



APPENDIX J

: ANTENNA SPECIFICATION



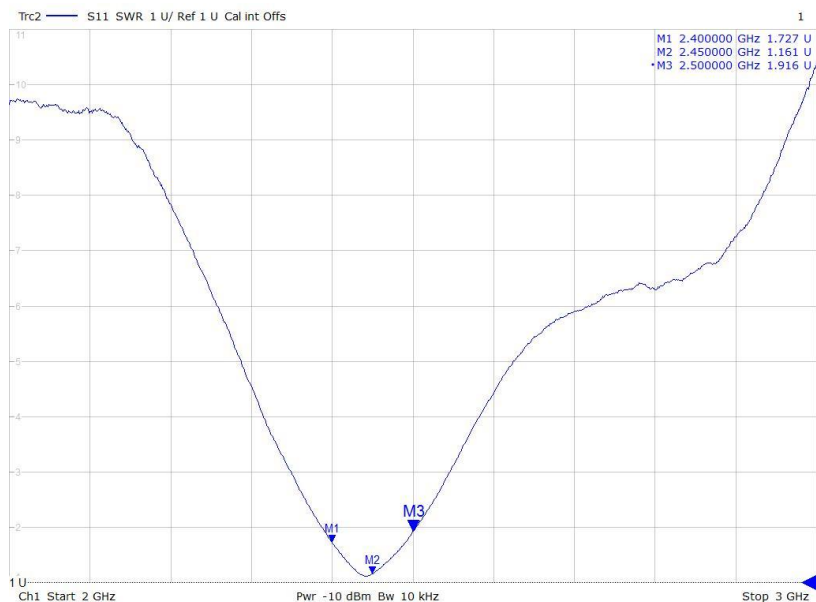
Order Number : GETEC-C1-25-632
Test Report Number : GETEC-E3-25-055

FCC Part 15 subpart C
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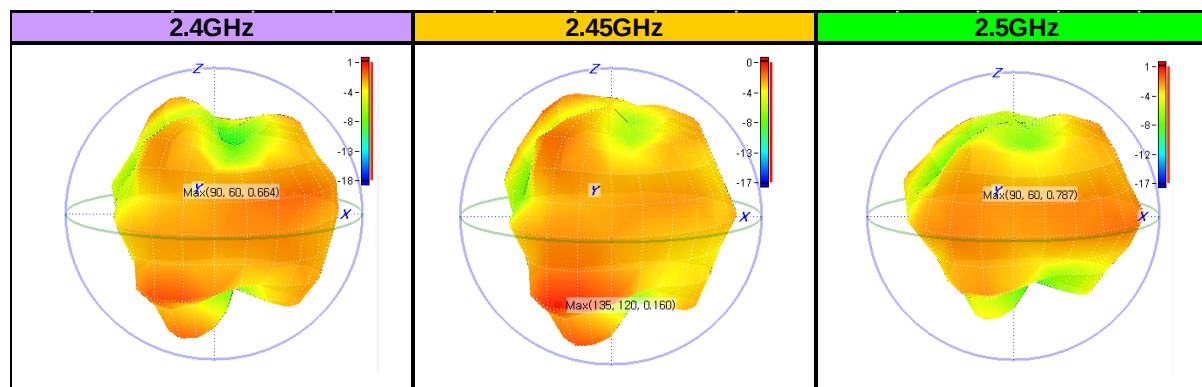
RTL8762EJF (Realtek)

