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APPROVAL SHEET

CUSTOMER: TATUNG CORP LTD;

FILE NO . :

DESCRIPTION : PIFA Antenna

經理 Manager	品保 Q C	工 程 師 Engineer

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

CUSTOMER P/N :

DATE : 中華民國 92年 07 月 28 日

Customer Approval

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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

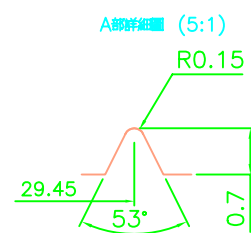
FAX : 02-2668-5795

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



1.未標註之圓角皆為 R0.5

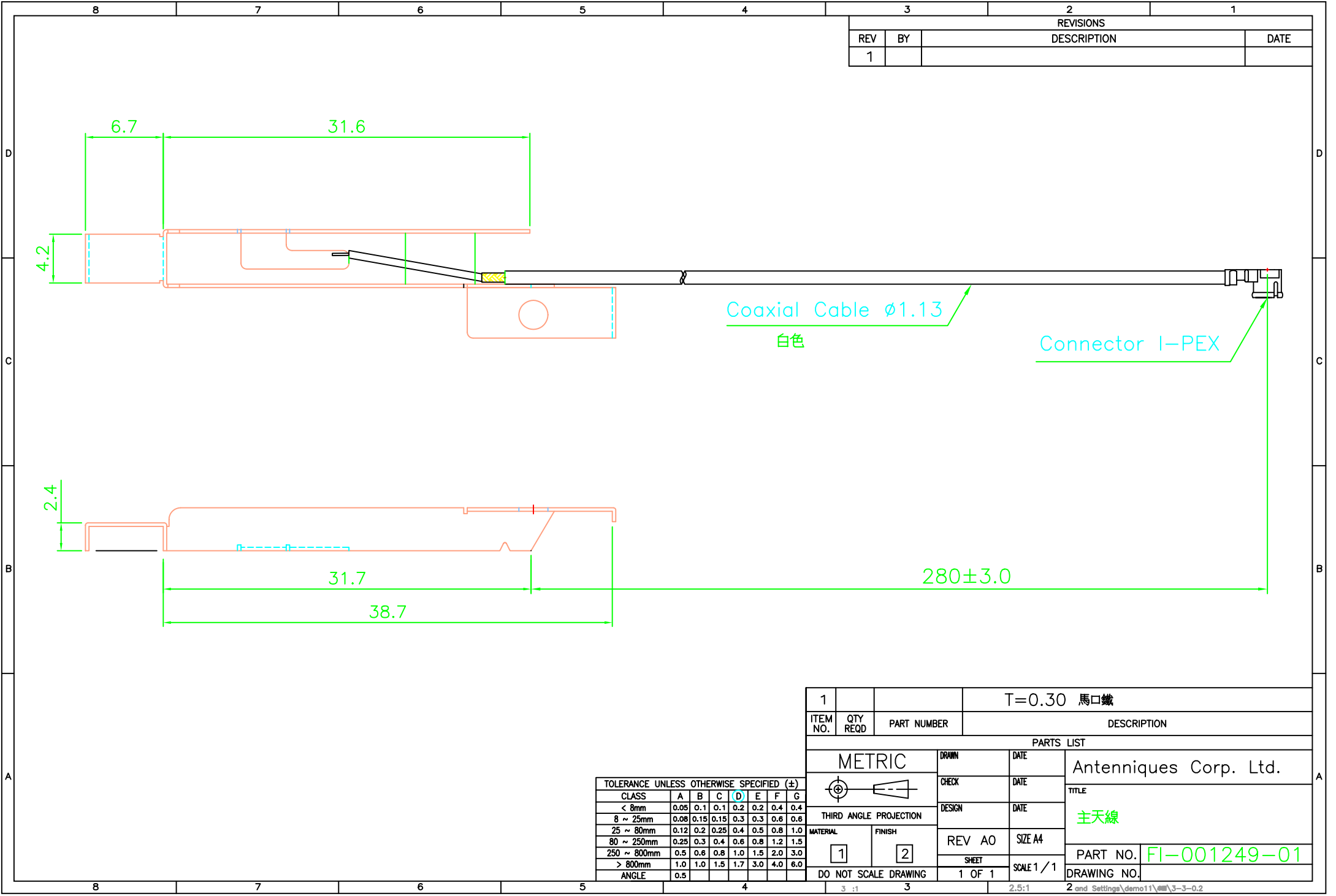
TOLERANCE UNLESS OTHERWISE SPECIFIED (±)						
CLASS	A	B	C	D	E	F
< 8mm	0.05	0.1	0.1	0.2	0.2	0.4
8 ~ 25mm	0.08	0.15	0.15	0.3	0.3	0.6
25 ~ 80mm	0.12	0.2	0.25	0.4	0.5	0.8
80 ~ 250mm	0.25	0.3	0.4	0.6	0.8	1.2
250 ~ 800mm	0.5	0.6	0.8	1.0	1.5	2.0
> 800mm	1.0	1.0	1.5	1.7	3.0	4.0
ANGLE	0.5					

1			T=0.30 馬口鐵	
ITEM NO.	QTY REQD	PART NUMBER	DESCRIPTION	
PARTS LIST				
METRIC		DIMEN	DATE	Antenniques Corp. Ltd.
		CHECK	DATE	
		DESIGN	DATE	
		TITLE		
THIRD ANGLE PROJECTION				
MATERIAL	FINISH	REV AO	SIZE M	
1	2			PART NO.
DO NOT SCALE DRAWING		SHEET 1 OF 1	SCALE 1/1	DRAWING NO.

3	1
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2.5:1

2 and Settings\demo11\gui\3-3-0.2



REVISIONS			
REV	BY	DESCRIPTION	DATE
1			

Coaxial Cable ø1.13
白色

Connector I-PEX

1			T=0.30 馬口鐵
ITEM NO.	QTY REQD	PART NUMBER	DESCRIPTION
PARTS LIST			
METRIC		DRAWN	DATE
THIRD ANGLE PROJECTION		CHECK	DATE
DESIGN		DATE	
REV A0		SIZE A4	
SHEET		SCALE 1/1	
DO NOT SCALE DRAWING		1 OF 1	

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							

Antenniques Corp. Ltd.

