

APPROVAL SHEET

Dielectric Chip Antenna

Part No : AMAN542012PC07

Modle : L1

2006. 11. 27

AMOTECH Co., Ltd 5B-1L, 617, Namchon-Dong, Namdong-Gu, Incheon, KOREA. TEL : 82-32-821-0363 FAX : 82-32-811-0283	Written	Checked		Approved

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1. Revision Record

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2006. 11. 27	NEW	

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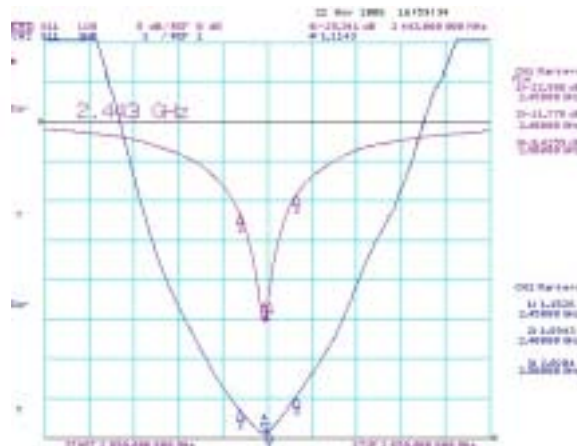
2. SPECIFICATIONS

2.1 Electrical Specification

No	ITEM	Spec			Remark
1	VSWR	Max 6.0 : 1 @ 1835±42MHz			
2	Radiation Gain	Avg.	H	Min -5.0	dBi
			E1	Min -3.5	
			E2	Min -3.5	
		Peak	H	Min -3.0	
			E1	Min -1.0	
			E2	Min -1.0	
3	Radiation Pattern	Omni - directional			
4	Impedence	nominal 50			Ω

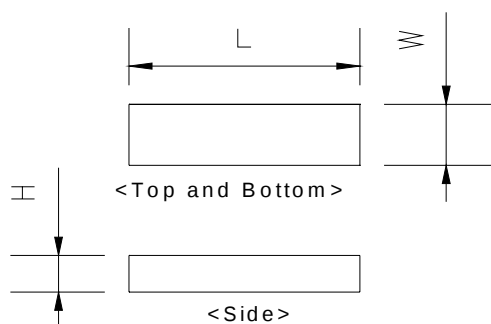
Radiation Pattern : measured data after matching on Bluetooth range

VSWR : measured data on manual jig



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Mechanical Specification



L (Length)	5.4
W (Width)	2.0
H (Height)	1.2

- unit : mm
- Tolerance : ± 0.15

2.2 Model & Lot notation

Model : AMAN 542012 PC 07
(1) (2) (3) (4)

- (1) : AMOTECH ANTENNA
- (2) : Chip Size (Length X Width X Height)
- (3) : Enterprise, Ex) PANTECH & Curitel- PC
- (4) : Model Num. (Ex : 04-PN320)

