

Verkada Elrond/Frodo Antenna test report

Apr. 09, 2025

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Antenna Design Department

Outline

- Antenna Structure & Placement
- Return Loss
- Isolation
- Radiation Pattern
- Peak Gain & Efficiency

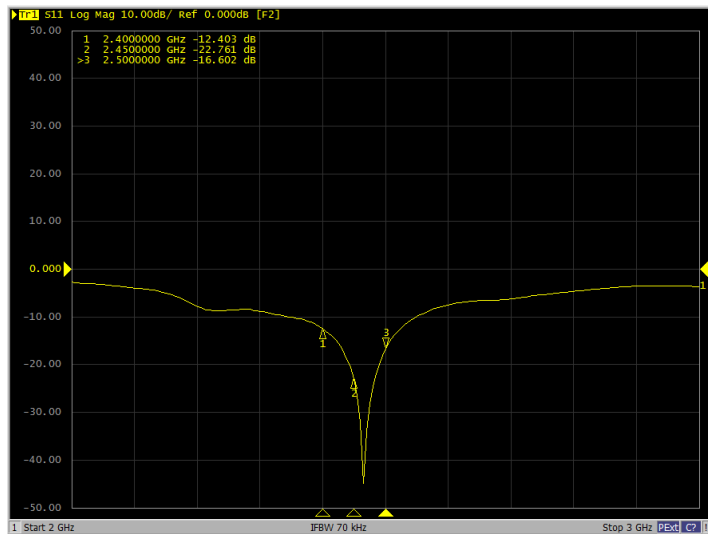


Antenna Structure & Placement

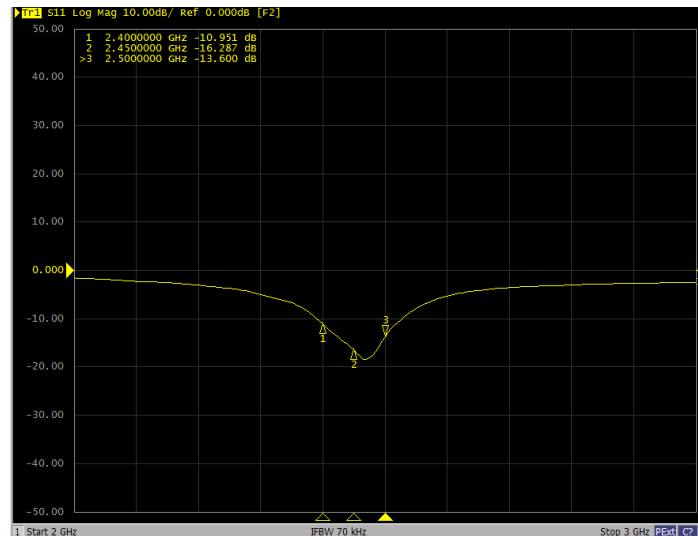
Ant No.	Operating Band	Type	Material	Feeding	Dimension
Sub-G	863 ~ 928MHz	PIFA	Metal	Trace	21(L) x 32(W) x 8(H) mm ³
BLE 1&2	2400 ~ 2500MHz	PIFA	PCB	Cable	30(L) x 18(W) x 0.4(T) mm ³

