





Test Report

Test report no.: 20054147-18456-1 Date of issue: 2021-03-12

Test result: The test item - passed - and complies with below listed standards.

Applicant

Veoneer US, Inc.

Manufacturer Veoneer US, Inc.

> Test Item NB24G20V0

RF-Spectrum Testing according to:

FCC 47 CFR Part 15 Radio Frequency Devices, Subpart C -§15.249 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHZ, and 24.0-24.25 GHz

Tested by (name, function, signature)

Karsten Geraldy Head of Laboratory RF

Approved by (name, function, signature)

Dr.-Ing. Harald Ansorge Managing Director

signature

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2021-03-12



Applicant and Test item details	
Applicant	Veoneer US, Inc. 26360 American Drive Southfield, MI 48034, USA
Manufacturer	Veoneer US, Inc. 26360 American Drive Southfield, MI 48034, USA
Test item description	24 GHz NB automotive radar
Model/Type reference	NB24G20V0
FCC ID	WU8NB24G20V0
Frequency	24.05 GHz – 24.25 GHz
Antenna	Integrated planar patch antenna
Power supply	8.0 V – 16.0 V DC
Temperature range	-40 °C – +85 °C

Disclaimer and Notes

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Within this test report, a ⊠ point / □ comma is used as a decimal separator. If otherwise, a detailed note is added adjected to its use.

Decision rule: Binary Statement for Simple Acceptance Rule according ILAC-G8:09/2019

IBL-Lab GmbH does not take test samples. The EUT used for testing is provided by the applicant.



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2 GENERAL INFORMATION

2.1 Administrative details	
Testing laboratory	IBL-Lab GmbH
	Heinrich-Hertz-Allee 7
	66386 Sankt Ingbert / Germany
	Fon: +49 6894 38938-0
	Fax: +49 6894 38938-99
	URL: <u>www.ib-lenhardt.de</u>
	E-Mail: info@ib-lenhardt.de
Accreditation	The testing laboratory is accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025:2018.
	Scope of testing and registration number:
	Electromagnetic Compatibility and
	Telecommunication (FCC requirements) <u>D-PL-21375-01-03</u>
	Website DAkkS: <u>https://www.dakks.de/</u>
	The Deutsche Akkreditierungsstelle GmbH (DAkkS) is also a signatory to
	ILAC Mutual Recognition Arrangement
Testing location	IBL-Lab GmbH
	Heinrich-Hertz-Allee 7
	66386 St. Ingbert / Germany
Date of receipt of test samples	2021-02-09
Start – End of tests	2021-02-09 – 2021-02-17

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2.2 Possible test case verdicts

Test sample meets the requirements	P (PASS)
Test sample does not meet the requirements	F (FAIL)
Test case does not apply to the test sample	N/A (Not applicable)
Test case not performed	N/P (Not performed)

2.3 Observations

No additional observations other than the reported observations within this test report have been made.

2.4 Opinions and interpretations

No appropriate opinions or interpretations according ISO/IEC 17025:2017 clause 7.8.7 are within this test report.

2.5 Revision History

-1 Initial Version



2.6 Further documents

List of further applicable documents	belonging to the present test report:
External EUT photographs:	20054147-18456_AnnexA
Internal EUT photographs:	20054147-18456_AnnexB
Test setup photographs:	20054147-18456_AnnexC



3 ENVIRONMENTAL & TEST CONDITIONS

3.1 Environmental conditions

Temperature	20°C ± 5°C
Relative humidity	25-75% r.H.
Barometric Pressure	860-1060 mbar
Power supply	230 V AC ± 5%

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3.2 Normal and extreme test conditions

	minimum	nominal	maximum
Temperature	-40 °C	+22 °C	+85 °C
Relative humidity	-/-	45 % r.h.	-/-
Power supply	8.0 V DC	13 V DC	16.0 V DC

4 TEST STANDARDS AND REFERENCES

Test standard (accredited)	Description
FCC 47 CFR Part 15	Radio Frequency Devices, Subpart C - §15.249 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHZ, and 24.0-24.25 GHz

Reference	Description
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
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices



5 EQUIPMENT UNDER TEST (EUT)

5.1 **Product description**

24 GHz NB automotive radar

5.2 Description of test item

Model name*	NB24G20V0
Serial number*	NON-FIP: 832108200366
	FIP: 832209200602
PCB identifier*	680414500F
Hardware status*	Rev E
Software status*	CFG 369
*: as dealared by applicant	· · · · ·

*: as declared by applicant

5.3 Technical data of test item

Operational carrier frequency*	24.05 GHz – 24.25 GHz
Operational frequency band*	24.00 GHz – 24.25 GHz
Type of radio transmission*	Modulated carrier
Modulation type*	Pulsed, FSK, Stepped FM
Number of channels*	1
Channel bandwidth*	<200 MHz
Channel spacing*	n.a.
Receiver category*	n.a.
Receiver bandwidth*	n.a.
Duty cycle*	n.a.
Antenna*	Integrated planar patch antenna
Rated RF output power*	13.26 dBm
Power supply*	8.0 V – 16.0 V DC
Temperature range*	-40 °C – +85 °C
Emission designator*	200MP0N

*: as declared by applicant

5.4 Additional information	
Model differences	The sensor has two possible housings, a housing with a form in place (FIP) gasket and one without. The sensor function between the two housing variants does not change. The housing with the FIP gasket is used to control radiated emissions. Radome, RF Shield & PCBA are the same for NB2.0 Radar for both with and without FIP gasket variants.
Ancillaries tested with	n.a.
Additional equipment used for testing	Notebook with CAN-adapter and special test software was used to stop FMCW and set low/mid/high carrier acc. to §15.31(c)



6 Test Setup Description

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Cyclically chamber inspections and range calibrations are performed. Where possible resp. necessary, RF generating and signaling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based frequency standard).

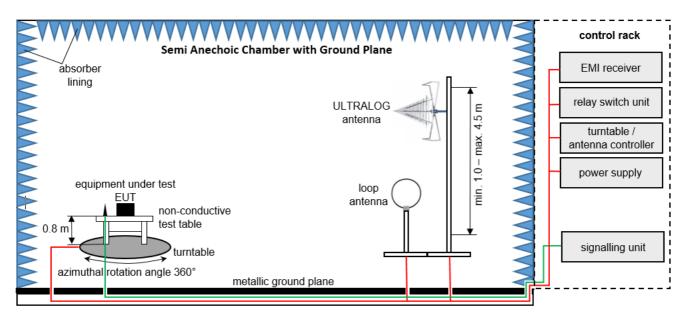
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).



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6.1 Semi Anechoic Chamber with Ground Plane

Radiated measurements are performed in vertical and horizontal plane in the frequency range 30 MHz to 1 GHz in a Semi Anechoic Chamber with a metallic ground plane. The EUT is positioned on a non-conductive test table with a height of 0.80 m above the metallic ground plane that covers the whole chamber. The receiving antennas conform to specification ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices. These antennas can be moved over the height range between 1.0 m and 4.5 m in order to search for maximum field strength emitted from the EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by a spectrum analyzer where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



Measurement distance: ULTRALOG antenna 3 m; loop antenna 3 m EMC32 software version: 11.10.00

FS = UR + CL + AF

(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

Example calculation:

FS [dBµV/m] = 12.35 [dBµV/m] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dBµV/m] (35.69 µV/m)



List of test equipment used:

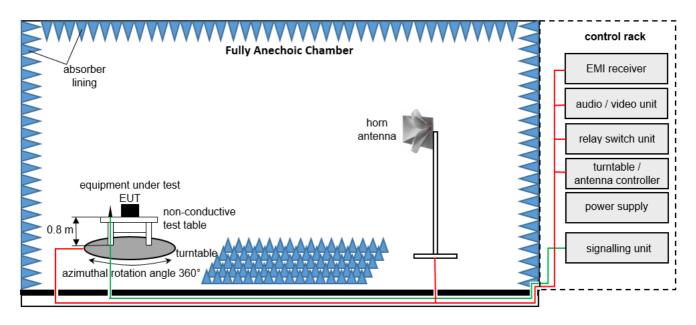
No.	Equipment	Manufacturer	Туре	Serial No.	IBL No.	Kind of Calibration	Last / Next Calibration
1	Power Supply	Elektro-Automatik GmbH & Co. KG	EA-PSI 9080-40 T	2000230001	LAB000313	NE	-
2	Test table	innco systems GmbH	PT1208-080-RH	-	LAB000306	NE	-
3	Positioner	maturo GmbH	TD 1.5-10KG		LAB000258	NE	-
4	Compressed Air	Implotex	1-850-30	-	LAB000256	NE	-
5	EMI Test Receiver	Rohde & Schwarz	ESW26	101481	LAB000236	К	$2020-06-03 \rightarrow 12M \rightarrow 2021-06-03$
6	Semi-Anechoic Chamber (SAC)	Albatross Projects GmbH	SAC 5 (Babylon 5)	20168.PRB	LAB000235	ZW	$2020\text{-}08\text{-}24 \rightarrow 12\text{M} \rightarrow 2021\text{-}08\text{-}24$
7	Measurement Software	Rohde & Schwarz	EMC32 V11.00.10		LAB000226	NE	-
8	Turntable	maturo GmbH	TT2.0-2t	TT2.0-2t/921	LAB000225	NE	-
9	Antenna Mast	maturo GmbH	CAM4.0-P	CAM4.0-P/316	LAB000224	NE	-
10	Antenna Mast	maturo GmbH	BAM4.5-P	BAM4.5-P/272	LAB000223	NE	-
11	Controller	maturo GmbH	FCU 3.0	10082	LAB000222	NE	-
12	Power Supply	Elektro-Automatik GmbH & Co. KG	PS 2042-10 B	2878350292	LAB000191	NE	-
13	Open Switch and Control Platform	Rohde & Schwarz	OSP200 Base Unit 2HU	101748	LAB000149	ZW	$2020\text{-}07\text{-}07 \to 12\text{M} \to 2021\text{-}07\text{-}07$
14	Antenna	Rohde & Schwarz	HF907	102898	LAB000124	К	$2020\text{-}04\text{-}23 \rightarrow 36\text{M} \rightarrow 2021\text{-}04\text{-}23$
15	Antenna	Rohde & Schwarz	HL562E	102001	LAB000123	К	$2020-07-05 \rightarrow 36M \rightarrow 2021-07-05$
16	Antenna	Rohde & Schwarz	HFH2-Z2E - Active Loop Antenna	100954	LAB000108	к	$2020\text{-}03\text{-}25 \rightarrow 36\text{M} \rightarrow 2021\text{-}03\text{-}25$
17	Pre-Amplifier	Schwarzbeck Mess- Elektronik OHG	BBV 9718 C	84	LAB000169	NE	-

