

Technical Data Sheet for Type2PT

Measurement result

Kanazawa Murata Mfg. Co., Ltd
Antenna Technical Support Section

Confidential

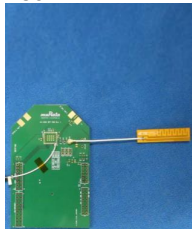
Summary

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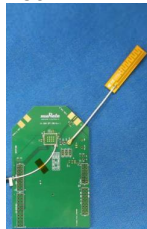
This is measurement data of FPC antenna for the Sub-GHz using an EVB for Type2PT.

Condition	Memo	[dB]	[dBi]
		Total efficiency (Ave.)	Peak gain (Max.)
1	Optimized matching circuit in free space (Layout 1)	-2.7	-0.3
2	Optimized matching circuit in free space (Layout 2)	-2.2	0.8
3	Optimized matching circuit in free space (Layout 3)	-2.0	1.8
4	Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 1)	-2.4	0.0
5	Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 2)	-2.0	0.9
6	Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 3)	-1.9	2.1

<Con.1>



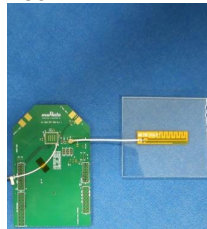
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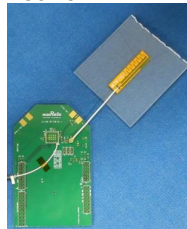
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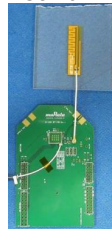
<Con.4>



<Con.5>



<Con.6>



<Comment>

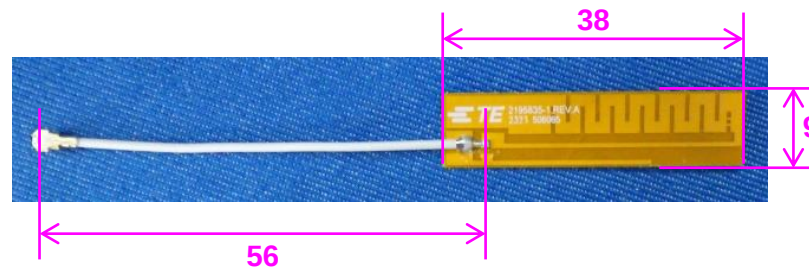
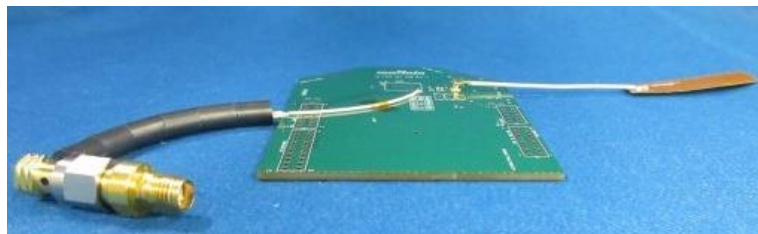
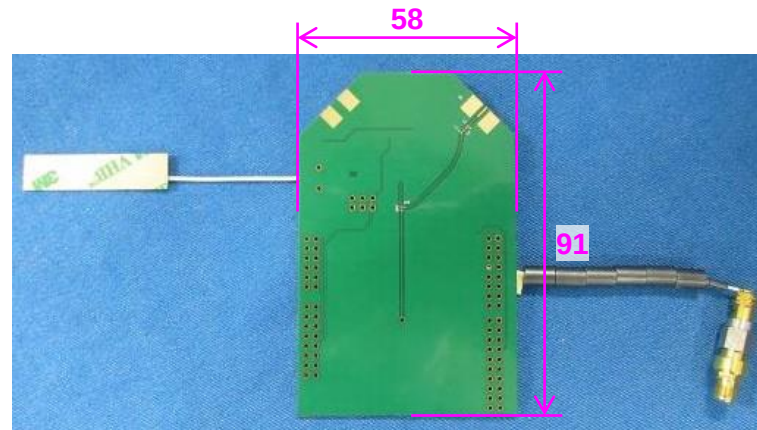
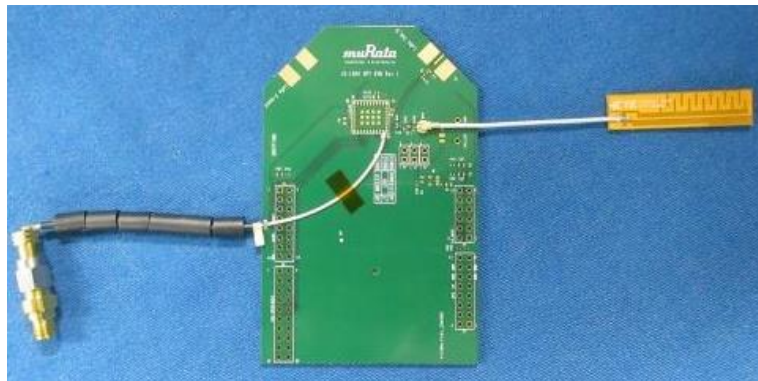
Condition 1~3 were evaluated in free space, and conditions 4~6 were evaluated after being attached to a plastic plate. The optimal matching circuit differs depending on there is or isn't the plastic plate as shown on page 5.

