

Technical Data Sheet for UWB

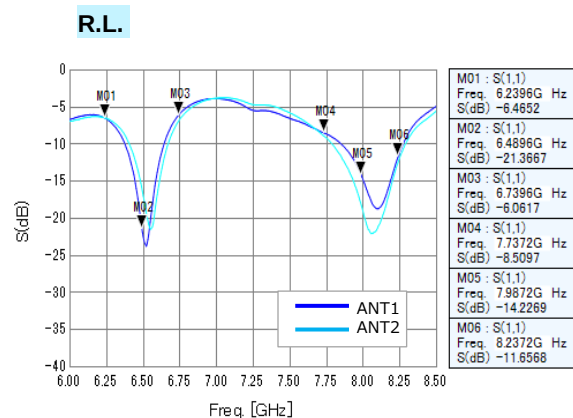
Measurement result

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



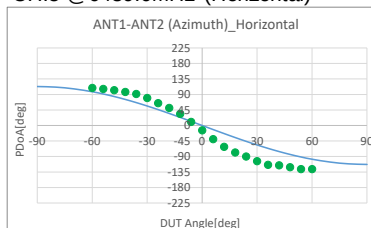
Summary

Condition	Memo	Antenna	Total efficiency [dB]		Peak gain [dBi]	
			CH.5 (3point Ave.)	CH.9 (3point Ave.)	CH.5 (Max.)	CH.9 (Max.)
1	UWB Antenna	1	-5.0	-4.4	0.3	2.7
		2	-5.1	-4.7	0.9	2.8

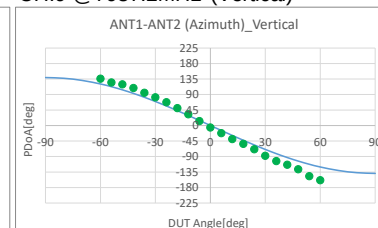


PD_{0A}

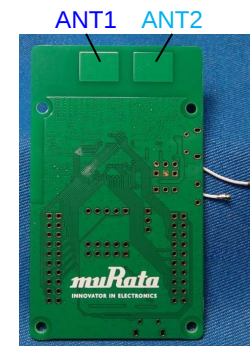
CH.5 @6489.6MHz (Horizontal)



CH.9 @7987.2MHz (Vertical)



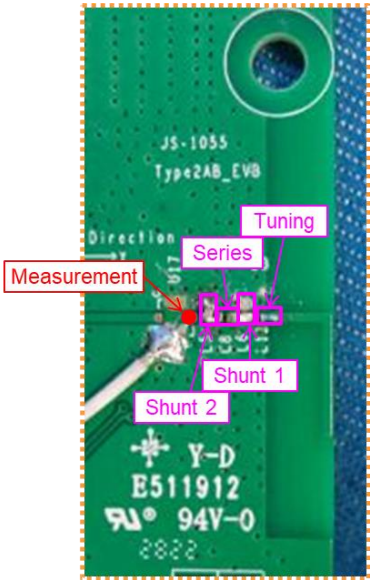
Angle	Measurement PD _{0A} [deg]		Angle	Phase Difference of Antenna	
	Horizontal	Vertical		Horizontal	Vertical
-60	108.7	136.3	-60 - -54	2.9	11.1
-54	105.8	125.2	-54 - -48	3.5	5.6
-48	102.3	119.6	-48 - -42	5.1	10.7
-42	97.2	109.0	-42 - -36	6.1	13.8
-36	91.1	95.2	-36 - -30	11.6	13.3
-30	79.5	81.9	-30 - -24	14.8	14.2
-24	64.7	67.7	-24 - -18	13.9	17.2
-18	50.8	50.5	-18 - -12	17.3	17.9
-12	33.5	32.6	-12 - -6	23.3	19.6
-6	10.2	13.0	-6 - 0	24.5	18.7
0	-14.3	-5.6	0 - 6	25.5	16.3
6	-39.8	-21.9	6 - 12	22.1	17.1
12	-61.9	-39.0	12 - 18	16.5	14.0
18	-78.4	-53.0	18 - 24	11.6	15.8
24	-90.0	-68.8	24 - 30	13.7	19.0
30	-103.7	-87.8	30 - 36	10.5	15.2
36	-114.2	-103.0	36 - 42	1.5	10.5
42	-115.7	-113.5	42 - 48	5.5	13.2
48	-121.3	-126.7	48 - 54	5.4	20.1
54	-126.6	-146.8	54 - 60	0.1	11.7
60	-126.7	-158.5			



Summary

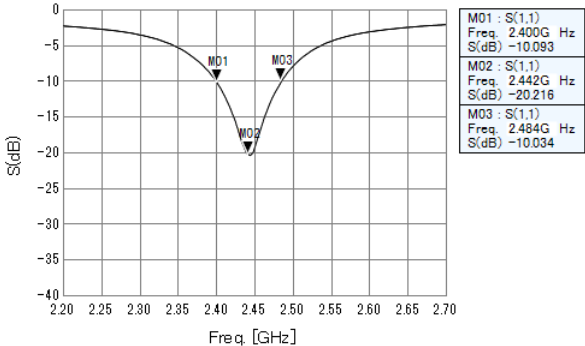
Condition	Memo	[dB]	[dBi]
		Total efficiency Average	Peak gain Max.
1	BLE Antenna	-6.4	-3.8

