

TEST REPORT

Test report no.: 4-3702/15-01-02



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

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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 - S-Band Up Mast Transceiver
Model name: NSX S Up 230V Pedestal
Type: 770-003.NG001
FCC-ID: ASLNSX-30U
Frequency range: 2.9 – 3.1 GHz
Tx power conducted: 30 kW (nominal pulse power)

Power Supply: 115/230 V AC
Temperature Range: -25°C to +55°C

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

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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:	2015-05-06
Date of receipt of test item:	2015-05-26
Start of test:	2015-05-26
End of test:	2015-06-03
Laboratory reference number:	018.15
Person(s) present during the test:	Mr. Henning Mextorf

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 - S-Band Up Mast Transceiver
Model name	NSX S Up 230V Pedestal
Type identification	770-003.NG001
S/N serial number	4006168000107
Frequency band	2.9 – 3.1 GHz
TX output power conducted	30 kW (nominal pulse power of magnetron)
Type of modulation	sequence of unmodulated pulses
Type of radio transmission	P0N
Power supply	115/230 V AC
Temperature range	-25°C to +55°C

7.2 List of components

NSX S Up 230V Pedestal equipped with:

- 30 kW magnetron, EEV Magnetron, Type MG5223, S/N 0032513

7.3 Antenna system(s)

Antenna size	Concept	Manufacturer	Type	TX gain dBi (mid)	Polarization	pattern / test report
12 ft	endfed slotted waveguide	Kelvin Hughes	28.0	LPR-A1	horizontal	data sheet / spec. available

7.4 Operating conditions

Operating condition 1: S-Band radar, 30 kW, EEV Magnetron, Type MG5223, S/N 0032513

7.5 Additional information

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

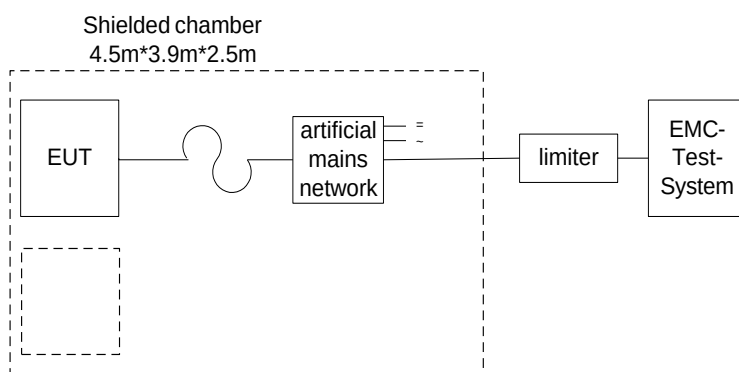
Test setup- and EUT-photos are included in test report: 4-3702_15-01-01_AnnexA (External Photos)
4-3702_15-01-01_AnnexB (Internal Photos)
4-3702_15-01-01_AnnexC (Test Setup)

8 RF measurements

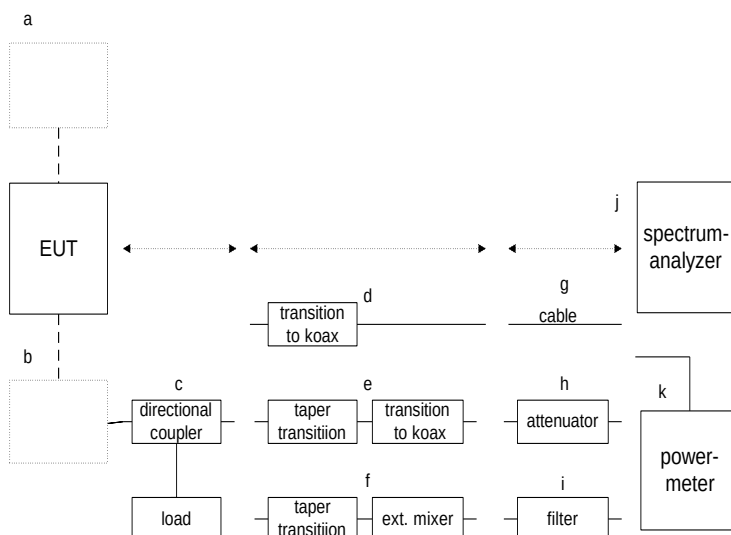
8.1 Description of test setup

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

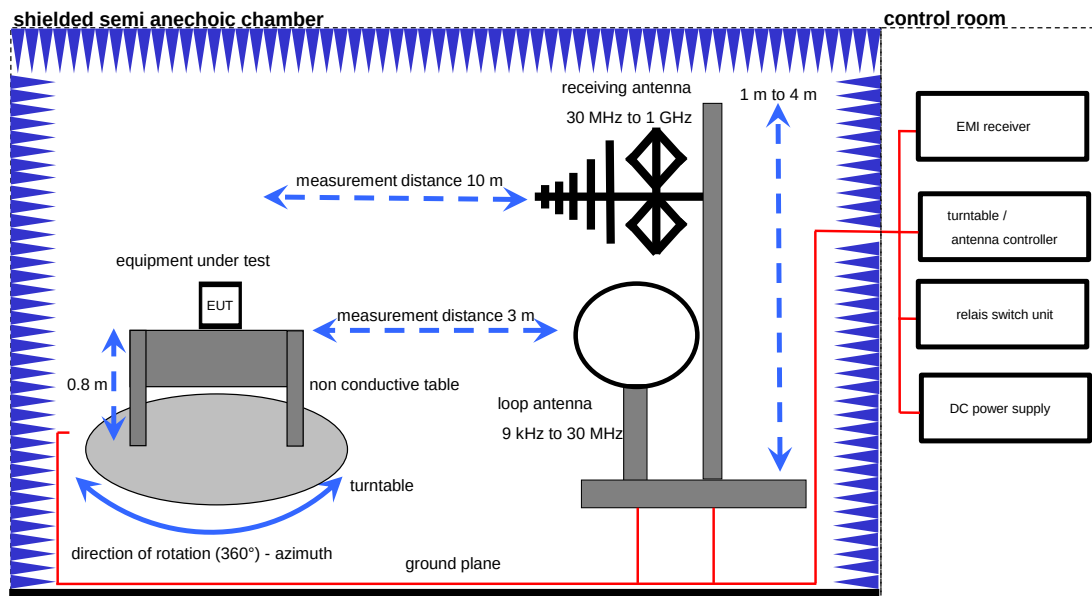


Setup 1.2 x...x

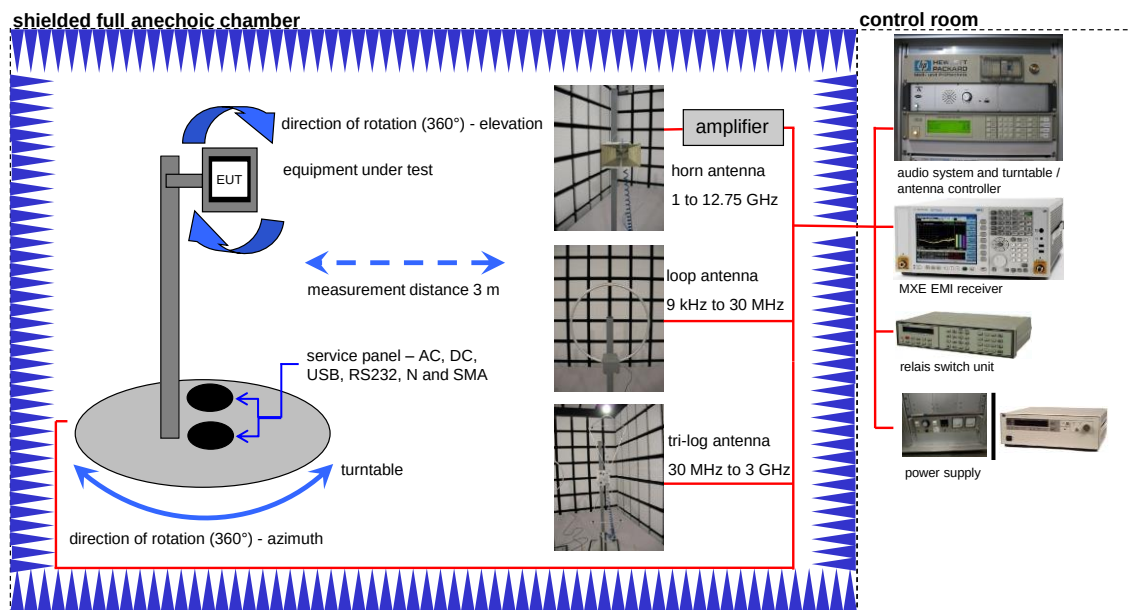
8.1.2 Radiation measurements

Setup 2.1: Radiated measurements chamber F

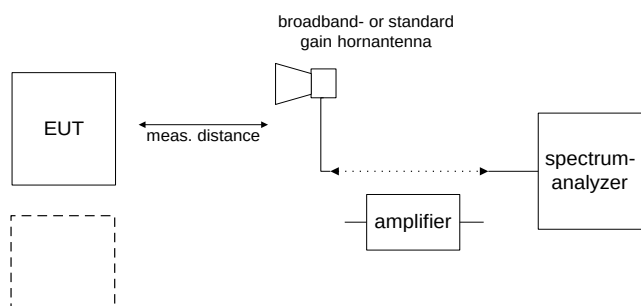
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas 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 analyzers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



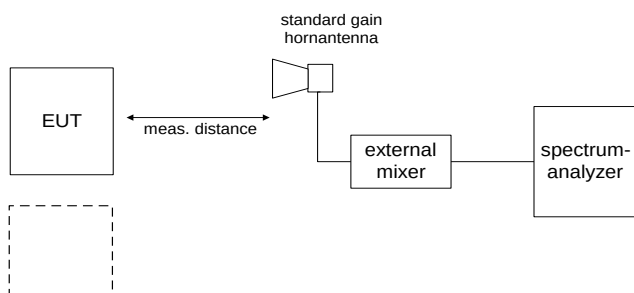
Setup 2.2: Radiated measurements chamber C



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

☒	No deviations from the technical specifications were ascertained
☐	There were deviations from the technical specifications ascertained

The present test report:

☒	describes the first test
☐	describes an additional test
☐	is a verification of documents
☐	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	see below	2015-07-24	-/-

Test Specification Clause	Test Case	Pass	Fail	N/A	N/P	Results
\$2.1046 / §80.215	Measurements required: RF power output / Transmitter power.	X				pk: 73.9 dBm avg: 41.2 dBm
\$2.1047 / §80.213	Measurements required: Modulation characteristics / Modulation requirements	X				complies
\$2.1049	Measurements required: Occupied bandwidth (Necessary Bandwidth)	X				max. 60 MHz max. 72 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				+957 ppm -998 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

I.	Transmitter characteristics / output power	12
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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 P0N and F3N emission: Mean power.

Limit: no limitations

Test setup: no. 1.2

Measurement results:

Mode	T _{pulse} [ns]	T _{rise} [ns]	T _{fall} [ns]	PRF [Hz]	P _{out pulse} [dBm]	P _{out mean} [dBm]
short pulse	47.14	13.3	42.07	3000	73.5	35.0
medium 1 pulse	156.2	8.0	46.27	2000	73.9	38.8
medium 2 pulse	421.4	7.2	49.21	1000	73.4	39.6
long pulse	822.7	6.8	47.22	750	73.3	41.2

Note:

P_{out mean} is calculated based on P_{out pulse} and duty cycle of transmitter.
see also Annex B, plots 1 - 8

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_{-40 dB} 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]	calculated necessary bw [MHz]	calculated B _{-40 dB} bandwidth [MHz]	see annex C, plot no.
short pulse	60.0	71.5	303.5	5
medium 1 pulse	34.8	40.7	215.0	6
medium 2 pulse	21.0	15.1	138.0	7
long pulse	14.3	7.73	77.8	8

Note:

see also Annex C, plots 5 – 8

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. 9
medium 1 pulse	Annex C, plot no.10
medium 2 pulse	Annex C, plot no.11
long pulse	Annex C, plot no.12

Note:

see also Annex C, plots 9 – 12

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]
2.61	RMS	-37.7	-13		-13	2.61	RMS	-37.3
4.98	RMS	-44.1	-13		-13	4.98	RMS	-42.4
6.09	RMS	-37.6	-13		-13	6.11	RMS	-29.2
Measurement uncertainty			± 1.5 dB					

n.f. = nothing found

Note:

see also Annex C, plots 13 – 28

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 [GHz]	Detector	Level [dBm]	Limit [dBm]		Limit [dBm]	F [GHz]	Detector	Level [dBm]
12.22	RMS	-71.3	-13		-13	12.21	RMS	-61.4
					-13	21.37	RMS	-64.6
					-13	27.47	RMS	-73.2
Measurement uncertainty			± 3 dB					

n.f. = nothing found

v / h = vertical / horizontal

Note:

see also Annex C, plots 29 – 36

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_{pulse} [ns]	$1.5/T$ [MHz]	f_{min} [GHz]	f_{max} [GHz]
short pulse	47.1	31.82	2.9318	3.0682
medium 1 pulse	156.2	9.60	2.9096	3.0904
medium 2 pulse	421.4	3.56	2.9036	3.0964
long pulse	822.7	1.82	2.9018	3.0982

Note:

f_{min} and f_{max} are based on 2.9 GHz – 3.1 GHz band.

Test setup: no. 1.2

Measurement results:

Temperature	Voltage	Reference Frequency	Measured Frequency	Deviation [MHz]	Deviation [ppm]
-30	115	3.051712	3.054632	2.920	957
-20	115	3.051712	3.054037	2.325	762
-10	115	3.051712	3.053347	1.635	536
0	115	3.051712	3.052632	0.920	301
10	115	3.051712	3.051892	0.180	59
20	115	3.051712	3.051712	0.000	0
20	115	3.051712	3.051712	0.000	0
20	98	3.051712	3.051712	0.000	0
30	132	3.051712	3.050907	-0.805	-264
40	115	3.051712	3.049957	-1.755	-575
50	115	3.051712	3.048667	-3.045	-998

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 μ 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 μ 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 μ V/m]		
Frequency [MHz]	Detector	Level [dB μ V/m]
No critical peaks detected. All detected peak values are below the average limits.		
Measurement uncertainty	± 3 dB	

Note:

see also Annex D, plot 1

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 [dBμV/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 [dBμV/m]		
Frequency [GHz]	Detector	Level [dBμV/m]
No critical peaks detected. All detected peak values are below the average limits.		
Measurement uncertainty	± 3 dB	

Note:

see also Annex D, plots 2 – 8

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	VIKII	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	VIKII	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

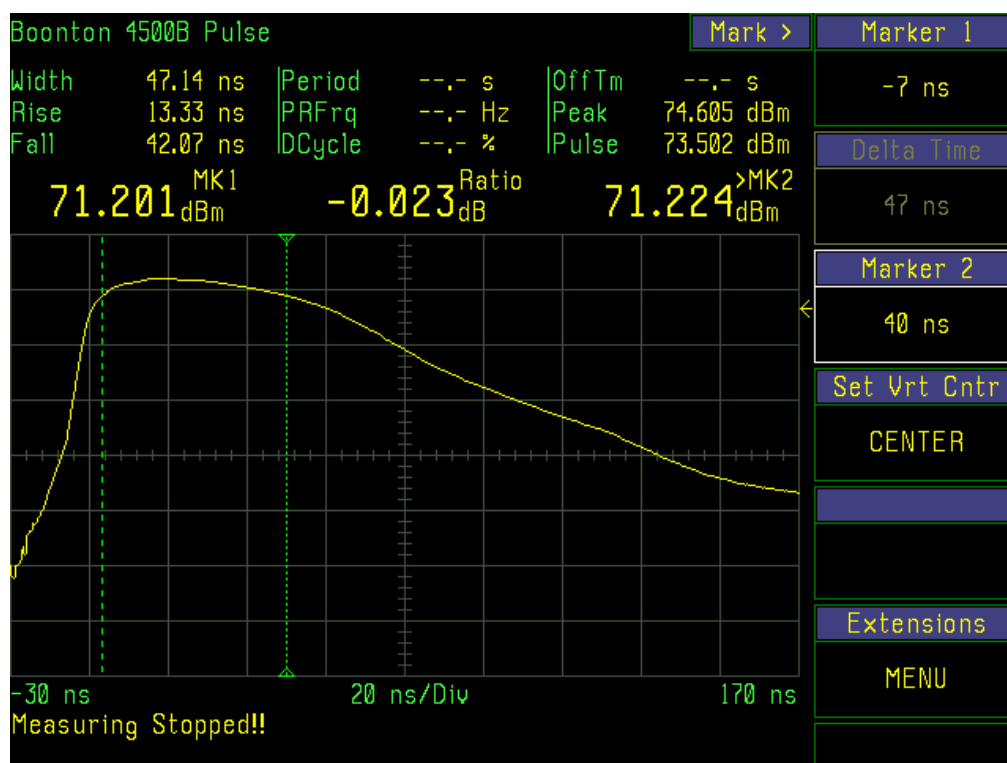
k calibration / calibrated
 ne not required (k, ev, izw, zw not required)
 ev periodic self verification
 Ve long-term stability recognized
 vlkl! Attention: extended calibration interval
 NK! Attention: not calibrated

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

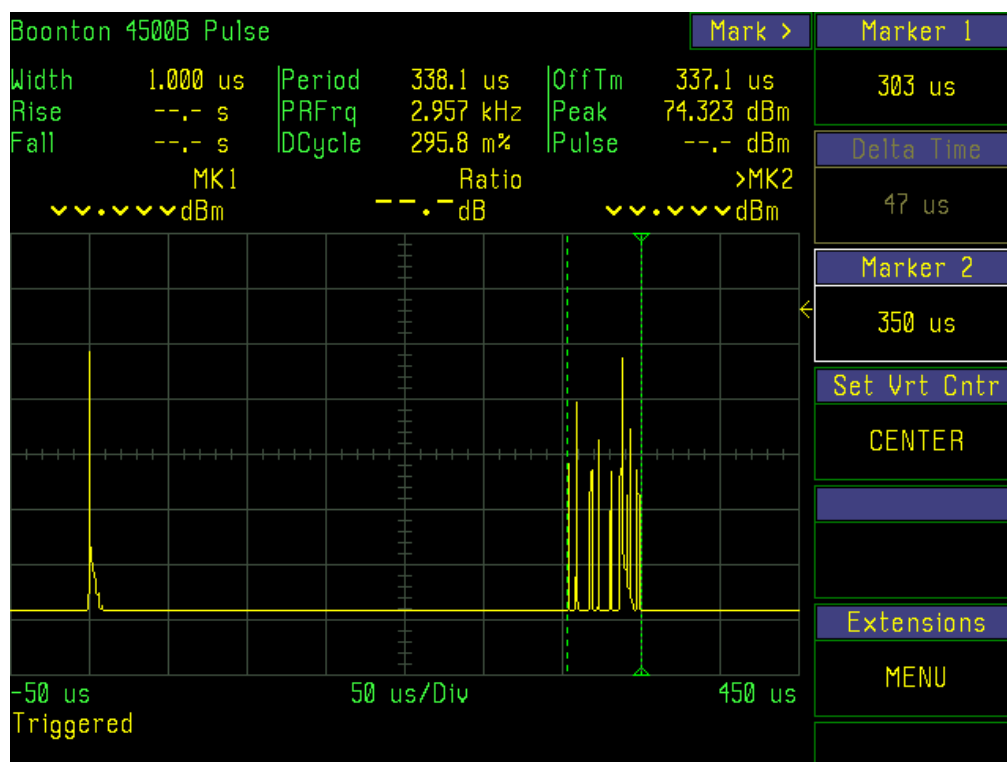
Annex B Measurement results, part 1 (PPA)

This annex consists of 5 pages including this page.

