



TEST REPORT nr. R16177901
Federal Communication Commission (FCC)

Test item

Description.....: WIRELESS HANDHELD TRANSMITTER
Trademark.....: WISYCOM
Model/Type: MTH400
FCC ID.....: POUMTH400USX

Test Specification

Standard: FCC Rules & Regulations, Title 47:2015
Part 74 paragraph(s): 861

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

Address: Via Spin, 156 – 36060 Romano d'Ezzelino (VI) – ITALY

Manufacturer's name : Same as client

Address: --

Report

Tested by: A. Bertezzo – Technician

Approved by: R. Beghetto – Laboratory Manager

Date of issue: 04.11.16

Contents.....: 75 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 47:2015
Part 74 paragraph(s): 861

Test specifications	Environmental Phenomena	Tests sequence	Result
FCC – Title 47 Part 74.861	Peak Output Power	1	Complies
FCC – Title 47 Part 74.861	Frequency Error vs. Voltage	2	Complies
FCC – Title 47 Part 74.861	Frequency Error vs. Temperature	3	Complies
FCC – Title 47 Part 74.861	Characteristic of the Audio Modulation	4	Complies
FCC – Title 47 Part 74.861	Occupied Bandwidth	5	Complies
FCC – Title 47 Part 74.861	Attenuation Power	6	Complies
FCC – Title 47 Part 74.861	Radiated Spurious	7	Complies

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



2. Description of Equipment under test (EUT)

Power supply : 3 Vdc from battery

Serial Number : --

Type of equipment : ☒ Transmitter Unit
☐ Receiver Unit

Type of station : ☐ Fixed station
☒ Portable station
☐ Mobile station

Frequency band : 470 – 608 MHz
614 – 698 MHz

Modulation : Wide band FM with pre-emphasis

Information on antenna : ☐ Integrated
☐ External
☒ Other: Dedicated

Gain: 0 dBi

SAR evaluation : Reference document KDB 447498;

Product description:

- Transmission frequency range 470 – 698 MHz;
- Test separation distance > 50 mm;
- Peak Output Power of channel (see also cl. 11.1 of this test report), including tolerance = 19,78 dBm + 1 dB (measurement uncertainty) = 20,78 dBm (119,67 mW)

According to cl. 4.3.1 2) and KDB 447498 Table Appendix B the maximum allowed power level shall be 164 mW for frequency up to 835 MHz.

Peak Output Power = 119,67 mW < 164 mW

2.1 Test Site

Company : CMC Centro Misure Compatibilità S.r.l.

Address : Via dell'Elettronica, 12/C
36016 Thiene (VI) – ITALY

Test site facility's FCC registration number : 271947



3. Testing and sampling

Date of receipt of test item : 19.07.16
Testing start date : 21.10.16
Testing end date : 26.10.16
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 P160882

4. Operative conditions

EUT exercising : EUT in continuous transmission at maximum power. Tests that required a modulated signal have been performed using a LF generator, through and adapter provided by the manufacturer to generate the maximum occupancy. Conducted measurements have been performed using an adapter provided by the manufacturer. Tests on nominal frequencies 470,075, 607,925, 614,075 and 638,000 MHz have been performed on model MHT400-B1-EUX 470,0 – 640,0 MHz. Tests on nominal frequencies 668,000 and 697,925 MHz have been performed on model MHT400-EU 566,0 – 798,0 MHz



5. Photograph(s) of EUT

5.1 Photograph(s) of EUT







6. Equipment 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 '16	January '17
CMC S108	EMCO	3115	Horn Antenna	9811-5622	June '16	June '19
CMC S127	Schaffner	HLA6120	Loop Antenna	1191	November '13	November '18
CMC S164	Rohde & Schwarz	ESU26	EMC interference receiver	100052	January '16	January '17
CMC S200	Schwarzbeck	NSLK 8128	V-LISN	8128-273	January '16	January '17
CMC S227	Rohde & Schwarz	ESR7	EMI Test Receiver 7GHz	101121	January '16	January '17
CMC S260	CMC	Wfr_N	Shielded Cable	Wfr_ant10-1	November '15	November '16
CMC S261	CMC	Wfr_N	Shielded Cable	Wfr_ant20-1	November '15	November '16
CMC S262	CMC	Wfr_N_fix	Shielded Cable	Wfr_fix32-1	November '15	November '16
CMC S263	CMC	Wfr_N_fix	Shielded Cable	Wfr_fix31-1	November '15	November '16
CMC S264	CMC	Wfr_N	Shielded Cable	Wfr_ext03-1	November '15	November '16
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 '15	November '16



7. Measurement uncertainty

Test	Expanded Uncertainty	note
Conducted Emission		
(50Ω/50μH AMN) - (9 kHz – 150 kHz)	±3,6 dB	1
(50Ω/50μH AMN) - (150 kHz – 30 MHz)	±3,0 dB	1
(Voltage probe) - (150 kHz – 30 MHz)	±2,9 dB	1
(50Ω/5μH AMN) - (150 kHz – 108 MHz)	±2,6 dB	1
Discontinuous Conducted Emission		
Conducted Emission (50Ω/50μH AMN) - (150 kHz – 30 MHz)	±3,0 dB	1
Disturbance Power (30 MHz – 300 MHz)		
	±3,4 dB	1
Radiated Emission		
(0,150 MHz – 30 MHz)	±3,8 dB	1
(30 MHz – 1000 MHz)	±3,8 dB	1
(1 GHz – 6 GHz)	±4,3 dB	1
Electromagnetic field EMF		
	±10,5 %	1
Harmonic current emissions test		
	±1,2 %	1
Voltage fluctuation and flicker test		
	±3,8 %	1
Insertion loss test		
	±2,0 dB	1
Radiated electromagnetic disturbance test (loop antenna)		
	±1,5 dB	1
Radiated electromagnetic field immunity test		
	0,81 V/m at 3V/m	1
Pulse modulated radiated electromagnetic field immunity test		
	0,81 V/m at 3V/m	1
Injected currents immunity test		
	0,45 V at 3V	1
Bulk current		
	3,7 mA at 60 mA	1
Power frequency magnetic field immunity test		
	0,23 A/m at 10 A/m	1
Effective radiated power (F < 1GHz)		
	±3,8 dB	1
Effective radiated power (F > 1GHz)		
	±5,5 dB	1
Frequency error		
	< 1x10 ⁻⁷	1
Modulation bandwidth		
	< 1x10 ⁻⁷	1
Conducted RF power and spurious emission		
	±0,7 dB	1
Adjacent channel power		
	±1,2 dB	1
Blocking		
	±1,2 dB	1
Electrostatic discharge immunity test		
		2
Electrical fast transients / burst immunity test		
		2
Surge immunity test		
		2
Pulse magnetic field immunity test		
		2
Damped oscillatory magnetic field immunity test		
		2
Short interruption immunity test		
		2
Voltage transient emission test		
	±2,2 %	1
Transient immunity test		
		2

