

產 品 規 格 承 認 書

Specification For Approval

日 期： 2005 / 12 / 16

Date

編 號： STA - 0980

File No.

承認廠商： 突破科技股份有限公司

Customer

製造廠商： 英碩企業股份有限公司

Manufacturer

型號品名： 2.4 / 5.0GHz External Antenna

Part Number

Description

INVAX P/N : AN2450-6401RS

廠商審核：

Approved By

Invax

英碩企業股份有限公司

台北市忠孝東路五段 815 號 4 樓

Tel: (02)2788-5218 Fax: (02)2783-1658

Cortec

東莞康捷電子有限公司

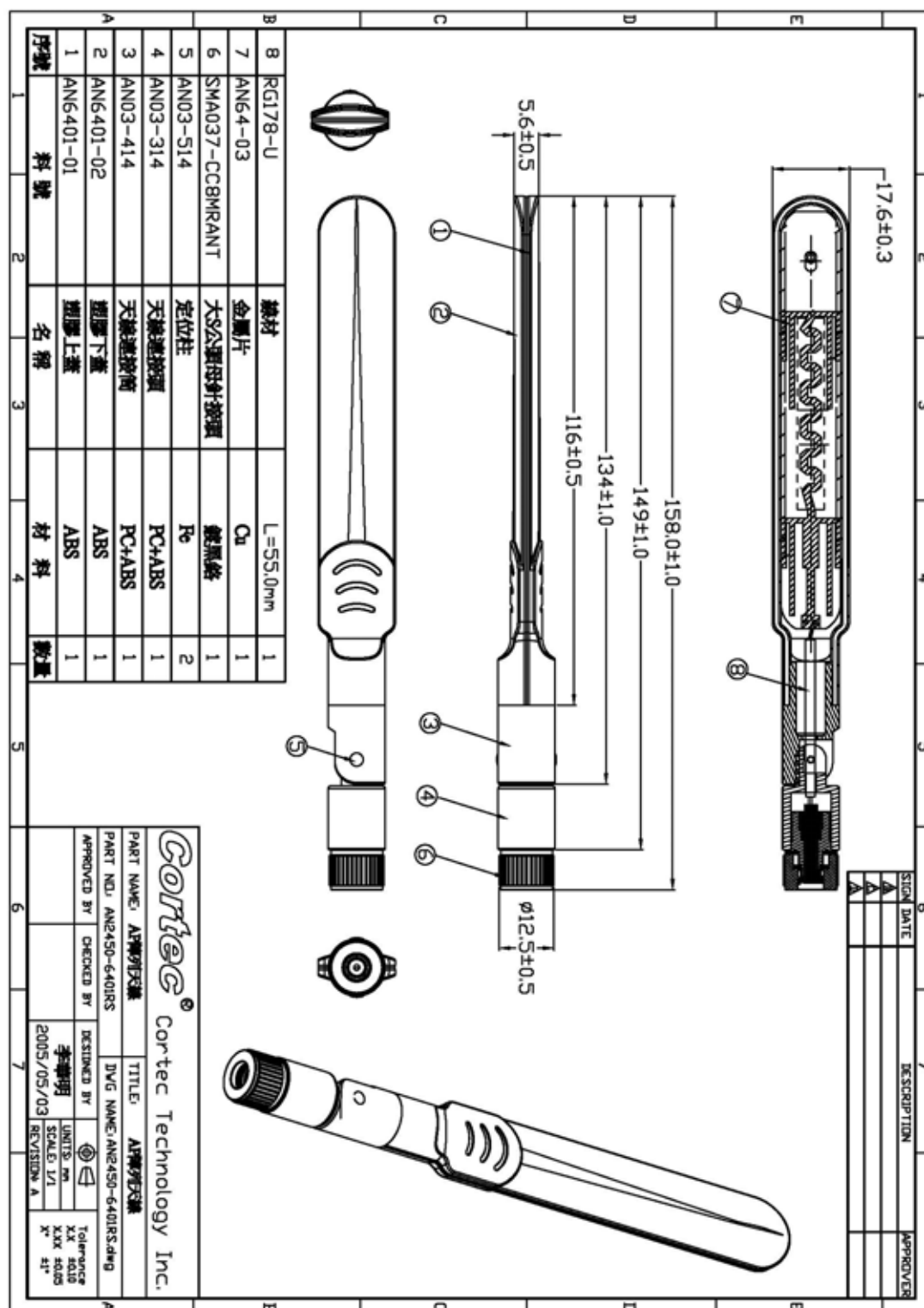
廣東省東莞市長安鎮振安路
沙頭段咸西工業區

Tel: 86-769-5317599 Fax: 86-769-5317869

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Product Name: 2.4 / 5.0 GHz External Antenna



2. Feature and Application

- . dual band dipole antenna design
- . small size / high gain / omni-directional radiation pattern
- . IEEE 802.11 a / b / g WLAN AP (Access Point) application
- . Bluetooth / HomeRF / ISM Band and other 2.4~2.5 or 4.9~ 5.9 GHz wireless communication application