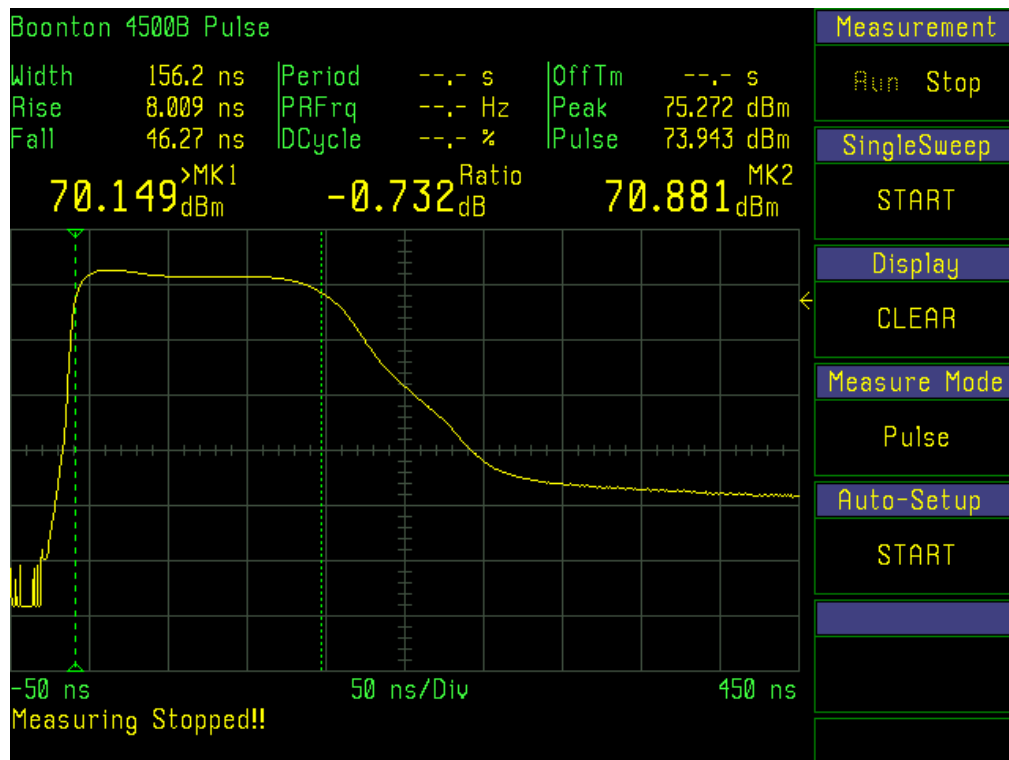
Plot No. 1: short pulse



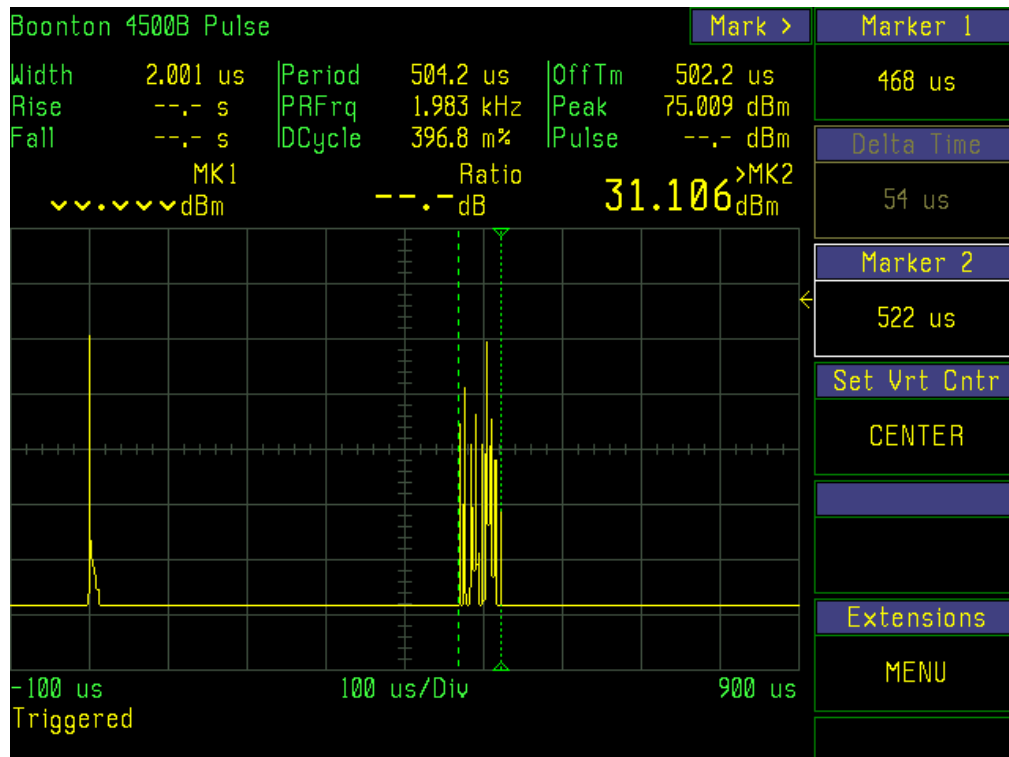
Plot No. 2: short pulse



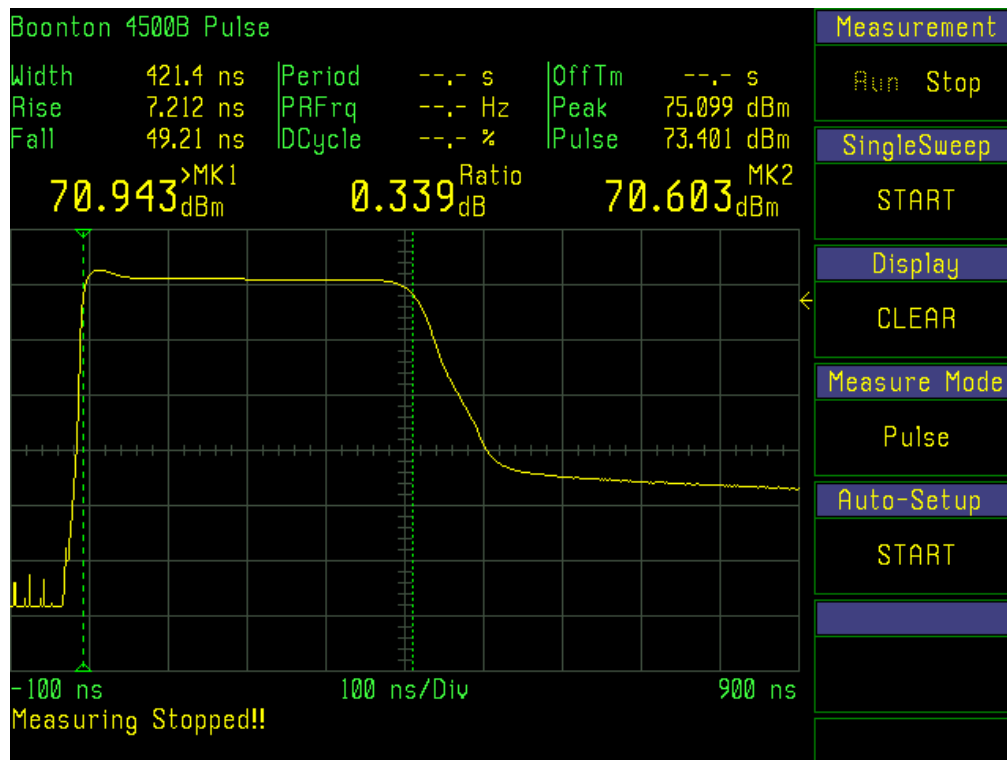
Plot No. 3: medium 1 pulse



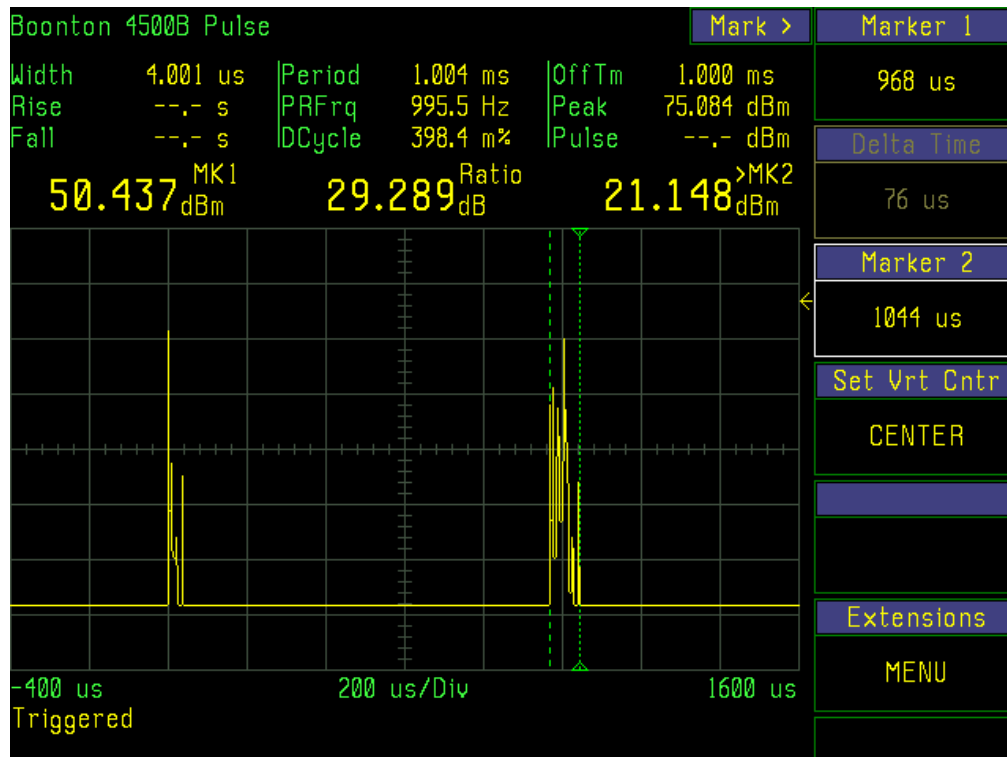
Plot No. 4: medium 1 pulse



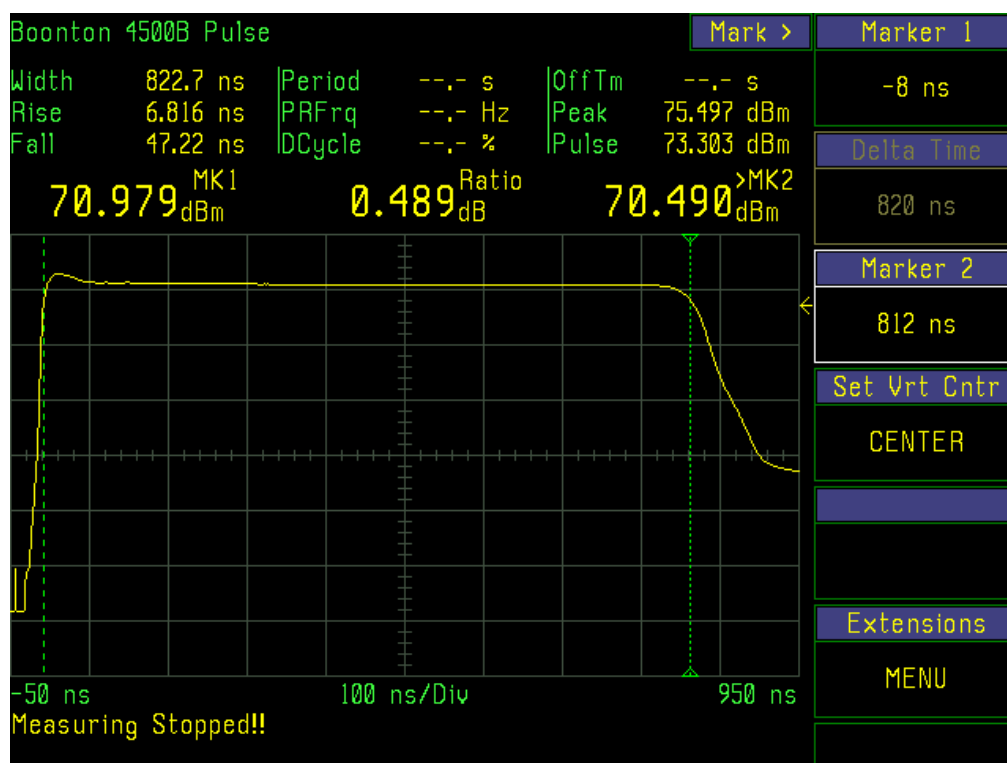
Plot No. 5: medium 2 pulse



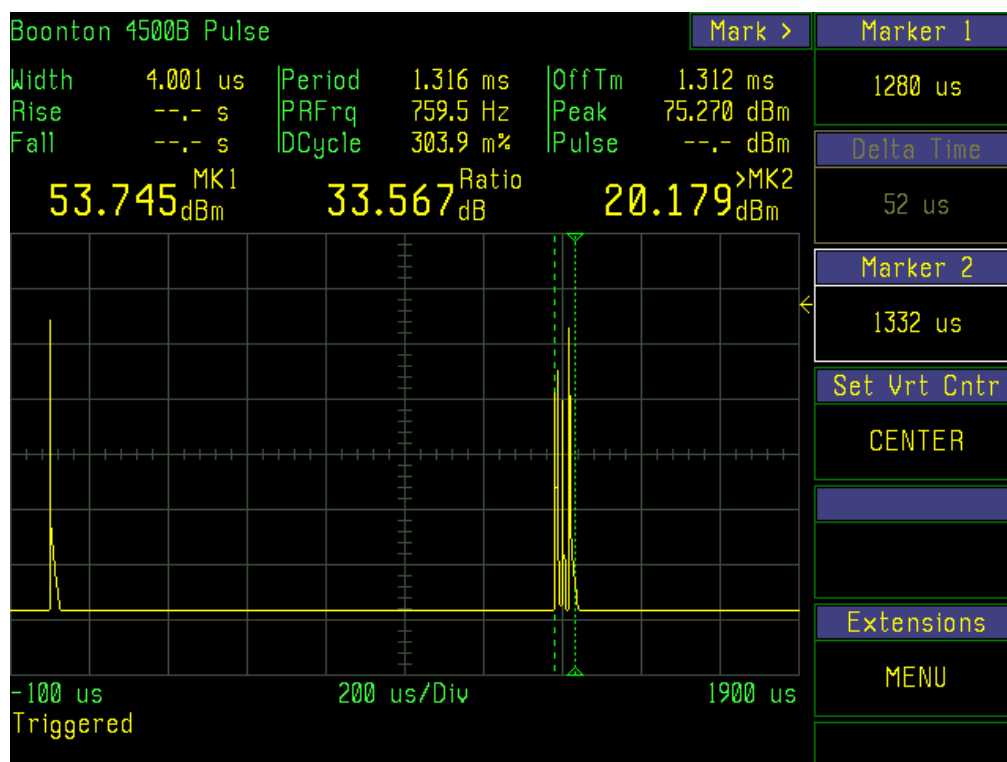
Plot No. 6: medium 2 pulse



Plot No. 7: long pulse



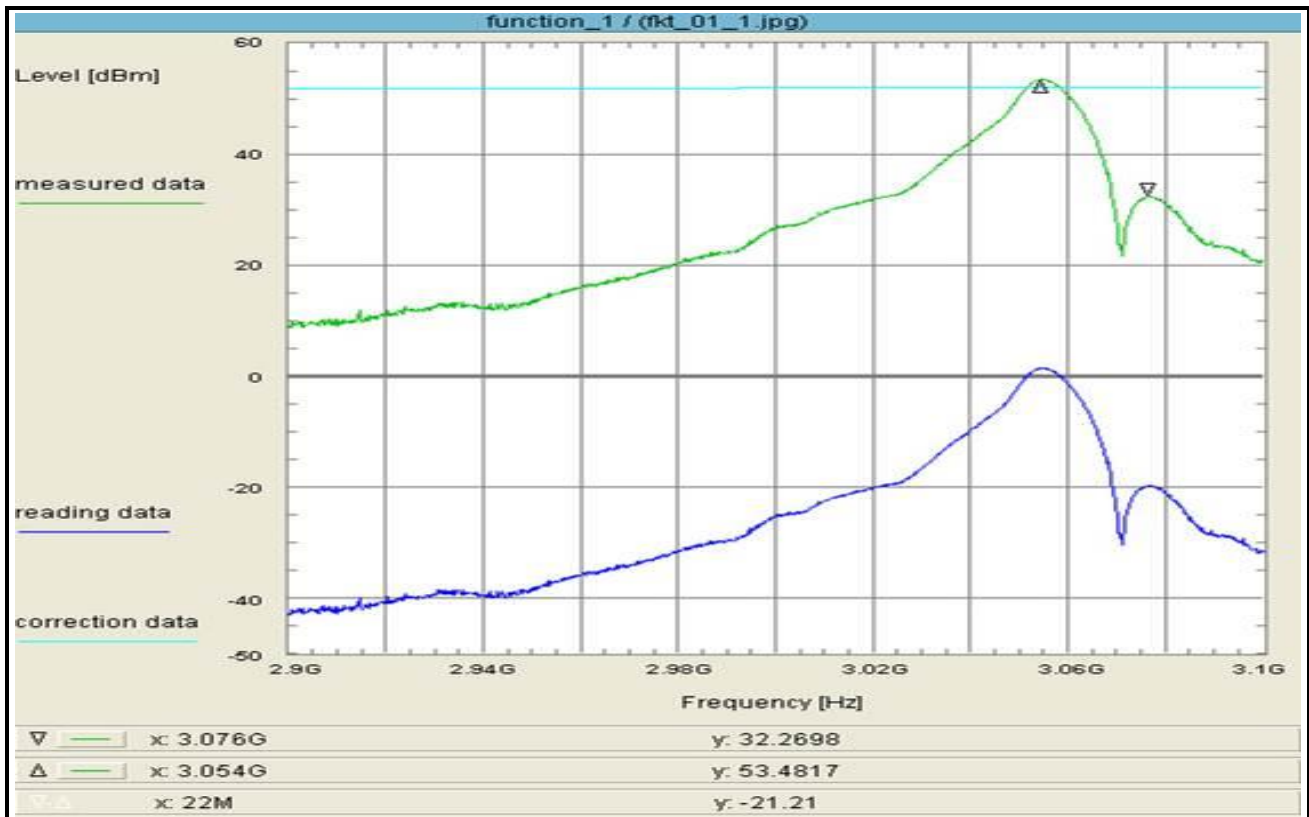
Plot No. 8: long pulse



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

This annex consists of 37 pages including this page.

Plot No. 1 (36)



Subclause: -/- Function test, frequency and power
Short pulse / medium pulse / long pulse
Measurement within the allocated band: 2.9 - 3.1 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 annex 1: 1.2cdhgj

Test equipment:
see annex 2: C217, R001, U314, UStu, W075, W076

Remark:

Test result: measurement for orientation

Environment condition:

Date & Time: Wed 27/May/2015 10:12:34
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 2.9 GHz
Stop frequency: 3.1 GHz
Center frequency: 3 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

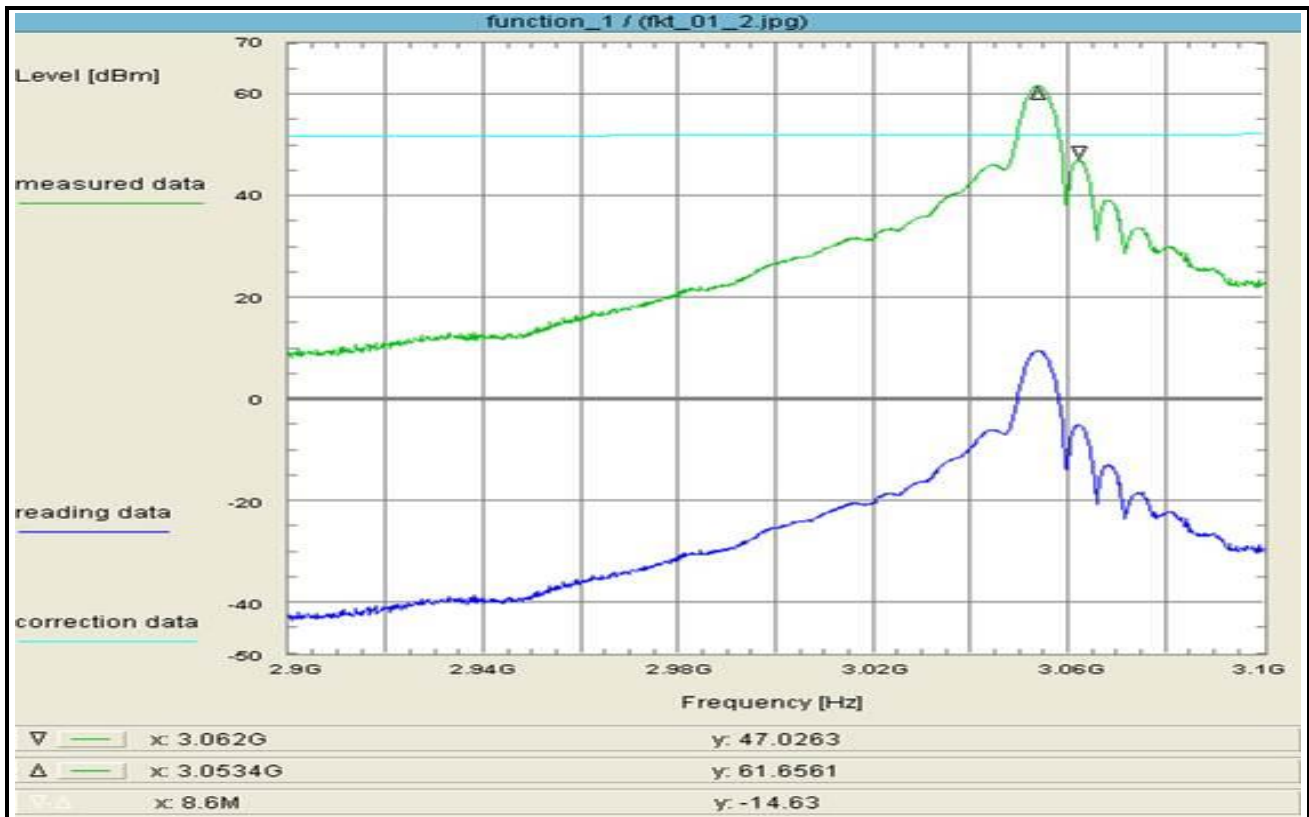
Correction:

Directional coupler (W075)	+ 30.5 dB
Coaxial cable (C217)	+ 1.2 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 (U314)	+ 20.3 dB
TOTAL CORRECTION:	+ 52.0 dB

Remarks:

Test of general function of the EUT and measurement for orientation

Plot No. 2 (36)



Subclause: -/- Function test, frequency and power
Short pulse / medium pulse / long pulse
Measurement within the allocated band: 2.9 - 3.1 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
med1 pulse

Test setup:
see annex 1: 1.2cdhgj

Test equipment:
see annex 2: C217, R001, U314, UStu, W075, W076

Remark:

Test result: measurement for orientation

Environment condition:

Date & Time: Wed 27/May/2015 10:16:38
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 2.9 GHz
Stop frequency: 3.1 GHz
Center frequency: 3 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

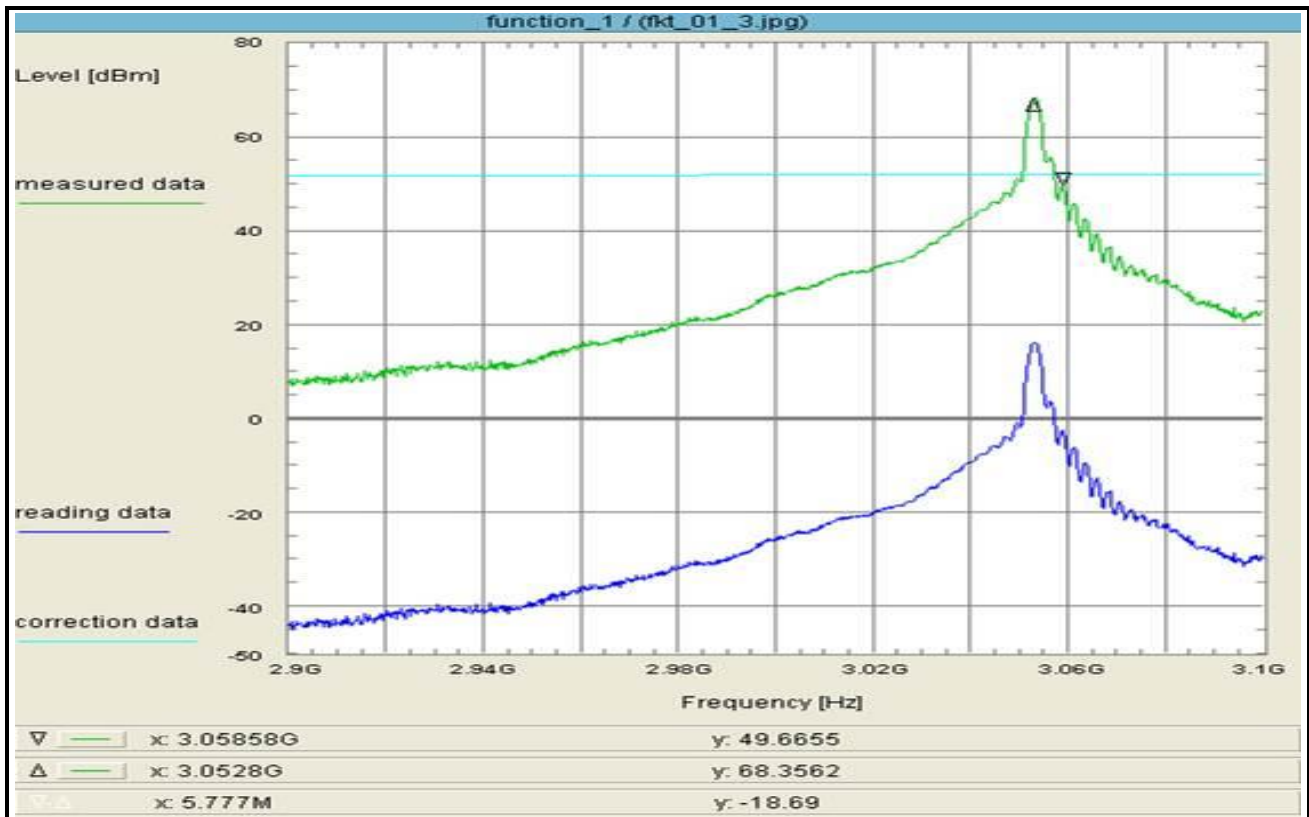
Correction:

Directional coupler (W075)	+ 30.5 dB
Coaxial cable (C217)	+ 1.2 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 (U314)	+ 20.3 dB
TOTAL CORRECTION:	+ 52.0 dB

Remarks:

Test of general function of the EUT and measurement for orientation

Plot No. 3 (36)



Subclause: -/- Function test, frequency and power
Short pulse / medium pulse / long pulse
Measurement within the allocated band: 2.9 - 3.1 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
med2 pulse

Test setup:
see annex 1: 1.2cdhgj

Test equipment:
see annex 2: C217, R001, U314, UStu, W075, W076

Remark:

Test result: measurement for orientation

Environment condition:

Date & Time: Wed 27/May/2015 10:18:10
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 2.9 GHz
Stop frequency: 3.1 GHz
Center frequency: 3 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

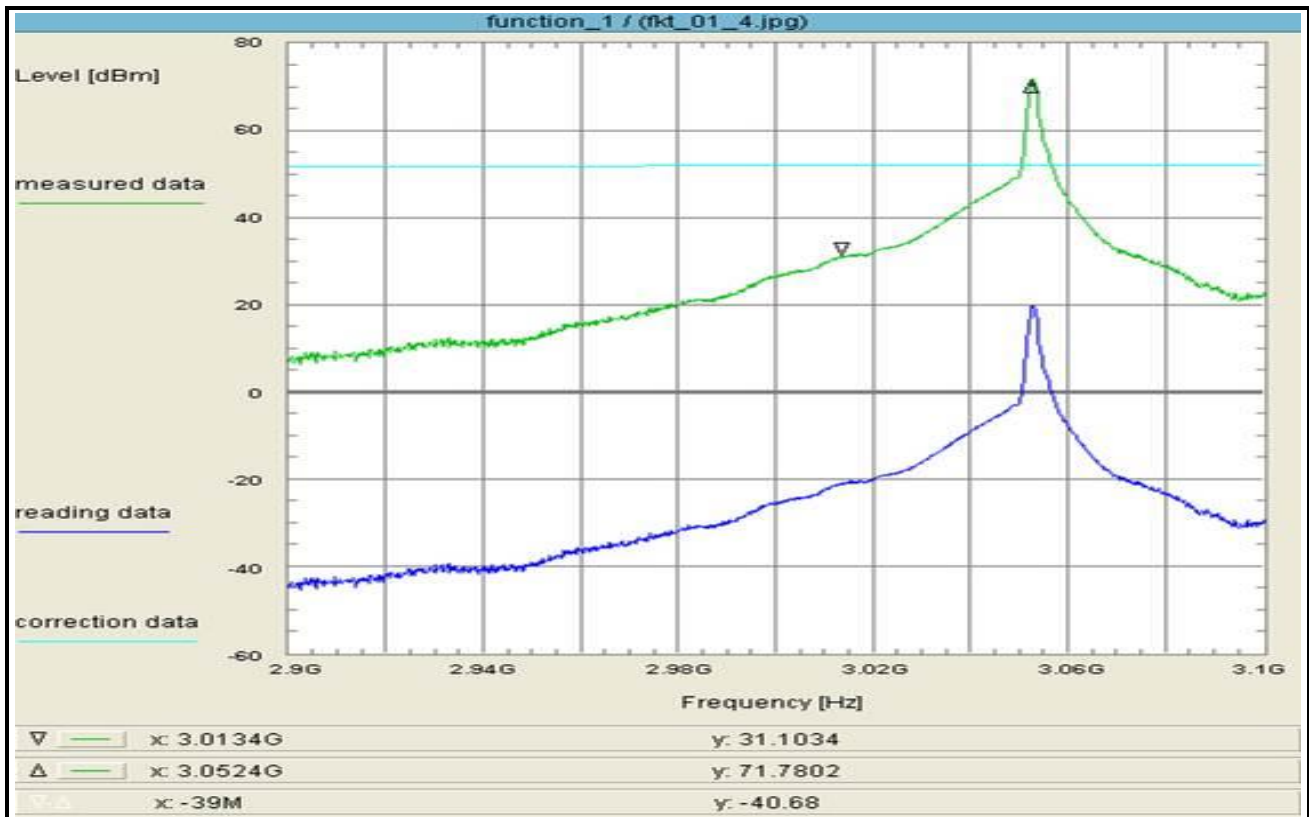
Correction:

Directional coupler (W075)	+ 30.5 dB
Coaxial cable (C217)	+ 1.2 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 (U314)	+ 20.3 dB
TOTAL CORRECTION:	+ 52.0 dB

Remarks:

Test of general function of the EUT and measurement for orientation

Plot No. 4 (36)



Subclause: -/- Function test, frequency and power
Short pulse / medium pulse / long pulse
Measurement within the allocated band: 2.9 - 3.1 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 annex 1: 1.2cdhgj

Test equipment:
see annex 2: C217, R001, U314, UStu, W075, W076

Remark:

Test result: measurement for orientation

Environment condition:

Date & Time: Wed 27/May/2015 10:18:50
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 2.9 GHz
Stop frequency: 3.1 GHz
Center frequency: 3 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

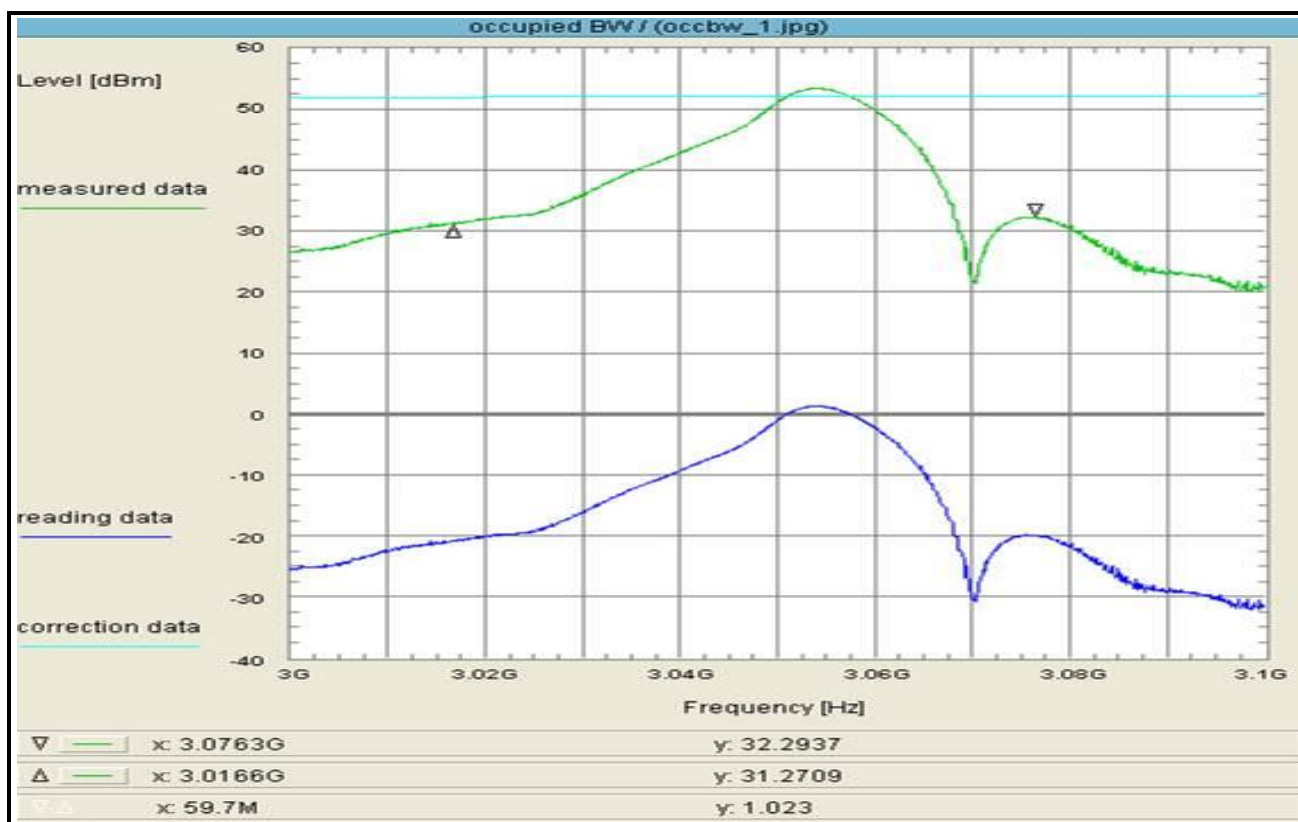
Correction:

Directional coupler (W075)	+ 30.5 dB
Coaxial cable (C217)	+ 1.2 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 (U314)	+ 20.3 dB
TOTAL CORRECTION:	+ 52.0 dB

Remarks:

Test of general function of the EUT and measurement for orientation

Plot No. 5 (36)



Subclause: Verification of the occupied bandwidth (99% bandwidth)
Short pulse / medium pulse / long pulse
Measurement within the allocated band: 2.9 - 3.1 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 subclause 1.5.2
short pulse

Test setup:

see annex 1: 1.2cdhgi

Test equipment:

see annex 2: C217, R001, U314, W075, W076

Remark:

Test result: Verification of the occupied bandwidth

Environment condition:

Date & Time: Wed 27/May/2015 10:46:02
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 3 GHz
Stop frequency: 3.1 GHz
Center frequency: 3.05 GHz
Frequency span: 100 MHz
Resolution-BW: 1 MHz
Video-BW: 50 MHz
Input attenuation: 30 dB
Trace-Mode: Max-Hold
Detector-Mode: Pos Peak

Correction:

Directional coupler (W075) + 30.6 dB
Coaxial cable (C217) + 1.2 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
Freefield attenuation (U314) + 20.3 dB
TOTAL CORRECTION: + 52.1 dB

Remarks:

The internal function of the spectrum analyzer was used to measure the occupied bandwidth (99% bandwidth). The measured value is about 60 MHz (delta marker).

Plot No. 6 (36)



Subclause: Verification of the occupied bandwidth (99% bandwidth)
Short pulse / medium pulse / long pulse
Measurement within the allocated band: 2.9 - 3.1 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 subclause 1.5.2
med1 pulse

Test setup:

see annex 1: 1.2cdhgj

Test equipment:

see annex 2: C217, R001, U314, W075, W076

Remark:

Test result: Verification of the occupied bandwidth

Environment condition:

Date & Time: Wed 27/May/2015 10:44:56
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 3.015 GHz
Stop frequency: 3.085 GHz
Center frequency: 3.05 GHz
Frequency span: 70 MHz
Resolution-BW: 1 MHz
Video-BW: 50 MHz
Input attenuation: 30 dB
Trace-Mode: Max-Hold
Detector-Mode: Pos Peak

Correction:

Directional coupler (W075)	+ 30.6 dB
Coaxial cable (C217)	+ 1.2 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
Freefield attenuation (U314)	+ 20.3 dB
TOTAL CORRECTION:	+ 52.1 dB

Remarks:

The internal function of the spectrum analyzer was used to measure the occupied bandwidth (99% bandwidth). The measured value is about 34.8 MHz (delta marker).

Plot No. 7 (36)



Subclause: Verification of the occupied bandwidth (99% bandwidth)
Short pulse / medium pulse / long pulse
Measurement within the allocated band: 2.9 - 3.1 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 subclause 1.5.2
med2 pulse

Test setup:

see annex 1: 1.2cdhgj

Test equipment:

see annex 2: C217, R001, U314, W075, W076

Remark:

Test result: Verification of the occupied bandwidth

Environment condition:

Date & Time: Wed 27/May/2015 10:42:53
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 3.025 GHz
Stop frequency: 3.075 GHz
Center frequency: 3.05 GHz
Frequency span: 50 MHz
Resolution-BW: 1 MHz
Video-BW: 50 MHz
Input attenuation: 30 dB
Trace-Mode: Max-Hold
Detector-Mode: Pos Peak

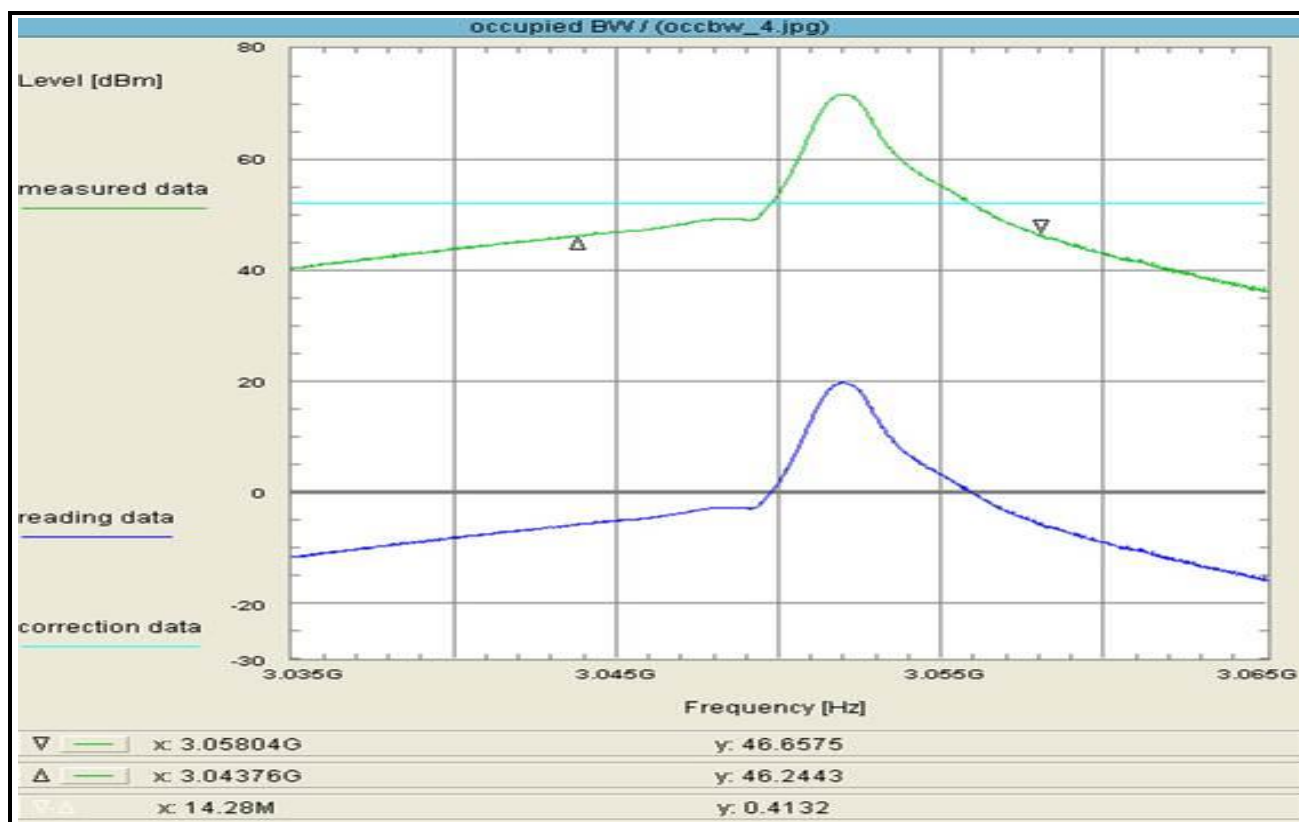
Correction:

Directional coupler (W075)	+ 30.6 dB
Coaxial cable (C217)	+ 1.2 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
Freefield attenuation (U314)	+ 20.3 dB
TOTAL CORRECTION:	+ 52.1 dB

Remarks:

The internal function of the spectrum analyzer was used to measure the occupied bandwidth (99% bandwidth).
The measured value is about 21 MHz (delta marker).

Plot No. 8 (36)



Subclause: Verification of the occupied bandwidth (99% bandwidth)
Short pulse / medium pulse / long pulse
Measurement within the allocated band: 2.9 - 3.1 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 subclause 1.5.2
long pulse

Test setup:

see annex 1: 1.2cdhgj

Test equipment:

see annex 2: C217, R001, U314, W075, W076

Remark:

Test result: Verification of the occupied bandwidth

Environment condition:

Date & Time: Wed 27/May/2015 10:40:40
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 3.035 GHz
Stop frequency: 3.065 GHz
Center frequency: 3.05 GHz
Frequency span: 30 MHz
Resolution-BW: 1 MHz
Video-BW: 50 MHz
Input attenuation: 30 dB
Trace-Mode: Max-Hold
Detector-Mode: Pos Peak

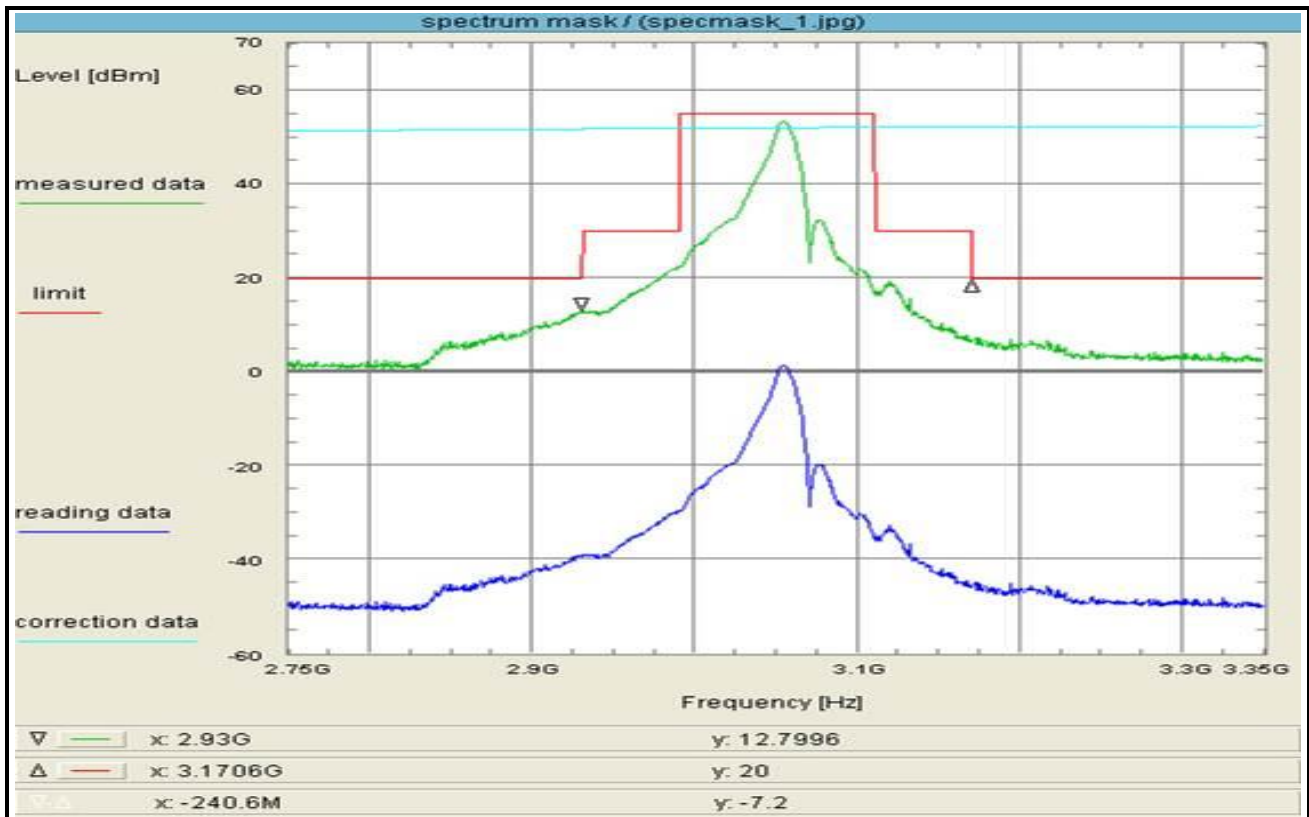
Correction:

Directional coupler (W075)	+ 30.6 dB
Coaxial cable (C217)	+ 1.2 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
Freefield attenuation (U314)	+ 20.3 dB
TOTAL CORRECTION:	+ 52.1 dB

Remarks:

The internal function of the spectrum analyzer was used to measure the occupied bandwidth (99% bandwidth). The measured value is about 14.3 MHz (delta marker).

Plot No. 9 (36)



Subclause: 80.211(f) Spectrum Mask
Pulsed rf-carrier in frequency range 2.9 - 3.1 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 annex 1: 1.2cdhgj

Test equipment:
see annex 2: C217, R001, U314, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 11:02:15
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 2.75 GHz
Stop frequency: 3.35 GHz
Center frequency: 3.05 GHz
Frequency span: 600 MHz
Resolution-BW: 1 MHz
Video-BW: 50 MHz
Input attenuation: 30 dB
Trace-Mode: Max-Hold
Detector-Mode: Pos Peak

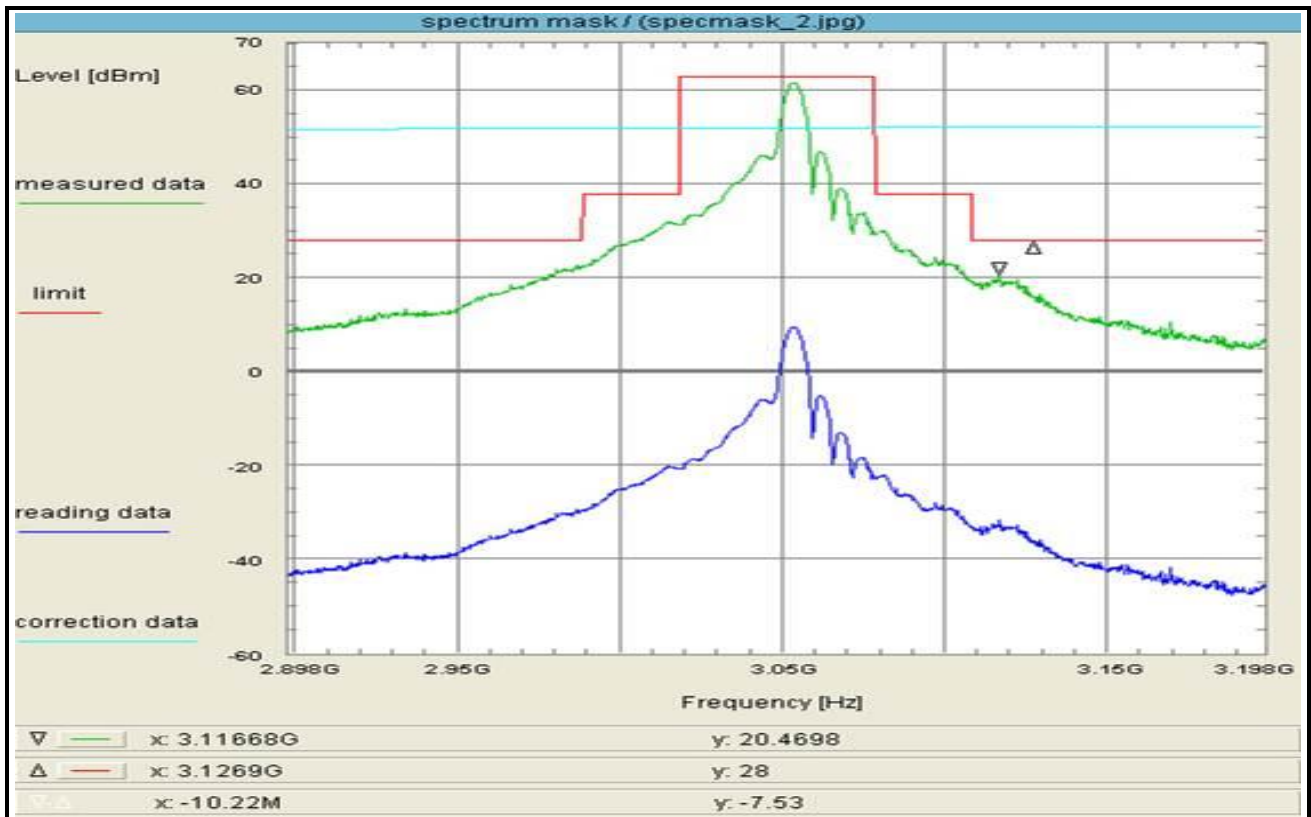
Correction:

Directional coupler (W075) + 30.6 dB
Coaxial cable (C217) + 1.2 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 (U314) + 20.3 dB
TOTAL CORRECTION: + 52.1 dB

Remarks:

Spectrum mask based on 120 MHz bandwidth.

Plot No. 10 (36)



Subclause: 80.211(f) Spectrum Mask
Pulsed rf-carrier in frequency range 2.9 - 3.1 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 annex 1: 1.2cdhgj

Test equipment:
see annex 2: C217, R001, U314, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 11:08:12
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 2.898 GHz
Stop frequency: 3.198 GHz
Center frequency: 3.048 GHz
Frequency span: 300 MHz
Resolution-BW: 1 MHz
Video-BW: 50 MHz
Input attenuation: 30 dB
Trace-Mode: Max-Hold
Detector-Mode: Pos Peak

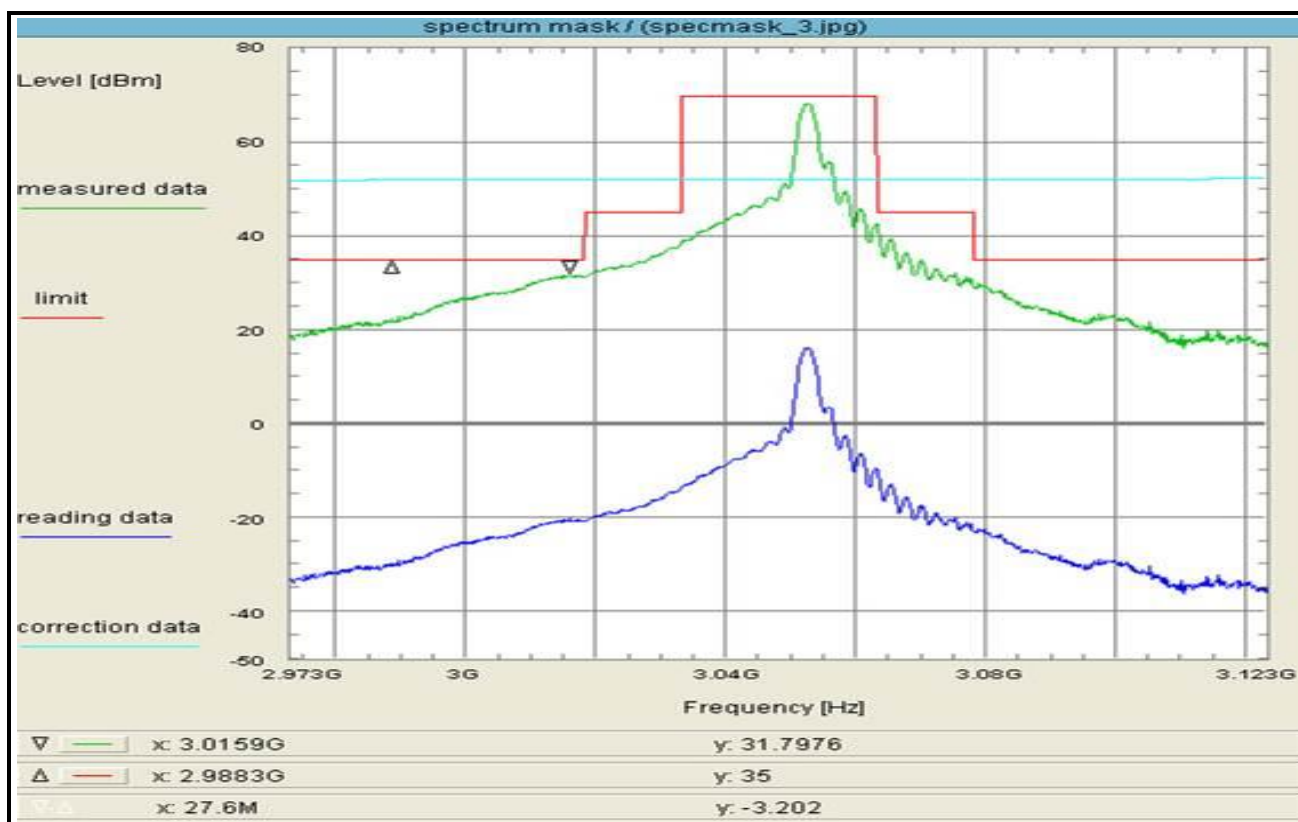
Correction:

Directional coupler (W075) + 30.6 dB
Coaxial cable (C217) + 1.2 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 (U314) + 20.3 dB
TOTAL CORRECTION: + 52.1 dB

Remarks:

Spectrum mask based on 60 MHz bandwidth.

