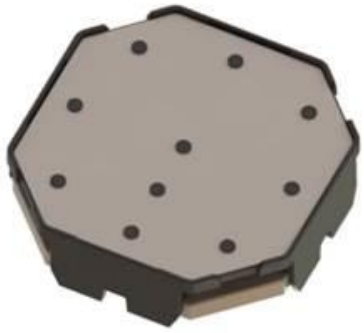
Ceramic Patch Antenna

AMO
AMOTECH



Data Sheet

Type : GNSS Wide Band Stacked Patch Antenna
Amotech Part No : RDSD35A60R-G4A-A-ACT2
Customer Part No : L&L1+L2&L5&L6

	Designed	Checked		Approved
-				
Date	. .	. .	. .	. .

Revision no	Content	Page	Date	Name
0	First, documented	-	2025.10.27	S.W Park

RoHS

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Designed	Checked		Approved
2025.10.30	2025.10.30	2025.10.30	2025.10.30

1. Specification

1.1 Electrical characteristic

No	Item	Specification		Unit	Remarks
1	Frequency (Fc)	L + L1	1525.00 ~ 1607.00	MHz	Notes : 1)
		L2+L5+L6	1166.00 ~ 1285.00	MHz	
		L + L1	1559.10 ± 10.00	MHz	Notes : 2)
		L2+L5+L6	1224.50 ± 10.00	MHz	
2	Return-Loss	L + L1	Typ. 10.0 @ 1525.00 ~ 1607.00 MHz (with Hybrid Coupler)	- dB	Notes : 1)
		L2+L5+L6	Typ. 10.0 @ 1166.00 ~ 1285.00MHz (with Hybrid Coupler)	- dB	
		L + L1	Min. 8.0 @ Fc	- dB	Notes : 2)
		L2+L5+L6	Min. 15.0 @ Fc	- dB	
3	Axial Ratio	L + L1	Refer to table 1.3.1.2 on page 3	dB	Notes : 1)
		L2+L5+L6	Refer to table 1.3.2.2 on page 4	dB	
4	Gain	L + L1	Refer to table 1.3.1.2 on page 3	dBic	Notes : 1)
		L2+L5+L6	Refer to table 1.3.2.2 on page 4	dBic	
5	Polarization	L + L1	RHCP (with Hybrid Coupler)	-	-
		L2+L5+L6	RHCP (with Hybrid Coupler)	-	-
6	Isolation	-	Typ.15.0 (with Hybrid Coupler)	- dB	Notes : 1)
7	Impedance	-	50	Ω	-

※ Notes: 1) Measured on Dia. 150mm Ground plane with Hybrid Coupler.

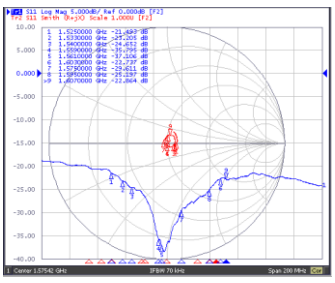
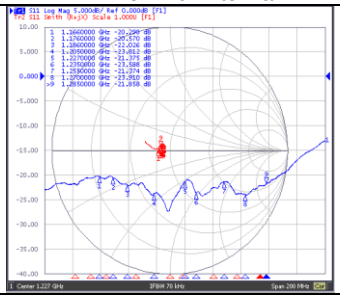
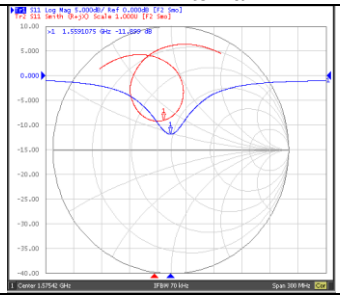
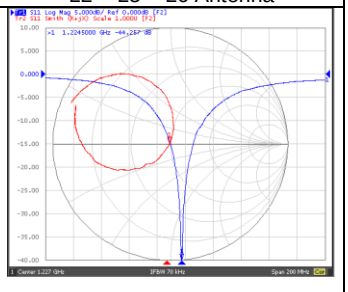
Notes: 2) Measured on AMOTECH FR4 Ground Plane with Adhesive tape and release liner. (Stack state)

- Fc is Min. Point of log mag.

