

# GainForce Technology Co.,Ltd

## 嘉光科技股份有限公司

### 承認書

### APPROVAL SHEET

品名： Multilayer Chip Antenna

MODEL NAME \_\_\_\_\_

料號： AT3216-B2R7HAAT/LF

PAT NUMBER 3.2\*1.6mm Multilayer Chip Antenna

客戶名稱： 晶訊科技股份有限公司

CUSTOMER \_\_\_\_\_

供應商： 嘉光科技股份有限公司

VENDOR \_\_\_\_\_

承認料號： \_\_\_\_\_

Approve P/N \_\_\_\_\_

使用機種： \_\_\_\_\_

MODEL \_\_\_\_\_

聯絡人： 許志遠 DENNIS

聯絡電話： +886-915-296-557

附件：

ACCESSORIES  規格書

SPECIFICATION

樣品

SAMPLE

圖樣

DRAWING

檢驗報告

TEST REPORT

認可狀況：

(APPROVED STATUS)

# AT3216 Series

## Multilayer Chip Antenna

### Features

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

### Applications

- ❖ Bluetooth/Wireless LAN/Home RF
- ❖ ISM band 2.4GHz applications



### Specifications

Part Number	Frequency Range (MHz)	Peak Gain (XZ-V)	Average Gain (XZ-V)	VSWR	Impedance
<b>AT3216</b> <b>-B2R7HAA_</b>	2400 ~ 2500	0.5 dBi typ.	-0.5 dBi typ.	2 max.	50 Ω

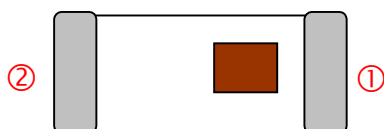
Q'ty/Reel (pcs) : 3,000pcs  
 Operating Temperature Range : -40 ~ +85 °C  
 Storage Temperature Range : -40 ~ +85 °C  
 Power Capacity : 3W max.

### Part Number

AT   3216   -   B   2R7   HAA   □   /LF  
 ①   ②   ③   ④   ⑤   ⑥   ⑦

① Type	AT : Antenna	② Dimensions ( L x W )	3.2x 1.6 mm
③ Material Code	B	④ Frequency Range	2R7=2700MHz
⑤ Specification Code	HAA	⑥ Packaging	T: Tape & Reel B: Bulk
⑦ Soldering	=lead-containing /LF=lead-free		

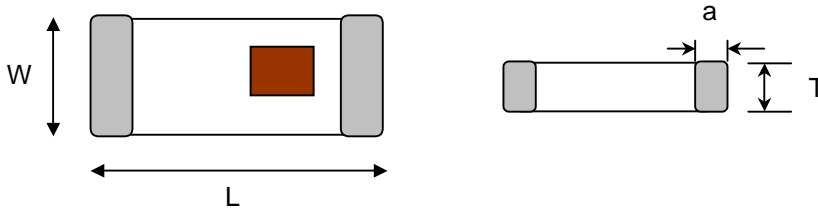
### Terminal Configuration



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

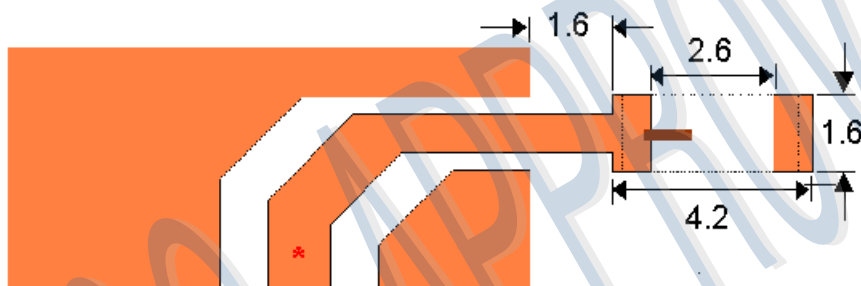
**Dimensions and Recommended PC Board Pattern**

Unit : mm

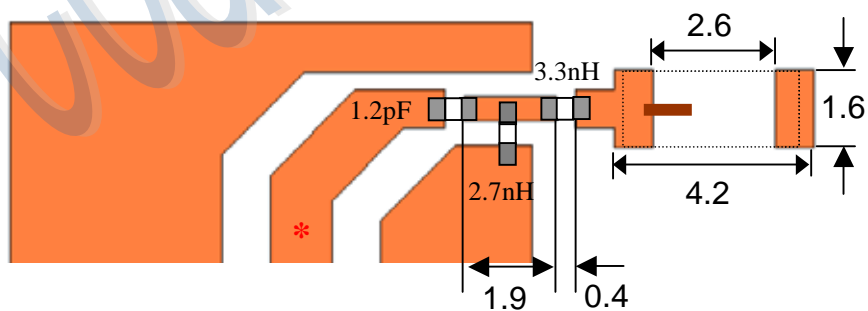


Mark	L	W	T	a
Dimensions	$3.2 \pm 0.2$	$1.6 \pm 0.2$	$1.3 + 0.1 / - 0.2$	$0.5 \pm 0.3$

