



Approval Sheet

Customer	Stijo	Data	2022/10/27		
Product	ANT	Models	HL160G		
P/N	BT:F600C-14RG-320 WIFI:F133X-14RB-290	Customer P/N			
Vender Approved By		Customer Approved By			
					
Checked By:		Checked By:			
Approval By:		Approval By:			
Version	Revise The Content	Revused	Approval	Date	Note

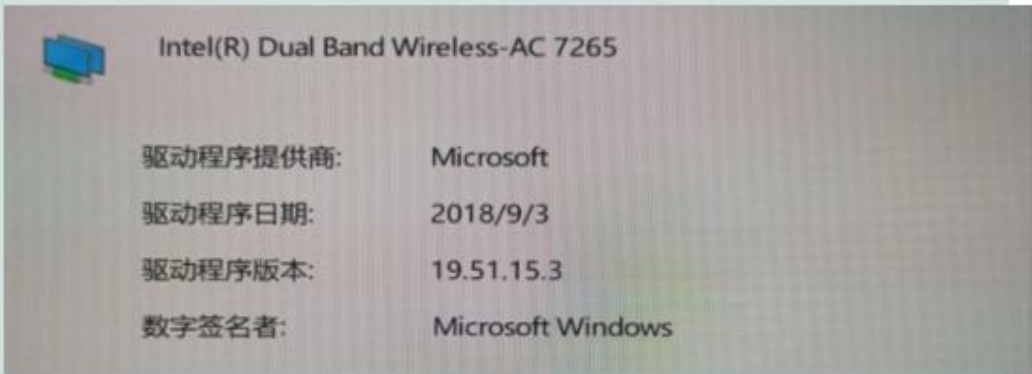


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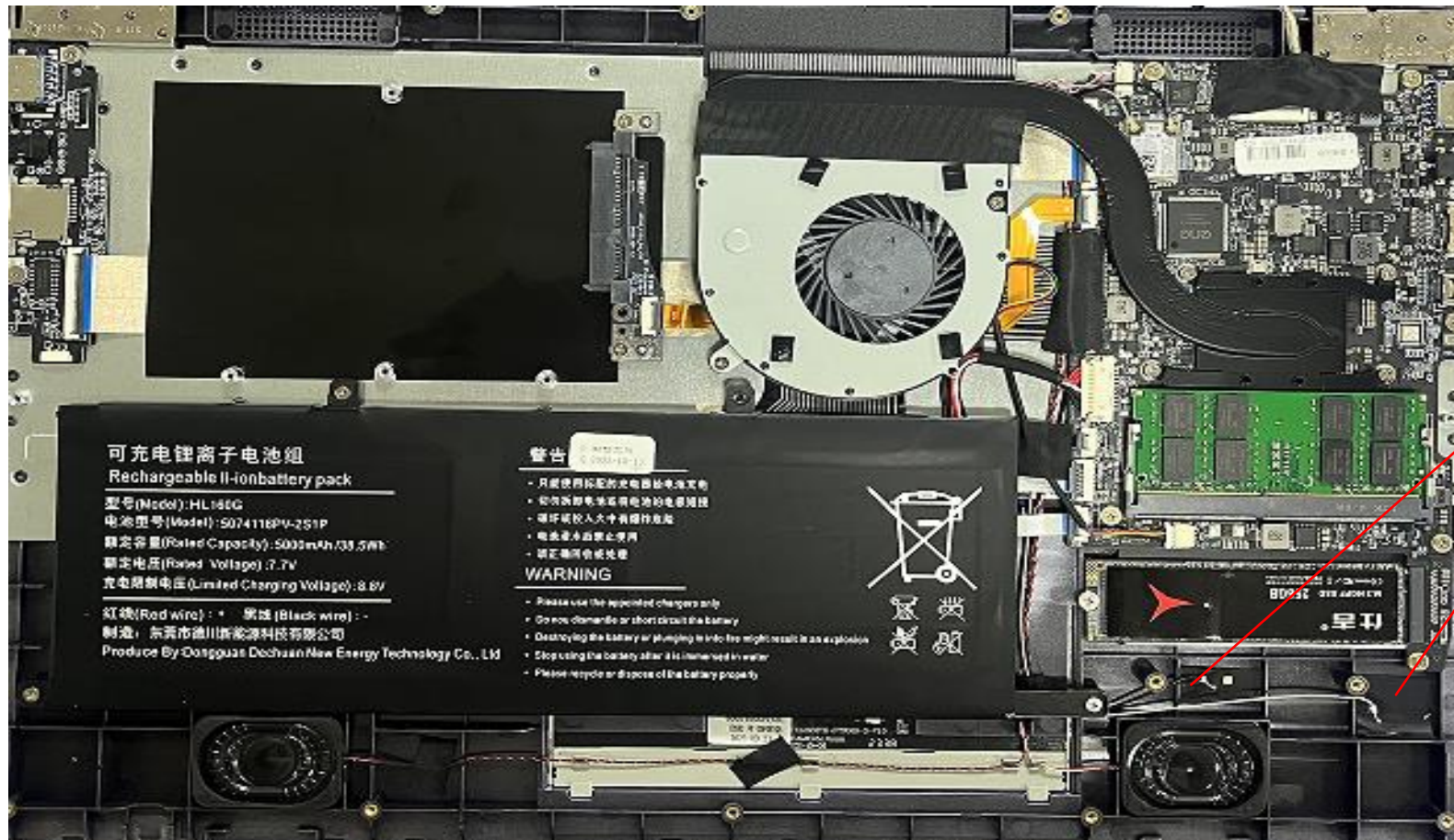


