**CETECOM™****CETECOM ICT Services**  
consulting - testing - certification >>>

## PARTIAL TEST REPORT

Test report no.: 1-0357/15-01-03

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](mailto: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

**Thrane & Thrane A/S**

Lundtoftegaardsvej 93D

DK-2800 Kgs Lyngby / DENMARK

Phone:

Fax: +45 3955 8888

Contact: Morten Becker Saul

e-mail: [morten.saul@cobham.com](mailto:morten.saul@cobham.com)

Phone: +45 3955 8209

### Manufacturer

**Thrane & Thrane A/S**

Lundtoftegaardsvej 93D

DK-2800 Kgs Lyngby / DENMARK

### Test standard/s

CFR 47 Part 25

Satellite Communications

RSS-170

Mobile Earth Stations and Ancillary Terrestrial Component Equipment Operating in the Mobile-Satellite Service Bands

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

### Test Item

**Kind of test item:** Hybrid BGAN M2M Inmarsat terminal**Model name:** EXPLORER 540 / TT-3715A**FCC ID:** ROJ-3715A**IC:** 6200B-3715A**Frequency:** Tx: 1626.5 – 1660.5 MHz  
Rx: 1525.0 – 1559.0 MHz)**Antenna:** Integrated antenna**Power supply:** 10.5 V DC to 32.0 V by power supply  
44 V DC to 57 V DC via PoE+ Injector**Temperature range:** -40°C to +75°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:

Karsten Gerald  
Lab Manager  
Radio Communications & EMC

### Test performed:

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 .....                    | 3  |
| 4       | Test location .....                      | 4  |
| 5       | Test environment .....                   | 4  |
| 6       | Test laboratory/ies sub-contracted ..... | 4  |
| 7       | Additional information .....             | 4  |
| 8       | Test item .....                          | 5  |
| 8.1     | General Description .....                | 5  |
| 8.2     | Operating conditions .....               | 5  |
| 9       | Description of test setup .....          | 6  |
| 9.1     | Conducted measurements .....             | 7  |
| 9.2     | Shielded fully anechoic chamber .....    | 8  |
| 9.3     | Radiated measurements > 12.75 GHz .....  | 9  |
| 10      | Measurement results .....                | 10 |
| 10.1    | Summary .....                            | 10 |
| 10.2    | Overview .....                           | 11 |
| Annex A | Measurement results .....                | 16 |
| Annex B | Document history .....                   | 30 |
| Annex C | Further information .....                | 30 |
| Annex D | Accreditation Certificate .....          | 31 |

## 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.

### 2.2 Application details

|                                    |                   |
|------------------------------------|-------------------|
| Date of receipt of order:          | 2015-09-28        |
| Date of receipt of test item:      | 2015-11-30        |
| Start of test:                     | 2015-12-01        |
| End of test:                       | 2015-12-03        |
| Laboratory reference number:       | 042.15            |
| Person(s) present during the test: | Mr. Bjarre Maaløe |

## 3 Test standard/s

| Test standard  | Date    | Test standard description                                                                                           |
|----------------|---------|---------------------------------------------------------------------------------------------------------------------|
| CFR 47 Part 25 | 2013-10 | Satellite Communications                                                                                            |
| RSS-170        | 2011-03 | Mobile Earth Stations and Ancillary Terrestrial Component Equipment Operating in the Mobile-Satellite Service Bands |

#### 4 Test location

CETECOM ICT Services GmbH  
Untertuerkheimer Strasse 6 – 10  
66117 Saarbruecken / Germany  
Phone: + 49 681 5 98 - 0  
Fax: + 49 681 5 98 - 9075

#### 5 Test environment

|              |                  |                                      |
|--------------|------------------|--------------------------------------|
| Temperature: | T <sub>nom</sub> | +23 °C during room temperature tests |
|              | T <sub>min</sub> | -/- °C                               |
|              | T <sub>max</sub> | -/- °C                               |
|              | T <sub>hum</sub> | -/- °C / -/- rel. humidity           |

Relative humidity: 45 %

Barometric pressure: not relevant for this kind of testing

|               |                  |                           |
|---------------|------------------|---------------------------|
| Power supply: | V <sub>nom</sub> | 57 V DC via PoE+ injector |
|               | V <sub>min</sub> | -/- V DC                  |
|               | V <sub>max</sub> | -/- V DC                  |

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

None

#### 7 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup- and EUT-photos are included in test report: 1-0357/15-01-01\_AnnexB  
TT-3715 photos\_Va

During the tests, the DUT is supplied by PoE+ power injector which is provided by the manufacturer:

Power supply manufacturer: Tycon Power Systems  
Model: TP-DCDC-2448GD-HP

## 8 Test item

### 8.1 General Description

|                                           |                                   |
|-------------------------------------------|-----------------------------------|
| Kind of test item                         | Hybrid BGAN M2M Inmarsat terminal |
| Type identification                       | EXPLORER 540 / TT-3715A           |
| Operating characteristics                 | BGAN, Rx/Tx, QPSK-pi/4, 16-QAM    |
| S/N serial number                         | Cetecom #5 RF MB# 1298140045      |
| HW hardware status                        | A01                               |
| SW software status                        | 0.05 build 804                    |
| TX frequency range / CS <sup>1)</sup>     | 1626.5 – 1660.5 MHz // 1.25 kHz   |
| RX frequency range                        | 1525.0 – 1559.0 MHz               |
| TX output power cond.                     | max. 34.3 dBm (measured value)    |
| TX output power rad. (EIRP) <sup>2)</sup> | max. 45.6 dBm (measured value)    |
| Kind of baseband signal                   | data                              |
| Data rate                                 | 33.6 – 604.8 kbps                 |
| Type of modulation                        | QPSK-pi/4, 16-QAM                 |
| Type of radio transmission                | G7W, D7W                          |
| Antenna                                   | integrated patch antenna          |
| Power supply                              | 44 to 57 V DC via PoE+ injector   |
| Temperature range                         | -40 °C to +75 °C                  |

<sup>1)</sup> channel spacing of modem / transceiver

<sup>2)</sup> for an antenna with an on-axis gain of 11.25 dBi (RHCP) within the transmit band

<sup>3)</sup> for operating conditions defined below

### 8.2 Operating conditions

| Modulation Scheme | Modulation | Bitrate (kbps) | f <sub>low</sub> | f <sub>mid</sub> | f <sub>high</sub> |
|-------------------|------------|----------------|------------------|------------------|-------------------|
| R20T05Q           | QPSK-pi/4  | 33.6           | 1626.6 MHz       | 1643.5 MHz       | 1660.4 MHz        |
| R20T1Q            | QPSK-pi/4  | 67.2           | 1626.6 MHz       | 1643.5 MHz       | 1660.4 MHz        |
| R5T1X<br>R20T1X   | 16QAM      | 134.4          | 1626.6 MHz       | 1643.5 MHz       | 1660.4 MHz        |
| R5T2Q<br>R20T2Q   | QPSK-pi/4  | 134.4          | 1626.6 MHz       | 1643.5 MHz       | 1660.4 MHz        |
| R5T2X<br>R20T2X   | 16QAM      | 268.8          | 1626.6 MHz       | 1643.5 MHz       | 1660.4 MHz        |
| R5T45Q<br>R20T45Q | QPSK-pi/4  | 302.4          | 1626.6 MHz       | 1643.5 MHz       | 1660.4 MHz        |
| R5T45X<br>R20T45X | 16QAM      | 604.8          | 1626.6 MHz       | 1643.5 MHz       | 1660.4 MHz        |
| TX off            | -/-        | -/-            | -/-              | -/-              | -/-               |

## 9 Description of test setup

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

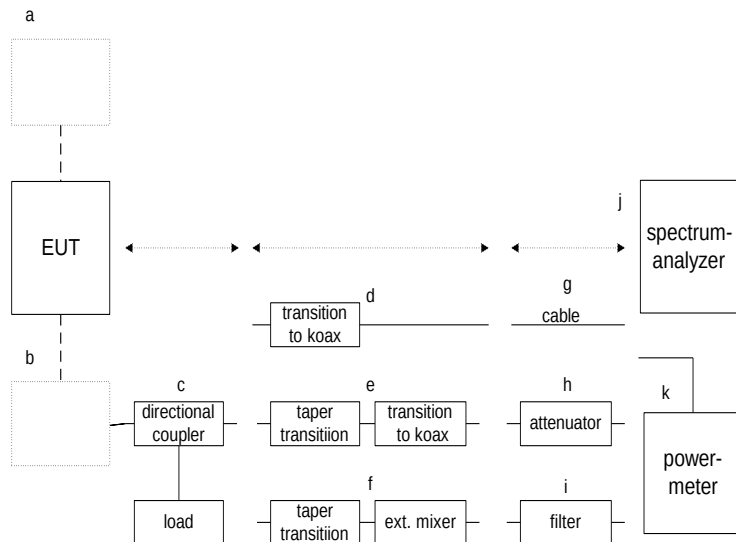
Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements 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                       |
| vk! | Attention: extended calibration interval   |     |                                                      |
| NK! | Attention: not calibrated                  | *)  | next calibration ordered / currently in progress     |

## 9.1 Conducted measurements



Setup 1.2 x...x

The setup code 1.2 x...x describes the used setup for conducted measurements.