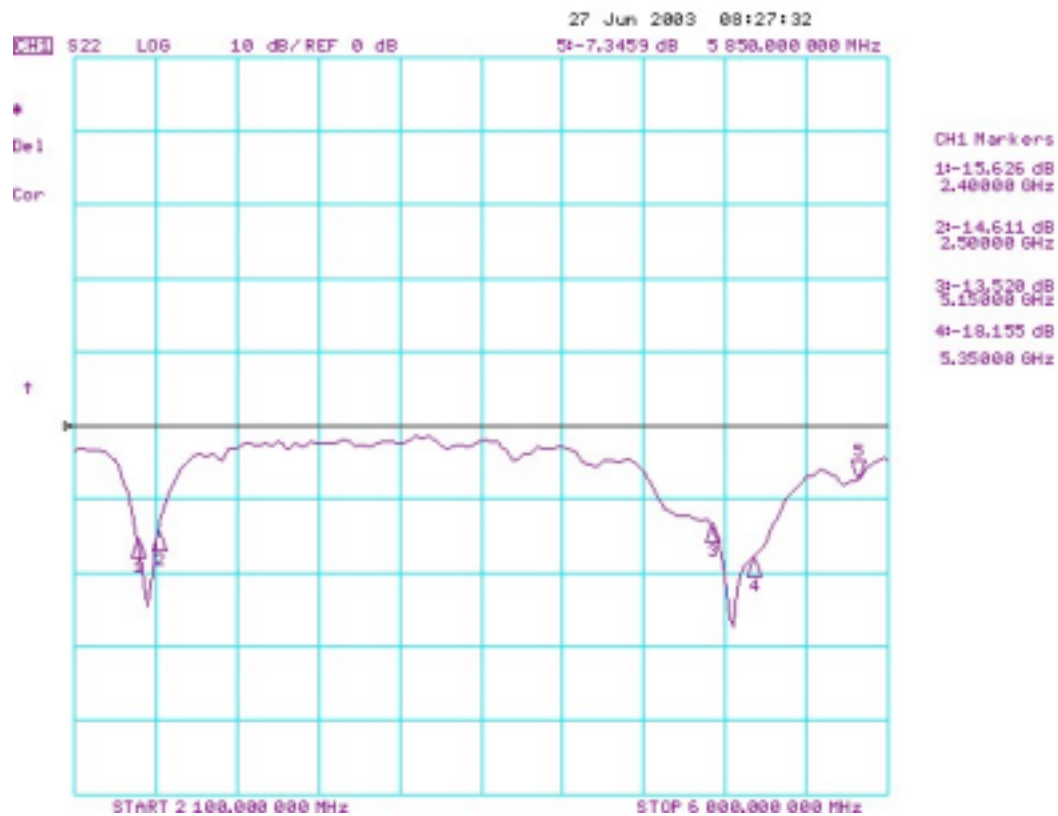
TITLE

主天線

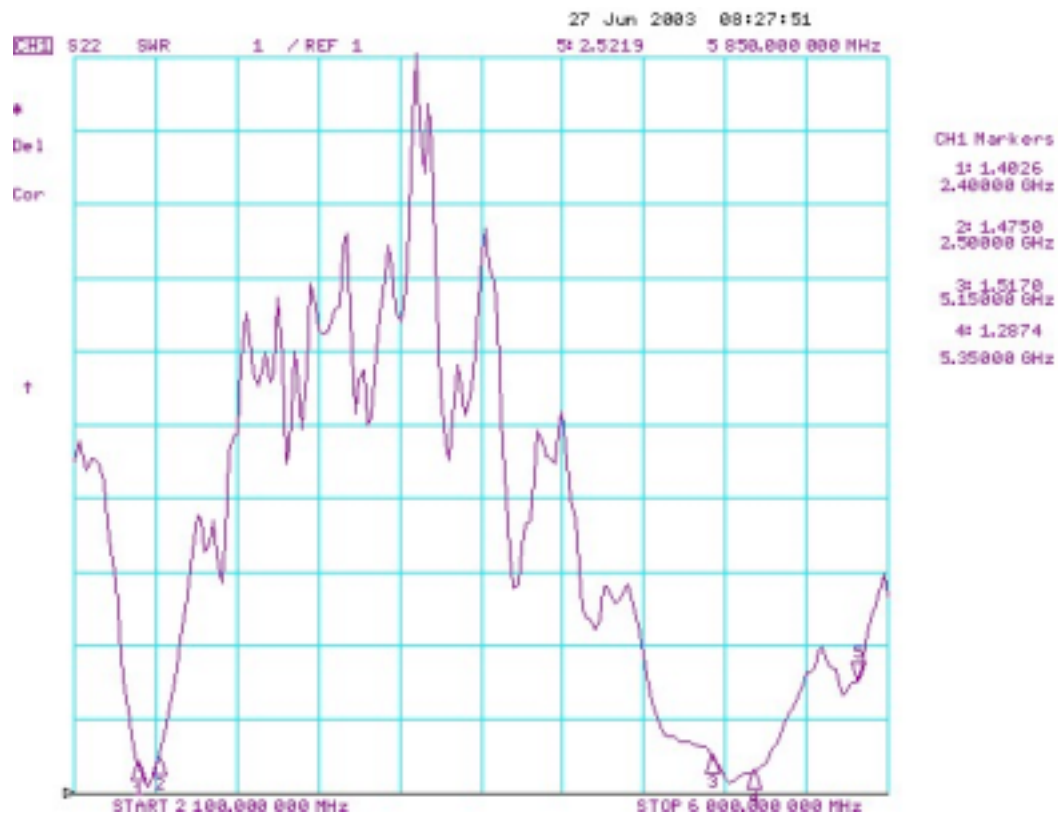
PART NO. FI-001249-01

DRAWING NO.

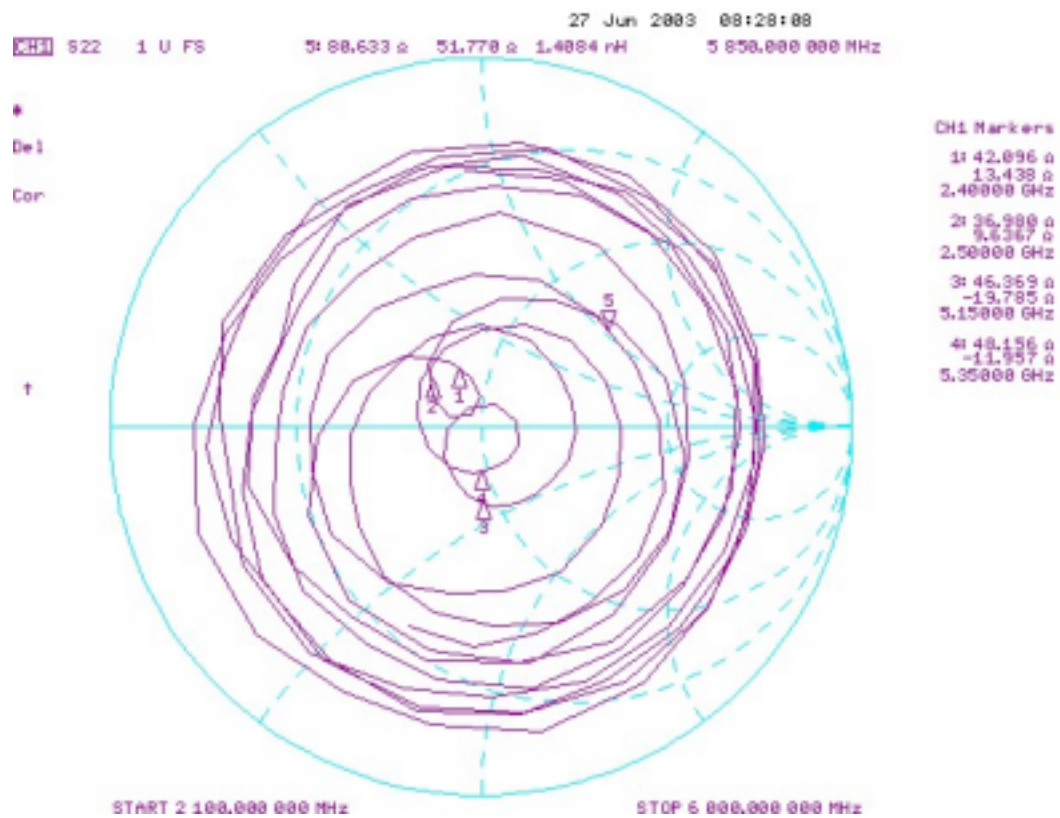
MAIN ANTENNA RETURN LOSS



V.S.W.R



SMITH CHART





Antenniques Co., Ltd.

