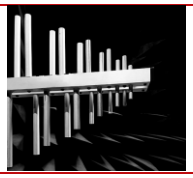
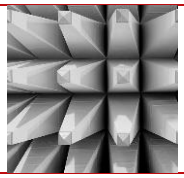



CETECOM™

CETECOM ICT Services
consulting - testing - certification ➤➤➤

TEST REPORT

Test report no.: 1-9177/15-33-08-C

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-00

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com

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

Applicant

Komatsu Ltd.
3-25-1 Shinomiya, Hiratsuka-shi, Kanagawa-ken
254-8555 / Japan
Phone: +81 463 22 8768
Fax: +81 463 22 8586
Contact: Shohei Ohta
e-mail: shonei_ohta@komatsu.co.jp
Phone: +81 463 22 8768

Manufacturer

Komatsu Ltd.
3-25-1 Shinomiya, Hiratsuka-shi, Kanagawa-ken
254-8555 / Japan

Test standard/s

47 CFR Part 25	Title 47 of the Code of Federal Regulations; Chapter I; Part 25 - Satellite Communications
RSS - 170 Issue 3	Mobile Earth Stations (MESs) and Ancillary Terrestrial Component (ATC) Equipment Operating in the Mobile-Satellite Service (MSS) Bands

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:	**Satellite communication device for construction machines**
Model name:	**KDTC730**
FCC ID:	**X4QKDTC730**
IC:	**4472A-KDTC730**
Frequency:	1616 MHz to 1626.5 MHz
Antenna:	ext. antenna (Hirschmann HIRD SX-0120x-01, 3dBic))
Power supply:	24 V DC
Temperature range:	-30 °C to +70 °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.

Test report authorized:

cn=Karsten Geraldy, o=CETECOM ICT Services GmbH, ou=GER-151201, email=karsten.geraldy@cetecom.com, c=DE
2016.02.04 10:44:23 +01'00'

Karsten Geraldy
Lab Manager
Radio Communications & EMC

Test performed:

Benedikt Gerber
cn=Benedikt Gerber, o=CETECOM ICT Services GmbH, ou=Radio Communications & EMC, email=benedikt.gerber@cetecom.com, c=DE
2016.02.04 10:22:46 +01'00'

Benedikt Gerber
Testing Manager
Radio Communications & EMC

1 Table of contents

1 Table of contents 2

2 General information 3

2.1 Notes and disclaimer 3
2.2 Application details 3

3 Test standard/s 4

4 Test environment 4

5 Test laboratories sub-contracted 4

6 Test item 5

6.1 General description 5
6.1 Operating conditions 5
6.2 Additional information 5

7 Description of the test setup 6

7.1 Shielded fully anechoic chamber 7
7.2 Radiated measurements > 12.75 GHz 9
7.3 Conducted measurements 10
7.4 Conducted measurements normal and extreme conditions 11

8 Sequence of testing 12

8.1 Sequence of testing radiated spurious 9 kHz to 30 MHz 12
8.2 Sequence of testing radiated spurious 30 MHz to 1 GHz 13
8.3 Sequence of testing radiated spurious 1 GHz to 12.75 GHz 14
8.4 Sequence of testing radiated spurious above 12.75 GHz 15

9 Measurement results 16

9.1 Summary 16
9.2 Overview 17

Annex A Conducted measurement results 24

Annex B Radiated measurement results 61

Annex C Document history 68

Annex D Further information 68

Annex E Accreditation Certificate 69

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.
The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM ICT Services GmbH.
The testing service provided by CETECOM ICT Services GmbH has been rendered under the current "General Terms and Conditions for CETECOM ICT Services GmbH".
CETECOM ICT Services GmbH will not be liable for any loss or damage resulting from false, inaccurate, inappropriate or incomplete product information provided by the customer.
Under no circumstances does the CETECOM ICT Services GmbH test report include any endorsement or warranty regarding the functionality, quality or performance of any other product or service provided.
Under no circumstances does the CETECOM ICT Services GmbH test report include or imply any product or service warranties from CETECOM ICT Services GmbH, including, without limitation, any implied warranties of merchantability, fitness for purpose, or non-infringement, all of which are expressly disclaimed by CETECOM ICT Services GmbH.
All rights and remedies regarding vendor’s products and services for which CETECOM ICT Services GmbH has prepared this test report shall be provided by the party offering such products or services and not by CETECOM ICT Services GmbH.
In no case this test report can be considered as a Letter of Approval.

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

This test report replaces the test report with the number 1-9177/15-33-08-A and dated 2015-12-08

2.2 Application details

Date of receipt of order:	2015-08-26
Date of receipt of test item:	2015-09-18
Start of test:	2015-09-22
End of test:	2015-10-01
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Description
47 CFR Part 25		Title 47 of the Code of Federal Regulations; Chapter I; Part 25 - Satellite Communications
RSS - 170 Issue 3	July 2015	Mobile Earth Stations (MESs) and Ancillary Terrestrial Component (ATC) Equipment Operating in the Mobile-Satellite Service (MSS) Bands

Guidance	Date	Description
ANSI C63.4-2014	-/-	American national standard for methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz
ANSI C63.10-2013	-/-	American national standard of procedures for compliance testing of unlicensed wireless devices

4 Test environment

Temperature	:	T_{nom} T_{max} T_{min}	+22 °C during room temperature tests +50 °C during high temperature tests -30 °C during low temperature tests
Relative humidity content	:		55 %
Barometric pressure	:		not relevant for this kind of testing
Power supply	:	V_{nom} V_{max} V_{min}	24 V DC by lab power supply -/- V -/- V

5 Test laboratories sub-contracted

None

6 Test item

6.1 General description

Kind of test item	:	Satellite communication device for construction machines
Type identification	:	KDTC730
PMN	:	KDTC730
HVIN	:	KDTC730
FVIN	:	KDTC730
HMN	:	NA
S/N serial number	:	1009
HW hardware status	:	7826-25-890B
SW software status	:	010.IRI.STEP4RC2
Frequency band	:	1616 MHz to 1626.5 MHz
Type of radio transmission Use of frequency spectrum	: :	TDMA/FDMA
Number of channels	:	240
Antenna	:	ext. antenna (Hirschmann HIRD SX-0120x-01, 3dBic)
Power supply	:	24 V DC by lab power supply
Temperature range	:	-30 °C to +70 °C

6.1 Operating conditions

Operating condition 1: TX on
fu = 1.61602 GHz (ch1)
fo = 1.626 GHz (ch240)
fm1 = 1.61852 GHz (ch61)
fm2 = 1.62102 GHz (ch121)
power: 0 dB (setting in software)
timeslot 4
BER loopback off,
Register seed Random
Delay 1820 µs
Doppler 0 Hz
Start traffic channel: STCH

Operating condition 2: TX off

6.2 Additional information

Test setup- and EUT-photos are included in test report: 1-9177/15-01-01_AnnexA
1-9177/15-01-01_AnnexB
1-9177/15-01-01_AnnexC

7 Description of the test setup

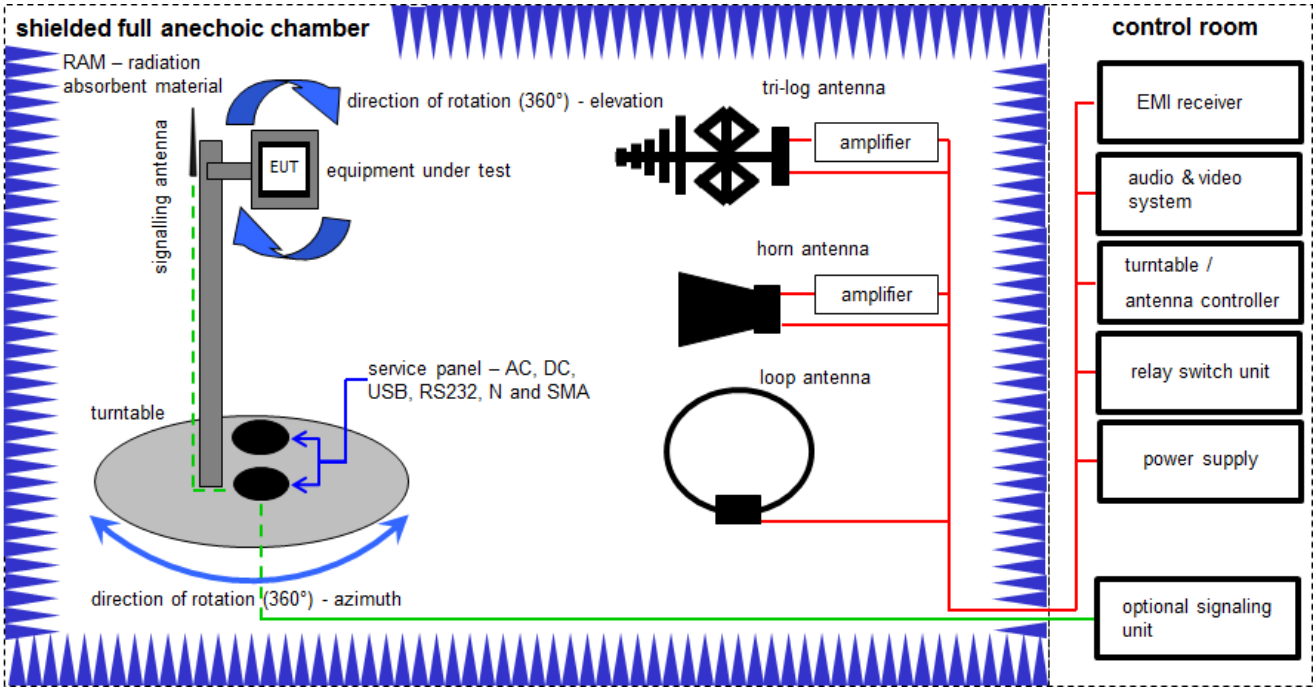
Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements 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).

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

7.1 Shielded fully anechoic chamber



Measurement distance: tri-log antenna and horn antenna 3 meter; loop antenna 3 meter / 1 meter

FS = UR + CA + AF
(FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

Example calculation:
FS [dBµV/m] = 40.0 [dBµV/m] + (-35.8) [dB] + 32.9 [dB/m] = 37.1 [dBµV/m] (71.61 µV/m)

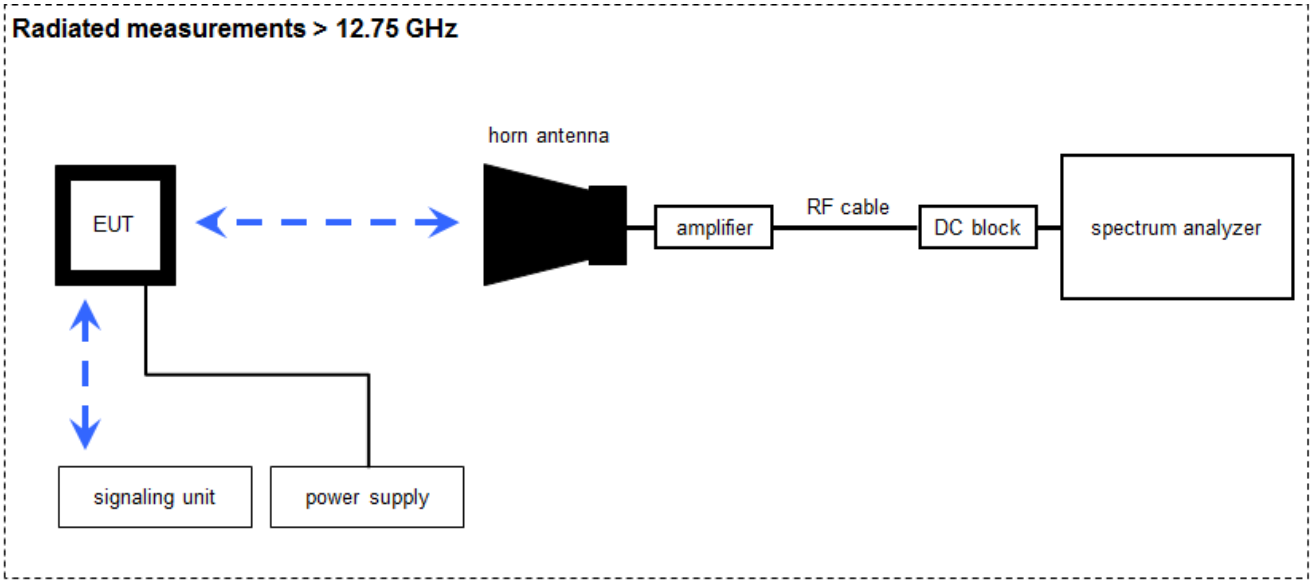
OP = AV + D - G + CA
(OP-radiated output power; AV-analyzer value; D-free field atteuation of measurement distance; G-antenna gain+amplifier gain; CA-loss signal path)

Example calculation:
OP [dBm] = -65.0 [dBm] + 50 [dB] - 20 [dBi] + 5 [dB] = -30 [dBm] (1 µW)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Power Supply 0-20V	6632A	HP	2851A01814	300000924	ne	09.11.2005	
2	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	9709-5290	300000212	k	13.08.2015	13.08.2017
3	n. a.	Universal Communication Tester	CMU200	R&S	106826	300003346	k	11.02.2015	11.02.2016
4	n. a.	Software Option für CMU 200	CMU-Kxx	R&S	106826	300003345	ne		
5	n. a.	EMI Test Receiver 20Hz-26,5GHz	ESU26	R&S	100037	300003555	k	22.01.2015	22.01.2016
6	n. a.	Signalgenerator 1-20 GHz	SMR20	R&S	101697/020	300003593	k	23.01.2014	23.01.2016
7	n. a.	Digitaler Radiocommunication Tester	CMD65	R&S	847527/005	300003611	k	06.03.2014	06.03.2017
8	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
9	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	318	300003696	k	22.04.2014	22.04.2017
10	n. a.	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22050	300004482	ev		
11	n. a.	Broadband Amplifier 5-13 GHz	CBLU5135235	CERNEX	22011	300004492	ev		
12	n. a.	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000032	300004510	ne		
13	n. a.	Messrechner und Monitor	Intel Core i3 3220/3,3 GHz, Prozessor	Agilent Technologies	2V2403033A5421	300004591	ne		
14	n. a.	Highpass Filter	WHKX2.6/18G-10SS	Wainwright	12	300004651	ne		
15	n. a.	NEXIO EMV-Software	BAT EMC	EMCO	12	300004682	ne		

7.2 Radiated measurements > 12.75 GHz



Measurement distance: horn antenna 25 cm

FS = UR + CA + AF
(FS-field strength; UR-voltage at the receiver; CA-loss signal path & distance correction; AF-antenna factor)

Example calculation:
FS [dBµV/m] = 40.0 [dBµV/m] + (-60.1) [dB] + 36.74 [dB/m] = 16.64 [dBµV/m] (6.79 µV/m)

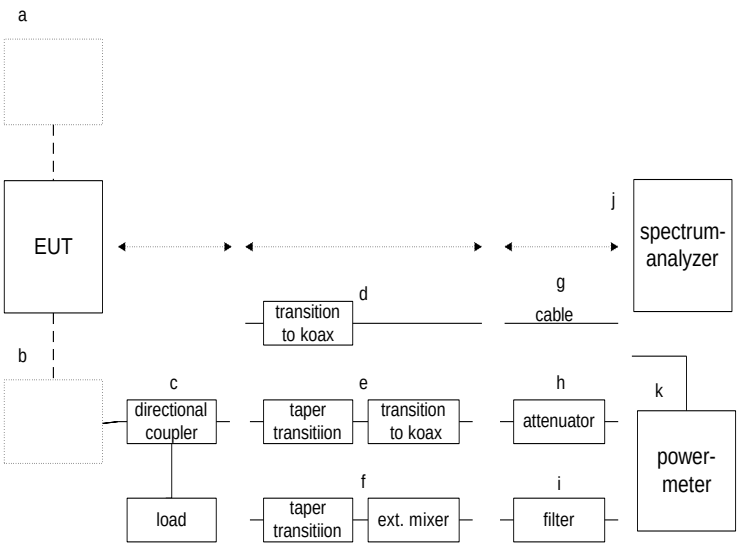
OP = AV + D - G + CA
(OP-radiated output power; AV-analyzer value; D-free field attenuation of measurement distance;
G-antenna gain+amplifier gain; CA-loss signal path)

Example calculation:
OP [dBm] = -59.0 [dBm] + 44.0 [dB] - 20.0 [dBi] + 5.0 [dB] = -30 [dBm] (1 µW)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP	00419	300002268	ev		
2	217	HF-Cable	KPS1533-590-KPS	Insulated Wire	00419	300002290	ev		
3	U005	High Power Attenuator 30 dB, DC to 18 GHz	9498A	HP	2702A04550	300002403	ev		
4	A039	Std. Gain Horn Antenna 11.90-18.00 GHz	1824-20	Flann	263	300002471	ne		
5	n. a.	Power Supply	LA30/5GA	Zentro	2046	300000711	NK!		
6	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	Ve	02.10.2014	02.10.2016

7.3 Conducted measurements



Setup 1.2 x...x

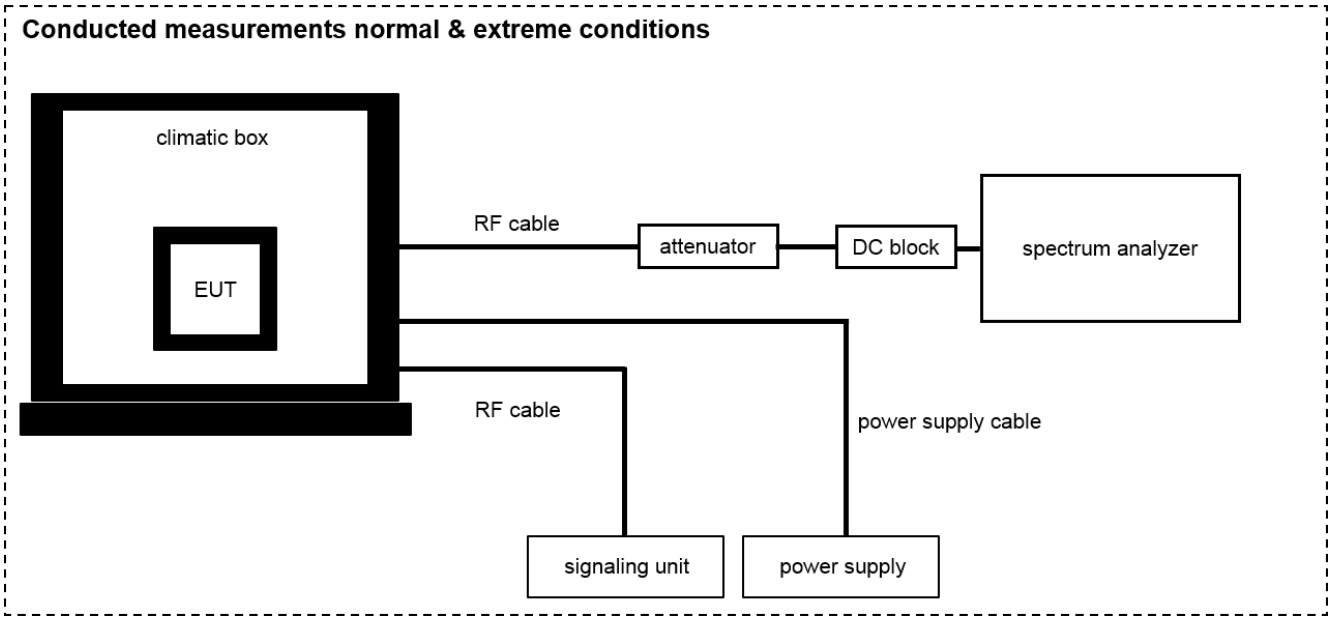
OP = AV + CA
(OP-output power; AV-analyzer value; CA-loss signal path)

Example calculation:
OP [dBm] = 6.0 [dBm] + 11.7 [dB] = 17.7 [dBm] (58.88 mW)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Power Supply	LA30/5GA	Zentro	2046	300000711	NK!		
2	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	Ve	02.10.2014	02.10.2016
3	217	HF-Cable	KPS1533-590-KPS	Insulated Wire		300002290	ev		
4	U005	High Power Attenuator 30 dB, DC to 18 GHz	9498A	HP	2702A04550	300002403	ev		
5		Low Pass Filter 1GHz	SLP-1000+	Mini-Circuits	R UU93901242		ev		
6		High Pass Filter 2275 MHz	VHF-2275+	Mini-Circuits	3 0719		ev		
7		Attenuater 10 dB DC to 11 GHz	768F-10	narda		300002370	ev		

7.4 Conducted measurements normal and extreme conditions



OP = AV + CA
(OP-output power; AV-analyzer value; CA-loss signal path)

Example calculation:
OP [dBm] = 6.0 [dBm] + 11.7 [dB] = 17.7 [dBm] (58.88 mW)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Power Supply	LA30/5GA	Zentro	2046	300000711	NK!		
2	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	Ve	02.10.2014	02.10.2016
3	217	HF-Cable	KPS1533-590-KPS	Insulated Wire		300002290	ev		
4	U005	High Power Attenuator 30 dB, DC to 18 GHz	9498A	HP	2702A04550	300002403	ev		
5	n. a.	Temperature Test Chamber	T-40/50	CTS GmbH	064023	300003540	ev	03.09.2015	03.09.2017

8 Sequence of testing

8.1 Sequence of testing radiated spurious 9 kHz to 30 MHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 1.5 m.
- At each turntable position the analyzer sweeps with positive-peak detector to find the maximum of all emissions.

Final measurement

- Identified emissions during the premeasurement are maximized by the software by rotating the turntable from 0° to 360°. In case of the 2-axis positioner is used the elevation axis is also rotated from 0° to 360°.
- The final measurement is done in the position (turntable and elevation) causing the highest emissions with quasi-peak (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the premeasurement and the limit is stored.

8.2 Sequence of testing radiated spurious 30 MHz to 1 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 10 m or 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 m to 3 m.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position ± 45° and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

8.3 Sequence of testing radiated spurious 1 GHz to 12.75 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height is 1.5 m.
- At each turntable position and antenna polarization the analyzer sweeps with positive peak detector to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximizes the peaks by rotating the turntable from 0° to 360°. This measurement is repeated for different EUT-table positions (0° to 150° in 30°-steps) and for both antenna polarizations.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

8.4 Sequence of testing radiated spurious above 12.75 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet.
- The measurement distance is as appropriate (e.g. 0.5 m).
- The EUT is set into operation.

Premeasurement

- The test antenna is handheld and moved carefully over the EUT to cover the EUT's whole sphere and different polarizations of the antenna.

Final measurement

- The final measurement is performed at the position and antenna orientation causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement and the limit is stored.

9 Measurement results

9.1 Summary

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.: 1-9177/15-33-09

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

TC identifier	Description	Verdict	Date	Remark
RF-Testing	CFR 47 Part 25	PASS	2016-02-04	-/-

Test Specification Clause	Test Case	Pass	Fail	N/A	N/P	Results
§2.1046 / §25.204	Measurements required: RF power output. Power limits	X				complies
§2.1049	Measurements required: Occupied bandwidth.	X				complies
§2.1055 / §25.202 (d) / RSS-170 5.2	Measurements required: Frequency stability. Frequency tolerance, Earth stations	X				complies
§2.1051 / §25.202 (f) / RSS-170 5.4.3.1	Measurements required: Spurious emissions at antenna terminals. Emission limitations (conducted)	X				complies
§2.1053 / §25.202 (f) / RSS-170 5.4.3.1	Measurements required: Field strength of spurious radiation. Emission limitations (radiated)	X				complies
§2.1051 / §25.216 (c,f) / RSS-170 5.4.3.2	Measurements required: Spurious emissions at antenna terminals. Protection of aeronautical radionavigation-satellite service	X				complies
§2.1053 / RSS-170 5.5 / RSS-Gen / FCC Part 15 B	Measurements required: Field strength of spurious radiation. Receiver Spurious Emissions	X				**

**see Cetecom test report no.: 1-9177/15-33-09

Note:
NA = Not applicable; NP = Not performed

9.2 Overview

I. RF power output / Power limits / Occupied bandwidth 18

II. Frequency tolerance, Earth stations 19

III. Emission limitations (RF spectrum mask) 20

IV. Emissions limitations (conducted emissions) 21

V. Emissions limits (radiated emissions) 22

VI. Limits on emissions from MESs for protection of aeronautical radionavigation-satellite service 23

I. RF power output / Power limits / Occupied bandwidth

Description / Limit:

§25.204 Power limits for earth stations
(a) In bands shared coequally with terrestrial radio communication services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station, other than an ESV, operating in frequency bands between 1 and 15 GHz, shall not exceed the following limits except as provided for in paragraph (c) of this section:
+ 40 dBW in any 4 kHz band for θ ≤0°
+ 40 + 3θ dBW in any 4 kHz band for 0° <θ ≤5°
where θ is the angle of elevation of the horizon viewed from the center of radiation of the antenna of the earth station and measured in degrees as positive above the horizontal plane and negative below it.