The matching state doesn't change much depending on the antenna installation angle, but the efficiency and maximum gain change significantly. Murata recommends attaching an antenna like Conditions 3 and 6, if peak gain should be increased.

Content

1. Appearance
2. Measurement condition
3. Measurement direction
4. Measurement result

1. Appearance



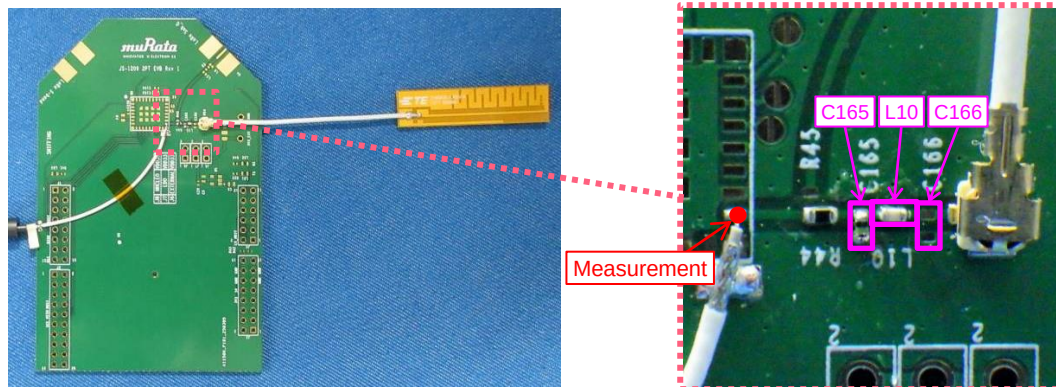
UNIT : mm

Confidential

2. Measurement condition

Condition	Memo	Matching circuit		
		C166	L10	C165
1	Optimized matching circuit in free space (Layout 1)	None	6.8pF	4.3nH
2	Optimized matching circuit in free space (Layout 2)	None	6.8pF	4.3nH
3	Optimized matching circuit in free space (Layout 3)	None	6.8pF	4.3nH
4	Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 1)	None	5.6pF	4.7nH
5	Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 2)	None	5.6pF	4.7nH
6	Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 3)	None	5.6pF	4.7nH

Size:1005 LQG15HS / GJM15 / Resistor

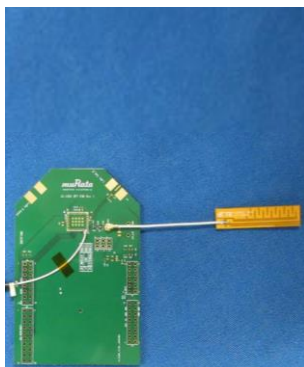


2. Measurement condition

Condition	Memo	Matching circuit		
		C166	L10	C165
1	Optimized matching circuit in free space (Layout 1)	None	6.8pF	4.3nH
2	Optimized matching circuit in free space (Layout 2)	None	6.8pF	4.3nH
3	Optimized matching circuit in free space (Layout 3)	None	6.8pF	4.3nH
4	Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 1)	None	5.6pF	4.7nH
5	Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 2)	None	5.6pF	4.7nH
6	Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 3)	None	5.6pF	4.7nH