Specification	
1.1 Electrical Properties	
Characteristics	Specifications
Working Band	2.4GHz Band 5GHz Band
Antenna From	FPC
Impedance	50 Ω
Polarization	Linear
Peak Gain	1.21dBi@ BT 3.6dBi@2.4G WIFI 4.54dBi@5G WIFI
1.2 Physical Properties	
Characteristics	Specifications
Operating Temp	-10°C~+60°C
Storage Temp	-10°C~+70°C
Humidity	10~95%RH

Ant Test Information

Frequency	2. 4G (2402~2483) Mhz	5G (5150~5850) Mhz
Module information		
Driver version information		

Antenna Placement



WIFI ANT

BT ANT

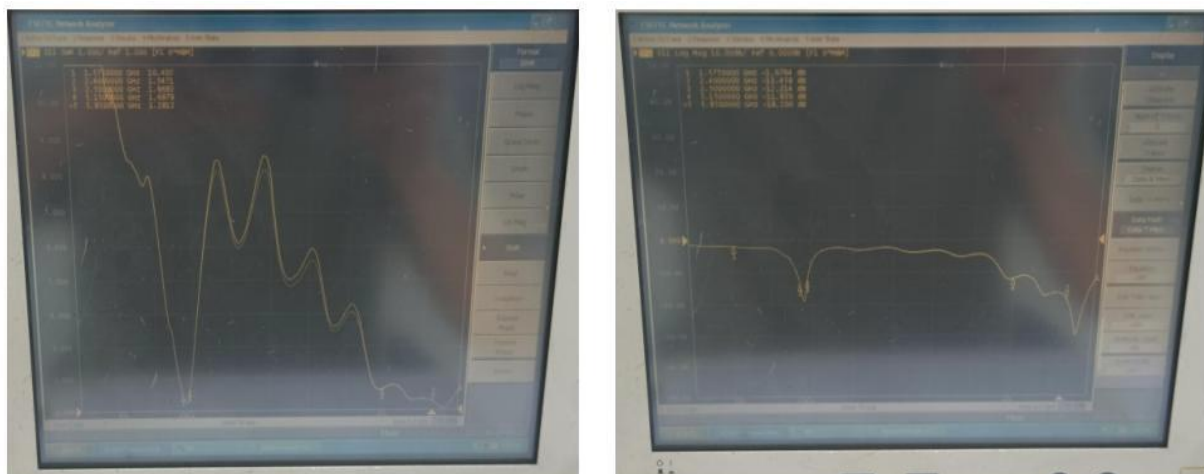
Test Data

S11 Parameter-VSWR(BT ANT)



Frequency (MHZ)	2400	2500
VSWR	1.63	1.92
Return Loss (DB)	-12.45	-10.59

S11 Parameter-VSWR(WIFI ANT)



Frequency (MHZ)	2400	2500	5150	5850
VSWR	1.54	1.66	1.68	1.28
Return Loss (DB)	-13.41	-12.31	-11.83	-18.29

Efficiency Table (BT)

Passive Test For BT								
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHS (%)	Max (dB)	Min (dB)
2400	30.99	-5.09	0.72	-1.43	19.324	11.67	0.72	-16.84
2410	29.18	-5.35	0.51	-1.64	18.584	10.593	0.51	-16.75
2420	30.09	-5.22	0.71	-1.44	19.397	10.688	0.71	-15.53
2430	30.87	-5.1	1.01	-1.14	20.221	10.652	1.01	-16.23
2440	30.99	-5.09	1.21	-0.94	20.765	10.227	1.21	-18.2
2450	29.81	-5.26	1.15	-1	20.412	9.397	1.15	-18.09
2460	30.33	-5.18	1.18	-0.97	21.009	9.323	1.18	-17
2470	31.76	-4.98	1.17	-0.98	22.124	9.637	1.17	-17.16
2480	32.03	-4.94	1.15	-1	22.418	9.611	1.15	-17.67
2490	31.31	-5.04	1.05	-1.1	21.914	9.401	1.05	-17.98
2500	30.97	-5.09	0.92	-1.23	21.588	9.385	0.92	-17.51