RSS-170, 5.3.2 Mobile Earth Stations (MESs)
The application for MES certification shall state the MES e.i.r.p. that is necessary for satisfactory communication. The maximum permissible e.i.r.p. will be the stated e.i.r.p. plus a 2 dB margin. If a detachable antenna is used, the certification application shall state the recommended antenna type and manufacturer, the antenna gain and the maximum transmitter output power at the antenna terminal.

Measurement results:

RF output power

state	freq. (range) GHz	result					remark
		conducted power PEAK			ant. gain	PEAK EIRP	
		dBm	dBW	W	dBi	dBW	
mod, fu	1616.02	38.9	8.9	7.8	3.0	11.9	opc 1, fu, plot 3
mod, fm	1621.02	37.6	7.6	5.8	3.0	10.6	opc 1, fm, plot 5
mod, fo	1625.98	38.7	8.7	7.4	3.0	11.7	opc 1, fo, plot 7

Note: cw = continuous wave mod = modulated
Bandwidth correction factor of 5 dB (10xlog(occbw/resbw)) is applied for values given above.

Determination of occupied bandwidth (99% bandwidth)

Operating condition	Frequency	Frequency GHz	Occupied bandwidth	Annex / Plot
1	fu	1616.02	31.9 kHz	A / 4
1	fm	1621.02	31.7 kHz	A / 6
1	fo	1625.98	31.9 kHz	A / 8

Operating conditions of DUT:
Carrier-on radio state (for more details see table above)

Test setup(s):
Test setup 1.2hgj

Plots:
see also annex A, plot 1 - 8

Verdict: Pass

II. Frequency tolerance, Earth stations

Description / Limit:

§25.202 (d) Frequency tolerance
The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent of the reference frequency.

Measurement results:

°C	Voltage [V AC]	Carrier frequency [GHz]	Deviation [MHz]	Deviation [ppm]
-30	233	1621.02153	0.33	0.2
-20	233	1621.02107	-0.14	-0.1
-10	233	1621.02094	-0.26	-0.2
0	233	1621.02097	-0.23	-0.1
10	233	1621.02120	0.00	0.0
20	233	1621.02120	0.00	0.0
20	268	1621.02120	0.00	0.0
20	198	1621.02120	0.00	0.0
30	233	1621.02117	-0.03	0.0
40	233	1621.02120	0.00	0.0
50	233	1621.02134	0.14	0.1

Operating conditions of DUT:
Carrier on (condition 1, see chapter 5.1)

Test setup(s):
Test setup 7.4

Verdict: Pass

III. Emission limitations (RF spectrum mask)

Description / Limit:

§25.202 Frequencies, frequency tolerance and emission limitations
(f) Emission limitations. Except for SDARS terrestrial repeaters, the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the schedule set forth in paragraphs (f)(1) through (f)(4) of this section. The outof-band emissions of SDARS terrestrial repeaters shall be attenuated in accordance with the schedule set forth in paragraph (h) of this section.
(1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;
(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;
(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth:
An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;
(4) In any event, when an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraphs (f) (1), (2) and (3) of this section.

Test setup: 1.2hgj

Measurement results:

Mode	see following plots
Tx-mode, fu	Annex A / 9, 10
Tx-mode, fm	Annex A / 17, 18
Tx-mode, fo	Annex A / 25, 26

Verdict: Pass

IV. Emissions limitations (conducted emissions)

Description / Limit:

§25.202 Frequencies, frequency tolerance and emission limitations
(f) Emission limitations. Except for SDARS terrestrial repeaters, the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the schedule set forth in paragraphs (f)(1) through (f)(4) of this section. The outof-band emissions of SDARS terrestrial repeaters shall be attenuated in accordance with the schedule set forth in paragraph (h) of this section.
(1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;
(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;
(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth:
An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;
(4) In any event, when an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraphs (f) (1), (2) and (3) of this section.

Test setup: 1.2xxxx (see plots)

Measurement results:

Conducted Spurious Emissions [dBm]								
bottom			middle			top		
F [GHz]	Detector	Level [dBm]	F [GHz]	Detector	Level [dBm]	F [GHz]	Detector	Level [dBm]
No critical peaks detected.			No critical peaks detected.			No critical peaks detected.		
Measurement uncertainty			± 1.5 dB					

n.f. = nothing found

Plots:

see also Annex A, plots 9 – 32

Verdict: Pass

V. Emissions limits (radiated emissions)

Description / Limit:

§25.202 Frequencies, frequency tolerance and emission limitations
(f) Emission limitations. Except for SDARS terrestrial repeaters, the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the schedule set forth in paragraphs (f)(1) through (f)(4) of this section. The outof-band emissions of SDARS terrestrial repeaters shall be attenuated in accordance with the schedule set forth in paragraph (h) of this section.
(1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;
(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;
(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth:
An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;
(4) In any event, when an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraphs (f) (1), (2) and (3) of this section.

Test setup: 7.2

Measurement results:

Radiated Spurious Emissions [dBm]								
bottom (fu)			middle (fm)			top (fo)		
F [GHz]	Detector	Level [dBm]	F [GHz]	Detector	Level [dBm]	F [GHz]	Detector	Level [dBm]
No critical peaks detected.			No critical peaks detected.			No critical peaks detected.		
Measurement uncertainty			± 3 dB					

n.f. = nothing found
v / h = vertical / horizontal

Plots:
see also Annex B, plots 1 – 6

Verdict: Pass

VI. Limits on emissions from MESs for protection of aeronautical radionavigation-satellite service

Description / Limit:

§25.216 EIRP emission density
(c) The e.i.r.p. density of emissions from mobile earth stations placed in service after July 21, 2002 with assigned uplink frequencies between 1610 MHz and 1660.5 MHz shall not exceed -70 dBW/MHz, averaged over any 2 millisecond active transmission interval, in the band 1559–1605 MHz. The e.i.r.p. of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed -80 dBW, averaged over any 2 millisecond active transmission interval, in the 1559–1605 MHz band.

(f) Mobile earth stations placed in service after July 21, 2002 with assigned uplink frequencies in the 1610–1660.5 MHz band shall suppress the power density of emissions in the 1605–1610 MHz band to an extent determined by linear interpolation from -70 dBW/MHz at 1605 MHz to -10 dBW/MHz at 1610 MHz.

Test setup: 1.2xxxx (see plots)

Measurement results:

Radiated Spurious Emissions [dBm]								
bottom (fu)			middle (fm)			top (fo)		
F [GHz]	Detector	Level [dBm]	F [GHz]	Detector	Level [dBm]	F [GHz]	Detector	Level [dBm]
No critical peaks detected.			No critical peaks detected.			No critical peaks detected.		
Measurement uncertainty			± 3 dB					

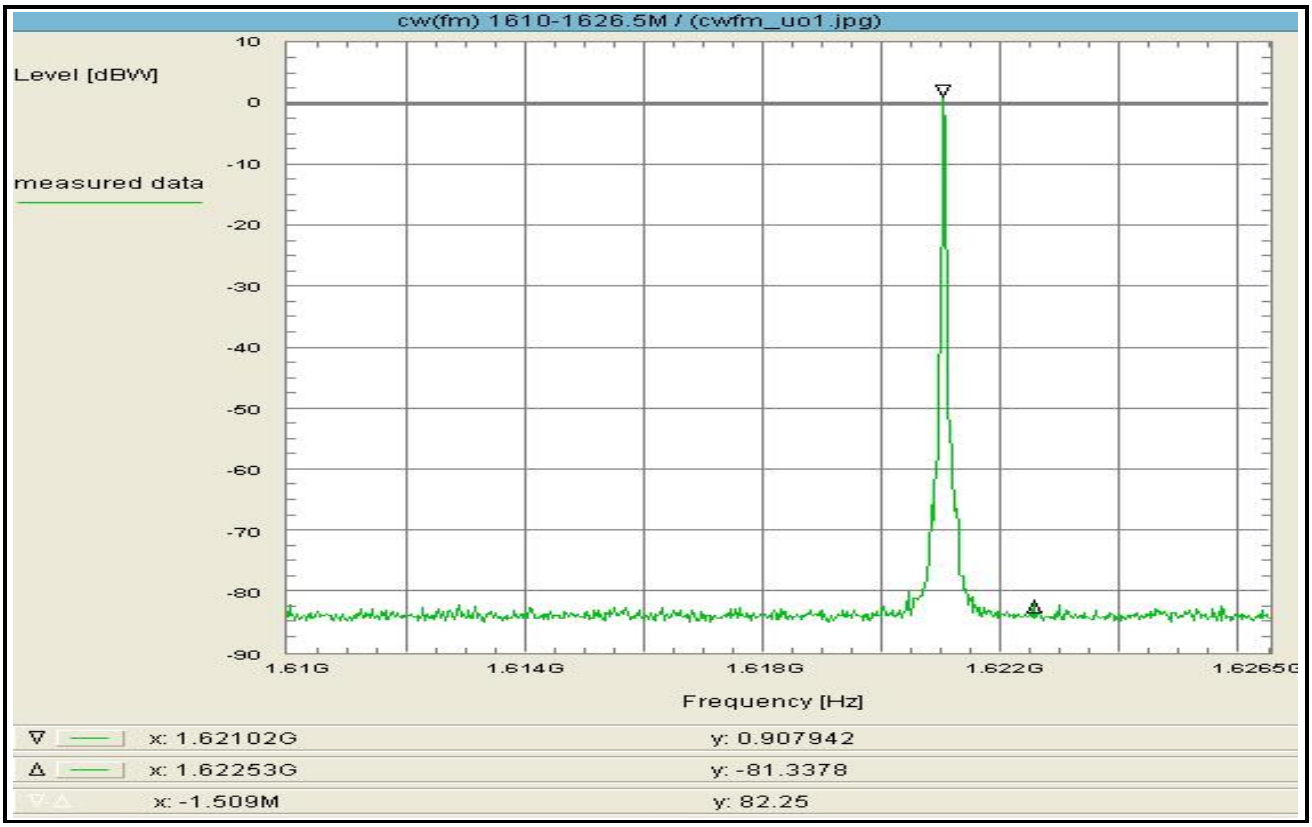
Plots:
see also Annex A, plots 33 - 36

Verdict: Pass

Annex A Conducted measurement results

Annex A consists of 37 pages including this page.

Plot No. 1 (36)



Subclause: -/- Function test
CW-rf-carrier in the middle of the band (fm)
Measurement within the band

Limit:
no limits defined

This test serves to verify the general function of the EUT and for orientation regarding to the spurious emissions which are expected within the band, furthermore for comparison of the actual power with the rated value at cw-carrier adjusted in the middle of the band (EIRP).

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fm

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **measurement for orientation.**

Environment condition:

Date & Time:	Wed 23/Sep/2015 13:28:52	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

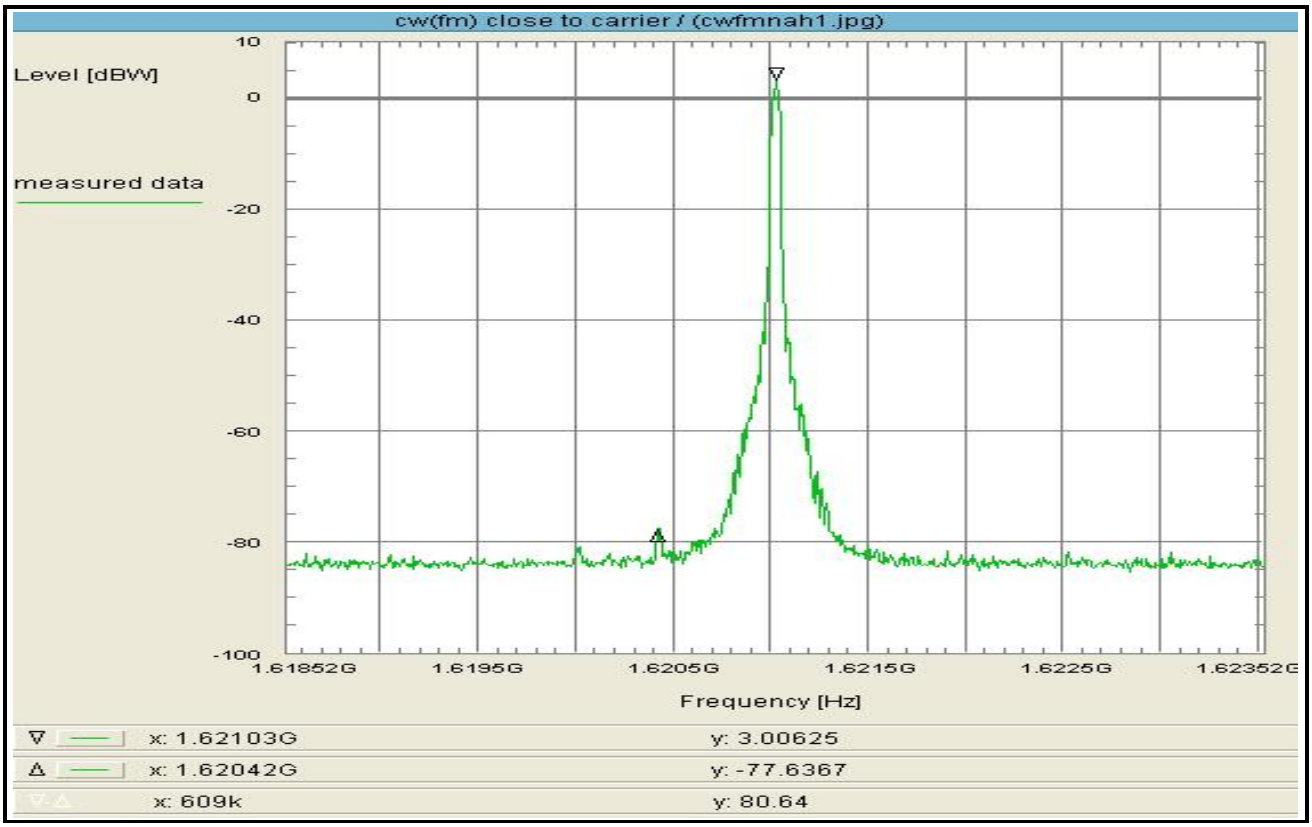
Start frequency:	1.61	GHz
Stop frequency:	1.6265	GHz
Center frequency:	1.61825	GHz
Frequency span:	16.5	MHz
Resolution-BW:	10	kHz
Video-BW:	1	kHz
Input attenuation:	0	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	3.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	33.6	dB

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

Plot No. 2 (36)



Subclause: -/- Function test
CW-rf-carrier in the middle of the band (fm)
Measurement close to the wanted rf-signal

Limit:
no limits defined

This test serves to verify the general function of the EUT and for orientation regarding to the spurious emissions which are expected within the expected ´nominated bandwitdh´ and for comparison of the actual rf-power with the rated value at cw-carrier adjusted in the middle of the band (EIRP!)

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fm

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **measurement for orientation.**

Environment condition:

Date & Time:	Wed 23/Sep/2015 13:27:24	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

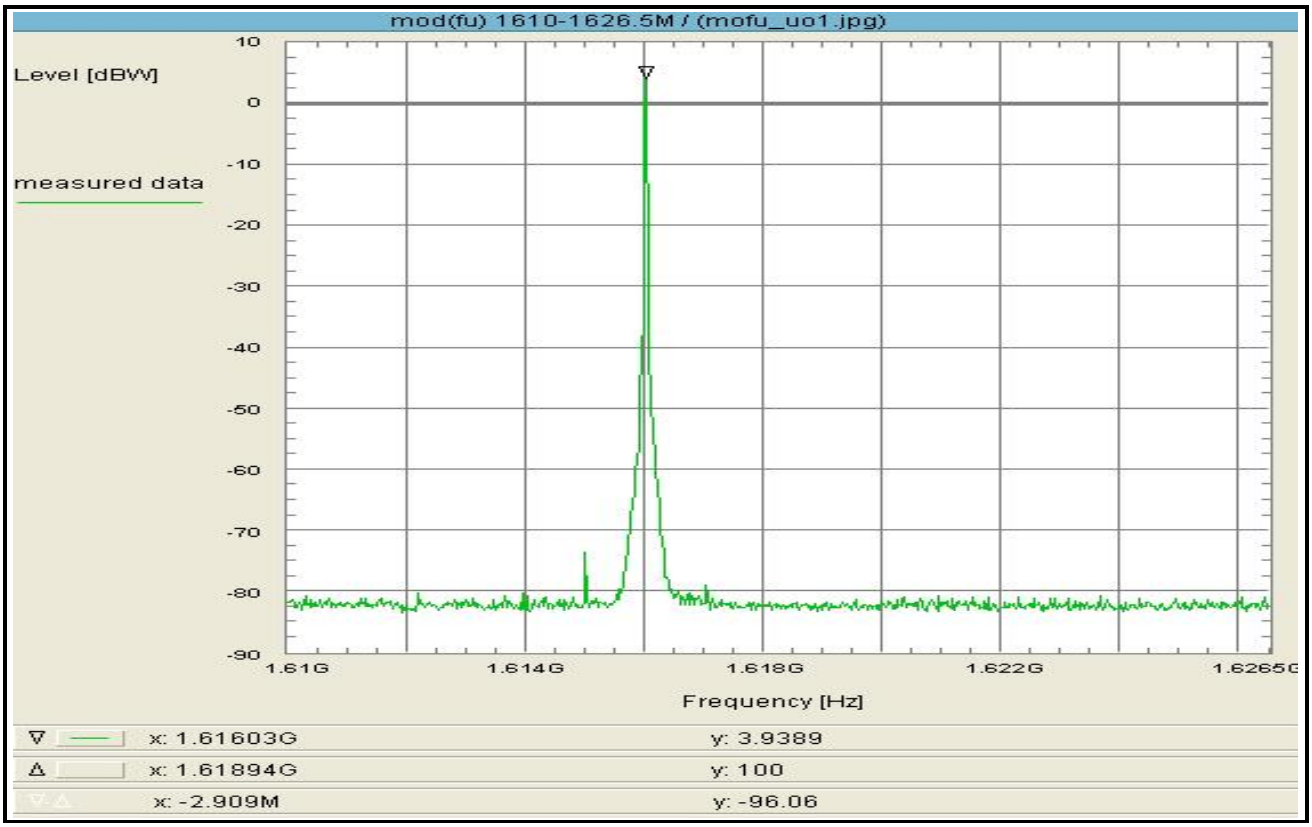
Start frequency:	1.61852	GHz
Stop frequency:	1.62352	GHz
Center frequency:	1.62102	GHz
Frequency span:	5	MHz
Resolution-BW:	10	kHz
Video-BW:	1	kHz
Input attenuation:	0	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	3.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	33.6	dB

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

Plot No. 3 (36)



Subclause: -/- Function test
Modulated rf-carrier at the lower edge of the band (fu)
Measurement within the band

Limit:
no limits defined

This test serves to verify the general function of the EUT and for orientation regarding to the spurious emissions which are expected within the band, furthermore for comparison of the actual power with the rated value at modulated carrier adjusted as close to the lower edge of the operating frequency band.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **measurement for orientation**

Environment condition:

Date & Time:	Thu 24/Sep/2015 12:55:36	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

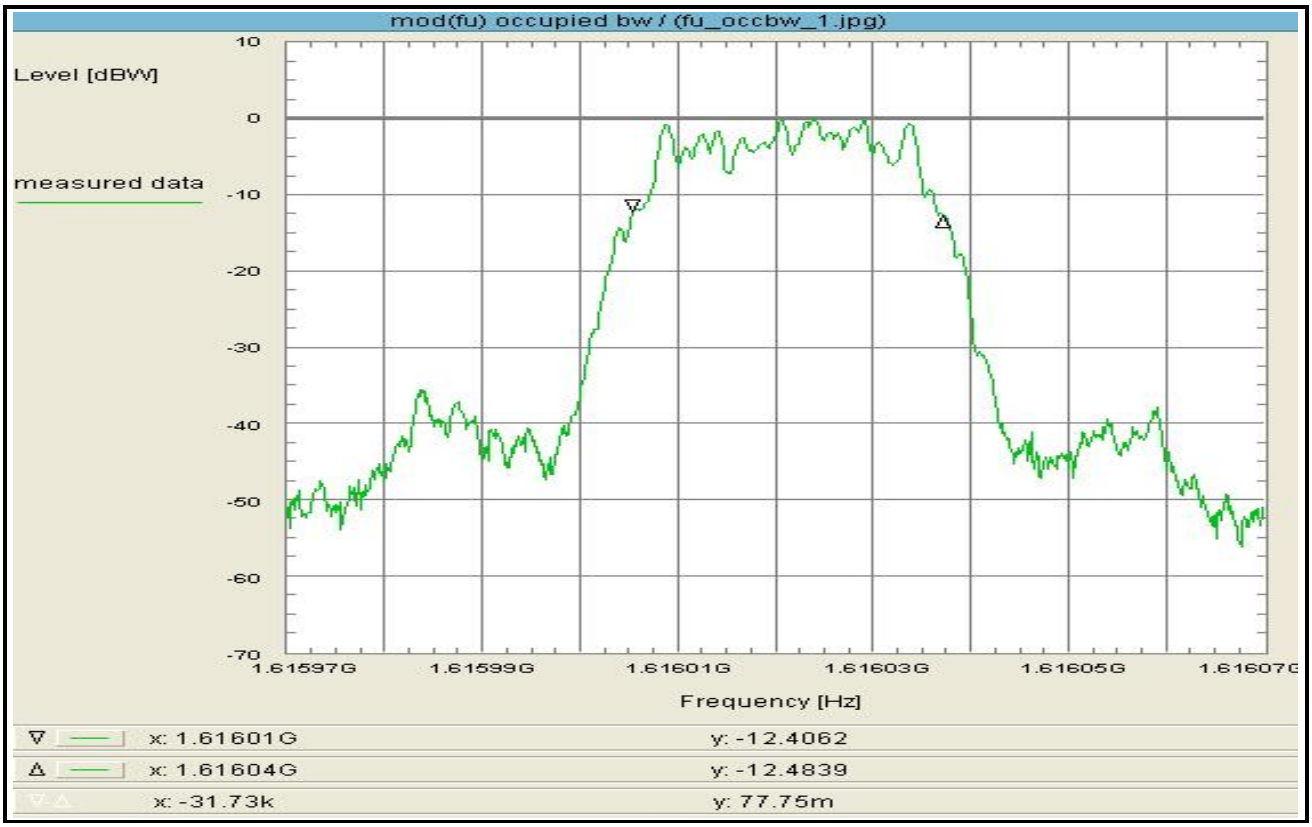
Start frequency:	1.61	GHz
Stop frequency:	1.6265	GHz
Center frequency:	1.61825	GHz
Frequency span:	16.5	MHz
Resolution-BW:	10	kHz
Video-BW:	1	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	30.6	dB

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

Plot No. 4 (36)



Subclause: -/- Function test
Modulated rf-carrier at the lower edge of the band (fu)
Determination of the ´occupied bandwidth´

Limit:
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 % of the total mean power radiated by a given emission. (see §2.1049).

