DAkkS Deutsche Akkreditierungsstelle D-PL-21375-01-00

LENHARDT WORLDWIDE | TESTING | CERTIFICATION

Bundesnetzagentur BNetzA-CAB-21/21-21

Test Report

Test report no.: 25031202-45436-0
Date of issue: 2025-10-20

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

Applicant
Raspberry Pi LTD

Manufacturer
Raspberry Pi LTD

Test Item
Raspberry Pi Compute Module 0

RF-Spectrum Testing according to:

FCC 47 CFR Part 15
Radio Frequency Devices – Subpart C
§ 15.247 Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz

RSS-247, Issue 4 (2025-07)
Digital Transmission Systems, Frequency Hopping Systems and Licence-Exempt Local Area Network Devices in 902-928 MHz, 2400-2483.5 MHz, 5150-5350 MHz, and 5470-5895 MHz bands

RSS-Gen, Issue 5 (2018-04) & A1 (2019-03) & A2 (2021-02)
General Requirements for Compliance of Radio Apparatus

Tested by (name, function, signature)	*Karsten Geraldy* *Lab Manager RF*	signature
Approved by (name, function, signature)	*Andreas Bender* *Deputy Managing Director*	signature

Applicant and Test item details	
Applicant	Raspberry Pi LTD 194 Cambridge Science Park, Milton Road CB4 0AB, Cambridge, United Kingdom Fon: +44 (0) 1223 322 633
Manufacturer	Raspberry Pi LTD 194 Cambridge Science Park, Milton Road CB4 0AB, Cambridge, United Kingdom
Test item description	Single board computer module design for embedded computing applications.
Model/Type reference	Raspberry Pi Compute Module 0
Standard specific information	
FCC ID	2ABCB-RPICM0
IC	20953-RPICM0
HMN	N/A
PMN	CM0
HVIN	CM0
FVIN	N/A
Technology	WiFi 2.4 GHz, 802.11 b/g/n
Frequency	2.4 GHz ISM band (2400 – 2483.5 MHz)
Antenna	external antenna
Power supply	5.0 V – 5.1 V DC
Temperature range	-20 °C – +50 °C

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.
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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.

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 according to ILAC-G8:09/2019

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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
Accreditation / Designation	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: • Attachment to the accreditation certificate D-PL-21375-01-00 ○ Electronics ○ Electromagnetic Compatibility ○ Radio ○ Electromagnetic Compatibility and Telecommunication (FCC requirements) ○ Telecommunication (TC) and Electromagnetic Compatibility (EMC) for Canadian Standards ○ Automotive EMC Website DAkkS: https://www.dakks.de/ The Deutsche Akkreditierungsstelle GmbH (DAkkS) is also a signatory to the ILAC Mutual Recognition Arrangement. • Designations ○ FCC Testing Laboratory Designation Number DE0024 ○ ISED ISED Company Number 27156 Testing Laboratory CAB Identifier DE0020 ○ Kraftfahrt-Bundesamt KBA-P 00120-23
Testing location	**IBL-Lab GmbH** Heinrich-Hertz-Allee 7 66386 St. Ingbert / Germany
Date of receipt of test samples	2025-06-26
Start – End of tests	2025-07-21 – 2025-10-08

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 Document history

-0 Initial Version

2.6 Further documents

List of further applicable documents belonging to the present test report:
– no additional documents –

3 ENVIRONMENTAL & TEST CONDITIONS

3.1 Environmental conditions of test laboratory

Temperature	20°C ± 5°C
Relative humidity	25-75 % r.H.
Barometric Pressure	860-1060 mbar
Power supply	230 V / 50 Hz

3.2 Normal and extreme test conditions

	minimum	nominal	maximum
Temperature	-20 °C	20 °C	+50 °C
Relative humidity	-/-	45 % r.h.	-/-
Power supply	5.0 V DC	5.1 V DC	5.1 V DC

4 TEST STANDARDS AND REFERENCES

Test standard (accredited)	Description
FCC 47 CFR Part 15	Radio Frequency Devices – Subpart C § 15.247 Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz
RSS-247, Issue 4 (2025-07)	Digital Transmission Systems, Frequency Hopping Systems and Licence-Exempt Local Area Network Devices in 902-928 MHz, 2400-2483.5 MHz, 5150-5350 MHz, and 5470-5895 MHz bands
RSS-Gen, Issue 5 (2018-04) & A1 (2019-03) & A2 (2021-02)	General Requirements for Compliance of Radio Apparatus

Reference	Description
ANSI C63.4-2014 / A1-2017	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 (2014-06-13) + A1 (2017-09-15)
ANSI C63.10-2020 / Cor1-2023 / A1-2024 / A1-2024 (errata)	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (2020-09-10) + Cor1 (2023-04-10) + A1 (2024-08-08) + Errata A1 (2024-11-18)
558074 D01 15.247 Meas Guide v05r02	Guidance for compliance measurements on digital transmission systems, frequency hopping spread spectrum systems and hybrid system devices operating under section 15.247 of the FCC rules

5 EQUIPMENT UNDER TEST (EUT)

5.1 Product Description

Single board computer module design for embedded computing applications.

*: as declared by applicant

5.2 Test Item Description

Model name*	Raspberry Pi Compute Module 0
Serial number*	conducted sample: #1 radiated sample: #3
Hardware status*	v1
Software status*	v1

*: as declared by applicant

5.3 Technical Data of Equipment

Technology*	WiFi 2.4 GHz, 802.11 b/g/n
Operational frequency band*	2.4 GHz ISM band (2400 – 2483.5 MHz)
Operational carrier frequency*	2412 MHz – 2462 MHz
Modulation type*	802.11b: DSSS (DBPSK, DQPSK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Data rate*	802.11b: 1 Mbps – 11 Mbps 802.11g: 6 Mbps – 54 Mbps 802.11n: up to 260 Mbps
Number of channels*	11
Channel bandwidth*	20 MHz
Channel spacing*	5 MHz
Receiver category*	1
Antenna*	external antenna
Antenna gain*	3.7 dBi
Power supply*	5.0 V – 5.1 V DC
Temperature range*	-20 °C – +50 °C

*: as declared by applicant

5.4 Additional Information

Model differences	– none –
Ancillaries tested with	– none –
Additional equipment used for testing	tp-link Archer AX1800 Dual Band Wi-Fi 6 Router and Raspberry Pi 500+ with test tool / test script

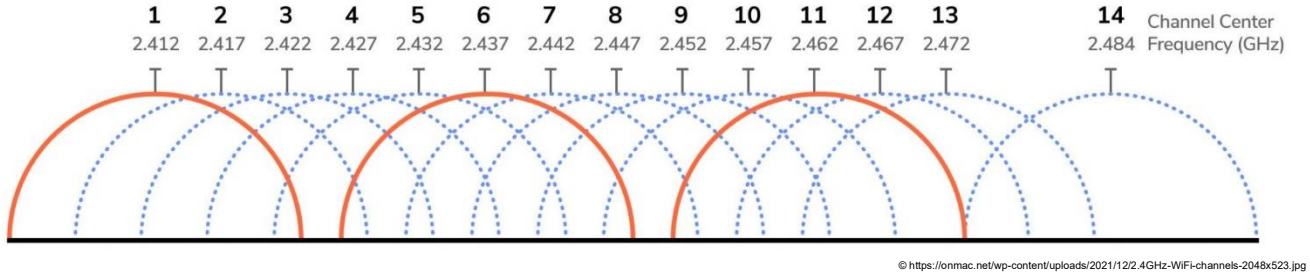
5.5 Test modes	
OP 1	b-mode, DSSS – DBPSK, 1 Mbps
OP 2	g-mode, OFDM – BPSK, ½, 6 Mbps
OP 3	n-mode HT20, MCS0, OFDM – BPSK, ½, 6.5 Mbps
Channels	Channels used for testing are marked in bold in channel list below
Worst case configuration with respect to RF output power *	No worst case configuration, all tests performed with above listed test modes.

* Worst case analysis according to ANSI C63.10, 5.6.2 has been performed based on conducted RF peak output power measurements resp. peak PSD measurements.

Channel list with **22 MHz (b-mode) / 20 MHz (g-, n-mode)** channel bandwidth:

2400 to 2483.5 DTS band channel number & center frequency													
channel	**1**	2	3	4	5	**6**	7	8	9	10	**11**	12	13
f_c / MHz	**2412**	2417	2422	2427	2432	**2437**	2442	2447	2452	2457	**2462**	2467	2472

WiFi 2.4 GHz channel plan (informative):



© https://onmac.net/wp-content/uploads/2021/12/2.4GHz-WiFi-channels-2048x523.jpg

6 SUMMARY OF TEST RESULTS

Test specification
FCC 47 CFR Part 15 RSS-247, Issue 4 (2025-07) / RSS-Gen, Issue 5 (2018-04) & A1 (2019-03) & A2 (2021-02)

Clause	Requirement / Test Case	Remark	Result	Verdict
15.247 (a)(2) RSS-247, 6.3.1 a)	DTS bandwidth (6 dB)	KDB 558074, clause: 8.2	≥ 9.10 MHz	**- PASS -**
RSS Gen, 6.7	Occupied bandwidth (99%)	-/-	≤ 16.50 MHz	**- PASS -**
15.247 (b)(1) RSS-247, 6.3.2	RF output power (peak power)	KDB 558074, clause: 8.3.1	25.4 dBm	**- PASS -**
15.247 (b)(4) RSS-247, 6.3.2	Antenna gain /Peak EIRP	-/-	3.7 dBi 29.1 dBm	**- PASS -**
15.247 (e) RSS-247, 6.3.1 b)	Peak power spectral density	KDB 558074, clause: 8.4	6.2 dBm/MHz	**- PASS -**
15.247 (d) RSS-247, 6.6	Band edge compliance (BEC), conducted	KDB 558074, clause: 8.5	< limit	**- PASS -**
15.247 (d) RSS-247, 6.6	Band edge compliance (BEC), radiated	KDB 558074, clause: 8.7	< limit	**- PASS -**
15.247 (d) RSS-247, 6.6	Conducted spurious emissions (CSE)	KDB 558074 DTS clause: 8.5	< limit	**- PASS -**
15.247(d) / §15.209 RSS-247, 6.6 / RSS-Gen, 8.9	Radiated spurious emissions (RSE)	-/-	< limit	**- PASS -**
§15.207 RSS-Gen, 8.8	AC conducted emissions	-/-	< limit	**- PASS -**

Comments and observations
Following pages show requirements and references of FCC Part 15.247, ANSI C63.10 and KDB 558074 only. Same tests are also applicable and valid for RSS-247, with clauses given in table above.

7 TEST RESULTS

7.1 DTS Bandwidth (6 dB)

Applicability
This requirement applies to all types of DTS equipment.

Description
The DTS Bandwidth is defined as the 6 dB bandwidth.

Limit
§15.247
(a)(2) The minimum 6 dB bandwidth shall be at least 500 kHz.

RSS-247, 6.3.1
a) the minimum 6 dB bandwidth shall be 500 kHz.

Test procedure
ANSI C63.10, 11.8
The steps are as follows:
a) Set RBW = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz.
b) Set the VBW ≥ [3 × RBW].
c) Detector = peak.
d) Trace mode = max-hold.
e) Sweep = No faster than coupled (auto) time.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission by placing two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "−6 dB down amplitude". If a marker is below this "−6 dB down amplitude" value, then it shall be as close as possible to this value.

Test setup: 8.4 with conducted test sample in test mode (see section 5.2)

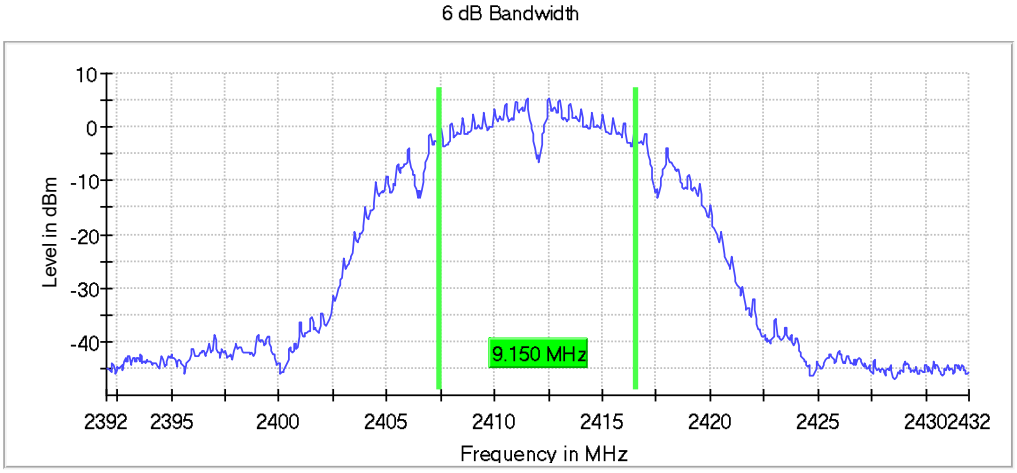
Test Results

EUT Mode	DTS Bandwidth (6 dB)			Limit [MHz]
	low channel [MHz]	mid channel [MHz]	high channel [MHz]	
OP 1	9.150	9.150	**9.100**	≥ 0.5
OP 2	15.20	15.20	15.20	≥ 0.5
OP 3	15.20	15.20	15.20	≥ 0.5

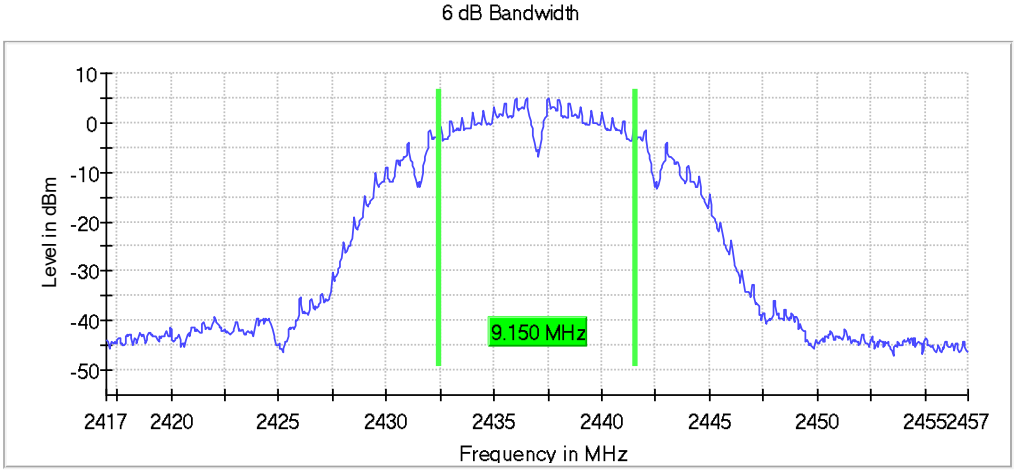
Comment:	---

Verdict	**- PASS -**	see next plots

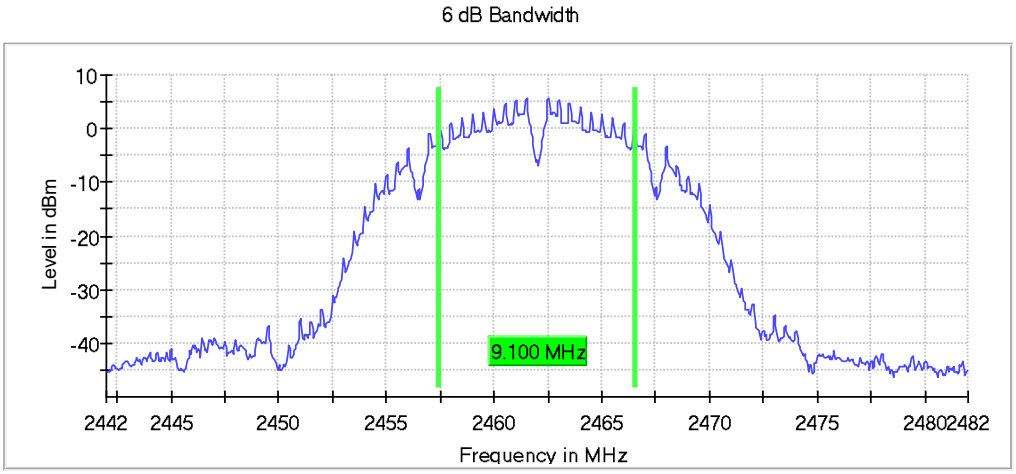
Plot 1: DTS Bandwidth (6 dB), OP 1, low channel



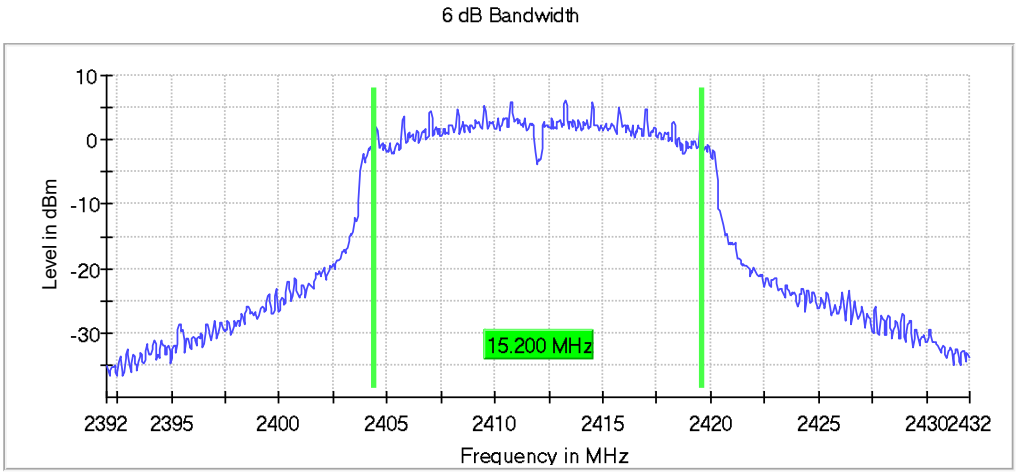
Plot 2: DTS Bandwidth (6 dB), OP 1, mid channel



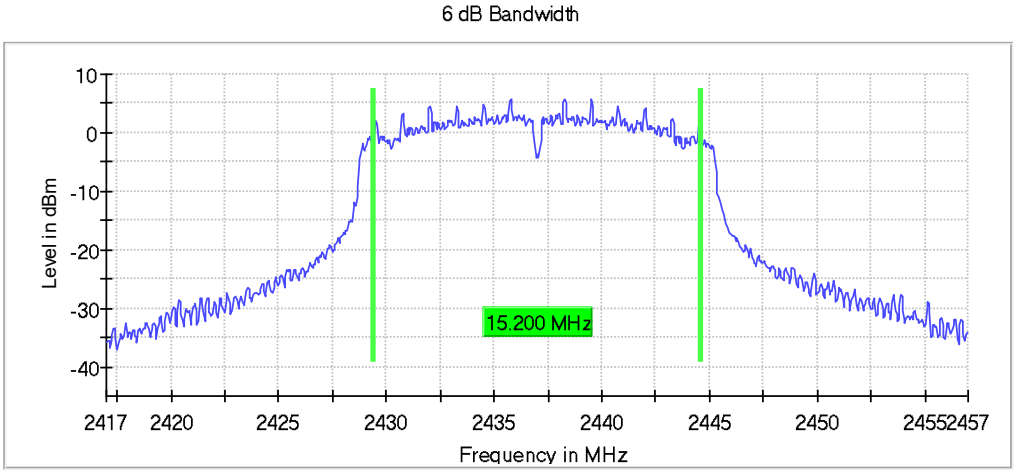
Plot 3: DTS Bandwidth (6 dB), OP 1, high channel



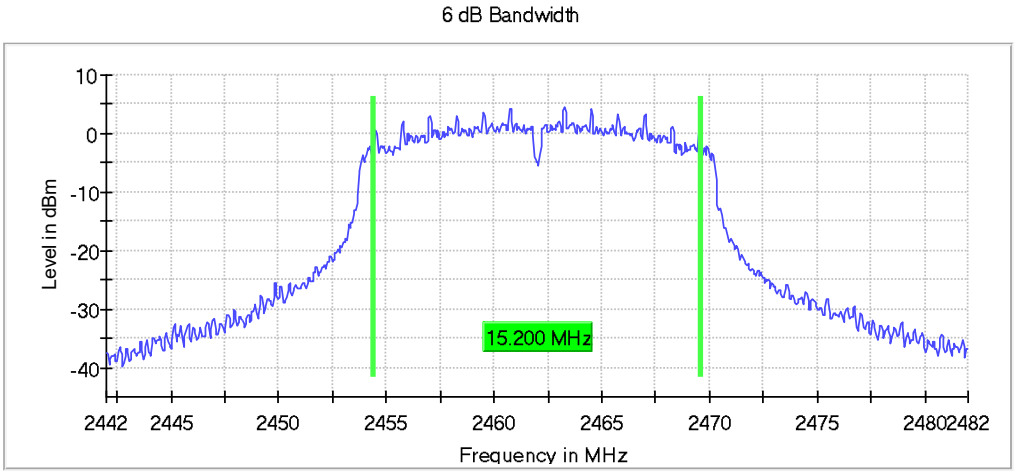
Plot 4: DTS Bandwidth (6 dB), OP 2, low channel



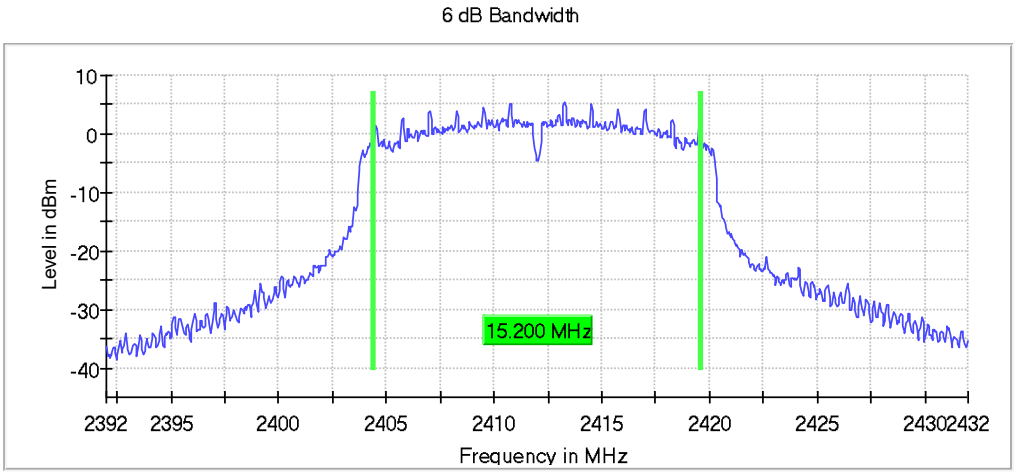
Plot 5: DTS Bandwidth (6 dB), OP 2, mid channel



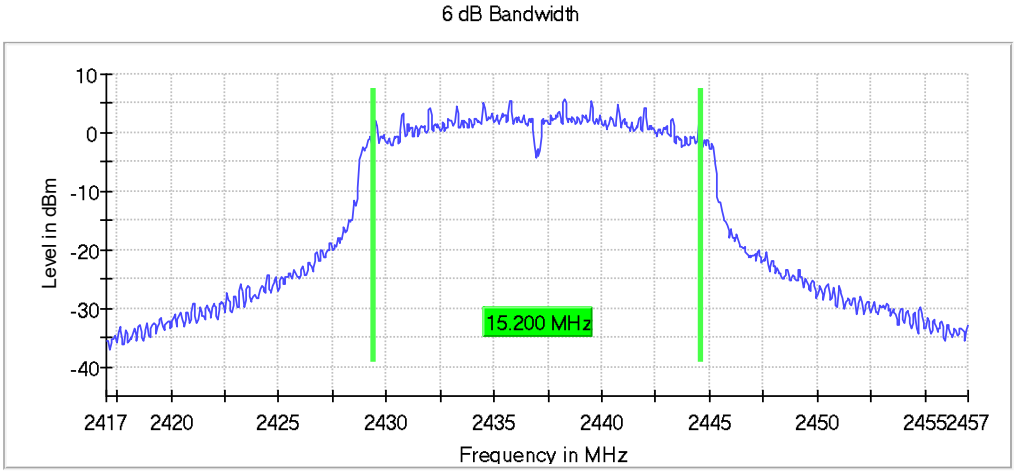
Plot 6: DTS Bandwidth (6 dB), OP 2, high channel



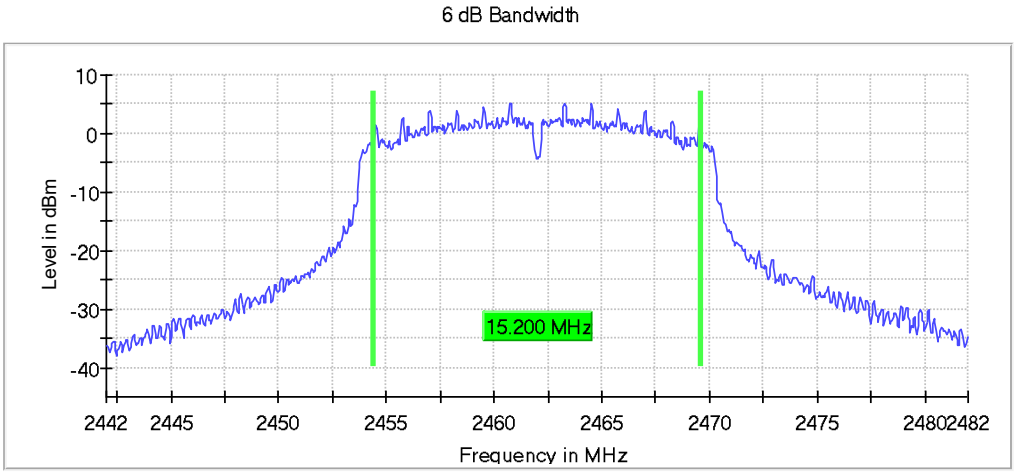
Plot 7: DTS Bandwidth (6 dB), OP 3, low channel



Plot 8: DTS Bandwidth (6 dB), OP 3, mid channel



Plot 9: DTS Bandwidth (6 dB), OP 3, high channel



7.2 Occupied Bandwidth (99% OBW)

Applicability
This requirement applies to all types of DTS equipment.

Description
RSS-Gen, 6.7
The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

Limit
No limit defined.

Test procedure
ANSI C63.10a-2024, 6.9.1 General requirements
The minimum resolution bandwidth shall be set according to the frequency range as follows:

Frequency range	Resolution Bandwidth
9 kHz – 30 MHz	0.1 kHz
30 MHz – 1000 MHz	1 kHz
Above 1000 MHz	10 kHz

At the frequency range boundaries, the smaller resolution bandwidth shall be used.

ANSI C63.10, 6.9.3 Occupied bandwidth-power bandwidth (99%) measurement procedure
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, without going below the values in 6.9.1 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).

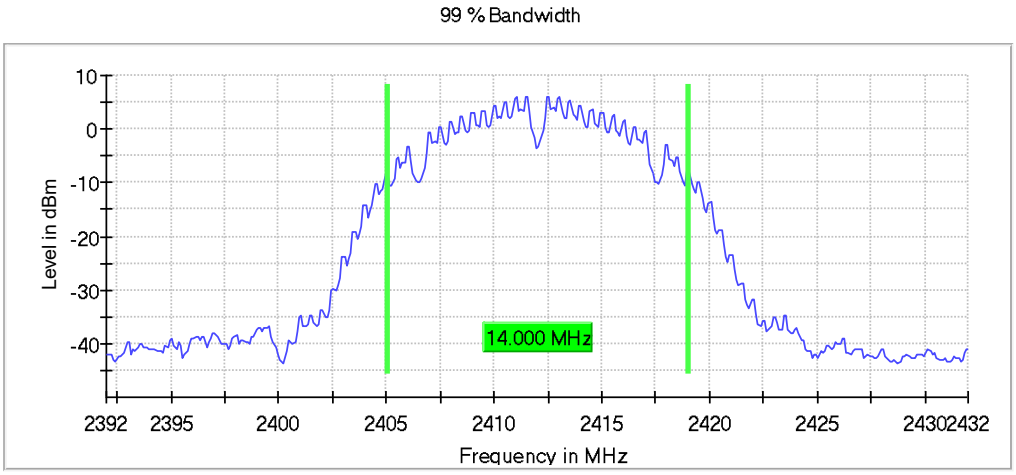
Test setup: 8.4 with conducted test sample in test mode (see section 5.2)

Test Results			
EUT Mode	**Occupied Bandwidth (99%)**		
	low channel [MHz]	**mid channel [MHz]**	**high channel [MHz]**
OP 1	14.00	14.10	14.00
OP 2	16.40	16.40	16.40
OP 3	16.40	16.30	**16.50**

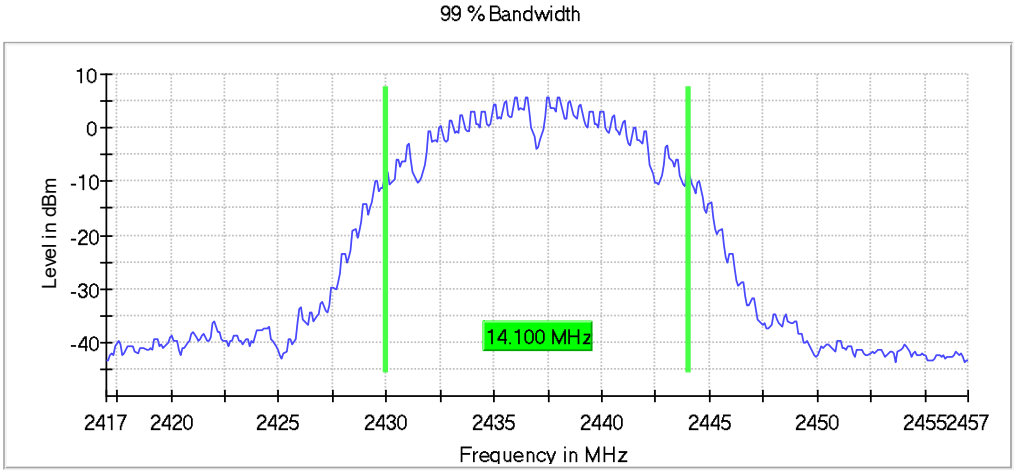
Comment:	---

Verdict	**- PASS -**	see next plots

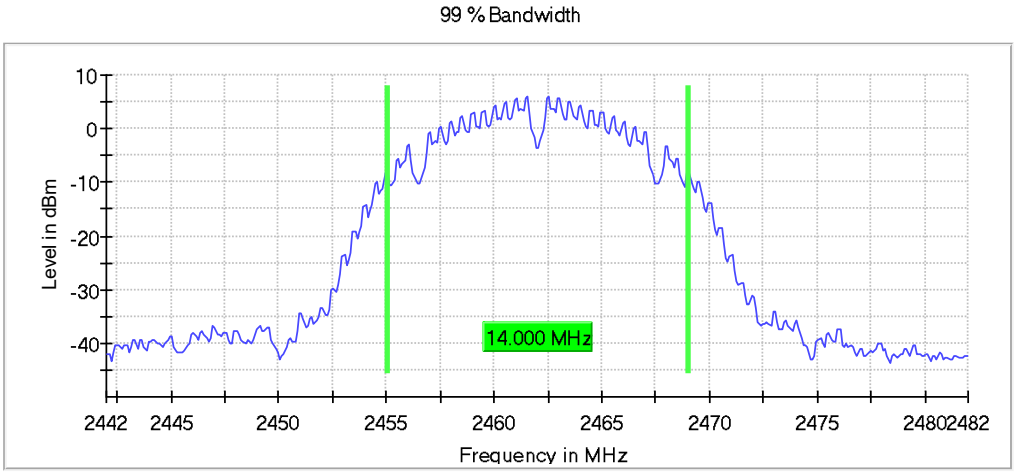
Plot 10: 99% Occupied Bandwidth, OP 1, low channel



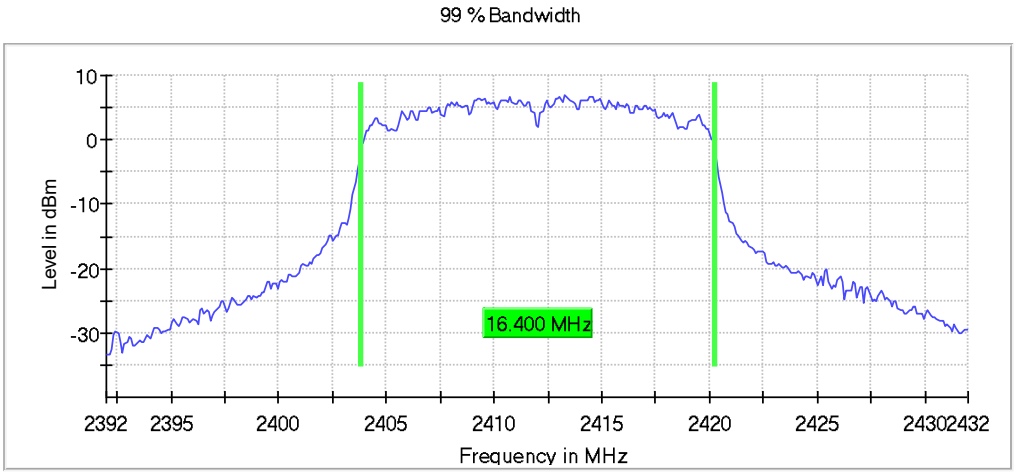
Plot 11: 99% Occupied Bandwidth, OP 1, mid channel



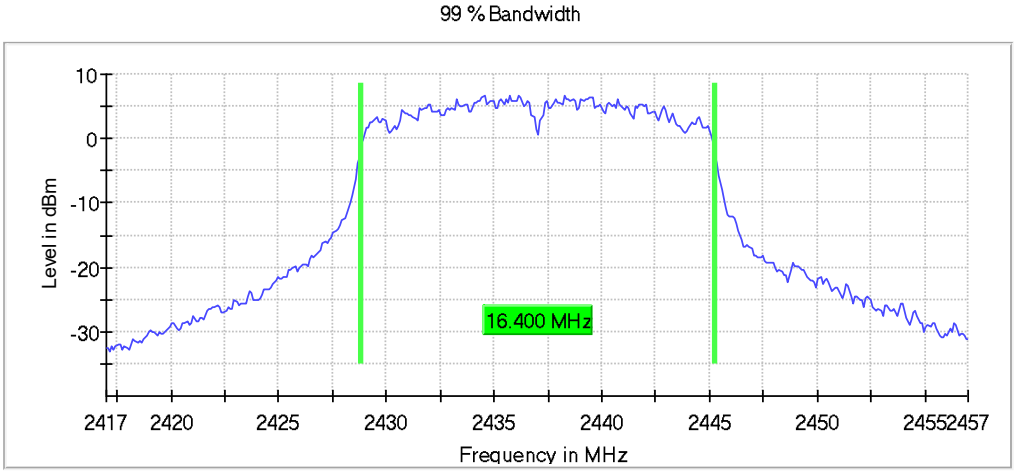
Plot 12: 99% Occupied Bandwidth, OP 1, high channel



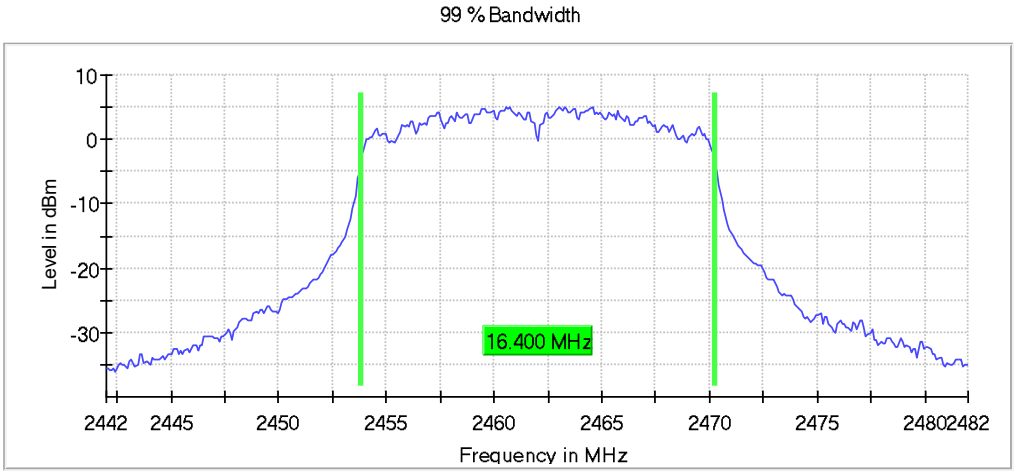
Plot 13: 99% Occupied Bandwidth, OP 2, low channel