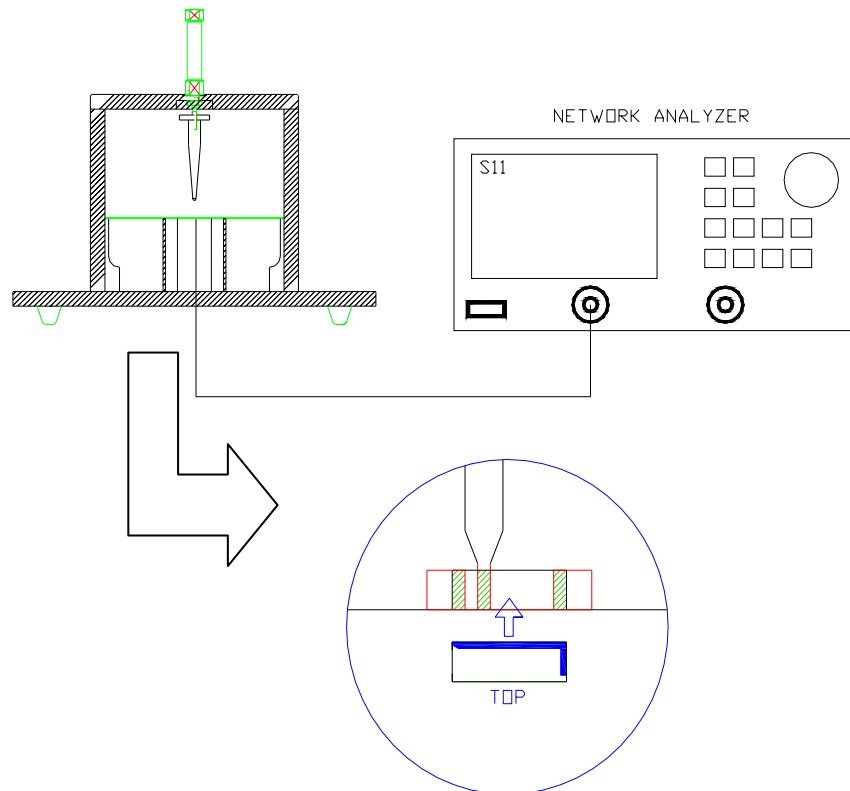
Lot : XX XX X X XX
(1) (2) (3) (4) (5)

- (1) : Year of body shaping
- (2) : Month of body shaping
- (3) : Permittivity ex) 1 : 9.5, 2 : 20.5
- (4) : Chip SIZE ex) A : 542012, B : 542015, C : 903012, D : 903015, E : 903040, F : 903045
G : 402027, H : 542020, I : 601815, J : 601818, K : 802012, L : 802015
M : 144050, N : 144060, O : 163040, P : 806040
- (5) : Month order of body production

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3. MEASUREMENT

3.1 VSWR' s Measurement



3.1.1 VSWR specification

- Refer to page 4

3.1.2 measurement method

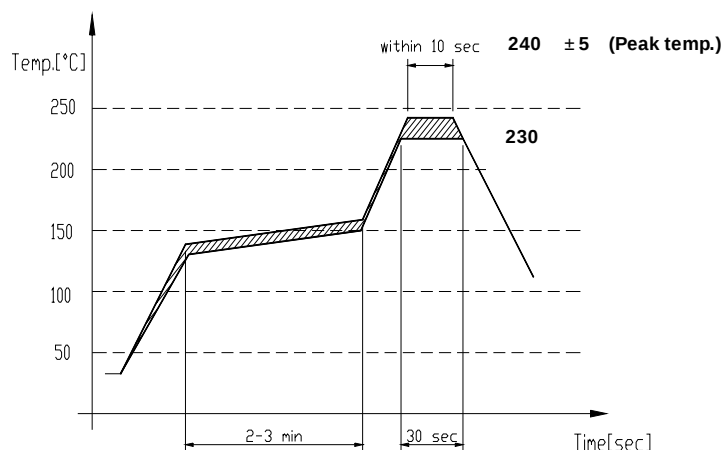
- Calibrate to RF cable
 - Center frequency : Refer to page 4
 - Span : 800MHz
 - Number of point : 801
- Connect RF Cable to SMA connector of jig.
- SET format of network analyzer in VSWR(SWR).
- Read the value of VSWR, after setting MARKER1, MARKER2, MARKER3.
- Verify that the value of VSWR is within specification

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5. Soldering Recommendation

5.1 Soldering Profile

Solder paste : Ag/Sn/Cu:96.5/3.0/0.5



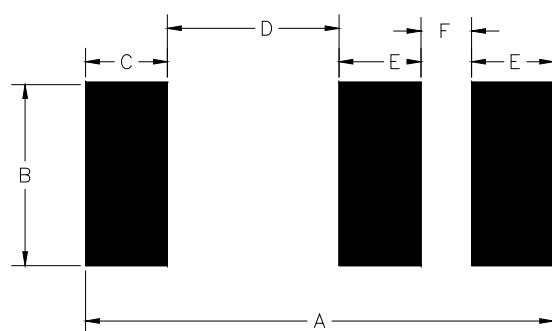
This product is designed for reflow soldering only. Do not use flow (wave) soldering.