Size:1005 LQG15HS / GJM15 / Resistor

<Condition 1>



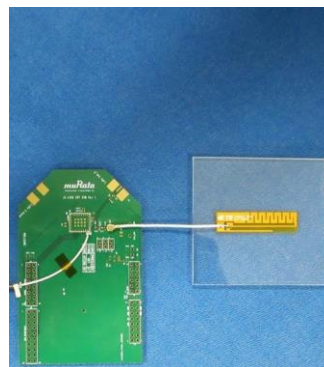
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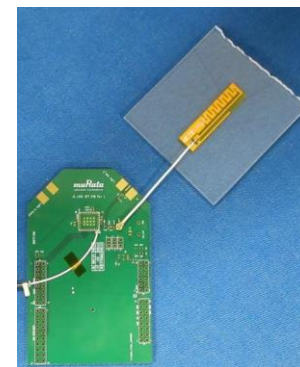
<Condition 3>



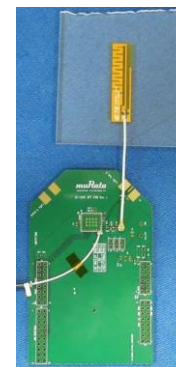
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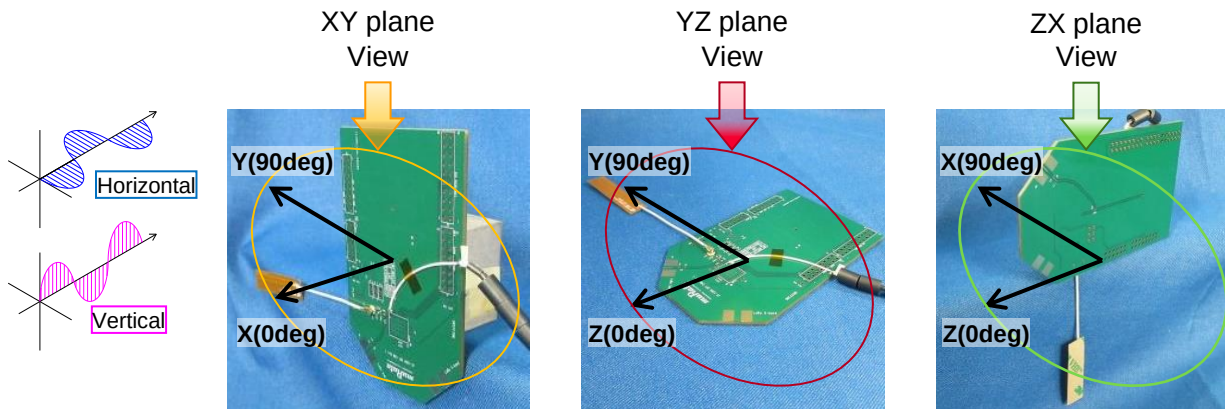
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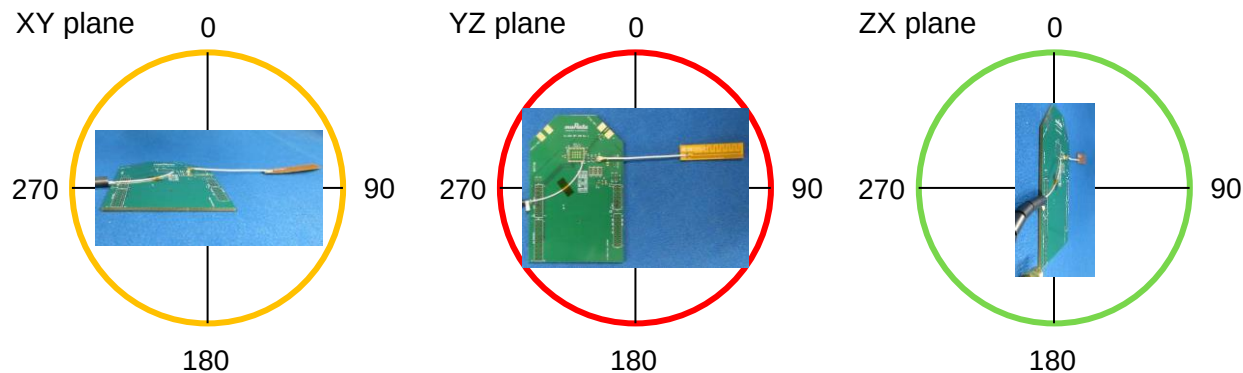
<Condition 6>



