

Antenna Test Report

For

Project IM-530

Version: V1

Customer	Unicair	Project	IM-530
Band	WCDMA:B1/B6 LTE:B1/2/3/4/5/8/12/13/18/19/26/28 GPS/WIFI 2.4G	Color	
Issued by	FJH	Checked by	
Confirmed by		Date	2024.05.30

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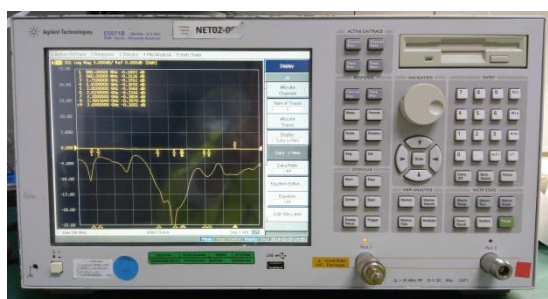
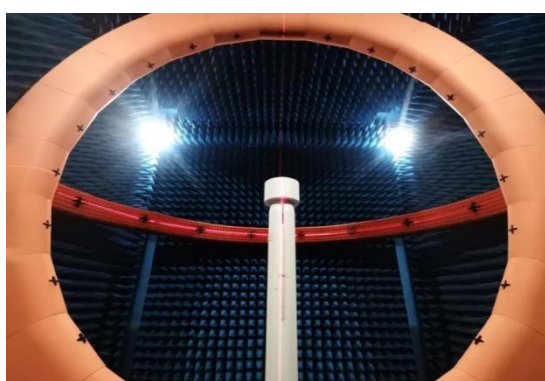
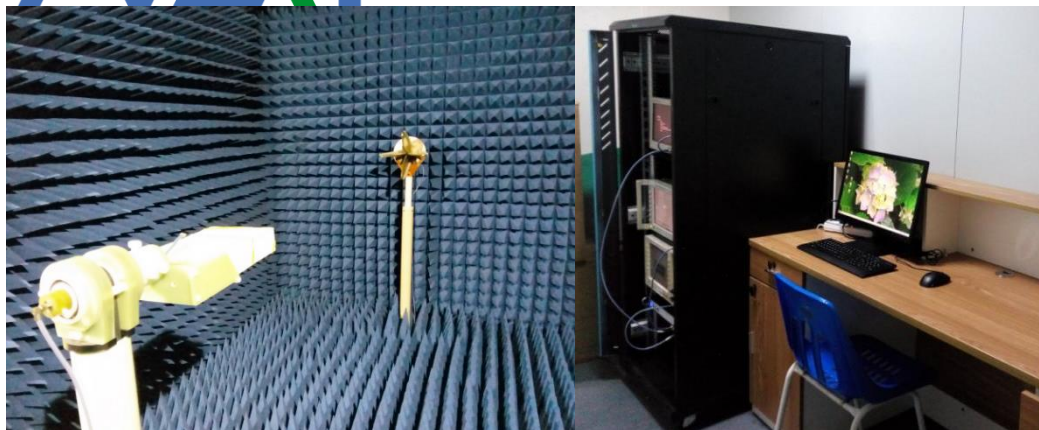


