

RADIO REPORT FCC 47 CFR Part 15C ISED Canada RSS-247 Digital transmission systems operating within the 2400.0 MHz - 2483.5 MHz band	
Report Reference No	G0M-2103-9644-TFC247WF-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	    DAkkS - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	IAV Automotive Engineering Inc.
Address	15620 Technology Drive Michigan 48168 Northville United States
Test Specification	47 CFR Part 15C RSS-247, Issue 2, 2017-02 RSS-Gen, Issue 5, Amendment 1, 2019-03
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	ECU Automotive Telemetry Reader
Model(s)	TDBOX2 LTE
Additional Model(s)	None
Brand Name(s)	None
Hardware Version(s)	032
Software Version(s)	0305
FCC ID	2AS2J-G00057-02
IC	24891-G0005702
Test Result	PASSED

Possible test case verdicts:		
Required by standard but not tested	N/T	
Not required by standard	N/R	
Not applicable to EUT	N/A	
Test object does meet the requirement	P(PASS)	
Test object does not meet the requirement	F(FAIL)	
Testing:		
Test Lab Temperature	20 °C - 30 °C	
Test Lab Humidity	25 % - 55 %	
Date of receipt of test item	2021-04-15	
Report:		
Compiled by	Florian Voigt	
Tested by (+ signature) (Responsible for Test)	Florian Voigt	
Approved by (+ signature) (Deputy Head of Lab)	Toralf Jahn	
Date of Issue	2021-08-10	
Total number of pages	56	
General Remarks:		
The test results presented in this report relate only to the object tested. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.		
Additional Comments:		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2021-08-10	Initial Release	

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
BPSK	Binary Phase Shift Keying
DSSS	Direct Sequence Spread Spectrum
EUT	Equipment Under Test
FCC	Federal Communications Commission
HT	High Throughput
IEEE 802.11	MAC and PHY Layer for WiFi
ISED	Innovation, Science and Economic Development Canada
OFDM	Orthogonal Frequency Division Multiplexing
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
RBW	Resolution bandwidth
RMS	Root mean square
VBW	Video bandwidth
V _{NOM}	Nominal supply voltage

REPORT INDEX

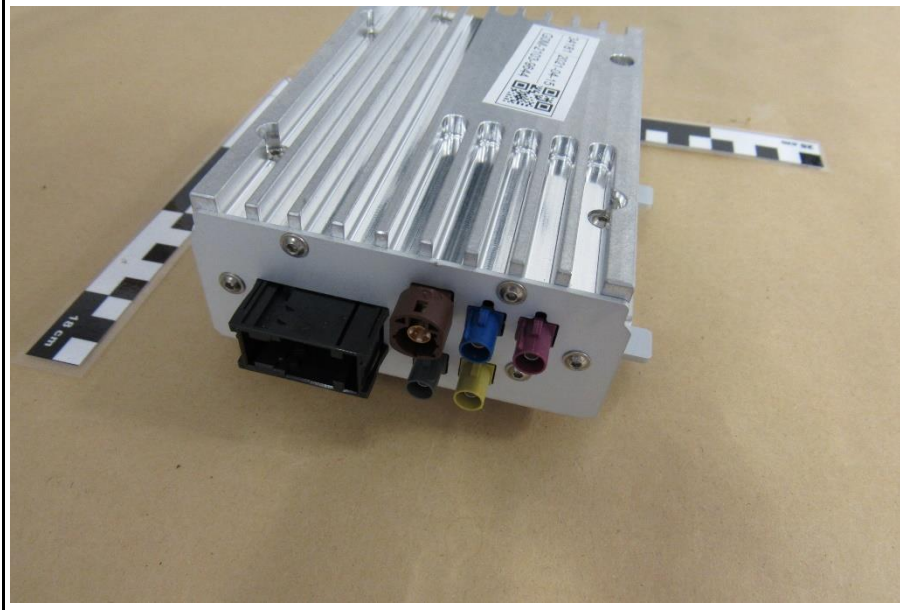
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1 Equipment (Test Item) Under Test

Description	ECU Automotive Telemetry Reader	
Model	TDBOX2 LTE	
Additional Model(s)	None	
Brand Name(s)	None	
Serial Number(s)	AAB-W0213.04.2100680009	
Test sample id	34175	
Hardware Version(s)	032	
Software Version(s)	0305	
PMN	TDBOX2 LTE	
HVIN	G00057-02	
FVIN	0305	
HMN	N/A	
FCC ID	2AS2J-G00057-02	
IC	24891-G0005702	
Equipment type	End Product	
Radio type	Transceiver	
Assigned frequency bands	2400.0 MHz - 2483.5 MHz	
Radio technology	IEEE 802.11 b/g/n (HT20 + HT40)	
Modulation	BPSK, QPSK, 16-QAM, 64-QAM	
Number of antenna ports	1	
Radio Module	Type	Bluetooth and 802.11 b/g/n module
	Model	ELLA-W131-A
	Manufacturer	u-blox
	HW Version	Not specified
	SW Version	Not specified
	FCC ID	PV7-WIBEAR11N-SF1
	IC	7738A-WB11NSF1
Antenna	Type	External
	Model	5B4.035.510 (Molex: 9 58 02)
	Manufacturer	Bugatti (Molex)
	Gain	3.0 dBi
Supply Voltage	V _{NOM}	13.8 VDC
Operating Temperature	T _{NOM}	25 °C
AC/DC-Adaptor	None	
Manufacturer	IAV GmbH Carnotstraße 1 10587 Berlin GERMANY	

1.1 Photos – Equipment External

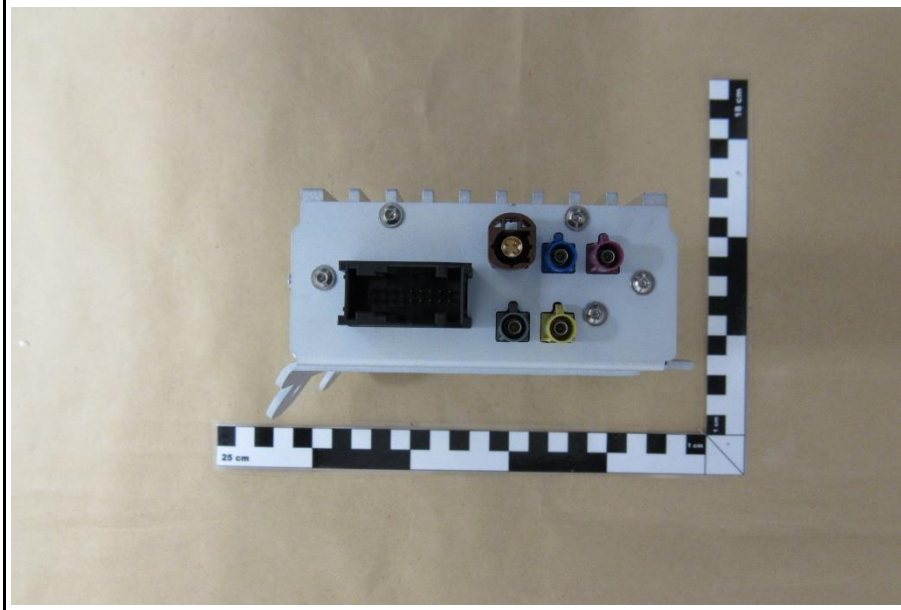
EUT FRONT VIEW PERSPECTIVE



EUT BACK RIGHT VIEW PERSPECTIVE



EUT FRONT SIDE VIEW



EUT BACK SIDE VIEW



EUT LEFT SIDE VIEW



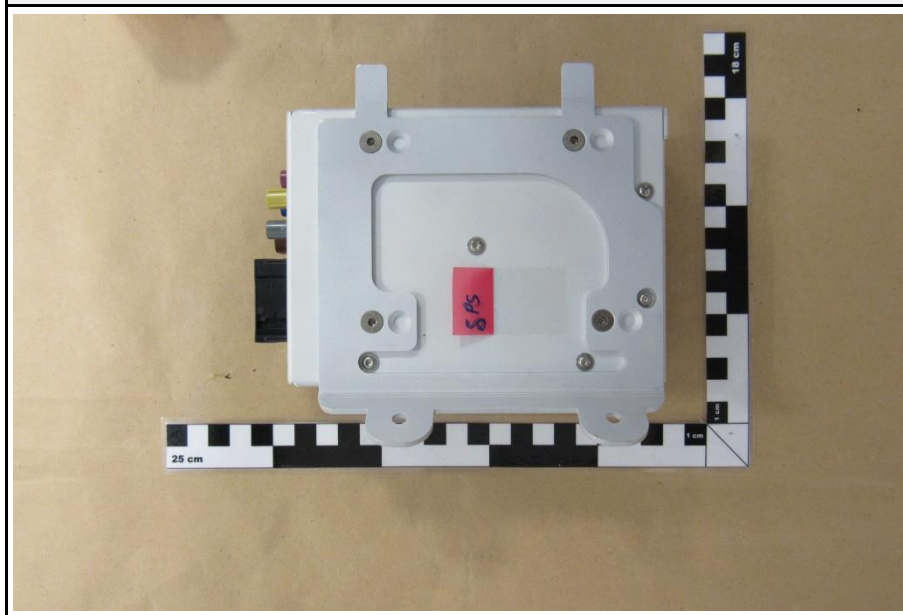
EUT RIGHT SIDE VIEW



EUT TOP VIEW



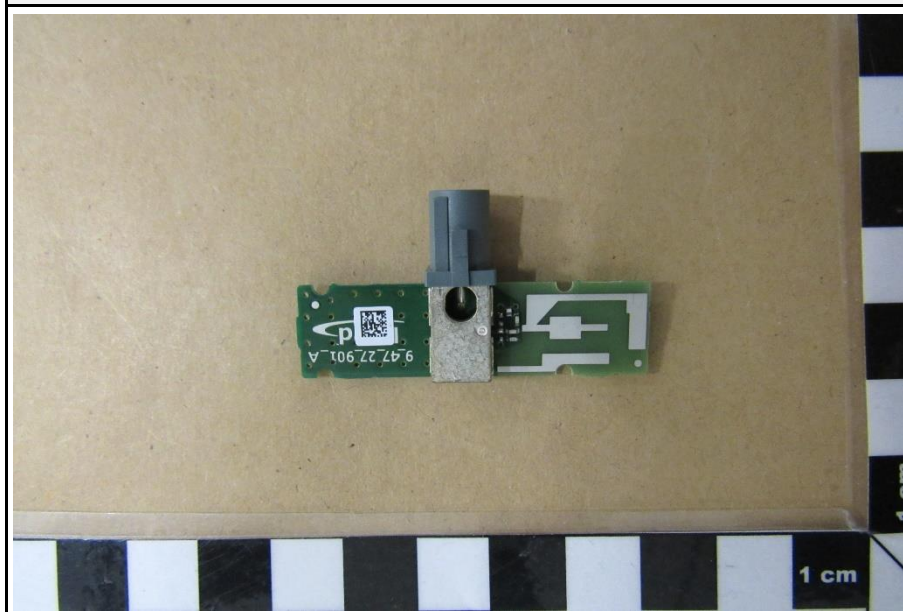
EUT BOTTOM SIDE VIEW



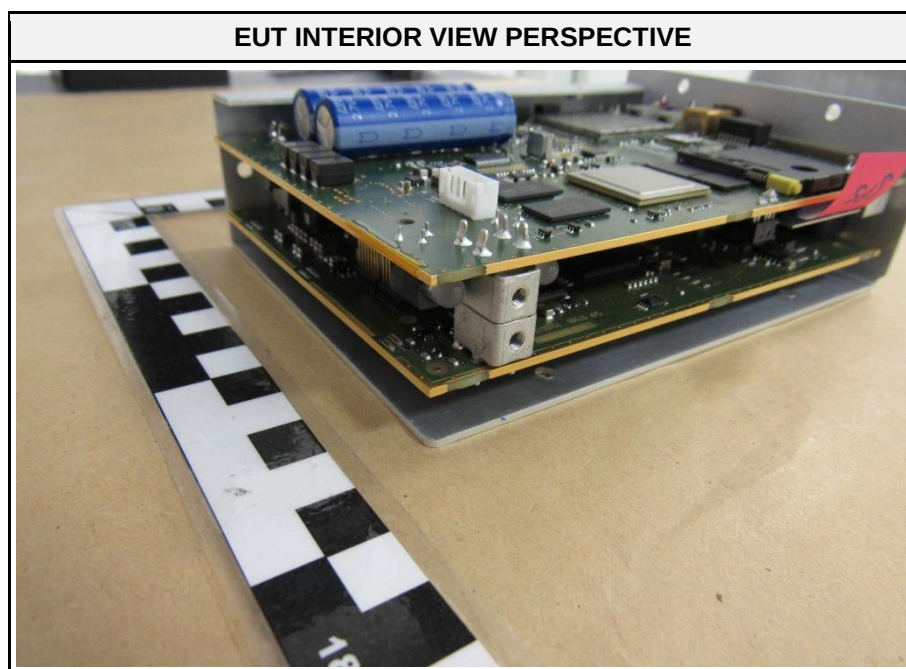
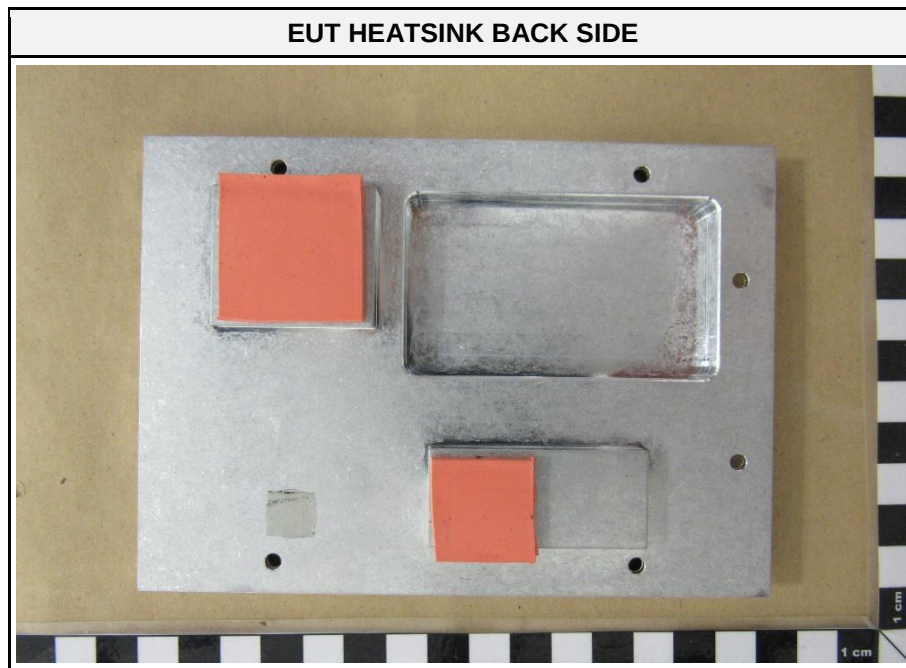
AE: WiFi antenna front



