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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. R19032401

Federal Communication Commission (FCC)

Test item

Description .....: TRANSCEIVER UNIT

Trademark .....: AUTEC

Model/Type .....: Model J6P Type NJ355

FCC ID .....: OQA-J6PNJ355

Test Specification

Standard.....: FCC Rules & Regulations, Title 47:2017
Part 15 paragraph(s): 203, 204, 205, 207, 209 and 247

Client's name .....: AUTEC S.r.l.

Address .....: Via Pomaroli, 65 – 36030 Caldogno (VI) – ITALY

Manufacturer's name : Same as client

Address .....: --

Report

Tested by .....: G. Gandini .....

Approved by .....: R. Beghetto – *Laboratory Manager* .....

Date of issue .....: 02.10.19

Contents.....: 100 pages

This test report shall not be reproduced except in full without the written approval of CMC.
The test results presented in this report relate only to the item tested.

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1. Summary

Standard:

FCC Rules & Regulations, Title 47:2017
Part 15 paragraph(s): 203, 204, 205, 207, 209 and 247

Test specifications	*Environmental Phenomena*	*Tests sequence*	*Result*
Part 15.247 (a) (1)	Pseudo randomly ordered list of hopping frequencies	1	Complies
Part 15.203	Antenna requirements	2	Complies
Part 15.207	Conducted emissions	--	N.A. (+)
Part 15.209	Radiated emissions	3	Complies
Part 15.247	20 dB Bandwidth	4	Complies
Part 15.247	Channel Separation	5	Complies
Part 15.247	Number of Hopping Channel	6	Complies
Part 15.247	Time of occupancy	7	Complies
Part 15.247	Band edge	8	Complies
Part 15.209 and 15.247	Peak Output Power	9	Complies
Part 15.209	Spurious emission	10	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

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2. Description of Equipment under test (EUT)

Power supply ..... :	7,2 Vdc from battery
Type of equipment ..... :	☑ Transmitter Unit
	☑ Receiver Unit
Type of station ..... :	❑ Fixed station
	☑ Portable station
	❑ Mobile station
Frequency band ..... :	902 – 928 MHz
Nominal frequencies ..... :	F_L: 915,075 MHz F_M: 921,425 MHz F_H: 927,825 MHz
Pseudo randomly ordered list of hopping frequencies ..... :	See document j6p_nj355_operational_description-rev0

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 ..... :	12.02.19
Testing start date ..... :	20.03.19
Testing end date ..... :	17.04.19
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 P190162

4. Operative conditions

EUT exercising ..... :	EUT in continuous transmission at maximum power

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5. Photograph(s) of EUT

5.1 Photograph(s) of EUT

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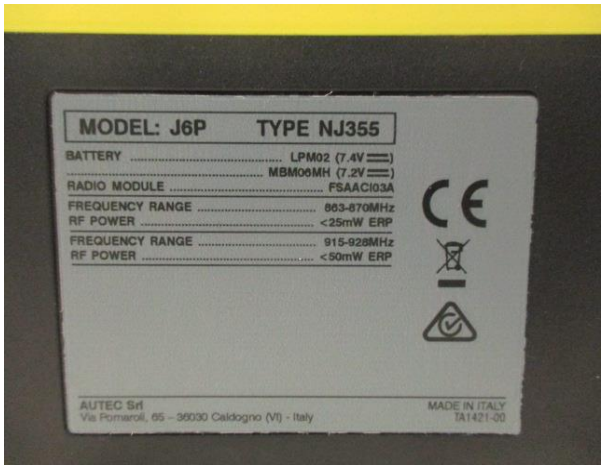

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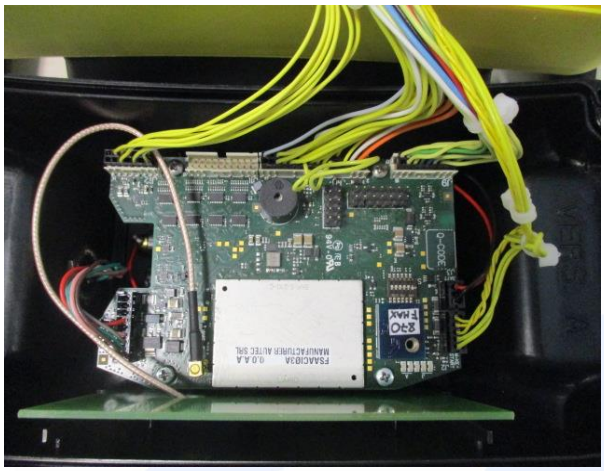

