



福州中天迅通信技术有限公司

Fuzhou ZHONGTIANXUN Communication Technology Co., Ltd

项目名称 (Project Name) : DX4000 (LOB) -MAIN

天线型号 (Antenna model) : ZTX-DX4000-LOB-MAIN

A2406

物料编码 (Item number) : F. 00000635

MPN 码 (MPN) : B0680320D

日期 (Date) : 2023-8-1

设计公司: 福州中天迅通信技术有限公司

Design company: Fuzhou zhongtianxxun communication technology Co., Ltd

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Tester: Enyuan xie

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版本 version	日期 date	状态 status
A1	2022-8-23	规格书制定。 First issue.
A2	2022-12-1	FPC 外形, 线路更新; 丝印第一行去掉 “-ANT” 离型纸及背胶更新, 同轴线中剥位置更新。 Performance optimization; FPC appearance, circuit update; Remove the first line of silk screen. "-ANT" release paper and adhesive are updated, and the stripping position of coaxial line is updated.
A3	2023-4-13	性能优化; FPC 线路更新。 Performance optimization; FPC line update.
A4	2023-8-1	FPC 背面改用黄色离型纸。 The FPC is switched to yellow off-profile paper.



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1 名词解释 (Explanation of Nouns)

dB _i	Decibel relative isotropic antenna
Tx	Transmit frequency
Rx	Receive frequency
TRP	Total Radiated Power
TIS	Total Isotropic Sensitivity
VSWR	Voltage Standing Wave Ratio
GSM	Global Service for Mobile communication
DCS	Digital Communication System
CDMA	Code Division Multiple Access
WCDMA	Wideband Code Division Multiple Access

2 测试设备 (Test equipment)

矢量网络分析仪 (Vector network analyzer)

安捷伦 8753E (Agilent 8753E)

频谱分析仪 (Frequency analyzer)

综合测试仪 (General-purpose tester)

安捷伦 8960 E5515C

标准高性能无反射屏蔽暗室 (High performance no-reflection shielding darkroom)

ETS

8m*4m*4m

3 适用频段 (Applied frequency band)

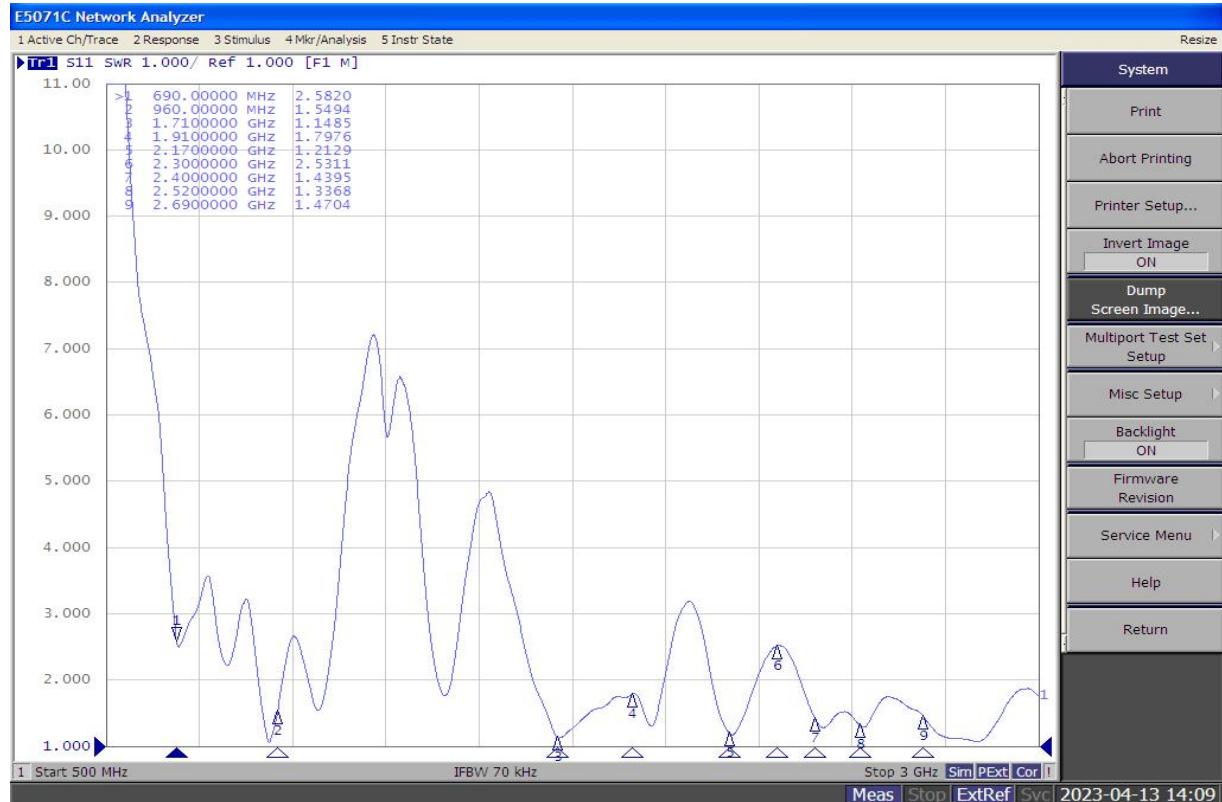
频段 Frequency Band	频率 Frequency
MAIN	690–960MHz; 1710–2690MHz。





