

RADIO TEST REPORT

REPORT NUMBER: M2010040-3

**TEST STANDARD: FCC PART 15 SUBPART C
SECTION 15.247
ISED RSS-247 SECTION 5.0**

**CLIENT: AUTOMATIC TECHNOLOGY
AUSTRALIA PTY LTD**

**DEVICE: OVERHEAD GARAGE DOOR
OPENER**

MODEL: ATS-3AM

FCC ID: X4K-ATS3DCB11WS

IC: 8880A-ATS3DCB11WS

DATE OF ISSUE: 24 MAY 2021

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Equipment Under Test (EUT): Overhead Garage Door Opener

REVISION TABLE

Version	Sec/Para Changed	Change Made	Date
1		Initial issue of document	24/05/2021

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CERTIFICATE OF COMPLIANCE

Device: Overhead Garage Door Opener
Model: ATS-3AM
Manufacturer: Automatic Technology Australia Pty Ltd

Radio Module: Transceiver
FCC ID: FCC ID: X4K-ATS3DCB11WS
IC ID: IC: 8880A-ATS3DCB11WS

Tested for: Automatic Technology Australia Pty Ltd
Address: 6-8 Fiveways Boulevard, Keysborough, VIC 3173, Australia
Phone Number: 03 9791 0275
Contact: Nikolai Klepikov
Email: nikolai.klepikov@ata-aust.com.au

Standard: FCC Part 15, Subpart C, Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ISED RSS-247, Issue 2, Section 5 Standard specifications for frequency hopping systems and digital transmission systems operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz

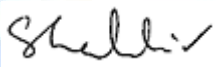
Result: The Overhead Garage Door Opener complied with the applicable requirements above standards. Refer to Report M2010040-3 for full details.

Test Date(s): 23 November & 21 – 23 December 2020

Issue Date: 24 May 2021

Test Engineer(s): 
Wilson Xiao

Attestation: *I hereby certify that the device(s) described herein were tested as described in this report and that the data included is that which was obtained during such testing.*

Authorised Signatory: 
Shabbir Ahmed, PhD
Lead Engineer – RDO

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RADIO REPORT FOR CERTIFICATION

1 TEST SUMMARY

Section	Description	FCC	RSS	Result(s)
6.1	Antenna Requirement	§15.203	§RSS-Gen 6.8	Complied
6.2	Restricted Bands of Operation	§15.205	§RSS-Gen 8.10	Complied
6.3	Radiated emission limits; general requirements	§15.209	§RSS-Gen 8.9	Complied
6.4	Conducted Limits	§15.207	§RSS-Gen 8.8	Complied
6.5	20dB bandwidth	§15.247(a)	§RSS-247 5.1(c)	Complied
6.6	Channel Separation	§15.247(a)(1)	§RSS-247 5.1(b)	Complied
6.7	Number of channels and time of occupancy	§15.247(a)(1)	§RSS-247 5.1(c)	Complied
6.8	Peak Output Power	§15.247(b)	§RSS-247 5.4(a)	Complied
6.9	Out-of-Band/Spurious Emissions	§15.247(d)	§RSS-247 5.5	Complied
6.10	Band-Edge Emission Measurements	§15.247(d)	§RSS-247 5.5	Complied
6.11	Maximum Permissible Exposure	§15.247(i)	§RSS-Gen3.4/ §RSS-102	Complied
6.12	Occupied Bandwidth – 99% power	§15.215	§RSS-Gen 6.7	Complied

2 TEST FACILITY

2.1 General

EMC Technologies Pty Ltd is accredited by the FCC as a test laboratory able to perform compliance testing for the public. EMC Technologies Pty Ltd has also been designated as a Conformity Assessment Body (CAB) by Australian Communications and Media Authority (ACMA) under the APECTEL MRA and is designated to perform compliance testing on equipment subject to Certification under Parts 15 and 18 of the FCC Commission’s rules – **Registration Number 494713 & Designation number AU0001.**


EMC Technologies Pty Ltd is also an ISED Canada recognized testing laboratory – **ISED company number: 3569B and CAB identifier number: AU0001.**

2.2 NATA Accreditation

NATA is the Australian National laboratory accreditation body and has accredited EMC Technologies to operate to the IEC/ISO17025 requirements. A major requirement for accreditation is the assessment of the company and its personnel as being technically competent in testing to the standards. This requires fully documented test procedures, continued calibration of all equipment to the National Standard at the National Measurements Institute (NMI) and an internal quality system similar to ISO 9002. NATA has mutual recognition agreements with the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Association for Laboratory Accreditation (A²LA).

All testing in this report has been conducted in accordance with EMC Technologies’ scope of NATA accreditation to ISO 17025 for both testing and calibration and ISO 17020 for Inspection – **Accreditation Number 5292.**

The current full scope of accreditation can be found on the NATA website: www.nata.com.au

 <p style="font-size: small;">Accreditation No.5292</p>	<p>This document shall not be reproduced except in full.</p>
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3 TEST EQUIPMENT CALIBRATION

Measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory such as Keysight Technologies (Australia) Pty Ltd or the National Measurement Institute (NMI) or in-house. All equipment calibration is traceable to Australian national standards at the National Measurements Institute.

Equipment Type	Make/Model/Serial Number	Last Cal. dd/mm/yyyy	Due Date dd/mm/yyyy	Cal. Interval
Chamber	Frankonia SAC-3-2 (R-144)	10/08/2020	10/08/2023	3 Year ^{*1}
EMI Receiver	R&S ESW26 Sn: 101306 (R-143)	05/06/2020	05/06/2021	1 Year ^{*2}
Antennas	EMCO 6502 Active Loop Antenna Sn: 2021 (A-310)	31/08/2020	31/08/2022	2 Year ^{*2}
	SUNOL JB1 Sn. A061917 (A-425)	04/09/2019	04/09/2021	2 Year ^{*2}
	EMCO 3115 Horn Antenna Sn: 9501-4398 (A-406)	16/01/2019	16/01/2022	3 Year ^{*1}
Cables ^{*3}	Huber & Suhner Sucoflex 104A Sn: 503055 (C-457)	04/06/2020	04/06/2021	1 Year ^{*1}
	Huber & Suhner Sucoflex 104A Sn: 800448 (C-520)	04/06/2020	04/06/2021	1 Year ^{*1}

Note *1. Internal NATA calibration.

Note *2. External NATA / A2LA calibration.

Note *3. Cables are verified before measurements are taken.

4 MEASUREMENT UNCERTAINTY

EMC Technologies has evaluated the equipment and the methods used to perform the emissions testing. The estimated measurement uncertainties for emissions tests shown within this report are as follows:

Conducted Emissions:	9 kHz to 30 MHz	±3.2 dB
Radiated Emissions:	9 kHz to 30 MHz	±4.1 dB
	30 MHz to 300 MHz	±5.1 dB
	300 MHz to 1000 MHz	±4.7 dB
	1 GHz to 18 GHz	±4.6 dB
Peak Output Power:		±1.5 dB

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Application of measurement uncertainty for this report:

The referenced uncertainty standard specifies that determination of compliance shall be based on measurements without taking into account measurement instrumentation uncertainty. However, the measurement uncertainty shall appear in the test report.

5 DEVICE DETAILS

(Information supplied by the Client)

The ATS-3 is an electro-mechanical device for opening and closing Overhead Garage Doors automatically. They can be controlled from inside the garage by a wall mounted wireless transmitter WTX-7V1AM or from a remote location using a wireless handheld transmitter PTX-6V1AM or TB-6V1AM or smart phone via a network.

5.1 EUT (Transmitter) Details

Radio:	Transceiver
Number of Channels:	25
Frequency Band:	902 – 928 MHz
	Low Channel: 912.5 MHz
Operating Frequency:	Mid Channel: 919.7 MHz
	High Channel: 926.9 MHz
Nominal Bandwidth:	340 kHz (<i>declared by client</i>)
Modulation:	2GFSK
Antenna:	¼ Wave Monopole
Antenna Peak Gain:	0 dBi

5.2 EUT (Host) Details

Test Sample:	Overhead Garage Door Opener
Model:	ATS-3AM
Supply Rating:	110 - 120V, 0.8A, 50/60Hz
Manufacturer:	Counter mast Technology (Dalian) Company Limited

5.3 Test Configuration

Testing was performed with the transceiver set to transmit continuously at Low channel (912.5 MHz), Mid Channel (919.7 MHz) and High Channel (926.9 MHz).

5.4 Modifications

No Modification was applied to achieve compliance.

5.5 Deviation from the Standard

Note any deviations to the standard

6 RESULTS

6.1 §15.203 / §RSS-Gen 6.8 Antenna Requirement

The transceiver incorporates a Wave Monopole antenna that cannot be replaced by another type.

Antenna Type: ¼ Wave Monopole

Antenna gain: 0 dBi

Connector: Not Applicable

6.2 §15.205 / §RSS-Gen 8.10 Restricted Bands of Operation

The provisions of the §15.205 restricted bands of operation and §15.209 radiated emissions limits have been met, refer to section 6.9

6.3 §15.209 / §RSS-Gen 8.9 Radiated emission limits; general requirements

The provisions of the §15.205 restricted bands of operation and §15.209 radiated emissions limits have been met, refer to section 6.9.

6.4 §15.207 / §RSS-Gen 8.8 Conducted Limits

6.4.1 Test Procedure

The arrangement specified in ANSI C63.10: 2013 was adhered to for the conducted EMI measurements. The EUT was placed in the RF screened enclosure and a CISPR EMI Receiver as defined in ANSI C63.2: 2009 was used to perform the measurements.

The specified 0.15 MHz to 30 MHz frequency range was sub-divided into sub-ranges to ensure that all short duration peaks were captured. For each of the sub-ranges, the EMI receiver was set to continuous scan with the Peak detector set to Max-Hold mode. The Quasi-Peak detector and the Average detector were then invoked to measure the actual Quasi-Peak and Average level of the most significant peaks, which were detected.

6.4.2 Limits

The limit applied was in accordance to the conducted limits defined in §15.207 / RSS-Gen 8.8.

6.4.3 Results

M2010040

Low Channel

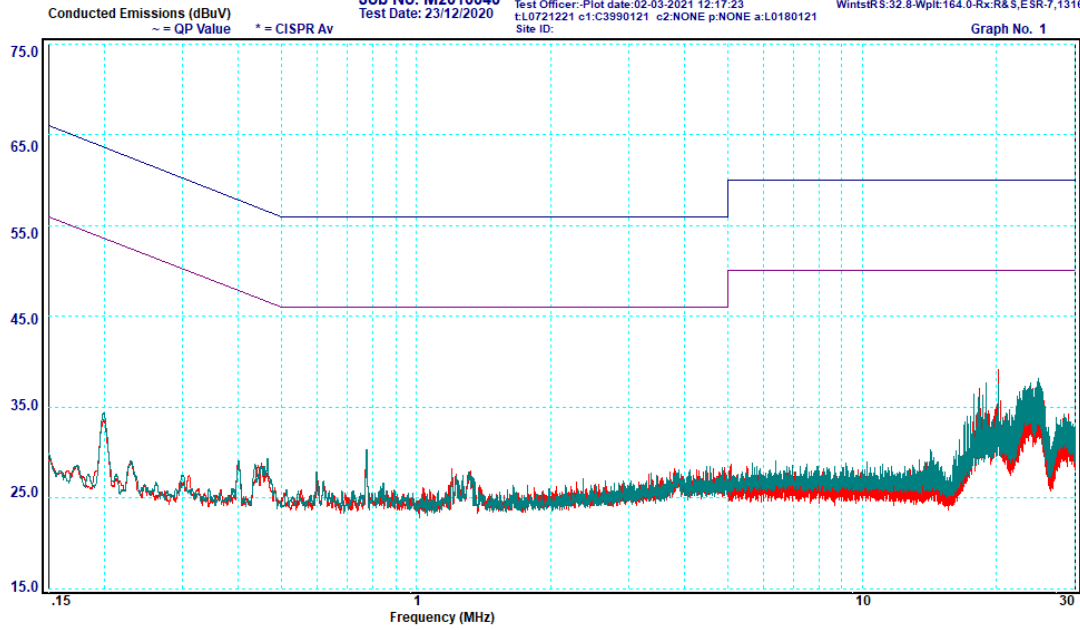
Limit1: FCC207_QP FCC Part 15.207 Conducted Quasi-Peak Limit
 Limit2: FCC207_AV FCC Part 15.207 Conducted Average Limit

Trace 2: Active Line
 Trace 3: Neutral Line

Job No: M2010040
 Test Date: 23/12/2020

Test Officer: Plot date: 02-03-2021 12:17:23
 t:L0721221 c1:C3990121 c2:NONE p:NONE a:L0180121
 Site ID:

WinstRS:32.8-Wpit:164.0-Rx:R&S,ESR-7,1316.3003K



Graph 6-1: AC Conducted Emissions, 150 kHz – 30 MHz, 912.5 MHz

M2010040

Mid Channel

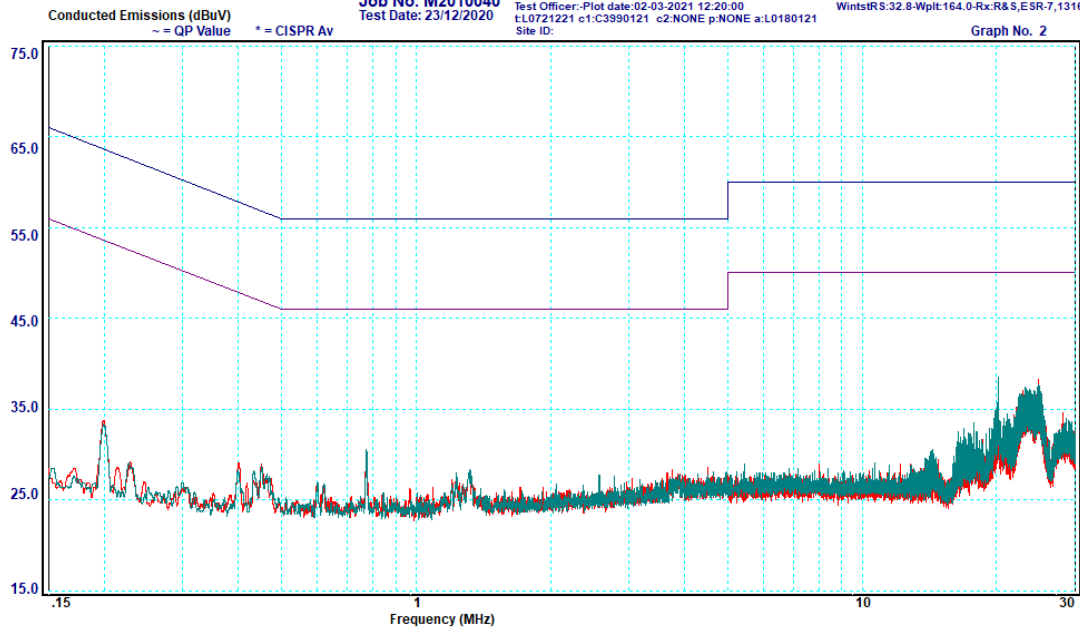
Limit1: FCC207_QP FCC Part 15.207 Conducted Quasi-Peak Limit
 Limit2: FCC207_AV FCC Part 15.207 Conducted Average Limit

Trace 2: Active Line
 Trace 3: Neutral Line

Job No: M2010040
 Test Date: 23/12/2020

Test Officer: Plot date: 02-03-2021 12:20:00
 t:L0721221 c1:C3990121 c2:NONE p:NONE a:L0180121
 Site ID:

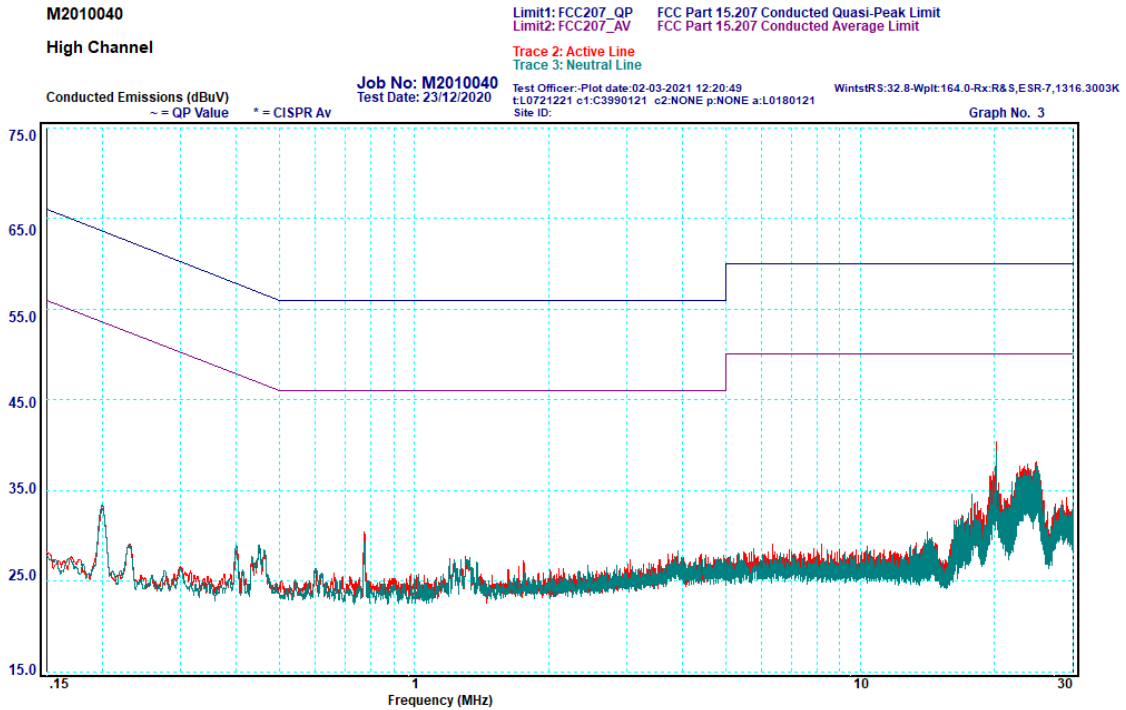
WinstRS:32.8-Wpit:164.0-Rx:R&S,ESR-7,1316.3003K



Graph 6-2: AC Conducted Emissions, 150 kHz – 30 MHz, 919.7 MHz



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Graph 6-3: AC Conducted Emissions, 150 kHz – 30 MHz, 926.9 MHz

6.5 §15.247(a) / §RSS-247 5.1(c) 20-dB bandwidth

6.5.1 Test Procedure

The tests were performed in accordance with ANSI C63.10: 2013 Clause 6.9.2.

The 20 dB bandwidth was measured while the device was transmitting with typical modulation applied. The resolution bandwidth of 10 kHz and the video bandwidth of 30 kHz were utilised when measuring the bandwidth.

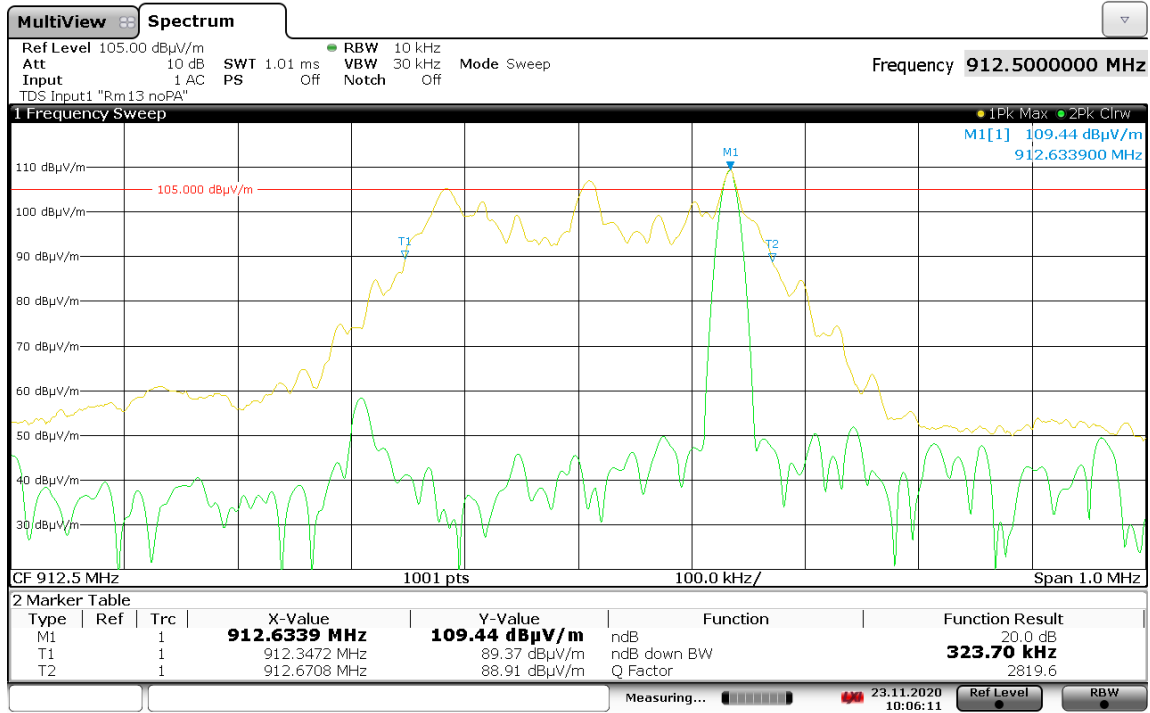
6.5.2 Limits

The Maximum allowed 20-dB bandwidth of the hopping channel is 500 kHz.

6.5.3 Results

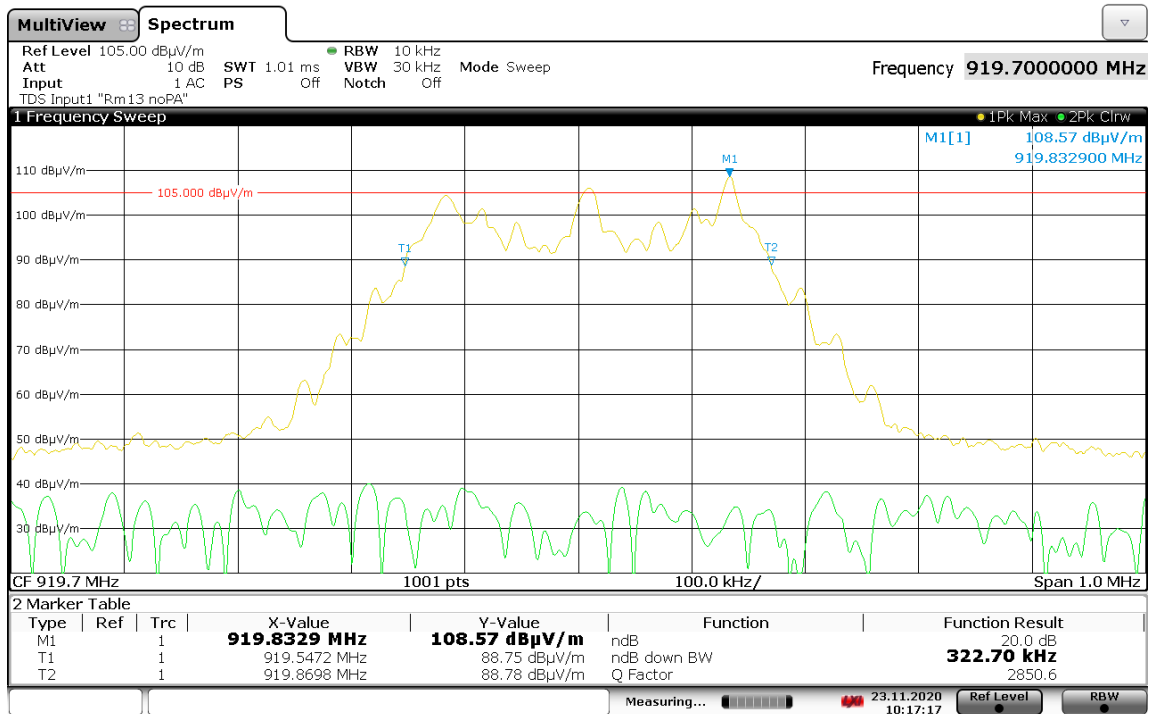
Table 6-1: 20 dB Bandwidth

Frequency [MHz]	20 dB Bandwidth [kHz]	Limit[kHz]	Results
912.5	323.70	500	Complied
919.7	322.70	500	Complied
926.9	322.70	500	Complied



