G.S.D. Srl PISA - Italy	***Test Report n. FCC-16601***	Rev. 03
Manufacturer	**CAEN RFID s.r.l.**	
Address	Via Vetraia, 11 55049 Viareggio (LU) Italy	
Test Family Name	**R1170IUNF**	
Testing Laboratory Name	**G.S.D. S.r.l.**	
Address	Via Marmiceto, 8 56121 Ospedaletto Pisa (PI) Italy	
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	FCC Listed. Registration Number: 424037.	
Location and Date of Issue	Pisa, 2016 July 08	

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Report Revision History

Revision details

Date	*Page No.(s)*	*Details*
2016 June 10	65	Rev. 00 Initial issue
2016 June 24	65	Rev. 01 §6.5 Datailed explanation for radiated power measurement
2016 July 01	65	Rev. 02 §6.5 Power calculation explanation
2016 July 01	65	Rev. 03 §6.5 Electric Field units changed in dBuV/m
2016 July 26	65	Rev. 03 §6.5 Detailed Calculation of erp

1. MANUFACTURER AND EUT IDENTIFICATION [1]

Manufacturer	**CAEN RFID s.r.l..**
Address	Via Vetraia, 11 55049 Viareggio (LU) Italy
Test Family Name	**R1170IUNF**
Date of reception	**2016 April 21**
Sampling	**Laboratory sample for certification**
Test Item Description	**RFID Device**
Nominal Input Voltage	**5 Vdc (USB)**
FCC ID	**UVECAENRFID023**

[1] A detailed documentation is preserved in the internal fascicle.

Fig. 1.1
Equipment Photo

2. REFERENCE STANDARDS

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

TEST	*STANDARD*
Emissions: Conducted and Radiated – Section 15.207 and 15.209	FCC Rules ad Regulations, Title 47 Part 15 – Sub part C 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
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)	FCC Rules ad Regulations, Title 47 Part 15 – Sub part C DA 00-705 (30 March 2000) – Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems 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 412172 D01 Determining ERP and EIRP v01r01 GUIDELINES FOR DETERMINING THE EFFECTIVE RADIATED POWER (ERP) AND EQUIVALENT ISOTROPICALLY RADIATED POWER (EIRP) OF AN RF TRANSMITTING SYSTEM

3. RESULT, CONDITION, MEASUREMENT UNCERTAINTY

Summary of Test Results

TEST	*RESULT*
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

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

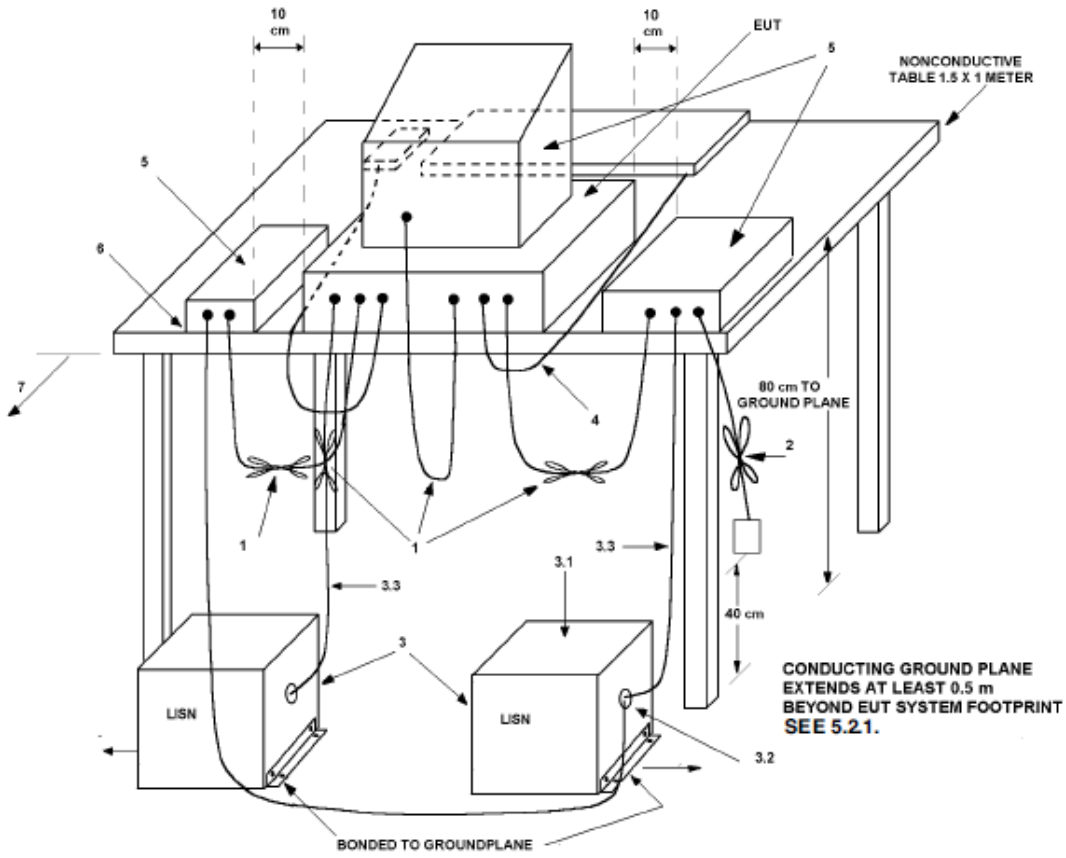
Climatic Conditions

PARAMETER	*VALUE*
Temperature	(293 ± 3) K
Relative humidity	(50 ± 5) %

Extensions

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

Modulations:
Type: PR_ASK_40 kHz



Conducted and 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)*	***Field Strenght*** ***QUASI-PEAK LIMITS*** *[dB (µV/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

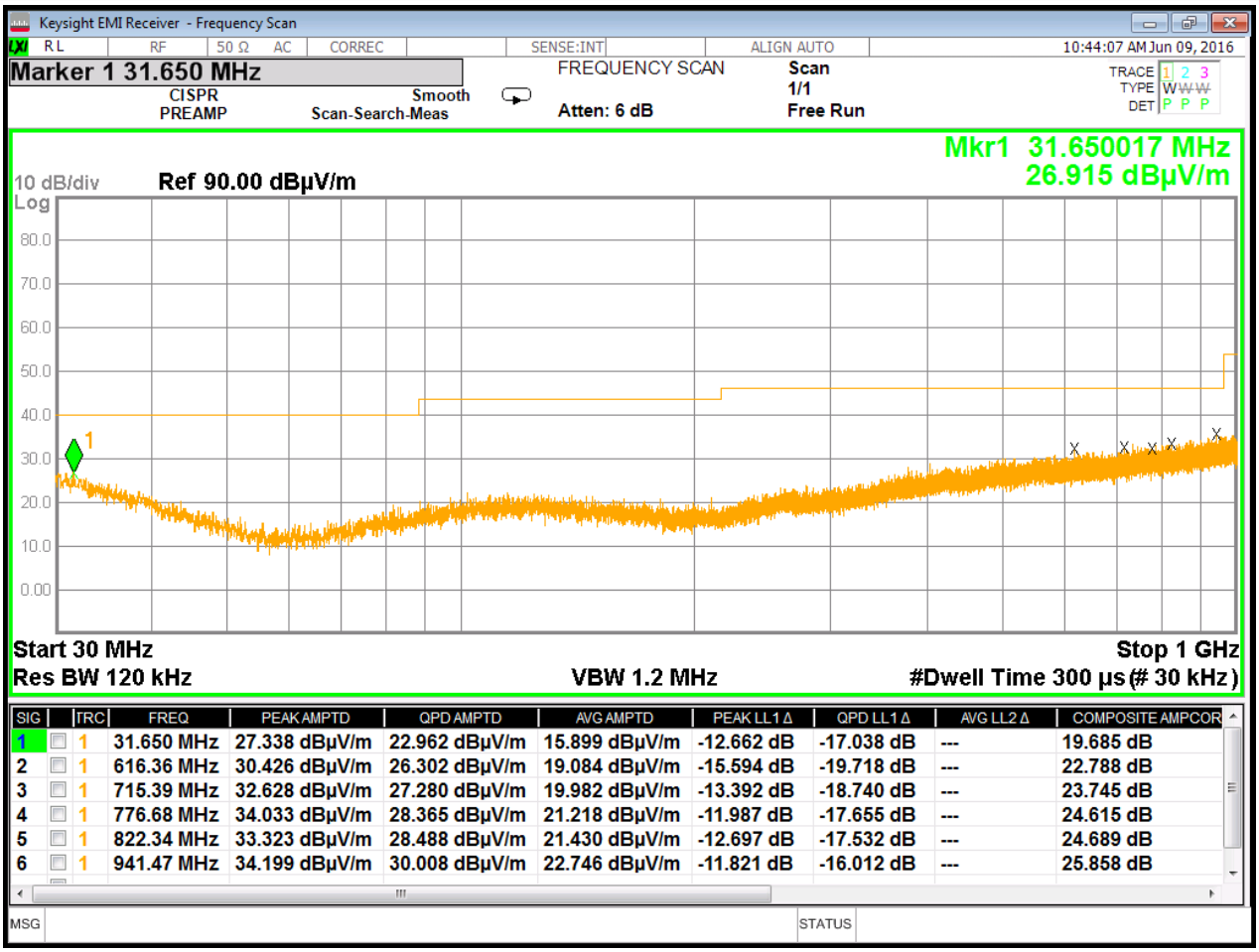
Notes

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.

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.

Job Number	FCC-16601
Test Name	Radiated Emissions
EUT Name	CAEN RFID s.r.l. - R1170IUNF



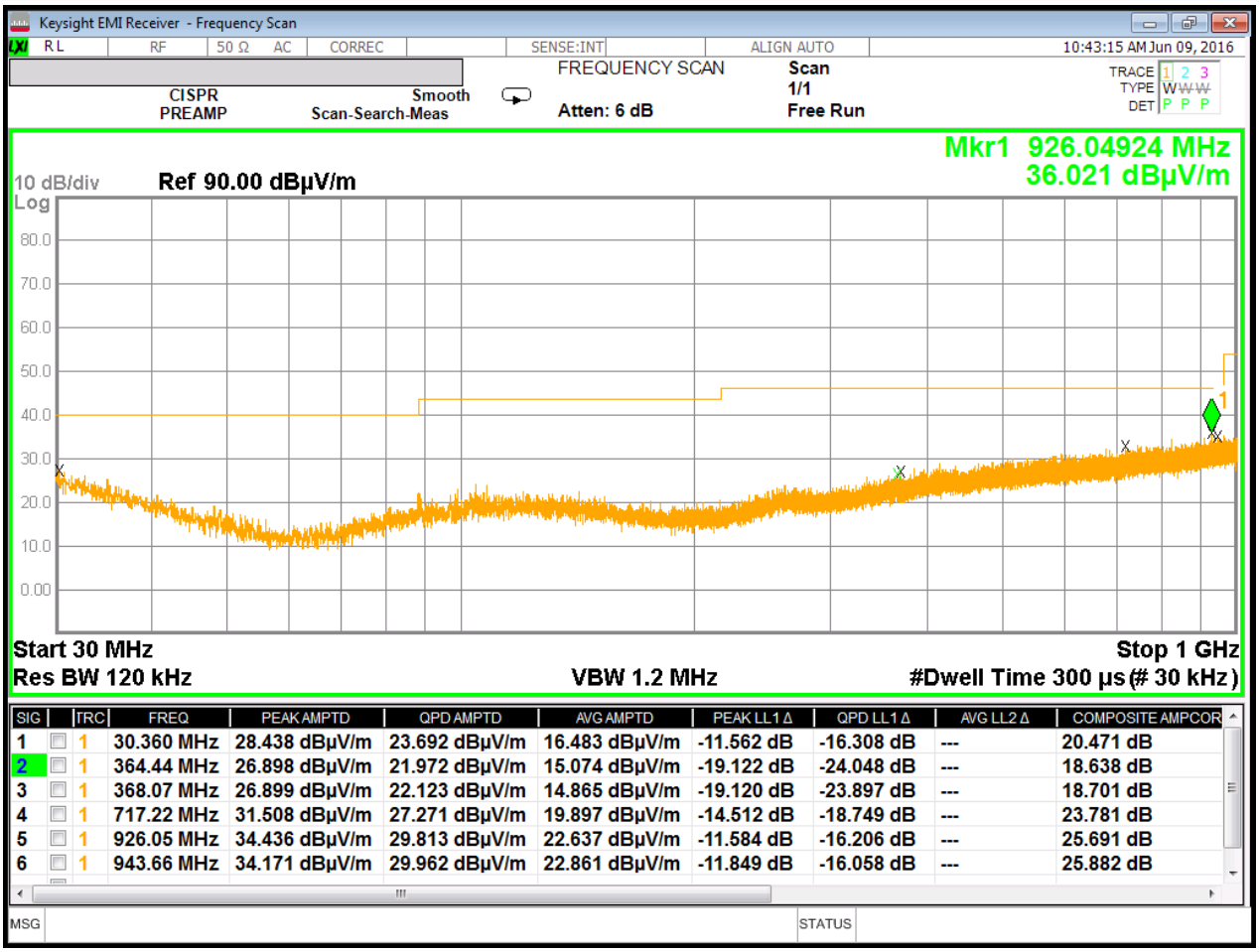
SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	AVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	AVG LL2 Δ	COMPOSITE AMPCOR
1	1	31.650 MHz	27.338 dBµV/m	22.962 dBµV/m	15.899 dBµV/m	-12.662 dB	-17.038 dB	---	19.685 dB
2	1	616.36 MHz	30.426 dBµV/m	26.302 dBµV/m	19.084 dBµV/m	-15.594 dB	-19.718 dB	---	22.788 dB
3	1	715.39 MHz	32.628 dBµV/m	27.280 dBµV/m	19.982 dBµV/m	-13.392 dB	-18.740 dB	---	23.745 dB
4	1	776.68 MHz	34.033 dBµV/m	28.365 dBµV/m	21.218 dBµV/m	-11.987 dB	-17.655 dB	---	24.615 dB
5	1	822.34 MHz	33.323 dBµV/m	28.488 dBµV/m	21.430 dBµV/m	-12.697 dB	-17.532 dB	---	24.689 dB
6	1	941.47 MHz	34.199 dBµV/m	30.008 dBµV/m	22.746 dBµV/m	-11.821 dB	-16.012 dB	---	25.858 dB

Fig. 4.1

POL V
MA: 100 cm
TT: 0°
EUT mode: Standby

Record of the measurement of radiated emissions (PK)
Maximum disturbance determined in the frequency range 30 – 1000 MHz, Pol. V.

Job Number	FCC-16601
Test Name	Radiated Emissions
EUT Name	CAEN RFID s.r.l. - R1170IUNF



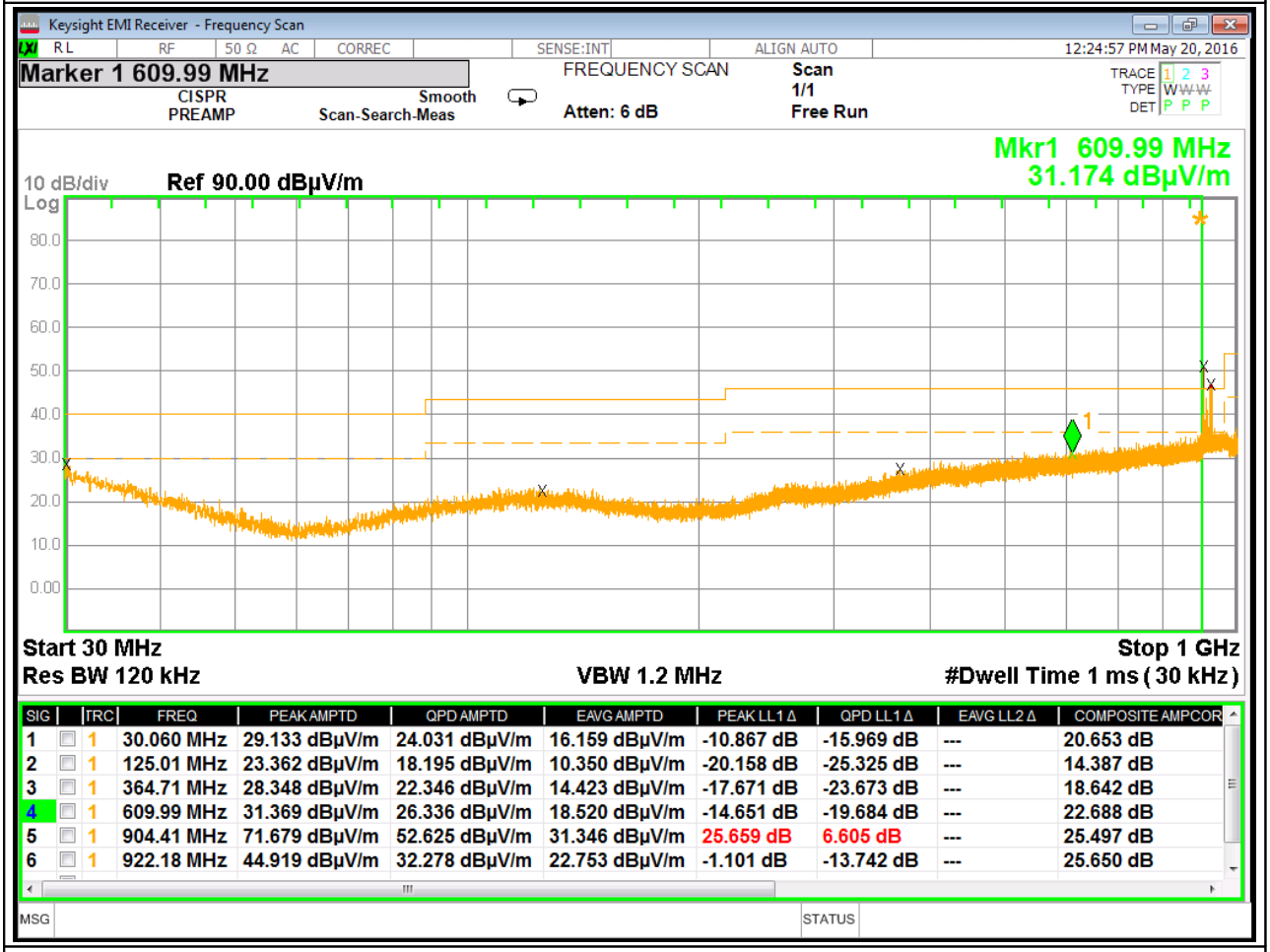
SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	AVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	AVG LL2 Δ	COMPOSITE AMPCOR
1	1	30.360 MHz	28.438 dBµV/m	23.692 dBµV/m	16.483 dBµV/m	-11.562 dB	-16.308 dB	---	20.471 dB
2	1	364.44 MHz	26.898 dBµV/m	21.972 dBµV/m	15.074 dBµV/m	-19.122 dB	-24.048 dB	---	18.638 dB
3	1	368.07 MHz	26.899 dBµV/m	22.123 dBµV/m	14.865 dBµV/m	-19.120 dB	-23.897 dB	---	18.701 dB
4	1	717.22 MHz	31.508 dBµV/m	27.271 dBµV/m	19.897 dBµV/m	-14.512 dB	-18.749 dB	---	23.781 dB
5	1	926.05 MHz	34.436 dBµV/m	29.813 dBµV/m	22.637 dBµV/m	-11.584 dB	-16.206 dB	---	25.691 dB
6	1	943.66 MHz	34.171 dBµV/m	29.962 dBµV/m	22.861 dBµV/m	-11.849 dB	-16.058 dB	---	25.882 dB

Fig. 4.2

POL H
MA: 100 cm
TT: 0°
EUT mode: Standby

Record of the measurement of radiated emissions (PK)
Maximum disturbance determined in the frequency range 30 – 1000 MHz, Pol. H.

Job Number	FCC-16601
Test Name	Radiated Emissions
EUT Name	CAEN RFID s.r.l. - R1170IUNF



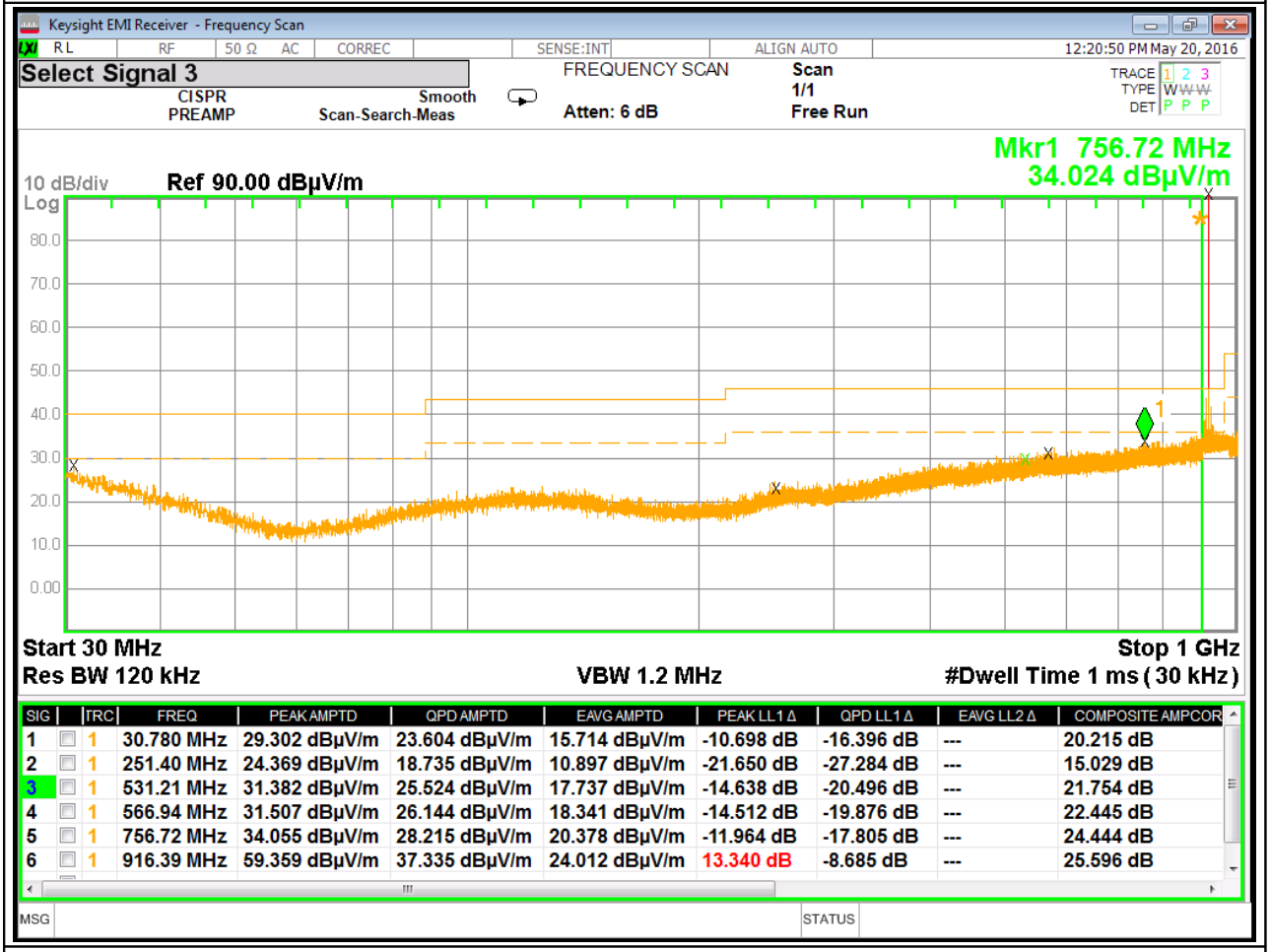
SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	EAVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	EAVG LL2 Δ	COMPOSITE AMPCOR
1	1	30.060 MHz	29.133 dBµV/m	24.031 dBµV/m	16.159 dBµV/m	-10.867 dB	-15.969 dB	---	20.653 dB
2	1	125.01 MHz	23.362 dBµV/m	18.195 dBµV/m	10.350 dBµV/m	-20.158 dB	-25.325 dB	---	14.387 dB
3	1	364.71 MHz	28.348 dBµV/m	22.346 dBµV/m	14.423 dBµV/m	-17.671 dB	-23.673 dB	---	18.642 dB
4	1	609.99 MHz	31.369 dBµV/m	26.336 dBµV/m	18.520 dBµV/m	-14.651 dB	-19.684 dB	---	22.688 dB
5	1	904.41 MHz	71.679 dBµV/m	52.625 dBµV/m	31.346 dBµV/m	25.659 dB	6.605 dB	---	25.497 dB
6	1	922.18 MHz	44.919 dBµV/m	32.278 dBµV/m	22.753 dBµV/m	-1.101 dB	-13.742 dB	---	25.650 dB

Fig. 4.3

POL V
MA: 100 cm
TT: 0°
EUT mode: Modulation

Record of the measurement of radiated emissions (PK)
Maximum disturbance determined in the frequency range 30 – 1000 MHz, Pol. V.

