# [APPROVAL SHEET]



Nice Korea Components Co., Ltd

TEL: 031-470-8989

FAX: 031-470-8949

# [APPROVAL SHEET]

Product	NKO	C−1
Model	SPP-F	R200 II
Designed by	Checked by	Approved by
/	/	/

2012. 4. 17

Nice Korea Components Co., Ltd

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### - Contents -

• 표시	1p
•목차	3р
1. Revision History	4p
2. Features & Applications	5р
3. Electrical Specifications	6р
4. Measurements Method & Conditions	12p
5. PCB Layout & Solder Pad size	13p
6. Antenna Dimensions	16p
7. Marking View	16p
8. Reflow Profile	17p
9. Environmental Tests	18p
10. Packaging	19p
11. Usage and Cautions	19p
12. RoHS Data	20p

# 1. Revision History

product	NKC-1		Model SPP-R200 I		-R200 II	
Rev. No.	Rev. Issue	Pa	ıge	De	signed	Date
1.0	Appro. Issue	-	_	KC	C. NAM	2012.4.17
-						

### 2. Features & Applications

#### 2.1 Features

This ceramic chip antenna is applied to 2.4 GHz ISM band applications, i.e. Bluetooth. Zigbee, Wireless LAN, etc...

형태		Bulk Ceramic
	유전체	Al2O3(Alumina)
재질	전극	은(Ag)
크기 (mm)	L = 10 + / - 0.1 $W = 2 + / - 0.1$ $T = 1.2 + / - 0.1$	
Weight	97~100 mg	

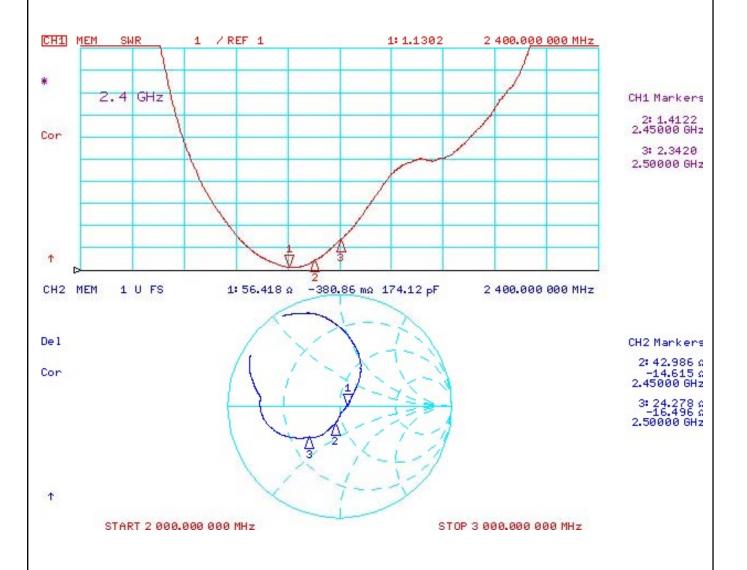
### 3. Electrical Specifications

3-1.

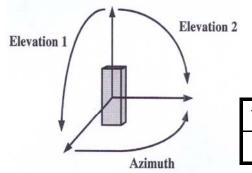
- \* All item are measured in room temperature (24~25 'C).
- \* All item are measured at customer set condition.

No.	Items	Typical Data
1	Frequency (MHz)	2400 ~2500
2	VSWR	2.5 : 1
3	Total Gain (Peak/AVG.) [dBi]	0.55 / -3.61
4	Impedance	50 ohm
5	Polarization	Linear