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Determination of the ´occupied bandwidth´**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:00:11	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

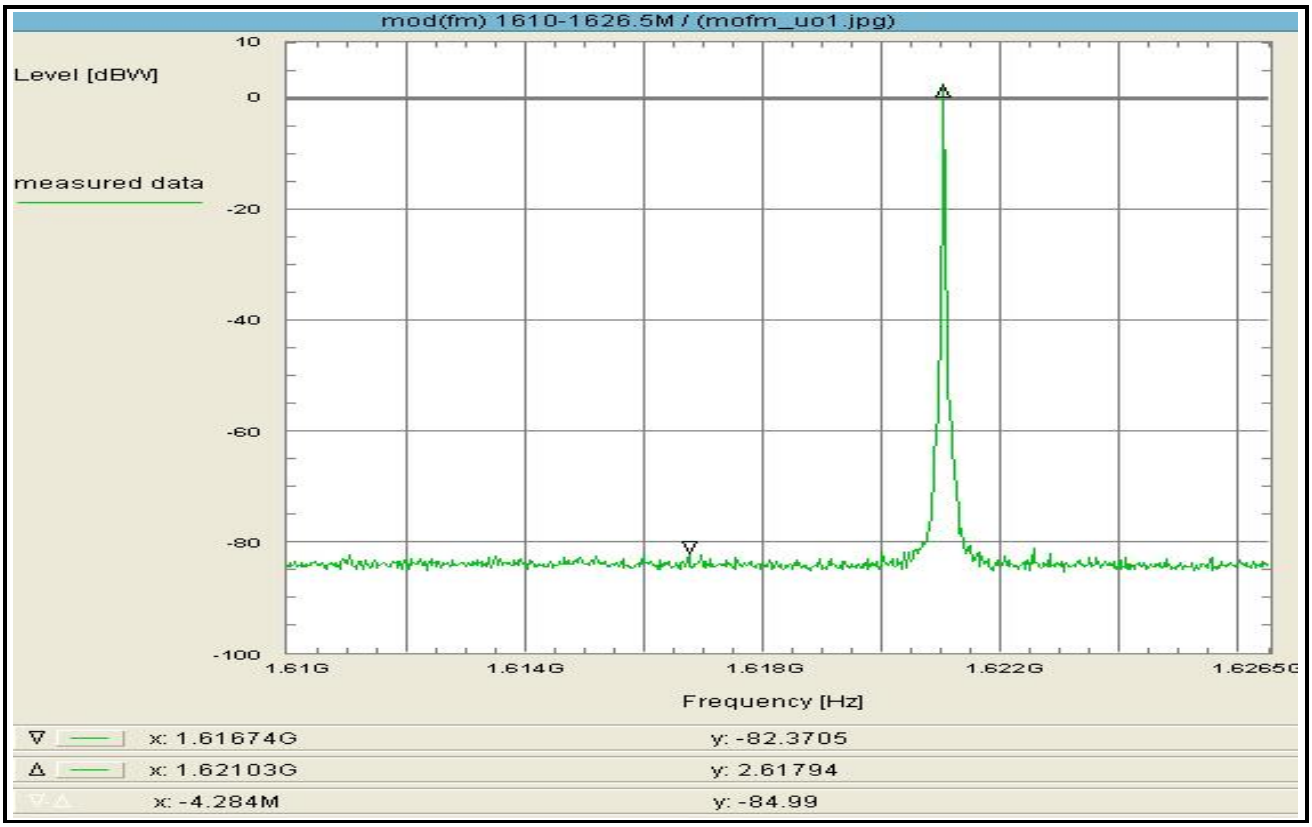
Start frequency:	1.61597	GHz
Stop frequency:	1.61607	GHz
Center frequency:	1.61602	GHz
Frequency span:	100	kHz
Resolution-BW:	1	kHz
Video-BW:	3	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	30.6	dB

Remarks:
Determination of the ´occupied bandwidth´ at fu:
The measured value is about 31.89 kHz (delta marker)
Internal function of spectrum analyzer was used.

Plot No. 5 (36)



Subclause: -/- Function test
Modulated rf-carrier in the middle of the band (fm)
Measurement within the band

Limit:
no limits defined

This test serves to verify the general function of the EUT and for orientation regarding to the spurious emissions which are expected within the band, furthermore for comparison of the actual power with the rated value at modulated carrier adjusted in the middle of the band (EIRP).

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fm

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **measurement for orientation.**

Environment condition:

Date & Time:	Wed 23/Sep/2015 13:38:41	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

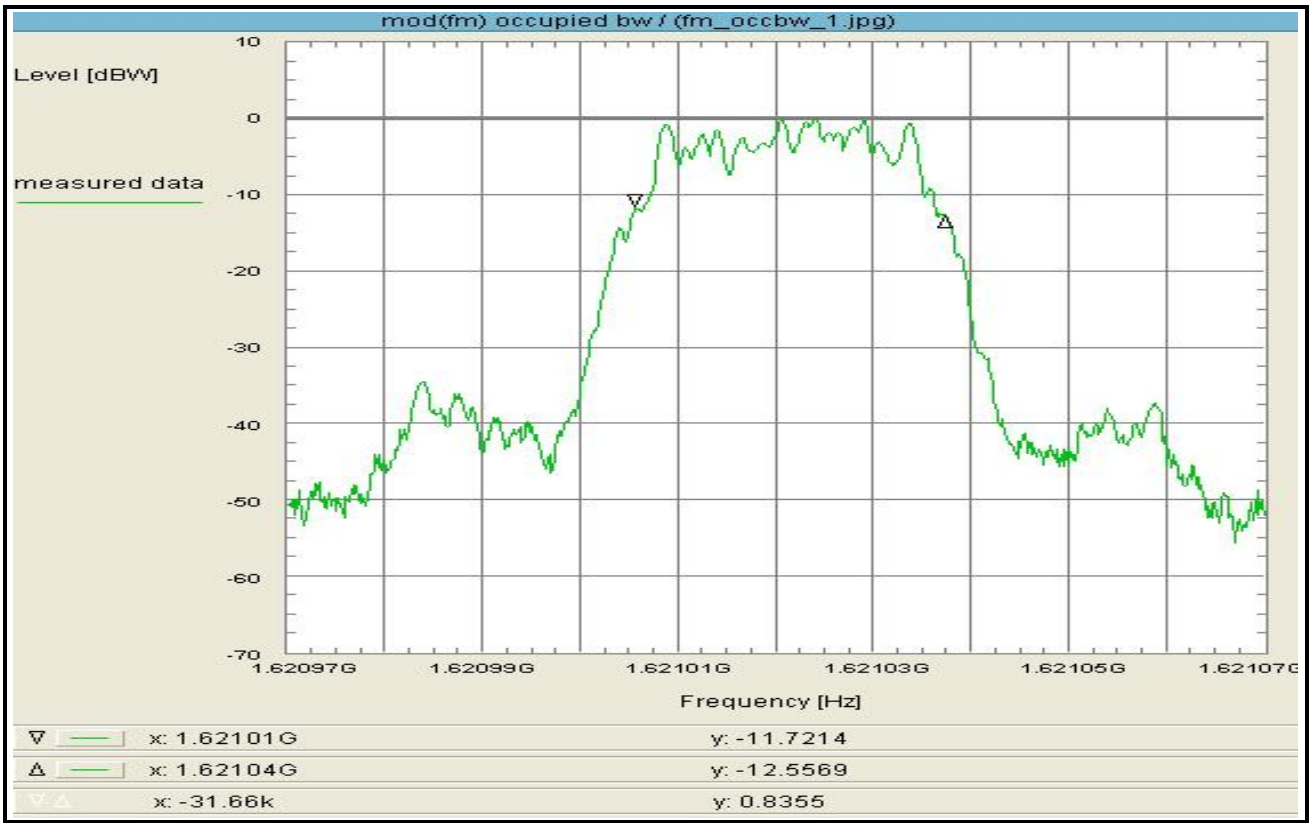
Start frequency:	1.61	GHz
Stop frequency:	1.6265	GHz
Center frequency:	1.61825	GHz
Frequency span:	16.5	MHz
Resolution-BW:	10	kHz
Video-BW:	1	kHz
Input attenuation:	0	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	30.6	dB

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

Plot No. 6 (36)



Subclause: -/- Function test
Modulated rf-carrier in the middle of the band (fm)
Determination of the ´occupied bandwidth´

Limit:
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 % of the total mean power radiated by a given emission. (see §2.1049).

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fm

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Determination of the ´occupied bandwidth´**

Environment condition:

Date & Time:	Thu 24/Sep/2015 11:52:58	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

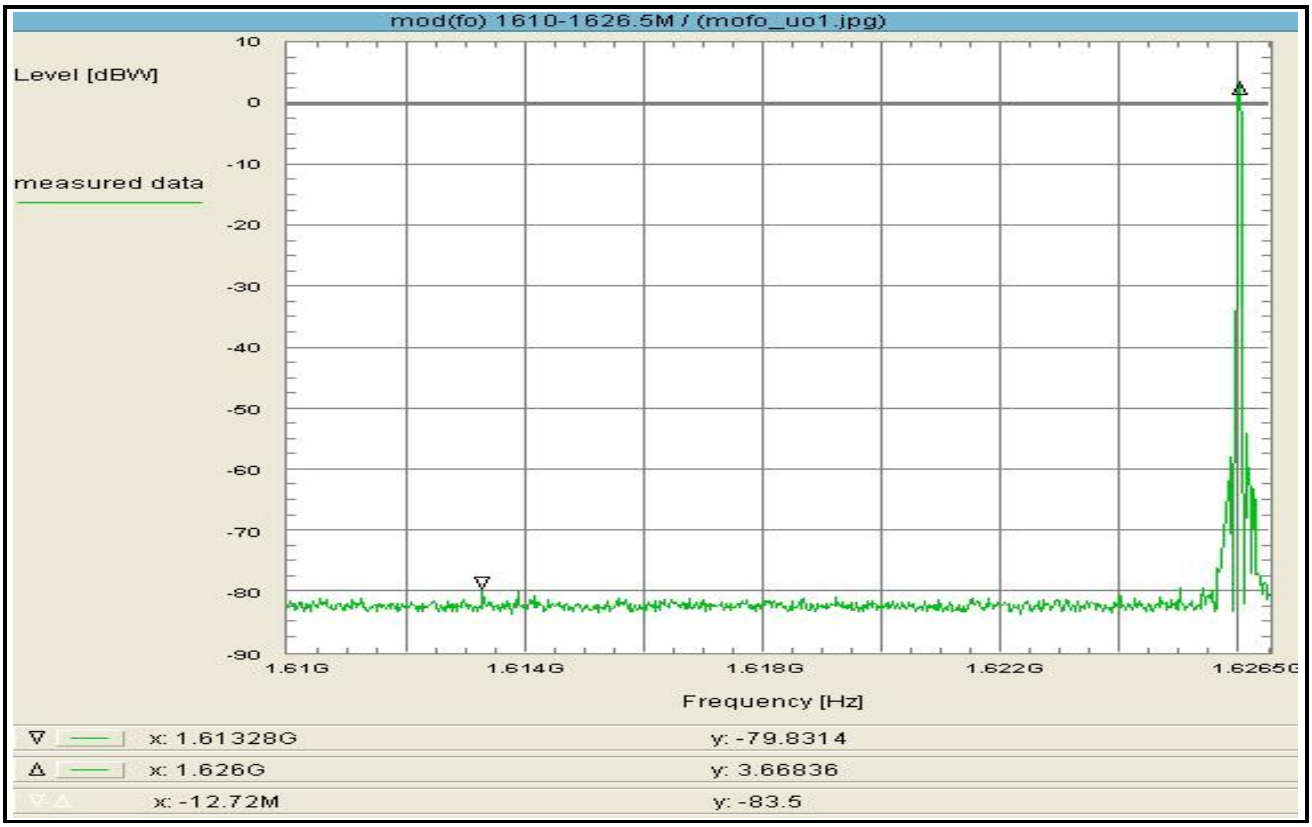
Start frequency:	1.62097	GHz
Stop frequency:	1.62107	GHz
Center frequency:	1.62102	GHz
Frequency span:	100	kHz
Resolution-BW:	1	kHz
Video-BW:	3	kHz
Input attenuation:	25	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	30.6	dB

Remarks:
Determination of the ´occupied bandwidth´ at fm:
The measured value is about 31.73 kHz (delta marker)
Internal function of spectrum analyzer was used.

Plot No. 7 (36)



Subclause: -/- Function test
Modulated rf-carrier at the upper edge of the band (fo)
Measurement within the band

Limit:
no limits defined

This test serves to verify the general function of the EUT and for orientation regarding to the spurious emissions which are expected within the band, furthermore for comparison of the actual power with the rated value at modulated carrier adjusted as close to the upper edge of the operating frequency band.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **measurement for orientation**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:11:04	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

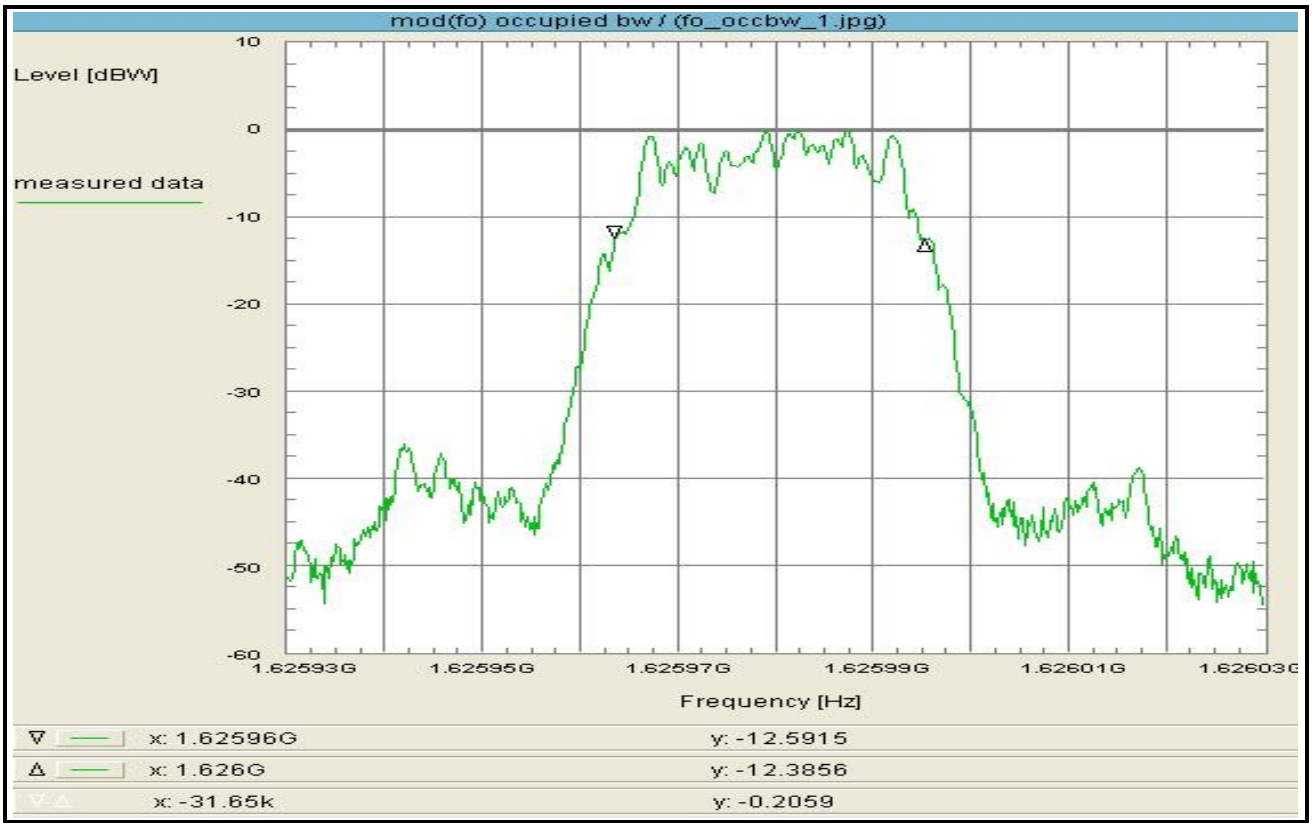
Start frequency:	1.61	GHz
Stop frequency:	1.6265	GHz
Center frequency:	1.61825	GHz
Frequency span:	16.5	MHz
Resolution-BW:	10	kHz
Video-BW:	1	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	30.6	dB

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

Plot No. 8 (36)



Subclause: -/- Function test
Modulated rf-carrier at the upper edge of the band (fo)
Determination of the ´occupied bandwidth´

Limit:
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 % of the total mean power radiated by a given emission. (see §2.1049).

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Determination of the ´occupied bandwidth´**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:17:01	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

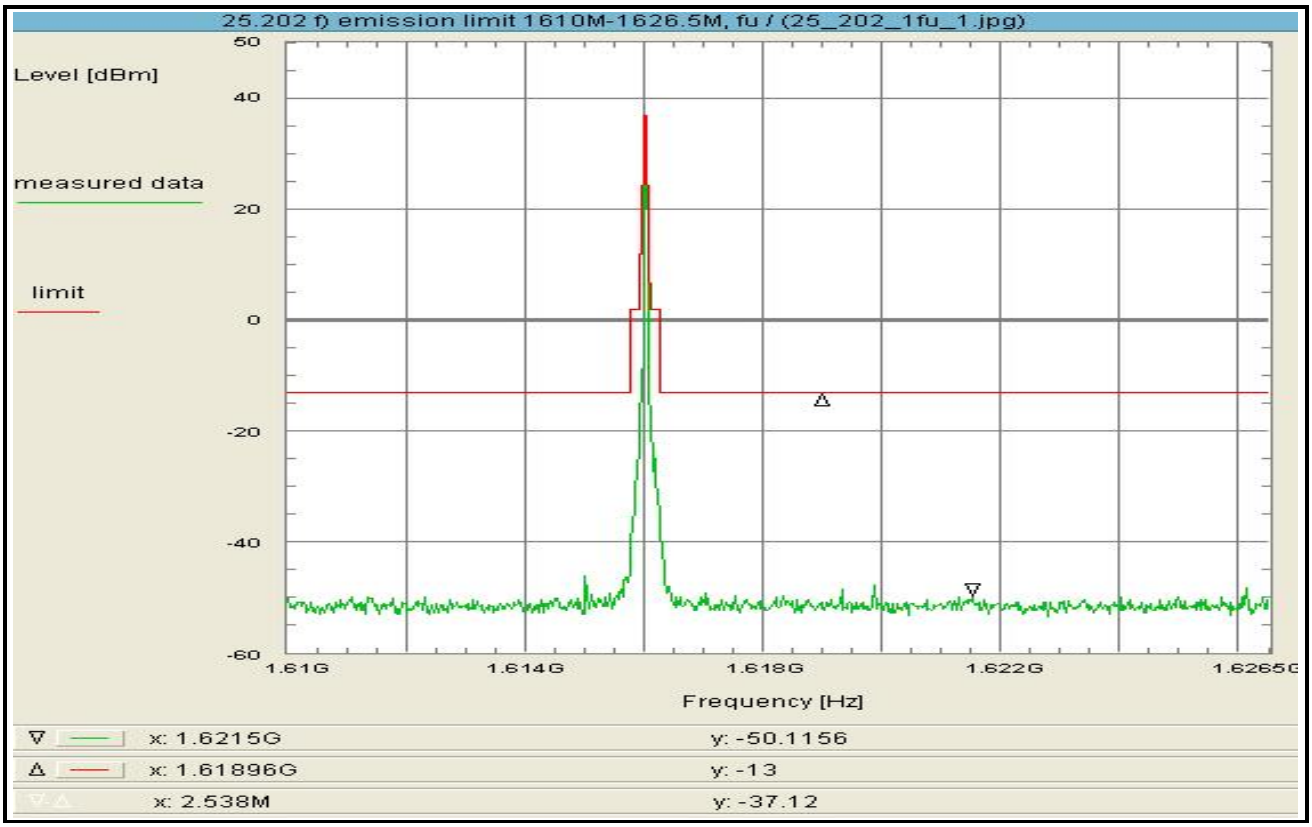
Start frequency:	1.62593	GHz
Stop frequency:	1.62603	GHz
Center frequency:	1.62598	GHz
Frequency span:	100	kHz
Resolution-BW:	1	kHz
Video-BW:	3	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	30.6	dB

Remarks:
Determination of the ´occupied bandwidth´ at fo:
The measured value is about 31.89 kHz (delta marker)
Internal function of spectrum analyzer was used.

Plot No. 9 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fu)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:01:02	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

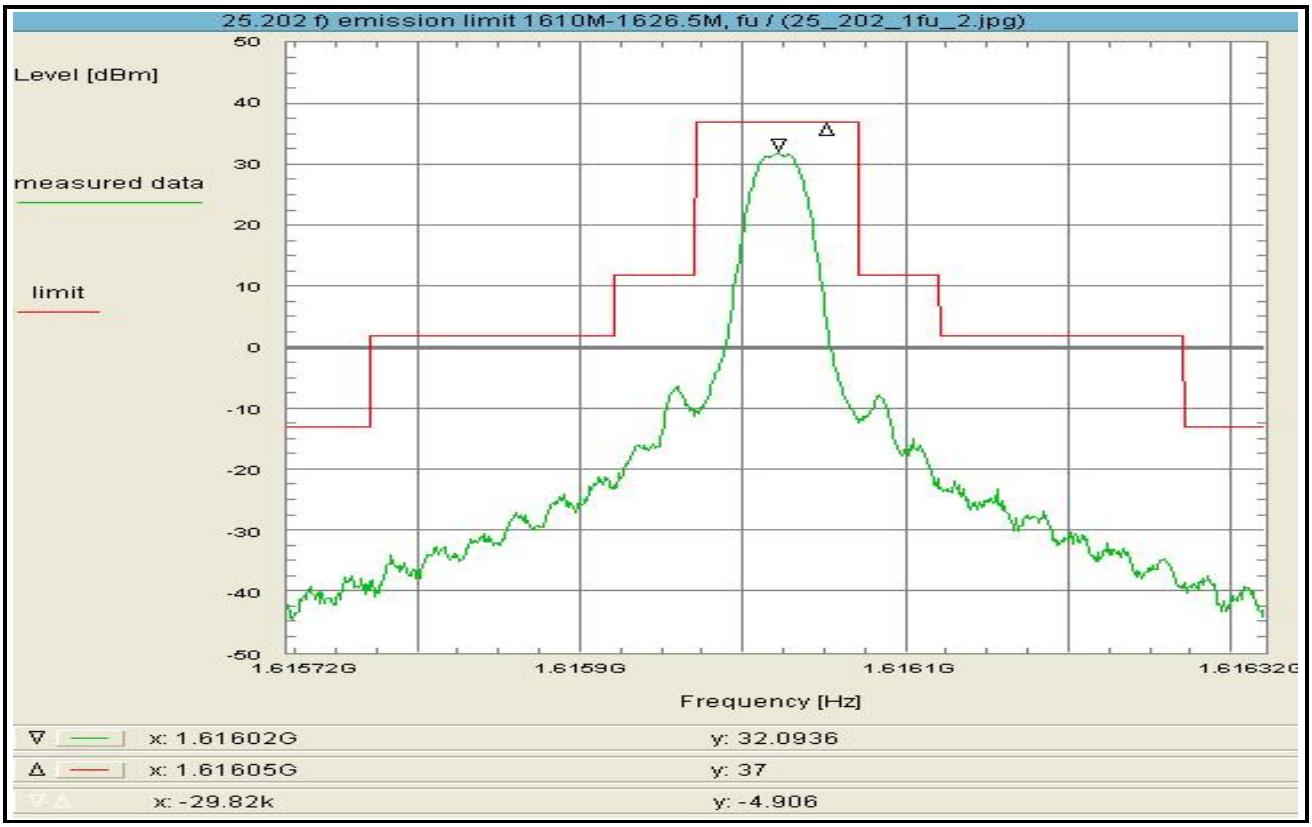
Start frequency:	1.61	GHz
Stop frequency:	1.6265	GHz
Center frequency:	1.61825	GHz
Frequency span:	16.5	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	26.6	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fu)

Plot No. 10 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fu)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:04:33	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

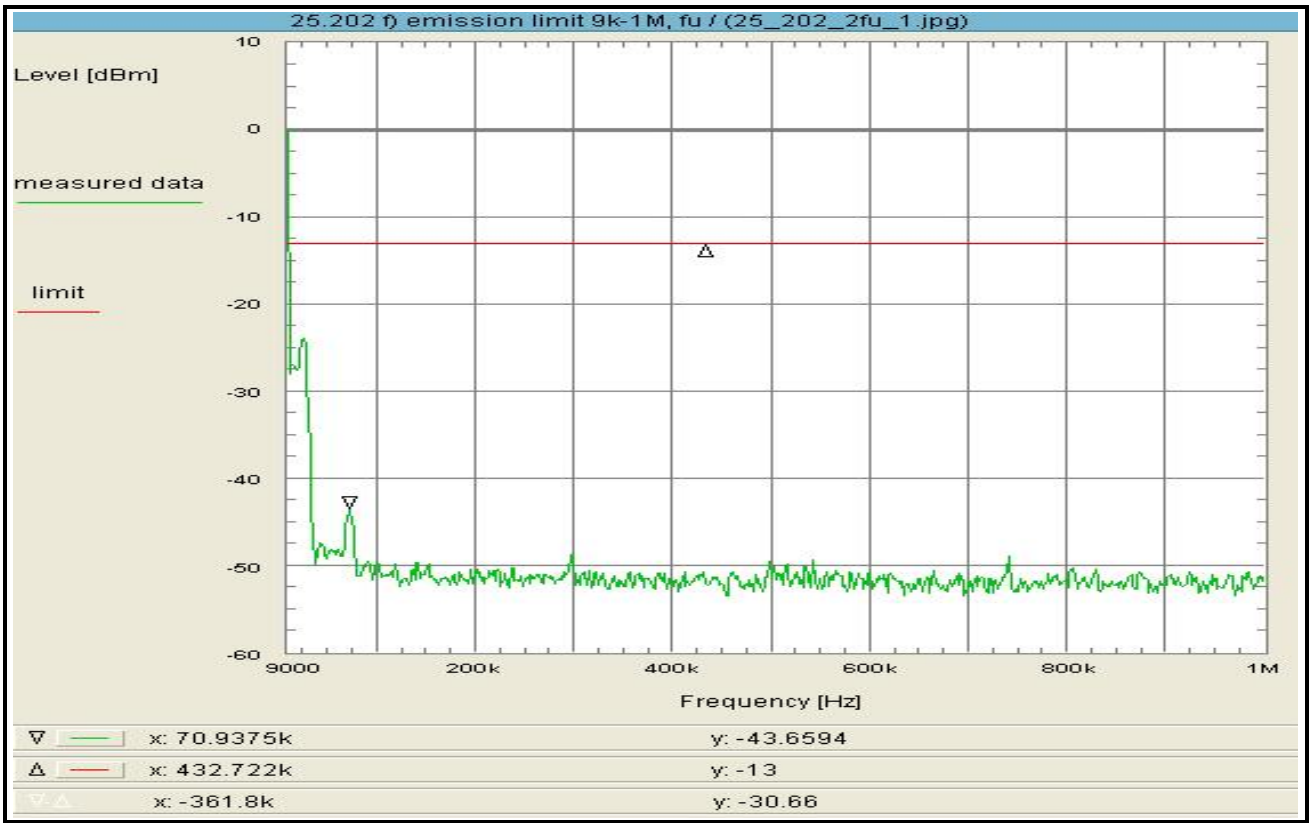
Start frequency:	1.61572	GHz
Stop frequency:	1.61632	GHz
Center frequency:	1.61602	GHz
Frequency span:	600	kHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	26.6	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fu)

