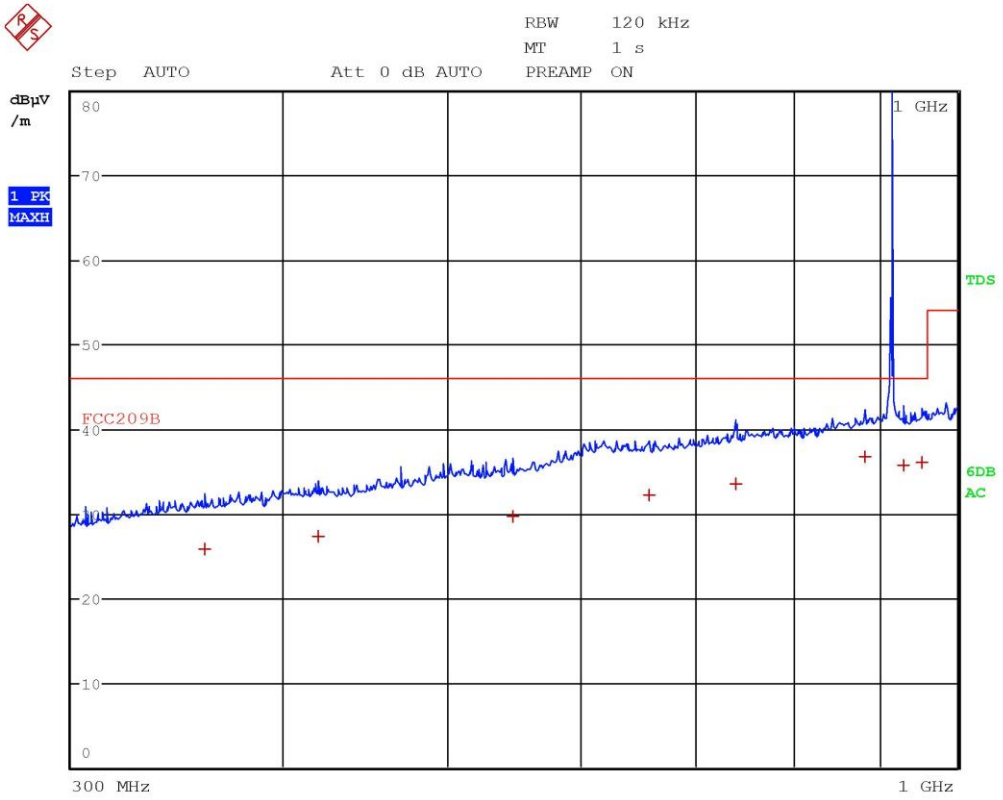


Gandini 20181517

CMC Centro Misure Compatibilità S.r.l.

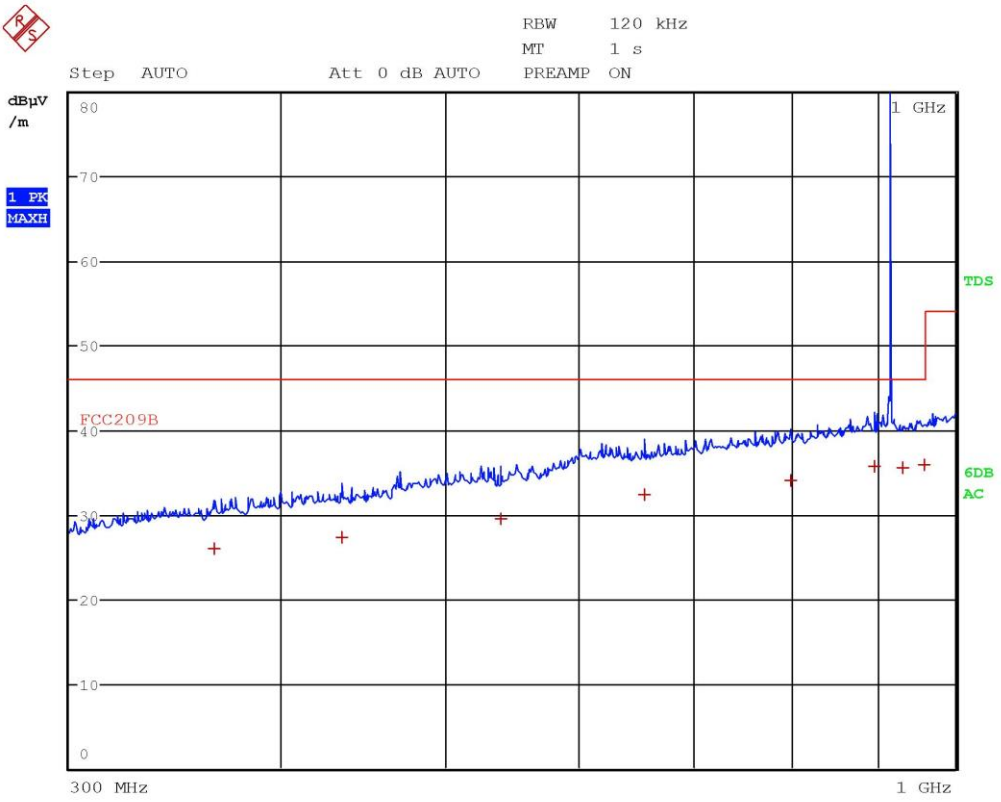
EDIT PEAK LIST (Final Measurement Results)

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

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	359.44 MHz	25.79	-20.22
1 Quasi Peak	419.6 MHz	27.31	-18.70
1 Quasi Peak	546.56 MHz	29.64	-16.37
1 Quasi Peak	658.48 MHz	32.24	-13.78
1 Quasi Peak	740.04 MHz	33.44	-12.57
1 Quasi Peak	882.92 MHz	36.64	-9.37
1 Quasi Peak	929.04 MHz	35.74	-10.27
1 Quasi Peak	952.84 MHz	36.00	-10.01

Gandini 20181517

CMC Centro Misure Compatibilità S.r.l.



Gandini 20181518

CMC Centro Misure Compatibilità S.r.l.

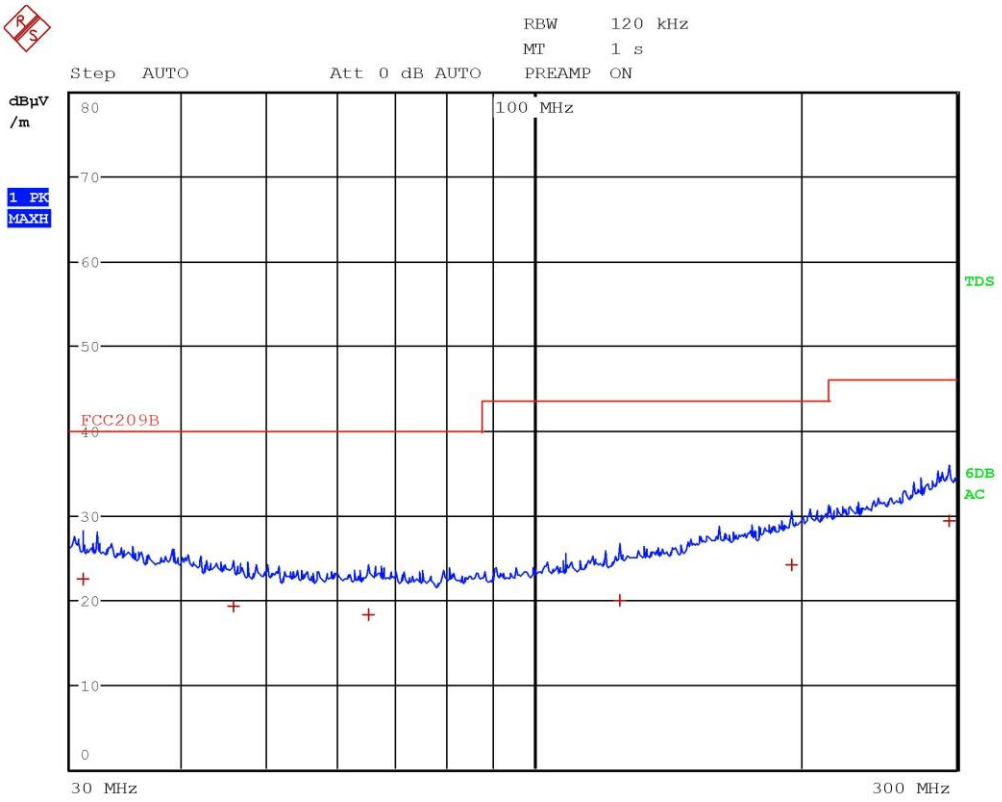
EDIT PEAK LIST (Final Measurement Results)

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

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	365.48 MHz	25.96	-20.05
1 Quasi Peak	434.64 MHz	27.34	-18.67
1 Quasi Peak	539.52 MHz	29.56	-16.45
1 Quasi Peak	654.84 MHz	32.27	-13.74
1 Quasi Peak	798.8 MHz	34.08	-11.93
1 Quasi Peak	895.12 MHz	35.71	-10.30
1 Quasi Peak	930.92 MHz	35.59	-10.42
1 Quasi Peak	959.32 MHz	35.95	-10.07

Gandini 20181518

CMC Centro Misure Compatibilità S.r.l.



Gandini 20181527

CMC Centro Misure Compatibilità S.r.l.

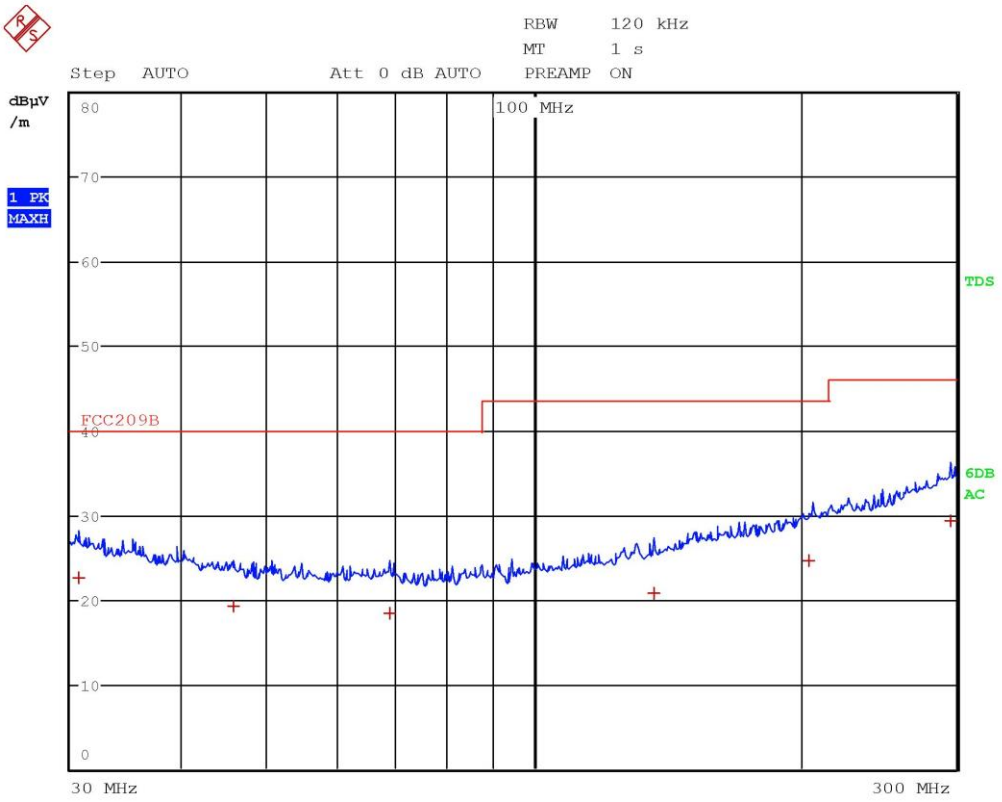
EDIT PEAK LIST (Final Measurement Results)

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

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	30.96 MHz	22.37	-17.62
1 Quasi Peak	45.84 MHz	19.16	-20.83
1 Quasi Peak	65.12 MHz	18.22	-21.77
1 Quasi Peak	124.92 MHz	19.95	-23.56
1 Quasi Peak	195.28 MHz	24.12	-19.39
1 Quasi Peak	294.88 MHz	29.33	-16.68

Gandini 20181527

CMC Centro Misure Compatibilità S.r.l.



Gandini 20181528

CMC Centro Misure Compatibilità S.r.l.

