CMC Centro Misure Compatibilità S.r.l.
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LAB N° 0168

Independent Testing Laboratory
Accredited by ACCREDIA according to UNI CEI EN ISO/IEC 17025 cert. nr. 0168

TEST REPORT nr. R17096801

Federal Communication Commission (FCC)

Test item

Description .....: WIRELESS NTC TEMPERATURE PROBE
Trademark .....: ELIWELL
Model/Type .....: EWSense Temp
FCC ID .....: 2AMLEEWSENSE

Test Specification

Standard.....: FCC Rules & Regulations, Title 47:2016
Part 15 paragraph(s): 203, 204, 205, 207, 209 and 247

Client's name .....: ELIWELL CONTROLS S.r.l.
Address .....: Via dell'Industria, 15 - Z.I. Paludi – 32010 Alpago (BL) – ITALY

Manufacturer's name : Same as client
Address .....: --

Report

Tested by .....: A. Bertezzolo – *Technician*
Approved by .....: R. Beghetto – *Laboratory Manager*
Date of issue .....: 13.02.18
Contents.....: 67 pages

Index

1. Summary

Standard:

FCC Rules & Regulations, Title 47:2016
Part 15 paragraph(s): 203, 204, 205, 207, 209 and 247

Test specifications	*Environmental Phenomena*	*Tests sequence*	*Result*
Part 15.203	Antenna requirements	1	Complies
Part 15.207	Conducted emissions	--	N.A. (+)
Part 15.209	Emissions in restricted frequency bands and in unrestricted frequency bands	2	Complies
Part 15.209	DTS bandwidth	3	Complies
Part 15.247 (d)	Band edge	4	Complies
Part 15.209 and 15.247	Fundamental emission output power	5	Complies
Part 15.209 and 15.247	Maximum power spectral density level in the fundamental emission	6	Complies
Part 15.209	Spurious emission	7	Complies
Part 1.1310	Maximum permissible exposure	8	Complies

(+) Devices which only employ battery power. See FCC Part 15.207 (c)

The Test Report was given to the Client representatives for necessary documentation of ratification of the tested equipment and it is valid for the FCC certification

2. Description of Equipment under test (EUT)

Power supply	:	3 Vdc from battery
Serial Number	:	--
Type of equipment	:	☑ Transmitter Unit
		☑ Receiver Unit
Type of station	:	❑ Fixed station
		☑ Portable station
		❑ Mobile station
Nominal frequencies	:	F_L: 2405 MHz F_M: 2440 MHz F_H: 2475 MHz

2.1 *Test Site*

Company	:	CMC Centro Misure Compatibilità S.r.l.
Address	:	Via della Fisica, 20
		36016 Thiene (VI) – ITALY
Test site facility's FCC registration number	:	182474

3. Testing and sampling

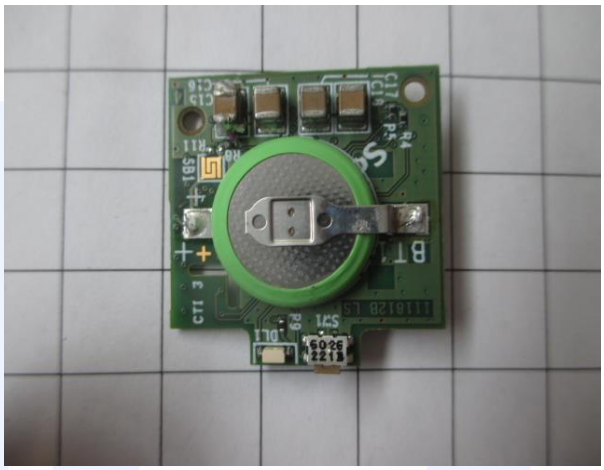
Date of receipt of test item	:	22.02.17
Testing start date	:	22.06.17
Testing end date	:	27.06.17
Samples tested nr.	:	1
Sampling procedure.	:	Equipment used for testing was picked up by the manufacturer, at the end of the production process with random criterion
Internal identification	:	adhesive label with the product number P170193

4. Operative conditions

EUT exercising	:	EUT in continuous transmission at maximum power

5. Photograph(s) of EUT

5.1 Photograph(s) of EUT



6. Equipment list

Id. number	*Manufacturer*	*Model*	*Description*	*Serial number*	*Last calibration*	*Due date calibration*
CMC S010	Rohde & Schwarz	ESH3-Z2	Impulses Limiting Device	- - -	January '17	January '18
CMC S108	EMCO	3115	Horn Antenna	9811-5622	June '16	June '19
CMC S127	Schaffner	HLA6120	Loop Antenna	1191	November '13	November '18
CMC S164	Rohde & Schwarz	ESU26	EMC interference receiver	100052	January '17	January '18
CMC S200	Schwarzbeck	NSLK 8128	V-LISN	8128-273	January '17	January '18
CMC S206	Rohde & Schwarz	ESCI 7	EMC Receiver	100781	January '17	January '18
CMC S227	Rohde & Schwarz	ESR7	EMI Test Receiver 7GHz	101121	January '17	January '18
CMC S260	CMC	Wfr_N	Shielded Cable	Wfr_ant10-1	November '16	November '17
CMC S261	CMC	Wfr_N	Shielded Cable	Wfr_ant20-1	November '16	November '17
CMC S262	CMC	Wfr_N_fix	Shielded Cable	Wfr_fix32-1	November '16	November '17
CMC S263	CMC	Wfr_N_fix	Shielded Cable	Wfr_fix31-1	November '16	November '17
CMC S264	CMC	Wfr_N	Shielded Cable	Wfr_ext03-1	November '16	November '17
CMC S271	Schwarzbeck	BBA 9106 + VHBB 9124	Biconical Antenna (30-300MHz)	831	June '16	June '19
CMC S287	Schwarzbeck	VUSLP 9111B	Log-periodic Antenna (200 MHz-3Ghz)	9111B-203	June '16	June '19
CMC S288	CMC	W_sma_white	Joint Shielded Cable	W_001	November '16	November '17
CMC S290	Schwarzbeck	BBHA 9170	Horn Antenna (15-40 GHz)	733	October '16	October '19

7. Measurement uncertainty

Test	Test Setup	Expanded uncertainty	Note
Conducted emission CISPR 16 LISN 50uH 0,009-0,0150MHz	PE001_01	3,4 dB	1
Conducted emission CISPR 16 LISN 50uH 0,150-30,0MHz	PE001_01	2,8 dB	1
Conducted emission CISPR 16 Voltage Probe 0,15-30MHz	PE001_02	2,6 dB	1
Conducted emission CISPR 16 Current Probe 0,15-30MHz	PE001_03	2,2 dB	1
Conducted emission CISPR 16 ISN 0,15-30MHz	PE001_04	4,5 dB	1
Clic CISPR 16 LISN 50uH 0,150-30,0MHz	PE001_05	2,8 dB	1
Disturbance Power 30-300 MHz	PE002_01	3,4 dB	1
Radiated Emission LAS 0,15-30MHz	PE003_01	1,5 dB	1
Radiated Emission CISPR 16 Loop Ant. 0,15-30MHz	PE004_01	3,8 dB	1
Radiated Emission CISPR 16 Bicon. Ant. 30-300MHz	PE004_02	3,3 dB	1
Radiated Emission CISPR 16 LogP. Ant. 300-1000MHz	PE004_03	3,2 dB	1
Radiated Emission CISPR 16 Horn Ant. 1-18GHz	PE004_04	3,6 dB	1
Human Exposure to electromagnetic fields	PE005_01	10,5 %	1
Harmonic current emissions test	PE006_01	10 mA + 1,6 %	1
Voltage fluctuation and flicker test	PE007_01	3,9 %	1
Radiated Immunity 80MHz-6GHz	PE102_XX	2,1 dB 0,81 V/m a 3V/m	1
Conducted Immunity 0,15-230MHz	PE105_XX	1,2 dB 0,44 V a 3V	1
AC Magnetic field	PE106_01	1,55 % 0,15 A/m a 10A/m	1
Pulse Magnetic field	PE107_01	6,22 % 18,6 A/m a 300A/m	1
Dumped Magnetic field	PE108_01	6,22 % 1,86 A/m a 30A/m	1
Common mode conducted immunity	PE112_01	2,12 % 0,21 V a 10V	1

Test	Test Setup	Expanded uncertainty	Note
Power/Spurious 9kHz-30MHz	PR001_01	3,8 dB	1
Power/Spurious ERP 30-1000MHz d=10m	PR001_02+03	4,3 dB	1
Misura della potenza EiRP 1-18GHz d=3m	PR001_04	4,3 dB	1
Misura della potenza EiRP 18-40GHz d=3m	PR001_05	5,5 dB	1
Frequency error	PR002_01+02	< 1x10-7	1
Timing zero span (1001pts.)	PR002_01+02	0,2 % SWT	1
Modulation bandwidth	PR002_01+02	< 1x10-7	1
Conducted RF power and spurious emission	PR002_01+02	1,2 dB	1
Adjacent channel power	PR002_01+02	1,2 dB	1
Blocking	PR002_01+02	1,2 dB	1

Test	Test Setup	Expanded uncertainty	Note
Electrostatic discharge immunity test	PE101_0X		2
Electrical fast transients / burst immunity test	PE103_0X		2
Surge immunity test	PE104_0X		2
Short interruption immunity test	PE109_01		2
Rev_17_01 date 20/03/2017			

Note 1:
The expanded uncertainty reported according to EN55016-4-2:2011 is based on a standard uncertainty multiplied by a coverage factor of K=2, providing a level of confidence of p = 95%

Note 2:

It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95% confidence, covering factor k = 2

8. Reference documents

Reference no.	*Description*
FCC Rules and Regulation Title 47 part 15:2016	--
ANSI C63.4:2014	American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz
KDB 558074 D01 DTS Meas Guidance v04	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247
Internal Procedure PM001 rev. 3.0 (Quality Manual)	Measure Procedure
Internal procedure INC_M rev. 9.0 (Quality Manual)	Measurement uncertainty calculation

9. Deviation from test specification

None

10. Test case verdicts

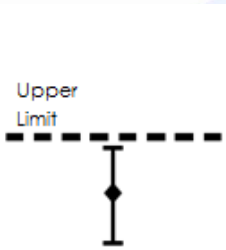
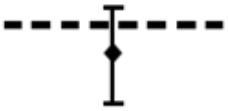
Test case does not apply to the test object	:	N.A.
Test item does meet the requirement	:	Complies
Test item does not meet the requirement	:	Does not comply
Test not performed	:	N.E.

11. Results

In this clause tests results are reported.

Measurement uncertainty is in accordance with document CMC INC_M rev. 9.0.

Judgement of compliance:

Case 1	Case 2	Case 3	Case 4
			
The sample complies with the requirement.	The sample complies with the requirement.	The sample does not comply with the requirement.	The sample does not comply with the requirement.
The measurement results is within the specification limit when the measurement uncertainty is taken into account.	It is not possible to state compliance using a 95% coverage probability for the expanded uncertainty although the measurement result is below the limit.	It is not possible to state compliance using a 95% coverage probability for the expanded uncertainty also the measurement result is upper the limit.	The measurement results is outside the specification limit when the measurement uncertainty is taken into account.

In agreement with ILAC-G8: 03/2009 Guidelines on the Reporting of Compliance with Specification.

11.1 Antenna requirements

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.203 and 15.204
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

--
Measurement uncertainty: See clause 7 of this test report

Test specification

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.
The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded

Environmental conditions

Temperature (°C)	*Atmospheric pressure (kPa)*	*Relative humidity (%)*
20	100	45

Result

Antenna Type	*External R.F. power amplifier*	*Gain*	*Remarks*	*Results*
Integrated antenna	Not Present	3,5 dBi	--	Complies

Result: The requirements are met

11.2 Emissions in restricted frequency bands and in unrestricted frequency bands

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part. 15.209
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Semi-anechoic chamber

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S127, CMC S164, CMC S271, CMC S287, CMC S290
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Enclosure
Frequency range: 0,009 MHz – 26000 MHz
Antenna polarization: Horizontal (H) – Vertical (V)
EUT – Antenna distance:
10 m for frequencies ≤ 1000 MHz
3 m for frequencies > 1000 MHz

Environmental conditions

Temperature (°C)	*Atmospheric pressure (kPa)*	*Relative humidity (%)*
22	100	45

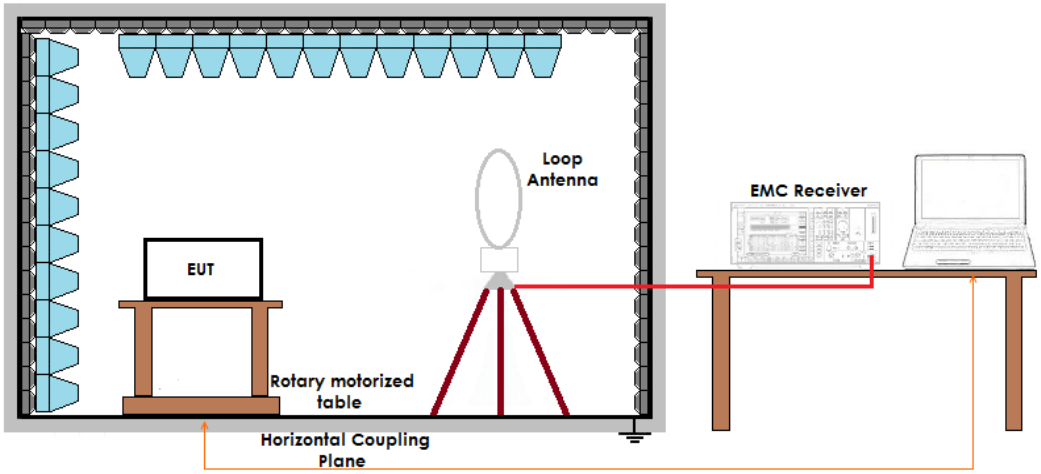
Acceptance limits

Frequency range (MHz)	*Test distance (m)*	*Limits [dB(µV/m)]*	
0,009 to 0,490	300	48,5 to 13,8	
0,490 to 1,705	30	33,8 to 22,9	
1,705 to 30	30	29,5	
30 to 88	3	40	
88 to 216	3	43,5	
216 to 960	3	46,0	
Above 960	3	53,9	
	Test distance (m)	*Linear average detector [dB(µV/m)]*	*Peak detector [dB(µV/m)]*
Above 1000	3	53,9	73,9

