

Measurement of MPE

1. Foreword

In adopt with the Human Exposure IEEE C95.1, and according to the FCC 1.1310. The *Maximum Permissible Exposure (MPE)* is obligated to measure in order to prove the safety of radiation harmfulness to the human body.

The *Gain* of the antenna used is measured in an *Anechoic chamber*. The *maximum total power to the antenna* is to be recorded. By adopting the *Friis Transmission Formula* and the *power gain of the antenna*, we can find the distance right away from the product, where the limit of the MPE is.

2. Description of EUT

EUT	:	11Mbps WLAN USB Adapter
Classification	:	Mobile Device
		(i) Under normal use condition, the antenna is at least 20cm away from the user;
		(ii) Warning statement for keeping 20cm separation distance and the prohibition of operating next to the person has been printed in the user's manual
Model No.	:	AWL300
Granted FCC ID	:	JVPAWL300
Frequency Range	:	2.412 GHz ~ 2.462GHz
Antenna Kit	:	1 patch antenna
Supported Channel:		11 Channel
Modulation Skill	:	DBPSK, DQPSK, CCK
Power Type	:	Powered by the USB port of the client's device
Applicant	:	BenQ Corporation
		8, Jihu Rd., Nei-hu Dist., Taipei 114, Taiwan, R.O.C.

3. Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	900/f ²	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	180/f ²	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

[The EUT is tested in transmit and receive modes and in the first, middle and the last channel separately. The following shows only our observation have the greatest emissions.]

According to OET BULLETIN 56 Fourth Edition/August 1999, Equation for Predicting RF Fields:

$$\text{Friis Transmission Formula: } S = \frac{PG}{4pR^2} = \frac{32.28 \times 1.466}{4p(20)^2} = 9.415 \times 10^{-3} \text{ mW/cm}^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

The Numeric gain G of antenna with a gain specified in dB is determined by:

$$G = \text{Log}^{-1} (\text{dB antenna gain}/10)$$

$$G = \text{Log}^{-1} (1.66 / 10) = 1.466$$

Subject:	Qualification Test Specification for 2.4GHz	DEVE No.: <u>B-095</u>	Rev.: 2
Cus. P/N :		Doc. No. :	
Auden P/N :	CP-2111BO-000		

1.ELECTRICAL SPECIFICATIONS

1-1 FREQUENCY BAND

<i>Freq. Band</i>	<i>FREQUENCY</i>
2.4GHz	2.4~2.5(GHz)

1-2 IMPEDANCE

Nominal Impedance : **50 ± 5 ohms**

1-3 VSWR

1-3-1 FREE SPACE ENGINEERING

<i>Freq. Band</i>	<i>FREQUENCY</i>
	2.4~2.5 (GHz)
2.4GHz	≤ 2.0

※ Measuring a 50Ω test jig is connected to a network analyzer to measure the VSWR.

※※ All test value is done in customer approval Fixture.

1-5 GAIN

Typical value:

<i>Freq. Band</i>	<i>FREQUENCY</i>	
	2.4(GHz)	2.5(GHz)
2.4GHz	$\geq -1\text{dBi}$	

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2. MECHANICAL SPECIFICATIONS

2-1 MECHANICAL CONFIGURATION

The appearance of the antenna is according to drawing **FIG. 2-1**

3. PACKAGING

Antenna to be packed in compartmentalized 10pcs/ polybag , X pcs / carton.