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6.2 Fully Anechoic Chamber



Measurement distance: horn antenna 3 m EMC32 software version: 11.10.00

FS = UR + CA + AF (FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

<u>Example calculation</u>: FS [dB μ V/m] = 40.0 [dB μ V/m] + (-35.8) [dB] + 32.9 [dB/m] = 37.1 [dB μ V/m] (71.61 μ V/m)

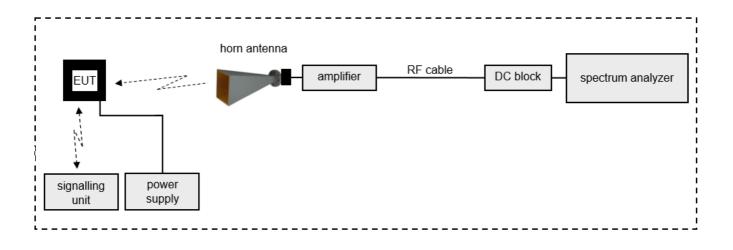
List of test equipment used:

No.	Equipment	Manufacturer	Туре	Serial No.	IBL No.	Kind of Calibration	Last / Next Calibration
1	Power Supply	Elektro-Automatik GmbH & Co. KG	EA-PSI 9080-40 T	2000230001	LAB000313	NE	-
2	Test table	innco systems GmbH	PT1208-080-RH	-	LAB000306	NE	-
3	Positioner	maturo GmbH	TD 1.5-10KG		LAB000258	NE	-
4	Compressed Air	Implotex	1-850-30	-	LAB000256	NE	-
5	EMI Test Receiver	Rohde & Schwarz	ESW26	101481	LAB000236	К	$2020-06-03 \rightarrow 12M \rightarrow 2021-06-03$
6	Semi-Anechoic Chamber (SAC)	Albatross Projects GmbH	SAC 5 (Babylon 5)	20168.PRB	LAB000235	ZW	$2020\text{-}08\text{-}24 \rightarrow 12\text{M} \rightarrow 2021\text{-}08\text{-}24$
7	Measurement Software	Rohde & Schwarz	EMC32 V11.00.10		LAB000226	NE	-
8	Turntable	maturo GmbH	TT2.0-2t	TT2.0-2t/921	LAB000225	NE	-
9	Antenna Mast	maturo GmbH	CAM4.0-P	CAM4.0-P/316	LAB000224	NE	-
10	Antenna Mast	maturo GmbH	BAM4.5-P	BAM4.5-P/272	LAB000223	NE	-
11	Controller	maturo GmbH	FCU 3.0	10082	LAB000222	NE	-
12	Power Supply	Elektro-Automatik GmbH & Co. KG	PS 2042-10 B	2878350292	LAB000191	NE	-
13	Open Switch and Control Platform	Rohde & Schwarz	OSP200 Base Unit 2HU	101748	LAB000149	ZW	$2020\text{-}07\text{-}07 \to 12\text{M} \to 2021\text{-}07\text{-}07$
14	Antenna	Rohde & Schwarz	HF907	102898	LAB000124	К	$2020-04-23 \rightarrow 36M \rightarrow 2021-04-23$
15	Antenna	Rohde & Schwarz	HL562E	102001	LAB000123	К	$2020-07-05 \rightarrow 36M \rightarrow 2021-07-05$
16	Antenna	Rohde & Schwarz	HFH2-Z2E - Active Loop Antenna	100954	LAB000108	к	$2020-03-25 \rightarrow 36M \rightarrow 2021-03-25$
17	Pre-Amplifier	Schwarzbeck Mess- Elektronik OHG	BBV 9718 C	84	LAB000169	NE	-

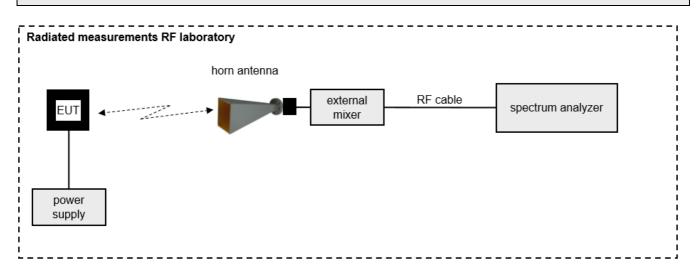


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6.3 Radiated measurements > 18 GHz



6.4 Radiated measurements > 50 GHz



Measurement distance: horn antenna e.g. 50 cm

FS = UR + CA + AF

(FS-field strength; UR-voltage at the receiver; CA-loss signal path & distance correction; AF-antenna factor)

Example calculation:

FS [dBµV/m] = 40.0 [dBµV/m] + (-60.1) [dB] + 36.74 [dB/m] = 16.64 [dBµV/m] (6.79 µV/m)

Note: conversion loss of mixer is already included in analyzer value.



List of test equipment used:

No.	Equipment	Manufacturer	Туре	Serial No.	IBL No.	Kind of Calibration	Last / Next Calibration
1	Test table	innco systems GmbH	PT0707-RH light	-	LAB000303	-	-
2	Spectrum Analyser	Rohde & Schwarz	FSW43	101391	LAB000289	NE	-
3	Power Supply	Elektro-Automatik GmbH & Co. KG	PS 2042-10 B	2878350263	LAB000190	NE	-
4	WG-Coax-Adapter	Flann Microwave Ltd	23373-TF30 UG383/U	273385	LAB000185	ZW	$2020\text{-}07\text{-}01 \rightarrow 12\text{M} \rightarrow 2021\text{-}07\text{-}01$
5	WG-Coax-Adapter	Flann Microwave Ltd	22093-TF30 UG599/U	273263	LAB000183	ZW	$2020-07-01 \rightarrow 12M \rightarrow 2021-07-01$
6	WG-Coax-Adapter	Flann Microwave Ltd	20093-TF30 UBR220	273374	LAB000181	ZW	$2020\text{-}07\text{-}01 \rightarrow 12\text{M} \rightarrow 2021\text{-}07\text{-}01$
7	Coaxial Cable	Huber & Suhner	SF101/1.0m	503989/1	LAB000163	ZW	$2020\text{-}06\text{-}05 \rightarrow 12\text{M} \rightarrow 2021\text{-}06\text{-}05$
8	Coaxial Cable	Huber & Suhner	SF101/0.5m	504118/1	LAB000162	ZW	$2020\text{-}06\text{-}05 \to 12 \text{M} \to 2021\text{-}06\text{-}05$
9	Coaxial Cable	Huber & Suhner	ST18/48"	2276454-01	LAB000157	ZW	$\textbf{2020-07-03} \rightarrow \textbf{12M} \rightarrow \textbf{2021-07-03}$
10	Coaxial Cable	Rosenberger	LU7-022-1000	34	LAB000154	NE	-
11	Coaxial Cable	Rosenberger	LU7-022-1000	33	LAB000153	NE	-
12	Antenna	Flann Microwave Ltd	27240-20	273367	LAB000137	ZW	$2020\text{-}08\text{-}01 \rightarrow 12\text{M} \rightarrow 2021\text{-}08\text{-}01$
13	Antenna	Flann Microwave Ltd	25240-20	272860	LAB000133	ZW	$2020\text{-}07\text{-}01 \rightarrow 12\text{M} \rightarrow 2021\text{-}07\text{-}01$
14	Antenna	Flann Microwave Ltd	23240-20	273430	LAB000132	ZW	$2020\text{-}07\text{-}01 \to 12\text{M} \to 2021\text{-}07\text{-}01$
15	Antenna	Flann Microwave Ltd	22240-20	270448	LAB000130	к	$2020\text{-}06\text{-}29 \to 36\text{M} \to 2021\text{-}06\text{-}29$
16	Antenna	Flann Microwave Ltd	20240-20	266403	LAB000128	к	$2020\text{-}06\text{-}29 \to 36\text{M} \to 2021\text{-}06\text{-}29$
17	Harmonic Mixer	Rohde & Schwarz	FS-Z110	102000	LAB000114	К	$2020\text{-}03\text{-}26 \rightarrow 12\text{M} \rightarrow 2021\text{-}03\text{-}26$
18	Harmonic Mixer	Rohde & Schwarz	FS-Z75	102015	LAB000112	К	$2020\text{-}03\text{-}26 \rightarrow 12\text{M} \rightarrow 2021\text{-}03\text{-}26$
19	Spectrum Analyser	Rohde & Schwarz	FSW50	101450	LAB000111	К	$2020\text{-}05\text{-}05 \to 12\text{M} \to 2021\text{-}05\text{-}05$
20	Antenna Mast	Schwarzbeck Mess- Elektronik OHG	AM 9104	99	LAB000109	NE	_
21	Climatic Chamber	CTS GmbH	T-65/50	204002	LAB000110	ZW	$2020\text{-}06\text{-}01 \to 12 \text{M} \to 2021\text{-}06\text{-}01$

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7 Measurement procedures

7.1 Radiated spurious emissions from 9 kHz to 30 MHz

Test setup

- The EUT is set up according to its intended use, as described in the user manual or as defined by the manufacturer.
- In case of floor standing equipment, it is placed in the middle of the turn table.
- In case of tabletop equipment it is placed on a non-conductive table with a height of 80 cm.
- Additional equipment, cables, ... necessary for testing, are positioned like under normal operation.
- Interface cables, e.g. power supply, network, ... are connected to the connection box in the turn table.
- EUT is powered on and set into operation.

Pre-scan

- Turntable performs an azimuthal rotation from 0° to 315° in 45° steps.
- For each turntable step the EMI-receiver/spectrum analyser performs a positive-peak/max-hold sweep (=worst-case). Data is transferred to EMI-software and recorded. EMI-software will show the maximum level of all single sweeps as the final result for the pre-scan.