1. Test Instrumentation and item

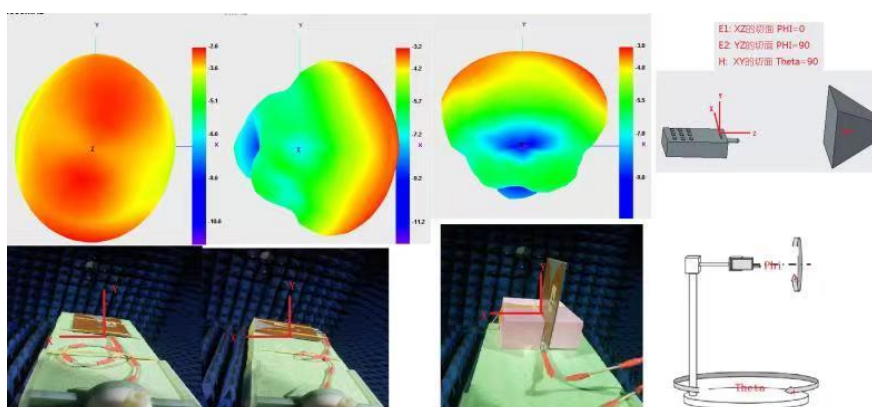
(Class)	(Test item)	(Equipment)
1. S parameter	1. (RL) 2. (VSWR) 3. (Smith chart)	(VNA) : Agilent E5071B R&S ZVB8 Protek A333
2. (Coupling testing)	1. (MAX Power) 2. (MIN Sens)	1.2G/3G Tester: Agilent 8960 2.The coupling box: TESCOM TC-5060A 3. 3D Chamber: ETS 3D Chamber (5x3x3)
3. (Passive Test)	1. (Efficiency) 2. (Gain) 3. (radiation pattern)	1. 3D Chamber: TEM24 3D Chamber (5x5x5) ETS 3D Chamber (5x3x3) 2. (VNA) : Agilent E5071B R&S ZVB8
4. (Active Test)	1. (TRP) 2. (TIS) 3. (Throughput rate)	1. 3D Chamber: TEM24 3D Chamber (5x5x5) ETS 3D Chamber (5x3x3) 2.2G/3G Tester: Agilent 8960 3.4G Tester: MT8820C/CMW500 4.WIFI/BT/NB-iot Tester: CMW500 5. 5G Tester: SP9500-CTS 6.Head: HEAD-P10 (FACE-P10)



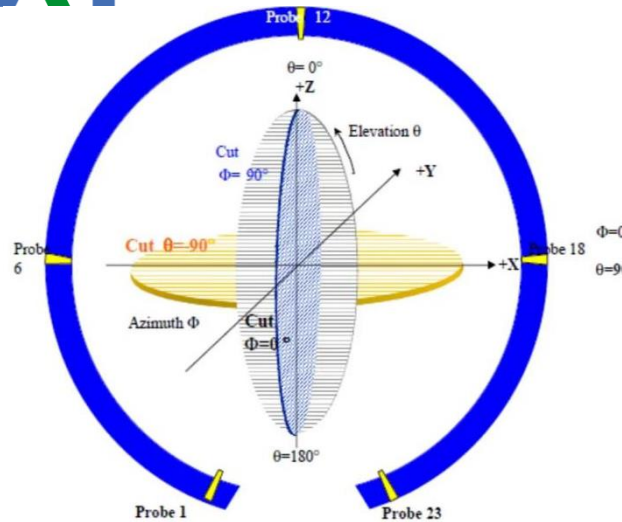
深圳市国质信网络通讯有限公司
ShenZhen NQI network communication ltd



2. Chamber coordinate axis



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2-1. Testing personnel: Wang Wenlong

Reviewers: Feng Jiahong

Testing site: National Quality and Information Technology Laboratory

3. Definitions

VSWR: Voltage Standing Wave Rate

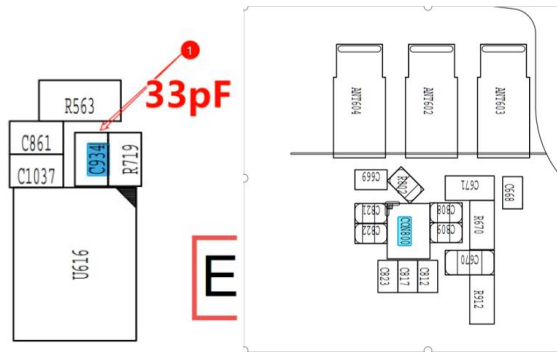
RL: Return loss

TRP: total radiated power

TIS: total isotropic sensitivity



4. Matching Circuit Description



C671	10NH
R670	0Ω
C670	0.5pF
R912	2NH
C668	0Ω
C669	NC
R802	0Ω
C821	0Ω
C822	3.3nh
C808	27nh
C934	33pF