(a) Without Matching Circuits



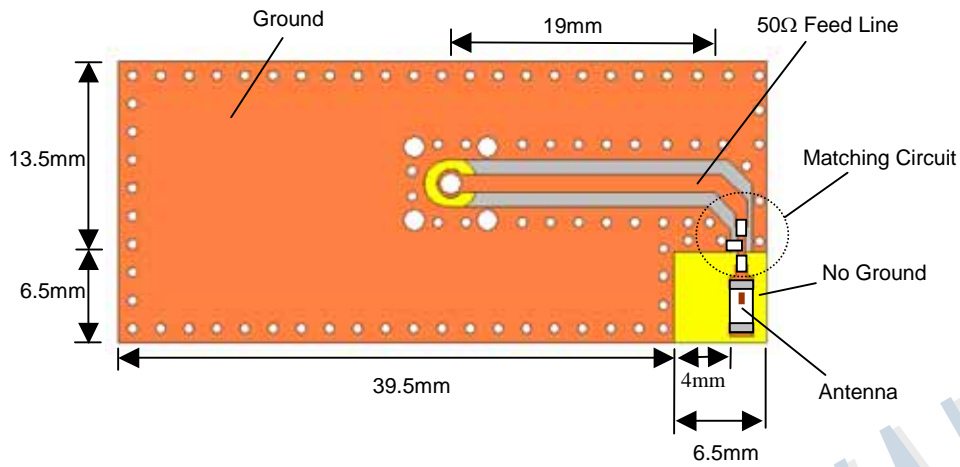
(b) With Matching Circuits



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

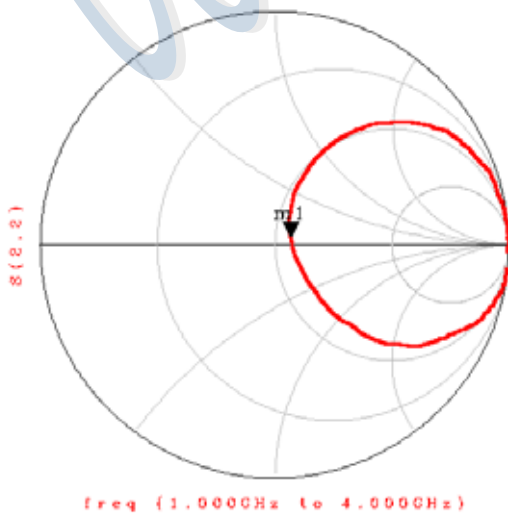
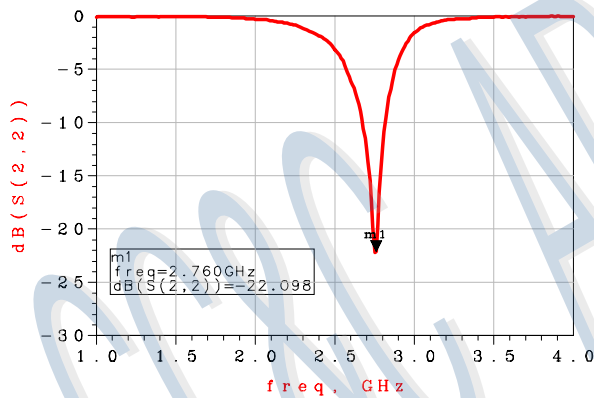
**Typical Electrical Characteristics (T=25°C)**

❖ Test Board

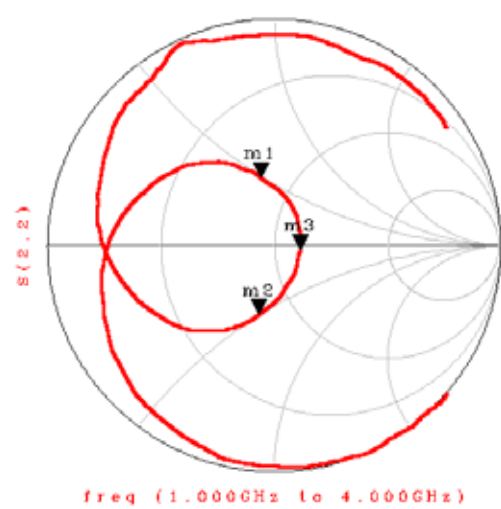
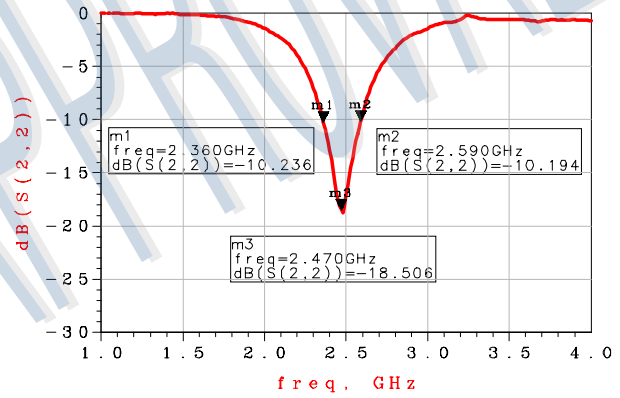