3. Technical Specification

A. Electrical Characteristics	
Working Frequency Range	2400 ~ 2500 MHz 4900 ~ 5900 MHz
S.W.R.	2400 ~ 2500 MHz: < 2.0 4900 ~ 5900 MHz: < 3.0
Antenna Gain	4 dBi
Antenna Radiation Pattern	Omni-directional
Impedance	50 Ohm
Connector	50 Ohm AN2450-6401RS: SMA Male Reverse
B. Mechanical Dimension	
Total Length	AN2450-6401RS: 158 mm
C. Material	
Color	AN2450-6401RS: Black
Material of Hinged Cover	PC+ABS (Color: Black)
Material of Hinged Casing	PC+ABS (Color: Black)
Material of Plastic Base	ABS(Color: Black)
Material of Plastic Cap	ABS (Color: Black)
Material of Connector	Copper (CT3604), Cr plated
Material of Sheet Metal	Copper
D. Environmental	

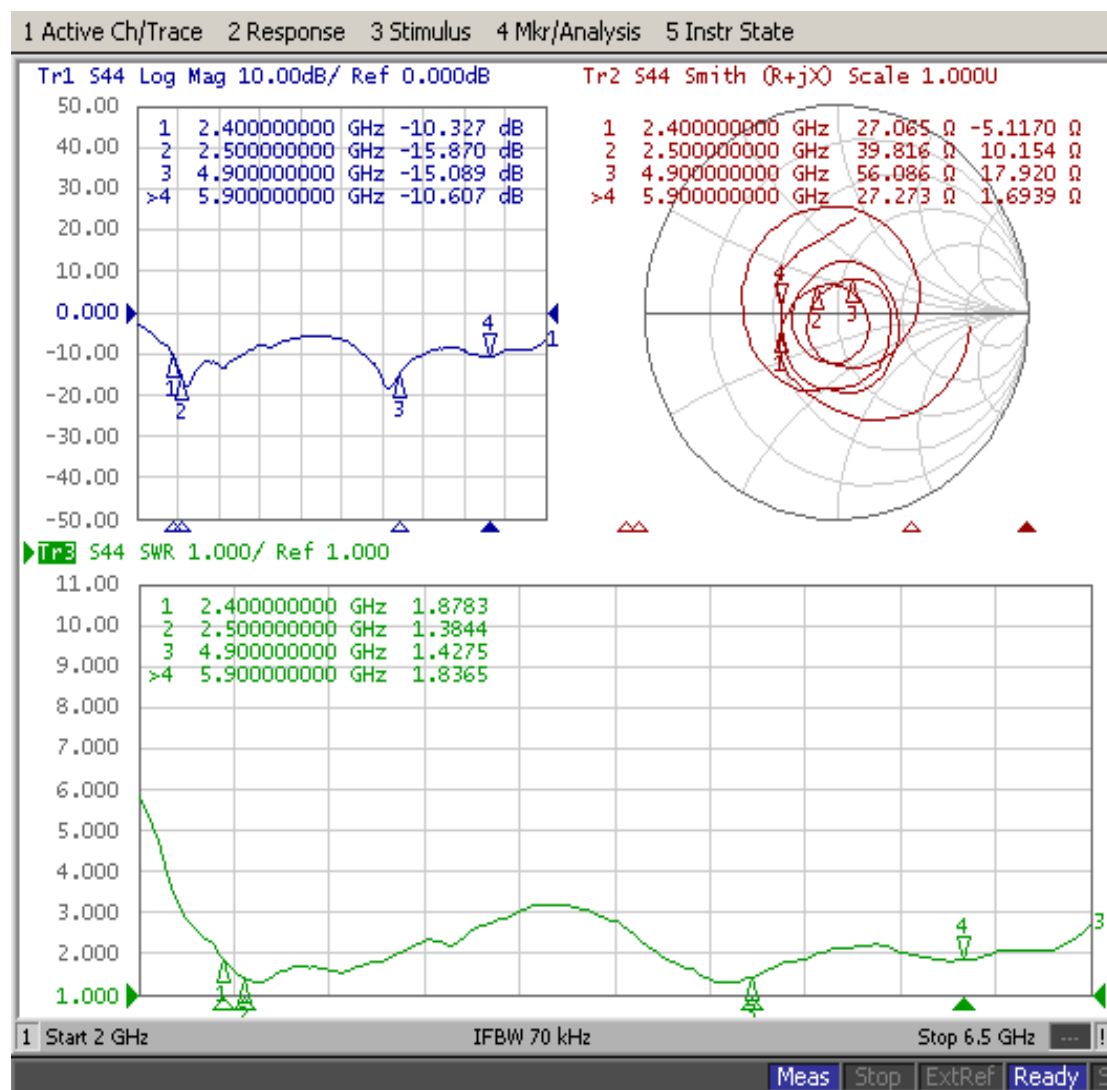
Product Number: AN2450-6401RS
Product Name: 2.4 / 5.0 GHz External Antenna