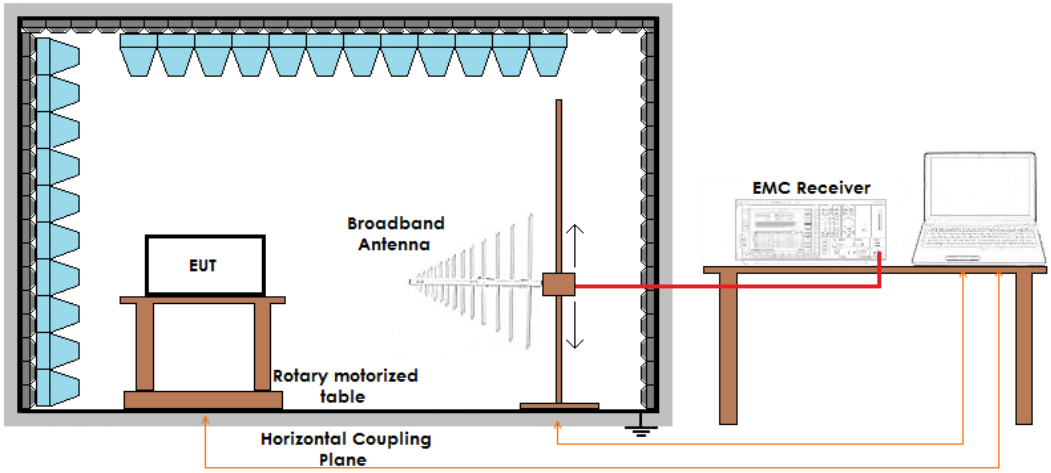
Remarks: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Setup

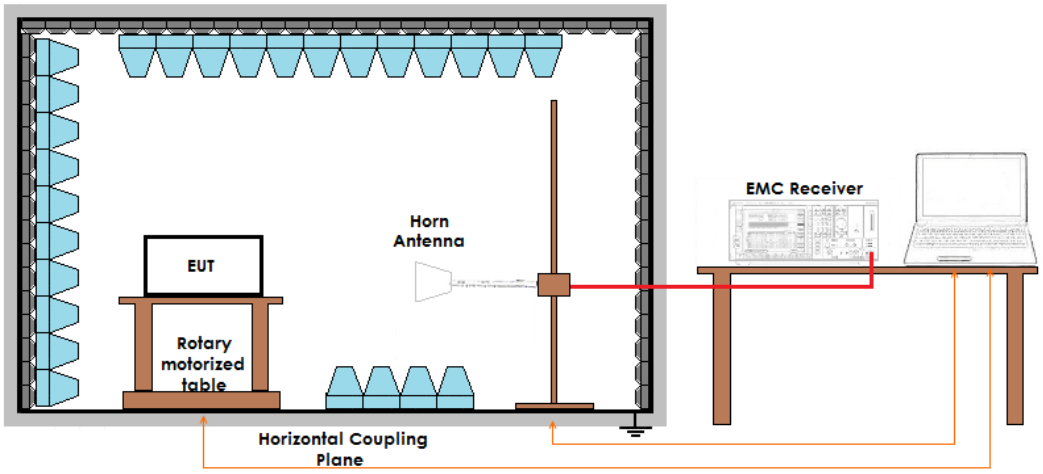
Frequency ≤ 30 MHz



Frequency ≤ 1 GHz



Frequency > 1 GHz



Result

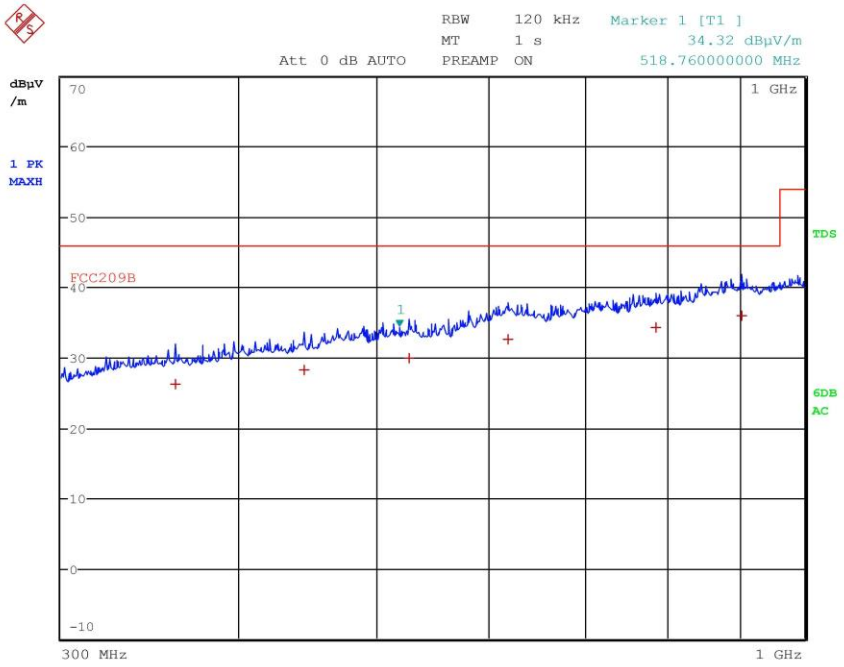
Polarization	*Frequency Range (MHz)*	*Graphs*	*Remarks*	*Result*
V	300 – 1000	G17096831	Worst case	Complies
H	300 – 1000	G17096832	Worst case	Complies
H	30 – 300	G17096833	Worst case	Complies
V	30 – 300	G17096834	Worst case	Complies
Loop	0,009 – 30	G17096835	Worst case	Complies
V	1000 – 10000	G17096836	Medium channel	Complies
H	1000 – 10000	G17096837	Medium channel	Complies
H	1000 – 10000	G17096838	Medium channel	Complies
V	1000 – 10000	G17096839	Medium channel	Complies
V	1000 – 10000	G17096840	Lowest channel	Complies
H	1000 – 10000	G17096841	Lowest channel	Complies
H	10000 – 18000	G17096842	Lowest channel	Complies
V	10000 – 18000	G17096843	Lowest channel	Complies
V	18000 – 26000	G17096844	Highest channel	Complies
H	18000 – 26000	G17096845	Highest channel	Complies

Remarks: Measurements at frequencies lower than 1000 MHz have been performed with an EUT – antenna distance of 10 m. Measured values have been corrected with FCC 3A10 factor.
Peaks above the limits are caused by the nominal transmitting frequencies. Final measurements have been performed only for values with margin lower than 20 dB from limit

Graphs Legend
PK: Peak; QP [1s] (quasi-peak at 1 second) values are marked with a +
AV: Average; AV [1s] (average at 1 second) values are marked with a x

Graphs

Meas Type Emission 10m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096831
Test Spec
Vert

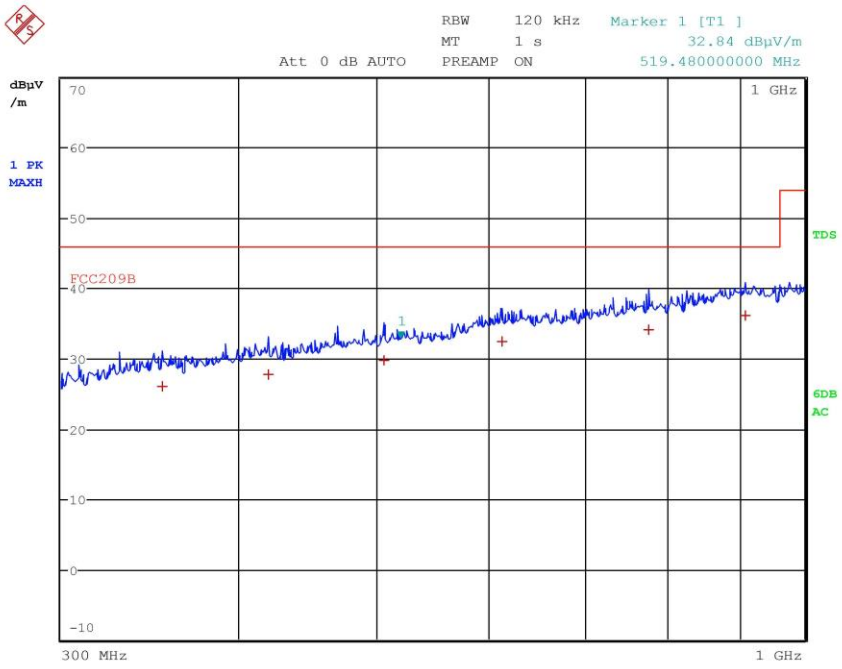


Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 6

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	361.200000000 MHz	26.17	Quasi Peak	-19.85
1	444.720000000 MHz	28.25	Quasi Peak	-17.77
1	526.720000000 MHz	29.83	Quasi Peak	-16.19
1	618.280000000 MHz	32.55	Quasi Peak	-13.47
1	785.600000000 MHz	34.26	Quasi Peak	-11.76
1	903.280000000 MHz	36.00	Quasi Peak	-10.02

Meas Type Emission 10m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096832
Test Spec
Horiz

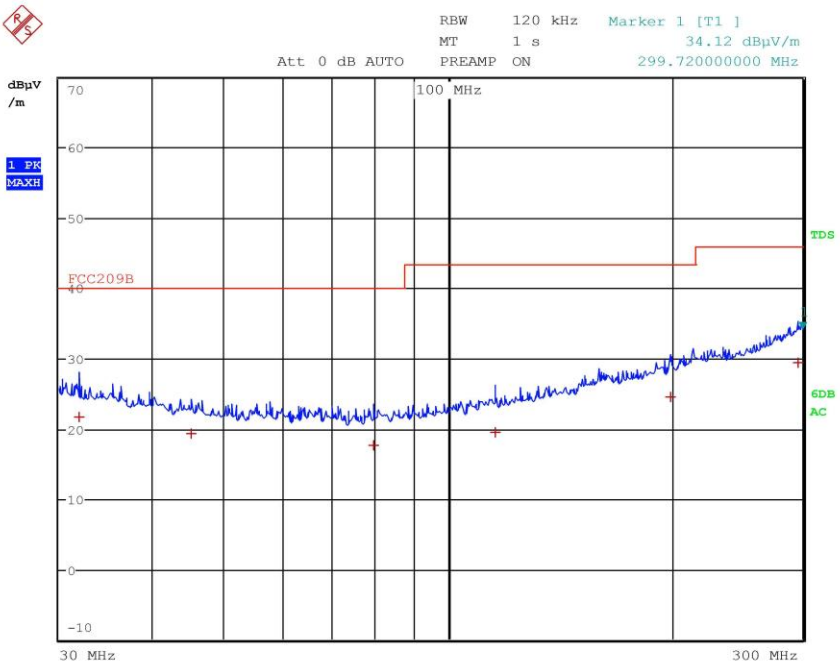


Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 6

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	353.480000000 MHz	26.06	Quasi Peak	-19.96
1	419.360000000 MHz	27.72	Quasi Peak	-18.30
1	506.200000000 MHz	29.72	Quasi Peak	-16.30
1	613.040000000 MHz	32.48	Quasi Peak	-13.54
1	776.040000000 MHz	34.14	Quasi Peak	-11.88
1	908.640000000 MHz	36.13	Quasi Peak	-9.89

Meas Type Emission 10m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096833
Test Spec
Horiz

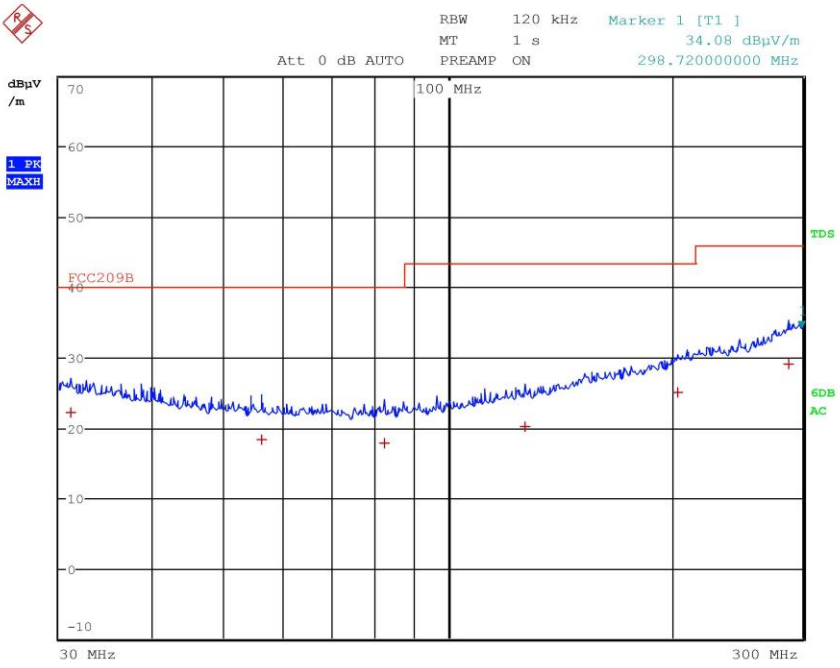


Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 6

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	31.920000000 MHz	21.76	Quasi Peak	-18.24
1	45.120000000 MHz	19.25	Quasi Peak	-20.75
1	79.320000000 MHz	17.72	Quasi Peak	-22.28
1	115.640000000 MHz	19.51	Quasi Peak	-24.01
1	199.440000000 MHz	24.55	Quasi Peak	-18.97
1	295.880000000 MHz	29.47	Quasi Peak	-16.55

Meas Type Emission 10m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096834
Test Spec
Vert