Final measurement

- Significant emissions found during the pre-scan will be maximized by the EMI-software by rotating the turntable from 0° to 360°.
- Loop antenna is rotated with special 3D adapter set to find maximum level of emissions.
- Plot of the pre-scan with frequencies of identified emissions including levels, correction factors, turn table
 position and settings of measuring equipment is recorded.



7.2 Radiated spurious emissions from 30 MHz to 1 GHz

Test setup

- The EUT is set up according to its intended use, as described in the user manual or as defined by the manufacturer.
- In case of floor standing equipment, it is placed in the middle of the turn table. In case of tabletop equipment it is placed on a non-conductive table with a height of 80 cm.
- Additional equipment, cables, ... necessary for testing, are positioned like under normal operation.
- Interface cables, e.g. power supply, network, ... are connected to the connection box in the turn table.
- EUT is powered on and set into operation.

Pre-scan

- Turntable performs an azimuthal rotation from 0° to 315° in 45° steps.
- Antenna polarisation is changed (H-V / V-H) and antenna height is changed from 1 meter to 4 meters.
- For each turntable step / antenna polarisation / antenna height the EMI-receiver/spectrum analyser performs a positive-peak/max-hold sweep (=worst-case). Data is transferred to EMI-software and recorded. EMI-software will show the maximum level of all single sweeps as the final result for the prescan.

Final measurement

- Significant emissions found during the pre-scan will be maximized by the EMI-software based on evaluated data during the pre-scan by rotating the turntable and changing antenna height and polarisation.
- Final measurement will be performed with measuring equipment settings as defined in the applicable test standards (e.g. ANSI C6.4).
- Plot of the pre-scan with frequencies of identified emissions including levels, correction factors, turn table position, antenna polarisation and settings of measuring equipment is recorded.



7.3 Radiated spurious emissions from 1 GHz to 18 GHz

Test setup

- The EUT is set up according to its intended use, as described in the user manual or as defined by the manufacturer.
- In case of floor standing equipment, it is placed in the middle of the turn table. In case of tabletop equipment it is placed on a non-conductive table with a height of 80 cm.
- Additional equipment, cables, ... necessary for testing, are positioned like under normal operation.
- Interface cables, e.g. power supply, network, ... are connected to the connection box in the turn table.
- EUT is powered on and set into operation.

Pre-scan

- Turntable performs an azimuthal rotation from 0° to 315° in 45° steps.
- Antenna polarisation is changed (H-V / V-H) and antenna height is changed from 1 meter to 4 meters.
- For each turntable step / antenna polarisation / antenna height the EMI-receiver/spectrum analyser performs a positive-peak/max-hold sweep (=worst-case). Data is transferred to EMI-software and recorded. EMI-software will show the maximum level of all single sweeps as the final result for the pre-scan.

Final measurement

- Significant emissions found during the pre-scan will be maximized by the EMI-software based on evaluated data during the pre-scan by rotating the turntable and changing antenna height and polarisation.
- Final measurement will be performed with measuring equipment settings as defined in the applicable test standards (e.g. ANSI C6.4).
- Plot of the pre-scan with frequencies of identified emissions including levels, correction factors, turn table position, antenna polarisation and settings of measuring equipment is recorded.



7.4 Radiated spurious emissions above 18 GHz

Test setup

- The EUT is set up according to its intended use, as described in the user manual or as defined by the manufacturer.
- Additional equipment, cables, ... necessary for testing, are positioned like under normal operation.
- EUT is powered on and set into operation.
- Test distance depends on EUT size and test antenna size (farfield conditions shall be met).

Pre-scan

 The test antenna is handheld and moved carefully over the EUT to cover the EUT's whole sphere and for different polarizations of the antenna.

Final measurement

- Significant emissions found during the pre-scan will be maximized, i.e. position and antenna orientation causing the highest emissions with Peak and RMS detector
- Final measurement will be performed with measuring equipment settings as defined in the applicable test standards (e.g. ANSI C63.4 / C63.10).
- Final plot showing measurement data, levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit is recorded.

Note

- In case of measurements with external harmonic mixers (e.g. above 50 GHz) special care is taken to avoid possible overloading of the external mixer's input.
- As external harmonic mixers may generate false images, care is taken to ensure that any emission measured by the spectrum analyzer is indeed radiated from the EUT and not internally generated by the external harmonic mixer. Signal identification feature of spectrum analyzer is used to eliminate/reduce images of the external harmonic mixer.



8 SUMMARY OF TEST RESULTS

Test specification

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FCC 47 CFR Part 15.249

Clause	Requirement / Test case	Test Conditions	Result / Remark	Verdict
§2.1049	Occupied bandwidth (99% bandwidth)	Normal		Р
§12.215(c)	Transmitter frequency stability	Extreme		Р
§15.249(a)	Field strength of emissions (wanted signal)	Normal		Р
§15.249(d) §15.209(a)	Field strength of emissions (spurious & harmonics)	Normal		Р

Notes

FCC's Millimeter Wave Test Procedures:

I. A radiated method of measurements in order to demonstrate compliance with the various regulatory requirements has been chosen in consideration of test equipment availability and the limitations of many external harmonic mixers. A conducted method of measurement could be employed if EUT and mixer waveguides both are accessible and of the same type (WG number) and if waveguide sections and transitions can be found. Another potential problem is that the peak power output may exceed the +20 dBm input power limit of many commercially available mixers. For these reasons a radiated method is preferred.

Comments and observations

none



9 TEST RESULTS

9.1 Occupied bandwidth

Description

§2.1049 Measurements required: Occupied bandwidth.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

Limits

The radar device's occupied bandwidth (i.e. 99% emission bandwidth) shall be contained in the frequency band.

Test procedure

ANSI C63.10, 6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

The following procedure shall be used for measuring 99% power bandwidth:

- a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
- d) Step a) through step c) might require iteration to adjust within the specified range.
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
- g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
- h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Note

Measurements with the peak detector are also suitable to demonstrate compliance of an EUT, as long as the required resolution bandwidth is used, because peak detection will yield amplitudes equal to or greater than amplitudes measured with RMS detector. The measurement data from a spectrum analyser peak detector will represent the worst-case results (see ANSI C63.10).

Test results

rootroounto				
EUT mode Test distance		f∟ [GHz]	f _H [GHz]	99% OBW [MHz]
NON-FIP	1 m	24.074169	24.230458	156.289
FIP	1 m	24.074120	24.230395	156.275



2021-03-12

·						
MultiView 🎫 Sp	ectrum X	Spectrum 2 X	Spectrum 3	× Transient Analysis	×	-
Ref Level 135.00).30 dB 🖷 RBW 1 MHz	-	_	_	
🖷 Att	0 dB 🖷 SWT	100 s 🖷 VBW 3 MHz	Mode Auto Sweep			
1 Occupied Bandy	width					⊖1Pk Max
130 dBµV					M1[1]	104.57 dBµ\ 24.107620 GHz
120 dBµV						
110 dBµV			M1			
		T1 7	V		T2	
100 dBµV						
90 dBµV						
		4				
80 dBμV		/			1 1	
70 dвµV		- A A A A A A A A A A A A A A A A A A A				4
managenter	monthe	Warman .				museum
60 dBµV						
50 dBµV						
40 dBµV						
CF 24.125 GHz		1001 p	uts		Si	pan 300.0 MHz
2 Marker Table		1001 p		001011127		
Type Ref	Trc X-	-Value D762 GHz 1	Y-Value .04.57 dBμV	Function Occ Bw	Function R 156.2892142	esult
M1 T1 T2	1 24.	074169 GHz 230458 GHz	102.97 dBµV 103.05 dBµV	Occ BW Occ Bw Centroid Occ Bw Freg Offset	24.15231	13869 GHz 59158 MHz
	1 24.	200400 0112	105.05 0000	Occ bin neg Oliset	Measuring	10.02.2021

Plot no. 1: 99% OBW, Peak detector, NON-FIP EUT

09:09:58 10.02.2021

Plot no. 2: 99% OBW, Peak detector, FIP EUT

									
MultiView	Spectrum	× Sp	ectrum 2	× Spectr	um 3	×			
Ref Level 13		iset 30.30 dB 🖷				_			
 Att 1 Occupied Ba 	0 dB = SW	/T 100 s 🖷	VBW 3 MHz I	Mode Auto Sweep	1				o 1Pk Max
	mawiaan							M1[1]	103.86 dBµV
130 dBµV									24.116010 GHz
120 dBµV									
110 dBµV				M1					
			T1 7	¥.				T2 -▼	
100 dBµV−−−−									
90 dBµ∨								+	
80 dBµV			5					7	
		and a	/					hy	
70 dBµ∨		1 marine Mari							theman
60 dBµV	mannon	Monteres							and a start of the
oo appi									
50 dBµV									
40 dBµV									
CF 24.125 GHz	z		1001 p	ts		1 30.0 MHz/		Sr	an 300.0 MHz
2 Marker Tabl	e								
Type Ref		X-Value 24.11601 G	Hz 1	Y-Value 03.86 dBµV	Occ Bw	Function	Eun 156.274	ction Re	
T1 T2	1	24.07412 0 24.230395 0	iHz	102.68 dBµV 102.91 dBµV	Occ Bw C	entroid reg Offset	2	4.15225	7532 GHz 3208 MHz
	~						- Measuring		40 11.02.2021 11:34:34

11:34:35 11.02.2021



9.2 Transmitter frequency stability

Description

§15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Limits

The radar device's occupied bandwidth (i.e. 99% emission bandwidth) shall be contained in the frequency band.

Test procedure

ANSI C63.10, 6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for

- the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be
- approximately three times the RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
- d) Step a) through step c) might require iteration to adjust within the specified range.
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
- g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
- h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Note

Measurements with the peak detector are also suitable to demonstrate compliance of an EUT, as long as the required resolution bandwidth is used, because peak detection will yield amplitudes equal to or greater than amplitudes measured with RMS detector. The measurement data from a spectrum analyser peak detector will represent the worst-case results (see ANSI C63.10).