Rev_16_01 date 09/02/2016

Note 1:

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

Note 2:

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



8. Reference documents

Reference no.	Description
FCC Rules and Regulation Title 47 part 15:2015	--
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. 2.0 (Quality Manual)	Measure Procedure
Internal procedure INC_M rev. 8.2 (Quality Manual)	Measurement uncertainty calculation



9. Deviation from test specification

None

10. Test case verdicts

Test case does not apply to the test object : N.A.

Test item does meet the requirement : Complies

Test item does not meet the requirement : Does not comply

Test not performed : N.E.

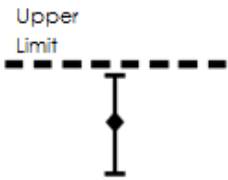
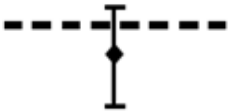


11. Results

In this clause tests results are reported.

Measurement uncertainty is in accordance with document CMC INC_M rev. 8.2.

Judgement of compliance:

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

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



11.1 Peak Output Power (Conducted)

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 74.861 (e)(1)(ii)
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S227
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: antenna

Environmental conditions

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

Acceptance limits

Frequency range (MHz)	RF Output Power
470 – 608 614 – 698	100 mW



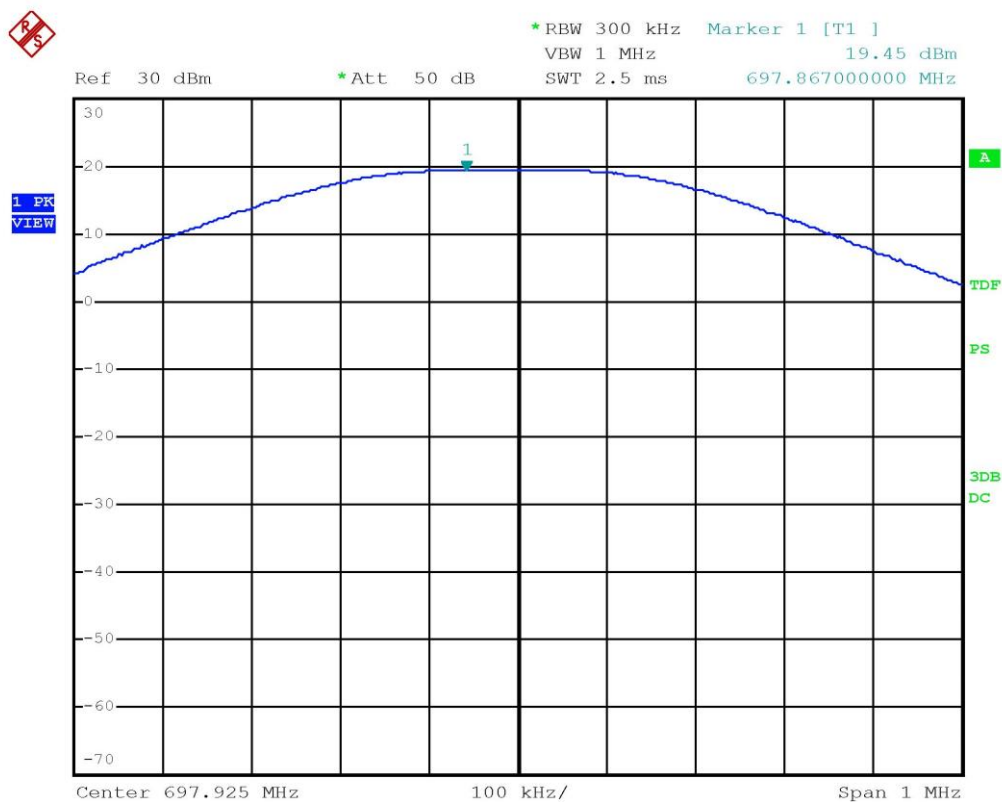
Result

Frequency (MHz)	Graphs	Measured Peak Output Power (dBm)	Peak Output Power (mW)	Results
697,925	G16177913	19,45	88,10	Complies
668,000	G16177914	19,27	84,53	Complies
638,000	G16177915	19,30	85,11	Complies
614,075	G16177916	19,75	94,41	Complies
607,925	G16177917	19,78	95,06	Complies
470,025	G16177918	19,62	91,62	Complies