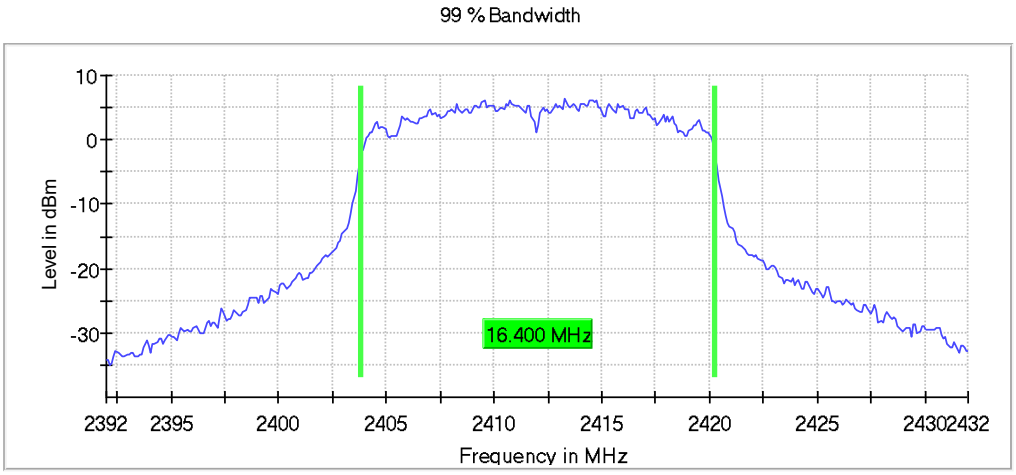
Plot 14: 99% Occupied Bandwidth, OP 2, mid channel



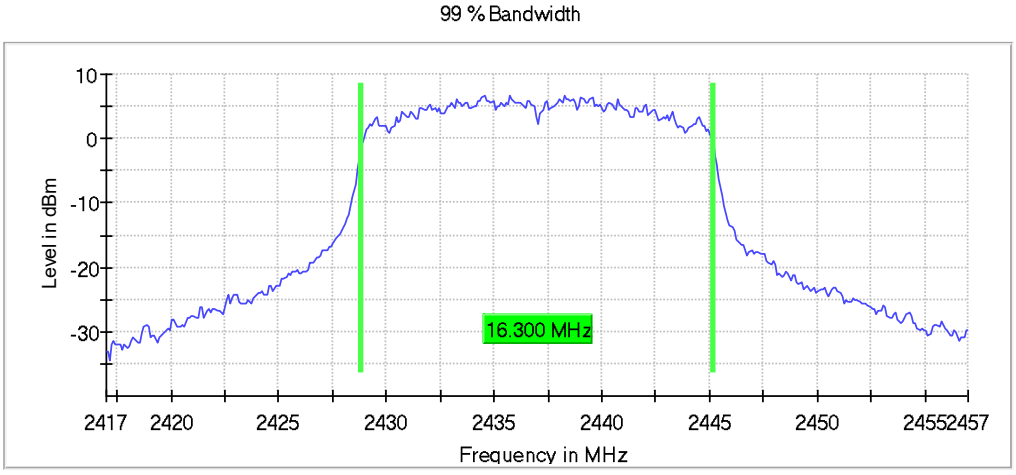
Plot 15: 99% Occupied Bandwidth, OP 2, high channel



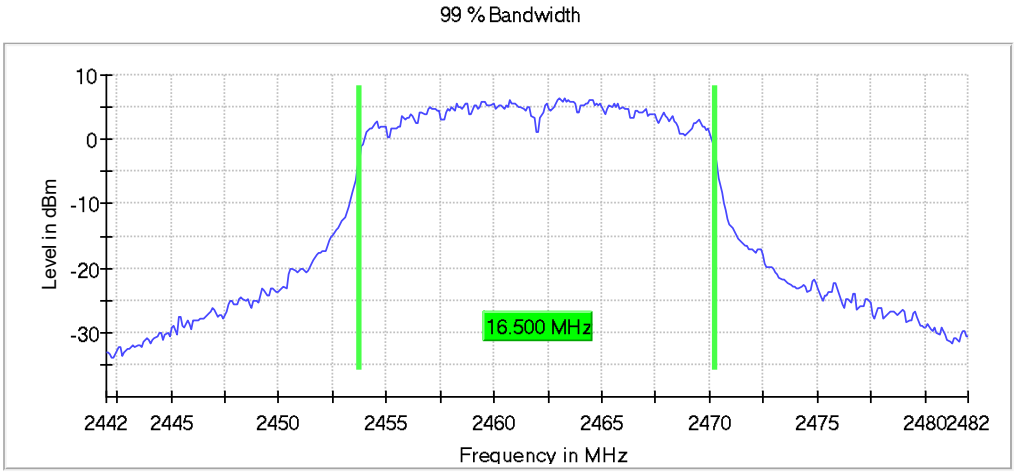
Plot 16: 99% Occupied Bandwidth, OP 3, low channel



Plot 17: 99% Occupied Bandwidth, OP 3, mid channel



Plot 18: 99% Occupied Bandwidth, OP 3, high channel



7.3 RF Output Power (conducted peak power)

Applicability
This requirement applies to all types of DTS equipment.

Description
The RF Output Power is defined as the conducted peak output power.

Limit
§15.247
(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:
(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.
(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi.

RSS-247, 6.3.2 Transmitter output power and e.i.r.p. requirements
For DTS operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W, and the e.i.r.p. shall not exceed 4 W, except as provided in section 6.5 a) and b).

Test procedure
KDB 558074 D01.

ANSI C63.10, 11.9.1.1 RBW ≥ DTS bandwidth
The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:
a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ [3 × RBW].
c) Set span ≥ [3 × RBW].
d) Sweep time = No faster than coupled (auto) time.
e) Detector = peak.
f) Trace mode = max-hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

Test setup: 8.4 with conducted sample (see 5.2)

Test Results				
EUT Mode	**RF Output Power (conducted peak power) [dBm]**			**Limit Max [dBm]**
	low channel	**mid channel**	**high channel**	
OP 1	16.7	16.6	16.5	30
OP 2	25.3	**25.4**	24.9	30
OP 3	25.1	**25.4**	25.3	30

Comment:	---

Verdict	**- PASS -**	

7.4 Antenna Gain, Peak EIRP

Applicability
This requirement applies to all types of DTS equipment.

Description
The antenna gain is defined as the difference between radiated peak power (Peak EIRP) subtracted by the conducted peak power of the module, given in dBi.

Limit
§15.247
(b)(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi.

RSS-247, 6.3.2 Transmitter output power and e.i.r.p. requirements
For DTS operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W, and the e.i.r.p. shall not exceed 4 W, except as provided in section 6.5 a) and b).

Test Results

Antenna type	low channel [dBi]	mid channel [dBi]	high channel [dBi]	Limit [dBi]
external antenna	3.7 dBi	3.7 dBi	3.7 dBi	6

Antenna type	Peak EIRP [dBm]	Limit [dBm]
external antenna	29.1	36

Note: - for antenna details see section 5.3
- peak EIRP is calcualated based on MAX(conducted peak power) and MAX(antenna gain) as worst case

Comment:	Antenna gain as declared by applicant.

Verdict	- PASS -	---

7.5 Peak Power Spectral Density (PSD)

Applicability
This requirement applies to all types of DTS equipment.

Description
The Power Spectral Density (PSD) is defined as the conducted peak power spectral density in a 3 kHz bandwidth during any time of continuous transmission.

Limits
§15.247
(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

RSS-247, 6.3.1 b)
The transmitter power spectral density conducted from the transmitter to the antenna(s) shall not be greater than 8 dBm/3 kHz band during any time interval of continuous transmission.

Test procedure
ANSI C63.10, 11.10.2 Method PKPSD (peak PSD)
The following procedure shall be used if maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:
a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span >1.5 times the DTS bandwidth.
c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ [3 × RBW].
e) Detector = peak.
f) Sweep time = No faster than coupled (auto) time.
g) Trace mode = max-hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

Test setup: 8.4 with conducted test sample in test mode (see section 5.2)

Test Results				
EUT Mode	**Peak Power Spectral Density [dBm / 3 kHz]**			**Limit [dBm / 3 kHz]**
	low channel	**mid channel**	**high channel**	
OP 1	-2,0	-1,2	-1,3	8
OP 2	**6,2**	5,6	4,1	8
OP 3	5,1	5,6	5,2	8

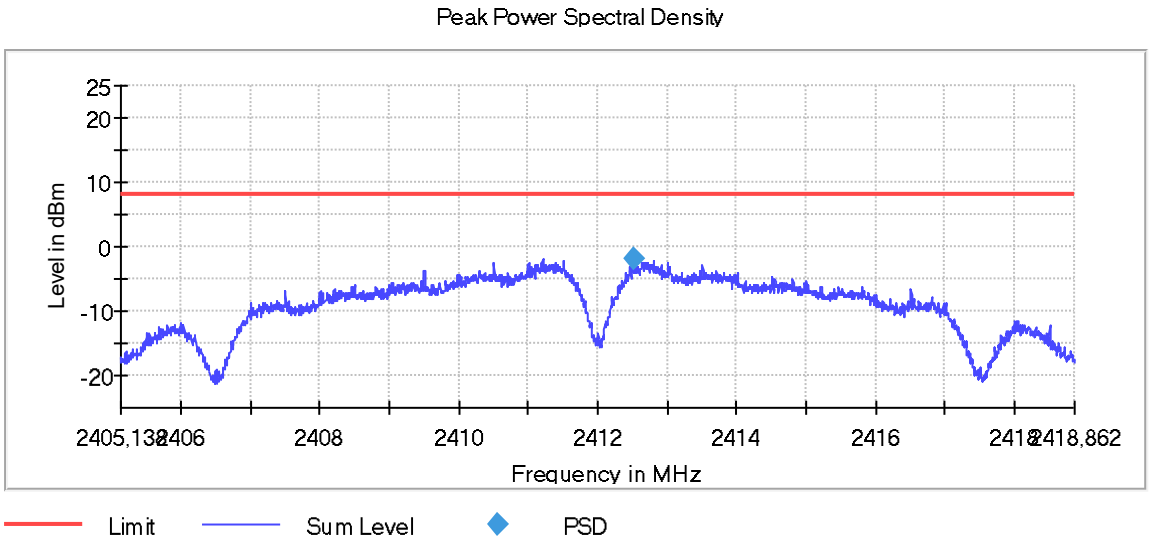
Comment:	---

Verdict	**- PASS -**	see next plots

Plot 19: Peak PSD, OP 1, low channel

Result

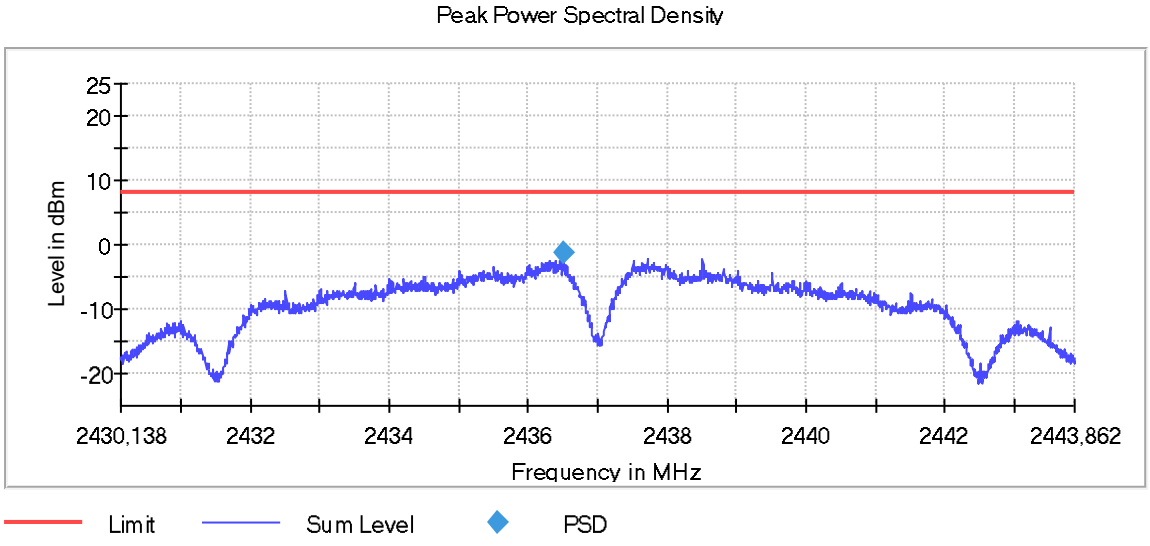
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2412.510000	-2.001	8.0	PASS



Plot 20: Peak PSD, OP 1, mid channel

Result

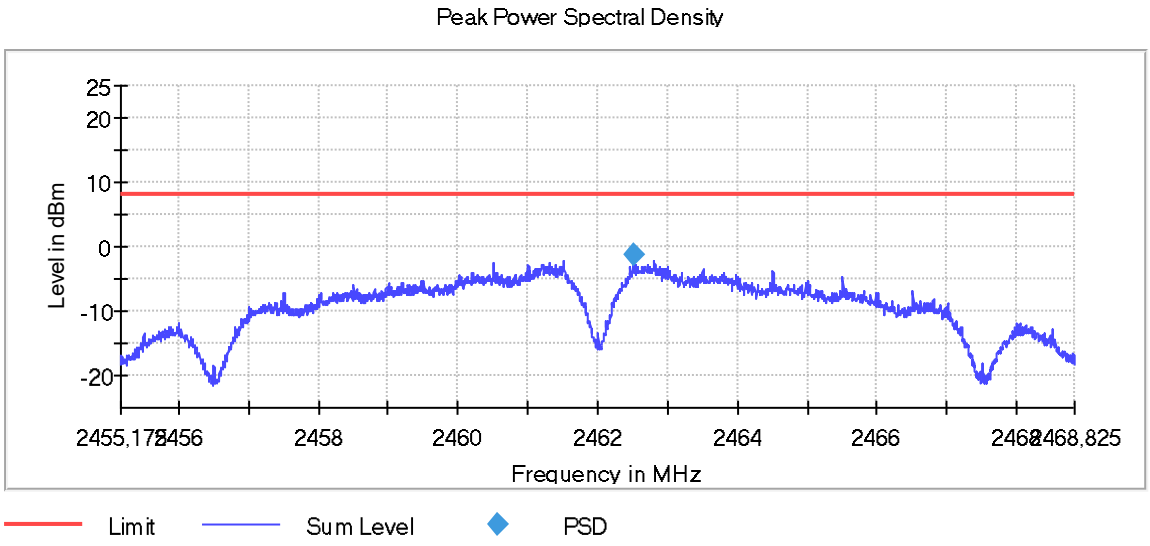
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2437.000000	2436.510000	-1.158	8.0	PASS



Plot 21: Peak PSD, OP 1, high channel

Result

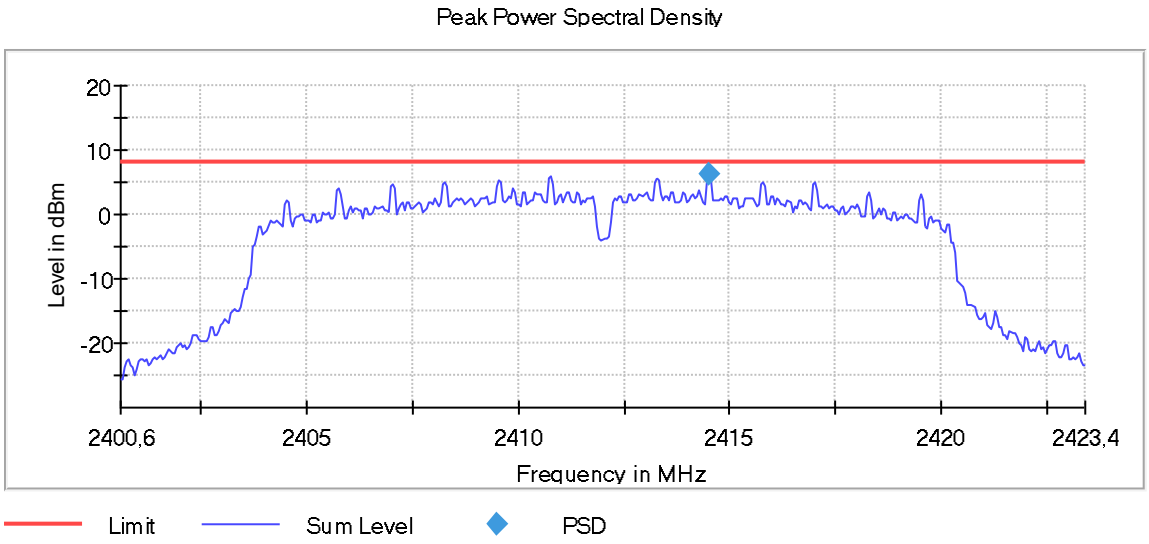
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2462.000000	2462.507500	-1.286	8.0	PASS



Plot 22: Peak PSD, OP 2, low channel

Result

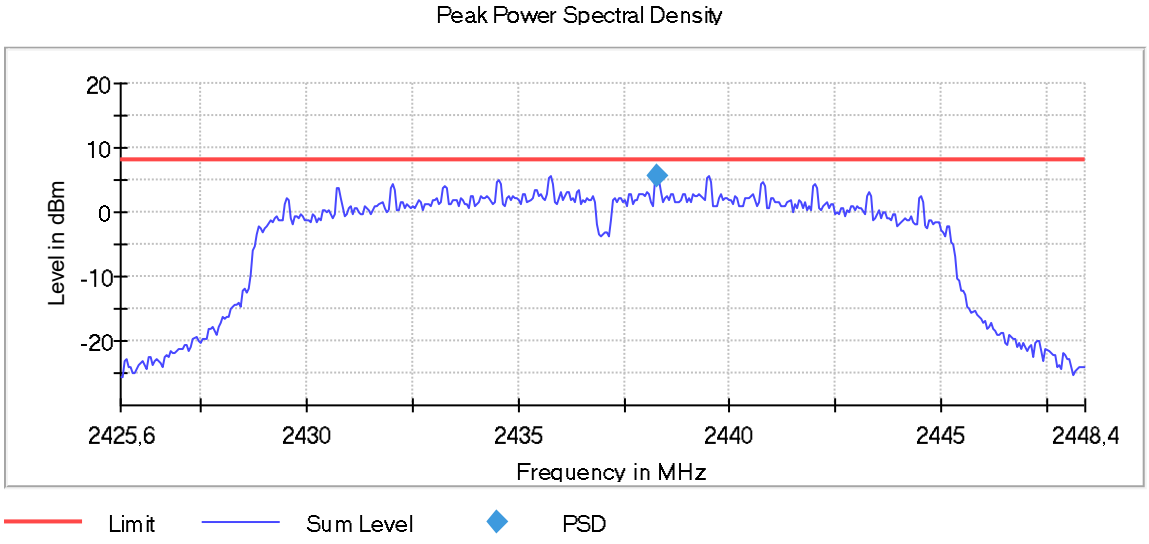
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2414.525000	6.166	8.0	PASS



Plot 23: Peak PSD, OP 2, mid channel

Result

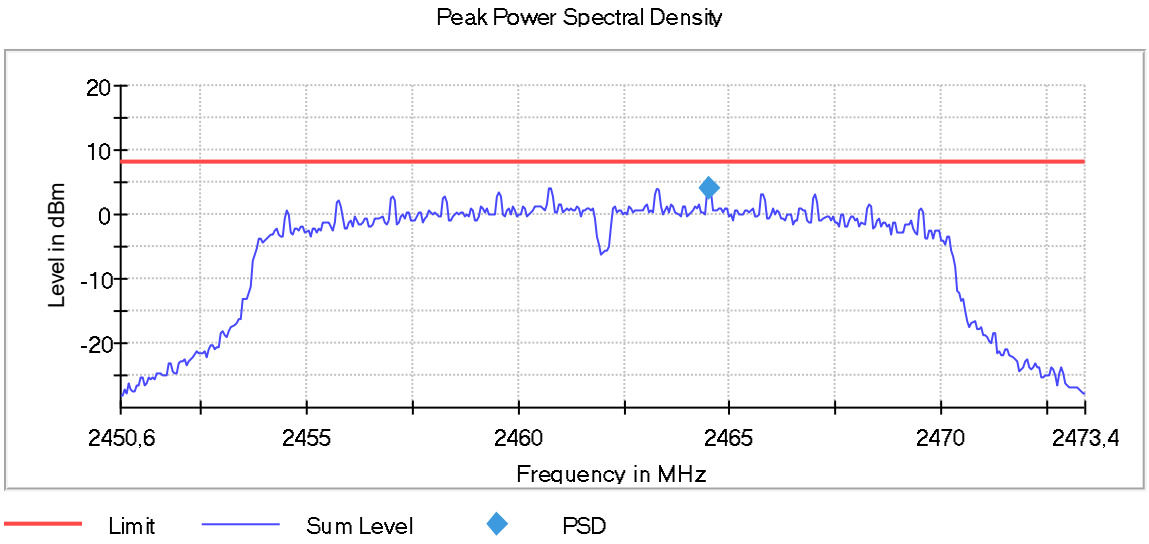
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2437.000000	2438.275000	5.641	8.0	PASS



Plot 24: Peak PSD, OP 2, high channel

Result

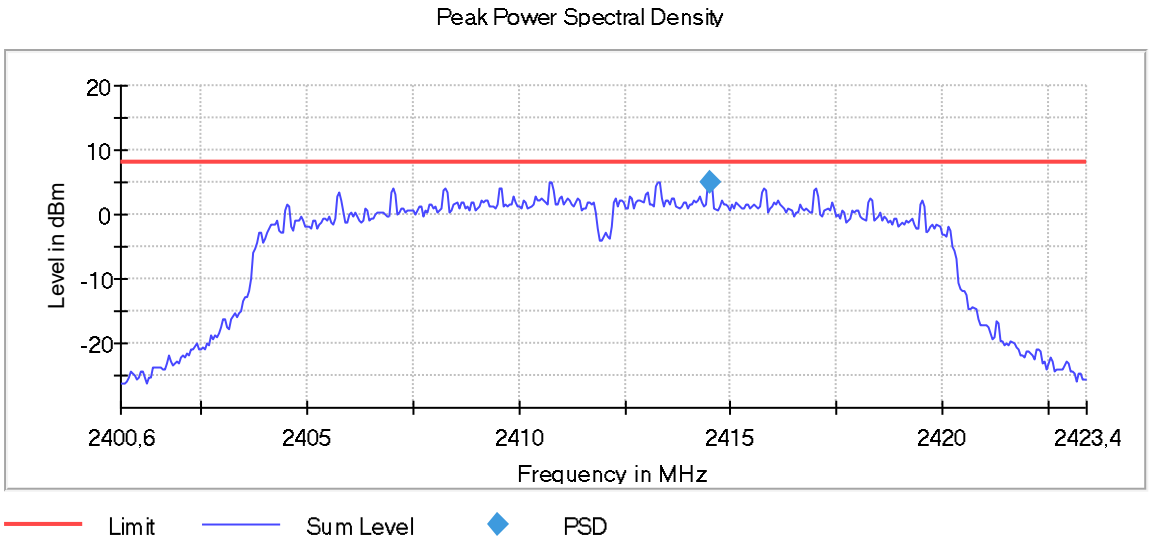
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2462.000000	2464.525000	4.123	8.0	PASS



Plot 25: Peak PSD, OP 3, low channel

Result

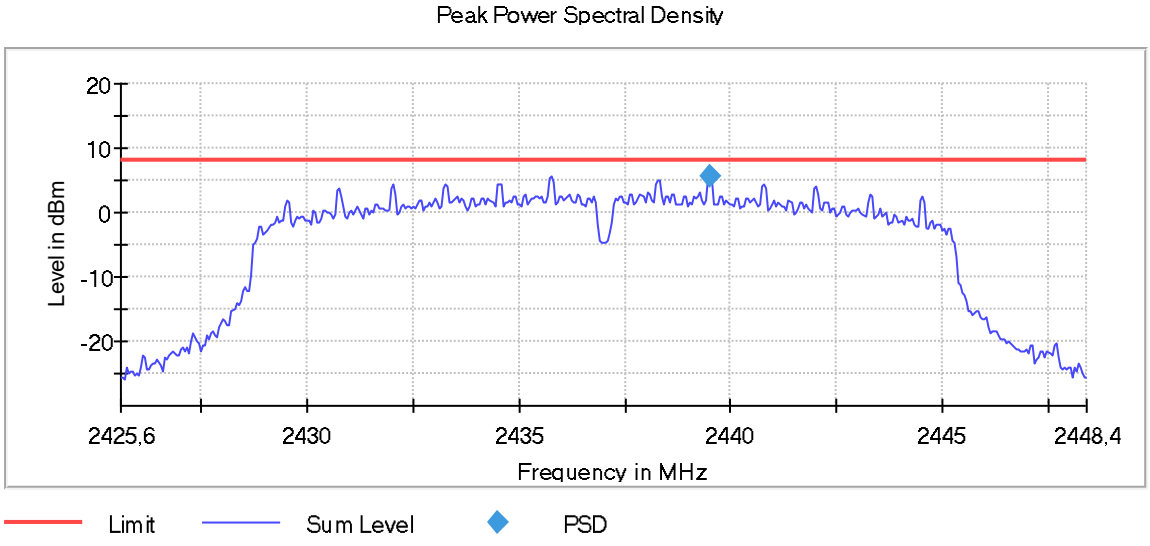
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2414.525000	5.146	8.0	PASS



Plot 26: Peak PSD, OP 3, mid channel

Result

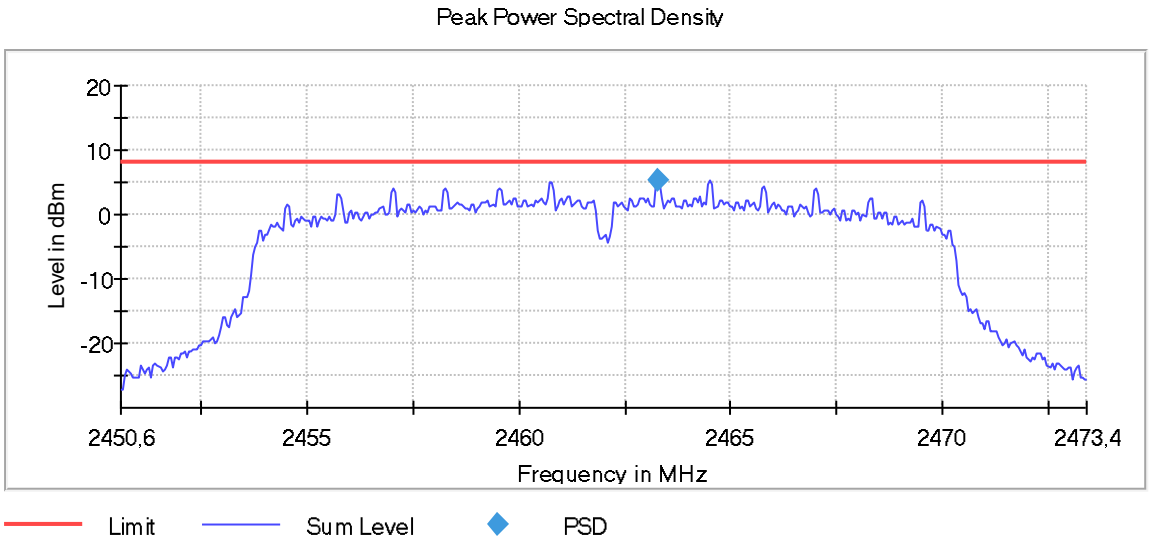
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2437.000000	2439.525000	5.603	8.0	PASS



Plot 27: Peak PSD, OP 3, high channel

Result

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2462.000000	2463.275000	5.238	8.0	PASS



7.6 Band Edge Compliance (BEC), conducted

Applicability
This requirement applies to all types of DTS equipment.

Description
On each operating frequency measured, band-edge emissions shall be reported by providing spectral plots of the measuring instrument display. The axes, the scale units per division, and the limit shall be clearly labeled in the test report.

Limits
§15.247
(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

RSS-247, 6.6
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Test procedure
ANSI C63.10, 11.11.2 Reference level measurement
Establish a reference level by using the following procedure:
a) Set instrument center frequency to DTS channel center frequency.
b) Set the span to ≥ 1.5 times the DTS bandwidth.
c) Set the RBW = 100 kHz.
d) Set the VBW ≥ [3 × RBW].
e) Detector = peak.
f) Sweep time = No faster than coupled (auto) time.
g) Trace mode = max-hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum PSD level.
Note that the channel found to contain the maximum PSD level can be used to establish the reference level

ANSI C63.10, 11.11.3 Emission level measurement
Establish an emission level by using the following procedure:
a) Set the center frequency and span to encompass frequency range to be measured. Note that the frequency range might need to be divided into multiple frequency ranges to retain frequency resolution.
NOTE—the number of points can also be increased for large spans to retain frequency resolution
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = No faster than coupled (auto) time.

f) Trace mode = max-hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

Test setup: 8.4 with conducted test sample in test mode (see section 5.2)

Test results (antenna 0)

BEC	low channel [dBc]	high channel [dBc]	Limit [dBc]
OP 1	> 43	> 50	≥ 20
OP 2	> 30	> 42	≥ 20
OP 3	> 29	> 42	≥ 20

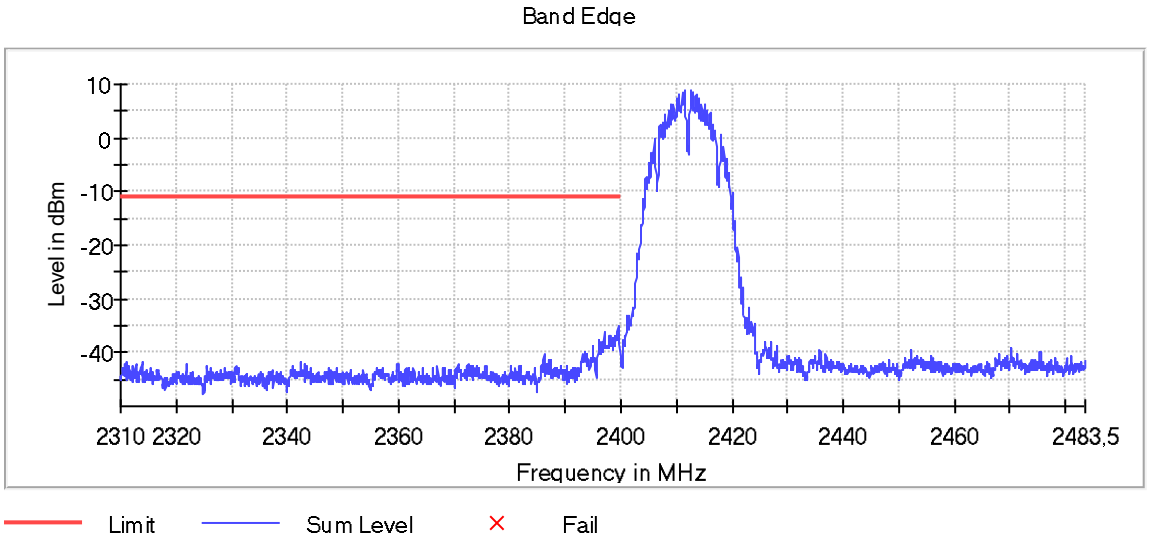
Comment:	---

Verdict	**- PASS -**	see next plots

Plot 28: BEC, OP 1, low channel

Measurements

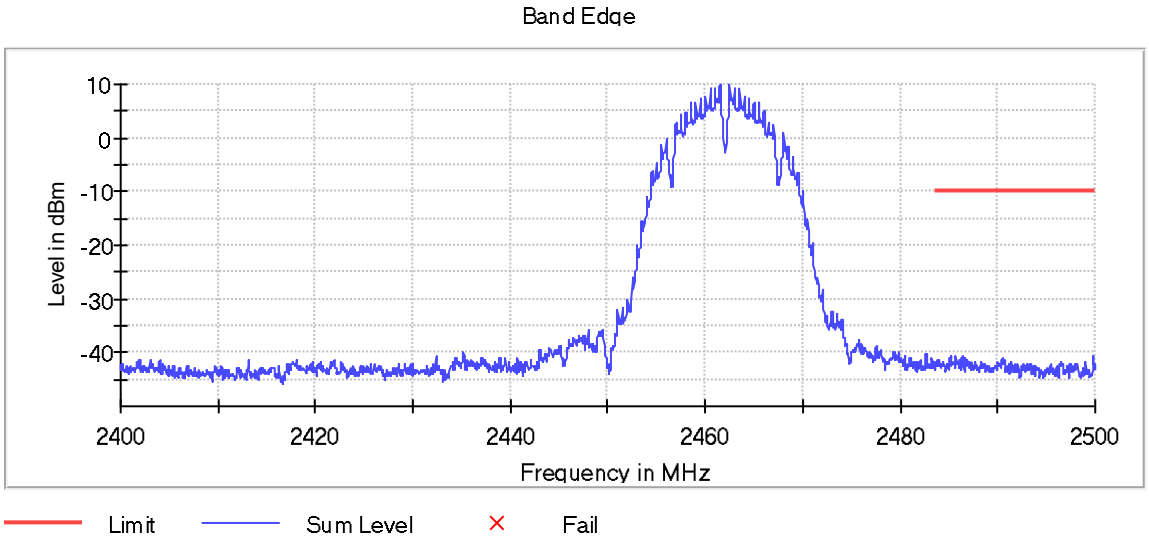
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.525000	-34.9	23.7	-11.1	PASS
2399.475000	-35.1	24.0	-11.1	PASS
2397.025000	-36.0	24.8	-11.1	PASS
2399.375000	-36.0	24.9	-11.1	PASS
2396.975000	-36.1	25.0	-11.1	PASS
2399.425000	-36.3	25.2	-11.1	PASS
2399.325000	-36.4	25.3	-11.1	PASS
2399.575000	-36.4	25.3	-11.1	PASS
2398.025000	-36.8	25.7	-11.1	PASS
2399.025000	-36.9	25.8	-11.1	PASS
2399.275000	-36.9	25.8	-11.1	PASS
2397.975000	-36.9	25.8	-11.1	PASS
2397.075000	-37.0	25.9	-11.1	PASS
2399.225000	-37.1	26.0	-11.1	PASS
2399.125000	-37.3	26.1	-11.1	PASS



