GainForce Technology Co.,Ltd

嘉光科技股份有限公司

5/30

承認書

APPROVAL SHEET

品　　名：
MODEL NAME　Antenna

料　　號：
PART NUMBER　AT5020-B2R8HAAT/LF

客戶名稱：
CUSTOMER　鴻邦電子

供 應 商：
VENDOR　GainForce

使用機種：
MODEL

聯 絡 人：　陳 仕 軒

聯絡電話：　(02) 2880-1838 / (755) 23115592

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)

2010. 6. 16

鴻邦(深圳)有限公司 文件管制中心 2014-06-0 PAGE: 005

R&D / PE / QC /PURCHASE / VENDOR

APP.NO.:

ACX
Advanced Ceramic X

6/70

AT5020 Series

Ceramic 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	Operating Frequency (MHz)	Peak Gain (XZ-V)	Average Gain (XZ-V)	VSWR	Impedance
AT5020 -B2R8HAA	2400 ~ 2500	0 dBi typ	-1 dBi typ	2 max	50 Ω

Q'ty/Reel (pcs) : 2,000pcs
Operating Temperature Range : -40 ~ +85 °C
Storage Temperature Range : +5 ~ +35 °C, Humidity 45~75%RH
Storage Period : 12 months max
Power Capacity : 2W max.

Part Number

AT 5020 - B 2R8 HAA □ □

① ② ③ ④ ⑤ ⑥ ⑦

① Type	Ceramic Antenna	② Dimensions (L × W)	5.0× 2.0 mm
③ Material Code	B	④ Initial center frequency	2R8=2800MHz
⑤ Specification Code	HAA	Packaging	T: Tape & Reel B: Bulk
⑥ Soldering	=lead-containing /LF=lead-free		

Terminal Configuration

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

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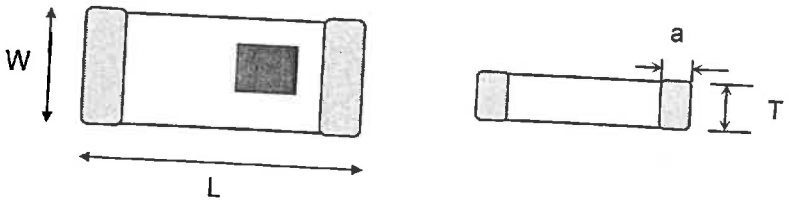
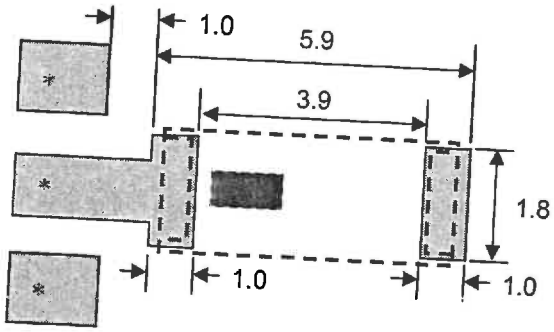
Dimensions and Recommended PC Board Pattern

Unit : mm

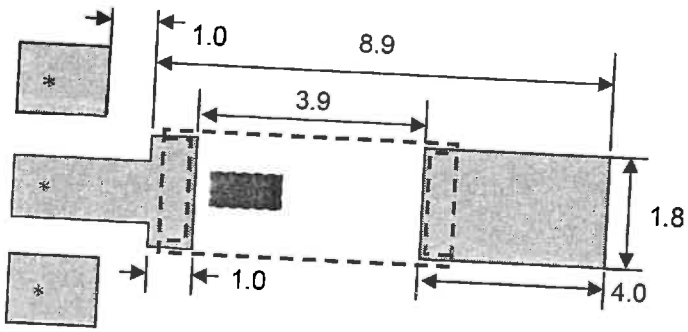


Mark	L	W	T	a
Dimensions	5.0±0.2	2.0±0.2	1.1±0.2	0.5±0.3

(a) Without Matching Circuits



(b) With Matching Circuits



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

Typical Electrical Characteristics (T=25°C)

