

Saward Antenna Debugging Report

Customer Name: Estone Technology LTD

Project Name: SB133-AX210 Module

Date: December 14, 2023

Project contact information

Customer contact person:

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Saward structure:

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Saward RF: Yang Wende

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Project Introduction

1. Project Description

Number of project antennas	Machine type
4	
Machine shell material: 13 inch metal shell	

2. Antenna Overview

Antenna number	name	Working frequency band/MHZ	manufacturer	Material/Structure
1	WIFI&BT&5Gwifi	2400MHz/2500MHz&5. 8GHz	ShenZhen SWARD Communi cation Technology Co.Ltd	PCB
2	WIFI&BT&5Gwifi	2400MHz/2500MHz&5. 8GHz		PCB
3	WIFI	2400MHz/2500MHz		PCB
4	GPS	1575MHz		Ceramic Antenna

Antenna layout



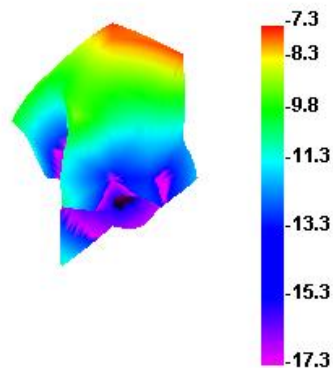
WIFI&BT main antenna S11



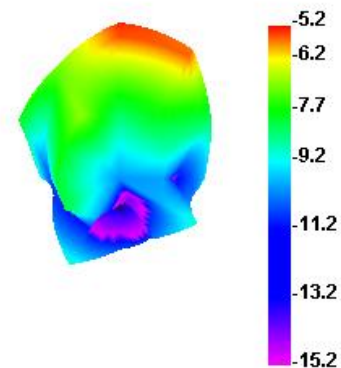
WIFI&BT main antenna efficiency

Passive Test For 2.4G			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
2400	24.62	-6.09	-7.34
2410	24.72	-6.07	-7.05
2420	25.43	-5.95	-6.77
2430	26.66	-5.74	-5.46
2440	27.91	-5.54	-4.58
2450	26.99	-5.69	-5.23
2460	27.21	-5.65	-5.27
2470	26.43	-5.78	-5.94
2480	27.51	-5.61	-5.34
2490	29.71	-5.27	-4.23
2500	32.19	-4.92	-3.13

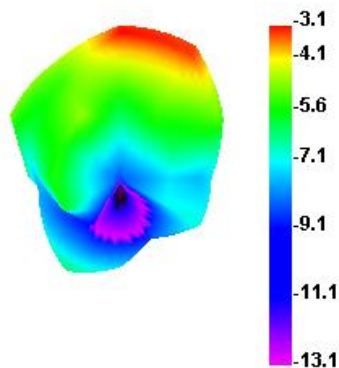
2400.000MHz



2450.000MHz



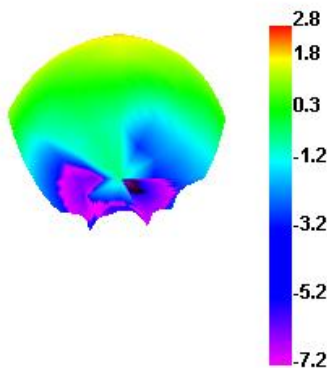
2500.000MHz



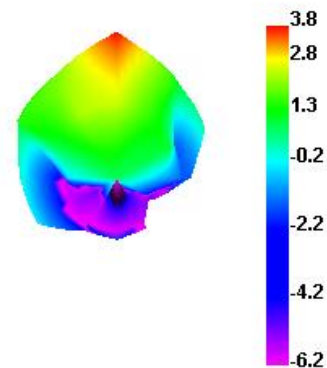
5GWIFI main antenna efficiency

Passive Test For 5G-WIFI			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
5000	31.59	-5.00	2.79
5100	26.9	-5.70	2.19
5200	25.69	-5.90	3.81
5300	20.84	-6.81	2.17
5400	27.15	-5.66	4.26
5500	27.26	-5.64	3.76
5600	22.16	-6.54	2.81
5700	22.17	-6.54	1.99
5800	27.15	-5.66	0.17
5900	23.26	-6.33	-1.64
6000	22.51	-6.48	-2.26