Use non-activated flux (Cl content 0.2% max.)

Follow the recommended soldering conditions to avoid damage.

Reflow-cycle is max. 3 times.

5.2 Soldering Land Pattern



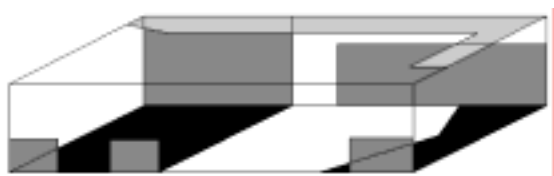
UNIT : mm

A	5.4
B	2.0
C	0.8
D	2.6
E	0.75
F	0.5

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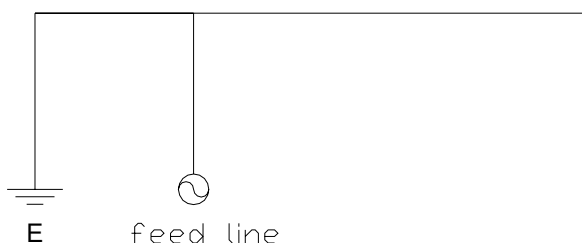
6. Structure & Material

6.1 Material



1	(Bulk)		Material
2	Pattern	 TOP	Ag
		 BOTTOM	
		 SIDE	

6.2 Equivalent circuit



7. Caution and Warranty

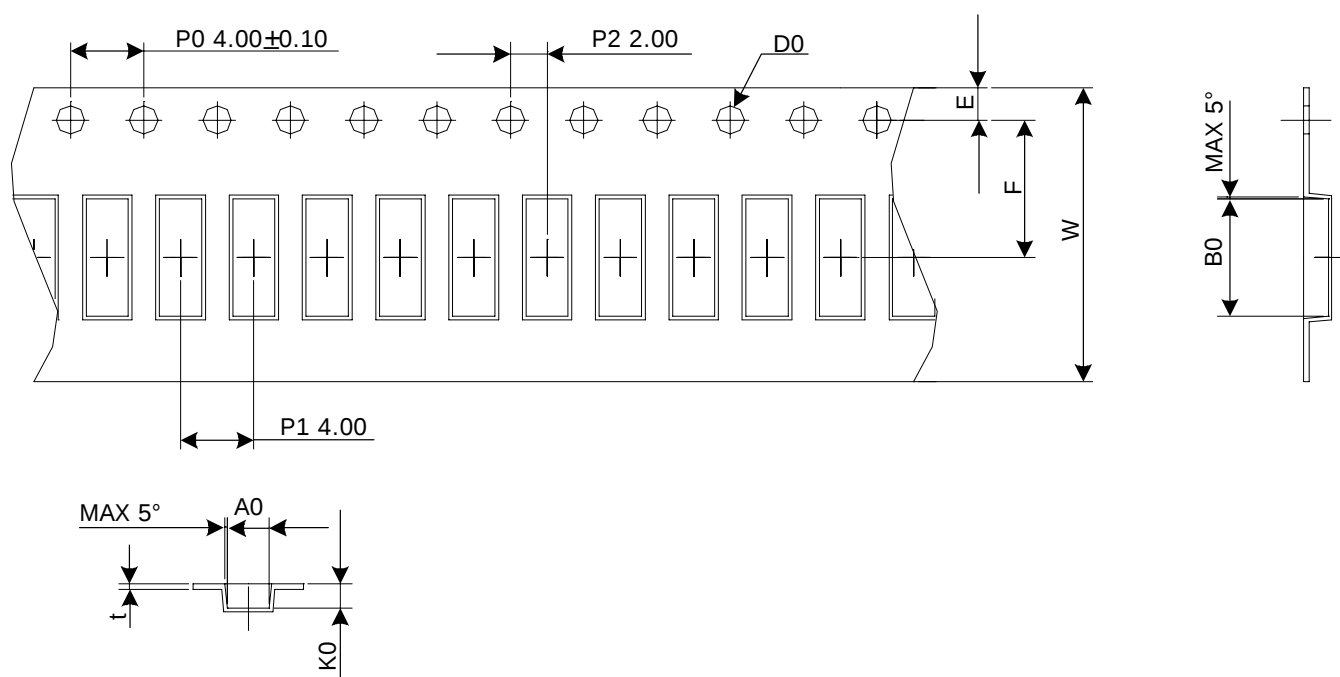
1. Ceramic Patch Antennas can be degraded when used at high temperature and humidity.
2. Electrode metallization made from silver is unprotected and will tarnish during storage in normal atmospheres affected by sulphuric compounds but has no effect whatsoever on the electrical performance or the processability of the patches. Because of this normal and to be expected process, AMOTECH accepts no warranty claims for tarnished products.
3. Ceramic Patch Antennas must avoid shock and drop, to prevent crack of antenna due to weight of itself.
4. Ceramic Patch Antennas must be used within 6 months, the antenna produced before 6 months should be checked for soldering feature before using