❖Test Board

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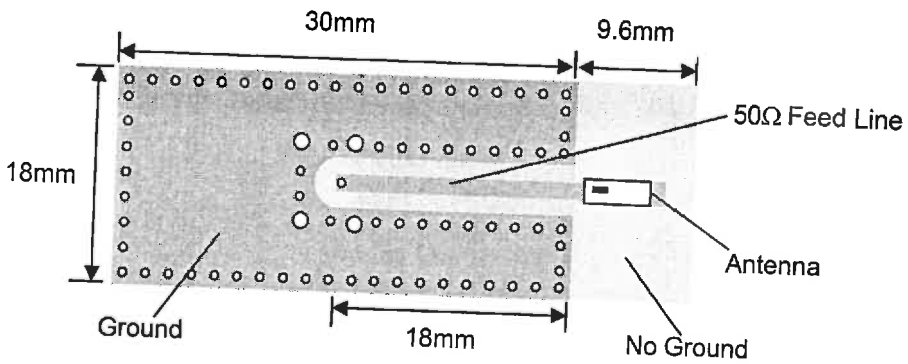
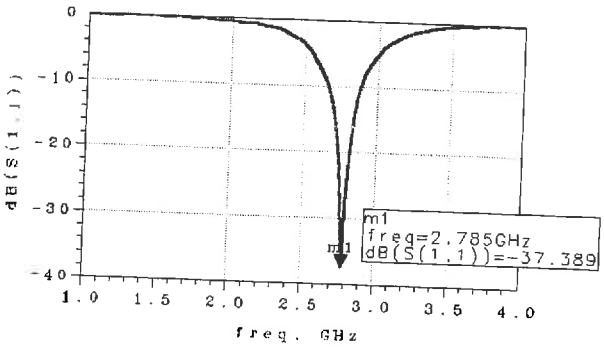
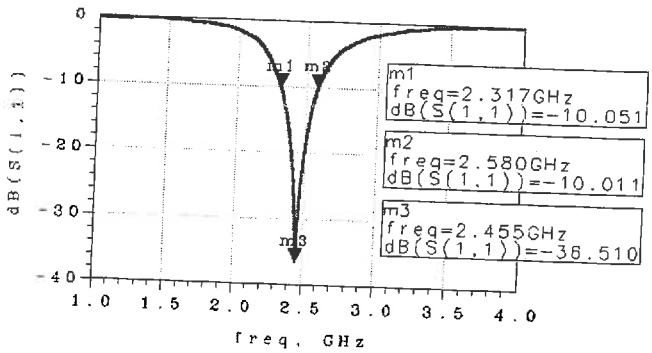


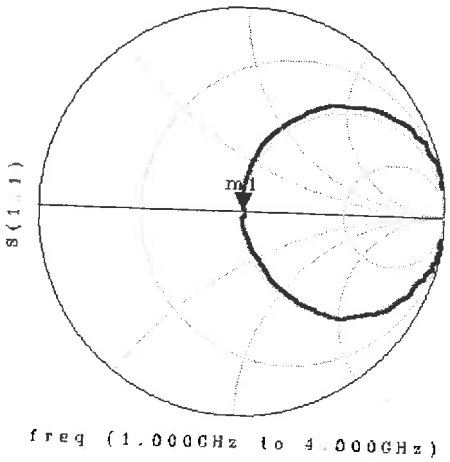
❖Return Loss

(a) Without Matching Circuits

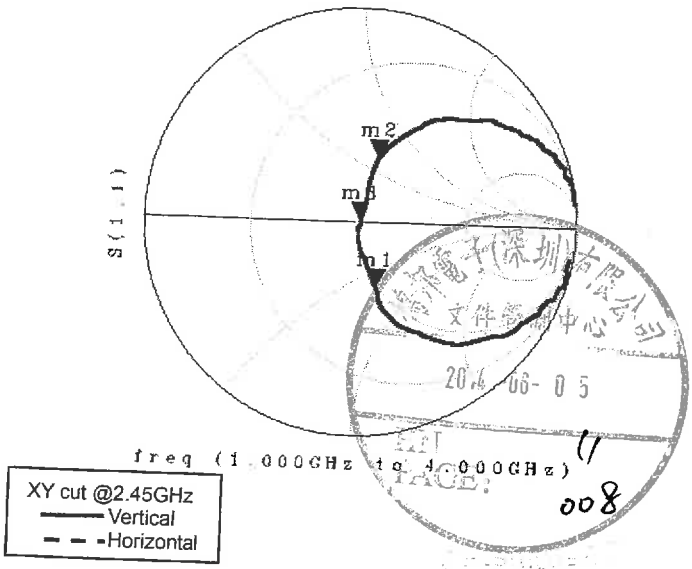


(b) With Matching Circuits





❖R



ACX
Advanced Ceramic X

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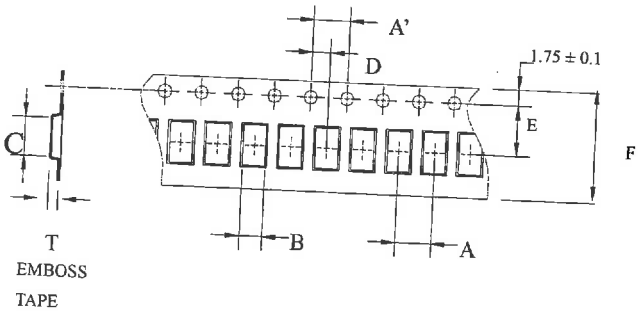
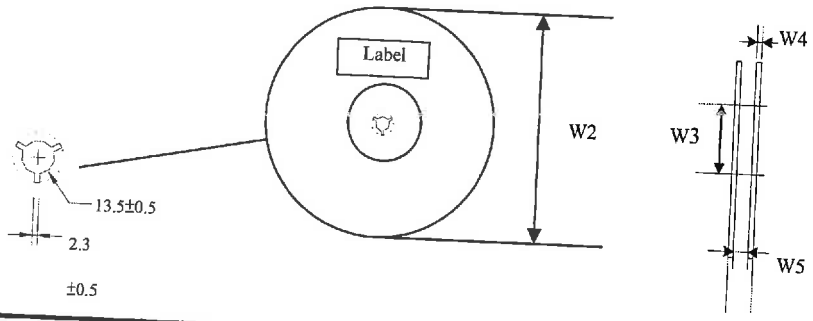
Taping Specifications

