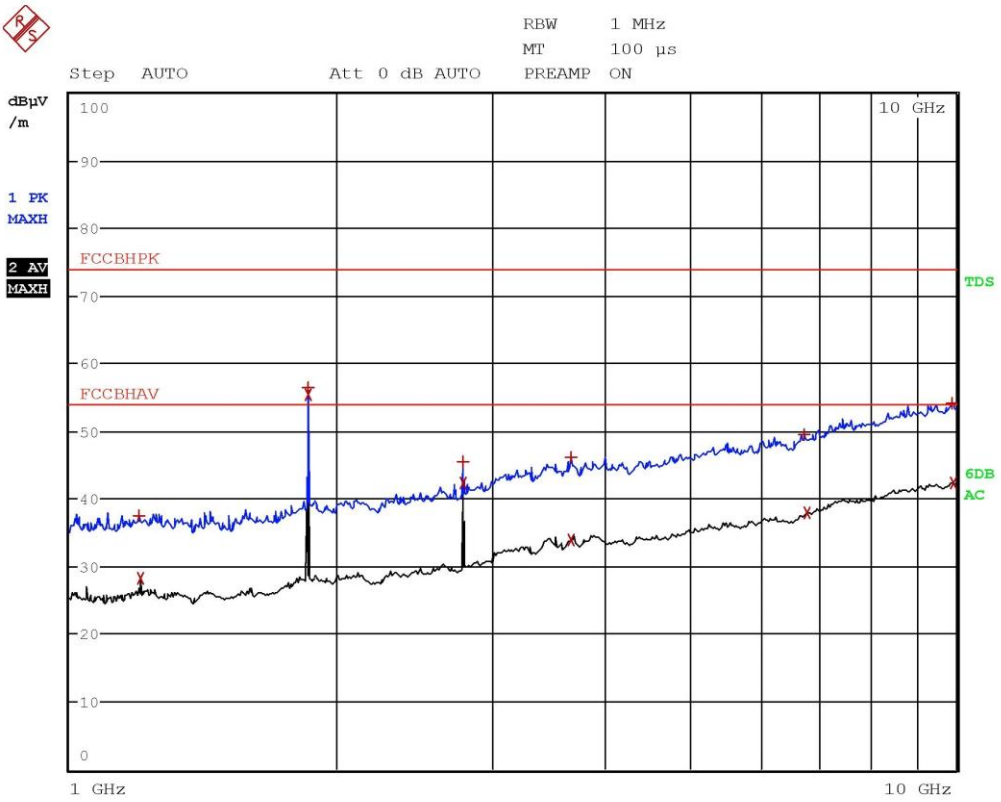


Gandini 19213619

CMC Centro Misure Compatibilità S.r.l.

EDIT PEAK LIST (Prescan Results)

Trace1:	FCCBHPK
Trace2:	FCCBHAV
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Max Peak	1.2 GHz	37.49	-36.48
2 Average	1.2004 GHz	28.15	-25.82
1 Max Peak	1.8556 GHz	56.31	-17.66
2 Average	1.8556 GHz	55.32	1.34
1 Max Peak	2.7836 GHz	45.40	-28.57
2 Average	2.7836 GHz	42.26	-11.71
2 Average	3.6768 GHz	33.87	-20.10
1 Max Peak	3.6792 GHz	46.01	-27.96
1 Max Peak	6.736 GHz	49.50	-24.47
2 Average	6.7872 GHz	37.95	-16.02
1 Max Peak	9.8804 GHz	54.16	-19.81
2 Average	9.9104 GHz	42.39	-11.58

Gandini 19213619

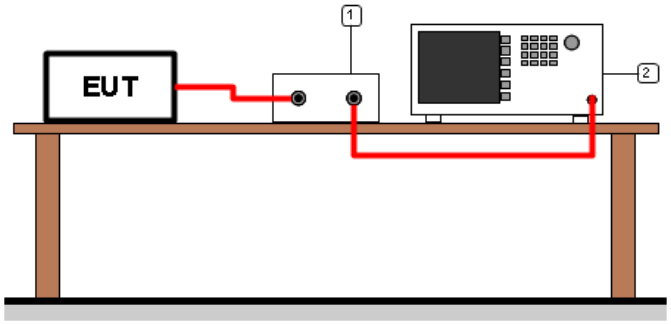
CMC Centro Misure Compatibilità S.r.l.

9.3 20 dB bandwidth

Tested by ..... :	G. Gandini
Test date ..... :	29.01.2020
Test location (stand) ..... :	Laboratory
Reference standards ..... :	FCC Rules and Regulation; Titles 47 Part. 15.247 ANSI C63.10 cl. 7.8.7
Supplementary test set-up description ..... :	--
Supplementary information..... :	--

Acceptance limits
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)

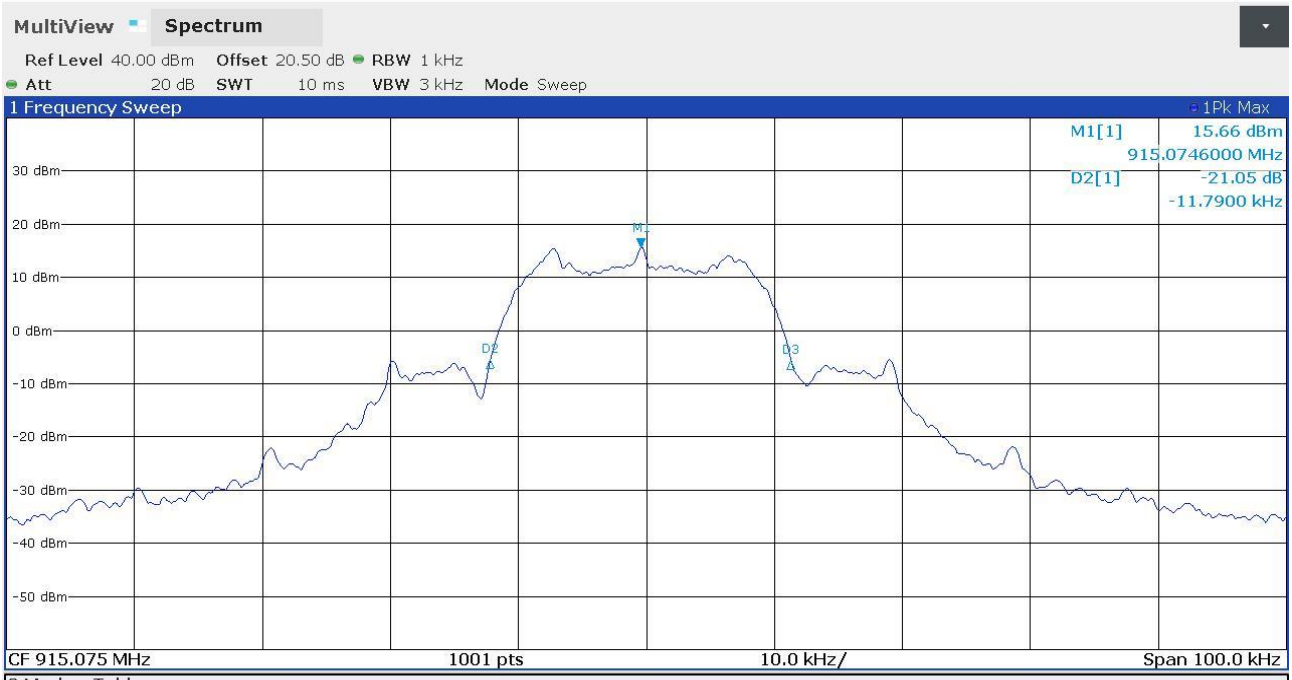
Result

Frequency (MHz)	*Graphs*	*20 dB bandwidth (kHz)*	*Maximum 20 dB bandwidth allowed (kHz)*	*Results*
915,075	G19213621	23,48	500	Complies
921,475	G19213626	23,58	500	Complies
927,825	G19213629	23,68	500	Complies

CMC Centro Misure Compatibilità S.r.l.

Graphs

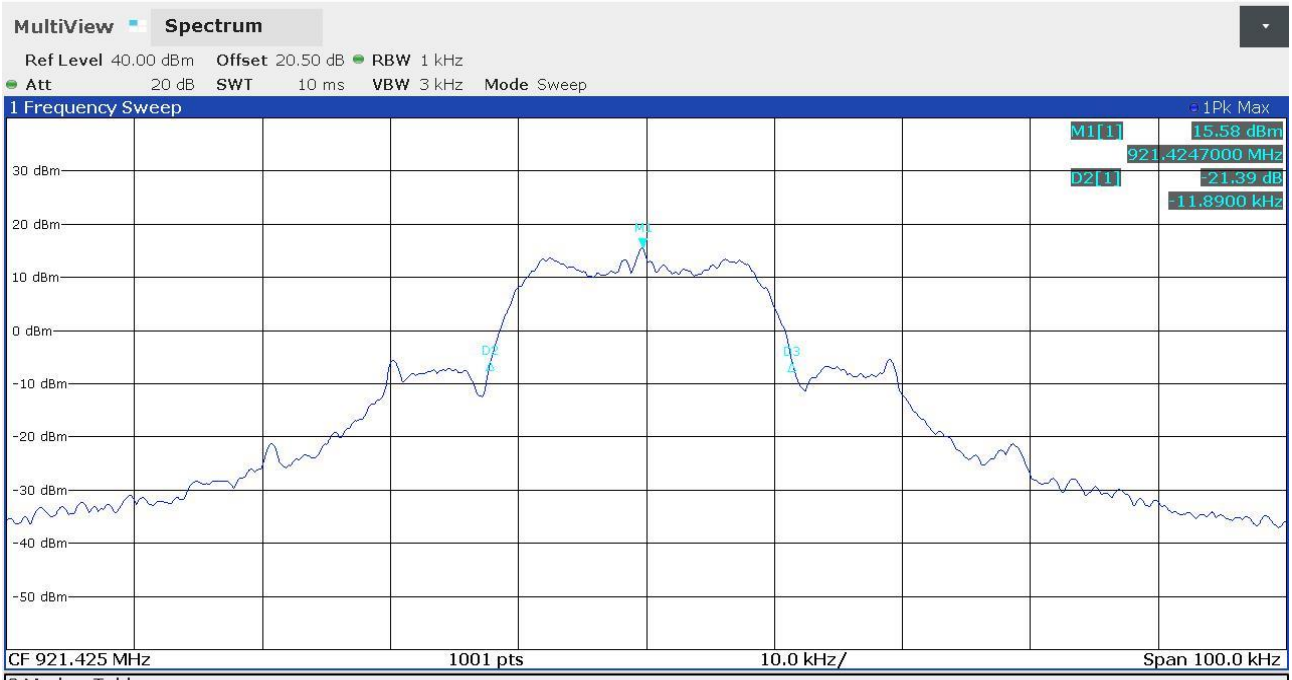
Gandini 19213621



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**915.0746 MHz**	**15.66 dBm**		
D2	M1	1	**-11.79 kHz**	**-21.05 dB**		
D3	M1	1	**11.69 kHz**	**-21.20 dB**		