❖ Return Loss

(a) Without Matching Circuits



(b) With Matching Circuits



## Test Report

No. : CE/2010/25138

Date : 2010/03/04

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ADVANCED CERAMIC X (ACX) CORPORATION  
16 TZU CHIANG ROAD, HSINCHU INDUSTRIAL DISTRICT,  
HSINCHU HSIEN, TAIWAN 303



The following sample(s) was/were submitted and identified by/on behalf of the client as :

Sample Description : MULTILAYER LTCC-A COMPONENTS (CERAMIC BODY)  
Style/Item No. : AD SERIES, AM SERIES, AT SERIES, AW SERIES, BD SERIES, BF SERIES, BL SERIES, BM SERIES, CD SERIES, CF SERIES, CP SERIES, DM SERIES, DP SERIES, DS SERIES, FA SERIES, FB SERIES, FD SERIES, HI SERIES, HF SERIES, HM SERIES, HS SERIES, LF SERIES, PD SERIES, NF SERIES, QS SERIES, SF SERIES, TS SERIES, LTCC SUBSTRATES, BCM2037  
Buyer/Order No. : LOCAL COMPANY OR USA COMPANY  
Sample Receiving Date : 2010/02/25  
Testing Period : 2010/02/25 TO 2010/03/04

Test Requested : In accordance with the RoHS Directive 2002/95/EC, and its amendment directives.

Test Method : With reference to IEC 62321: 2008 Procedures for the Determination of Levels of Regulated Substances in Electrotechnical Products.

- (1) Determination of Cadmium by ICP-AES.
- (2) Determination of Lead by ICP-AES.
- (3) Determination of Mercury by ICP-AES.
- (4) Determination of Hexavalent Chromium by UV/Vis Spectrometry.
- (5) Determination of PBB and PBDE by GC/MS.

Test Result(s) : Please refer to next page(s).

**Chenyu Kung / Operation Manager**  
Signed for and on behalf of  
**SGS TAIWAN LTD.**  
Chemical Laboratory – Taipei

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# Test Report

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Date : 2010/03/04

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ADVANCED CERAMIC X (ACX) CORPORATION  
 16 TZU CHIANG ROAD, HSINCHU INDUSTRIAL DISTRICT,  
 HSINCHU HSIEN, TAIWAN 303



Test results by chemical method (Unit: mg/kg)

Test Item (s):	Method (Refer to)	Result	MDL
		No.1	
Cadmium (Cd)	(1)	n.d.	2
Lead (Pb)	(2)	38	2
Mercury (Hg)	(3)	n.d.	2
Hexavalent Chromium Cr(VI) by alkaline extraction	(4)	n.d.	2
<b>Sum of PBBs</b>	(5)	n.d.	-
Monobromobiphenyl		n.d.	5
Dibromobiphenyl		n.d.	5
Tribromobiphenyl		n.d.	5
Tetrabromobiphenyl		n.d.	5
Pentabromobiphenyl		n.d.	5
Hexabromobiphenyl		n.d.	5
Heptabromobiphenyl		n.d.	5
Octabromobiphenyl		n.d.	5
Nonabromobiphenyl		n.d.	5
Decabromobiphenyl		n.d.	5
<b>Sum of PBDEs</b>		n.d.	-
Monobromodiphenyl ether		n.d.	5
Dibromodiphenyl ether		n.d.	5
Tribromodiphenyl ether		n.d.	5
Tetrabromodiphenyl ether		n.d.	5
Pentabromodiphenyl ether		n.d.	5
Hexabromodiphenyl ether		n.d.	5
Heptabromodiphenyl ether		n.d.	5
Octabromodiphenyl ether		n.d.	5
Nonabromodiphenyl ether	n.d.	5	
Decabromodiphenyl ether	n.d.	5	

## TEST PART DESCRIPTION:

NO.1 : MIXED ALL PARTS

Note : 1. mg/kg = ppm; 0.1wt% = 1000ppm

2. n.d. = Not Detected

3. MDL = Method Detection Limit

4. "-" = Not Regulated

5. The sample(s) was/were analyzed on behalf of the applicant as mixing sample in one testing.

The above result(s) was/were only given as the informality value.