❖Tape & Reel Dimensions (Unit: mm) vs. Quantity (pcs)



Type	A	A'	B	C	D	E	F	T	Quantity/per reel	Tape material
AT5020	4.0± 0.1	4.0± 0.1	2.4± 0.1	5.4± 0.1	2.0± 0.05	5.5± 0.1	12.0± 0.1	1.20± 0.1	2,000pcs	Plastic (Embossed)

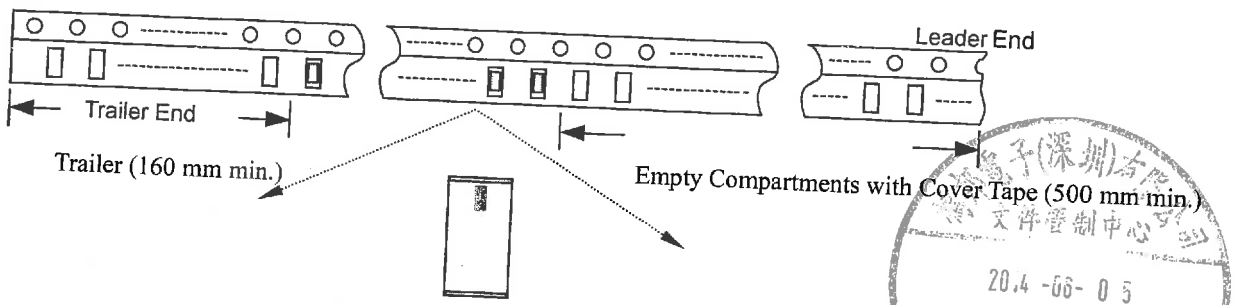
❖Reel Dimensions (Unit: mm)



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

Type	W2	W3	W4	W5
AT5020	178±1	60±1	1.4±0.2	17±0.5

❖Leader and Trailer Tape



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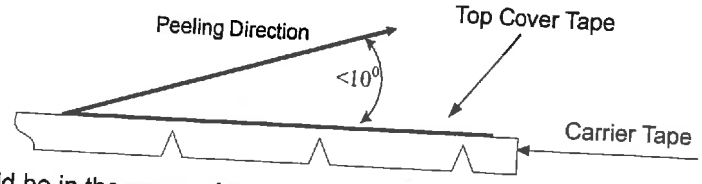
❖**Peel-off Force**



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

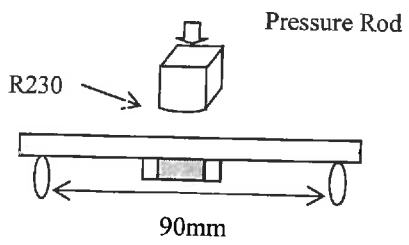
❖**Storage Conditions**

(1) Temperature: 15 ~35℃, relative humidity (RH): 45~75%.
(2) Non-corrosive environment

Notes

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

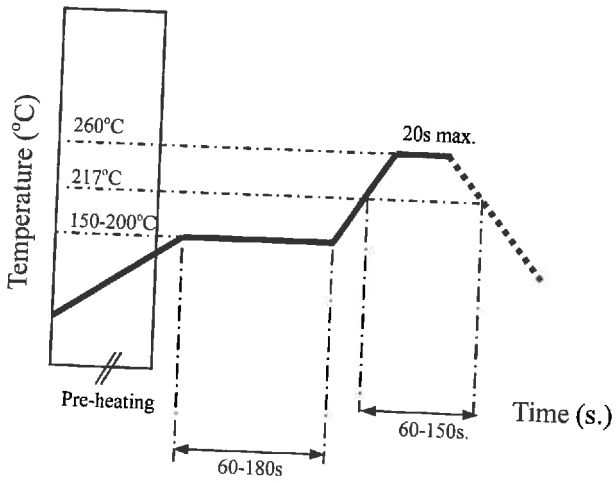
Mechanical & Environmental Characteristics