5f, No. 6, Lane 122, Sec 2, Ganyuan St., Shulin City,
Taipei, 238 Taiwan, R.O.C.

Tel: 886-2-26685793 Fax: 886-2-26685795

PIFA

Antenna Test Report

2002/7/25

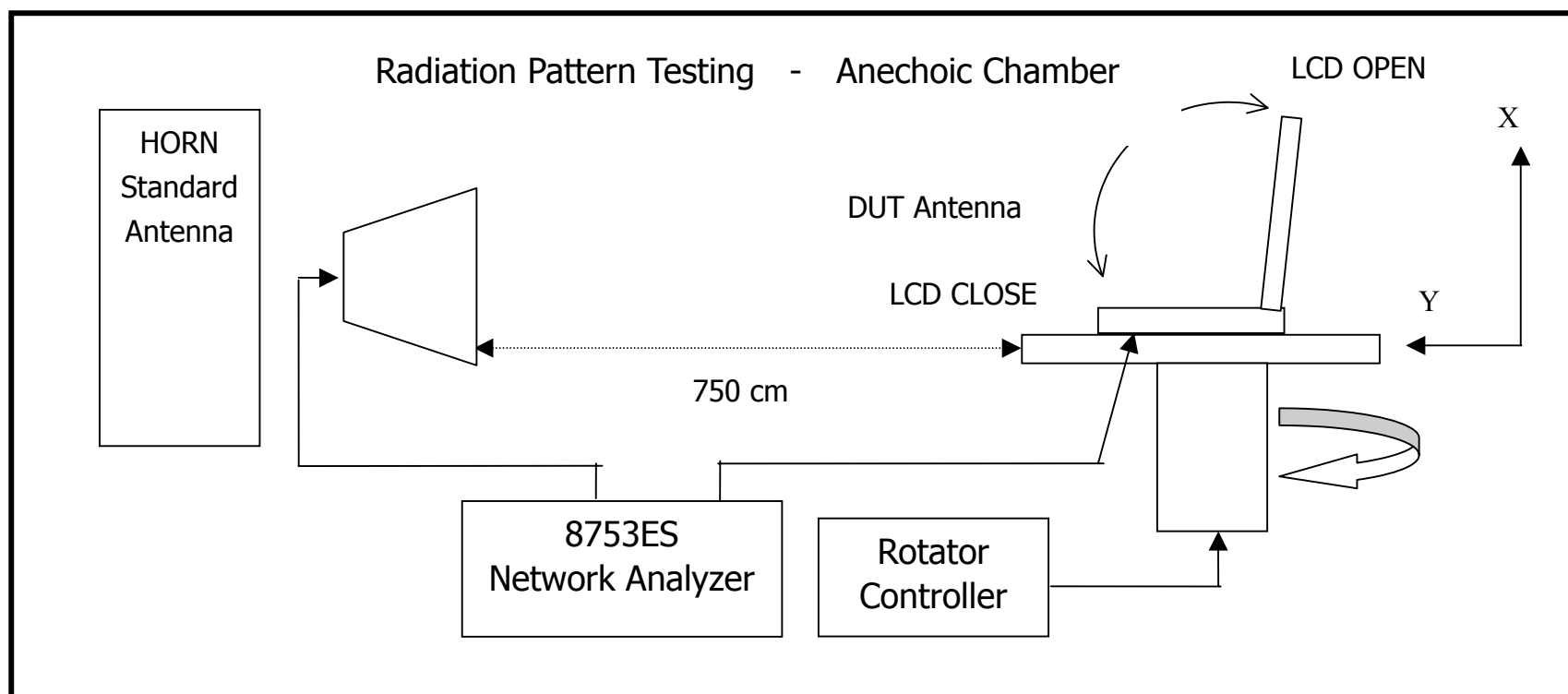
1

Antenniques 2002 Antenniques 2002



I. 802.11 and BLUETOOTH Antenna Testing Conditions:

1. Testing set up:





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 anechoic chamber space absorption.

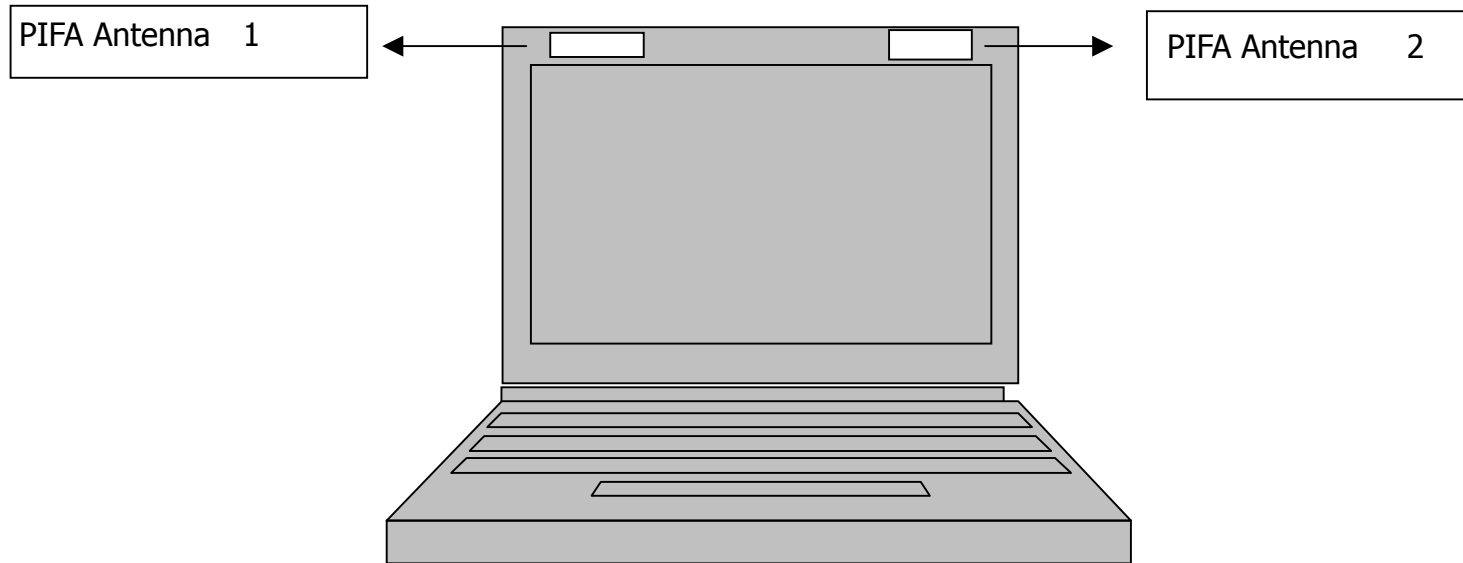
(2). Testing concept:

- (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)



