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## TEST REPORT

**8551-PT-R0167-12**

Copy No. 1 of 2

Page 1 of 1

**Date of issue:** July 31<sup>st</sup>, 2012

**Customer:** ALCOMA spol. s r.o.  
Vinšova 11  
106 00 Praha 10  
Czech Republic

**Manufacturer:** UBIQUITI NETWORKS.  
2580 Orchard Parkway  
San Jose, CA 95131  
USA

**Subject of the test:** Radio parameters

**Kind of equipment:** Digital Fixed Radio Systems - Point to point equipment

**Type:** Power Bridge M10

**Serial number:** s/n 1213F002722B81AEA

**Test procedure (used standard):** ETSI EN 302 217-2-2 V1.4.1

The results of the tests have been obtained following the procedures reported in this Report and are related only to the tested item, date, place and conditions of the test. Test Report does not substitute any other document that may be required by national authorities according to relevant regulations. These tests were carried out beyond the accreditation of Czech Metrology Institute - Testing laboratory TESTCOM Praha.

Measurement equipment, date and place of test, ambient and test conditions, results of testing and statements of compliance and other relevant information are written in the Annex 1 of this Test Report.

**Tested by:**

Jiří Novotný  
František Šebek, Ph.D.



**Head of the Department:**

Marek Svoboda, Ph.D.

End of test report

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# 1. Technical Summary And Test Results

## 1.1 Technical Summary

Applicant:	<b>ALCOMA s.r.o. Vinšova 11 106 00 Praha 10 Czech Republic</b>
Manufacturer:	<b>UBIQUITI NETWORKS 2580 Orchard Parkway San Jose, CA 95131 USA</b>
Kind of Equipment:	<b>Digital Fixed Radio Systems - Point to point equipment</b>
Class Identifier:	<b>2</b>
Type Designation(s):	<b>Power Bridge M10</b>
RF Power:	<b>2 mW</b>
Lower sub-band:	<b>10 308 MHz to 10 406 MHz</b>
Higher sub-band:	<b>10 490 MHz to 10 574 MHz</b>
Number of Units:	<b>1</b>
Date of Receipt of Unit(s):	<b>20.7.2012</b>
Start of Test:	<b>20.7.2012</b>
Finish of Test:	<b>20.7.2012</b>

## 1.2 Test Results of Unit No. 1 Transceiver

Type Designation: **Power Bridge M10**

Serial No.: **1213F002722B81AEA**

Transmitter nominal carrier frequencies:

**CH 1: 10 322 MHz**

**CH 2: 10 406 MHz**

**CH 3: 10 574 MHz**

Power Supply Range:  **$V_{nom} = 230 \text{ V AC}$**

Temperature Range:  **$T_{nom} = \text{Ambient temperature}$**

Standard: ETSI EN 302 217-2-2 V1.4.1 (2010-07)

Ambient temperature:  $(27 \pm 1) ^\circ\text{C}$ Relative humidity:  $(52 \pm 10) \%$ 

RF Power Nominal Setting: 3 dBm

Channel Separation: 28 MHz

Clause 5.2.1 and 5.2.3: **TRANSMITTER POWER AND POWER TOLERANCE**

TEST CONDITIONS		RF POWER [dBm]	
		CH 1	Limit [dBm]
Tnom	Vnom	2.8	3.0
Tmin	Vnom	--	3.0
Tmax	Vnom	--	3.0
		CH 2	Limit [dBm]
Tnom	Vnom	2.8	3.0
Tmin	Vnom	--	3.0
Tmax	Vnom	--	3.0
		CH 3	Limit [dBm]
Tnom	Vnom	3.3	3.0
Tmin	Vnom	--	3.0
Tmax	Vnom	--	3.0
Measurement uncertainty		$\pm 1$ dB	

Clause 4.2.1, 4.2.3: **LIMIT**

The maximum power shall be limited, in term of EIRP of the systems by the provisions given in the ITU Radio Regulations (2004). Those limits shall be inclusive of tolerances and, if applicable, ATPC/RTPC influence.

The nominal transmitter power shall be declared by the supplier. The tolerance of the nominal transmitter power shall be within  $\pm B$  dB, within the environmental profile declared by the supplier for the intended limits of usage of the equipment; the value of B is given in the relevant annex(es).

TEST EQUIPMENT USED: A082+HP8481, A034

REMARKS: The measurement was carried out according to ETSI EN 301 126-2-3 V1.2.1 clause 4.2.1. EUT was in MODE 1 (for details see Additional information), Burst/Frame duration was 1.53/219.5 ms. RF POWER is the power supplied to the antenna feeder and is the sum of power for both polarizations - POL1 and POL2 (for details see Additional information). As the LIMIT was taken value from General Authorization No. VO-R14/06.2012-8 issued by Czech Telecommunication Office.

Ambient temperature:  $(28 \pm 1) ^\circ\text{C}$ Relative humidity:  $(48 \pm 10) \%$ 

RF Power Nominal Setting: 3 dBm

Channel Separation: 28 MHz

Clause 5.2.4: **TRANSMITTER RF SPECTRUM MASK**

TEST CONDITIONS		RELATIVE POWER SPECTRUM DENSITY MASK remains below the defined limits
		CH 1
Tnom	Vnom	NO
Tmin	Vnom	--
Tmax	Vnom	--
		CH 2
Tnom	Vnom	NO
Tmin	Vnom	--
Tmax	Vnom	--
		CH 3
Tnom	Vnom	NO
Tmin	Vnom	--
Tmax	Vnom	--
Measurement uncertainty		$\pm 1,5$ dB

Clause 4.2.4: **LIMIT**

The relative power spectrum density mask, reported in the relevant Table, shall be met.
---

Limits of power spectral density are defined at the Table 2E, Spectral efficiency 4H.
---

TEST EQUIPMENT USED: A034

REMARKS: See chapter 5 for plots of spectrum density masks. EUT was in MODE 1 or MODE 2 (for details see chapter Additional information and Graphs).

Standard: ETSI EN 302 217-2-2 V1.4.1 (2010-07)

Ambient temperature:  $(28 \pm 1) \text{ }^\circ\text{C}$

Relative humidity:  $(48 \pm 10) \%$

RF Power Nominal Setting: 3 dBm

Channel Separation 28 MHz

Clause 5.2.6: **TRANSMITTER SPURIOUS EMISSIONS**

SPURIOUS EMISSIONS	CH 1		
Frequency Range/Frequency [MHz]	Bandwidth [kHz]	Level [dBm]	Limit [dBm]
8 000 to 26 000	1000	<-50.0	50
	CH 2		
8 000 to 26 000	1000	<-50.0	50
8 000 to 26 000	1000	<-50.0	50
Measurement uncertainty	$\pm 2,5 \text{ dB}$		

Clause 4.2:6 and 4.3.1: **LIMIT**

The transmitter shall comply with the requirements of clause 4 of EN 301 390 V1.2.1. The CEPT/ERC Recommendation 74-01 (2002) shall apply for point-to-point equipment. This Recommendation requires the limits reported in table A.2 of EN 301 390 V1.2.1.