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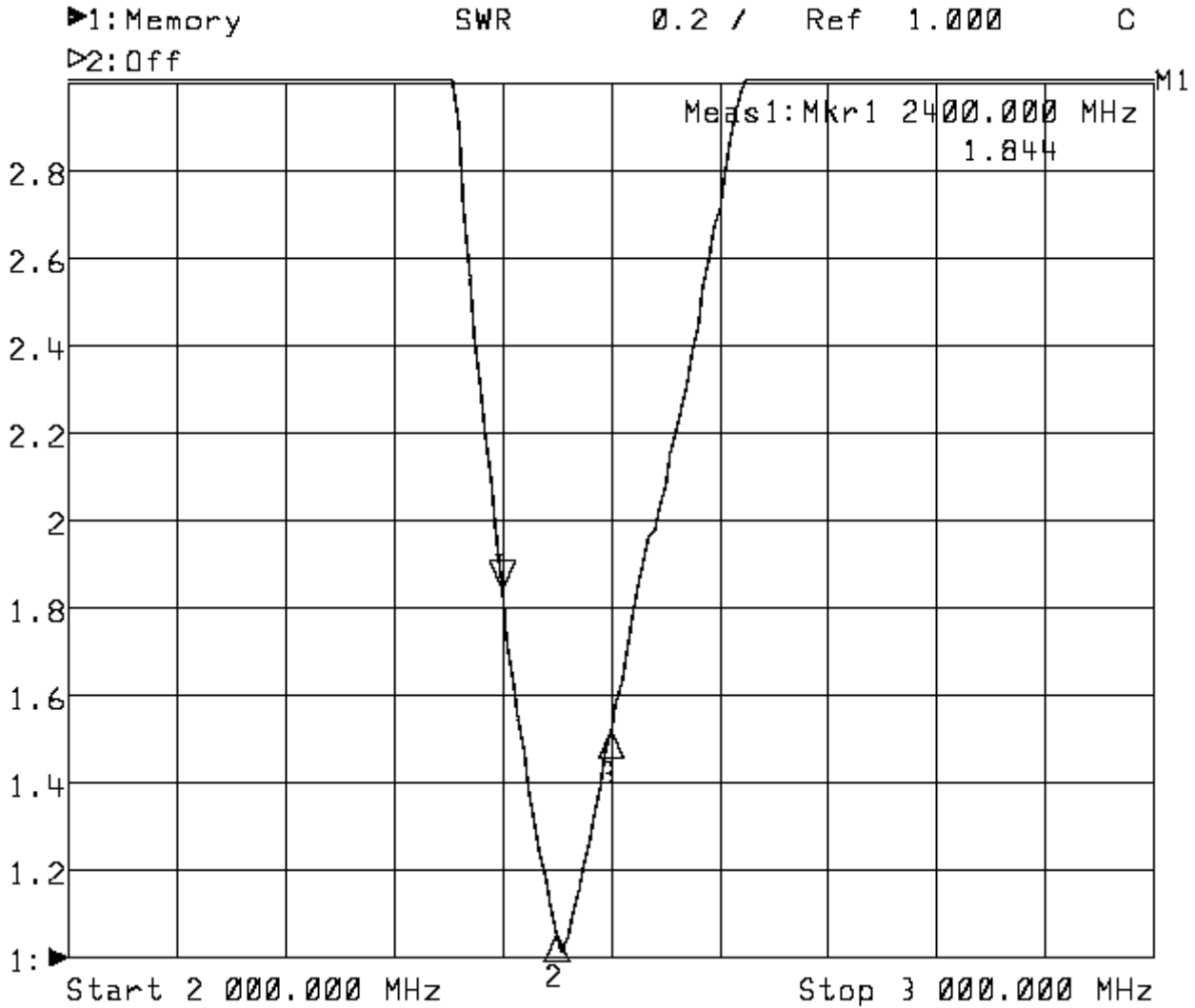
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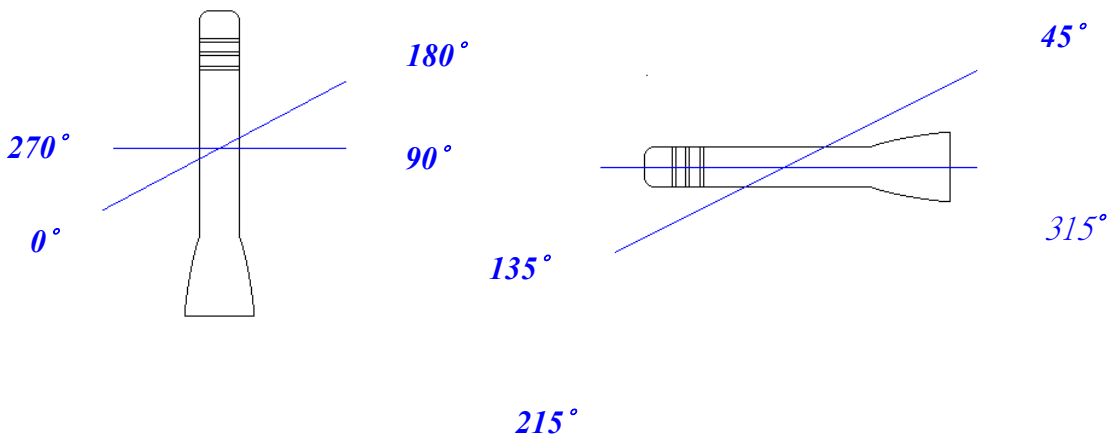
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1: Mkr (MHz)	2: Mkr (MHz)	dB
1> 2400.0000	2450.0000	1.844
2: 2450.0000	2500.0000	1.053
3: 2500.0000		1.523