4. 测试指标和数据图表 (Test project)

4. 1 驻波图 (VSWR)





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4.2 无源效率 (Antenna passive test)

chNo	Freq (MHz)	Gain (dBi)	Efficiency_Pcent (%)	chNo	Freq(MHz)	Gain (dBi)	Efficiency_Pcent (%)
1	690	-4.690281293	21.71137156	16	840	-1.512014938	33.1900297
2	700	-4.541821437	22.29137644	17	850	-1.13540131	34.5740155
3	710	-4.108761787	21.52947011	18	860	-0.84397277	36.17545611
4	720	-3.946192154	20.37268848	19	870	-1.143352505	35.4761065
5	730	-3.719765794	18.09023862	20	880	-1.234029433	35.04428066
6	740	-3.060076957	19.6328607	21	890	-0.194234757	40.23783482
7	750	-3.012772436	20.27591507	22	900	0.294739607	41.1827748
8	760	-3.541878691	18.71818284	23	910	0.143359951	35.91219228
9	770	-3.708447952	20.05057036	24	920	0.128080636	31.67794822
10	780	-3.184164038	20.21414656	25	930	0.534023664	32.47343804
11	790	-3.213609525	19.22687908	26	940	-0.037988831	34.08348607
12	800	-3.111262315	21.24668438	27	950	-0.200556844	34.54870729
13	810	-3.236949464	23.8577746	28	960	-0.059120218	33.72965595
14	820	-2.326326306	26.83690939	29	1710	1.808431912	47.07275646
15	830	-2.006338691	29.83357634	30	1730	1.288342754	44.95890344



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chNo	Freq(MHz)	Gain (dBi)	Efficiency_Pcent (%)	chNo	Freq (MHz)	Gain (dBi)	Efficiency_Pcent (%)
31	1750	1.194841286	45.19788829	46	2050	0.452893951	30.9638913
32	1770	0.969652326	41.75024713	47	2070	0.578084152	27.46794916
33	1790	0.35011776	36.74530226	48	2090	0.432225619	27.41280588
34	1810	0.267647078	35.82152178	49	2110	0.749363877	30.0998146
35	1830	-0.043475112	36.60907304	50	2130	1.013010092	35.99286402
36	1850	-0.054691877	31.68470838	51	2150	1.319467455	40.91774805
37	1870	-0.162372959	31.33158305	52	2170	1.782083251	43.31853161
38	1890	-0.160185585	33.73318203	53	2300	0.073035153	31.09960231
39	1910	0.450308356	32.61290411	54	2320	0.358372531	31.99455393
40	1930	0.96764863	35.78198118	55	2340	0.579607019	32.70009327
41	1950	1.290514644	41.57110004	56	2360	1.340723431	35.70210422
42	1970	1.750581503	45.50343667	57	2380	2.00860285	38.92989408
43	1990	1.651376926	44.63771088	58	2400	2.673488129	42.92768622
44	2010	0.660182413	36.90365778	59	2500	2.654592624	41.7512665
45	2030	0.883526646	34.39417472	60	2520	2.220396952	39.64337672

chNo	Freq (MHz)	Gain (dBi)	Efficiency_Pcent (%)	chNo	Freq(MHz)	Gain (dBi)	Efficiency_Pcent (%)
61	2540	1.134728644	34.05605132	66	2640	0.038591757	29.42135129
62	2560	-0.040135238	31.34923198	67	2660	0.989238107	34.64140894
63	2580	-0.653948778	28.42218927	68	2680	0.885175831	36.91469772
64	2600	-0.859810394	26.69661097	69	2690	0.93986192	38.75768651
65	2620	-0.85668189	25.81078453				



