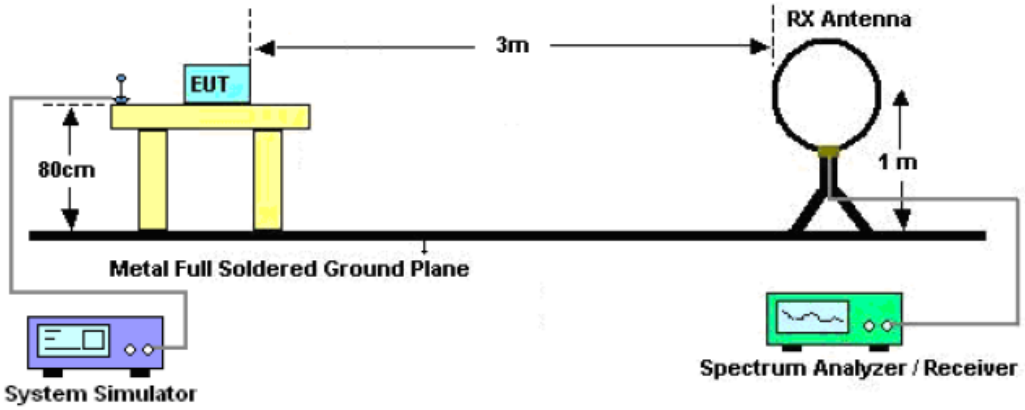
11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

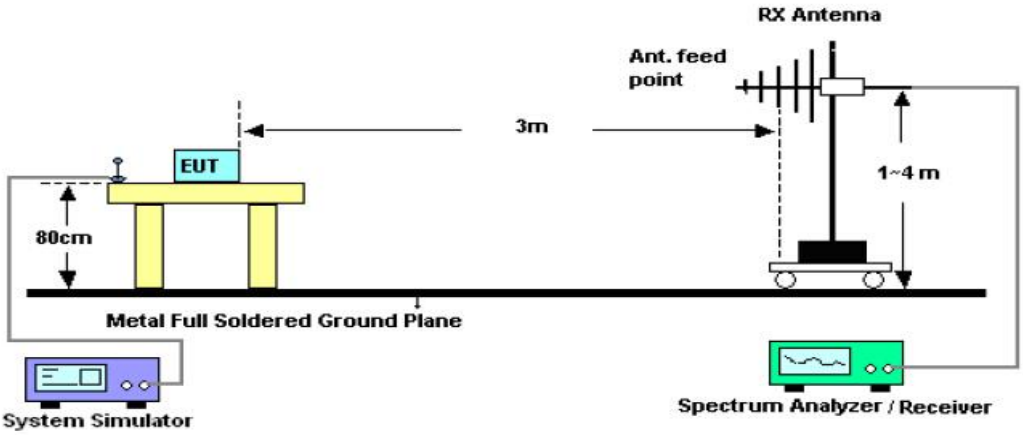
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

11.2. TEST SETUP

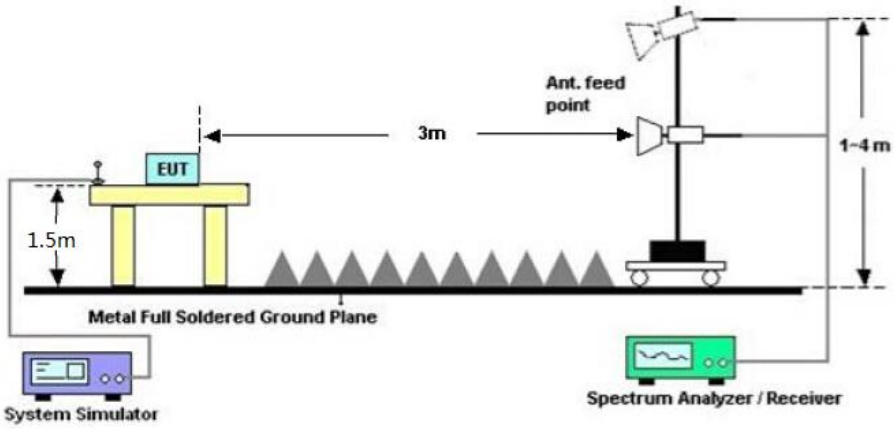
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



11.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested for restricted band radiated emission,
The test records reported below are the worst result compared to other modes.

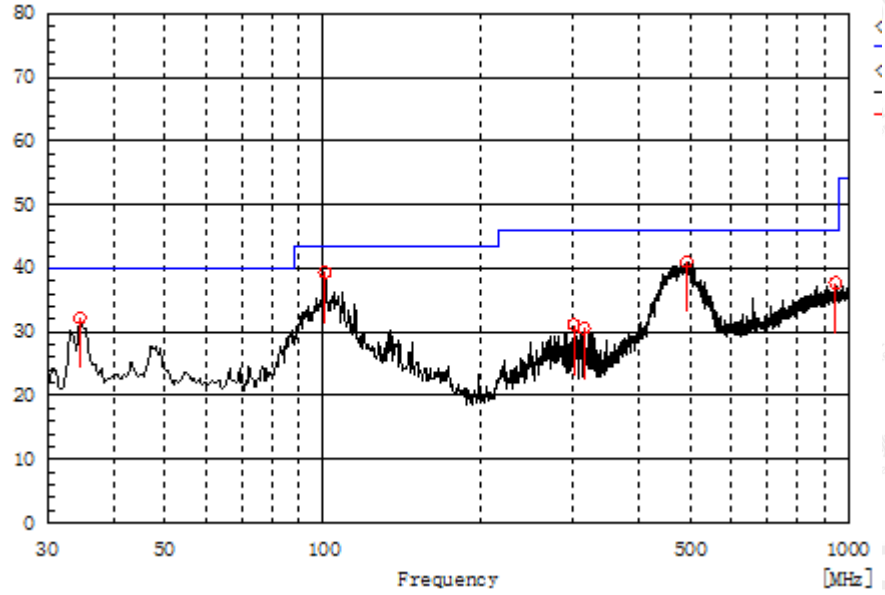
11.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ