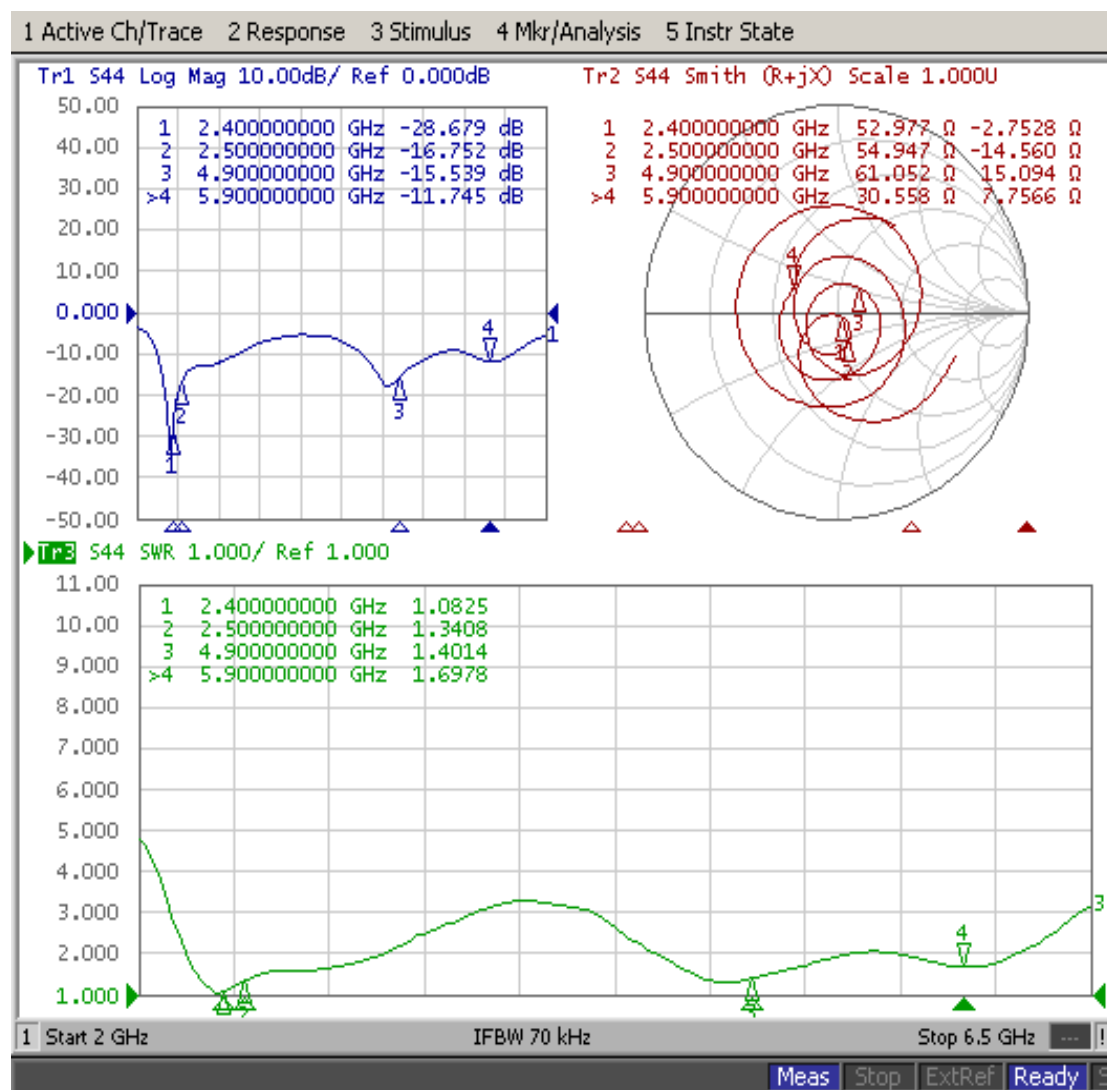
Operation Temperature	- 30°C ~ + 85 °C
Storage Temperature	- 30°C ~ + 85°C