3. Mechanical dimensions



4. Judge Conditions:

802.11 : Peak Gain $\leq$ 3dBi , Average Gain more larger is better ◦

BLUETOOTH : Average Gain $\geq$ -5dBi



II. Gain Pattern of Left Antenna : Test results 1

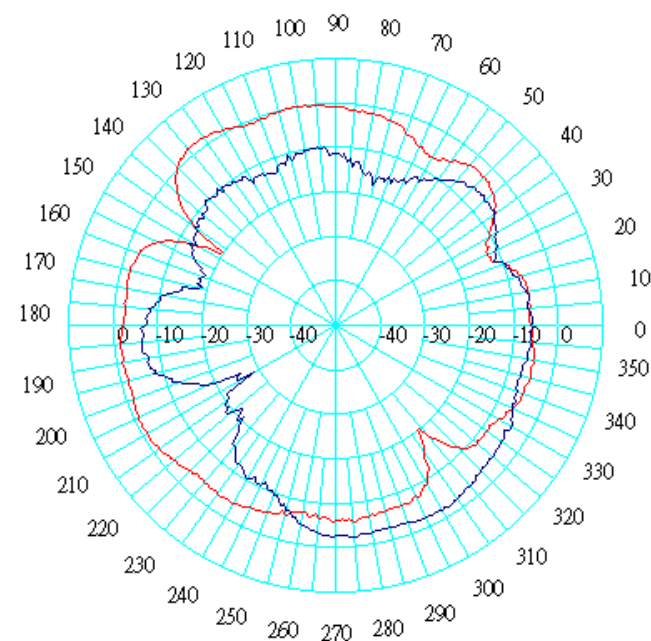
Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	NB Power
<u>PIFA</u>	Wireless LAN	LEFT	1.13	700	Off

1. Peak Gain and Average Gain

Antenna	Gain of XY Plane(Azimuth)-open		
	Frequency		2.45
<u>1</u>	H	Peak	1.12389
		Average	-4.5998
<u>1</u>	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





Test results 2

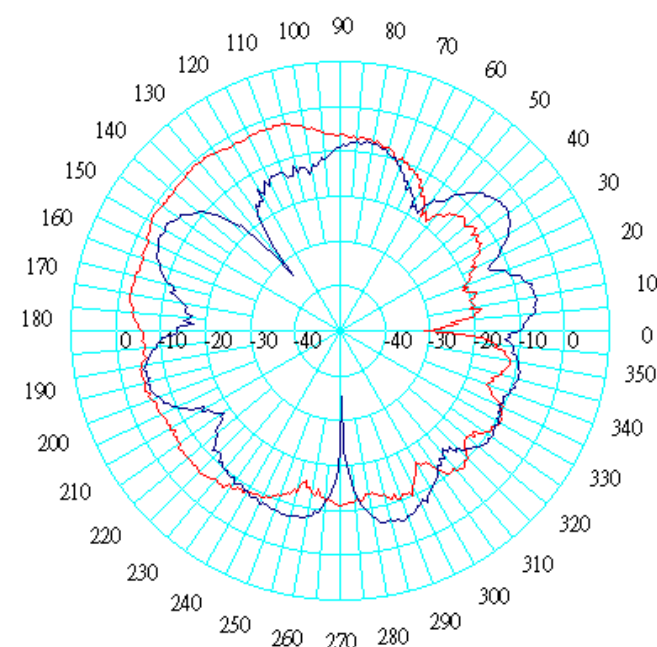
Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	NB Power
<u>PIFA</u>	Wireless LAN	LEFT	1.13	700	Off

1. Peak Gain and Average Gain

Antenna	Gain of XY Plane(Azimuth)-close-face up		
	Frequency		2.45
<u>1</u>	H	Peak	-3.959
		Average	-5.6045
<u>1</u>	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





Test results 3

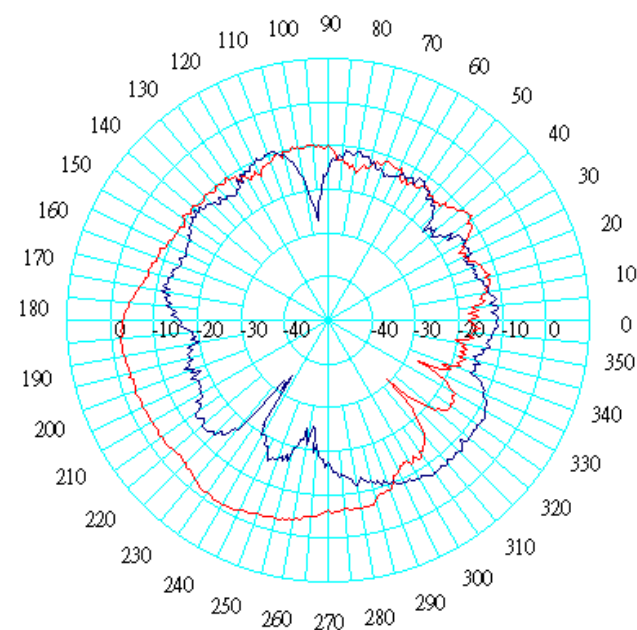
Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	NB Power
<u>PIFA</u>	Wireless LAN	LEFT	1.13	700	Off

1. Peak Gain and Average Gain

Antenna	Gain of XY Plane(Azimuth)-close-downm		
	Frequency		2.45
<u>1</u>	H	Peak	-0.318
		Average	-6.0294
<u>1</u>	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





III. Gain Pattern of Right Antenna : Test results 4

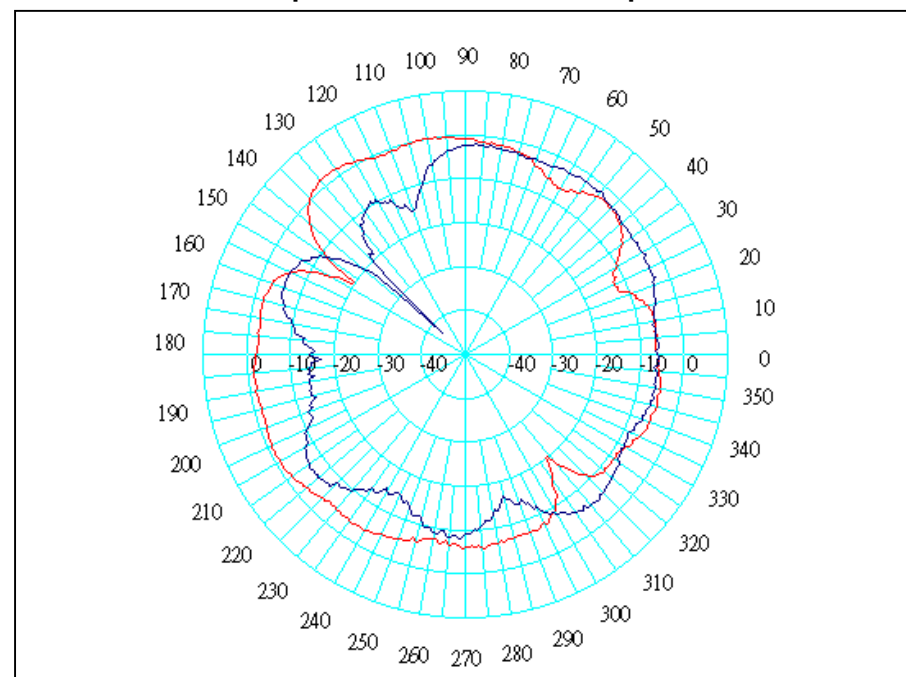
Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	NB Power
<u>PIFA</u>	Bluetooth	RIGHT	1.13	700	Off

1. Peak Gain and Average Gain

Antenna	Gain of XY Plane(Azimuth)-open		
	Frequency		2.45
<u>2</u>	H	Peak	1.0045
		Average	-3.5998
<u>2</u>	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