Plot No. 11 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fu)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:08:02	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

Start frequency:	9	kHz
Stop frequency:	1	MHz
Center frequency:	504.5	kHz
Frequency span:	991	kHz
Resolution-BW:	5	kHz
Video-BW:	20	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

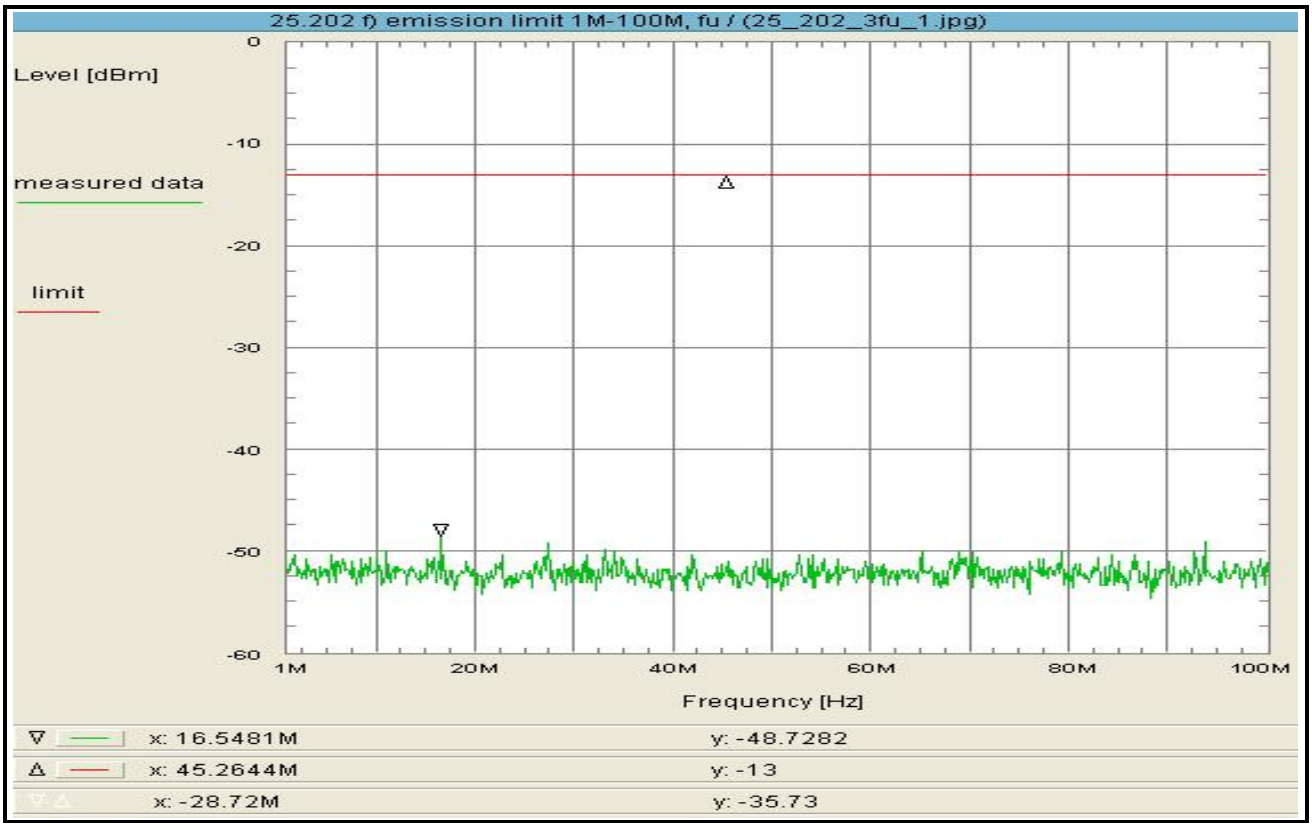
Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.5	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (5k -> 4k)	-	1.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	29.3	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fu)

Rather left the plot shows the zero line of the spectrum analyzer.

Plot No. 12 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fu)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:07:06	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

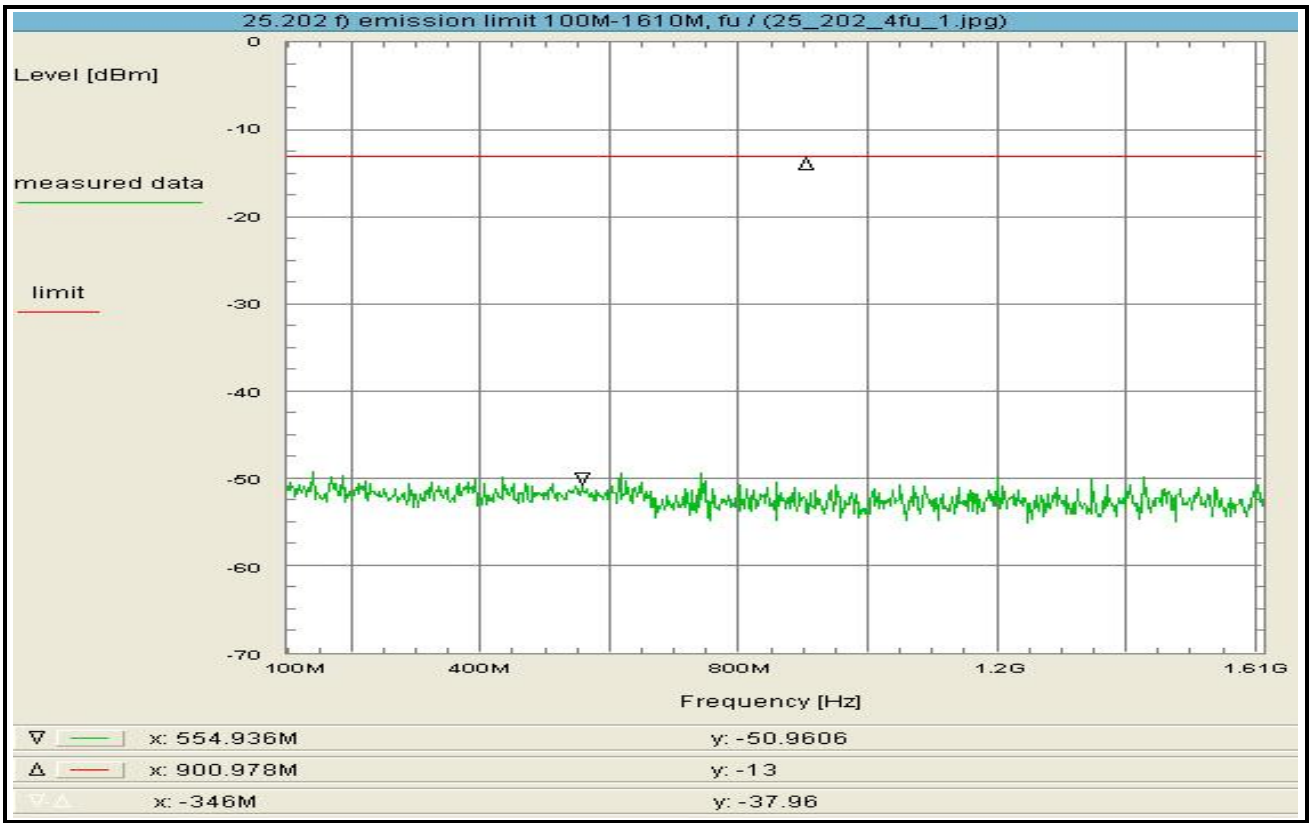
Start frequency:	1	MHz
Stop frequency:	100	MHz
Center frequency:	50.5	MHz
Frequency span:	99	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.5	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	26.3	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fu)

Plot No. 13 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fu)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:06:04	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

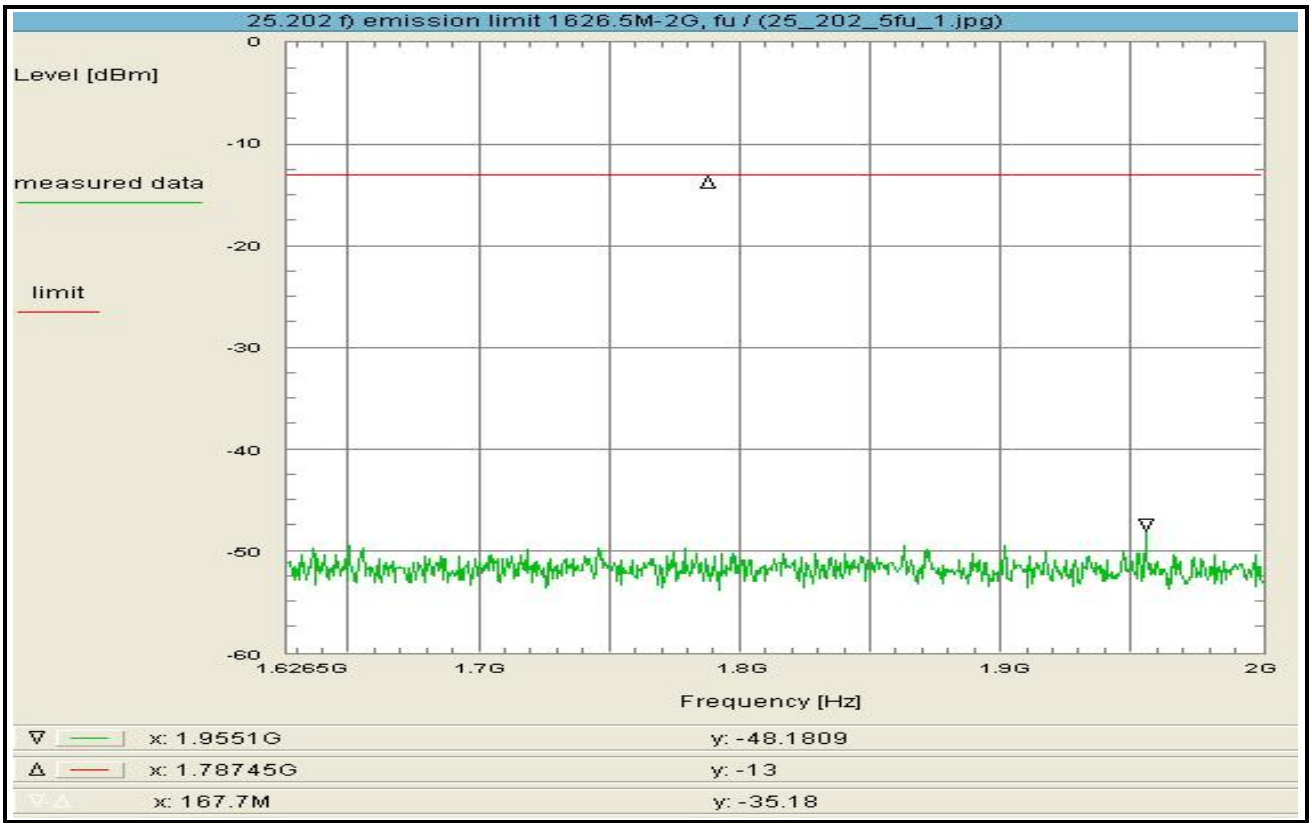
Start frequency:	100	MHz
Stop frequency:	1.61	GHz
Center frequency:	855	MHz
Frequency span:	1.51	GHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	5	dB
Trace-Mode:	Clear Write	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.6	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	26.4	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fu)

Plot No. 14 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fu)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:05:46	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

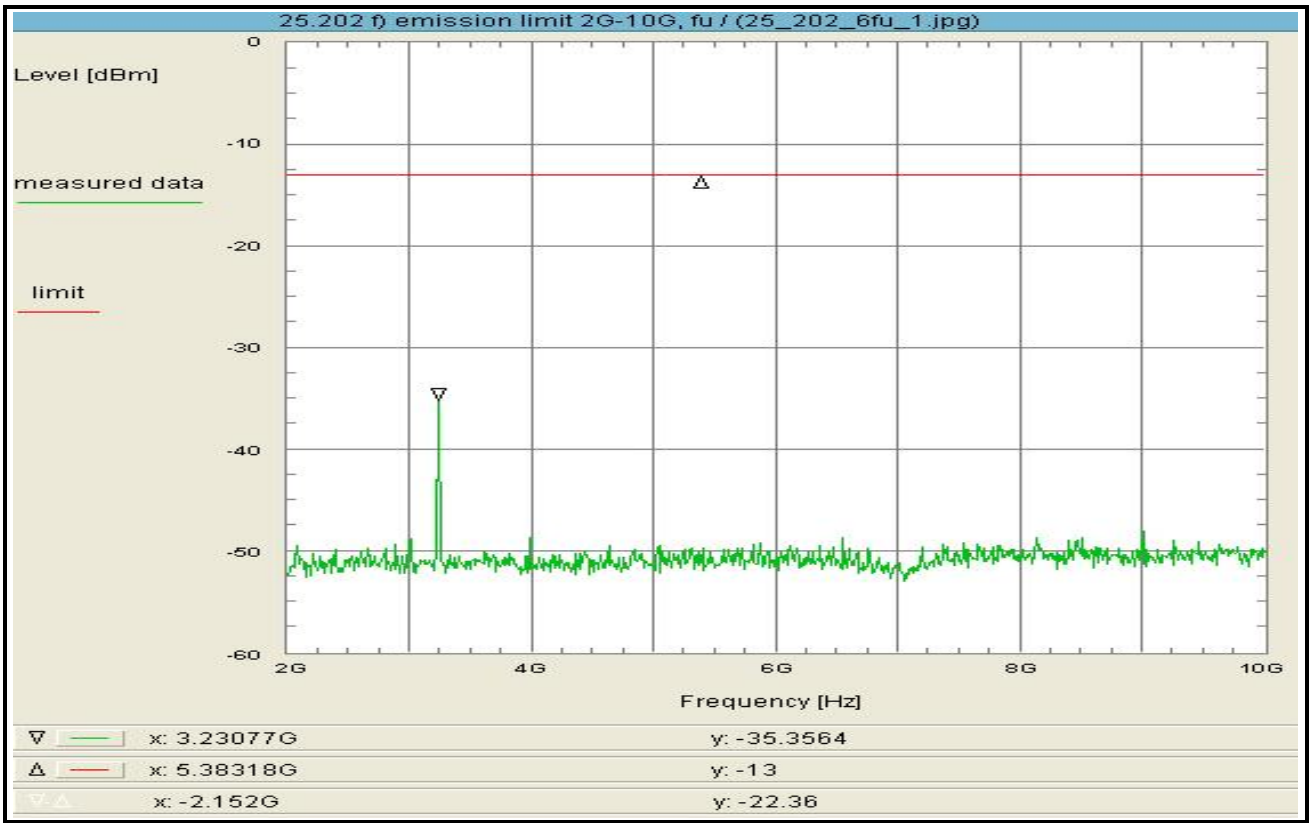
Start frequency:	1.6265	GHz
Stop frequency:	2	GHz
Center frequency:	1.81325	GHz
Frequency span:	373.5	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.9	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	26.7	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fu)

Plot No. 15 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fu)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:05:23	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

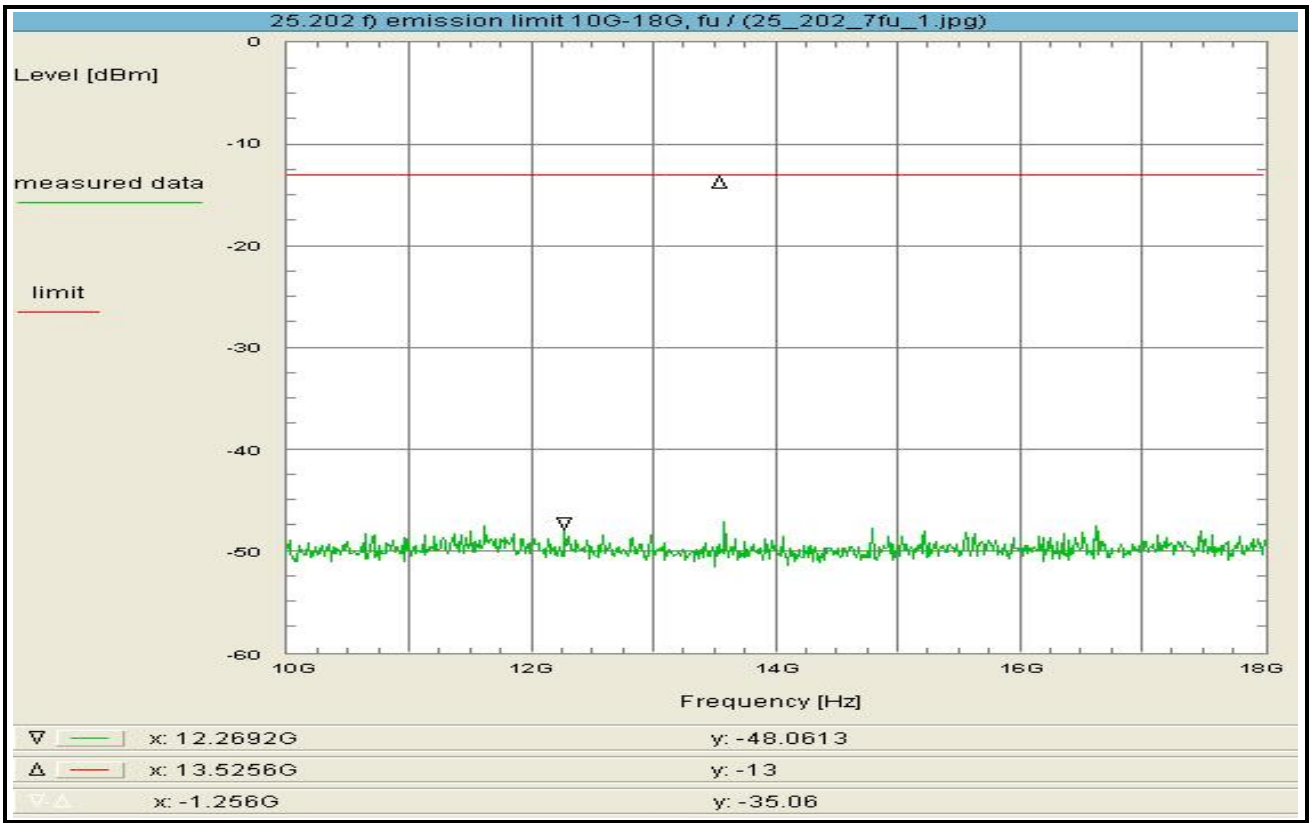
Start frequency:	2	GHz
Stop frequency:	10	GHz
Center frequency:	6	GHz
Frequency span:	8	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	1.5	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	17.3	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fu)

Plot No. 16 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the lower edge of the band (fu)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:04:58	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

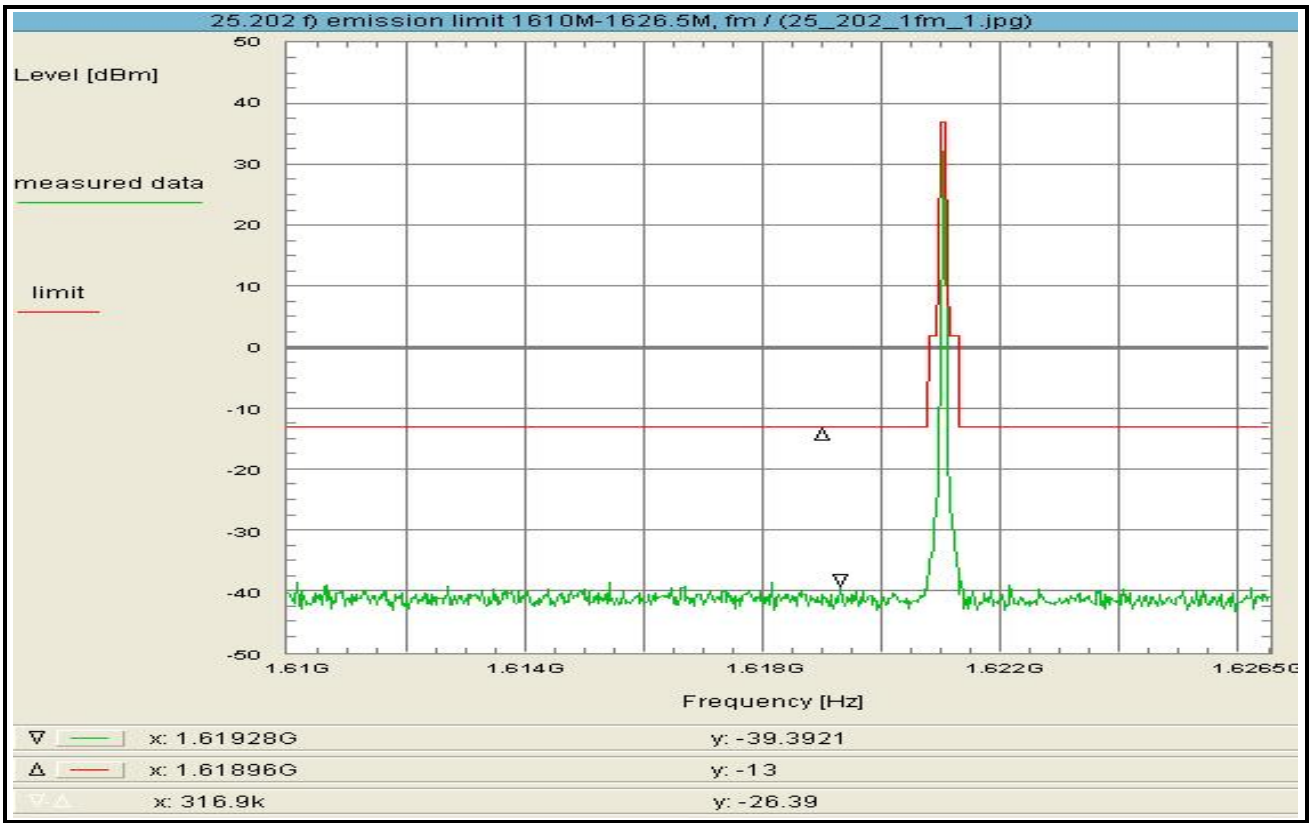
Start frequency:	10	GHz
Stop frequency:	18	GHz
Center frequency:	14	GHz
Frequency span:	8	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	2.4	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.9	dB
TOTAL CORRECTION:	+	18.3	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fu)

Plot No. 17 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fm

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 11:48:02	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

