

## TEST REPORT

Test report no.: 4-3680/14-01-02-A



Deutsche  
Akkreditierungsstelle  
D-PL-12076-01-00

### Testing laboratory

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#### Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS). The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-00

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### Manufacturer

**Raytheon Anschutz GmbH**  
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24106 Kiel / GERMANY

### Test standard/s

FCC CFR 47 Part 80 Stations in the Maritime Services  
FCC CFR 47 Part 15B Radio Frequency Devices / Unintentional Radiators

For further applied test standards please refer to section 4 of this test report.

### Test Item

**Kind of test item:** Shipborne Radar - X-Band Up Mast Transceiver  
**Model name:** NSX X Up 230V Pedestal  
**Type:** 770-001.NG001  
**FCC ID:** ASLNSX-25U  
**Frequency range:** 9.3 – 9.5 GHz  
**Tx power conducted:** 25 kW (nominal pulse power)  
**Power Supply:** 115/230 V AC  
**Temperature Range:** -25°C to +55°C

### Test report authorized:

Meheza Walla  
Radio Communications & EMC

### Test performed:

Karsten Gerald  
Radio Communications & EMC



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## 2 General information

### 2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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### 2.2 Application details

Date of receipt of order:	2014-10-14
Date of receipt of test item:	2014-10-13
Start of test:	2014-10-14
End of test:	2014-10-22
Laboratory reference number:	021.14
Person(s) present during the test:	Mr. Olaf Albertsen and Mr. Oliver Ehmler

## 3 Test location

CETECOM ICT Services GmbH  
Untertuerkheimer Strasse 6 - 10  
66117 Saarbruecken / GERMANY

#### 4 Test standard/s and Reference/s

Test standard/s	Date	Description
FCC CFR 47 Part 80	2013/2014	Stations in the Maritime Services
FCC CFR 47 Part 15B	2013/2014	Radio Frequency Devices / Unintentional Radiators

Reference/s	Date	Description
ITU-R M.1177-4	2011-04	Techniques for measurement of unwanted emissions of radar systems
ITU-R SM.329-12	2012-09	Unwanted emissions in the spurious domain
ITU-R SM.1541-5	2013-08	Unwanted emissions in the out-of-band domain

#### 5 Test environment

Temperature:	$T_{nom}$	+22 °C during room temperature tests
	$T_{min}$	-30 °C
	$T_{max}$	+55 °C
Relative humidity:		45 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	$V_{nom}$	115/230 V AC

#### 6 Test laboratory/ies sub-contracted

none

## 7 Test item

### 7.1 General Description

Kind of test item	Shipborne Radar - X-Band Up Mast Transceiver
Model name	NSX X Up 230V Pedestal
Type identification	770-001.NG001
S/N serial number	4006099000101
Frequency band	9.3 – 9.5 GHz
TX output power conducted	25 kW (nominal pulse power of magnetron)
Type of modulation	sequence of unmodulated pulses
Type of radio transmission	P0N
Power supply	115/115/230 V AC
Temperature range	-25°C to +55°C

### 7.2 List of components

NSX X Up 230V Pedestal equipped with:

- 25 kW magnetron, EEV Magnetron, Type MG5424, S/N 0076734

### 7.3 Antenna system(s)

Antenna size	Concept	Manufacturer	Type	TX gain dBi (mid)	Polarization	pattern / test report
8 ft	endfed slotted waveguide	Kelvin Hughes	LPR-A25	31.0	horizontal	data sheet / spec. available

### 7.4 Operating conditions

Operating condition 1: X-Band radar, 25 kW, EEV Magnetron, Type MG5424, S/N 0076734

### 7.5 Additional information

The indirect test method as described in ITU-R M.1177 was used to perform the measurements.

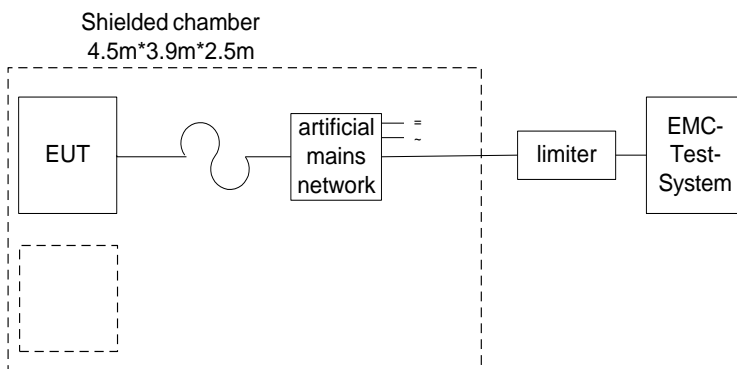
Test setup- and EUT-photos are included in test report: 4-3680\_14-01-01\_AnnexA (External Photos)  
 4-3680\_14-01-01\_AnnexB (Internal Photos)  
 4-3680\_14-01-01\_AnnexC (Test Setup)

## 8 RF measurements

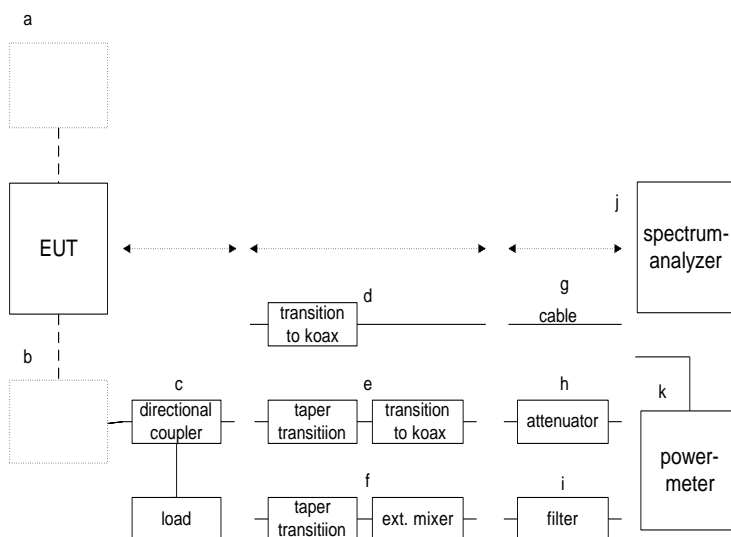
### 8.1 Description of test setup

Following diagrams show possible test setups. They can be considered as applicable in general. Depending on the tests performed and/or depending on the EUT configuration (e.g. amount of different components, setup, ...) the real test setup may vary slightly from the diagrams shown below.

#### 8.1.1 Conducted measurements



Setup 1.1

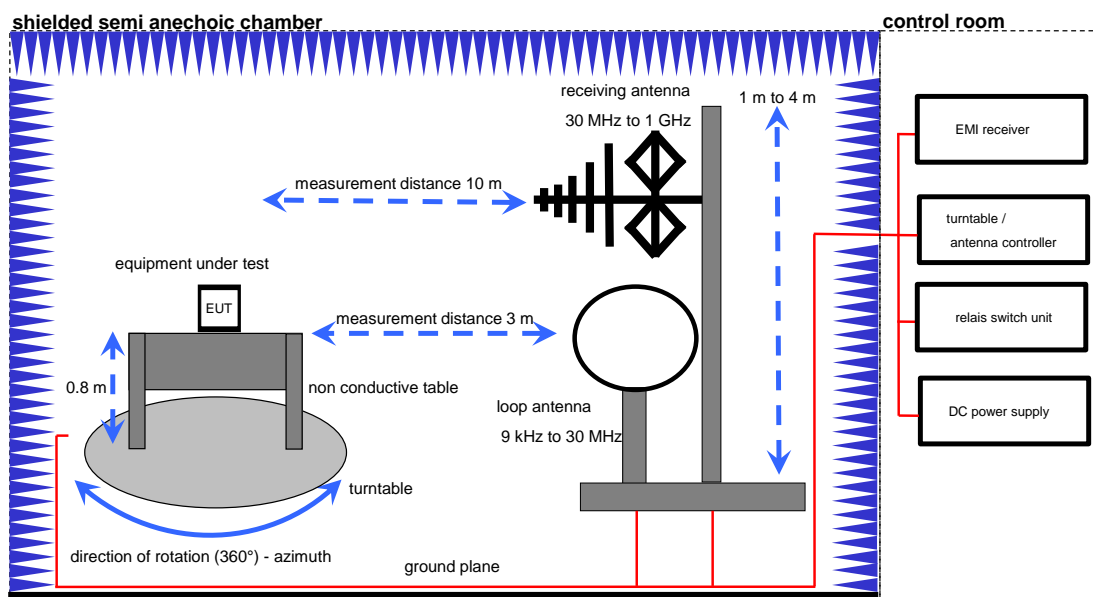


Setup 1.2 x...x

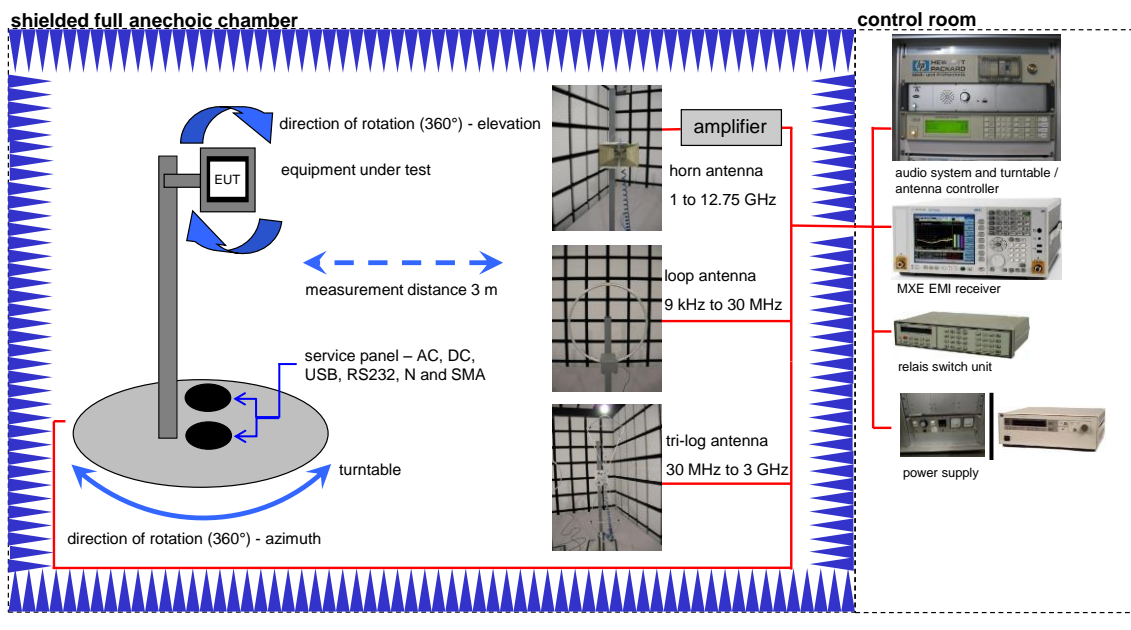
## 8.1.2 Radiation measurements

### Setup 2.1: Radiated measurements chamber F

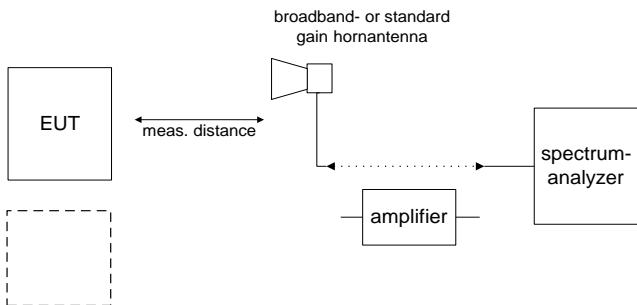
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



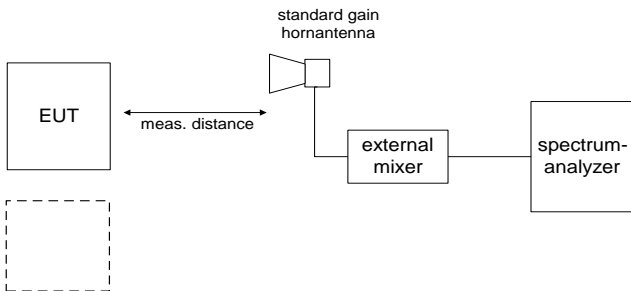
### Setup 2.2: Radiated measurements chamber C



**Setup 2.3: Radiated measurements in test lab up to 50 GHz**



**Setup 2.4: Radiated measurements in test lab above 50 GHz**





## 8.2 Test environment

The environment conditions are documented with each test (see annex(e) with measurement results).

## 8.3 Measurement uncertainties

The measurement and test setup is in accordance to the specification and schematically shown in 8.1. The reference to each test is shown in annex(e) with measurement results.

Measurement uncertainties: Potential error sources/effects in that setup:

- mismatch HF Cable - RF Input of Analyzer
- mismatch Waveguide Adaptor - HF Cable
- mismatch Waveguide Adaptor - Directional Coupler
- mismatch Pedestal Flange - Directional Coupler
- Spectrum Analyzer frequency response
- Spectrum Analyzer IF gain uncertainty
- HF-Cable frequency response calibration uncertainty
- HF-Cable frequency response data conversion uncertainty
- Directional Coupler frequency response calibration uncertainty
- Directional Coupler frequency response data conversion uncertainty
- Attenuator frequency response calibration uncertainty
- Attenuator frequency response data conversion uncertainty

Our total uncertainty for above listed factors with a 95% confidence level (acc. UKAS, ETSI) is  $\leq \pm 1.5\text{dB}$ .

## 9 Test results

### 9.1 Summary

<input checked="" type="checkbox"/>	<b>No deviations from the technical specifications were ascertained</b>
<input type="checkbox"/>	There were deviations from the technical specifications ascertained

The present test report:

<input checked="" type="checkbox"/>	<b>describes the first test</b>
<input type="checkbox"/>	describes an additional test
<input type="checkbox"/>	is a verification of documents
<input type="checkbox"/>	is only valid with the test report no.:

TC identifier	Description	Verdict	Date	Remark
RF-Testing	FCC CFR 47 Part 80 / FCC CFR 47 Part 15B	PASS	2015-07-02	-/-

Test Specification Clause	Test Case	Pass	Fail	N/A	N/P	Results
§2.1046 / §80.215	Measurements required: RF power output / Transmitter power.	X				pulse: 73.8 dBm avg: 41.7 dBm
§2.1047 / §80.213	Measurements required: Modulation characteristics / Modulation requirements	X				complies
§2.1049	Measurements required: Occupied bandwidth (Necessary Bandwidth / B-25dB bandwidth)	X				max. 97 MHz max. 92 MHz max. 102 MHz
§2.1051 / §80.211	Measurements required: Spurious emissions at antenna terminals / Emission limitations (conducted emissions)	X				complies
§2.1053 / §80.211	Measurements required: Field strength of spurious radiation / Emission limitations (radiated emissions)	X				complies
§2.1055 / §80.209	Measurements required: Frequency stability / Transmitter frequency tolerances	X				+954 ppm -653 ppm
§15.107	Conducted limits	X				complies
§15.109	Radiated emission limits	X				complies

N/A: Not Applicable  
N/P: Not Performed

## 9.2 Overview

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## I. Transmitter characteristics / output power

### Description / Limit:

#### § 80.215

(a) Transmitter power shown on the radio station authorization is the maximum power the licensee is authorized to use. Power is expressed in the following terms:

(3) For PON and F3N emission: Mean power.

**Limit:** no limitations

**Test setup:** no. 1.2

### Measurement results:

Mode	T <sub>pulse</sub> [ns]	T <sub>rise</sub> [ns]	T <sub>fall</sub> [ns]	PRF [Hz]	P <sub>out pulse</sub> [dBm]	P <sub>out mean</sub> [dBm]
short pulse	49.6	7.6	38.4	3000	72.2	33.9
medium 1 pulse	201.7	9.6	40.3	2000	73.8	39.9
medium 2 pulse	461.3	9.9	42.8	1000	73.8	40.4
long pulse	864.8	9.2	42.3	750	73.6	41.7

### Note:

P<sub>out mean</sub> is calculated based on P<sub>out pulse</sub> and duty cycle of transmitter.  
see also Annex B, plots 1 - 12

**Result:** The measurement is passed.

## II. Modulation requirements

### Description / Limit:

#### **§ 80.213**

(a) Transmitters must meet the following modulation requirements:

(g) Radar stations operating in the bands above 2.4 GHz may use any type of modulation consistent with the bandwidth requirements in § 80.209(b).

#### **§ 80.209**

(b) When pulse modulation is used in land and ship radar stations operating in the bands above 2.4 GHz the frequency at which maximum emission occurs must be within the authorized bandwidth and must not be closer than  $1.5/T$  MHz to the upper and lower limits of the authorized bandwidth where "T" is the pulse duration in microseconds.

**Test setup:** no. 1.2

### **Measurement results:**

see page 18, VII Transmitter frequency tolerance

**Result:** The measurement is passed.

### III. Occupied bandwidth / Necessary bandwidth / B<sub>-25 dB</sub> / B<sub>-40 dB</sub> bandwidth

#### Description:

#### § 2.1049

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

#### **ITU-R SM.1541: Necessary bandwidth**

For a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions.

#### **ITU-R SM.1541, Annex 8, 2.1 Un-modulated radar pulses**

Recommendation ITU-R SM.853 provides guidance for determining the necessary bandwidth (20 dB below the peak envelope value) for rectangular and trapezoidal pulses. For these systems, the necessary bandwidth  $B_N$  is the smaller of:

$$B_N = \frac{1.79}{\sqrt{t \cdot tr}} \text{ or } \frac{6.36}{t}$$

where  $t$  is the pulse duration (at half amplitude) and  $tr$  is the rise time, both in seconds.

#### **ITU-R SM.1541, Annex 8, 3.1 Formulas for the 40 dB bandwidth**

The following formulas for the 40 dB bandwidth ( $B_{-40}$ ) of primary radar transmitters have been established. For non-FM pulse radars, including spread spectrum or coded pulse radars, the bandwidth is the lesser of:

$$B_{-40\text{dB}} = \frac{K}{\sqrt{t \cdot tr}} \text{ or } \frac{64}{t}$$

where the coefficient  $K$  is 7.6 for lower-power radars (< 100kW) and radars operating in the radionavigation service in the 2 900-3 100 MHz and 9 200-9 500 MHz bands. The latter expression applies if the rise time  $tr$  is less than about 0.0094t when  $K$  is 6.2, or about 0.014t when  $K$  is 7.6.

**Limit:** no limitations

#### Measurement results:

Mode	measured occupied bw [MHz]	measured B <sub>-25 dB</sub> bandwidth [MHz]	calculated necessary bw [MHz]	calculated B <sub>-40 dB</sub> bandwidth [MHz]	see annex C, plot no.
short pulse	97.0	102	92.2	391.4	5, 9
medium 1 pulse	43.0	42.5	31.5	172.7	6,10
medium 2 pulse	28.0	19.6	13.8	112.5	7,11
long pulse	18.0	10.0	7.35	74.0	8, 12

#### **Note:**

see also Annex C, plots 1 – 12

**Result:** The measurement is passed.

#### IV. Emission limits (RF spectrum mask)

##### Description / Limit:

##### § 80.211

The emissions must be attenuated according to the following schedule:

(f) The mean power when using emissions other than those in paragraphs (a), (b), (c) and (d) of this section:

(1) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 dB;

(2) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 dB; and

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus  $10\log_{10}$  (mean power in watts) dB.

**Test setup:** no. 1.2

##### Measurement results:

Mode	see following plots
short pulse	Annex C, plot no. 13
medium 1 pulse	Annex C, plot no.14
medium 2 pulse	Annex C, plot no.15
long pulse	Annex C, plot no.16

##### **Note:**

see also Annex C, plots 13 – 16

**Result:** The measurement is passed.

## V. Emissions limits (conducted emissions)

### Description / Limit:

#### § 80.212

The emissions must be attenuated according to the following schedule:

(f) The mean power when using emissions other than those in paragraphs (a), (b), (c) and (d) of this section:

(1) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 dB;

(2) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 dB; and

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus  $10\log_{10}$  (mean power in watts) dB.

**Test setup:** no. 1.2

### Measurement results:

Conducted Spurious Emissions [dBm]								
short pulse			limit line			long pulse		
F [GHz]	Detector	Level [dBm]	Limit [dBm]		Limit [dBm]	F [GHz]	Detector	Level [dBm]
8.99	RMS	-38.1	-13		-13	8.98	RMS	-41.2
9.95	RMS	-47.2	-13		-13	9.95	RMS	-48.1
18.8	RMS	-33.5	-13		-13	18.8	RMS	-18.7
28.2	RMS	-58.8	-13		-13	28.2	RMS	-36.0
Measurement uncertainty			± 1.5 dB					

n.f. = nothing found

### **Note:**

see also Annex C, plots 17 – 24

For performing the measurements the indirect test method as described in ITU-R M.1177-4 was used. A directional coupler with dummy load was connected at the transmitter output.

**Result:** The measurement is passed.



## VI. Emissions limits (radiated emissions)

### Description / Limit:

#### § 80.212

The emissions must be attenuated according to the following schedule:

(f) The mean power when using emissions other than those in paragraphs (a), (b), (c) and (d) of this section:

(1) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 dB;

(2) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 dB; and

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus  $10\log_{10}$  (mean power in watts) dB.

**Test setup:** no. 2.2 and 2.3

### Measurement results:

Radiated Spurious Emissions [dBm]								
short pulse			limit line			long pulse		
F [MHz]	Detector	Level [dBm]	Limit [dBm]		Limit [dBm]	F [MHz]	Detector	Level [dBm]
86.3	Peak	-510	-13		-13	85.7	Peak	-56.8
161.9	Peak	-62.8	-13		-13	162.5	Peak	-62.1
9400	Peak	carrier	-13		-13	9400	Peak	carrier
18790	Peak	-52.3	-13		-13	18790	Peak	-45.2
28174	Peak	-49.0	-13		-13	28188	Peak	-36.3
37570	Peak	-50.0	-13		-13	37584	Peak	-34.3
Measurement uncertainty			± 3 dB					

n.f. = nothing found

v / h = vertical / horizontal

### **Note:**

see also Annex C, plots 25 – 32

**Result:** The measurement is passed.

## VII. Transmitter frequency tolerance

### Description:

#### § 80.209

(b) When pulse modulation is used in land and ship radar stations operating in the bands above 2.4 GHz the frequency at which maximum emission occurs must be within the authorized bandwidth and must not be closer than  $1.5/T$  MHz to the upper and lower limits of the authorized bandwidth where "T" is the pulse duration in microseconds.

Mode	$T_{\text{pulse}}$ [ns]	$1.5/T$ [MHz]	$f_{\text{min}}$ [GHz]	$f_{\text{max}}$ [GHz]
short pulse	49.6	30.24	9.3302	9.4698
medium 1 pulse	201.7	7.44	9.3074	9.4926
medium 2 pulse	461.3	3.25	9.3033	9.4967
long pulse	864.8	1.73	9.3017	9.4983

### Note:

$f_{\text{min}}$  and  $f_{\text{max}}$  are based on 9.3 GHz – 9.5 GHz band.

**Test setup:** no. 1.2

### Measurement results:

Temperature	Voltage	Reference Frequency	Measured Frequency	Deviation [MHz]	Deviation [ppm]
-30	115	9.393090	9.402050	8.96	954
-20	115	9.393090	9.400620	7.53	802
-10	115	9.393090	9.398650	5.56	592
0	115	9.393090	9.396600	3.51	374
10	115	9.393090	9.395210	2.12	226
20	115	9.393090	9.393090	0.00	0
20	115	9.393090	9.393090	0.00	0
20	98	9.393090	9.393090	0.00	0
30	132	9.393090	9.391870	-1.22	-130
40	115	9.393090	9.389210	-3.88	-413
50	115	9.393090	9.386960	-6.13	-653

lowest measured frequency:  
highest measured frequency:  
maximum deviation:  
(based on normal temp.)

9.386960 GHz  
9.402050 GHz  
+8.96 MHz (+954 ppm)  
-6.13 MHz (-653 ppm)

**Result:** The measurement is passed.

## VIII. AC Conducted Limits

### Description / Limit:

#### §15.107 / 207

(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency of emission [MHz]	Conducted limit [dB $\mu$ V]	
	Quasi-peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

\*Decreases with the logarithm of the frequency.

**Test setup:** 1.1

### Measurement results:

AC conducted emissions < 30 MHz [dB $\mu$ V/m]		
Frequency [MHz]	Detector	Level [dB $\mu$ V/m]
No critical peaks detected. All detected peak values are below the average limits.		
Measurement uncertainty	± 3 dB	

### **Note:**

see also Annex D, plots 1 – 2

**Result:** The measurement is passed.

## IX. Radiated Emission Limits

### Description / Limit:

#### §15.109 / 209

(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission [MHz]	Field strength [microvolts/meter]	Field strength [dB $\mu$ V/meter]	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)		300
0.490 – 1.705	24000/F(kHz)		30
1.705 – 30	30	29.5	30
30 – 88	100	40.0	3
88 – 216	150	43.5	3
216 – 960	200	46.0	3
above 960	500	54.0	3

(c) In the emission tables above, the tighter limit applies at the band edges.

**Test setup:** 2.1 – 2.3

### Measurement results:

Spurious Emissions Radiated [dB $\mu$ V/m]		
Frequency [GHz]	Detector	Level [dB $\mu$ V/m]
11.1 GHz (short pulse)	Peak	45.8
18.8 GHz (short pulse)	RMS	27.1
28.2 GHz (short pulse)	RMS	28.5
11.1 GHz (long pulse)	Peak	38.3
18.8 GHz (long pulse)	RMS	31.8
28.2 GHz (long pulse)	RMS	40.7
37.6 GHz (long pulse)	RMS	37.1
Measurement uncertainty	± 3 dB	

### Note:

see also Annex D, plots 3 – 14

**Result:** The measurement is passed.

## Annex A Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signaling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
2	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
3	50	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B5979	300000210	ne		
4	50	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	27.01.2014	27.01.2015
5	50	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	Ve	11.02.2014	11.02.2015
6	50	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
7	50	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
8	50	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
9	50	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
10	50	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	22.04.2014	22.04.2016
11	50	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	22.01.2014	22.01.2015
12	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	12.01.2012	12.01.2015
13	n. a.	Double-Ridged Waveguide Horn Antenna 1-18,0GHz	3115	EMCO	8812-3088	300001032	viKI!	08.05.2013	08.05.2015
14	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
15	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
16	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	30.01.2014	30.01.2016
17	9	Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erfi	91350	300001155	ne		
18	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
19	90	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
20	90	Band Reject filter	WRCG1855/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
21	90	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
22	90	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
23	90	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	viKI!	29.10.2014	29.10.2017
24	90	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	13.03.2014	13.03.2015
25	90	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000037	300004509	ne		
26	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
27	231	Stub Tuner (double)	N300A	Microlab/Fxr	00419	300002042	ev		
28	240	Directional Coupler RPS90	90-2-N-F-40-SP-SP-C	CMT	900687-002	300001598	ev		
29	217	HF-Cable	KPS1533-590-KPS	Insulated Wire	900687-002	300002290	ev		
30	R001	Spectrum Analyzer 9kHz-50GHz portable spectrum analyzer	8565E	HP Meßtechnik	3515A00283	300000916	Ve	28.01.2013	28.01.2015
31	241	Waveguide Directional Couplerr, 8.2 to 12.4 GHz, 20	X752D	HP	1829A21784	300000484	ev		

		dB							
32	214	Attenuator (N-connector)	10 dB / 10 W	Spinner	745379	400000047	ev		
33	214	RF Peak Power Analyzer+ PPA Sensor	4500B + 58318	Boonton Electronics	12331 + 6276	300003871	k	29.01.2014	29.01.2015
34	CR 79	Std. Gain Horn Antenna 26.5-40.0 GHz	V637	Narda	7911	300001751	ne		
35	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787	k	22.07.2013	22.07.2015
36	A029	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442	k	19.07.2013	19.07.2015
37	A029	PXA Spectrum Analyzer 3Hz to 50GHz	N9030A PXA Signal Analyzer	Agilent Technologies	US51350267	300004338	k	09.01.2014	09.01.2015

**Agenda:** Kind of Calibration

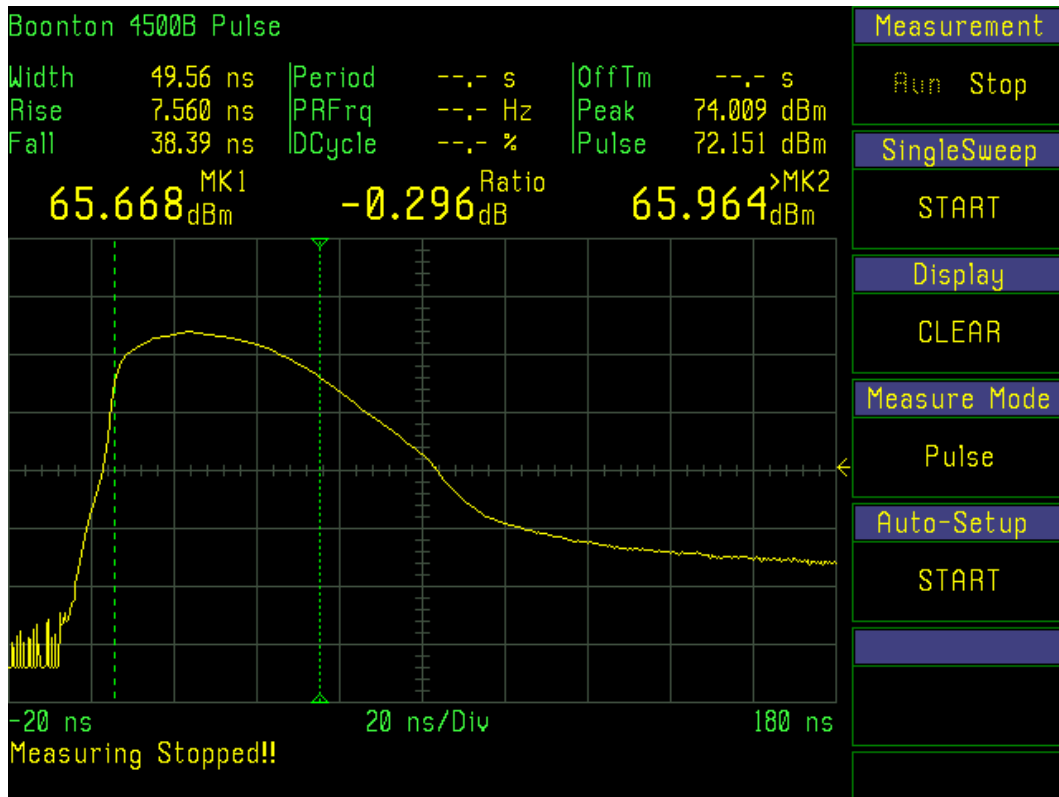
k calibration / calibrated  
 ne not required (k, ev, izw, zw not required)  
 ev periodic self verification  
 Ve long-term stability recognized  
 vlk! Attention: extended calibration interval  
 NK! Attention: not calibrated

EK limited calibration  
 zw cyclical maintenance (external cyclical maintenance)  
 izw internal cyclical maintenance  
 g blocked for accredited testing  
 \*) next calibration ordered / currently in progress

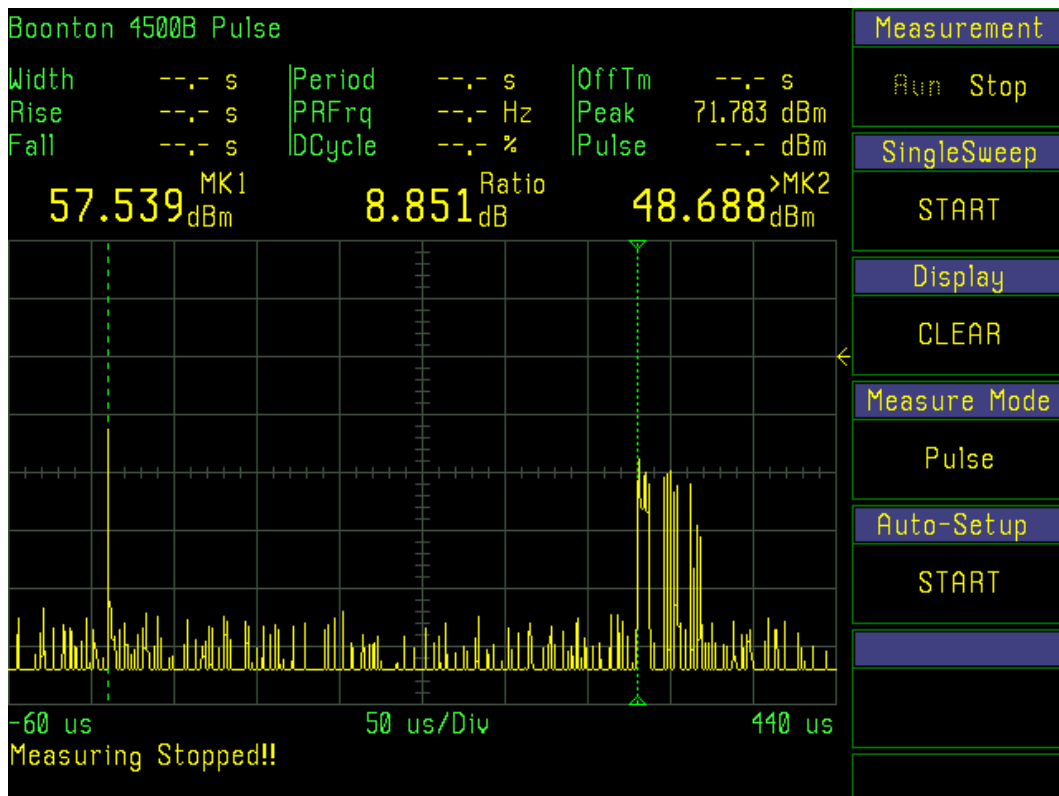
## Annex B Measurement results, part 1 (PPA)

This annex consists of 7 pages including this page.