TEST EQUIPMENT USED: A034

REMARKS: EUT was in MODE 2. For the results when the EUT was in MODE 1 see graphs in chapter 5.

### 1.3 Summary of Test Results

- P = Complied with the requirements of the specification for this test (used standard)
- F = Not complied with the requirements of the specification for this test (used standard)
- N/A = Not applicable

#### Unit No. 1

<b>Clause of the standard: Parameter</b> .....	<b>Result</b>
Clause 5.2.1 and 5.2.3: TRANSMITTER POWER AND POWER TOLERANCE .....	F
Clause 5.2.4: TRANSMITTER RF SPECTRUM MASK .....	F
Clause 5.2.5: DESCRETE CW COMPONENTS EXCEEDING THE SPECTRUM MASK LIMIT .....	N/A
Clause 5.2.6: TRANSMITTER SPURIOUS EMISSIONS .....	F
Clause 5.2.8: TRANSMITTER RADIO FREQUENCY TOLERANCE .....	N/A
Clause 5.3.2: BER AS A FUNCTION OF RECEIVER INPUT SIGNAL LEVEL (RSL).....	N/A
Clause 5.3.3: CO-CHANNEL AND ADJACENT CHANNEL INTERFERENCE SENSITIVITY .....	N/A
Clause 5.3.4: CW SPURIOUS INTERFERENCE .....	N/A



## 2. Test Equipment

Lab Id. No.	Test equipment	Type	Manufacturer	Serial No.
002	Spectrum Analyzer	8595A	Hewlett-Packard	3132 A
006	Signal Generator	8657B	Hewlett-Packard	3133 U
007	Signal Generator	8657B	Hewlett-Packard	3133 U
011	RF Millivoltmeter	URV 4	Rohde-Schwarz	871889/047
014	Attenuator 20 dB/30 W	RBU-30	Rohde-Schwarz	825 723/009
017	Attenuator 40 dB/1 kW	RBS 1000	Rohde-Schwarz	835922/007
022	4-Port Junction Box	DVU 4	Rohde-Schwarz	832731/004
024	Regulating Transformer	TST 280/6	RFT	740 889
026	Heating Chamber	3524/11	Feutron	142/88
027	Freezing Chamber	NZ 350-40	Frigera	35/88
028	Shielded Chamber	-	Siemens	-
029	Digital Multimeter	M-3850	Metex	EB 127 259
030	4-Port Junction Pad	MA1612A	Anritsu	M54131
031	Digital Oscilloscope	9310AM	Le Croy	9310 3310
034	Spectrum Analyzer	8563E	Hewlett-Packard	3436A02701
035	Tracking Source	85644A	Hewlett-Packard	3407A00177
036	Preamplifier	87405A	Hewlett-Packard	3207A00368
037	Step Attenuator	8494A	Hewlett-Packard	3308A23005
038	Step Attenuator	8495A	Hewlett-Packard	3308A15336
039	Attenuator 10 dB/100 W	RBU 100	Rohde-Schwarz	836121/007
041	Anechoic Chamber	-	Frankonia	-
042	Environmental Chamber	KWP 450/70	Weiss	221/18068
043	Directional Bridge	8721A	Hewlett-Packard	-
048	Signal Generator	8664A	Hewlett-Packard	3546A01039
050	Power Splitter	11667A	Hewlett-Packard	0000A21292
051	Dual Directional Coupler	778D	Hewlett-Packard	16738
052	Simulated Man	-	Testcom	-
053	Spectrum Analyzer	8595E	Hewlett-Packard	3726U00949
055	Termination 50 Ohm/1 W	378NF	Narda	-
056	Termination 50 Ohm/1 W	378NM	Narda	-
057	Termination 50 Ohm/1 W	378NM	Narda	-
058	Attenuator 3 dB/20 W	768-3	Narda	-
059	Attenuator 6 dB/20 W	768-6	Narda	-
060	Attenuator 10 dB/20 W	768-10	Narda	-
061	Attenuator 10 dB/20 W	768-10	Narda	-
062	Attenuator 20 dB/50 W	776B-20	Narda	-
063	Attenuator 15 dB/50 W	776B-30	Narda	-
064	Attenuator 30 dB/150 W	769-30	Narda	06472
065	Step Attenuator	745	Narda	02698
066	Dual Directional Coupler	-	Tesla	-
067	Attenuator 8 dB/1 kW	RFA1000NFF8Z	RES-NET	9851
068	Dual directional Coupler	-	Tesla	185
069	Signal Generator	83732A	Hewlett-Packard	3520A00697
072	Attenuator 30 dB/50 W	776B-30	Narda	-
073	Signal Generator	SMIQ03B	Rohde-Schwarz	100522
074	Thermometer - Hygrometer	C3120A	Comet System	-
075	Thermometer - Hygrometer	C3120A	Comet System	-
076	Isolating Transformer	LTS 006	RFT	310329
077	Digital Oscilloscope	9310AM	Le Croy	5935
078	Signal Generator	8657A	Hewlett-Packard	2849U01178

Standard: ETSI EN 302 217-2-2 V1.4.1 (2010-07)