(Diversity/three in one antenna matched according to the original motherboard)

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5. antenna switch

RF1: WCDMA: B1 LTE: B1/B2/B3/B4/B8

RF2: WCDMA: B6 LTE: B5/B13/B18/B19/B26

RF3: LTE: B12/B28

6. Antenna testing steps

1. Prepare testing equipment: Testing antennas requires the use of appropriate testing equipment, such as test turntables, antenna testers, power meters, etc.
2. Determine the test object: Determine the antenna type and testing frequency range to be tested.
3. Preparation before testing: Before testing, it is necessary to calibrate and calibrate the antenna, such as calibrating the testing equipment, adjusting the testing position, preheating the equipment, etc.
4. Conduct testing: Test according to the testing process and record the test data
5. Data analysis: Analyze test data to extract useful information such as VSWR, power, gain, frequency response, etc.
6. returns: Organize test results into reports for product quality control and improvement



7. Types of Antennas

PIFA

8. TRP&TIS

8.1.LTE

NQI ANT TRP&TIS parameter Summary of						
BAND	LTE-B1 (10M)			LTE-B2 (10M)		
CHANNEL	18050	18300	18550	18650	18900	19150
TRP (dBm)	20.98	20.63	20.33	20.48	20.22	19.96
TIS (dBm)	-98.72	-98.39	-98.23	-97.69	-97.63	-97.73
BAND	LTE-B3 (10M)			LTE-B4 (10M)		
CHANNEL	19250	19575	19900	20000	20175	20350
TRP (dBm)	20.11	20.12	20.25	19.12	19.29	19.39
TIS (dBm)	-96.37	-96.26	-95.5	-98.38	-98.16	-97.52
BAND	LTE-B3 (20M)					
CHANNEL	19300	19575	19850			
TRP (dBm)	20.04	20.12	20.16			
TIS (dBm)	-92.92	-92.87	-92.64			
BAND	LTE-B5 (10M)			LTE-B8 (10M)		
CHANNEL	20450	20525	20600	21500	21625	21750
TRP (dBm)	19.79	19.72	19.72	20.08	19.76	19.12
TIS (dBm)	-94.52	-94.31	-94.06	-96.61	-96.53	-96.12
BAND	LTE-B12 (10M)			LTE-B13 (10M)		
CHANNEL	23060	23095	23130		23230	
TRP (dBm)	18.43	18.31	18.23		18.43	
TIS (dBm)	-93.93	-93.61	-93.52		-93.36	
BAND	LTE-B18 (10M)			LTE-B19 (10M)		
CHANNEL	23900	23925	23950	24050	24075	24100
TRP (dBm)	18.55	18.52	18.46	19.39	19.26	19.12
TIS (dBm)	-93.69	-93.64	-93.53	-94.71	-94.65	-94.63
BAND	LTE-B26 (10M)			LTE-B28 (10M)		
CHANNEL	26740	26865	26990	27260	27435	27610
TRP (dBm)	19.64	19.36	19.16	18.12	18.21	18.34
TIS (dBm)	-94.96	-94.73	-94.02	-93.52	-94.02	-93.79
BAND	WCDMA B1			WCDMA B6		
CHANNEL	9612	9750	9888	4162	4175	4188
TRP (dBm)	20.52	20.56	20.59	18.98	19.08	19.13
TIS (dBm)	-109.72	-109.33	-109.16	-109.06	-108.83	-108.67

NQI ANT TRP&TIS parameter Summary of			
BAND	WIFI_B (11M)		
CHANNEL	1	6	11
TRP (dBm)	13.43	12.0	14.1
TIS (dBm)	-84.47	-81.43	-84.32
BAND	WIFI_G (54M)		
CHANNEL	1	6	11
TRP (dBm)	10.52	10.32	11.13
TIS (dBm)	-68.35	-66.17	-70.5
BAND	WIFI_N (65M)		
CHANNEL	1	6	11
TRP (dBm)	10.57	10.26	11.39
TIS (dBm)	-65.02	-62.03	-64.12