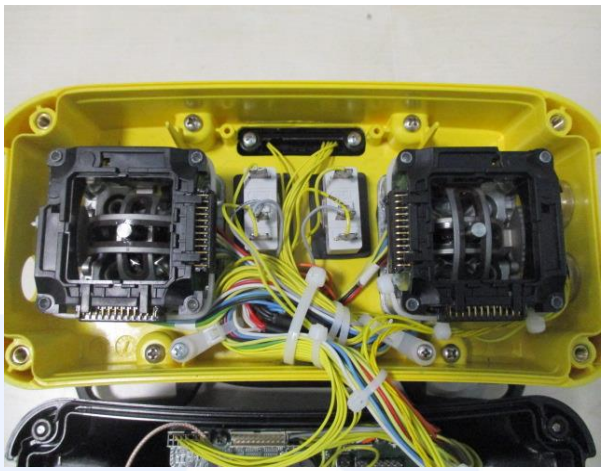

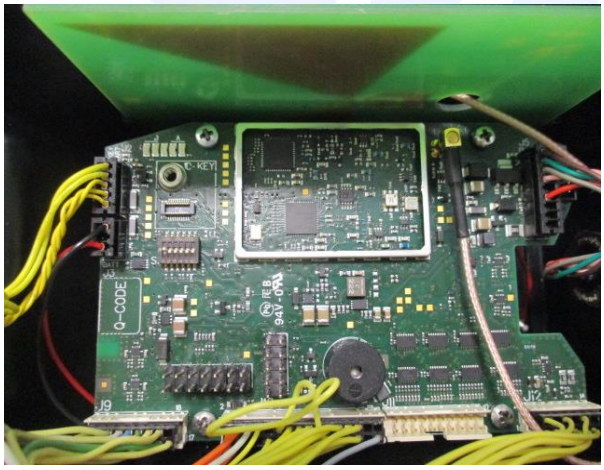

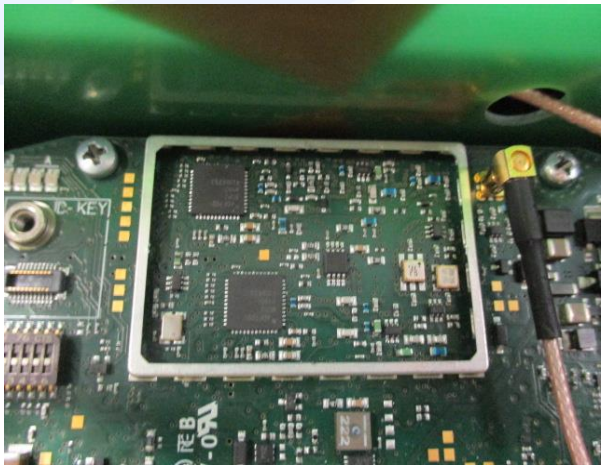

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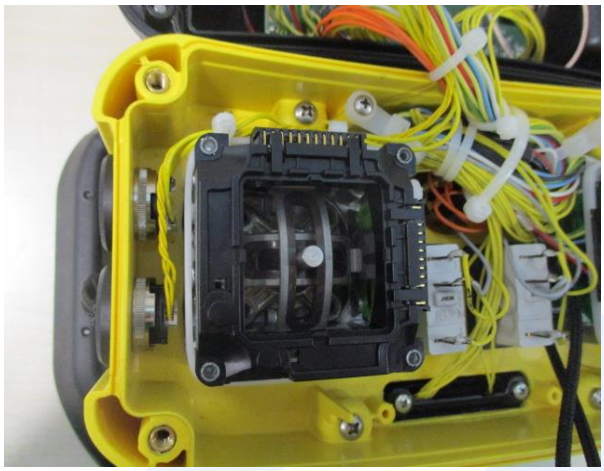

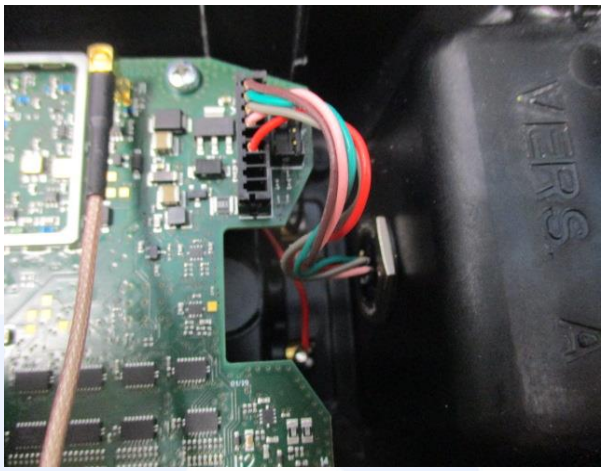

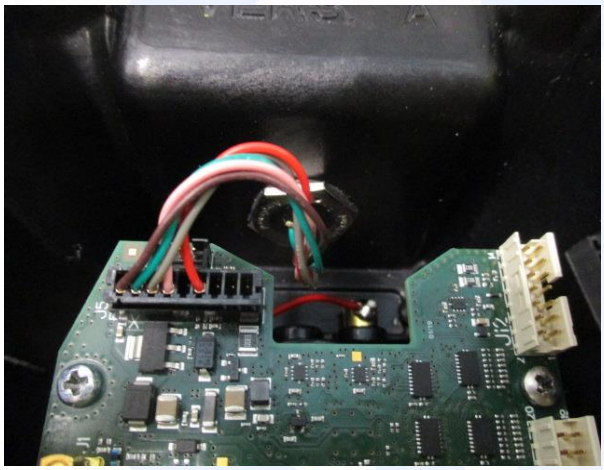

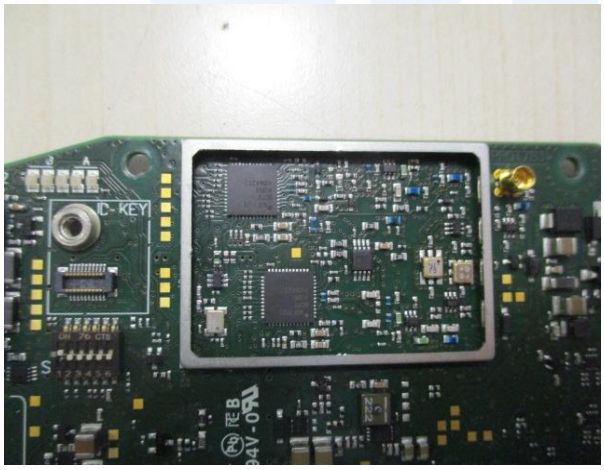

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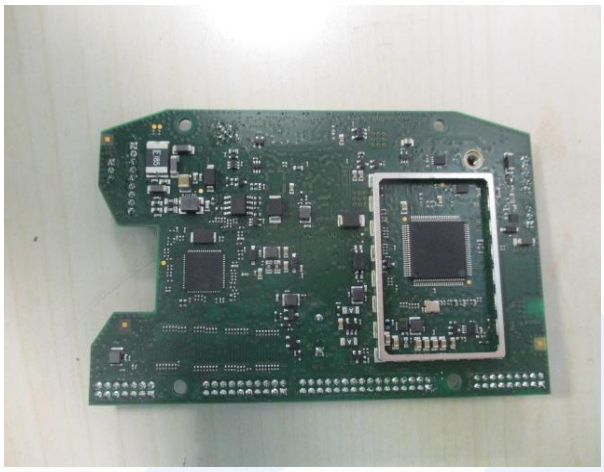