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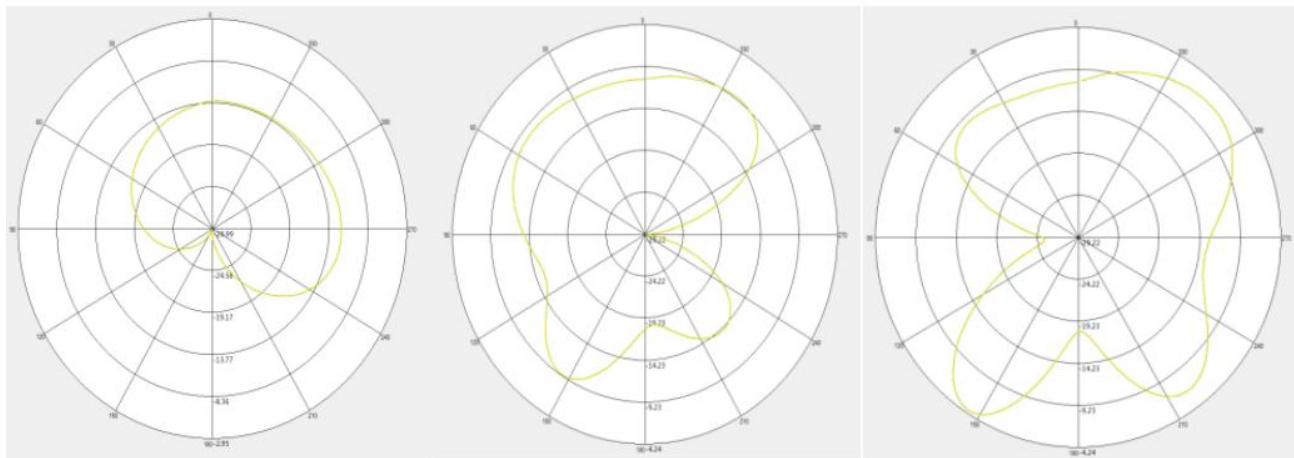
4.3 2D 方向图 (2D direction diagram)

800MHz

XOY

XOZ

YOZ

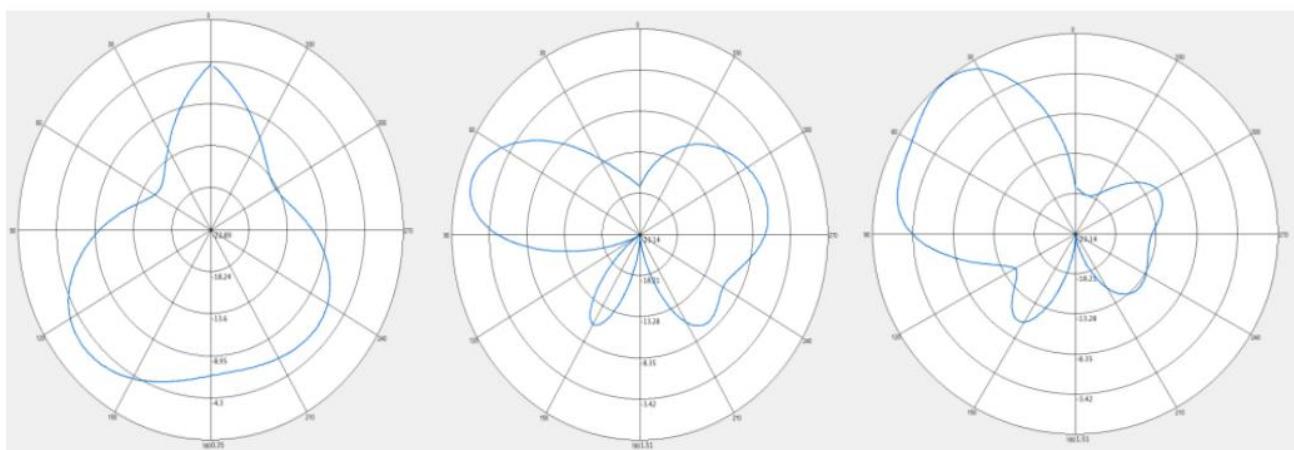


1910MHz

XOY

XOZ

YOZ



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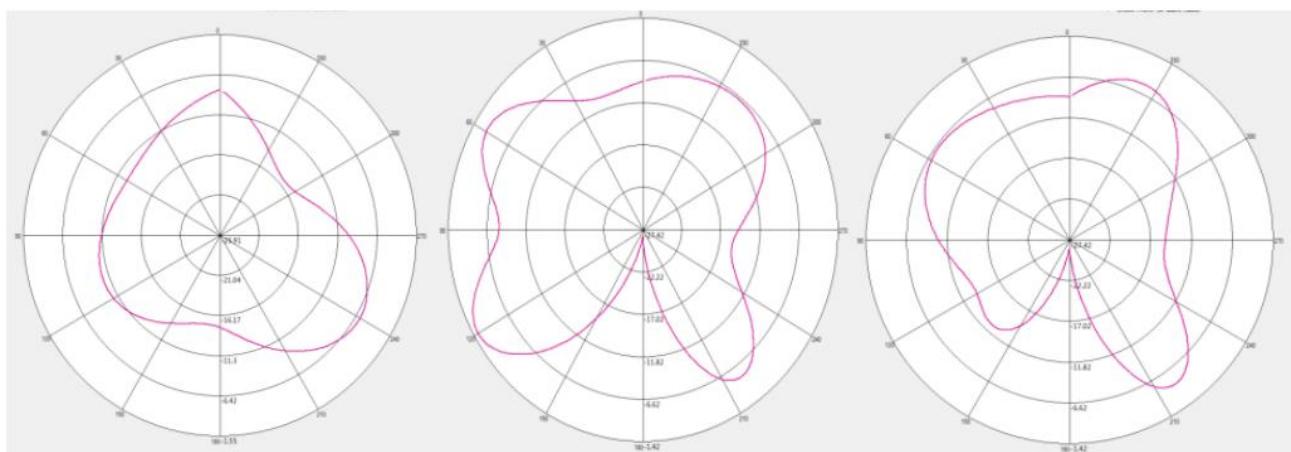
Fuzhou ZHONGTIANXUN Communication Technology Co., Ltd