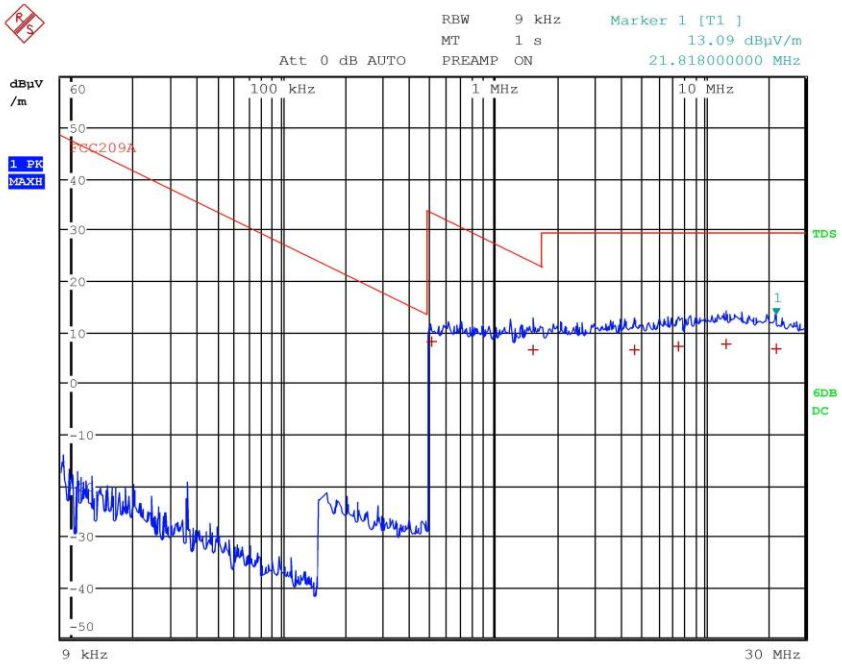


Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 6

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	31.120000000 MHz	22.21	Quasi Peak	-17.79
1	56.160000000 MHz	18.30	Quasi Peak	-21.70
1	82.080000000 MHz	17.86	Quasi Peak	-22.14
1	126.880000000 MHz	20.20	Quasi Peak	-23.32
1	203.880000000 MHz	24.99	Quasi Peak	-18.53
1	286.680000000 MHz	29.05	Quasi Peak	-16.97

Meas Type Emission 10m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096835
Test Spec
Loop

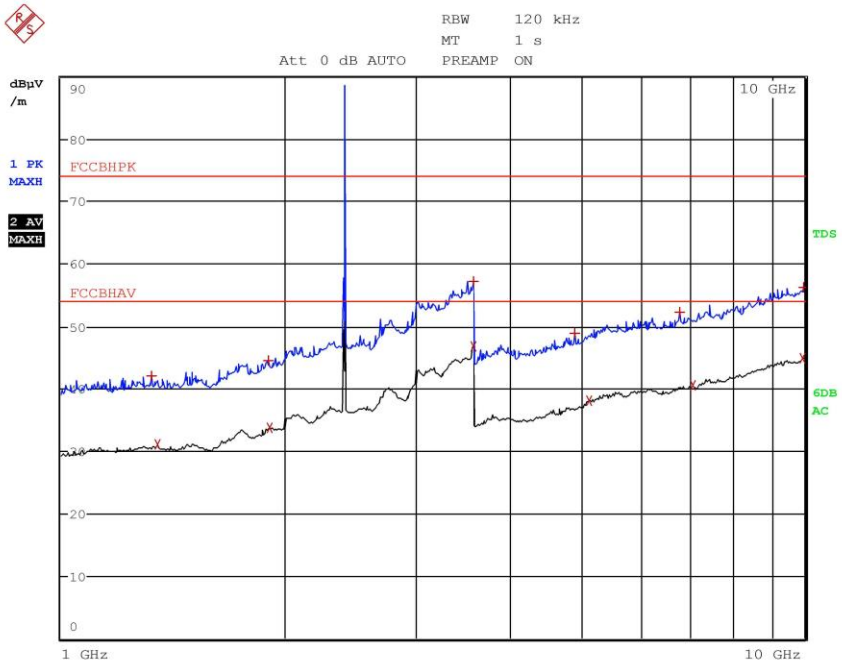


Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 6

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	506.000000000 kHz	8.12	Quasi Peak	-25.40
1	1.554000000 MHz	6.46	Quasi Peak	-17.31
1	4.682000000 MHz	6.43	Quasi Peak	-23.11
1	7.518000000 MHz	7.13	Quasi Peak	-22.41
1	12.766000000 MHz	7.77	Quasi Peak	-21.77
1	21.818000000 MHz	6.71	Quasi Peak	-22.83

Meas Type Emission 3m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096836
Test Spec
Vert



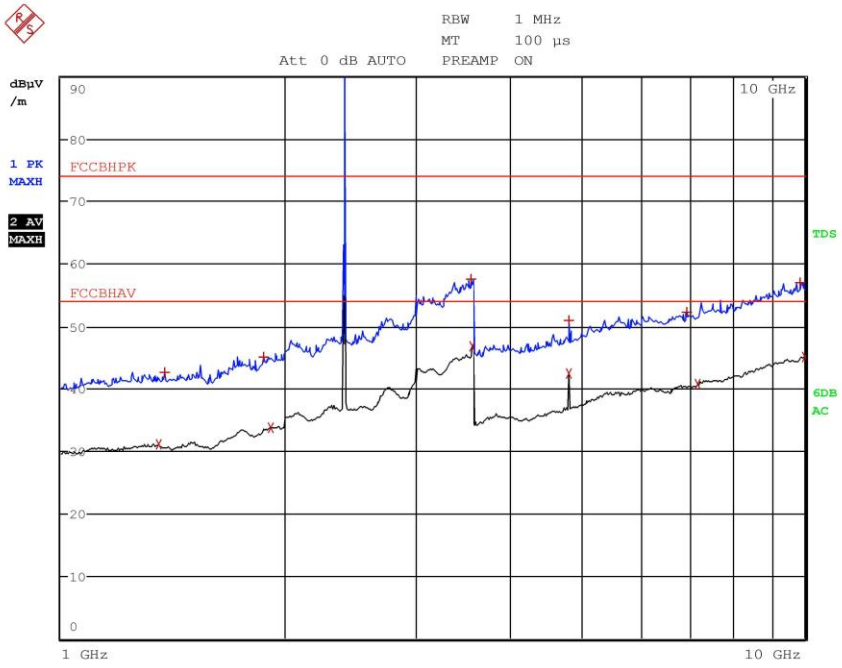
Meas Type Emission 3m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096836
Test Spec
Vert

Final Measurement

Meas Time: 1 s
Margin: 40 dB
Subranges: 12

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	1.321200000 GHz	42.09	Max Peak	-31.89
2	1.347200000 GHz	31.03	Average	-22.95
1	1.896800000 GHz	44.48	Max Peak	-29.50
2	1.908000000 GHz	33.71	Average	-20.27
1	3.593200000 GHz	57.22	Max Peak	-16.76
2	3.593600000 GHz	46.81	Average	-7.17
1	4.912800000 GHz	48.89	Max Peak	-25.09
2	5.122400000 GHz	38.09	Average	-15.89
1	6.782000000 GHz	52.20	Max Peak	-21.78
2	7.058000000 GHz	40.52	Average	-13.46
2	9.923600000 GHz	44.95	Average	-9.03
1	9.974000000 GHz	56.27	Max Peak	-17.71

Meas Type Emission 3m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096837
Test Spec
Horiz



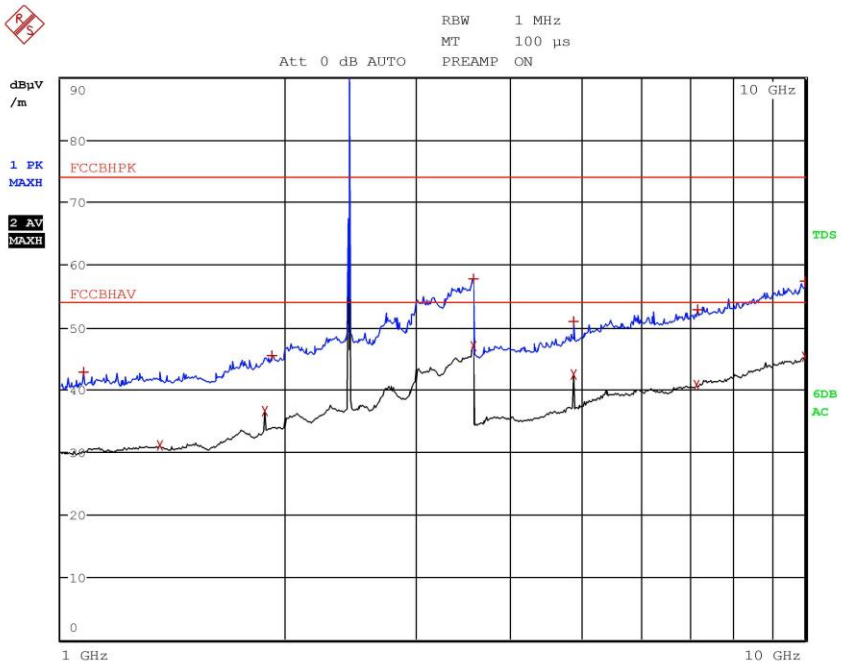
Meas Type Emission 3m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096837
Test Spec
Horiz

Final Measurement

Meas Time: 1 s
Margin: 40 dB
Subranges: 12

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
2	1.351200000 GHz	31.08	Average	-22.90
1	1.378400000 GHz	42.58	Max Peak	-31.40
1	1.868800000 GHz	45.02	Max Peak	-28.96
2	1.916400000 GHz	33.84	Average	-20.14
1	3.561200000 GHz	57.57	Max Peak	-16.41
2	3.577600000 GHz	46.81	Average	-7.17
2	4.808800000 GHz	42.51	Average	-11.47
1	4.810800000 GHz	50.97	Max Peak	-23.01
1	6.950800000 GHz	52.37	Max Peak	-21.61
2	7.175600000 GHz	40.79	Average	-13.19
1	9.863600000 GHz	56.93	Max Peak	-17.05
2	9.984000000 GHz	45.14	Average	-8.84

Meas Type Emission 3m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096838
Test Spec
Horiz



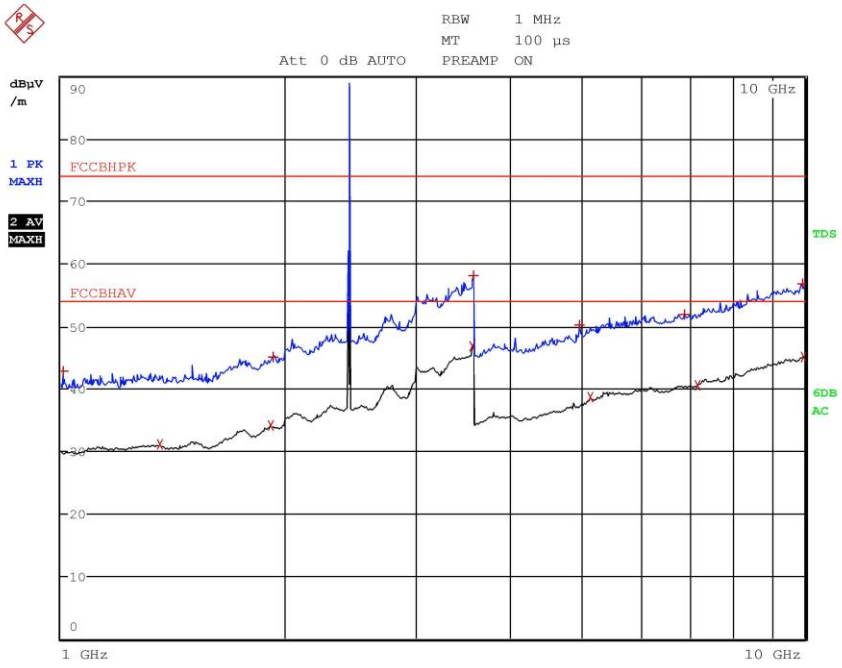
Meas Type Emission 3m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096838
Test Spec
Horiz

Final Measurement

Meas Time: 1 s
Margin: 40 dB
Subranges: 12

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	1.073200000 GHz	42.89	Max Peak	-31.09
2	1.360400000 GHz	31.17	Average	-22.81
2	1.881600000 GHz	36.52	Average	-17.46
1	1.922400000 GHz	45.43	Max Peak	-28.55
1	3.598400000 GHz	57.85	Max Peak	-16.13
2	3.598800000 GHz	46.96	Average	-7.02
2	4.878800000 GHz	42.52	Average	-11.46
1	4.879200000 GHz	51.03	Max Peak	-22.95
2	7.155200000 GHz	40.66	Average	-13.32
1	7.178800000 GHz	52.77	Max Peak	-21.21
2	9.987200000 GHz	45.27	Average	-8.71
1	9.994800000 GHz	57.34	Max Peak	-16.64

Meas Type Emission 3m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096839
Test Spec
Vert



Meas Type Emission 3m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096839
Test Spec
Vert

