

样品承认书

Sample Approved Sheet

合拓（HT-1608-C03）承认书

制 造 商 Shenzhen Hetuo Technology Co., Ltd
manufacturer
产品名称 Ceramic antennas
Product name
品牌 合拓自产 HT-1608-C03

合拓 判定审核组

制订	审核	批准	承认书完成时间
李瑶娜	胡雪文	吴寿平	2024.1.23

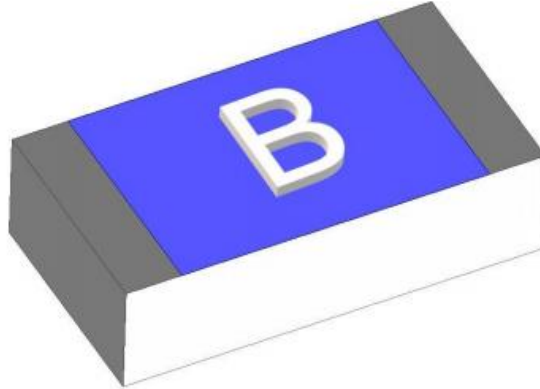
（客户）判定审核组

承认书编号 承认书提供时间

承认	审核	批准	承认日期
评审项目： ☐ 承认书 3 份 ☐ 规格书/图纸 ☐ 检测报告 ☐ 样品__PCS ☐ 安规 ☐ HSF			
评审结果： ☐ 接受 ☐ 有条件接受 ☐ 拒绝			

1. Antenna picture

The report mainly provides the test status of the electrical properties parameters of . The antenna is a **2.4~2.5GHz** Band . The antenna Picture and assembly are shown below. Antenna picture & assembly picture



2. Antenna Test Equipment Introduction

Test of antenna input characteristics using Agilent E5071C and Agilent 5062A vector network analyzer; The radiation pattern of the antenna are tested using the Satimo starlab 3D near field Anechoic Chamber , and the instrument is used to agilent8960 E5515 and Agilent E4438C. The test coordinates of the darkroom are as follows:

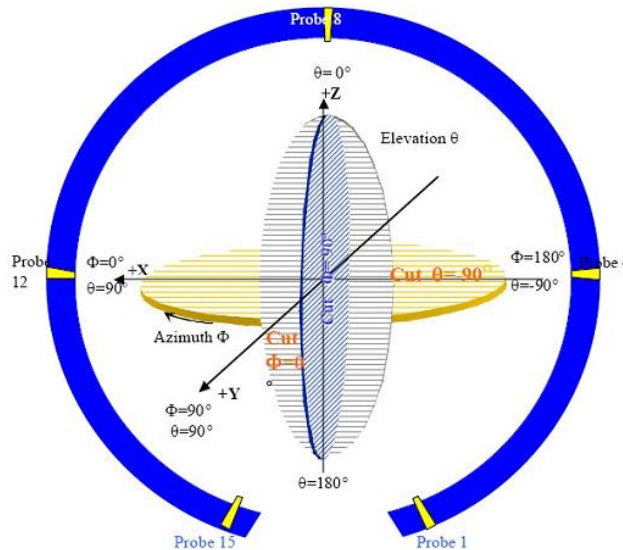


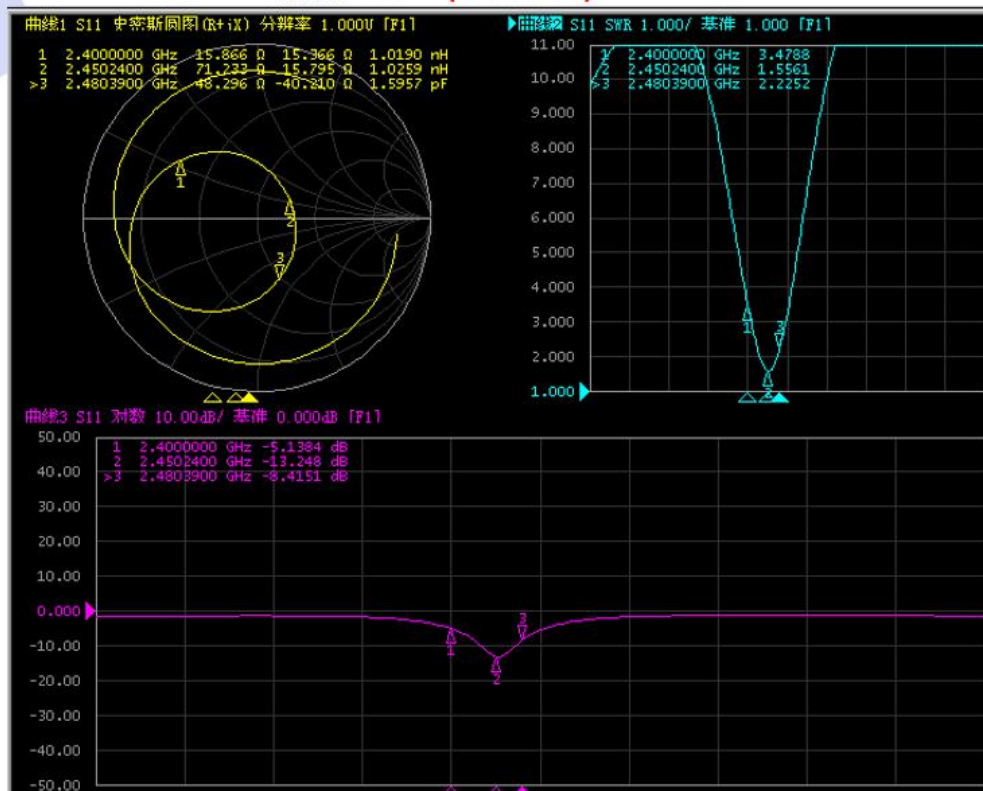
图 4 3D 微波暗室测试坐标系 (back view)

3. Electrical Specification

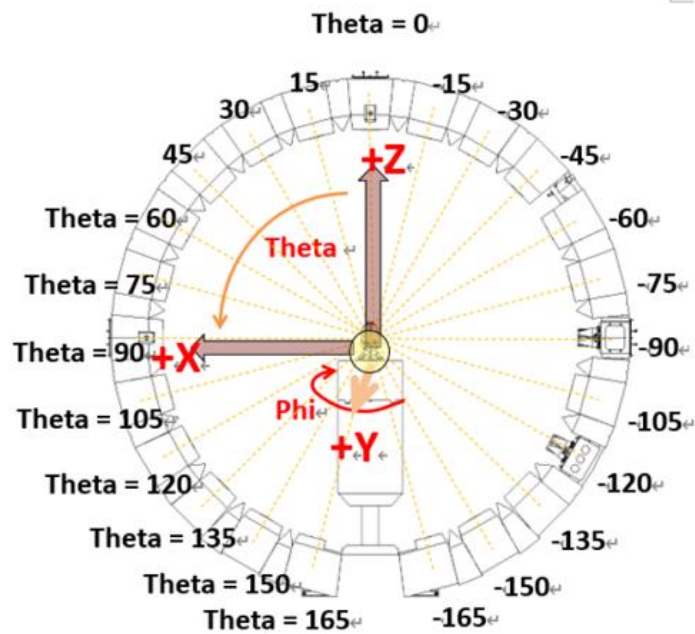
3-2 Passive S11 parameter

Measuring Method is a 50 Ω coaxial cable is connected to the antenna. Then this cable is connected to a network analyzer to measure the S11 parameter, Keeping this fixture away from metal at least 20cm.