Gandini 19213626

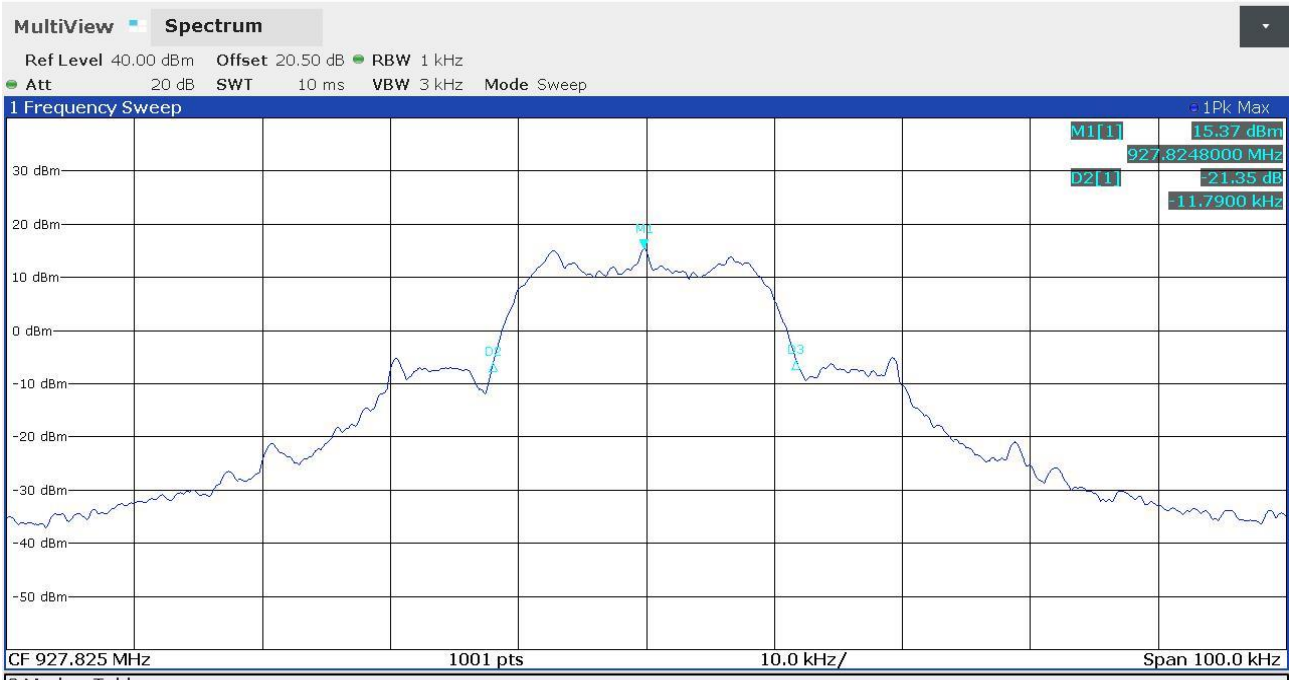


2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**921.4247 MHz**	**15.58 dBm**		
D2	M1	1	**-11.89 kHz**	**-21.39 dB**		
D3	M1	1	**11.69 kHz**	**-21.54 dB**		

CMC Centro Misure Compatibilità S.r.l.

Gandini 19213629



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**927.8248 MHz**	**15.37 dBm**		
D2	M1	1	**-11.79 kHz**	**-21.35 dB**		
D3	M1	1	**11.89 kHz**	**-20.94 dB**		

CMC Centro Misure Compatibilità S.r.l.

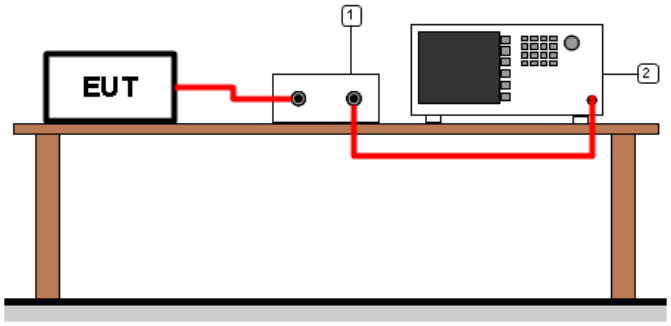
9.4 Channel separation

Tested by ..... :	G. Gandini
Test date ..... :	29.01.2020
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.

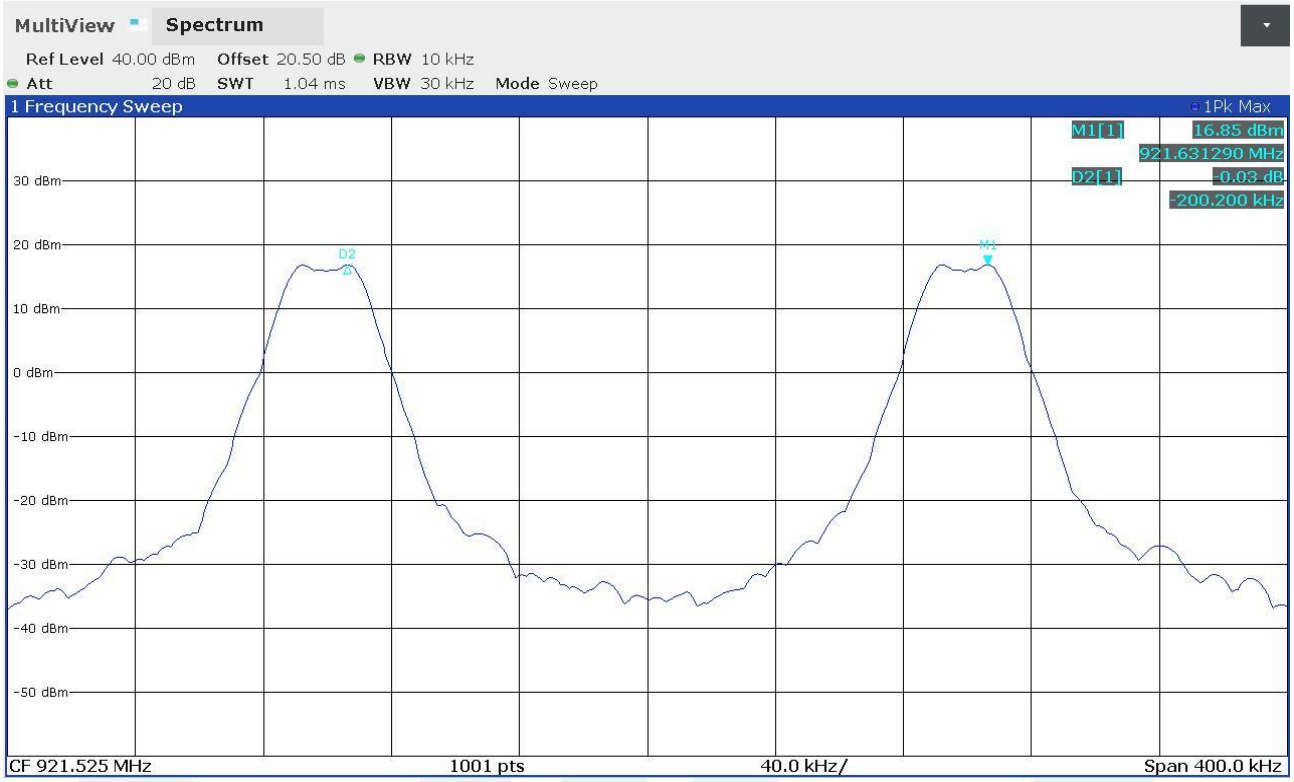
Result

Frequency band (MHz)	*Graphs*	*Channel separation (kHz)*	*Minimum channel separation required (kHz)*	*Results*
902 – 928	G19213635	200,2	25	Complies

CMC Centro Misure Compatibilità S.r.l.

Graphs

Gandini 19213635



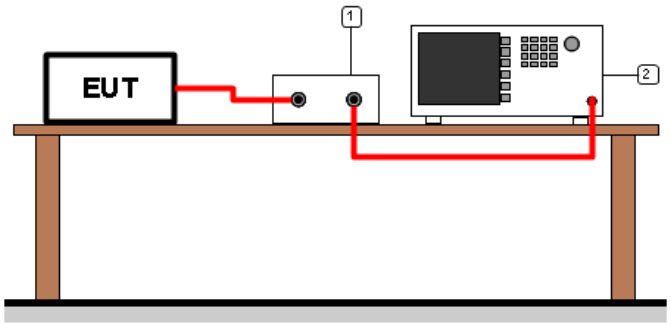
9.5 Number of hopping channels

Tested by ..... :	G. Gandini
Test date ..... :	29.01.2020
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.

