FCC Test Report

FOR:
Qolsys, Inc.

Model Name:
QS-ZWAVEAH

Product Description:
The Equipment under Test is a module, model number QS-ZWAVEAH that contains a Zwave radio

FCC ID: 2AAJXQS-ZWAVEAH

Applied Rules and Standards:
47 CFR Parts:15B

REPORT #: EMC_QOLSY-006-20001_FCC_15B_R1

DATE: 2020-10-30

A2LA Accredited

IC recognized #
3462B-2

***CETECOM* Inc.**
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CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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1 Assessment

The following device as further described in section 3 of this report was evaluated against the applicable criteria specified in the Code of Federal Regulations Title 47 parts 15B.

No deficiencies were ascertained.

Company	Description	Model
Qolsys, Inc.	The Equipment under Test is a module, model number QS-ZWAVEAH that contains a Zwave radio	QS-ZWAVEAH

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2020-10-30	Compliance	Cindy Li (Lab Manager)	Cindy Li Digitally signed by cindy.li@cetecom.com DN: CN=cindy.li@cetecom.com Reason: I have reviewed this document Location: your signing location here Date: 2020-10-30 14:44:43 Foxit Reader Version: 10.0.1

Responsible for the Report:

Date	Section	Name	Signature
2020-10-30	Compliance	Yuchan Lu (Test Engineer)	Yuchan Lu Digitally signed by: Yuchan Lu DN: CN = Yuchan Lu email = Yuchan.Lu@cetecom.com C = US O = CETECOM Inc. OU = EMC Date: 2020.10.30 13:45:14 -07'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
EMC Lab Manager:	Cindy Li
Responsible Project Leader:	Akanksha Baskaran

2.2 Identification of the Client

Applicant's Name:	Qolsys, Inc.
Street Address:	1900 The Alameda Ste 420
City/Zip Code	San Jose, CA 95126
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment under Test (EUT)

3.1 EUT Specifications

Marketing Name:	Zwave Module
Model Number:	QS-ZWAVEAH
FWIN:	6.81.03
HVIN:	Rev. F
PMN:	Zwave Module
Power Supply/ Rated Operating Voltage Range:	Vmin: 3 VDC/ Vnom: 3.3 VDC / Vmax: 3.6 VDC
Operating Temperature Range:	Low 0ºC, Nominal 25ºC, High 40ºC
Radios included in the device:	N/A
Sample Revision:	☐Prototype Unit; ☐Production Unit; ■Pre-Production
EUT Dimensions [mm]:	57 x 25 x 10
Weight [grams]:	8.5
EUT Diameter:	■< 60 cm☐ Other _____

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes / Comments
1	QC171174900134	Rev. F	6.04	-

3.3 Support Equipment

SE #	Description
1	AC/DC Converter, Manufacture: Sure-Power, Model: SW-070100AB
2	Qolsys, Model: IQPanel2, P/N QS9202-4208-840
3	Laptop,

3.4 Test Sample Configuration

Set-up #	EUT / AE used for set-up	Comments
1	EUT#1	-

4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to evaluate the compliance of the EUT against the relevant requirements specified in the Code of Federal Regulations Title 47 parts 15B.

Radiated Emission tests are carried out to show that the EUT complies with FCC15.109 (a) radiated emissions limit for Class B device.

Conducted Emission tests are carried out to show that the EUT complies with FCC15.107 (a) conducted emissions limit for Class B device.

4.1 Date of Testing:

09/09/2020 -- 09/23/2020

4.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=1.

Radiated measurement

9 kHz to 30MHz	±2.5 dB (Magnetic Loop Antenna)
30 MHz to 1000 MHz	±2.0 dB (Biconilog Antenna)
1 GHz to 40 GHz	±2.3 dB (Horn Antenna)

4.3 Environmental Conditions during Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25°C
- Relative humidity: 40-60%

Deviating test conditions are indicated at individual test description where applicable.

