	2.0	2.1
MIN.	0.9	1.0
S	0.34	0.37
Specification(規格)	10 MAX.	15 MAX.
Units(単位)	mille-ohm	mille-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK

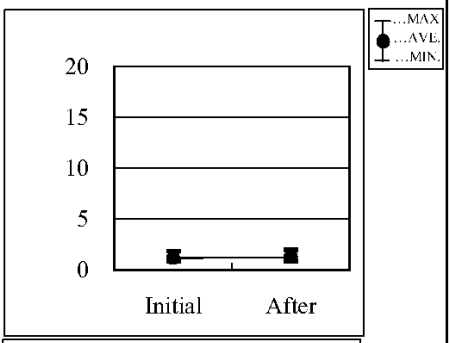


DOCUMENT CLASSIFICATION	TITLE	No.
Qualification Test Report テストレポート	MHF series micro coaxial connector	TR-1037

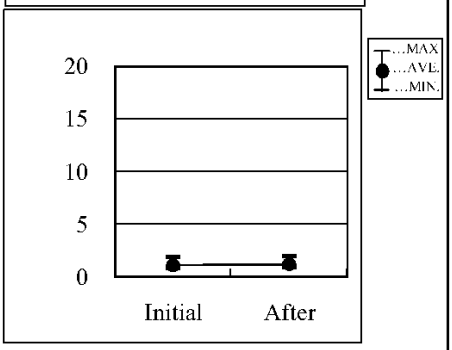
(8) Thermal shock(熱衝撃)

Appearance(外観) : No abnormality(異常無し)

Contact resistance of inner contact (中心導体接触抵抗)	Initial (初期)	After testing (試験後)
AVE.	1.23	1.34
MAX.	1.9	2.0
MIN.	0.9	0.9
S	0.25	0.32
Specification(規格)	20 MAX.	25 MAX.
Units(単位)	mille-ohm	mille-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK



Contact resistance of ground contact (外部導体接触抵抗)	Initial (初期)	After testing (試験後)
AVE.	1.13	1.24
MAX.	1.9	2.0
MIN.	0.9	0.9
S	0.37	0.38
Specification(規格)	10 MAX.	15 MAX.
Units(単位)	mille-ohm	mille-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK



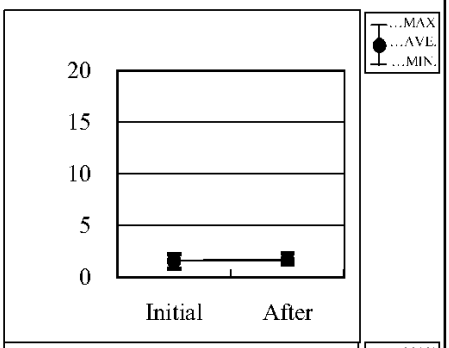
Insulation resistance (絶縁抵抗)	Initial (初期)	After testing (試験後)
Results(結果) MIN. value	10,000	10,000
Specification(規格)	500 MIN.	100 MIN.
Units(単位)	mega-ohm	mega-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK

DOCUMENT CLASSIFICATION	TITLE	No.
Qualification Test Report テストレポート	MHF series micro coaxial connector	TR-1037

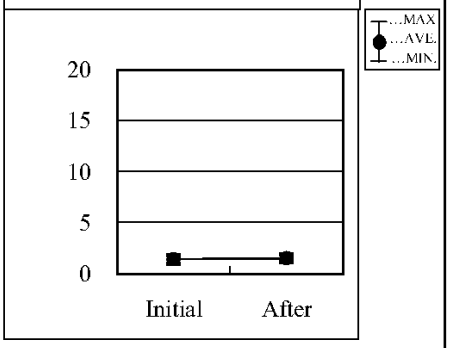
(9) Humidity(湿度)

Appearance(外観) : No abnormality(異常無し)

Contact resistance of inner contact (中心導体接触抵抗)	Initial (初期)	After testing (試験後)
AVE.	1.58	1.72
MAX.	2.2	2.3
MIN.	0.8	1.2
S	0.45	0.51
Specification(規格)	20 MAX.	25 MAX.
Units(単位)	mille-ohm	mille-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK



Contact resistance of ground contact (外部導体接触抵抗)	Initial (初期)	After testing (試験後)
AVE.	1.44	1.55
MAX.	1.8	1.9
MIN.	1.0	1.2
S	0.25	0.25
Specification(規格)	10 MAX.	15 MAX.
Units(単位)	mille-ohm	mille-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK



Insulation resistance (絶縁抵抗)	Initial (初期)	After testing (試験後)
Results(結果) MIN. value	10,000	10,000
Specification(規格)	500 MIN.	100 MIN.
Units(単位)	mega-ohm	mega-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK

(10) Salt water spray (塩水噴霧)

	Initial(初期)	After testing(試験後)
Results(結果)	No abnormality(異常無し)	No abnormality(異常無し)
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK

(11) Solderability , reflow solderimg resistance(半田付け性 , 半田耐熱性)

	Solderability(半田付け性)	Reflow solderimg resistance(半田耐熱性)
Results(結果)	No abnormality(異常無し)	No abnormality(異常無し)
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK

Heat Shrink Tube Sumitube F32

1. SCOPE

THIS SPECIFICATION COVERS NEW **SUMITUBE F32** .