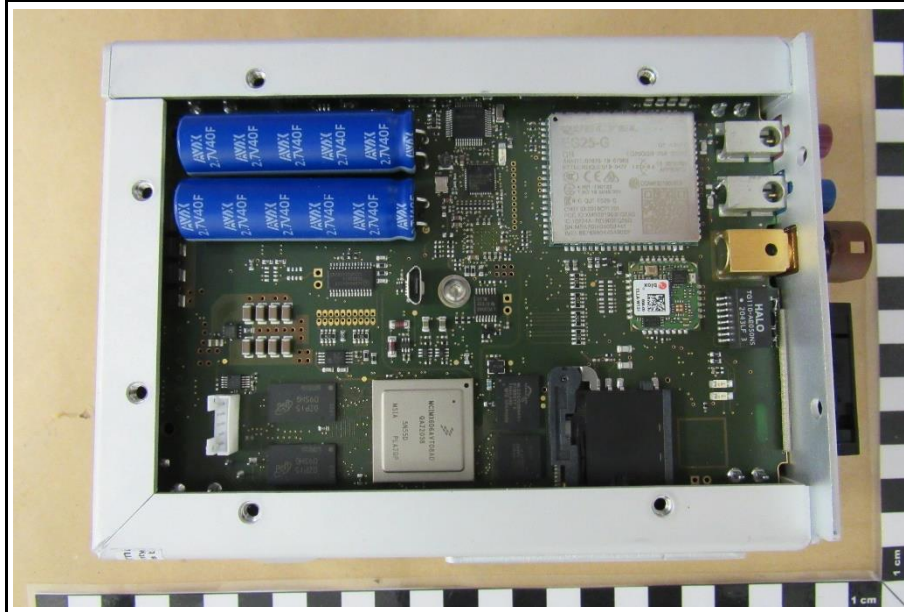
AE: WiFi antenna PCB top



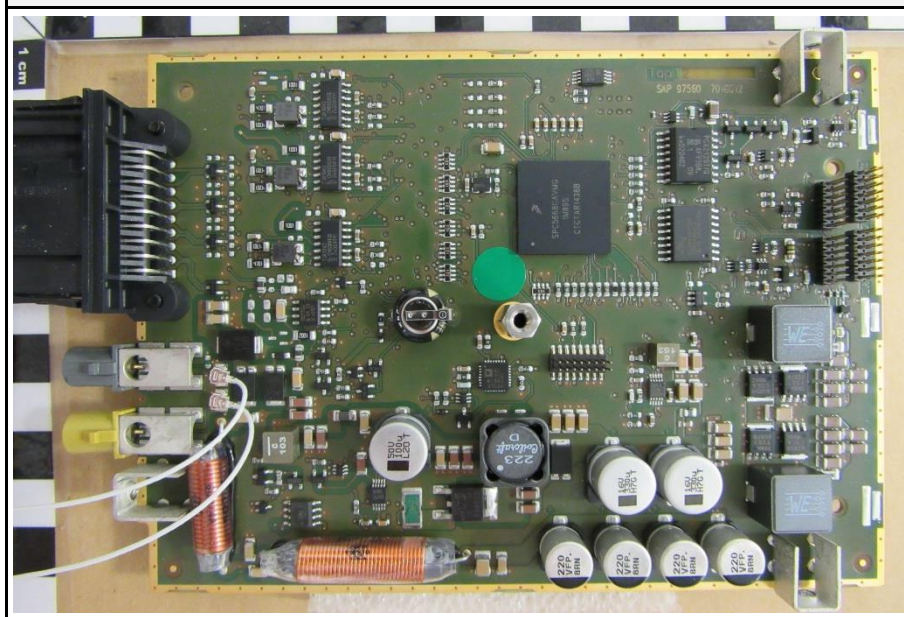
1.2 Photos – Equipment Internal



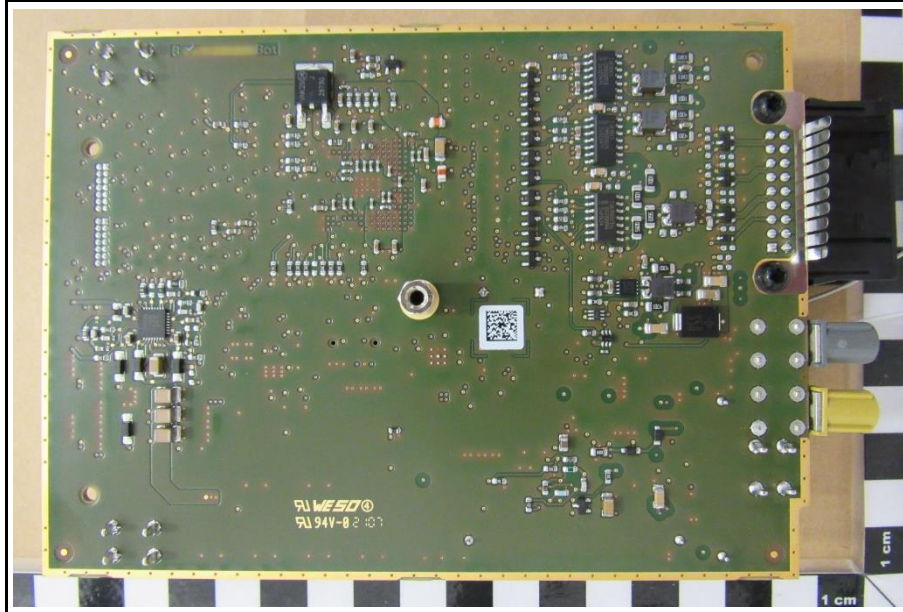
EUT INTERIOR VIEW



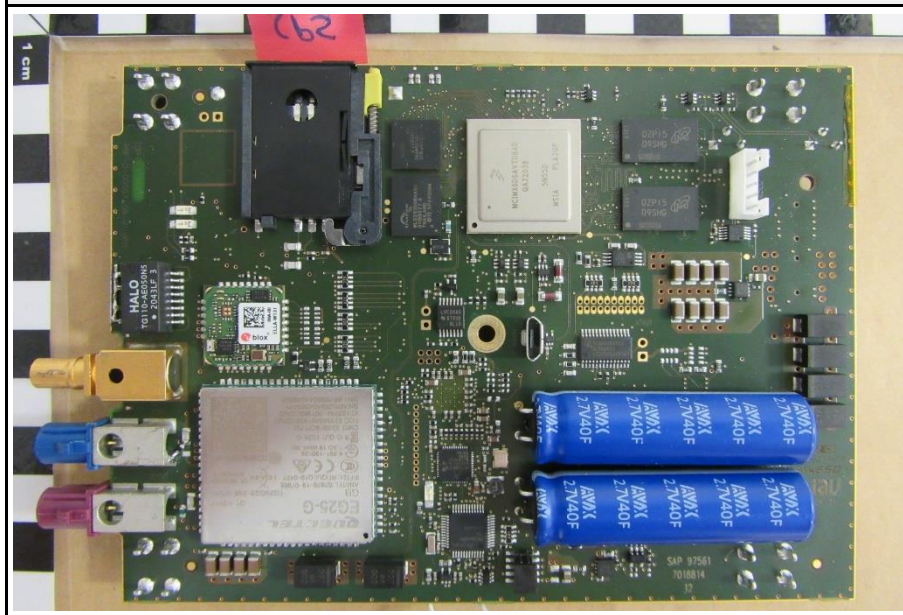
LOWER PCB TOP SIDE



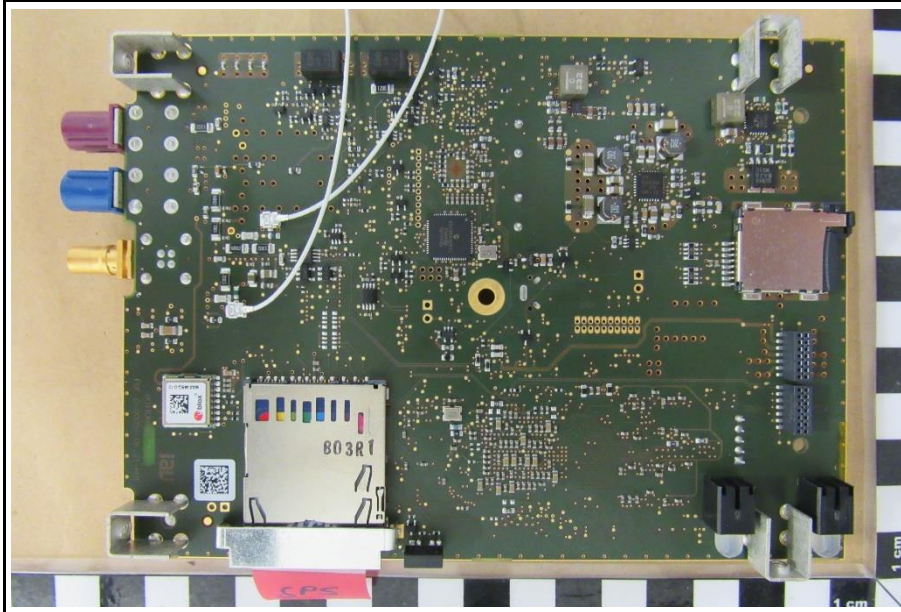
LOWER PCB BOTTOM SIDE



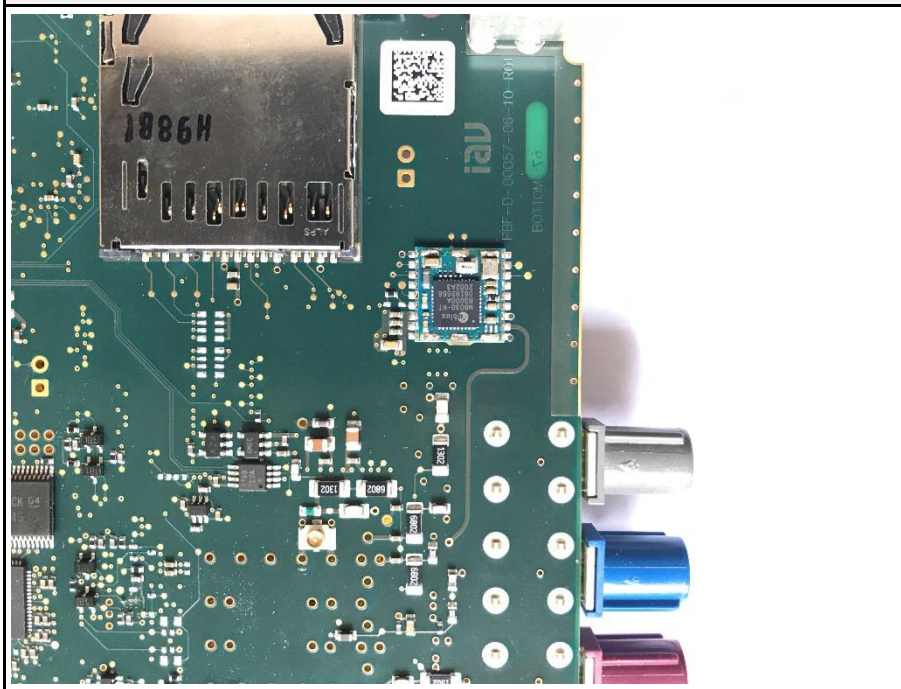
UPPER PCB TOP SIDE



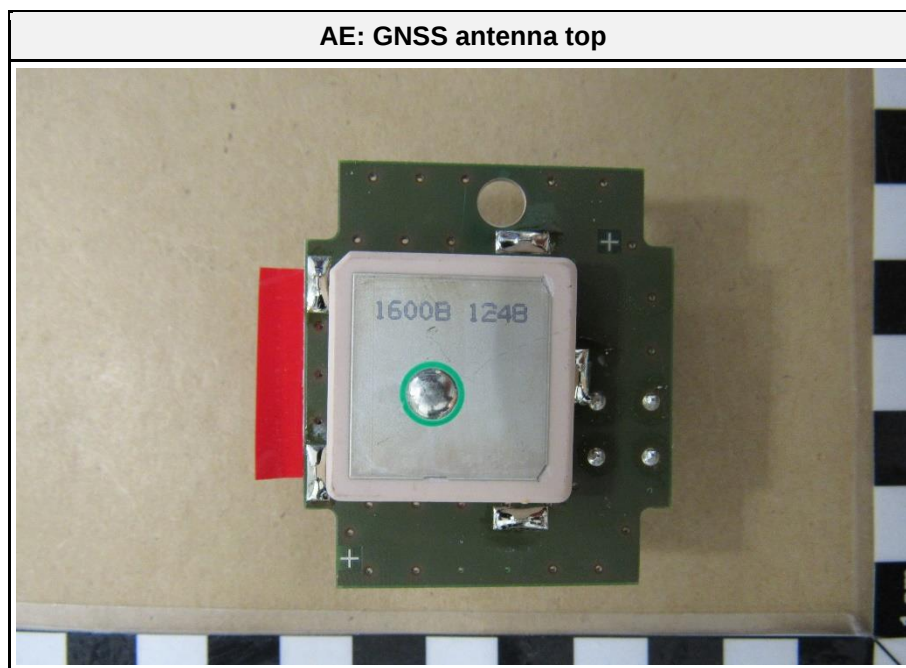
UPPER PCB BOTTOM SIDE



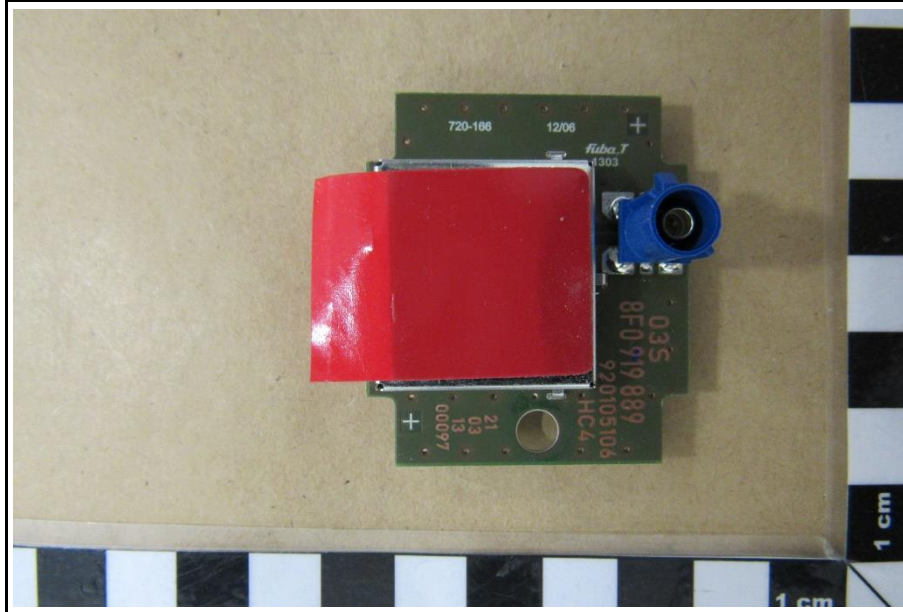
GNSS MODULE PCB TOP VIEW (Customer provided)



