11.3. LIMITS AND MEASUREMENT RESULT

15.209 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.

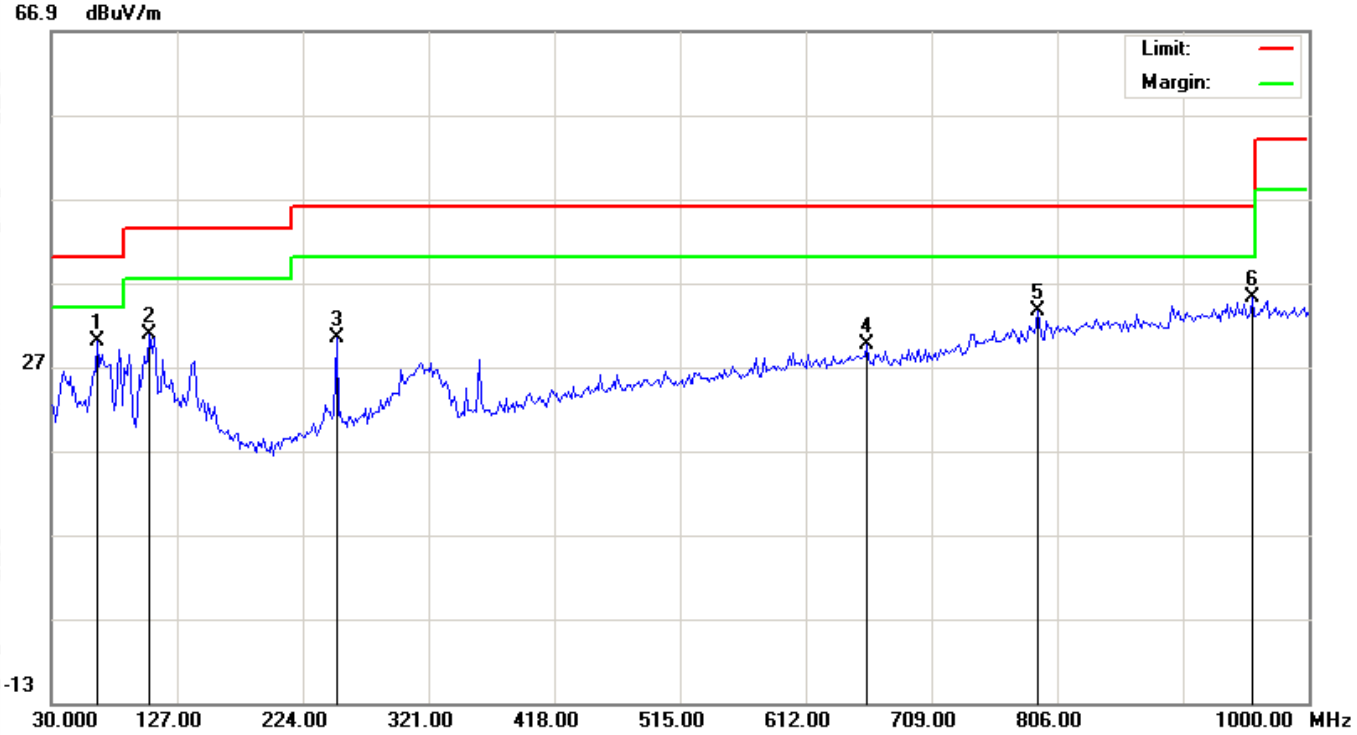
11.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

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

RADIATED EMISSION BELOW 1GHZ

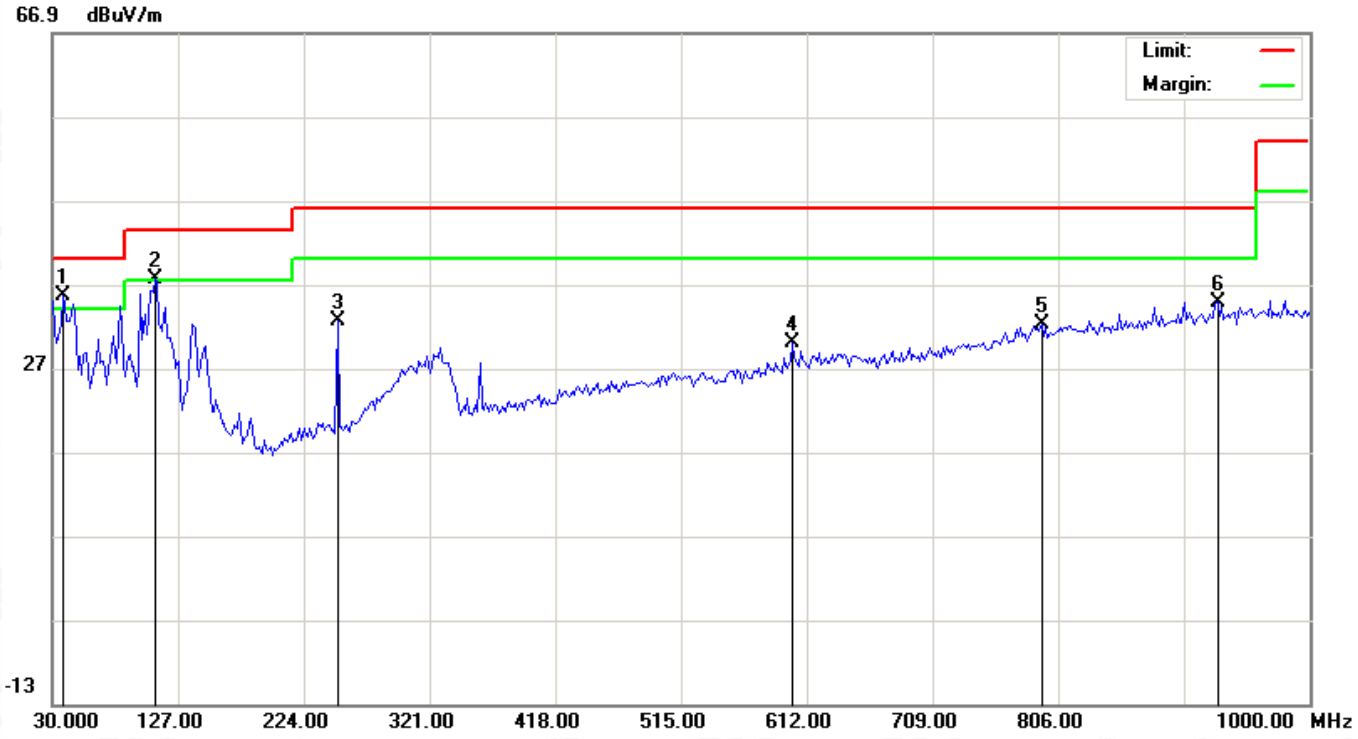
EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	65.5667	12.04	17.89	29.93	40.00	-10.07	peak			
2		105.9833	14.27	16.60	30.87	43.50	-12.63	peak			
3		249.8667	11.90	18.49	30.39	46.00	-15.61	peak			
4		658.8832	2.03	27.66	29.69	46.00	-16.31	peak			
5		791.4500	3.46	30.22	33.68	46.00	-12.32	peak			
6		956.3500	3.10	32.18	35.28	46.00	-10.72	peak			

RESULT: PASS

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	38.0833	16.15	19.41	35.56	40.00	-4.44	peak			
2	!	109.2167	20.62	16.91	37.53	43.50	-5.97	peak			
3		249.8667	14.16	18.49	32.65	46.00	-13.35	peak			
4		600.6833	3.08	26.96	30.04	46.00	-15.96	peak			
5		793.0667	2.02	30.25	32.27	46.00	-13.73	peak			
6		928.8667	2.95	31.95	34.90	46.00	-11.10	peak			

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. All test modes had been tested. The mode 3 at GFSK 2Mbps is the worst case and recorded in the report.

RADIATED EMISSION ABOVE 1GHZ

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4804.000	45.51	0.08	45.59	74	-28.41	peak
4804.000	42.79	0.08	42.87	54	-11.13	AVG
7206.000	43.63	2.21	45.84	74	-28.16	peak
7206.000	39.64	2.21	41.85	54	-12.15	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4804.000	44.69	0.08	44.77	74	-29.23	peak
4804.000	41.58	0.08	41.66	54	-12.34	AVG
7206.000	42.39	2.21	44.6	74	-29.4	peak
7206.000	38.47	2.21	40.68	54	-13.32	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4880.000	46.08	0.14	46.22	74	-27.78	peak
4880.000	43.97	0.14	44.11	54	-9.89	AVG
7320.000	44.37	2.36	46.73	74	-27.27	peak
7320.000	40.73	2.36	43.09	54	-10.91	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4880.000	45.21	0.14	45.35	74	-28.65	peak
4880.000	42.28	0.14	42.42	54	-11.58	AVG
7320.000	43.58	2.36	45.94	74	-28.06	peak
7320.000	39.72	2.36	42.08	54	-11.92	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4960.000	46.89	0.22	47.11	74	-26.89	peak
4960.000	43.27	0.22	43.49	54	-10.51	AVG
7440.000	45.14	2.64	47.78	74	-26.22	peak
7440.000	40.34	2.64	42.98	54	-11.02	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4960.000	45.67	0.22	45.89	74	-28.11	peak
4960.000	42.02	0.22	42.24	54	-11.76	AVG
7440.000	43.67	2.64	46.31	74	-27.69	peak
7440.000	38.82	2.64	41.46	54	-12.54	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RESULT: PASS

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

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

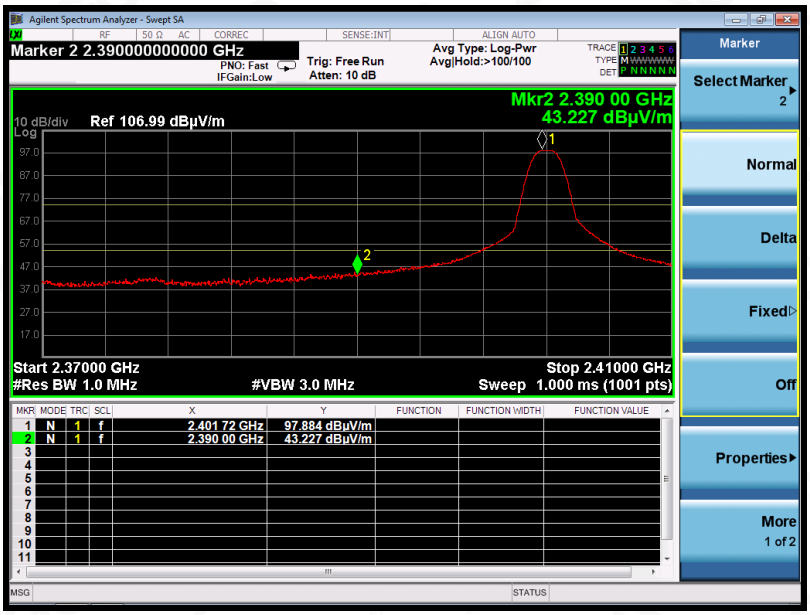
The “Factor” value can be calculated automatically by software of measurement system.

