

## SPECIFICATION FOR APPROVAL

Customer : 中磊電子股份有限公司

Product Description : Multilayer Chip Antenna, AT9520 series

Your Part Number : 61721000AC

ACX Part Number : AT9520-B2R4HAAT/LF

File Number : \_\_\_\_\_

Date : Jul. 20, 2006

	Approved	Comments
中磊電子		
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>

表單編號: T-S00-E007

版次: 1

依據文件: 量產零組件核准辦法

# 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 (XZ-V)	Average Gain (XZ-V)	VSWR	Impedance
<b>AT9520-B2R4HAA_</b>	2400~2500	3.0 dBi typ.	1.0 dBi typ.	2 max.	50

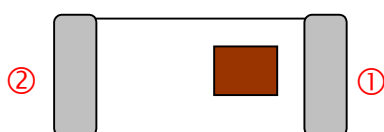
Q'ty/Reel (pcs) : 1000pcs  
 Operating Temperature Range : -40 ~ +85 °C  
 Storage Temperature Range : -40 ~ +85 °C  
 Power Capacity : 3W max.

### Part Number

**AT**   **9520**   -   **B**   **2R4**   **HAA**   **□**   **/LF**  
 ①            ②            ③            ④            ⑤            ⑥            ⑦

① Type	AT : Antenna	② Dimensions ( L x W )	9.5x 2.0 mm
③ Material Code	B	④ Frequency Range	2R4=2400MHz
⑤ Specification Code	HAA	⑥ Packaging	T: Tape & Reel B: Bulk
⑦ Soldering	=lead-containing /LF=lead-free		

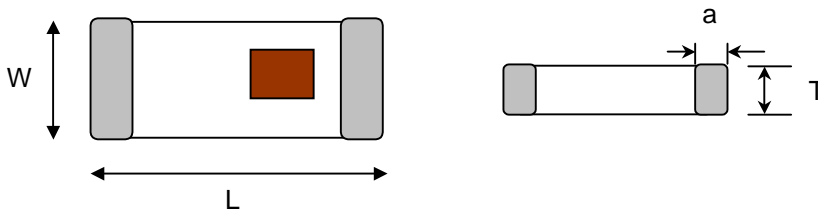
### Terminal Configuration



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

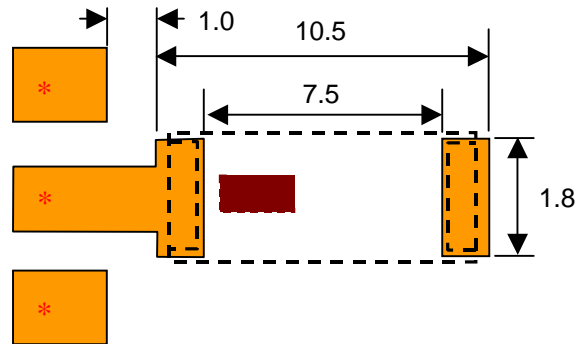
**Dimensions and Recommended PC Board Pattern**

Unit : mm

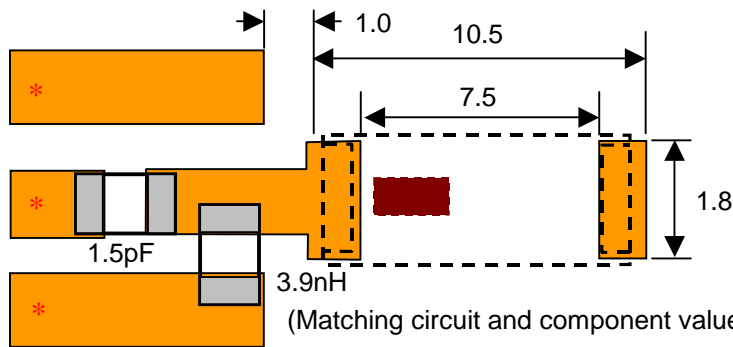


Mark	L	W	T	a
Dimensions	9.5±0.2	2.0±0.2	1.2+ 0.1/-0.2	0.5±0.3

(a) Without Matching Circuits (Moderate Bandwidth)



(b) With Matching Circuits (Wide Bandwidth)

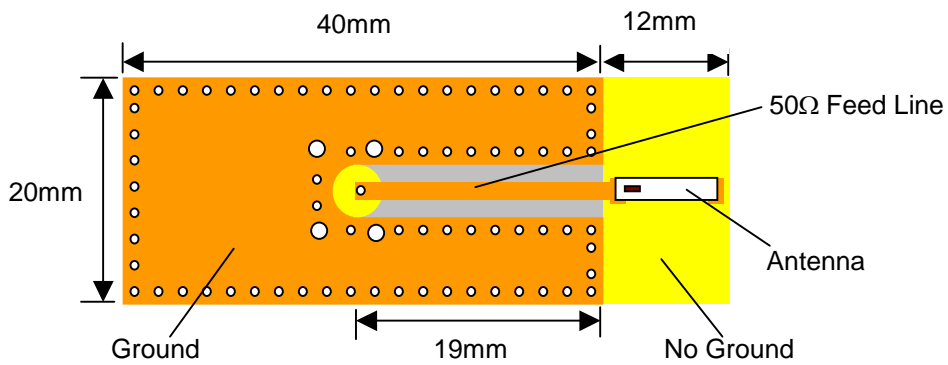


(Matching circuit and component values will be different, depending on PCB layout)

