



**CE MARKING**

*ELECTROMAGNETIC COMPATIBILITY  
ELECTRICAL SAFETY  
LASER SPECTROSCOPY  
ENVIRONMENTAL PHYSICS*

**G.S.D. S.r.l.**  
Certified in accordance with  
**UNI EN ISO 9001:2008**  
by  
**TÜV Rheinland Italia S.r.l.**  
Certificate N. 39 00 1850509

<b>G.S.D. Srl PISA - Italy</b>	<b>Test Report n. FCC-16810</b>	Rev. 04
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<b>Manufacturer</b>	<b>CAEN RFID s.r.l.</b>
Address	Via Vetraia, 11 55049 Viareggio (LU) Italy

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<b>Test Family Name</b>	<b>R1260U</b>
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<b>Testing Laboratory Name</b>	<b>G.S.D. S.r.l.</b>
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	FCC Listed. Registration Number: 424037.

<b>Location and Date of Issue</b>	Pisa, 2016 December 30

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### Report Revision History

#### *Revision details*

<i>Date</i>	<i>Page No.(s)</i>	<i>Details</i>
2017 January 18	57	Rev. 00 First issue
2017 January 19	57	Rev. 01 Second Issue: Change 15B in 15C Modified Tables pages 26/33
2017 January 24	58	Rev. 02 Third Issue: Radiated Emissions: Change 15A in 15C
2017 January 24	55	Rev. 03 Fourth Issue: Pag 1-3: Item Name: R1620U in R1260U Pag. 6 Modulation correction Pag. 7 ANSI C63.10 Radiated Emission Figure Pag. 40 Radiated Power Limits §7. Photos with PC deleted
2017 January 24	57	Rev. 04 Fourth Issue: Conducted Emission deleted pag.7 Conducted Emissions Photos Added

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<b>1. MANUFACTURER AND EUT IDENTIFICATION<sup>1</sup></b>	
<b>Manufacturer</b>	<b>CAEN RFID s.r.l.</b>
Address	Via Vetraia, 11 55049 Viareggio (LU) Italy
<b>Test Family Name</b>	<b>R1260U</b>
Date of reception	<b>2016 March 04</b>
Sampling	<b>Laboratory sample for certification</b>
Test Item Description	<b>RFID Device</b>
Nominal Input Voltage	<b>5 Vdc</b>
<b>FCC ID</b>	<b>UVECAENRFID024</b>

<sup>1</sup>A detailed documentation is preserved in the internal fascicle.

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*Fig. 1.1  
Equipment Photo*

**2. REFERENCE STANDARDS**

Tests and measurements are performed accordingly to the reference standards given in the table below:

<i>TEST</i>	<i>STANDARD</i>
Emissions: Conducted and Radiated – Section 15.207 and 15.209	<p>FCC Rules and Regulations, Title 47 Part 15 – Sub part C</p> <p>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</p> <p>ANSI C63.10 2013 – American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices</p>
Operation within the band 902-928 MHz: Alternative Test Procedures 15.247 (b) and (c), and (a) Bandwidth and average time of occupancy, Band Edge 15.247 (d)	<p>FCC Rules and Regulations, Title 47 Part 15 – Sub part C</p> <p>DA 00-705 (30 March 2000) – Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems</p> <p>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</p> <p>ANSI C63.10 2013 – American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices</p>
Antenna Requirement: §15.203	FCC Rules and Regulations, Title 47 Part 15 – Sub part C

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**3. RESULT, CONDITION, MEASUREMENT UNCERTAINTY**

Summary of Test Results

<i>TEST</i>	<i>RESULT</i>
Emissions: conducted Section 15.207	Pass
Emissions: radiated Section 15.209	Pass
Bandwidth and Average Time of Occupancy Section 15.247 (a)	Pass
Operation within the band 902-928 MHz: Section 15.247 (b) and (c)	Pass
Band Edge Section 15.247 (d)	Pass

Measurement uncertainty

<i>TEST</i>	<i>EXPANDED UNCERTAINTY</i>
Conducted Emission – 50Ω/50μH (150 kHz - 30 MHz)	± 3.5 dB
Radiated Emission – (Semianechoic Room) (30 MHz - 18 GHz)	± 4.7 dB

Climatic Conditions

<i>PARAMETER</i>	<i>VALUE</i>
Temperature	(293 ± 3) K
Relative humidity	(50 ± 5) %

Extensions

The results refer only to the sampled EUT and under the specified conditions.

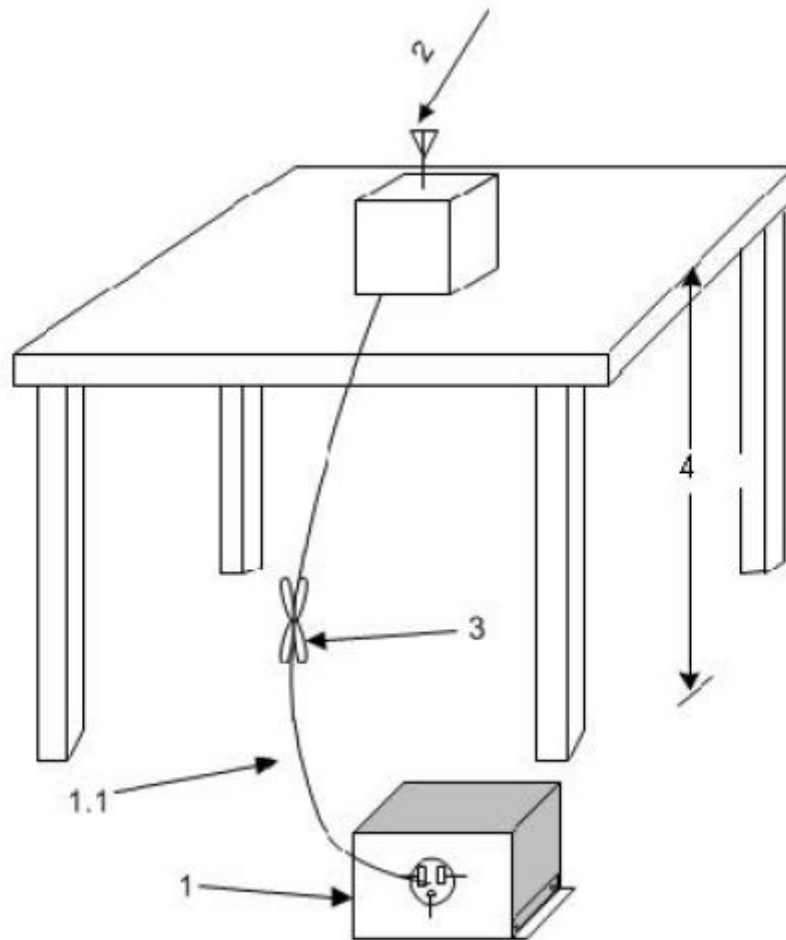
Modulations

DSB ASK M4 TX40 RX256

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Radiated EUT Test Set-up example (ANSI C63.10 2013)

**4. RADIATED EMISSIONS**

In the following table you can find the limits established by the reference standard:

FREQUENCY RANGE (MHz)	<i>Field Strength</i> <i>QUASI-PEAK LIMITS</i> [dB ( $\mu$ V/m)]
0.009 – 0.490	48.15 – 13.8 @ 300m
0.490 – 1.705	33.8 – 23 @ 30m
1.705 – 30	29.5 @ 30m
30 – 88	40
88 – 216	43.5
216 – 960	46
Above 960	54

**Test Equipment**

EQUIPMENT	MANUFACTURER	MODEL	CAL. DUE
MXE EMI Receiver	Agilent/Keysight	N9038A	01/2017
Anechoic Chamber	Comtest	CSA01	01/2017
Bilog Antenna	Schaffner	CBL6112B	01/2017
Horn Antenna	EMCO	3115	01/2017
Horn Antenna	Alpha Industries	61932500	01/2017
Controller	Deisel	HD100	01/2017
Turn Table	Deisel	MA240	01/2017
LISN	GSD	NTW06	01/2017

**Test procedure:** RE22R02

**Notes**

Azimuth position EUT-Antenna corresponding to 0° identifies the rotating table orientation (TT) in which the instrument to be tested shows the front part turned towards the antenna. Positive grades individuate clockwise rotations of TT when this one is observed from the top. For negative degrees, TT rotation is counter-clockwise.

Antenna height respect to the mass plane is conventionally individuated with: MA=XXX where XXX indicates the height (always positive and greater than 100) expressed in cm.

Antenna horizontal polarisation is indicated by POL=H.

Antenna vertical polarisation is indicated by POL=V.

EUT was tested in the three orthogonal planes.

**Note:**

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

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measurement.

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))

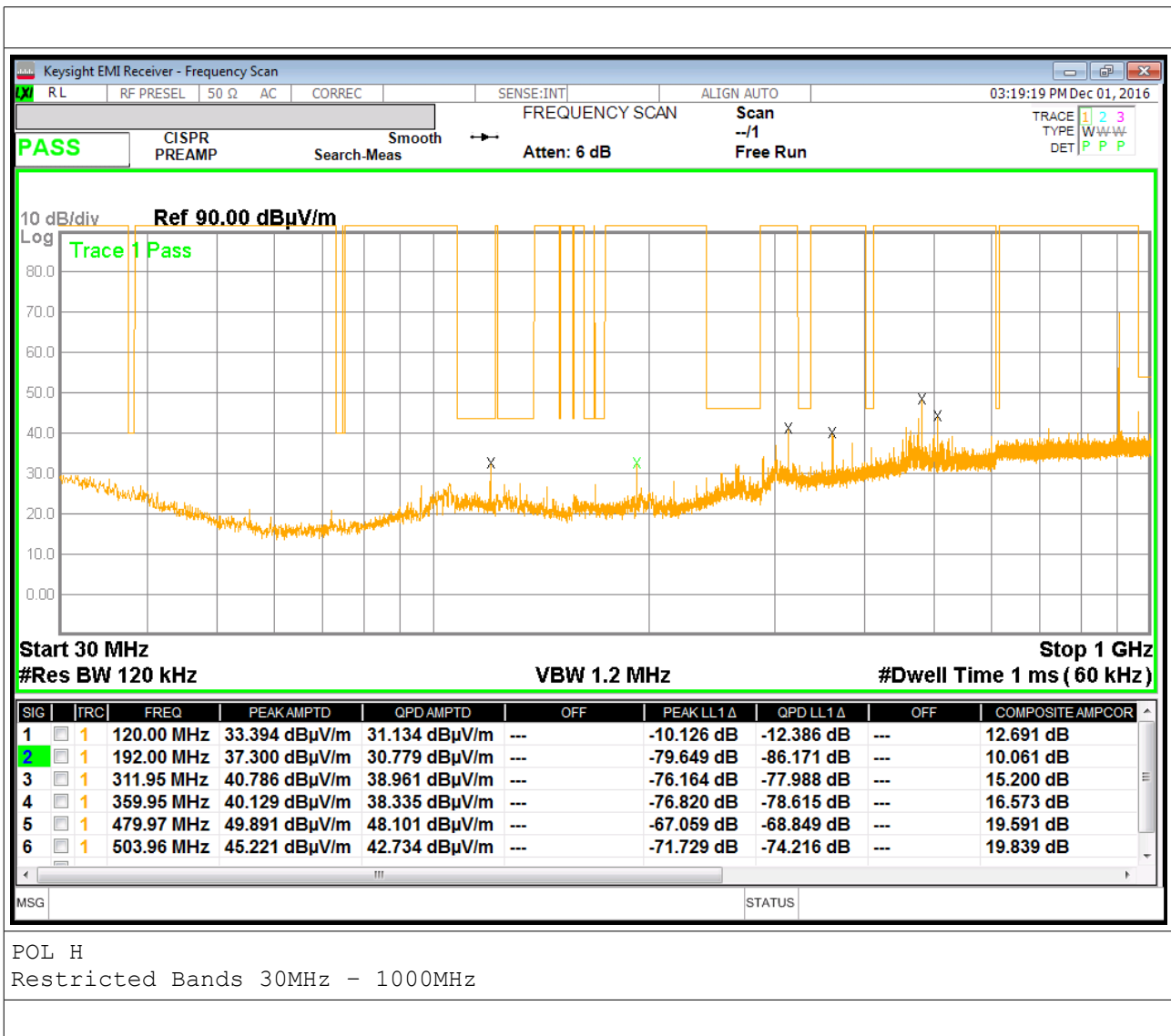
Results and conclusions

In all the operative conditions, equipment complied with the standard limits. Graphics in following figures show the most significant registrations of the performed measurements.

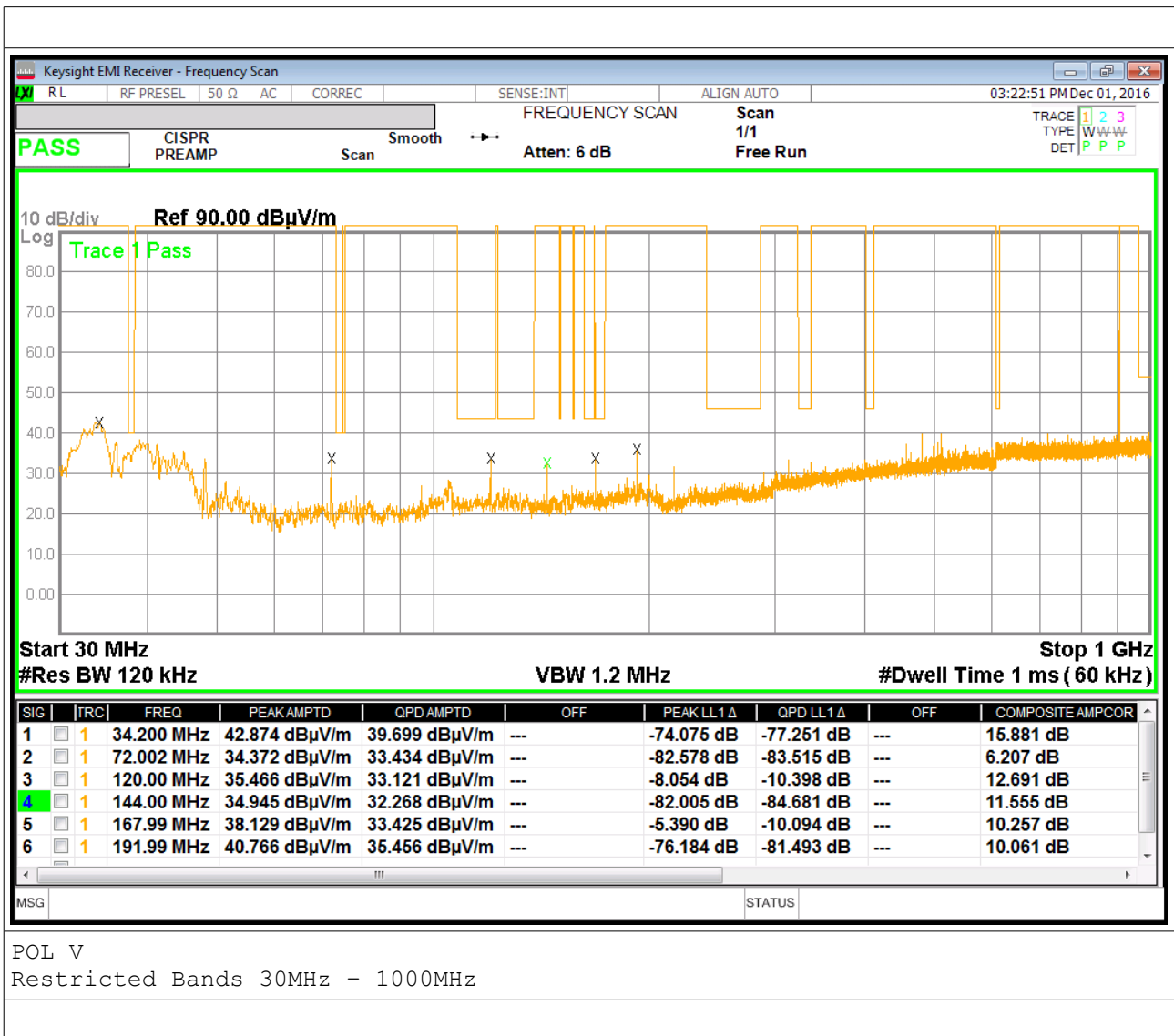
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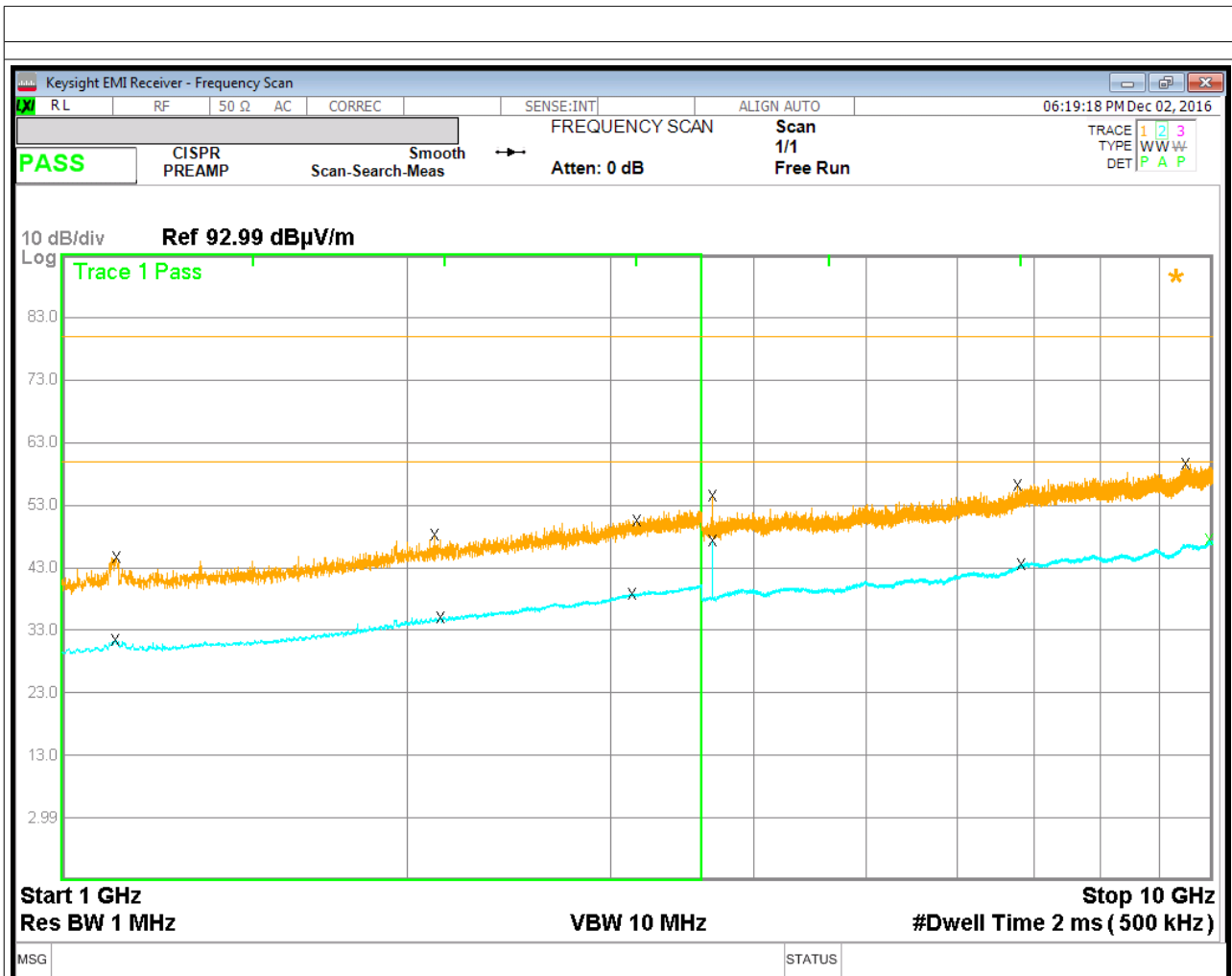
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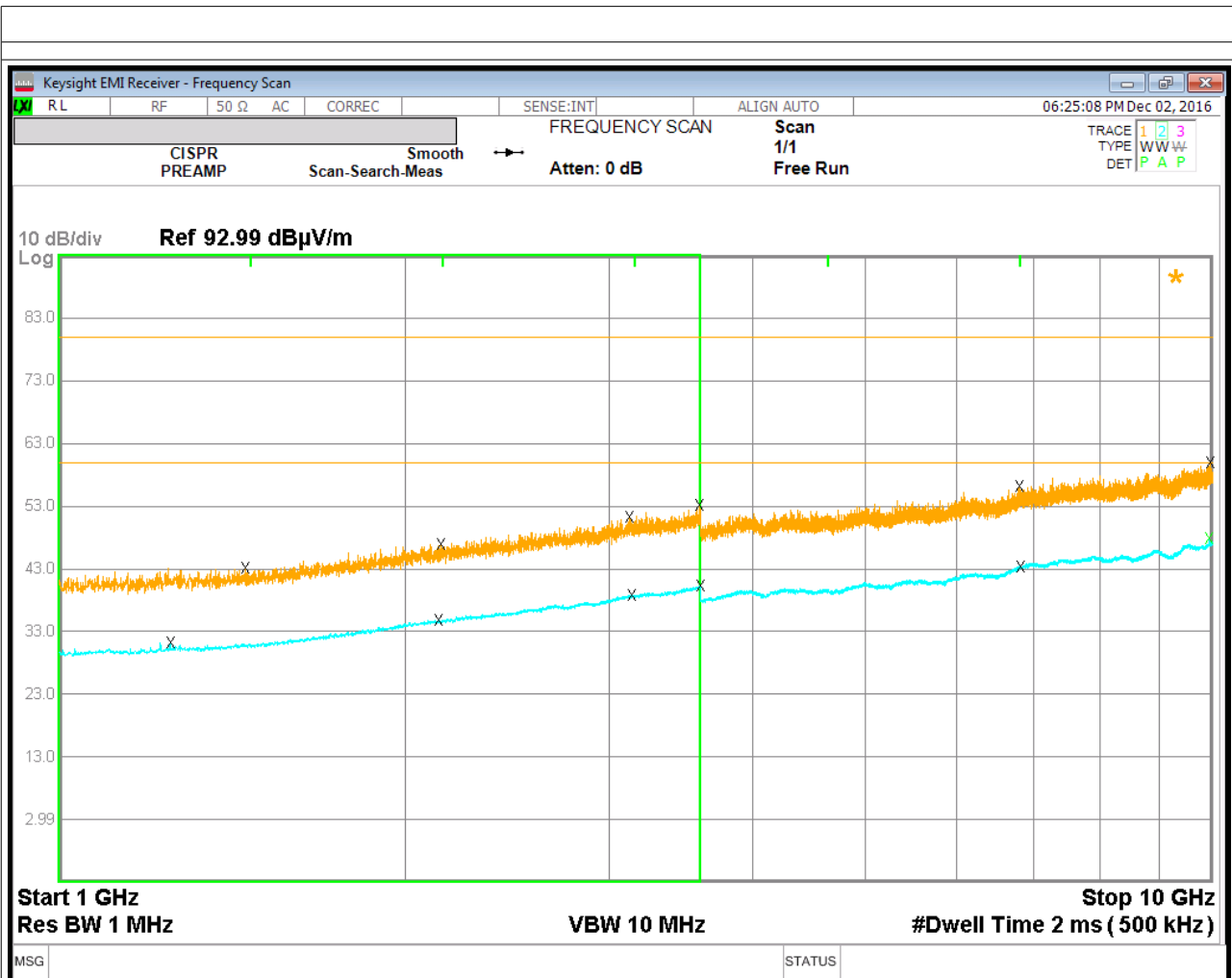
SIG	TRC	FREQ	PEAK AMPTD	OFF	EAVG AMPTD	PEAK LL1 Δ	OFF	EAVG LL2 Δ	COMPOSITE AMPCOR
1	2	1.1125 GHz	61.320 dBμV/m	---	31.167 dBμV/m	-18.680 dB	---	-28.833 dB	29.515 dB
2	1	1.1155 GHz	59.024 dBμV/m	---	31.113 dBμV/m	-20.975 dB	---	-28.887 dB	29.523 dB
3	1	2.1085 GHz	47.481 dBμV/m	---	34.620 dBμV/m	-32.519 dB	---	-25.379 dB	33.282 dB
4	2	2.1340 GHz	47.511 dBμV/m	---	34.731 dBμV/m	-32.489 dB	---	-25.269 dB	33.348 dB
5	2	3.1310 GHz	51.550 dBμV/m	---	38.710 dBμV/m	-28.450 dB	---	-21.289 dB	36.693 dB
6	1	3.1620 GHz	51.072 dBμV/m	---	38.617 dBμV/m	-28.928 dB	---	-21.383 dB	36.786 dB
7	1	3.6730 GHz	50.732 dBμV/m	---	38.091 dBμV/m	-29.268 dB	---	-21.909 dB	38.319 dB
8	2	3.6730 GHz	50.895 dBμV/m	---	39.936 dBμV/m	-29.105 dB	---	-20.063 dB	38.319 dB
9	1	6.7605 GHz	56.032 dBμV/m	---	42.909 dBμV/m	-23.967 dB	---	-17.091 dB	43.513 dB
10	2	6.8095 GHz	56.535 dBμV/m	---	43.317 dBμV/m	-23.465 dB	---	-16.683 dB	43.641 dB
11	1	9.4715 GHz	59.810 dBμV/m	---	46.380 dBμV/m	-20.190 dB	---	-13.620 dB	46.884 dB
12	2	9.9330 GHz	60.613 dBμV/m	---	47.103 dBμV/m	-19.387 dB	---	-12.897 dB	47.418 dB