Job Number	FCC-16601
Test Name	Radiated Emissions
EUT Name	CAEN RFID s.r.l. - R1170IUNF



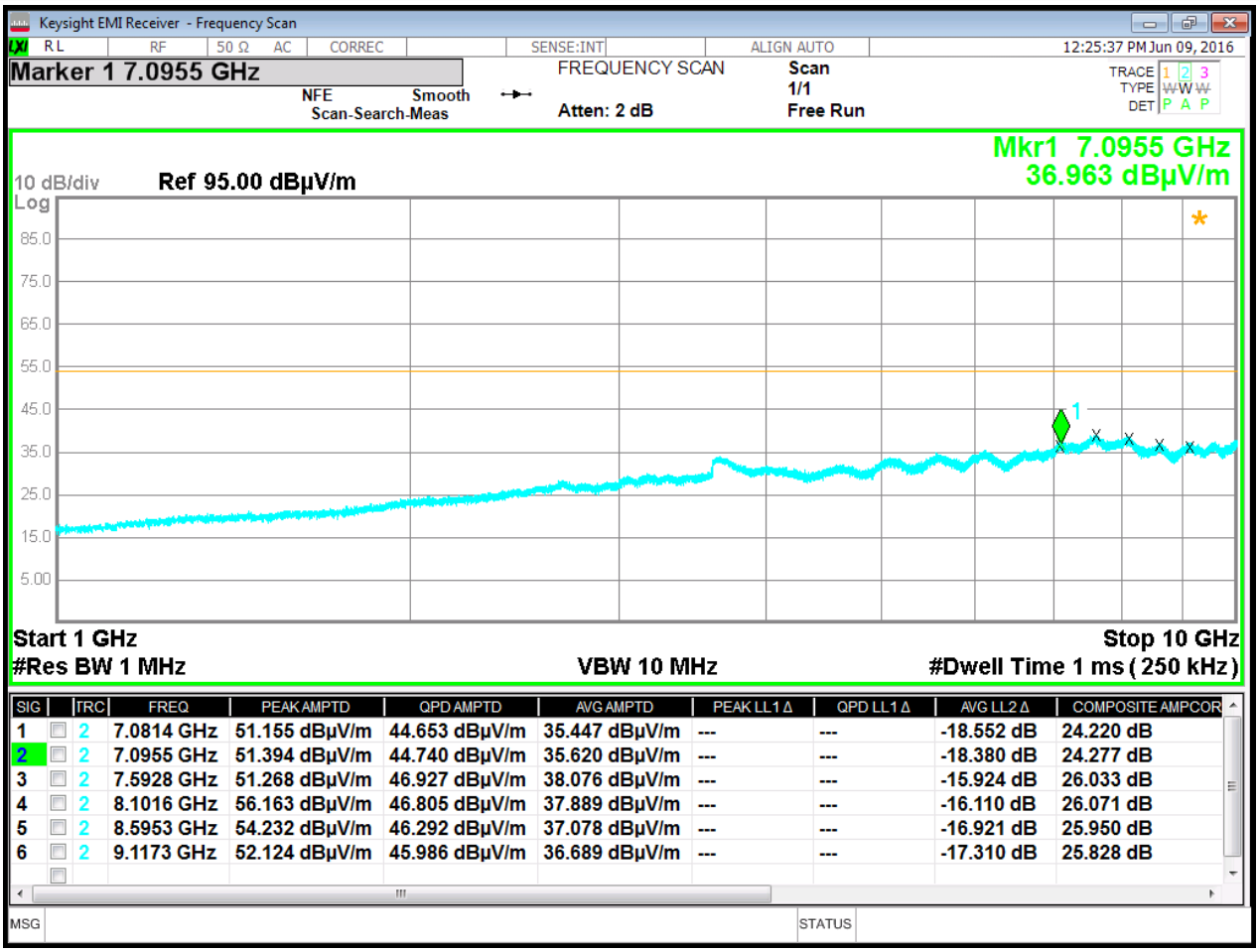
SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	EAVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	EAVG LL2 Δ	COMPOSITE AMPCOR
1	1	30.780 MHz	29.302 dBµV/m	23.604 dBµV/m	15.714 dBµV/m	-10.698 dB	-16.396 dB	---	20.215 dB
2	1	251.40 MHz	24.369 dBµV/m	18.735 dBµV/m	10.897 dBµV/m	-21.650 dB	-27.284 dB	---	15.029 dB
3	1	531.21 MHz	31.382 dBµV/m	25.524 dBµV/m	17.737 dBµV/m	-14.638 dB	-20.496 dB	---	21.754 dB
4	1	566.94 MHz	31.507 dBµV/m	26.144 dBµV/m	18.341 dBµV/m	-14.512 dB	-19.876 dB	---	22.445 dB
5	1	756.72 MHz	34.055 dBµV/m	28.215 dBµV/m	20.378 dBµV/m	-11.964 dB	-17.805 dB	---	24.444 dB
6	1	916.39 MHz	59.359 dBµV/m	37.335 dBµV/m	24.012 dBµV/m	13.340 dB	-8.685 dB	---	25.596 dB

Fig. 4.4

POL H
MA: 100 cm
TT: 0°
EUT mode: Modulation

Record of the measurement of radiated emissions (PK)
Maximum disturbance determined in the frequency range 30 – 1000 MHz, Pol. H.

Job Number	FCC-16601
Test Name	Radiated Emissions
EUT Name	CAEN RFID s.r.l. - R1170IUNF



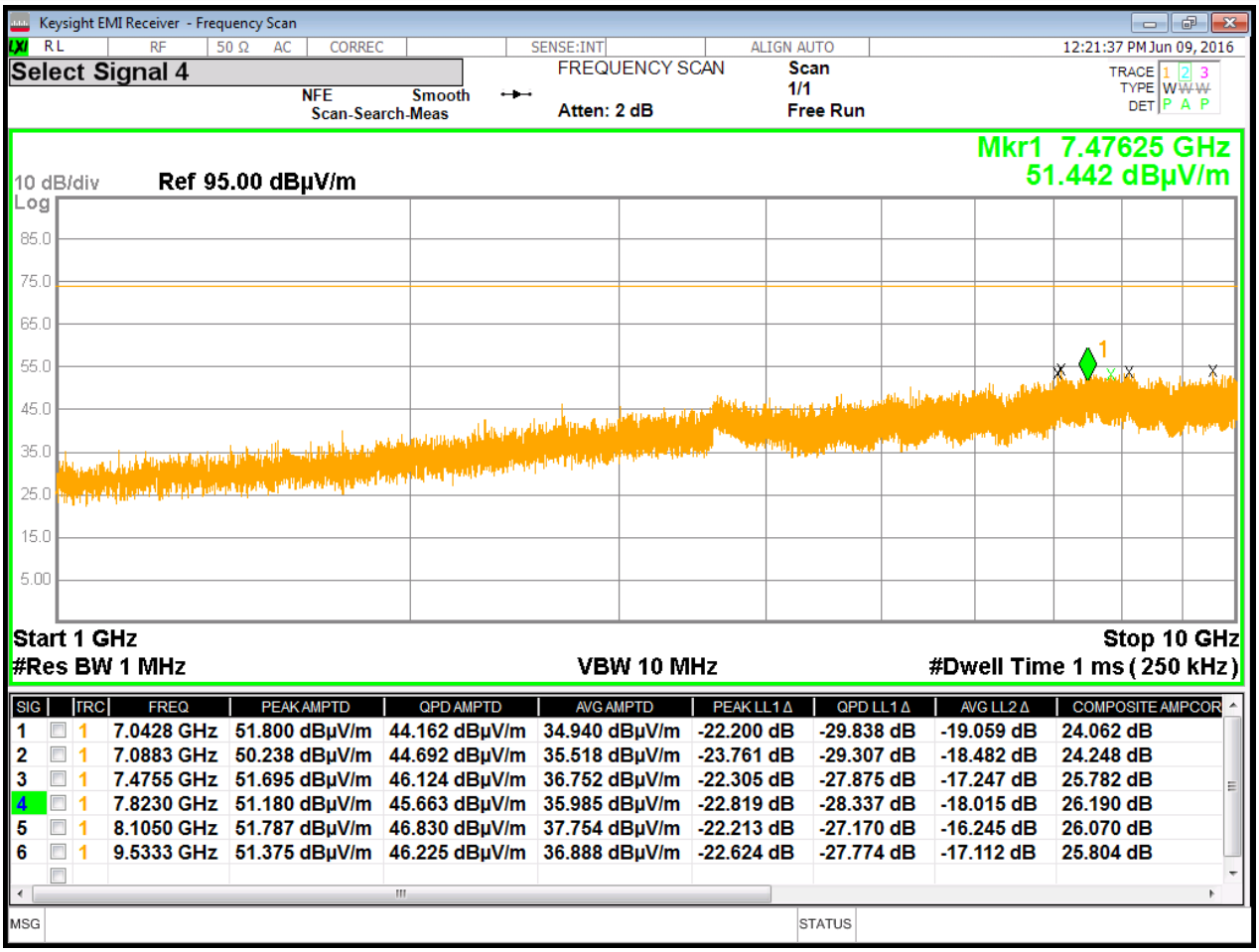
SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	AVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	AVG LL2 Δ	COMPOSITE AMPCOR
1	2	7.0814 GHz	51.155 dBµV/m	44.653 dBµV/m	35.447 dBµV/m	---	---	-18.552 dB	24.220 dB
2	2	7.0955 GHz	51.394 dBµV/m	44.740 dBµV/m	35.620 dBµV/m	---	---	-18.380 dB	24.277 dB
3	2	7.5928 GHz	51.268 dBµV/m	46.927 dBµV/m	38.076 dBµV/m	---	---	-15.924 dB	26.033 dB
4	2	8.1016 GHz	56.163 dBµV/m	46.805 dBµV/m	37.889 dBµV/m	---	---	-16.110 dB	26.071 dB
5	2	8.5953 GHz	54.232 dBµV/m	46.292 dBµV/m	37.078 dBµV/m	---	---	-16.921 dB	25.950 dB
6	2	9.1173 GHz	52.124 dBµV/m	45.986 dBµV/m	36.689 dBµV/m	---	---	-17.310 dB	25.828 dB

Fig. 4.5

POL V
MA: 100 cm
TT: 0°
EUT mode: Modulation

Record of the measurement of radiated emissions (AVG detector)
Maximum disturbance determined in the frequency range 1 – 10 GHz, Pol. V.

Job Number	FCC-16601
Test Name	Radiated Emissions
EUT Name	CAEN RFID s.r.l. - R1170IUNF



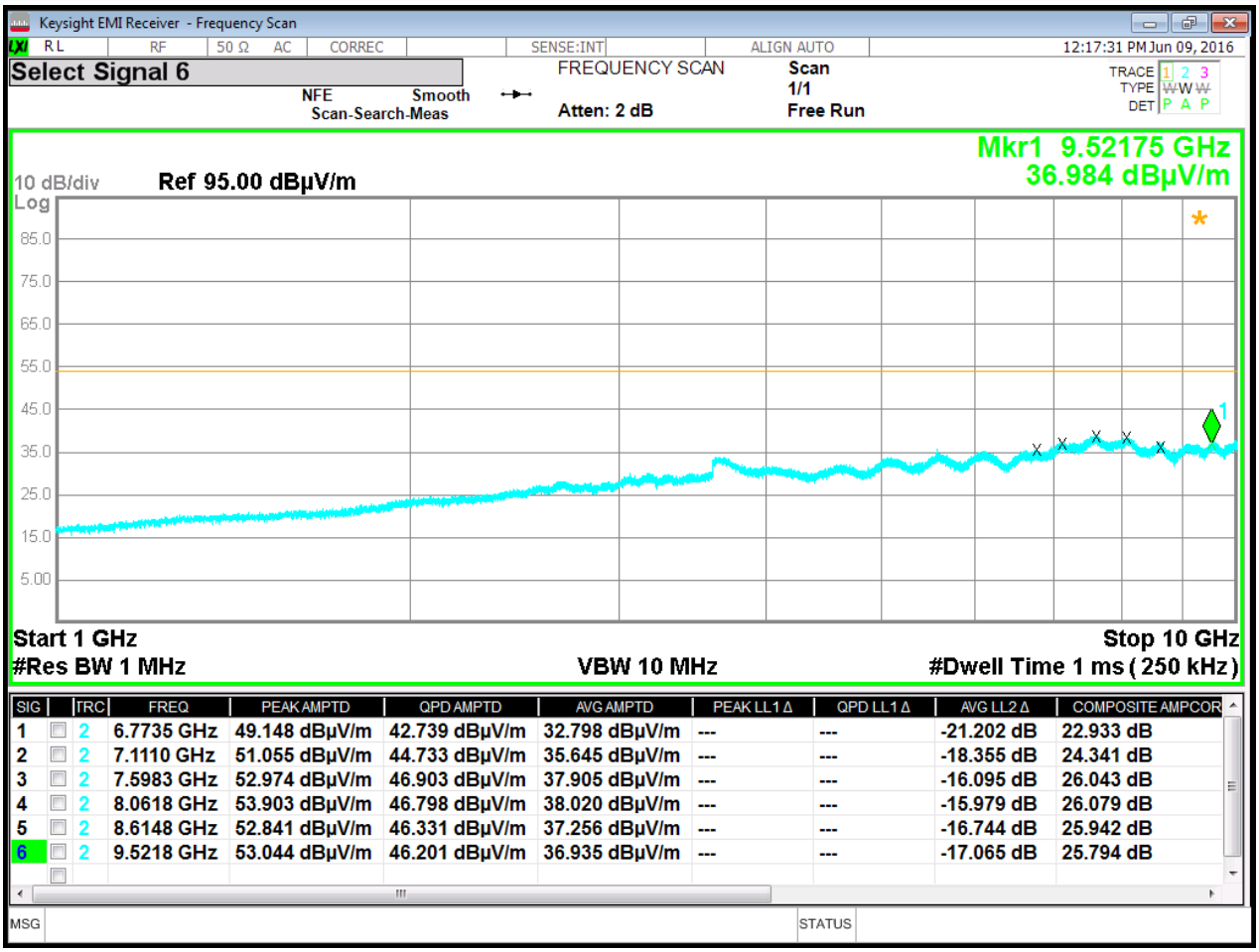
SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	AVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	AVG LL2 Δ	COMPOSITE AMPCOR
1	1	7.0428 GHz	51.800 dBµV/m	44.162 dBµV/m	34.940 dBµV/m	-22.200 dB	-29.838 dB	-19.059 dB	24.062 dB
2	1	7.0883 GHz	50.238 dBµV/m	44.692 dBµV/m	35.518 dBµV/m	-23.761 dB	-29.307 dB	-18.482 dB	24.248 dB
3	1	7.4755 GHz	51.695 dBµV/m	46.124 dBµV/m	36.752 dBµV/m	-22.305 dB	-27.875 dB	-17.247 dB	25.782 dB
4	1	7.8230 GHz	51.180 dBµV/m	45.663 dBµV/m	35.985 dBµV/m	-22.819 dB	-28.337 dB	-18.015 dB	26.190 dB
5	1	8.1050 GHz	51.787 dBµV/m	46.830 dBµV/m	37.754 dBµV/m	-22.213 dB	-27.170 dB	-16.245 dB	26.070 dB
6	1	9.5333 GHz	51.375 dBµV/m	46.225 dBµV/m	36.888 dBµV/m	-22.624 dB	-27.774 dB	-17.112 dB	25.804 dB

Fig. 4.6

POL V
MA: 100 cm
TT: 0°
EUT mode: Modulation

Record of the measurement of radiated emissions (Peak detector)
Maximum disturbance determined in the frequency range 1 – 10 GHz, Pol. V.

Job Number	FCC-16601
Test Name	Radiated Emissions
EUT Name	CAEN RFID s.r.l. - R1170IUNF



SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	AVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	AVG LL2 Δ	COMPOSITE AMPCOR
1	2	6.7735 GHz	49.148 dBµV/m	42.739 dBµV/m	32.798 dBµV/m	---	---	-21.202 dB	22.933 dB
2	2	7.1110 GHz	51.055 dBµV/m	44.733 dBµV/m	35.645 dBµV/m	---	---	-18.355 dB	24.341 dB
3	2	7.5983 GHz	52.974 dBµV/m	46.903 dBµV/m	37.905 dBµV/m	---	---	-16.095 dB	26.043 dB
4	2	8.0618 GHz	53.903 dBµV/m	46.798 dBµV/m	38.020 dBµV/m	---	---	-15.979 dB	26.079 dB
5	2	8.6148 GHz	52.841 dBµV/m	46.331 dBµV/m	37.256 dBµV/m	---	---	-16.744 dB	25.942 dB
6	2	9.5218 GHz	53.044 dBµV/m	46.201 dBµV/m	36.935 dBµV/m	---	---	-17.065 dB	25.794 dB

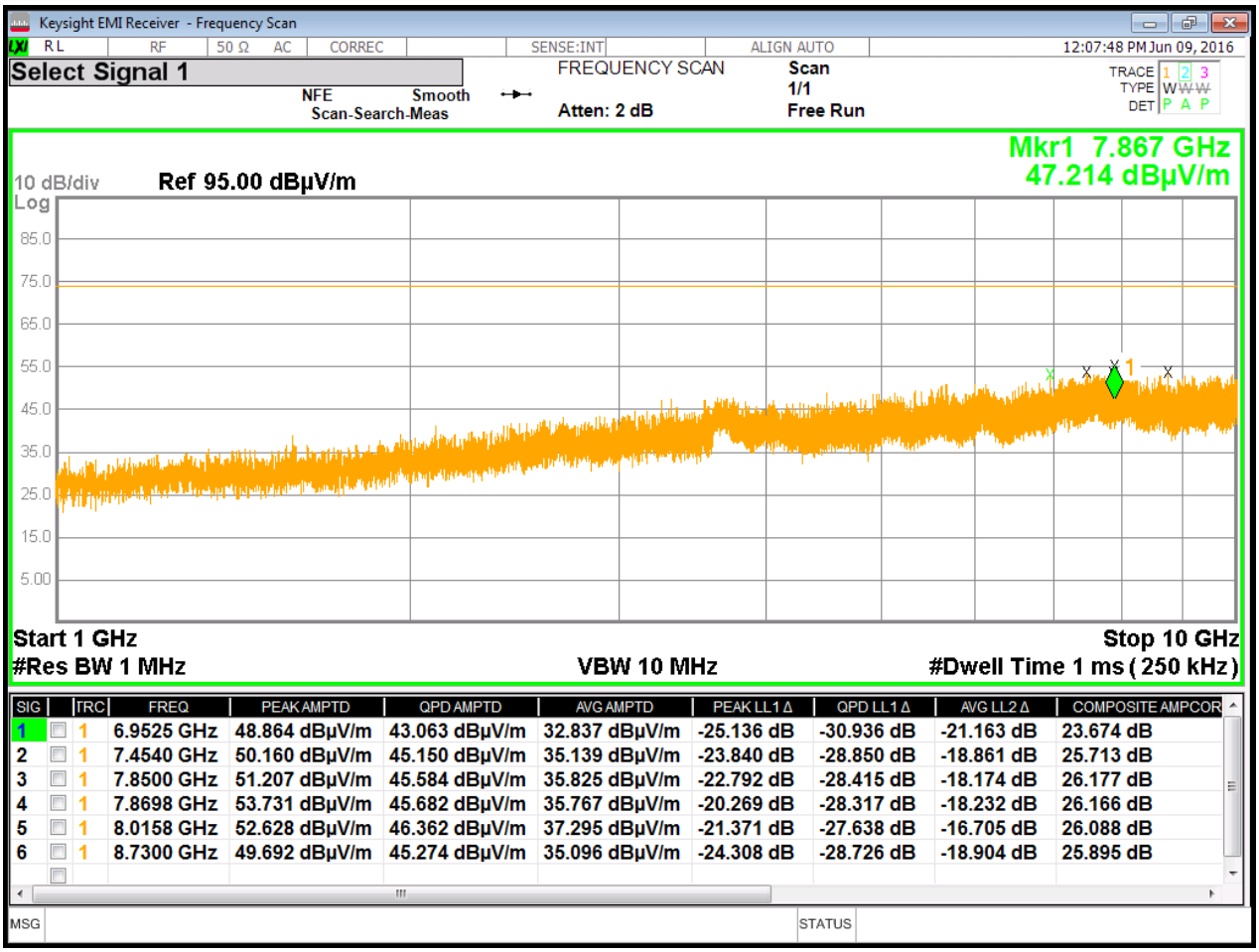
MSG STATUS

Fig. 4.7

POL H
MA: 100 cm
TT: 0°
EUT mode: Modulation

Record of the measurement of radiated emissions (AVG detector)
Maximum disturbance determined in the frequency range 1 – 10 GHz, Pol. H.

Job Number	FCC-16601
Test Name	Radiated Emissions
EUT Name	CAEN RFID s.r.l. - R1170IUNF



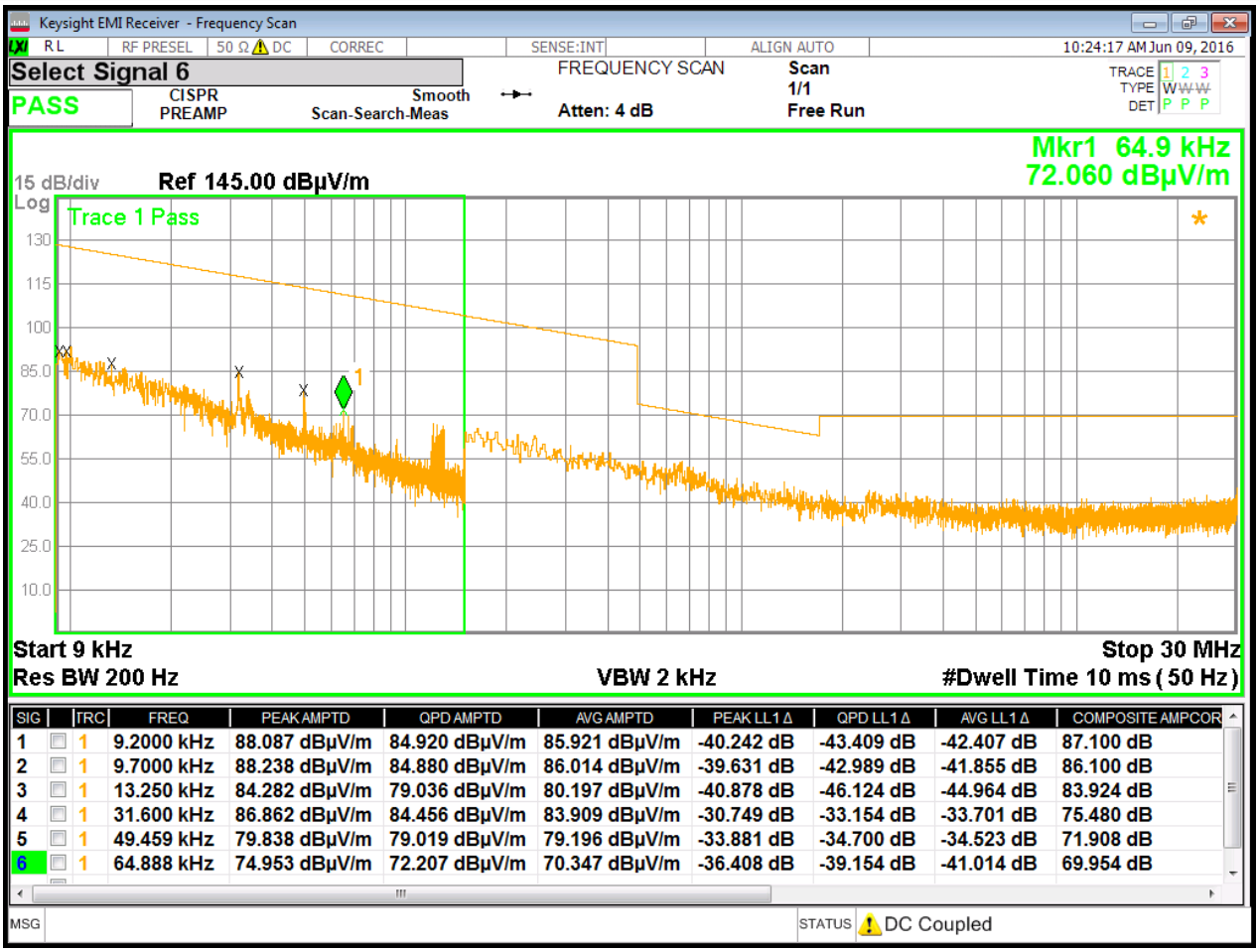
SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	AVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	AVG LL2 Δ	COMPOSITE AMPCOR
1	1	6.9525 GHz	48.864 dBµV/m	43.063 dBµV/m	32.837 dBµV/m	-25.136 dB	-30.936 dB	-21.163 dB	23.674 dB
2	1	7.4540 GHz	50.160 dBµV/m	45.150 dBµV/m	35.139 dBµV/m	-23.840 dB	-28.850 dB	-18.861 dB	25.713 dB
3	1	7.8500 GHz	51.207 dBµV/m	45.584 dBµV/m	35.825 dBµV/m	-22.792 dB	-28.415 dB	-18.174 dB	26.177 dB
4	1	7.8698 GHz	53.731 dBµV/m	45.682 dBµV/m	35.767 dBµV/m	-20.269 dB	-28.317 dB	-18.232 dB	26.166 dB
5	1	8.0158 GHz	52.628 dBµV/m	46.362 dBµV/m	37.295 dBµV/m	-21.371 dB	-27.638 dB	-16.705 dB	26.088 dB
6	1	8.7300 GHz	49.692 dBµV/m	45.274 dBµV/m	35.096 dBµV/m	-24.308 dB	-28.726 dB	-18.904 dB	25.895 dB

Fig. 4.8

POL H
MA: 100 cm
TT: 0°
EUT mode: Modulation

Record of the measurement of radiated emissions (Peak detector)
Maximum disturbance determined in the frequency range 1 – 10 GHz, Pol. H.

Job Number	FCC-16601
Test Name	Radiated Emissions
EUT Name	CAEN RFID s.r.l. - R1170IUNF



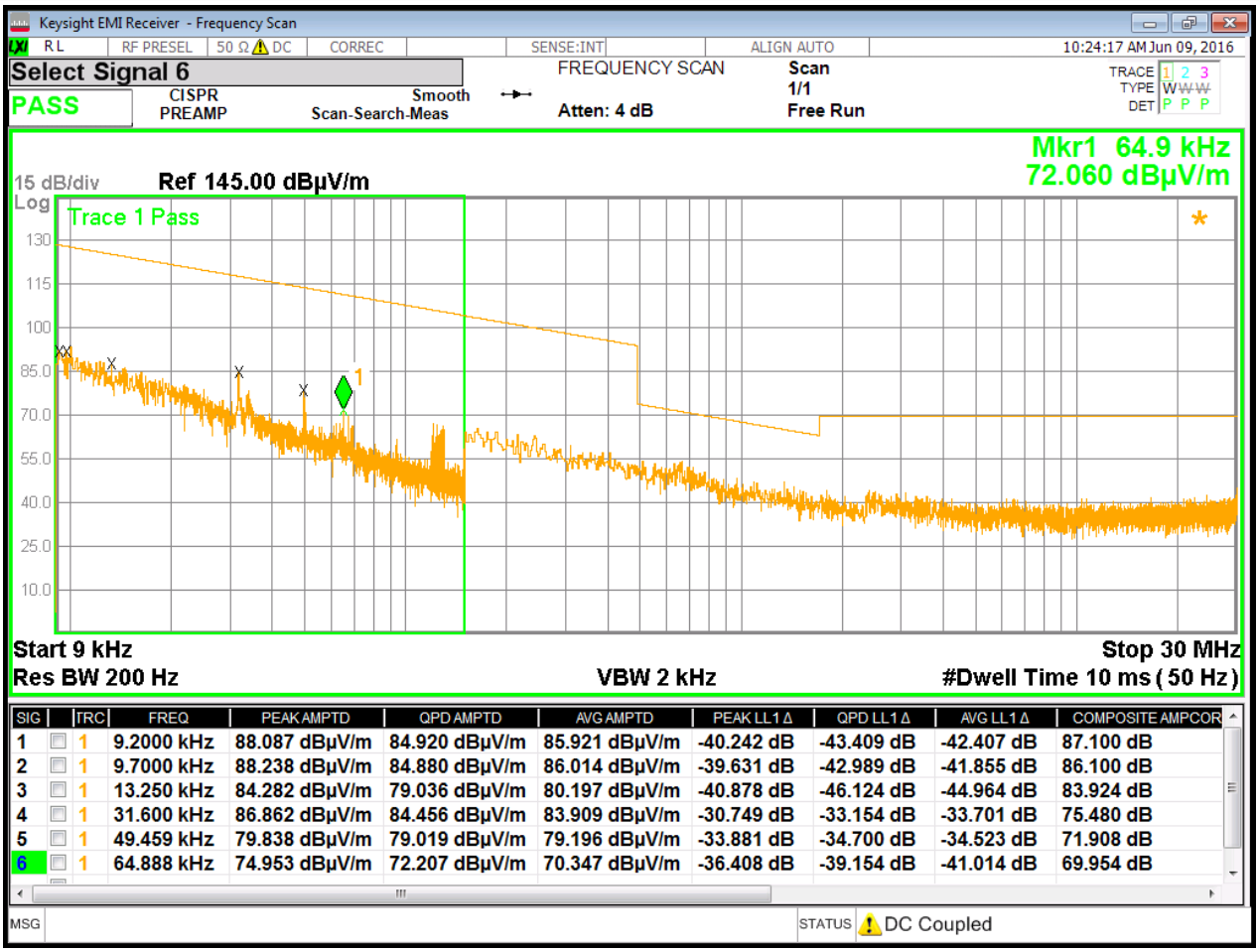
SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	AVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	AVG LL1 Δ	COMPOSITE AMPCOR
1	1	9.2000 kHz	88.087 dBµV/m	84.920 dBµV/m	85.921 dBµV/m	-40.242 dB	-43.409 dB	-42.407 dB	87.100 dB
2	1	9.7000 kHz	88.238 dBµV/m	84.880 dBµV/m	86.014 dBµV/m	-39.631 dB	-42.989 dB	-41.855 dB	86.100 dB
3	1	13.250 kHz	84.282 dBµV/m	79.036 dBµV/m	80.197 dBµV/m	-40.878 dB	-46.124 dB	-44.964 dB	83.924 dB
4	1	31.600 kHz	86.862 dBµV/m	84.456 dBµV/m	83.909 dBµV/m	-30.749 dB	-33.154 dB	-33.701 dB	75.480 dB
5	1	49.459 kHz	79.838 dBµV/m	79.019 dBµV/m	79.196 dBµV/m	-33.881 dB	-34.700 dB	-34.523 dB	71.908 dB
6	1	64.888 kHz	74.953 dBµV/m	72.207 dBµV/m	70.347 dBµV/m	-36.408 dB	-39.154 dB	-41.014 dB	69.954 dB

Fig. 4.9

POL Parallel
MA: 150 cm
TT: 0°
EUT mode: Modulation

Record of the measurement of radiated emissions (PK)
Maximum disturbance determined in the frequency range 0.009 – 30 MHz, Pol. Parallel.

