



### Approval Sheet

Customer	Yu Ke	Data	2023/09/12
Product	G/W/B Antennas	Models	T1016
P/N	T639-13LB-044	Customer P/N	
Specifications	Black FPC; RF0.81 IPEX-III Black Line;Long=44mm		

Vender Approved By	Customer Approved By
	
Checked By:	Checked By:
Audit By:	Audit By:
Approval By:	Approval By:

#### File Revision Table

Version	Revise The Content	Revused	Approval	Date	Note



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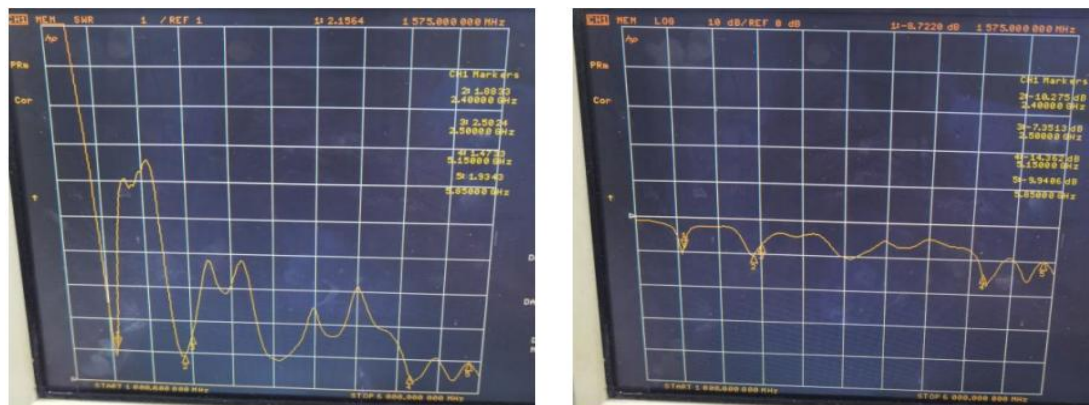
Specification	
1.1 Electrical Properties	
Characteristics	Specifications
Working Band	GPS 2.4G WIFI/5G WIFI
Antenna From	PIFA
Impedance	50 $\Omega$
Polarization	Linear
Peak Effi	20%@GPS; 26%@2.4G; 29%@5G
Peak Gain	-1.5dBi@GPS; 0.2dBi@2.4G; 1.3dBi@5G
1.2 Physical Properties	
Characteristics	Specifications
Operating Temp	-10°C~+60°C
Storage Temp	-10°C~+70°C
Humidity	10~95%RH

## Antenna Placement



### Test Data

#### S11 Parameter-VSWR



Frequency (MHZ)	1575	2400	2500	5150	5850
VSWR	2.15	1.88	2.50	1.47	1.93
Return Loss (DB)	-8.77	-10.27	-7.35	-14.36	-9.94

#### Efficiency Table (GPS)

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHIS (%)	Max (dB)	Min (dB)	irectivity (dBi)	Beamwidth (3dB)	AttH (dB)	AttV (dB)
1570	19.75	-7.04	-1.57	-3.72	8.484	11.263	-1.57	-16.03	5.47	30	41.12	40.65
1575	20.4	-6.9	-1.5	-3.65	8.893	11.508	-1.5	-15.59	5.4	30	41.25	40.8
1580	20.57	-6.87	-1.53	-3.68	9.038	11.532	-1.53	-15.47	5.34	30	41.33	40.9

#### Efficiency Table (2.4G)

Passive Test For WIFI2.4												
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHIS (%)	Max (dB)	Min (dB)	irectivity (dBi)	Beamwidth (3dB)	AttH (dB)	AttV (dB)
2400	25.25	-5.98	-0.69	-2.84	8.093	17.16	-0.69	-17.1	5.29	0	45.79	46.02
2410	25.23	-5.98	-0.53	-2.68	8.068	17.16	-0.53	-16.74	5.45	0	46	46.28
2420	24.39	-6.13	-0.49	-2.64	7.743	16.648	-0.49	-17.71	5.64	0	45.66	45.93
2430	24.12	-6.18	-0.42	-2.57	7.633	16.487	-0.42	-18.29	5.76	0	45.82	46.17
2440	24.72	-6.07	-0.19	-2.34	7.84	16.876	-0.19	-17.23	5.88	0	45.92	46.28
2450	25.46	-5.94	-0.04	-2.19	8.136	17.328	-0.04	-15.99	5.9	0	45.95	46.38
2460	25.83	-5.88	0.03	-2.12	8.335	17.49	0.03	-15.44	5.91	0	45.93	46.31
2470	25.6	-5.92	-0.01	-2.16	8.347	17.257	-0.01	-15	5.91	0	46.24	46.64
2480	25.78	-5.89	0.07	-2.08	8.469	17.309	0.07	-14.76	5.96	0	46.17	46.56
2490	26.3	-5.8	0.23	-1.92	8.726	17.573	0.23	-15.17	6.04	0	46.38	46.78
2500	24.91	-6.04	0.12	-2.03	8.32	16.591	0.12	-15.36	6.15	0	46.26	46.65