8.3.GPS

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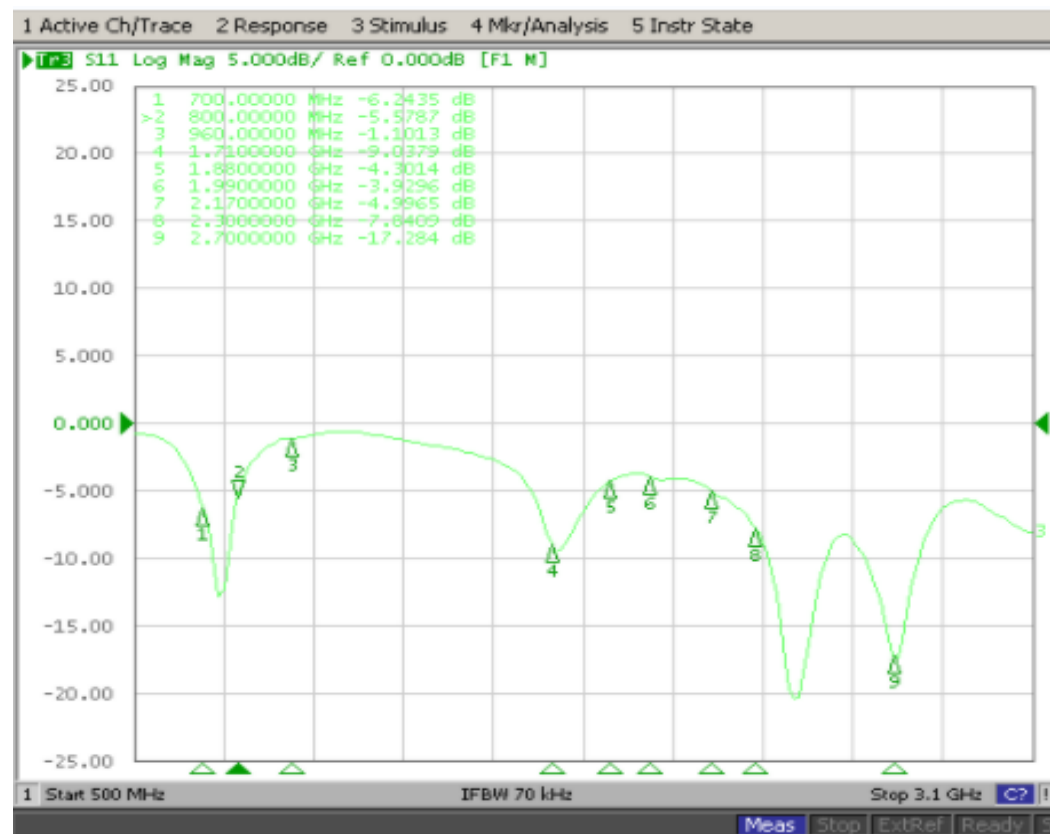
9.Passive Test

9.1. frequency range

Main antenna: 700MHZ-960MHZ
1700MHZ-2200MHZ
Diversity antenna: 1700MHZ-2200MHZ
Three in one antenna: 1500MHZ-1600MHZ
2400MHZ-2500MHZ

