



TEST REPORT

Nr. R21081901

Federal Communication Commission (FCC)

Report Reference No.	R21081901
Date of issue:	03.05.2021
Total number pages:	26
Applicant's name	Intercomp S.p.A.
Address	Via della Scienza, 27, 37139 Verona (VR) - Italy
Test specification:	
Standards	FCC Rules & Regulations, Title 47:2019 Part 15 paragraph(s): 107 and 109
Non-standard test method	N/A
Test Report Form No.	15-107_15-109CMC
Test Report Form(s) Originator ..	CMC Centro Misure Compatibilità S.r.l.
Master TRF	2021-04
General disclaimer:	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of CMC Centro Misure Compatibilità S.r.l.	
Test item description	LoRa WAN magnetic sensor for parked vehicles detection for inground installation
Trademark	Intercomp
Manufacturer	Intercomp S.p.A.
Model / Type reference	Ecoh-915
FCC ID	2AUT7ECOH-915
Rating(s)	5 Vdc from USB
Report	
Tested by (name + signature)	G. Gandini
Approved by (name + signature)	R. Beghetto



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2 Reference standard	
FCC Rules and Regulation Title 47 part 15:2019	--
3 List of attachments	
Attachment 1: Instruments list, measurement uncertainty, judgement of compliance and quality manual references	
4 Deviation(s) from test specification	
None	
5 Testing location	
CMC Centro Misure Compatibilità S.r.l. Via della Fisica, 20 – 36016 Thiene (VI) – Italy Test site facility's FCC registration number: 182474	

Revision index	Date	Change history
1.0	03.05.2021	--



Testing and sampling:	
Date of receipt of test item.....	30.03.2021
Testing start date	26.04.2021
Testing end date	26.04.2021
Sampling procedure.....	Equipment used for testing was picked up by the manufacturer, at the end of the production process with random criterion. The results relate to the sample as it has been received.
Internal identification.....	Adhesive label with the product number P210408
General remarks:	
This 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 object tested. “(see appended table)”: refers to a table appended to the report. Throughout this report a comma is used as the decimal separator. Tests reported in this test report marked by wording: “Test not accredited by ACCREDIA” are not part of the ACCREDIA accreditation of this laboratory.	
Possible test case verdicts:	
Test case does not apply to the test object:	N/A (Not Applicable)
Test object does meet the requirement:	P (Pass)
Test object does not meet the requirement:	F (Fail)
Test object does not performed:	N/E (Not Executed)
Definition of symbols used in this test report:	
☒ Indicates that the listed condition, standard or equipment is applicable for this report. ☐ Indicates that the listed condition, standard or equipment is not applicable for this report.	



6 General description of tested item and testing condition(s)

Description	LoRa WAN magnetic sensor for parked vehicles detection for inground installation						
Model Number	Ecoh-915						
FCC ID	2AUT7ECOH-915						
Serial Number	--						
Brand name	Intercomp						
Type of device	TV Broadcast Receiver	☐					
	FM Broadcast Receiver	☐					
	CB Receiver	☐					
	Superregenerative Receiver	☐					
	Scanning Receiver	☐					
	Radar Detector	☐					
	All other receivers subject to Part 15	☐					
	TV Interface Device	☐					
	Cable System Terminal Device	☐					
	Stand-alone Cable input selector switch	☐					
	Class B personal computers and peripherals	☐					
	CPU boards and internal power supplies used with Class B personal computers	☐					
	Class B personal computers assembled using authorized CPU boards or power supplies	☐					
	Class B external switching power supplies	☐					
	Other Class B digital devices & peripherals	☒					
	Class A digital devices, peripherals & external switching power supplies	☐					
	Access Broadband over Power Line (Access BPL)	☐					
	All other devices	☐					
Test power supply.....		Voltage and Frequency	Reference poles				
			N	L1	L2	L3	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 5 V from USB	☐				
Emission class	Class B						
Software version	0.0.0						



Test arrangements of EUT	<i>Intended operational arrangement(s) of EUT</i>		<i>Test arrangement (see basic standard)</i>
	☐	Table-top only	Table-top
	☐	Floor-standing only	Floor-standing
	☐	Can be floor-standing or table-top	Table-top
	☐	Rack mounted	In rack or table-top
	☒	Other, for example wall mounted, ceiling mounted, handheld, body worn (underground EUT)	Table-top
Required highest frequency for radiated measurement.....:	<i>Highest frequency generated or used in the device or on which the device operates or tunes (MHz)</i>		<i>Upper frequency of measurement range (MHz)</i>
	☐	Below 1,705	30
	☒	1,705 – 108	1000
	☐	108 – 500	2000
	☐	500 – 1000	5000
	☐	Above 1000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower
Operating modes	No.	Operating mode of test item	
	1	EUT in operation	
Declination of responsibility	Components list and software/hardware version (if reported) are provided by the manufacturer. CMC Centro Misure Compatibilità S.r.l. cannot be considered responsible for these information, for any other document sent by the manufacturer and for any difference between the software version present in the tested sample and that present in the object intended for final sale. In some cases, the software in the tested sample is in a version dedicated exclusively to the test, and therefore does not represent the software installed in the final version of the product.		