3. Measurement direction

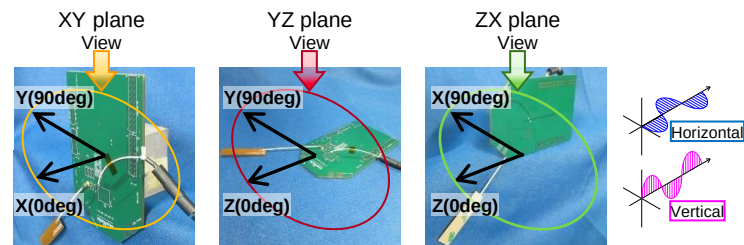
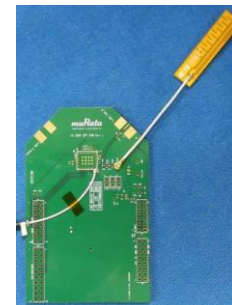
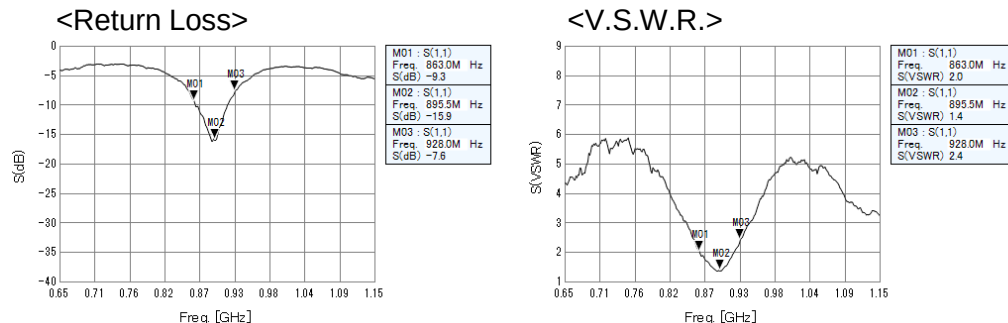


2D Directional indication



4. Measurement result

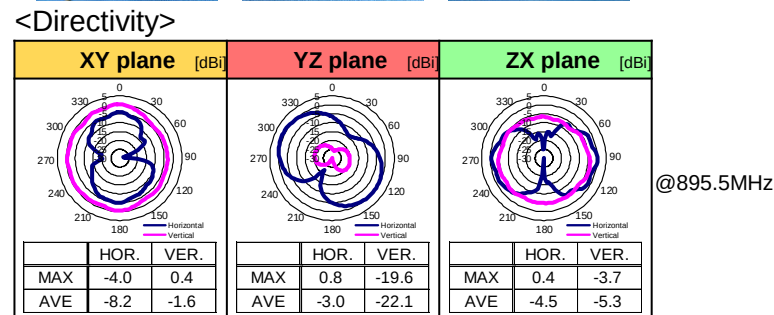
Condition 2: Optimized matching circuit in free space (Layout 2)