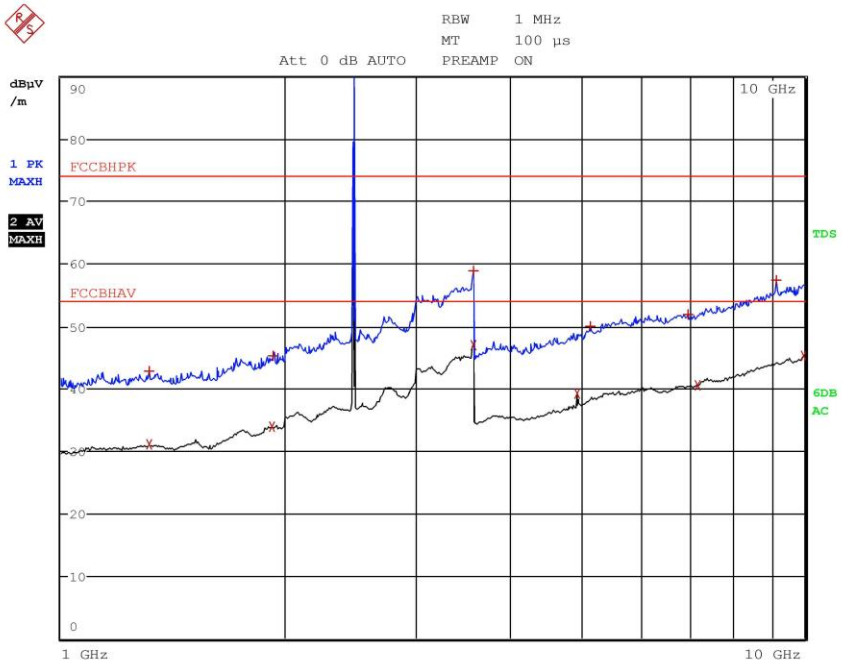
Final Measurement

Meas Time: 1 s
Margin: 40 dB
Subranges: 12

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	1.008000000 GHz	42.86	Max Peak	-31.12
2	1.357600000 GHz	31.11	Average	-22.87
2	1.915600000 GHz	34.15	Average	-19.83
1	1.926800000 GHz	45.03	Max Peak	-28.95
2	3.577600000 GHz	46.79	Average	-7.19
1	3.587200000 GHz	58.19	Max Peak	-15.79
1	4.974400000 GHz	50.22	Max Peak	-23.76
2	5.153600000 GHz	38.72	Average	-15.26
1	6.891600000 GHz	51.97	Max Peak	-22.01
2	7.194000000 GHz	40.55	Average	-13.43
1	9.916000000 GHz	56.89	Max Peak	-17.09
2	9.976400000 GHz	45.10	Average	-8.88

Meas Type	Emission 3m
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096840
Test Spec	

Vert



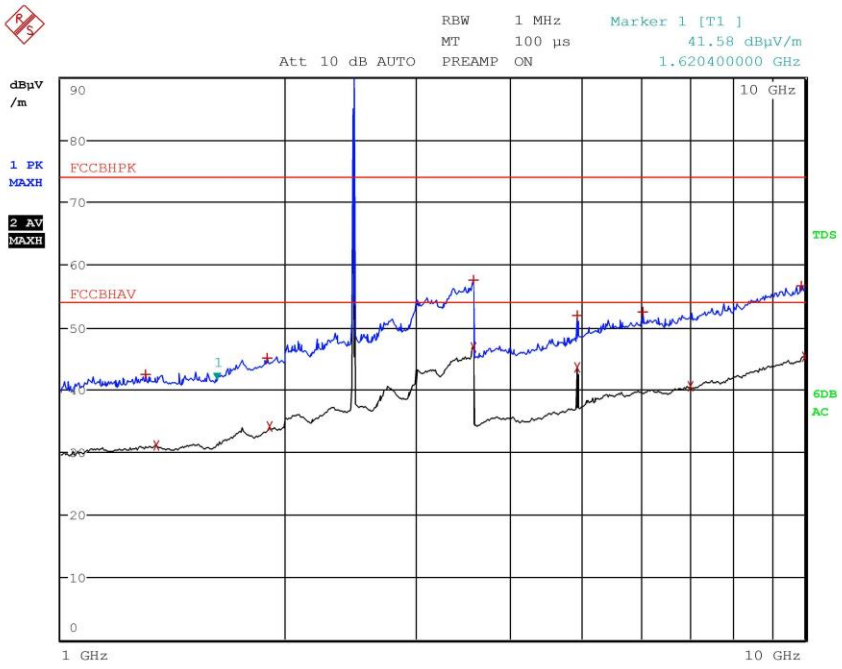
Meas Type Emission 3m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096840
Test Spec
Vert

Final Measurement

Meas Time: 1 s
Margin: 40 dB
Subranges: 12

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	1.313200000 GHz	42.84	Max Peak	-31.14
2	1.314000000 GHz	31.04	Average	-22.94
2	1.920800000 GHz	33.97	Average	-20.01
1	1.926800000 GHz	45.29	Max Peak	-28.69
1	3.594000000 GHz	58.98	Max Peak	-15.00
2	3.598800000 GHz	46.96	Average	-7.02
2	4.948800000 GHz	39.17	Average	-14.81
1	5.150400000 GHz	50.07	Max Peak	-23.91
1	6.967600000 GHz	51.92	Max Peak	-22.06
2	7.169200000 GHz	40.63	Average	-13.35
1	9.140400000 GHz	57.36	Max Peak	-16.62
2	9.971200000 GHz	45.22	Average	-8.76

Meas Type Emission 3m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096841
Test Spec
Horiz



Meas Type Emission 3m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096841
Test Spec
Horiz

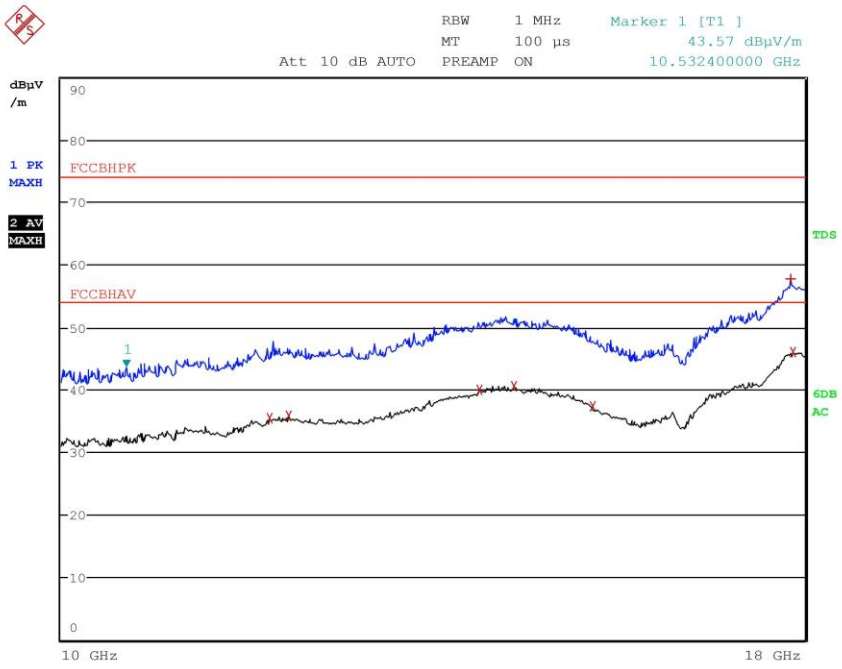
Final Measurement

Meas Time: 1 s
Margin: 40 dB
Subranges: 12

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	1.297200000 GHz	42.44	Max Peak	-31.54
2	1.342800000 GHz	31.05	Average	-22.93
1	1.896000000 GHz	45.06	Max Peak	-28.92
2	1.906000000 GHz	34.04	Average	-19.94
1	3.582400000 GHz	57.51	Max Peak	-16.47
2	3.600000000 GHz	46.88	Average	-7.10
1	4.949200000 GHz	51.83	Max Peak	-22.15
2	4.949200000 GHz	43.67	Average	-10.31
1	6.051200000 GHz	52.42	Max Peak	-21.56
2	7.026800000 GHz	40.54	Average	-13.44
1	9.901200000 GHz	56.63	Max Peak	-17.35
2	9.983600000 GHz	45.34	Average	-8.64

Meas Type	Emission 3m
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096842
Test Spec	

Horiz

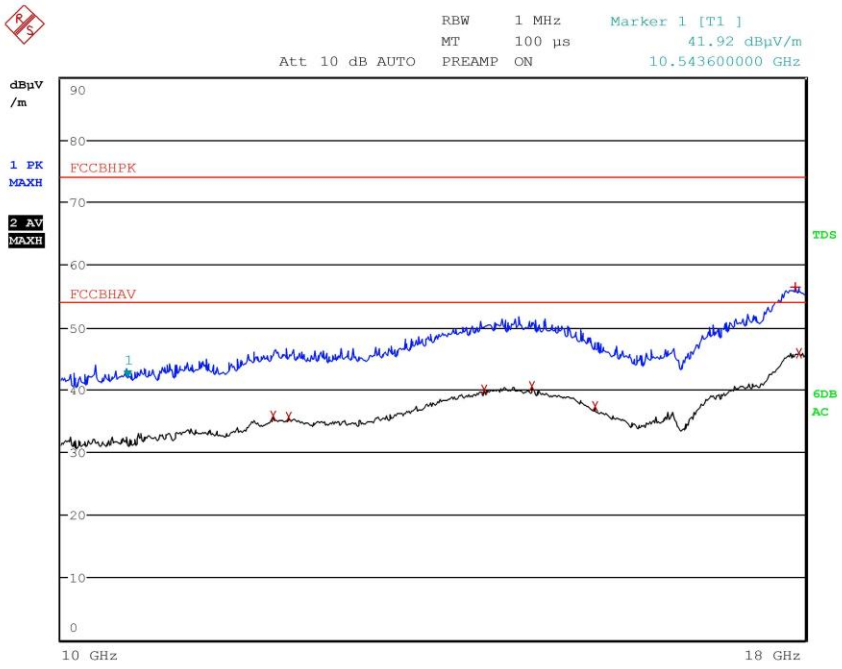


Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 7

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
2	11.797200000 GHz	35.36	Average	-18.62
2	11.976000000 GHz	35.85	Average	-18.13
2	13.918400000 GHz	39.92	Average	-14.06
2	14.308000000 GHz	40.61	Average	-13.37
2	15.224800000 GHz	37.38	Average	-16.60
1	17.796800000 GHz	57.67	Max Peak	-16.31
2	17.838800000 GHz	45.98	Average	-8.00

Meas Type Emission 3m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096843
Test Spec
Vert

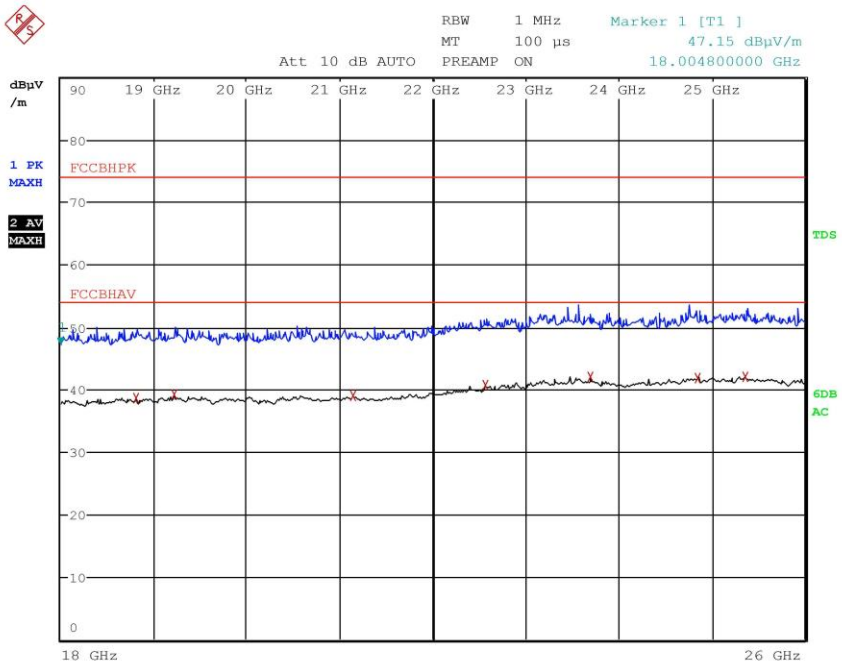


Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 7

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
2	11.827600000 GHz	35.76	Average	-18.22
2	11.974400000 GHz	35.70	Average	-18.28
2	13.971600000 GHz	39.98	Average	-14.00
2	14.511600000 GHz	40.51	Average	-13.47
2	15.246800000 GHz	37.28	Average	-16.70
1	17.856400000 GHz	56.51	Max Peak	-17.47
2	17.917600000 GHz	45.83	Average	-8.15

Meas Type Emission 3m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096844
Test Spec
Vert

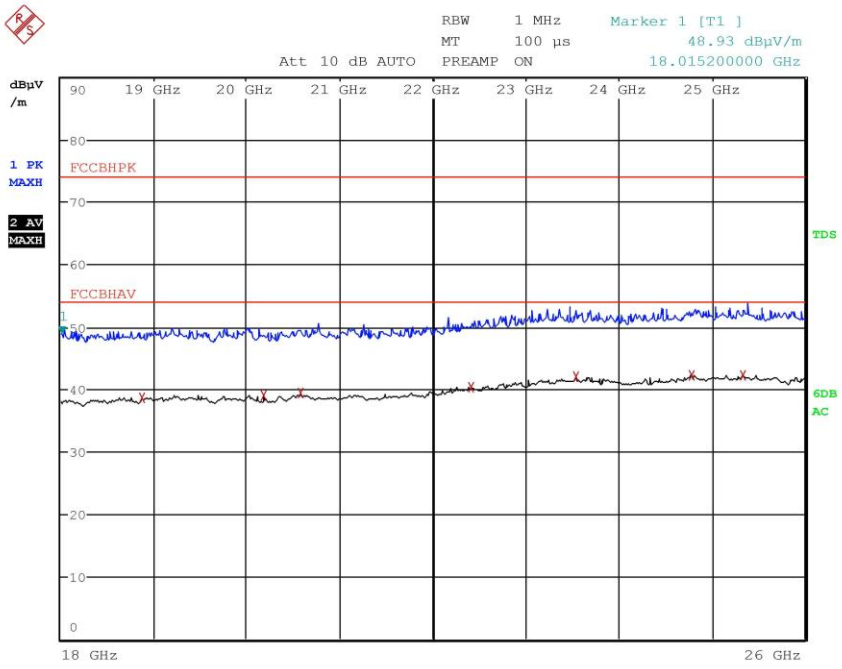


Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 7

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
2	18.804000000 GHz	38.64	Average	-15.34
2	19.218800000 GHz	39.16	Average	-14.82
2	21.136800000 GHz	39.05	Average	-14.93
2	22.562800000 GHz	40.76	Average	-13.22
2	23.690000000 GHz	42.04	Average	-11.94
2	24.840800000 GHz	41.83	Average	-12.15
2	25.361600000 GHz	42.08	Average	-11.90