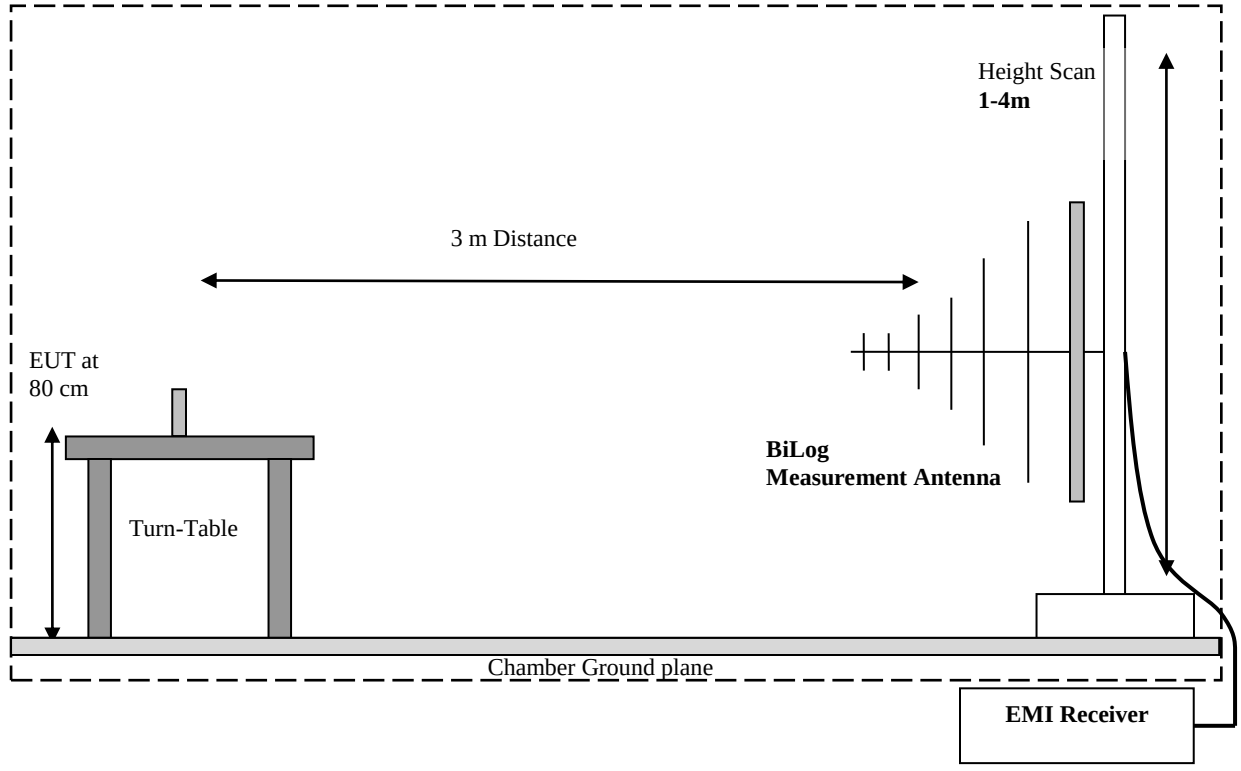
5 Measurement Procedures

Testing is performed according to the guidelines provided in ANSI C63.4-2014 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

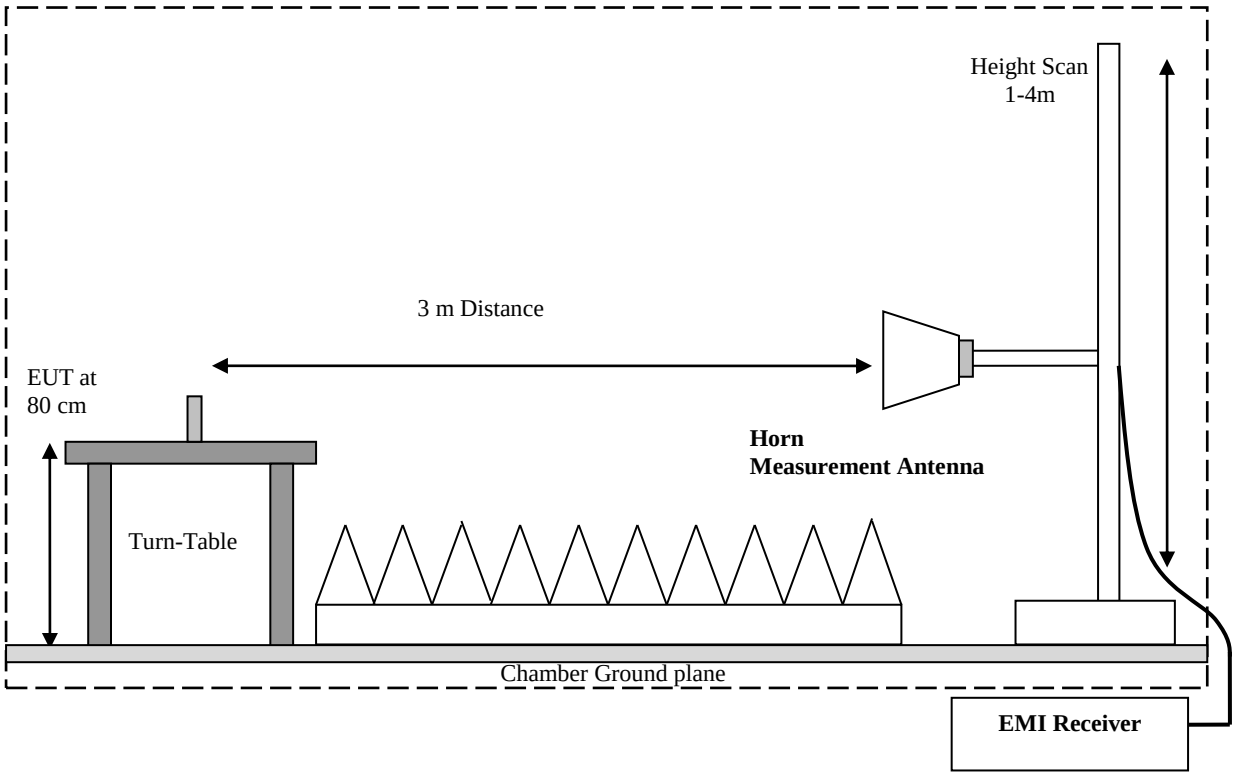
5.1 Radiated Measurement for EUT with diameter less than 60 cm

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

Radiated Emissions Test Setup 30MHz-1GHz Measurements



Radiated Emissions Test Setup 1GHz-18GHz Measurements



5.2 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

- Measured reading in dBµV
- Cable Loss between the receiving antenna and SA in dB and
- Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

FS (dBµV/m) = Measured Value on SA (dBµV) + Cable Loss (dB) + Antenna Factor (dB/m)

Example:

Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0

6 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
FCC §15.109	Radiated Emissions	Nominal	RX Mode	■	☐	☐	Complies
FCC §15.107	Conducted Emissions	Nominal	RX Mode	■	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.

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7 Test Result Data

7.1 Radiated EmissionsMeasurement according to CFR 47 Part 15.109

Spectrum Analyzer settings		
Sweep Frequency Range	30 MHz – 1 GHz	1 GHz – 40 GHz
Resolution Bandwidth	120 kHz	1 MHz
Detector (Exploratory Measurements)	Peak	Peak, Average
Detector (Final Measurements)	Quasi-Peak	Peak, Average
Trace Mode	Max Hold	Max Hold
Step Size	40 kHz	800 kHz
Measurement Time (Exploratory Measurements)	2 ms	2 ms
Measurement Time (Final Measurements)	100 ms	100 ms

7.1.1 Limits:

Class A Limits		
Frequency of emission (MHz)	**Field Strength @ 10 m (µV/m)**	**Field Strength @ 3 m (dBµV/m)**
30-88	90	49.5
88-216	150	54
216-960	210	56.9
Above 960	300	60

Class B Limits		
Frequency of emission (MHz)	**Field Strength @ 3 m (µV/m)**	**Field Strength @ 3 m (dBµV/m)**
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Note: For measurements below 1 GHz, the limits above use a quasi-peak detector. For measurements above 1 GHz, the limits above use an average detector.