Plot 29: BEC, OP 1, high channel

Measurements

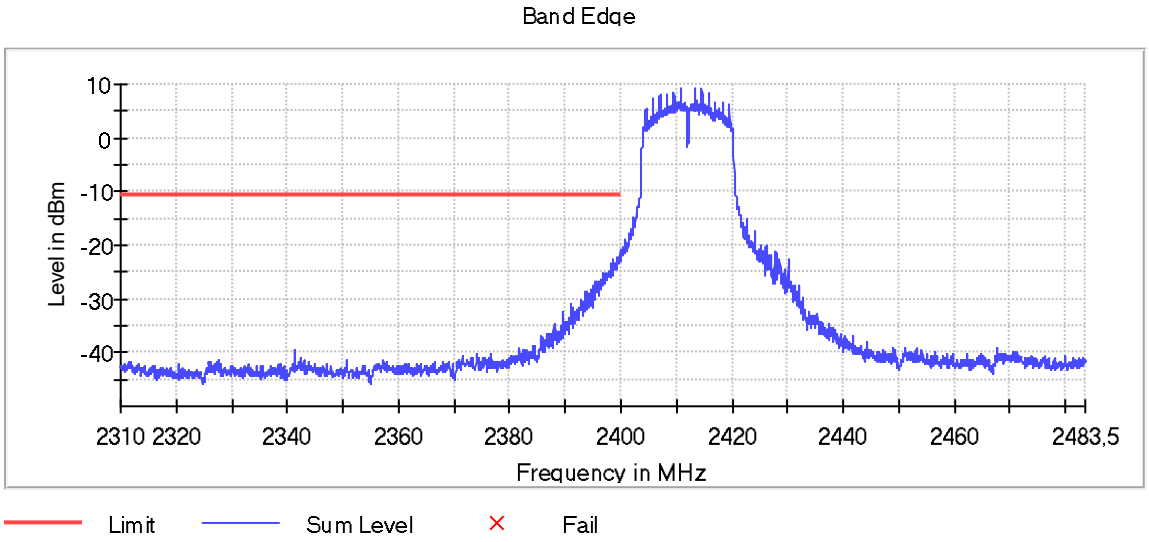
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2499.825000	-40.7	30.7	-10.0	PASS
2485.725000	-40.8	30.8	-10.0	PASS
2485.175000	-40.8	30.8	-10.0	PASS
2486.375000	-40.8	30.8	-10.0	PASS
2485.025000	-40.8	30.8	-10.0	PASS
2486.325000	-40.8	30.8	-10.0	PASS
2490.525000	-40.9	30.8	-10.0	PASS
2485.125000	-40.9	30.8	-10.0	PASS
2499.775000	-40.9	30.8	-10.0	PASS
2490.475000	-40.9	30.9	-10.0	PASS
2485.075000	-41.0	31.0	-10.0	PASS
2486.675000	-41.2	31.1	-10.0	PASS
2486.725000	-41.2	31.2	-10.0	PASS
2486.125000	-41.3	31.3	-10.0	PASS
2485.675000	-41.4	31.3	-10.0	PASS



Plot 30: BEC, OP 2, low channel

Measurements

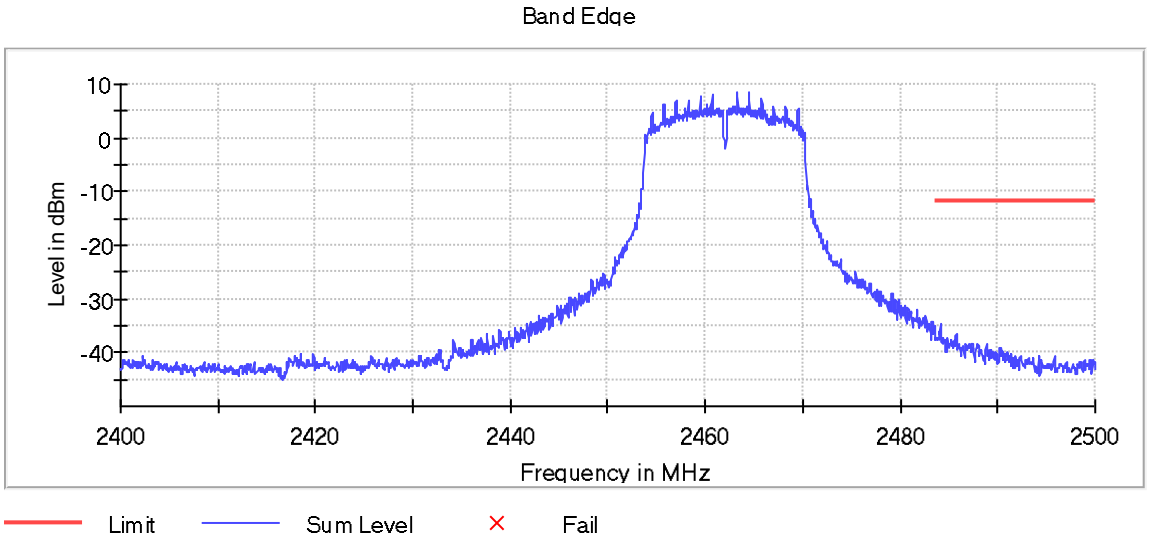
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.875000	-20.7	10.0	-10.7	PASS
2399.825000	-20.9	10.2	-10.7	PASS
2399.925000	-21.6	10.9	-10.7	PASS
2399.975000	-22.3	11.6	-10.7	PASS
2399.475000	-22.3	11.6	-10.7	PASS
2399.225000	-22.4	11.7	-10.7	PASS
2399.725000	-22.4	11.8	-10.7	PASS
2399.525000	-22.5	11.8	-10.7	PASS
2399.775000	-22.5	11.8	-10.7	PASS
2398.625000	-22.8	12.1	-10.7	PASS
2398.575000	-22.8	12.1	-10.7	PASS
2399.275000	-22.8	12.2	-10.7	PASS
2399.175000	-22.9	12.2	-10.7	PASS
2399.425000	-23.0	12.3	-10.7	PASS
2399.625000	-23.1	12.5	-10.7	PASS



Plot 31: BEC, OP 2, high channel

Measurements

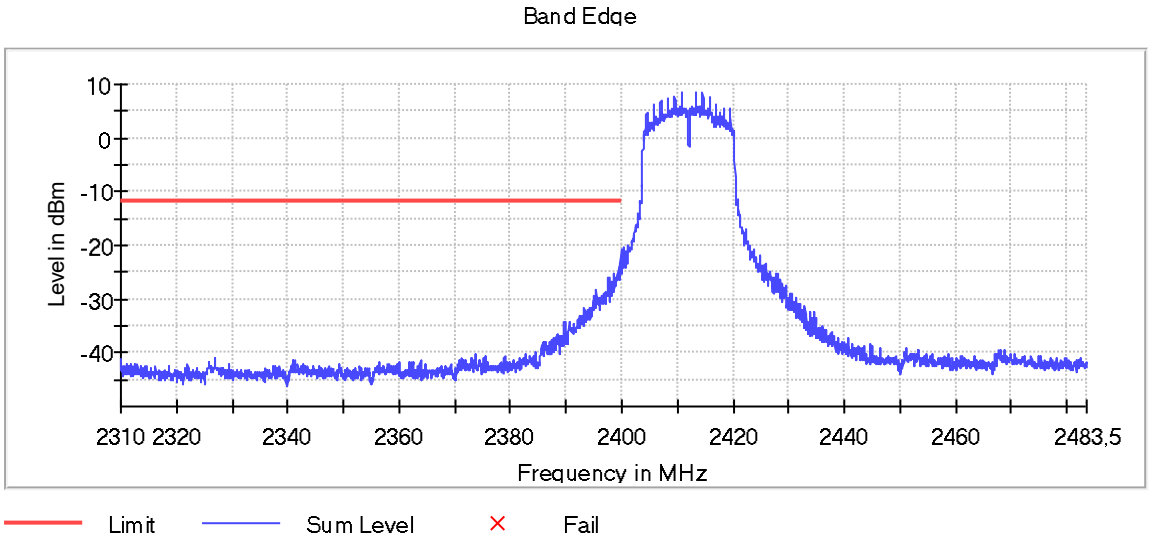
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2484.125000	-34.6	22.9	-11.6	PASS
2484.175000	-34.6	23.0	-11.6	PASS
2484.025000	-36.2	24.6	-11.6	PASS
2483.975000	-36.4	24.7	-11.6	PASS
2484.075000	-36.6	25.0	-11.6	PASS
2485.775000	-36.6	25.0	-11.6	PASS
2485.725000	-36.8	25.2	-11.6	PASS
2483.675000	-37.1	25.5	-11.6	PASS
2483.725000	-37.2	25.6	-11.6	PASS
2484.875000	-37.2	25.6	-11.6	PASS
2484.825000	-37.2	25.6	-11.6	PASS
2483.625000	-37.3	25.7	-11.6	PASS
2483.525000	-37.3	25.7	-11.6	PASS
2484.225000	-37.3	25.7	-11.6	PASS
2484.425000	-37.4	25.7	-11.6	PASS



Plot 32: BEC, OP 3, low channel

Measurements

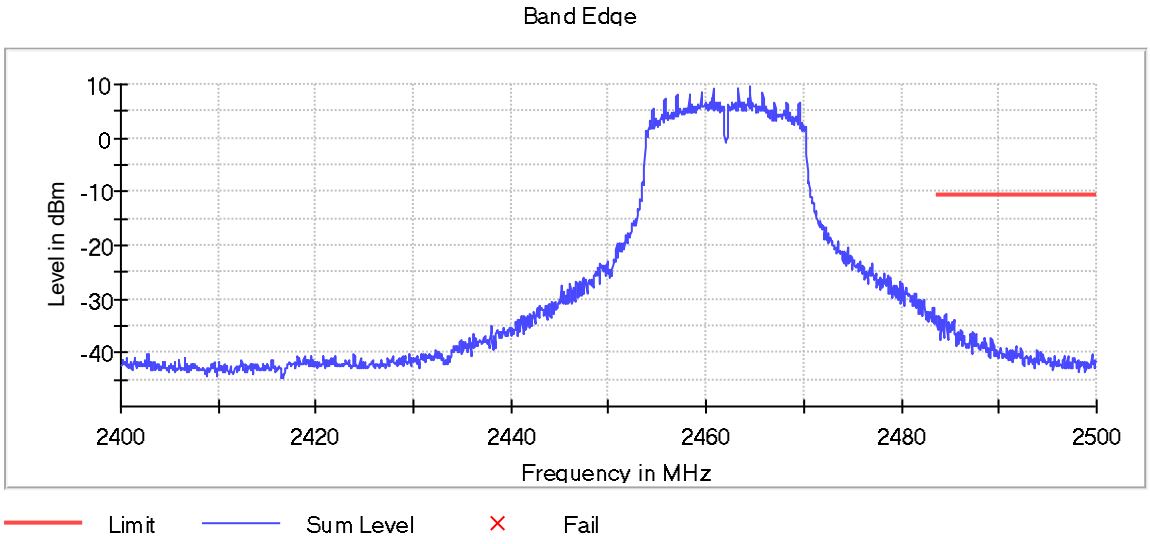
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.875000	-20.9	9.3	-11.6	PASS
2399.825000	-21.0	9.4	-11.6	PASS
2399.925000	-22.7	11.1	-11.6	PASS
2399.775000	-23.3	11.7	-11.6	PASS
2399.525000	-23.7	12.1	-11.6	PASS
2399.475000	-23.9	12.3	-11.6	PASS
2399.425000	-25.2	13.6	-11.6	PASS
2399.975000	-25.2	13.6	-11.6	PASS
2399.225000	-25.2	13.6	-11.6	PASS
2399.275000	-25.3	13.7	-11.6	PASS
2399.375000	-25.3	13.7	-11.6	PASS
2399.125000	-25.3	13.8	-11.6	PASS
2398.625000	-25.4	13.8	-11.6	PASS
2399.175000	-25.4	13.8	-11.6	PASS
2399.575000	-25.4	13.8	-11.6	PASS



Plot 33: BEC, OP 3, high channel

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2484.525000	-32.6	22.1	-10.5	PASS
2484.575000	-32.7	22.2	-10.5	PASS
2484.475000	-33.2	22.6	-10.5	PASS
2483.875000	-33.3	22.7	-10.5	PASS
2483.925000	-33.6	23.0	-10.5	PASS
2483.825000	-33.6	23.1	-10.5	PASS
2483.525000	-33.7	23.2	-10.5	PASS
2483.575000	-33.8	23.3	-10.5	PASS
2485.375000	-34.0	23.4	-10.5	PASS
2484.225000	-34.1	23.5	-10.5	PASS
2485.325000	-34.1	23.6	-10.5	PASS
2483.625000	-34.1	23.6	-10.5	PASS
2484.425000	-34.2	23.6	-10.5	PASS
2484.825000	-34.2	23.7	-10.5	PASS
2484.625000	-34.2	23.7	-10.5	PASS



7.7 Band Edge Compliance (BEC), radiated

Applicability

This requirement applies to all types of DTS equipment.

Description

On each operating frequency measured, band-edge emissions shall be reported by providing spectral plots of the measuring instrument display. The axes, the scale units per division, and the limit shall be clearly labeled in the test report

Limits

§15.247

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

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In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Test procedure

ANSI C63.10, 6.10.5 Restricted-band band-edge measurements

For frequency hopping systems, the hopping shall be turned OFF during this test.

Set the unlicensed wireless device to the lowest frequency channel.

Set the unlicensed wireless device to operate at maximum output power and 100% duty cycle, or equivalent “normal mode of operation” as specified in 6.10.3.

Perform the test as follows:

1) Span: Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products that fall outside of the authorized band of operation.
2) Reference level offset: Adjusted for gains and losses of measurement antenna factor, preamp gain and cable loss, so as to indicate field strength, in units of dBµV/m at 3 m, directly on the instrument display.
3) Reference level: As required to keep the signal from exceeding the maximum spectrum analyzer 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 4.1.6.2.
4) Attenuation: Auto (at least 10 dB preferred).
5) Sweep time: No faster than coupled (auto) time.
6) Resolution bandwidth: 1 MHz
7) Video bandwidth: 3 × RBW
8) Detector (unless specified otherwise): Peak and average above 1 GHz
9) Trace: Max-hold for final measurement.

Allow the trace to stabilize.

Repeat above steps for the highest frequency channel.

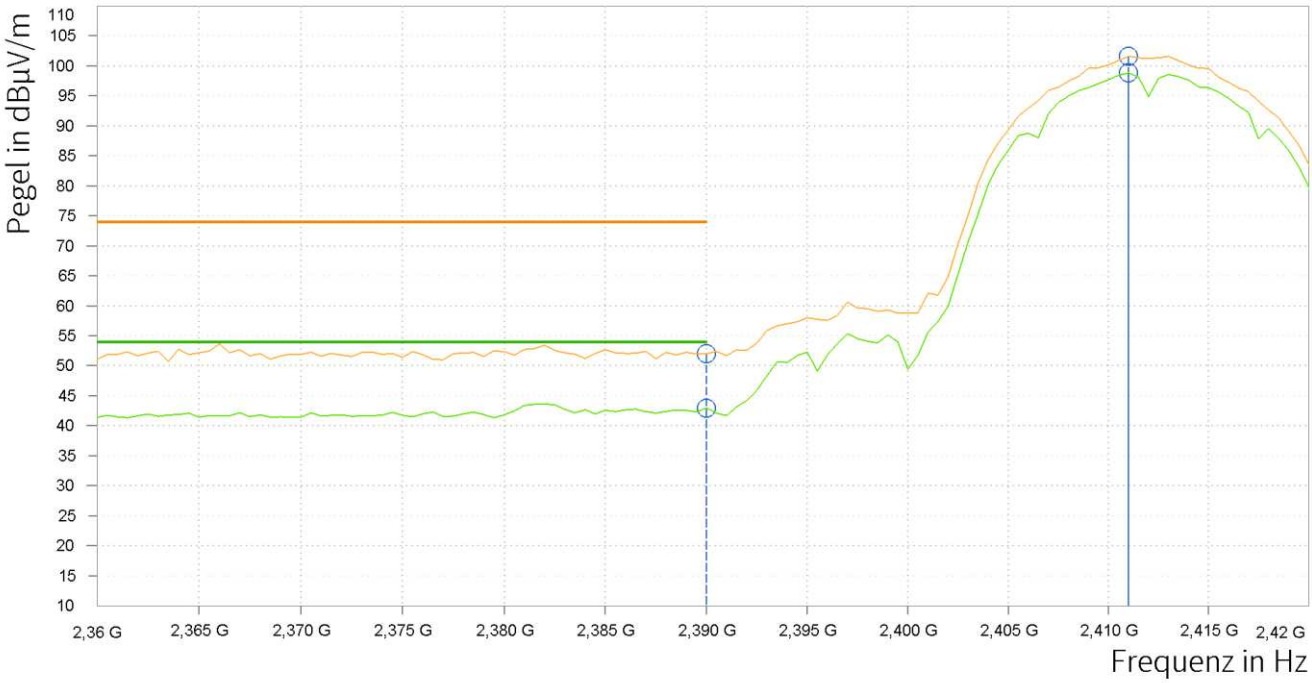
Note Band Edge Compliance (BEC) is performed for low / high channel and modulation with the highest output power (as worst case). In case of spurious other modulations are spot-checked.
Test setup: 8.4 with radiated test sample in test mode (see section 5.2)
Test results

BEC	low channel [dµV/m @ 3m]	high channel [dµV/m @ 3m]	Limit [dµV/m @ 3m]
OP 1	≤ 43 AVG / ≤ 52 PK	≤ 43 AVG / ≤ 53 PK	≤ 54 AVG / ≤ 74 PK
OP 2	≤ 54 AVG / ≤ 72 PK	≤ 50 AVG / ≤ 70 PK	≤ 54 AVG / ≤ 74 PK
OP 3	≤ 54 AVG / ≤ 70 PK	≤ 53 AVG / ≤ 72 PK	≤ 54 AVG / ≤ 74 PK

Comment:	---

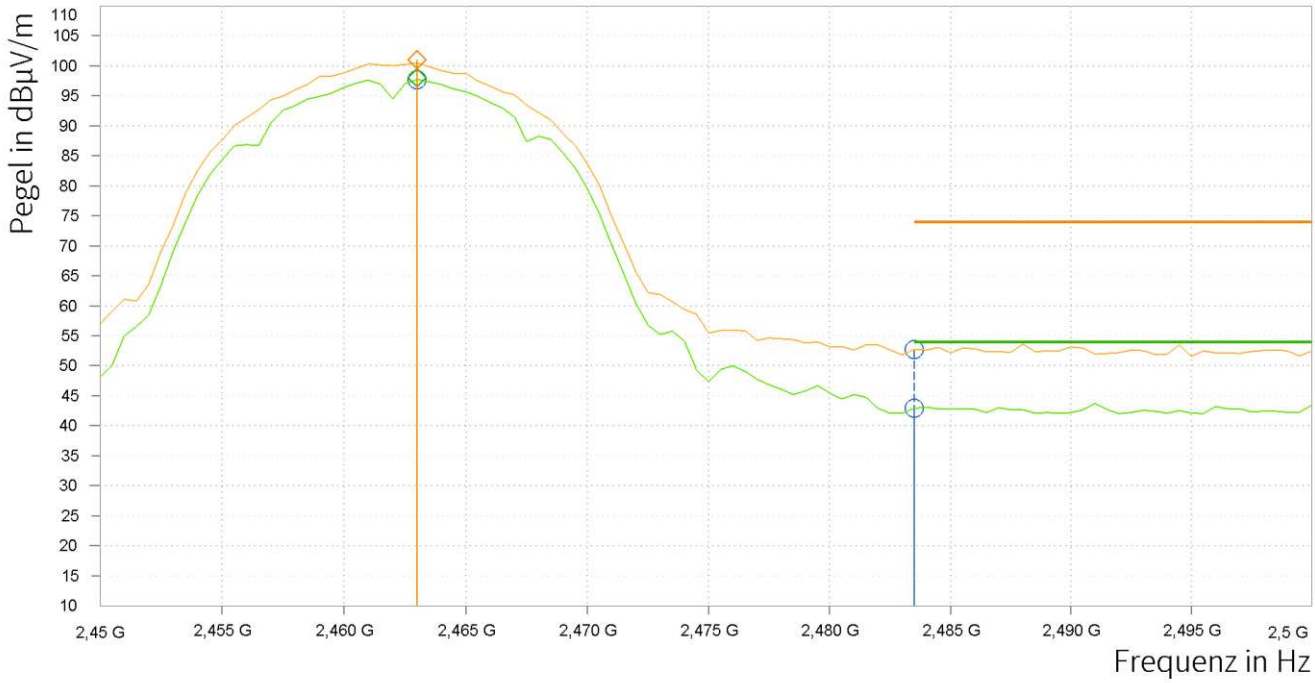
Verdict	**- PASS -**	see next plots

Plot 34: BEC, OP 1, low channel



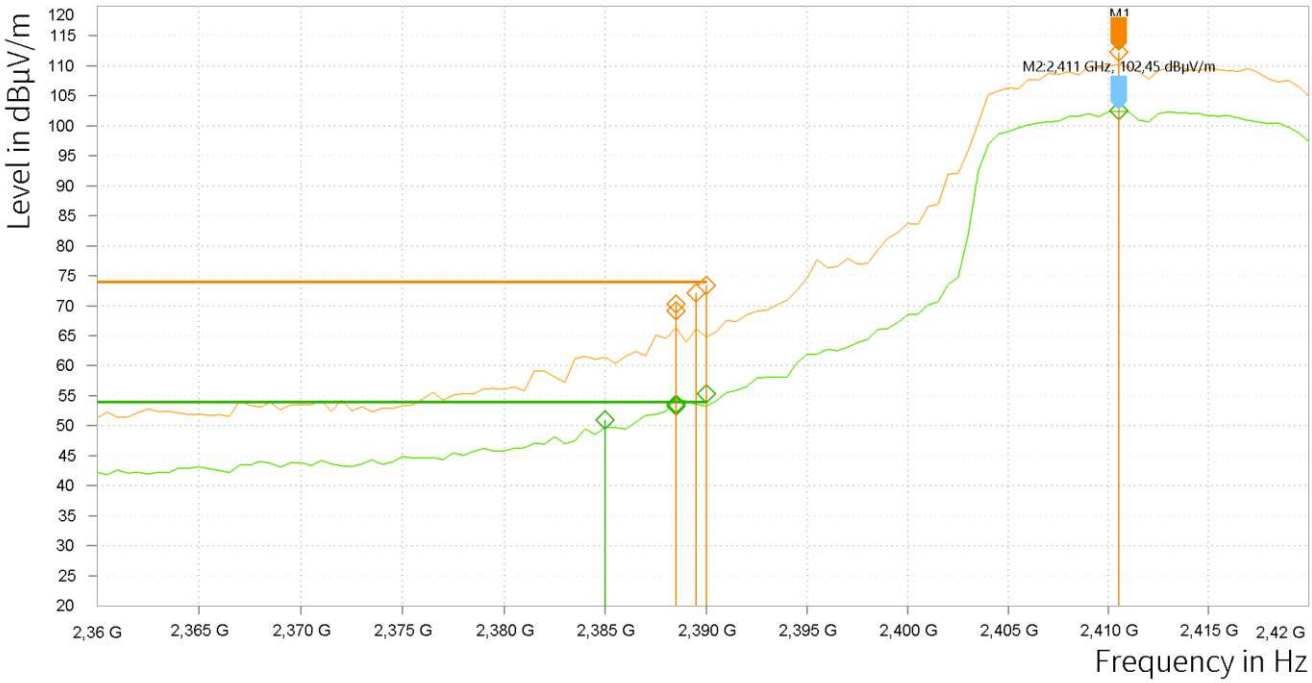
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	2.390,000	51,99	74,00	22,01	42,95	54,00	10,05	28,92	H	0	97,9	1.000,000
1	2.411,000	101,61			98,81			29,02	H	0	168,5	1.000,000

Plot 35: BEC, OP 1, high channel



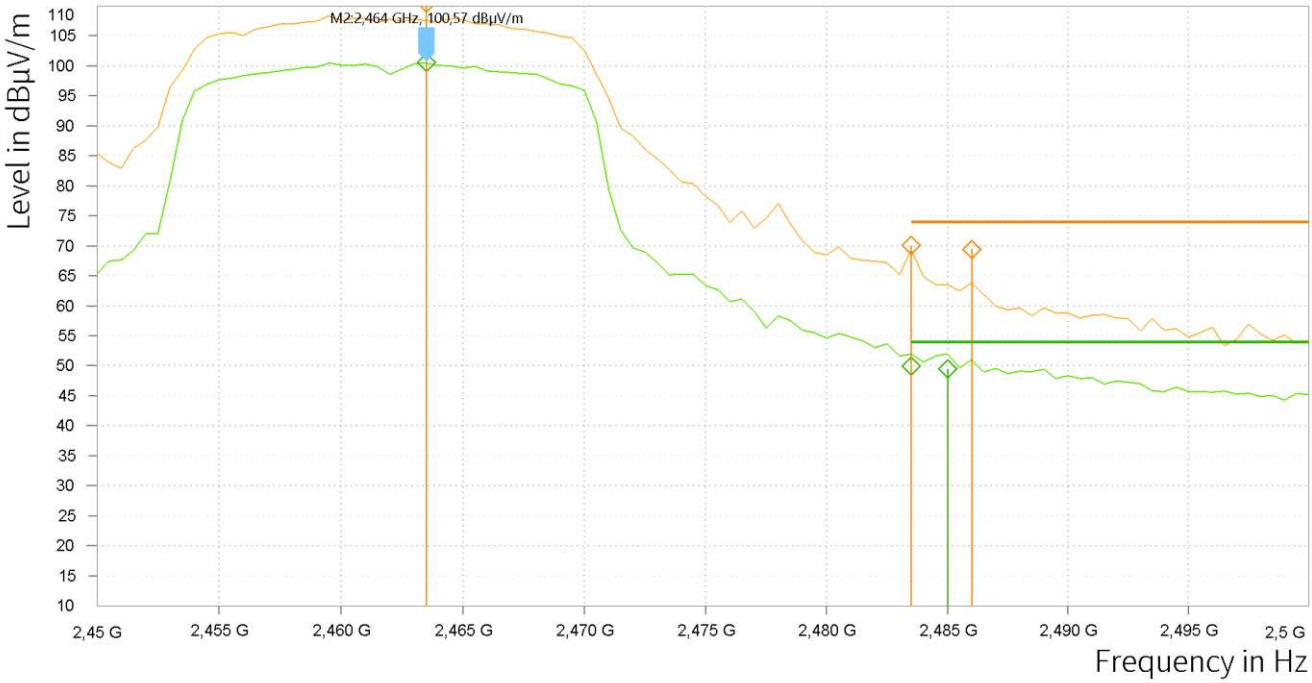
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	2.463,000	101,07			98,00			29,22	H	-15	281,3	1.000,000
1	2.483,500	52,74	74,00	21,26	42,89	54,00	11,11	29,36	V	90	17,1	1.000,000

Plot 36: BEC, OP 2, low channel



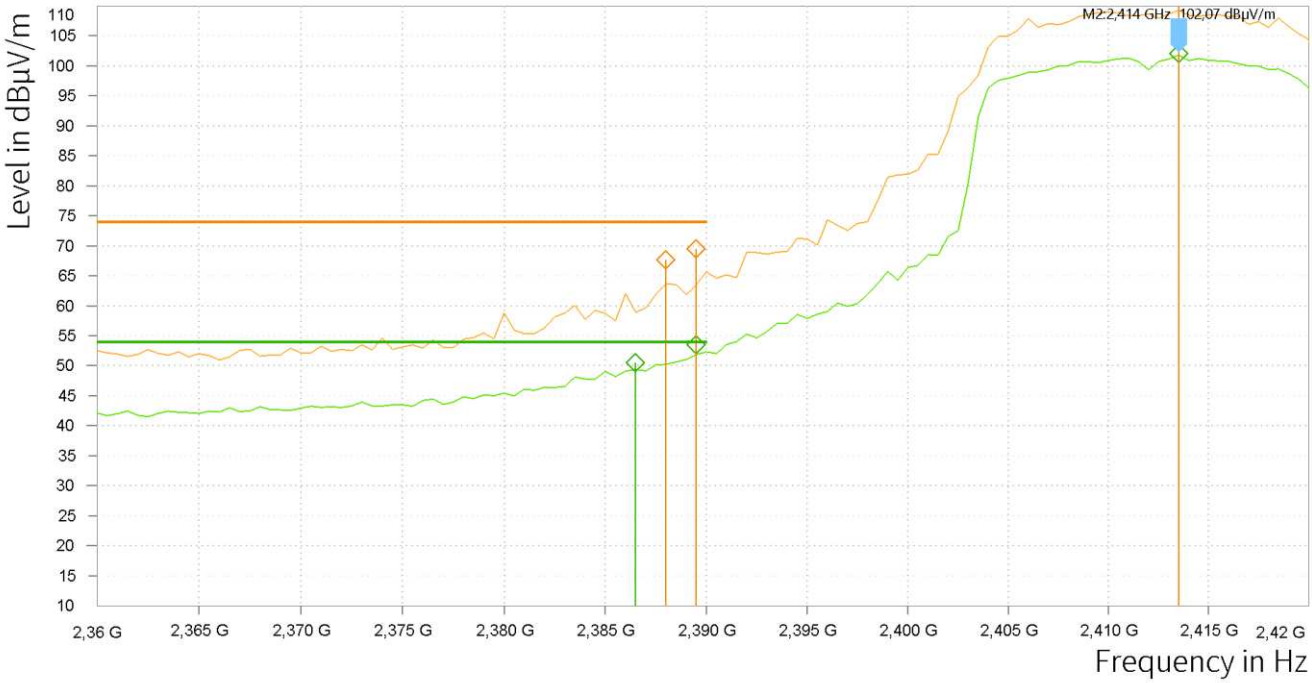
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	2.385,000				50,92	54,00	3,08	28,91	H	15	139,1	1.000,000
1	2.388,500	69,14	74,00	4,86	53,63	54,00	0,37	28,92	H	14,1	153,7	1.000,000
1	2.388,500	70,32	74,00	3,68	53,27	54,00	0,73	28,92	H	4,3	139,1	1.000,000
1	2.389,500	72,17	74,00	1,83				28,92	H	14,3	132	1.000,000
1	2.390,000	73,42			55,38			28,92	H	14,1	138,3	1.000,000
1	2.410,500	112,26			102,45			29,01	H	4,5	131,9	1.000,000

Plot 37: BEC, OP 2, high channel



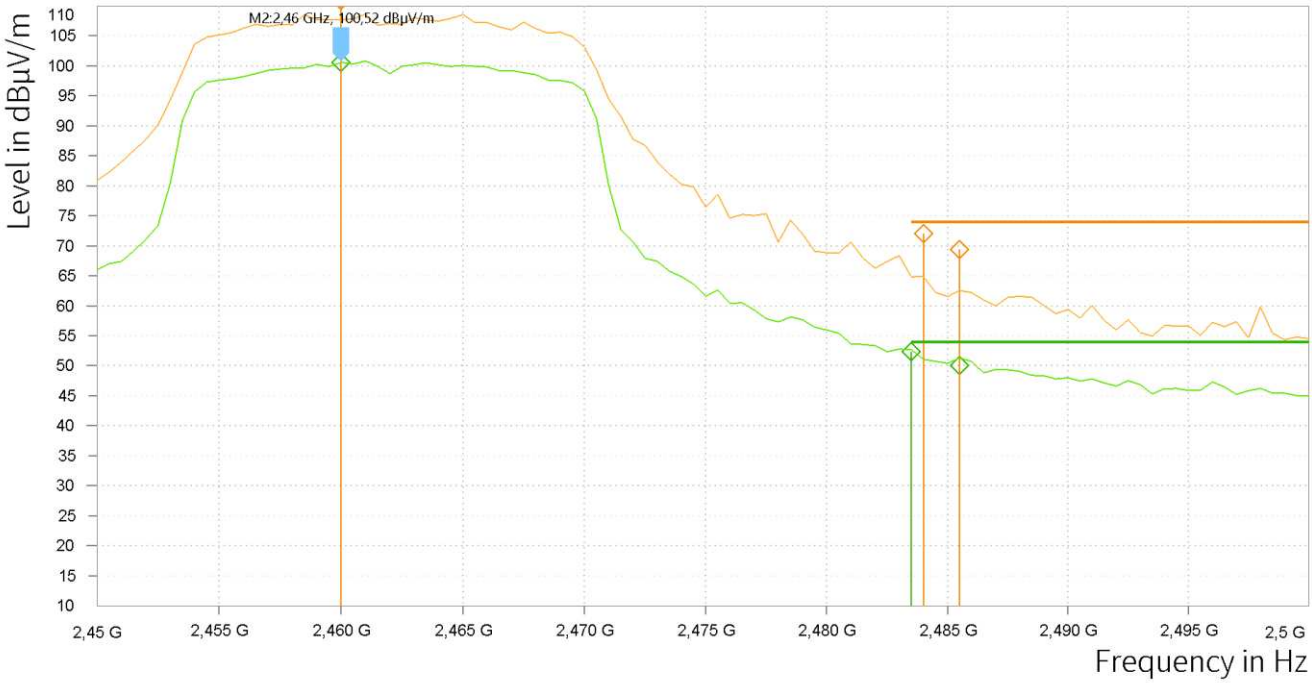
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	2.463,500	110,45			100,57			29,23	H	14,7	134,5	1.000,000
1	2.483,500	70,02	74,00	3,98	49,91	54,00	4,09	29,36	H	94,2	123,3	1.000,000
1	2.485,000				49,47	54,00	4,53	29,37	H	94,7	287,6	1.000,000
1	2.486,000	69,44	74,00	4,56				29,37	H	4,7	126,1	1.000,000

Plot 38: BEC, OP 3, low channel



Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	2.386,500				50,52	54,00	3,48	28,91	H	15	135,5	1.000,000
1	2.388,000	67,62	74,00	6,38				28,92	H	15	142	1.000,000
1	2.389,500	69,46	74,00	4,54	53,45	54,00	0,55	28,92	H	15	139,2	1.000,000
1	2.413,500	111,60			102,07			29,03	H	15	136,7	1.000,000

Plot 39: BEC, OP 3, high channel



Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	2.460,000	110,95			100,52			29,20	H	13,6	124,9	1.000,000
1	2.483,500				52,35	54,00	1,65	29,36	H	-8,6	126	1.000,000
1	2.484,000	71,97	74,00	2,03				29,36	H	15	121,3	1.000,000
1	2.485,500	69,37	74,00	4,63	50,09	54,00	3,91	29,37	H	4,4	120,4	1.000,000

7.8 Conducted Spurious Emissions (CSE)

Applicability
This requirement applies to all types of DTS equipment.

Description
Spurious emission / unwanted emissions are emission on a frequency or frequencies which are outside the authorized band and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products.

Limits
§15.247
(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. Attenuation below the general limits specified in §15.209(a) is not required.

RSS-247, 6.6
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum device, digitally modulated device, or hybrid system is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power – based on either an RF conducted or a radiated measurement – provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 6.3.2, the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Test procedure
ANSI C63.10, 11.11.2 Reference level measurement
Establish a reference level by using the following procedure:
a) Set instrument center frequency to DTS channel center frequency.
b) Set the span to ≥ 1.5 times the DTS bandwidth.
c) Set the RBW = 100 kHz.
d) Set the VBW ≥ [3 × RBW].
e) Detector = peak.
f) Sweep time = No faster than coupled (auto) time.
g) Trace mode = max-hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum PSD level.
Note that the channel found to contain the maximum PSD level can be used to establish the reference level

ANSI C63.10, 11.11.3 Emission level measurement
Establish an emission level by using the following procedure:
a) Set the center frequency and span to encompass frequency range to be measured. Note that the frequency range might need to be divided into multiple frequency ranges to retain frequency resolution.
NOTE—the number of points can also be increased for large spans to retain frequency resolution
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = No faster than coupled (auto) time.
f) Trace mode = max-hold.
g) Allow trace to fully stabilize.

h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11.