Efficiency Table (2.4G WIFI)

Passive Test For WIFI2.4								
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHS (%)	Max (dB)	Min (dB)
2400	26.48	-5.77	3.02	0.87	6.941	19.537	3.02	-16.35
2410	26.78	-5.72	2.76	0.61	7.182	19.596	2.76	-15.38
2420	27.22	-5.65	2.82	0.67	7.286	19.929	2.82	-15.77
2430	29.28	-5.33	2.94	0.79	8.062	21.215	2.94	-15.84
2440	33.13	-4.8	2.91	0.76	9.628	23.504	2.91	-16.94
2450	34.34	-4.64	3.18	1.03	10.58	23.76	3.18	-16.95
2460	34.65	-4.6	3.6	1.45	11.034	23.614	3.6	-14.93
2470	36.1	-4.42	3.35	1.2	12.085	24.015	3.35	-12.06
2480	38.28	-4.17	3.23	1.08	13.343	24.932	3.23	-11.29
2490	40.06	-3.97	3.37	1.22	14.457	25.599	3.37	-10.51
2500	38.89	-4.1	3.28	1.13	14.44	24.449	3.28	-10.32

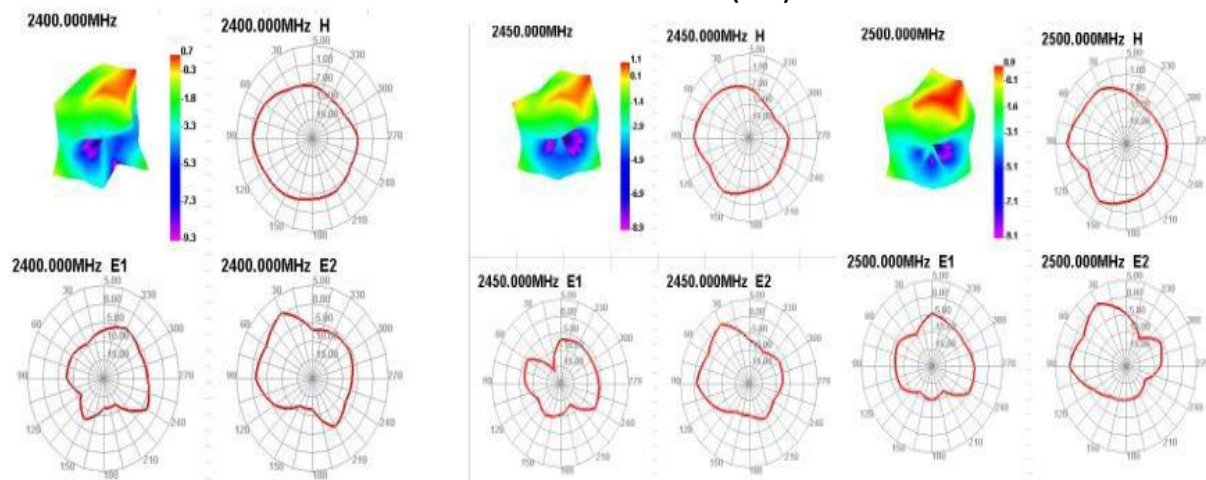
Efficiency Table (5G)