2. VSWR & 3D Efficiency

VSWR



3D Efficiency



Test Results

No	Frequency	Peak Value		Minimum Value		Avg. Gain	Efficiency
	[MHz]	Value[dBi]	Degree	Value[dBi]	Degree	[dBi]	[%]
1	2400.00	0.66	90 / 60	-17.51	120 / 180	-3.04	49.63
2	2410.00	1.12	135 / 120	-18.52	120 / 180	-4.05	39.37
3	2420.00	0.79	135 / 120	-18.84	120 / 180	-4.49	35.57
4	2430.00	0.62	135 / 120	-18.71	120 / 180	-4.47	35.72
5	2440.00	0.13	135 / 120	-17.85	120 / 180	-3.70	42.71
6	2450.00	0.16	135 / 120	-17.07	180 / 285	-3.22	47.64
7	2460.00	0.71	90 / 60	-16.46	180 / 285	-2.70	53.70
8	2470.00	1.28	90 / 60	-16.09	180 / 270	-2.28	59.16
9	2480.00	1.50	90 / 60	-16.31	180 / 270	-2.22	60.02
10	2490.00	1.43	90 / 60	-16.44	180 / 270	-2.38	57.75
11	2500.00	0.79	90 / 60	-16.65	180 / 270	-3.03	49.78



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FCC Part 15 subpart C
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ESP32-WROOM-32UE (Espressif)

2. Test Result - Type1

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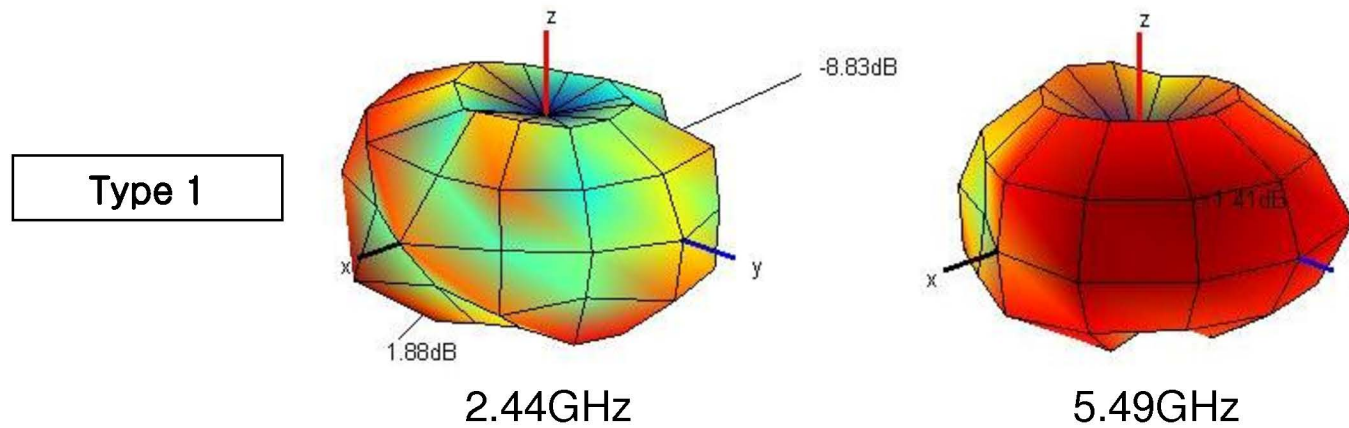
- Passive Efficiency