VSWR



Sample status & coordinates



Gain & Efficiency—BT- ANT



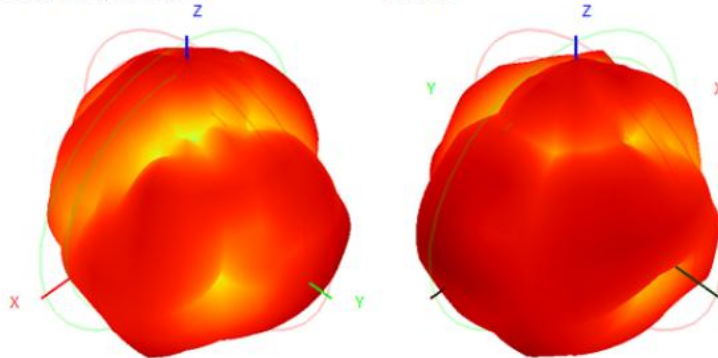
深圳市合拓科技有限公司

Frequency ID	1	2	3	4	5	6	7	8	9	10	11
Frequency (MHz)	2400.0	2410.0	2420.0	2430.0	2440.0	2450.0	2460.0	2470.0	2480.0	2490.0	2500.0
Efficiency (dBi)	-7.49	-7.46	-7.55	-7.40	-7.38	-7.37	-7.42	-7.26	-7.15	-7.24	-7.28
Gain (dBi)	-2.58	-3.03	-2.18	-2.58	-2.68	-2.51	-1.70	-2.30	-1.76	-1.55	-1.39
Efficiency (%)	17.84	17.94	17.59	18.20	18.29	18.31	18.12	18.80	19.27	18.90	18.71
Directivity (dB)	4.91	4.43	5.37	4.82	4.70	4.86	5.72	4.95	5.39	5.69	5.89
Peak Gain Position (Theta)	120.00	120.00	120.00	135.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00
Peak Gain Position (Phi)	105.00	105.00	105.00	180.00	105.00	105.00	105.00	120.00	120.00	120.00	120.00
Efficiency ThetaPol (%)	5.60	5.50	5.33	5.29	5.16	5.25	5.14	5.43	5.79	5.93	5.95
Efficiency PhiPol (%)	12.24	12.43	12.26	12.90	13.13	13.06	12.98	13.37	13.48	12.97	12.76
Upper Hem. Efficiency (%)	8.33	8.48	8.28	8.55	8.54	8.24	8.09	8.20	8.37	8.23	8.06
Lower Hem. Efficiency (%)	9.51	9.46	9.32	9.64	9.75	10.07	10.03	10.60	10.91	10.67	10.65