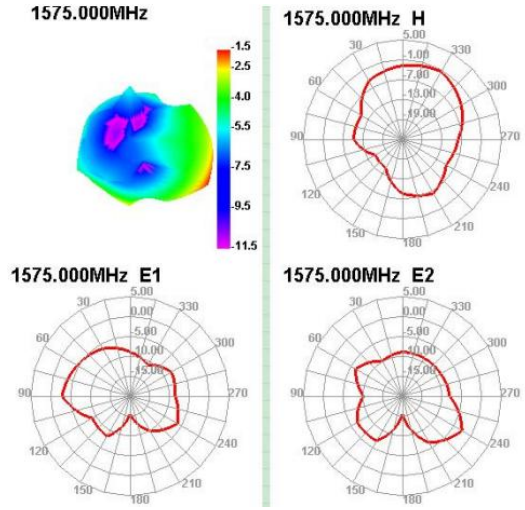




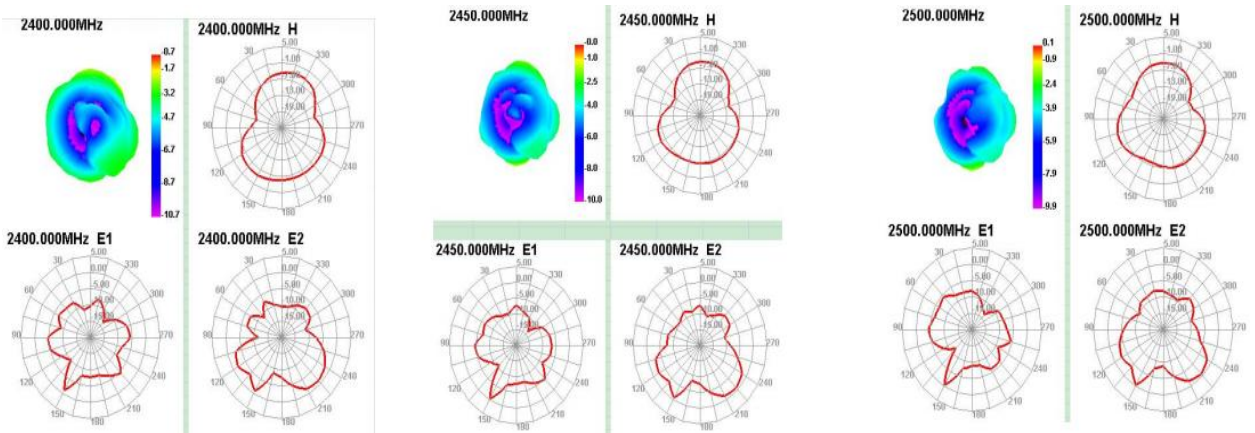
Efficiency Table (5G)