10:06:12 23.11.2020

Graph 6-4: 20 dB Bandwidth, 912.5 MHz

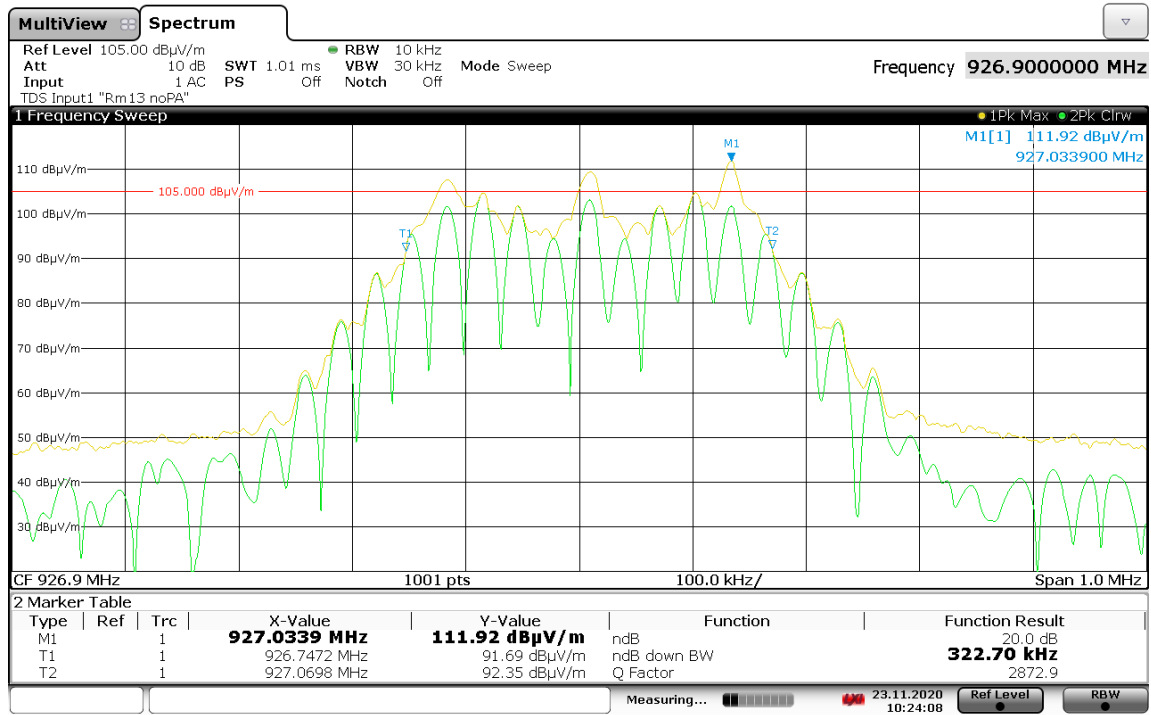


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Graph 6-5: 20 dB Bandwidth, 919.7 MHz



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10:24:09 23.11.2020

Graph 6-6: 20 dB Bandwidth, 926.9 MHz

6.6 §15.247(a) / §RSS-247 5.1(b) Channel Separation

6.6.1 Test procedure

The tests were performed in accordance with ANSI C63.10: 2013 Clause 7.8.2.

The channel separation was measured while the device was transmitting with typical hopping function enable.

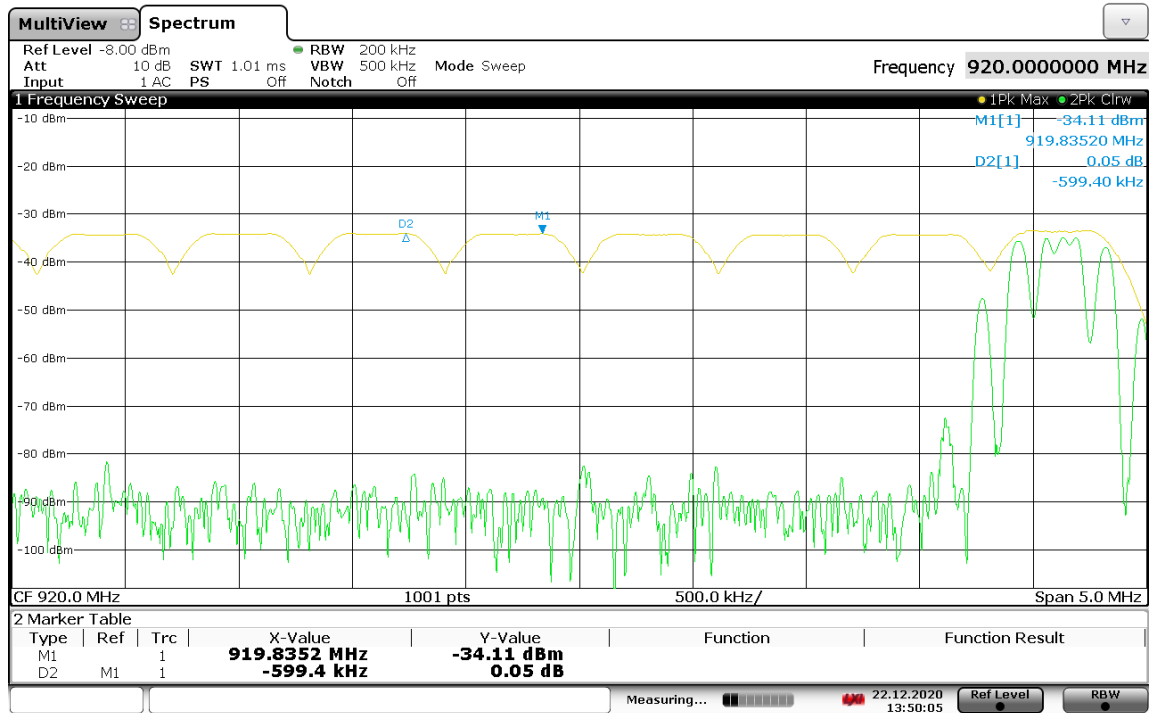
6.6.2 Limits

In the band 902 - 928 MHz, the channel separation must be more than 25 kHz or the 20-dB bandwidth whichever is greater.

6.6.3 Results

Table 6-2: Channel Separation

Channel Separation [kHz]	Limit [kHz]	Result
599.40	323.70	Complied



13:50:05 22.12.2020

Graph 6-7: Channel Separation

6.7 §15.247(a) / §RSS-247 5.1(c) Number of channels and time of occupancy

6.7.1 Test procedure

The tests were performed in accordance with ANSI C63.10: 2013 Clause 7.8.3 for Number of hopping frequencies and Clause 7.8.4 for Time of occupancy.

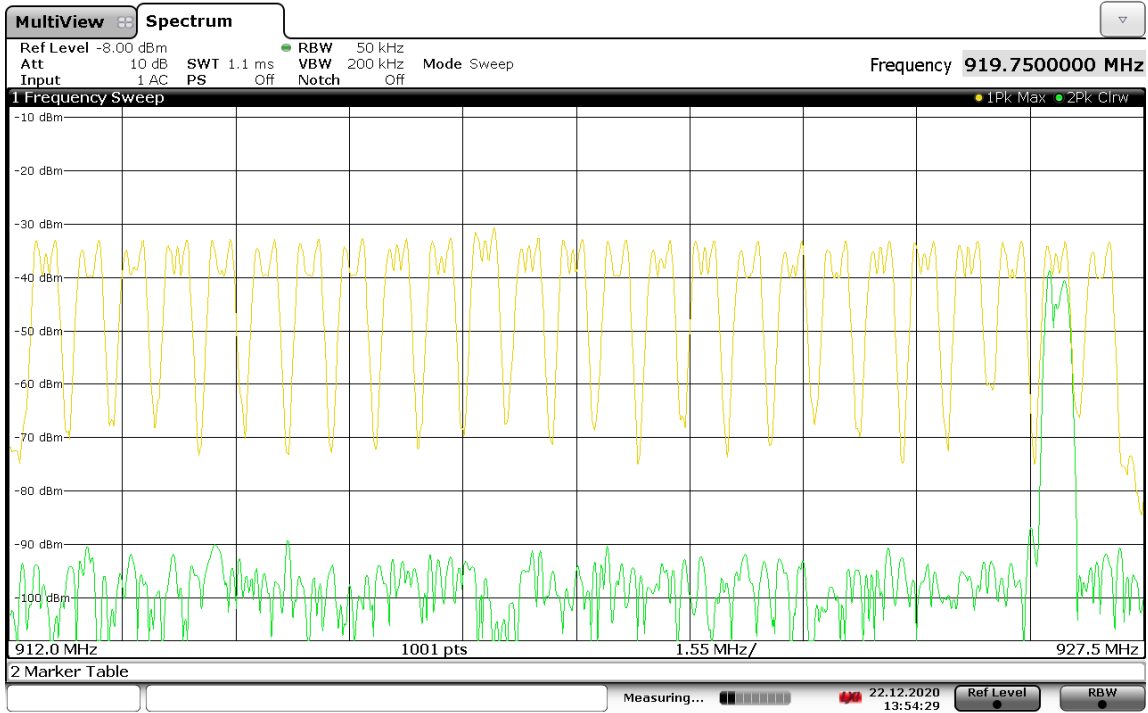
6.7.2 Limits

In the band 902 - 928 MHz, frequency hopping systems operation bands shall use at least 25 hopping frequencies. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a 10 seconds period.

6.7.3 Results

Table 6-3: Number of Channels

Number of Channels	Limit	Result
25	≥25	Complied

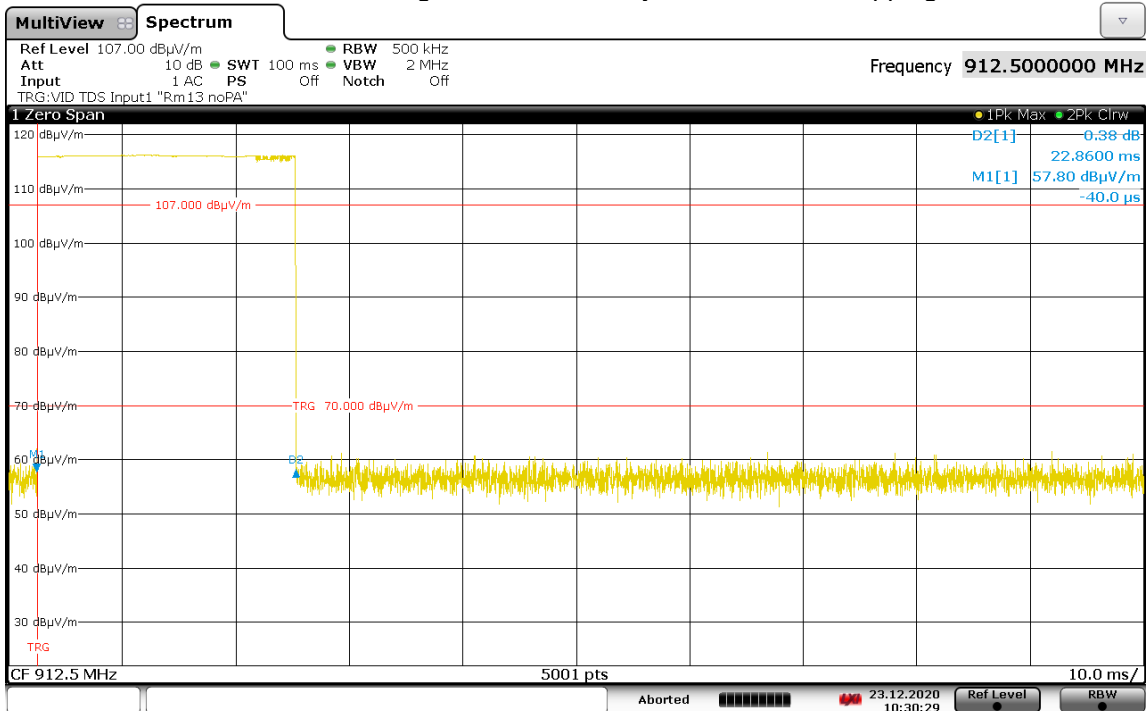


13:54:30 22.12.2020

Graph 6-8: Number of Channels
Table 6-4: Average Time of Occupancy

Occupancy time for a single hop (ms)	Average time of occupancy in 10 seconds (ms)	Limit (ms)	Result
22.86	22.86	≤400	Complied

Note, Customer declared the RF signal transmits every 60 seconds on hopping mode.



10:30:29 23.12.2020

Graph 6-9: Duration of one pulse



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6.8 §15.247(b) / §RSS 5.4(a) Peak Output Power

6.8.1 Test procedure

The field strength of the fundamental transmitted frequency was measured inside a semi-anechoic chamber compliant with ANSI C63.4: 2014 in accordance to ANSI C63.10: 2013 clause 7.8.5.

The EUT was positioned on a test turn-table and rotated through 360° to determine the highest emissions. The measurement antenna was also varied between 1 and 4 metres height. Different orientations of the EUT (x, y and z-axis) and measurement antenna polarisations (vertical and horizontal) were investigated to produce the highest emission EIRP. All measurements were made at a distance of 3 metres. The fundamental emissions were measured using a peak detector.