*Loss for measurement cable was excluded from gain and efficiency



Condition	Tuning 1	Matching circuit		
		Shunt 1	Series	Shunt 2
1	8.2nH	None	1.1nH	2.0pF

- Size:1005 LQG15HS / GJM15 / Resistor
- Size:0603 LQP03 / GRM03 / Resistor



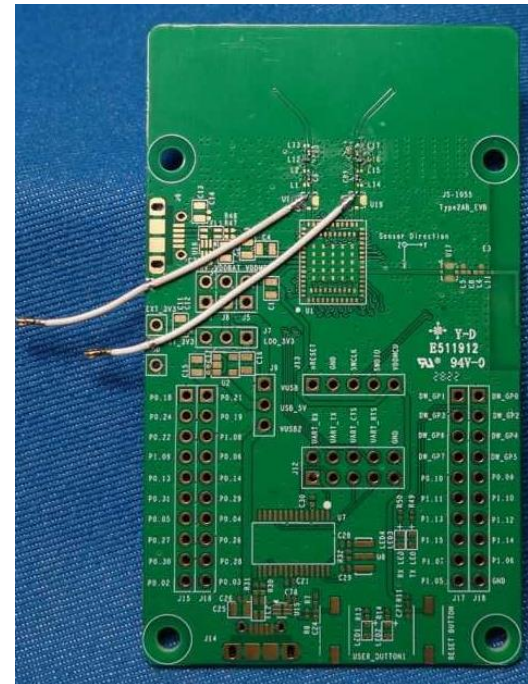
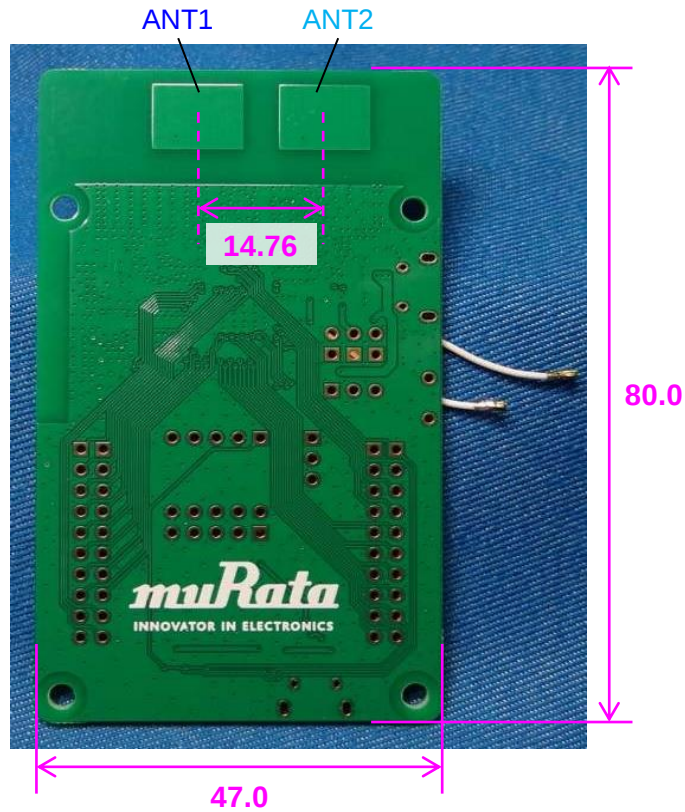