7.1.2 Test Summary:

Environmental Conditions	
Ambient Temperature:	23.7° C
Relative Humidity:	42.9%
Atmospheric Pressure:	1010 mbar

Test Results						
Plot #	**EUT Set-Up #**	**EUT operating mode**	**Scan Frequency**	**Power Supply Input**	**Comments**	**Result**
1 - 3	1	RX Mode	30 MHz – 18 GHz	5 VDC	-	Pass

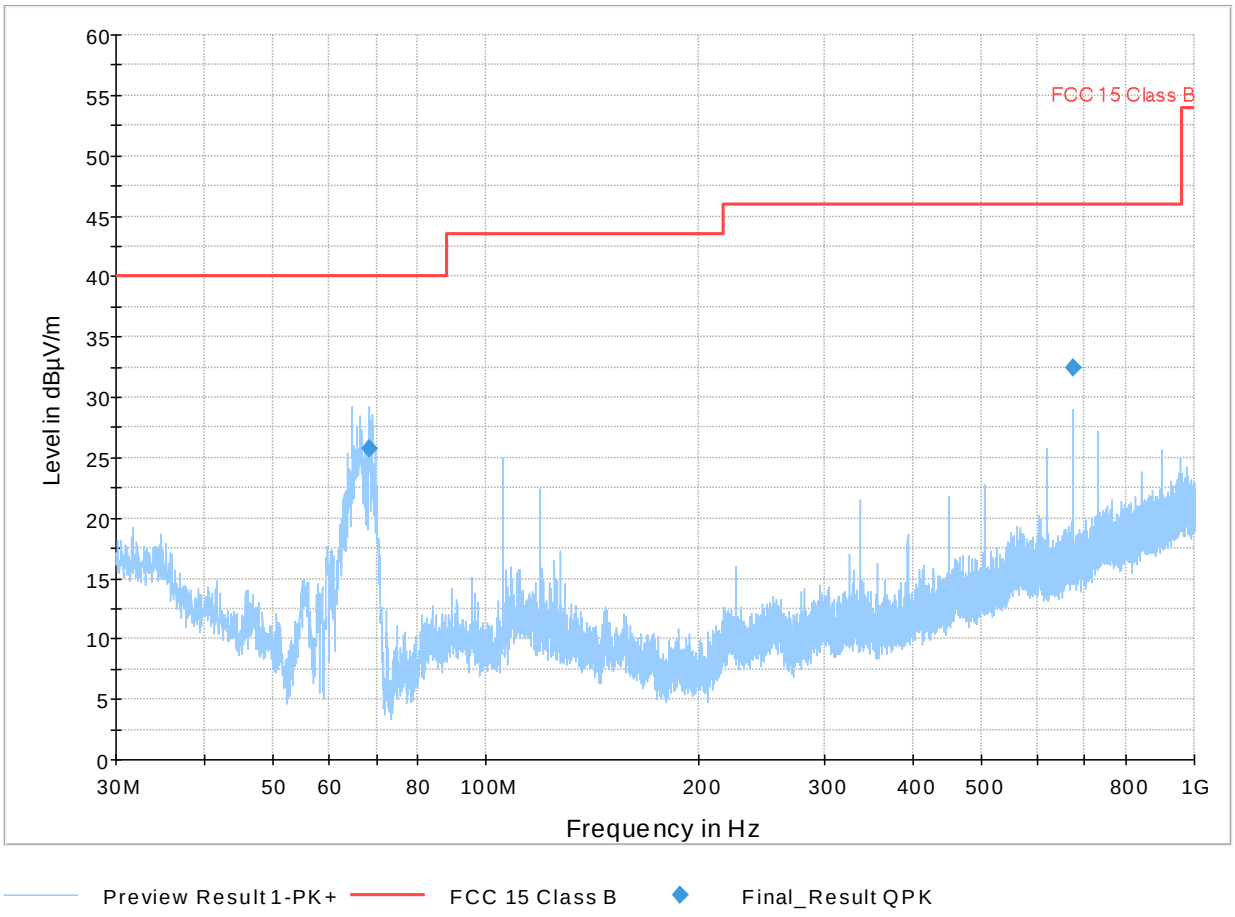
7.1.3 Measurement Plots:

Plot # 1

Disclaimer: Any measurement data within 2dB from the limit line is conditional PASS/FAIL due to measurement uncertainty considerations.