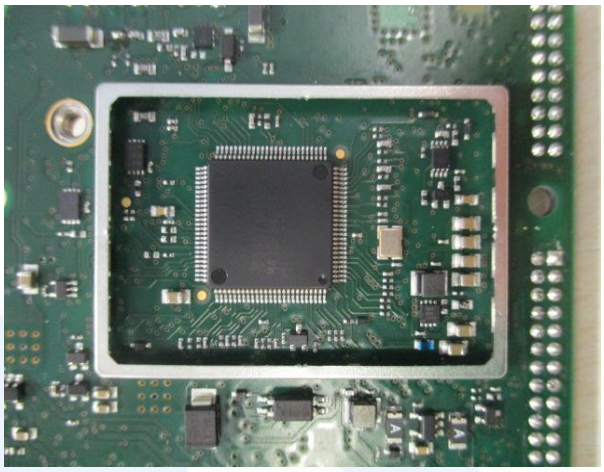

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6. Equipment list

Id. number	Manufacturer	Model	Description	Serial number	Last calibration	Due date calibration
CMC S108	EMCO	3115	Horn Antenna	9811-5622	June '16	June '19
CMC S127	Schaffner	HLA6120	Loop Antenna	1191	November '18	November '23
CMC S164	Rohde & Schwarz	ESU26	EMC interference receiver	100052	January '19	January '20
CMC S227	Rohde & Schwarz	ESR7	EMI Test Receiver 7GHz	101121	January '19	January '20
CMC S260	CMC	Wfr_N	Shielded Cable	Wfr_ant10-1	November '18	November '19
CMC S261	CMC	Wfr_N	Shielded Cable	Wfr_ant20-1	November '18	November '19
CMC S262	CMC	Wfr_N_fix	Shielded Cable	Wfr_fix32-1	November '18	November '19
CMC S263	CMC	Wfr_N_fix	Shielded Cable	Wfr_fix31-1	November '18	November '19
CMC S264	CMC	Wfr_N	Shielded Cable	Wfr_ext03-1	November '18	November '19
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 '18	November '19

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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	3,0 dB	1
Conducted emission CISPR 16 Voltage Probe 0,15-30MHz	PE001_02	2,9 dB	1
Conducted emission CISPR 16 Current Probe 0,15-30MHz	PE001_03	2,6 dB	1
Conducted emission CISPR 16 ISN 0,15-30MHz	PE001_04	4,7 dB	1
Clic CISPR 16 LISN 50uH 0,150-30,0MHz	PE001_05	3,1 dB	1
Disturbance Power 30-300 MHz	PE002_01	3,6 dB	1
Radiated Emission LAS 0,15-30MHz	PE003_01	2,0 dB	1
Radiated Emission CISPR 16 Loop Ant. 0,15-30MHz	PE004_01	4,0 dB	1
Radiated Emission CISPR 16 Bicon. Ant. 30-300MHz	PE004_02	3,9 dB	1
Radiated Emission CISPR 16 LogP. Ant. 300-1000MHz	PE004_03	3,8 dB	1
Radiated Emission CISPR 16 Horn Ant. 1-18GHz	PE004_04	4,2 dB	1
Human Exposure to electromagnetic fields	PE005_01	23,6 %	1
Harmonic current emissions test	PE006_01	10 mA + 2,6 %	1
Voltage fluctuation and flicker test	PE007_01	4,8 %	1
Radiated Immunity 80MHz-6GHz	PE102_XX	2,1 dB 0,82 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	6,25 % 18,7 A/m a 300A/m	1
Dumped Magnetic field	PE108_01	6,25 % 1,87 A/m a 30A/m	1
Common mode conducted immunity	PE112_01	2,21 % 0,22 V a 10V	1

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Test	Test Setup	Expanded uncertainty	Note
Power/Spurious 9kHz-30MHz	PR001_01	4,0 dB	1
Power/Spurious ERP 30-1000MHz d=10m	PR001_02+03	4,7 dB	1
Misura della potenza EiRP 1-18GHz d=3m	PR001_04	4,7 dB	1
Misura della potenza EiRP 18-40GHz d=3m	PR001_05	5,4 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	1,1 dB	1
Adjacent channel power	PR002_01+02	1,1 dB	1
Blocking	PR002_01+02	1,1 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_19_02 date 27/03/2019			

Note 1:
The expanded uncertainty reported according to the document EA-4-02 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

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8. Reference documents

Reference no.	*Description*
FCC Rules and Regulation Title 47 part 15:2017	--
KDB 558074 D01 15.247 Meas Guidance v05	Guidance for compliance measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices operating under section 15.247 of the FCC rules
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
ANSI C63.10:2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Internal Procedure PM001 rev. 3.0 (Quality Manual)	Measure Procedure
Internal procedure INC_M rev. 9.1 (Quality Manual)	Measurement uncertainty calculation

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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.

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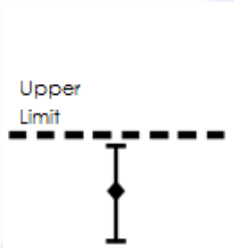
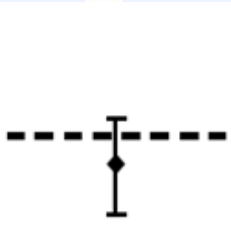
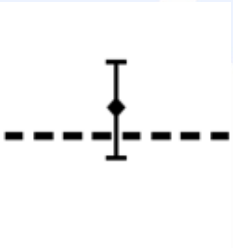
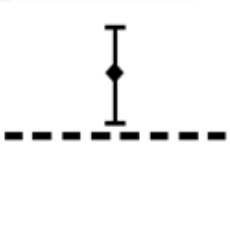
11. Results

In this clause tests results are reported.