The GFSK 2Mbps is the worst case and recorded in the report.

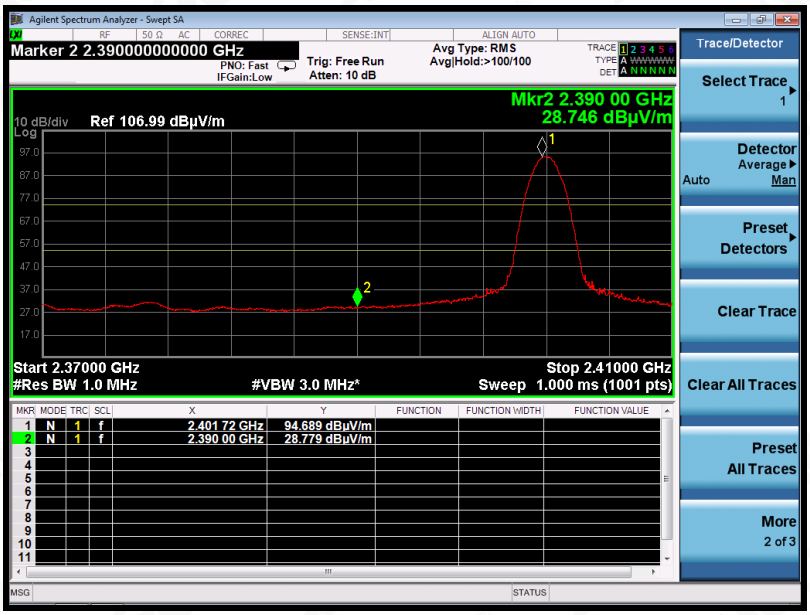
TEST RESULT FOR RESTRICTED BANDS REQUIREMENTS(1M)

