

Technical Data Sheet for GNSS/BLE/WiFi/LoRa Type1WL Measurement result

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



Summary

<Content>

Antenna performance of EVB for Type1WL was measured.

Condition	Memo
1	Default

Condition	Comment	Antenna	[dB]				[dBi]			
			Total efficiency (Ave.)				Peak gain (Max.)			
			LoRa (1) 800MHz band	LoRa (2) 900MHz band	GNSS	BLE/WiFi	LoRa (1) 800MHz band	LoRa (2) 900MHz band	GNSS	BLE/WiFi
1	Default	LoRa	-2.6	-2.4			0.4	0.0		
		GNSS			-5.1				0.4	
		BLE/WiFi				-1.4				1.7

<Comment>

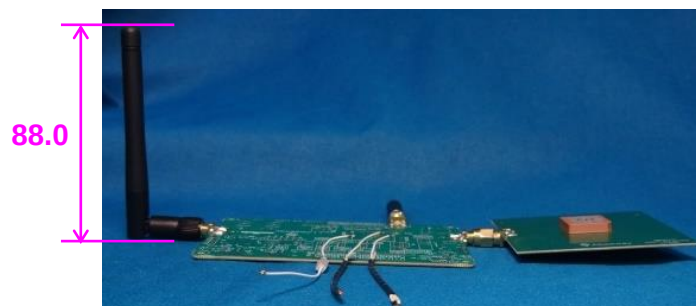
Antenna performance of LoRa, GNSS and BLE/WiFi is shown in above table.