Passive Test For WIFI5G								
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHS (%)	Max (dB)	Min (dB)
5150	14.21	-8.48	-2.92	-5.07	7.417	6.788	-2.92	-21.94
5170	14.03	-8.53	-2.45	-4.6	7.51	6.521	-2.45	-20.13
5190	17.7	-7.52	-1.44	-3.59	9.259	8.441	-1.44	-19.27
5210	16.77	-7.76	-1.99	-4.14	8.492	8.275	-1.99	-21.42
5230	18.97	-7.22	-1.84	-3.99	9.681	9.292	-1.84	-23.64
5250	17.31	-7.62	-2.99	-5.14	9.189	8.118	-2.99	-23.39
5270	21.19	-6.74	-2.27	-4.42	11.595	9.599	-2.27	-20.68
5290	18.76	-7.27	-2.53	-4.68	10.506	8.259	-2.53	-18.4
5310	19.57	-7.08	-2.32	-4.47	11.219	8.353	-2.32	-18.86
5330	20.35	-6.91	-2.38	-4.53	11.96	8.387	-2.38	-19.52
5350	23.62	-6.27	-1.83	-3.98	13.93	9.687	-1.83	-18.58
5370	23.87	-6.22	-1.57	-3.72	14.02	9.848	-1.57	-19.55
5390	22.86	-6.41	-1.62	-3.77	13.443	9.413	-1.62	-19.09
5410	29.22	-5.34	-0.01	-2.16	16.9	12.32	-0.01	-16.25
5430	27.03	-5.68	0.46	-1.69	15.208	11.82	0.46	-19.37
5450	29.96	-5.23	1.3	-0.85	16.709	13.255	1.3	-20.7
5470	27.01	-5.68	0.57	-1.58	14.866	12.145	0.57	-21.45
5490	27.76	-5.57	0.07	-2.08	14.668	13.087	0.07	-19.69
5510	27.41	-5.62	-0.34	-2.49	13.684	13.726	-0.34	-17.92
5530	26.82	-5.72	-0.28	-2.43	12.916	13.9	-0.28	-18.17
5550	25.89	-5.87	-0.65	-2.8	12.421	13.467	-0.65	-17.89
5570	22.83	-6.41	-1.78	-3.93	10.777	12.055	-1.78	-17.84
5590	20.29	-6.93	-2.72	-4.87	9.198	11.091	-2.72	-19
5610	18.7	-7.28	-2.41	-4.56	8.366	10.336	-2.41	-22.37
5630	17.34	-7.61	-2.39	-4.54	8.002	9.341	-2.39	-29.38
5650	18.55	-7.32	-1.97	-4.12	8.787	9.764	-1.97	-24.36
5670	15.58	-8.07	-2.71	-4.86	7.387	8.192	-2.71	-19.01
5690	16.93	-7.71	-1.89	-4.04	8.228	8.706	-1.89	-17.98
5710	11.37	-9.44	-3.43	-5.58	5.699	5.674	-3.43	-21.8
5730	13.49	-8.7	-2.45	-4.6	6.746	6.742	-2.45	-23.05
5750	11.07	-9.56	-3.44	-5.59	5.442	5.625	-3.44	-24.25
5770	15.63	-8.06	-2.15	-4.3	7.542	8.086	-2.15	-19.98
5790	16.06	-7.94	-2.18	-4.33	7.737	8.324	-2.18	-17.1
5810	20.28	-6.93	-1.37	-3.52	9.937	10.341	-1.37	-16.19
5830	20.53	-6.88	-1.32	-3.47	10.299	10.226	-1.32	-14.63
5850	23.63	-6.27	-0.43	-2.58	12.298	11.328	-0.43	-14.48

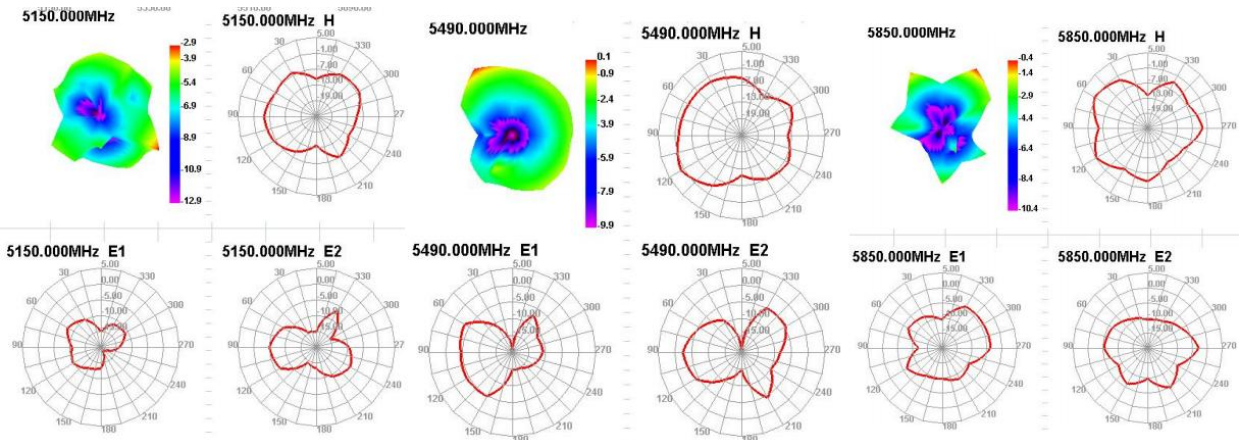
### Radiation Pattern(GPS)



### Radiation Pattern(2.4G)



### Radiation Pattern(5G)





### WiFi/BT Measured

#### WIFI Test

Test environment: Open space

Test distance: 10m

The test results are shown on the right

#### BT Test

Test environment: Open space (channel)

