

**Product Number: 200SRP-HA-AN**  
**Product Name: 2.4 GHz External Antenna**

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- 2. Specification**
- 3. S Parameter Test Data**
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## **1. Reliability Testing**

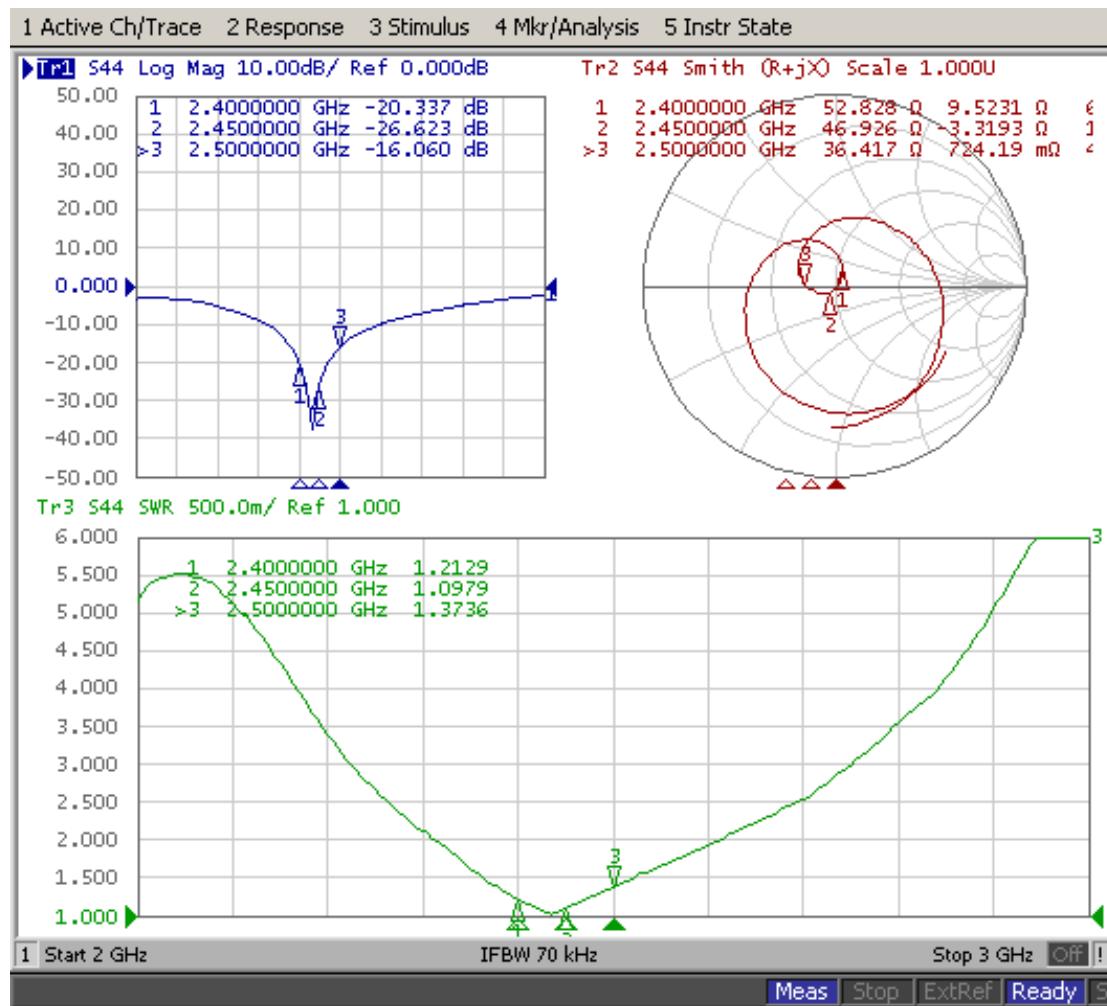
<b>Test Item</b>	<b>Procedure</b>	<b>Requirement</b>
<b>1. Visual inspection and Dimension Check</b>	Applicable methods using x5 magnification	follow specification
<b>2. Rapid Changing of Temperature</b>	-40°C (30minutes) to 90°C (30minutes); 120 cycles	After 2 hours recovery: 1. no visible damage 2. Freq. Tol.: < ±5%
<b>3. Damp Heat</b>	500 hours at 60°C; 90 ~ 95% RH	After 2 hours recovery: 1. no visible damage 2. Freq. Tol. : < ±5%
<b>4. Endurance</b>	500 hours at 90°C	After 2 hours recovery: 1. no visible damage 2. Freq Tol.: < ±5%

Product Number: 200SRP-HA-AN  
Product Name: 2.4 GHz External Antenna

## 2. Specification

A. Electrical Characteristics	
S.W.R.	<= 2.0 @ 2400~2500 MHz
Antenna Gain	5 ± 0.7 dBi (*Depends on Product Mechanical Environment*)
Impedance	50 Ohm
B. Material	
Material of Radiator	Cu (Plated)
Connector Type	50 Ohm SMA Male Reverse
C. Environmental	
Operation Temperature	-30 °C ~ +85 °C
Storage Temperature	-30 °C ~ +85 °C