Final_Result

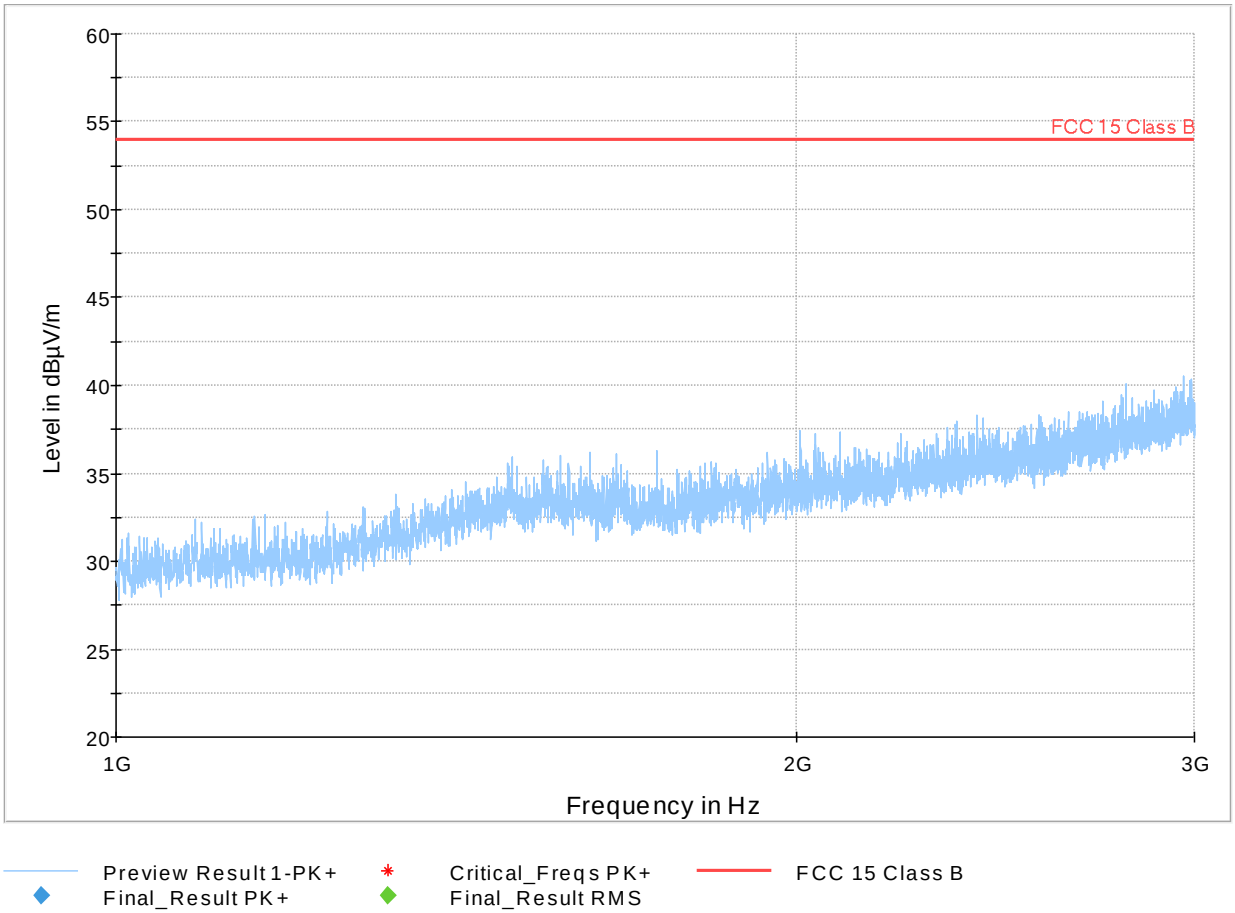
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
68.218	25.80	40.00	14.20	500.0	120.000	188.0	V	328.0	8.0	
674.953	32.47	46.02	13.55	500.0	120.000	140.0	H	35.0	23.1	



Plot # 2

Disclaimer: Any measurement data within 2dB from the limit line is conditional PASS/FAIL due to measurement uncertainty considerations.

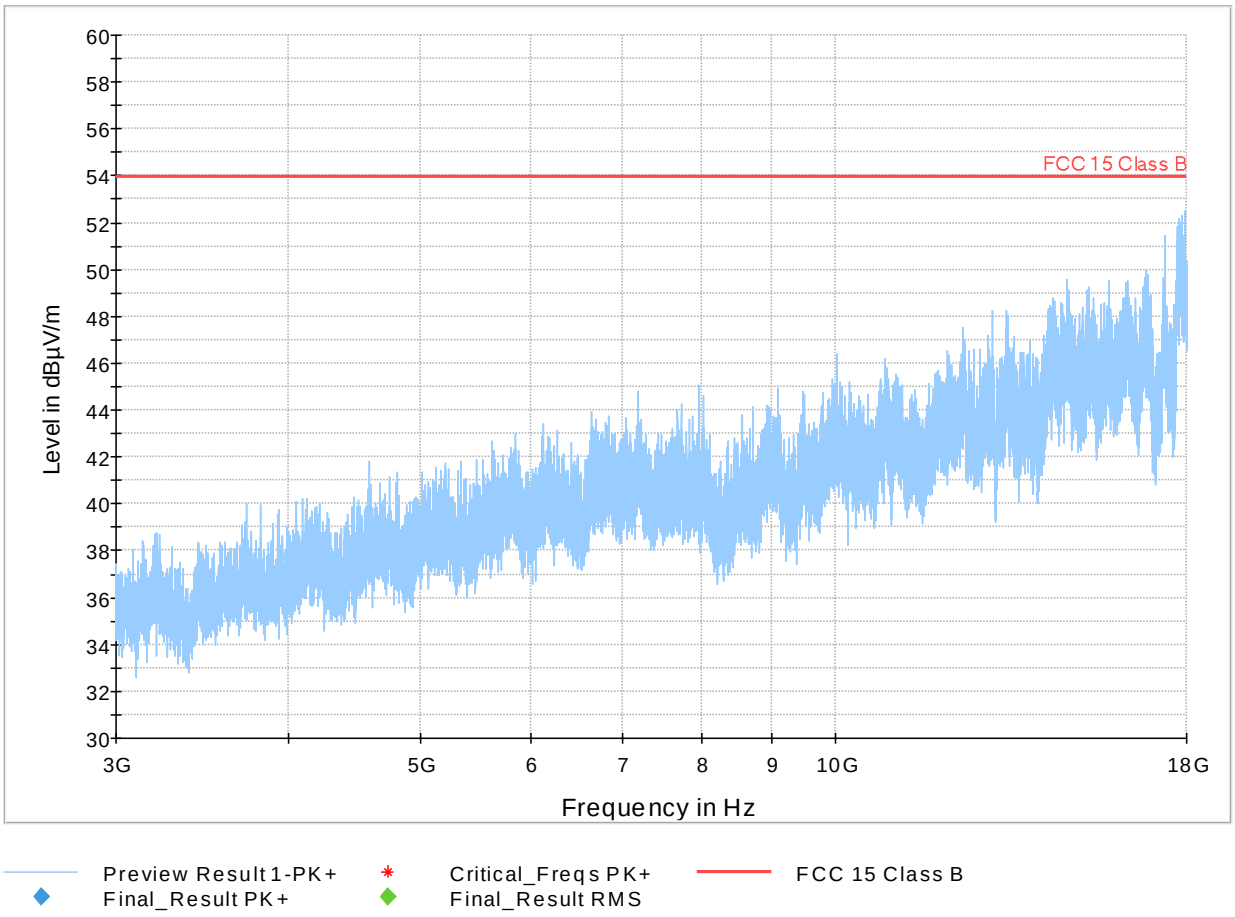
Final_Result



Plot # 3

Disclaimer: Any measurement data within 2dB from the limit line is conditional PASS/FAIL due to measurement uncertainty considerations.

