

Test Report

Test report no.: 25091930-49335-0

Date of issue: 2026-04-14

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

Applicant

Schrader Electronics Ltd

Manufacturer

Schrader Electronics Ltd

Test Item

SHR3

Radio Frequency Testing according to:

Ministry of Internal Affairs and Communications notification (Japan)
Article 88,
Annex 22-1

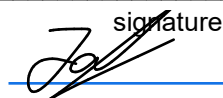
Tested by
(name, function, signature)

Piotr Sardyko
Lab Manager



Approved by
(name, function, signature)

Janoschka Sebastian
Head of Department Radio


signature

Sebastian Janoschka (Apr 14, 2026 18:04:58 GMT+2)

signature

Applicant and Test item details	
Applicant	Schrader Electronics Ltd . 11 Technology Park, Belfast Road, BT41 1QS Antrim, Northern Ireland, UK
Manufacturer	Schrader Electronics Ltd. 11 Technology Park, Belfast Road, BT41 1QS Antrim, Northern Ireland, UK + Sensata Technologies China Co., Ltd. 18 Chuangxin Avenue, Xinbei District, Changzhou 213031, China + Sensata Technologies de Mexico S de RL de CV Av. Aguascalientes Sur # 401, Ex Ejido Salto de Ojocaliente, CP. 20290 Aguascalientes, Mexico + Sensata Technologies Malaysia Sdn Bhd Lot 84, Persiaran Subang Indah, Taman Perindustrian Subang USJ 1, 47600 Subang Jaya, Selangor Darul Ehsan
Test item description	Tyre Pressure Monitoring Sensor
Model/Type reference	SHR3

Disclaimer and Notes

The content of this report relates to the mentioned test sample(s) only.
IBL-Lab GmbH does not take samples. The samples used for testing are provided by the applicant.
Without a written permit of IBL-Lab GmbH, this test report shall not be reproduced, except in full.

The last valid version is available at [TAMSys®](#).

Signatures are done electronically, if signer does not match stated signer, it is signed per order.
Information supplied by the applicant can affect the validity of results. The data is marked accordingly.

Copyright ©: All rights reserved by IBL-Lab GmbH

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:

Decision rule based on simple acceptance without guard bands, binary statement, based on mutually agreed uncertainty tolerances with expansion factor k=2.

1 TABLE OF CONTENTS

1	TABLE OF CONTENTS	3
2	GENERAL INFORMATION	4
2.1	ADMINISTRATIVE DETAILS.....	4
2.2	POSSIBLE TEST CASE VERDICTS.....	4
2.3	OBSERVATIONS	4
2.4	OPINIONS AND INTERPRETATIONS.....	4
2.5	REVISION HISTORY.....	4
2.6	FURTHER DOCUMENTS	4
3	ENVIRONMENTAL & TEST CONDITION.....	5
3.1	ENVIRONMENTAL CONDITIONS OF LAB	5
4	TEST STANDARDS AND REFERENCES	5
5	EQUIPMENT UNDER TEST (EUT)	6
5.1	PRODUCT DESCRIPTION*	6
5.2	TECHNICAL DATA OF EQUIPMENT*	6
5.3	TEST ITEM (EQUIPMENT UNDER TEST) DESCRIPTION*	6
5.4	AUXILIARY EQUIPMENT (AE) DESCRIPTION*	6
5.5	TEST ITEM OPERATING MODES DESCRIPTION*	6
5.6	TEST ITEM SET-UPS DESCRIPTION	7
5.7	NORMAL TEST CONDITIONS	7
5.8	ADDITIONAL INFORMATION	7
6	SUMMARY OF TEST RESULTS	8
7	TEST RESULTS	9
7.1	OUTPUT POWER AND OUTPUT POWER TOLERANCE	9
7.2	OCCUPIED BANDWIDTH	12
7.3	TRANSMITTER SPURIOUS EMISSIONS	15
7.4	RESTRICTION FUNCTION OF TRANSMISSION TIME	20
8	MEASUREMENT EQUIPMENT**	23
8.1	FULLY ANECHOIC CHAMBER	24
8.2	MEASUREMENTS UNDER NORMAL AND EXTREME CLIMATIC CONDITIONS	26
9	MEASUREMENT UNCERTAINTIES	27
	ANNEX A EXTERNAL PHOTOGRAPHS OF EUT	28
	ANNEX B TEST SETUP PHOTOGRAPHS.....	32

2 GENERAL INFORMATION

2.1 Administrative details

Testing laboratory	IBL-Lab GmbH Heinrich-Hertz-Allee 7 66386 St. Ingbert / Germany Fon: +49 6894 38938-0 Fax: +49 6894 38938-99 URL: https://ib-lenhardt.com/ E-Mail: info@ib-lenhardt.com
Testing location	IBL-Lab GmbH Heinrich-Hertz-Allee 7 66386 St. Ingbert / Germany
Date of receipt of test samples	2026-04-08
Start – End of tests	2026-04-09 - 2026-04-10

2.2 Possible test case verdicts

Test sample meets the requirements	P (PASS) – the measured value is below the acceptance limit, AL = TL
Test sample does not meet the requirements	F (FAIL) – the measured value is above the acceptance limit, AL = TL
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

-0: Initian version

2.6 Further documents

List of further applicable documents belonging to the present test report:
None

3 ENVIRONMENTAL & TEST CONDITION

3.1 Environmental conditions of lab	
Temperature	20°C
Relative humidity	25-75 % r.H.
Barometric Pressure	860-1060 mbar

4 TEST STANDARDS AND REFERENCES

Test standard
<i>Ministry of Internal Affairs and Communications notification (Japan)</i> <i>Article 88,</i> <i>Annex 22-1</i>

Reference	Description
none	---

5 EQUIPMENT UNDER TEST (EUT)

5.1 Product Description*

Tyre Pressure Monitoring Sensor

*: declared by the applicant

5.2 Technical Data of Equipment*

Number of channel:	1
Channel tested:	433.92 MHz
Max output power:	-10 dBm = 0.1 mW
RF mode:	TX
Modulation mode:	FSK
Antenna Type:	Internal
Antenna gain:	-25.64 dBi
Antenna connector:	None
Equipment type:	Production model
Temperature range:	Tmin: -40 °C, Tmax: 120 °C
Type of power source:	3 V battery
Test source voltage:	Vmin: 2.7 VDC, Vnom: 3 VDC, Vmax: 3.3 VDC

*: declared by the applicant

5.3 Test Item (Equipment Under Test) Description*

Short designation	EUT Model	EUT Description	Serial number	Hardware status	Software status
EUT A	SHR3	TPMS (external DC power supply, conducted sample)	N/A	N/A	N/A
EUT B	SHR3	TPMS (radiated sample)	N/A	N/A	N/A

*: declared by the applicant

5.4 Auxiliary Equipment (AE) Description*

AE short designation	EUT Name (if available)	EUT Description	Serial number (if available)	Software (if used)
AE1	EMC mode	LF trigger tool	-	-
AE2	CW mode	LF trigger tool	-	-
AE3	Learn mode	LF trigger tool	-	-

*: declared by the applicant

5.5 Test Item Operating Modes Description*

EUT operating mode no.	Description of operating modes	Additional information
op. 1	EMC mode	The sensor will transmit a block (400ms) of 4 FSK frames every 1.8 sec.
op. 2	CW	The sensor would transmit a constant tone at 433.92MHz MHz.
op. 3	Learn mode	The sensor will transmit a burst of 4 FSK frames (10 ms) every 25 seconds.

TR no.: **25091930-49335-0**

2026-04-14

*: declared by the applicant

5.6 Test Item Set-ups Description		
set. 1	EUT A + AE 1	Tested conducted.
set. 2	EUT A + AE 2	Tested conducted.
set. 3	EUT B + AE 3	Tested with test fixture.

5.7 Normal test conditions			
Temperatur, [°C]		Voltage, [V]	
Tnom	20	Vmin	2.7
		Vnom	3
		Vmax	3.3

5.8 Additional Information	
Test items differences	None
Additional application considerations to test a component or sub-assembly	None.

6 SUMMARY OF TEST RESULTS

Test specification

Ministry of Internal Affairs and Communications notification (Japan)
Article 88,
Annex 22-1

Requirement / Test Case	Voltage	Set-up	Operating mode	Result / Remark	Verdict
Transmitter requirement:					
Output power and Output power tolerance	Min, nom, max	1	2	None	Pass
Frequency Allocations and Occupied Bandwidth	Min, nom, max	1	1	None	Pass
Transmitter Spurious Emissions	Min, nom, max	1	2	None	Pass
Secondary radiated Emissions Strength	Min, nom, max	-	-	The EUT works only in Tx mode	N/A
Restriction Function of Transmission Time	Nom	2	3	None	Pass

Notes

None

Comments and observations

None

7 TEST RESULTS

7.1 Output power and Output power tolerance

Test equipment (Please see Chapter 8 for exact information of test equipment)

Conducted. Please see Chapter 8.

Description

The measurement was done conducted.

Please see photos in Annex B for test Set-up.

Please see measurement plots below for spectrum analyzer settings.

Limits:**Limits:****Output Power:**

1 mW (0 dBm)

Power Tolerance:

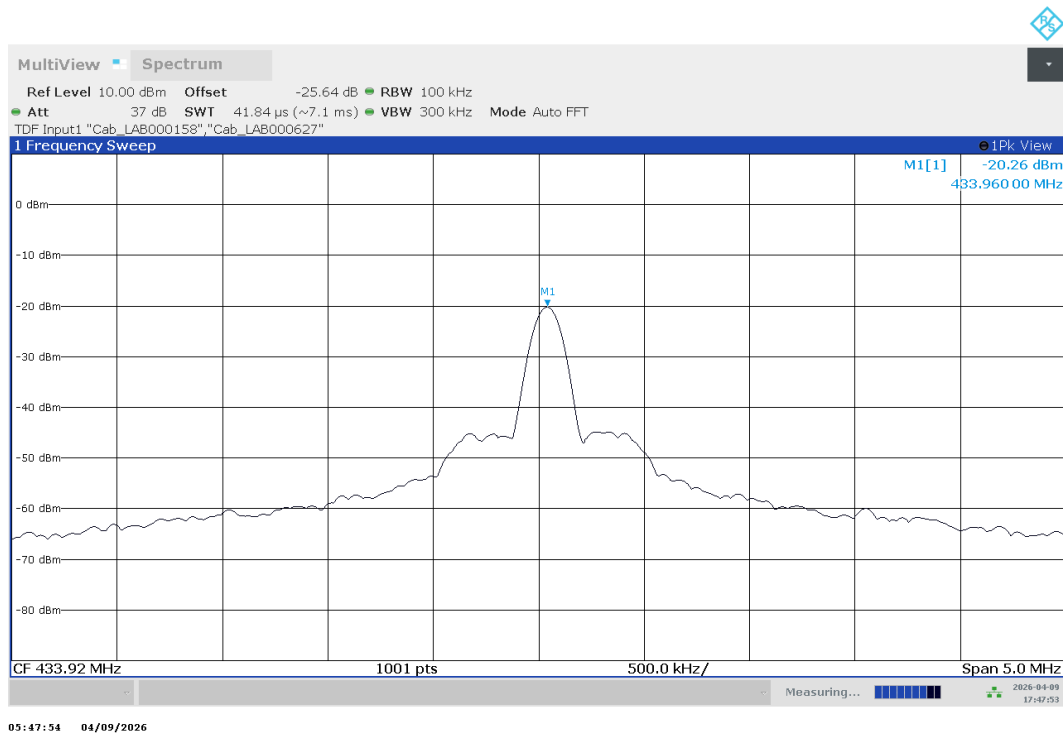
Upper Limit +20 %

Results: Pass*.