Passive Test For WIFI5G								
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHS (%)	Max (dB)	Min (dB)
5150	29.22	-5.34	1.91	-0.24	20.037	9.181	1.91	-24.03
5170	30.73	-5.12	2.56	0.41	20.809	9.917	2.56	-34.3
5190	31.64	-5	2.97	0.82	21.048	10.594	2.97	-24.8
5210	33.83	-4.71	3.19	1.04	22.384	11.449	3.19	-21.49
5230	34	-4.68	3.13	0.98	22.722	11.283	3.13	-21.11
5250	35.76	-4.47	3.28	1.13	24.175	11.58	3.28	-17.55
5270	38.17	-4.18	3.87	1.72	25.544	12.622	3.87	-15.08
5290	38.47	-4.15	4.11	1.96	25.218	13.25	4.11	-14.35
5310	36.91	-4.33	4.01	1.86	23.882	13.03	4.01	-15.99
5330	38.18	-4.18	4.03	1.88	24.578	13.598	4.03	-15.8
5350	41.77	-3.79	4.43	2.28	26.479	15.294	4.43	-15.25
5370	41.18	-3.85	4.46	2.31	25.702	15.481	4.46	-14.1
5390	37.78	-4.23	3.93	1.78	23.514	14.261	3.93	-15.67
5410	44.21	-3.54	4.54	2.39	27.66	16.552	4.54	-16.48
5430	42.46	-3.72	4.1	1.95	26.582	15.883	4.1	-17.24
5450	44.92	-3.48	4.15	2	27.988	16.936	4.15	-14.39
5470	43.24	-3.64	3.69	1.54	27.096	16.142	3.69	-13.51
5490	42.49	-3.72	3.77	1.62	26.8	15.685	3.77	-14.12
5510	44.95	-3.47	3.97	1.82	28.366	16.584	3.97	-16.61
5530	45.83	-3.39	4.1	1.95	28.748	17.086	4.1	-14.89
5550	48.91	-3.11	4.47	2.32	30.646	18.259	4.47	-15.22
5570	45.15	-3.45	4.13	1.98	28.3	16.854	4.13	-14.84
5590	44.93	-3.47	4.11	1.96	27.984	16.944	4.11	-15.71
5610	43.86	-3.58	3.99	1.84	27.014	16.841	3.99	-15.84
5630	42.68	-3.7	3.75	1.6	26.393	16.291	3.75	-15.78
5650	42.48	-3.72	3.67	1.52	26.528	15.949	3.67	-15.38
5670	37.51	-4.26	3.04	0.89	23.663	13.849	3.04	-15.72
5690	40.43	-3.93	3.48	1.33	25.363	15.064	3.48	-16.2
5710	34.03	-4.68	2.76	0.61	21.258	12.771	2.76	-17.84
5730	40.08	-3.97	3.6	1.45	25.121	14.961	3.6	-17.41
5750	32.44	-4.89	2.69	0.54	20.263	12.182	2.69	-19.7
5770	36.96	-4.32	3.21	1.06	22.862	14.101	3.21	-18.51
5790	32.3	-4.91	2.56	0.41	19.599	12.699	2.56	-18.83
5810	36.45	-4.38	3	0.85	21.939	14.51	3	-17.84
5830	35.43	-4.51	2.57	0.42	21.255	14.178	2.57	-18.42
5850	40.62	-3.91	2.9	0.75	24.07	16.547	2.9	-18.79

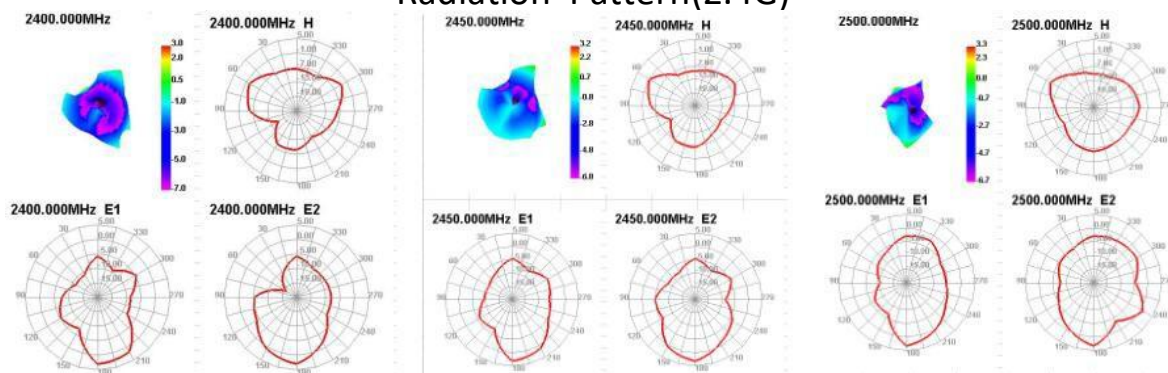
Efficiency Table (5G)