<Efficiency>

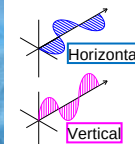
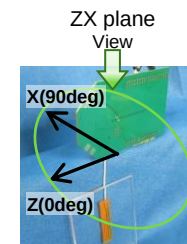
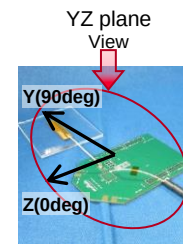
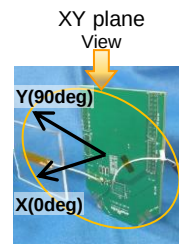
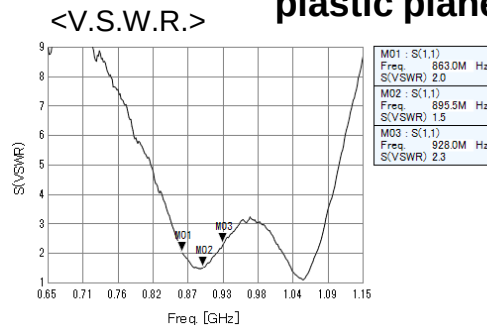
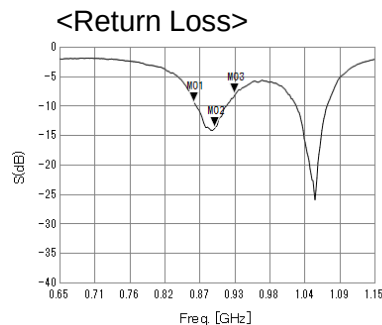
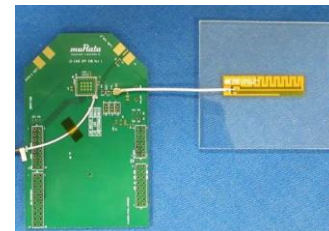
LINEAR POLAMIZATION		XY-plane		YZ-plane		ZX-plane		Total Efficiency
		hor.	ver.	hor.	ver.	hor.	ver.	
863.0 MHz	MAX.	-4.6	-0.6	0.0	-20.5	-0.6	-4.7	-2.4
	AVE.	-8.8	-2.1	-3.6	-24.5	-4.8	-6.0	
895.5 MHz	MAX.	-4.0	0.4	0.8	-19.6	0.4	-3.7	-2.0
	AVE.	-8.2	-1.6	-3.0	-22.1	-4.5	-5.3	
928.0 MHz	MAX.	-4.4	-0.2	0.2	-18.5	-0.3	-3.8	-2.2
	AVE.	-8.8	-2.0	-3.4	-22.8	-4.7	-5.8	

*Red color shows peak gain



4. Measurement result

Condition 4: Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 1)

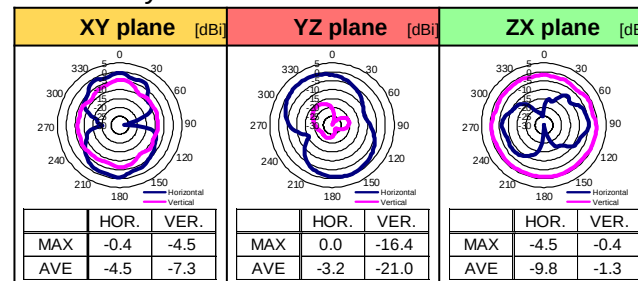


<Efficiency>

LINEAR POLAMIZATION		XY-plane		YZ-plane		ZX-plane		Total Efficiency
		hor.	ver.	hor.	ver.	hor.	ver.	
863.0 MHz	MAX.	-0.6	-6.6	-1.1	-19.1	-6.6	-1.1	-2.9
	AVE.	-4.9	-8.5	-4.1	-23.1	-10.9	-2.0	
895.5 MHz	MAX.	-0.4	-4.5	0.0	-16.4	-4.5	-0.4	-2.2
	AVE.	-4.5	-7.3	-3.2	-21.0	-9.8	-1.3	
928.0 MHz	MAX.	-0.1	-5.7	-0.5	-17.5	-6.0	0.0	-2.2
	AVE.	-4.5	-7.2	-3.4	-22.8	-10.2	-1.6	