Plot No. 1: EEV Magnetron, Type MG5424, short pulse

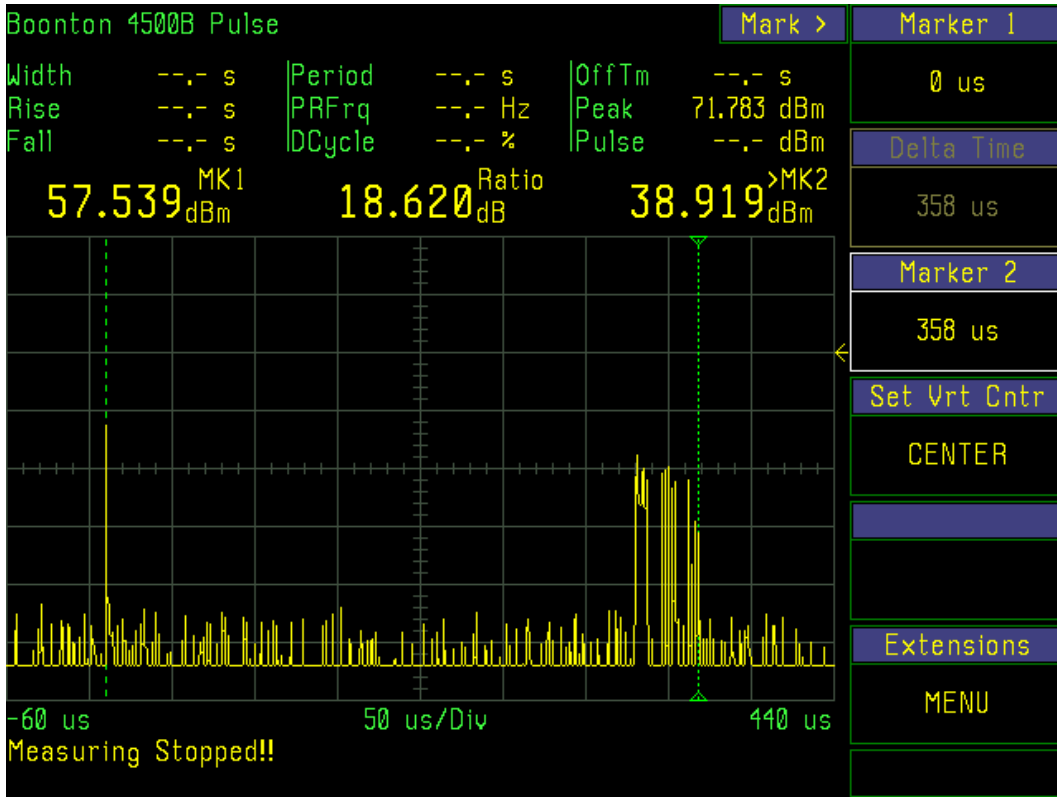


Plot No. 2: EEV Magnetron, Type MG5424, short pulse

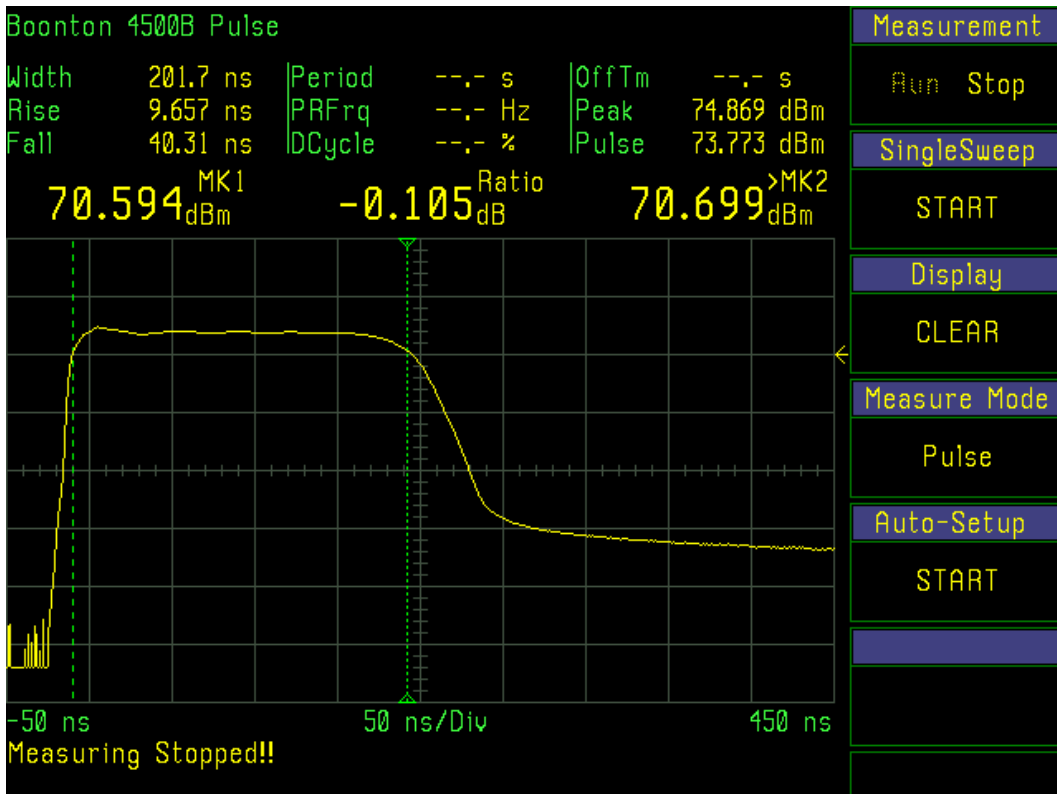




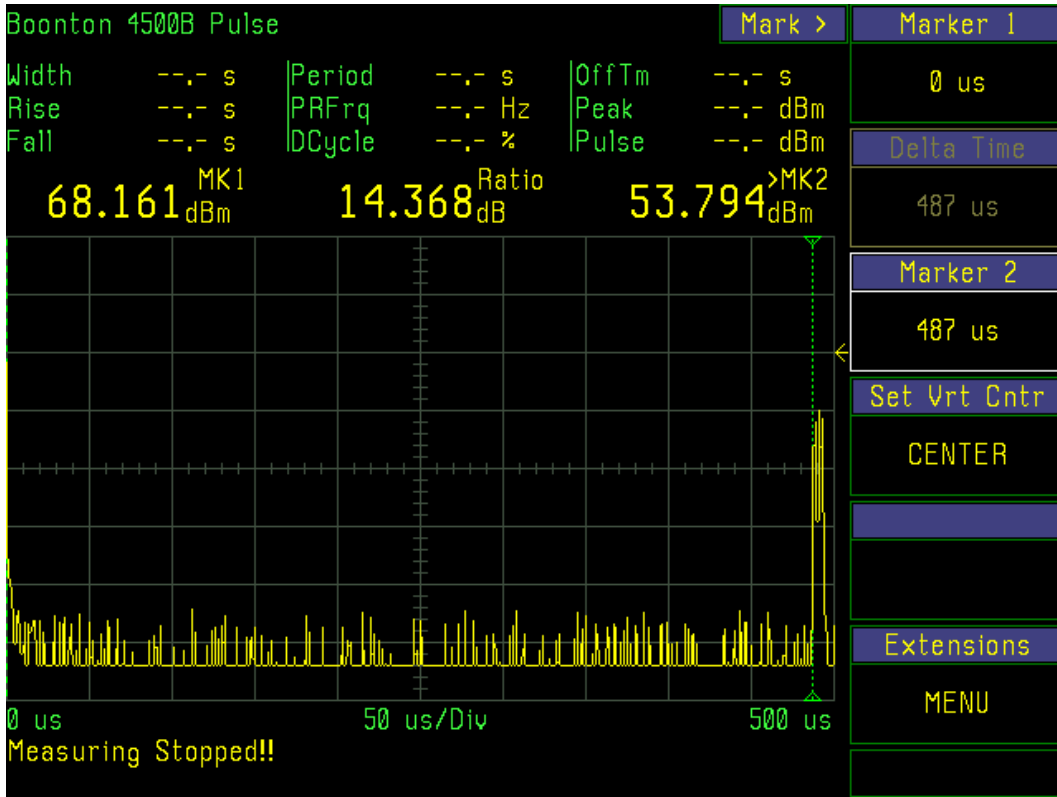
Plot No. 3: EEV Magnetron, Type MG5424, short pulse



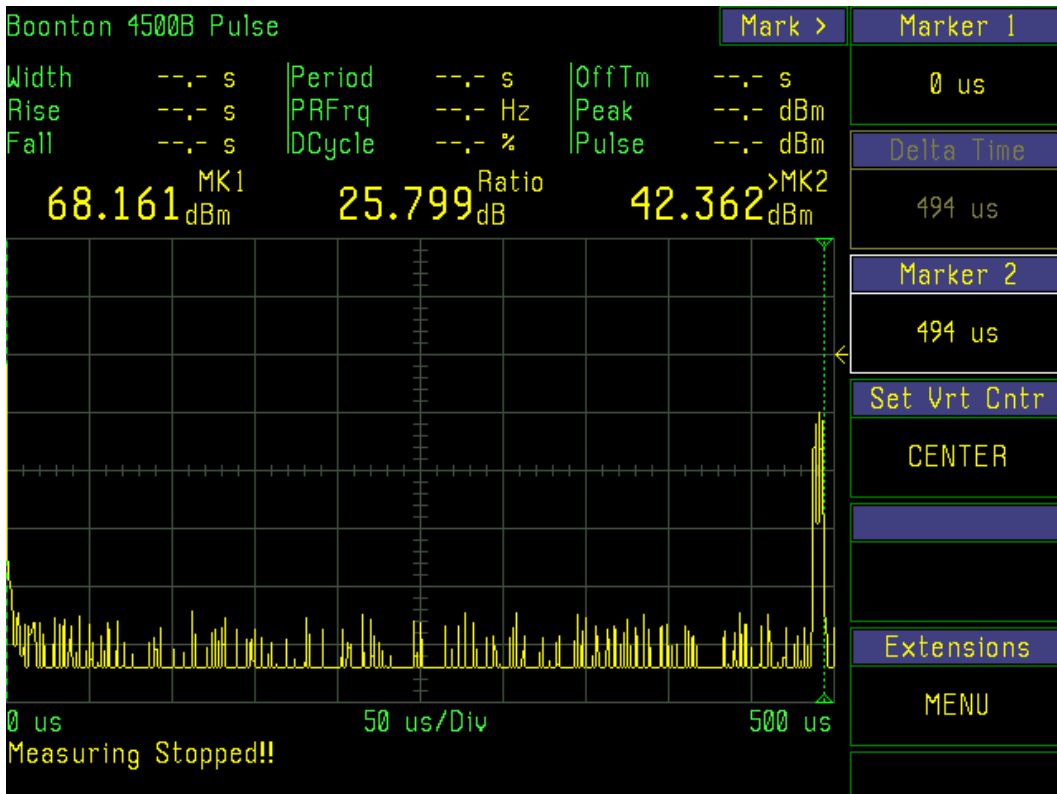
Plot No. 4: EEV Magnetron, Type MG5424, medium 1 pulse



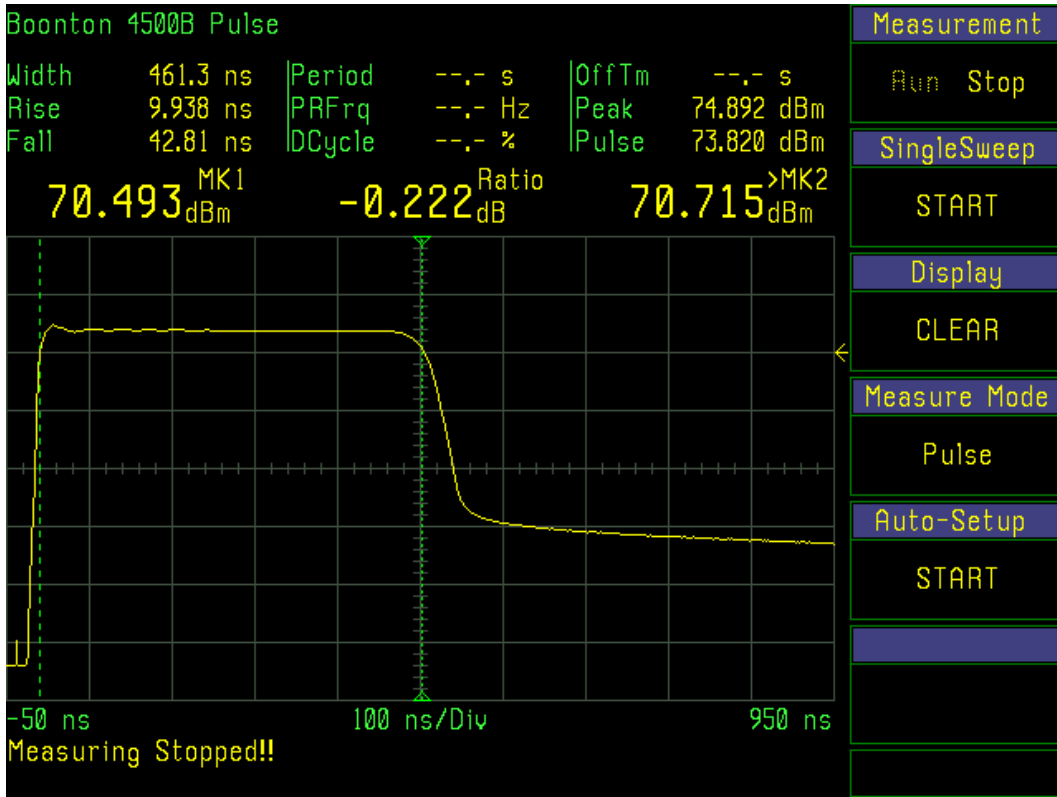
Plot No. 5: EEV Magnetron, Type MG5424, medium 1 pulse



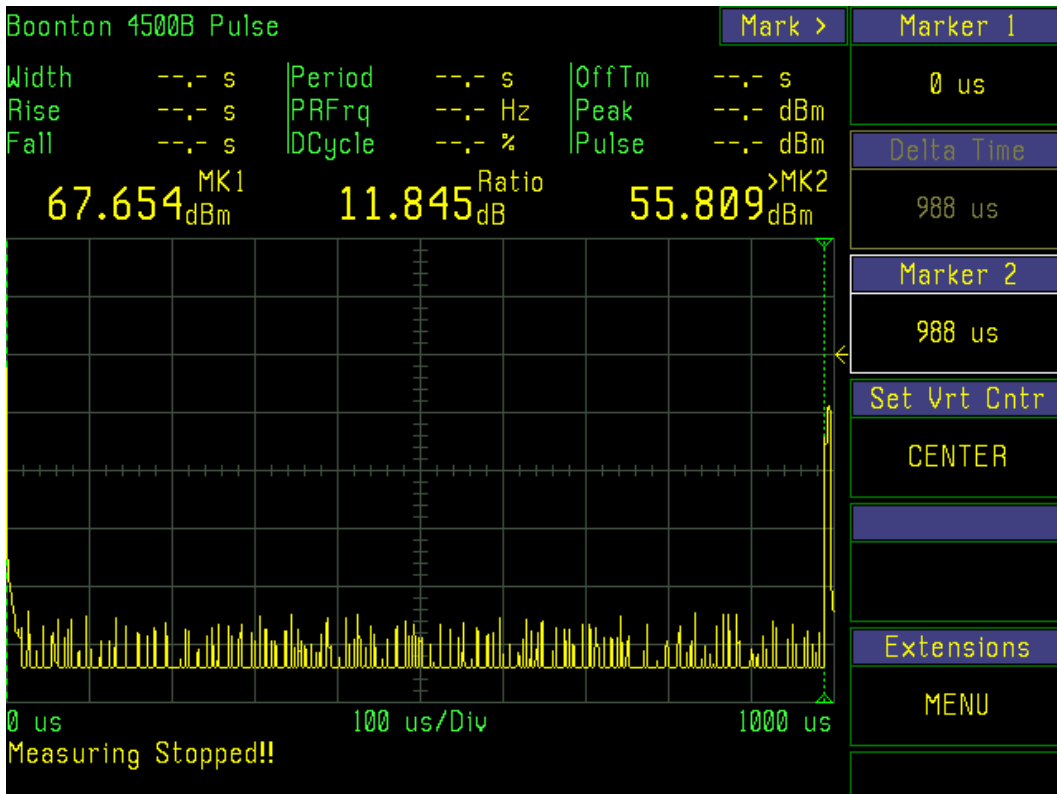
Plot No. 6: EEV Magnetron, Type MG5424, medium 1 pulse



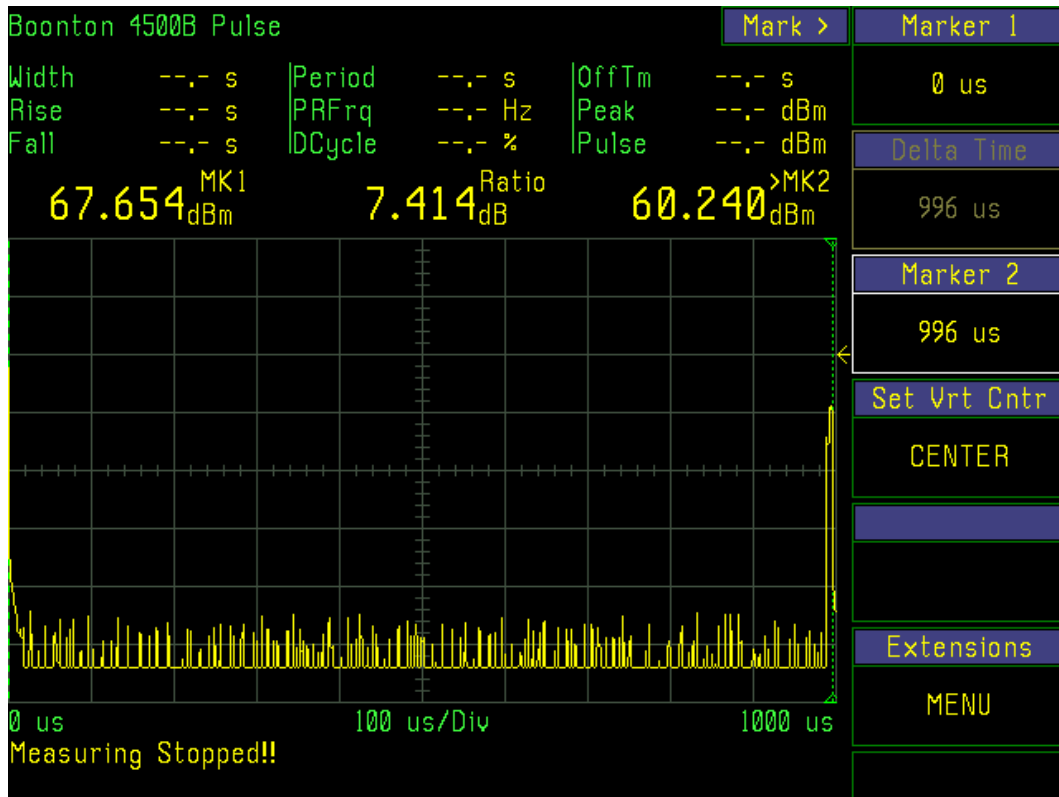
Plot No. 7: EEV Magnetron, Type MG5424, medium 2 pulse



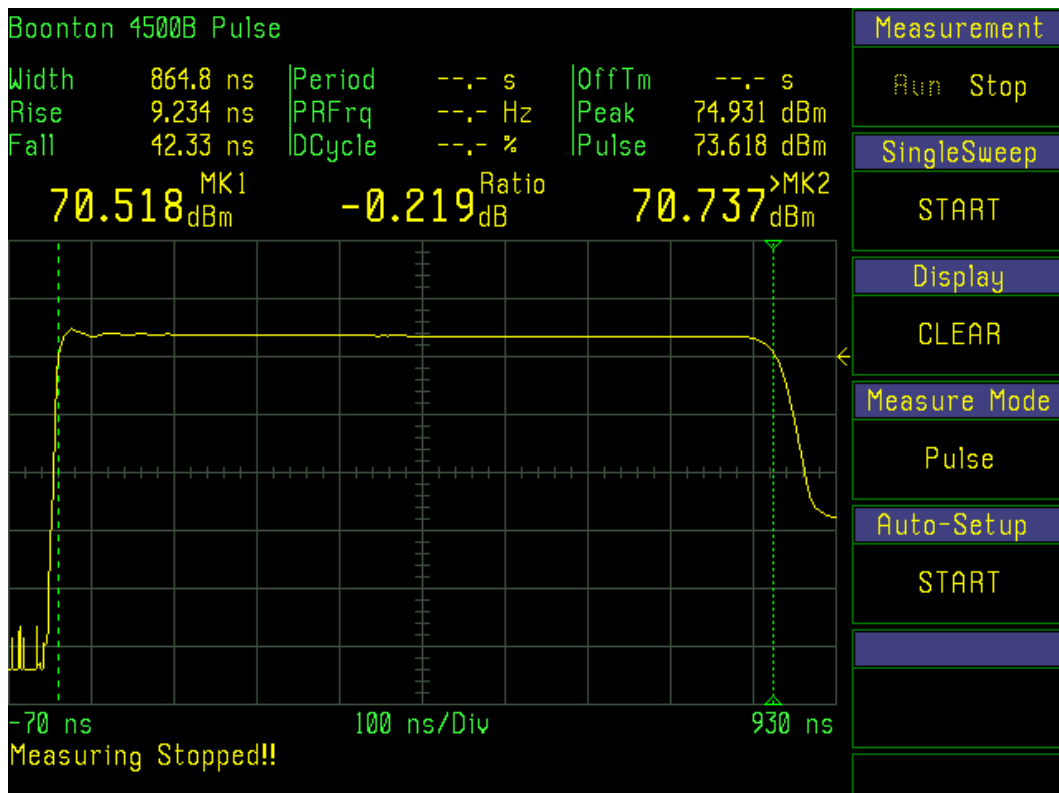
Plot No. 8: EEV Magnetron, Type MG5424, medium 2 pulse



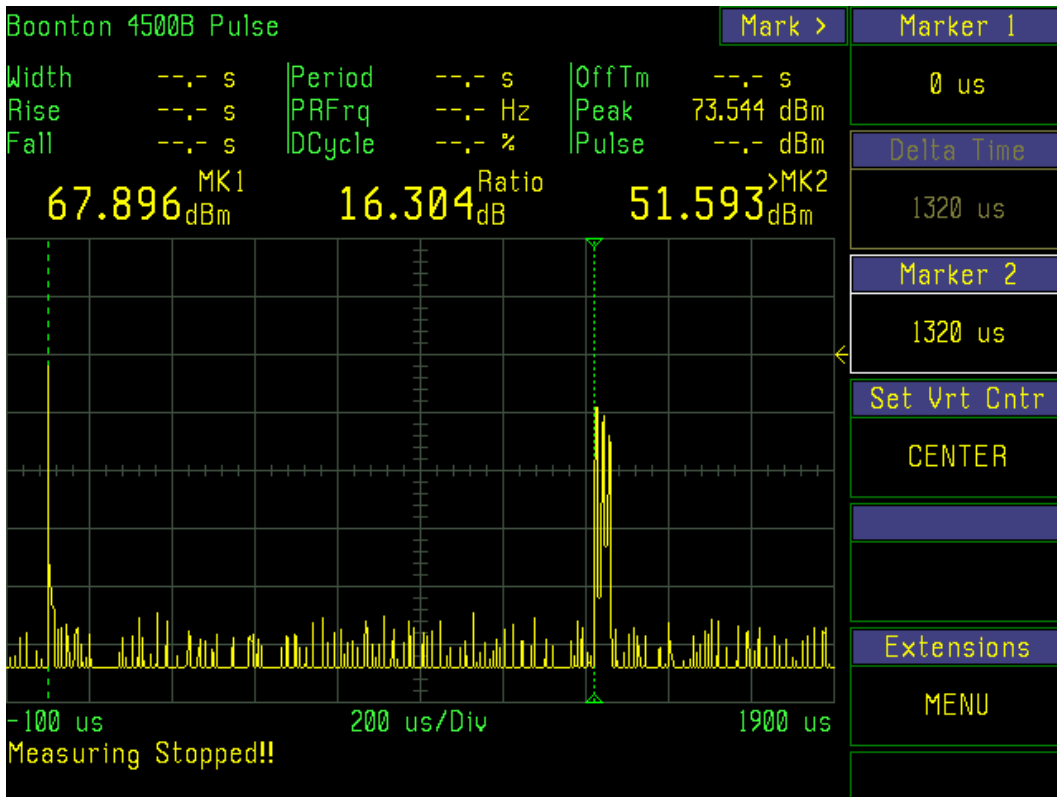
Plot No. 9: EEV Magnetron, Type MG5424, medium 2 pulse



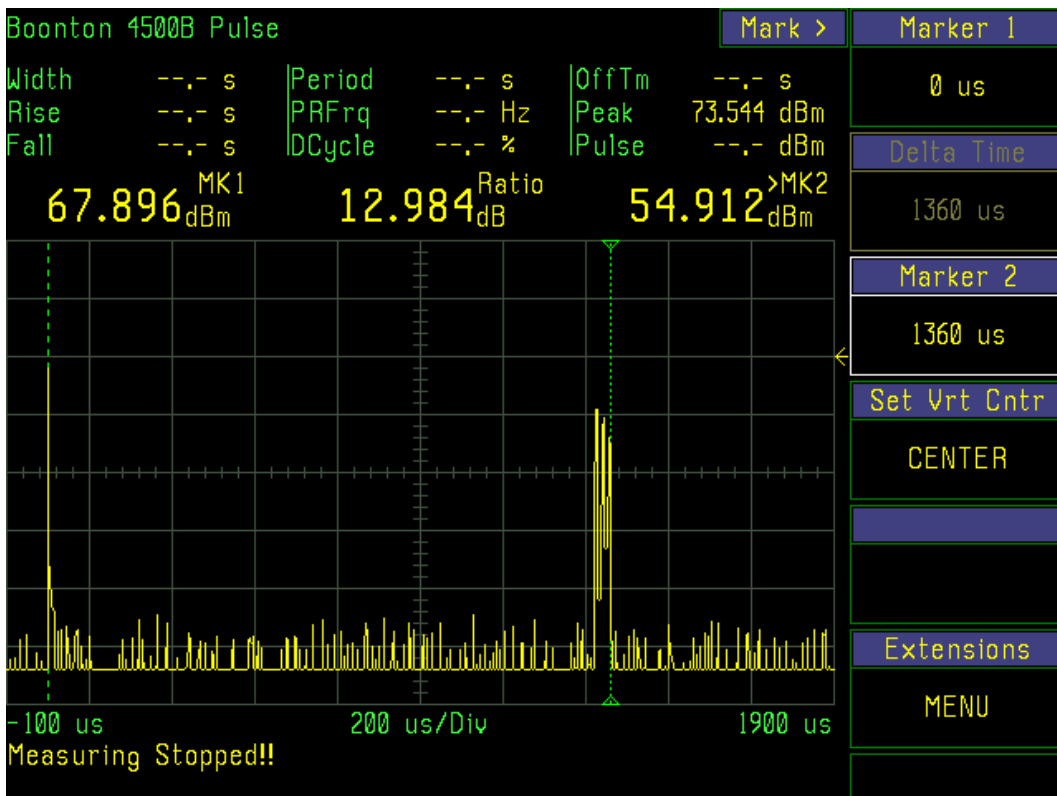
Plot No. 10: EEV Magnetron, Type MG5424, long pulse



Plot No. 11: EEV Magnetron, Type MG5424, long pulse



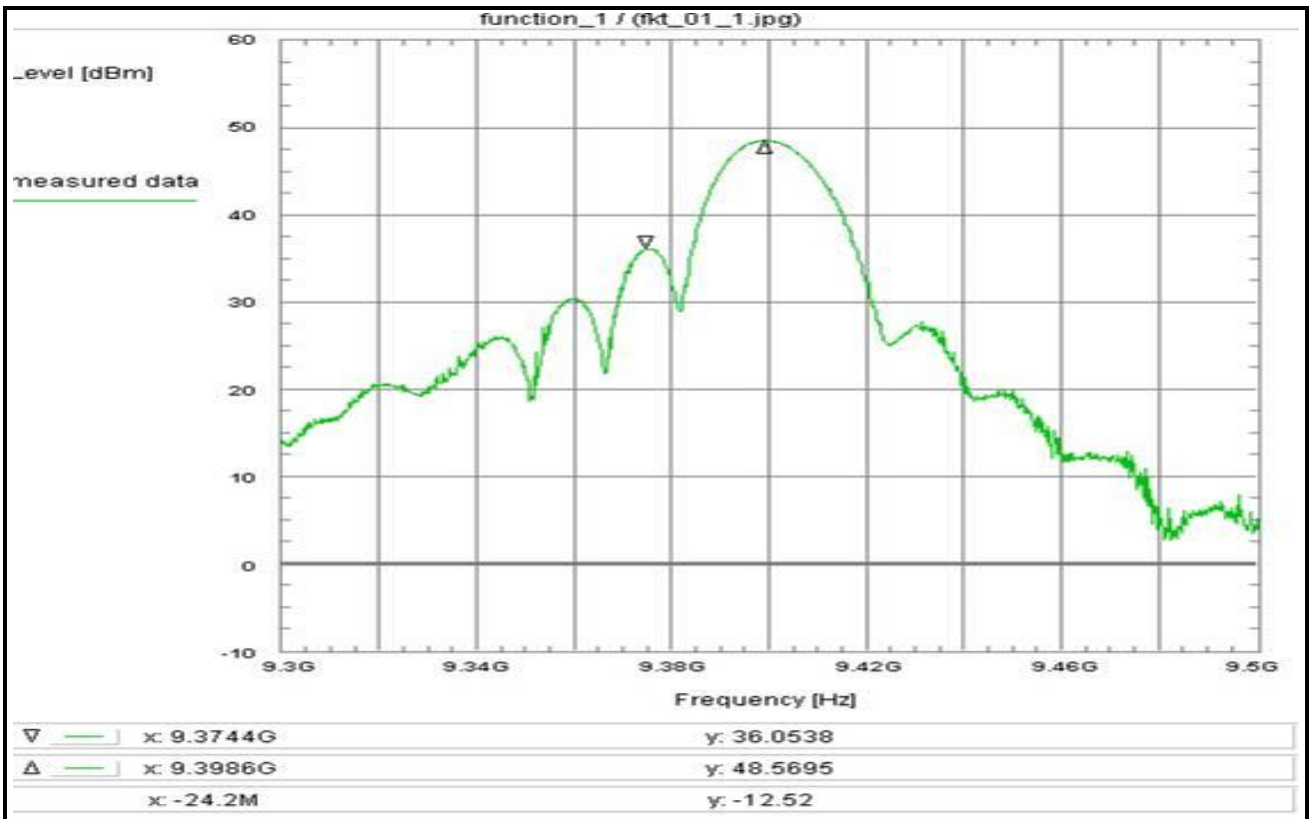
Plot No. 12: EEV Magnetron, Type MG5424, long pulse



**Annex C Measurement results, part 2 (FCC Part 80)**

This annex consists of 33 pages including this page.

Plot No. 1 ( 32 )



**Subclause:** -- Function test, frequency and power  
Short pulse / medium pulse / long pulse  
Measurement within the allocated band: 9.3 - 9.5 GHz

**Limit:**  
no limits defined

This test serves to verify the general function of the EUT and to orientate regarding to the spurious emissions which are expected within the band, furthermore for comparison of the measured power with the rated value.

