

[APPROVAL SHEET]

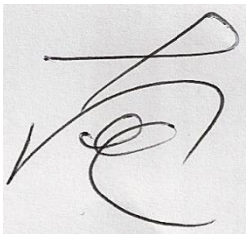
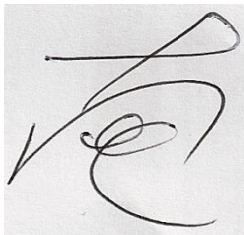
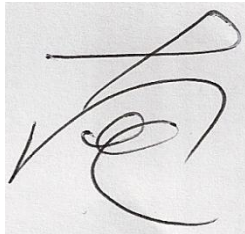


Nice Korea Components Co., Ltd

TEL : 031-470-8989

FAX : 031-470-8949

[APPROVAL SHEET]

Product	NKC-2	
Model	SPP-R300	
Designed by	Checked by	Approved by
		
/	/	/

2012. 8. 6

Nice Korea Components Co., Ltd

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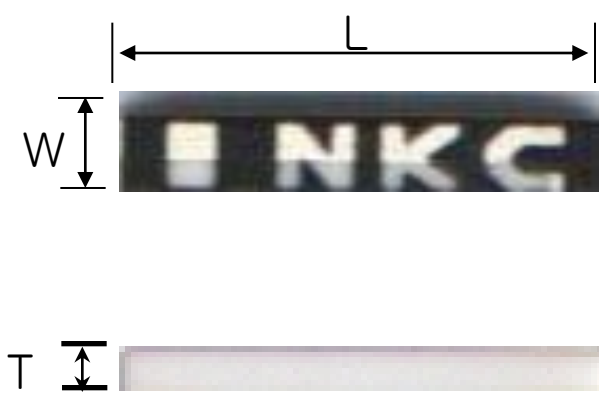
1. Revision History

product	NKC-2	Model	SPP-R300	
Rev. No.	Rev. Issue	Page	Designed	Date
1.0	Appro. Issue	–	KC. NAM	2012.8.6

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	
재질	유전체	Al ₂ O ₃ (Alumina)
	전극	은(Ag)
크기 (mm)	L = 10+/- 0.1	
	W = 2+/- 0.1	
	T = 1.2+/- 0.1	
Weight	97~100 mg	