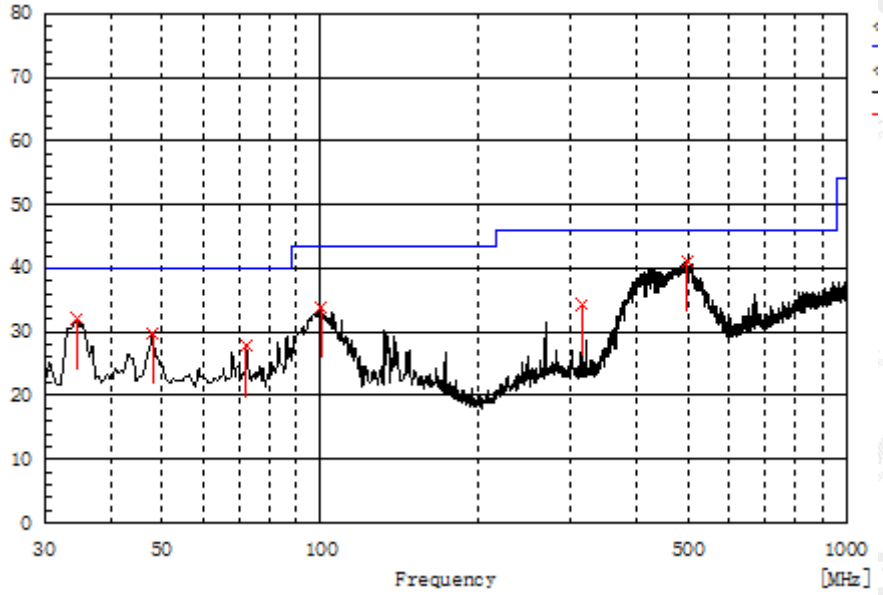
EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHZ	Antenna	Horizontal



Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) QP	Margin dB	Pass/Fail	Height cm	Angle deg
34.365	H	16.0	16.1	32.1	40.0	7.9	Pass	150.0	274.2
100.810	H	25.9	13.5	39.4	43.5	4.1	Pass	150.0	17.6
300.145	H	13.7	17.4	31.1	46.0	14.9	Pass	100.0	240.5
313.725	H	12.9	17.7	30.6	46.0	15.4	Pass	100.0	265.2
492.205	H	18.2	22.8	41.0	46.0	5.0	Pass	150.0	268.0
946.650	H	7.1	30.6	37.7	46.0	8.3	Pass	150.0	249.0

RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHZ	Antenna	Vertical



Frequency., MHz.,	Polarization.,	Reading., dB(uV).,	Factor., dB., (1/m).,	Level., dB(uV/m)., PK.,	Limit., dB(uV/m)., QP.,	Margin., dB.,	Pass/Fail.,	Height., cm.,	Angle., deg.,
34.365.,	V.,	15.9.,	16.1.,	32.0.,	40.0.,	8.0.,	Pass.,	150.0.,	107.3.,
47.945.,	V.,	12.6.,	17.2.,	29.8.,	40.0.,	10.2.,	Pass.,	150.0.,	335.9.,
72.195.,	V.,	14.0.,	13.8.,	27.8.,	40.0.,	12.2.,	Pass.,	200.0.,	143.2.,
100.325.,	V.,	20.4.,	13.4.,	33.8.,	43.5.,	9.7.,	Pass.,	200.0.,	48.8.,
313.725.,	V.,	16.6.,	17.7.,	34.3.,	46.0.,	11.7.,	Pass.,	100.0.,	356.8.,
497.540.,	V.,	18.3.,	22.8.,	41.1.,	46.0.,	4.9.,	Pass.,	200.0.,	202.7.,

RESULT: PASS

Note:

1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.
2. The “Factor” value can be calculated automatically by software of measurement system.
3. All test modes had been pre-tested. The 802.11b at low channel is the worst case and recorded in the report.