4. S11 Return Loss / S.W.R. / Impedance Testing Result

Antenna @ 180 degree



Antenna @ 90 degree



5. Antenna Radiation Pattern

Testing Equipment Specification:

Antenna Anechoic Chamber Dimension: 8 x 4 x 4 m

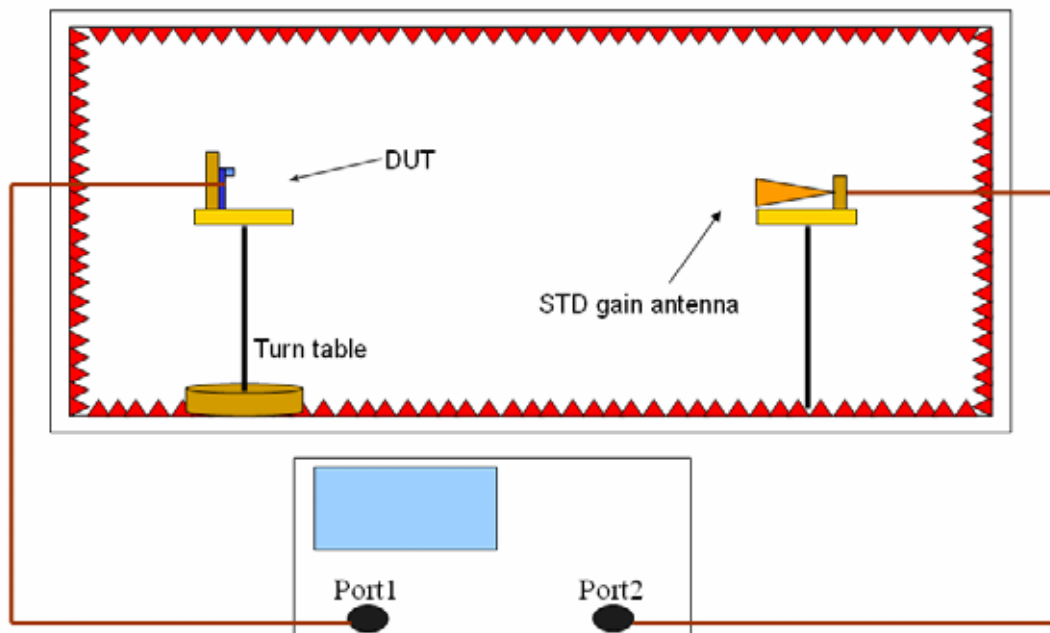
Quiet Zone: 600mm @1 GHz