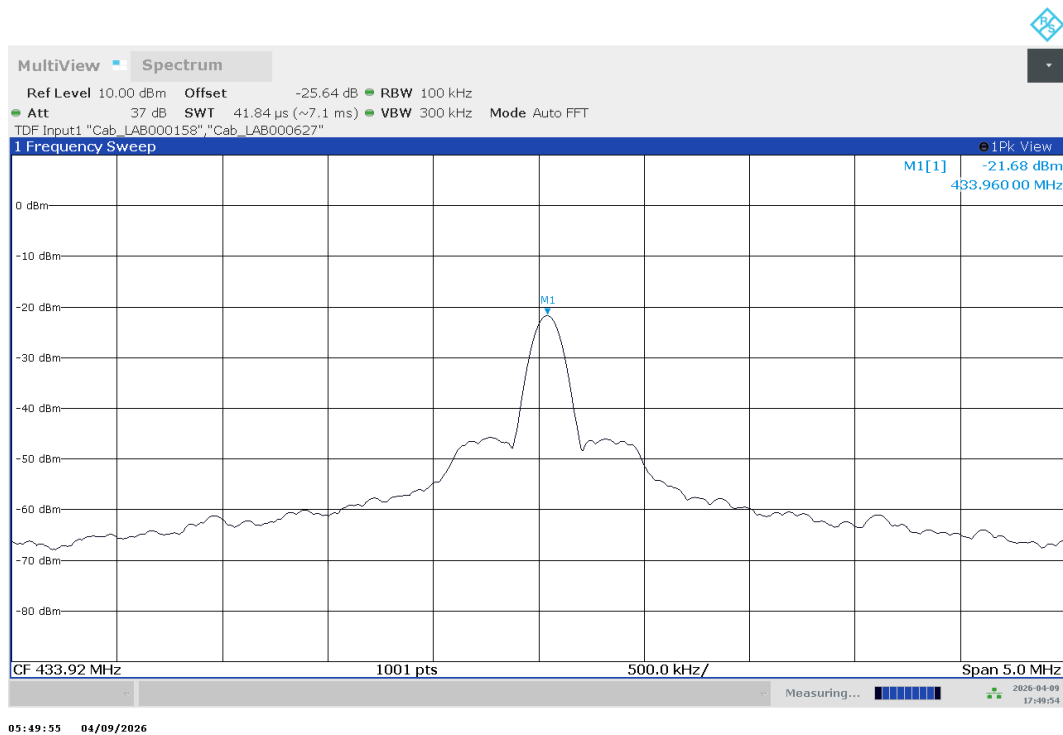
Op./ Set.	Condi- tions	Measured Power Level		Declared Level		Power tolerance, [%]	Verdict
		[dBm]	[mW]	[dBm]	[mW]		
Set.1, Op. 2	Vnom	-20.26	0.0094276	-10	0.1	-90.57	Pass
Set.1, Op. 2	Vmin	-21.68	0.0067925	-10	0.1	-93.21	Pass
Set.1, Op. 2	Vmax	-19.26	0.0118470	-10	0.1	-88.15	Pass

* Please see measurement plots below.

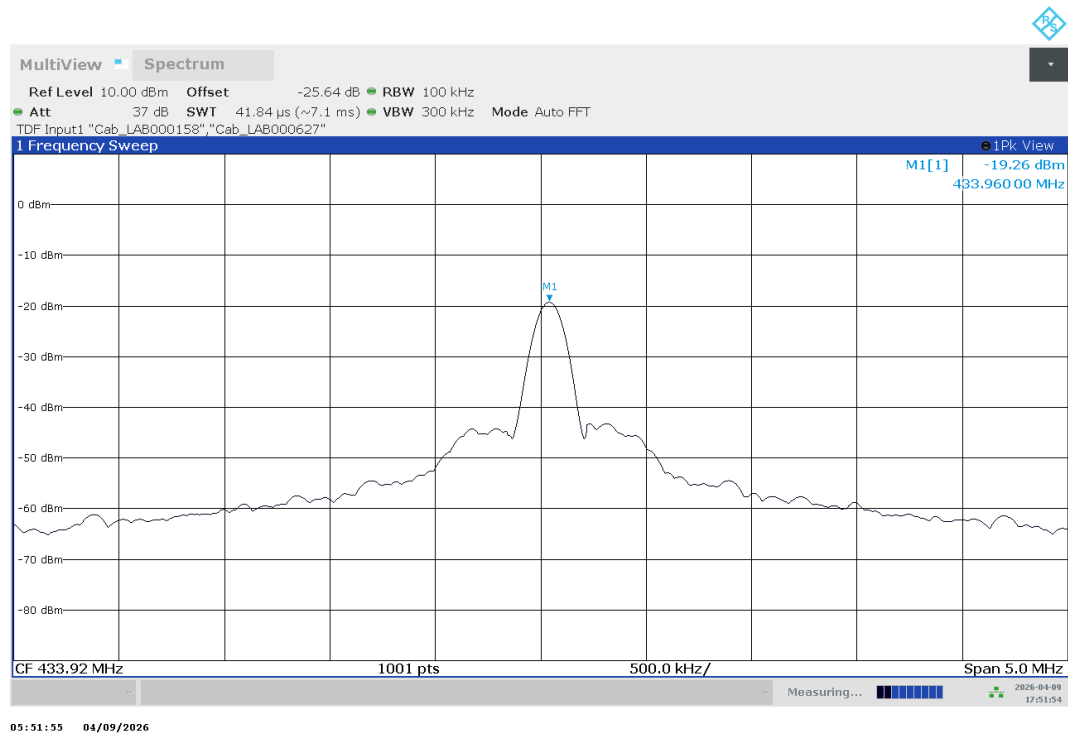
7.1.1 Tnom/Vnom, Set-up 1, Op. 2



7.1.2 Tnom/Vmin, Set-up 1, Op. 2



7.1.3 Tnom/Vmax, Set-up 1, Op. 2



05:51:55 04/09/2026

7.2 Occupied Bandwidth

Test equipment (Please see Chapter 8 for exact information of test equipment)

Conducted. Please see Chapter 8.

Description

The measurement was done conducted.
Please see photos in Annex B for test Set-up.
Please see measurement plots below for spectrum analyzer settings.

Limits:

Limits:

Frequency allocations in 433.92MHz (433.795~434.045MHz)
Occupied bandwidth below 250 kHz or less.

Results*

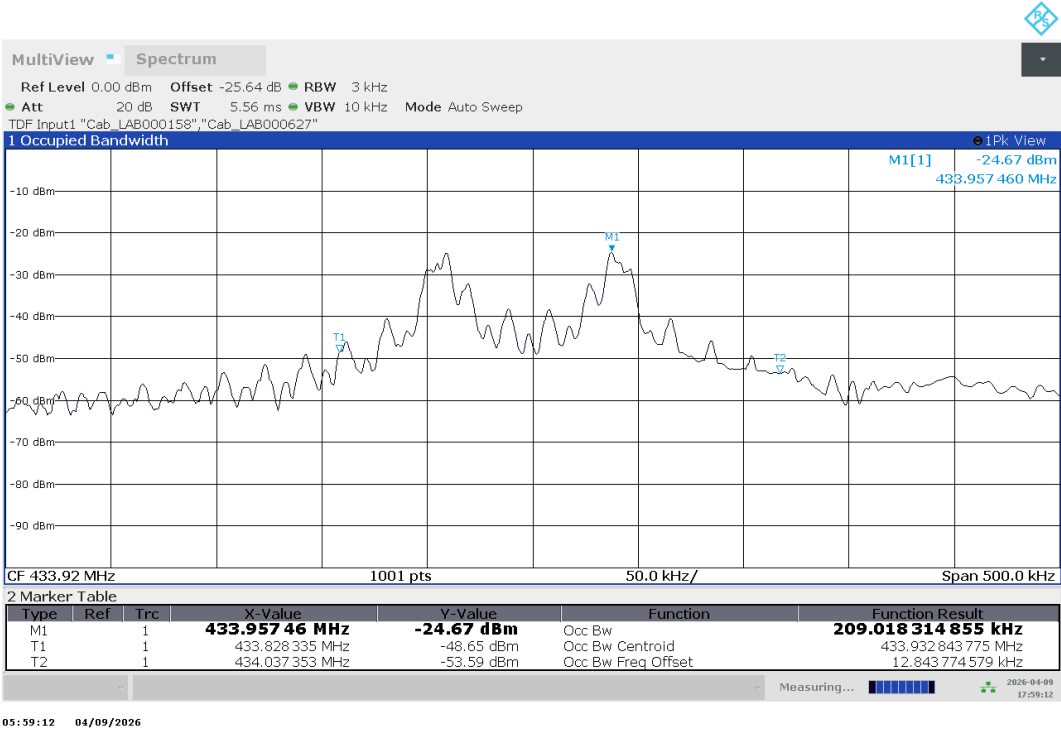
Op./ Set.	Conditions	Detector	F _{low} 99 % OBW, [MHz]	F _{high} 99 % OBW, [MHz]	99 % OBW, [kHz]	Verdict
Set.1, Op. 1	Vnom	Peak	433.828335	434.0373529	209.018	Pass
Set.1, Op. 1	Vmin	Peak	433.829055	434.03531	206.255	Pass
Set.1, Op. 1	Vmax	Peak	433.828168	434.0428851	214.717	Pass

* Please see measurement plots below.