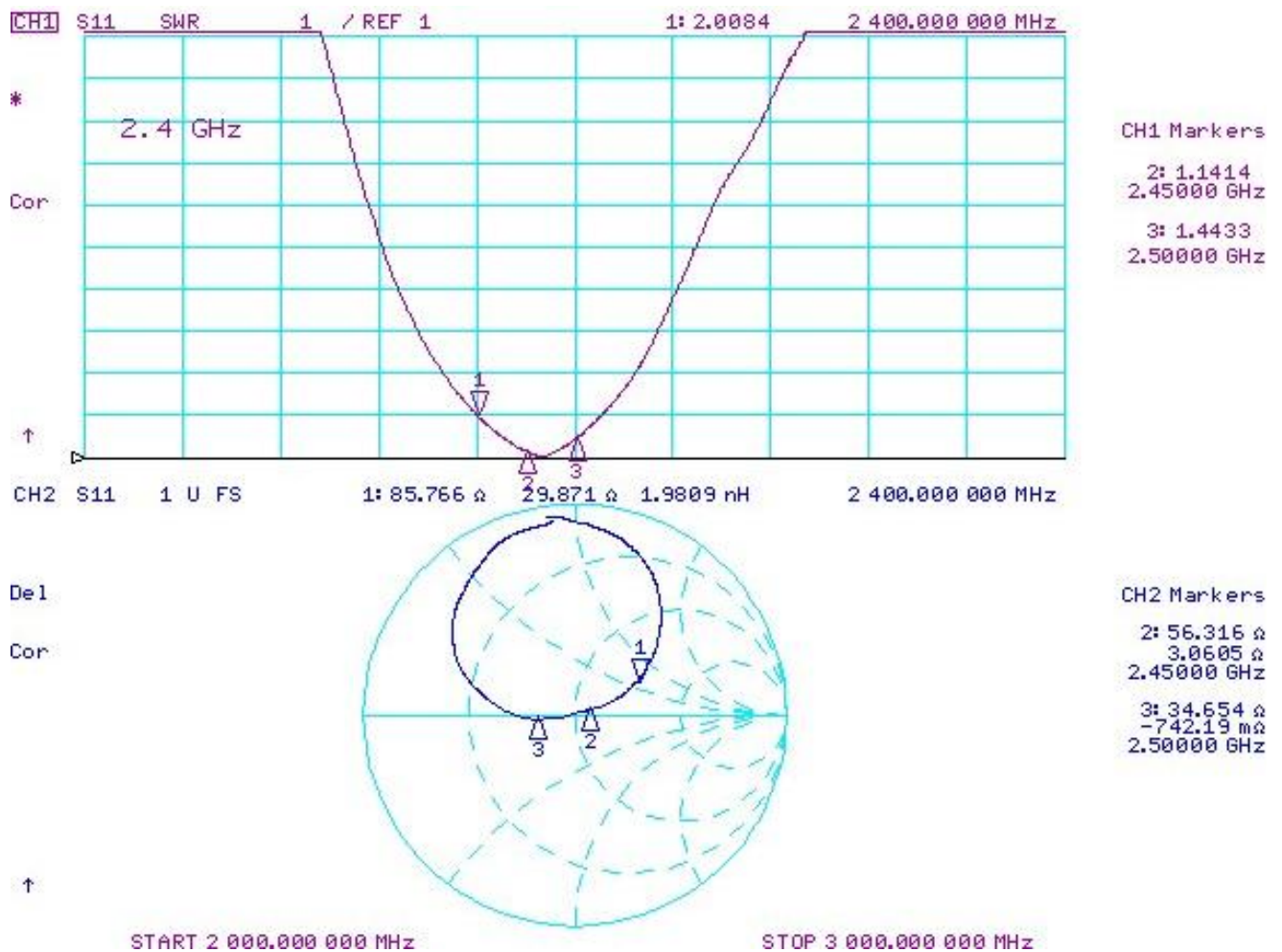
3. Electrical Specifications

3-1.

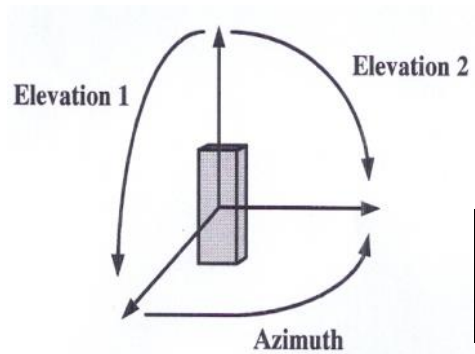
- * All item are measured in room temperature (24~25 ‘C).
- * All item are measured at customer set condition.

No.	Items	Typical Data