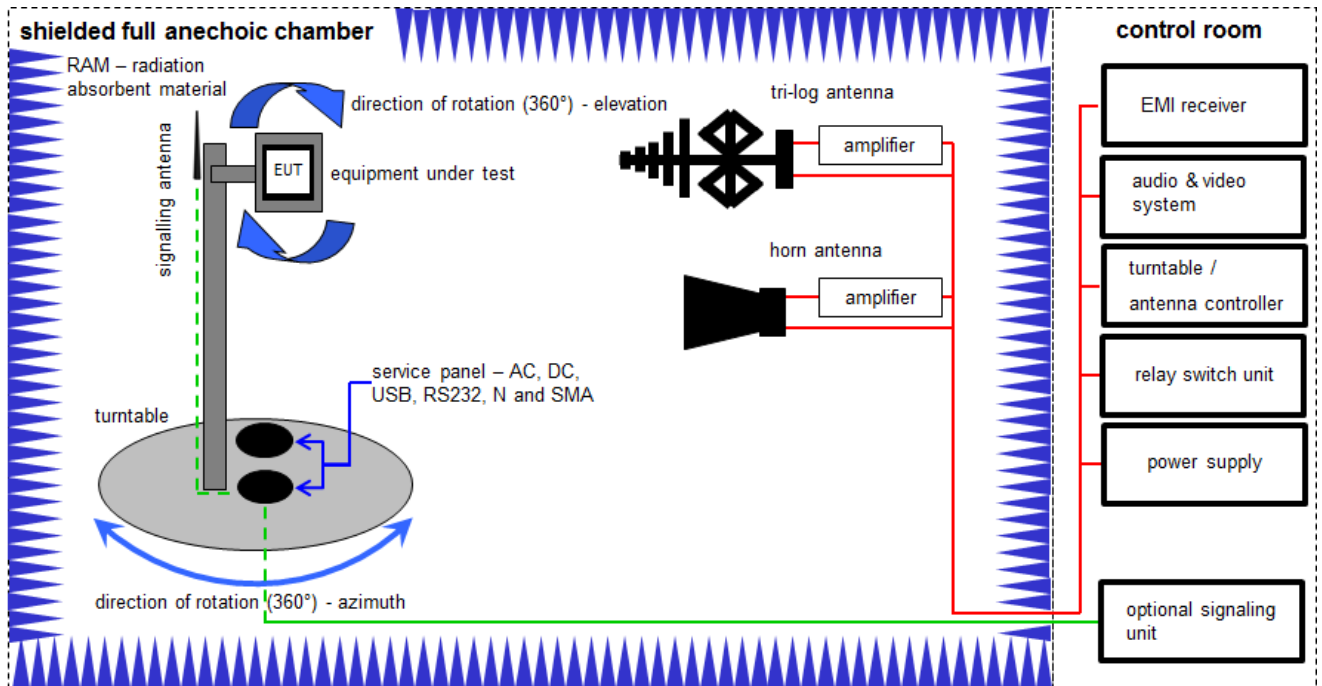
### Example:

DUT -> transition to coax -> cable -> filter -> spectrum analyzer = 1.2 dgij

### Equipment table:

| No. | Lab / Item | Equipment                                               | Type            | Manufacturer   | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|---------------------------------------------------------|-----------------|----------------|------------|-----------------|---------------------|------------------|------------------|
| 1   | U005       | High Power Attenuator 30 dB, DC to 18 GHz               | 9498A           | HP             | 2702A04550 | 300002403       | ev                  |                  |                  |
| 2   | R001       | Spectrum Analyzer 9kHz-50GHz portable spectrum analyzer | 8565E           | HP             | 3515A00283 | 300000916       | Ve                  | 12.02.2015       | 12.02.2017       |
| 3   | 217        | HF-Cable                                                | KPS1533-590-KPS | Insulated Wire |            | 300002290       | ev                  |                  |                  |
| 4   | U019       | Attenuator                                              | 375 BNM         | Narda          | 43         |                 | ev                  |                  |                  |
| 5   |            | Cobham Notch filter                                     | XN 6534         | BSC            | 2404102    |                 | ev                  |                  |                  |

## 9.2 Shielded fully anechoic chamber



Measurement distance: tri-log antenna and horn antenna 3 meter

$$OP = AV + D - G + CA$$

(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:

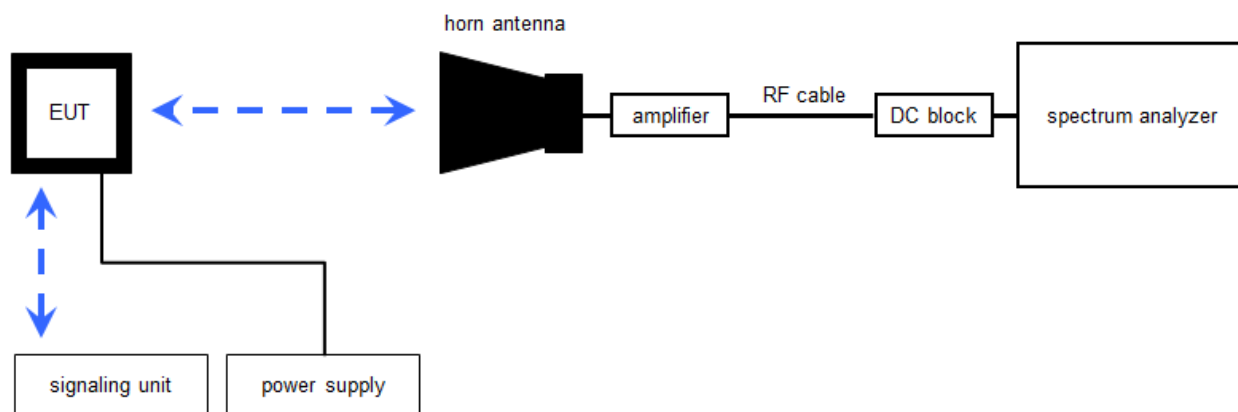
$$OP \text{ [dBm]} = -65.0 \text{ [dBm]} + 50 \text{ [dB]} - 20 \text{ [dBi]} + 5 \text{ [dB]} = -30 \text{ [dBm]} (1 \mu\text{W})$$

### Equipment table:

| No. | Lab / Item | Equipment                                      | Type                | Manufacturer         | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|------------------------------------------------|---------------------|----------------------|------------|-----------------|---------------------|------------------|------------------|
| 1   | n. a.      | DC power supply, 60Vdc, 50A, 1200 W            | 6032A               | HP                   | 2818A03450 | 300001040       | Ve                  | 20.01.2015       | 20.01.2018       |
| 2   | n. a.      | Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115                | EMCO                 | 8812-3088  | 300001032       | vIKII               | 20.05.2015       | 20.05.2017       |
| 3   | n. a.      | Anechoic chamber                               | FAC 3/5m            | MWB / TDK            | 87400/02   | 300000996       | ev                  |                  |                  |
| 4   | n. a.      | Switch / Control Unit                          | 3488A               | HP                   | *          | 300000199       | ne                  |                  |                  |
| 5   | n. a.      | Amplifier                                      | js42-00502650-28-5a | Parzich GMBH         | 928979     | 300003143       | ne                  |                  |                  |
| 6   | n. a.      | Highpass Filter                                | WHKX7.0/18G-8SS     | Wainwright           | 18         | 300003789       | ne                  |                  |                  |
| 7   | n. a.      | MXE EMI Receiver 20 Hz to 26,5 GHz             | N9038A              | Agilent Technologies | MY51210197 | 300004405       | k                   | 06.03.2015       | 06.03.2016       |
| 8   | n. a.      | 4U RF Switch Platform                          | L4491A              | Agilent Technologies | MY50000037 | 300004509       | ne                  |                  |                  |

### 9.3 Radiated measurements > 12.75 GHz

#### Radiated measurements > 12.75 GHz



$$OP = AV + D - G + CA$$

(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:

$$OP \text{ [dBm]} = -59.0 \text{ [dBm]} + 44.0 \text{ [dB]} - 20.0 \text{ [dBi]} + 5.0 \text{ [dB]} = -30 \text{ [dBm]} (1 \mu\text{W})$$

#### Equipment table:

| No. | Lab / Item | Equipment                                               | Type            | Manufacturer   | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|---------------------------------------------------------|-----------------|----------------|------------|-----------------|---------------------|------------------|------------------|
| 1   | R001       | Spectrum Analyzer 9kHz-50GHz portable spectrum analyzer | 8565E           | HP             | 3515A00283 | 300000916       | Ve                  | 12.02.2015       | 12.02.2017       |
| 2   | A039       | Std. Gain Horn Antenna 11.90-18.00 GHz                  | 1824-20         | Flann          | 263        | 300002471       | ne                  |                  |                  |
| 3   | A021       | Std. Gain Horn Antenna 26.4-40.1 GHz                    | 2224-20         | Flann          | 233        | 300001973       | ne                  |                  |                  |
| 4   | A019       | Std. Gain Horn Antenna 17.6-26.7 GHz                    | 2024-20         | Flann          | 156        | 300001968       | ne                  |                  |                  |
| 5   | 217        | HF-Cable                                                | KPS1533-590-KPS | Insulated Wire |            | 300002290       | ev                  |                  |                  |