Lab Id. No.	Test equipment	Type	Manufacturer	Serial No.
080	Interval Counter	SR620	Stanford Research	3352
081	Time and Frequency Precise Generator	GPG24	Dicom s.r.o.	0108251
082	Power Meter	437B	Hewlett-Packard	3125U05716
083	Step Attenuator	DPSP	Rohde-Schwarz	880607/044
084	Power Splitter	11636A	Hewlett-Packard	04464
085	Power Splitter	11667A	Hewlett-Packard	19894
087	Termination 50 Ohm/1 W	378NF	Narda	-
108	Notch Filter	-	Kathrein	-
111	RF Test Fixture	-	Testcom	-
112	AF Test Fixture	-	Testcom	-
123	Power Supply	YE 2 T	Mesit	PC 001
127	Power Supply	TSZ 75	ZPA	547 1255
134	Notch Filter 15 - 90 MHz	SF 1	Schomandl	10046
135	Notch Filter 85 - 260 MHz	SF 2	Schomandl	10004
136	Notch Filter 210 - 500 MHz	SF 3	Schomandl	10010
137	Notch Filter 500 - 1000 MHz	SF 4	Schomandl	10016
142	Radiocommunication Tester	CMTA 54	Rohde-Schwarz	838262/005
143	AF Transformer	CM - Z39	Rohde-Schwarz	835844/0002
144	Power Amplifier 9 kHz - 220 MHz	BSA 0122-20	Bonn Elektronik	943954A
145	Power Amplifier 200 - 1000 MHz	BLWA 2010-20	Bonn Elektronik	943954B
146	Precision Dipole 30 - 300 MHz	VHAP	Schwarzbeck	705
147	Precision Dipole 30 - 300 MHz	VHAP	Schwarzbeck	706
148	Precision Dipole 300 - 1000 MHz	UHAP	Schwarzbeck	728
149	Precision Dipole 300 - 1000 MHz	UHAP	Schwarzbeck	729
150	Biconical Broadband Antenna to 300 MHz	VHBB 9124 + BA 9106	Schwarzbeck	0204/93
151	Biconical Broadband Antenna 0.3 - 1 GHz	UBA 9116	Schwarzbeck	313/93
152	Short Dipole 25 - 80 MHz	VHAA 9110	Schwarzbeck	140
154	Broadband Horn Antenna 0.8 - 4.5 GHz	BBHA 9120-A	Schwarzbeck	215
155	Broadband Horn Antenna 0.8 - 4.5 GHz	BBHA 9120-A	Schwarzbeck	216
156	Broadband Horn Antenna 2 - 14 GHz	BBHA 9120-C	Schwarzbeck	309
157	Broadband Horn Antenna 2 - 14 GHz	BBHA 9120-C	Schwarzbeck	310
160	ACP Filter	ACPX 107-125-A	COMNET Sys	736001
161	ACP Filter	ACPX 107-200-A	COMNET Sys	736002
162	ACP Filter	ACPX 107-250-A	COMNET Sys	736003
163	Noise Generator	RG 1	Wandel-Goltermann	467250 G
164	Colour Noise Filter	-	Testcom	-
165	Transmission Measuring Set	PMD-1	Wandel-Goltermann	454632 B
166	Power Supply	6653A	Hewlett-Packard	US36400106
167	Power Supply	6653A	Hewlett-Packard	US36400120
169	Notch filter 1.4 – 2.0 GHz	-	Testcom	-
170	Level Amplifier	PSV-39	Wandel-Goltermann	B-0011
171	Bit Error Rate Meter	BER Meter	Radom	-
174	Ferrite Circulator	CKU 355H	Tesla	2900024/001
175	Ferrite Circulator	CKU 356	Tesla	2900056/001
176	Power Supply	6634A	Hewlett-Packard	3004A-02063
177	Power Supply	6634A	Hewlett-Packard	3326A-03226
178	Amplifier 10 – 1000 MHz	ZFL-1000VH	Mini-Circuits	-
179	Amplifier 1 – 500 MHz	ZHL-5W-1	Mini-Circuits	-
202	Video-Millivoltmeter	VMV 21	Tesla	86 114
306	Tuneable Filter 60 – 180 MHz	-	Tesla	-
402	Spectrum Analyzer	Hewlett-Packard	8593A	3221U00500
403	Spectrum Analyzer	Hewlett-Packard	8564E	3423A00170
404	Microwave Frequency Counter	Hewlett-Packard	5352B	3049A00944

Standard: ETSI EN 302 217-2-2 V1.4.1 (2010-07)

Lab Id. No.	Test equipment	Type	Manufacturer	Serial No.
406	Power Sensor	Hewlett-Packard	8481B	2350A04020
407	Power Sensor	Hewlett-Packard	8487A	3318A01218
408	Power Sensor	Hewlett-Packard	8485D	3318A01820
409	Digital Oscilloscope	Hewlett-Packard	54503A	2929A01322
410	BER Analyzer	Wandel-Goltermann	PF-4	G-0167
413	Variable Attenuator	Hewlett-Packard	G382A	2925
414	Variable Attenuator	Hewlett-Packard	J382A	3714
415	Variable Attenuator	Hewlett-Packard	H382A	2670
416	Variable Attenuator	Hewlett-Packard	X382A	12778
417	Variable Attenuator	Hewlett-Packard	X382A	12791
418	Variable Attenuator	Hewlett-Packard	P382A	9082
419	Variable Attenuator	Hewlett-Packard	P382A	9382
420	Variable Attenuator	Hewlett-Packard	K382A	2956
421	Variable Attenuator	Hewlett-Packard	K382A	2967
422	Variable Attenuator	Hewlett-Packard	R382A	3008
423	Variable Attenuator	Hewlett-Packard	R382A	3030
424	Coaxial Variable Attenuator	T-CZ	CFN 20401	0100
425	Coaxial Variable Attenuator	T-CZ	CFN 20401	0101
426	Coaxial Step Attenuator	Hewlett-Packard	354A	01768
427	Coaxial Step Attenuator	Hewlett-Packard	8494B	2812A14873
428	Coaxial Step Attenuator	Hewlett-Packard	8496B	2728A12353
429	Directional Coupler	Hewlett-Packard	J752A	4238
430	Directional Coupler	Hewlett-Packard	J752C	4564
431	Directional Coupler	Hewlett-Packard	J752C	1829A04882
432	Directional Coupler	Hewlett-Packard	H752A	1829A04229
433	Directional Coupler	Hewlett-Packard	H752C	1829A04171
434	Directional Coupler	Hewlett-Packard	X752A	18474
435	Directional Coupler	Hewlett-Packard	X752C	19875
436	Directional Coupler	Hewlett-Packard	P752A	1829A11180
437	Directional Coupler	Hewlett-Packard	P752C	1829A13539
438	Directional Coupler	Hewlett-Packard	K752A	91
439	Directional Coupler	Hewlett-Packard	K752C	389
440	Directional Coupler	Hewlett-Packard	R752A	121
441	Directional Coupler	Hewlett-Packard	R752C	381
442	Coaxial Directional Coupler	Wawecom	S-902-3A	11
443	Coaxial Directional Coupler	Wawecom	C-902-3A	60
444	Coaxial Directional Coupler	Wawecom	X-902-A	51
445	Coaxial Directional Coupler	Hewlett-Packard	779D	1144A02176
446	Coaxial Directional Coupler	Hewlett-Packard	779D	1144A02332
447	Coaxial Directional Coupler	Hewlett-Packard	11691D	1212A02394
448	Power Supply	Hewlett-Packard	6654A	3502A01324
449	Power Supply	Hewlett-Packard	6654A	3502A01325
450	Variable Attenuator	Flann Microwave	FMI17/11	238
451	Variable Attenuator	Flann Microwave	FMI17/11	239
454	Variable Attenuator	T-CZ	QFW 70214	0102
455	Variable Attenuator	T-CZ	QFW 70214	0101
456	Variable Attenuator	T-CZ	QFW 10214	0101
457	Variable Attenuator	ČVUT, VL Poděbrady	-	-
458	Network tester	Wandel-Goltermann	ANT-20	J-0020
459	Power Meter	Rohde-Schwarz	NRVD	101105
G31	Signal Generator	Rohde-Schwarz	SMR40	832850/011

### 3. Additional Information

There were measured only three parameters under normal test conditions according to ETSI EN 302 217-2-2 V1.4.1 on the request of applicant. The Power Bridge M10 equipment operates as point to point equipment based on General Authorization No. VO-R14/06.2012-8 issued by Czech Telecommunication Office:

Clause 5.2.1 and 5.2.3: TRANSMITTER POWER AND POWER TOLERANCE

Clause 5.2.4: TRANSMITTER RF SPECTRUM MASK

Clause 5.2.6: TRANSMITTER SPURIOUS EMISSIONS

Considering that the EUT is TDMA equipment the measurement was also carried out according to ETSI EN 302 326-2 V1.2.2 standard.

As the measuring point was chosen antenna feeder with two polarisations outputs (see photographs). Polarization 1 (POL1) is turned +45° and polarization 2 (POL2) is turned -45°.