Test setup: 8.4 with conducted test sample in test mode (see section 5.2)

Test results

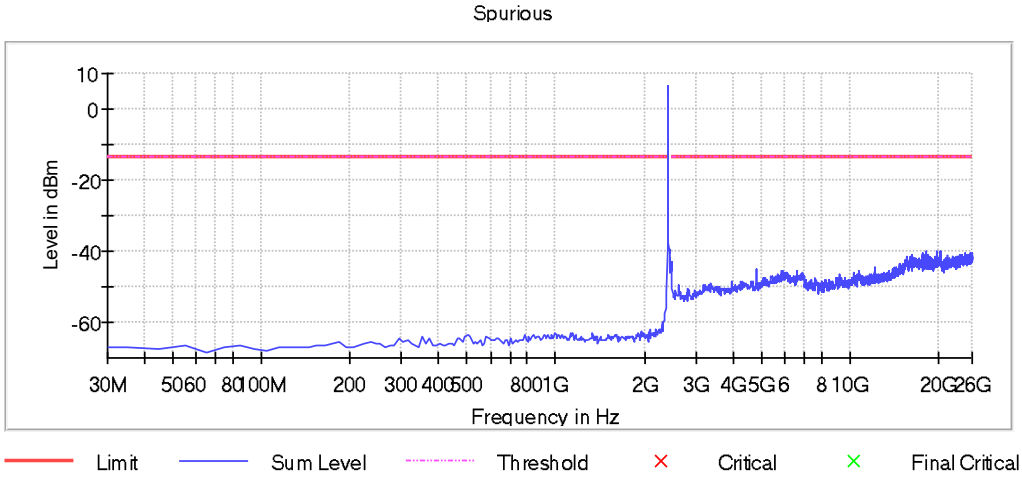
EUT Mode / Channel	Frequency [MHz]	Peak/RMS Detector	Level [dBm]	Limit [dBm]	Verdict
OP 1 / low/mid/high	see plots	MaxPeak	see plots*	see plots	- passed -
OP 2 / low/mid/high	see plots	MaxPeak	see plots*	see plots	- passed -
OP 3 / low/mid/high	see plots	MaxPeak	see plots	see plots	- passed -

* all detected peaks are more than 6 dB below the limit

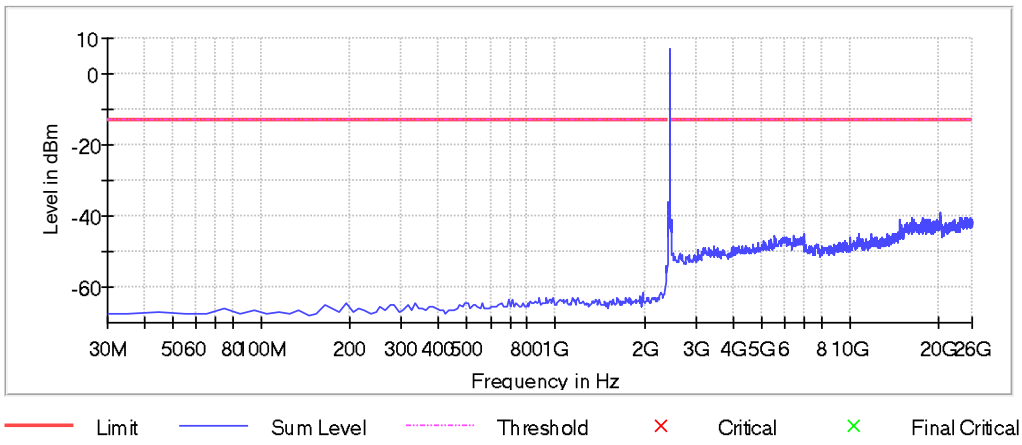
Comment:	---

Verdict	**- PASS -**	see next plots

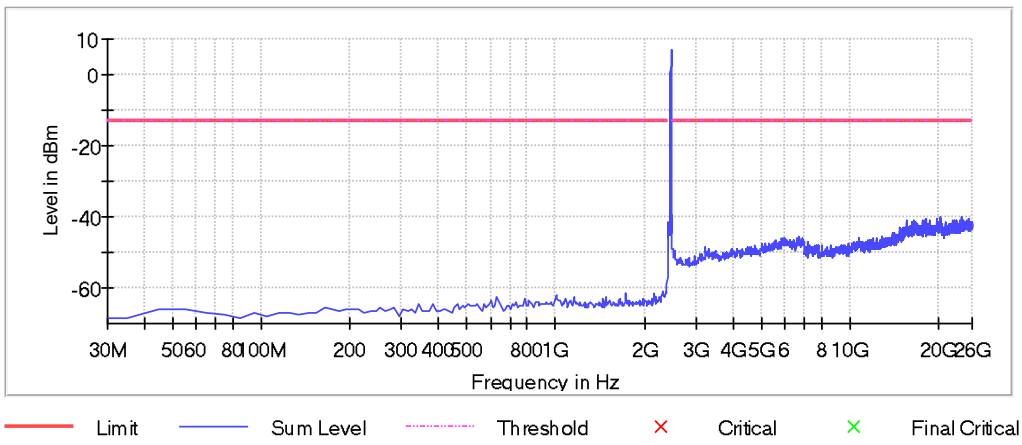
Plot 40: CSE, OP 1, low channel, 30 MHz – 26 GHz



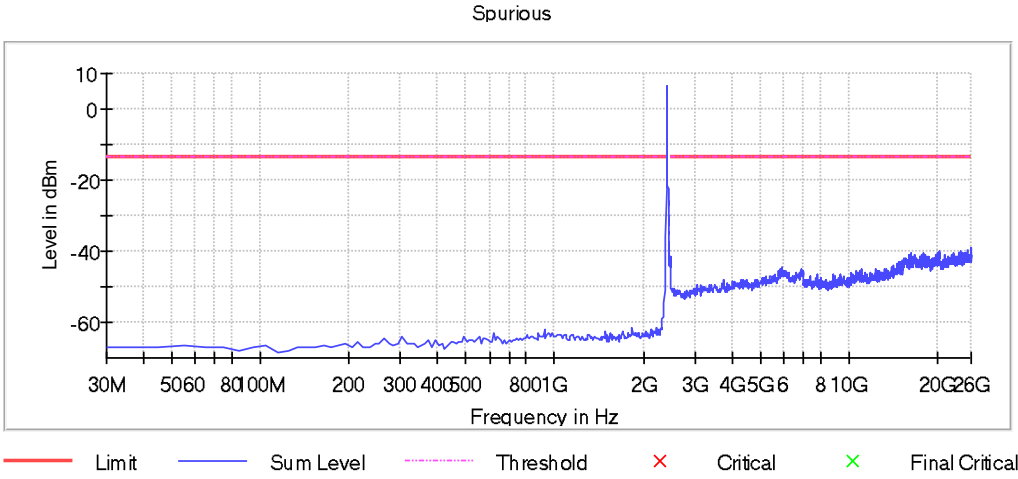
Plot 41: CSE, OP 1, mid channel, 30 MHz – 26 GHz



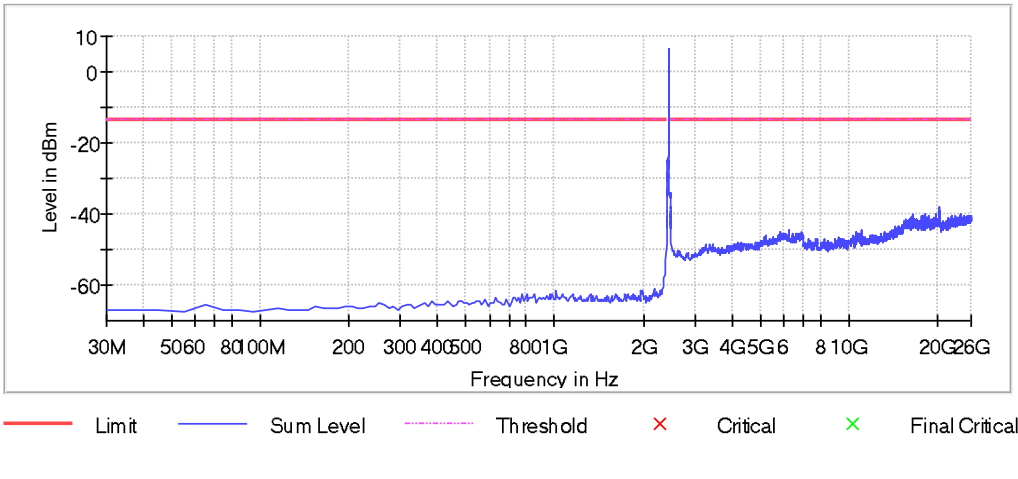
Plot 42: CSE, OP 1, high channel, 30 MHz – 26 GHz



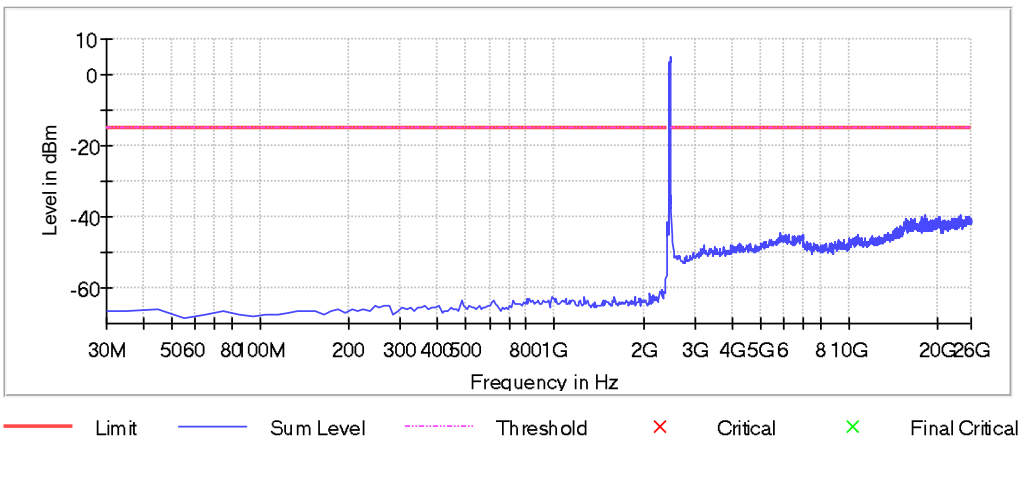
Plot 43: CSE, OP 2, low channel, 30 MHz – 26 GHz



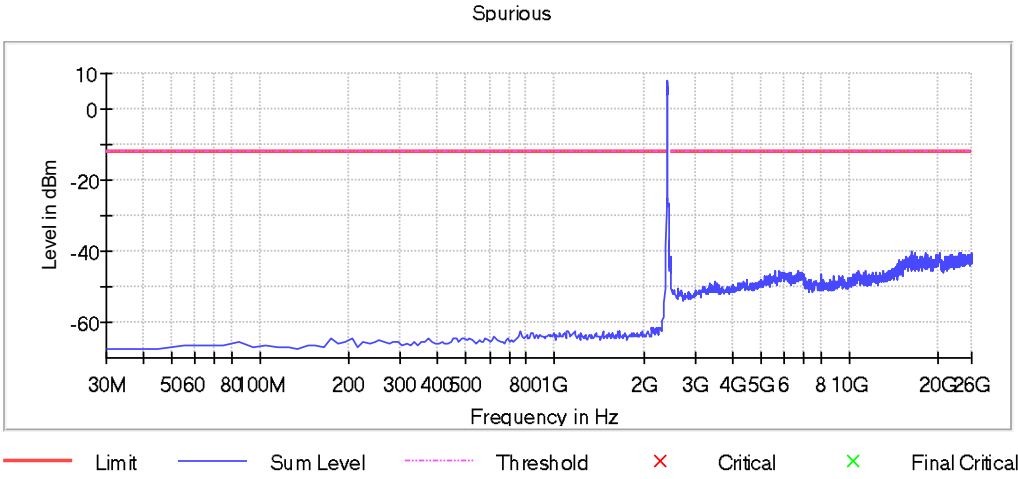
Plot 44: CSE, OP 2, mid channel, 30 MHz – 26 GHz



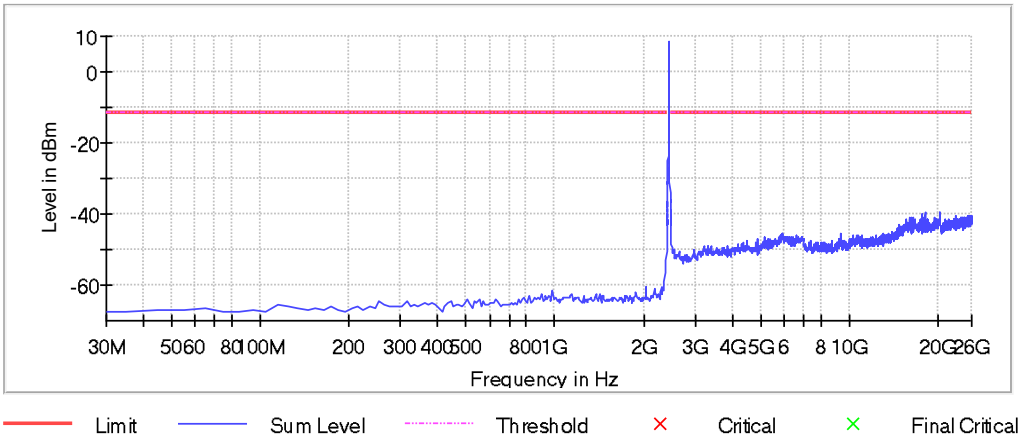
Plot 45: CSE, OP 2, high channel, 30 MHz – 26 GHz



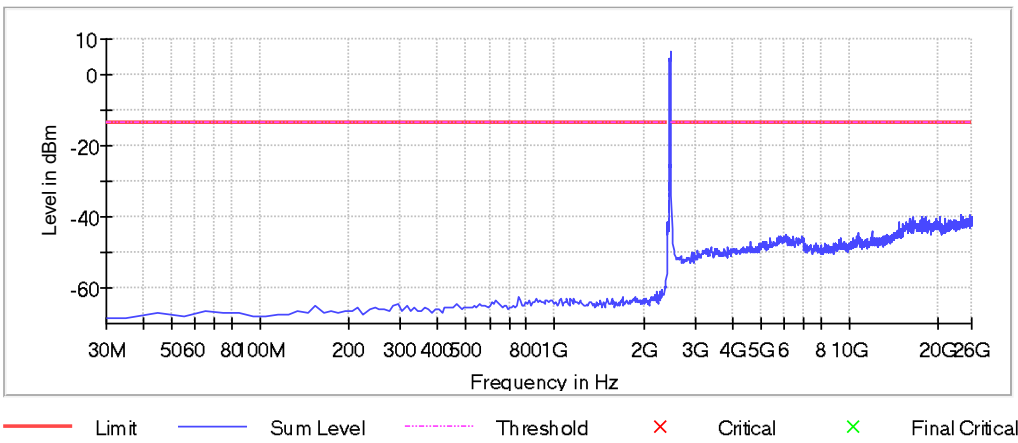
Plot 46: CSE, OP 3, low channel, 30 MHz – 26 GHz



Plot 47: CSE, OP 3, mid channel, 30 MHz – 26 GHz



Plot 48: CSE, OP 3, high channel, 30 MHz – 26 GHz



7.9 Radiated Spurious Emissions (RSE)

Applicability
This requirement applies to all types of DTS equipment.

Description
Spurious emission / unwanted emissions are emission on a frequency or frequencies which are outside the authorized band and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products. Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation.

Limits
15.247(d) / §15.209
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

RSS-247, 6.6, RSS-Gen, 8.9
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum device, digitally modulated device, or hybrid system is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power – based on either an RF conducted or a radiated measurement – provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 6.3.2, the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Frequency [MHz]	Field Strength [µV/m] / [dBµV/m]	Measurement distance [m]
0.009 – 0.490	2400/F[kHz]	300
0.490 – 1.705	24000/F[kHz]	30
1.705 – 30.0	30.0 / 29.5	30
30 – 88	100 / 40.0	3
88 – 216	150 / 43.5	3
216 – 960	200 / 46.0	3
960 – 40 000	500 / 54.0	3

Note
Radiated Spurious Emissions (RSE) are performed for low / mid / high channel and modulation with the highest output power (as worst case). In case of spurious other modulations are spot-checked.

Test setup: 8.1, 8.2, 8.3 with radiated test sample in test mode (see 5.2)
Test distance correction factor of 20dB/decade is already considered in the plots / result table.

Test results					
EUT Mode / Channel	**Frequency [MHz]**	**Detector**	**Level [dBµV/m @LD]**	**Limit [dBµV/m @LD]**	**Verdict**
OP 1 / low channel	see plots	MaxPeak	see plots*	see plots	- passed -
OP 1 / mid channel	see plots	MaxPeak	see plots*	see plots	- passed -
OP 1 / high channel	see plots	MaxPeak	see plots*	see plots	- passed -

* all detected peaks are more than 6 dB below the limit

Note:
LD = Limit Distance of 300m / 30m / 3m depending on frequency range, see limit table

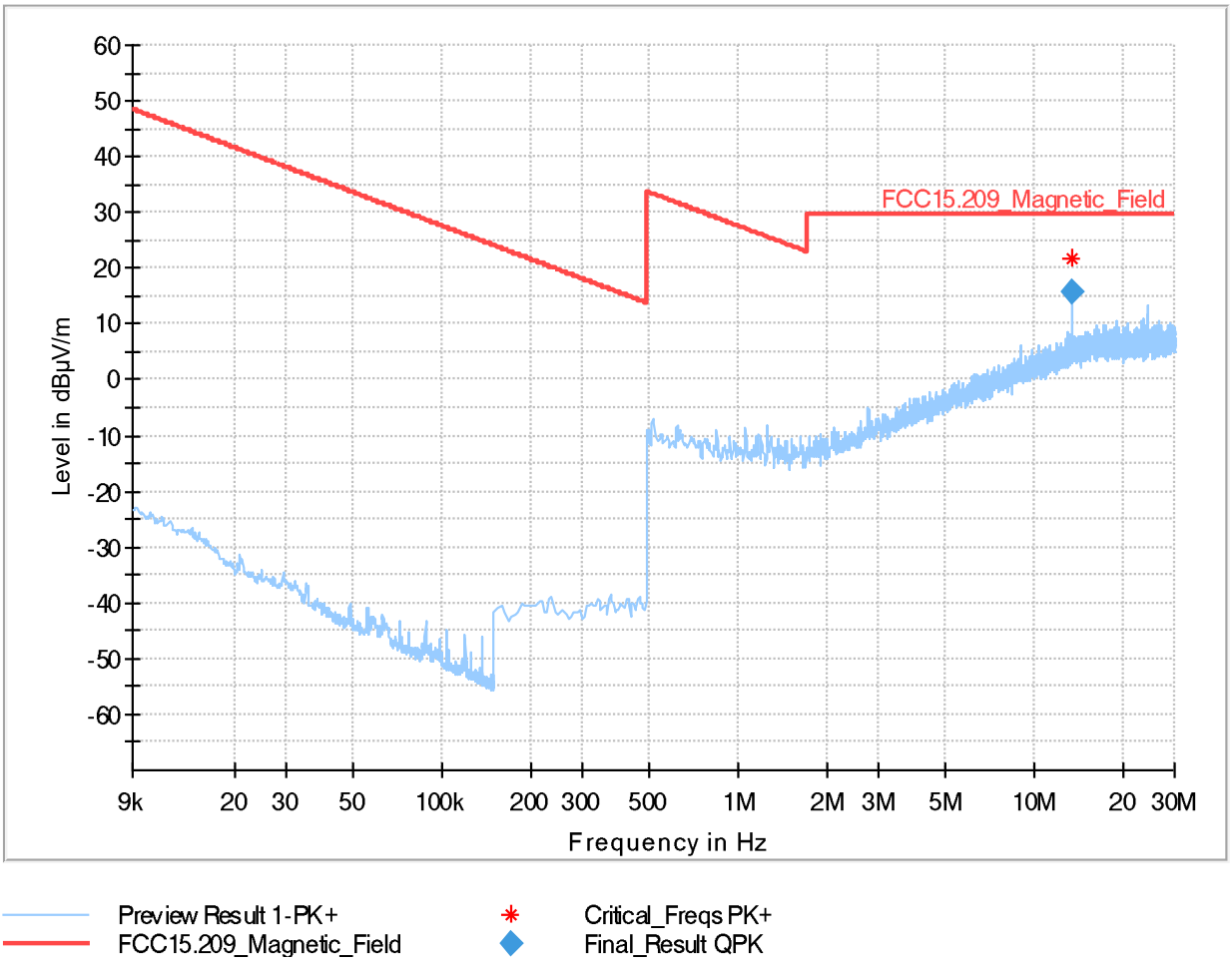
Comment:	---

Verdict	**- PASS -**	see next plots

Description of line and marker for all radiated spurious emission (RSE) measurements:

positive Peak (Max Hold) trace during pre-scan
Max Peak value
final Quasi Peak value

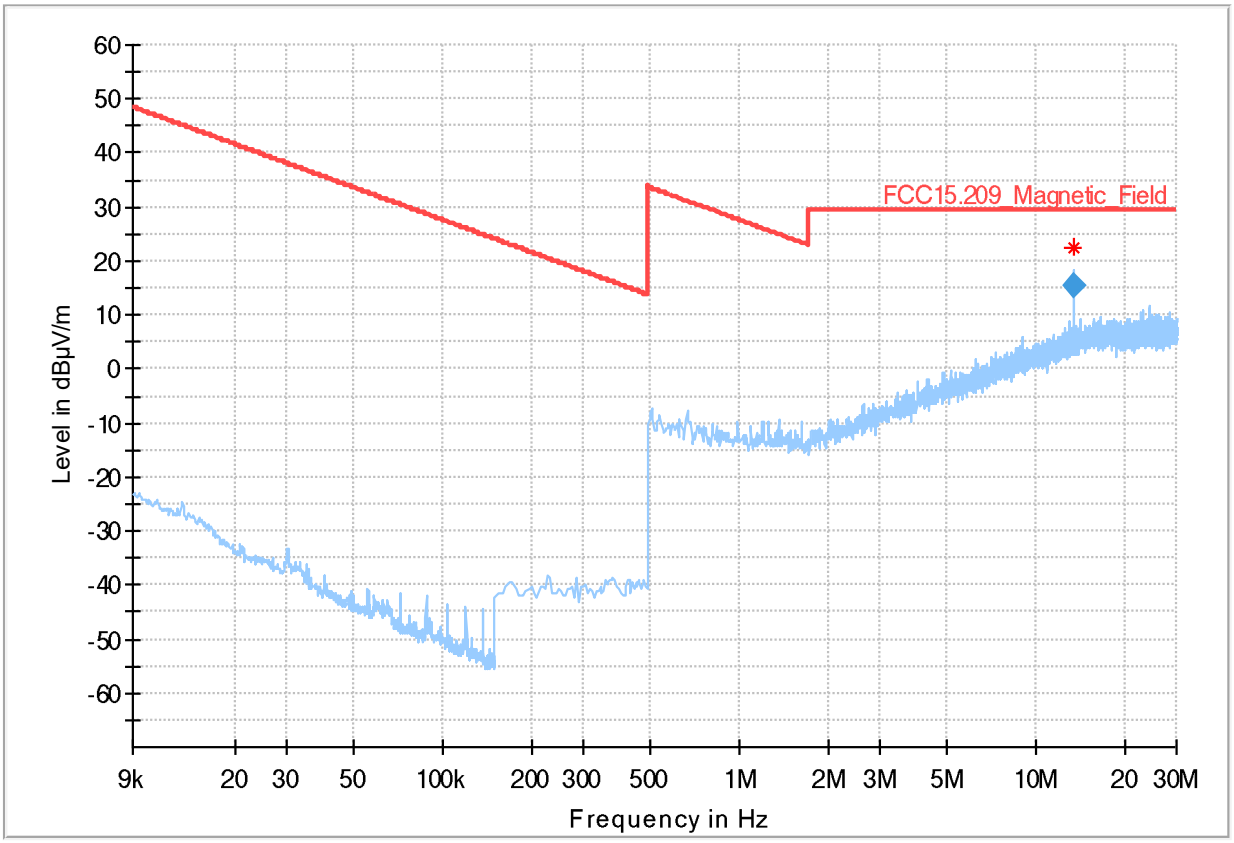
Plot 49: RSE, 9 kHz – 30 MHz, OP 1, low channel, loop antenna



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
13.559886	15.77	29.54	13.77	100.0	9.000	V	160.0	-0.9

Note:
The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kHz resulted in a level of Y dBµV/m, which is equivalent to Y - 51.5 = Z dBµA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.
(Certification & Engineering Bureau, Q&A on Certification Procedures and Requirements, TCB Workshop April 2020, Nicolas DesMarais, 2020-04-09 - ISED Q&A - DesMarais.pdf)

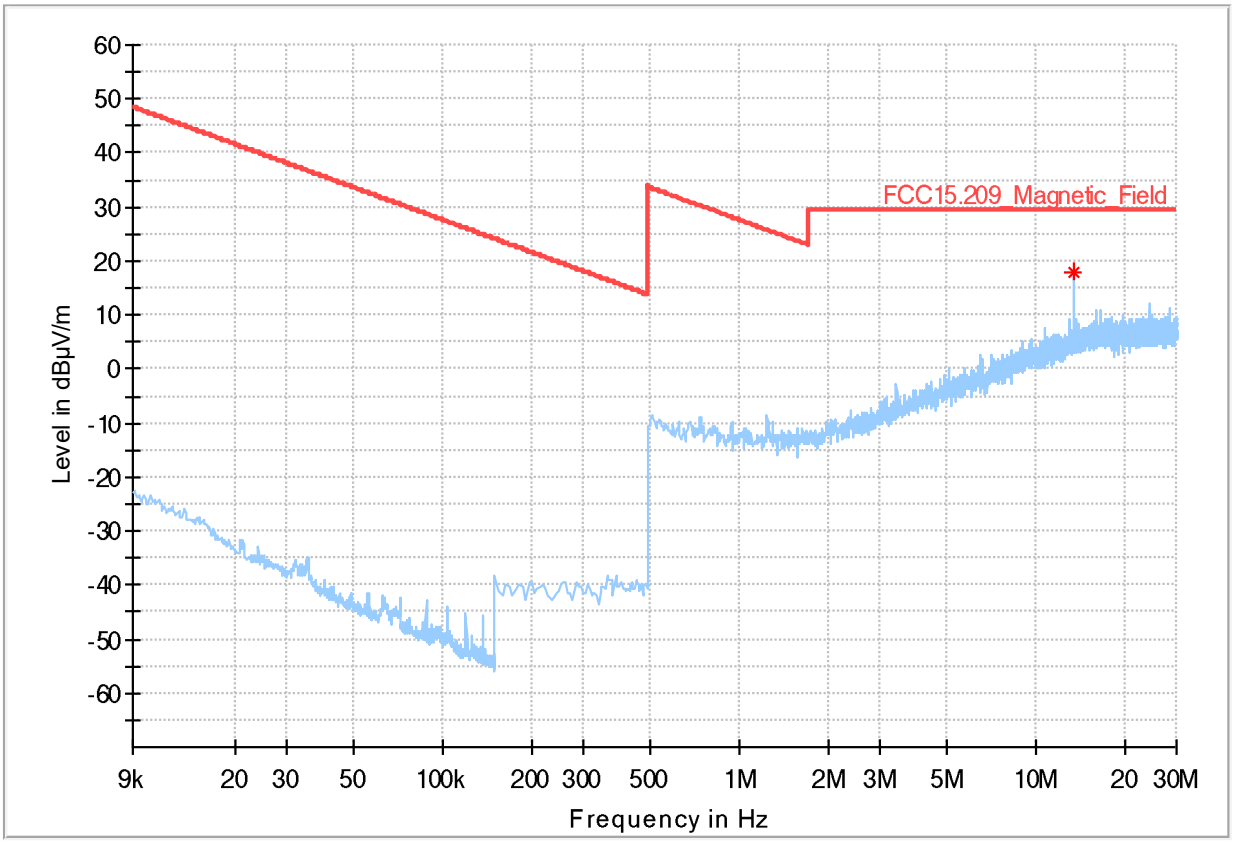
Plot 50: RSE, 9 kHz – 30 MHz, OP 1, mid channel, loop antenna



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
13.559886	15.62	29.54	13.92	100.0	9.000	V	182.0	-0.9

Note:
The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kHz resulted in a level of Y dBµV/m, which is equivalent to Y - 51.5 = Z dBµA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.
(Certification & Engineering Bureau, Q&A on Certification Procedures and Requirements, TCB Workshop April 2020, Nicolas DesMarais, 2020-04-09 - ISED Q&A - DesMarais.pdf)

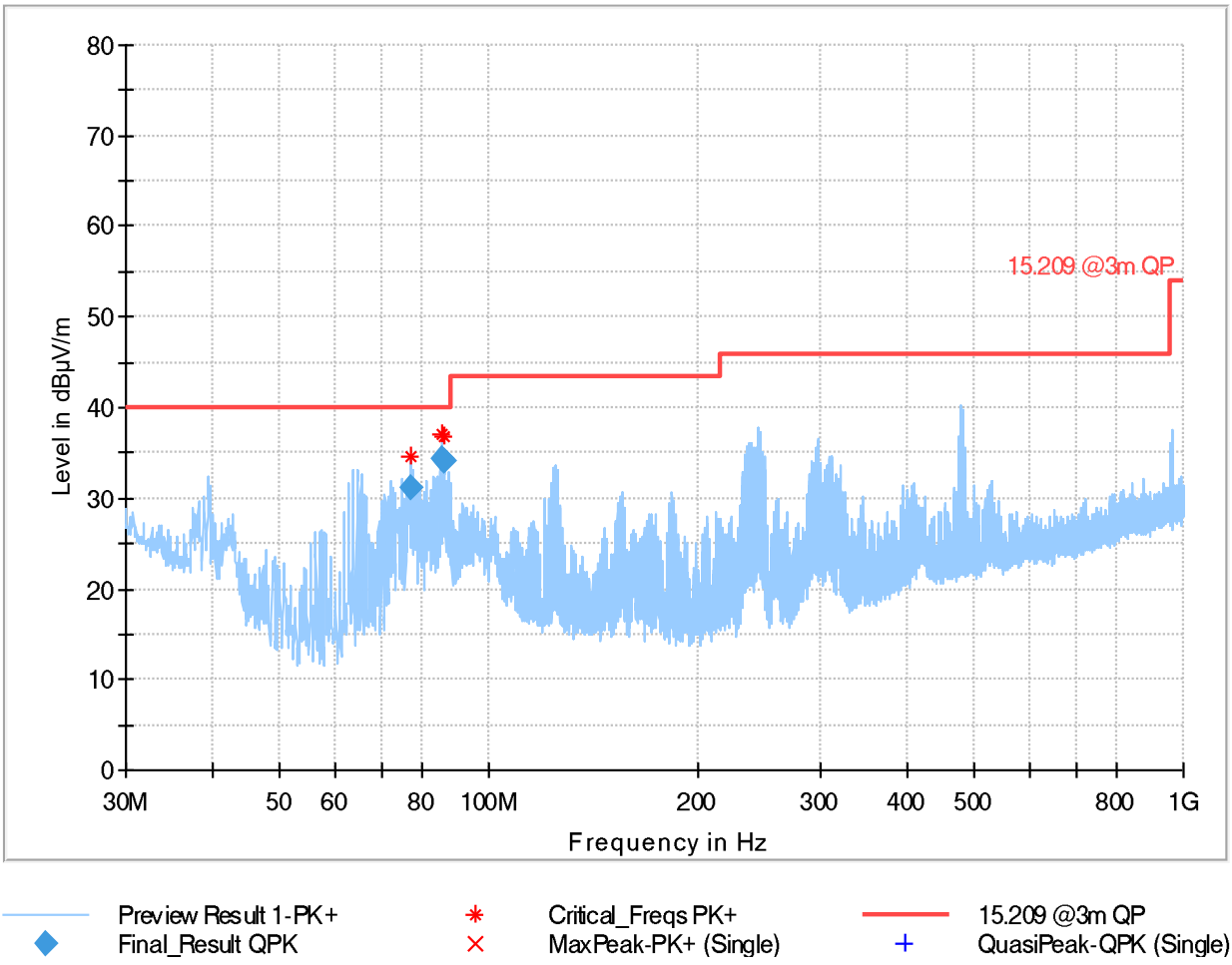
Plot 51: RSE, 9 kHz – 30 MHz, OP 1, high channel, loop antenna



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
13.559886	17.98	29.54	11.56	---	---	V	0.0	-0.9

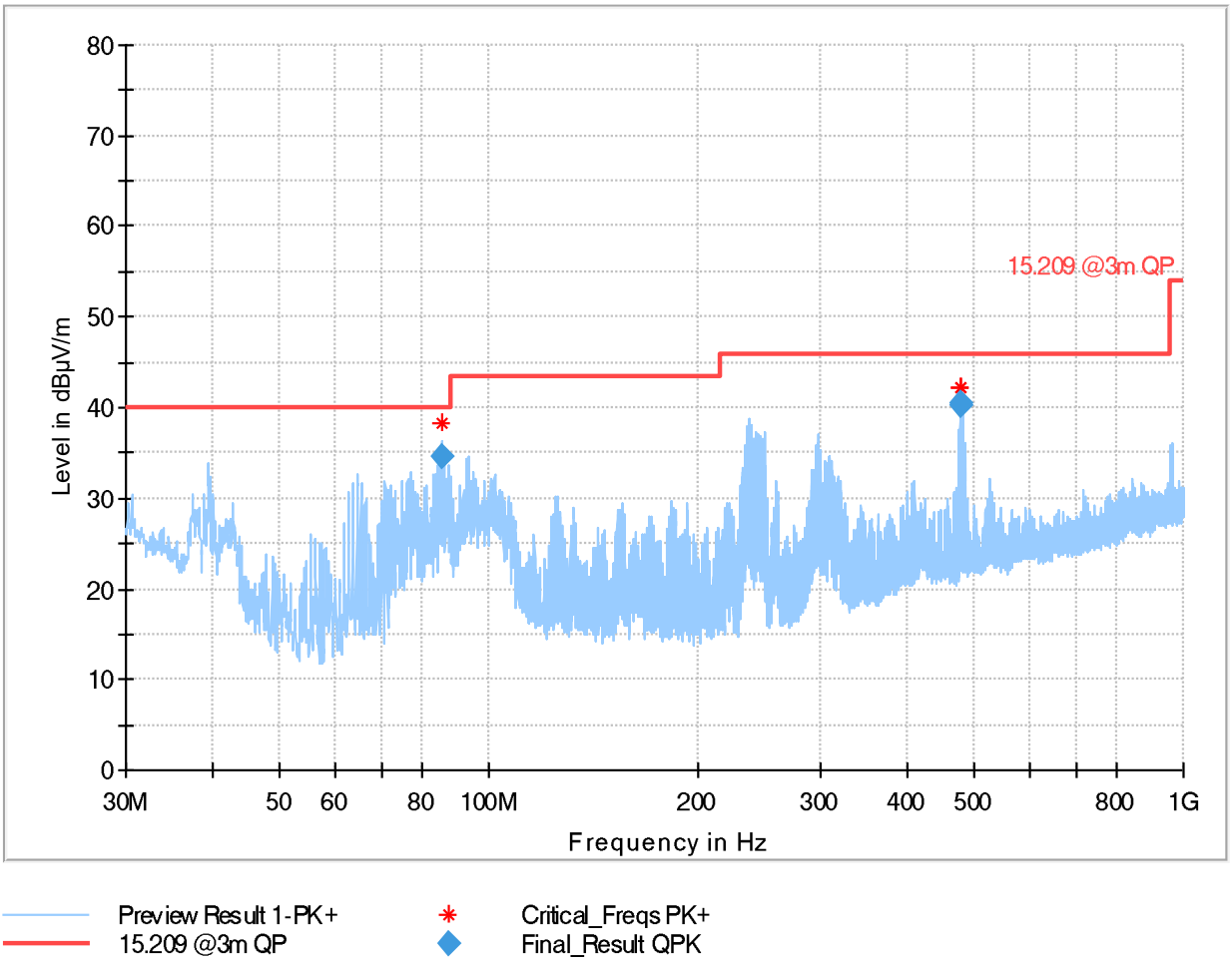
Note:
The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kHz resulted in a level of Y dBµV/m, which is equivalent to Y - 51.5 = Z dBµA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.
(Certification & Engineering Bureau, Q&A on Certification Procedures and Requirements, TCB Workshop April 2020, Nicolas DesMarais, 2020-04-09 - ISED Q&A - DesMarais.pdf)

Plot 52: RSE, 30 MHz – 1 GHz, OP 1, low channel, horizontal / vertical polarisation