### 3-2. VSWR (S11) of USER SET condition



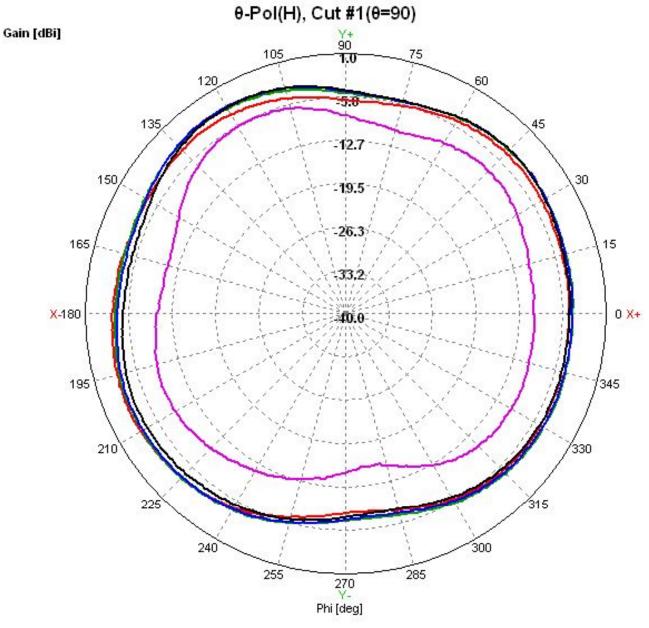
### 3-3. Radiation Patterns



Theta	Vertical Field of measured plane
Phi	Horizontal Field of measured plane

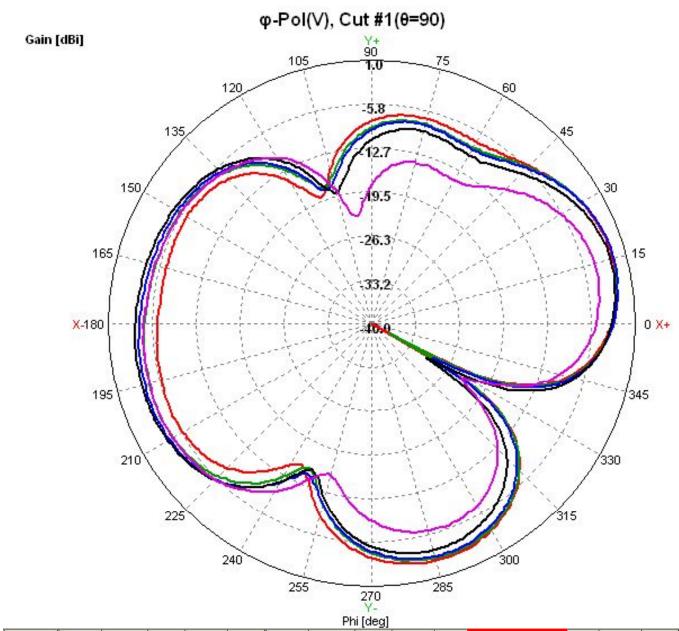
이득[dBi] (Co-Pola)	Total Gain (	Peak/Avg) [dBi]	0.55 /	-3.61
	A zimuth	C-:	Peak	-0.76
01 = [ 10.]	Azimuth	Phi	Avg	-3.19
		Thata	Peak	0.55
(CO-Pola)	Elevation1	Theta	Avg	-3.61
	Elevation2	Theta	Peak	-2.37
	LievationZ	meta	Avg	-4.19





	θ-Pol(H)					φ-Pol(V)					PwrSum				
Freq.[GHz]	Avg.[dBi]	Peak[dBi]	φ[deg]	Null[dBi]	φ[deg]	Avg.[dBi]	Peak[dBi]	φ[deg]	Null[dBi]	φ[deg]	Avg.[dBi]	Peak[dBi]	φ[deg]	Null[dBi]	φ[deg]
2.400	-4.63	-2.65	206.00	-8.62	276.00	-8.66	-3.63	147.00	-17.53	290.00	-3.19	-0.76	147.00	-7.32	282.00
2.420	-4.16	-2.52	125.00	-7.51	278.00	-8.82	-3.30	149.00	-19.92	289.00	-2.88	-0.30	143.00	-6.89	283.00
2.430	-4.22	-2.30	121.00	-7.78	276.00	-8.85	-3.21	147.00	-21.82	288.00	-2.93	-0.28	140.00	-7.32	282.00
2.450	-4.65	-2.48	120.00	-8.34	278.00	-9.42	-3.58	149.00	-22.00	283.00	-3.40	-0.66	140.00	-8.06	282.00
2.500	-9.57	-5.95	115.00	-15.82	282.00	-12.50	-6.70	143.00	-26.45	276.00	-7.78	-4.25	138.00	-15.45	276.00