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

1. Appearance

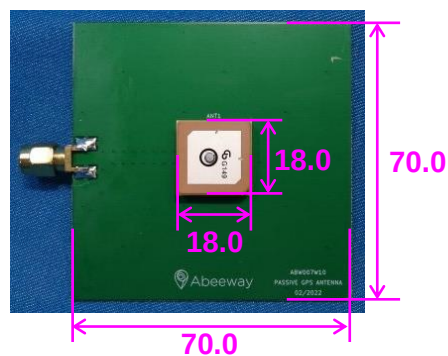
UNIT : mm



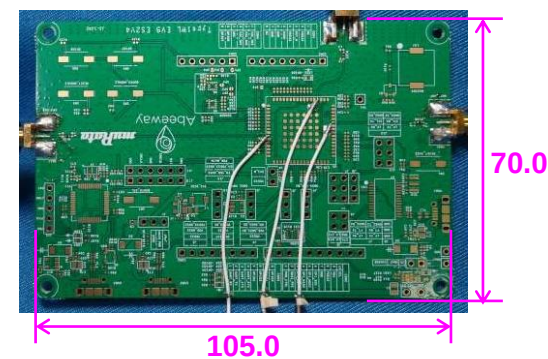
<BLE/WiFi>



<GNSS>



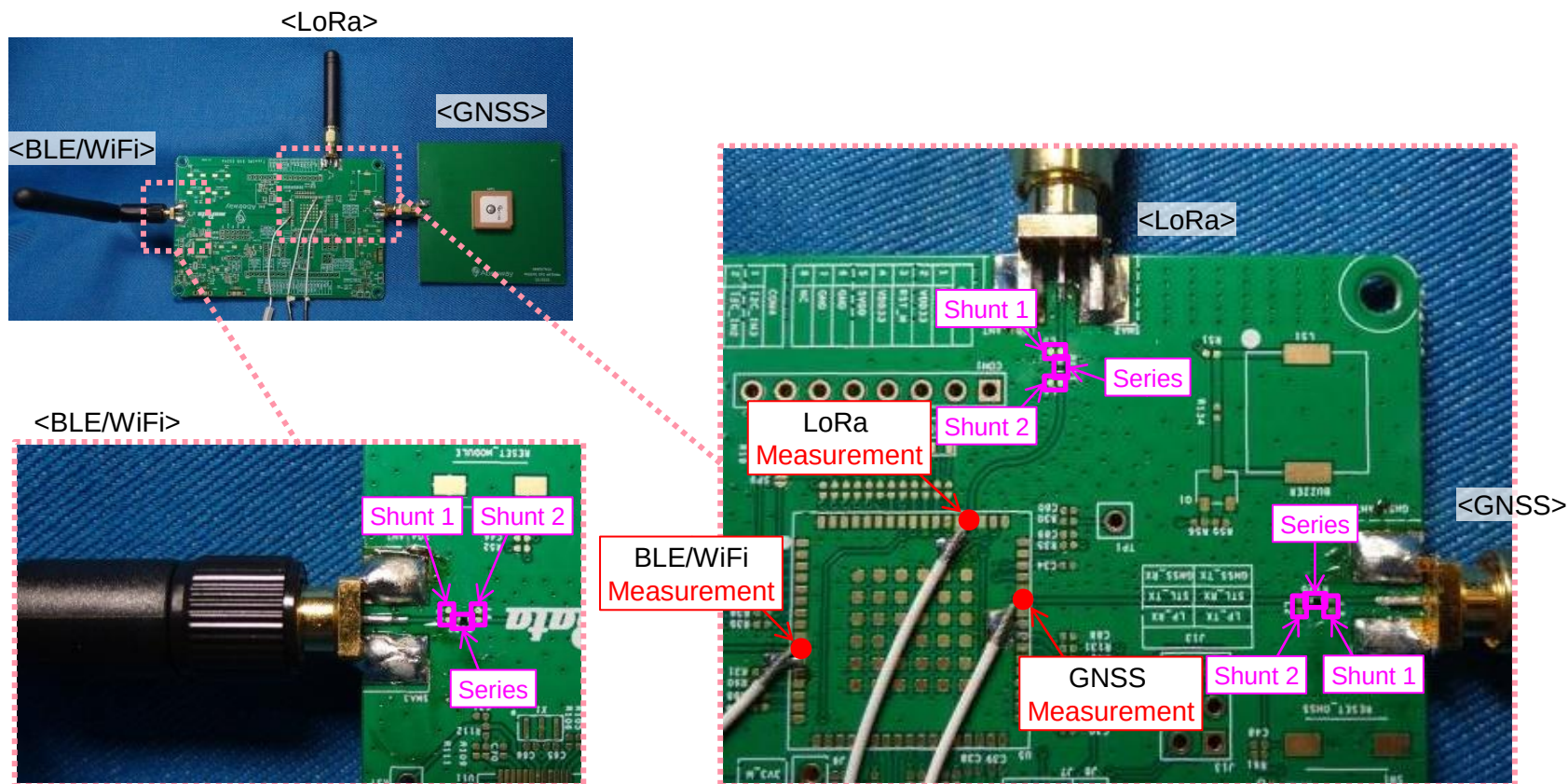
<LoRa>



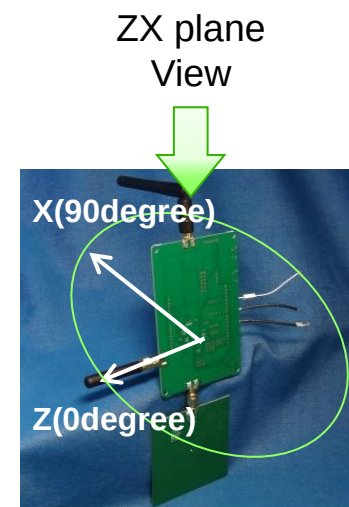
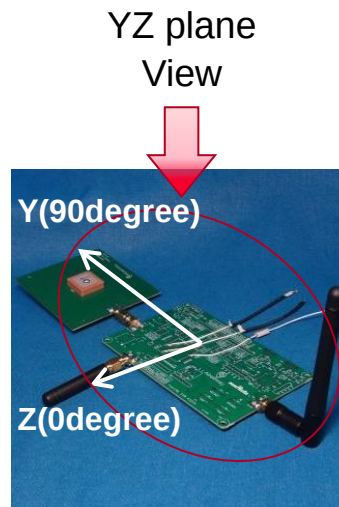
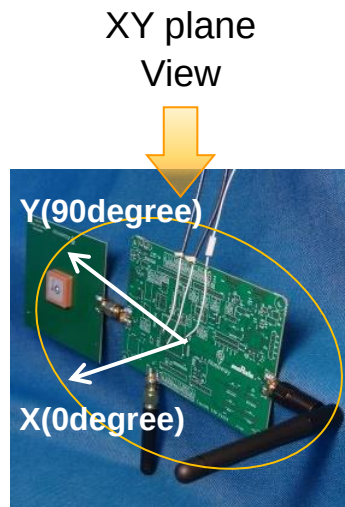