## 3. S Parameter Test data



**Product Number: 200SRP-HA-AN**  
**Product Name: 2.4 GHz External Antenna**

#### **4. Antenna Radiation Pattern**

**Testing Equipment Specification:**

**Antenna Anechoic Chamber Dimension: 8 x 4 x 4 m**

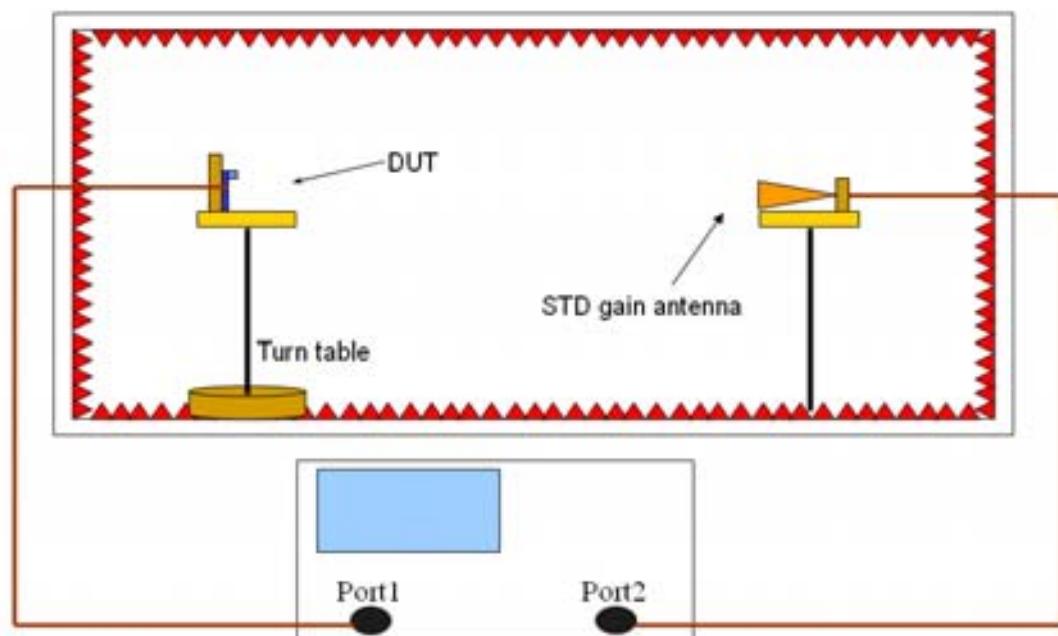
**Quite Zone: 600mm @1 GHz**

**Isolation: >100dB @ 1 MHz ~ 10 GHz**

**Testing Equipment: Agilent 5071B**

**Received Antenna: 0.7 ~ 6.0 GHz for Gain Calibration**

**Double Ridged Horn Antenna**



#### **5. Mechanical Drawing**

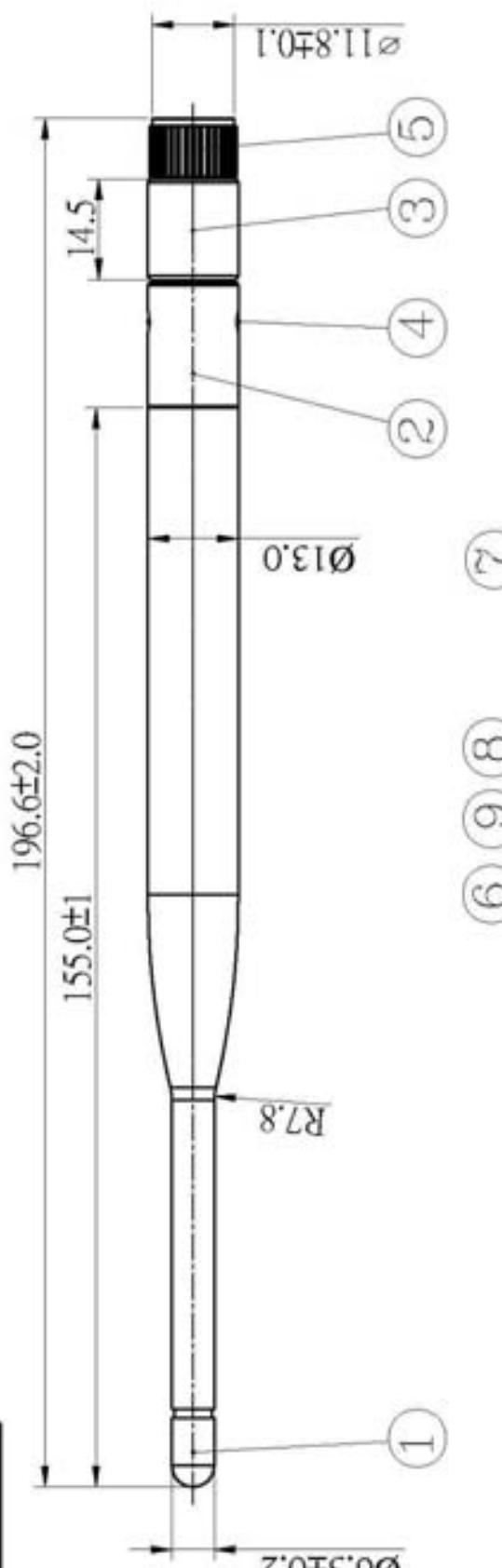
#### **6. MSDS & SGS Report**

**ROHS**

Compatible

 $196.6 \pm 2.0$  $155.0 \pm 1$  $14.5$  $\phi 11.8 \pm 0.1$  $\phi 13.0$ 

R7.8

 $\phi 6.3 \pm 0.2$ 

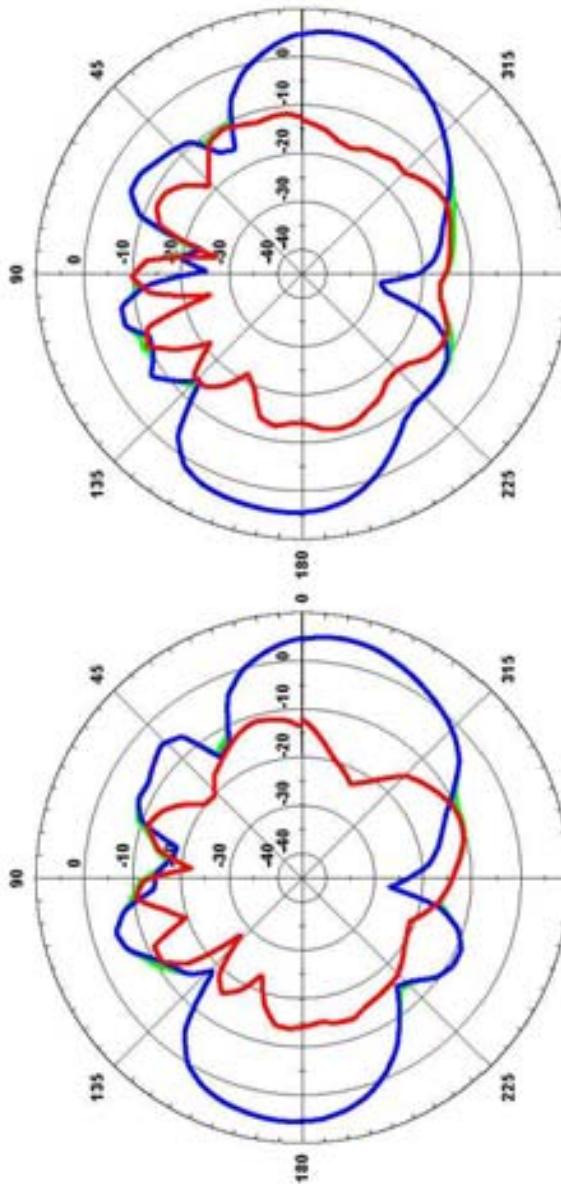
B		9 R-AN1901-00A	Sleeve	ABS	φ8.20/ L=30.0 mm	1
8	R-RG-178U	Cable	RG178	L=70.0mm	1	
7	R-AN94-02S	Tube	Cu	φ5.20/L=26.0 mm	1	
6	R-AN1901-06	Spring	Cu	L=94.0mm	1	
5	R-SMA324-CC8MRANT	SMA Male Revers	Cu	Electrodeposition	1	
4	R-AN03-514CZ	Rivet	Cu	Electrodeposition	2	
3	R-AN03-T01	Base	PA-6	Black	1	
2	R-AN03-T02	Hinge	PA-6	Black	1	
1	R-AN1901-01	Body	TPE	Black	1	
No.		Part Number	Name	Material	Finished	Qty
1					3	2

