

This device is a PCMCIA card. As such it is classified as portable. Since MPE does not apply to portable devices, this is provided as information only. Also, since the power of this device is lower than 11.4 mW conducted and uses a max 3dBi gain, SAR is not required.

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	:	Wireless LAN PC Card
Classification	:	Portable Device
		(i) Under normal use condition, the antenna is at least 5cm away from the user;
		(ii) Warning statement for keeping 5cm separation distance and the prohibition of operating next to the person has been printed in the user's manual
Model No.	:	DB6802-01C
Granted FCC ID	:	NP2-DB-6802-L1
Frequency Range	:	2.412 GHz ~ 2.462GHz
Antenna Kit	:	2 chip antennas
Supported Channel:		11 Channel
Modulation Skill	:	DBPSK, DQPSK, CCK (w/PBCC mode)
Power Type	:	Powered by the PCMCIA slot of the client device
Applicant	:	DBTel Incorporated
		No.29, Tzu Chiang St., Tu-Cheng, Taipei, 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:

$$\text{Friis Transmission Formula: } S = \frac{PG}{4\pi R^2} = \frac{11.4 \times 1.995}{4\pi(5)^2} = 0.724 \times 10^{-1} \text{ mW / cm}^2$$

Remark:

"The safe MPE estimated distance the user must maintain from the antenna is at least 5 cm."

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:

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

$$G = \text{Log}^{-1} (3 / 10) = 1.995$$

SPECIFICATION FOR APPROVAL

Customer : 大霸電子股份有限公司

Product Description : Chip Antenna

Your Part Number : _____

ACX Part Number : AT9520-B2R4HAAT

File Number : SF1-250131

Date : May 28, 2002

大霸電子	Approved	Comments
ACX	Prepared by	
	張家瑞	

環德電子工業股份有限公司

Advanced Ceramic X Corporation

16 Tzu Chiang Road, Hsinchu Industrial District Hsinchu Hsien, Taiwan, 30316

TEL : (03)598-7008

FAX : (03)598-7001

<http://www.acxc.com.tw>

AT9520 Series

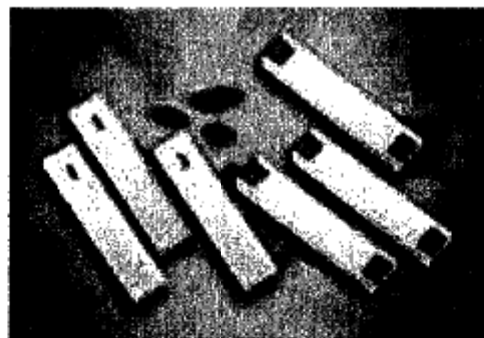
Multilayer Chip Antenna

Features

- ❖ Monolithic SMD with small, low-profile and light-weight type.
- ❖ Wide bandwidth

Applications

- ❖ 2.4GHz WLAN, Home RF, Bluetooth Modules, etc.



Specifications

Part Number	Frequency Range (MHz)	Peak Gain (dBi)	Average Gain (dBi)	VSWR	Impedance
AT9520-B2R4HAA_	2400~2500	3.0 dBi typ.	1.0 dBi typ.	2 max.	50 Ω

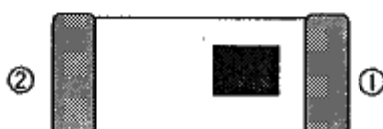
Q'ty/Reel (pcs) : 1000pcs
 Operating Temperature Range : -40 ~ +85 °C
 Storage Temperature Range : -40 ~ +85 °C
 Power Capacity : 3W max.