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

PK



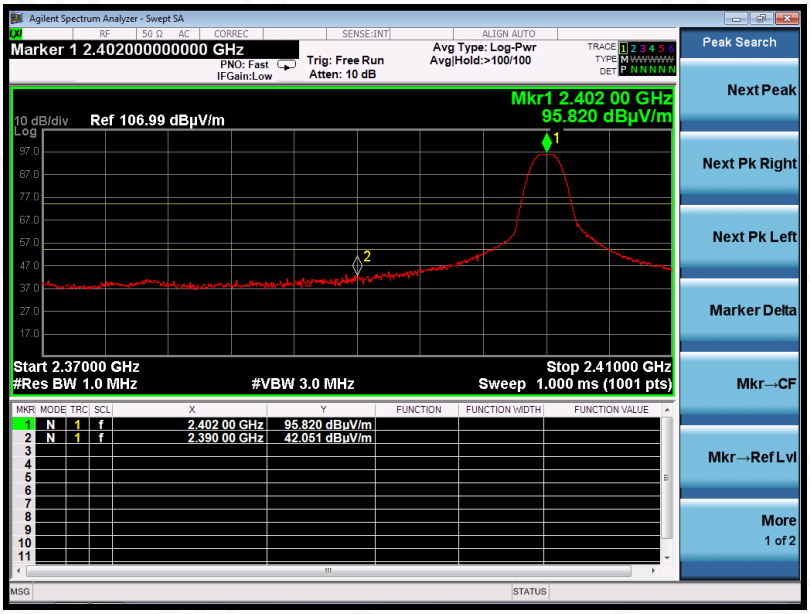
AV



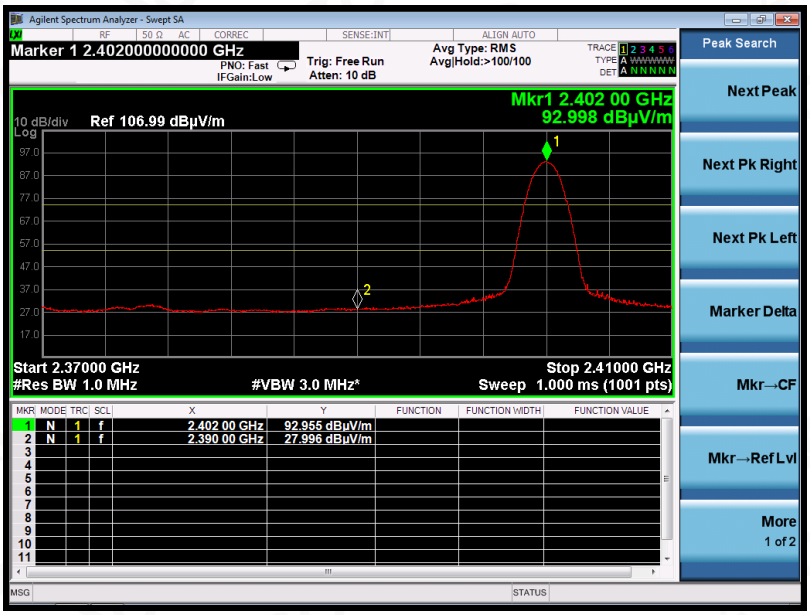
RESULT: PASS

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

PK



AV

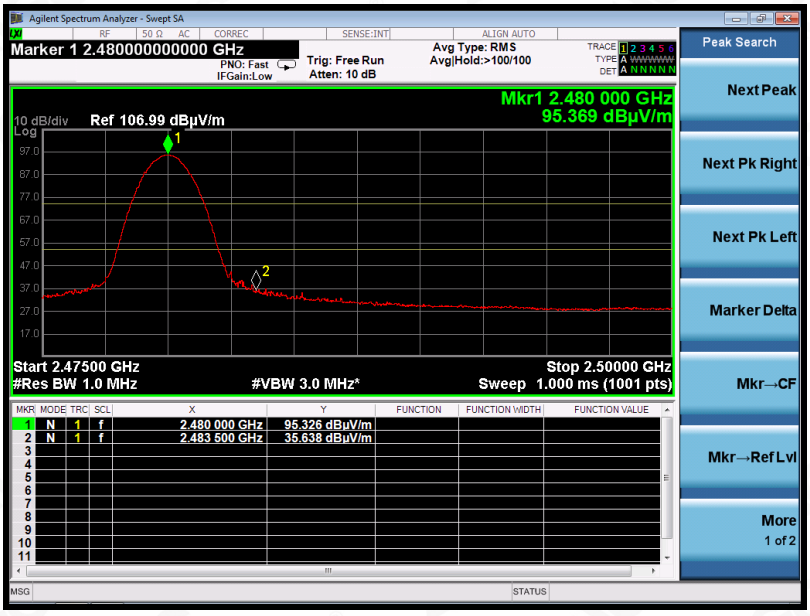


RESULT: PASS

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

PK

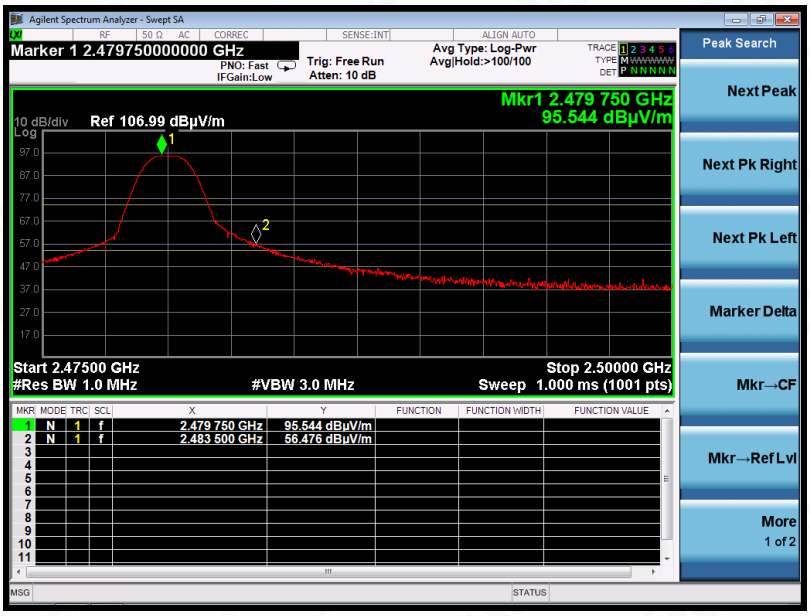
AV



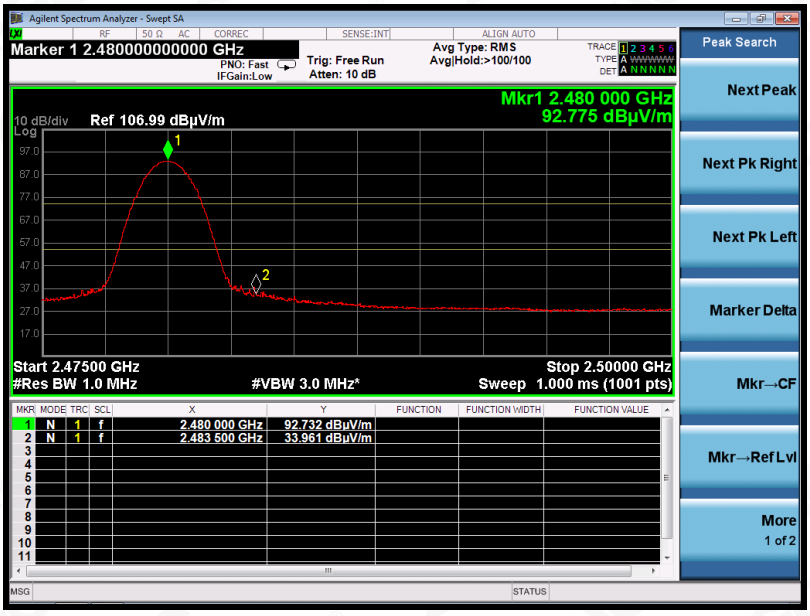
RESULT: PASS

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical

PK



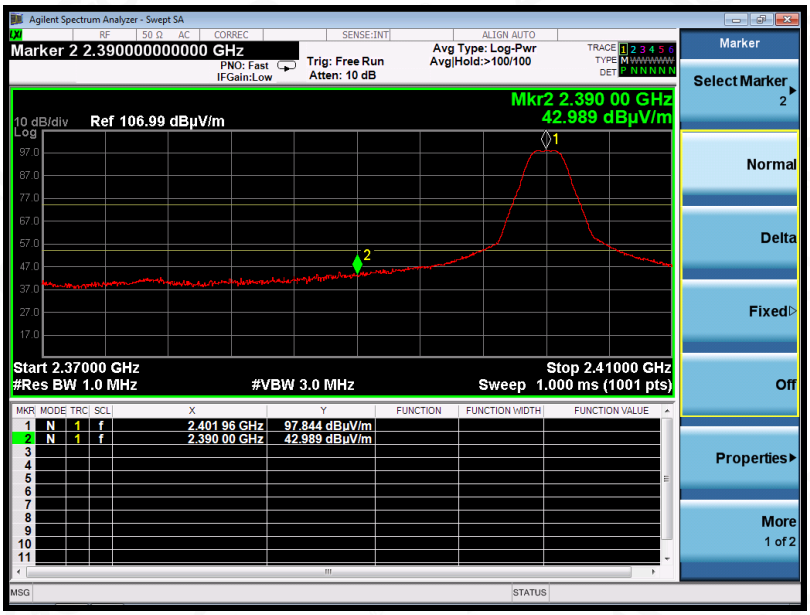
AV



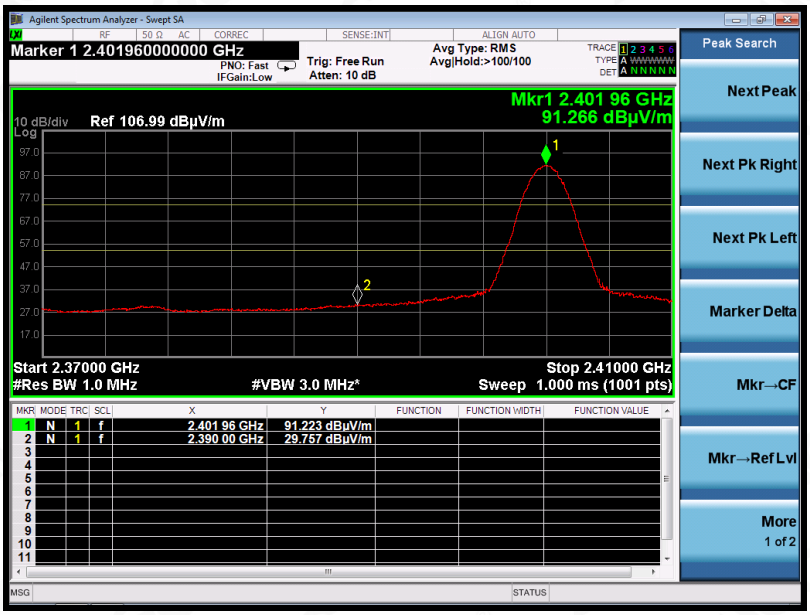
TEST RESULT FOR RESTRICTED BANDS REQUIREMENTS(2M)

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

PK



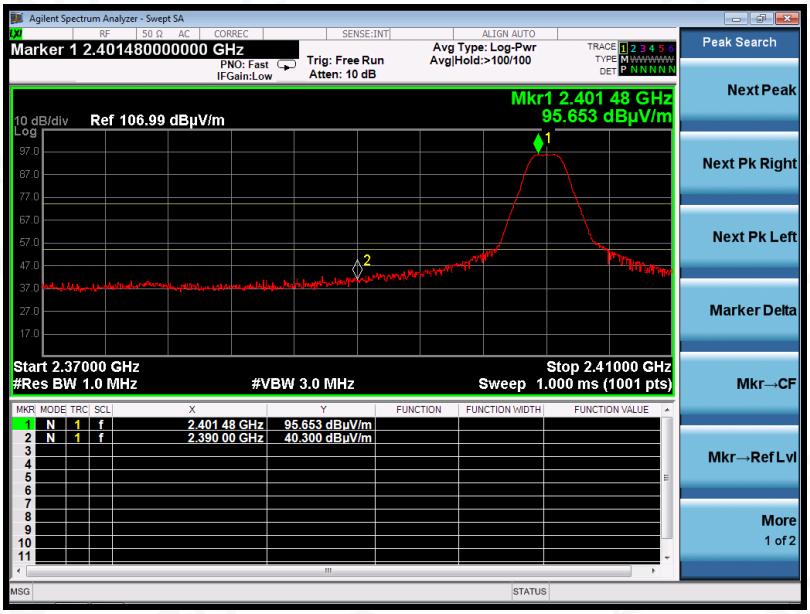
AV



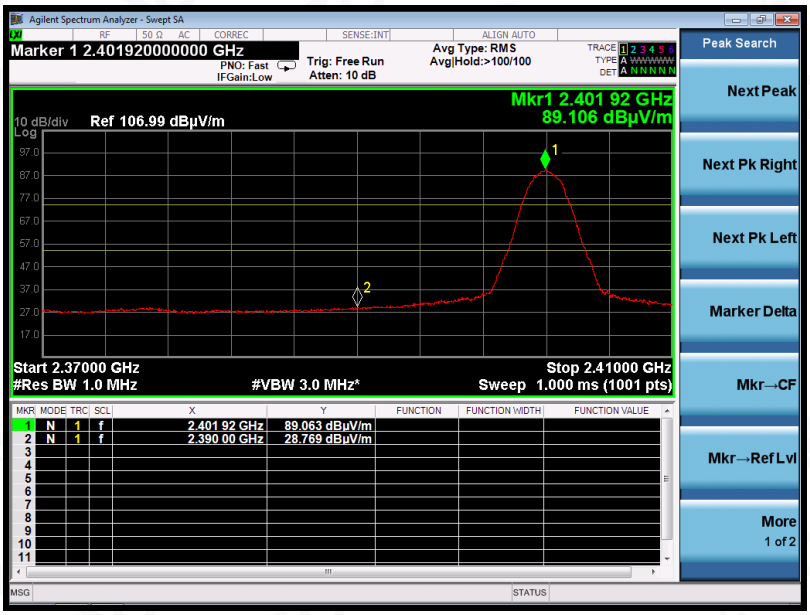
RESULT: PASS

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

PK



AV



RESULT: PASS

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

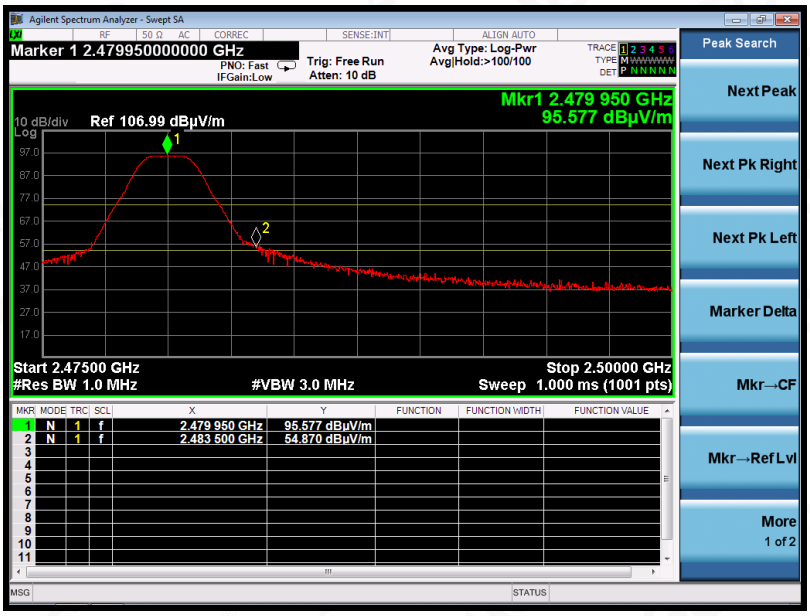
PK

AV

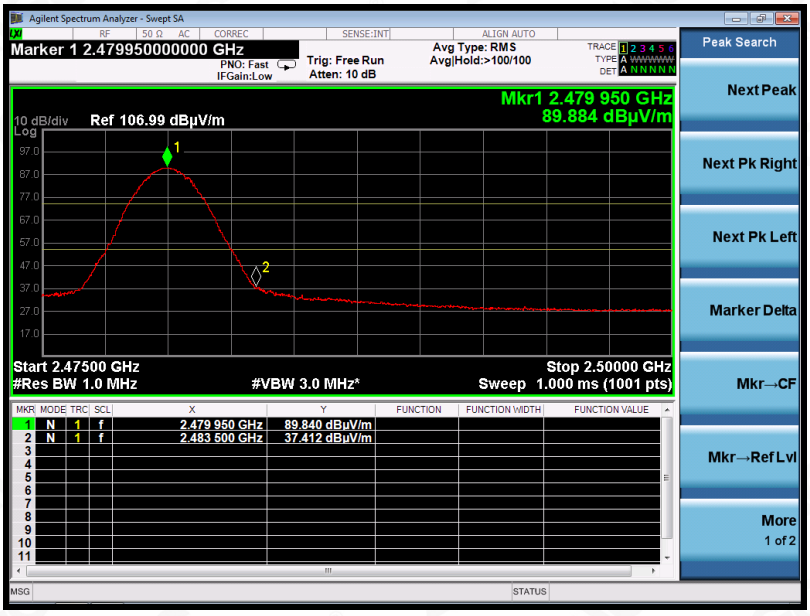
RESULT: PASS

EUT	Cascade Antenna	Model Name	CA-55
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical

PK



AV



RESULT: PASS

Note: 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.