B		PART NAME: Antenna 2.4GHz 5dBi		PART NO.: R-AN2400-1901RS dwg	
A		APPROVED BY	CHECKED BY	DESIGNED BY	REVISION B1
		Grant	Liu kui	Liu Guanghui	Tolerance
		2007/02/07	2007/02/07	2007/02/07	X.X ± 0.10
					X.XX ± 0.05
					X* ± 1%

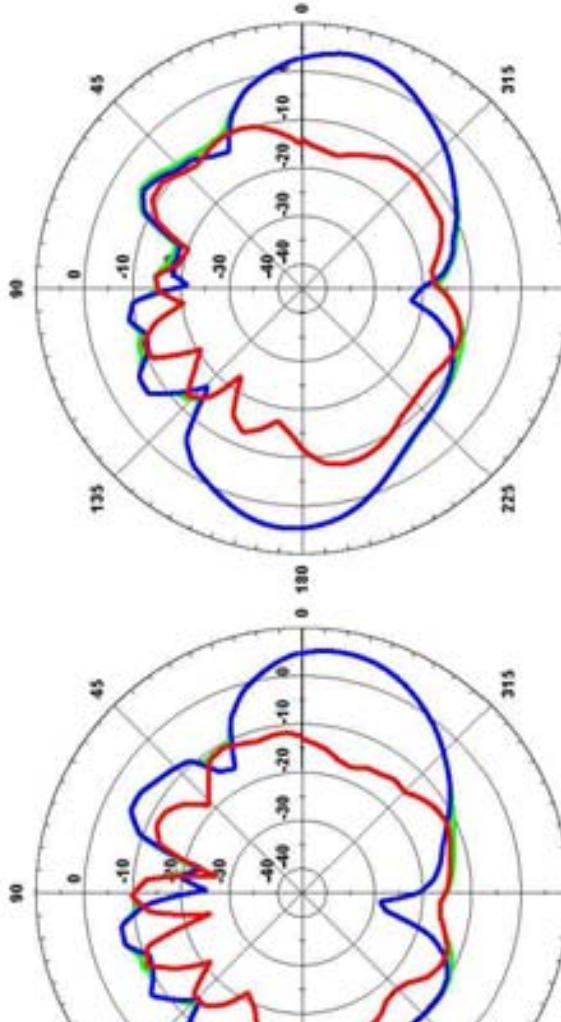
## Electrical Performance-Radiation Pattern and Gain

E-Plane

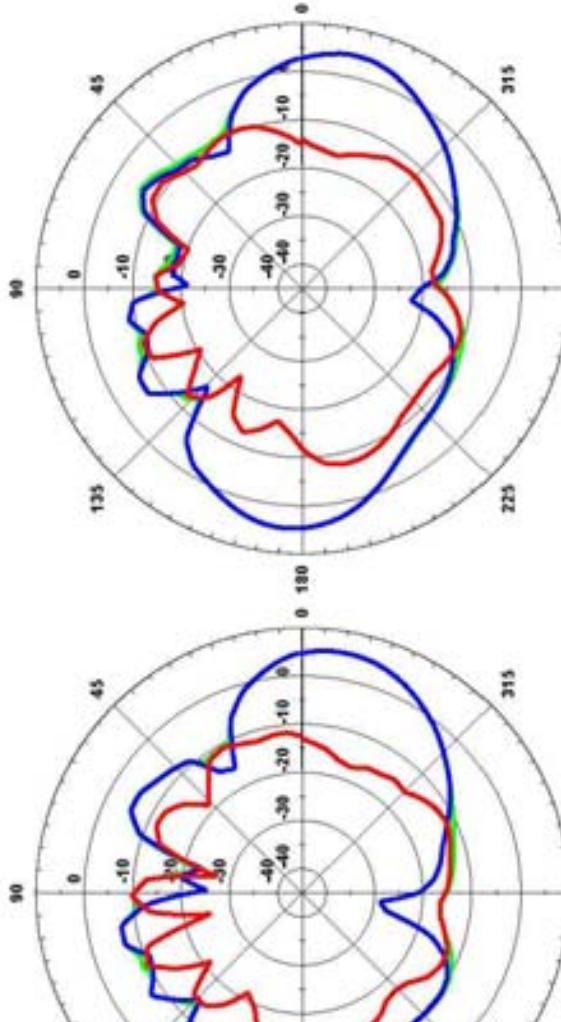
24000MHz 2450MHz



2450MHz 2500MHz



2500MHz



Ver. Pol. (max.) =	-10.1
Ver. Pol. (avg.) =	-14.6
Hor. Pol. (max.) =	5.6
Hor. Pol. (avg.) =	-0.6
Tol. Gain (max.) =	5.6
Tol. Gain (avg.) =	-0.6

Ver. Pol. (max.) =	-7.6
Ver. Pol. (avg.) =	-12.3
Hor. Pol. (max.) =	4.8
Hor. Pol. (avg.) =	-1.8
Tol. Gain (max.) =	4.8
Tol. Gain (avg.) =	-1.7

Unit: dBi

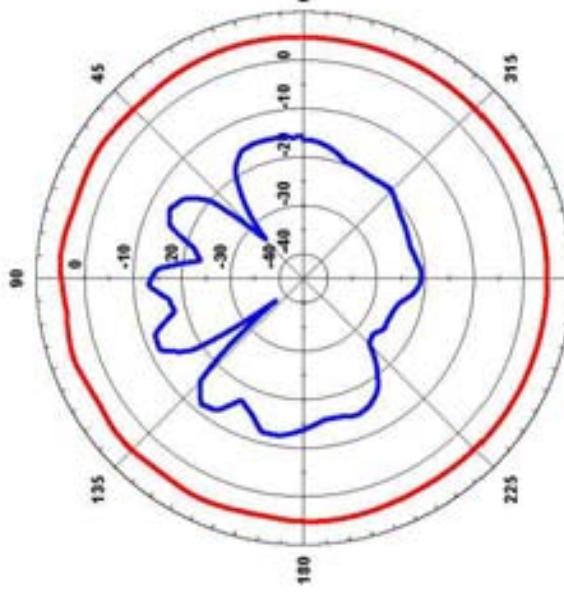
Unit: dB

Unit: dBi

# Electrical Performance-Radiation Pattern and Gain

## H-Plane

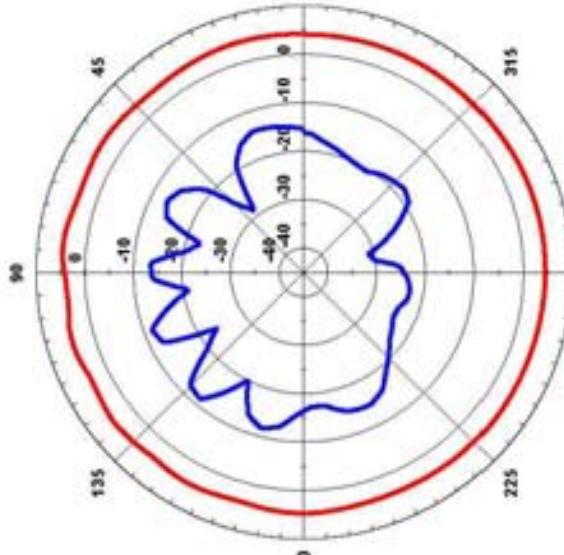
24000MHz



Ver. Pol. (max.)=	<b>5.3</b>
Ver. Pol. (avg.)=	<b>4.8</b>
Hor. Pol. (max.)=	<b>-11.5</b>
Hor. Pol. (avg.)=	<b>-16.8</b>
Tol. Gain (max.)=	<b>5.3</b>
Tol. Gain (avg.)=	<b>4.8</b>