Test results 5

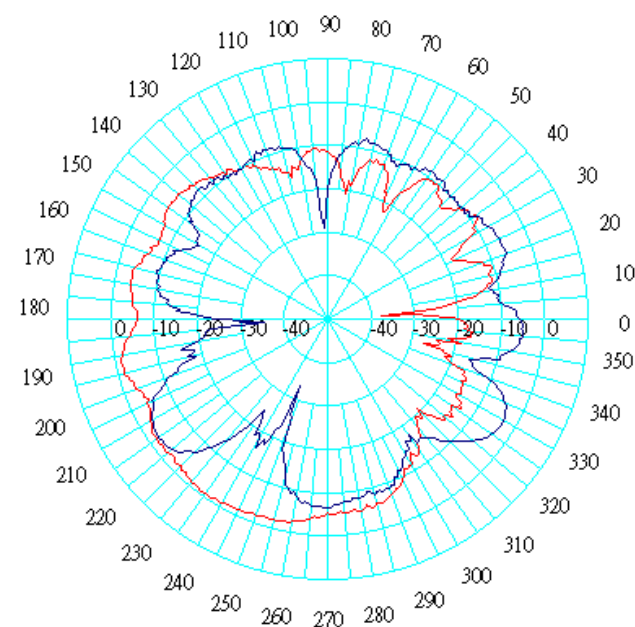
Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	NB Power
<u>PIFA</u>	Bluetooth	RIGHT	1.13	700	Off

1. Peak Gain and Average Gain

Antenna	Gain of XY Plane(Azimuth)-close-face up		
	Frequency		2.45
<u>2</u>	H	Peak	-1.318
		Average	-5.7490
<u>2</u>	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





Test results 6

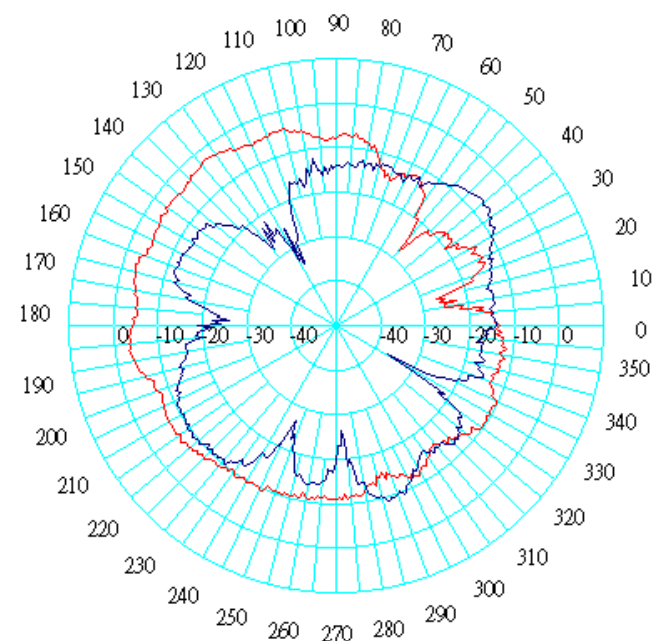
Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	NB Power
<u>PIFA</u>	Bluetooth	RIGHT	1.13	700	Off

1. Peak Gain and Average Gain

Antenna	Gain of XY Plane(Azimuth)-close-face down		
	Frequency		2.45
<u>2</u>	H	Peak	-1.218
		Average	-5.8390
<u>2</u>	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

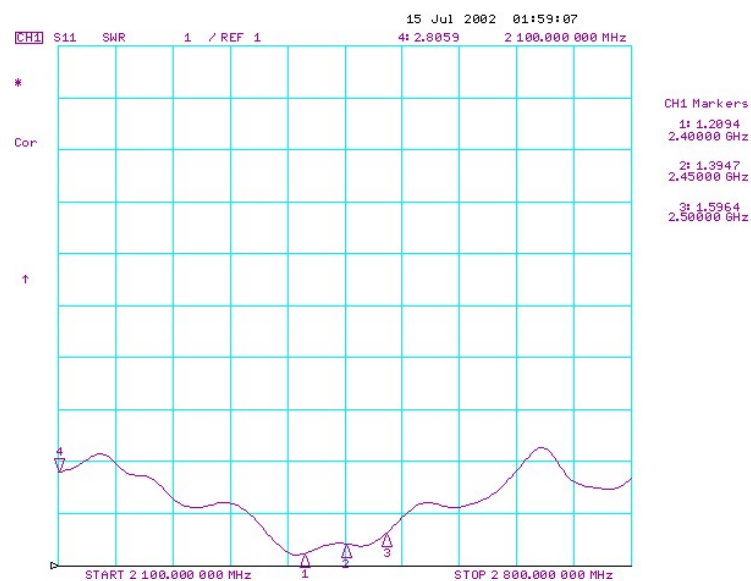




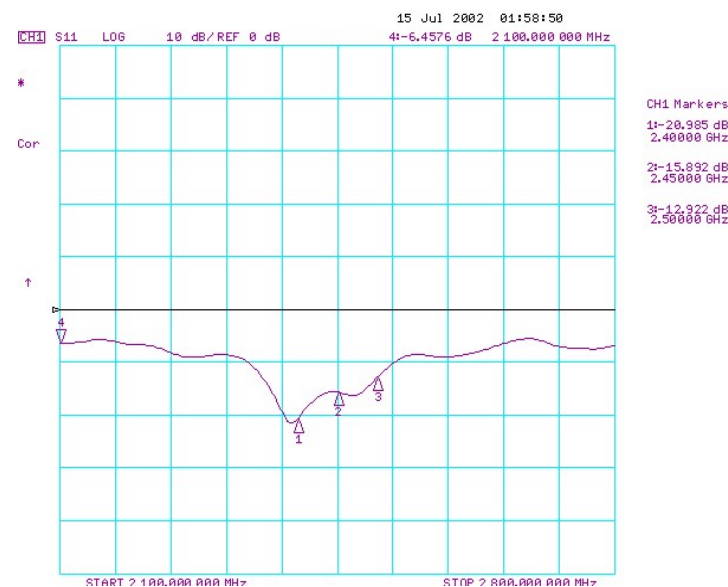
IV. Electronic Characteristic of Left Antenna : Test results7

Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	NB Power
<u>PIFA</u>	Wireless LAN	LEFT	1.13	700	Off

1.V.S.W.R



2.RETURN LOSS

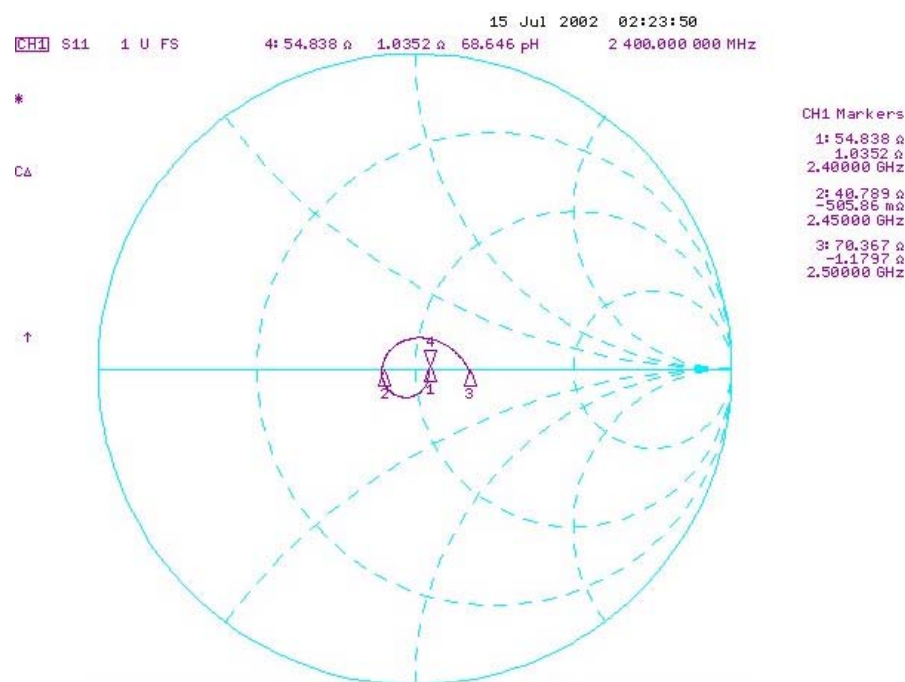




Test results 8

Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	Power
<u>PIFA</u>	Wireless LAN	LEFT	1.13	700	Off