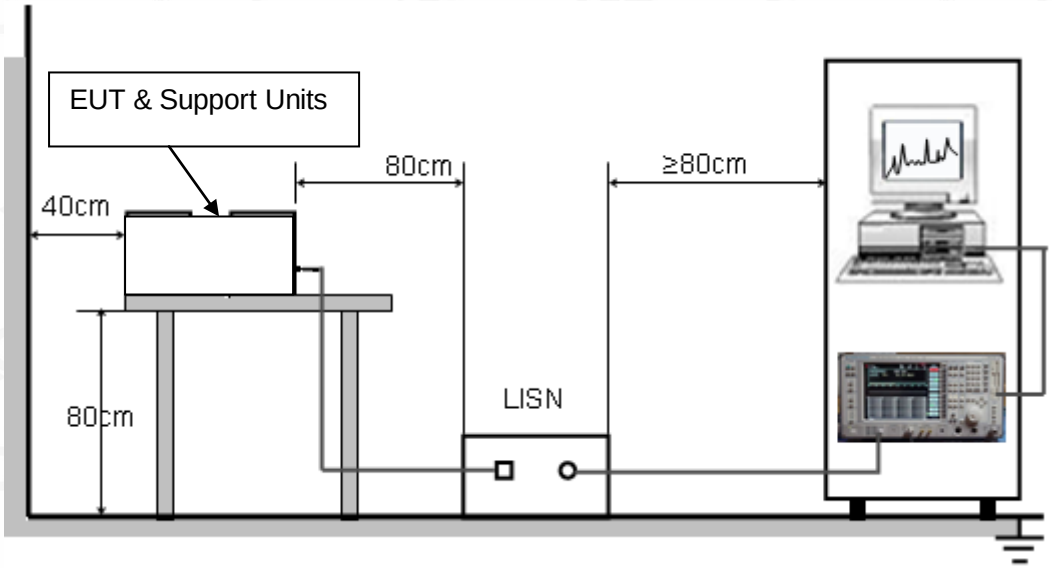
12. FCC LINE CONDUCTED EMISSION TEST

12.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note: 1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



12.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by adapter which received AC120V/60Hz power by a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

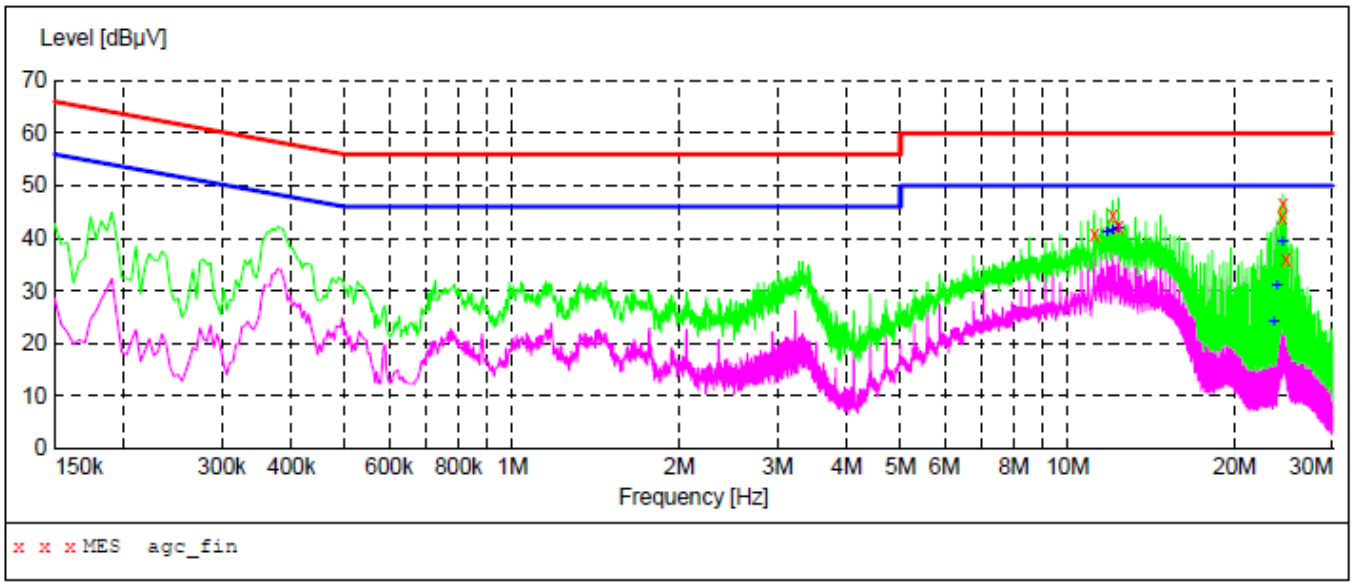
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

Line Conducted Emission Test Line 1-L



MEASUREMENT RESULT: "agc_fin"

2020/1/10 14:18

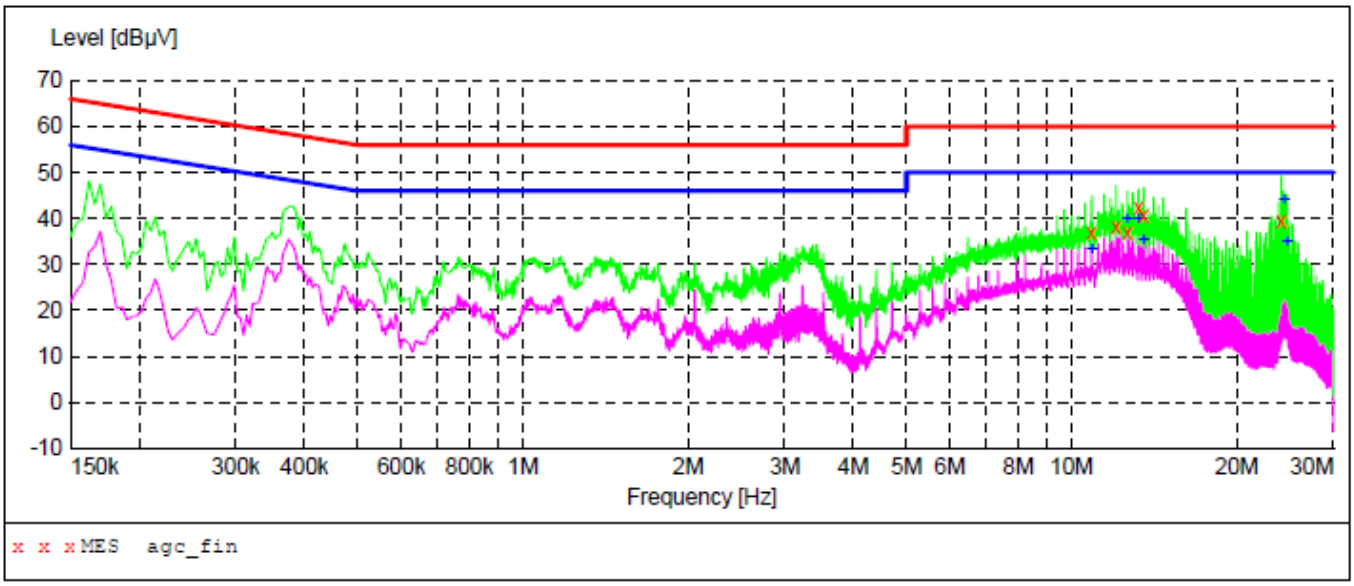
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
11.178000	40.80	11.7	60	19.2	QP	L1	FLO
12.058000	44.40	11.8	60	15.6	QP	L1	FLO
12.354000	42.30	11.8	60	17.7	QP	L1	FLO
24.350000	44.10	12.5	60	15.9	QP	L1	FLO
24.410000	46.60	12.5	60	13.4	QP	L1	FLO
24.706000	35.90	12.5	60	24.1	QP	L1	FLO

MEASUREMENT RESULT: "agc_fin2"

2020/1/10 14:18

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
11.762000	41.10	11.7	50	8.9	AV	L1	FLO
12.058000	41.30	11.8	50	8.7	AV	L1	FLO
12.350000	41.90	11.8	50	8.1	AV	L1	FLO
23.530000	23.90	12.5	50	26.1	AV	L1	FLO
23.822000	31.00	12.5	50	19.0	AV	L1	FLO
24.410000	39.20	12.5	50	10.8	AV	L1	FLO

Line Conducted Emission Test Line 2-N



MEASUREMENT RESULT: "agc_fin"

2020/1/10 14:22

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
10.878000	37.00	11.7	60	23.0	QP	N	FLO
12.054000	38.30	11.8	60	21.7	QP	N	FLO
12.642000	36.80	11.8	60	23.2	QP	N	FLO
13.226000	42.50	11.8	60	17.5	QP	N	FLO
13.522000	40.50	11.9	60	19.5	QP	N	FLO
24.106000	39.40	12.5	60	20.6	QP	N	FLO

MEASUREMENT RESULT: "agc_fin2"