Final_Result



7.2 AC Power line Conducted Emissions according to CFR 47 Part 15.107

Spectrum Analyzer Setting	
Frequency band	150 kHz – 30 MHz
Resolution Bandwidth	9 kHz
Detector (Exploratory Measurements)	Peak, Average
Detector (Final Measurements)	Quasi-Peak, Average
Trace Mode	Max Hold
Step Size	4 kHz
Measurement Time	20 ms

7.2.1 Measurement Procedure:

- The EUT and accessories are placed on a non-conducting table 80 cm above the horizontal ground plane and 40 cm from the vertical ground plane.
- Cables that hang closer than 40 cm to the ground plane are gathered into a 30 cm to 40 cm long bundle.
- The power cable of the EUT is connected to the LISN.
- The 6 highest emissions within 20 dB of the limit are noted.

7.2.2 Limits:

Class A Limits		
Frequency of emission (MHz)	**Conducted Limit (dBµV)**	
	Quasi-peak	**Average**
0.15-0.5	79	66
0.5-30	73	60

Class B Limits		
Frequency of emission (MHz)	**Conducted Limit (dBµV)**	
	Quasi-peak	**Average**
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency

7.2.3 Test Summary:

Environmental Conditions	
Ambient Temperature:	23.9° C
Relative Humidity:	40%
Atmospheric Pressure:	1012 mbar

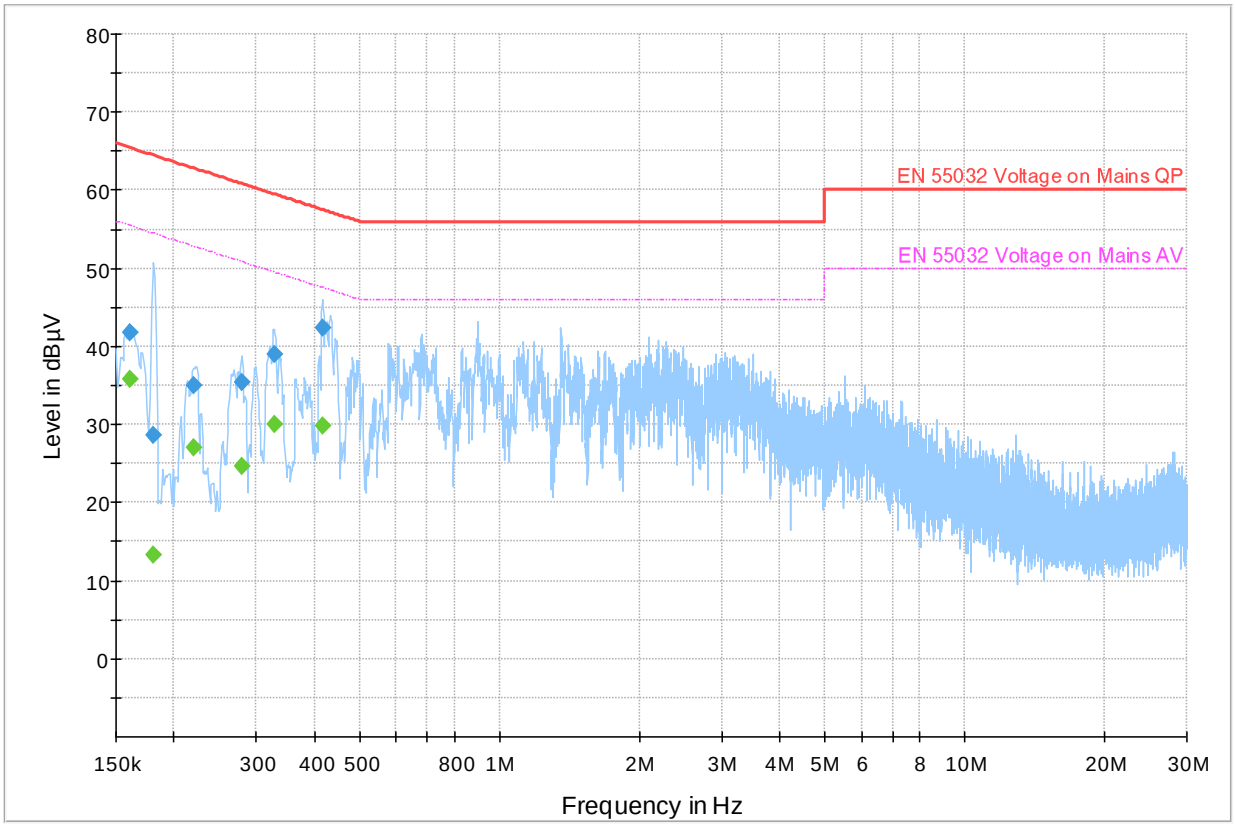
Test Results							
Plot #	**EUT Set-Up #**	**EUT operating mode**	**Detector (Peak / AVG / QP)**	**Line Under Test**	**Power Supply Input**	**Comments**	**Result**
1	1	RX Mode	Peak & AVG	Line &Return	110V AC	-	Pass