Item	Requirements	Procedure
Solderability	1. No apparent damage 2. More than 95% of the terminal electrode shall be covered with new solder	1. Preheat: 120± 5 °C 2. Solder: 245± 5°C for 5± 1 sec
Soldering strength (Termination Adhesion)	1. 1kg minimum	1. Solder specimen onto test jig. 2. Apply push force at 0.5mm/s until electrode pads are peeled off or ceramic are broken. Pushing force is applied to longitude direction
Deflection (Substrate Bending)	1. No apparent damage	1. Solder specimen onto test jig (FR4, 0.8mm) using the recommend soldering profile. 2. Apply a bending force of 1mm deflection 
Heat/Humidity Resistance	1. No apparent damage 2. Fulfill the electrical specification after test	1. Temperature: 85± 2°C 2. Humidity: 90% ~ 95% RH 3. Duration: 1000±48hrs 4. Recovery: 1-2hrs
Thermal shock (Temperature Cycle)	1. No apparent damage 2. Fulfill the electrical specification after test	1. One cycle/step 1：125 ± 5°C for 30 min step 2：- 40 ± 5°C for 30 min 2. No of cycles：100 3. Recovery:1-2 hrs
Low Temperature Resistance	1. No apparent damage 2. Fulfill the electrical specification after test	1. Temperature: -40°± 5 °C 2. Duration: 500 ±24hrs 3. Recovery: 1-2hrs

Soldering Conditions

❖**Typical Soldering Profile for Lead-free Process**

Reflow Soldering :



Notes

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

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
http://www.acxc.com.tw

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Test Report

No. : CE/2013/55890 Date : 2013/06/07

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 applicant as :

Sample Submitted By	:	ADVANCED CERAMIC X (ACX) CORPORATION
Sample Description	:	MULTILAYER LTCC-B COMPONENTS (CERAMIC BODY)
Style/Item No.	:	AD SERIES, AT SERIES, BD SERIES, BF SERIES, BL SERIES, BM SERIES, BW SERIES, CD SERIES, CF SERIES, CP SERIES, DM SERIES, DP SERIES, DS SERIES, EF SERIES, ES SERIES, FA SERIES, FB SERIES, FD SERIES, FM SERIES, GS SERIES, HI SERIES, HF SERIES, HM SERIES, HS SERIES, LF SERIES, OM SERIES, OS SERIES, PD SERIES, NF SERIES, QS SERIES, SF SERIES, TS SERIES, TP SERIES, LTCC SUBSTRATES
Sample Receiving Date	:	2013/05/31
Testing Period	:	2013/05/31 TO 2013/06/07

==========

Test Requested : (1) As specified by client, with reference to RoHS Directive 2011/65/EU Annex II to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs contents in the submitted sample.

(2) As specified by client, to test Halogen-Fluorine, Chlorine, Bromine, Iodine contents in the submitted sample.

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

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

SGS TAIWAN LTD
Troy Chang / Manager-Tech
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory – Taipei

文件管制中心
2014-06-03
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Test Report

No. : CE/2013/55890 Date : 2013/06/07

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

Test Result(s)

PART NAME No.1 : MULTILAYER LTCC-B COMPONENTS (CERAMIC BODY)

Test Item(s)	Unit	Method	MDL	Result No.1
Cadmium (Cd)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
Lead (Pb)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	57400
Mercury (Hg)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
Hexavalent Chromium Cr(VI)	mg/kg	With reference to IEC 62321: 2008 and performed by UV-VIS.	2	n.d.
Sum of PBBs	mg/kg	With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
Monobromobiphenyl			5	n.d.
Dibromobiphenyl			5	n.d.
Tribromobiphenyl			5	n.d.
Tetrabromobiphenyl			5	n.d.
Pentabromobiphenyl			5	n.d.
Hexabromobiphenyl			5	n.d.
Heptabromobiphenyl			5	n.d.
Octabromobiphenyl			5	n.d.
Nonabromobiphenyl			5	n.d.
Decabromobiphenyl			5	n.d.
Sum of PBDEs			-	n.d.
Monobromodiphenyl ether			5	n.d.
Dibromodiphenyl ether			5	n.d.
Tribromodiphenyl ether			5	n.d.
Tetrabromodiphenyl ether			5	n.d.
Pentabromodiphenyl ether			5	n.d.
Hexabromodiphenyl ether			5	n.d.
Heptabromodiphenyl ether			5	n.d.
Octabromodiphenyl ether			5	n.d.
Nonabromodiphenyl ether			5	n.d.
Decabromodiphenyl ether			5	n.d.

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Test Report

No. : CE/2013/55890 Date : 2013/06/07

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

Test Item(s)	Unit	Method	MDL	Result No.1
Halogen				
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)			50	n.d.
Halogen-Bromine (Br) (CAS No.: 10097-32-2)			50	n.d.
Halogen-Iodine (I) (CAS No.: 14362-44-8)			50	n.d.