- All Products in Mass Production Pass through the Inspection Process (100%)

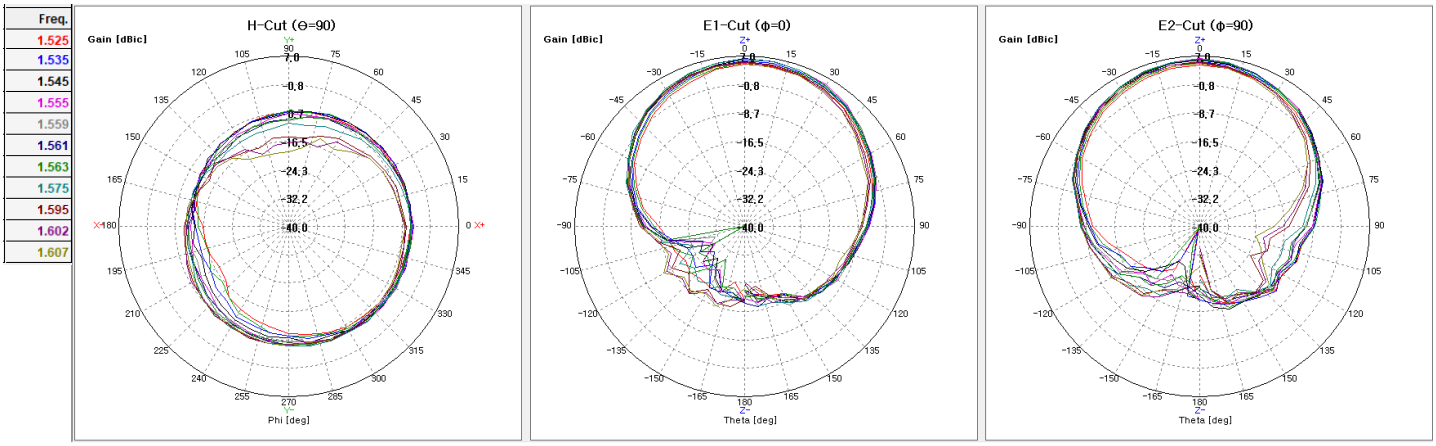
➔ Inspection List : Frequency(MHz), Return Loss(-dB)

1.2 Typical S-parameter Data (Log mag & Smith chart)

Measured on Dia. 150mm Ground plane with Hybrid Coupler.		AMOTECH FR4 Ground Plane with Adhesive tape and release liner. (Stack state)	
L + L1 Antenna	L2 + L5 + L6 Antenna	L + L1 Antenna	L2 + L5 + L6 Antenna
			

1.3.1.1 Right Hand Circular Polarization (RHCP) 2D Radiation Patterns (L + L1 Band).

※ Measured on Dia. 150mm Ground plane with Hybrid Coupler.



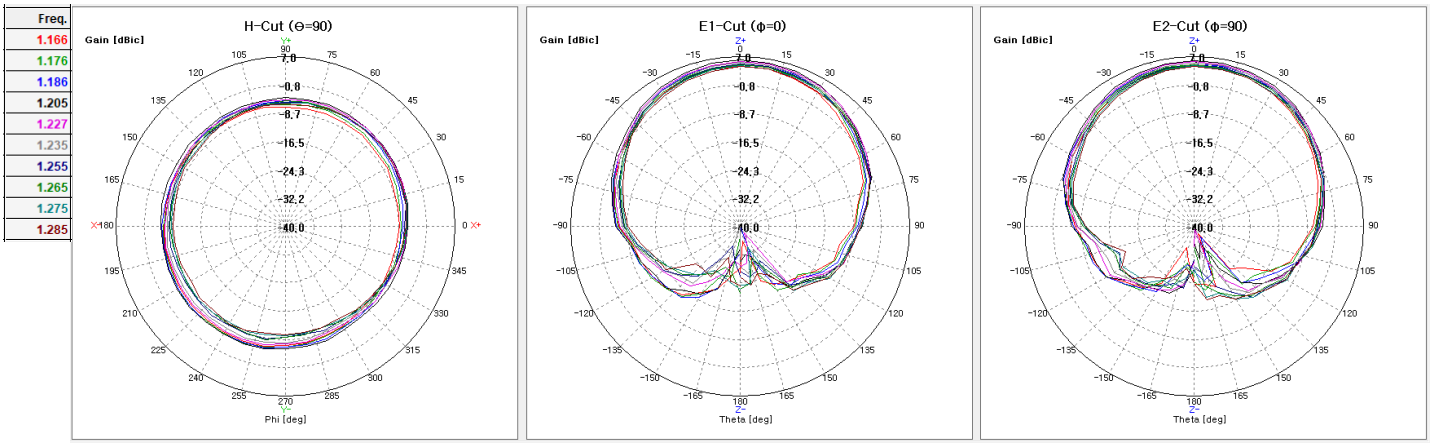
1.3.1.2 Right Hand Circular Polarization (RHCP) Gain & Axial Ratio (L + L1 Band)