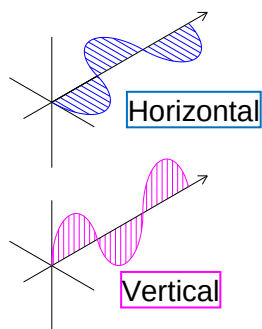
2. Measurement condition

Condition	Memo	Matching circuit		
		Shunt 1	Series	Shunt 2
Condition 1	LoRa	None	0ohm	None
	GNSS	None	0ohm	None
	BLE/WiFi	None	0ohm	None

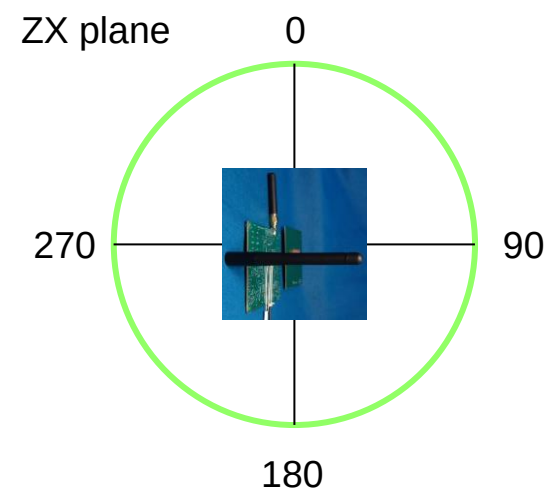
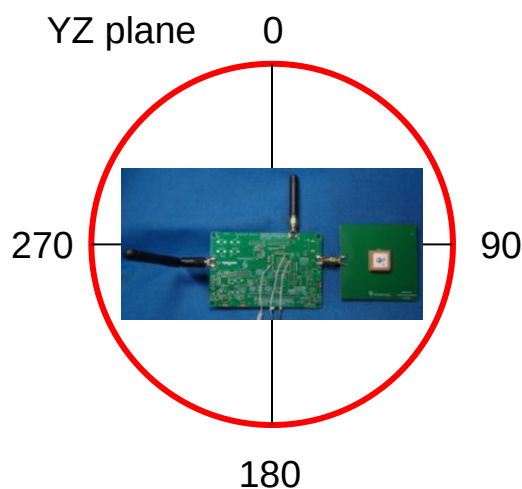
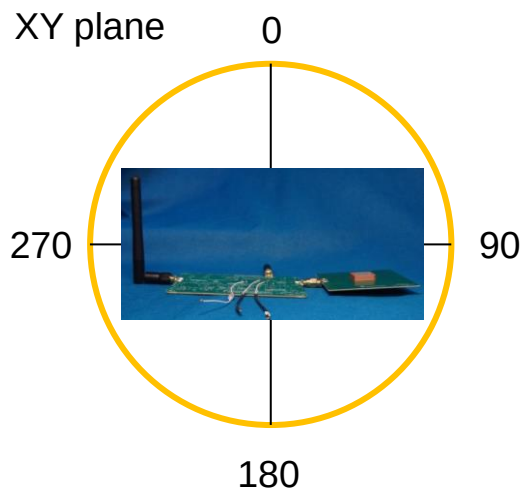
Size:1005 LQG15HS / GRM15 / Resistor