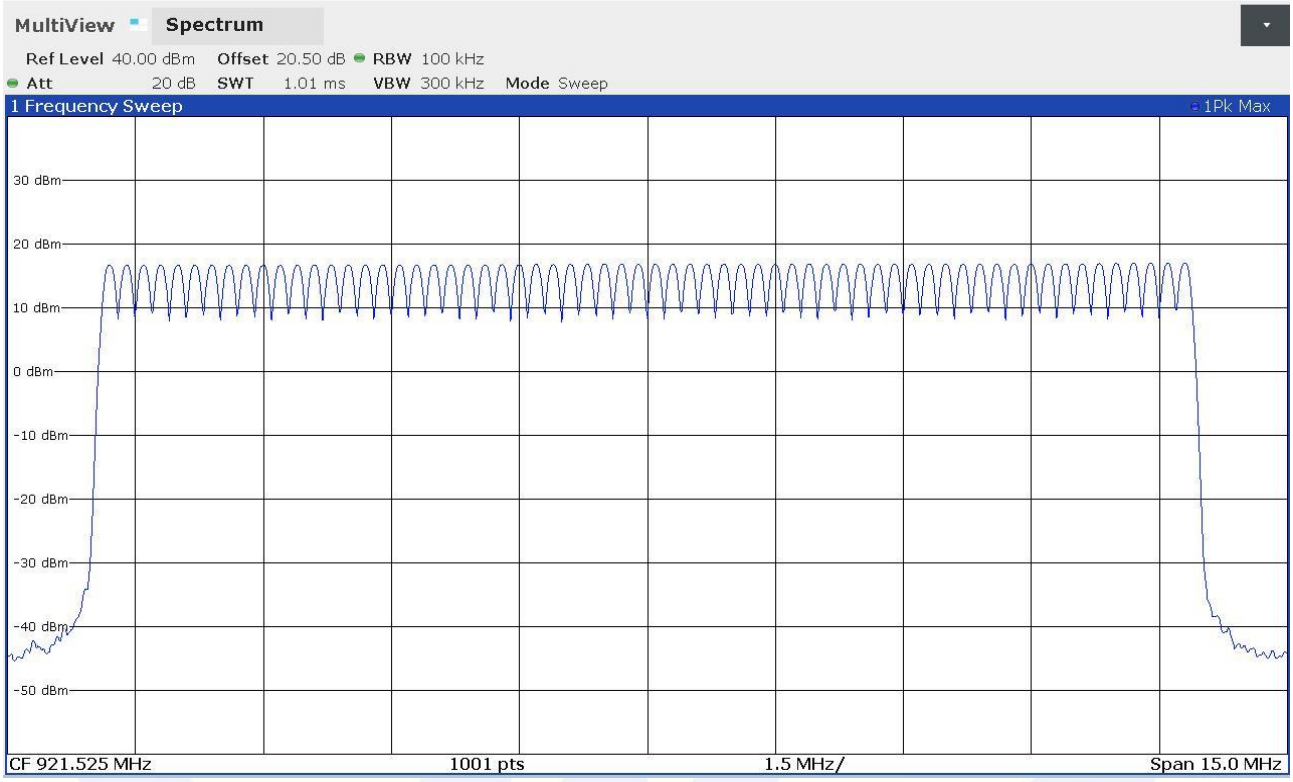
Result

Frequency band (MHz)	*Graphs*	*Number of hopping channels*	*Minimum number of hopping channels required*	*Results*
902 – 928	G19213633 and G19213634	64	50	Complies

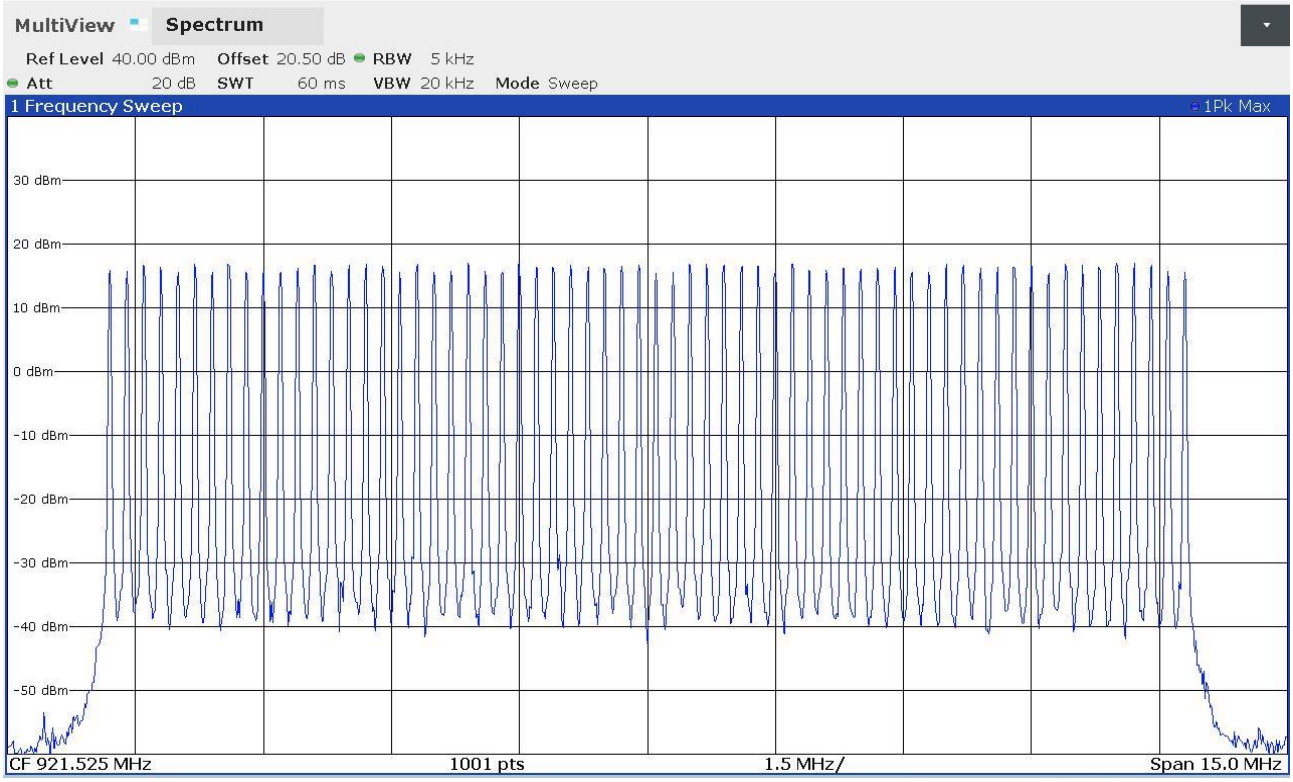
CMC Centro Misure Compatibilità S.r.l.

Graphs

Gandini 19213633



Gandini 19213634



CMC Centro Misure Compatibilità S.r.l.

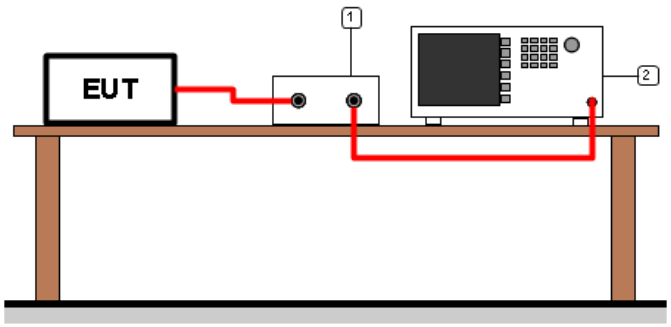
9.6 Time of occupancy

Tested by ..... :	G. Gandini
Test date ..... :	29.01.2020
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)

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Result

Frequency (MHz)	*Graphs*	*Dwell time (ms)*
921,975	G19213640	20,85

Frequency (MHz)	*Graphs*	*Number of transmissions*	*Period*
924,051	G19213642 and G19213644	7	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***
145,95 ms	400 ms	Complies