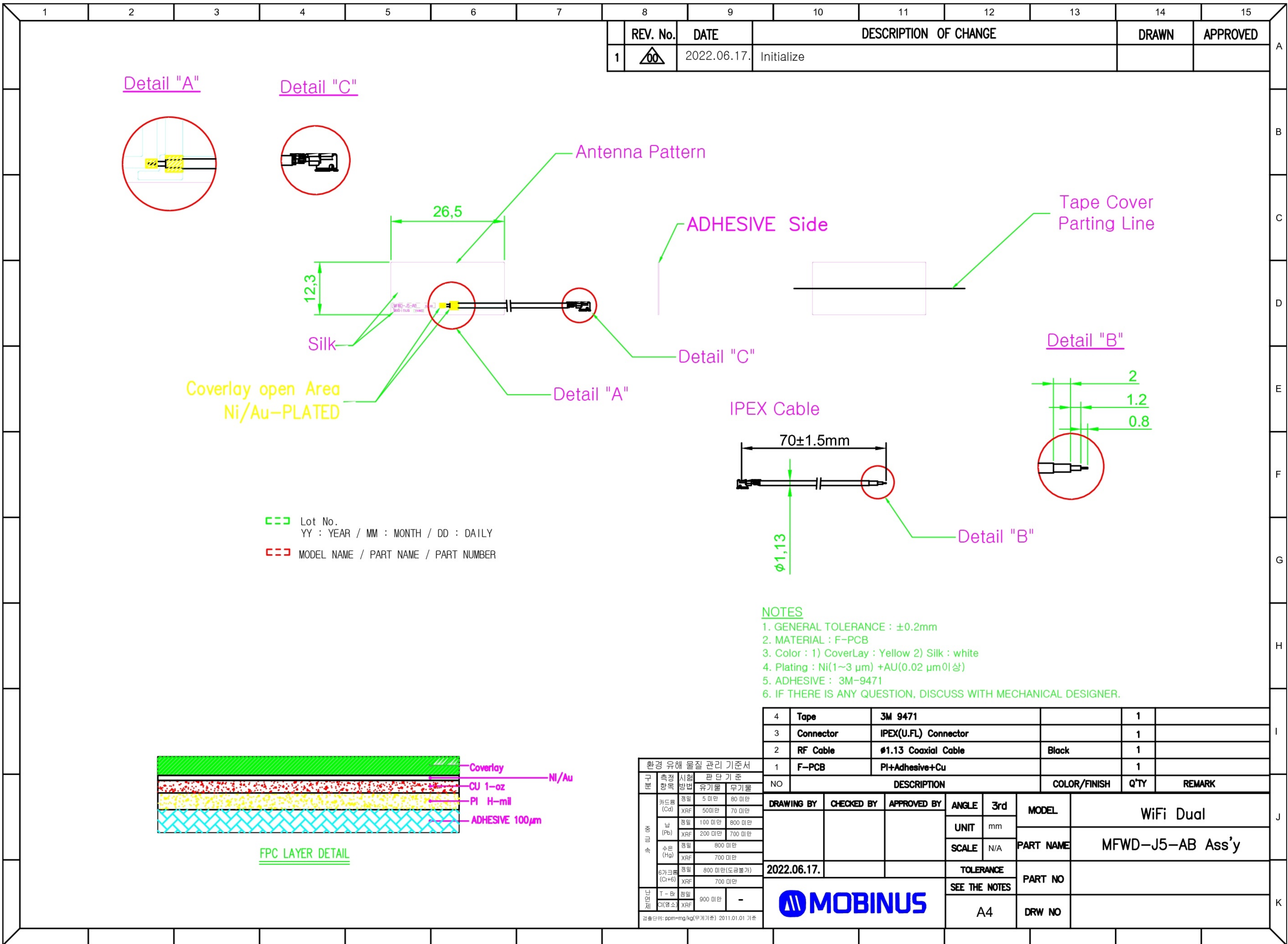
	1	2	3	4	5	6	7	8	9	10	11	12
Frequency [MHz]	2400	2420	2440	2460	2480	2500	5150	5250	5350	5490	5725	5825
Efficiency [dB]	-2.73	-2.82	-2.89	-2.97	-2.84	-3.15	-3.13	-3.06	-3.67	-2.80	-2.78	-2.71
Efficiency [%]	53.3	52.3	51.4	50.4	52.0	48.4	48.6	49.4	43.0	52.5	52.7	53.6
TRG _s [dB]	-6.10	-6.17	-6.18	-6.24	-5.90	-6.10	-7.30	-6.99	-7.60	-7.13	-7.55	-7.64
Gain _{s Peak} [dB]	-0.23	0.45	1.39	1.89	2.05	1.14	-0.06	0.77	0.12	-0.45	1.00	0.87
Gain _{s Min} [dB]	-34.80	-19.90	-22.34	-21.04	-26.99	-32.71	-27.26	-32.56	-24.59	-32.29	-25.73	-26.15
TRG _p [dB]	-5.42	-5.51	-5.64	-5.74	-5.80	-6.23	-5.22	-5.32	-5.92	-4.80	-4.54	-4.40
Gain _{p Peak} [dB]	-0.85	-0.14	0.06	-0.34	-0.98	-1.35	0.08	-0.59	-0.74	0.45	0.04	0.24
Gain _{p Min} [dB]	-23.11	-24.51	-19.26	-19.15	-24.84	-22.96	-25.98	-25.14	-31.35	-28.39	-16.71	-23.14
UHRG [dB]	-6.08	-6.20	-6.34	-6.52	-6.46	-6.77	-6.40	-6.46	-6.99	-5.74	-5.61	-5.45
UHRG/TRG [%]	46.3	45.9	45.2	44.2	43.5	43.4	47.1	45.7	46.5	50.8	52.1	53.2
H-Plane	-8.60	-8.65	-8.90	-9.12	-8.63	-8.57	-10.37	-9.97	-10.29	-9.93	-11.41	-11.79
E1-Plane, AVG [dB]	-8.03	-8.47	-8.67	-9.02	-9.04	-9.50	-4.36	-3.90	-4.80	-4.32	-4.31	-4.34
E2-Plane, AVG [dB]	-4.04	-4.16	-4.22	-4.30	-3.93	-4.08	-9.34	-8.57	-9.18	-8.69	-8.02	-7.99
Peak Gain [dB]	0.73	1.23	1.88	2.22	2.25	1.25	1.22	1.07	0.26	1.41	2.24	2.07
Directivity [dB]	3.47	4.05	4.77	5.19	5.09	4.40	4.35	4.13	3.93	4.21	5.02	4.78
Minimum Gain [dB]	-10.99	-9.16	-8.83	-8.41	-7.32	-8.65	-12.58	-14.90	-15.82	-14.62	-13.53	-12.83
Test Condition	FS											
Antenna Type												
Average Efficiency	-2.96 dB		50.63 %									