Unit: dBi

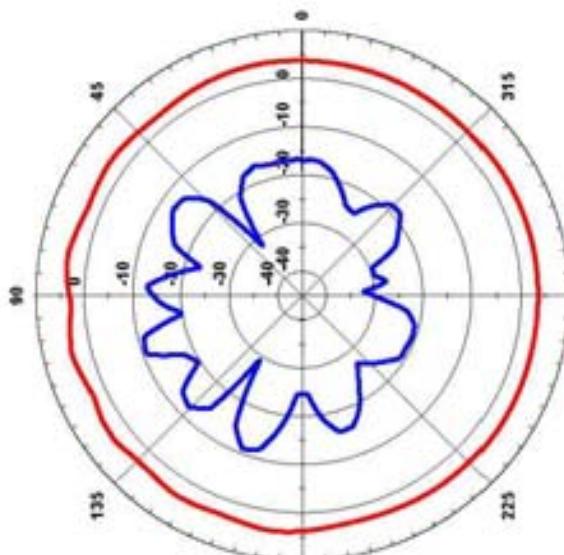
2450MHz



Ver. Pol. (max.)=	<b>4.8</b>
Ver. Pol. (avg.)=	<b>4.3</b>
Hor. Pol. (max.)=	<b>-11.4</b>
Hor. Pol. (avg.)=	<b>-16.8</b>
Tol. Gain (max.)=	<b>4.8</b>
Tol. Gain (avg.)=	<b>4.3</b>

Unit: dBi

2500MHz



Ver. Pol. (max.)=	<b>4.2</b>
Ver. Pol. (avg.)=	<b>3.5</b>
Hor. Pol. (max.)=	<b>-10.6</b>
Hor. Pol. (avg.)=	<b>-17.4</b>
Tol. Gain (max.)=	<b>4.2</b>
Tol. Gain (avg.)=	<b>3.5</b>

Unit: dBi

## PA-6 Datasheet

### 納普工程塑料檢測報告單

QR-82401-04 A/1

NO : 06040401

品名	增韌增強尼龍	檢驗標準	QW-824-03	顏色	黑色
型號	PA6-EA	批號	----	數量	2T
檢驗項目		單位	檢驗標準	標準要求	實測數據
拉伸強度		Mpa	GB/T1040-92	----	35.6
拉伸模量		Mpa	GB/T1040-92	----	1363
斷裂伸長率		%	GB/T1040-92	----	63.6
簡支梁沖擊強度(缺口)		KJ/M2	GB/T1043-93	----	20.0
簡支梁沖擊強度(非缺口)		KJ/M2	GB/T1043-93	----	NB

結論：

以上數據均為實測數據

檢驗員：李興華 日期：2006-05-07 審核：汪文 日期：2006-05-07

## TPE Datasheet

物性項目 Property	單位 Unit	ASTM 試驗法 Test Method	TPE
比重 Specific Gravity	---	D792	0.88
模具收縮率 Shrinkage	%	D955	0.8-2.5
斷裂拉伸強度 Tensile Strength	Kg/ cm <sup>2</sup>	D638	3.1
扭曲強度 Flexural Strength	Kg/ cm <sup>2</sup>	D790	---
衝擊強度缺口 23°C Impact Strength	Kg cm/cm	D256	---
硬度 Hardness	A Shore	---	13
熱變形溫度 0.45 MPa Heat Deflection Temp.	°C	D648	80
熔融指數 Melt Flow Index	G/ min <sup>2</sup>	D1238	10
燃燒性 Flammability	---	UL94	HB
<b>Testing Data from</b>			
東莞市合春塑料有限公司 Tel:86-0769-2774772			
台灣大雅國際股份有限公司 Tel:886-02-27775232			

## Copper

## Copper Datasheet

## Coaxial Cable Datasheet

RG-178 Coaxial Cable Specification		
<b>1. Cable Type</b>	MIL – C – 17 / RG-178	
<b>2. Impedance</b>	50 ± 3 ohm	
<b>3. Inner Conductor</b>	<b>Material</b>	silver-coated copper
	<b>Conductor Numbers</b>	7
	<b>Conductor Size</b>	0.102 mm
	<b>Outer Diameter</b>	0.3 mm
<b>4. Dielectric Layer</b>	<b>Material</b>	FEP
	<b>Color</b>	Clear
	<b>Average Thickness</b>	0.28 mm
	<b>Diameter</b>	0.86 mm
<b>5. Braid (Shielding)</b>	<b>Material</b>	silver-coated copper
	<b>Construction</b>	16-3-0.1 mm
	<b>Coverage</b>	95 %
<b>6. Outer Cover</b>	<b>Material</b>	FEP
	<b>Color</b>	Brown
	<b>Average Thickness</b>	0.25 mm
	<b>Diameter</b>	1.80 ± 0.05 mm
<b>7. V.S.W.R Testing</b>	< 1.3 (DC ~ 6.0 GHz)	
<b>8. Attenuation</b> (dB / 100 meter )	<b>100 MHz</b>	46
	<b>900 MHz</b>	155
	<b>1800 MHz</b>	295
	<b>2400 MHz</b>	340
	<b>5200 MHz</b>	505
	<b>6000 MHz</b>	550
<b>9. Capacitance</b>	97 ± 3 ( pF / meter)	
<b>10. Maximum Power</b>	30 dBm	
<b>11. Spark Test</b>	2.0 KV	
<b>12. Rating Temp. and Volt.</b>	200°C / 30V	
<b>13. Conductor Resistance</b>	335 ohm / KM / 20°C max.	
<b>14. Dielectric Resistance</b>	3 G ohm / KM / 20°C min.	