Part Number

AT **9520** - **B** **2R4** **HAA** **□**
 ① ② ③ ④ ⑤ ⑥

① Type	AT : Antenna	② Dimensions (L × W)	9.5 × 2.0 mm
③ Material Code	B	④ Frequency Range	2R4=2400MHz
⑤ Specification Code	HAA	⑥ Packaging	T: Tape & Reel B: Bulk

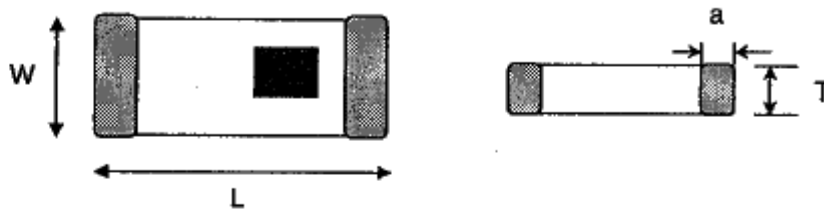
Terminal Configuration



No.	Terminal Name	No.	Terminal Name
①	Feeding Point	②	NC

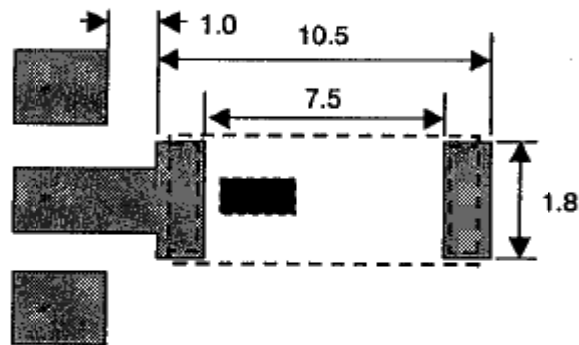
Dimensions and Recommended PC Board Pattern

Unit : mm

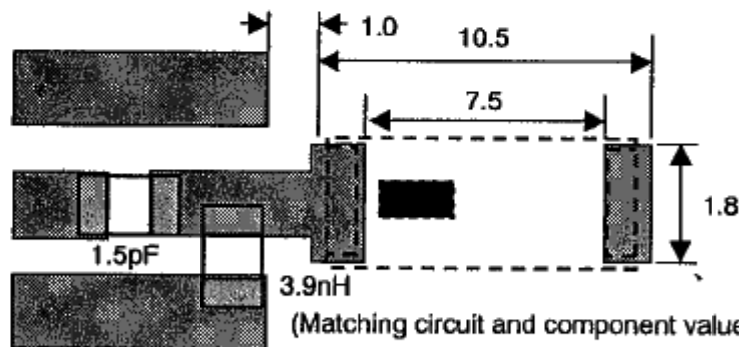


Mark	L	W	T	a
Dimensions	9.5±0.2	2.0±0.2	1.2+ 0.1/-0.2	0.5±0.3

(a) Without Matching Circuits (Moderate Bandwidth)



(b) With Matching Circuits (Wide Bandwidth)

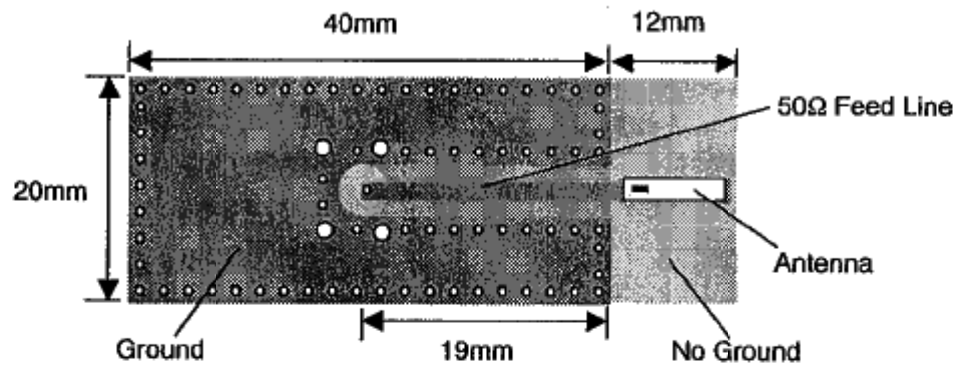


(Matching circuit and component values will be different,
depending on PCB layout)

*Line width should be designed to match 50Ω characteristic impedance, depending on PCB material and thickness.