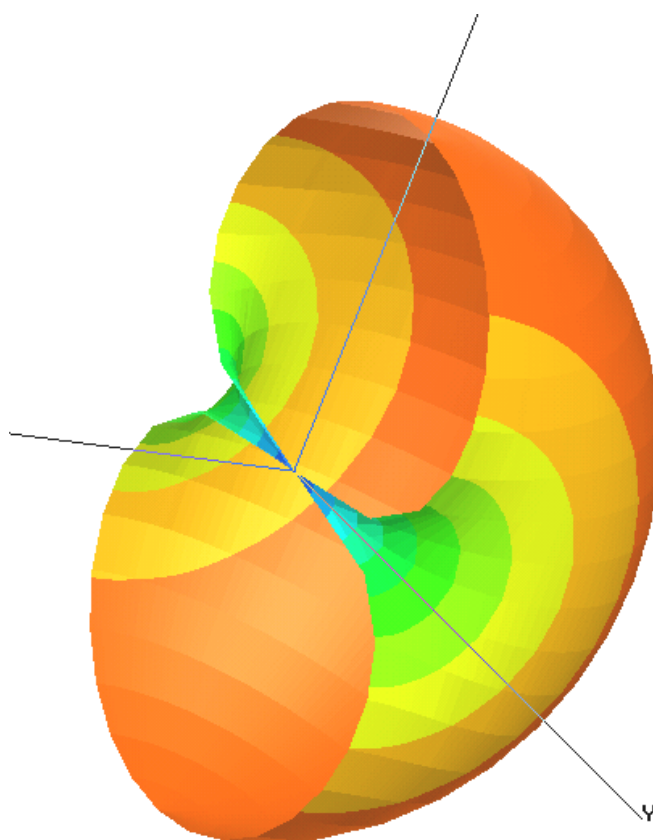
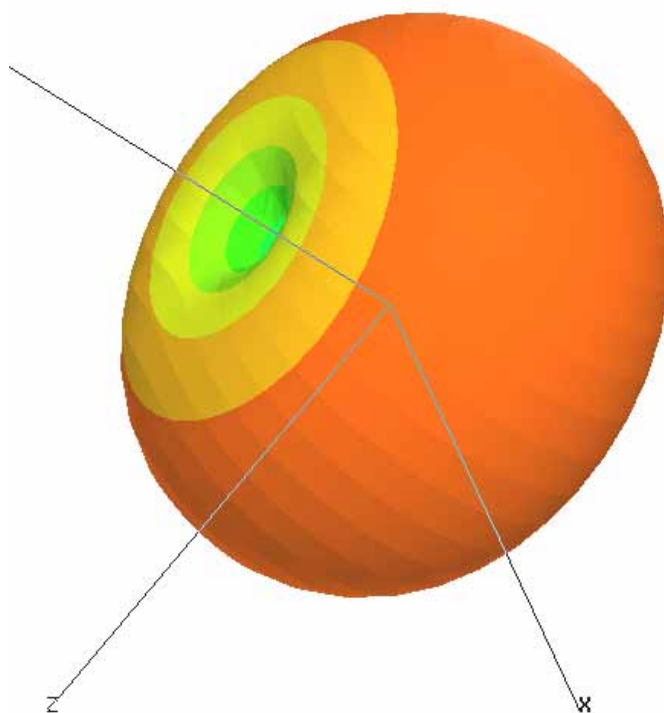
Isolation: >100dB @ 1 MHz ~ 10 GHz

Testing Equipment: Agilent 8720D

Received Antenna: 0.7~6.0 GHz for Gain Calibration

Double Ridged Horn Antenna





6. Plastic Parts Material Datasheet

TEIJIN POLYCARBONATE SINGAPORE PTE. LTD.