### (Elevation 1)



	0-Pol(H)					φ-Pol(V)					PwrSum				
Freq.[GHz]	Avg.[dBi]	Peak[dBi]	φ[deg]	Null(dBi)	φ[deg]	Avg.[dBi]	Peak[dBi]	φ[deg]	Null[dBi]	φ[deg]	Avg.[dBi]	Peak[dBi]	φ[deg]	Null(dBi)	φ[deg]
2.400	-7.65	-3.47	278.00	-28.64	38.00	-5.79	-1.18	16.00	-45.14	331.00	-3.61	0.55	284.00	-17.39	112.00
2.420	-7.86	-3.35	277.00	-27.01	110.00	-5.46	-0.97	16.00	-36.97	331.00	-3.49	0.28	284.00	-17.16	108.00
2.430	-8.07	-3.40	277.00	-29.82	111.00	-5.32	-0.94	16.00	-29.11	331.00	-3.47	0.08	284.00	-17.75	109.00
2.450	-8.34	-3.02	278.00	-31.53	115.00	-5.61	-1.49	16.00	-30.01	328.00	-3.75	-0.23	284.00	-17.44	106.00
2.500	-10.65	-5.25	284.00	-38.25	17.00	-7.53	-3.98	13.00	-23.62	329.00	-5.80	-2.83	284.00	-18.68	100.00

Ver 1.0 (2012.04.17)

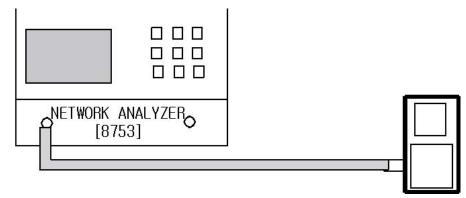
10/23 page

#### (Elevation 2) θ-Pol(H), Cut #1(θ=90) Gain [dBi] 90 105 1.0 120 60 5.8 45 135 30 150 -19.5 26.3 165 15 33,2 X-180 0 X+ 10.0 195 345 330 210 225 315 240 300 255 285 270 Phi [deg] 0-Pol(H) PwrSum φ-Pol(V) Avg.[dBi]|Peak[dBi]| \phi[deg] | Null[dBi] | \phi[deg] | Avg.[dBi]|Peak[dBi] | \phi[deg] | Null[dBi] Avg.[dBi] Peak[dBi] φ[deg] Null[dBi] φ[deg] Freq.[GHz] φ[deg] -7.09-4.35 337.00 -22.48 119.00 -15.21 223.00 301.00 -11.02 122.00 2.400 -7.31-3.42 287.00 -4.19-2.37-3.97 -15.53 225.00 2.420 -6.87327.00 -32.43 121.00 -8.13-4.01 284.00 -4.45-2.47305.00 -11.15 119.00 -6.78 -3.76 329.00 -39.21 122.00 -8.27 -4.09 285.00 -15.62 225.00 -2.35 305.00 -10.96 115.00 2.430 -4.45227.00 -10.47 115.00 2.450 -6.68 -3.51 330.00 -33.05 124.00 -9.04-4.83 282.00 -15.89 -4.69-2.50303.00 -8.81 328.00 -5.02 297.00 -9.85 112.00 -5.96 -22.85 126.00 -11.70 -7.76 280.00 -20.94 2.00 -7.012.500 Ver 1.0 (2012.04.17) 11/23 page

### 4. Measurements Method & Conditions

The measurement of antenna performance is measurement of gain, radiation pattern using ORBIT/FR apparatus in Anechoic chamber and measurement of VSWR using Network analyzer.

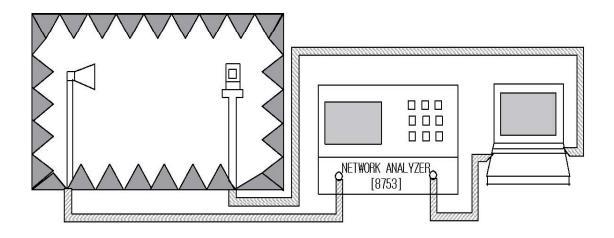
#### 4-1. The measurement of Frequency and VSWR



#### [Measurement Method]

- 1. As seen the above, network analyzer is set up for S11 measurement.
- 2. The measurement frequency range is to set up from 2 GHz to 3 GHz.
- 3. Perform S11 one port full calibration.
- 4. Measure the VSWR of three points of Bluetooth frequency range such as 2.4 GHz, 2.45 GHz, and 2.5 GHz.