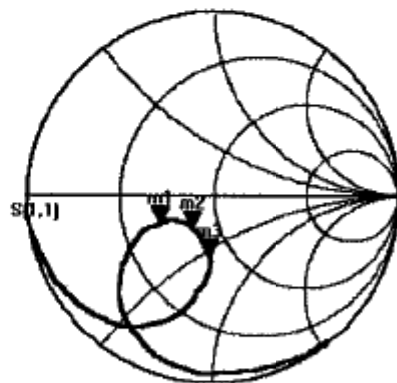
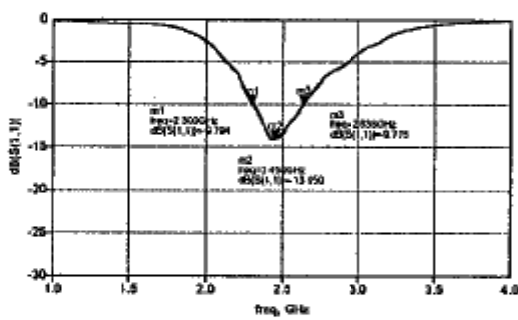
Typical Electrical Characteristics (T=25°C)

❖ Test Board

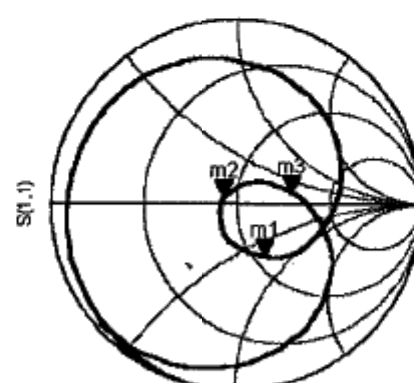
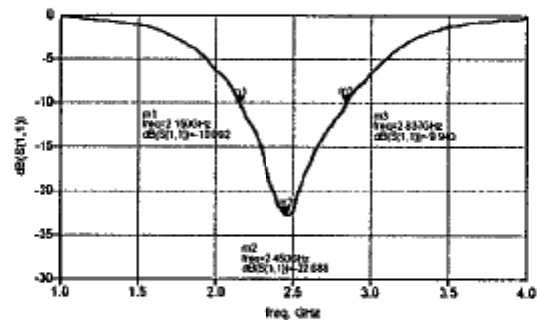