6.1 Photos of the test item





7 Verdict summary section

FCC Rules & Regulations, Title 47:2019 Part 15 paragraph(s): 107 and 109				
Clause	Requirement – Test case	Basic standard	Test sequence	Verdict
Part 15.107	Conducted emission	ANSI C63.4	2	P
Part 15.109	Radiated emission	ANSI C63.4	1	P





Normative references	
Reference no.	Description
FCC Rules and Regulation Title 47 part 15:2019	--
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





8 Test conditions

8.1 General

Environmental reference conditions.....:	The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:		
	Temperature	Humidity	Atmospheric pressure
	15 °C – 35 °C	30 % - 60 %	800 hPa – 1060 hPa
	If explicitly required in the basic standard or applied product standard the climatic values are recorded and documented separately in this test report.		
Measurement uncertainties	Attachment 1		



9 Emission

9.1 Conducted emission

Tested by	G. Gandini	
Test date	26.04.2021	
Test location (stand)	Shielded chamber (CMC A001)	
Reference standards	FCC Rules and Regulation; Titles 47 Part. 15.107 ANSI C63.4 cl. 7	
Test set-up description	☒	Table top equipment set-up (80 cm above the reference ground plane)
	☐	Floor standing equipment set-up (insulating material up to 12 mm thick)
	☐	False floor installation equipment set-up (insulating material up to 34 cm above the reference ground plane)
Supplementary Test set-up description	--	
Test method applied	☒	Artificial mains network, 50 μ H/50 Ω LISN
	☐	Other:

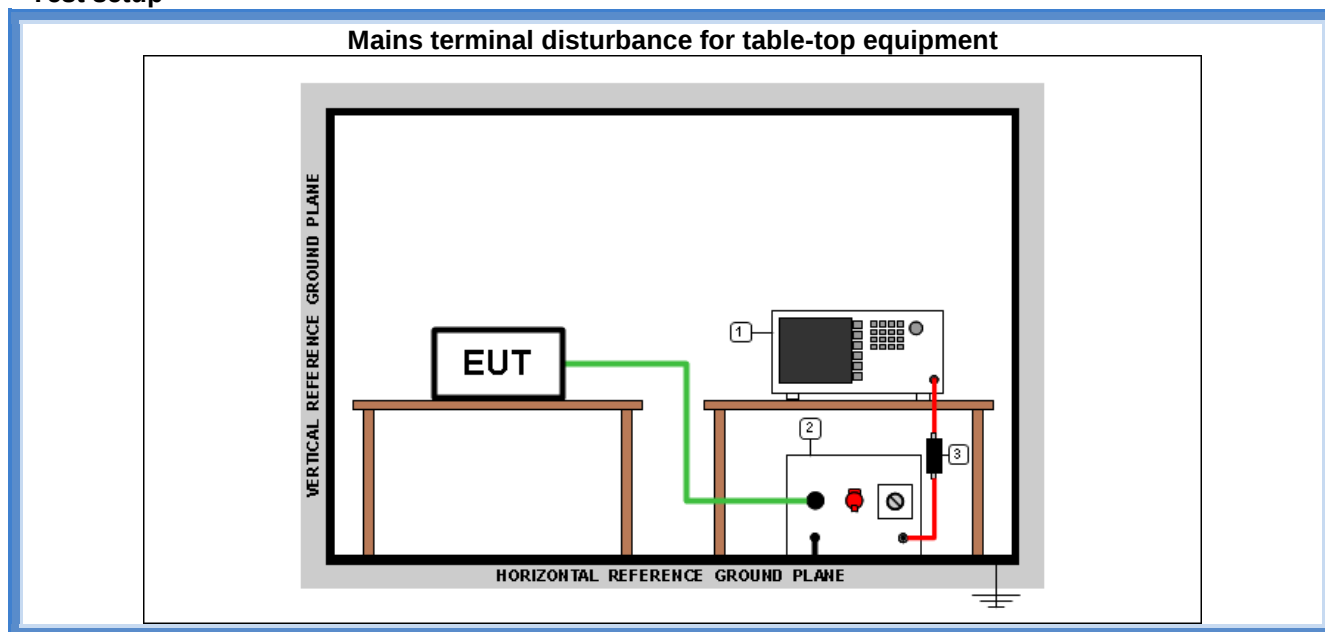
Acceptance limits

Limits for class A equipment		
Frequency range (MHz)	$\text{dB}(\mu\text{V})$ Quasi-peak	$\text{dB}(\mu\text{V})$ Average
0,15 to 0,50	79	66
0,5 to 5	73	60
5 to 30	73	60

Limits for class B equipment		
Frequency range (MHz)	$\text{dB}(\mu\text{V})$ Quasi-peak	$\text{dB}(\mu\text{V})$ Average
0,15 to 0,50	66 to 56	56 to 46
0,5 to 5	56	46
5 to 30	60	50



Test setup



Test setup PE001_01

Nr.	Id. Number	Manufacturer	Model	Description
3	CMC S010	Rohde & Schwarz	ESH3-Z2	Pulse limiter
2	CMC S200	Schwarzbeck	NSLK 8128	V-LISN
1	CMC S206	Rohde & Schwarz	ESCI 7	EMC Receiver 9KHz-7GHz

Result

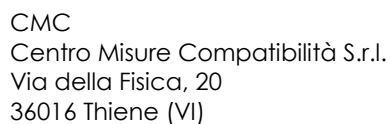
Line	Frequency Range (MHz)	Graphs	Remarks	Result
N	0,15 – 30	G21081907	--	P
L1	0,15 – 30	G21081908	--	P