1	Frequency (MHz)	2400 ~2500
2	VSWR	2 : 1
3	Total Gain (Peak/AVG.) [dBi]	0
4	Impedance	50 ohm
5	Polarization	Linear

3-2. VSWR (S₁₁) of USER SET condition

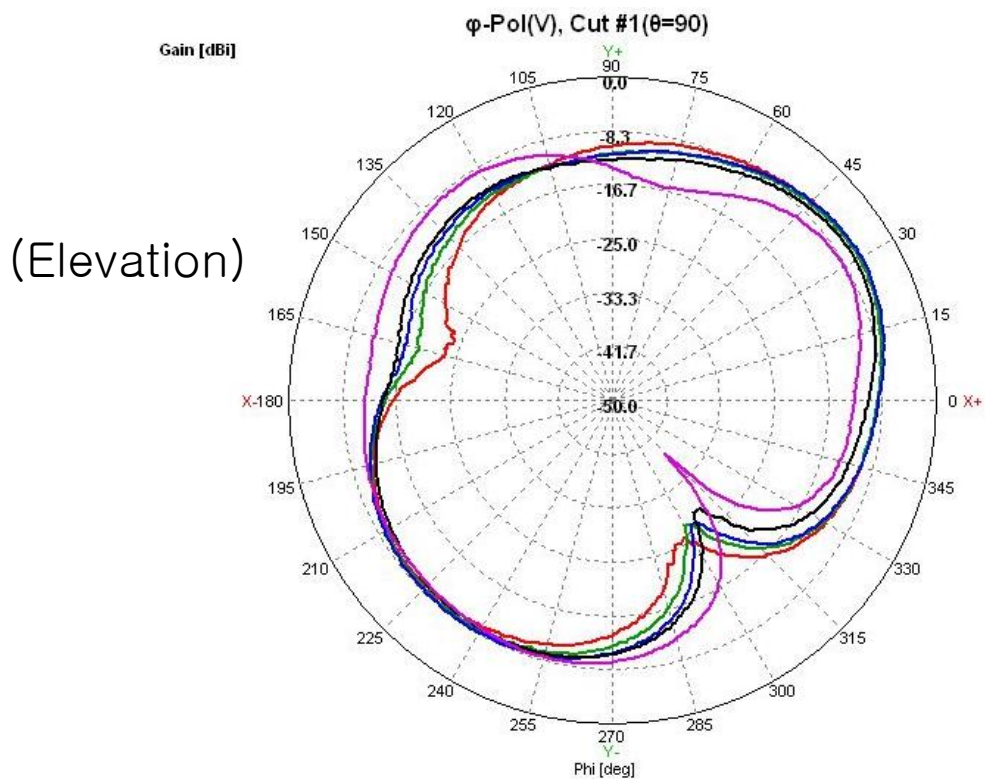
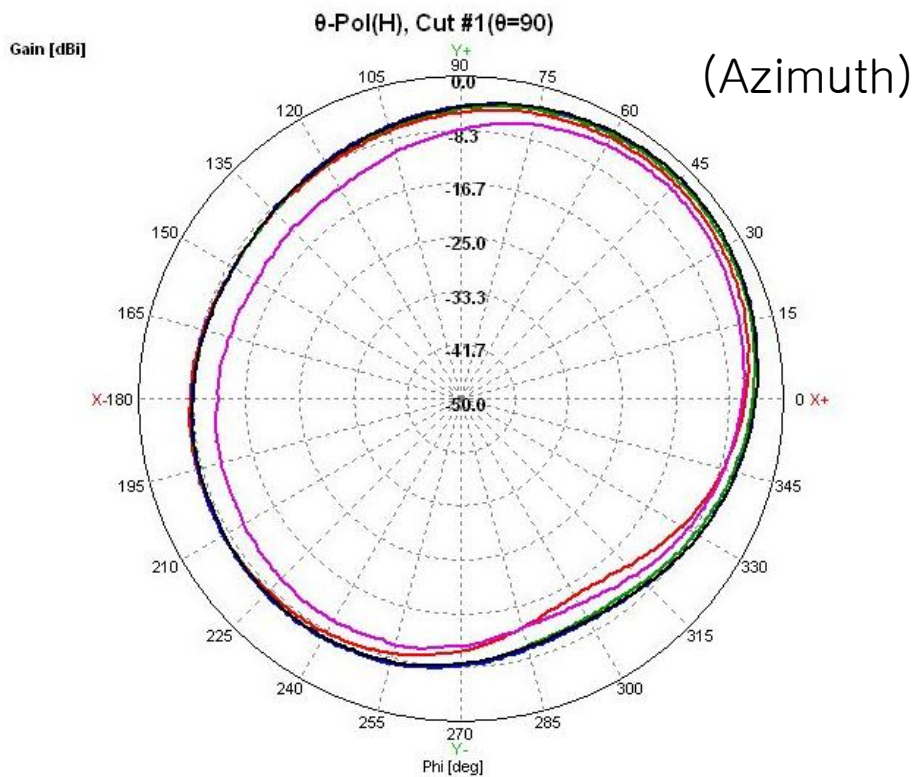