❖ Return Loss

(a) Without Matching Circuits



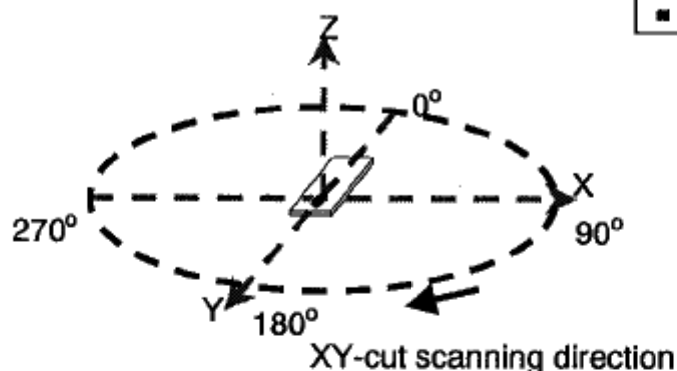
(b) With Matching Circuits



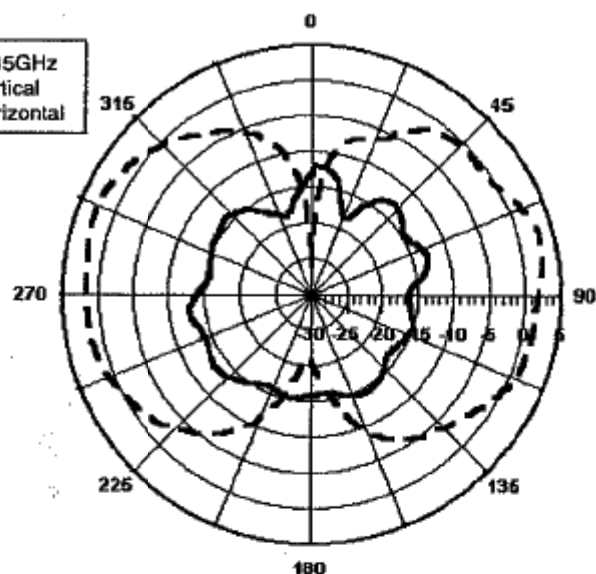
◆Radiation Patterns

ACX
Advanced Ceramic X

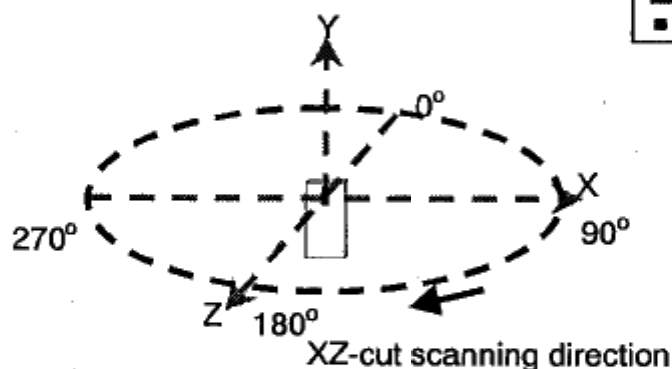
XY-V/XY-H



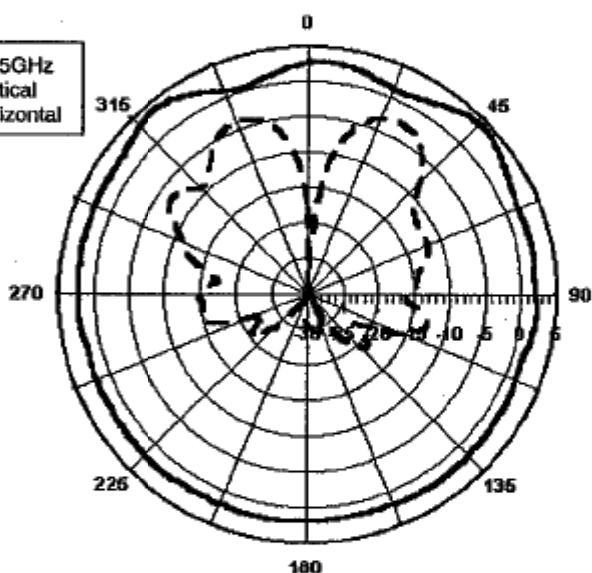
XY cut @2.45GHz
 — Vertical
 - - - Horizontal