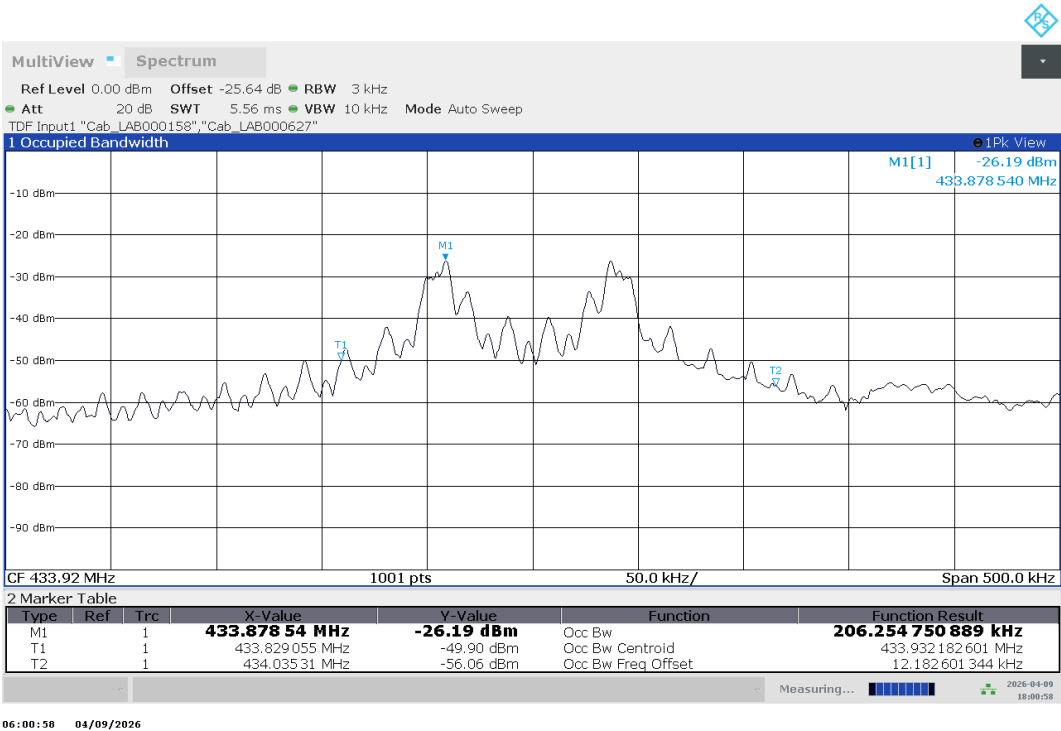
TR no.: 25091930-49335-0

2026-04-14

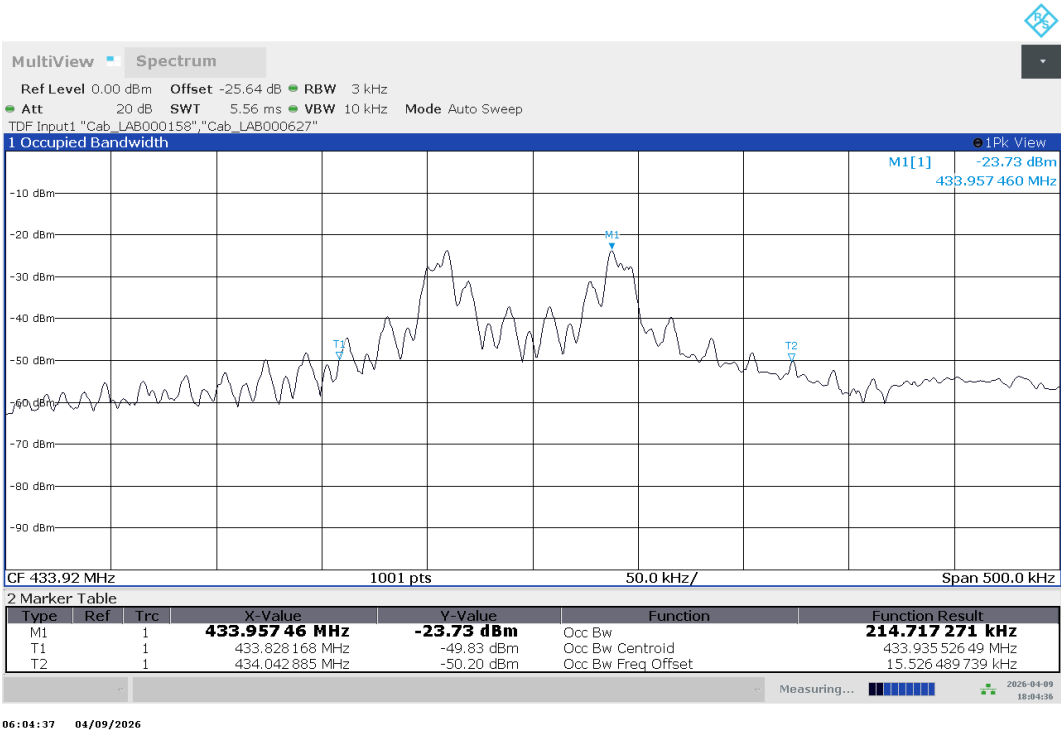
7.2.1 Tnom/Vnom, Set-up 1, Op. 1



7.2.2 Tnom/Vmin, Set-up 1, Op. 1



7.2.3 Tnom/Vmax, Set-up 1, Op. 1



7.3 Transmitter Spurious Emissions

Test equipment (Please see Chapter 8 for exact information of test equipment)

Conducted. Please see Chapter 8.

Description

The measurement was done radiated for frequency range 30 MHz – 1 GHz and conducted for frequency range 1 GHz – 12.75 GHz.

Please see photos in Annex B for test Set-up.

Please see measurement plots below for spectrum analyzer settings.

Limits

30 MHz – 433.795 MHz / 434.045 MHz – 1 GHz: <250 nW/100 kHz (-36 dBm/100 kHz)

Above 1 GHz: < 1 µW/1MHz (-30 dBm/1 MHz)

Results*

Op./ Set.	Frequency	Detector	Frequency range, [MHz]	Highest level, [dBm]	Limit, [dBm]	Margin, [dB]	Verdict
Set.1, Op. 2	Vnom	Peak	30 - 1000	-40.68	-36	4.68	Pass
Set.1, Op. 2	Vmin	Peak	30 - 1000	-42.62	-36	6.62	Pass
Set.1, Op. 2	Vmax	Peak	30 - 1000	-39.17	-36	3.17	Pass
Set.1, Op. 2	Vnom	Peak	1000-12750	-59.95	-30	29.95	Pass
Set.1, Op. 2	Vmin	Peak	1000-12750	-63.76	-30	33.76	Pass
Set.1, Op. 2	Vmax	Peak	1000-12750	-56.94	-30	26.94	Pass

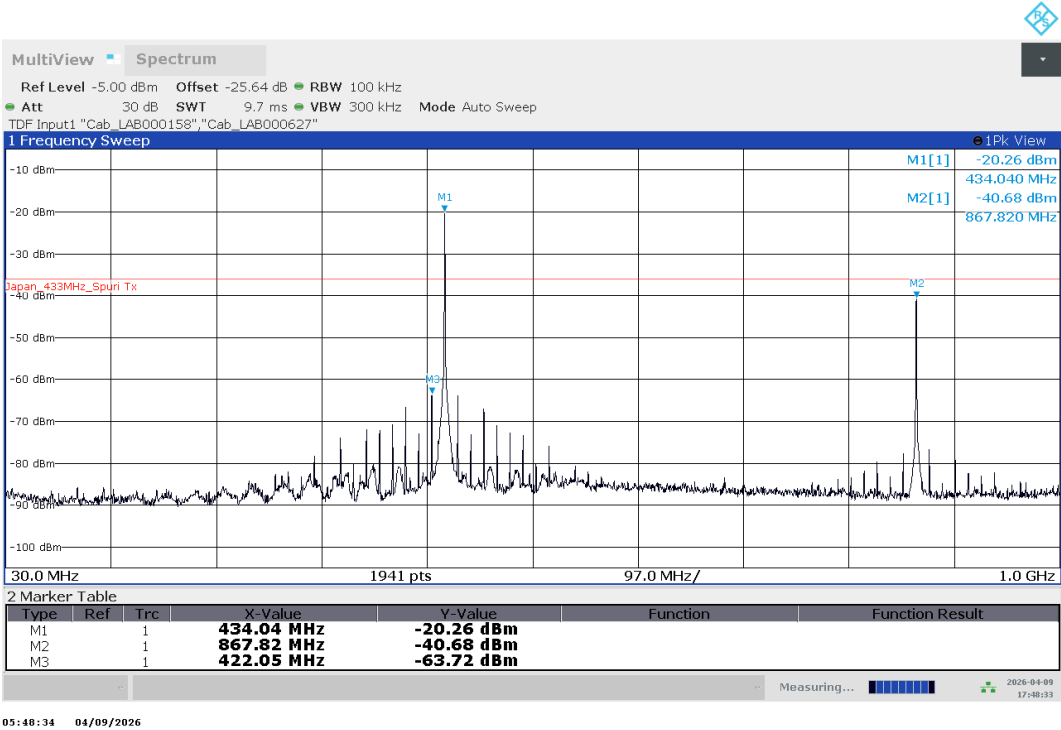
* Please see measurement plots below.