Test tool: Bluetooth speaker

Test distance: 10m

Results: The music was played smoothly and without noise



### GPS Measured

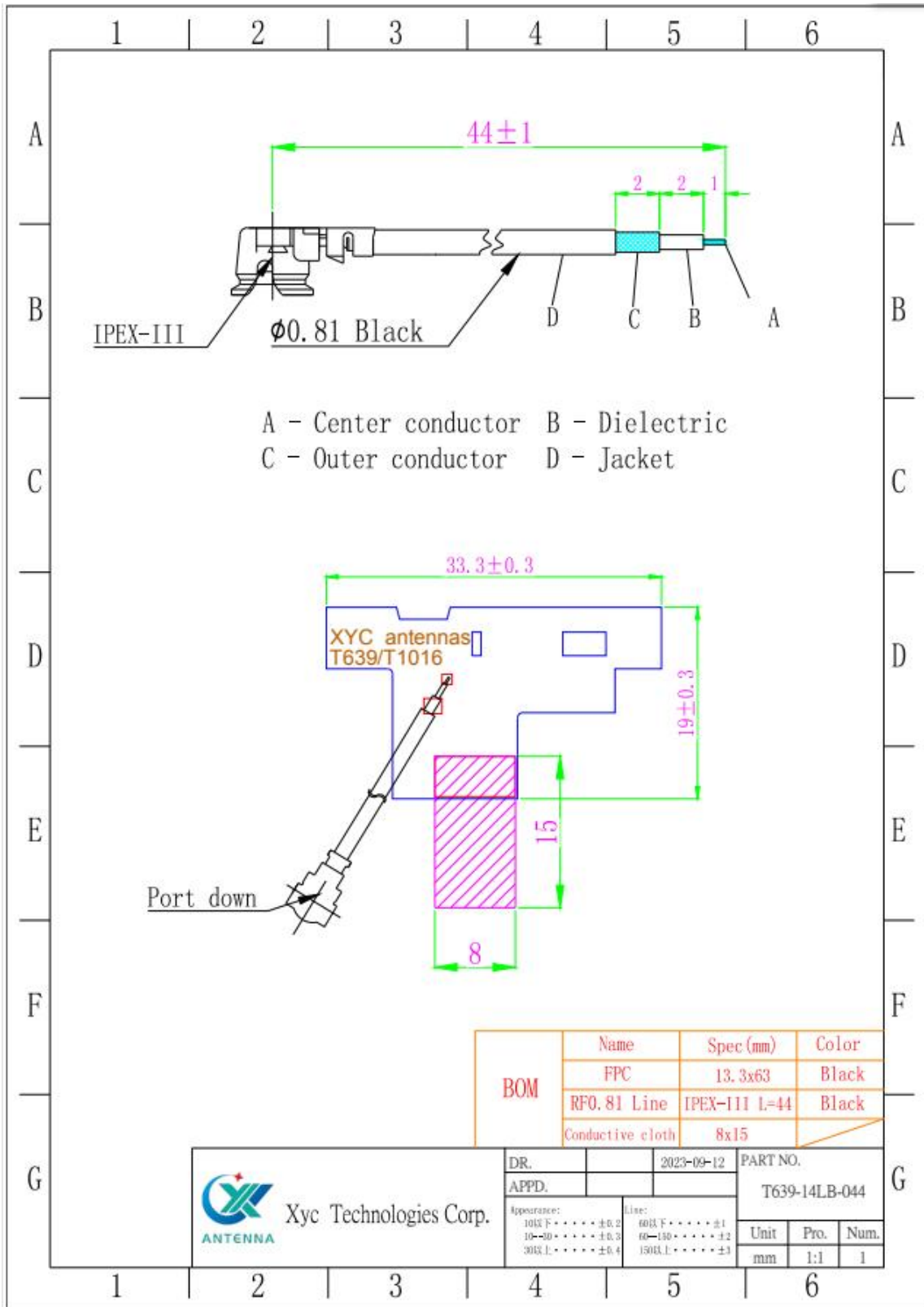


The measured effect of GPS cold start is as follows:  
 CN value over 40 3 pieces  
 CN value over 35 9 pieces  
 9 were actually located