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

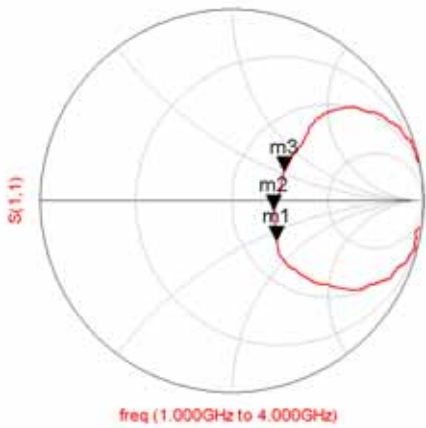
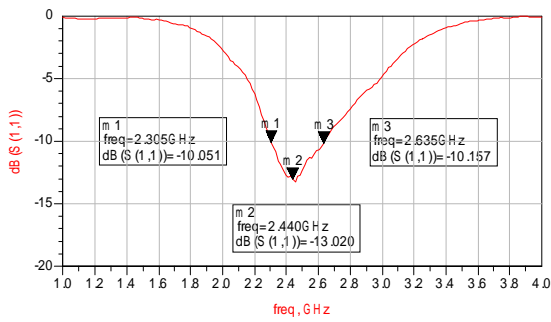
**Typical Electrical Characteristics (T=25°C)**

❖ Test Board

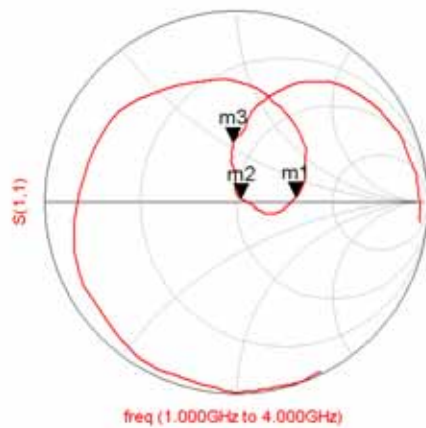
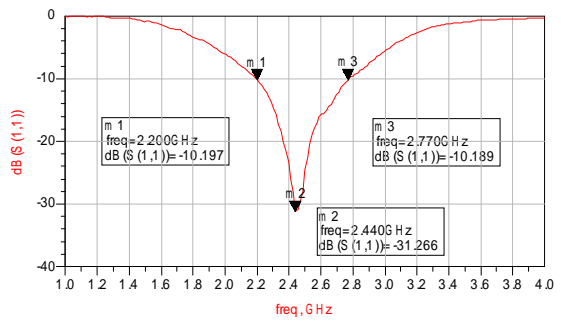


❖ Return Loss

(a) Without Matching Circuits

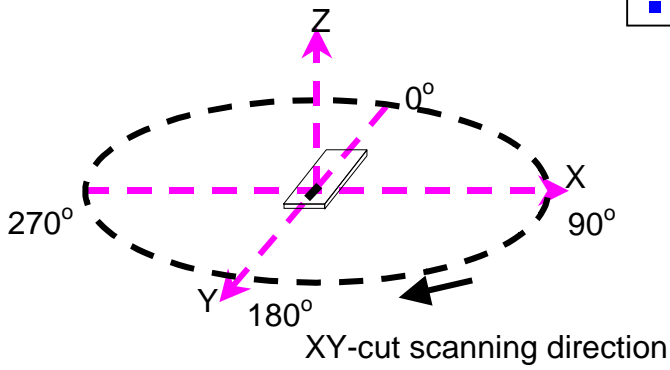


(b) With Matching Circuits

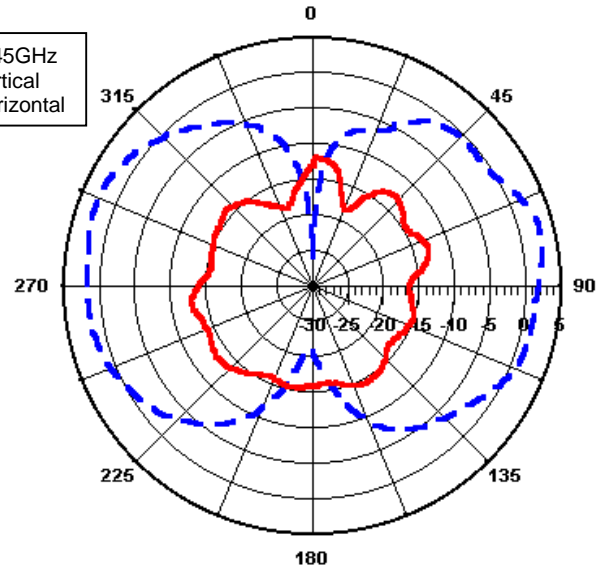


❖ Radiation Patterns

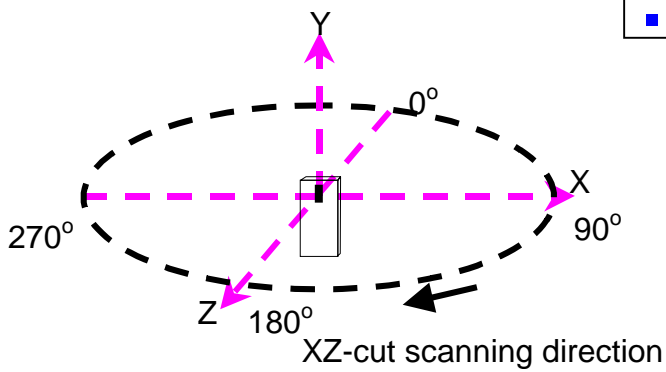
XY-V/XY-H



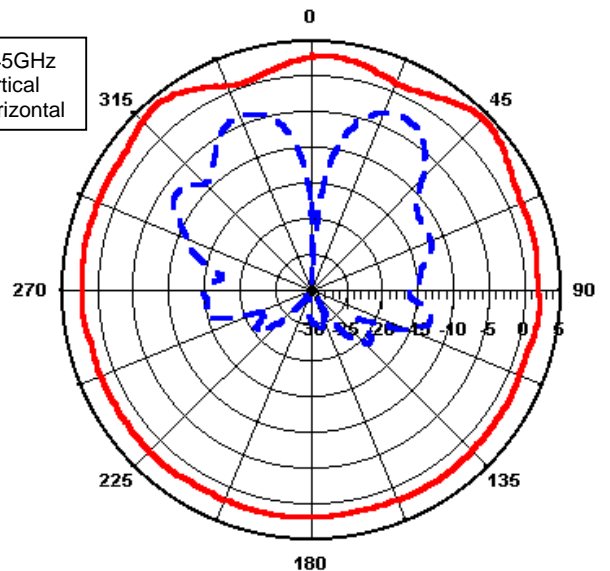
XY cut @2.45GHz  
— Vertical  
- - - Horizontal



