

Measurement of Maximum Permissible Exposure

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

FCC ID	:	MSQAAM6KVIPD1
Product Name	:	4-Port Wi-Fi Ethernet Router
Model Name	:	AAM6XXXVI-PD1, AAM6XXXVI-XXX, 6218-I3-XXX (X= 0~9, A~Z)
Frequency Range	:	2.412GHz ~ 2.462GHz
Channel Spacing	:	5MHz
Support Channel	:	11 Channels
Modulation Skill	:	DBPSK, DQPSK, CCK, OFDM
Power Type	:	Powered by the switching adapter, Manufacture: OEM Model: ADS0243-U120150 I/P: 100-240VAC 50-60Hz 0.55A. O/P: 12VDC 1.5A. Primary: 185cm length, non-shielded, no ferrite core Secondary: 190cm length, non-shielded, no ferrite core

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:

Friis Transmission Formula:
$$S = \frac{PG}{4\pi R^2} = \frac{311.89 \times 2.344}{4\pi(20)^2} = 0.145mW / cm^2$$

Estimated safe separation:
$$R = \sqrt{\frac{PG}{4\pi}} = \sqrt{\frac{311.89 \times 2.344}{4\pi}} = 7.627cm$$

Note: "The safe estimated separation that the user must maintain from the antenna is at least 6.5cm"

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:

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

$$G = \text{Log}^{-1} (3.70 / 10) = 2.344$$

Appendix

Antenna Specification

產品規格承認書

Specification For Approval

日期： 2007 / 06 / 07

Date

編號： 070607010

File No.

版本： 1.0

Revision

承認廠商： 華碩電腦

Customer

製造廠商： 英碩科技股份有限公司

Manufacturer

型號品名： 2.4 GHz External Antenna

Part Number

Description

INVAX P/N : AN2400-37A2BX

廠商審核：

Approved By

Invax

英碩科技股份有限公司
台北市忠孝東路五段 815 號 4 樓
Tel: 886-2-2788-5218 Fax:886-2-2783-1658

Cortec

東莞康捷電子有限公司
廣東省東莞市長安鎮振安路
沙頭段咸西工業區
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- 4. Antenna Radiation Pattern**
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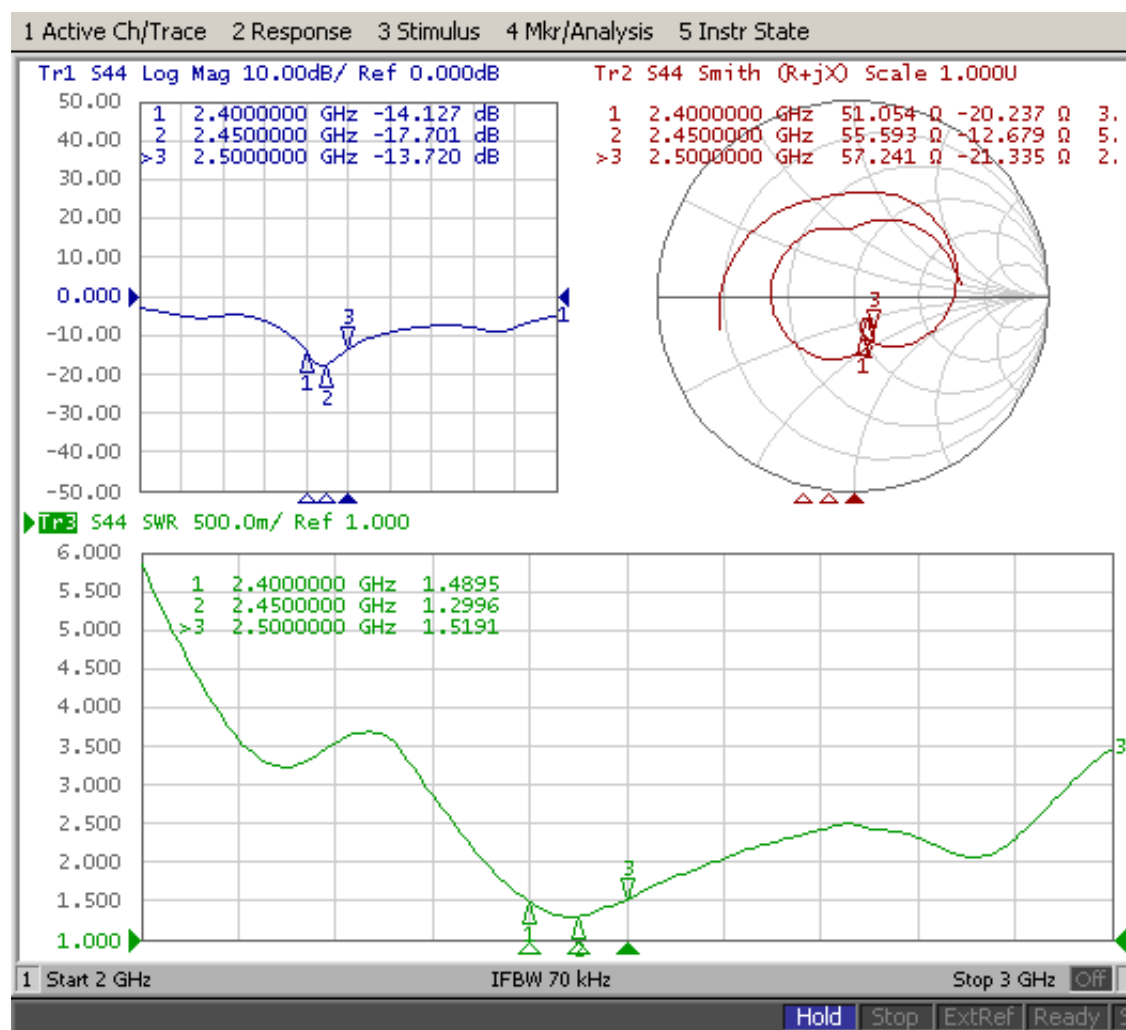
1. Reliability Testing