Measurement uncertainty is in accordance with document CMC INC_M rev. 9.1.

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.

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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.

Result

Antenna Type	*External R.F. power amplifier*	*Gain*	*Remarks*	*Results*
Dedicated antenna	Not Present	2 dBi	--	Complies

Result: The requirements are met

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11.2 Radiated emissions

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
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Enclosure
Frequency range: 0,009 MHz – 10000 MHz
Antenna polarization: Horizontal (H) – Vertical (V)
10 m for frequencies ≤ 30 MHz
3 m for frequencies > 30 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. The results have been extrapolated to the specified distance using an extrapolation factor

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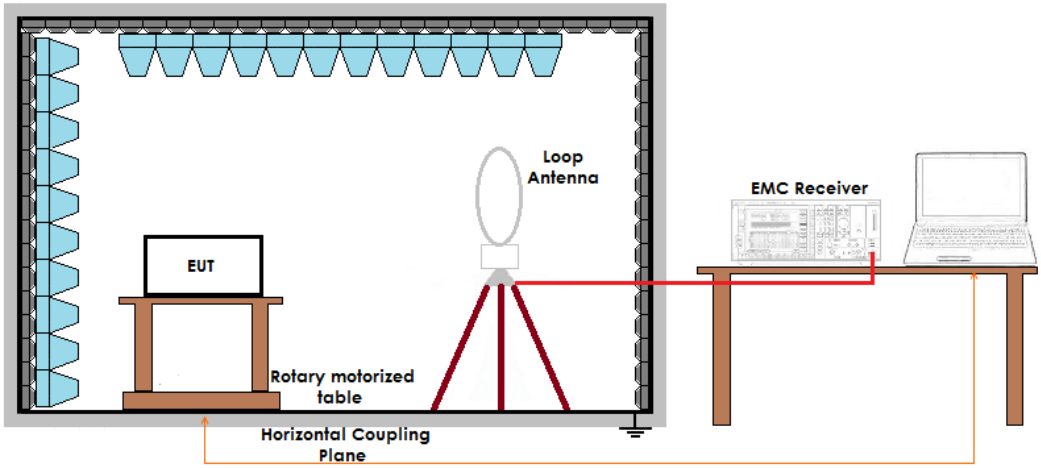
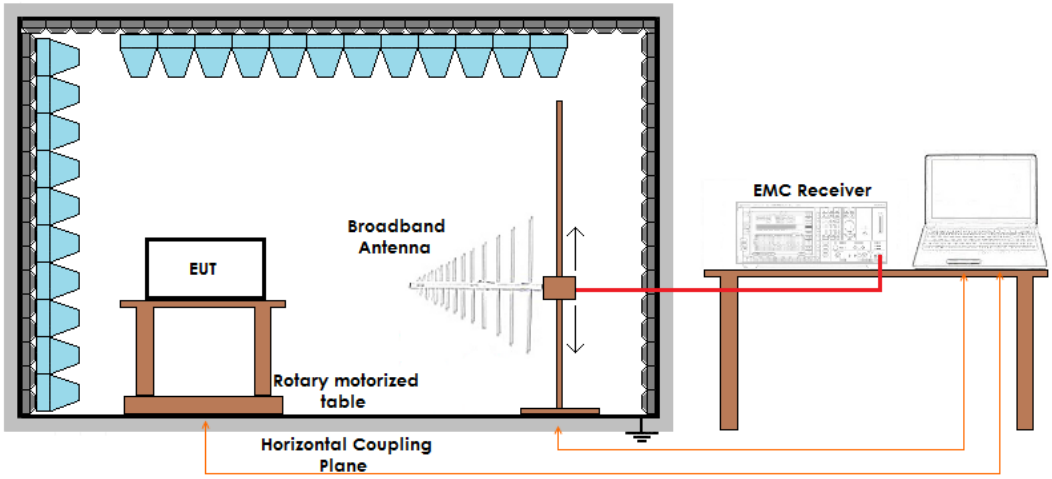
Setup