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8. Packing

8.1 Tape Dimension (unit : mm)

8.1.1 Size



A0	2.30 ± 0.10	E	1.75 ± 0.10
B0	6.40 ± 0.10	F	7.50
K0	1.35 ± 0.10	t	0.30 ± 0.05
D0	1.55 ± 0.05	W	16.00 ± 0.30

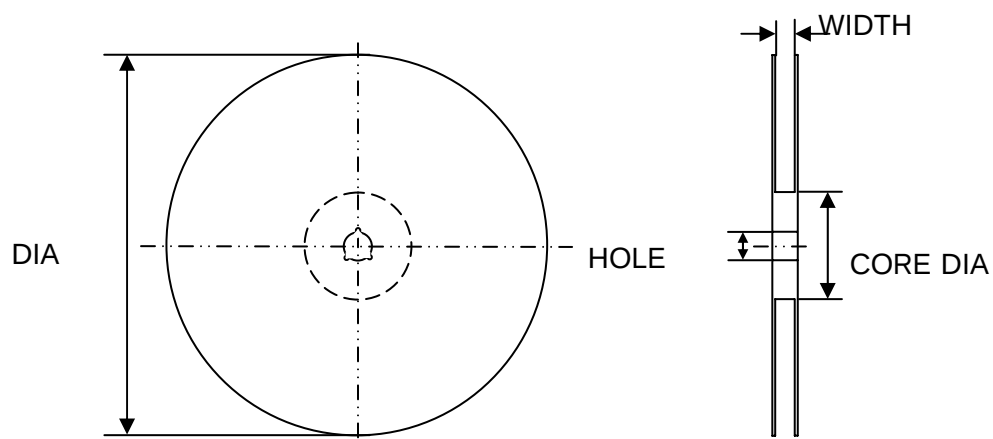
8.1.2 Surface resistance

- 1) Carrier tape : $10^9 - 10^{11}\Omega$
- 2) Cover tape : $10^8 - 10^{11}\Omega$
- 3) Reel : $10^9 - 10^{11}\Omega$