L + L1 Band RHCP Gain Table @ Average Gain [dBic]											
Theta(Θ)	1.525GHz	1.535GHz	1.545GHz	1.555GHz	1.559GHz	1.561GHz	1.563GHz	1.575GHz	1.595GHz	1.602GHz	1.607GHz
0	4.55	5.43	5.91	6.15	6.12	6.07	6.08	6.06	5.42	5.19	4.94
10	4.29	5.20	5.64	5.88	5.86	5.84	5.85	5.90	5.13	4.81	4.57
20	3.58	4.46	4.93	5.20	5.17	5.14	5.14	5.16	4.50	4.23	3.97
30	2.61	3.43	3.86	4.08	4.05	4.01	4.01	3.99	3.27	3.00	2.76
40	1.31	2.10	2.55	2.77	2.71	2.67	2.68	2.61	1.78	1.50	1.27
50	-0.59	0.20	0.63	0.82	0.80	0.76	0.71	0.68	-0.04	-0.33	-0.58
60	-2.67	-1.90	-1.51	-1.34	-1.44	-1.50	-1.51	-1.69	-2.61	-2.96	-3.23
70	-4.88	-4.12	-3.74	-3.55	-3.56	-3.67	-3.67	-3.82	-4.83	-5.27	-5.60
80	-7.61	-6.91	-6.57	-6.39	-6.58	-6.64	-6.69	-6.92	-8.12	-8.40	-8.70
90	-10.16	-9.31	-8.99	-8.81	-8.88	-8.95	-8.91	-9.14	-10.26	-10.71	-11.14

L + L1 Band Axial Ratio Table @ Average [dB]											
Theta(Θ)	1.525GHz	1.535GHz	1.545GHz	1.555GHz	1.559GHz	1.561GHz	1.563GHz	1.575GHz	1.595GHz	1.602GHz	1.607GHz
0	1.9	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.4
10	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3
20	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.5	2.5
30	2.4	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.5	2.6	2.6
40	2.6	2.5	2.4	2.5	2.5	2.6	2.6	2.7	3.1	3.3	3.4
50	3.1	2.7	2.7	2.6	2.6	2.7	2.7	2.9	3.7	4.0	4.2
60	4.2	3.8	3.4	3.3	3.5	3.3	3.4	3.7	4.6	5.2	5.5
70	5.9	5.4	4.9	4.6	4.6	4.6	4.5	5.3	7.3	8.8	11.0
80	11.6	9.9	8.7	8.6	8.6	8.8	8.6	10.3	12.2	11.8	12.3
90	12.2	12.8	11.4	11.4	11.4	12.5	12.1	13.2	13.4	12.9	12.0

1.3.2.1 Right Hand Circular Polarization (RHCP) 2D Radiation Patterns (L2 + L5 + L6 Band).

※ Measured on Dia. 150mm Ground plane with Hybrid Coupler.



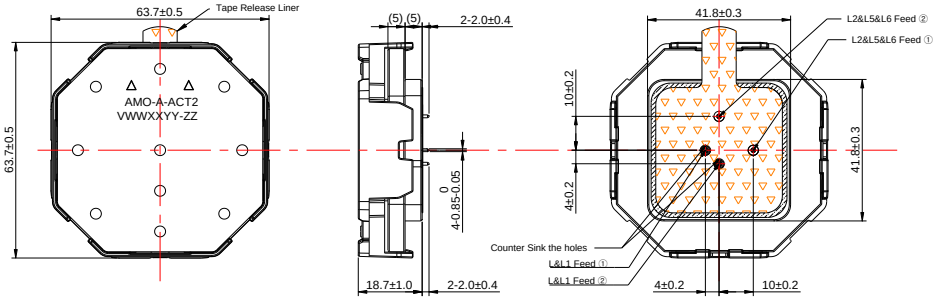
1.3.2.2 Right Hand Circular Polarization (RHCP) Gain & Axial Ratio (L2 + L5 + L6 Band)