Remarks: tests performed on 120 Vac side of power unit

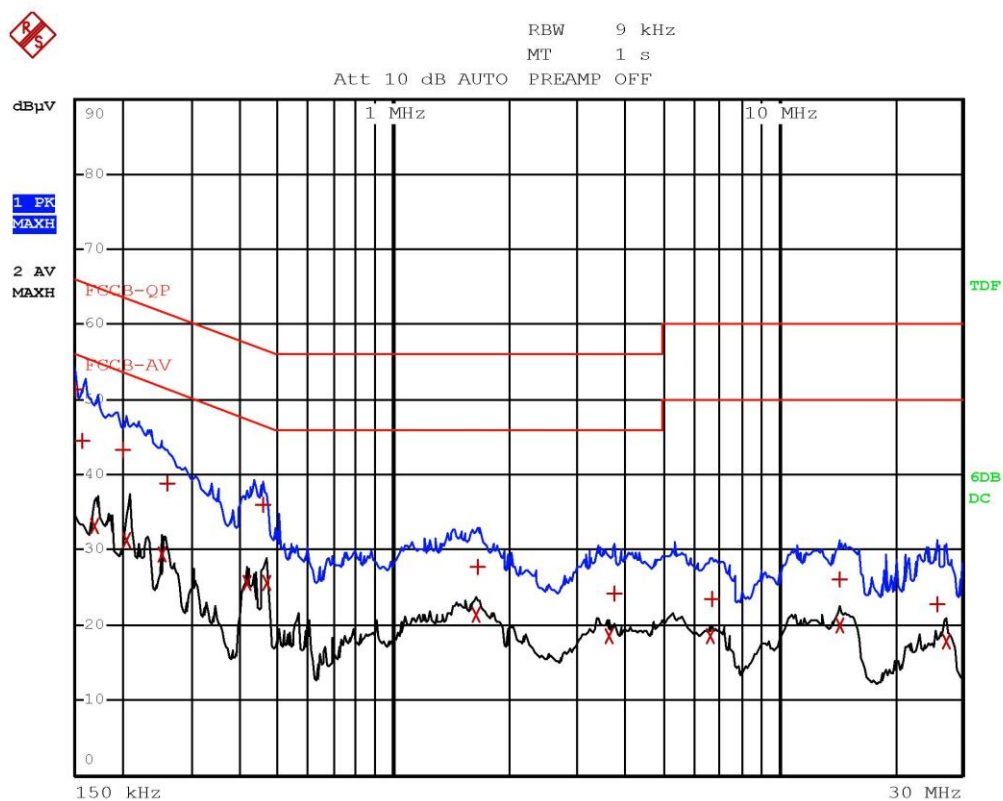
Graphs Legend

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

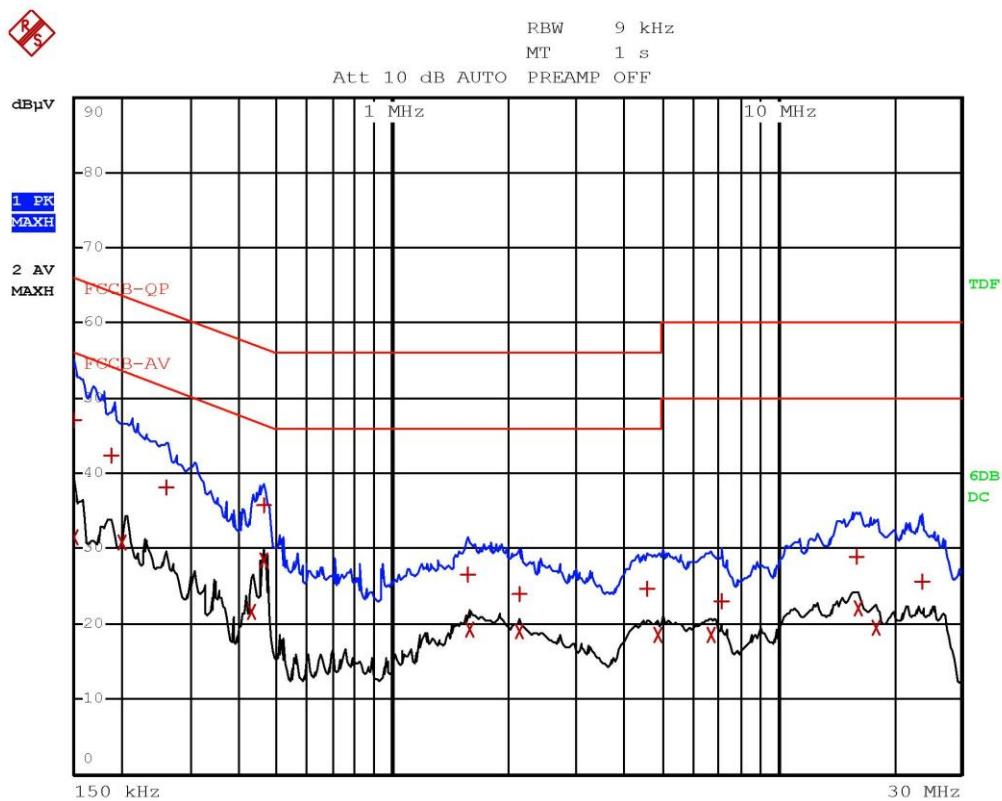


Gandini 21081907-Line N



EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCCB-QP			
Trace2:	FCCB-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB	
1 Quasi Peak	150 kHz	51.28	-14.71	
1 Quasi Peak	158 kHz	44.56	-21.00	
2 Average	170 kHz	33.09	-21.86	
1 Quasi Peak	202 kHz	43.38	-20.14	
2 Average	206 kHz	31.20	-22.16	
2 Average	250 kHz	29.35	-22.40	
1 Quasi Peak	258 kHz	38.87	-22.62	
2 Average	414 kHz	25.53	-22.03	
1 Quasi Peak	458 kHz	35.97	-20.75	
2 Average	466 kHz	25.67	-20.90	
2 Average	1.646 MHz	21.31	-24.68	
1 Quasi Peak	1.666 MHz	27.85	-28.14	
2 Average	3.63 MHz	18.44	-27.55	
1 Quasi Peak	3.762 MHz	24.22	-31.78	
2 Average	6.682 MHz	18.56	-31.43	
1 Quasi Peak	6.722 MHz	23.44	-36.55	
2 Average	14.45 MHz	19.88	-30.11	
1 Quasi Peak	14.49 MHz	26.09	-33.90	
1 Quasi Peak	25.958 MHz	22.86	-37.13	
2 Average	27.358 MHz	17.87	-32.12	

Gandini 21081907-Line N



Gandini 21081908-Line L



EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCCB-QP			
Trace2:	FCCB-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB	
1 Quasi Peak	150 kHz	47.19	-18.80	
2 Average	150 kHz	31.47	-24.52	
1 Quasi Peak	190 kHz	42.47	-21.56	
2 Average	202 kHz	30.88	-22.64	
1 Quasi Peak	262 kHz	38.18	-23.18	
2 Average	430 kHz	21.68	-25.56	