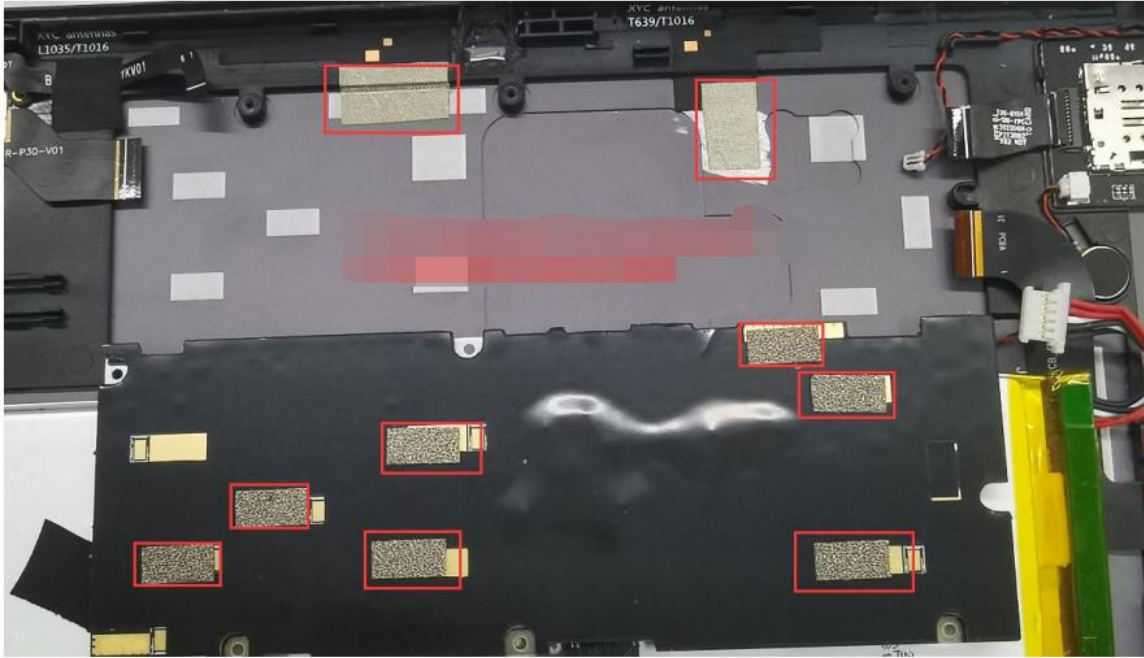
Note;  
 GPS star search test. It varies by time period and region. The above data are the best data in our test (open area)



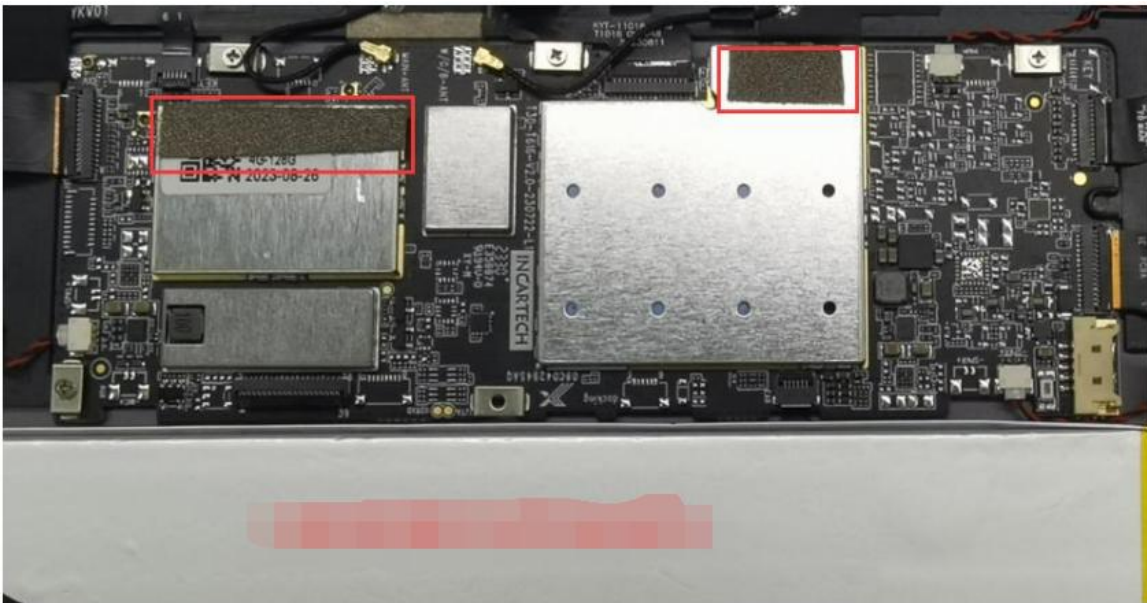
### Antenna Assembly



## Notes



1. Attach a conductive sponge to the copper exposed area on the back of the mainboard.
2. Attach conductive cloth to the copper exposed area of the antenna and ground it.



The motherboard shield is grounded with conductive sponge