Note :

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. " - " = Not Regulated

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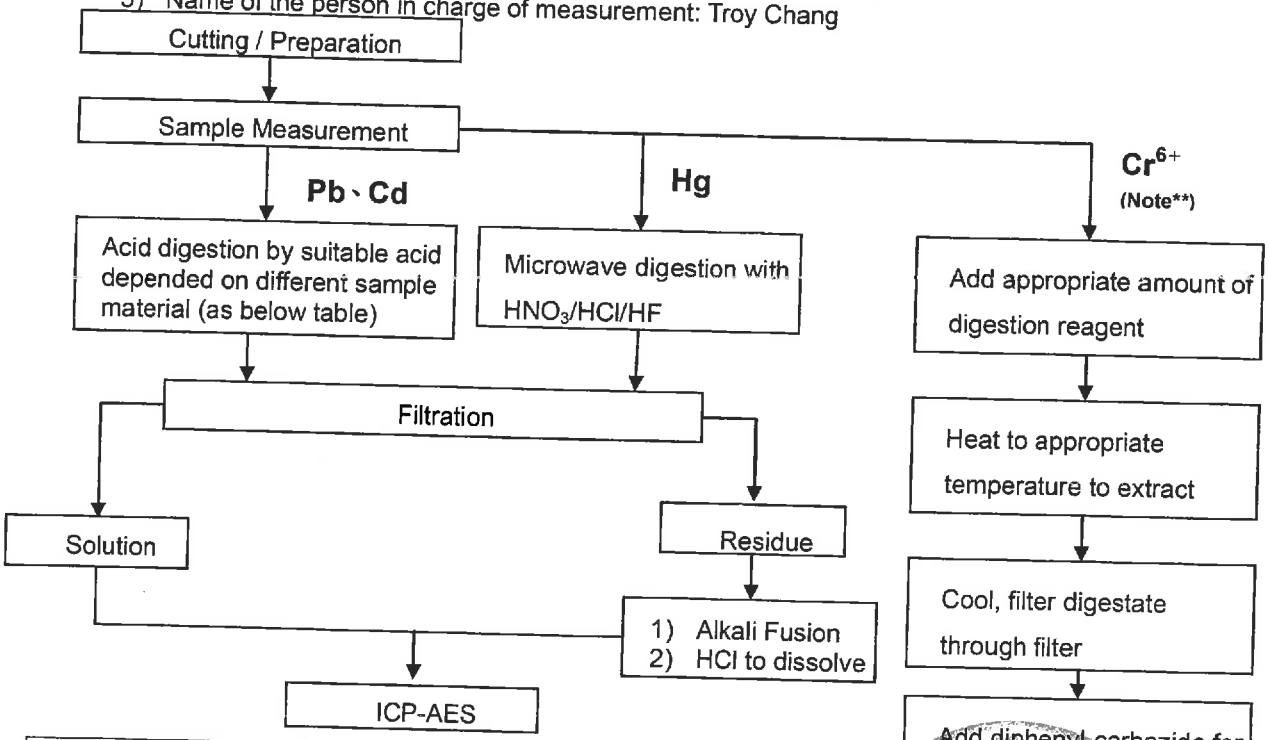
Test Report

No. : CE/2013/55890 Date : 2013/06/07

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^{6+} 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_3, HCl, HF, H_2O_2
Glass	HNO_3/HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO_3
Plastic	H_2SO_4, H_2O_2, HNO_3, HCl
Others	Added appropriate reagent to total digestion

Note :** (1) For non-metallic material, add alkaline digestion reagent and heat to 90~95°C
(2) For metallic material, add pure water and heat to boiling.

SGS Taiwan Ltd. 台灣通標檢驗技術股份有限公司 | 33, Wu Chuan Rd., New Taipei Industrial Park, New Taipei City, Taiwan / 新北市新北產業園區五權路33號
t+886 (02)2299 3279 f+886 (02)2299 3237 www.sgs.tw