Job Number	FCC-16601
Test Name	Radiated Emissions
EUT Name	CAEN RFID s.r.l. - R1170IUNF



SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	AVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	AVG LL1 Δ	COMPOSITE AMPCOR
1	1	9.2000 kHz	88.087 dBµV/m	84.920 dBµV/m	85.921 dBµV/m	-40.242 dB	-43.409 dB	-42.407 dB	87.100 dB
2	1	9.7000 kHz	88.238 dBµV/m	84.880 dBµV/m	86.014 dBµV/m	-39.631 dB	-42.989 dB	-41.855 dB	86.100 dB
3	1	13.250 kHz	84.282 dBµV/m	79.036 dBµV/m	80.197 dBµV/m	-40.878 dB	-46.124 dB	-44.964 dB	83.924 dB
4	1	31.600 kHz	86.862 dBµV/m	84.456 dBµV/m	83.909 dBµV/m	-30.749 dB	-33.154 dB	-33.701 dB	75.480 dB
5	1	49.459 kHz	79.838 dBµV/m	79.019 dBµV/m	79.196 dBµV/m	-33.881 dB	-34.700 dB	-34.523 dB	71.908 dB
6	1	64.888 kHz	74.953 dBµV/m	72.207 dBµV/m	70.347 dBµV/m	-36.408 dB	-39.154 dB	-41.014 dB	69.954 dB

Fig. 4.10

POL Orthogonal
MA: 150 cm
TT: 0°
EUT mode: Modulation

Record of the measurement of radiated emissions (PK)
Maximum disturbance determined in the frequency range 0.009 – 30 MHz, Pol. Orthogonal.

5. POWER LINES CONDUCTED EMISSIONS

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

FCC 15.207

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

(*) *Limit decreasing linearly with logarithm of frequency*

Test Equipment

EQUIPMENT	MANUFACTURER	MODEL	CAL. DUE
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.

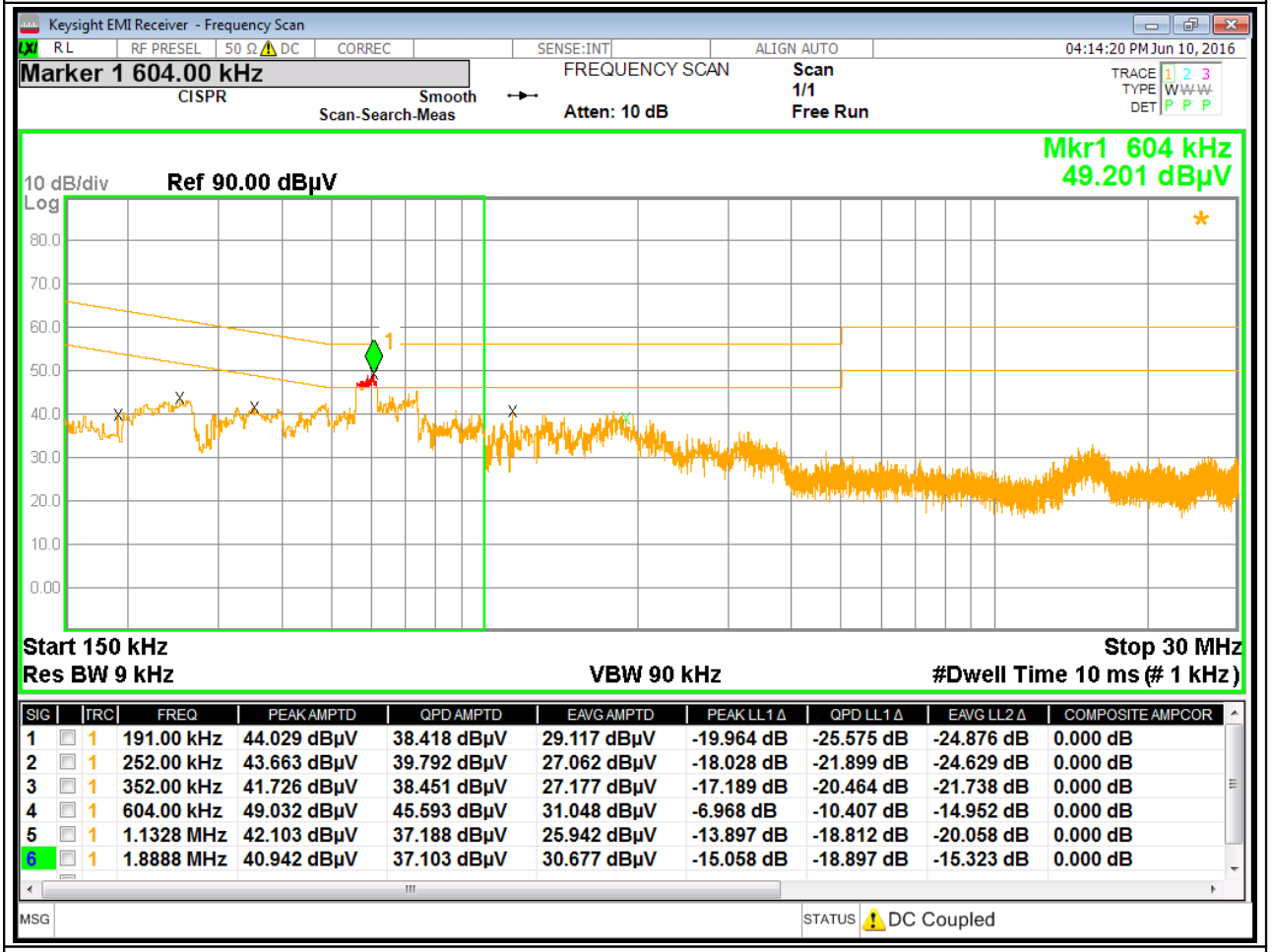
EUT modes of operations were tested in order to achieve the maximum level of emission.

Results

Equipment complied with the test specification limits.

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

Job Number	FCC-16601
Test Name	Power line Conducted Emissions FCC 15.207
EUT Name	R1170IUNF



SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	EAVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	EAVG LL2 Δ	COMPOSITE AMPCOR
1	1	191.00 kHz	44.029 dBµV	38.418 dBµV	29.117 dBµV	-19.964 dB	-25.575 dB	-24.876 dB	0.000 dB
2	1	252.00 kHz	43.663 dBµV	39.792 dBµV	27.062 dBµV	-18.028 dB	-21.899 dB	-24.629 dB	0.000 dB
3	1	352.00 kHz	41.726 dBµV	38.451 dBµV	27.177 dBµV	-17.189 dB	-20.464 dB	-21.738 dB	0.000 dB
4	1	604.00 kHz	49.032 dBµV	45.593 dBµV	31.048 dBµV	-6.968 dB	-10.407 dB	-14.952 dB	0.000 dB
5	1	1.1328 MHz	42.103 dBµV	37.188 dBµV	25.942 dBµV	-13.897 dB	-18.812 dB	-20.058 dB	0.000 dB
6	1	1.8888 MHz	40.942 dBµV	37.103 dBµV	30.677 dBµV	-15.058 dB	-18.897 dB	-15.323 dB	0.000 dB

Fig. 5.1

Phase 1 of auxiliary apparatus (worst case)
EUT mode: disconnected
Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

Job Number	FCC-16601
Test Name	Power line Conducted Emissions FCC 15.207
EUT Name	R1170IUNF

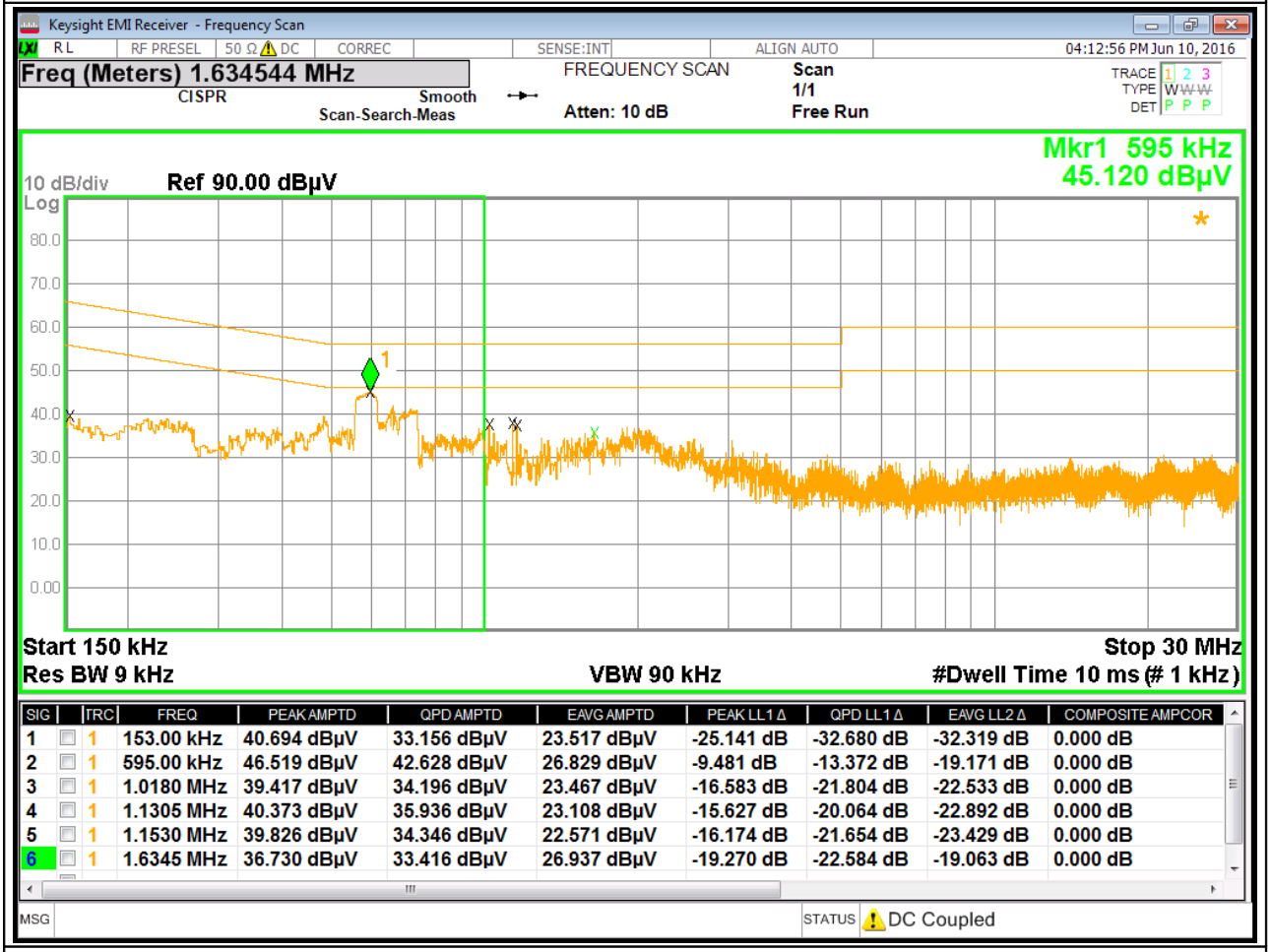
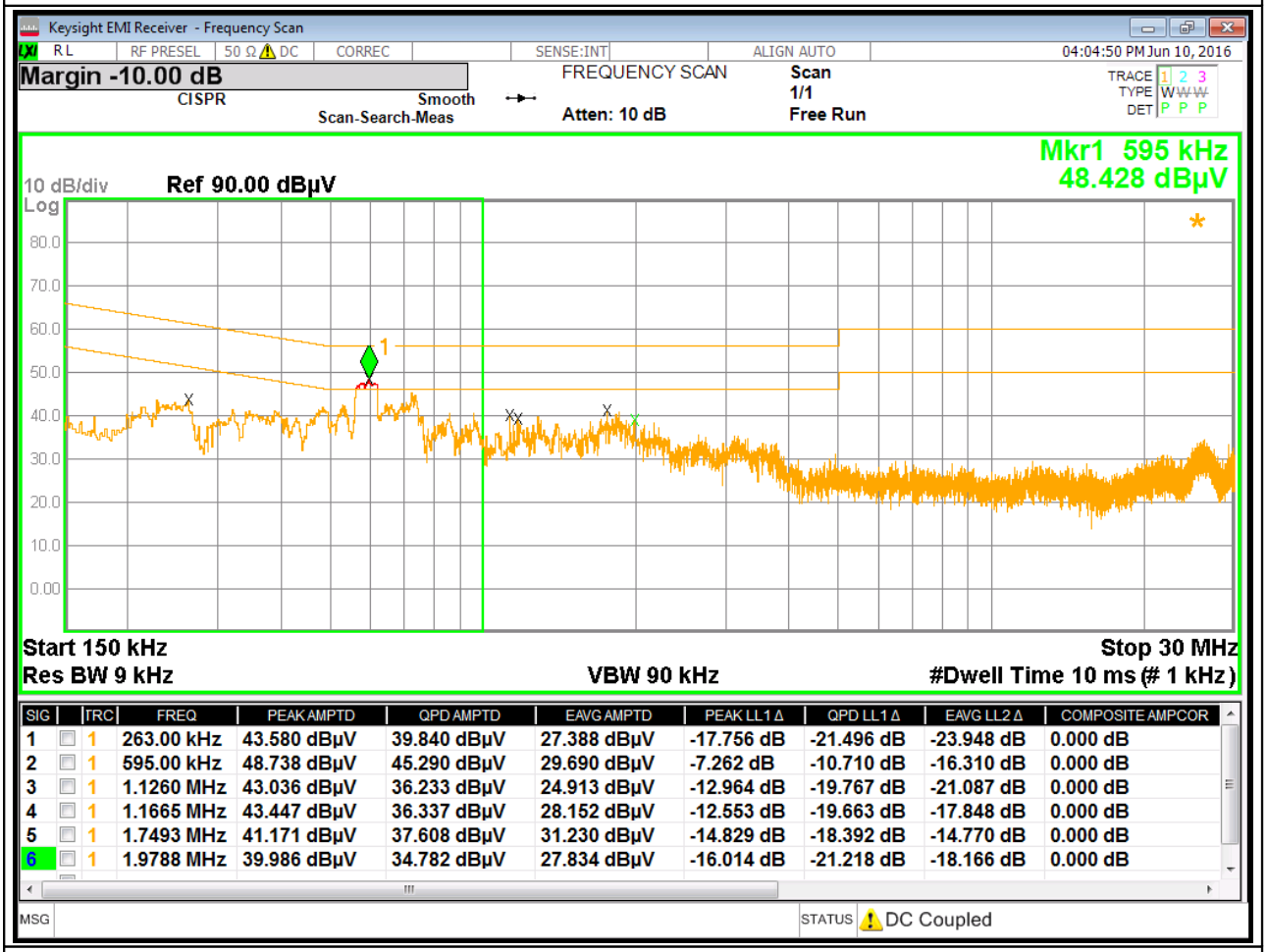


Fig. 5.2

Phase 2 of auxiliary apparatus (worst case)
EUT mode: disconnected
Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

Job Number	FCC-16601
Test Name	Power line Conducted Emissions FCC 15.207
EUT Name	R1170IUNF



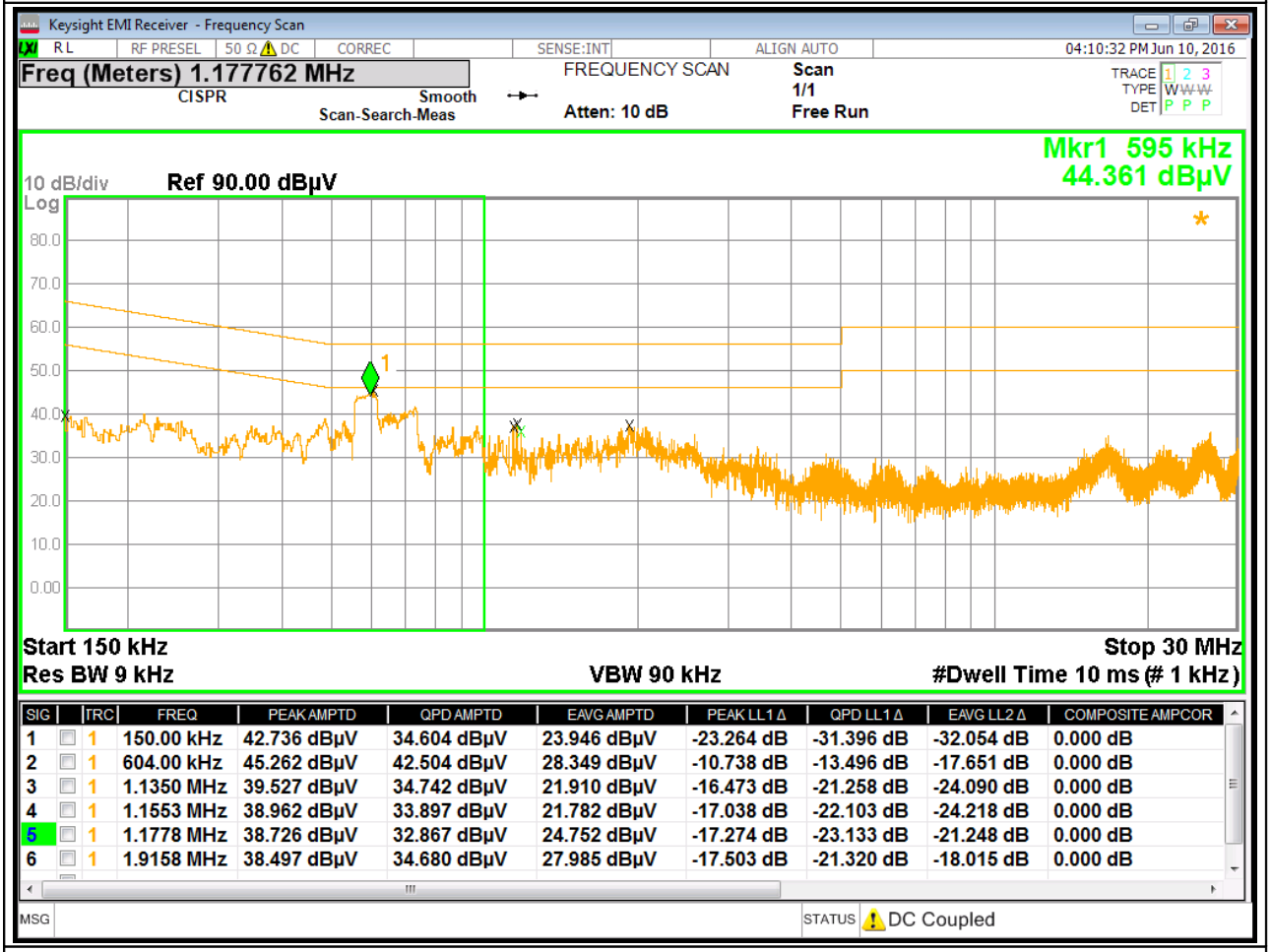
SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	EAVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	EAVG LL2 Δ	COMPOSITE AMPCOR
1	1	263.00 kHz	43.580 dBµV	39.840 dBµV	27.388 dBµV	-17.756 dB	-21.496 dB	-23.948 dB	0.000 dB
2	1	595.00 kHz	48.738 dBµV	45.290 dBµV	29.690 dBµV	-7.262 dB	-10.710 dB	-16.310 dB	0.000 dB
3	1	1.1260 MHz	43.036 dBµV	36.233 dBµV	24.913 dBµV	-12.964 dB	-19.767 dB	-21.087 dB	0.000 dB
4	1	1.1665 MHz	43.447 dBµV	36.337 dBµV	28.152 dBµV	-12.553 dB	-19.663 dB	-17.848 dB	0.000 dB
5	1	1.7493 MHz	41.171 dBµV	37.608 dBµV	31.230 dBµV	-14.829 dB	-18.392 dB	-14.770 dB	0.000 dB
6	1	1.9788 MHz	39.986 dBµV	34.782 dBµV	27.834 dBµV	-16.014 dB	-21.218 dB	-18.166 dB	0.000 dB

Fig. 5.3

Phase 1 of auxiliary apparatus (worst case)
EUT mode: Modulation
Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

Job Number	FCC-16601
Test Name	Power line Conducted Emissions FCC 15.207
EUT Name	R1170IUNF



SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	EAVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	EAVG LL2 Δ	COMPOSITE AMPCOR
1	1	150.00 kHz	42.736 dBµV	34.604 dBµV	23.946 dBµV	-23.264 dB	-31.396 dB	-32.054 dB	0.000 dB
2	1	604.00 kHz	45.262 dBµV	42.504 dBµV	28.349 dBµV	-10.738 dB	-13.496 dB	-17.651 dB	0.000 dB
3	1	1.1350 MHz	39.527 dBµV	34.742 dBµV	21.910 dBµV	-16.473 dB	-21.258 dB	-24.090 dB	0.000 dB
4	1	1.1553 MHz	38.962 dBµV	33.897 dBµV	21.782 dBµV	-17.038 dB	-22.103 dB	-24.218 dB	0.000 dB
5	1	1.1778 MHz	38.726 dBµV	32.867 dBµV	24.752 dBµV	-17.274 dB	-23.133 dB	-21.248 dB	0.000 dB
6	1	1.9158 MHz	38.497 dBµV	34.680 dBµV	27.985 dBµV	-17.503 dB	-21.320 dB	-18.015 dB	0.000 dB

Fig. 5.4

Phase 2 of auxiliary apparatus (worst case)
EUT mode: Modulation
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

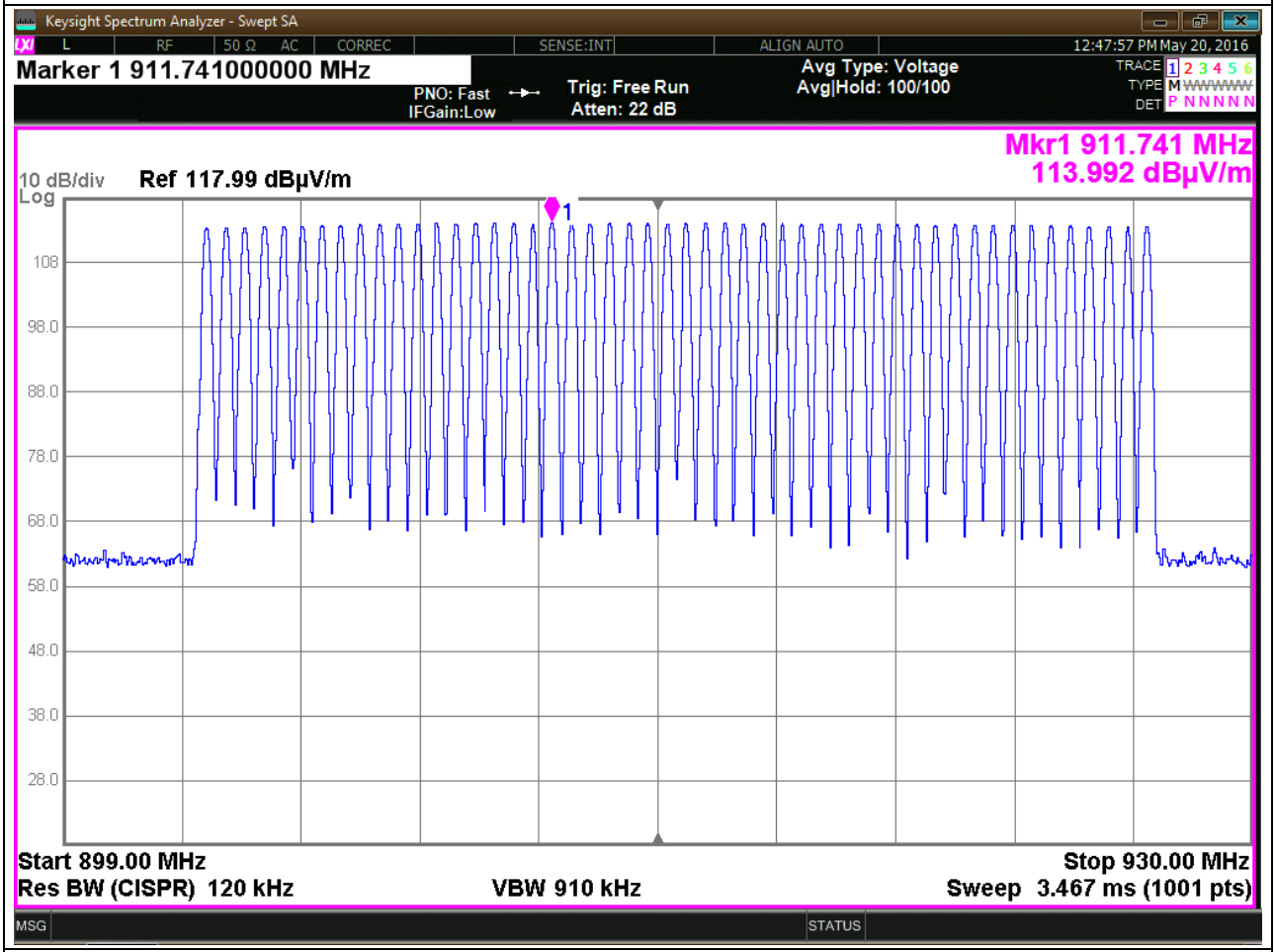


Fig. 6.1

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.