L2 + L5 + L6 Band RHCP Gain Table @ Average Gain [dBic]										
Theta(Θ)	1.166GHz	1.176GHz	1.186GHz	1.205GHz	1.227GHz	1.235GHz	1.255GHz	1.265GHz	1.275GHz	1.285GHz
0	4.23	4.73	5.17	5.94	5.59	5.23	4.86	4.70	4.45	4.19
10	4.17	4.64	5.07	5.83	5.39	5.05	4.63	4.46	4.20	3.93
20	3.63	4.15	4.63	5.38	4.92	4.54	4.05	3.84	3.57	3.32
30	2.70	3.28	3.75	4.56	4.18	3.81	3.31	3.09	2.79	2.45
40	1.31	1.90	2.40	3.29	2.97	2.65	2.26	2.08	1.82	1.50
50	-0.25	0.25	0.71	1.59	1.26	0.86	0.59	0.47	0.29	0.05
60	-1.47	-1.08	-0.69	0.09	-0.37	-0.74	-1.28	-1.47	-1.68	-1.90
70	-3.27	-2.74	-2.29	-1.52	-1.90	-2.26	-2.67	-2.82	-3.06	-3.44
80	-5.40	-4.95	-4.50	-3.90	-4.40	-4.76	-5.05	-5.07	-5.25	-5.55
90	-7.19	-6.66	-6.22	-5.51	-6.24	-6.71	-7.26	-7.31	-7.52	-7.82

L2 + L5 + L6 Band Axial Ratio Table @ Average [dB]										
Theta(Θ)	1.166GHz	1.176GHz	1.186GHz	1.205GHz	1.227GHz	1.235GHz	1.255GHz	1.265GHz	1.275GHz	1.285GHz
0	1.6	1.6	1.5	1.4	0.9	0.8	1.0	1.2	1.6	2.0
10	1.6	1.6	1.5	1.3	0.7	0.5	0.7	1.1	1.5	2.0
20	1.7	1.7	1.6	1.3	0.7	0.5	0.7	1.1	1.6	2.1
30	1.7	1.7	1.6	1.3	0.7	0.6	0.9	1.2	1.6	2.2
40	1.9	1.8	1.7	1.4	0.9	0.8	1.2	1.6	1.9	2.3
50	2.3	2.1	1.9	1.5	1.1	1.1	1.5	1.7	2.0	2.4
60	2.6	2.5	2.5	2.1	2.1	2.2	2.3	2.5	2.6	2.8
70	3.2	2.9	2.7	2.4	2.7	3.0	3.4	3.4	3.6	3.9
80	5.6	5.0	4.5	3.6	3.4	3.4	3.7	3.8	4.0	4.2
90	5.7	5.2	4.8	4.3	4.7	4.7	6.0	6.0	6.3	6.7

2. Mechanical Outline

2.1 Dimension



< TOP > < SIDE > < BOTTOM >

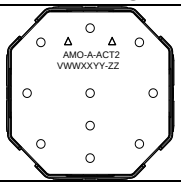
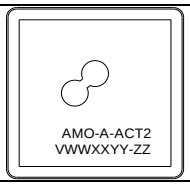
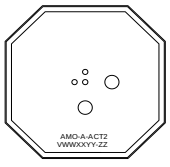
* NOTE
1. UNIT : mm
2. All Around Both sides Typ. 0.3 Chamfer
   (Chamfer 0.2mm, Land 0.1mm)
3. Attach the Antenna on PCB without tape Release Liner
4. Counter sink the holes with a 0.3mm chamfer

2.2 Tuning : Top & Bottom (According to Procedure of AMOTECH document)

2.3 Mechanical characteristic

No	Item	Specification		Unit	Remarks
1	Dielectric constant	L + L1	9.5 ± 0.5	-	Ceramic
		L2+ L5 +L6	9.5 ± 0.5		
2	Electrode	-	Silver	-	-
3	Probe	-	brass	-	-
4	Tape	L + L1	Double sided adhesive tape	-	Thickness : 1.0mm
		L2+ L5 +L6	Double sided adhesive tape	-	3M-468MP
		Carrier	Double sided adhesive tape	-	3M-468MP
5	Carrier	-	PC	-	-
6	2nd Radiator	-	SUS	-	-
7	UV coating		Applied		