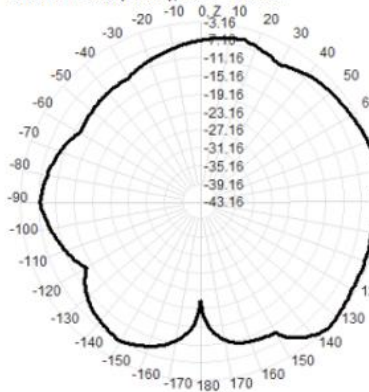
Gain & Efficiency—BT- ANT

2400.0MHz H+V, Eff: 17.8%

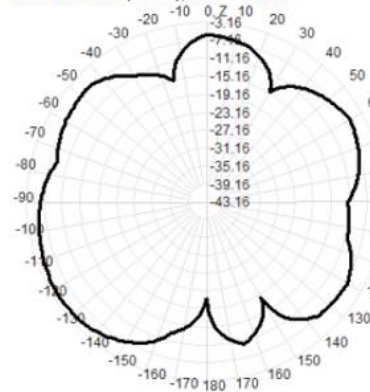
Back View



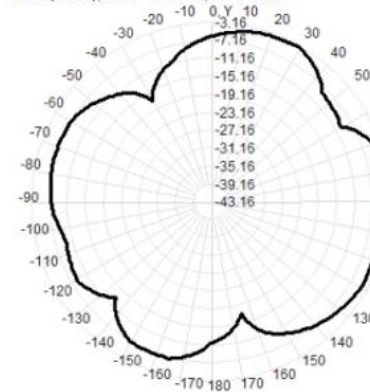
2400.0MHz Total(E1-XZ), Max=-3.16dBi



2400.0MHz Total(E2-YZ), Max=-4.28dBi



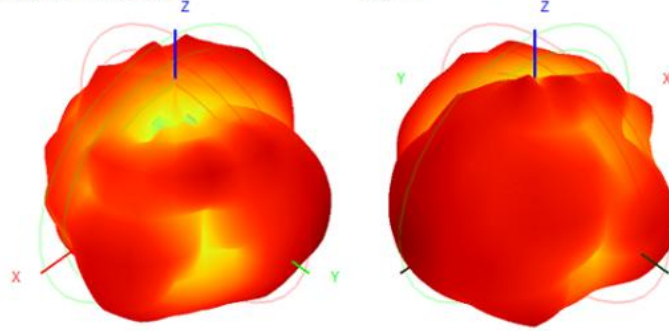
Total(H-XY), Max=-3.61dBi, CirD=13.89



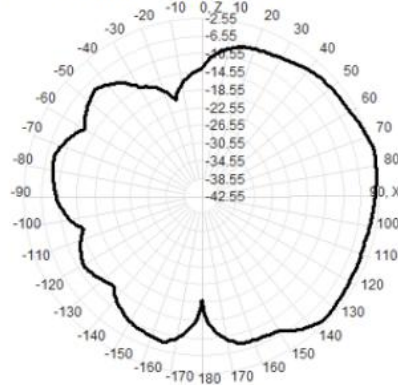
Gain & Efficiency—BT- ANT

2450.0MHz H+V, Eff: 18.3%

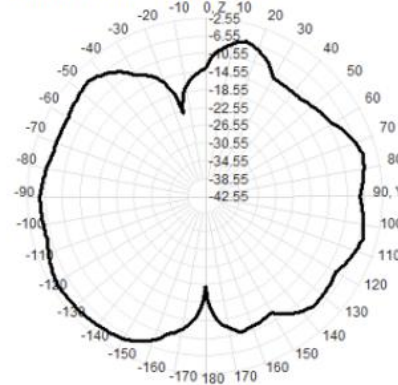
Back View



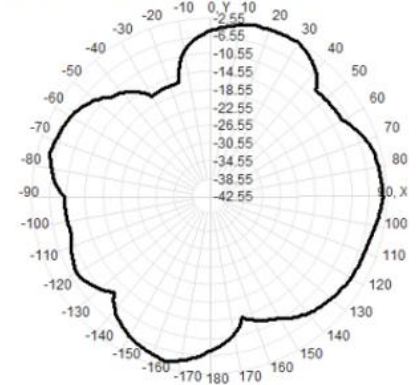