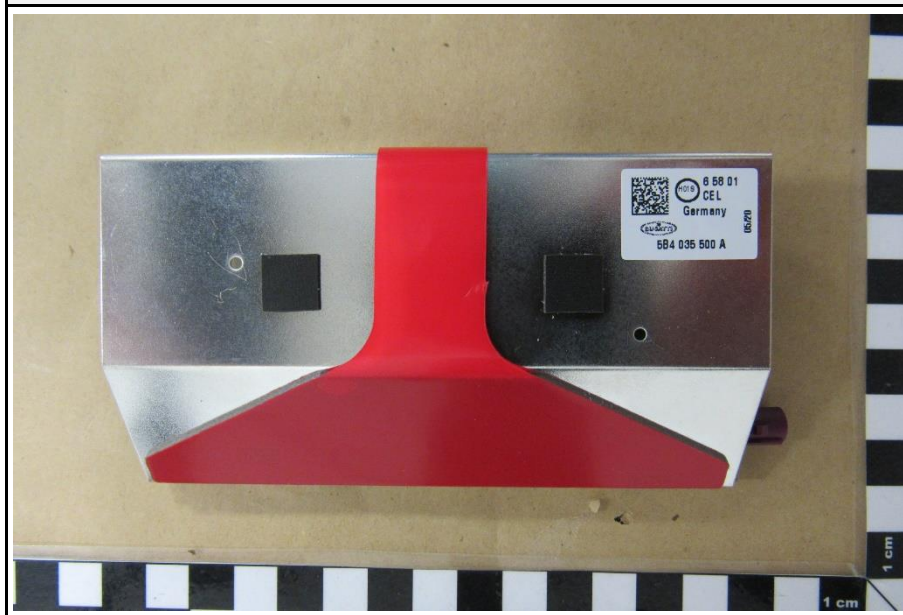
1.3 Photos – Ancillary Equipment



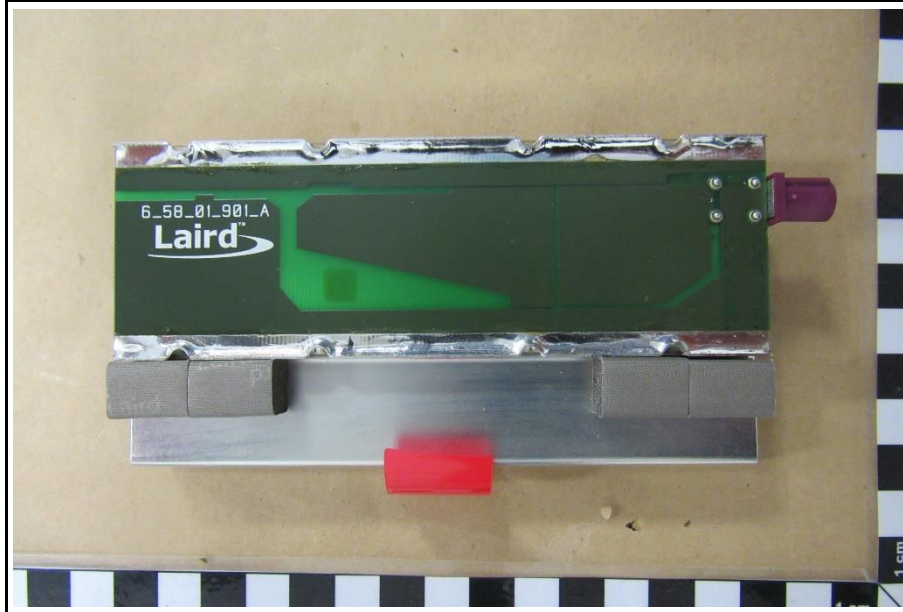
AE: GNSS antenna bottom



AE: LTE antenna front



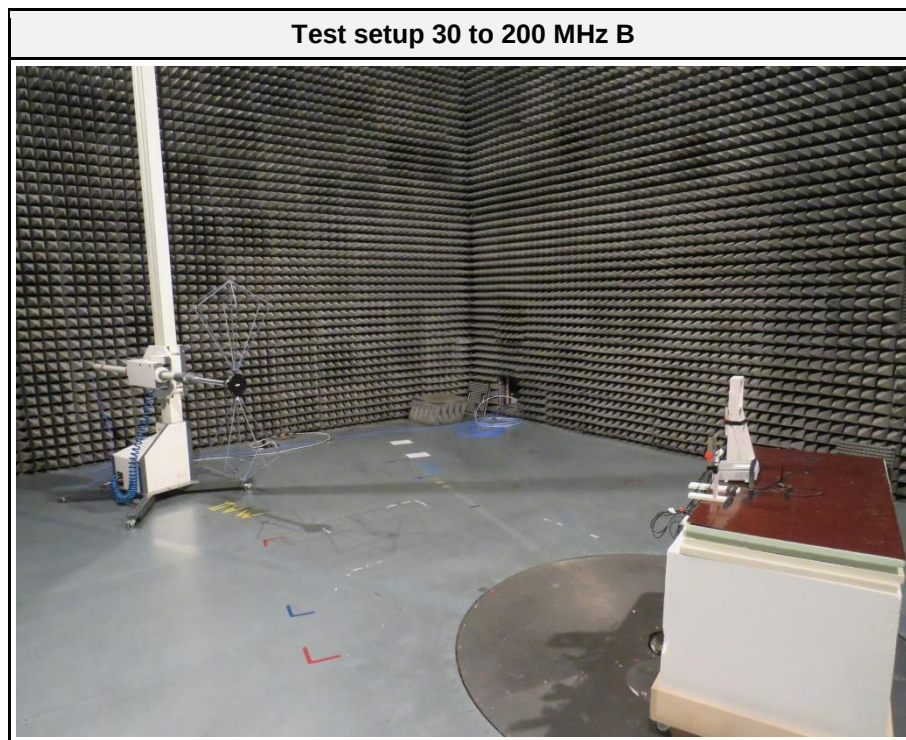
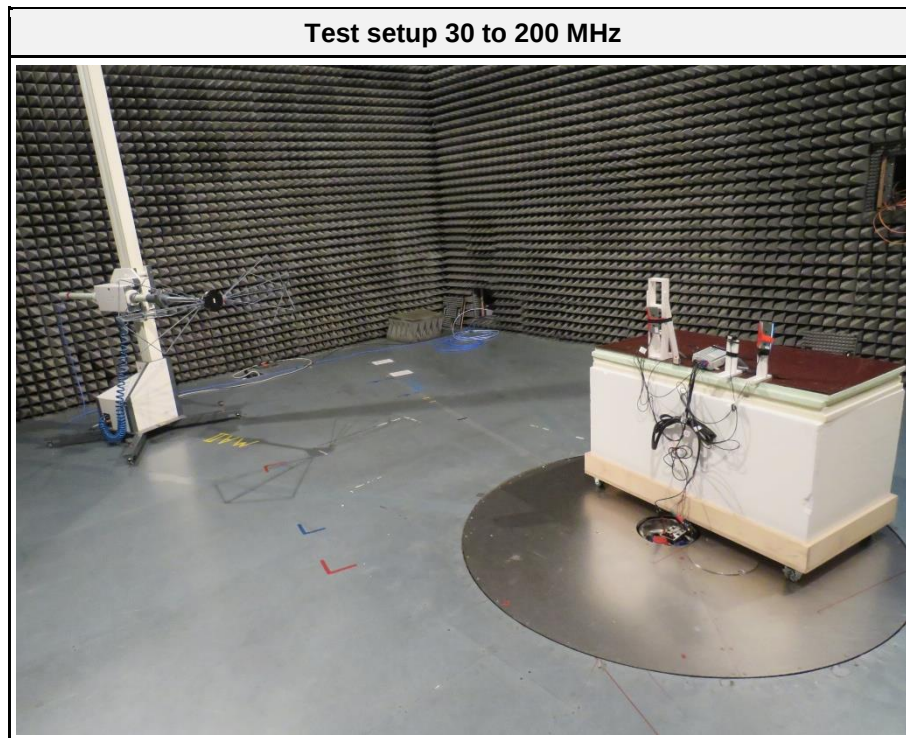
AE: LTE antenna back