EUT was measured in two regimes:

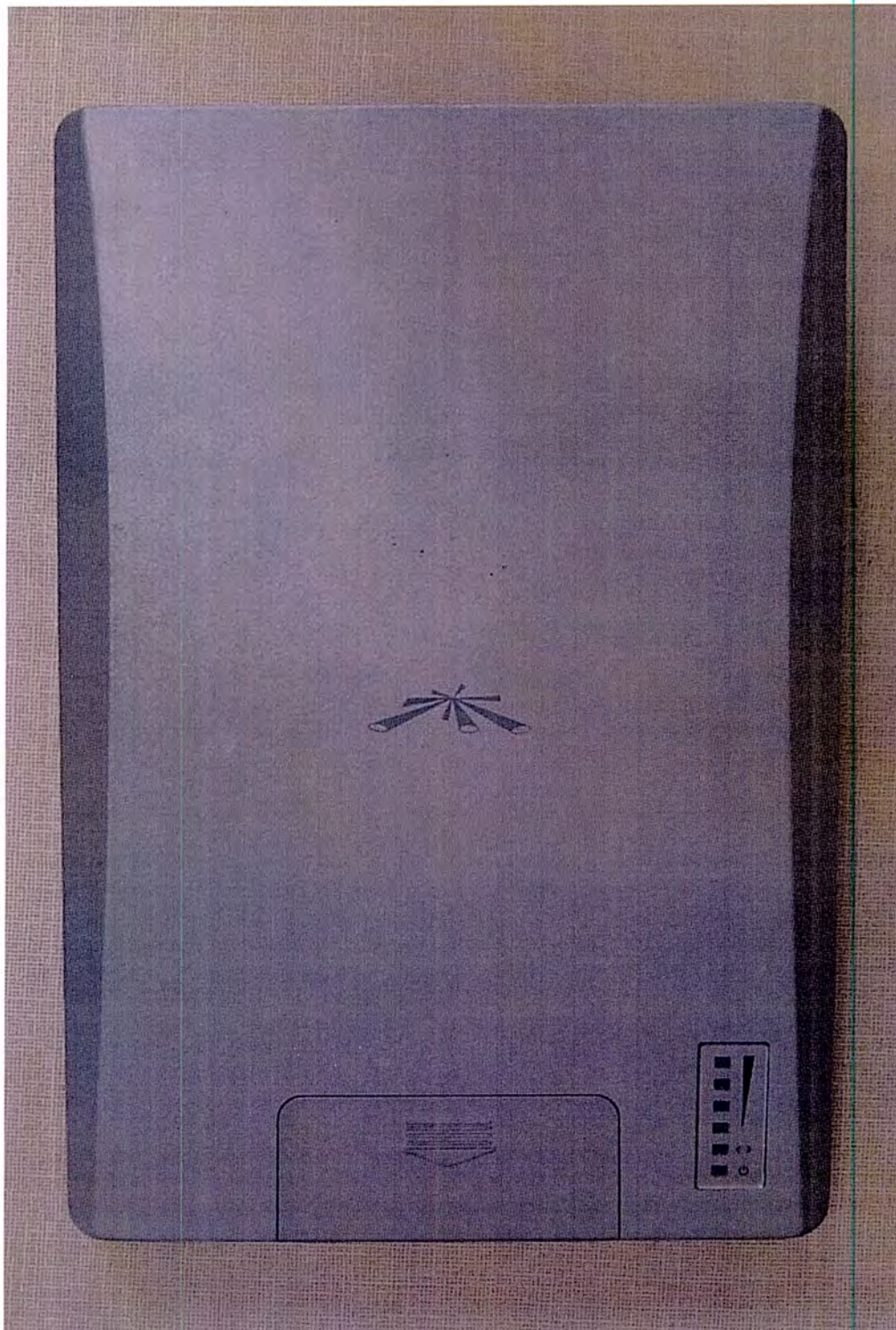
- Communications searching with the other station (MODE 1),
- Established communication with the other station (the same type S/N 1213F002722B81AEB). Transmission mode was established as MCS index, 64 QAM modulation and transmission capacity max. 182 Mbit/s in 28 MHz channel. Link was asymmetrically data load max 95 Mbit/s versus 1 Mbit/s with packet length 1518 Bytes (MODE 2).