## Survey Report

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

Sample Description : COAXIAL SERIES  
Style/Item No : COAXIAL SERIES  
Testing Period : 2005/01/28 TO 2006/07/17

---

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

\* This report is combined with 4 copies of test reports which hereby certified by SGS through the verification of each above certification provided by client.\*

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

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SGS TAIWAN LIMITED | NO. 128-1, Wu Kung Road, WuKu Industrial Zone, Taipei, county, Taiwan.  
(0886-2) 22993939 (0886-2) 2299-3237 [www.sgs.com/tw](http://www.sgs.com/tw)

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### Test Result(s)

PART NAME NO.1	: GRAY METAL(CE/2005/95123)
PART NAME NO.2	: IRON-GRAY METAL(CE/2006/46186)
PART NAME NO.3	: MIXED ALL PARTS(MULTILAYER FERRITE CHIP BEADS, MULTILAYER FERRITE CHIP INDUCTORS)(CE/2006/26763)
PART NAME NO.4	: MIXED ALL PARTS(MULTILAYER FERRITE CHIP BEADS, HIGH CURRENT FERRITE CHIP BEADS, BEAD ARRAY, MULTILAYER FERRITE COMMON MODE CHOKE)(CE/2006/22877)
PART NAME NO.5	: MIXED ALL PARTS(聚脂,聚胺基甲酸酯(2芯束絞漆包銅線))(CE/2006/57221)
PART NAME NO.6	: SILVER COLORED SOLDER(CE/2006/25828)
PART NAME NO.7	: MIXED ALL PARTS(IC)(CE/2006/26941)
PART NAME NO.8	: MIXED ALL PARTS(TOSHIBA SEMICONDUCTOR)(CE/2005/B6346A)
PART NAME NO.9	: MIXED ALL PARTS(BODY)(CE/2005/60638A NO.1)
PART NAME NO.10	: SILVER COLORED METAL PIN(CE/2005/60638A NO.2)
PART NAME NO.11	: BLACK EPOXY(CE/2005/91990B NO.3)
PART NAME NO.12	: SILVER COLORED METAL(CE/2006/20960A)
PART NAME NO.13	: MLCC(KA/2006/60498)
PART NAME NO.14	: THICK FILM CHIP RESISTORS & CHIP ARRAY(KA/2006/62695)
PART NAME NO.15	: SILVER COLORED METAL(CE/2006/31989A NO.1)
PART NAME NO.16	: SILVER COLORED PLATING(CE/2006/31989A NO.2)
PART NAME NO.17	: PET FILM (MYLAR)(KA/2005/B0923A-01)
PART NAME NO.18	: MIXED ALL PARTS(SYLGARD 170 A & B SILICONE ELASTOMER)(CE/2005/87166)
PART NAME NO.19	: COPPER/SILVER COLORED METAL(CE/2005/A2849)
PART NAME NO.20	: BLACK PASTE(CE/2006/21870)
PART NAME NO.21	: TRANSPARENT LIQUID(CE/2006/21871)
PART NAME NO.22	: WHITE INK(CE/2005/A0062)
PART NAME NO.23	: GREEN PCB(SH6006519/CHEM)
PART NAME NO.24	: BLACK PELLETS(CE/2005/C2222)
PART NAME NO.25	: COPPER COLORED METAL SHEET(C5191 (PBP))(CE/2006/30709)
PART NAME NO.26	: YELLOW TAPE(CE/2005/15543)
PART NAME NO.27	: LT. YELLOW LIQUID(CE/2006/21993)
PART NAME NO.28	: GOLDEN COLORED METAL(SZR0607121195405C)(CTI)
PART NAME NO.29	: GREEN LIQUID(GZ0603035698/CHEM)
PART NAME NO.30	: WHITE PLASTIC BAR(SH6060096/CHEM)

**Survey Report**

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Test Item(s):	Unit	Method	MDL	Result				
				NO.1	NO.2	NO.3	NO.4	NO.5
Monobromobiphenyl	ppm	With reference to USEPA3540C, Analysis was performed by GC/MS and screening via USEPA 3550C with HPLC/DAD/MS	5	—	—	N.D.	—	N.D.
Dibromobiphenyl	ppm		5	—	—	N.D.	—	N.D.
Tribromobiphenyl	ppm		5	—	—	N.D.	—	N.D.
Tetrabromobiphenyl	ppm		5	—	—	N.D.	—	N.D.
Pentabromobiphenyl	ppm		5	—	—	N.D.	—	N.D.
Hexabromobiphenyl	ppm		5	—	—	N.D.	—	N.D.
Heptabromobiphenyl	ppm		5	—	—	N.D.	—	N.D.
Octabromobiphenyl	ppm		5	—	—	N.D.	—	N.D.
Nonabromobiphenyl	ppm		5	—	—	N.D.	—	N.D.
Decabromobiphenyl	ppm		5	—	—	N.D.	—	N.D.
<b>Total PBBs</b>	ppm		—	—	—	N.D.	—	N.D.
Monobromobiphenyl ether	ppm		5	—	—	N.D.	—	N.D.
Dibromobiphenyl ether	ppm		5	—	—	N.D.	—	N.D.
Tribromobiphenyl ether	ppm		5	—	—	N.D.	—	N.D.
Tetrabromobiphenyl ether	ppm		5	—	—	N.D.	—	N.D.
Pentabromobiphenyl ether	ppm		5	—	—	N.D.	—	N.D.
Hexabromobiphenyl ether	ppm		5	—	—	N.D.	—	N.D.
Heptabromobiphenyl ether	ppm		5	—	—	N.D.	—	N.D.
Octabromobiphenyl ether	ppm		5	—	—	N.D.	—	N.D.
Nonabromobiphenyl ether	ppm		5	—	—	N.D.	—	N.D.
Decabromobiphenyl ether	ppm		5	—	—	N.D.	—	N.D.
<b>Total PBBEs(PBDEs)</b>	ppm		—	—	—	N.D.	—	N.D.
<b>Total of Mono to Nona(Note 4)</b>	ppm		—	—	—	N.D.	—	N.D.
Test Item(s):	Unit	Method	MDL	Result				
				NO.1	NO.2	NO.3	NO.4	NO.5
Hexavalent Chromium (CrVI)	ppm	With reference to US EPA Method 3060A & 7196A for Hexavalent Chromium. Analysis was performed by UV/Vis Spectrometry.	2	N.D.	N.D.	N.D.	—	N.D.
Cadmium (Cd)	ppm	With reference to BS EN 1122:2001, Method B for Cadmium Content. Analysis was performed by ICP-AES.	2	N.D.	N.D.	N.D.	—	N.D.
Mercury (Hg)	ppm	With reference to US EPA Method 3052 for Mercury Content. Analysis was performed by ICP-AES.	2	N.D.	N.D.	N.D.	—	N.D.
Lead (Pb)	ppm	With reference to US EPA Method 3050B for Lead Content. Analysis was performed by ICP-AES.	2	N.D.	89.6	—	N.D.	N.D.