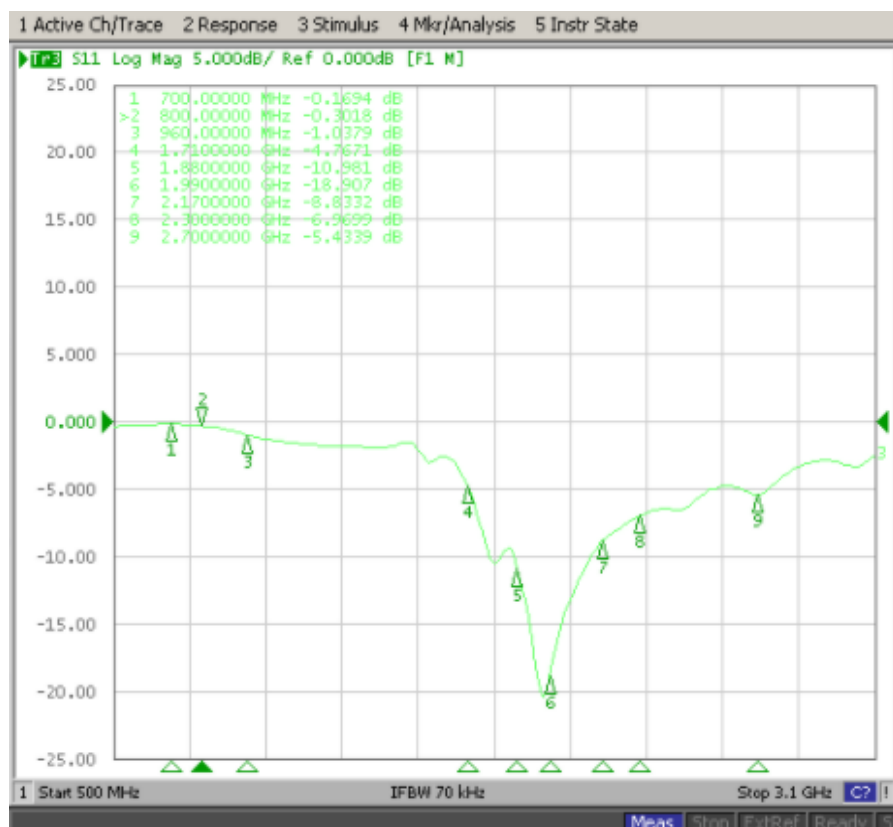
9.2. RL/VSWR

Main antenna



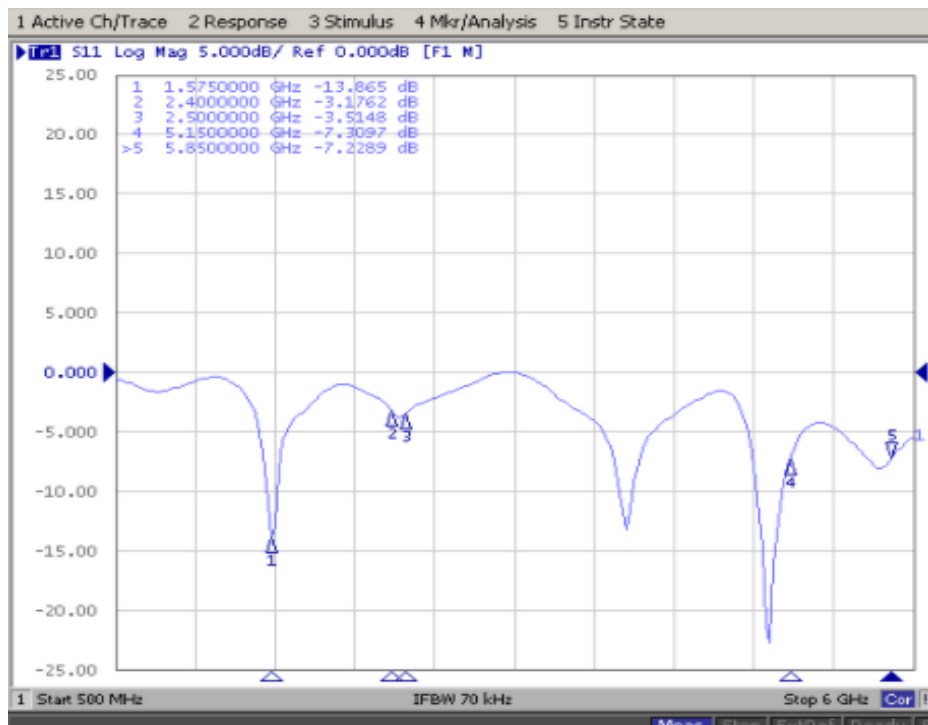


Diversity antenna



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Three in one antenna



9.3.Effeciency、 Gain、 Radiation pattern

Main antenna

Freq (MHz)	Effi (%)	Gain (dBi)
700	20.38	-4.52
720	21.98	-2.65
740	24.83	-2.26
760	30.34	-0.46
780	32.58	2.84
800	29.92	3.48