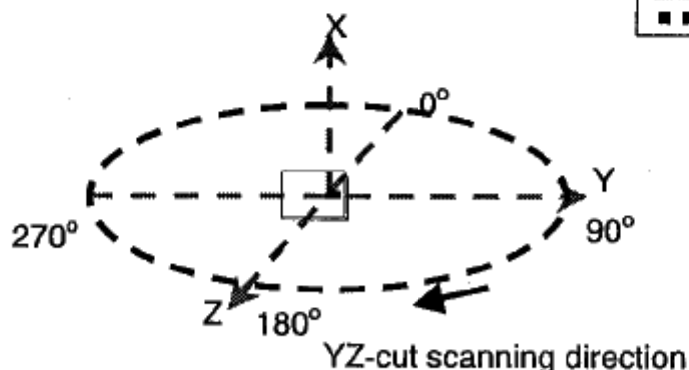
XZ-V/XZ-H



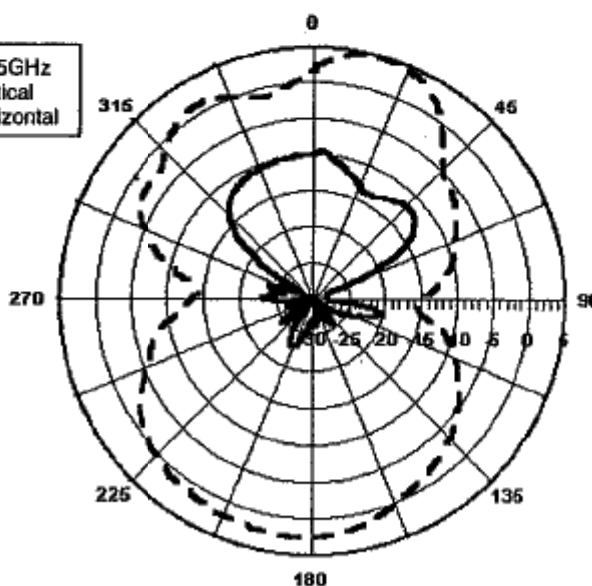
XZ cut @2.45GHz
 — Vertical
 - - - Horizontal



YZ-V/YZ-H



YZ cut @2.45GHz
 — Vertical
 - - - Horizontal



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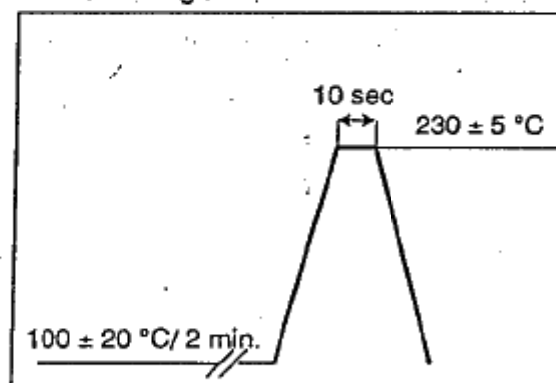
Mechanical & Environmental Characteristics

Item	Requirements	Procedure
Solderability	<ol style="list-style-type: none"> No apparent damage More than 75% of the terminal electrode shall be covered with new solder 	<ol style="list-style-type: none"> Preheat: $120 \pm 5^{\circ}\text{C}$ Solder: $230 \pm 5^{\circ}\text{C}$ for 5 ± 1 sec
Thermal shock (Temperature Cycle)	<ol style="list-style-type: none"> No apparent damage Fulfill the electrical specification after test 	<ol style="list-style-type: none"> One cycle/ step 1: $85 \pm 5^{\circ}\text{C}$ for 20sec step 2: $-40 \pm 3^{\circ}\text{C}$ for 20sec Cycle time: 30min No. of cycles: 100 Recovery: 1-2hrs
Heat Resistance	<ol style="list-style-type: none"> No apparent damage Fulfill the electrical specification after test 	<ol style="list-style-type: none"> Temperature: $85 \pm 2^{\circ}\text{C}$ Duration: 24 ± 2hrs Recovery: 1-2hrs
Low Temperature Resistance	<ol style="list-style-type: none"> No apparent damage Fulfill the electrical specification after test 	<ol style="list-style-type: none"> Temperature: $-40 \pm 5^{\circ}\text{C}$ Duration: 24 ± 2hrs Recovery: 1-2hrs
Humidity Resistance	<ol style="list-style-type: none"> No apparent damage Fulfill the electrical specification after test 	<ol style="list-style-type: none"> Temperature: $85 \pm 2^{\circ}\text{C}$ Humidity: 80% - 85% RH Duration: 1000 ± 48hrs Recovery: 1-2hrs
Drop Shock	<ol style="list-style-type: none"> No apparent damage 	<ol style="list-style-type: none"> Dropped onto hard wood from height of 50 cm for 3 times ; each x,y and z direction except terminal direction

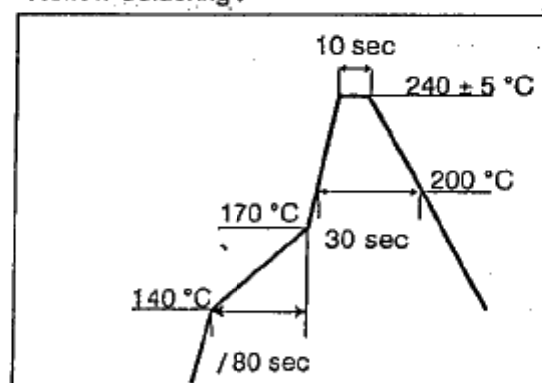
* Operating temperature range: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$

