

FCC Test Report (Part 15C)

WPT

Test report no.:	LAB-531A (v3.0)	Date of report:	31-Mar-2023
Number of pages:	37	Project support engineer:	Jürgen Mitterer
Test period:	19-Jul-2022 to 29-Aug-2022		

Applicant:	Molex CVS Bochum GmbH, Meesmannstr. 103, 44807 Bochum, Germany, Mr. Antonios Langner		
Manufacturer:	Molex CVS Bochum GmbH, Meesmannstr. 103, 44807 Bochum, Germany		
EUT identification:	Molex, WCH-303 (WCH-303a)		
FCC ID:	WJLWCH-303	ISED ID:	7847A-WCH303

Testing laboratory:	Molex CVS Lab, Molex CVS Bochum GmbH, Meesmannstr.103, 44807 Bochum, Germany				
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	FCC designation no.:		DE0017	ISED recognition no.:	DE0015
	Laboratory manager:		Robert Müller		

Test result:	The EUT complies with the requirements made in the referred test documents.
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Approver:	Ines Baufeld	Technical review:	Robert Müller
Title:	Laboratory Quality Manager	Title:	Laboratory Manager

Signature:		Signature:	
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Project support engineer: Jürgen Mitterer
 Date of issue: 31-Mar-2023
 Report no.: LAB-531A (v3.0)

FCC Test Report (WJLWCH-303)
 Template Version 8.0
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Version History

Report Number	Date	Comment
LAB-531A (v1.0)	04-Oct-2022	1 st approved version
LAB-531A (v2.0)	08-Nov-2022	2 nd approved version, added missing 5 W test results for ISED in chapter 3.3
LAB-531A (v3.0)	31-Mar-2023	3 rd approved version, passive equipment added to equipment list

1. Summary for FCC Part 15C Test Report

Date of receipt	15-Jul-2022
Testing completed	29-Aug-2022
The customer's contact person	Mr. Antonios Langner
Test samples / setup pictures	LAB-531A_WJLWCH-303_FCC_WPT_Test_Setup_Photos_v1.0.pdf
HW change / difference document	none
Notes	none

1.1. EUT and accessory Information

The EUT is an inductive wireless power transfer device (wireless charger) with transmitter and load modulation operating at 127.55 kHz. The EUT is tested with an artificial load, continuous maximum load 15 W and maximum duty cycle of 100 %.

The following test samples provided by the customer were tested.

ID	Description	Manufacturer	Type	S/N	HW Version	SW Version
DAB2220223	WPT Device	Molex	WCH-303a	51033785C10221887AEF AF0074	C10	23.3
DAB2220232	WPT Device	Molex	WCH-303a	51033785C10221887AEF AF0048	C10	23.3

The following accessories have been provided by the customer and belong to the equipment under test (EUT).

ID	Description	Manufacturer	Type	S/N	HW Version	SW Version
DAB210788E	DC power cable long (15W)	Molex	-	-	-	-
DAB2220242	DC power cable long (15W)	Molex	-	-	-	-
BOC201540E	AVID Qi Medium Power Receiver with 10 Ohm load	AVID Technologies	102-03	00002044	1.2	-
DAB2220070	Load Receiver (5W)	Molex	TREC-EF	0000028C7FE2	0.8	-
DAB2220069	Load Receiver (5W)	Molex	TREC-EF	0000028C7FE1	0.8	-
DAB2220062	Load Receiver (15W)	Molex	TREC-EF	0000028C7FB8	0.9	-
DAB2220052	Load Receiver (15W)	Molex	TREC-EF	0000028C7FBE	0.9	-

1.2. Technical characteristics

Power Supply [V]	Lead-acid battery (vehicle regulated) – 13.2 V DC		
Voltage Range [V]	$U_{nom} = 13.2$	$U_{min} = 11.2$	$U_{max} = 15.2$
Charging cut-off Voltage [V] @ 15W	$U_{cut-off} = 9.0$ (wireless power transfer is stopped for $U < U_{cut-off}$)		
Temperatures Range [°C]	-40 ... +85 (WPT +60)		
Radio Type	WPT transceiver		
Product Category	Category I radio apparatus (type 3)		
Operating Frequency Range [kHz]	127.55		
Communication Frequency [kHz]	Same as operating frequency range		
Operating Channels	Not channelized		
Antenna Type	Integral inductive loop coils (no customization allowed)		
Antenna Gain [dBi]	n.a.		
Modulation Type	5 W mode: H-field for charging is not modulated 15 W mode: H-field for charging is digital modulated		
Modulation Technique	5 W mode: H-field for charging is not modulated 15 W mode: H-field for charging is FSK modulated		

Above technical information was provided by the applicant. For more details, please refer to the User's manual of the EUT.

1.3. Applied standards

Standard / Rule Part	Version	Year
CFR 47, FCC Part 15C	-	Jul-2022
ANSI C63.10	-	Jun-2013
ISED RSS-Gen	Issue 5 + AMD1 + AMD2	Feb-2021
ISED RSS-216	Issue 2 + AMD1	Sep-2020
ISED ICES-001	Issue 5	Jul-2020

Deviations or clarifications to these standards are noted in the related test result under “test method and limit”.

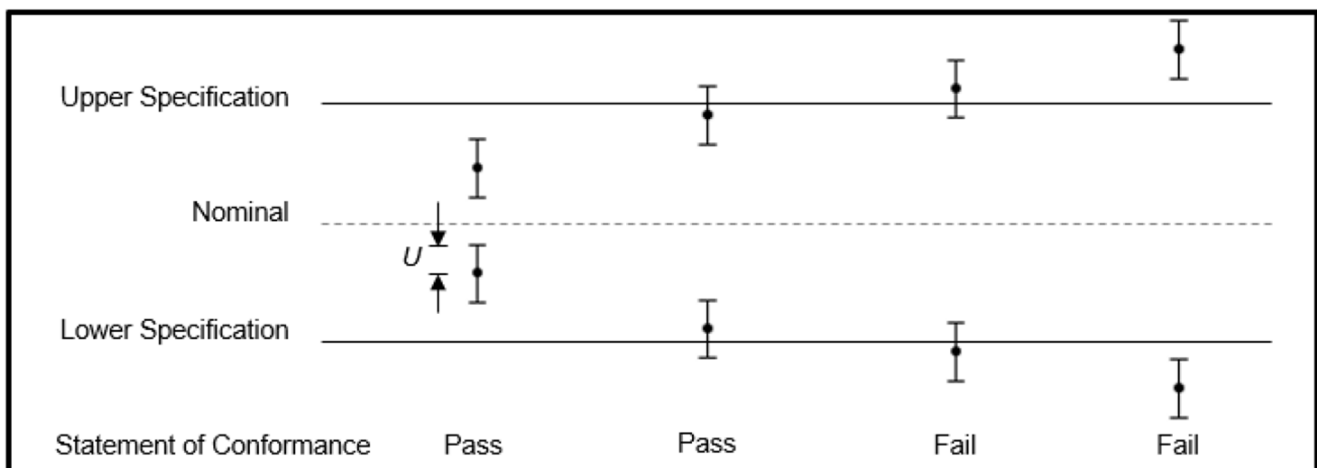
1.4. Measurement uncertainties

Parameter	Measurement Uncertainty	Maximum Uncertainty
Radio Frequency	$\pm 1.0 \times 10^{-7}$	$\pm 1 \times 10^{-5}$
Total RF Power, conducted	± 0.79 dB	± 1.5 dB
RF Power density, conducted	± 0.79 dB	± 3.0 dB
Spurious emissions, conducted	± 1.67 dB	± 3.0 dB
All emissions, radiated	± 5.21 dB	± 6.0 dB
Temperature	± 1.0 °C	± 3.0 °C
Humidity	± 2.0 %	± 5.0 %

These uncertainties represent an expanded uncertainty expressed approximately at the 95 % confidence level using a coverage factor of $k=2$

1.5. Decision Rule

Unless it is inherent in the requested customer specification or test standard, the “Binary Statement for Simple Acceptance” as defined in ILAC G8:2019 clause 4.2.1 is applied as decision rule for the conformity statement, see the following picture. Therefore, the measured values are compared directly with the limit values without taking the measurement uncertainty into account.



U = 95% expanded measurement uncertainty

1.6. Risk Assessment

Following the guidance of ILAC G8:2019 clause 5.2, the level of specific risk of False Accept or False Reject considering different decision rules and respectively expanded measurement uncertainties can be expressed as follows.

Decision Rule	Distance of Measurement Value to Limit	Probability of wrong Conformity Statement
6 Sigma	3 x Measurement Uncertainty	< 1 ppm
3 Sigma	1.5 x Measurement Uncertainty	< 0.16 %
ILAC G8:2009 Rule	1 x Measurement Uncertainty	< 2.5 %
ISO 14253.1:2017	0.83 x Measurement Uncertainty	< 5 %
Simple Acceptance, ILAC G8:2009 4.2.1	Measurement Value on Limit Line	50 % "worst case" scenario

1.7. Summary of test results

Section	Section in CFR 47	Section in RSS-Gen	Section in RSS-216	Name of the test	Result
3 & 4	15.205, 15.209	8.9, 8.10	6.2.2.2, 6.2.3 (Type 3 WPT devices)	Radiated emissions	PASSED
-	15.207	-	6.2.2.1	AC powerline conducted emissions	NA
5	15.215 (c)	6.7	-	Occupied bandwidth	PASSED

PASSED: The EUT complies with the essential requirements in the standard.

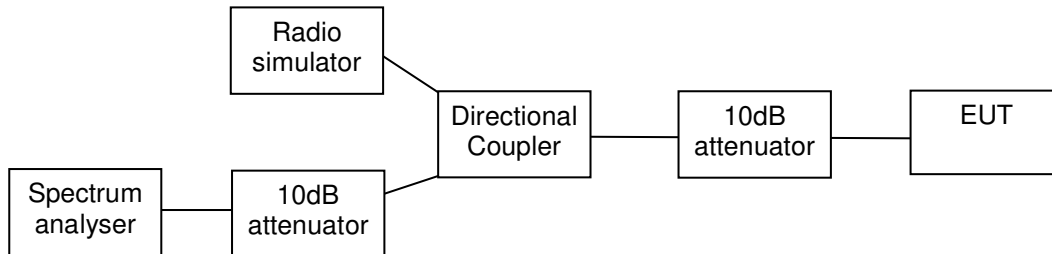
FAILED: The EUT does not comply with the essential requirements in the standard.

NP: The test was not performed.

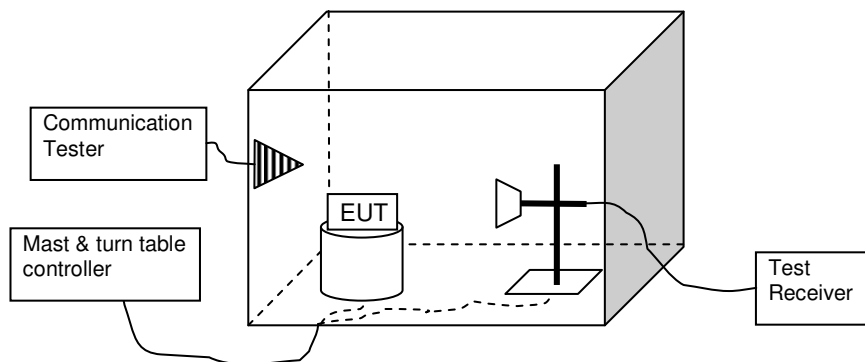
NA: The test was not applicable.