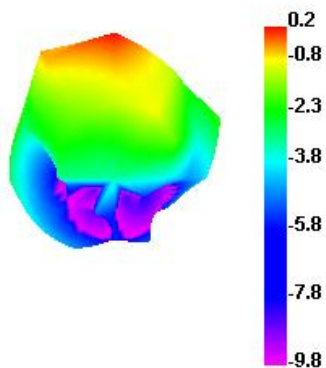
5000.000MHz



5500.000MHz



5800.000MHz



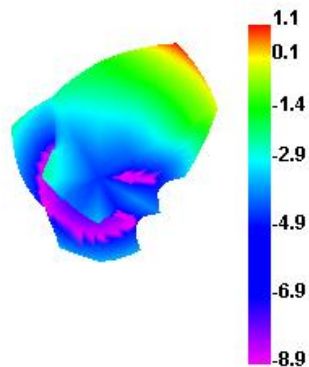
WIFI&BT&5Gwifi sub antenna S11



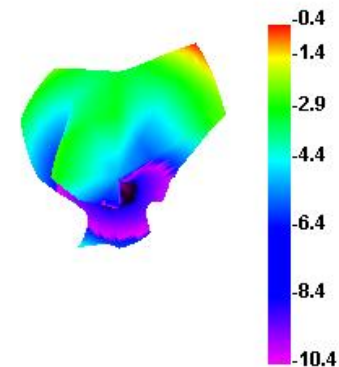
WIFI&BT sub antenna efficiency

Passive Test For 2.4G			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
2400	20.85	-6.81	1.05
2410	21.15	-6.75	0.89
2420	20.32	-6.92	0.35
2430	20.61	-6.86	0.02
2440	21.22	-6.73	-0.27
2450	22.35	-6.51	-0.36
2460	22.45	-6.49	-0.6
2470	20.22	-6.94	-1.2
2480	19.05	-7.2	-1.58
2490	20.42	-6.9	-1.37
2500	21.34	-6.71	-1.22

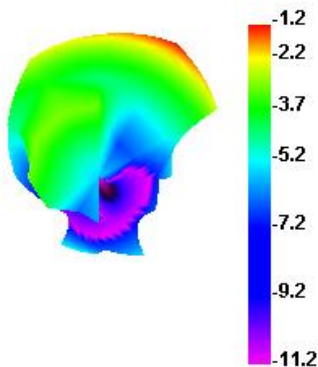
2400.000MHz



2450.000MHz



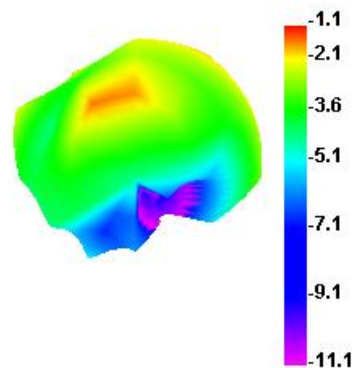
2500.000MHz



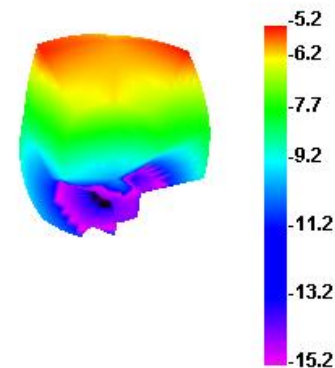
5GWIFI sub antenna efficiency

Passive Test For 5G-WIFI			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
5000	18.47	-7.34	-1.1
5100	18.41	-7.35	-1.29
5200	13.21	-8.79	-2.67
5300	18.29	-7.38	-4.99
5400	18.49	-7.33	-3.97
5500	18.02	-7.44	-5.23
5600	18.68	-7.29	-3.98
5700	19.22	-7.16	-2.6
5800	19.32	-7.14	-2.3
5900	16.52	-7.82	-3.55
6000	16.95	-7.71	-3.9