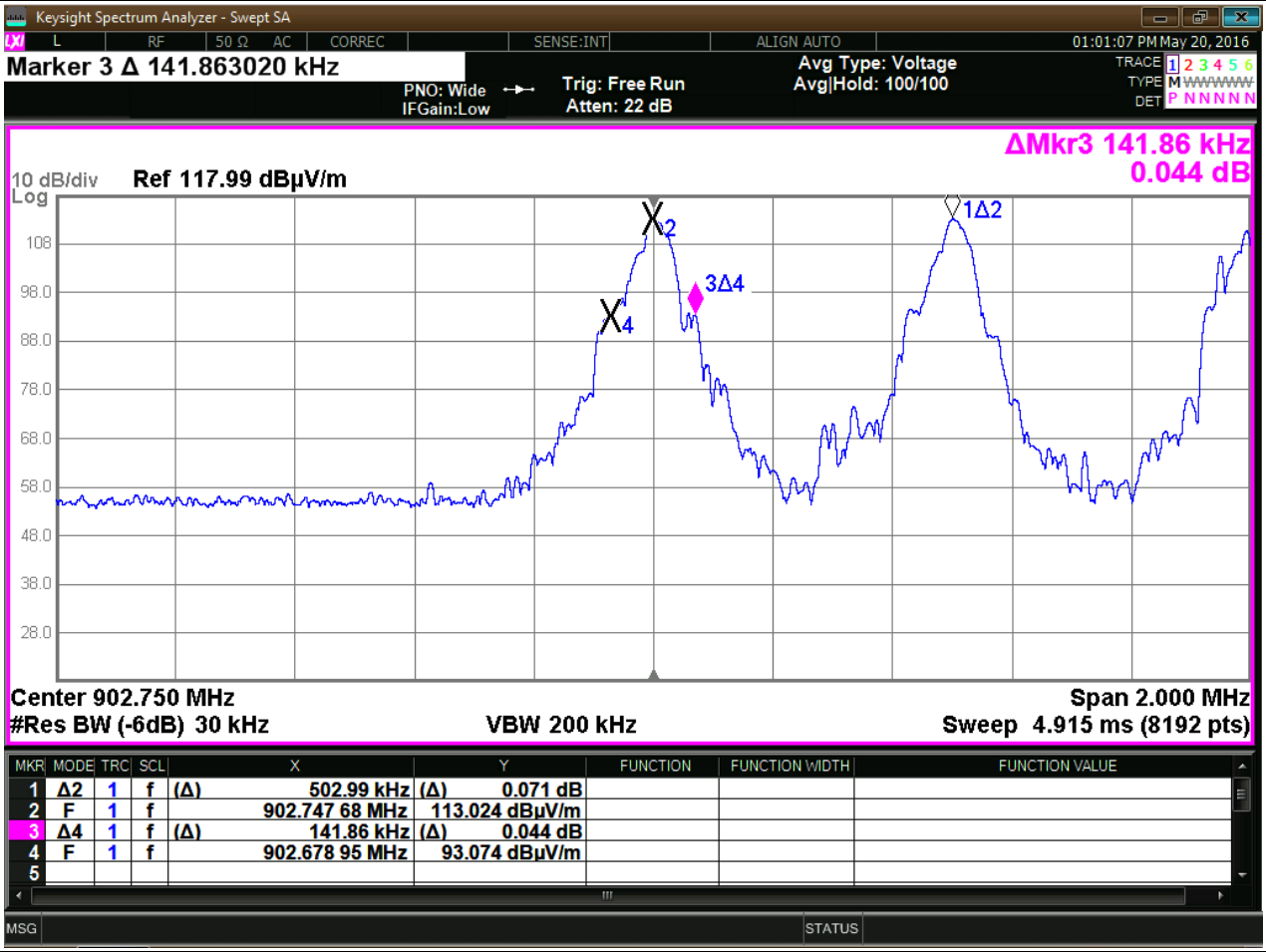


Fig. 6.2
Modulation ; Channels: 0 to 1; Maxhold

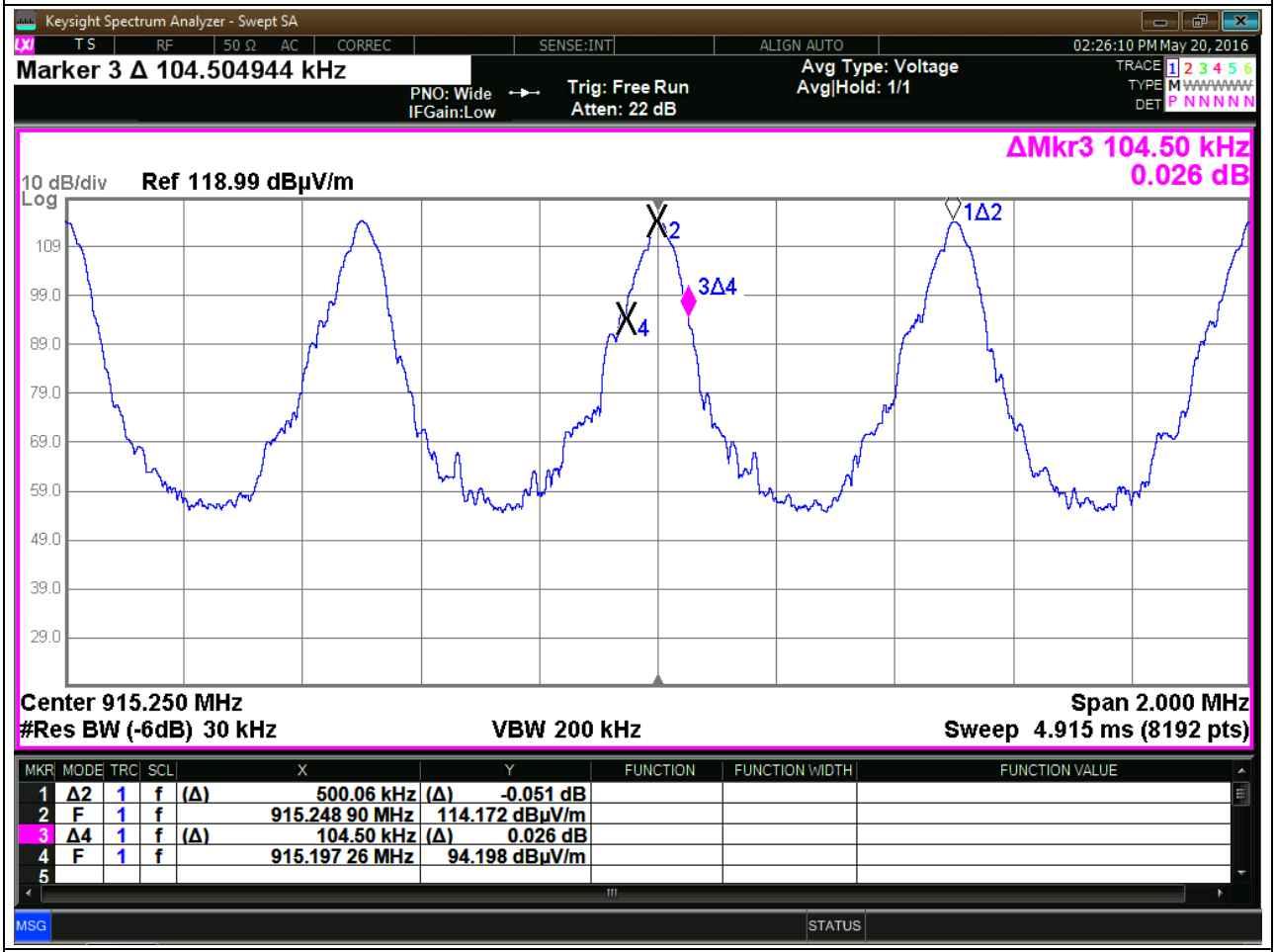


Fig. 6.3
Modulation; Channels: 25 to 26; Maxhold

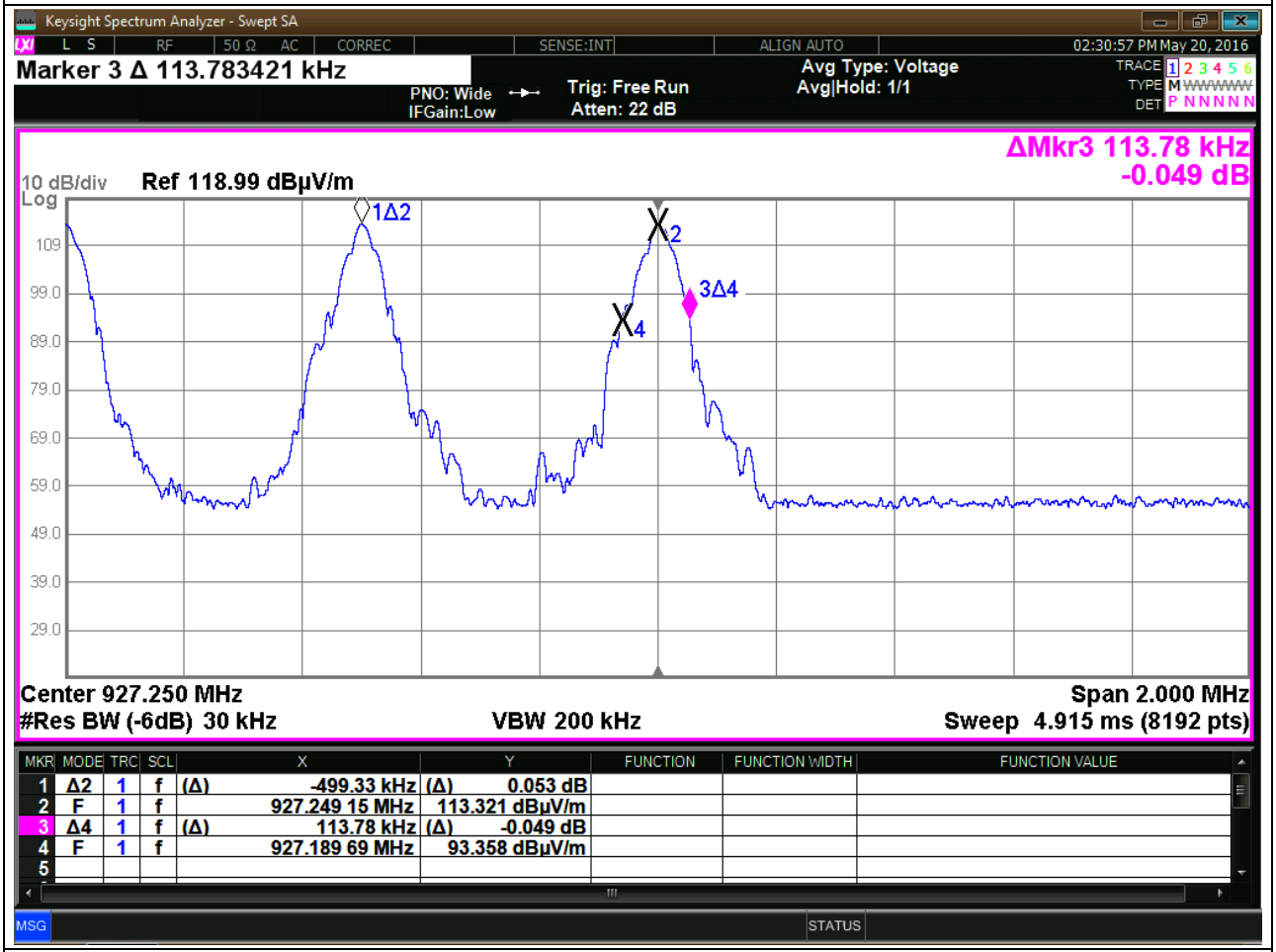


Fig. 6.4
Modulation; Channels: 49 to 48; Maxhold.

6.3. TIME OF OCCUPANCY

Measurements

Channel	Dwell Time (ms)	Nr. of Transmission for channel (in 40 s) [average]	Pol.	Time of Occupancy in 20 s (ms) [average]
0	33.0	**4** [4.29]	--	**66.0** [70.8]
25	33.1	**4** [4.27]	--	**66.2** [70.7]
49	33.1	**4** [4.26]	--	**66.2** [70.4]

The following figures show the acquired graphics.

Time of transmission

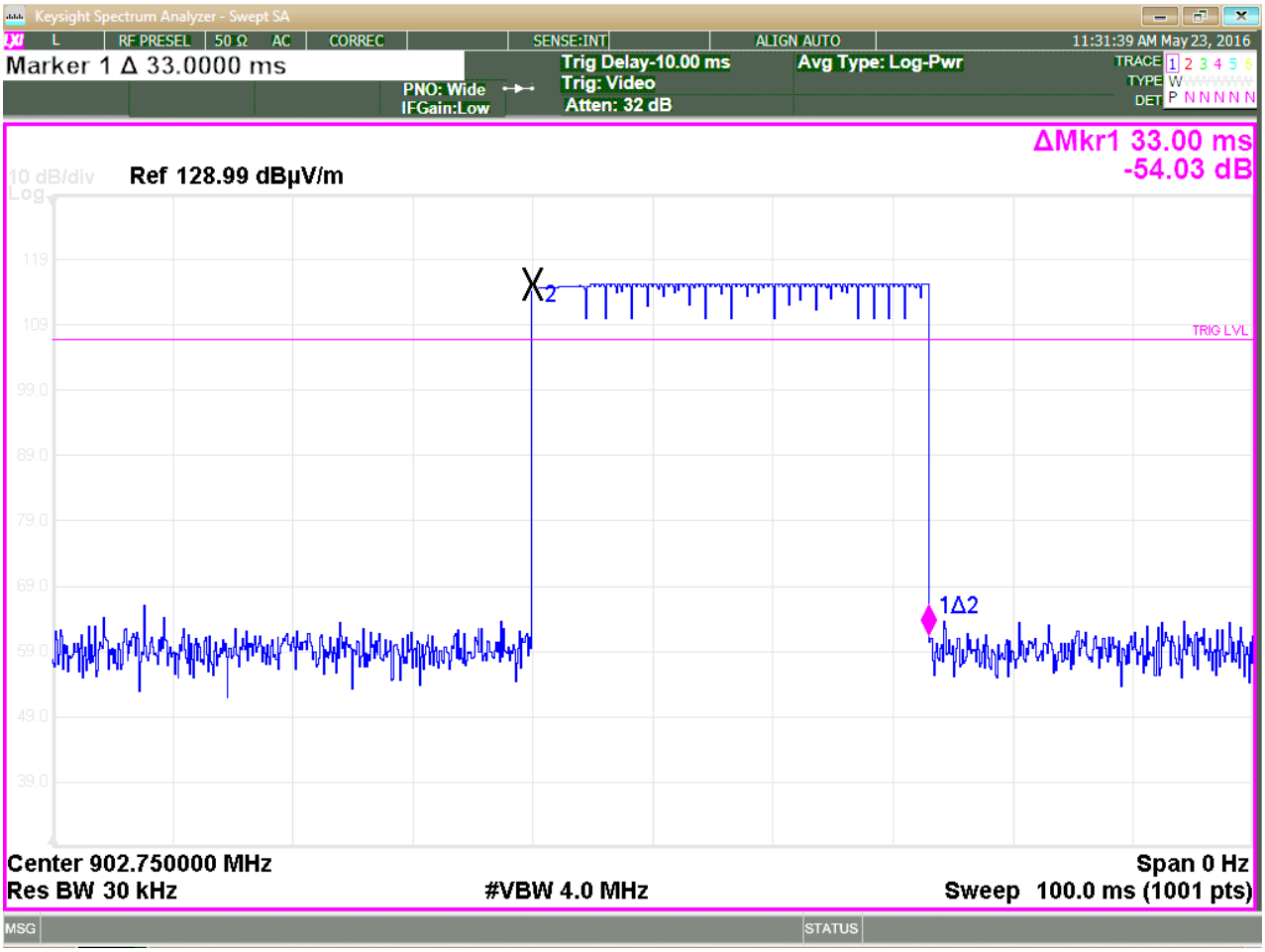


Fig. 6.5
Channel: 0 (Maxhold)

Nr. of Transmission for channel

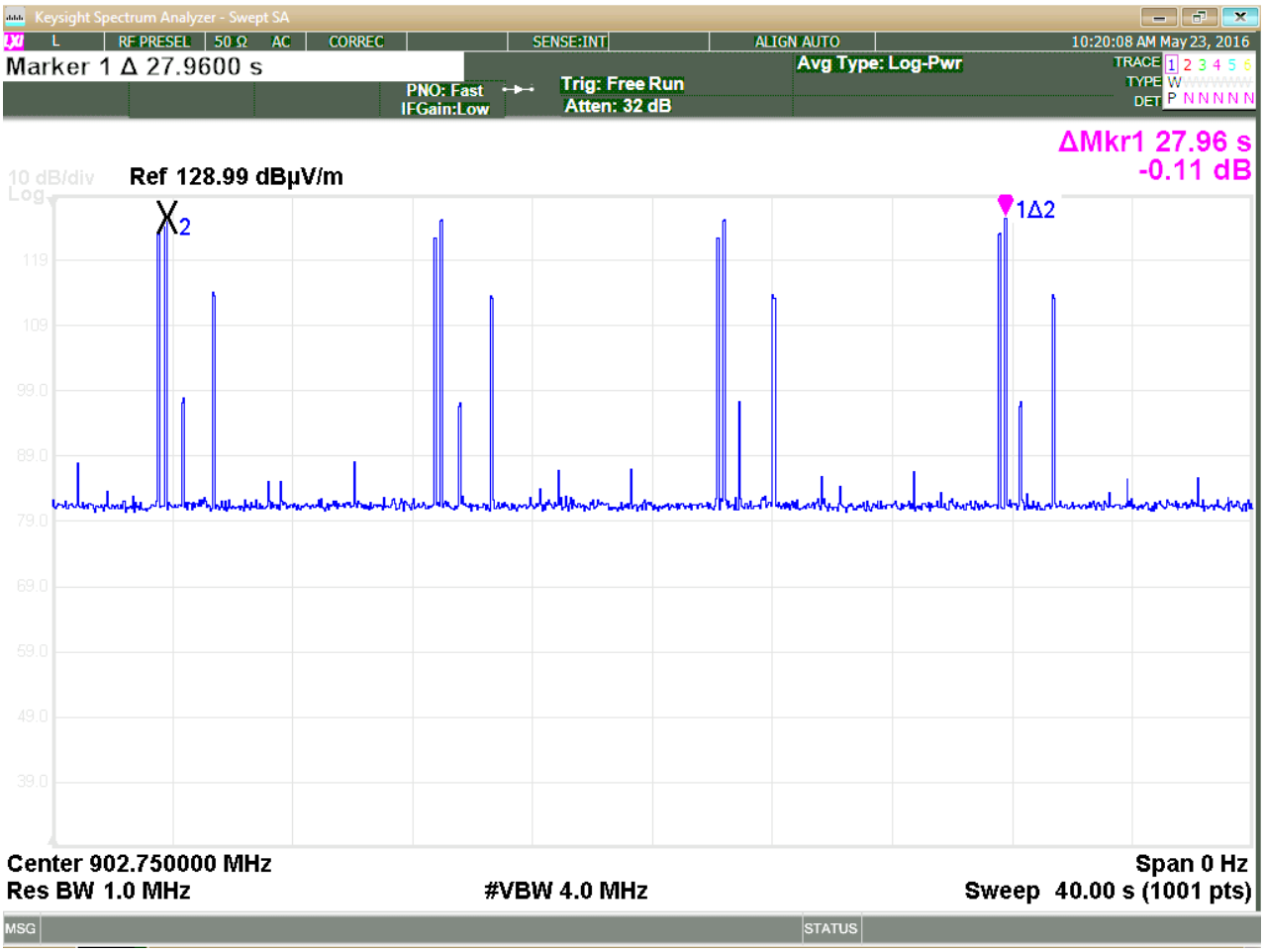


Fig. 6.6
Channel: 0

Time of transmission

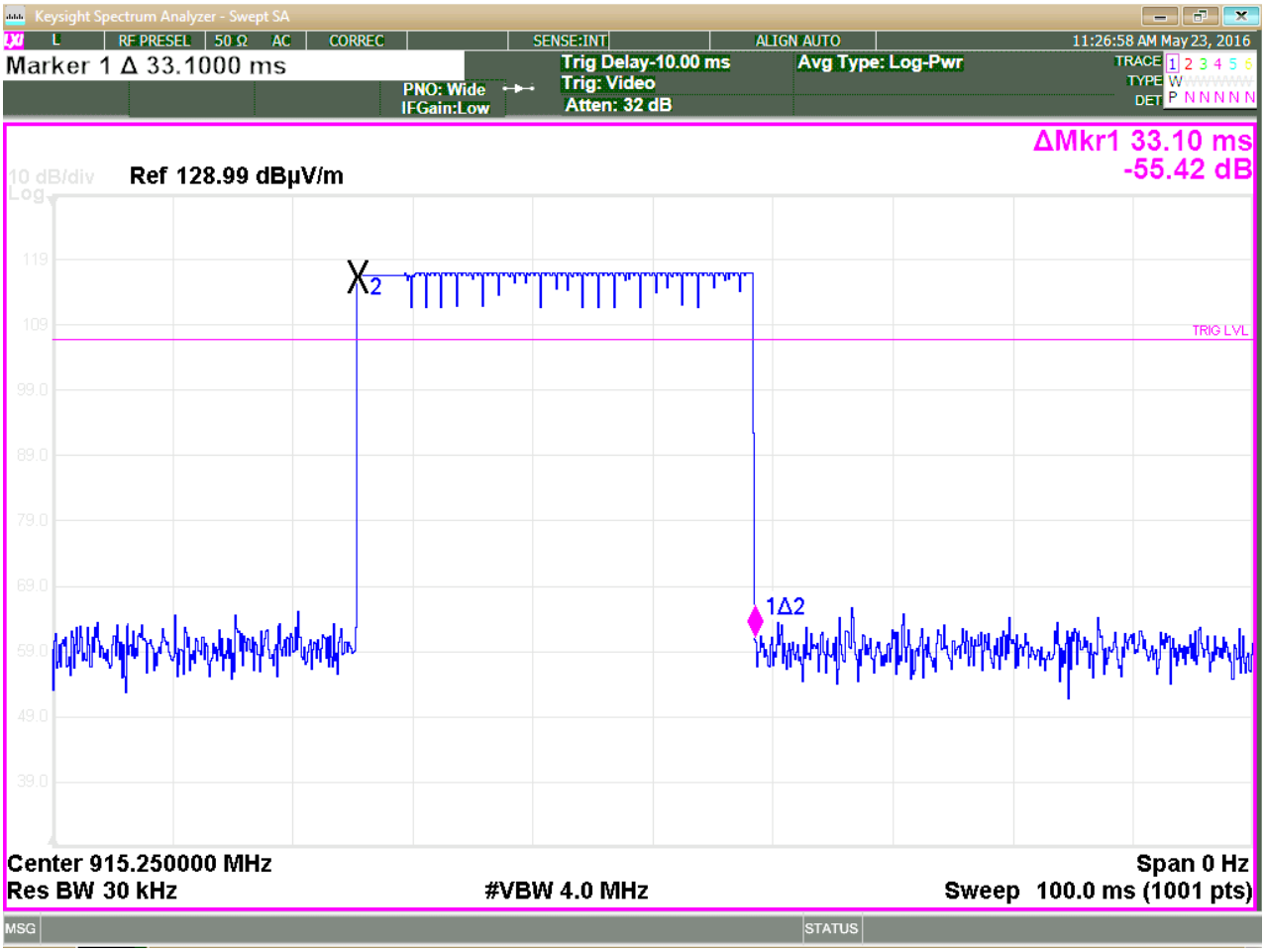


Fig. 6.7
Channel: 25 (Maxhold)

Nr. of Transmission for channel

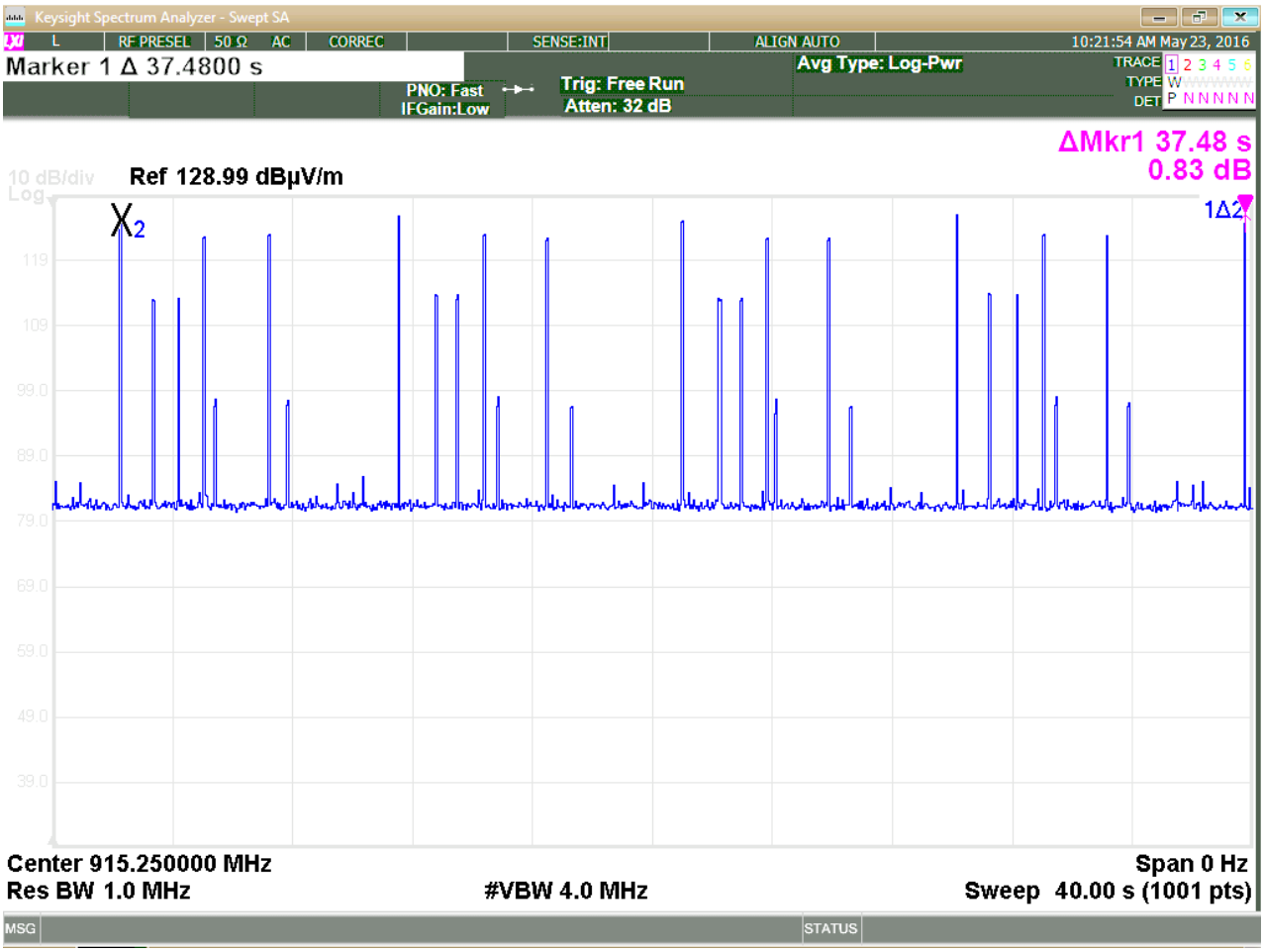


Fig. 6.8
Channel: 25

Time of transmission

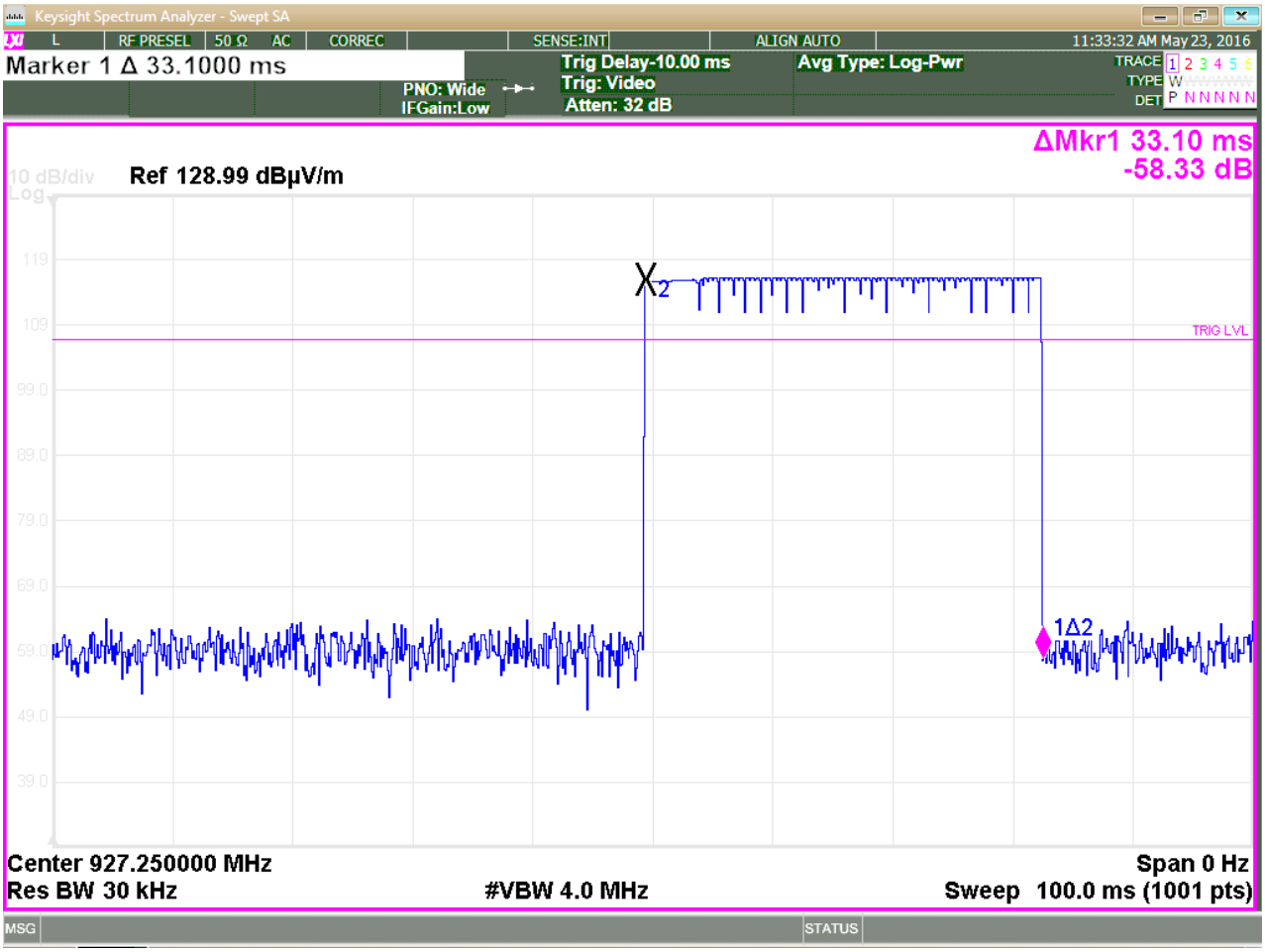


Fig. 6.9
Channel: 49 (Maxhold)