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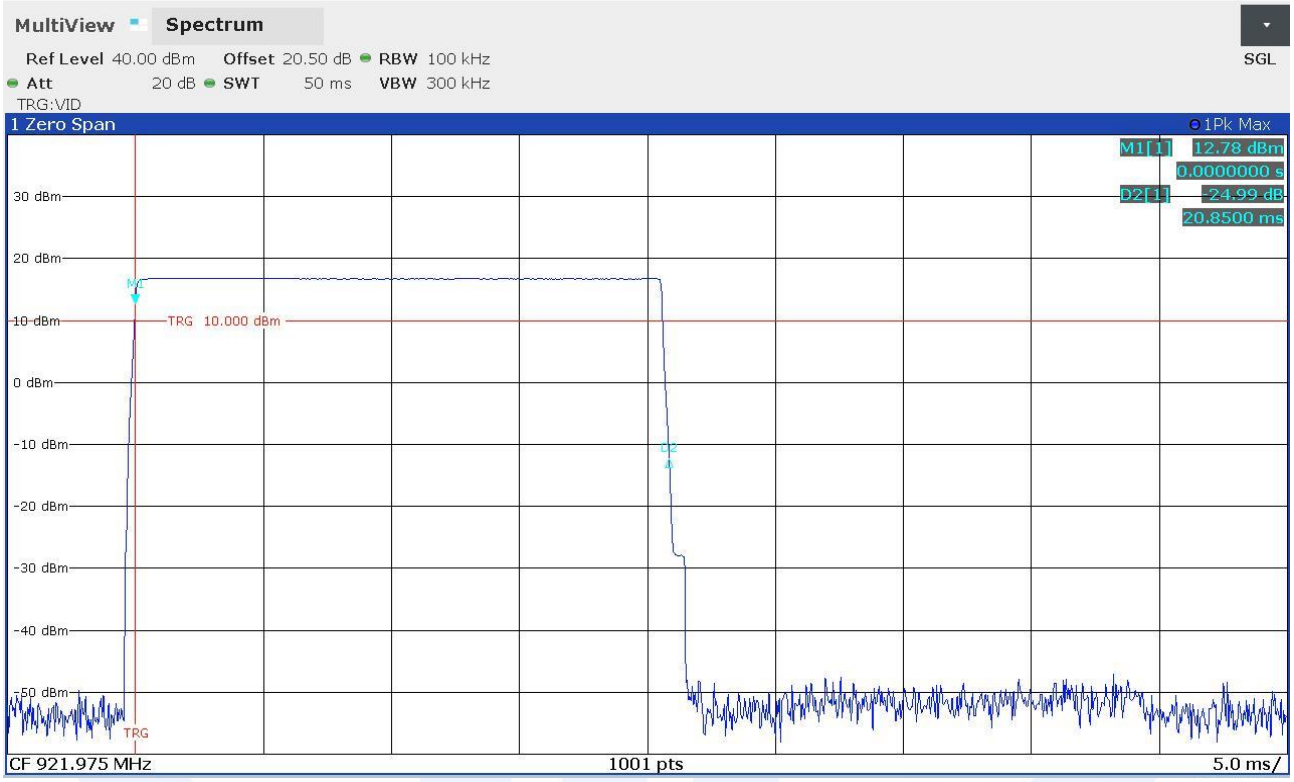
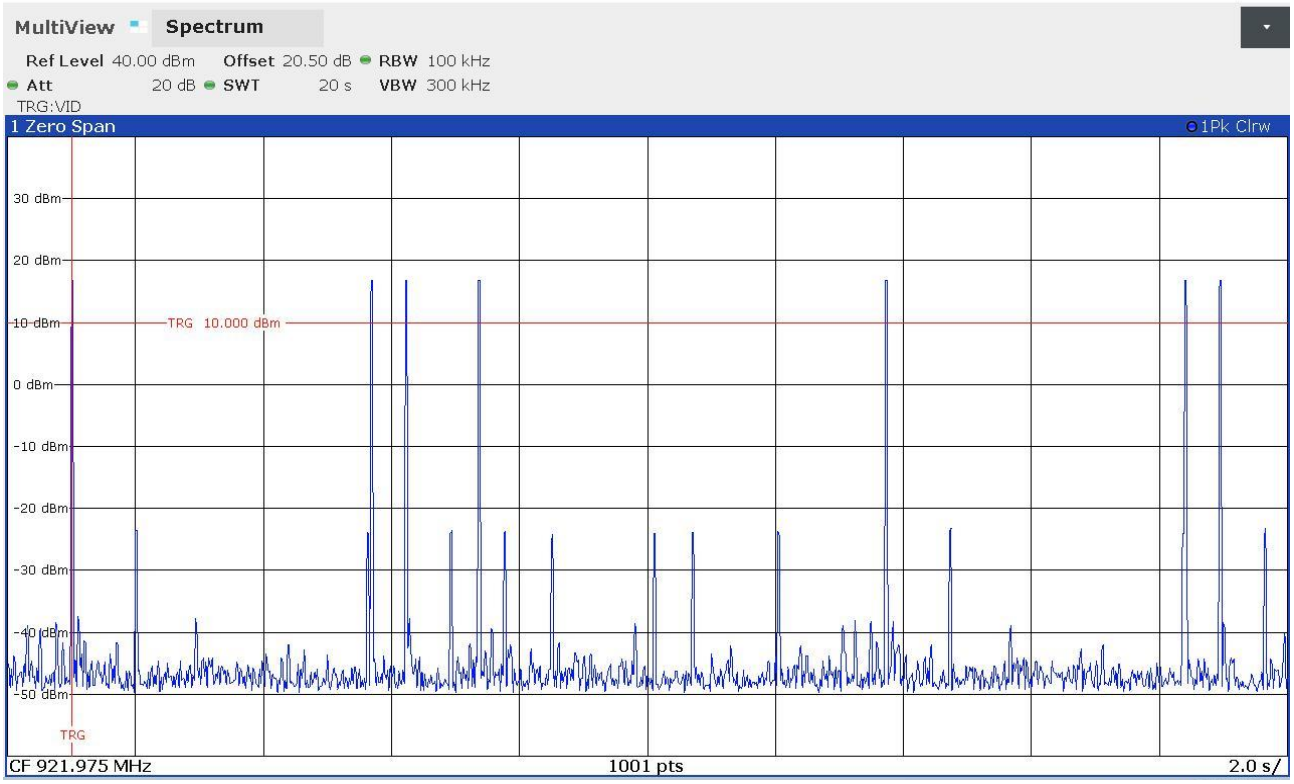
Graphs

Gandini 19213640

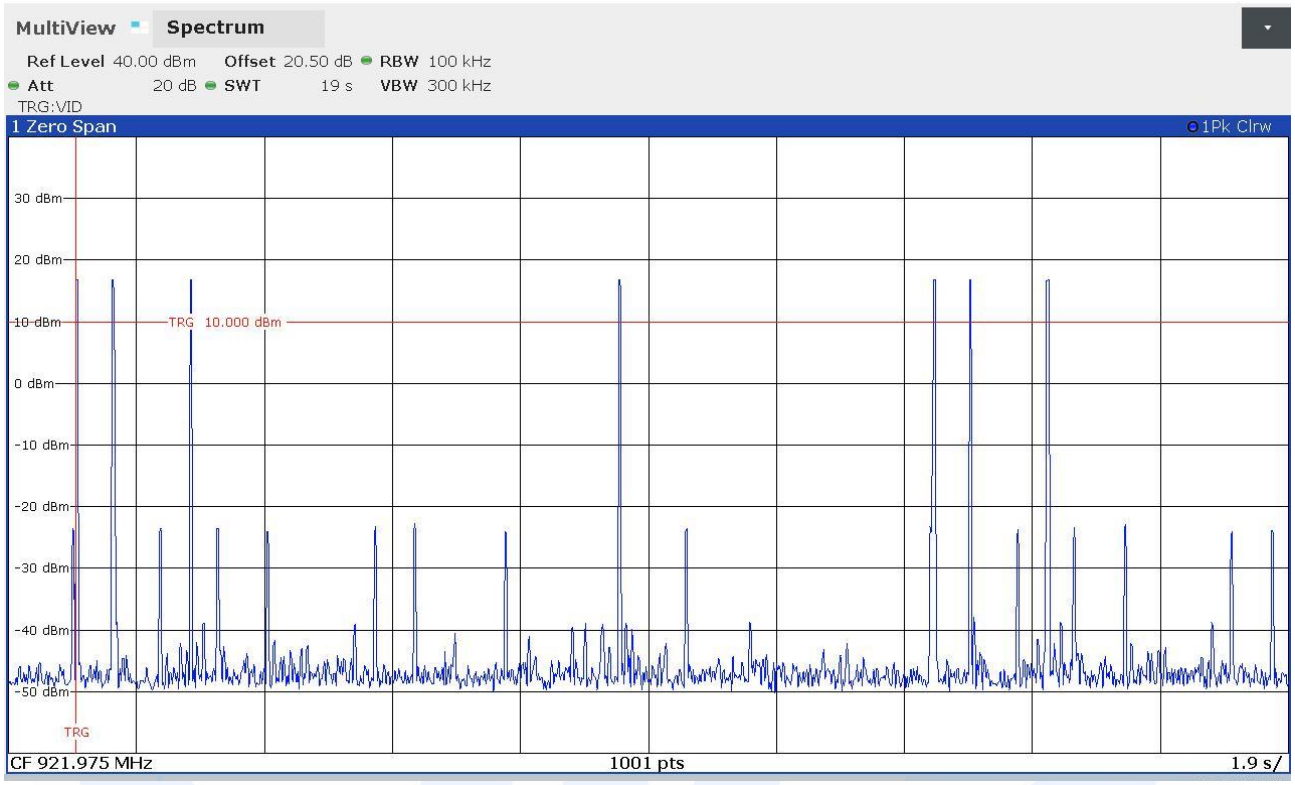


Gandini 19213642



CMC Centro Misure Compatibilità S.r.l.

Gandini 19213644



9.7 Band edge

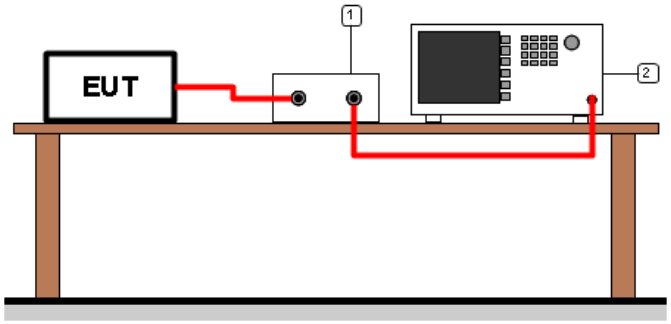
Tested by ..... :	G. Gandini
Test date ..... :	29.01.2020
Test location (stand) ..... :	Laboratory
Reference standards ..... :	FCC Rules and Regulation; Titles 47 Part. 15.247 ANSI C63.10 cl. 7.8.6
Supplementary test set-up description ..... :	--
Supplementary information..... :	--

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

CMC Centro Misure Compatibilità S.r.l.