Typical Soldering Profile

Flow Soldering :



Reflow Soldering :



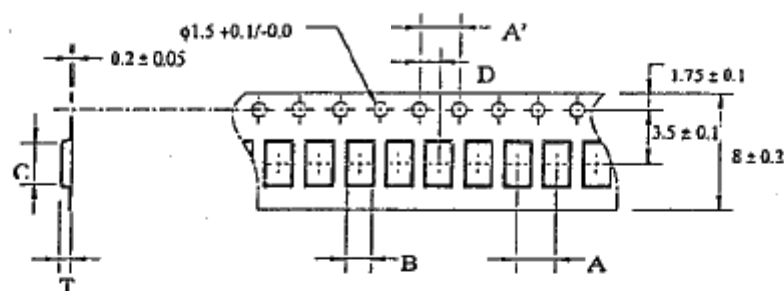
The sample must be pre-heated before soldering .The temperature difference between preheating and soldering must be within 150°C .

Notes

❖ The contents of this data sheet are subject to change without notice. Please confirm the specifications and delivery conditions when placing your order.

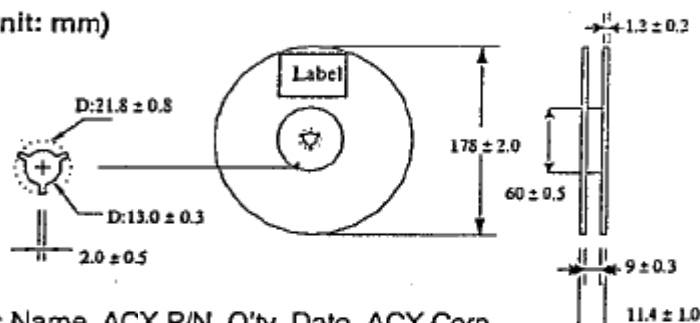
Taping Specifications

❖ Tape Dimensions (Unit: mm)



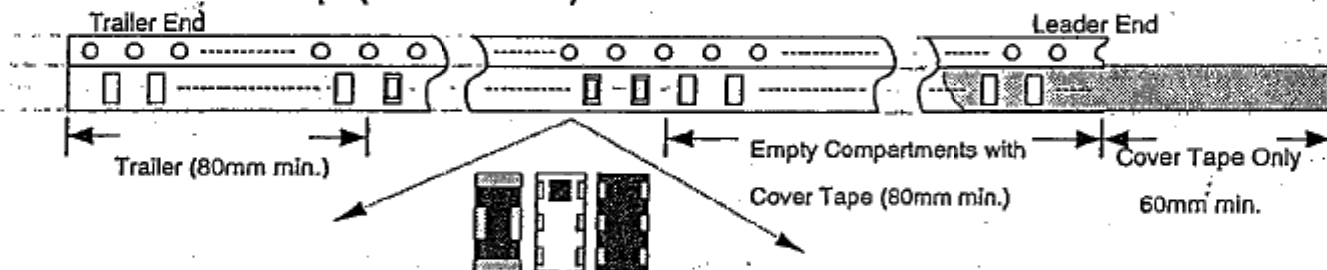
Type	A	A'	B	C	D	T
2012	4.0±0.1	4.0±0.1	1.6±0.1	2.4±0.1	2.0±0.1	Max. 1.3
3216	4.0±0.1	4.0±0.1	1.9±0.1	3.5±0.1	2.0±0.1	Max. 1.4

❖ Reel Dimensions (Unit: mm)

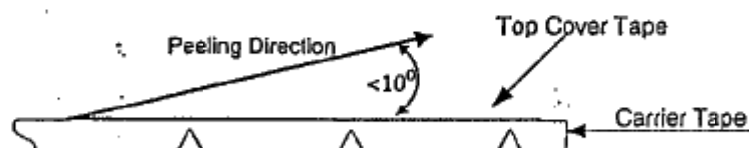


Label: Customer's Name, ACX P/N, Q'ty, Date, ACX Corp.