## 4. Photographs Of Equipment

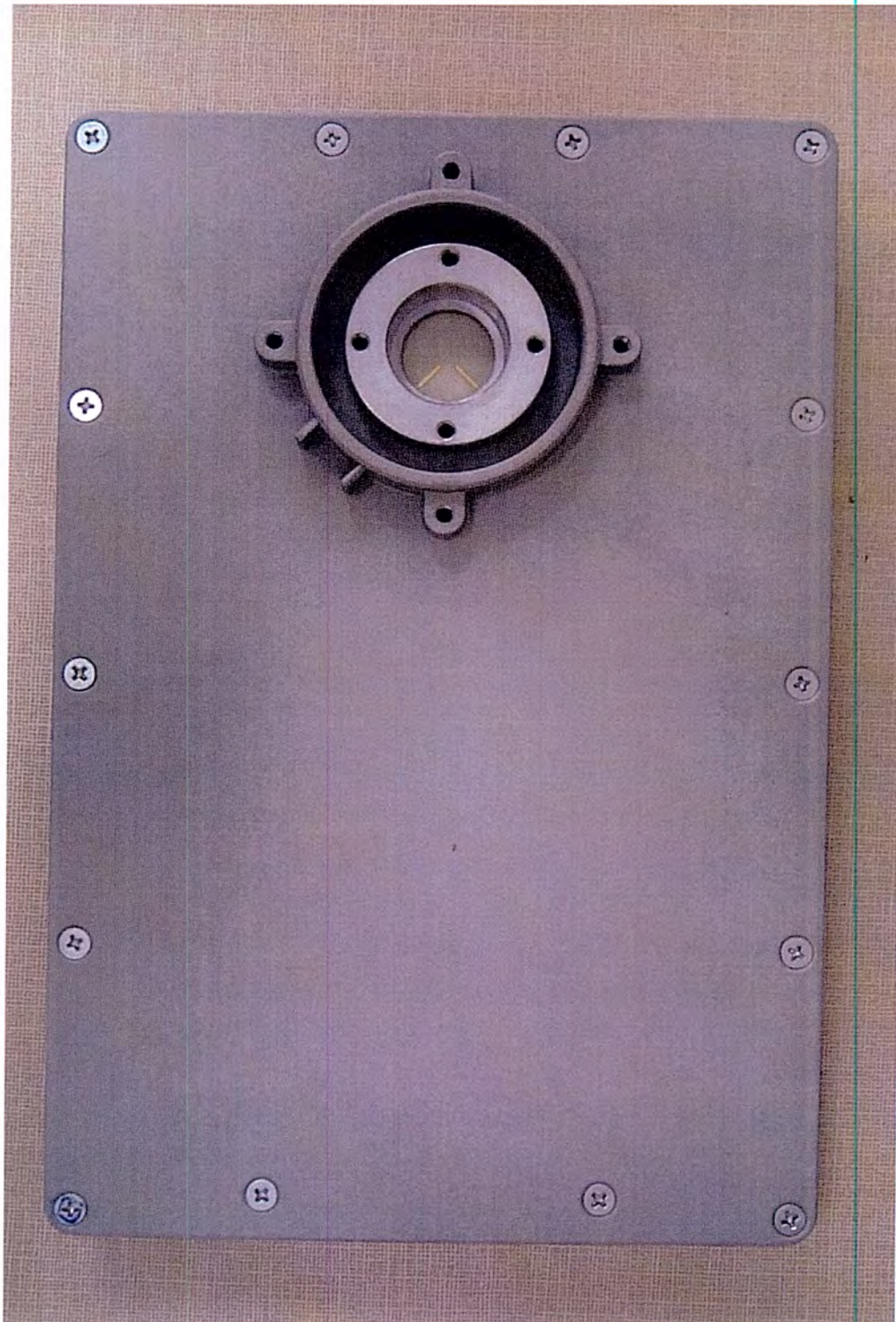
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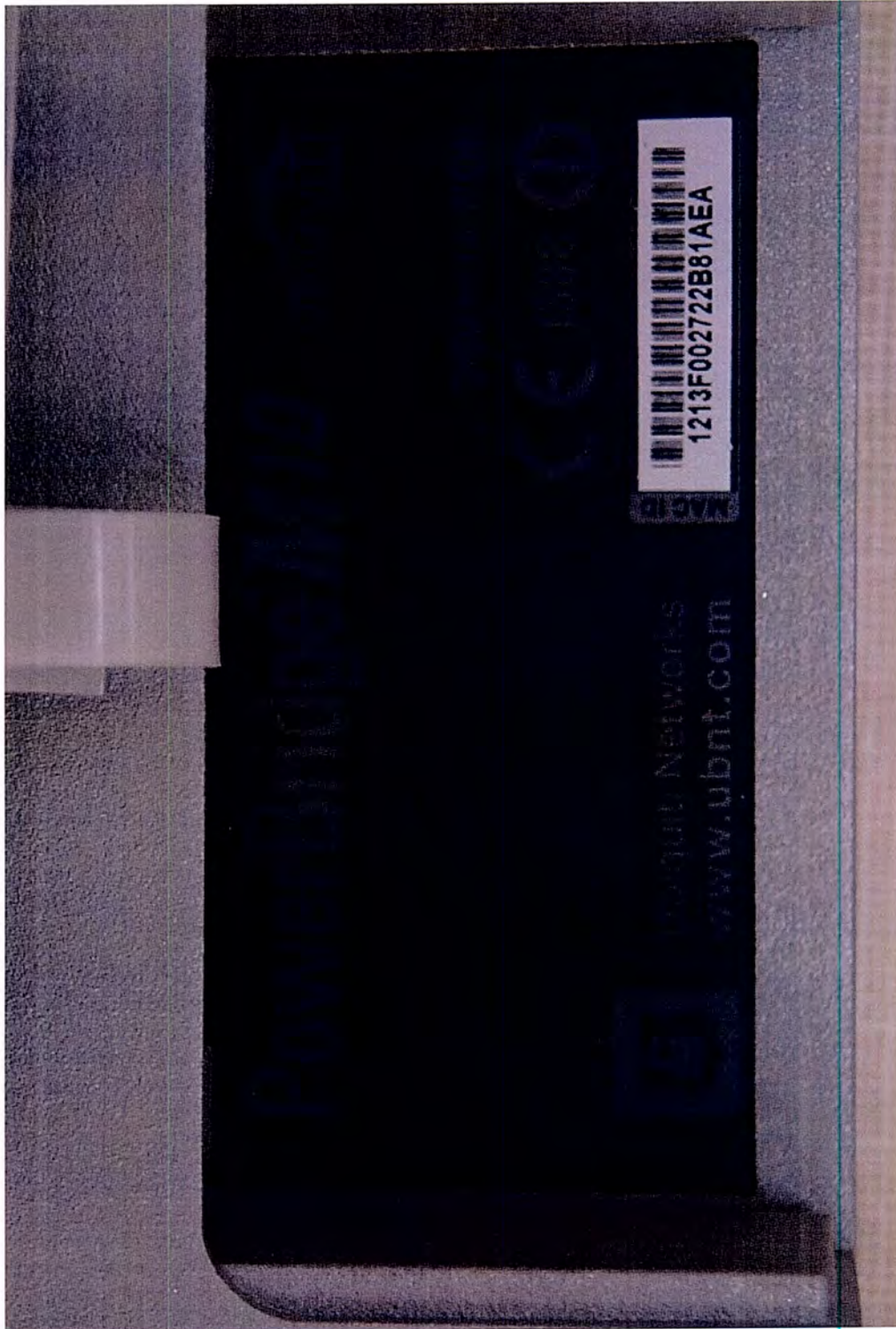
**PHOTOGRAPH 1: Unit 1, overall external view – one side**