3. Measurement direction

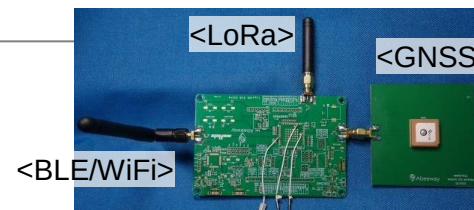


2D Directional indication

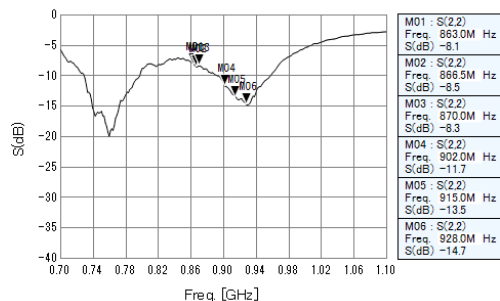


4. Measurement result

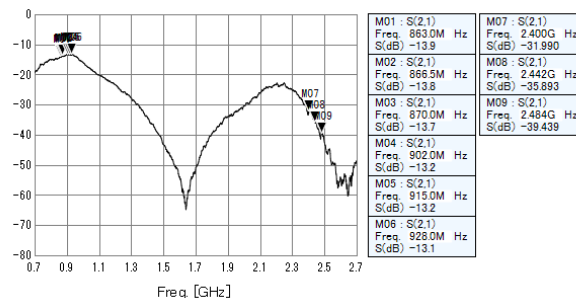
Condition 1: Default_LoRa



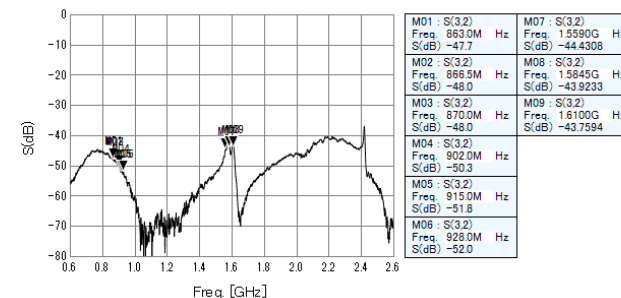
<Return Loss>



<Isolation> LoRa-BLE/WiFi



<Isolation> LoRa-GNSS

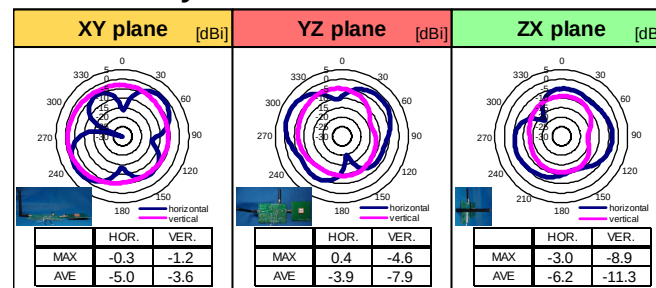


<Efficiency>

*Red color shows peak gain
[dBi] [dB]