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## Test Report

No. : CE/2010/25138

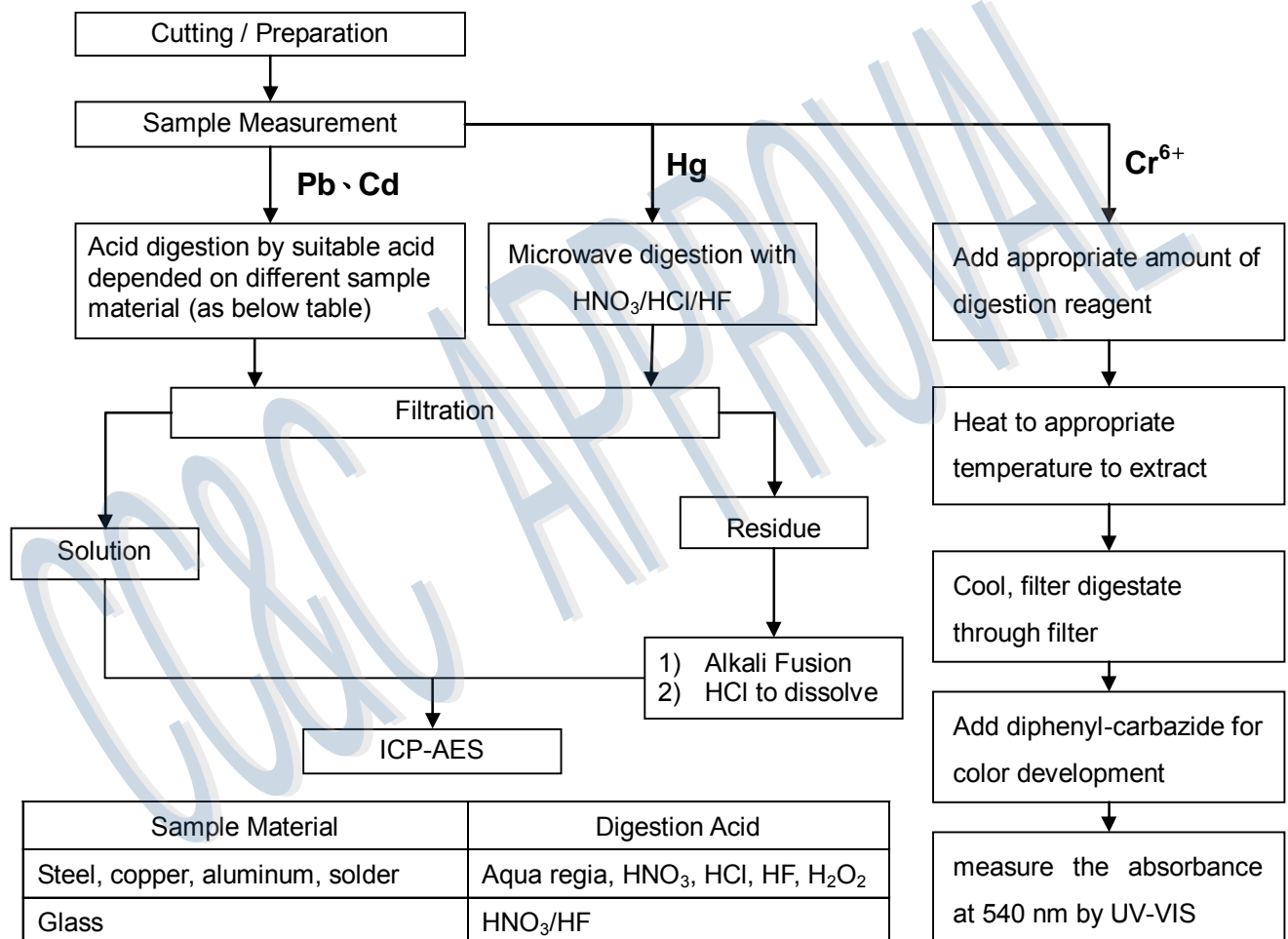
Date : 2010/03/04

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ADVANCED CERAMIC X (ACX) CORPORATION  
 16 TZU CHIANG ROAD, HSINCHU INDUSTRIAL DISTRICT,  
 HSINCHU HSIEN, TAIWAN 303



- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.  
 (Cr<sup>6+</sup> test method excluded)
- 2) Name of the person who made measurement: Climbgreat Yang
- 3) Name of the person in charge of measurement: Troy Chang



Sample Material	Digestion Acid
Steel, copper, aluminum, solder	Aqua regia, HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub>
Glass	HNO <sub>3</sub> /HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO <sub>3</sub>
Plastic	H <sub>2</sub> SO <sub>4</sub> , H <sub>2</sub> O <sub>2</sub> , HNO <sub>3</sub> , HCl
Others	Any acid to total digestion