1. Appearance
2. Measurement condition
3. Measurement result

1. Appearance – UWB antenna



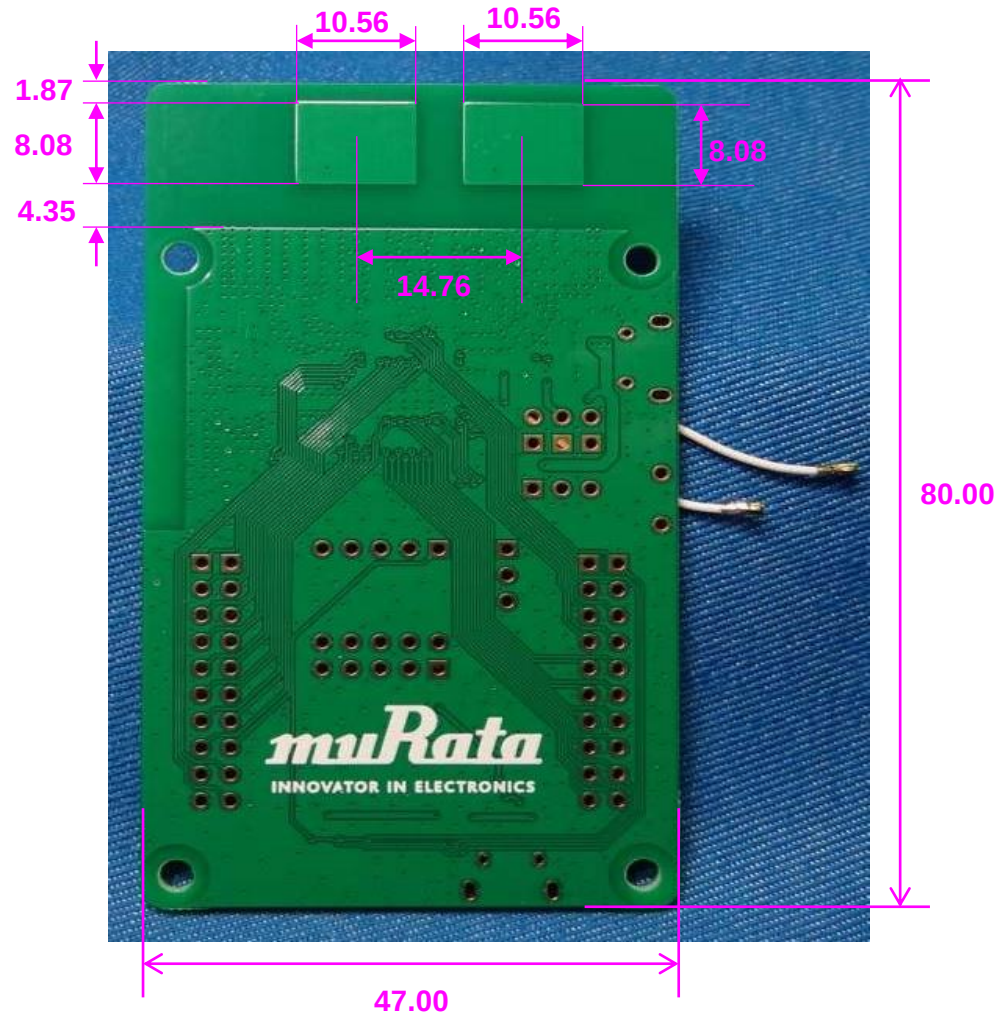
UNIT : mm



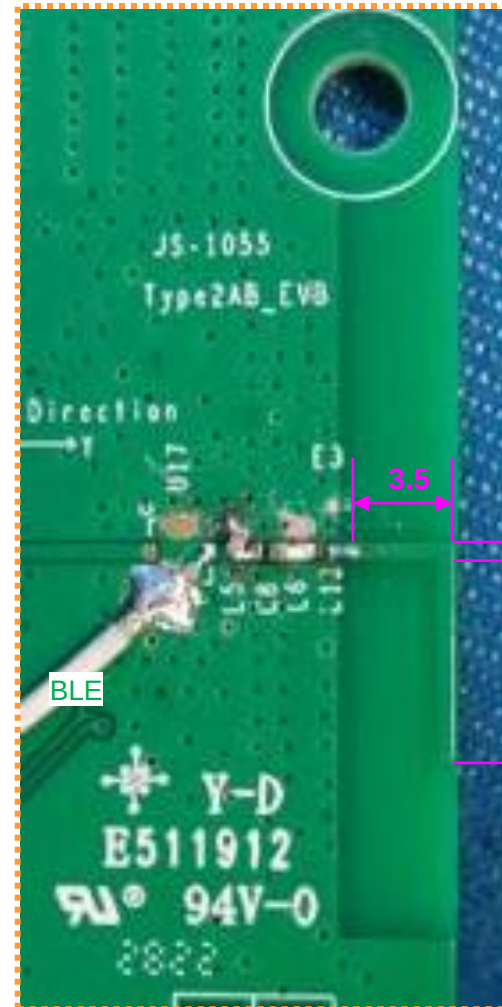
1. Appearance – UWB antenna Dimension



UNIT : mm



1. Appearance – BLE antenna Dimension



UNIT : mm

3.5

0.5

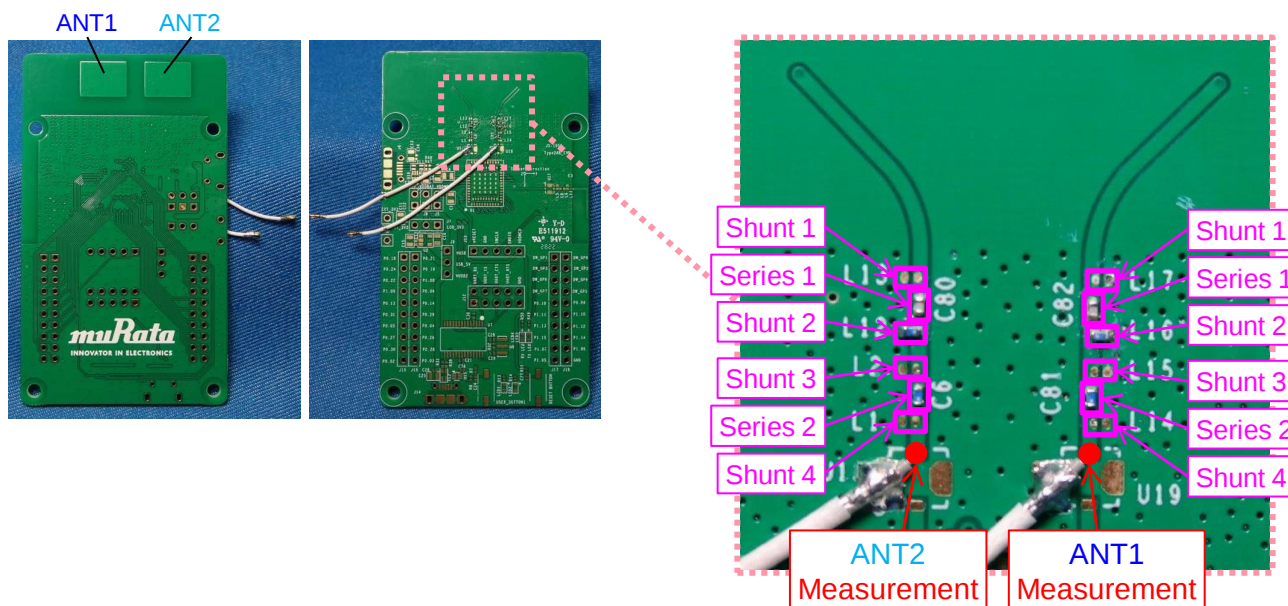
6.45

BLE

2. Measurement condition for UWB

Condition	Memo	Antenna	Matching circuit					
			Shunt 1	Series 1	Shunt 2	Shunt 3	Series 2	Shunt 4
Condition 1	UWB Antenna	ANT1	None	0.5pF	1.6nH	None	1.0nH	None
		ANT2	None	0.5pF	1.6nH	None	1.0nH	None

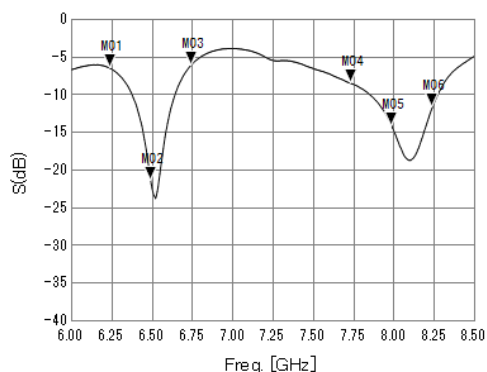
Size:0603 LQP03 / GRM03 / Resistor



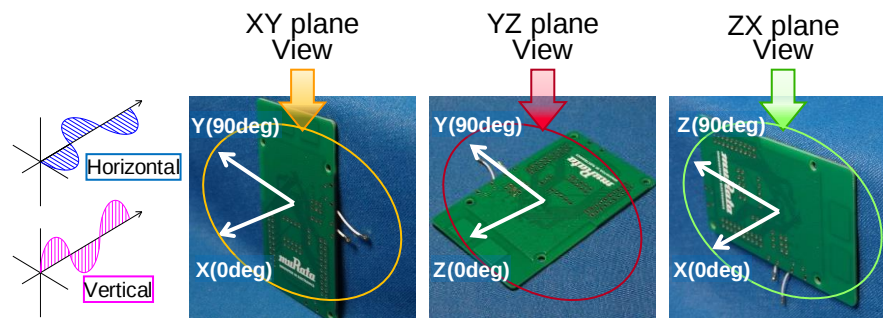
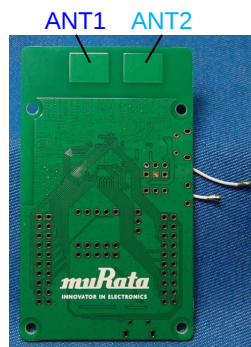
3. Measurement result for UWB

Condition 1: Antenna 1