POL V

Fig. 4.1

Record of the measurement of radiated emissions (PK in orange, AVG in blu)  
Maximum disturbance determined in the frequency range 1 – 10 GHz

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SIG	TRC	FREQ	PEAK AMPTD	OFF	EAVG AMPTD	PEAK LL1 Δ	OFF	EAVG LL2 Δ	COMPOSITE AMPCOR
1	2	1.2480 GHz	44.414 dBμV/m	---	31.261 dBμV/m	-35.586 dB	---	-28.739 dB	29.894 dB
2	1	1.4515 GHz	43.144 dBμV/m	---	30.696 dBμV/m	-36.856 dB	---	-29.304 dB	30.464 dB
3	2	2.1335 GHz	47.200 dBμV/m	---	34.613 dBμV/m	-32.800 dB	---	-25.387 dB	33.347 dB
4	1	2.1450 GHz	47.276 dBμV/m	---	34.619 dBμV/m	-32.724 dB	---	-25.380 dB	33.377 dB
5	1	3.1200 GHz	51.628 dBμV/m	---	38.516 dBμV/m	-28.372 dB	---	-21.483 dB	36.660 dB
6	2	3.1325 GHz	51.440 dBμV/m	---	38.704 dBμV/m	-28.560 dB	---	-21.296 dB	36.698 dB
7	1	3.5860 GHz	52.758 dBμV/m	---	39.984 dBμV/m	-27.241 dB	---	-20.016 dB	38.058 dB
8	2	3.5960 GHz	52.943 dBμV/m	---	40.072 dBμV/m	-27.056 dB	---	-19.927 dB	38.088 dB
9	1	6.7925 GHz	57.034 dBμV/m	---	43.294 dBμV/m	-22.966 dB	---	-16.706 dB	43.596 dB
10	2	6.8090 GHz	56.638 dBμV/m	---	43.329 dBμV/m	-23.361 dB	---	-16.670 dB	43.640 dB
11	2	9.9325 GHz	60.002 dBμV/m	---	48.006 dBμV/m	-19.998 dB	---	-11.994 dB	47.418 dB
12	1	9.9635 GHz	60.134 dBμV/m	---	46.820 dBμV/m	-19.866 dB	---	-13.180 dB	47.455 dB

POL H

Fig. 4.2

Record of the measurement of radiated emissions (PK in orange, AVG in blu)  
 Maximum disturbance determined in the frequency range 1 – 10 GHz

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Job Number                   FCC-16810  
 Test Name                    Radiated Emissions - FCC 15C  
 EUT Name                    CAEN RFID s.r.l. - R1260U

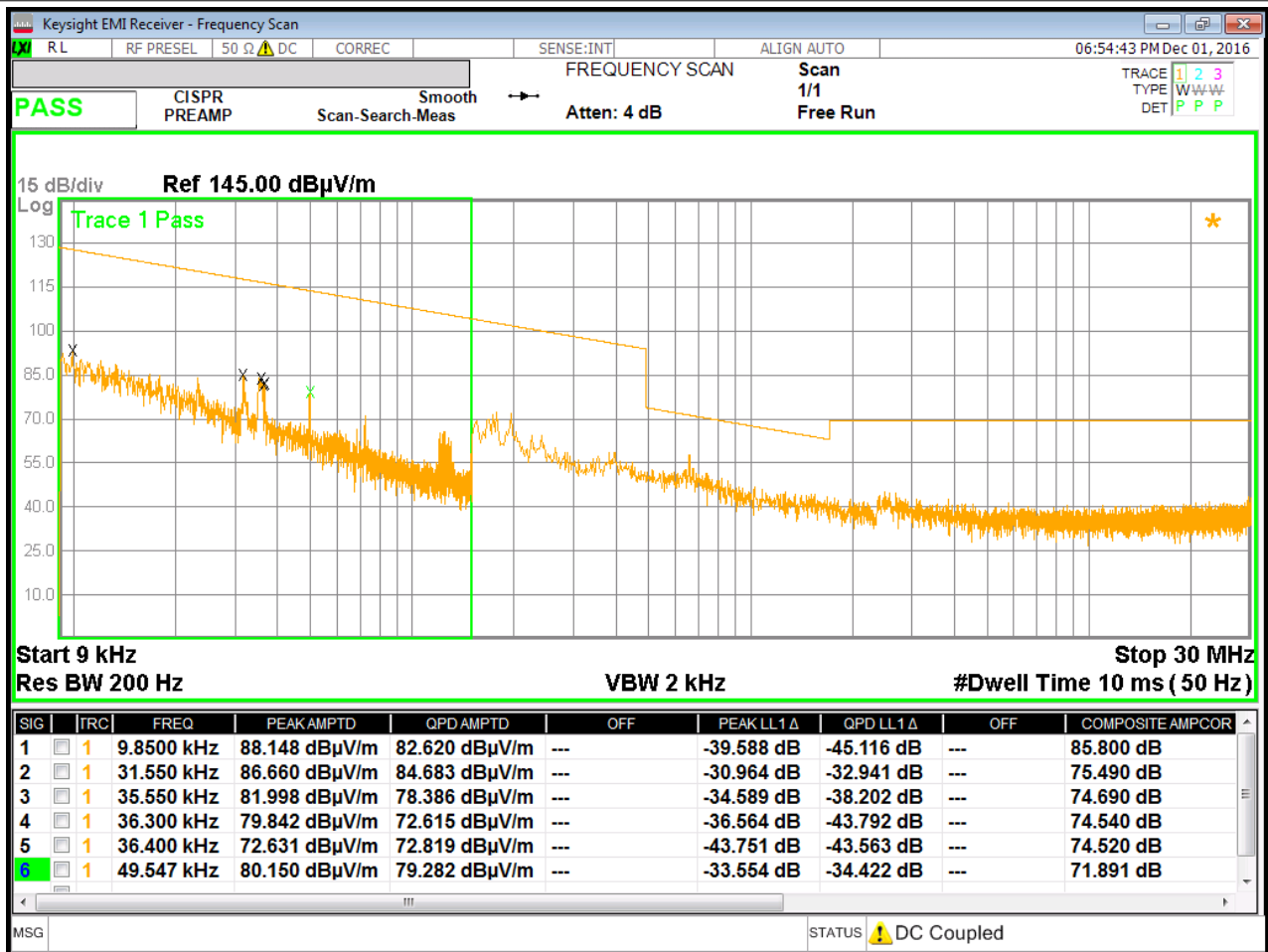


Fig. 4.3

Maximum disturbance determined in the frequency range 150 kHz – 30 MHz.  
 Loop Antenna Parallel Polarization

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Job Number FCC-16810  
 Test Name Radiated Emissions - FCC 15C  
 EUT Name CAEN RFID s.r.l. - R1260U

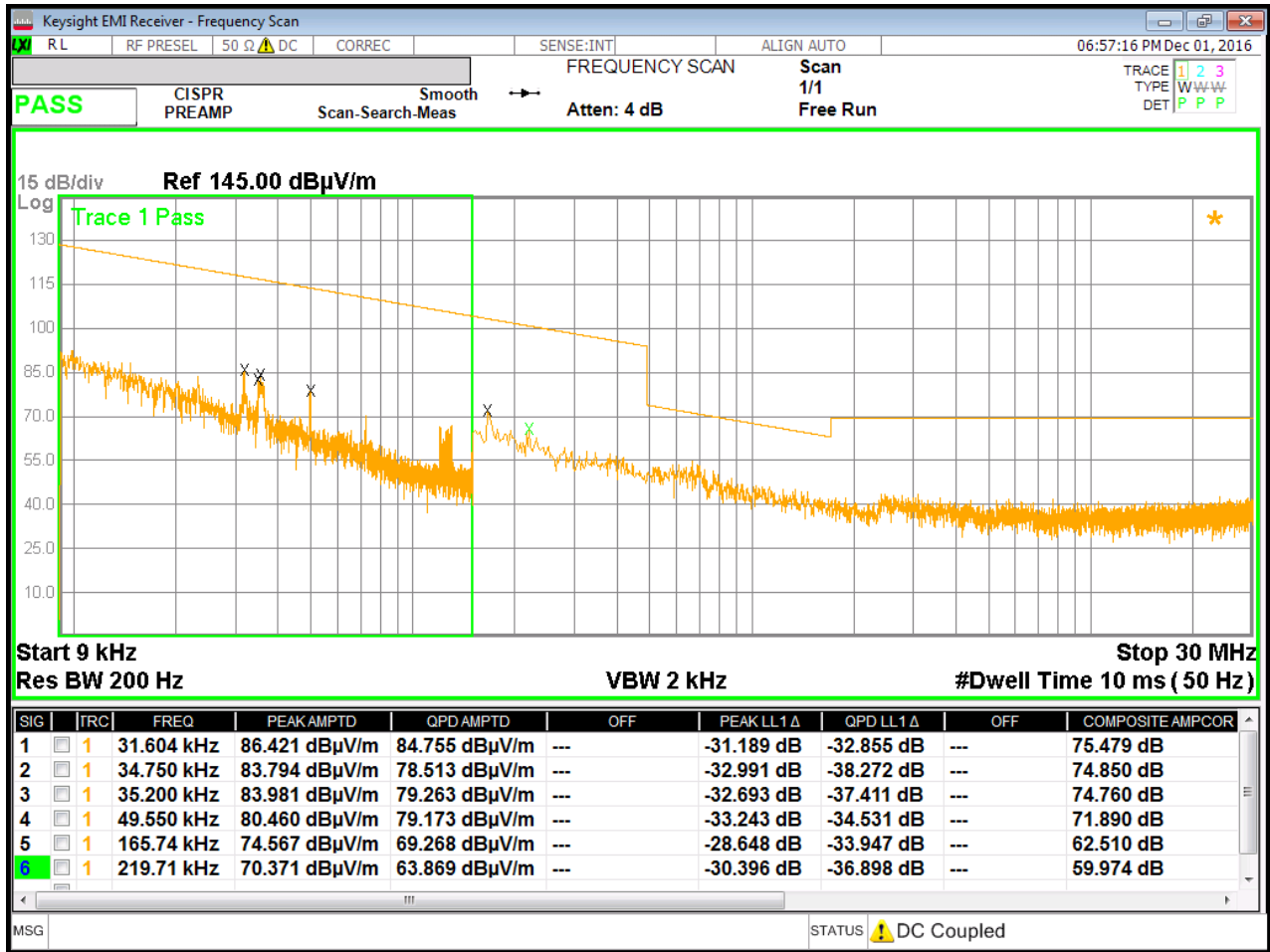


Fig. 4.4

Maximum disturbance determined in the frequency range 150 kHz – 30 MHz.  
 Loop Antenna Orthogonal Polarization

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## 5. POWER LINES CONDUCTED EMISSIONS

Equipment shall meet the limits below when using a CISPR16 quasi-peak and average detector receivers.

### FCC 15.207

<i>FREQUENCY RANGE</i> (MHz)	<i>QUASI-PEAK LIMIT</i> [dB (μV)]	<i>AVERAGE LIMIT</i> [dB (μV)]
0.15 – 0.50	66 – 56 <sup>(*)</sup>	56 – 46 <sup>(*)</sup>
0.50 – 5	56	46
5 – 30	60	50

<sup>(\*)</sup> Limit decreasing linearly with logarithm of frequency

### Test Equipment

<b>EQUIPMENT</b>	<b>MANUFACTURER</b>	<b>MODEL</b>	<b>CAL. DUE</b>
MXE EMI Receiver	Agilent/Keysight	N9038A	01/2017
Screened Room	GSD	CSC01	01/2017
LISN	GSD	GSDA01	01/2017
LISN	COMTEST	---	01/2017

### Test procedure: CE22R01

The EUT power cable was connected to a LISN and the monitored output of the LISN was connected to a spectrum analyzer by a transient limiter. The conducted emissions from 150 kHz to 30 MHz were monitored and compared to the specification limits

### Test method

Test method was in accordance with the reference standard.

EUT modes of operations were tested in order to achieve the maximum level of emission.

### Results

Equipment complied with the test specification limits.

Graphics in following figures show some registrations of the frequency spectrum of the conducted emissions.