RADIATED EMISSION ABOVE 1GHZ

EUT	MULTIMEDIA NAVIGATION	**Model Name**	Costa Mesa 900
Temperature	25°C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHZ	**Antenna**	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4824.052	48.45	3.72	52.17	74	-21.83	peak
4824.104	42.22	3.72	45.94	54	-8.06	AVG
7236.119	43.37	8.15	51.52	74	-22.48	peak
7236.053	38.42	8.15	46.57	54	-7.43	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	MULTIMEDIA NAVIGATION	**Model Name**	Costa Mesa 900
Temperature	25°C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHZ	**Antenna**	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4824.048	47.71	3.72	51.43	74	-22.57	peak
4824.038	41.52	3.72	45.24	54	-8.76	AVG
7236.090	43.46	8.15	51.61	74	-22.39	peak
7236.041	37.19	8.15	45.34	54	-8.66	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHZ	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4874.056	49.53	3.75	53.28	74	-20.72	peak
4874.042	45.84	3.75	49.59	54	-4.41	AVG
7311.055	43.64	8.16	51.8	74	-22.2	peak
7311.079	38.37	8.16	46.53	54	-7.47	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHZ	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4874.035	48.52	3.75	52.27	74	-21.73	peak
4874.071	43.46	3.75	47.21	54	-6.79	AVG
7311.035	44.34	8.16	52.5	74	-21.5	peak
7311.064	38.27	8.16	46.43	54	-7.57	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHZ	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4924.112	49.52	3.81	53.33	74	-20.67	peak
4924.078	45.64	3.81	49.45	54	-4.55	AVG
7386.084	44.59	8.19	52.78	74	-21.22	peak
7386.077	38.41	8.19	46.6	54	-7.4	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHZ	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4924.083	48.72	3.81	52.53	74	-21.47	peak
4924.061	44.59	3.81	48.4	54	-5.6	AVG
7386.098	43.66	8.19	51.85	74	-22.15	peak
7386.086	38.53	8.19	46.72	54	-7.28	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RESULT: PASS

Note:

Other emissions from 1GHz to 25 GHz are considered as ambient noise. No recording in the test report.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

All test modes had been pre-tested. The 802.11b mode is the worst case and recorded in the report.

12. BAND EDGE EMISSION

12.1. MEASUREMENT PROCEDURE

Radiated restricted band edge measurements

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting

12.2. TEST SET-UP

same as 11.2

Note:

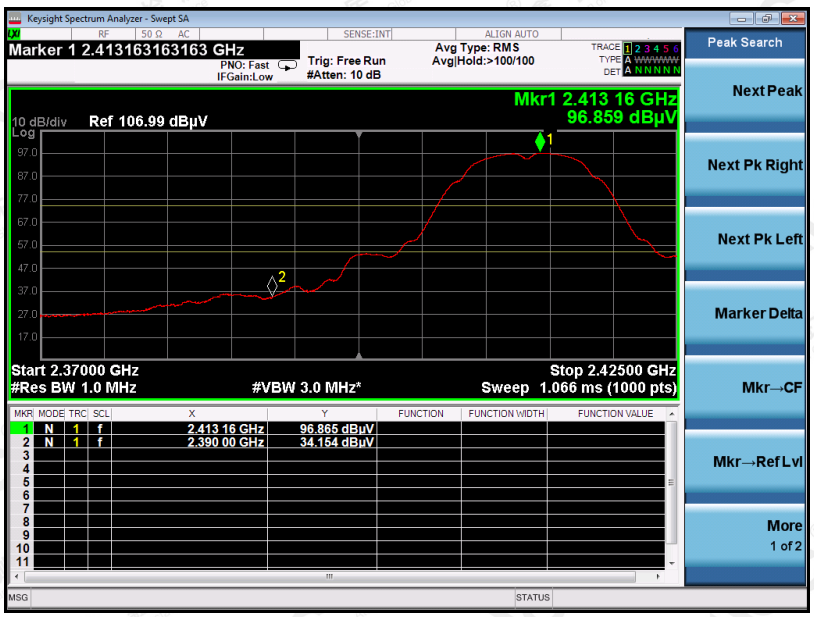
1. Factor=Antenna Factor + Cable loss - Amplifier gain. Field Strength=Factor + Reading level
2. The factor had been edited in the “Input Correction” of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB(μV) to represent the Amplitude. Use the F dB(μV/m) to represent the Field Strength. So A=F.