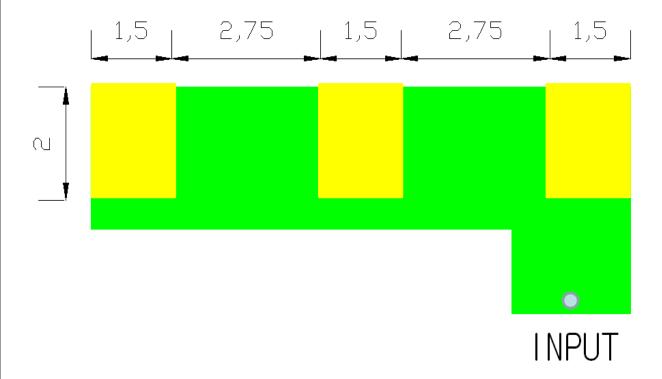
#### 4-2. The measurement of Gain & Radiation Patterns



#### [Measurement Method]

- 1. As seen the above, network analyzer is to set up in Anechoic chamber.
- 2. As seen beneath, for the measurement planes as Azimuth, Elevation 1, and Elevation 2, measure Gain data of vertical polarization and horizontal polarization for each plane.

### 5. PCB Layout & Solder Pad size



Solder Pad

Pattern Pad

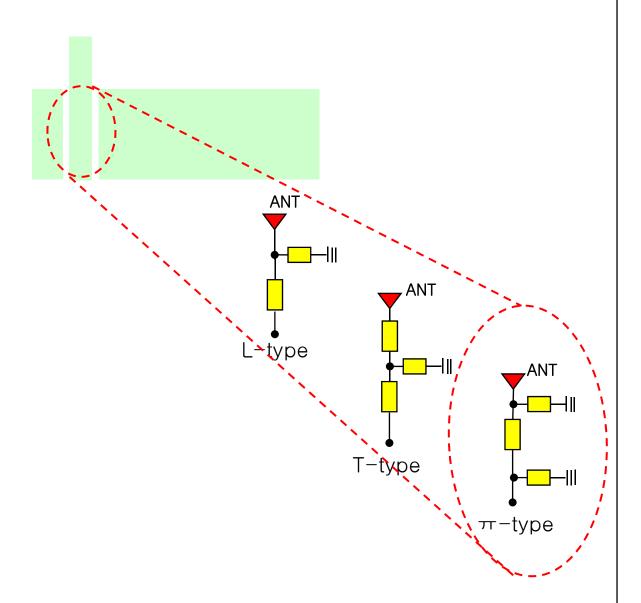
INPUT Via

Unit: mm

tolerances: +/- 0.05

13/23 page

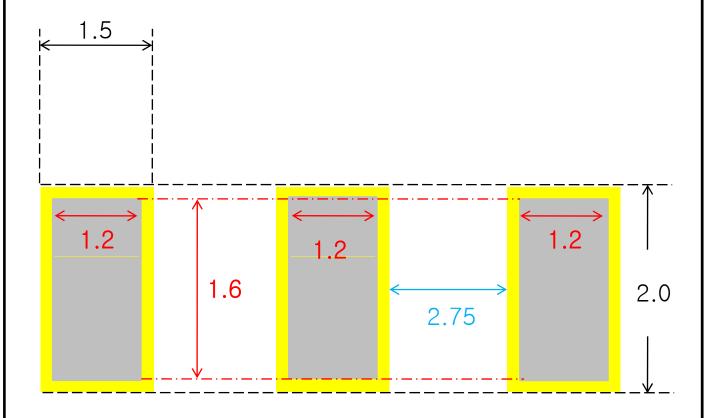
#### 5-1. Matching Circuits



- (1) 실제 적용되는 Board의 GND SIZE 및 형태에 따른 Impedance 조정,
- (2) 설계된 전송선의 50 ohm miss-matching시 Impedance 조정,
- (3) 안테나 자체의 부족한 Impedance 조정,
- (4) 이 이외의 다른 변화에 따른 특성 조정에 Lumped elements 사용 시 3가지 종류 중 한가지의 matching circuit을 적용함.