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see subclause 1.5.2  
short pulse

**Test setup:**  
see section 8.1: 1.2cdhgj

**Test equipment:**  
see annex 2: C217, R001, U214, W240, W242

**Remark:**

**Test result:** measurement for orientation

**Environment condition:**

Date & Time: Thu 16/Oct/2014 11:24:44  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 23 °C  
Humidity: 50 %  
Voltage: 233 Vac

**Setup of measurement equipment:**

Start frequency: 9.3 GHz  
Stop frequency: 9.5 GHz  
Center frequency: 9.4 GHz  
Frequency span: 200 MHz  
Resolution-BW: 1 MHz  
Video-BW: 50 MHz  
Input attenuation: 20 dB  
Trace-Mode: Max-Hold  
Detector-Mode: Pos Peak

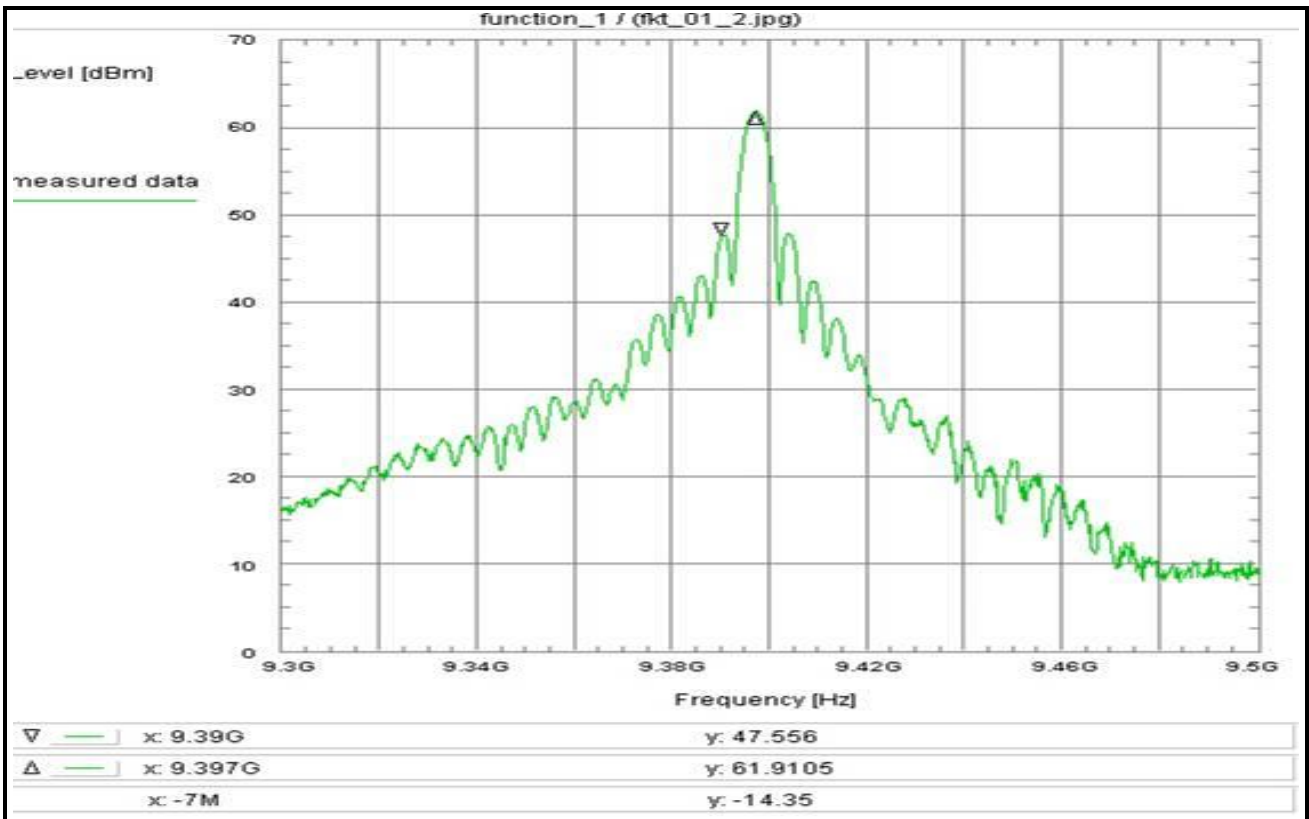
**Correction:**

Directional coupler (W240) + 44.0 dB  
Coaxial cable (C217) + 2.2 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Attenuation (U214) + 9.5 dB  
TOTAL CORRECTION: + 55.7 dB

**Remarks:**

Test of general function of the EUT and measurement for orientation

Plot No. 2 ( 32 )



**Subclause:** -/- Function test, frequency and power  
Short pulse / medium pulse / long pulse  
Measurement within the allocated band: 9.3 - 9.5 GHz

**Limit:**  
no limits defined

This test serves to verify the general function of the EUT and to orientate regarding to the spurious emissions which are expected within the band, furthermore for comparison of the measured power with the rated value.

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see subclause 1.5.2  
medium1 pulse

**Test setup:**  
see section 8.1: 1.2cdhgj

**Test equipment:**  
see annex 2: C217, R001, U214, W240, W242

**Remark:**

**Test result:** measurement for orientation

**Environment condition:**  
Date & Time: Thu 16/Oct/2014 11:37:04  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 23 °C  
Humidity: 50 %  
Voltage: 233 Vac

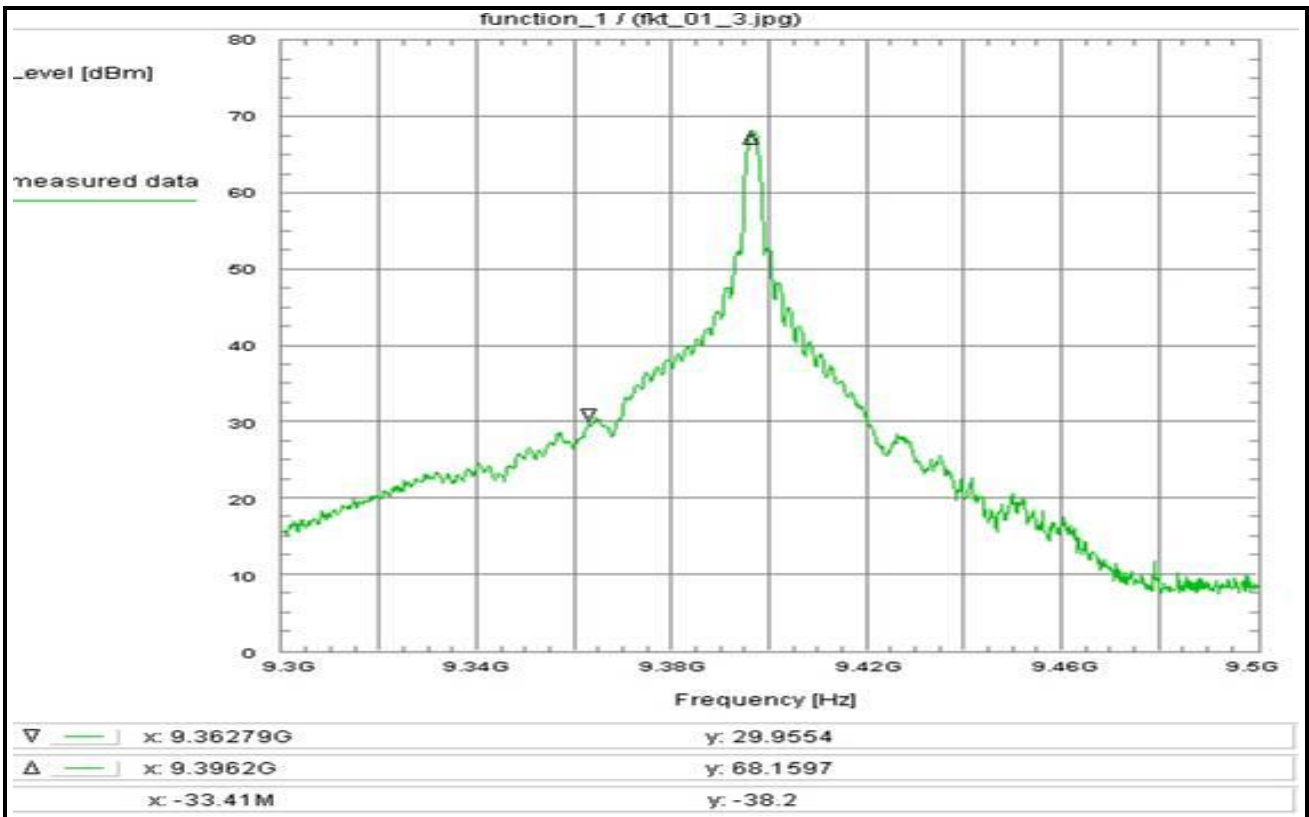
**Setup of measurement equipment:**  
Start frequency: 9.3 GHz  
Stop frequency: 9.5 GHz  
Center frequency: 9.4 GHz  
Frequency span: 200 MHz  
Resolution-BW: 1 MHz  
Video-BW: 50 MHz  
Input attenuation: 30 dB  
Trace-Mode: Max-Hold  
Detector-Mode: Pos Peak

**Correction:**  
Directional coupler (W240) + 44.0 dB  
Coaxial cable (C217) + 2.2 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Attenuation (U214) + 9.5 dB  
TOTAL CORRECTION: + 55.7 dB

**Remarks:**  
Test of general function of the EUT and measurement for orientation



Plot No. 3 ( 32 )



**Subclause:** -/- Function test, frequency and power  
Short pulse / medium pulse / long pulse  
Measurement within the allocated band: 9.3 - 9.5 GHz

**Limit:**  
no limits defined

This test serves to verify the general function of the EUT and to orientate regarding to the spurious emissions which are expected within the band, furthermore for comparison of the measured power with the rated value.

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see subclause 1.5.2  
medium2 pulse

**Test setup:**  
see section 8.1: 1.2cdhgj

**Test equipment:**  
see annex 2: C217, R001, U214, W240, W242

**Remark:**  
measurement for orientation

**Test result:** Test passed

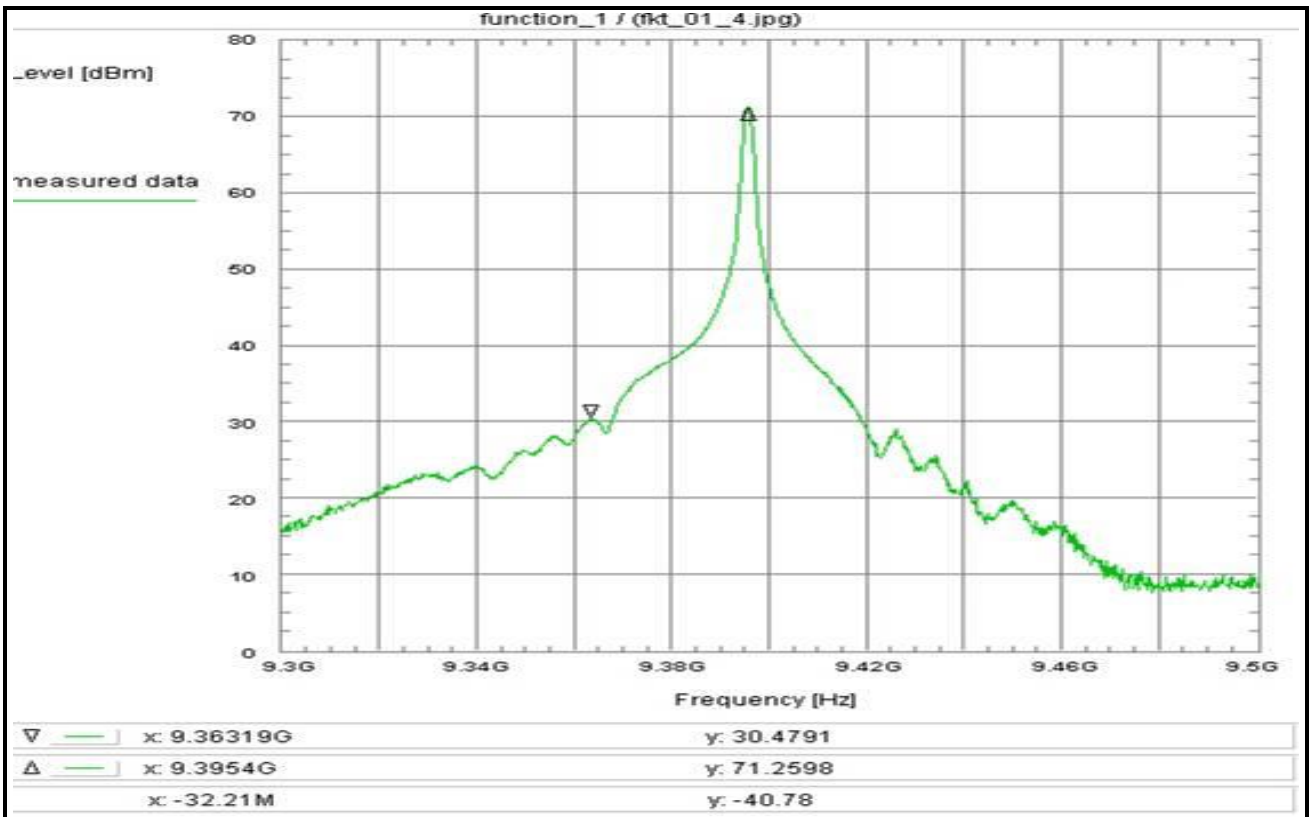
**Environment condition:**  
Date & Time: Thu 16/Oct/2014 11:38:00  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 23 °C  
Humidity: 50 %  
Voltage: 233 Vac

**Setup of measurement equipment:**  
Start frequency: 9.3 GHz  
Stop frequency: 9.5 GHz  
Center frequency: 9.4 GHz  
Frequency span: 200 MHz  
Resolution-BW: 1 MHz  
Video-BW: 50 MHz  
Input attenuation: 30 dB  
Trace-Mode: Max-Hold  
Detector-Mode: Pos Peak

**Correction:**  
Directional coupler (W240) + 44.0 dB  
Coaxial cable (C217) + 2.2 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Attenuation (U214) + 9.5 dB  
TOTAL CORRECTION: + 55.7 dB

**Remarks:**  
Test of general function of the EUT and measurement for orientation

Plot No. 4 ( 32 )



**Subclause:** -/- Function test, frequency and power  
Short pulse / medium pulse / long pulse  
Measurement within the allocated band: 9.3 - 9.5 GHz

**Limit:**  
no limits defined

This test serves to verify the general function of the EUT and to orientate regarding to the spurious emissions which are expected within the band, furthermore for comparison of the measured power with the rated value.

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see subclause 1.5.2  
long pulse

**Test setup:**  
see section 8.1: 1.2cdhgj

**Test equipment:**  
see annex 2: C217, R001, U214, W240, W242

**Remark:**

**Test result:** measurement for orientation

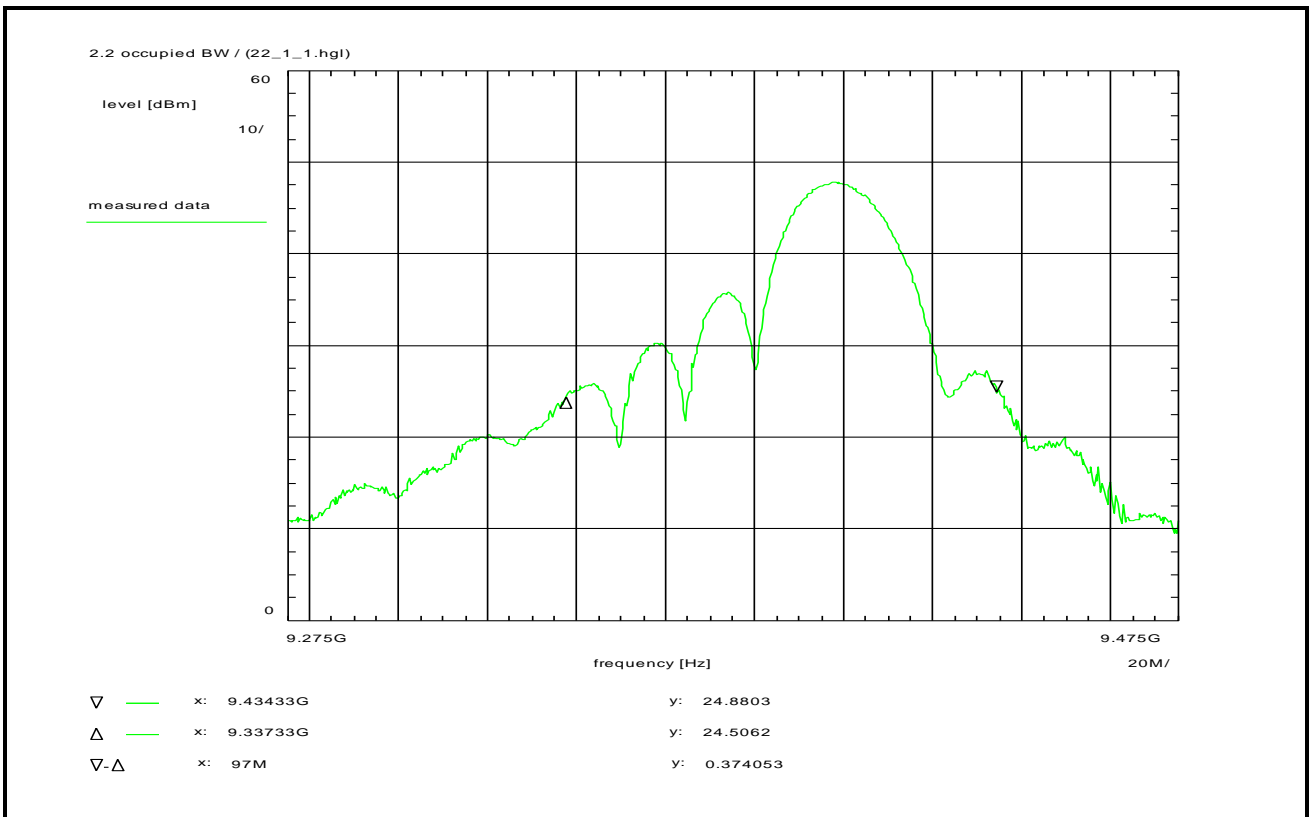
**Environment condition:**  
Date & Time: Thu 16/Oct/2014 11:39:47  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 23 °C  
Humidity: 50 %  
Voltage: 233 Vac

**Setup of measurement equipment:**  
Start frequency: 9.3 GHz  
Stop frequency: 9.5 GHz  
Center frequency: 9.4 GHz  
Frequency span: 200 MHz  
Resolution-BW: 1 MHz  
Video-BW: 50 MHz  
Input attenuation: 30 dB  
Trace-Mode: Max-Hold  
Detector-Mode: Pos Peak

**Correction:**  
Directional coupler (W240) + 44.0 dB  
Coaxial cable (C217) + 2.2 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Attenuation (U214) + 9.5 dB  
TOTAL CORRECTION: + 55.7 dB

**Remarks:**  
Test of general function of the EUT and measurement for orientation

Plot No. 5 ( 28 )



**Subclause:** -/- Verification of the occupied bandwidth (99% bandwidth)  
Short pulse / medium pulse / long pulse  
Measurement within the allocated band: 9.3 - 9.5 GHz

**Limit:**  
The occupied bandwidth is defined as the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0.5% of the emitted power. This is also known as the 99% emission bandwidth.

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see section 7.4  
short pulse

**Test setup:**  
see section 8.1: 1.2cdhgj

**Test equipment:**  
see annex A: C217, R001, U214, W240, W242

**Remark:**

**Test result:** determination of the occupied bandwidth

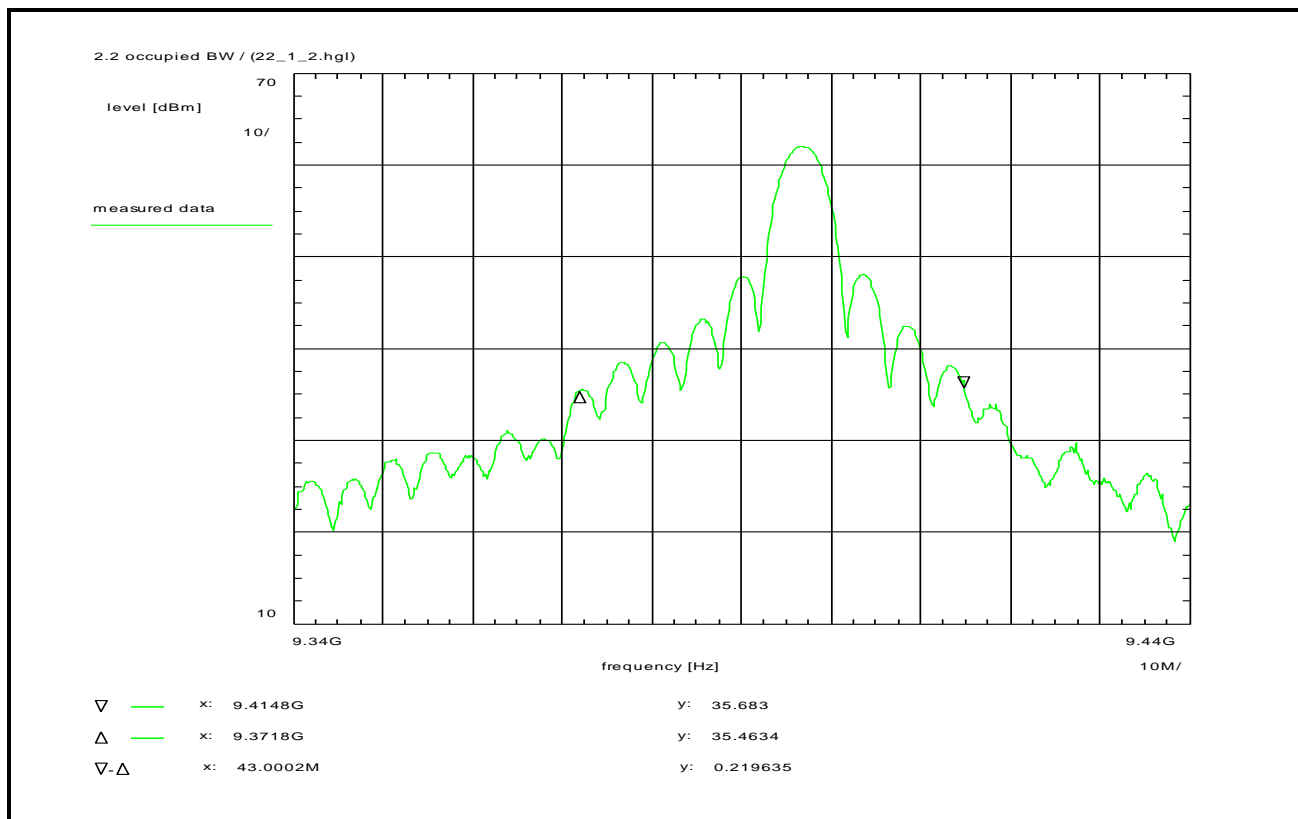
**Environment condition:**  
Date & Time: Tue 14/Oct/2014 14:03:47  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 22 °C  
Humidity: 45 %  
Voltage: 233 Vac

**Setup of measurement equipment:**  
Start frequency: 9.275 GHz  
Stop frequency: 9.475 GHz  
Center frequency: 9.375 GHz  
Frequency span: 200 MHz  
Input attenuation: 10 dB  
Resolution-BW: 1 MHz  
Video-BW: 1 MHz  
Video-Average: 1 sweep(s) (>1)  
Detector-Mode: 2 Pos Peak (Maximum-Hold)

**Correction (average):**  
Directional coupler (W240) + 43.9 dB  
Coaxial cable (C217) + 2.2 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Attenuation (U214) + 9.5 dB  
TOTAL CORRECTION: + 55.6 dB

**Remarks:**  
Internal function of spectrum analyser was used to measure the occupied bandwidth. The measured value is about 97 MHz (delta marker).

Plot No. 6 ( 28 )



**Subclause:** -/- Verification of the occupied bandwidth (99% bandwidth)  
Short pulse / medium pulse / long pulse  
Measurement within the allocated band: 9.3 - 9.5 GHz

**Limit:**  
The occupied bandwidth is defined as the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0.5% of the emitted power. This is also known as the 99% emission bandwidth.

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see section 7.4  
med1 pulse

**Test setup:**  
see section 8.1: 1.2cdhgi

**Test equipment:**  
see annex A: C217, R001, U214, W240, W242

**Remark:**

**Test result:** determination of the occupied bandwidth

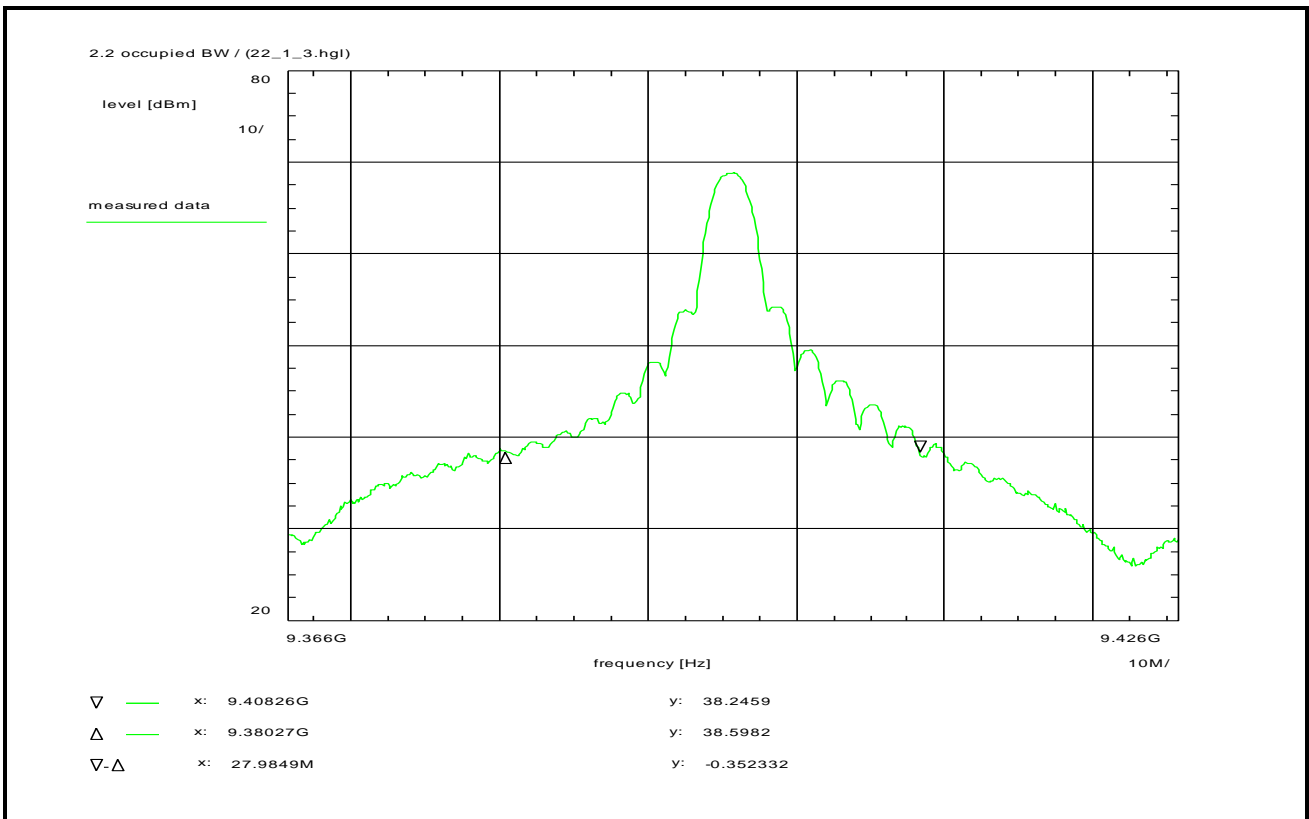
**Environment condition:**  
Date & Time: Tue 14/Oct/2014 14:05:42  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 22 °C  
Humidity: 45 %  
Voltage: 233 Vac

**Setup of measurement equipment:**  
Start frequency: 9.34 GHz  
Stop frequency: 9.44 GHz  
Center frequency: 9.39 GHz  
Frequency span: 100 MHz  
Input attenuation: 20 dB  
Resolution-BW: 1 MHz  
Video-BW: 1 MHz  
Video-Average: 1 sweep(s) (>1)  
Detector-Mode: 2 Pos Peak (Maximum-Hold)

**Correction (average):**  
Directional coupler (W240) + 43.8 dB  
Coaxial cable (C217) + 2.2 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Attenuation (U214) + 9.5 dB  
TOTAL CORRECTION: + 55.5 dB

**Remarks:**  
Internal function of spectrum analyser was used to measure the occupied bandwidth. The measured value is about 43 MHz (delta marker).

Plot No. 7 ( 28 )



**Subclause:** -/- Verification of the occupied bandwidth (99% bandwidth)  
Short pulse / medium pulse / long pulse  
Measurement within the allocated band: 9.3 - 9.5 GHz

**Limit:**  
The occupied bandwidth is defined as the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0.5% of the emitted power. This is also known as the 99% emission bandwidth.

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see section 7.4  
med2 pulse

**Test setup:**  
see section 8.1: 1.2cdhgj

**Test equipment:**  
see annex A: C217, R001, U214, W240, W242

**Remark:**

**Test result:** determination of the occupied bandwidth

**Environment condition:**

Date & Time: Tue 14/Oct/2014 14:08:00  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 22 °C  
Humidity: 45 %  
Voltage: 233 Vac

**Setup of measurement equipment:**

Start frequency: 9.3657 GHz  
Stop frequency: 9.4257 GHz  
Center frequency: 9.3957 GHz  
Frequency span: 60 MHz  
Input attenuation: 30 dB  
Resolution-BW: 1 MHz  
Video-BW: 1 MHz  
Video-Average: 1 sweep(s) (>1)  
Detector-Mode: 2 Pos Peak (Maximum-Hold)

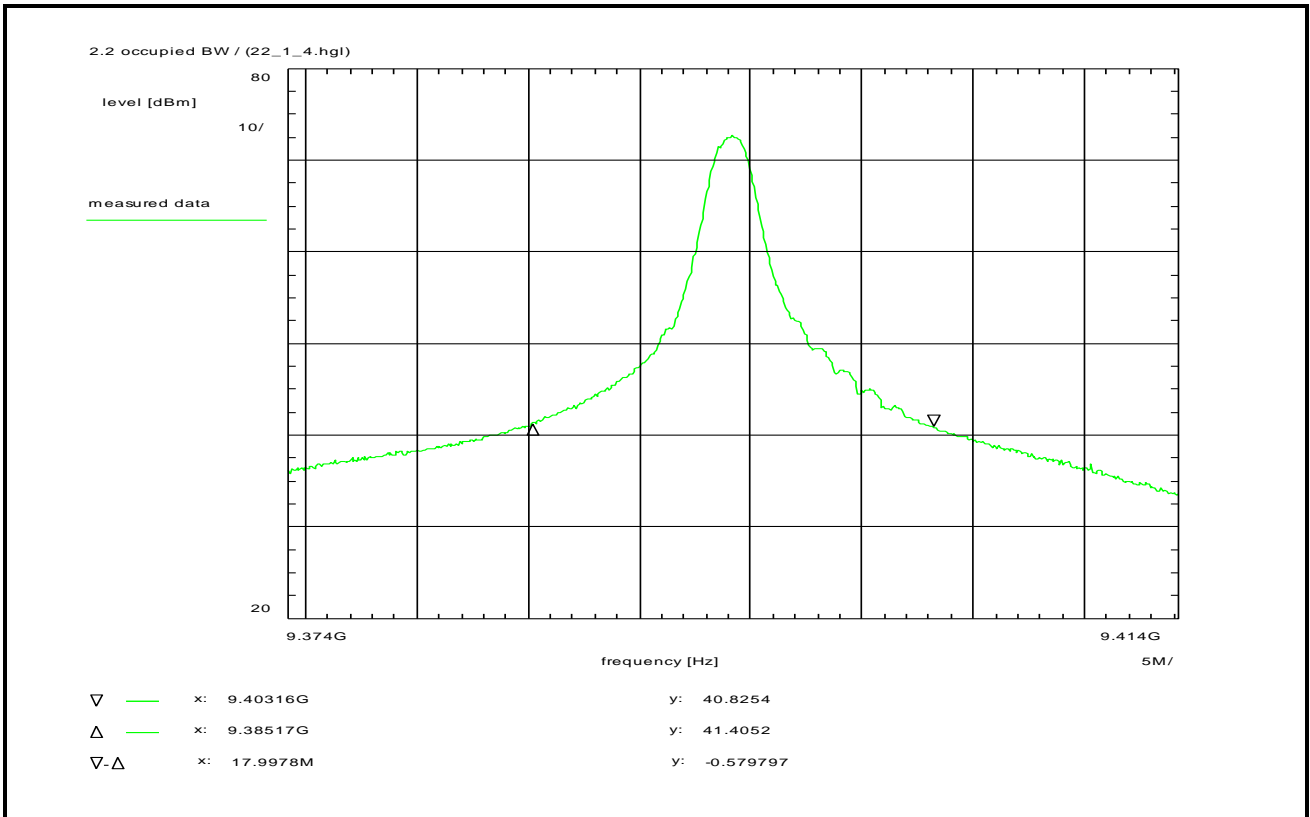
**Correction (average):**

Directional coupler (W240) + 43.7 dB  
Coaxial cable (C217) + 2.2 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Attenuation (U214) + 9.5 dB  
TOTAL CORRECTION: + 55.4 dB

**Remarks:**

Internal function of spectrum analyser was used to measure the occupied bandwidth. The measured value is about 28 MHz (delta marker).

Plot No. 8 ( 28 )



**Subclause:** -/- Verification of the occupied bandwidth (99% bandwidth)  
Short pulse / medium pulse / long pulse  
Measurement within the allocated band: 9.3 - 9.5 GHz

**Limit:**  
The occupied bandwidth is defined as the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0.5% of the emitted power. This is also known as the 99% emission bandwidth.