Graphs

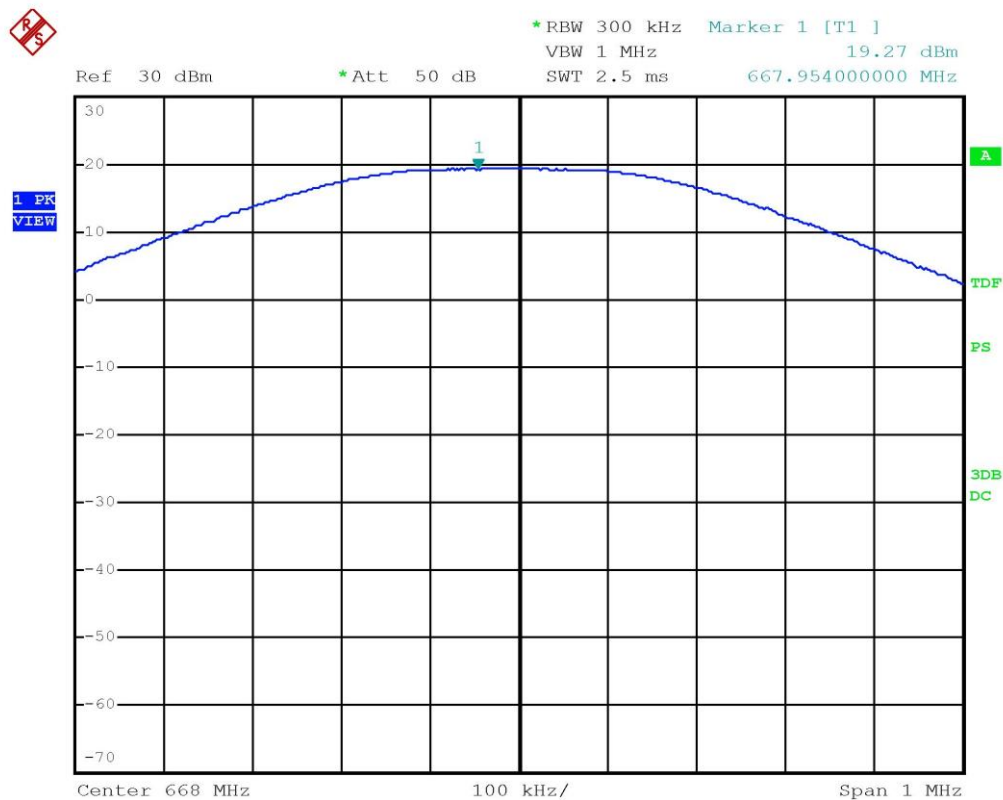
G16177913



Bertezzo 16177913



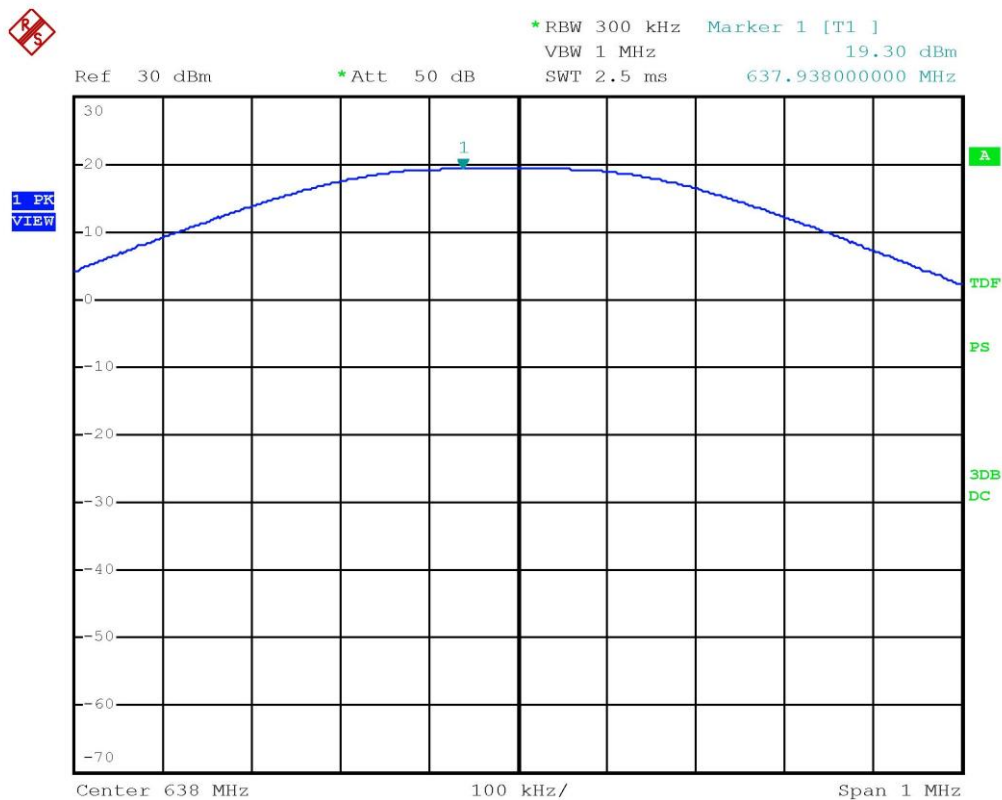
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Bertezzo 16177914



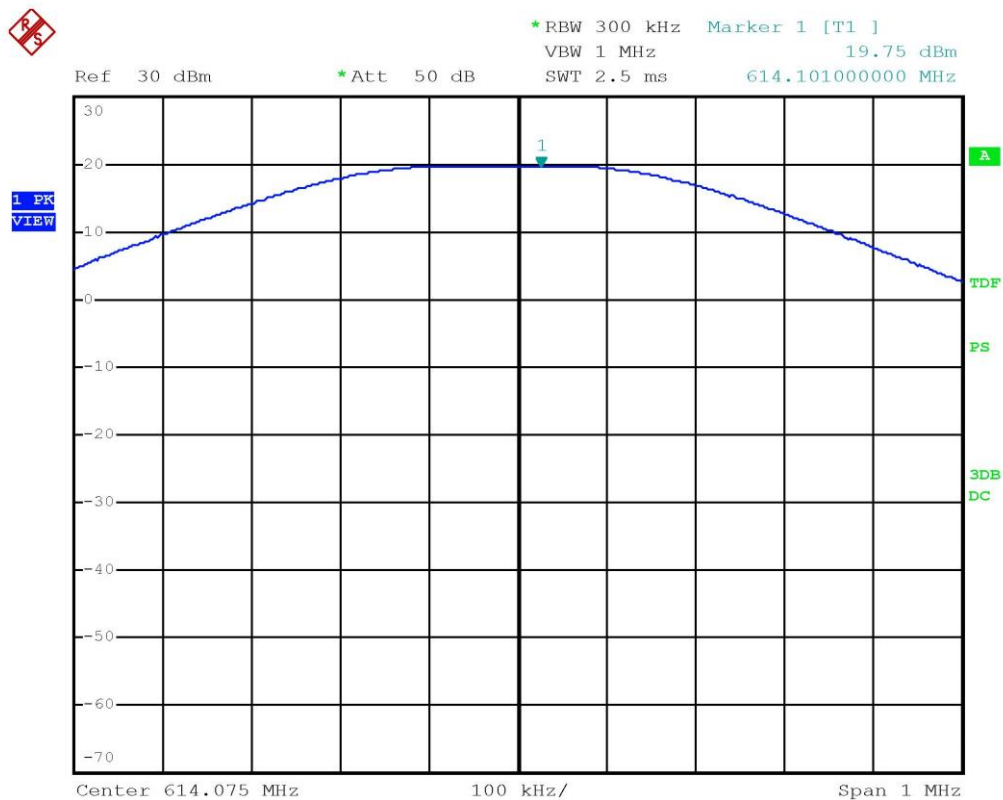
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Bertezzo 16177915