12.3. TEST RESULT

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Horizontal

PK

AV

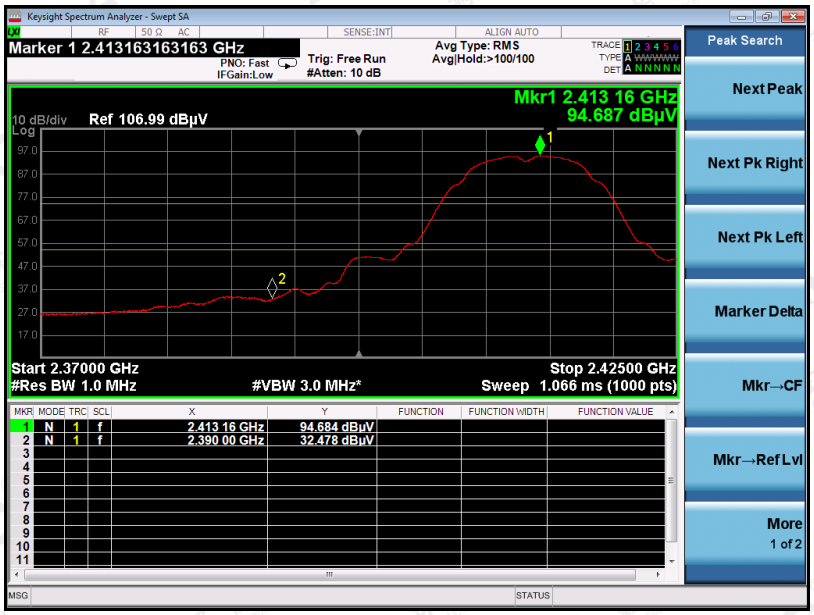


RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Vertical

PK

AV



RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Horizontal

PK

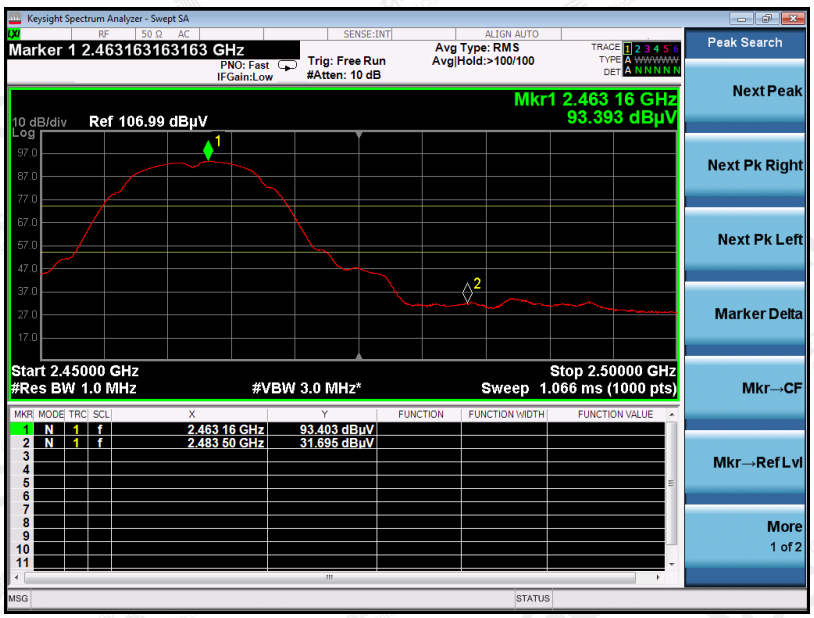
AV

RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Vertical

PK

AV

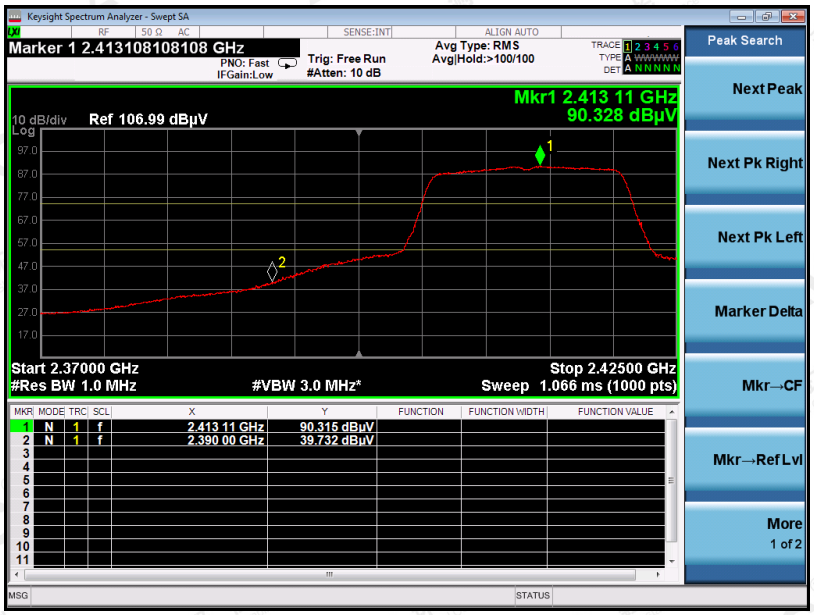


RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2412MHZ	Antenna	Horizontal

PK

AV