Meas Type Emission 3m
Equipment under Test
Manufacturer
OP Condition
Operator Bertezzolo 17096845
Test Spec
Horiz



Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 7

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
2	18.875600000 GHz	38.75	Average	-15.23
2	20.185200000 GHz	39.13	Average	-14.85
2	20.577200000 GHz	39.43	Average	-14.55
2	22.412000000 GHz	40.39	Average	-13.59
2	23.536000000 GHz	42.09	Average	-11.89
2	24.781200000 GHz	42.35	Average	-11.63
2	25.338000000 GHz	42.32	Average	-11.66

Result: The requirements are met

11.3 DTS bandwidth

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247
- KDB 558074 D01 DTS Meas Guidance v04 cl. 8.1
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S164, CMC S287
Measurement uncertainty: See clause 7 of this test report

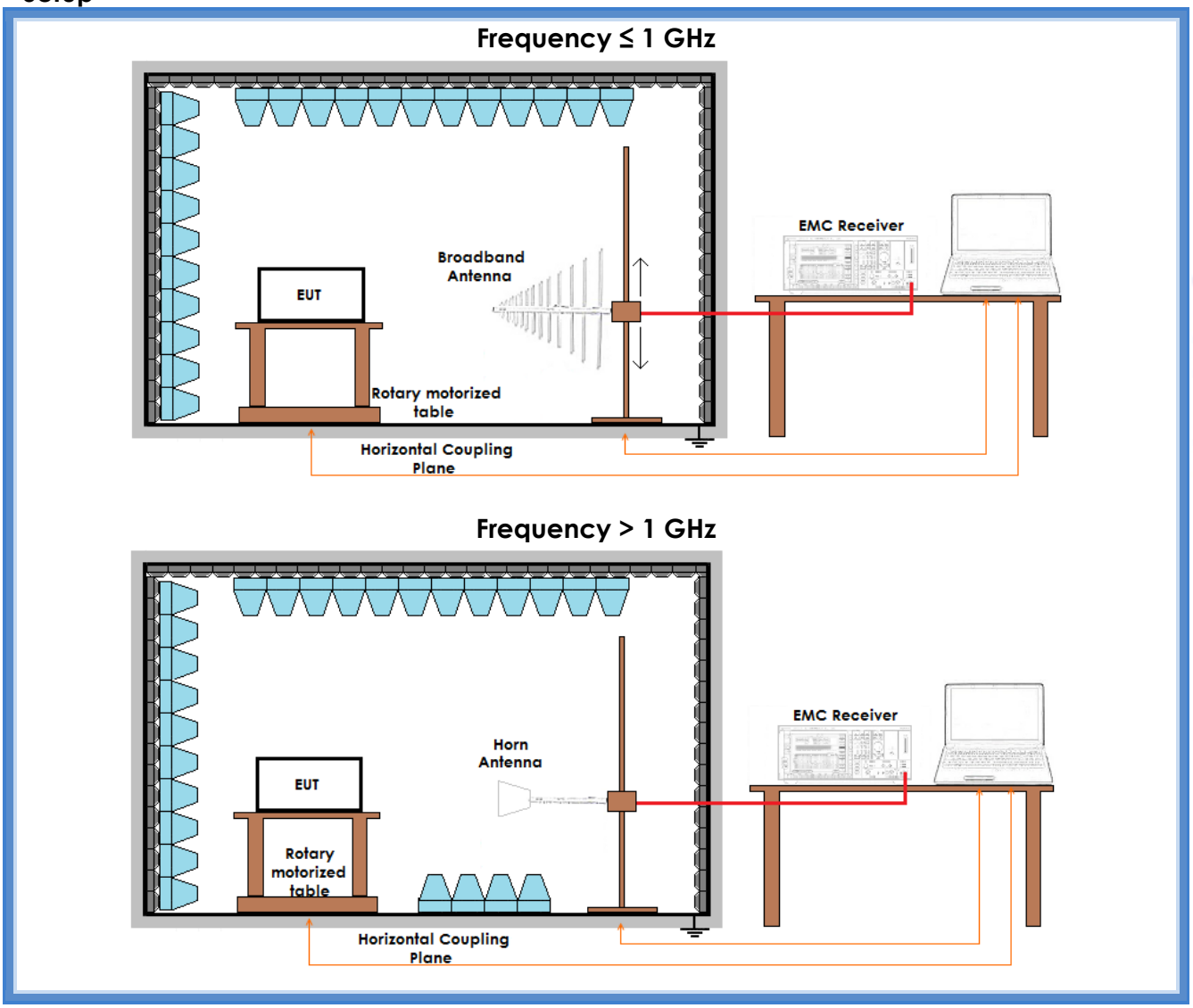
Test specification

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Environmental conditions

Temperature (°C)	*Atmospheric pressure (kPa)*	*Relative humidity (%)*
22	100	45

Setup

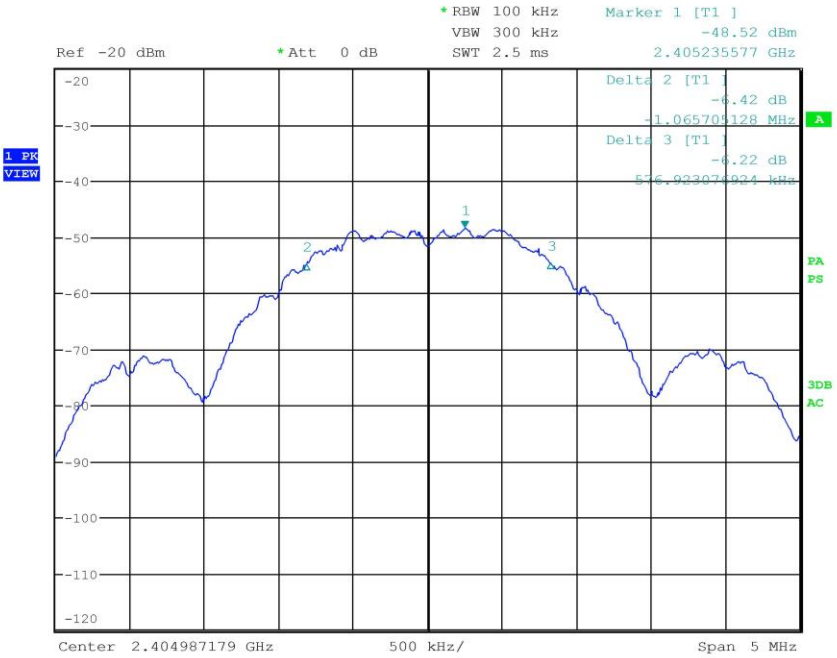


Result

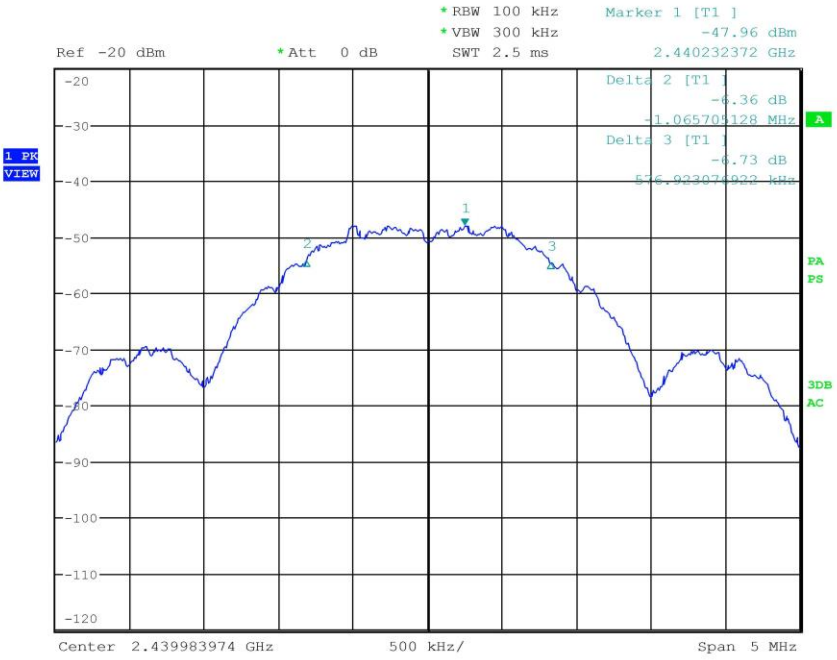
Channel	*Graphs*	*6 dB bandwidth (kHz)*	*Limits (kHz)*	*Results*
Lowest	G17096801	1642,628	At least 500	Complies
Medium	G17096816	1642,628	At least 500	Complies
Highest	G17096826	1658,653	At least 500	Complies

Graphs

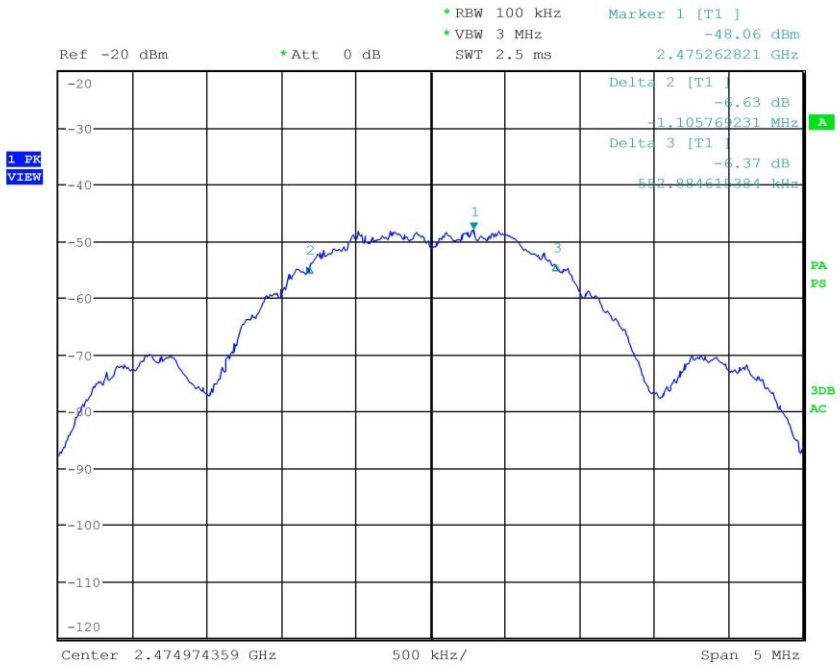
Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096801
Test Spec	



Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096816
Test Spec	



Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096826
Test Spec	



Result: The requirements are met

11.4 Band edge

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247 (d)
- KDB 558074 D01 DTS Meas Guidance v04 cl. 11.1(a) and 12.1
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S164, CMC S287
Measurement uncertainty: See clause 7 of this test report