2. Test setups

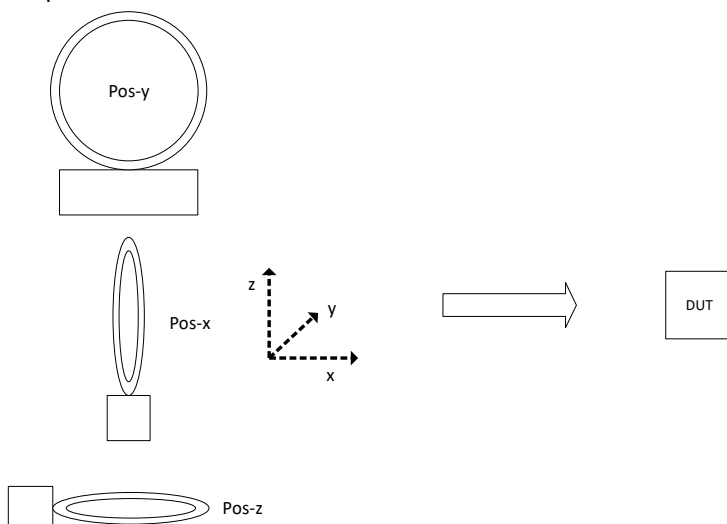
2.1. Conducted RF test setup (Setup 1)



2.2. Radiated emissions test setup (Setup 2)



Loop Antenna orientation:



3. Radiated emissions below 30 MHz

EUT with DUT number	DAB2220232
Accessories with DUT numbers	DAB2220242, DAB2220069, DAB2220052
Operation Voltage [V] / [Hz]	13.2 V / DC
Result	PASSED
Remarks	none
Temp [°C] / Humidity [%RH]	+15 °C to +35 °C / 20 % to 75 %
Date of measurement	16-Aug-2022 – 18-Aug-2022
Test Responsible	Frank Wittmann
Test system SW / Version / Configuration	Rohde & Schwarz EMC32 / 10.60.20 / 1.6

3.1. Test method and limit

The measurement is made according to ANSI C63.10 and RSS-Gen as follows:

- ⇒ The measurement distance is 3 m with a shielded loop antenna. The magnetic field to electric field conversion factor is 51.5 dB ($\text{dB}\mu\text{A}/\text{m} = \text{dB}\mu\text{V}/\text{m} - 51.5 \text{ dB}$).
- ⇒ The Limit has been adjusted with the distance correction factor according to 15.31(f)(2). (+40 dB for 30 m distance and +80 dB for 300 m distance)
- ⇒ The measurement is divided into the Preliminary Measurement and the Final Measurement.
The Preliminary Measurement and the Final Measurement are performed with the measuring antenna at 1m height. The equipment under test (EUT) is located on an 80 cm table, which is rotated by 360 degrees. The DUT is positioned in horizontal position on the test table.
- ⇒ During the Preliminary Measurement, the suspected frequencies are searched by using the PK detector and the measuring antenna is turned in 3 orthogonal positions (x-, y-, z-pos) to find out worst case position.
In the Final Measurement the exact frequency and amplitude of these emissions are re-measured by using the applicable QP and AV detector.
- ⇒ The Final Measurement is performed if the Preliminary Measurement results are closer than 20 dB to the permissible limit.
- ⇒ The measurement results are obtained as described in the following formula: $E [\text{dB}\mu\text{V}/\text{m}] = U_{\text{RX}} + A_{\text{CF}}$
Where U_{RX} is receiver reading and A_{CF} is total correction factor including cable loss, antenna factor and preamplifier gain ($A_{\text{CF}} = L_{\text{CABLES}} + \text{AF} - G_{\text{PREAMP}}$).
- ⇒ Example values and calculation for one final QP measurement frequency at 127.616 kHz, see result in 3.2.1:
 $E [\text{dB}\mu\text{V}/\text{m}] = 56.14 + 20.9 = 77.04$

FCC limits for radiated emissions measurements (3 m measurement distance)

Frequency range [MHz]	Limit [$\mu\text{V}/\text{m}$]	Limit [$\text{dB}\mu\text{V}/\text{m}$]	Detector
0.009 - 0.09	$10000 * 2400 / f[\text{kHz}]$	128.5 - 93.8	AV
0.09 - 0.11			QP
0.11 - 0.19			AV
0.19 - 0.49			AV
0.490 - 1.705	$100 * 24000 / f[\text{kHz}]$	73.8 - 63.0	QP
1.705 - 30.0	$100 * 30$	69.5	QP

ICES-001 Induction cooking limits (3 m measurement distance)

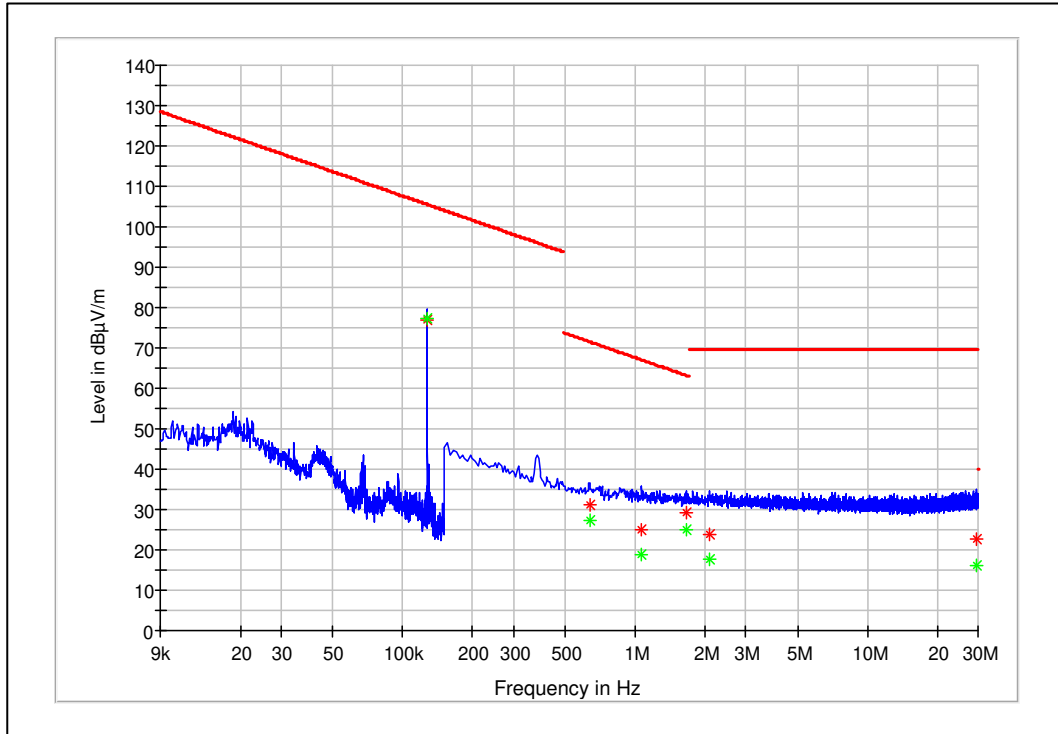
Frequency range [MHz]	Limit [$\text{dB}\mu\text{A}/\text{m}$]	Limit [$\text{dB}\mu\text{V}/\text{m}$]	Detector
0.009 - 0.070	69.0	120.5	QP
0.070 - 0.15	69 - 39	120.5 – 90.5	QP
0.15 - 30	39 - 7	90.5 – 58.5	QP

3.2. Test results (FCC)

3.2.1 5 W not modulated

DUT horizontal, Antenna x-position

Peak detector (< 150 kHz: RBW 200 Hz, > 150 kHz: RBW 10 kHz)



Quasi-Peak detector (< 150 kHz: RBW 200 Hz, >150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	77.04	105.49	28.45	100.0	x-pos	105.0	20.9	horizontal	PASSED
0.637550	31.30	71.51	40.22	100.0	x-pos	242.0	21.1	horizontal	PASSED
1.065400	25.16	67.05	41.89	100.0	x-pos	128.0	21.1	horizontal	PASSED
1.657425	29.21	63.22	34.00	100.0	x-pos	299.0	20.9	horizontal	PASSED
2.095225	23.97	69.54	45.57	100.0	x-pos	70.0	20.9	horizontal	PASSED
29.398025	22.65	69.54	46.89	100.0	x-pos	95.0	21.8	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

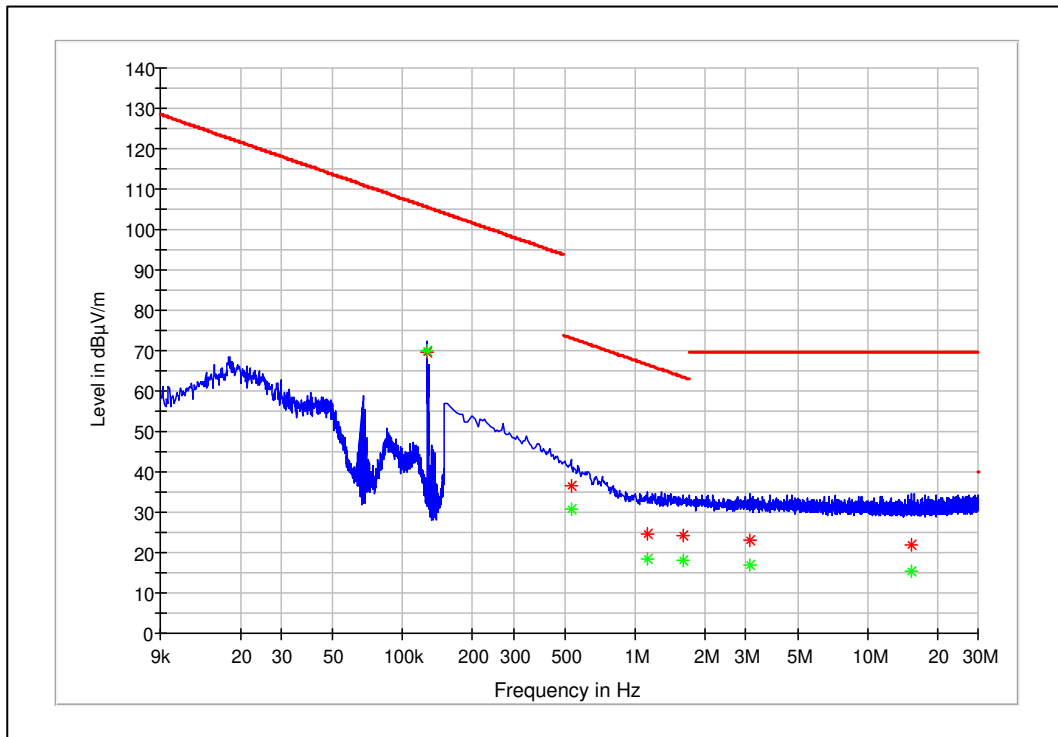
CISPR-Average detector (< 150 kHz: RBW 200Hz, > 150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	77.45	105.49	28.03	100.0	x-pos	105.0	20.9	horizontal	PASSED
0.637550	27.27	71.51	44.25	100.0	x-pos	242.0	21.1	horizontal	PASSED
1.065400	18.71	67.05	48.34	100.0	x-pos	128.0	21.1	horizontal	PASSED
1.657425	24.86	63.22	38.36	100.0	x-pos	299.0	20.9	horizontal	PASSED
2.095225	17.71	69.54	51.83	100.0	x-pos	70.0	20.9	horizontal	PASSED
29.398025	16.26	69.54	53.28	100.0	x-pos	95.0	21.8	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation

DUT horizontal, Antenna y-position

Peak detector (< 150 kHz: RBW 200 Hz, > 150 kHz: RBW 10 kHz)