Test results							
EUT mode	Temperature / Voltage	f∟ [GHz]	f _H [GHz]	99% OBW [MHz]			
NON-FIP	T _{max} / V _{nom}	24.076443	24.232539	156.097			
NON-FIP	T _{nom} / V _{min} /V _{max}	24.074169	24.230458	156.289			
NON-FIP	T _{min} / V _{nom}	24.07474	24.23077	156.030			

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Plot no. 3: 99% OBW, Peak detector, Tnom

X MultiView 📑 Spectrum × Spectrum 2 × Spectrum 3 × Transient Analysis ×
 Ref Level
 135.00 dBµ/
 Offset
 30.30 dB
 RBW
 1 MHz

 Att
 0 dB
 SWT
 100 s
 VBW
 3 MHz
 Mode
 Auto Sweep
 Att 0 dB • SWT
 Occupied Bandwidth M1[1] 104.57 dBµ' 4.107620 GH 130 dBµV-120 dBµV 110 dBµV 100 dBµV 90 dBµ\ 80 dBµ\ 70 dBµ∨ 60 dBuV 50 dBµV 40 dBµ∨ Span 300.0 MHz CF 24.125 GHz 1001 pts 30.0 MHz/ 2 Marker Table Type Ref Tr Function Function Result 156.289214217 MHz X-Value 24.10762 GHz Y-Value 104.57 dBμV Occ Bw Occ Bw Centroid Occ Bw Freq Offs M1 T1 24.074169 GHz 24.230458 GHz 24.152313869 GHz 27.313869158 MHz 400 10.02.2021 09:09:57 Measuring...

09:09:58 10.02.2021

Plot no. 4: 99% OBW, Peak detector, Tmin

MultiView -	Spectrum	× Spectrur	n 2 🗙	Spectrum 3	× Spectr	um 4 💙	×		•
Ref Level 13	35.00 dBuV 0	ffset 30.30 dB 🖷	RBW 1 MHz	•					
 Att 	0 dB 🖷 S			Mode Auto Sweep					
1 Occupied Ba	andwidth								o1Pk Max
100 10 11								M1[1]	104.20 dBµV
130 dBµV									24.133520 GHz
120 dBµV									
110 dBµV−−−−		T1		M1			Т2		
					······································				
100 dBµ∨									
90 dBµV									
		Ń						λ.	
80 dBµV		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						N.	
70 dBµV		A						Ny Ny	
AD dBuy	min marker where the second							Muner	moundand
60 dBµV									
50 dBµV									
40 dBµV									
CF 24.15 GHz			1001	ots	30).0 MHz/		S	an 300.0 MHz
2 Marker Tab	le								
Type Re	f Trc	X-Value	-	Y-Value		Function		Function R	esult
M1	1	24.13352 GH		LO4.20 dBµV	Occ Bw			156.0298887	
T1 T2	1	24.07474 Gł 24.23077 Gł		103.35 dBµV 102.62 dBµV	Occ Bw Cer Occ Bw Fre				55135 GHz 34711 MHz
							 Measuring 		12.02.2021 10:15:53

10:15:53 12.02.2021



Plot no. 5: 99% OBW, Peak detector, T_{max}

¢\$ MultiView 📒 Spectrum X Spectrum 2 X Spectrum 3 X Spectrum 4 ×
 Ref Level
 135.00
 dBµV
 Offset
 30.30
 dB
 RBW
 1 MHz

 • Att
 0
 dB
 • SWT
 100 s
 • VBW
 3 MHz
 Mode
 Auto Sweep

 1 Occupied Bandwidth
 100 s
 • VBW
 3 MHz
 Mode
 Auto Sweep
 01Pk Ma 103.51 dBµ\ 4.126920 GH M1[1] 130 dBµV-120 dBµV 110 dBµV M1 100 dBµ\ 90 dBµ\ 80 dBµV 70 dBµ∨ un. 60 dBµV 50 dBµV 40 dBµ∨ Span 300.0 MHz CF 24.15 GHz 1001 pts 30.0 MHz/ 2 Marker Table Type Ref Tro Eunction Function Result 156.096722253 MHz Y-Value 103.51 dBµV X-Value 24.12692 GHz Occ Bw Occ Bw Centroid Occ Bw Freq Offs M1 T1 T2 24.076443 GHz 24.232539 GHz 24.154491057 4.491056725 102.85 102.63 GHz Measuring... 12.02.2021 12:29:40

12:29:41 12.02.2021



9.3 Field strength of emissions (wanted signal)

Description / Limits

§15.249 (a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental	Field strength of harmonics
902 – 928 MHz	50 mV/m (94 dBµV/m)	500 μV/m (54 dBμV/m)
2400 – 2483.5 MHz	50 mV/m (94 dBµV/m)	500 μV/m (54 dBμV/m)
5725 – 5875 MHz	50 mV/m (94 dBµV/m)	500 μV/m (54 dBμV/m)
24.00 – 24.25 GHz	250 mV/m (108 dBµV/m)	2500 μV/m (68 dBμV/m)

§15.249 (c) Field strength limits are specified at a distance of 3 meters.

Test procedure

§15.31 (c) Except as otherwise indicated in §15.256, for swept frequency equipment, measurements shall be made with the frequency sweep stopped at those frequencies chosen for the measurements to be reported.

§15.31 (m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range	Number of frequencies	Location
< 1MHz bandwidth	1	middle
1 – 10 MHz bandwidth	2	1 near bottom and 1 near top
> 10 MHz bandwidth	3	1 near bottom / middle / top

§15.35 (b) Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, e.g., see §§15.250, 15.252, 15.253(d), 15.255, 15.256, and 15.509 through 15.519, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device, e.g., the total peak power level. Note that the use of a pulse desensitization correction factor may be needed to determine the total peak emission level. The instruction manual or application note for the measurement instrument should be consulted for determining pulse desensitization factors, as necessary.

§15.35 (c) Unless otherwise specified, e.g., §§15.255(b), and 15.256(l)(5), when the radiated emission limits are expressed in terms of the average value of the emission, 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 value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to Supplier's Declaration of Conformity.

Test results

lest results					
EUT mode	EUT	Test distance	AVG field strength [dBµV/m]	PK field strength [dBμV/m]	
Normal	NON-FIP	1 m	93.8	109.1	
Normal	FIP	1 m	93.2	108.8	
B / M / T	NON-FIP	1 m	110.7	110.8	



 $\mathbf{\wedge}$

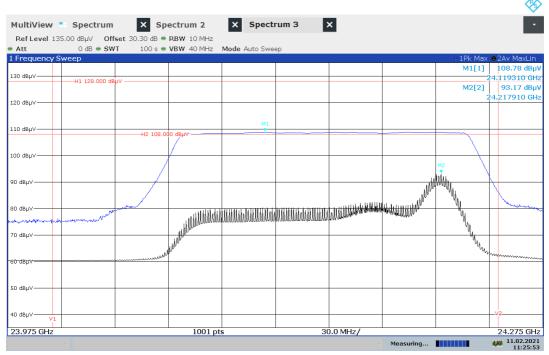
2021-03-12

Ref Level 135	5.00 dBµV Off	set 30.30 dB 🖷	RBW 10 MHz						
• Att	0 dB 🖷 SW	T 100 s 🖷	VBW 40 MHz	Mode Auto Swe	ер				
1 Frequency Sv	weep						I		●2Av MaxLir
130 dBµV								M1[1]	109.05 dB
130 0001	——H1 128.000 dB	μν						M2[2]	24.099830 G 93.82 dB
									24.217310 G
120 dBµV									242170100
110 dBµV				M1					
		H2 108.00	ю авр⊽ ————						
			/						
100 dBμV		/						M2	
								Ϋ́.	
90 dBµV		/							<u> </u>
								(''Wu	
		man					MMMMMM	1 ^{- 1} 0	men
80 dBµV	A second and the second second			机化加强机机	MI MI MI MI MI	WWWWWWWWW	A. H. W.W.W.W.	<u> </u>	
unan markan	A second s		. WILLING AND IN THE REAL OF A DECEMBER OF A		DEDA DONTADEG LANDA PARA			Υ <u>ν</u> .	
70 dBµV								<u>η</u> λ.	
			M ¹⁰					1 Min	
60 dBpV			•						mmmm
00 000									
50 dBµ∨									
40 dBµV									V2
V1				[
23.975 GHz			1001 pt	S	30).0 MHz/			24.275 (

Plot no. 6: Peak / Average field strength, normal mode, NON-FIP EUT

14:07:22 09.02.2021

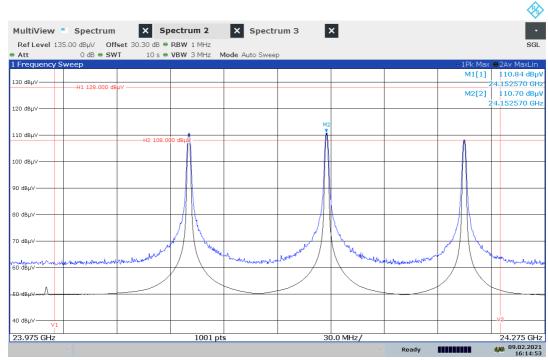
Plot no. 7: Peak / Average field strength, normal mode, FIP EUT



11:25:54 11.02.2021



2021-03-12



Plot no. 8: Peak / Average field strength, FMCW stop mode, bottom/middle/top, NON-FIP EUT

16:14:53 09.02.2021

Note: CW-mode (B/M/T) with duty cycle of 100%, duty cycle of normal mode needs to be considered!

INGENIEURBÜRO

9.4 Field strength of emissions (spurious and harmonics)

Description / Limits

§15.249 (a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental	Field strength of harmonics
902 – 928 MHz	50 mV/m (94 dBµV/m)	500 μV/m (54 dBμV/m)
2400 – 2483.5 MHz	50 mV/m (94 dBµV/m)	500 µV/m (54 dBµV/m)
5725 – 5875 MHz	50 mV/m (94 dBµV/m)	500 µV/m (54 dBµV/m)
24.00 – 24.25 GHz	250 mV/m (108 dBµV/m)	2500 μV/m (68 dBμV/m)

§15.249 (c) Field strength limits are specified at a distance of 3 meters.