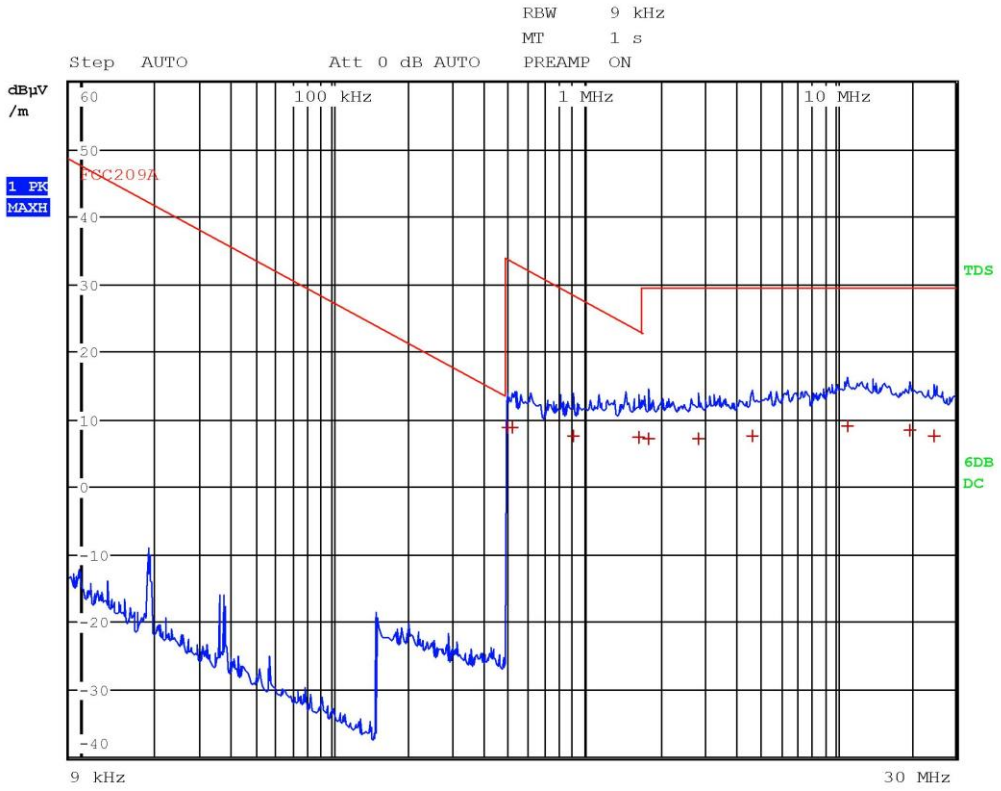
EDIT PEAK LIST (Final Measurement Results)

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

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	30.6 MHz	22.53	-17.46
1 Quasi Peak	45.8 MHz	19.22	-20.77
1 Quasi Peak	68.84 MHz	18.36	-21.64
1 Quasi Peak	136.88 MHz	20.70	-22.81
1 Quasi Peak	204.32 MHz	24.68	-18.84
1 Quasi Peak	295.68 MHz	29.29	-16.72

Gandini 20181528

CMC Centro Misure Compatibilità S.r.l.



Gandini 20181529

CMC Centro Misure Compatibilità S.r.l.

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCC209A
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	494 kHz	8.78	-24.94
1 Quasi Peak	514 kHz	8.84	-24.53
1 Quasi Peak	906 kHz	7.54	-20.91
1 Quasi Peak	1.638 MHz	7.38	-15.93
1 Quasi Peak	1.814 MHz	7.26	-22.27
1 Quasi Peak	2.846 MHz	7.06	-22.47
1 Quasi Peak	4.646 MHz	7.49	-22.04
1 Quasi Peak	11.11 MHz	9.11	-20.42
1 Quasi Peak	19.87 MHz	8.37	-21.16
1 Quasi Peak	24.842 MHz	7.51	-22.02

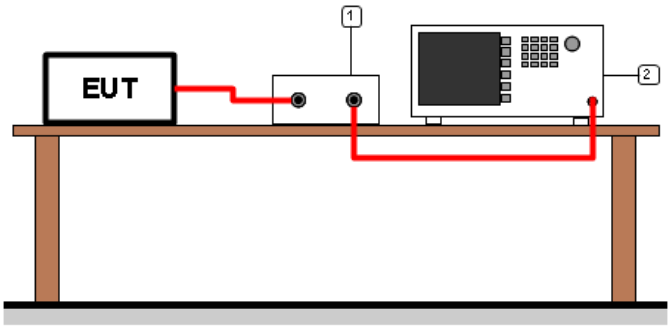
Gandini 20181529

CMC Centro Misure Compatibilità S.r.l.

9.3 20 dB bandwidth

Tested by ..... :	G. Gandini
Test date ..... :	24.11.2020
Test location (stand) ..... :	Laboratory
Reference standards ..... :	FCC Rules and Regulation; Titles 47 Part. 15.215 (c) ANSI C63.10 cl. 7.8.7
Supplementary information..... :	--

Test setup



Test setup PR002_01				
Nr.	*Id. Number*	*Manufacturer*	*Model*	*Description*
2	CMC S295	Rohde & Schwarz	FSW43	Spectrum Analyzer 43GHz
1	--	--	--	Cable + attenuator (calibrated before the test)

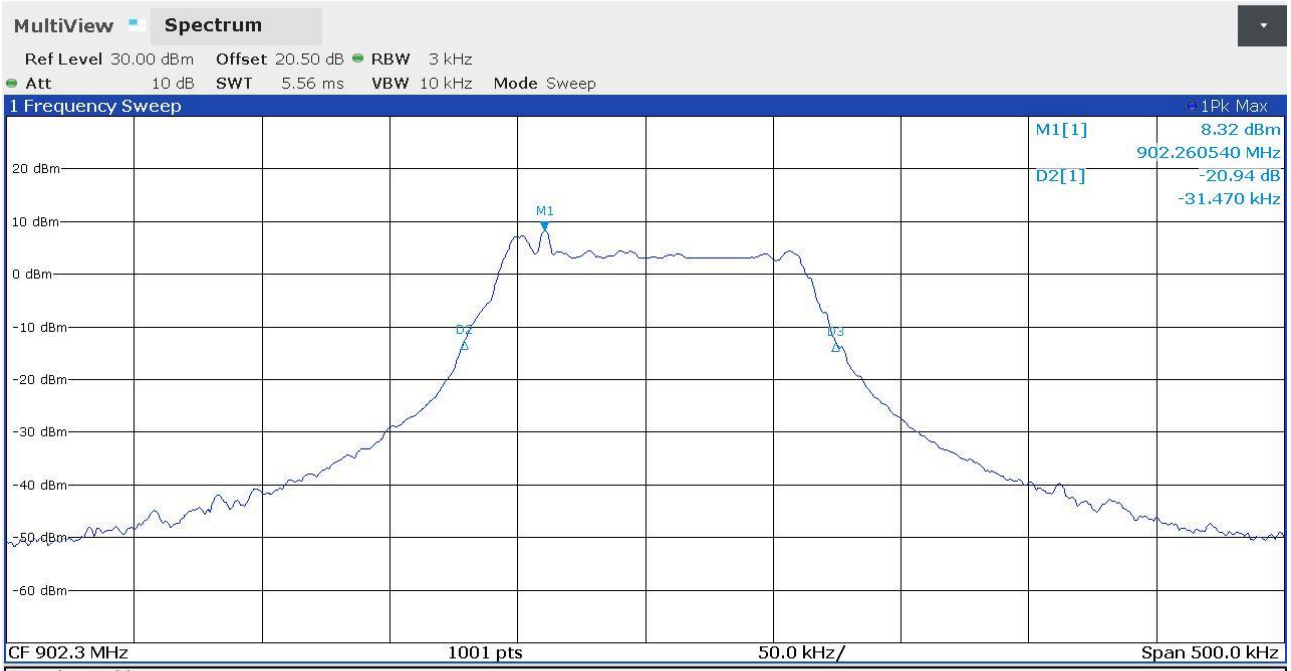
Result

Frequency (MHz)	*Graphs*	*20 dB bandwidth (kHz)*
902,30	G20181531	145,36
908,50	G20181535	143,86
914,90	G20181538	145,36

CMC Centro Misure Compatibilità S.r.l.

Graphs

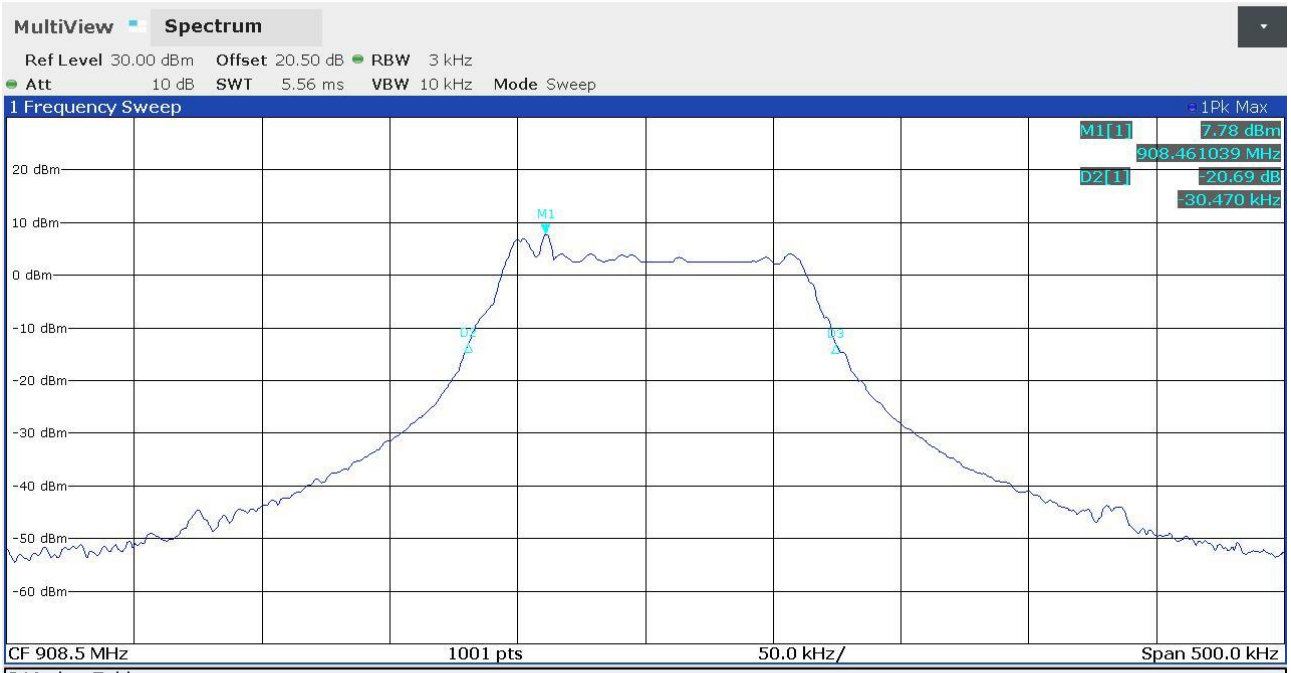
Gandini 20181531



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**902.26054 MHz**	**8.32 dBm**		
D2	M1	1	**-31.47 kHz**	**-20.94 dB**		
D3	M1	1	**113.89 kHz**	**-21.25 dB**		

Gandini 20181535

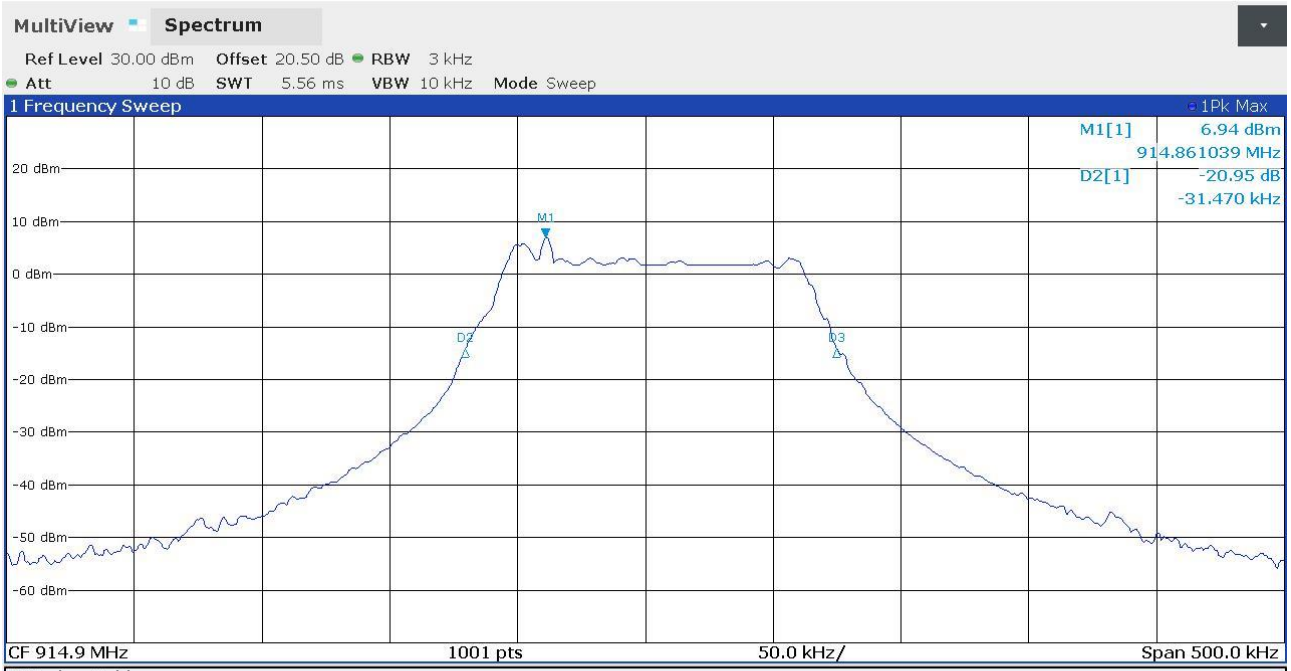


2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**908.461039 MHz**	**7.78 dBm**		
D2	M1	1	**-30.47 kHz**	**-20.69 dB**		
D3	M1	1	**113.39 kHz**	**-20.82 dB**		

CMC Centro Misure Compatibilità S.r.l.