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see section 7.4  
long pulse

**Test setup:**  
see section 8.1: 1.2cdhgj

**Test equipment:**  
see annex A: C217, R001, U214, W240, W242

**Remark:**

**Test result:** determination of the occupied bandwidth

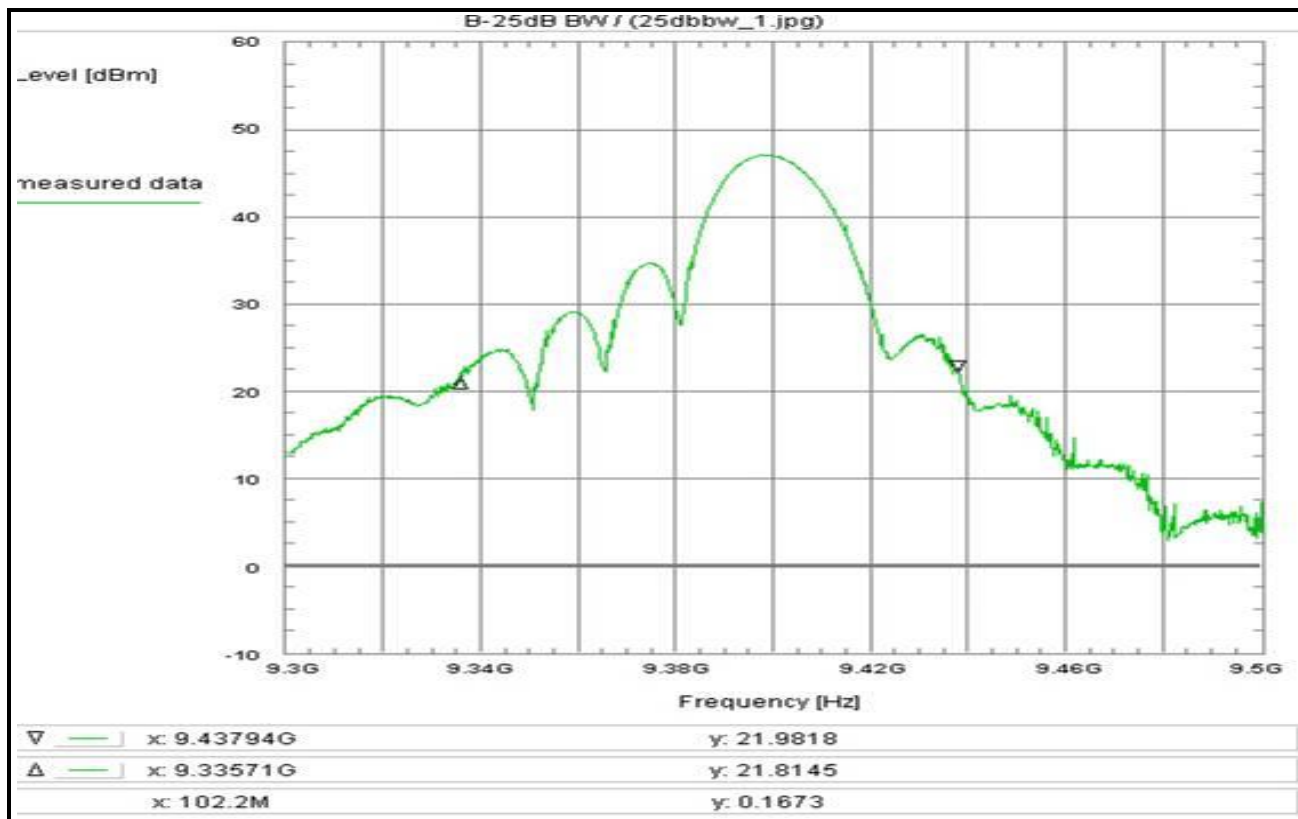
**Environment condition:**  
Date & Time: Tue 14/Oct/2014 14:10:15  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 22 °C  
Humidity: 45 %  
Voltage: 233 Vac

**Setup of measurement equipment:**  
Start frequency: 9.374166667 GHz  
Stop frequency: 9.414166667 GHz  
Center frequency: 9.394166667 GHz  
Frequency span: 40 MHz  
Input attenuation: 30 dB  
Resolution-BW: 1 MHz  
Video-BW: 1 MHz  
Video-Average: 1 sweep(s) (>1)  
Detector-Mode: 2 Pos Peak (Maximum-Hold)

**Correction (average):**  
Directional coupler (W240) + 43.6 dB  
Coaxial cable (C217) + 2.2 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Attenuation (U214) + 9.5 dB  
TOTAL CORRECTION: + 55.3 dB

**Remarks:**  
Internal function of spectrum analyser was used to measure the occupied bandwidth. The measured value is about 18 MHz (delta marker).

Plot No. 9 ( 32 )



**Subclause:** -/- Verification of the B-25 dB bandwidth  
 Short pulse / medium pulse / long pulse  
 Measurement within the allocated band: 9.3 - 9.5 GHz

**Limit:**  
 For non-FM pulse radar systems the B-40 dB bandwidth can be calculated according to following formula:  
 $B-40 = 7.6 / \sqrt{tp * tr}$  or  $64 / tp$  where  
 tp = pulse duration in [s], tr = rise time in [s]

**Test results:**  
 see plot (an explicit table was not generated)

**Operating condition of DUT:**  
 operating condition 1, see subclause 1.5.2  
 short pulse

**Test setup:**  
 see section 8.1: 1.2cdhgi

**Test equipment:**  
 see annex 2: C217, R001, U214, W240, W242

Remark:

**Test result:** determination of the B-25dB bandwidth

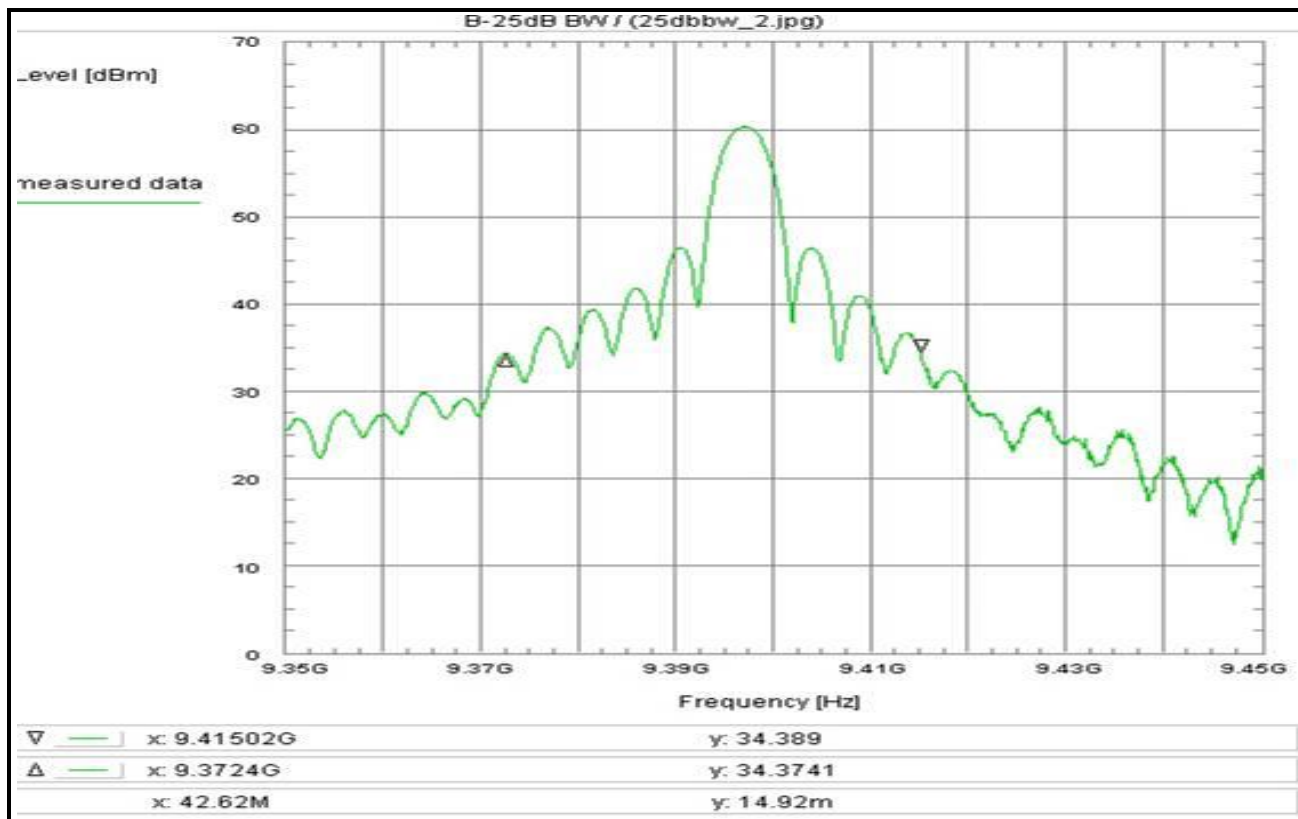
**Environment condition:**  
 Date & Time: Thu 16/Oct/2014 11:49:37  
 Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
 Temperature: 23 °C  
 Humidity: 50 %  
 Voltage: 233 Vac

**Setup of measurement equipment:**  
 Start frequency: 9.3 GHz  
 Stop frequency: 9.5 GHz  
 Center frequency: 9.4 GHz  
 Frequency span: 200 MHz  
 Resolution-BW: 1 MHz  
 Video-BW: 1 MHz  
 Input attenuation: 20 dB  
 Trace-Mode: Max-Hold  
 Detector-Mode: Pos Peak

**Correction:**  
 Directional coupler (W240) + 44.0 dB  
 Coaxial cable (C217) + 2.2 dB  
 DUT-Antenna + 0.0 dBi  
 Test antenna + 0.0 dB  
 BW correction factor + 0.0 dB  
 Atten. between HPA and feedhorn - 0.0 dB  
 Attenuation (U214) + 9.5 dB  
 TOTAL CORRECTION: + 55.7 dB

**Remarks:**  
**Verification of the B-25 dB bandwidth:**  
 The measured value is about 102 MHz (delta marker).

Plot No. 10 ( 32 )



**Subclause:** -/- Verification of the B-25 dB bandwidth  
Short pulse / medium pulse / long pulse  
Measurement within the allocated band: 9.3 - 9.5 GHz

**Limit:**  
For non-FM pulse radar systems the B-40 dB bandwidth can be calculated according to following formula:  
 $B-40 = 7.6 / \sqrt{tp * tr}$  or  $64 / tp$  where  
 $tp$  = pulse duration in [s],  $tr$  = rise time in [s]

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see subclause 1.5.2  
med1 pulse

**Test setup:**  
see section 8.1: 1.2cdhgi

**Test equipment:**  
see annex 2: C217, R001, U214, W240, W242

Remark:

**Test result:** determination of the B-25dB bandwidth

**Environment condition:**  
Date & Time: Thu 16/Oct/2014 11:52:28  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 23 °C  
Humidity: 50 %  
Voltage: 233 Vac

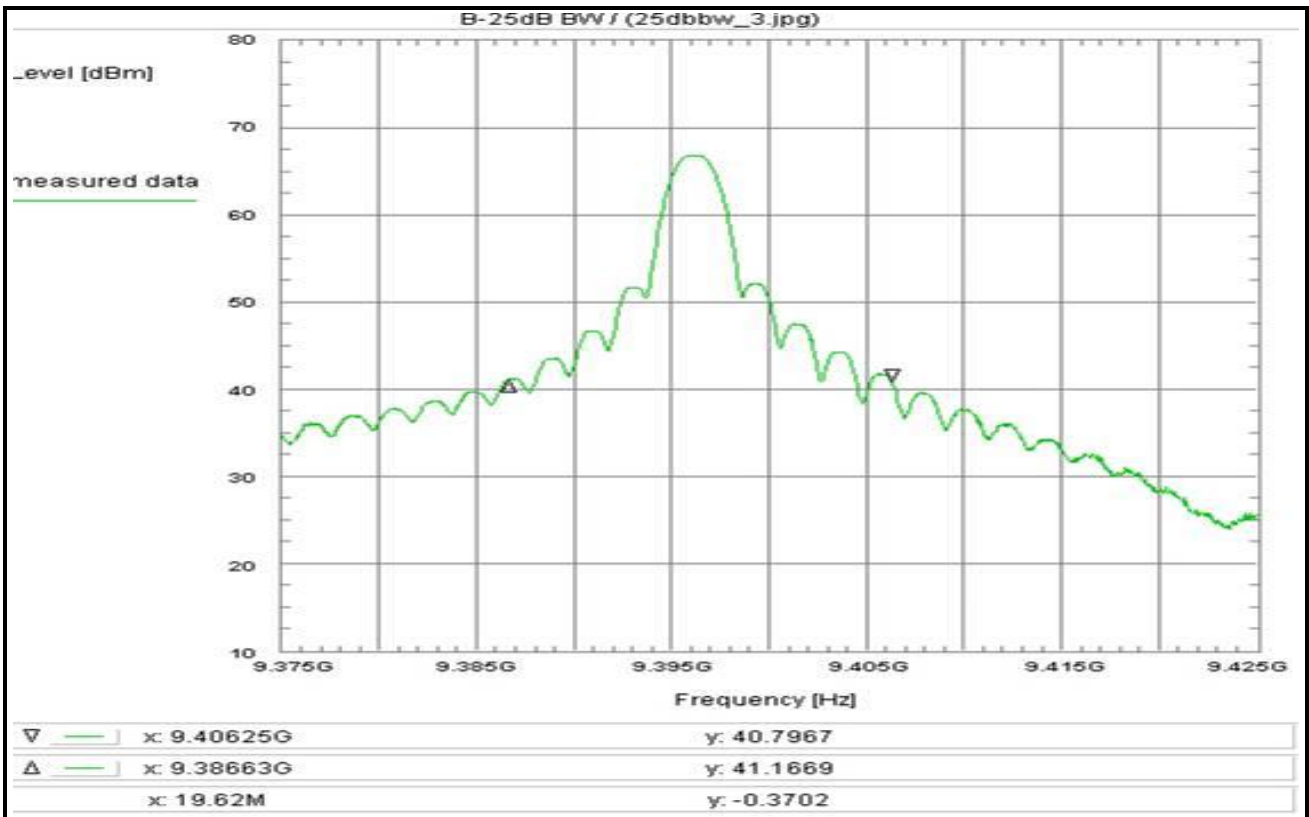
**Setup of measurement equipment:**  
Start frequency: 9.35 GHz  
Stop frequency: 9.45 GHz  
Center frequency: 9.4 GHz  
Frequency span: 100 MHz  
Resolution-BW: 1 MHz  
Video-BW: 1 MHz  
Input attenuation: 30 dB  
Trace-Mode: Max-Hold  
Detector-Mode: Pos Peak

**Correction:**  
Directional coupler (W240) + 43.8 dB  
Coaxial cable (C217) + 2.2 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Attenuation (U214) + 9.5 dB  
TOTAL CORRECTION: + 55.5 dB

**Remarks:**  
**Verification of the B-25 dB bandwidth:**  
The measured value is about 42.5 MHz (delta marker).



Plot No. 11 ( 32 )



**Subclause:** -/- Verification of the B-25 dB bandwidth  
Short pulse / medium pulse / long pulse  
Measurement within the allocated band: 9.3 - 9.5 GHz

**Limit:**  
For non-FM pulse radar systems the B-40 dB bandwidth can be calculated according to following formula:  
 $B-40 = 7.6 / \sqrt{tp * tr}$  or  $64 / tp$  where  
 $tp$  = pulse duration in [s],  $tr$  = rise time in [s]

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see subclause 1.5.2  
med2 pulse

**Test setup:**  
see section 8.1: 1.2cdhgi

**Test equipment:**  
see annex 2: C217, R001, U214, W240, W242

Remark:

**Test result:** determination of the B-25dB bandwidth

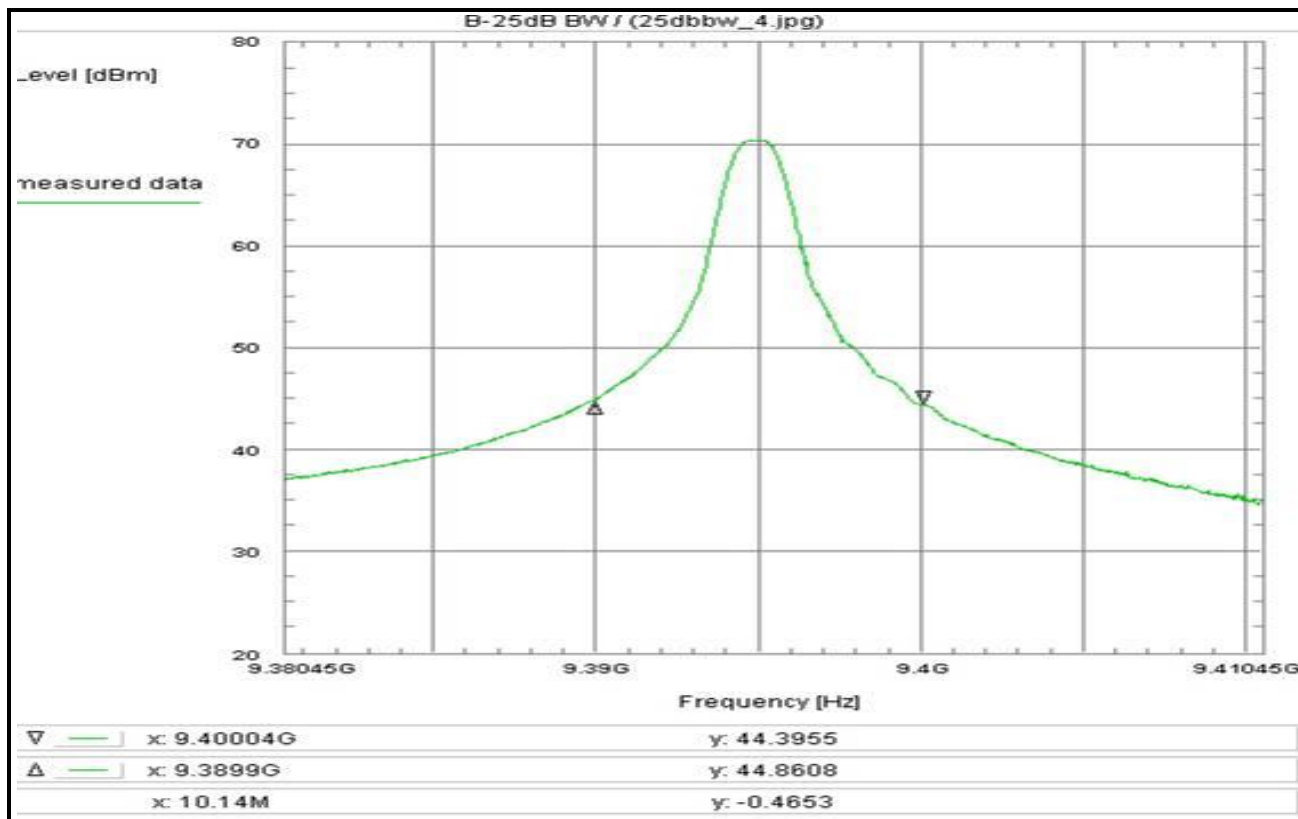
**Environment condition:**  
Date & Time: Thu 16/Oct/2014 11:54:21  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 23 °C  
Humidity: 50 %  
Voltage: 233 Vac

**Setup of measurement equipment:**  
Start frequency: 9.375 GHz  
Stop frequency: 9.425 GHz  
Center frequency: 9.4 GHz  
Frequency span: 50 MHz  
Resolution-BW: 1 MHz  
Video-BW: 1 MHz  
Input attenuation: 30 dB  
Trace-Mode: Max-Hold  
Detector-Mode: Pos Peak

**Correction:**  
Directional coupler (W240) + 43.8 dB  
Coaxial cable (C217) + 2.2 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Attenuation (U214) + 9.5 dB  
TOTAL CORRECTION: + 55.5 dB

**Remarks:**  
**Verification of the B-25 dB bandwidth:**  
The measured value is about 19.6 MHz (delta marker).

Plot No. 12 ( 32 )



**Subclause:** -/- Verification of the B-25 dB bandwidth  
Short pulse / medium pulse / long pulse  
Measurement within the allocated band: 9.3 - 9.5 GHz

**Limit:**  
For non-FM pulse radar systems the B-40 dB bandwidth can be calculated according to following formula:  
 $B-40 = 7.6 / \sqrt{tp * tr}$  or  $64 / tp$  where  
tp = pulse duration in [s], tr = rise time in [s]

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see subclause 1.5.2  
long pulse

**Test setup:**  
see section 8.1: 1.2cdhgi

**Test equipment:**  
see annex 2: C217, R001, U214, W240, W242

Remark:

**Test result:** determination of the B-25dB bandwidth

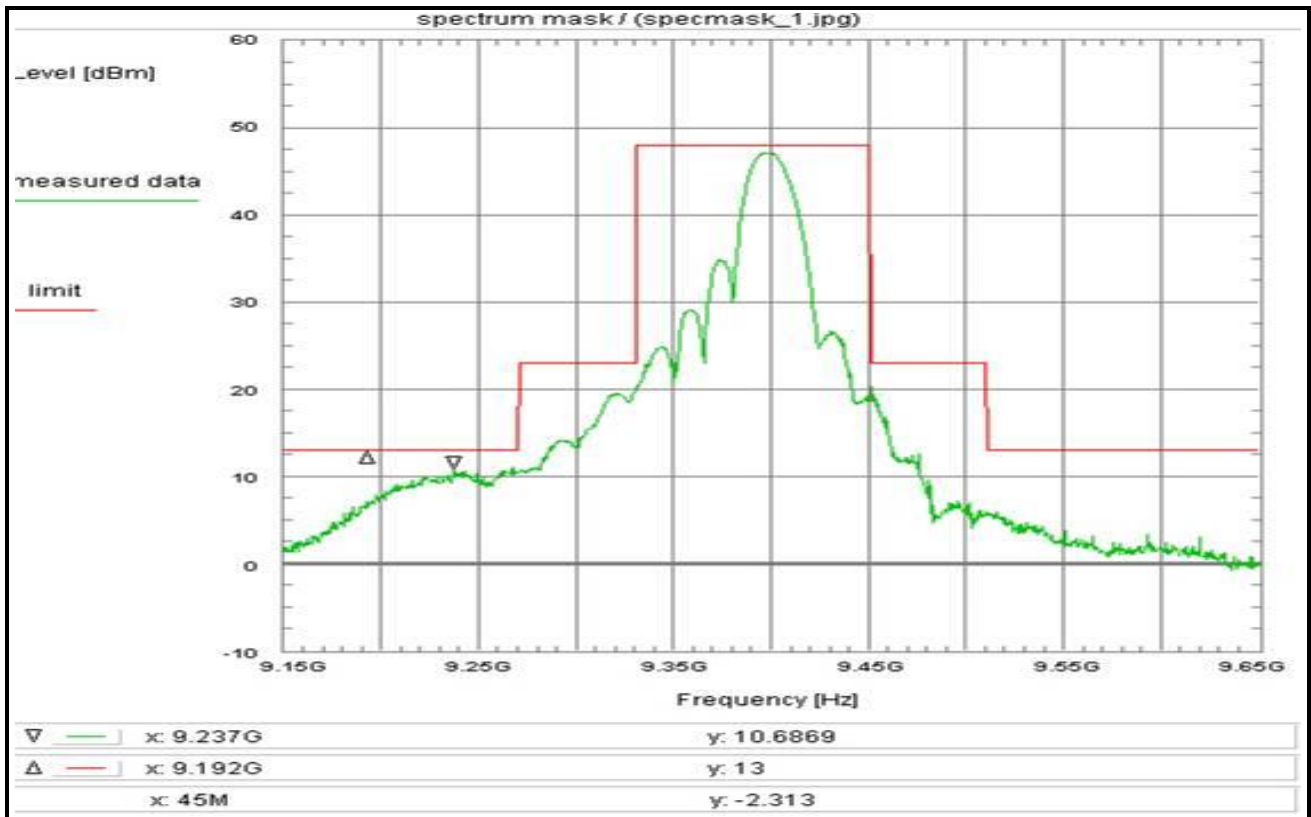
**Environment condition:**  
Date & Time: Thu 16/Oct/2014 11:56:36  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 23 °C  
Humidity: 50 %  
Voltage: 233 Vac

**Setup of measurement equipment:**  
Start frequency: 9.38045 GHz  
Stop frequency: 9.41045 GHz  
Center frequency: 9.39545 GHz  
Frequency span: 30 MHz  
Resolution-BW: 1 MHz  
Video-BW: 1 MHz  
Input attenuation: 30 dB  
Trace-Mode: Max-Hold  
Detector-Mode: Pos Peak

**Correction:**  
Directional coupler (W240) + 43.7 dB  
Coaxial cable (C217) + 2.2 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Attenuation (U214) + 9.5 dB  
TOTAL CORRECTION: + 55.4 dB

**Remarks:**  
**Verification of the B-25 dB bandwidth:**  
The measured value is about 10 MHz (delta marker).

Plot No. 13 ( 32 )



**Subclause:** 80.211(f) **Spectrum Mask**  
Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz

**Limit:**  
Limit acc. to FCC 47 CFR §80.211(f)

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see subclause 1.5.2  
short pulse

**Test setup:**  
see section 8.1: 1.2cdhgj

**Test equipment:**  
see annex 2: C217, R001, U214, W240, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**

**Date & Time:** Thu 16/Oct/2014 13:06:12  
**Location:** CETECOM ICT Services GmbH, Laboratory RSC-Sat  
**Temperature:** 23 °C  
**Humidity:** 50 %  
**Voltage:** 233 Vac

**Setup of measurement equipment:**

**Start frequency:** 9.15 GHz  
**Stop frequency:** 9.65 GHz  
**Center frequency:** 9.4 GHz  
**Frequency span:** 500 MHz  
**Resolution-BW:** 1 MHz  
**Video-BW:** 1 MHz  
**Input attenuation:** 20 dB  
**Trace-Mode:** Max-Hold  
**Detector-Mode:** Pos Peak

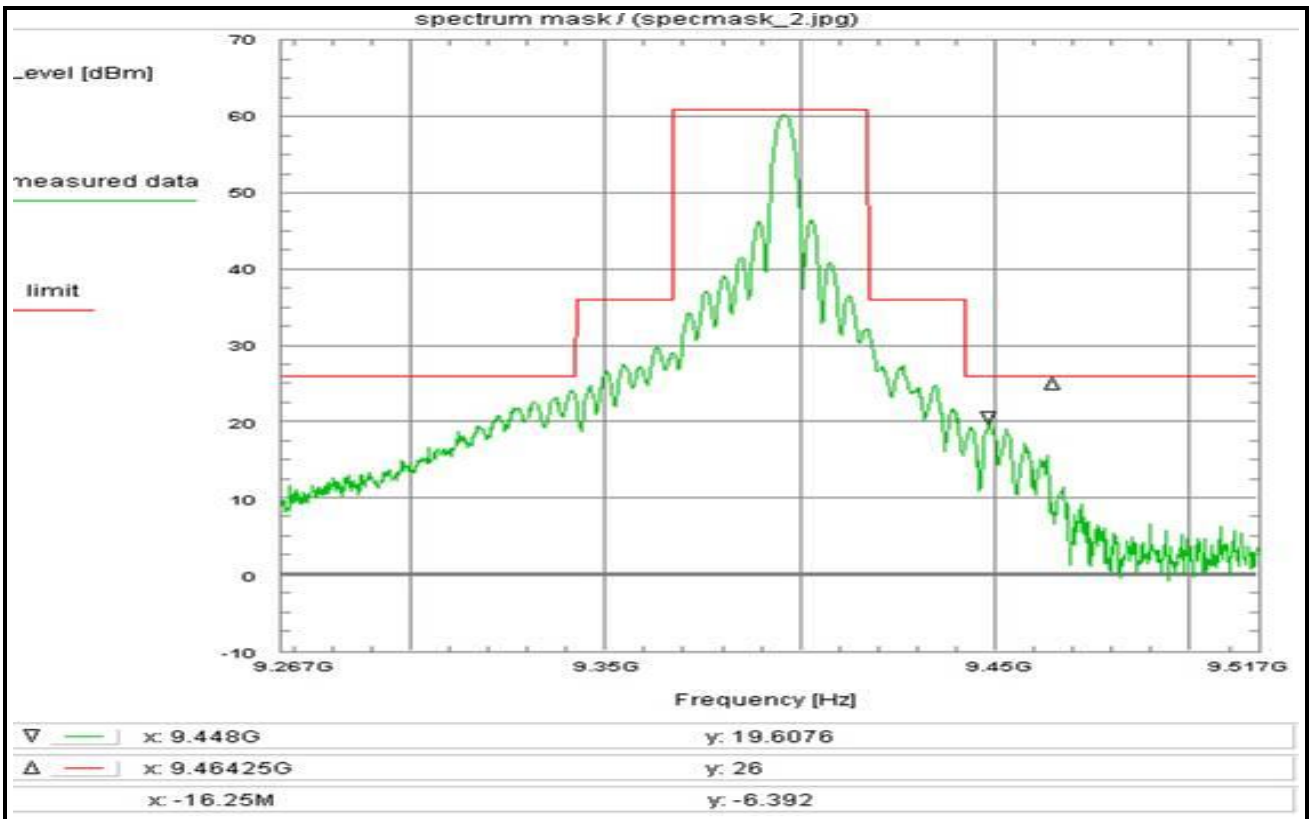
**Correction:**

**Directional coupler (W240)** + 43.9 dB  
**Coaxial cable (C217)** + 2.2 dB  
**DUT-Antenna** + 0.0 dBi  
**Test antenna** + 0.0 dB  
**BW correction factor** + 0.0 dB  
**Atten. between HPA and feedhorn** - 0.0 dB  
**Attenuation (U214)** + 9.5 dB  
**TOTAL CORRECTION:** + 55.6 dB

**Remarks:**

Spectrum mask based on 120 MHz bandwidth.

Plot No. 14 ( 32 )



**Subclause:** 80.211(f) Spectrum Mask  
Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz

**Limit:**  
Limit acc. to FCC 47 CFR §80.211(f)

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see subclause 1.5.2  
med1 pulse

**Test setup:**  
see section 8.1: 1.2cdhgj

**Test equipment:**  
see annex 2: C217, R001, U214, W240, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**

Date & Time: Thu 16/Oct/2014 13:19:43  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 23 °C  
Humidity: 50 %  
Voltage: 233 Vac

**Setup of measurement equipment:**

Start frequency: 9.267 GHz  
Stop frequency: 9.517 GHz  
Center frequency: 9.392 GHz  
Frequency span: 250 MHz  
Resolution-BW: 1 MHz  
Video-BW: 1 MHz  
Input attenuation: 30 dB  
Trace-Mode: Max-Hold  
Detector-Mode: Pos Peak

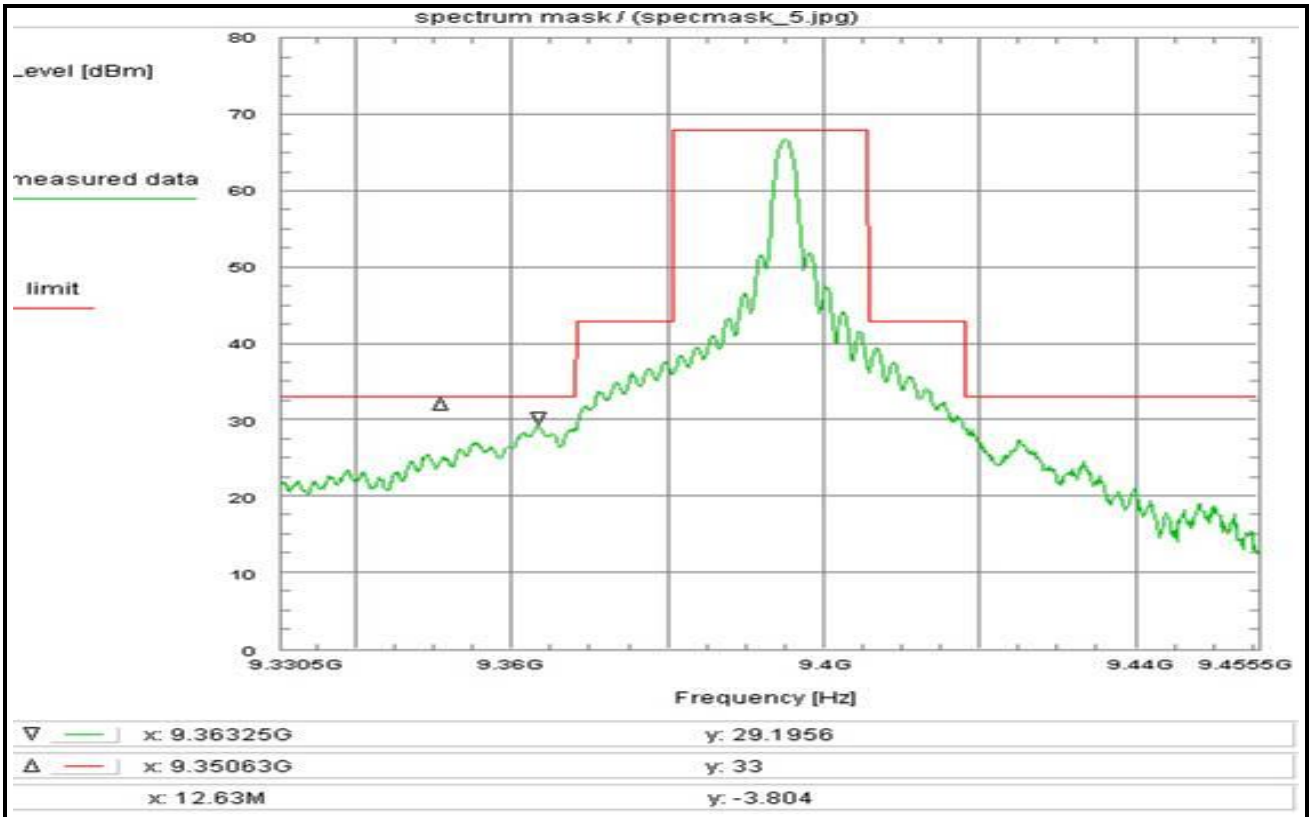
**Correction:**

Directional coupler (W240) + 43.9 dB  
Coaxial cable (C217) + 2.2 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Attenuation (U214) + 9.5 dB  
TOTAL CORRECTION: + 55.6 dB

**Remarks:**

Spectrum mask based on 50 MHz bandwidth.