§15.249 (d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation:

Frequency	Field Strength	Measurement distance
0.009 – 0.490 MHz	2400/F[kHz] μV/m	300 m
0.490 – 1.705 MHz	24000/F[kHz] μV/m	30 m
1.705 – 30.0 MHz	30.0 µV/m / 29.5 dBµV/m	30 m
30 – 88 MHz	100 µV/m / 40.0 dBµV/m	3 m
88 – 216 MHz	150 µV/m / 43.5 dBµV/m	3 m
216 – 960 MHz	200 µV/m / 46.0 dBµV/m	3 m
960 – 100 000 MHz	500 μV/m / 54.0 dBμV/m	3 m

§15.249 (e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

Test procedure

§15.31 (c) Except as otherwise indicated in §15.256, for swept frequency equipment, measurements shall be made with the frequency sweep stopped at those frequencies chosen for the measurements to be reported.
§15.31 (m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range	Number of frequencies	Location
< 1MHz bandwidth	1	middle
1 – 10 MHz bandwidth	2	1 near bottom and 1 near top
> 10 MHz bandwidth	3	1 near bottom / middle / top

§15.35 (b) Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, e.g.,see §§15.250, 15.252, 15.253(d), 15.255, 15.256, and 15.509 through 15.519, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device, e.g., the total peak power level. Note that the use of a pulse desensitization correction factor may be needed to determine the total peak emission level. The instruction manual or application note for the measurement instrument should be consulted for determining pulse desensitization factors, as necessary.



§15.35 (c) Unless otherwise specified, e.g., §§15.255(b), and 15.256(l)(5), when the radiated emission limits are expressed in terms of the average value of the emission, 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 value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to Supplier's Declaration of Conformity.

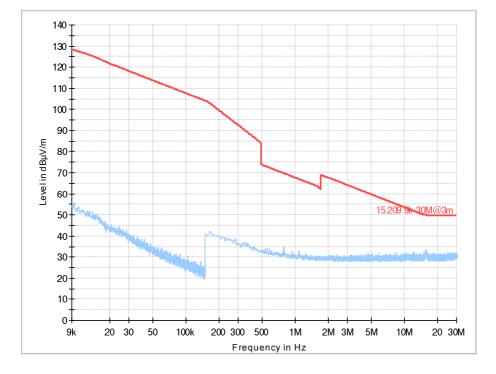
Typical test distances

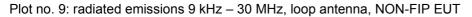
Up to 18 GHz:	3.00 m
18 – 50 GHz:	0.50 m
50 – 110 GHz:	0.25 m
110 – 245 GHz:	0.10 m
In-band / OOB:	1m

Channel / Mode	Frequency [GHz]	Detector	Test distance [m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
NON-FIP	0.32	QP	3	33.8	46.0	12.2
NON-FIP	0.48	QP	3	36.2	46.0	9.8
NON-FIP	0.64	QP	3	45.0	46.0	1.0
NON-FIP	12.087	AVG	3	43.2	54.0	10.8
NON-FIP	48.435	AVG	0.5	52.9	68.0	15.1
NON-FIP	72.651	AVG	0.25	43.6	68.0	24.4
FIP	12.075	AVG	3	43.8	54.0	10.2
FIP	48.434	AVG	0.5	51.8	68.0	16.2

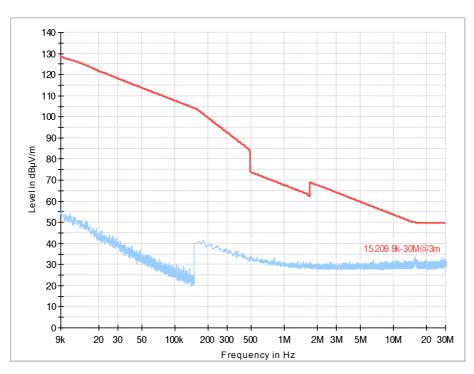


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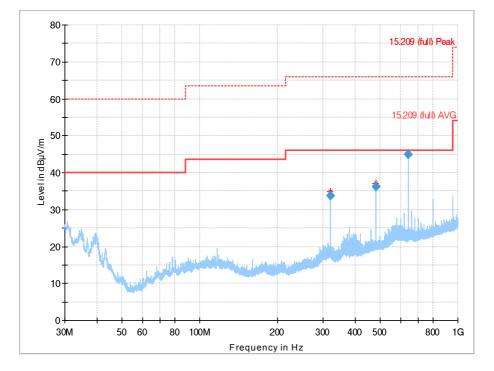


Plot no. 10: radiated emissions 9 kHz - 30 MHz, loop antenna, FIP-EUT





2021-03-12



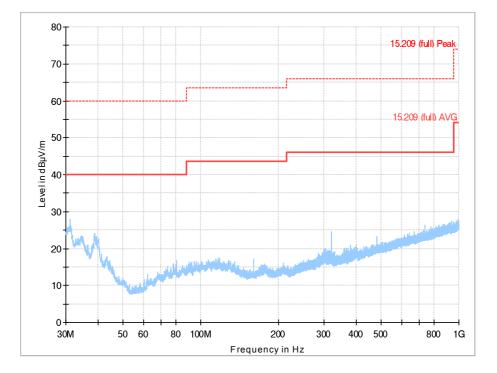
Plot no. 11: radiated emissions 30 MHz - 1 GHz, hor./vert. polarization, NON-FIP EUT

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
320.000000	33.82	46.00	12.18	100.0	120.000	120.0	V	184.0
480.000000	36.17	46.00	9.83	100.0	120.000	138.0	V	246.0
640.000000	44.96	46.00	1.04	100.0	120.000	103.0	V	150.0

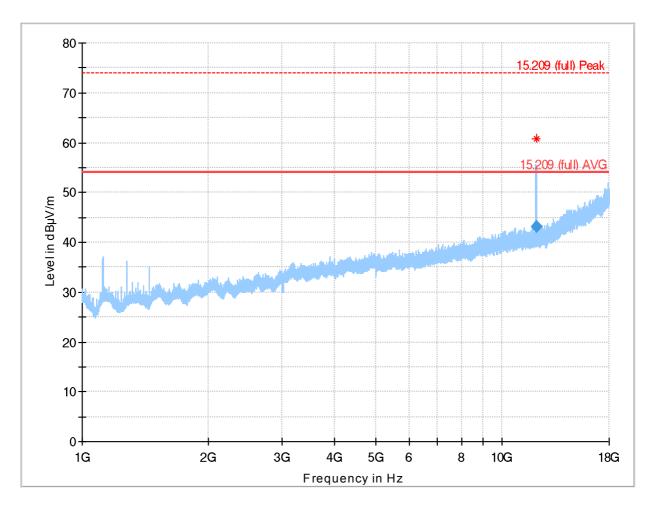


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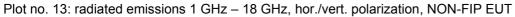








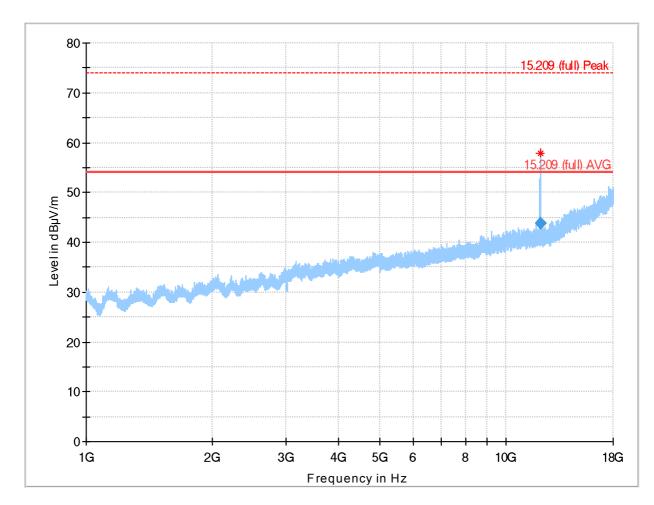
2021-03-12



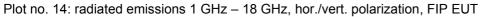
Final_Result

Frequency	Average	Limit	Margin	Meas. Time	Bandwidth	Height	Pol	Azimuth
(MHz)	(dBµV/m)	(dBµV/m)	(dB)	(ms)	(kHz)	(cm)		(deg)
12087.225000	43.20	54.00	10.80	100.0	1000.000	150.0	Η	73.0





2021-03-12



Final_Result

Frequency	Average	Limit	Margin	Meas. Time	Bandwidth	Height	Pol	Azimuth
(MHz)	(dBµV/m)	(dBµV/m)	(dB)	(ms)	(kHz)	(cm)		(deg)
12074.850000	43.78	54.00	10.22	100.0	1000.000	150.0	Н	82.0



2021-03-12

Plot no. 15: radiated emissions 18 GHz – 24 GHz, hor./vert. polarization, normal mode, NON-FIP EUT

MultiView Spectrum X Spectrum 2 X Spectrum 3 X Transient Analysis X Ref Level 100.00 dBµV Offset 30.00 dB • RBW 1 MHz Att 0 dB • SWT 100 s • VBW 3 MHz Mode Auto Sweep
PA Frequency Sweep • 1Pk Max • 2Av MaxLin
MI[1] 56,40 dBµV
23.998500 GHz
io deju
23.985300 GHz
+DBUY
20 dBµV
4 DBUY
so day v
20 dBµV
0 dBuV
18.0 GHz 10001 pts 600.0 MHz/ 24.0 GHz
Measuring 10.02.2021

10:53:30 10.02.2021

Plot no. 16: radiated emissions 18 GHz - 24 GHz, hor./vert. polarization, FMCW stop mode, bottom, NON-FIP

Ref Level 1	Spectrum	Spectru		Spectrum 3	× Transie	nt Analysis	×		
Att	07.00 abµv 01 0 dB 🖷 SV			Node Auto Swee	p				
₄ Frequency	Sweep							o 1Pk Ma	x ⊜2Av MaxLin
								M1[1]	53.12 dBµ 23.995500 GF
) dBµ∨								M2[2]	47.00 dBj
dBµV									23.995500 G
dBµ∨									
BUV									
dBµ∨									
dвµV									
dBµ∨									
	hen ditte her her her her her her her her her he	and the second provide second second	and a production between		hitter and a state of the	his south and weather	a de la constante de la constan		and the second states
dBµ∨									
									- Harris Martin
dBµ∨									
dBµV									
-									

10:59:08 10.02.2021



2021-03-12

Plot no. 17: band edge compliance 24 GHz – 24.25 GHz, hor./vert. polarization, normal mode, NON-FIP EUT