TR no.: 25091930-49335-0

2026-04-14

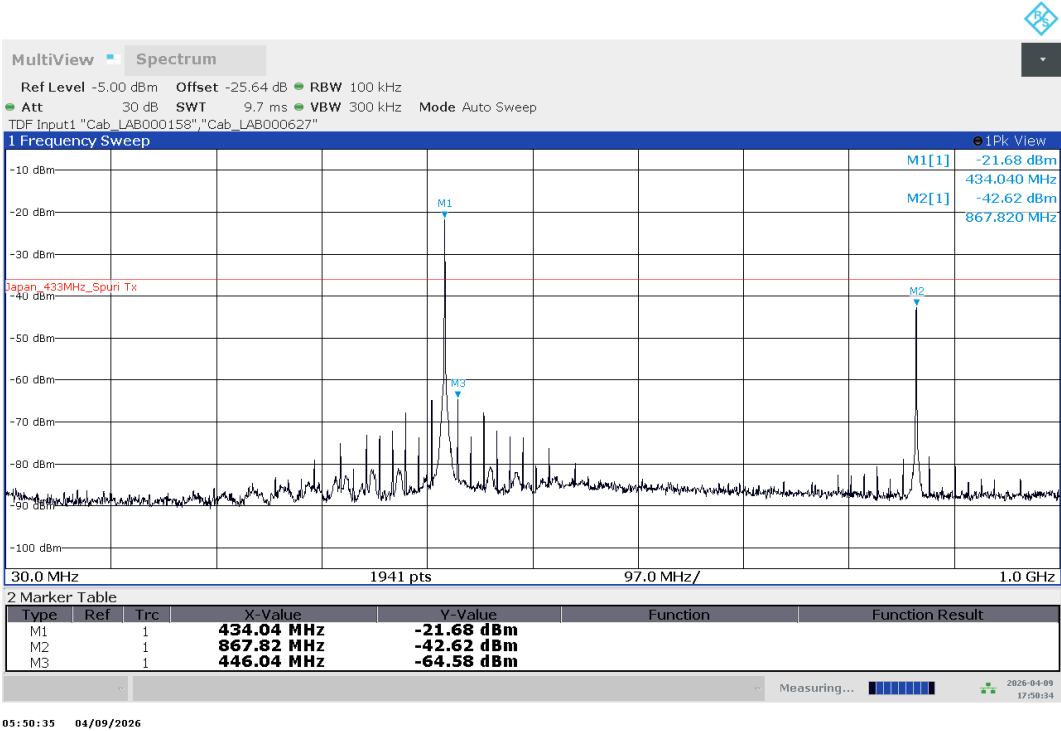
Frequency range: 30 MHz -1000 MHz

7.3.1 Tnom/Vnom, Set-up 1, Op. 2



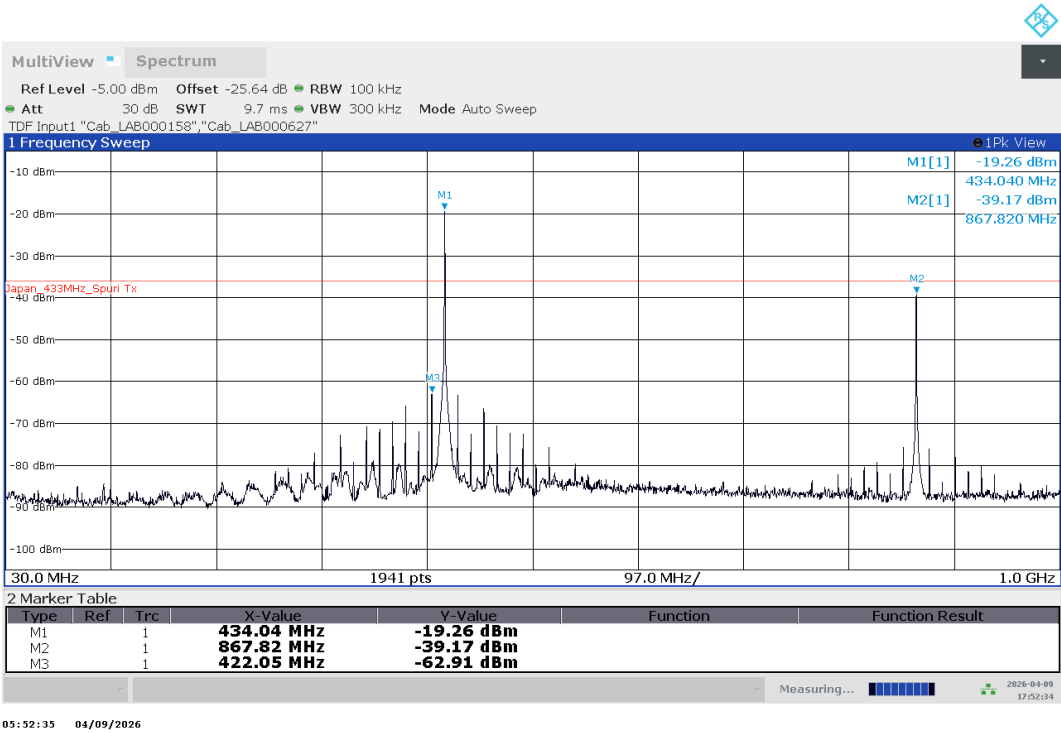
05:48:34 04/09/2026

7.3.2 Tnom/Vmin, Set-up 1, Op. 2



05:50:35 04/09/2026

7.3.3 Tnom/Vmax, Set-up 1, Op. 2

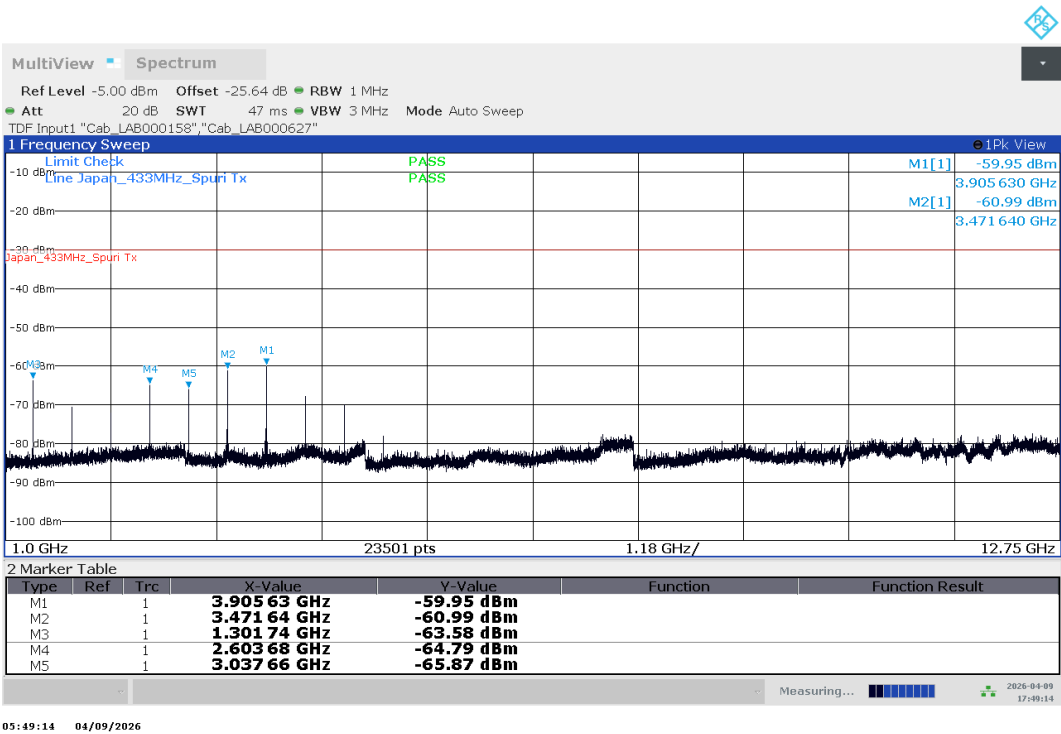


TR no.: 25091930-49335-0

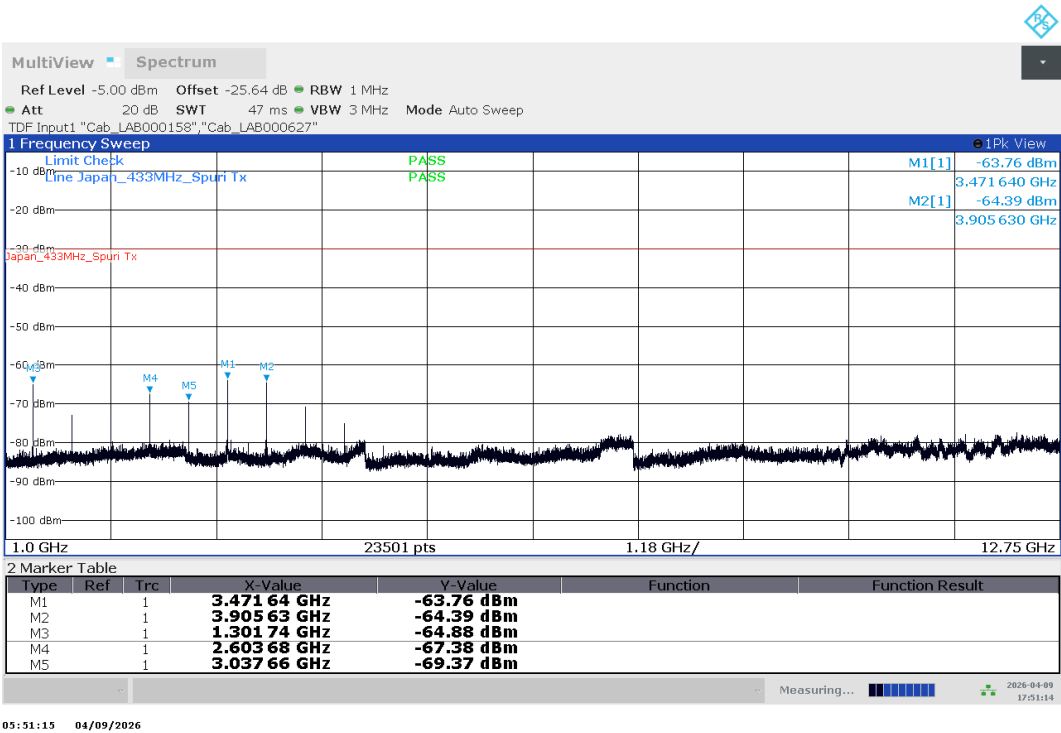
2026-04-14

Frequency range: 1000 MHz -12750 MHz

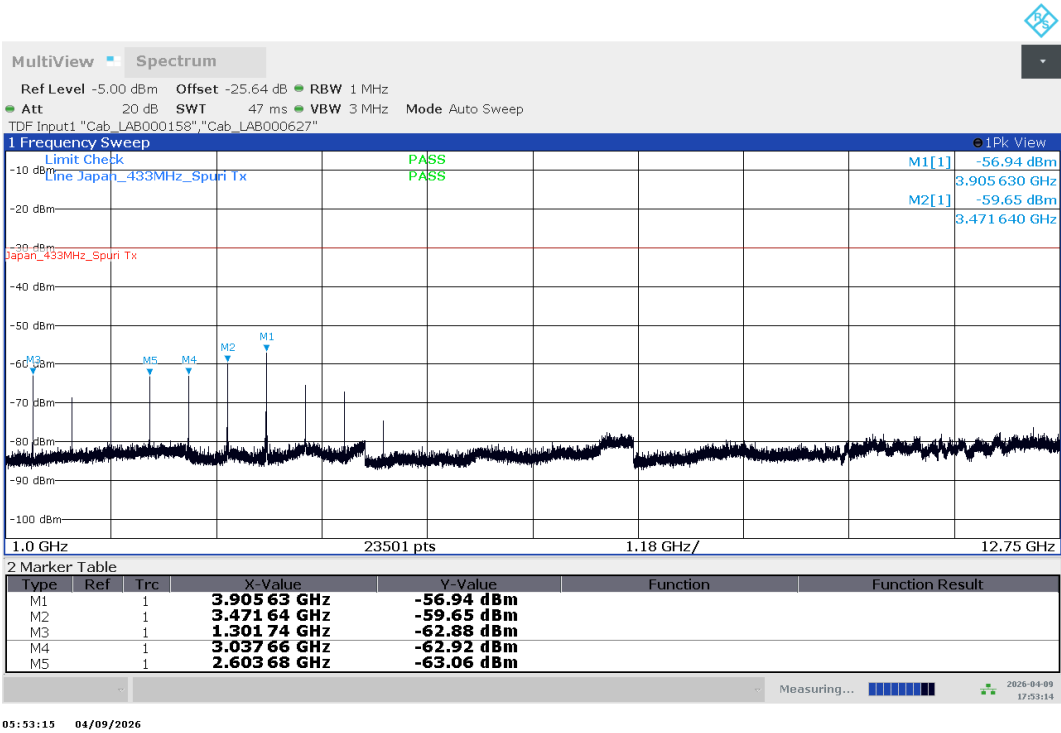
7.3.4 Tnom/Vnom, Set-up 1, Op. 2



7.3.5 Tnom/Vmin, Set-up 1, Op. 2



7.3.6 Tnom/Vmax, Set-up 1, Op. 2



7.4 Restriction Function of Transmission Time

Test equipment (Please see Chapter 8 for exact information of test equipment)

Conducted. Please see Chapter 8.