Gandini 20181538



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**914.861039 MHz**	**6.94 dBm**		
D2	M1	1	**-31.47 kHz**	**-20.95 dB**		
D3	M1	1	**113.89 kHz**	**-21.10 dB**		

CMC Centro Misure Compatibilità S.r.l.

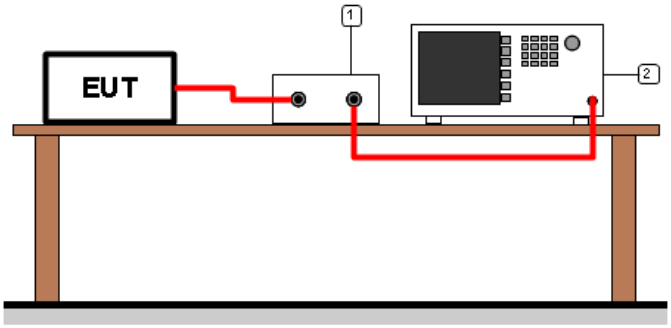
9.4 Channel separation

Tested by ..... :	G. Gandini
Test date ..... :	27.11.2020
Test location (stand) ..... :	Laboratory
Reference standards ..... :	FCC Rules and Regulation; Titles 47 Part. 15.247 KDB 558074 D01 15.247 Meas Guidance v05r02 cl. 9 b) ANSI C63.10 cl. 7.8.2
Supplementary test set-up description ..... :	--
Supplementary information..... :	--

Acceptance limits

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Test setup



Test setup PR002_01				
Nr.	*Id. Number*	*Manufacturer*	*Model*	*Description*
2	CMC S295	Rohde & Schwarz	FSW43	Spectrum Analyzer 43GHz
1	--	--	--	Cable + attenuator (calibrated before the test)

CMC Centro Misure Compatibilità S.r.l.

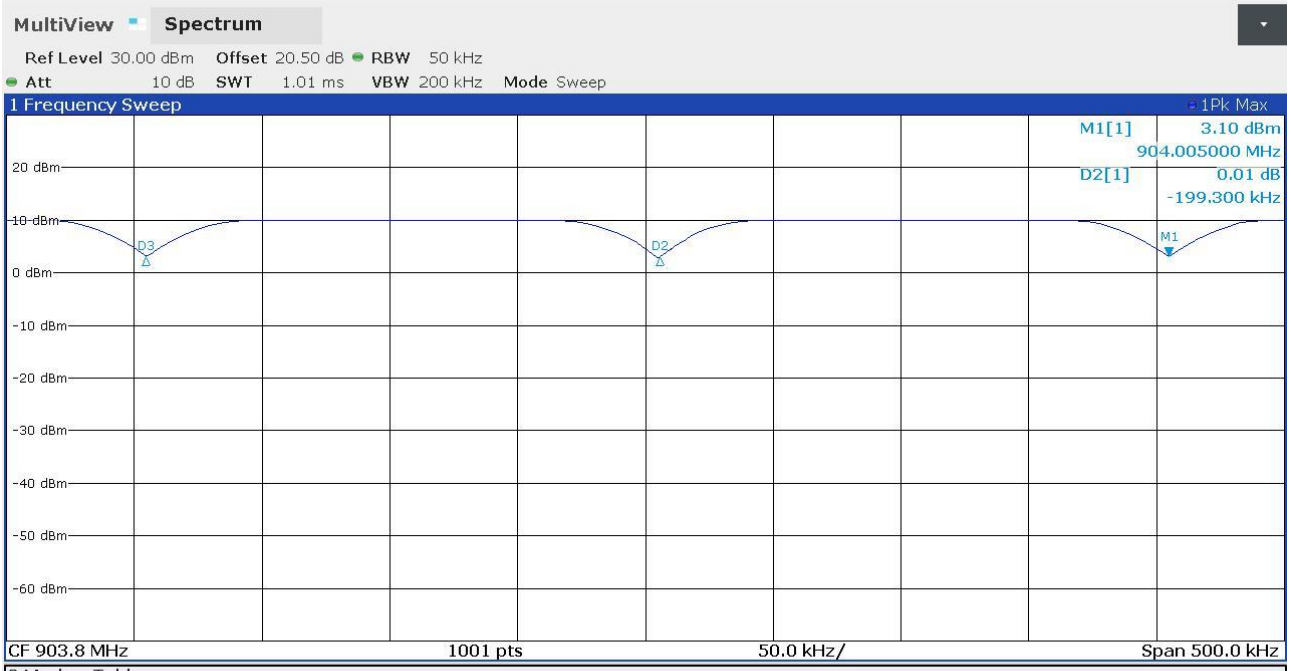
Result

Frequency band (MHz)	*Graphs*	*Channel separation (kHz)*	*Minimum channel separation required (kHz)*	*Results*
902 – 928	G20181544 G20181545	200	145,36	Complies

CMC Centro Misure Compatibilità S.r.l.

Graphs

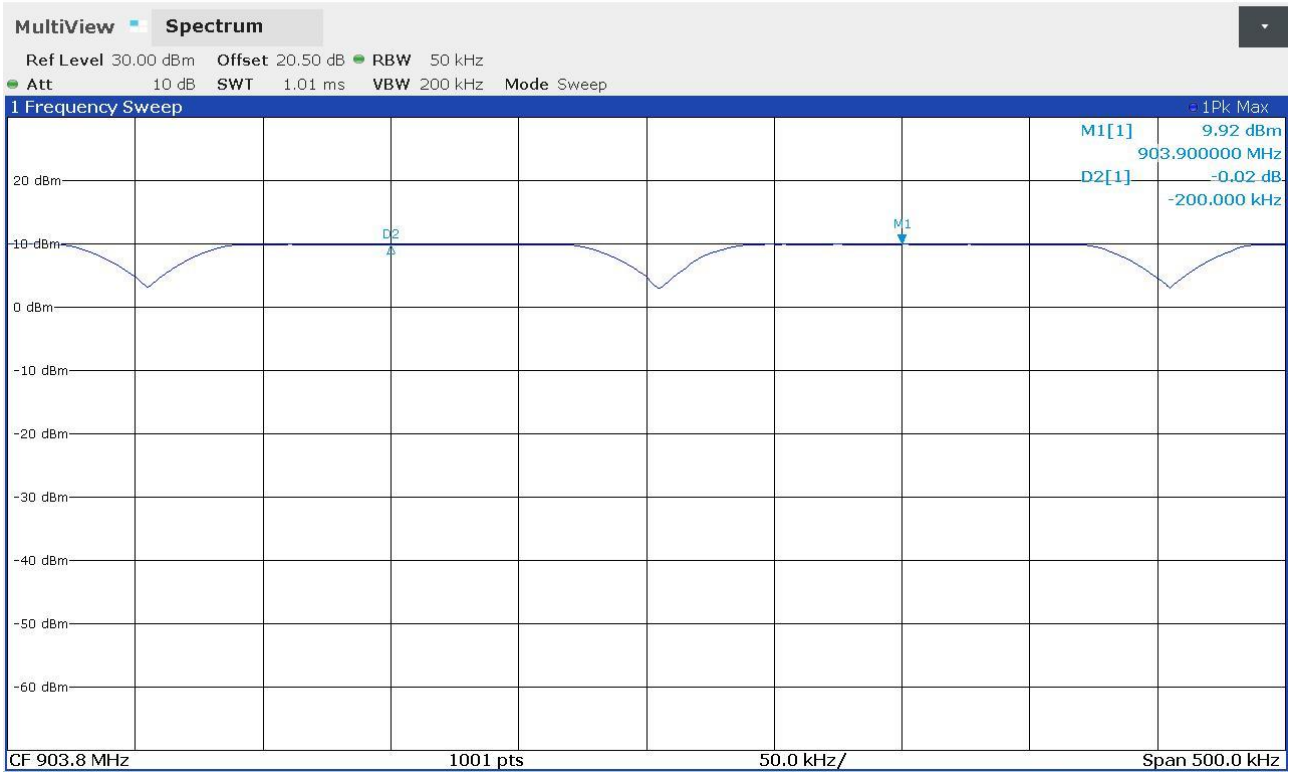
Gandini 20181544



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**904.005 MHz**	**3.10 dBm**		
D2	M1	1	**-199.3 kHz**	**0.01 dB**		
D3	M1	1	**-400.3 kHz**	**0.08 dB**		

Gandini 20181545



CMC Centro Misure Compatibilità S.r.l.

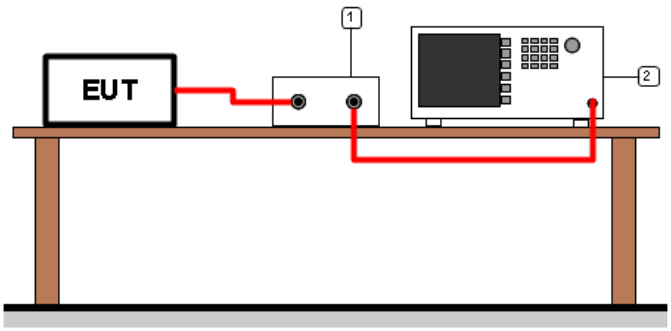
9.5 Number of hopping channels

Tested by ..... :	G. Gandini
Test date ..... :	27.11.2020
Test location (stand) ..... :	Laboratory
Reference standards ..... :	FCC Rules and Regulation; Titles 47 Part. 15.247 KDB 558074 D01 15.247 Meas Guidance v05r02 cl. 9 b) ANSI C63.10 cl. 7.8.3
Supplementary test set-up description ..... :	--
Supplementary information..... :	--

Acceptance limits

For frequency hopping systems operating in the 902 – 928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0,4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0,4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Test setup



Test setup PR002_01				
Nr.	*Id. Number*	*Manufacturer*	*Model*	*Description*
2	CMC S295	Rohde & Schwarz	FSW43	Spectrum Analyzer 43GHz
1	--	--	--	Cable + attenuator (calibrated before the test)

CMC Centro Misure Compatibilità S.r.l.

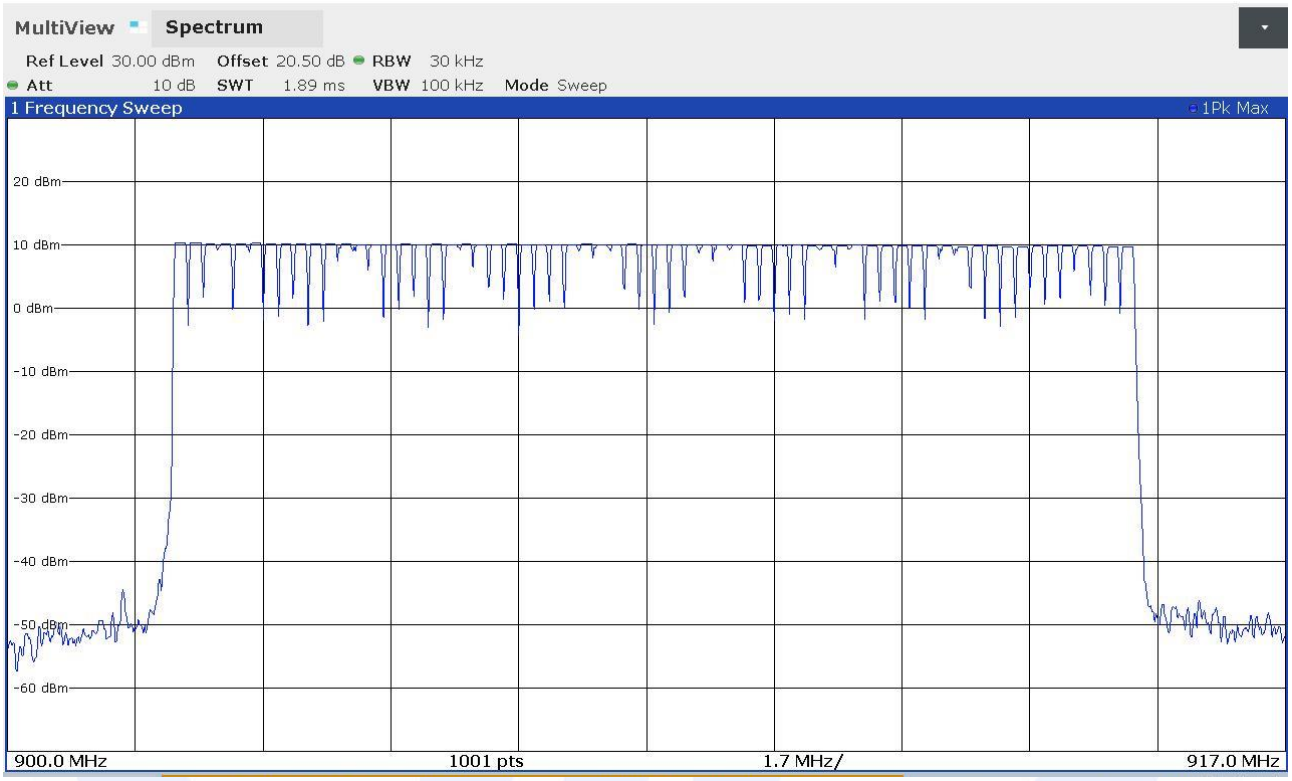
Result

Frequency band (MHz)	*Graphs*	*Number of hopping channels*	*Minimum number of hopping channels required*	*Results*
902 – 928	G20181548 G20181549 G20181550 G20181551	64	50	Complies