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Test Item(s):	Unit	Method	MDL	Result				
				NO.6	NO.7	NO.8	NO.9	NO.10
Monobromobiphenyl	ppm	With reference to USEPA3540C, Analysis was performed by GC/MS and screening via USEPA 3550C with HPLC/DAD/MS	5	N.D.	N.D.	N.D.	N.D.	—
Dibromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Tribromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Tetrabromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Pentabromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Hexabromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Heptabromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Octabromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Nonabromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Decabromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Total PBBS	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Monobromobiphenyl ether	ppm		—	N.D.	N.D.	N.D.	N.D.	—
Dibromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Tribromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Tetrabromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Pentabromobiphenyl ether	ppm	With reference to USEPA3540C, Analysis was performed by GC/MS and screening via USEPA 3550C with HPLC/DAD/MS	5	N.D.	N.D.	N.D.	N.D.	—
Hexabromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Heptabromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Octabromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Nonabromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Decabromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Total PBBEs(PBDEs)	ppm		5	N.D.	N.D.	N.D.	N.D.	—
Total of Mono to Nona (Note 4)	ppm		—	N.D.	N.D.	N.D.	N.D.	—
Test Item(s):	Unit	Method	MDL	Result				
Hexavalent Chromium (CrVI)	ppm	With reference to US EPA Method 3060A & 7196A for Hexavalent Chromium. Analysis was performed by UV/Vis Spectrometry.	2	N.D.	N.D.	N.D.	N.D.	N.D.
Cadmium (Cd)	ppm	With reference to BS EN 1122:2001, Method B for Cadmium Content. Analysis was performed by ICP-AES.	2	N.D.	N.D.	N.D.	N.D.	N.D.
Mercury (Hg)	ppm	With reference to US EPA Method 3052 for Mercury Content. Analysis was performed by ICP-AES.	2	N.D.	N.D.	N.D.	N.D.	N.D.
Lead (Pb)	ppm	With reference to US EPA Method 3050B for Lead Content. Analysis was performed by ICP-AES.	2	71.6	N.D.	11.0	—	24.8

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Test Item(s):	Unit	Method	MDL	Result				
				NO.11	NO.12	NO.13	NO.14	NO.15
Monobromobiphenyl	ppm	With reference to USEPA3540C, Analysis was performed by GC/MS and screening via USEPA 3550C with HPLC/DAD/MS	5	—	N.D.	N.D.	N.D.	N.D.
Dibromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Tribromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Tetrabromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Pentabromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Hexabromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Heptabromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Octabromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Nonabromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Decabromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Total PBBs	ppm		-	—	N.D.	N.D.	N.D.	N.D.
Monobromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Dibromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Tribromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Tetrabromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Pentabromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Hexabromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Heptabromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Octabromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Nonabromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Decabromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Total PBBEs(PBDEs)	ppm		-	—	N.D.	N.D.	N.D.	N.D.
Total of Mono to Nona(Note 4)	ppm		-	—	N.D.	N.D.	N.D.	N.D.

Test Item(s):	Unit	Method	MDL	Result				
				NO.11	NO.12	NO.13	NO.14	NO.15
Hexavalent Chromium (CrVI)	ppm	With reference to US EPA Method 3060A & 7196A for Hexavalent Chromium. Analysis was performed by UV/Vis Spectrometry.	2	—	N.D.	N.D.	N.D.	N.D.
Cadmium (Cd)	ppm	With reference to BS EN 1122:2001, Method B for Cadmium Content. Analysis was performed by ICP-AES.	2	—	N.D.	N.D.	N.D.	N.D.
Mercury (Hg)	ppm	With reference to US EPA Method 3052 for Mercury Content. Analysis was performed by ICP-AES.	2	—	N.D.	N.D.	N.D.	N.D.
Lead (Pb)	ppm	With reference to US EPA Method 3050B for Lead Content. Analysis was performed by ICP-AES.	2	26.4	N.D.	N.D.	254.0	N.D.

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Test Item(s):	Unit	Method	MDL	Result				
				NO.16	NO.17	NO.18	NO.19	NO.20
Monobromobiphenyl	ppm	With reference to USEPA3540C, Analysis was performed by GC/MS and screening via USEPA 3550C with HPLC/DAD/MS	5	—	N.D.	N.D.	N.D.	N.D.
Dibromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Tribromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Tetrabromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Pentabromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Hexabromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Heptabromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Octabromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Nonabromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Decabromobiphenyl	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Total PBBs	ppm		—	—	N.D.	N.D.	N.D.	N.D.
Monobromobiphenyl ether	ppm	With reference to USEPA3540C, Analysis was performed by GC/MS and screening via USEPA 3550C with HPLC/DAD/MS	5	—	N.D.	N.D.	N.D.	N.D.
Dibromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Tribromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Tetrabromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Pentabromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Hexabromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Heptabromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Octabromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Nonabromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Decabromobiphenyl ether	ppm		5	—	N.D.	N.D.	N.D.	N.D.
Total PBBEs(PBDEs)	ppm		—	—	N.D.	N.D.	N.D.	N.D.
Total of Mono to Nona(Note 4)	ppm		—	—	N.D.	N.D.	N.D.	N.D.
Test Item(s):	Unit	Method	MDL	Result				
				NO.16	NO.17	NO.18	NO.19	NO.20
Hexavalent Chromium (CrVI)	ppm	With reference to US EPA Method 3060A & 7196A for Hexavalent Chromium. Analysis was performed by UV/VIS Spectrometry.	2	—	N.D.	N.D.	N.D.	N.D.
Cadmium (Cd)	ppm	With reference to BS EN 1122:2001, Method B for Cadmium Content. Analysis was performed by ICP-AES.	2	—	N.D.	N.D.	N.D.	N.D.
Mercury (Hg)	ppm	With reference to US EPA Method 3052 for Mercury Content. Analysis was performed by ICP-AES.	2	—	N.D.	N.D.	N.D.	N.D.
Lead (Pb)	ppm	With reference to US EPA Method 3050B for Lead Content. Analysis was performed by ICP-AES.	2	—	N.D.	N.D.	21.5	N.D.
Hexavalent Chromium (CrVI)	**	With reference to IEC 62321, Ed.1 111/54/CDV. Analysis was performed by UV-VIS	0.02mg/kg with 50 cm <sup>2</sup> surface area	Negative	—	—	—	—

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Test Item(s):	Unit	Method	MDL	Result				
				NO.21	NO.22	NO.23	NO.24	NO.25
Monobromobiphenyl	ppm	With reference to USEPA3540C, Analysis was performed by GC/MS and screening via USEPA 3550C with HPLC/DAD/MS	5	N.D.	N.D.	N.D.	N.D.	N.D.
Dibromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Tribromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Tetrabromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Pentabromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Hexabromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Heptabromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Octabromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Nonabromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Decabromobiphenyl	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
<b>Total PBBs</b>	ppm		-	N.D.	N.D.	N.D.	N.D.	N.D.
Monobromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Dibromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Tribromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Tetrabromobiphenyl ether	ppm	With reference to USEPA3540C, Analysis was performed by GC/MS and screening via USEPA 3550C with HPLC/DAD/MS	5	N.D.	N.D.	N.D.	N.D.	N.D.
Pentabromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Hexabromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Heptabromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Octabromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Nonabromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
Decabromobiphenyl ether	ppm		5	N.D.	N.D.	N.D.	N.D.	N.D.
<b>Total PBBEs(PBDEs)</b>	ppm		-	N.D.	N.D.	N.D.	N.D.	N.D.
<b>Total of Mono to Nona</b> (Note 4)	ppm		-	N.D.	N.D.	N.D.	N.D.	N.D.