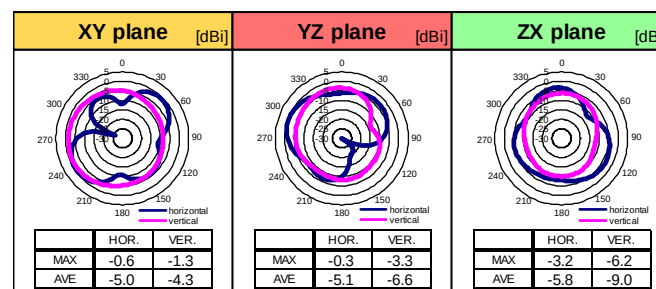
LINEAR POLAMIZATION		XY-plane		YZ-plane		ZX-plane		Total Efficiency
		hor.	ver.	hor.	ver.	hor.	ver.	
863 MHz	MAX.	-0.9	-1.9	-0.3	-5.2	-3.7	-9.8	-2.9
	AVE.	-5.7	-4.3	-4.6	-8.6	-6.9	-12.3	
866.5 MHz	MAX.	-0.3	-1.2	0.4	-4.6	-3.0	-8.9	-2.3
	AVE.	-5.0	-3.6	-3.9	-7.9	-6.2	-11.3	
870 MHz	MAX.	-0.6	-1.6	0.0	-4.7	-3.4	-9.0	-2.6
	AVE.	-5.3	-4.1	-4.4	-8.1	-6.6	-11.5	

<Directivity>



@866.5MHz

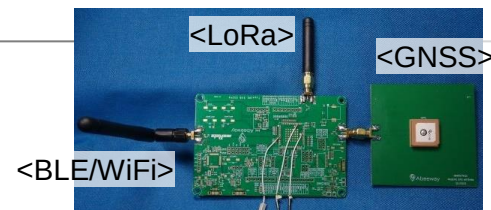
LINEAR POLAMIZATION		XY-plane		YZ-plane		ZX-plane		Total Efficiency
		hor.	ver.	hor.	ver.	hor.	ver.	
902 MHz	MAX.	-0.7	-1.3	0.0	-3.7	-3.8	-6.7	-2.5
	AVE.	-5.1	-4.3	-4.8	-7.0	-6.2	-9.6	
915 MHz	MAX.	-0.6	-1.3	-0.3	-3.3	-3.2	-6.2	-2.5
	AVE.	-5.0	-4.3	-5.1	-6.6	-5.8	-9.0	
928 MHz	MAX.	-0.5	-1.1	-0.2	-3.0	-2.8	-5.6	-2.1
	AVE.	-4.8	-3.8	-4.9	-6.2	-5.3	-8.3	