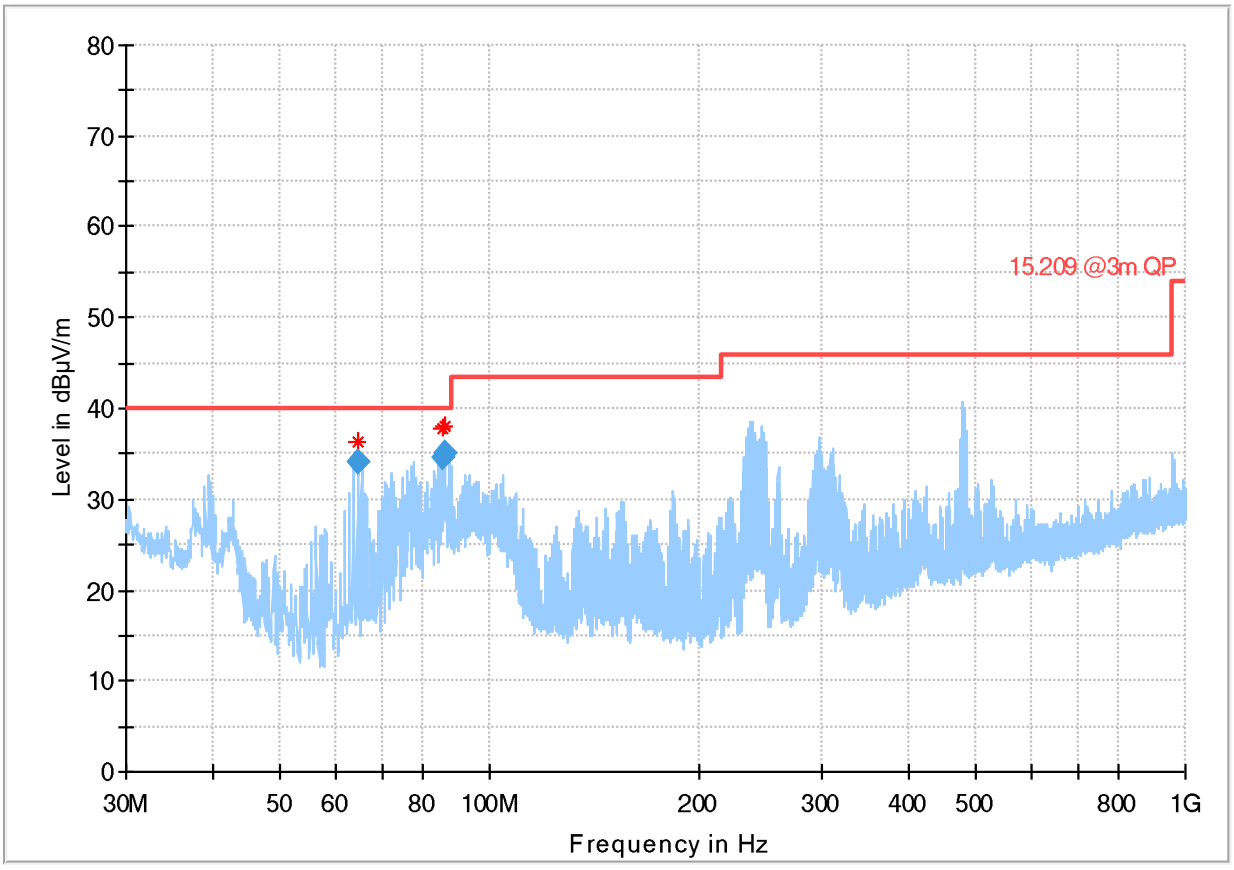
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
77.280500	31.08	40.00	8.92	100.0	120.000	121.0	V	236.0
85.454000	34.41	40.00	5.59	100.0	120.000	100.0	V	72.0
86.260000	34.10	40.00	5.90	100.0	120.000	103.0	V	292.0

Plot 53: RSE, 30 MHz – 1 GHz, OP 1, mid channel, horizontal / vertical polarisation



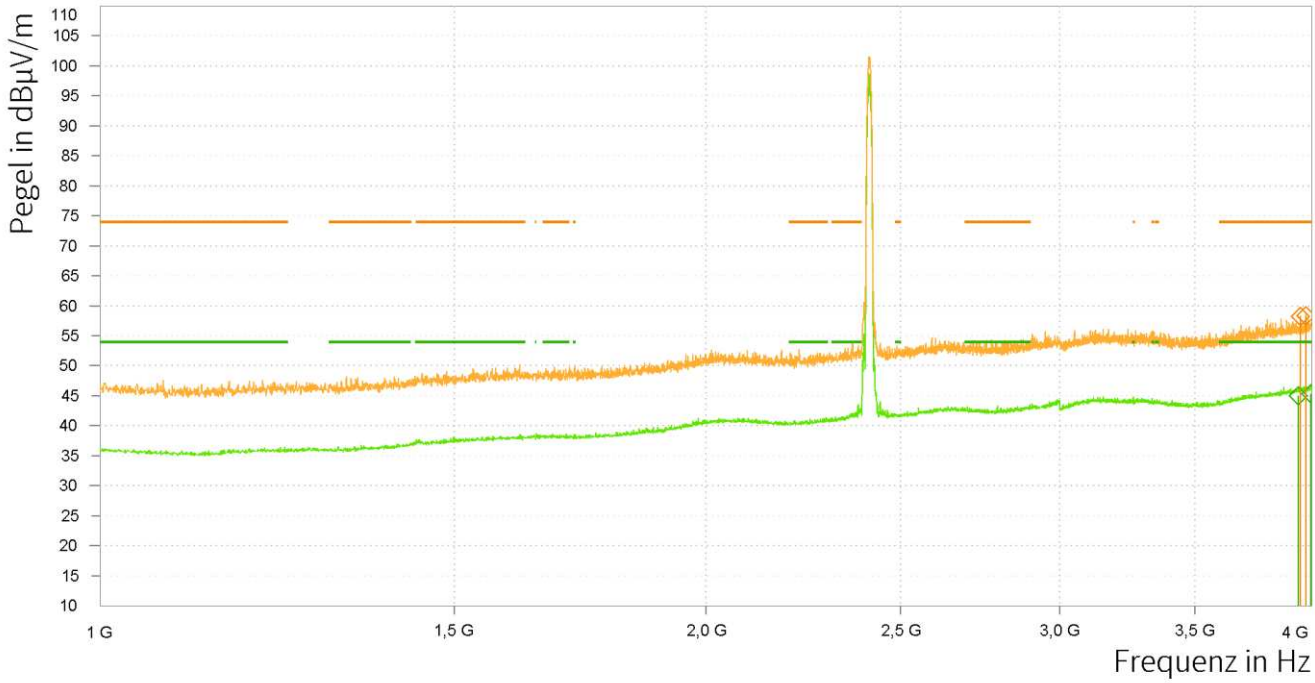
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
85.465500	34.53	40.00	5.47	100.0	120.000	103.0	V	-15.0
478.140000	40.23	46.00	5.77	100.0	120.000	100.0	V	205.0
479.091500	40.48	46.00	5.52	100.0	120.000	100.0	V	209.0

Plot 54: RSE, 30 MHz – 1 GHz, OP 1, high channel, horizontal / vertical polarisation



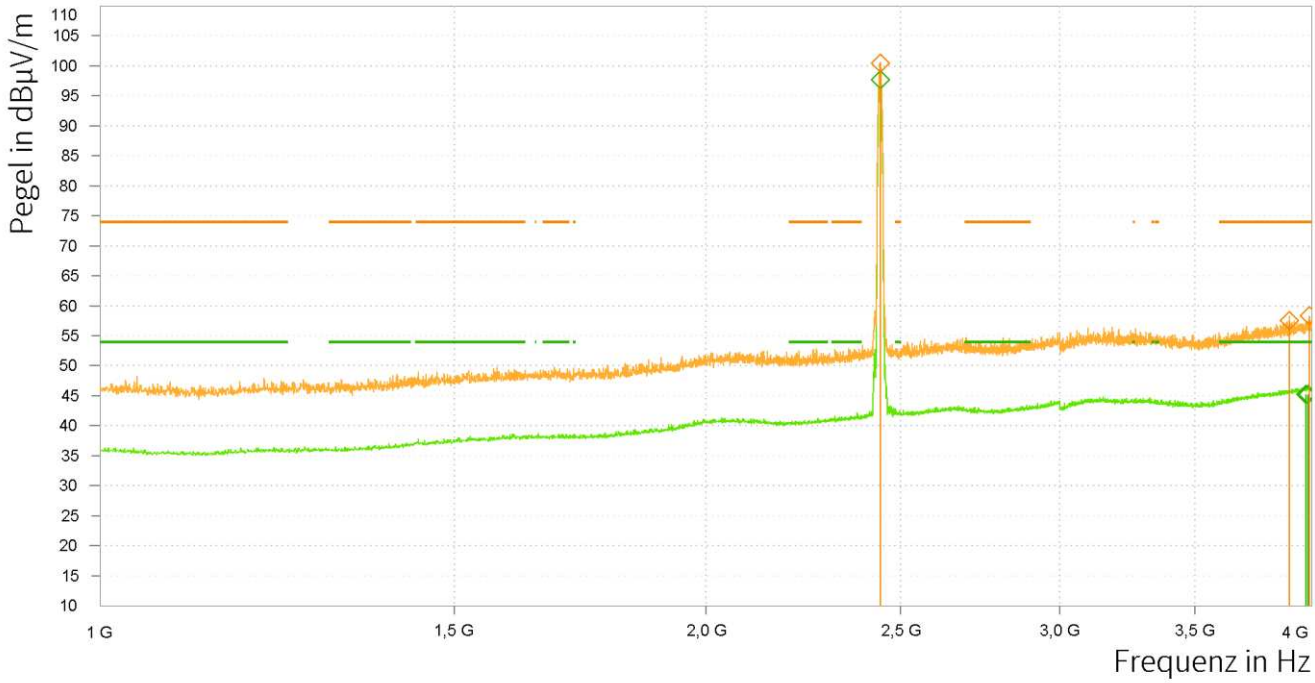
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
64.557500	34.15	40.00	5.85	100.0	120.000	148.0	V	357.0
85.465500	34.55	40.00	5.45	100.0	120.000	103.0	V	24.0
86.267000	34.98	40.00	5.02	100.0	120.000	123.0	V	126.0

Plot 55: RSE, 1 GHz – 4 GHz, OP 1, low channel, horizontal / vertical polarisation



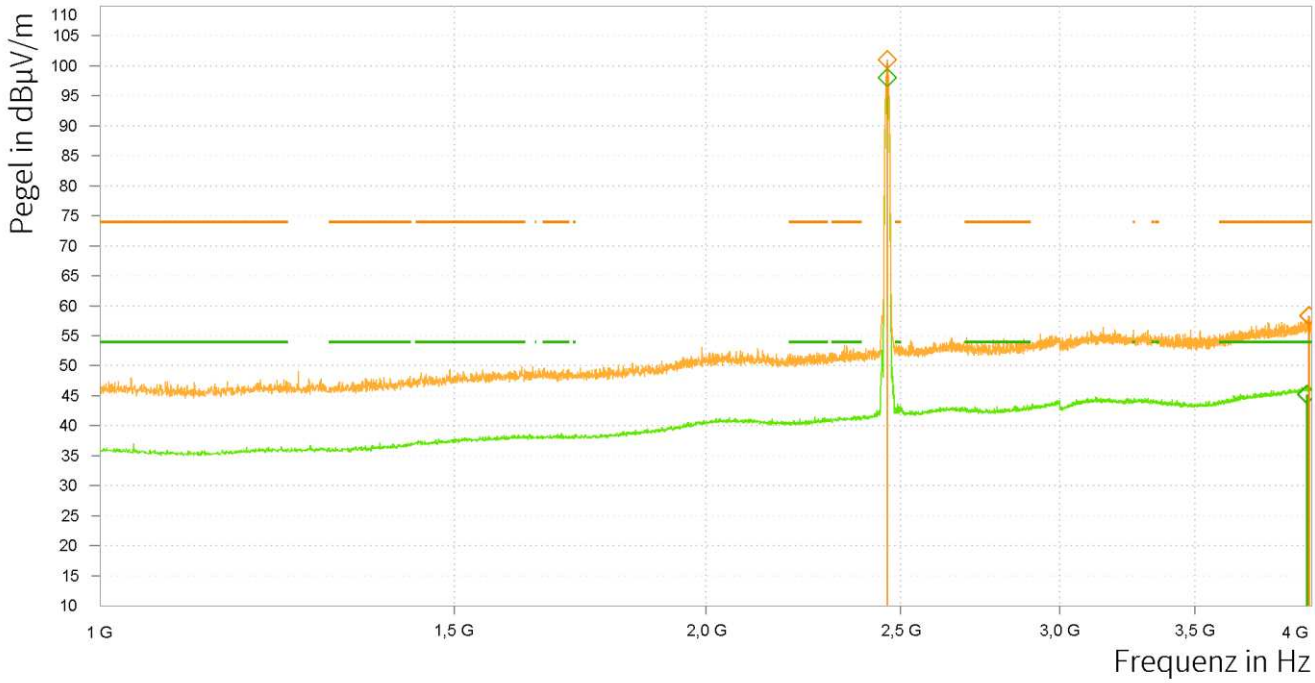
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	3.940,500				45,01	54,00	8,99	33,25	V	94,8	37,5	1.000,000
1	3.949,000	58,23	74,00	15,77				33,26	H	98,8	36,4	1.000,000
1	3.974,000	58,34	74,00	15,66				33,24	H	81,8	350	1.000,000
1	3.996,000				45,32	54,00	8,68	33,22	V	15	338,3	1.000,000

Plot 56: RSE, 1 GHz – 4 GHz, OP 1, mid channel, horizontal / vertical polarisation



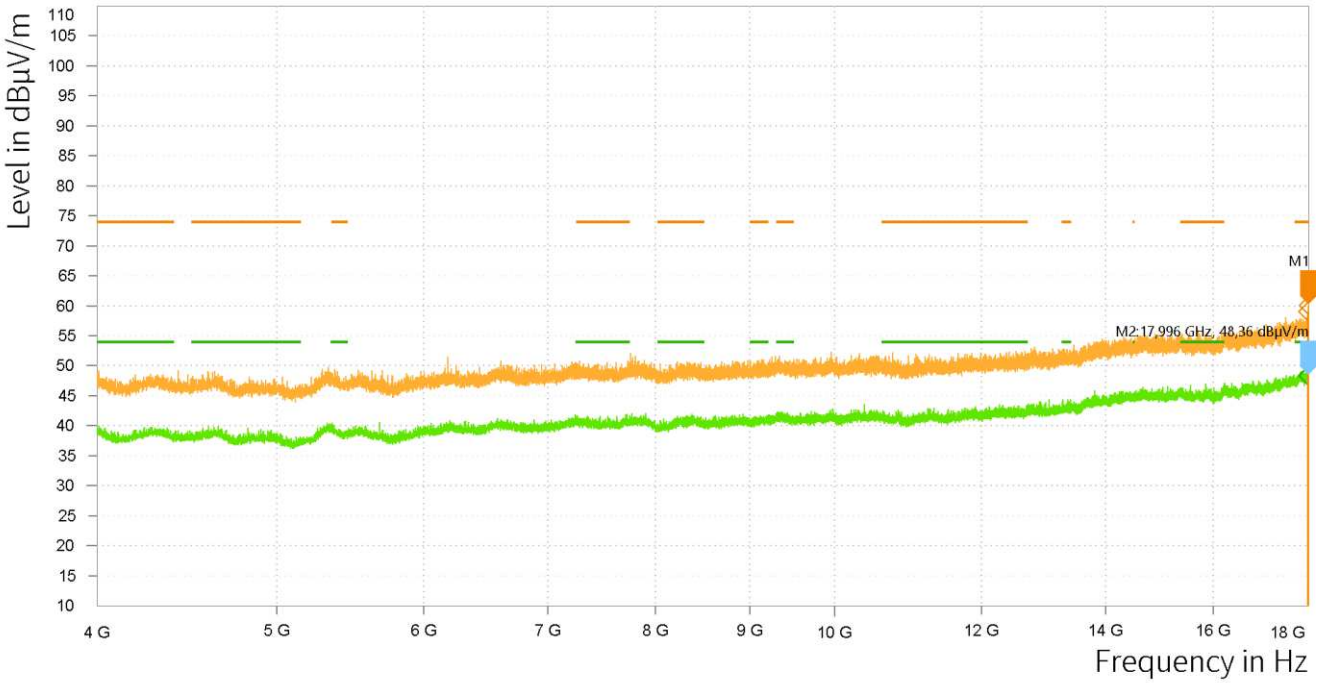
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	2.443,000	100,48			97,67			29,14	H	-8,9	158,8	1.000,000
1	3.899,000	57,51	74,00	16,49				33,22	H	105	370,1	1.000,000
1	3.975,500				45,23	54,00	8,77	33,24	V	104,9	269,2	1.000,000
1	3.984,500				45,26	54,00	8,74	33,23	H	-15	23,3	1.000,000
1	3.989,500	58,28	74,00	15,72				33,23	H	105	163,4	1.000,000

Plot 57: RSE, 1 GHz – 4 GHz, OP 1, high channel, horizontal / vertical polarisation



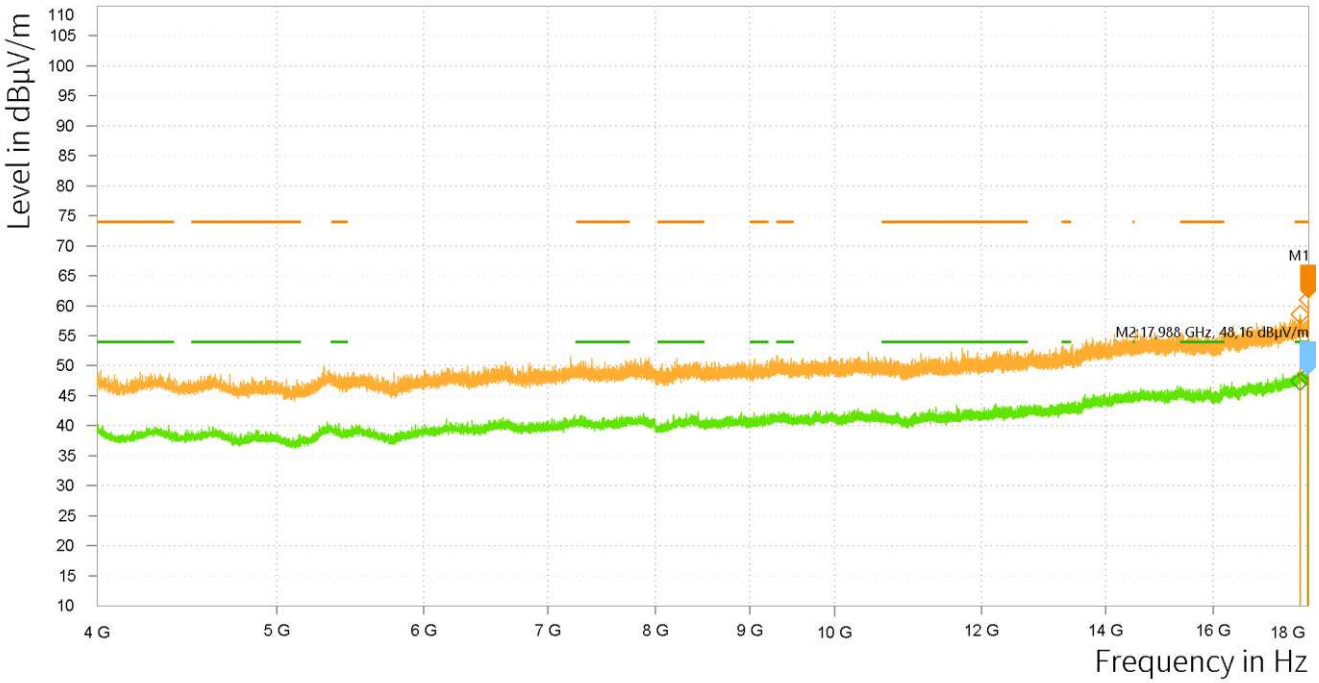
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	2.463,000	101,07			98,00			29,22	H	-15	281,3	1.000,000
1	3.976,500				45,22	54,00	8,78	33,24	V	15	109,9	1.000,000
1	3.981,000				45,25	54,00	8,75	33,24	V	104,9	368,6	1.000,000
1	3.986,500	58,30	74,00	15,70				33,23	H	-15	38,2	1.000,000
1	3.991,500	58,33	74,00	15,67				33,23	H	105	343,1	1.000,000

Plot 58: RSE, 4 GHz – 18 GHz, OP 1, low channel, horizontal / vertical polarisation



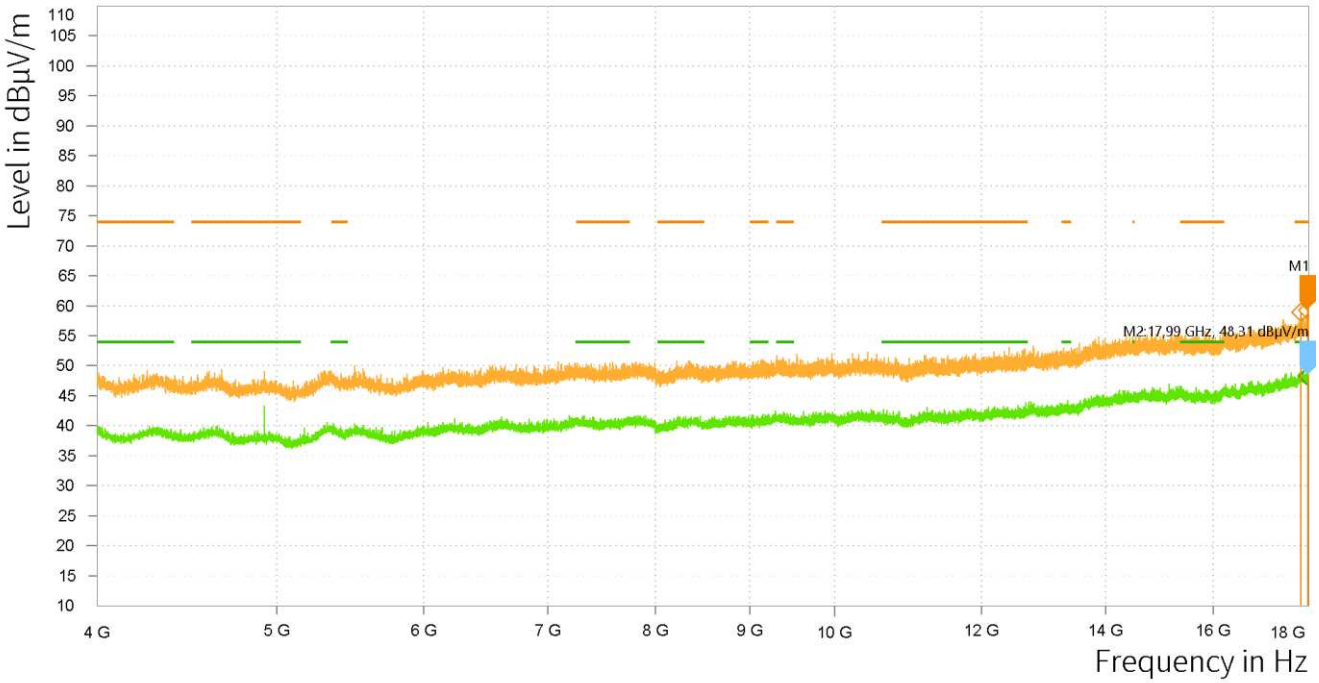
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
2	17.981,500	59,02	74,00	14,98				44,45	V	105	18,4	1.000,000
2	17.983,500				48,29	54,00	5,71	44,46	H	-6,8	62,1	1.000,000
2	17.995,500				48,36	54,00	5,64	44,50	H	105	391,8	1.000,000
2	17.998,500	60,06	74,00	13,94				44,51	H	105	364,3	1.000,000

Plot 59: RSE, 4 GHz – 18 GHz, OP 1, mid channel, horizontal / vertical polarisation



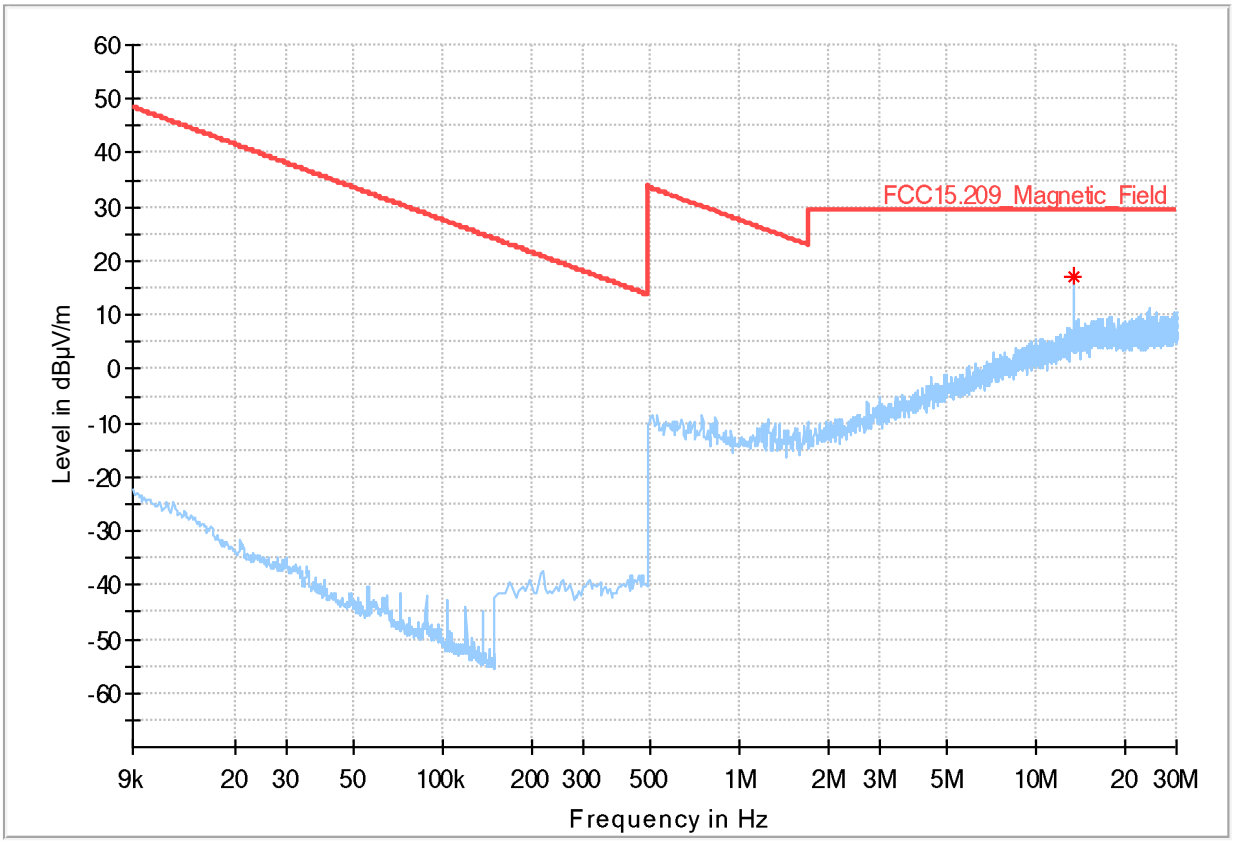
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
2	17.816,500				47,44	54,00	6,56	44,00	H	105	380,5	1.000,000
2	17.823,000	58,59	74,00	15,41				44,02	V	104,2	214,7	1.000,000
2	17.988,000				48,16	54,00	5,84	44,47	H	15	222,4	1.000,000
2	17.996,000	60,98	74,00	13,02				44,50	V	15	314,1	1.000,000

Plot 60: RSE, 4 GHz – 18 GHz, OP 1, high channel, horizontal / vertical polarisation



Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
2	17.827,500	58,91	74,00	15,09				44,03	H	15	46,7	1.000,000
2	17.986,500	59,22	74,00	14,78	48,22	54,00	5,78	44,47	H	80,9	311,9	1.000,000
2	17.990,000				48,31	54,00	5,69	44,48	V	94,4	98,4	1.000,000

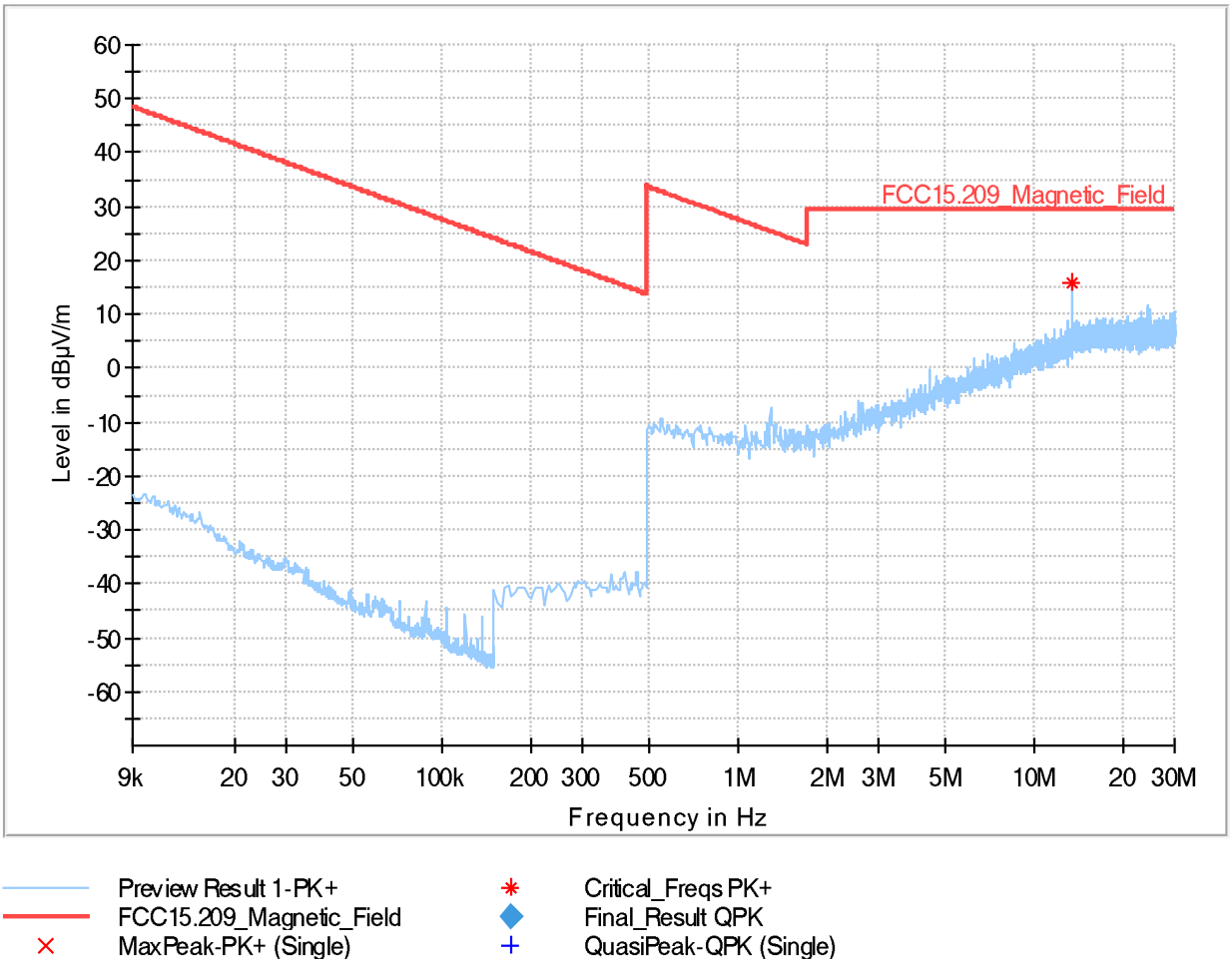
Plot 61: OP 2, RSE, 9 kHz – 30 MHz, low channel, loop antenna



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
13.559886	17.18	29.54	12.36	---	---	V	225.0	-0.9

Note:
The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kHz resulted in a level of Y dBµV/m, which is equivalent to Y - 51.5 = Z dBµA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.
(Certification & Engineering Bureau, Q&A on Certification Procedures and Requirements, TCB Workshop April 2020, Nicolas DesMarais, 2020-04-09 - ISED Q&A - DesMarais.pdf)

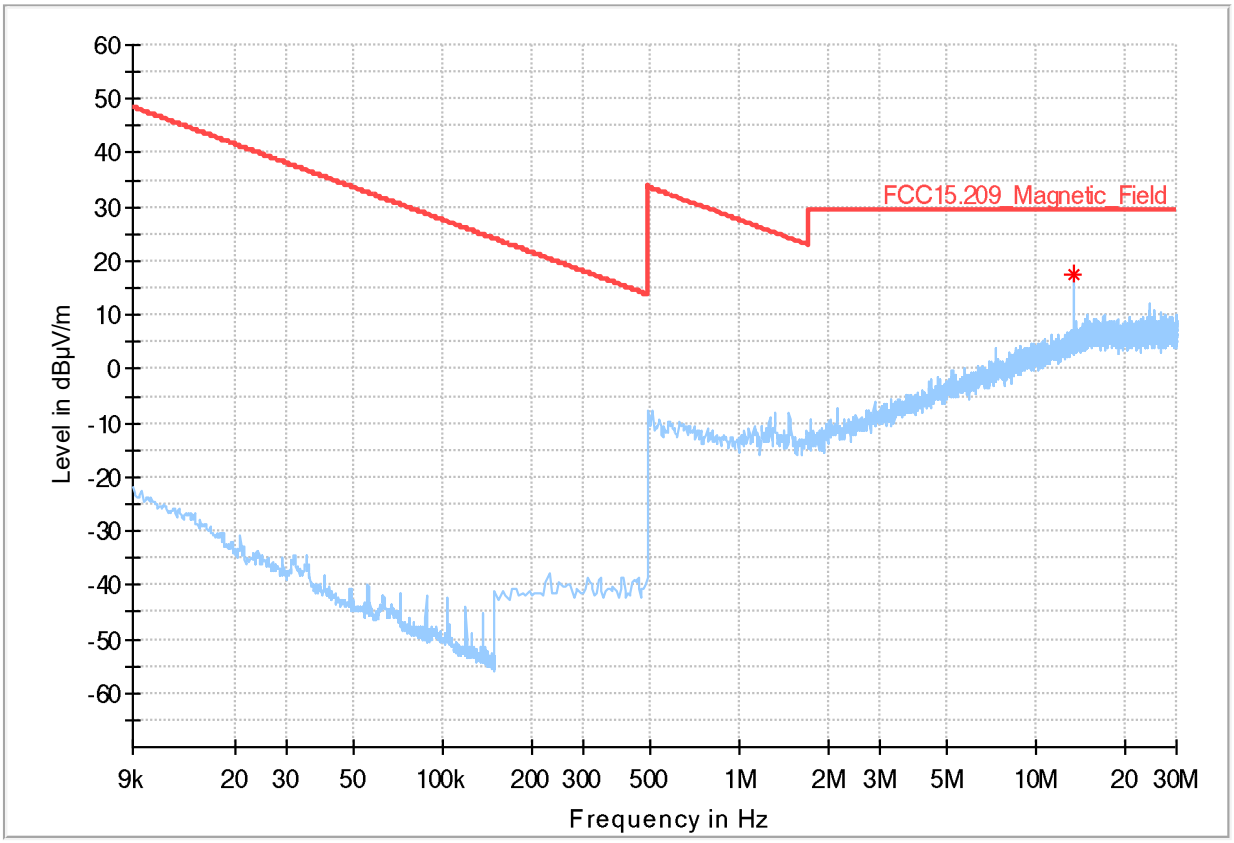
Plot 62: OP 2, RSE, 9 kHz – 30 MHz, mid channel, loop antenna



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
13.559886	16.04	29.54	13.50	---	---	V	67.0	-0.9

Note:
The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kHz resulted in a level of Y dBµV/m, which is equivalent to Y - 51.5 = Z dBµA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.
(Certification & Engineering Bureau, Q&A on Certification Procedures and Requirements, TCB Workshop April 2020, Nicolas DesMarais, 2020-04-09 - ISED Q&A - DesMarais.pdf)