3-3. Radiation Patterns



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

이득[dBi] (Co-Pola)	Azimuth	Phi	Peak	-1.79
			Avg	-5.93
	Elevation	Theta	Peak	-5.61
			Avg	-10.31

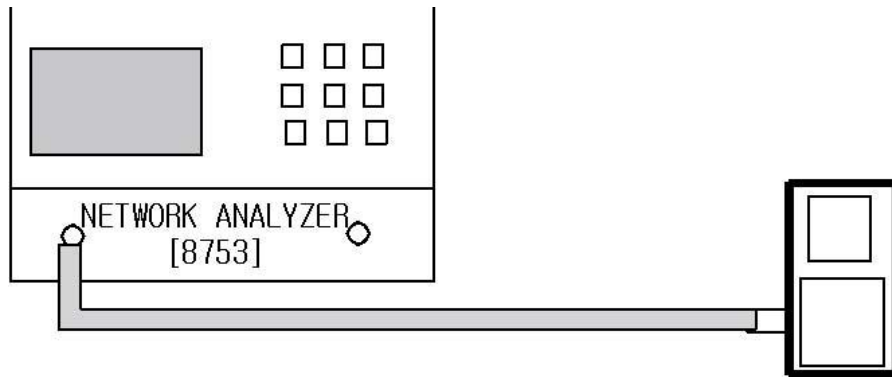


No	Freq.[GHz]	θ -Pol(H)					ϕ -Pol(V)					PwrSum				
		Avg.[dBi]	Peak[dBi]	ϕ [deg]	Null[dBi]	ϕ [deg]	Avg.[dBi]	Peak[dBi]	ϕ [deg]	Null[dBi]	ϕ [deg]	Avg.[dBi]	Peak[dBi]	ϕ [deg]	Null[dBi]	ϕ [deg]
1	2.400	-6.97	-2.93	43.00	-14.85	298.00	-10.69	-5.84	32.00	-26.07	298.00	-5.44	-1.26	35.00	-14.54	298.00
2	2.420	-6.21	-2.27	41.00	-10.98	300.00	-10.68	-6.00	31.00	-27.72	300.00	-4.88	-0.86	39.00	-10.89	300.00
3	2.430	-5.86	-1.87	43.00	-10.33	299.00	-10.31	-5.61	32.00	-27.37	303.00	-4.52	-0.47	36.00	-10.17	299.00
4	2.450	-5.93	-1.79	44.00	-10.59	295.00	-11.11	-6.62	33.00	-28.74	308.00	-4.78	-0.72	37.00	-10.18	305.00
5	2.500	-8.61	-3.96	43.00	-13.54	292.00	-11.23	-8.71	30.00	-38.47	314.00	-6.71	-2.85	36.00	-12.32	306.00

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.

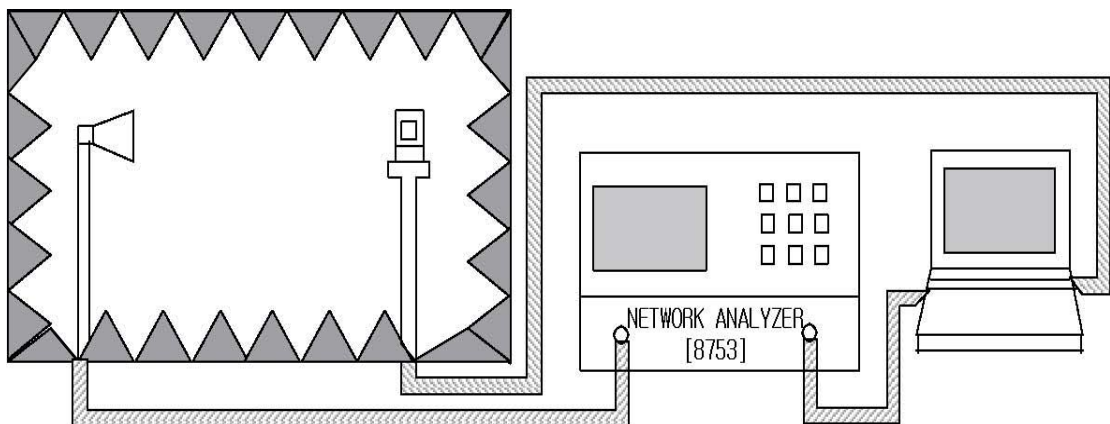
4-1. The measurement of Frequency and VSWR