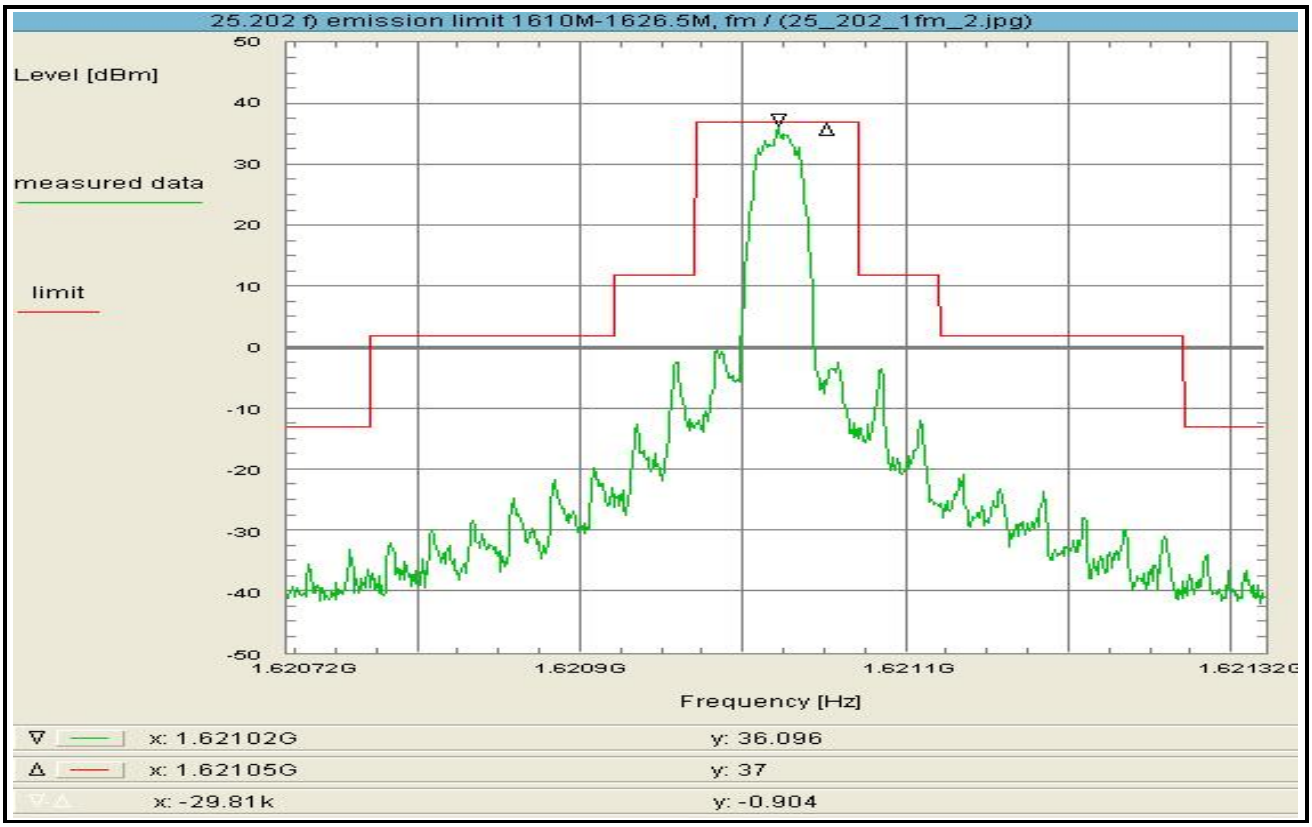
Start frequency:	1.61	GHz
Stop frequency:	1.6265	GHz
Center frequency:	1.61825	GHz
Frequency span:	16.5	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	25	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	26.6	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 18 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fm

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 11:55:35	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

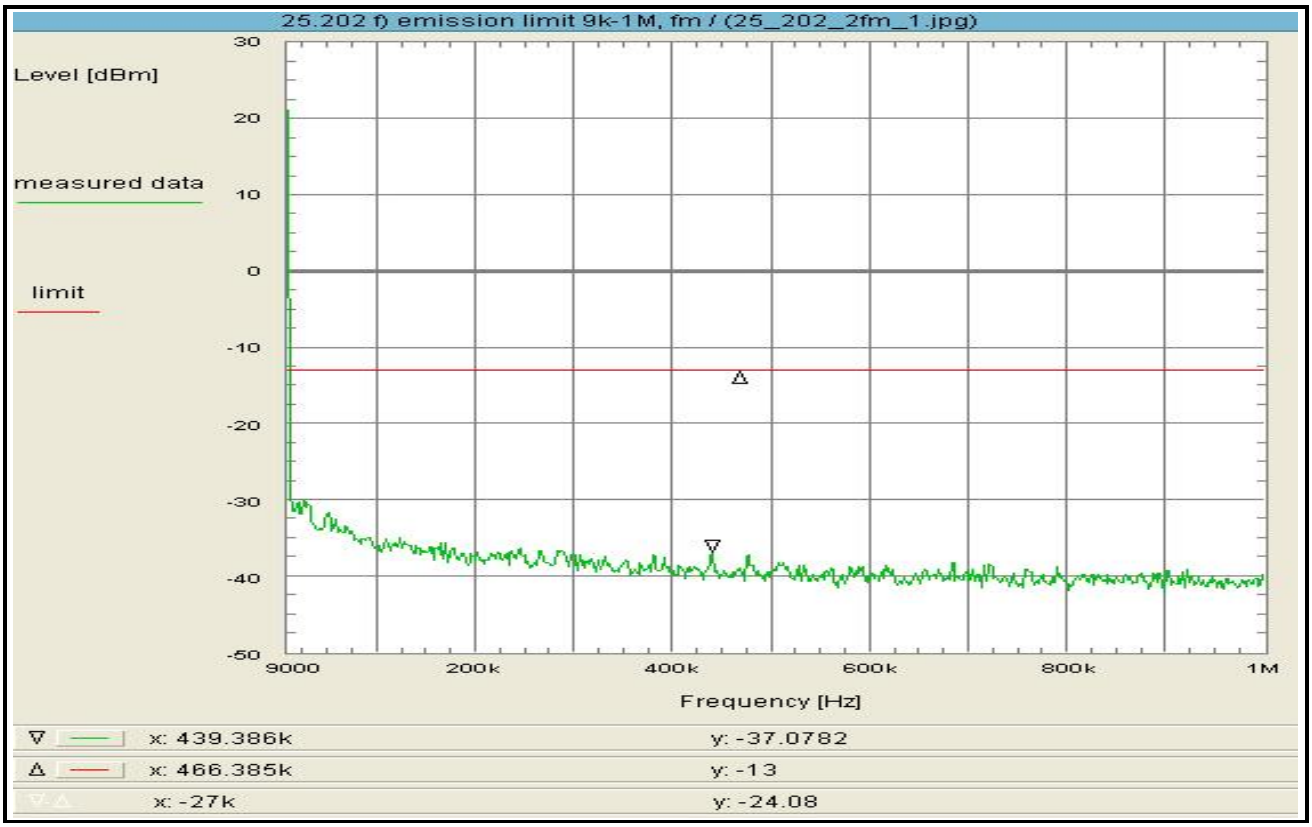
Start frequency:	1.62072	GHz
Stop frequency:	1.62132	GHz
Center frequency:	1.62102	GHz
Frequency span:	600	kHz
Resolution-BW:	3	kHz
Video-BW:	10	kHz
Input attenuation:	25	dB
Trace-Mode:	Clear Write	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (3k -> 4k)	+	1.2	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	31.8	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 19 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fm

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 12:01:05	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

Start frequency:	9	kHz
Stop frequency:	1	MHz
Center frequency:	504.5	kHz
Frequency span:	991	kHz
Resolution-BW:	5	kHz
Video-BW:	20	kHz
Input attenuation:	25	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

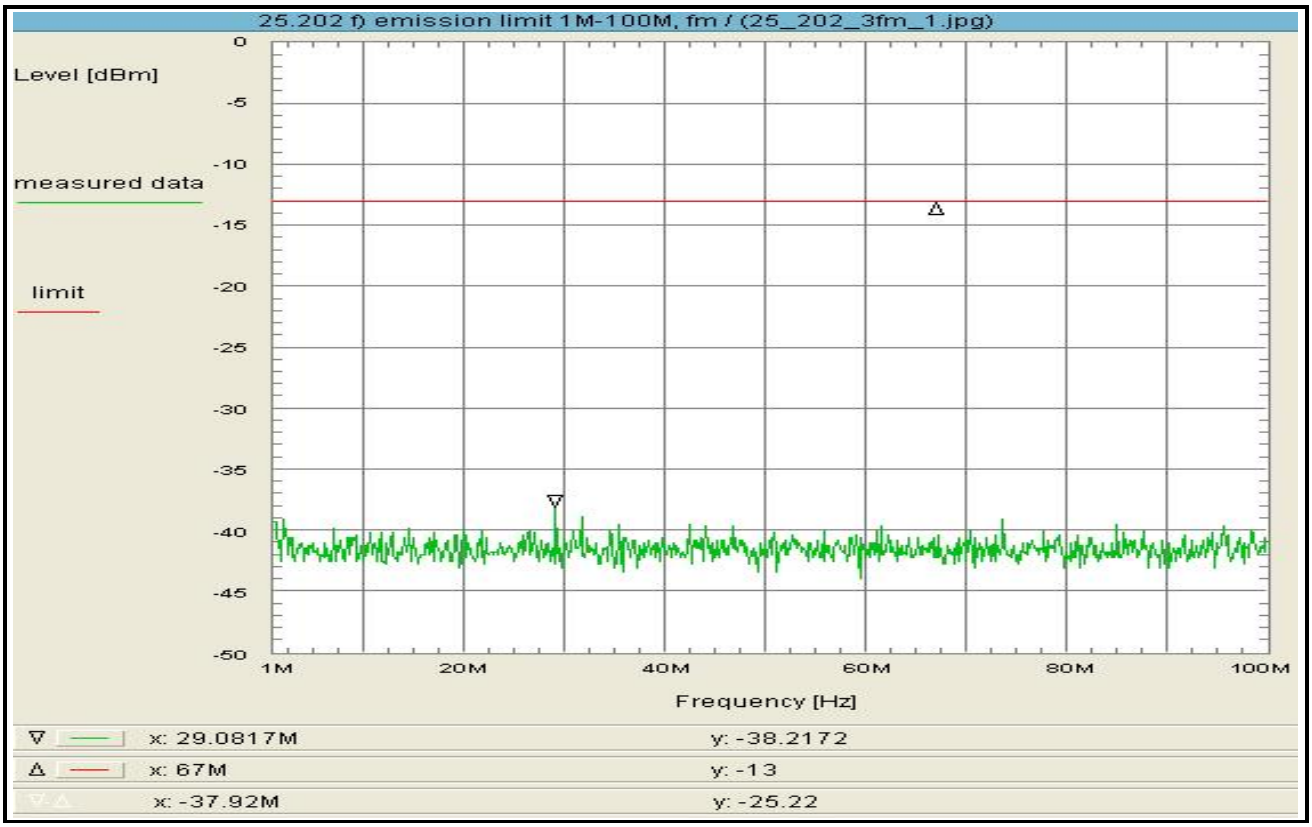
Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.5	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (5k -> 4k)	-	1.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	29.3	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Rather left the plot shows the zero line of the spectrum analyzer.

Plot No. 20 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fm

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 11:59:04	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

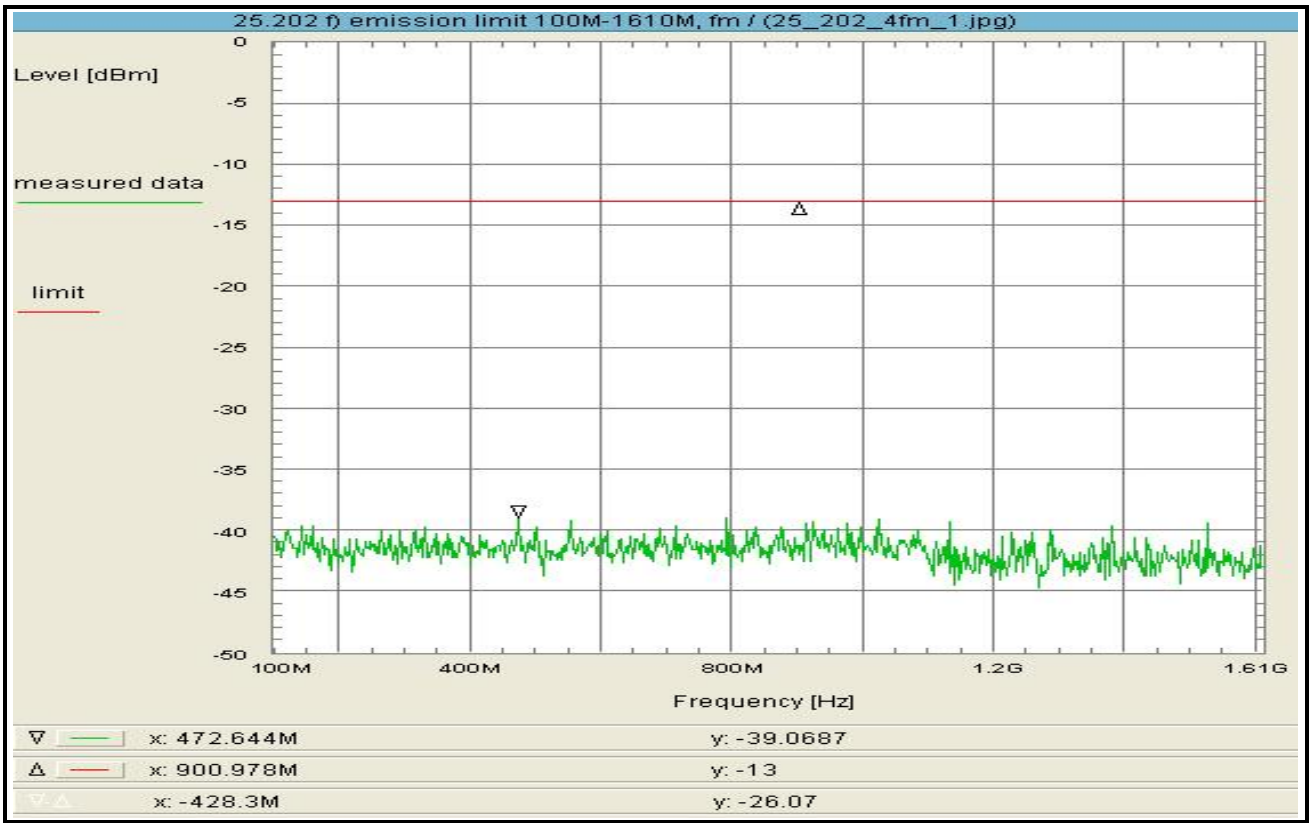
Start frequency:	1	MHz
Stop frequency:	100	MHz
Center frequency:	50.5	MHz
Frequency span:	99	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	25	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.5	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	26.3	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 21 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fm

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 11:57:31	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

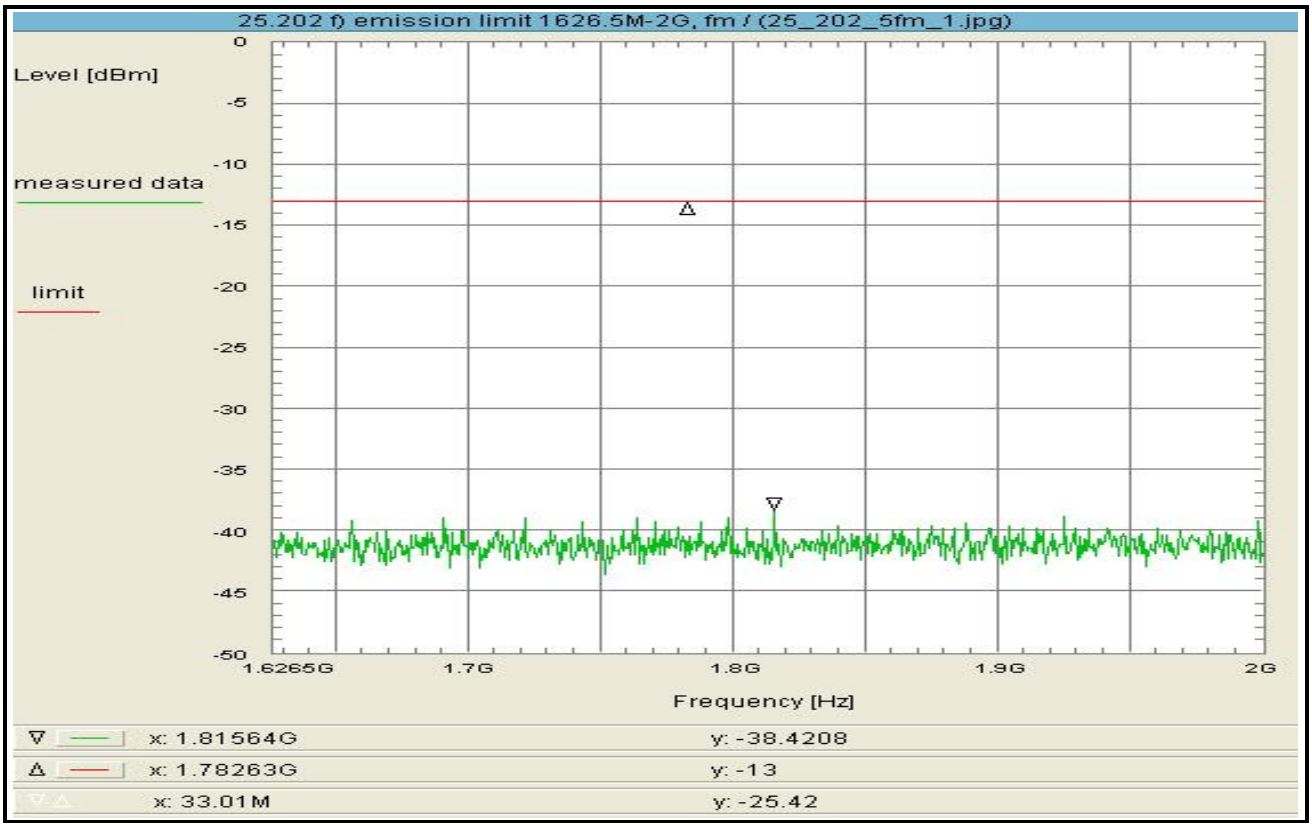
Start frequency:	100	MHz
Stop frequency:	1.61	GHz
Center frequency:	855	MHz
Frequency span:	1.51	GHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	25	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.6	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	26.4	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 22 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fm

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 11:56:37	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

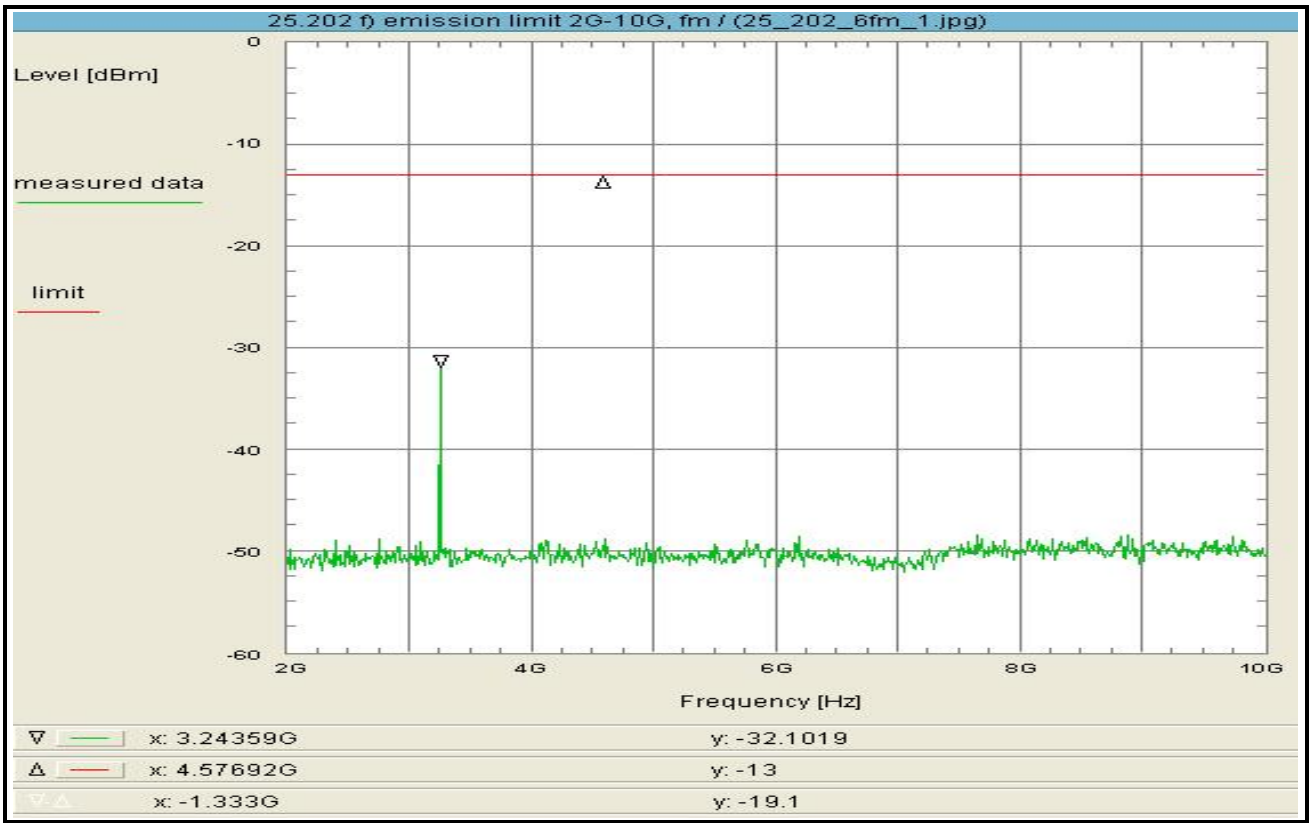
Start frequency:	1.6265	GHz
Stop frequency:	2	GHz
Center frequency:	1.81325	GHz
Frequency span:	373.5	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	25	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.9	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	26.7	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Plot No. 23 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fm

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005, U227

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 12:51:09	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

Start frequency:	2	GHz
Stop frequency:	10	GHz
Center frequency:	6	GHz
Frequency span:	8	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

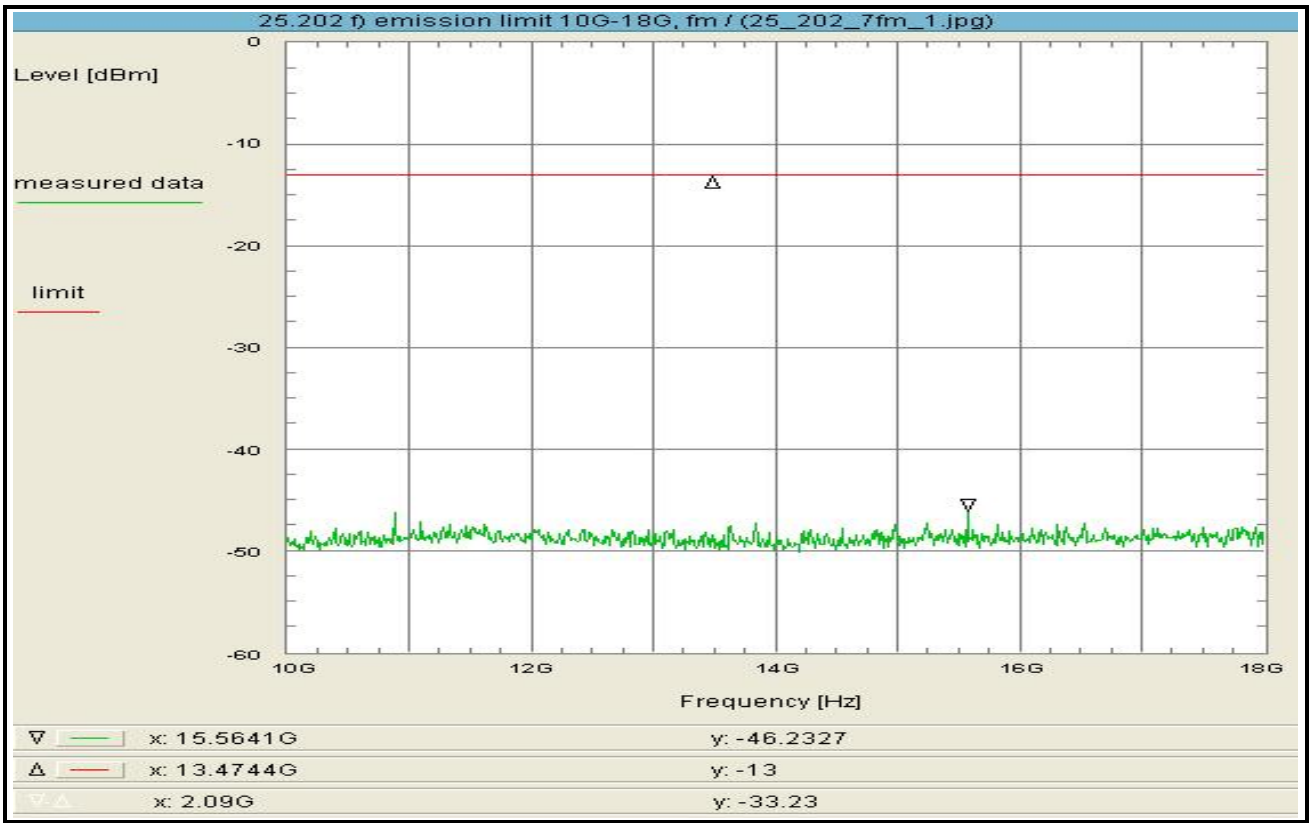
Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	1.5	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	17.3	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Rather left the plot shows the zero line of the spectrum analyzer.