## 10 Measurement results

### 10.1 Summary

The present test report:

|                                     |                                                                                              |
|-------------------------------------|----------------------------------------------------------------------------------------------|
| <input type="checkbox"/>            | describes the first test                                                                     |
| <input type="checkbox"/>            | describes an additional test                                                                 |
| <input type="checkbox"/>            | is a verification of documents                                                               |
| <input checked="" type="checkbox"/> | is a partial test report and is only valid with Cetecom the test report no.: 1-8390/14-01-05 |

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

| TC identifier | Description              | Verdict   | Date       | Remark |
|---------------|--------------------------|-----------|------------|--------|
| RF-Testing    | CFR 47 Part 25 / RSS-170 | see table | 2016-01-22 | -/-    |

| Test Specification Clause          | Test Case                                                                                                   | Pass | Fail | N/A | N/P | Results  |
|------------------------------------|-------------------------------------------------------------------------------------------------------------|------|------|-----|-----|----------|
| §2.1046 / §25.204/ RSS-170, 5.3.2  | Measurements required: RF power output / Power limits                                                       | X    |      |     |     | complies |
| §2.1051/ §25.202/ RSS-170, 5.4.3.1 | Measurements required: Spurious emissions at antenna terminals / Emission limitations (conducted emissions) | X    |      |     |     | complies |
| §2.1053/ §25.202/ RSS-170, 5.4.3.1 | Measurements required: Field strength of spurious radiation / Emission limitations (radiated emissions)     | X    |      |     |     | complies |

**Note:**

NA = Not applicable; NP = Not performed

**10.2 Overview**

I. RF power output / Power limits .....12

II. Emissions limitations (conducted emissions).....13

III. Emissions limits (radiated emissions) .....14

IV. Emissions limitations (conducted emissions).....15

## I. RF power output / Power limits

### Description / Limit:

#### §25.204 Power limits

(b) In bands shared coequally with terrestrial radiocommunication services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station 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  $\theta \leq 0^\circ$

+40 + 3 \*  $\theta$  dBW in any 4 kHz band for  $0^\circ < \theta \leq 5^\circ$

$\theta$  = elevation angle above horizon

(c) For angles of elevation of the horizon greater than  $5^\circ$  there shall be no restriction as to the equivalent isotropically radiated power transmitted by an earth station towards the horizon.

### Test setup(s):

Test setup 1.2cdk

### Measurement results:

| Modulation Scheme | Transmitter conducted output power [dBW] |                  |                   | Transmitter radiated output power / EIRP [dBW] |                  |                   |
|-------------------|------------------------------------------|------------------|-------------------|------------------------------------------------|------------------|-------------------|
|                   | f <sub>low</sub>                         | f <sub>mid</sub> | f <sub>high</sub> | f <sub>low</sub>                               | f <sub>mid</sub> | f <sub>high</sub> |
| R20T05Q           | 3.8                                      | 3.8              | 3.8               | 15.1                                           | 15.0             | 15.0              |
| R5T1X             | 4.3                                      | 4.3              | 4.3               | 15.6                                           | 15.5             | 15.5              |
| R20T45X           | 3.8                                      | 3.8              | 3.8               | 15.1                                           | 15.0             | 15.0              |

**Note:** As the manufacturer declares that the RF Part is the same as in test report 1-8390/14-01-05 only spot checks are measured.

### Operating conditions of DUT:

Carrier-on radio state (for more details see table above)

**Verdict: Passed**

## II. 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.

- (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:

| Conducted Spurious Emissions [dBm] |          |             |                  |          |             |                   |          |             |
|------------------------------------|----------|-------------|------------------|----------|-------------|-------------------|----------|-------------|
| f <sub>low</sub>                   |          |             | f <sub>mid</sub> |          |             | f <sub>high</sub> |          |             |
| F [MHz]                            | Detector | Level [dBm] | F [MHz]          | Detector | Level [dBm] | F [MHz]           | Detector | Level [dBm] |
|                                    |          |             | 0.277            | Pos-Peak | -99.0       |                   |          |             |
|                                    |          |             | 5.95             | Pos-Peak | -100.7      |                   |          |             |
|                                    |          |             | 1611.78          | Pos-Peak | -83.9       |                   |          |             |
|                                    |          |             | 1526.84          | Pos-Peak | -75.7       |                   |          |             |
|                                    |          |             | 1681.13          | Pos-Peak | -87.7       |                   |          |             |
|                                    |          |             | 9870.83          | Pos-Peak | -75.2       |                   |          |             |
|                                    |          |             |                  |          |             |                   |          |             |
|                                    |          |             |                  |          |             |                   |          |             |
| Measurement uncertainty            |          |             | ± 1.5 dB         |          |             |                   |          |             |

**Note:** As the manufacturer declares that the RF Part is the same as in test report 1-8390/14-01-05, spurious measurements are only performed at mid frequency (fm).

### Plots:

see also Annex B, plots 4 - 12

**Verdict:** Passed

### III. 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.

- (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:** 2.0 - 2.4

#### **Measurement results:**

| Radiated Spurious Emissions [dBm] |          |             |                  |          |             |                   |          |             |
|-----------------------------------|----------|-------------|------------------|----------|-------------|-------------------|----------|-------------|
| f <sub>low</sub>                  |          |             | f <sub>mid</sub> |          |             | f <sub>high</sub> |          |             |
| F [MHz]                           | Detector | Level [dBm] | F [MHz]          | Detector | Level [dBm] | F [MHz]           | Detector | Level [dBm] |
|                                   |          |             | 43.774           | Pos-Peak | -65.495     |                   |          |             |
|                                   |          |             | 249.996          | Pos-Peak | -71.430     |                   |          |             |
|                                   |          |             | 286.468          | Pos-Peak | -73.185     |                   |          |             |
|                                   |          |             | 569.417          | Pos-Peak | -63.785     |                   |          |             |
|                                   |          |             | 13145            | Pos-Peak | -95.2       |                   |          |             |
|                                   |          |             | 18075            | Pos-Peak | -85.5       |                   |          |             |
|                                   |          |             |                  |          |             |                   |          |             |
|                                   |          |             |                  |          |             |                   |          |             |
| Measurement uncertainty           |          |             | ± 3 dB           |          |             |                   |          |             |

n.f. = nothing found

v / h = vertical / horizontal

**Note:** As the manufacturer declares that the RF Part is the same as in test report 1-8390/14-01-05, spurious measurements are only performed at mid frequency (fm).

#### **Plots:**

see also Annex B, plots 1 - 3

**Verdict:** Passed

#### IV. Emissions limitations (conducted emissions)

##### Description / Limit:

##### § 25.216 Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service.

(h) Mobile earth stations manufactured more than six months after FEDERAL REGISTER publication of the rule changes adopted in FCC 03–283 with assigned uplink frequencies in the 1626.5–1660.5 MHz band shall suppress the power density of emissions in the 1605–1610 MHz band-segment to an extent determined by linear interpolation from -70 dBW/MHz at 1605 MHz to -46 dBW/MHz at 1610 MHz, averaged over any 2 millisecond active transmission interval. The e.i.r.p of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed a level determined by linear interpolation from -80 dBW at 1605 MHz to -56 dBW at 1610 MHz, averaged over any 2 millisecond active transmission interval.

(i) The e.i.r.p density of carrier-off state emissions from mobile earth stations manufactured more than six months after FEDERAL REGISTER publication of the rule changes adopted in FCC 03–283 with assigned uplink frequencies between 1 and 3 GHz shall not exceed -80 dBW/MHz in the 1559–1610 MHz band averaged over any two millisecond interval.

**Test setup:** 1.2gj

##### Measurement results:

| Conducted Spurious Emissions [dBm] |          |             |                         |          |             |                         |          |             |
|------------------------------------|----------|-------------|-------------------------|----------|-------------|-------------------------|----------|-------------|
| f <sub>low</sub>                   |          |             | f <sub>mid</sub>        |          |             | f <sub>high</sub>       |          |             |
| F [MHz]                            | Detector | Level [dBm] | F [MHz]                 | Detector | Level [dBm] | F [MHz]                 | Detector | Level [dBm] |
| no critical peaks found            |          |             | no critical peaks found |          |             | no critical peaks found |          |             |
|                                    |          |             |                         |          |             |                         |          |             |
|                                    |          |             |                         |          |             |                         |          |             |
|                                    |          |             |                         |          |             |                         |          |             |
|                                    |          |             |                         |          |             |                         |          |             |
|                                    |          |             |                         |          |             |                         |          |             |
|                                    |          |             |                         |          |             |                         |          |             |
|                                    |          |             |                         |          |             |                         |          |             |
| Measurement uncertainty            |          |             | ± 1.5 dB                |          |             |                         |          |             |

n.f. = nothing found

**Note:** As the manufacturer declares that the RF Part is the same as in test report 1-8390/14-01-05, spurious measurements are only performed at mid frequency (fm).