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<i>Frequency (MHz)</i>	<i>H - Plane</i>		<i>E - Plane</i>
	<i>MAX (dBi)</i>	<i>AVR (dBi)</i>	<i>MAX (dBi)</i>
2400	1.97	-3.19	1.12
2450	1.60	-3.77	1.66
2500	1.70	-3.03	1.38

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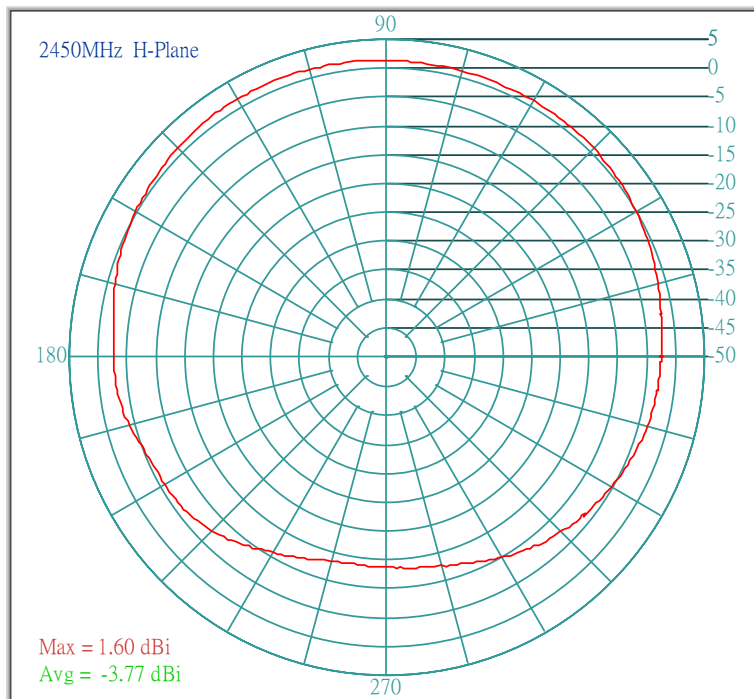
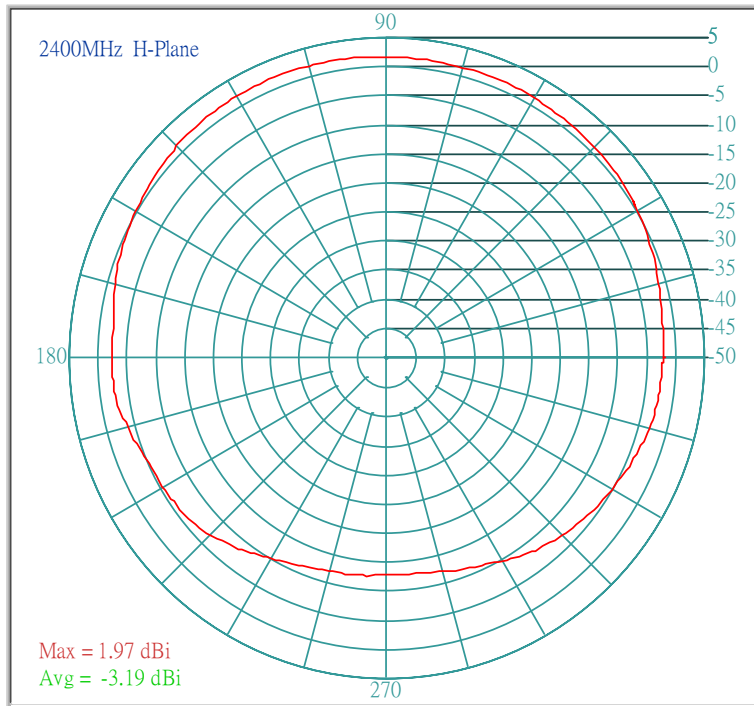
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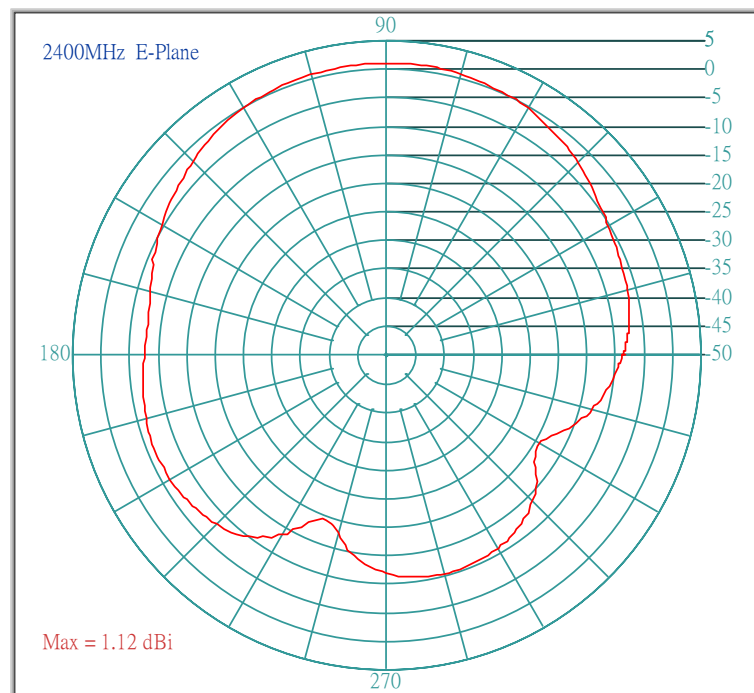
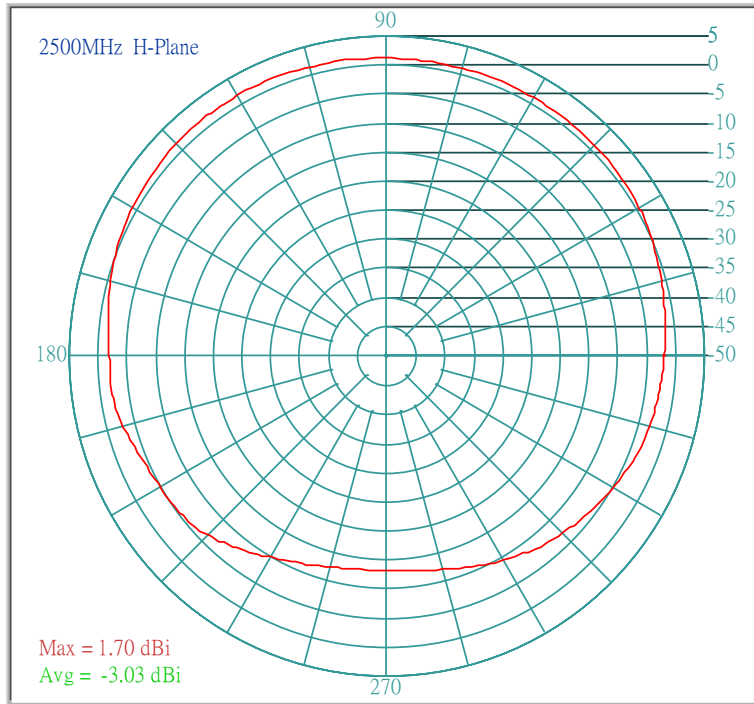