Quasi-Peak detector (< 150 kHz: RBW 200 Hz, >150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	69.71	105.49	35.77	100.0	y-pos	23.0	20.9	horizontal	PASSED
0.528100	36.38	73.15	36.77	100.0	y-pos	173.0	21.1	horizontal	PASSED
1.130075	24.75	66.54	41.80	100.0	y-pos	165.0	21.1	horizontal	PASSED
1.617625	24.35	63.43	39.08	100.0	y-pos	244.0	20.9	horizontal	PASSED
3.120075	23.08	69.54	46.46	100.0	y-pos	38.0	20.9	horizontal	PASSED
15.547625	21.87	69.54	47.67	100.0	y-pos	5.0	21.1	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

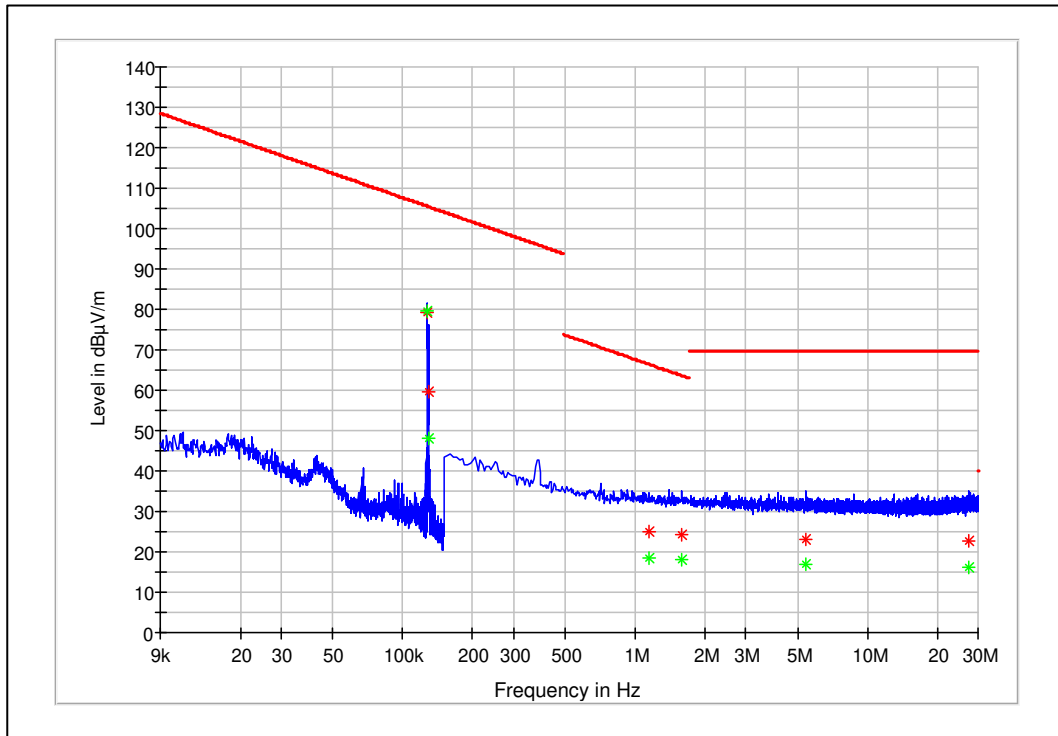
CISPR-Average detector (< 150 kHz: RBW 200Hz, > 150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	70.15	105.49	35.34	100.0	y-pos	23.0	20.9	horizontal	PASSED
0.528100	30.66	73.15	42.49	100.0	y-pos	173.0	21.1	horizontal	PASSED
1.130075	18.64	66.54	47.91	100.0	y-pos	165.0	21.1	horizontal	PASSED
1.617625	18.14	63.43	45.28	100.0	y-pos	244.0	20.9	horizontal	PASSED
3.120075	16.84	69.54	52.70	100.0	y-pos	38.0	20.9	horizontal	PASSED
15.547625	15.56	69.54	53.98	100.0	y-pos	5.0	21.1	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation

DUT horizontal, Antenna z-position

Peak detector (< 150 kHz: RBW 200 Hz, > 150 kHz: RBW 10 kHz)



Quasi-Peak detector (< 150 kHz: RBW 200 Hz, >150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	79.12	105.49	26.36	100.0	z-pos	89.0	20.9	horizontal	PASSED
0.128321	59.65	105.44	45.79	100.0	z-pos	105.0	20.9	horizontal	PASSED
1.140025	24.89	66.47	41.58	100.0	z-pos	80.0	21.1	horizontal	PASSED
1.587775	24.10	63.59	39.49	100.0	z-pos	67.0	20.9	horizontal	PASSED
5.398625	23.14	69.54	46.40	100.0	z-pos	302.0	21.1	horizontal	PASSED
27.209025	22.56	69.54	46.98	100.0	z-pos	45.0	21.7	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

CISPR-Average detector (< 150 kHz: RBW 200Hz, > 150 kHz: RBW 9 kHz)

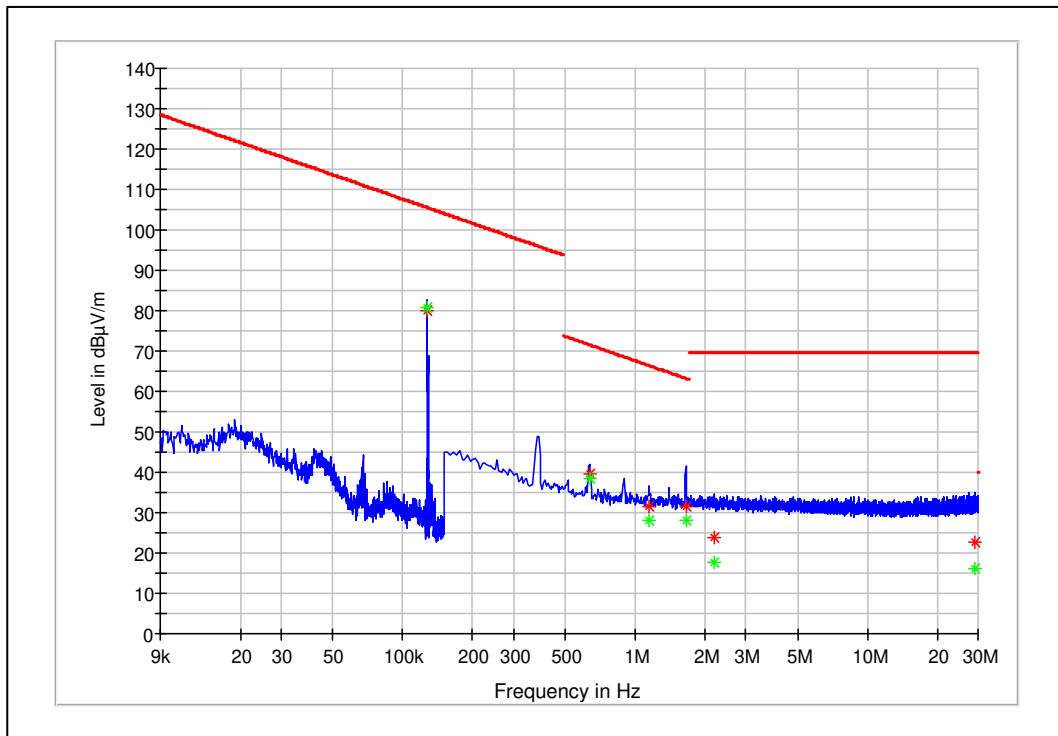
Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	79.54	105.49	25.94	100.0	z-pos	89.0	20.9	horizontal	PASSED
0.128321	48.13	105.44	57.31	100.0	z-pos	105.0	20.9	horizontal	PASSED
1.140025	18.65	66.47	47.82	100.0	z-pos	80.0	21.1	horizontal	PASSED
1.587775	18.01	63.59	45.58	100.0	z-pos	67.0	20.9	horizontal	PASSED
5.398625	16.78	69.54	52.76	100.0	z-pos	302.0	21.1	horizontal	PASSED
27.209025	16.29	69.54	53.25	100.0	z-pos	45.0	21.7	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation

3.2.2 15 W modulated

DUT horizontal, Antenna x-position

Peak detector (< 150 kHz: RBW 200 Hz, > 150 kHz: RBW 10 kHz)



Quasi-Peak detector (< 150 kHz: RBW 200 Hz, >150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	80.18	105.49	25.31	100.0	x-pos	244.0	20.9	horizontal	PASSED
0.637550	39.67	71.51	31.85	100.0	x-pos	255.0	21.1	horizontal	PASSED
1.149975	31.41	66.39	34.98	100.0	x-pos	263.0	21.1	horizontal	PASSED
1.652450	31.59	63.24	31.65	100.0	x-pos	256.0	20.9	horizontal	PASSED
2.184775	23.78	69.54	45.76	100.0	x-pos	281.0	20.9	horizontal	PASSED
29.074650	22.68	69.54	46.86	100.0	x-pos	225.0	21.8	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

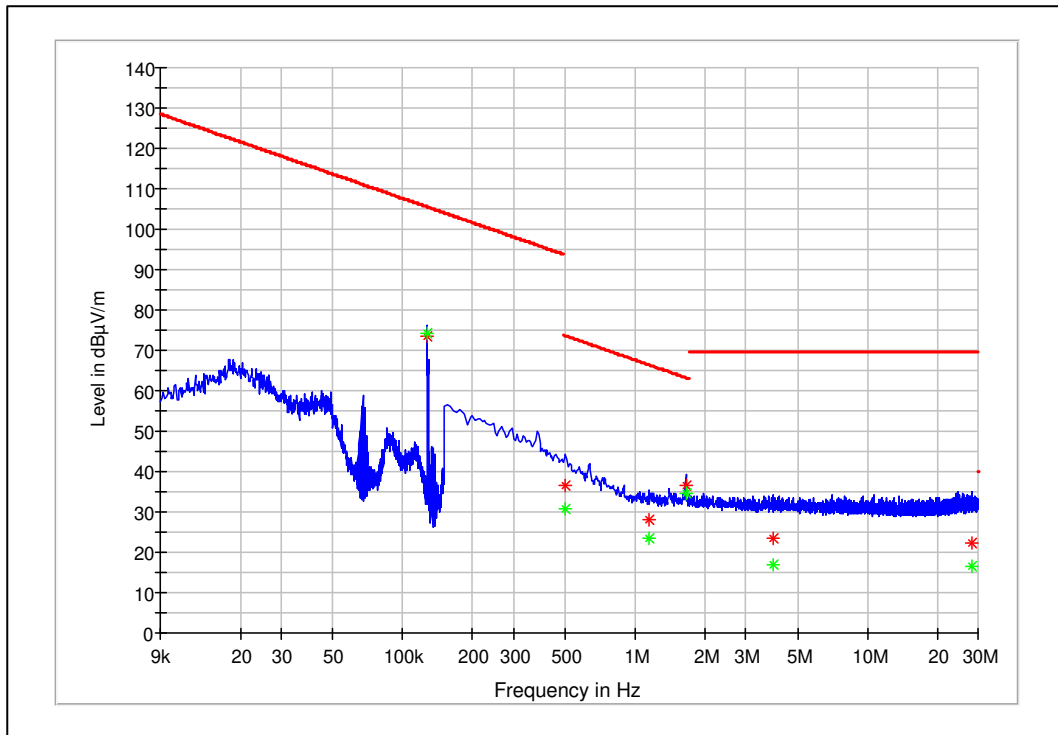
CISPR-Average detector (< 150 kHz: RBW 200Hz, > 150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	80.59	105.49	24.89	100.0	x-pos	244.0	20.9	horizontal	PASSED
0.637550	38.41	71.51	33.11	100.0	x-pos	255.0	21.1	horizontal	PASSED
1.149975	28.08	66.39	38.31	100.0	x-pos	263.0	21.1	horizontal	PASSED
1.652450	28.25	63.24	35.00	100.0	x-pos	256.0	20.9	horizontal	PASSED
2.184775	17.62	69.54	51.92	100.0	x-pos	281.0	20.9	horizontal	PASSED
29.074650	16.31	69.54	53.23	100.0	x-pos	225.0	21.8	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