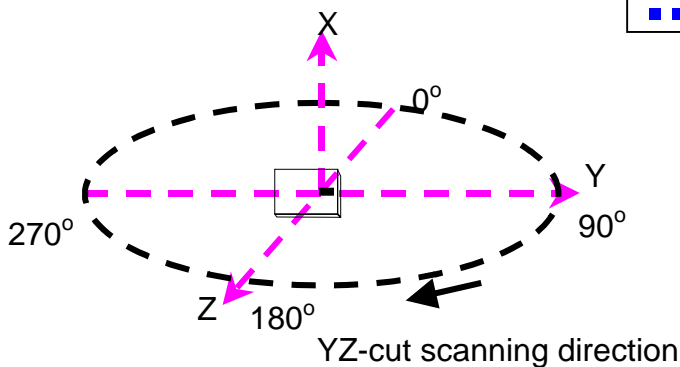
XZ-V/XZ-H



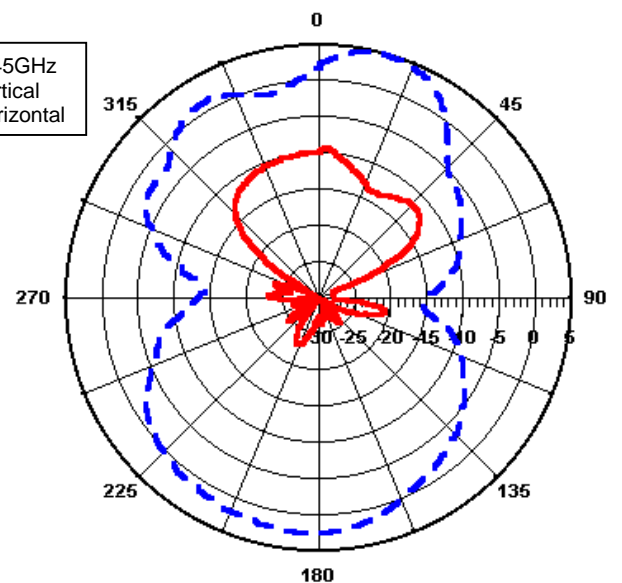
XZ cut @2.45GHz  
— Vertical  
- - - Horizontal



YZ-V/YZ-H



YZ cut @2.45GHz  
— Vertical  
- - - Horizontal



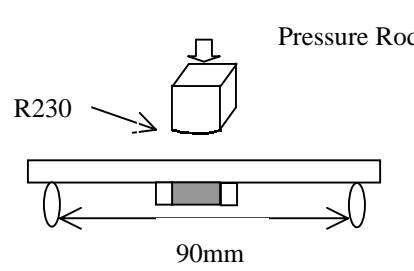
**Advanced Ceramic X Corp.**

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

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

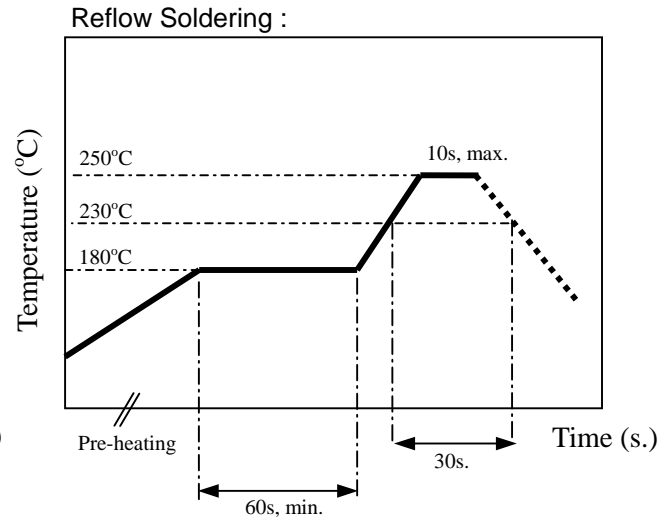
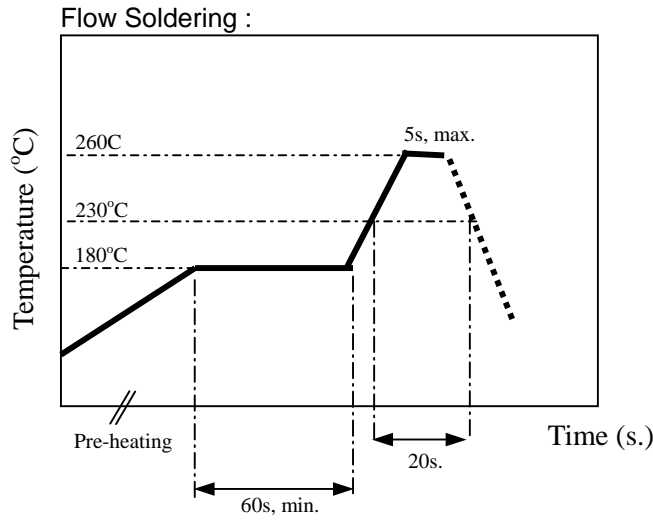
E-mail: [acx@acxc.com.tw](mailto:acx@acxc.com.tw) <http://www.acxc.com.tw>