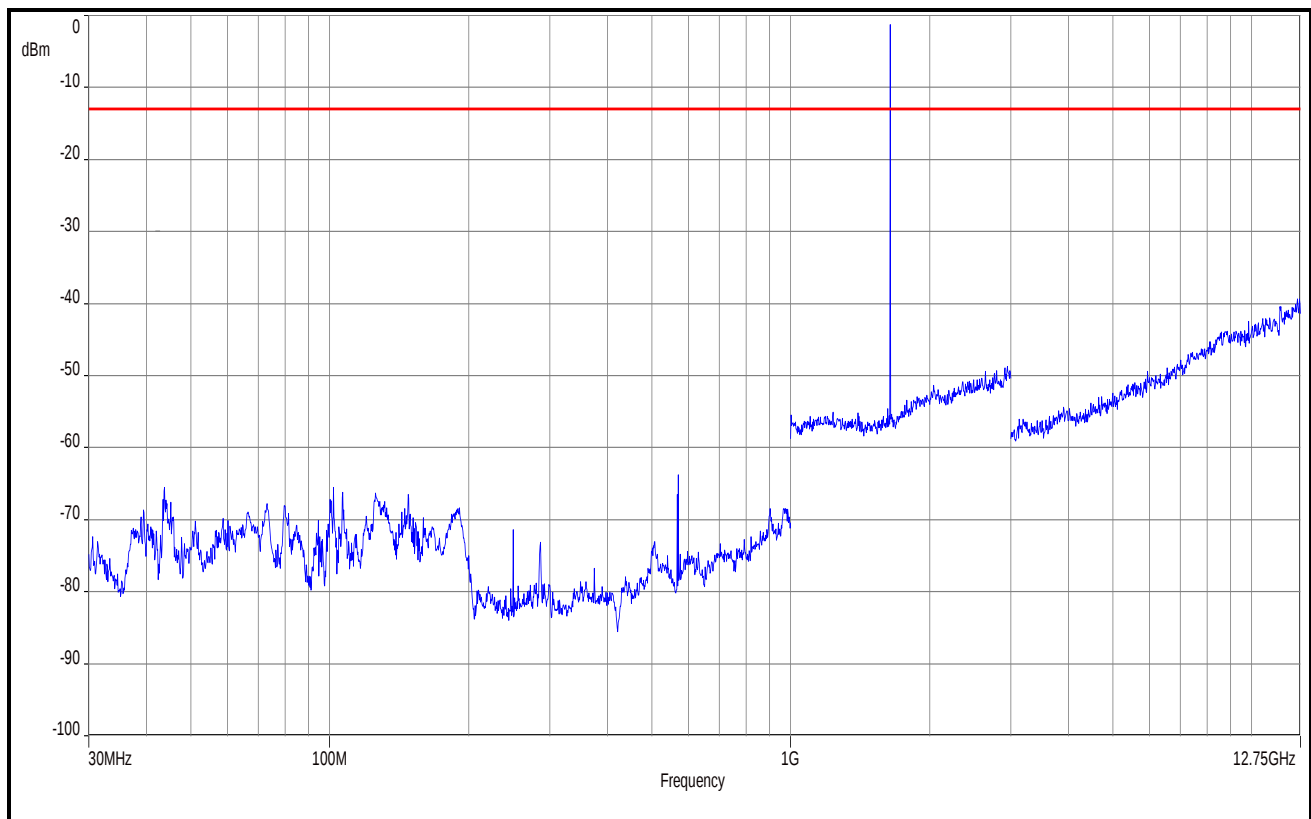
##### Plots:

see also Annex B, plot 13

**Verdict:** Passed

## Annex A Measurement results

This annex consists of 14 pages including this page.

**Plot No. 1 ( 13 )**

**Subclause:** 25.202 f) Frequencies, frequency tolerance and emission limitations  
Emission limitations, modulated carrier in the middle of the band  
Radiation coming out of DUT-cabinet(s): 30 MHz – 12.75 GHz

**Limit:**

Limit according to 25.202 f):  $-43.0 + 10 \log(P_{\max}) \text{ dBc/4kHz}$   
This corresponds to -13.0 dBm.

**Test results:**

see plot (an explicit table was not generated)

**Operating condition of DUT:**  
R5T1X, fm, see section 8.2

**Test setup:**

see section 9.2:

**Remark:**

Plot shows wanted signal.

**Test result:** Test passed

**Environment condition:**

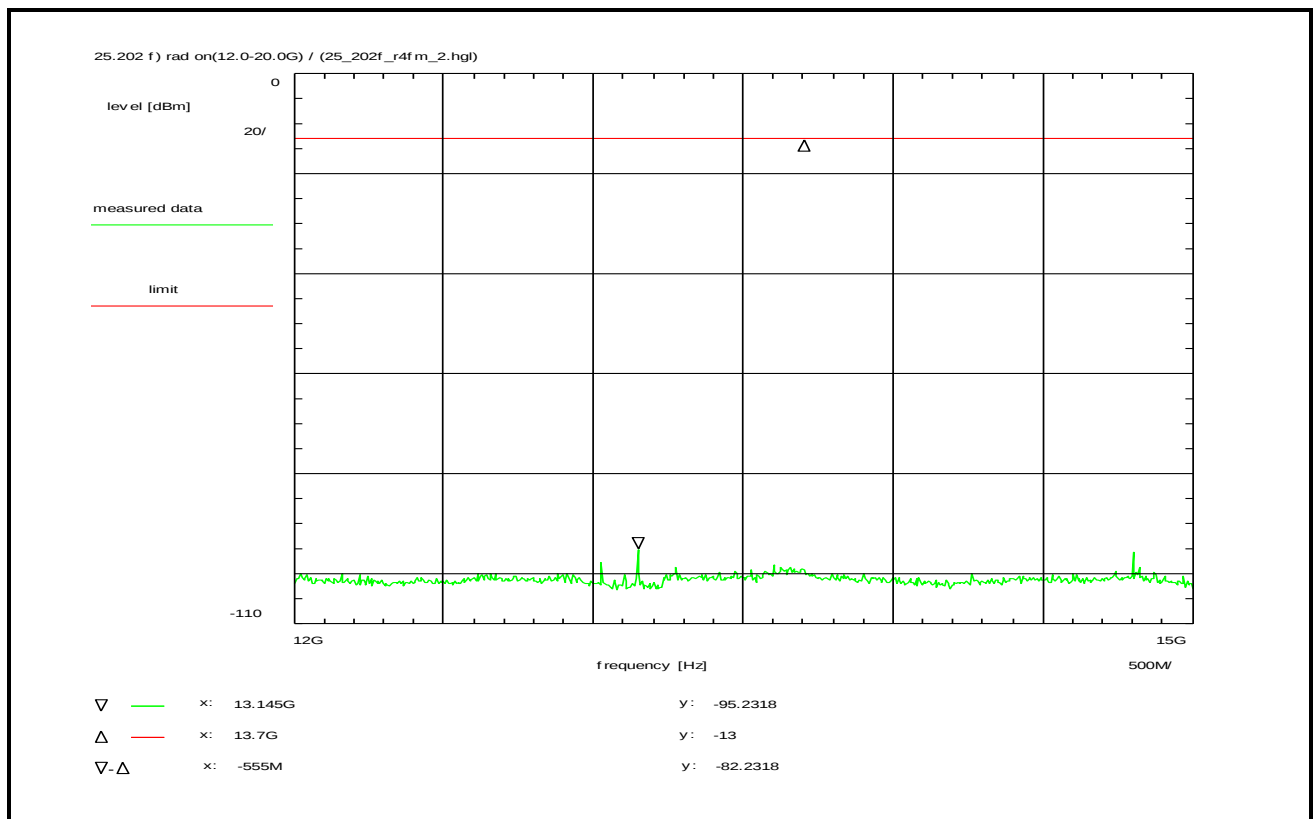
Date & Time: 01/Dec/2015  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 22 °C  
Humidity: 55 %  
Voltage: 230 Vac

**Setup of measurement equipment:**

Start frequency: 30 MHz  
Stop frequency: 12.75 GHz  
Resolution-BW: 100 kHz  
Video-BW: 300 kHz  
Detector-Mode: Pos Peak (Maximum-Hold)

**Remarks:**

Carrier-on state. Carrier in the middle of the band (fm).  
Radiated measurement in 3 m test distance.

**Plot No. 2 ( 13 )**

**Subclause:** 25.202 f) Frequencies, frequency tolerance and emission limitations  
Emission limitations, modulated carrier in the middle of the band  
Radiation coming out of DUT-cabinet(s): 12.0 GHz - 15.0 GHz

**Limit:**

Limit according to 25.202 f):  $-43.0 + 10 \log(P_{\max}) \text{ dBc/4kHz}$   
This corresponds to -13.0 dBm.