Plot No. 11 (36)



Subclause: 80.211(f) Spectrum Mask
Pulsed rf-carrier in frequency range 2.9 - 3.1 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 annex 1: 1.2cdhgj

Test equipment:
see annex 2: C217, R001, U314, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 11:13:29
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 2.973 GHz
Stop frequency: 3.123 GHz
Center frequency: 3.048 GHz
Frequency span: 150 MHz
Resolution-BW: 1 MHz
Video-BW: 50 MHz
Input attenuation: 30 dB
Trace-Mode: Max-Hold
Detector-Mode: Pos Peak

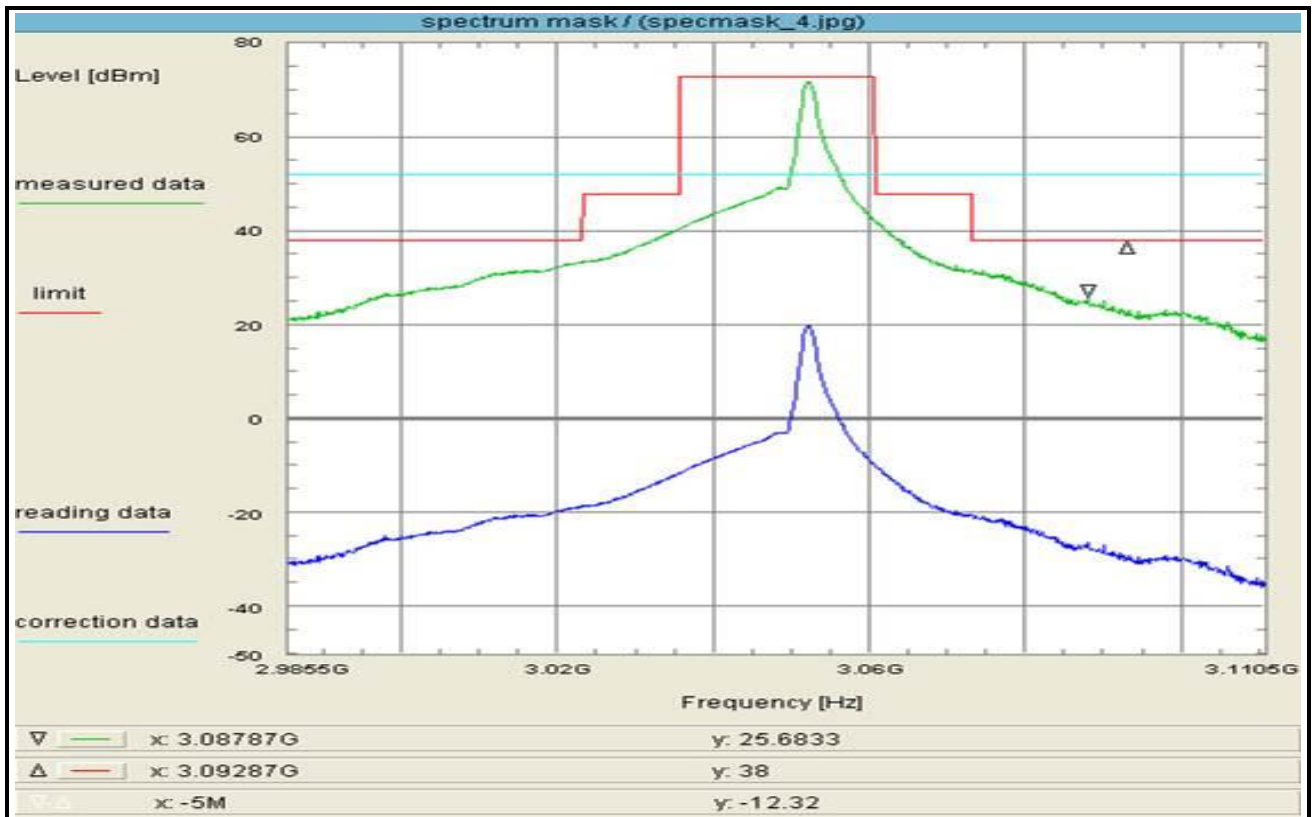
Correction:

Directional coupler (W075) + 30.6 dB
Coaxial cable (C217) + 1.2 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 (U314) + 20.3 dB
TOTAL CORRECTION: + 52.1 dB

Remarks:

Spectrum mask based on 30 MHz bandwidth.

Plot No. 12 (36)



Subclause: 80.211(f) Spectrum Mask
Pulsed rf-carrier in frequency range 2.9 - 3.1 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 annex 1: 1.2cdhgj

Test equipment:
see annex 2: C217, R001, U314, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 11:12:16
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 2.9855 GHz
Stop frequency: 3.1105 GHz
Center frequency: 3.048 GHz
Frequency span: 125 MHz
Resolution-BW: 1 MHz
Video-BW: 50 MHz
Input attenuation: 30 dB
Trace-Mode: Max-Hold
Detector-Mode: Pos Peak

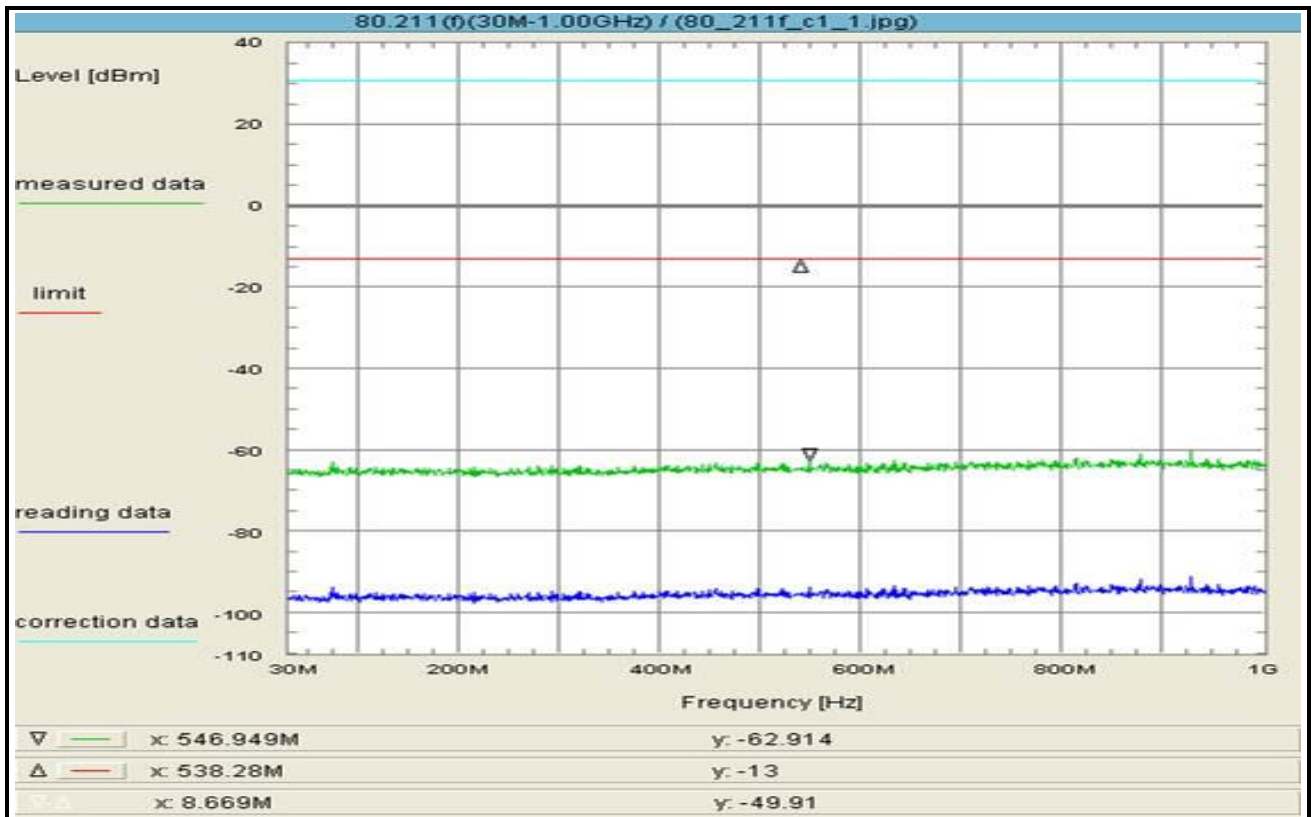
Correction:

Directional coupler (W075)	+ 30.6 dB
Coaxial cable (C217)	+ 1.2 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 (U314)	+ 20.3 dB
TOTAL CORRECTION:	+ 52.1 dB

Remarks:

Spectrum mask based on 25 MHz bandwidth.

Plot No. 13 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 30 MHz - 1.0 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 annex 1: 1.2cdigj

Test equipment:
see annex 2: C217, R001, UStu, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 14:54:06
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 30 MHz
Stop frequency: 1 GHz
Center frequency: 515 MHz
Frequency span: 970 MHz
Resolution-BW: 100 kHz
Video-BW: 1 MHz
Input attenuation: 0 dB
Trace-Mode: Max-Hold
Detector-Mode: Pos Peak

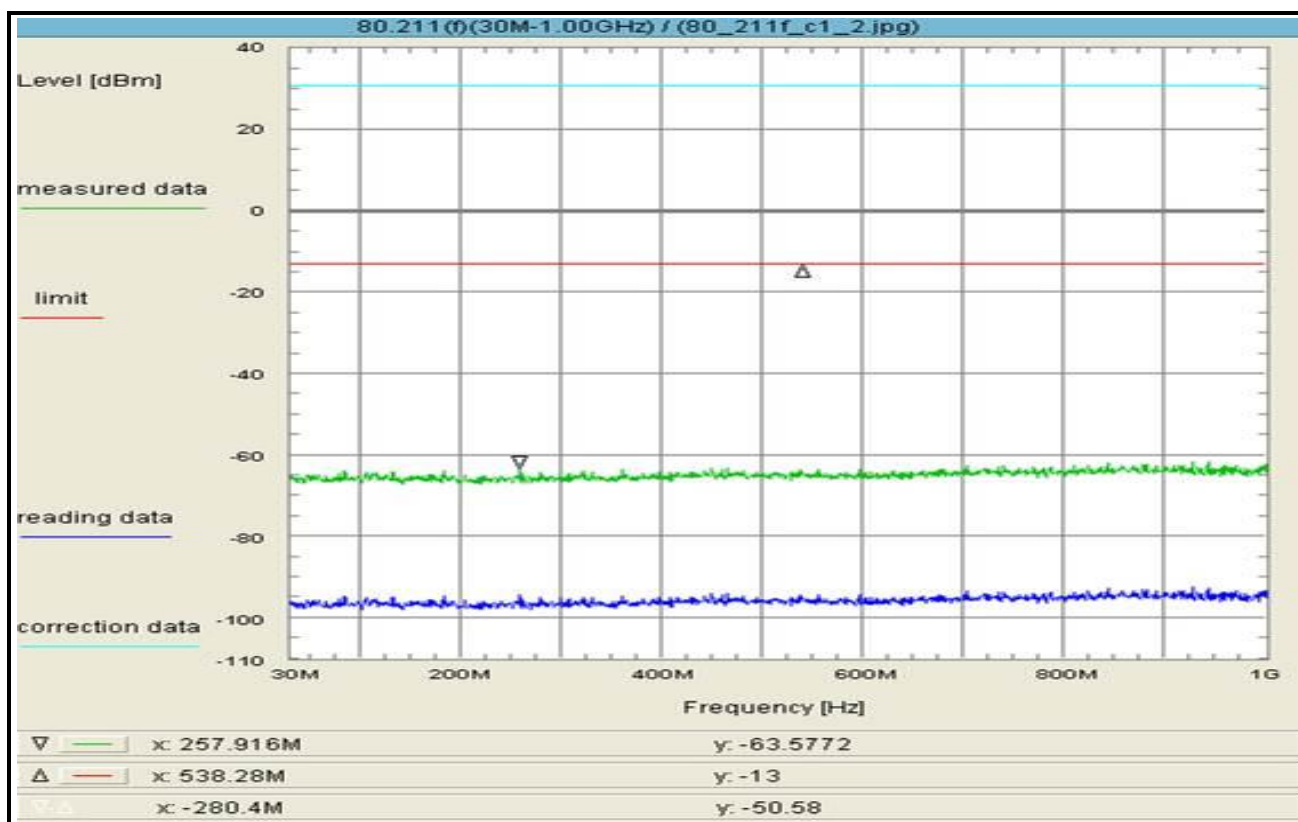
Correction:

Directional coupler (W075) + 30.0 dB
Coaxial cable (C217) + 0.4 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 (UStu) + 0.5 dB
TOTAL CORRECTION: + 30.9 dB

Remarks:

Max-Hold Mode
Test setup with Stub Tuner.

Plot No. 14 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 30 MHz - 1.0 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 annex 1: 1.2cdigj

Test equipment:
see annex 2: C217, R001, UStu, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 14:54:37
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

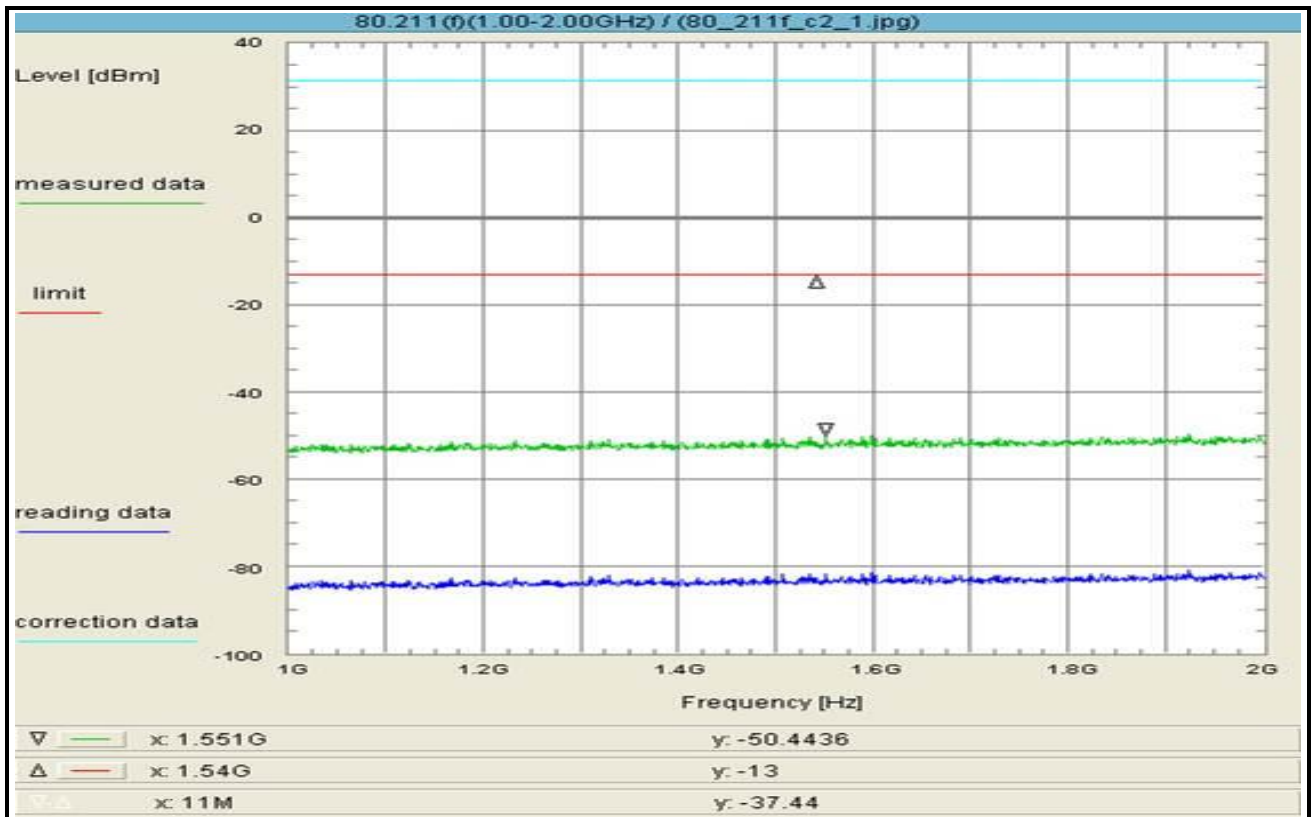
Start frequency: 30 MHz
Stop frequency: 1 GHz
Center frequency: 515 MHz
Frequency span: 970 MHz
Resolution-BW: 100 kHz
Video-BW: 1 MHz
Input attenuation: 0 dB
Trace-Mode: Max-Hold
Detector-Mode: Pos Peak

Correction:

Directional coupler (W075)	+ 30.0 dB
Coaxial cable (C217)	+ 0.4 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 (UStu)	+ 0.5 dB
TOTAL CORRECTION:	+ 30.9 dB

Remarks:
Max-Hold Mode
Test setup with Stub Tuner.

Plot No. 15 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 1.0 - 2.0 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 annex 1: 1.2cdigj

Test equipment:
see annex 2: C217, R001, UStu, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 14:56:38
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 1 GHz
Stop frequency: 2 GHz
Center frequency: 1.5 GHz
Frequency span: 1 GHz
Resolution-BW: 1 MHz
Video-BW: 50 MHz
Input attenuation: 0 dB
Trace-Mode: Max-Hold
Detector-Mode: Pos Peak

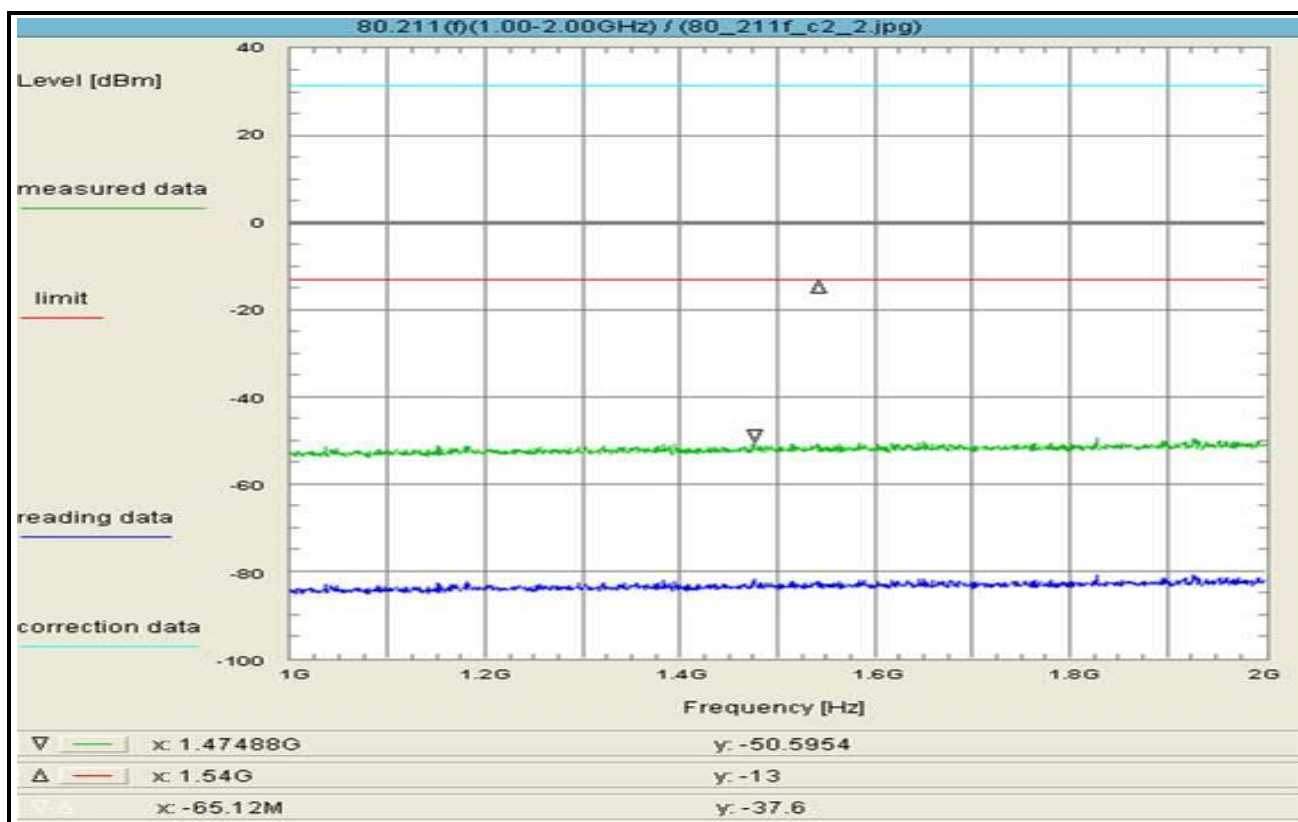
Correction:

Directional coupler (W075) + 30.0 dB
Coaxial cable (C217) + 0.8 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 (UStu) + 0.6 dB
TOTAL CORRECTION: + 31.4 dB

Remarks:

Max-Hold Mode
Test setup with Stub Tuner.

Plot No. 16 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 1.0 - 2.0 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 annex 1: 1.2cdigj

Test equipment:
see annex 2: C217, R001, UStu, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 14:55:53
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 1 GHz
Stop frequency: 2 GHz
Center frequency: 1.5 GHz
Frequency span: 1 GHz
Resolution-BW: 1 MHz
Video-BW: 50 MHz
Input attenuation: 0 dB
Trace-Mode: Max-Hold
Detector-Mode: Pos Peak

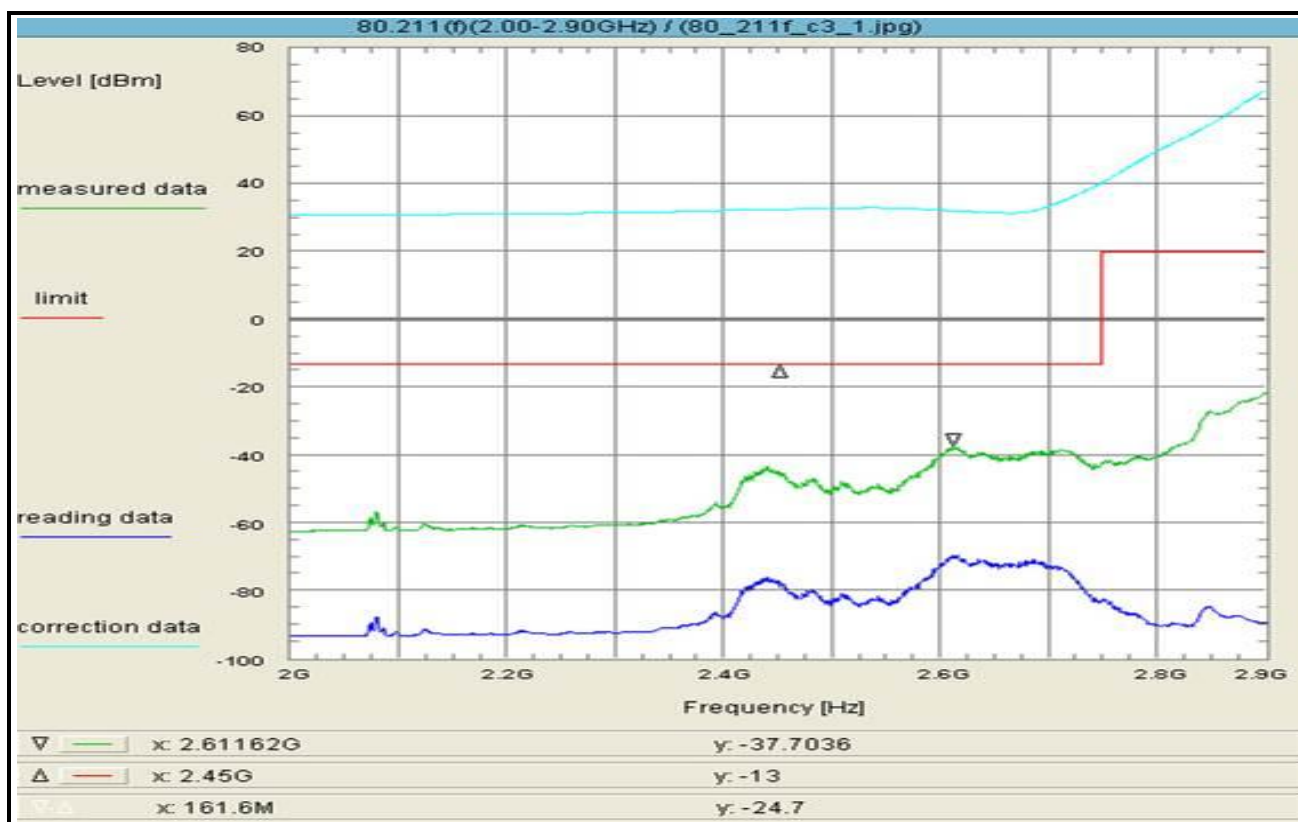
Correction:

Directional coupler (W075) + 30.0 dB
Coaxial cable (C217) + 0.8 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 (UStu) + 0.6 dB
TOTAL CORRECTION: + 31.4 dB

Remarks:

Max-Hold Mode
Test setup with Stub Tuner.