DUT horizontal, Antenna y-position

Peak detector (< 150 kHz: RBW 200 Hz, > 150 kHz: RBW 10 kHz)



Quasi-Peak detector (< 150 kHz: RBW 200 Hz, >150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	73.61	105.49	31.88	100.0	y-pos	332.0	20.9	horizontal	PASSED
0.503225	36.42	73.57	37.15	100.0	y-pos	75.0	21.1	horizontal	PASSED
1.145000	28.25	66.43	38.18	100.0	y-pos	15.0	21.1	horizontal	PASSED
1.657425	36.46	63.22	26.76	100.0	y-pos	15.0	20.9	horizontal	PASSED
3.945925	23.31	69.54	46.23	100.0	y-pos	135.0	21.0	horizontal	PASSED
28.328400	22.50	69.54	47.04	100.0	y-pos	173.0	21.8	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

CISPR-Average detector (< 150 kHz: RBW 200Hz, > 150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	74.05	105.49	31.44	100.0	y-pos	332.0	20.9	horizontal	PASSED
0.503225	30.86	73.57	42.71	100.0	y-pos	75.0	21.1	horizontal	PASSED
1.145000	23.39	66.43	43.03	100.0	y-pos	15.0	21.1	horizontal	PASSED
1.657425	34.62	63.22	28.59	100.0	y-pos	15.0	20.9	horizontal	PASSED
3.945925	17.03	69.54	52.51	100.0	y-pos	135.0	21.0	horizontal	PASSED
28.328400	16.42	69.54	53.12	100.0	y-pos	173.0	21.8	horizontal	PASSED

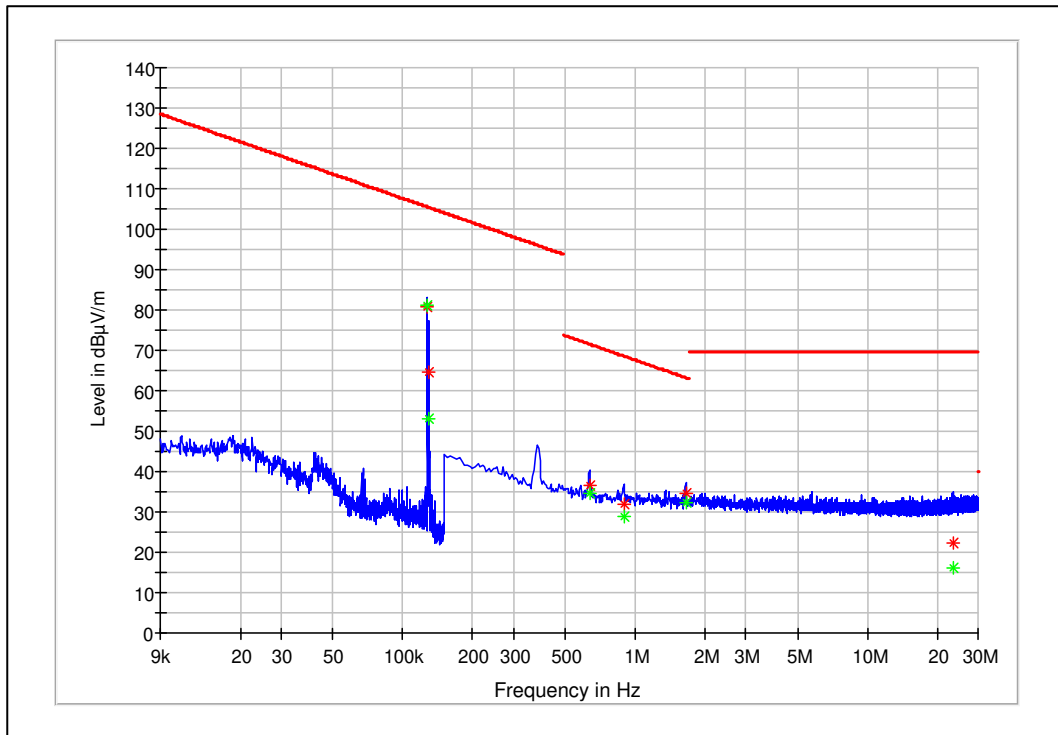
No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

Project support engineer: Jürgen Mitterer
Date of issue: 31-Mar-2023
Report no.: LAB-531A (v3.0)

FCC Test Report (WJLWCH-303)
Template Version 8.0
Molex, LLC – All Rights Reserved.

DUT horizontal, Antenna z-position

Peak detector (< 150 kHz: RBW 200 Hz, > 150 kHz: RBW 10 kHz)



Quasi-Peak detector (< 150 kHz: RBW 200 Hz, >150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	80.80	105.49	24.68	100.0	z-pos	255.0	20.9	horizontal	PASSED
0.128498	64.59	105.43	40.84	100.0	z-pos	255.0	20.9	horizontal	PASSED
0.637550	36.37	71.51	35.14	100.0	z-pos	266.0	21.1	horizontal	PASSED
0.891275	32.07	68.60	36.53	100.0	z-pos	281.0	21.1	horizontal	PASSED
1.657425	34.52	63.22	28.69	100.0	z-pos	263.0	20.9	horizontal	PASSED
23.358375	22.49	69.54	47.05	100.0	z-pos	133.0	21.4	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

CISPR-Average detector (< 150 kHz: RBW 200Hz, > 150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	81.22	105.49	24.27	100.0	z-pos	255.0	20.9	horizontal	PASSED
0.128498	53.01	105.43	52.41	100.0	z-pos	255.0	20.9	horizontal	PASSED
0.637550	34.51	71.51	37.01	100.0	z-pos	266.0	21.1	horizontal	PASSED
0.891275	28.88	68.60	39.72	100.0	z-pos	281.0	21.1	horizontal	PASSED
1.657425	32.33	63.22	30.89	100.0	z-pos	263.0	20.9	horizontal	PASSED
23.358375	16.28	69.54	53.26	100.0	z-pos	133.0	21.4	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

Project support engineer: Jürgen Mitterer
Date of issue: 31-Mar-2023
Report no.: LAB-531A (v3.0)

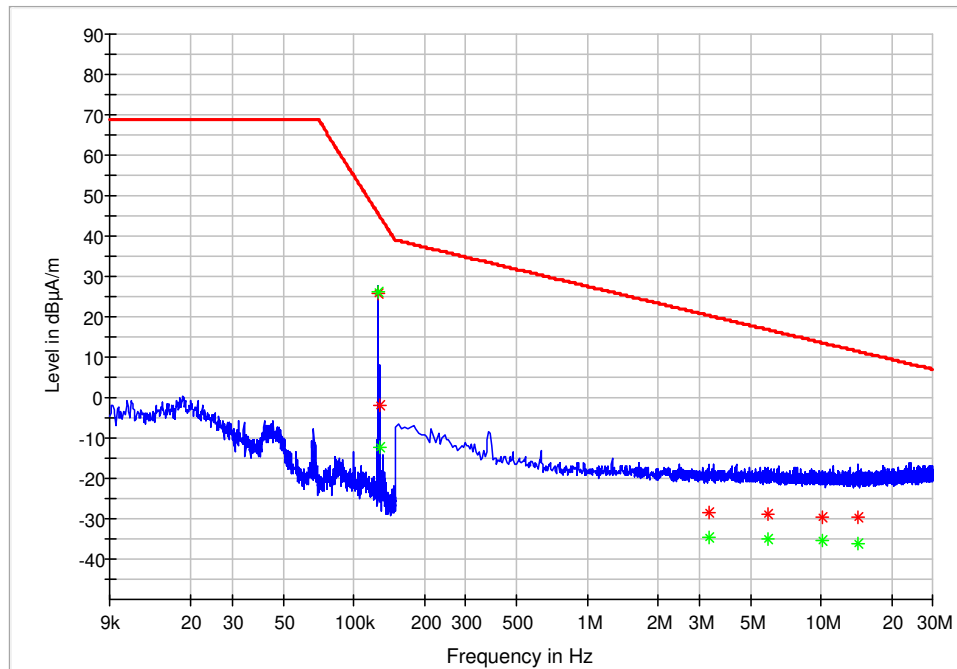
FCC Test Report (WJLWCH-303)
Template Version 8.0
Molex, LLC – All Rights Reserved.

3.3. Test results (ISED)

3.3.1 5 W not modulated

DUT horizontal, Antenna x-position

Peak detector (< 150 kHz: RBW 200 Hz, > 150 kHz: RBW 10 kHz)



Quasi-Peak detector (< 150 kHz: RBW 200 Hz, >150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμA/m]	Limit [dBμA/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	25.62	45.36	19.74	100.0	x-pos	105.0	-30.6	horizontal	PASSED
0.128762	-1.86	45.01	46.87	100.0	x-pos	75.0	-30.6	horizontal	PASSED
3.289225	-28.58	20.35	48.93	100.0	x-pos	6.0	-30.6	horizontal	PASSED
5.886175	-28.86	16.84	45.70	100.0	x-pos	105.0	-30.5	horizontal	PASSED
10.055225	-29.44	13.60	43.04	100.0	x-pos	149.0	-30.5	horizontal	PASSED
14.368550	-29.80	11.45	41.25	100.0	x-pos	8.0	-30.5	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

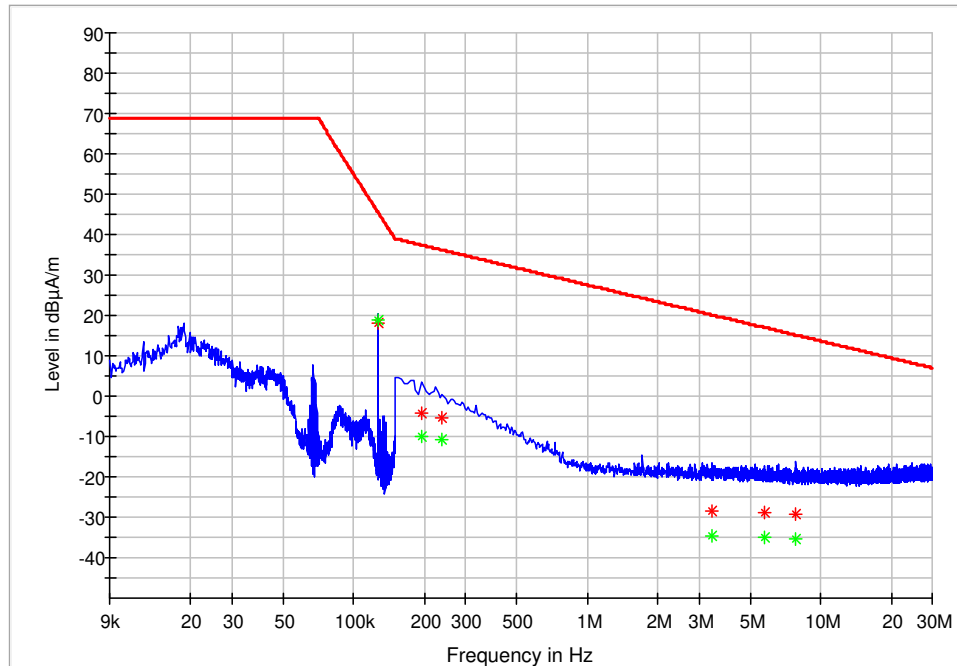
CISPR-Average detector (< 150 kHz: RBW 200Hz, > 150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμA/m]	Limit [dBμA/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	26.05	45.36	19.31	100.0	x-pos	105.0	-30.6	horizontal	PASSED
0.128762	-12.46	45.01	57.47	100.0	x-pos	75.0	-30.6	horizontal	PASSED
3.289225	-34.74	20.35	55.10	100.0	x-pos	6.0	-30.6	horizontal	PASSED
5.886175	-35.02	16.84	51.85	100.0	x-pos	105.0	-30.5	horizontal	PASSED
10.055225	-35.56	13.60	49.16	100.0	x-pos	149.0	-30.5	horizontal	PASSED
14.368550	-36.01	11.45	47.45	100.0	x-pos	8.0	-30.5	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation

DUT horizontal, Antenna y-position

Peak detector (< 150 kHz: RBW 200 Hz, > 150 kHz: RBW 10 kHz)



Quasi-Peak detector (< 150 kHz: RBW 200 Hz, >150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμA/m]	Limit [dBμA/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	18.23	45.36	27.13	100.0	y-pos	26.0	-30.6	horizontal	PASSED
0.194775	-4.09	37.42	41.51	100.0	y-pos	119.0	-30.6	horizontal	PASSED
0.239550	-5.28	36.17	41.45	100.0	y-pos	345.0	-30.6	horizontal	PASSED
3.393700	-28.56	20.16	48.72	100.0	y-pos	203.0	-30.6	horizontal	PASSED
5.781700	-28.68	16.94	45.62	100.0	y-pos	195.0	-30.5	horizontal	PASSED
7.861250	-29.09	15.09	44.18	100.0	y-pos	53.0	-30.4	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

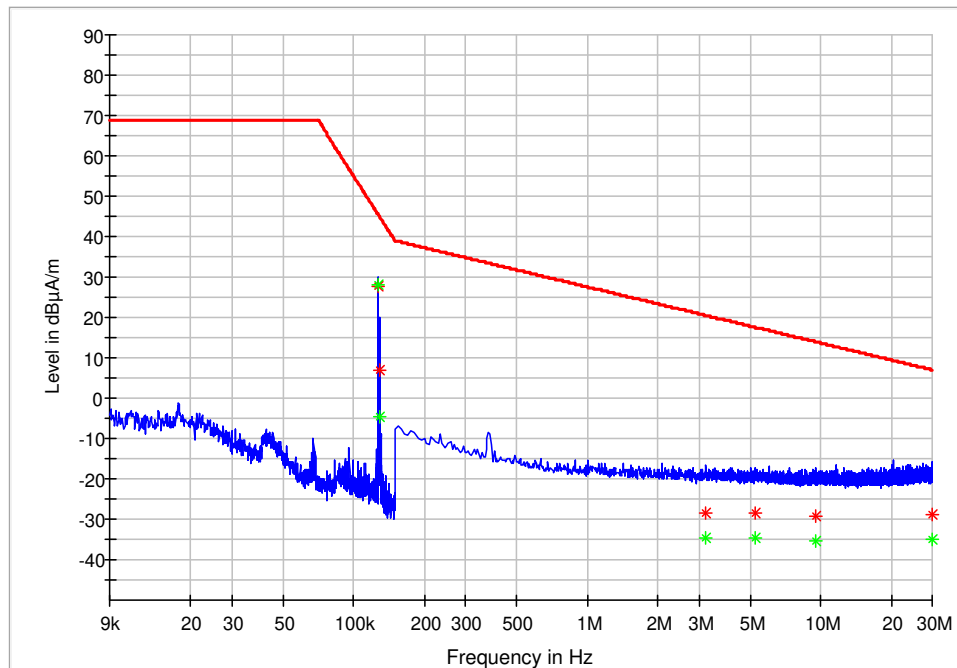
CISPR-Average detector (< 150 kHz: RBW 200Hz, > 150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμA/m]	Limit [dBμA/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	18.67	45.36	26.69	100.0	y-pos	26.0	-30.6	horizontal	PASSED
0.194775	-10.11	37.42	47.53	100.0	y-pos	119.0	-30.6	horizontal	PASSED
0.239550	-10.81	36.17	46.99	100.0	y-pos	345.0	-30.6	horizontal	PASSED
3.393700	-34.70	20.16	54.86	100.0	y-pos	203.0	-30.6	horizontal	PASSED
5.781700	-34.93	16.94	51.87	100.0	y-pos	195.0	-30.5	horizontal	PASSED
7.861250	-35.34	15.09	50.43	100.0	y-pos	53.0	-30.4	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation

DUT horizontal, Antenna z-position

Peak detector (< 150 kHz: RBW 200 Hz, > 150 kHz: RBW 10 kHz)



Quasi-Peak detector (< 150 kHz: RBW 200 Hz, >150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμA/m]	Limit [dBμA/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	27.59	45.36	17.77	100.0	z-pos	86.0	-30.6	horizontal	PASSED
0.128409	6.82	45.12	38.29	100.0	z-pos	225.0	-30.6	horizontal	PASSED
3.234500	-28.45	20.45	48.90	100.0	z-pos	302.0	-30.6	horizontal	PASSED
5.214550	-28.43	17.57	45.99	100.0	z-pos	345.0	-30.4	horizontal	PASSED
9.572650	-29.07	13.90	42.97	100.0	z-pos	45.0	-30.5	horizontal	PASSED
29.835825	-28.80	7.03	35.84	100.0	z-pos	323.0	-29.7	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

CISPR-Average detector (< 150 kHz: RBW 200Hz, > 150 kHz: RBW 9 kHz)

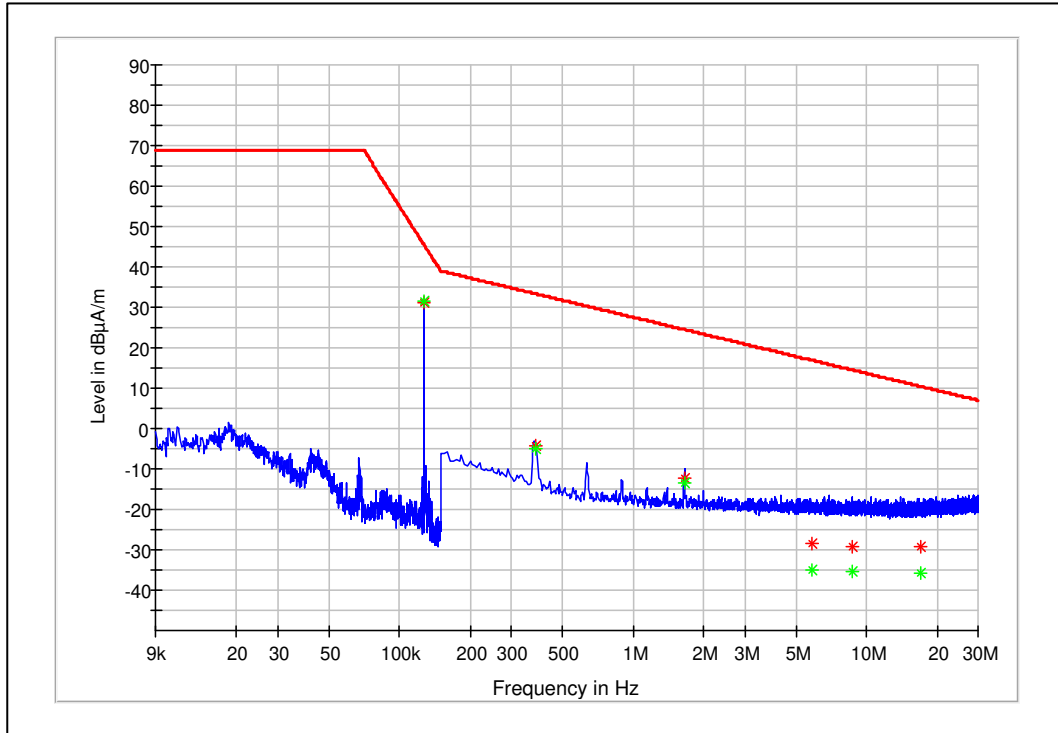
Frequency [MHz]	Level [dBμA/m]	Limit [dBμA/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	28.01	45.36	17.36	100.0	z-pos	86.0	-30.6	horizontal	PASSED
0.128409	-4.66	45.12	49.78	100.0	z-pos	225.0	-30.6	horizontal	PASSED
3.234500	-34.63	20.45	55.09	100.0	z-pos	302.0	-30.6	horizontal	PASSED
5.214550	-34.49	17.57	52.06	100.0	z-pos	345.0	-30.4	horizontal	PASSED
9.572650	-35.35	13.90	49.25	100.0	z-pos	45.0	-30.5	horizontal	PASSED
27.209025	16.29	69.54	53.25	100.0	z-pos	323.0	-29.7	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation

3.3.2 15 W modulated

DUT horizontal, Antenna x-position

Peak detector (< 150 kHz: RBW 200 Hz, > 150 kHz: RBW 10 kHz)



Quasi-Peak detector (< 150 kHz: RBW 200 Hz, >150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμA/m]	Limit [dBμA/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127552	31.09	45.38	14.29	100.0	x-pos	247.0	-30.6	horizontal	PASSED
0.383367	-4.28	33.33	37.61	100.0	x-pos	255.0	-30.5	horizontal	PASSED
1.658842	-12.14	24.49	36.63	100.0	x-pos	255.0	-30.6	horizontal	PASSED
5.833508	-28.64	16.89	45.53	100.0	x-pos	345.0	-30.5	horizontal	PASSED
8.695342	-29.22	14.48	43.70	100.0	x-pos	15.0	-30.5	horizontal	PASSED
16.901433	-29.41	10.47	39.88	100.0	x-pos	341.0	-30.4	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

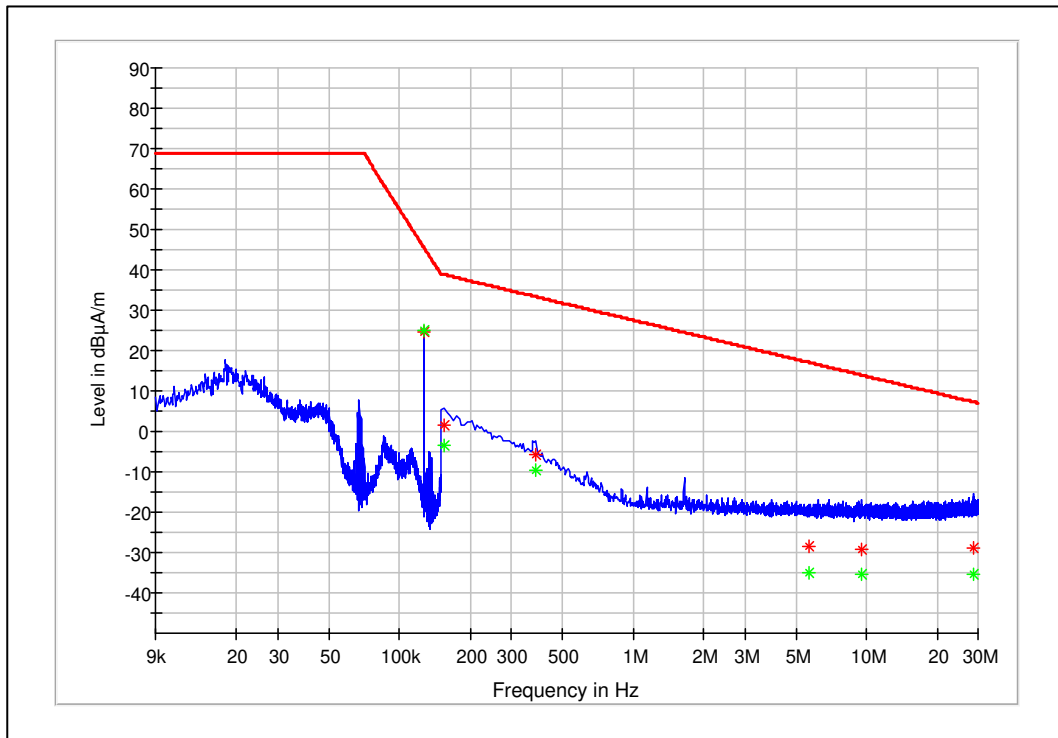
CISPR-Average detector (< 150 kHz: RBW 200Hz, > 150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμA/m]	Limit [dBμA/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127552	31.49	45.38	13.89	100.0	x-pos	247.0	-30.6	horizontal	PASSED
0.383367	-4.92	33.33	38.26	100.0	x-pos	255.0	-30.5	horizontal	PASSED
1.658842	-13.51	24.49	38.00	100.0	x-pos	255.0	-30.6	horizontal	PASSED
5.833508	-34.86	16.89	51.75	100.0	x-pos	345.0	-30.5	horizontal	PASSED
8.695342	-35.32	14.48	49.80	100.0	x-pos	15.0	-30.5	horizontal	PASSED
16.901433	-35.58	10.47	46.05	100.0	x-pos	341.0	-30.4	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