Return Loss - BLE 1&2

Spec : Return Loss > 10dB



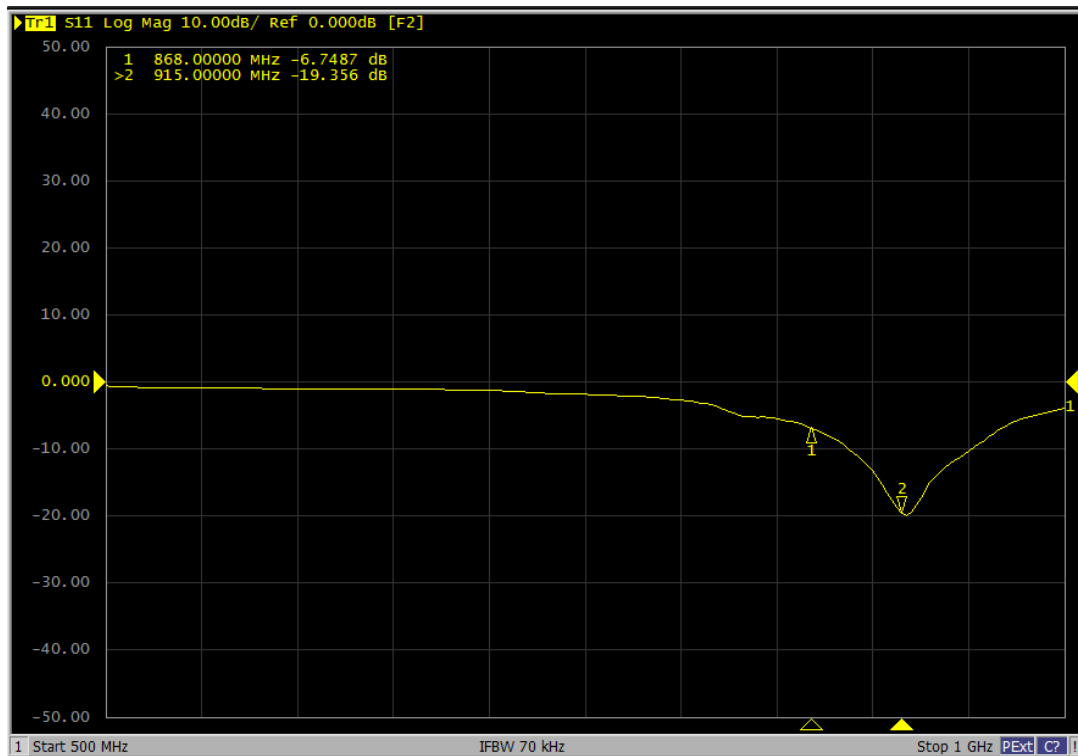
BLE1



BLE2

Return Loss - Sub-G

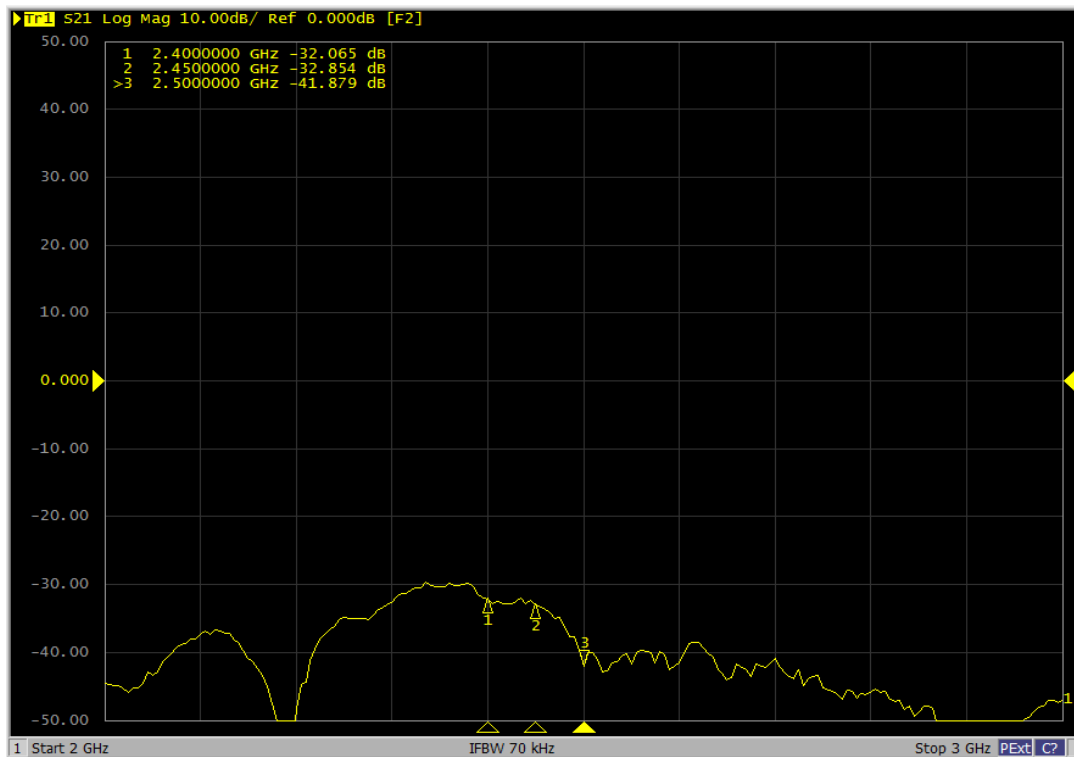
Spec : Return Loss > 10dB



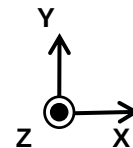
- In order to reduce the peak gain, 868MHz was intentionally tuning to be below 10 dB.

