

# AT2202 Antenna characterization - preliminary measurement data

Confidential

## Contents – Measurements and Analysis



- ❑ The following preliminary measurements are currently done for the AT2202, models 2S unit with the BT/Wi-Fi antenna.
  - Antenna Return Loss/VSWR Measurement –done
  - Antenna Gain and Efficiency Measurements –done
  - Antenna Range Test – done (*with BT Diag Mode Mode for 2.4 GHz band*)
  - Antenna Range Test – **To be done** (*Require **Wi-Fi** Diag Mode for 5GHz band*)

# Equipment List and EUT

## Equipment List and Test Method



### ☐ Equipment List and EUT

No.	Equipment	Brand	Model No	Serial No.	Calibrated Date	
1	Far Field Anechoic Chamber	-	Indoor Lab	AP871	19-Feb-2021	18-Feb-2024
2	Transmit Horn Antenna	ETS Lindgren	ETS 3115	29269/ETS3115	NA	NA
3	Reference Antenna	MVG	SH800	ANTMVG80001	NA	NA
4	Signal Generator	Keysight	N5182A	MY50143240	03-Feb-2021	03-Feb-2023
5	Signal Receiver	R&S	ESU 40	ESW44/103032	24-Aug-2021	23-Aug-2022
6	VNA	Keysight	5071C	MY46100445	11-Aug-2021	11-Aug-2023
7	EUT (Display Audio)	Panasonic	AT2202	500030	NA	NA

### ☐ Equipment List and EUT

Refer IEEE Recommended Practice for Antenna Measurements

Document No: IEEE Std 149<sup>TM</sup>-2021

## Antenna VSWR/RL Measurement Setup



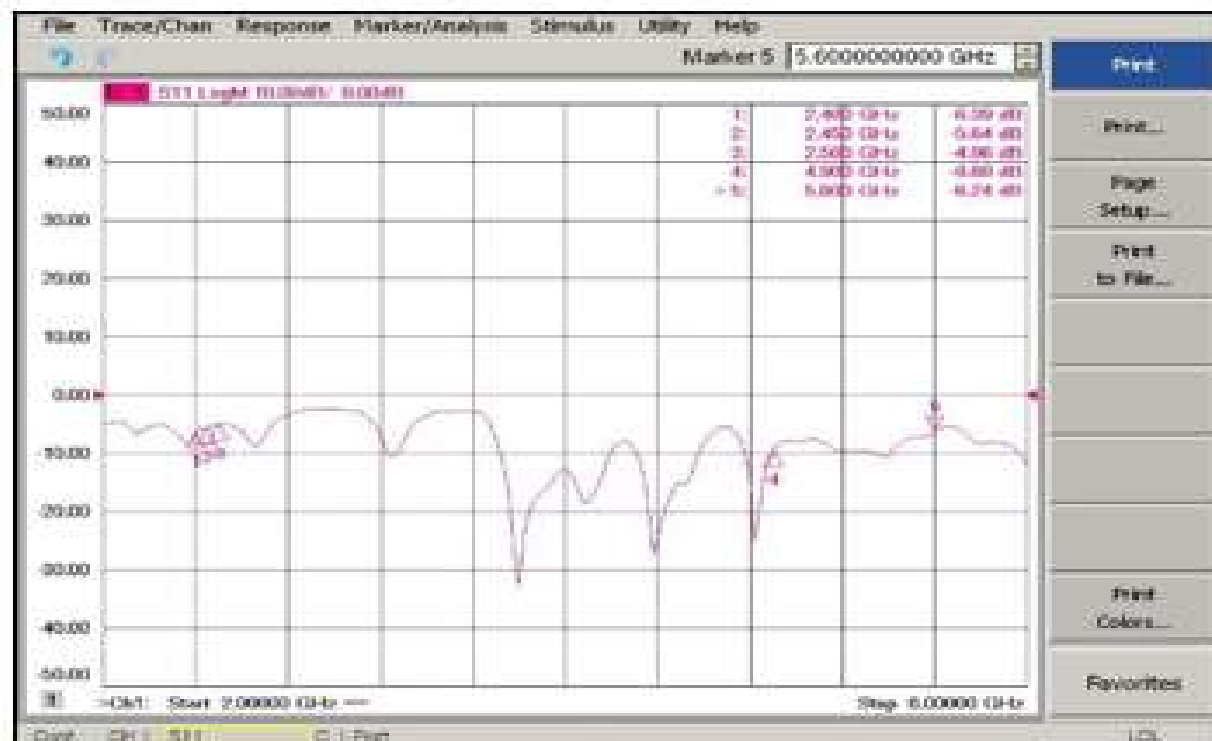
### BT Dual band Antenna VSWR/RL measurement setup for AT2202 unit

- BT antenna Return loss/VSWR measurement done for AT2202 unit and below are the test setup.



# Return loss measurement

## Return loss measurement



Frequency	Return loss
2.4GHz	-6.39 dB
2.45GHz	-5.64 dB
4.9 GHz	-9.6 dB
5.6 GHz	-6.24 dB

### Inference:

- Antenna Return loss for both configuration are more than -5dB in desired band(2.4GHz-2.5GHz) and (4.9 – 5.6 GHz).

## Antenna Gain and Efficiency Measurements



Freq (GHz)	9" Top Chassis	
	Gain . dB	Effi %
2.4	0.7	24%
2.45	-0.1	20%
2.5	-1.5	17%
4.9	0.3	16%
5.5	1.7	17%
5.6	3.4	21%

### Inference:

- Antenna Gain for the AT2202 model are relatively better for both bands;
  - The actual range performance for BT/Wi-Fi depends on the combined values of Gain and Range testing results;

# Antenna Range Test

## Antenna Range Test



### Range test Setup:



#### ❑ BT band (2.4GHz); *with Modified Antenna*

- Range test is performed to measure the receiver signal strength at different distances (*at 3m, 4m and 4.5m ranges*) and compared with the receiver sensitivity level of BT chipset to meet required margin.
  - w.r.t. BT 2.4GHz band, the Range Test results are OK with positive Link margin for AT2202 models;

#### ❑ Wi-Fi dual band (mainly 5GHz band and 2.4GHz);

- Require the Wi-Fi diag mode to conduct the range test accordingly to confirm the Link margin
  - the Antenna Orientation and any other changes if any required to be decided based on the range testing for Wi-Fi dual band;

## Summary



- AT2202 model 2S unit – BT/Wi-Fi dual band Antenna performance measurements done for variants with no-modify antenna configuration;
- the following configurations are used for measurement of Antenna Parameters;
  - – no-modify antenna position;
- Antenna parameters for Antenna gain, Return Loss, Efficiency details provided.
- Currently, **Antenna range test has been completed for BT 2.4GHz band alone (OK)** and need to be performed for **Wi-Fi 5G band** to confirm the antenna performance.
- For Range Testing, the **Diag Mode usage procedure for Wi-Fi tests with SW update** are required in AT2202, 2S unit; please help to get the same.