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*	
915,075	100 kHz	G19213638	F_L: 915,0719 MHz	Complies
	100 kHz	G19213639		
927,825	100 kHz	G19213636	F_H: 927,9689 MHz	Complies
	100 kHz	G19213637		

Frequency (MHz)	*Bandwidth*	*Graph(s) – No hopping*	*Results*	
915,075	100 kHz	G19213623	F_L: 914,9330 MHz	Complies
	100 kHz	G19213624		
927,825	100 kHz	G19213631	F_H: 927,9689 MHz	Complies
	100 kHz	G19213632		

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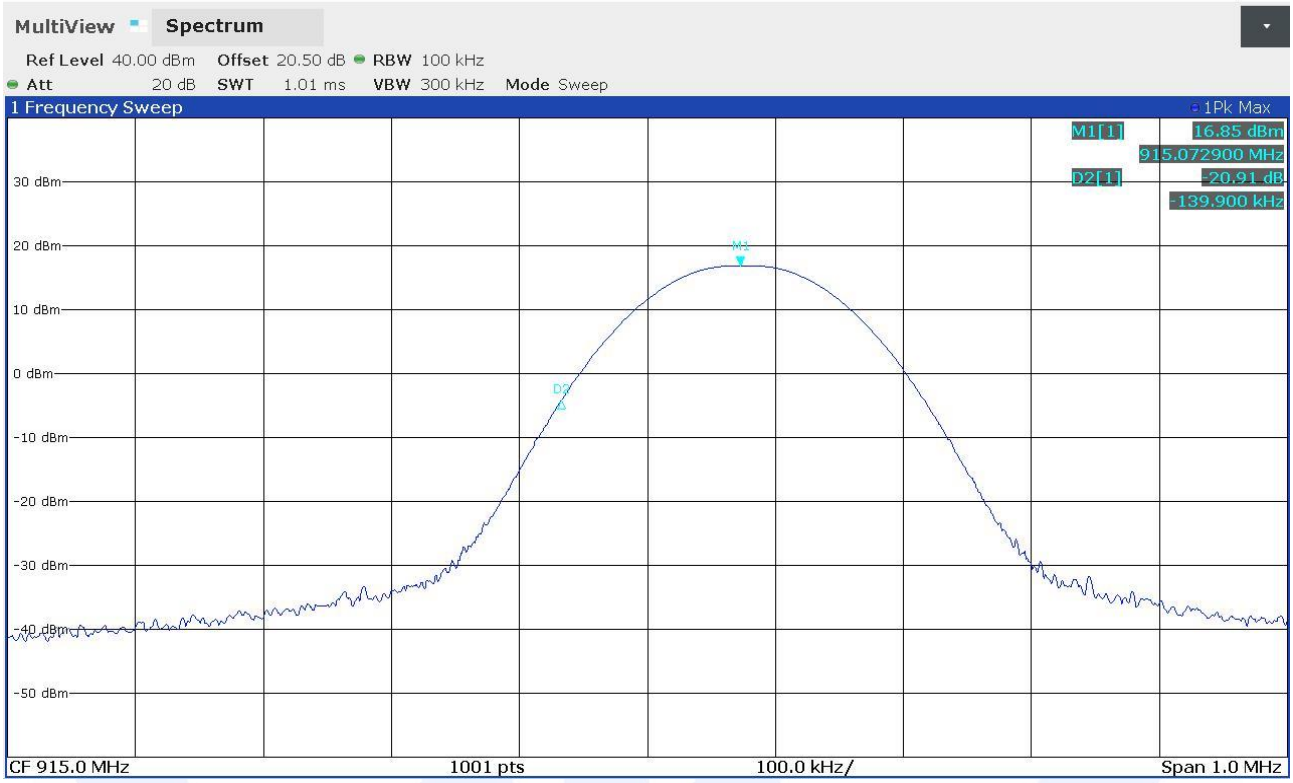
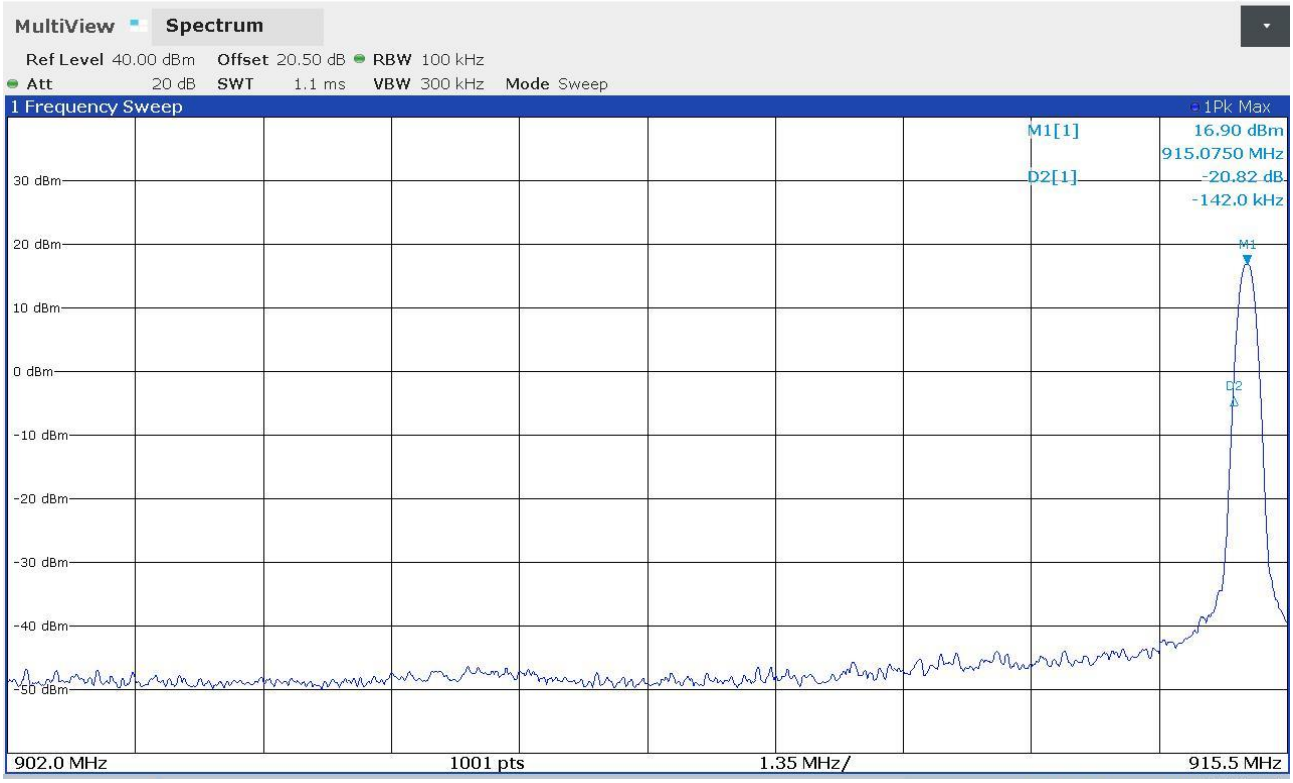
Graphs