❖ Leader and Trailer Tape (Plastic material)



❖ Peel-off Force



Peel-off force should be in the range of 0.1 – 0.6 N at a peel-off speed of 300±10 mm/min.

❖ Storage Conditions

To avoid damaging the solderability of the external electrodes, be sure to observe the following points.

- (1) Store products at the ambient temperature in the range of 15 ~35°C and humidity of 45~75% RH. Be noted that the packing materials may be deformed when the temperature exceeds 40°C.
- (2) Store products in non-corrosive gas, such as Cl₂, NH₃, SO₂, NO_x, etc.
- (3) Stored products should be used within 6 months of receipt. Solderability should be verified when exceeding the indicated period.

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Advanced Ceramic X Corp.

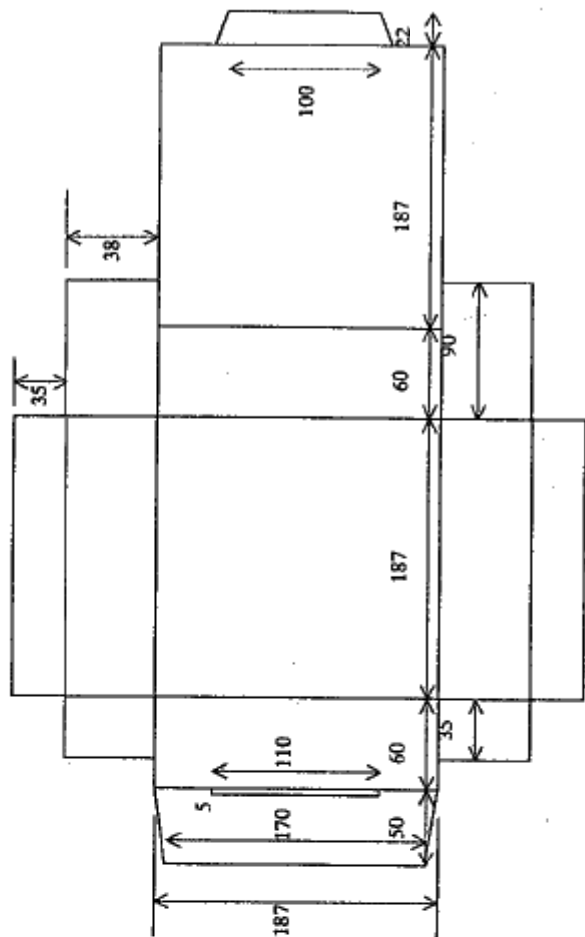
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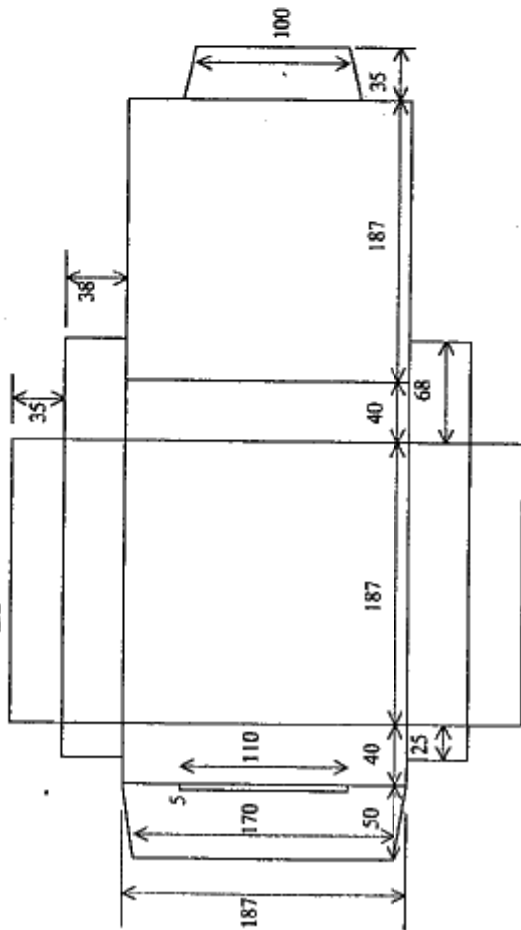
E-mail: acx@acxc.com.tw