*Red color shows peak gain

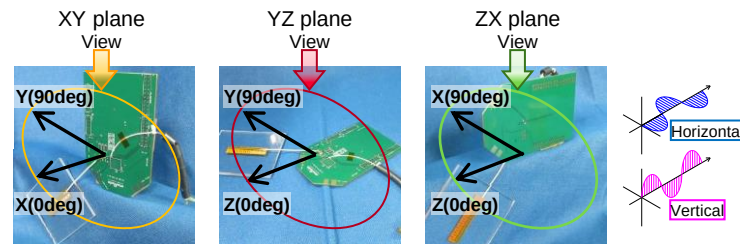
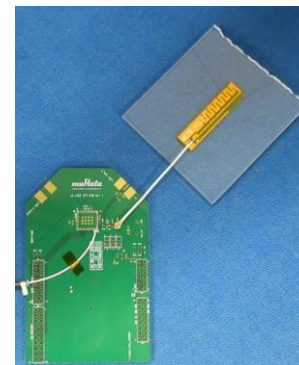
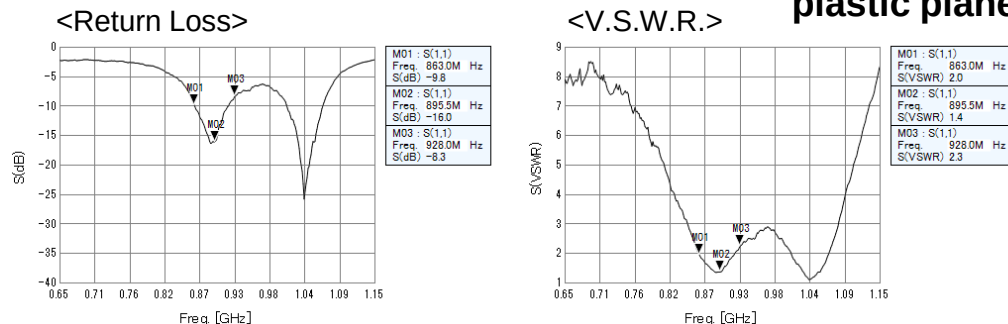
<Directivity>



@895.5MHz

4. Measurement result

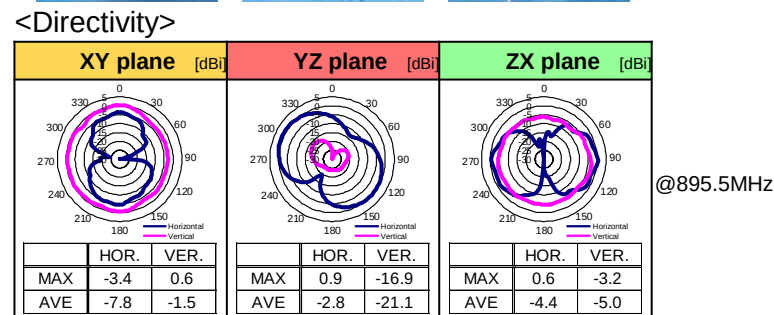
Condition 5: Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 2)



<Efficiency>

LINEAR POLAMIZATION		XY-plane		YZ-plane		ZX-plane		Total
		hor.	ver.	hor.	ver.	hor.	ver.	Efficiency
863.0 MHz	MAX.	-4.6	-0.5	0.1	-19.4	-0.5	-4.5	-2.4
	AVE.	-8.6	-2.1	-3.5	-23.4	-4.9	-5.7	
895.5 MHz	MAX.	-3.4	0.6	0.9	-16.9	0.6	-3.2	-1.9
	AVE.	-7.8	-1.5	-2.8	-21.1	-4.4	-5.0	
928.0 MHz	MAX.	-3.7	0.1	0.6	-16.4	-0.1	-3.3	-1.8
	AVE.	-8.1	-1.6	-3.0	-22.1	-4.4	-5.2	

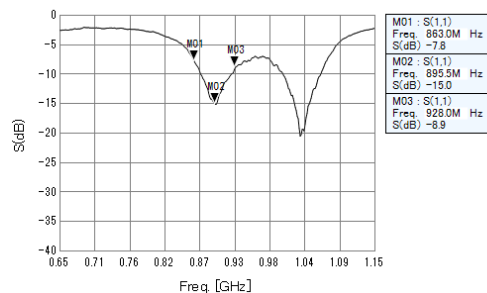
*Red color shows peak gain



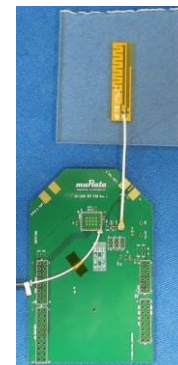
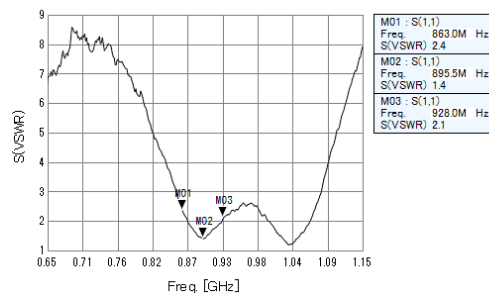
4. Measurement result