2020/1/10 14:22

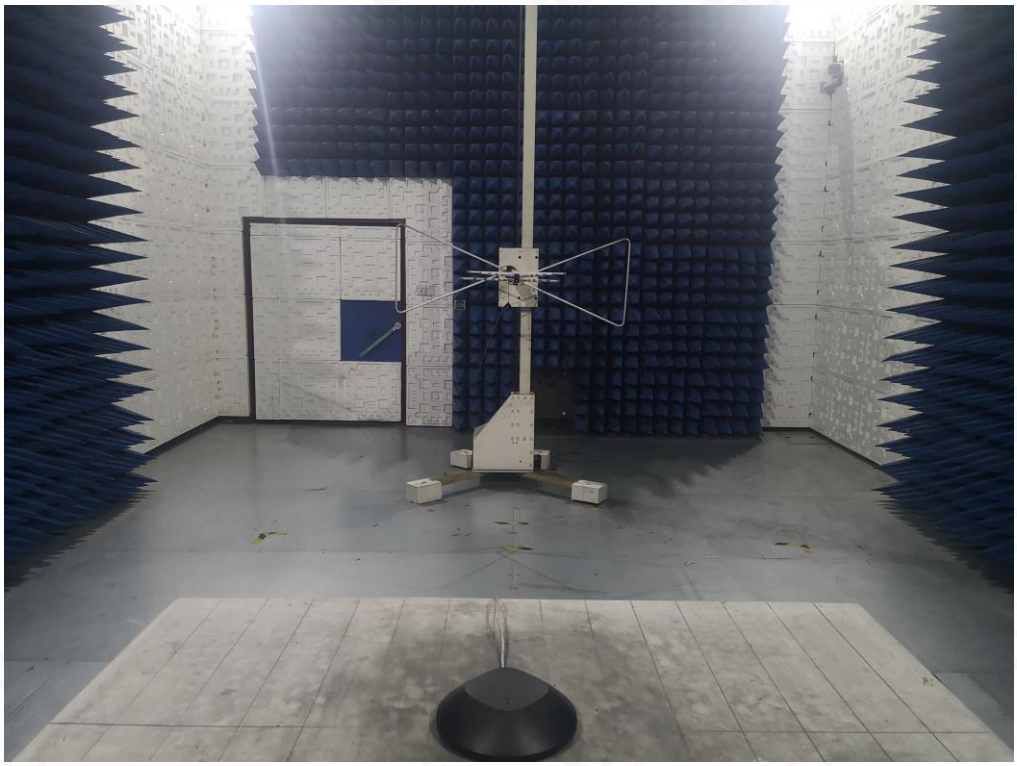
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
10.878000	33.40	11.7	50	16.6	AV	N	FLO
12.638000	39.90	11.8	50	10.1	AV	N	FLO
13.226000	40.00	11.8	50	10.0	AV	N	FLO
13.522000	35.50	11.9	50	14.5	AV	N	FLO
24.394000	43.80	12.5	50	6.2	AV	N	FLO
24.690000	34.90	12.5	50	15.1	AV	N	FLO

RESULT: PASS

Note: All the test modes had been tested, the mode 3 at GFSK 2Mbps was the worst case. Only the data of the worst case would be record in this test report.