1 Quasi Peak	462 kHz	35.83	-20.81	
2 Average	462 kHz	28.56	-18.09	
1 Quasi Peak	1.57 MHz	26.50	-29.49	
2 Average	1.586 MHz	19.14	-26.85	
1 Quasi Peak	2.138 MHz	23.86	-32.13	
2 Average	2.15 MHz	18.95	-27.04	
1 Quasi Peak	4.578 MHz	24.57	-31.42	
2 Average	4.874 MHz	18.48	-27.51	
2 Average	6.738 MHz	18.44	-31.55	
1 Quasi Peak	7.202 MHz	22.92	-37.07	
1 Quasi Peak	15.994 MHz	29.03	-30.96	
2 Average	16.138 MHz	22.07	-27.92	
2 Average	18.062 MHz	19.47	-30.52	
1 Quasi Peak	23.878 MHz	25.55	-34.44	

Gandini 21081908-Line L



9.2 Radiated emission

Tested by	G. Gandini	
Test date	26.04.2021	
Test location (stand)	Semi-anechoic chamber (CMC A070)	
Reference standards	FCC Rules and Regulation; Titles 47 Part. 15.109 ANSI C63.4 cl. 8	
Test set-up description	☒	Table top equipment set-up (80 cm above the reference ground plane)
	☐	Floor standing equipment set-up (insulating material up to 12 mm thick)
	☐	False floor installation equipment set-up (insulating material up to 34 cm above the reference ground plane)
Supplementary test set-up description	--	
Test method applied	OATS or SAC with measurement distance [m]: 10 m for frequencies below 1 GHz 3 m for frequencies above 1 GHz	
Supplementary information	--	

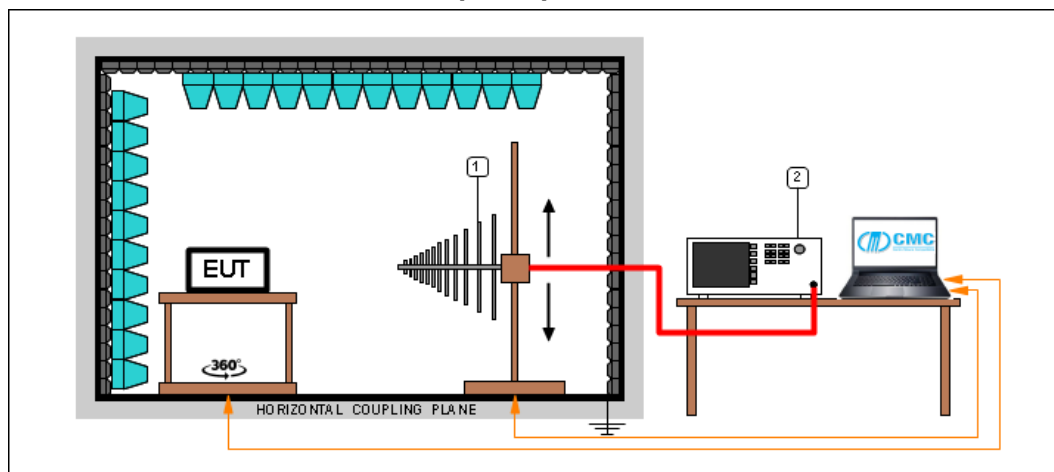
Acceptance limits

Class A radiated limits		
Frequency range (MHz)	Limits [dB(μV/m)]	Measurement distance (m)
30 to 88	39,08	10
88 to 216	43,52	10
216 to 960	46,44	10
Above 960	49,54	10