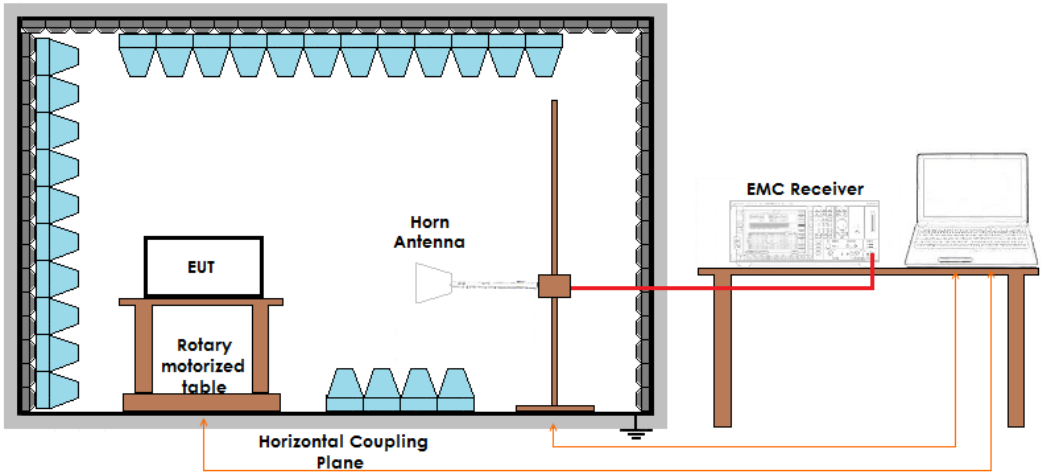
Frequency ≤ 30 MHz



Frequency ≤ 1 GHz



Frequency > 1 GHz



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Result

Polarization	*Frequency Range (MHz)*	*Graphs*	*Remarks*	*Result*
H	300 – 1000	G19032401	Lowest channel	Complies
V	300 – 1000	G19032402	Lowest channel	Complies
V	300 – 1000	G19032403	Medium channel	Complies
H	300 – 1000	G19032404	Medium channel	Complies
H	300 – 1000	G19032405	Highest channel	Complies
V	300 – 1000	G19032406	Highest channel	Complies
V	30 – 300	G19032407	Highest channel	Complies
H	30 – 300	G19032408	Highest channel	Complies
H	30 – 300	G19032409	Medium channel	Complies
V	30 – 300	G19032410	Medium channel	Complies
V	30 – 300	G19032411	Lowest channel	Complies
H	30 – 300	G19032412	Lowest channel	Complies
Loop	0,009 – 30	G19032413	Worst case	Complies
H	1000 – 3000	G19032414	Highest channel	Complies
V	1000 – 3000	G19032415	Highest channel	Complies
V	1000 – 3000	G19032416	Medium channel	Complies
H	1000 – 3000	G19032417	Medium channel	Complies
H	1000 – 3000	G19032418	Lowest channel	Complies
V	1000 – 3000	G19032419	Lowest channel	Complies
V	3000 – 10000	G19032422	Lowest channel	Complies
H	3000 – 10000	G19032423	Lowest channel	Complies
H	3000 – 10000	G19032424	Medium channel	Complies
V	3000 – 10000	G19032425	Medium channel	Complies
V	3000 – 10000	G19032426	Highest channel	Complies
H	3000 – 10000	G19032427	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 different conversion factors, based on the measuring distance provided by the standard. Peaks above the limits are caused by the nominal transmitting frequencies			

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

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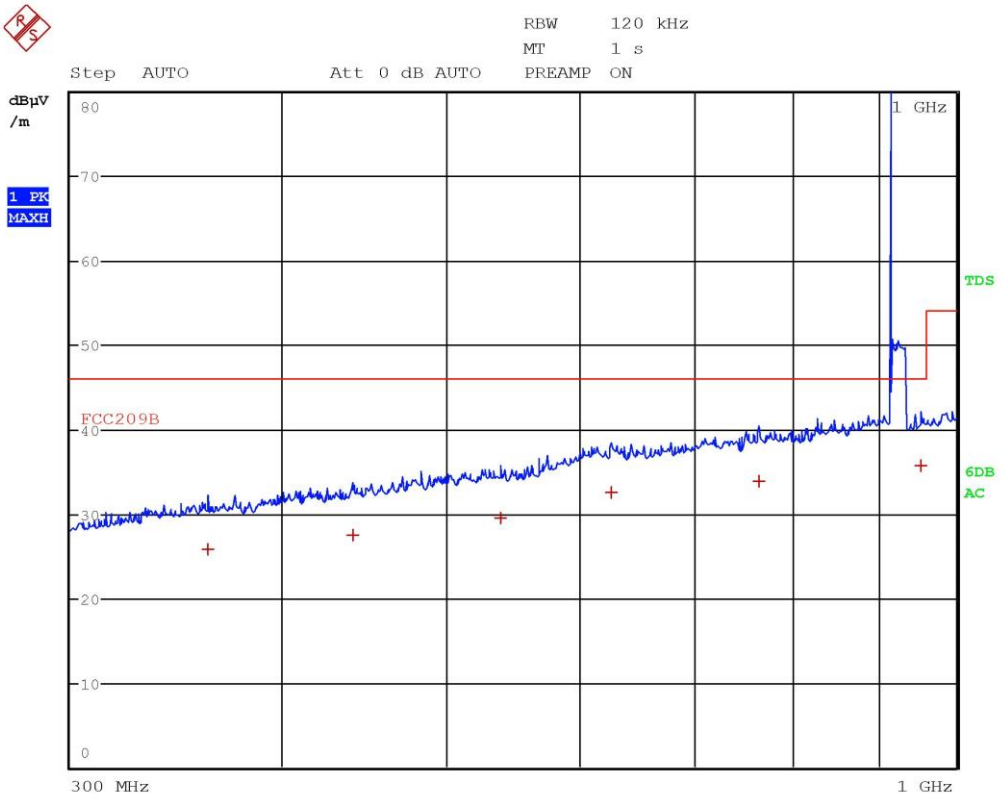
Graphs



Gandini 19032401

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EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCC209B
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	362 MHz	25.79	-20.22
1 Quasi Peak	440.32 MHz	27.41	-18.60
1 Quasi Peak	538.24 MHz	29.51	-16.50
1 Quasi Peak	626.04 MHz	32.45	-13.56
1 Quasi Peak	764.84 MHz	33.84	-12.17
1 Quasi Peak	952.44 MHz	35.68	-10.33