Plot No. 17 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 6.5 - 8.5 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 annex 1: 1.2cdigj

Test equipment:
see annex 2: R001, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 15:05:31
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

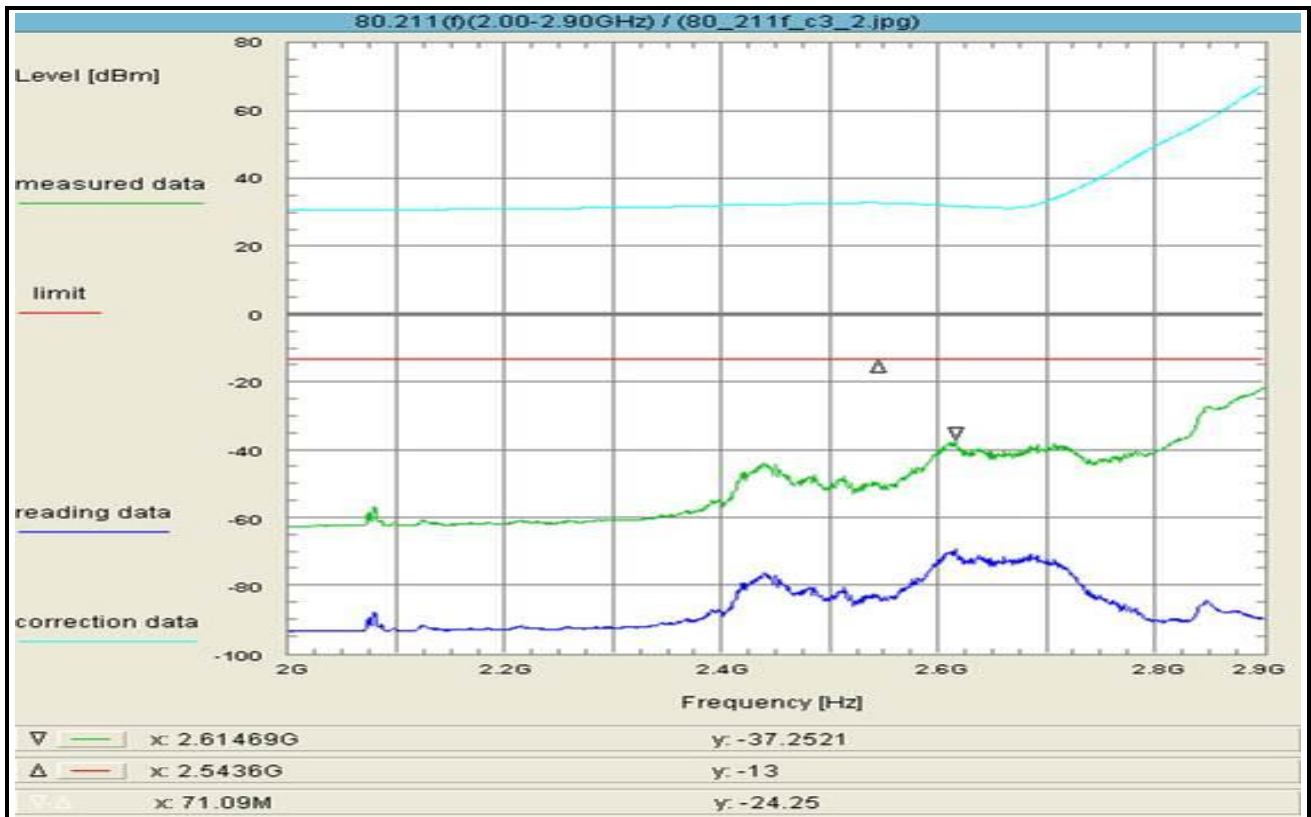
Start frequency: 2 GHz
Stop frequency: 2.9 GHz
Center frequency: 2.45 GHz
Frequency span: 900 MHz
Resolution-BW: 1 MHz
Video-BW: 1 MHz
Input attenuation: 0 dB
Trace-Mode: Max-Hold
Detector-Mode: AVG

Correction:

Directional coupler (W075)	+ 30.0 dB
Coaxial cable (C217)	+ 1.1 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 (UStu)	+ 4.7 dB
TOTAL CORRECTION:	+ 35.8 dB

Remarks:
Max-Hold Mode
Test setup with Stub Tuner.

Plot No. 18 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 6.5 - 8.5 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 annex 1: 1.2cdigj

Test equipment:
see annex 2: C217, R001, UStu, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 15:12:04
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 2 GHz
Stop frequency: 2.9 GHz
Center frequency: 2.45 GHz
Frequency span: 900 MHz
Resolution-BW: 1 MHz
Video-BW: 1 MHz
Input attenuation: 0 dB
Trace-Mode: Clear Write
Detector-Mode: AVG

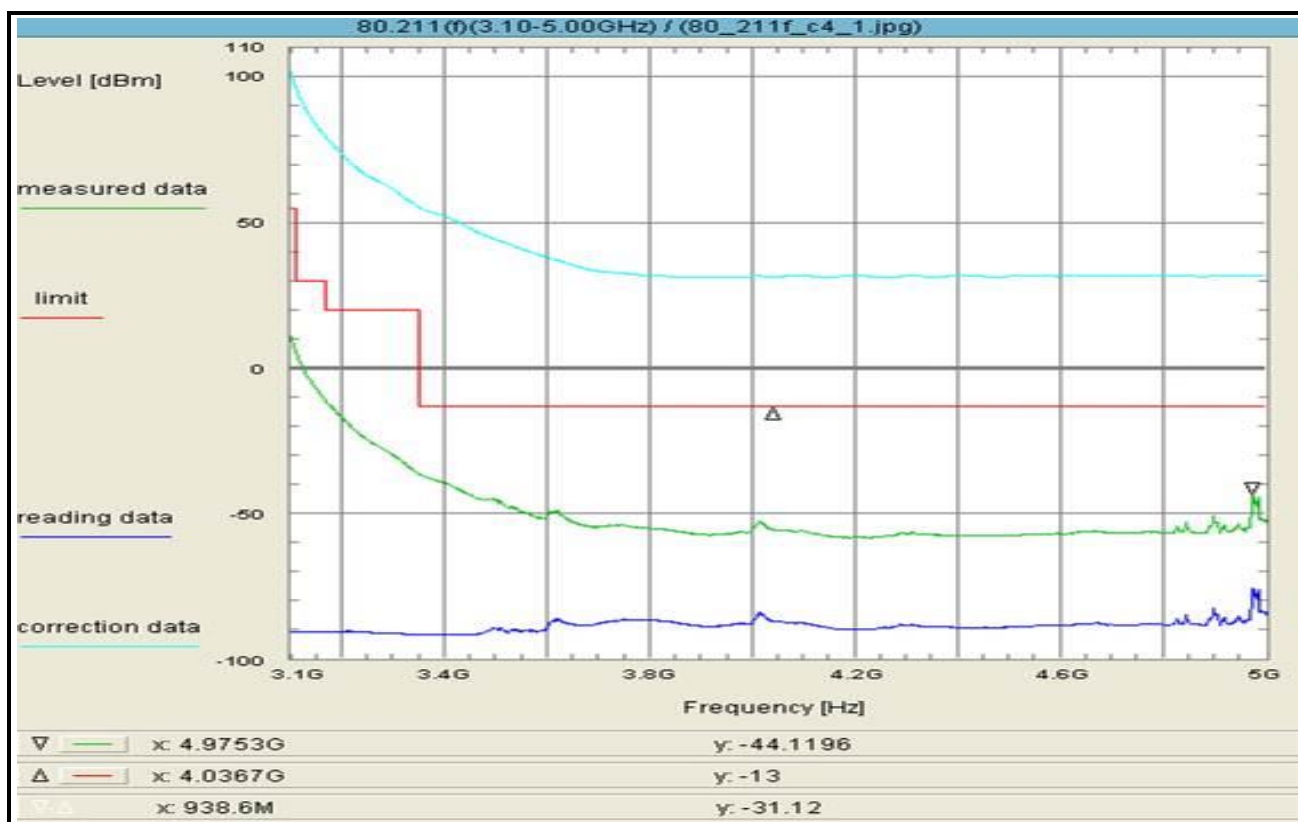
Correction:

Directional coupler (W075)	+ 30.0 dB
Coaxial cable (C217)	+ 1.1 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 (UStu)	+ 4.7 dB
TOTAL CORRECTION:	+ 35.8 dB

Remarks:

Max-Hold Mode
Test setup with Stub Tuner.

Plot No. 19 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 3.1 - 5.0 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 annex 1: 1.2cdigj

Test equipment:
see annex 2: C217, R001, UStu, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 15:09:03
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 3.1 GHz
Stop frequency: 5 GHz
Center frequency: 4.05 GHz
Frequency span: 1.9 GHz
Resolution-BW: 1 MHz
Video-BW: 1 MHz
Input attenuation: 0 dB
Trace-Mode: Clear Write
Detector-Mode: AVG

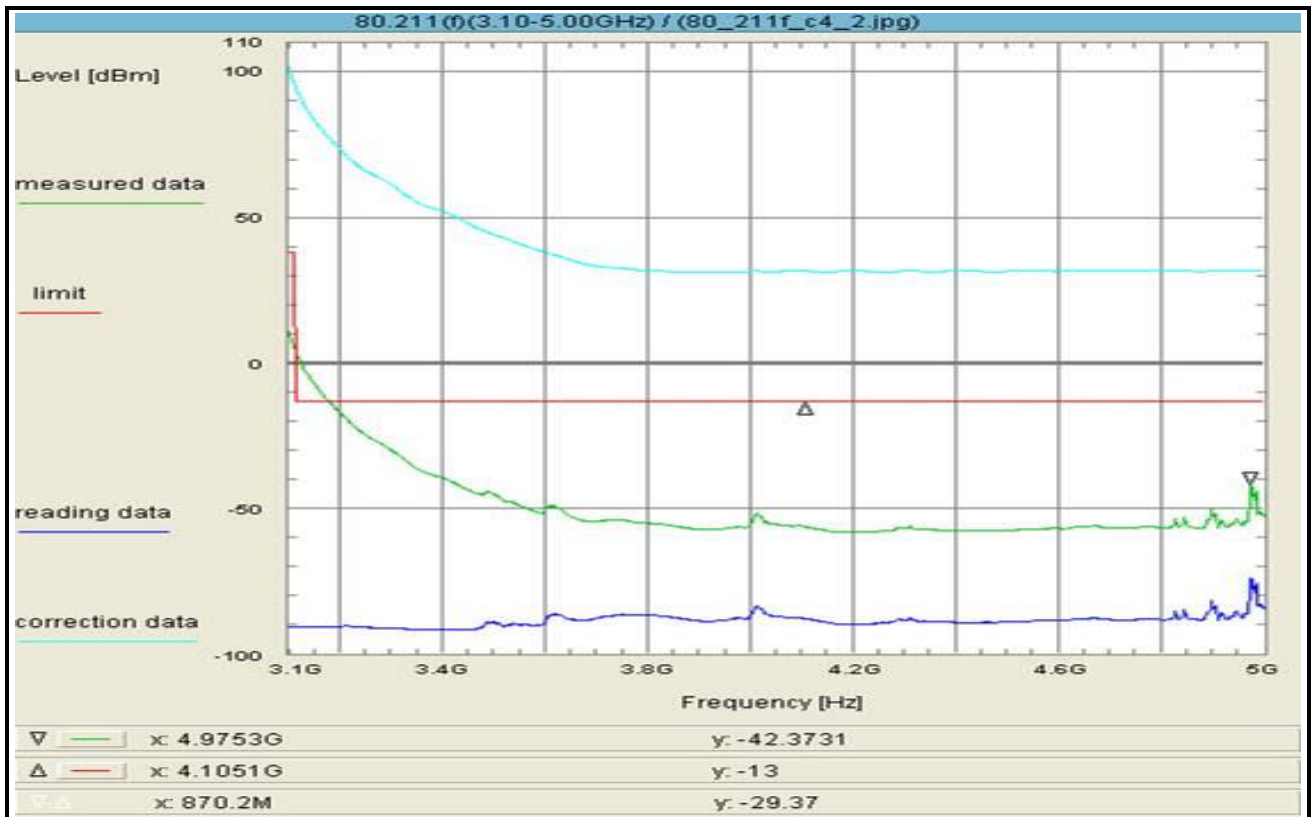
Correction:

Directional coupler (W075)	+ 30.0 dB
Coaxial cable (C217)	+ 1.4 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 (UStu)	+ 8.0 dB
TOTAL CORRECTION:	+ 39.4 dB

Remarks:

Max-Hold Mode
Test setup with Stub Tuner.

Plot No. 20 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 3.1 - 5.0 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 annex 1: 1.2cdigj

Test equipment:
see annex 2: C217, R001, UStu, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 15:15:34
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 22 °C
Humidity: 45 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 3.1 GHz
Stop frequency: 5 GHz
Center frequency: 4.05 GHz
Frequency span: 1.9 GHz
Resolution-BW: 1 MHz
Video-BW: 1 MHz
Input attenuation: 0 dB
Trace-Mode: Max-Hold
Detector-Mode: AVG

Correction:

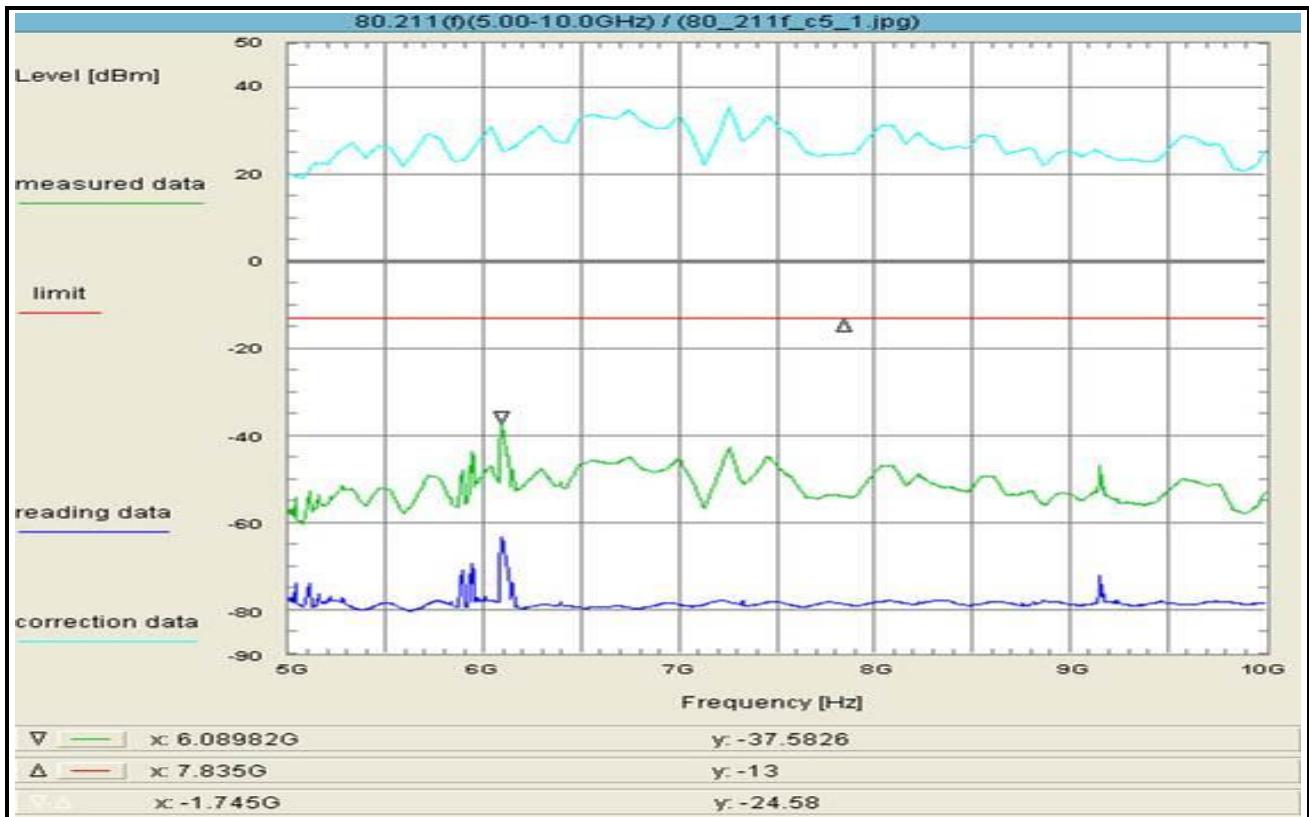
Directional coupler (W075) + 30.0 dB
Coaxial cable (C217) + 1.4 dB
DUT-Antenna + 0.0 dBi
Test antenna + 0.0 dB
BW correction factor + 0.0 dB
Atten. between HPA and feedhorn - 0.0 dB
Attenuation (UStu) + 8.0 dB
TOTAL CORRECTION: + 39.4 dB

Remarks:

Max-Hold Mode
Test setup with Stub Tuner.

The plot shows the limit is not met. This is not caused by the EUT.
The reason for this is the sensitivity of the test equipment. (Stubtuner)

Plot No. 21 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 5.0 - 10.0 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 annex 1: 1.2cegj

Test equipment:
see annex 2: C217, R001, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 15:26:43
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 23 °C
Humidity: 40 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 5 GHz
Stop frequency: 10 GHz
Center frequency: 7.5 GHz
Frequency span: 5 GHz
Resolution-BW: 1 MHz
Video-BW: 1 MHz
Input attenuation: 10 dB
Trace-Mode: Max-Hold
Detector-Mode: AVG

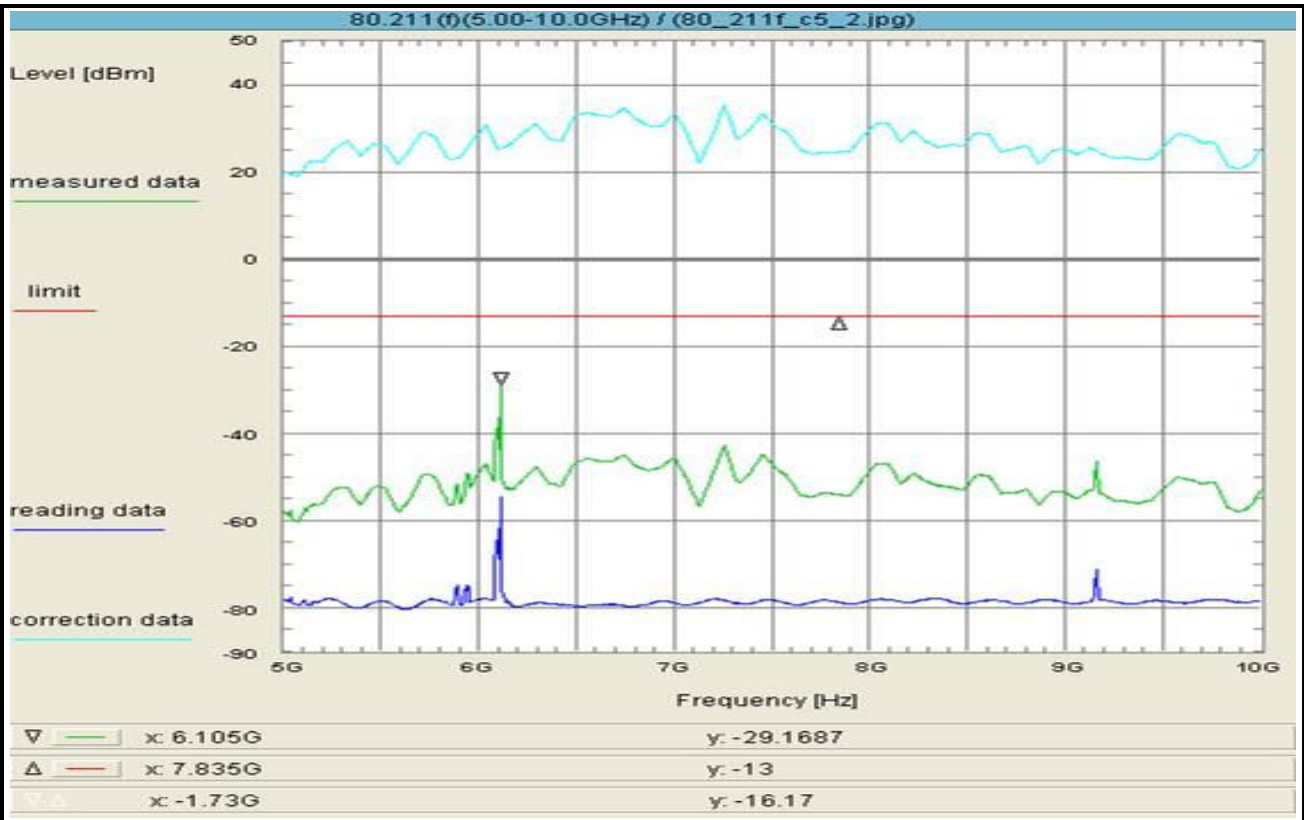
Correction:

Directional coupler (W075) + 25.0 dB
Coaxial cable (C217) + 1.9 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
Freefield attenuation + 0.0 dB
TOTAL CORRECTION: + 26.9 dB

Remarks:

Max-Hold Mode
Test setup with taper transitions R32/R70

Plot No. 22 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 5.0 - 10.0 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 annex 1: 1.2cegj

Test equipment:
see annex 2: C217, R001, W075, W076

Remark:

Test result: Test passed

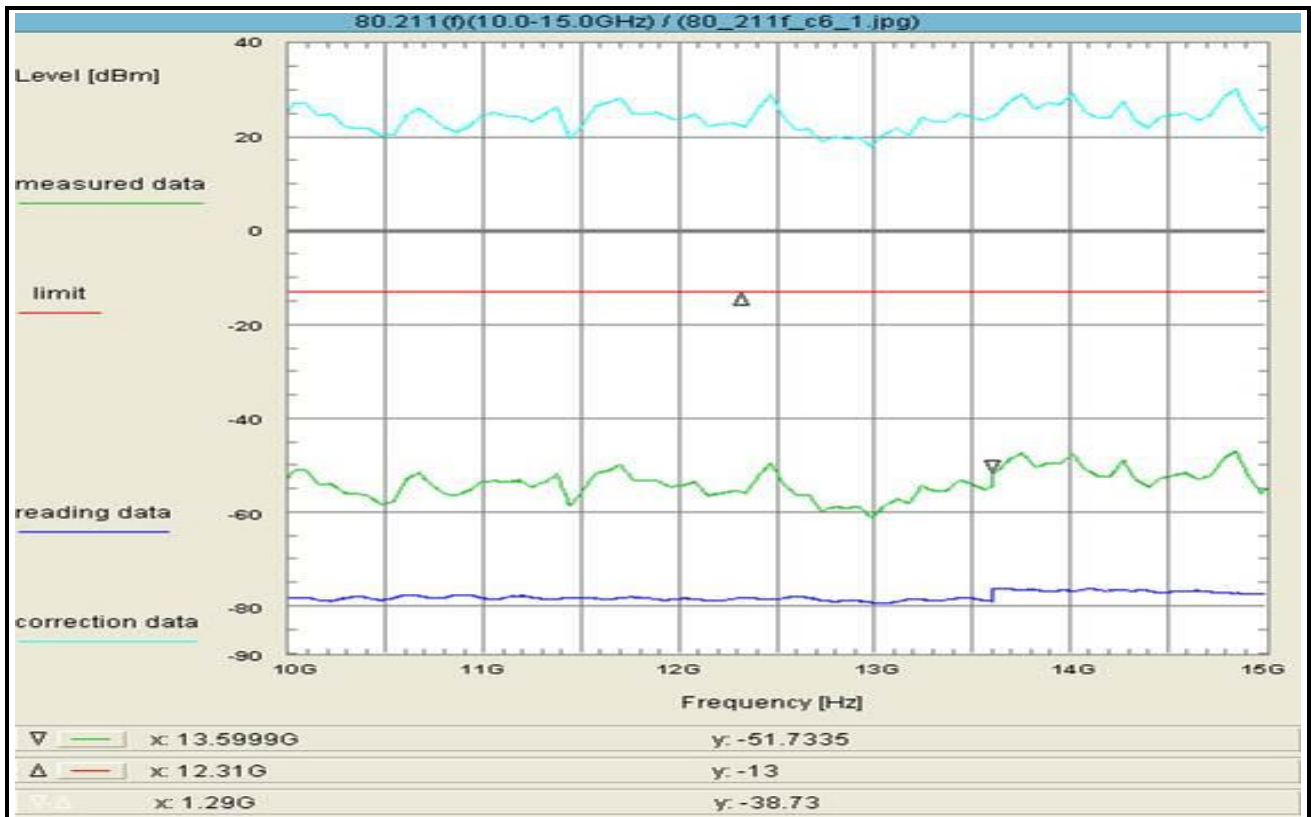
Environment condition:
Date & Time: Wed 27/May/2015 15:28:21
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 23 °C
Humidity: 40 %
Voltage: 233 Vac