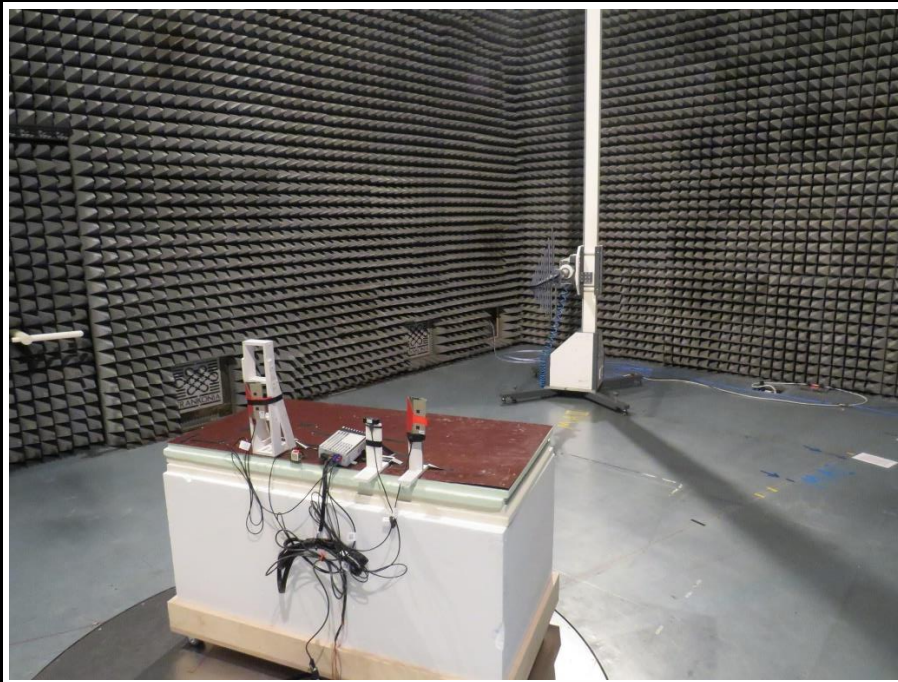
AE: Power and CAN cable



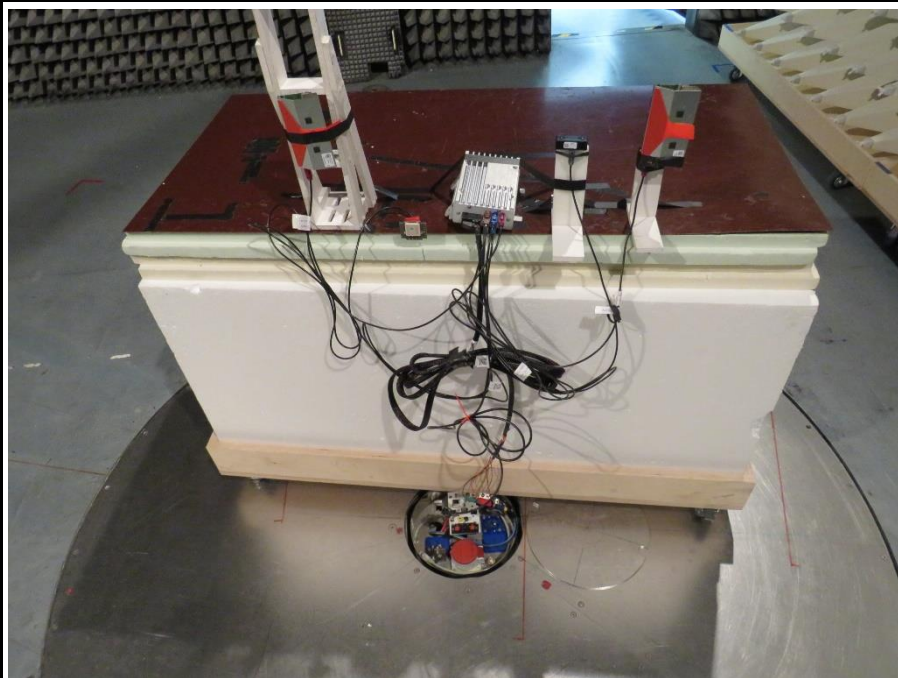
1.4 Photos – Test Setup



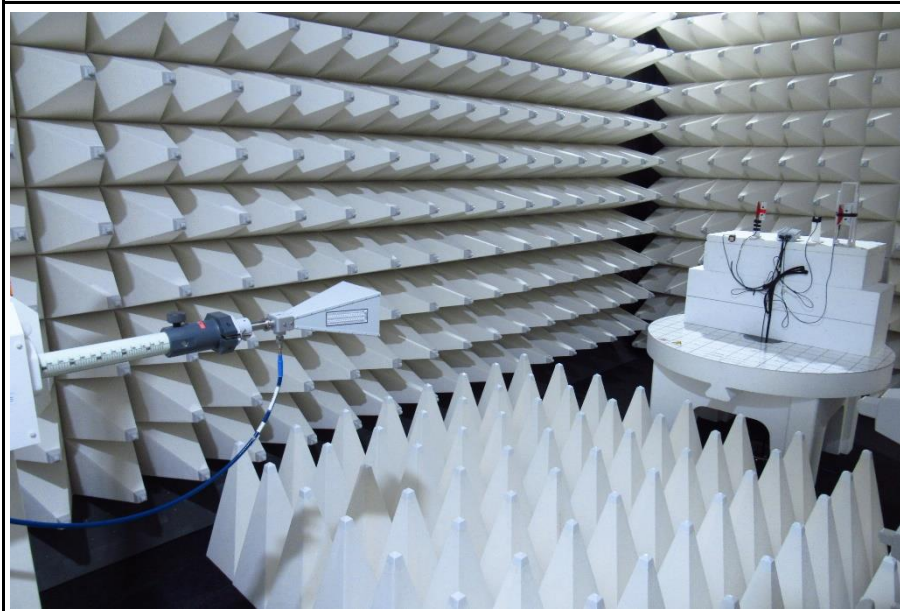
Test setup 200 to 1000 MHz



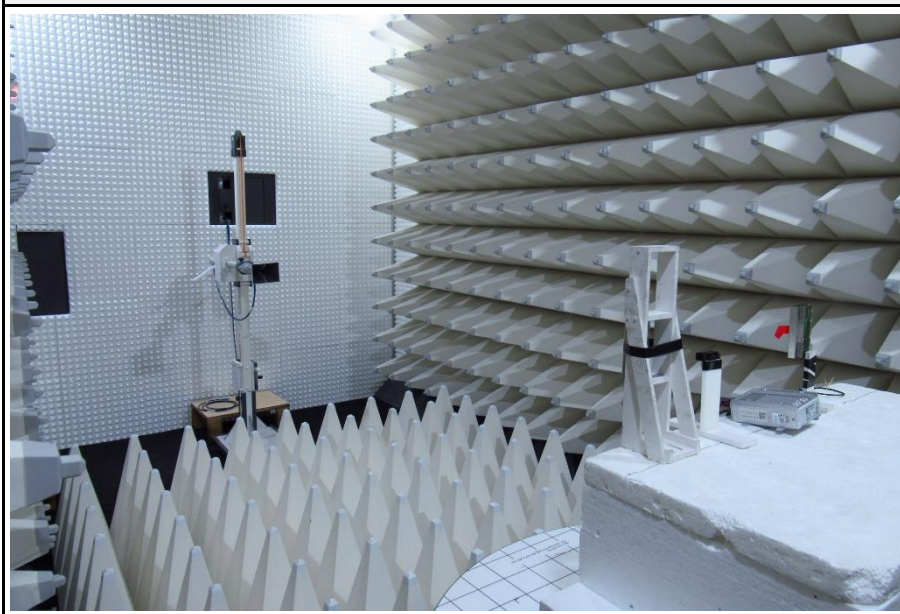
Test setup EUT view 30 to 1000 MHz



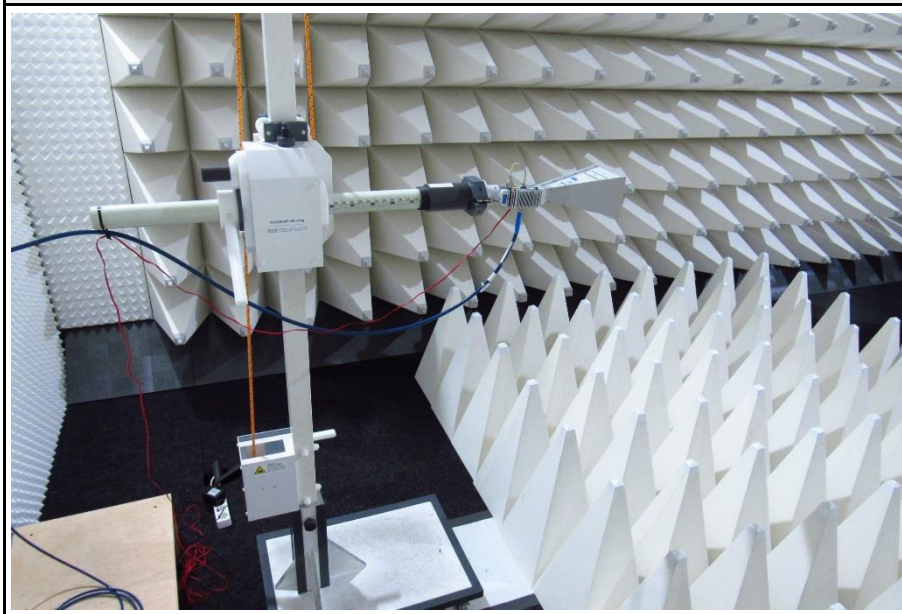
Test setup 1 to 8 GHz A



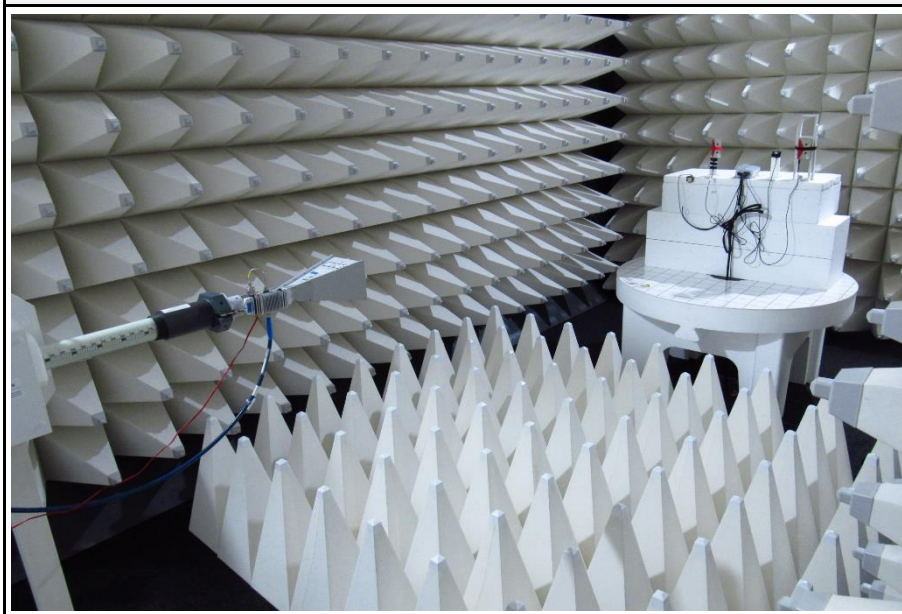
Test setup 1 to 8 GHz B



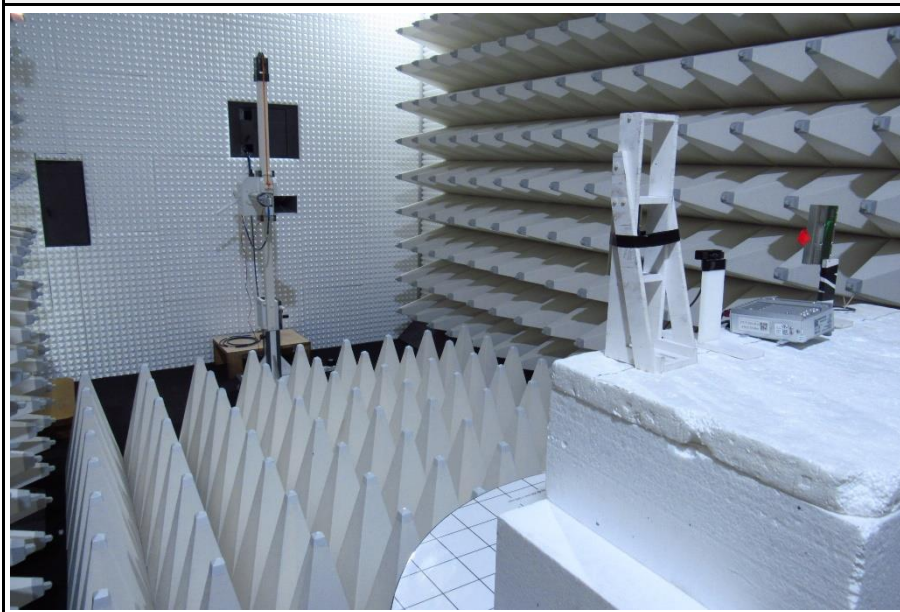
Test setup 8 to 18 GHz A



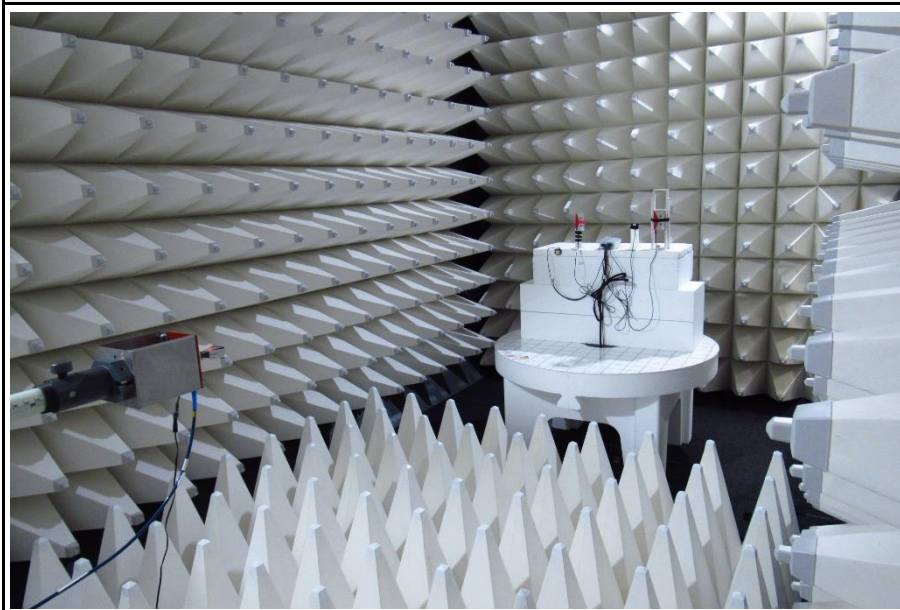
Test setup 8 to 18 GHz B



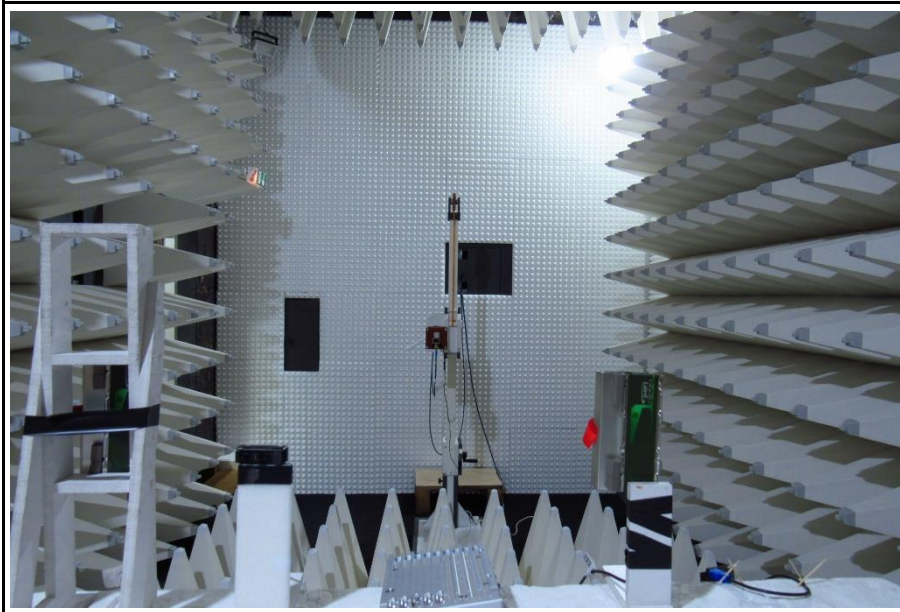
Test setup 8 to 18 GHz C



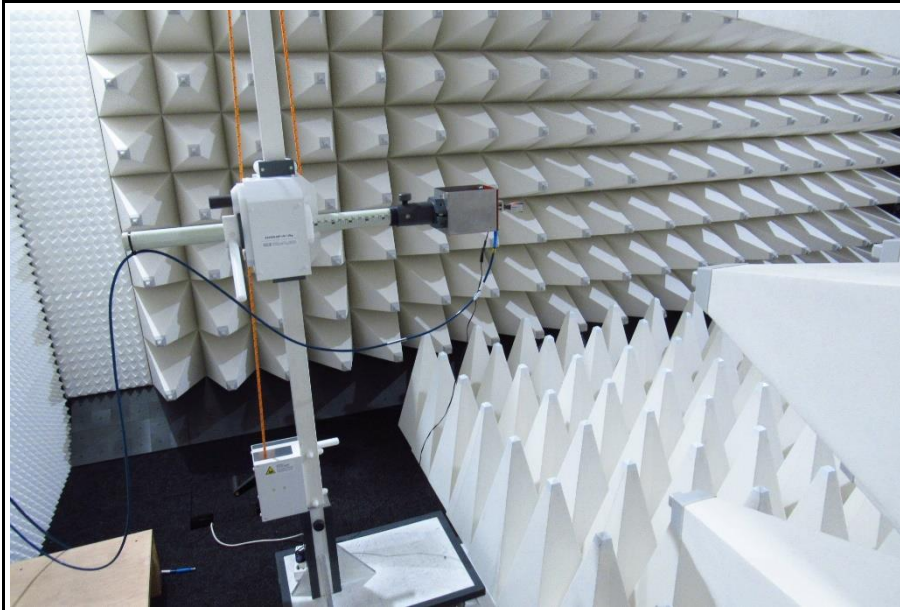
Test setup 18 to 26.5 GHz A



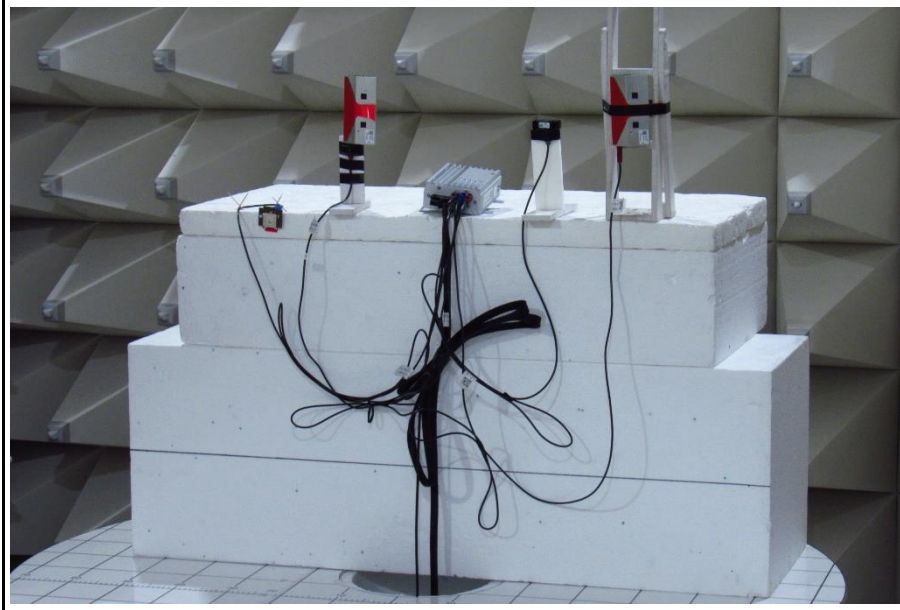
Test setup 18 to 26.5 GHz B



Test setup 18 to 26.5 GHz C



Test setup EUT view 1 to 26.5GHz



1.5 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Laptop	Lenovo	T440	Setting test modes
AE	Laptop power supply	Lenovo	ADLX45NDC3A	
AE	GSM/UMTS/LTE Antenna	Laird	6 58 01	
AE	GSM/UMTS/LTE Antenna	Laird	6 58 01	
AE	GPS Antenna	Continental	52510720	
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment:				

1.6 Test Modes

Mode	Description
HT40 (IEEE 802.11n)	Mode = Transmit Modulation = OFDM/BPSK Bandwidth = 40 MHz Duty cycle = 100% Power setting (1 Simultaneous Tx) = 15 (Software setting) Data rate (1 Simultaneous Tx) = 13 Mbps MCS (1 Simultaneous Tx) = 0
Receive	Mode = Receive
Comment: The above settings were found as worst case regarding maximum output power due evaluation of the modular approval test report.	

1.7 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx / Rx	3	2422

1.8 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dBμV. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB/m)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dBμV/m). The FCC limits are given in units of μV/m. The following formula is used to convert the units of μV/m to dBμV/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log(\mu\text{V/m})$$

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading + AF	= Net Reading	:	Net reading - FCC limit	= Margin
+21.5 dBμV + 26 dB/m	= 47.5 dBμV/m	:	47.5 dBμV/m - 57.0 dBμV/m	= -9.5 dB

2 Result Summary

FCC 47 CFR Part 15C, ISED RSS-247				
Product Standard Reference	Requirement	Reference Method	Result	Remarks
ISED RSS-Gen, Issue 5 (section 6.7)	Occupied Bandwidth	ANSI C63.10-2013	N/R	Informational only
FCC § 15.247(a)(2) ISED RSS-247, Issue 2 (section 5.2)	6 dB Bandwidth	ANSI C63.10-2013	N/T	
FCC § 15.247(b) ISED RSS-247, Issue 2 (section 5.4)	Maximum peak conducted power	ANSI C63.10-2013	N/T	
FCC § 15.247(e) ISED RSS-247, Issue 2 (section 5.2)	Power spectral density	ANSI C63.10-2013	N/T	
FCC § 15.207 ISED RSS-247, Issue 2 (section 3.1)	AC power line conducted emissions	ANSI C63.10-2013	N/R	Not directly or indirectly connected to mains
FCC § 15.247(d) ISED RSS-247, Issue 2 (section 5.5)	Band edge compliance	ANSI C63.10-2013	N/T	
FCC § 15.247(d) ISED RSS-247, Issue 2 (section 5.5)	Conducted spurious emissions	ANSI C63.10-2013	N/T	
FCC § 15.247(d) FCC § 15.209 ISED RSS-Gen, Issue 5 (section 6.13)	Transmitter radiated spurious emissions	ANSI C63.10-2013	PASS	
ISED RSS-247, Issue 2 (section 3.1)	Receiver radiated spurious emissions	ANSI C63.10-2013	PASS	
Comment:				

Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

3 Test Conditions and Results

3.1 Test Conditions and Results - Transmitter radiated emissions

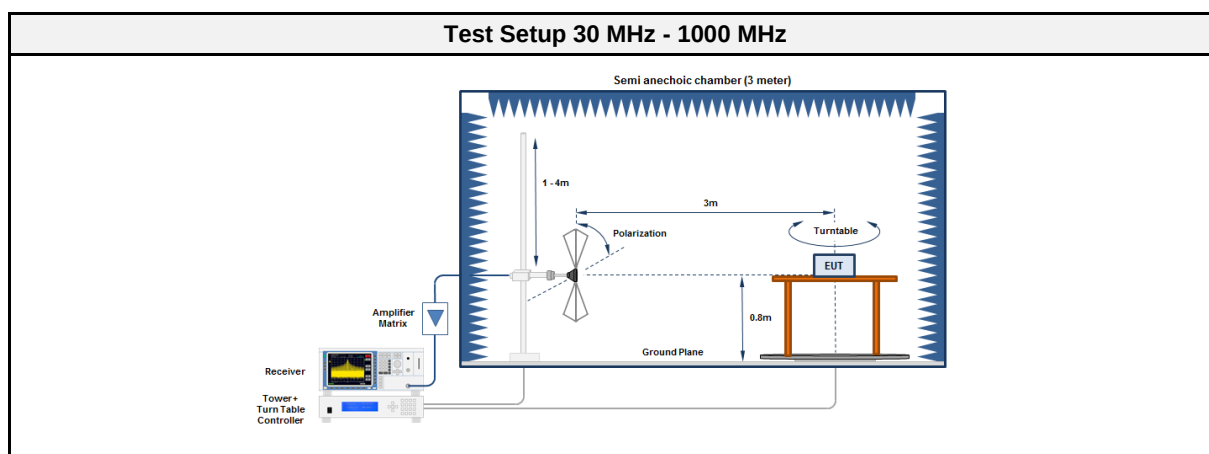
3.1.1 Information

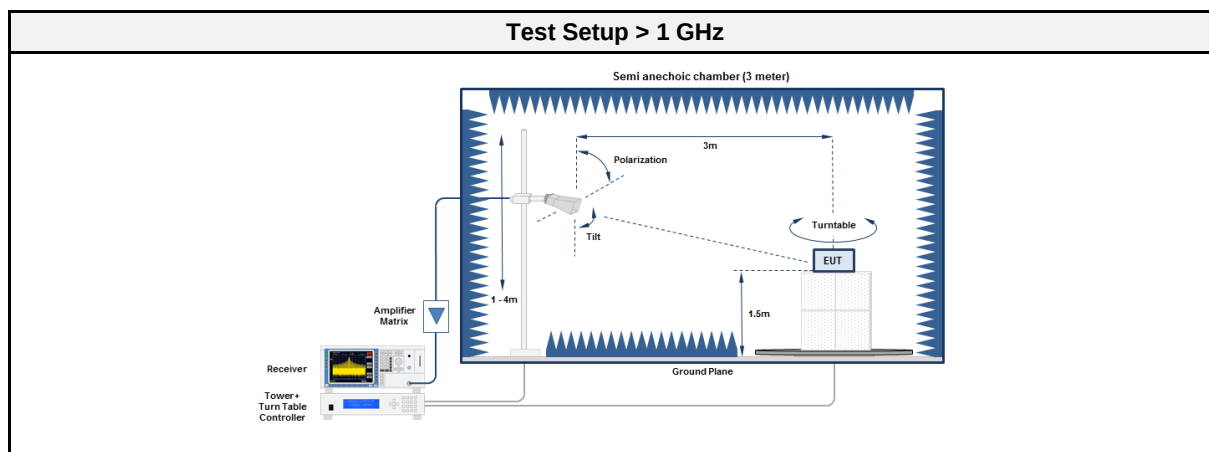
Test Information	
Reference	FCC § 15.247(d); FCC § 15.209; ISSED RSS-Gen, Issue 5 (section 6.13)
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12
Operator	Florian Voigt
Date	2021-06-08 + 2021-07-16
Comment: Measurements above 1 GHz are pre-measurements when level of detected emissions (Average/Peak) is 10 dB or more below the corresponding limit lines. In case the level of detected emissions have less than 10 dB margin to the corresponding limit lines, the EUT is tilted in 30-degree steps between 0 to 150 degree.	