6.8.2 Limits

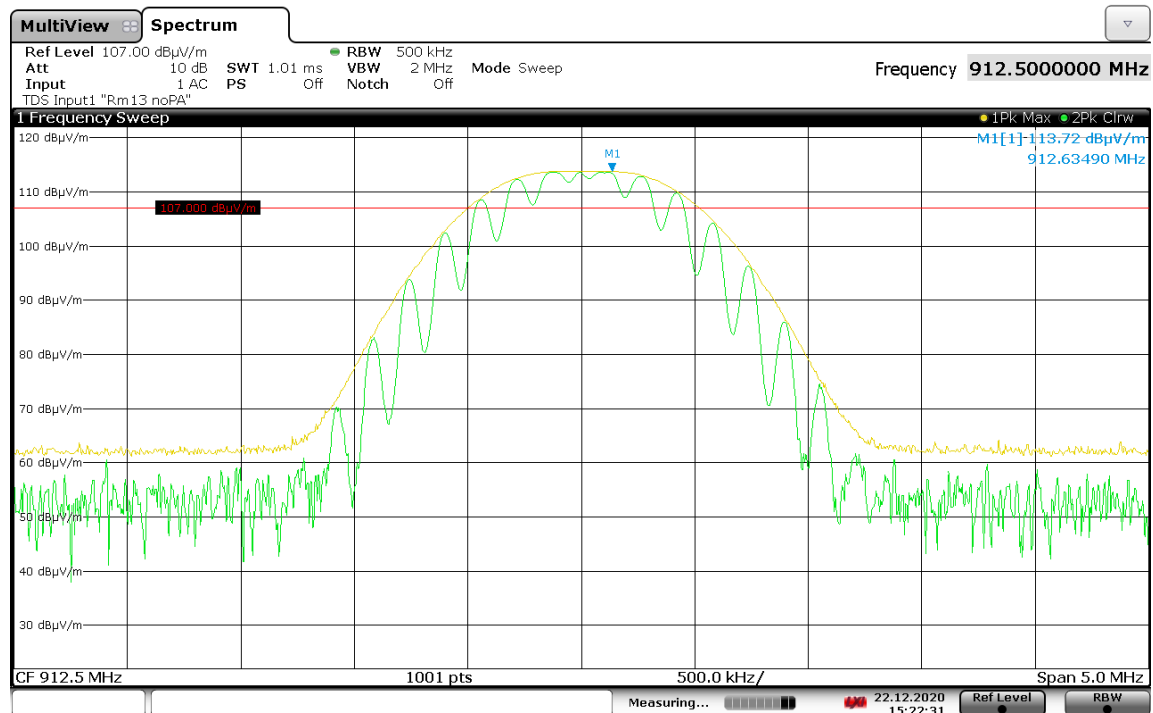
The maximum conducted output power at 902 - 928 MHz is 250mW.

6.8.3 Results

The measured radiated field strength is converted to equivalent conducted output power for checking compliance (KDB 558074 D01 Section 3).

Table 6-5: Maximum peak power

Frequency (MHz)	E-Field @ 3 m (dBuV/m)	EIRP (mW)	Antenna Gain (dBi)	Equivalent Conducted Output Power (mW)	Limit (mW)	Results
912.5	113.72	70.65	0	70.65	250	Complied
919.7	113.78	71.63	0	71.63	250	Complied
926.9	113.94	74.32	0	74.32	250	Complied

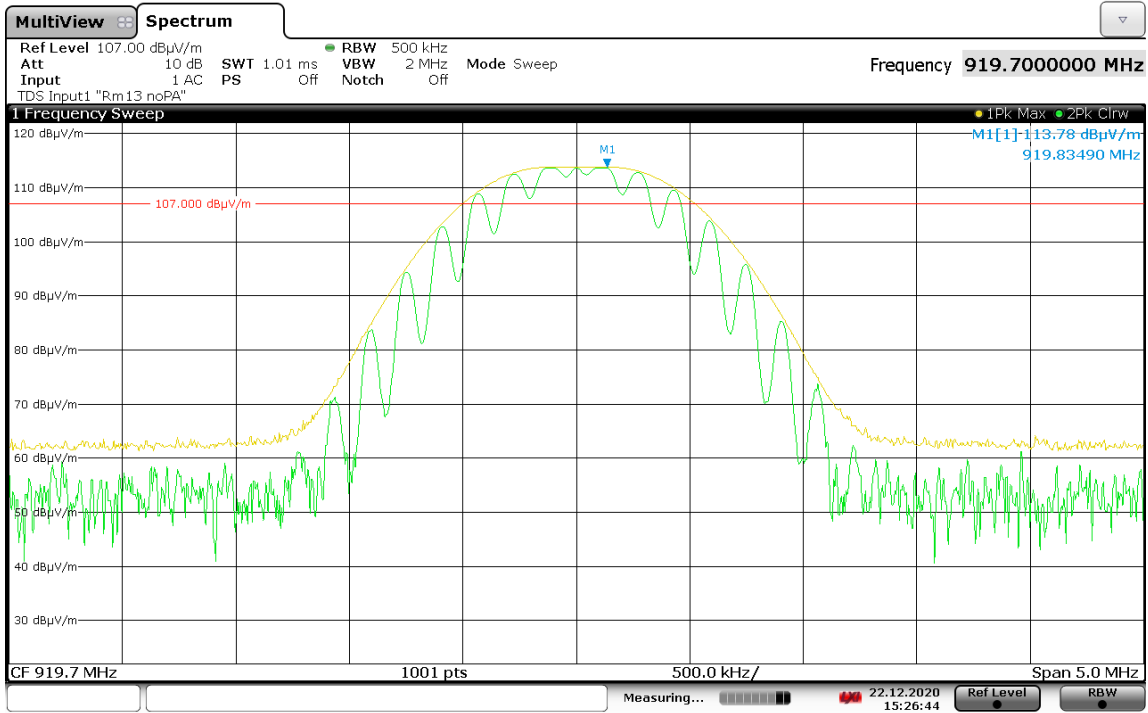


15:22:31 22.12.2020

Graph 6-10: Max EIRP, 912.5 MHz

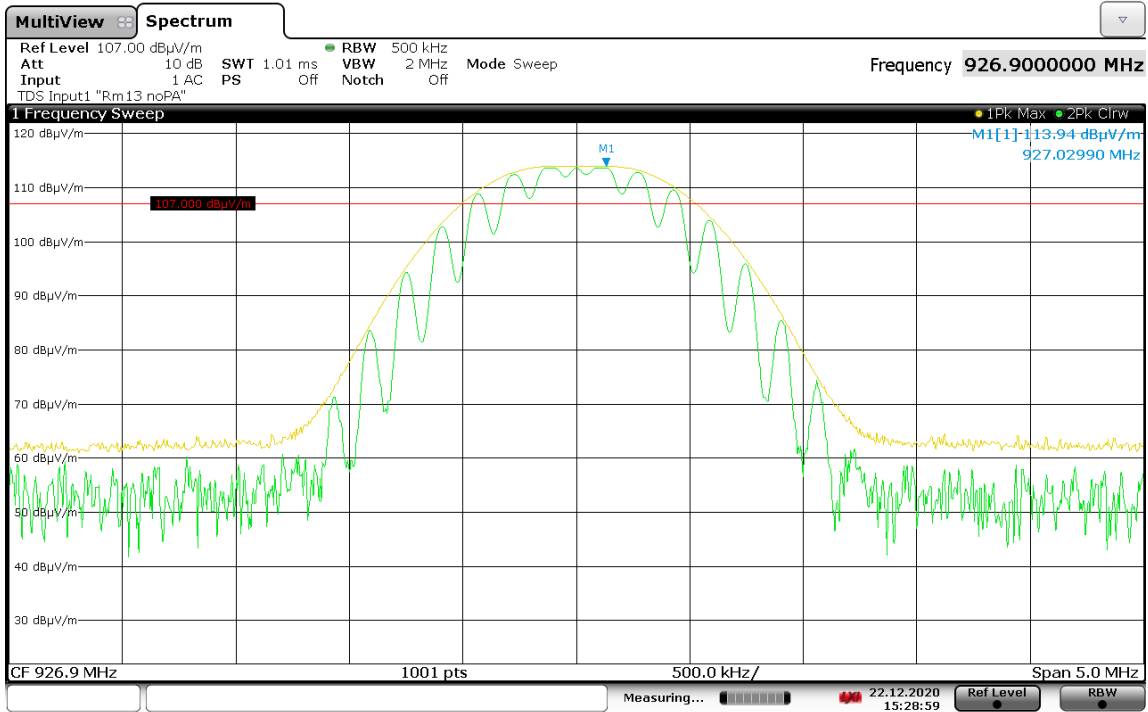


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15:26:44 22.12.2020

Graph 6-11: Max EIRP, 919.7 MHz



15:28:59 22.12.2020

Graph 6-12: Max EIRP, 926.9 MHz



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6.9 15.247(d) / §RSS 5.5 Out-of-Band/Spurious Emissions

6.9.1 Test procedure

Radiated out-of-band/spurious emissions measurements were performed in a semi-anechoic chamber compliant with ANSI C63.4: 2014.

The test frequency range was sub-divided into smaller bands with the defined resolution bandwidths to permit reliable display and identification of emissions.

Frequency range [MHz]	Measurement Bandwidth [kHz]	Measurement Distance [m]	Antenna
0.009 to 0.150	0.2	3	0.6 metre loop antenna
0.150 to 30	9	3	
30 to 1000	120	3	Biconilog hybrid
1000 to 18 000	1000	3	Standard gain or broadband horn
18 000 to 40 000	1000	1	

EUT was set at a height of 0.8 m for measurements below 1000 MHz and set at a height of 1.5 m for measurements above 1000 MHz.

The sample was slowly rotated with the spectrum analyser set to Max-Hold. This was performed for at least two antenna heights. When an emission was located, it was positively identified and its maximum level found by rotating the automated turntable and by varying the antenna height. For below 1000 MHz the emissions were measured with a Quasi-Peak detector, and for above 1000 MHz the emissions were measured with Peak and Average detectors.

The measurement data for each frequency range was corrected for cable losses, antenna factors and preamplifier gain. This process was performed for both horizontal and vertical polarisations of the measurement antenna.

EUT was investigated on all three axes (x, y, and z). Measurements on the worst axis are presented below.

6.9.2 Limits

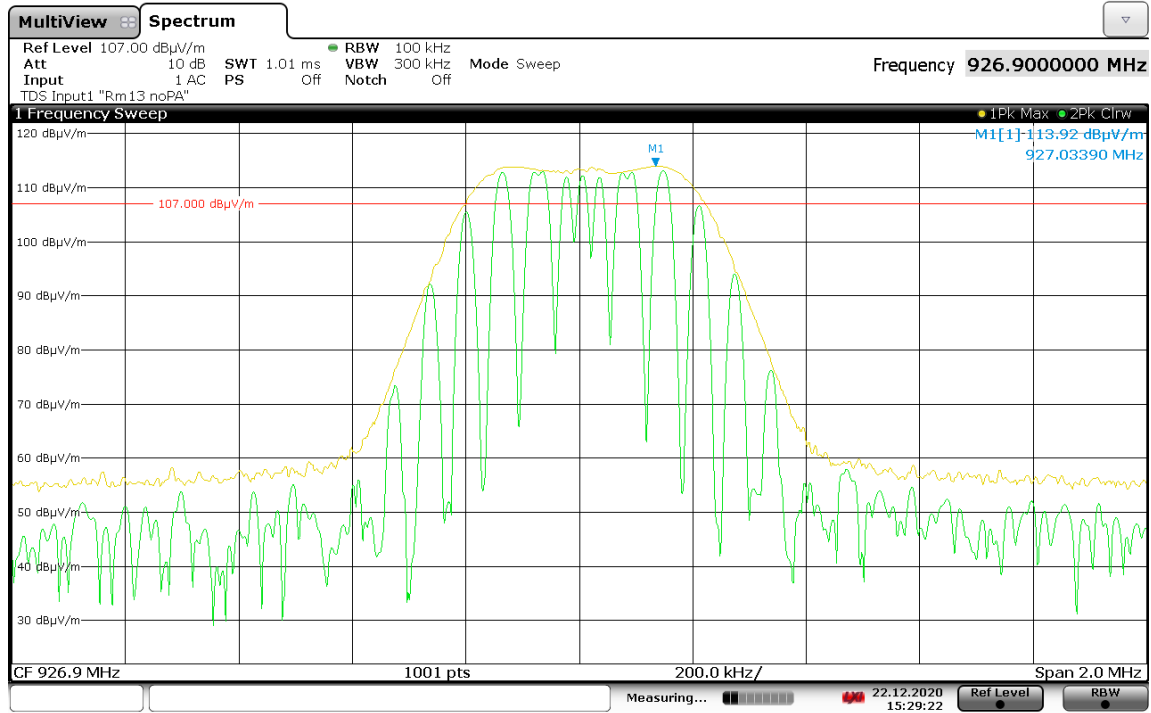
The limit applied is in accordance with the out-of-band/spurious emissions limit defined in §15.247(d) / §RSS 5.5.

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.

The in-band peak PSD in 100 kHz bandwidth were measured. The maximum PSD level was used to establish the limit for nonrestricted frequency bands. However, the general limits of §15.209 apply for the restricted bands of operation defined in §15.205.