[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

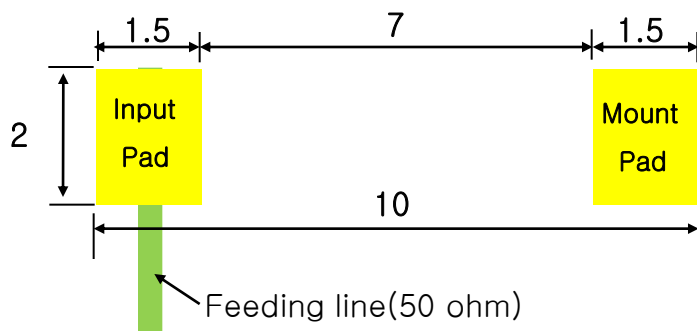


[Measurement Method]

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

5-1. Top Layout

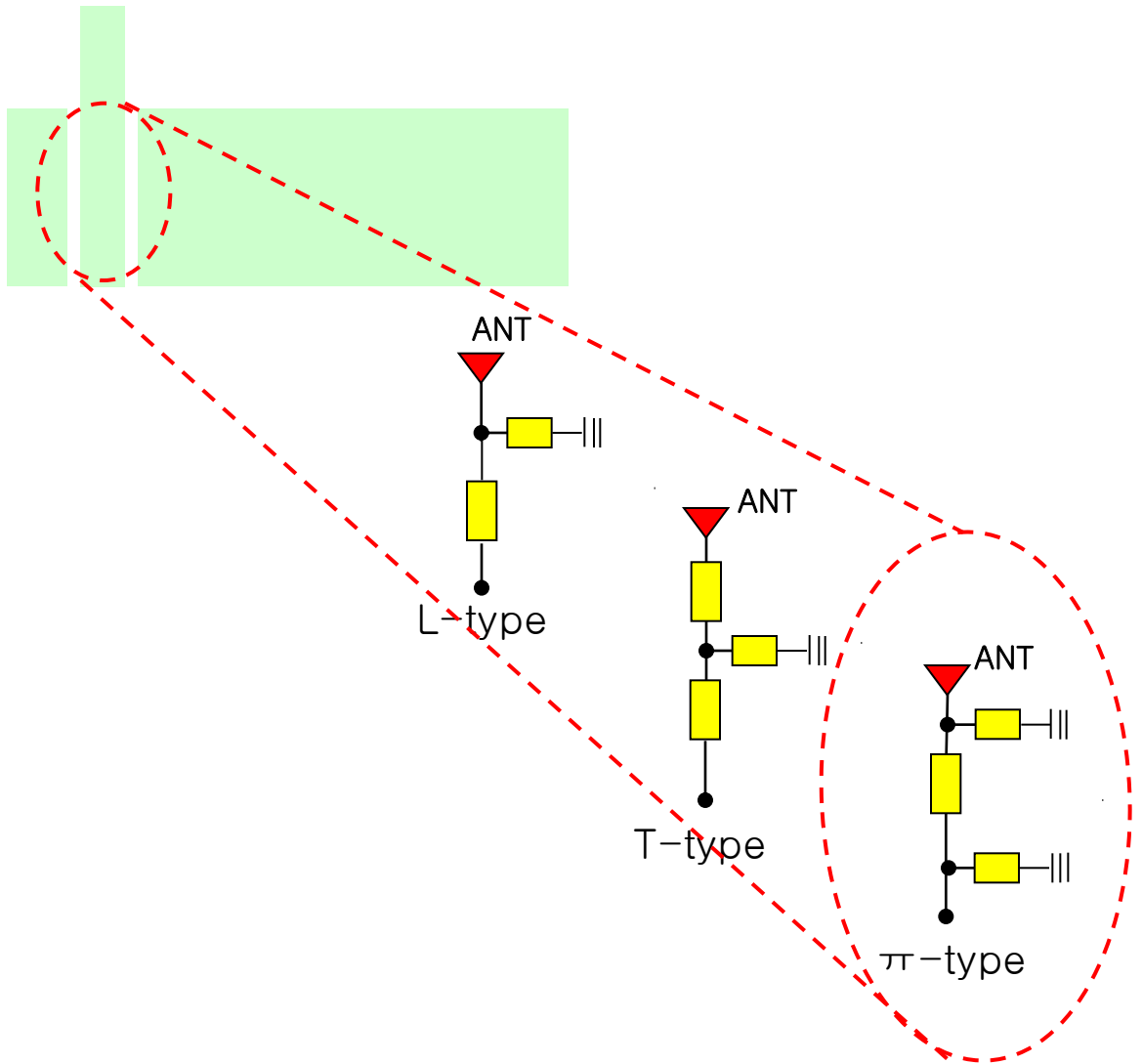


Solder Pad

Unit : mm

tolerances : ± 0.05

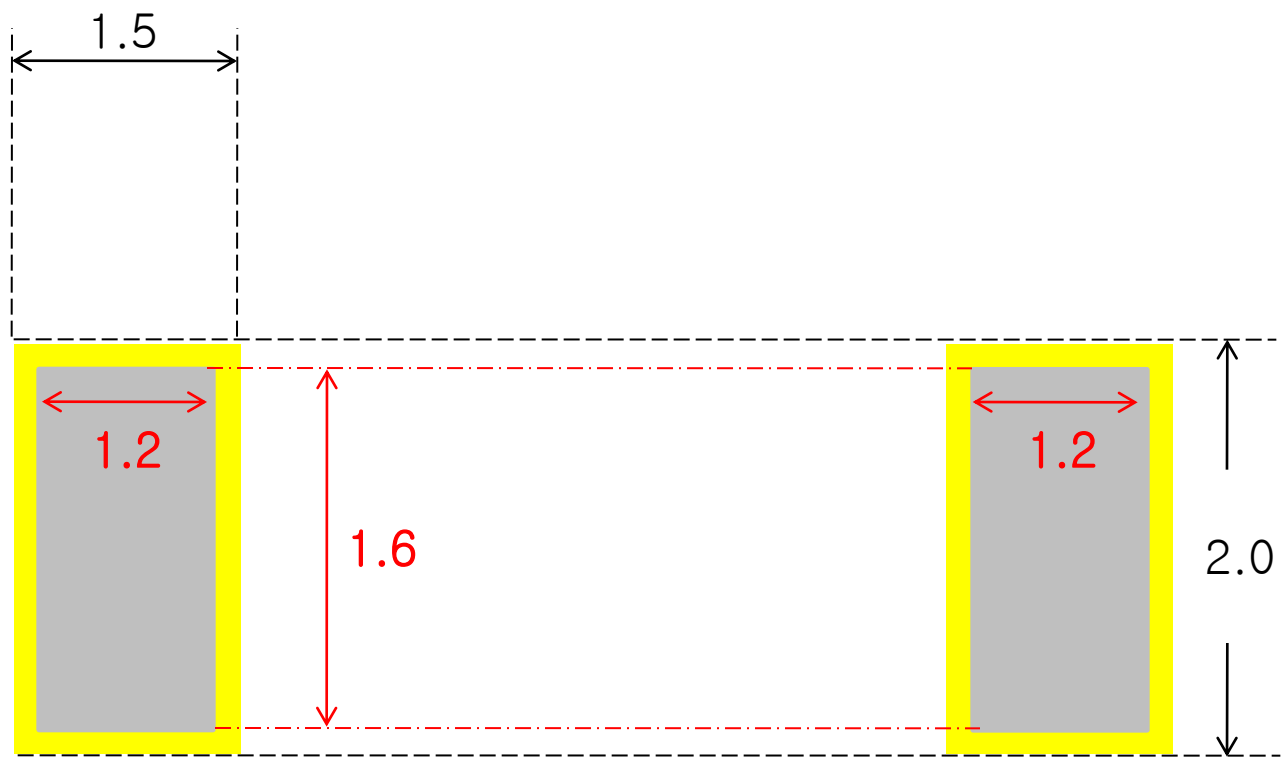
5-1. Matching Circuits



- (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.

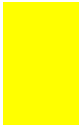
Matching circuit 적용 시 matching circuit이 차지하는 면적 및 가장 좋은 결과를 얻을 수 있는 matching type를 선택함.