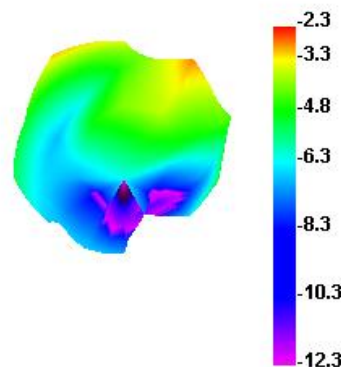
5000.000MHz



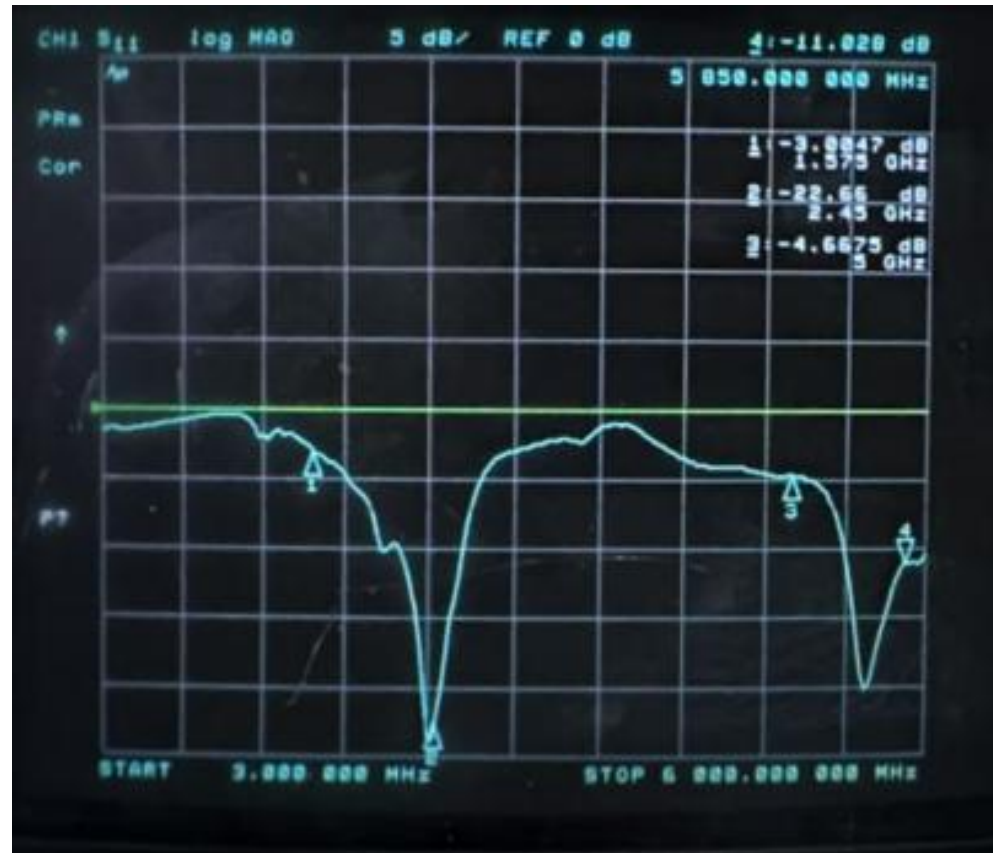
5500.000MHz



5800.000MHz



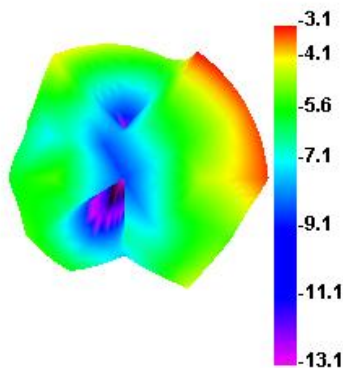
2.4GWIFI remote control antenna S11



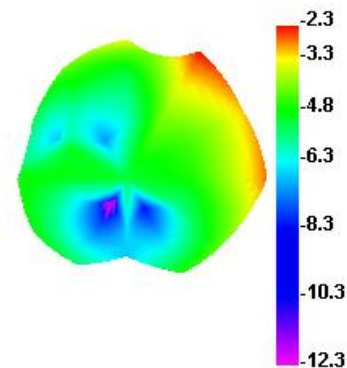
2.4GWIFI remote control antenna efficiency

Passive Test For 2.4G			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
2400	14.34	-8.43	-3.09
2410	14.7	-8.33	-2.76
2420	11.95	-9.23	-3.38
2430	11.76	-9.3	-3.35
2440	11.46	-9.41	-3.36
2450	14.4	-8.42	-2.34
2460	15.47	-8.11	-1.93
2470	17.24	-7.63	-1.38
2480	15.72	-8.04	-1.59
2490	15.77	-8.02	-1.6
2500	12.78	-8.93	-2.47