## Mechanical & Environmental Characteristics

	Requirements	Procedure
Solderability	<ol style="list-style-type: none"> <li>No apparent damage</li> <li>More than 75% of the terminal electrode shall be covered with new solder</li> </ol>	<ol style="list-style-type: none"> <li>Preheat: <math>120 \pm 5^\circ\text{C}</math></li> <li>Solder: <math>230 \pm 5^\circ\text{C}</math> for <math>5 \pm 1</math> sec</li> </ol>
Thermal shock (Temperature Cycle)	<ol style="list-style-type: none"> <li>No apparent damage</li> <li>Fulfill the electrical specification after test</li> </ol>	<ol style="list-style-type: none"> <li>One cycle/ step 1: <math>85 \pm 5^\circ\text{C}</math> for 20sec step 2: <math>-40 \pm 3^\circ\text{C}</math> for 20sec</li> <li>Cycle time: 30min</li> <li>No. of cycles: 100</li> <li>Recovery: 1-2hrs</li> </ol>
Heat Resistance	<ol style="list-style-type: none"> <li>No apparent damage</li> <li>Fulfill the electrical specification after test</li> </ol>	<ol style="list-style-type: none"> <li>Temperature: <math>85 \pm 2^\circ\text{C}</math></li> <li>Duration: <math>24 \pm 2</math>hrs</li> <li>Recovery: 1-2hrs</li> </ol>
Low Temperature Resistance	<ol style="list-style-type: none"> <li>No apparent damage</li> <li>Fulfill the electrical specification after test</li> </ol>	<ol style="list-style-type: none"> <li>Temperature: <math>-40 \pm 5^\circ\text{C}</math></li> <li>Duration: <math>24 \pm 2</math>hrs</li> <li>Recovery: 1-2hrs</li> </ol>
Humidity Resistance	<ol style="list-style-type: none"> <li>No apparent damage</li> <li>Fulfill the electrical specification after test</li> </ol>	<ol style="list-style-type: none"> <li>Temperature: <math>85 \pm 2^\circ\text{C}</math></li> <li>Humidity: 80% ~ 85% RH</li> <li>Duration: <math>1000 \pm 48</math>hrs</li> <li>Recovery: 1-2hrs</li> </ol>
Soldering strength (Push strength)	<ol style="list-style-type: none"> <li>9.8N minimum</li> </ol>	<ol style="list-style-type: none"> <li>Solder specimen onto test jig.</li> <li>Apply push force at 0.5mm/s until electrode pads are peeled off or ceramic are broken. Pushing force is applied to longitude direction</li> </ol>
Deflection (Bending)	<ol style="list-style-type: none"> <li>No apparent damage</li> <li>Fulfill the electrical specification</li> </ol>	<ol style="list-style-type: none"> <li>Solder specimen onto test jig (FR4, 0.8mm) using the recommend soldering profile.</li> <li>Apply a bending force of 2mm deflection</li> </ol> 
Drop Shock	<ol style="list-style-type: none"> <li>No apparent damage</li> </ol>	<ol style="list-style-type: none"> <li>Dropped onto hard wood from height of 50 cm for 3 times ; each x,y and z direction except terminal direction</li> </ol>

## Typical Soldering Profile

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



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

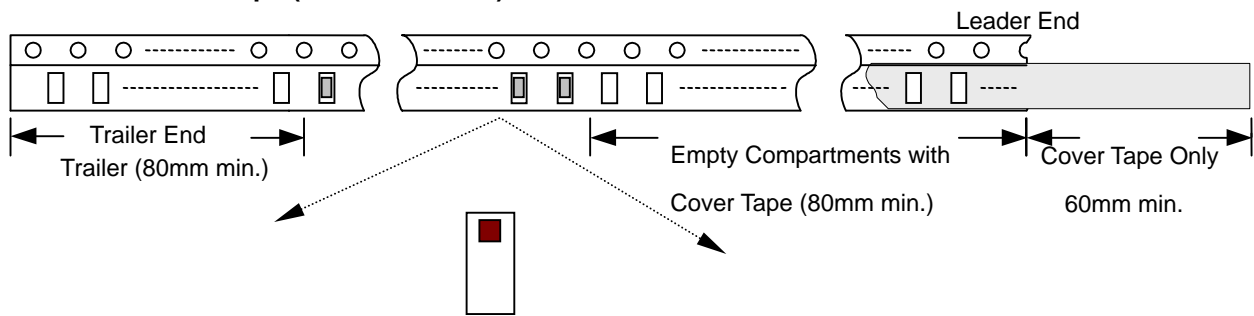
### Notes

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

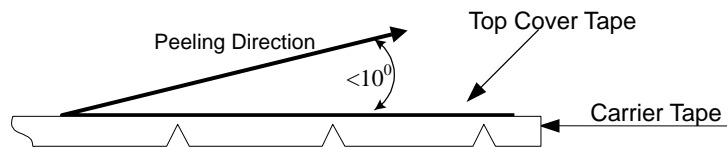




❖ **Leader and Trailer Tape (Plastic material)**



❖ **Peel-off Force**



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

❖ **Storage Conditions**

- (1) Temperature: 15 ~35 , relative humidity (RH): 45~75%.
- (2) Non-corrosive environment
- (3) Products should be used within six months of receipt.

**Notes**

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

## Test Report

ADVANCED X CORPORATION.

16 TZU CHIANG ROAD, HSINCHU INDUSTRIAL DISTRICT,  
HSINCHU HSIEN, TAIWAN 30316.

Report No. : CE/2006/57261

Date : 2006/05/29

Page : 1 of 3

**The following merchandise was (were) submitted and identified by the client as :**

Type of Product : 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, HI  
SERIES, HF SERIES, LF SERIES, NF SERIES, TS  
SERIES. LTCC SUBSTRATES. ZV4. ZV5  
Buyer/Order No : LOCAL COMPANY OR USA COMPANY  
Sample Received : 2006/05/22  
Testing Date : 2006/05/22 TO 2006/05/29

=====

**Test Result** : - Please see the next page -

  
Daniel Yeh, M.R. / Operation Manager  
Signed for and on behalf of  
SGS TAIWAN LTD.

# Test Report

ADVANCED X CORPORATION.