Table 6-6: 100 kHz reference level measurement

Freq. (MHz)	Peak at 3 m (dBµV/m)	Established Limit at 3m (dBµV/m)
912.5	113.68	-
919.7	113.76	-
926.9	113.92	93.92

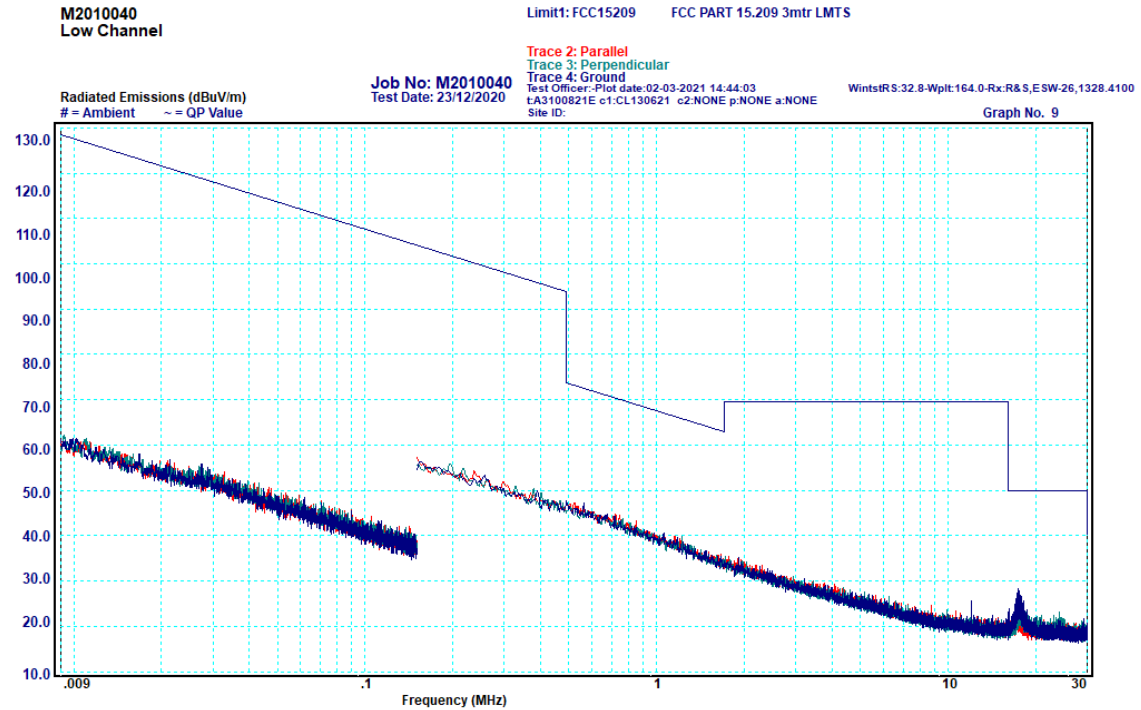


15:29:23 22.12.2020

Graph 6-13: 100 kHz bandwidth reference level

6.9.3 Transmitter Spurious Emissions: 9 kHz - 30 MHz

All emissions measured in the frequency band 9kHz - 30MHz complied with the requirements of the standard.



Graph 6-14: Transmitter Spurious Emissions, 9kHz - 30 MHz, 912.5 MHz

No peaks were measured within 10 dB of the limit.

M2010040
Mid Channel

Limit1: FCC15209 FCC PART 15.209 3mtr LMTS

Trace 2: Parallel
Trace 3: Perpendicular
Trace 4: Ground

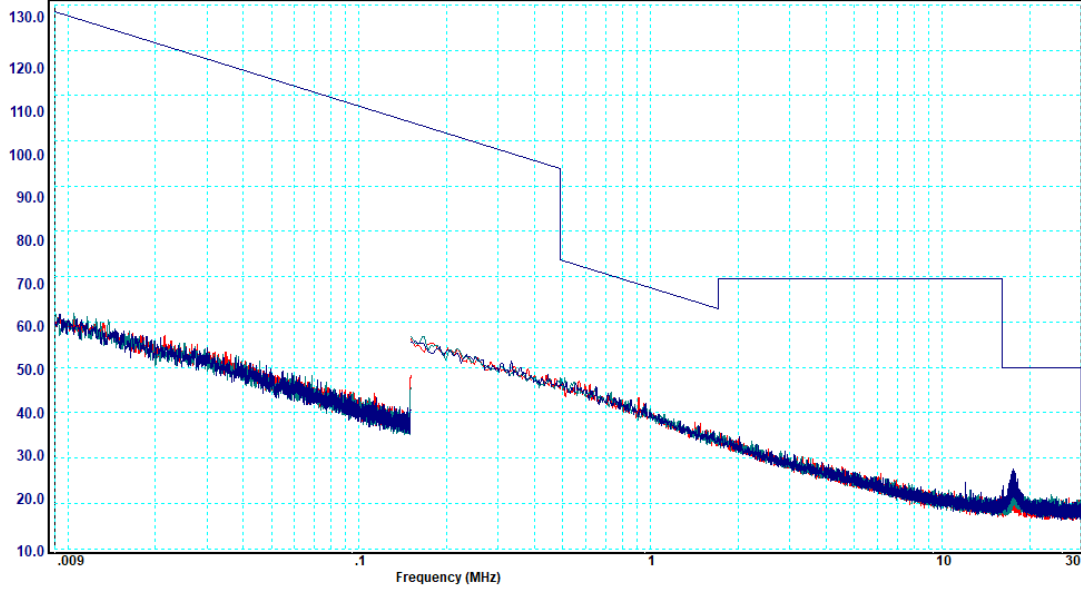
Job No: M2010040
Test Date: 23/12/2020

WintstRS:32.8-Wpit:164.0-Rx:R&S,ESW-26,1328.4100

Radiated Emissions (dBuV/m)
= Ambient ~ = QP Value

t:A3100821E c1:CL130621 c2:NONE p:NONE a:NONE
Site ID:

Graph No. 7



Graph 6-15: Transmitter Spurious Emissions, 9kHz - 30 MHz, 919.7 MHz

No peaks were measured within 10 dB of the limit.

M2010040
High Channel

Limit1: FCC15209 FCC PART 15.209 3mtr LMTS

Trace 2: Parallel
Trace 3: Perpendicular
Trace 4: Ground

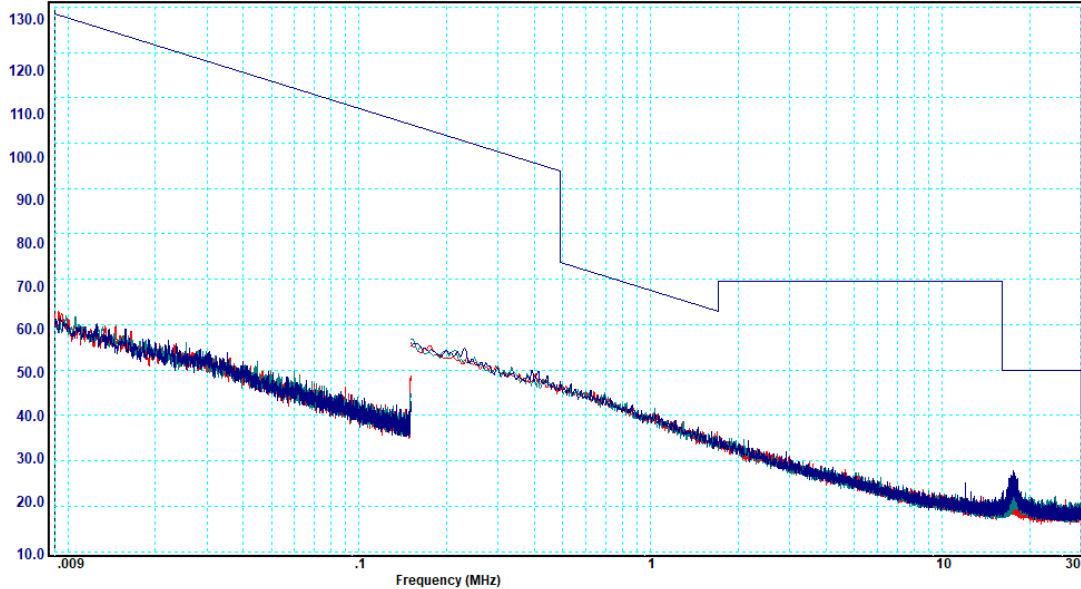
Job No: M2010040
Test Date: 23/12/2020

WintstRS:32.8-Wpit:164.0-Rx:R&S,ESW-26,1328.4100

Radiated Emissions (dBuV/m)
= Ambient ~ = QP Value

t:A3100821E c1:CL130621 c2:NONE p:NONE a:NONE
Site ID:

Graph No. 8



Graph 6-16: Transmitter Spurious Emissions, 9kHz - 30 MHz, 926.9 MHz

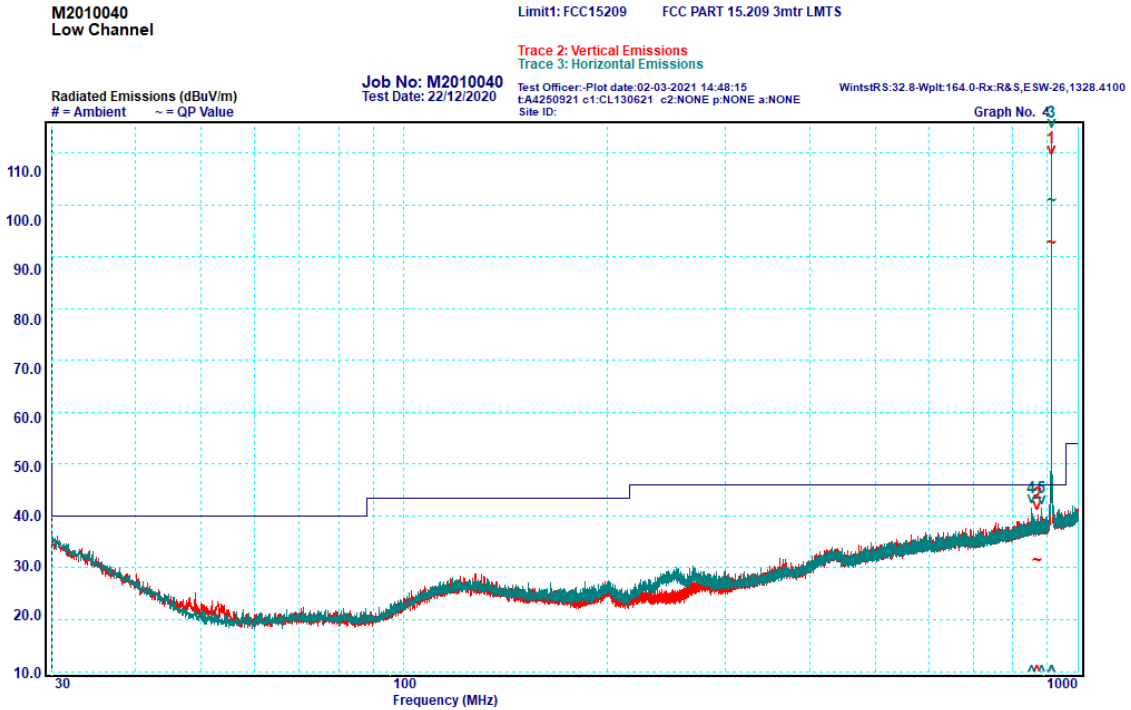
No peaks were measured within 10 dB of the limit.



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6.9.4 Transmitter Spurious Emissions: 30 - 1000 MHz

All emissions measured in the frequency band 30 - 1000 MHz complied with the requirements of the standard.



Graph 6-17: Transmitter Spurious Emissions, 30 - 1000 MHz, 912.5 MHz

Table 6-7: Transmitter Spurious Emissions, 30 - 1000 MHz, 912.5 MHz

Peak	Frequency [MHz]	Polarisation	Quasi Peak		
			Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
1*	912.51	Vertical	N/A	N/A	N/A
2	870.63	Vertical	31.4	46	-14.6
3*	912.51	Horizontal	N/A	N/A	N/A
4	852.61	Horizontal	38.3	46	-7.7
5	882.5	Horizontal	36.5	46	-9.5

*Peaks 1 and 3 are the fundamental transmissions and are not subject to the spurious emissions limit of the standard.