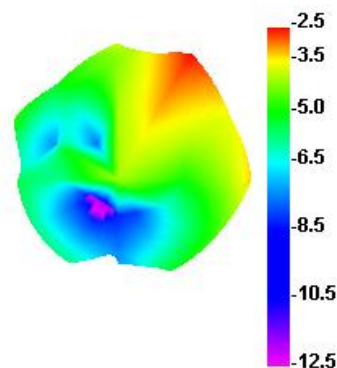
2400.000MHz



2450.000MHz



2500.000MHz



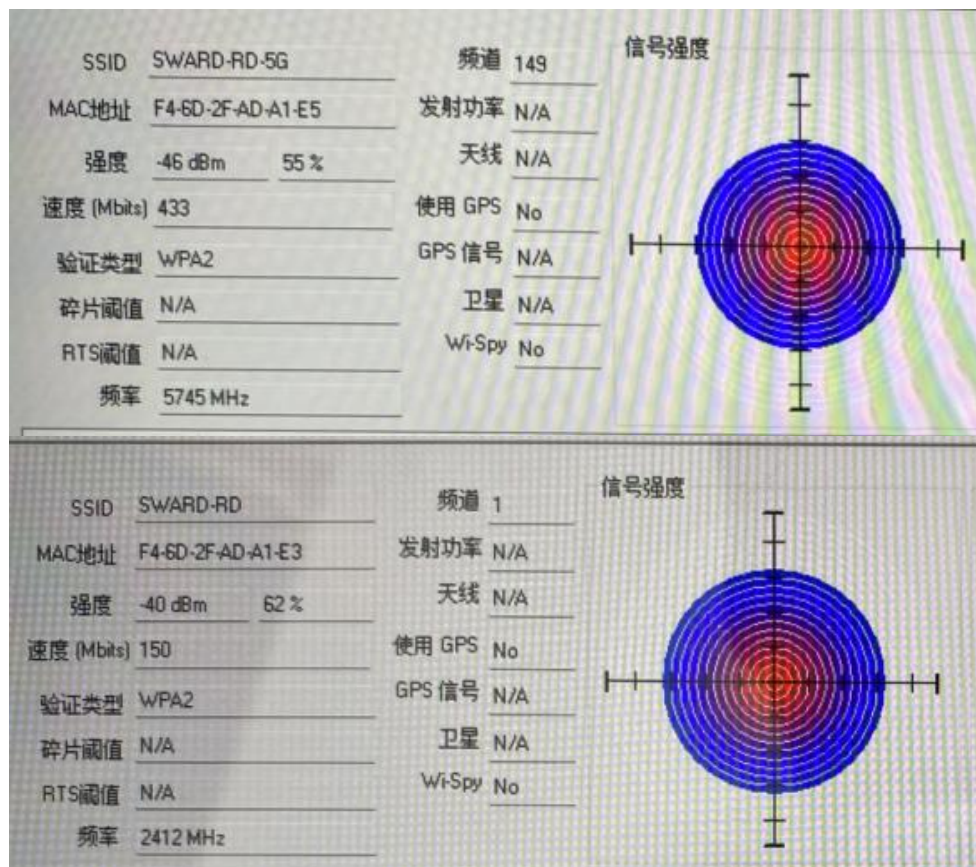
WIFI antenna throughput test

Iperf throughput testing						
model		module		Software version		
Model number	channel	distance	Testing angle	Test data (TX) 1-minute mean	Test data (RX) 1-minute mean	Remarks (Number of Swaps)
2.4GWIFI		15m	0°	53.9M/S	109M/S	0
			90°	57.3M/S	104M/S	
			180°	56.1M/S	102M/S	
			270°	55.3M/S	102M/S	
5GWIFI		15m	0°	198M/S	306M/S	0
			90°	201M/S	303M/S	
			180°	196M/S	315M/S	
			270°	210M/S	320M/S	

BT antenna measured distance

Actual measurement effect	
Model number	1
testing environment	Soward R&D Center
Test equipment	Huawei AM08
test distance	10m $\geq$

WIFI antenna signal strength measured image (data)

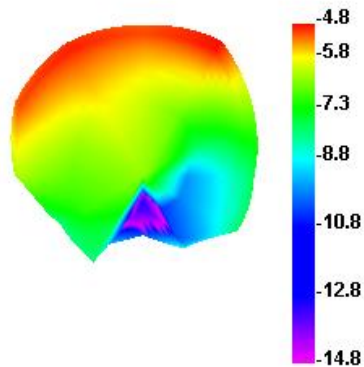


Testing location: Our R&D office
Test time: 14:00-14:30
Testing distance: 10-15 meters
Signal strength: -48dBm to -39dBm

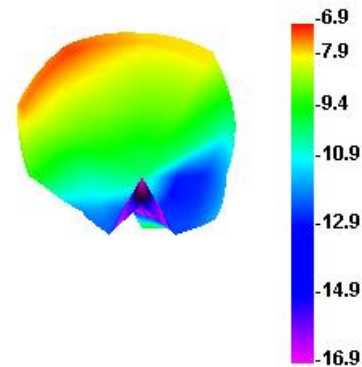
GPS antenna efficiency

Passive Test For GPS			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
1570	23.73	-6.25	-4.84
1571	22.68	-6.44	-5.3
1572	21.35	-6.71	-5.61
1573	20.91	-6.80	-5.96
1574	23.52	-6.29	-6.43
1575	25.28	-5.97	-6.91
1576	26.25	-5.81	-7.4
1577	25.36	-5.96	-8
1578	24.63	-6.09	-8.52
1579	24.05	-6.19	-9.05
1580	23.59	-6.27	-9.58