16 TZU CHIANG ROAD, HSINCHU INDUSTRIAL DISTRICT,  
HSINCHU HSIEN, TAIWAN 30316.

Report No. : CE/2006/57261

Date : 2006/05/29

Page : 2 of 3

## Test Result

PART NAME NO.1 : GRAY SLICE

Test Item (s):	Unit	Method	MDL	Result
				No.1
Monobromobiphenyl	%	With reference to USEPA3540C or USEPA3550C. Analysis was performed by HPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS), 83/264/EEC, and 76/769/EEC)	0.0005	N.D.
Dibromobiphenyl	%		0.0005	N.D.
Tribromobiphenyl	%		0.0005	N.D.
Tetrabromobiphenyl	%		0.0005	N.D.
Pentabromobiphenyl	%		0.0005	N.D.
Hexabromobiphenyl	%		0.0005	N.D.
Heptabromobiphenyl	%		0.0005	N.D.
Octabromobiphenyl	%		0.0005	N.D.
Nonabromobiphenyl	%		0.0005	N.D.
Decabromobiphenyl	%		0.0005	N.D.
<b>Total PBBs (Polybrominated biphenyls)/Sum of above</b>	%		-	N.D.
Monobromobiphenyl ether	%	With reference to USEPA3540C or USEPA3550C. Analysis was performed by HPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS), 83/264/EEC, and 76/769/EEC)	0.0005	N.D.
Dibromobiphenyl ether	%		0.0005	N.D.
Tribromobiphenyl ether	%		0.0005	N.D.
Tetrabromobiphenyl ether	%		0.0005	N.D.
Pentabromobiphenyl ether	%		0.0005	N.D.
Hexabromobiphenyl ether	%		0.0005	N.D.
Heptabromobiphenyl ether	%		0.0005	N.D.
Octabromobiphenyl ether	%		0.0005	N.D.
Nonabromobiphenyl ether	%		0.0005	N.D.
Decabromobiphenyl ether	%		0.0005	N.D.
<b>Total PBBEs(PBDEs) (Polybrominated biphenyl ethers)/Sum of above</b>	%		-	N.D.
<b>Total of Mono to Nona-brominated biphenyl ether. (Note 4)</b>	%	-	N.D.	

# Test Report

ADVANCED X CORPORATION.

16 TZU CHIANG ROAD, HSINCHU INDUSTRIAL DISTRICT,  
HSINCHU HSIEN, TAIWAN 30316.

Report No. : CE/2006/57261

Date : 2006/05/29

Page : 3 of 3

Test Item (s):	Unit	Method	MDL	Result
				No.1
Chromium VI (Cr+6)	ppm	UV-VIS(US EPA 7196A) after reference to US EPA 3060A.	2	N.D.
Cadmium (Cd)	ppm	ICP-AES after reference to EN 1122, method B:2001 or other acid digestion.	2	N.D.
Mercury (Hg)	ppm	ICP-AES after reference to US EPA 3052 or other acid digestion.	2	N.D.
Lead (Pb)	ppm	ICP-AES after reference to US EPA 3050B or other acid digestion.	2	19.8

- NOTE: (1) N.D. = Not detected (<MDL)  
 (2) ppm = mg/kg  
 (3) MDL = Method Detection Limit  
 (4) Decabromobiphenyl ether (DecaBDE) in polymeric applications is exempted by Commission Decision of 13 Oct 2005 amending Directive 2002/95/EC notified under document 2005/717/EC.  
 (5) PBBEs=PBDEs=Polybrominated Diphenyl Ethers=PBDOs=PBBOs.  
 (6) " - " = Not Regulation

## Test Report

ADVANCED CERAMIC X CORPORATION.

16 TZU CHIANG ROAD, HSINCHU INDUSTRIAL DISTRICT,  
HSINCHU HSIEN, TAIWAN 30316.

Report No. : CE/2006/57260B


Date : 2006/06/15

Page : 1 of 3

**The following merchandise was (were) submitted and identified by the client as :**

Type of Product : MULTILAYER LTCC-B COMPONENTS  
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, HI  
SERIES, HF SERIES, LF SERIES, NF SERIES, TS  
SERIES, LTCC SUBSTRATES, ZV4, ZV5  
Buyer/Order No : LOCAL COMPANY OR USA COMPANY  
Sample Received : 2006/05/22  
Testing Date : 2006/05/22 TO 2006/05/29 &  
2006/06/08 TO 2006/06/15

-----  
**Test Result** : - Please see the next page -

  
Daniel Yeh, M.R. / Operation Manager  
Signed for and on behalf of  
SGS TAIWAN LTD.

# Test Report

ADVANCED CERAMIC X CORPORATION.

16 TZU CHIANG ROAD, HSINCHU INDUSTRIAL DISTRICT,  
HSINCHU HSIEN, TAIWAN 30316.

Report No. : CE/2006/57260B

Date : 2006/06/15

Page : 2 of 3

## Test Result

PART NAME NO.1 : RED/SILVER COLORED COMPONENTS

Test Item (s):	Unit	Method	MDL	Result
				No.1
Monobromobiphenyl	%	With reference to USEPA3540C or USEPA3550C. Analysis was performed by HPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS), 83/264/EEC, and 76/769/EEC)	0.0005	N.D.
Dibromobiphenyl	%		0.0005	N.D.
Tribromobiphenyl	%		0.0005	N.D.
Tetrabromobiphenyl	%		0.0005	N.D.
Pentabromobiphenyl	%		0.0005	N.D.
Hexabromobiphenyl	%		0.0005	N.D.
Heptabromobiphenyl	%		0.0005	N.D.
Octabromobiphenyl	%		0.0005	N.D.
Nonabromobiphenyl	%		0.0005	N.D.
Decabromobiphenyl	%		0.0005	N.D.
<b>Total PBBs (Polybrominated biphenyls)/Sum of above</b>	%		-	N.D.
Monobromobiphenyl ether	%	With reference to USEPA3540C or USEPA3550C. Analysis was performed by HPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS), 83/264/EEC, and 76/769/EEC)	0.0005	N.D.
Dibromobiphenyl ether	%		0.0005	N.D.
Tribromobiphenyl ether	%		0.0005	N.D.
Tetrabromobiphenyl ether	%		0.0005	N.D.
Pentabromobiphenyl ether	%		0.0005	N.D.
Hexabromobiphenyl ether	%		0.0005	N.D.
Heptabromobiphenyl ether	%		0.0005	N.D.
Octabromobiphenyl ether	%		0.0005	N.D.
Nonabromobiphenyl ether	%		0.0005	N.D.
Decabromobiphenyl ether	%		0.0005	N.D.
<b>Total PBBEs(PBDEs) (Polybrominated biphenyl ethers)/Sum of above</b>	%		-	N.D.
<b>Total of Mono to Nona-brominated biphenyl ether. (Note 4)</b>	%	-	N.D.	