**PHOTOGRAPH 2: Unit 1, overall external view – the other side**



**PHOTOGRAPH 3: Unit 1, detailed view of type label**





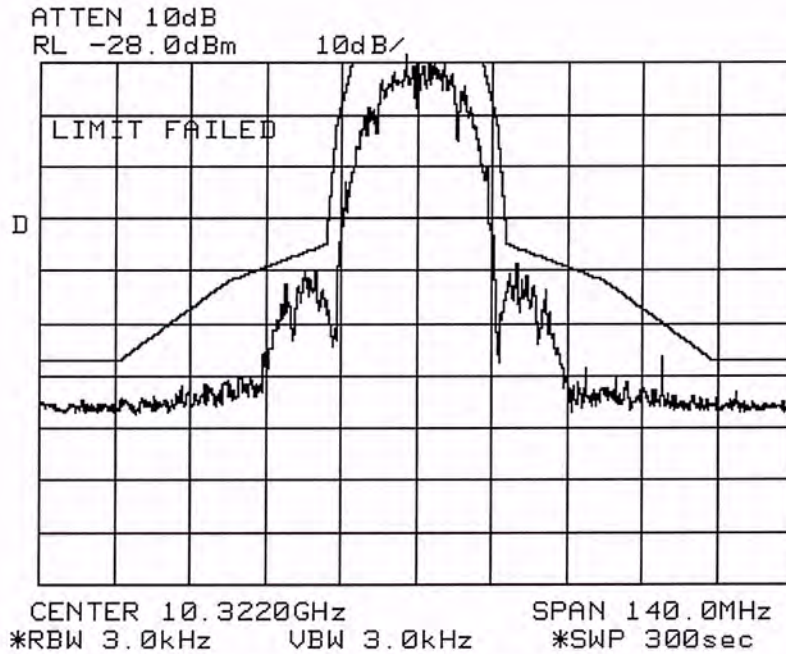
## 5. Graphs

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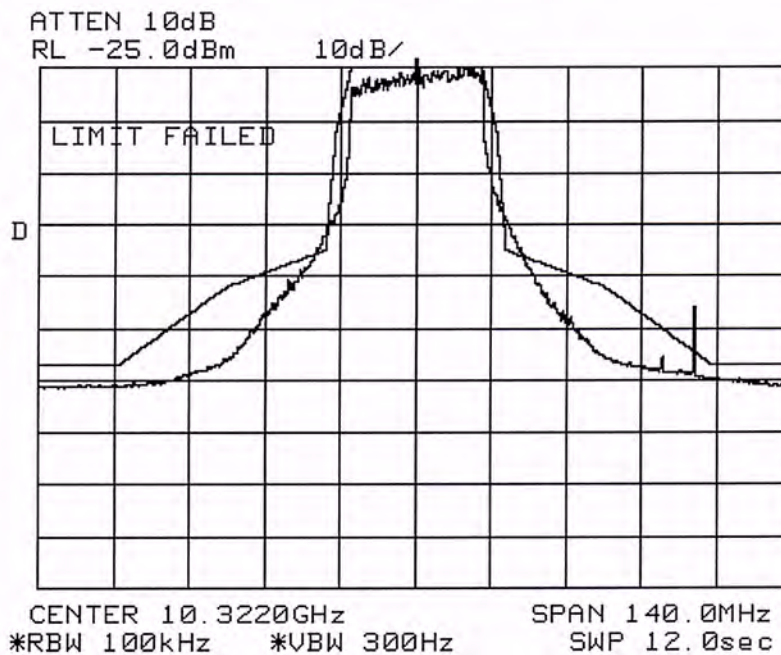
## 5.1 Graphs - Unit No.1

GRAPH 1 Transmitter RF spectrum mask, CH1, POL2, MODE 1



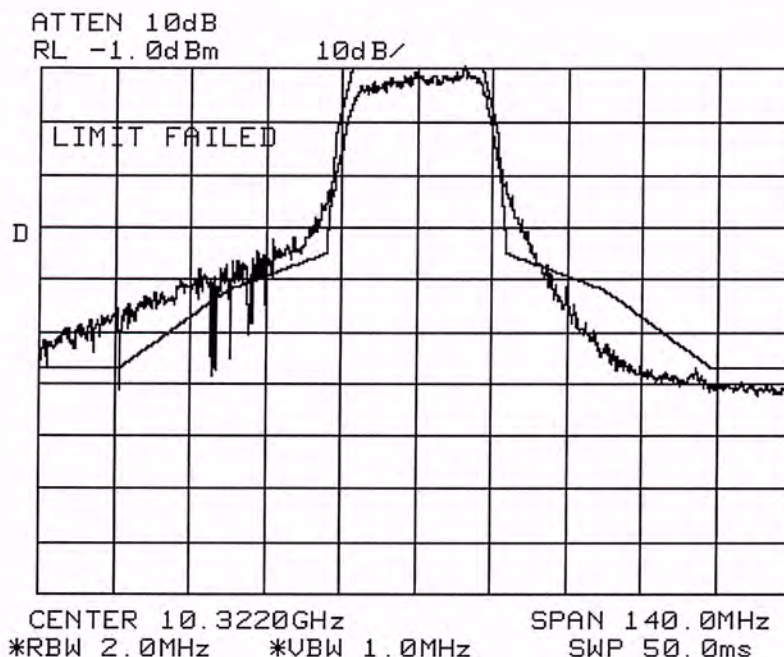
Remarks: SA settings according to ETSI EN 302 326-2 V1.2.2 Table 14. RBW/VBW was calculate to 3 kHz with respect to Note 2 and MAX HOLD

GRAPH 2 Transmitter RF spectrum mask, CH1, POL2, MODE 2



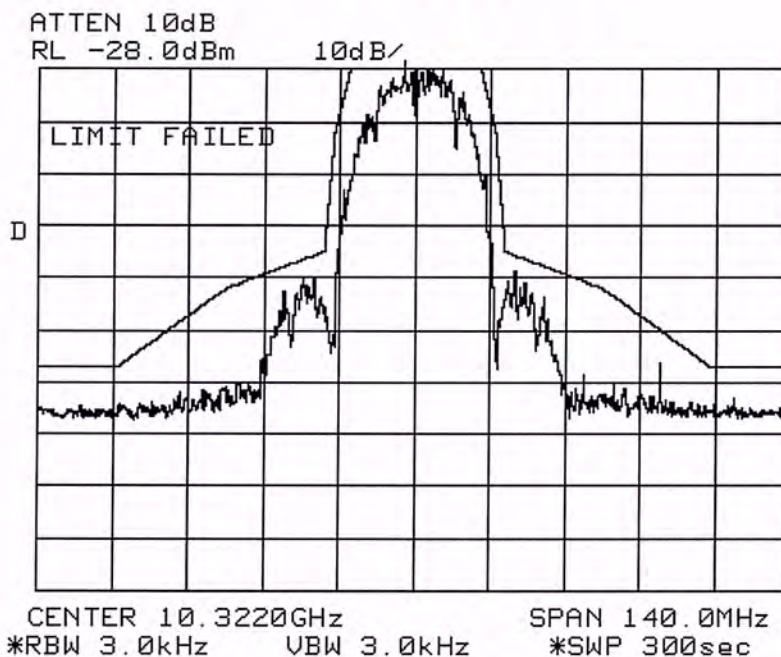
Remarks: SA settings according to ETSI EN 302 217-2-2 V1.4.1 Table 6 and MAX HOLD

**GRAPH 3 Transmitter RF spectrum mask, CH1, POL2, MODE 2, different RBW/VBW settings**



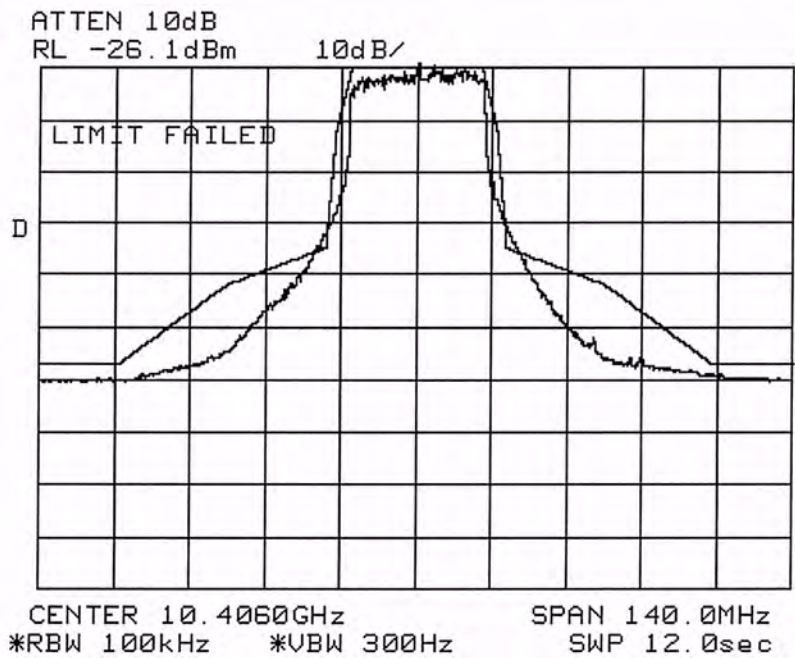
Remarks: SA settings according to ETSI EN 302 217-2-2 V1.4.1 Table 6 with different RBW/VBW and MAX HOLD