2450.0MHz Total(E1-XZ), Max=-2.55dBi



2450.0MHz Total(E2-YZ), Max=-4.00dBi



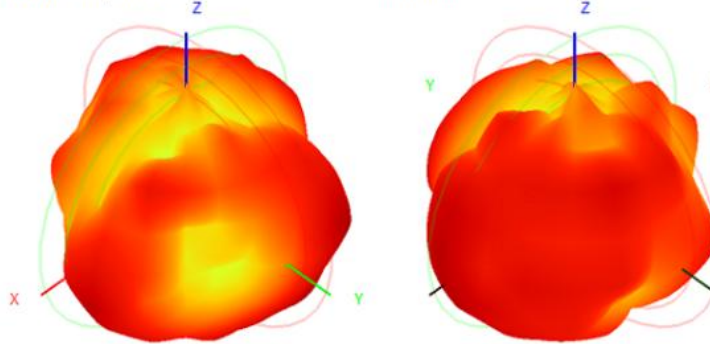
Total(H-XY), Max=-2.68dBi, CirD=13.84



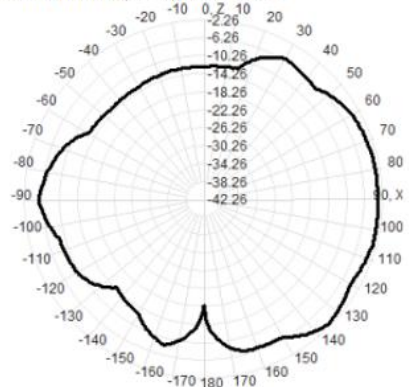
Gain & Efficiency—BT- ANT

2500.0MHz H+V, Eff: 18.7%

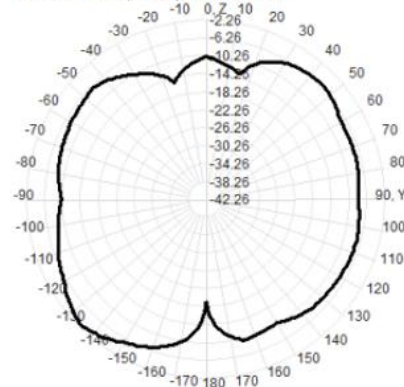
Back View



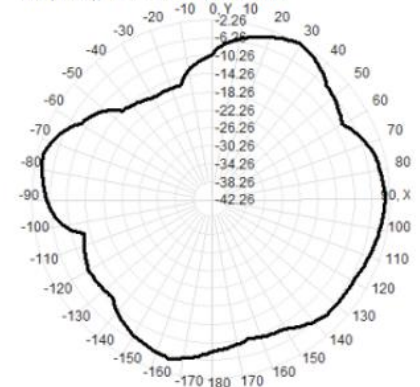
2500.0MHz Total(E1-XZ), Max=-3.04dBi



2500.0MHz Total(E2-YZ), Max=-2.85dBi

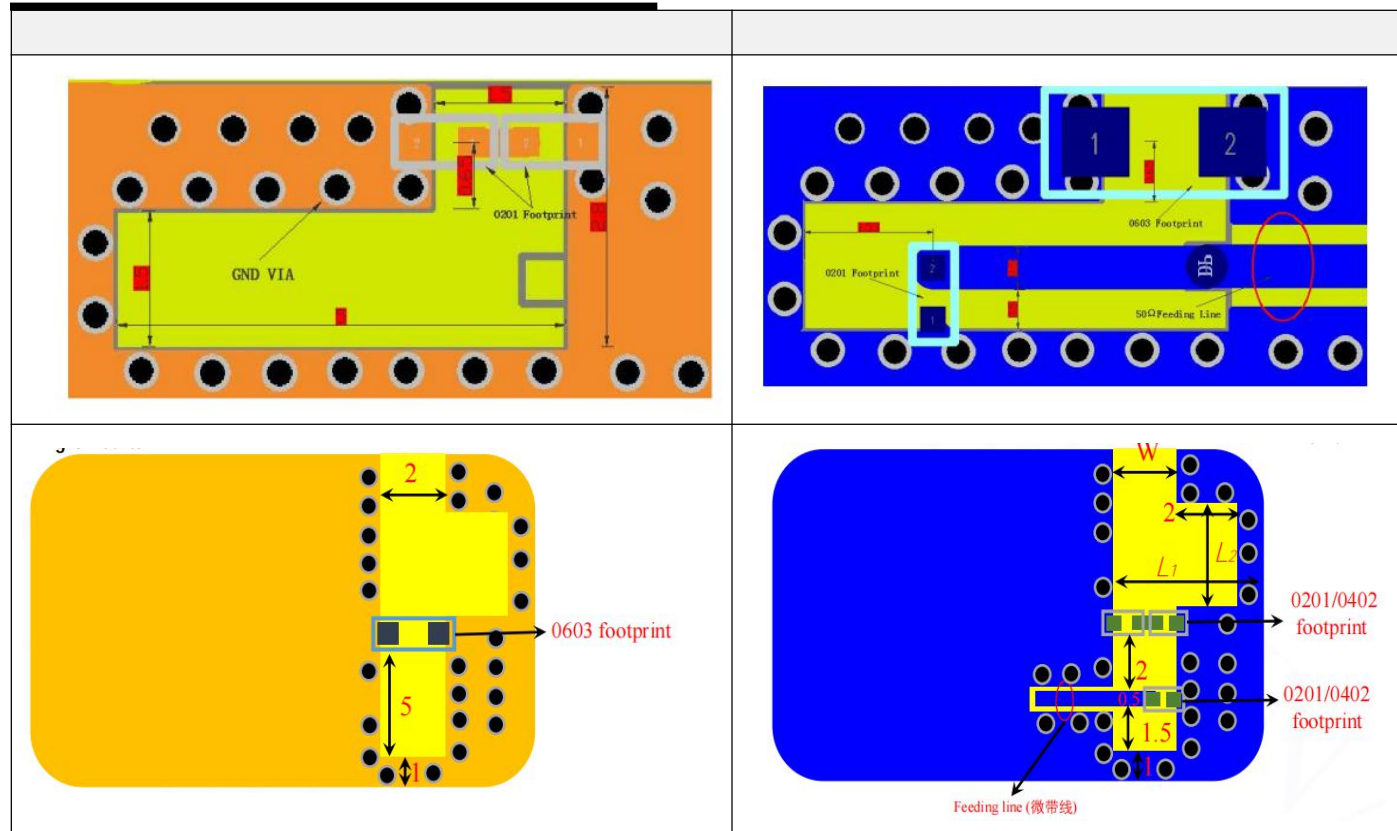


Total(H-XY), Max=-2.26dBi, CirD=13.91



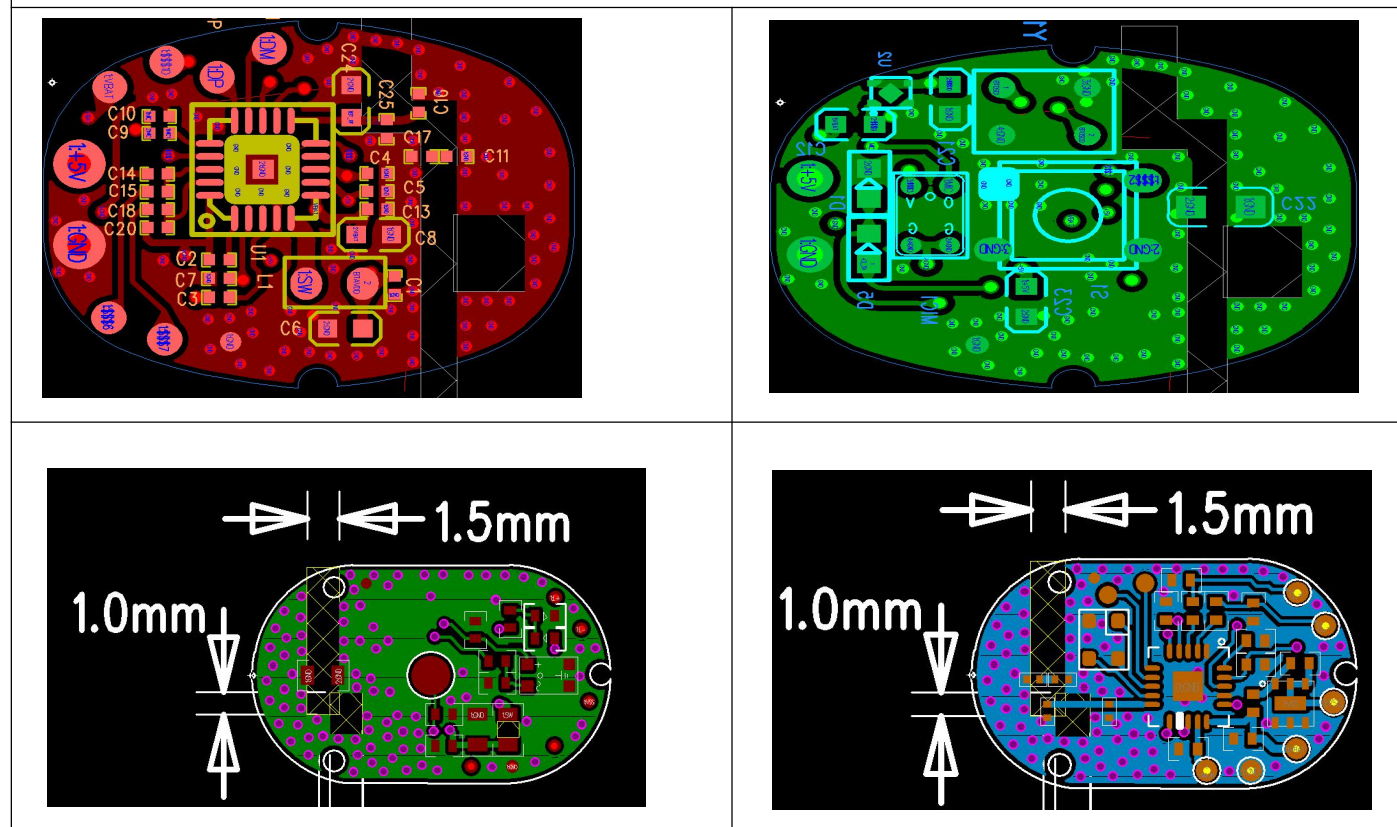