## Test Report

ADVANCED CERAMIC X CORPORATION.

16 TZU CHIANG ROAD, HSINCHU INDUSTRIAL DISTRICT,  
HSINCHU HSIEN, TAIWAN 30316.

Report No. : CE/2006/57260B

Date : 2006/06/15

Page : 3 of 3

Test Item (s):	Unit	Method	MDL	Result
				No.1
Chromium VI (Cr+6)	ppm	UV-VIS(US EPA 7196A) after reference to US EPA 3060A.	2	N.D.
Cadmium (Cd)	ppm	ICP-AES after reference to EN 1122, method B:2001 or other acid digestion.	2	N.D.
Mercury (Hg)	ppm	ICP-AES after reference to US EPA 3052 or other acid digestion.	2	N.D.
Lead (Pb)	ppm	ICP-AES after reference to US EPA 3050B or other acid digestion.	2	41578.7

NOTE: (1) N.D. = Not detected (<MDL)

(2) ppm = mg/kg

(3) MDL = Method Detection Limit

(4) Decabromobiphenyl ether (DecaBDE) in polymeric applications is exempted by  
Commission Decision of 13 Oct 2005 amending Directive 2002/95/EC notified  
under document 2005/717/EC.

(5) PBBEs=PBDEs=Polybrominated Diphenyl Ethers=PBDOs=PBBOs.

(6) " - " = Not Regulation

(7) The report number of CE/2006/57260 is invalid.

**DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL**  
**of 27 January 2003**  
**on the restriction of the use of certain hazardous substances in electrical and electronic equipment**

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 95 thereof,

Having regard to the proposal from the Commission <sup>(1)</sup>,

Having regard to the opinion of the Economic and Social Committee <sup>(2)</sup>,

Having regard to the opinion of the Committee of Regions <sup>(3)</sup>,

Acting in accordance with the procedure laid down in Article 251 of the Treaty in the light of the joint text approved by the Conciliation Committee on 8 November 2002 <sup>(4)</sup>,

Whereas:

- (1) The disparities between the laws or administrative measures adopted by the Member States as regards the restriction of the use of hazardous substances in electrical and electronic equipment could create barriers to trade and distort competition in the Community and may thereby have a direct impact on the establishment and functioning of the internal market. It therefore appears necessary to approximate the laws of the Member States in this field and to contribute to the protection of human health and the environmentally sound recovery and disposal of waste electrical and electronic equipment.
- (2) The European Council at its meeting in Nice on 7, 8 and 9 December 2000 endorsed the Council Resolution of 4 December 2000 on the precautionary principle.
- (3) The Commission Communication of 30 July 1996 on the review of the Community strategy for waste management stresses the need to reduce the content of hazardous substances in waste and points out the potential benefits of Community-wide rules limiting the presence of such substances in products and in production processes.
- (4) The Council Resolution of 25 January 1988 on a Community action programme to combat environmental pollution by cadmium <sup>(5)</sup> invites the Commission to pursue without delay the development of specific measures for such a programme. Human health also has

to be protected and an overall strategy that in particular restricts the use of cadmium and stimulates research into substitutes should therefore be implemented. The Resolution stresses that the use of cadmium should be limited to cases where suitable and safer alternatives do not exist.

- (5) The available evidence indicates that measures on the collection, treatment, recycling and disposal of waste electrical and electronic equipment (WEEE) as set out in Directive 2002/96/EC of 27 January 2003 of the European Parliament and of the Council on waste electrical and electronic equipment <sup>(6)</sup> are necessary to reduce the waste management problems linked to the heavy metals concerned and the flame retardants concerned. In spite of those measures, however, significant parts of WEEE will continue to be found in the current disposal routes. Even if WEEE were collected separately and submitted to recycling processes, its content of mercury, cadmium, lead, chromium VI, PBB and PBDE would be likely to pose risks to health or the environment.
- (6) Taking into account technical and economic feasibility, the most effective way of ensuring the significant reduction of risks to health and the environment relating to those substances which can achieve the chosen level of protection in the Community is the substitution of those substances in electrical and electronic equipment by safe or safer materials. Restricting the use of these hazardous substances is likely to enhance the possibilities and economic profitability of recycling of WEEE and decrease the negative health impact on workers in recycling plants.
- (7) The substances covered by this Directive are scientifically well researched and evaluated and have been subject to different measures both at Community and at national level.
- (8) The measures provided for in this Directive take into account existing international guidelines and recommendations and are based on an assessment of available scientific and technical information. The measures are necessary to achieve the chosen level of protection of

<sup>(1)</sup> OJ C 365 E, 19.12.2000, p. 195 and OJ C 240 E, 28.8.2001, p. 303.

<sup>(2)</sup> OJ C 116, 20.4.2001, p. 38.

<sup>(3)</sup> OJ C 148, 18.5.2001, p. 1.

<sup>(4)</sup> Opinion of the European Parliament of 15 May 2001 (OJ C 34 E, 7.2.2002, p. 109), Council Common Position of 4 December 2001 (OJ C 90 E, 16.4.2002, p. 12) and Decision of the European Parliament of 10 April 2002 (not yet published in the Official Journal), Decision of the European Parliament of 18 December 2002 and Decision of the Council of 16 December 2002.

<sup>(5)</sup> OJ C 30, 4.2.1988, p. 1.

<sup>(6)</sup> See page 24 of this Official Journal.



human and animal health and the environment, having regard to the risks which the absence of measures would be likely to create in the Community. The measures should be kept under review and, if necessary, adjusted to take account of available technical and scientific information.