M2010040
Mid Channel

Limit1: FCC15209 FCC PART 15.209 3mtr LMTS

Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

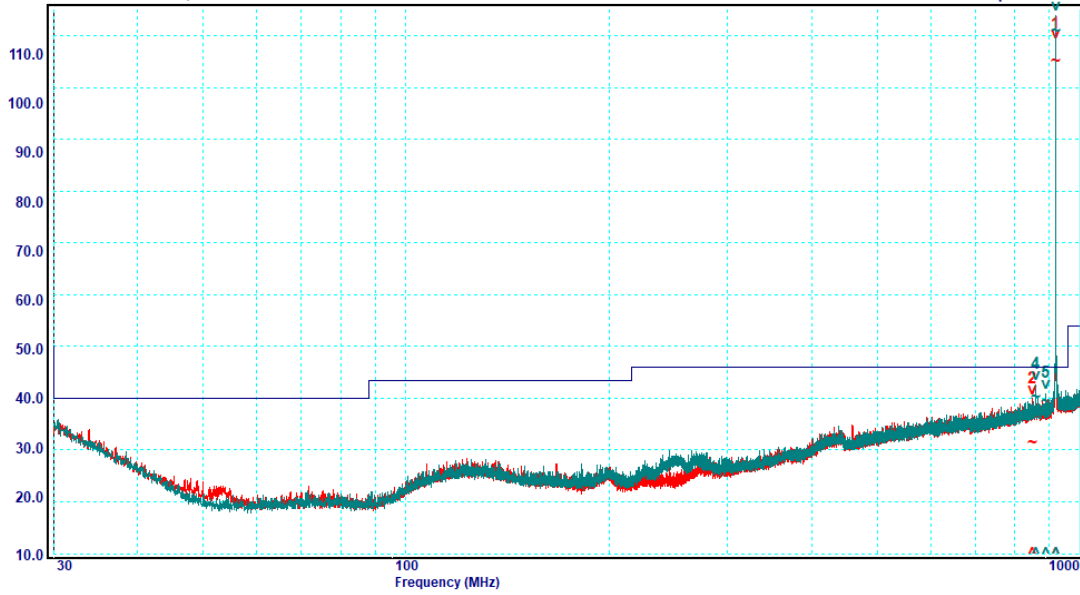
Job No: M2010040
Test Date: 22/12/2020

Test Officer: Plot date: 02-03-2021 14:54:17
t:A4250921 c1:CL130621 c2:NONE p:NONE a:NONE
Site ID:

WinstorS:32.8-Wplit:164.0-Rx:R&S,ESW-26,1328.4100

Radiated Emissions (dBuV/m)
= Ambient ~ = QP Value

Graph No. 63



Graph 6-18: Transmitter Spurious Emissions, 30 - 1000 MHz, 919.7 MHz

Table 6-8: Transmitter Spurious Emissions, 30 - 1000 MHz, 919.7 MHz

Peak	Frequency [MHz]	Polarisation	Quasi Peak		
			Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
1*	919.71	Vertical	N/A	N/A	N/A
2	849.91	Vertical	31.4	46	-14.6
3*	919.71	Horizontal	N/A	N/A	N/A
4	859.83	Horizontal	40.2	46	-5.8
5	889.82	Horizontal	39.4	46	-6.6

*Peaks 1 and 3 are the fundamental transmissions and are not subject to the spurious emissions limit of the standard.

M2010040
High Channel

Limit1: FCC15209 FCC PART 15.209 3mtr LMTS

Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

Job No: M2010040

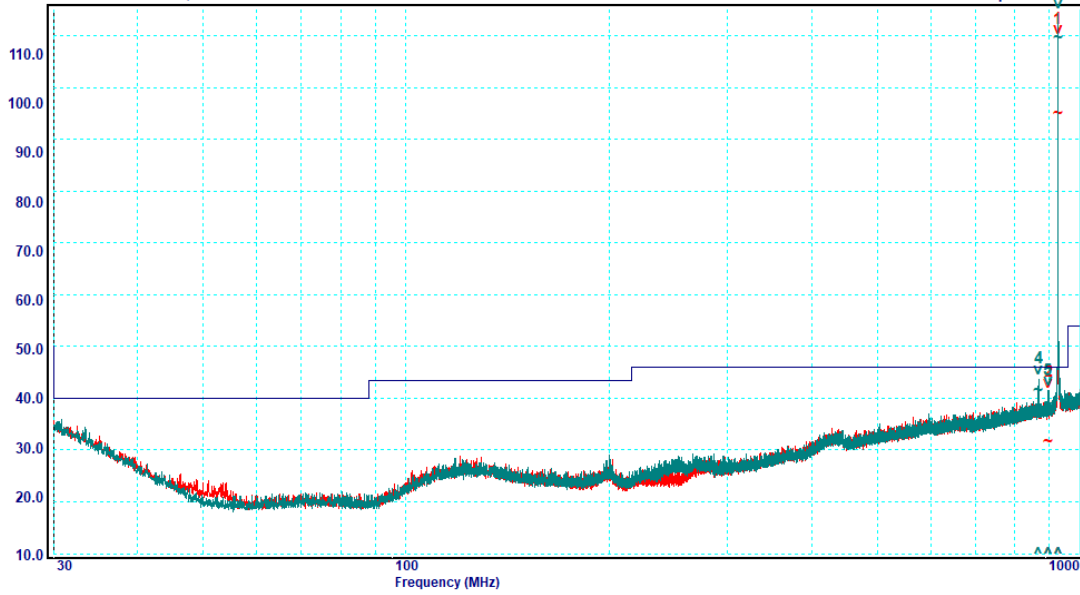
Test Date: 22/12/2020

Test Officer: Plot date: 02-03-2021 14:52:22
t:A4250921 c1:CL130621 c2:NONE p:NONE a:NONE
Site ID:

WinstorS:32.8-Wplit:164.0-Rx:R&S,ESW-26,1328.4100

Radiated Emissions (dBuV/m)
= Ambient ~ = QP Value

Graph No. 53



Graph 6-19: Transmitter Spurious Emissions, 30 - 1000 MHz, 926.9 MHz

Table 6-9: Transmitter Spurious Emissions, 30 - 1000 MHz, 926.9 MHz

Peak	Frequency [MHz]	Polarisation	Quasi Peak		
			Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
1*	926.91	Vertical	N/A	N/A	N/A
2	897.2	Vertical	31.6	46	-14.4
3*	926.92	Horizontal	N/A	N/A	N/A
4	867.03	Horizontal	41.4	46	-4.6
5	896.81	Horizontal	39	46	-7

*Peaks 1 and 3 are the fundamental transmissions and are not subject to the spurious emissions limit of the standard.

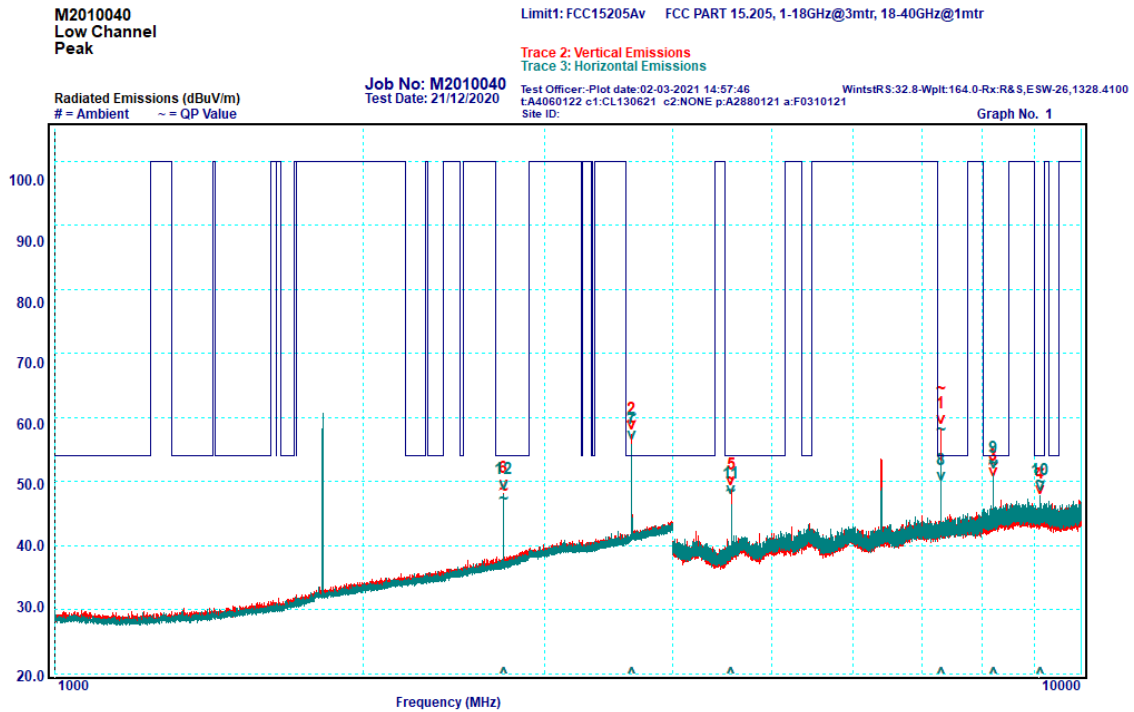
6.9.5 Transmitter Spurious Emissions: 1 - 10 GHz

All emissions measured in the frequency band 1 – 10 GHz complied with the requirements of the standard.

Note, as per KDB 558074 D01 15.247 Meas Guidance v05r02 section 9 b), the average radiated filed strength is calculated by subtracting the duty cycle correction factor from the measurement performed with a peak detector.

Table 6-10: Duty Cycle Correction Factor

Occupancy time in 100 msec (ms)	Duty Cycle	Duty Cycle Correction Factor (DCCF)
22.86	22.86%	12.8



Graph 6-20: Transmitter Spurious Emissions, 1 - 10 GHz, 912.5 MHz

Table 6-11: Transmitter Spurious Emissions, 1 - 10 GHz, 912.5 MHz

Peak	Frequency [MHz]	Polarisation	Measured Peak	Calculated Average	Limit [dBµV/m]	Margin [dB]
			Level [dBµV/m]			
1	7300.14	Vertical	64.4	51.6	54	-2.4
2	3650.52	Vertical	59.2	46.4	54	-7.6
3	8212.02	Vertical	52.6	39.8	54	-14.2
4	9125.02	Vertical	51.8	39.0	54	-15
5	4562.51	Vertical	50.4	37.6	54	-16.4
6	2737.69	Vertical	48.6	35.8	54	-18.2
7	3650.48	Horizontal	60.2	47.4	54	-6.6
8	7300.03	Horizontal	57.9	45.1	54	-8.9
9	8213.71	Horizontal	52.8	40.0	54	-14
10	9125.09	Horizontal	49.9	37.1	54	-16.9
11	4563.03	Horizontal	48.4	35.6	54	-18.4
12	2737.7	Horizontal	47.2	34.4	54	-19.6



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M2010040
Mid Channel
Peak

Limit1: FCC15205Av FCC PART 15.205, 1-18GHz@3mtr, 18-40GHz@1mtr

Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

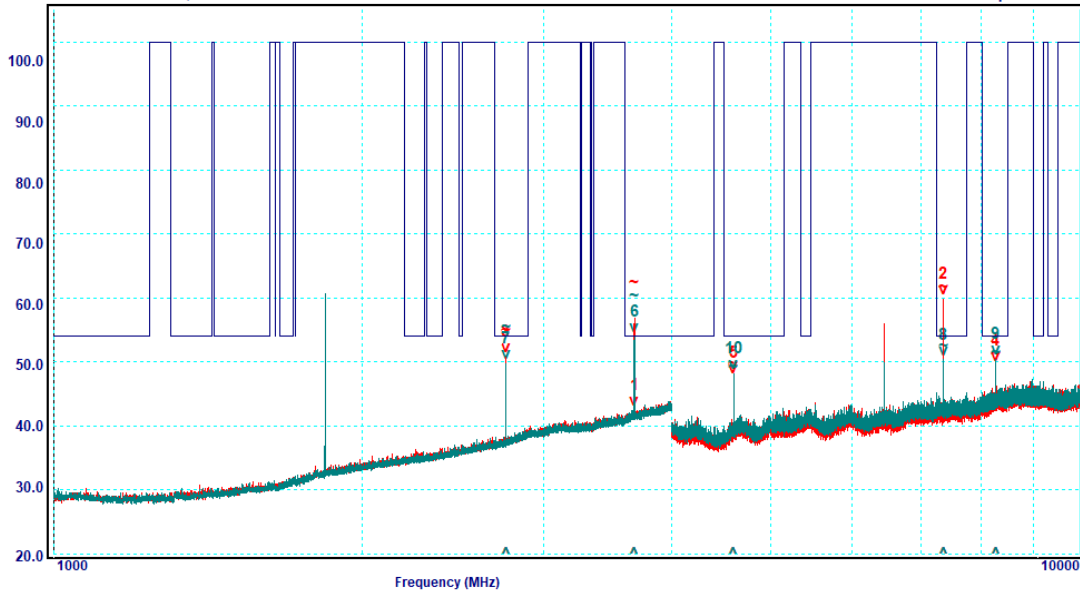
Job No: M2010040
Test Date: 21/12/2020

Test Officer-Plot date:02-03-2021 15:01:06
t:A4060122 c1:CL130621 c2:NONE p:A2680121 a:F0310121
Site ID: WinstRS:32.8-Wpit:164.0-Rx:R&S_ESW-26,1328.4100

Radiated Emissions (dBuV/m)