Plot No. 15 ( 32 )



**Subclause:** 80.211(f) **Spectrum Mask**  
Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz

**Limit:**  
Limit acc. to FCC 47 CFR §80.211(f)

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see subclause 1.5.2  
med2 pulse

**Test setup:**  
see section 8.1: 1.2cdhgj

**Test equipment:**  
see annex 2: C217, R001, U214, W240, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**

**Date & Time:** Thu 16/Oct/2014 13:22:54  
**Location:** CETECOM ICT Services GmbH, Laboratory RSC-Sat  
**Temperature:** 23 °C  
**Humidity:** 50 %  
**Voltage:** 233 Vac

**Setup of measurement equipment:**

**Start frequency:** 9.3305 GHz  
**Stop frequency:** 9.4555 GHz  
**Center frequency:** 9.393 GHz  
**Frequency span:** 125 MHz  
**Resolution-BW:** 1 MHz  
**Video-BW:** 1 MHz  
**Input attenuation:** 30 dB  
**Trace-Mode:** Max-Hold  
**Detector-Mode:** Pos Peak

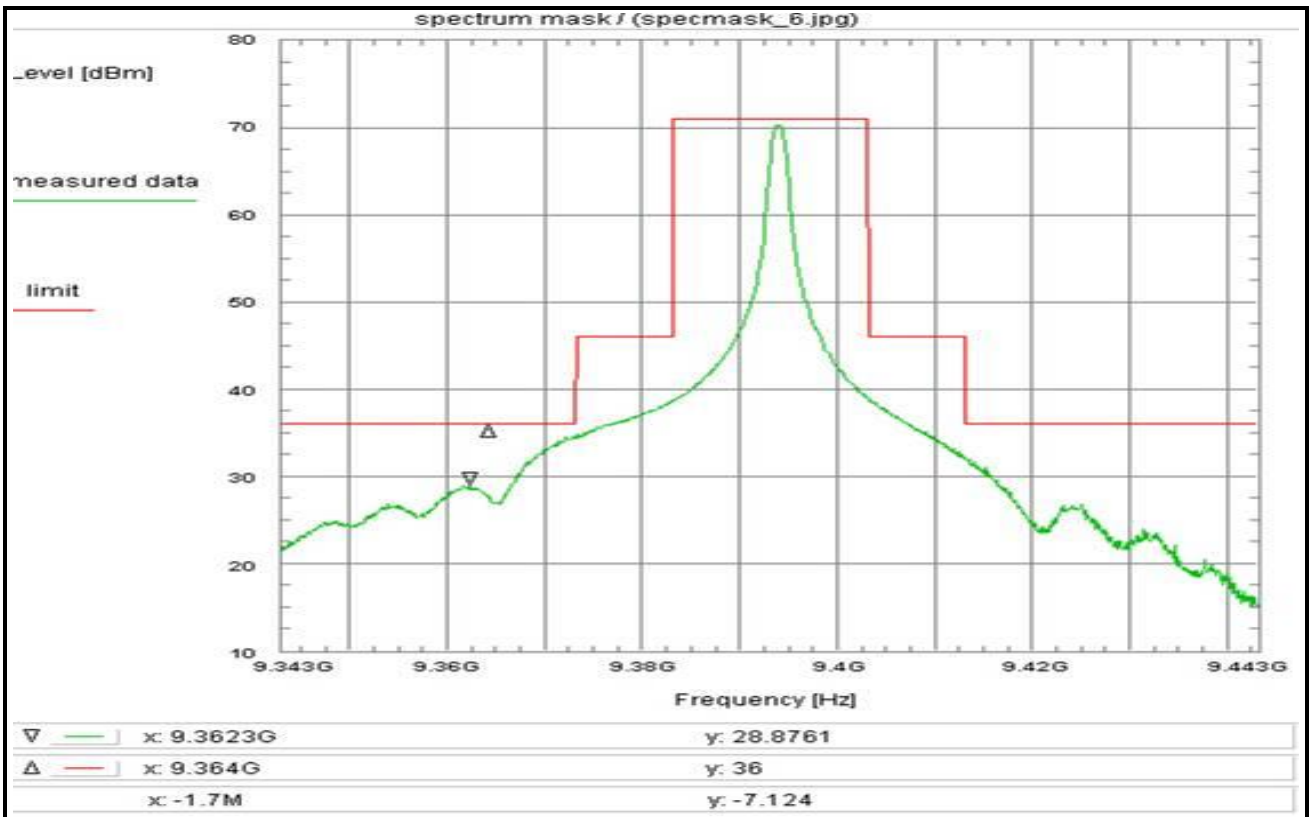
**Correction:**

**Directional coupler (W240)** + 43.9 dB  
**Coaxial cable (C217)** + 2.2 dB  
**DUT-Antenna** + 0.0 dBi  
**Test antenna** + 0.0 dB  
**BW correction factor** + 0.0 dB  
**Atten. between HPA and feedhorn** - 0.0 dB  
**Attenuation (U214)** + 9.5 dB  
**TOTAL CORRECTION:** + 55.6 dB

**Remarks:**

Spectrum mask based on 25 MHz bandwidth.

Plot No. 16 ( 32 )



**Subclause:** 80.211(f) **Spectrum Mask**  
Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz

**Limit:**  
Limit acc. to FCC 47 CFR §80.211(f)

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see subclause 1.5.2  
long pulse

**Test setup:**  
see section 8.1: 1.2cdhgj

**Test equipment:**  
see annex 2: C217, R001, U214, W240, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**

**Date & Time:** Thu 16/Oct/2014 13:26:14  
**Location:** CETECOM ICT Services GmbH, Laboratory RSC-Sat  
**Temperature:** 23 °C  
**Humidity:** 50 %  
**Voltage:** 233 Vac

**Setup of measurement equipment:**

**Start frequency:** 9.343 GHz  
**Stop frequency:** 9.443 GHz  
**Center frequency:** 9.393 GHz  
**Frequency span:** 100 MHz  
**Resolution-BW:** 1 MHz  
**Video-BW:** 1 MHz  
**Input attenuation:** 30 dB  
**Trace-Mode:** Max-Hold  
**Detector-Mode:** Pos Peak

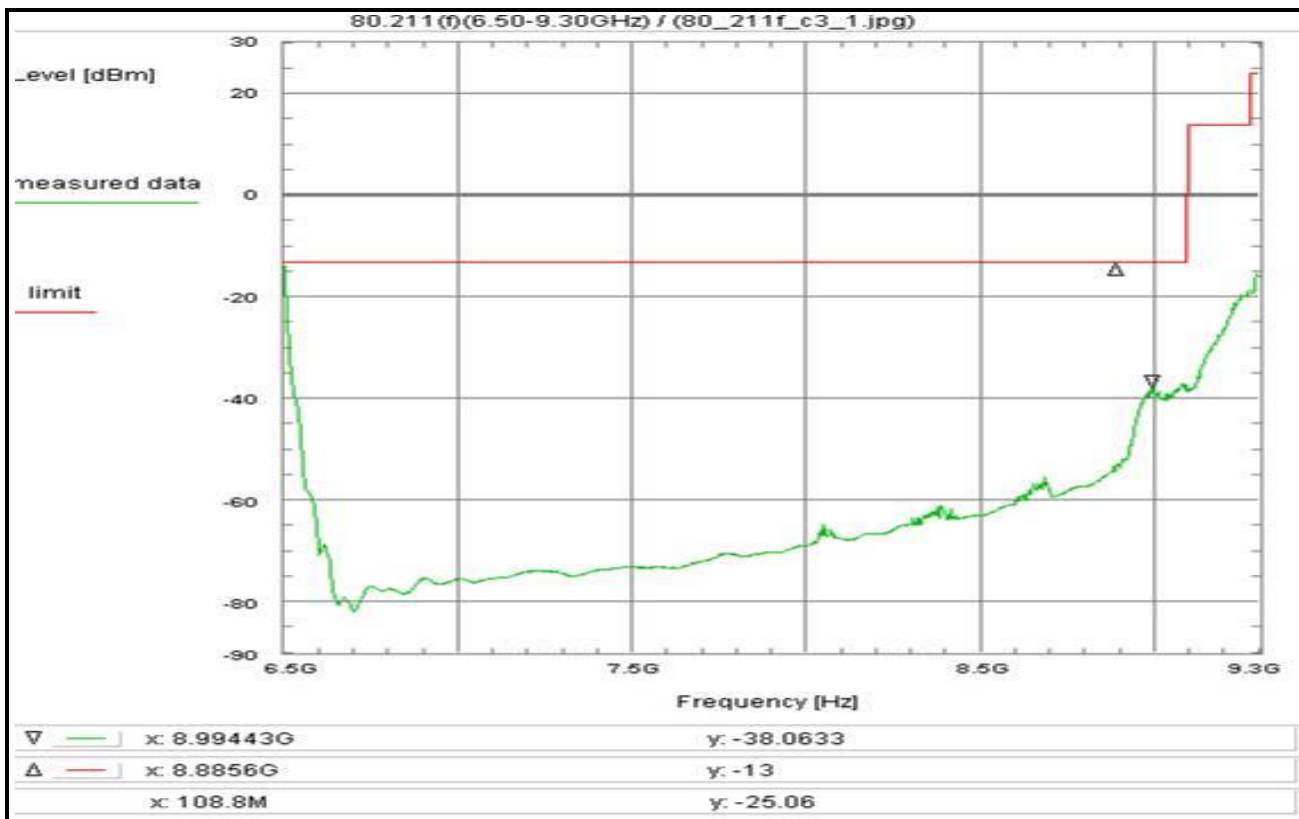
**Correction:**

**Directional coupler (W240)** + 43.8 dB  
**Coaxial cable (C217)** + 2.2 dB  
**DUT-Antenna** + 0.0 dBi  
**Test antenna** + 0.0 dB  
**BW correction factor** + 0.0 dB  
**Atten. between HPA and feedhorn** - 0.0 dB  
**Attenuation (U214)** + 9.5 dB  
**TOTAL CORRECTION:** + 55.5 dB

**Remarks:**

Spectrum mask based on 20 MHz bandwidth.

Plot No. 17 ( 32 )



**Subclause:** 80.211(f) Conducted Spurious Emissions  
Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
Examination of the frequency range 6.5 - 9.3 GHz

**Limit:**  
Limit acc. to FCC 47 CFR §80.211(f)

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see subclause 1.5.2  
short pulse

**Test setup:**  
see section 8.1: 1.2cdigj

**Test equipment:**  
see annex 2: C217, R001, U231, W241, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**

Date & Time: Thu 16/Oct/2014 13:35:55  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 23 °C  
Humidity: 50 %  
Voltage: 233 Vac

**Setup of measurement equipment:**

Start frequency: 6.5 GHz  
Stop frequency: 9.3 GHz  
Center frequency: 7.9 GHz  
Frequency span: 2.8 GHz  
Resolution-BW: 1 MHz  
Video-BW: 1 MHz  
Input attenuation: 6 dB  
Trace-Mode: Max-Hold  
Detector-Mode: AVG

**Correction:**

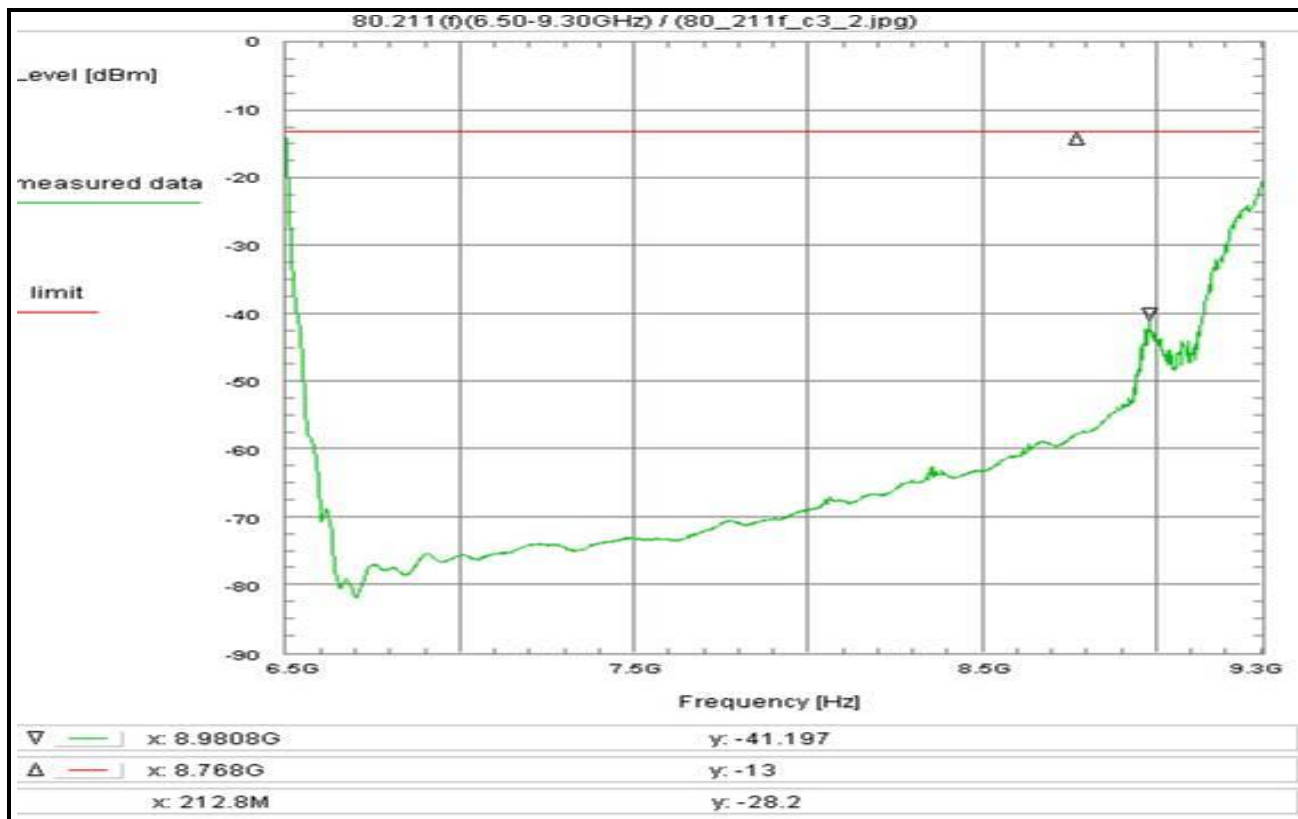
Directional coupler (W241) + 19.6 dB  
Coaxial cable (C217) + 2.0 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Stub tuner (U231) + 7.5 dB  
TOTAL CORRECTION: + 29.1 dB

**Remarks:**

Max-Hold Mode  
Test setup with taper transitions R100-->N and Stub Tuner.

Rather left the plot shows the cut-off frequency of the directional coupler.

Plot No. 18 ( 32 )



**Subclause:** 80.211(f) Conducted Spurious Emissions  
 Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
 Examination of the frequency range 6.5 - 9.3 GHz

**Limit:**  
 Limit acc. to FCC 47 CFR §80.211(f)

**Test results:**  
 see plot (an explicit table was not generated)

**Operating condition of DUT:**  
 operating condition 1, see subclause 1.5.2  
 long pulse

**Test setup:**  
 see section 8.1: 1.2cdigj

**Test equipment:**  
 see annex 2: C217, R001, U231, W241, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**

Date & Time: Thu 16/Oct/2014 13:40:41  
 Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
 Temperature: 23 °C  
 Humidity: 50 %  
 Voltage: 233 Vac

**Setup of measurement equipment:**

Start frequency: 6.5 GHz  
 Stop frequency: 9.3 GHz  
 Center frequency: 7.9 GHz  
 Frequency span: 2.8 GHz  
 Resolution-BW: 1 MHz  
 Video-BW: 1 MHz  
 Input attenuation: 6 dB  
 Trace-Mode: Max-Hold  
 Detector-Mode: AVG

**Correction:**

Directional coupler (W241) + 19.6 dB  
 Coaxial cable (C217) + 2.0 dB  
 DUT-Antenna + 0.0 dBi  
 Test antenna + 0.0 dB  
 BW correction factor + 0.0 dB  
 Atten. between HPA and feedhorn - 0.0 dB  
 Stub tuner (U231) + 7.5 dB  
 TOTAL CORRECTION: + 29.1 dB

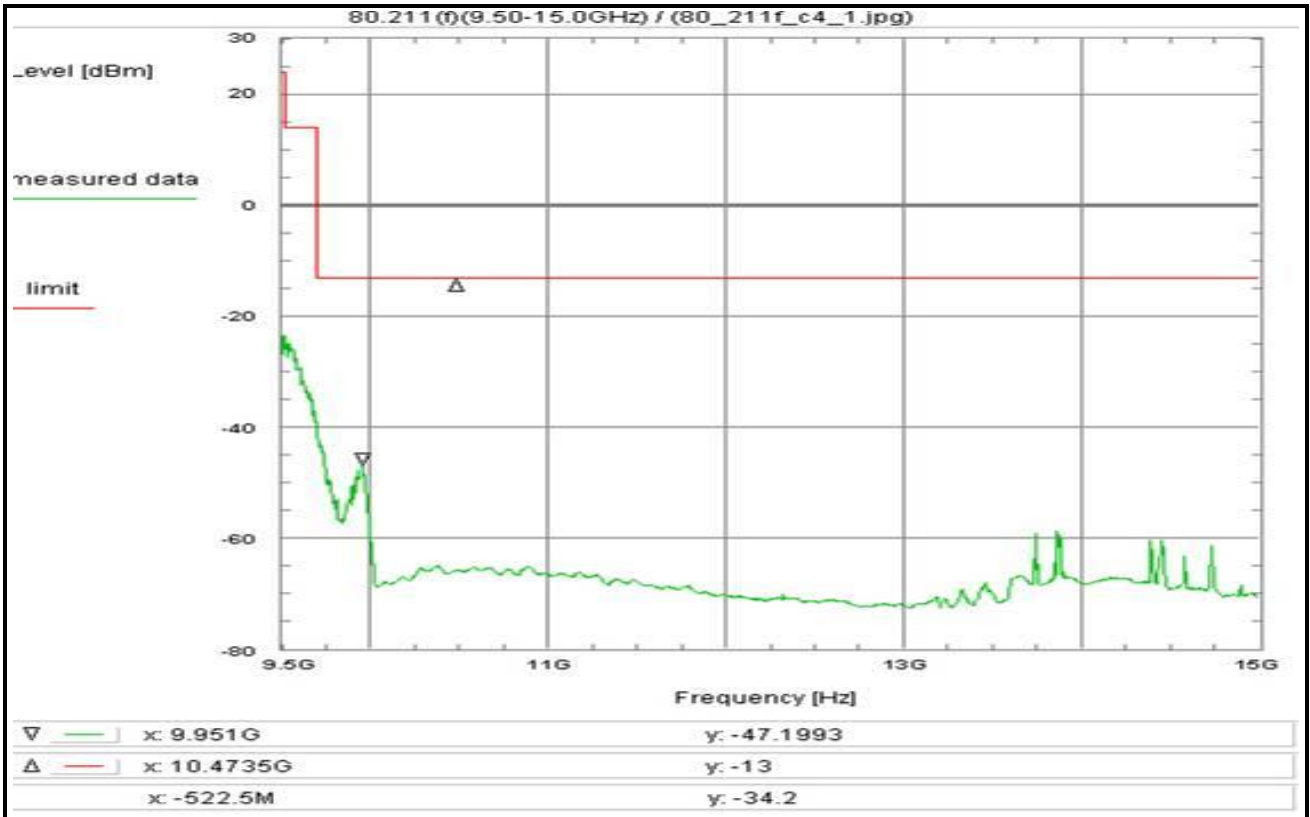
**Remarks:**

Max-Hold Mode  
 Test setup with taper transitions R100-->N and Stub Tuner.  
 Measurement starts at physical cut-off frequency of wave guide.

Rather left the plot shows the cut-off frequency of the directional coupler.



Plot No. 19 ( 32 )



**Subclause:** 80.211(f) Conducted Spurious Emissions  
Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
Examination of the frequency range 9.5 - 15.0 GHz

**Limit:**  
Limit acc. to FCC 47 CFR §80.211(f)

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see subclause 1.5.2  
short pulse

**Test setup:**  
see section 8.1: 1.2cdigj

**Test equipment:**  
see annex 2: C217, R001, U231, W241, W242

**Remark:**

**Test result:** Test passed

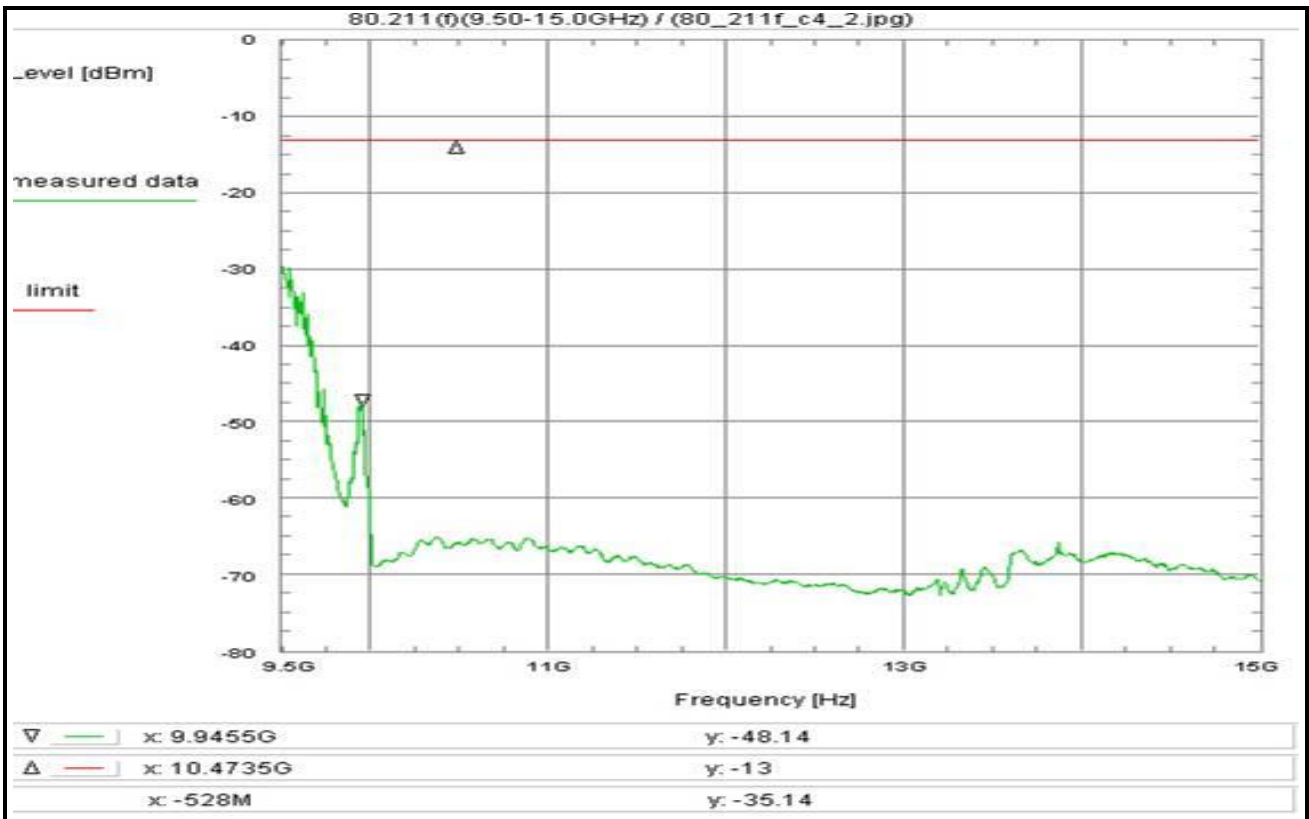
**Environment condition:**  
Date & Time: Thu 16/Oct/2014 13:37:16  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 23 °C  
Humidity: 50 %  
Voltage: 233 Vac

**Setup of measurement equipment:**  
Start frequency: 9.5 GHz  
Stop frequency: 15 GHz  
Center frequency: 12.25 GHz  
Frequency span: 5.5 GHz  
Resolution-BW: 1 MHz  
Video-BW: 1 MHz  
Input attenuation: 6 dB  
Trace-Mode: Max-Hold  
Detector-Mode: AVG

**Correction:**  
Directional coupler (W241) + 19.7 dB  
Coaxial cable (C217) + 2.6 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Stub tuner (U231) + 4.0 dB  
TOTAL CORRECTION: + 26.3 dB

**Remarks:**  
Max-Hold Mode  
Test setup with taper transitions R100-->N and Stub Tuner.

Plot No. 20 ( 32 )



**Subclause:** 80.211(f) Conducted Spurious Emissions  
Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
Examination of the frequency range 9.5 - 15.0 GHz

**Limit:**  
Limit acc. to FCC 47 CFR §80.211(f)

**Test results:**  
see plot (an explicit table was not generated)

**Operating condition of DUT:**  
operating condition 1, see subclause 1.5.2  
long pulse

**Test setup:**  
see section 8.1: 1.2cdigj

**Test equipment:**  
see annex 2: C217, R001, U231, W241, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**

Date & Time: Thu 16/Oct/2014 13:38:47  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 23 °C  
Humidity: 50 %  
Voltage: 233 Vac

**Setup of measurement equipment:**

Start frequency: 9.5 GHz  
Stop frequency: 15 GHz  
Center frequency: 12.25 GHz  
Frequency span: 5.5 GHz  
Resolution-BW: 1 MHz  
Video-BW: 1 MHz  
Input attenuation: 6 dB  
Trace-Mode: Max-Hold  
Detector-Mode: AVG

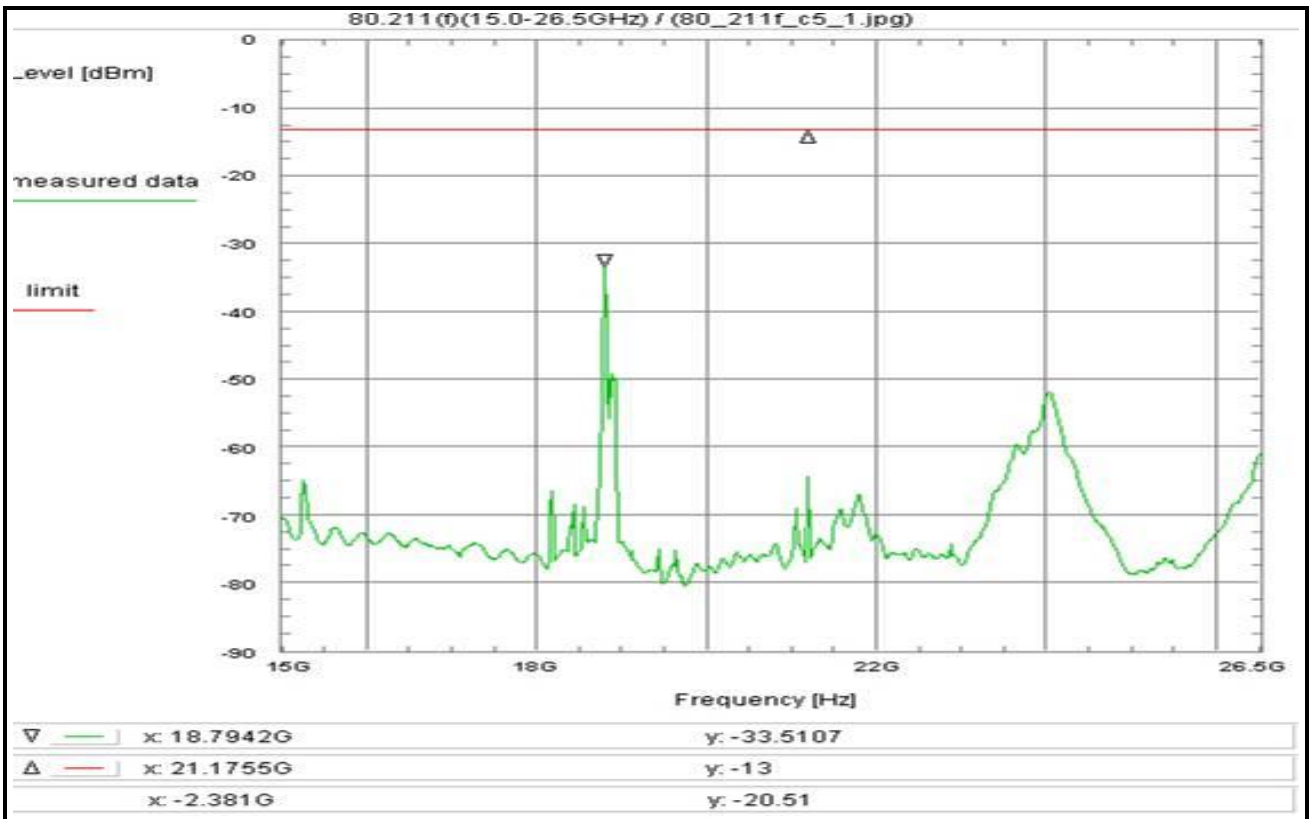
**Correction:**

Directional coupler (W241) + 19.7 dB  
Coaxial cable (C217) + 2.6 dB  
DUT-Antenna + 0.0 dBi  
Test antenna + 0.0 dB  
BW correction factor + 0.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
Stub tuner (U231) + 4.0 dB  
TOTAL CORRECTION: + 26.3 dB

**Remarks:**

Max-Hold Mode  
Test setup with taper transitions R100-->N and Stub Tuner.

Plot No. 21 ( 32 )



**Subclause:** 80.211(f) Conducted Spurious Emissions  
 Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
 Examination of the frequency range 15.0 - 26.5 GHz

**Limit:**  
 Limit acc. to FCC 47 CFR §80.211(f)

**Test results:**  
 see plot (an explicit table was not generated)

**Operating condition of DUT:**  
 operating condition 1, see subclause 1.5.2  
 short pulse

**Test setup:**  
 see section 8.1: 1.2cegj

**Test equipment:**  
 see annex 2: C217, R001, W022, W241, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**  
 Date & Time: Thu 16/Oct/2014 13:44:46  
 Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
 Temperature: 23 °C  
 Humidity: 50 %  
 Voltage: 233 Vac

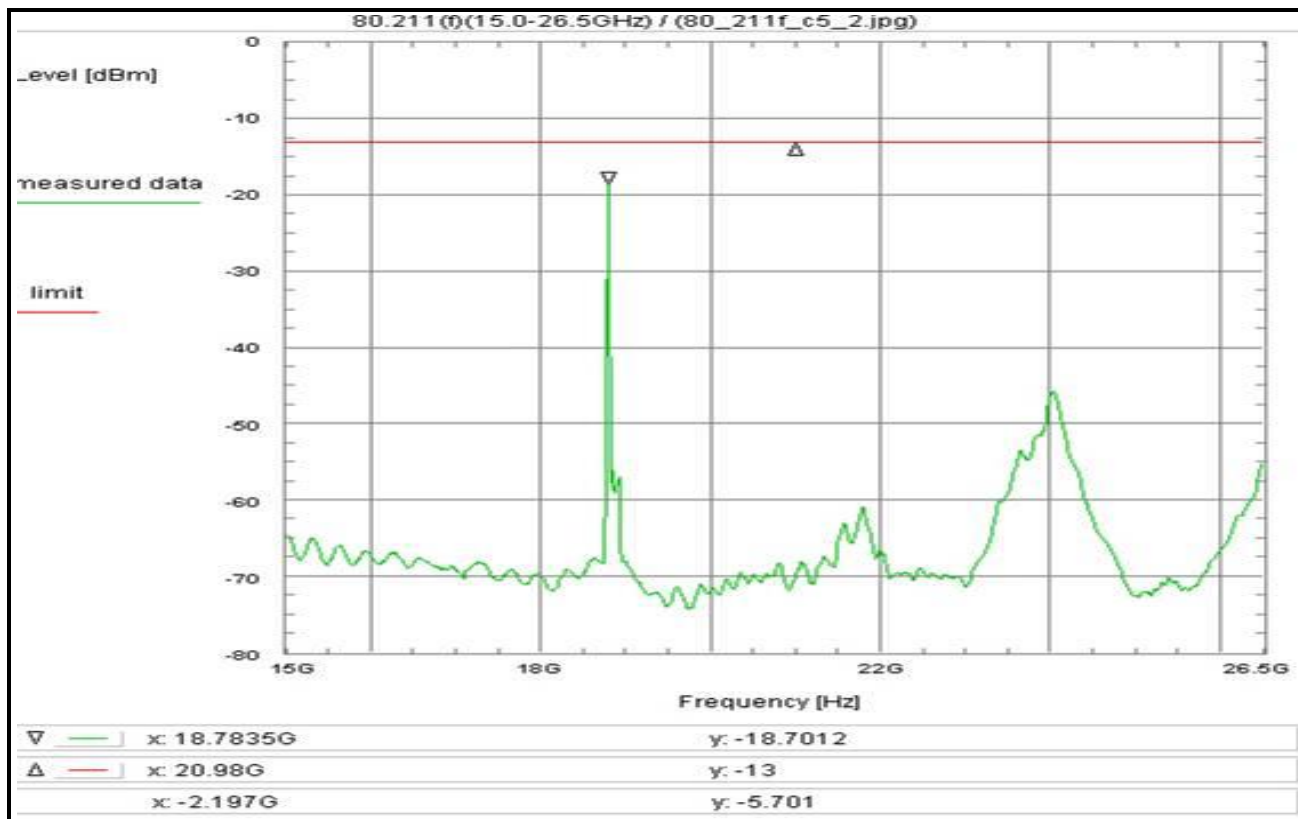
**Setup of measurement equipment:**  
 Start frequency: 15 GHz  
 Stop frequency: 26.5 GHz  
 Center frequency: 20.75 GHz  
 Frequency span: 11.5 GHz  
 Resolution-BW: 1 MHz  
 Video-BW: 1 MHz  
 Input attenuation: 6 dB  
 Trace-Mode: Max-Hold  
 Detector-Mode: AVG

**Correction:**  
 Directional coupler (W241) + 13.8 dB  
 Coaxial cable (C217) + 3.8 dB  
 DUT-Antenna + 0.0 dBi  
 Test antenna + 0.0 dB  
 BW correction factor + 0.0 dB  
 Atten. between HPA and feedhorn - 0.0 dB  
 Attenuation + 0.0 dB  
 TOTAL CORRECTION: + 17.6 dB

**Remarks:**  
 Max-Hold Mode  
 Test setup with taper transitions R100/R180

Plot shows 2nd harmonic.