Setup of measurement equipment:
Start frequency: 5 GHz
Stop frequency: 10 GHz
Center frequency: 7.5 GHz
Frequency span: 5 GHz
Resolution-BW: 1 MHz
Video-BW: 1 MHz
Input attenuation: 10 dB
Trace-Mode: Max-Hold
Detector-Mode: AVG

Correction:
Directional coupler (W075) + 25.0 dB
Coaxial cable (C217) + 1.9 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
Freefield attenuation + 0.0 dB
TOTAL CORRECTION: + 26.9 dB

Remarks:
Max-Hold Mode
Test setup with taper transitions R32/R70

Plot No. 23 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 10.0 - 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 annex 1: 1.2cegj

Test equipment:
see annex 2: C217, R001, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 15:37:33
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 23 °C
Humidity: 40 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 10 GHz
Stop frequency: 15 GHz
Center frequency: 12.5 GHz
Frequency span: 5 GHz
Resolution-BW: 1 MHz
Video-BW: 1 MHz
Input attenuation: 10 dB
Trace-Mode: Max-Hold
Detector-Mode: AVG

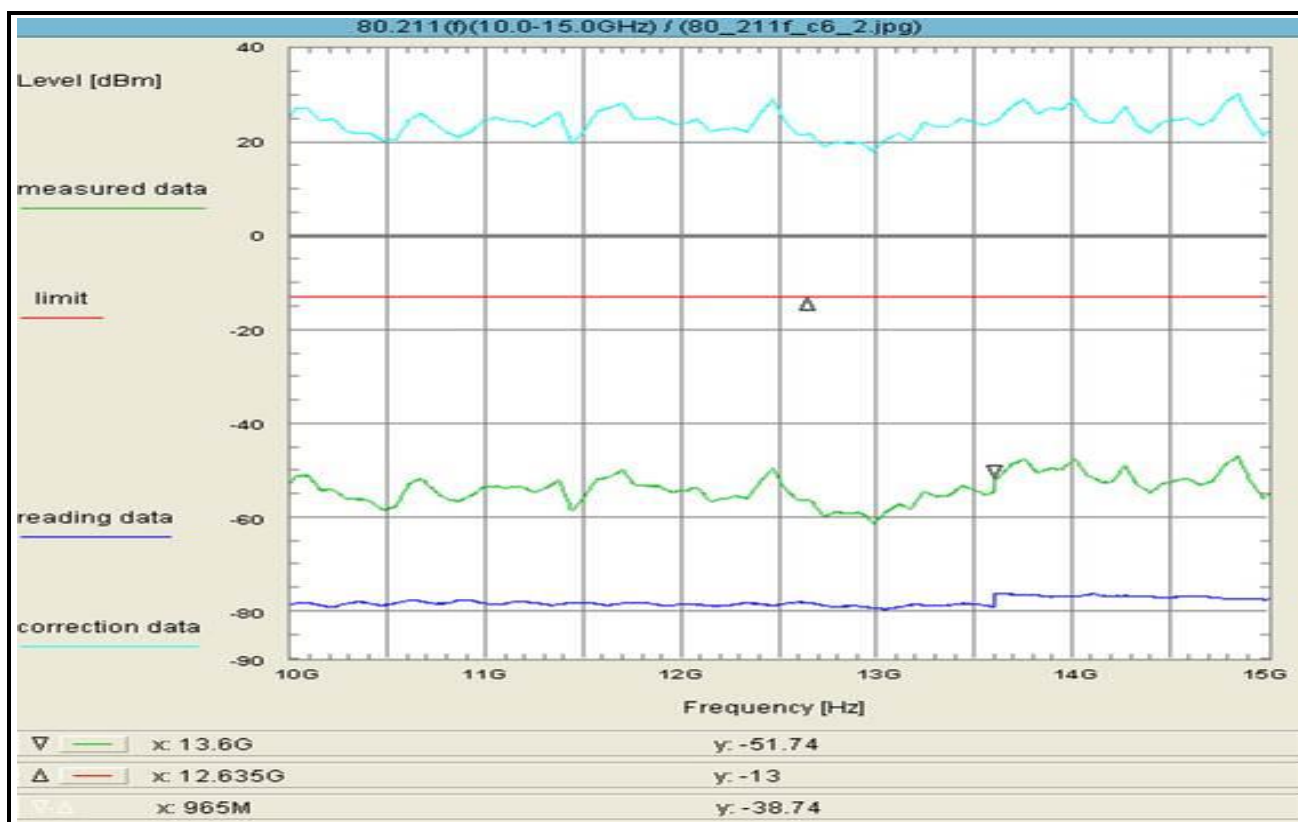
Correction:

Directional coupler (W075) + 21.5 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
Freefield attenuation + 0.0 dB
TOTAL CORRECTION: + 24.1 dB

Remarks:

Max-Hold Mode
Test setup with taper transitions R32/R120

Plot No. 24 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 10.0 - 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 annex 1: 1.2cegj

Test equipment:
see annex 2: C217, R001, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 15:40:10
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 23 °C
Humidity: 40 %
Voltage: 233 Vac

Setup of measurement equipment:

Start frequency: 10 GHz
Stop frequency: 15 GHz
Center frequency: 12.5 GHz
Frequency span: 5 GHz
Resolution-BW: 1 MHz
Video-BW: 1 MHz
Input attenuation: 10 dB
Trace-Mode: Clear Write
Detector-Mode: AVG

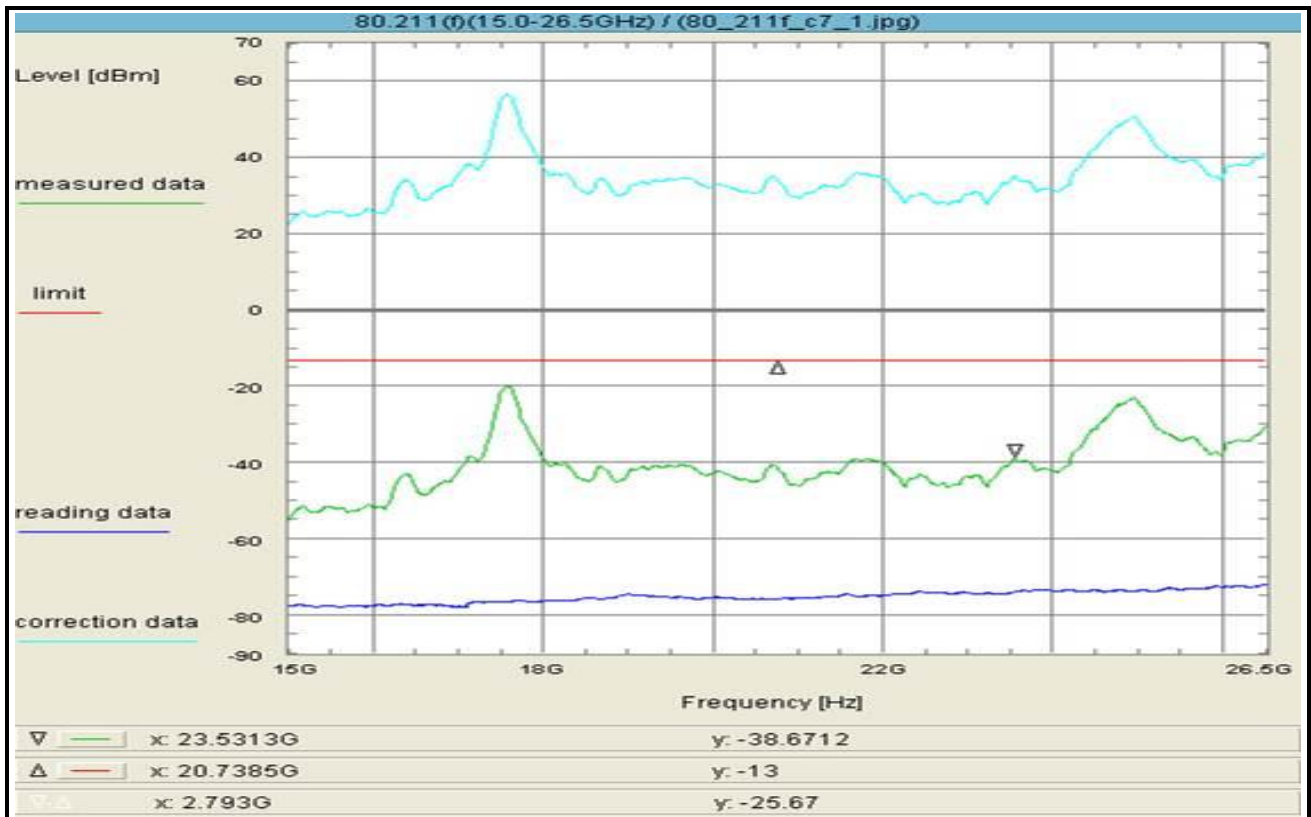
Correction:

Directional coupler (W075) + 21.5 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
Freefield attenuation + 0.0 dB
TOTAL CORRECTION: + 24.1 dB

Remarks:

Max-Hold Mode
Test setup with taper transitions R32/R120

Plot No. 25 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 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 annex 1: 1.2cegj

Test equipment:
see annex 2: C217, R001, W022, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 15:45:29
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 23 °C
Humidity: 40 %
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: 10 dB
Trace-Mode: Max-Hold
Detector-Mode: AVG

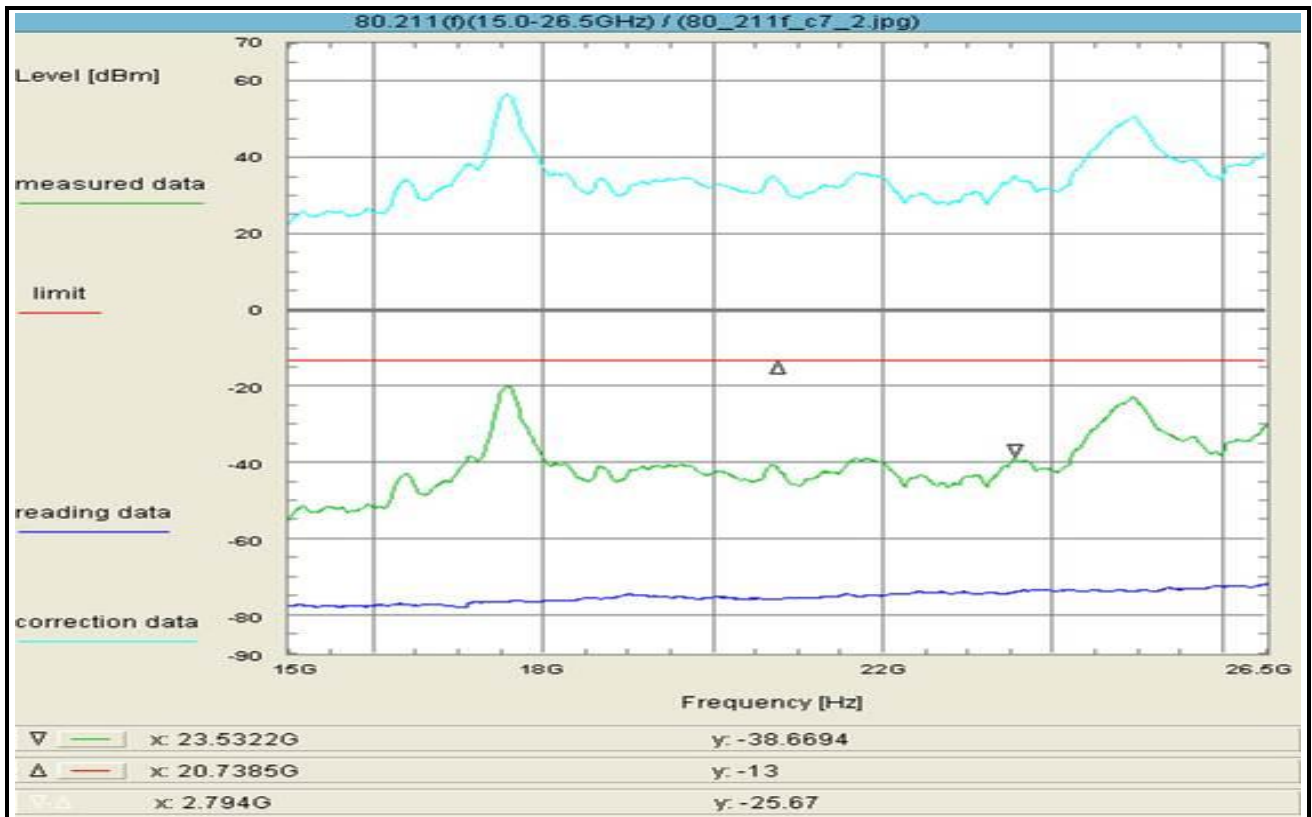
Correction:

Directional coupler (W075) + 30.7 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
Freefield attenuation + 0.0 dB
TOTAL CORRECTION: + 34.5 dB

Remarks:

Max-Hold Mode
Test setup with taper transitions R32/R180

Plot No. 26 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 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 annex 1: 1.2cegj

Test equipment:
see annex 2: C217, R001, W022, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 15:44:42
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 23 °C
Humidity: 40 %
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: 10 dB
Trace-Mode: Max-Hold
Detector-Mode: AVG

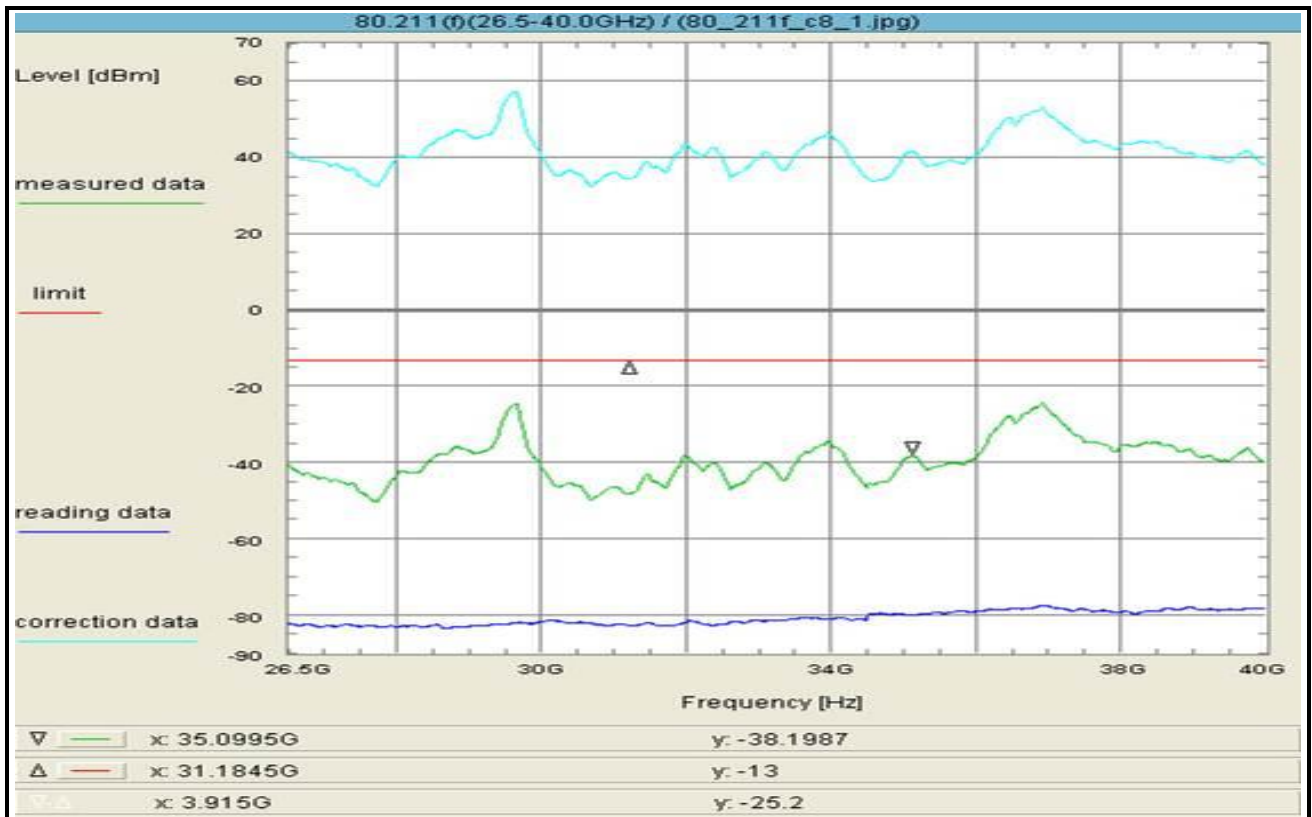
Correction:

Directional coupler (W075)	+ 30.7 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
Freefield attenuation	+ 0.0 dB
TOTAL CORRECTION:	+ 34.5 dB

Remarks:

Max-Hold Mode
Test setup with taper transitions R32/R180

Plot No. 27 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 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 annex 1: 1.2cegj

Test equipment:
see annex 2: C217, R001, W022, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 15:49:47
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 23 °C
Humidity: 40 %
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

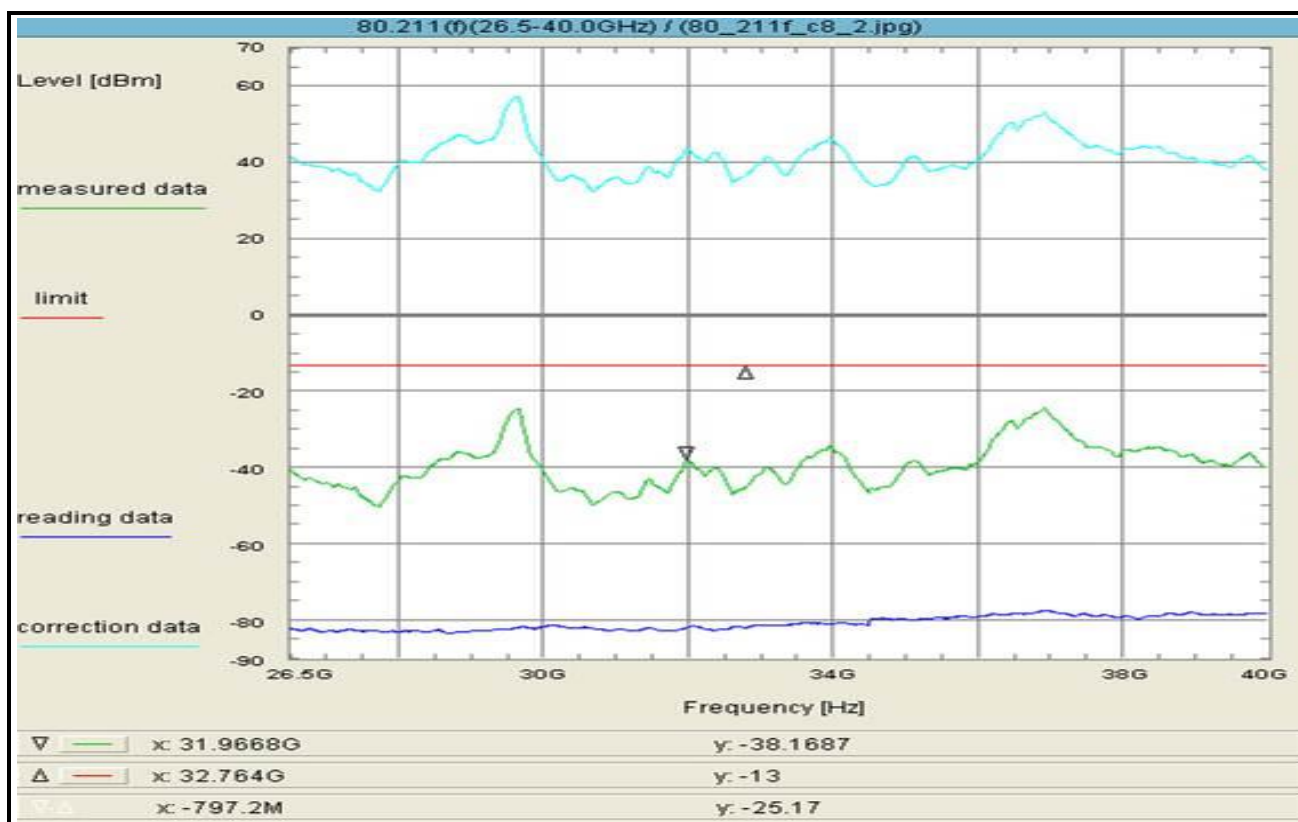
Correction:

Directional coupler (W075) + 35.7 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
Freefield attenuation + 0.0 dB
TOTAL CORRECTION: + 41.3 dB

Remarks:

Max-Hold Mode
Test setup with taper transitions R32/R320

Plot No. 28 (36)



Subclause: 80.211(f) Conducted Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 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 annex 1: 1.2cegj

Test equipment:
see annex 2: C217, R001, W022, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 15:50:26
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 23 °C
Humidity: 40 %
Voltage: 233 Vac

Setup of measurement equipment:

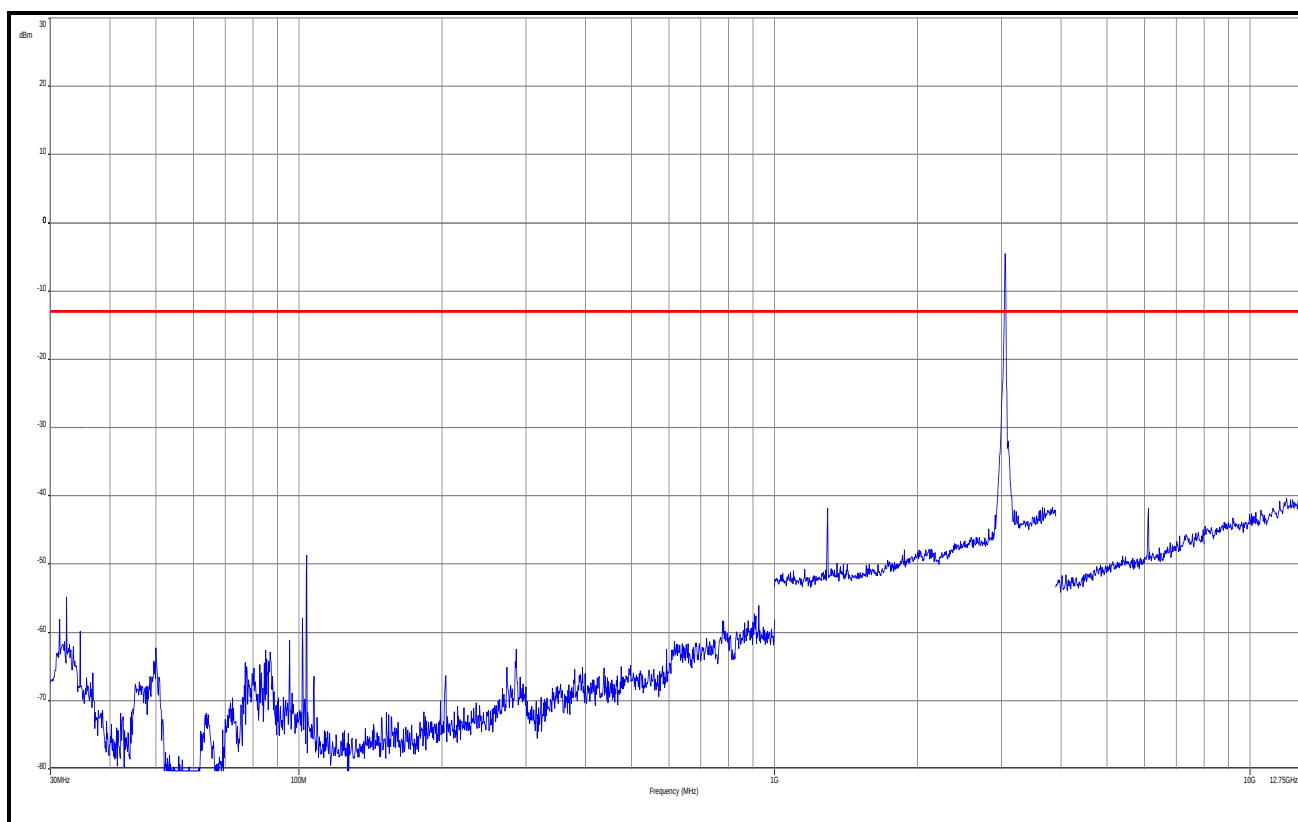
Start frequency: 26.5 GHz
Stop frequency: 40 GHz
Center frequency: 33.25 GHz
Frequency span: 13.5 GHz
Resolution-BW: 1 MHz
Video-BW: 1 MHz
Input attenuation: 0 dB
Trace-Mode: Max-Hold
Detector-Mode: AVG