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Test Report

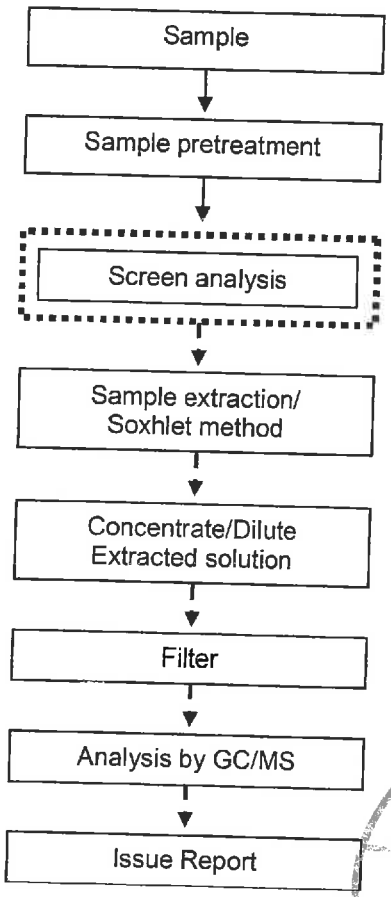
No. : CE/2013/55890 Date : 2013/06/07

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

PBB/PBDE analytical FLOW CHART

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

First testing process →
Optional screen process ....
Confirmation process - ·→



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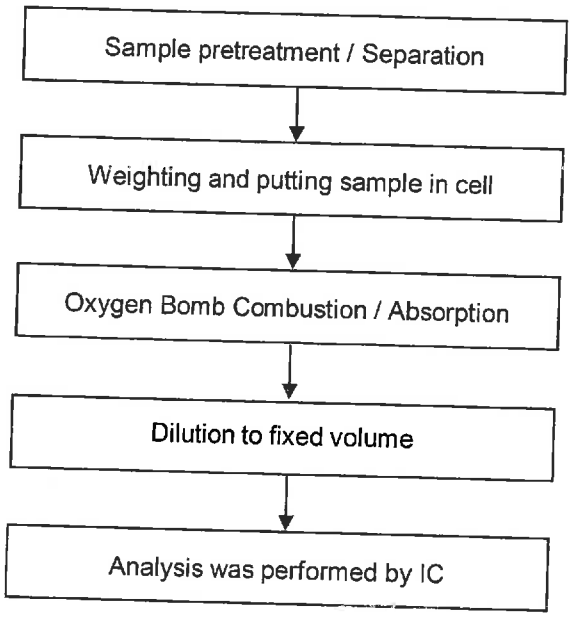
Test Report

No. : CE/2013/55890 Date : 2013/06/07

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

Analytical flow chart of halogen content

- Name of the person who made measurement: Rita Chen
- Name of the person in charge of measurement: Troy Chang



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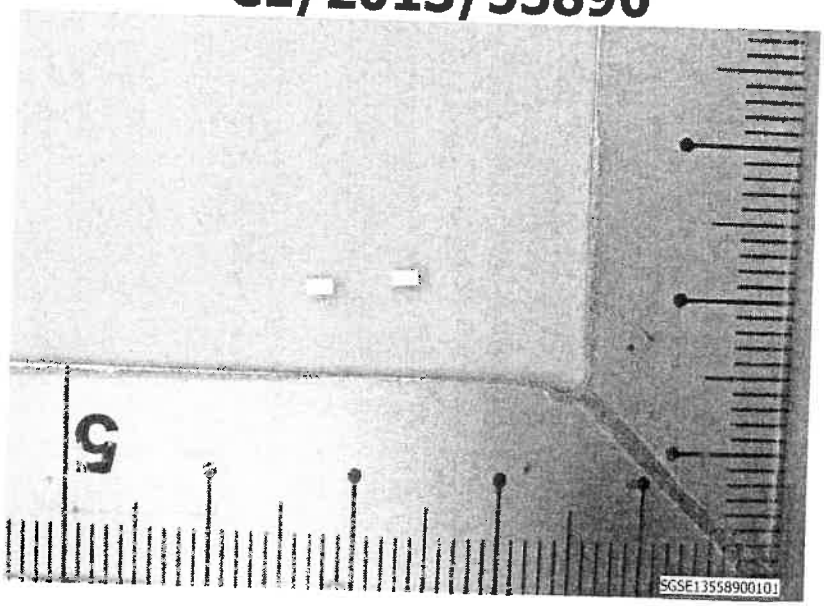
Test Report

No. : CE/2013/55890 Date : 2013/06/07

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

*** The tested sample / part is marked by an arrow if it's shown on the photo. ***

CE/2013/55890



** End of Report **

有效性不詳
For Question
Please Contact with SGS
www.tw.sgs.com

Test Report

No. : CE/2014/51371 Date : 2014/05/15

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 applicant as :

Sample Submitted By	:	ADVANCED CERAMIC X (ACX) CORPORATION
Sample Description	:	TERMINATION MATERIAL
Style/Item No.	:	AD SERIES, AT SERIES, BD SERIES, BF SERIES, BL SERIES, BM SERIES, BW SERIES, CD SERIES, CF SERIES, CP SERIES, DM SERIES, DP SERIES, DS SERIES, EF SERIES, ES SERIES, FA SERIES, FB SERIES, FD SERIES, FM SERIES, GS SERIES, HI SERIES, HF SERIES, HM SERIES, HS SERIES, LF SERIES, OM SERIES, OS SERIES, PD SERIES, NF SERIES, QS SERIES, SF SERIES, TS SERIES, TP SERIES, LTCC SUBSTRATES, CB SERIES
Sample Receiving Date	:	2014/05/08
Testing Period	:	2014/05/08 TO 2014/05/15

==========

Test Requested : (1) As specified by client, with reference to RoHS Directive 2011/65/EU Annex II to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs contents in the submitted sample.