Test Item	Procedure	Requirement
1. Visual inspection and Dimension Check	Applicable methods using x5 magnification	follow specification
2. Rapid Changing of Temperature	-40°C (30minutes) to 90°C (30minutes); 24 cycles	After 2 hours recovery: 1. no visible damage 2. Freq. Tol.: < ±5%
3. Damp Heat	24 hours at 60°C; 90 ~ 95% RH	After 2 hours recovery: 1. no visible damage 2. Freq. Tol. : < ±5%
4. Endurance	24 hours at 90°C	After 2 hours recovery: 1. no visible damage 2. Freq Tol.: < ±5%

2. Specification

A. Electrical Characteristics	
S.W.R.	≤ 2.0 @ 2400 ~ 2500 MHz
Antenna Gain	3.0 ± 0.7 dBi (*Depends on Product Mechanical Environment*)
Impedance	50 Ohm
B. Material	
Material of Radiator	Cu (Plated)
Material of Coaxial Cable	O.D.1.13 / 90 mm
C. Environmental	
Operation Temperature	- 30 °C ~ + 85 °C
Storage Temperature	- 30 °C ~ + 85 °C

3. S Parameter Test data



4. Antenna Radiation Pattern

Testing Equipment Specification:

Antenna Anechoic Chamber Dimension: 8 x 4 x 4 m

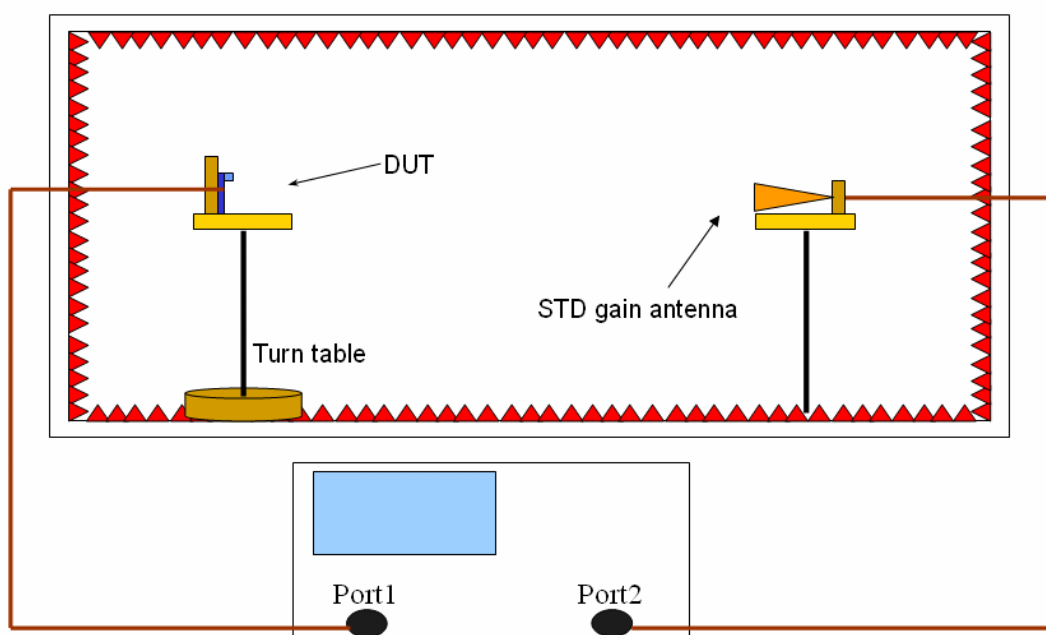
Quiet Zone: 600mm @1 GHz

Isolation: >100dB @ 1 MHz ~ 10 GHz

Testing Equipment: Agilent 5071B

Received Antenna: 0.7 ~ 6.0 GHz for Gain Calibration

Double Ridged Horn Antenna



5. Mechanical Drawing

6. MSDS & SGS Report



Cortec Technology Inc.