**Test results:**

see plot (an explicit table was not generated)

**Operating condition of DUT:**

R5T1X, fm, see section 8.2

**Test setup:**

see section 9.3:

**Test equipment:**

see annex A: A016, A039, B11b, C219, R001, U019

**Remark:**

**Test result:** Test passed

**Environment condition:**

Date & Time: Wed 02/Dec/2015 08:26:40  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 22 °C  
Humidity: 55 %  
Voltage: 230 Vac

**Setup of measurement equipment:**

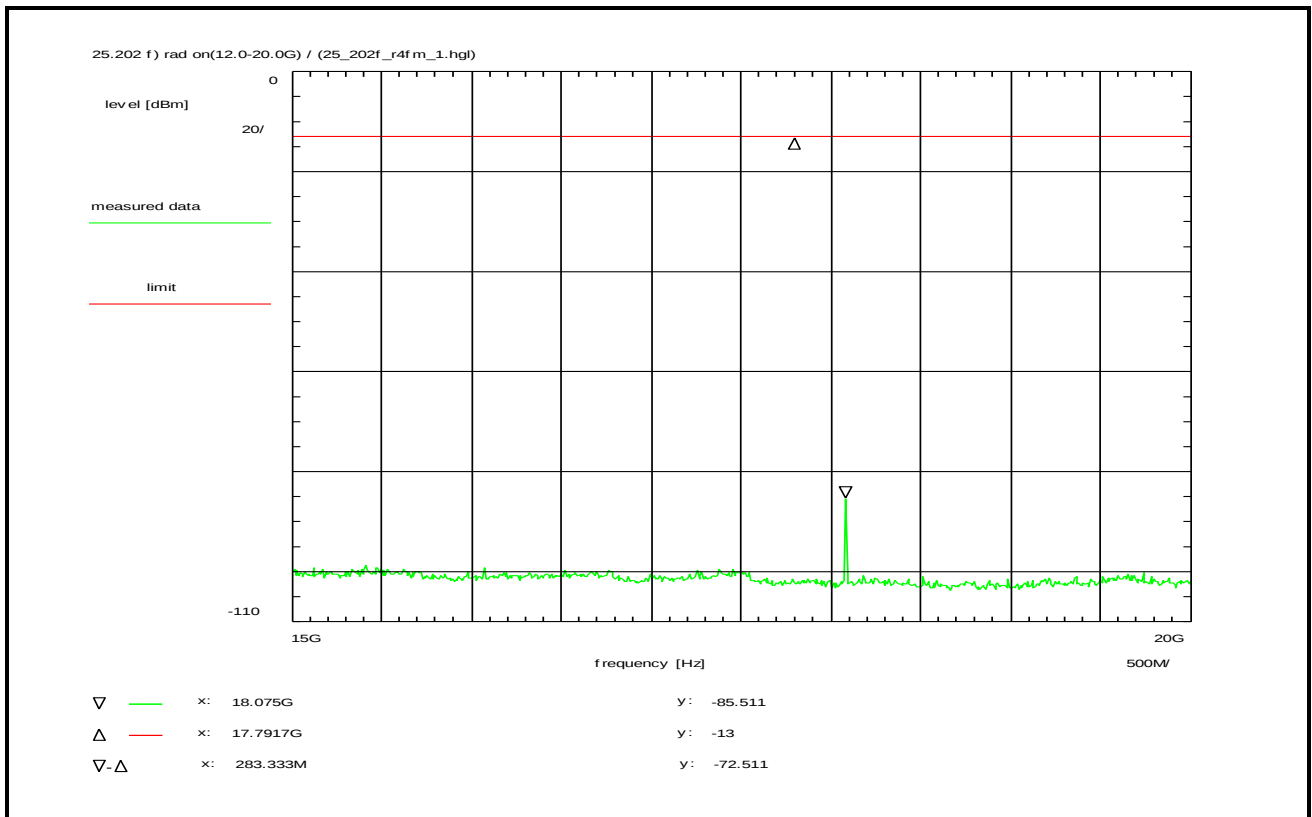
Start frequency: 12 GHz  
Stop frequency: 15 GHz  
Center frequency: 13.5 GHz  
Frequency span: 3 GHz  
Input attenuation: 10 dB  
Resolution-BW: 100 kHz  
Video-BW: 100 kHz  
Video-Average: 1 sweep(s) (>1)  
Detector-Mode: 2 Pos Peak (Maximum-Hold)

**Correction (average):**

Directional coupler + 0.0 dB  
Coaxial cable (C219) + 2.2 dB  
DUT-Antenna (on-axis) + 0.0 dBi  
Test antenna (A039) - 19.1 dB  
BW correction factor (100k -> 4k) - 14.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
(B11b) - 31.1 dB  
(13.50GHz, 0.4m) + 47.1 dB  
TOTAL CORRECTION: - 14.9 dB

**Remarks:**

Carrier-on state. Carrier in the middle of the band (fm).  
Radiated measurement in 1 m test distance.

**Plot No. 3 ( 13 )**

**Subclause:** 25.202 f) Frequencies, frequency tolerance and emission limitations  
Emission limitations, modulated carrier in the middle of the band  
Radiation coming out of DUT-cabinet(s): 15.0 GHz - 20.0 GHz

**Limit:**

Limit according to 25.202 f):  $-43.0 + 10 \log(P_{\max}) \text{ dBc/4kHz}$   
This corresponds to -13.0 dBm.

**Test results:**

see plot (an explicit table was not generated)

**Operating condition of DUT:**

R5T1X, fm, see section 8.2

**Test setup:**

see section 9.3:

**Test equipment:**

see annex A: A016, A039, B11b, C219, R001, U019

**Remark:**

**Test result:** Test passed

**Environment condition:**

Date & Time: Wed 02/Dec/2015 08:21:37  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 22 °C  
Humidity: 55 %  
Voltage: 230 Vac

**Setup of measurement equipment:**

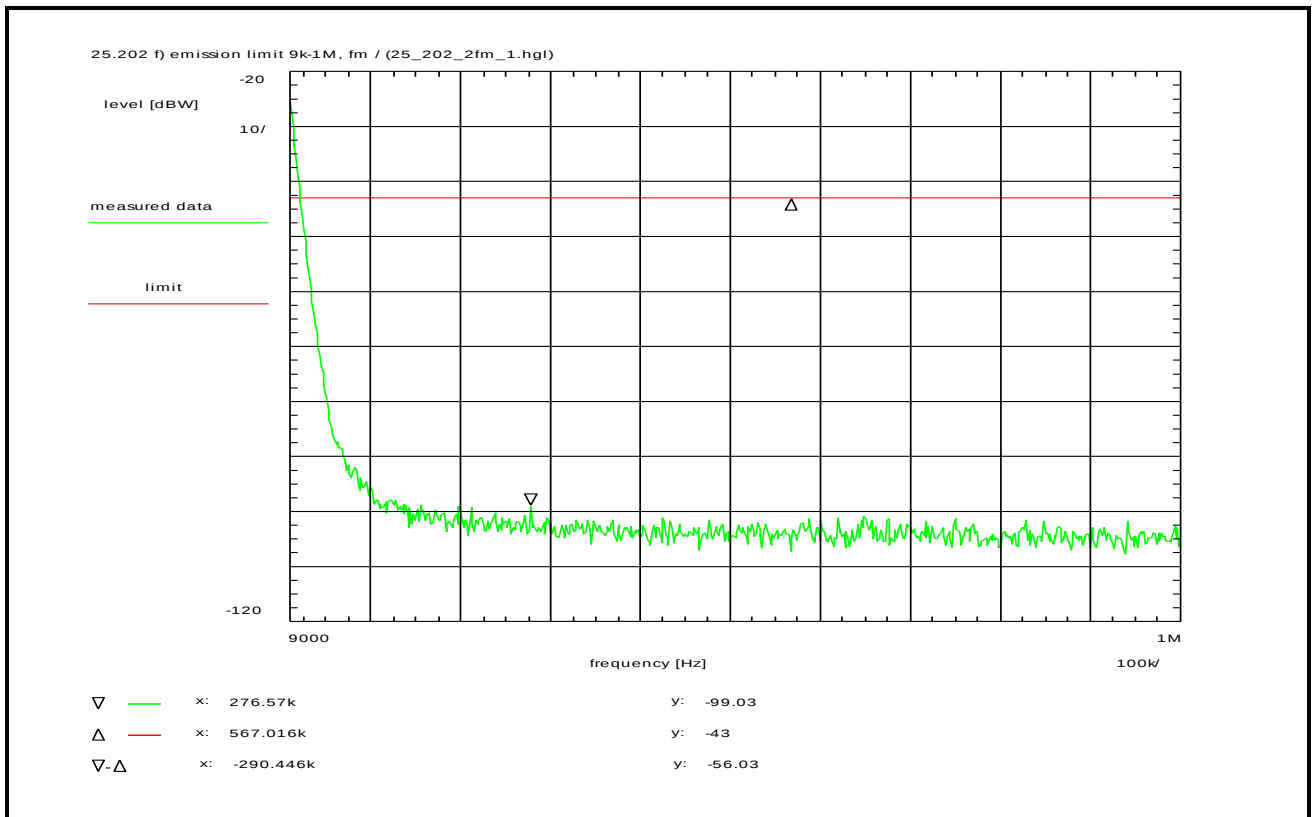
Start frequency: 15 GHz  
Stop frequency: 20 GHz  
Center frequency: 17.5 GHz  
Frequency span: 5 GHz  
Input attenuation: 10 dB  
Resolution-BW: 100 kHz  
Video-BW: 100 kHz  
Video-Average: 1 sweep(s) (>1)  
Detector-Mode: 2 Pos Peak (Maximum-Hold)