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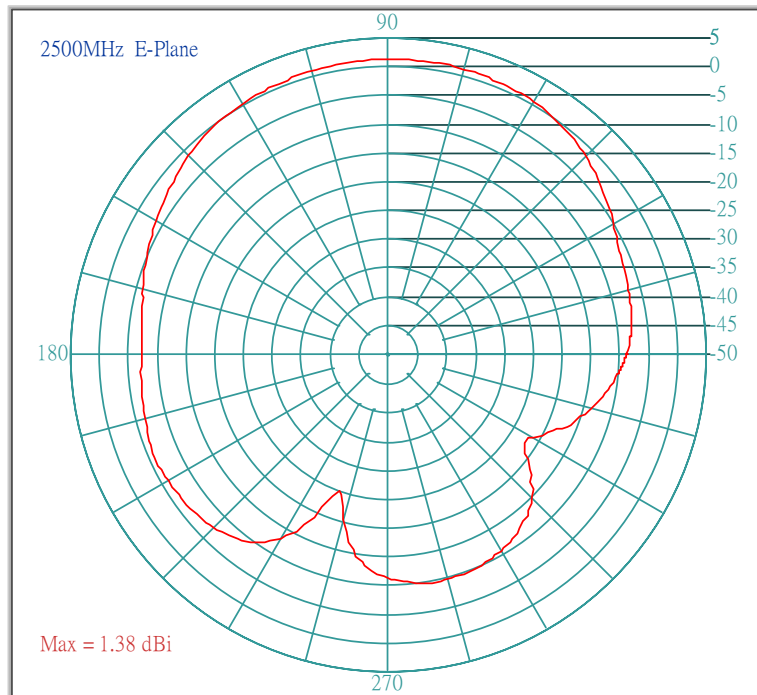
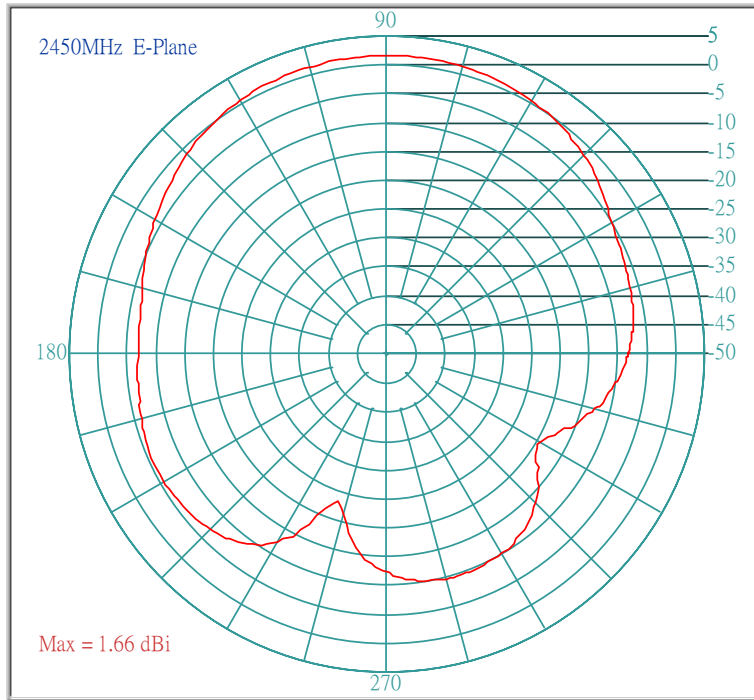
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SP3830L-X	PFA INSULATED HIGH-FREQUENCY COAXIAL CABLE (FWS 5020)	PAGE	1/4
PRODUCT STANDARD		ISSUED	5-9-2001
		REVISED	