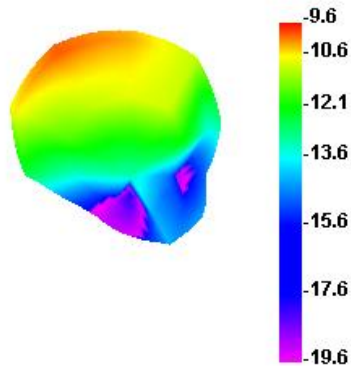
1570.000MHz



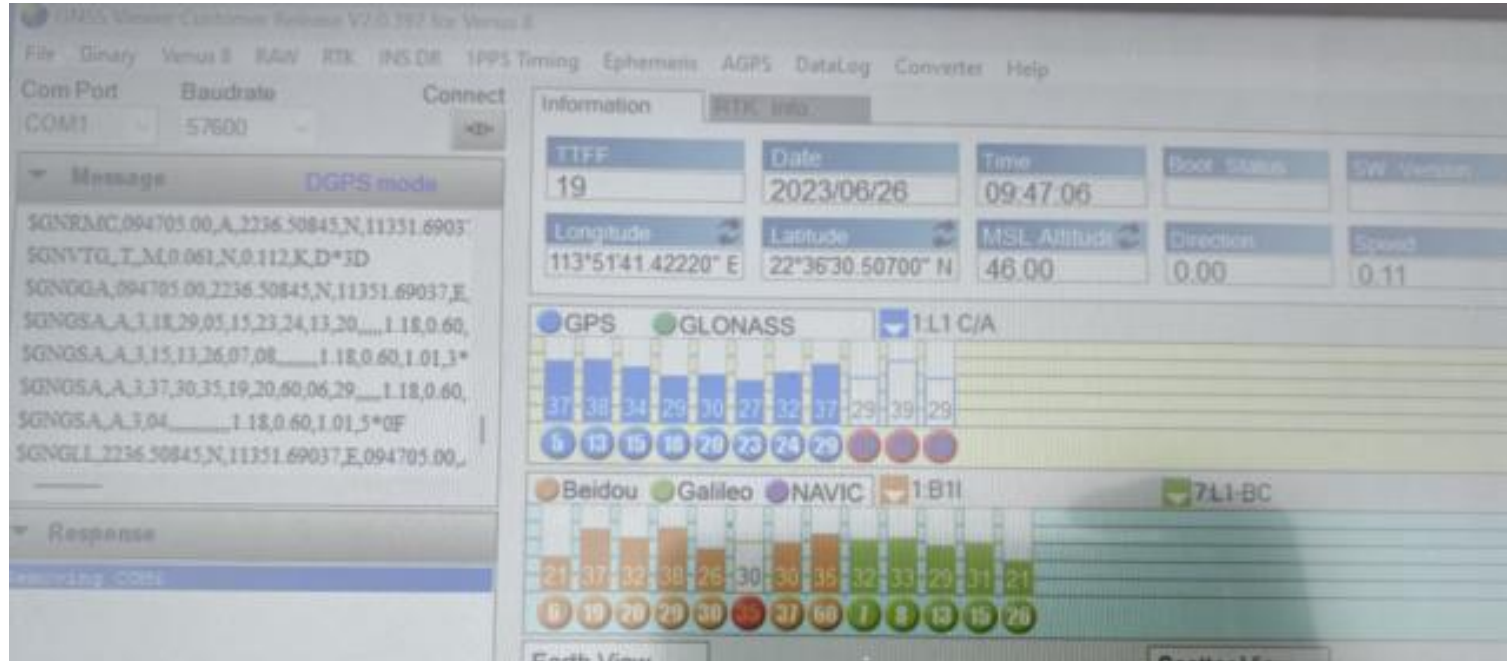
1575.000MHz



1580.000MHz



GPS measured images (data)



Testing location: Our company's rooftop
Test time: 19:00 to 19:30
Testing direction: East, South, West, North
Cold start positioning time: 60 seconds

Environmental treatment and assembly instructions



Note: 1. This report is based on the actual debugging and testing of the prototype, including environmental treatment, antenna position, and assembly position of various components

Cannot be changed arbitrarily;

2. If there are any changes to the materials used in the prototype, please provide timely feedback to our company for re verification;

3. List of sensitive devices:

TP (material, coating, wiring, etc.)