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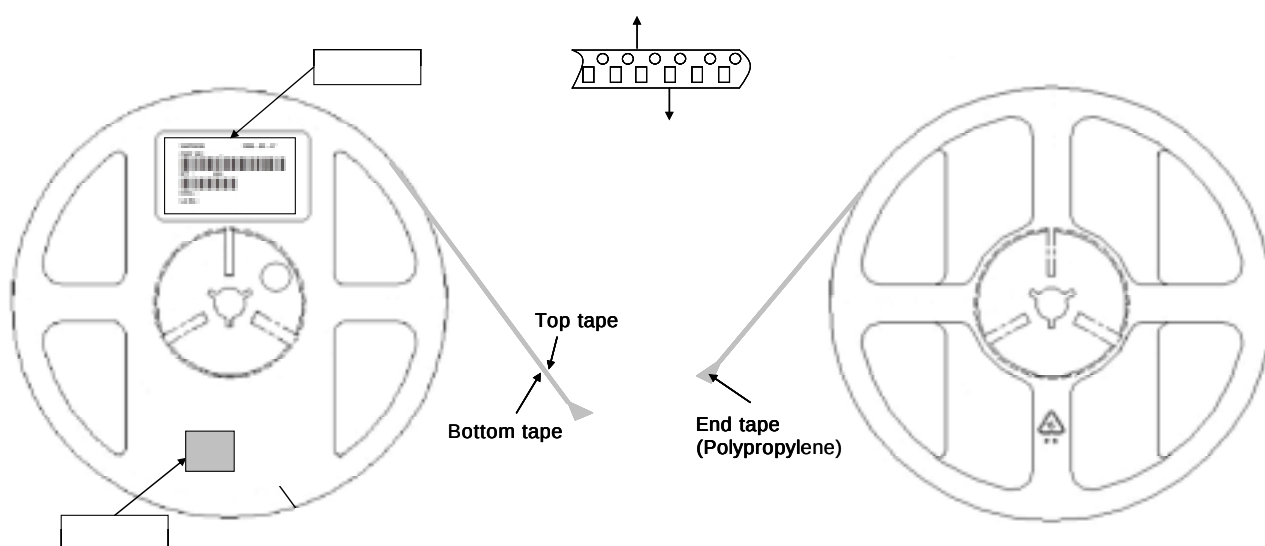
8.2 Description of Reel

8.2.1 Size



ITEM	DIA	WIDTH	CORE DIA	HOLE
Size(mm)	180.0 +0, -3	17.0 ± 0.3	60.0 ± 1	13.0 ± 0.5

8.2.2 Attaching Level & Winding Method



8.2.3 Material

- 1) Plastic reel : GPPS (General Purpose Poly Styrene) resin

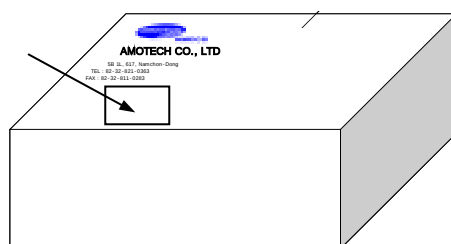
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8.3 Description of Packing Box

8.3.1 Small Box

Size : 185 (W) x 185 (D) x 68 (T) (mm)

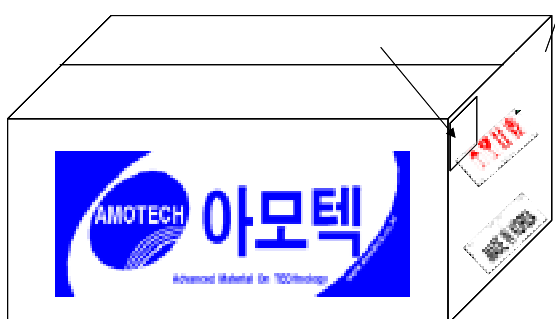
quantity : 3 reel (2,000 ea/reel × 3 reel = 6,000 ea)



8.3.2 Medium Box

Size : 365 (W) x 200 (D) x 200 (T) (mm)

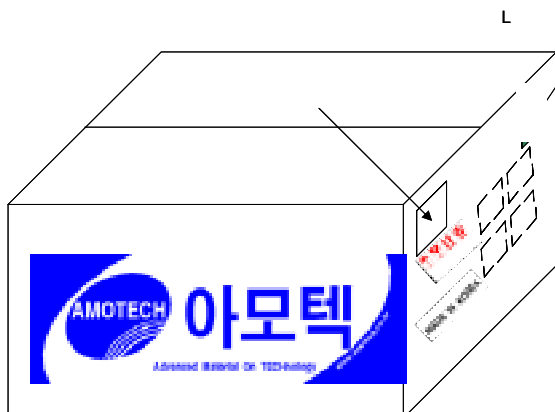
quantity : 5 Small Box (6,000 ea/ Small Box × 5 Small Box = 30,000 ea)