DUT horizontal, Antenna y-position

Peak detector (< 150 kHz: RBW 200 Hz, > 150 kHz: RBW 10 kHz)



Quasi-Peak detector (< 150 kHz: RBW 200 Hz, >150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμA/m]	Limit [dBμA/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127545	24.47	45.38	20.91	100.0	y-pos	329.0	-30.6	horizontal	PASSED
0.156047	1.41	38.76	37.35	100.0	y-pos	15.0	-30.6	horizontal	PASSED
0.384992	-5.88	33.31	39.18	100.0	y-pos	0.0	-30.5	horizontal	PASSED
5.688483	-28.57	17.04	45.61	100.0	y-pos	338.0	-30.5	horizontal	PASSED
9.561092	-29.08	13.91	42.99	100.0	y-pos	23.0	-30.5	horizontal	PASSED
28.497542	-28.94	7.31	36.25	100.0	y-pos	163.0	-29.7	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

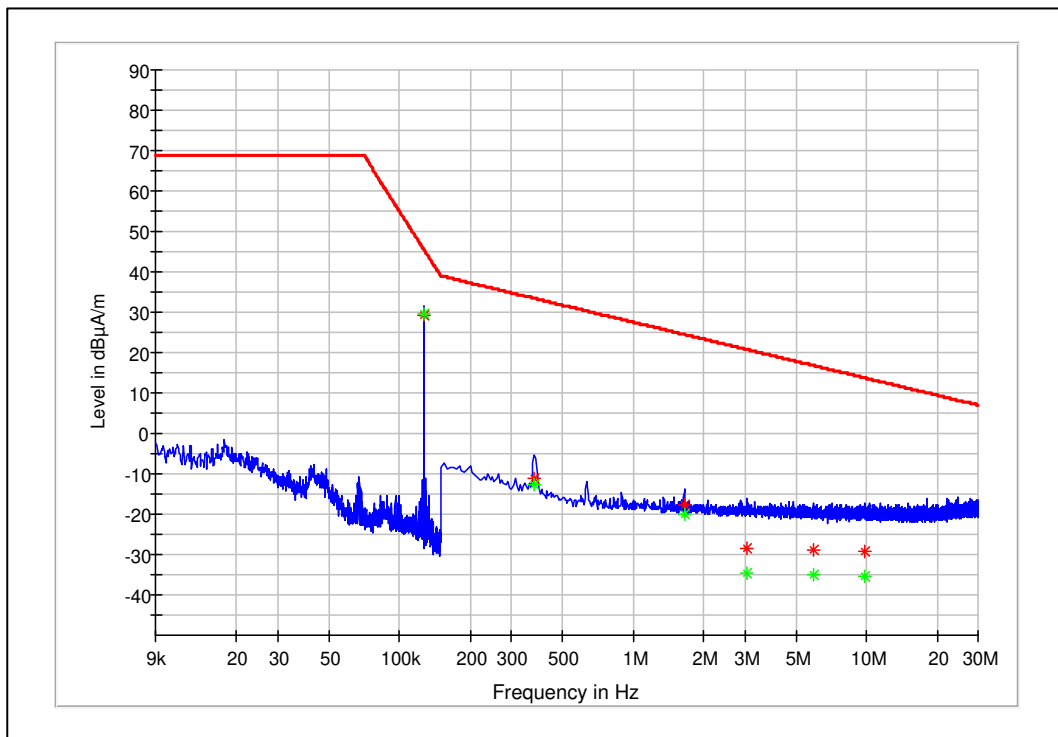
CISPR-Average detector (< 150 kHz: RBW 200Hz, > 150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμA/m]	Limit [dBμA/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127545	24.89	45.38	20.49	100.0	y-pos	329.0	-30.6	horizontal	PASSED
0.156047	-3.64	38.76	42.40	100.0	y-pos	15.0	-30.6	horizontal	PASSED
0.384992	-9.72	33.31	43.03	100.0	y-pos	0.0	-30.5	horizontal	PASSED
5.688483	-34.81	17.04	51.85	100.0	y-pos	338.0	-30.5	horizontal	PASSED
9.561092	-35.37	13.91	49.28	100.0	y-pos	23.0	-30.5	horizontal	PASSED
28.497542	-35.21	7.31	42.52	100.0	y-pos	163.0	-29.7	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

DUT horizontal, Antenna z-position

Peak detector (< 150 kHz: RBW 200 Hz, > 150 kHz: RBW 10 kHz)



Quasi-Peak detector (< 150 kHz: RBW 200 Hz, >150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμA/m]	Limit [dBμA/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	29.29	45.36	16.07	100.0	z-pos	255.0	-30.6	horizontal	PASSED
0.378850	-11.21	33.40	44.62	100.0	z-pos	236.0	-30.5	horizontal	PASSED
1.657425	-17.50	24.49	41.99	100.0	z-pos	247.0	-30.6	horizontal	PASSED
3.065350	-28.38	20.78	49.16	100.0	z-pos	307.0	-30.6	horizontal	PASSED
5.906075	-28.72	16.82	45.54	100.0	z-pos	75.0	-30.5	horizontal	PASSED
9.876125	-29.26	13.71	42.97	100.0	z-pos	329.0	-30.5	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

CISPR-Average detector (< 150 kHz: RBW 200Hz, > 150 kHz: RBW 9 kHz)

Frequency [MHz]	Level [dBμA/m]	Limit [dBμA/m]	Margin [dB]	Height [cm]	Antenna Position	Azimuth [deg]	Transducer [dB]	EUT Orientation	Result
0.127616	29.71	45.36	15.65	100.0	z-pos	255.0	-30.6	horizontal	PASSED
0.378850	-12.77	33.40	46.18	100.0	z-pos	236.0	-30.5	horizontal	PASSED
1.657425	-19.85	24.49	44.34	100.0	z-pos	247.0	-30.6	horizontal	PASSED
3.065350	-34.60	20.78	55.38	100.0	z-pos	307.0	-30.6	horizontal	PASSED
5.906075	-34.95	16.82	51.76	100.0	z-pos	75.0	-30.5	horizontal	PASSED
9.876125	-35.57	13.71	49.28	100.0	z-pos	329.0	-30.5	horizontal	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

4. Radiated emissions above 30 MHz

EUT with DUT number	DAB2220232
Accessories with DUT numbers	DAB2220242, DAB2220052
Operation Voltage [V] / [Hz]	13.2 V / DC
Result	PASSED
Remarks	none
Temp [°C] / Humidity [%RH]	+15 °C to +35 °C / 20 % to 75 %
Date of measurement	16-Aug-2022 – 18-Aug-2022
Test Responsible	Frank Wittmann
Test system SW / Version / Configuration	Rohde & Schwarz EMC32 / 10.60.20 / 1.6

4.1. Test method and limit

The measurement is made according to ANSI C63.10 and RSS-Gen as follows:

- ⇒ The EUT is placed on a nonconductive table in the centre of the turntable.
- ⇒ The DUT is positioned in horizontal position on the test table.
- ⇒ The measurement is divided into the Preliminary Measurement and the Final Measurement.
The Preliminary Measurement and the Final Measurement is performed in 3 m distance without floor absorbers by rotating the turntable of 360 degrees and moving the antenna height between 1-4 m.
- ⇒ During the Preliminary Measurement the suspected frequencies are searched by using the PK detector.
In the Final Measurement the exact frequency and amplitude of these emissions are re-measured by using the applicable QP detector.
- ⇒ The Final Measurement is performed if the Preliminary Measurement results are closer than 20 dB to the permissible limit.
- ⇒ The measurement results are obtained as described in the following formula: $E \text{ [dB}\mu\text{V/m]} = U_{RX} + A_{CF}$
Where U_{RX} is receiver reading and A_{CF} is total correction factor including cable loss, antenna factor and preamplifier gain ($A_{CF} = L_{CABLES} + AF - G_{PREAMP}$).
- ⇒ Example values and calculation for one final QP measurement frequency at 36.402 MHz, see result in 5.2:
 $E \text{ [dB}\mu\text{V/m]} = 23.77 - 9.3 = 14.47$

FCC limits for radiated emissions measurements (3 m measurement distance)

Frequency range [MHz]	Limit [$\mu\text{V/m}$]	Limit [dB $\mu\text{V/m}$]	Detector
30 – 88	100	40	QP
88 – 216	150	43.5	QP
216 – 960	200	46	QP
960 – 1000	500	54	QP

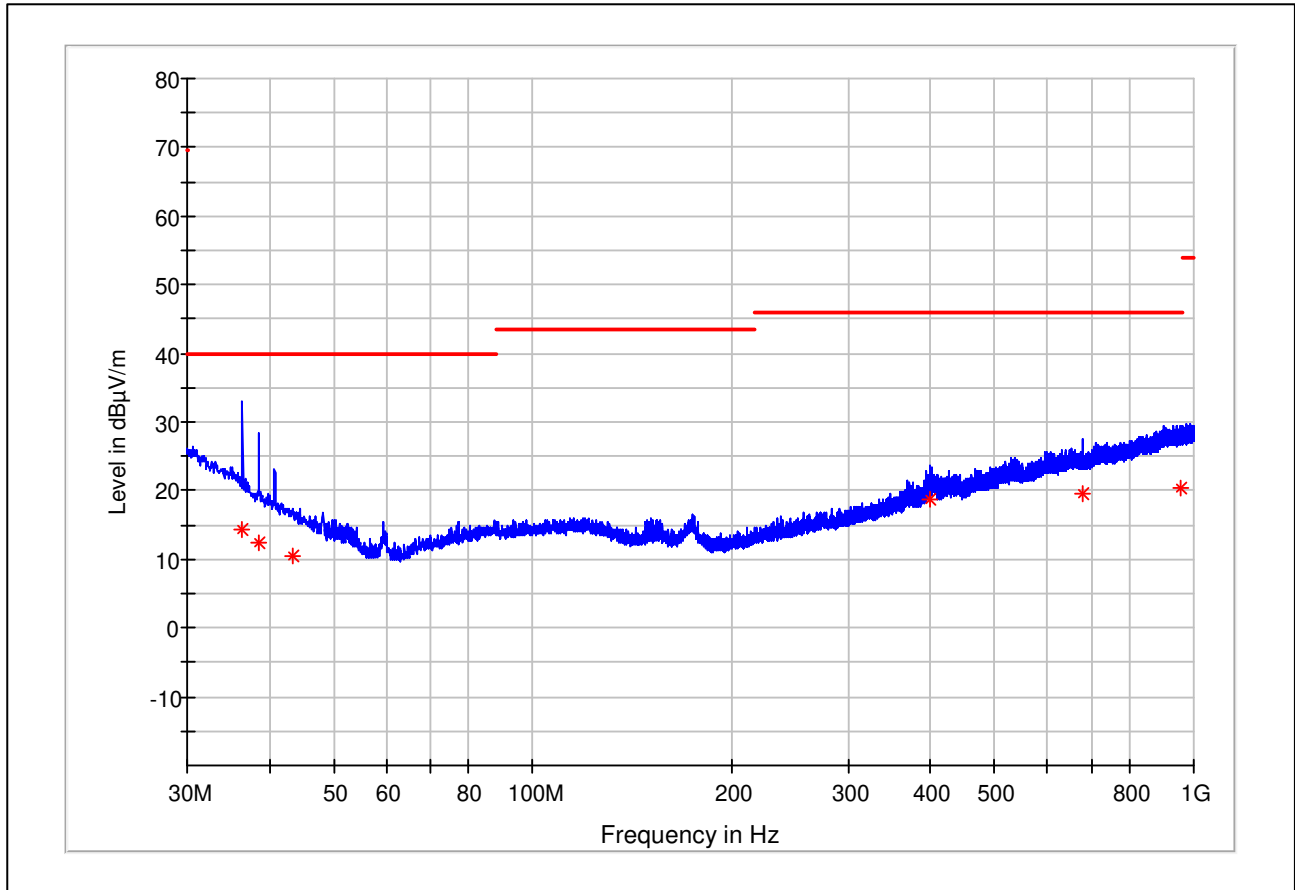
ICES-001 SAC limits (3 m measurement distance)