**Correction (average):**

Directional coupler + 0.0 dB  
Coaxial cable (C219) + 2.6 dB  
DUT-Antenna (on-axis) + 0.0 dBi  
Test antenna (A016) - 19.7 dB  
BW correction factor (100k -> 4k) - 14.0 dB  
Atten. between HPA and feedhorn - 0.0 dB  
(B11b) - 31.1 dB  
(17.50GHz, 0.3m) + 46.8 dB  
TOTAL CORRECTION: - -15.4 dB

**Remarks:**

Carrier-on state. Carrier in the middle of the band (fm).  
Radiated measurement in 1 m test distance.

**Plot No. 4 ( 13 )**

**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:  $-43+10\log(P_{max})\text{dBc/4kHz} = -43\text{ dBW}$

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:

R5T1X, fm, see section 8.2

Test setup:

see section 9.1: 1.2 hijg

Test equipment:

see annex A: C219, FCob, R001

Remark:

**Test result:** Test passed

Environment condition:

Date & Time: Wed 02/Dec/2015 10:31:57

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

Input attenuation: 10 dB

Resolution-BW: 10 kHz

Video-BW: 10 kHz

Video-Average: 1 sweep(s) (>1)

Detector-Mode: 2 Pos Peak (Maximum-Hold)

Correction (average):

Directional coupler + 0.0 dB

Coaxial cable (C219) + 0.1 dB

DUT-Antenna (on-axis) + 11.2 dBi

Test antenna + 0.0 dB

BW correction factor (10k -> 4k) - 4.0 dB

Atten. between HPA and feedhorn + 0.0 dB

Attenuator + 6.0 dB

Band stop filter (FCob) + 0.0 dB

TOTAL CORRECTION: + 13.3 dB

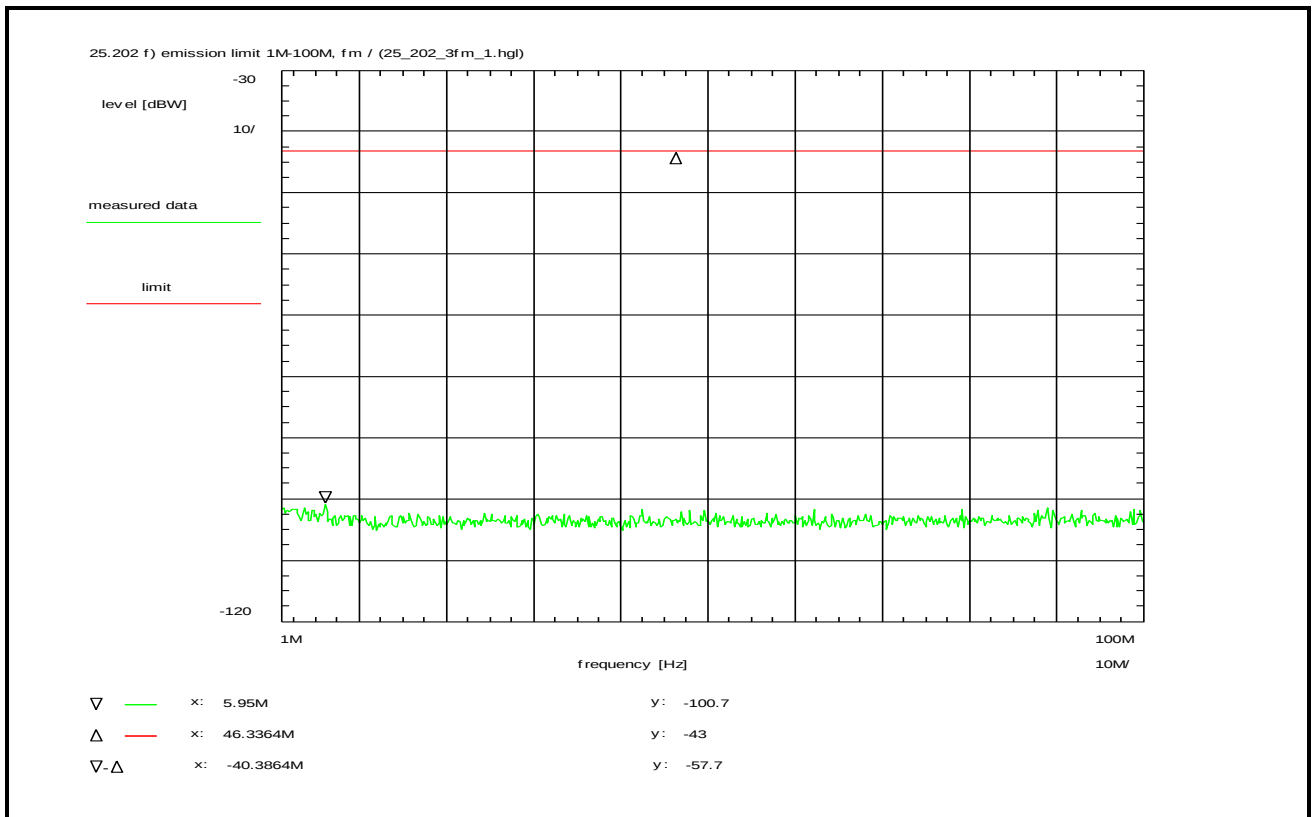
Remarks:

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

For EIRP calculation:

'worst-case' = maximum antenna gain

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

**Plot No. 5 ( 13 )**

**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:

R5T1X, fm, see section 8.2

Test setup:

see section 9.1: 1.2 hijg

Test equipment:

see annex A: C219, FCob, R001

Remark:

**Test result:** Test passed

Environment condition:

Date & Time: Wed 02/Dec/2015 10:29:57

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

Input attenuation: 10 dB

Resolution-BW: 10 kHz

Video-BW: 10 kHz

Video-Average: 1 sweep(s) (>1)

Detector-Mode: 2 Pos Peak (Maximum-Hold)

Correction (average):