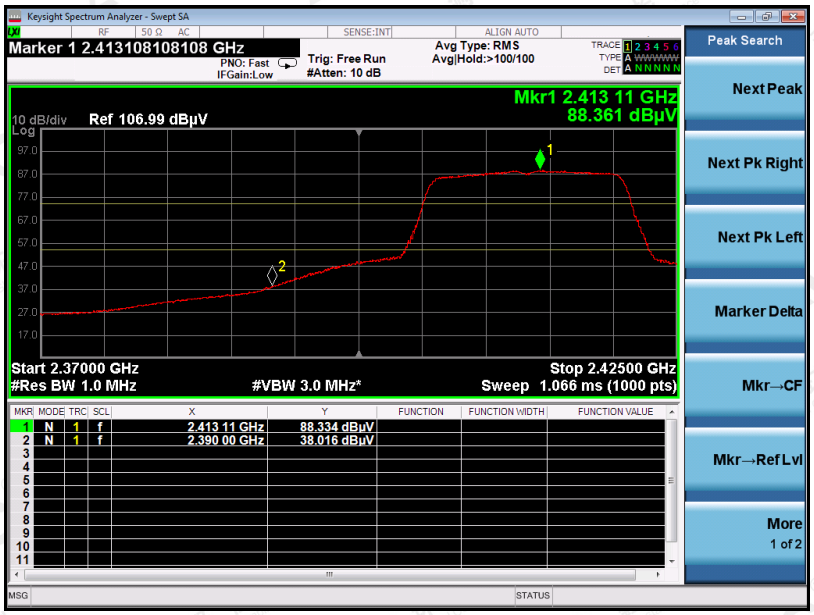


RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2412MHZ	Antenna	Vertical

PK

AV

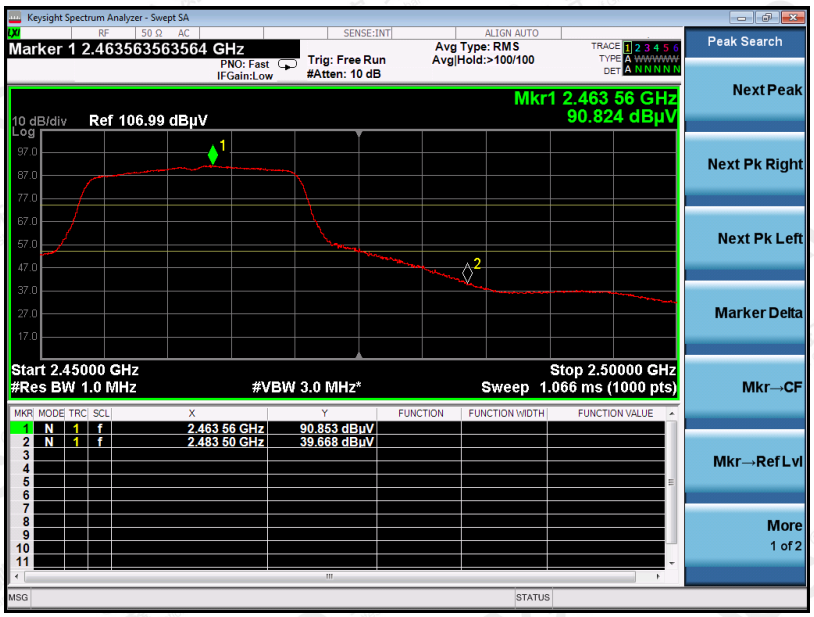


RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2462MHZ	Antenna	Horizontal

PK

AV

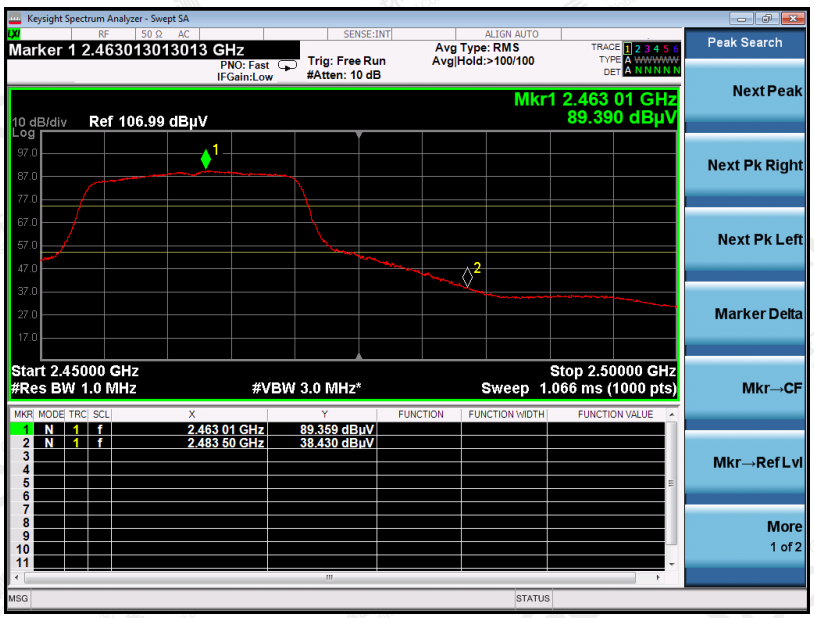


RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2462MHZ	Antenna	Vertical

PK

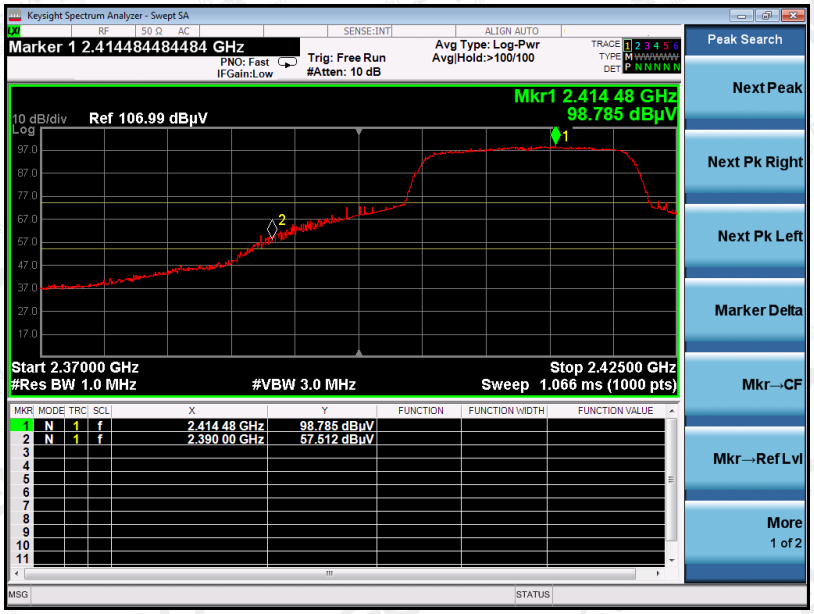
AV



RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 20 with data rate 6.5 2412MHZ	Antenna	Horizontal