<Return Loss>



M01 : S(1,1)
Freq. 6.2396G Hz
S(dB) -6.4652
M02 : S(1,1)
Freq. 6.4896G Hz
S(dB) -21.3667
M03 : S(1,1)
Freq. 6.7396G Hz
S(dB) -6.0617
M04 : S(1,1)
Freq. 7.7372G Hz
S(dB) -8.5097
M05 : S(1,1)
Freq. 7.9872G Hz
S(dB) -14.2269
M06 : S(1,1)
Freq. 8.2372G Hz
S(dB) -11.6568

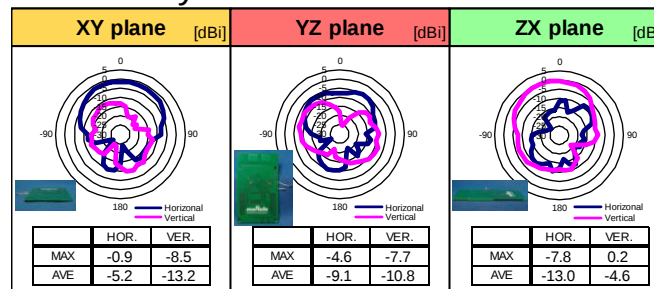


<Efficiency>

*Red color shows peak gain

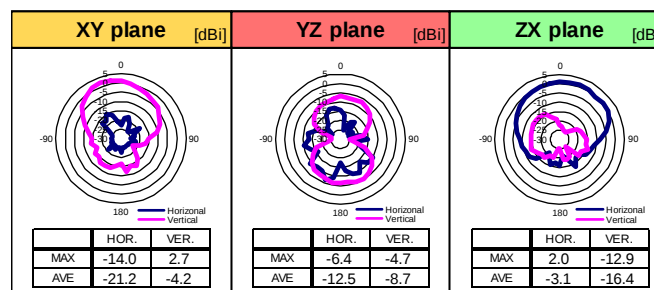
LINEAR POLARIZATION		XY-plane [dBi]		YZ-plane [dBi]		ZX-plane [dBi]		Total Efficiency
		hor.	ver.	hor.	ver.	hor.	ver.	
6239.6 MHz	MAX.	0.0	-10.2	-4.1	-7.2	-10.6	0.3	-4.8
	AVE.	-4.6	-14.7	-9.0	-11.1	-16.5	-4.4	
6489.6 MHz	MAX.	-0.9	-8.5	-4.6	-7.7	-7.8	0.2	-4.3
	AVE.	-5.2	-13.2	-9.1	-10.8	-13.0	-4.6	
6739.6 MHz	MAX.	-2.4	-7.4	-6.1	-6.7	-7.4	-1.2	-6.1
	AVE.	-7.1	-11.3	-10.2	-10.7	-11.4	-6.3	