1. SMITH CHART

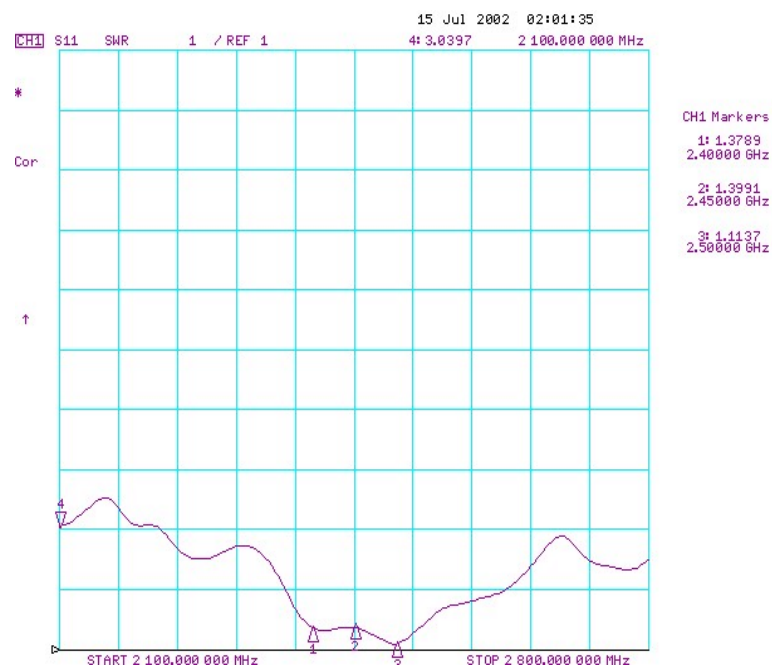




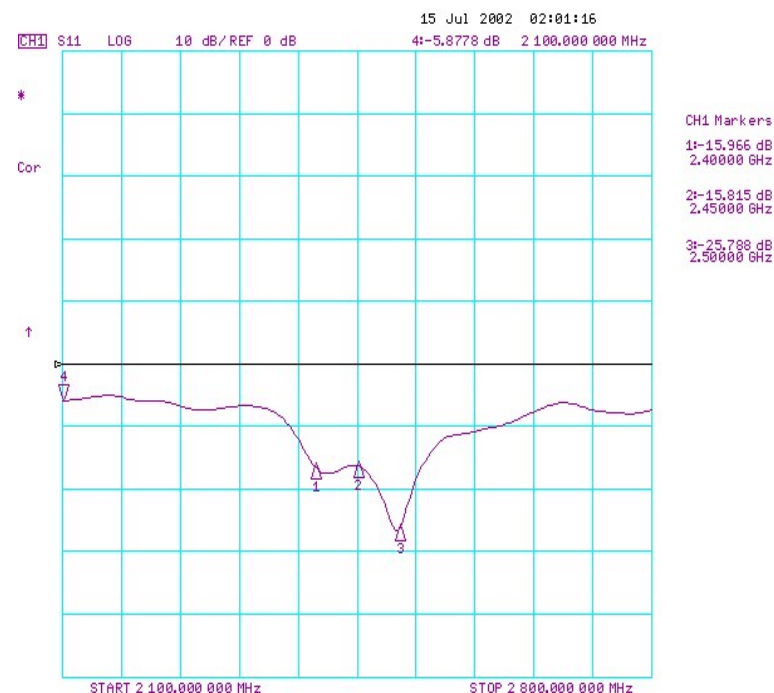
V. Electronic Characteristic of Left Antenna : Test results 9

Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	Power
<u>PIFA</u>	Wireless LAN	RIGHT	1.13	700	Off

1.V.S.W.R



2.RETURN LOSS

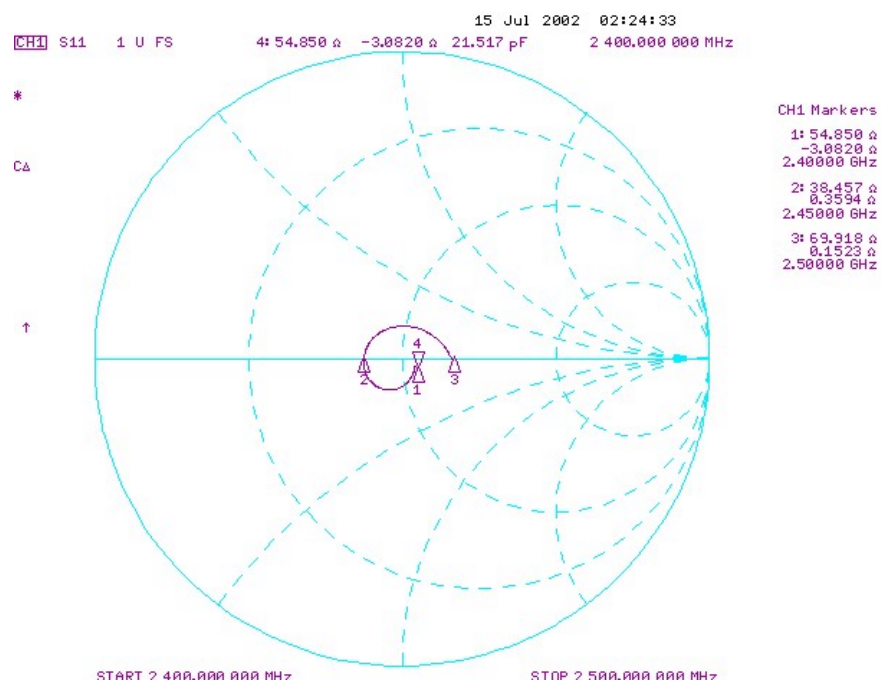




Test results 10

Antenna	Application	Placement	Cable dia. Φ mm	Cable length mm	Power
<u>PIFA</u>	Wireless LAN	RIGHT	1.13	700	Off

1. SMITH CHART





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							

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 specification,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 specification,PRS-1180