1. SCOPE

This standard covers "PFA insulated High-Frequency coaxial cable".

2. CONSTRUCTION

Construction and dimensions of the cable are shown in Figure.1 and Table 1.

3. PERFORMANCE

Performance of the finished cable is shown in Table 2. The test methods are in accordance with applicable test methods described in JIS C 3005.

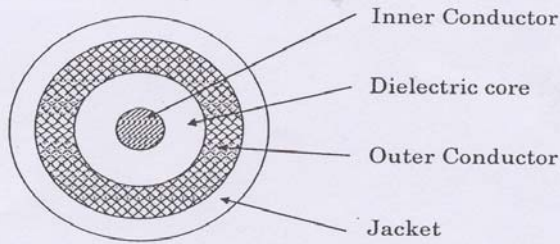


Figure 1.

NOTE :

MADE BY

M. Nakayama

APPROVALS

T. Matsuda

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Table 1. Construction

Item	Material	Unit	Specified Value
Inner Conductor	Material	—	Silver coated annealed copper wire
	Stranding	No./mm	7/0.05
	Dia.(approx.)		0.15
Dielectric Core	Material	—	PFA
	Thick.(nom.)	mm	0.13
	Dia.	mm	0.41±0.03
	Color	—	Natural
Outer Conductor	Material	—	Silver coated annealed copper wire
	Type	—	Braid (8/5/0.05)
	Dia.(approx)	mm	0.65
Jacket	Material	—	PFA
	Thick.(nom.)	mm	0.08
	Dia.	mm	0.81 +0.04/-0.02
	Color	—	Standard color is white

Table 2. Performance

Item	Unit	Specified Value	Note
Appearance	—	Faultless in visible	—
Inner conductor resistance	Ω/km	Max.1,400	At 20℃
Insulation resistance	MΩ·km	Min.1000	At 20℃
Dielectric strength	—	Dielectric core: No breakdown at AC1.5kV for 0.15sec.	Spark test
		Jacket: No breakdown at AC1.5kV for 0.15sec.	Spark test
		No breakdown at AC1kV for 1min.	Outer conductor to inner conductor
Heat resistance for solder	—	Shrink or expansion of dielectric core are not more than 0.5mm	※
Capacitance	pF/m	nom. 98	At 1kHz
Characteristic impedance	Ω	50±3	TDR method
Attenuation (nom.)	dB/m	3.1	1.0GHz
		4.7	2.0GHZ
		5.8	3.0GHz
		6.9	4.0GHz
		7.8	5.0GHz
		8.5	6.0GHz

※ After immersion of dielectric core, 10mm into soldering pot which is 230℃ for 5 seconds, shrinkage or expansion of the dielectric core must not exceed 0.5mm.

NOTE :

MADE BY

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SP3830L-X	PFA INSULATED HIGH-FREQUENCY COAXIAL CABLE (FWS 5020)	PAGE	3/4
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		REVISED	
<p>4. INSPECTION An inspection is took place in accordance with applicable test methods. The cable has to pass the specifications described Table 1 and Table 2.</p> <p>5. TEST METHOD The test methods are in accordance with applicable test methods described in JIS C 3005 (Test methods for rubber or plastic insulated wires and cables).</p> <p>6. TEMPERATURE RATING 150 °C</p> <p>7. VOLATGE LATING 250 V</p> <p>8. MARKING ON TAG Each reel of finished cable is tagged to indicate following information: (1) Designation of the cable, (2) Conductor size, (3) Length, (4) Date of manufacture or LOT No., (5) Specification No., and (6) Manufacture's name.</p> <p>9. PACKAGE The finished cables are cut into a shipping length of 200 meters, reeled to paper bobbin and packed securely to prevent injuries during transportation. Odd length of the finished wires should be accepted for shipping according to the condition of mutual agreement. In the case no agreement is found, the condition stated in quotation shall prevail.</p> <p>10. APPLICATION NOTES 10-1. For use other than the use mutually agreed, compatibility should be carefully confirmed in each practical use by user. 10-2. It is recommended to make a trial run for each practical application.</p>			
NOTE :		MADE BY	<i>M. Nakayama</i>
		APPROVALS	<i>T. Koyama</i>

Subject:	Qualification Test Specification for 2.4GHz	DEVE No.: <u>B-095</u>	Rev.: 13
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10-3. In case a design for use of cable is changed, please contact our sales department, if necessary. Do not use under extreme mechanical stress such as hard bending, tightening, and twisting. The use under extreme mechanical stress may cause not only shortening the life span of cable but also troubles such as decline of dielectric strength.

10-4. Handling precautions

- ① Do not hurt the insulation and sheath of the cable by making holes and scratches. And avoid any sharp edge when wiring so as not to injure cables.
- ② Avoid unnecessary excessive force to cable, such as pulling, twisting, bending or tightening.

10-5. Storage precautions

Avoid continuous exposure to sunlight.

NOTE :	MADE BY	<i>M. Kobayama</i>
	APPROVALS	<i>J. Hanazawa</i>