Plot No. 24 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier in the middle of the band (fm)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fm

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 12:53:25	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

Start frequency:	10	GHz
Stop frequency:	18	GHz
Center frequency:	14	GHz
Frequency span:	8	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

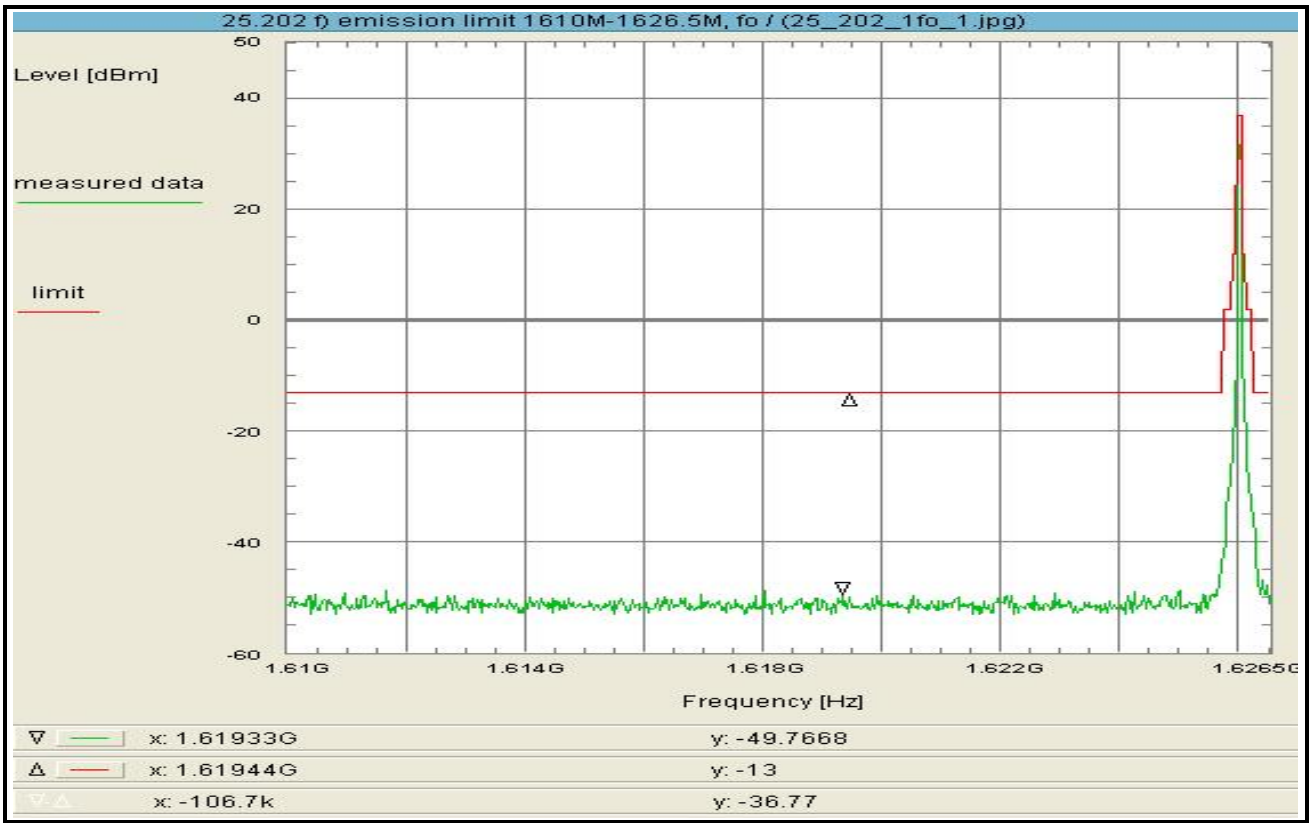
Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	2.4	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.9	dB
TOTAL CORRECTION:	+	18.3	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)

Rather left the plot shows the zero line of the spectrum analyzer.

Plot No. 25 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fo)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:17:55	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

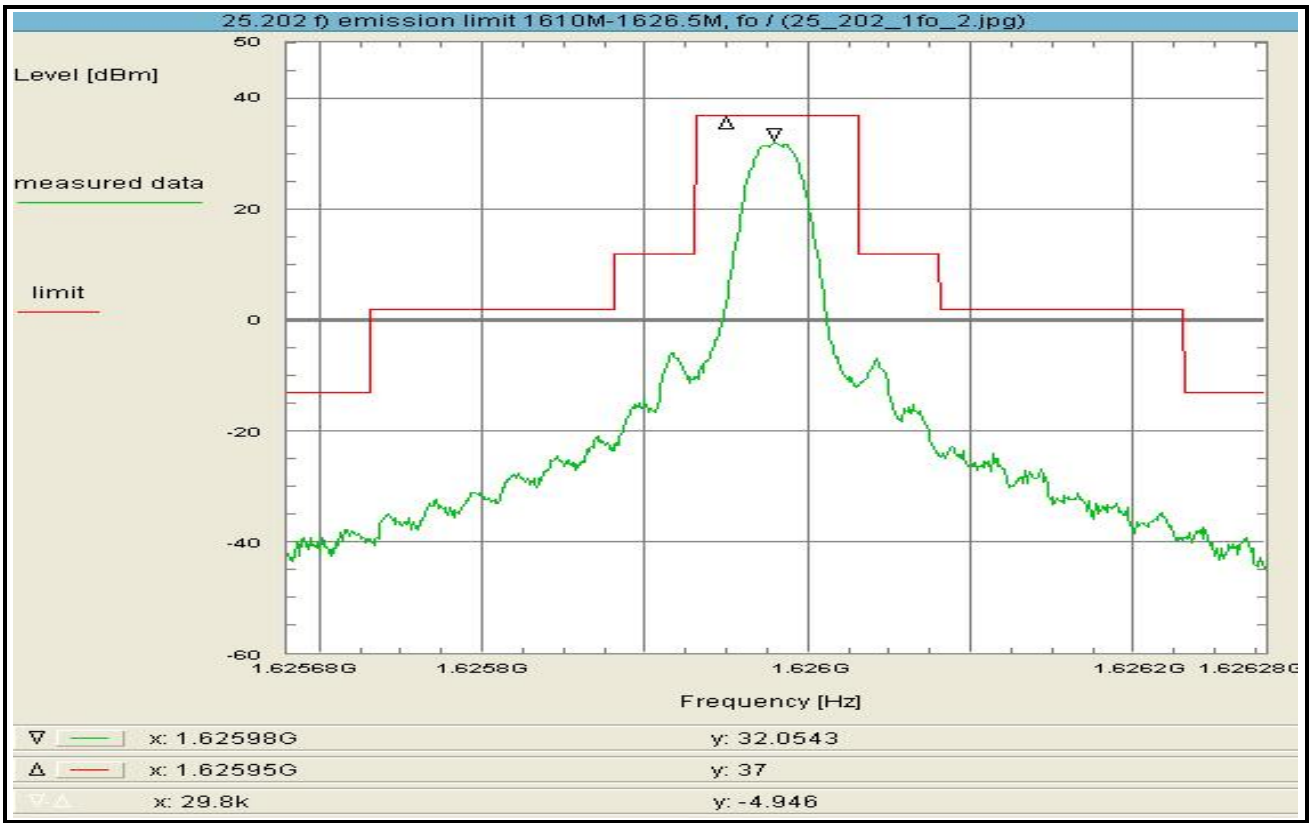
Start frequency:	1.61	GHz
Stop frequency:	1.6265	GHz
Center frequency:	1.61825	GHz
Frequency span:	16.5	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	26.6	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fo)

Plot No. 26 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fo)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:20:02	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

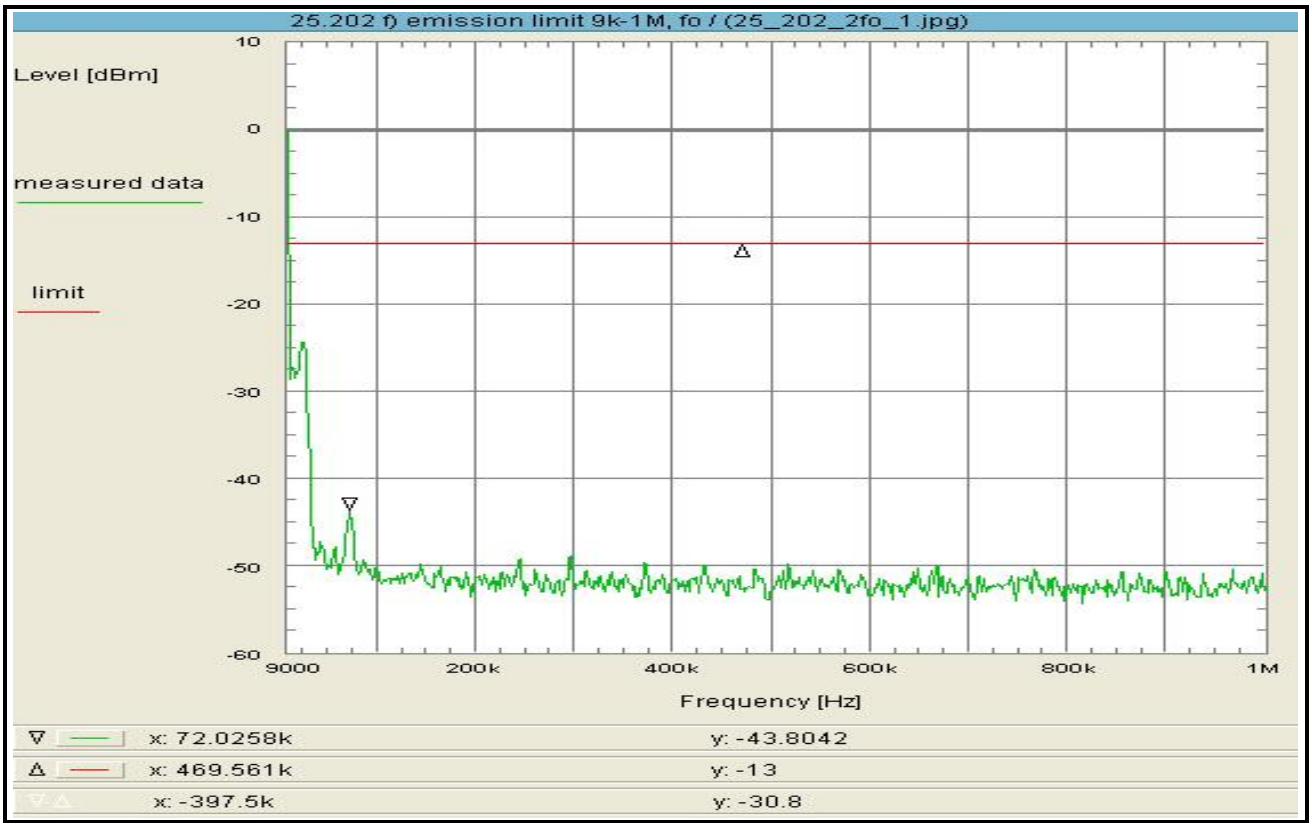
Start frequency:	1.62568	GHz
Stop frequency:	1.62628	GHz
Center frequency:	1.62598	GHz
Frequency span:	600	kHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	26.6	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fo)

Plot No. 27 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fo)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:09:04	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

Start frequency:	9	kHz
Stop frequency:	1	MHz
Center frequency:	504.5	kHz
Frequency span:	991	kHz
Resolution-BW:	5	kHz
Video-BW:	20	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

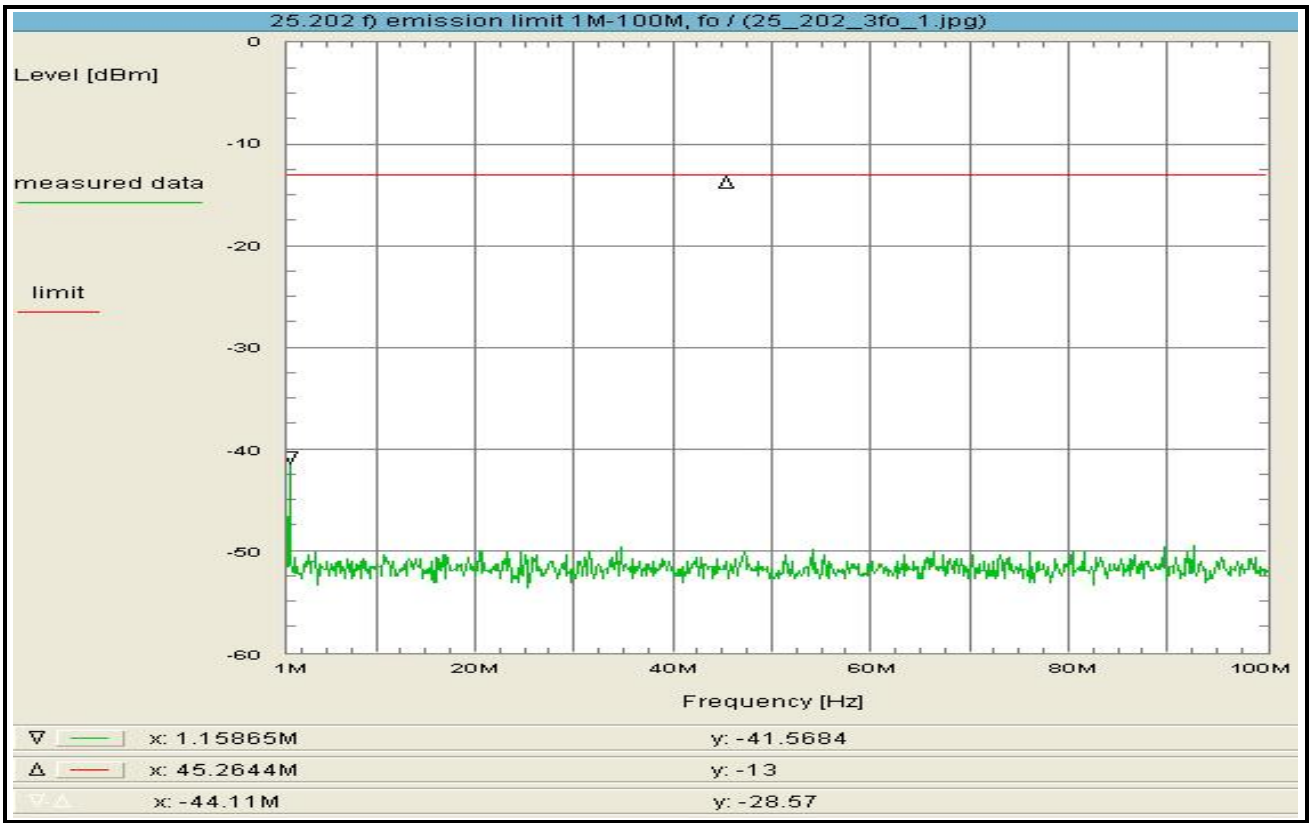
Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.5	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (5k -> 4k)	-	1.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	29.3	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fo)

Rather left the plot shows the zero line of the spectrum analyzer.

Plot No. 28 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fo)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:10:15	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

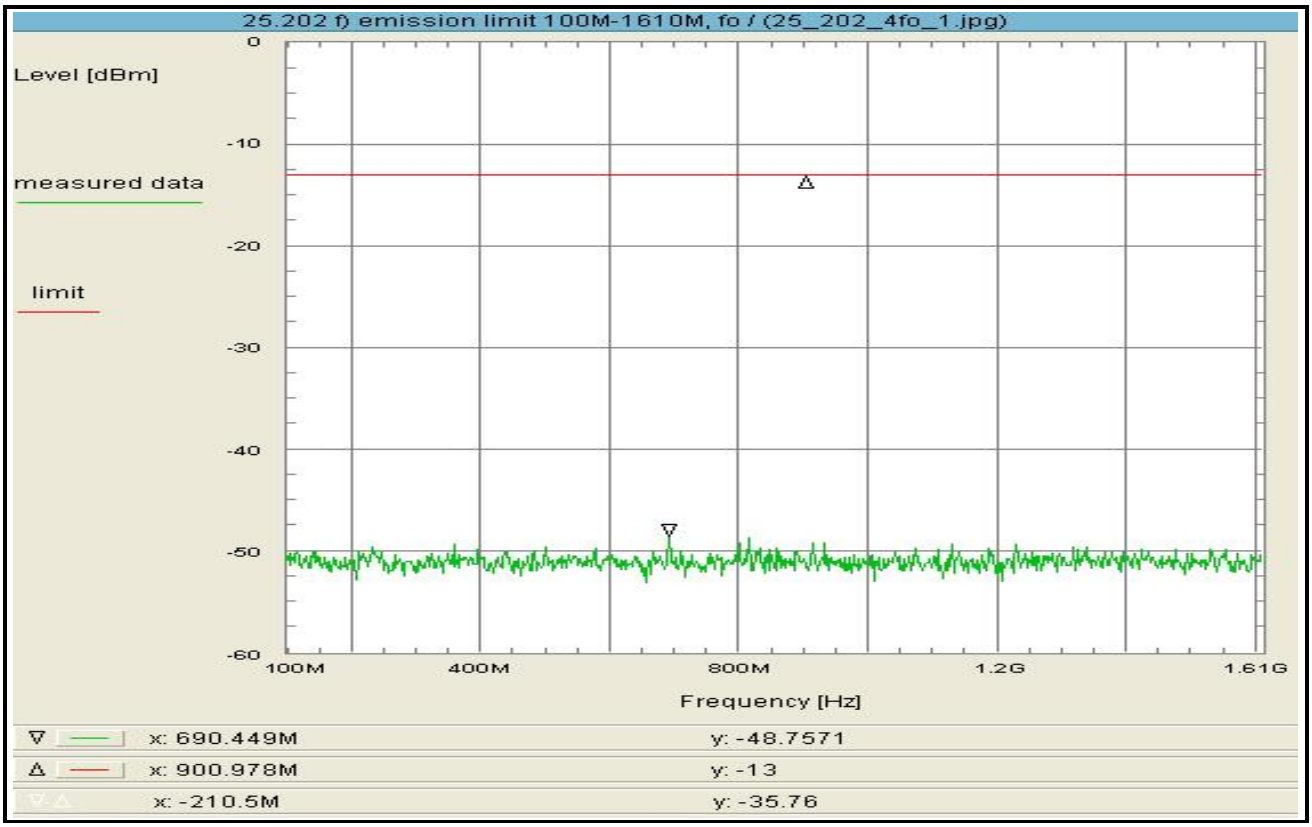
Start frequency:	1	MHz
Stop frequency:	100	MHz
Center frequency:	50.5	MHz
Frequency span:	99	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.5	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	26.3	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fo)

Plot No. 29 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fo)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:21:18	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

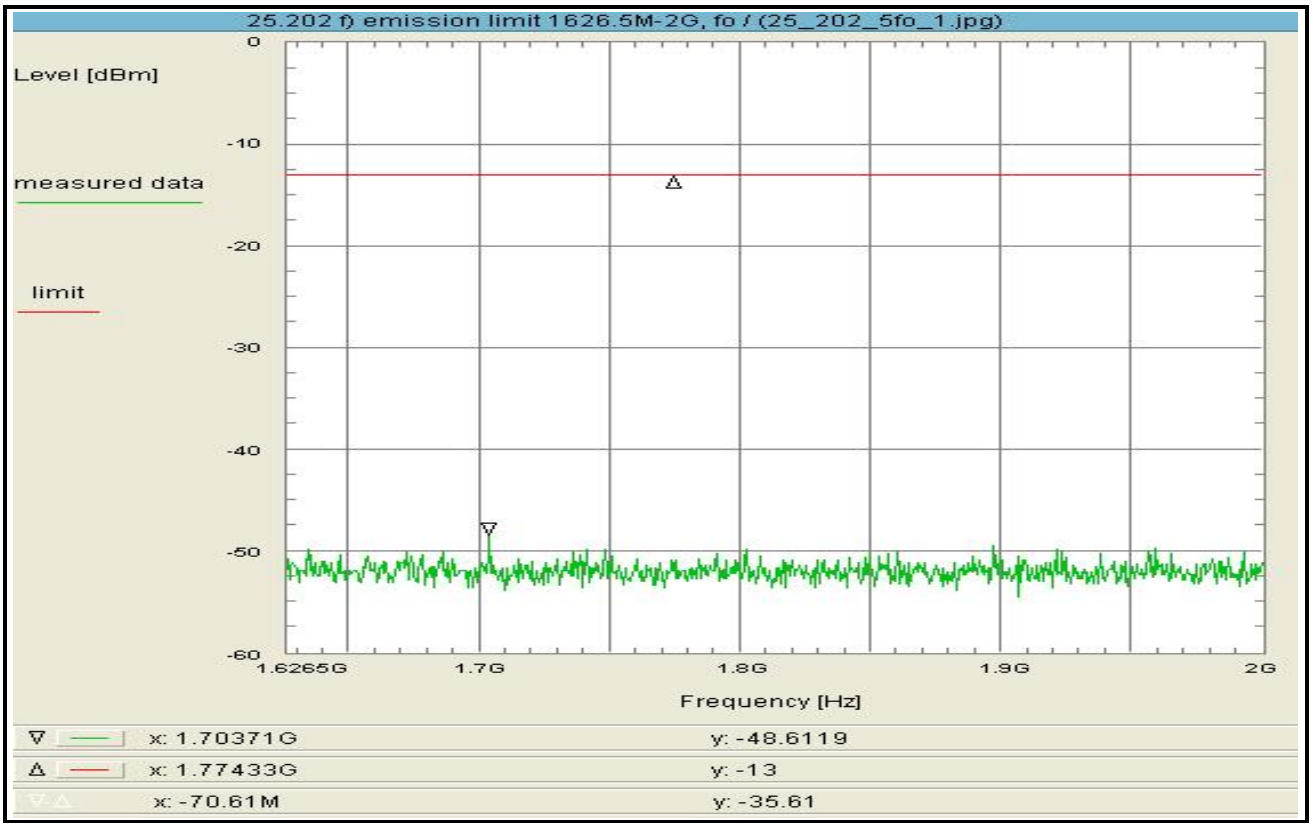
Start frequency:	100	MHz
Stop frequency:	1.61	GHz
Center frequency:	855	MHz
Frequency span:	1.51	GHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.6	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	26.4	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fo)

Plot No. 30 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fo)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:21:43	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

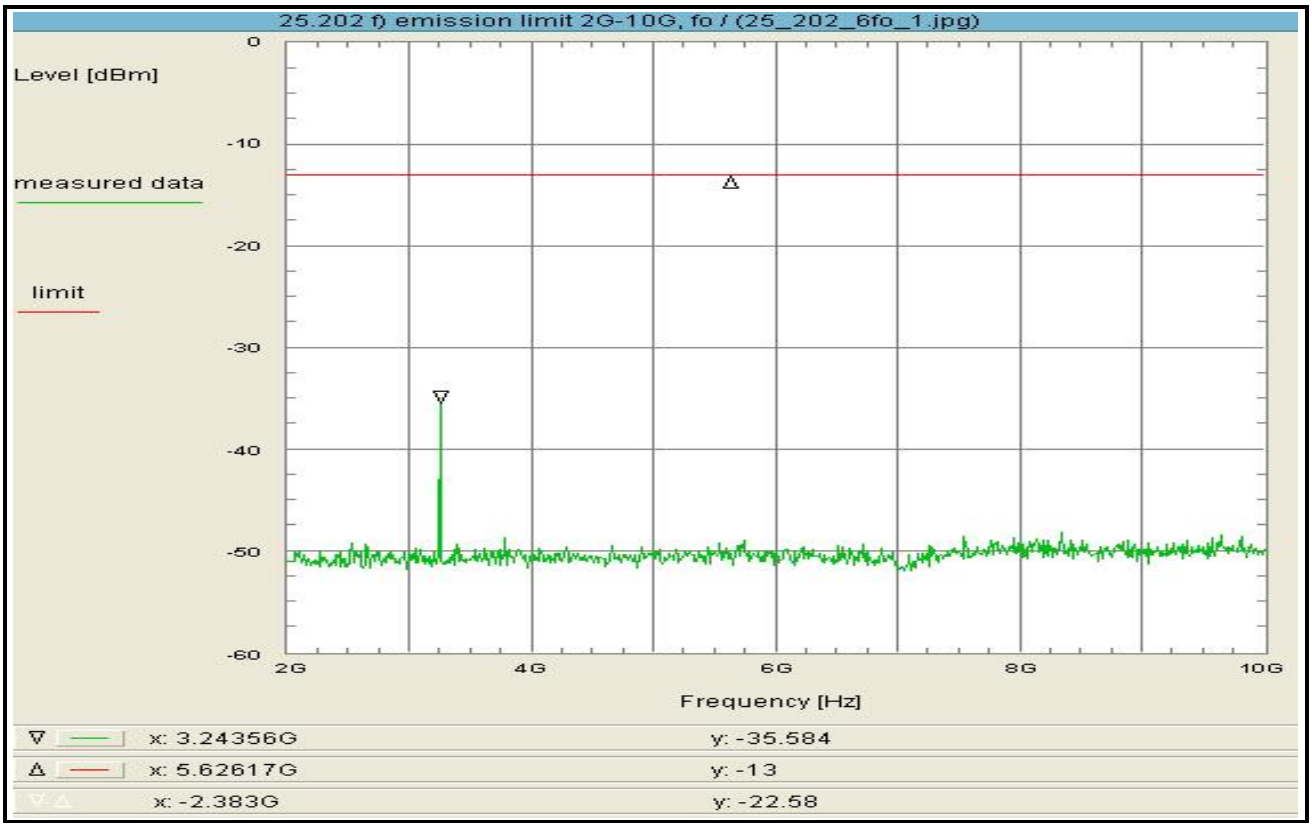
Start frequency:	1.6265	GHz
Stop frequency:	2	GHz
Center frequency:	1.81325	GHz
Frequency span:	373.5	MHz
Resolution-BW:	10	kHz
Video-BW:	30	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.9	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (10k -> 4k)	-	4.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	26.7	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fo)