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Freq (MHz)	Effi (%)	Gain (dBi)
820	23.93	1.67
840	37.41	3.16
860	50.12	4.49
880	54.95	5.13
900	45.19	3.81
920	33.34	1.81
940	26.3	0.9
960	20.46	-0.55
1710	41.4	4.12
1730	49.32	4.85
1750	50.23	4.11
1770	48.75	3.86
1790	49.89	4.7
1810	48.31	4.75
1830	47.97	4.25
1850	46.88	3.91
1870	45.39	3.8
1890	42.17	3.25

Freq (MHz)	Effi (%)	Gain (dBi)
1910	41.4	2.79
1930	43.15	3
1950	45.39	3.46
1970	44.16	3.29
1990	42.17	3.19
2010	42.27	3.23
2030	43.65	3.15
2050	45.19	3.61
2070	41.98	3.59
2090	42.85	3.66
2110	45.81	4.46
2130	43.95	4.22
2150	44.67	4.61
2170	42.95	4.62
2190	44.26	5.17
2210	47.86	5.3
2230	51.17	5.26
2250	49.66	5.3
2270	47.86	5.44



Diversity antenna

Freq (MHz)	Effi (%)	Gain (dBi)
1700	24.15	-0.53
1720	26.61	-0.09
1740	29.38	0.99
1760	29.72	1.26
1780	32.73	2.5
1800	35.48	3.15
1820	31.12	2.76
1840	30.55	2.7
1860	31.84	3.01
1880	37.76	3.07
1900	42.56	2.13
1920	44.87	1.94
1940	50.23	2.8
1960	54.83	3.11
1980	58.88	3
2000	60.26	2.41
2020	60.81	2.75
2040	61.24	2.97

Freq (MHz)	Effi (%)	Gain (dBi)
2060	55.72	2.39
2080	59.43	2.58
2100	59.7	2.99
2120	58.61	3.08
2140	54.83	2.58
2160	51.05	2.09
2180	47.64	2.07
2200	42.95	2.34
2220	45.71	3.34
2240	43.75	2.99
2260	43.55	3
2280	41.3	3.1
2300	39.72	3.24



Three in one antenna

Freq (MHz)	Effi (%)	Gain (dBi)
1570	43.75	2.24
1580	47.75	2.84
2400	27.54	0.03
2410	26.92	0.23
2420	27.54	-0.03
2430	27.16	0.2
2440	26.3	0
2450	25.93	-0.14
2460	25.23	0.06
2470	24.83	-0.2
2480	23.41	-0.48
2490	23.24	-1.18
2500	22.71	-1.7

Freq (MHz)	Effi (%)	Gain (dBi)
5150	37.24	4.43
5180	35.4	4.7
5210	33.04	4.34
5240	33.57	4.63
5270	31.92	4.69
5300	29.99	4.42
5330	29.04	4.29
5360	27.1	4.11
5390	27.04	3.68
5420	31.33	4.58
5450	30.48	4.08
5480	34.59	4.5
5510	34.83	4.36
5540	35.65	3.96
5570	39.26	4.41
5600	39.72	4.5
5630	45.39	4.33
5660	42.76	4.04
5690	44.26	4.31
5720	40.09	3.5
5750	33.96	2.77
5780	30.34	1.98
5810	27.86	0.77
5840	25.7	-0.19
5870	24.32	0.57



10 . Antenna appearance/size

10.1. Main antenna

1

2

3

4

5

6

■ ROHS □ REACH □ 无

hite silk screen characters

Technical requirements:

1. The marked * is a mandatory and key dimension for measurement. The tolerance of all dimensions of the copper foil circuit shall not exceed ± 0.05, and the tolerance of the external dimensions punched out by the mold shall not exceed ± 0.2. The unmarked dimensions shall be subject to the drawing.

2. Substrate 13 μ m. Copper Pool 18 μ m. Gold plated 1U. The surface of the wiring surface is matte black except for the golden fingers.