8.3.3 Large Box

Size : 390 (W) x 390 (D) x 280 (T) (mm)

quantity : 14 Small Box (6,000 ea/ Small Box × 14 Small Box = 84,000 ea)



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8.4 Description of Packing Label

AMOTECH CO.,LTD. 617 5B-1L, Namchon-Dong, Namdong-Gu, Incheon-City, Korea <u>Dielectric Chip Antenna</u> Type : AMAN542012PC07 Lot No : Quantity : 2,000 pcs Date : 2006/11/27

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9. Harmfulness material' s Test Report

9.1 Material ngredient Analysis

SGS Testing Korea Co., Ltd. #18-34, Sanbon-dong, Gungpo-city, Kyunggi-do, Korea 435-040 Tel : 031) 425-5765~6, Fax: 031) 427-2374, Internet-http://www.sgslab.co.kr	
Test Report	No. F690501/LF-CTS050284 Date : May 12, 2005 Page 1 of 2
AMOTECH 617, Namchon-dong, Namdong-gu, Incheon, Korea	
The following merchandise was submitted and identified by the client as :-	
Type of Product	: Ceramic PiFA Antenna
SGS File No.	: G-49/2005-2072/9
Buyer	: SAMSUNG
Style / Item No.	: Ceramic PiFA Antenna
Sample Receiving Date	: May. 04, 2005
Test Performing Date	: May. 06, 2005
Test Performed	: SGS Testing Korea tested the sample which was selected by applicant with following result.
Test Results	: For further details, please refer to following page.
KHJ/hjp	SGS Testing Korea Co., Ltd.  Jason Han / Director
This Test Report is issued by the Company subject to its General Conditions of Service printed overleaf. Attention is drawn to the limitations of liability, indemnification and jurisdictional issues defined therein. The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full, without prior written permission of the Company.	

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SGS Testing Korea Co., Ltd.

#18-34, Sanbon-dong, Gunpo-city, Kyunggi-do, Korea 435-040
Tel : 031) 428-5765~6, Fax: 031) 427-2374, InterNet>http://www.sgslab.co.kr

Test Report No. F690501/LF-CTS050284 Date : May 12, 2005 Page 2 of 2

Heavy Metal

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	USEPA 3050B, ICP-AES	0.5	n. d.
Lead (Pb)	mg/kg	USEPA 3050B, ICP-AES	5	n. d.
Mercury (Hg)	mg/kg	USEPA 3052, ICP-AES	2	n. d.
Hexavalent Chromium (Cr VI)	mg/kg	USEPA 3060A, UV-vis	1	n. d.

Flame Retardants

Test Items	Unit	Test Method	MDL	Results
Polybrominated Biphenyls (PBBs)	-	-	-	-
Bromobiphenyl	mg/kg	With reference to USEPA 3540C. Analysis was performed by GC/MS..	5	n. d.
Dibromobiphenyl	mg/kg		5	n. d.
Tribromobiphenyl	mg/kg		5	n. d.
Tetrabromobiphenyl	mg/kg		5	n. d.
Pentabromobiphenyl	mg/kg		5	n. d.
Hexabromobiphenyl	mg/kg		5	n. d.
Heptabromobiphenyl	mg/kg		5	n. d.
Octabromobiphenyl	mg/kg		5	n. d.
Nonabromobiphenyl	mg/kg		5	n. d.
Decabromobiphenyl	mg/kg		5	n. d.
Polybrominated Diphenyl Ethers (PBDEs)	-	-	-	-
Bromodiphenyl ether	mg/kg	With reference to USEPA 3540C. Analysis was performed by GC/MS.	5	n. d.
Dibromodiphenyl ether	mg/kg		5	n. d.
Tribromodiphenyl ether	mg/kg		5	n. d.
Tetrabromodiphenyl ether	mg/kg		5	n. d.
Pentabromodiphenyl ether	mg/kg		5	n. d.
Hexabromodiphenyl ether	mg/kg		5	n. d.
Heptabromodiphenyl ether	mg/kg		5	n. d.
Octabromodiphenyl ether	mg/kg		5	n. d.
Nonabromodiphenyl ether	mg/kg		5	n. d.
Decabromodiphenyl ether	mg/kg		5	n. d.