Plot No. 31 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fo)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:23:40	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

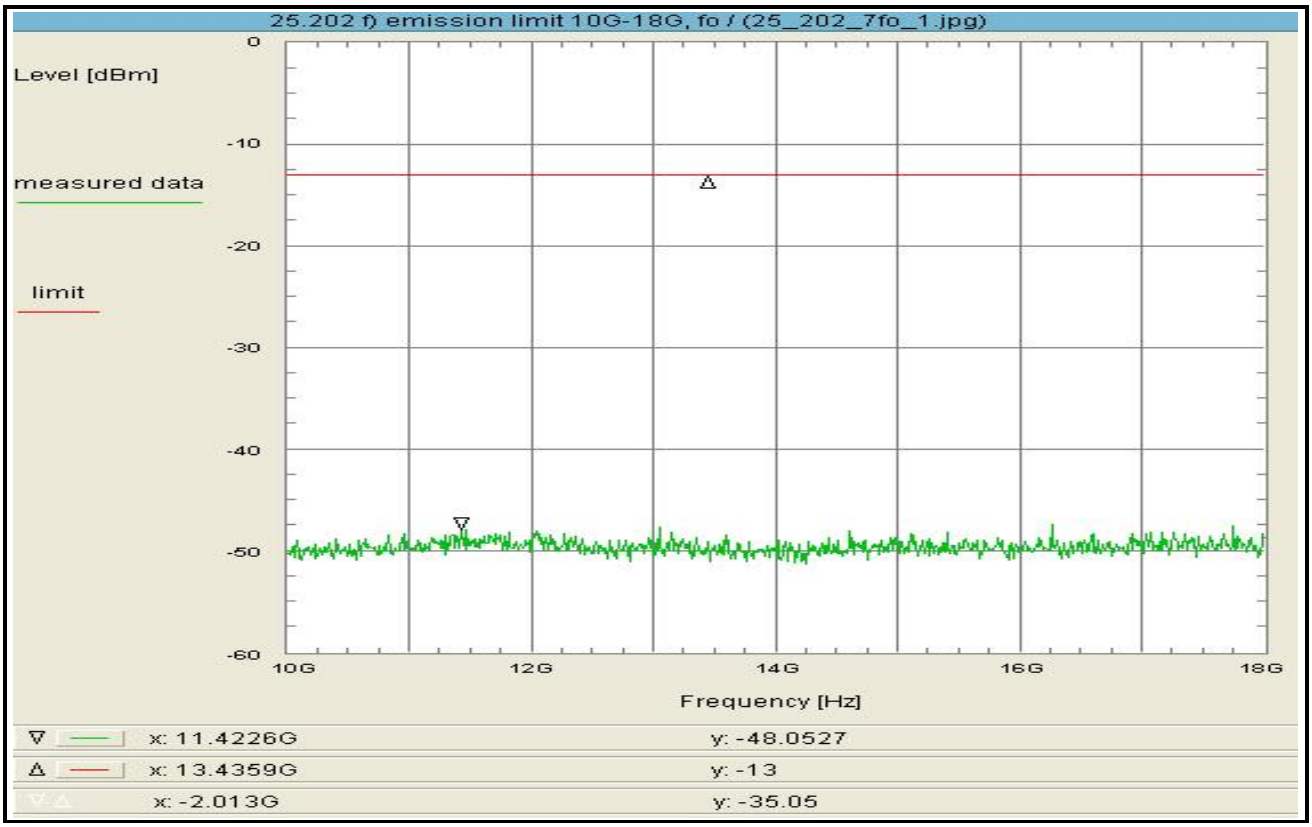
Start frequency:	2	GHz
Stop frequency:	10	GHz
Center frequency:	6	GHz
Frequency span:	8	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	1.5	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	17.3	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fo)

Plot No. 32 (36)



Subclause: 25.202 f) Frequencies, frequency tolerance and emission limitations
Emission limitations
Modulated rf-carrier at the upper edge of the band (fo)

Limit:
Limit according to 25.202 f):
50-100% of assigned bw: -25dBc/4kHz
100-250% of assigned bw: -35dBc/4kHz
> 250% of assigned bw: -43+10log(Pmax)dBc/4kHz = -43 dBW
The mean power of emissions shall be attenuated
below the mean output power of the transmitter
in accordance with the above schedule.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:24:08	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

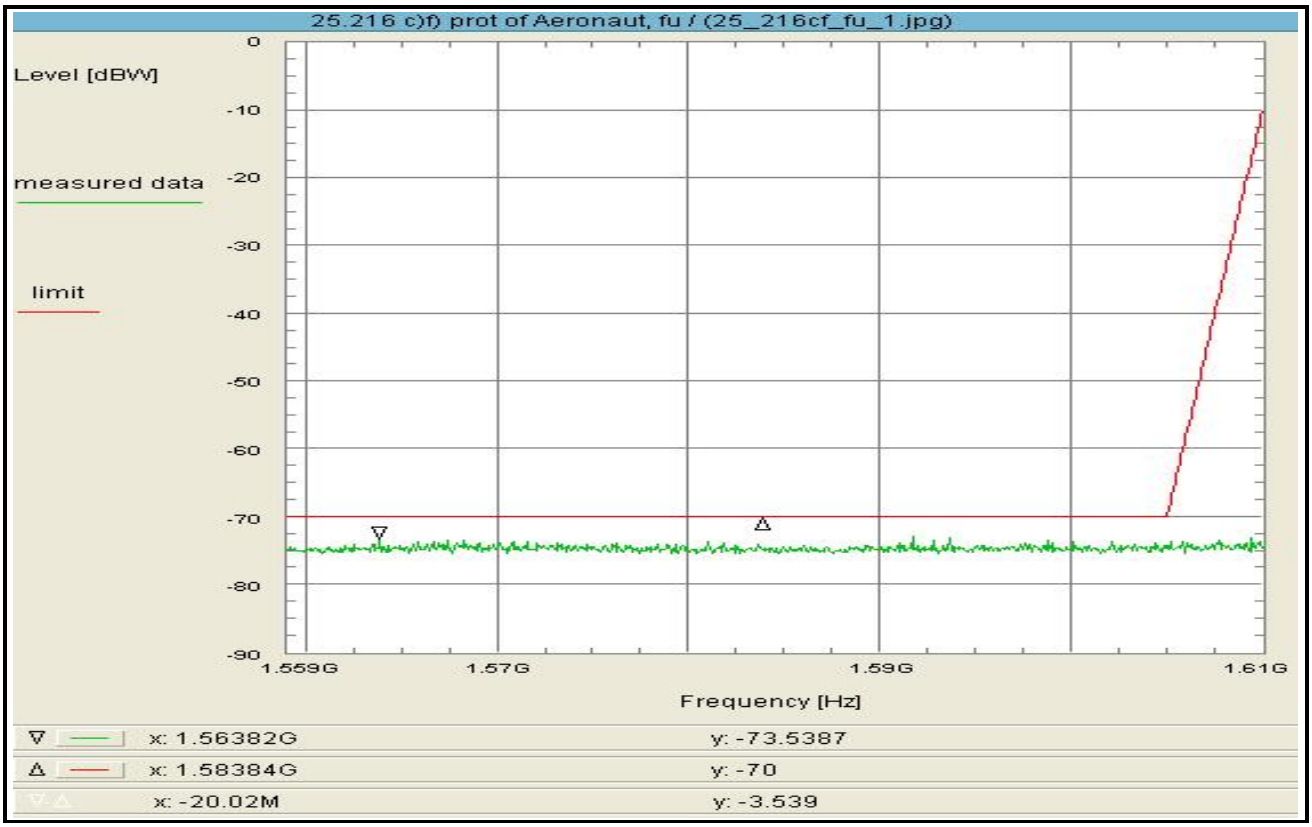
Start frequency:	10	GHz
Stop frequency:	18	GHz
Center frequency:	14	GHz
Frequency span:	8	GHz
Resolution-BW:	100	kHz
Video-BW:	300	kHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	Pos Peak	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	2.4	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor (100k -> 4k)	-	14.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.9	dB
TOTAL CORRECTION:	+	18.3	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fo)

Plot No. 33 (36)



Subclause: 25.216 c)f) Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service
Carrier-on state, modulated carrier at the lower edge of the band (fu)
Conducted measurement at the antenna-connector

Limit:
Limit according to 25.216 c) and f):
1559.0 - 1605.0MHz: -70dBW/1MHz
1605.0 - 1610MHz: -70 to -10dBW/1MHz)linear interpolated)
The EIRP, averaged over any two-millisecond active transmission interval from the MESs in the carrier-on state shall not exceed the limits above.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:30:01	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

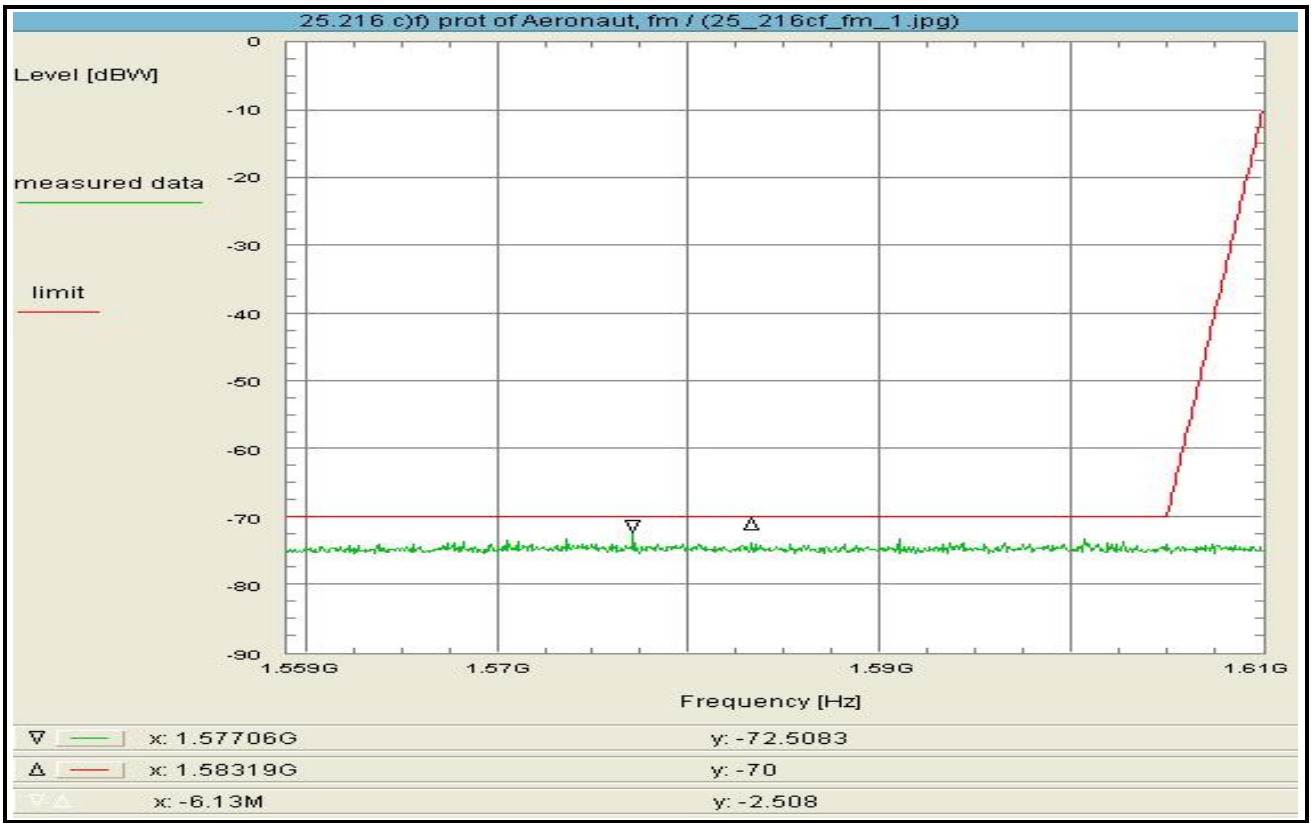
Start frequency:	1.559	GHz
Stop frequency:	1.61	GHz
Center frequency:	1.5845	GHz
Frequency span:	51	MHz
Resolution-BW:	1	MHz
Video-BW:	10	MHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	RMS	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	30.6	dB

Remarks:
Carrier-on state / Carrier at the lower edge of the band (fu)
Measurement with 1 MHz resolution/video filter and RMS Detector.
For EIRP calculation:
´worst-case´ = maximum antenna gain

Plot No. 34 (36)



Subclause: 25.216 c)f) Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service
Carrier-on state, modulated carrier in the middle of the band (fm)
Conducted measurement at the antenna-connector

Limit:
Limit according to 25.216 c) and f):
1559.0 - 1605.0MHz: -70dBW/1MHz
1605.0 - 1610MHz: -70 to -10dBW/1MHz)linear interpolated)
The EIRP, averaged over any two-millisecond active transmission interval from the MESs in the carrier-on state shall not exceed the limits above.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:29:29	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

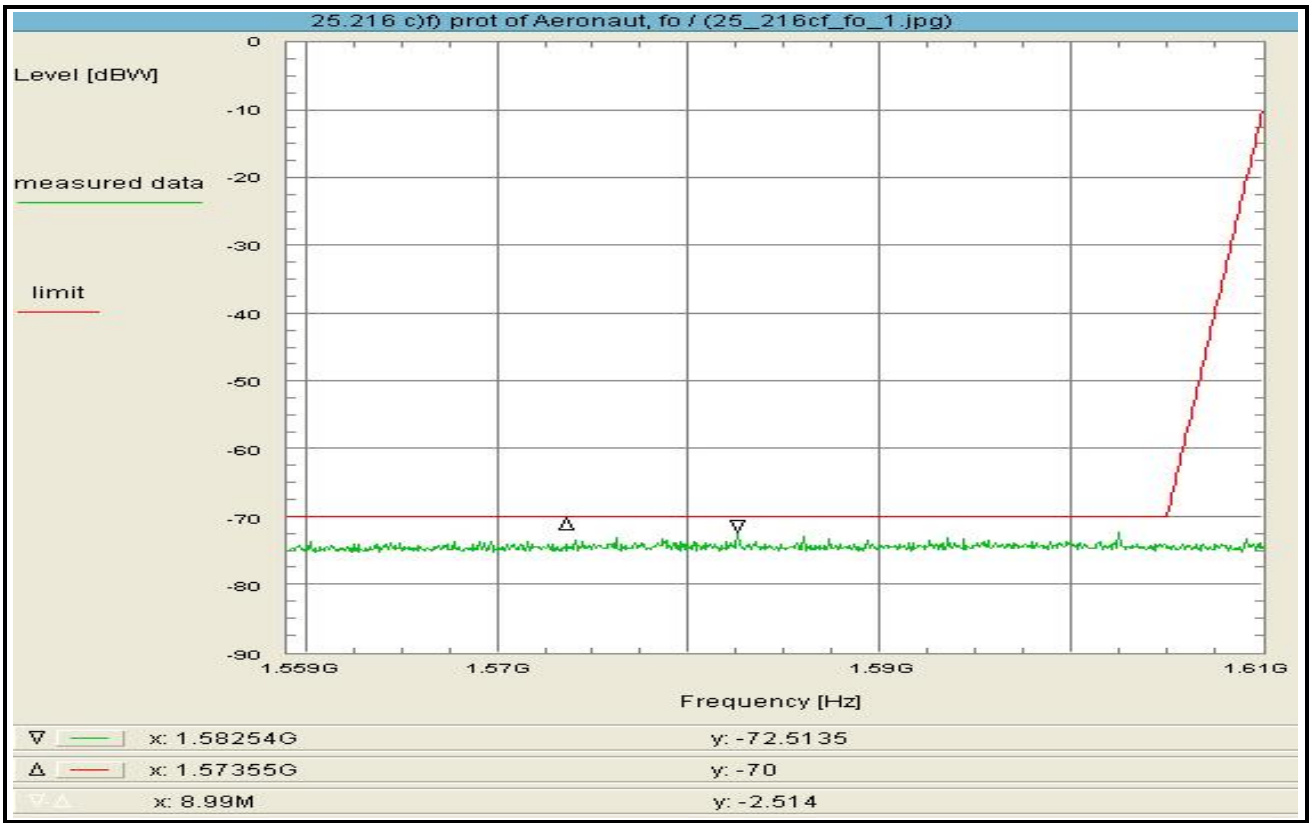
Start frequency:	1.559	GHz
Stop frequency:	1.61	GHz
Center frequency:	1.5845	GHz
Frequency span:	51	MHz
Resolution-BW:	1	MHz
Video-BW:	10	MHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	RMS	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	30.6	dB

Remarks:
Carrier-on state / Carrier in the middle of the band (fm)
Measurement with 1 MHz resolution/video filter and RMS Detector.
For EIRP calculation:
´worst-case´ = maximum antenna gain

Plot No. 35 (36)



Subclause: 25.216 c)f) Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service
Carrier-on state, modulated carrier at the upper edge of the band (fo)
Conducted measurement at the antenna-connector

Limit:
Limit according to 25.216 c) and f):
1559.0 - 1605.0MHz: -70dBW/1MHz
1605.0 - 1610MHz: -70 to -10dBW/1MHz)linear interpolated)
The EIRP, averaged over any two-millisecond active transmission interval from the MESs in the carrier-on state shall not exceed the limits above.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001, U005

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:28:47	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

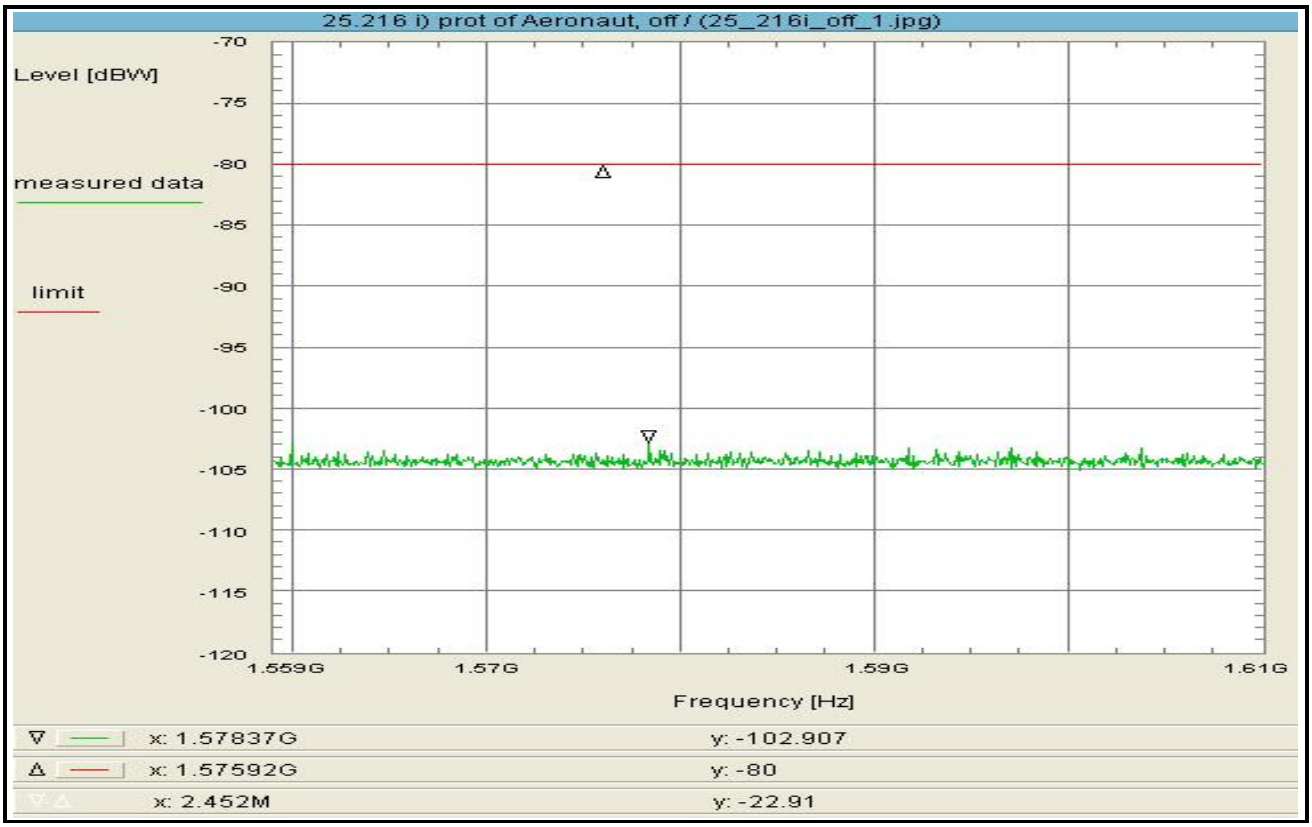
Start frequency:	1.559	GHz
Stop frequency:	1.61	GHz
Center frequency:	1.5845	GHz
Frequency span:	51	MHz
Resolution-BW:	1	MHz
Video-BW:	10	MHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	RMS	

Correction:

Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation (U005)	+	29.8	dB
TOTAL CORRECTION:	+	30.6	dB

Remarks:
Carrier-on state / Carrier at the upper edge of the band (fo)
Measurement with 1 MHz resolution/video filter and RMS Detector.
For EIRP calculation:
´worst-case´ = maximum antenna gain

Plot No. 36 (36)



Subclause: 25.216 i) Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service
Carrier-off state, conducted measurement at the antenna-connector

Limit:
Limit according to 25.216 i): -80dBW/1MHz

The EIRP, averaged over any two-millisecond active transmission interval from the MESs in the carrier-off state shall not exceed the limit above.