Nr. of Transmission for channel

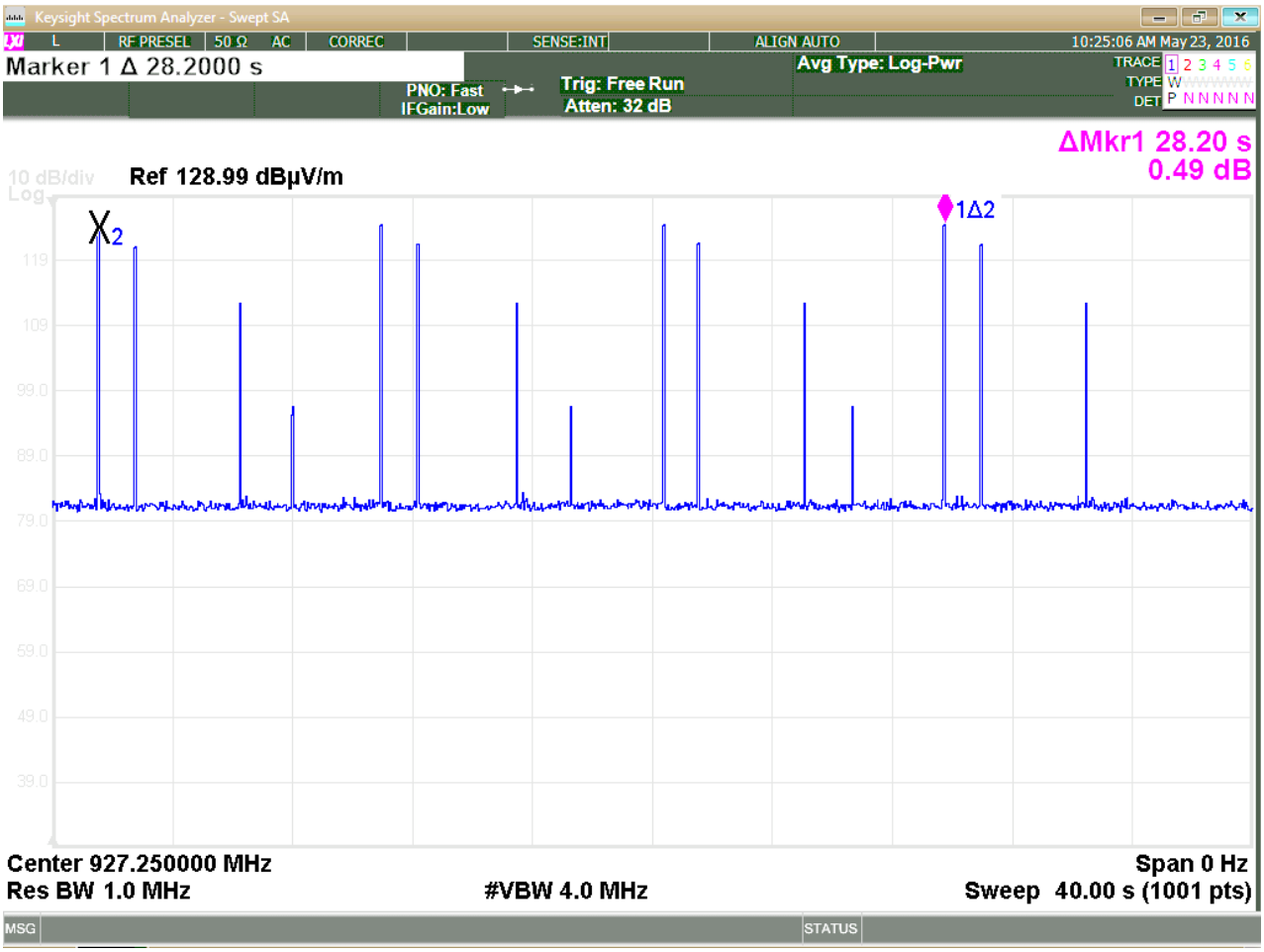


Fig. 6.10
Channel: 49

6.4. 20 dB Bandwidth

Measurements

Channel	Frequency (Pol. V / Pol. H) [MHz]	Bandwidth (Pol. V / Pol. H) [kHz]
0	902.7485 / 902.7495	59.0 / 57.0
25	915.2505 / 915.2500	63.0 / 50.0
49	927.2505 / 927.2495	55.5 / 50.5

The following figures show the acquired graphics.

Ch 0: Bandwidth

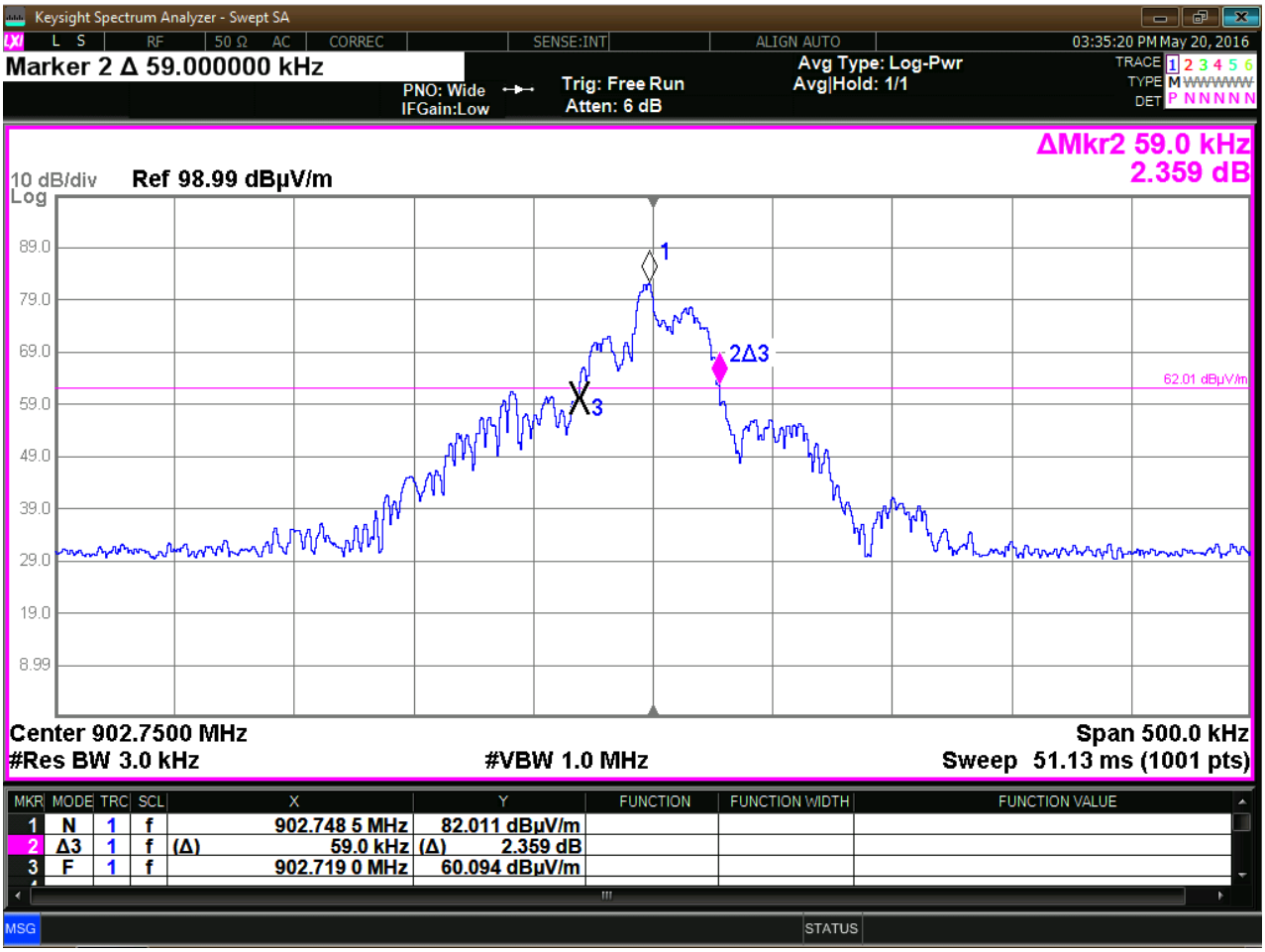


Fig. 6.11
Pol. V

Ch 25: Bandwidth

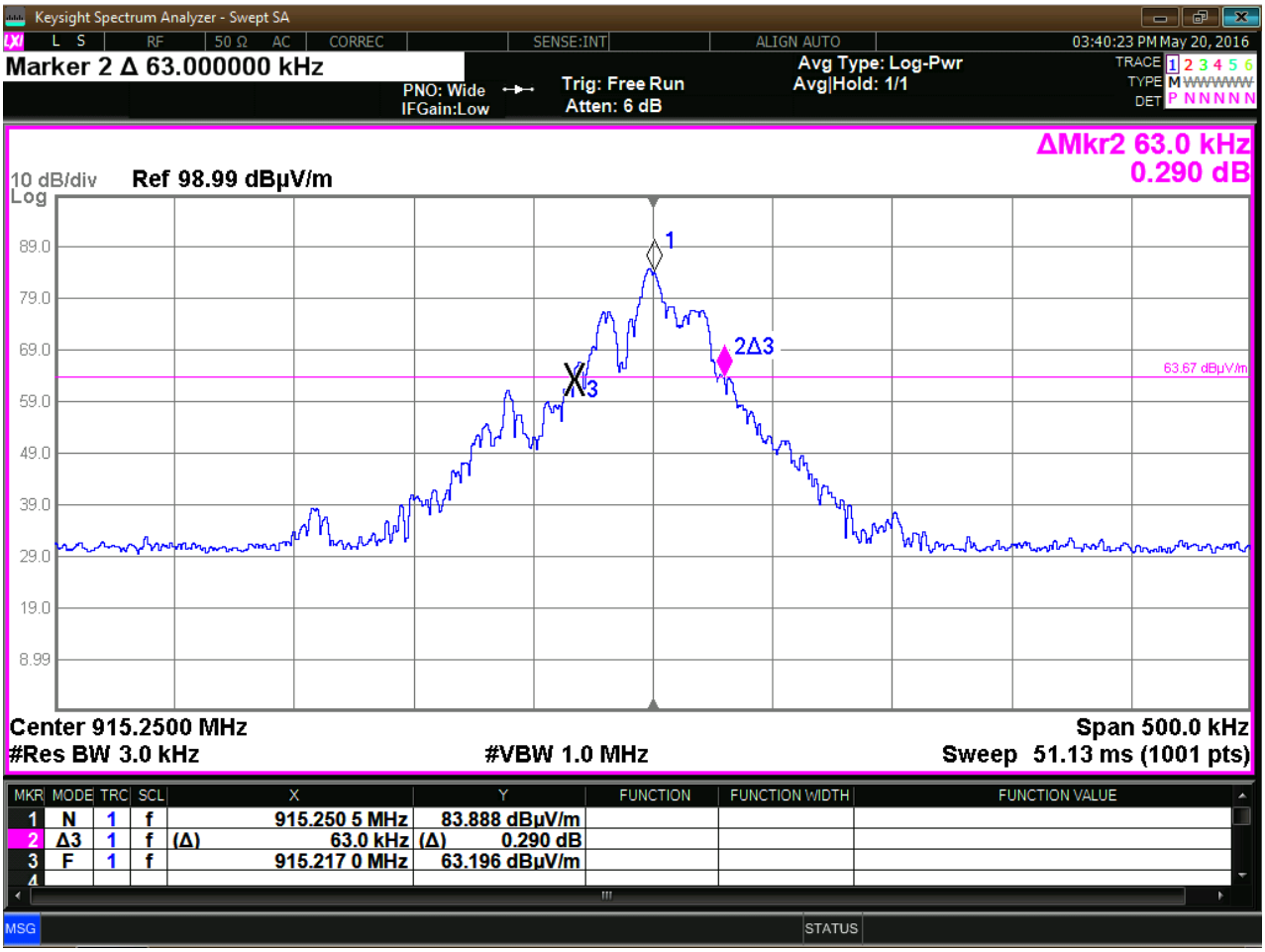


Fig. 6.12
Pol. V

Ch 49: Bandwidth

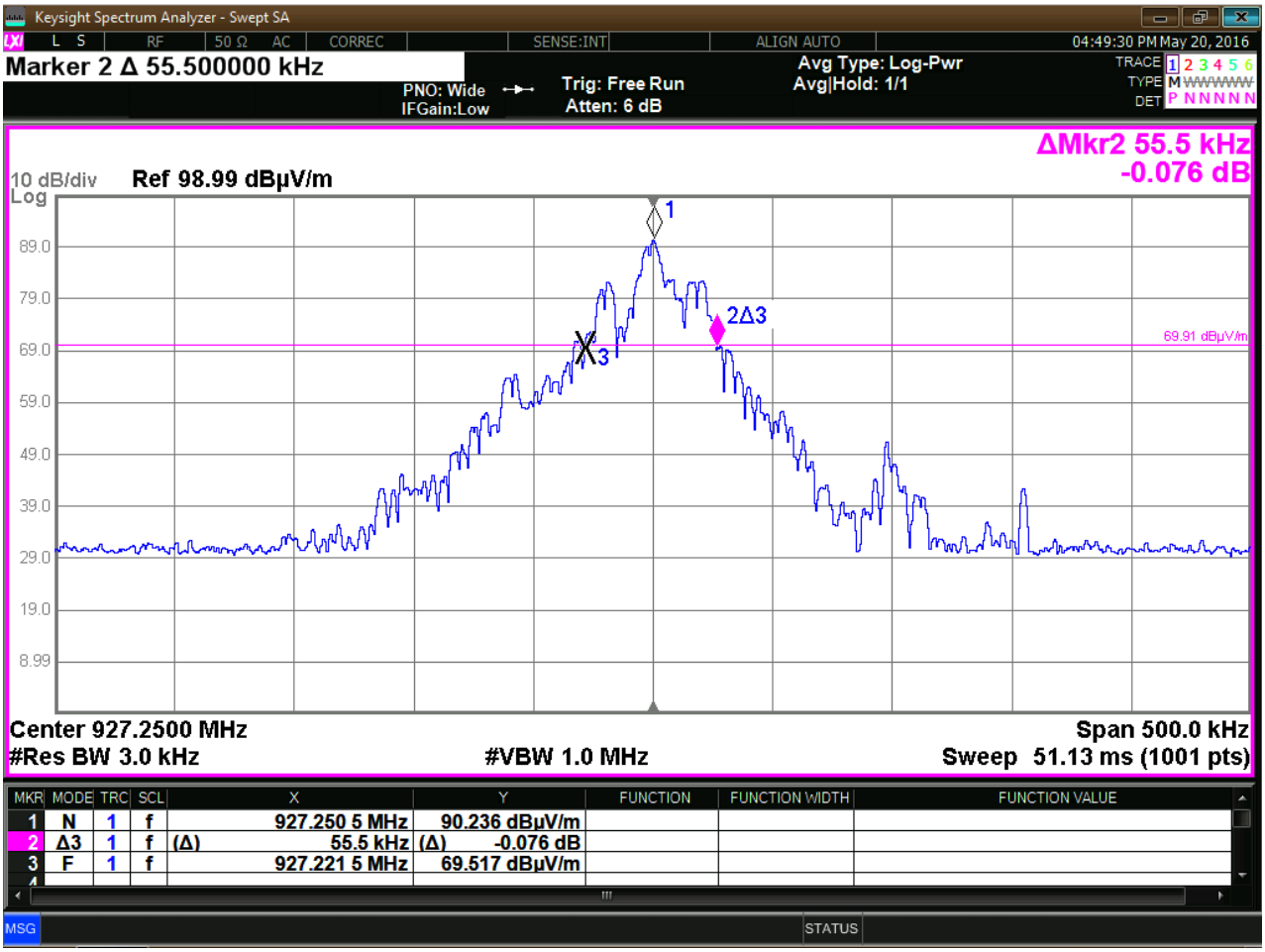


Fig. 6.13
Pol. V

Ch 0: Bandwidth

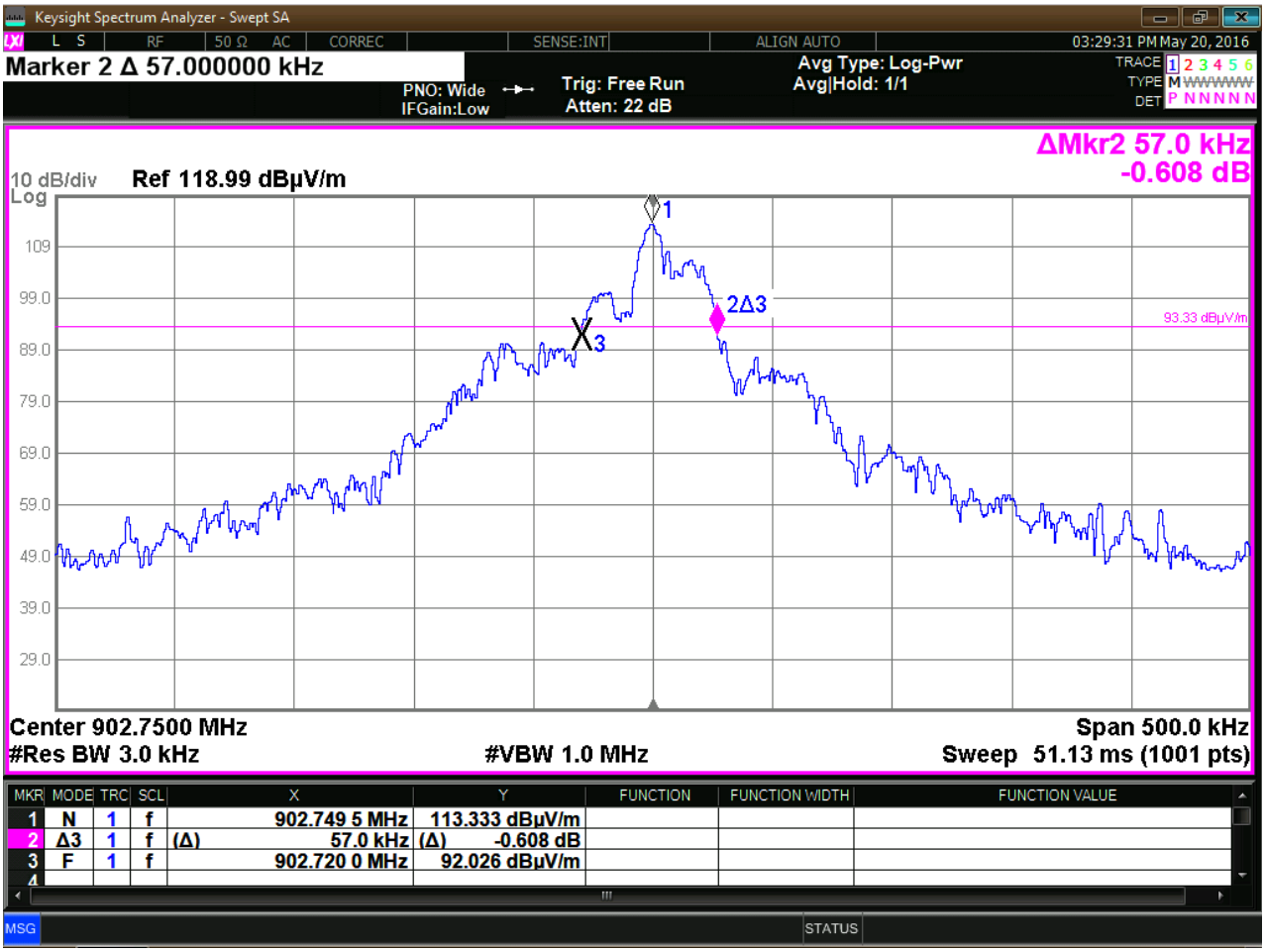


Fig. 6.14
Pol. H

Ch 25: Bandwidth

Fig. 6.15
Pol. H

Ch 49: Bandwidth

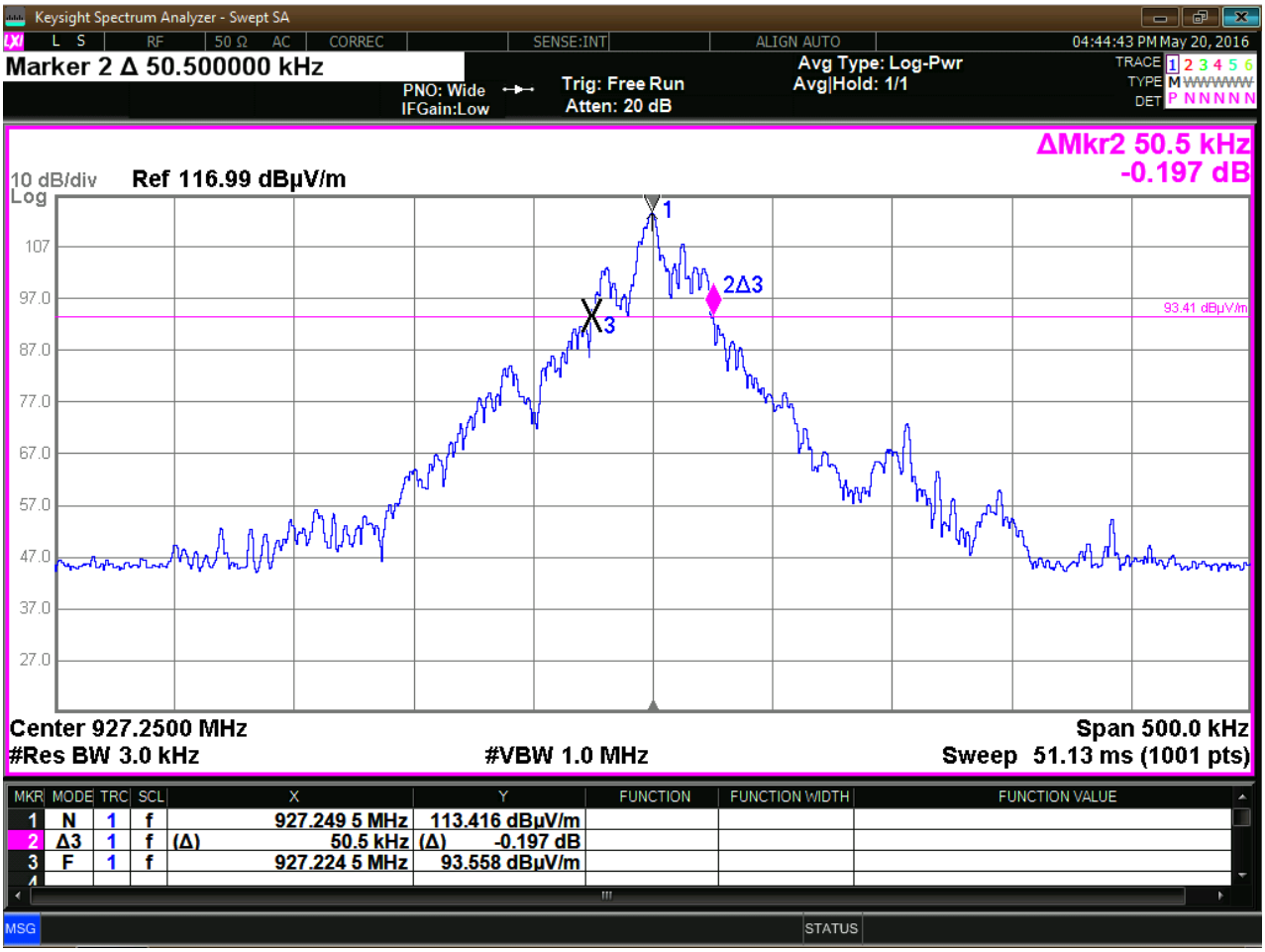


Fig. 6.16
Pol. H

6.5. PEAK OUTPUT POWER

Equipment shall meet the limits below.

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

Measurement

Eirp and Erp measurement were measured accordingly to ANSI C63.10: 2013 and 412172 D01 Determining ERP and EIRP v01r01.
Field Strength approach (linear terms):

$$erp = (E * d)^2 / (30 * 1.64) \quad (1)$$

E = Electric field strength in V/M
d = measure distance in m

Note: for f< 1GHz the radiated power is in ERP

The measured values are:

CHANNEL	Electric Field [dBµV/m] / **Output Power [dBm]**	
	Pol. V	Pol. H
0	85.2 / **-12.1**	113.5 / **16.1**
25	86.6 / **-10.7**	114.1 / **16.7**
49	92.2 / **-5.2**	113.3 / **15.9**

Maximum Electric Field 114.1 dBuV/m = 0.507 V/m
d = 3m

Accordingly to (1) erp is calculated:

$$erp = 0.047\,W$$

The following figures show the acquired graphics.