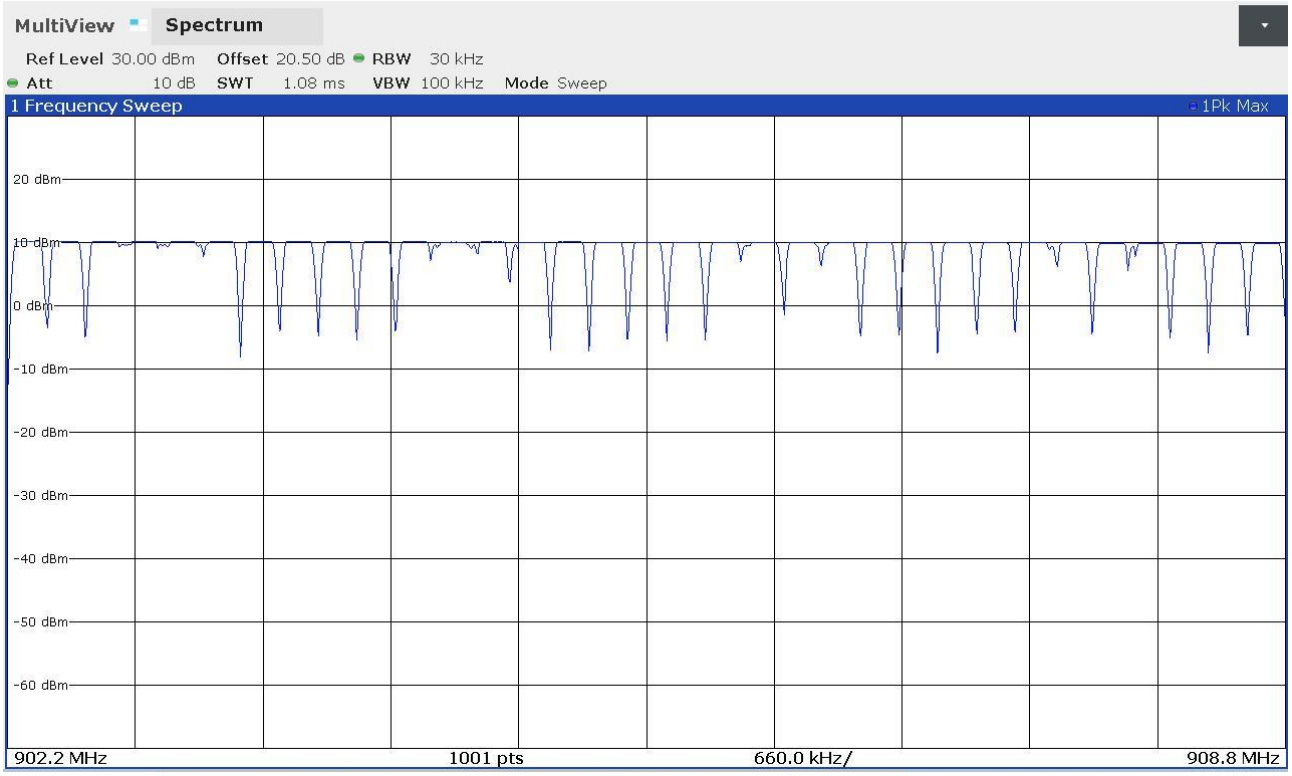
CMC Centro Misure Compatibilità S.r.l.

Graphs

Gandini 20181548

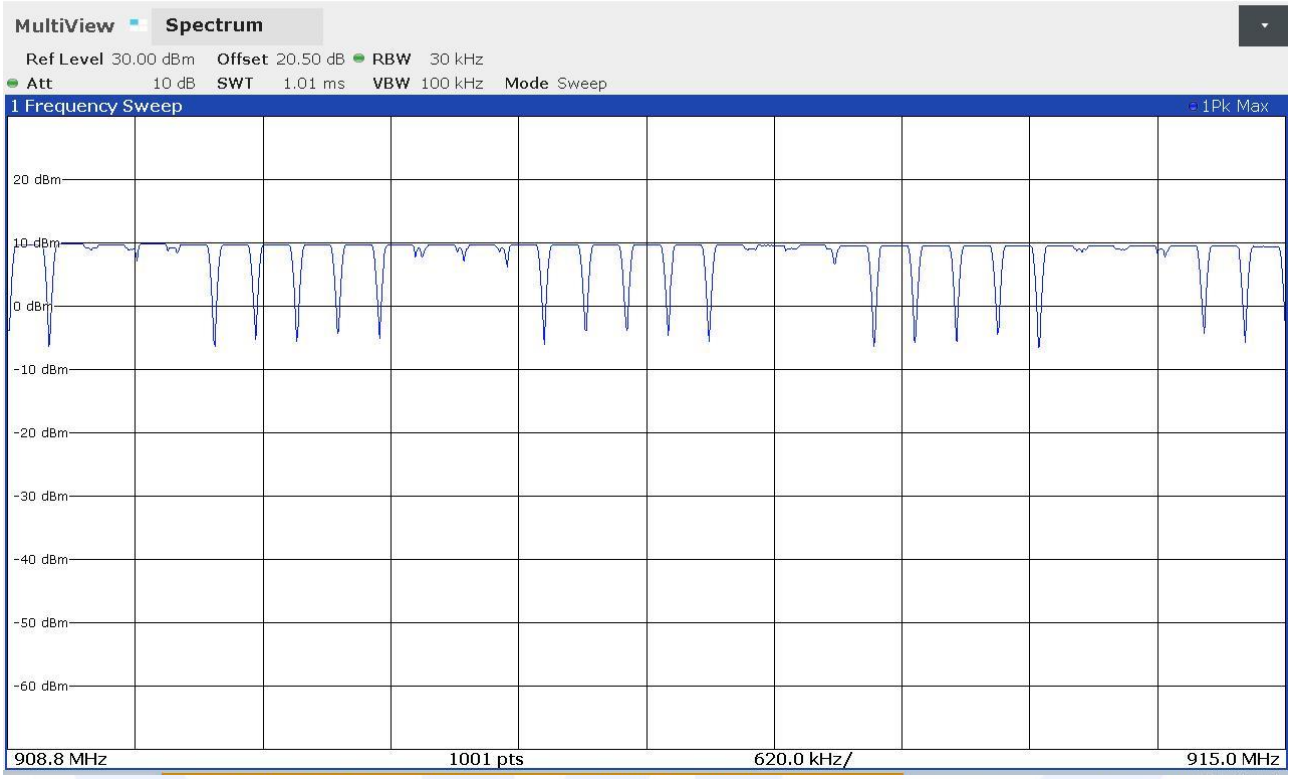


Gandini 20181549

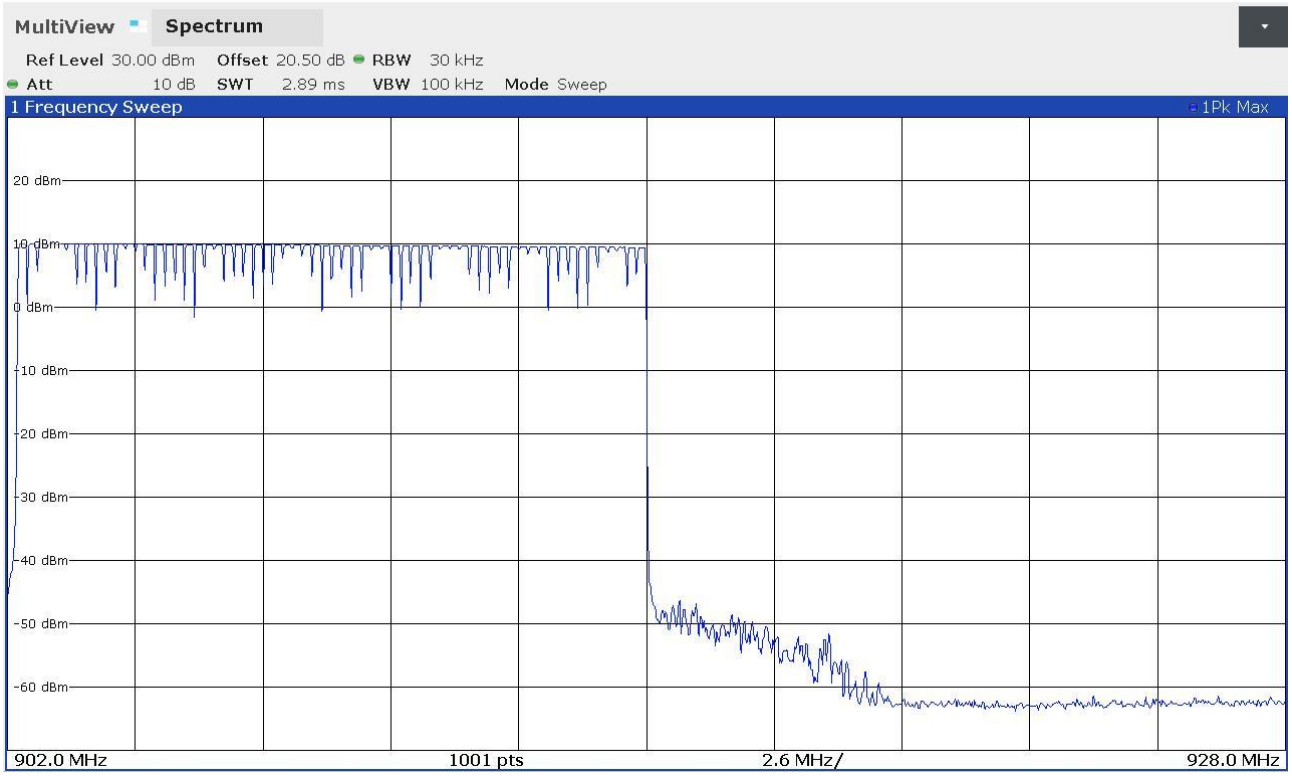


CMC Centro Misure Compatibilità S.r.l.

Gandini 20181550



Gandini 20181551



CMC Centro Misure Compatibilità S.r.l.

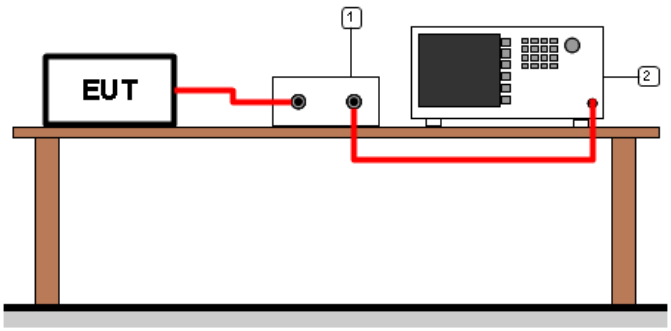
9.6 Time of occupancy

Tested by ..... :	G. Gandini
Test date ..... :	27.11.2020
Test location (stand) ..... :	Laboratory
Reference standards ..... :	FCC Rules and Regulation; Titles 47 Part. 15.247 KDB 558074 D01 15.247 Meas Guidance v05r02 cl. 9 b) ANSI C63.10 cl. 7.8.4
Supplementary test set-up description ..... :	--
Supplementary information..... :	--

Acceptance limits

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Test setup



Test setup PR002_01				
Nr.	*Id. Number*	*Manufacturer*	*Model*	*Description*
2	CMC S295	Rohde & Schwarz	FSW43	Spectrum Analyzer 43GHz
1	--	--	--	Cable + attenuator (calibrated before the test)

CMC Centro Misure Compatibilità S.r.l.