Test specification

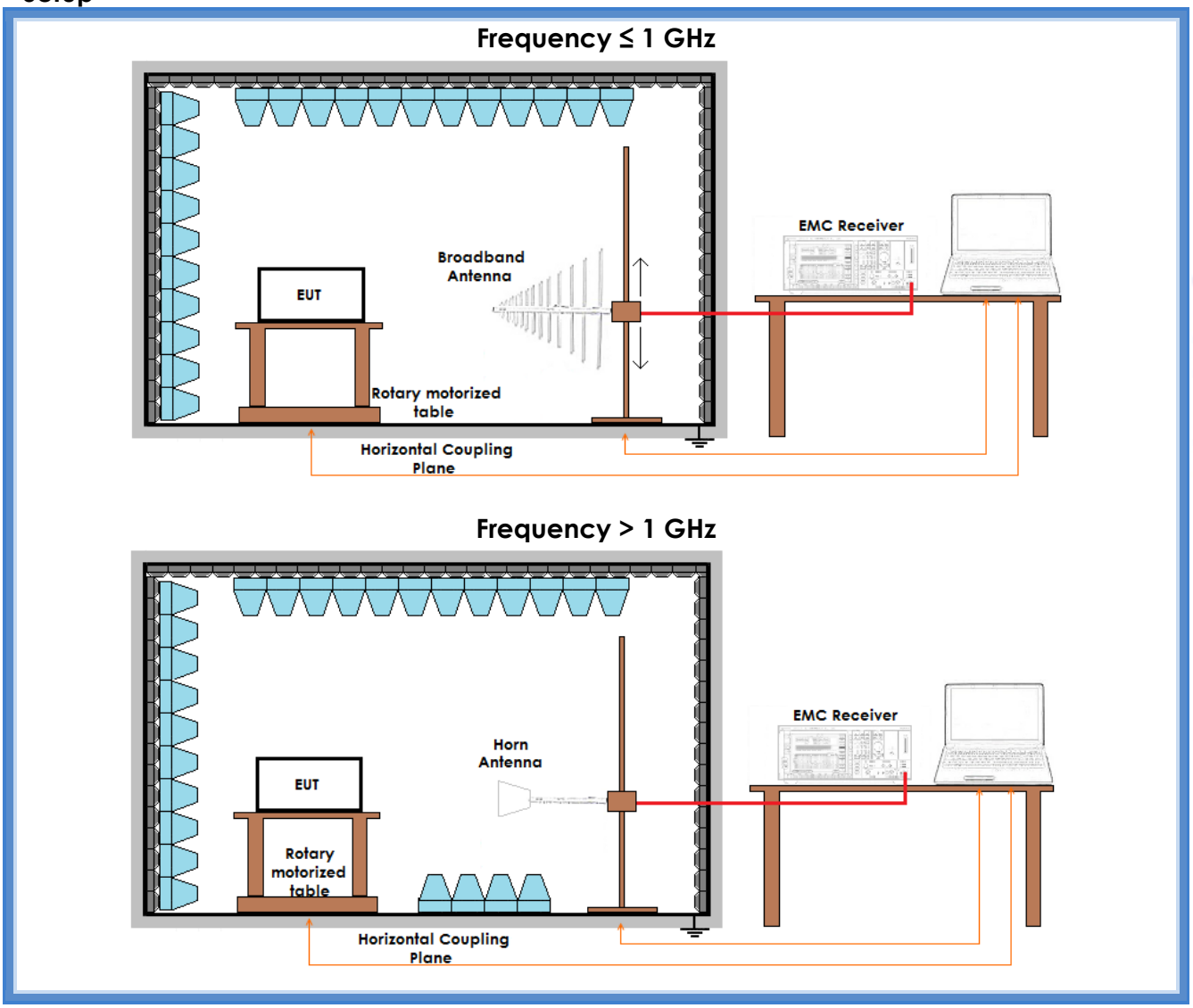
See FCC Part 15.247

Environmental conditions

Temperature (°C)	*Atmospheric pressure (kPa)*	*Relative humidity (%)*
22	100	45

Acceptance limits: operation within the band 2400 – 2483,5 MHz

Setup

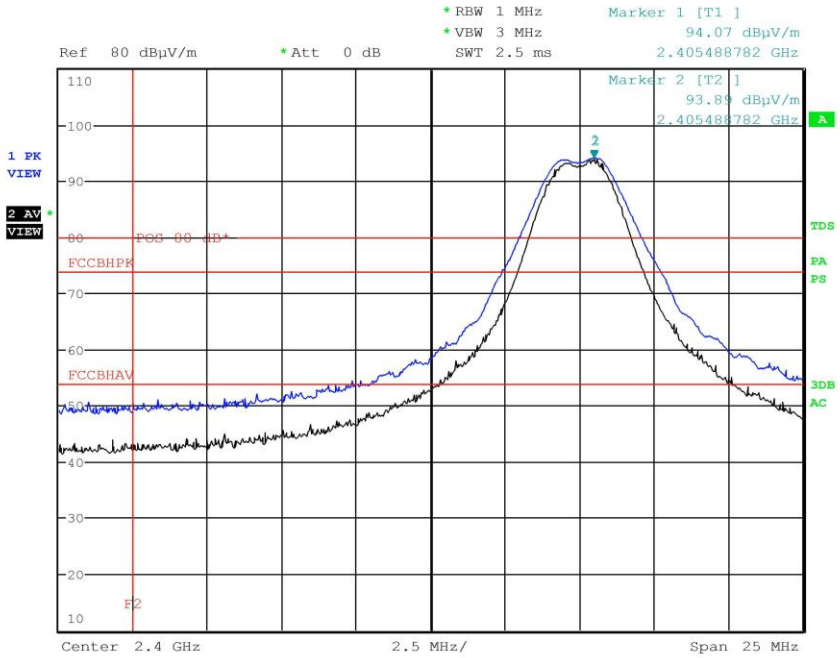


Result

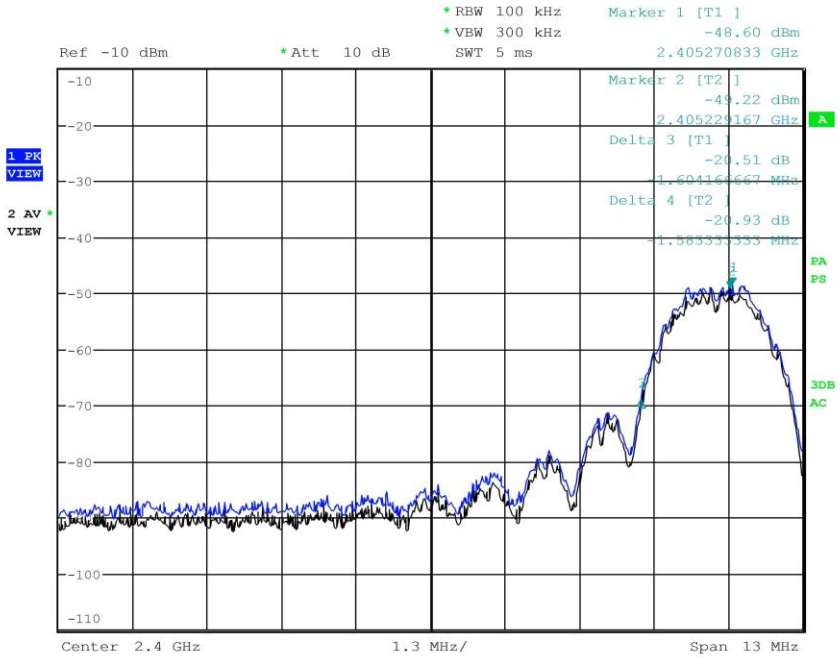
Channel	*Bandwidth*	*Graph(s)*	*Results*	
Lowest	1 MHz	G17096804	2403,645834 MHz	Complies
	100 kHz	G17096805		
Highest	1 MHz	G17096825	2480,294872 MHz	Complies

Graphs

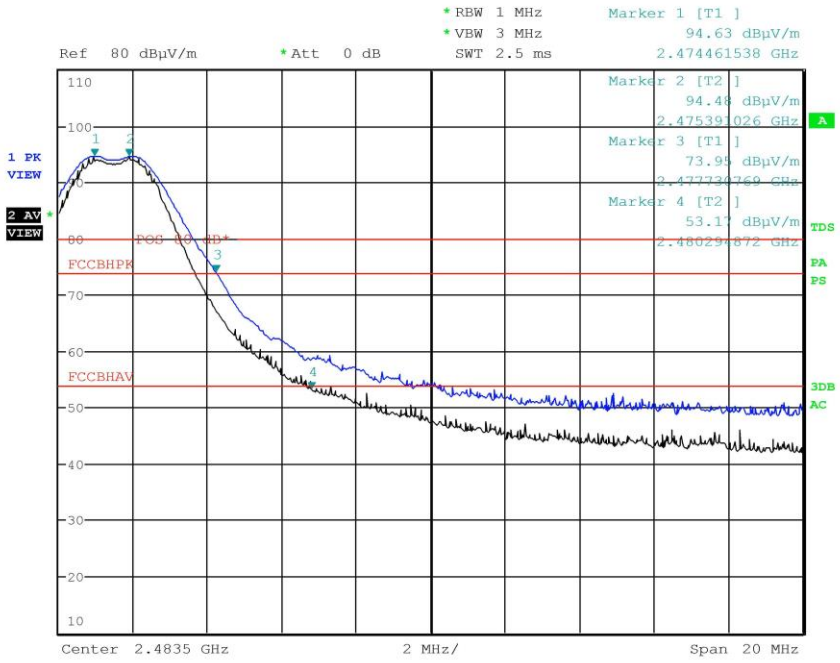
Meas Type	Emission 3m
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096804
Test Spec	



Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096805
Test Spec	



Meas Type	Emission 3m
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096825
Test Spec	



Result: The requirements are met

11.5 Fundamental emission output power

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247
- KDB 558074 D01 DTS Meas Guidance v04 cl. 3.0 and 9
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S164, CMC S287
Measurement uncertainty: See clause 7 of this test report

Test specification

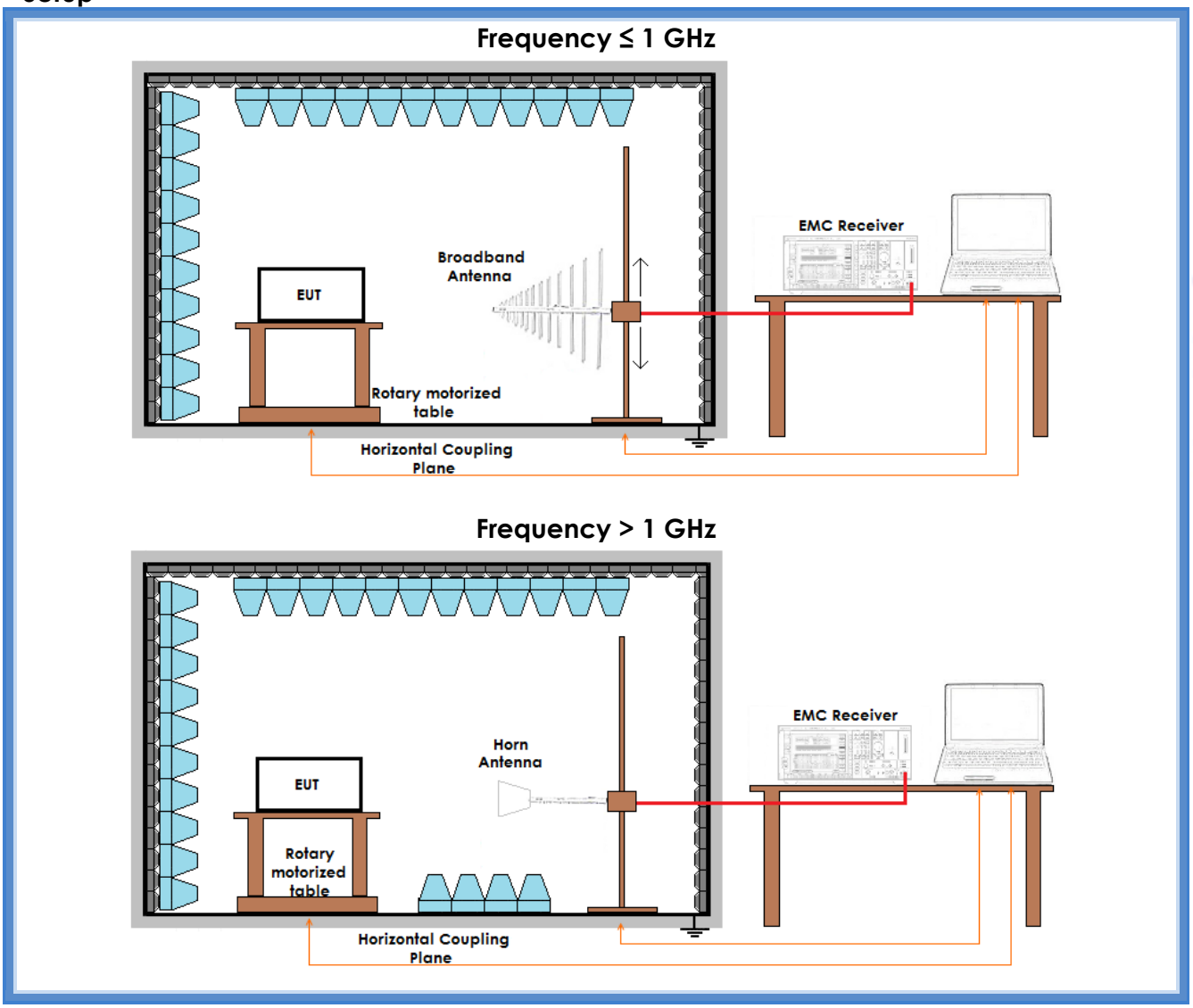
Port: Enclosure
Antenna polarization: Horizontal (H) – Vertical (V)
EUT – Antenna distance: 3 m
EUT height about the floor: 80 cm

Environmental conditions

Temperature (°C)	*Atmospheric pressure (kPa)*	*Relative humidity (%)*
20	100	45

Acceptance limits: for systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt

Setup



Result

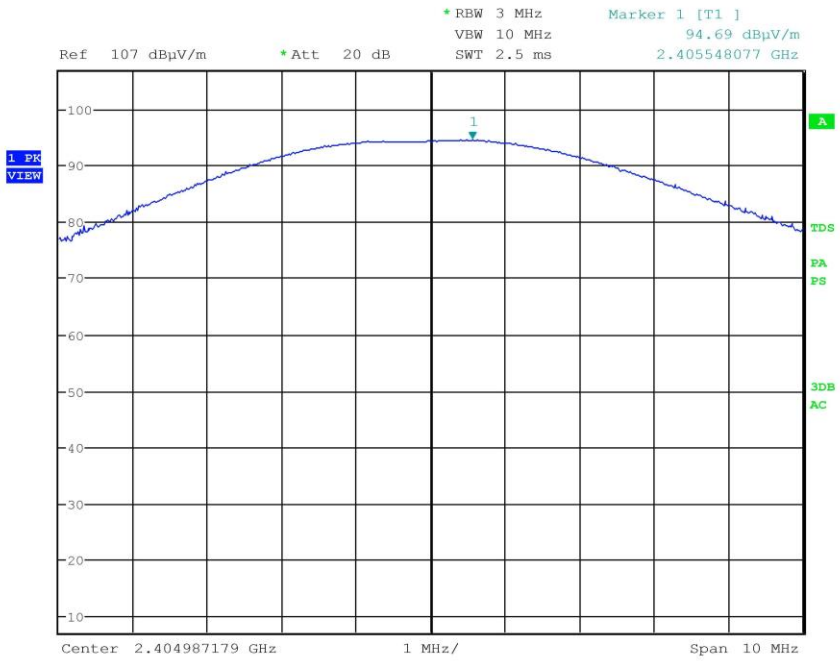
Channel	*Polarization*	*Graphs*	*Measured PK level (dBµV/m)*	*Peak Output Conducted Power (mW)*	*Remarks*
Lowest	Worst case	G17096802	94,69	0,395	--
Medium	Worst case	G17096820	95,35	0,459	--
Highest	Worst case	G17096830	94,95	0,419	--

Conducted value = $(E \times d)^2 / (30 \times G)$

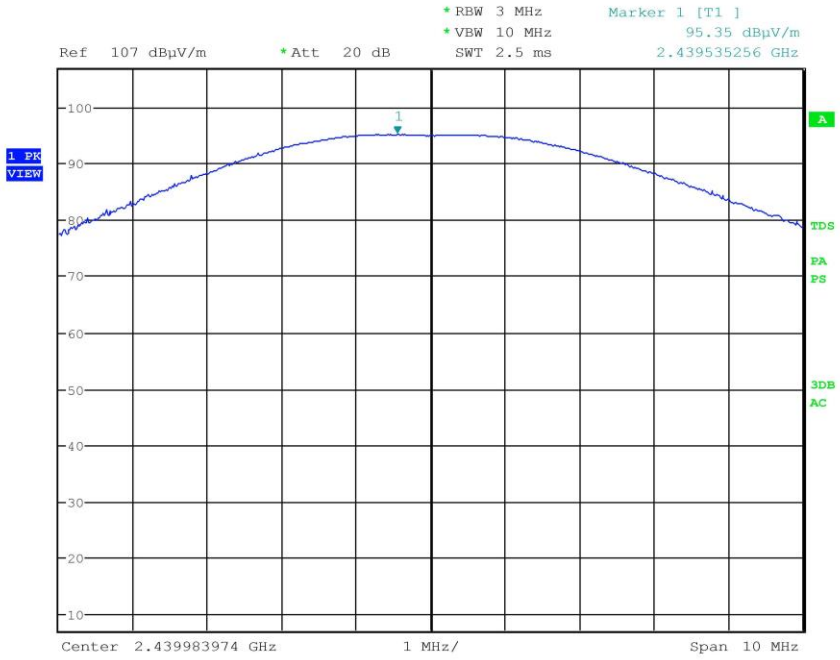
Where:
E = $(10^{(dB\mu V/m)/20})/1000000$, the maximum measured fundamental field strength in V/m
G = $10^{dBi/10}$, the numeric gain of the transmitting antenna: 2,239 (3,5 dBi)
d = the distance in meters from which the field strength was measured (3 m)
P = the power in watts