广东省东莞市长安镇振安路沙头段咸西工业区

Model : AN2400-37A2BX // 2

Remark : H-Plane // Vertical Polarization

Tested by : CORTEC Antenna 3D Lab // Zhao Yao Rong

Location: Chamber

Temperature (°C): 22.00

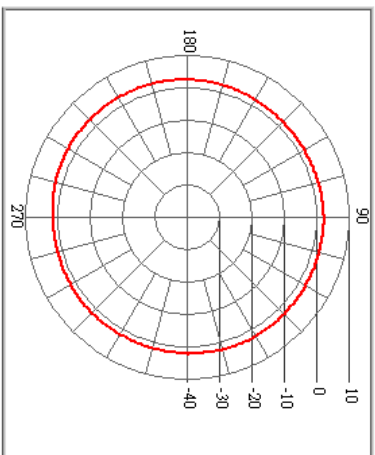
Date: 2007/6/6

Humidity (%): 55.00

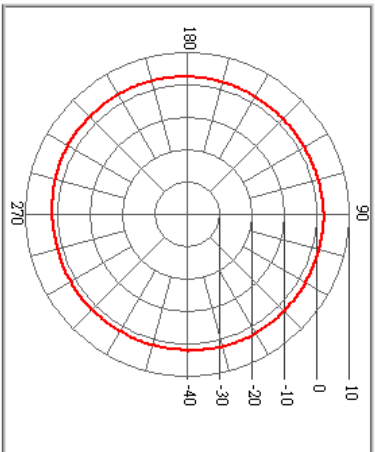
Time: 下午 02:02:41

Approved by:

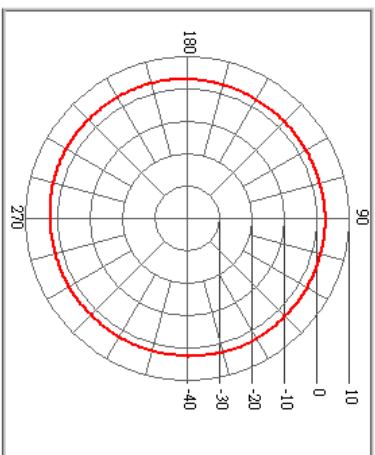
Freq. (MHz)	2390	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Peak Gain (dbi)	2.69	2.68	3.22	3.27	3.22	2.97	2.98	3.03	3.11	2.93	2.73	2.78
Peak Degree	217	211	211	199	199	199	204	205	217	217	205	223
AV Gain (dbi)	2.09	2.09	2.63	2.73	2.65	2.4	2.4	2.45	2.51	2.31	2.11	2.12