- (9) This Directive should apply without prejudice to Community legislation on safety and health requirements and specific Community waste management legislation, in particular Council Directive 91/157/EEC of 18 March 1991 on batteries and accumulators containing certain dangerous substances <sup>(1)</sup>.
- (10) The technical development of electrical and electronic equipment without heavy metals, PBDE and PBB should be taken into account. As soon as scientific evidence is available and taking into account the precautionary principle, the prohibition of other hazardous substances and their substitution by more environmentally friendly alternatives which ensure at least the same level of protection of consumers should be examined.
- (11) Exemptions from the substitution requirement should be permitted if substitution is not possible from the scientific and technical point of view or if the negative environmental or health impacts caused by substitution are likely to outweigh the human and environmental benefits of the substitution. Substitution of the hazardous substances in electrical and electronic equipment should also be carried out in a way so as to be compatible with the health and safety of users of electrical and electronic equipment (EEE).
- (12) As product reuse, refurbishment and extension of lifetime are beneficial, spare parts need to be available.
- (13) The adaptation to scientific and technical progress of the exemptions from the requirements concerning phasing out and prohibition of hazardous substances should be effected by the Commission under a committee procedure.
- (14) The measures necessary for the implementation of this Directive should be adopted in accordance with Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission <sup>(2)</sup>.

HAVE ADOPTED THIS DIRECTIVE:

#### Article 1

#### Objectives

The purpose of this Directive is to approximate the laws of the Member States on the restrictions of the use of hazardous substances in electrical and electronic equipment and to contri-

bute to the protection of human health and the environmentally sound recovery and disposal of waste electrical and electronic equipment.

#### Article 2

#### Scope

- Without prejudice to Article 6, this Directive shall apply to electrical and electronic equipment falling under the categories 1, 2, 3, 4, 5, 6, 7 and 10 set out in Annex IA to Directive No 2002/96/EC (WEEE) and to electric light bulbs, and luminaires in households.
- This Directive shall apply without prejudice to Community legislation on safety and health requirements and specific Community waste management legislation.
- This Directive does not apply to spare parts for the repair, or to the reuse, of electrical and electronic equipment put on the market before 1 July 2006.

#### Article 3

#### Definitions

For the purposes of this Directive, the following definitions shall apply:

- 'electrical and electronic equipment' or 'EEE' means equipment which is dependent on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such currents and fields falling under the categories set out in Annex IA to Directive 2002/96/EC (WEEE) and designed for use with a voltage rating not exceeding 1 000 volts for alternating current and 1 500 volts for direct current;
- 'producer' means any person who, irrespective of the selling technique used, including by means of distance communication according to Directive 97/7/EC of the European Parliament and of the Council of 20 May 1997 on the protection of consumers in respect of distance contracts <sup>(3)</sup>:
  - manufactures and sells electrical and electronic equipment under his own brand;
  - resells under his own brand equipment produced by other suppliers, a reseller not being regarded as the 'producer' if the brand of the producer appears on the equipment, as provided for in subpoint (i); or
  - imports or exports electrical and electronic equipment on a professional basis into a Member State.

Whoever exclusively provides financing under or pursuant to any finance agreement shall not be deemed a 'producer' unless he also acts as a producer within the meaning of subpoints (i) to (iii).

<sup>(1)</sup> OJ L 78, 26.3.1991, p. 38. Directive as amended by Commission Directive 98/101/EC (OJ L 1, 5.1.1999, p. 1).

<sup>(2)</sup> OJ L 184, 17.7.1999, p. 23.

<sup>(3)</sup> OJ L 144, 4.6.1997, p. 19. Directive as amended by Directive 2002/65/EC (L 271, 9.10.2002, p. 16).

## Article 4

**Prevention**

1. Member States shall ensure that, from 1 July 2006, new electrical and electronic equipment put on the market does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE). National measures restricting or prohibiting the use of these substances in electrical and electronic equipment which were adopted in line with Community legislation before the adoption of this Directive may be maintained until 1 July 2006.

2. Paragraph 1 shall not apply to the applications listed in the Annex.

3. On the basis of a proposal from the Commission, the European Parliament and the Council shall decide, as soon as scientific evidence is available, and in accordance with the principles on chemicals policy as laid down in the Sixth Community Environment Action Programme, on the prohibition of other hazardous substances and the substitution thereof by more environment-friendly alternatives which ensure at least the same level of protection for consumers.

## Article 5

**Adaptation to scientific and technical progress**

1. Any amendments which are necessary in order to adapt the Annex to scientific and technical progress for the following purposes shall be adopted in accordance with the procedure referred to in Article 7(2):

- (a) establishing, as necessary, maximum concentration values up to which the presence of the substances referred to in Article 4(1) in specific materials and components of electrical and electronic equipment shall be tolerated;
- (b) exempting materials and components of electrical and electronic equipment from Article 4(1) if their elimination or substitution via design changes or materials and components which do not require any of the materials or substances referred to therein is technically or scientifically impracticable, or where the negative environmental, health and/or consumer safety impacts caused by substitution are likely to outweigh the environmental, health and/or consumer safety benefits thereof;
- (c) carrying out a review of each exemption in the Annex at least every four years or four years after an item is added to the list with the aim of considering deletion of materials and components of electrical and electronic equipment from the Annex if their elimination or substitution via design changes or materials and components which do not require any of the materials or substances referred to in

Article 4(1) is technically or scientifically possible, provided that the negative environmental, health and/or consumer safety impacts caused by substitution do not outweigh the possible environmental, health and/or consumer safety benefits thereof.

2. Before the Annex is amended pursuant to paragraph 1, the Commission shall *inter alia* consult producers of electrical and electronic equipment, recyclers, treatment operators, environmental organisations and employee and consumer associations. Comments shall be forwarded to the Committee referred to in Article 7(1). The Commission shall provide an account of the information it receives.

## Article 6

**Review**

Before 13 February 2005, the Commission shall review the measures provided for in this Directive to take into account, as necessary, new scientific evidence.