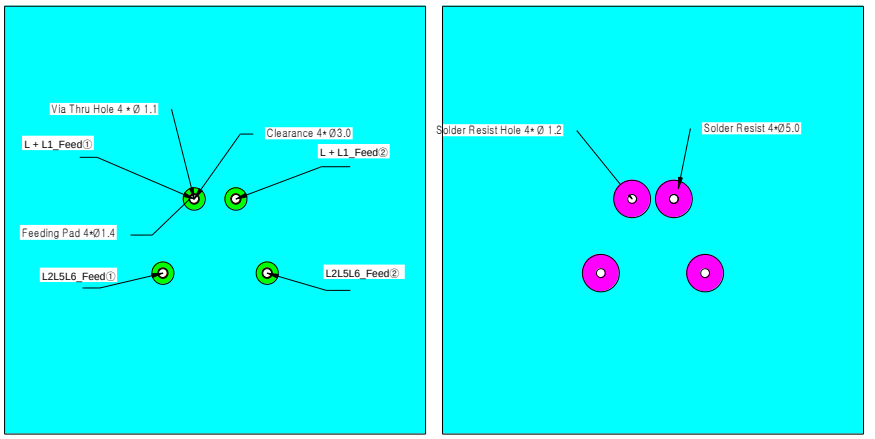
2.4 Marking

2nd Radiator+Carrier	L + L1 Antenna	L2 + L5 + L6 Antenna
		

- V : Line section
- WW : Year
- XX : Month
- YY : Day
- ZZ : Serial number of daily

2.5 Recommended Land Pattern

2.5.1 Top Pattern (Top View)



VIA Thru Hole

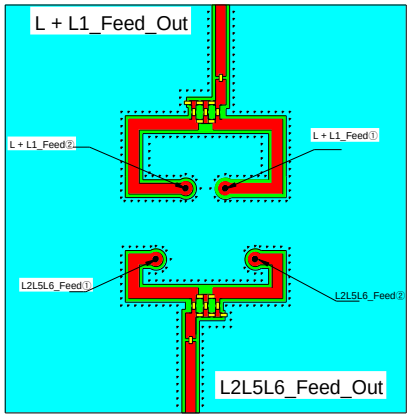
Ground Pattern

No Ground (Clearance)

Feeding Pad

The Solder resist (PSR) Area For Feed Pad

2.5.2 Bottom Pattern (Bottom View)



VIA Thru Hole

Ground

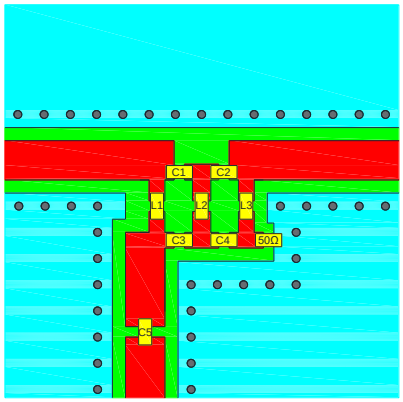
No Ground (Clearance)

50Ω Feeding Line

Component

※ Note : Feed ① direction is close to Feed_out.

2.5.3 Component Value for Hybrid Coupler



L + L1 Antenna		L2 + L5 + L6 Antenna	
C1, C2, C3, C4 (1005) mm	2.0 pF	C1, C2, C3, C4 (1005) mm	2.7 pF
Ln (1005) mm	4.7 nH	Ln (1005) mm	6.8 nH
C5 (1005) mm	100 pF	C5 (1005) mm	100 pF
R (1005) mm	50 ohm	R (1005) mm	50 ohm

3. Reliability Test

No	Item	Test condition	Requirement
1	Drop Test	1. Place antenna on set 2. 1.5m height 3. Drop 5 times	1. No Visible defect 2. S11 change rate (Δfc < 0.2 %)
2	Vibration Test	1. 5-55-5 ㎐, 1 Octave/min, Amp.=1.5mm, acceleration=2g, Crossover Freq.=18 ㎐, Hold time = 2H.R	1. No Visible defect 2. S11 change rate (Δfc < 0.2 %)
3	Humidity	1. 60℃, 95%RH, 96Hr	1. No Visible defect 2. S11 change rate (Δfc < 0.2 %)
4	Thermal Shock	1. +85℃(30min) → -40℃ (30min) 2. 96 cycle	1. No Visible defect 2. S11 change rate (Δfc < 0.2 %)
5	High Temperature Resistance	1. +110℃, 96Hr	1. No Visible defect 2. S11 change rate (Δfc < 0.2 %)
6	Low Temperature Resistance	1. -40℃, 96Hr	1. No Visible defect 2. S11 change rate (Δfc < 0.2 %)
7	Adhesion Strength of Soldering	1. Used of pull push gauge.	1. Spec(min. 5kgf)