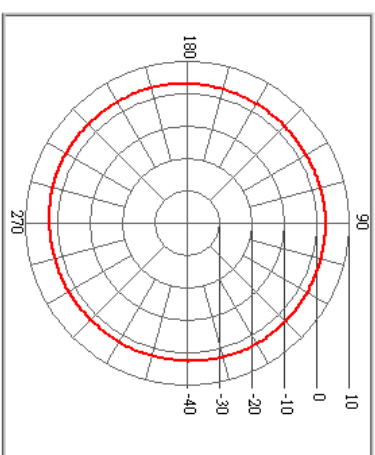
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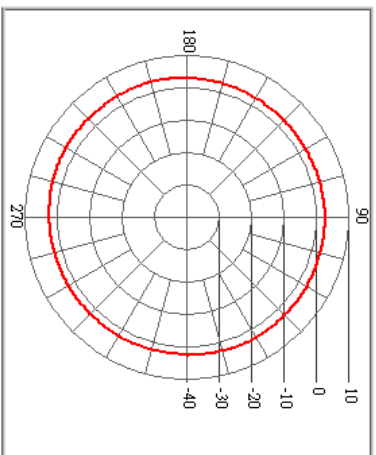
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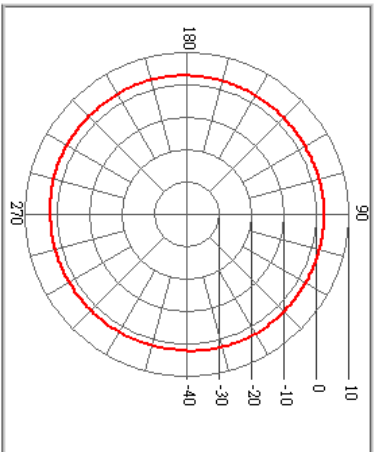
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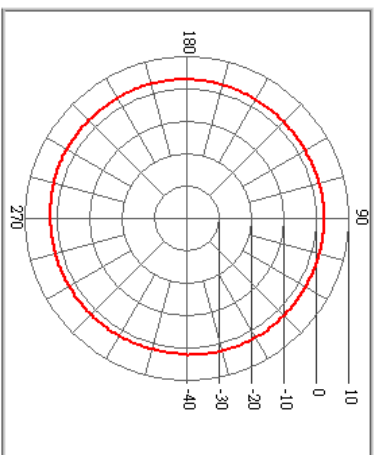
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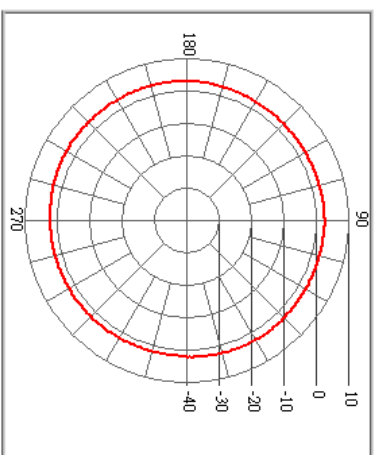
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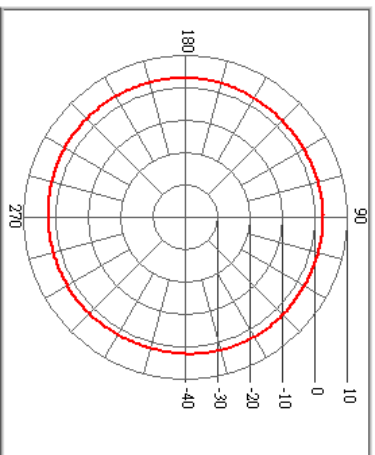
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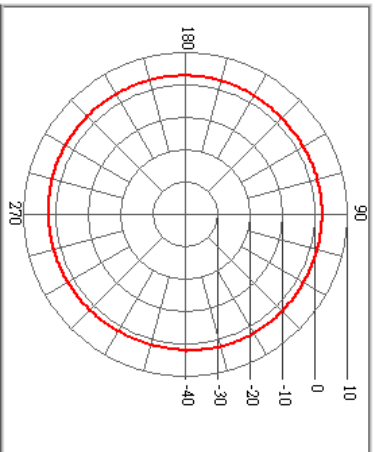
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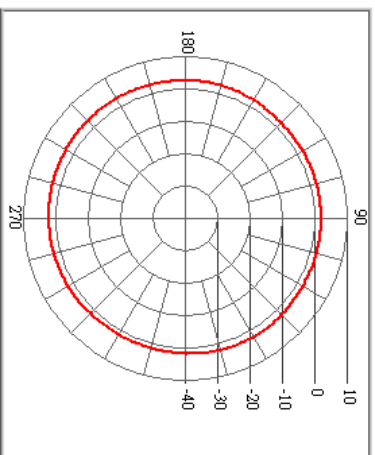
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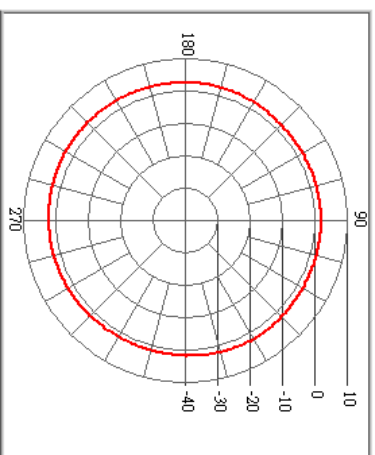
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2480