Correction:

Directional coupler (W075) + 35.7 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
Freefield attenuation + 0.0 dB
TOTAL CORRECTION: + 41.3 dB

Remarks:

Max-Hold Mode
Test setup with taper transitions R32/R320

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 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 27/May/2015
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:

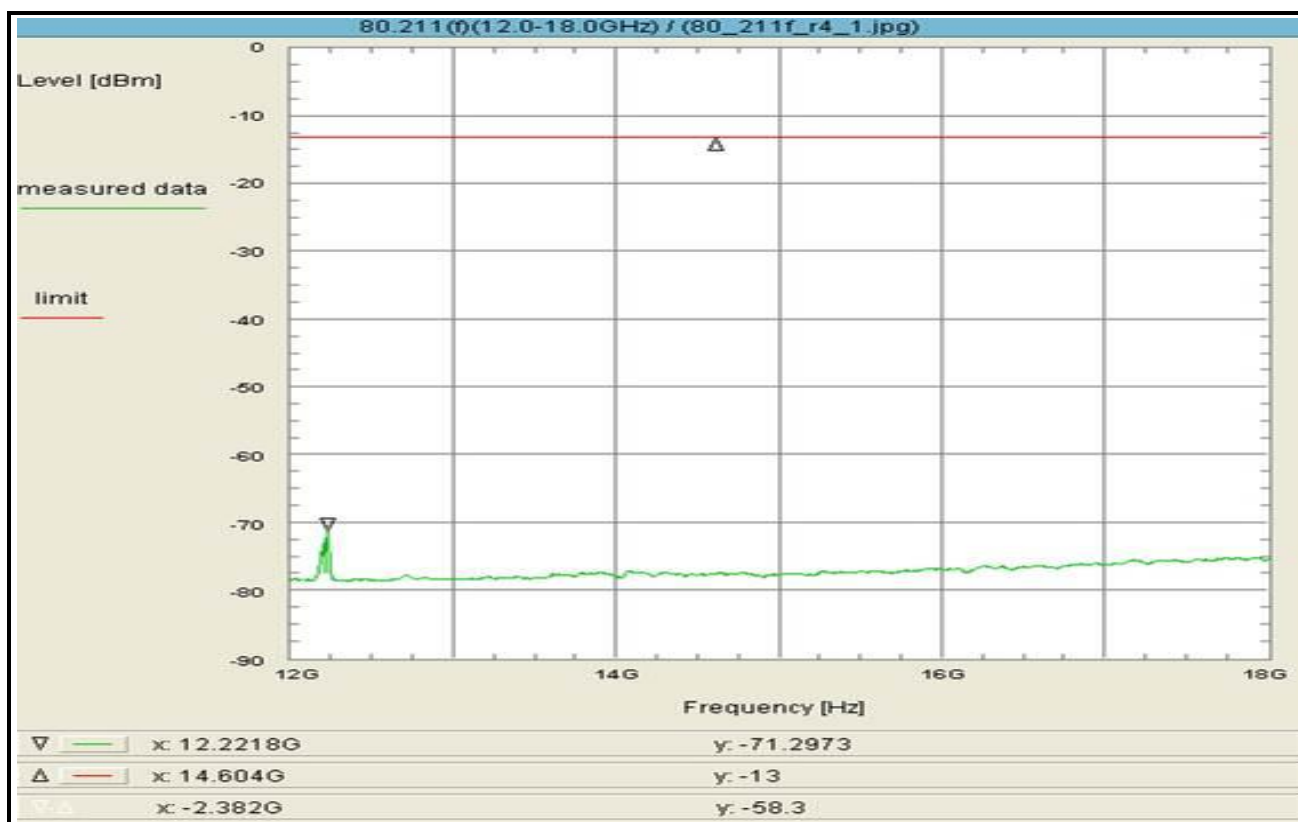
Max-Hold Mode / Pos-Peak

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

The plot displays a spectral signal with a blue line representing the measured power. A horizontal red line is drawn at -13 dBm. The background is a light grey shaded area representing the noise floor, which is bounded by a lower blue line and an upper blue line. The signal shows several sharp peaks, with the most prominent one at approximately 2.4 GHz reaching about 12 dBm. Other significant peaks are visible at approximately 1.9 GHz, 5.8 GHz, and 12.75 GHz. The signal level generally increases with frequency, starting around -70 dBm at 30 MHz and rising to about -40 dBm at 12.75 GHz.

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

Plot No. 31 (36)



Subclause: 80.211(f) Radiated Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 12.0 - 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 annex 1: 2.3

Test equipment:
see annex 2: A039, B11b, C217, R001, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 16:41:45
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 23 °C
Humidity: 40 %
Voltage: 230V 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: 100 kHz
Input attenuation: 0 dB
Trace-Mode: Max-Hold
Detector-Mode: AVG

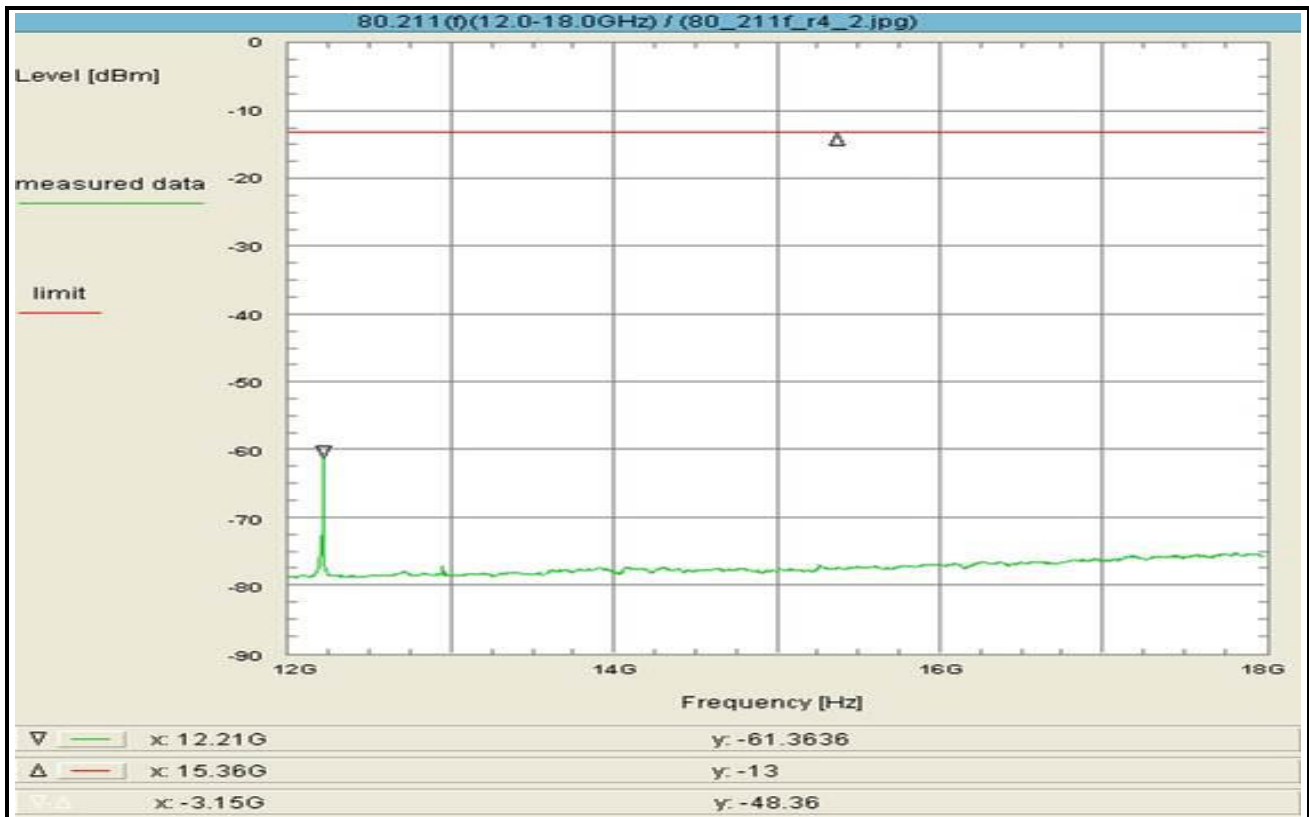
Correction:

Directional coupler	+ 0.0 dB
Coaxial cable (C217)	+ 3.0 dB
DUT-Antenna	+ 0.0 dBi
Test antenna (A039)	- 19.9 dB
BW correction factor	+ 0.0 dB
Atten. between HPA and feedhorn	- 0.0 dB
Freefield attenuation (15.00GHz, 0.4m)	+ 48.0 dB
Amplifier (B11b)	- 31.4 dB
TOTAL CORRECTION:	- -3 dB

Remarks:
Max-Hold Mode

Plot shows 4th harmonic.

Plot No. 32 (36)



Subclause: 80.211(f) Radiated Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 12.0 - 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 annex 1: 2.3

Test equipment:
see annex 2: A039, B11b, C217, R001, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 16:46:56
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 23 °C
Humidity: 40 %
Voltage: 230V 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: 100 kHz
Input attenuation: 0 dB
Trace-Mode: Max-Hold
Detector-Mode: AVG

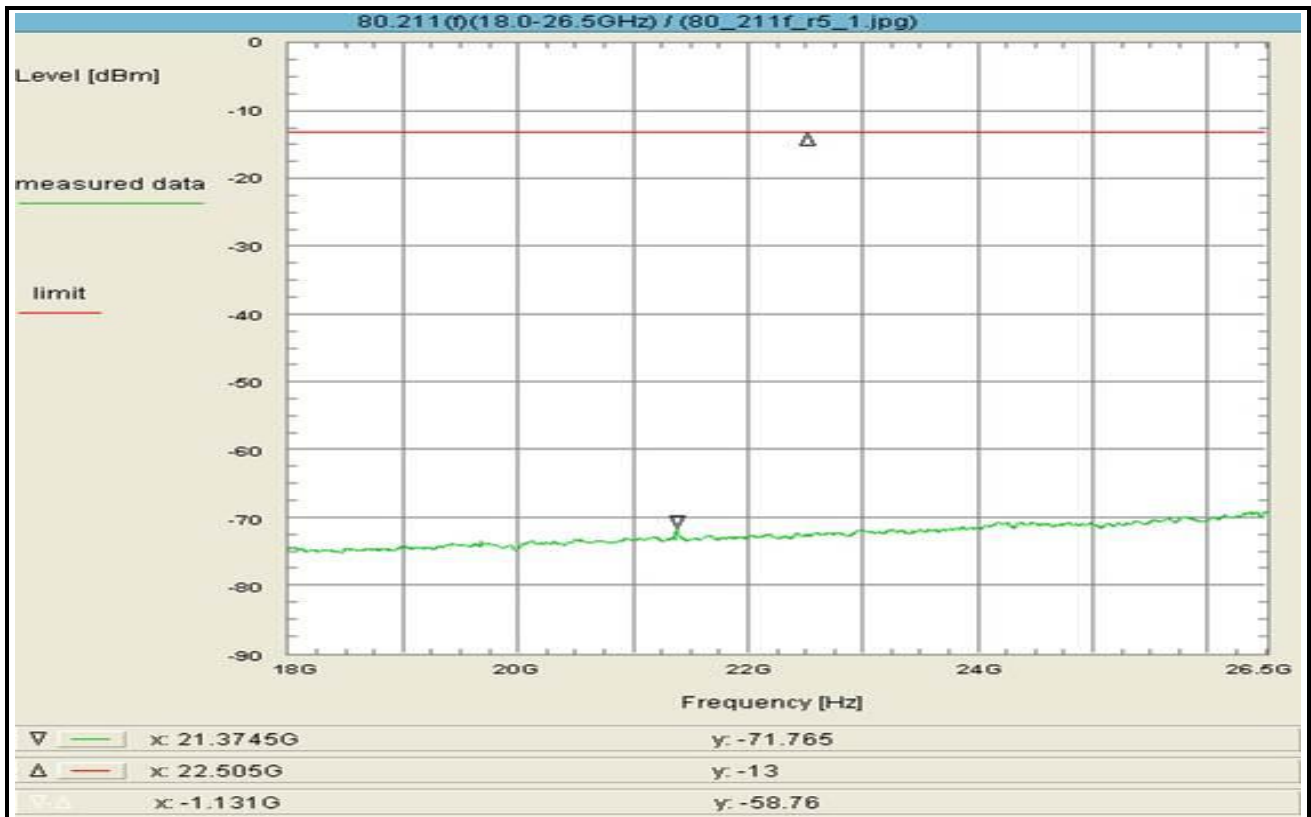
Correction:

Directional coupler	+ 0.0 dB
Coaxial cable (C217)	+ 3.0 dB
DUT-Antenna	+ 0.0 dBi
Test antenna (A039)	- 19.9 dB
BW correction factor	+ 0.0 dB
Atten. between HPA and feedhorn	- 0.0 dB
Freefield attenuation (15.00GHz, 0.4m)	+ 48.0 dB
(B11b)	- 31.4 dB
TOTAL CORRECTION:	- -3 dB

Remarks:
Max-Hold Mode

Plot shows 4th harmonic.

Plot No. 33 (36)



Subclause: 80.211(f) Radiated Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 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 annex 1: 2.3

Test equipment:
see annex 2: A019, B11b, C217, R001, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 16:58:12
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 23 °C
Humidity: 40 %
Voltage: 230V 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: 100 kHz
Input attenuation: 0 dB
Trace-Mode: Max-Hold
Detector-Mode: AVG

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
(B11b)	- 30.4 dB
TOTAL CORRECTION:	+ 3.2 dB

Remarks:
Max-Hold Mode

Plot shows 7th harmonic.

Plot No. 34 (36)



Subclause: 80.211(f) Radiated Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 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 annex 1: 2.3

Test equipment:
see annex 2: A019, B11b, C217, R001, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 16:54:59
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 23 °C
Humidity: 40 %
Voltage: 230V 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: 100 kHz
Input attenuation: 0 dB
Trace-Mode: Max-Hold
Detector-Mode: AVG

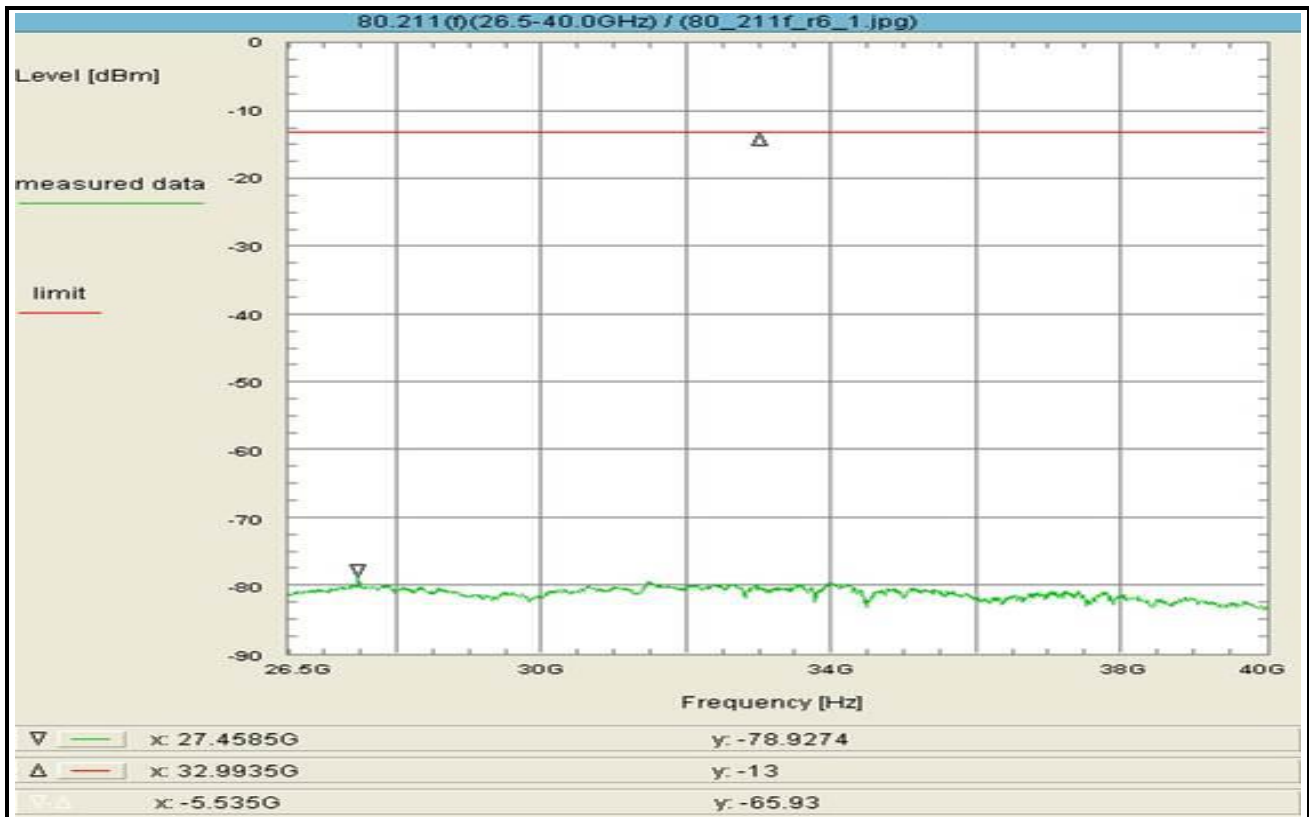
Correction:

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
(B11b)	- 30.4 dB
TOTAL CORRECTION:	+ 3.2 dB

Remarks:
Max-Hold Mode

Plot shows 7th harmonic.

Plot No. 35 (36)



Subclause: 80.211(f) Radiated Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 26.5 - 40.0 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 annex 1: 2.3

Test equipment:
see annex 2: A021, BCBL, C217, R001, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 17:16:48
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 23 °C
Humidity: 40 %
Voltage: 230V 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: 100 kHz
Input attenuation: 0 dB
Trace-Mode: Max-Hold
Detector-Mode: AVG

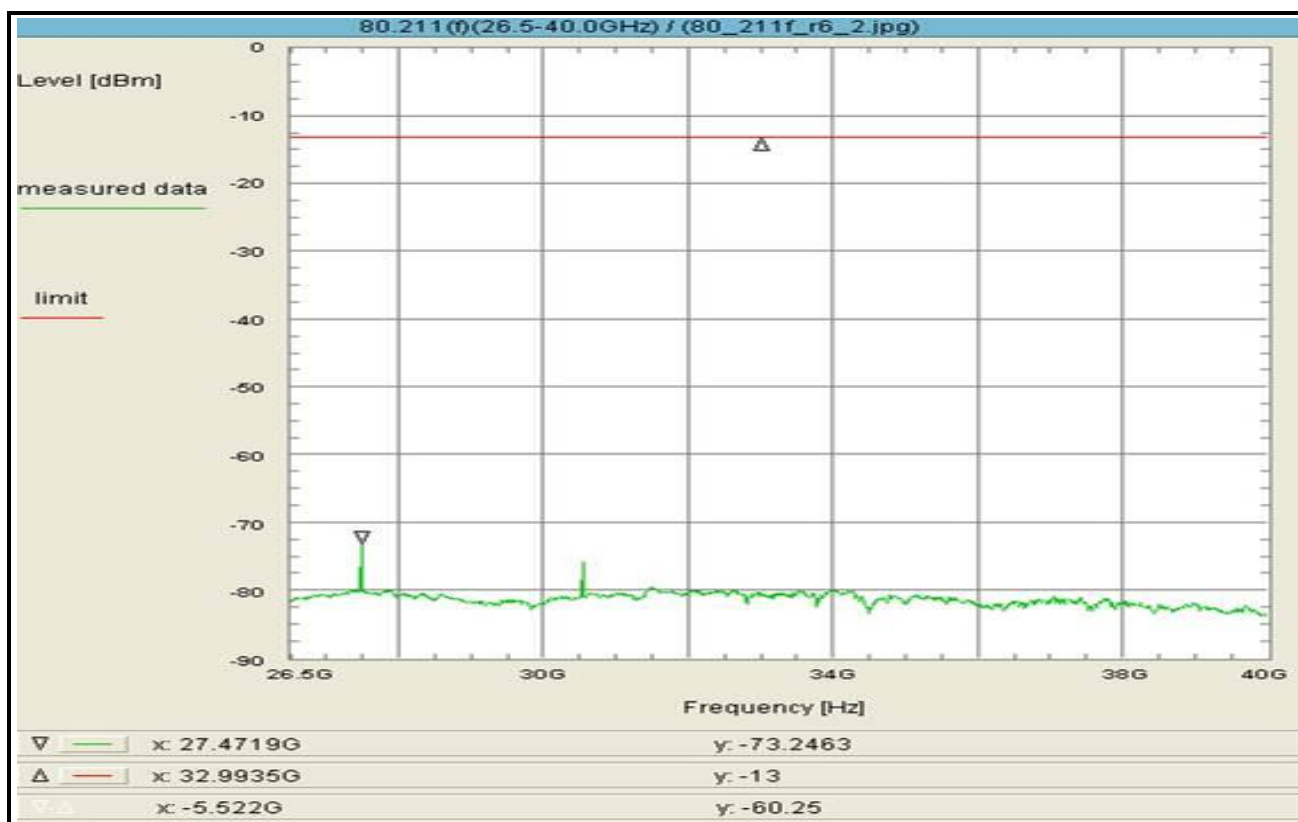
Correction:

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
(BCBL)	- 47.7 dB
TOTAL CORRECTION:	- -12.8 dB

Remarks:
Max-Hold Mode

Plot shows 9th harmonic.