2500MHz

XOY

XOZ

YOZ



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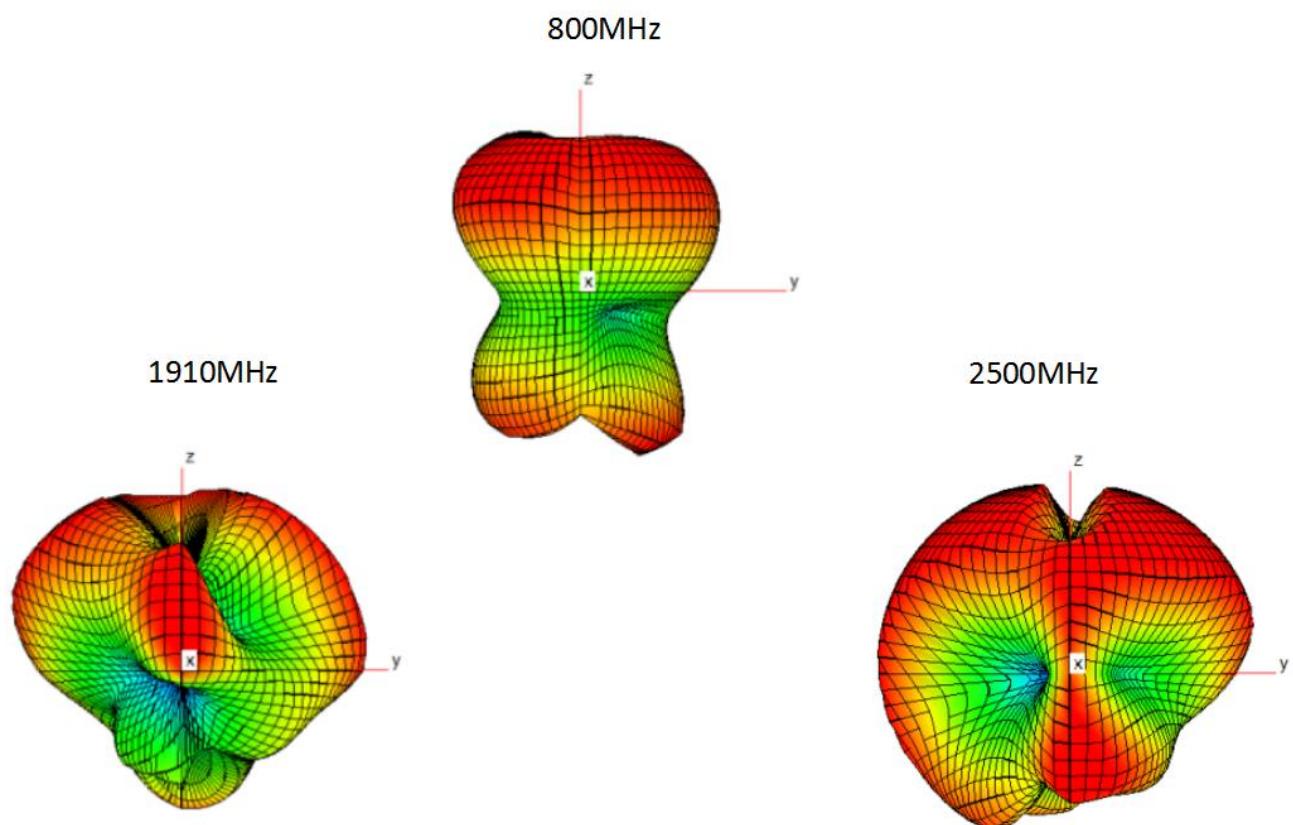
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4.4 3D 方向图 (3D direction diagram)



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4.5 有源数据 (Active test data)

WU 模块/WU module

Frequency band	argument\channel	128	190	251
GSM850	TRP	27.04	26.22	26.09
	TIS	-103.75	-103.84	-102.95
Frequency band	argument\channel	1	62	124
GSM900	TRP	26.61	27.37	27.1
	TIS	-103.01	-103.41	-100.79
Frequency band	argument\channel	512	698	885
DCS1800	TRP	23.85	24.57	24.01
	TIS	-103.22	-103.07	-101.73
Frequency band	argument\channel	512	661	810
PCS1900	TRP	26.51	26.21	26.32
	TIS	-101.12	-105.03	-101.47
Frequency band	argument\channel	10562	10700	10838
W1	TRP	16.78	16.66	16.56
	TIS	-107.89	-108.22	-107.67
Frequency band	argument\channel	9662	9800	9938
W2	TRP	17.07	17.01	16.57
	TIS	-107.71	-106.69	-108.01