2. FEATURE

NEW **SUMITUBE F32** IS AN IRRADIATED CROSSLINKED , THERMALLY-STABILIZED , FLAME-RETARDANT FLEXIBLE POLYOLEFIN HEAT SHRINKABLE TUBING .
UNLIKE OTHER TYPICAL FLAME-RETARDANT TUBING , NEW **SUMITUBE F32** IS FREE OF POLYBROMINATED BIPHENYL OXIDES (PBBOs) , POLYBROMINATED BIPHENYL ETHERS (PBBEs) , POLYBROMINATED BIPHENYLS (PBBs) AS FLAME-RETARDED CHEMICALS .

3. RECOGNITION

NEW **SUMITUBE F32** IS UL-RECOGNIZED AND CSA-CERTIFIED AT 125 DEG. C , 600 V WITH UL VW-1 AND CSA OFT FLAME-RETARDANCY RATING .

	UL 224	CSA
VALTAGE RATING	600V	600V
TEMPERATURE RATING	125 DEG. C	125 DEG. C
CATALO NO.	**SUMITUBE F32**	**SUMITUBE F32**
FILE NO.	E-48762	LR84766

4. COLOR

STANDARDS COLORS ; BLACK , WHITE , BROWN , RED , ORANGE , BLUE , GREEN , YELLOW , VIOLET , GRAY .

5. MARKING

FOLLOWING LETTERS SHOULD BE PRINTED ON THE SURFACE OF THE PRODUCTS
.SU VW-1 SUMI-PAC CSA HS X PO TUBING SUMITUBE F32 125 C OFT -F- (Size) SP

6. STANDARD SIZES

STANDARD SIZES SHALL BE SPECIFIED IN TABLE

7. PROPERTIES.

PROPERTIES SHALL BE AS SPECIFIED WITH TABLE

8. METOD OF MEASURING SIZES AND TESTING PROPERTIES

1.) INSIDE DIAMETER

INSIDE DIAMETER SHALL BE MEASURED BY A METAL GAGE ROD OR A METAL TAPE GAGE WHICH HAS INTERVAL OR GRADUATION .

欣格科技股份有限公司 **Antenniques Co.,Ltd**

台北縣樹林市柑園街二段 122 巷 6 號 5 樓 TEL：02-2668-5793 FAX：02-2668-5795

5F,No.6,Laine 122, Sec 2,Ganyun St, Shulin Chulin City,Taipei Hsien,238 Taiwan R.O.C.

E-mail：anten.niques@msa.hinet.net 網 站：www.antenniques.com.tw

Heat Shrink Tube Sumitube F32

IN CASE OF USING A GAGE ROD : READ THE VALUE OF THE MAXIMUM GAGE ROD WHICH SHALL PASS FREELY INTO THE TUBING WITHOUT EXPANDING THE TUBING .

IN CASE OF USING A TAPER GAGE : READ THE VALUE ON THE GAGE WHEN THE TUBING ISN'T EXPANDED BY INSERTION AND THERE IS NO VISIBLE SPACE BETWEEN THE TUBING AND THE TAPER GAGE .

2.) WALL THICKNESS
WALL THICKNESS SHALL BE MEASURED BY A PIN-DIAL GAGE OR A MICROMETER AT SEVERAL POINTS .

3.) SHRINKABLE CONDITION AND LONGITUDINAL CHANGE
SHRINKABLE CONDITION : UNRESTRICTED SHRINKAGE SHALL BE PLACED AT 150 DEG. C IN A CICULATING AIR OVEN FOR 5 MINUTES .

LONGITUDINAL SHRINKAGE : THE TUBING SHALL BE CUT IN ABOUT 100 MM AND MEASURED THE LENGTH . AFTER UNRESTRICTED SHRINKAGE (AFTER RECOVERED) , THE LENGTH IS TO BE RE-MEASURED AND THE LONGITUDINAL SHRINKAGE SHALL BE CALCULATED FROM THE FOLLOWING FORMULA .

$$\text{LONGITUDINAL CHANGE} = \frac{\text{LENGTH AS SUPPLIED} - \text{LENGTH AFTER RECOVERED}}{\text{LENGTH AS SUPPLIED}} * 100\ \%$$

4.) PROPERTIES SHALL BE TESTED IN ACCORDANCE WITH UL224 & CSA 22.2 NO. 198 TEST METHOD

欣格科技股份有限公司 **Antenniques Co.,Ltd**

台北縣樹林市柑園街二段 122 巷 6 號 5 樓 TEL：02-2668-5793 FAX：02-2668-5795

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E-mail：anten.niques@msa.hinet.net 網 站：www.antenniques.com.tw

Heat Shrink Tube

Canadian Standards Association
Association canadienne de normalisation

CERTIFICATION RECORD

The company named below has been authorized by Canadian Standards Association to represent the products listed in this record as "CSA Certified" and to affix the CSA Mark · · to these products according to the terms and conditions of the CSA Service Agreement.