Plot No. 22 ( 32 )



**Subclause:** 80.211(f) Conducted Spurious Emissions  
 Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
 Examination of the frequency range 15.0 - 26.5 GHz

**Limit:**  
 Limit acc. to FCC 47 CFR §80.211(f)

**Test results:**  
 see plot (an explicit table was not generated)

**Operating condition of DUT:**  
 operating condition 1, see subclause 1.5.2  
 long pulse

**Test setup:**  
 see section 8.1: 1.2cegj

**Test equipment:**  
 see annex 2: C217, R001, W022, W241, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**  
 Date & Time: Thu 16/Oct/2014 13:48:26  
 Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
 Temperature: 23 °C  
 Humidity: 50 %  
 Voltage: 233 Vac

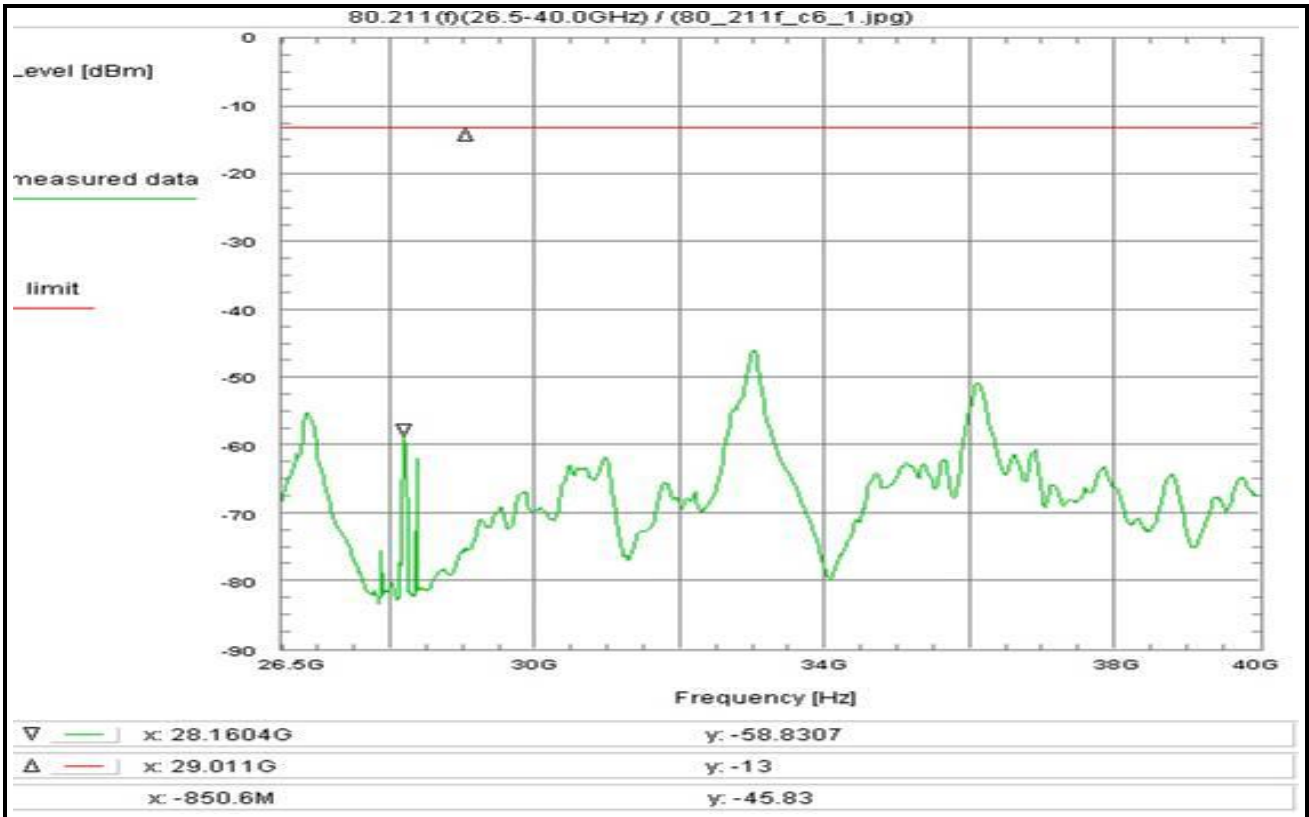
**Setup of measurement equipment:**  
 Start frequency: 15 GHz  
 Stop frequency: 26.5 GHz  
 Center frequency: 20.75 GHz  
 Frequency span: 11.5 GHz  
 Resolution-BW: 1 MHz  
 Video-BW: 1 MHz  
 Input attenuation: 12 dB  
 Trace-Mode: Max-Hold  
 Detector-Mode: AVG

**Correction:**  
 Directional coupler (W241) + 13.8 dB  
 Coaxial cable (C217) + 3.8 dB  
 DUT-Antenna + 0.0 dBi  
 Test antenna + 0.0 dB  
 BW correction factor + 0.0 dB  
 Atten. between HPA and feedhorn - 0.0 dB  
 Attenuation + 0.0 dB  
 TOTAL CORRECTION: + 17.6 dB

**Remarks:**  
 Max-Hold Mode  
 Test setup with taper transitions R100/R180

Plot shows 2nd harmonic.

Plot No. 23 ( 32 )



**Subclause:** 80.211(f) Conducted Spurious Emissions  
 Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
 Examination of the frequency range 26.5 - 40.0 GHz

**Limit:**  
 Limit acc. to FCC 47 CFR §80.211(f)

**Test results:**  
 see plot (an explicit table was not generated)

**Operating condition of DUT:**  
 operating condition 1, see subclause 1.5.2  
 short pulse

**Test setup:**  
 see section 8.1: 1.2cegj

**Test equipment:**  
 see annex 2: C217, R001, W022, W241, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**  
 Date & Time: Thu 16/Oct/2014 14:00:27  
 Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
 Temperature: 23 °C  
 Humidity: 50 %  
 Voltage: 233 Vac

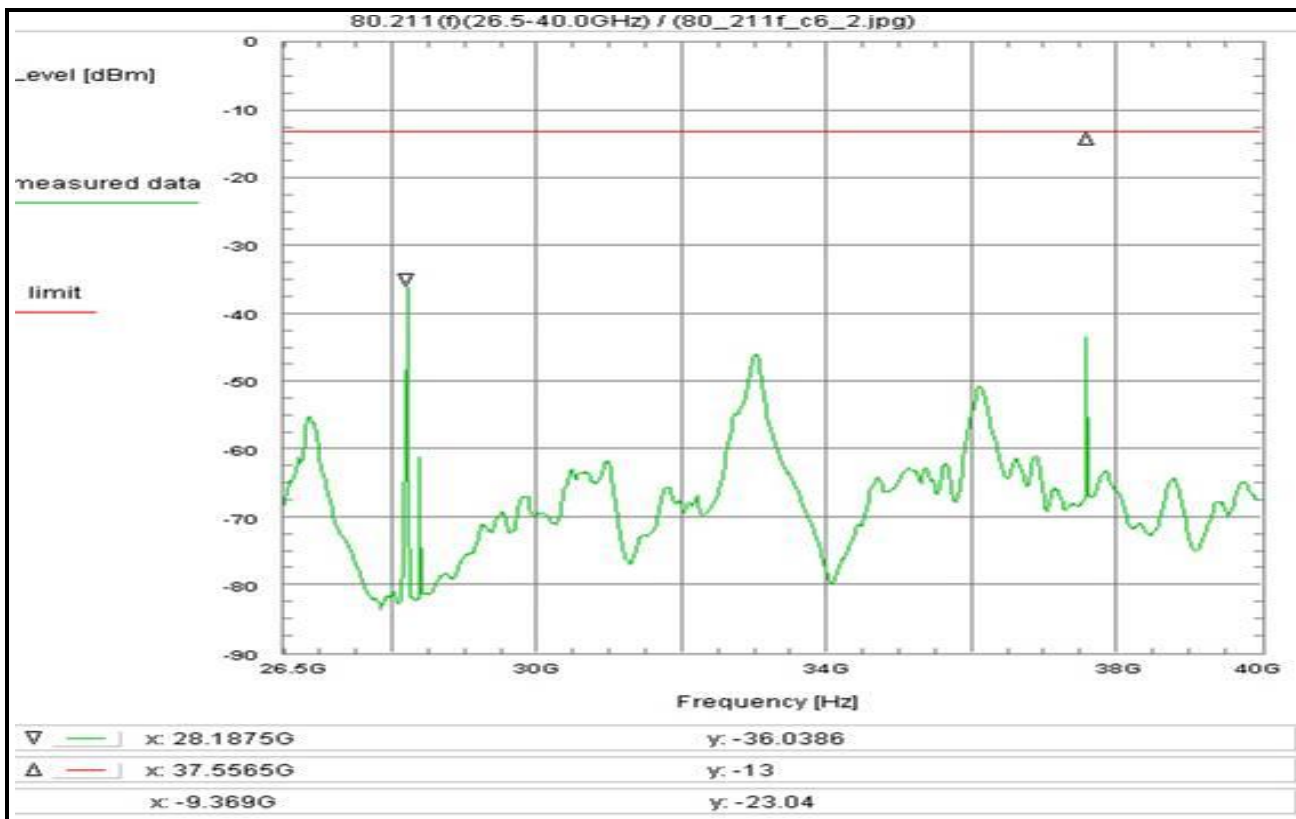
**Setup of measurement equipment:**  
 Start frequency: 26.5 GHz  
 Stop frequency: 40 GHz  
 Center frequency: 33.25 GHz  
 Frequency span: 13.5 GHz  
 Resolution-BW: 1 MHz  
 Video-BW: 1 MHz  
 Input attenuation: 0 dB  
 Trace-Mode: Max-Hold  
 Detector-Mode: AVG

**Correction:**  
 Directional coupler (W241) + 18.9 dB  
 Coaxial cable (C217) + 5.6 dB  
 DUT-Antenna + 0.0 dBi  
 Test antenna + 0.0 dB  
 BW correction factor + 0.0 dB  
 Atten. between HPA and feedhorn - 0.0 dB  
 Attenuation + 0.0 dB  
 TOTAL CORRECTION: + 24.5 dB

**Remarks:**  
 Max-Hold Mode  
 Test setup with taper transitions R100/R320

Plot shows frequency response of directional coupler.  
 Plot shows 3rd harmonic.

Plot No. 24 ( 32 )



**Subclause:** 80.211(f) Conducted Spurious Emissions  
 Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
 Examination of the frequency range 26.5 - 40.0 GHz

**Limit:**  
 Limit acc. to FCC 47 CFR §80.211(f)

**Test results:**  
 see plot (an explicit table was not generated)

**Operating condition of DUT:**  
 operating condition 1, see subclause 1.5.2  
 long pulse

**Test setup:**  
 see section 8.1: 1.2cegj

**Test equipment:**  
 see annex 2: C217, R001, W022, W241, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**  
 Date & Time: Thu 16/Oct/2014 14:02:15  
 Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
 Temperature: 23 °C  
 Humidity: 50 %  
 Voltage: 233 Vac

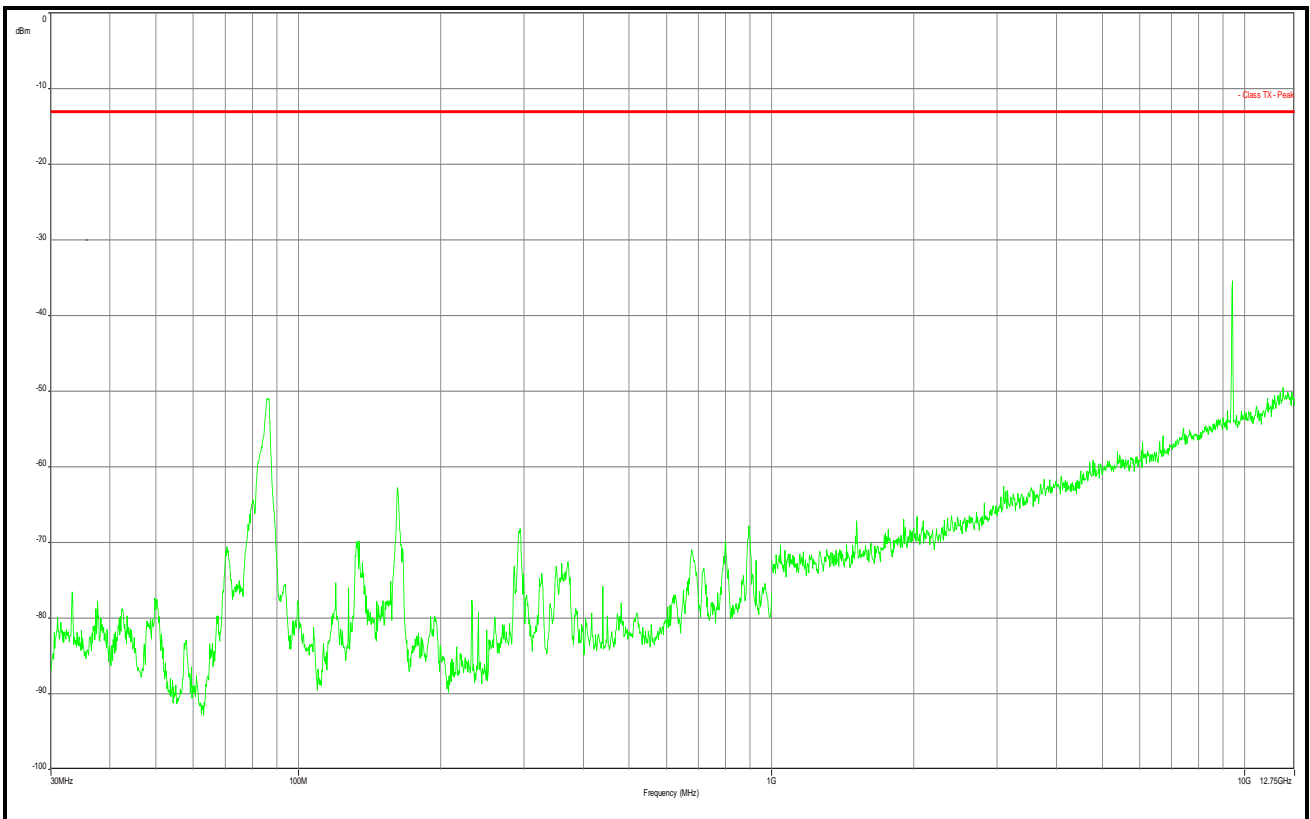
**Setup of measurement equipment:**  
 Start frequency: 26.5 GHz  
 Stop frequency: 40 GHz  
 Center frequency: 33.25 GHz  
 Frequency span: 13.5 GHz  
 Resolution-BW: 1 MHz  
 Video-BW: 1 MHz  
 Input attenuation: 0 dB  
 Trace-Mode: Max-Hold  
 Detector-Mode: AVG

**Correction:**  
 Directional coupler (W241) + 18.9 dB  
 Coaxial cable (C217) + 5.6 dB  
 DUT-Antenna + 0.0 dBi  
 Test antenna + 0.0 dB  
 BW correction factor + 0.0 dB  
 Atten. between HPA and feedhorn - 0.0 dB  
 Attenuation + 0.0 dB  
 TOTAL CORRECTION: + 24.5 dB

**Remarks:**  
 Max-Hold Mode  
 Test setup with taper transitions R100/R320

Plot shows frequency response of directional coupler.  
 Plot shows 3rd and 4th harmonic.

Plot No. 25 ( 32 )



**Subclause:** 80.211(f) Radiated Spurious Emissions  
 Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
 Examination of the frequency range 30.0 MHz - 12.75 GHz

**Limit:**  
 Limit acc. to 80.211(f): -13 dBm

**Test results:**  
 see plot (an explicit table was not generated)

**Operating condition of DUT:**  
 operating condition 1, see subclause 1.5.2  
 short pulse

**Test setup:**  
 see section 8.1: 2.2

**Remark:**

**Test result:** Test passed

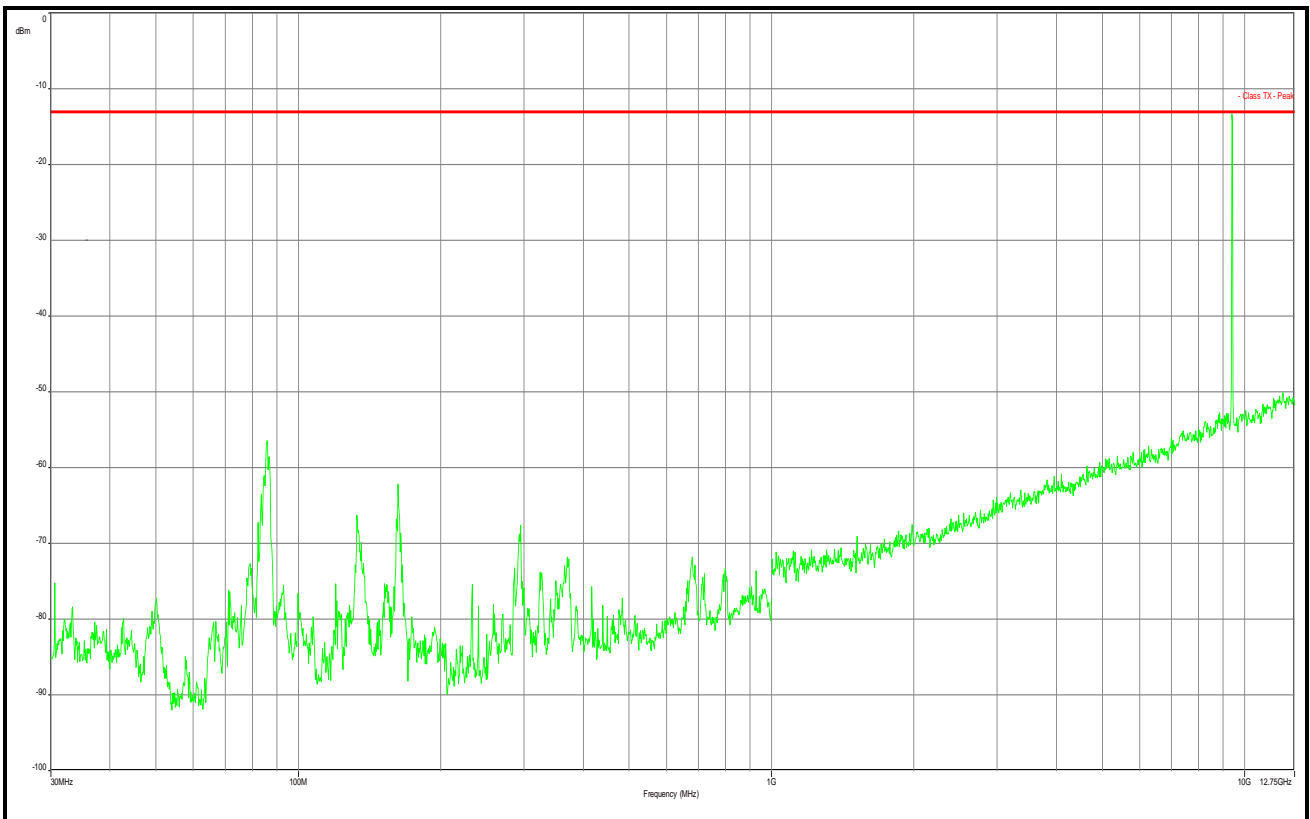
**Environment condition:**  
 Date & Time: Wed 22/Oct/2014  
 Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
 Temperature: 23 °C  
 Humidity: 50 %  
 Voltage: 233 Vac

**Setup of measurement equipment:**  
 Start frequency: 30 MHz  
 Stop frequency: 12.75 GHz  
 Resolution-BW: 0.1 / 1 MHz  
 Video-BW: 0.1 / 1 MHz  
 Input attenuation: 0 dB  
 Trace-Mode: Max-Hold  
 Detector-Mode: Pos Peak

**Remarks:**  
 Max-Hold Mode / Pos-Peak

Plot shows wanted signal / carrier leakage in the 9 GHz range.

Plot No. 26 ( 32 )



**Subclause:** 80.211(f) Radiated Spurious Emissions  
 Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
 Examination of the frequency range 30.0 MHz - 12.75 GHz

**Limit:**  
 Limit acc. to 80.211(f): -13 dBm

**Test results:**  
 see plot (an explicit table was not generated)

**Operating condition of DUT:**  
 operating condition 1, see subclause 1.5.2  
 long pulse

**Test setup:**  
 see section 8.1: 2.2

**Remark:**

**Test result:** Test passed

**Environment condition:**

Date & Time: Wed 22/Oct/2014  
 Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
 Temperature: 23 °C  
 Humidity: 50 %  
 Voltage: 233 Vac

**Setup of measurement equipment:**

Start frequency: 30 MHz  
 Stop frequency: 12.75 GHz  
 Resolution-BW: 0.1 / 1 MHz  
 Video-BW: 0.1 / 1 MHz  
 Input attenuation: 0 dB  
 Trace-Mode: Max-Hold  
 Detector-Mode: Pos Peak

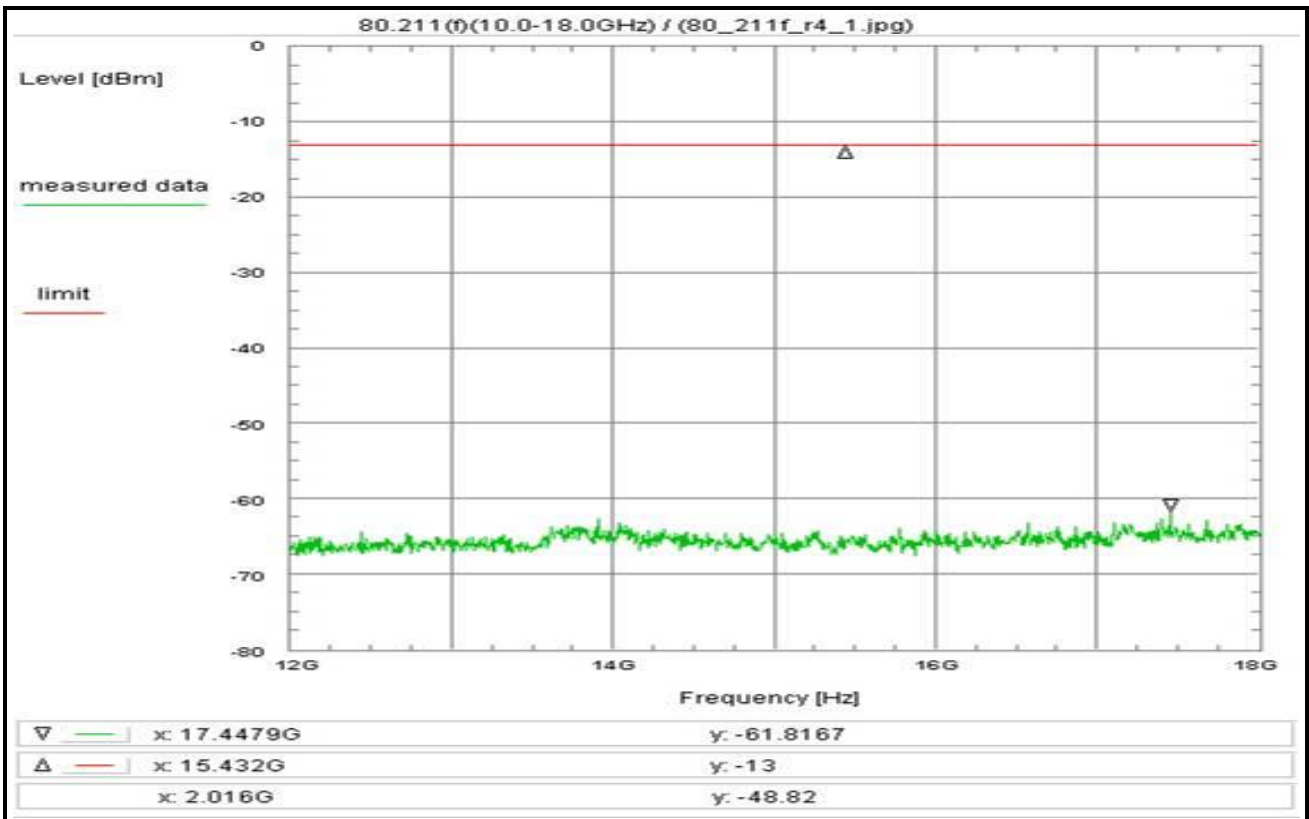
**Remarks:**

Max-Hold Mode / Pos-Peak

Plot shows wanted signal / carrier leakage in the 9 GHz range.



Plot No. 27 ( 32 )



**Subclause:** 80.211(f) Radiated Spurious Emissions  
 Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
 Examination of the frequency range 10.0 - 18.0 GHz

**Limit:**  
 Limit acc. to 80.211(f): -13 dBm

**Test results:**  
 see plot (an explicit table was not generated)

**Operating condition of DUT:**  
 operating condition 1, see subclause 1.5.2  
 short pulse

**Test setup:**  
 see section 8.1: 2.3

**Test equipment:**  
 see annex 2: A016, B11b, C217, R001, W242

**Remark:**

**Test result:** Test passed

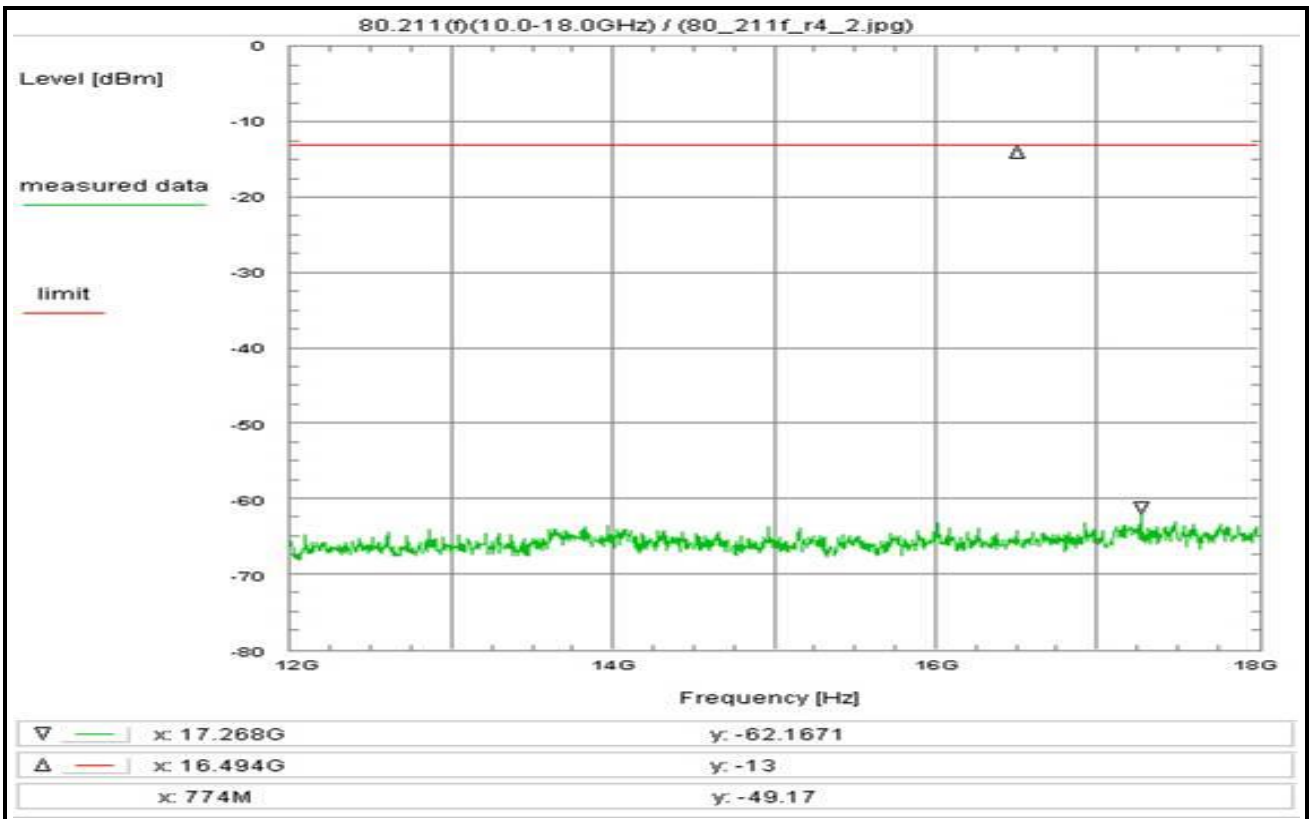
**Environment condition:**  
 Date & Time: Thu 16/Oct/2014 15:48:26  
 Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
 Temperature: 23 °C  
 Humidity: 50 %  
 Voltage: 233 Vac

**Setup of measurement equipment:**  
 Start frequency: 12 GHz  
 Stop frequency: 18 GHz  
 Center frequency: 15 GHz  
 Frequency span: 6 GHz  
 Resolution-BW: 1 MHz  
 Video-BW: 1 MHz  
 Input attenuation: 0 dB  
 Trace-Mode: Max-Hold  
 Detector-Mode: Pos Peak

**Correction:**  
 Directional coupler + 0.0 dB  
 Coaxial cable (C217) + 3.0 dB  
 DUT-Antenna + 0.0 dBi  
 Test antenna (A016) - 18.5 dB  
 BW correction factor + 0.0 dB  
 Atten. between HPA and feedhorn - 0.0 dB  
 Freefield attenuation (15.00GHz, 0.5m) + 49.9 dB  
 (B11b) - 31.4 dB  
**TOTAL CORRECTION:** + 3.0 dB

**Remarks:**  
 Max-Hold Mode / Pos-Peak

Plot No. 28 ( 32 )



**Subclause:** 80.211(f) Radiated Spurious Emissions  
 Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
 Examination of the frequency range 10.0 - 18.0 GHz

**Limit:**  
 Limit acc. to 80.211(f): -13 dBm

**Test results:**  
 see plot (an explicit table was not generated)

**Operating condition of DUT:**  
 operating condition 1, see subclause 1.5.2  
 long pulse

**Test setup:**  
 see section 8.1: 2.3

**Test equipment:**  
 see annex 2: A016, B11b, C217, R001, W242

**Remark:**

**Test result:** Test passed

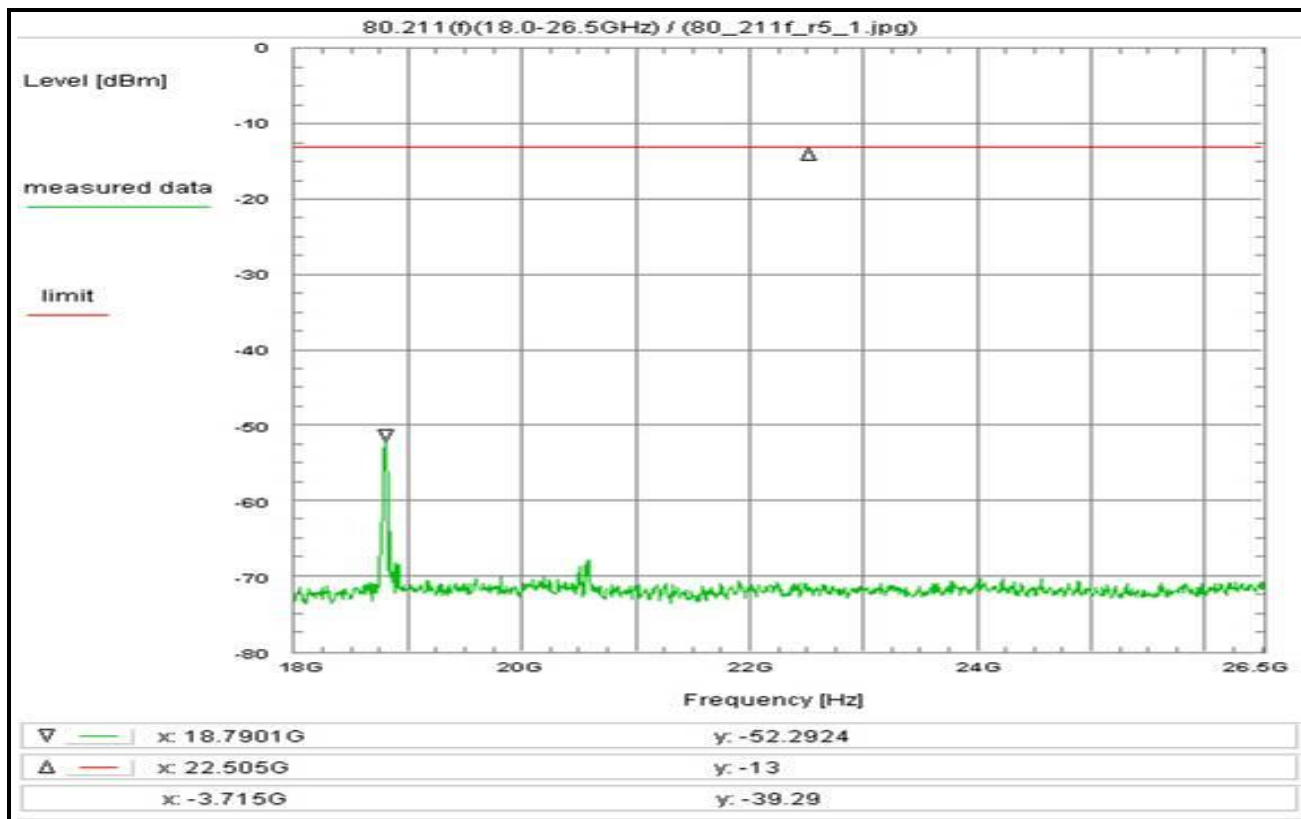
**Environment condition:**  
 Date & Time: Thu 16/Oct/2014 15:49:36  
 Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
 Temperature: 23 °C  
 Humidity: 50 %  
 Voltage: 233 Vac