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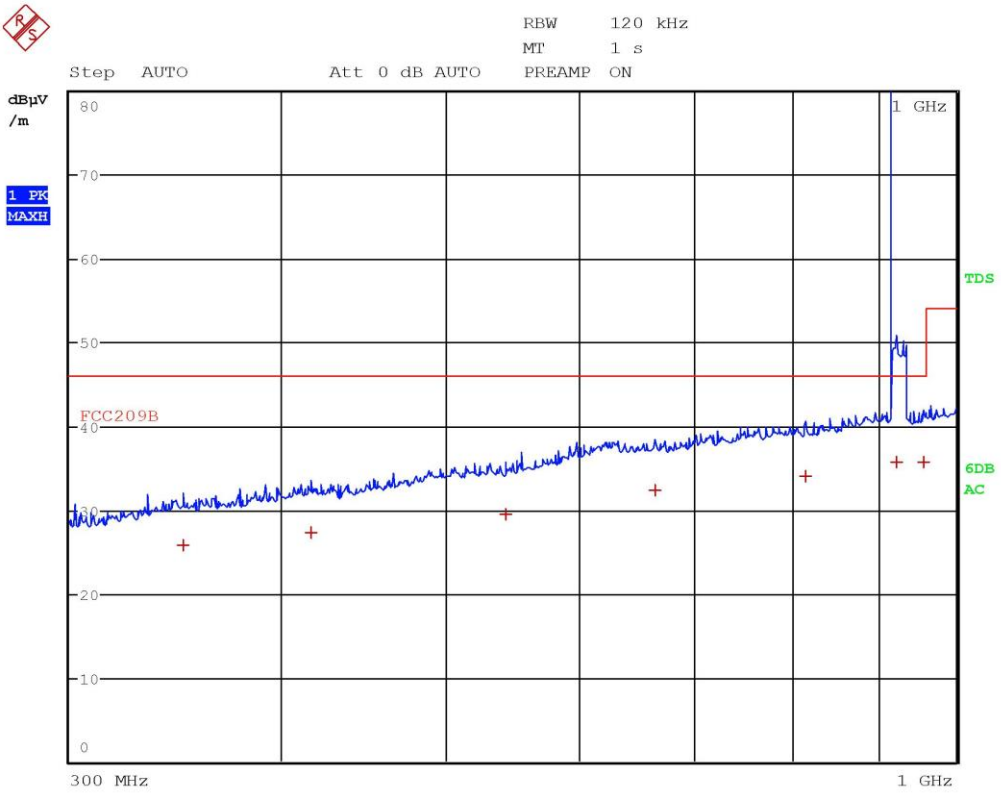

Gandini 19032402

CMC Centro Misure Compatibilità S.r.l.

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCC209B
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	350.36 MHz	25.79	-20.22
1 Quasi Peak	416.36 MHz	27.29	-18.73
1 Quasi Peak	542.2 MHz	29.55	-16.47
1 Quasi Peak	664.2 MHz	32.29	-13.72
1 Quasi Peak	815.76 MHz	34.03	-11.99
1 Quasi Peak	921.44 MHz	35.67	-10.34
1 Quasi Peak	955.72 MHz	35.71	-10.30

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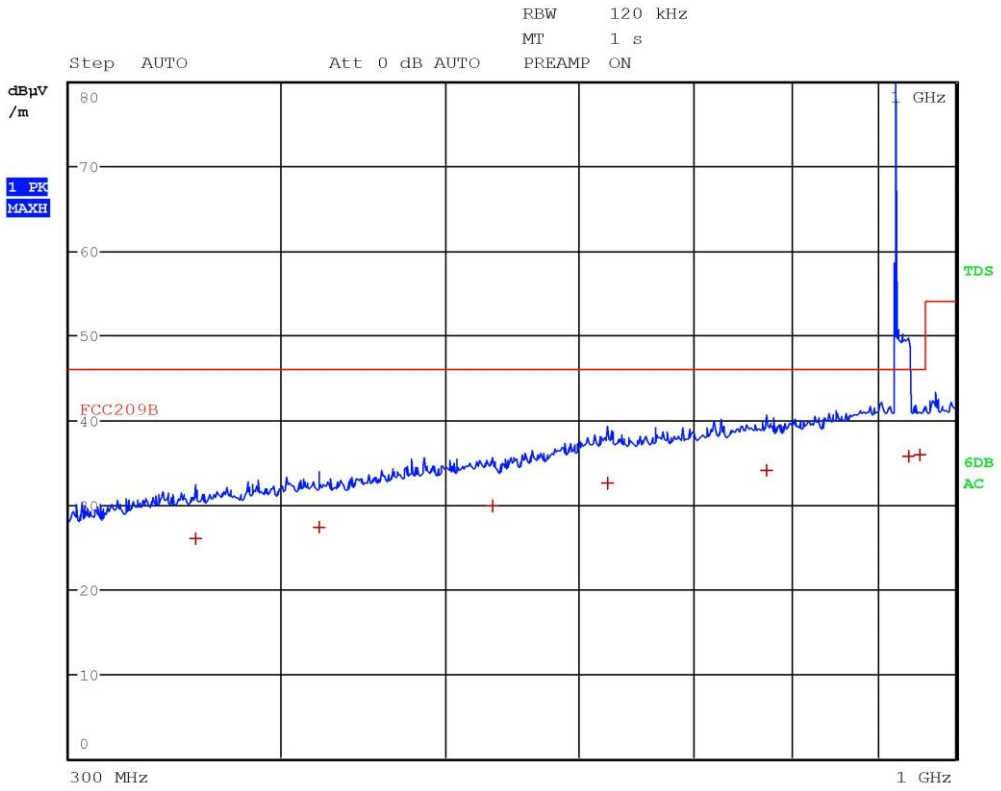

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CMC Centro Misure Compatibilità S.r.l.

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCC209B
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	356.16 MHz	25.95	-20.06
1 Quasi Peak	421.44 MHz	27.36	-18.65
1 Quasi Peak	533.16 MHz	29.82	-16.19
1 Quasi Peak	623.32 MHz	32.56	-13.45
1 Quasi Peak	773.24 MHz	33.99	-12.02
1 Quasi Peak	938.4 MHz	35.69	-10.32
1 Quasi Peak	952.24 MHz	35.86	-10.15