NUMBR 084766X0000 March 26, 1994(Replaces:July 10, 1990)

CLASS 9032 01 (Re-examination Service)

SUMI-PAC ELECTRO-CHEMICAL CORP. 84766
4th Fl., Pacific Commercial Bldg.
285, Chung Hsiao E. Rd., Sec 4
Taipei, Taiwan
FACTORY
No 15, Industrial 5th Rd.
Hsin-Chu, Enlarged Industrial Park
6th Lin, Feng-Shan Chun
Hukao Hsiang, Hsin-Chu Hsin
Taiwan

INSULATING DEVICES AND MATERIALS - Insulating Tubing and Sleeving

- Max temperature rating: 125C
- Max voltage rating: 600V
- "SUMITUBE F2" and "SUMITUBE F32", flexible heat-shrinkable irradiated cross-linked polyolefin tubing (Class I), in trade sizes 3/64 in to 1 in and 1.0mm to 26mm, OFT.
- Max temperature rating: 125C.
- Max voltage rating: 150V.
- "SUMITUBE F4", flexible heat-shrinkable irradiated cross-linked polyolefin tubing (Class I), in trade sizes 3/64 in to 1 in and 1.0mm to 26mm, OFT.

Note: Above tubing approved in all colours except clear and transparent.

* * * * * * * * * *

欣格科技股份有限公司 **Antenniques Co.,Ltd**

台北縣樹林市柑園街二段 122 巷 6 號 5 樓 TEL：02-2668-5793 FAX：02-2668-5795

5F,No.6,Laine 122, Sec 2,Ganyun St, Shulin Chulin City,Taipei Hsien,238 Taiwan R.O.C.

E-mail：anten.niques@msa.hinet.net 網 站：www.antenniques.com.tw

Heat Shrink Tube

YDPU2 November 4, 1994
Component – Extruded Tubing, Electrical

SUMITOMO ELECTRIC INDUSTRIES LTD
IRRADIATED PRODUCTS DIV

E48762 (S)
(C–cont. from B card)

Irradiated flexible heat shrinkable polyolefin.

Sumitube F32	600	125	I	+	—	Yes
826 or Sumitube B2	600	125	I	+	—	Yes
Sumitube F5	600	125	I	+	—	Yes
939 or Sumitube F(Z)	600	105	I or IIe	+	—	Yes
940 or Sumitube F2(Z)	600	125	I	+	—	Yes
942 or Sumitube F4(Z)	300	125	I	+	—	Yes
958 or SM12	600	125	I	+	—	Yes
963 or SM23	600	125	I	+	—	Yes
938 or Sumitube F(TZ)	600	105	II	+	—	Yes

Report: February 16, 1973.

Replaces E48762C dated July 20, 1994.

(Cont. on D card)

390139001 N3228 **Underwriters Laboratories Inc.®** DII/0010143

欣格科技股份有限公司 Antenniques Co.,Ltd

台北縣樹林市柑園街二段 122 巷 6 號 5 樓 TEL：02-2668-5793 FAX：02-2668-5795

5F,No.6,Laine 122, Sec 2,Ganyun St, Shulin Chulin City,Taipei Hsien,238 Taiwan R.O.C.