**Setup of measurement equipment:**  
 Start frequency: 12 GHz  
 Stop frequency: 18 GHz  
 Center frequency: 15 GHz  
 Frequency span: 6 GHz  
 Resolution-BW: 1 MHz  
 Video-BW: 1 MHz  
 Input attenuation: 0 dB  
 Trace-Mode: Max-Hold  
 Detector-Mode: Pos Peak

**Correction:**  
 Directional coupler + 0.0 dB  
 Coaxial cable (C217) + 3.0 dB  
 DUT-Antenna + 0.0 dBi  
 Test antenna (A016) - 18.5 dB  
 BW correction factor + 0.0 dB  
 Atten. between HPA and feedhorn - 0.0 dB  
 Freefield attenuation (15.00GHz, 0.5m) + 49.9 dB  
 (B11b) - 31.4 dB  
 TOTAL CORRECTION: + 3.0 dB

**Remarks:**  
 Max-Hold Mode / Pos-Peak

Plot No. 29 ( 32 )



**Subclause:** 80.211(f) Radiated Spurious Emissions  
 Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
 Examination of the frequency range 18.0 - 26.5 GHz

**Limit:**  
 Limit acc. to 80.211(f): -13 dBm

**Test results:**  
 see plot (an explicit table was not generated)

**Operating condition of DUT:**  
 operating condition 1, see subclause 1.5.2  
 short pulse

**Test setup:**  
 see section 8.1: 2.3

**Test equipment:**  
 see annex 2: A019, BCBL, C217, R001, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**  
 Date & Time: Thu 16/Oct/2014 15:36:36  
 Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
 Temperature: 23 °C  
 Humidity: 50 %  
 Voltage: 233 Vac

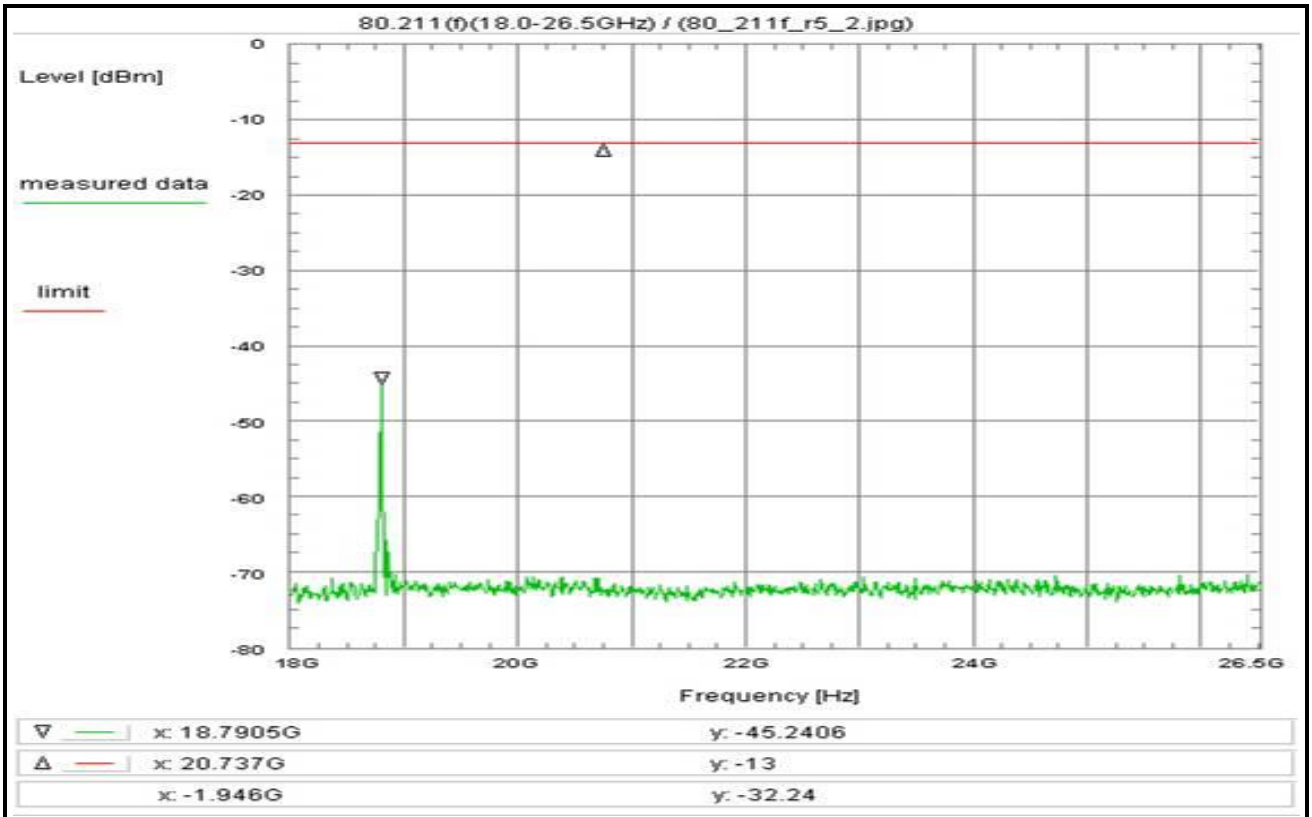
**Setup of measurement equipment:**  
 Start frequency: 18 GHz  
 Stop frequency: 26.5 GHz  
 Center frequency: 22.25 GHz  
 Frequency span: 8.5 GHz  
 Resolution-BW: 1 MHz  
 Video-BW: 1 MHz  
 Input attenuation: 0 dB  
 Trace-Mode: Max-Hold  
 Detector-Mode: Pos Peak

**Correction:**  
 Directional coupler + 0.0 dB  
 Coaxial cable (C217) + 4.0 dB  
 DUT-Antenna + 0.0 dBi  
 Test antenna (A019) - 19.3 dB  
 BW correction factor + 0.0 dB  
 Atten. between HPA and feedhorn - 0.0 dB  
 Freefield attenuation (22.25GHz, 0.3m) + 48.9 dB  
 (BCBL) - 46.0 dB  
 TOTAL CORRECTION: -12.4 dB

**Remarks:**  
 Max-Hold Mode / Pos-Peak

Plot shows 2nd harmonic.

Plot No. 30 ( 32 )



**Subclause:** 80.211(f) Radiated Spurious Emissions  
 Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
 Examination of the frequency range 18.0 - 26.5 GHz

**Limit:**  
 Limit acc. to 80.211(f): -13 dBm

**Test results:**  
 see plot (an explicit table was not generated)

**Operating condition of DUT:**  
 operating condition 1, see subclause 1.5.2  
 long pulse

**Test setup:**  
 see section 8.1: 2.3

**Test equipment:**  
 see annex 2: A019, BCBL, C217, R001, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**  
 Date & Time: Thu 16/Oct/2014 15:37:48  
 Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
 Temperature: 23 °C  
 Humidity: 50 %  
 Voltage: 233 Vac

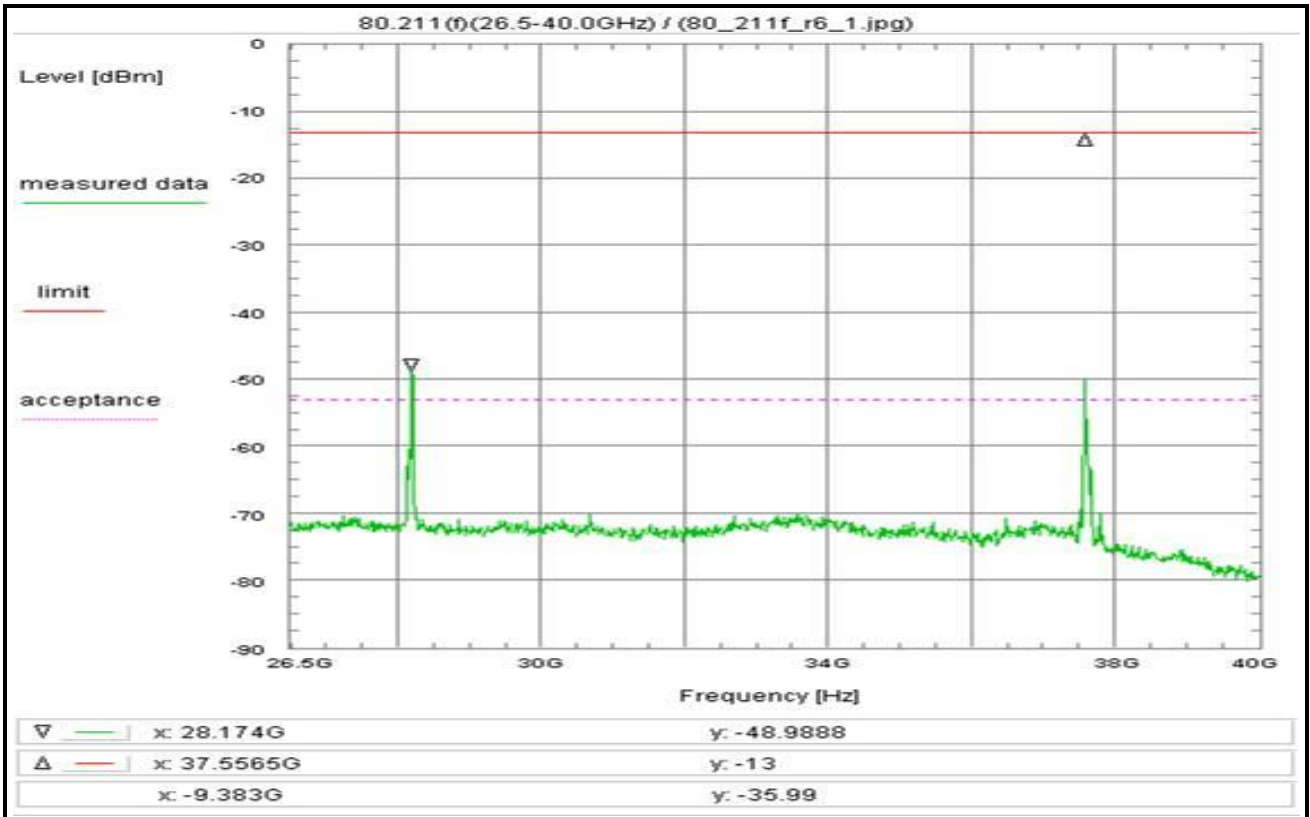
**Setup of measurement equipment:**  
 Start frequency: 18 GHz  
 Stop frequency: 26.5 GHz  
 Center frequency: 22.25 GHz  
 Frequency span: 8.5 GHz  
 Resolution-BW: 1 MHz  
 Video-BW: 1 MHz  
 Input attenuation: 0 dB  
 Trace-Mode: Max-Hold  
 Detector-Mode: Pos Peak

**Correction:**  
 Directional coupler + 0.0 dB  
 Coaxial cable (C217) + 4.0 dB  
 DUT-Antenna + 0.0 dBi  
 Test antenna (A019) - 19.3 dB  
 BW correction factor + 0.0 dB  
 Atten. between HPA and feedhorn - 0.0 dB  
 Freefield attenuation (22.25GHz, 0.3m) + 48.9 dB  
 (BCBL) - 46.0 dB  
 TOTAL CORRECTION: -12.4 dB

**Remarks:**  
 Max-Hold Mode / Pos-Peak

Plot shows 2nd harmonic.

Plot No. 31 ( 32 )



**Subclause:** 80.211(f) Radiated Spurious Emissions  
 Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
 Examination of the frequency range 26.5 - 40.0 GHz

**Limit:**  
 Limit acc. to 80.211(f): -13 dBm

**Test results:**

No. #	Frequency Hz	Level dBm	Acceptance dBm	Exceeding dB	Limit dBm	Exceeding dB
1	28.1740G	-49.0	-53.0	4.0	-13.0	-36.0
2	37.5700G	-50.0	-53.0	3.0	-13.0	-37.0

**Operating condition of DUT:**  
 operating condition 1, see subclause 1.5.2  
 short pulse

**Test setup:**  
 see section 8.1: 2.3

**Test equipment:**  
 see annex 2: A021, BCBL, C217, R001, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**  
 Date & Time: Thu 16/Oct/2014 15:44:38  
 Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
 Temperature: 23 °C  
 Humidity: 50 %  
 Voltage: 233 Vac

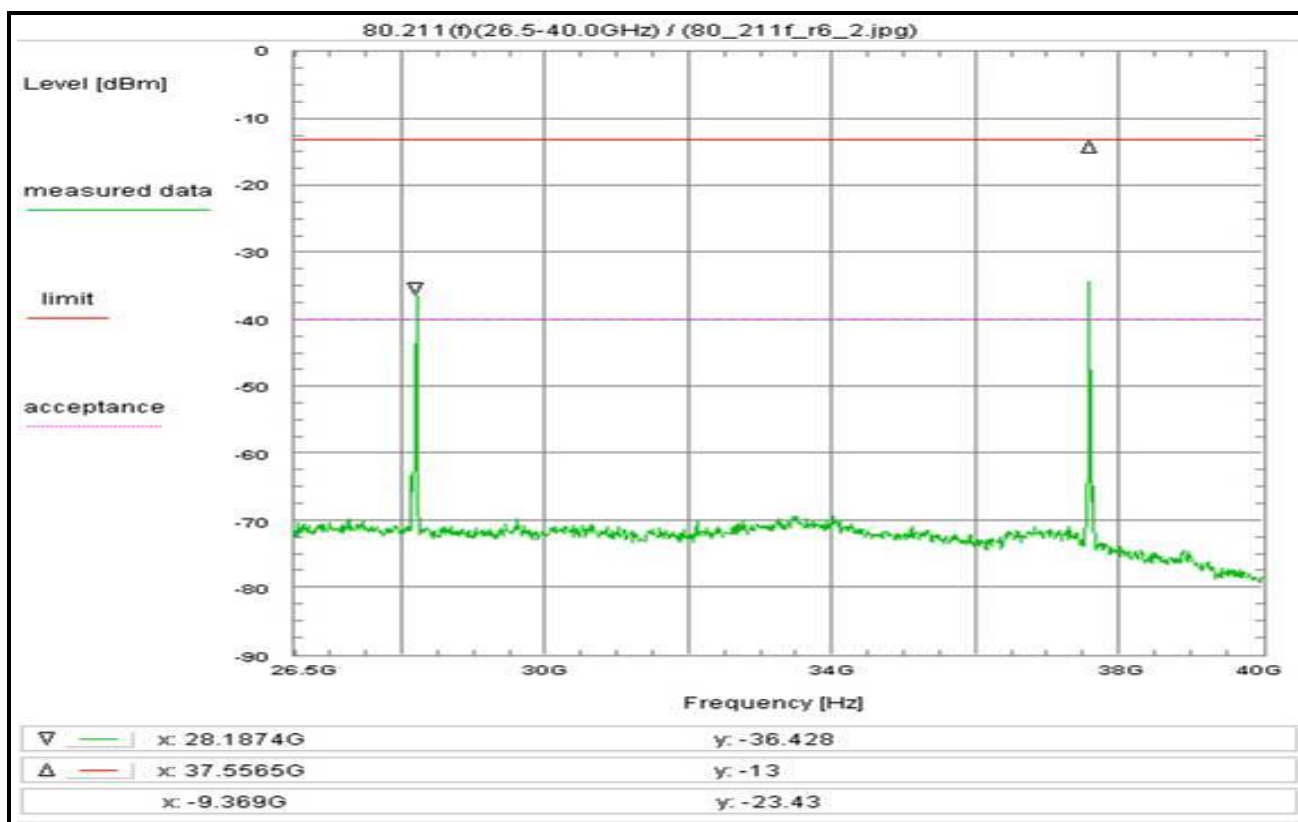
**Setup of measurement equipment:**  
 Start frequency: 26.5 GHz  
 Stop frequency: 40 GHz  
 Center frequency: 33.25 GHz  
 Frequency span: 13.5 GHz  
 Resolution-BW: 1 MHz  
 Video-BW: 1 MHz  
 Input attenuation: 0 dB  
 Trace-Mode: Max-Hold  
 Detector-Mode: Pos Peak

**Correction:**  
 Directional coupler + 0.0 dB  
 Coaxial cable (C217) + 5.6 dB  
 DUT-Antenna + 0.0 dBi  
 Test antenna (A021) - 19.6 dB  
 BW correction factor + 0.0 dB  
 Atten. between HPA and feedhorn - 0.0 dB  
 Freefield attenuation (33.25GHz, 0.2m) + 48.9 dB  
 Amplifier (BCBL) - 47.7 dB  
 TOTAL CORRECTION: -12.8 dB

**Remarks:**  
 Max-Hold Mode / Pos-Peak

Plot shows 3rd and 4th harmonic.

Plot No. 32 ( 32 )



**Subclause:** 80.211(f) Radiated Spurious Emissions  
 Pulsed rf-carrier in frequency range 9.3 - 9.5 GHz  
 Examination of the frequency range 26.5 - 40.0 GHz

**Limit:**  
 Limit acc. to 80.211(f): -13 dBm

No.	Frequency Hz	Level dBm	Acceptance dBm	Exceeding dB	Limit dBm	Exceeding dB
1	28.1875G	-36.3	-40.0	3.7	-13.0	-23.3
2	37.5835G	-34.3	-40.0	5.7	-13.0	-21.3

**Operating condition of DUT:**  
 operating condition 1, see subclause 1.5.2  
 long pulse

**Test setup:**  
 see section 8.1: 2.3

**Test equipment:**  
 see annex 2: A021, BCBL, C217, R001, W242

**Remark:**

**Test result:** Test passed

**Environment condition:**  
 Date & Time: Thu 16/Oct/2014 15:43:27  
 Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
 Temperature: 23 °C  
 Humidity: 50 %  
 Voltage: 233 Vac

**Setup of measurement equipment:**  
 Start frequency: 26.5 GHz  
 Stop frequency: 40 GHz  
 Center frequency: 33.25 GHz  
 Frequency span: 13.5 GHz  
 Resolution-BW: 1 MHz  
 Video-BW: 1 MHz  
 Input attenuation: 0 dB  
 Trace-Mode: Max-Hold  
 Detector-Mode: Pos Peak

**Correction:**  
 Directional coupler + 0.0 dB  
 Coaxial cable (C217) + 5.6 dB  
 DUT-Antenna + 0.0 dBi  
 Test antenna (A021) - 19.6 dB  
 BW correction factor + 0.0 dB  
 Atten. between HPA and feedhorn - 0.0 dB  
 Freefield attenuation (33.25GHz, 0.2m) + 48.9 dB  
 Amplifier (BCBL) - 47.7 dB  
 TOTAL CORRECTION: -12.8 dB

**Remarks:**  
 Max-Hold Mode / Pos-Peak

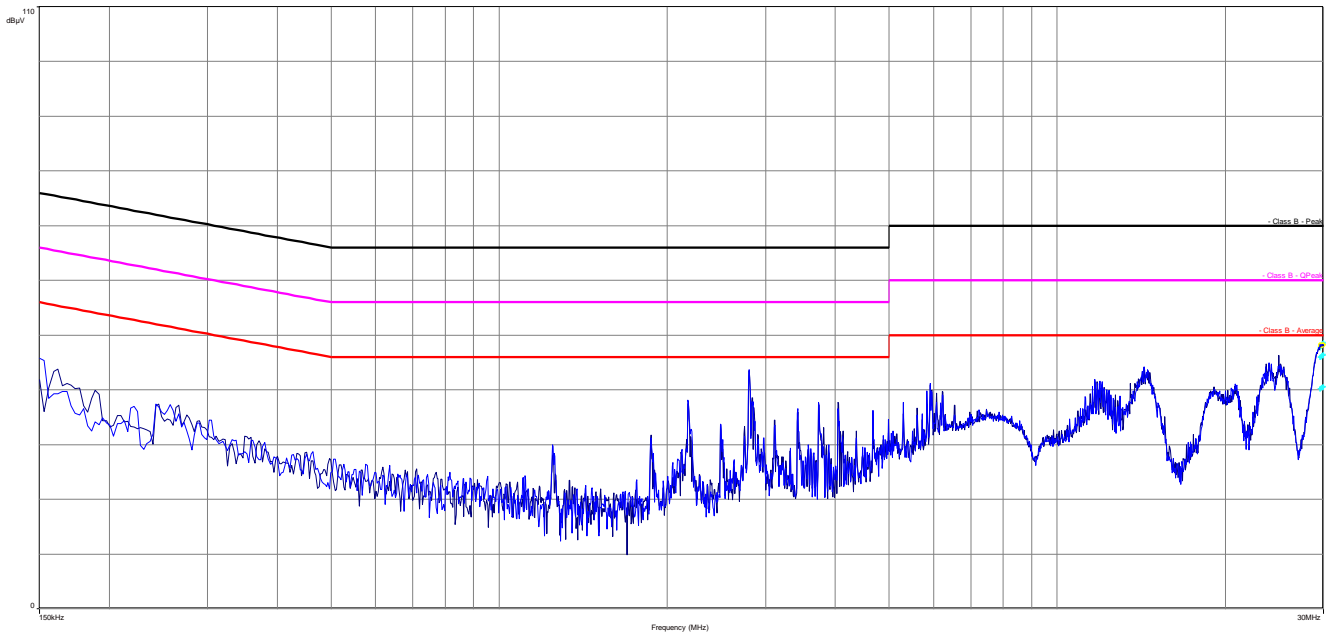
Plot shows 3rd and 4th harmonic.

## Annex D Measurement results, part 3 (FCC Part 15B)

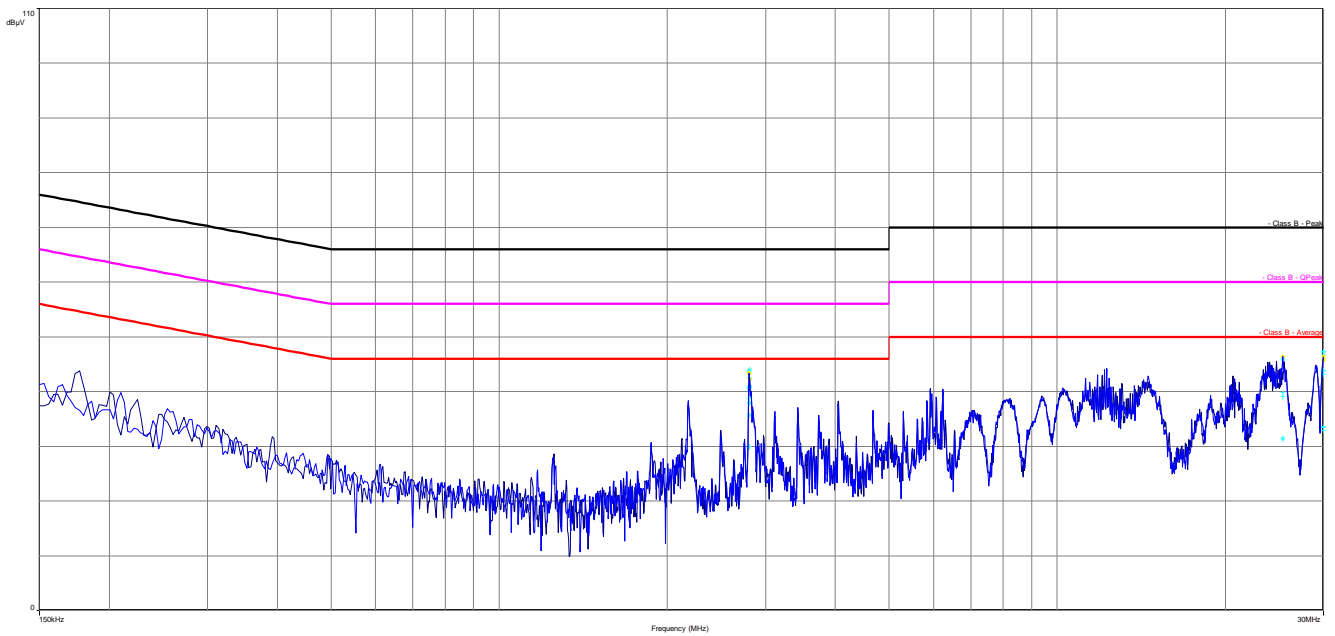
This annex consists of 14 pages including this page.

Measurements documented by this annex were performed with transmitter on (short pulse and long pulse) as worst case scenario.

Plot No. 1: AC conducted, Tx on, short pulse

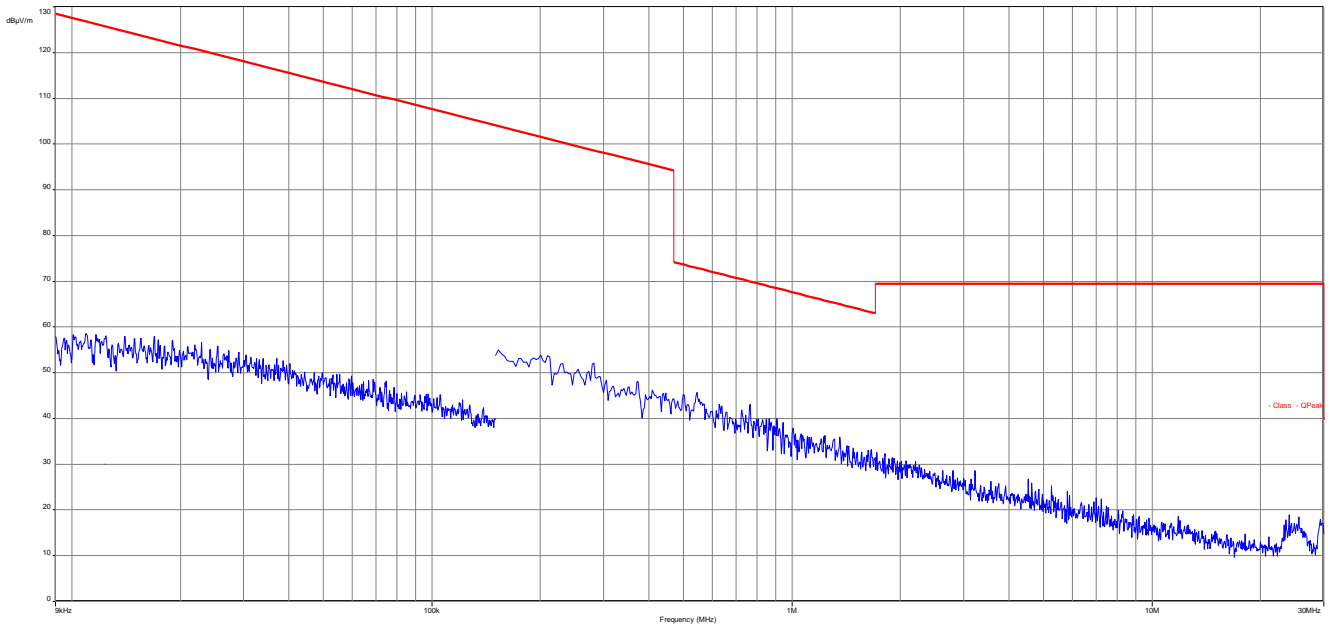


Plot No. 2: AC conducted, Tx on, long pulse

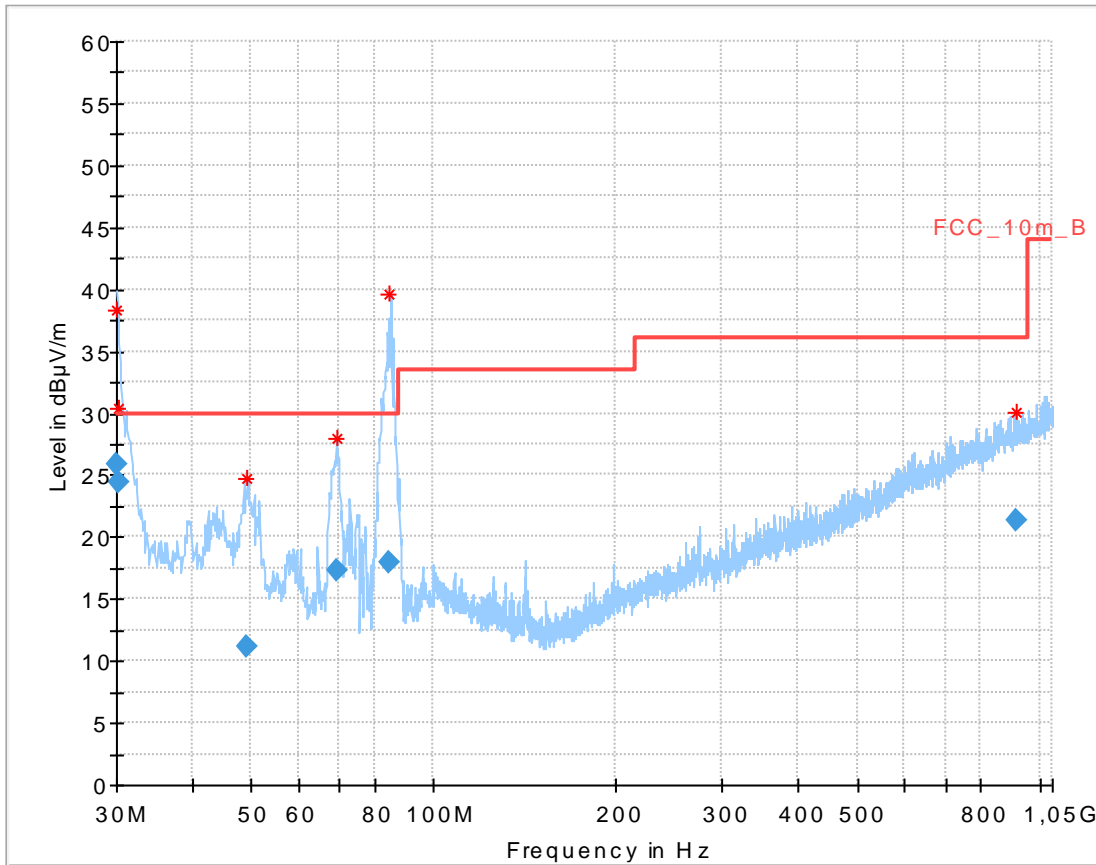




Plot No. 3: Tx on, short pulse



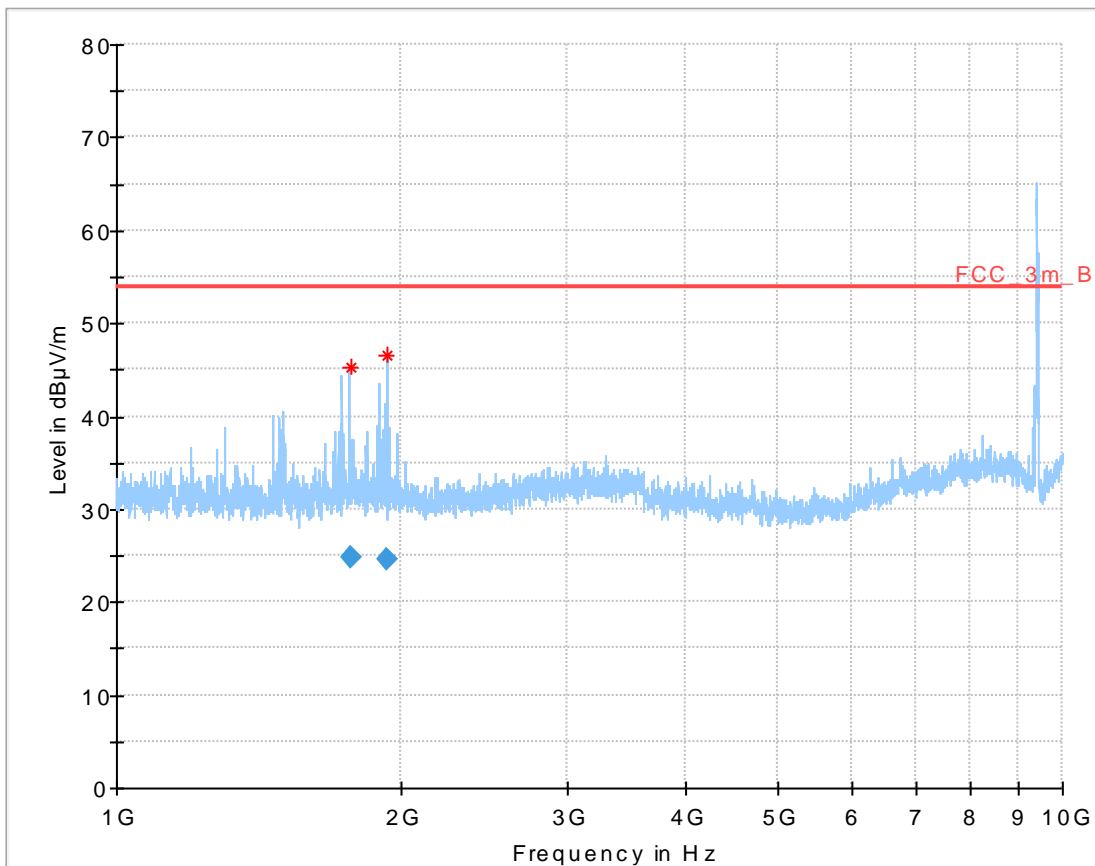
Plot No. 4: Tx on, short pulse



Final\_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.020552	25.84	30.00	4.16	1000.0	120.000	103.0	V	-5	13.3
30.224100	24.39	30.00	5.61	1000.0	120.000	101.0	V	-9	13.4
49.039050	11.22	30.00	18.78	1000.0	120.000	173.0	V	-9	12.9
69.160650	17.36	30.00	12.64	1000.0	120.000	174.0	V	50	8.6
84.635100	17.91	30.00	12.09	1000.0	120.000	103.0	V	302	9.2
917.060550	21.41	36.00	14.59	1000.0	120.000	200.0	H	50	24.2