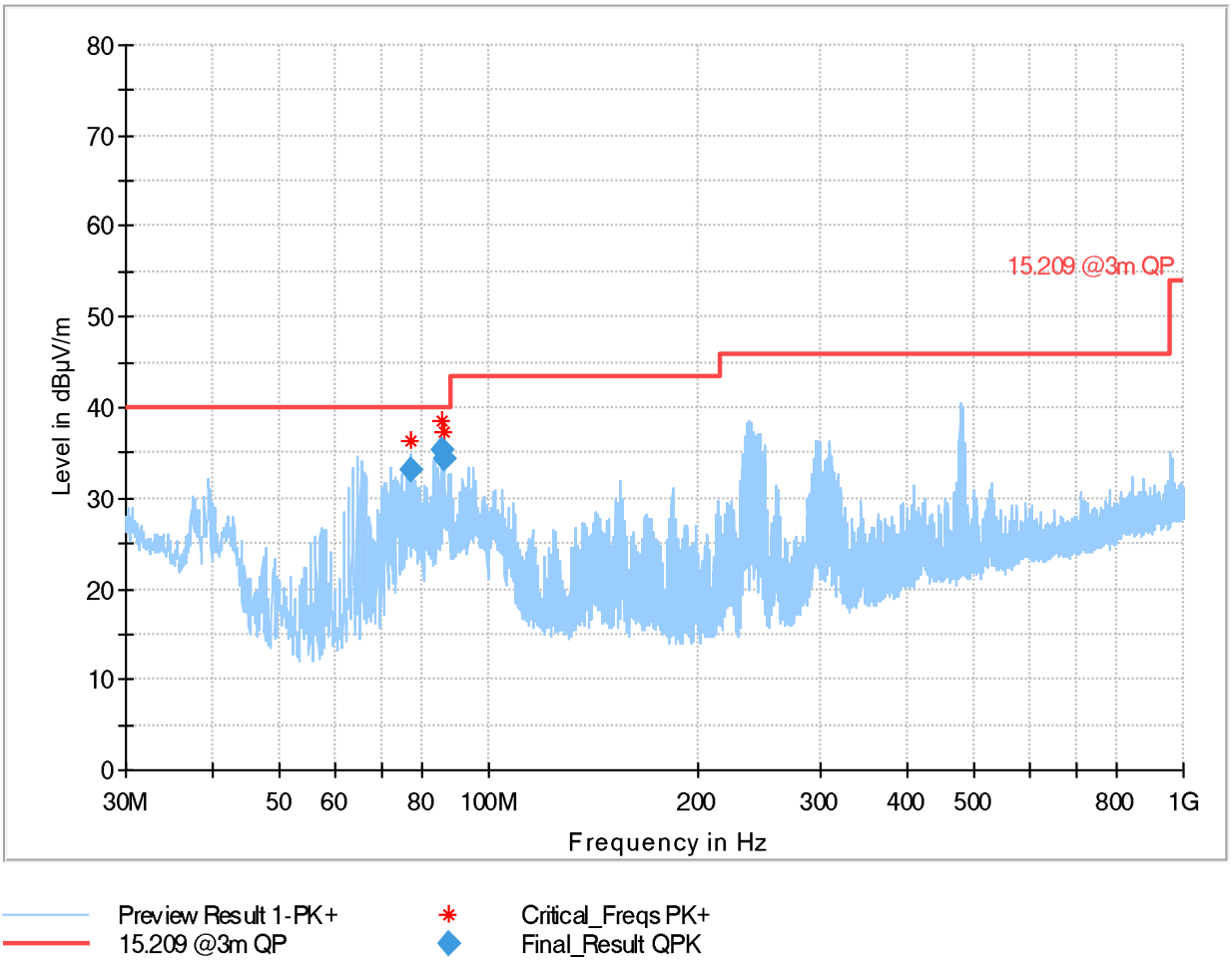
Plot 63: OP 2, RSE, 9 kHz – 30 MHz, high channel, loop antenna



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
13.559886	17.50	29.54	12.04	---	---	V	54.0	-0.9

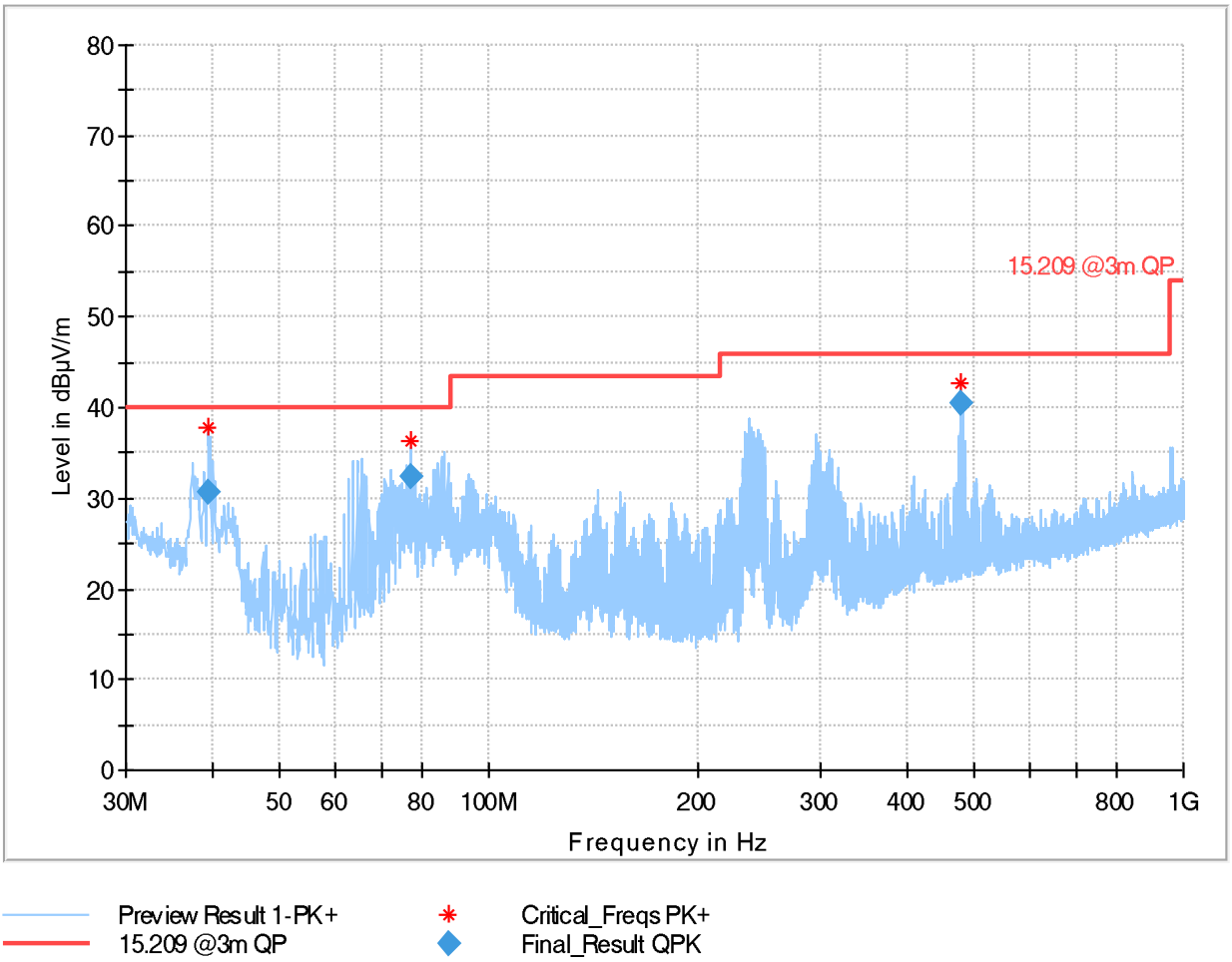
Note:
The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kHz resulted in a level of Y dBµV/m, which is equivalent to Y - 51.5 = Z dBµA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.
(Certification & Engineering Bureau, Q&A on Certification Procedures and Requirements, TCB Workshop April 2020, Nicolas DesMarais, 2020-04-09 - ISED Q&A - DesMarais.pdf)

Plot 64: RSE, 30 MHz – 1 GHz, OP 2, low channel, horizontal / vertical polarisation



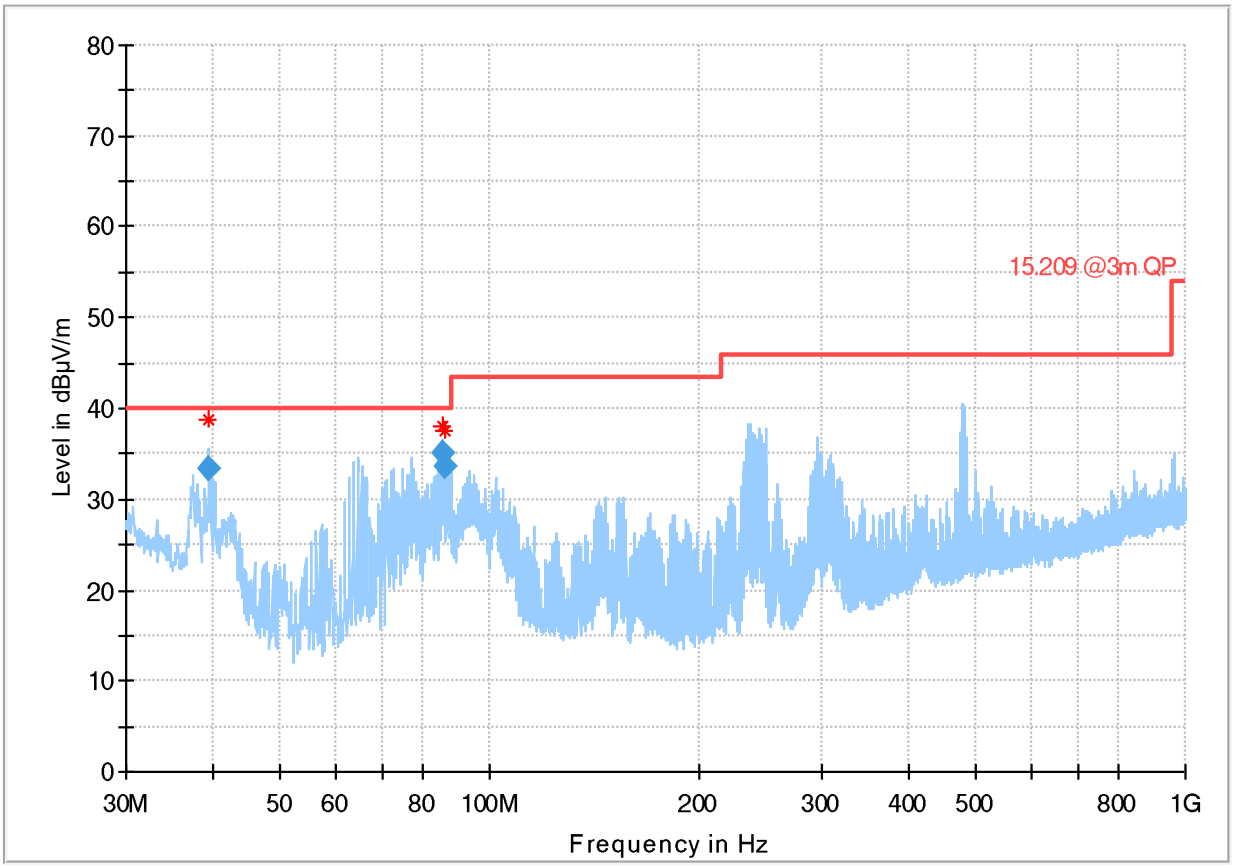
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
77.269000	33.04	40.00	6.96	100.0	120.000	126.0	V	259.0
85.465500	35.38	40.00	4.62	100.0	120.000	100.0	V	169.0
86.237000	34.37	40.00	5.63	100.0	120.000	129.0	V	52.0

Plot 65: RSE, 30 MHz – 1 GHz, OP 2, mid channel, horizontal / vertical polarisation



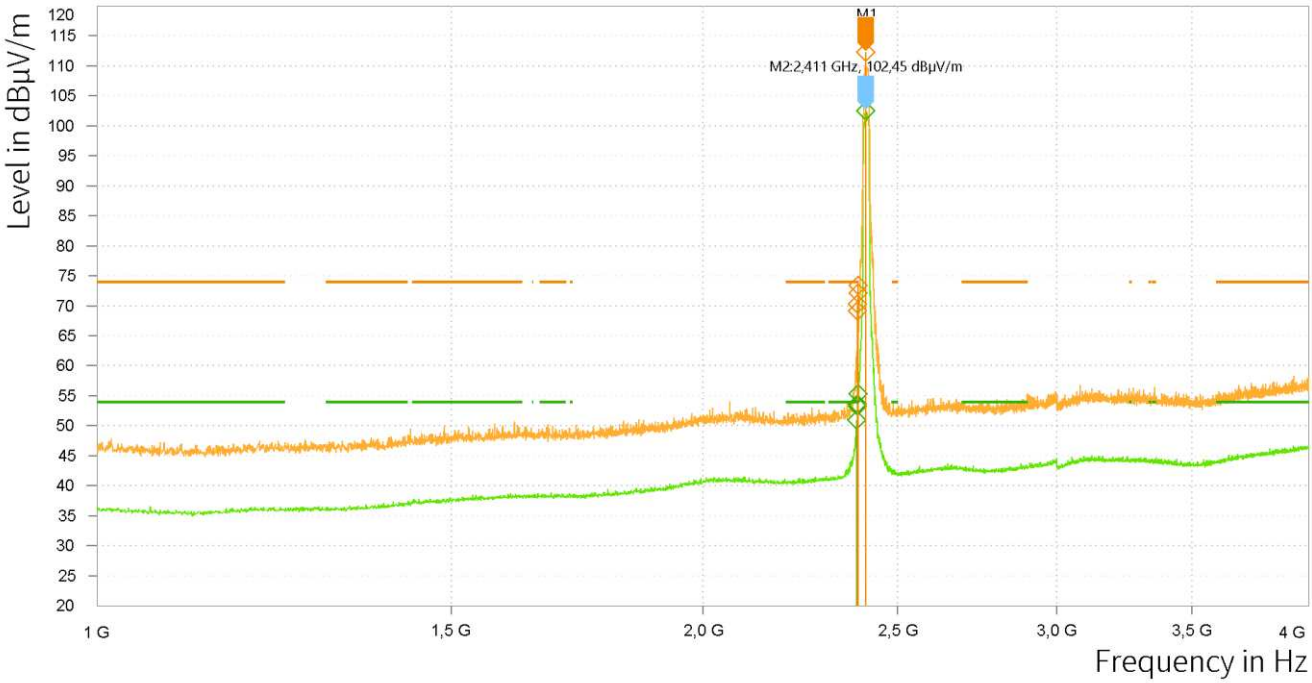
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
39.517500	30.70	40.00	9.30	100.0	120.000	104.0	V	38.0
77.269000	32.42	40.00	7.58	100.0	120.000	100.0	V	206.0
479.091500	40.50	46.00	5.50	100.0	120.000	100.0	V	189.0

Plot 66: RSE, 30 MHz – 1 GHz, OP 2, high channel, horizontal / vertical polarisation



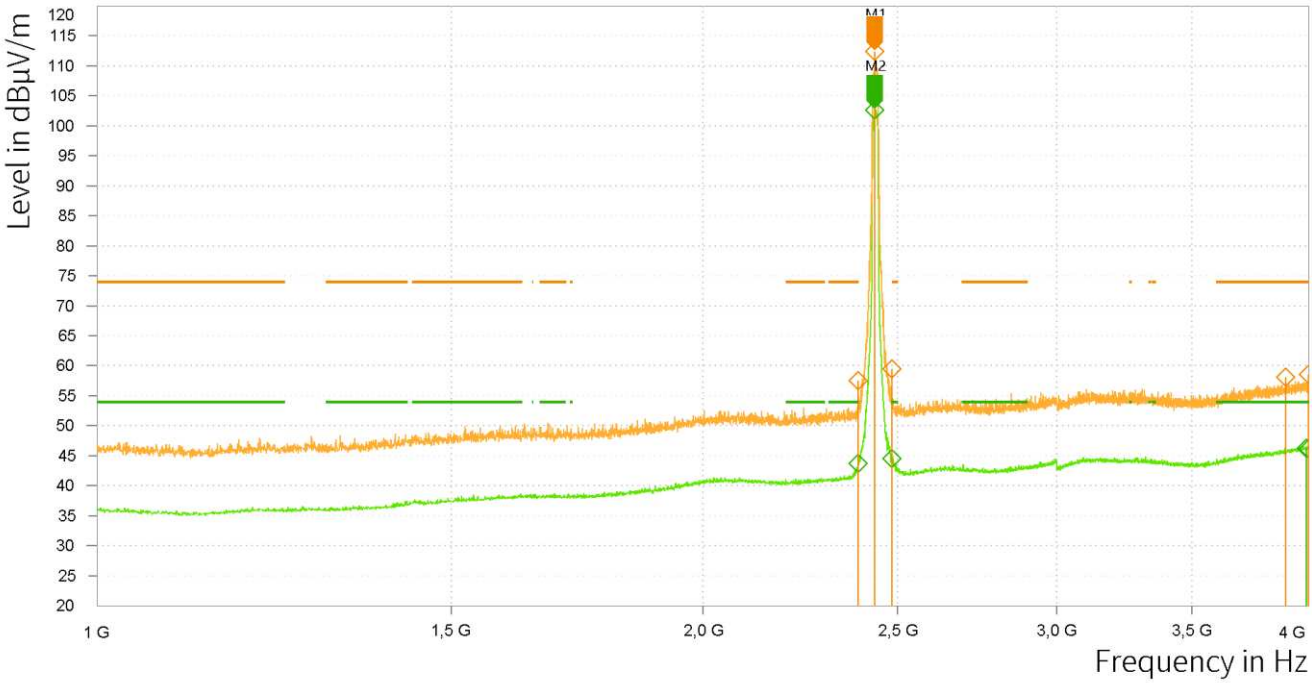
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
39.517500	33.44	40.00	6.56	100.0	120.000	100.0	V	2.0
85.465500	35.13	40.00	4.87	100.0	120.000	103.0	V	90.0
86.361500	33.72	40.00	6.28	100.0	120.000	100.0	V	94.0

Plot 67: RSE, 1 GHz – 4 GHz, OP 2, low channel, horizontal / vertical polarisation



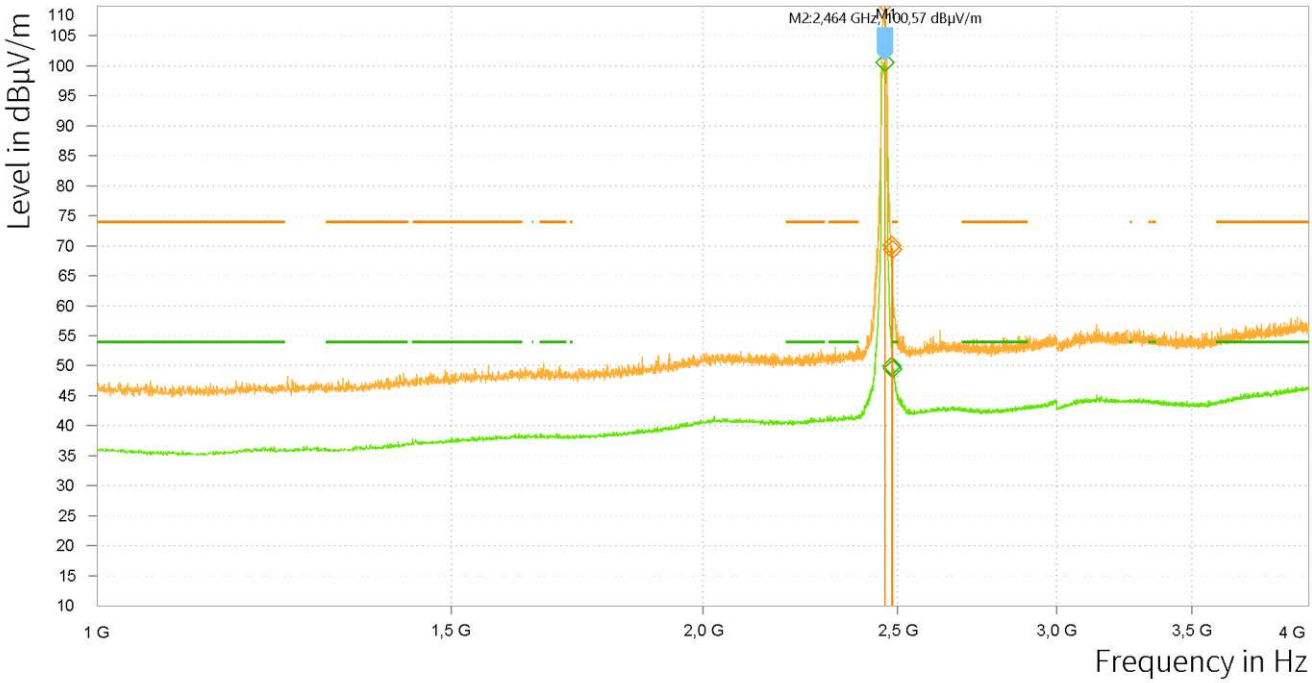
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	2.385,000				50,92	54,00	3,08	28,91	H	15	139,1	1.000,000
1	2.388,500	69,14	74,00	4,86	53,63	54,00	0,37	28,92	H	14,1	153,7	1.000,000
1	2.388,500	70,32	74,00	3,68	53,27	54,00	0,73	28,92	H	4,3	139,1	1.000,000
1	2.389,500	72,17	74,00	1,83				28,92	H	14,3	132	1.000,000
1	2.390,000	73,42			55,38			28,92	H	14,1	138,3	1.000,000
1	2.410,500	112,26			102,45			29,01	H	4,5	131,9	1.000,000

Plot 68: RSE, 1 GHz – 4 GHz, OP 2, mid channel, horizontal / vertical polarisation



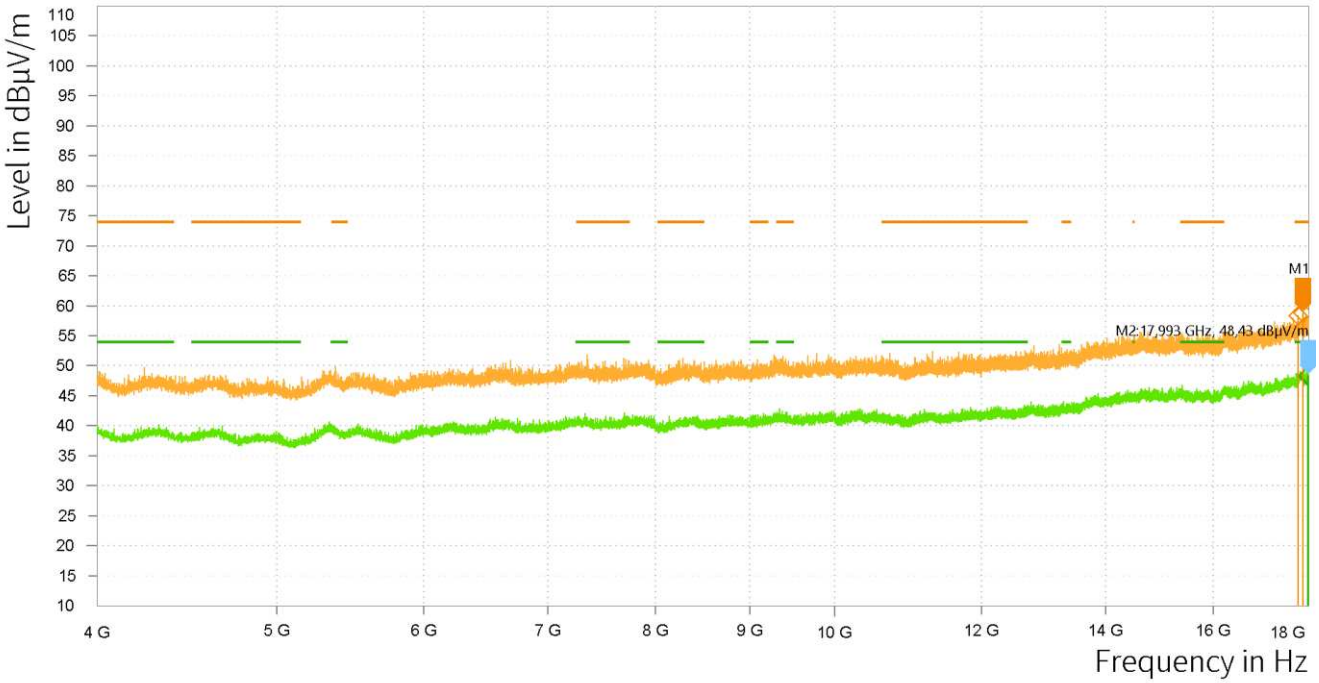
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	2.390,000	57,55			43,71			28,92	H	4,5	132,9	1.000,000
1	2.436,000	112,39			102,57			29,11	H	15	132,2	1.000,000
1	2.483,500	59,44	74,00	14,56	44,55	54,00	9,45	29,36	H	15	132,9	1.000,000
1	3.898,500	58,14	74,00	15,86				33,22	V	98,8	42,8	1.000,000
1	3.990,000				46,19	54,00	7,81	33,23	V	104,2	362	1.000,000
1	3.998,500				46,14	54,00	7,86	33,22	V	-15	287,2	1.000,000
1	4.000,000	58,55	74,00	15,45				33,22	V	75	295,1	1.000,000

Plot 69: RSE, 1 GHz – 4 GHz, OP 2, high channel, horizontal / vertical polarisation



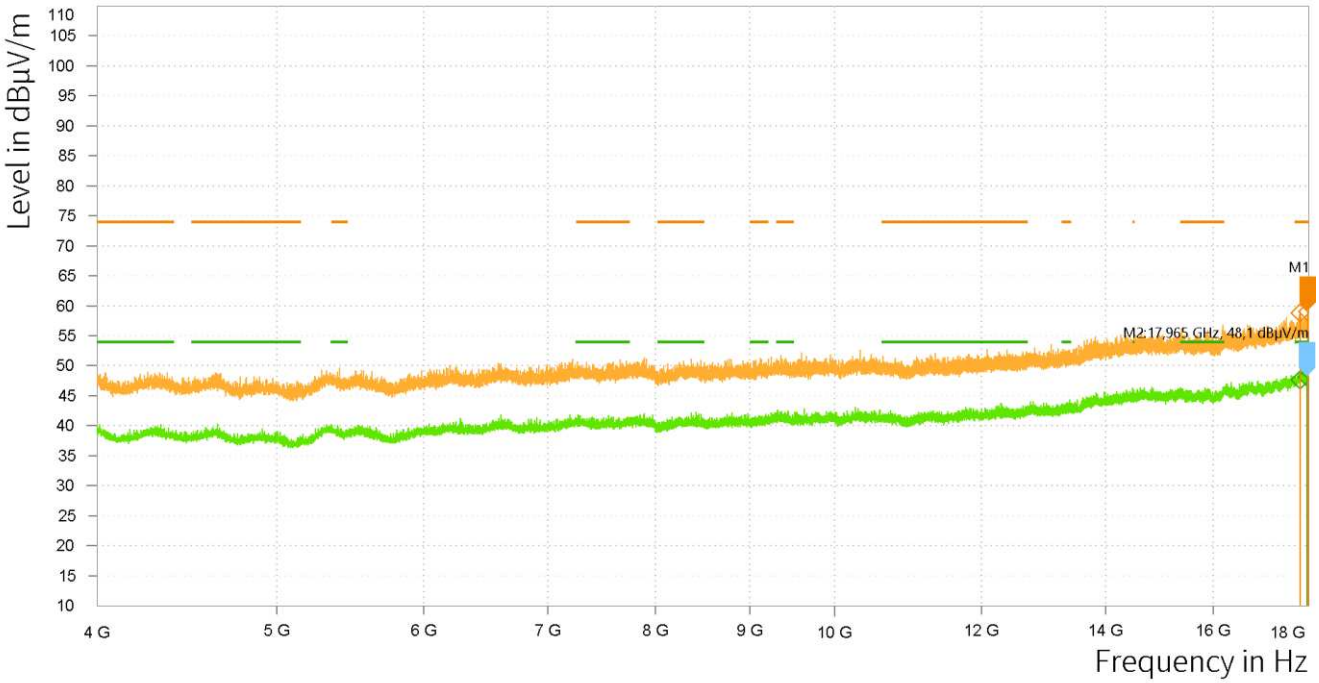
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	2.463,500	110,45			100,57			29,23	H	14,7	134,5	1.000,000
1	2.483,500	70,02	74,00	3,98	49,91	54,00	4,09	29,36	H	94,2	123,3	1.000,000
1	2.485,000				49,47	54,00	4,53	29,37	H	94,7	287,6	1.000,000
1	2.486,000	69,44	74,00	4,56				29,37	H	4,7	126,1	1.000,000

Plot 70: RSE, 4 GHz – 18 GHz, OP 2, low channel, horizontal / vertical polarisation



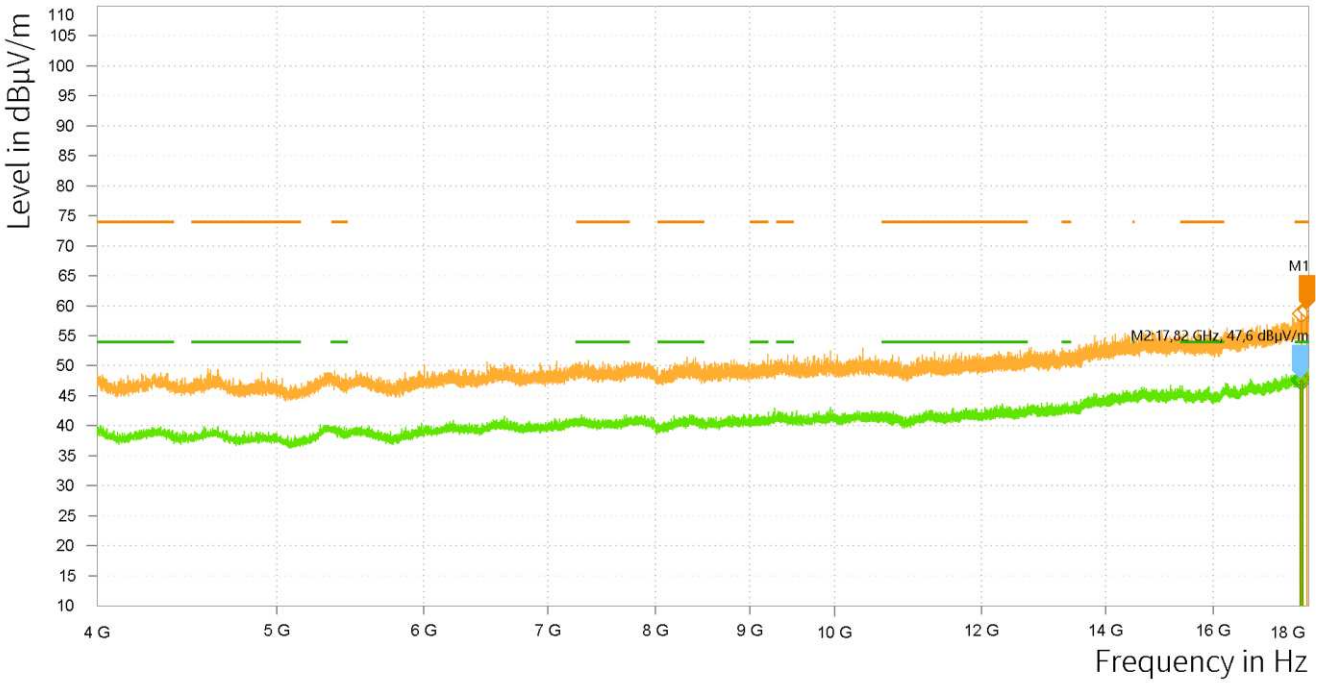
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
2	17.766,000	58,32	74,00	15,68				43,91	V	83,9	30,2	1.000,000
2	17.884,500	58,80	74,00	15,20				44,16	H	75,9	243,3	1.000,000
2	17.981,500				48,25	54,00	5,75	44,45	V	105	150,5	1.000,000
2	17.993,000				48,43	54,00	5,57	44,49	H	75	36,7	1.000,000

Plot 71: RSE, 4 GHz – 18 GHz, OP 2, mid channel, horizontal / vertical polarisation



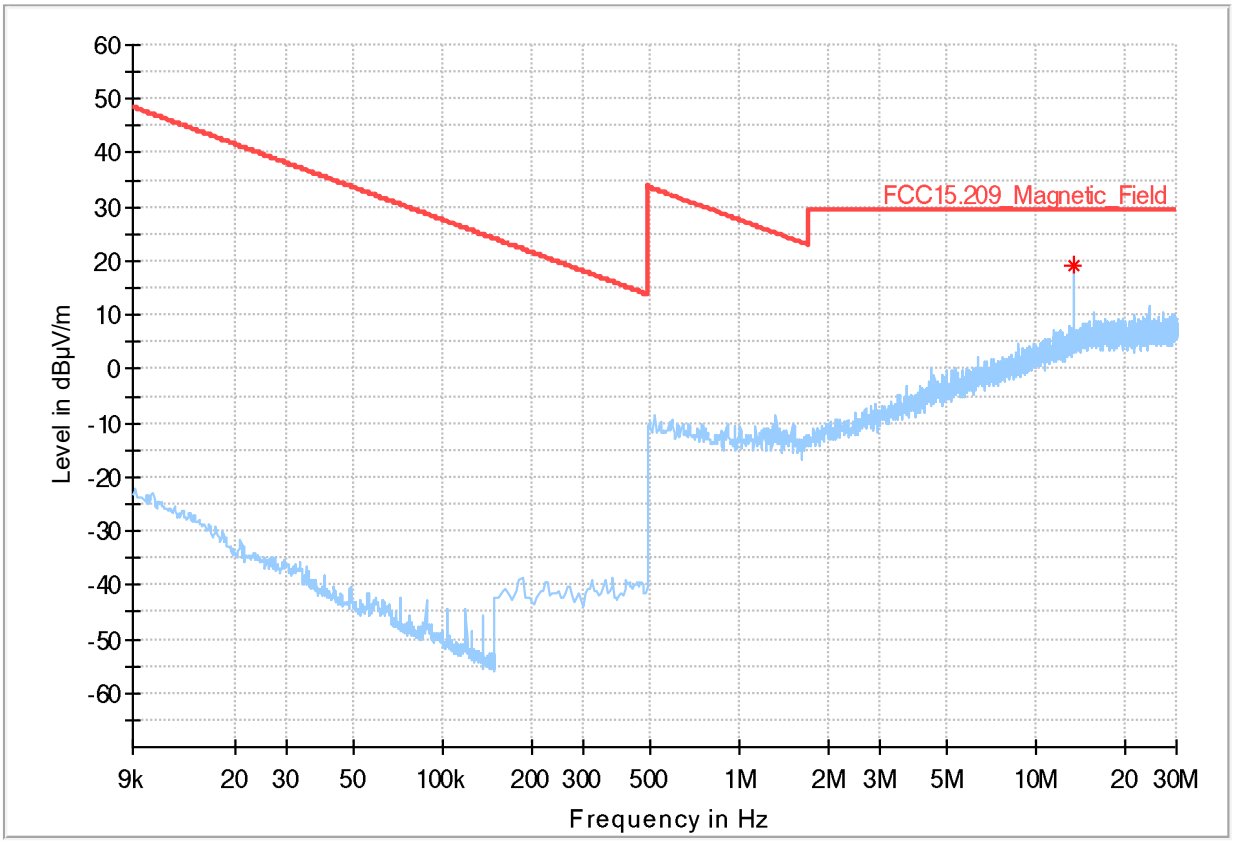
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
2	17.808,500	58,75	74,00	15,25	47,66	54,00	6,34	43,99	V	75	366,5	1.000,000
2	17.964,500				48,10	54,00	5,90	44,40	H	-15	81,6	1.000,000
2	17.989,500	59,06	74,00	14,94				44,48	V	81,3	358,3	1.000,000

Plot 72: RSE, 4 GHz – 18 GHz, OP 2, high channel, horizontal / vertical polarisation



Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
2	17.820,000				47,60	54,00	6,40	44,01	V	-15	133,3	1.000,000
2	17.844,000	58,65	74,00	15,35				44,06	V	105	87,8	1.000,000
2	17.884,500				47,57	54,00	6,43	44,16	H	15	263,1	1.000,000
2	17.963,000	59,27	74,00	14,73				44,39	V	105	311,1	1.000,000