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Job Number FCC-16810  
 Test Name Power Line Conducted Emissions  
 FCC 15.207  
 EUT Name CAEN RFID s.r.l. - R1260U

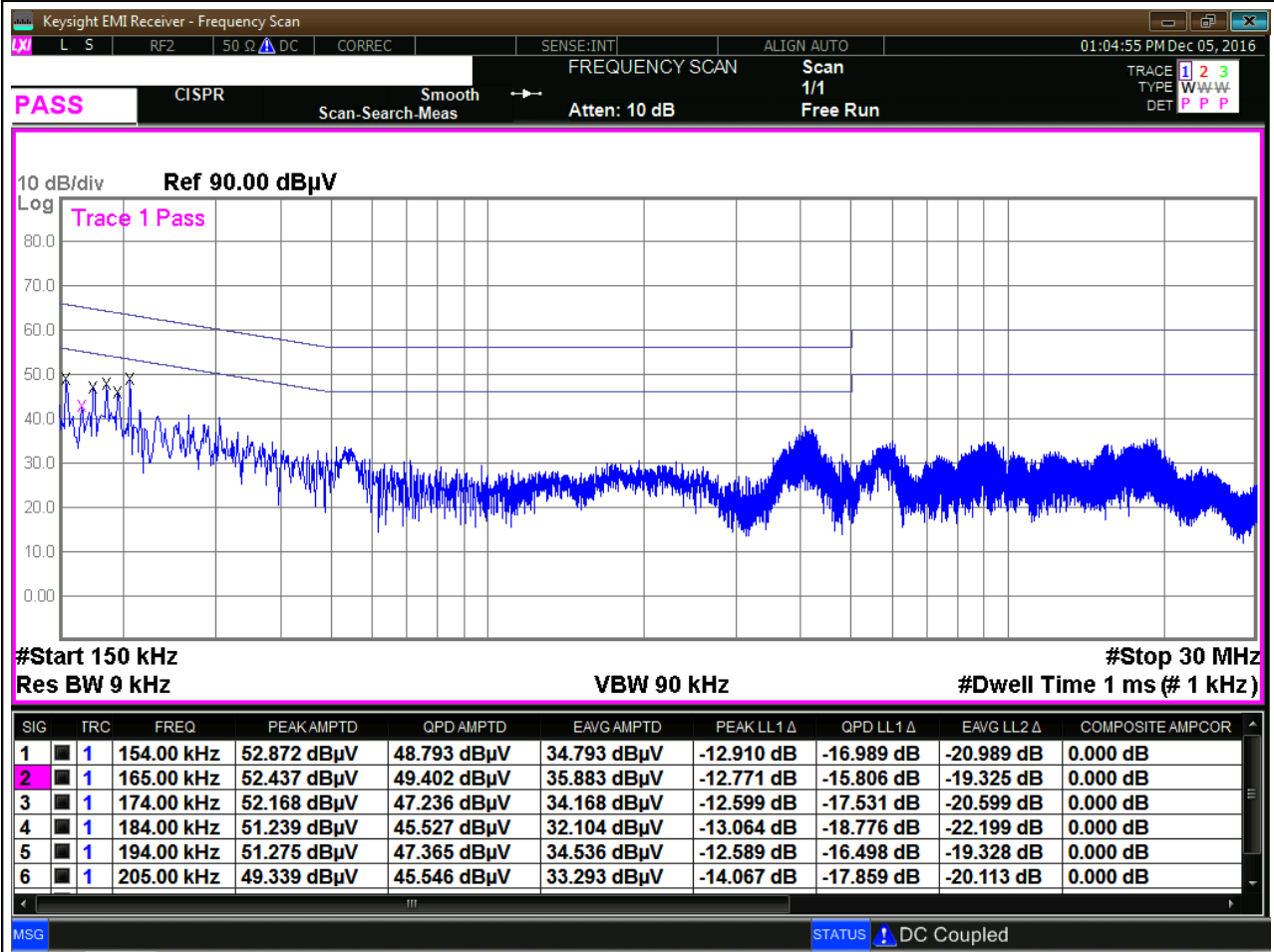


Fig. 5.1

Line 1 of Auxiliary Apparatus  
 EUT mode: Transmitting  
 Auxiliary apparatus: Laptop whit power supply linked  
 B Band (0.15 – 30 MHz)

Job Number FCC-16810  
 Test Name Power line Conducted Emissions  
 FCC 15.207  
 EUT Name CAEN RFID s.r.l. - R1260U

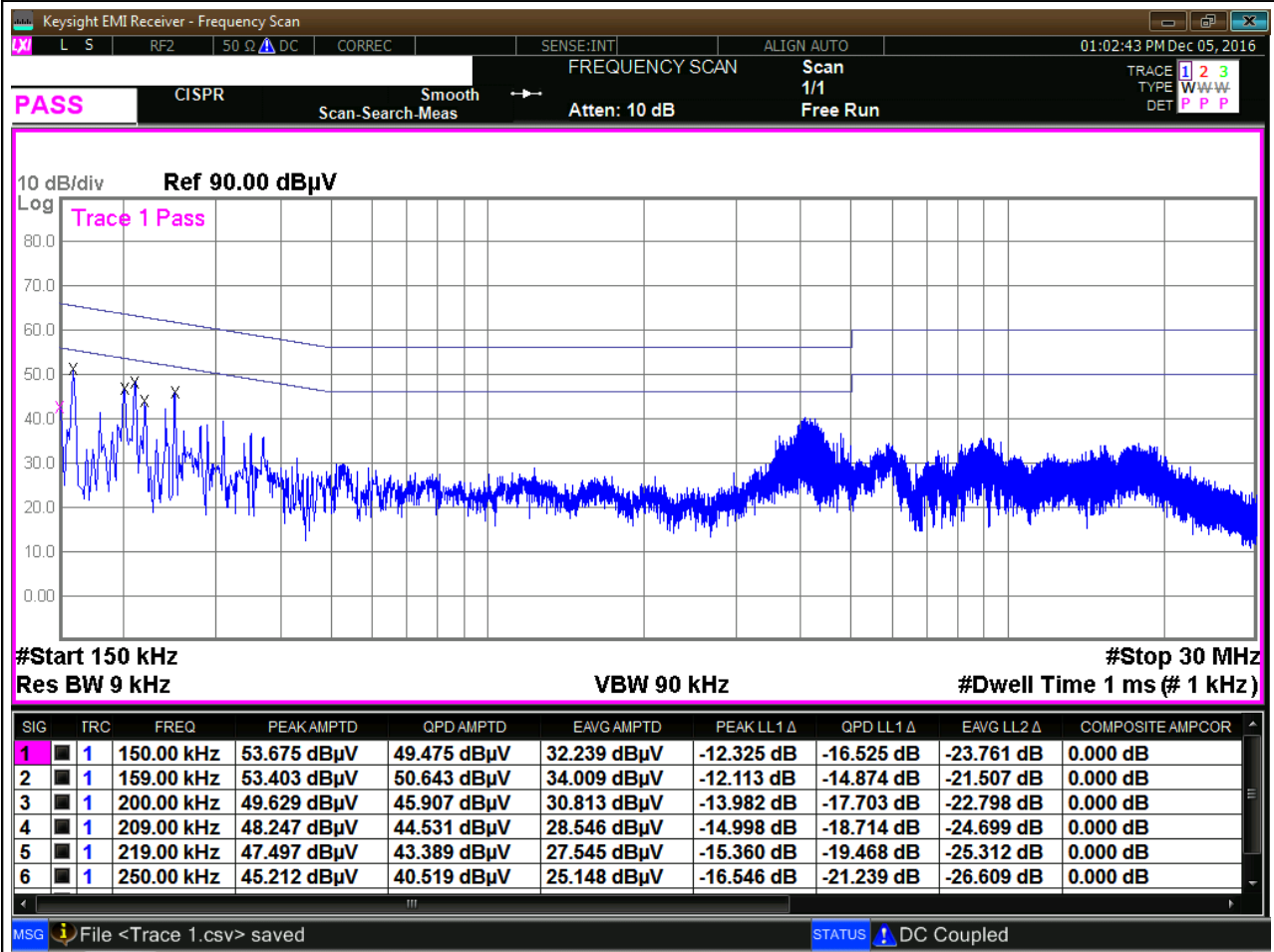


Fig. 5.2

Line 2 of Auxiliary Apparatus  
 EUT mode: Transmitting  
 Auxiliary apparatus: Laptop whit power supply linked  
 B Band (0.15 – 30 MHz)

## 6. OPERATION WITHIN THE BAND 902 - 928 MHz

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.

### 6.1. NUMBER OF HOPPING CHANNEL

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;
- if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies.

The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

## Measurement

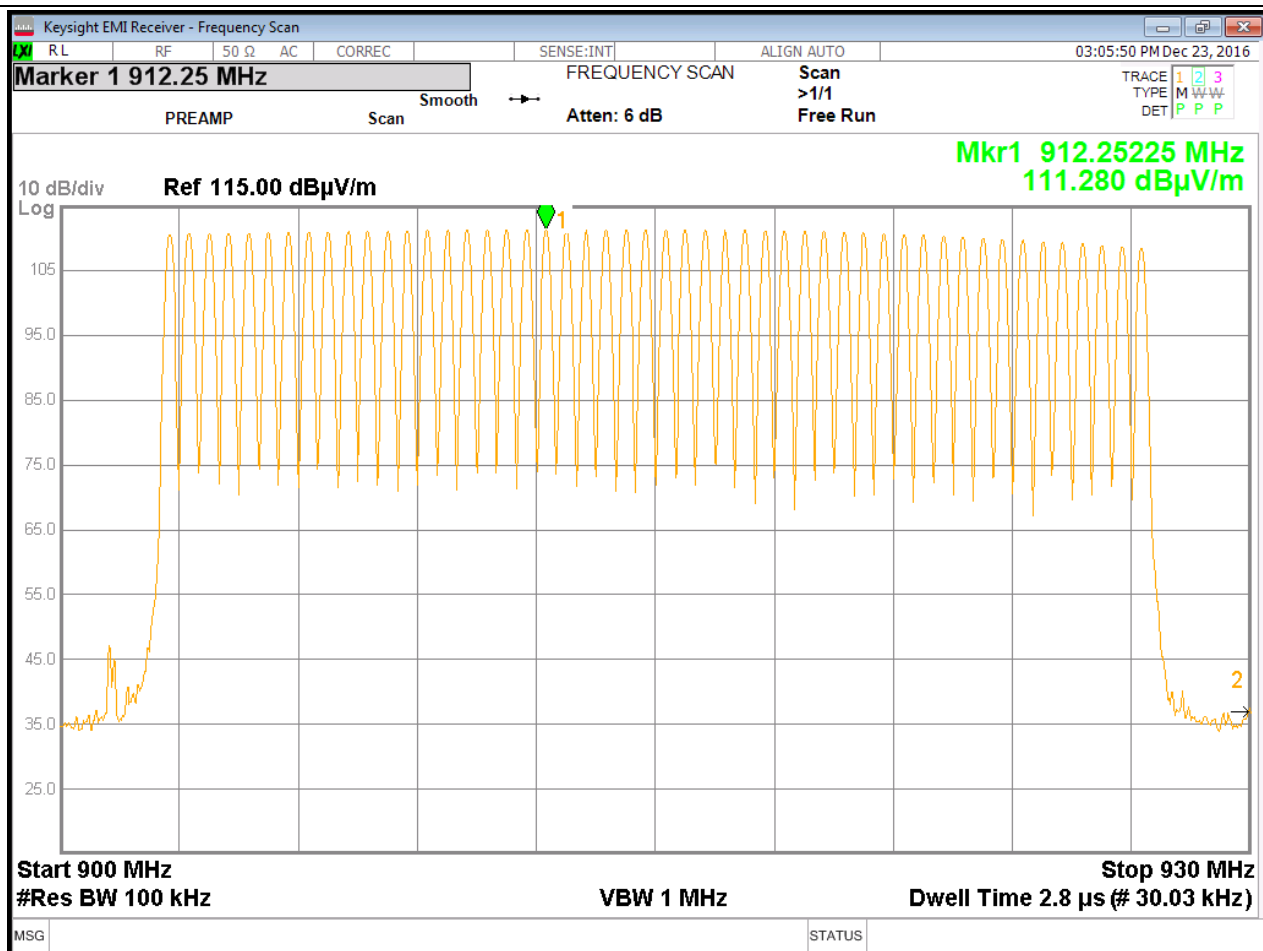


Fig. 6.1  
Pol. V

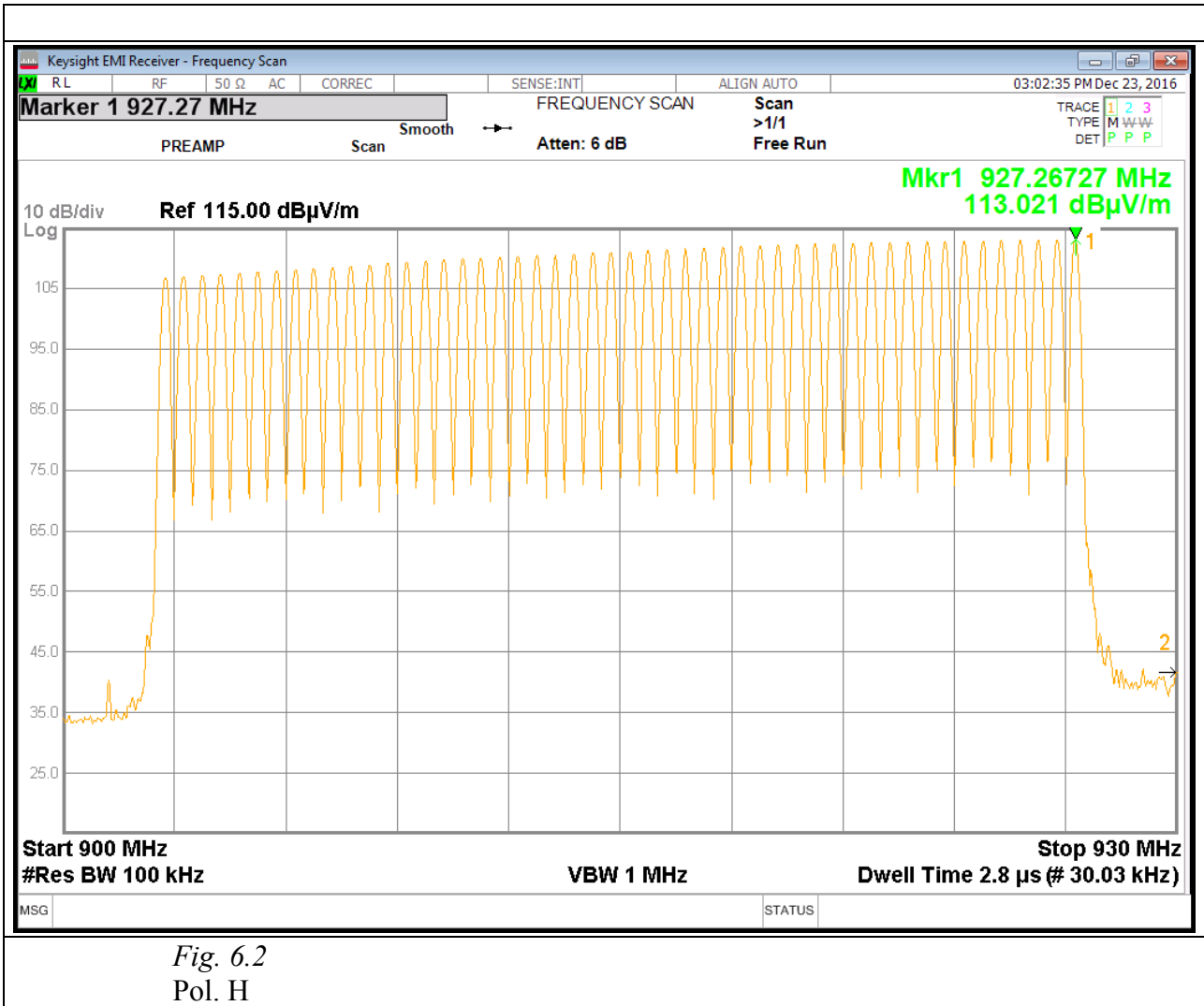


Fig. 6.2  
Pol. H

6.2. CARRIER FREQUENCY SEPARATION

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.

Measurement

The following figures show the acquired graphics.