Isolation - BLE 1&2

Spec : Isolation > 20dB

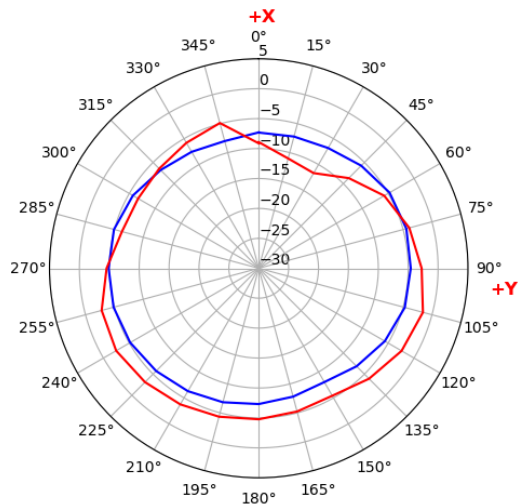


2D Radiation Pattern @ Sub-G



SubG_XY plane - Azimuth

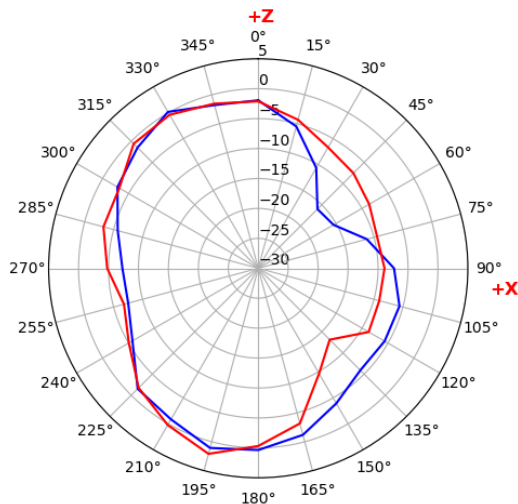
— 868MHz — 915MHz



Frequency	Peak	Min	Delta
868MHz	-4.9	-7.5	2.6
915MHz	-2.5	-17.4	14.9

SubG_XZ plane - Side to Side

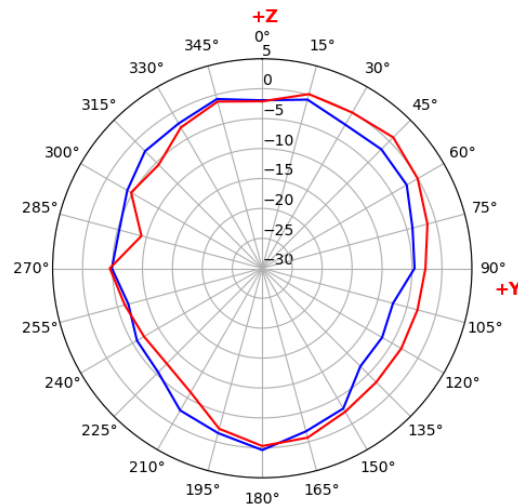
— 868MHz — 915MHz



Frequency	Peak	Min	Delta
868MHz	0.1	-15.9	16
915MHz	1.9	-13.2	15.1

SubG_YZ plane - Front to back