2.4GHz 1608 Chip Antenna: HT-1608-C03

Evaluation Board Reference



设计指导:

- 1、原则上，净空区左侧边缘距离板边的间距L1应该尽量大，且注意与底部电池的间距。
- 2、净空区的宽度W最优为1.5mm~2mm。
- 3、净空区的长度L2的长度为2mm~4mm。



2.4GHz 1608 Chip Antenna:HT-1608-C03

Taping Specifications

Reel and Taping Specification

Reel Specification

TYPE	SIZE		A	B	C	D
1608	7"	4K/Reel	4.0±0.5	4.0±2	13.5±0.5	178±2

Tapping Specification

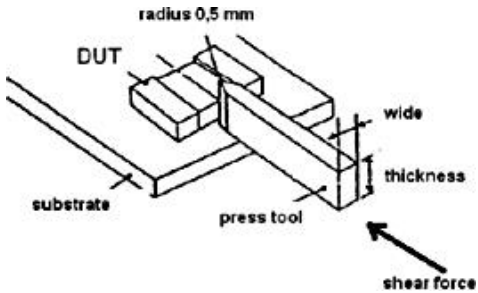
Packaging	Type	A	B	W	E	F	G	H	T	ψD	P
Paper Type	1608	1.90±0.20	3.50±0.20	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.75±0.10	1.50±0.10	4.0±0.1