									I
MultiView 🗧	Spectrum	× Spectrum	n 2 🗙 🤅	Spectrum 3	× Transie	nt Analysis	×		•
Ref Level 112 • Att PA	2.30 dBµV Off 5 dB = SW	set 30.30 dB ● I T 100 s ● Y		lode Auto Sweej	>				_
1 Frequency Sv	weep							o 1Pk Max	●2Av MaxLin
110 dBµV								M1[1]	58.48 dBµ∀
100 dBµV								M2[1]	24.000000 GHz 67.32 dBμV
90 dBµV								M 2	24.250000 GHz
80 dBµV			/						
70 dBµV	——H1 74.000 dBµ	^{bu} uu - v	AMMANDALAN.	ANT AANTINAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN	MANIANOW	na mananana pala		M2
60 dBµV	manno	- And Market	- MWWWMMMM	AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	ld fA Dhar an nda dd dd a con s	kaliste	~ ' 1	- "M	Mannana
50 dBµVM3	• •	H2 54.000	авуу —					"Myn	M4 MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
50 dBµVM3 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	mmm	Murray Marriella							- Ander
30 dBµV									
20 dBuV									-V2-
V1									
CF 24.125 GHz			1001 pts	;	30	0.0 MHz/		Sp	an 300.0 MHz
2 Marker Table									
Type Ref M1 M2	1 1 1	X-Value 24.0 GHz 24.25 GHz	6)	Y-Value 8.48 dBµV 7.32 dBµV		Function		Function Re	esult
M3 M4	2	24.0 GHz 24.25 GHz	44	4.38 dBµV 3.50 dBµV					
	7					7	Measuring		10.02.2021 10:04:05

10:04:06 10.02.2021

Plot no. 18: band edge compliance 24 GHz, hor./vert. polarization, normal mode, NON-FIP EUT

									
MultiView 🗧	Spectrum	× Spectrum	n 2 🗙	Spectrum 3	× Transie	nt Analysis	×		•
RefLevel 11	2.30 dBµV Off	set 30.30 dB 🖷 F	RBW 1 MHz						
🖷 Att	5 dB 🖷 SW	/T 300 s 🖷 🔪	/BW 3 MHz N	lode Auto Sweep	>				
PA 1 Frequency S								o tDk Mov	●2Av MaxLin
110 dBµV	weep							M1[1]	58.40.dBµ∀
110 0001									4.000000 GHz
100 dBµV								M2[1]	—103.59 dBµV
· ·									4.080940 GHz
90 dBµV									
80 dBµ∨								~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
	H1 74.000 dBµ	v ———						~~~	
70 dBµ∨								and a start of the	M4-
				N	1		amentert	r	annannan an a
60 dBµV		mm	Anna nama	ma ma	hum	man mana			p"
		H2 54.000	dBµV —	V					mp '
50 dBµ∨				M	3			mannonantal	
	h		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		hann	mm	hard a second and a second sec	ſ	
40 dBμV									
20.40.44									
30 dBµV									
20 dBµV									
20 0001				V	1				
CF 24.0 GHz		I I	1001 pt	5	17	7.5 MHz/	1	Sp	an 175.0 MHz
2 Marker Tabl	е		· · · · · ·					· · · · · · · · · · · · · · · · · · ·	
Type Ref		X-Value		Y-Value		Function		Function Re	esult
M1 M2	1	24.0 GH: 4.08094 GH		58.40 dBµV 53.59 dBµV					
M3	2	24.0 GH	z 4	13.63 dBµV					
M4	2 2	4.08566 GH	z 6	5.75 dBµV					
							Measuring		10.02.2021 10:13:29

10:13:30 10.02.2021



2021-03-12

Plot no. 19: band edge compliance 24 GHz, hor./vert. polarization, FMCW stop mode, bottom, NON-FIP EUT

					٨
MultiView	Spectrum	X Spectrum 2	× Spectrum 3	× Transient Analysis	× •
Ref Level 1	12.30 dBµV C	Offset 30.30 dB • RBW	1 MHz		_
Att	5 dB 👄 5	WT 10 s • VBW	3 MHz Mode Auto Sweep		
PA 1 Frequency	Sween				⊙1Pk Max ⊜2Av MaxLin
110 dBµV					M1[1] 56.47 dBpV
					23.995200 GHz
100 dBµV					M2[1] 108.31 H8µV
					24.075440 GHz
90 dBµV					
80 dвµV					// \\
	H1 74.000 c	BuV			
70 dBµ∨					
					Manda and and and and and and and and and
60 dBµV			M1		An and the second s
It is a second by the	10.000	H2,54,000 dBµV ;	www.weiner	www.whenthe and	MMmm MMy Com.
50 dBµ∨			X		
-40-dBp∀	~				
30 dBµV					
20 dBµV			V1		
CF 24.0 GHz			1001 pts	16.0 MHz/	Span 160.0 MHz
2 Marker Tab			X 11 1		
Type Re M1	ef Trc	X-Value 23.9952 GHz	Y-Value 56.47 dBμV	Function	Function Result
M2	î	24.07544 GHz	108.31 dBµV		
M3	2	23.99536 GHz	48.22 dBµV		
M4	2	24.07544 GHz	108.23 dBµV		
				- N	10.02.2021 10:17:41

10:17:41 10.02.2021

Plot no. 20: band edge compliance 24 GHz, hor./vert. polarization, normal mode, FIP EUT

									I
MultiView	Spectrum	× Sp	ectrum 2	× Spect	rum 3	×			•
Ref Level 11	2.30 dBµV Off	set 30.30 dB 🖷	RBW 1 MHz			_			
	5 dB 🖷 SW			Iode Auto Swee	Þ				
PA									
1 Frequency S	weep	1		1	1	1	1	1	●2Av MaxLin
110 dBµ∨									<u>57.72 dB</u> μV
									4.000000 GHz
100 dBµV								M2[2]	/42.99 dBμV
									4.000000 GHz
90 dBµV									N
80 dBµV									
CC GDP I								L ~	
	H1 74.000 dBµ	w							
70 dBµ∨								~	
								pr ²	MARAMARA
60 dBµV				N	1		mount		Manapper
man man	mmm	nome more	mon	mon	mm	manna.			1
	and a state	H2 54.000	j dBμV	V 7					and .
50 dBµ∨								www.	
				M	2		manne	www.www.	
40 3817	mmm	h	mm	mm	www.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		and the second s	
30 dBµ∨									
20 dBµV									
20 0000									
				N N	1				
CF 24.0 GHz			1001 pt	s	1	7.5 MHz/		Sp	an 175.0 MHz
	~					~	Measuring		<pre>\$ 11.02.2021 13:13:38 </pre>

13:13:38 11.02.2021



2021-03-12

MultiView 📒	Spectrum	X Spectrum 2	× Spectrum 3	× Transient Analysis	×	
Ref Level 11	2.30 dBuV Off	set 30.30 dB = RBW 1	MHz	_		
 Att 	5 dB 🖷 SW		MHz Mode Auto Swee	p		
PA						
1 Frequency S	weep				o 1Pk I	Max 😑 2Av MaxLin
110 dBµV					M4[2	
E.						24.2501700 GHz
100 dBµV					M1[1	l]
$ \rangle$						24.2300000 GHz
90 dBµV						
80 dBµV	han					
· ·	H1 74.000 dBu					
M®) dBµV	H1 74.000 dBp	V	~~~ N	12		
K.				man		
60 dBuV				- manun		manna
ου usμv —	men and and a second se			М4		
50 ID 11		H2 54:000 dBUV ~				
50 dBµ∨						me and a second and
40 dBµV						
30 dBµ∨						
20 dBµ∨						
			N N	2		
CF 24.25 GHz		· · · · · ·	1001 pts	4.0 MHz/		Span 40.0 MHz
2 Marker Tabl	e			· · · ·		
Type Ref		X-Value	Y-Value	Function	Function	n Result
M1	1	24.23 GHz	103.28 dBµV			
M2	1	24.25 GHz 24.23 GHz	67.15 dBµV 66.33 dBµV			
M3 M4	2 2	24.23 GHZ	53.26 dBµV			
	<u> </u>	TILOVE, UIL	55.20 0001			10.02.2021
					Measuring	09:53:39

Plot no. 21: band edge compliance 24.25 GHz, hor./vert. polarization, normal mode, NON-FIP EUT

09:53:40 10.02.2021

Plot no. 22: band edge compliance 24.25 GHz, hor./vert. polarization, FMCW stop mode, top, NON-FIP EUT

r <mark>pe Ref</mark> 11 12	1 1	X-Value 24.23002 GH 24.25 GH 24.23002 GH	z	Y-Value 08.00 dBμV 60.44 dBμV 07.54 dBμV		Function		Function Re	esult
arker Tabl			1001 pi						
4.25 GHz			1001 pt			4.0 MHz/		ļ	
δµV ————————————————————————————————————					2				
ν									
-									
μV									· · · · ·
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v			manderson	March march 100	12				
μv <u> </u>	- and the second	man man man	a						
~~~~	H1 74.000 dB								
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X									
μv ———									
								24	1.2500000 @
Вµ∨								M2[1]	60.44 dE
									.2300200 0
вµу					-		-	-	108.00 dE
equency S	weep							o 1Pk <u>Max</u>	●2Av MaxL
t	5 dB 🖷 SV	VT 10 s 🖷	VBW 3 MHz I	Mode Auto Swee	p				
fLevel 11		fset 30.30 dB 🖷							
View	Spectrum	× Spectru	m 2 🗙	Spectrum 3	× Tran	sient Analysis	×		

10:19:55 10.02.2021



#### 2021-03-12

	Spectrum		ectrum 2	× Spect	rum 3				
Att	12.30 dBµV Off 5 dB • SW			<b>/lode</b> Auto Swee	n				
PA			VBW SPARE A		F				
. Frequency S	Sweep	1	1	1	r	1	-	●1Pk Max	
L1O dBµ∀								M2[2]	
									4.2500400
ιοο dBμV								M1[1]	66.31
N.								2	4.2500000
- X									
90 dBµV									
	home								
30 dBµV	1 mm								
		~~~							
	H1 74.000 dBµ	w	manna						
70 dBµ∨			- · · · ·		1				
~				and man	hyman				
50 dBpV					·	annon an	m man	monum	man
oo upp +	-				12				
		H2 54.00	dBµV		h				
50 dBµ∨		~~~	har harring		- Conservation	mannoman	mmmmmmmmmmm	monund	mann
Ю dBµV									
ю ивру									
30 dBµ∨									
an draw									
20 dBµ∨									
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Plot no. 23: band edge compliance 24.25 GHz, hor./vert. polarization, normal mode, FIP EUT