— 868MHz — 915MHz

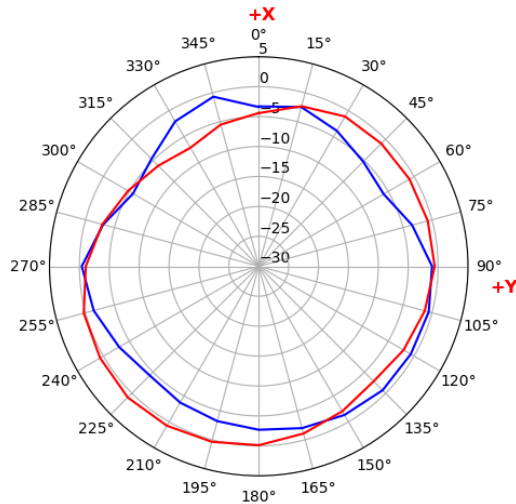


Frequency	Peak	Min	Delta
868MHz	0.1	-7.3	7.4
915MHz	0.5	-8.2	8.7

2D Radiation Pattern @ BLE 2.45GHz

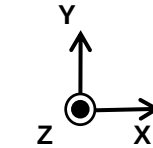
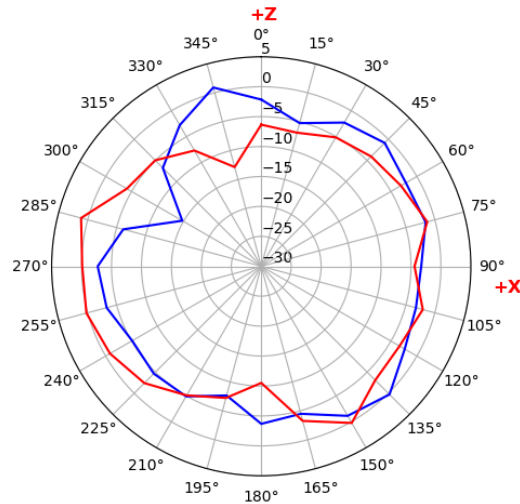
2450_XY plane - Azimuth

— BLE1 — BLE2



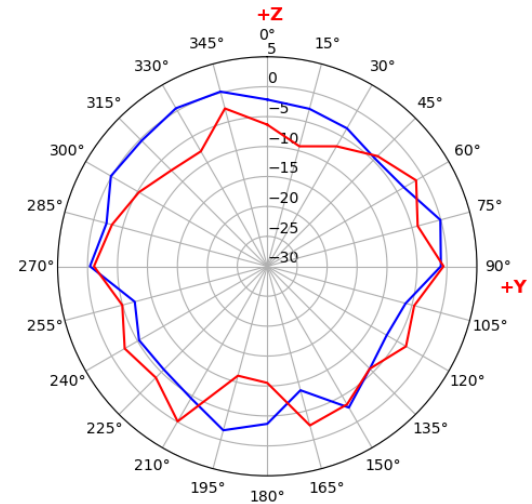
2450_XZ plane - Side to Side

— BLE1 — BLE2

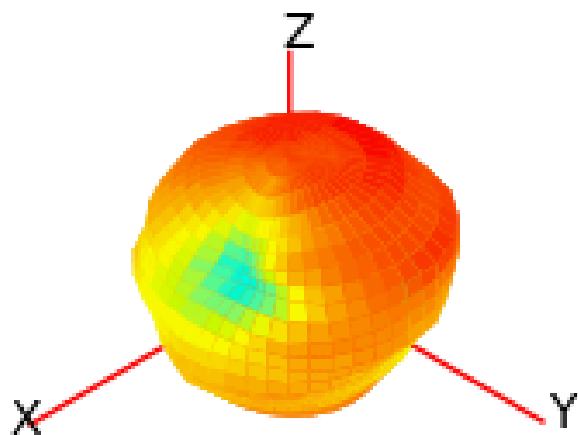
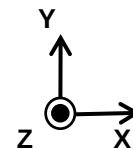