Matching circuit 적용 시 matching circuit이 차지하는 면적 및 가장 좋은 결과를 얻을 수 있는 matching type를 선택함.

### 5-2. SOLDERING CREAM AREA



Soldering Cream의 면적은 SMD 업체 현황(메탈 스크린 두께, 온도)에 따라 변경 될 수 있으므로 협의를 요함 Unit: mm





Ver 1.0 (2012.04.17)

15/23 page









## 6. Ag pattern & Dimensions



### 7. Marking View



7-1. 마킹 종류

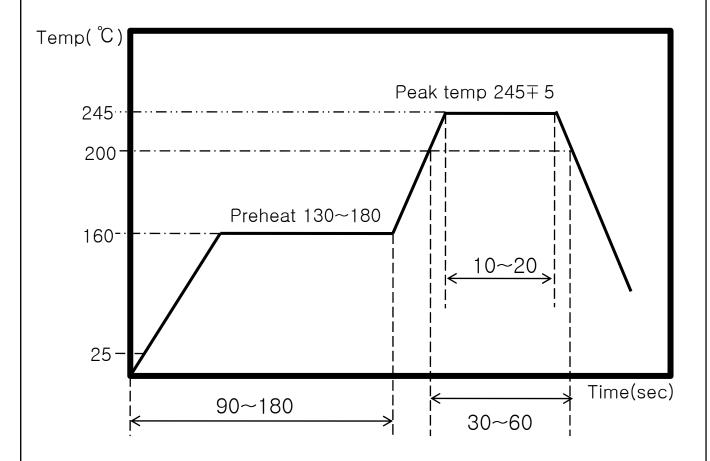
\* RF용 검정 잉크 사용

Ver 1.0 (2012.04.17)

17/23 page

### 8. Reflow Profile

8-1. Standard reflow condition(Pb-free)



SMD 업체 현황에 따라 peak temp 및 시간은 변경 될 수 있으므로 협의를 요함

8-2. 수동 납땜 (인두기)을 할 경우(Pb-free)