Note : n. d. = Not detected
MDL = Method Detection Limit

***** End *****

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9.2 Powder



Test Report

FUJII TITANIUM IND. CO., LTD.
12-8, SENGUN-CHO, HIRATSUKA-CITY,
KANAKAWA-PREF. JAPAN

Report No. : CE/2004/61738
Date : 2004/06/21
Page : 1 of 1

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

Type of Product : BARIUM TITANATE POWDER
Style/Item No : MMT-20M(B)
Sample Received : 2004/06/15
Testing Date : 2004/06/15 TO 2004/06/21

Test Result

PART NAME NO.1 : GRAY POWDER

Test Item (s)	Unit	Method	MDL	Result			
				No.1			
Cadmium (Cd)	ppm	ICP-AES after as per EN 1122, method B:2001 or other acid digestion.	2	N.D.			
Chromium (Cr)	ppm	ICP-AES after as per US EPA 3050B or other acid digestion.	2	N.D.			
Mercury (Hg)	ppm	ICP-AES after as per US EPA 3052 or other acid digestion.	2	N.D.			
Lead (Pb)	ppm	ICP-AES after as per US EPA 3050B or other acid digestion.	2	N.D.			

NOTE: (1) N.D. = Not detected. (<MDL)
(2) ppm = $\mu\text{g}/\text{kg}$
(3) MDL = Method Detection Limit


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

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TW0883088

SGS Taiwan Ltd. 128-1 Wu Kong Road, Hsiao Tsinan 2nd, Taipei County, Taiwan / 台灣縣新莊工業區五路128-1號
台灣檢驗科技股份有限公司 電話: 886-2-2218-2888 傳真: 886-2-2218-2889 網址: www.sgs.com

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9.3 Ag paste



Test Report No. F690501/LF-CTSGP06-0257

Date: January 11, 2006

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To: MICRO M CO., LTD.
Rm#503, B-dong, Bundangtechnopark
Yatap-dong
Bundang-gu
KYUNGKI-DO
Korea

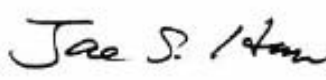
The following merchandise was submitted and identified by the client as :

Commodity : PCC11837
SGS File No. : GP06-0257
Received Date : January 04, 2006
Test Performing Date : January 05, 2006
Test Performed : SGS Testing Korea tested the sample(s) selected by applicant with following results
Test Results : For further details, please refer to following page(s)
Buyer(s) : SAMSUNG

SGS Testing Korea Co. Ltd.

Brendan Lee
Patrick An
Monet Jeong
Jinee Song
/Testing Person


Jeff Jang / Technical Mgr


Jason Han / Lab Director

The above certificate is the accredited test items by Korea Laboratory Accreditation Scheme (KOLAS), which signed the ILAC-MRA.

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Test Report No. F690501/LF-CTSGP06-0257

Date: January 11, 2006

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Sample No. : GP06-0257.001
Sample Description : PCC11837
Style/Item No. : N/A
Comments : Material is silver paste.

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	US EPA 3050B(1996), US EPA 6010B(1996)	0.5	N.D.
Lead (Pb)	mg/kg	US EPA 3050B(1996), US EPA 6010B(1996)	5	12.0
Mercury (Hg)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996)	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	US EPA 3060A(1996), US EPA 7196A(1992)	1	N.D.