Frequency band	argument\channel	4357	4408	4458
W5	TRP	17.14	16.97	17.47
	TIS	-103.56	-106.41	-103.74
Frequency band	argument\channel	2937	3013	3088
W8	TRP	19.41	19.95	18.19
	TIS	-105.98	-106.79	-106.44
Frequency band	argument\channel	50	300	550
band1	TRP	17.97	17.99	17.76
	TIS	-95.41	-95.45	-95.01
Frequency band	argument\channel	1250	1575	1900
band3	TRP	17.51	17.72	17.29
	TIS	-94.29	-94.31	-94.42
Frequency band	argument\channel	2450	2525	2600
band5	TRP	17.83	17.78	18.46
	TIS	-91.81	-92.53	-92.12
Frequency band	argument\channel	2850	3100	3350
band7	TRP	16.63	18.55	17.37
	TIS	-90.75	-91.44	-90.13





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Frequency band	argument\channel	3500	3625	3750
band8	TRP	19. 96	20. 54	18. 31
	TIS	-90. 93	-86. 15	-90. 40
Frequency band	argument\channel	2420	2430	2440
band20	TRP	17. 63	18. 60	19. 05
	TIS	-89. 91	-89. 99	-91. 57
Frequency band	argument\channel	9260	9360	9460
band28	TRP	16. 77	17. 44	16. 03
	TIS	-89. 72	-90. 56	-91. 92
Frequency band	argument\channel	37850	38000	38150
band38	TRP	17. 94	18. 05	17. 36
	TIS	-86. 58	-86. 61	-86. 96
Frequency band	argument\channel	38750	39150	39550
band40	TRP	18. 55	19. 11	19. 61
	TIS	-88. 06	-86. 88	-87. 96
Frequency band	argument\channel	40340	40640	41140
band41	TRP	17. 92	17. 82	17. 31
	TIS	-86. 92	-87. 11	-86. 98



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LAR 模块/LAR module

Frequency band	argument\channel	128	190	251
GSM850	TRP	26.82	25.84	27.76
	TIS	-101.08	-101.57	-101.89
GSM900	argument\channel	1	62	124
	TRP	26.03	27.36	27.21
	TIS	-102.31	-103.57	-102.24
Frequency band	argument\channel	512	698	885
DCS1800	TRP	25.22	24.89	24.92
	TIS	-101.28	-103.56	-102.88
Frequency band	argument\channel	512	661	810
PCS1900	TRP	26.38	25.74	26.03
	TIS	-101.74	-105.09	-105.16
Frequency band	argument\channel	10562	10700	10838
W1	TRP	16.22	16.31	16.36
	TIS	-106.79	-106.94	-107.28
Frequency band	argument\channel	9662	9800	9938
W2	TRP	16.05	16.30	15.99
	TIS	-108.96	-109.58	-109.88

Frequency band	argument\channel	1537	1638	1738
W4	TRP	16.69	17.43	16.62
	TIS	-106.67	-107.09	-107.03
Frequency band	argument\channel	4357	4408	4458
W5	TRP	17.22	17.09	17.59
	TIS	-102.41	-101.24	-101.57
Frequency band	argument\channel	2937	3013	3088
W8	TRP	19.61	19.36	18.67
	TIS	-104.18	-104.84	-103.96
Frequency band	argument\channel	50	300	550
band1	TRP	16.69	17.28	17.44
	TIS	-93.88	-95.02	-94.34
Frequency band	argument\channel	650	900	1150
band2	TRP	16.88	16.35	16.22
	TIS	-94.42	-94.84	-95.14
Frequency band	argument\channel	1250	1575	1900
band3	TRP	17.50	17.37	16.89
	TIS	-93.79	-93.64	-93.64





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Frequency band	argument\channel	2000	2175	2350
band4	TRP	17. 44	17. 97	17. 44
	TIS	-93. 42	-94. 27	-94. 22
Frequency band	argument\channel	2450	2525	2600
band5	TRP	18. 02	17. 78	18. 25
	TIS	-90. 35	-90. 02	-91. 02
Frequency band	argument\channel	2850	3100	3350
band7	TRP	16. 63	18. 15	17. 37
	TIS	-93. 33	-93. 46	-92. 36
Frequency band	argument\channel	3500	3625	3750
band8	TRP	19. 2	20. 04	18. 79
	TIS	-89. 37	-90. 25	-90. 27
Frequency band	argument\channel	5035	5095	5155
band12	TRP	15. 63	15. 72	15. 18
	TIS	-87. 85	-88. 08	-89. 14
Frequency band	argument\channel	5780	5790	5800
band17	TRP	14. 96	16. 21	15. 11
	TIS	-85. 12	-85. 36	-87. 92
Frequency band	argument\channel	9260	9360	9460
band28	TRP	16. 71	17. 15	16. 34
	TIS	-86. 09	-87. 19	-88. 53