Gandini 19213623

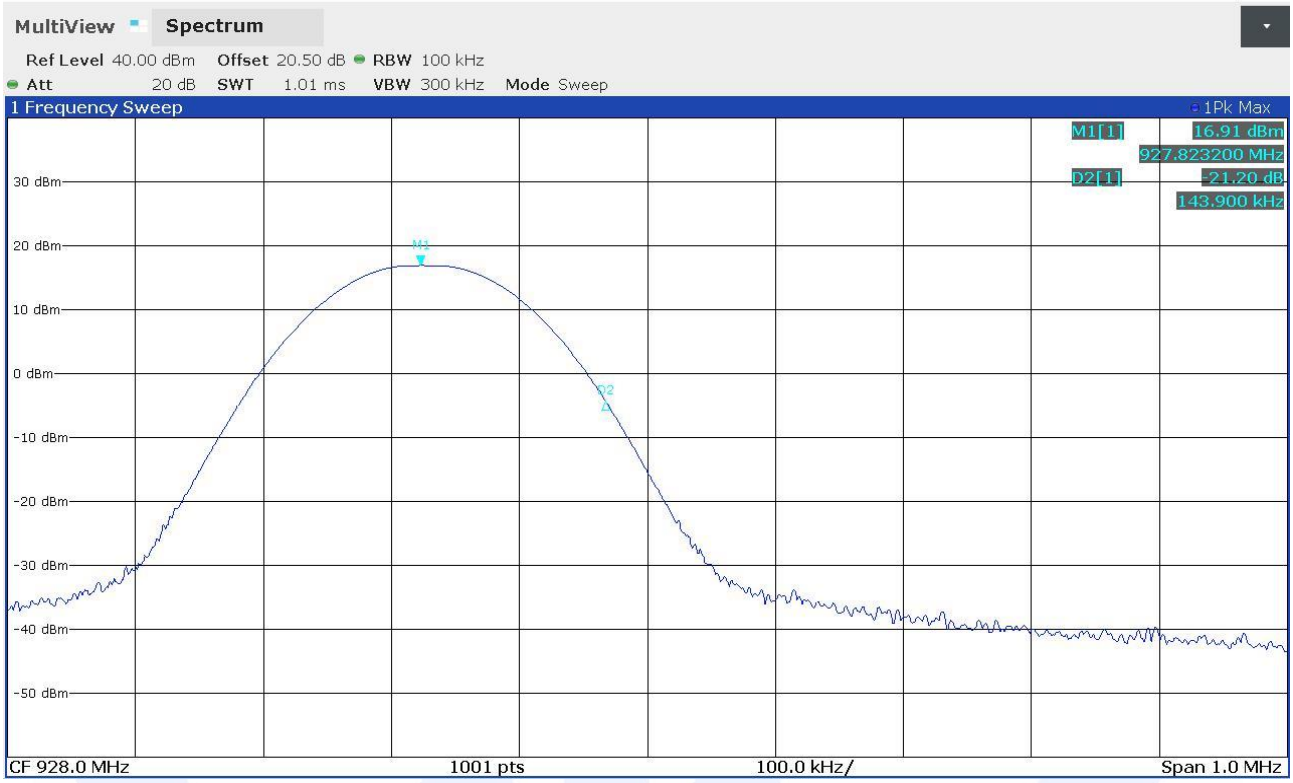


Gandini 19213624

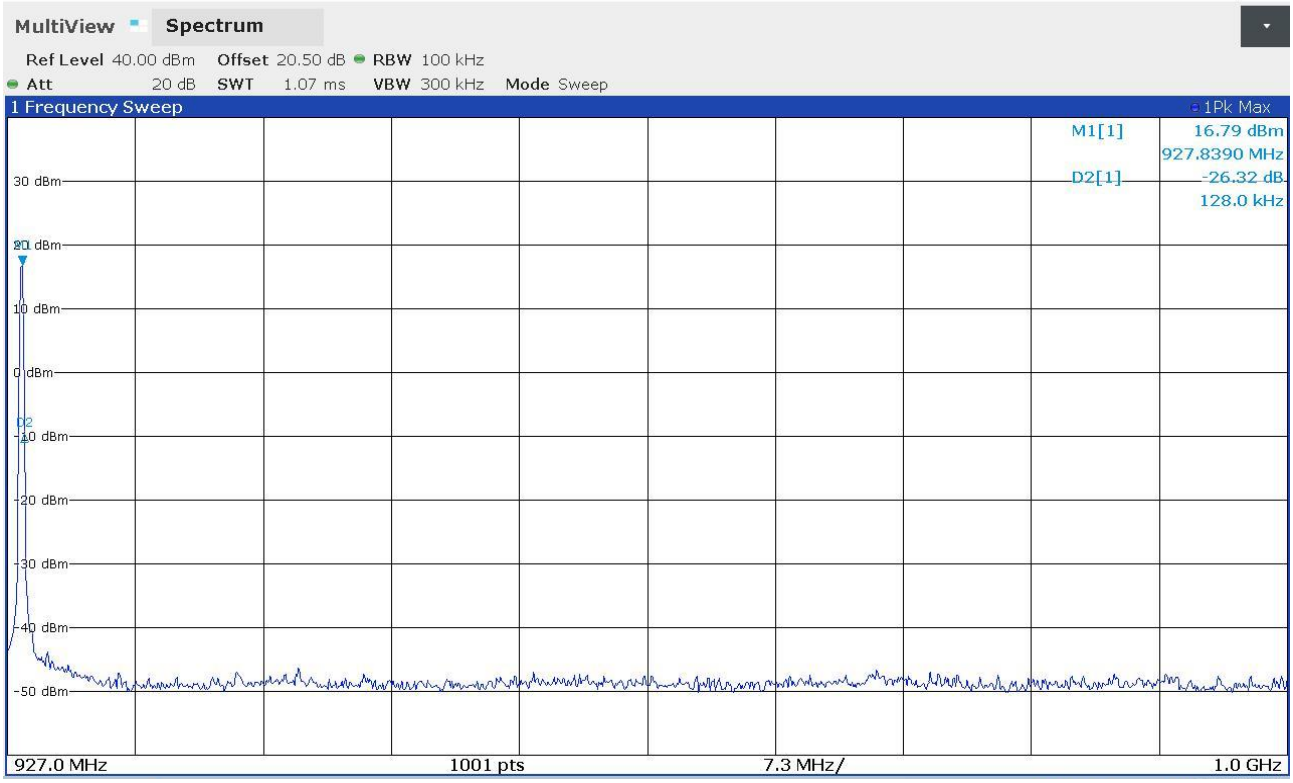


CMC Centro Misure Compatibilità S.r.l.

Gandini 19213631

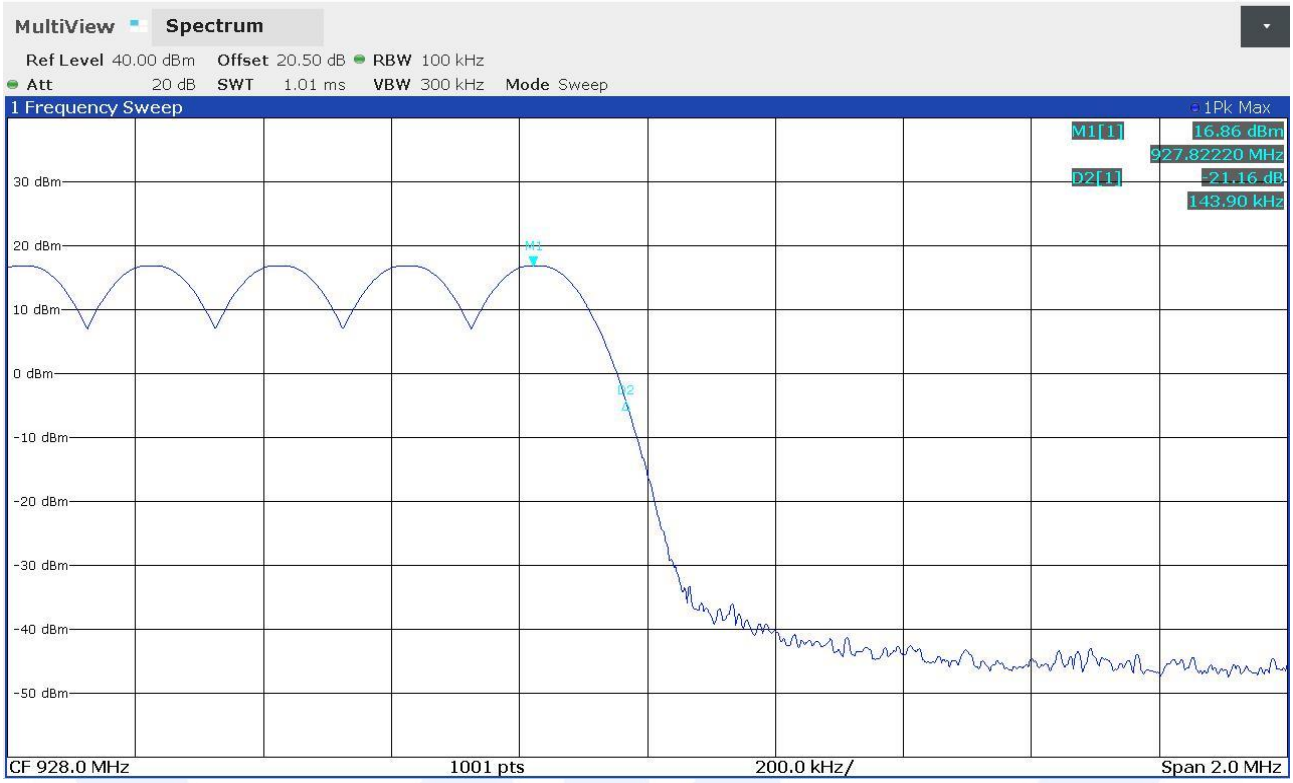


Gandini 19213632

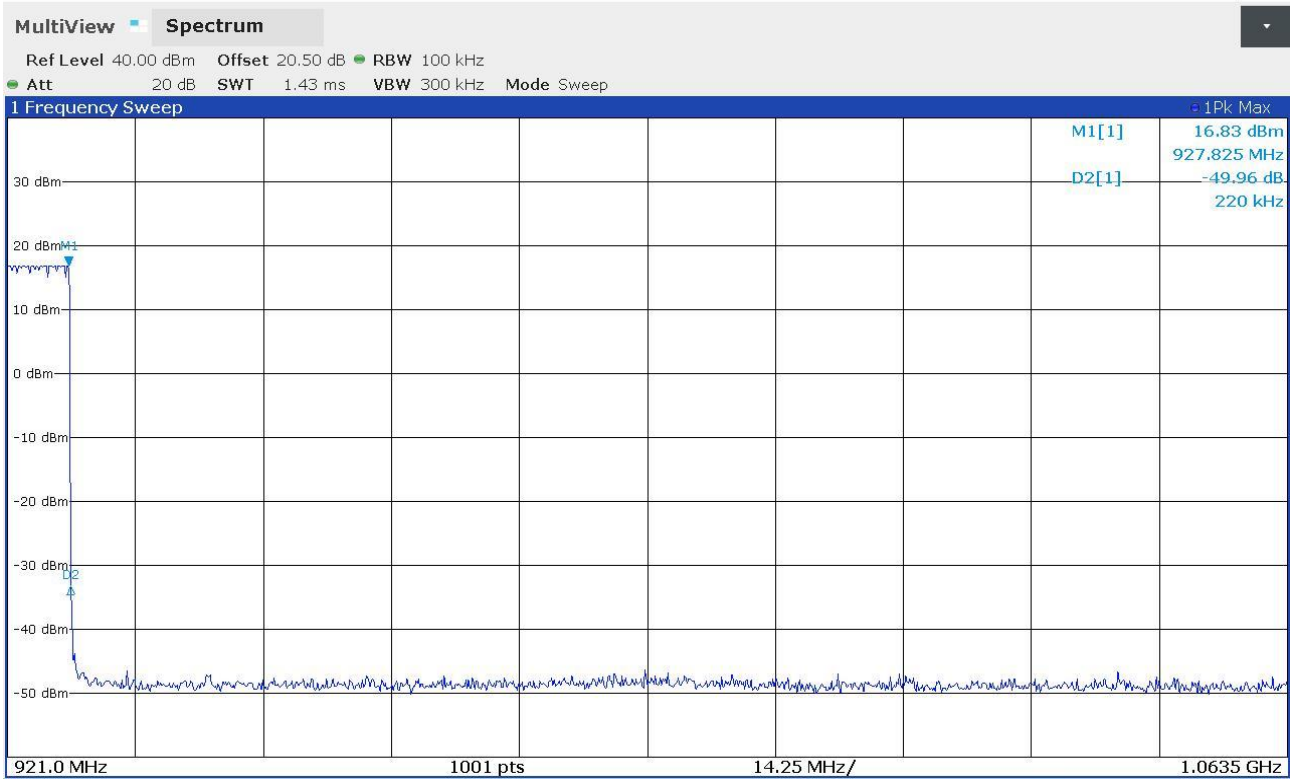


CMC Centro Misure Compatibilità S.r.l.