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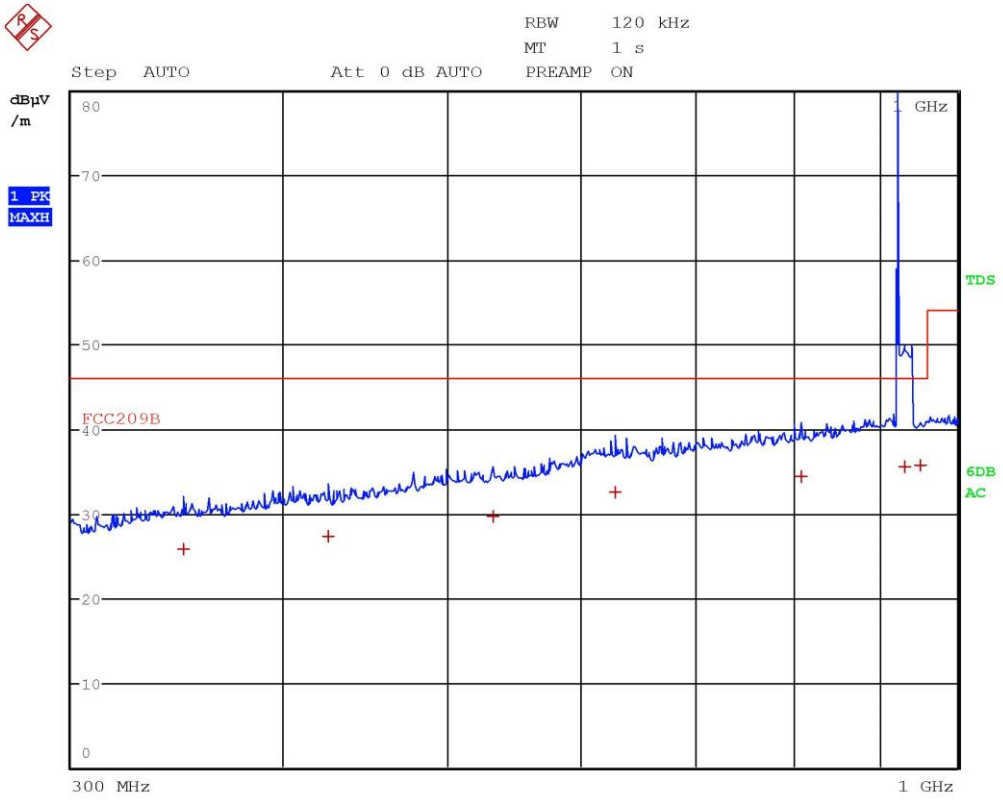

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CMC Centro Misure Compatibilità S.r.l.

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCC209B
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	349.24 MHz	25.79	-20.22
1 Quasi Peak	425.72 MHz	27.22	-18.79
1 Quasi Peak	532 MHz	29.67	-16.35
1 Quasi Peak	628.16 MHz	32.52	-13.49
1 Quasi Peak	808.36 MHz	34.31	-11.70
1 Quasi Peak	930.32 MHz	35.50	-10.52
1 Quasi Peak	951.2 MHz	35.76	-10.25

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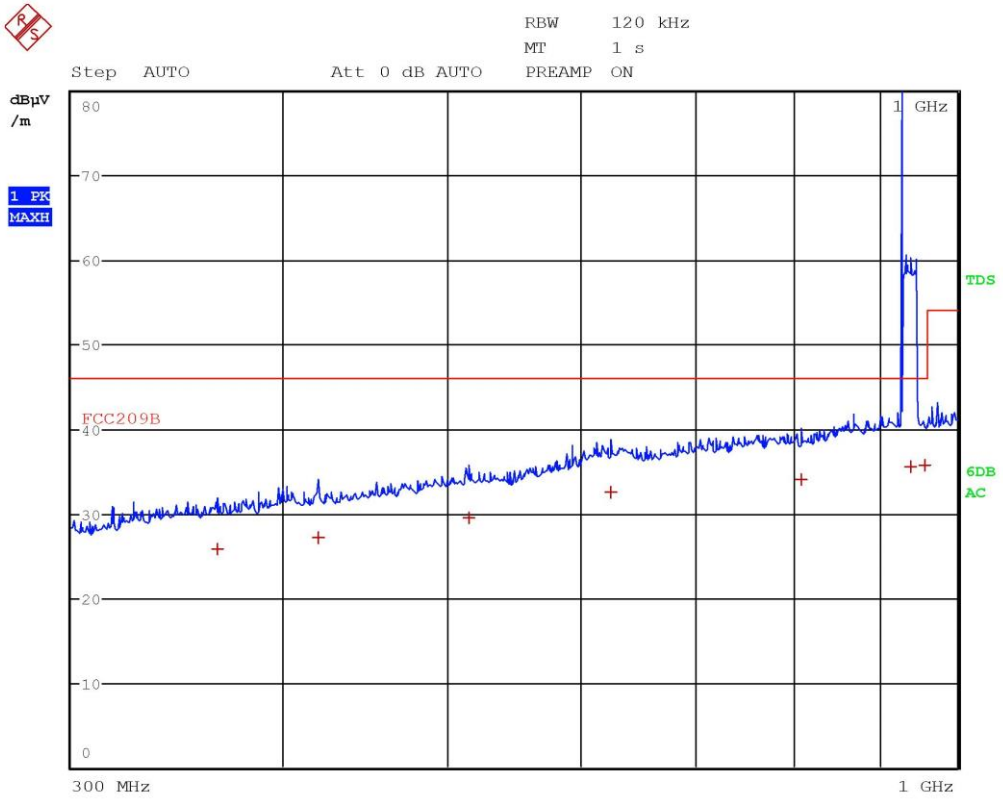

Gandini 19032405

CMC Centro Misure Compatibilità S.r.l.