5-2. SOLDERING CREAM AREA



Unit: mm

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



Solder Pad



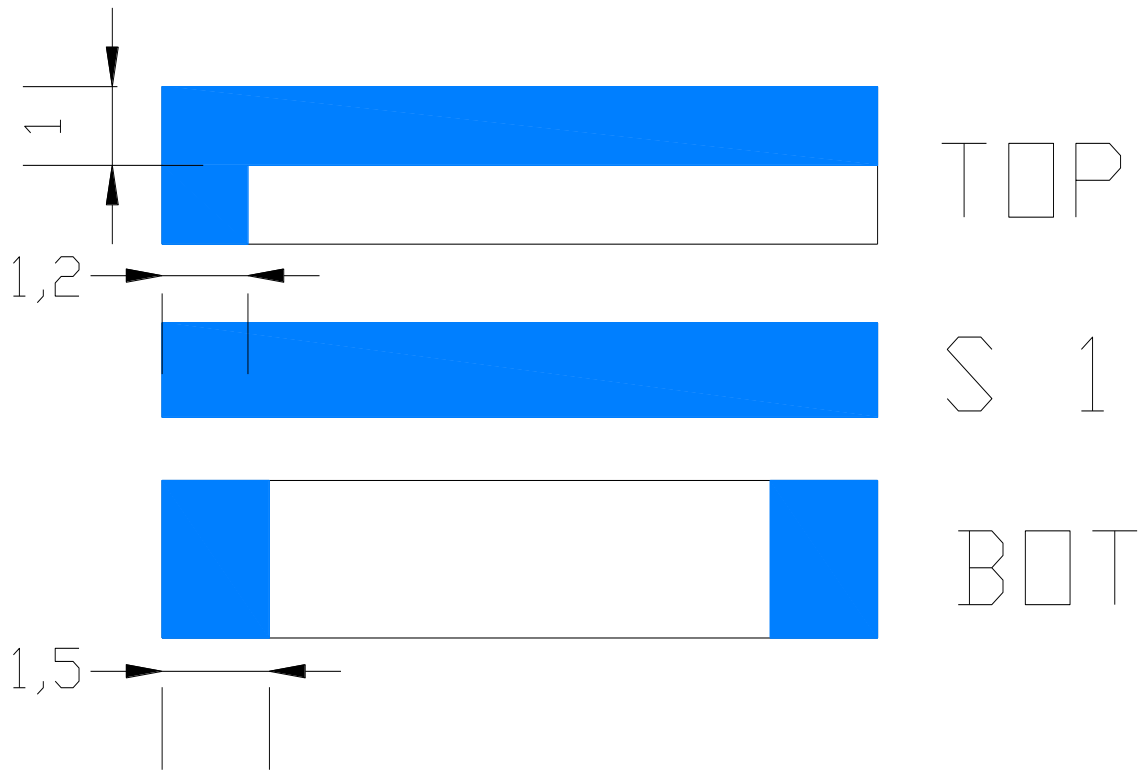
Soldering Cream

5-3. Antenna position



Feeding line(50 ohm)

6. Ag pattern & Dimensions



7. Marking View

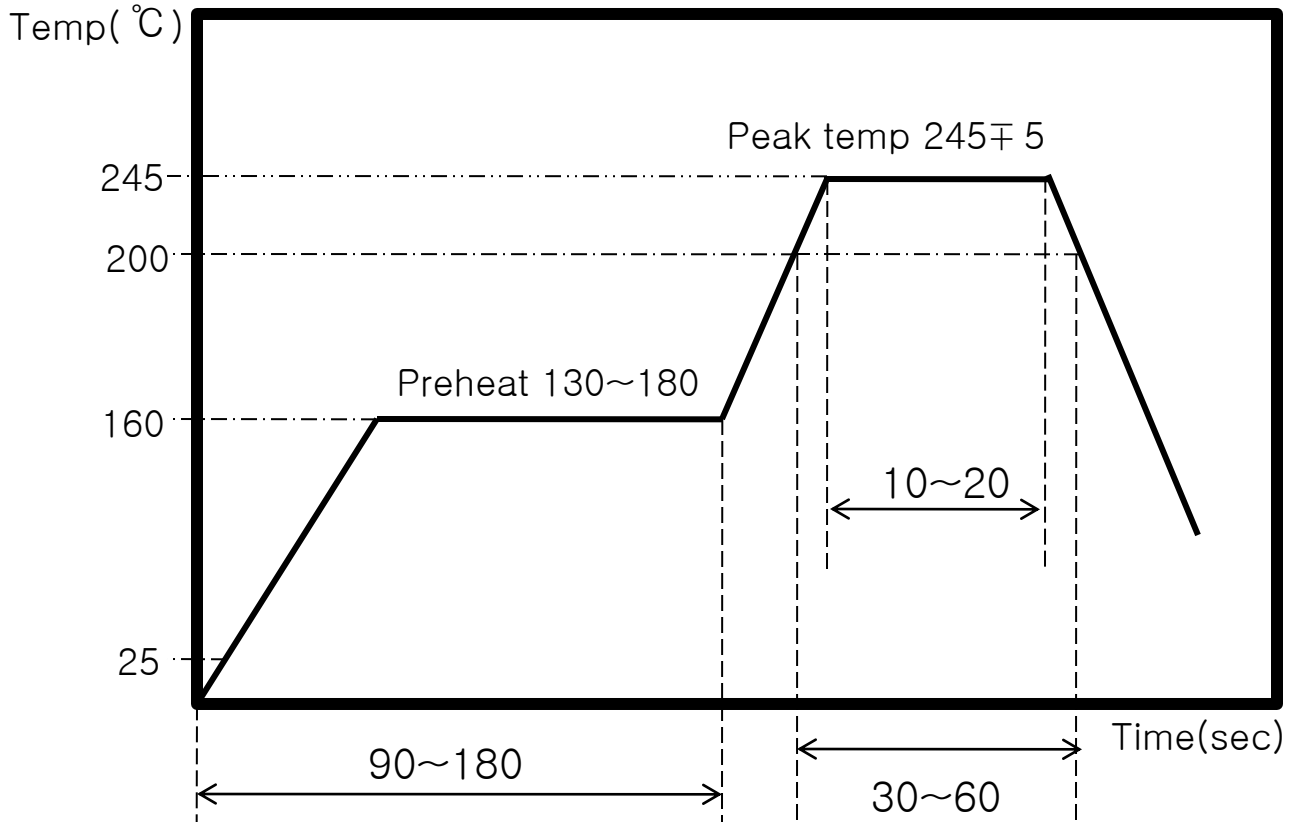


7-1. 마킹 종류

* RF용 검정 잉크 사용

8. Reflow Profile

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

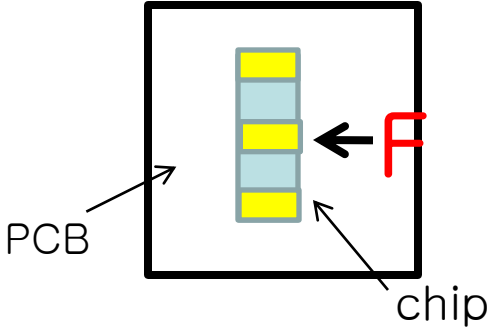


SMD 업체 현황에 따라 peak temp 및 시간은 변경 될 수 있으므로 협의를 요함

8-2. 수동 납땜 (인두기)을 할 경우(Pb-free)