Description

The measurement was done radiated.

Please see photos in Annex B for test Set-up.

Please see measurement plots below for spectrum analyzer settings.

Limits:

360 sec/hour or less

In the case of periodic transmission:

Transmission time: 1 s or less

Quiescent time: 1 s or more

Results*

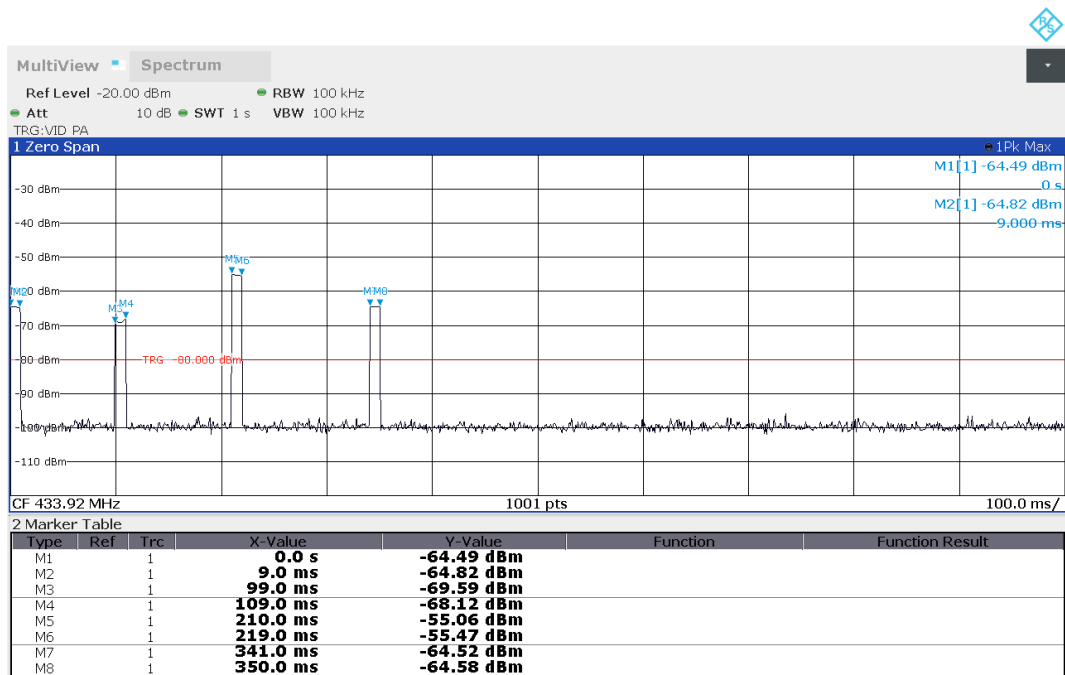
Results

Op./ Set.	Conditions	Measured time, [ms]	Limit**, [s]		Margin, [ms]	Verdict
		Trans. / quies. time	Trans. / quies. time		Trans. / quies. time	
Set.2, Op. 3	Vnom	37 / 25300	≤1	≥1	963/24300	Pass
Set.1, Op. 1	Vnom	37 / 1900	≤1	≥1	963/900	Pass
Op./ Set.	Conditions	Measured time, [s]	Limit**, [s]		Margin, [s]	Verdict
			Total transmission time / 1 hour			
Set.2, Op. 3	Vnom	5.26	360		354.74	Pass
Set.1, Op. 1	Vnom	70.11	360		289.89	Pass

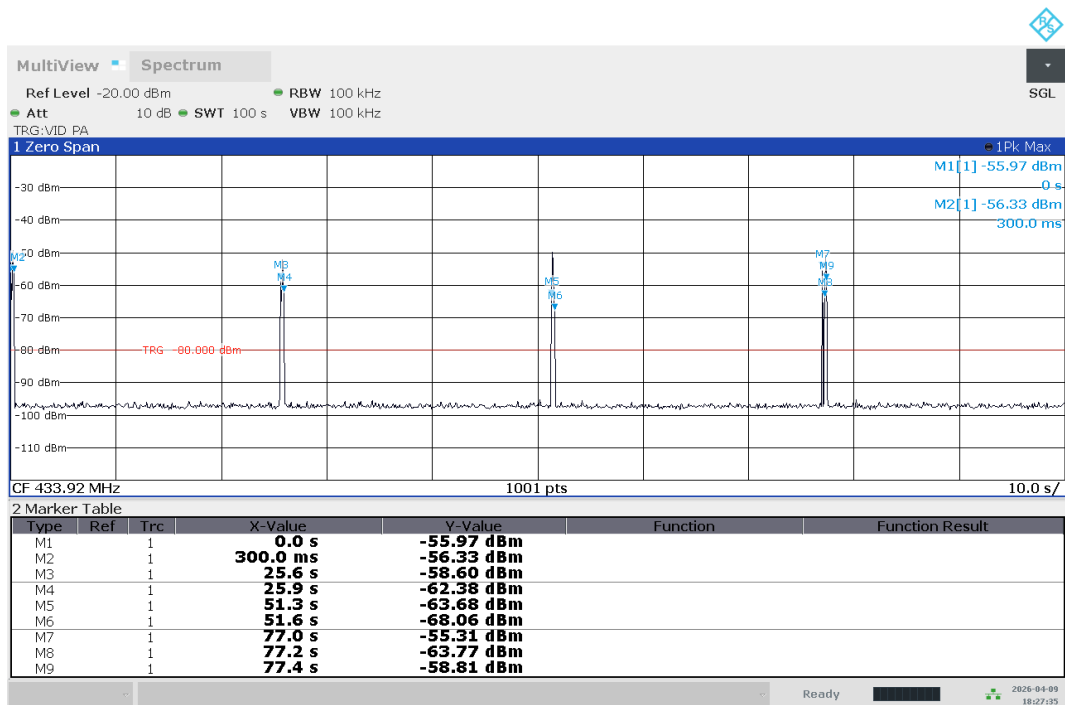
* Please see measurement plots below.