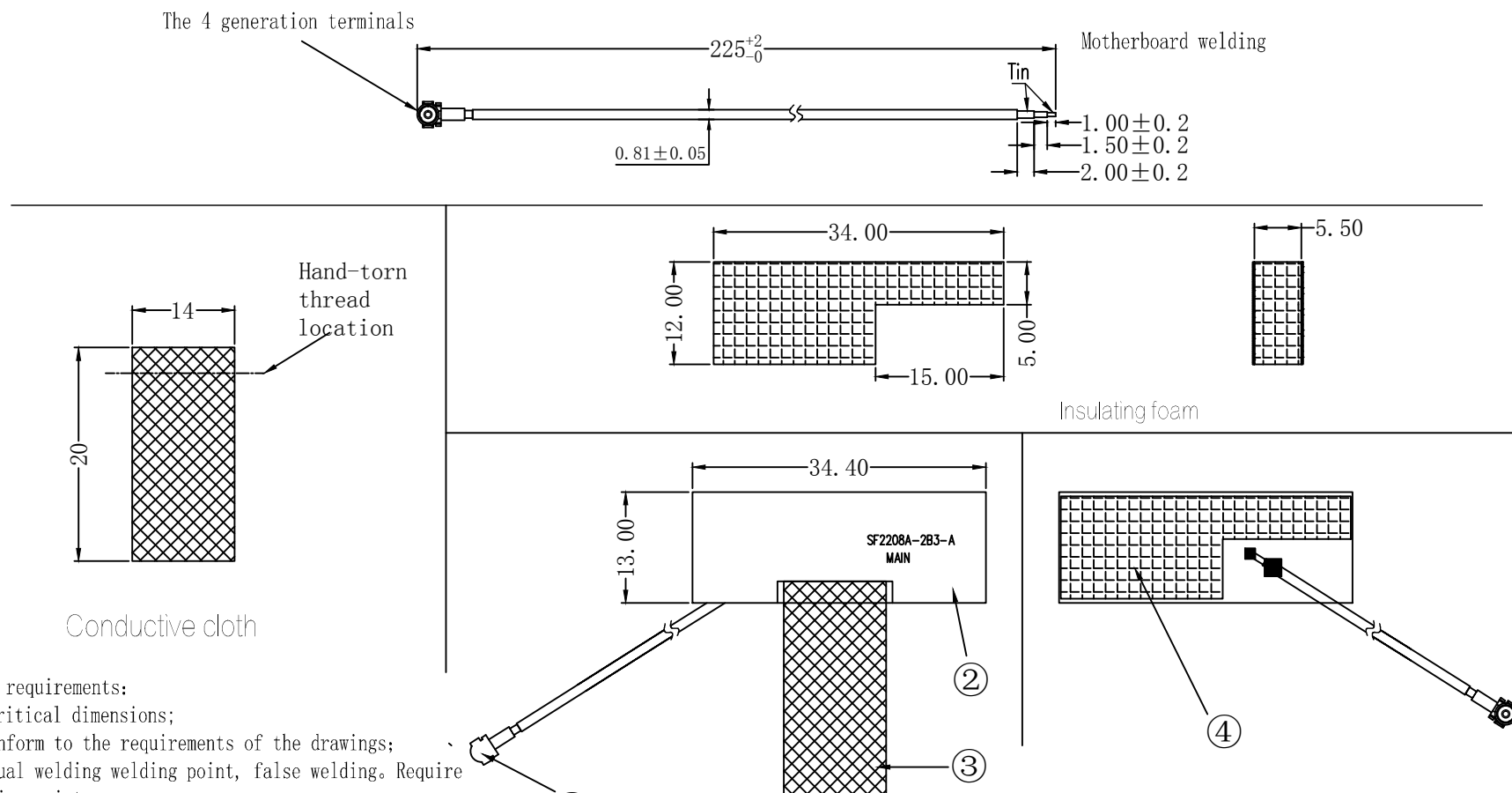
Screen (amplification circuit, LED, ribbon design, etc.)

Shell material (antenna assembly method, structural interference, shell material, antenna position height and area, etc.)

Motherboard (motherboard conduction, RF circuit matching, PA, dual power, filtering, LNA, power circuit, etc.)

Camera, battery, motor, MIC, fingerprint recognition module, etc

4. Due to the small number or only one testing machine, some probabilistic issues cannot be completely identified. It is recommended to conduct small-scale trial production before mass production to identify problem points (such as flashing screens, speaker noise, TP jumping, black screen crash, signal diving, etc.)



technical requirements:

- 1.* for critical dimensions;
- 2.Size conform to the requirements of the drawings;
- 3.No virtual welding welding point, false welding. Require full welding points.
- 4.Network test pass.
- 5.No marked tolerance according toSJ/T 10628 1995 6classes;

①Terminals facing inside

5										
4	Insulating foam	black	1	34*12*5.5mm						
3	Conductive cloth	gray	1	14*20mm						
2	PCB	green	1	SF2208A-2B3-A	RD	YWD	2024.1.25	Q C		
1	coaxial line	black	1	φ=0.81mm	RF					
	name	color	quantity	specifications	audits			approval		