Result

Frequency (MHz)	*Graphs*	*Dwell time (ms)*
903,90	G20181547	372

Frequency (MHz)	*Graphs*	*Number of transmissions*	*Period*
903,90	G20181546	1	20 s

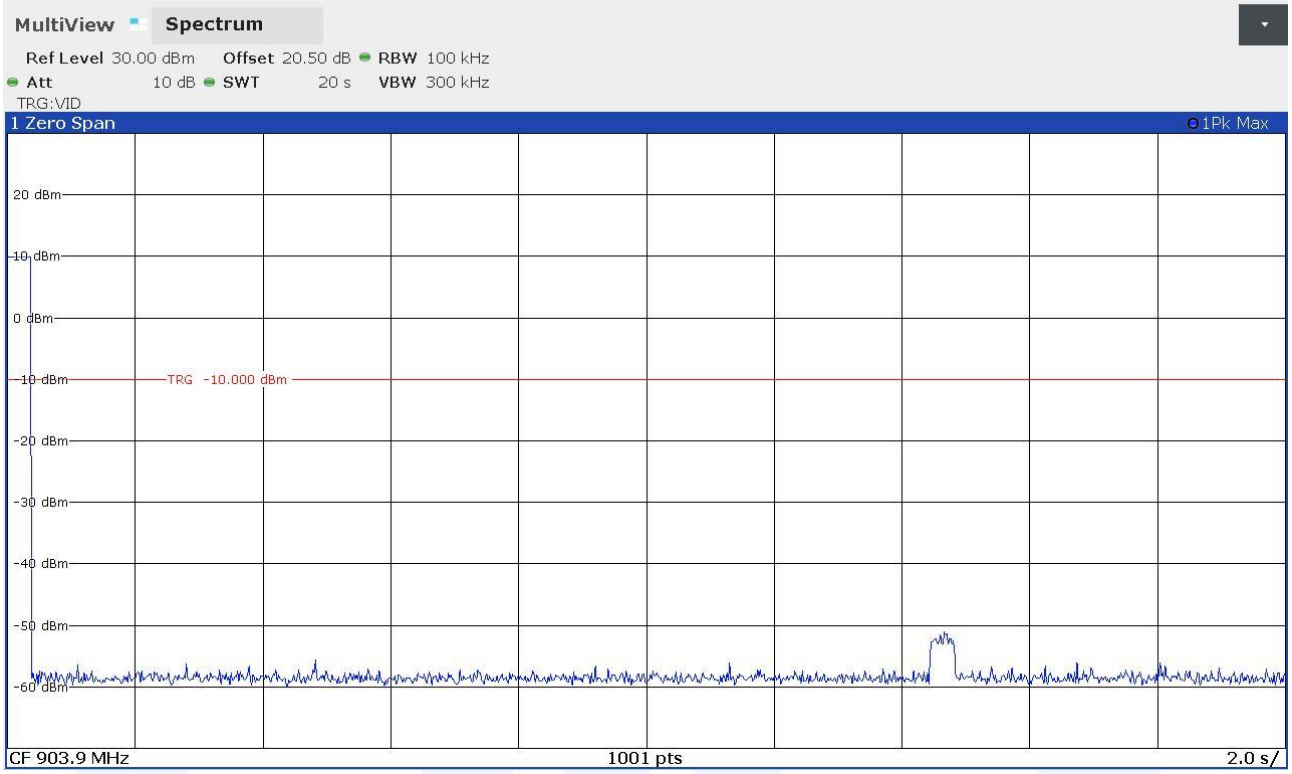
Remarks: only the highest peaks have been considered. The lowest peaks are due to the auxiliary receiver unit

Time of occupancy (Dwell time x Nr. transmissions)	***Maximum allowed time of occupancy***	***Results***
372 ms	400 ms	Complies

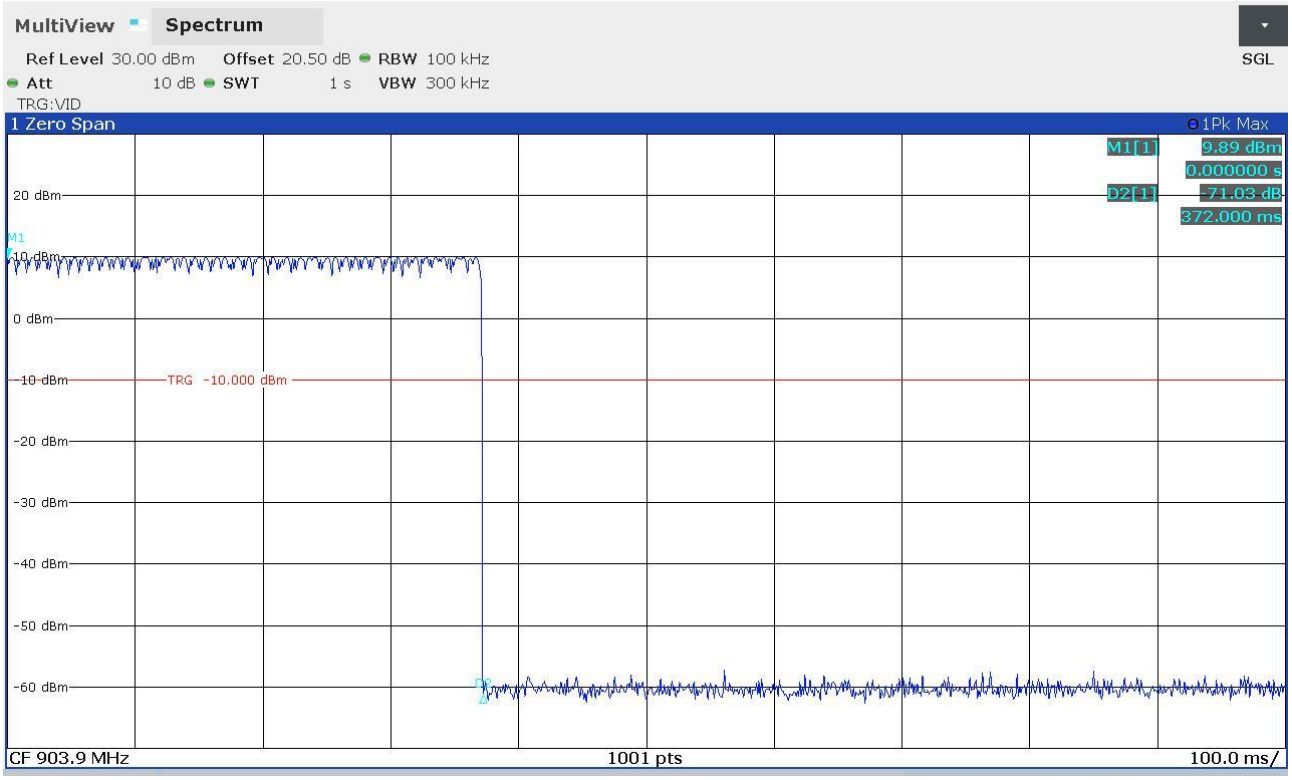
CMC Centro Misure Compatibilità S.r.l.

Graphs

Gandini 20181546



Gandini 20181547



CMC Centro Misure Compatibilità S.r.l.

9.7 Band edge

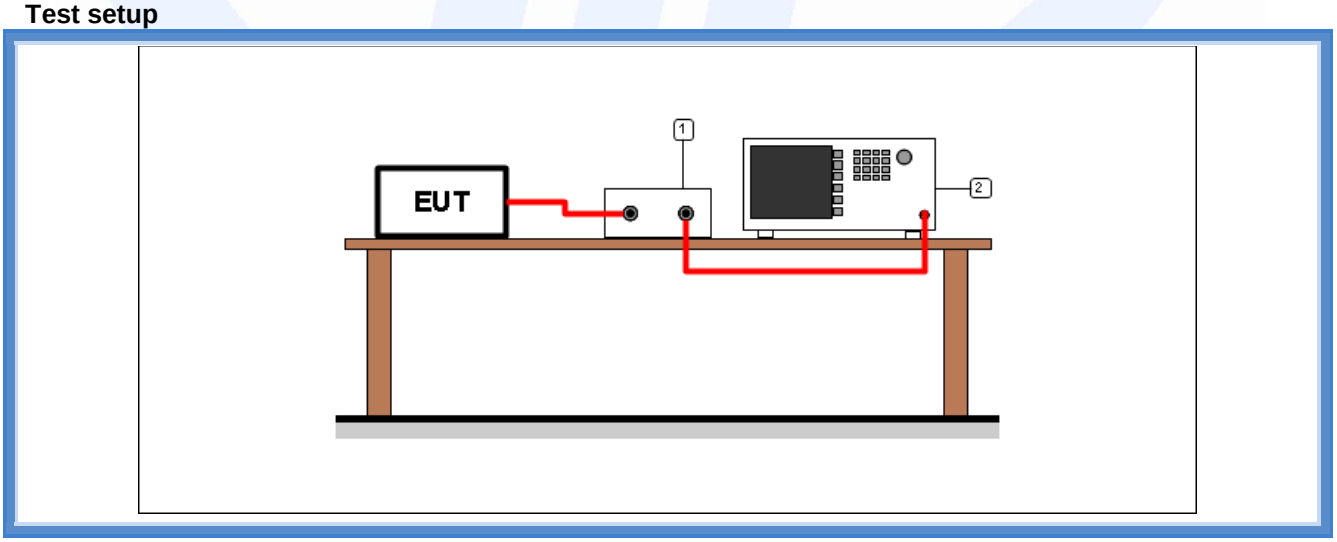
Tested by ..... :	G. Gandini
Test date ..... :	27.11.2020
Test location (stand) ..... :	Laboratory
Reference standards ..... :	FCC Rules and Regulation; Titles 47 Part. 15.247 ANSI C63.10 cl. 7.8.6
Supplementary test set-up description ..... :	--
Supplementary information..... :	--

Acceptance limits

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

Operation within the band 902 – 928 MHz

Test setup



Test setup PR002_01				
Nr.	*Id. Number*	*Manufacturer*	*Model*	*Description*
2	CMC S295	Rohde & Schwarz	FSW43	Spectrum Analyzer 43GHz
1	--	--	--	Cable + attenuator (calibrated before the test)

Result

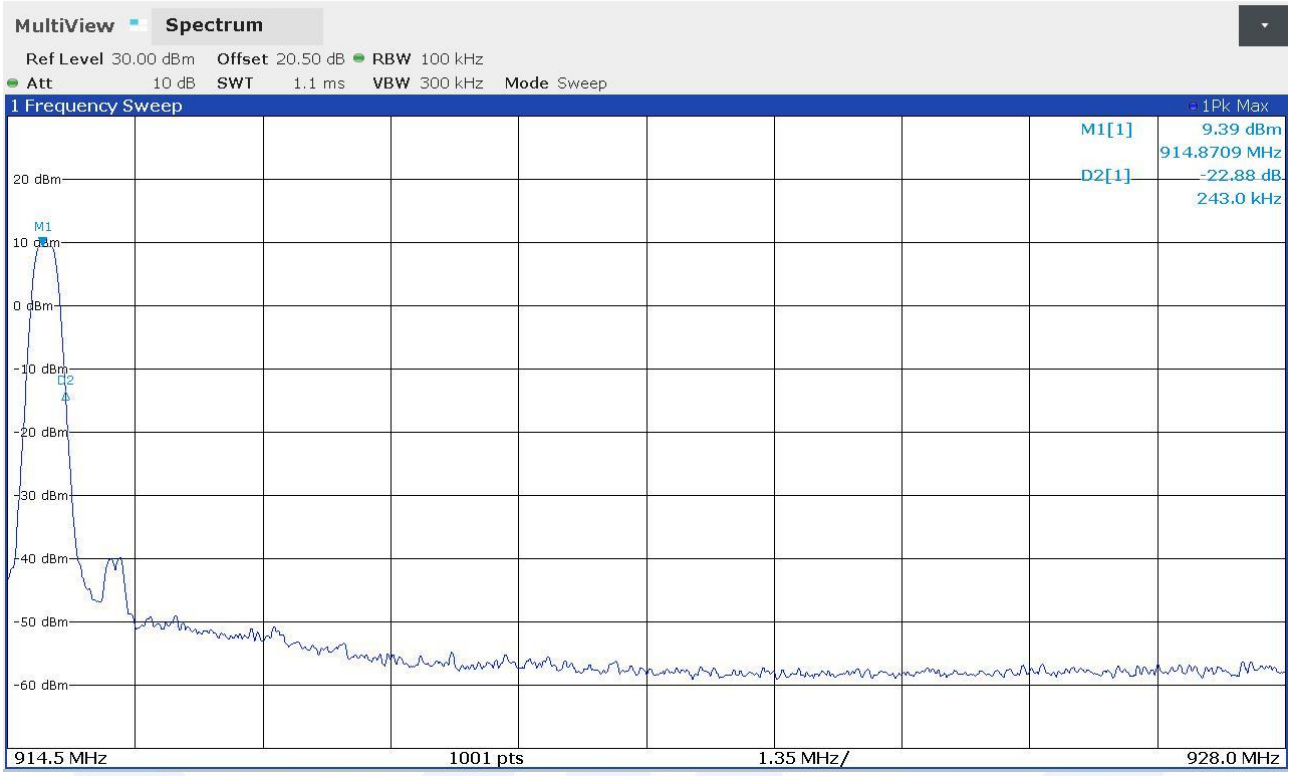
Frequency (MHz)	*Bandwidth*	*Graph(s) – Hopping*	*Results*	
902,30	100 kHz	G20181552	F_L: 902,1102 MHz	Complies
902,30	100 kHz	G20181553	--	Complies
914,90	100 kHz	G20181554	F_H: 927,9320 MHz	Complies
914,90	100 kHz	G20181555	--	Complies