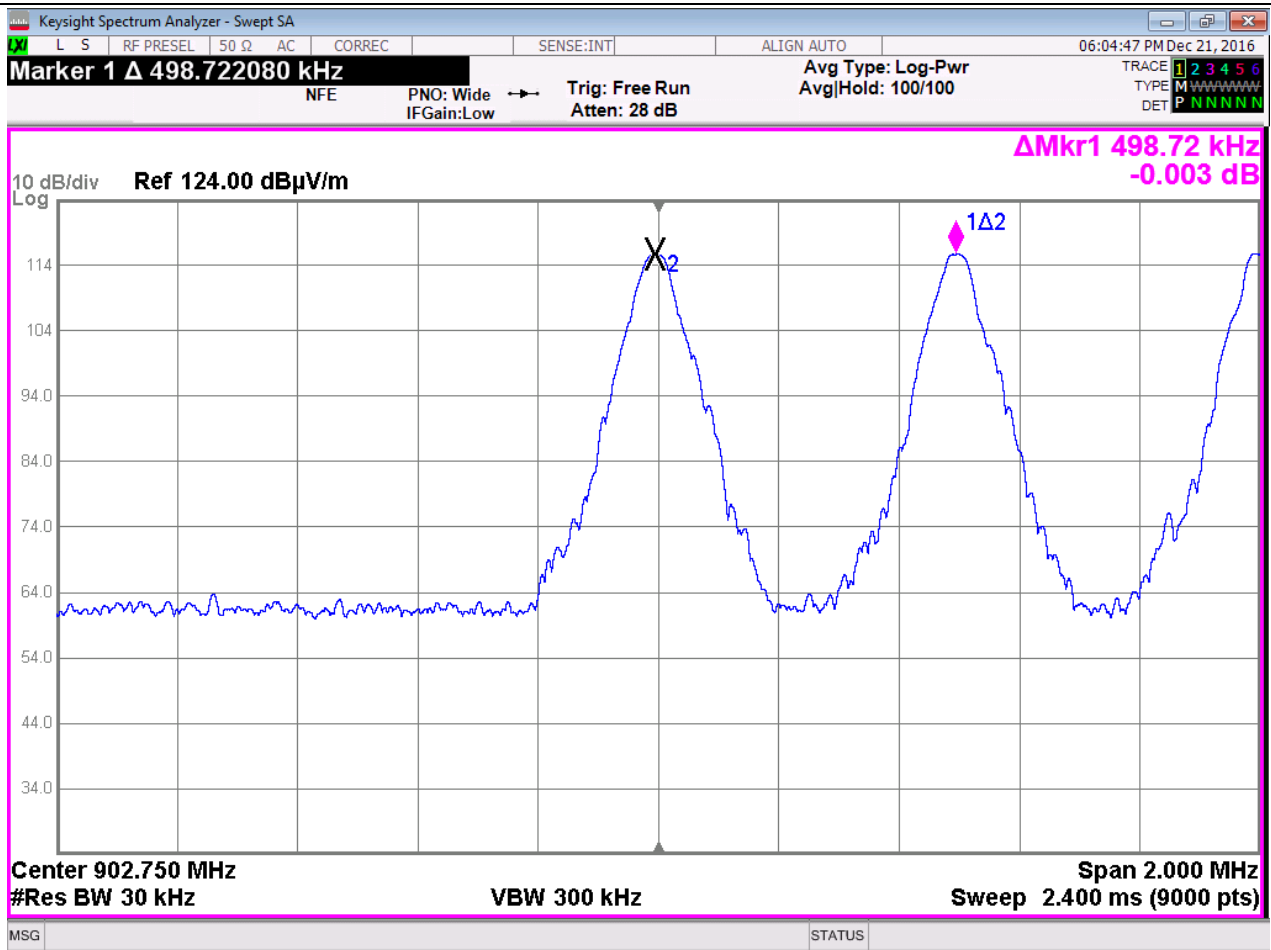


Fig. 6.3  
Pol. V; Channels: 0 to 1; Maxhold

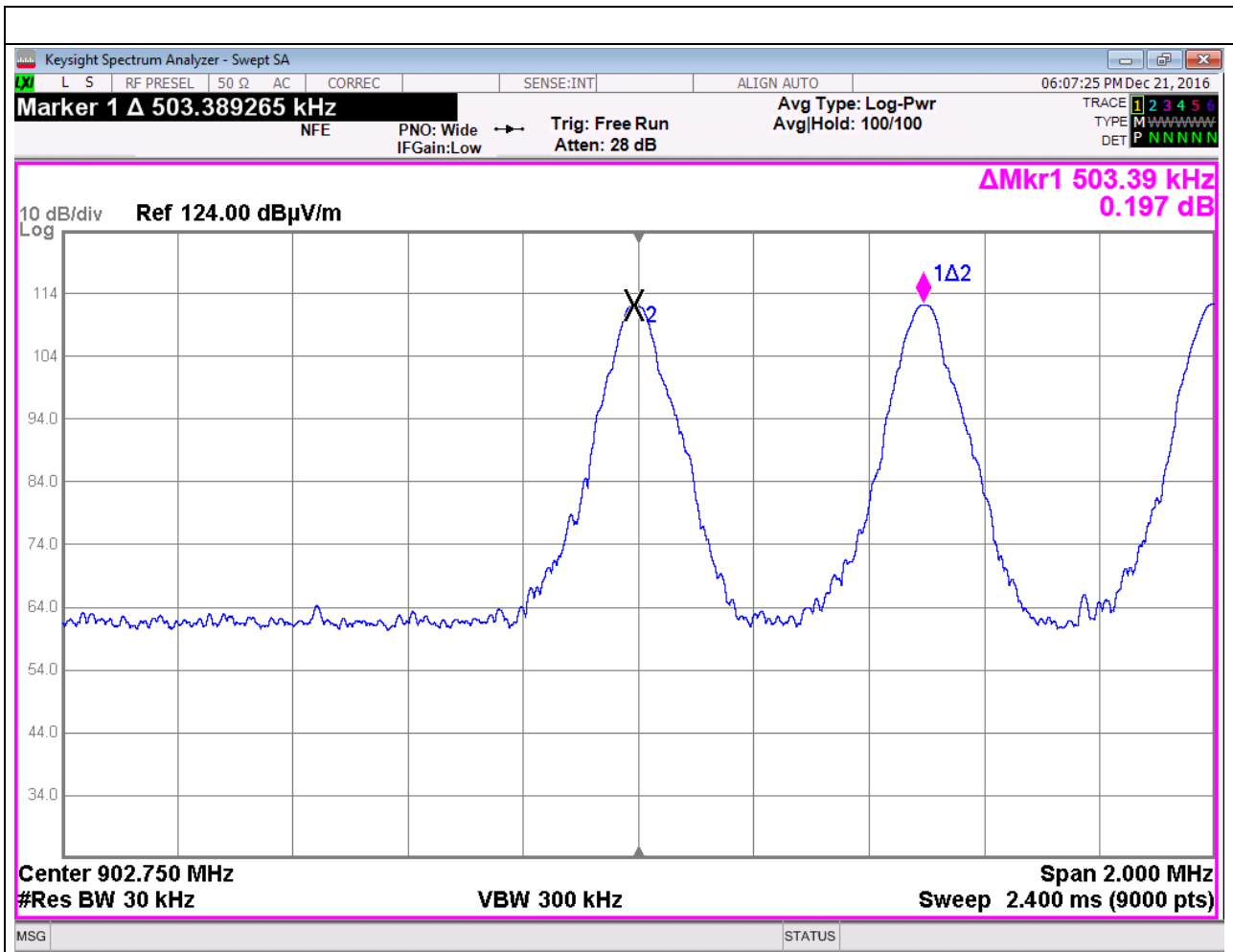


Fig. 6.4  
Pol. H; Channels: 0 to 1; Maxhold



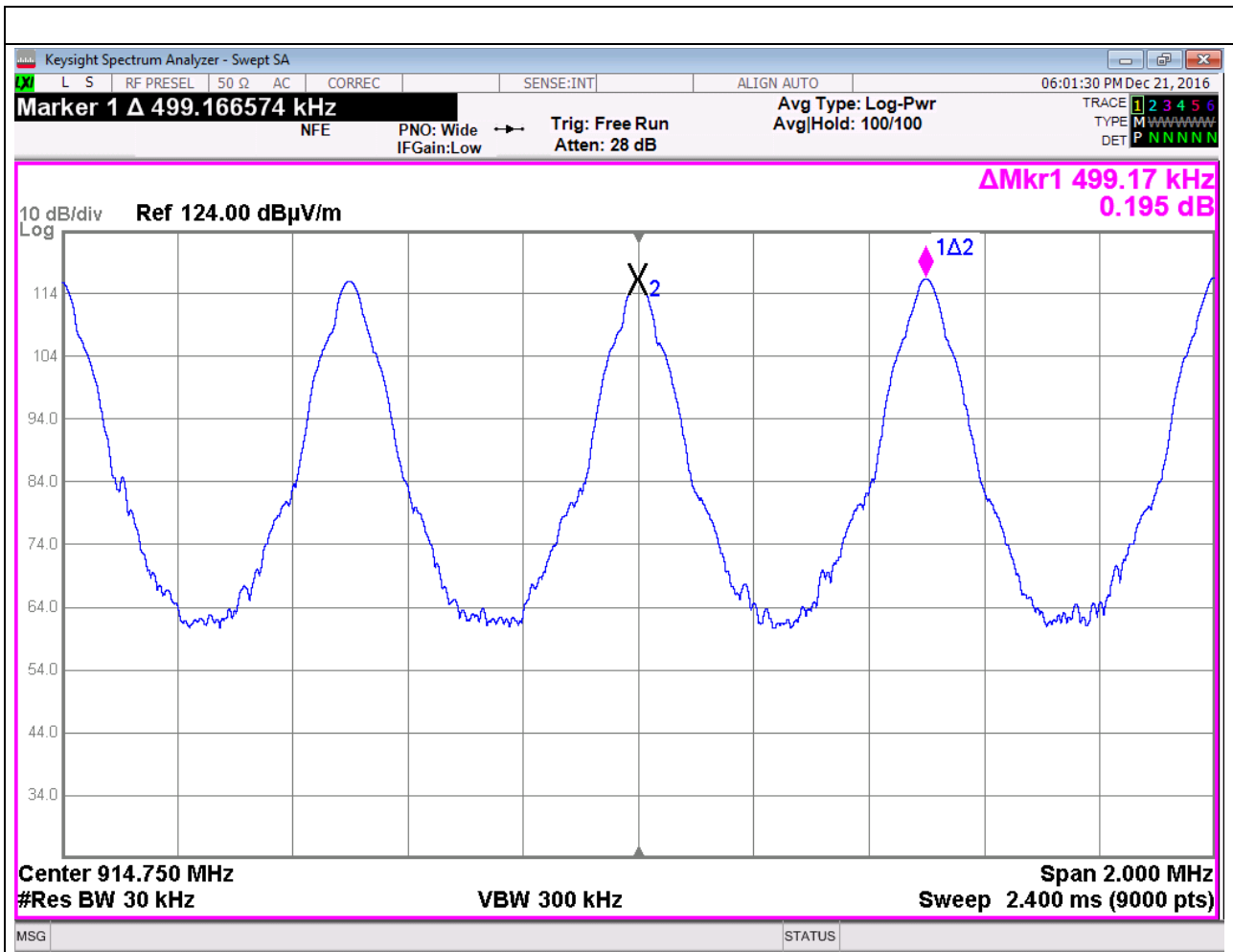


Fig. 6.6  
Pol. H; Channels: 24 to 25; Maxhold

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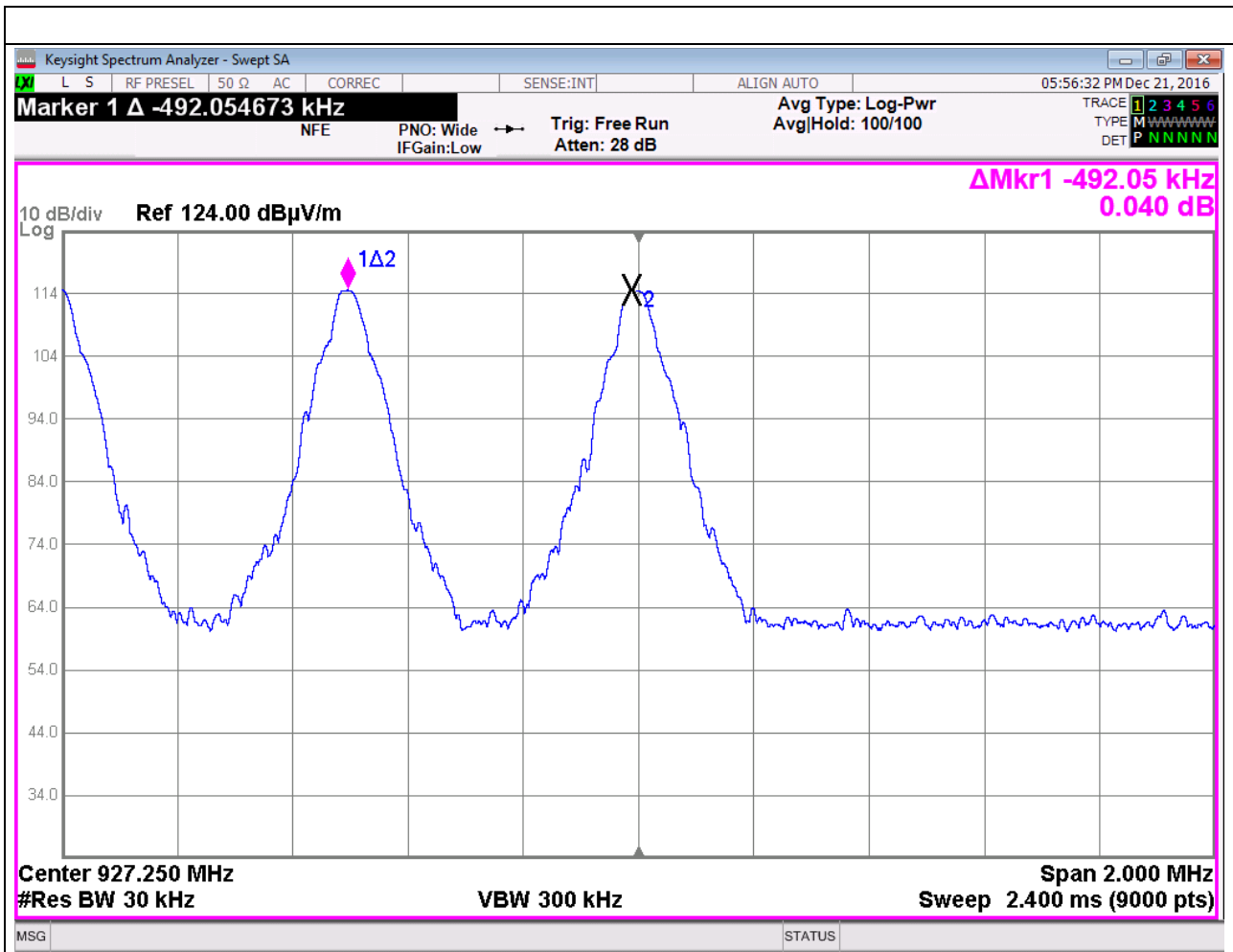


Fig. 6.7

Pol. V; Channels: 49 to 48; Maxhold

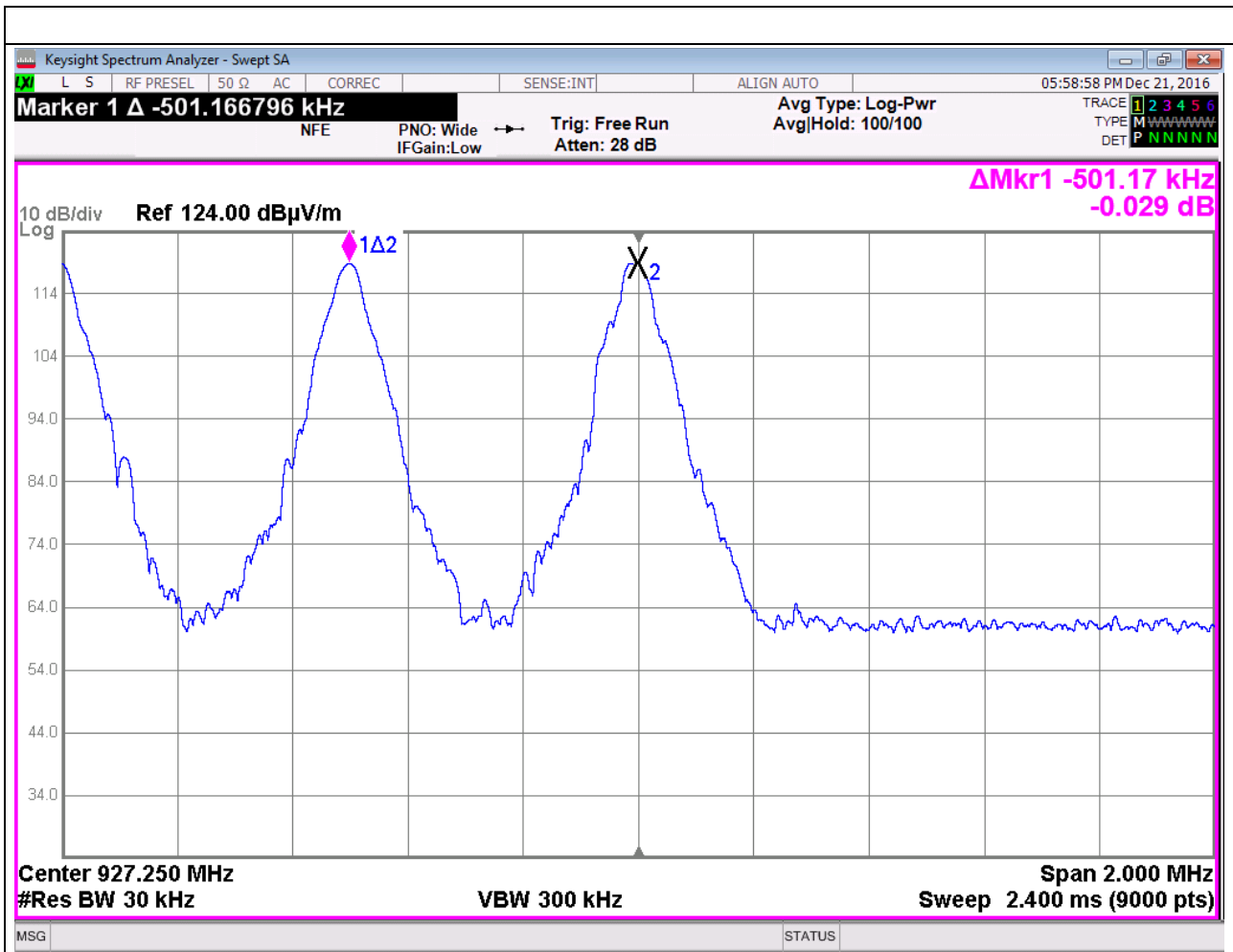


Fig. 6.8

Pol. H; Channels: 49 to 48; Maxhold

6.3. TIME OF OCCUPANCY

Measurements

<b>Channel</b>	<b>Dwell Time (ms)</b>	<b>Nr. of Transmission for channel (average)</b>	<b>Time of Occupancy (ms)</b>	<b>Limit (msec)</b>	<b>Result</b>
0	28.99	6 (in 20 s)	174.9 (in 20 s)	400	Pass
24	28.98	6 (in 20 s)	173.9 (in 20 s)	400	Pass
49	28.99	6 (in 20 s)	174.9 (in 20 s)	400	Pass

The following figures show the acquired graphics.

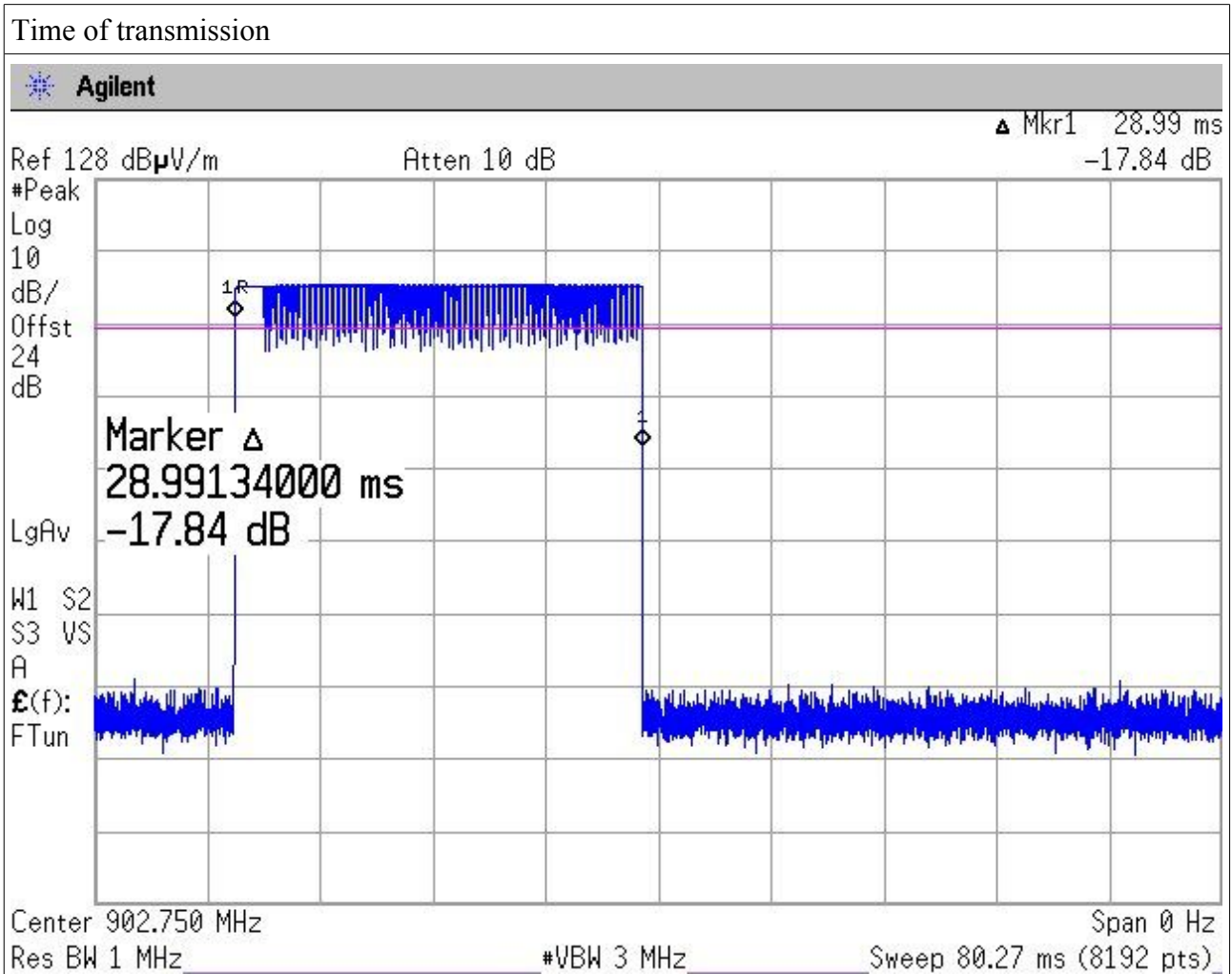


Fig. 6.9  
Channel: 0 (Maxhold)