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## Test Report

No. : CE/2010/25138

Date : 2010/03/04

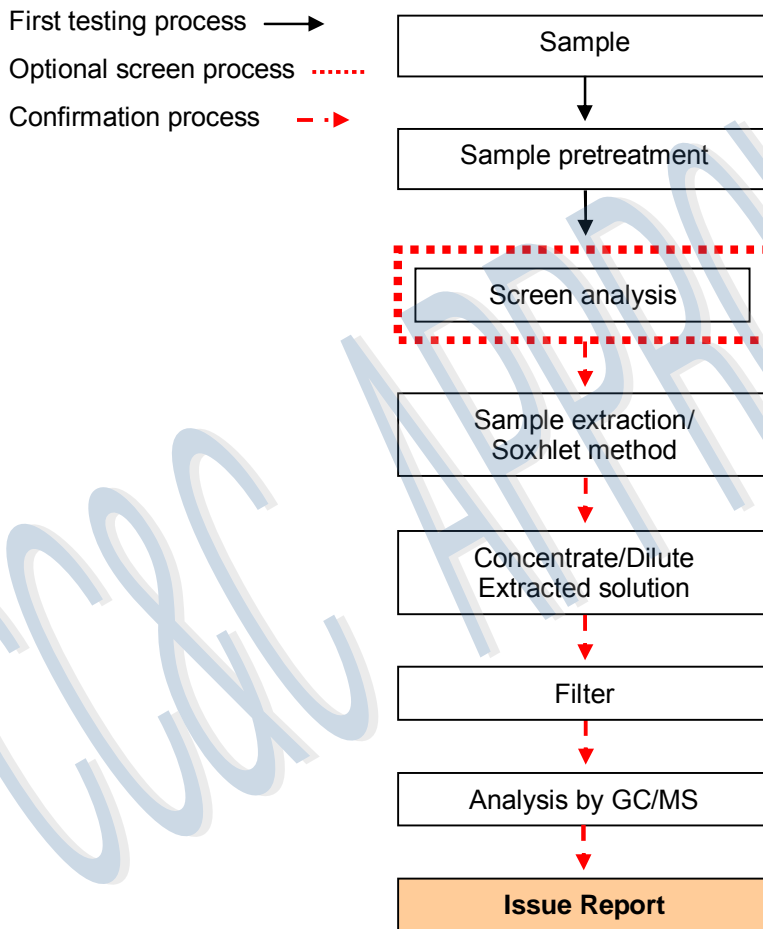
Page : 4 of 5

ADVANCED CERAMIC X (ACX) CORPORATION  
 16 TZU CHIANG ROAD, HSINCHU INDUSTRIAL DISTRICT,  
 HSINCHU HSIEN, TAIWAN 303



### PBB/PBDE analytical FLOW CHART

- 1) Name of the person who made measurement: Roman Wong
- 2) Name of the person in charge of measurement: Shinjyh Chen



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## Test Report

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ADVANCED CERAMIC X (ACX) CORPORATION  
16 TZU CHIANG ROAD, HSINCHU INDUSTRIAL DISTRICT,  
HSINCHU HSIEN, TAIWAN 303



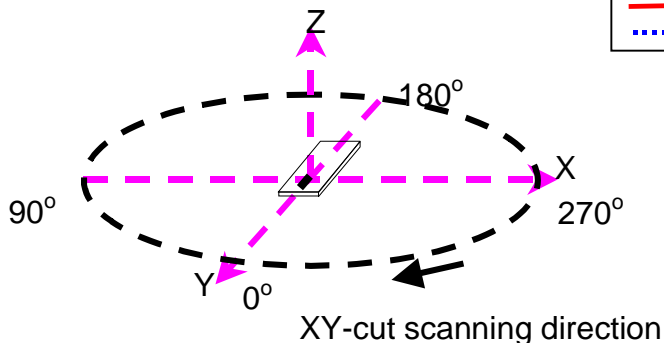
\*\* End of Report \*\*

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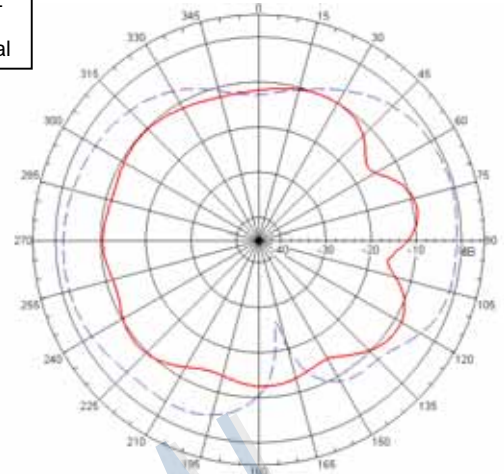
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Radiation Patterns