Test Item(s):	Unit	Method	MDL	Result				
				NO.21	NO.22	NO.23	NO.24	NO.25
Hexavalent Chromium (CrVI)	ppm	With reference to US EPA Method 3060A & 7196A for Hexavalent Chromium. Analysis was performed by UV/Vis Spectrometry.	2	N.D.	N.D.	N.D.	N.D.	N.D.
Cadmium (Cd)	ppm	With reference to BS EN 1122:2001, Method B for Cadmium Content. Analysis was performed by ICP-AES.	2	N.D.	N.D.	N.D.	N.D.	N.D.
Mercury (Hg)	ppm	With reference to US EPA Method 3052 for Mercury Content. Analysis was performed by ICP-AES.	2	N.D.	N.D.	N.D.	N.D.	N.D.
Lead (Pb)	ppm	With reference to US EPA Method 3050B for Lead Content. Analysis was performed by ICP-AES.	2	N.D.	N.D.	37.0	N.D.	17.6

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Test Item(s):	Unit	Method	MDL	Result				
				NO.26	NO.27	NO.28	NO.29	NO.30
Monobromobiphenyl	ppm	With reference to USEPA3540C, Analysis was performed by GC/MS and screening via USEPA 3550C with HPLC/DAD/MS	5	N.D.	N.D.	—	N.D.	N.D.
Dibromobiphenyl	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Tribromobiphenyl	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Tetrabromobiphenyl	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Pentabromobiphenyl	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Hexabromobiphenyl	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Heptabromobiphenyl	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Octabromobiphenyl	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Nonabromobiphenyl	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Decabromobiphenyl	ppm		5	N.D.	N.D.	—	N.D.	N.D.
<b>Total PBBs</b>	ppm		-	N.D.	N.D.	—	N.D.	N.D.
Monobromobiphenyl ether	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Dibromobiphenyl ether	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Tribromobiphenyl ether	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Tetrabromobiphenyl ether	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Pentabromobiphenyl ether	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Hexabromobiphenyl ether	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Heptabromobiphenyl ether	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Octabromobiphenyl ether	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Nonabromobiphenyl ether	ppm		5	N.D.	N.D.	—	N.D.	N.D.
Decabromobiphenyl ether	ppm		5	N.D.	N.D.	—	N.D.	N.D.
<b>Total PBBEs(PBDEs)</b>	ppm		-	N.D.	N.D.	—	N.D.	N.D.
<b>Total of Mono to Nona</b> (Note 4)	ppm		-	N.D.	N.D.	—	N.D.	N.D.

Test Item(s):	Unit	Method	MDL	Result				
				NO.26	NO.27	NO.28	NO.29	NO.30
Hexavalent Chromium (CrVI)	ppm	With reference to US EPA Method 3060A & 7196A for Hexavalent Chromium. Analysis was performed by UV/Vis Spectrometry.	2	N.D.	N.D.	N.D.	—	N.D.
Cadmium (Cd)	ppm	With reference to BS EN 1122:2001, Method B for Cadmium Content. Analysis was performed by ICP-AES.	2	N.D.	N.D.	49.0	N.D.	N.D.
Mercury (Hg)	ppm	With reference to US EPA Method 3052 for Mercury Content. Analysis was performed by ICP-AES.	2	N.D.	N.D.	N.D.	N.D.	N.D.
Lead (Pb)	ppm	With reference to US EPA Method 3050B for Lead Content. Analysis was performed by ICP-AES.	2	N.D.	N.D.	—	N.D.	N.D.

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Test Item(s):	Unit	Method	MDL	Result				
				NO.26	NO.27	NO.28	NO.29	NO.30
Lead (Pb)	ppm	With reference to US EPA Method 3052 for Lead Content. Analysis was performed by ICP-AES.	2	—	—	36780.0	—	—
Hexavalent Chromium (CrVI)	ppm	With reference to IEC 62321, Ed.1 111/54/CDV. Analysis was performed by UV-VIS	2	—	—	—	N.D.	—

Note : 1. mg/kg = ppm

2. n.d. = Not Detected

3. MDL = Method Detection Limit

4. Sum of Mono to NonabDE & according to 2005/717/EC DecaBDE is exempt.

5. Spot-test:

Negative = Absence of CrVI coating, Positive = Presence of CrVI coating;

(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 CrVI coating

Positive = Presence of CrVI coating; 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.

6. — = Not Conducted

7. - = Not Regulated

8. \*\* = Qualitative analysis (No Unit)

\*\* End of Report \*\*



## Test Report

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

Type of Product : ANTENNA  
Style/Item No. : EM SERIES; IM SERIES; NB SERIES; AN SERIES  
Sample Received : 2004/01/05 & 2004/04/23 & 2004/06/11 & 2004/06/24 &  
2004/12/09 & 2005/01/26 & 2005/02/17  
Testing Date : 2004/01/05 TO 2004/01/06 & 2004/04/23 TO 2004/04/28 &  
2004/06/11 TO 2004/06/21 & 2004/06/24 TO 2004/07/01 &  
2004/12/09 TO 2004/12/16 & 2005/01/26 TO 2005/01/28 &  
2005/02/17 TO 2005/03/03

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

\*This report is combined with reports of SZTYR050102512/LP & CE/2004/62767 &  
GZSCR040100230/LP & CE/2004/61520 & GZSCR040413274/LP & GZSCR050207531/LP\*

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

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**Test Result**

PART NAME NO.1	:	BRASSY COLOR METAL BAR(SZTYR050102512/LP)
PART NAME NO.2	:	BLACK PLASTIC SHEET(GZSCR040100230/LP)
PART NAME NO.3	:	TAN TRANSPARENT LIQUID(GZSCR040413274/LP)
PART NAME NO.4	:	BLACK PLASTIC JACKET(KHCX 32AWG-SB TA)(CE/2004/61520)
PART NAME NO.5	:	TRANSPARENT FEP JACKET(CE/2004/C1640)
PART NAME NO.6	:	WHITE PALSTIC(CE/2004/62767)
PART NAME NO.7	:	SILVER COLORED METAL WIRE(GZSCR050207531/LP NO. 1)
PART NAME NO.8	:	TRANSPARENT LT. BROWN PLASTIC(GZSCR050207531/LP NO. 2)

Test Item (s):	Unit	Method	MDL	Result				
				No.1	No.2	No.3	No.4	No.5
PBBs(Polybrominated biphenyls)(CAS NO:059536-65-1)	%	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.	N.D.
PBBEs(PBDEs)(Polybrominated biphenyl ethers)	%	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.	N.D.