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCC209B
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	365.6 MHz	25.86	-20.15
1 Quasi Peak	420.04 MHz	27.11	-18.90
1 Quasi Peak	514.76 MHz	29.46	-16.55
1 Quasi Peak	624.24 MHz	32.47	-13.54
1 Quasi Peak	808.84 MHz	34.02	-11.99
1 Quasi Peak	938.96 MHz	35.53	-10.48
1 Quasi Peak	956.84 MHz	35.69	-10.33

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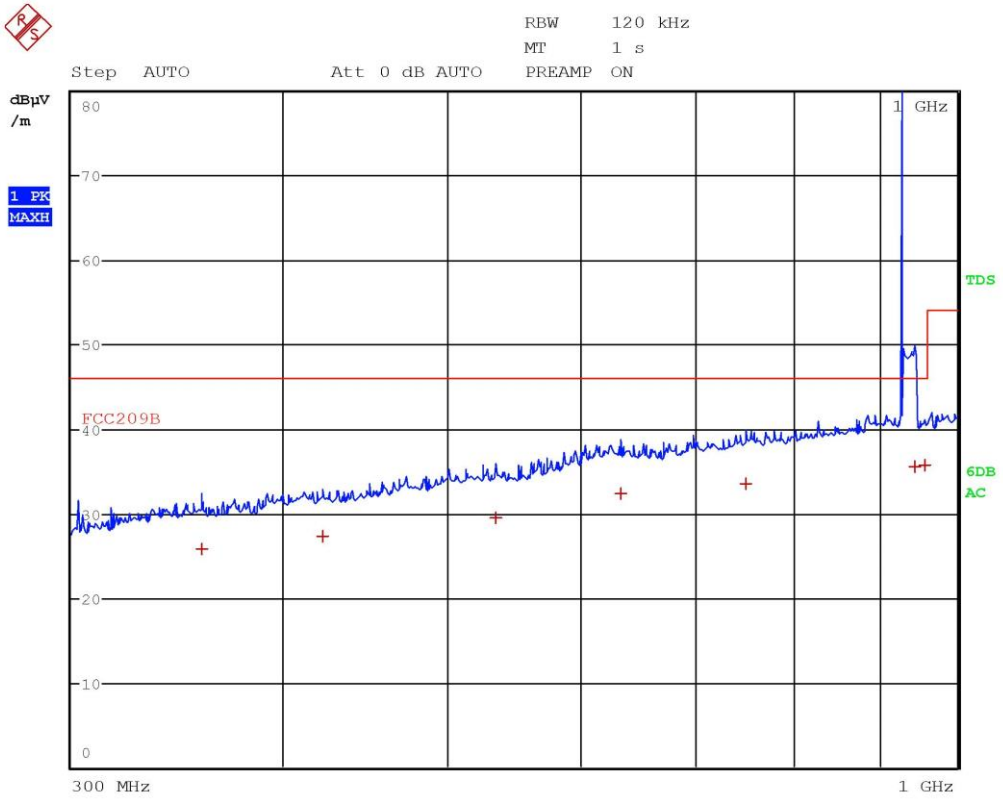

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CMC Centro Misure Compatibilità S.r.l.

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCC209B
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	358.56 MHz	25.74	-20.27
1 Quasi Peak	421.96 MHz	27.27	-18.74
1 Quasi Peak	534.24 MHz	29.55	-16.46
1 Quasi Peak	632.68 MHz	32.35	-13.66
1 Quasi Peak	749.92 MHz	33.57	-12.44
1 Quasi Peak	944.12 MHz	35.56	-10.45
1 Quasi Peak	956.92 MHz	35.76	-10.25

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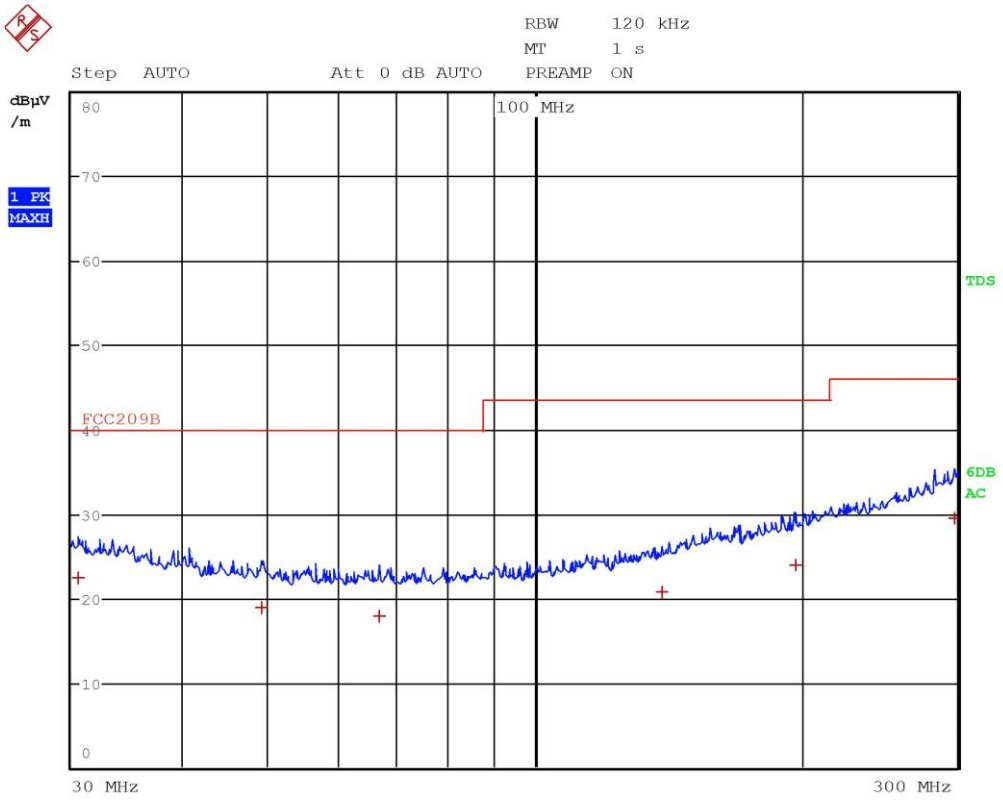

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CMC Centro Misure Compatibilità S.r.l.

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCC209B
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	30.48 MHz	22.42	-17.57
1 Quasi Peak	49.16 MHz	18.84	-21.15
1 Quasi Peak	66.72 MHz	17.96	-22.03
1 Quasi Peak	139.04 MHz	20.82	-22.69
1 Quasi Peak	197.12 MHz	23.95	-19.56
1 Quasi Peak	298.24 MHz	29.53	-16.48

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