Frequency band	argument\channel	66486	66786	67086
band66	TRP	17. 53	17. 32	17. 02
	TIS	-92. 41	-93. 32	-92. 68
Frequency band	argument\channel	37850	38000	38150
band38	TRP	17. 37	17. 61	17. 2
	TIS	-89. 74	-89. 52	-89. 33
Frequency band	argument\channel	38750	39150	39550
band40	TRP	16. 98	18. 09	19. 36
	TIS	-87. 86	-87. 18	-89. 72
Frequency band	argument\channel	40340	40640	41140
band41	TRP	17. 36	17. 74	16. 41
	TIS	-88. 60	-88. 81	-88. 33



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4.6 装配图 (Environment treatment)

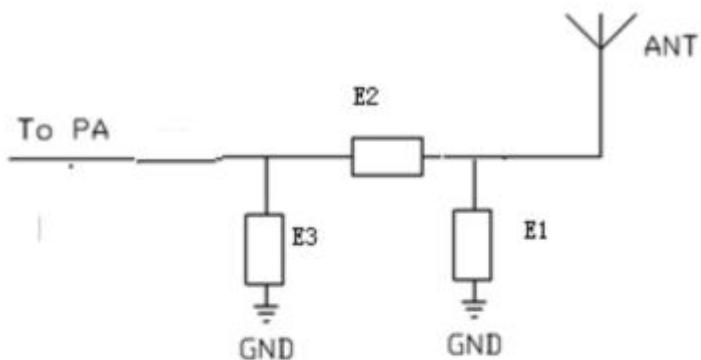


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5. 匹配说明 (Matching circuit)

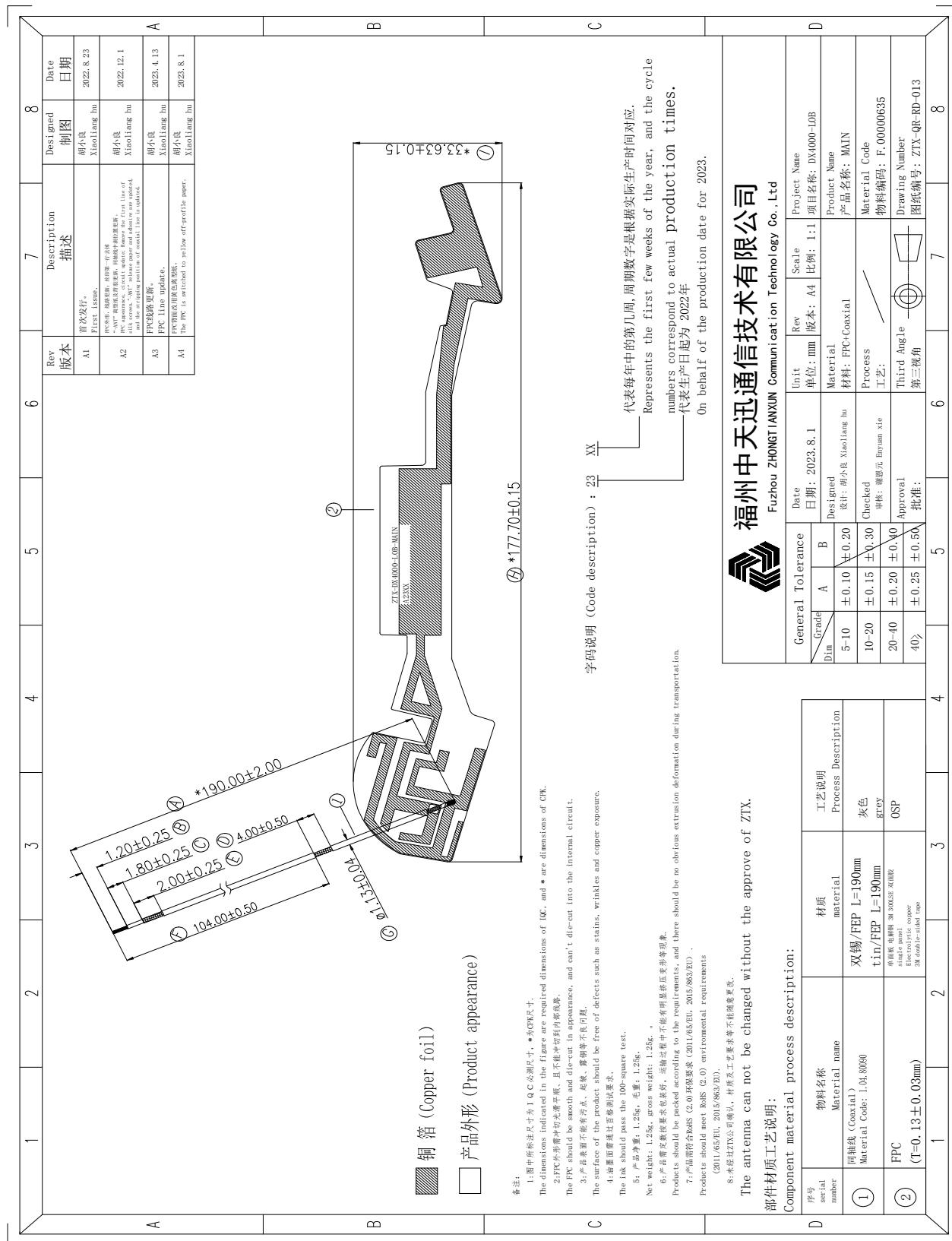


匹配说明 Matching specification	LTE
E1	NC
E2	1. 1nh
E3	1pf





6. 天线外形图 (Mechanical Specification)