3.1.2 Limits

Limits			
Frequency range [MHz]	Detector	Field strength [µV/m]	Measurement distance [m]
0.009 - 0.09	Average	2400/F[kHz]	300
0.09 - 0.110	Quasi-Peak	2400/F[kHz]	300
0.110 - 0.490	Average	2400/F[kHz]	300
0.490 - 1.705	Quasi-Peak	24000/F[kHz]	30
1.705 - 30.0	Quasi-Peak	30	30
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.1.3 Setup





3.1.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
EMI Test Receiver	R&S	ESR7	EF00943	2020-07	2021-07
Antenna	R&S	HK 116	EF00030	2021-05	2024-05
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC2	EF01616	2021-05	2022-05
Spectrum analyzer	R&S	FSU43	EF01631	2020-07	2021-07
Horn antenna	Amplifier Research	ATH18G40	EF01152	2020-11	2022-11
Horn antenna	Schwarzbeck	BBHA 9120B	EF01678	2021-03	2022-03
Horn Antenna	Schwarzbeck	HWRD 650	EF01679	2021-03	2022-03

3.1.5 Procedure

Test Procedure 30 MHz - 1000 MHz
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector

Test Procedure > 1 GHz
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector

3.1.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
2422	74.4366	17.30	pk	ver	40.00	-22.72
2422	2389.1	56.38	pk	hor	74.00	-17.62
2422	2389.1	39.67	avg	hor	54.00	-14.33
2422	2389.7	56.45	pk	ver	74.00	-17.55
2422	2389.7	43.79	avg	ver	54.00	-10.21

3.2 Test Conditions and Results - Receiver radiated emissions

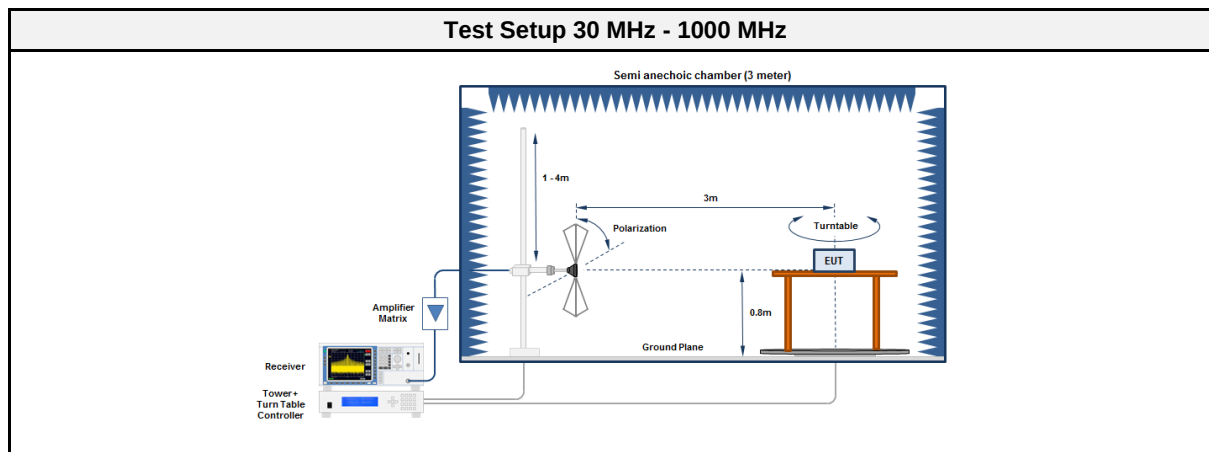
3.2.1 Information

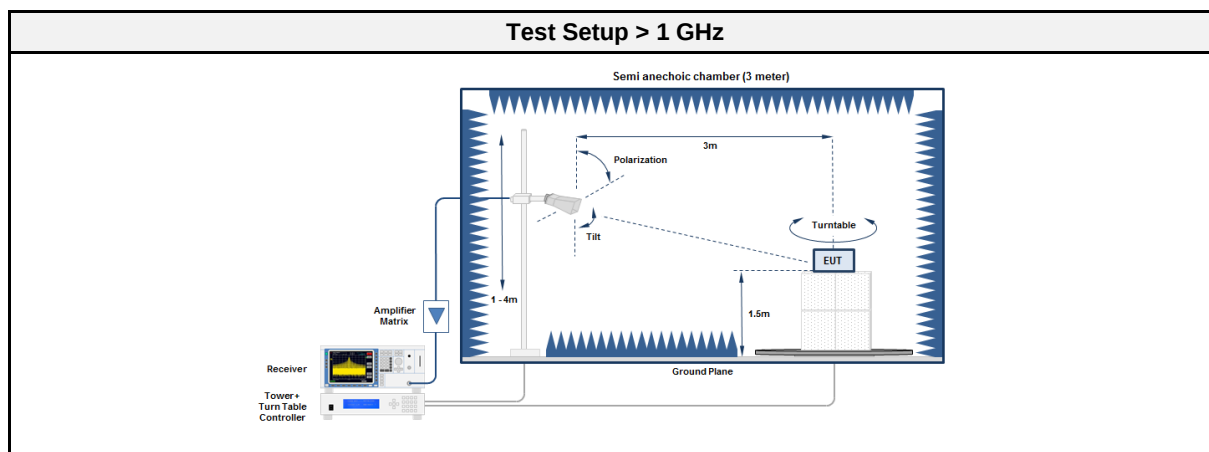
Test Information	
Reference	ISED RSS-247, Issue 2 (section 3.1)
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.10 6.5, 6.6, 11.12
Operator	Florian Voigt
Date	2021-06-08 + 2021-07-16
Comment: Measurements above 1 GHz are pre-measurements when level of detected emissions (Average/Peak) is 10 dB or more below the corresponding limit lines. In case the level of detected emissions have less than 10 dB margin to the corresponding limit lines, the EUT is tilted in 30-degree steps between 0 to 150 degree.	

3.2.2 Limits

Limits			
Frequency range [MHz]	Detector	Field strength [$\mu\text{V/m}$]	Measurement distance [m]
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.2.3 Setup





3.2.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
EMI Test Receiver	R&S	ESR7	EF00943	2020-07	2021-07
Antenna	R&S	HK 116	EF00030	2021-05	2024-05
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC2	EF01616	2021-05	2022-05
Spectrum analyzer	R&S	FSU43	EF01631	2020-07	2021-07
Horn antenna	Amplifier Research	ATH18G40	EF01152	2020-11	2022-11
Horn antenna	Schwarzbeck	BBHA 9120B	EF01678	2021-03	2022-03
Horn Antenna	Schwarzbeck	HWRD 650	EF01679	2021-03	2022-03

3.2.5 Procedure

Test Procedure 30 - 1000 MHz
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector

Test Procedure > 1 GHz
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector

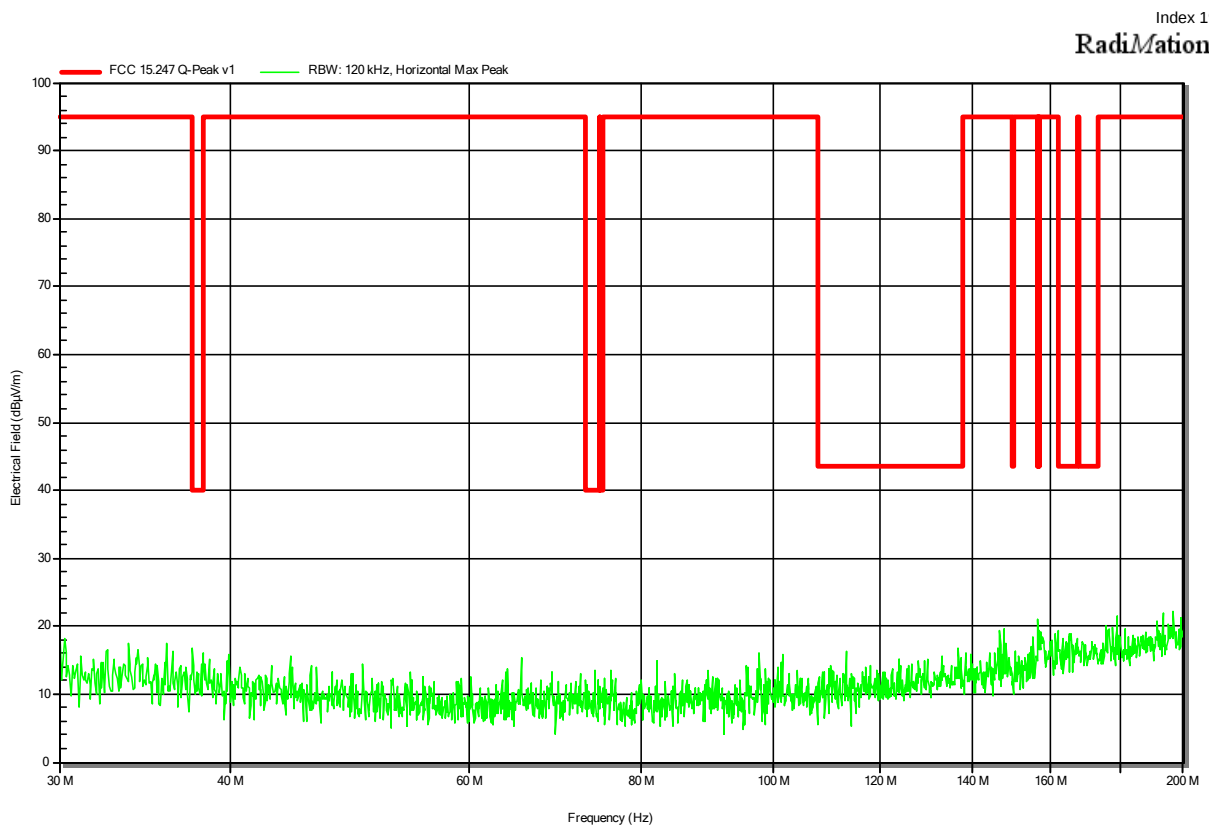
3.2.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dB μ V/m]	Det.	Pol.	Limit [dB μ V/m]	Margin [dB]
2422	74.7368	17.50	pk	ver	40.00	-22.55

ANNEX A Transmitter spurious emissions

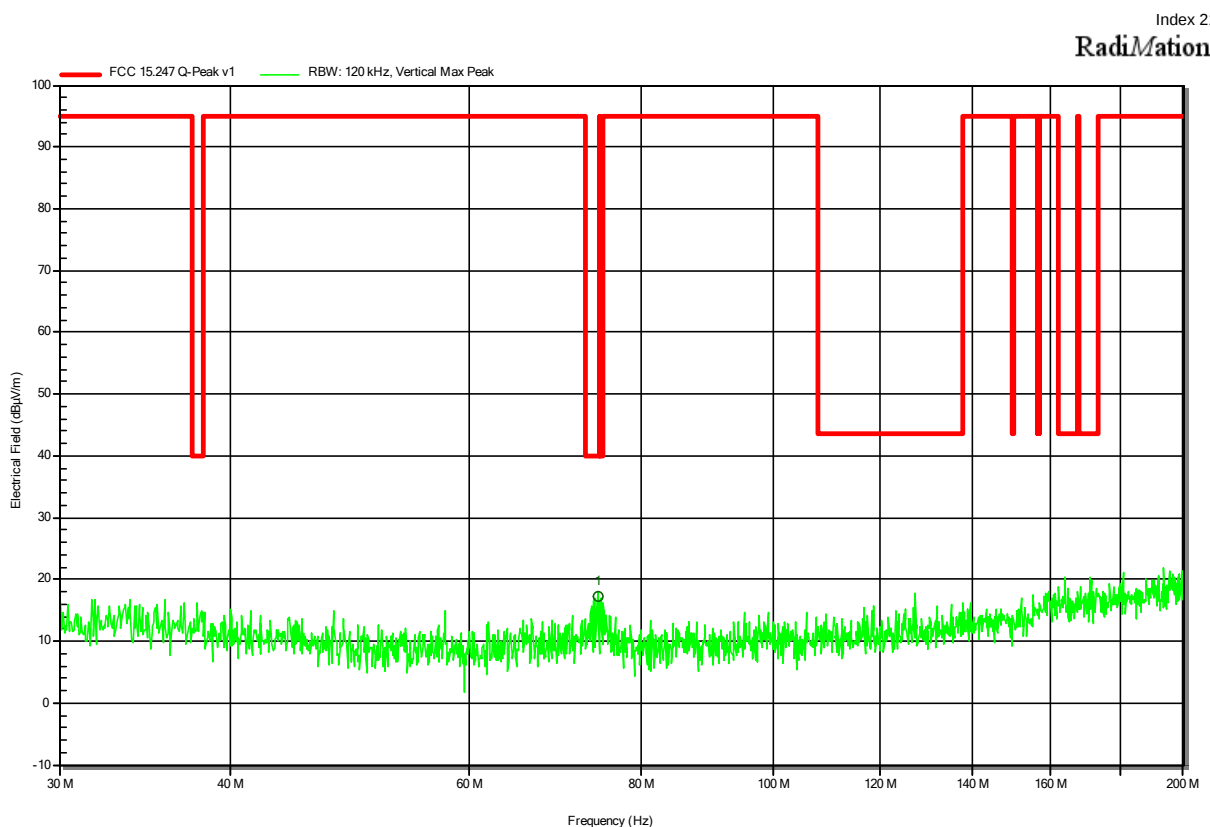
Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: Tx; 802.11n, HT40, 2422MHz, OFDM
 Test Date: 2021-07-16
 Note:



Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Tx; 802.11n, HT40, 2422MHz, OFDM
 Test Date: 2021-07-16
 Note:



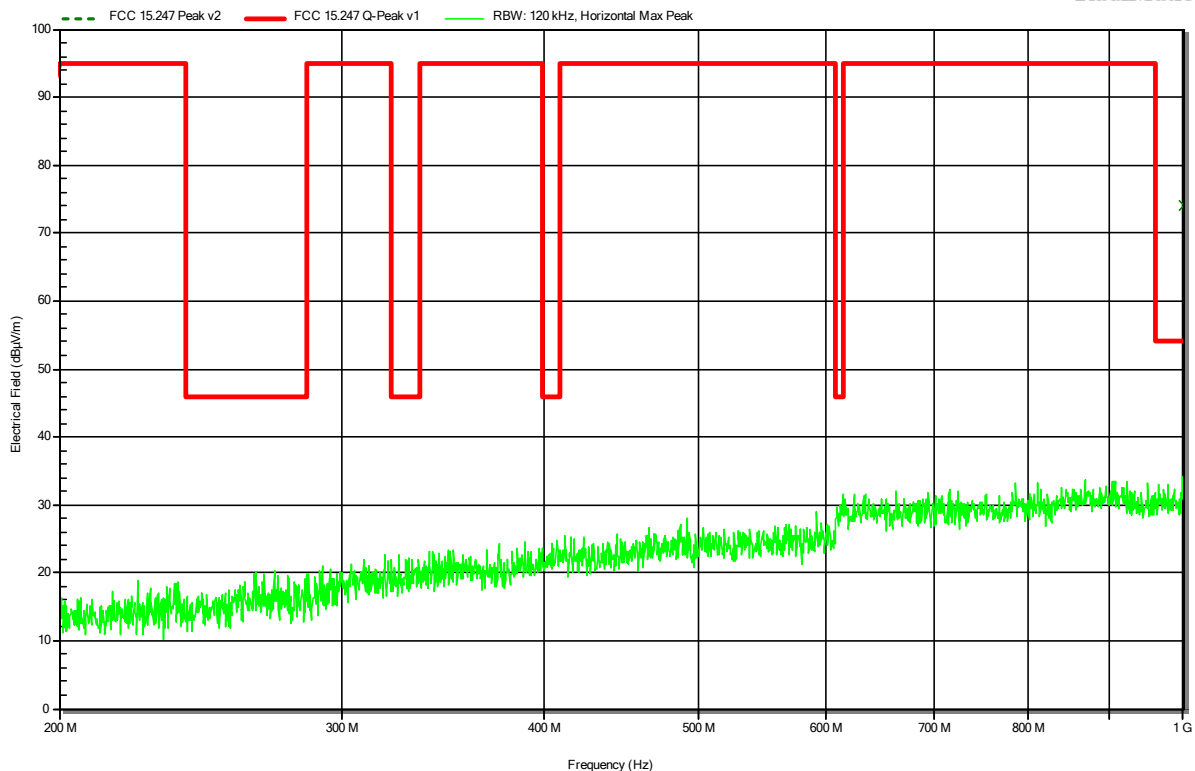
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
74.4366 MHz	17.3 dBµV/m	40 dBµV/m	-22.72 dB	Pass

Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; 802.11n, HT40, 2422MHz, OFDM
 Test Date: 2021-07-16
 Note:

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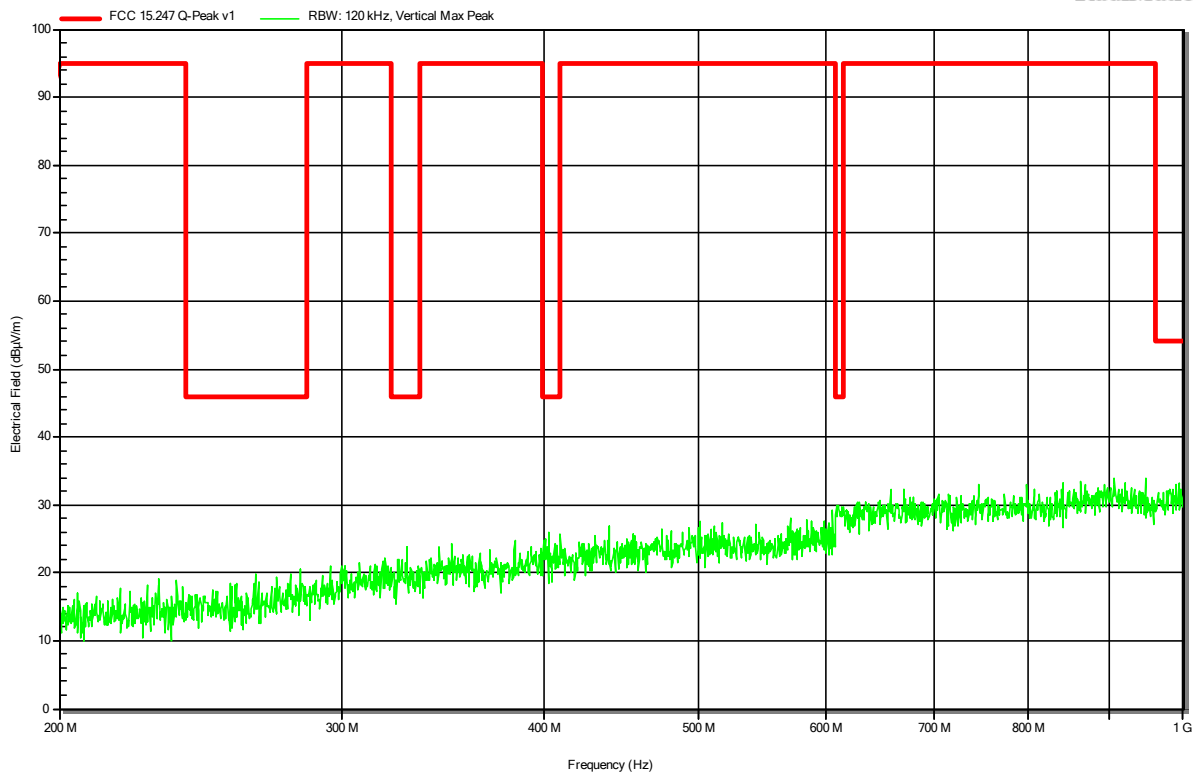


Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Tx; 802.11n, HT40, 2422MHz, OFDM
 Test Date: 2021-07-16
 Note:

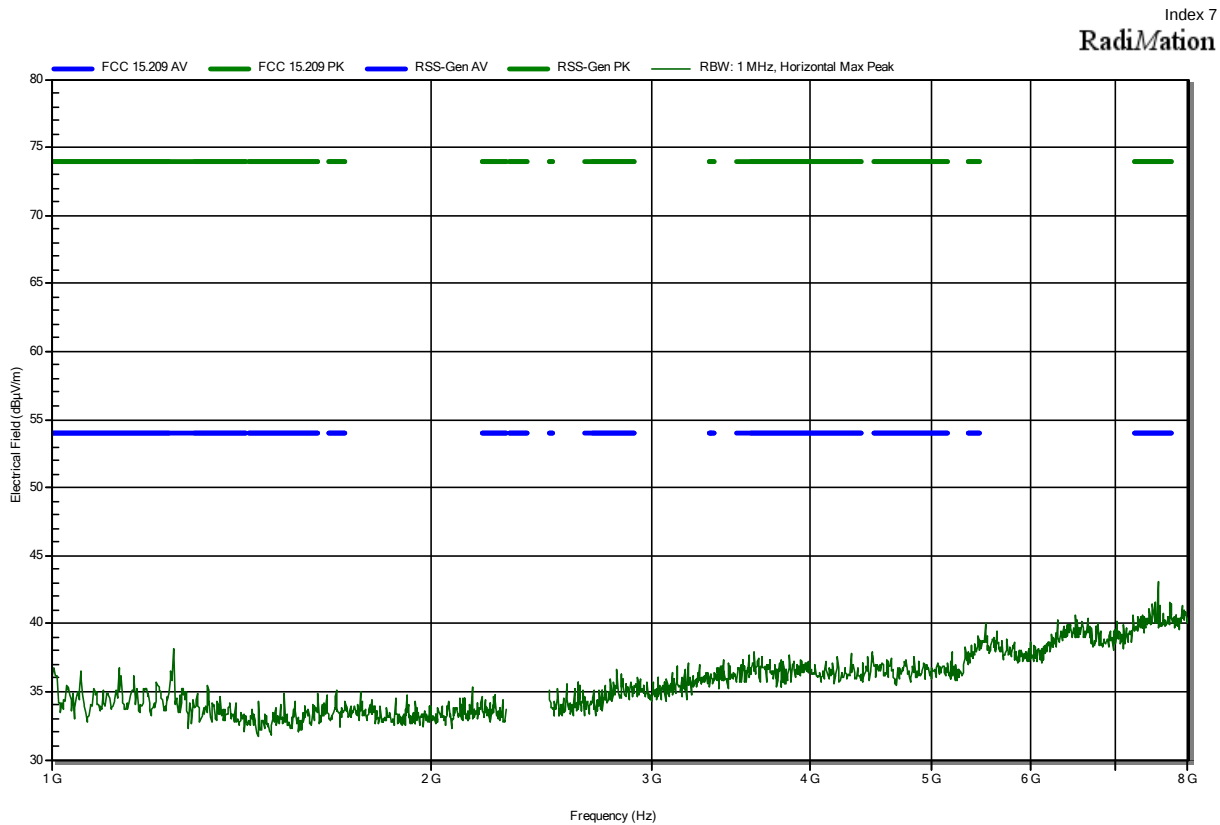
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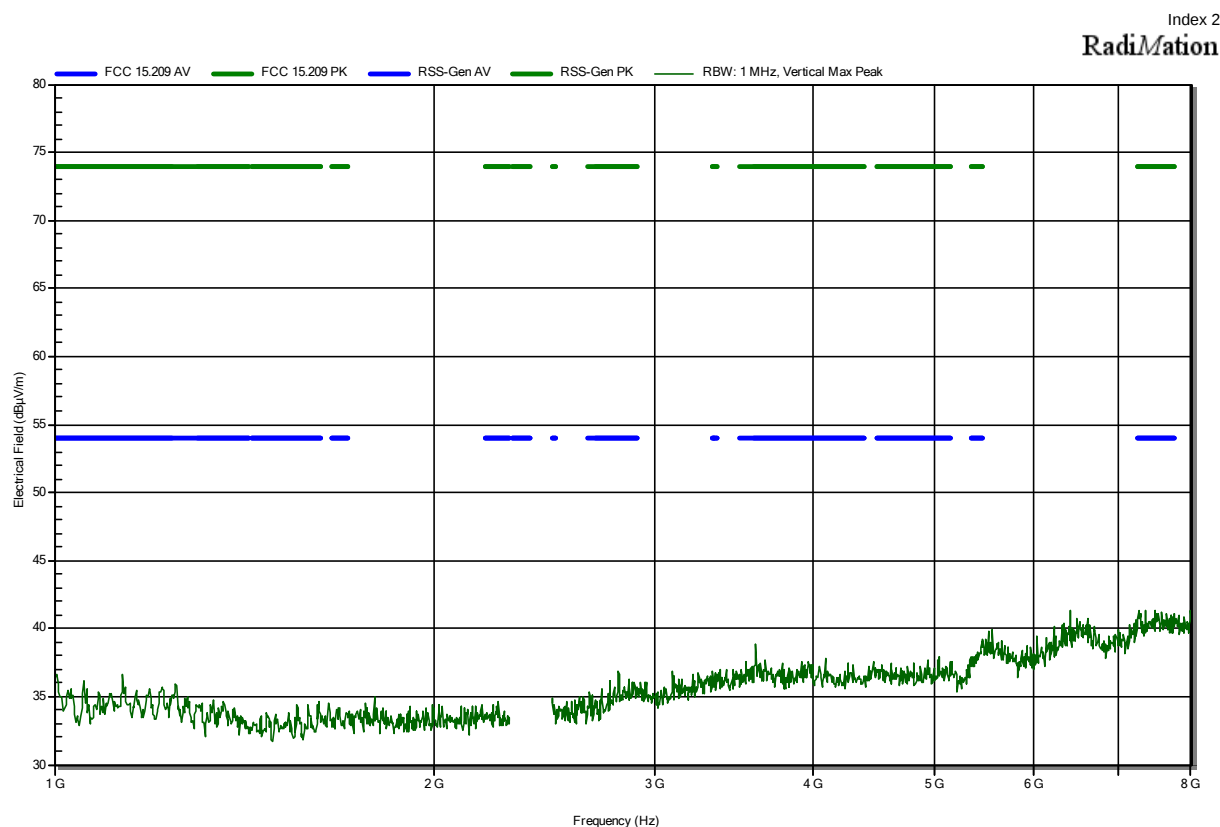
Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Schwarzbeck BBHA 9120B, Horizontal
 Measurement distance: 3 m
 Mode: Tx; 802.11n, HT40, 2422MHz, OFDM
 Test Date: 2021-06-08
 Note:



Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Schwarzbeck BBHA 9120B, Vertical
 Measurement distance: 3 m
 Mode: Tx; 802.11n, HT40, 2422MHz, OFDM
 Test Date: 2021-06-08
 Note:

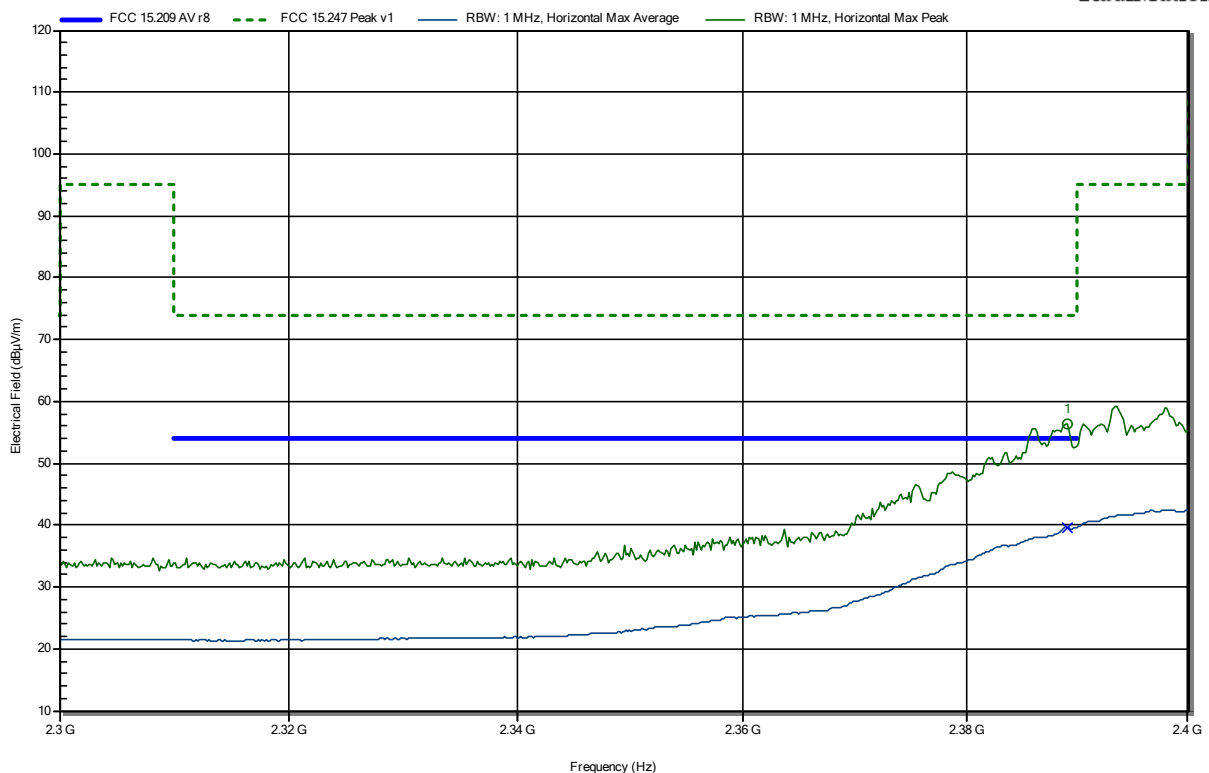


Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Schwarzbeck BBHA 9120B, Horizontal
 Measurement distance: 3 m
 Mode: Tx; 802.11n, HT40, 2422MHz, OFDM
 Test Date: 2021-06-08
 Note: lower bandedge

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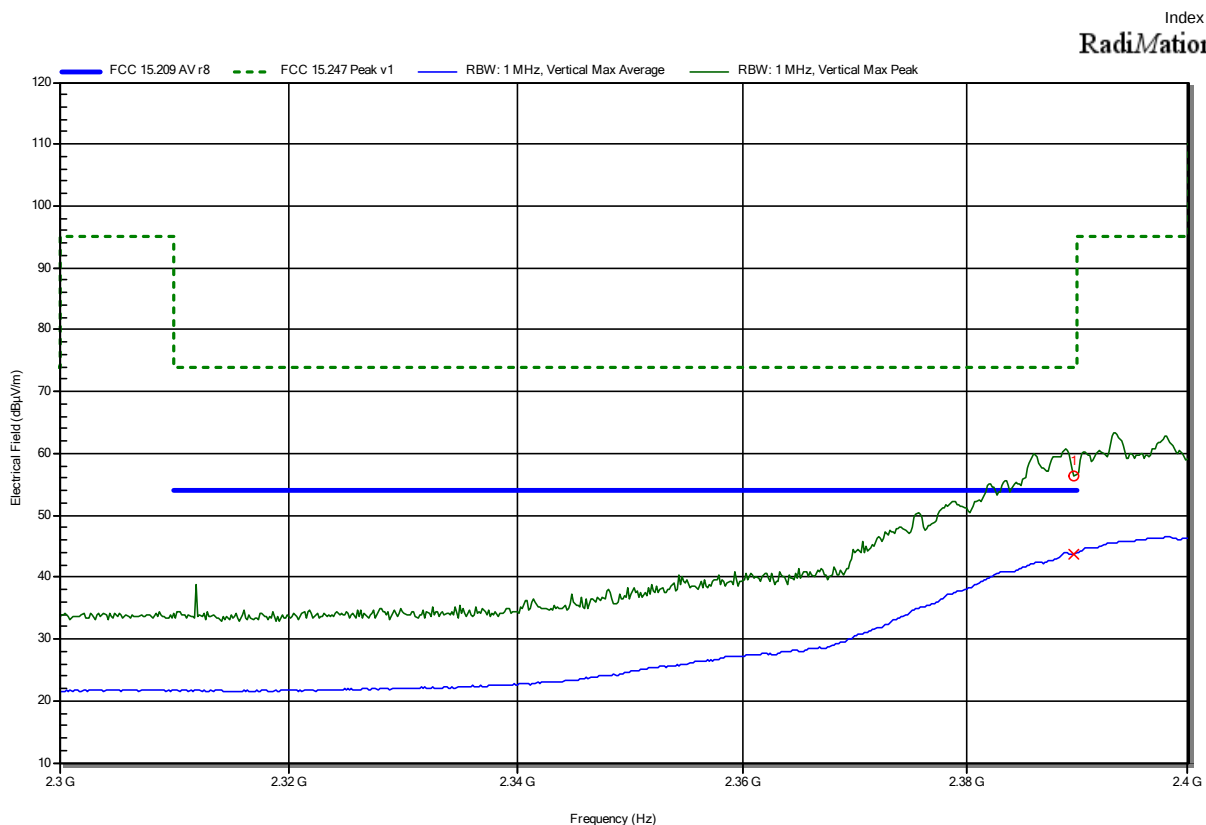
Frequency 2.3891 GHz	Peak 56.38 dBμV/m	Peak Limit 74 dBμV/m	Peak Difference -17.62 dB	Peak Status Pass
Frequency 2.3891 GHz	Average 39.67 dBμV/m	Average Limit 54 dBμV/m	Average Difference -14.33 dB	Average Status Pass

Test Report No.: G0M-2103-9644-TFC247WF-V01

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

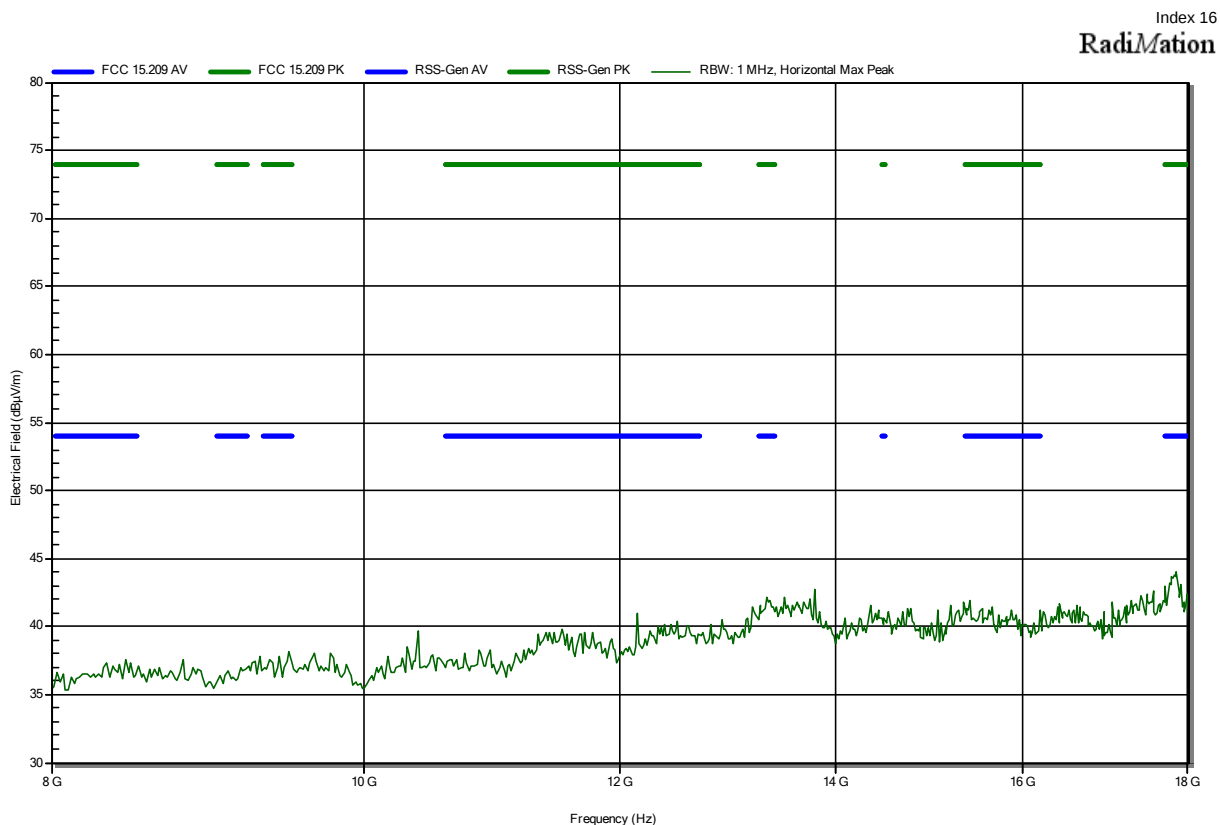
Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Schwarzbeck BBHA 9120B, Vertical
 Measurement distance: 3 m
 Mode: Tx; 802.11n, HT40, 2422MHz, OFDM
 Test Date: 2021-06-08
 Note: lower bandedge