<Directivity>



@6489.6MHz

LINEAR POLARIZATION		XY-plane [dBi]		YZ-plane [dBi]		ZX-plane [dBi]		Total Efficiency
		hor.	ver.	hor.	ver.	hor.	ver.	
7737.2 MHz	MAX.	-12.5	2.3	-6.1	-5.8	2.4	-12.4	-4.0
	AVE.	-18.5	-4.8	-13.2	-9.1	-3.0	-16.2	
7987.2 MHz	MAX.	-14.0	2.7	-6.4	-4.7	2.0	-12.9	-4.2
	AVE.	-21.2	-4.2	-12.5	-8.7	-3.1	-16.4	
8237.2 MHz	MAX.	-12.5	1.8	-7.6	-5.5	0.5	-11.4	-5.0
	AVE.	-18.6	-5.2	-13.6	-9.5	-4.4	-15.4	

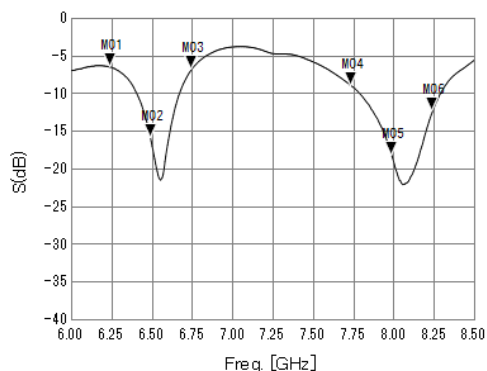


@7987.2MHz

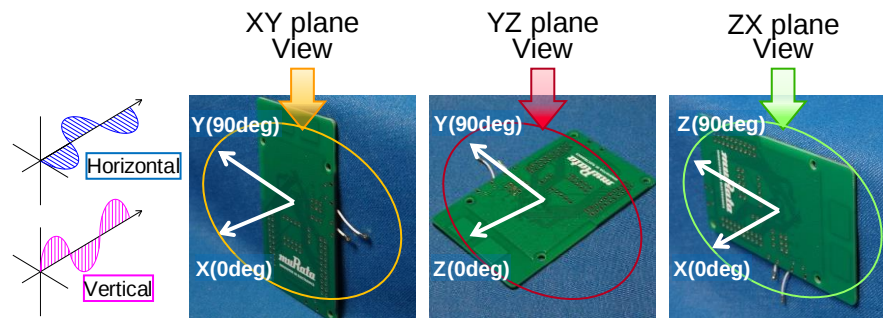
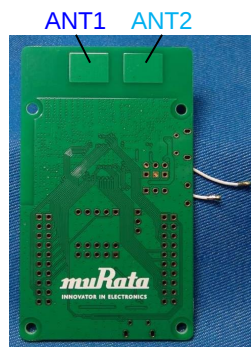
3. Measurement result for UWB

Condition 1: Antenna 2

<Return Loss>



M01 : S(2,2)	Freq. 6.2396G Hz
S(dB) -6.4273	
M02 : S(2,2)	Freq. 6.4896G Hz
S(dB) -15.9638	
M03 : S(2,2)	Freq. 6.7396G Hz
S(dB) -6.8560	
M04 : S(2,2)	Freq. 7.7372G Hz
S(dB) -8.9650	
M05 : S(2,2)	Freq. 7.9872G Hz
S(dB) -18.3139	
M06 : S(2,2)	Freq. 8.2372G Hz
S(dB) -12.3751	

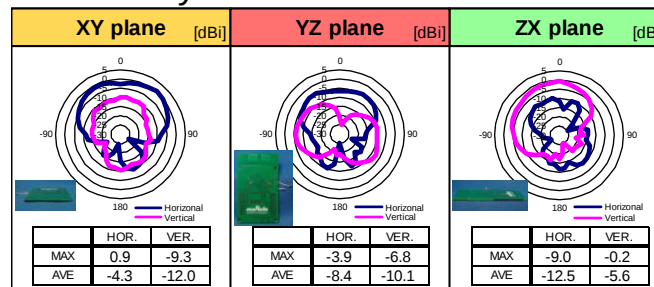


<Efficiency>

*Red color shows peak gain

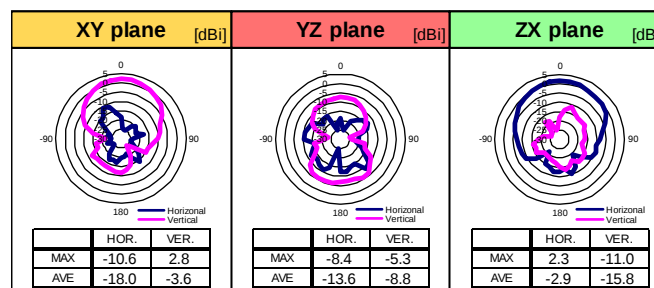
LINEAR POLARIZATION		XY-plane [dBi]		YZ-plane [dBi]		ZX-plane [dBi]		Total Efficiency
		hor.	ver.	hor.	ver.	hor.	ver.	
6239.6 MHz	MAX.	0.6	-8.5	-3.2	-6.8	-8.6	-0.7	-5.2
	AVE.	-4.3	-12.4	-8.2	-11.4	-13.6	-5.9	
6489.6 MHz	MAX.	0.9	-9.3	-3.9	-6.8	-9.0	-0.2	-4.3
	AVE.	-4.3	-12.0	-8.4	-10.1	-12.5	-5.6	
6739.6 MHz	MAX.	-1.6	-6.3	-6.0	-6.7	-6.8	-1.4	-6.0
	AVE.	-6.1	-11.5	-10.3	-10.4	-10.8	-6.4	