#01-01 111 SAKRA AVE. SINGAPORE 627881 SINGAPORE

Material Designation: L-1250#(f2), L-1250U#, L-1250V#, L-1250Z#
Product Description: Polycarbonate (PC)

Color	Min. thick. (mm)	Flame Class	HWI	HAI	RTL Elec.	RTL Imp.	RTL Str.
ALL	0.40	V-2	4	3	80	80	80
	0.84	V-2	4	3	80	80	80
	1.5	HB	4	0	125	115	125
	3.0	HB	1	0	125	115	125
	6.0	HB	1	0	125	115	125
CXT:2, HVTR:2, D495:5							

Material designation may be suffixed with any one or two letters.

Subjected to one or more of the following tests; Ultraviolet Light,
Water Exposure in accordance with UL 746C, where the
acceptability for outdoor use is to be determined by UL Inc.

Report Date: 1999-07-29

台灣台達化學工業股份有限公司
ABS 通用級(一般用)規格性質一覽表

性 質 Properties			試驗 方法 ASTM	通用級（一般用）General Purpose						
				3000H	3000D	3000	6000	1000	5000	5000s
M E C H A N I C A L	機 械 質	ZOD 沖擊強度 (IZOD Impact Strength)	D256	34 50	30 38	25 33	23 30	21 27	17 21	13 16
		抗張強度-降伏點 (Tensile Strength at Yield)	D638	400	410	380	400	430	460	480
		抗張強度-斷裂點 (Tensile Strength at Break)		340	360	310	340	340	360	380
		伸張率-斷裂點 (Elongation at Break)	D638	60	40	40	30	30	20	20
		抗折強度 (Flexural Yield)	D790	620	600	580	640	700	750	800
		抗折系數 (Flexural Modulus)	D790	21,000	21,000	20,000	22,000	24,000	26,000	30,000
T H E R M A L	熱 性 質	熱變形溫度 (Heat Distortion Temp)	D648	87	86	85	86	87	88	89
		Vicat 軟化溫度 (Vicat Softening Temp)	D1525	102	101	100	101	102	103	104
		流動指數 (Melt Flow index)	D1238	0.5 6.0	1.0 10.0	1.2 12.0	1.6 16.0	1.8 18.0	2.2 20.0	2.1 19.0
		燃燒性 (Flammability)	UL-94	94HB	94HB	94HB	94HB	94HB	94HB	94HB
E L E C T R I C A L	電 氣 性	相對溫度指數 (Relative Temp index)	UL-746B	-	-	60	60	60	60	60
		抗熱線燃燒性 (High Current Arc ignition)	UL-746A	-	-	15	13	17	18	15
		抗電弧性 (High Current Arc ignition)	UL-746A	-	-	200	200	200	200	15
		電弧產生速率 (Arc Tracking Rate)	UL-746A	-	-	0	0	0	0	0
O T H E R S	其 他	比重 (Specific Gravity)	D792	1.03	1.03	1.03	1.03	1.03	1.03	1.04
		硬度 (Rockwell Hardness)	D785	103	102	100	107	110	115	119
		成型收縮 (Mold shrinkage)	D955	0.4	0.4	0.4	0.4	0.4	0.4	0.4
		吸水率 (Water Absorption)	D570	0.3	0.3	0.3	0.3	0.3	0.3	0.3