PK

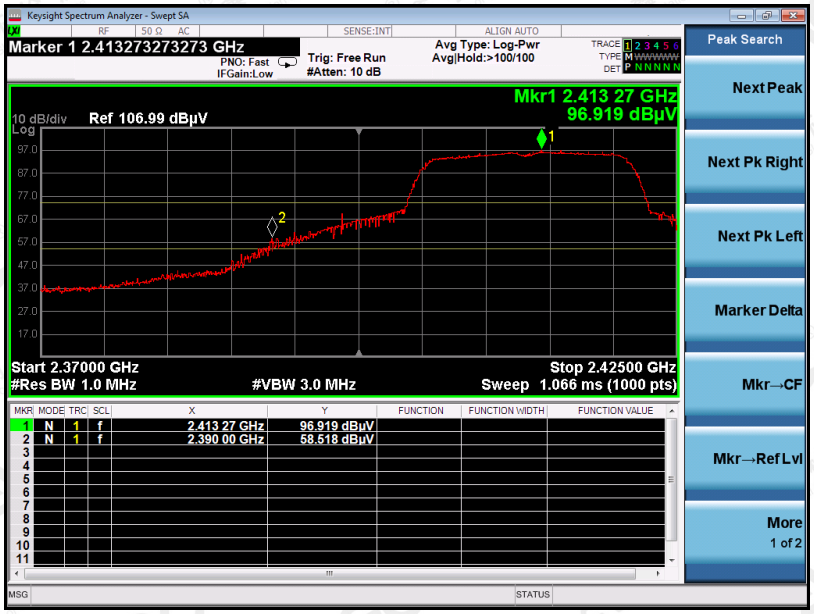


AV

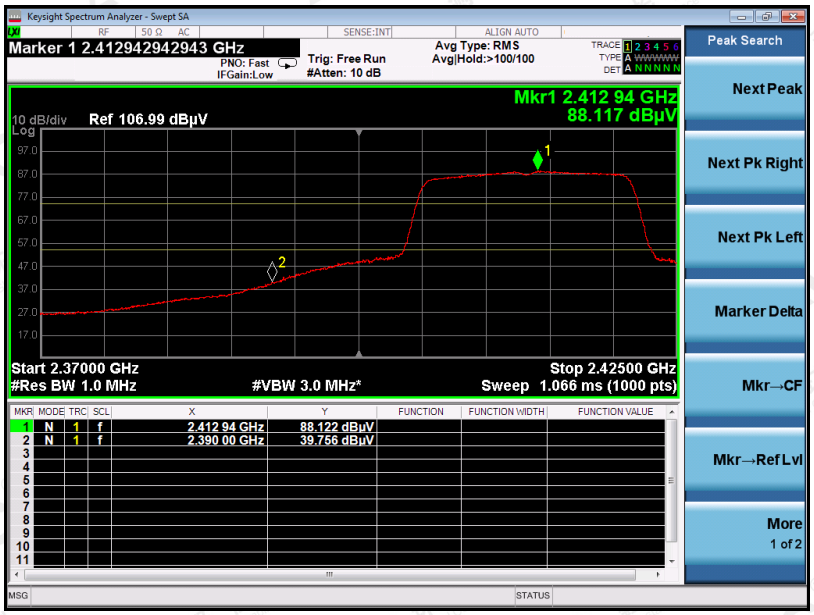
RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 20 with data rate 6.5 2412MHZ	Antenna	Vertical

PK



AV



RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 20 with data rate 6.5 2462MHZ	Antenna	Horizontal

PK

AV

RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 20 with data rate 6.5 2462MHZ	Antenna	Vertical

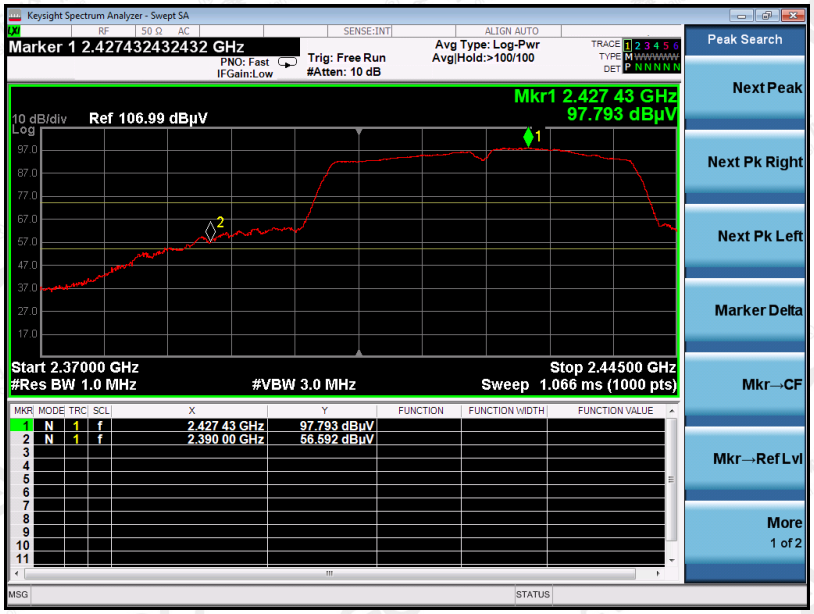
PK

AV

RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 40 with data rate 13.5 2422MHZ	Antenna	Horizontal