** The manufacturer is responsible for not exceeding this requirement.

7.4.1 Tnom/Vnom, Set-up 2, Op. 3, 1 s

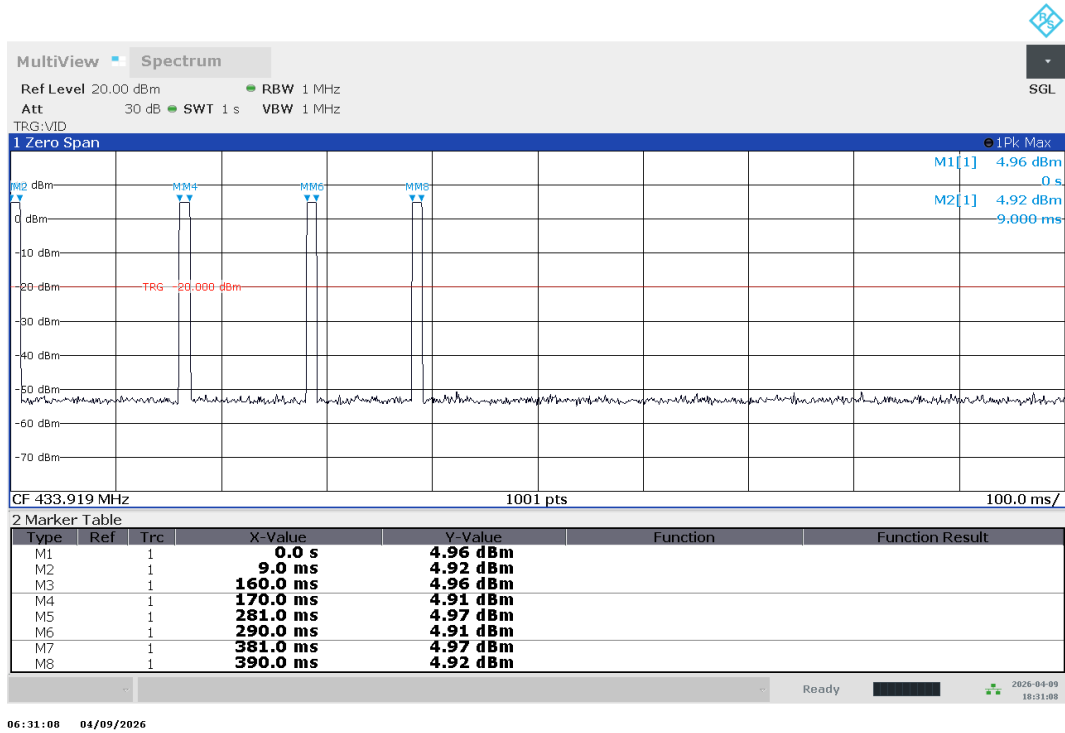


7.4.2 Tnom/Vnom, Set-up 2, Op. 3, 100s

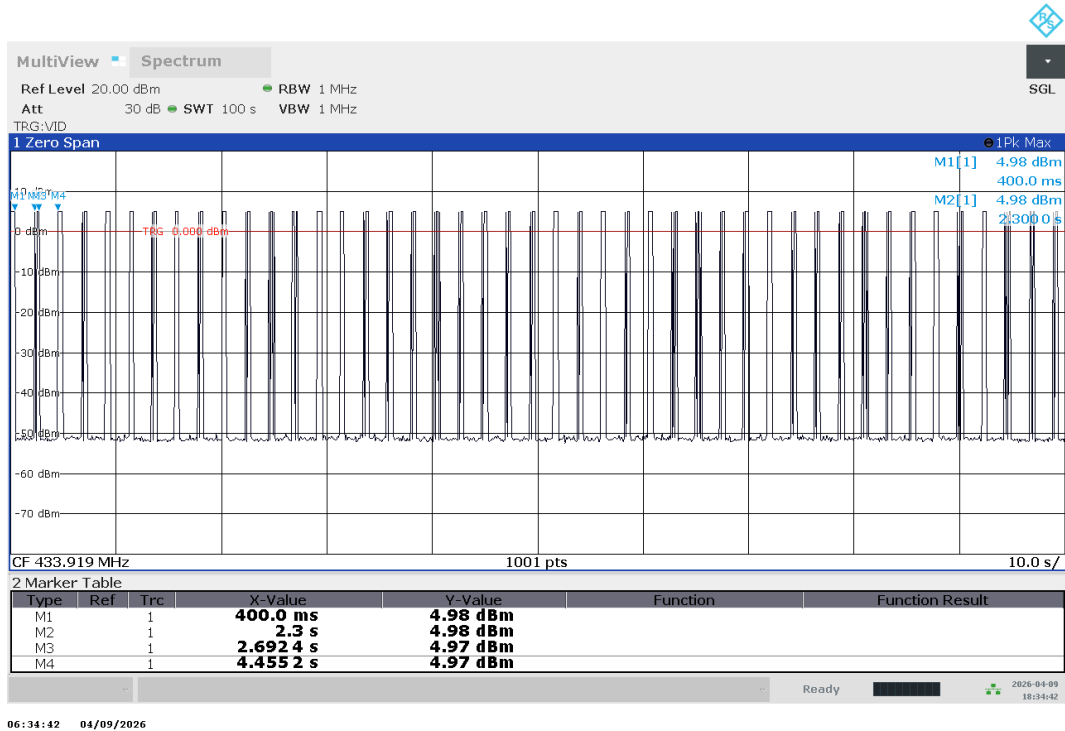


06:27:35 04/09/2026

7.4.3 Tnom/Vnom, Set-up 1, Op. 1, 1 s



7.4.4 Tnom/Vnom, Set-up 1, Op. 1, 100s



8 MEASUREMENT EQUIPMENT**

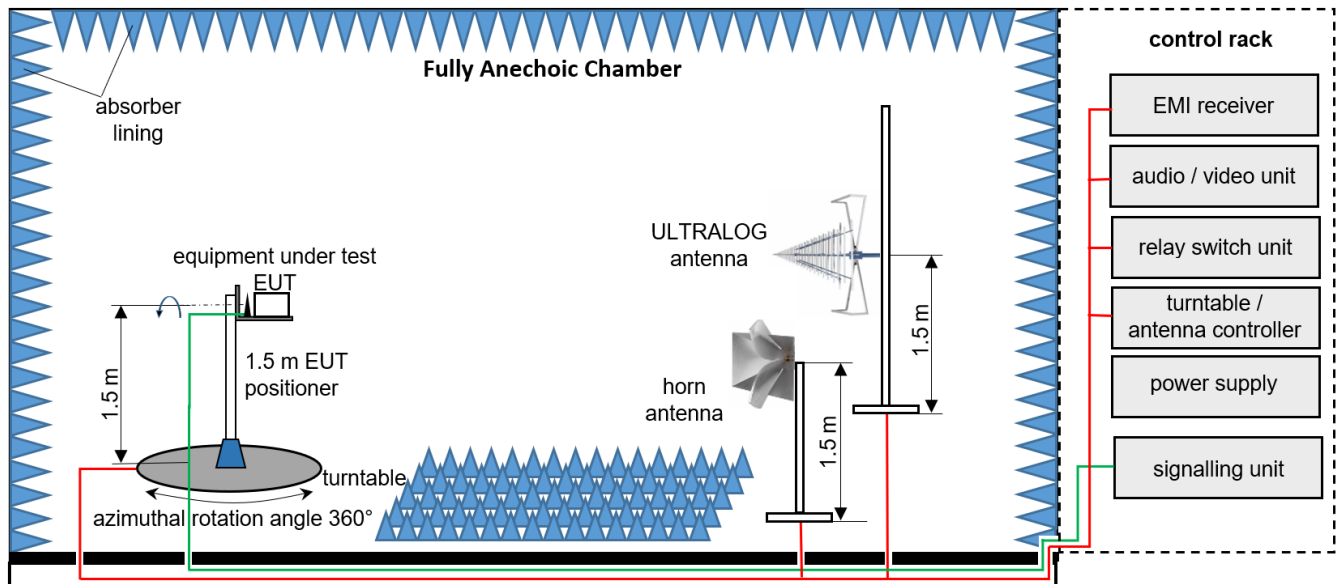
Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements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

Kind of calibration (abbreviations):

- C = calibrated
- CM = cyclic maintenance
- NR = not required
- L = locked

8.1 Fully Anechoic Chamber



Measurement distance: ULTRALOG antenna and horn antenna at 3 m; loop antenna at 3 m
EMC32 software version: 11.20.00 (if used)

Description:

$$\text{EIRP} = \text{AV} + \alpha_{\text{radiated loss}} + G_{\text{antenna}} + G_{\text{amplifier}} + \alpha_{\text{cable loss}}$$

$$P = 10^{\frac{\text{EIRP}_{\text{dBm}}}{10}}$$

- radiated output power $\rightarrow \text{EIRP}_{\text{dBm}}$
- analyzer value $\rightarrow \text{AV}_{\text{dB}}$
- free space loss $\rightarrow \alpha_{\text{radiated loss}_{\text{dB}}}$
- antenna gain $\rightarrow G_{\text{antenna}_{\text{dBi}}}$
- amplifier gain $\rightarrow G_{\text{amplifier}_{\text{dB}}}$
- cable loss $\rightarrow \alpha_{\text{cable loss}_{\text{dB}}}$

Example:

$$\text{EIRP} = -65.0 \text{ dBm} + 50 \text{ dB} - 20 \text{ dBi} + 5 \text{ dB} = -30 \text{ dBm}$$

List of test equipment used:

No.	Equipment	Manufacturer	Type	Serial No.	IBL No.	Kind of Calibration ¹⁾	Last / Next Calibration
1	Power Supply	Elektro-Automatik GmbH & Co. KG	EA-PSI 9080-40 T	2000230001	LAB000313	NR	–
2	Test table	innco systems GmbH	PT1208-080-RH	-	LAB000306	NR	–
3	Positioner	matur GmbH	TD 1.5-10KG		LAB000258	NR	–
4	Compressed Air	Implotex	1-850-30	-	LAB000256	NR	–
5	EMI Test Receiver	Rohde & Schwarz	ESW26	101481	LAB000236	C	2025-06-13 → 12M → 2026-06-13
6	Semi-Anechoic Chamber (SAC)	Albatross Projects GmbH	SAC 5 (Babylon 5)	20168.PR.B	LAB000235	CM	2025-03-18 → 36M → 2028-03-18
7	Measurement Software	Rohde & Schwarz	EMC32 V11.00.10		LAB000226	NR	–
8	Turntable	matur GmbH	TT2.0-2t	TT2.0-2t/921	LAB000225	NR	–
9	Antenna Mast	matur GmbH	CAM4.0-P	CAM4.0-P/316	LAB000224	NR	–
10	Antenna Mast	matur GmbH	BAM4.5-P	BAM4.5-P/272	LAB000223	NR	–
11	Controller	matur GmbH	FCU 3.0	10082	LAB000222	NR	–
12	Multimeter	Keysight	U1242B	MY59240021	LAB000187	C	2025-09-05 → 12M → 2026-09-05
13	Open Switch and Control Platform	Rohde & Schwarz	OSP200 Base Unit 2HU	101748	LAB000149	CM	–
14	Antenna	Rohde & Schwarz	HF907	102898	LAB000124	C	2023-06-13 → 36M → 2026-06-13
15	Antenna	Rohde & Schwarz	HL562E	102219	LAB000832	C	2023-09-12 → 36M → 2026-09-12
16	Antenna	Rohde & Schwarz	HFH2-Z2E - Active Loop Antenna	100954	LAB000108	C	2023-05-05 → 36M → 2026-05-05
17	Pre-Amplifier	Schwarzbeck Mess-Elektronik OHG	BBV 9718 C	84	LAB000169	NR	–
18	Low noise amplifier	B&Z Technologies	BZ-01000900-111550-202320	24336	LAB000296	NR	–
19	Low noise amplifier	B&Z Technologies	BZ-08001800-180855-202020	22105	LAB000297	NR	–
20	High-pass filter (7 GHz – 23 GHz)	AtlantRF	HPF 7-23	-	LAB000444	NR	–
21	High-pass filter (3.3 GHz – 12.75 GHz)	AtlantRF	HPF 3.3-11	-	LAB000382	NR	–
22	High-pass filter (1.3 GHz – 12.75 GHz)	Microwave Circuits Inc	H1G713G1	46291	LAB000443	NR	–