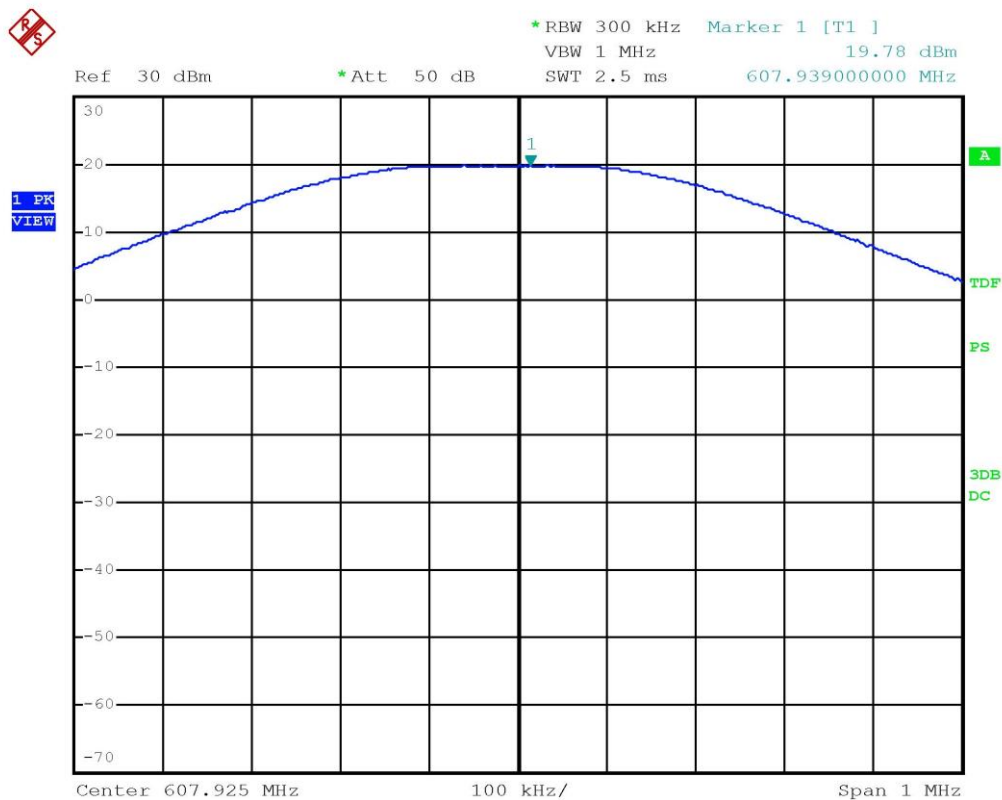
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Bertezzo 16177916



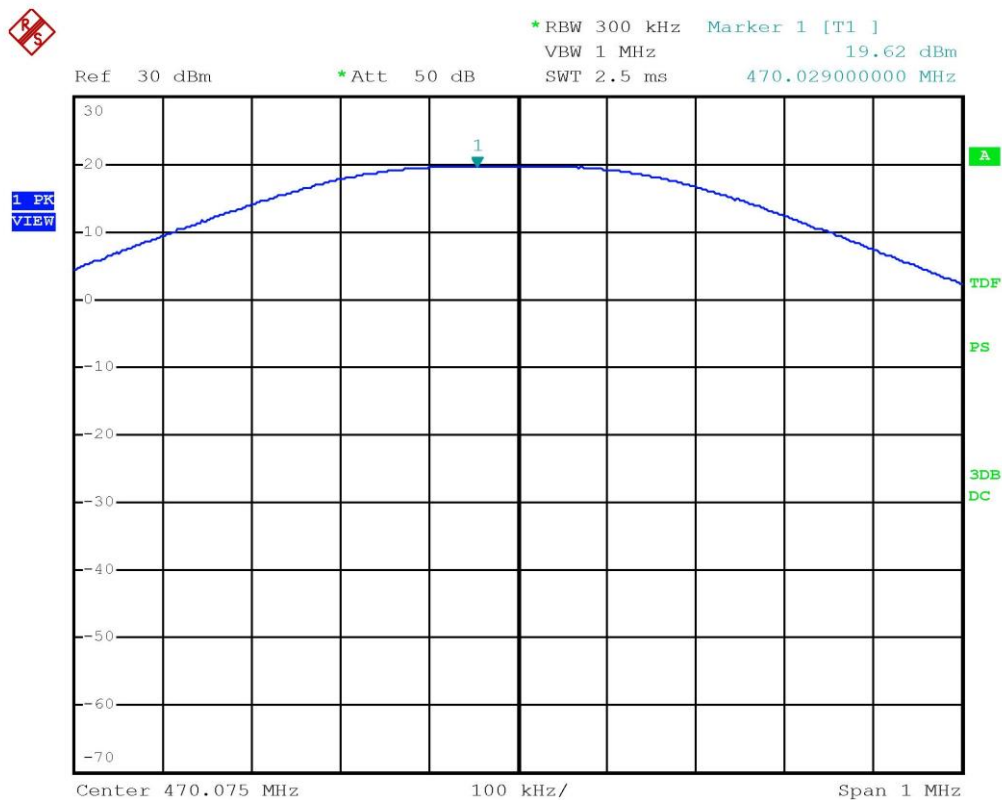
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G16177918



Bertezzo 16177918

Result: The requirements are met



11.2 Frequency Error vs. Voltage

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 74.861 (e)(4)
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S227
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Antenna

Environmental conditions

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

Acceptance limits

The frequency tolerance of the transmitter shall be 0,005 percent



Result

Frequency (MHz)	Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
470,075	3,50	46	0,00000979	0,098
470,075	3,20	47	0,00001000	0,100
470,075	3,00	44	0,00000936	0,094
470,075	2,80	48	0,00001021	0,102
470,075	2,60	49	0,00001042	0,104
470,075	2,40	49	0,00001042	0,104
470,075	2,20	49	0,00001042	0,104
470,075	2,00	50	0,00001064	0,106
470,075	1,80	50	0,00001064	0,106
470,075	1,60	*	*	*

* Switching off of the EUT

Frequency (MHz)	Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
607,925	3,50	61	0,00001003	0,100
607,925	3,20	62	0,00001020	0,102
607,925	3,00	60	0,00000987	0,099
607,925	2,80	59	0,00000971	0,097
607,925	2,60	60	0,00000987	0,099
607,925	2,40	59	0,00000971	0,097
607,925	2,20	61	0,00001003	0,100
607,925	2,00	62	0,00001020	0,102
607,925	1,80	61	0,00001003	0,100
607,925	1,60	*	*	*