PK



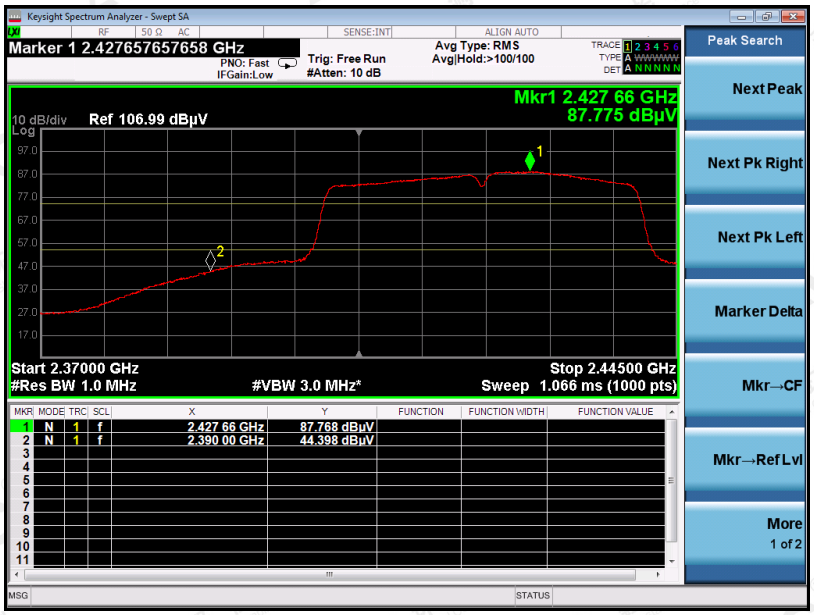
AV

RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 40 with data rate 13.5 2422MHZ	Antenna	Vertical

PK

AV

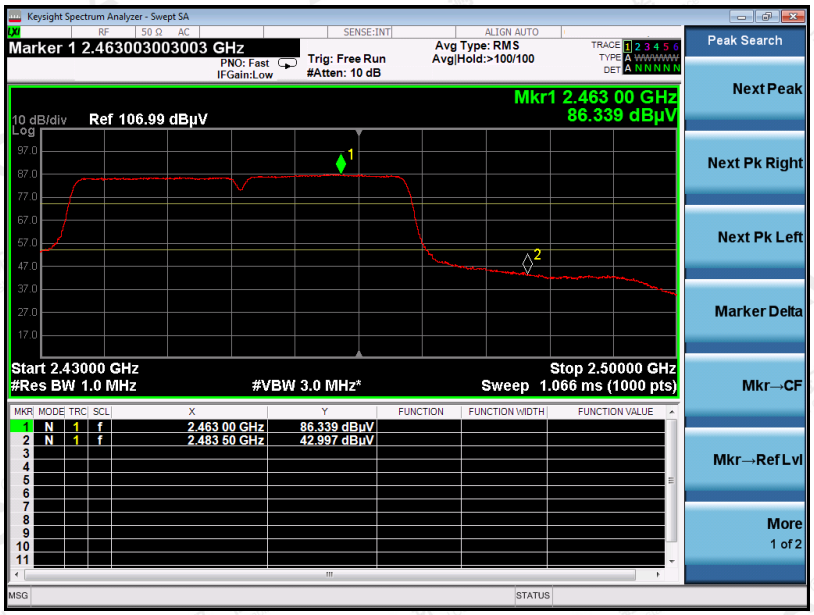


RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 40with data rate 13.5 2452MHZ	Antenna	Horizontal

PK

AV

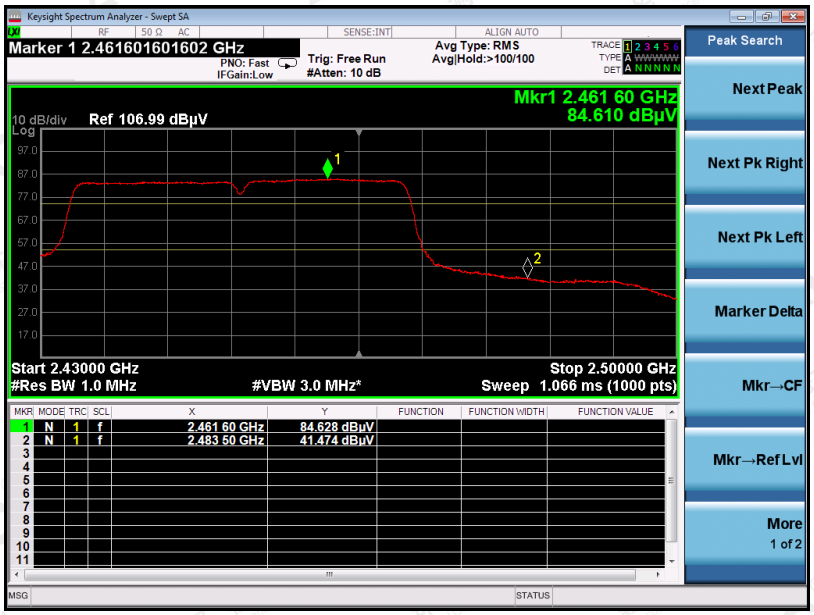


RESULT: PASS

EUT	MULTIMEDIA NAVIGATION	Model Name	Costa Mesa 900
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 40 with data rate 13.5 2452MHZ	Antenna	Vertical