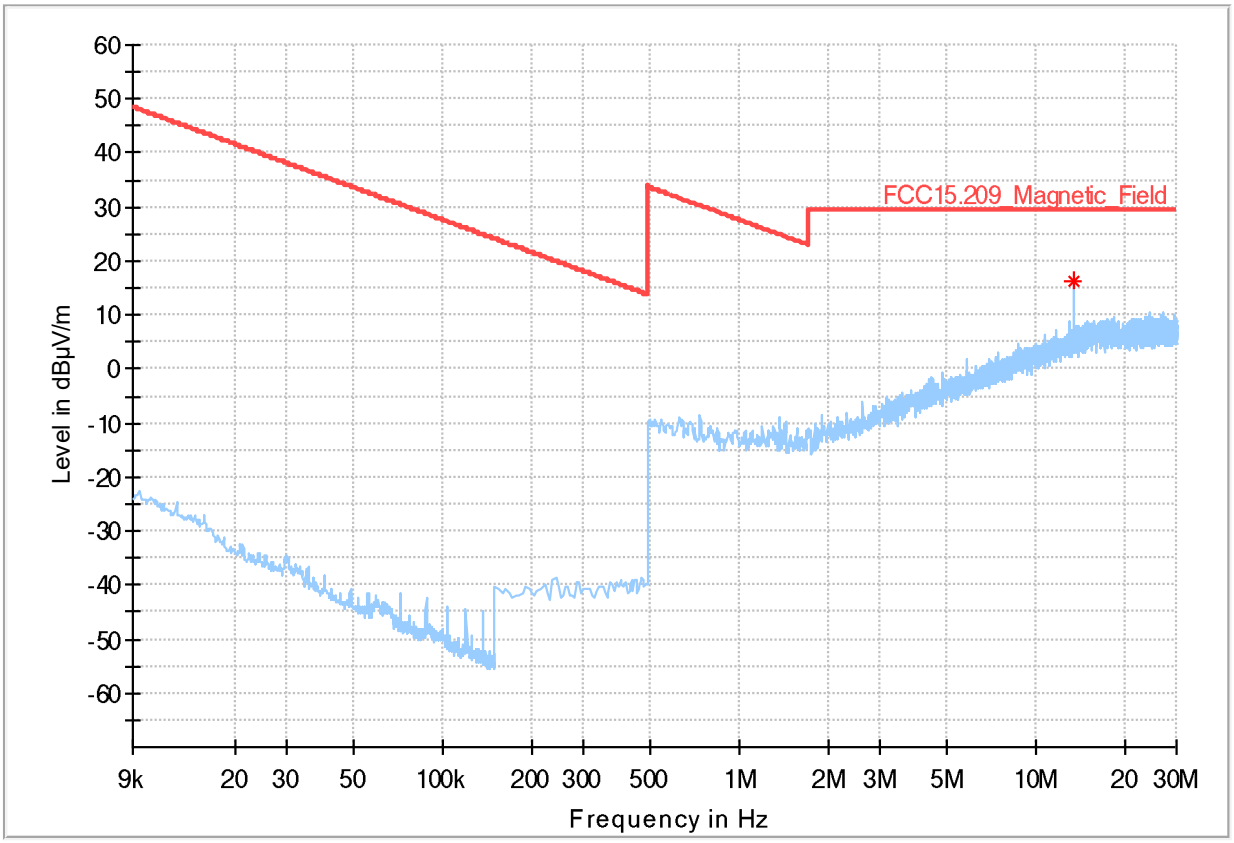
Plot 73: OP 3, RSE, 9 kHz – 30 MHz, low channel, loop antenna



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
13.559886	19.06	29.54	10.48	---	---	V	240.0	-0.9

Note:
The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kHz resulted in a level of Y dBµV/m, which is equivalent to Y - 51.5 = Z dBµA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.
(Certification & Engineering Bureau, Q&A on Certification Procedures and Requirements, TCB Workshop April 2020, Nicolas DesMarais, 2020-04-09 - ISED Q&A - DesMarais.pdf)

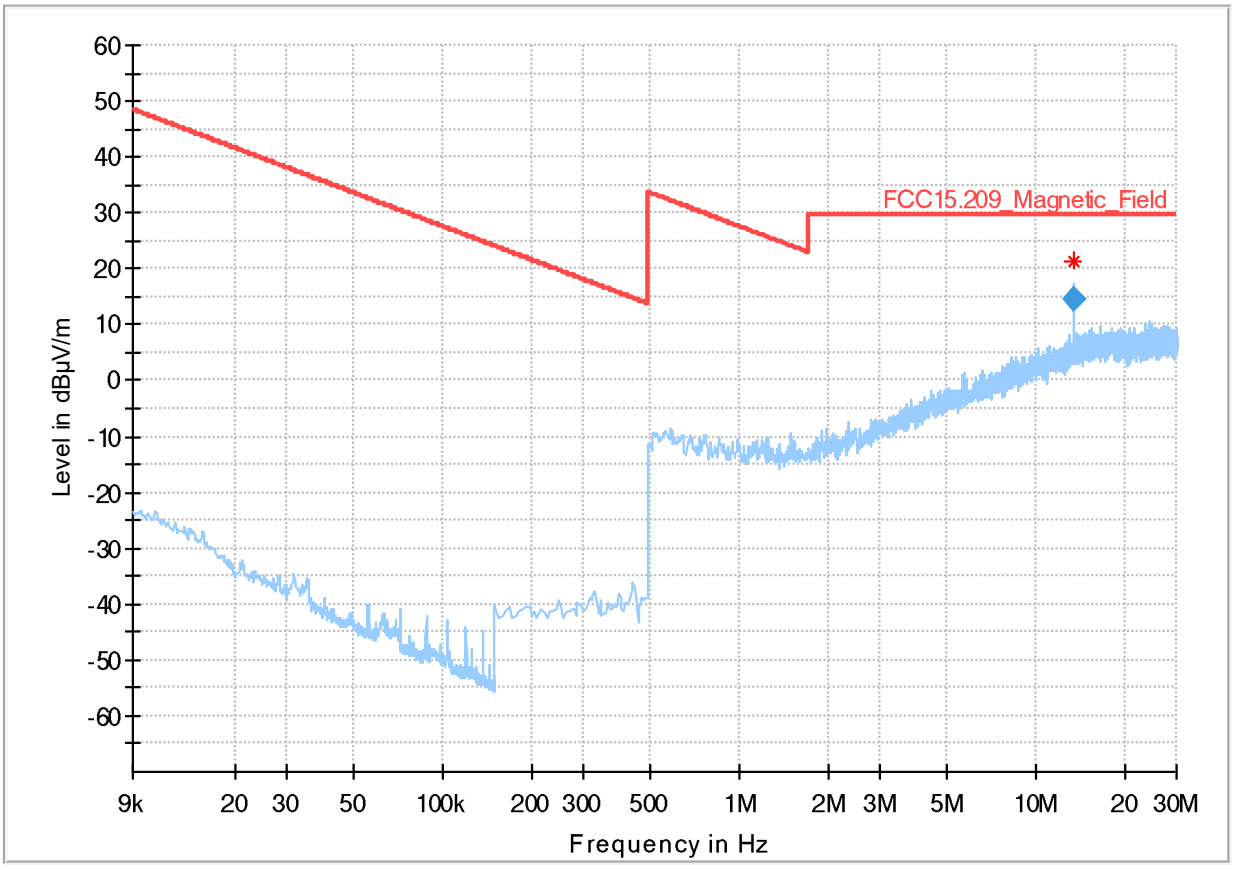
Plot 74: OP 3, RSE, 9 kHz – 30 MHz, mid channel, loop antenna



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
13.559886	16.37	29.54	13.17	---	---	V	1.0	-0.9

Note:
The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kHz resulted in a level of Y dBµV/m, which is equivalent to Y - 51.5 = Z dBµA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.
(Certification & Engineering Bureau, Q&A on Certification Procedures and Requirements, TCB Workshop April 2020, Nicolas DesMarais, 2020-04-09 - ISED Q&A - DesMarais.pdf)

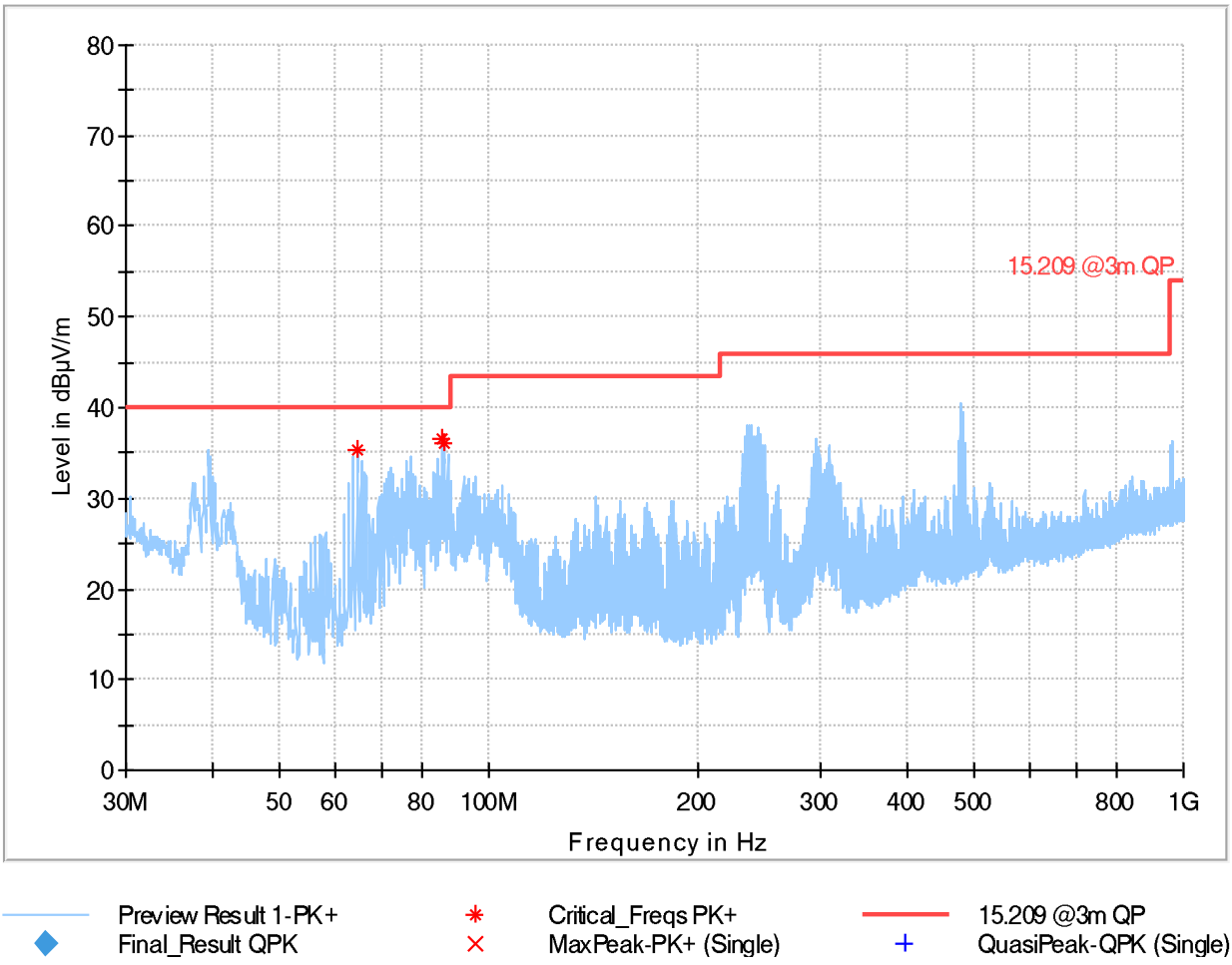
Plot 75: OP 3, RSE, 9 kHz – 30 MHz, high channel, loop antenna



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
13.559886	14.72	29.54	14.82	100.0	9.000	V	251.0	-0.9

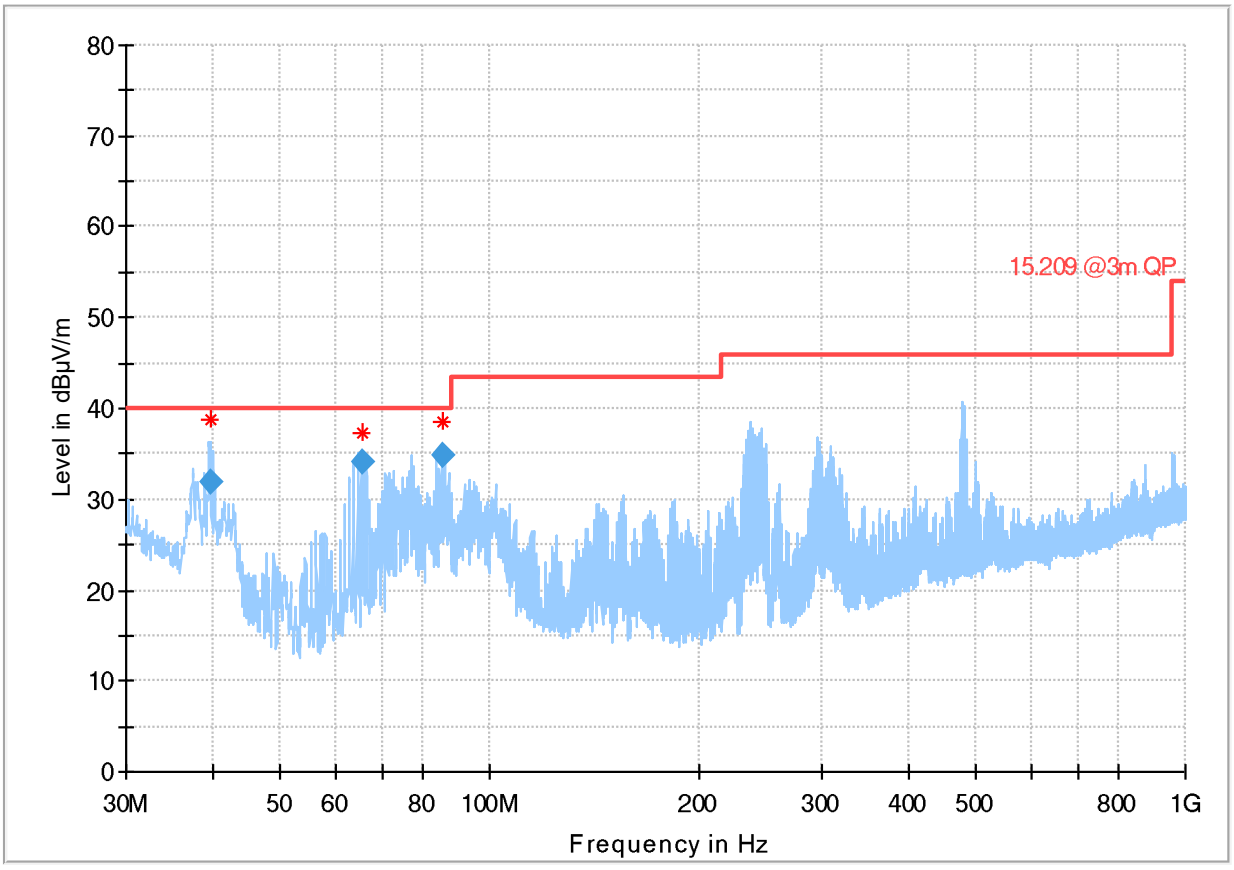
Note:
The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kHz resulted in a level of Y dBµV/m, which is equivalent to Y - 51.5 = Z dBµA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.
(Certification & Engineering Bureau, Q&A on Certification Procedures and Requirements, TCB Workshop April 2020, Nicolas DesMarais, 2020-04-09 - ISED Q&A - DesMarais.pdf)

Plot 76: RSE, 30 MHz – 1 GHz, OP 3, low channel, horizontal / vertical polarisation



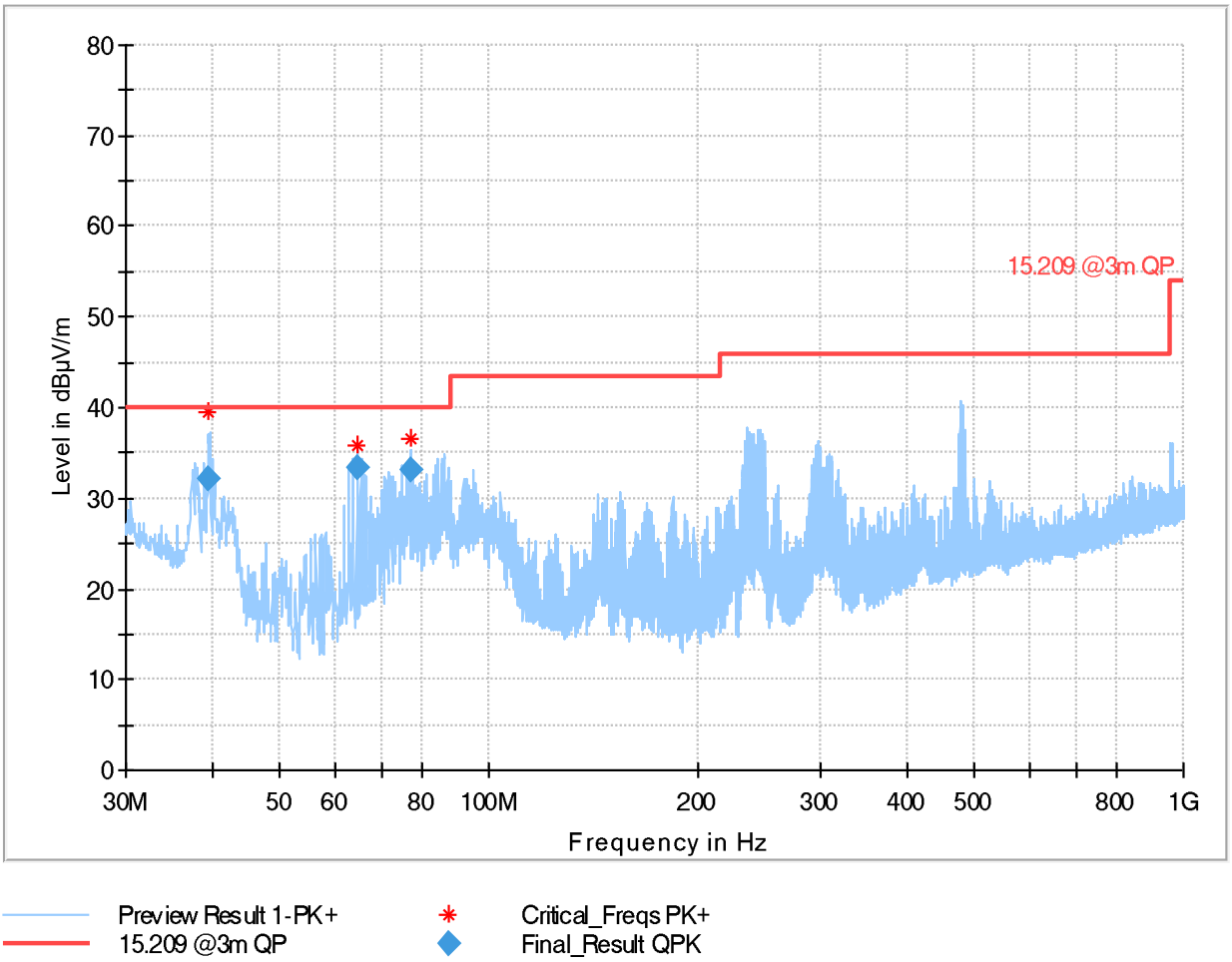
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
86.271500	36.07	40.00	3.93	---	---	100.0	V	87.0
85.435500	36.51	40.00	3.49	---	---	100.0	V	99.0
64.532000	35.39	40.00	4.61	---	---	100.0	V	277.0

Plot 77: RSE, 30 MHz – 1 GHz, OP 3, mid channel, horizontal / vertical polarisation



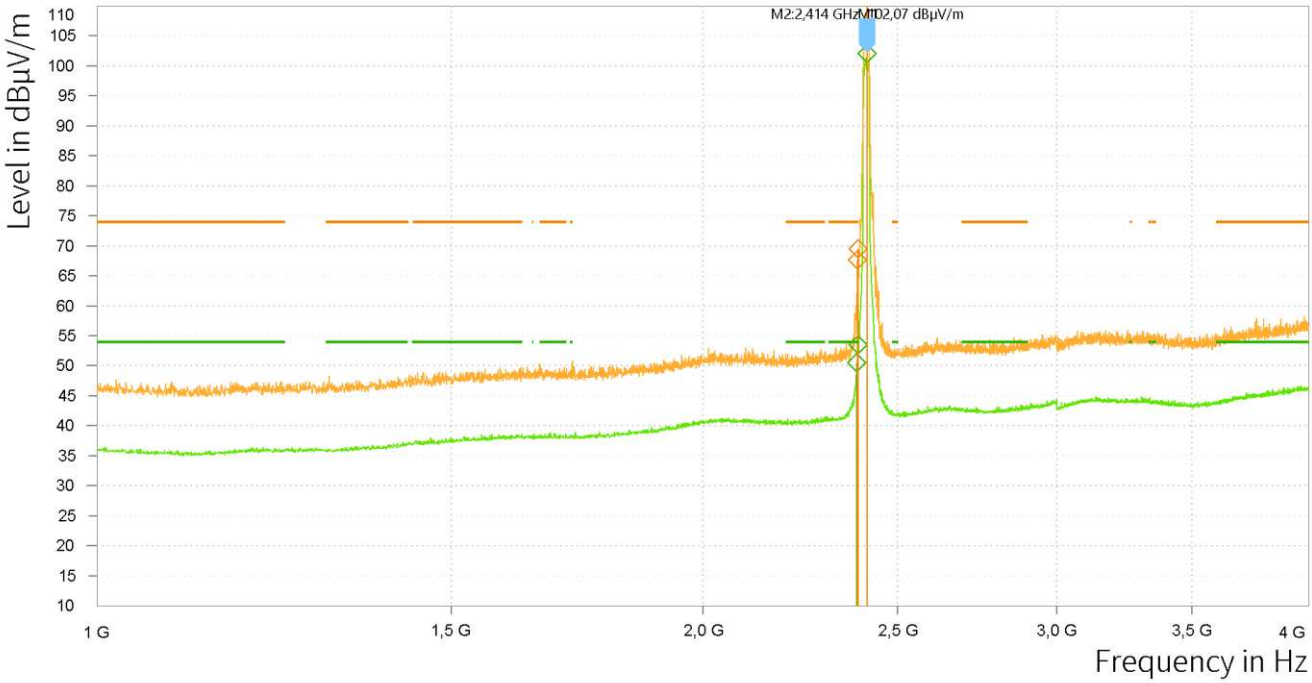
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
39.651500	31.87	40.00	8.13	100.0	120.000	104.0	V	98.0
65.539000	34.03	40.00	5.97	100.0	120.000	103.0	V	275.0
85.465500	34.77	40.00	5.23	100.0	120.000	100.0	V	76.0

Plot 78: RSE, 30 MHz – 1 GHz, OP 3, high channel, horizontal / vertical polarisation



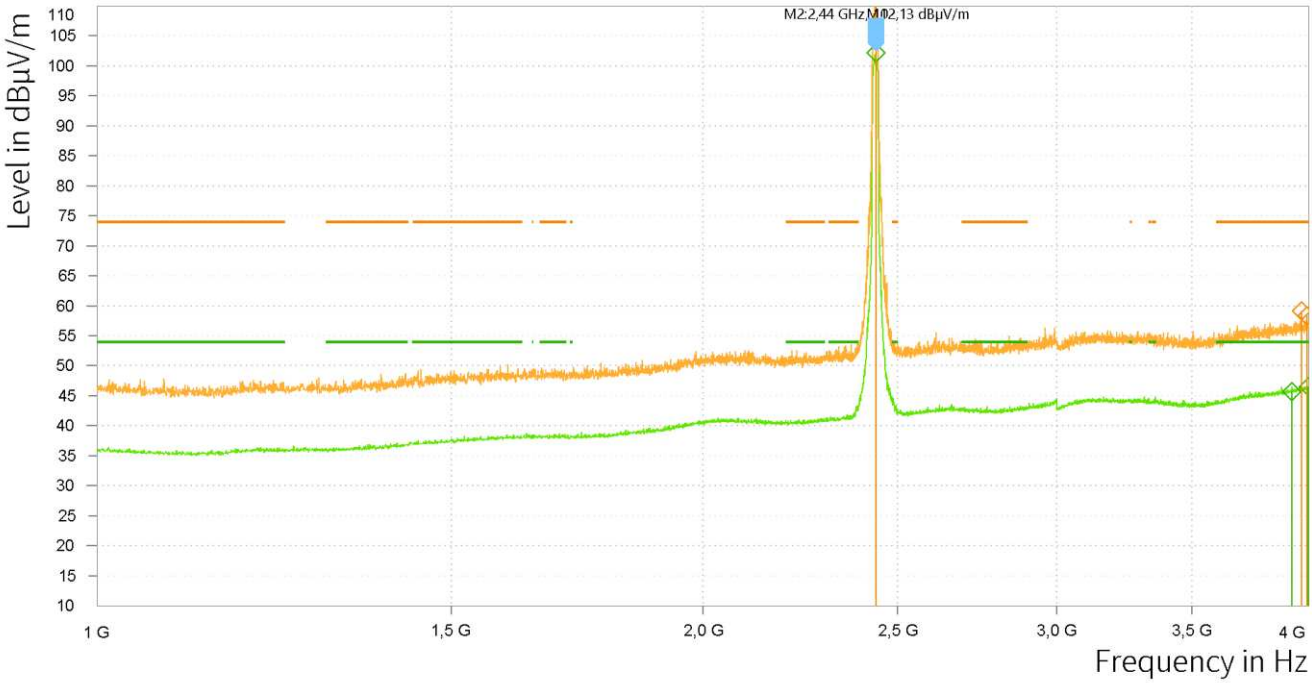
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
39.513000	32.15	40.00	7.85	100.0	120.000	104.0	V	180.0
64.677500	33.45	40.00	6.55	100.0	120.000	141.0	V	9.0
77.269000	33.09	40.00	6.91	100.0	120.000	144.0	V	163.0

Plot 79: RSE, 1 GHz – 4 GHz, OP 3, low channel, horizontal / vertical polarisation



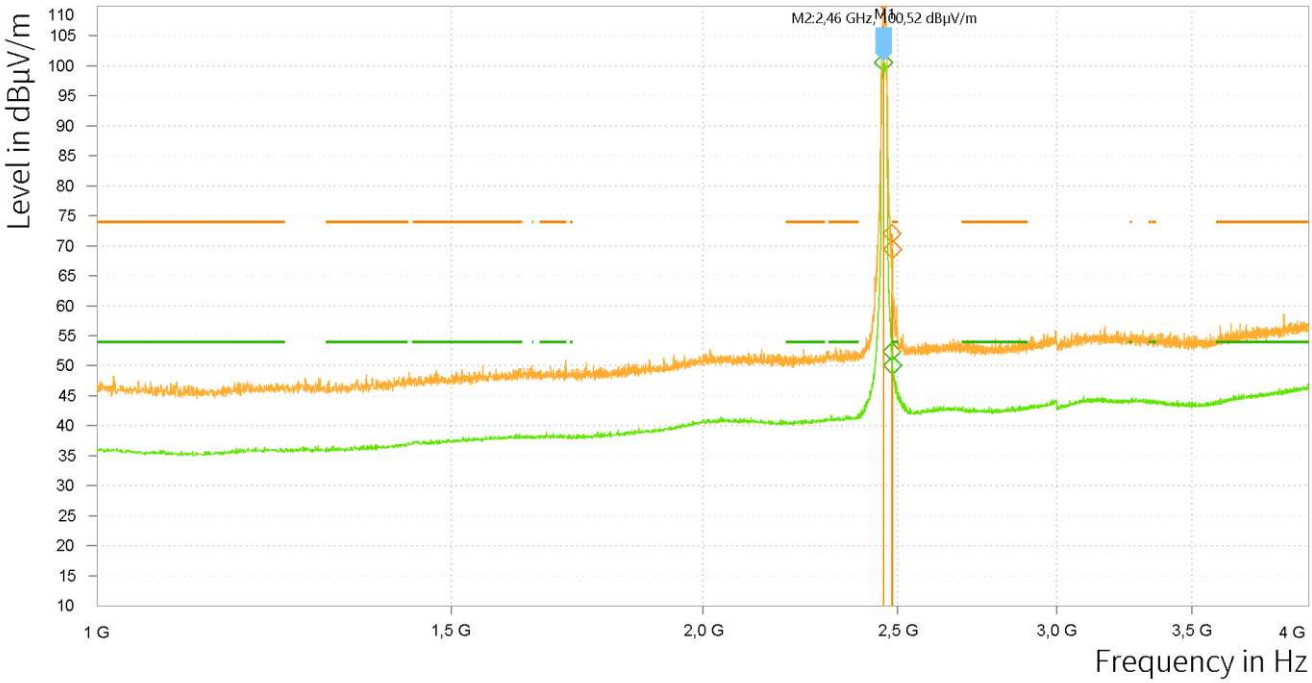
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	2.386,500				50,52	54,00	3,48	28,91	H	15	135,5	1.000,000
1	2.388,000	67,62	74,00	6,38				28,92	H	15	142	1.000,000
1	2.389,500	69,46	74,00	4,54	53,45	54,00	0,55	28,92	H	15	139,2	1.000,000
1	2.413,500	111,60			102,07			29,03	H	15	136,7	1.000,000

Plot 80: RSE, 1 GHz – 4 GHz, OP 3, mid channel, horizontal / vertical polarisation



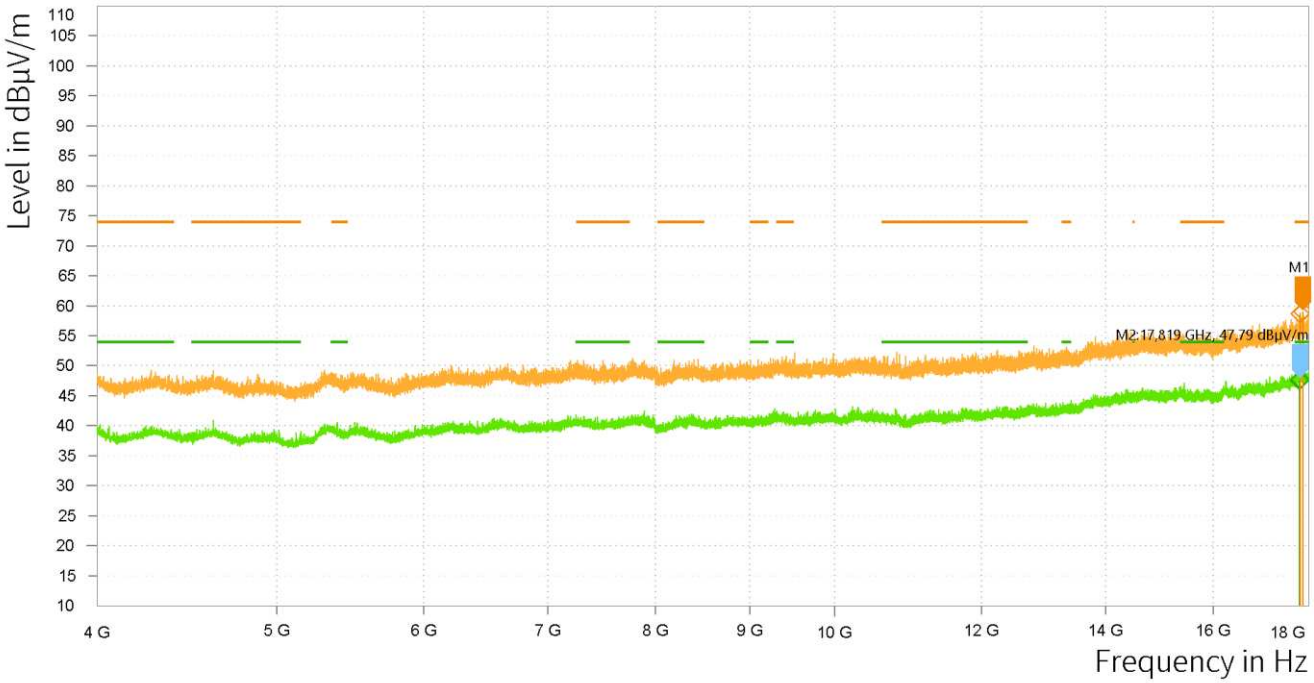
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	2.439,500	112,14			102,13			29,13	H	4,3	133,9	1.000,000
1	3.925,000				45,69	54,00	8,31	33,24	H	104,1	370,3	1.000,000
1	3.969,000	59,09	74,00	14,91				33,25	H	75	241,4	1.000,000
1	3.994,500	58,37	74,00	15,63				33,22	H	105	41	1.000,000
1	3.999,500				46,42	54,00	7,58	33,22	H	85,4	264,3	1.000,000

Plot 81: RSE, 1 GHz – 4 GHz, OP 3, high channel, horizontal / vertical polarisation



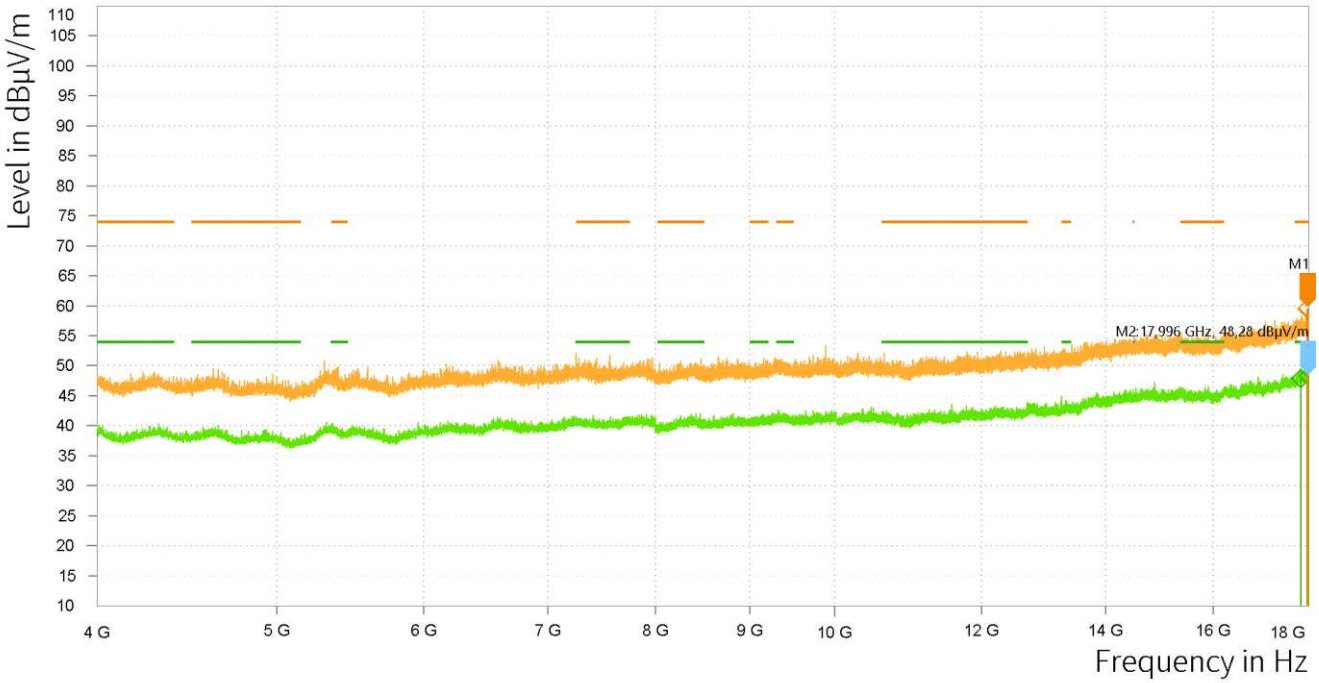
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
1	2.460,000	110,95			100,52			29,20	H	13,6	124,9	1.000,000
1	2.483,500				52,35	54,00	1,65	29,36	H	-8,6	126	1.000,000
1	2.484,000	71,97	74,00	2,03				29,36	H	15	121,3	1.000,000
1	2.485,500	69,37	74,00	4,63	50,09	54,00	3,91	29,37	H	4,4	120,4	1.000,000

Plot 82: RSE, 4 GHz – 18 GHz, OP 3, low channel, horizontal / vertical polarisation



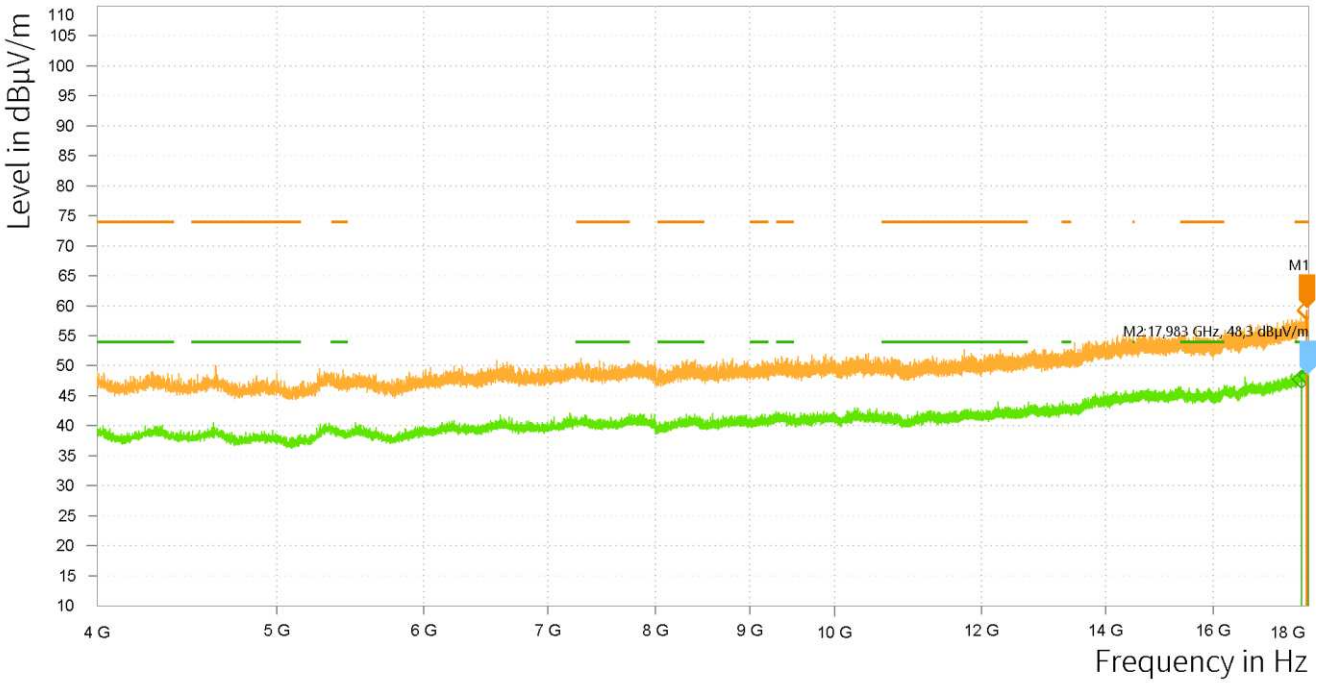
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
2	17.800,500				47,48	54,00	6,52	43,97	H	105,1	178,6	1.000,000
2	17.814,500	58,62	74,00	15,38				44,00	H	4,3	133,5	1.000,000
2	17.819,000				47,79	54,00	6,21	44,01	V	80,9	104,9	1.000,000
2	17.879,000	59,01	74,00	14,99				44,15	V	105,1	83,2	1.000,000

Plot 83: RSE, 4 GHz – 18 GHz, OP 3, mid channel, horizontal / vertical polarisation



Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
2	17.824,000				47,85	54,00	6,15	44,02	V	75	180,8	1.000,000
2	17.967,500	59,43	74,00	14,57				44,41	H	75	277,9	1.000,000
2	17.991,500	59,62	74,00	14,38				44,48	H	94,9	378,9	1.000,000
2	17.996,000				48,28	54,00	5,72	44,50	H	104,3	32	1.000,000

Plot 84: RSE, 4 GHz – 18 GHz, OP 3, high channel, horizontal / vertical polarisation



Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Elevation [deg]	Azimuth [deg]	Meas. BW [kHz]
2	17.850,000				47,72	54,00	6,28	44,07	V	95,8	21,5	1.000,000
2	17.960,000	59,17	74,00	14,83				44,38	H	15	170,4	1.000,000
2	17.976,000	59,39	74,00	14,61				44,43	H	14,3	10,5	1.000,000
2	17.983,000				48,30	54,00	5,70	44,46	H	104,1	361,9	1.000,000

7.10 AC Conducted Emissions

Description / Limits

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission [MHz]	Conducted limit [dBµV]	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5.0	56	46
5.0 – 30	60	50
*Decreases with the logarithm of the frequency.		