Frequency (MHz)	*Bandwidth*	*Graph(s) – No hopping*	*Results*	
902,30	100 kHz	G20181542	F_L: 902,1022 MHz	Complies
902,30	100 kHz	G20181543	--	Complies
914,90	100 kHz	G20181540	F_H: 915,1415 MHz	Complies
914,90	100 kHz	G20181541	--	Complies

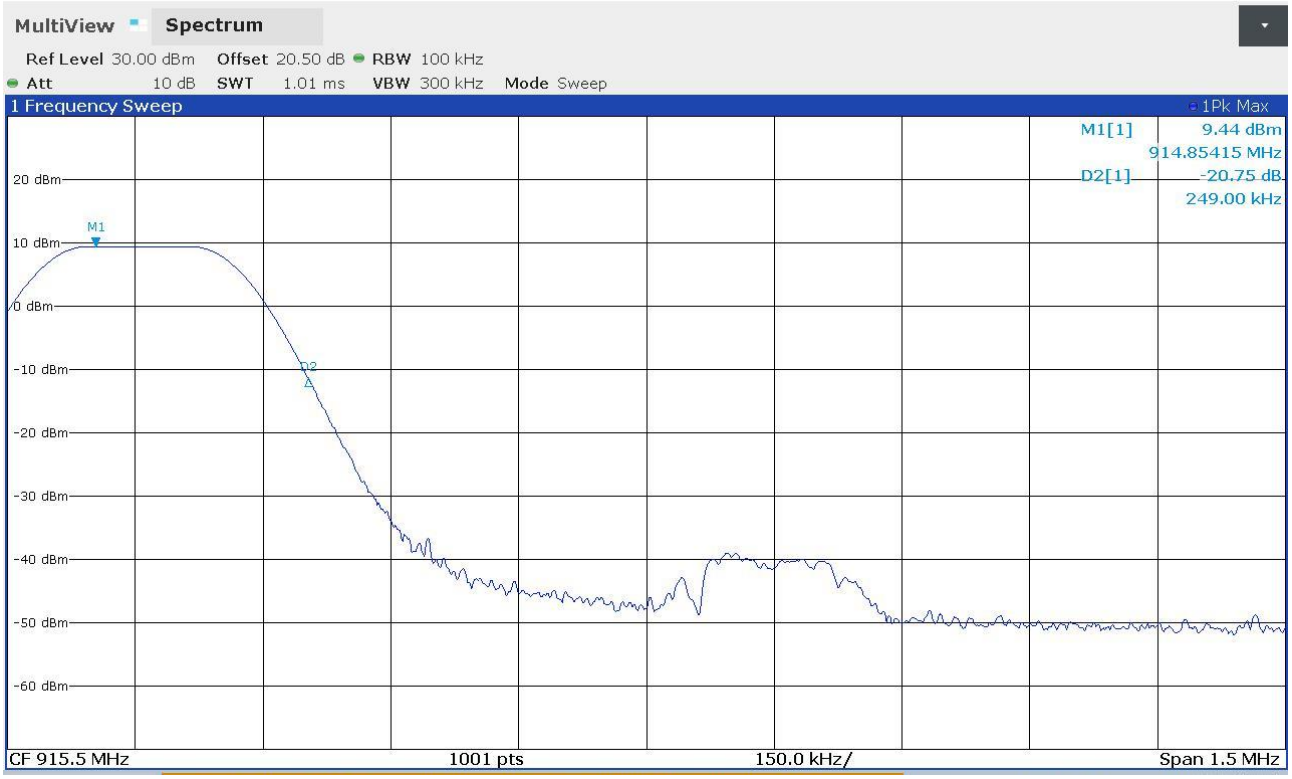
CMC Centro Misure Compatibilità S.r.l.

Graphs

Gandini 20181540

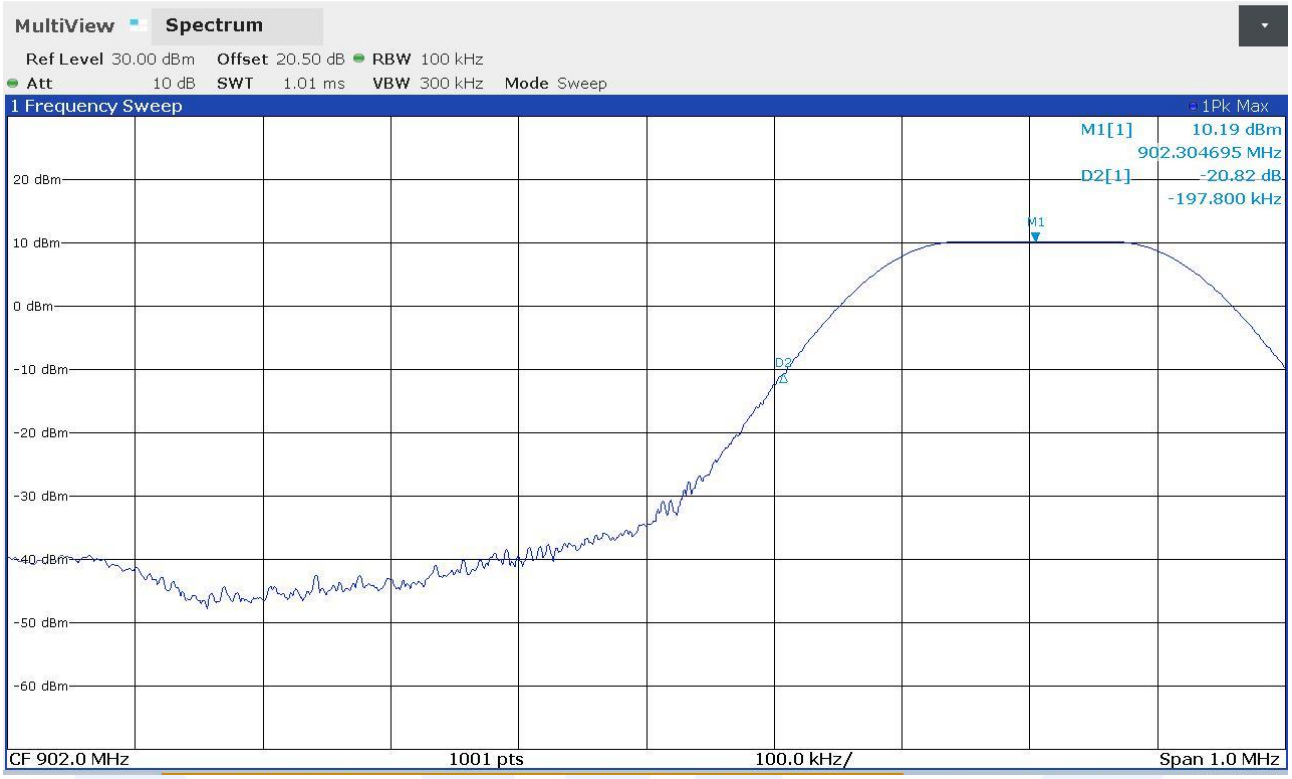


Gandini 20181541

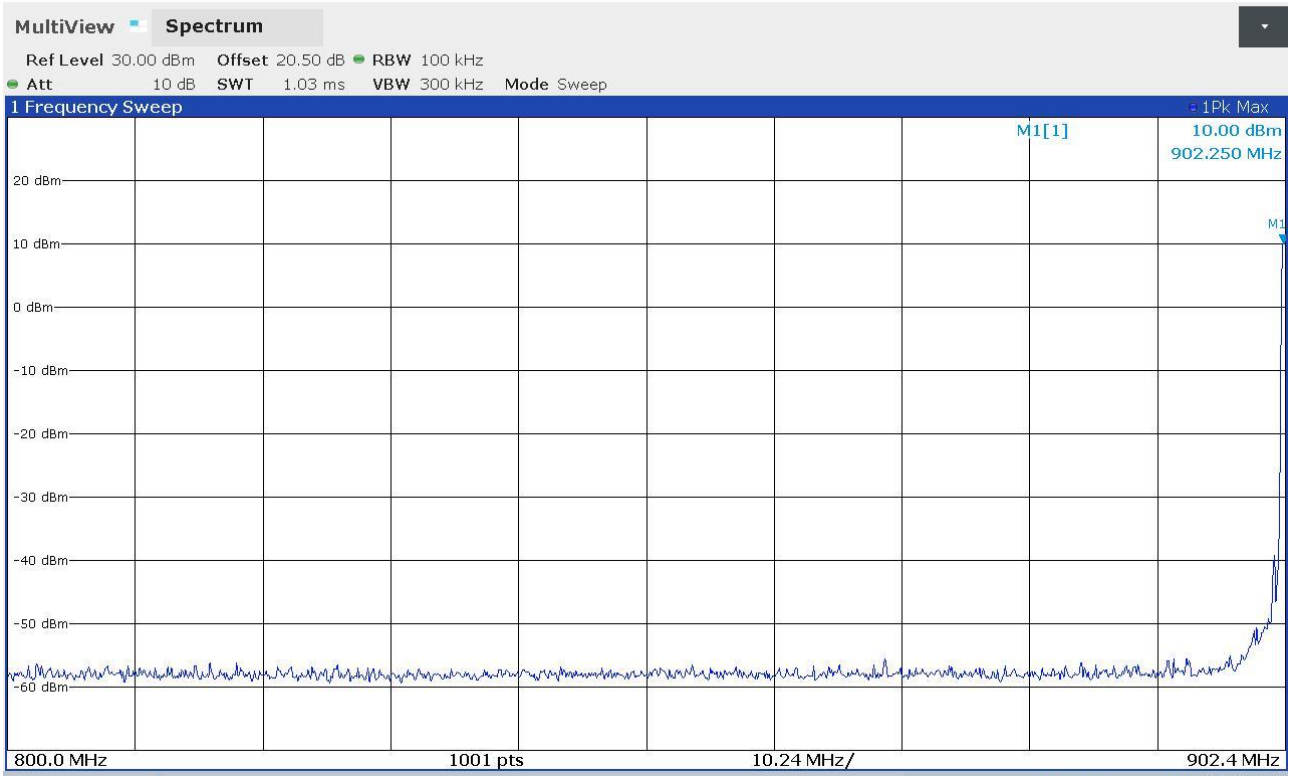


CMC Centro Misure Compatibilità S.r.l.