PK

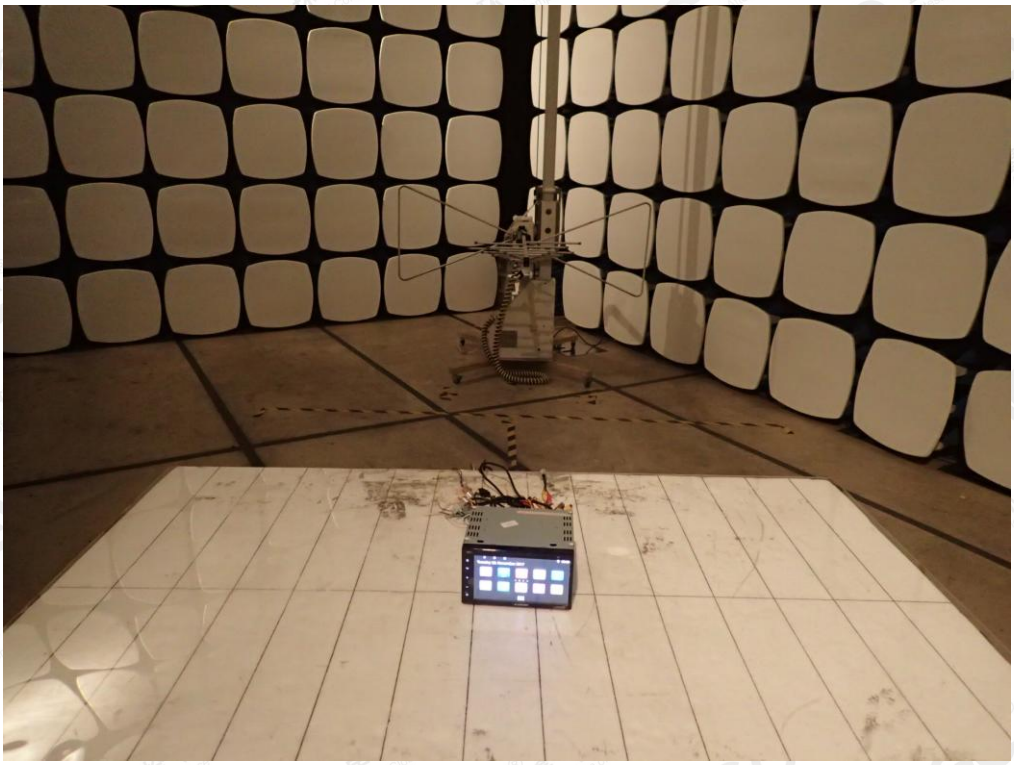
AV

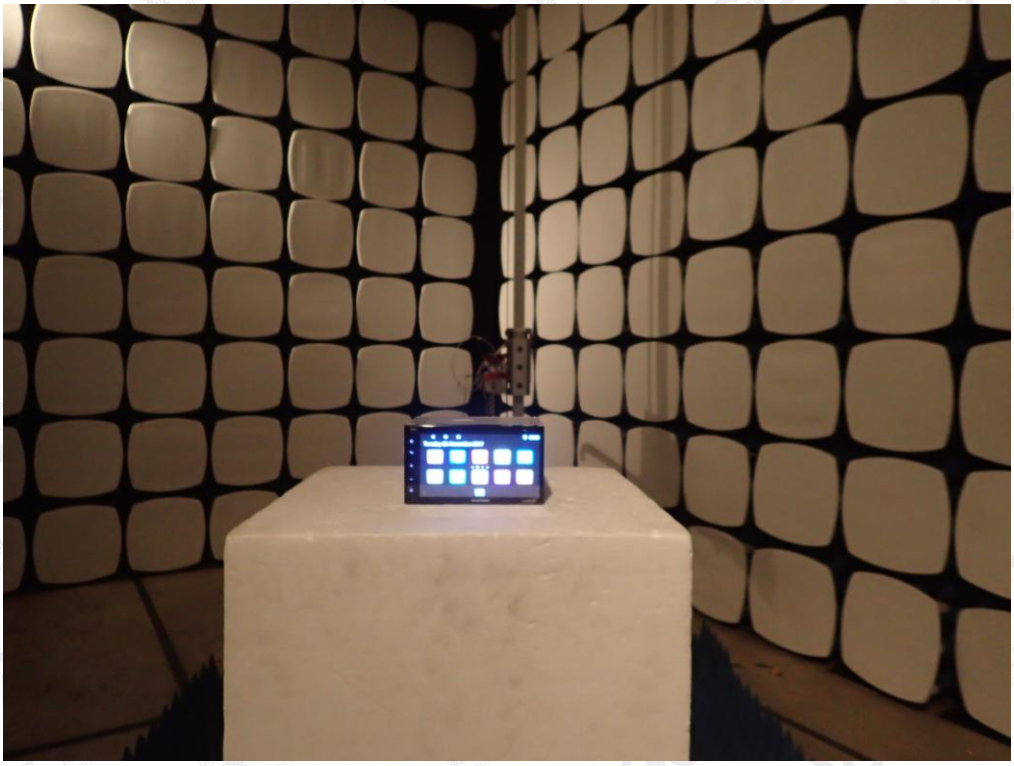


RESULT: PASS

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC RADIATED EMISSION TEST SETUP





----END OF REPORT----