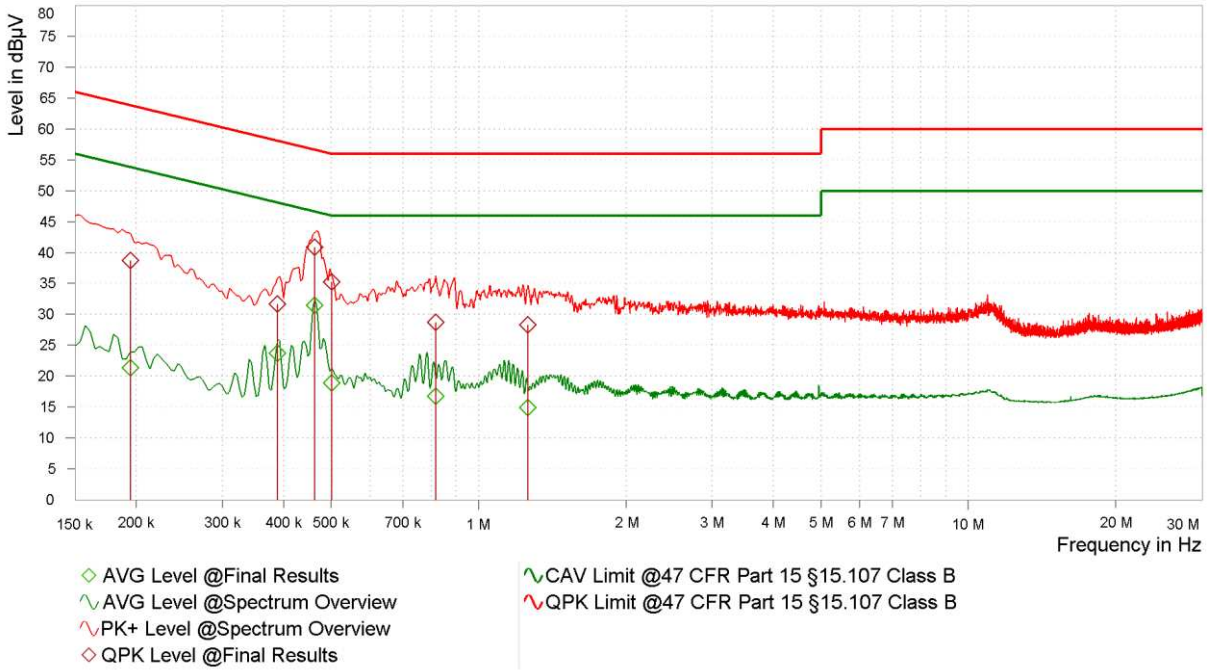
§15.207 (c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtainig their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

Test setup: 8.5 with radiated test sample in test mode (see section 5.2)

Test results

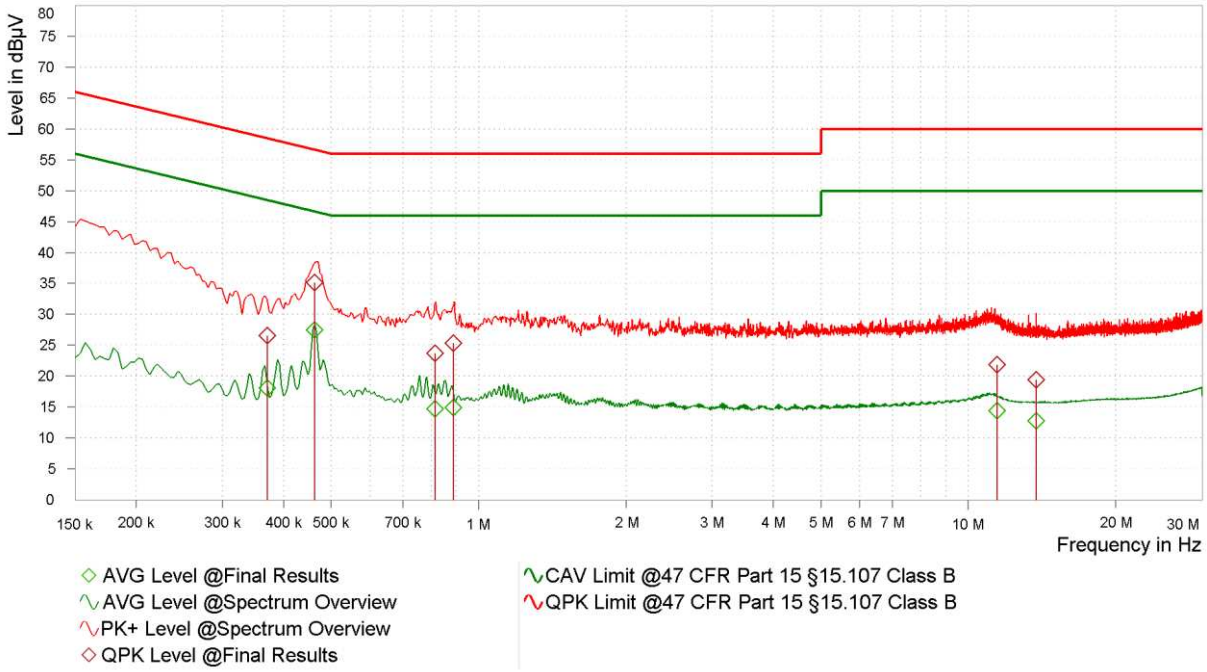
See next pages!

Plot no. 85: conducted emissions, line L1



Rg	Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	AVG Level [dBµV]	AVG: CAV Limit [dBµV]	AVG Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]	Meas. Time [s]
1	0,195	38,72	63,83	25,11	21,31	53,83	32,52	9,84	L1	9,000	15,000
1	0,389	31,71	58,09	26,38	23,65	48,09	24,44	10,05	L1	9,000	15,000
1	0,463	40,85	56,63	15,78	31,50	46,63	15,13	10,15	L1	9,000	15,000
1	0,501	35,28	56,00	20,72	18,93	46,00	27,07	10,19	L1	9,000	15,000
1	0,818	28,75	56,00	27,25	16,76	46,00	29,24	10,05	L1	9,000	15,000
1	1,262	28,34	56,00	27,66	14,90	46,00	31,10	9,97	L1	9,000	15,000

Plot no. 86: conducted emissions, neutral N



Rg	Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	AVG Level [dBµV]	AVG: CAV Limit [dBµV]	AVG Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]	Meas. Time [s]
1	0,370	26,58	58,50	31,92	18,13	48,50	30,37	10,02	N	9,000	15,000
1	0,463	35,15	56,63	21,48	27,45	46,63	19,18	10,15	N	9,000	15,000
1	0,814	23,74	56,00	32,26	14,69	46,00	31,31	10,05	N	9,000	15,000
1	0,889	25,38	56,00	30,62	14,88	46,00	31,12	10,02	N	9,000	15,000
1	11,437	21,82	60,00	38,18	14,43	50,00	35,57	10,33	N	9,000	15,000
1	13,747	19,42	60,00	40,58	12,74	50,00	37,26	10,41	N	9,000	15,000

8 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. 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).

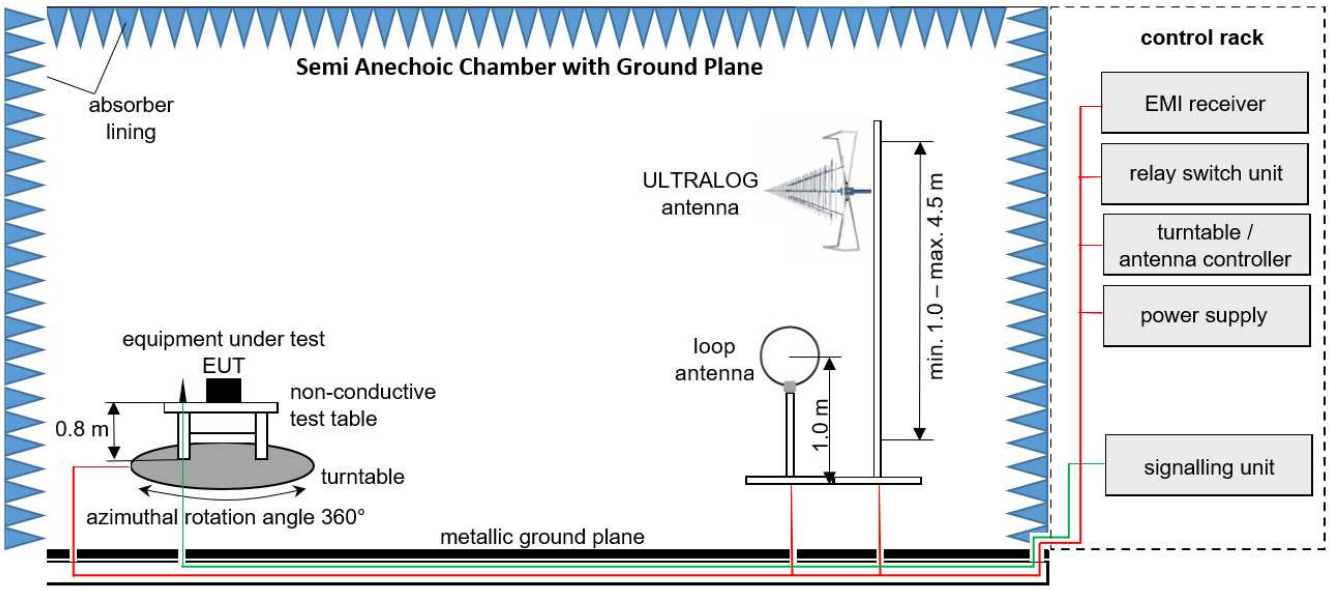
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

Kind of calibration (abbreviations):

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

8.1 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, 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: loop antenna at 3 m, ULTRALOG antenna at 3 m
EMC32 software version: 11.20.00

Description:

$$E = U_{Rx} + \alpha_{cable\ loss} + A$$

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

- radiated output power → $E|_{\frac{dB\mu V}{m}}$
- voltage at the receiver → $U|_{\frac{dB\mu V}{m}}$
- antenna factor → $A|_{\frac{dB}{m}}$
- cable loss → $\alpha_{cable\ loss}|_{dB}$

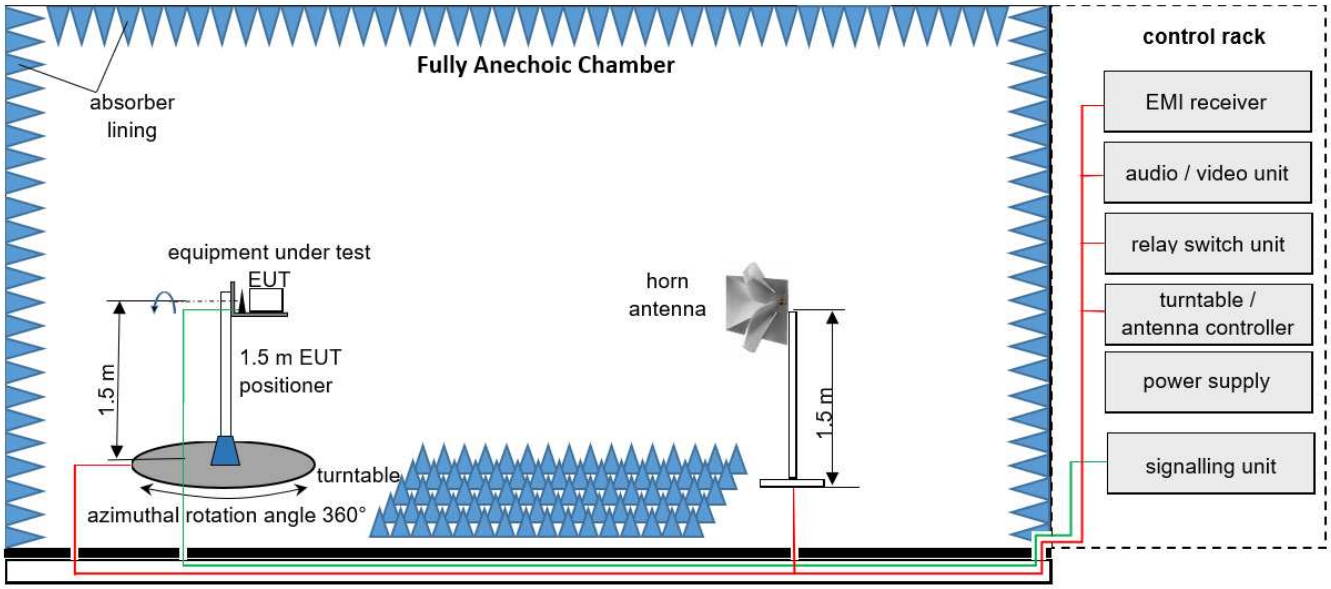
Example:

$$E = 12.35\ \frac{dB\mu V}{m} + 1.90\ dB + 16.80\ \frac{dB}{m} = 31.05\ \frac{dB\mu V}{m}$$

List of test equipment used:

No.	Equipment	Manufacturer	Type	Serial No.	IBL No.	Kind of Calibration	Last / Next Calibration
1	Power Supply	Rohde & Schwarz	IN 600	101554	LAB000824	NR	–
2	Antenna	Rohde & Schwarz	HL562E	102173	LAB000673	C	2022-10-17 → 36M → 2025-10-17
3	Power Supply	Chroma	61602		LAB000507	NR	–
4	EMI Test Receiver	Rohde & Schwarz	ESW26	101517	LAB000363	C	2025-01-10 → 12M → 2026-01-10
5	Power Supply	Elektro-Automatik GmbH & Co. KG	EA-PSI 9080-40 T	2000230001	LAB000313	NR	–
6	Test table	innco systems GmbH	PT1208-080-RH	-	LAB000306	NR	–
7	Antenna Mast	Berlebach	Tripod HFH2-Z8 & -Z9	101762	LAB000292	NR	–
8	Positioner	maturo GmbH	TD 1.5-10KG		LAB000258	NR	–
9	Compressed Air	Implotex	1-850-30	-	LAB000256	NR	–
10	Semi/Fully Anechoic Chamber	Albatross Projects GmbH	Babylon 5 (SAC 5)	20168.PRB	LAB000235	CM	2025-03-18 → 36M → 2028-03-18
11	Measurement Software	Rohde & Schwarz	EMC32 V11.20		LAB000226	NR	–
12	Turntable	maturo GmbH	TT2.0-2t	TT2.0-2t/921	LAB000225	NR	–
13	Antenna Mast	maturo GmbH	CAM4.0-P	CAM4.0-P/316	LAB000224	NR	–
14	Antenna Mast	maturo GmbH	BAM4.5-P	BAM4.5-P/272	LAB000223	NR	–
15	Controller	maturo GmbH	FCU 3.0	10082	LAB000222	NR	–
16	Power Supply	Elektro-Automatik GmbH & Co. KG	EA-PS 2042-10 B	2878350292	LAB000191	NR	–
17	Pre-Amplifier	Schwarzbeck Mess-Elektronik OHG	BBV 9718 C	84	LAB000169	CM	0000-00-00 → 12M →
18	Antenna	Rohde & Schwarz	HF907	102899	LAB000151	C	2023-05-15 → 36M → 2026-05-15
19	Antenna	Rohde & Schwarz	HL562E	102005	LAB000150	C	2022-12-22 → 36M → 2025-12-22
20	Open Switch and Control Platform	Rohde & Schwarz	OSP220 Base Unit 2HU	101748	LAB000149	NR	–
21	Antenna	Rohde & Schwarz	HFH2-Z2E	100954	LAB000108	C	2025-06-24 → 24M → 2027-06-24

8.2 Fully Anechoic Chamber



Measurement distance: horn antenna at 3 m
EMC32 software version: 11.20.00

Description:

$$E = U_{Rx} + \alpha_{cable\ loss} + A$$

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

- radiated output power → $E|_{\frac{dB\mu V}{m}}$
- voltage at the receiver → $U|_{\frac{dB\mu V}{m}}$
- antenna factor → $A|_{\frac{dB}{m}}$
- cable loss → $\alpha_{cable\ loss}|_{dB}$

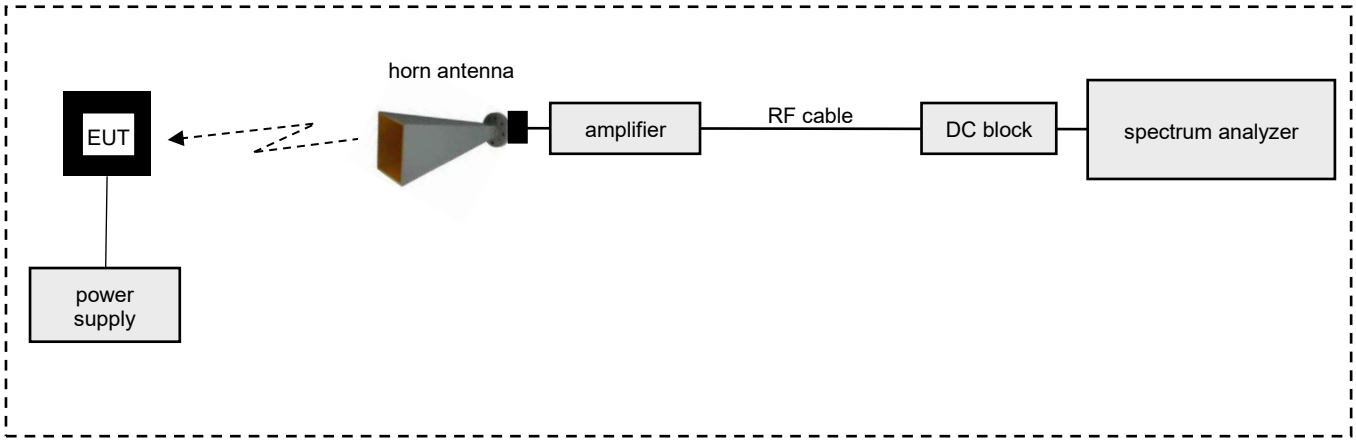
Example:

$$E = 12.35\ \frac{dB\mu V}{m} + 1.90\ dB + 16.80\ \frac{dB}{m} = 31.05\ \frac{dB\mu V}{m}$$

List of test equipment used:

No.	Equipment	Manufacturer	Type	Serial No.	IBL No.	Kind of Calibration	Last / Next Calibration
1	Antenna	TTE Europe	HA-18G-40G-20-2.4mm-F	2110081000210	LAB000865	C	—
2	Antenna Mast	innco systems GmbH	MA3000-PP-NS	xxxxx	LAB000864	NR	–
3	Antenna Mast	innco systems GmbH	AS2500-PP-HK	xxxxx	LAB000863	NR	–
4	Positioner	innco systems GmbH	DE3750-RH	xxxxx	LAB000862	NR	–
5	Turntable	innco systems GmbH	Turntable	xxxxxxx	LAB000861	NR	–
6	Power Supply	Elektro-Automatik GmbH & Co. KG	EA-PS 9080-20 T	2500230006	LAB000696	NR	–
7	Fully Anechoic Chamber (FAC)	Albatross Projects GmbH	SkyLab 3 (FAC 3)	P31018	LAB000686	CM	2025-03-18 → 36M → 2028-03-18
8	Power Supply	Rohde & Schwarz	IN 600	101126	LAB000684	NR	–
9	Spectrum Analyser	Rohde & Schwarz	FSW43	101391	LAB000289	C	2025-06-12 → 12M → 2026-06-12
10	Antenna	Rohde & Schwarz	HF907	102898	LAB000124	C	2023-06-13 → 36M → 2026-06-13
11	Antenna	Rohde & Schwarz	HL562E	102001	LAB000123	C	2023-04-05 → 36M → 2026-04-05

8.3 Radiated measurements > 18 GHz

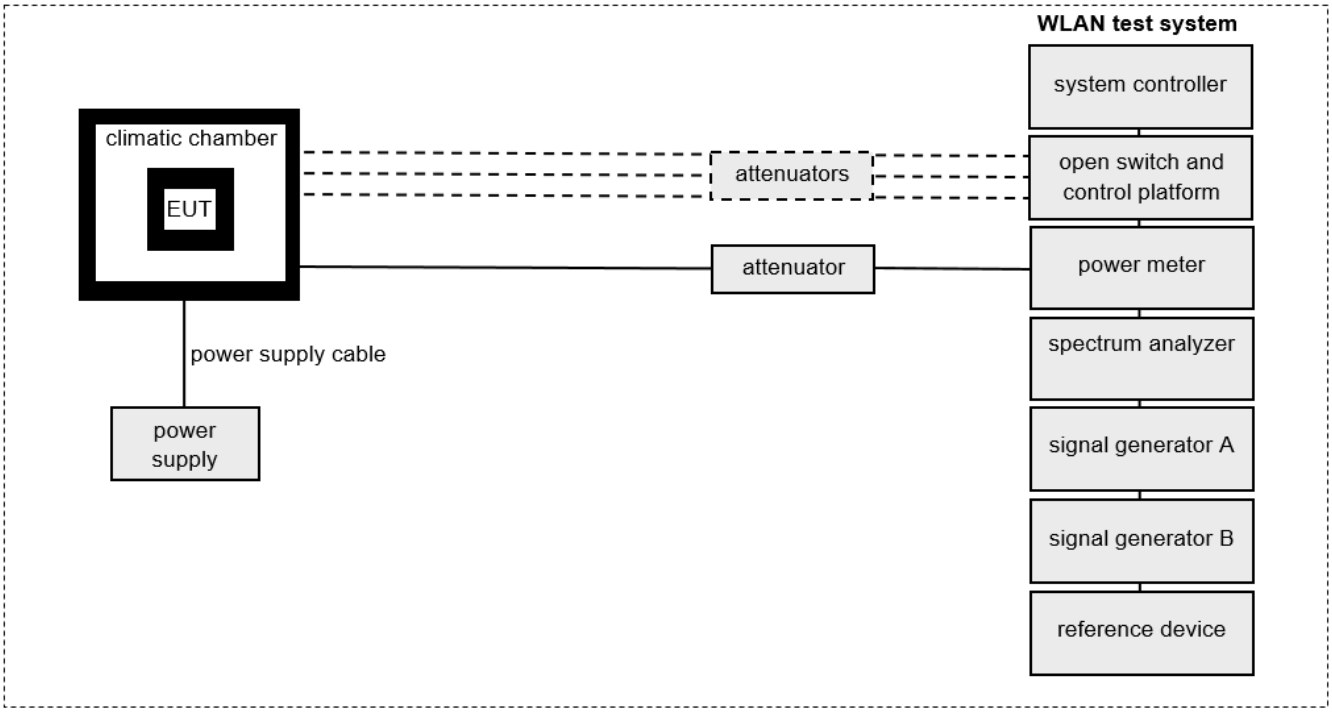


List of test equipment used:

No.	Equipment	Manufacturer	Type	Serial No.	IBL No.	Kind of Calibration	Last / Next Calibration
1	Absorber	Telemeter Electronic	EPP 12	-	LAB000327	NR	–
2	Test table	innco systems GmbH	PT0707-RH light	-	LAB000303	NR	–
3	Spectrum Analyser	Rohde & Schwarz	FSW43	101391	LAB000289	C	2025-06-12 → 12M → 2026-06-12
4	Power Supply	Elektro-Automatik GmbH & Co. KG	EA-PS 2042-10 B	2878350263	LAB000190	NR	–
5	WG-Coax-Adapter	Flann Microwave Ltd	20093-TF30 UBR220	273374	LAB000181	CM	2025-06-24 → 12M → 2026-06-24
6	Coaxial Cable	Huber & Suhner	SF101/1.5m	503987/1	LAB000165	CM	2025-04-25 → 12M → 2026-04-25
7	Antenna	Flann Microwave Ltd	20240-20 (18.0-26.5 GHz)	266403	LAB000128	CM	2025-05-21 → 12M → 2026-05-21
8	Antenna Mast	Schwarzbeck Mess-Elektronik OHG	AM 9104	99	LAB000109	NR	–
9	Multimeter	Keysight	U1242B	MY59110034	LAB000009	C	2025-09-05 → 12M → 2026-09-05

8.4 Conducted measurements WLAN test system R&S TS 8997

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The losses for all signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm.

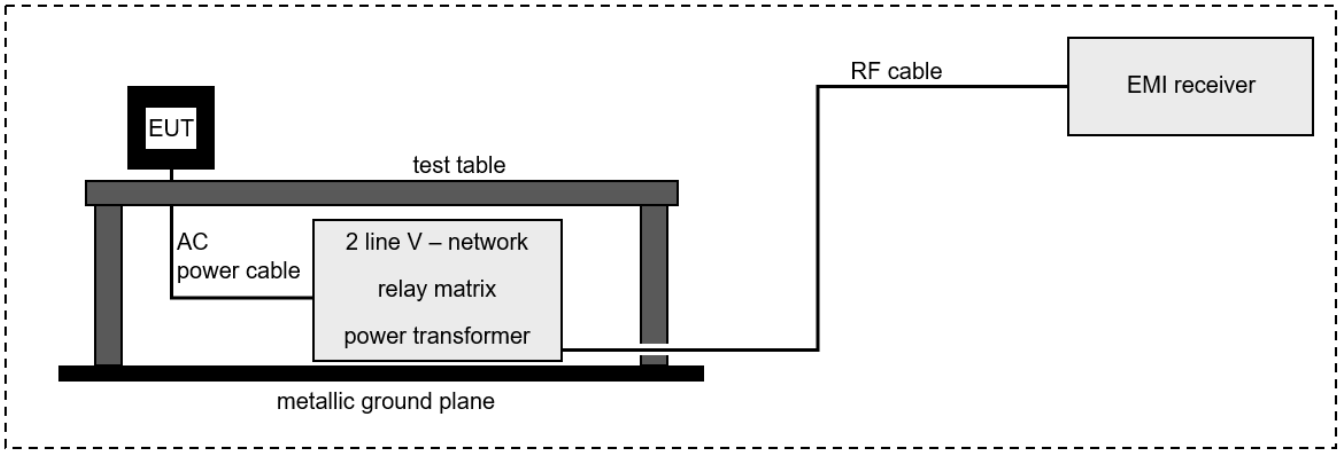


EMC32/WMS32 software version: 12.20.00

List of test equipment used:

No.	Equipment	Manufacturer	Type	Serial No.	IBL No.	Kind of Calibration	Last / Next Calibration
1	Open Switch and Control Platform	Rohde & Schwarz	OSP-B157W8Plus	100830	LAB000358	C	2025-06-17 → 12M → 2026-06-17
2	TS8997	Rohde & Schwarz	TS8997-Rack	100829	LAB000322	NR	–
3	Open Switch and Control Platform	Rohde & Schwarz	OSP-B157WX	101247	LAB000280	NR	–
4	Spectrum Analyser	Rohde & Schwarz	FSV40	101403	LAB000278	C	2025-06-13 → 12M → 2026-06-13
5	Vector Signal Generator	Rohde & Schwarz	SMBV100A-06	258240	LAB000277	C	2024-12-10 → 36M → 2027-12-10
6	Signal Generator	Rohde & Schwarz	SMB100A-20	178175	LAB000276	C	2024-04-03 → 36M → 2027-04-03
7	Radio Communication Tester	Rohde & Schwarz	CMW270	101479	LAB000275	NR	–
8	Controller	Hewlett Packard	ATS-Z230	101379	LAB000274	NR	–
9	Power Supply	Elektro-Automatik GmbH & Co. KG	EA-PS 2042-10 B	2878350263	LAB000190	NR	–

8.1 AC conducted emissions



Description:

$$E = U_{Rx} + \alpha_{cable\ loss} + VC$$

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

- radiated output power → $E|_{\frac{dB\mu V}{m}}$
- voltage at the receiver → $U_{Rx}|_{\frac{dB\mu V}{m}}$
- correction factor of the ISN → $VC|_{\frac{dB}{m}}$
- loss of the cable and filter → $\alpha_{cable\ loss}|_{dB}$

Example:

$$E = 37.62\ \frac{dB\mu V}{m} + 9.90\ dB + 0.23\ \frac{dB}{m} = 47.75\ \frac{dB\mu V}{m}$$

List of test equipment used:

No.	Equipment	Manufacturer	Type	Serial No.	IBL No.	Kind of Calibration	Last / Next Calibration
1	EMI Test Receiver	Rohde & Schwarz	EPL1000	100921	LAB000873	C	2024-12-19 → 12M → 2025-12-19
2	Power Supply	Chroma	61704		LAB000540	NR	–
3	Shielded room	Albatross Projects GmbH	Sputnik 1 (Schirmkabine)		LAB000257	NR	–
4	Open Switch and Control Platform	Rohde & Schwarz	OSP-B200S2	101443	LAB000239	NR	–
5	Two-Line V-Network	Rohde & Schwarz	ENV216	102597	LAB000220	C	2025-06-11 → 12M → 2026-06-11

9 MEASUREMENT PROCEDURES

9.1 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 360° continuously.
- For each turntable position 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.

Distance correction (extrapolation)

- When performing measurements on test distances other than defined in the rules, the results shall be extrapolated to the specified distance by conservatively presuming that the field strength decays at 40 dB/decade of distance in the region closer than λ in m divided by 2π (i.e., λ/2π), and at 20 dB/decade of distance beyond that, using the measurement of a single point at the radial angle that produces the maximum emission.
  This correction is already included in the limit line of corresponding measurement plots.

Detailed requirements can be found in e.g. ANSI C63.4 / C63.10

9.2 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 360° continuously.
- Antenna polarisation is changed (H-V / V-H) and antenna height is changed from 1 meter to 4 meters.
- For each turntable position / 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.

Distance correction (extrapolation)

- When performing measurements on test distances other than defined in the rules, the results shall be extrapolated to the specified distance by conservatively presuming that the field strength decays at 20 dB/decade of distance beyond the region λ in m divided by 2π (i.e., λ/2π), using the measurement of a single point at the radial angle that produces the maximum emission.
  This correction is already included in the corresponding measurement plots.

Detailed requirements can be found in e.g. ANSI C63.4 / C63.10

9.3 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 360° continuously.
- Antenna polarisation is changed (H-V / V-H) and antenna height is changed from 1 meter to 4 meters.
- For each turntable position / 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.

Distance correction (extrapolation)

- When performing measurements on test distances other than defined in the rules, the results shall be extrapolated to the specified distance by conservatively presuming that the field strength decays at 20 dB/decade of distance beyond the region λ in m divided by 2π (i.e., λ/2π), using the measurement of a single point at the radial angle that produces the maximum emission.
  This correction is already included in the corresponding measurement plots.

Detailed requirements can be found in e.g. ANSI C63.4 / C63.10

9.4 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.

Distance correction (extrapolation)

- When performing measurements on test distances other than defined in the rules, the results shall be extrapolated to the specified distance by conservatively presuming that the field strength decays at 20 dB/decade of distance beyond the region λ in m divided by 2π (i.e., $\lambda/2\pi$), using the measurement of a single point at the radial angle that produces the maximum emission.
  This correction is already included in the corresponding measurement plots.

Detailed requirements can be found in e.g. ANSI C63.4 / C63.10

10 MEASUREMENT UNCERTAINTIES

Radio frequency	≤ ± 1 x 10^{-7}
RF power, conducted	≤ ± 0.75 dB
Power spectral density	≤ ± 3 dB
Maximum frequency deviation	≤ ± 5 %
Deviation limitation Duty Cycle, Tx-sequence, Tx-gap	≤ ± 5 %
Occupied channel bandwidth	≤ ± 5 %
Conducted spurious emission of transmitter	≤ ± 4 dB
Conducted emission of receivers	≤ ± 4 dB
Radiated emission of transmitter	≤ ± 6 dB
Radiated emission of receiver	≤ ± 6 dB
Temperature	≤ ± 2.5 °C
Humidity	≤ ± 10 %

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 %.