7. Metal Parts Material Datasheet

Copper Datasheet

合金編號 Copper Alloy CN & JIS No.	化學成分 Composition (%)									
	銅 Cu	鉛 Pb	鐵 Fe	錫 Sn	鋅 Zn	鋁 Al	錳 Mn	鎳 Ni	磷 P	銅+鋁+鐵 +錳+鎳 Cu+Al+Fe +Mn+Ni
C3501	60.0~64.0	0.7~1.7	0.2 以下 0.2max	Fe+Sn 0.4 以下 0.4max	殘余 Rem					
C3601	59.0~63.0	1.8~3.7	0.3 以下 0.3max	Fe+Sn 0.5 以下 0.5max	殘余 Rem					
C3602	59.0~63.0	1.8~3.7	0.5 以下 0.5max	Fe+Sn 1.2 以下 1.2max	殘余 Rem					
C3603	57.0~61.0	1.8~3.7	0.35 以下 0.35max	Fe+Sn 0.6 以下 0.6max	殘余 Rem					
C3604	57.0~61.0	1.8~3.7	0.5 以下 0.5max	Fe+Sn 1.2 以下 1.2max	殘余 Rem					
C3605	57.0~60.0	3.5~4.5	0.5 以下 0.5max	Fe+Sn 1.2 以下 1.2max	殘余 Rem					
C3712	58.0~62.0	0.26~1.2	Fe+Sn 0.8 以下 0.8max		殘余 Rem					
C3771	57.0~61.0	1.0~2.5	Fe+Sn 1.0 以下 1.0max		殘余 Rem					
合金種類 Alloy CN & JIS No.	符號 Symbol	別類 Name	特性用途 Speciality and Utilities							
C3501	線(B)	Nipple 用黃銅 Nipple Using Brass	切削性、冷間鍛造性良好 機車、腳踏車、腳踏車用接頭螺帽 Excellent Cold Forging and Good Machine-ability Use Motorcycle and Bicycle Join Nut...							
C3601	(B)	快削黃銅 Free Cutting Brass	切削性良好，C3601,C3602 延展性也良好，電腦、電子、釣具、筆、燈飾、螺絲、小螺帽、齒輪、凡而、照相機各種五金零件 Excellent Machine-ability and C3601, C3602 Good Excellent to Use Computer, Electronic ,Clock, Pen, Light and Fishing, Nut, Gear, Valve Camera Parts, Hardware Parts...							
C3602	(A)									
	(B)									
C3603	(B)									
C3604	(A)									
	(B)									
C3605	(A)									
	(B)									
C3712	(A)	Forging Brass	熱間性良好，精密鍛造亦適合機械零組件。 熱間鍛造性和切削性均佳，凡而，表殼，機械零件等 Excellent Hot Forging Uses Precision Forging, Machine Parts, Excellent Hot Forging and Good Machine-ability . Using Value, Watch, Machine Parts...							
	(B)									
C3771	(A)									
	(B)									

8. Coaxial Cable Datasheet

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

9. Reliability Testing

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

Product Number: AN2450-6401RS
Product Name: 2.4 / 5.0 GHz External Antenna



10. SGS Testing Report



INVAX SYSTEM & TRADING CORP.
CORTEC TECHNOLOGY INC.
4F. No.815, CHUNG HSAIO EAST RD. SEC.5,
TAIPEI, TAIWAN, R.O.C.

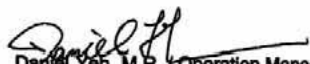
Report No. : CE/2004/C1640A
Date : 2004/12/16
Page : 1 of 8

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

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

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SGS TAIWAN LIMITED NO. 136-1, Wu Kong Road, Wuku Industrial Zone, Taipei county, Taiwan.
t886-2) 22993939 t886-2) 2299-3237 www.sgs.com.tw



INVAX SYSTEM & TRADING CORP.
CORTEC TECHNOLOGY INC.
4F, No.815, CHUNG HSAIO EAST RD. SEC.5,
TAIPEI, TAIWAN, R.O.C.

Report No. : CE/2004/C1640A
Date : 2004/12/16
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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	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
P-CHLOROANILINE (CAS NO.106-47-8)	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.
4,4-DIAMINODIPHENYLMETHANE (CAS NO.101-77-9)	ppm	Analysis was performed by GC/MS.	3	N.D.	---	N.D.
3,3-DICHLOROBENZIDINE (CAS NO.91-94-1)	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 Report

INVAX SYSTEM & TRADING CORP.
CORTEC TECHNOLOGY INC.
4F, No.815, CHUNG HSAIO EAST RD. SEC.5,
TAIPEI, TAIWAN, R.O.C.

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Test Item (s):	Unit	Method	MDL	Result		
				No.6	No.7	No.8
Asbestos						
Anthrophyllite(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 (<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

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