* Switching off of the EUT

Frequency (MHz)	Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
614,075	3,50	70	0,00001140	0,114
614,075	3,20	71	0,00001156	0,116
614,075	3,00	70	0,00001140	0,114
614,075	2,80	72	0,00001172	0,117
614,075	2,60	70	0,00001140	0,114
614,075	2,40	71	0,00001156	0,116
614,075	2,20	71	0,00001156	0,116
614,075	2,00	70	0,00001140	0,114
614,075	1,80	70	0,00001140	0,114
614,075	1,60	*	*	*

* Switching off of the EUT



Frequency (MHz)	Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
638,000	3,50	73	0,00001144	0,114
638,000	3,20	73	0,00001144	0,114
638,000	3,00	73	0,00001144	0,114
638,000	2,80	73	0,00001144	0,114
638,000	2,60	73	0,00001144	0,114
638,000	2,40	73	0,00001144	0,114
638,000	2,20	73	0,00001144	0,114
638,000	2,00	73	0,00001144	0,114
638,000	1,80	73	0,00001144	0,114
638,000	1,60	*	*	*

* Switching off of the EUT

Frequency (MHz)	Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
668,000	3,50	37	0,00000554	0,055
668,000	3,20	37	0,00000554	0,055
668,000	3,00	37	0,00000554	0,055
668,000	2,80	37	0,00000554	0,055
668,000	2,60	37	0,00000554	0,055
668,000	2,40	37	0,00000554	0,055
668,000	2,20	37	0,00000554	0,055
668,000	2,00	37	0,00000554	0,055
668,000	1,80	37	0,00000554	0,055
668,000	1,60	*	*	*

* Switching off of the EUT

Frequency (MHz)	Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
697,925	3,50	100	0,00001433	0,143
697,925	3,20	98	0,00001404	0,140
697,925	3,00	102	0,00001461	0,146
697,925	2,80	103	0,00001476	0,148
697,925	2,60	101	0,00001447	0,145
697,925	2,40	101	0,00001447	0,145
697,925	2,20	103	0,00001476	0,148
697,925	2,00	106	0,00001519	0,152
697,925	1,80	99	0,00001418	0,142
697,925	1,60	*	*	*

* Switching off of the EUT

Result: The requirements are met



11.3 Frequency Error vs. Temperature

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 74.861 (e)(4)
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S227
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Antenna

Environmental conditions

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

Acceptance limits

The frequency tolerance of the transmitter shall be 0,005 percent



Result

Frequency (MHz)	Temperature (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
470,075	55	48	0,0000102	0,102
470,075	50	49	0,0000104	0,104
470,075	40	48	0,0000102	0,102
470,075	30	47	0,0000100	0,100
470,075	10	48	0,0000102	0,102
470,075	0	47	0,0000100	0,100
470,075	-10	46	0,0000098	0,098
470,075	-20	42	0,0000089	0,089
470,075	-30	38	0,0000081	0,081

Frequency (MHz)	Temperature (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
607,925	55	63	0,0000104	0,104
607,925	50	65	0,0000107	0,107
607,925	40	64	0,0000105	0,105
607,925	30	62	0,0000102	0,102
607,925	10	63	0,0000104	0,104
607,925	0	62	0,0000102	0,102
607,925	-10	65	0,0000107	0,107
607,925	-20	60	0,0000099	0,099
607,925	-30	58	0,0000095	0,095

Frequency (MHz)	Temperature (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
614,075	55	73	0,0000119	0,119
614,075	50	72	0,0000117	0,117
614,075	40	72	0,0000117	0,117
614,075	30	73	0,0000119	0,119
614,075	10	70	0,0000114	0,114
614,075	0	70	0,0000114	0,114
614,075	-10	68	0,0000111	0,111
614,075	-20	66	0,0000107	0,107
614,075	-30	60	0,0000098	0,098

Frequency (MHz)	Temperature (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
638,000	55	75	0,0000118	0,118
638,000	50	72	0,0000113	0,113
638,000	40	73	0,0000114	0,114
638,000	30	70	0,0000110	0,110
638,000	10	70	0,0000110	0,110
638,000	0	69	0,0000108	0,108
638,000	-10	71	0,0000111	0,111
638,000	-20	65	0,0000102	0,102
638,000	-30	60	0,0000094	0,094



Frequency (MHz)	Temperature (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
668,000	55	38	0,0000057	0,057
668,000	50	37	0,0000055	0,055
668,000	40	38	0,0000057	0,057
668,000	30	37	0,0000055	0,055
668,000	10	35	0,0000052	0,052
668,000	0	36	0,0000054	0,054
668,000	-10	35	0,0000052	0,052
668,000	-20	30	0,0000045	0,045
668,000	-30	28	0,0000042	0,042

Frequency (MHz)	Temperature (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
697,925	55	45	0,0000064	0,064
697,925	50	98	0,0000140	0,140
697,925	40	103	0,0000148	0,148
697,925	30	109	0,0000156	0,156
697,925	10	193	0,0000277	0,277
697,925	0	93	0,0000133	0,133
697,925	-10	48	0,0000069	0,069
697,925	-20	235	0,0000337	0,337
697,925	-30	372	0,0000533	0,533

Result: The requirements are met



11.4 Characteristics of the Audio Modulation Circuitry

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 74.861 (e3)
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC A201
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Antenna