Passive Test For WIFI5G								
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHS (%)	DHS (%)	Max (dB)	Min (dB)
5150	37.28	-4.28	-0.51	-2.66	19.529	17.756	-0.51	-13.84
5170	43.35	-3.63	0.3	-1.85	23.07	20.285	0.3	-13.15
5190	39.71	-4.01	0.22	-1.93	21.425	18.29	0.22	-13.54
5210	48.01	-3.19	0.76	-1.39	26.301	21.712	0.76	-12.83
5230	44.53	-3.51	0.54	-1.61	24.294	20.231	0.54	-12.29
5250	51.71	-2.86	1.15	-1	28.392	23.315	1.15	-12.71
5270	52.77	-2.78	1.09	-1.06	29.141	23.633	1.09	-12.56
5290	54.99	-2.6	1.28	-0.87	30.397	24.592	1.28	-11.94
5310	52.39	-2.81	1.29	-0.86	28.88	23.514	1.29	-12.62
5330	52.79	-2.77	1.54	-0.61	28.877	23.918	1.54	-12.89
5350	57.26	-2.42	2	-0.15	31.265	25.991	2	-12.47
5370	54.79	-2.61	1.55	-0.6	29.82	24.968	1.55	-13
5390	48.6	-3.13	1.14	-1.01	26.396	22.204	1.14	-14.61
5410	55.26	-2.58	1.87	-0.28	29.841	25.417	1.87	-15.08
5430	49.08	-3.09	1.48	-0.67	26.541	22.542	1.48	-15.15
5450	52.96	-2.76	1.76	-0.39	28.634	24.325	1.76	-14.29
5470	47.74	-3.21	1.63	-0.52	25.603	22.137	1.63	-14.09
5490	49.67	-3.04	1.85	-0.3	26.455	23.216	1.85	-14.33
5510	48.11	-3.18	1.75	-0.4	25.486	22.627	1.75	-15.78
5530	51.43	-2.89	1.89	-0.26	27.439	23.994	1.89	-16.53
5550	51.08	-2.92	2.25	0.1	27.225	23.857	2.25	-15.48
5570	49.81	-3.03	2.02	-0.13	26.495	23.31	2.02	-15.74
5590	53.19	-2.74	1.94	-0.21	28.395	24.792	1.94	-16.78
5610	50.54	-2.96	1.56	-0.59	26.962	23.575	1.56	-17.27
5630	55.44	-2.56	2.05	-0.1	29.738	25.707	2.05	-16.53
5650	46.5	-3.33	1.82	-0.33	24.63	21.868	1.82	-16.42
5670	54.28	-2.65	1.77	-0.38	29.111	25.174	1.77	-19.71
5690	49.33	-3.07	2.07	-0.08	26.234	23.094	2.07	-18.1
5710	52.93	-2.76	1.67	-0.48	28.442	24.485	1.67	-17.34
5730	52.48	-2.8	2.26	0.11	27.977	24.499	2.26	-15.84
5750	49.89	-3.02	1.93	-0.22	26.822	23.07	1.93	-16.65
5770	53.47	-2.72	2.44	0.29	28.77	24.701	2.44	-19.44
5790	49.82	-3.03	1.95	-0.2	26.756	23.069	1.95	-25.1
5810	51.22	-2.91	2.13	-0.02	27.31	23.907	2.13	-21.33
5830	49.7	-3.04	2.11	-0.04	26.575	23.128	2.11	-18.64
5850	52.97	-2.76	2.51	0.36	28.692	24.283	2.51	-16.09

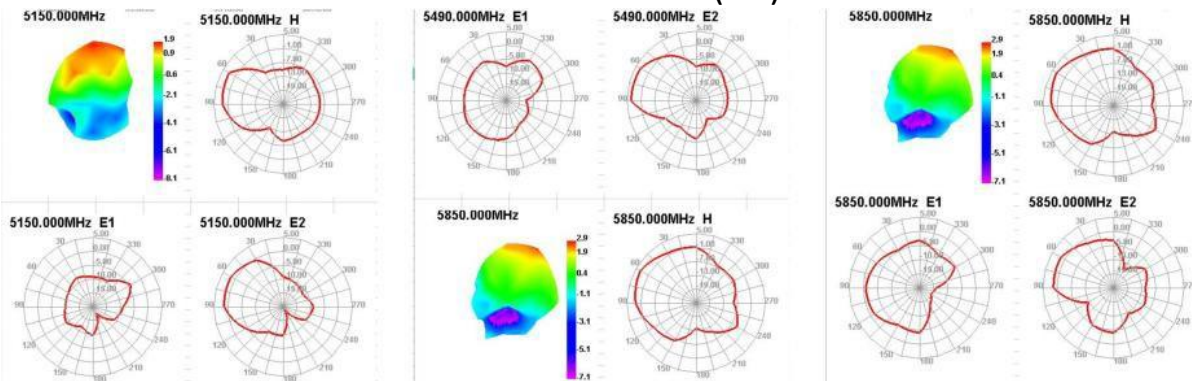
Radiation Pattern(BT)



Radiation Pattern(2.4G)



Radiation Pattern(5G)



Antenna Assembly