3. Reliability test: salt water spray test (24H) rubber friction test alcohol resistance test constant temperature and humidity test cold and hot shock test flexure test at gold finger pin.

4. Release film shipping method.

Δ					
Δ					
Δ					
mark	change date	change order number	Changed by	notes	
1			2	3	4

0-10

±0.05

○

0.02

10-18

±0.06

◎

0.03

18-30

±0.08

⊥

0.02

30-40

±0.09

▽

0.04

40-

±0.10

Angle

±0.5°

Item name

IM530G

Product Name

LM

Date

2024.5.20

Part number

NQI-IM530G-LM-FB-V1

Special process

PI+Cu

Document number

016-07-01

examining

to

MD

XMH

RF

FJH

NXG

version

V1

Unmarked tolerance standards

item name

IM530G

Product Name

LM

Date

2024.5.20

Part number

NQI-IM530G-LM-FB-V1

Special process

PI+Cu

Document number

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examining

to

MD

XMH

RF

FJH

NXG

version

V1

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深圳市国质信网络通讯有限公司

First perspective

unit

mm

scale

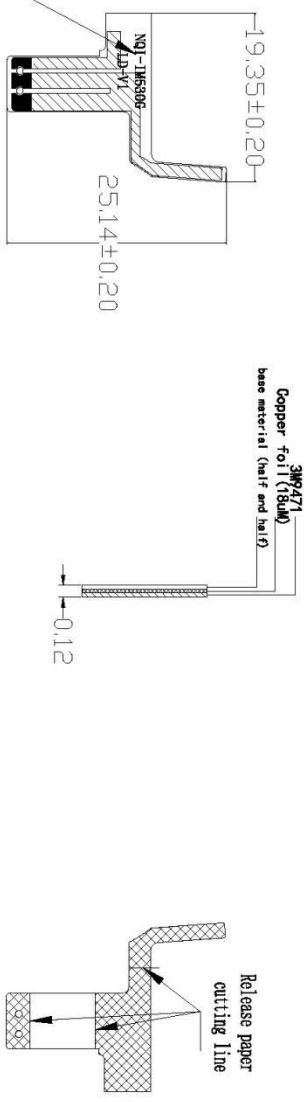
Fit

version

V1



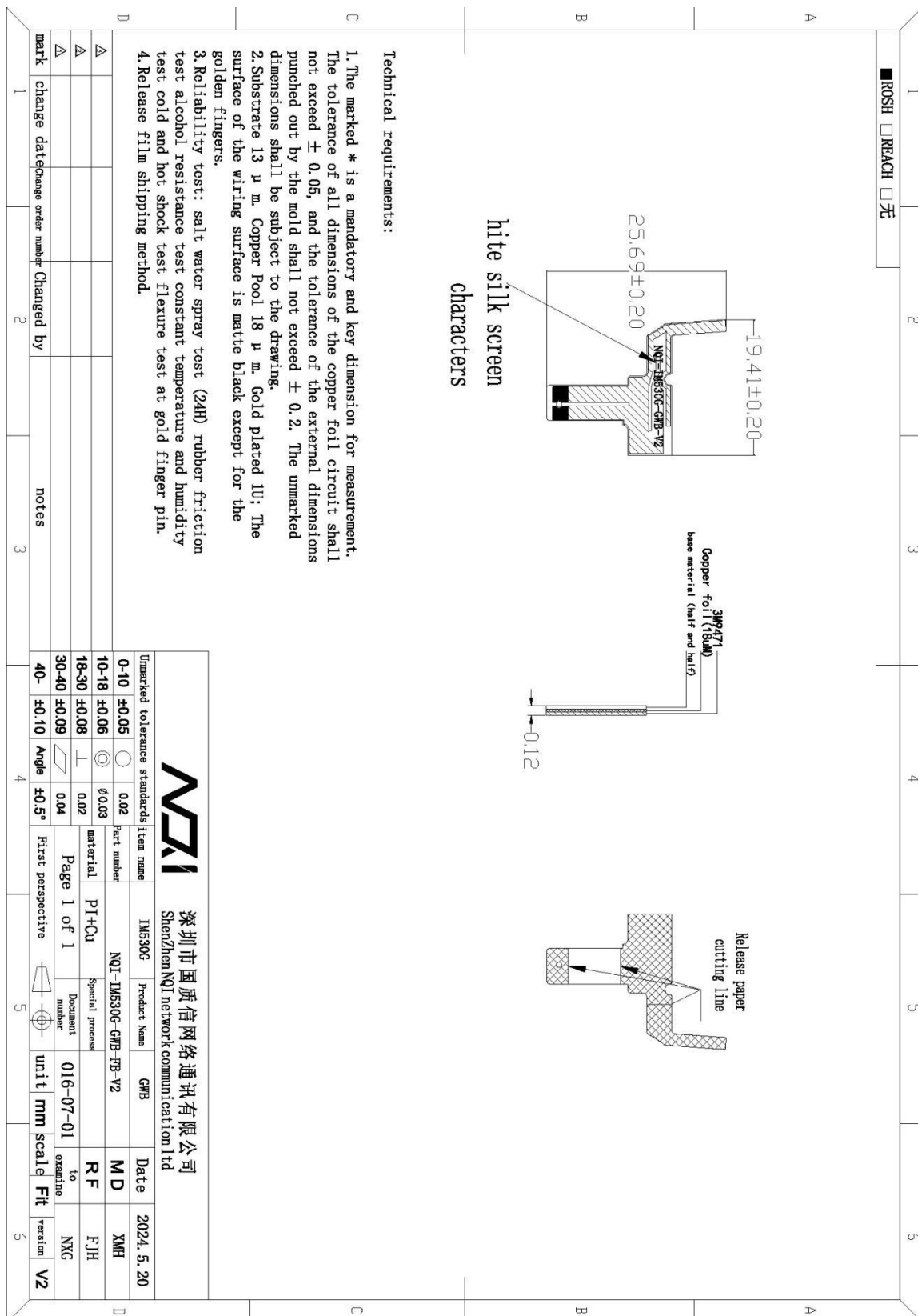
10.2. Diversity antenna