Environmental conditions

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

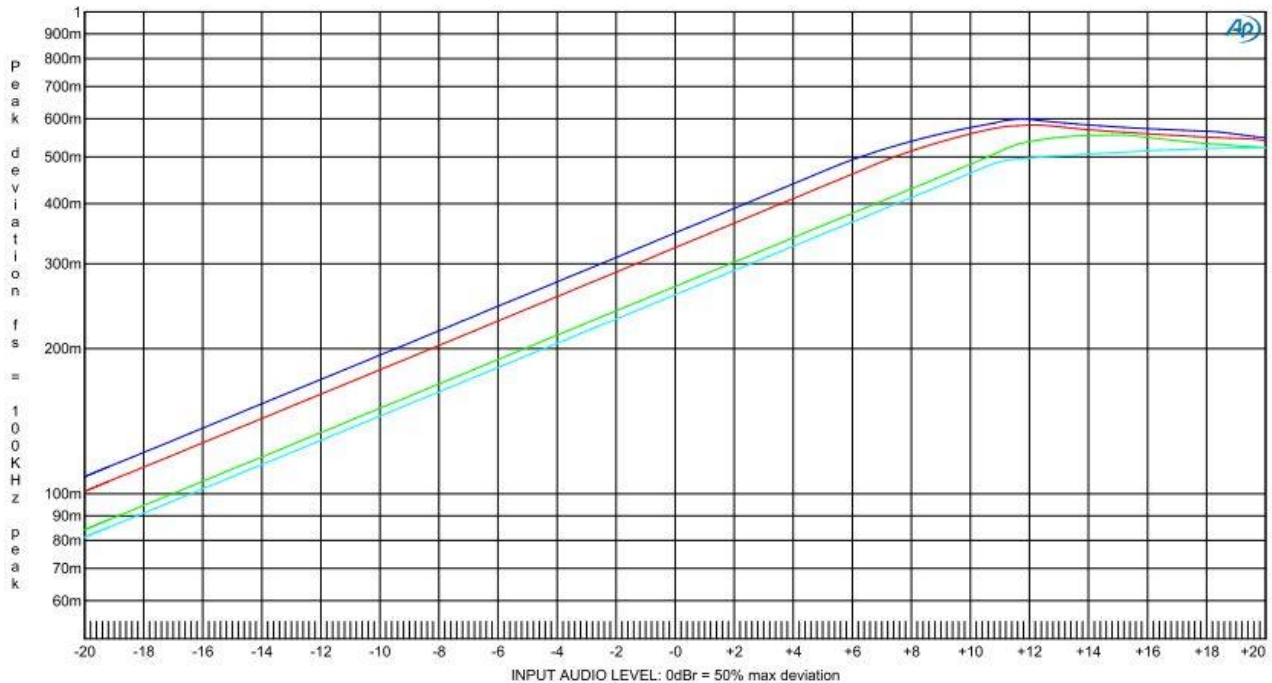
Acceptance limits

A maximum deviation of ± 75 kHz is permitted when frequency modulation is employed



Result

MODULATION LEVEL vs AUDIO INPUT



Result: The requirements are met



11.5 Occupied bandwidth

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 74.861 (e)(5)
- 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 S227
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Antenna

Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
20	100	42

Acceptance limits

The operating bandwidth shall not exceed 200 kHz



Result

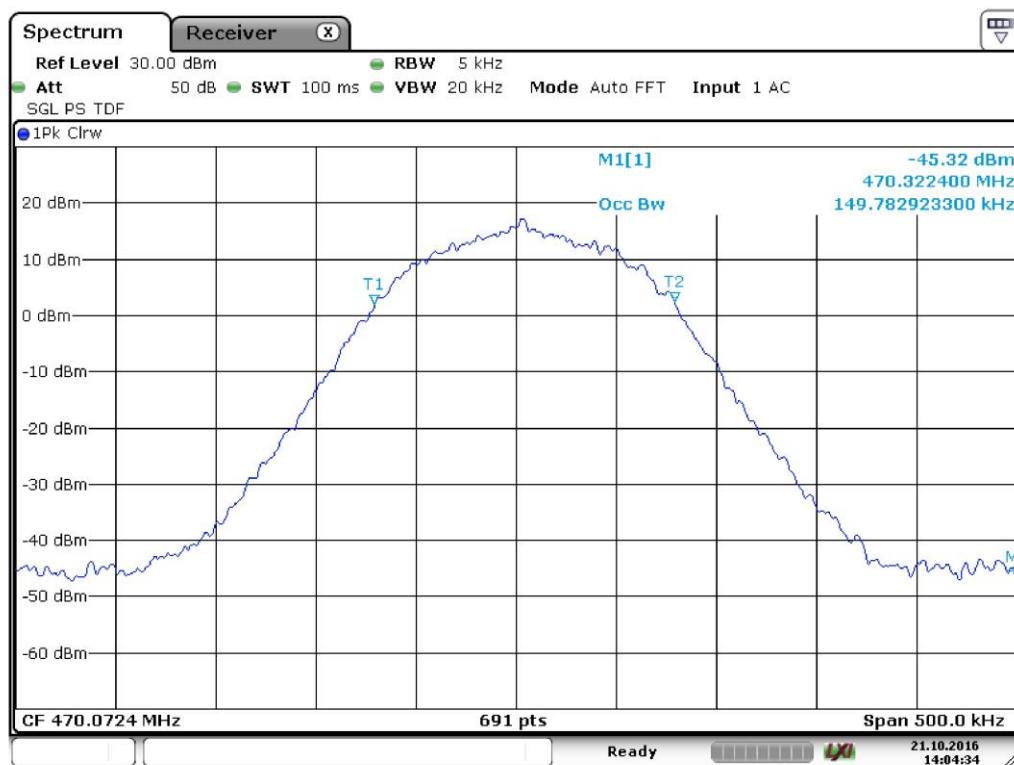
<i>Frequency (MHz)</i>	<i>Graph(s)</i>	<i>Bandwidth (kHz)</i>	<i>Result</i>
470,025	G16177901	149,782923	Complies
607,925	G16177904	157,018813	Complies
614,075	G16177905	156,295224	Complies
638,000	G16177908	154,124457	Complies
668,000	G16177909	154,124457	Complies
697,925	G16177911	153,400868	Complies