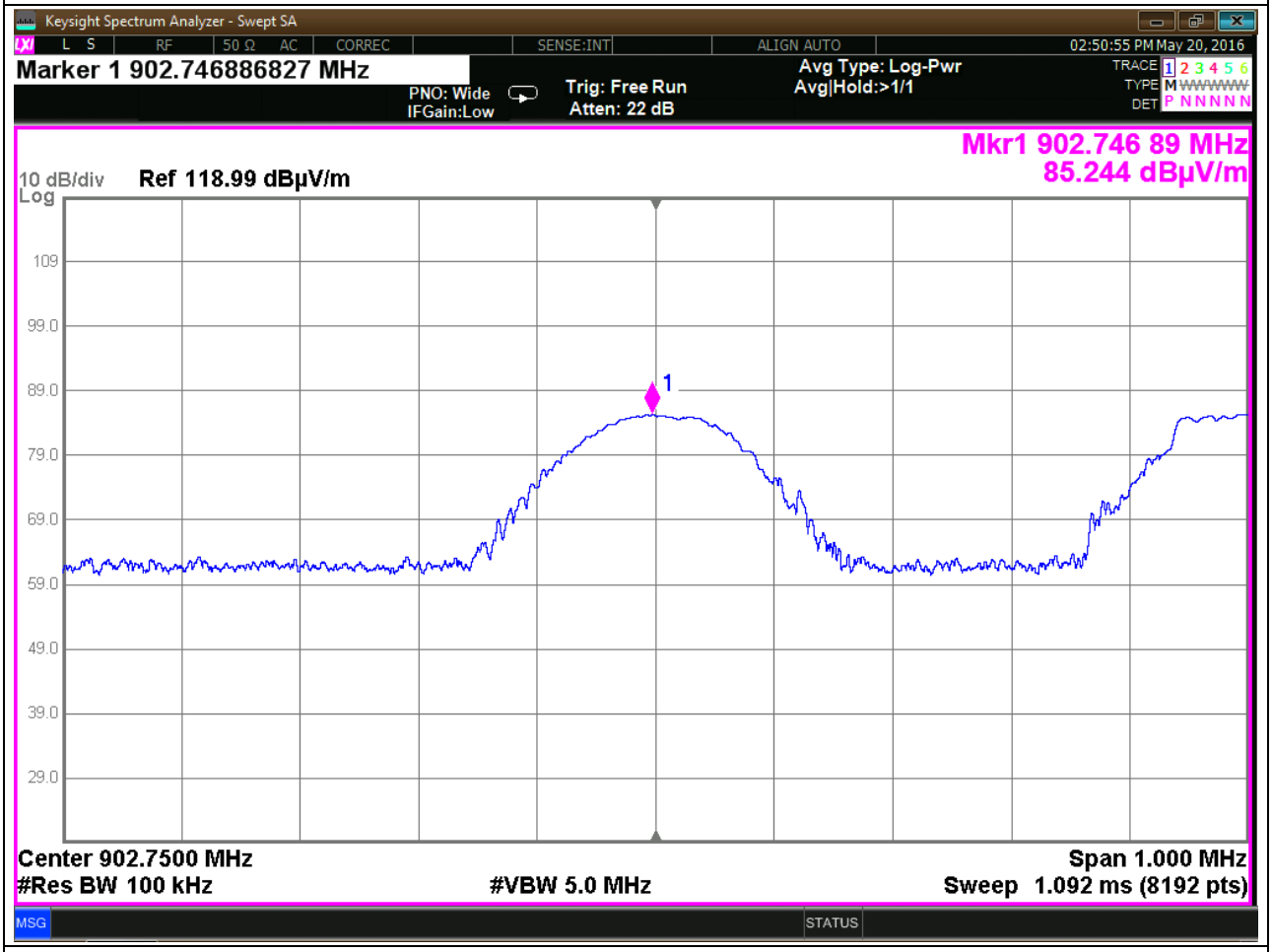


Fig. 6.17
Pol. V, Channel 0, Max Hold

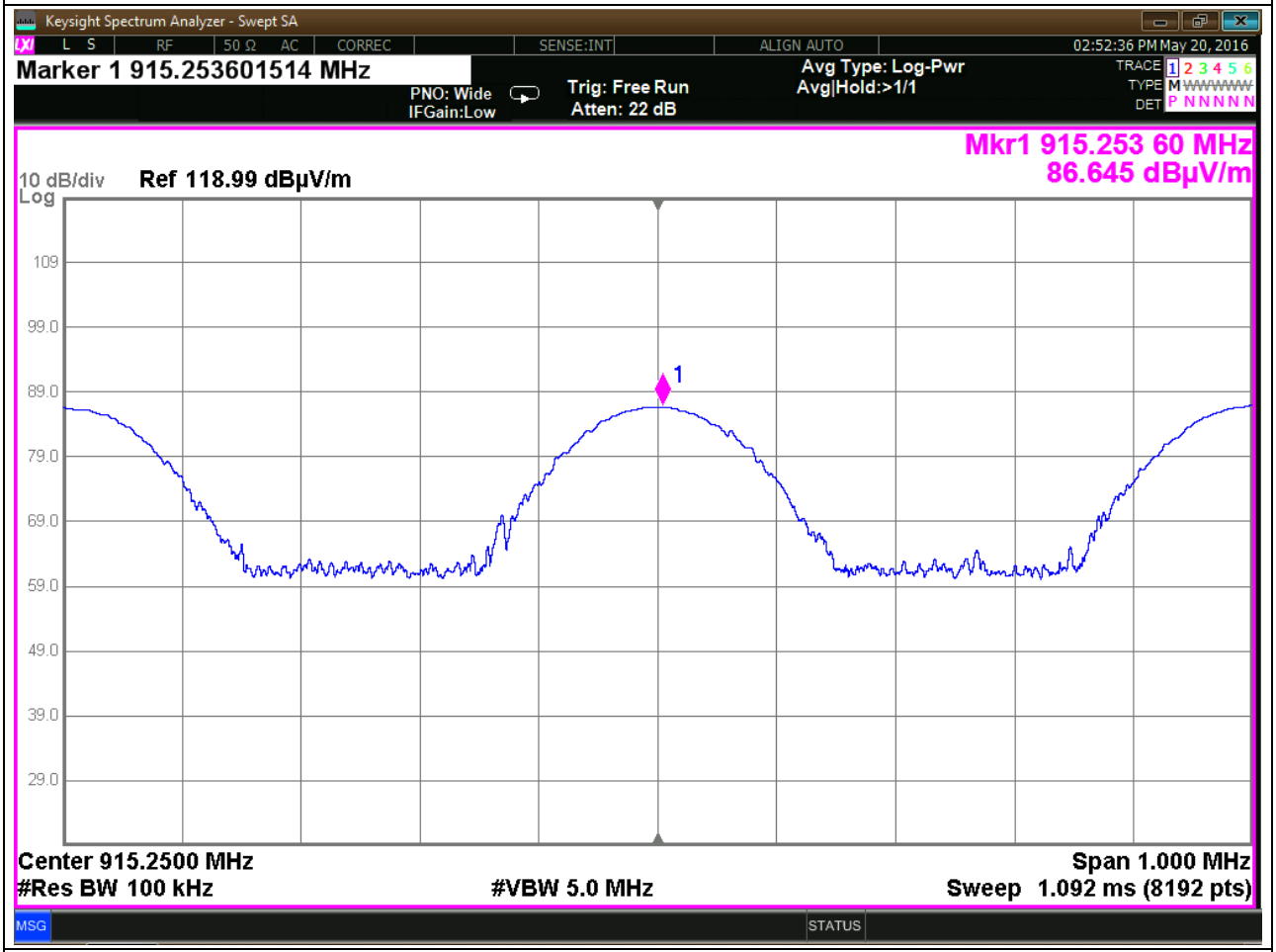


Fig. 6.18
Pol. V, Channel 25, Max Hold

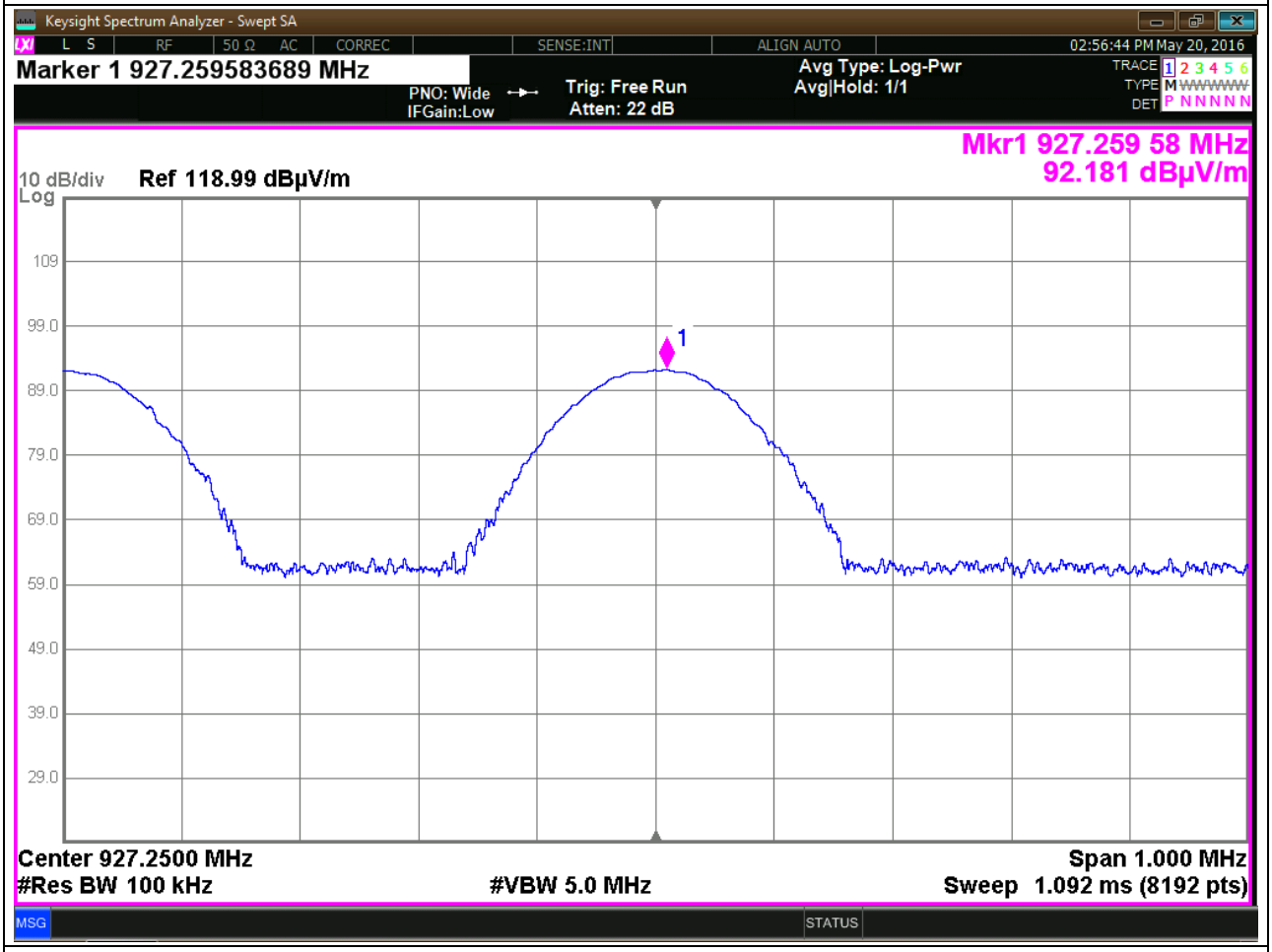


Fig. 6.19
Pol. V, Channel 49, Max Hold

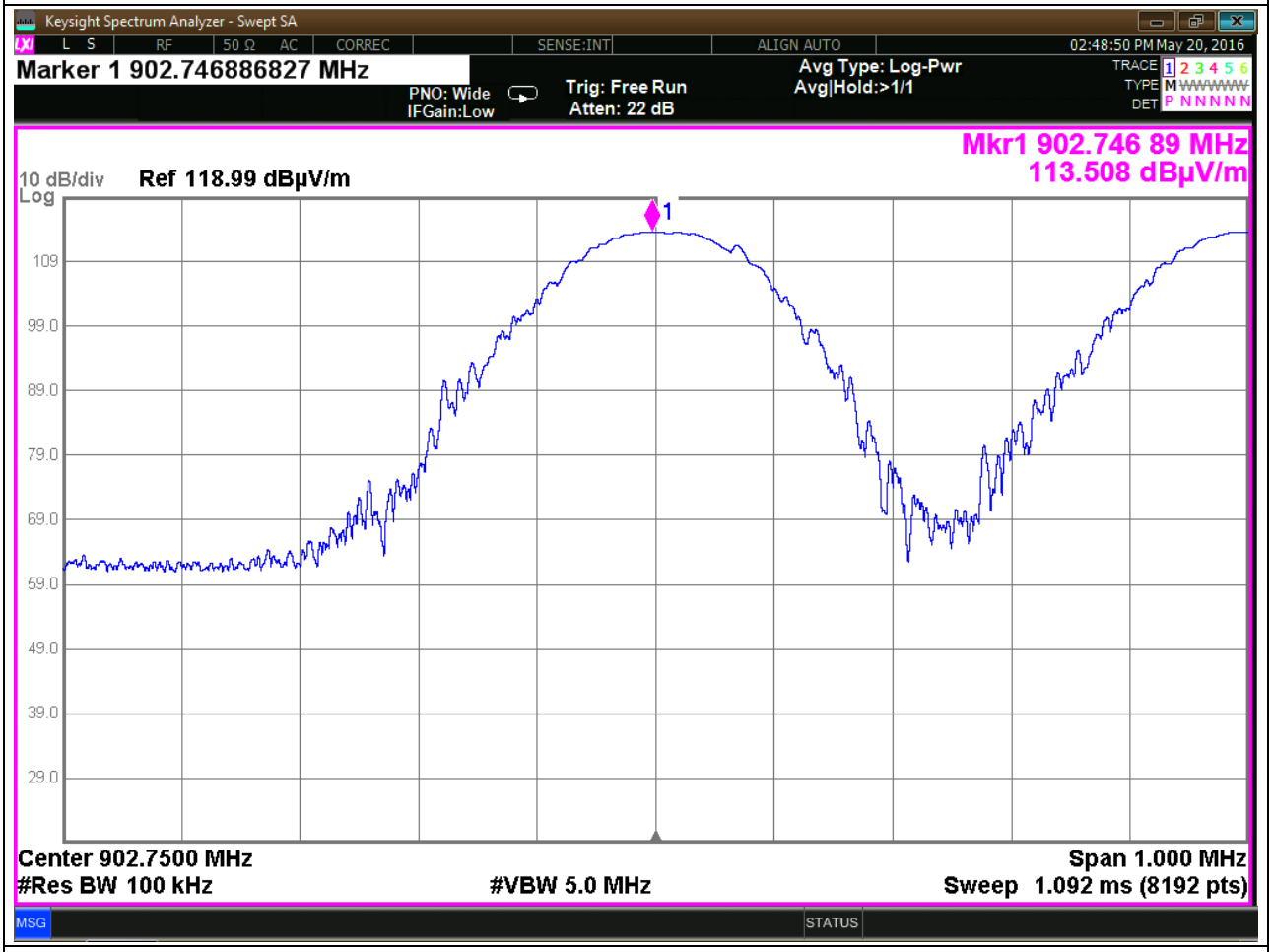


Fig. 6.20
Pol. H, Channel 0, Max Hold

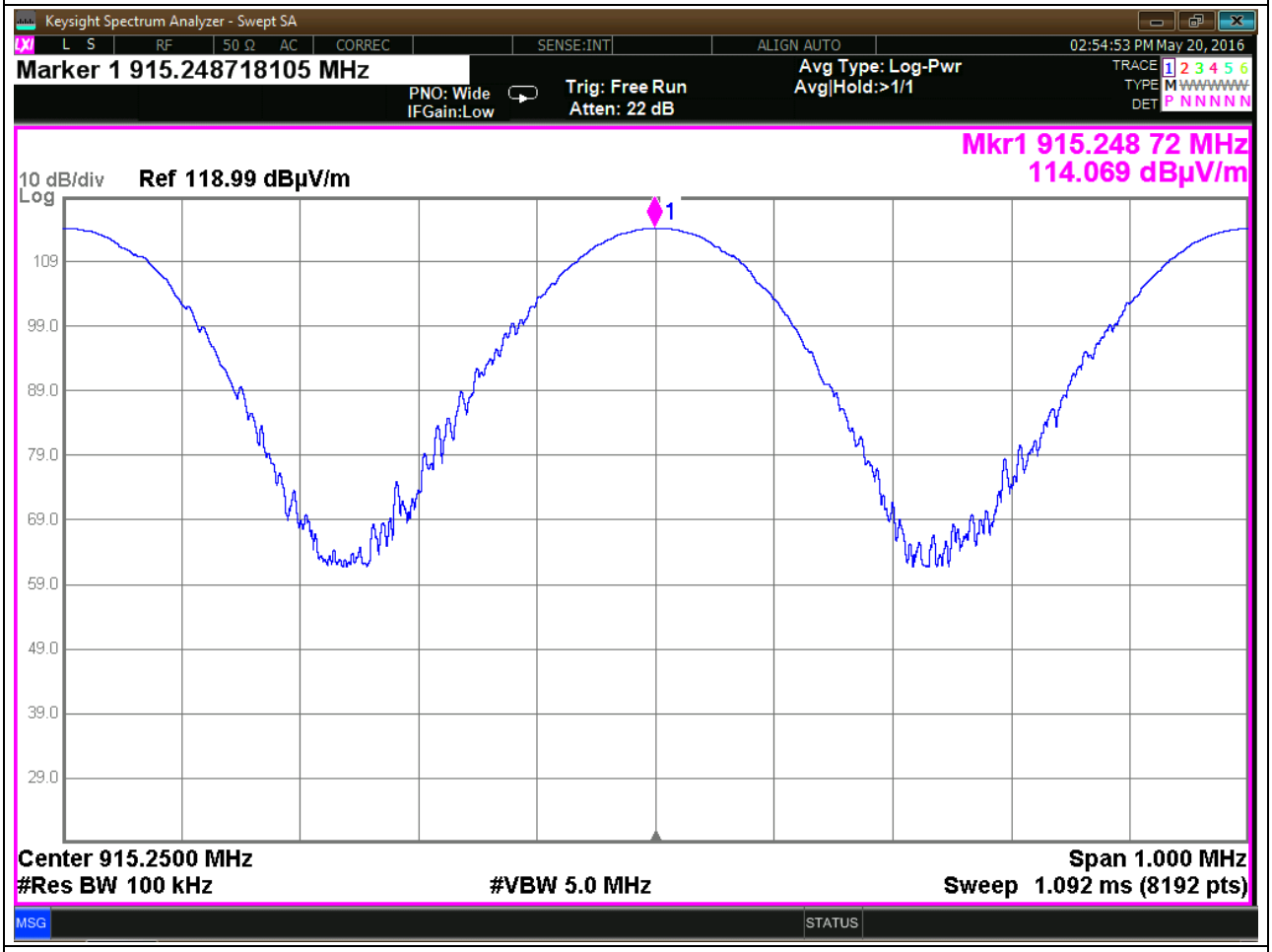


Fig. 6.21
Pol. H, Channel 25, Max Hold

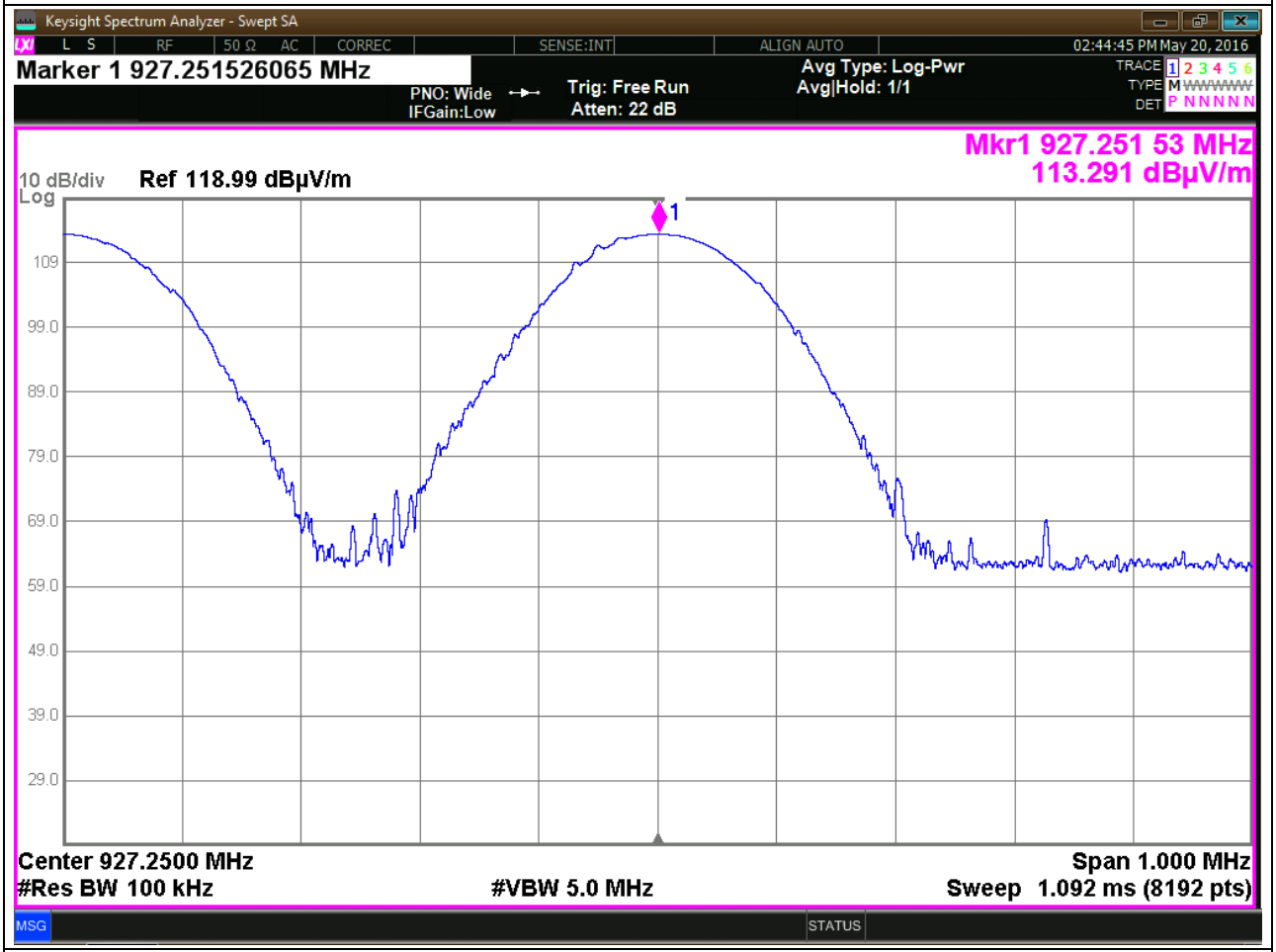


Fig. 6.22
Pol. H, Channel 49, Max Hold

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.