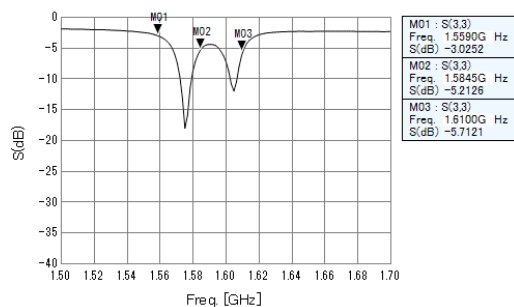
@915MHz

4. Measurement result

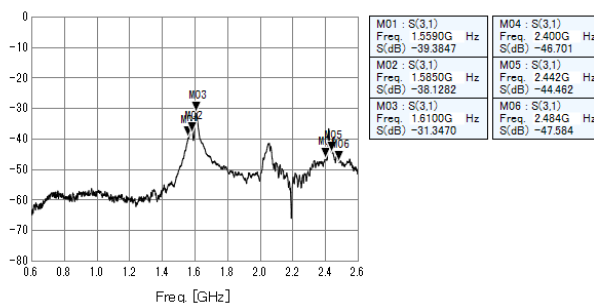
Condition 1: Default_ GNSS



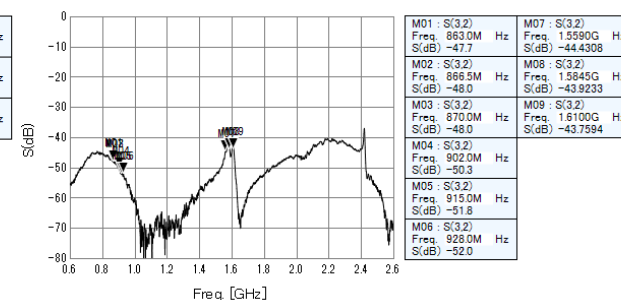
<Return Loss>



<Isolation> GNSS-BLE/WiFi



<Isolation> GNSS-LoRa

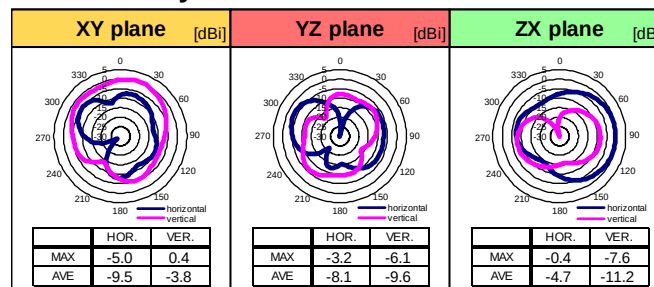


<Efficiency>

LINEAR POLAMIZATION		XY-plane		YZ-plane		ZX-plane		Total Efficiency
		hor.	ver.	hor.	ver.	hor.	ver.	
1559 MHz	MAX.	-5.8	-9.3	-8.6	-9.8	-10.3	-7.6	-9.4
	AVE.	-9.5	-13.2	-14.6	-13.3	-14.6	-11.2	
1584.5 MHz	MAX.	-5.0	-3.2	-6.1	-0.4	-7.6	-7.6	-3.9
	AVE.	-9.5	-3.8	-8.1	-9.6	-4.7	-11.2	
1610 MHz	MAX.	-1.7	-1.9	-3.8	-4.1	-1.9	-3.4	-3.9
	AVE.	-5.6	-5.8	-9.5	-8.3	-6.5	-7.2	

*Red color shows peak gain
[dBi] [dB]