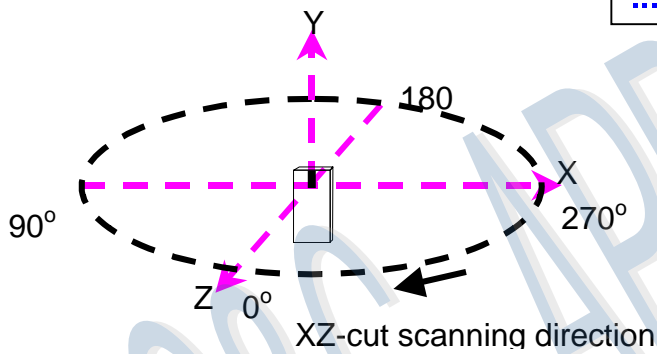
XY-V/XY-H



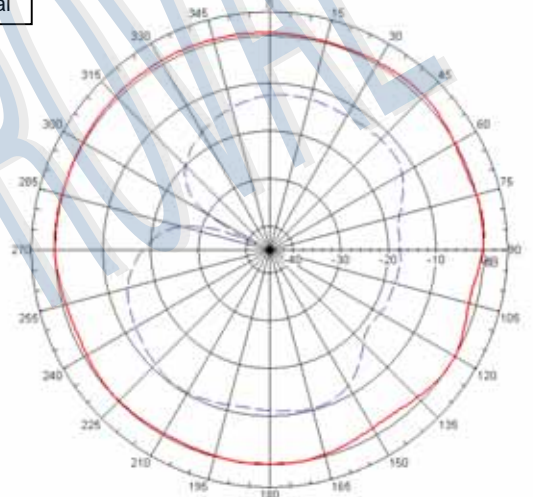
XY cut @2.45GHz  
— Vertical  
⋯ Horizontal



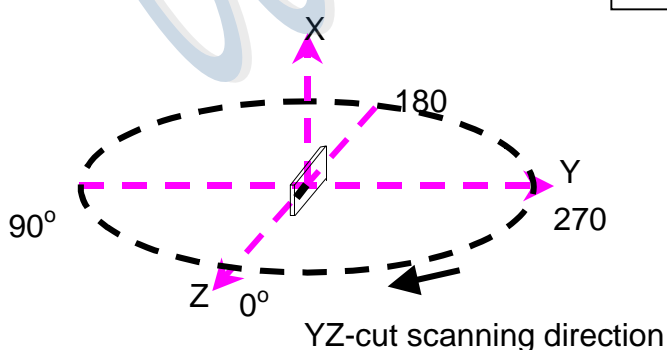
XZ-V/XZ-H



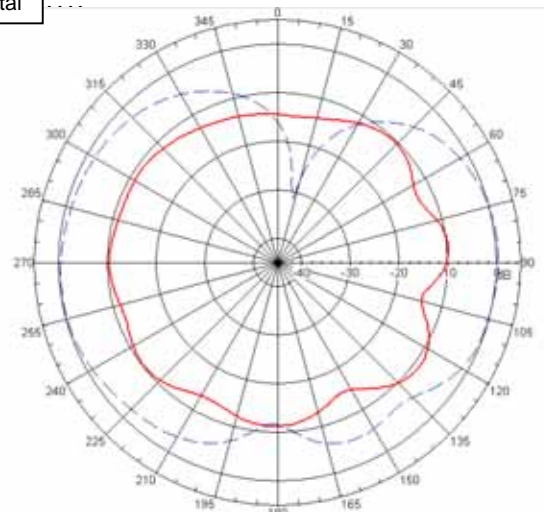
XZ cut @2.45GHz  
— Vertical  
⋯ Horizontal



YZ-V/YZ-H



YZ cut @2.45GHz  
— Vertical  
⋯ Horizontal



**Advanced Ceramic X Corp.**

16 Tzu Chiang Road, Hsinchu Industrial District Hsinchu Hsien 303, Taiwan

TEL:886-3-5987008 FAX:886-3-5987001

E-mail: [acx@acxc.com.tw](mailto:acx@acxc.com.tw) <http://www.acxc.com.tw>

## Test Report

No. : CE/2010/50443

Date : 2010/05/11

Page : 1 of 6

ADVANCED CERAMIC X (ACX) CORPORATION  
16, TZU CHIANG ROAD, HSINCHU INDUSTRIAL DISTRICT,  
HSINCHU HSIEN, TAIWAN 303



The following sample(s) was/were submitted and identified by/on behalf of the client as :

Sample Description : TERMINATION MATERIAL  
Style/Item No. : AD SERIES, AM SERIES, AT SERIES, AW SERIES, BD SERIES,  
BF SERIES, BL SERIES, BM SERIES, CD SERIES, CF SERIES,  
CP SERIES, DM SERIES, DP SERIES, DS SERIES, FA SERIES,  
FB SERIES, FD SERIES, HI SERIES, HF SERIES, HM SERIES,  
HS SERIES, LF SERIES, PD SERIES, NF SERIES, QS SERIES,  
SF SERIES, TS SERIES, LTCC SUBSTRATES, BCM2037  
Buyer/Order No. : LOCAL COMPANY OR USA COMPANY  
Sample Receiving Date : 2010/05/04  
Testing Period : 2010/05/04 TO 2010/05/11

=====  
**Test Requested** : In accordance with the RoHS Directive 2002/95/EC, and its amendment directives.