Directional coupler + 0.0 dB

Coaxial cable (C219) + 0.1 dB

DUT-Antenna (on-axis) + 11.2 dBi

Test antenna + 0.0 dB

BW correction factor (10k -> 4k) - 4.0 dB

Atten. between HPA and feedhorn + 0.0 dB

Attenuator + 6.0 dB

Band stop filter (FCob) + 0.0 dB

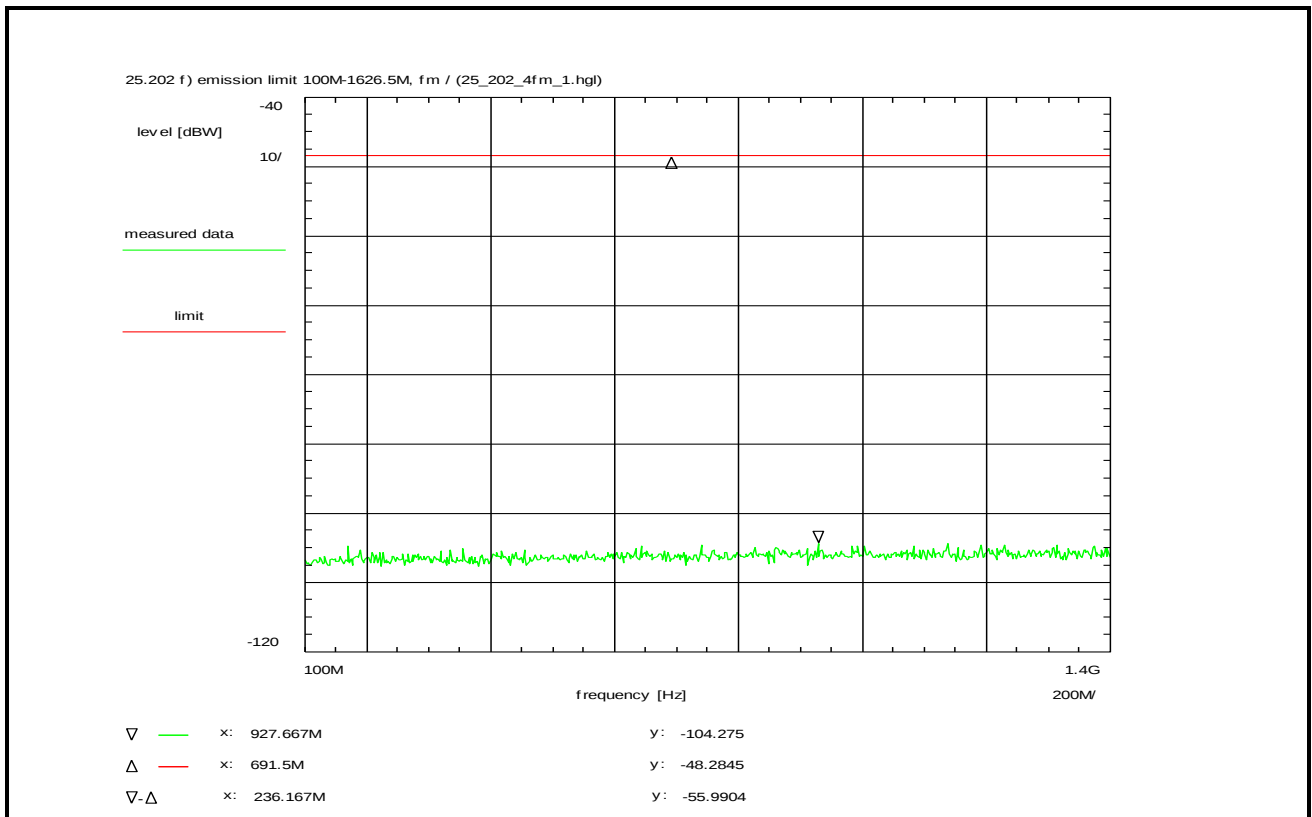
TOTAL CORRECTION: + 13.3 dB

Remarks:

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

For EIRP calculation:

'worst-case' = maximum antenna gain

**Plot No. 6 ( 13 )**

**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:  $-43+10\log(P_{max})\text{dBc/4kHz} = -43\text{ dBW}$

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:

R5T1X, fm, see section 8.2

Test setup:

see section 9.1: 1.2 hlgj

Test equipment:

see annex A: C219, FCob, R001, U005

Remark:

**Test result:** Test passed

Environment condition:

Date & Time: Wed 02/Dec/2015 09:52:21

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: 1400 MHz

Center frequency: 750 MHz

Frequency span: 1300 MHz

Input attenuation: 10 dB

Resolution-BW: 10 kHz

Video-BW: 10 kHz

Video-Average: 1 sweep(s) (>1)

Detector-Mode: 2 Pos Peak (Maximum-Hold)

Correction (average):

Directional coupler + 0.0 dB

Coaxial cable (C219) + 0.5 dB

DUT-Antenna (on-axis) + 11.2 dBi

Test antenna + 0.0 dB

BW correction factor (10k -> 4k) - 4.0 dB

Atten. between HPA and feedhorn + 0.0 dB

Attenuator + 6.0 dB

Band stop filter (FCob) + 3.0 dB

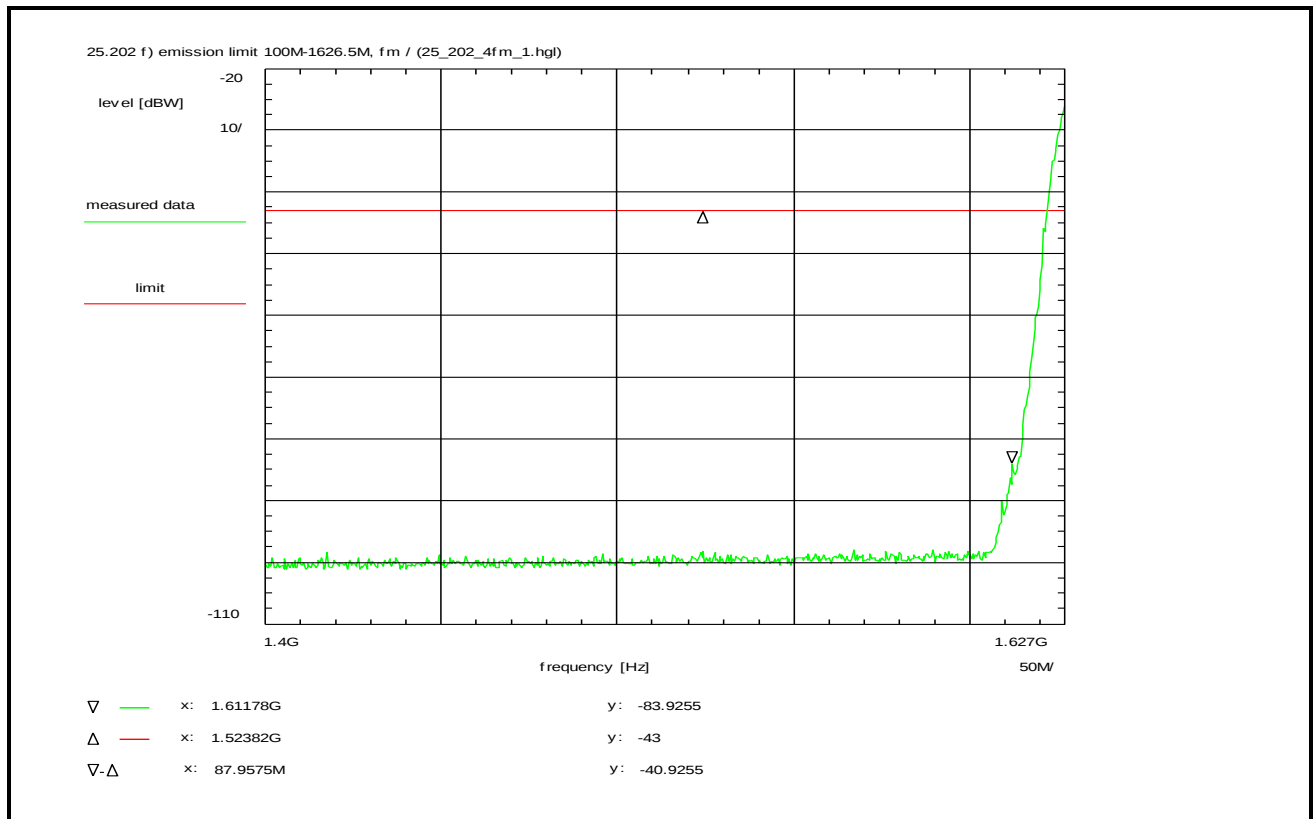
TOTAL CORRECTION: + 16.7 dB

Remarks:

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

For EIRP calculation:

'worst-case' = maximum antenna gain

**Plot No. 7 ( 13 )**

**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:  $-43+10\log(P_{max})\text{dBc/4kHz} = -43\text{ dBW}$

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:

R5T1X, fm, see section 8.2

Test setup:

see section 9.1: 1.2 hij

Test equipment:

see annex A: C219, FCob, R001, U005

Remark:

**Test result:** Test passed (see also next plot)

Environment condition:

Date & Time: Wed 02/Dec/2015 09:52:21  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 22 °C  
Humidity: 55 %  
Voltage: 230 Vac

Setup of measurement equipment:

Start frequency: 1.4 GHz  
Stop frequency: 1.6265 GHz  
Center frequency: 1.51325 GHz  
Frequency span: 226.5 MHz  
Input attenuation: 10 dB  
Resolution-BW: 10 kHz  
Video-BW: 10 kHz  
Video-Average: 1 sweep(s) (>1)  
Detector-Mode: 2 Pos Peak (Maximum-Hold)

Correction (average):

|                                  |            |
|----------------------------------|------------|
| Directional coupler              | + 0.0 dB   |
| Coaxial cable (C219)             | + 0.7 dB   |
| DUT-Antenna (on-axis)            | + 11.2 dBi |
| Test antenna                     | + 0.0 dB   |
| BW correction factor (10k -> 4k) | - 4.0 dB   |
| Atten. between HPA and feedhorn  | + 0.0 dB   |
| Attenuator                       | + 6.0 dB   |
| Band stop filter (FCob)          | + 3.0 dB   |
| TOTAL CORRECTION:                | + 16.9 dB  |