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Unmarked tolerance standards <table><tr><td>0-10</td><td>±0.05</td><td>○</td><td>0.02</td><td>Part number</td><td>IM5306</td><td>Product Name</td><td>LD</td><td>Date</td><td>2024.5.20</td></tr><tr><td>10-18</td><td>±0.06</td><td>◎</td><td>φ0.03</td><td>material</td><td>PI+Cu</td><td>Special process</td><td>NQI-IM5306-LD-FB-V1</td><td>MD</td><td>XMH</td></tr><tr><td>18-30</td><td>±0.08</td><td>┘</td><td>0.02</td><td>Page 1 of 1</td><td></td><td>Document number</td><td>016-07-01</td><td>R F</td><td>FJH</td></tr><tr><td>30-40</td><td>±0.09</td><td>▱</td><td>0.04</td><td>First perspective</td><td></td><td>unit</td><td>mm</td><td>to examine</td><td>NXG</td></tr><tr><td>40-</td><td>±0.10</td><td>Angle</td><td>±0.5°</td><td></td><td></td><td>mm</td><td>scale</td><td>Fit</td><td>version</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>V1</td></tr></table> Nqi 深圳市国质信网络通讯有限公司 ShenZhen NQI network communication ltd						0-10	±0.05	○	0.02	Part number	IM5306	Product Name	LD	Date	2024.5.20	10-18	±0.06	◎	φ0.03	material	PI+Cu	Special process	NQI-IM5306-LD-FB-V1	MD	XMH	18-30	±0.08	┘	0.02	Page 1 of 1		Document number	016-07-01	R F	FJH	30-40	±0.09	▱	0.04	First perspective		unit	mm	to examine	NXG	40-	±0.10	Angle	±0.5°			mm	scale	Fit	version										V1
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10.3. Three in one antenna



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