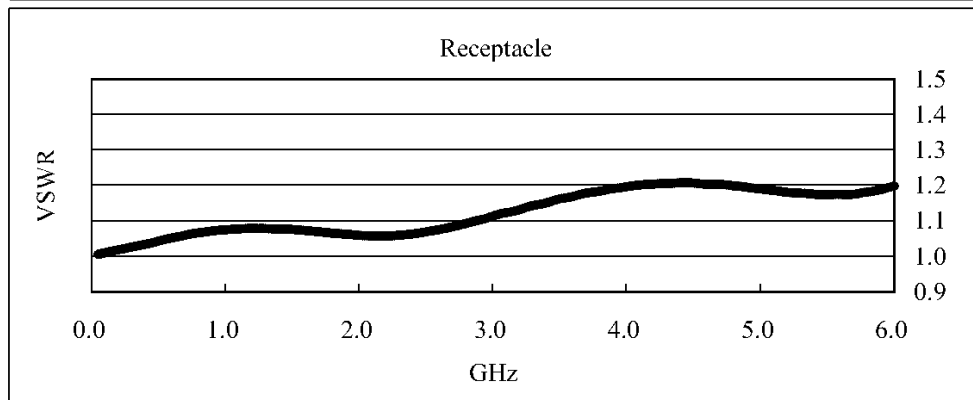
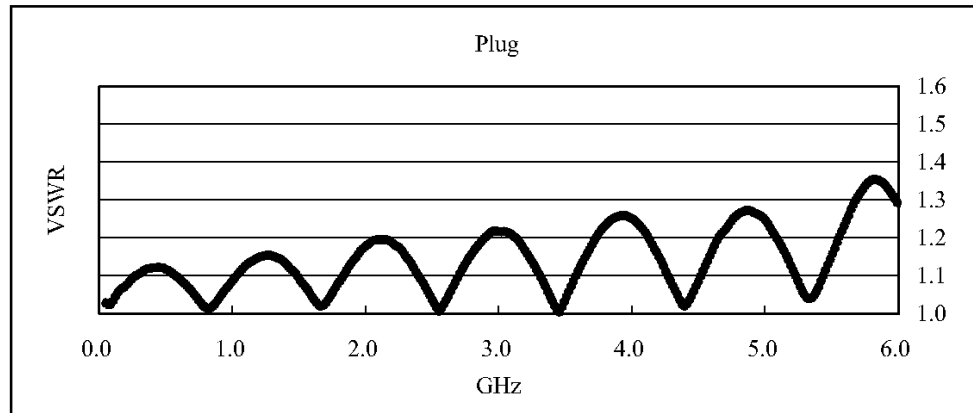
4. Results

(1) Dielectric withstanding voltage

Results	No abnormality
Sample quantity	10pcs.
Judge	OK

(2) VSWR

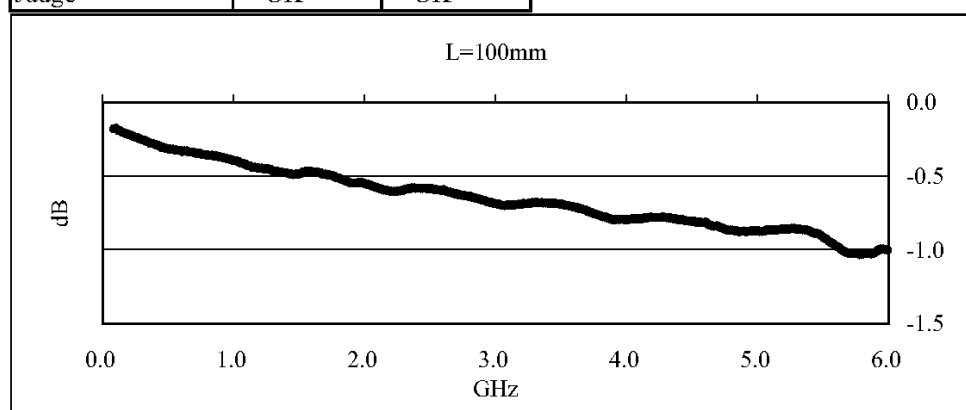
	Plug		Receptacle	
	0.1~3GHz	3~6GHz	0.1~3GHz	3~6GHz
AVE.	1.240	1.370	1.120	1.216
MAX.	1.25	1.39	1.13	1.24
MIN.	1.23	1.35	1.11	1.20
Specification	1.3 MAX.	1.5 MAX.	1.3 MAX.	1.4 MAX.
Sample quantity	5pcs.	5pcs.	5pcs.	5pcs.
Judge	OK	OK	OK	OK



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

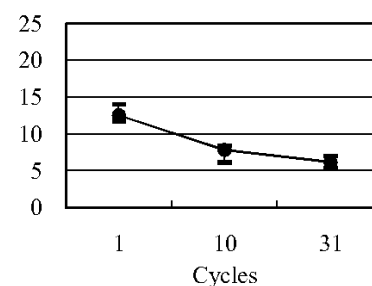
(3) Insertion loss

	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

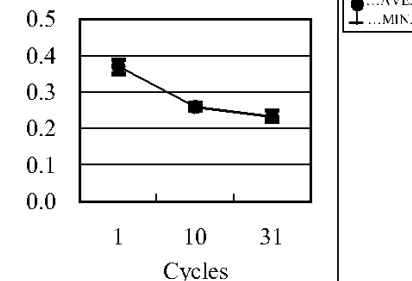


(3) Unmating force(抜去力)

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



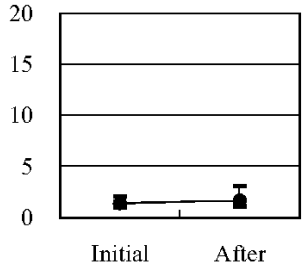
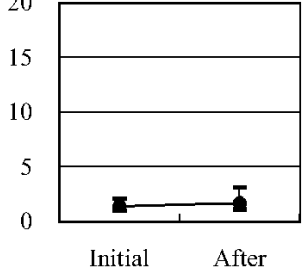
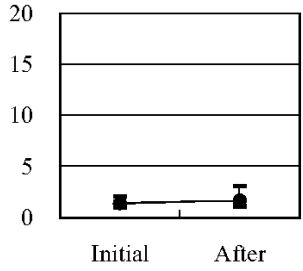
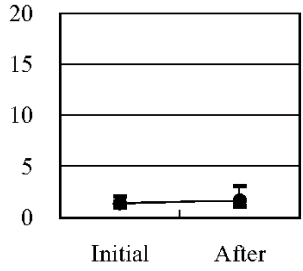
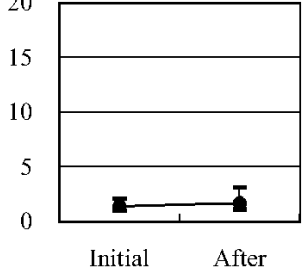
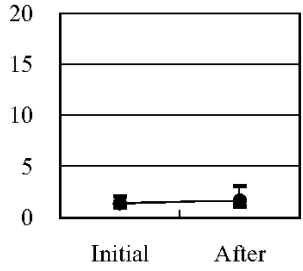
Unmating force of inner contact (中心導体抜去力)	Initial (初期)	After 30cycles (30回後)
AVE.	0.372	0.233
MAX.	0.39	0.25
MIN.	0.35	0.22
S	0.015	0.012
Specification(規格)	0.15 MIN.	0.1 MIN.
Units(単位)	N	N
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK



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)