2. Test Result

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- Radiation Pattern





REV. No.	DATE	DESCRIPTION OF CHANGE	DRAWN	APPROVED
1	2022.06.17.	Initialize		

Lot No.
YY : YEAR / MM : MONTH / DD : DAILY
MODEL NAME / PART NAME / PART NUMBER

- NOTES
- GENERAL TOLERANCE : $\pm 0.2\text{mm}$
 - MATERIAL : F-PCB
 - Color : 1) CoverLay : Yellow 2) Silk : white
 - Plating : Ni(1~3 μm) +AU(0.02 μm 이상)
 - ADHESIVE : 3M-9471
 - IF THERE IS ANY QUESTION, DISCUSS WITH MECHANICAL DESIGNER.

4	Tape	3M 9471		1	
3	Connector	IPEX(U.FL) Connector		1	
2	RF Cable	$\phi 1.13$ Coaxial Cable	Black	1	
1	F-PCB	PI+Adhesive+Cu		1	

환경 유해 물질 관리 기준서				1	F-PCB	Pl+Adhesive+Cu						1	
구분	측정 항목	판 단 기 준		NO	DESCRIPTION			COLOR/FINISH		Q'TY	REMARK		
		시험 방법	유기물										무기물
90 mm 4F	카드뮴 (Cd)	정밀	5 미만	80 미만	DRAWING BY	CHECKED BY	APPROVED BY	ANGLE	3rd	MODEL	WiFi Dual		
		XRF	500미만	70 미만				UNIT	mm				
	납 (Pb)	정밀	100 미만	800 미만	SCALE	N/A	PART NAME	MFWD-J5-AB Ass'y					
		XRF	200 미만	700 미만									
	수은 (Hg)	정밀	800 미만		2022.06.17.			TOLERANCE	PART NO				
		XRF	700 미만										
	6가크롬 (Cr+6)	정밀	800 미만 (도금불가)					SEE THE NOTES	DRW NO				
		XRF	700 미만										
	T-Br (영조)	정밀	900 미만	-				A4					
		XRF											
검출단위: ppm=mg/kg(무게기준) 2011.01.01 기준													



ANGLE	3rd	MODEL	WiFi Dual
UNIT	mm	PART NAME	MFWD-J5-AB Ass'y
SCALE	N/A	PART NO	
SEE THE NOTES		DRW NO	