Nr. of Transmission for channel

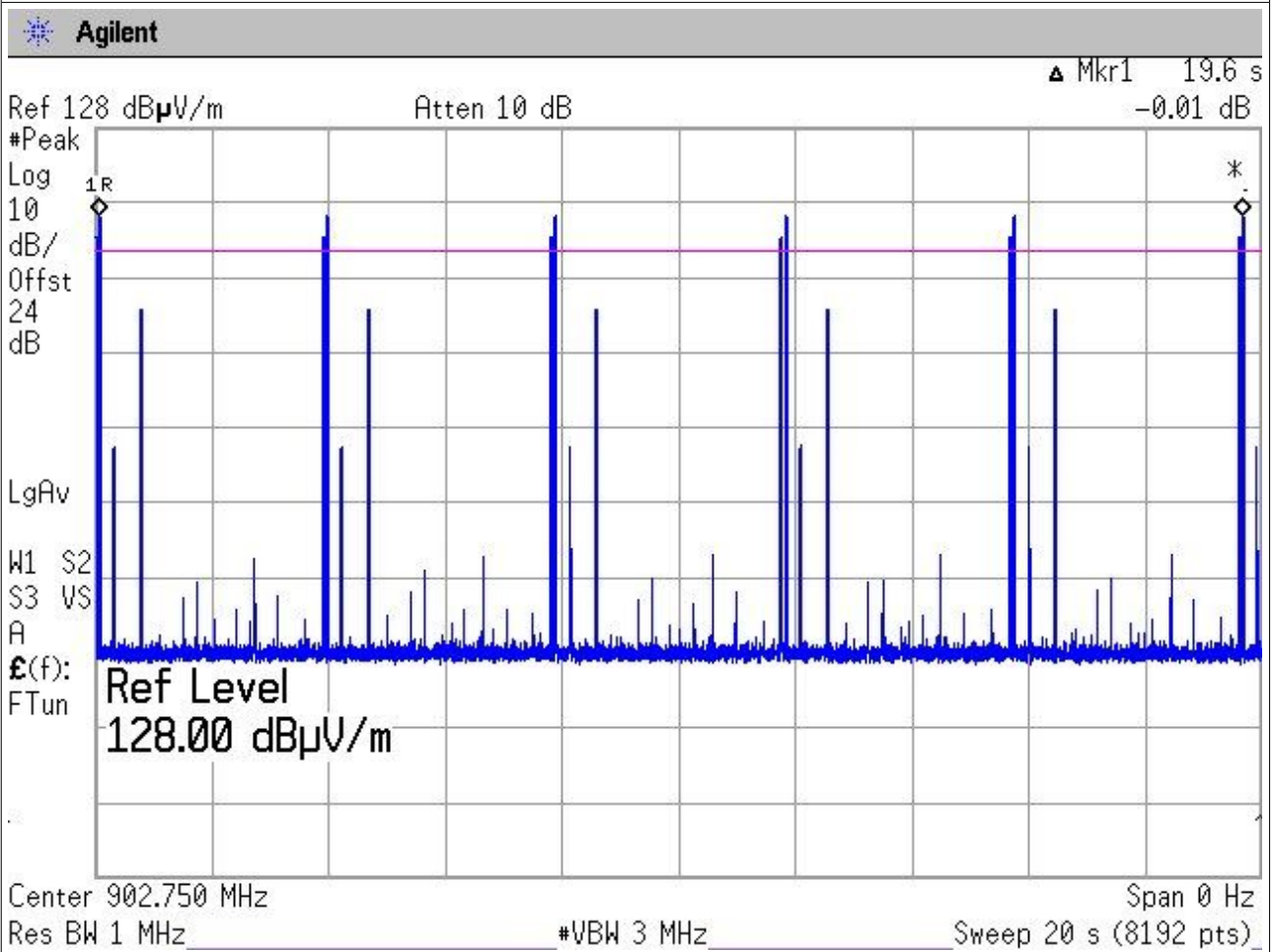


Fig. 6.10  
Channel: 0

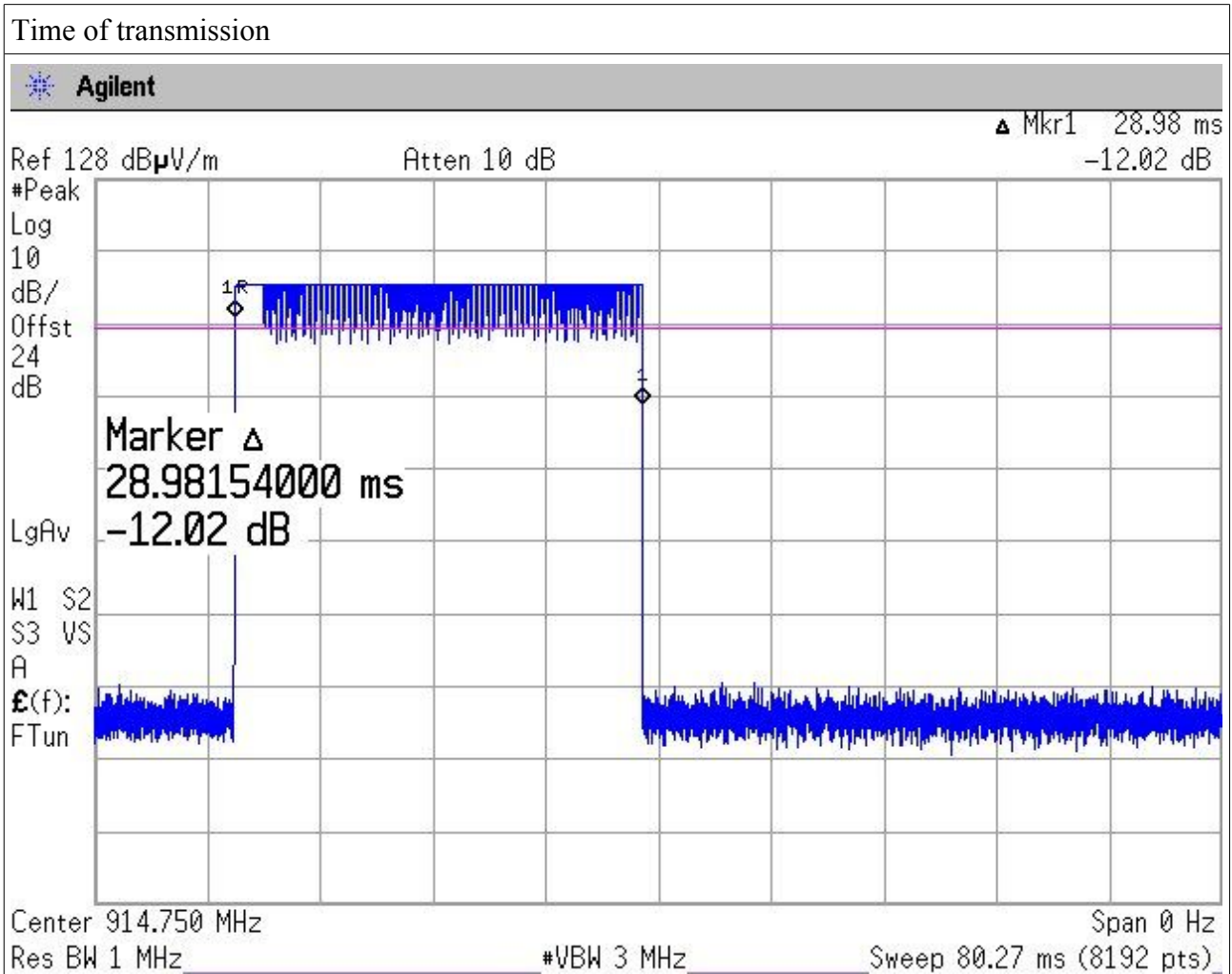


Fig. 6.11  
Channel: 24 (Maxhold)

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Nr. of Transmission for channel

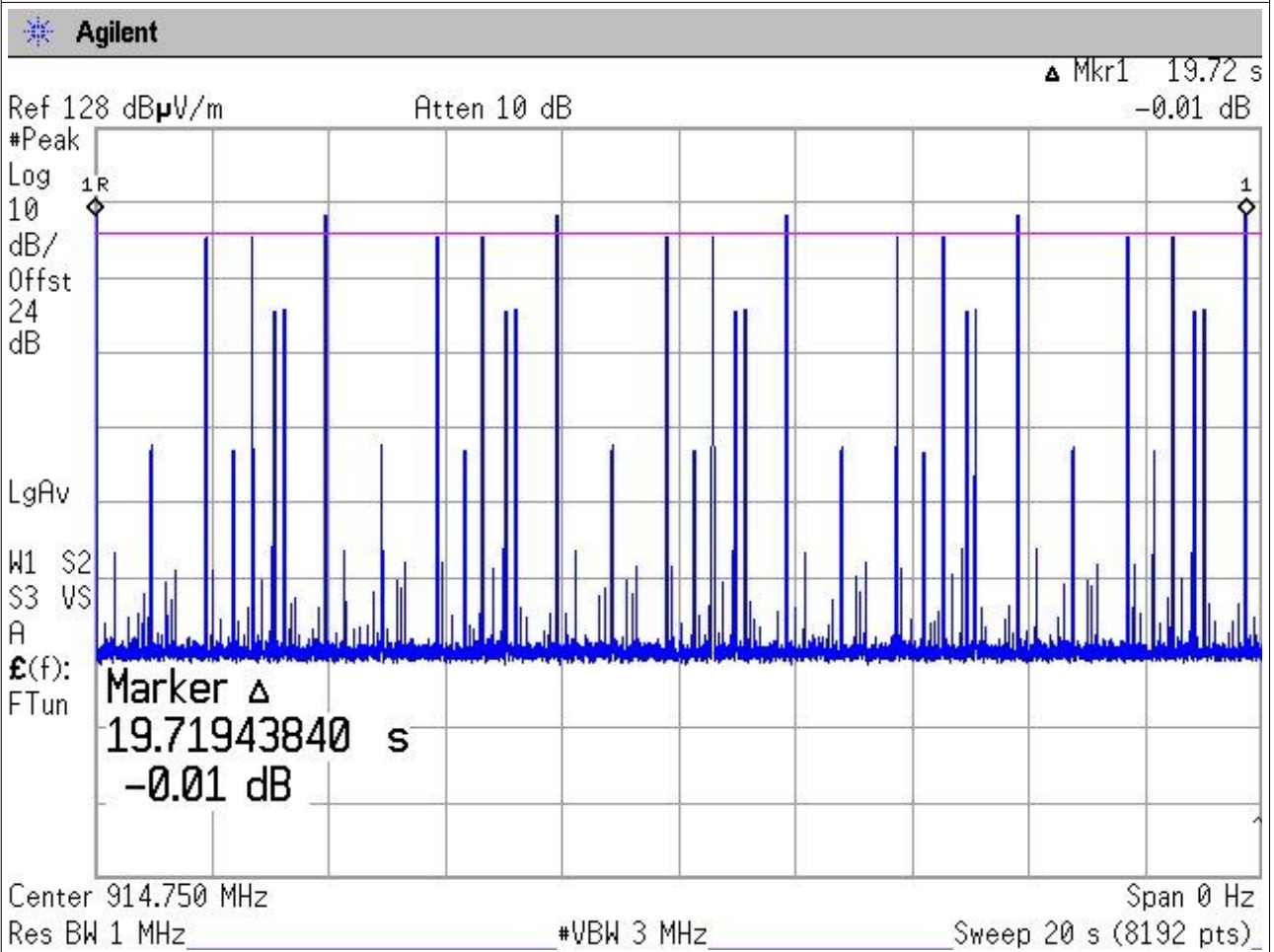


Fig. 6.12  
Channel: 24

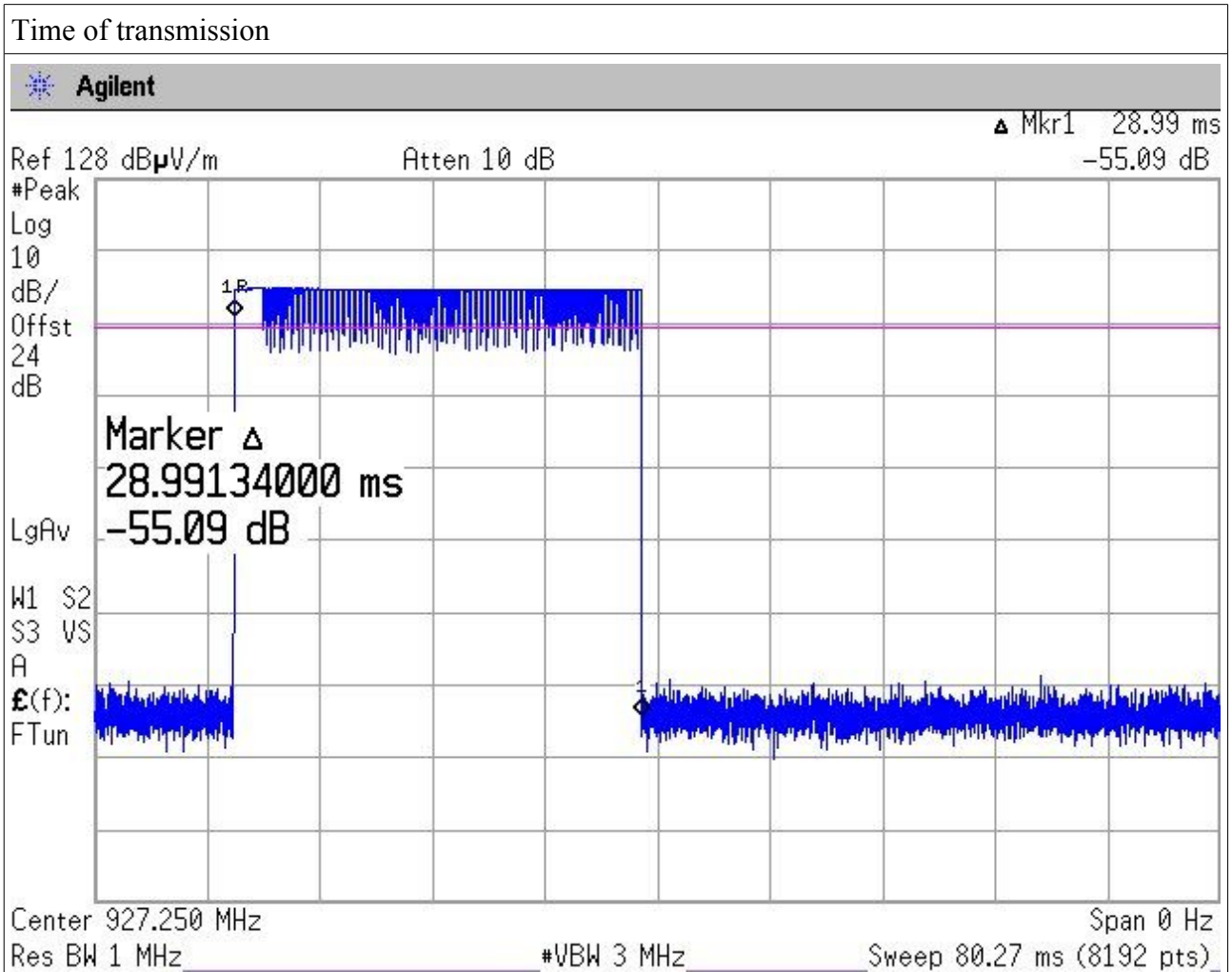


Fig. 6.13  
Channel: 49 (Maxhold)



Nr. of Transmission for channel

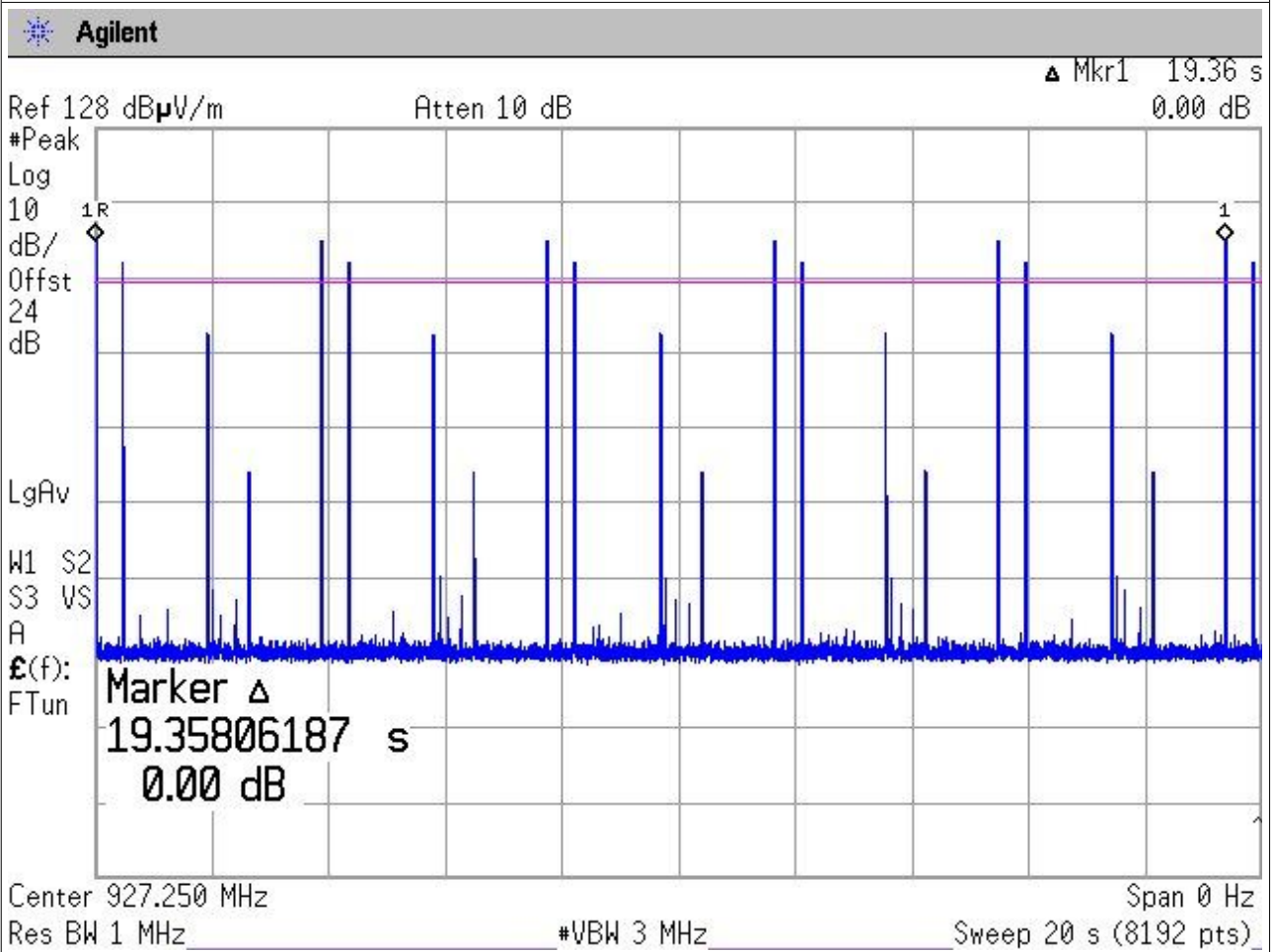


Fig. 6.14  
Channel: 49

6.4. 20 dB BANDWIDTH

Measurements

*Modulation: Pol V*

Channel	Frequency [MHz]	Bandwidth [kHz]	Limit [kHz]	Result
0	902.74702	85.7	500	Pass
24	914.74728	85.8	500	Pass
49	927.24692	86.7	500	Pass

*Modulation: Pol H*

Channel	Frequency [MHz]	Bandwidth [kHz]	Limit [kHz]	Result
0	902.74755	85.7	500	Pass
24	914.74755	85.8	500	Pass
49	927.24768	86.5	500	Pass

The following figures show the acquired graphics.