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

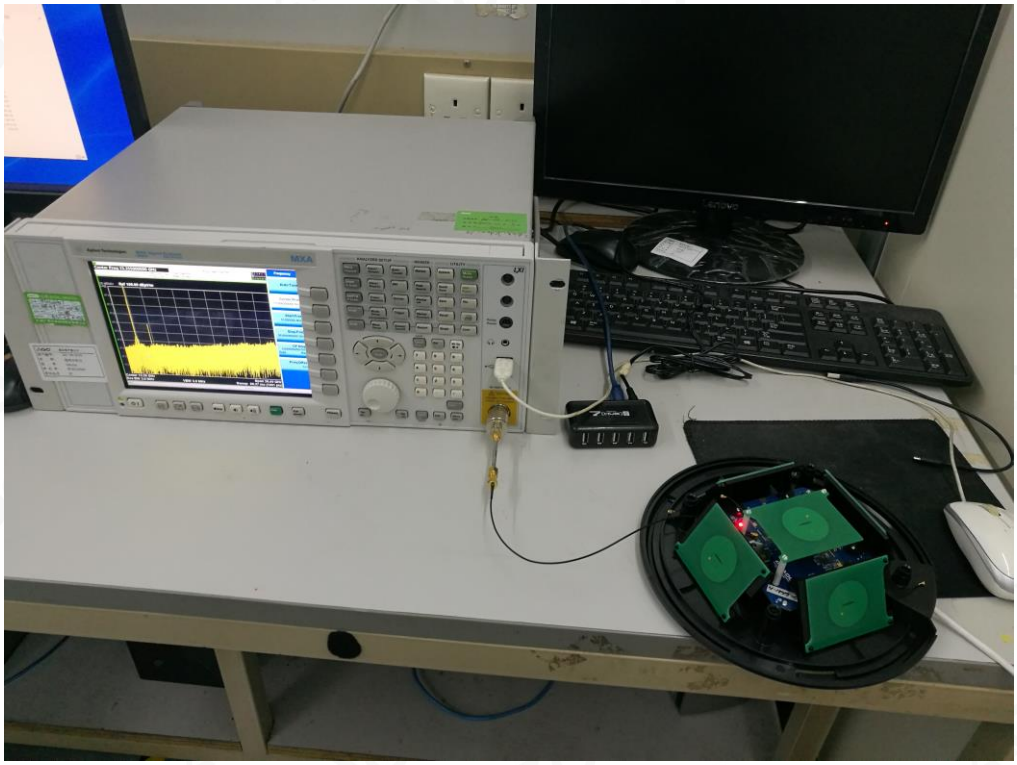
RADIATED EMISSION TEST SETUP BELOW 1GHZ



RADIATED EMISSION TEST SETUP ABOVE 1GHZ

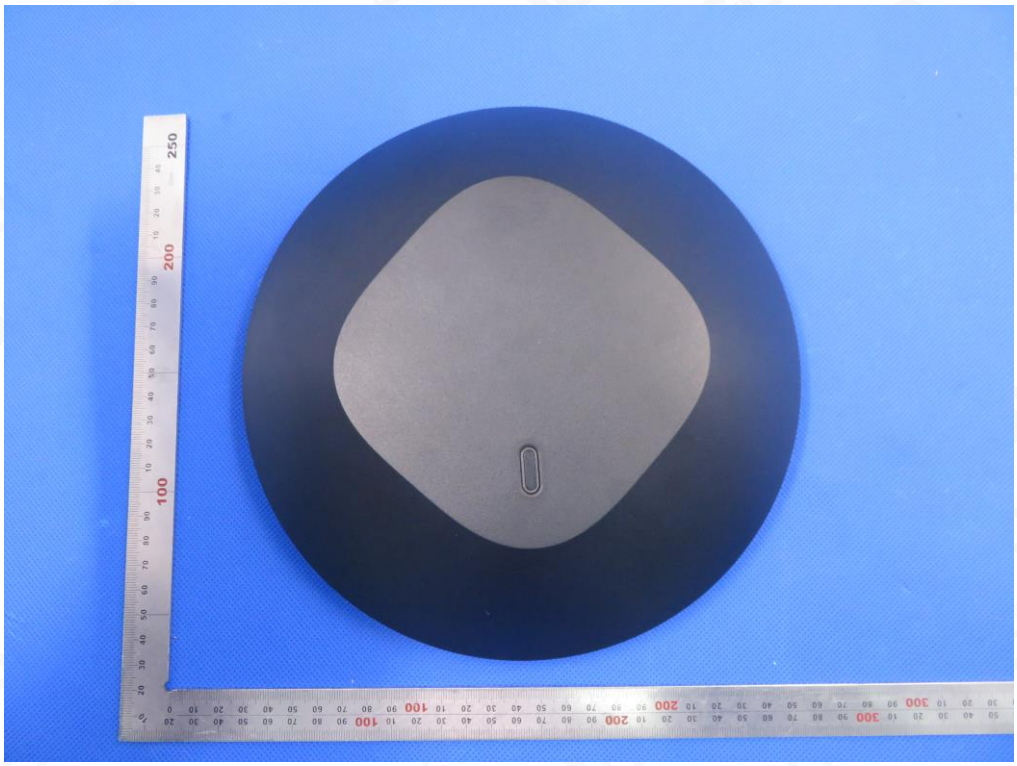
CONDUCTED EMISSION TEST SETUP

CONDUCTED TEST SETUP



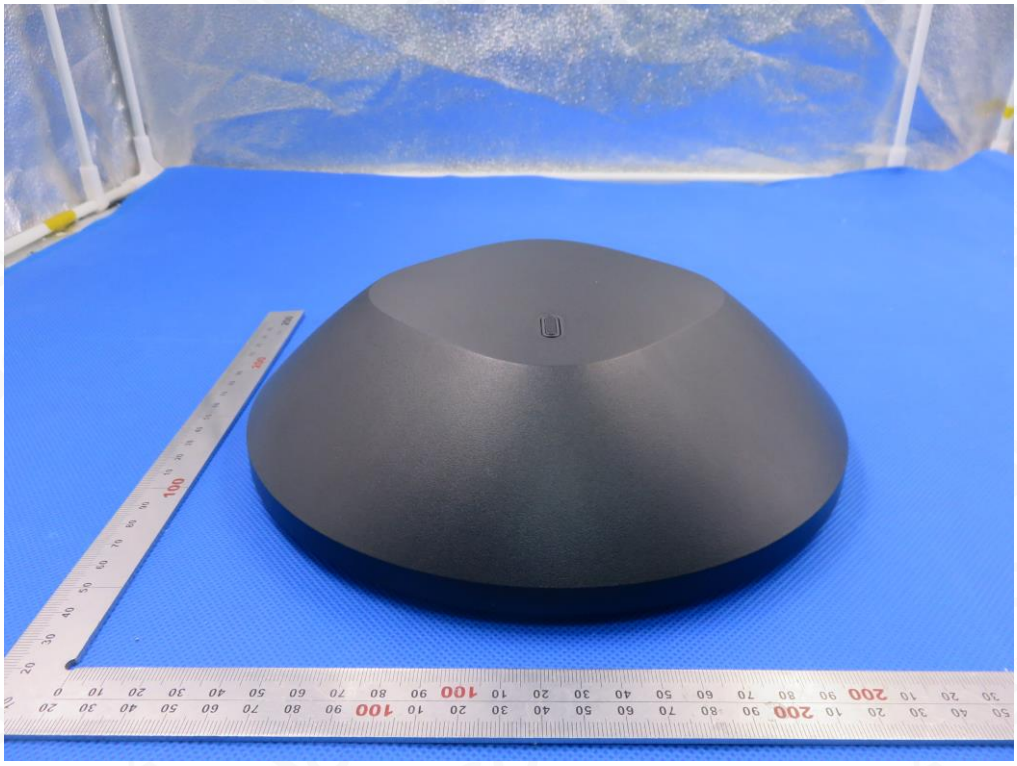
APPENDIX B: PHOTOGRAPHS OF EUT

TOP VIEW OF EUT