1 **2** **3** **4** **5** **6** **7** **8**

A

铜箔 (Copper foil) 产品外形 (Product appearance) 无胶区 (Adhesive-free zone)
 OSB 背胶区域 (Adhesive area)
 离型纸开槽位 (Slotting position of release paper)

B

① 43.22±0.10
 ② 39.60±0.10
 ③ 20.00±0.10
 ④ 16.40±0.10
 ⑤ 19.50±0.10
 ⑥ 9.50±0.10
 ⑦ 17.70±0.15
 ⑧ 0.3mm
 ⑨ 33.63±0.15

C

备注 (Remarks) :

- 图中所标注尺寸为IQC必测尺寸。
- 线路采用丝印工艺。
- The silk printing process is used in circuit.
- 字码采用丝印工艺, 亚光白色。
- The word code adopts silk printing process, matte white.
- 净重: 0.72g, 毛重: 0.72g。
- NW: 0.72G; GW: 0.72G。
- 外形需冲切光滑平顺、且不能冲切到内部线路。
- 产品表面不能有污点、起皱、露铜等不良问题。
- Spots, wrinkling and copper exposed are not accepted.
- 产品需符合RoHS (2.0) environmental protection requirements (2011/65/EU, 2015/863/EU)。
- Products must comply with RoHS (2.0) environmental protection requirements (2011/65/EU, 2015/863/EU)。
- FPC天线成品未经过ZTX公司确认, 材料不能随意更改。
- The antenna can not be changed without the approve of ZTX.

字码说明 (Code description) : 23 XY

D

Grade	General Tolerance	Date	Design	Unit	Rev	Scale	Project Name
Dim	A	B	日期: 2023.8.1	单位: mm	版本: A4	比例: 1:1	项目名称: DX4000-LOB
5-10	±0.10	±0.20	设计: 刘小良	Xiaoliang hu	Material: FPC	Product Name: MAIN	Product Name: MAIN
10-20	±0.15	±0.30	审核: 钱元	Euyuan xie	Process	Material Code	Material Code
20-40	±0.20	±0.50	Approval		Third Angle	E: 03. 00807	E: 03. 00807
40≥	±0.25	±0.50	批准:		第三视角	Drawing Number	Drawing Number

E

Rev	版本	设计	制图	日期
A1	首次发行。	刘小良	刘小良	2022.8.23
A2	IPC更新, 需求书: 1608-17-01-007-“IPC-6012B-007-耐热性管理要求书”。	刘小良	刘小良	2022.12.1
A3	IPC线路更新, “IPC-6012B-007-耐热性管理要求书”中涉及的其他更改。	刘小良	刘小良	2023.4.13
A4	IPC-6012B-007-耐热性管理要求书。	刘小良	刘小良	2023.8.1