인두 온도 : 340 'C / 시간 : 각 단 max 3 sec

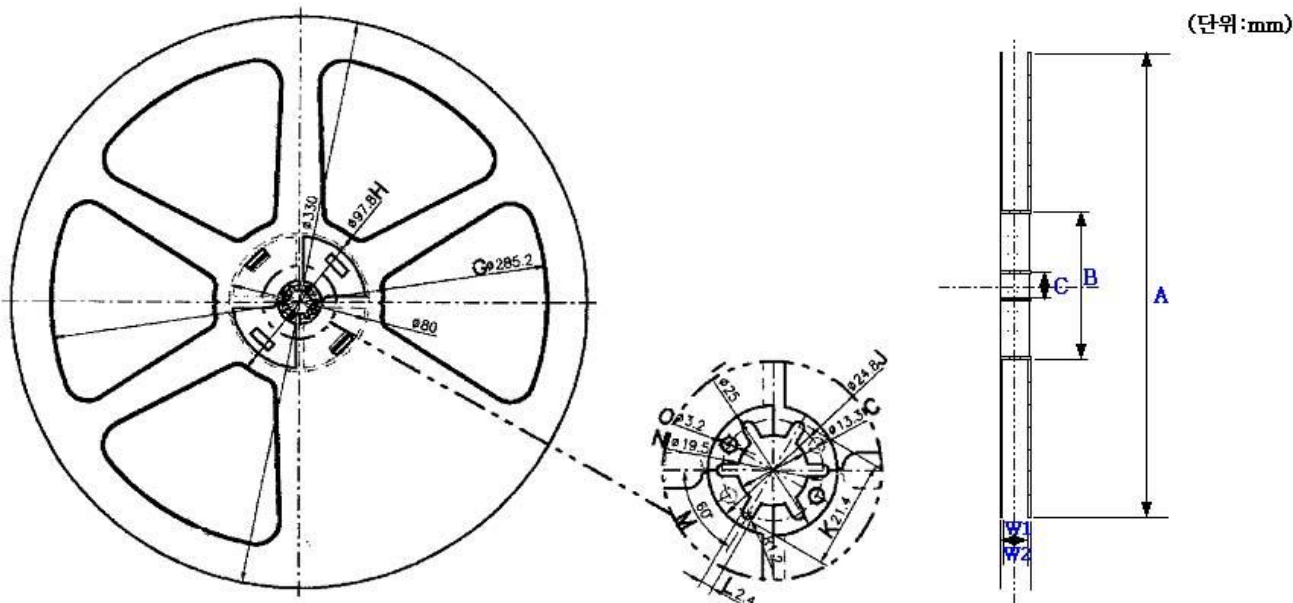
9. Environmental Tests

No.	ITEM	TEST COND	TEST REQU
1	High Temperature Resistance	1. Temp: $+125\pm5^{\circ}\text{C}$ 2. Time: $1000\pm24\text{hrs}$ 3. Measure Fc after left for 24hrs min. at room temp	1. Within electric spec(VSWR) 2. No visual damage
2	Low Temperature Resistance	1. Temp: $-40\pm5^{\circ}\text{C}$ 2. Time: $1000\pm24\text{hrs}$ 3. Measure Fc after left for 48hrs min. at room temp	1. Within electric spec(VSWR) 2. No visual damage
3	Thermal Shock	1. 1cycle/step1: $-40\pm3^{\circ}\text{C}$,30min step2: $+125\pm3^{\circ}\text{C}$,30min 2. Number of cycle:30 3. Measure after left for 48hrs min. at room temp	1. Within electric spec(VSWR) 2. No visual damage
4	Humidity	1. Humidity:85%RH 2. Temp: $+85\pm3^{\circ}\text{C}$ 3. Time: $1000\pm24\text{hrs}$ 4. Measure Fc after left for 48hrs min. at room temp	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



항 목	A	B	C
SPEC	330±1	80±1	13±0.2

EIAJ - RRM 0330							
RRM08D -56D							
품명	08D	12D	16D	24D	32D	44D	56D
규격	08	12	16	24	32	44	56
W1	9.5	13.5	17.5	25.5	33.5	45.5	57.5
W2	13.5	17.5	21.5	29.5	37.5	49.5	61.5


11. Usage and Cautions

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

12. RoHS Data

(1) Ceramic Power

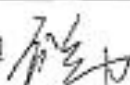
시 험 성 적 서

한국세라믹기술원 후153-801 서울서 금천구 가산동 233-5 (Tel: 02 3282 2416/7, Fax: 02 3282 2418)	성적서번호 : 2011-1248 페이지 (1) / (총 3)	
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1. 의 피 자
 - 기관명/성명 : 해동세라믹 / 김원식
 - 주 소 : 경기도 화성시 장안면 석포리 681-13, 14
 - 의 회 일 자 : 2011 년 05월 23일
2. 시험성적서의 용도 : 품질관리
3. 시험 시료명/품질 : 세라믹 Base
4. 시험기간 : 2011 년 05월 23일 ~ 2011 년 06월 03일
5. 시험방법 : KS C IEC 62321, 기기분석
6. 시험환경
 - 온도 : (21 ± 1) ℃ , 상대습도 : (37 ± 3) % R.H.
7. 시험결과