Graphs

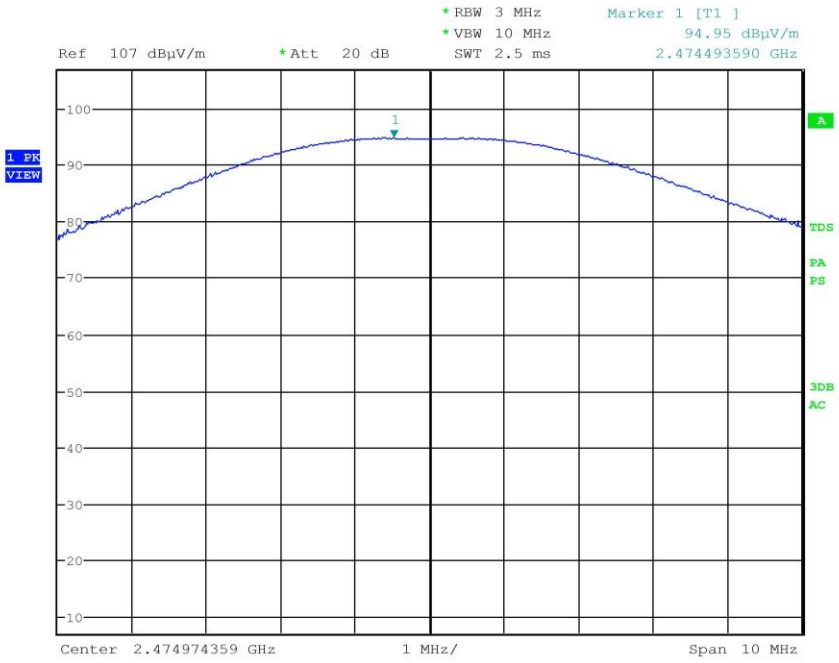
Meas Type	Emission 3m
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096802
Test Spec	



Meas Type	Emission 3m
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096820
Test Spec	



Meas Type	Emission 3m
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096830
Test Spec	



Result: The requirements are met

11.6 Maximum power spectral density level in the fundamental emission

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247
- KDB 558074 D01 DTS Meas Guidance v04 cl. 10.2
- Internal procedure PM001
- See clause 4 of this test report

Test configuration

Test site:
Semi-anechoic chamber

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S164, CMC S287
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Enclosure
Antenna polarization: Horizontal (H) – Vertical (V)
EUT – Antenna distance: 3 m

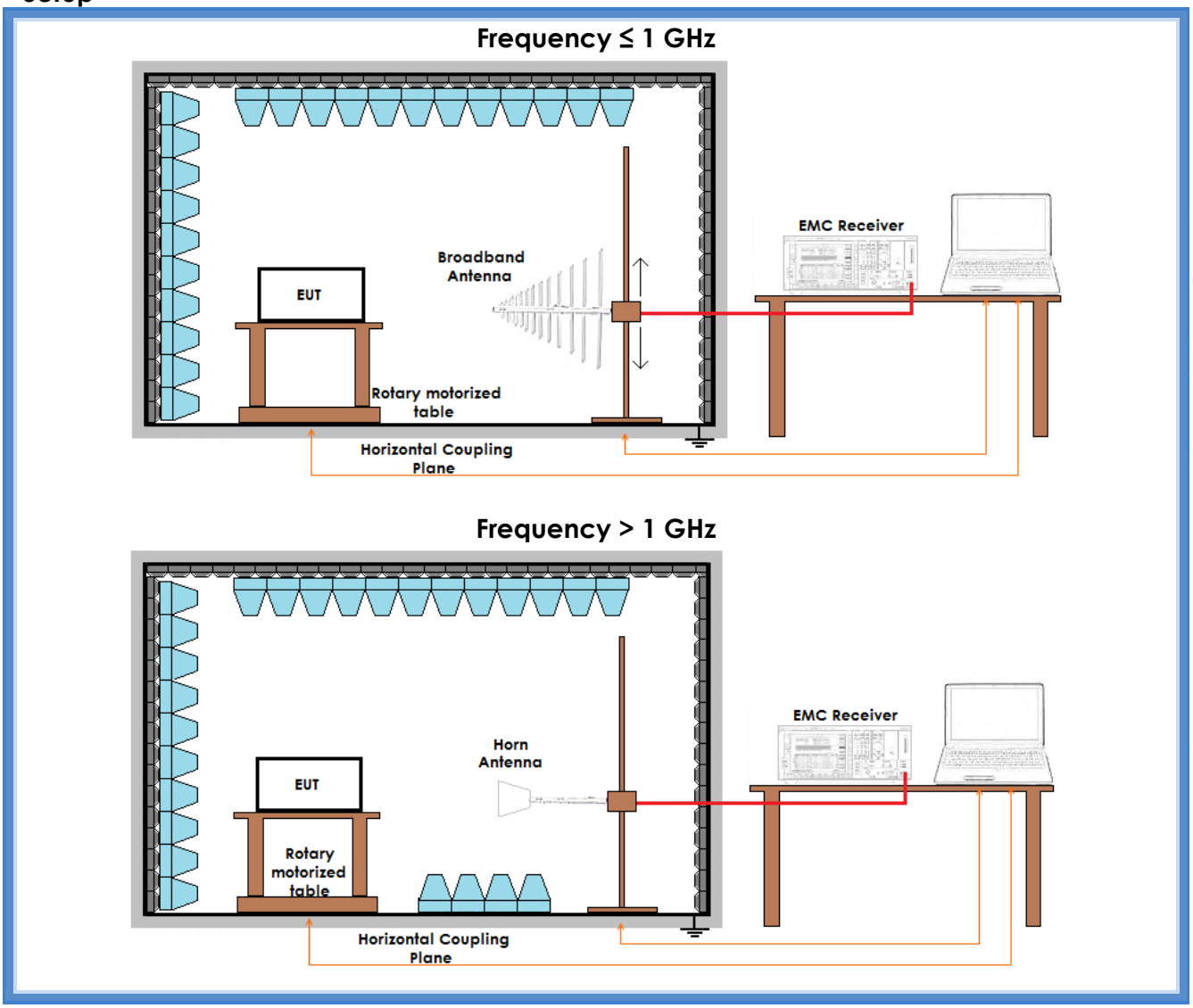
Environmental conditions

Temperature (°C)	*Atmospheric pressure (kPa)*	*Relative humidity (%)*
22	100	42

Acceptance limits:

Frequency Range	*Power Spectral Density*
2400 – 2483,5 MHz	8 dBm / 6,31 mW

Setup



Result

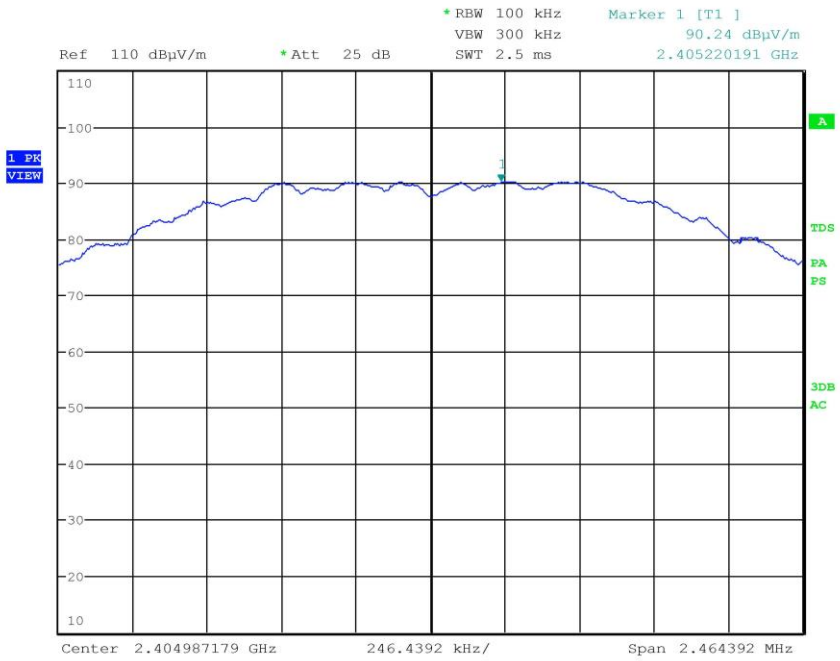
Channel	*Polarization*	*Graphs*	*Measured PK level (dBµV/m)*	*Power Spectral Density (mW)*	*Remarks*
Lowest	Worst case	G17066806	90,24	0,142	RBW: 100 kHz
Lowest	Worst case	G17066807	77,95	0,008	RBW: 3 kHz
Medium	Worst case	G17066818	90,90	0,165	RBW: 100 kHz
Medium	Worst case	G17066819	78,68	0,010	RBW: 3 kHz
Highest	Worst case	G17066828	90,42	0,148	RBW: 100 kHz
Highest	Worst case	G17066829	78,08	0,009	RBW: 3 kHz

Conducted value = $(E \times d)^2 / (30 \times G)$

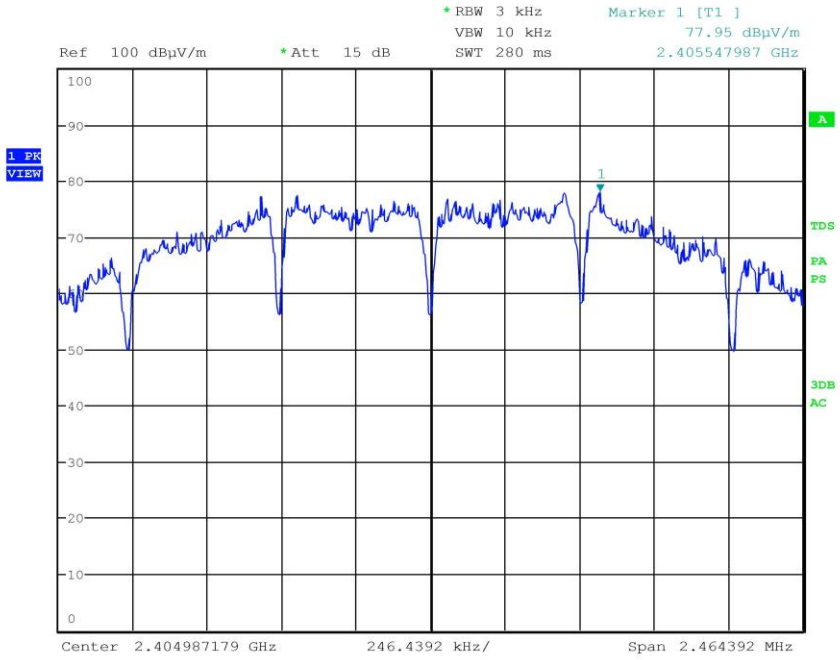
Where:
E = $(10^{(dB\mu V/m)/20})/1000000$, the maximum measured fundamental field strength in V/m
G = $10^{dBi/10}$, the numeric gain of the transmitting antenna: 2,239 (3,5 dBi)
d = the distance in meters from which the field strength was measured (3 m)
P = the power in watts

Graphs

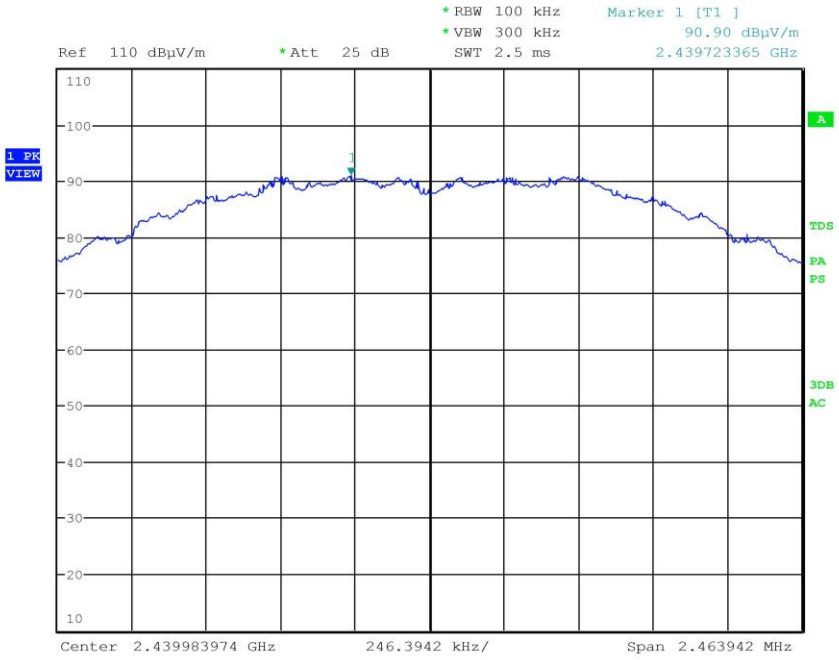
Meas Type	Emission 3m
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096806
Test Spec	