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
TX on, fu

Test setup:
see annex 1: 1.2hgj

Test equipment:
see annex 2: C218, R001

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	Thu 24/Sep/2015 13:54:45	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

Start frequency:	1.559	GHz
Stop frequency:	1.61	GHz
Center frequency:	1.5845	GHz
Frequency span:	51	MHz
Resolution-BW:	1	MHz
Video-BW:	10	MHz
Input attenuation:	5	dB
Trace-Mode:	Max-Hold	
Detector-Mode:	RMS	

Correction:

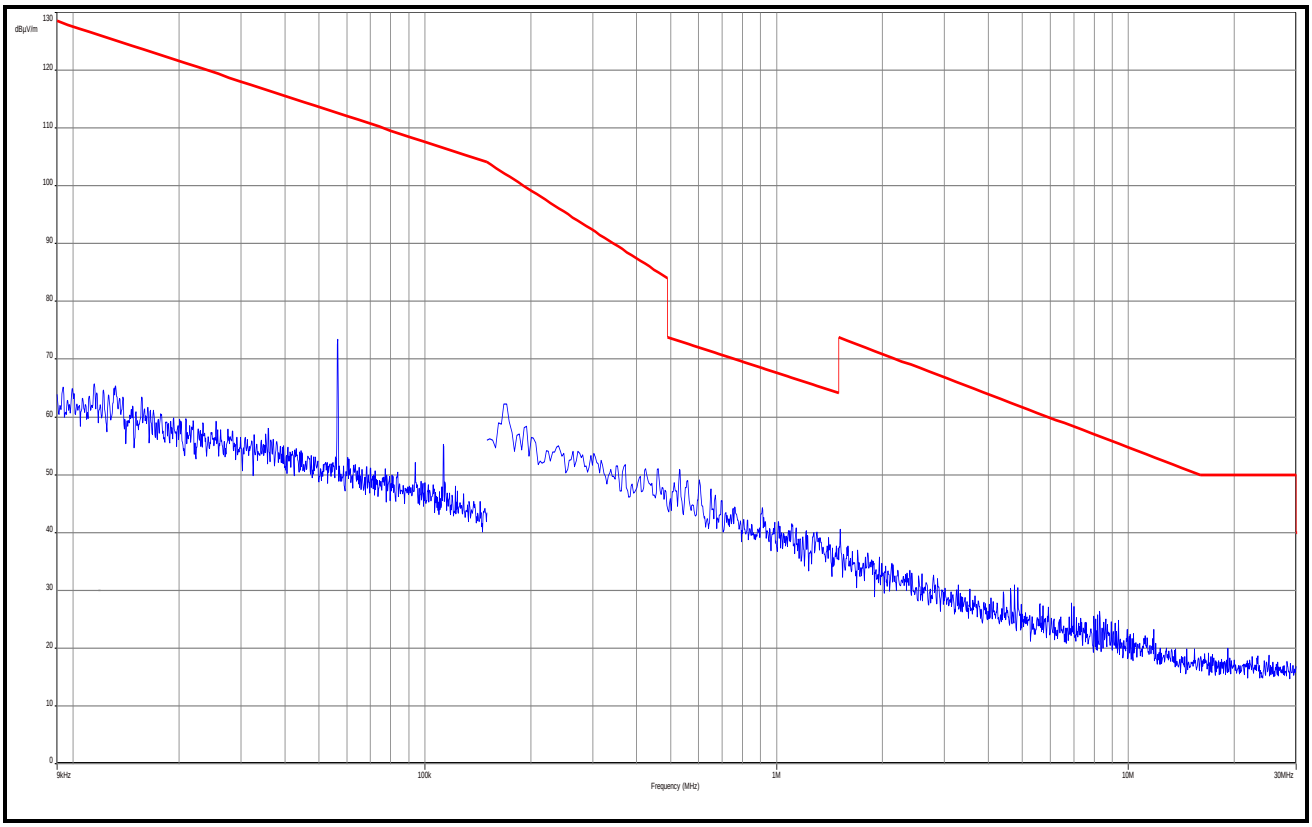
Directional coupler	+	0.0	dB
Coaxial cable (C218)	+	0.8	dB
DUT-Antenna (on-axis)	+	0.0	dBi
Test antenna	+	0.0	dB
BW correction factor	+	0.0	dB
Atten. between HPA and feedhorn	+	0.0	dB
Attenuation	+	0.0	dB
TOTAL CORRECTION:	+	0.8	dB

Remarks:
Carrier-off state.
Measurement with 1 MHz resolution filter and RMS Detector.
For EIRP calculation:
´worst-case´ = maximum antenna gain

Annex B Radiated measurement results

Annex B consists of 7 pages including this page.

Plot No. 1 (6)



Subclause: 4.2.4 Unwanted emissions outside the band
Radiated measurements: 9 kHz - 30 MHz

Limit:
Limit acc. to 4.2.2.1: see also chapter 8.2

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
fu

Test setup:
7.1 shielded fully anechoic chamber

Remark:

Test result: **Test passed**

Environment condition:

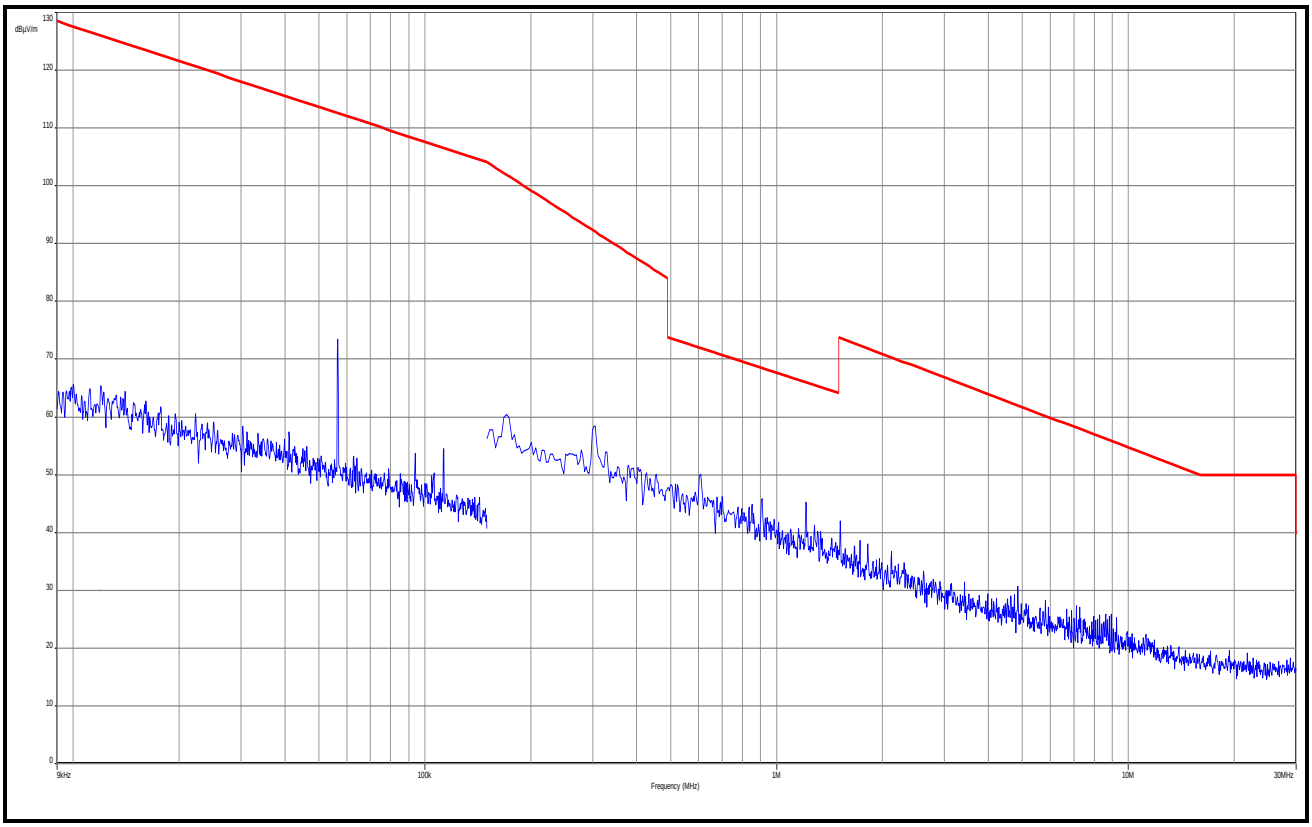
Date & Time:	25/Sep/2015	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

Start frequency:	9	kHz
Stop frequency:	30	MHz

Remarks:

Plot No. 2 (6)



Subclause: 4.2.4 Unwanted emissions outside the band
Radiated measurements: 9 kHz - 30 MHz

Limit:
Limit acc. to 4.2.2.1: see also chapter 8.2

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
fm

Test setup:
7.1 shielded fully anechoic chamber

Remark:

Test result: **Test passed**

Environment condition:

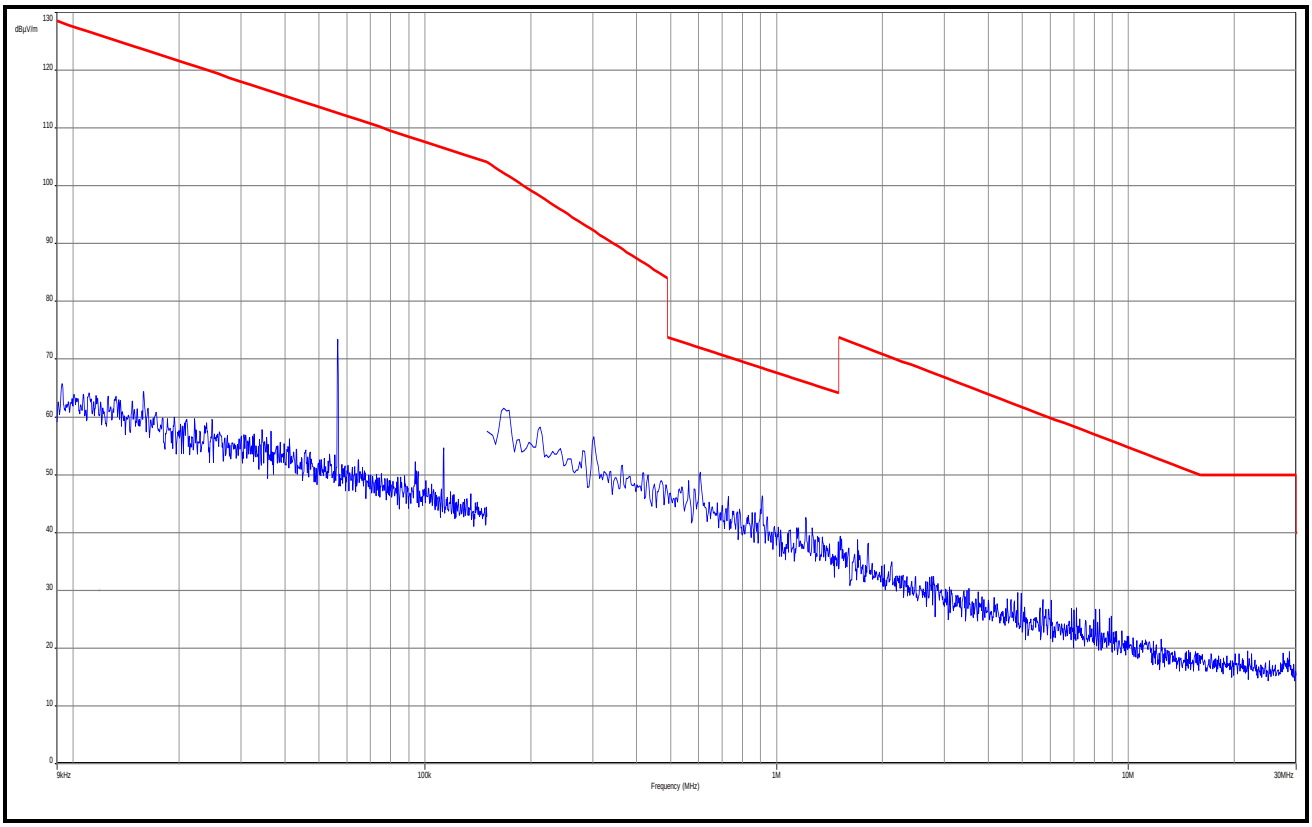
Date & Time:	25/Sep/2015	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

Start frequency:	9	kHz
Stop frequency:	30	MHz

Remarks:

Plot No. 3 (6)



Subclause: 4.2.4 Unwanted emissions outside the band
Radiated measurements: 9 kHz - 30 MHz

Limit:
Limit acc. to 4.2.2.1: see also chapter 8.2

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
fo

Test setup:
7.1 shielded fully anechoic chamber

Remark:

Test result: **Test passed**

Environment condition:

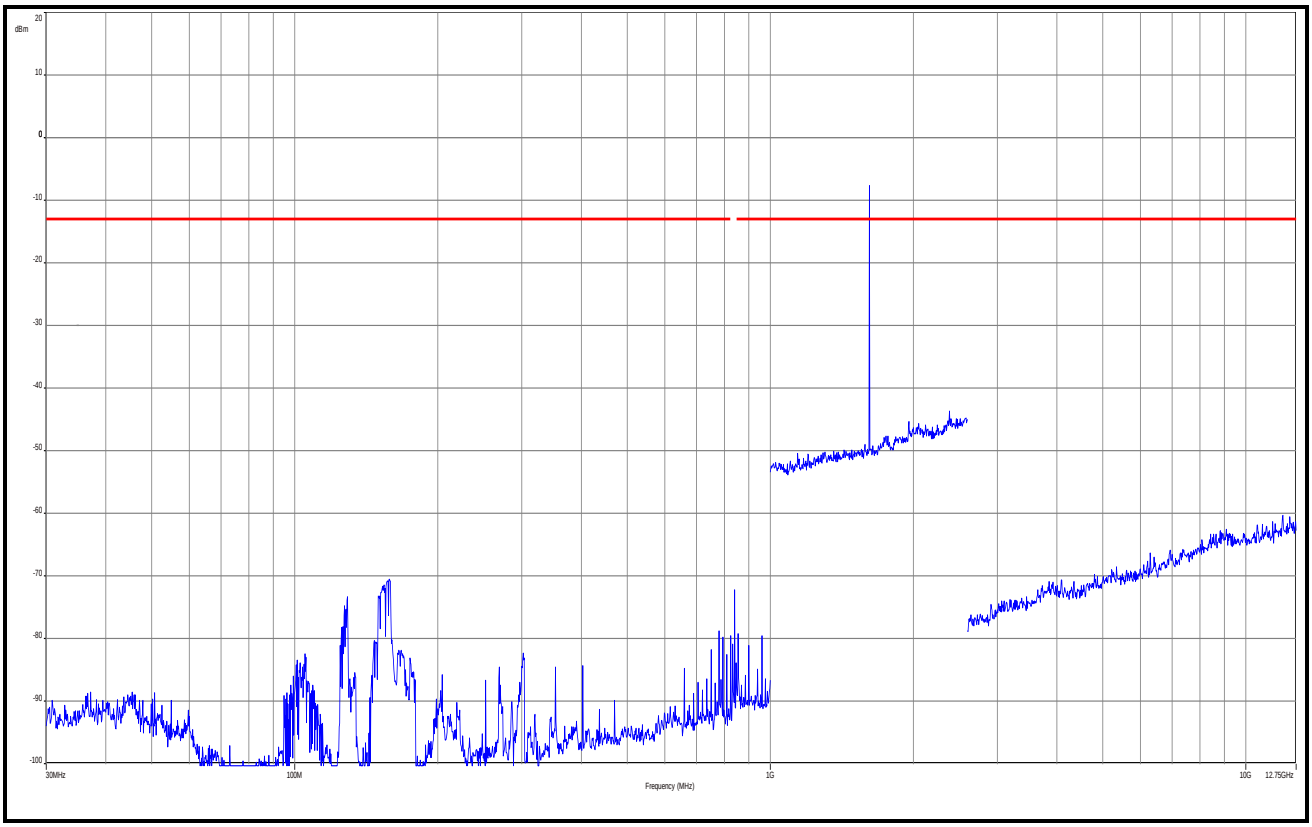
Date & Time:	25/Sep/2015	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

Start frequency:	9	kHz
Stop frequency:	30	MHz

Remarks:

Plot No. 4 (6)



Subclause: 4.2.4 Unwanted emissions outside the band
Radiated measurements: 30 kHz - 12750 MHz

Limit:
Limit acc. to 4.2.2.1: see also chapter 8.2

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
fu

Test setup:
7.1 shielded fully anechoic chamber

Remark:

Test result: **Test passed**

Environment condition:

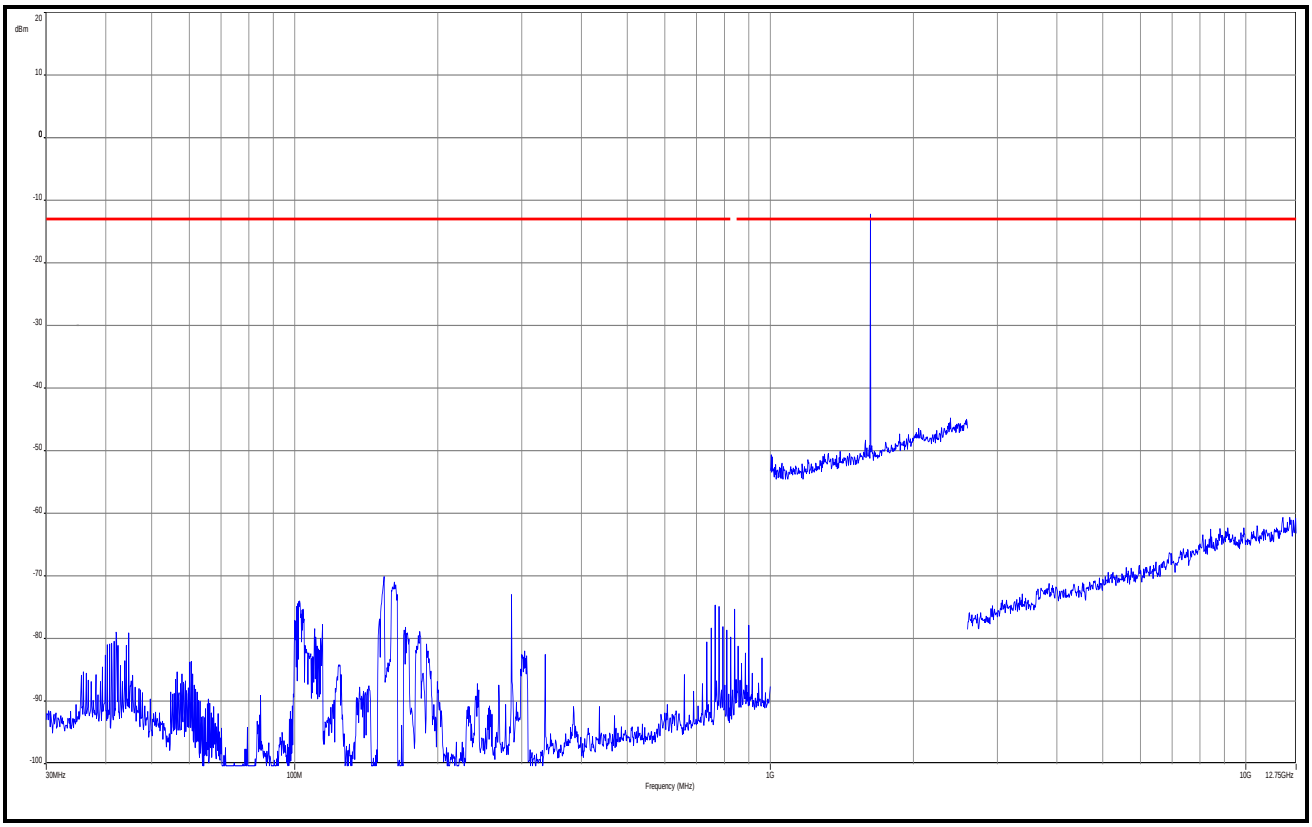
Date & Time:	25/Sep/2015	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

Start frequency:	30	kHz
Stop frequency:	12.75	GHz

Remarks:

Plot No. 5 (6)



Subclause: 4.2.4 Unwanted emissions outside the band
Radiated measurements: 30 kHz - 12750 MHz

Limit:
Limit acc. to 4.2.2.1: see also chapter 8.2

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
fm

Test setup:
7.1 shielded fully anechoic chamber

Remark:

Test result: **Test passed**

Environment condition:

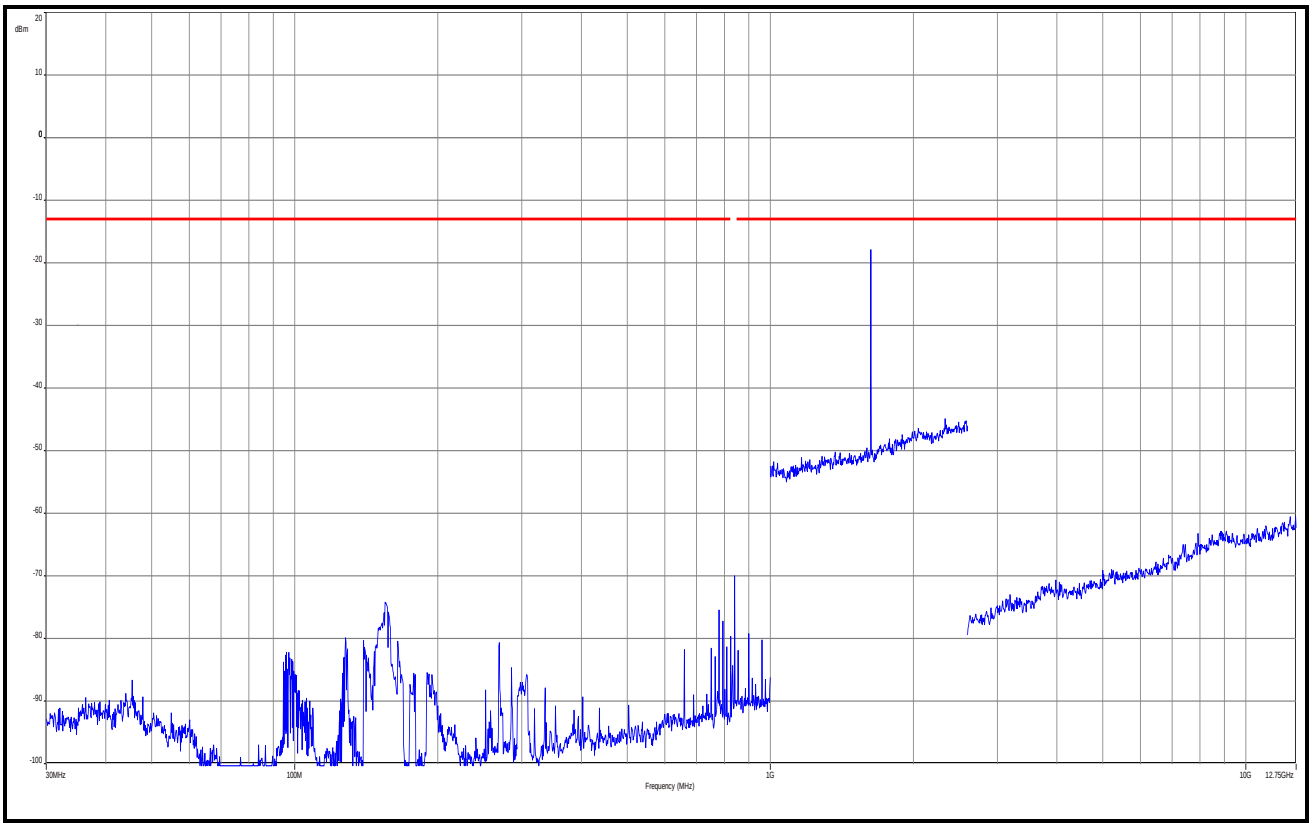
Date & Time:	25/Sep/2015	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

Start frequency:	30	kHz
Stop frequency:	12.75	GHz

Remarks:

Plot No. 6 (6)



Subclause: 4.2.4 Unwanted emissions outside the band
Radiated measurements: 30 kHz - 12750 MHz

Limit:
Limit acc. to 4.2.2.1: see also chapter 8.2

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

Operating condition of DUT:
operating condition 1, see subclause 1.5.2
fo

Test setup:
7.1 shielded fully anechoic chamber

Remark:

Test result: **Test passed**

Environment condition:

Date & Time:	25/Sep/2015	
Location:	CETECOM ICT Services GmbH, Laboratory RSC-Sat	
Temperature:	22	°C
Humidity:	55	%
Voltage:	230	Vac

Setup of measurement equipment:

Start frequency:	30	kHz
Stop frequency:	12.75	GHz

Remarks:

Annex C Document history

Version	Applied changes	Date of release
	Initial release	2015-11-10
-A	output power and occupied bandwidth added	2015-12-08
-B	output power and antenna information corrected	2015-12-10
-C	Canadian EIRP requirement included	2016-02-04

Annex D 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
PMN		Product marketing name
HMN		Host marketing name
HVIN		Hardware version identification number
FVIN		Firmware version identification number

Annex E Accreditation Certificate

Front side of certificate

DAkkS Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Beliehene 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 Bescheid 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

Im Auftrag Dipl.-Ing. (FH) Ralf Egner
Abteilungsleiter

Back side of certificate

Deutsche Akkreditierungsstelle GmbH

Standort Berlin	Standort Frankfurt am Main	Standort Braunschweig
Spittelmarkt 10	Gartenstraße 6	Bundesallee 100
10117 Berlin	60594 Frankfurt am Main	38116 Braunschweig

Die auszugsweise Veröffentlichung der Akkreditierungsurkunde bedarf der vorherigen schriftlichen Zustimmung der Deutsche Akkreditierungsstelle GmbH (DAkkS). Ausgenommen davon ist die separate Weiterverbreitung des Deckblattes durch die umseitig genannte Konformitätsbewertungsstelle in unveränderter Form.

Es darf nicht der Anschein erweckt werden, dass sich die Akkreditierung auch auf Bereiche erstreckt, die über den durch die DAkkS bestätigten Akkreditierungsbereich hinausgehen.

Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom 31. Juli 2009 (BGBl. I S. 2625) 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 (Abl. 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 der 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.nu

Note:

The current certificate including annex may be received from CETECOM ICT Services on request.