Plot no. 24: radiated emissions 24.25 GHz - 26.5 GHz, hor./vert. polarization, normal mode, NON-FIP EUT

1ultiView 🎫 Spe	ectrum ×	Spectrum 2	× Spectrum 3	× Transie	nt Analysis	×		•
Ref Level 107.00 Att) dBµV Offset 3 0 dB ● SWT	30.30 dB • RBW 1 M 100 s • VBW 3 M	Hz Hz Mode Auto Swee	n.				
A Frequency Swee				r			o 1 Pk May	: e2Av MaxLin
							M1[1]	59.84 dBµ 24.29850 GH
) dBµV							M2[2]	42.25 dBL
dBµV								24.34330 GH
dBµV								
<mark>DBUV</mark> dBµV								
м1								
11 Тврич овойу ууууууууу аврич М2 Палания Палания								
dBµV	month marker with	www.how.e. and	Mary Mary Marker Marker		det i stat	and a		
M2			an a constant way the	an an the strength of the second	- Mar Mar Mar Markan	and the second second	an a	and the second
depv depv depv	unummen	~~~~						
dBµV								
dBµV								
uop /								
dBµV								
4.25 GHz		10	01 pts	22	5.0 MHz/			26.5 GH

12:05:37 10.02.2021

12:03:58 11.02.2021



2021-03-12

Plot no. 25: radiated emissions 24.25 GHz - 26.5 GHz, hor./vert. polarization, FMCW stop mode, top, NON-FIP

									I
MultiView 📑	Spectrum	× Spectru	m 2 🗙	Spectrum 3	× Transie	nt Analysis	×		
Ref Level 10	07.00 dBµV Off	set 30.30 dB 🖷	RBW 1 MHz		_		_		_
Att PA	0 dB 🖷 SW	/T 10 s 🖷	VBW 3 MHz N	Node Auto Swee	p				
1 Frequency S	Sweep							o1Pk Max	●2Av MaxLin
								M1[1]	53.12 dBµV
100 dBµV									24.309730 GHz
								M2[2]	47.17 dBµV
90 dBµV								-	24.309730 GHz
so appi									
80 dBµV									
74 DBUV									
70 dBµV									
60 dBµV									
the status									
SOLVERN	and and the second second	يرين والراملة	The first she take	al tan a	and a state of the state of the		والمرابع والمراجع والمراجع والمراجع	an an ann an an taon Maile I fhanail	to all to all the
48. dBµ∨	1 1								
	for the second s								
30 dBµV									
20 dBµV									
10 dBµV									
24.25 GHz			10001 pt	ts	22	5.0 MHz/			26.5 GHz
							Measuring		400 10.02.2021 11:04:23

11:04:24 10.02.2021

Plot no. 26: radiated emissions 26.5 GHz - 40 GHz, hor./vert. polarization, normal mode, NON-FIP EUT

Ref Level 97.00 dBp Att 0 d		B ●RBW 1MHz s ●VBW 3MHz M	/lode Auto Sweep					
A	0 341 10		Node Hato Sweep					
Frequency Sweep						MI	0 IPK Max [1]	e 2Av MaxLin 46.41 dB
) dBµV							1.1	38.7660 G
ивру-						M2	[2]	33.54 dB
								38.8870 G
dBµV								
DBUV								
dBµV								-
dBµV								-
DBUV dBµV								
							4	Arra and and a
many many work	when the manufacture	warmed the work have been	of a market	manyan	from more and the	han an a	an a with more ways .	and the state of
dBµV								M2
	~							fin
dBµV				†				
dBµV								+
dBµV								
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13:45:48 10.02.2021



TR no.: 20054147-18456-1

Plot no. 27: radiated emissions 40 GHz – 50 GHz, hor./vert. polarization, normal operation, NON-FIP EUT

A Frequency Sweep						o 1 Dk Ma	< ⊜2Av Max
requency sweep						M1[1	
λµV —						 	48.15700
						M2[2] 41.38
							48.34700
14							
UV PEAK							
ληγ							
						M1	
V						 invert ye	
UV AVG			and the second second	4	which remained	 in horizont	however
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the courses						M2	
3µV					_	 L.M.	$ \longrightarrow $
$\sim \sim \sim \sim \sim$							
3µv — — — —							
3µV							
sμv						 	
18µV							
:		10	01 pts		1.0 GHz/		50.0

Plot no. 28: radiated emissions 48.3 GHz range (2nd harmonic), hor./vert. polarization, normal mode, NON-FIP

MultiView = Spe	ctrum 🗙 S	Spectrum 2	× Spect	um 3	×			-
Ref Level 95.30 dBµV	Offset 30.70 dB	RBW 1 MHz			_			_
	• SWT 100 s •	VBW 3 MHz N	lode Auto Sweep					
PA 1 Frequency Sweep							o 1 Dk Max	● 2Av MaxLin
Threquency Sweep							M2[2]	52.92 dBµ\
90 dBµV								8.434870 GH
38 DBUV PEAK HARMS							M1[1]	64.73 dBµ\
00 10 11							4	8.177120 GH
80 dBµV								
74 DBUV PEAK								
70 dBµV	M1	-						
58 DBUV AVG HARMS								
60 dBµV	Mbaaadaaaaaa	www.www.www.www.	uhaludahahahaaaaaha	Alaxaaaaaaaaaaaaaaaaaa	ANAMA MANAMA	www.www.www	MM	
00 4001						M2	l M	
54 DBUV AVG						Ť		
so dap√ laha ang ananan	u provani				1		6 m Calendra	man and the second states of t
						1 1		
40 dBµV						μ	1	
			A CONTRACTOR OF THE OWNER	and the second s	hourse house	angenerated and the	·····	
30 dBµV								
20 dBµV								
10 10 11								
10 dBµV								
0 dBµV								
CF 48.3 GHz		1001 p	te	5	0.0 MHz/		Cr	an 500.0 MHz
		1001 þ	13	J				

16:05:09 11.02.2021



TR no.: 20054147-18456-1

2021-03-12

Plot no. 29: radiated emissions 40 GHz - 50 GHz, hor./vert. polarization, FMCW stop mode B/M/T, NON-FIP

.ef Level 95.30 dBμV .tt 0 dB		0 s = VBW 3 MHz	Mada Auto C						5
	- 5001 1		Mode Auto St	weep					
requency Sweep	1						C		🗧 😐 2Av Maxl
								M1[1]	
ВµV									48.30700
								M2[2]	52,12
3µV									48.30700
UV PEAK									
3µV							M1		-
								1	
3µV									
νµν									
UV AVG							M2		
3µV		maliton have been		mar Marshow Marked	and the second second second	mounter	alit	howman	um many m
much la have	manded the ser	should be and the second							
Vula								L	<u>+</u>
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3нл									
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Plot no. 30: radiated emissions 48.3 GHz range (2nd harmonic), hor./vert. polarization, B/M/T, NON-FIP EUT

										- 🗞
MultiView	Spectrum	× Sp	ectrum 2	× Spectr	um 3 💙	×				•
Ref Level 95	.30 dBµV Offs	et 30.70 dB 🖷 F	BW 1 MHz	_	_	_				SGL
 Att 	0 dB 🖷 SW1	10 s 🗢 V	BW 3 MHz Mo	ode Auto Sweep						
PA 1 Frequency S	ween								• 1 Pk May	● 2Av MaxLin
i rrequerie, o									M1[1]	67.88 dBµV
90 dBµ∨										8.305000 GHz
88 DBUV PEAK HAR	MS								M2[2]	65.89 dBµV
80 dBµV									4	18.304500 GHz
74 DBUV PEAK					M1					
70 dBµV	45				M2					
DO DOOT ATO HAR		1			Λ					
60 dBµ∨					1					
					1			1		
54 DBUV AVG	ennounceredand	Unitermina	and the second	and and the particular	Munner Mansher	ano and a second	an marine where the second	\mathcal{M}	Josephane un	mounduture
					Щ					
40 dBµV		C			·			Р		
30 dBµ∨										
20 dBµV										
10 dBµV										
10 UBHV										
0 dBµV										
CF 48.3 GHz	1	1	1001 pt	S	50).0 MHz/			Sp	an 500.0 MHz

15:47:41 11.02.2021



Plot no. 31: radiated emissions 40 GHz - 50 GHz, hor./vert. polarization, normal operation, FIP EUT

MultiView	Spectrum	×s	Spectrum 2	× Spect	trum 3	×			•
🖷 Att	.30 dBµV Offs 0 dB • SW1		RBW 1 MHz VBW 3 MHz M	ode Auto Swee	p				
PA 1 Frequency S	ween							o 1Pk Max	● 2Av MaxLin
90 dBµV								M1[1]	63.93 dBµV 48.33700 GHz
·								M2[2]	41.67 dBµV 48.34700 GHz
80 dBµ∨									48/34700 01/2
74 DBUV PEAK 70 dBµV									
								MI	
60 dBµ∨									
54 DBUV AVG 50 dBµV		and the street of	manun martines	-	and the second second	Markan war	umum	www.	www.www.
hourseman	when me	and the states						M2	
40 dBµ∨	_							li	
30 dвµV	\sim								
00 0001									
20 dBµV									
10 dBµV									
10 3001									
0 dBµV									
40.0 GHz	1	1	1001 pt	is	1	1.0 GHz/	1	1	50.0 GHz

15:41:12 11.02.2021

Plot no. 32: radiated emissions 48.3 GHz range (2nd harmonic), hor./vert. polarization, normal mode, FIP EUT