Frequency 2.3897 GHz	Peak 56.45 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -17.55 dB	Peak Status Pass
Frequency 2.3897 GHz	Average 43.79 dBµV/m	Average Limit 54 dBµV/m	Average Difference -10.21 dB	Average Status Pass

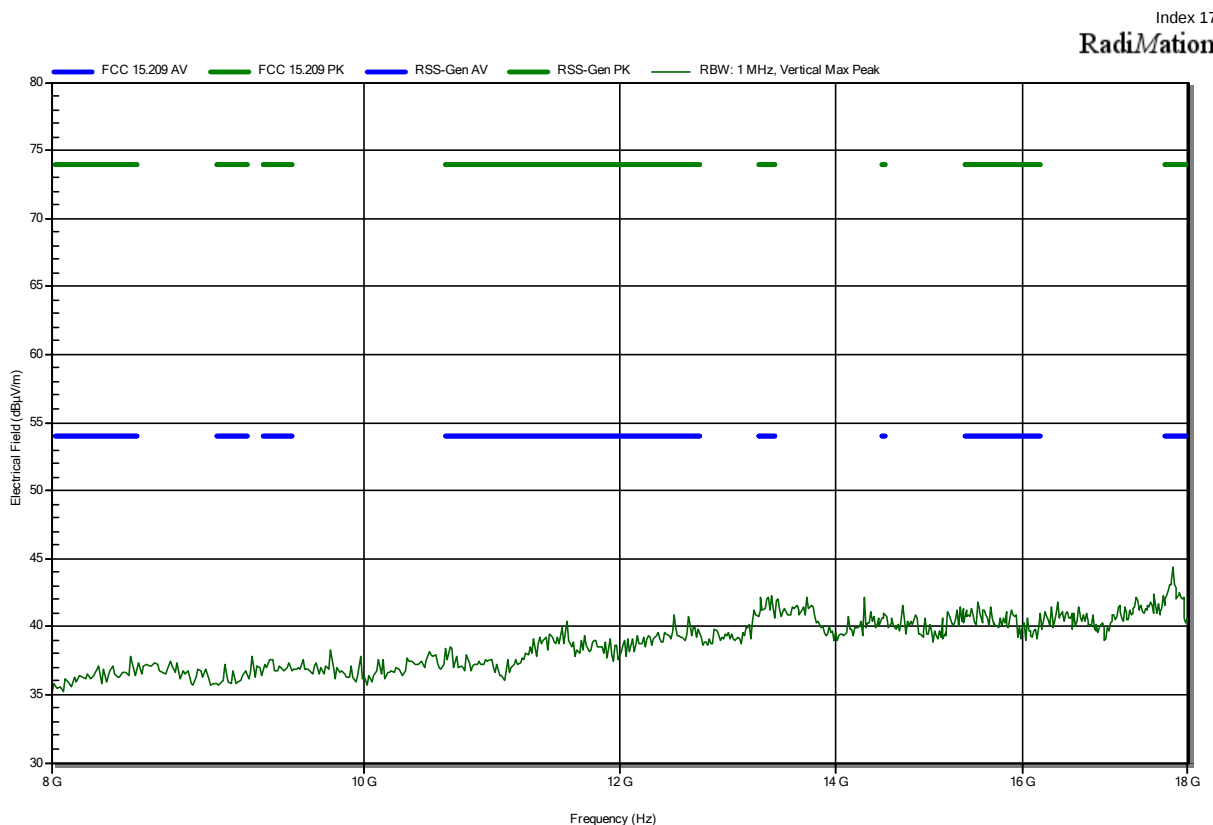
Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Schwarzbeck HWRD 650, Horizontal
 Measurement distance: 3 m
 Mode: Tx; 802.11n, HT40, 2422MHz, OFDM
 Test Date: 2021-06-08
 Note:



Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Schwarzbeck HWRD 650, Vertical
 Measurement distance: 3 m
 Mode: Tx; 802.11n, HT40, 2422MHz, OFDM
 Test Date: 2021-06-08
 Note:

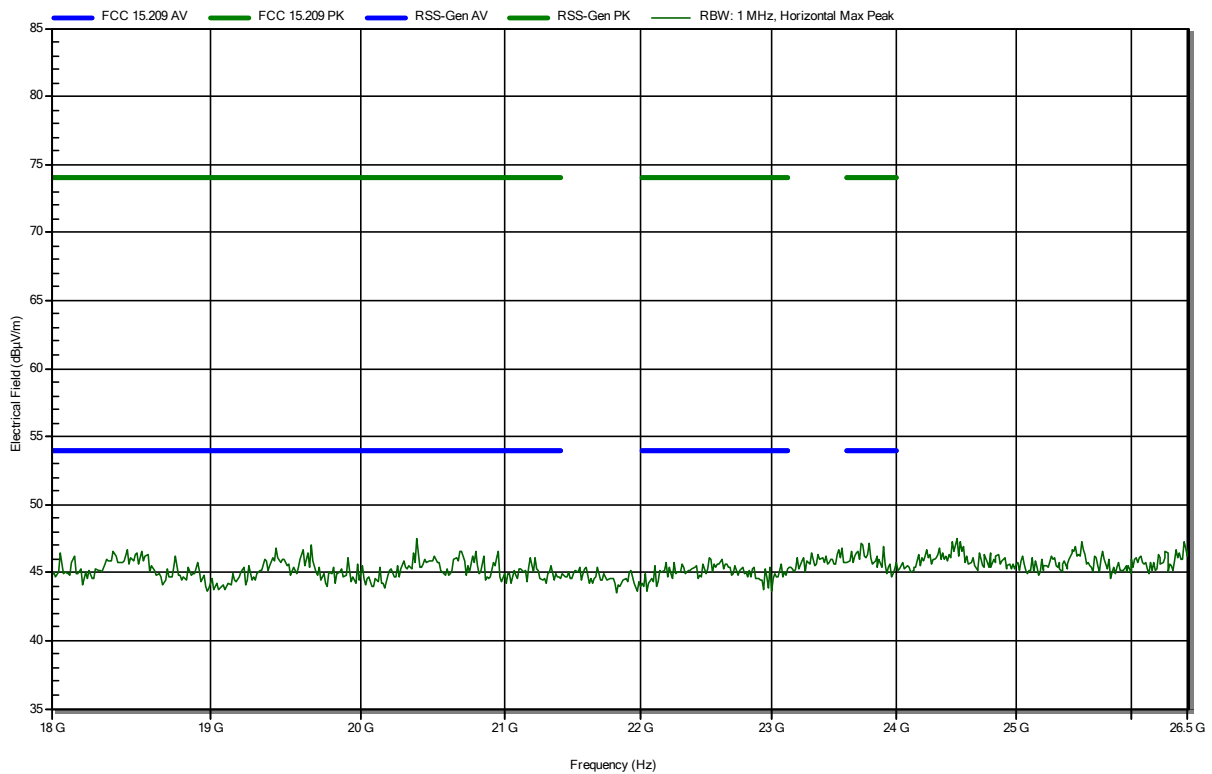


Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Amplifier Research ATH18G40, Horizontal
 Measurement distance: 3 m
 Mode: Tx; 802.11n, HT40, 2422MHz, OFDM
 Test Date: 2021-06-08
 Note:

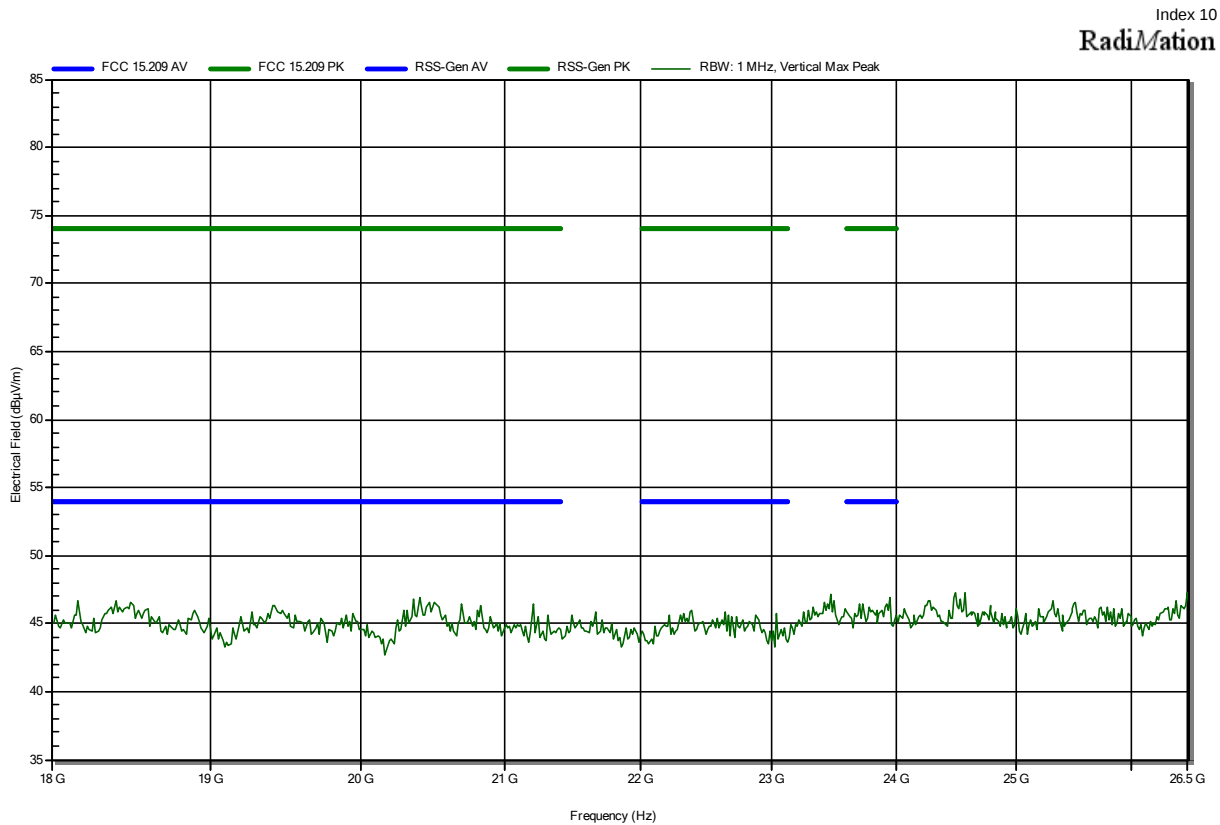
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Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

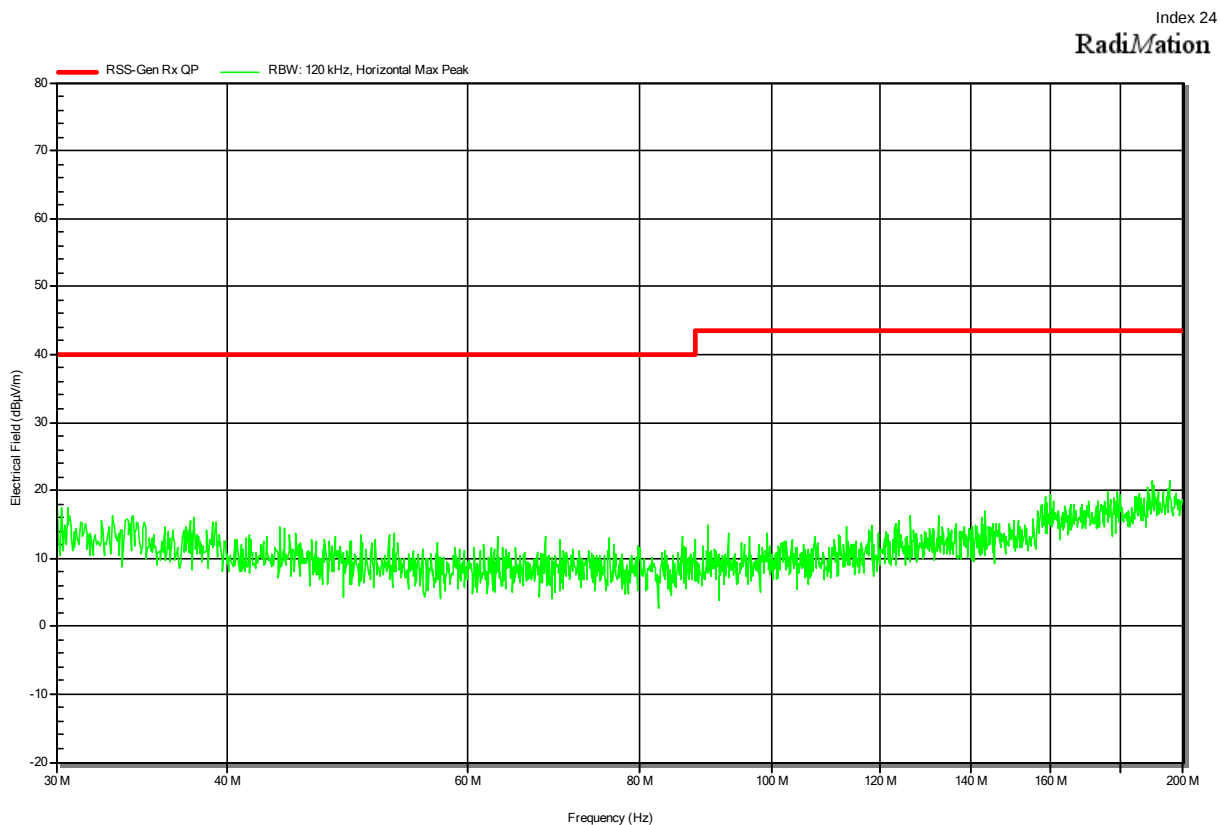
Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Amplifier Research ATH18G40, Vertical
 Measurement distance: 3 m
 Mode: Tx; 802.11n, HT40, 2422MHz, OFDM
 Test Date: 2021-06-08
 Note:



ANNEX B Receiver spurious emissions

Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: Rx; 802.11n, HT40, 2422MHz
 Test Date: 2021-07-16
 Note:

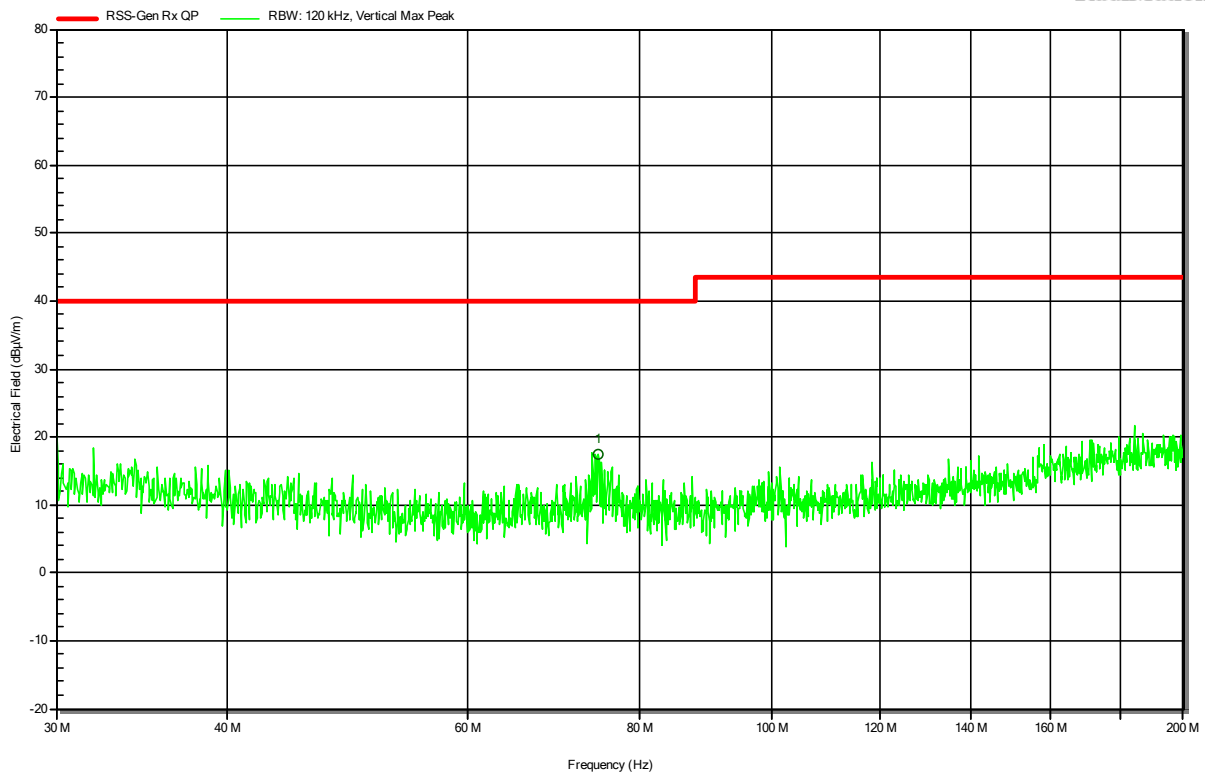


Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Rx; 802.11n, HT40, 2422MHz
 Test Date: 2021-07-16
 Note:

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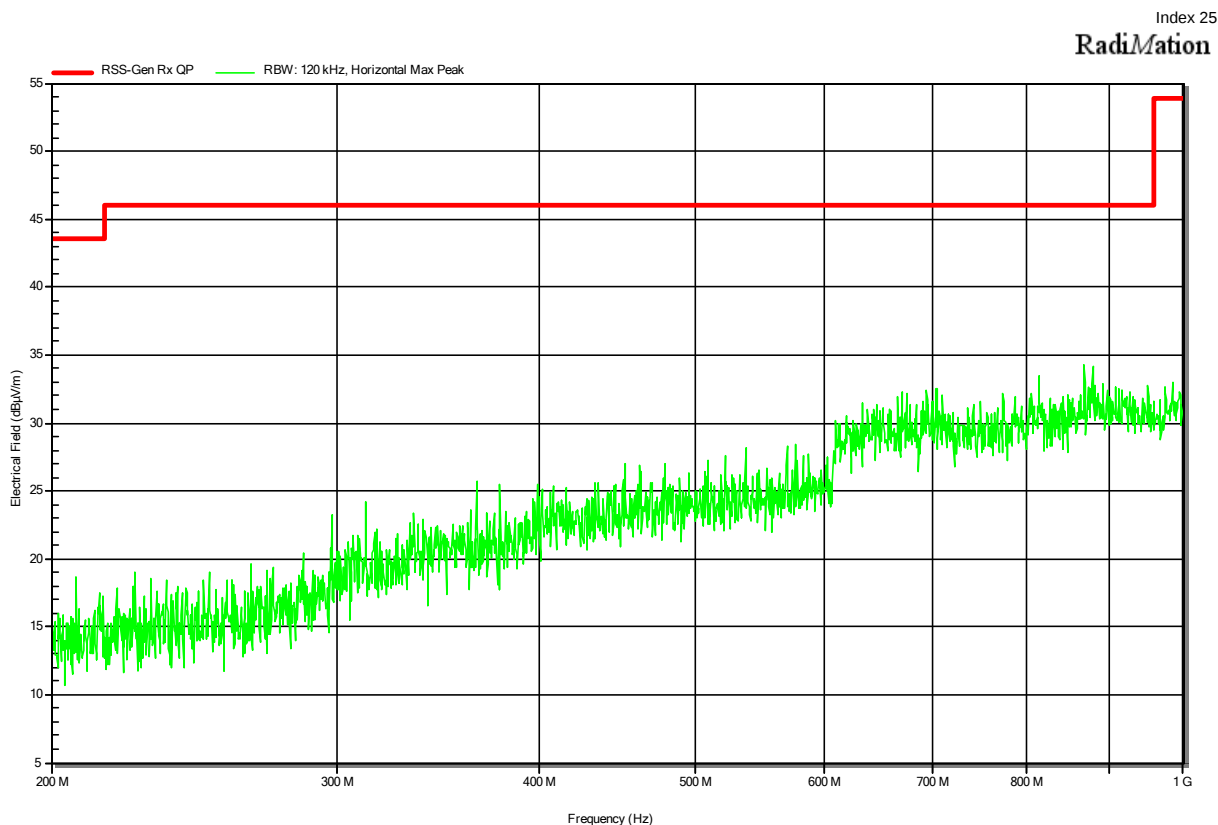
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
74.7368 MHz	17.5 dBµV/m	40 dBµV/m	-22.55 dB	Pass

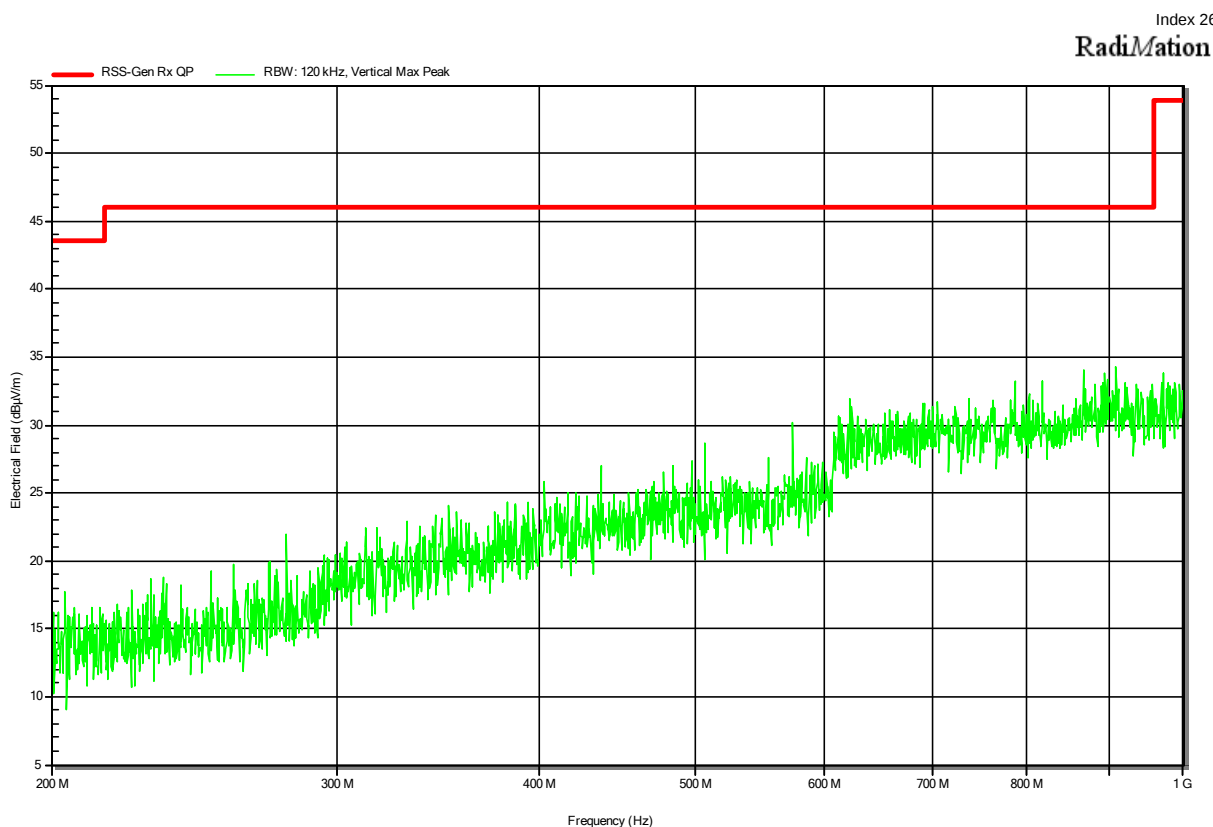
Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Rx; 802.11n, HT40, 2422MHz
 Test Date: 2021-07-16
 Note:



Radiated Spurious Emissions according to RSS-247, 47 CFR Part 15.247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Rx; 802.11n, HT40, 2422MHz
 Test Date: 2021-07-16
 Note:

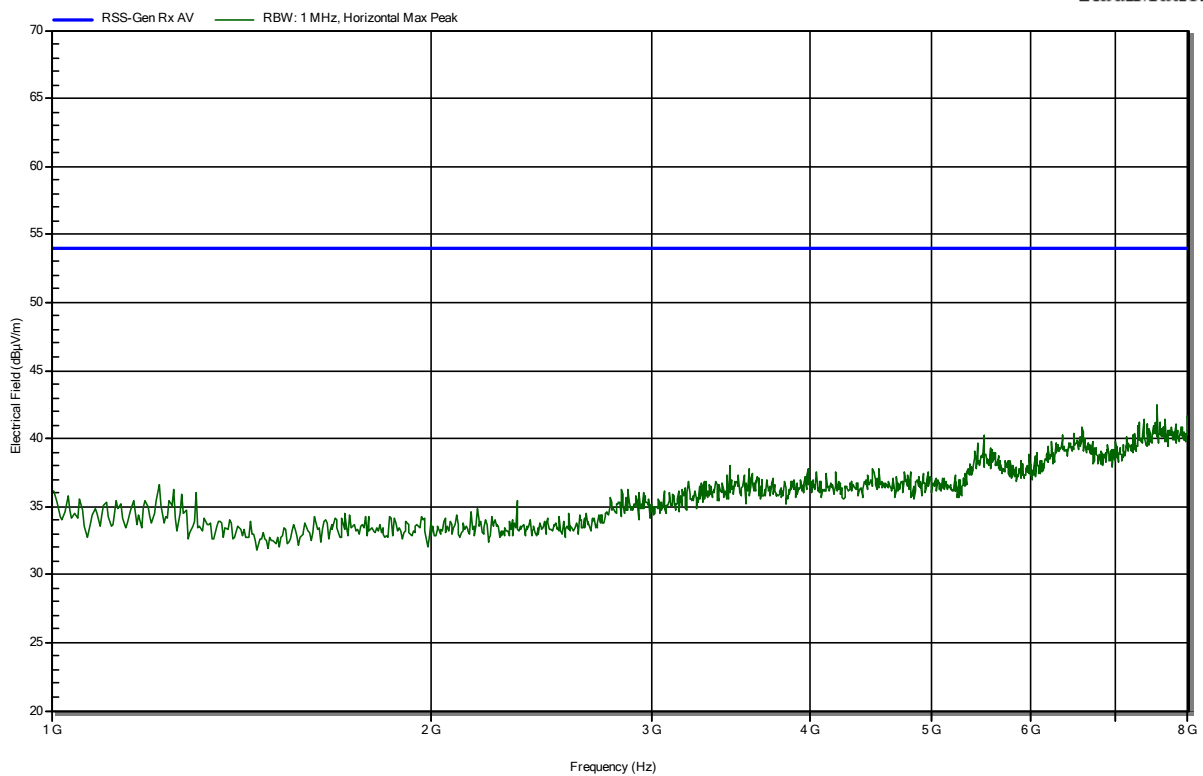


Radiated Spurious Emissions according to RSS-247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Schwarzbeck BBHA 9120B, Horizontal
 Measurement distance: 3 m
 Mode: Rx; 802.11n, HT40, 2422MHz
 Test Date: 2021-06-08
 Note:

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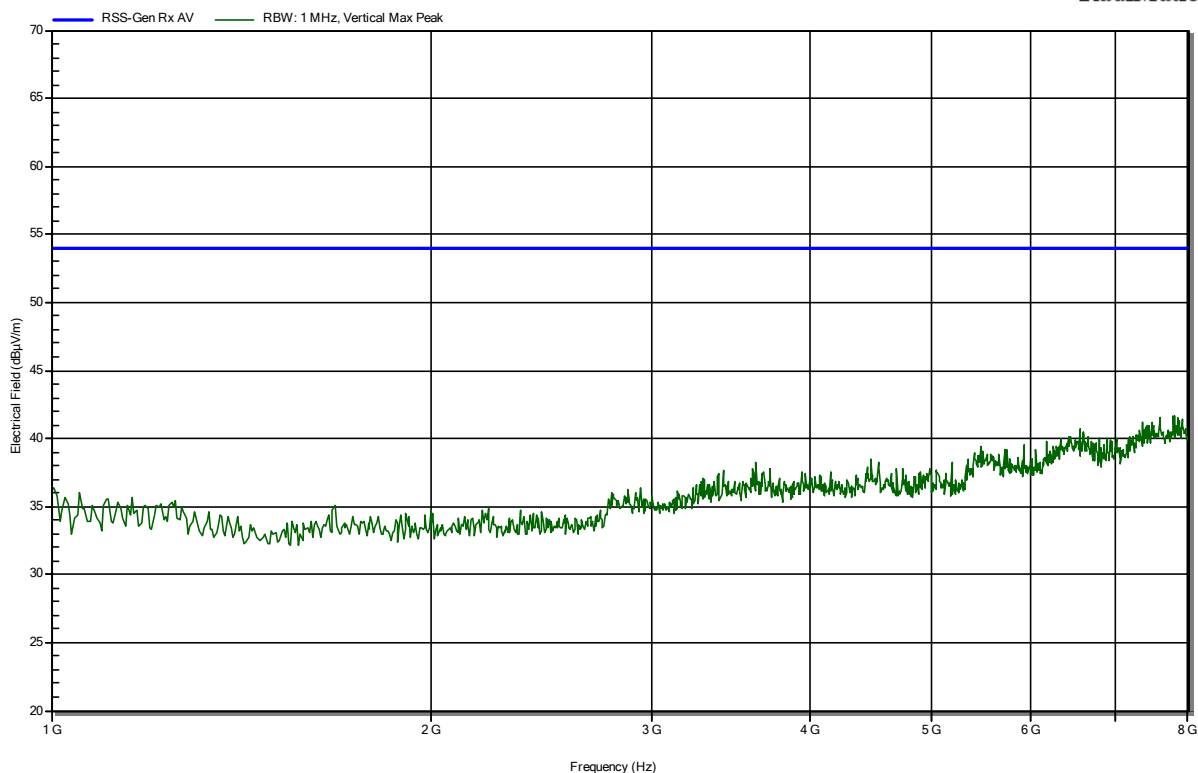


Radiated Spurious Emissions according to RSS-247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Schwarzbeck BBHA 9120B, Vertical
 Measurement distance: 3 m
 Mode: Rx; 802.11n, HT40, 2422MHz
 Test Date: 2021-06-08
 Note:

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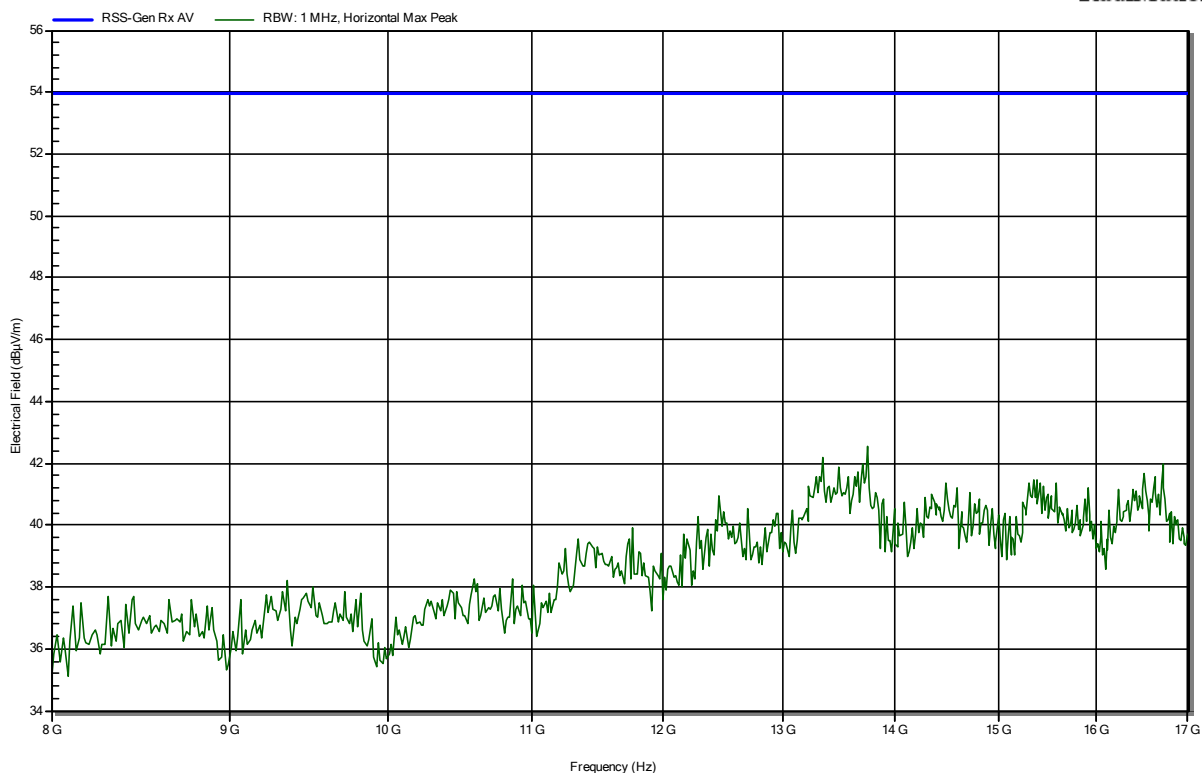


Radiated Spurious Emissions according to RSS-247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Schwarzbeck HWRD 650, Horizontal
 Measurement distance: 3 m
 Mode: Rx; 802.11n, HT40, 2422MHz
 Test Date: 2021-06-08
 Note:

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Radiated Spurious Emissions according to RSS-247

Project Number: G0M-2103-9644
 Applicant: IAV Automotive Engineering Inc.
 Model Description: ECU Automotive Telemetry Reader
 Model: TDBOX2 LTE
 Test Sample ID: 34175
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 13.8 VDC
 Antenna: Schwarzbeck HWRD 650, Vertical
 Measurement distance: 3 m
 Mode: Rx; 802.11n, HT40, 2422MHz
 Test Date: 2021-06-08
 Note:

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