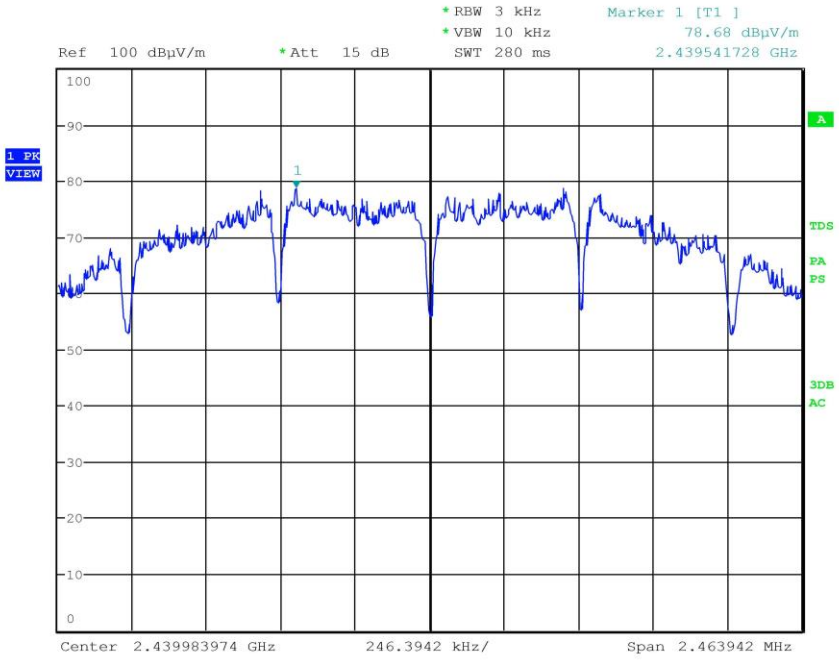
Meas Type	Emission 3m
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096807
Test Spec	



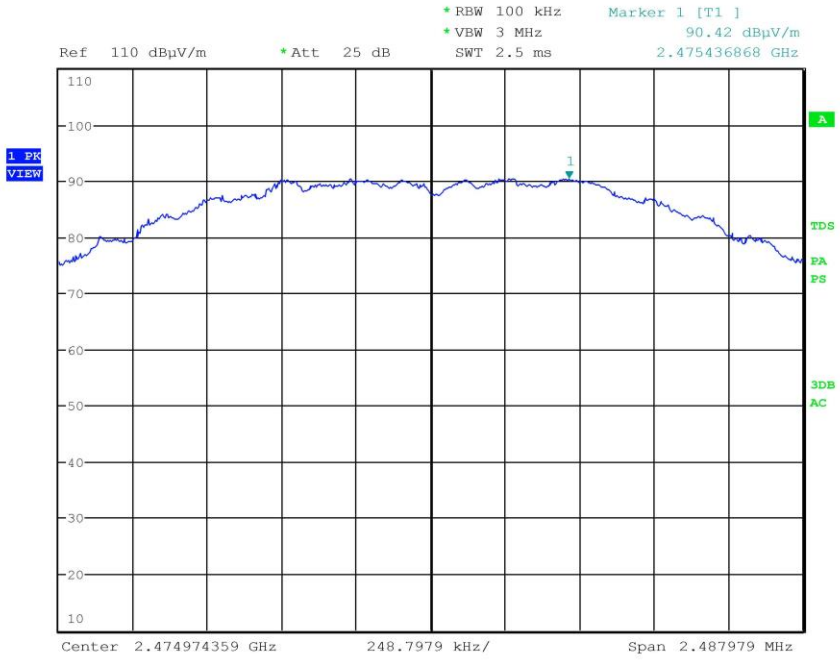
Meas Type	Emission 3m
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096818
Test Spec	



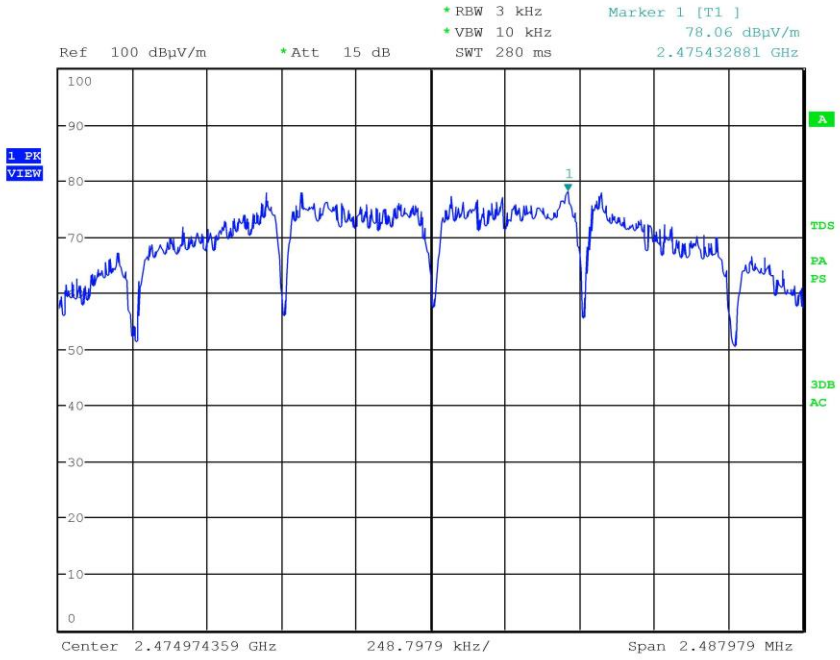
Meas Type	Emission 3m
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096819
Test Spec	



Meas Type	Emission 3m
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096828
Test Spec	



Meas Type	Emission 3m
Equipment under Test	
Manufacturer	
OP Condition	
Operator	Bertezzolo 17096829
Test Spec	



Result: The requirements are met

11.7 Spurious Emission

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.209
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Semi-anechoic chamber

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S127, CMC S164, CMC S271, CMC S287, CMC S290
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Enclosure
Antenna polarization: Horizontal (H) – Vertical (V)
EUT – Antenna distance: 3 m
EUT height about the floor: 80 cm
Detector AV + Peak

Environmental conditions

Temperature (°C)	*Atmospheric pressure (kPa)*	*Relative humidity (%)*
22	100	45

Acceptance limits

Acceptance limits for emissions in restricted frequency bands		
Frequency (MHz)	*AV limits [dB(µV/m)]*	*Peak limits [dB(µV/m)]*
> 1000	54	74

The restricted frequency bands are listed in the following table

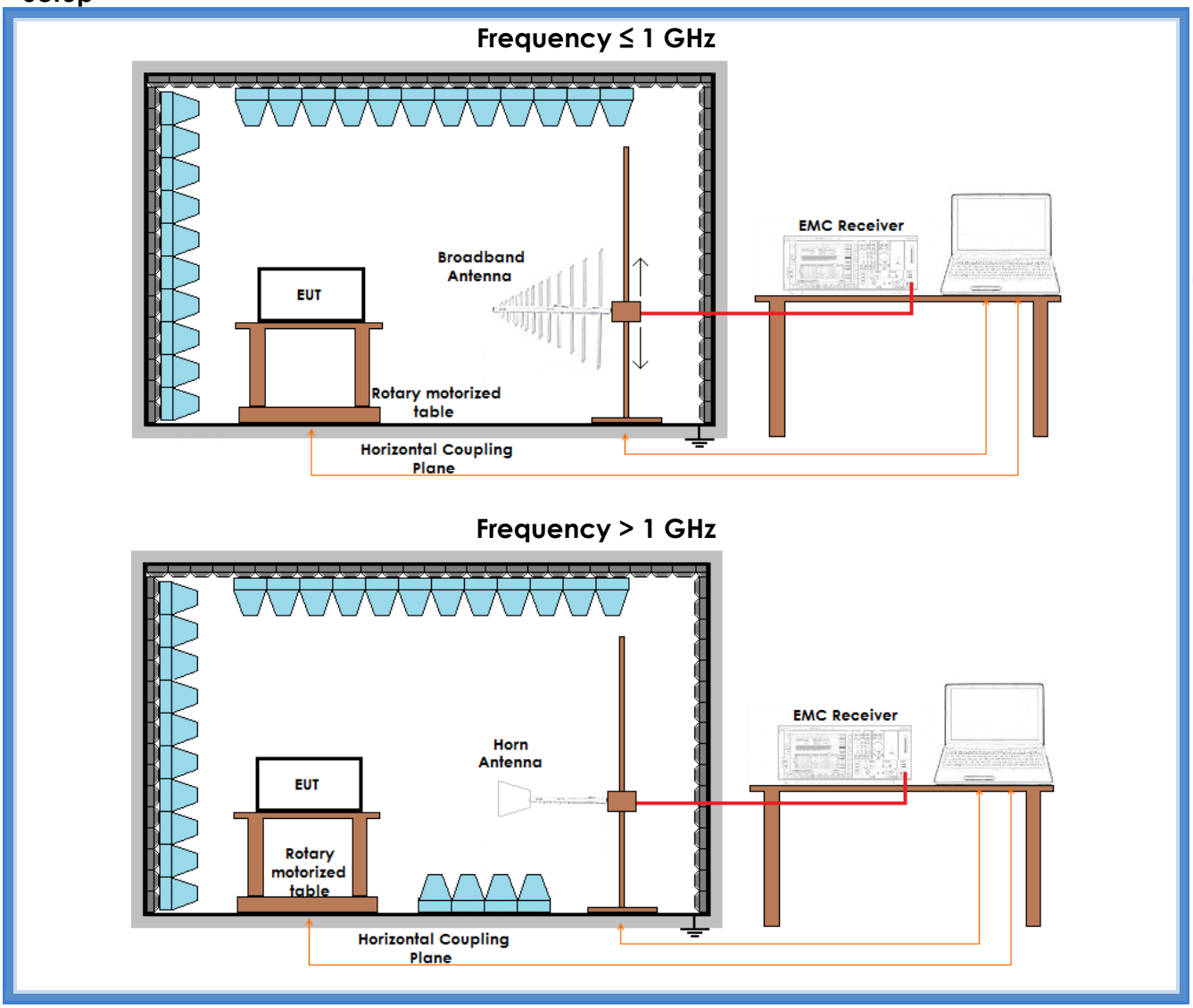
MHz	MHz	MHz	GHz
0,090 – 0,110	16,42 – 16,423	399,9 – 410	4,5 – 5,15
0,495 – 0,505	16,69475 – 16,69525	608 – 614	5,35 – 5,46
2,1735 – 2,1905	16,80425 – 16,80475	960 – 1240	7,25 – 7,75
4,125 – 4,128	25,5 – 25,67	1300 – 1427	8,025 – 8,5
4,17725 – 4,17775	37,5 – 38,25	1435 – 1626,5	9,0 – 9,2
4,20725 – 4,20775	73 – 74,6	1645,5 – 1646,5	9,3 – 9,5
6,215 – 6,218	74,8 – 75,2	1660 – 1710	10,6 – 12,7
6,26775 – 6,26825	108 – 121,94	1718,8 – 1722,2	13,25 – 13,4
6,31175 – 6,31225	123 – 138	2200 – 2300	14,47 – 14,5
8,291 – 8,294	149,9 – 150,05	2310 – 2390	15,35 – 16,2
8,362 – 8,366	156,52475 – 156,52525	2483,5 – 2500	17,7 – 21,4
8,37625 – 8,38675	156,7 – 156,9	2690 – 2900	22,01 – 23,12
8,41425 – 8,41475	162,0125 – 167,17	3260 – 3267	23,6 – 24,0
12,29 – 12,293	167,72 – 173,2	3332 – 3339	31,2 – 31,8
12,51975 – 12,52025	240 – 285	3345,8 – 3358	36,43 – 36,5
12,57675 – 12,57725	322 – 335,4	3600 – 4400	Above 38,6
13,36 – 13,41			

Acceptance limits for emissions in non-restricted frequency bands

The DTS rules specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

a) If the maximum peak conducted output power procedure was used to demonstrate compliance as described in 9.1, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz
b) If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz.
c) In either case, attenuation to levels below the 15.209 general radiated emissions limits is not required

Setup



Result – AV detector

Harmonic	Lowest channel		Medium channel		Highest channel		Results
	Level (dBµV/m)	Limits (dBµV/m)	Level (dBµV/m)	Limits (dBµV/m)	Level (dBµV/m)	Limits (dBµV/m)	
II	42,50	54,00	42,51	54,00	43,57	54,00	Complies
III	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	Complies
IV	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	Complies
V	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	Complies
VI	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	Complies
VII	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	Complies
VIII	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	Complies
IX	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	Complies
X	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	Complies

Remarks: EUT was tested in 3 orthogonal planes. The results in this table show the highest values. No spurious other then harmonics have been found. The results have been extrapolated to the specified distance using an extrapolation factor. For all harmonics it was considered the limit of 54 dBµV/m as a worse case.

Result – Peak detector

Harmonic	Lowest channel		Medium channel		Highest channel		Results
	Level (dBµV/m)	Limits (dBµV/m)	Level (dBµV/m)	Limits (dBµV/m)	Level (dBµV/m)	Limits (dBµV/m)	
II	50,97	74,00	51,02	74,00	51,82	74,00	Complies
III	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	Complies
IV	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	Complies
V	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	Complies
VI	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	Complies
VII	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	Complies
VIII	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	Complies
IX	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	Complies
X	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	Complies

Remarks: EUT was tested in 3 orthogonal planes. The results in this table show the highest values. No spurious other then harmonics have been found. The results have been extrapolated to the specified distance using an extrapolation factor. For all harmonics it was considered the limit of 74 dBµV/m as a worse case.

Result: The requirements are met

11.8 Maximum permissible exposure

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 1.1310
- Internal procedure PM001
- See clause 4 of this test report

Test configuration

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S164, CMC S287
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Antenna

Acceptance limits	1 mW/cm^2 max at 20 cm of distance

Result

Power Density Limit (mW/cm2)	*Maximum Output Power (mW)*	*Antenna Gain (G)*	*Power Density at 20 cm (mW/cm2)*	*Remarks*
1,00	0,459	2,239 (3,5 dBi)	2,04E-04	Measured
Remarks: Power Density = (P x G) / (4πR^2)				

Result: The requirements are met