<http://www.acxc.com.tw>

3P

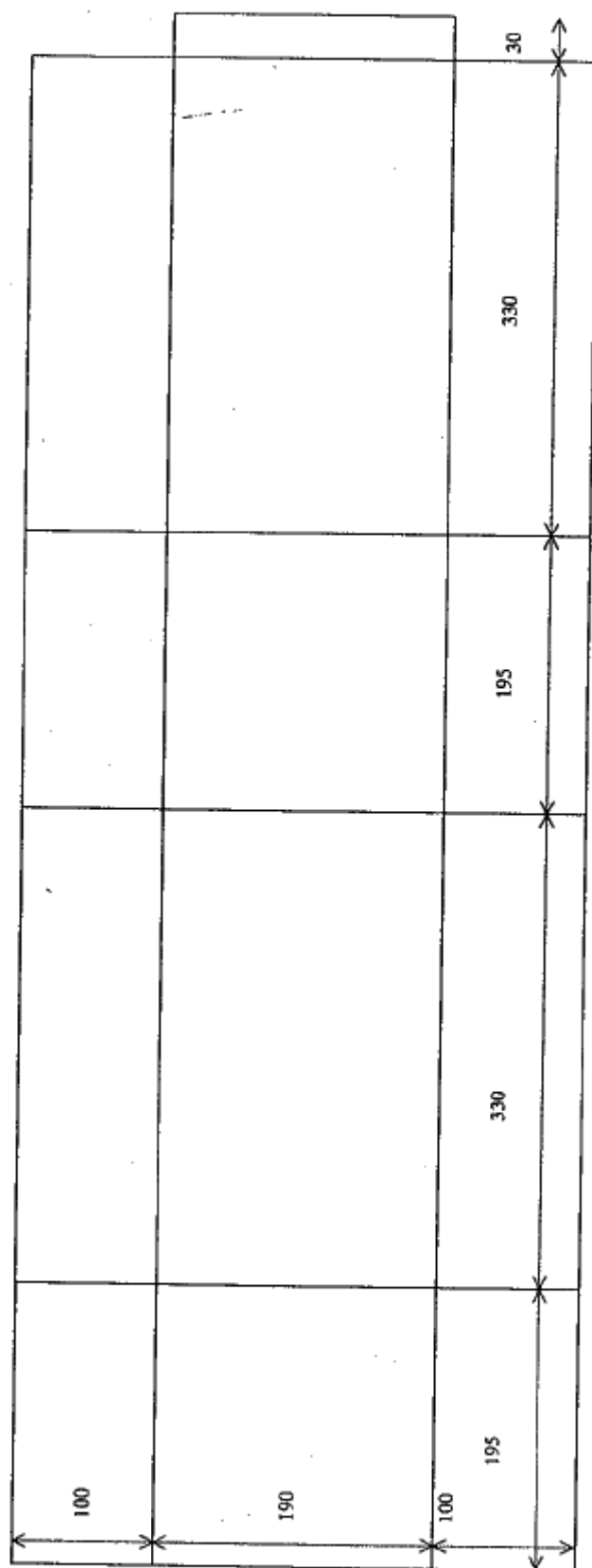


2P



包裝內盒 2 捲裝 3 捲裝展開圖

ACX Advanced Ceramic X			Product Name	File Name	Date	Sheet
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			Drawn	Check	Approval	ISO NO.
			Ray			



包裝外盒 1:5 捲裝展開圖

ACX Advanced Ceramic X		Product Name	File Name	Date	Sheet
		CTN-25P	CTN-25P	2000/01/14	1:5 m/m
		Drawn	Check	Approval	ISO NO.
		Ray			