(2) As specified by client, to test Halogen-Fluorine, Chlorine, Bromine, Iodine contents in the submitted sample.

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

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

SGS TAIWAN LTD

Troy Chang / Manager – Tech
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory – Taipei

灣邦電子(深圳)有限公司
文件管制中心
2014-06-05
HFI
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Test Report

No. : CE/2014/51371 Date : 2014/05/15

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

Test Result(s)

PART NAME No.1 : GRAY FRAGMENTS

Test Item(s)	Unit	Method	MDL	Result No.1
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5: 2013 and performed by ICP-AES.	2	n.d.
Lead (Pb)	mg/kg	With reference to IEC 62321-5: 2013 and performed by ICP-AES.	2	32
Mercury (Hg)	mg/kg	With reference to IEC 62321-4: 2013 and performed by ICP-AES.	2	n.d.
Hexavalent Chromium Cr(VI)	mg/kg	With reference to IEC 62321: 2008 and performed by UV-VIS.	2	n.d.
Sum of PBBs	mg/kg	With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
Monobromobiphenyl			5	n.d.
Dibromobiphenyl			5	n.d.
Tribromobiphenyl			5	n.d.
Tetrabromobiphenyl			5	n.d.
Pentabromobiphenyl			5	n.d.
Hexabromobiphenyl			5	n.d.
Heptabromobiphenyl			5	n.d.
Octabromobiphenyl			5	n.d.
Nonabromobiphenyl			5	n.d.
Decabromobiphenyl			5	n.d.
Sum of PBDEs			-	n.d.
Monobromodiphenyl ether			5	n.d.
Dibromodiphenyl ether			5	n.d.
Tribromodiphenyl ether			5	n.d.
Tetrabromodiphenyl ether			5	n.d.
Pentabromodiphenyl ether			5	n.d.
Hexabromodiphenyl ether			5	n.d.
Heptabromodiphenyl ether			5	n.d.
Octabromodiphenyl ether			5	n.d.
Nonabromodiphenyl ether			5	n.d.
Decabromodiphenyl ether			5	n.d.

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司 | 33, Wu Chuan Rd., New Taipei Industrial Park, New Taipei City, Taiwan / 新北市新北產業園區五權路33號
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Test Report

No. : CE/2014/51371 Date : 2014/05/15

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

Test Item(s)	Unit	Method	MDL	Result No.1
Halogen				
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)			50	n.d.
Halogen-Bromine (Br) (CAS No.: 10097-32-2)			50	n.d.
Halogen-Iodine (I) (CAS No.: 14362-44-8)			50	n.d.

Note :

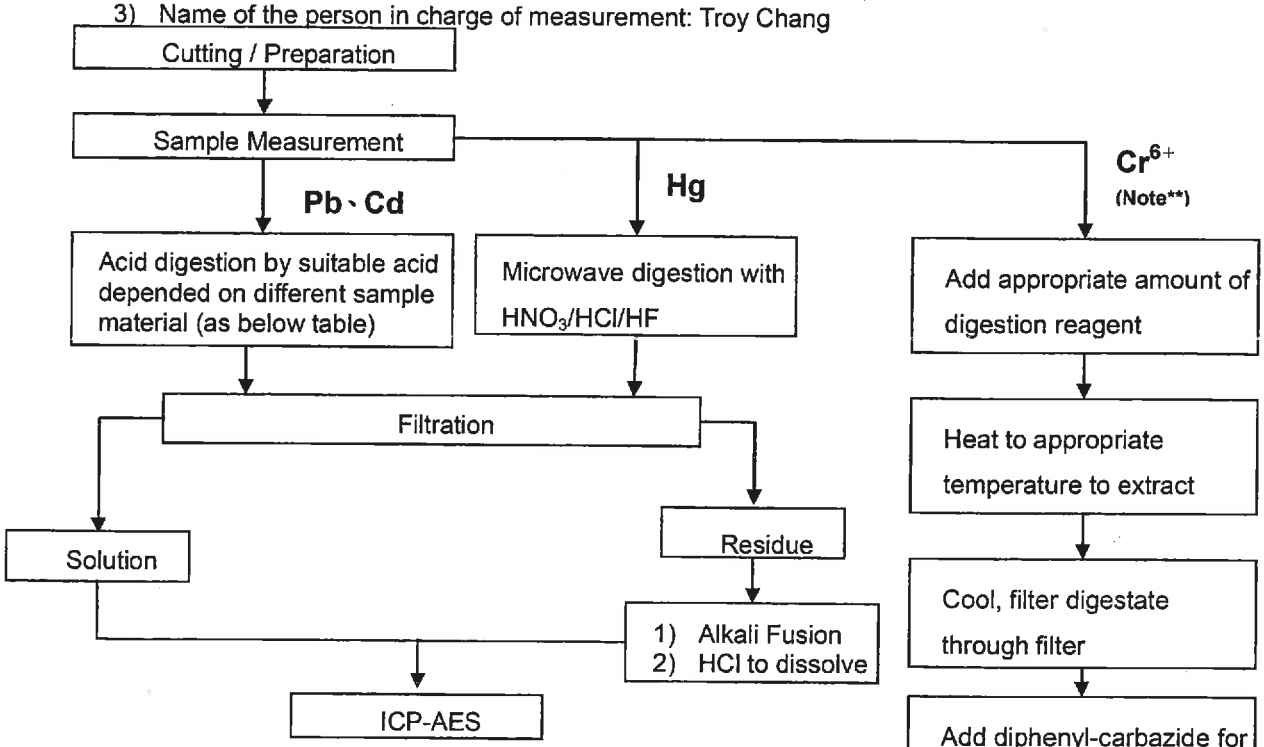
1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. " - " = Not Regulated