<Directivity>



@6489.6MHz

LINEAR POLARIZATION		XY-plane [dBi]		YZ-plane [dBi]		ZX-plane [dBi]		Total Efficiency
		hor.	ver.	hor.	ver.	hor.	ver.	
7737.2 MHz	MAX.	-9.8	2.8	-9.0	-5.8	1.6	-11.3	-4.4
	AVE.	-16.5	-4.3	-14.6	-9.2	-3.3	-15.2	
7987.2 MHz	MAX.	-10.6	2.8	-8.4	-5.3	2.3	-11.0	-4.3
	AVE.	-18.0	-3.6	-13.6	-8.8	-2.9	-15.8	
8237.2 MHz	MAX.	-13.2	1.5	-9.8	-5.9	1.0	-13.0	-5.4
	AVE.	-18.3	-4.9	-14.7	-9.5	-4.3	-16.9	

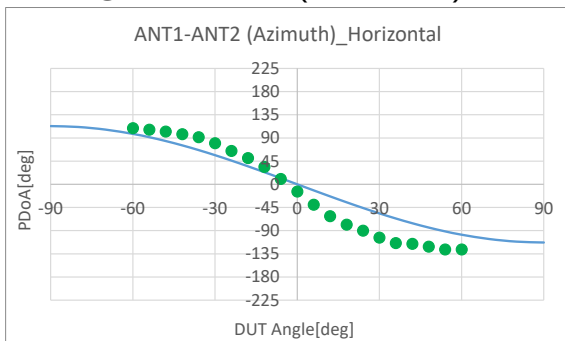


@7987.2MHz

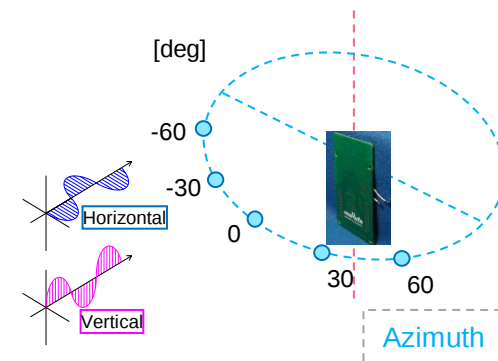
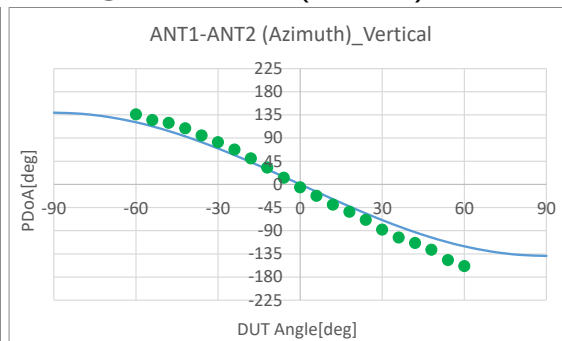
3. Measurement result for UWB

<PDoA>

CH.5 @6489.6MHz (Horizontal)

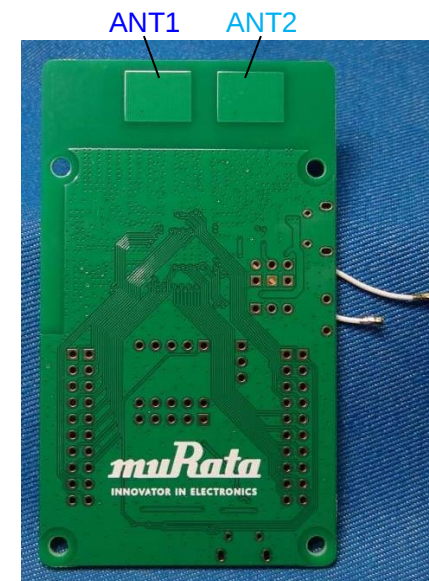


CH.9 @7987.2MHz (Vertical)



— Theoretical PDoA
● Measurement PDoA

	Angle	Measurement PDoA [deg]		Angle	Phase Difference of Antenna	
		Horizontal	Vertical		Horizontal	Vertical
Azimuth	-60	108.7	136.3	-60 - -54	2.9	11.1
	-54	105.8	125.2	-54 - -48	3.5	5.6
	-48	102.3	119.6	-48 - -42	5.1	10.7
	-42	97.2	109.0	-42 - -36	6.1	13.8
	-36	91.1	95.2	-36 - -30	11.6	13.3
	-30	79.5	81.9	-30 - -24	14.8	14.2
	-24	64.7	67.7	-24 - -18	13.9	17.2
	-18	50.8	50.5	-18 - -12	17.3	17.9
	-12	33.5	32.6	-12 - -6	23.3	19.6
	-6	10.2	13.0	-6 - 0	24.5	18.7
	0	-14.3	-5.6	0 - 6	25.5	16.3
	6	-39.8	-21.9	6 - 12	22.1	17.1
	12	-61.9	-39.0	12 - 18	16.5	14.0
	18	-78.4	-53.0	18 - 24	11.6	15.8
	24	-90.0	-68.8	24 - 30	13.7	19.0
	30	-103.7	-87.8	30 - 36	10.5	15.2
	36	-114.2	-103.0	36 - 42	1.5	10.5
	42	-115.7	-113.5	42 - 48	5.5	13.2
	48	-121.3	-126.7	48 - 54	5.4	20.1
	54	-126.6	-146.8	54 - 60	0.1	11.7
	60	-126.7	-158.5			