SWARD

ShenZhen SWARD Communication Technology Co.Ltd

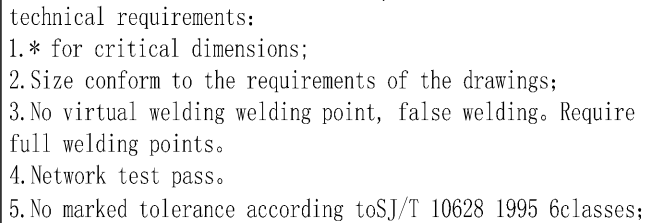
SF2208A-2L24B-225-A

time markup

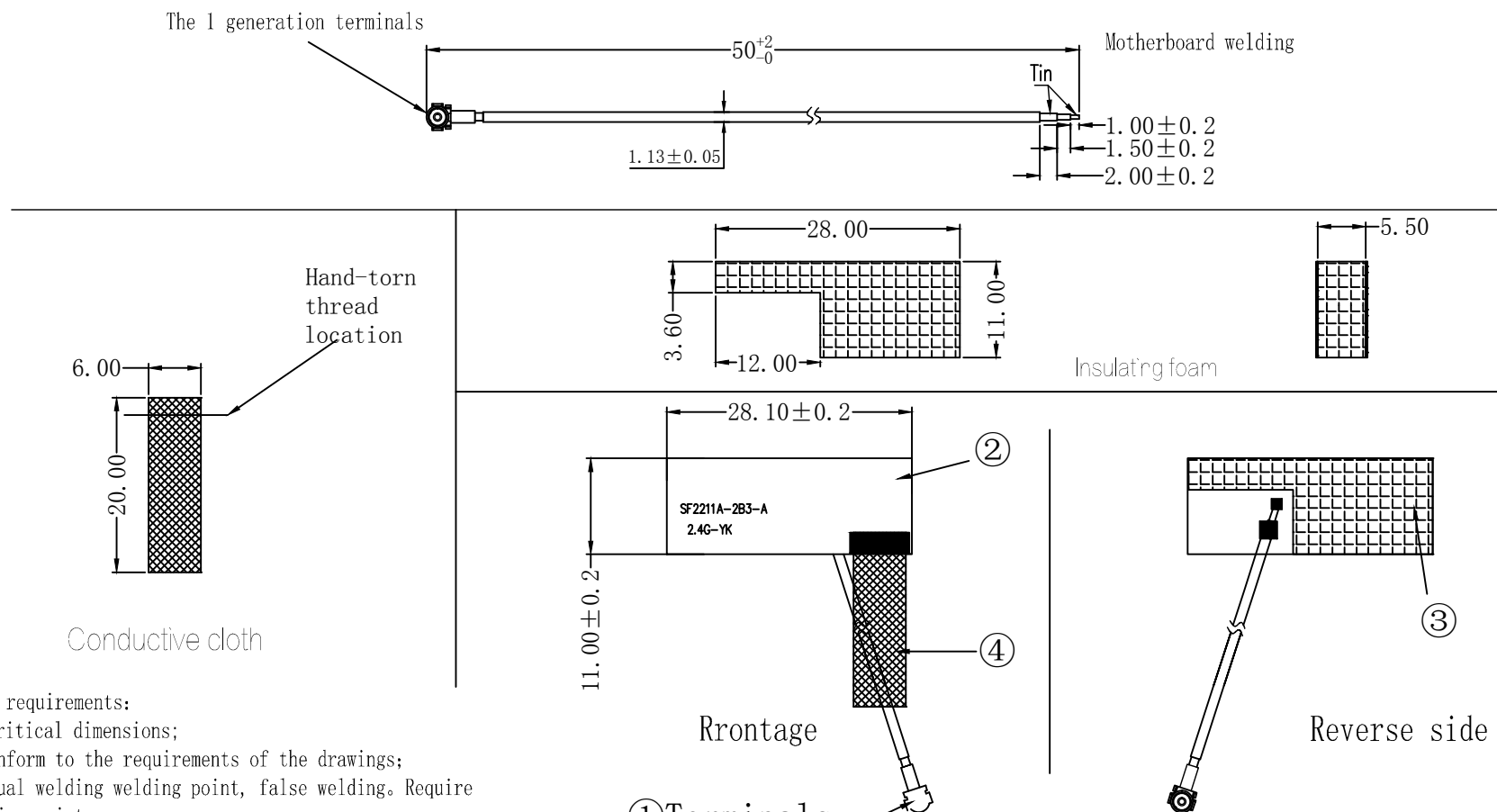
percentage

1 A 1 : 1

ROHS



SWD-FM-RD-012 A. 0/2019.12



technical requirements:

- 1.* for critical dimensions;
- 2.Size conform to the requirements of the drawings;
- 3.No virtual welding welding point, false welding. Require full welding points.
- 4.Network test pass.
- 5.No marked tolerance according toSJ/T 10628 1995 6classes;

5										
4	Insulating foam	black	1	28*11*5.5mm						
3	Conductive cloth	gray	1	6*20mm	signatures	date	mass	signatures	date	
2	PCB	green	1	SF2208A-2B3-A						
1	coaxial line	black	1	$\phi=1.13$ mm	RF					
	name	color	quantity	specifications	audits		approval			