Condition 6: Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 3)

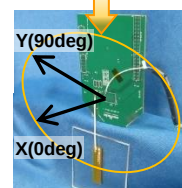
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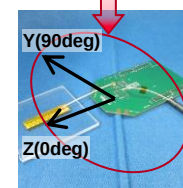
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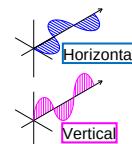
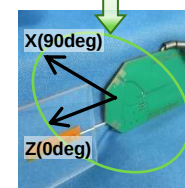
XY plane View



YZ plane View



ZX plane View

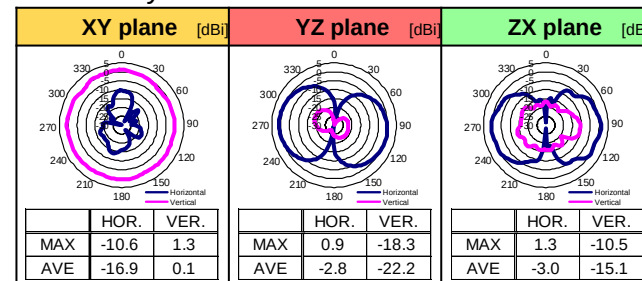


<Efficiency>

LINEAR POLAMIZATION		XY-plane		YZ-plane		ZX-plane		Total
		hor.	ver.	hor.	ver.	hor.	ver.	Efficiency
863.0 MHz	MAX.	-15.8	0.5	-0.3	-19.1	0.5	-15.0	-2.5
	AVE.	-20.5	-0.7	-3.8	-24.1	-3.5	-17.7	
895.5 MHz	MAX.	-10.6	1.3	0.9	-18.3	1.3	-10.5	-1.8
	AVE.	-16.9	0.1	-2.8	-22.2	-3.0	-15.1	
928.0 MHz	MAX.	-12.2	2.1	0.9	-17.0	2.1	-12.4	-1.6
	AVE.	-17.5	0.2	-2.7	-22.3	-2.5	-15.5	

*Red color shows peak gain

<Directivity>



@895.5MHz

4. Measurement result (Comparison)

<Measurement condition>

Condition	Memo
Condition 1	Optimized matching circuit in free space (Layout 1)
Condition 2	Optimized matching circuit in free space (Layout 2)
Condition 3	Optimized matching circuit in free space (Layout 3)
Condition 4	Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 1)
Condition 5	Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 2)
Condition 6	Optimized matching circuit with antenna on 3mm thick plastic plane (Layout 3)

<Measurement result>

Total efficiency				[dB]	[%]
Condition	Frequency [MHz]			Average	Average
	863	895.5	928		
Condition 1	-3.0	-2.4	-2.7	-2.7	53.7
Condition 2	-2.4	-2.0	-2.2	-2.2	60.2
Condition 3	-2.4	-1.8	-1.9	-2.0	62.5
Condition 4	-2.9	-2.2	-2.2	-2.4	57.3
Condition 5	-2.4	-1.9	-1.8	-2.0	63.1
Condition 6	-2.5	-1.8	-1.6	-1.9	63.9

Peak gain				[dBi]
Condition	Frequency [MHz]			Max.
	863	895.5	928	
Condition 1	-0.5	-0.3	-0.4	-0.3
Condition 2	0.0	0.8	0.2	0.8
Condition 3	0.6	1.2	1.8	1.8
Condition 4	-0.6	0.0	0.0	0.0
Condition 5	0.1	0.9	0.6	0.9
Condition 6	0.5	1.3	2.1	2.1