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Ch 0: Bandwidth

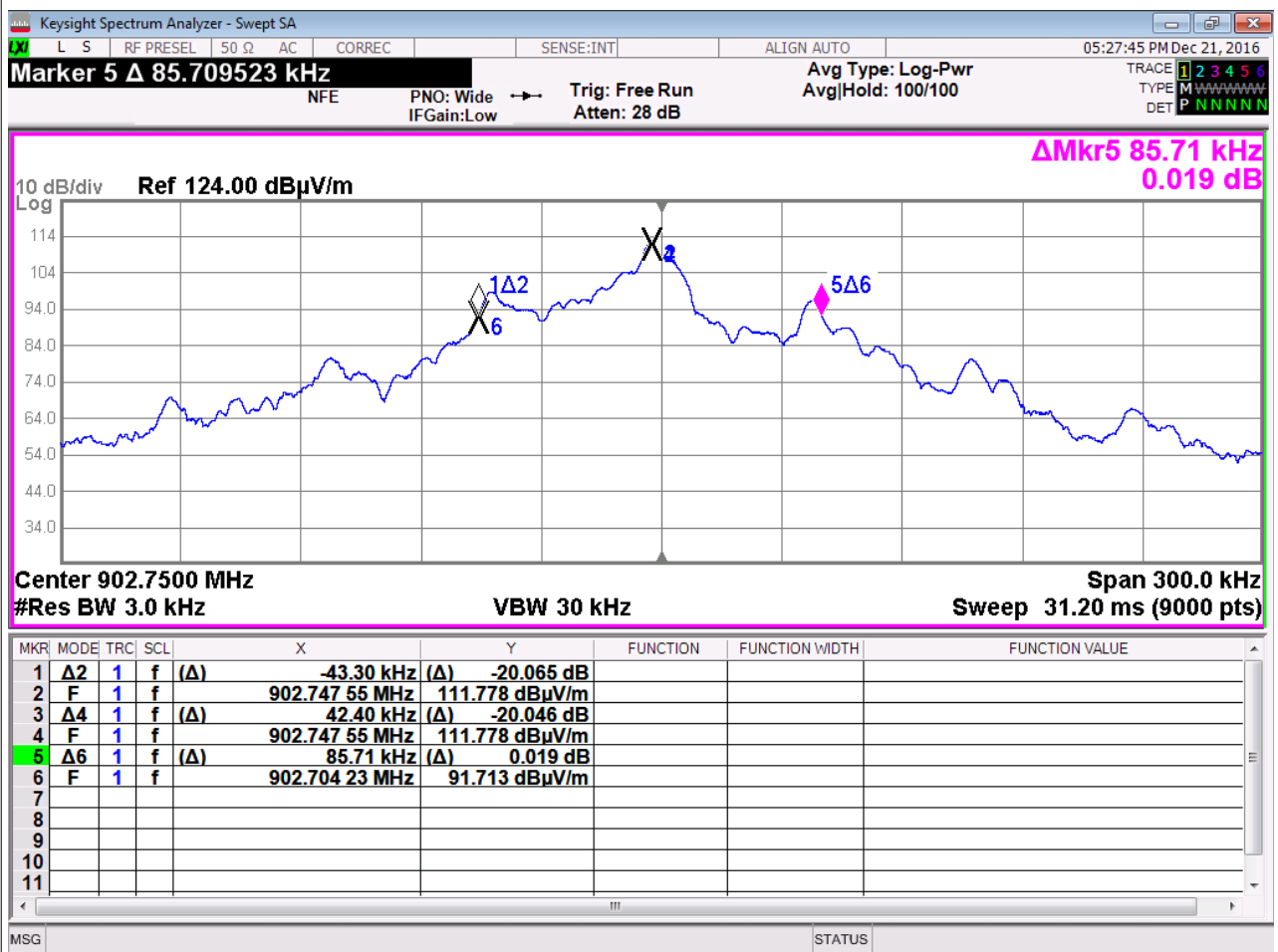


Fig. 6.16  
Pol. H

Ch 24: Bandwidth

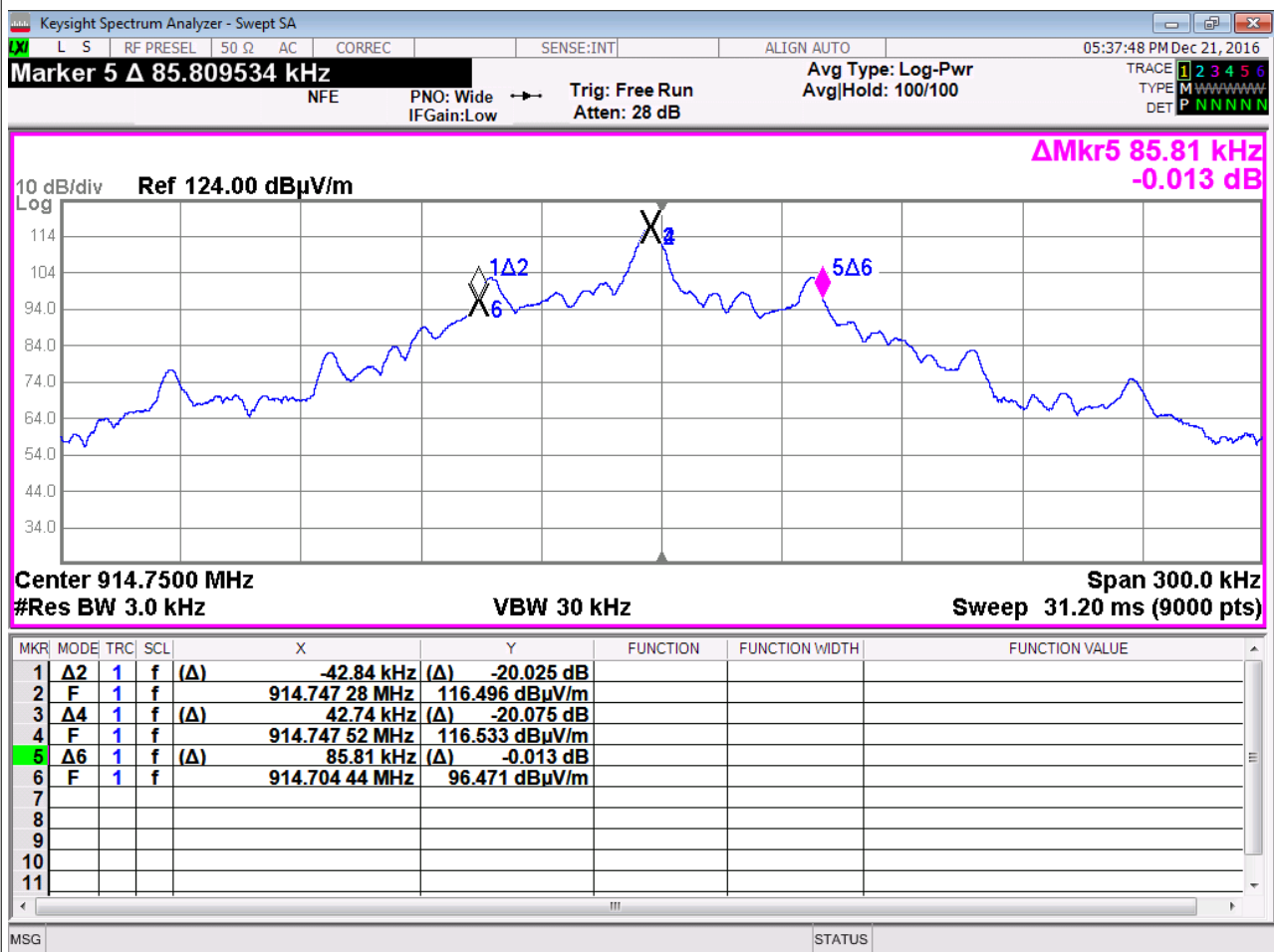


Fig. 6.17  
Pol. V

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Ch 24: Bandwidth

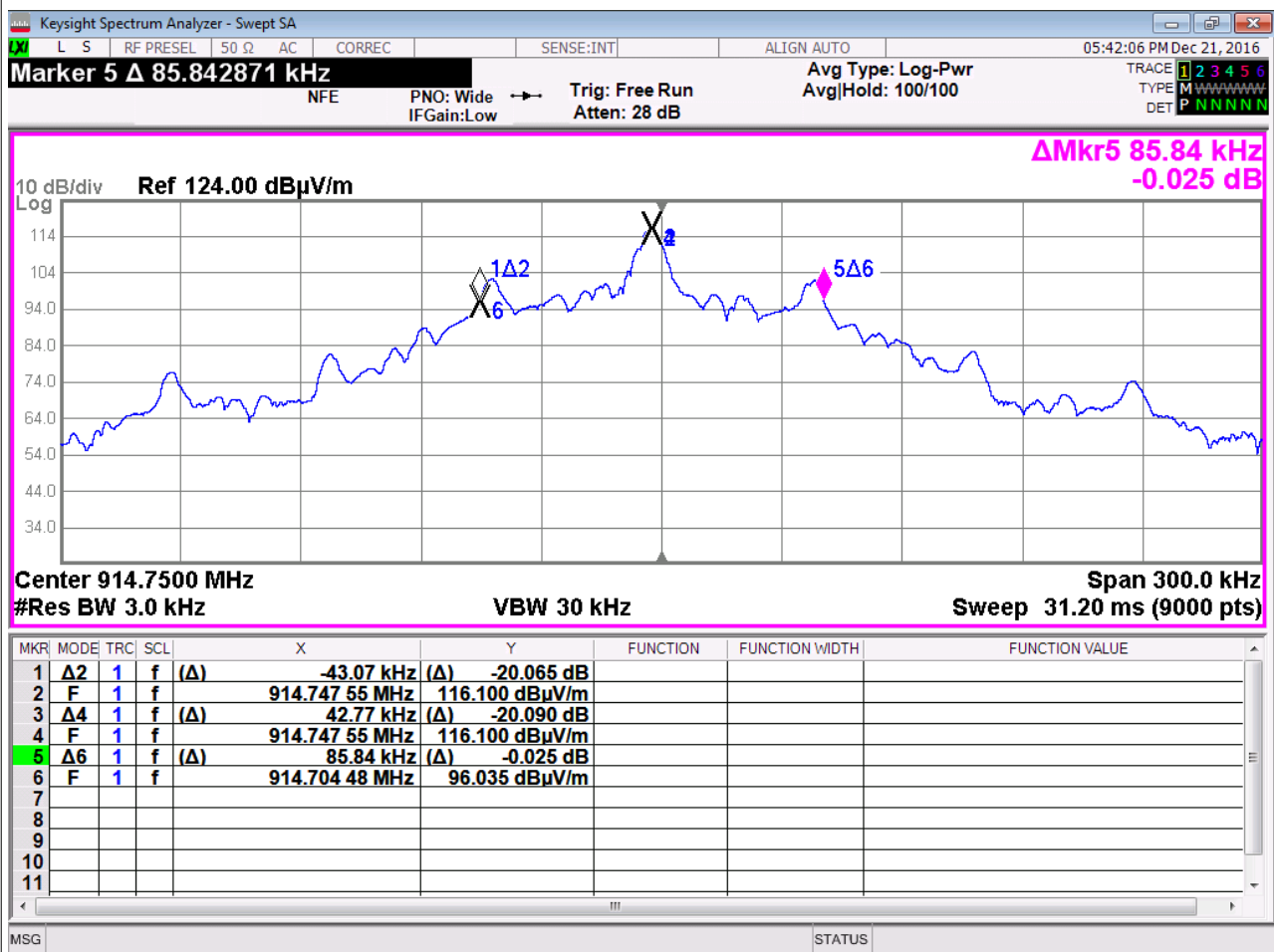


Fig. 6.18  
Pol. H

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Ch 49: Bandwidth

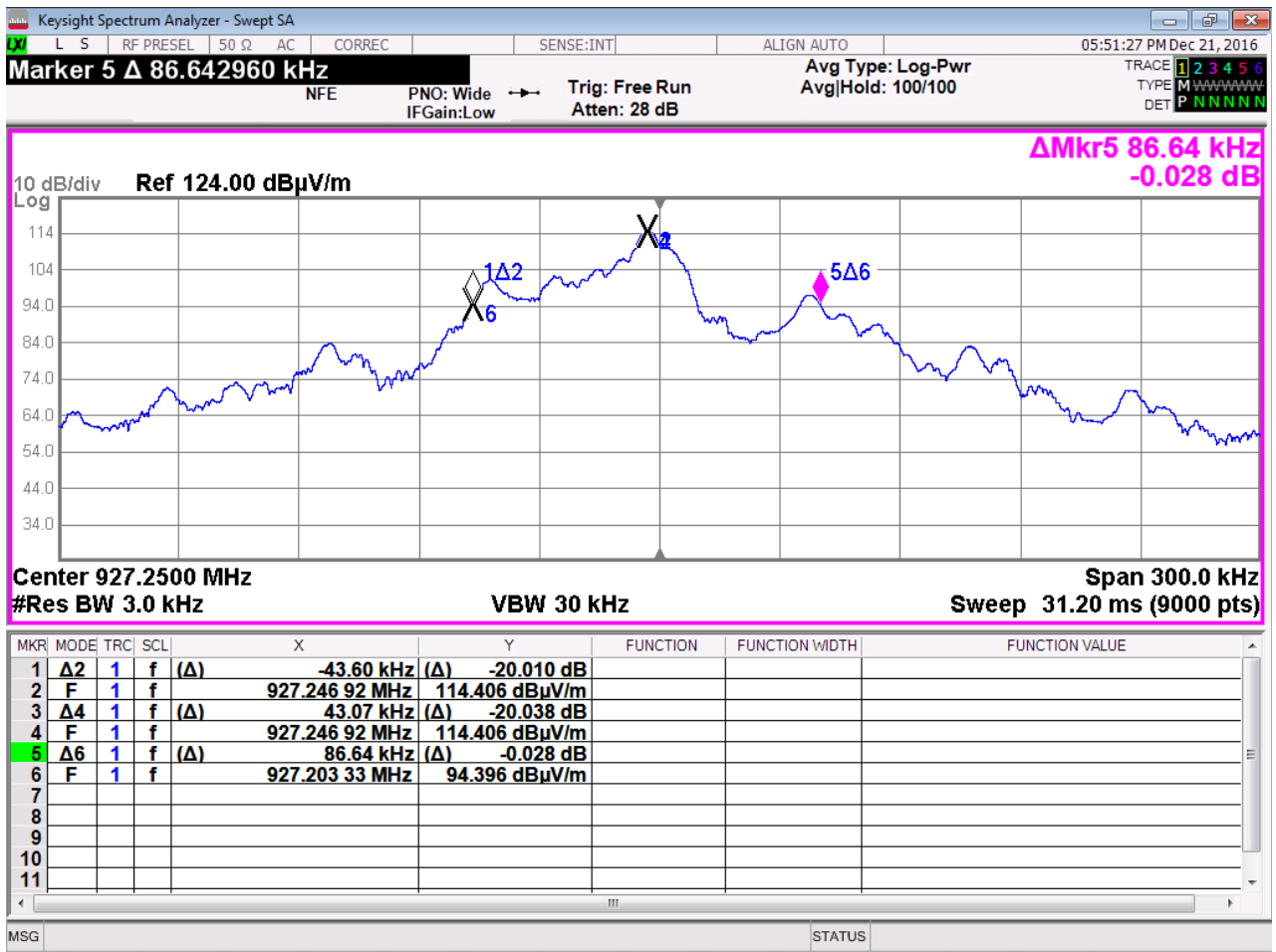


Fig. 6.19  
Pol. V

Ch 49: Bandwidth

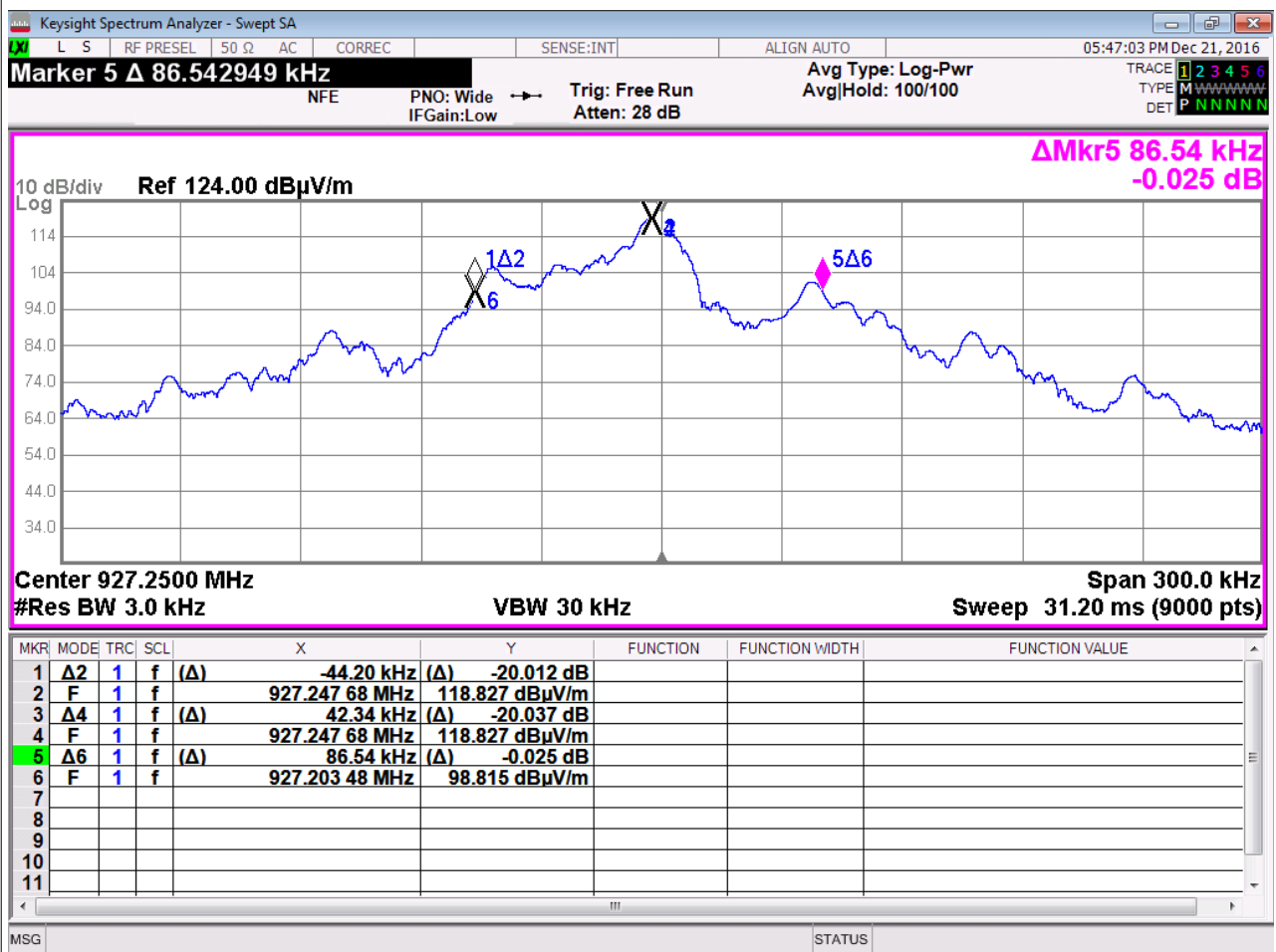


Fig. 6.20  
 Pol. H

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6.5. *PEAK OUTPUT POWER*

Equipment shall meet the limits below.

<i>FREQUENCY RANGE</i> [MHz]	<i>NR OF CHANNEL</i> [#]	<i>RF CONDUCTED POWER OUTPUT LIMIT</i> [dBm]
902 – 928	50	30.0 (1 W)
902 – 928	< 50	24.0 (0.25 W)

Measurement (radiated)

The measured values are:

<i>CHANNEL</i>	Field @ 3m	Output Power (e.r.p.)	
	(dB $\mu$ V/m)	(mW)	(dBm)
0	113.13	37.6	15.75
24	115.39	63.3	18.01
49	116.20	76.3	18.82

The following figures show the acquired graphics.