인두 온도: 340 'C / 시간: 각 단 max 3 sec

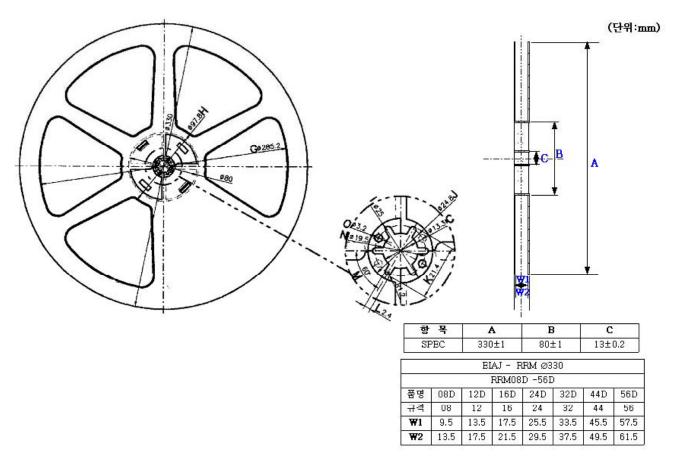
# 9. Environmental Tests

No.	ITEM	TEST COND	TEST REQU
1	High Temperature Resistance	<ol> <li>Temp: +125±5℃</li> <li>Time: 1000±24hrs</li> <li>Measure Fc after left for 24hrs min. at room temp</li> </ol>	1. Within electric spec(VSWR) 2. No visual damage
2	Low Temperature Resistance	<ol> <li>Temp: -40±5℃</li> <li>Time: 1000±24hrs</li> <li>Measure Fc after left for 48hrs min. at room temp</li> </ol>	<ol> <li>Within electric spec(VSWR)</li> <li>No visual damage</li> </ol>
3	Thermal Shock	<ol> <li>1. 1cycle/step1:-40±3℃,30min step2:+125±3℃,30min</li> <li>2. Number of cycle:30</li> <li>3. Measure after left for 48hrs min. at room temp</li> </ol>	1. Within electric spec(VSWR) 2. No visual damage
4	Humidity	<ol> <li>Humidity:85%RH</li> <li>Temp:+85±3℃</li> <li>Time:1000±24hrs</li> <li>Measure Fc after left for 48hrs min. at room temp</li> </ol>	1. Within electric spec(VSWR) 2. No visual damage
5	Adhesive strength of termination	1. Applied force on SMD chip till detached point from PCB.	1. No mechanical damage by forces applied on the right 2. Strength(F)>5kgf

### 10. Packaging

10-1. Reel Taping Quantity
4,000 pcs / 1 reel

### 10-2. Carrier Tape & Reel Dimensions



### 11. Usage and Cautions

Safe-keeping conditions : 3 months in 20+/-15'C & less than 60%

#### 12. RoHS Data

### (1) Ceramic Power

### 시험성적서

한 국 세 라 믹 기 술 원

생적서번호: 2011-1248

우153-801 서울시 궁친구 가산등 233-5 페이지 (1)/(종 3) (Tel: 02 3282 2416/7, Fax: 02 3282 2418)



1. 의 회 자

ㅇ 기관명/성명 : 허동세라믹 / 김원식

주 소 : 경기도 화성시 장안면 석포리 681-13, 14

의 회 일 자 : 2011년 05월 23일

2. 시험성적서의 용도 : 품질관리

3, 시험 시료명/물궐 : 세라믹 Base

4. 시험기간: 2011 년 05월 23일 ~ 2011 년 06월 03일

5. 시험방법: KS C IEC 62321, 기기분석

6. 시헌환경 ○ 온도 : ( 21 ± 1 ) ℃ , 상대습도 : ( 37 ± 3 ) % R.H.

시험결과

시료당	시험분석항목	시험분석결과	시험문석방법	비교
	Pb (mg/kg)	불점을(<5)		
	Cd (mg/kg)	본검춘(<1)		1
	Hg (mg/kg)	불검축(<1)	VC C TEC 50901	
	Cr*- (mg/kg)	불검출(<0.1)	N2 C 1EC 02321	
서박익 Base	PBBs (mg/kg)	분건층		
	PBDEs (mg/kg)	불권증	불건축(<1) 불건축(<0.1) 물건축 불건축 불건축 통건축	
	PFOS (mg/kg)	봉건축		
	PFOA (mg/kg)	본건송	m1 m1 M 23	
	Cl (mg/kg)	분관호	기기분석	
	Br (mg/kg)	분성술		

BLMERALS OPTIMA 5300 DVS.

문서의 사용된기가는 PERRIN-ELMER사의 Claus 500 m 본석에 사용된 LYVis는 Varian Cary 100 업. 본석에 사용된 LCMS/MS는 AB sciex 3200 QTRAP 일, 문석에 사용된 ICM Metrolam Models 일.

확 인 시험자: 최기인(78歲)(기년

2011 . 06 . 03

### 한 국 세 라 믹 기 술 원

바고) 이 센적서는 의로자가 체시한 시로 및 시로템으로 시험한 평가진파로서 전체 지름에 대한 동일 및 생상을 보증하지 않습니다.

양식 -PB-03-02A(3)

#### (2) Ag Paste

#### SGS

Test Report No. F490101/LE-CTSAYAA11-42073

Issued Date: 2012. 01. 05 Page 1 of 4

To: CHANGSUNG CORPORATION 11B-9L

The following merchandise was submitted and identified by the client as

SGS File No. : AYAA11-42073 : CSP-1381 Product Name Item No./Part No. Received Date : 2011. 12. 30

Test Period : 2012. 01. 02 to 2012. 01. 05

Test Results

: For further details, please refer to following page(s): SGS Korea tested the sample(s) selected by applicant with following results.

SGS Korea Co. Ltd.