**Test Method** : With reference to IEC 62321: 2008  
Procedures for the Determination of Levels of Regulated Substances in  
Electrotechnical Products.  
(1) Determination of Cadmium by ICP-AES.  
(2) Determination of Lead by ICP-AES.  
(3) Determination of Mercury by ICP-AES.  
(4) Determination of Hexavalent Chromium by Spot test / boiling water  
extraction Method.  
(5) Determination of PBB and PBDE by GC/MS.

**Test Result(s)** : Please refer to next page(s).

**Chenyu Kung / Operation Manager**  
**Signed for and on behalf of**  
**SGS TAIWAN LTD.**  
**Chemical Laboratory – Taipei**

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ADVANCED CERAMIC X (ACX) CORPORATION  
16, TZU CHIANG ROAD, HSINCHU INDUSTRIAL DISTRICT,  
HSINCHU HSIEN, TAIWAN 303



Test results by chemical method (Unit: mg/kg)

Test Item (s):	Method (Refer to)	Result	MDL
		No.1	
Cadmium (Cd)	(1)	n.d.	2
Lead (Pb)	(2)	n.d.	2
Mercury (Hg)	(3)	n.d.	2
Hexavalent Chromium Cr(VI) by Spot test / boiling water extraction	(4)	Negative	See Note 4
<b>Sum of PBBs</b>	(5)	n.d.	-
Monobromobiphenyl		n.d.	5
Dibromobiphenyl		n.d.	5
Tribromobiphenyl		n.d.	5
Tetrabromobiphenyl		n.d.	5
Pentabromobiphenyl		n.d.	5
Hexabromobiphenyl		n.d.	5
Heptabromobiphenyl		n.d.	5
Octabromobiphenyl		n.d.	5
Nonabromobiphenyl		n.d.	5
Decabromobiphenyl		n.d.	5
<b>Sum of PBDEs</b>		n.d.	-
Monobromodiphenyl ether		n.d.	5
Dibromodiphenyl ether		n.d.	5
Tribromodiphenyl ether		n.d.	5
Tetrabromodiphenyl ether		n.d.	5
Pentabromodiphenyl ether		n.d.	5
Hexabromodiphenyl ether		n.d.	5
Heptabromodiphenyl ether		n.d.	5
Octabromodiphenyl ether		n.d.	5
Nonabromodiphenyl ether	n.d.	5	
Decabromodiphenyl ether	n.d.	5	

## TEST PART DESCRIPTION:

NO.1 : GRAY PLATING LAYER

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HSINCHU HSIEN, TAIWAN 303



Note : 1. mg/kg = ppm; 0.1wt% = 1000ppm

2. n.d. = Not Detected

3. MDL = Method Detection Limit

4. Spot-test:

Negative = Absence of Cr(VI) coating / surface layer,

Positive = Presence of Cr(VI) coating / surface layer;

(The tested sample should be further verified by boiling-water-extraction method if the spot test result cannot be confirmed.)

Boiling-water-extraction:

Negative = Absence of Cr(VI) coating / surface layer.

Positive = Presence of Cr(VI) coating / surface layer;

the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm<sup>2</sup> sample surface area.