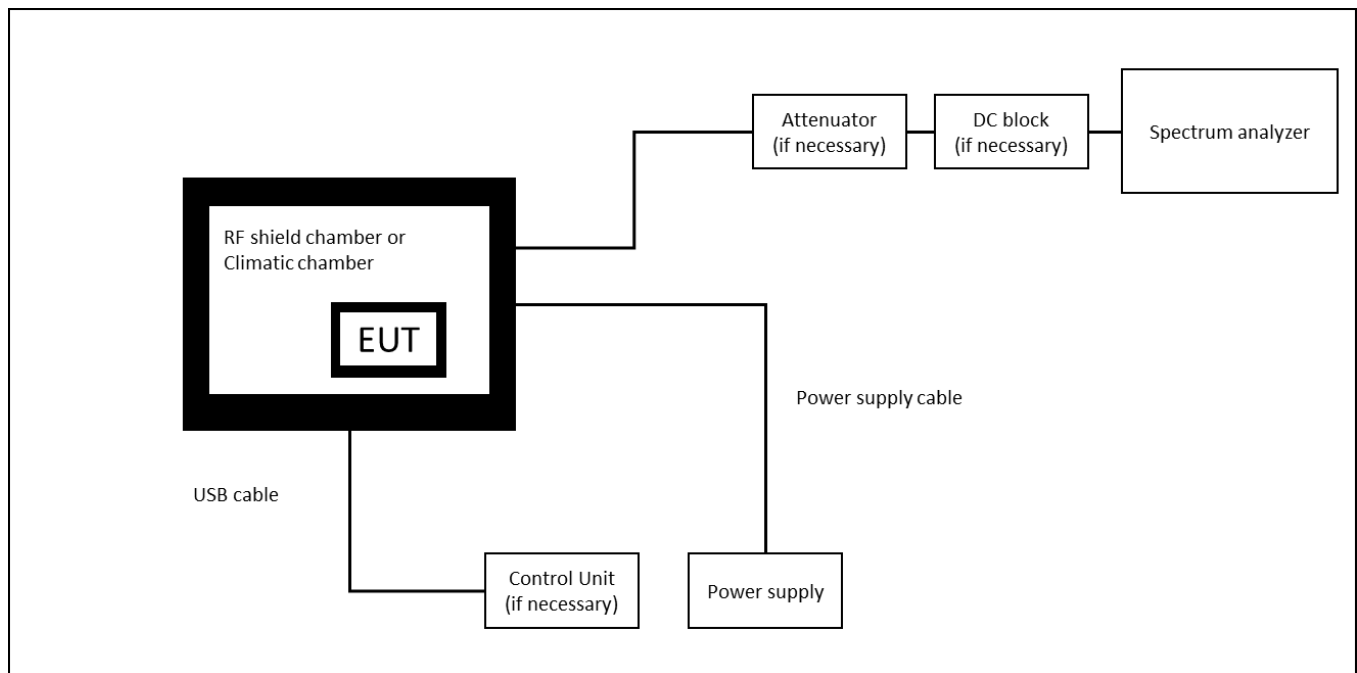
* The gain values of Amp and attenuation values of Cab and Att are remeasured annually internal.

** All the devices in the table above with “Next calibration” date are DAkkS calibrated (Germany), which is equivalent to calibration conducted by the NICT or a designated calibration agency under Article 102-18-1 of the Radio Act.

All the devices without “Next calibration” date were calibrated or/and checked on site by using measuring instruments, which have been calibrated as described above.

1) C- calibrated. CM- cyclic maintenance. NR- not relevant.

8.2 Measurements under normal and extreme climatic conditions



$$FS = UR + CL + AF$$

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

Example calculation:

$$FS [dB\mu V/m] = 12.35 [dB\mu V/m] + 1.90 [dB] + 16.80 [dB\mu V/m] = 31.05 [dB\mu V/m]$$

List of test equipment used:

No.	Equipment	Manufacturer	Type	Serial No.	IBL No.	Calibration
1	Power Supply	Elektro-Automatik GmbH & Co. KG	EA-PS 2042-10 B	2878350263	LAB000191	-
2	Multimeter	Keysight	U1242B	MY59240020	LAB000188	2025-09-05 → 12M → 2026-09-05
3	Spectrum Analyser	Rohde & Schwarz	FSW43	101391	LAB000289	2025-06-12 → 12M → 2026-06-12
4	RF shield box	Rohde & Schwarz	CMW-Z10	101612	LAB000693	-
5	RF cable	Huber & Suhner	ST18/48"	2276454-02	LAB000158	2026-04-08 → 12M → 2027-04-08
6	RF cable	Huber & Suhner	SUCOFLEX 101P	593/1P	LAB000627	2026-04-14 → 12M → 2027-04-14

* The gain values of LNA amplifiers (if used) and attenuation values of cables and attenuators (if used) are remeasured annually internal.

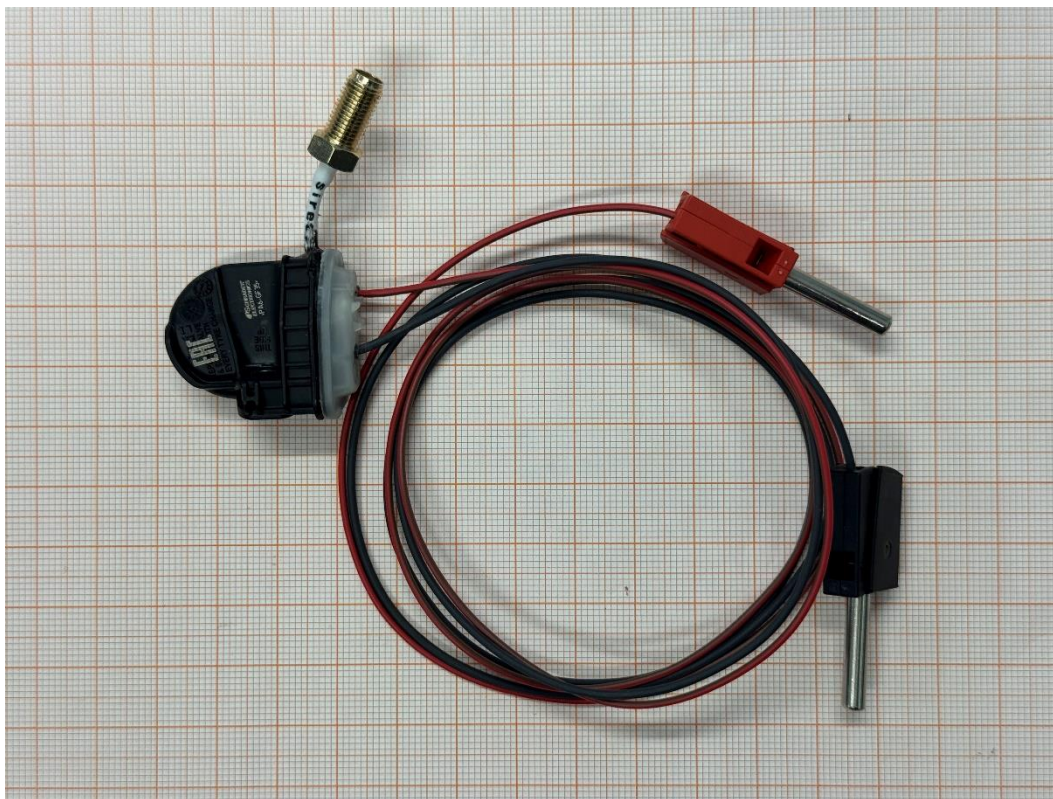
** All the devices in the table above with "Next calibration" date are DAkkS calibrated (Germany), which is equivalent to calibration conducted by the NICT or a designated calibration agency under Article 102-18-1 of the Radio Act. All the devices without "Next calibration" date were calibrated or/and checked on site by using measuring instruments, which have been calibrated as described above.

9 MEASUREMENT UNCERTAINTIES

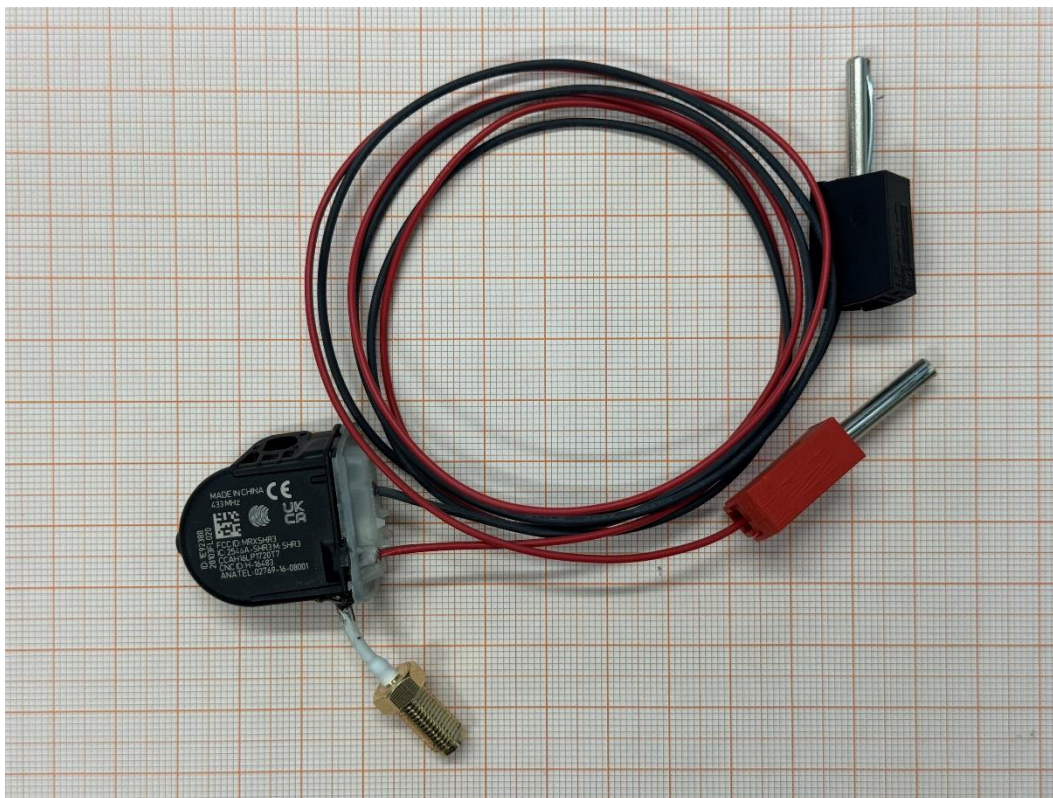
Test case	Measurement uncertainty*
Output power and Output power tolerance	$\leq \pm 6$ dB
Transmitter Spurious Emissions	$\leq \pm 6$ dB
Secondary radiated Emissions Strength Secondary radiated	$\leq \pm 6$ dB
Occupied Bandwidth	± 2.7 %
Radio frequency	± 0.4 ppm
Time domain measurement	± 2.32 ms
DC and low frequency voltages	± 3 %
Temperature	± 1 °C
Humidity	± 3 %

*) The indicated expanded measurement uncertainty corresponds to the standard measurement uncertainty for the measurement results multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %.