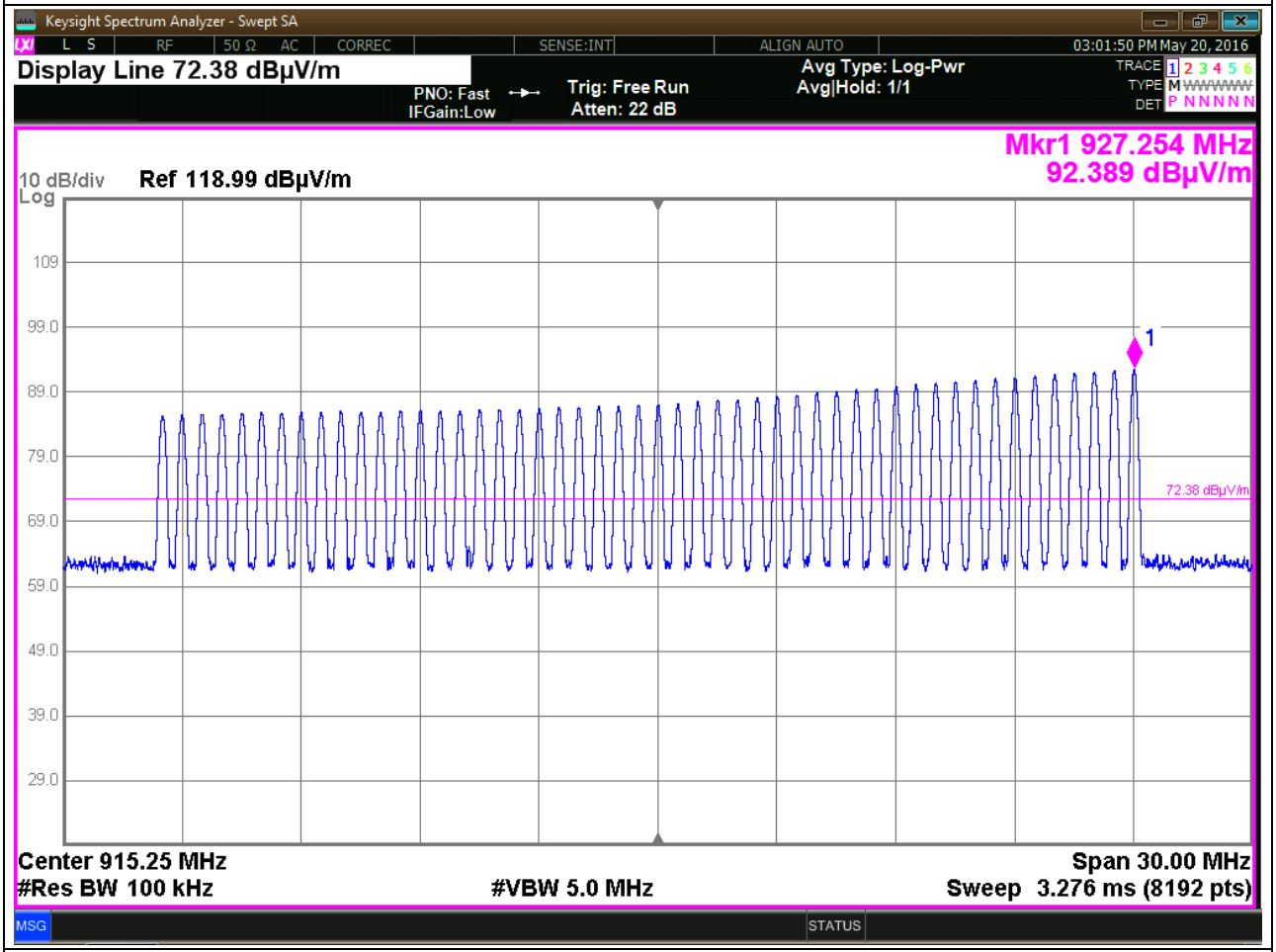


Fig. 6.23
Pol. V

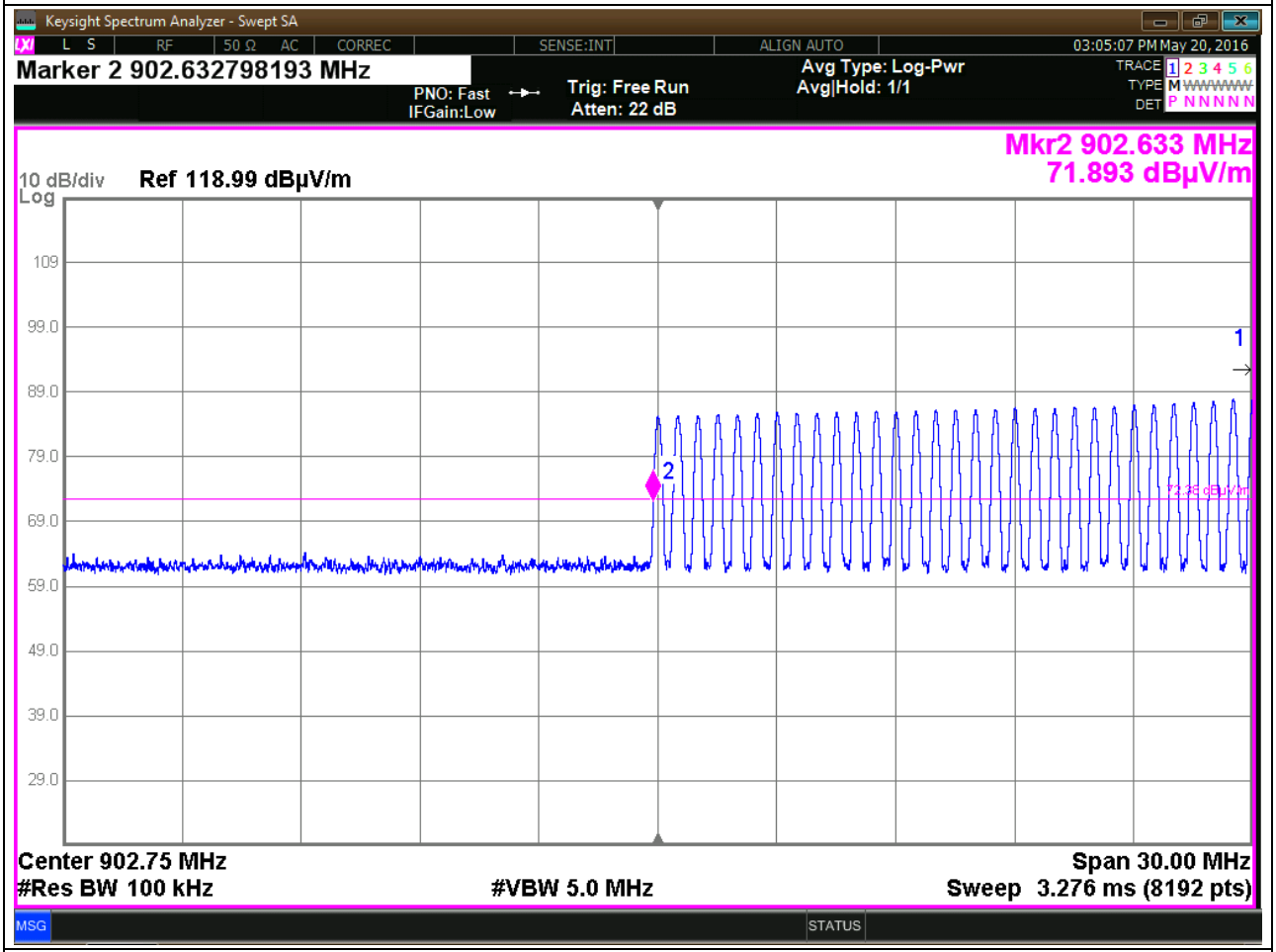


Fig. 6.24
Pol. V, Low Band Edge

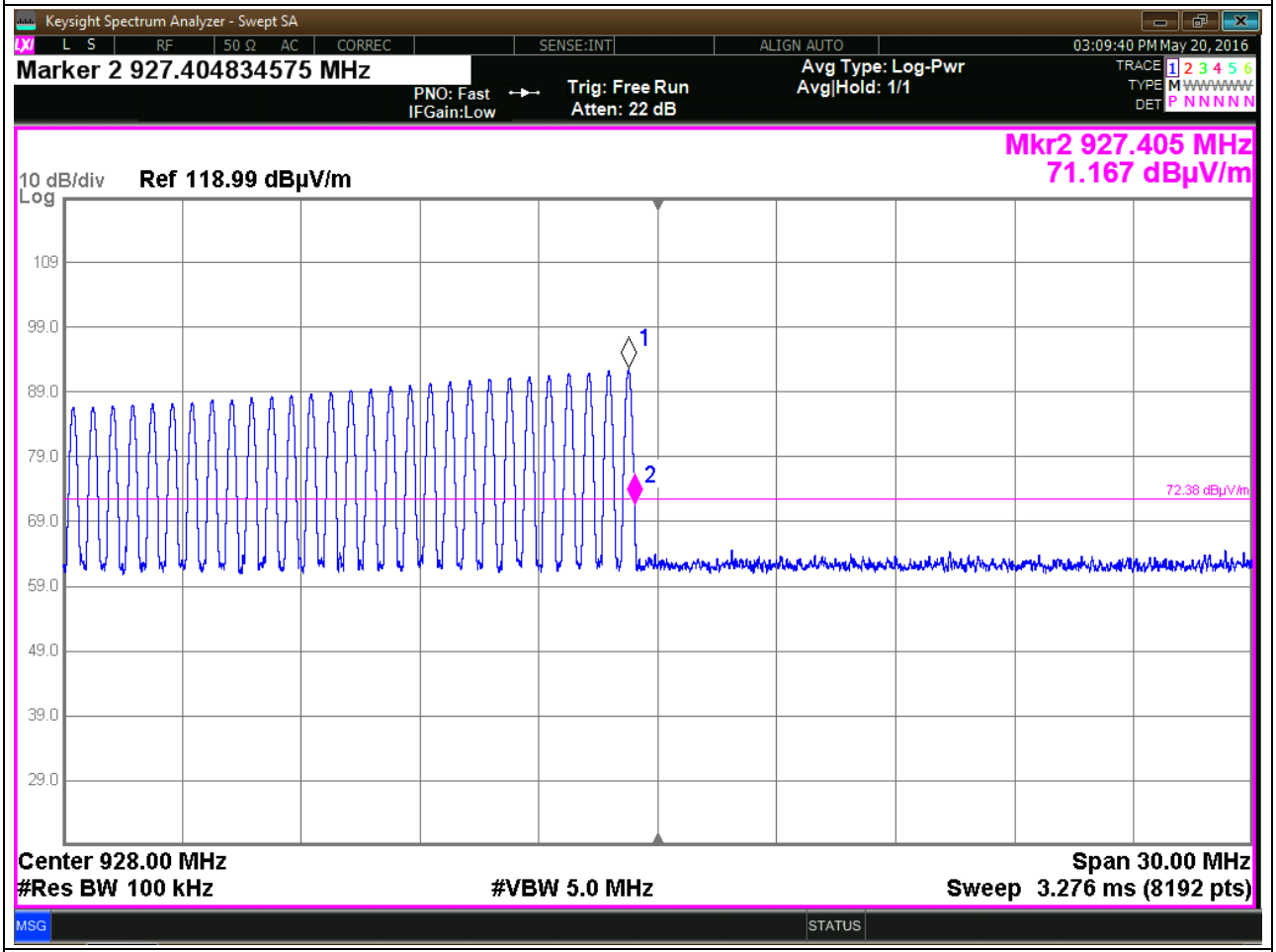


Fig. 6.25
Pol. V, High Band Edge

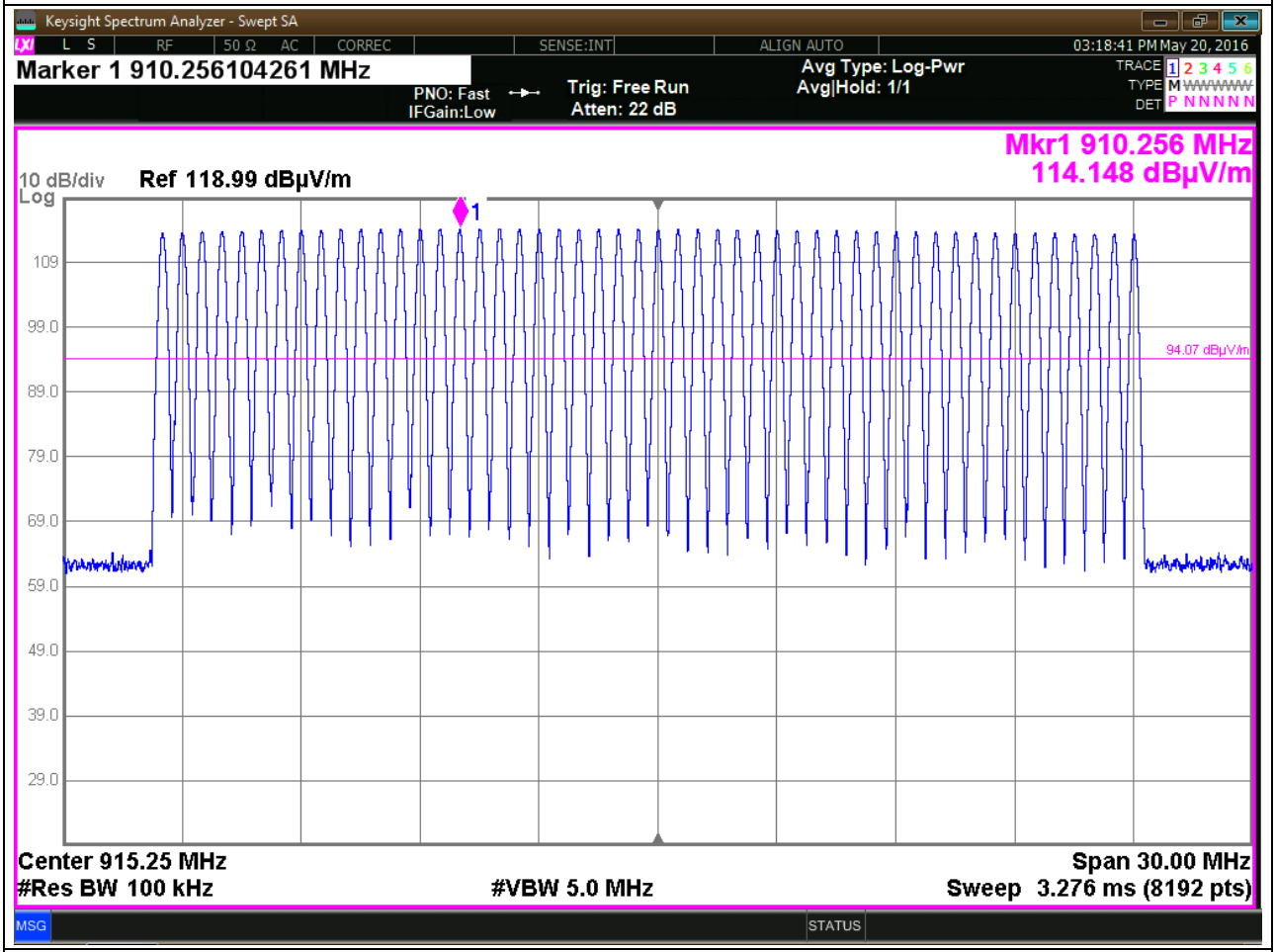


Fig. 6.26
Pol. H

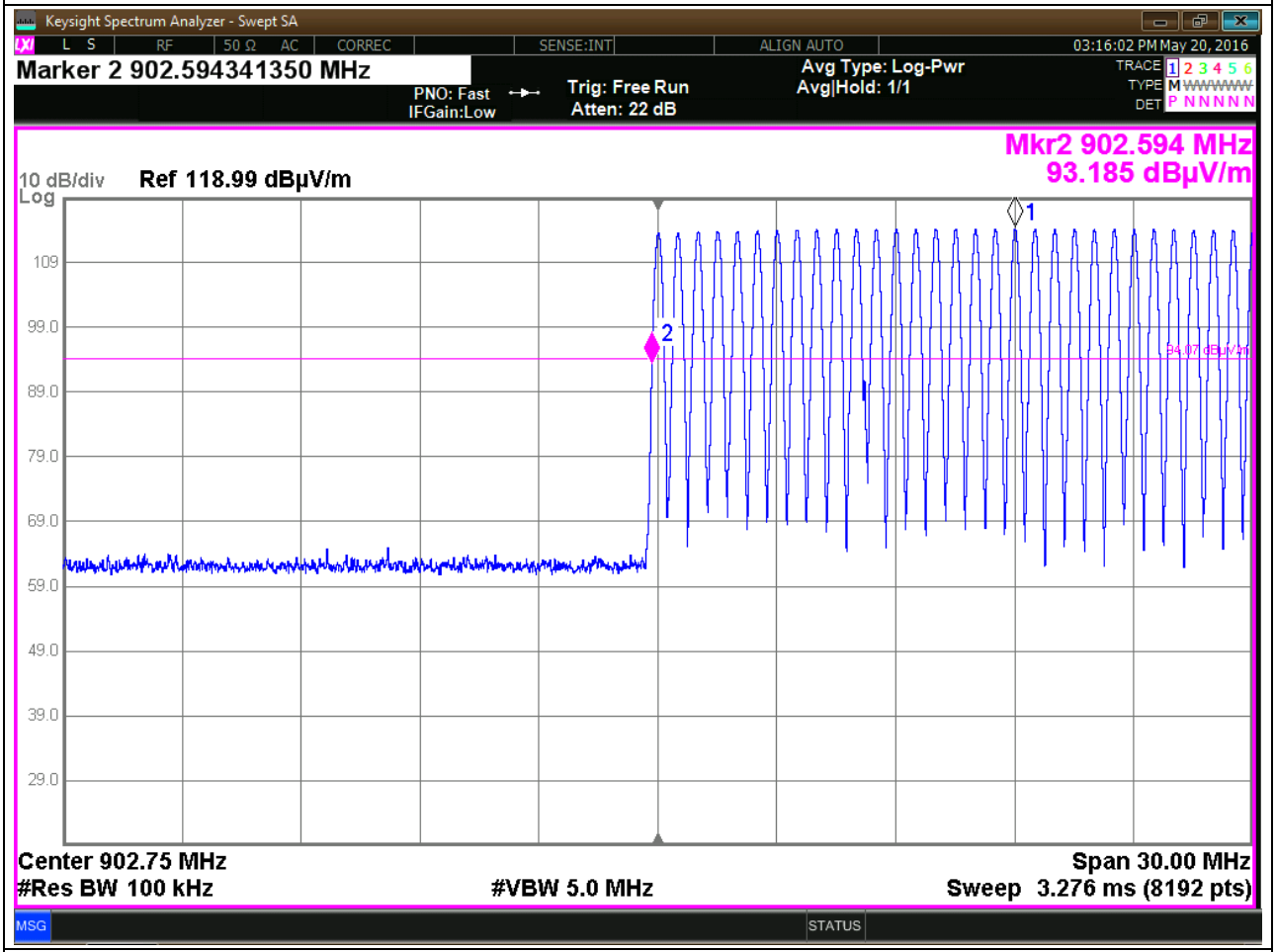


Fig. 6.27
Pol. H, Low Band Edge

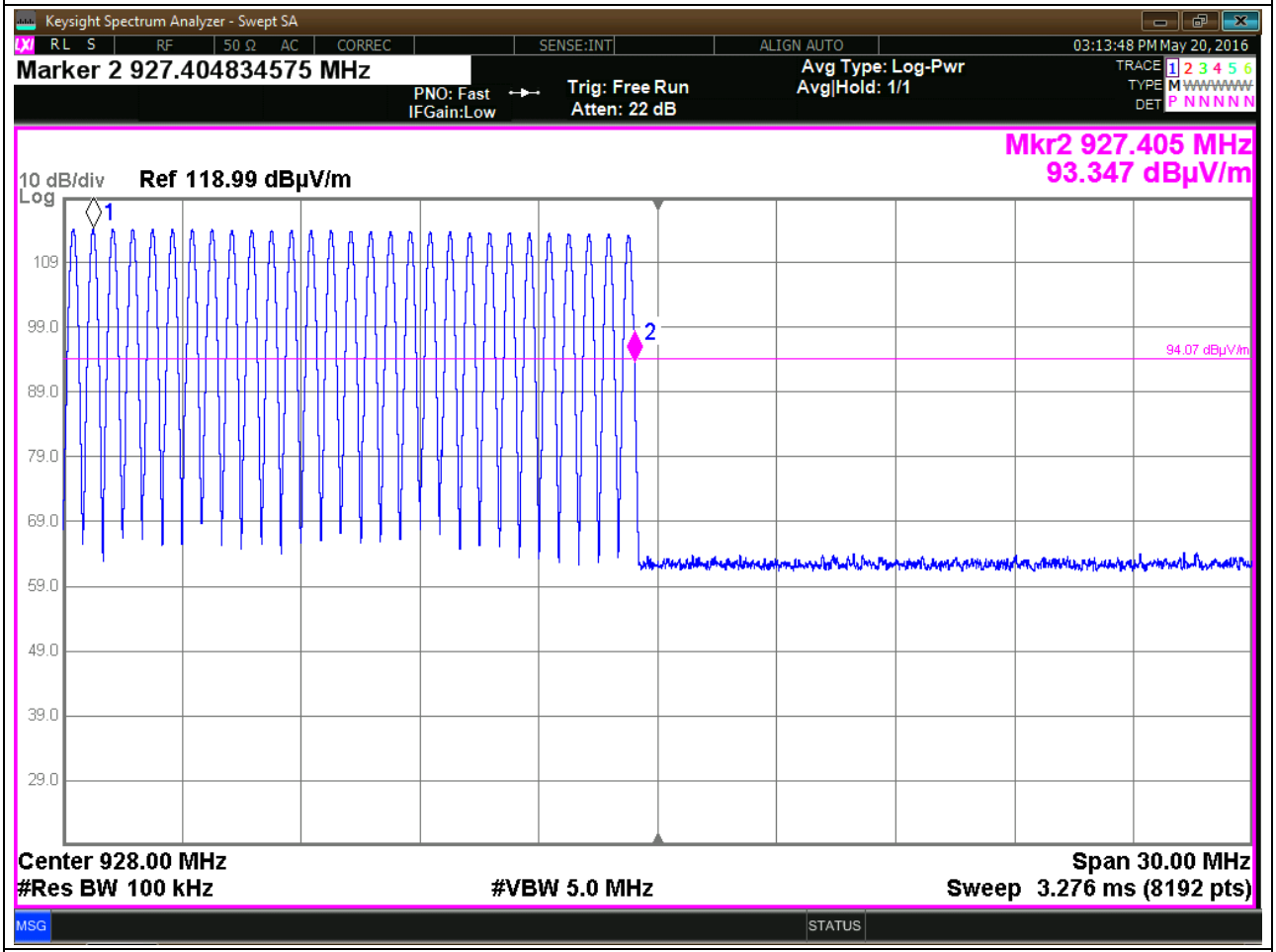


Fig. 6.28
Pol. H, High Band Edge

7. RADIATED OPERATION WITHIN THE BAND 902 - 928 MHZ

7.1. SPURIOUS RADIATED EMISSIONS

Nr Harmonics	AVG Level (dBµV/m)						AVG Limits (dBµV/m)	Remark
	Ch 0		Ch 25		Ch 49			
	F (MHz)	(dBµV/m)	F (MHz)	(dBµV/m)	F (MHz)	(dBµV/m)		
2	--	--	--	--	--	--	54.0	
3	--	--	--	--	--	--	54.0	
4	--	--	--	--	--	--	54.0	
5	--	--	--	--	--	--	54.0	
6	--	--	--	--	--	--	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 (dBµV/m)						PK Limits (dBµV/m)	Remark
	Ch 0		Ch 25		Ch 49			
	F (MHz)	(dBµV/m)	F (MHz)	(dBµV/m)	F (MHz)	(dBµV/m)		
2	--	--	--	--	--	--	74.0	
3	--	--	--	--	--	--	74.0	
4	--	--	--	--	--	--	74.0	
5	--	--	--	--	--	--	74.0	
6	--	--	--	--	--	--	74.0	
7	--	--	--	--	--	--	74.0	
8	--	--	--	--	--	--	74.0	
9	--	--	--	--	--	--	74.0	
10	--	--	--	--	--	--	74.0	

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

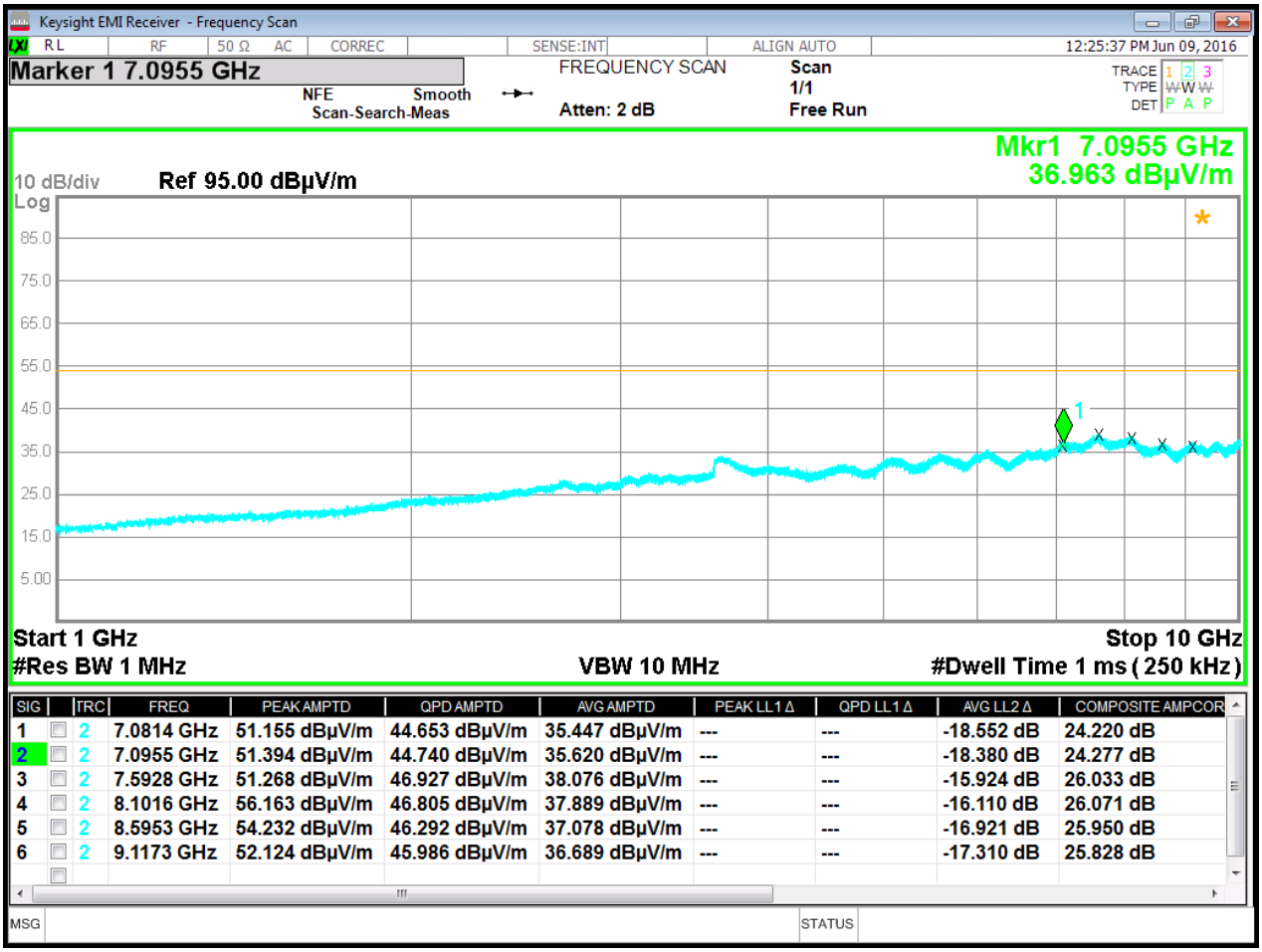
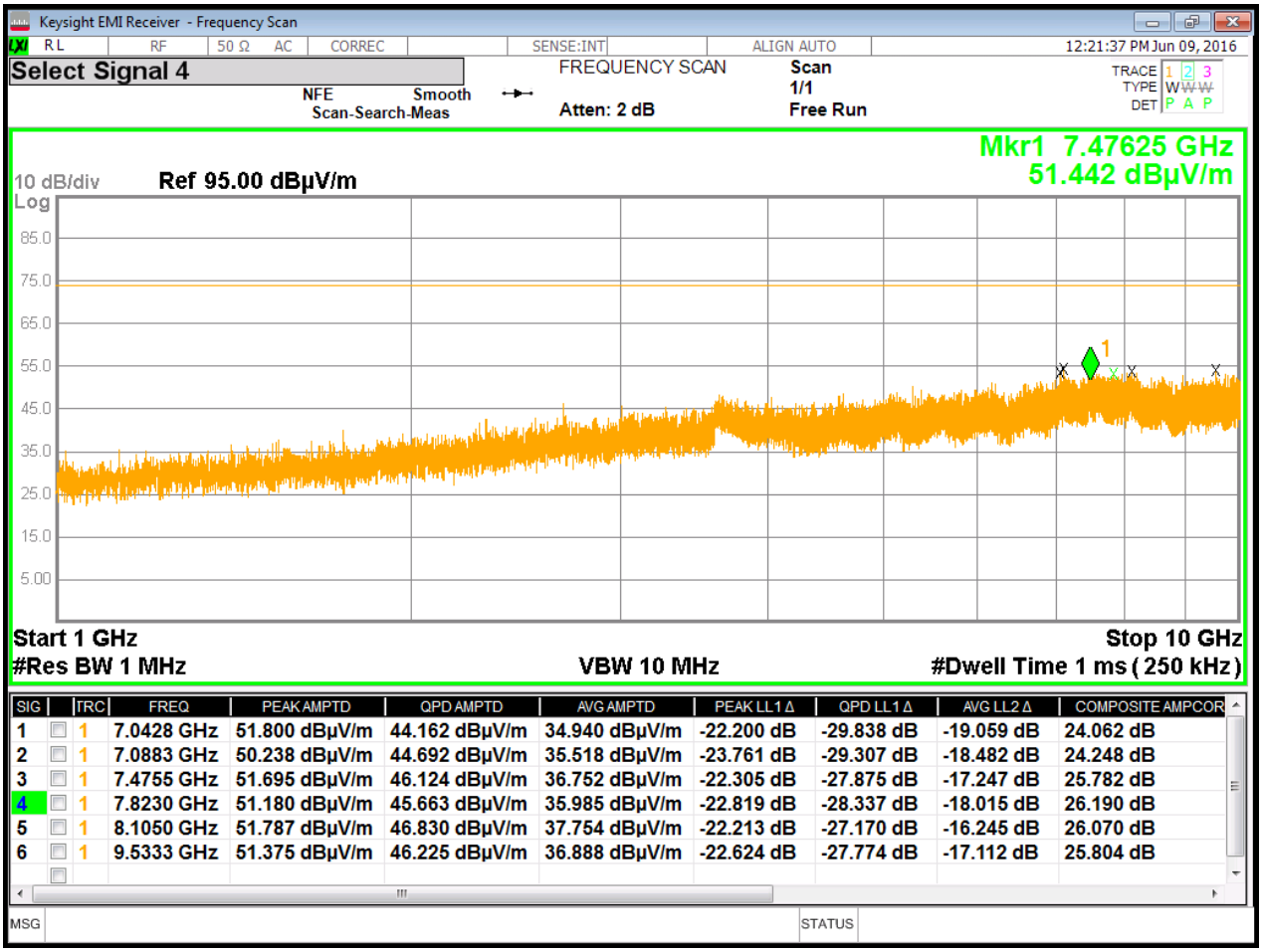


Fig. 7.1

POL V
MA: 100 cm
TT: 0°
EUT mode: Modulation

Record of the measurement of radiated emissions (AVG detector)
Maximum disturbance determined in the frequency range 1 – 10 GHz, Pol. V.