시료명	시험분석항목	시험분석결과	시험분석방법	비고	
세라믹 Base	Pb (mg/kg)	불검출(<5)	KS C IEC 62321		
	Cd (mg/kg)	불검출(<1)			
	Hg (mg/kg)	불검출(<1)			
	Cr ³⁺ (mg/kg)	불검출(<0.1)			
	PBBs (mg/kg)	불검출			
	PBDEs (mg/kg)	불검출	기기분석		
	PFOS (mg/kg)	불검출			
	PFOA (mg/kg)	불검출			
	Cl (mg/kg)	불검출			
	Br (mg/kg)	불검출			

참고) 1. 상기 분석에 사용된 ICP-OES는 PERKIN-ELMER사의 OPTIMA 5300 DV임.
 2. 상기 분석에 사용된기기는 PERKIN-ELMER사의 Cleus 520 mass임.
 3. 상기 분석에 사용된 UV/Vis는 Varian Cary 100 임.
 4. 상기 분석에 사용된 LC/MS/MS는 AB sciex 3200 QTRAP 임.
 5. 상기 분석에 사용된 IC는 Metrohm Model6 임.

확 인 시험자 : 최 기 인 (7848) 기인	기술책임자 : 박 덕 원 
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2011 . 06 . 03

한국세라믹기술원



본표의 성적서는 피보자가 표시한 시료 및 시료명으로 시험한 결과결과표지 전체 지면에 대한 통일 및 정확을 보장하지 않습니다.

(3) Marking Ink

SGS

Test Report No. 10000017-CT000011-0000

Issued Date: 2011-04-08 Page 1 of 8

To: SEOS-CHEMICAL RESEARCH LABORATORY CO., LTD.
Korea Chemical Research Center
1000-7 Jungang-dong
Shinwon-si
Gyeongsang-do 429-400
Korea

The following description was submitted and identifying the client as:

Sub File No.: 1000011-0000
Product Name: SC04500 Black
Batch No./Part No.: SC04500 Black
Received Date: 2011-04-01
Test Period: 2011-04-04 to 2011-04-08
Test Results: For further details please refer to following pages.
Test Performance: SGS Korea used the standard test method applied with following results.

SGS Korea Co., Ltd.

Test Report

Test Report / Chemical Lab Mgr

Analyst: Joon
Joon Kim
Cindy Park
Jung-Ang Testing Person

SGS

Test Report No. 10000017-CT000011-0000

Issued Date: 2011-04-08 Page 2 of 8

Sample No.: AYAA11-10960-001
Sample Description: SC04500 Black
Batch No./Part No.: SC04500 Black

Table 1

Test Item	Unit	Test Method	MSL	Result
Chlorine (Cl)	mg/kg	With reference to IEC 6247-2008, GC MS	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 6247-2008, GC MS	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 6247-2008, GC MS	1	N.D.
Hexachlorobenzene (HCB)	mg/kg	With reference to IEC 6247-2008, GC MS	1	N.D.
Polychlorinated Biphenyls (PCB)	mg/kg	With reference to IEC 6247-2008, GC MS	0.5	N.D.
Di-n-butyltin	mg/kg	With reference to IEC 6247-2008, GC MS	0.5	N.D.

Table 2

Test Item	Unit	Test Method	MSL	Result
Chlorine (Cl)	mg/kg	With reference to IEC 6247-2008, GC MS	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 6247-2008, GC MS	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 6247-2008, GC MS	1	N.D.
Hexachlorobenzene (HCB)	mg/kg	With reference to IEC 6247-2008, GC MS	1	N.D.
Polychlorinated Biphenyls (PCB)	mg/kg	With reference to IEC 6247-2008, GC MS	0.5	N.D.
Di-n-butyltin	mg/kg	With reference to IEC 6247-2008, GC MS	0.5	N.D.
Chlorine (Cl)	mg/kg	With reference to IEC 6247-2008, GC MS	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 6247-2008, GC MS	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 6247-2008, GC MS	1	N.D.
Hexachlorobenzene (HCB)	mg/kg	With reference to IEC 6247-2008, GC MS	1	N.D.
Polychlorinated Biphenyls (PCB)	mg/kg	With reference to IEC 6247-2008, GC MS	0.5	N.D.
Di-n-butyltin	mg/kg	With reference to IEC 6247-2008, GC MS	0.5	N.D.
Chlorine (Cl)	mg/kg	With reference to IEC 6247-2008, GC MS	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 6247-2008, GC MS	5	N.D.
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Polychlorinated Biphenyls (PCB)	mg/kg	With reference to IEC 6247-2008, GC MS	0.5	N.D.
Di-n-butyltin	mg/kg	With reference to IEC 6247-2008, GC MS	0.5	N.D.

NOTE: (1) N.D. = Not detected (MSL)
(2) mg/kg = ppm
(3) MSL = Method Detection Limit
(4) = Not regulated
(5) * = Qualitative analysis (Yes/No)
(6) * = Testing water content
Negative = Absence of GSH testing
Positive = Presence of GSH testing, the detected concentration is below the detection limit
Positive = Presence of GSH testing, the detected concentration is below the detection limit

SGS

Test Report No. 10000017-CT000011-0000

Issued Date: 2011-04-08 Page 3 of 8



NOTE: (1) N.D. = Not detected (MSL)
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Positive = Presence of GSH testing, the detected concentration is below the detection limit