Test Report

No. : CE/2014/51371 Date : 2014/05/15

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^{6+} 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_3, HCl, HF, H_2O_2
Glass	HNO_3/HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO_3
Plastic	H_2SO_4, H_2O_2, HNO_3, HCl
Others	Added appropriate reagent to total digestion

Note :** (1) For non-metallic material, add alkaline digestion reagent and heat to 90~95°C.
(2) For metallic material, add pure water and heat to boiling.

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Test Report

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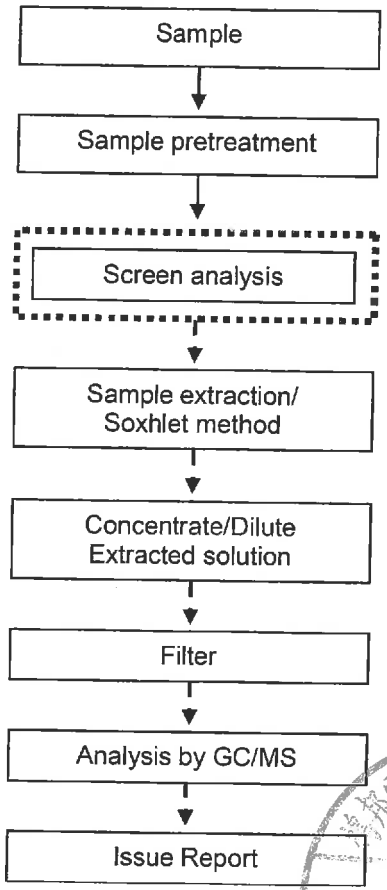
16, TZU CHIANG ROAD, HSINCHU INDUSTRIAL DISTRICT, HSINCHU HSIEN, TAIWAN 303

PBB/PBDE analytical FLOW CHART

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

First testing process ⟶
Optional screen process ....
Confirmation process – ·▸



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Analytical flow chart of halogen content

- Name of the person who made measurement: Rita Chen
- Name of the person in charge of measurement: Troy Chang

Sample pretreatment / Separation
↓
Weighting and putting sample in cell
↓
Oxygen Bomb Combustion / Absorption
↓
Dilution to fixed volume
↓
Analysis was performed by IC

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Test Report

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*** The tested sample / part is marked by an arrow if it's shown on the photo. ***

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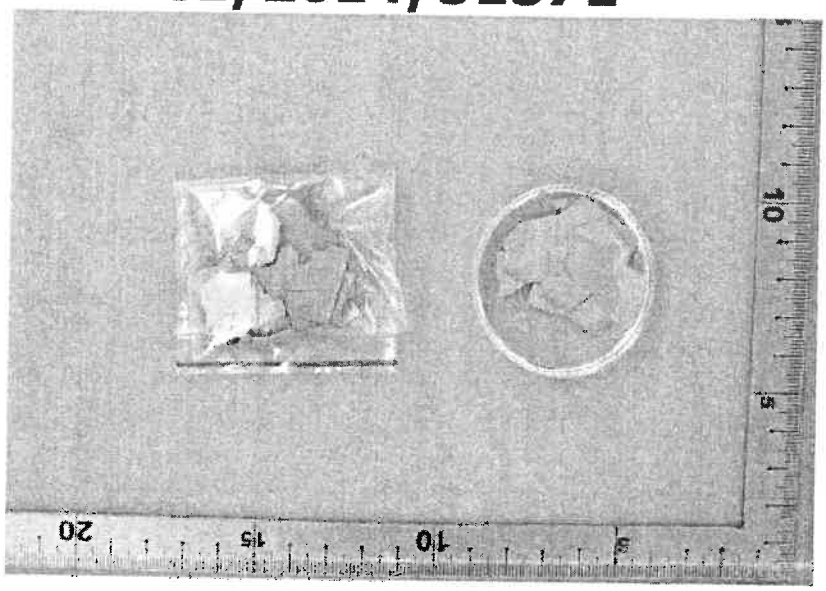

** End of Report **

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