※ The sample must satisfy Requirement after 24 hours of test

※ Be base on IEC Climatic category (IEC68-1) -40℃ / +90℃ / 56h

4. Soldering Condition

- Wettability to IEC 68-2-58 :≥75%(After Aging)

4.1 Manual Soldering(By Iron) – Pb free

- Soldering Temperature : 360℃ ± 5℃, 5sec max.
  (Solder : Sn/Ag/Cu:96.5/3.0/0.5)
- Must comply with above soldering condition to prevent from degradation of antenna performance.

5. Caution and Warranty

5.1 Electrode metallizations are unprotected silver and will tarnish during storage due to sulphuric compounds (namely H2S) in the atmosphere. Elevated temperature and humidity will accelerate this process. Human skin contact, wool etc. also cause tarnishing. This has no effect whatsoever on the electrical performance of the patches. Tarnishing of the silver plated feed pins may affect solderability. Because of this normal and to be expected process, AMOTECH accepts no warranty claims for tarnished products.

AMOTECH uses vacuum packaging to reduce atmospheric influence and to extend shelf life.

5.2 Patch Antennas must avoid shock and drop, to prevent cracking of the antenna.

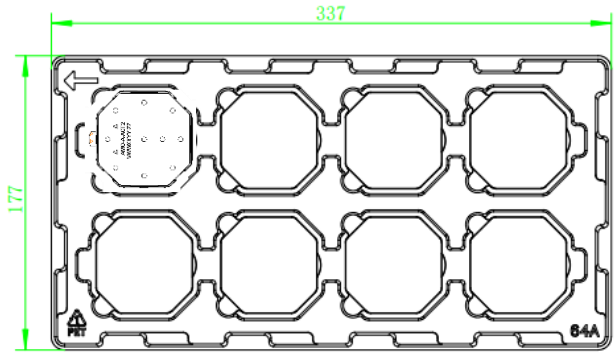
5.3 Patch Antennas should be used within 6 months after delivery, antennas older than 6 months should be checked for solderability before using.

5.4 If you plan to re-use the products that be taken out from packaging. Suggest to re-pack them within 48 hours by re-seal to prevent discoloration.

6. Package

6.1 Tray

- Quantity



- 8ea/tray

6.2 Inner box

- Dimension: 370 (W) x 195 (D) x 130 (T) (mm)
- Quantity : 4 tray (8ea/ tray × 4 tray) ＝ 32ea)

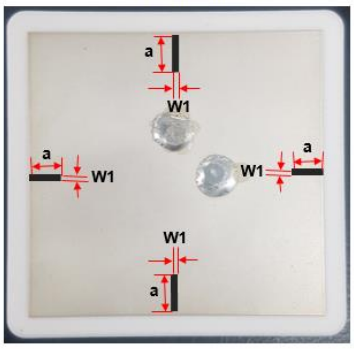
6.3 Outer box

- Dimension : 390 (W) x 620 (D) x 150 (T) (mm)
- Quantity : 3 inner box (32ea/ inner box ×3 inner box ＝ 96ea)

DOC. No.	15-Tuning Boundary-001						
Standard process	Mearsurement process						
Product	Ceramic Patch Antenna						
Written by	Q.A PART						
Original Date	2025. 06. 23	Rev. No.	0	Rev. Date	-	Page	1/1

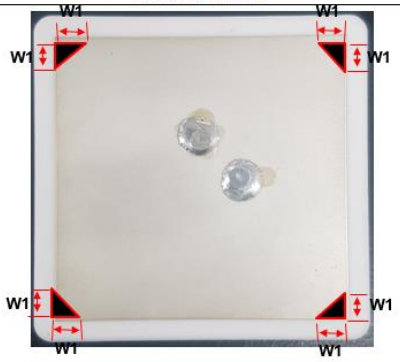
RDSD35A60 Type (SD35)
Manual top tuning procedure