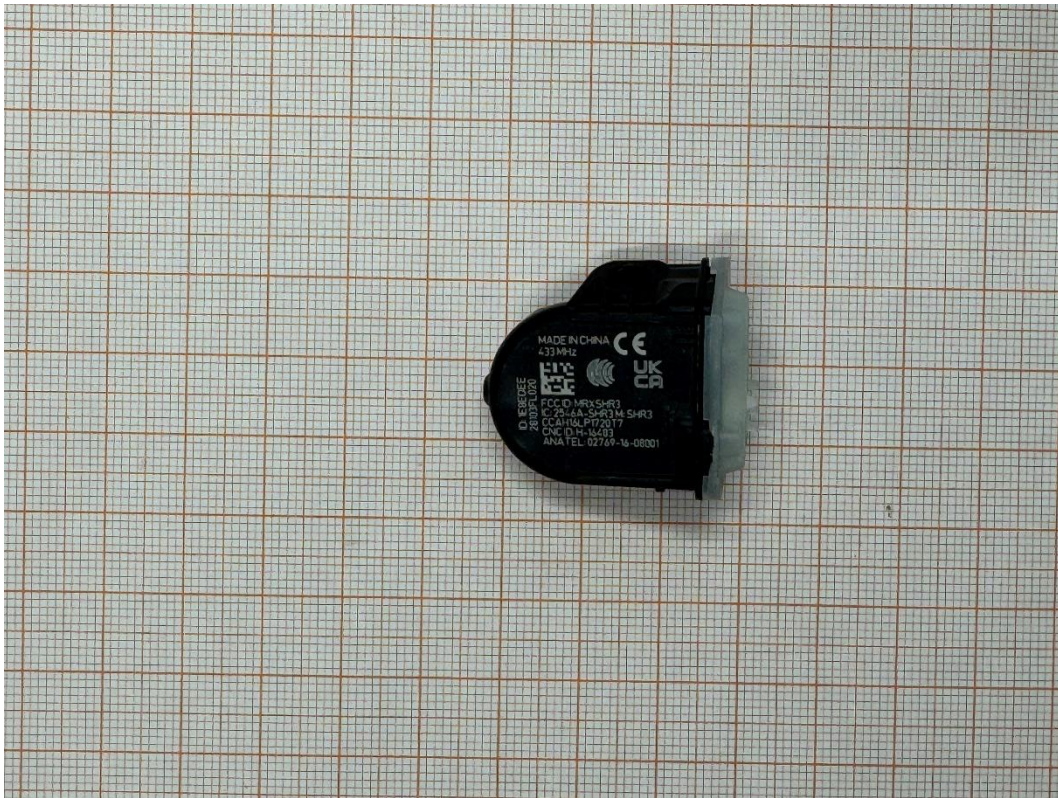
ANNEX A EXTERNAL PHOTOGRAPHS OF EUT



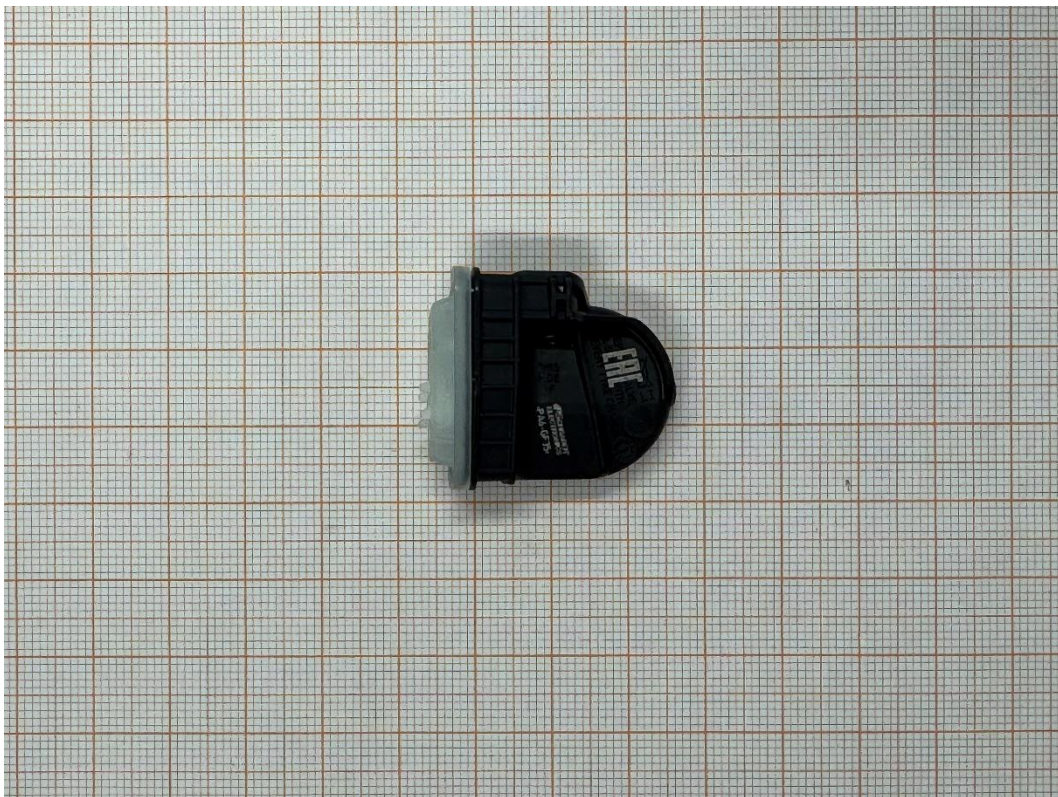
Photograph 1: EUT A, view 1



Photograph 2: EUT A, view 2



Photograph 3: EUT B, view 1



Photograph 4: EUT B, view 2



Photograph 5: AE1

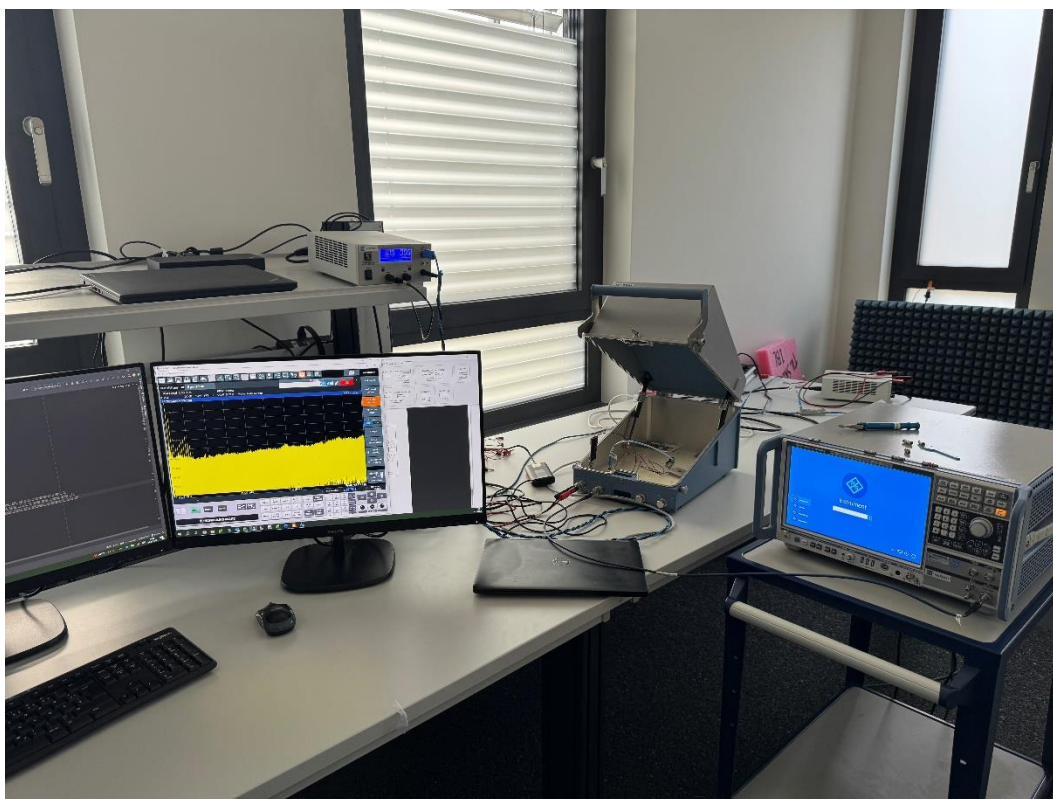


Photograph 6: AE2

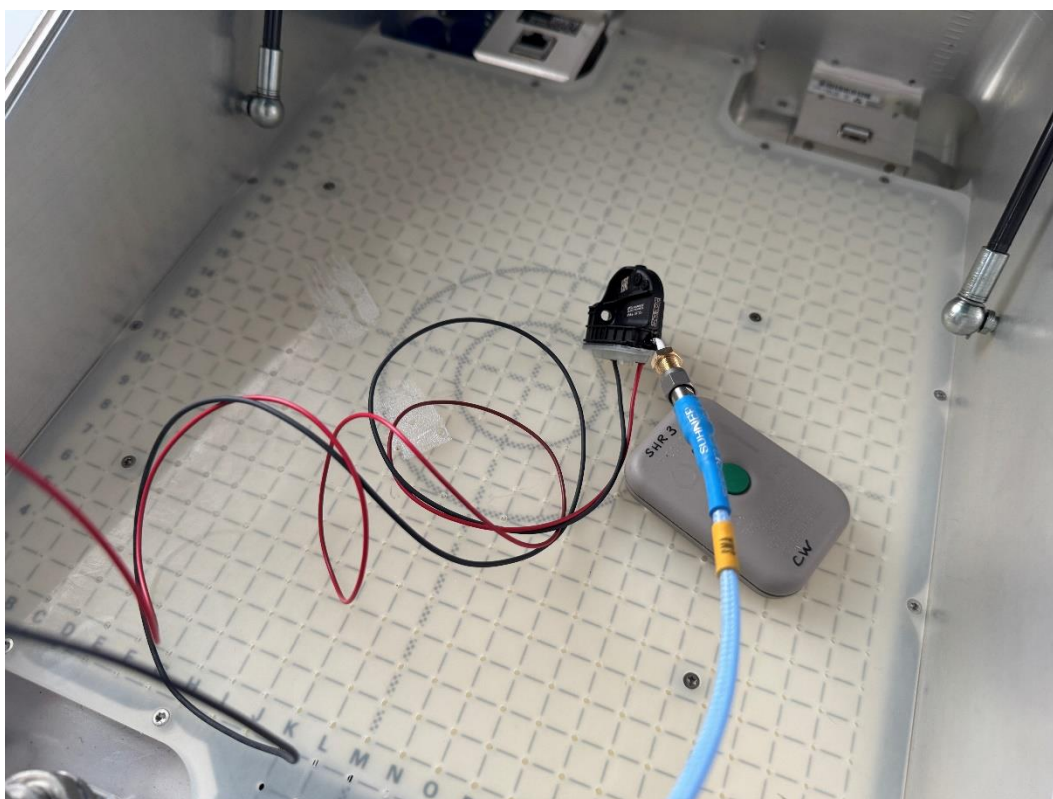


Photograph 7: AE3

ANNEX B TEST SETUP PHOTOGRAPHS



Photograph 8: Conducted measurement, overall view.



Photograph 9: Conducted measurement, close view.



Photograph 10: Test fixture measurement, overall view.



Photograph 11: Test fixture measurement, close view.

END OF TEST REPORT