2450_YZ plane - Front to back

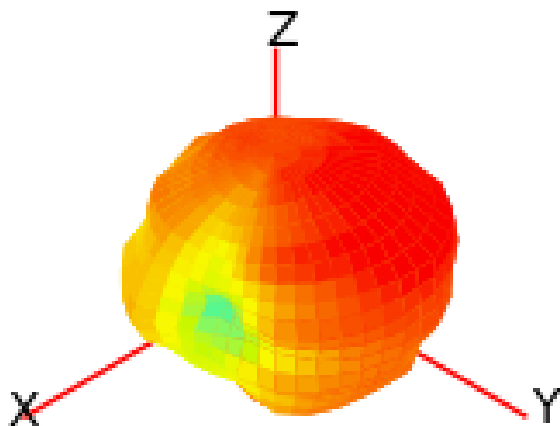
— BLE1 — BLE2



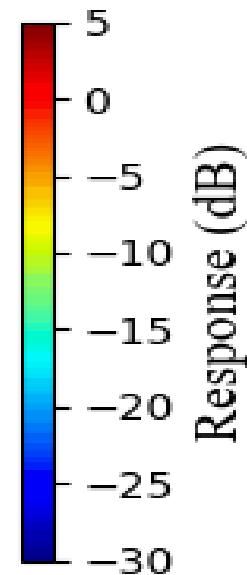
3D Radiation Pattern @ Sub-G



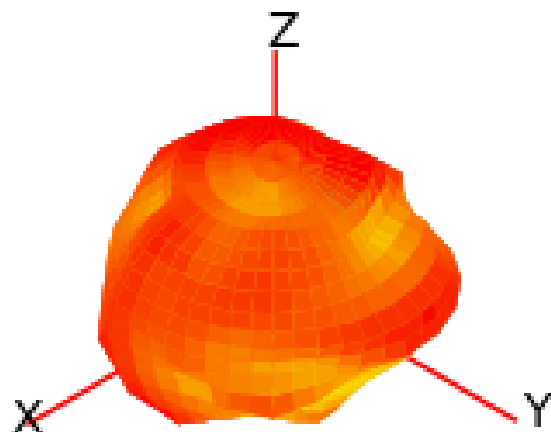
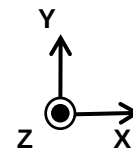
0.868GHz



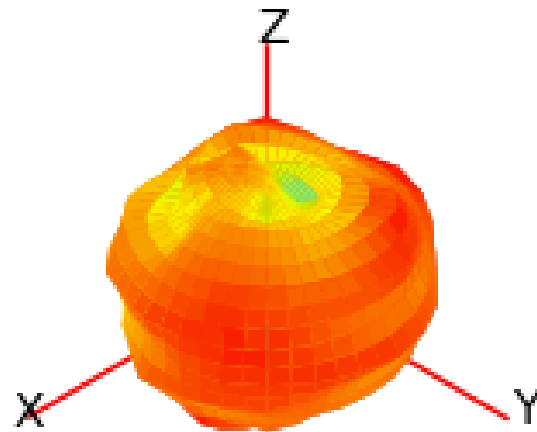
0.915GHz



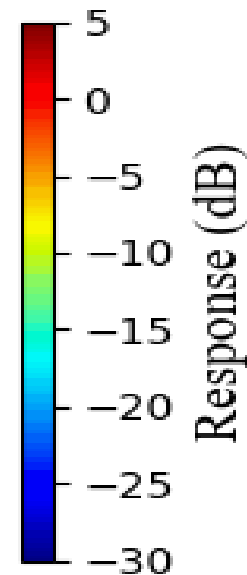
3D Radiation Pattern @ BLE 2.45GHz



BLE1



BLE2



Peak Gain & Efficiency

Freq. (MHz)	Sub-G Antenna	
	Efficiency (%)	Peak Gain (dBi)
863	38.2	0.24
865	40.1	0.29
868	40.7	0.37
902	49.5	2.15
915	50.7	2.26
928	50.4	2.33

Freq. (MHz)	BLE1 Antenna	
	Efficiency (%)	Peak Gain (dBi)
2400	52.5	2.21
2450	54.8	2.54
2500	53.8	2.37

Freq. (MHz)	BLE2 Antenna	
	Efficiency (%)	Peak Gain (dBi)
2400	51.3	1.84
2450	53.5	2.13
2500	52.8	1.99

LTE ECC

Band	LTE1<E2	Peak Gain
2	<0.08	<3.15
4	<0.023	<3.27
5	<0.05	<3.47
12	<0.025	<2.89
13	<0.013	<3.32
14	<0.06	<3.35
66	<0.08	<3.52
71	<0.018	<2.24

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