Gandini 19213636

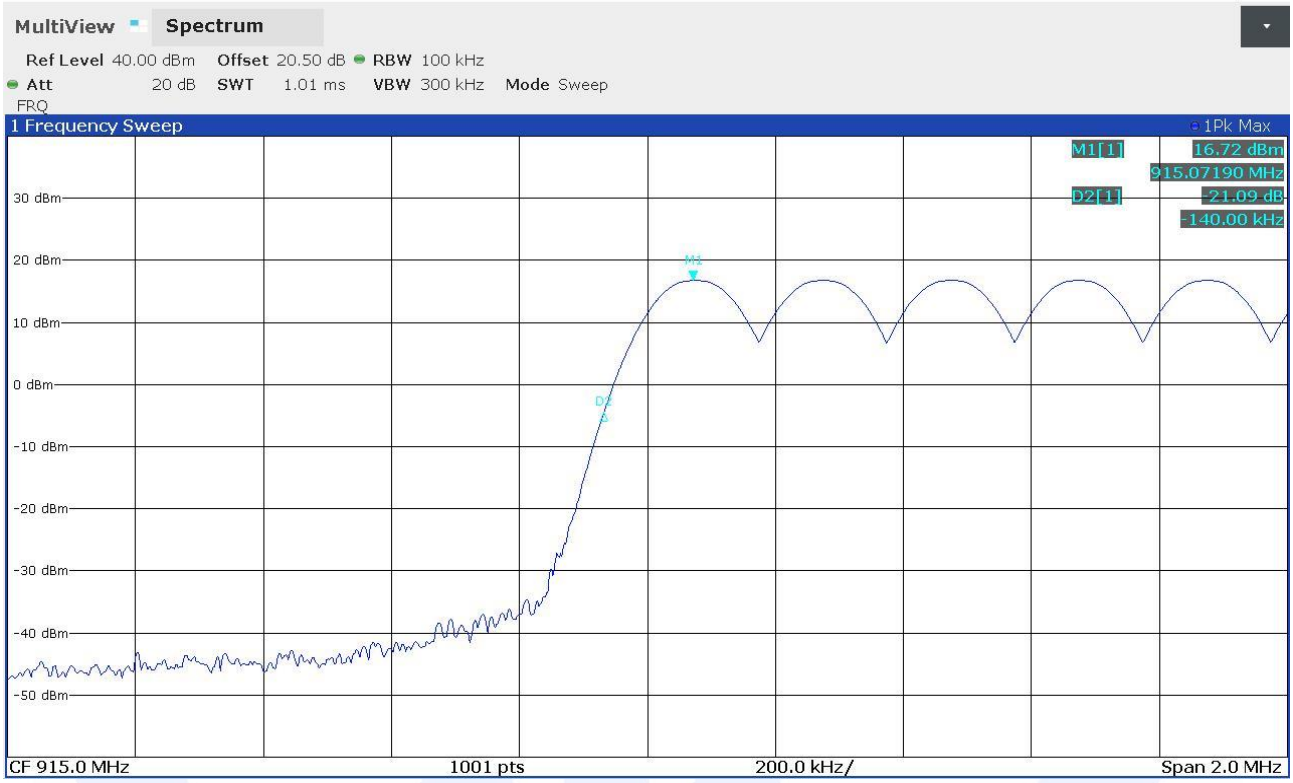


Gandini 19213637

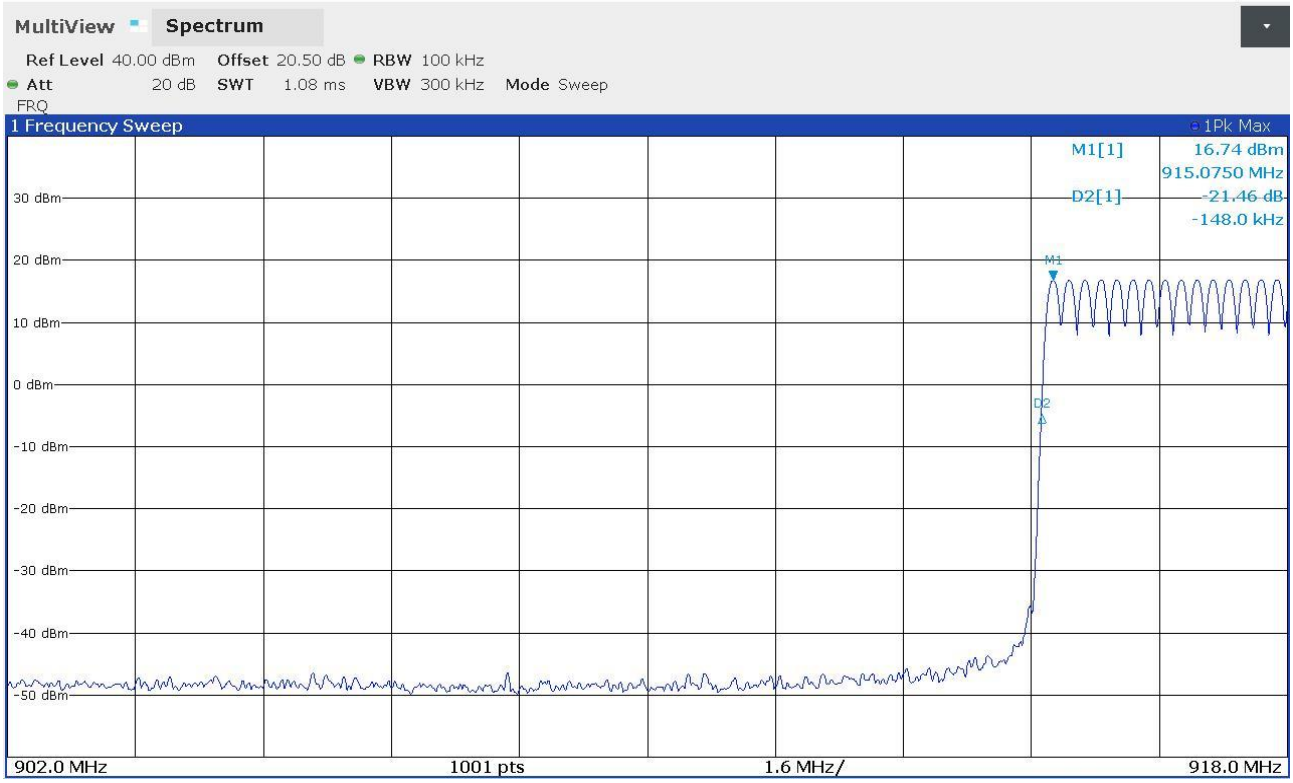


CMC Centro Misure Compatibilità S.r.l.

Gandini 19213638



Gandini 19213639



CMC Centro Misure Compatibilità S.r.l.

9.8 Peak Output Power

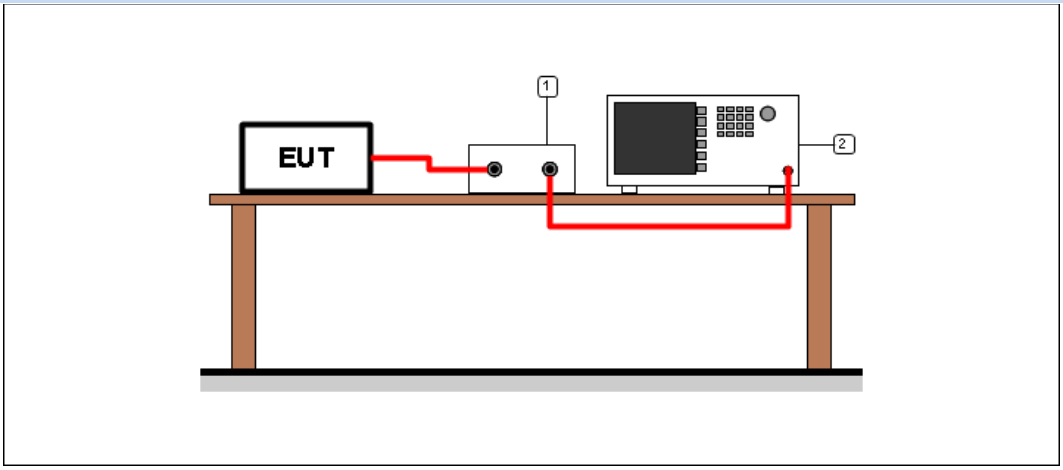
Tested by ..... :	G. Gandini
Test date ..... :	29.01.2020
Test location (stand) ..... :	Laboratory
Reference standards ..... :	FCC Rules and Regulation; Titles 47 Part. 15.247 KDB 558074 D01 15.247 Meas Guidance v05r02 cl. 2.2 ANSI C63.10 cl. 7.8.5
Supplementary information..... :	--

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)*
915,075	G19213622	16,87	48,64	1000
921,475	G19213627	16,86	48,53	1000
927,825	G19213630	16,91	49,09	1000