Class B radiated limits		
Frequency range (MHz)	Limits [dB(μV/m)]	Measurement distance (m)
30 to 88	40	3
88 to 216	43,52	3
216 to 960	46,02	3
Above 960	53,98	3

Test setup

Frequency ≤ 1 GHz



Test setup PE004_02

Nr.	Id. Number	Manufacturer	Model	Description
2	CMC S353	Rohde & Schwarz	ESW26	EMI Test Receiver 1 Hz - 26.5 GHz
1	CMC S271	Schwarzbeck	BBA 9106 + VHBB 9124	Broadband Antenna

Test setup PE004_03

Nr.	Id. Number	Manufacturer	Model	Description
2	CMC S353	Rohde & Schwarz	ESW26	EMI Test Receiver 1 Hz - 26.5 GHz
1	CMC S287	Schwarzbeck	VUSLP 9111B	Broadband Antenna

Result

Polarization	Frequency Range (MHz)	Graphs	Remarks	Result
V	30 – 300	G21081901	--	P
H	30 – 300	G21081902	--	P
H	300 – 1000	G21081903	--	P
V	300 – 1000	G21081904	--	P

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 conversion factor $20\log(\text{test distance}/10)$, based on the measuring distance provided by the standard, using the transducer factor of the test receiver

Graphs Legend

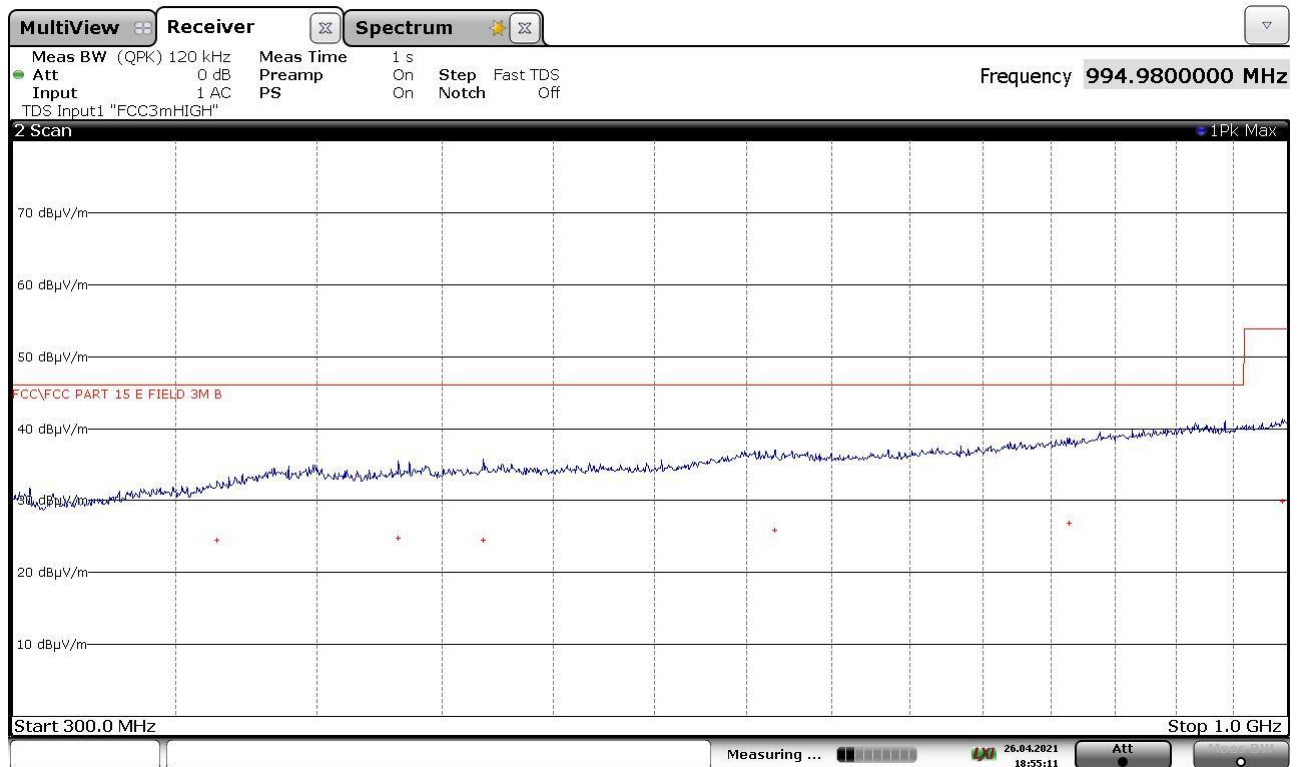
PK: Peak; QP [1s] (quasi-peak at 1 second) values are marked with a +