SWARD

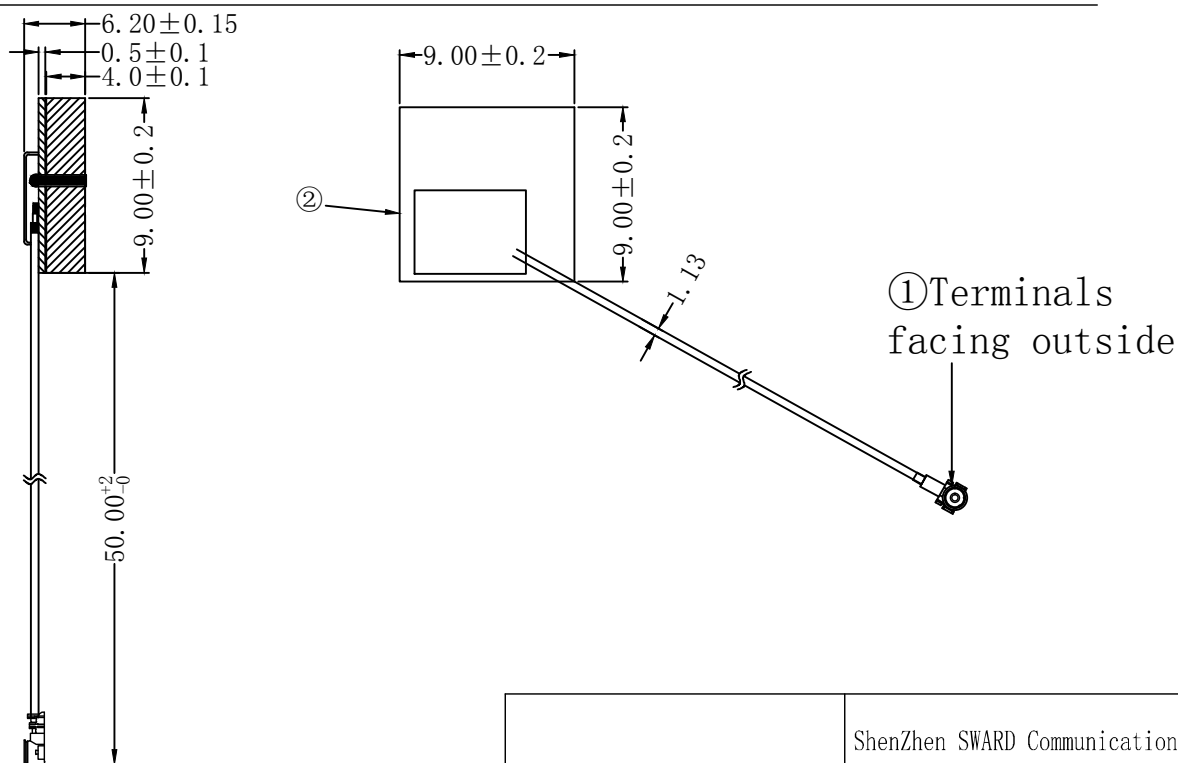
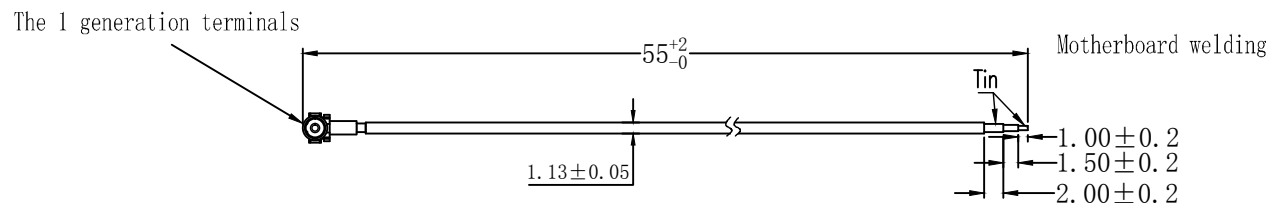
ShenZhen SWARD Communication Technology Co.Ltd

SF2211A-2R11B-050-A

time markup percentage

1 A 1 : 1

ROHS

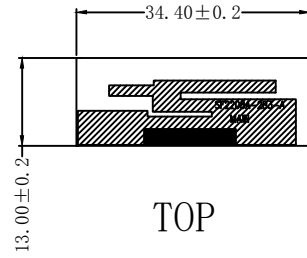


technical requirements:

- 1.* for critical dimensions;
- 2.Size conform to the requirements of the drawings;
- 3.No virtual welding welding point, false welding. Require full welding points.
- 4.Network test pass.
- 5.No marked tolerance according toSJ/T 10628 1995 6classes;

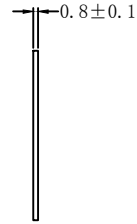
5											SWARD					Technology Co., Ltd			
4																SS934Z-6R11B-050-A			
3					signatures	date	mass	signatures	date	time markup				percentage	ROHS				
2	Ceramic antenna	black	1	SS934Z-6B2-A						RD	YWD	2024. 1. 25	Q C						
1	Cable	black	1	Ø=1.13mm						RF						1			A
	name	color	quantity	specifications	audits				approval										

PCB Layout

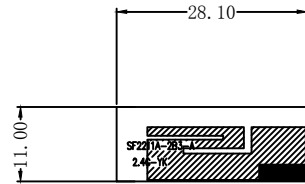


TOP

Main Antenna

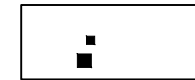
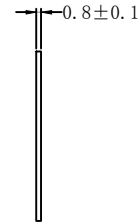


BOTTOM

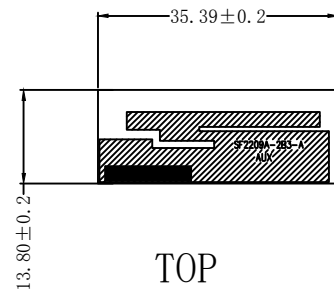


TOP

2.4G Antenna

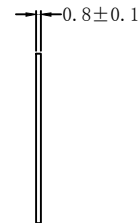


BOTTOM



TOP

Aux Antenna



BOTTOM