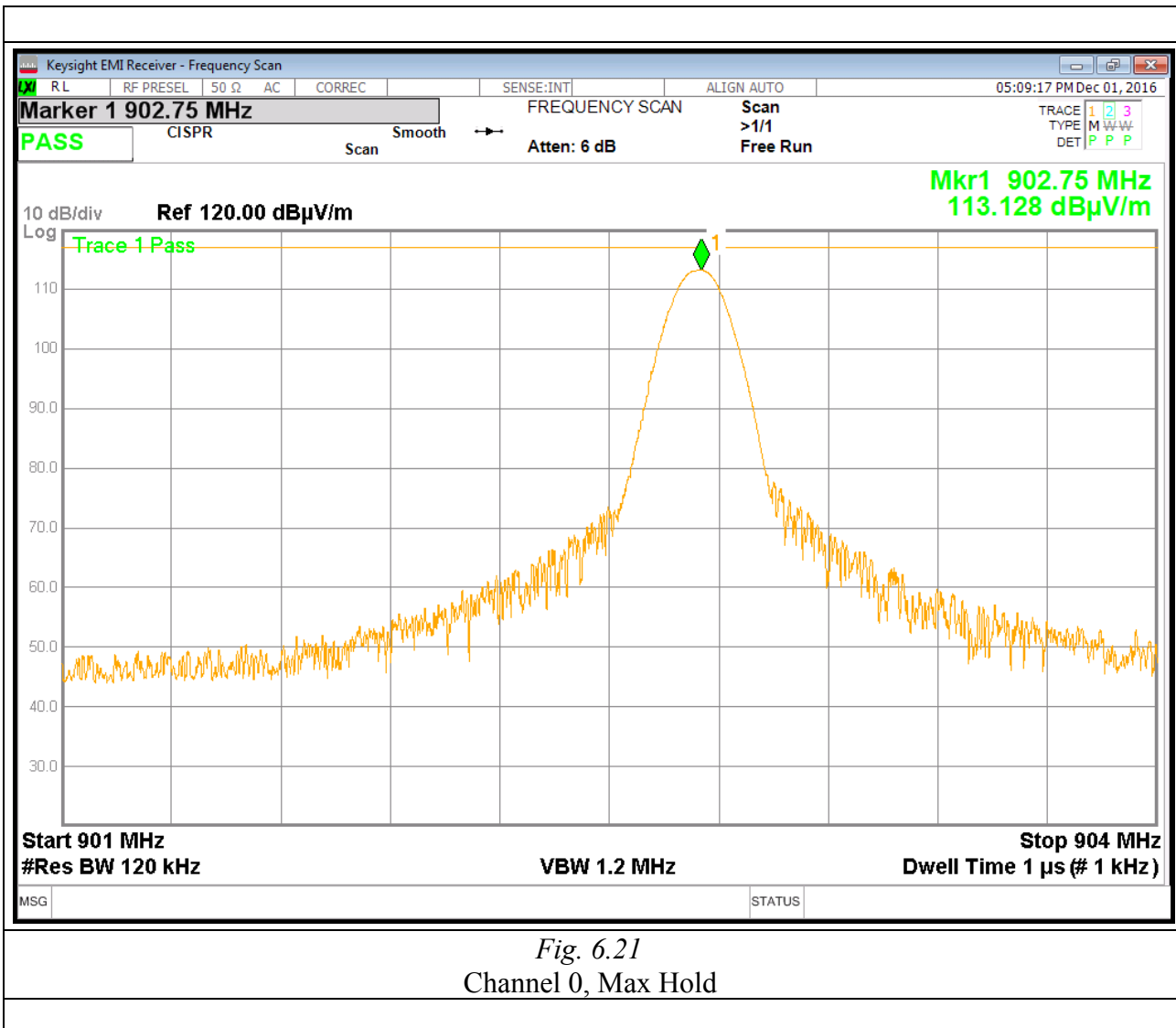


Fig. 6.21  
Channel 0, Max Hold

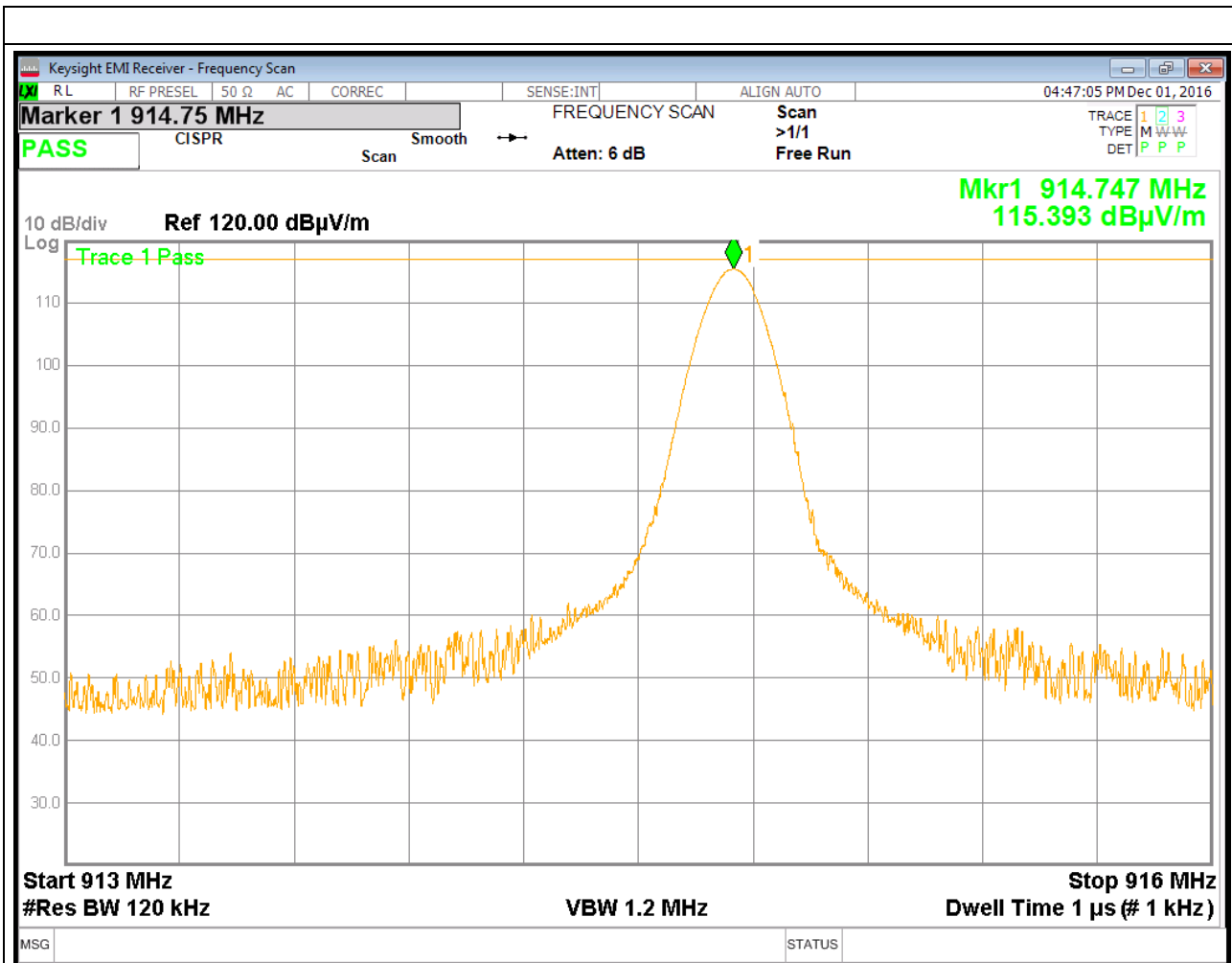


Fig. 6.22  
Channel 24, Max Hold

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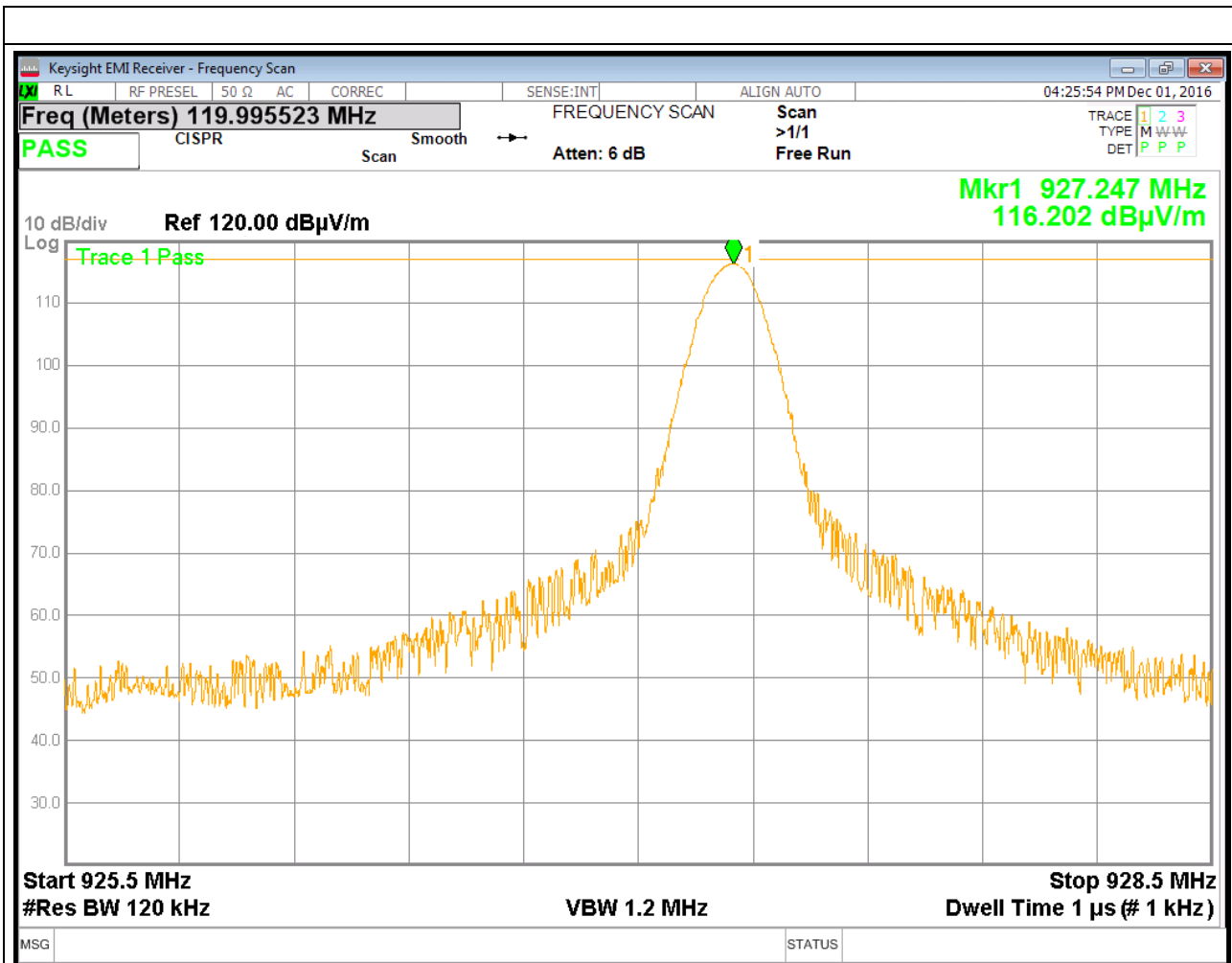


Fig. 6.23  
Channel 49, Max Hold

6.6. BAND EDGE

Emissions must be within the band 902-928 MHz.

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)).

Measurements

The following figures show the acquired graphics.

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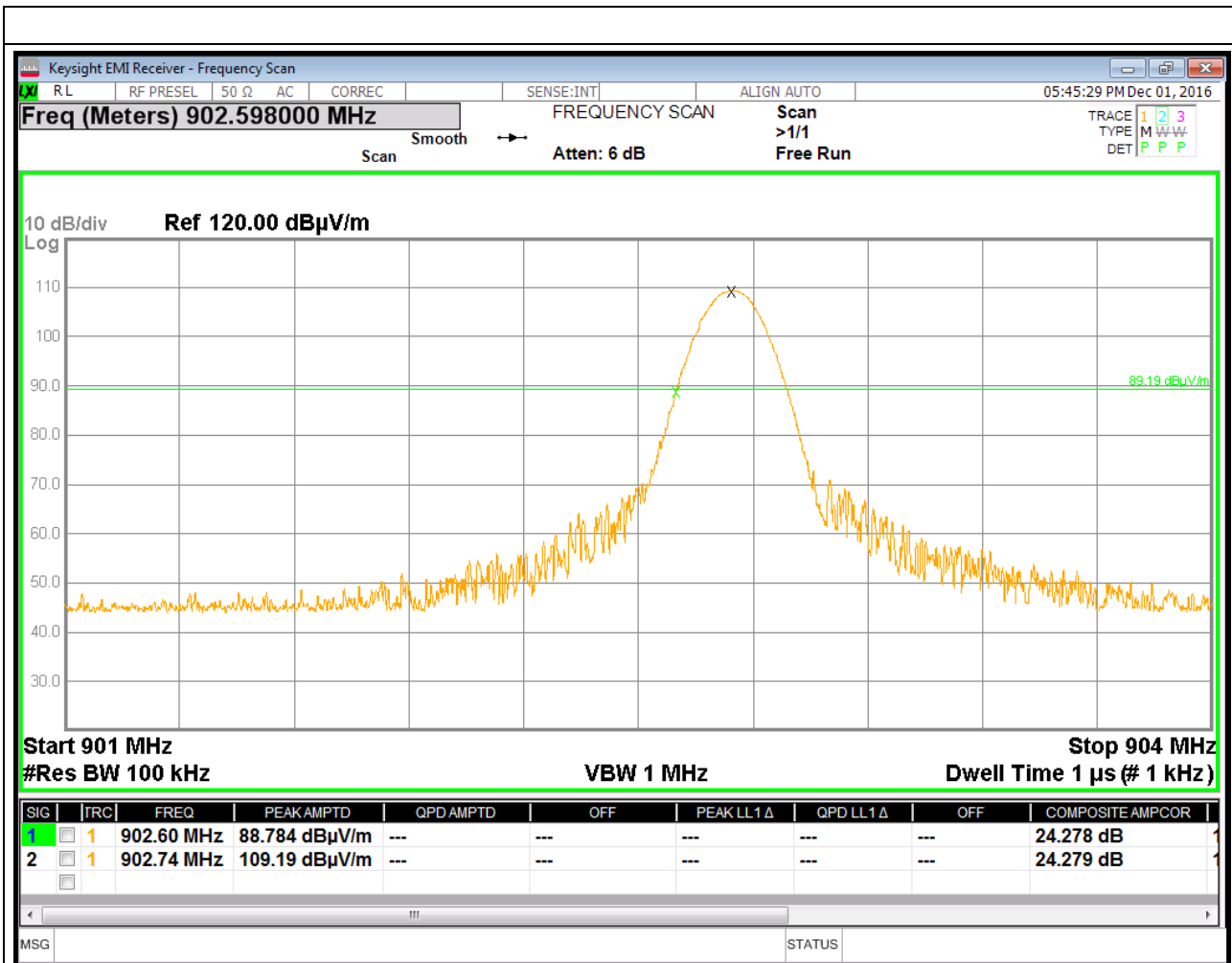


Fig. 6.24  
Pol. V  
Channel "0" (Ch Low)

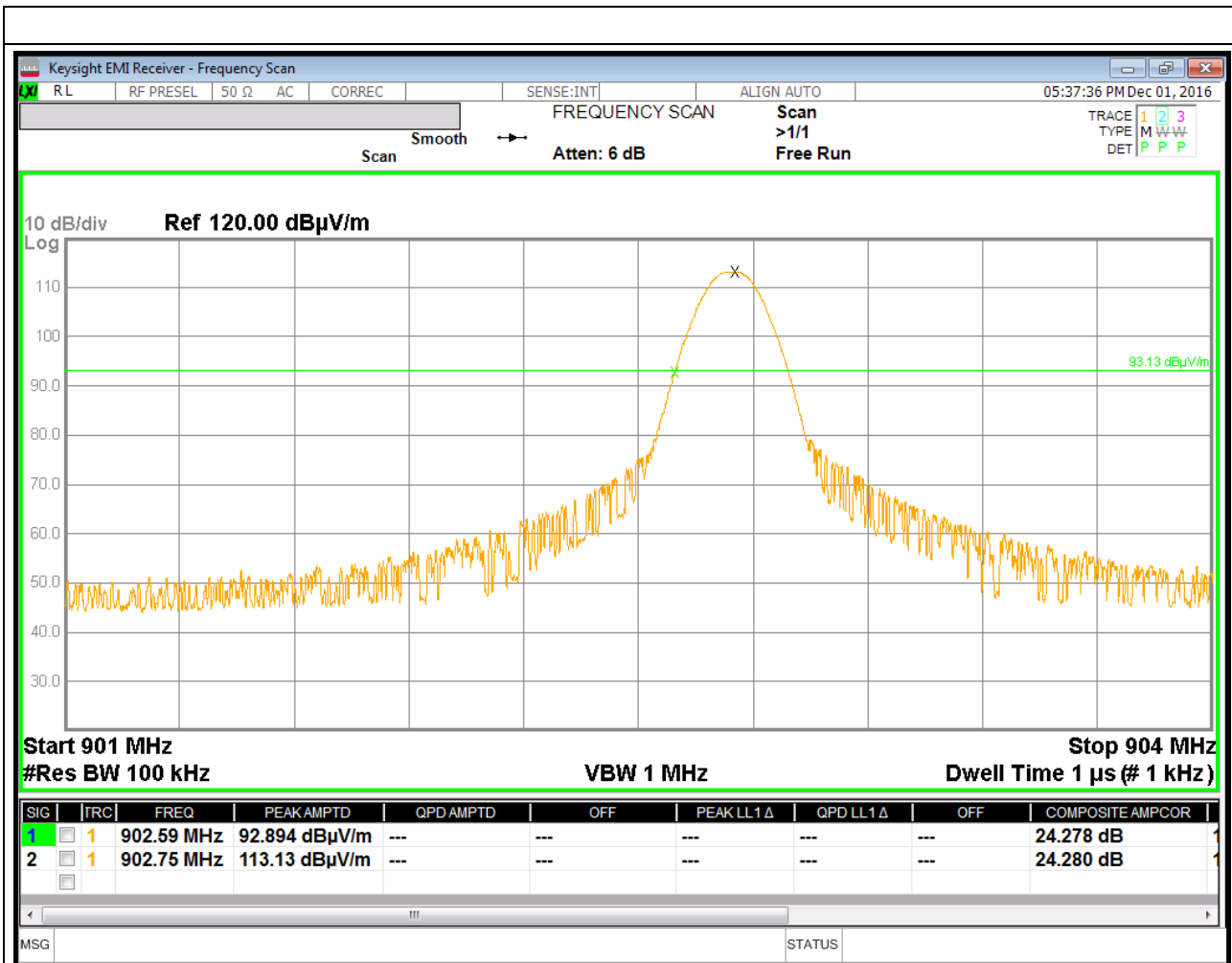


Fig. 6.25  
 Pol. H  
 Channel "0" (Ch Low)