Gandini 20181542

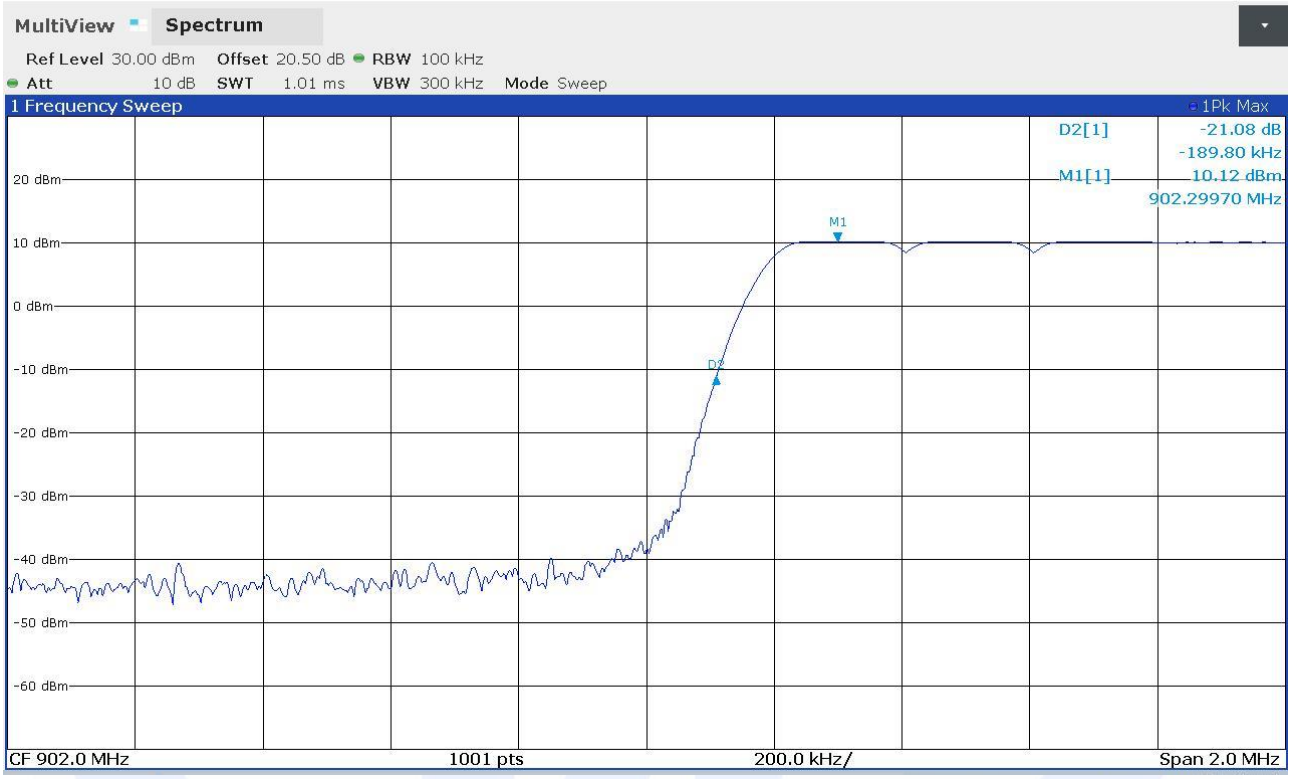


Gandini 20181543

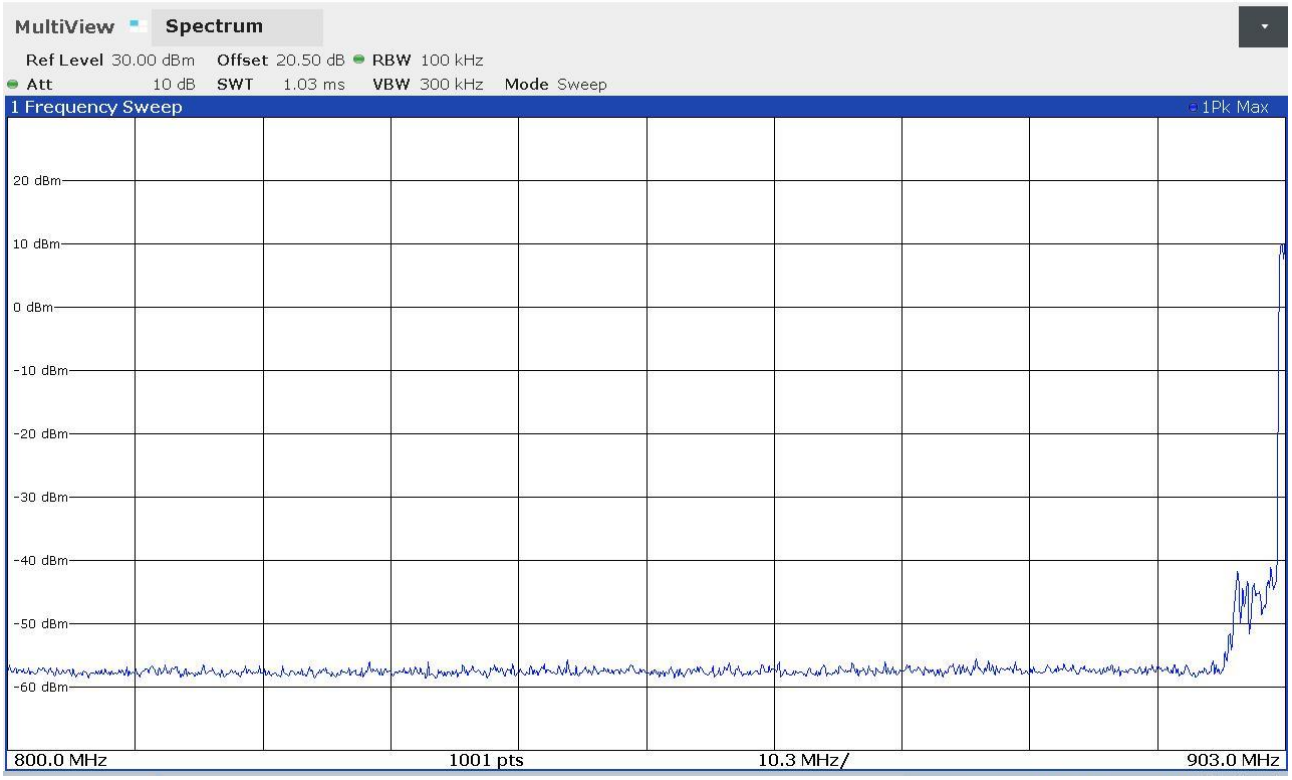


CMC Centro Misure Compatibilità S.r.l.

Gandini 20181552

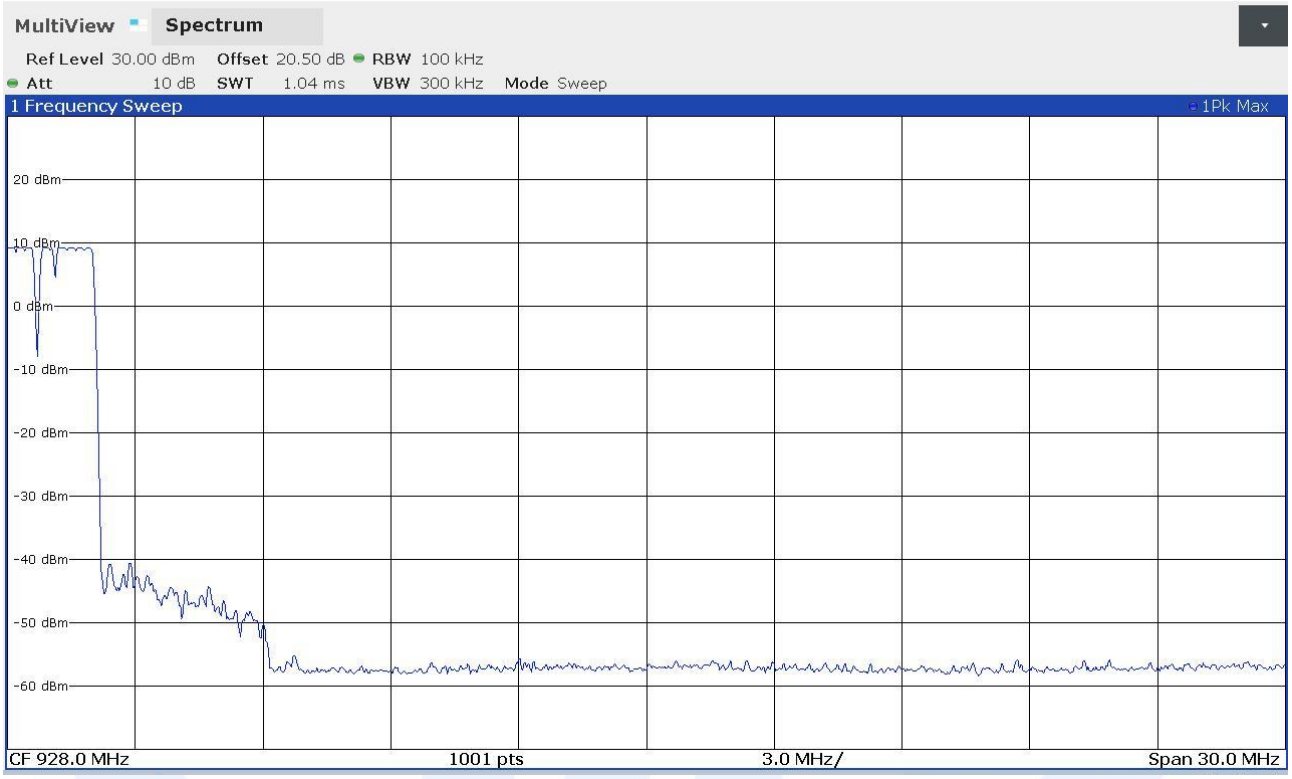


Gandini 20181553

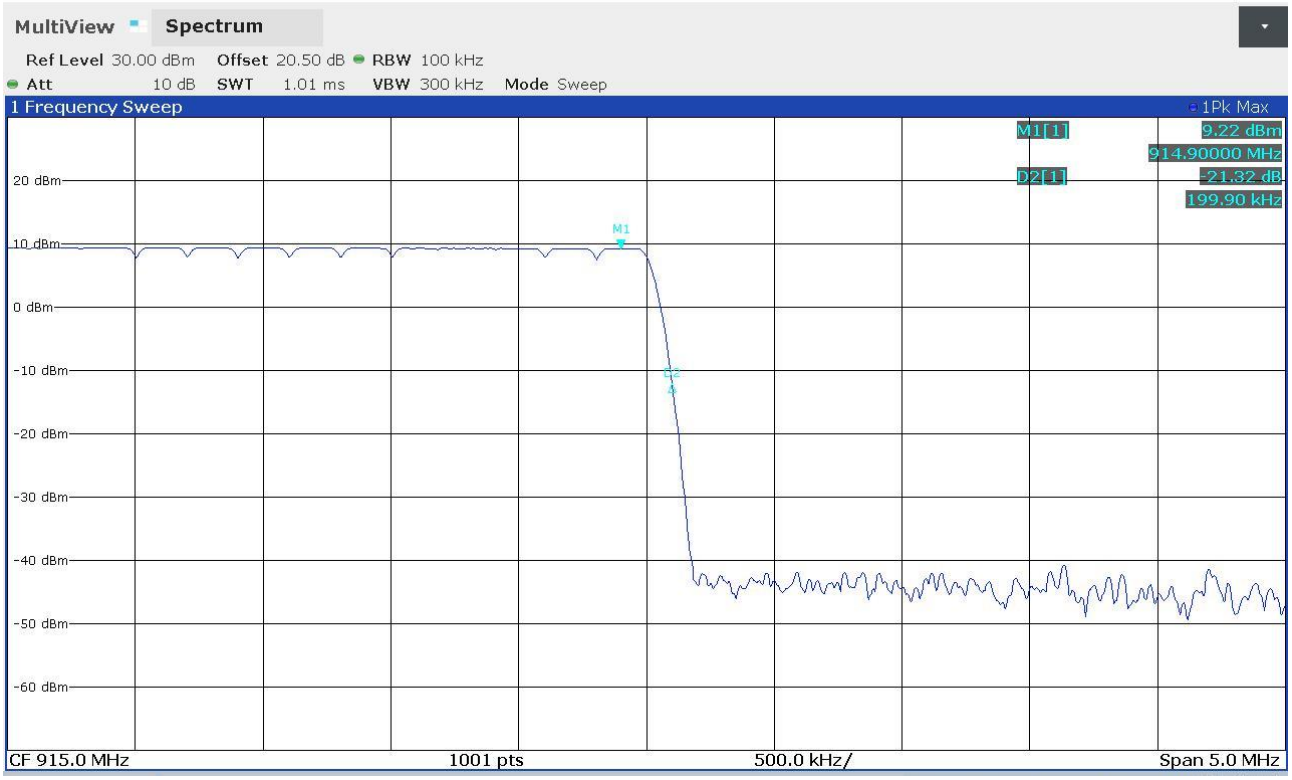


CMC Centro Misure Compatibilità S.r.l.

Gandini 20181554



Gandini 20181555



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9.8 Peak Output Power

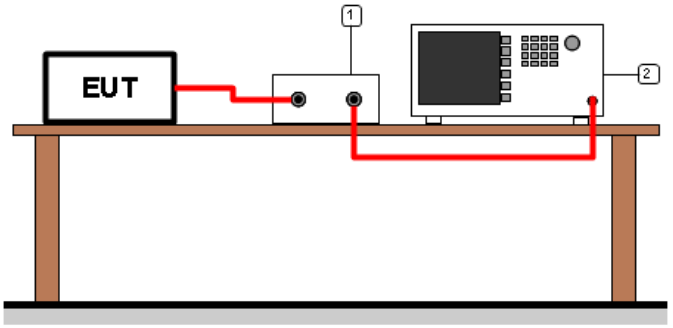
Tested by ..... :	G. Gandini
Test date ..... :	27.11.2020
Test location (stand) ..... :	Laboratory
Reference standards ..... :	FCC Rules and Regulation; Titles 47 Part. 15.247 KDB 558074 D01 15.247 Meas Guidance v05r02 cl. 2.2 ANSI C63.10 cl. 7.8.5
Supplementary information..... :	--

Acceptance limits

For frequency hopping systems operating in the 2400–2483,5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483,5 MHz band: 0,125 watts.

For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0,25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.