F

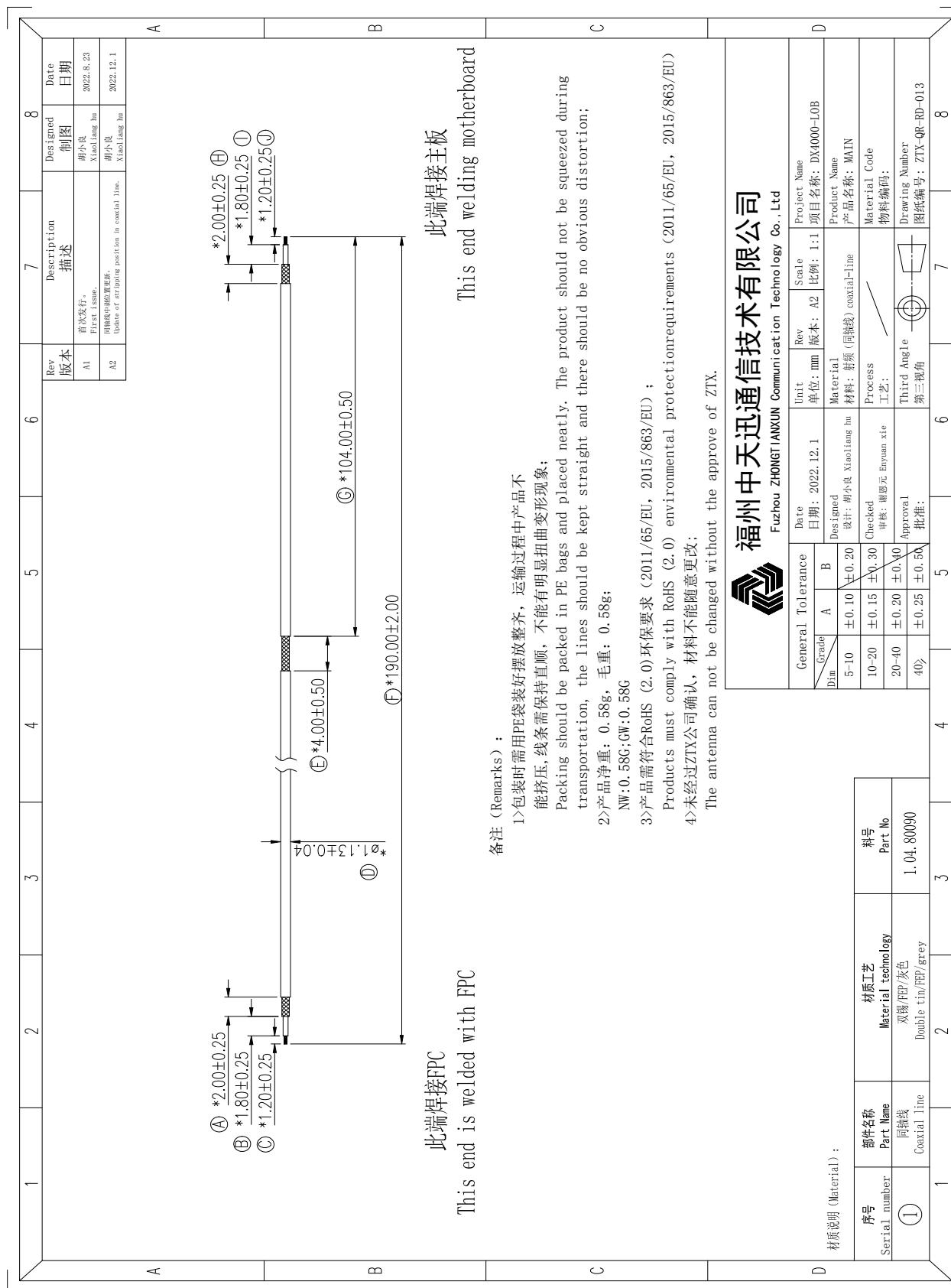
代表每年中的第几周, 周期数字是根据实际生产时间对应。
 Represents the first few weeks of the year, and the cycle numbers correspond to actual production times.
 代表生产日起为 2023年
 On behalf of the production date for 2023.

G

材料明细 (material details)

序号	物料名称	工艺/规格型号
1	铜箔 (copper foil)	厚度: 0.03mm R&B: 30μm 材料: 6000 Model: 6000-001
2	PI层 (PI layer)	厚度: 0.05mm R&B: 50μm 材料: 6000 Model: 6000-002
3	3M胶 (3M glue)	厚度: 0.02mm R&B: 20μm 材料: 6000 Model: 6000-003
4	离型纸 (Release paper)	厚度: 0.02mm R&B: 20μm 材料: 6000 Model: 6000-004

H





7. 包装作业指导 (The packing way)

SOP																																													
product name	Product number	Process number/name	version	File Number	Instrument calibration and requirements:																																								
MAIN	DX400-10B	package	A1	ZTX-Q-WT-023	<p>1. The test equipment must be grounded;</p> <p>2. After reconnecting the interface or when the connection test is unstable, the instrument needs to be calibrated;</p>																																								
Operation method & operation parameters (after self-checking the operation of the procedure is qualified, it can flow into the next procedure)																																													
					<p>1. Confirm the quantity of 50-pcs products for rubber band wrapping;</p> <p>2. Put 50-pcs product into (240*150mm) PE open bag, paste small label, fill in product name, material number, quantity, period and other information;</p> <p>4. Packing, carton size (45*32.5*21cm), except for the mantissa of each box (5000bps), and a handwritten inspection report is attached;</p> <p>5. The label is affixed to the upper right corner of the outer box, and the contents of the outer label (including: company name, supplier code, customer specification number, production cycle, production batch, packaging quantity, supplier code, enclosed inspection report, EOL, etc.);</p> <p>6. Seal the labeled box with adhesive tape in the shape of "T";</p> <p>7. During the testing process, the tested products should be handled with care;</p> <p>8. When operating the test fixture, use it in strict accordance with the operating specifications to avoid damage;</p> <p>9. During the testing process, the tested products should be handled with care;</p> <p>10. When operating the test fixture, use it in strict accordance with the operating specifications to avoid damage;</p> <p>11. Keep the test site clean and tidy, free of dust, water, and oil;</p> <p>12. The materials are placed neatly and clearly marked;</p>																																								
					<p>Note: 1. Whether the customer material code and quantity are correct, the label must be printed by the machine. 2. The contents of the inner label, outer label, shipping report, and delivery note must be consistent. 3. If it is a test product or there is a change, the corresponding mark shall be affixed to the mantissa box, and the inspection report shall be enclosed.</p>																																								
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