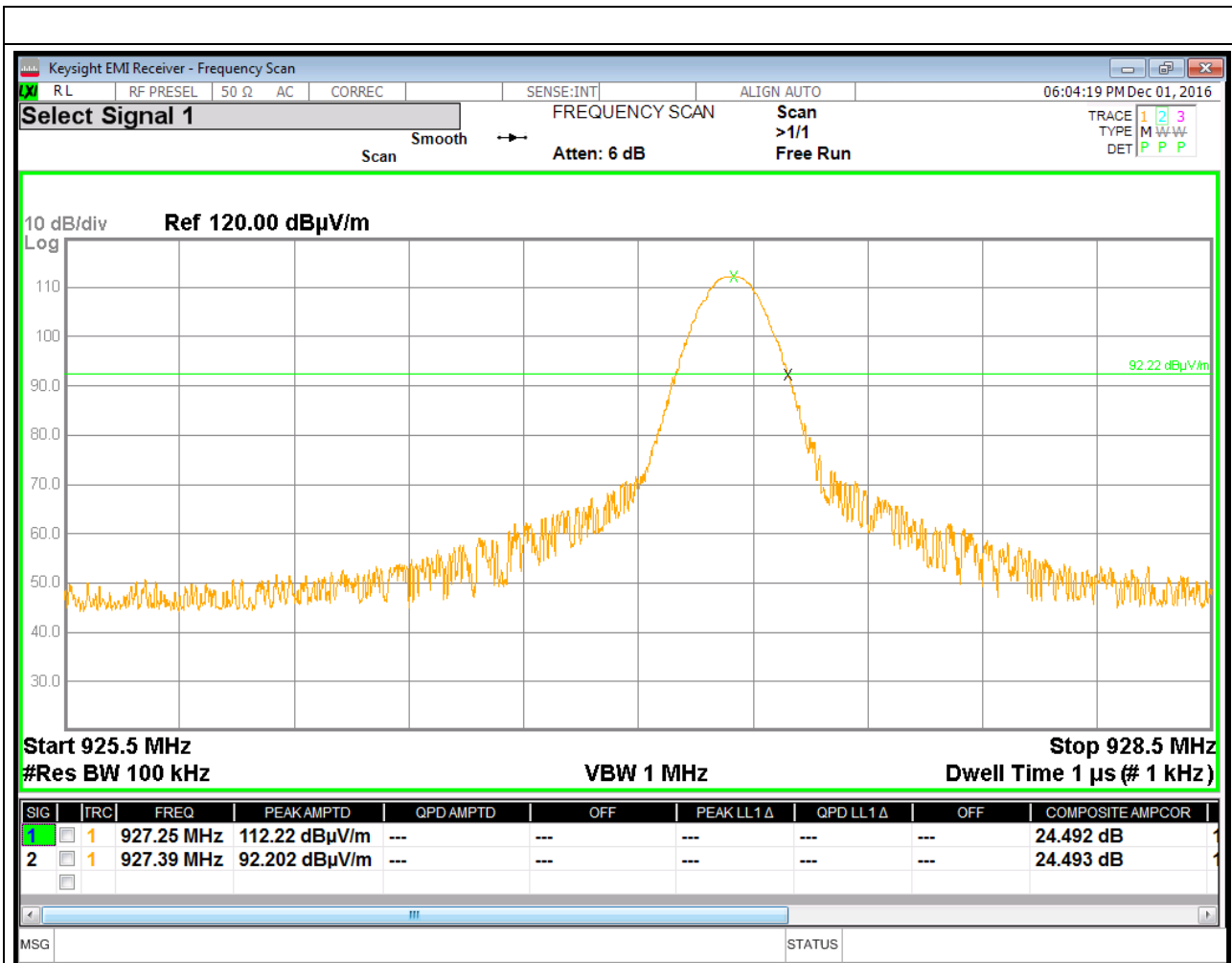


Fig. 6.26  
 Pol. V  
 Channel "49" (Ch High)



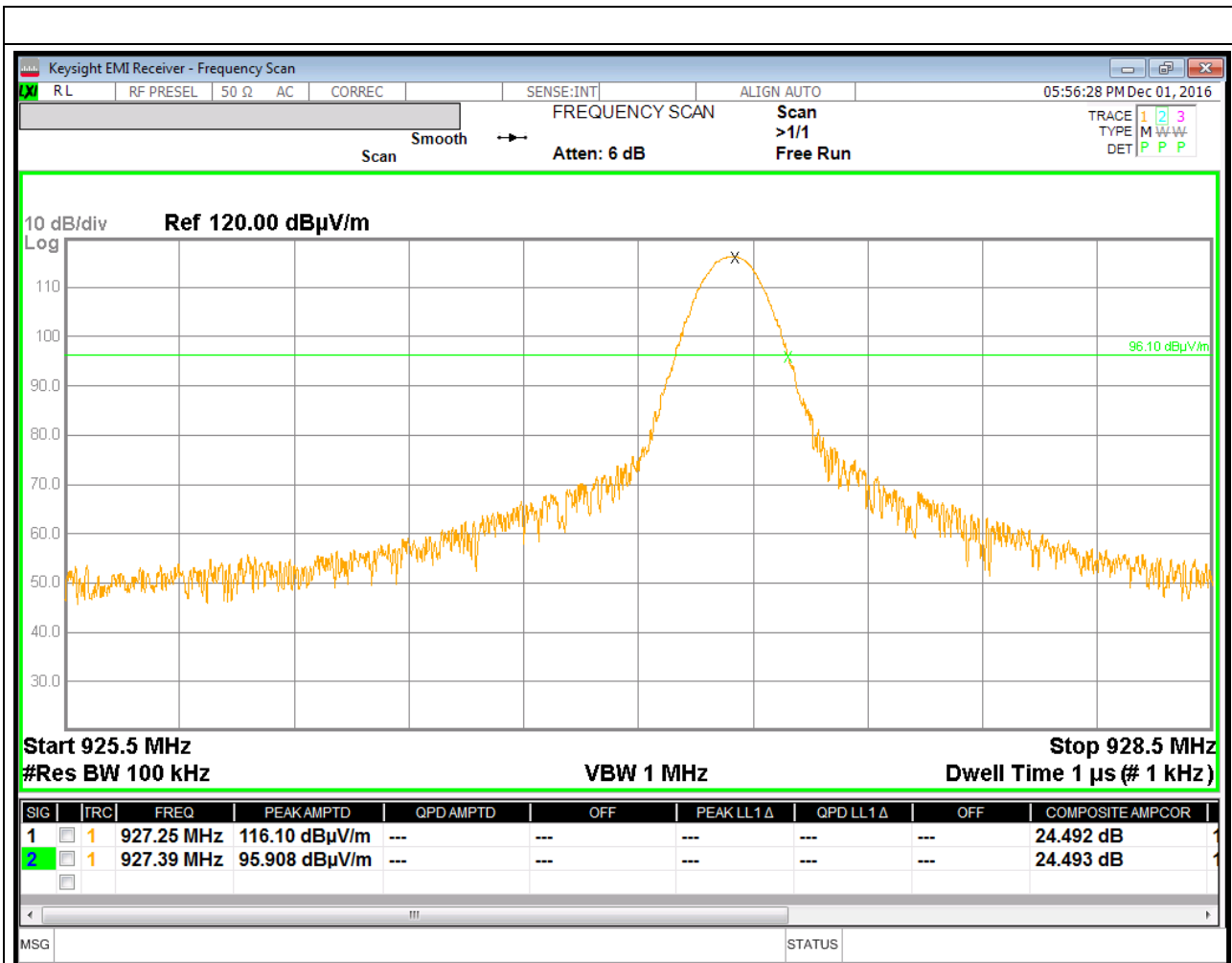


Fig. 6.27  
Pol. V  
Channel "49" (Ch High)

<u>Test Equipment</u>			
<b>EQUIPMENT</b>	<b>MANUFACTURER</b>	<b>MODEL</b>	<b>CAL. DUE</b>
MXE EMI Receiver	Agilent/Keysight	N9038A	01/2017
EMI Receiver	Agilent	E4440	01/2017
Anechoic Chamber	Comtest	CSA01	01/2017
Bilog Antenna	Schaffner	CBL6112B	01/2017
Horn Antenna	EMCO	3115	01/2017
Controller	Deisel	HD100	01/2017
Turn Table	Deisel	MA240	01/2017
Attenuator	Narda	768-10	01/2017
<u>Test procedure:</u> CT15C01			

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6.7. SPURIOUS RADIATED EMISSIONS

Nr Harmonics	AV Level (dB $\mu$ V/m)						AV Limits (dB $\mu$ V/m)	Remark
	Ch 0		Ch 24		Ch 49			
	F (MHz)	(dB $\mu$ V/m)	F (MHz)	(dB $\mu$ V/m)	F (MHz)	(dB $\mu$ V/m)		
2	1805.50	44.3	1829.50	36.7	1854.50	40.6	54.0	
3	2708.25	--	2744.25	--	2781.75	--	54.0	
4	3611.00	30.0	3659.00	30.5	3709.00	--	54.0	
5	4513.75	--	4573.75	--	4636.25	30.0	54.0	
6	5416.50	32.7	5488.50	--	5563.50	--	54.0	
7		--		--		--	54.0	
8		--		--		--	54.0	
9		--		--		--	54.0	
10		--		--		--	54.0	

Note: Levels below 20 dB of limits are indicated with (--).

Nr Harmonics	Peak Level (dB $\mu$ V/m)						AV Limits (dB $\mu$ V/m)	Remark
	Ch 0		Ch 24		Ch 49			
	F (MHz)	(dB $\mu$ V/m)	F (MHz)	(dB $\mu$ V/m)	F (MHz)	(dB $\mu$ V/m)		
2	1805.50	--	1829.50	--	1854.50	--	74.0	
3	2708.25	--	2744.25	--	2781.75	--	74.0	
4	3611.00	--	3659.00	--	3709.00	--	74.0	
5	4513.75	--	4573.75	--	4636.25	--	74.0	
6	5416.50	--	5488.50	--	5563.50	--	74.0	
7		--		--		--	74.0	
8		--		--		--	74.0	
9		--		--		--	74.0	
10		--		--		--	74.0	

Note: Levels below 20 dB of limits are indicated with (--).

<u>Test Equipment</u>			
<b>EQUIPMENT</b>	<b>MANUFACTURER</b>	<b>MODEL</b>	<b>CAL. DUE</b>
EMI Receiver	Agilent	E4440	01/2017
MXE EMI Receiver	Agilent/Keysight	N9038A	01/2017
Anechoic Chamber	Comtest	CSA01	01/2017
Bilog Antenna	Schaffner	CBL6112B	01/2017
Horn Antenna	EMCO	3115	01/2017
Controller	Deisel	HD100	01/2017
Turn Table	Deisel	MA240	01/2017
LISN	GSD	NTW06	01/2017
<u>Test procedure:</u> CT15R01			

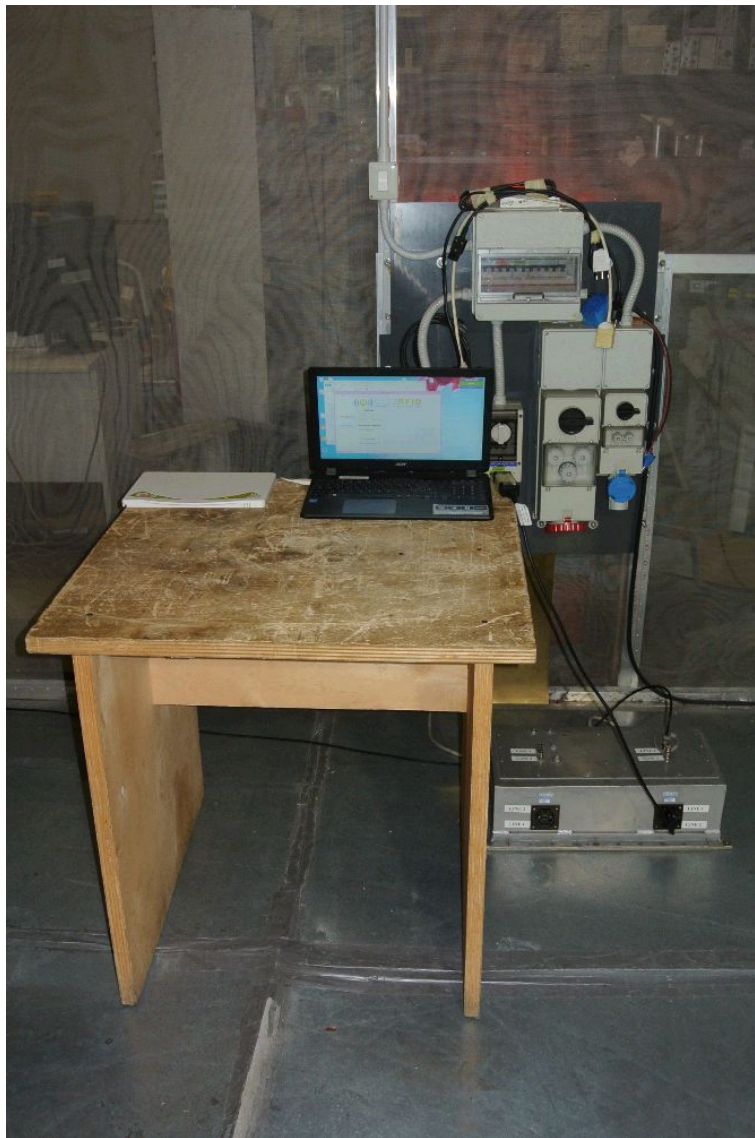
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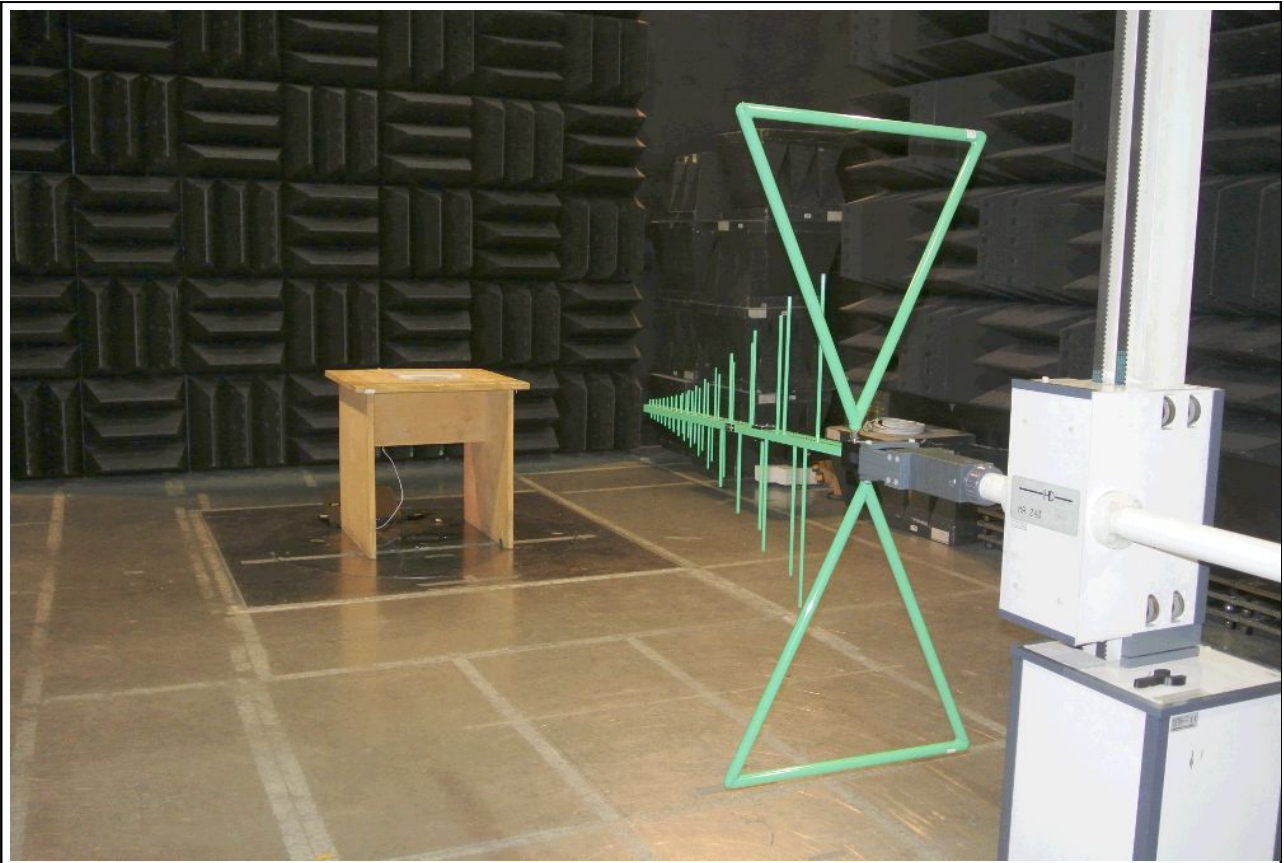


7. PHOTO



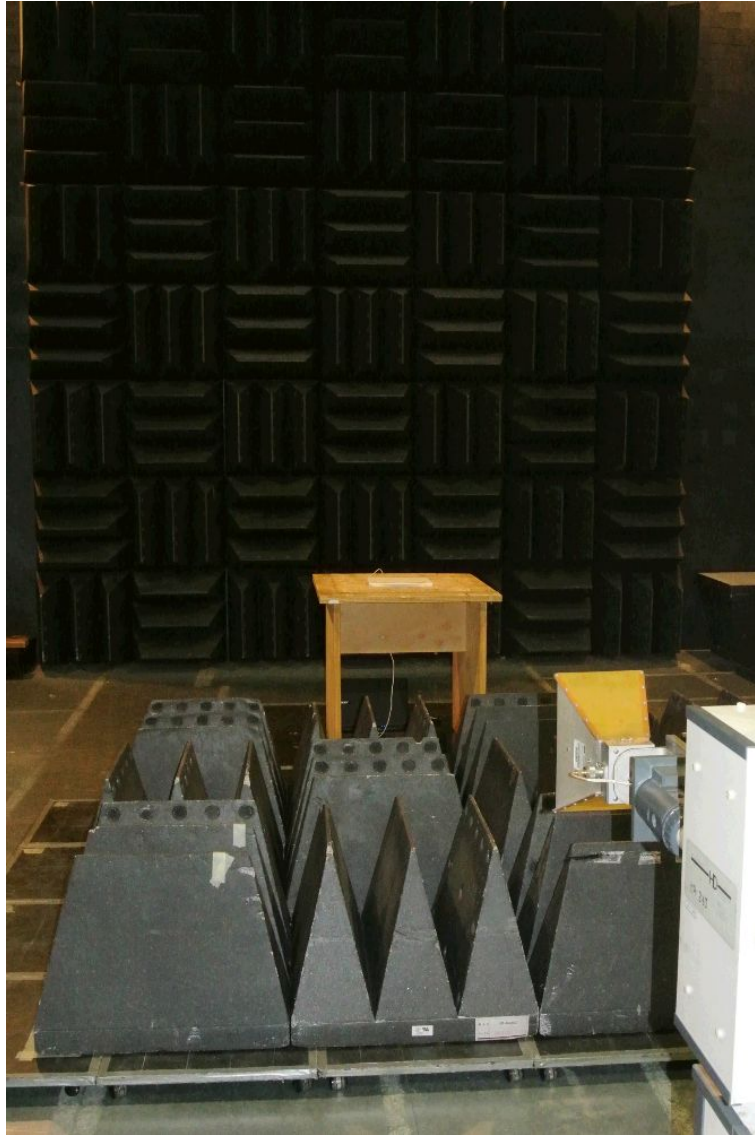
*Fig. 7.1*

*Conducted Emissions Test Set-up*



*Fig. 7.2*

*FCC part 15C Radiated Emissions Test Set-up  
Range: 30 – 1000 MHz*



*Fig. 7.3*

*FCC part 15C Radiated Emissions Test Set-up  
Range: 1 – 10 GHz*





*Fig. 7.4*

*FCC part 15C Radiated Emissions Test Set-up  
Range: 9 kHz – 30 MHz*