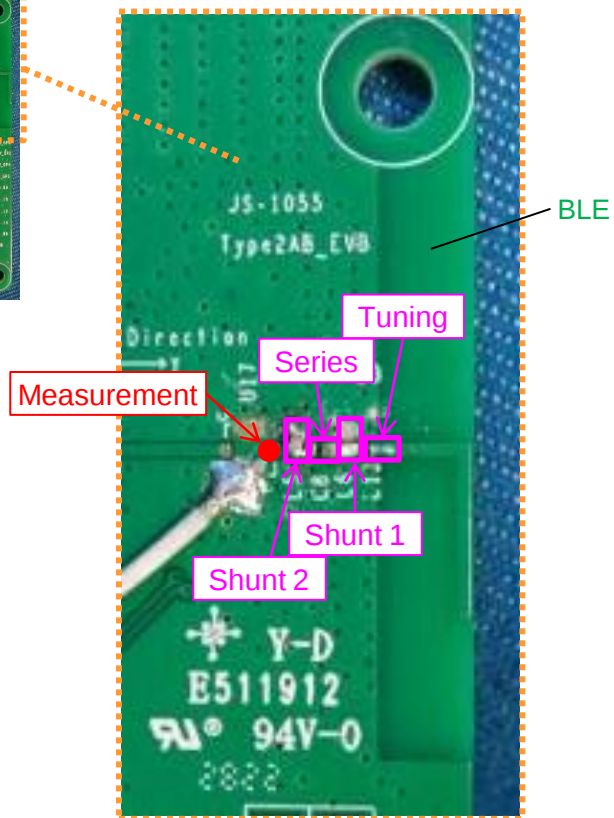


2. Measurement condition for BLE

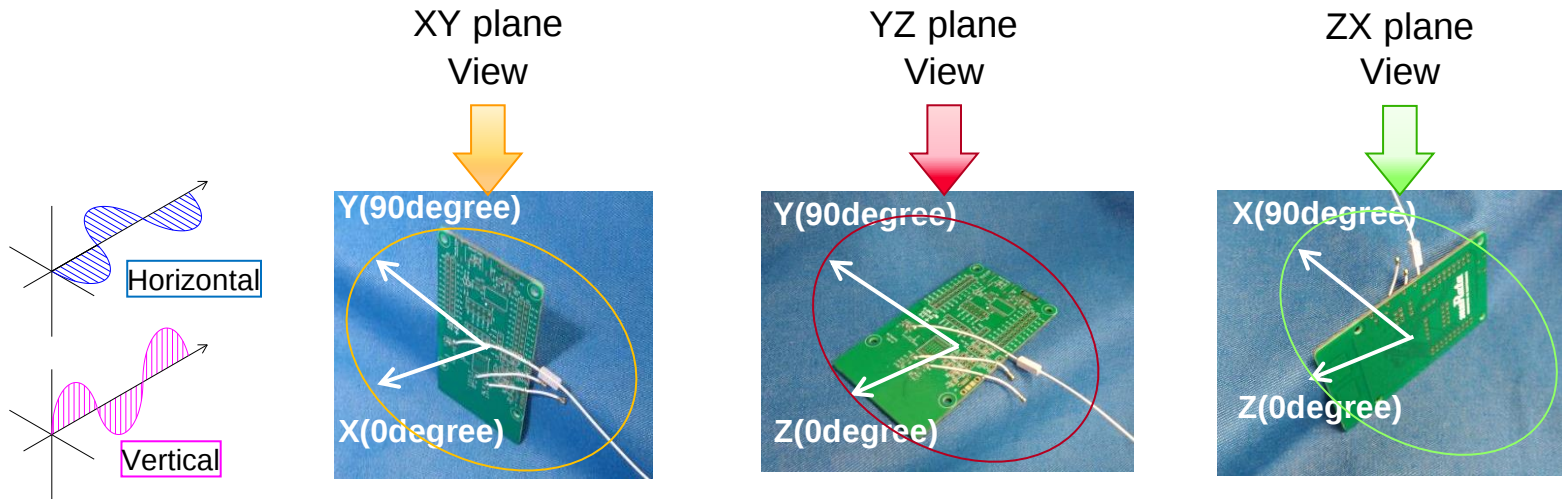
Condition	Memo	Tuning 1	Matching circuit		
			Shunt 1	Series	Shunt 2
Condition 1	BLE Antenna	8.2nH	None	1.1nH	2.0pF