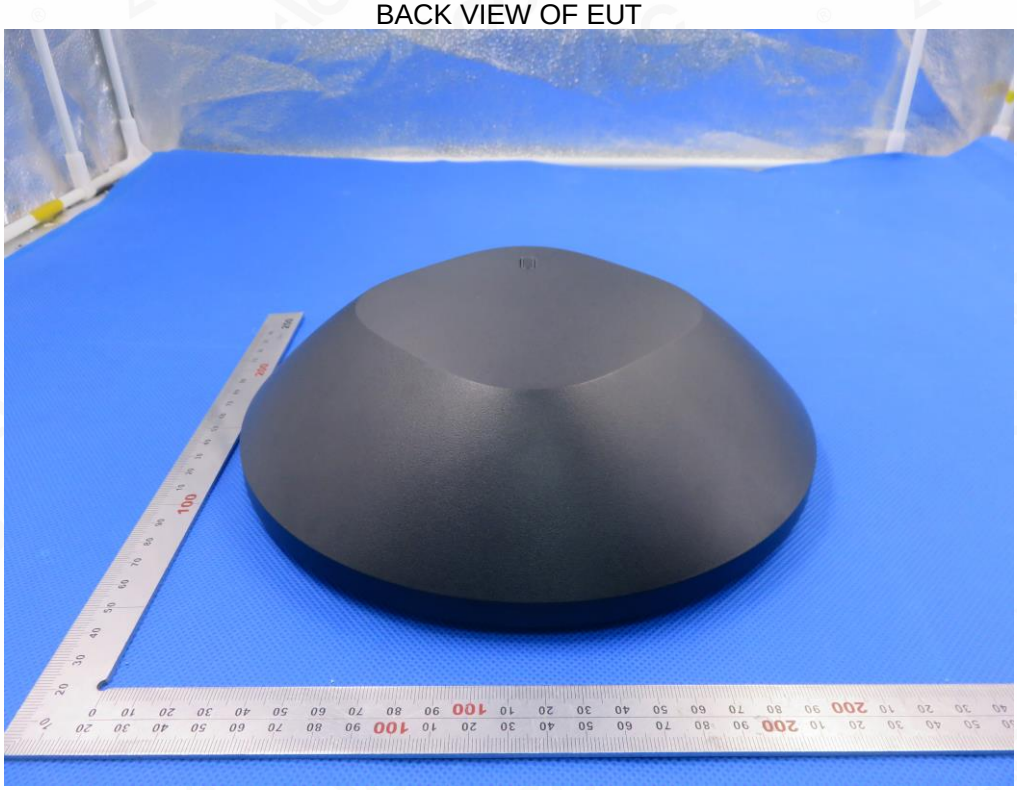


BOTTOM VIEW OF EUT

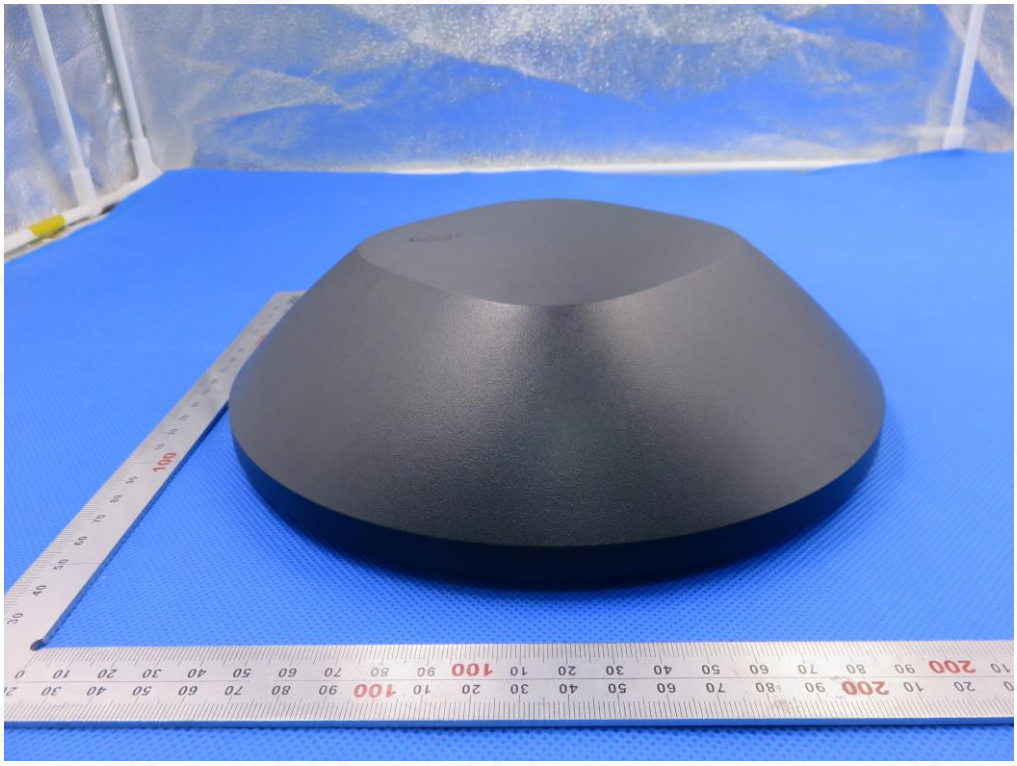
FRONT VIEW OF EUT



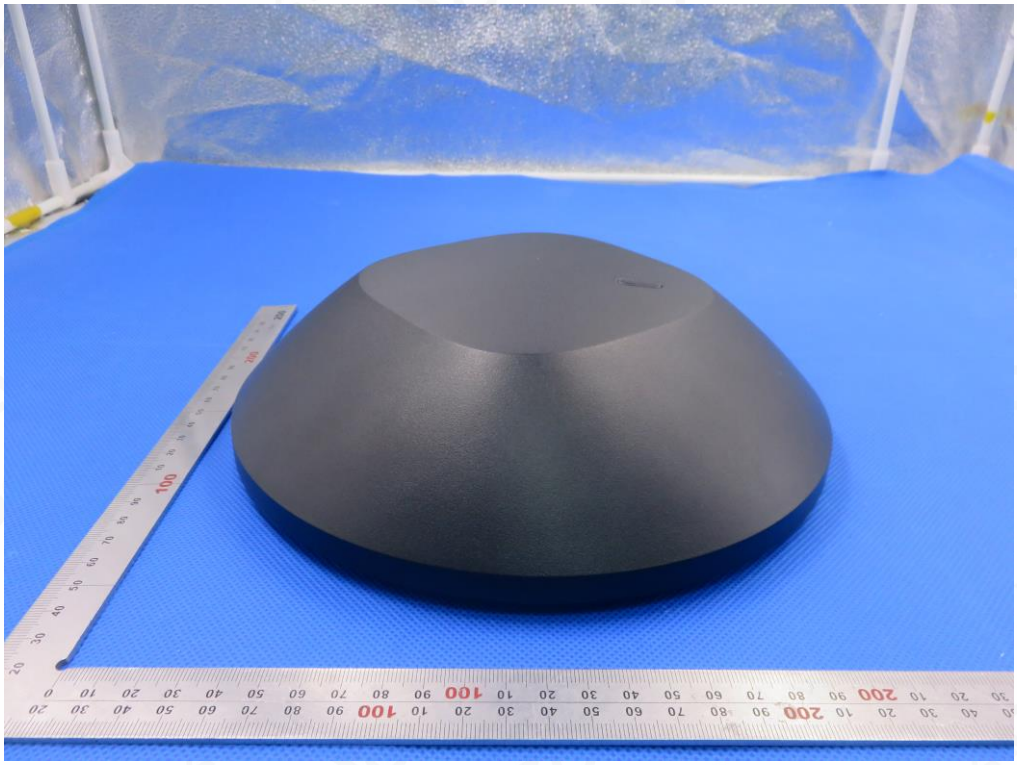
BACK VIEW OF EUT



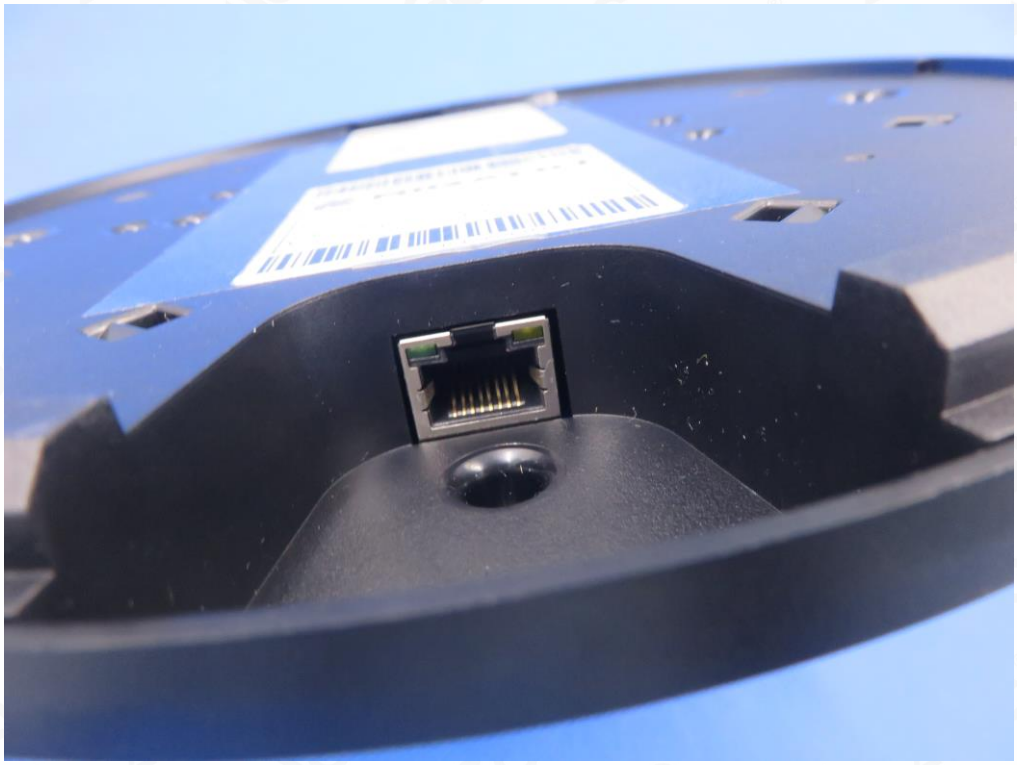
LEFT VIEW OF EUT



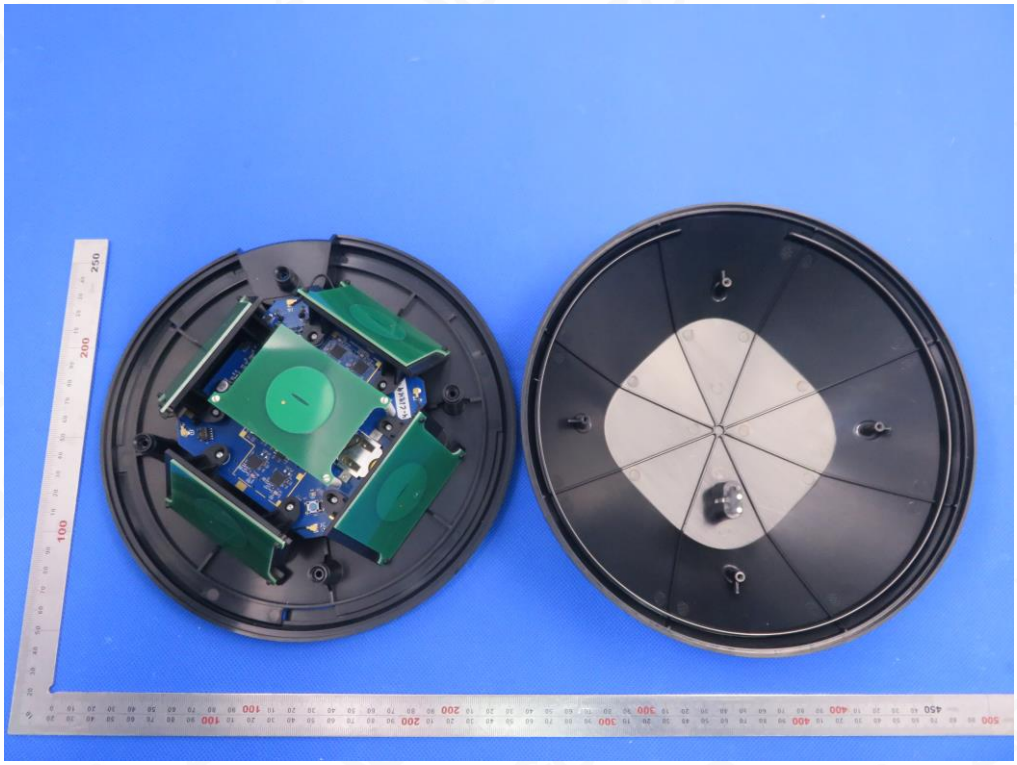
RIGHT VIEW OF EUT



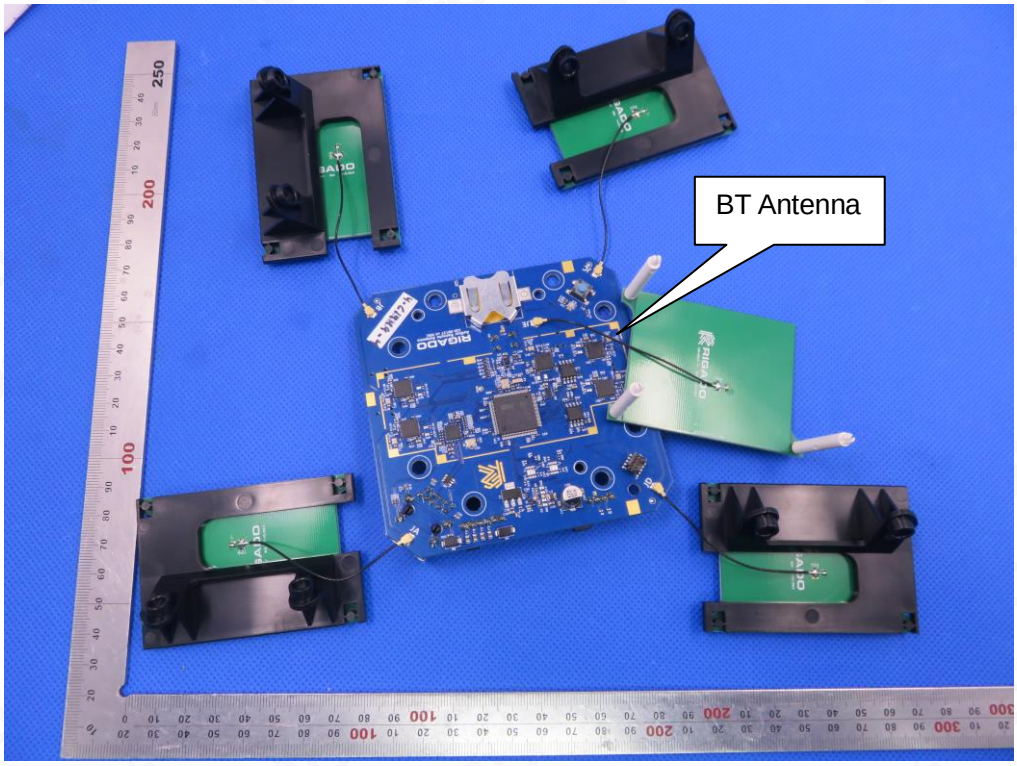
VIEW OF EUT(PORT)