= Ambient ~ = QP Value

Graph No. 2



Graph 6-21: Transmitter Spurious Emissions, 1 - 10 GHz, 919.7 MHz

Table 6-12: Transmitter Spurious Emissions, 1 - 10 GHz, 919.7 MHz

Peak	Frequency [MHz]	Polarisation	Measured Peak	Calculated Average	Limit [dBµV/m]	Margin [dB]
			Level [dBµV/m]			
1	3679.32	Vertical	62.3	49.5	54	-4.5
2	7357.71	Vertical	61.7	48.9	54	-5.1
3	2759.29	Vertical	54.9	42.1	54	-11.9
4	8276.81	Vertical	51.2	38.4	54	-15.6
5	4598.57	Vertical	49.6	36.8	54	-17.2
6	3679.34	Horizontal	60.3	47.5	54	-6.5
7	2759.34	Horizontal	55.4	42.6	54	-11.4
8	7358.38	Horizontal	52.4	39.6	54	-14.4
9	8277.73	Horizontal	51.4	38.6	54	-15.4
10	4597.97	Horizontal	49.1	36.3	54	-17.7

M2010040
High Channel
Peak

Limit1: FCC15205Av FCC PART 15.205, 1-18GHz@3mtr, 18-40GHz@1mtr

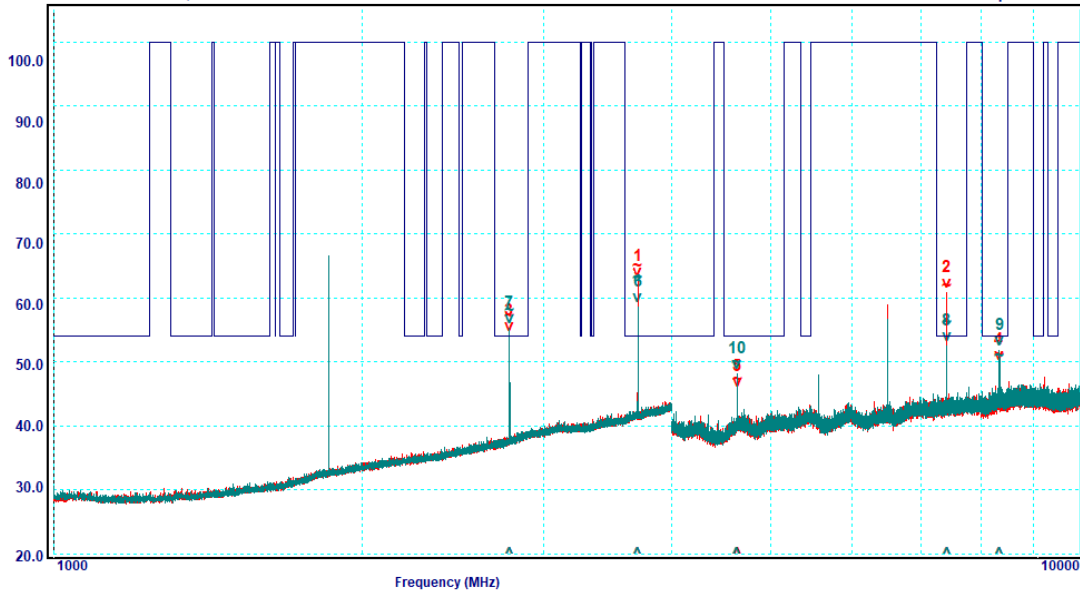
Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

Job No: M2010040
Test Date: 21/12/2020

Test Officer-Plot date:02-03-2021 15:03:19
t:A4060122 c1:CL130621 c2:NONE p:A2890121 a:F0310121
WinStRS:32.8-Wpit:164.0-Rx:R&S,ESW-26,1328.4100
Site ID:

Radiated Emissions (dBuV/m)
= Ambient ~ = QP Value

Graph No. 3



Graph 6-22: Transmitter Spurious Emissions, 1 - 10 GHz, 926.9 MHz

Table 6-13: Transmitter Spurious Emissions, 1 - 10 GHz, 926.9 MHz

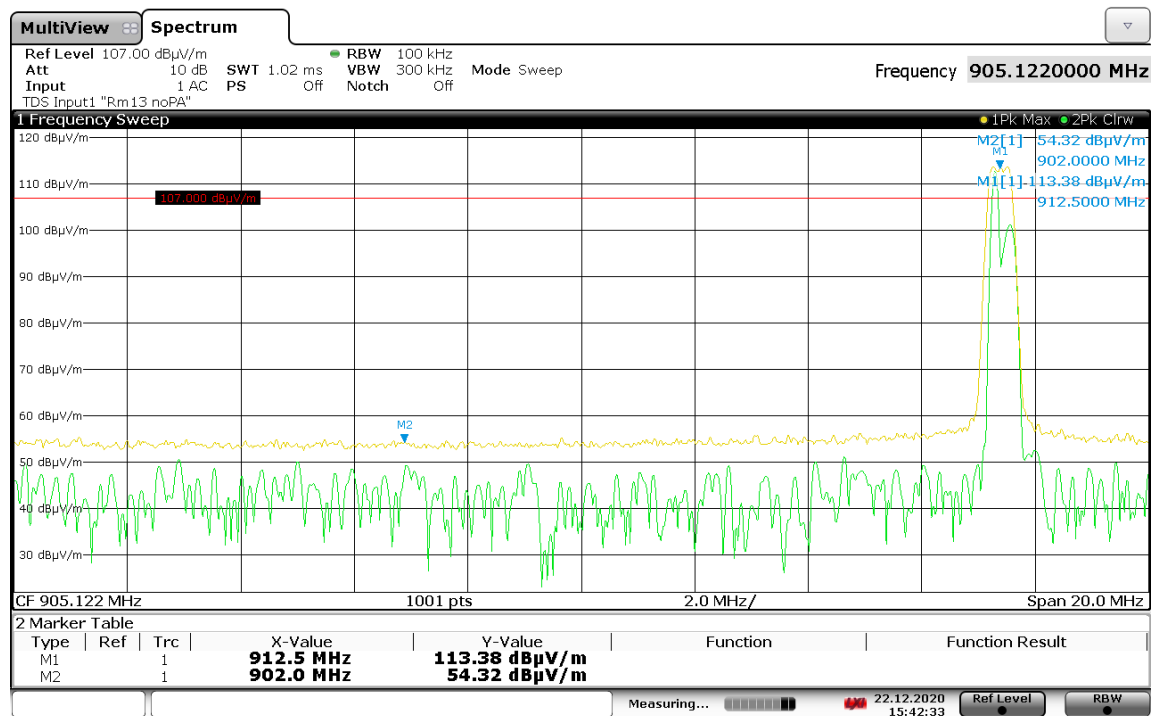
Peak	Frequency [MHz]	Polarisation	Measured Peak	Calculated Average	Limit [dBµV/m]	Margin [dB]
			Level [dBµV/m]			
1	3708.13	Vertical	65	52.2	54	-1.8
2	7414.99	Vertical	61.8	49.0	54	-5
3	2780.87	Vertical	57.2	44.4	54	-9.6
4	8341.62	Vertical	51.1	38.3	54	-15.7
5	4634.92	Vertical	47.2	34.4	54	-19.6
6	3708.09	Horizontal	63	50.2	54	-3.8
7	2780.17	Horizontal	58	45.2	54	-8.8
8	7415.76	Horizontal	56.1	43.3	54	-10.7
9	8342.87	Horizontal	50.8	38.0	54	-16
10	4634.6	Horizontal	49.8	37.0	54	-17

6.10 §15.247(d) / §RSS 5.5 Band Edge Emission Measurements

Band-edge measurements were done using radiated in accordance to ANSI C63.10 clause 6.10. All emissions measured near the lower and upper band edge complied with the requirements of §15.247 / §RSS 5.5. Authorised-band band-edges were measured in the lower end and Restricted-band band-edges were measured in the upper end.

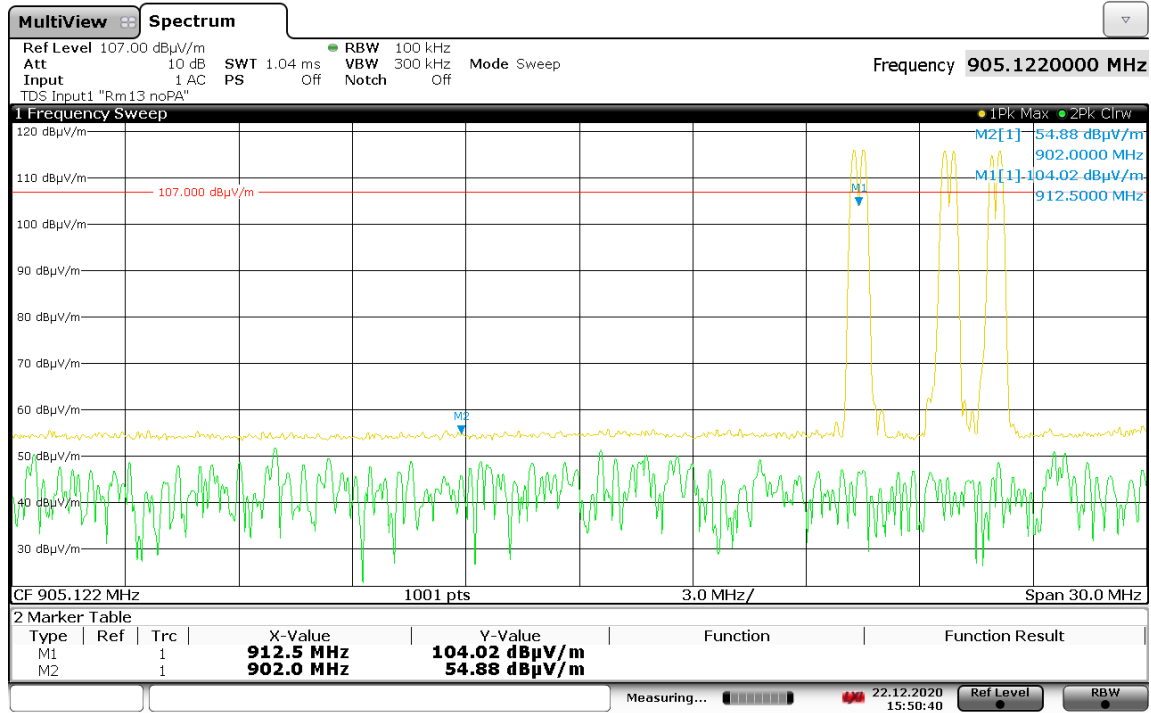
Table 6-14: Band edge Measurement

Measurement Type	Freq [MHz]	Measurement [dBuV/m]	Limit [dBuV/m]	Result
Peak - Hop off	902	54.32	93.92	Complied
Peak - Hop on	902	54.88	93.92	Complied
Peak - Hop off	928	55.43	93.92	Complied
Peak - Hop on	928	54.95	93.92	Complied