AV: Average; AV [1s] (average at 1 second) values are marked with a X



Graphs

Gandini 21081901



FINAL RESULT TABLE

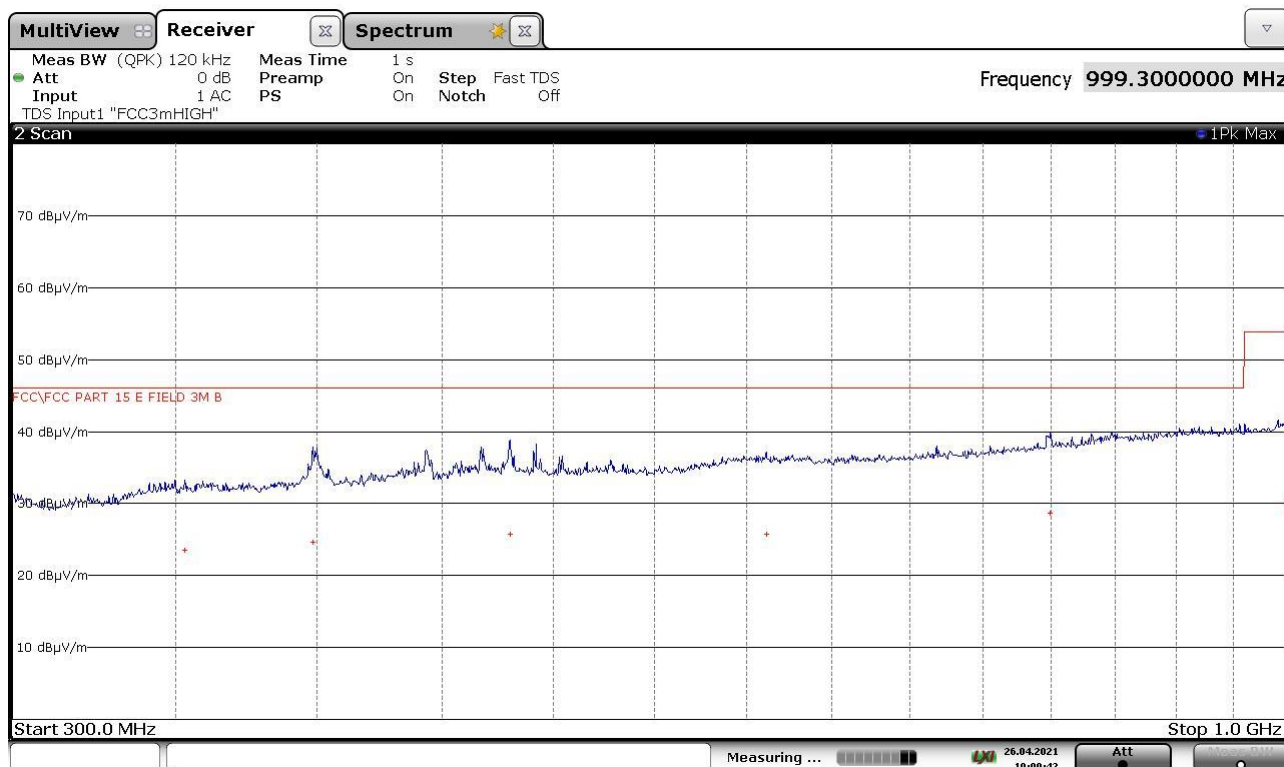
QUASI PEAK

Freq Hz	Lev dBuV/m	Margin dB
363810000	+24,50	-21,50
431850000	+24,76	-21,24
467940000	+24,55	-21,45
616440000	+25,85	-20,15
813840000	+26,90	-19,10
994980000	+29,97	-23,93