					_	_			<u> </u>
MultiView	Spectrum	× Sp	ectrum 2	× Spectr	um 3 🛛 💈	×			-
Ref Level 95	.30 dBµV Offs	et 30.70 dB 🖷 F	RBW 1 MHz						
🖷 Att	0 dB 🖷 SW1	f 100 s 👄 🗸	BW 3 MHz Mo	de Auto Sweep					
PA									
1 Frequency S	weep	1						-	2Av MaxLin
								M1[1]	65.35 dBµV
90 dBµV									18.307990 GHz
88 DBUV PEAK HAR	MS							M2[2]	51.77 dBµV
80 dBµV									48.434370 GHz
ου α <u>θ</u> μν									
74 DBUV PEAK									
70 dBµV									
68 DBUV AVG HARN	IS				M1				
		MMMMMMMM	MANAANAANAANAA	inniwwww.www.www	WAAAAAAAAAAAAA	MANAAA MANAAAAA	MANNA MANANA MANANA	win.	
60 dBµ∨		off storage by	CHIMBER OF				date of the state		
							M2		
54 DBUV AVG	Muraning						1 1 1	A. A	and and a start of the second
SoldBbo	Same and the second					1		P 300 980 400	and the second se
					۱ <i>ا</i>				
40 dBuV							I 1		
40 dBµV		, en mainside marked a	**		here we are an are a survey of the	monded breezeware	annear an		
30 dBµV									
20 dBµV									
10 dBµ∨									
0 dBµV									
CF 48.3 GHz	1	1	1001 pt	lS	50).0 MHz/	1	Sr	ban 500.0 MHz
01 1010 0112			2001 pt.	-					

16:10:04 11.02.2021



TR no.: 20054147-18456-1

2021-03-12

Plot no. 33: radiated emissions 40 GHz – 50 GHz, hor./vert. polarization, FMCW stop mode B/M/T, FIP EUT

ef Level 95.30 dBµV O								
t 0 dB 🖷 S'	WT 10 s 🗢 VB	WI3 MHZ MI	ode Auto Sweep					
equency Sweep							●1Pk Max	●2Av Ma
							M1[1]	67.08
μν								48.3070
IV PEAK HARMS							M2[2]	51.35
								48.3070
μν								
JV РЕАК µV							M1.	
V AVG HARMS							Y	
μV								
IV AVG							M2	ade a
νu	mannen	· · · · · · · · · · · · · · · · · · ·	mittle when we would be	Mayaberto Marcon Ma	and the second	monohulunter	Marghann	www.vec.
the many marker w	and reframerican	ANA CAMPAGE CONTRACT]					
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μν								
VL								
V								
0 GHz		1001 pt		l	L.0 GHz/			50

Plot no. 34: radiated emissions 48.3 GHz range (2nd harmonic), hor./vert. polarization, B/M/T, FIP EUT

IultiView 📑 S			ectrum 2	× Spect	rum 3	×			
Ref Level 95.30 dB Att 0				and a sub- Course					e
Att U	0D 🖷 2441	10 s 🖶 V	RAA 2 MLZ IA	lode Auto Sweep					
- requency Sweep								●1Pk Max	●2Av Max
								M1[1]	67.08
dBµV									18.304500
BUV PEAK HARMS								M2[2]	65.62
10.11									48.304500
iBµV									
BUV PEAK									
IBUV PEAK					M1				
BUV AVG HARMS					M2				
	6				11				
ВµV								- 1	
BUV AVG		the transmission			All and shares		a se da sea		
(Blaft - government	Contraction of the	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	مان الحاربيونية. مرجوعة المتعاركات	en al and a star a s		Party Contraction of the second	an and a second and a second of	and have been been a fragmenter	and the state of the second
					III				
IBµV					111			1.11	
18hv					ľ				
iBuV									
IBµV									
IBµV									
V4									
48.3 GHz			1001 p	ts	5	0.0 MHz/		Cr) ban 500.0



Plot no. 35: radiated emissions 50 GHz - 75 GHz, hor./vert. polarization, normal mode, NON-FIP EUT

MultiView	- Spectrum	1							•
Reflevel 97	.00 dBµV Offse	at 24.70 dB 🖷 BI	RW 1 MHz						
	● SWT		3WF3 MHz Mo	de Auto Sweep					
Inp: ExtMix V									
1 Frequency	Sweep	1					●1Pk Max A	uto ID 😐 2Av M	
								M1[1]	57.34 dBµV
90 dBµ∨								M2[2]	72.4900 GHz 41.15 dBμV
								IVIZ[Z]	72.6490 GHz
80 dBµV									7210490 0112
74 DBUV PEAK									
70 dBµV									
60 dBµ∨								M	1
								م بر	human
54 DBUV AVG				manne	man make mark and a for the second	mon march more	mound	has some worken	
50 ubp (mar warman	and a second and the second	Capital Capita						
									M2
40 dBµV							<u> </u>		
	T								
30 dBµV									
20 dBµV									
10 dBµV									
0 dBµV									
50.0 GHz			1001 pt		<u> </u>	.5 GHz/			75.0 GHz
50.0 GHZ			1001 pt	s	2				10.02.2021
	~					~	Measuring		16:48:42

16:48:42 10.02.2021

Plot no. 36: radiated emissions 50 GHz - 75 GHz, hor./vert. polarization, FMCW stop mode B/M/T, NON-FIP EUT

								<u> </u>
	Spectrum							•
Ref Level 91.00 d	BµV Offset 24.70 de							SGL
Inp: ExtMix V		s 🗢 VBW 3 MHz Mod	le Auto Sweep					
Frequency Swee	ер				1	●1Pk Clrw #	Auto ID. ●2Av M	
							M1[1]	60.65 dBμ' 72.22650 GH
							M2[2]	
0 dBµV								72.68900 GH
DBUV PEAK								
0 dBµ∨								
							M1	
0 dBµV							T T	
								M2
4 DBUV AVG 50. dBHV			and the second second		No. and Address Manager, June 1.		A STREET, STREE	and the second s
	ويروي والمتأمرة الأراكان أترجع ويتقل والمعود وأروياتهم	Line of the state of the second		the state of the s	and the second se			
0 dBµV								
0 dBµV								
.0 dBµV								
) dBµV								
50.0 GHz		10001 pt	5	2	.5 GHz/			75.0 GHz 10.02.2021 16:01:50
						Ready		10.02.2021

16:01:51 10.02.2021



TR no.: 20054147-18456-1

2021-03-12

Plot no. 37: radiated emissions 72.45 GHz range (3rd harmonic), hor./vert. polarization, normal mode, NON-FIP

MultiView Spectrum	
	•
Ref Level 97.00 dBµV Offset 24.70 dB ● RBW 1 MHz	
SWT 100 s VBW 3 MHz Mode Auto Sweep	
Inp: ExtMix V	
1 Frequency Sweep 0.1Pk Max = 2Av M1[1] 58.	MaxLin 77 dBµV
	77 ивру 080 GHz
90 UB/V	55 dBµV
	400 GHz
80 dBµV	
74 DBUY PEAK	
70 dBµV	
60 dbµv YY Y	
provide a second se	
se deux avec and a second a se	· · · · · · · · · · · · · · · · · · ·
su dejv	
X	
40 dBµV	
30 dBµV	
20 dBµV	
10 dguv-	
0 d8µV	
CF 72.45 GHz 1001 pts 70.0 MHz/ Span 70	
- Measuring 🚺 🗤 🗤	.02.2021 16:30:06

16:30:07 10.02.2021

Plot no. 38: radiated emissions 72.45 GHz range (3rd harmonic), hor./vert. polarization, B/M/T, NON-FIP

									- 📀
MultiView	Spectrum								•
Ref Level 97.	00 dBµV Offse								SGL
Inp: ExtMix V	● SWT	10 s 👄 VI	BWF3 MHz Mo	de Auto Sweep					
1 Frequency S	weep						o 1Pk Max A	uto ID 😐 2Av M	1
								M1[1]	61.96 dBµV 72.689160 GHz
90 dBµ∨								M2[2]	57.42 dBµV
									72.689160 GHz
80 dBµ∨									
74 DBUV PEAK									
70 dBµ∨									
								M1	
60 dBµ∨					8			<u></u>	
54 DBUV-AVG	maturn	- Markan Markan	والمراجع والمحافظ والمحافظ والمحافظ والمحافظ	and a married the mathematical	-	and the second sector that the sector that the second sector that the sector that	- An	murharment	manne
50 dBµV									
					L)				
40 dBμV	(Л				
30 dBµV									
20 dBµV									
10 dBµV									
0 dBµV									
CF 72.45 GHz	1		1001 pt	<u> </u> s	70	0.0 MHz/	1	Sr	an 700.0 MHz
	~					~ ~ ~	Ready		400 10.02.2021 16:09:34
									16:09:34

16:09:35 10.02.2021



2021-03-12

Plot no. 39: radiated emissions 75 GHz - 110 GHz, hor./vert. polarization, NON-FIP EUT

									
MultiView	Spectrum	I I							-
Ref Level 97.00									
Inp: ExtMix W	● SWT	100 s 🖶 V	BW 3 MHz Mo	de Auto Sweep					
1 Frequency Sw	veep						🔜 1 Pk Max A	Auto ID 😑 2Av M	laxLin Auto ID
								M1[1]	57.92 dBµV 96.7660 GHz
90 dBµV								M2[2]	44.25 dBµV
80 dBµV									96.8000 GHz
74 DBUV PEAK									
70 dBµV									
60 dBµV						MI			
	and a she	durburn my	mummer	mannan	and man for many and	- Armanna	munnhousen	home warmen	many
54 DBUV AVGALANA SO dBUV	pur scarrow and a	durch and	- mar -			M2			
40 dBµV									
30 dBµV									
20 dBµV									
10 dBµV									
0 dBµV									
75.0 GHz			1001 pt	S		3.5 GHz/			110.0 GHz
	~					~	Measuring		10.02.2021

17:04:11 10.02.2021



10 MEASUREMENT UNCERTAINTIES

Radio frequency	≤ ± 10 ppm
Radiated emission	≤ ± 6 dB
Temperature	≤±1°C
Humidity	≤ ± 5 %
DC and low frequency voltages	≤ ± 3 %

The indicated expanded measurement uncertainty corresponds to the standard measurement uncertainty for the measurement results multiplied by the coverage factor k = 2. It was determined in accordance with EA-4/02 M:2013. The true value is located in the corresponding interval with a probability of 95 %.

End of Test Report