Frequency range [MHz]	Limit [$\mu\text{V/m}$]	Limit [dB $\mu\text{V/m}$]	Detector
30 – 230	100	40	QP
230 - 1000	223.9	47	QP

4.2. Test results (FCC)

4.2.1 15 W modulated

Peak detector (RBW 300 kHz)



Quasi-Peak detector (RBW 120 kHz)

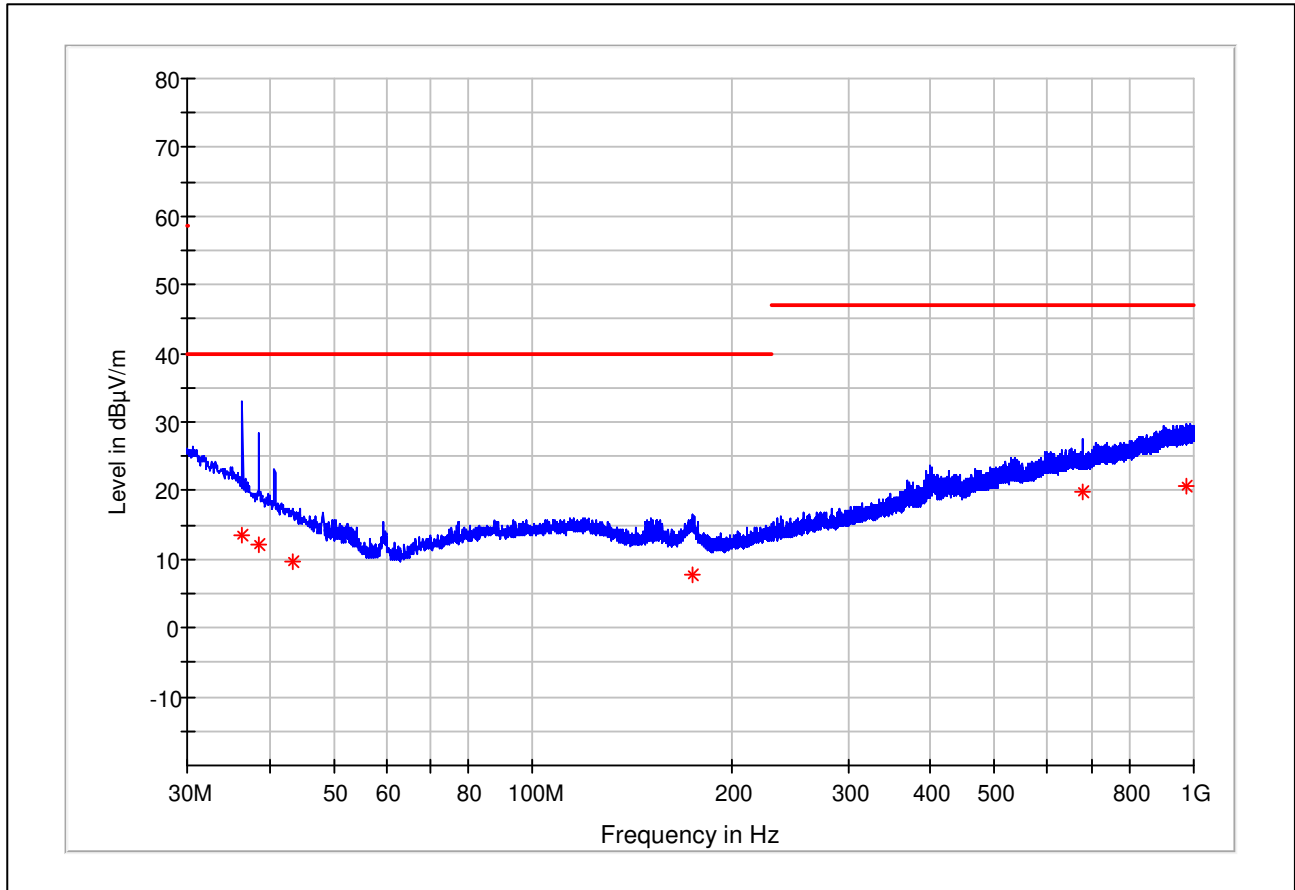
Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Polarisation	Azimuth [deg]	Transducer [dB]	Result
36.402000	14.47	40.00	25.53	385.0	Horizontal	315.0	-9.3	PASSED
38.439000	12.52	40.00	27.48	325.0	Horizontal	310.0	-10.6	PASSED
43.240500	10.45	40.00	29.55	227.0	Vertical	15.0	-13.8	PASSED
398.939500	18.66	46.02	27.36	145.0	Vertical	263.0	-9.8	PASSED
679.366500	19.68	46.02	26.34	115.0	Horizontal	176.0	-3.9	PASSED
956.980500	20.45	46.02	25.57	115.0	Horizontal	105.0	0.2	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

4.3. Test results (ISED)

4.3.1 15 W modulated

Peak detector (RBW 300 kHz)



Quasi-Peak detector (RBW 120 kHz)

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Polarisation	Azimuth [deg]	Transducer [dB]	Result
36.402000	13.63	40.00	26.37	355.0	Horizontal	296.0	-9.3	PASSED
38.439000	12.01	40.00	27.99	355.0	Horizontal	302.0	-10.6	PASSED
43.240500	9.64	40.00	30.36	219.0	Vertical	11.0	-13.8	PASSED
174.627000	7.86	40.00	32.14	325.0	Horizontal	340.0	-14.3	PASSED
679.366500	19.82	47.00	27.18	117.0	Horizontal	165.0	-3.9	PASSED
974.683000	20.62	47.00	26.38	145.0	Vertical	152.0	0.4	PASSED

No further emissions found less than 20 dB to the regulatory limit and no emission found in the restricted bands of operation.

5. Occupied bandwidth

EUT with DUT number	DAB2220223
Accessories with DUT numbers	DAB210788E, DAB2220070, BOC201540E
Operation Voltage [V] / [Hz]	13.2 V / DC
Result	PASSED
Remarks	none
Temp [°C] / Humidity [%RH]	+15 °C to +35 °C / 20 % to 75 %
Date of measurement	19-Jul-2022 – 29-Aug-2022
Test Responsible	Jürgen Mitterer
Test system SW / Version	Emissions_Radio_CEFCC / 1.8

5.1. Test method and limit

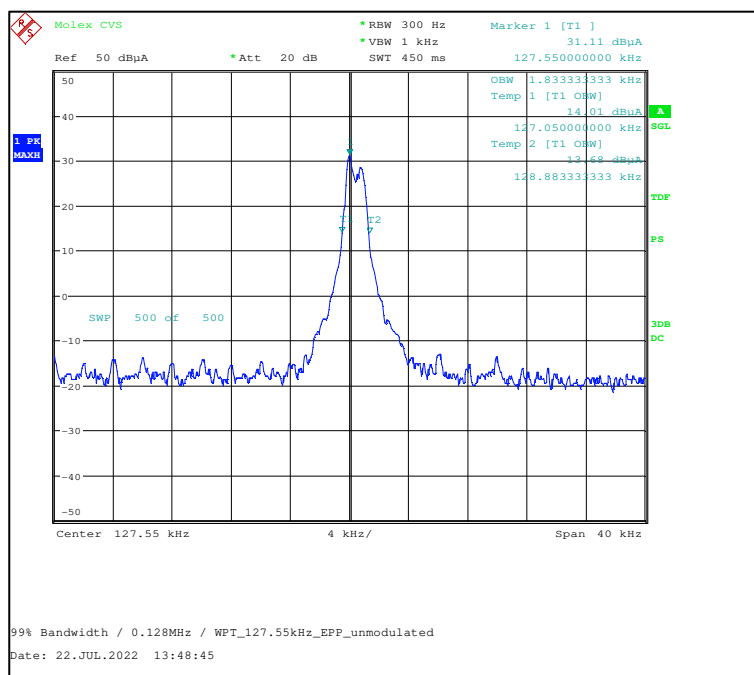
The measurement is made according to FCC 15.215(c) and RSS-Gen.

FCC and ISSED limits for occupied bandwidth measurements

20 dB Bandwidth Limit [kHz]	99 % Bandwidth Limit [kHz]
N.A.	N.A.

5.2. 99 % OBW

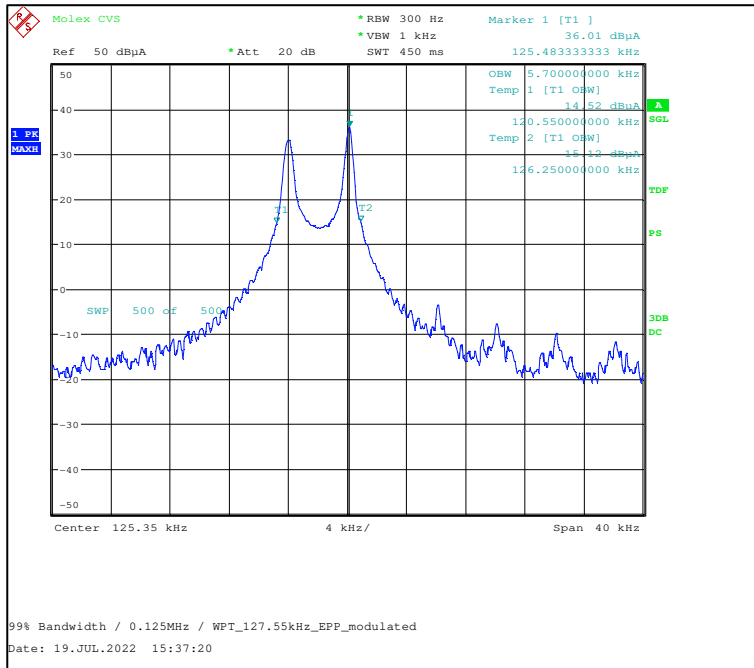
5.2.1 5 W not modulated



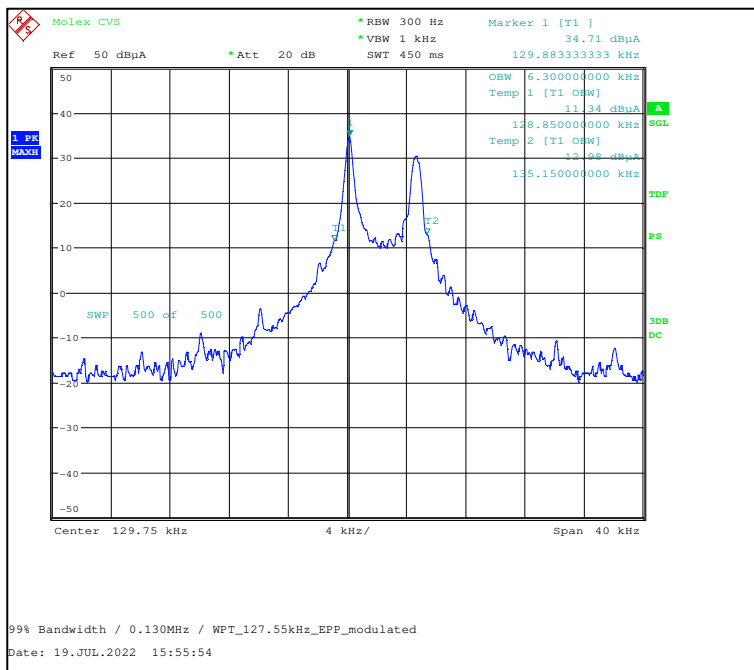
Frequency [kHz]	99% Bandwidth [kHz]
127.55	1.833