Picture of Sample as Received:



*** End ***

NOTE: (1) N.D. = Not detected (<MDL)
(2) ppm = mg/kg
(3) MDL = Method Detection Limit
(4) Estimated expanded uncertainty U with a coverage factor =2, k corresponding to a level of confidence of about 95%

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9.4 Carrier Tape

		SGS Korea Co., Ltd. #1002-2, Hwasan-dl, Omsan-up, Ulsan, Korea 689-890 Tel : 052/239-6908-10, Fax: 052/239-6913, InterNet: http://www.sgsgroup.co.kr	
Test Report	No. F690101/LF-CTS008578	Date : December 19, 2003	Page 1 of 2
CHEM TECH SOLUTION CO., LTD #402 Najin Bldg., 408, Sang-dong, Wonmi-gu, Bucheon-si, Gyeonggi-do, Korea			
The following merchandise was submitted and identified by the client as : -			
Type of Product	:	PS Clear Sheet	
SGS File No.	:	S-49/2003-4761	
Country of Origin	:	Korea	
Sample Receiving Date	:	Dec. 11, 2003	
Test Performing Date	:	Dec. 12, 2003	
Test Performed	:	SGS Korea tested the sample which was selected by applicant with following result.	
Test Results	:	For further details, please refer to following page.	
SHP/mss		SGS Korea Co., Ltd.  T.J.Hwang / Lab. Manager	
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SGS Korea Co., Ltd. #1002-2, Hwasan-dl, Omsan-up, Ulsan, Korea 689-890 Tel : 052/239-6908-10 Fax : 052/239-6913 www.sgsgroup.co.kr			

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SGS Korea Co., Ltd.
#1002-2, Hwasan-ro, Onsan-up, Ulsu-gun, Ulsan, Korea 689-880
Tel : 052)239-6900~10, Fax: 052)239-6913, InterNet: http://www.sgsgroup.co.kr

Test Report No. F690101/LF-CTS008578 Date : December 19, 2003 Page 2 of 2

Heavy Metal

Test Item	Unit	Test Method	Detection Limit	Result
Cadmium (Cd)	mg/kg	EN 1122, ICP-AES	0.5	n. d.
Lead (Pb)	mg/kg	USEPA 3050B, ICP-AES	5	n. d.
Mercury (Hg)	mg/kg	USEPA 3052, ICP-AES	0.5	n. d.
Hexavalent Chromium (Cr VI)	mg/kg	USEPA 3060A	0.16	n. d.

n. d. : n. d. = Not detected

***** End *****

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#1002-2, Hwasan-ro, Onsan-up, Ulsu-gun, Ulsan, Korea 689-880
Tel : 052)239-6900~10, Fax: 052)239-6913, InterNet: http://www.sgsgroup.co.kr

Member of SGS Group (Société Générale de Surveillance)

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9.5 Carrier Cover

DENKA
DENKA BUNSEKI CENTER
8-6-1 Asahi-cho
Machida-shi Tokyo 194-8660 JAPAN
Phone : +81-42-721-3616
Registry Number for Measurement Laboratory Accreditation
of Tokyo metropolitan:541

Laboratory Analysis Report

Report Date : April 22, 2004
Doc. No. : 24016-4
Sample Description : ALS-ATA
Prepared for : OJIMA Plant DENKA KAKO CO.,LTD.

Results of Analysis

Analyte	Concentration/ppm	Method	Notes
Cadmium (Cd)	< 5ppm	SONY TECHNICAL STANDARDS SS-00259	
Chromium (Cr)	< 5ppm	SONY TECHNICAL STANDARDS SS-00259	Total Chromium
Lead (Pb)	< 30ppm	SONY TECHNICAL STANDARDS SS-00259	
Mercury (Hg)	< 2ppm	Japanese Clinical Standard	

Equipment for Measurement
Cd,Pb,Cr : ICP-AES(Inductively Coupled Plasma Atomic Emission Spectrometer)
Spector-RIKAKU Corp. CIROS-120
Hg : Au-Amalgam Reduction - Atomic Absorption Spectrometer
Nippon Instruments Corporation, MA-2000

Yoshihiro Furukawa
Yoshihiro Furukawa
Manager