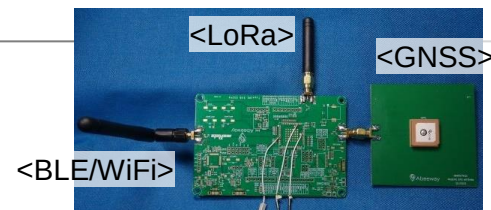
<Directivity>



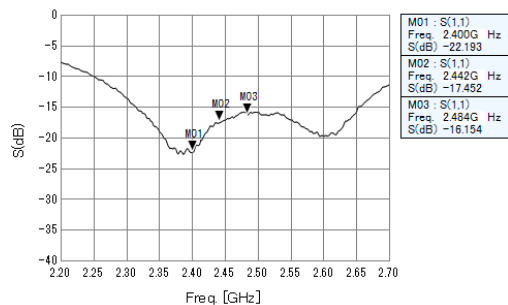
@1584.5MHz

4. Measurement result

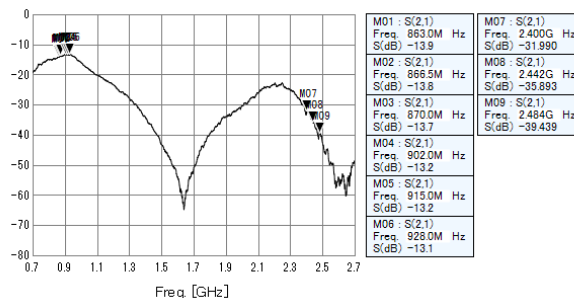
Condition 1: Default_BLE/WiFi



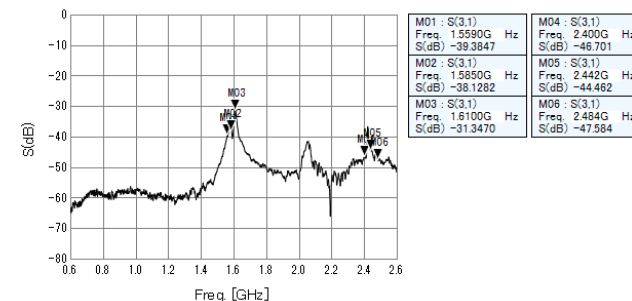
<Return Loss>



<Isolation> BLE/WiFi-LoRa



<Isolation> BLE/WiFi-GNSS

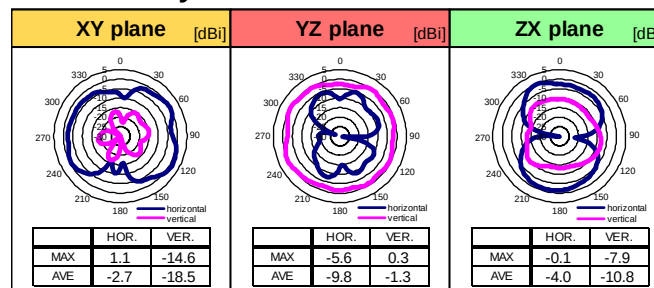


<Efficiency>

*Red color shows peak gain
[dBi] [dB]

LINEAR POLAMIZATION		XY-plane		YZ-plane		ZX-plane		Total Efficiency
		hor.	ver.	hor.	ver.	hor.	ver.	
2400 MHz	MAX.	1.0	-13.1	-4.5	-0.2	-0.2	-7.9	-1.4
	AVE.	-2.8	-17.3	-8.5	-1.8	-4.4	-10.1	
2442 MHz	MAX.	1.1	-14.6	-5.6	0.3	-0.1	-7.9	-1.4
	AVE.	-2.7	-18.5	-9.8	-1.3	-4.0	-10.8	
2484 MHz	MAX.	1.7	-16.2	-6.2	-0.2	-0.2	-8.1	-1.3
	AVE.	-2.4	-19.5	-11.1	-0.9	-3.7	-11.0	

<Directivity>



@2442MHz

4. Measurement result

<Measurement condition>

Condition	Memo
Condition 1	Default

<Measurement result>

Condition	Frequency [MHz]												[dB]				[%]			
	LoRa (1)			LoRa (2)			GNSS			BLE/WiFi			Average	Average	Average	Average	Average	Average	Average	Average
	863	866.5	870	902	915	928	1559	1584.5	1610	2400	2442	2484	LoRa(1)	LoRa(2)	GNSS	BLE/WiFi	LoRa(1)	LoRa(2)	GNSS	BLE/WiFi
Condition 1_LoRa	-2.9	-2.3	-2.6	-2.5	-2.5	-2.1							-2.6	-2.4			55.2	57.7		
Condition 1_GNSS							-9.4	-3.9	-3.9						-5.1				30.9	
Condition 1_BLE/WiFi										-1.4	-1.4	-1.3				-1.4				72.8

Peak gain

Condition	Frequency [MHz]												Max.	Max.	Max.	Max.
	LoRa (1)			LoRa (2)			GNSS			BLE/WiFi			LoRa(1)	LoRa(2)	GNSS	BLE/WiFi
	863	866.5	870	902	915	928	1559	1584.5	1610	2400	2442	2484	LoRa(1)	LoRa(2)	GNSS	BLE/WiFi
Condition 1_LoRa	-0.3	0.4	0.0	0.0	-0.3	-0.2							0.4	0.0		
Condition 1_GNSS							-5.8	0.4	-1.7						0.4	
Condition 1_BLE/WiFi										1.0	1.1	1.7				1.7

Annex: Antenna Vendor Information

LoRa antenna

Vendor: Low Power Radio Solutions Ltd

Addr: Two River Industrial Estate, Station Lane, Witney, Oxfordshire OX28 4BH, UK

BLE/WiFi antenna

Vendor: Pulse Finland Oy

Addr: Takatie 6, 90440 Kempele, Finland

GNSS antenna

Vendor: Abeeway

Addr: 2000 Rte des Lucioles, 06410 Biot, France