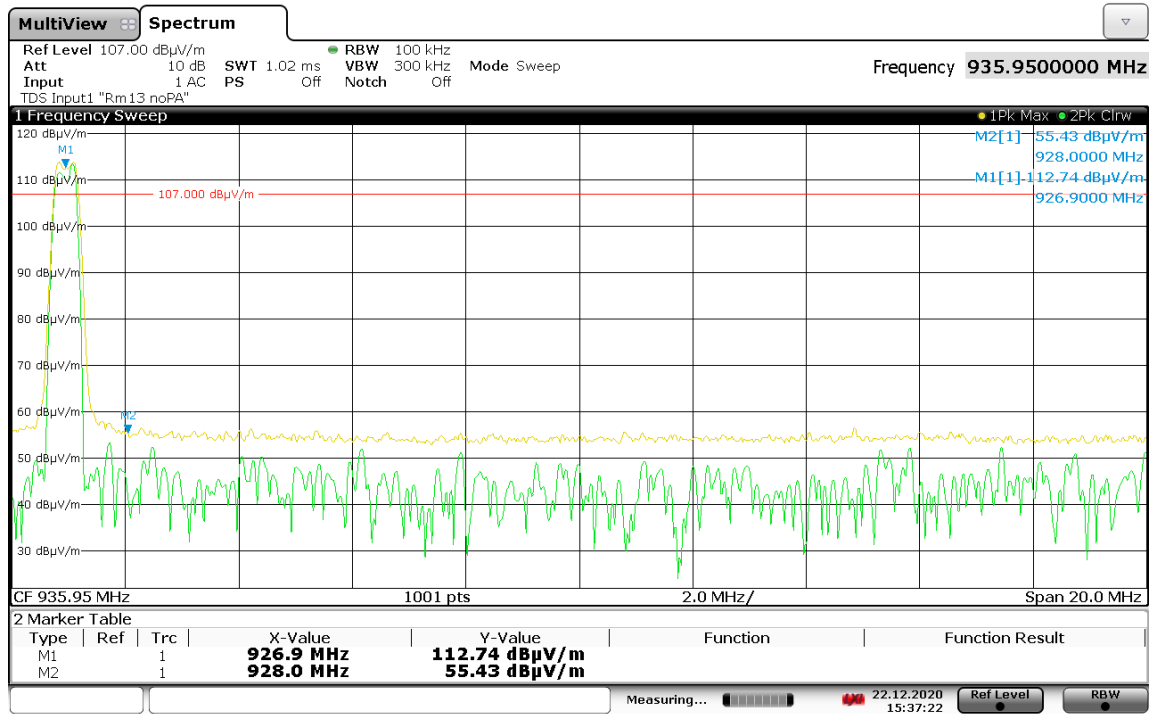
15:42:34 22.12.2020

Graph 6-23: Lower Band-edge, Hopping off



15:50:41 22.12.2020

Graph 6-24: Lower Band-edge, Hopping on

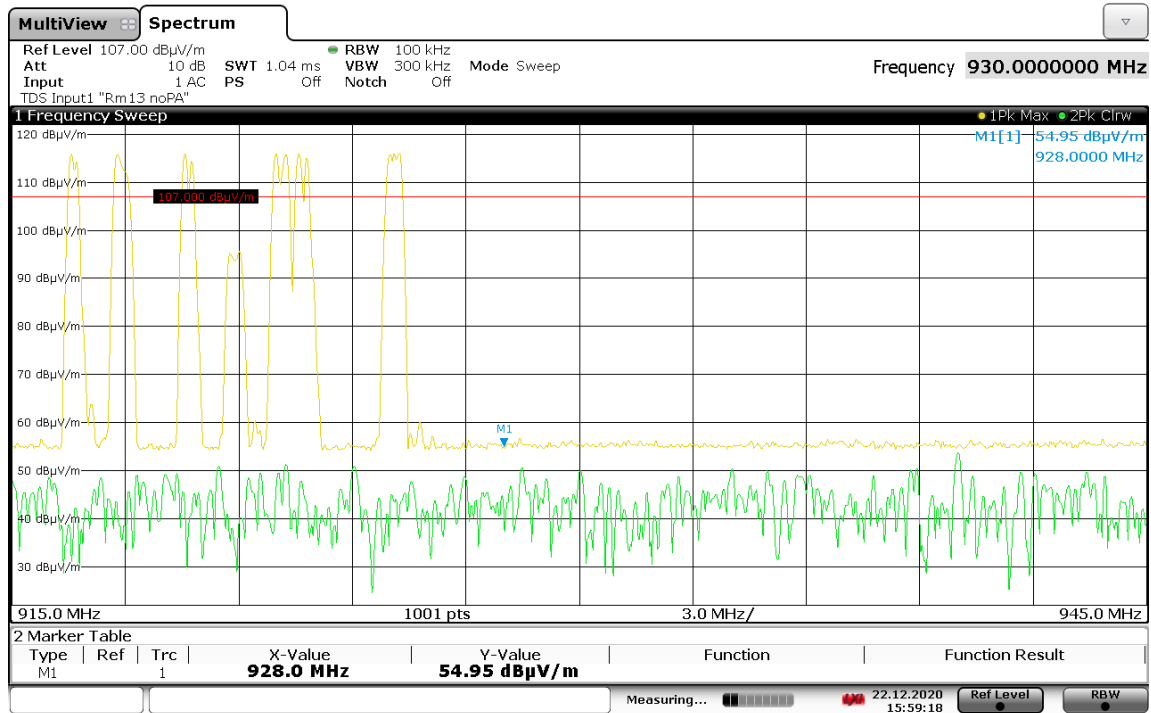


15:37:22 22.12.2020

Graph 6-25: Upper Band-edge, Hopping off



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15:59:19 22.12.2020

Graph 6-26: Upper Band-edge, Hopping on

6.11 §15.247(i) / §RSS-Gen 3.4/§RSS-102 Maximum Permissible Exposure

The EUT complied with the applicable radio frequency exposure levels. Refer to EMC Technologies report M2010040-5 & M2010040-6.

6.12 §15.215 / §RSS-Gen 6.7 Occupied Bandwidth – 99% power

6.12.1 Test procedure

The bandwidth containing 99% power of the transmitted signal was measured using the procedure from ANSI C63.10 section 6.9.

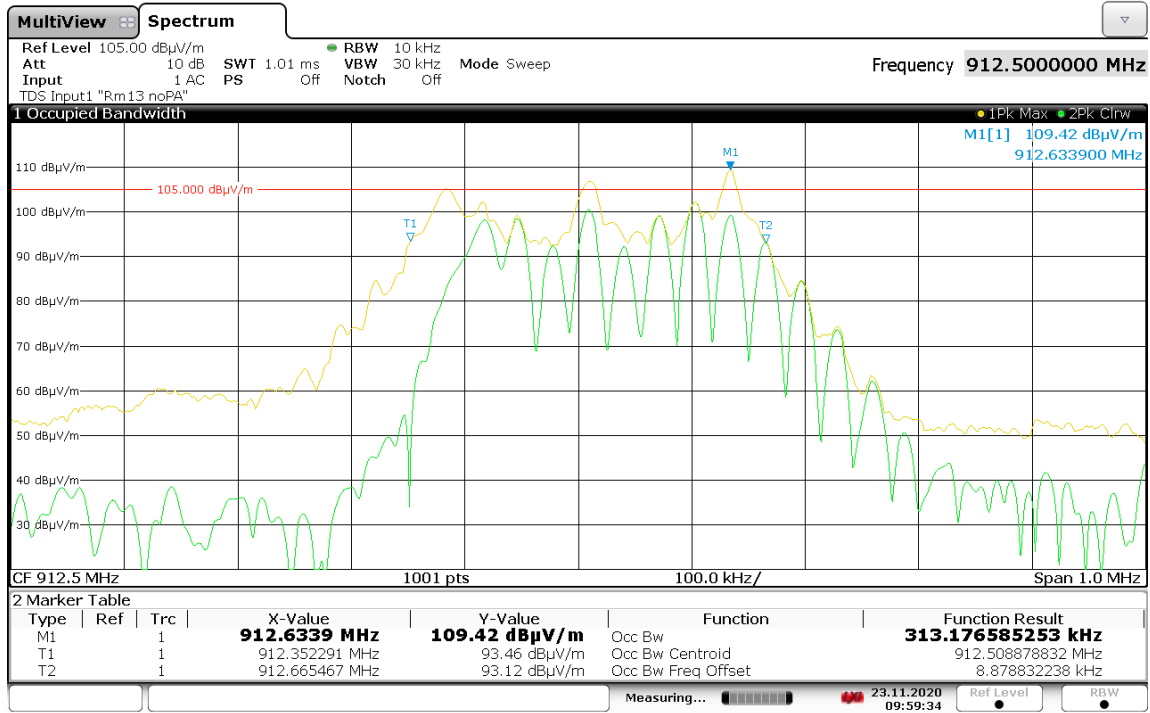
6.12.2 Limits

The 99% power bandwidth should be contained within the frequency band 902 - 928 MHz.

6.12.3 Results

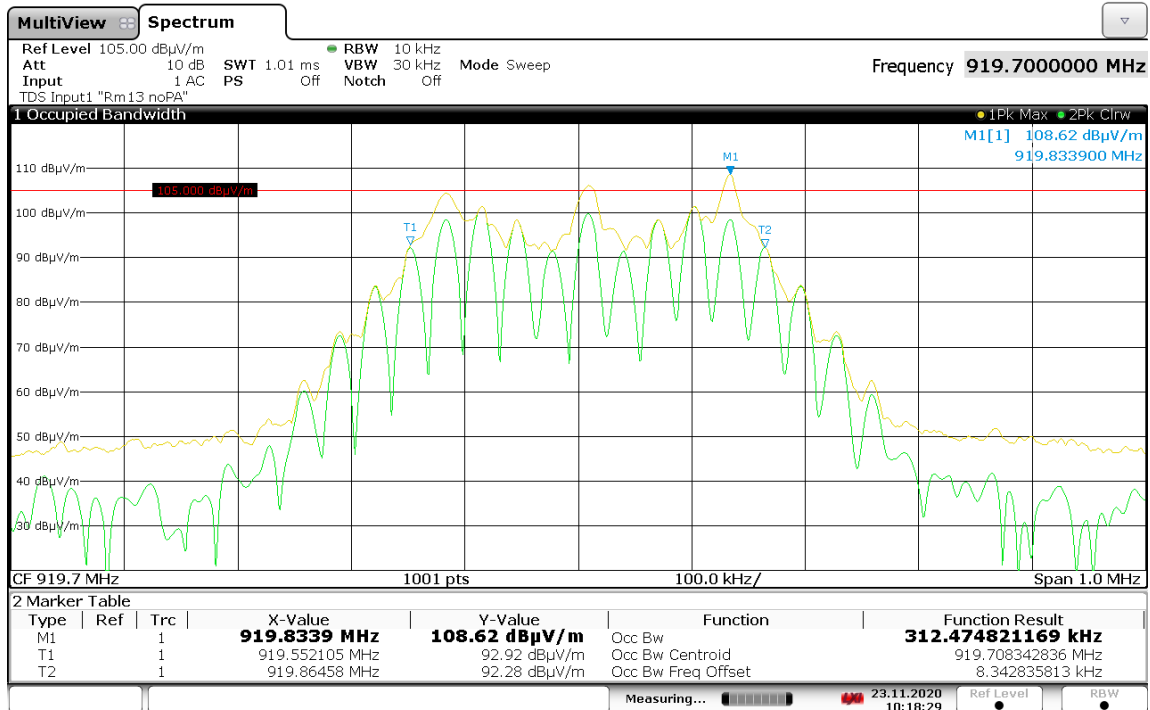
Table 6-15: Occupied bandwidth

Frequency [MHz]	99% Bandwidth [kHz]	Low Frequency [MHz]	High Frequency [MHz]	Result
912.5	313.17	912.35	912.66	Complied
919.7	312.47	919.55	919.86	Complied
926.9	312.16	926.75	927.06	Complied



09:59:34 23.11.2020

Graph 6-27: Occupied Bandwidth, 912.5 MHz

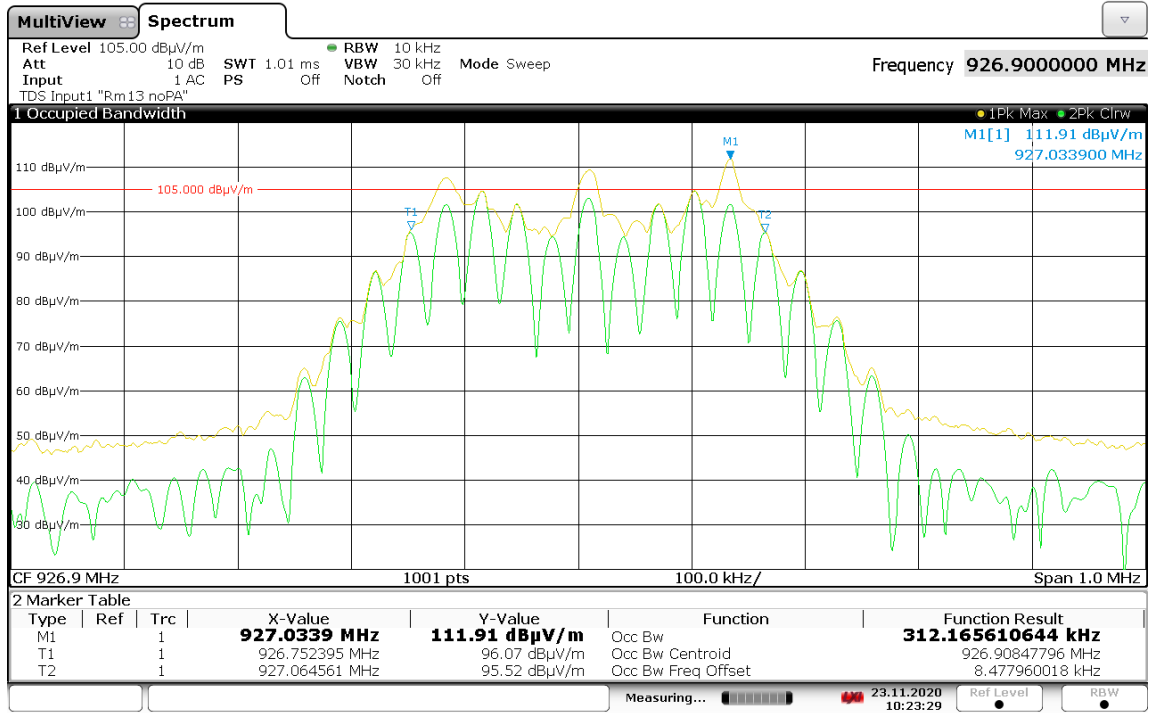


10:18:30 23.11.2020

Graph 6-28: Occupied Bandwidth, 919.7 MHz



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10:23:29 23.11.2020

Graph 6-29: Occupied Bandwidth, 926.9 MHz

END OF REPORT