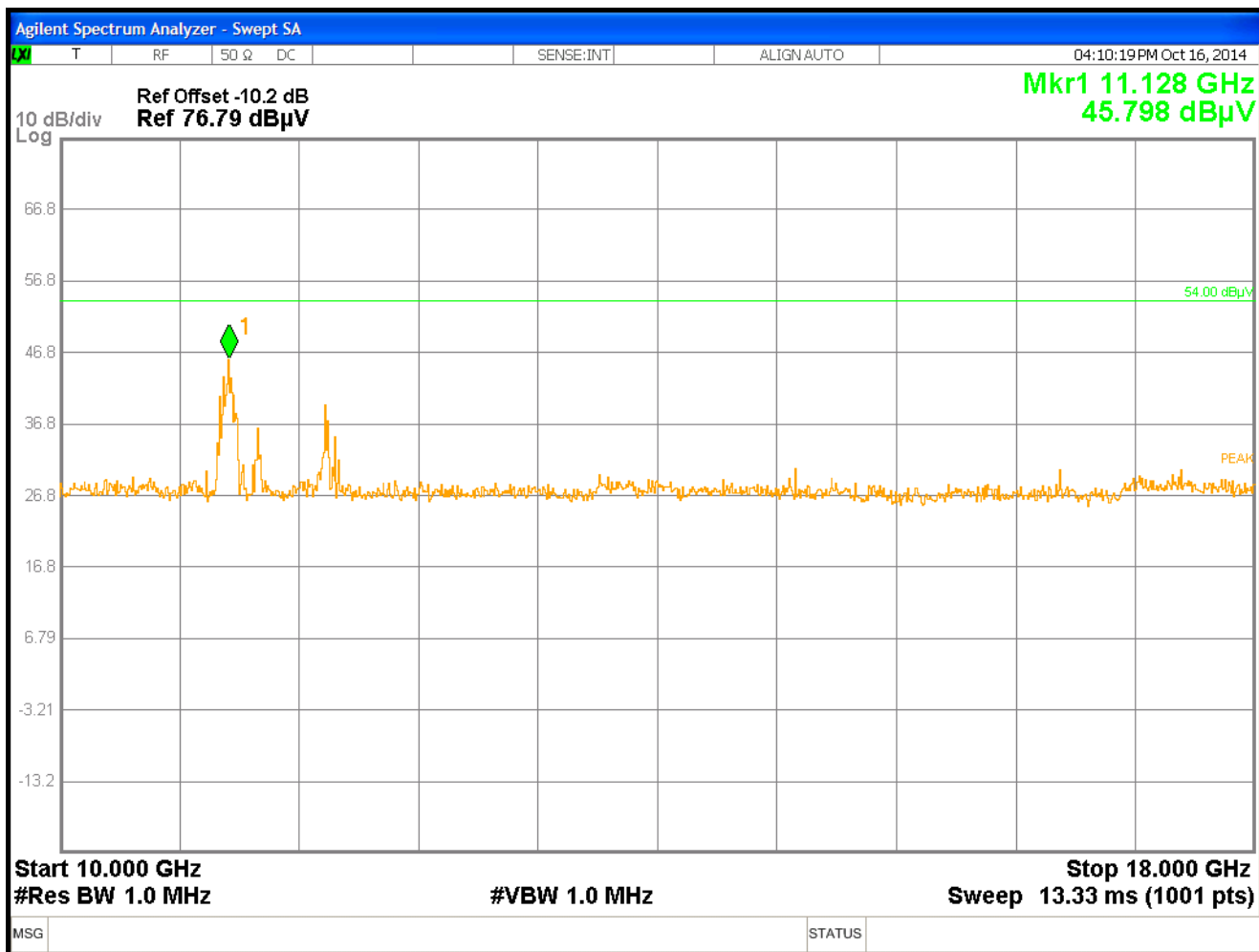
Plot No. 5: Tx on, short pulse



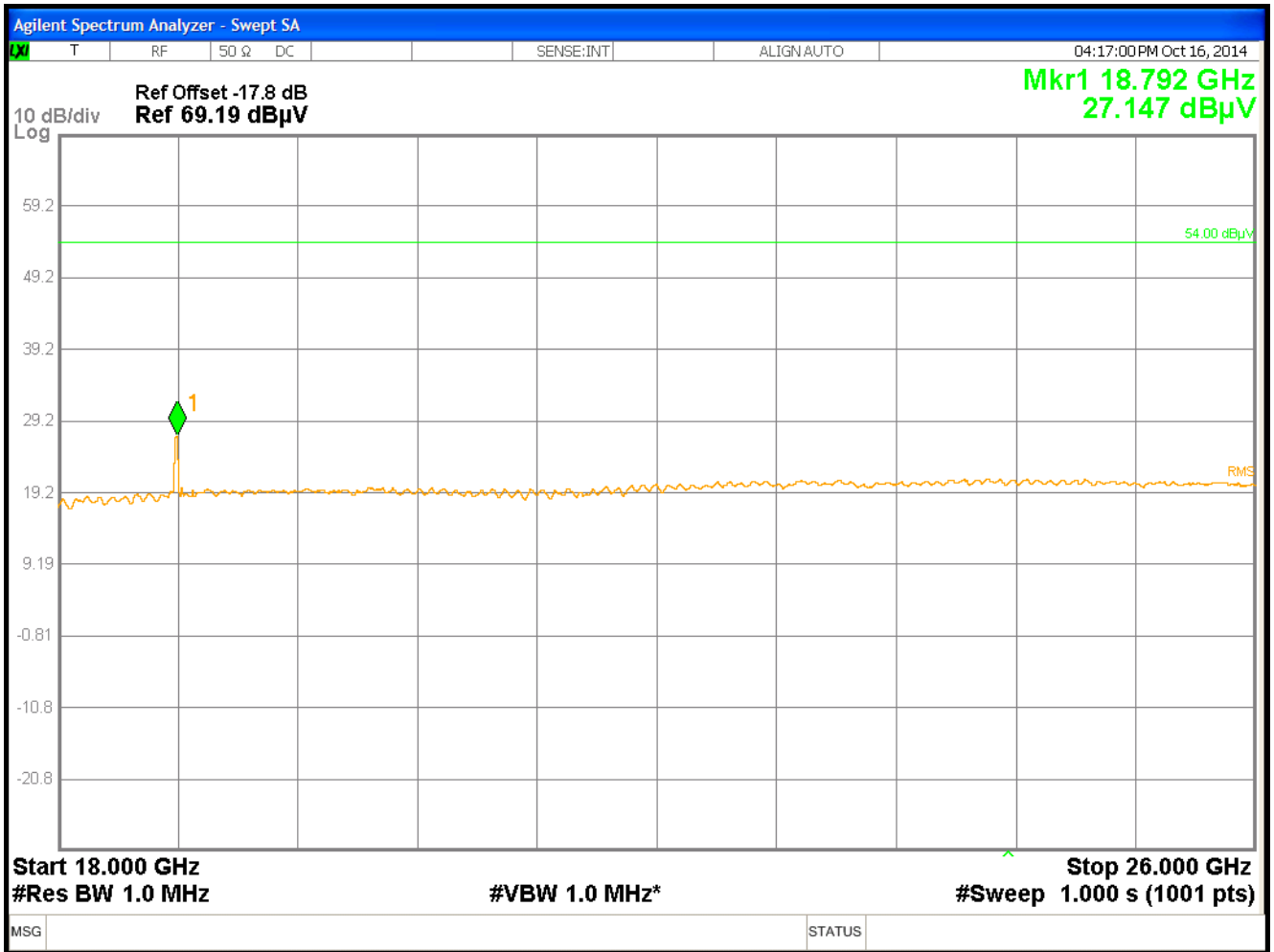
Final\_Result

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1768.113000	24.89	54.00	29.11	1000.0	1000.000	100.0	V	10	-4.4
1931.976000	24.52	54.00	29.48	1000.0	1000.000	100.0	V	113	-4.2

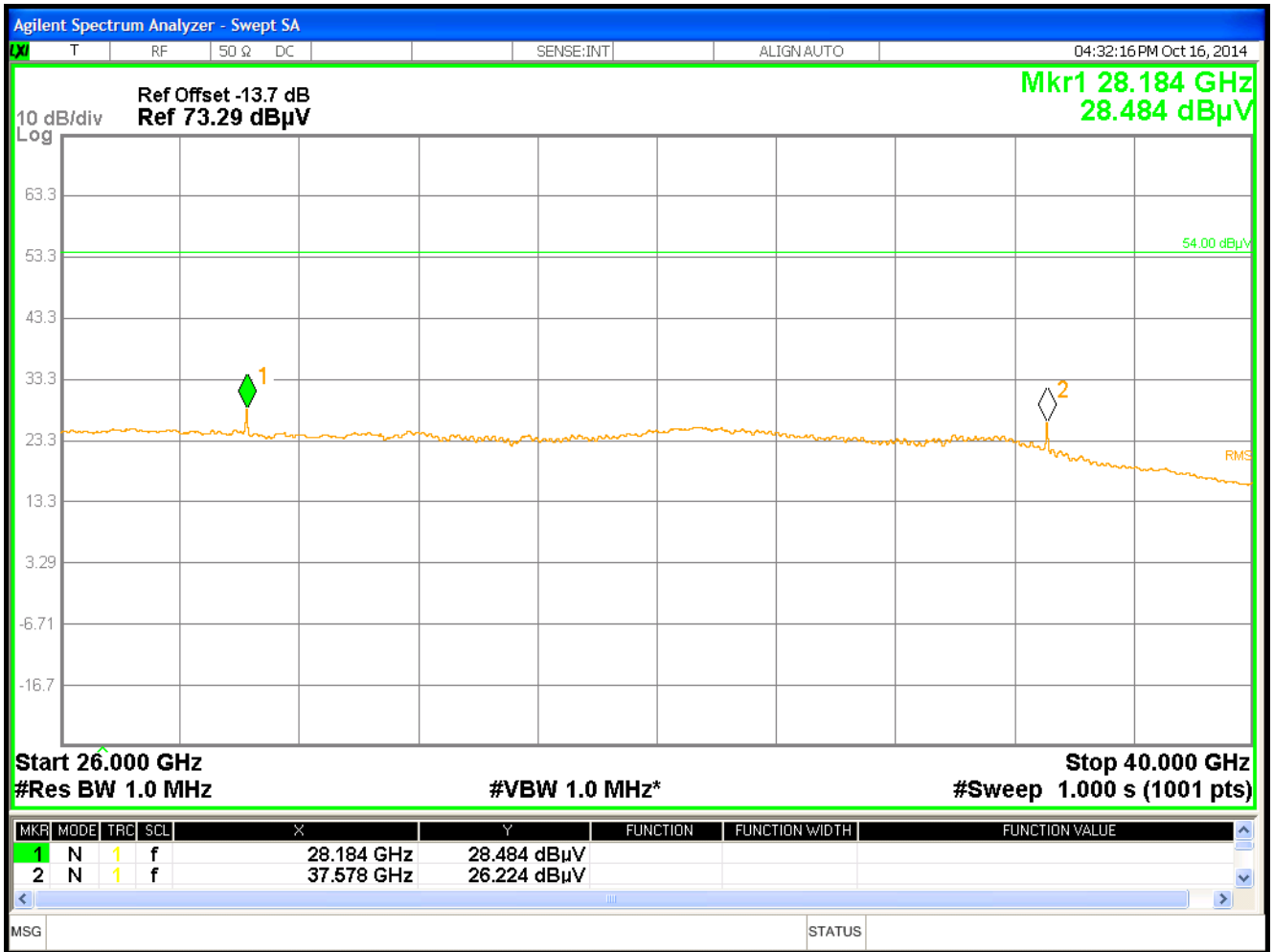
Plot No. 6: Tx on, short pulse



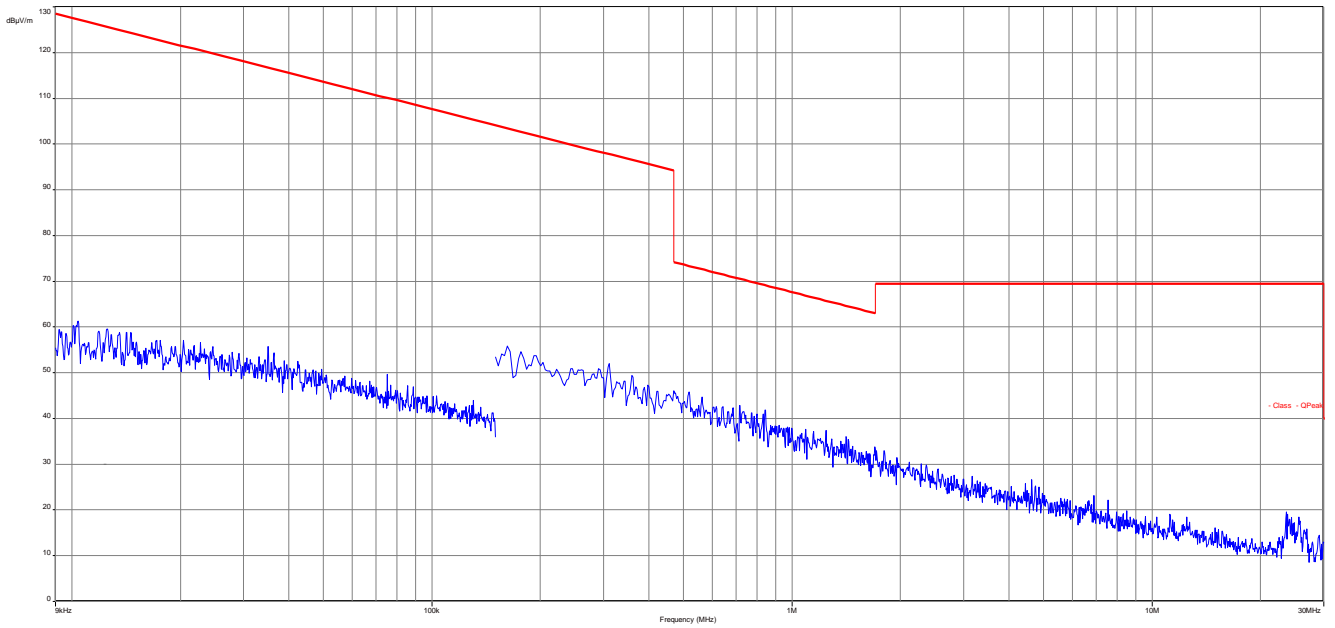
Plot No. 7: Tx on, short pulse



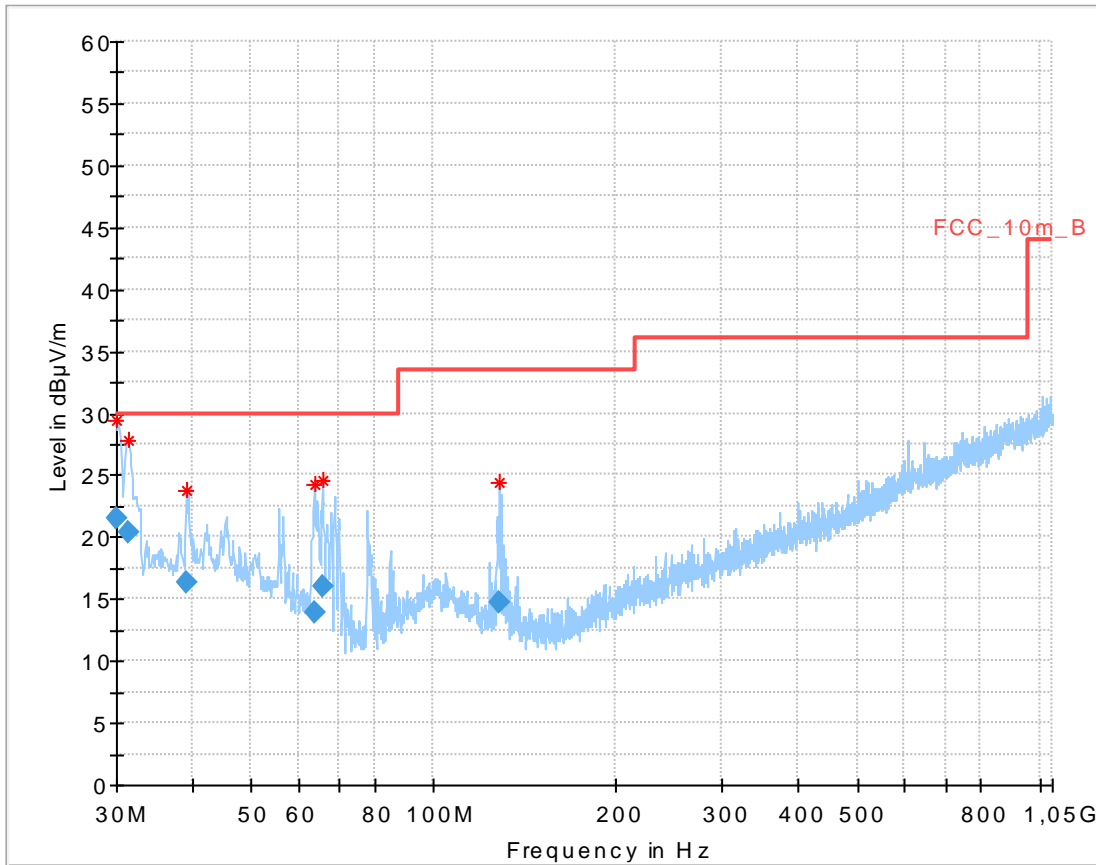
Plot No. 8: Tx on, short pulse



Plot No. 9: Tx on, long pulse



Plot No. 10: Tx on, long pulse

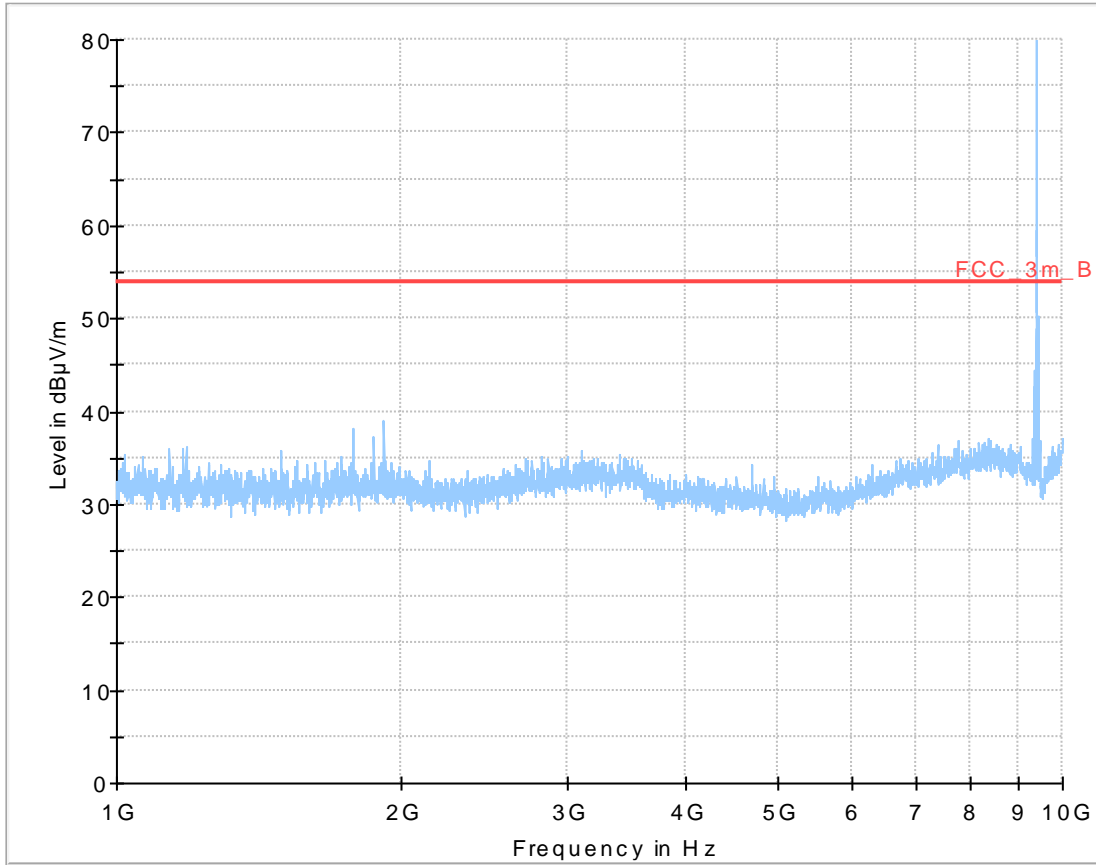


Final\_Result

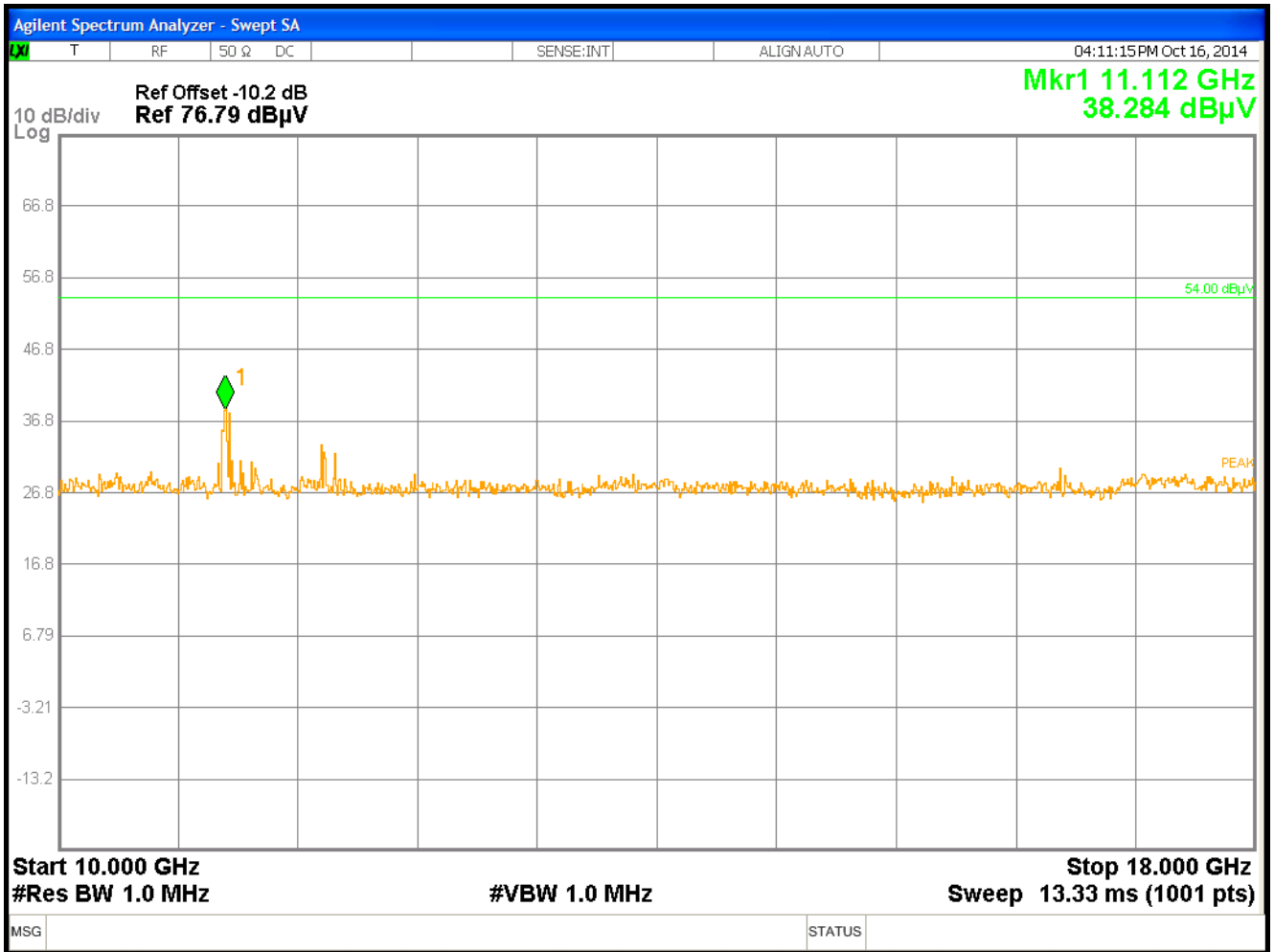
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.043832	21.50	30.00	8.50	1000.0	120.000	103.0	V	320	13.3
31.450050	20.44	30.00	9.56	1000.0	120.000	101.0	V	320	13.5
39.276750	16.40	30.00	13.60	1000.0	120.000	104.0	V	50	14.0
63.858900	13.94	30.00	16.06	1000.0	120.000	174.0	V	281	9.7
65.704350	16.07	30.00	13.93	1000.0	120.000	103.0	V	215	9.3
128.166150	14.65	33.50	18.85	1000.0	120.000	98.0	V	5	9.5



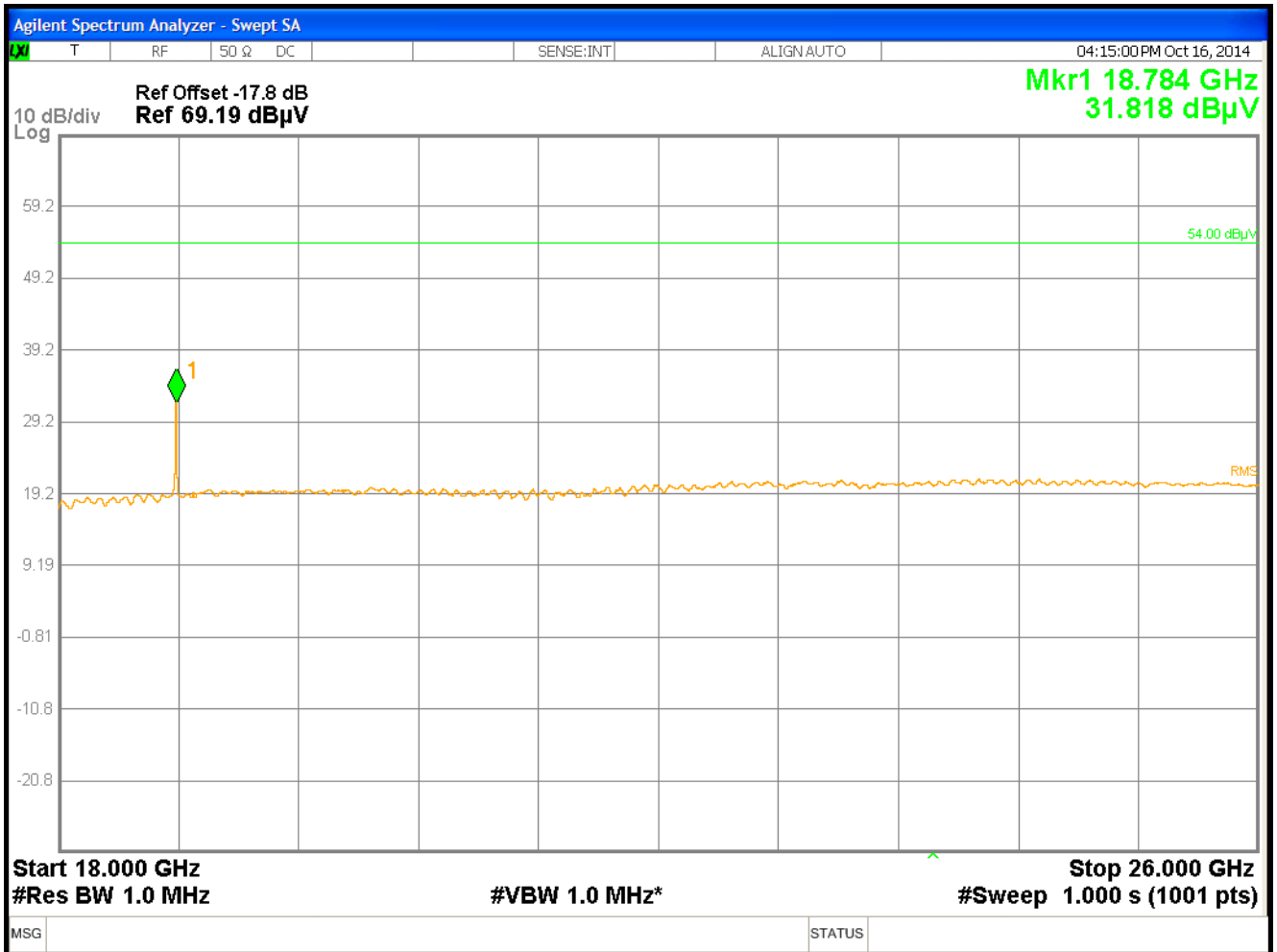
Plot No. 11: Tx on, long pulse



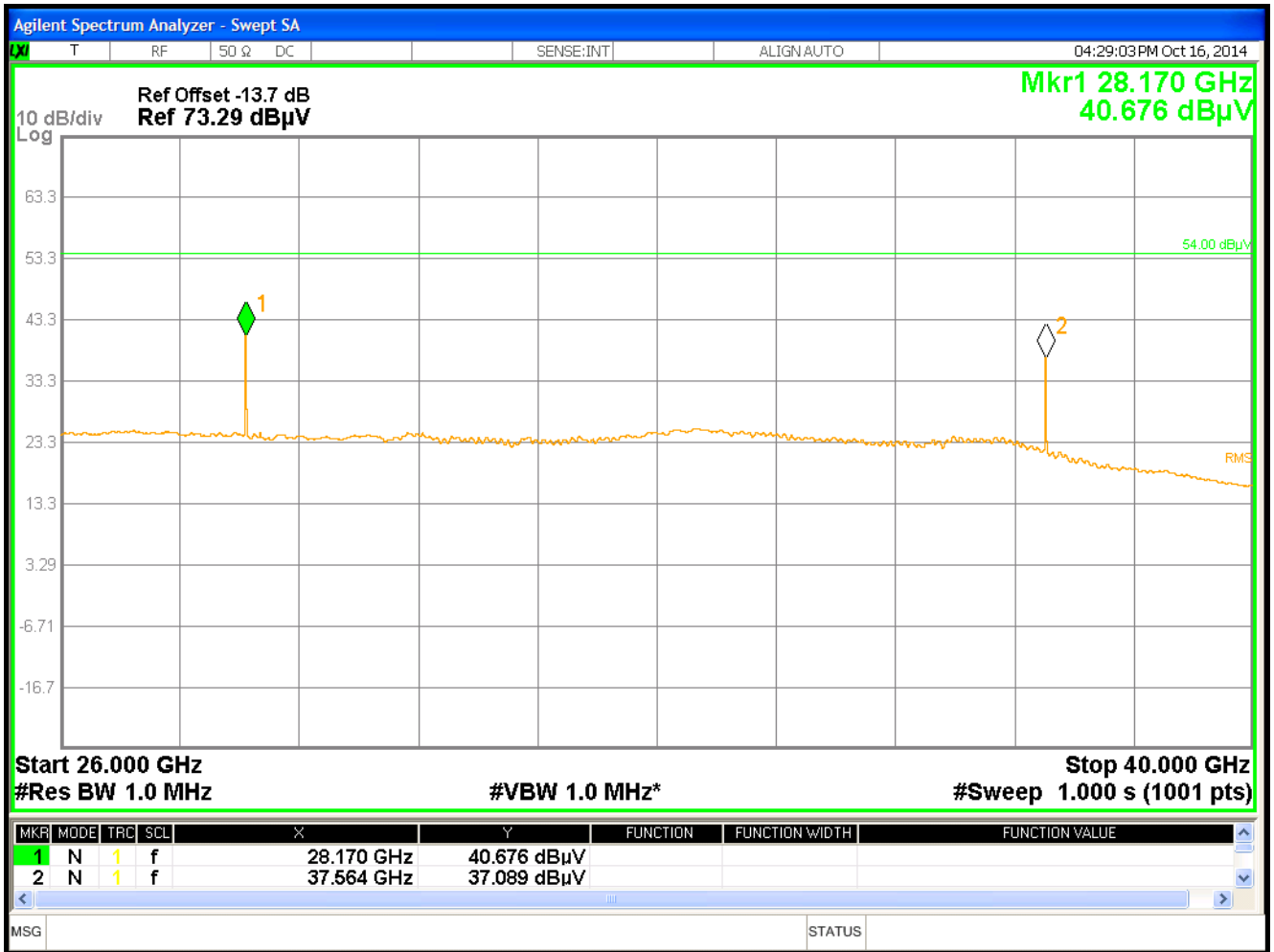
Plot No. 12: Tx on, long pulse



Plot No. 13: Tx on, long pulse



Plot No. 14: Tx on, long pulse



**Annex E Document history**

Version	Applied changes	Date of release
	Initial release - DRAFT	2014-12-15
	minor editorial changes based on manufacturer's comments	2015-03-24
-A	FCC ID added	2015-07-02

**Annex F Further information****Glossary**

AVG	-	Average
DUT	-	Device under test
EMC	-	Electromagnetic Compatibility
EN	-	European Standard
EUT	-	Equipment under test
ETSI	-	European Telecommunications Standard Institute
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	Not applicable
PP	-	Positive peak
QP	-	Quasi peak
S/N	-	Serial number
SW	-	Software