5.2.2 15 W modulated

127.55kHz with negative FSK:



127.55kHz with positive FSK:

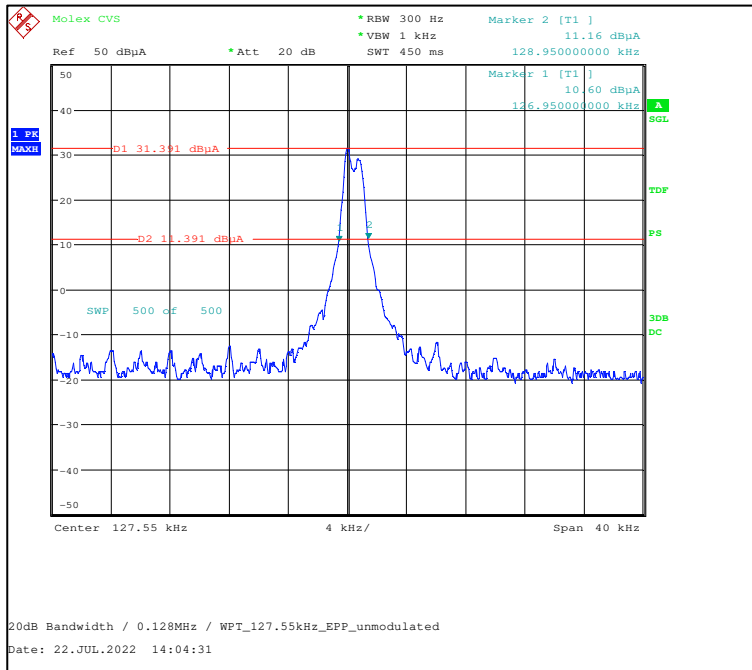


Frequency [kHz]	99% Bandwidth [kHz]
127.55 - FSK	5.70
127.55 + FSK	6.30

5.3. 20 db OBW

5.3.1 5 W not modulated

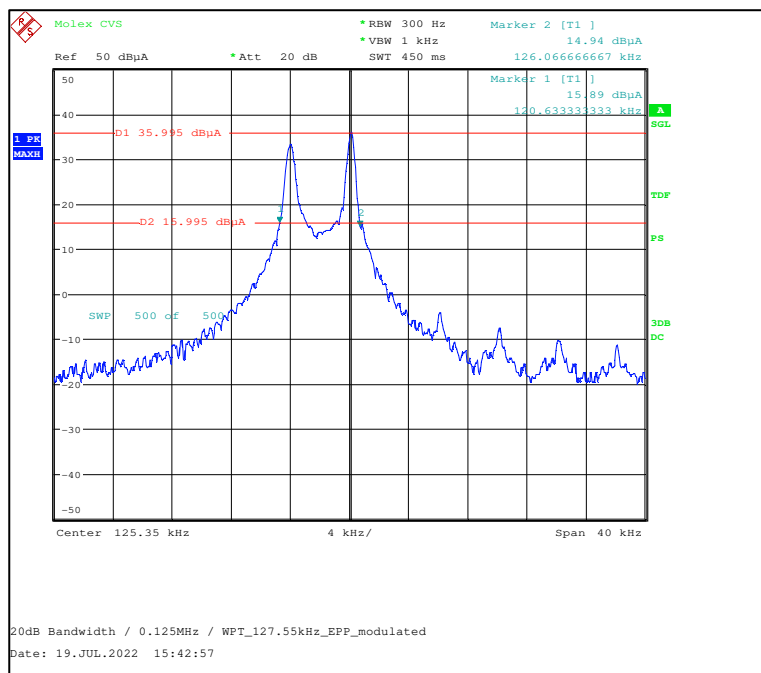
127.55 kHz



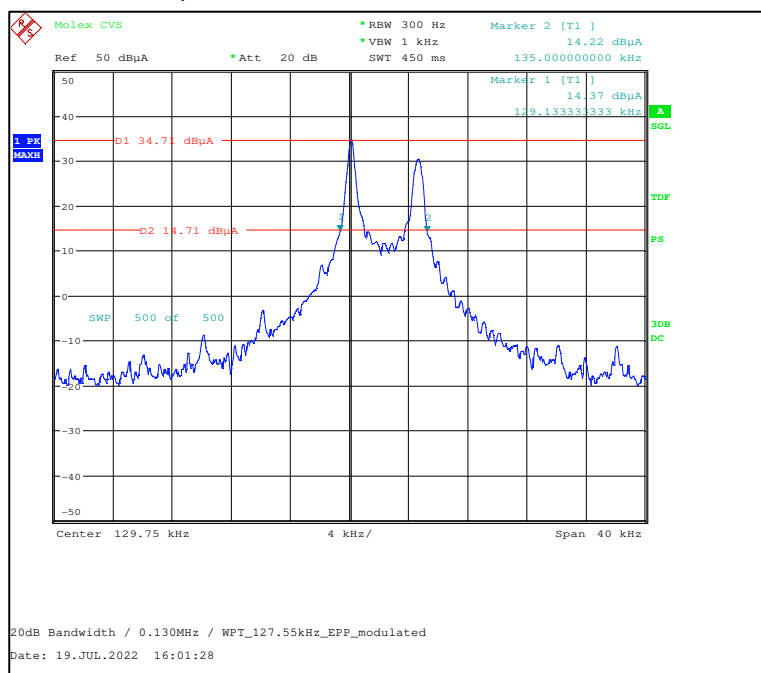
Frequency [kHz]	20dB Bandwidth [kHz]
127.55	2.0 kHz

5.3.2 15 W modulated

127.55kHz with negative FSK:



127.55kHz with positive FSK:



Frequency [kHz]	20dB OBW [kHz]
127.55 - FSK	5.43
127.55 + FSK	5.87

6. Test Equipment

6.1. Conducted Radio

Equipment	Manufacturer	Type	SERIAL-NO.	Actual Calibration	Next Calibration
Signal Generator	ROHDE & SCHWARZ	SMP02	828269/008	12.05.2020	12.05.2023
Signal Generator	ROHDE & SCHWARZ	SMB100A	181275	04.05.2022	04.05.2023
Vector Signal Generator	ROHDE & SCHWARZ	SMBV100A	263158	05.05.2022	05.05.2023
EMI Test Receiver	ROHDE & SCHWARZ	ESU26	100077	04.05.2022	04.05.2023
Vector Signal Generator	ROHDE & SCHWARZ	SMJ100A	100845	09.05.2022	09.05.2024
Power Supply	Hewlett Packard - Agilent	E3632A	MY40011318	11.05.2020	11.05.2023
Temp. / Humidity Logger	Lufft	Opus 10	13262	21.01.2020	21.01.2023
Climatic Chamber	Vötsch	VT4002	521/85094	06.10.2020	06.10.2022

Passive devices:

Equipment*	Manufacturer	Type	SERIAL-NO.
Loop antenna 6 cm	ETS-Lindgreen	7405-901B	Radio 0001
10 dB attenuator	Pasternack	PE7001-10	Radio 0002
RF-cable 2m	Huber & Suhner	Sucoflex 104	563441/4
RF-cable 20 cm	Huber & Suhner	Sucoflex 104	199784/4
Directional coupler	Tyco electronics	M/A-COM 0.5 – 18 GHz	96341

*Passive components included in used signal path

6.2. Radiated Emission

Equipment	Manufacturer	Type	SERIAL-NO.	Actual Calibration	Next Calibration
Antenna	Schwarzbeck Mess-Elektronik	FMZB_1519	1519-056	22.07.2020	22.07.2023
Signal Generator	ROHDE & SCHWARZ	SMP02	828269/008	12.05.2020	12.05.2023
Signal Generator	ROHDE & SCHWARZ	SML01	100652	11.05.2021	11.05.2024
Power Supply	Hewlett Packard - Agilent	E3632A	KR75303301	11.05.2020	11.05.2023
Field Analyzer	Wandel & Goltermann	EMR20	P-0030	30.10.2020	30.10.2023
Antenna	ROHDE & SCHWARZ	HL025	359012/006		
Temp. / Humidity Logger	Lufft	Opus 10	13262	21.01.2020	21.01.2023
Antenna	ROHDE & SCHWARZ	HL562	100191	01.10.2021	01.10.2024
Antenna	ROHDE & SCHWARZ	HK-116: 20-300MHz	825177/0017	25.11.2021	25.11.2024
Antenna	ROHDE & SCHWARZ	HK-116: 20-300MHz	100401	21.08.2020	21.08.2023
Antenna	ROHDE & SCHWARZ	HL223	832369/006	04.05.2022	04.05.2025
Antenna	Schwarzbeck	UBA 9116	9116-396	27.07.2020	27.07.2023
Antenna	Emco	3115	9810-5588	24.03.2021	24.03.2024
Antenna	Schwarzbeck	BBHA-9120-D	01617	09.02.2022	09.02.2025
Antenna	ROHDE & SCHWARZ	HL223	100731	25.11.2021	25.11.2024
Antenna	Schwarzbeck Mess-Elektronik	VAMP 9243	9243-486	25.05.2021	25.05.2024
Isotropic Electric Field Probe	Wandel & Goltermann	Type 8	M-0082	30.10.2020	30.10.2023
Signal Generator	ROHDE & SCHWARZ	SMB100A	181275	04.05.2022	04.05.2023
EMI Test Receiver	ROHDE & SCHWARZ	ESW44	101733	17.05.2022	17.05.2023

Passive devices

Equipment*	Manufacturer	Type	SERIAL-NO.
OSP Switch Unit	ROHDE & SCHWARZ	OSP-320	103089
OSP Switch Unit	ROHDE & SCHWARZ	OSP-230	101023
Low Noise Amplifier	Miteq	LNA-40-00100800-15-10P	15383
RF Attenuator	Huber & Suhner	3dB DC-18GHz	751933 No.1
RF Attenuator	Huber & Suhner	3dB DC-18GHz	751933 No.2
RF Cable	Huber & Suhner	Sucoflex 104	506968
RF Cable	Huber & Suhner	Sucoflex 104	506967
RF Cable	Huber & Suhner	Sucoflex 126EA	517430
RF Cable	Huber & Suhner	Sucoflex 126PEA	0815

*Passive components included in used signal paths

End of Report