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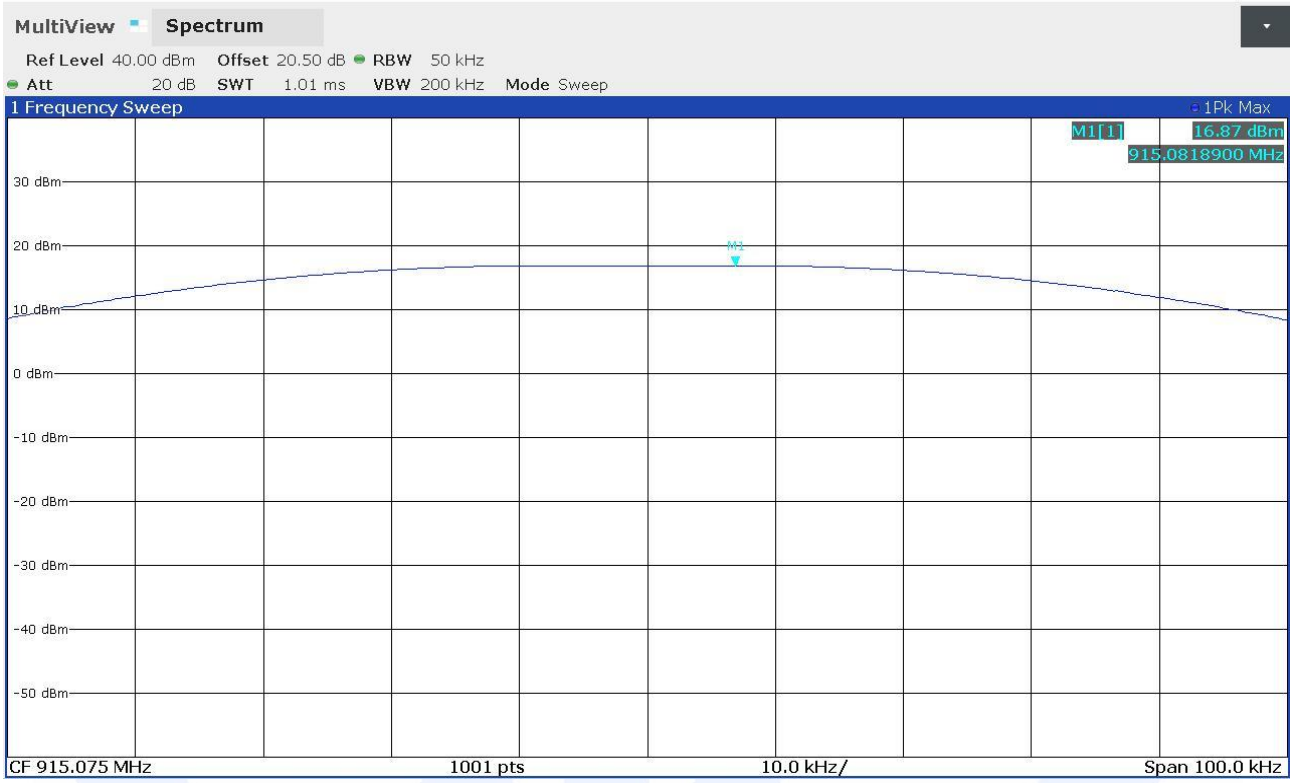
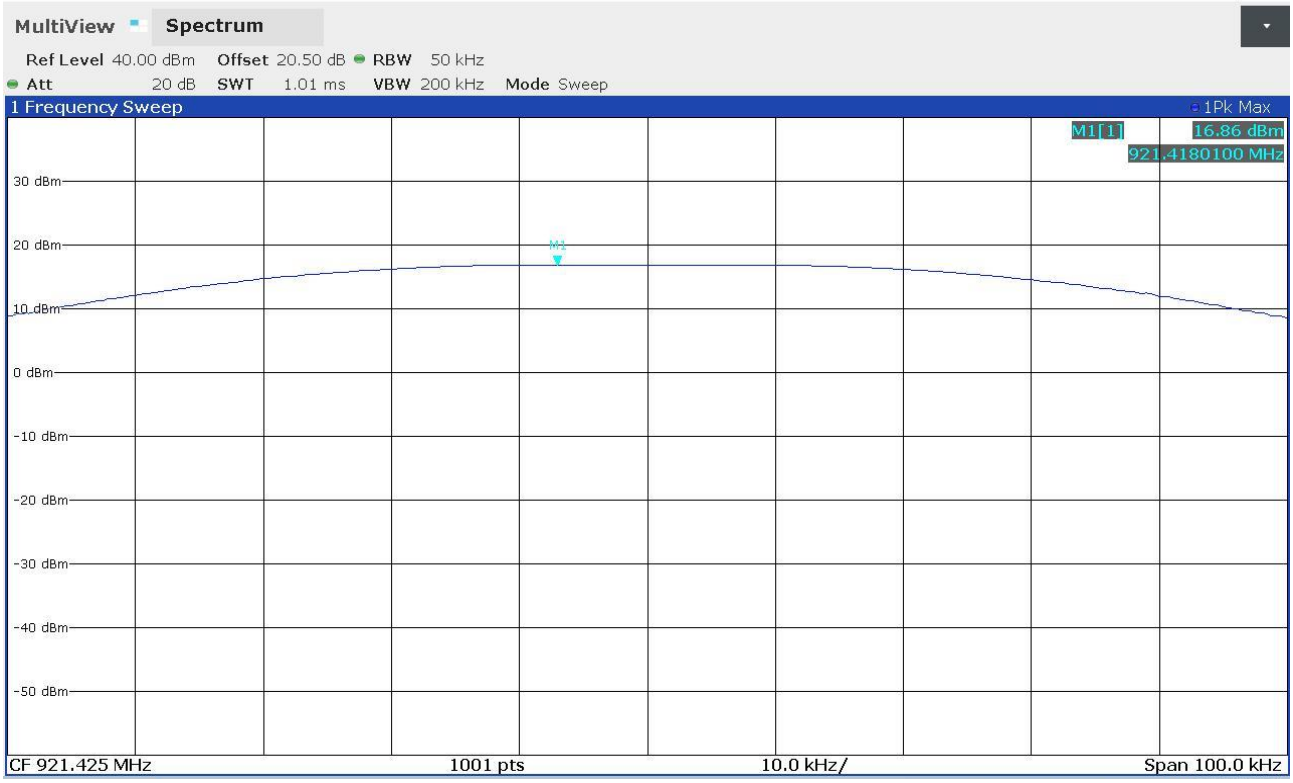
Graphs

Gandini 19213622

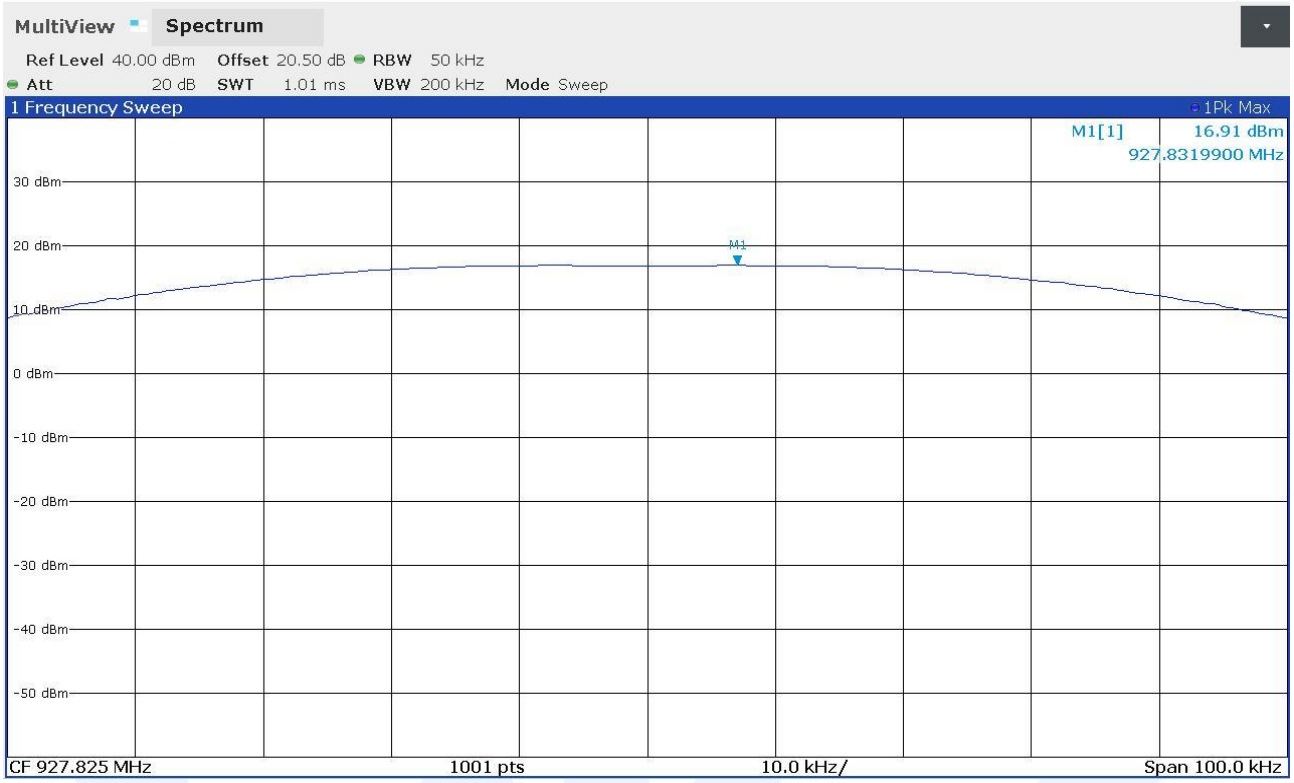


Gandini 19213627



CMC Centro Misure Compatibilità S.r.l.

Gandini 19213630



CMC Centro Misure Compatibilità S.r.l.

Attachment 1

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 '19	November '20
CMC S261	CMC	Wfr_N	Shielded Cable	Wfr_ant20-1	November '19	November '20
CMC S262	CMC	Wfr_N_fix	Shielded Cable	Wfr_fix32-1	November '19	November '20
CMC S263	CMC	Wfr_N_fix	Shielded Cable	Wfr_fix31-1	November '19	November '20
CMC S264	CMC	Wfr_N	Shielded Cable	Wfr_ext03-1	November '19	November '20
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 '19	November '20
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 0,009-0,0150MHz	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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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_01 date 16/01/2020			

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

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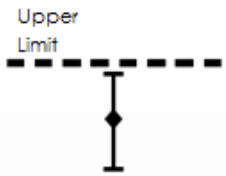
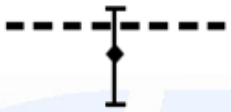
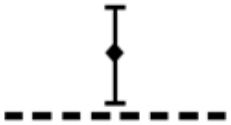
Attachment 1

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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