E-mail：anten.niques@msa.hinet.net 網 站：www.antenniques.com.tw

Heat Shrink Tube Sumitube F32

ABS Characteristics

POLYLAC®

特性 Typical Properties	試驗法 ASTM Test	單位 Units	一般級 (General Purpose) PA-707	PA-757	PA-717C	PA-727	PA-747	PA-709
引張強度 Tensile Strength	D-638	kg/cm² (lb/in²)	500 (7,090)	480 (6,800)	450 (6,380)	485 (6,870)	385 (5,470)	400 (5,670)
延伸率 Tensile Elongation	D-638	%	15	20	25	20	30	40
彎曲彈性率 Flexural Modulus	D-790	10^4 kg/cm² (10^4 lb/in²)	2.9 (4.1)	2.7 (3.8)	2.5 (3.5)	2.7 (3.8)	2.2 (3.1)	2.3 (3.2)
彎曲強度 Flexural Strength	D-790	kg/cm² (lb/in²)	860 (12,200)	790 (11,200)	720 (10,200)	780 (11,000)	620 (8,800)	640 (9,070)
洛氏硬度 Rockwell-Hardness	D-785		R-116	R-116	R-115	R-110	R-108	R-102
IZOD 衝擊強度 IZOD Impact Strength (Notched)	D-256	1/8" kg-cm/cm (ft-lb/in)	14 (2.6)	20 (3.7)	28 (5.2)	26 (4.8)	41 (7.5)	45 (8.4)
		1/4" kg-cm/cm (ft-lb/in)	14 (2.6)	18 (3.3)	25 (4.6)	23 (4.2)	36 (6.6)	40 (7.4)
軟化點 Vicat Softening Temp.	D-1525	°C (°F)	105 (221)	105 (221)	104 (219)	105 (221)	103 (217)	105 (221)
熱變形溫度 Heat Distortion Temp.	D-648 (annealed) (unannealed)	°C (°F)	99(210) 88(190)	99(210) 88(190)	98(208) 87(189)	99(210) 87(190)	99(207) 86(187)	99(208) 88(190)
比重 Specific Gravity	D-792	23/23 °C	1.06	1.05	1.04	1.04	1.03	1.03
流動係數 Melt Flow Index	D-1238	200 °C × 5kg g/10min (Cond.G)	1.9	1.8	1.4	1.8	1.2	0.5
	ISO-1133*	220 °C × 10kg g/10min	20	22	14	19	13	5
燃燒率 Flammability		File No. E56070 UL & C-UL	1/16"HB	1/16"HB	1/16"HB	1/16"HB	1/16"HB	1/16"HB
產品特性 Product Description			高光澤性 高剛性 High Gloss High Rigid	高剛性 高光澤性 High Gloss Medium Impact	一般射出成型用 Medium Impact	電鍍級 Electro-Plating	超高強度 射出成型用 High Impact	超高衝擊強度 押管用 Super Impact

以上數據係依照ASTM試驗方法於本公司實驗室所測得，僅供參考用。*ISO 試驗方法

欣格科技股份有限公司 Antenniques Co.,Ltd

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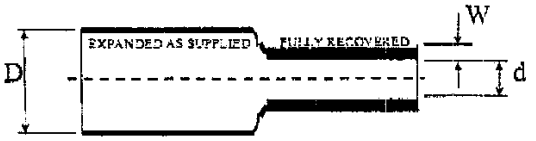
Heat Shrink Tube

TABLE 1. STANDARD SIZE



TRADE SIZE (METRIC)	AS SUPPLIED (MM)		AFTER RECOVERED (MM)		STANDARDS LENGTH	
	INSIDE DIAMETER D	NOM. WALL THICKNESS	INSIDE DIAMETER d (MAX)	WALL THICKNESS W (MIN)	CUT(M)	SPOOL(M)
1*0.2	1.30±0.30	0.2	0.50	0.33	1	200
1.5*0.2	2.00±0.30	0.2	0.75	0.36	1	200
2*0.2	2.50±0.30	0.2	1.00	0.44	1	200
2.5*0.25	3.00±0.30	0.25	1.25	0.44	1	200
3*0.25	3.50±0.30	0.25	1.50	0.44	1	200
3.5*0.25	4.00±0.30	0.25	1.75	0.44	1	200
4*0.25	4.50±0.30	0.25	2.00	0.44	1	200
5*0.25	5.40±0.30	0.25	2.50	0.56	1	100
6*0.25	6.40±0.40	0.25	3.00	0.56	1	100
7*0.25	7.40±0.40	0.25	3.50	0.56	1	50
8*0.25	8.40±0.40	0.25	4.00	0.56	1	50
9*0.25	9.40±0.40	0.25	4.50	0.56	1	50
10*0.25	10.4±0.40	0.25	5.00	0.56	1	50
11*0.25	11.4±0.40	0.25	5.50	0.56	1	50
12*0.25	12.4±0.40	0.25	6.00	0.56	1	50
13*0.30	13.4±0.40	0.30	6.50	0.69	1	50
14*0.30	14.5±0.40	0.30	7.00	0.69	1	50
15*0.30	15.5±0.40	0.30	7.50	0.69	1	50
16*0.30	16.8±0.50	0.30	8.00	0.69	1	50
18*0.35	18.7±0.50	0.35	9.00	0.77	1	50
20*0.35	21.2±0.60	0.35	10.00	0.77	1	50
22*0.40	23.2±0.60	0.40	11.00	0.77	1	50
25*0.40	26.1±0.80	0.40	12.50	0.87	1	50
28*0.50	29.0±1.00	0.50	14.00	0.87	1	50
30*0.50	32.0±1.00	0.50	15.00	0.87	1	50

*LONGITUDINAL CHANGE :(5±5)%

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