**GRAPH 4 Transmitter RF spectrum mask, CH2, POL2, MODE 1**



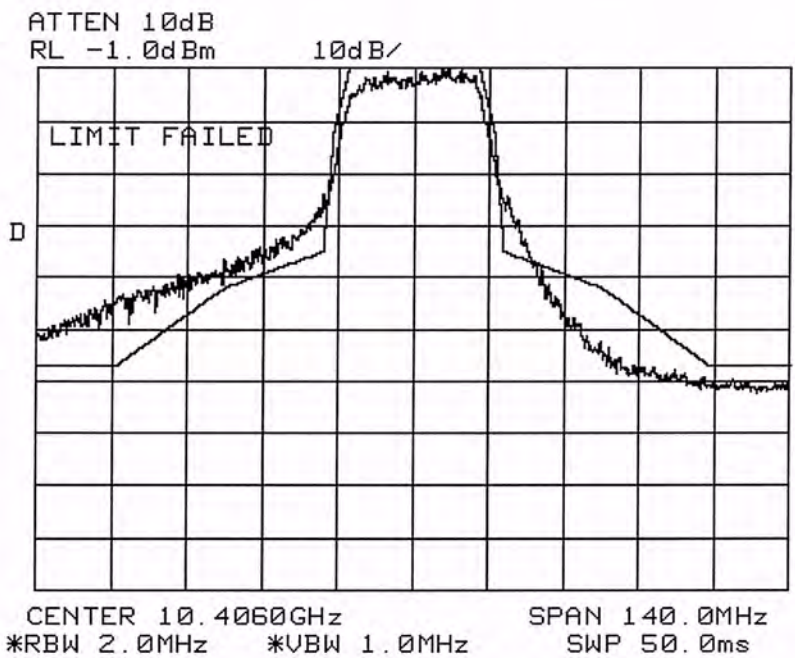
Remarks: SA settings according to ETSI EN 302 326-2 V1.2.2 Table 14. RBW/VBW was calculate to 3 kHz with respect to Note 2 and MAX HOLD

**GRAPH 5 Transmitter RF spectrum mask, CH2, POL2, MODE 2**



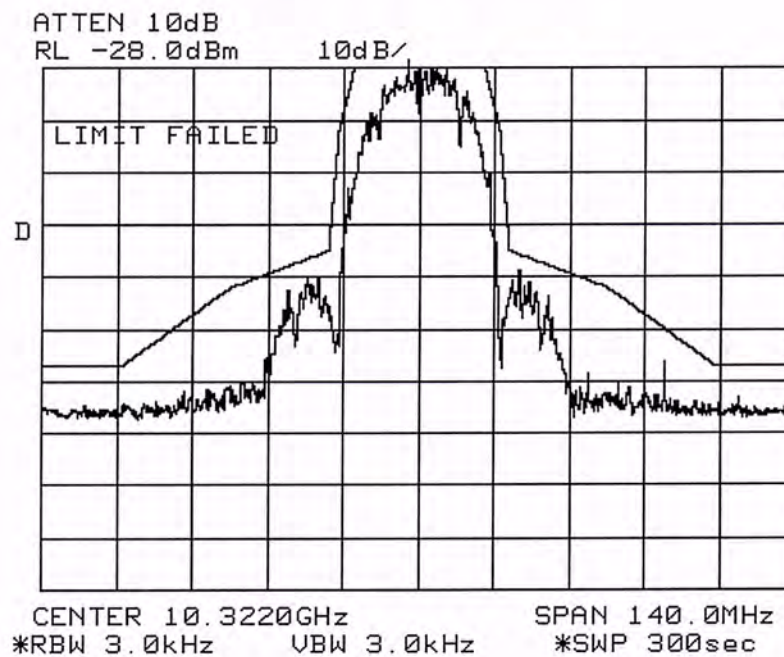
Remarks: SA settings according to ETSI EN 302 217-2-2 V1.4.1 Table 6 and MAX HOLD

**GRAPH 6 Transmitter RF spectrum mask, CH2, POL2, MODE 2, different RBW/VBW settings**



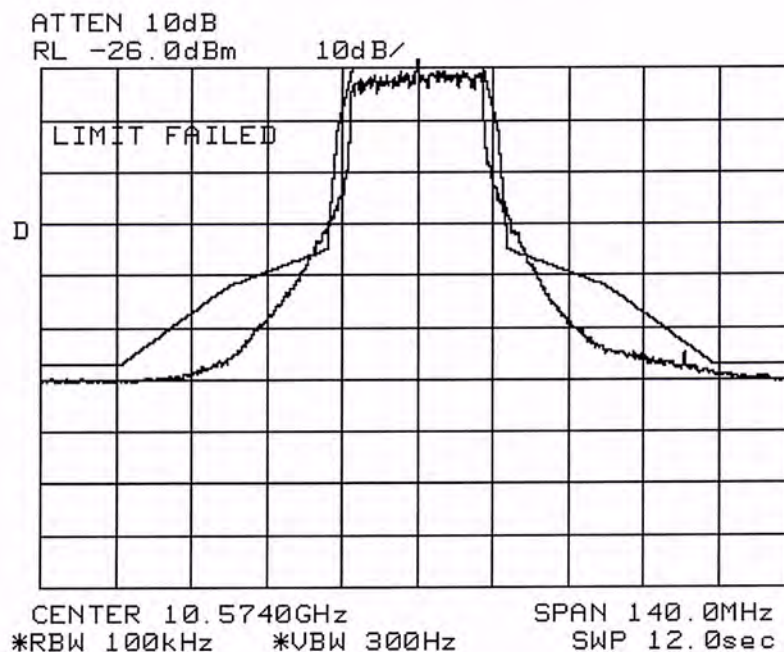
Remarks: SA settings according to ETSI EN 302 217-2-2 V1.4.1 Table 6 with different RBW/VBW and MAX HOLD

**GRAPH 7 Transmitter RF spectrum mask, CH3, POL2, MODE 1**



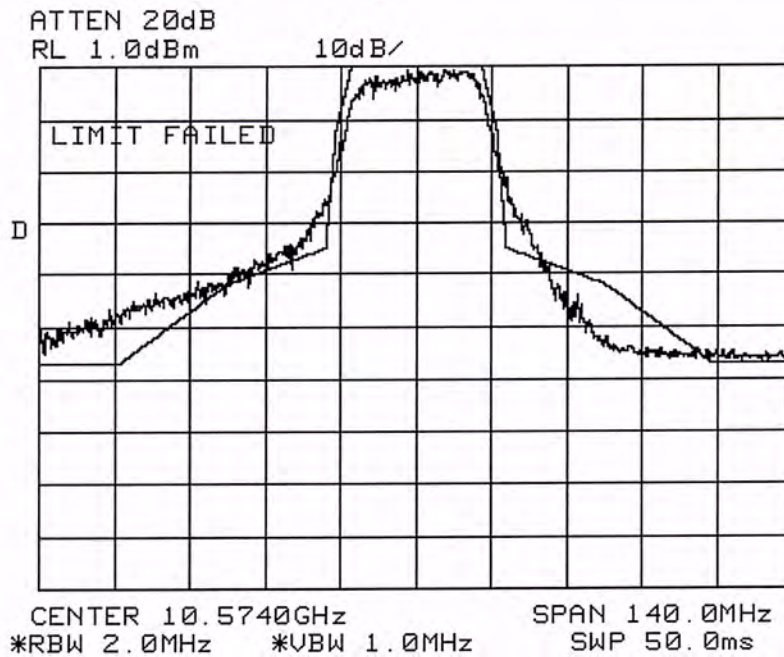
Remarks: SA settings according to ETSI EN 302 326-2 V1.2.2 Table 14. RBW/VBW was calculate to 3 kHz with respect to Note 2 and MAX HOLD