Size:1005 LQG15HS / GJM15 / Resistor

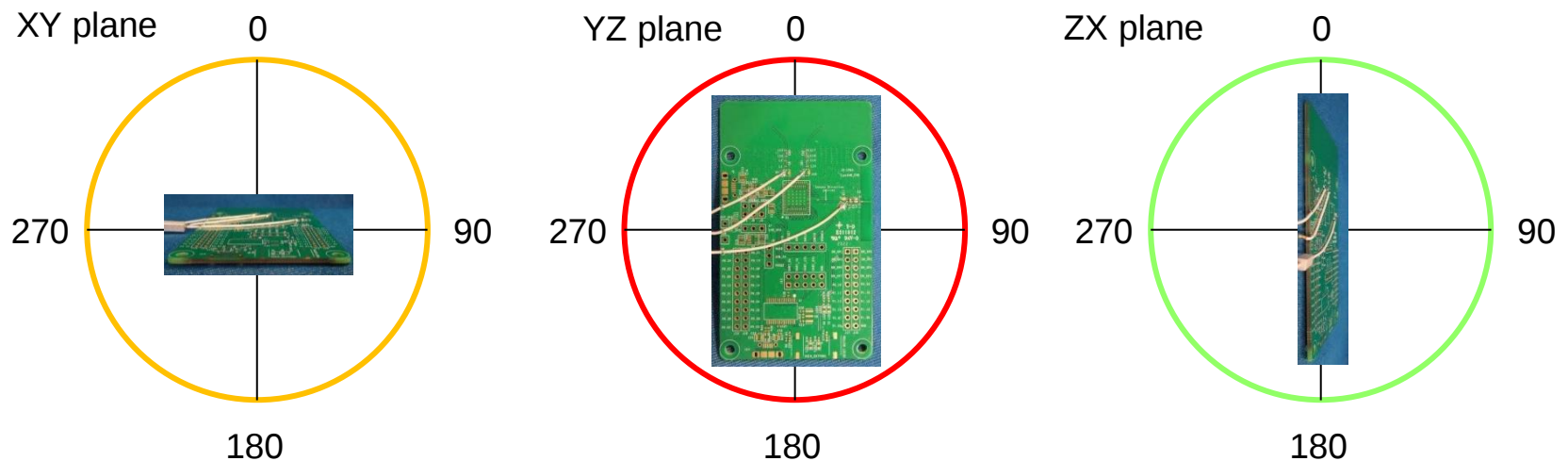
Size:0603 LQP03 / GRM03 / Resistor



3. Measurement direction for BLE



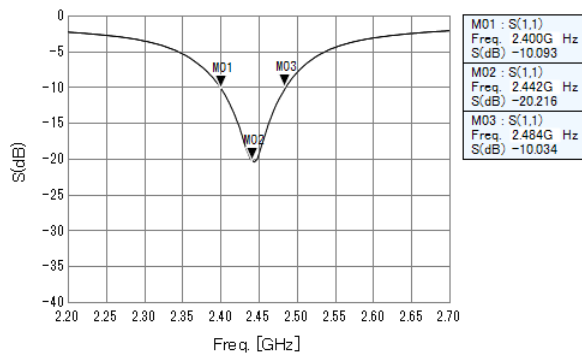
2D Directional indication



4. Measurement result for BLE

Condition 1:

<Return Loss>



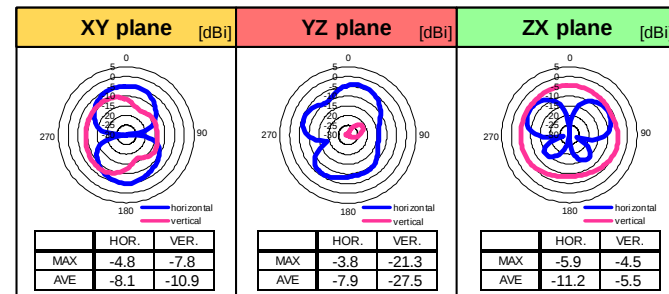
<Efficiency>

*Red color shows peak gain

LINEAR POLARIZATION		XY-plane [dBi]		YZ-plane [dBi]		ZX-plane [dBi]		Total Efficiency [dB]
		hor.	ver.	hor.	ver.	hor.	ver.	
2400 MHz	MAX.	-5.2	-8.1	-4.1	-21.9	-6.6	-4.9	-6.4
	AVE.	-8.7	-11.2	-8.3	-27.8	-11.8	-5.9	
2442 MHz	MAX.	-4.8	-7.8	-3.8	-21.3	-5.9	-4.5	-6.1
	AVE.	-8.1	-10.9	-7.9	-27.5	-11.2	-5.5	
2484 MHz	MAX.	-5.5	-8.3	-4.2	-22.8	-6.3	-4.8	-6.7
	AVE.	-8.8	-11.6	-8.5	-28.4	-11.9	-6.1	

*Loss for measurement cable was excluded from gain and efficiency

<Directivity>



@2442MHz

Antenna manufacturer information

UWB antenna

Model: JS-1055-UWB-ANT

Manufacturer: Murata Manufacturing Co., Ltd.

Address: 10-1, Higashikotari 1-chome, Nagaokakyo-shi, Kyoto 617-8555, Japan

UWB antenna

Model: JS-1055-BLE-ANT

Manufacturer: Murata Manufacturing Co., Ltd.

Address: 10-1, Higashikotari 1-chome, Nagaokakyo-shi, Kyoto 617-8555, Japan