Graphs

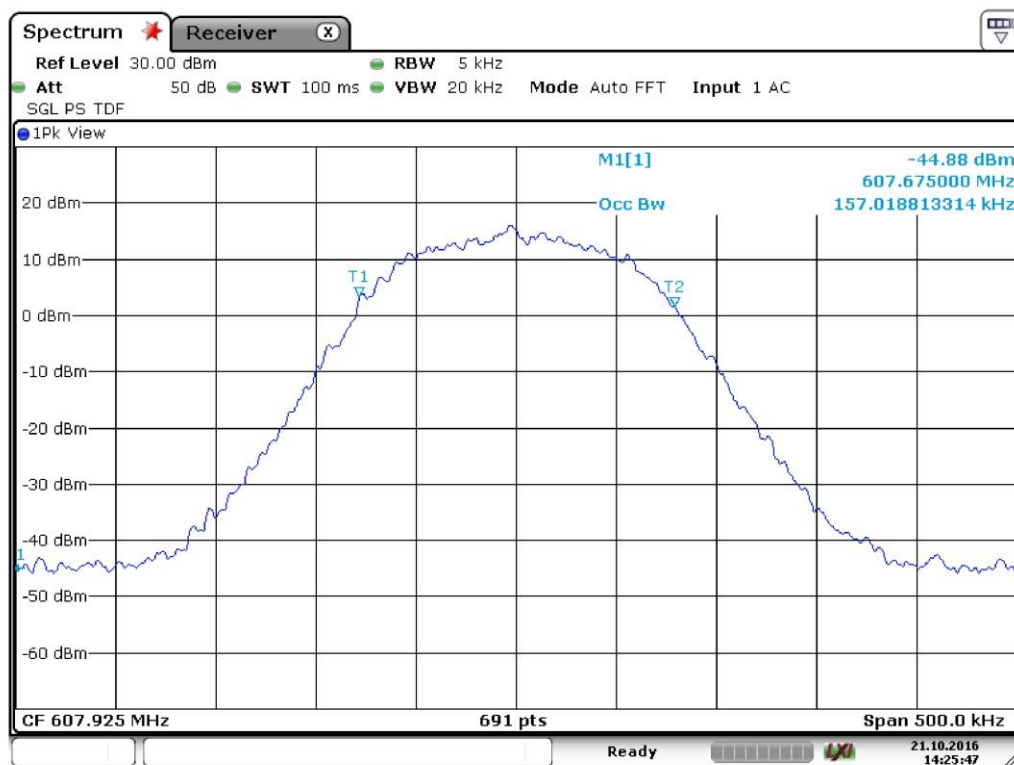
G16177901



Bertezzolo 16177901



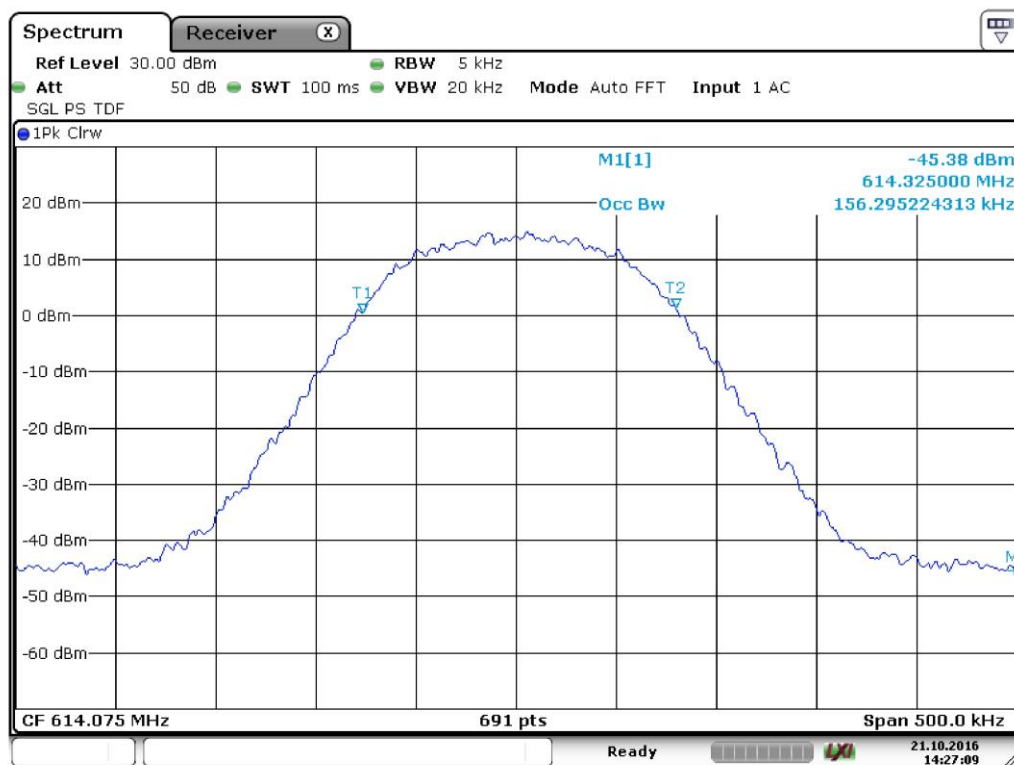
G16177904



Bertezzolo 16177904



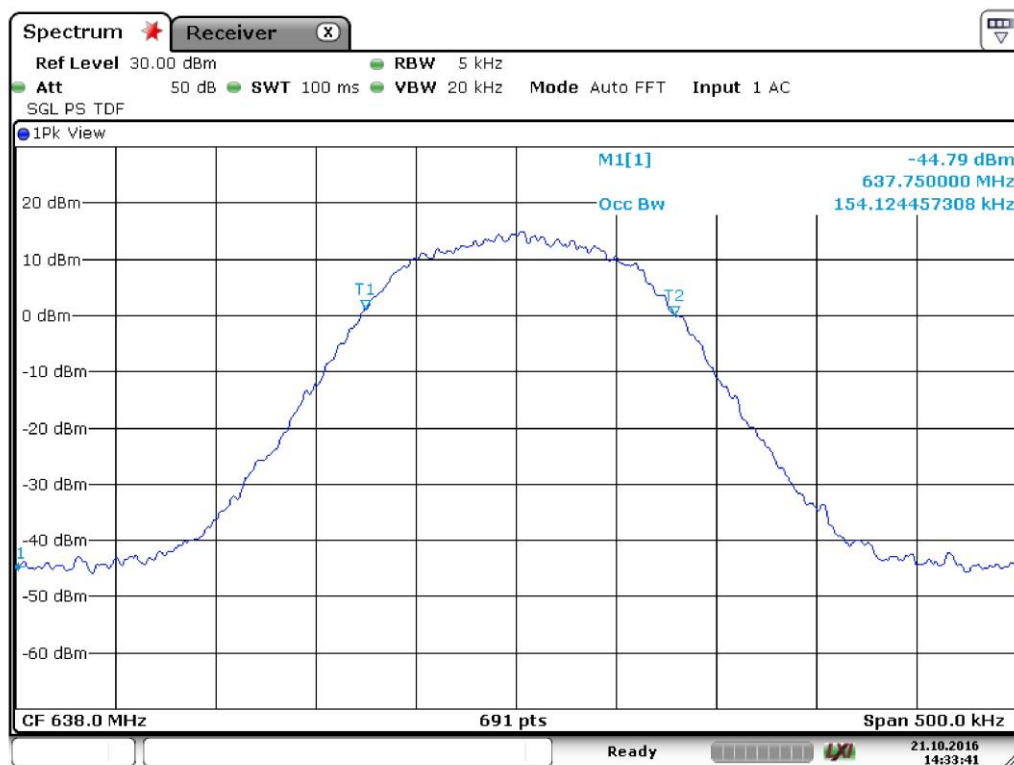
G16177905



Bertezzolo 16177905



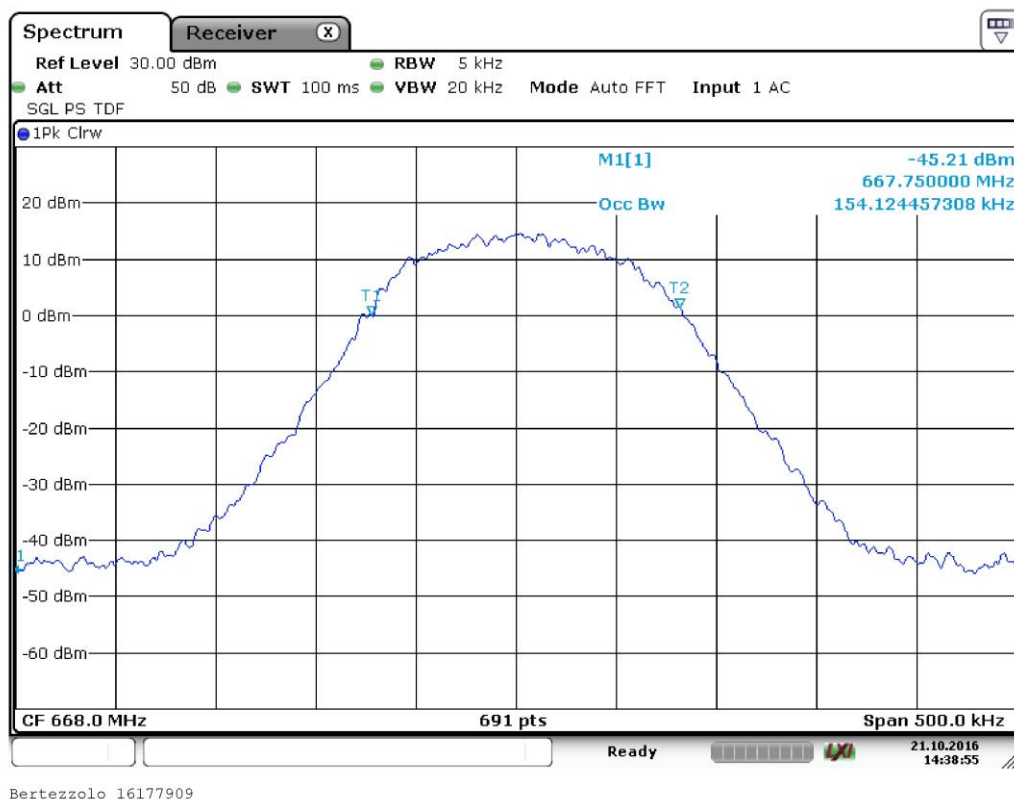
G16177908



Bertezzolo 16177908

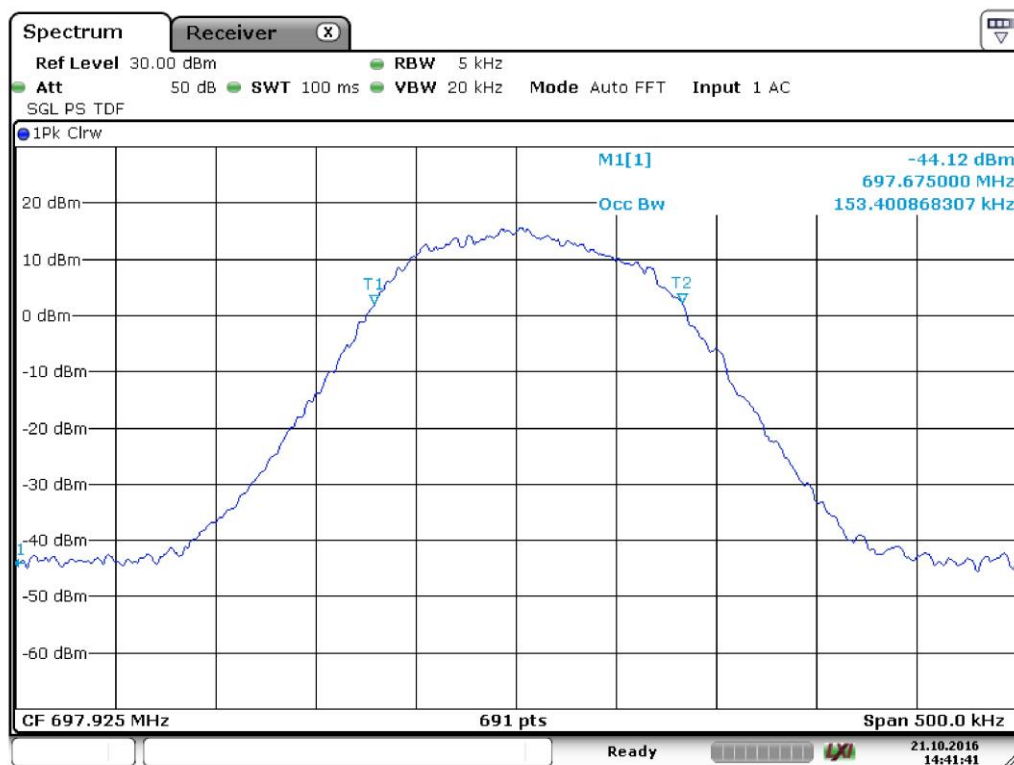


G16177909





G16177911



Bertezzolo 16177911

Result: The requirements are met



11.6 Attenuation Power

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 74.861 (e)(6)
- 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 S227
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Antenna

Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	101	42

Acceptance limits

$f \pm 100 \text{ kHz to } f \pm 200 \text{ kHz}$	$f \pm 200 \text{ kHz to } f \pm 500 \text{ kHz}$	$f \pm 500 \text{ kHz}$
25 dBc	35 dBc	$43 + 10\log_{10}$ (mean output power in watts) dB below the mean output power