Plot No. 36 (36)



Subclause: 80.211(f) Radiated Spurious Emissions
Pulsed rf-carrier in frequency range 2.9 - 3.1 GHz
Examination of the frequency range 26.5 - 40.0 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 annex 1: 2.3

Test equipment:
see annex 2: A021, BCBL, C217, R001, W075, W076

Remark:

Test result: Test passed

Environment condition:

Date & Time: Wed 27/May/2015 17:19:18
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat
Temperature: 23 °C
Humidity: 40 %
Voltage: 230V 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: 100 kHz
Input attenuation: 0 dB
Trace-Mode: Max-Hold
Detector-Mode: AVG

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
(BCBL)	- 47.7 dB
TOTAL CORRECTION:	- -12.8 dB

Remarks:
Max-Hold Mode

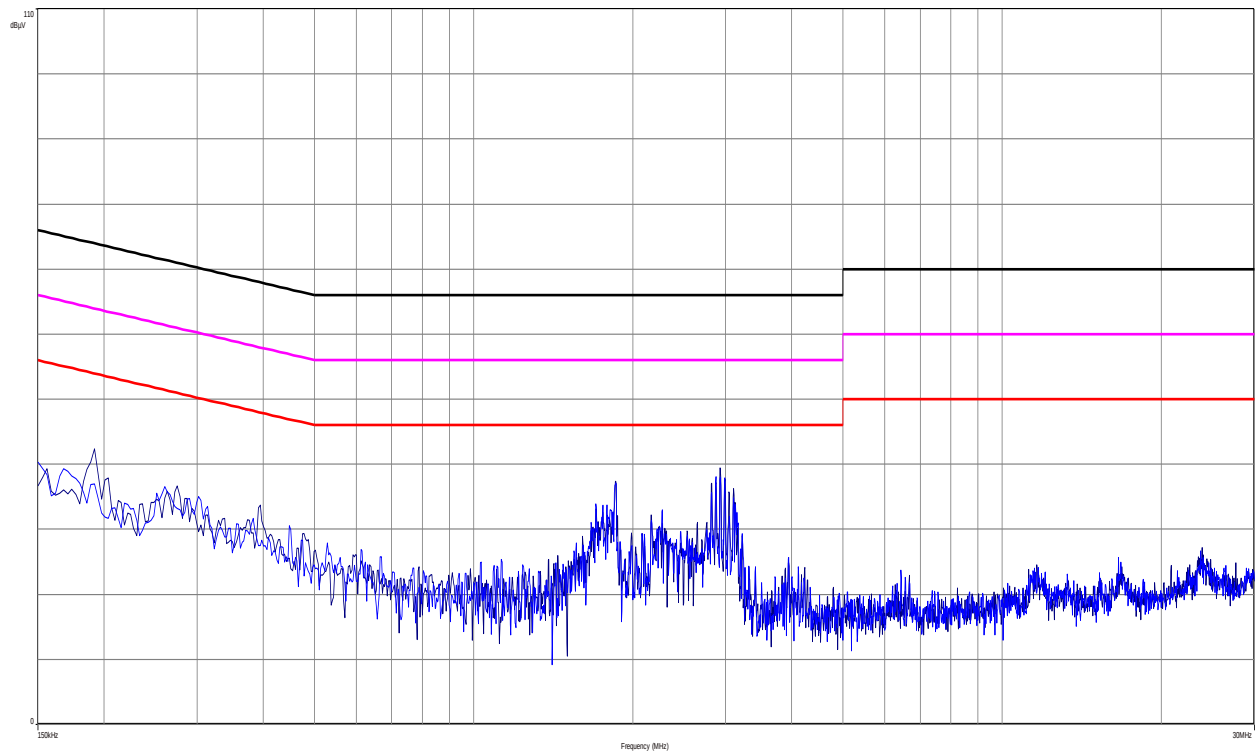
Plot shows 9th harmonic.

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

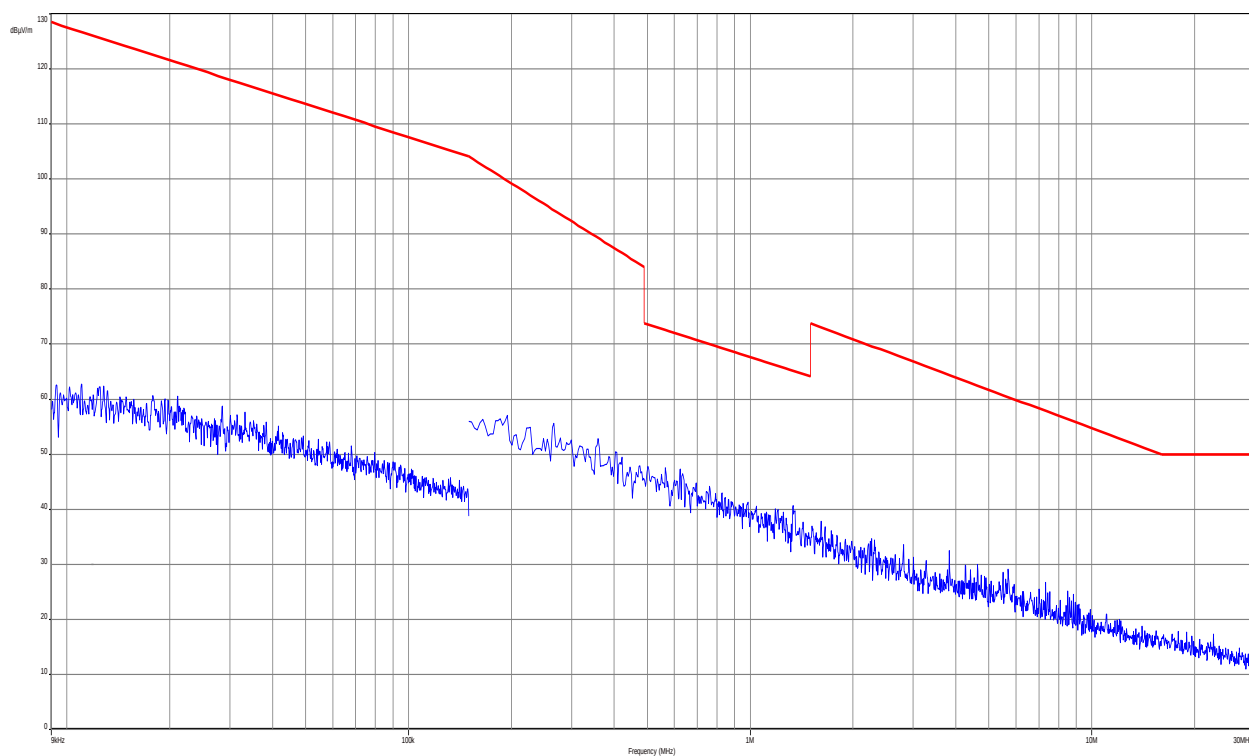
This annex consists of 6 pages including this page.

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

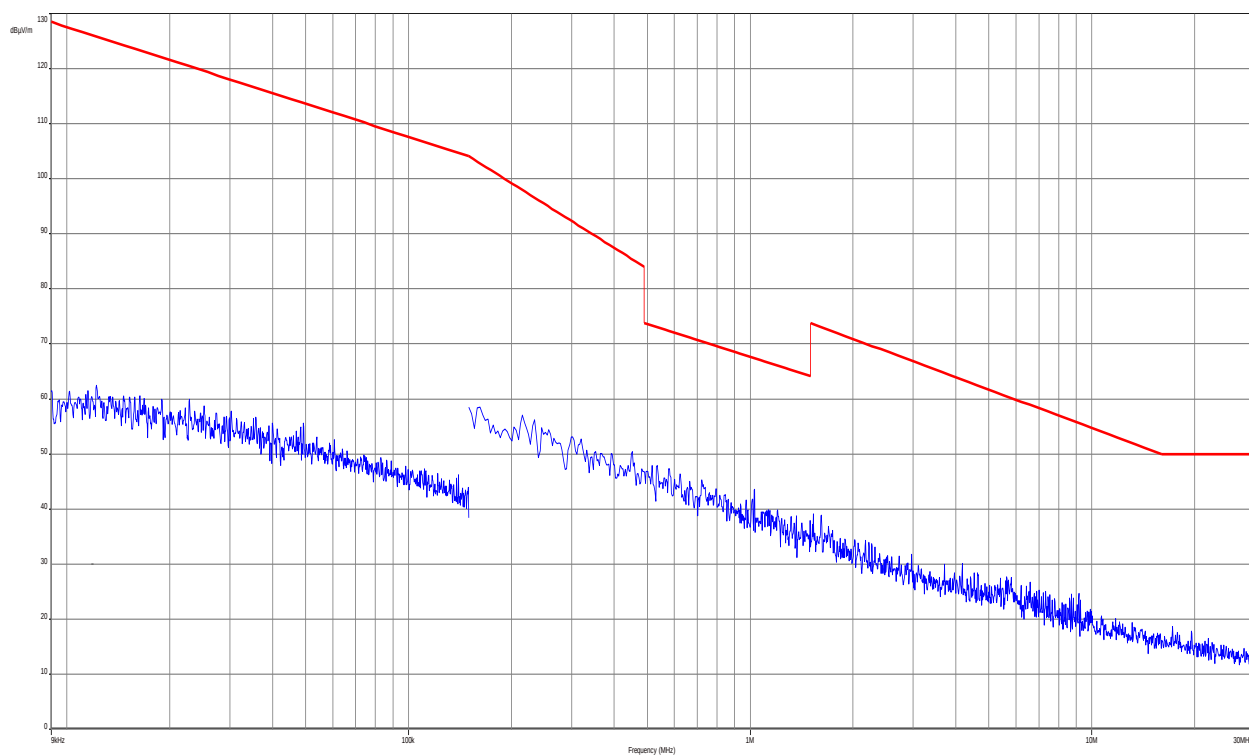
Plot No. 1: AC conducted, Tx off



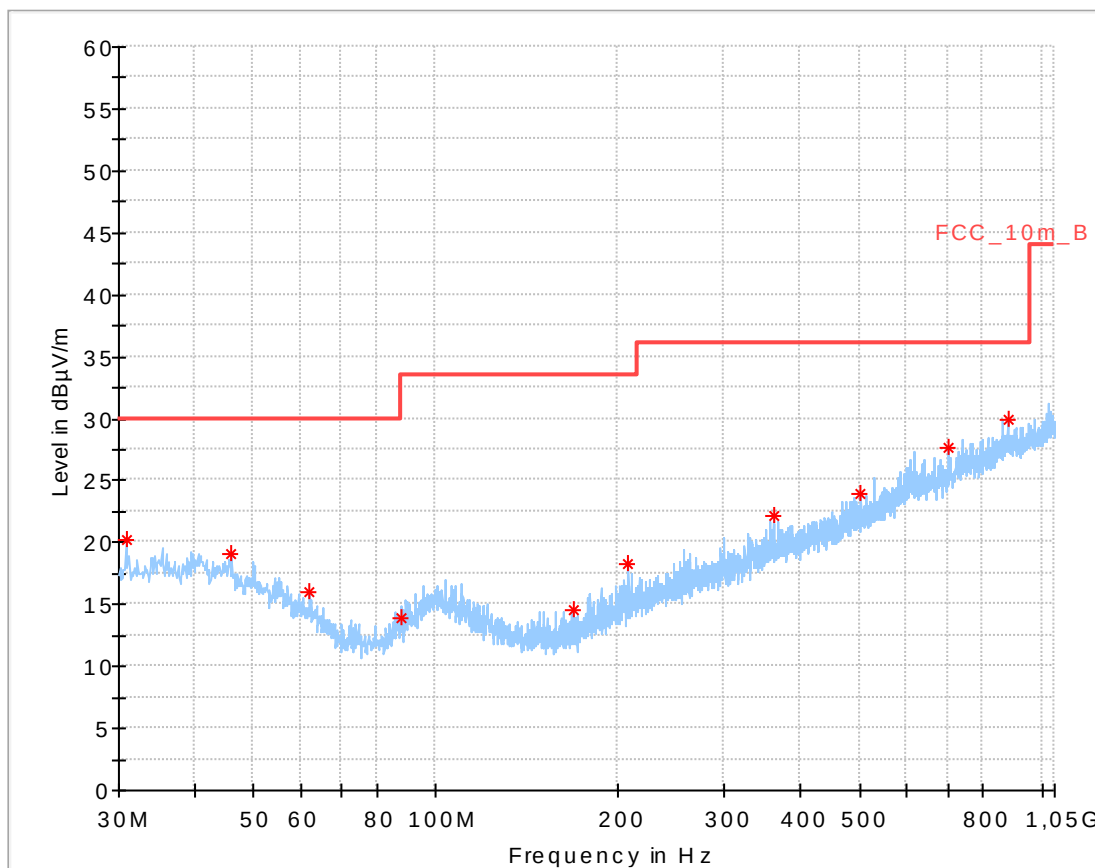
Plot No. 2: Tx on, short pulse, magnetic



Plot No. 3: Tx on, long pulse, magnetic



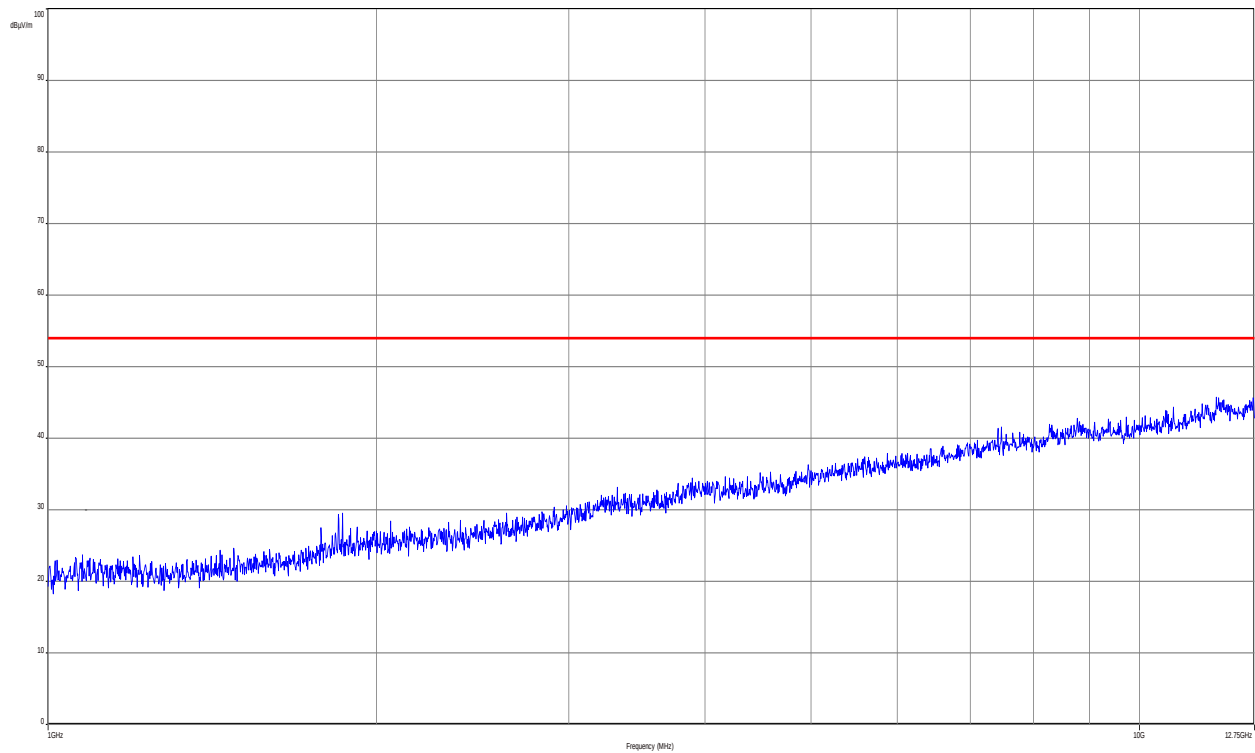
Plot No. 4: Tx on, short pulse



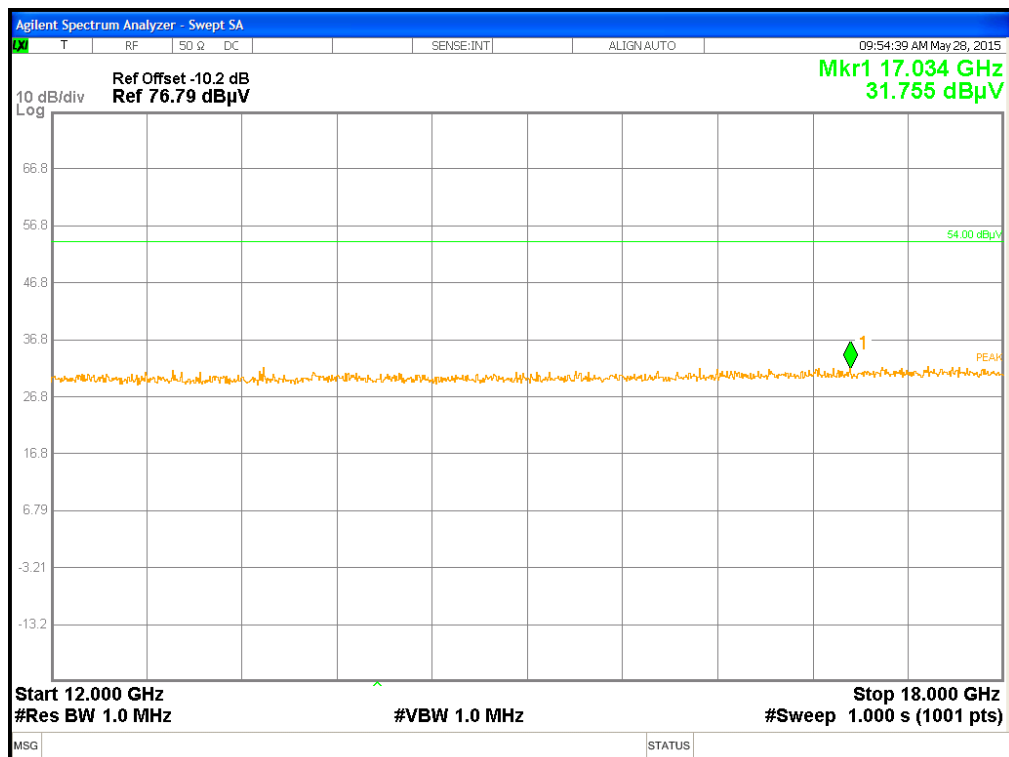
Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	BW (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.892500	20.28	30.00	9.72	---	---	300.0	H	315	13.4
46.065000	19.05	30.00	10.95	---	---	300.0	H	180	13.6
62.002500	15.95	30.00	14.05	---	---	100.0	V	135	10.1
87.502500	13.96	30.00	16.04	---	---	300.0	H	270	9.9
168.975000	14.56	33.50	18.94	---	---	100.0	V	180	9.7
208.245000	18.33	33.50	15.17	---	---	300.0	H	315	12.0
360.352500	22.12	36.00	13.88	---	---	300.0	H	0	16.2
503.535000	23.99	36.00	12.01	---	---	100.0	H	270	18.8
699.120000	27.65	36.00	8.35	---	---	300.0	V	225	21.5
878.895000	29.98	36.00	6.02	---	---	300.0	H	180	23.8

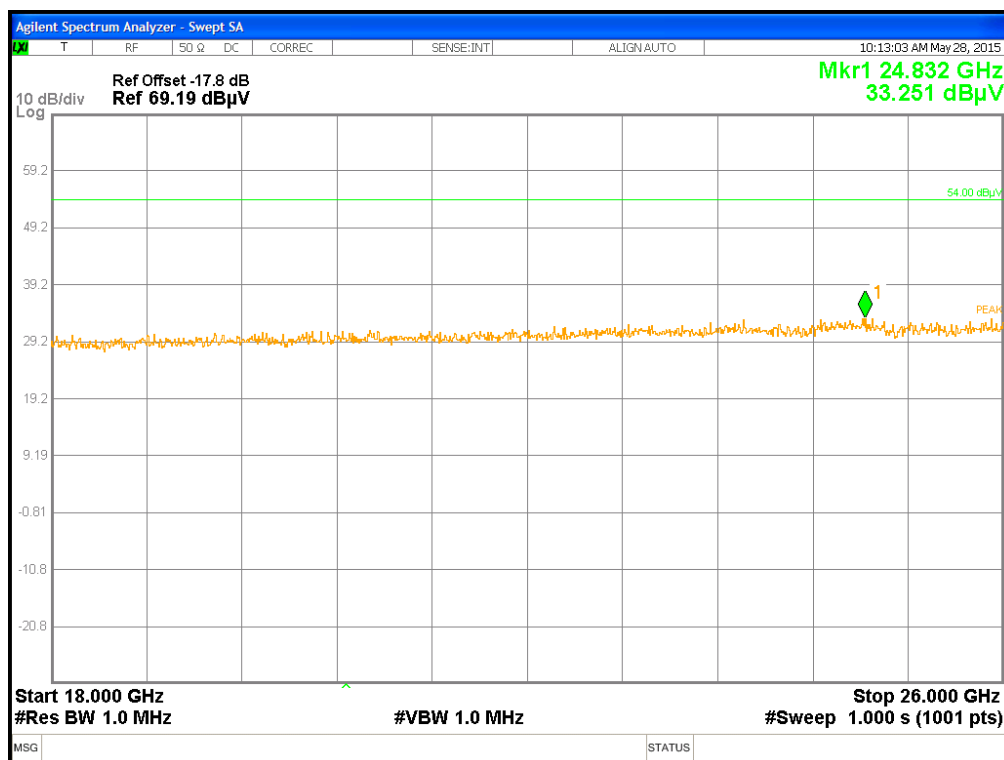
Plot No. 5: Tx off



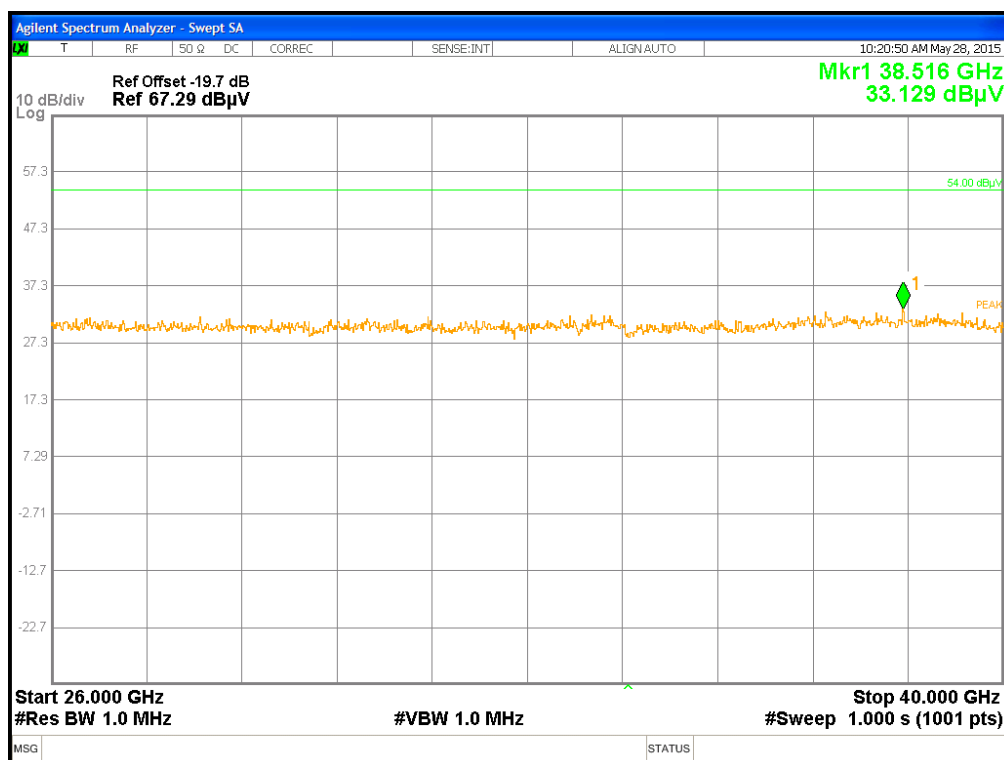
Plot No. 6: Tx off



Plot No. 7: Tx off



Plot No. 8: Tx off



Annex E Document history

Version	Applied changes	Date of release
DRAFT	Initial release - DRAFT	2015-07-16
	minor changes based on manufacturer's information	2015-07-24

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

Annex G Accreditation Certificate

Front side of certificate



Deutsche Akkreditierungsstelle GmbH

Befehlens gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV
Unterzeichnerin der Multilateralen Abkommen
von EA, ILAC und IAF zur gegenseitigen Anerkennung

Akkreditierung



Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

CETECOM ICT Services GmbH
Untertürkheimer Straße 6-10, 66117 Saarbrücken

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

Drahtgebundene Kommunikation einschließlich xDSL
VoIP und DECT
Akustik
Funk einschließlich WLAN
Short Range Devices (SRD)
RFID
WiMax und Richtfunk
Mobilfunk (GSM / DCs, Over the Air (OTA) Performance)
Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
Produktsicherheit
SAR und Hearing Aid Compatibility (HAC)
Umweltsimulation
Smart Card Terminals
Bluetooth
Wi-Fi Services

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Beschluss vom 07.03.2014 mit der
Akkreditierungsnummer D-PL-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der
Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 77 Seiten.

Registrierungsnummer der Urkunde: D-PL-12076-01-00

Frankfurt am Main, 07.03.2014

Cetecom GmbH

Im Auftrag D-PL-12076-01-00
Hilke Kasper
Hilke Kasper

Back side of certificate

Deutsche Akkreditierungsstelle GmbH

Standort Berlin
Spittelmarkt 10
10117 Berlin

Standort Frankfurt am Main
Gartenstraße 6
60594 Frankfurt am Main

Standort Braunschweig
Bundesallee 100
38116 Braunschweig

Die auszugsweise Veröffentlichung der Akkreditierungsurkunde bedarf der vorherigen schriftlichen
Zustimmung der Deutsche Akkreditierungsstelle GmbH (DAkkS). Ausgenommen davon ist die separate
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unveränderter Form.

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31. Juli 2009 (BGBl. I S. 2025) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments
und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung
im Zusammenhang mit der Vermarktung von Produkten (Abbl. L 218 vom 9. Juli 2008, S. 30).
Die DAkkS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der
European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und
des International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen
erkennen ihre Akkreditierungen gegenseitig an.

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.org

Note:

The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.

<http://www.cetecom.com/eu/de/cetecom-group/europa/deutschland-saarbruecken/akkreditierungen.html>