21081901_2



Gandini 21081902



FINAL RESULT TABLE

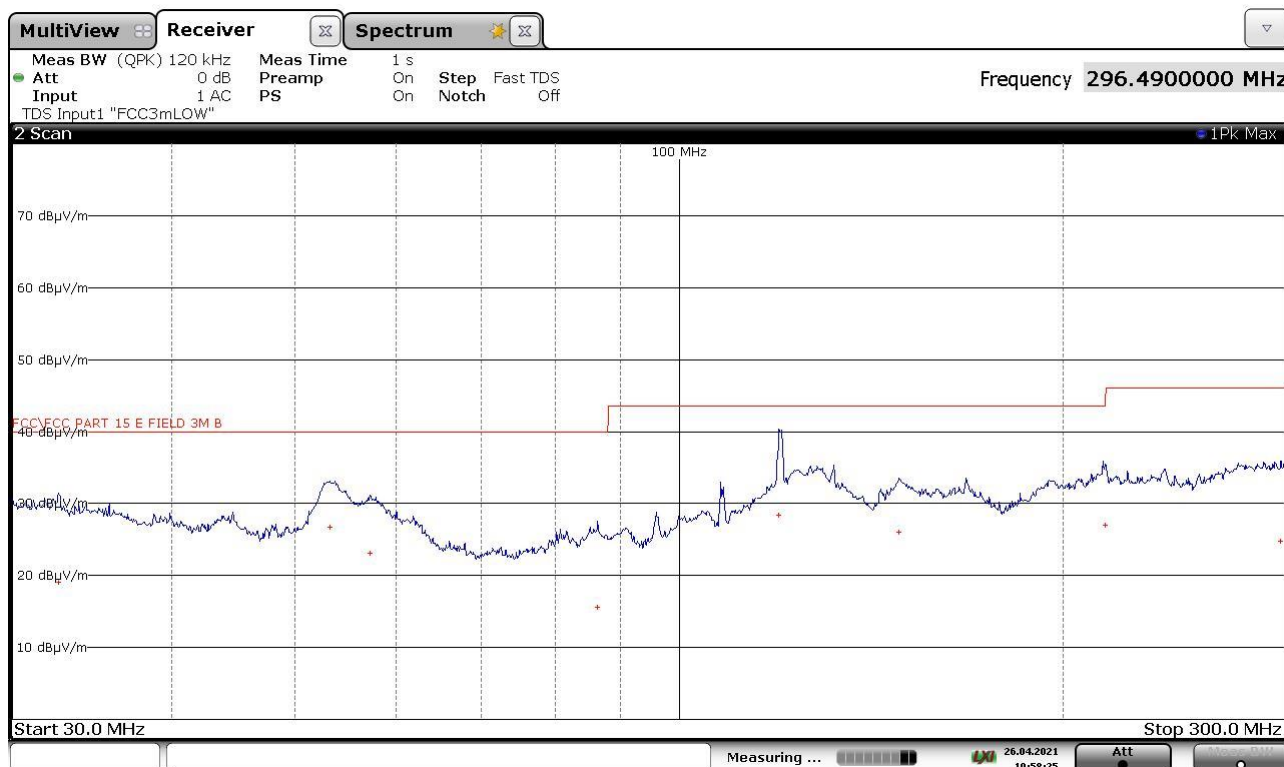
QUASI PEAK

Freq Hz	Lev dBuV/m	Margin dB
353010000	+23,55	-22,45
398340000	+24,56	-21,44
479820000	+25,69	-20,31
611250000	+25,77	-20,23
799440000	+28,66	-17,34
999300000	+30,20	-23,70

21081902_2



Bandini 21081903



FINAL RESULT TABLE

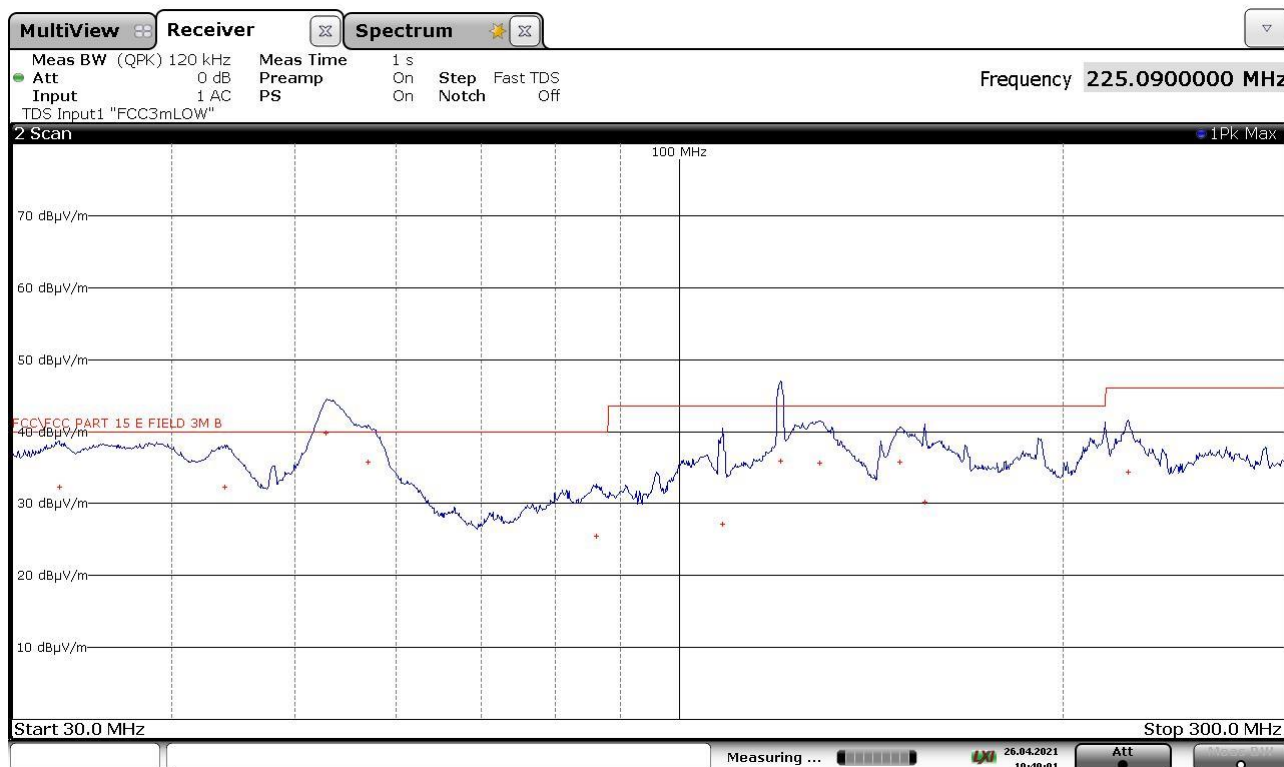
QUASI PEAK

Freq Hz	Lev dBuV/m	Margin dB
32580000	+19,00	-21,00
53190000	+26,71	-13,29
57210000	+23,12	-16,88
86280000	+15,55	-24,45
119730000	+28,36	-15,14
148650000	+25,97	-17,53
215910000	+27,02	-16,48
296490000	+24,82	-21,18

21081903_2



Gandini 21081904



FINAL RESULT TABLE

QUASI PEAK

Freq Hz	Lev dBuV/m	Margin dB
32640000	+32,21	-7,79
44040000	+32,26	-7,74
52890000	+39,83	-0,17
57030000	+35,82	-4,18
86100000	+25,43	-14,57
108210000	+27,07	-16,43
120210000	+35,87	-7,63
128910000	+35,68	-7,82
149070000	+35,72	-7,78
155820000	+30,26	-13,24
225090000	+34,32	-11,68