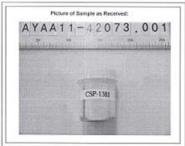
Cindy Park Jerry Jung/ Testing Person

SGS KAMA CO. LIST 14-0 open STULL hopen dry Dinger (p. reparge. Spange At have 411 (8) 1-05 KAMA CO. LIST 1-05 (3) 1406 (8) 419 JULY 450 (60) 450 (60) Added Model in French spill strangenties.

#### SGS

Test Report No. F699101/LF-CTSAYAA11-42073

Issued Date: 2012. 01. 05 Page 3 of 4



NOTE: (1) N.D. = Not detected (~MDL)
[2] ringfig = spin
[3] MDL = Muthed Detection Limit
(4) - = No regulation
[3)\* = Boting-water-ordection
Negative = Absence of CMI costing
Passive = Presence of CMI costing, the detected concentration in boiling-water-extraction
solution is equal or greater than 0.02 ringfig with 50 cm2 sample surface area.

SQS Ryma Co. 130 This Course, SQS long rap Congress, Francis or Springeric Francis; Co. 1 Feb. (2011 - 600 co. 6 F

#### SGS

#### Test Report No. research.coscount.com

Secret Outs: 2012 01.15. Page 2 ship.

Sample No. AWAIT-COLLESS
Sample Description (COP-CB) tract No. Fact No.

Deptition .									
Sections .	Link	Seatherne	MEX	Bennie					
Caterian (Cri.	early.	With whenevery HE STEP LINES SCP.	44	50					
heat (Ph)	1999	- Web warmers of a data trees you	- 5	NO.					
Stemans (196)	25/20	With White or Will Still Company of the	11.0	6.0					
Heateled Chenan III Vi	1940	With Advance of the Control of the Control		8.0					

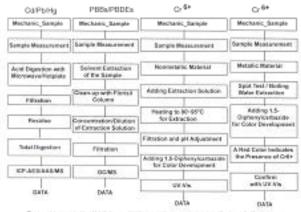
Pari Tame	Live	Tax Nettor	600.	Beach
(Besternotytery)	69/90	PART reference to RC 60007 2008; GC MS	- 6	80.
THURSDAY.	make	Fifth Interesting to BTC 52021 2005, GC-MS	. 5	9.0
Electricisms	1996	retri retrieve ou to 400 scoot 2008; (SCAN)		50.
Strike-productive of	ma/hai	falls reference to BIC 62521 2004, GIC MS	. 5	80
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(Application of the last of	make.	Sittle reference to STC 10001 0006, GCANS	2.6	8.0
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Management of the last	make	fide presents to BIC 62021 2006; GC-MR	- 15	80
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rhead-conscionors street	marke	BMI reference to BC 60001,0006, GC MS	- 5	40
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Tanapatromotory only other	1090	NAME INVESTOR OF REC ROOM JOSES, GO AND	- 6	90.

Hot TV: (Vision interests) (ARIO);
 Hot May = pope (I) MAY = Memory Transaction (I memory Transaction

--- Parameter and community of the

#### SGS

Test Report No. recensus-crawson-apra Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr\*\*/PBBs&PB0Es Testing



The temples were despived totally by pre-contri stection Drief - Galaxie III

MOTE: If M (I) = Next operand (Helfs.)

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(I) M(I) = Note (Helfs.)

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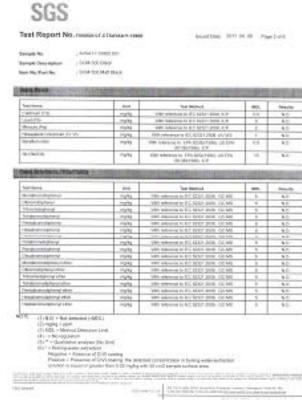
(I) = Note (Helfs.)

solvenia 7.30 m North Colonia (Colonia)

Ver 1.0 (2012.04.17)

### (3) Marking Ink





SGS

Test Report No. resent tersewerser

baseline 201 N St. Papie (6)



HETE (1982 - November (1983)

C) Regis - John

ON Mark - Commission (1984)

C) Regis - Market (1984)

C) The Commission (1984)

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