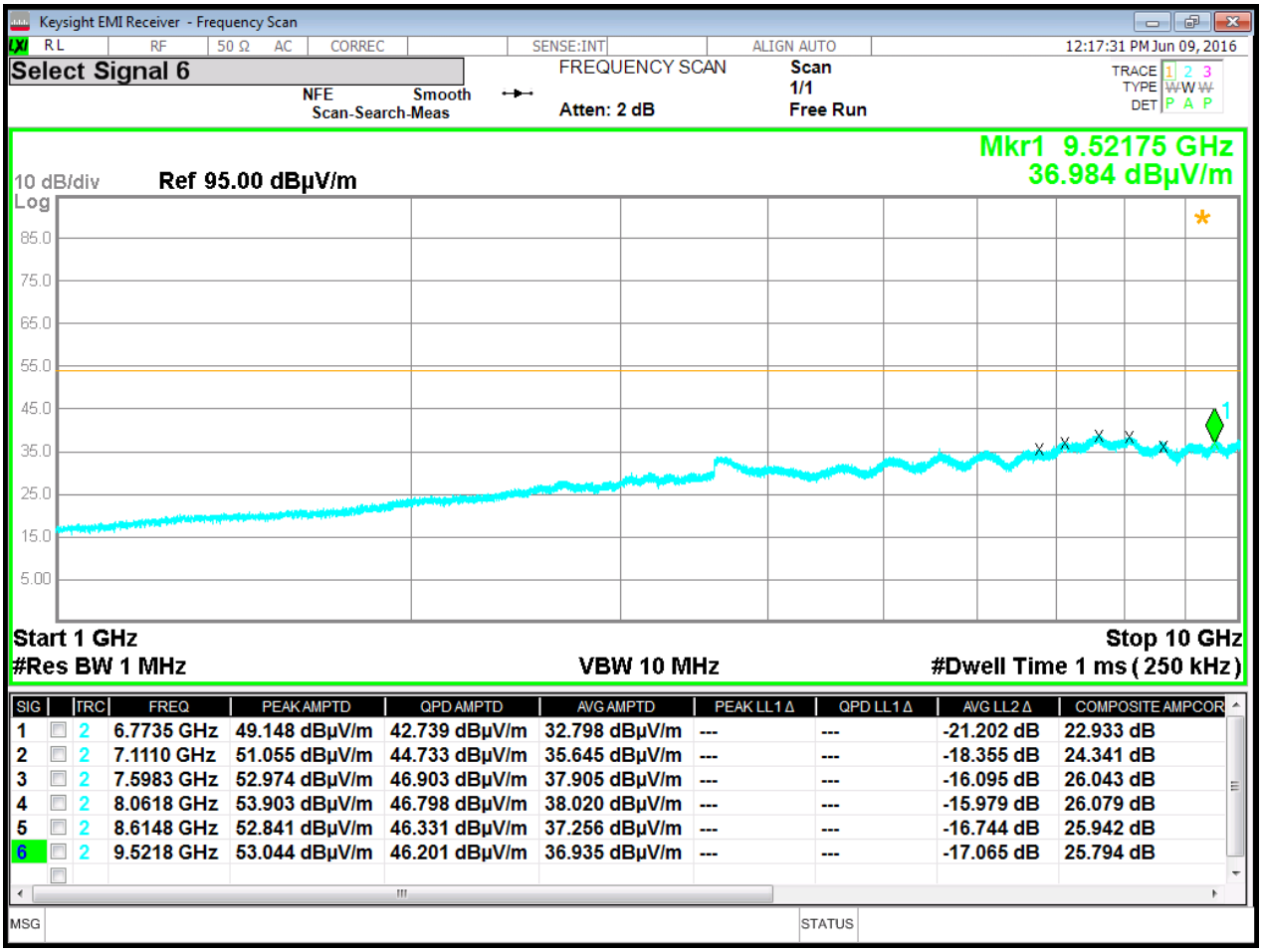


SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	AVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	AVG LL2 Δ	COMPOSITE AMPCOR
1	1	7.0428 GHz	51.800 dBµV/m	44.162 dBµV/m	34.940 dBµV/m	-22.200 dB	-29.838 dB	-19.059 dB	24.062 dB
2	1	7.0883 GHz	50.238 dBµV/m	44.692 dBµV/m	35.518 dBµV/m	-23.761 dB	-29.307 dB	-18.482 dB	24.248 dB
3	1	7.4755 GHz	51.695 dBµV/m	46.124 dBµV/m	36.752 dBµV/m	-22.305 dB	-27.875 dB	-17.247 dB	25.782 dB
4	1	7.8230 GHz	51.180 dBµV/m	45.663 dBµV/m	35.985 dBµV/m	-22.819 dB	-28.337 dB	-18.015 dB	26.190 dB
5	1	8.1050 GHz	51.787 dBµV/m	46.830 dBµV/m	37.754 dBµV/m	-22.213 dB	-27.170 dB	-16.245 dB	26.070 dB
6	1	9.5333 GHz	51.375 dBµV/m	46.225 dBµV/m	36.888 dBµV/m	-22.624 dB	-27.774 dB	-17.112 dB	25.804 dB

Fig. 7.2

POL V
MA: 100 cm
TT: 0°
EUT mode: Modulation

Record of the measurement of radiated emissions (Peak detector)
Maximum disturbance determined in the frequency range 1 – 10 GHz, Pol. V.

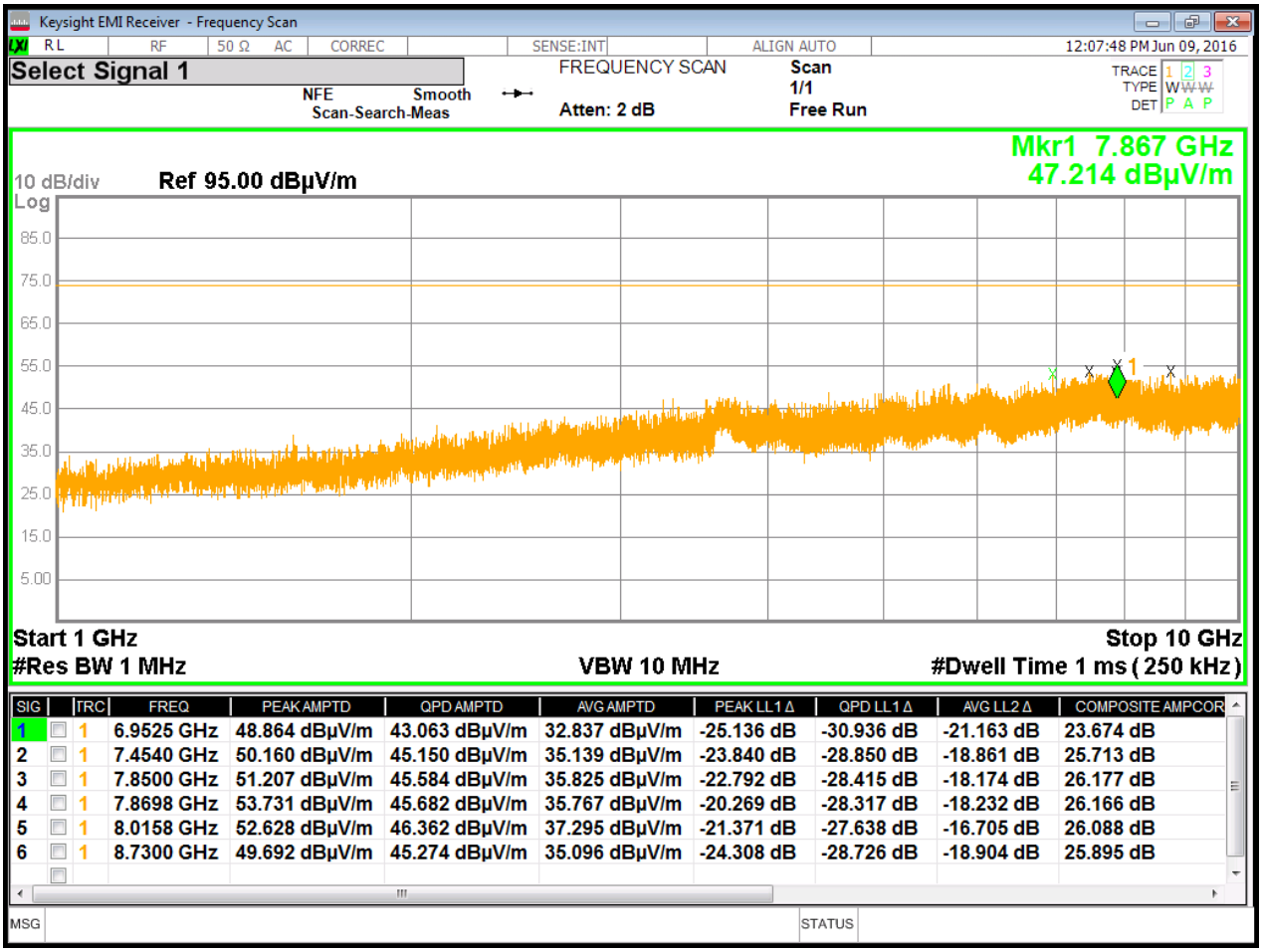


SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	AVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	AVG LL2 Δ	COMPOSITE AMPCOR
1	2	6.7735 GHz	49.148 dBµV/m	42.739 dBµV/m	32.798 dBµV/m	---	---	-21.202 dB	22.933 dB
2	2	7.1110 GHz	51.055 dBµV/m	44.733 dBµV/m	35.645 dBµV/m	---	---	-18.355 dB	24.341 dB
3	2	7.5983 GHz	52.974 dBµV/m	46.903 dBµV/m	37.905 dBµV/m	---	---	-16.095 dB	26.043 dB
4	2	8.0618 GHz	53.903 dBµV/m	46.798 dBµV/m	38.020 dBµV/m	---	---	-15.979 dB	26.079 dB
5	2	8.6148 GHz	52.841 dBµV/m	46.331 dBµV/m	37.256 dBµV/m	---	---	-16.744 dB	25.942 dB
6	2	9.5218 GHz	53.044 dBµV/m	46.201 dBµV/m	36.935 dBµV/m	---	---	-17.065 dB	25.794 dB

Fig. 7.3

POL H
MA: 100 cm
TT: 0°
EUT mode: Modulation

Record of the measurement of radiated emissions (AVG detector)
Maximum disturbance determined in the frequency range 1 – 10 GHz, Pol. H.



SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	AVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	AVG LL2 Δ	COMPOSITE AMPCOR
1	1	6.9525 GHz	48.864 dBµV/m	43.063 dBµV/m	32.837 dBµV/m	-25.136 dB	-30.936 dB	-21.163 dB	23.674 dB
2	1	7.4540 GHz	50.160 dBµV/m	45.150 dBµV/m	35.139 dBµV/m	-23.840 dB	-28.850 dB	-18.861 dB	25.713 dB
3	1	7.8500 GHz	51.207 dBµV/m	45.584 dBµV/m	35.825 dBµV/m	-22.792 dB	-28.415 dB	-18.174 dB	26.177 dB
4	1	7.8698 GHz	53.731 dBµV/m	45.682 dBµV/m	35.767 dBµV/m	-20.269 dB	-28.317 dB	-18.232 dB	26.166 dB
5	1	8.0158 GHz	52.628 dBµV/m	46.362 dBµV/m	37.295 dBµV/m	-21.371 dB	-27.638 dB	-16.705 dB	26.088 dB
6	1	8.7300 GHz	49.692 dBµV/m	45.274 dBµV/m	35.096 dBµV/m	-24.308 dB	-28.726 dB	-18.904 dB	25.895 dB

Fig. 7.4

POL H
MA: 100 cm
TT: 0°
EUT mode: Modulation

Record of the measurement of radiated emissions (Peak detector)
Maximum disturbance determined in the frequency range 1 – 10 GHz, Pol. H.

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
Controller	Deisel	HD100	01/2017
Turn Table	Deisel	MA240	01/2017
LISN	GSD	NTW06	01/2017

Test procedure: CT15R01

8. PHOTO

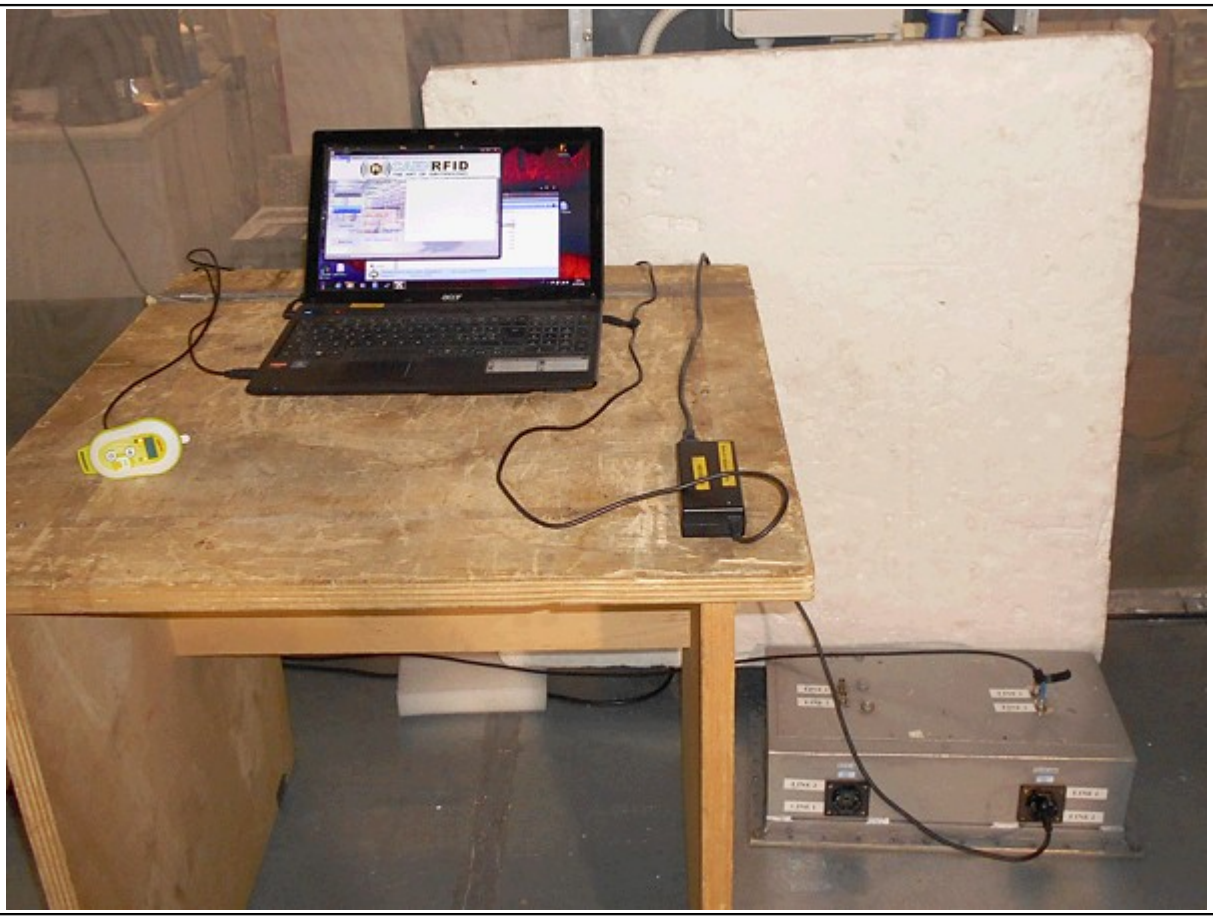


Fig. 8.1
Conducted Emissions Test Set-up

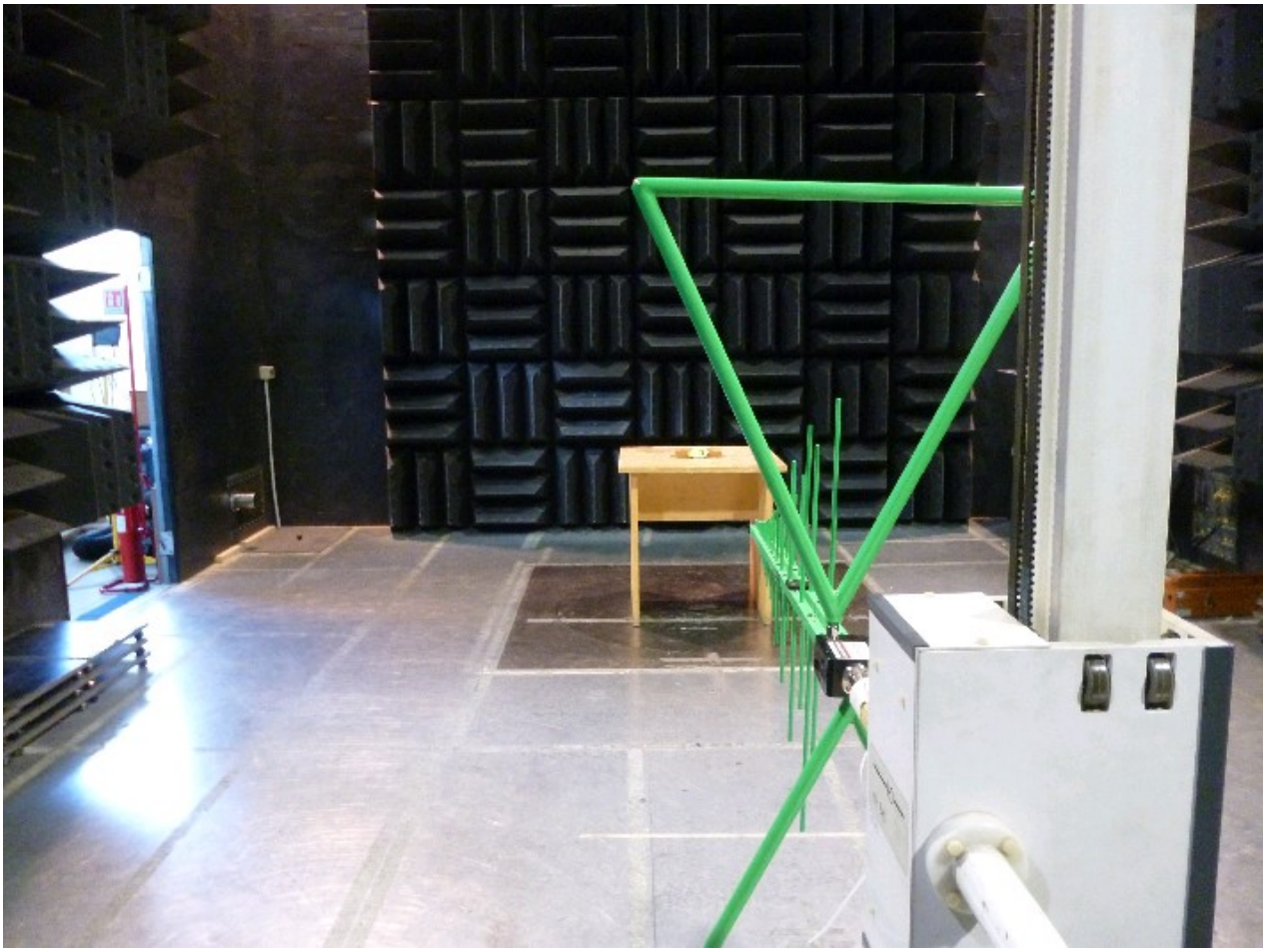


Fig. 8.2

Radiated Emissions Test Set-up
Range: 30 – 1000 MHz

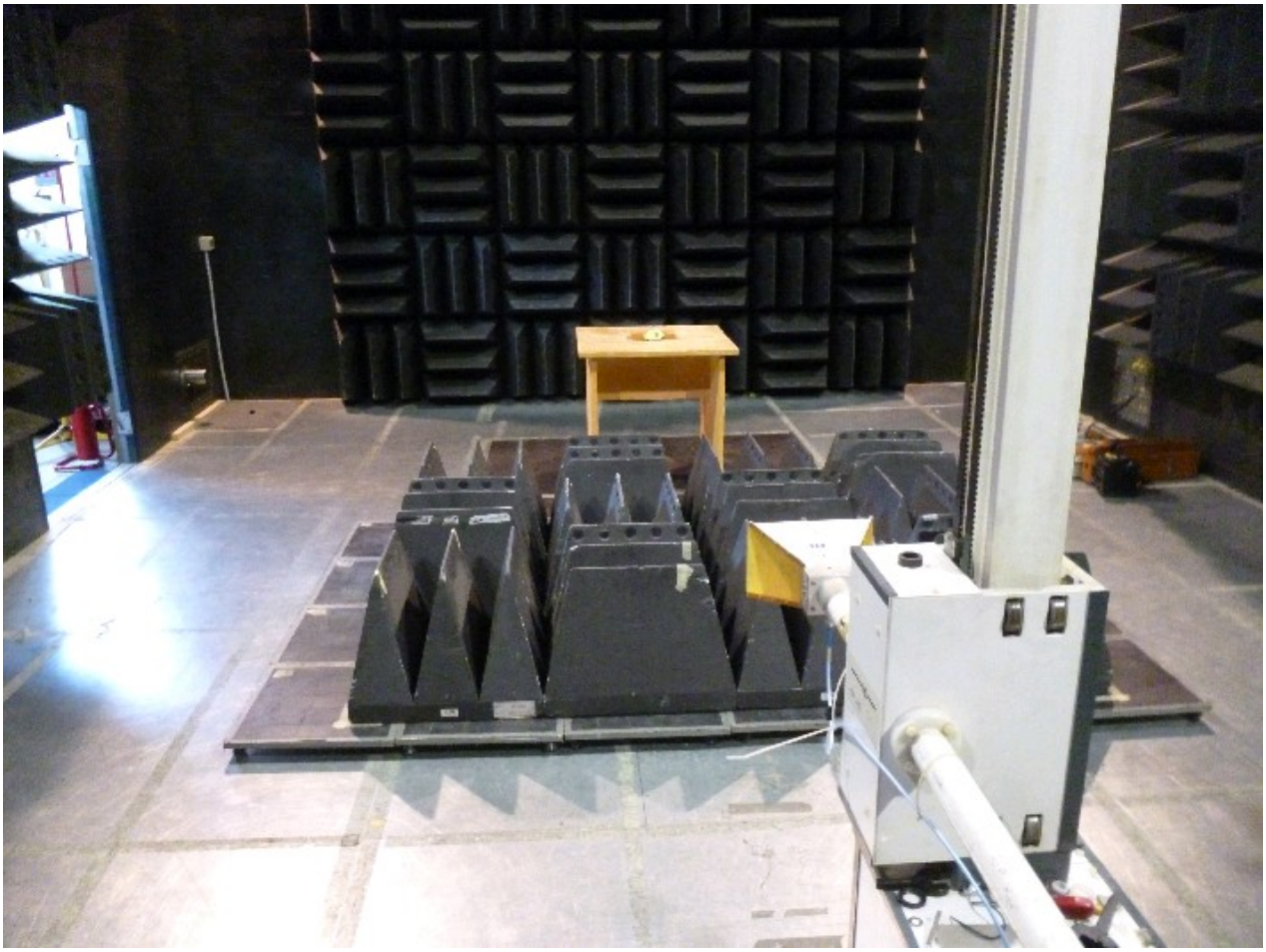


Fig. 8.3

Radiated Emissions Test Set-up
Range: 1 – 10 GHz

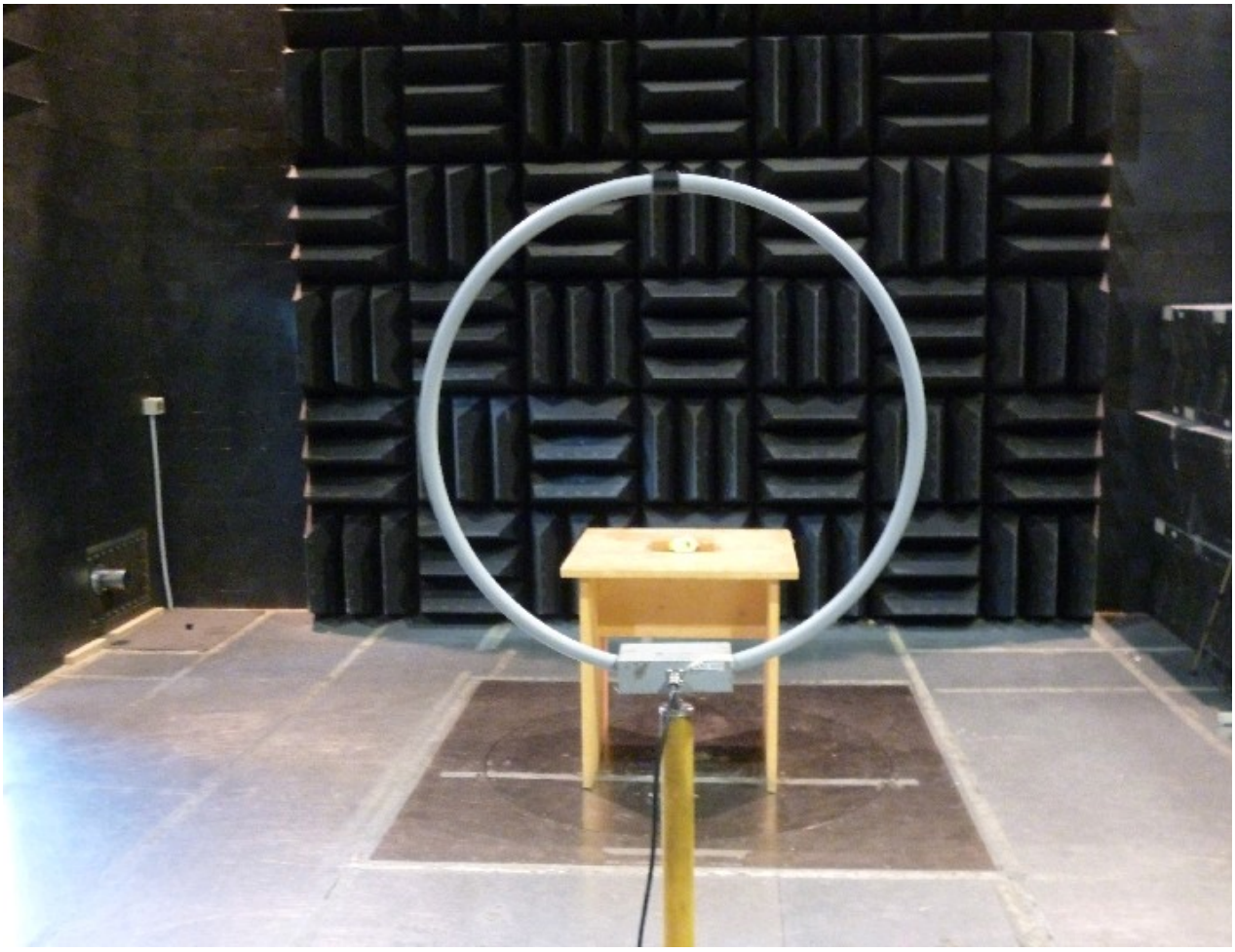


Fig. 8.4

Radiated Emissions Test Set-up
Range: 9 kHz – 30 MHz