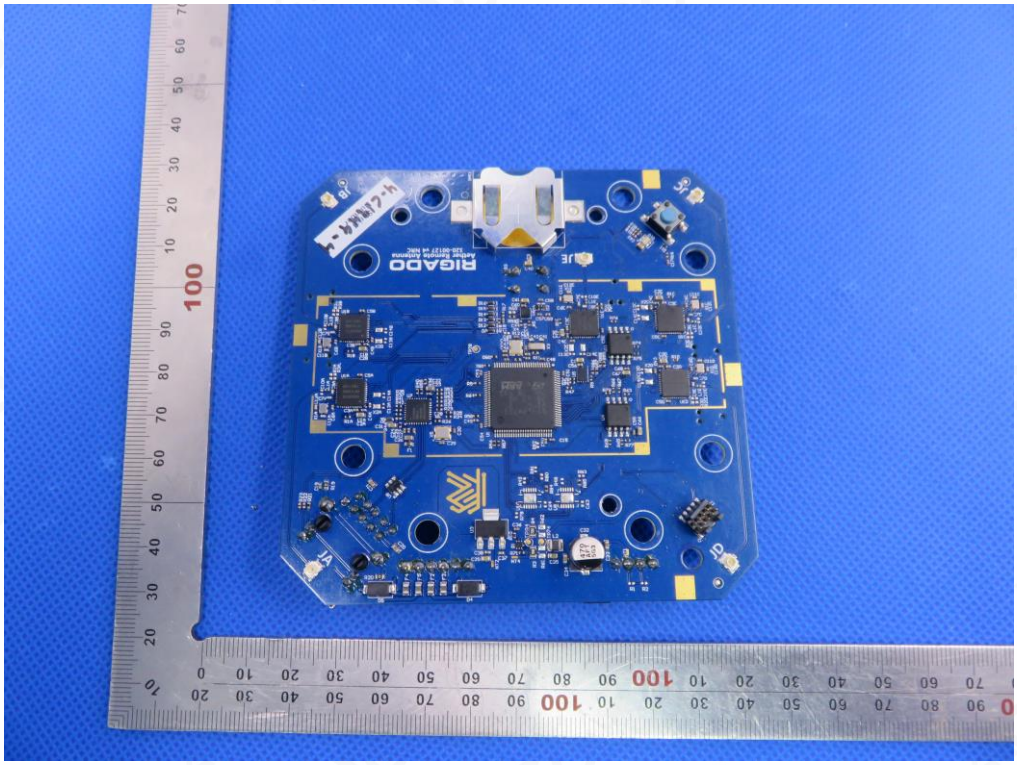
OPEN VIEW OF EUT-1



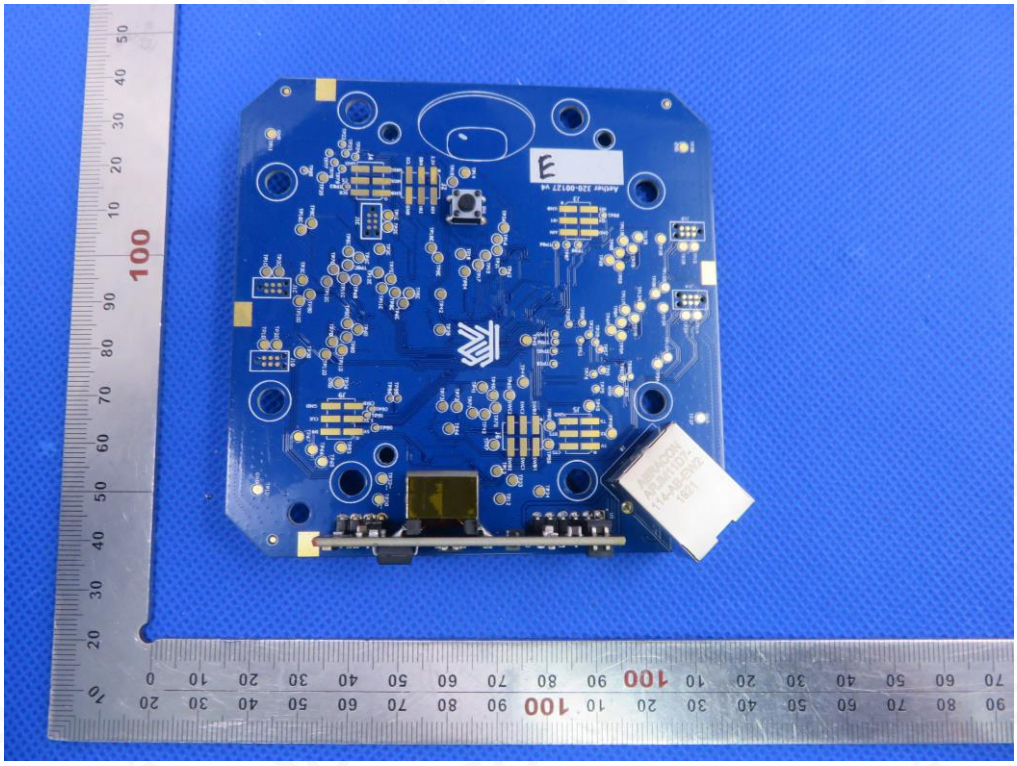
OPEN VIEW OF EUT-2



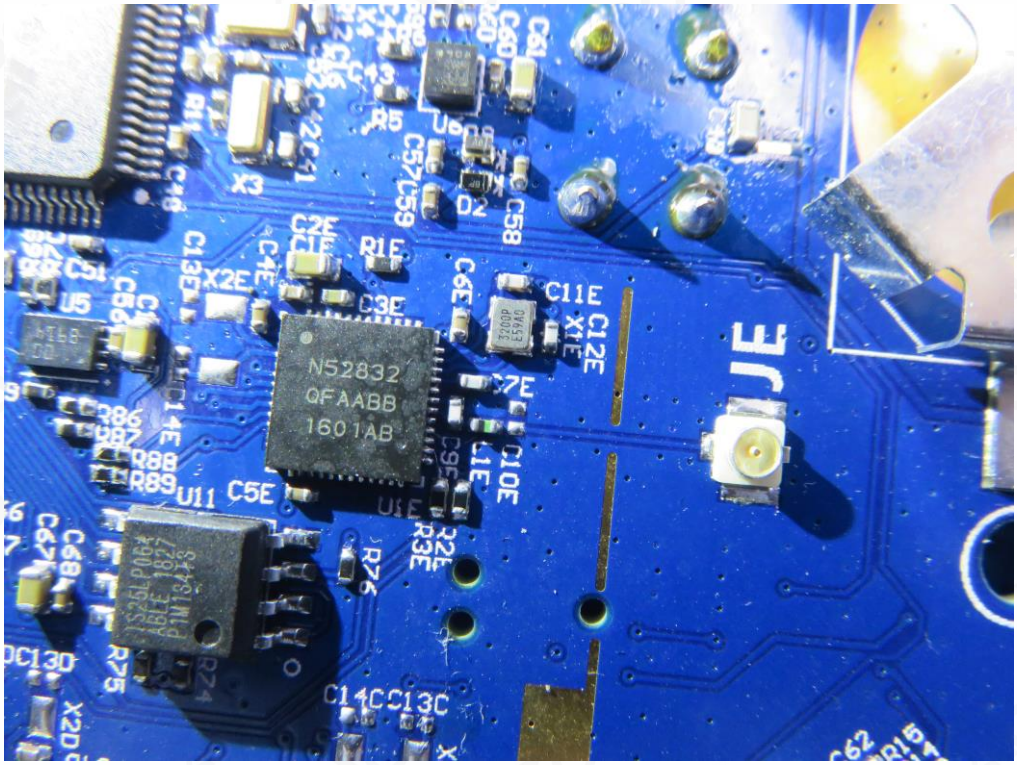
INTERNAL VIEW OF EUT-1



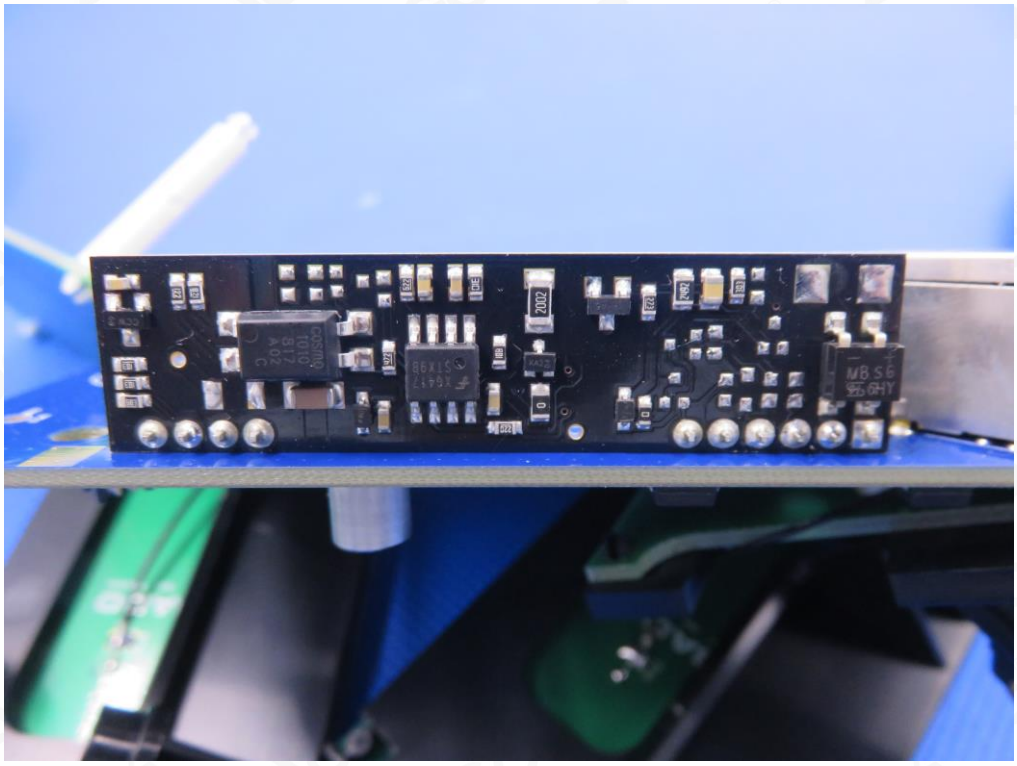
INTERNAL VIEW OF EUT-2



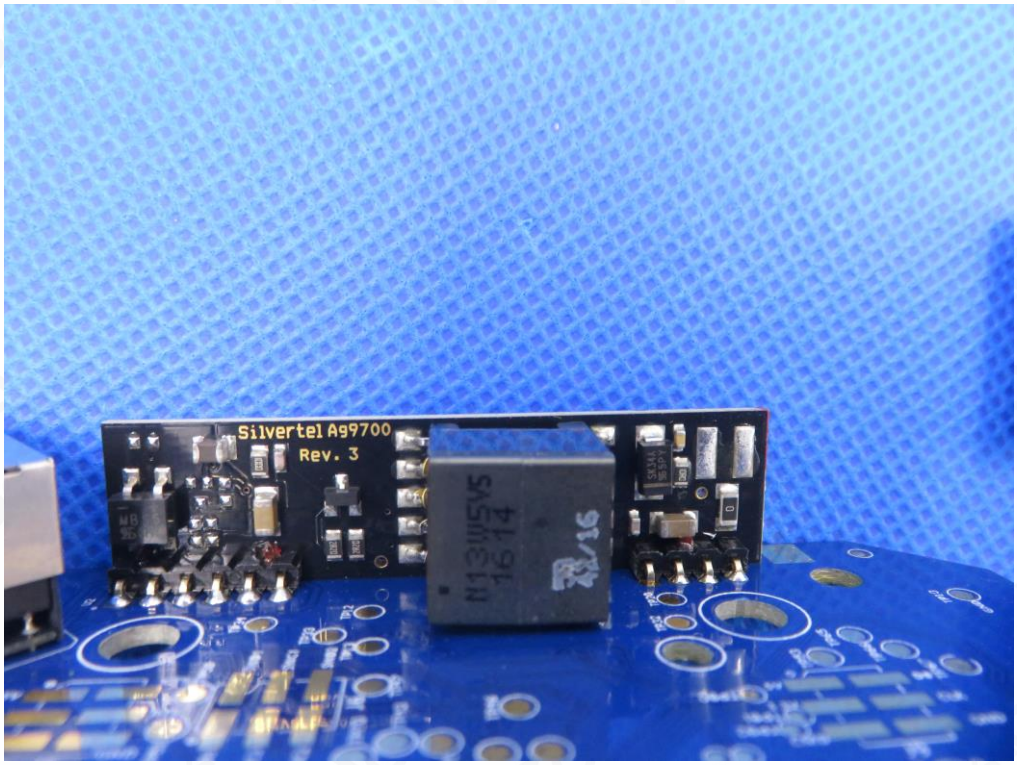
INTERNAL VIEW OF EUT-3



INTERNAL VIEW OF EUT-4



INTERNAL VIEW OF EUT-5



----END OF REPORT----