5. "-" = Not Regulated

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No. : CE/2010/50443

Date : 2010/05/11

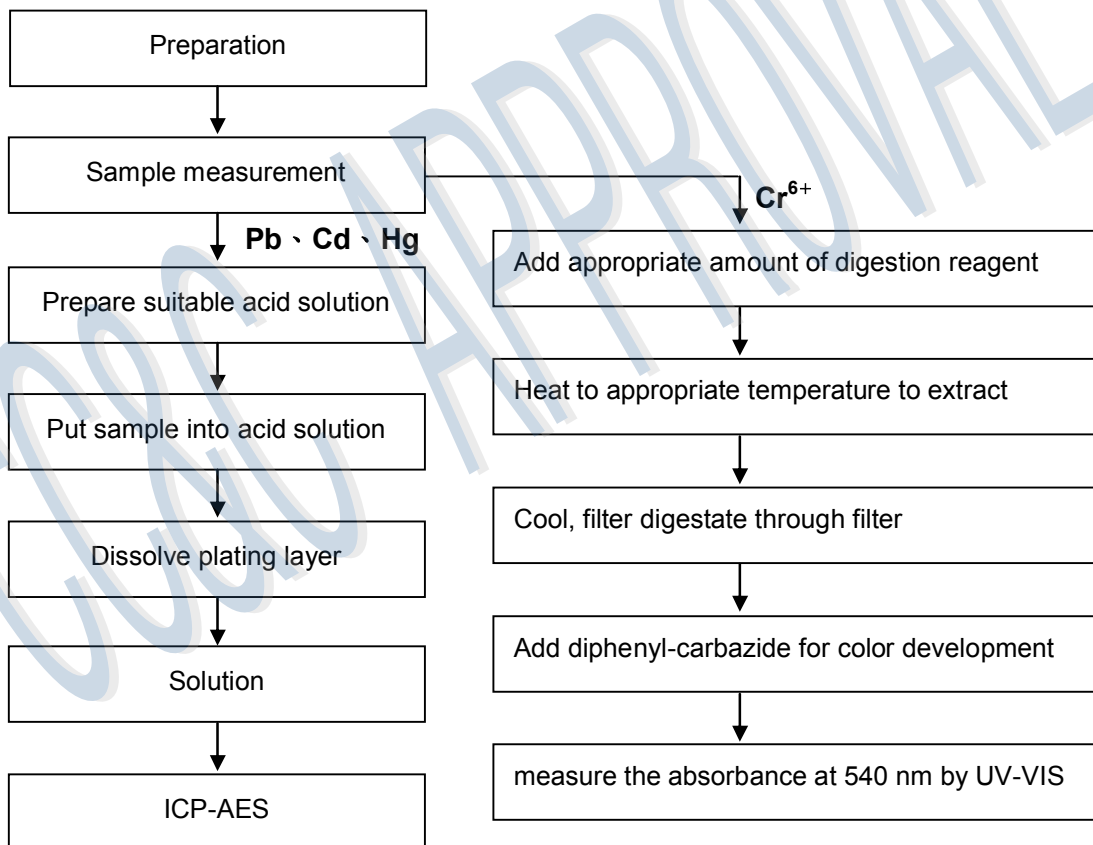
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HSINCHU HSIEN, TAIWAN 303



- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr<sup>6+</sup> test method excluded)
- 2) Name of the person who made measurement: Climbgreat Yang
- 3) Name of the person in charge of measurement: Troy Chang

### Flow Chart of Stripping method for metal analysis



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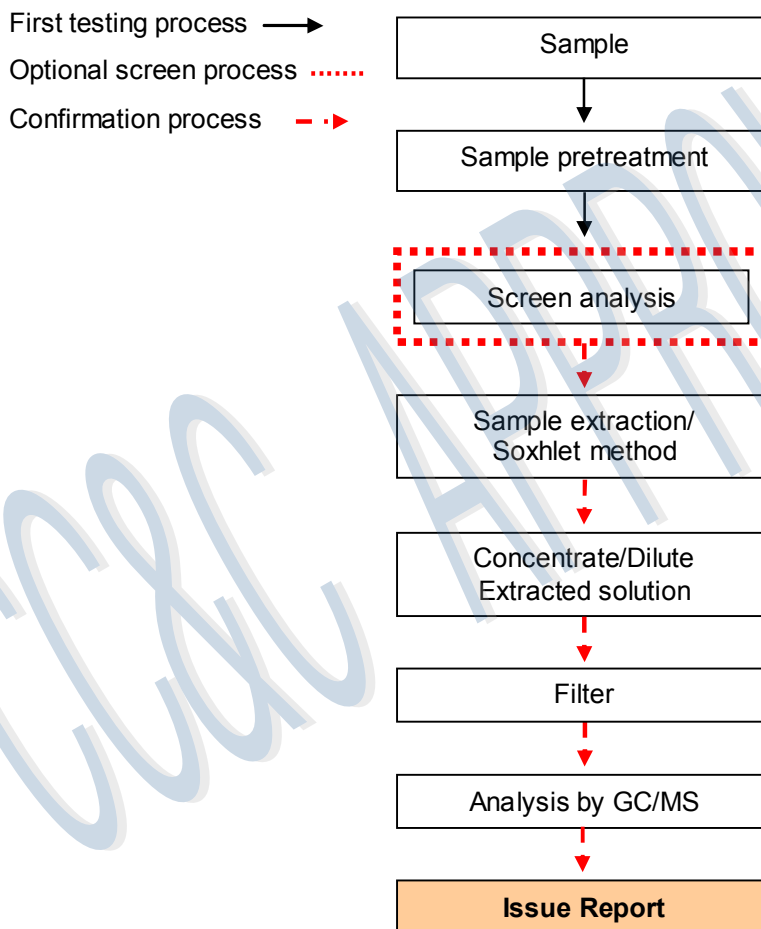
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### PBB/PBDE analytical FLOW CHART

- 1) Name of the person who made measurement: Roman Wong
- 2) Name of the person in charge of measurement: Troy Chang



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\*\* End of Report \*\*

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