7.2.4 Measurement Plots:

Plot # 1

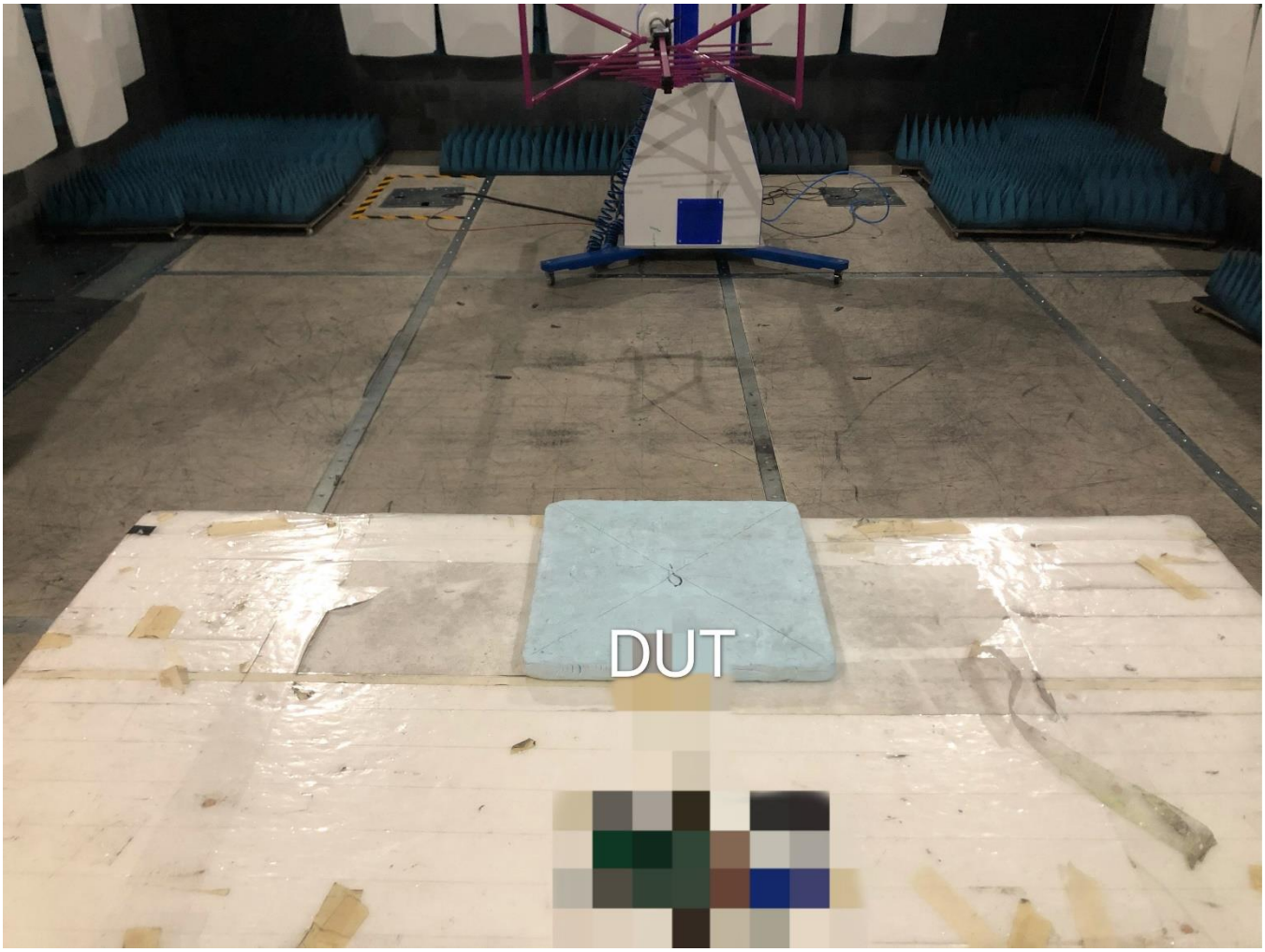
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)	Comment
0.161	---	35.89	55.43	19.54	500.0	9.000	L1	GND	10.5	
0.161	41.74	---	65.43	23.69	500.0	9.000	L1	GND	10.5	
0.181	---	13.36	54.44	41.08	500.0	9.000	L1	GND	10.5	
0.181	28.57	---	64.44	35.87	500.0	9.000	L1	GND	10.5	
0.220	---	26.98	52.81	25.83	500.0	9.000	L1	GND	10.2	
0.220	35.10	---	62.81	27.71	500.0	9.000	L1	GND	10.2	
0.280	---	24.66	50.81	26.16	500.0	9.000	L1	GND	10.1	
0.280	35.45	---	60.81	25.36	500.0	9.000	L1	GND	10.1	
0.329	---	30.09	49.47	19.38	500.0	9.000	L1	GND	10.0	
0.329	39.02	---	59.47	20.45	500.0	9.000	L1	GND	10.0	
0.418	---	29.89	47.50	17.61	500.0	9.000	L1	GND	10.0	
0.418	42.44	---	57.50	15.06	500.0	9.000	L1	GND	10.0	