**GRAPH 8 Transmitter RF spectrum mask, CH3, POL2, MODE 2**



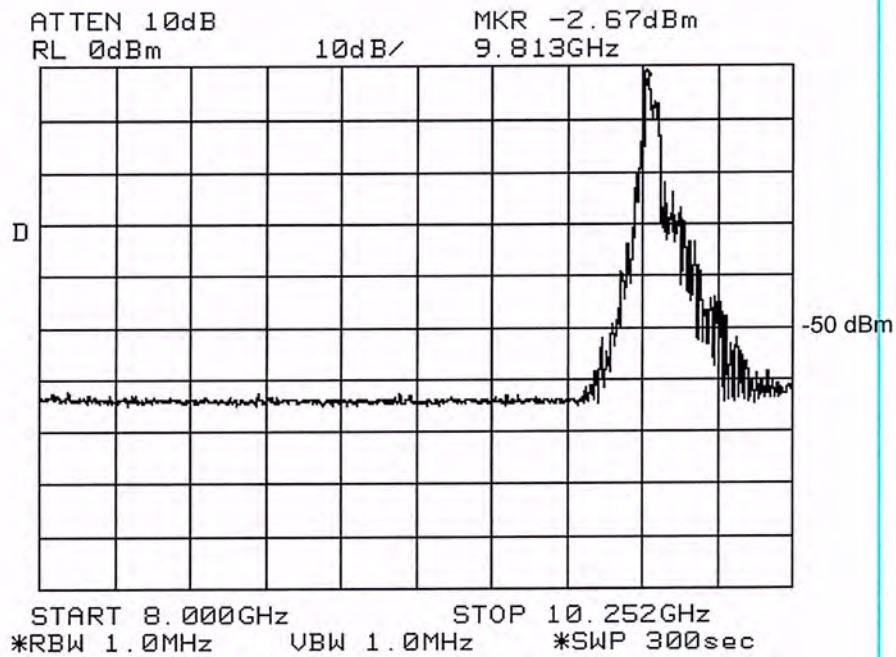
Remarks: SA settings according to ETSI EN 302 217-2-2 V1.4.1 Table 6 and MAX HOLD

**GRAPH 9 Transmitter RF spectrum mask, CH2, POL2, MODE 2, different RBW/VBW settings**

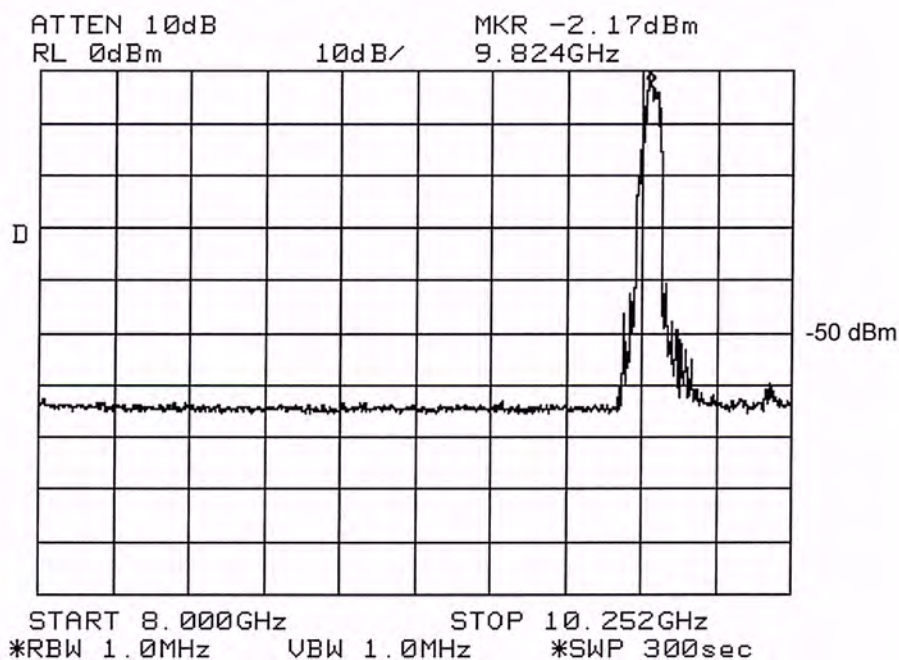


Remarks: SA settings according to ETSI EN 302 217-2-2 V1.4.1 Table 6 with different RBW/VBW and MAX HOLD

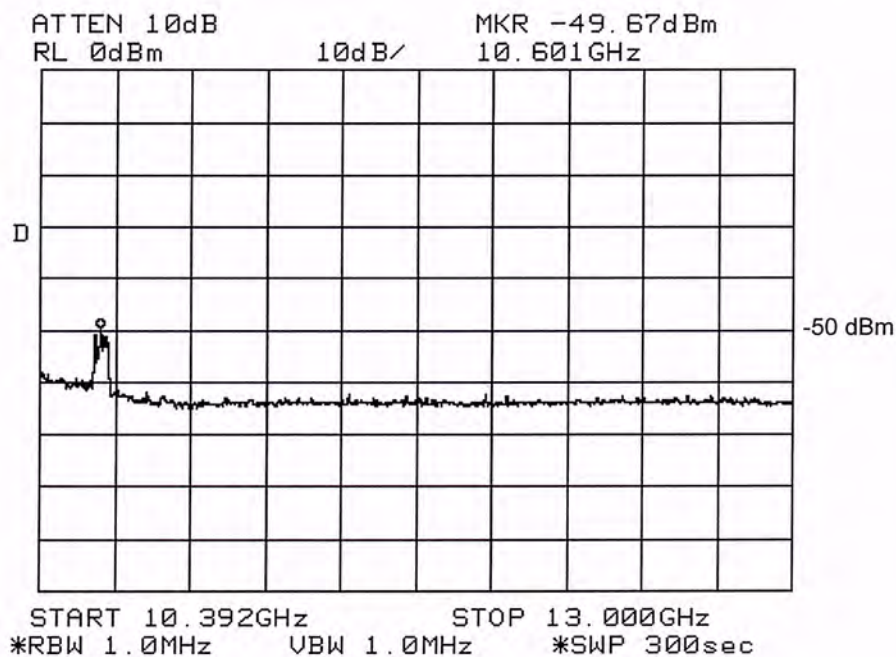
**GRAPH 10 Transmitter spurious emissions – below the band, POL1, MODE 1**



**GRAPH 11 Transmitter spurious emissions – below the band, POL2, MODE 1**



**GRAPH 12 Transmitter spurious emissions – above the band, POL1, MODE 1**



**GRAPH 13 Transmitter spurious emissions – above the band, POL2, MODE 1**