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Test Item (s):	Unit	Method	MDL	Result				
				No.1	No.2	No.3	No.4	No.5
Chromium VI (Cr+6)	ppm	As per US EPA 7196A and US EPA 3060A.	2	N.D.	---	N.D.	N.D.	N.D.
Cadmium (Cd)	ppm	ICP-AES after as per EN 1122, method B:2001 or other acid digestion.	2	22.0	N.D.	N.D.	N.D.	N.D.
Mercury (Hg)	ppm	ICP-AES after as per US EPA 3052 or other acid digestion.	2	N.D.	---	N.D.	N.D.	N.D.
Lead (Pb)	ppm	ICP-AES after as per US EPA 3050B or other acid digestion.	2	24600.0	6.0	N.D.	N.D.	N.D.

Test Item (s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
PBBs(Polybrominated biphenyls)(CAS NO:059536-65-1)	%	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.	---	N.D.
PBBEs(PBDEs)(Polybrominated biphenyl ethers)	%	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.	---	N.D.



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Test Item (s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
Chromium VI (Cr+6)	ppm	As per US EPA 7196A and US EPA 3060A.	2	---	N.D.	N.D.
Cadmium (Cd)	ppm	ICP-AES after as per EN 1122, method B:2001 or other acid digestion.	2	N.D.	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.	N.D.	---
Cadmium (Cd)	ppm	ICP-AES after as per EN 1122, method B:2001 or other acid digestion.	15	---	---	N.D.
Mercury (Hg)	ppm	ICP-AES after as per US EPA 3052 or other acid digestion.	50	---	---	N.D.
Lead (Pb)	ppm	ICP-AES after as per US EPA 3050B or other acid digestion.	15	---	---	N.D.

Test Item (s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
AZO		As per LMBG 8202-2				
4-AMINODIPHENYL (CAS NO.92-67-1)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
BENZIDINE (CAS NO.92-87-5)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
4-CHLORO-O-TOLUIDINE (CAS NO.95-69-2)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
2-NAPHTHYLAMINE (CAS NO.91-59-8)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
O-AMINOAZOTOLUENE (CAS NO.97-56-3)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.

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Test Item(s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
2-AMINO-4-NITROTOLUENE (CAS NO.106-47-8)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
4,4-DIAMINODIPHENYLMETHANE (CAS NO.101-77-9)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
2,4-DIAMINOANISOLE (CAS NO.615-05-4)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
3,3-DIMETHOXYBENZIDINE (CAS NO.119-90-4)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
3,3-DIMETHYLBENZIDINE (CAS NO.119-93-7)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
3,3-DIMETHYL 4,4-DIAMINODIPHENYLMETHANE (CAS NO.838-88-0)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
P-CRESIDINE(2-METHOXY-5-METHYLANILINE) (CAS NO.120-71-8)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
4,4-METHYLENE BIS(2-CHLORANILINE) (CAS NO.101-14-4)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
4,4-OXYDIANILINE (CAS NO.101-80-4)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
4,4-THIODIANILINE (CAS NO.139-65-1)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
O-TOLUIDINE (CAS NO.95-53-4)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.

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Test Item (s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
2,4-TOLUYLENDIAMINE (CAS NO.95-80-7)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
2,4,5-TRIMETHYLANILINE (CAS NO.137-17-7)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
O-ANISIDINE (CAS NO.90-04-0)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
P-AMINOAZOBENZENE (CAS NO.60-09-3)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.

Test Item (s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
Mirex(CAS NO:002385-85-5)	ppm	Analysis was performed by GC/MS.	4	N.D.	---	---

Test Item (s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
PCBs(Polychlorinated Biphenyls)(CAS NO:001336-36-3)	ppm	With reference to USEPA 8082A. Analysis was performed by GC/ECD/MS.	0.5	N.D.	---	---

Test Item (s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
Organic-tin compounds						
Triphenyl Tin(TPT)(CAS NO:000668-34-8)	ppm	With reference to 83/677/EEC & DIN 38407. Analysis was performed by GC/FPD.	0.03	---	---	N.D.
Tributyl Tin(TBT)	ppm	With reference to 83/677/EEC & DIN 38407. Analysis was performed by GC/FPD.	0.03	---	---	N.D.

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Test Item (s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
Asbestos						
Anthophyllite(CAS NO.017068-78-9)	**	As per NIOSH 9000 method. Analysis was performed by XRD.	-	---	---	Negative
Crocodolite(CAS NO.012001-28-4)	**	As per NIOSH 9000 method. Analysis was performed by XRD.	-	---	---	Negative
Amosite(CAS NO.012172-73-5)	**	As per NIOSH 9000 method. Analysis was performed by XRD.	-	---	---	Negative
Tremolite(CAS NO.014567-73-8)	**	As per NIOSH 9000 method. Analysis was performed by XRD.	-	---	---	Negative
Chrysotile(CAS NO.012001-29-5)	**	As per NIOSH 9000 method. Analysis was performed by XRD.	-	---	---	Negative
Actinolite(CAS NO.013768-00-8)	**	As per NIOSH 9000 method. Analysis was performed by XRD.	-	---	---	Negative

Test Item (s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
PCBs(Polychlorinated Biphenyls)(CAS NO:001336-36-3)	ppm	With reference to USEPA 8082A. Analysis was performed by GC/ECD/MS.	0.5	---	---	N.D.

Test Item (s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
Polychlorinated Naphthalene	ppm	With reference to USEPA 8081B. Analysis was performed by GC/MS.	5	---	---	N.D.

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Test Item (s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
PVC (CAS No:9002-86-2)	**	Analysis was performed by FTIR/ATR and Pyro-GC/MS.	-	---	---	N.D.

Test Item (s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
Chlorinated Paraffin (C10-C13) (CAS No:010871-26-2)	%	With reference to USEPA3540C or USEPA3550C. Analysis was performed by GC/MS or GC/ECD.	0.01	---	---	N.D.

Test Item (s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
Formaldehyde(CAS No:000050-00-0)	ppm	With reference to DIN 53315 & USEPA 8315A method. Analysis was performed by HPLC/DAD/MS	0.2	---	---	N.D.

NOTE: (1) N.D. = Not detected (&lt;MDL)

(2) ppm = mg/kg

(3) MDL = Method Detection Limit

(4) " --- " = Not Applicable

(5) " - " = No Regulation

(6) \* = Results shown are of the adjusted analytical results

(7) \*\* = Qualitative analysis (No Unit)

(8) Negative = Undetectable / Positive = Detectable

(9) The MDL is 5ppm for the single compound of CP