21081904_2



Attachment 1

Instruments list

<i>Id. number</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Description</i>	<i>Serial number</i>	<i>Last calibration</i>	<i>Due date calibration</i>
CMC S010	Rohde & Schwarz	ESH3-Z2	Impulses Limiting Device	- - -	January '21	January '22
CMC S108	EMCO	3115	Horn Antenna	9811-5622	June '19	June '22
CMC S127	Schaffner	HLA6120	Loop Antenna	1191	November '18	November '23
CMC S200	Schwarzbeck	NSLK 8128	V-LISN	8128-273	January '21	January '22
CMC S206	Rohde & Schwarz	ESCI 7	EMC Receiver 9KHz-7GHz	100781	January '21	January '22
CMC S260	CMC	Wfr_N	Shielded Cable	Wfr_ant10-1	November '20	November '21
CMC S261	CMC	Wfr_N	Shielded Cable	Wfr_ant20-1	November '20	November '21
CMC S262	CMC	Wfr_N_fix	Shielded Cable	Wfr_fix32-1	November '20	November '21
CMC S263	CMC	Wfr_N_fix	Shielded Cable	Wfr_fix31-1	November '20	November '21
CMC S264	CMC	Wfr_N	Shielded Cable	Wfr_ext03-1	November '20	November '21
CMC S271	Schwarzbeck	BBA 9106 + VHBB 9124	Biconical Antenna (30-300MHz)	831	June '19	June '22
CMC S287	Schwarzbeck	VUSLP 9111B	Log-periodic Antenna (200 MHz-3GHz)	9111B-203	June '19	June '22
CMC S288	CMC	W_sma_white	Joint Shielded Cable	W_001	November '20	November '21
CMC S295	Rohde & Schwarz	FSW43	Spectrum Analyzer 43GHz	104059	November '19	November '22
CMC S353	Rohde & Schwarz	ESW26	Emi Test Receiver 1 Hz - 26.5 GHz	101492	September '20	September '22



Attachment 1

Measurement uncertainty

Test	Test Setup	Expanded uncertainty	Note
Conducted emission CISPR 16 LISN 50uH 0,009-0,0150 MHz	PE001_01	3,4 dB	1
Conducted emission CISPR 16 LISN 50uH 0,150-30,0 MHz	PE001_01	3,0 dB	1
Conducted emission CISPR 16 Voltage Probe 0,15-30 MHz	PE001_02	2,3 dB	1
Conducted emission CISPR 16 Current Probe 0,15-30 MHz	PE001_03	2,6 dB	1
Conducted emission CISPR 16 ISN 0,15-30 MHz	PE001_04	4,7 dB	1
Clic CISPR 16 LISN 50uH 0,150-30,0 MHz	PE001_05	2,9 dB	1
Radiated Emission CDNE 30-300 MHz	PE001_06	3,3 dB	1
Disturbance Power 30-300 MHz	PE002_01	3,8 dB	1
Radiated Emission LAS 0,15-30 MHz	PE003_01	2,0 dB	1
Radiated Emission CISPR 16 Loop Ant. 0,15-30 MHz	PE004_01	4,2 dB	1
Radiated Emission CISPR 16 Bicon. Ant. 30-300 MHz	PE004_02	4,1 dB	1
Radiated Emission CISPR 16 LogP. Ant. 300-1000 MHz	PE004_03	3,9 dB	1
Radiated Emission CISPR 16 Horn Ant. 1-18 GHz	PE004_04	4,1 dB	1
Human Exposure to electromagnetic fields	PE005_01	16,7 %	1
Harmonics	PE006_01	10 mA + 2,9 %	1
Flicker	PE007_01	4,36 %	1
Radiated Immunity 80 MHz - 6 GHz	PE102_XX	2,20 dB 0,87 V/m a 3V/m	1
Conducted Immunity 0,15 - 230 MHz	PE105_XX	1,20 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	6,23 % 18,7 A/m a 300A/m	1
Dumped Magnetic field	PE108_01	6,23 % 1,87 A/m a 30A/m	1
Common mode conducted immunity	PE112_01	2,16 % 0,22 V a 10V	1



Attachment 1

Test	Test Setup	Expanded uncertainty	Note
Power/Spurious 9kHz-30MHz	PR001_01	4,2 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+05	4,7 dB	1
Misura della potenza EIRP 18-40GHz d=3m	PR001_06	5,4 dB	1
Frequency error	PR002_01+02	$< 1 \times 10^{-7}$	1
Timing zero span (1001pts.)	PR002_01+02	0,2 % SWT	1
Modulation bandwidth	PR002_01+02	$< 1 \times 10^{-7}$	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
Ring Wave immunity test	PE110_01		2
Low frequency immunity test	PE111_01		2
Dumped Oscillatory immunity test	PE113_01		2
Rev. 21_01 date 23/02/2021			

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 $p = 95\%$

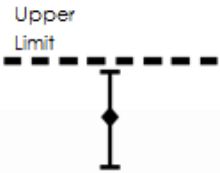
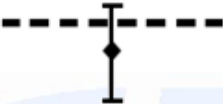
Note 2:

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



Attachment 1

Judgement of compliance

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

In agreement with ILAC-G8:09/2019 cl.4.2.1 Guidelines on Decision Rules and Statements of Conformity

Quality manual references – Internal procedure

Internal Procedure PM001 rev. 3.1 (Quality Manual)	Measure procedure
Internal Procedure INC_M rev. 9.5 (Quality Manual)	Measurement uncertainty calculation