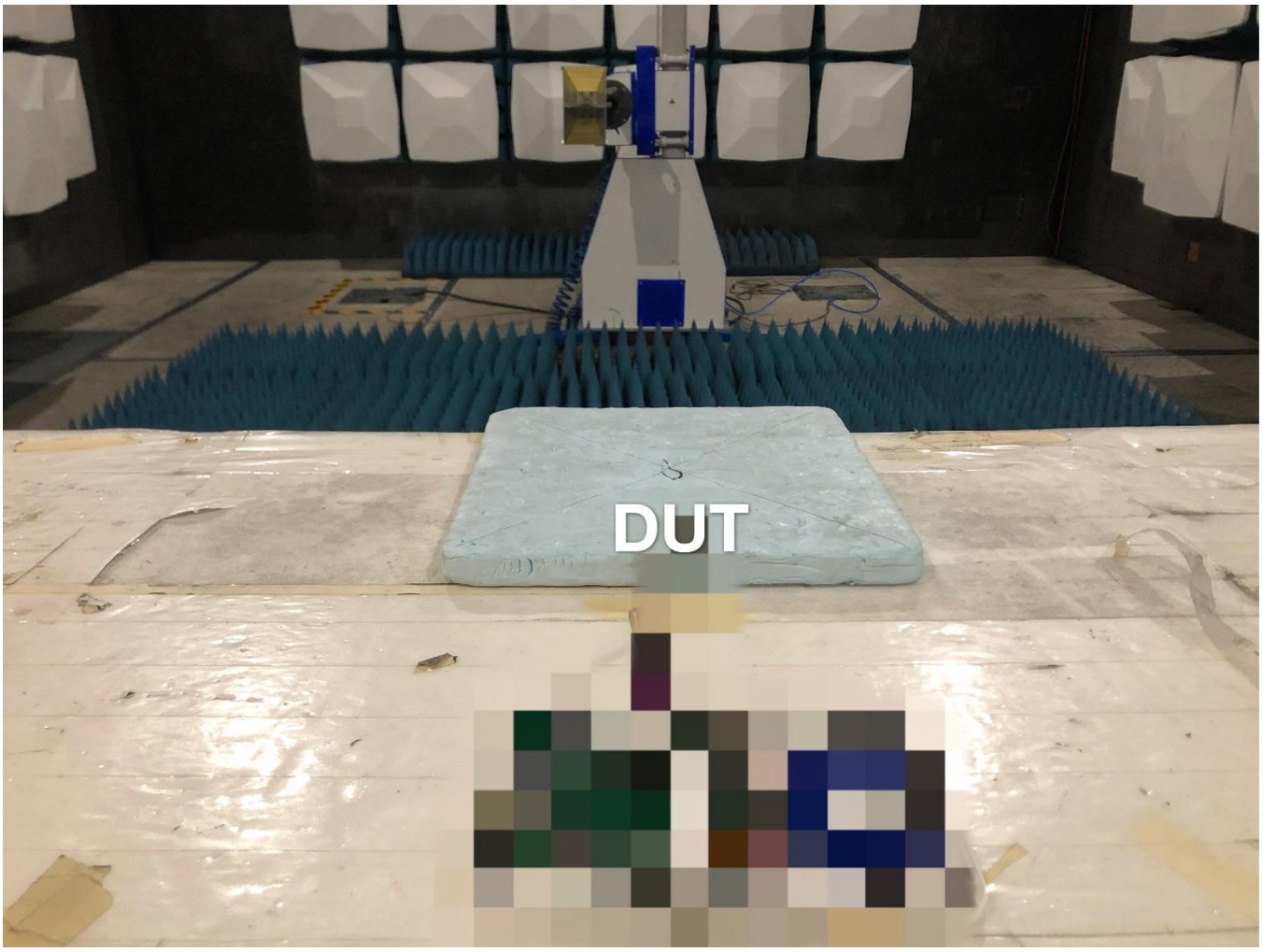


8 Test Setup Photos

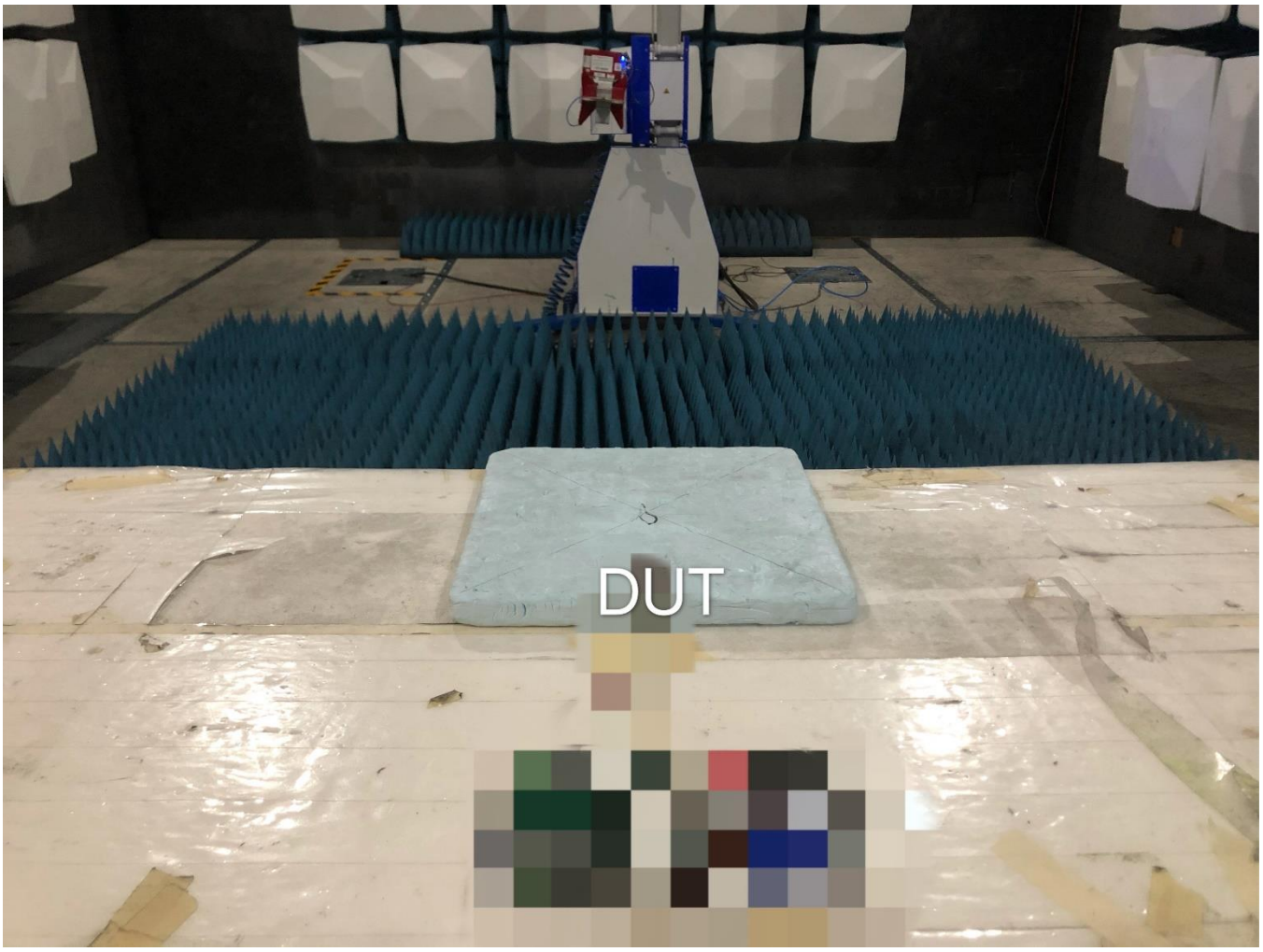
30 MHz to 1 GHz



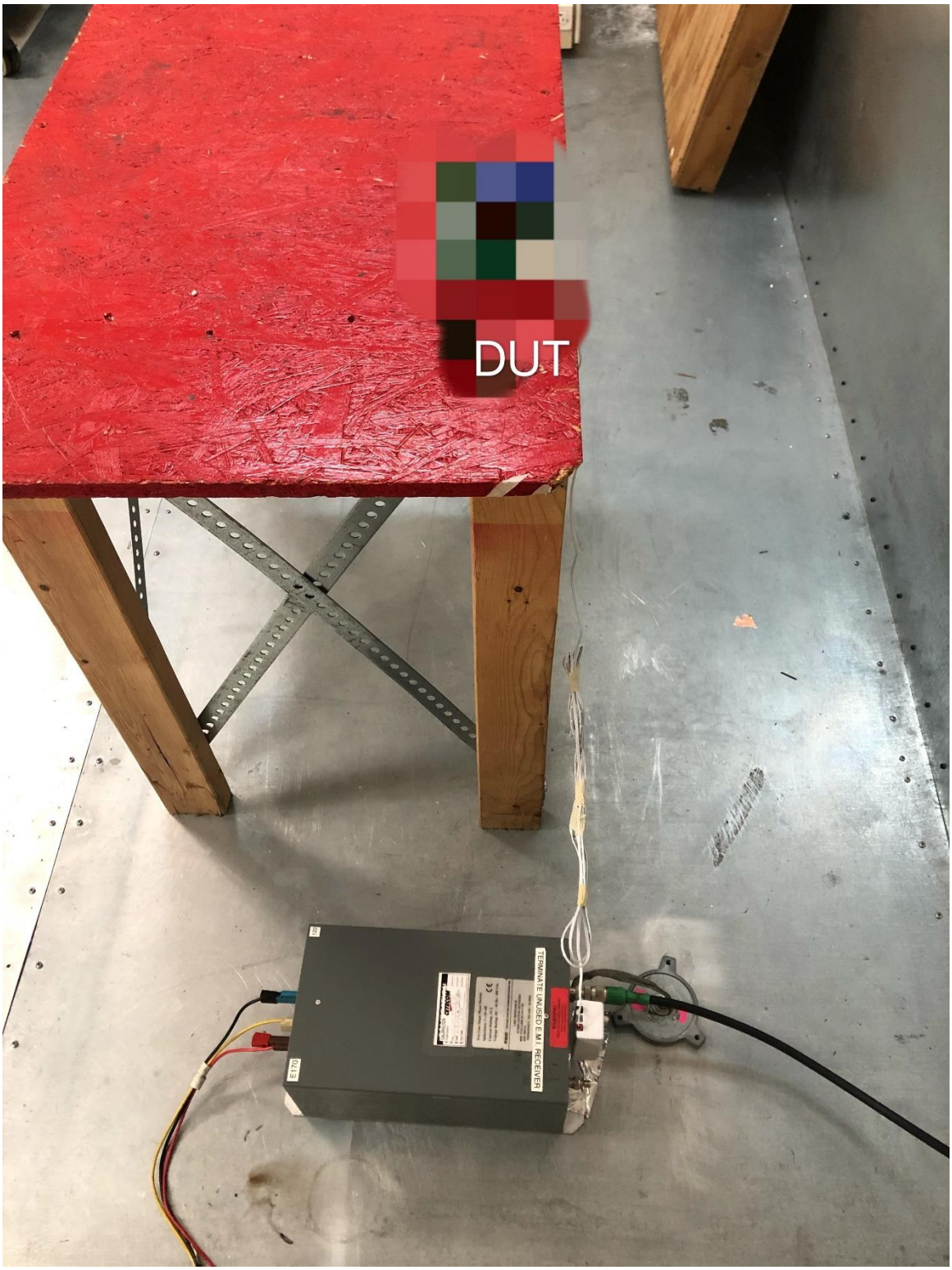
1 GHz to 3 GHz



3 GHz to 18 GHz



AC Conducted Measurements



9 TestEquipment AndAncillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
PASSIVE LOOP ANTENNA	ETS LINDGREN	6507	00161344	3 YEARS	10/26/2017
BILOG ANTENNA	TESEO	CBL 6141B	41106	3 YEARS	11/01/2017
HORN ANTENNA	ETS.LINDGREN	3115	00035111	3 YEARS	04/17/2019
HORN ANTENNA	ETS LINDGREN	3117	00169547	3 YEARS	09/01/2020
HORN ANTENNA	ETS LINDGREN	3116C	00169535	3 YEARS	09/24/2017
WIDEBAND RADIO COMMUNICATION	R&S	CMW500	109825	3 YEARS	02/12/2018
SIGNAL ANALYZER	R&S	FSV 40	101022	2 YEARS	07/15/2019
COMPACT DIGITAL BAROMETER	CONTROL COMPANY	10510-922	200236891	3 YEARS	04/13/2020
DIGITAL THRMOMETER	CONTROL COMPANY	36934-164	191871994	2 YEARS	01/10/2019
LINE IMPEDANCE STABILIZATION NETWORK	FCC	FCC-LISN-50-25-2-08	08014	3 YEARS	07/19/2019

Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.
Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated “N/A” for calibration status either do not specifically require calibration or is internally characterized before use.

10 Revision History

Date	Report Name	Changes to report	Report prepared by
2020-10-15	EMC_QOLSY-006-20001_FCC_15B	Initial Version	Yuchan Lu
2020-10-30	EMC_QOLSY-006-20001_FCC_15B_R1	Deleted IC ID and Canada references, updated setup photos according to customer's confidentiality request	Yuchan Lu

<<The End>>