Test setup



Test setup PR002_01				
Nr.	*Id. Number*	*Manufacturer*	*Model*	*Description*
2	CMC S295	Rohde & Schwarz	FSW43	Spectrum Analyzer 43GHz
1	--	--	--	Cable + attenuator (calibrated before the test)

Result

Frequency (MHz)	*Graphs*	*Peak Output Power (dBm)*	*Peak Output Power (mW)*	*Limit (mW)*
902,30	G20181533	10,60	11,48	1000
908,50	G20181534	10,30	10,72	1000
914,90	G20181539	9,50	8,91	1000

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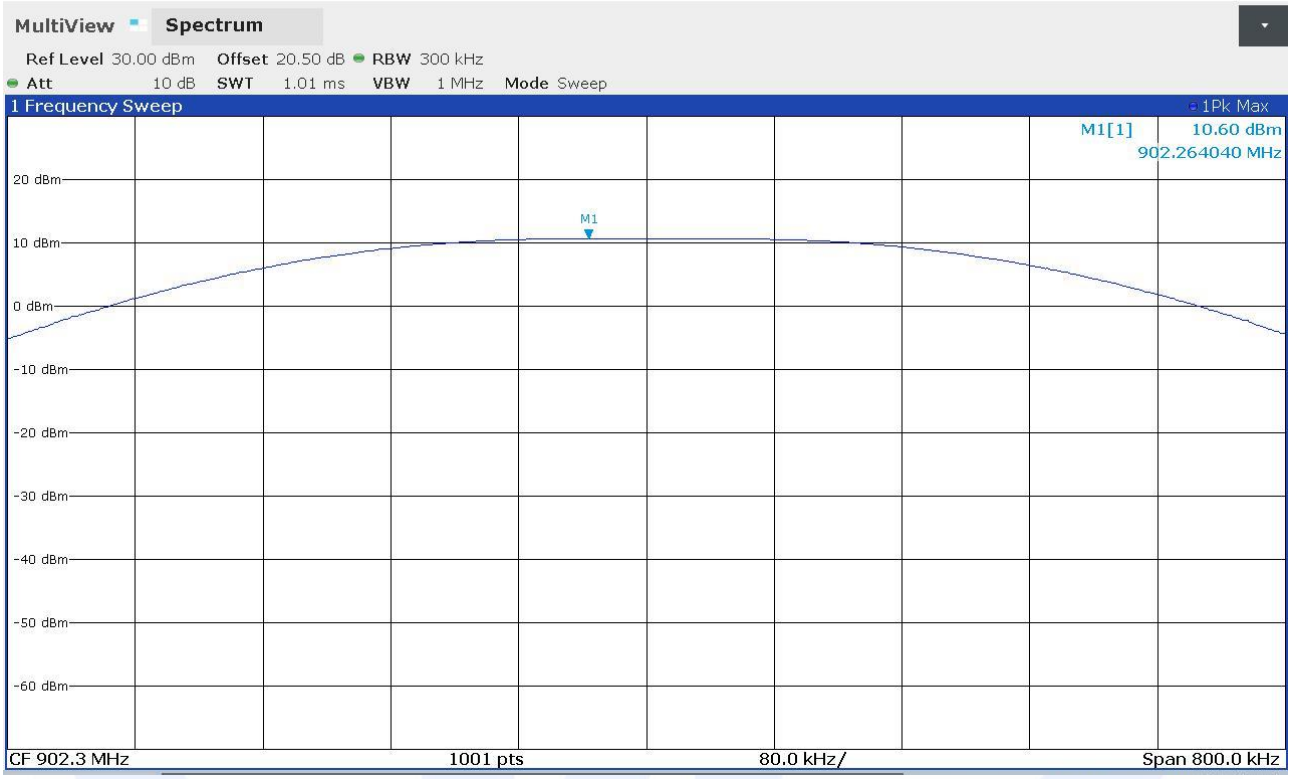
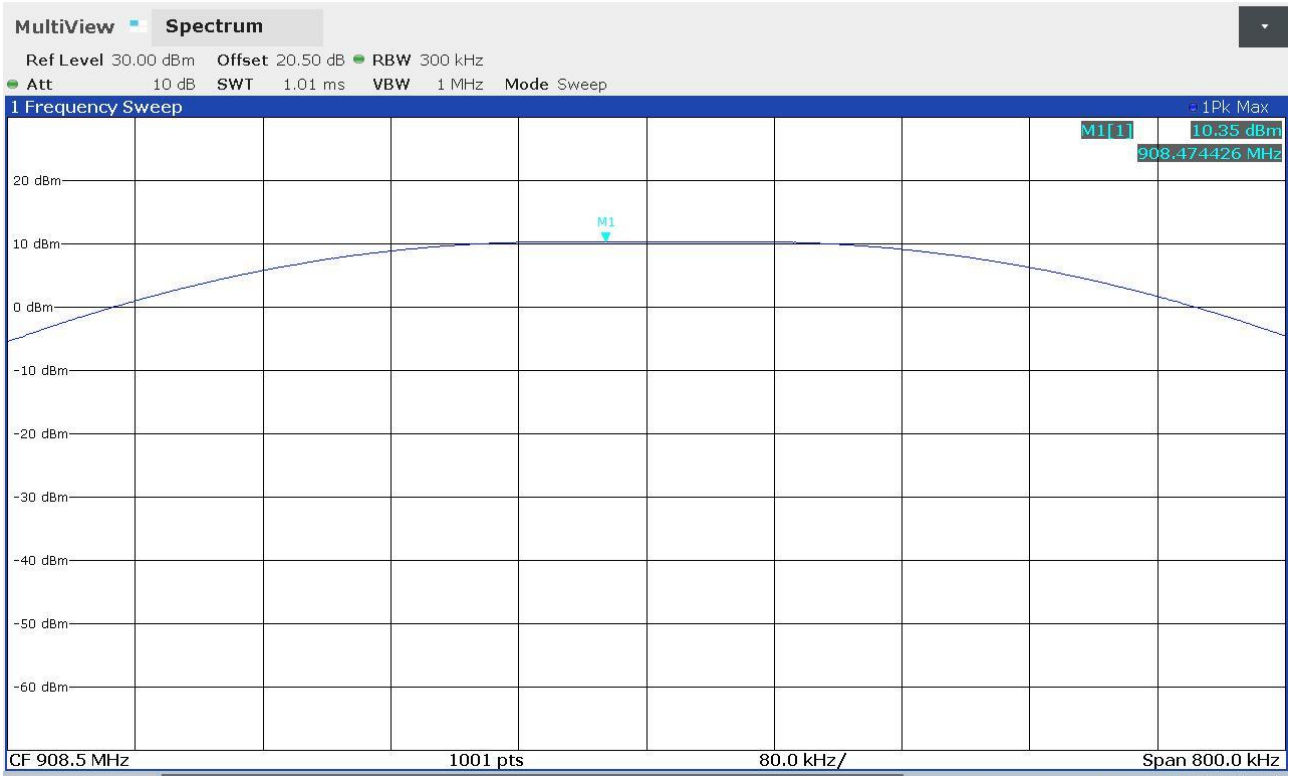
Graphs

Gandini 20181533



Gandini 20181534



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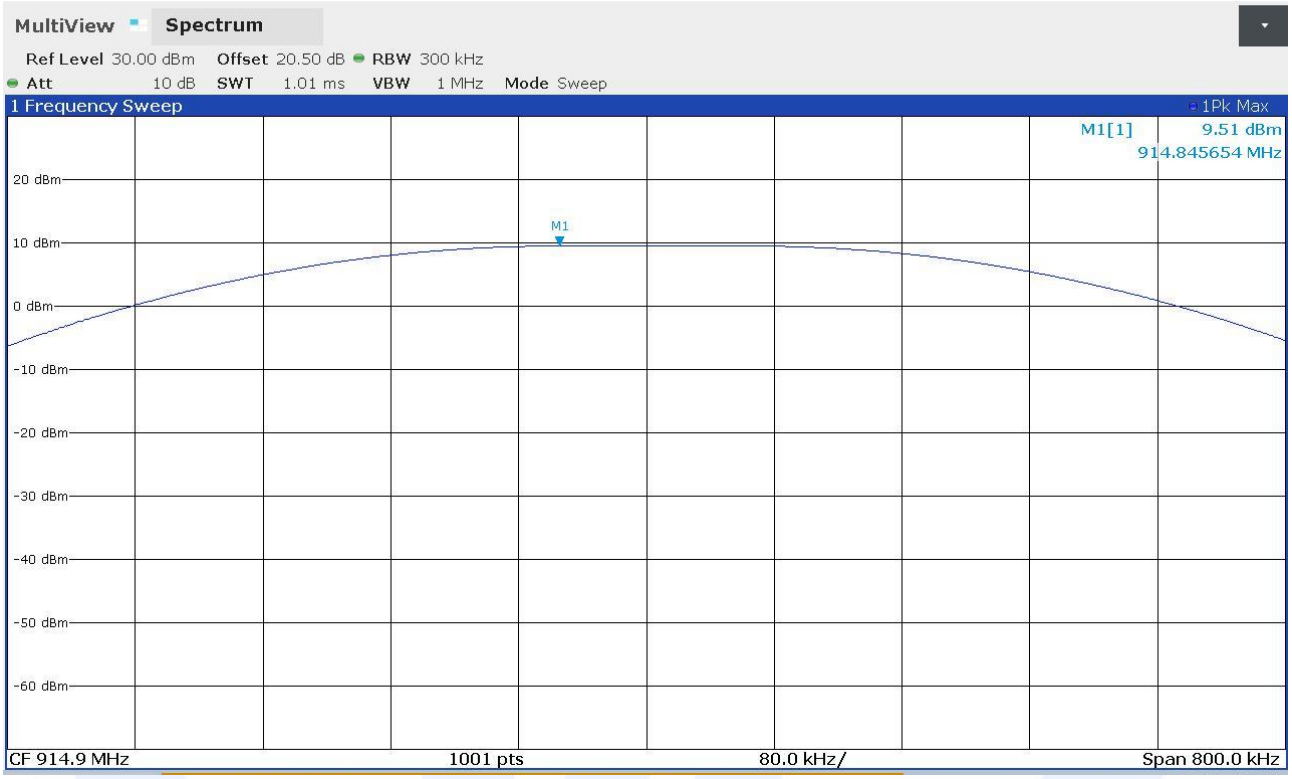
Gandini 20181539



CMC Centro Misure Compatibilità S.r.l.

Attachment 1

Instruments list

Id. number	*Manufacturer*	*Model*	*Description*	*Serial number*	*Last calibration*	*Due date calibration*
CMC S010	Rohde & Schwarz	ESH3-Z2	Impulses Limiting Device	- - -	January '20	January '21
CMC S108	EMCO	3115	Horn Antenna	9811-5622	June '19	June '22
CMC S127	Schaffner	HLA6120	Loop Antenna	1191	November '18	November '23
CMC S164	Rohde & Schwarz	ESU26	EMC interference receiver	100052	January '20	January '21
CMC S200	Schwarzbeck	NSLK 8128	V-LISN	8128-273	January '20	January '21
CMC S206	Rohde & Schwarz	ESCI 7	EMC Receiver 9KHz-7GHz	100781	January '20	January '21
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

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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	2,9 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	3,6 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	4,0 dB	1
Radiated Emission CISPR 16 Bicon. Ant. 30-300 MHz	PE004_02	3,9 dB	1
Radiated Emission CISPR 16 LogP. Ant. 300-1000 MHz	PE004_03	3,8 dB	1
Radiated Emission CISPR 16 Horn Ant. 1-18 GHz	PE004_04	4,2 dB	1
Human Exposure to electromagnetic fields	PE005_01	23,6 %	1
Harmonics	PE006_01	10 mA + 2,6 %	1
Flicker	PE007_01	4,79 %	1
Radiated Immunity 80 MHz - 6 GHz	PE102_XX	1,95 dB 0,75 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	6,25 % 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

CMC Centro Misure Compatibilità S.r.l.

Attachment 1

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+05	4,7 dB	1
Misura della potenza EiRP 18-40GHz d=3m	PR001_06	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
Ring Wave immunity test	PE110_01		2
Low frequency immunity test	PE111_01		2
Dumped Oscillotary immunity test	PE113_01		2
Rev_20_02 date 24/02/2020			

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%

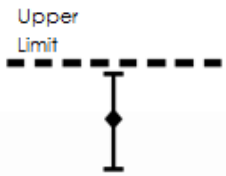
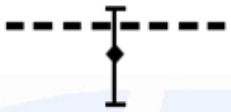
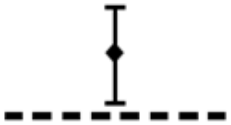
Note 2:

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

CMC Centro Misure Compatibilità S.r.l.

Attachment 1

Judgement of compliance

Case 1	Case 2	Case 3	Case 4
			
The sample complies with the requirements.	The sample complies with the requirements.	The sample does not comply with the requirements.	The sample does not comply with the requirements.
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

Quality manual references – Internal procedure

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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