Top Tuning method 1



◆ **Tuning standard**
- **Tuning Point: Max 4 points only with method1**
- **Tuning Length : a ≤ 3.00mm**
- **Tuning Wide: W1 ≤ 2.00mm**

Top Tuning method 2



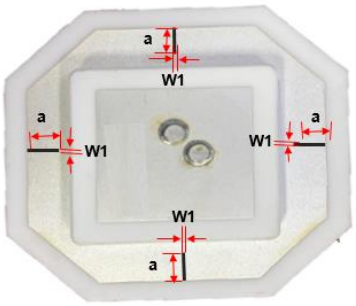
◆ **Tuning standard**
- **Tuning Point: Max 4 points only with method2**
- **Tuning Wide: W1 ≤ 3.00mm**

◆ The above criteria is for only tuning which is the manual mark by worker. The tuning made in Ag printing process is not applied to the above criteria.
◆ Total tuning points with all above 2 methods : Max 4 points
◆ Criteria of defective parts
- If tuned antennas do not meet above standard, Amotech will regard them as defective part

DOC. No.	15-Tuning Boundary-001						
Standard process	Mearsurement process						
Product	Ceramic Patch Antenna						
Written by	Q.A PART						
Original Date	2025.06.23	Rev. No.	0	Rev. Date		Page	1/1

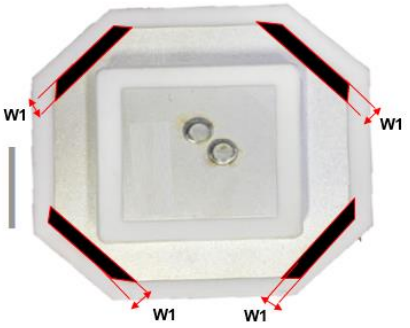
RDSD35A60 Type (A60R)
Manual top tuning procedure

Top Tuning method 1



◆ **Tuning standard**
- **Tuning Point: Max 4 points only with method1**
- **Tuning Length : a ≤ 7.00mm**
- **Tuning Wide: W1 ≤ 2.00mm**

Top Tuning method 2



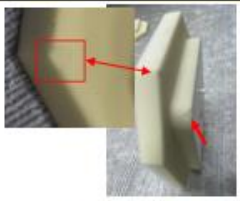
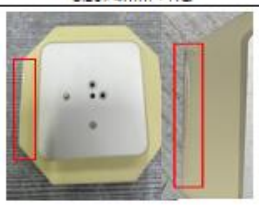
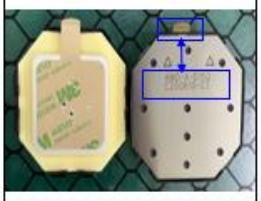
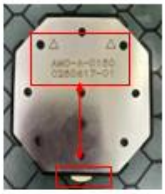
◆ **Tuning Standard**
- **Tuning Point : Max 4 points only with method 2**
- **Tuning Wide : W1 : 2.00mm**

◆ The above criteria is for only tuning which is the manual mark by worker. The tuning made in Ag printing process is not applied to the above criteria.
◆ Total tuning points with all above 2 methods : Max 4 points
◆ Criteria of defective parts
- If tuned antennas do not meet above standard, Amotech will regard them as defective part

Doc No.	10Patch-Boundary-001
Process	Appearance Inspect
Product	RDSD35A60-G4A-A-D150
Write Dept	Quality Dept.
Origin Date	2025.06.25

RDSD35A60 Type
Appearance Limit

Revision Date	-	Revision No.	0	Page	1/1

Item	O K	N G			Etc
No printing & Chipping					
		No printing •Size:≤2.0mm,Allow Q'ty:3ea •Size:>2.0mm : NG		Chipping Size≤4mm,Allow Q'ty:3ea Size>4mm : NG	
Foreign body					
		Foreign body size ≤2mm, Allowe Q'ty:2ea Foreign body size >2mm : NG		Paste Foreign body NG	
Assembly direction & Scratch					
		Assembly direction NG	boss Size 3.0mm~3.7mm OK	Carrier scratch/molding NG	
Remark	UV coating Apperance Limit : UV coating Thickness is thicker than the Tape (Release liner) thickness, treat them as defective				