2.4GHz 1608 Chip Antenna: HT-1608-C03

Reliability Table

Test Item	Procedure	Requirements Ceramic Type	Remark (Reference)
Electrical Characterization		Fulfill the electrical specification	User Spec.
Thermal Shock	1. Preconditioning: $50 \pm 10^{\circ}\text{C}$ / 1 hr , then keep for 24 ± 1 hrs at room temp. 2. Initial measure: Spec: refer Initialspec. 3. Rapid change of temperature test: -30°C to $+85^{\circ}\text{C}$; 100 cycles; 15 minutes at Lower category temperature; 15 minutes at Upper category temperature.	No Visible Damage. Fulfill the electrical specification.	MIL-STD-202 107
Temperature Cycling	1. Initial measure: Spec: refer Initialspec. 2. 100 Cycles (-30°C to $+85^{\circ}\text{C}$), Soak Mode=1 (2 Cycle/hours). 3. Measurement at 24 ± 2 Hours after test condition.	No Visible Damage. Fulfill the electrical specification.	JESD22 JA104
High Temperature Exposure	1. Initial measure: Spec: refer Initialspec. 2. Unpowered; 500hours @ $T=+85^{\circ}\text{C}$. 3. Measurement at 24 ± 2 hours after test.	No Visible Damage. Fulfill the electrical specification.	MIL-STD-202 108
Low Temperature Storage	1. Initial measure: Spec: refer Initialspec. 2. Unpowered: 500hours @ $T=-30^{\circ}\text{C}$. 3. Measurement at 24 ± 2 hours after test.	No Visible Damage. Fulfill the electrical specification.	MIL-STD-202 108
Solderability (SMD Bottom Side)	Dipping method: a. Temperature: $235 \pm 5^{\circ}\text{C}$ b. Dipping time: $3 \pm 0.5\text{s}$	The solder should cover over 95% of the critical area of bottom side.	IEC 60384-21/22 4.10
Soldering Heat Resistance (RSH)	Preheating temperature: $150 \pm 10^{\circ}\text{C}$. Preheating time: 1~2 min. Solder temperature: $260 \pm 5^{\circ}\text{C}$. Dipping time: $5 \pm 0.5\text{s}$	No Visible Damage.	IEC 60384-21/22 4.10
Vibration	5g's for 20 min., 12 cycles each of 3 orientations Note: Use 8"X5" PCB .031" thick 7 secure points on, one long side and 2 secure points at corners of opposite sides. Parts mounted within 2" from any secure point. Test from 10-2000 Hz.	No Visible Damage.	MIL-STD-202 Method 204
Mechanical Shock	Three shocks in each direction shall be applied along the three mutually perpendicular axes of the test specimen (18 shocks) Peak value: 1,500g's Duration: 0.5ms Velocity change: 15.4 ft/s Waveform: Half-sine	No Visible Damage.	MIL-STD-202 Method 213
Humidity Bias	1. Humidity: 85% R.H., Temperature: $85 \pm 2^{\circ}\text{C}$. 2. Time: 500 ± 24 hours. 3. Measurement at 24 ± 2 hrs after test condition.	No Visible Damage. Fulfill the electrical specification.	MIL-STD-202 Method 106

2.4GHz 3216 Chip Antenna: HT-1608-C03

Board Flex (SMD)	1. Mounting method: IR-Reflow. PCB Size (L:100 × W:40 × T:1.6mm) 2. Apply the load in direction of the arrow until bending reaches 2 mm.	No Visible Damage.	AEC-Q200 005
Adhesion	Force of 1.8Kg for 60 seconds. 	No Visible Damage Magnification of 20X or greater may be employed for inspection of the mechanical integrity of the device body terminals and body/terminal junction.	AEC-Q200 006
Physical Dimension	Any applicable method using x10 magnification, micrometers, calipers, gauges, contour projectors, or other measuring equipment, capable of determining the actual specimen dimensions.	In accordance with specification.	JESD22 JB100

Revision History

Revision	Date	Content
1	2019/03/01	New Datasheet
2	2020/02/22	Add 2D radiation characteristic