In particular the Commission shall, by that date, present proposals for including in the scope of this Directive equipment which falls under categories 8 and 9 set out in Annex IA to Directive 2002/96/EC (WEEE).

The Commission shall also study the need to adapt the list of substances of Article 4(1), on the basis of scientific facts and taking the precautionary principle into account, and present proposals to the European Parliament and Council for such adaptations, if appropriate.

Particular attention shall be paid during the review to the impact on the environment and on human health of other hazardous substances and materials used in electrical and electronic equipment. The Commission shall examine the feasibility of replacing such substances and materials and shall present proposals to the European Parliament and to the Council in order to extend the scope of Article 4, as appropriate.

## Article 7

**Committee**

1. The Commission shall be assisted by the Committee set up by Article 18 of Council Directive 75/442/EEC <sup>(1)</sup>.

2. Where reference is made to this paragraph, Articles 5 and 7 of Decision 1999/468/EC shall apply, having regard to Article 8 thereof.

The period provided for in Article 5(6) of Decision 1999/468/EC shall be set at three months.

3. The Committee shall adopt its rules of procedure.

<sup>(1)</sup> OJ L 194, 25.7.1975, p. 39.

*Article 8***Penalties**

Member States shall determine penalties applicable to breaches of the national provisions adopted pursuant to this Directive. The penalties thus provided for shall be effective, proportionate and dissuasive.

*Article 9***Transposition**

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive before 13 August 2004. They shall immediately inform the Commission thereof.

When Member States adopt those measures, they shall contain a reference to this Directive or be accompanied by such a reference on the occasion of their official publication. The methods of making such a reference shall be laid down by the Member States.

2. Member States shall communicate to the Commission the text of all laws, regulations and administrative provisions adopted in the field covered by this Directive.

*Article 10***Entry into force**

This Directive shall enter into force on the day of its publication in the *Official Journal of the European Union*.

*Article 11***Addressees**

This Directive is addressed to the Member States.

Done at Brussels, 27 January 2003.

*For the European Parliament*

*The President*

P. COX

*For the Council*

*The President*

G. DRYS

## ANNEX

**Applications of lead, mercury, cadmium and hexavalent chromium, which are exempted from the requirements of Article 4(1)**

1. Mercury in compact fluorescent lamps not exceeding 5 mg per lamp.
2. Mercury in straight fluorescent lamps for general purposes not exceeding:
  - halophosphate 10 mg
  - triphosphate with normal lifetime 5 mg
  - triphosphate with long lifetime 8 mg.
3. Mercury in straight fluorescent lamps for special purposes.
4. Mercury in other lamps not specifically mentioned in this Annex.
5. Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.
6. Lead as an alloying element in steel containing up to 0,35 % lead by weight, aluminium containing up to 0,4 % lead by weight and as a copper alloy containing up to 4 % lead by weight.
7. — Lead in high melting temperature type solders (i.e. tin-lead solder alloys containing more than 85 % lead),
  - lead in solders for servers, storage and storage array systems (exemption granted until 2010),
  - lead in solders for network infrastructure equipment for switching, signalling, transmission as well as network management for telecommunication,
  - lead in electronic ceramic parts (e.g. piezoelectronic devices).
8. Cadmium plating except for applications banned under Directive 91/338/EEC <sup>(1)</sup> amending Directive 76/769/EEC <sup>(2)</sup> relating to restrictions on the marketing and use of certain dangerous substances and preparations.
9. Hexavalent chromium as an anti-corrosion of the carbon steel cooling system in absorption refrigerators.
10. Within the procedure referred to in Article 7(2), the Commission shall evaluate the applications for:
  - Deca BDE,
  - mercury in straight fluorescent lamps for special purposes,
  - lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signalling, transmission as well as network management for telecommunications (with a view to setting a specific time limit for this exemption), and
  - light bulbs,as a matter of priority in order to establish as soon as possible whether these items are to be amended accordingly.

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<sup>(1)</sup> OJ L 186, 12.7.1991, p. 59.

<sup>(2)</sup> OJ L 262, 27.9.1976, p. 201.

## RoHS排外條款

1. Mercury in compact fluorescent lamps not exceeding 5 mg per lamp. 小型日光燈之汞含量不得超過 5 毫克/每支。
2. Mercury in straight fluorescent lamps for general purpose not exceeding: 一般用途直管日光燈之汞含量不得超過:
  - halophosphate 10mg。鹵素磷酸鹽型 10 毫克。
  - triphosphate with normal lifetime 5mg。三磷酸鹽一般型 5 毫克。
  - triphosphate with normal lifetime 8mg。三磷酸鹽長效型 8 毫克。
3. Mercury in straight fluorescent lamps for special purpose。特殊用途直管日光燈之汞含量。
4. Mercury in other lamps not specifically mentioned in this Annex.  
本附錄中未特別提及之其它照明燈中的汞含量。
5. Lead in glass of cathode ray tubes, electronic components and fluorescent tubes。  
陰極射線管、電子零件及螢光管之玻璃內的鉛含量。
6. Lead as an alloying element in steel containing up to 0.35% lead by weight, aluminum containing up to 0.4% lead by weight and as a copper alloy containing up to 4% lead by weight。  
用於鉛含量不超過 0.35wt% 之鋼材、鉛含量不超過 0.4wt% 之鋁材，以及鉛含量不超過 4wt% 之銅合金。
7. Lead in high melting temperature type solder (i.e. tin-lead solder alloys containing more than 85%) 高熔點錫料 (意即：錫鉛錫料合金中鉛含量超過 85%) 中的鉛。
8. Lead in solders for servers, storage and storage array systems (exemption granted until 2010) 伺服器、儲存設備與儲存陣列系統錫料中的鉛 (免除至 2010 年)。
9. Lead in solders for network infrastructure equipment for switching, signaling, transmission as well as network management for telecommunication.  
交換、發信與傳輸，以及電信網路管理之網路基礎設施設備錫料中的鉛
10. Lead in electronic ceramic parts (e.g. piezoelectric devices). 電子陶瓷零件中的鉛 (例如：壓電元件)

## 聲明書

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