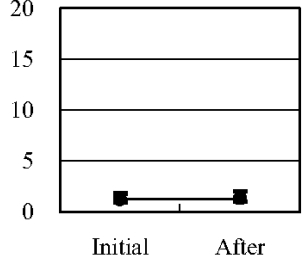
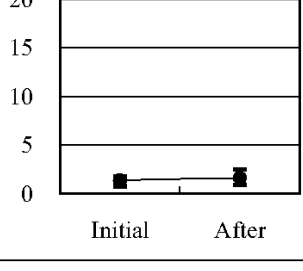
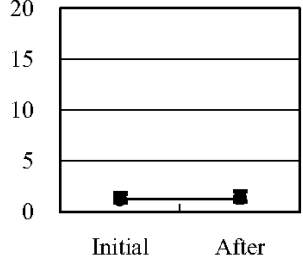
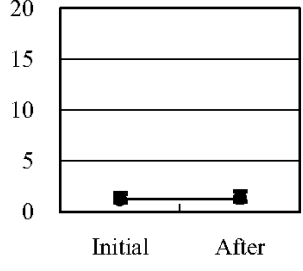
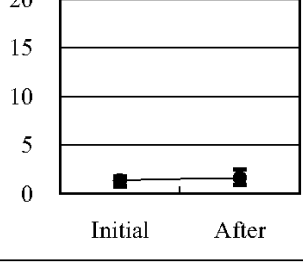
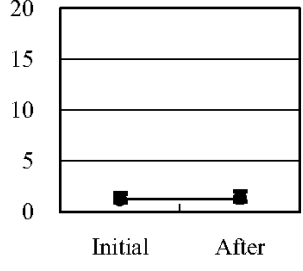
Appearance(外観) : No abnormality(異常無し)

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

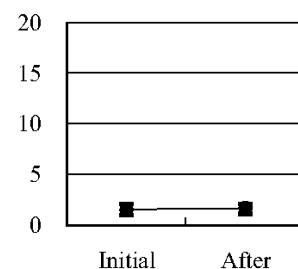
(6) Vibration(振動)

Appearance(外観) : No abnormality(異常無し)

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

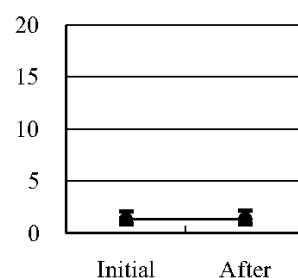
Contact resistance of inner contact

(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



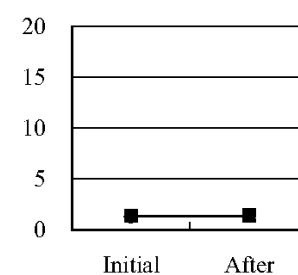
(7) Shock(衝撃)

Appearance(外観) : No abnormality(異常無し)

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

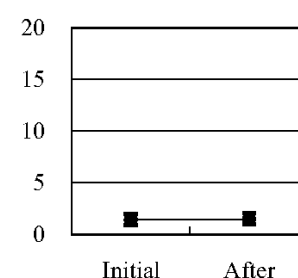
Contact resistance of inner contact

(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

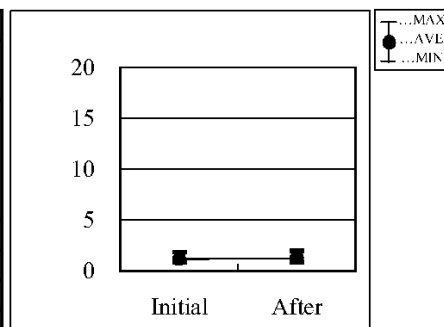


DOCUMENT CLASSIFICATION	TITLE	No.
Qualification Test Report テストレポート	MHF series micro coaxial connector	TR-1037

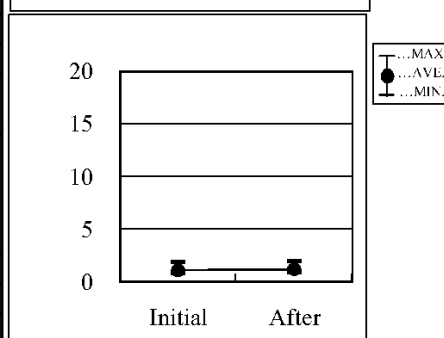
(8) Thermal shock(熱衝撃)

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



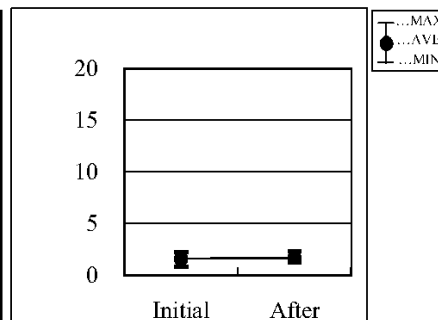
Insulation resistance (絶縁抵抗)		
	Initial (初期)	After testing (試験後)
Results(結果) MIN. value	10,000	10,000
Specification(規格)	500 MIN.	100 MIN.
Units(単位)	mega-ohm	mega-ohm
Sample quantity(試料数)	10pcs.	10pcs.
Judge(判定)	OK	OK

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

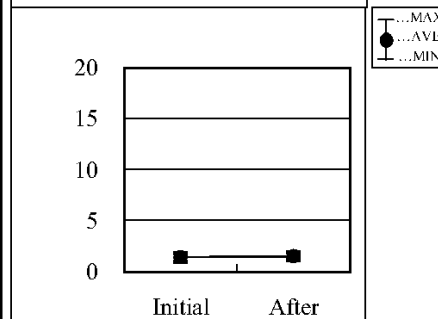
(9) Humidity(湿度)

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 soldering resistance(半田付け性, 半田耐熱性)

	Solderability(半田付け性)	Reflow soldering 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
VOLTAGE 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
.RU VW-1 SUMI-PAC CSA HS X PO TUBING SUMITUBE F32 125 C OFT -F- (Size) $\varnothing$

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, Lane 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 CIRCULATING 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



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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.

NUMBER 084766X0000 March 28, 1994 (Replaces: July 10, 1990)

CLASS 9032 01 (Re-examination Service)

SUMI-PAC ELECTRO-CHEMICAL CORP.
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

84766

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, Lane 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	600	125	I	+	—	Yes
Sumitube B2						
Sumitube F5	600	125	I	+	—	Yes
939 or	800	105	I or II®	+	—	Yes
Sumitube F(Z)						
940 or	600	125	I	+	—	Yes
Sumitube F2(Z)						
942 or	300	125	I	+	—	Yes
Sumitube F4(Z)						
958 or SM12	600	125	I	+	—	Yes
963 or SM23	600	125	I	+	—	Yes
938 or	600	105	II	+	—	Yes
Sumitube F(TZ)						

Report: February 18, 1973.

Replaces E48762C dated July 20, 1994.

390139001 N3228 Underwriters Laboratories Inc.®

(Cont. on D card)

011/0010143



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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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Heat Shrink Tube Sumitube F32

ABS Characteristics

POLYLAC[®]

特 性 試 驗 法 單 位			一般級 (General Purpose)					
Typical Properties	ASTM Test	Units	PA-707	PA-757	PA-717C	PA-727	PA-747	PA-709
引張強度 Tensile Strength	D-638	kg/cm ² (lb/in ²)	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/cm ² (10 ⁴ lb/in ²)	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/cm ² (lb/in ²)	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 x 5kg g/10min(Cond.G)	1.9	1.8	1.4	1.8	1.2	0.5
	ISO-1133	220 °C x 10kg g/10min	20	22	14	19	13	5
可燃性 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			高光澤性 高剛性	高剛性 高光澤性	一般射出 成型用	電鍍級	超高強度 射出成型用	超高衝擊強度 押管用
Product Description			High Gloss High Rigid	High Gloss Medium Impact	Medium Impact	Electro-Plating	High Impact	Super Impact

以上數據係依照 ASTM 標準方法於荷重實驗室所測得，僅供參考用。* ISO 試驗方法



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Heat Shrink Tube

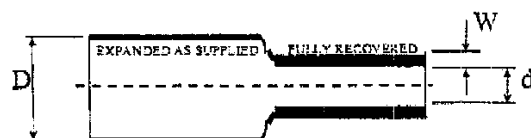


TABLE 1. STANDARD SIZE

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

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