2490

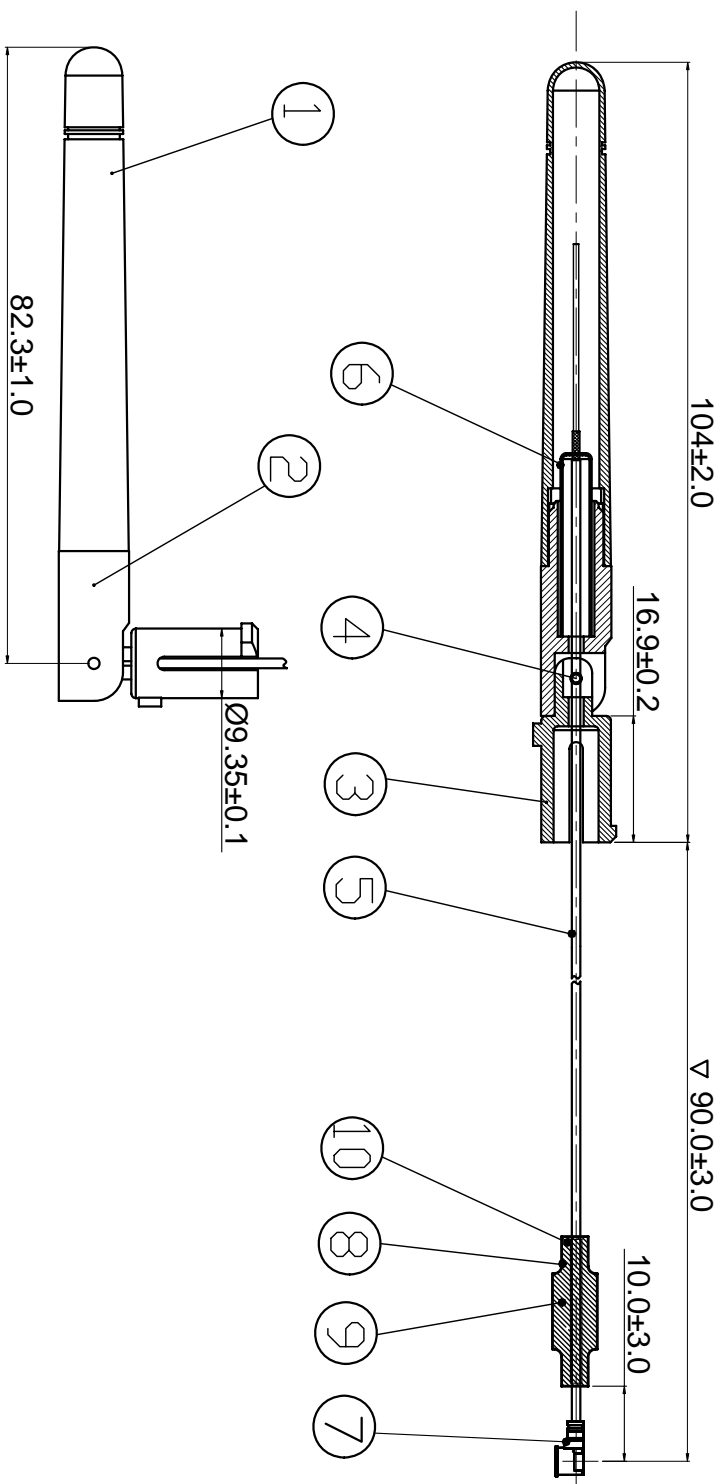


2500

ROHS

Compatible

SIGN	DATE	DESCRIPTION	APPROVER
△			
△			
△			



- 備註
1. 未標註公差參照標準公差.
 2. 標 V 的尺寸為重點控制尺寸.
 3. 接頭接口朝下

No.	Part Number	Description	Material	Finish	Qty
10	R-HSTUBE-020N	Hstube		Ø2.0*18.0mm	1
9	R-MR-040020100	Fe ₂ O ₃		Black	1
8	R-HSTUBE-035N	Hstube		Ø3.5*21.0mm	1
7	R-CB-TEE113-01	Connector	I-Pex	MHF	1
6	R-AN4424517S	Tube	Brass	Ø4.40*24.5mm	1
5	R-CB-113B	Cable		Ø1.13 mm L=169.0mm(Black)	1
4	R-AN01-1213Z	Hinge Pin	Brass	Black Zn Plated	2
3	R-AN3701-02P	Body3	PC+ABS	Purple Gray	1
2	R-AN57-05P	Body2	PC+ABS	Purple Gray	1
1	R-AN57-03P	Body1	TPE	Purple Gray	1

Cortec[®] Cortec Technology Inc.

PART NAME: Antenna-2.4GHz TITLE: Antenna-2.4GHz

PART NO.: AN2400-37A2BX DWG NAME: AN2400-37A2BX.dwg

APPROVED BY	CHECKED BY	DESIGNED BY	UNITS: mm	Tolerance
Grant 2007/06/06	劉奎 2007/06/06	王新鋒 2007/06/06	SCALE: 1/1	X.X ±0.10 X.XX ±0.05 X° ±1°