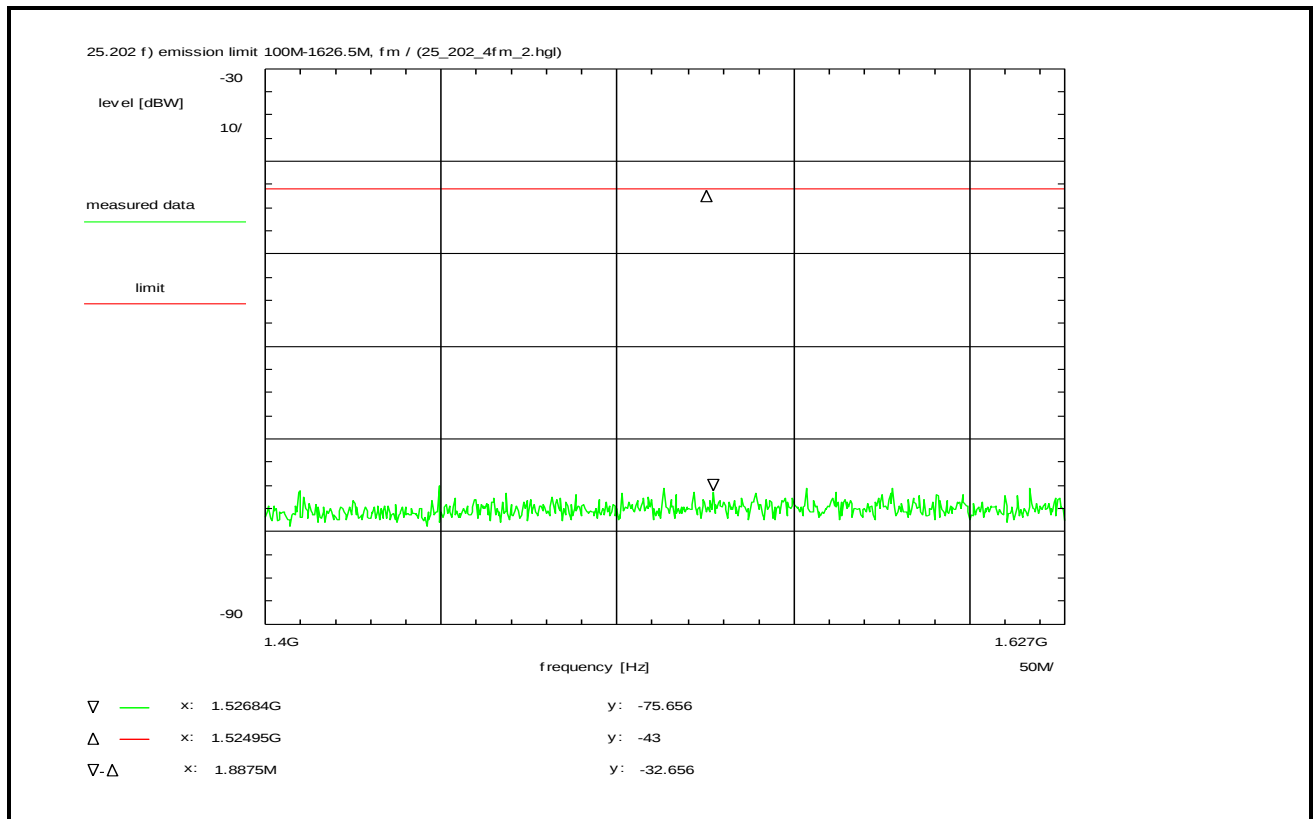
Remarks:

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

For EIRP calculation:

'worst-case' = maximum antenna gain

Rather right the plot shows the lower edge of the band stop filter. (see also next plot)

**Plot No. 8 ( 13 )**

**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:  $-43+10\log(P_{max})\text{dBc/4kHz} = -43\text{ dBW}$

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:

R5T1X, fm, see section 8.2

Test setup:

see section 9.1: 1.2 hgj

Test equipment:

see annex A: C219, R001, U005

Remark:

**Test result:** Test passed

Environment condition:

Date & Time: Wed 02/Dec/2015 09:43:51

Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat

Temperature: 22 °C

Humidity: 55 %

Voltage: 230 Vac

Setup of measurement equipment:

Start frequency: 1.4 GHz

Stop frequency: 1.6265 GHz

Center frequency: 1.51325 GHz

Frequency span: 226.5 MHz

Input attenuation: 10 dB

Resolution-BW: 10 kHz

Video-BW: 10 kHz

Video-Average: 1 sweep(s) (>1)

Detector-Mode: 2 Pos Peak (Maximum-Hold)

Correction (average):

Directional coupler + 0.0 dB

Coaxial cable (C219) + 0.7 dB

DUT-Antenna (on-axis) + 11.2 dBi

Test antenna + 0.0 dB

BW correction factor (10k -> 4k) - 4.0 dB

Atten. between HPA and feedhorn + 0.0 dB

Attenuator (U005) + 29.8 dB

( + 0.0 dB

TOTAL CORRECTION: + 37.7 dB

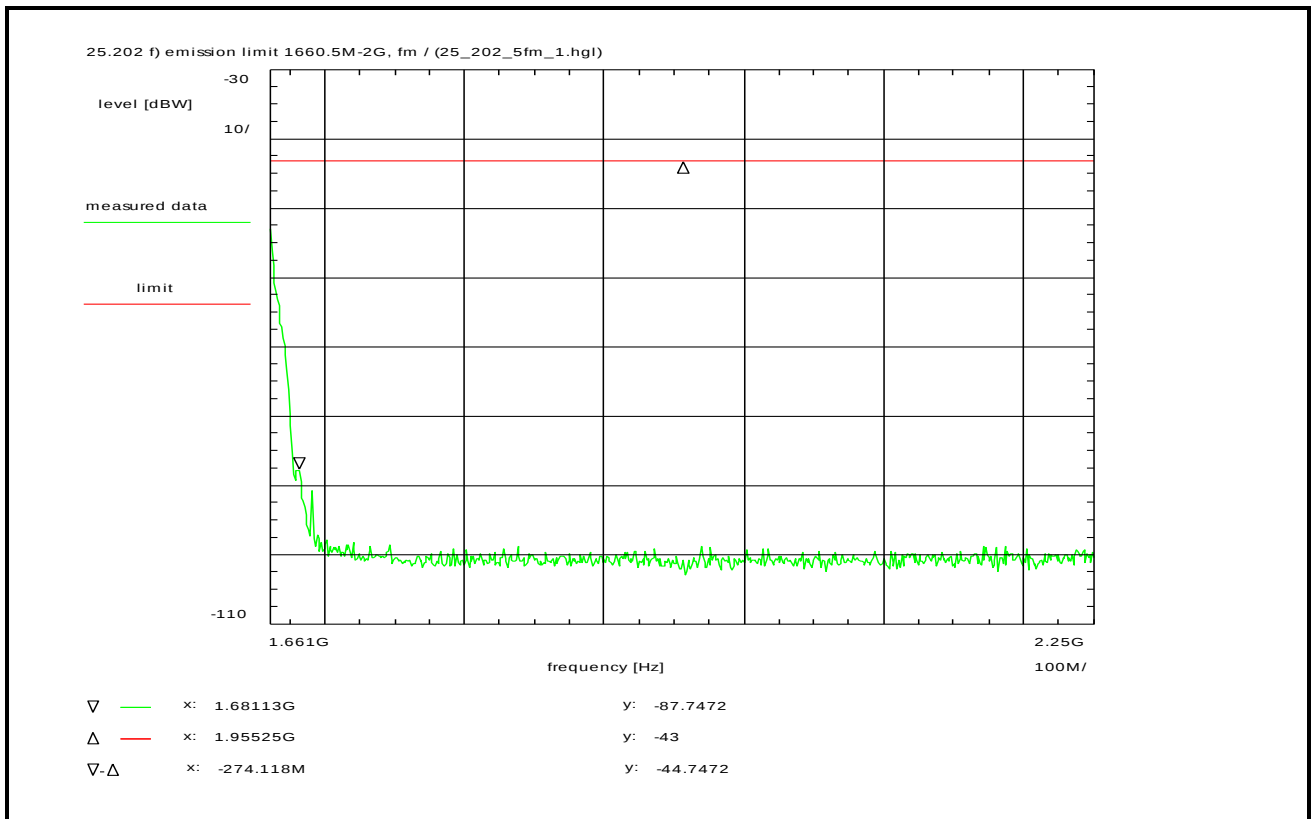
Remarks:

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

For EIRP calculation:

'worst-case' = maximum antenna gain

Retest without band stop filter.

**Plot No. 9 ( 13 )**

**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:  $-43+10\log(P_{max})\text{dBc/4kHz} = -43\text{ dBW}$

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:

R5T1X, fm, see section 8.2

Test setup:

see section 9.1: 1.2 hijg

Test equipment:

see annex A: C219, FCob, R001

Remark:

**Test result:** Test passed

Environment condition:

Date & Time: Wed 02/Dec/2015 09:56:20

Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat

Temperature: 22 °C

Humidity: 55 %

Voltage: 230 Vac

Setup of measurement equipment:

Start frequency: 1.6605 GHz

Stop frequency: 2.25 GHz

Center frequency: 1.95525 GHz

Frequency span: 589.5 MHz

Input attenuation: 10 dB

Resolution-BW: 10 kHz

Video-BW: 10 kHz

Video-Average: 1 sweep(s) (>1)

Detector-Mode: 2 Pos Peak (Maximum-Hold)

Correction (average):

Directional coupler + 0.0 dB

Coaxial cable (C219) + 0.8 dB

DUT-Antenna (on-axis) + 11.2 dBi

Test antenna + 0.0 dB

BW correction factor (10k -> 4k) - 4.0 dB

Atten. between HPA and feedhorn + 0.0 dB

Attenuator + 6.0 dB

Band stop filter (FCob) + 1.8 dB

TOTAL CORRECTION: + 15.8 dB

Remarks:

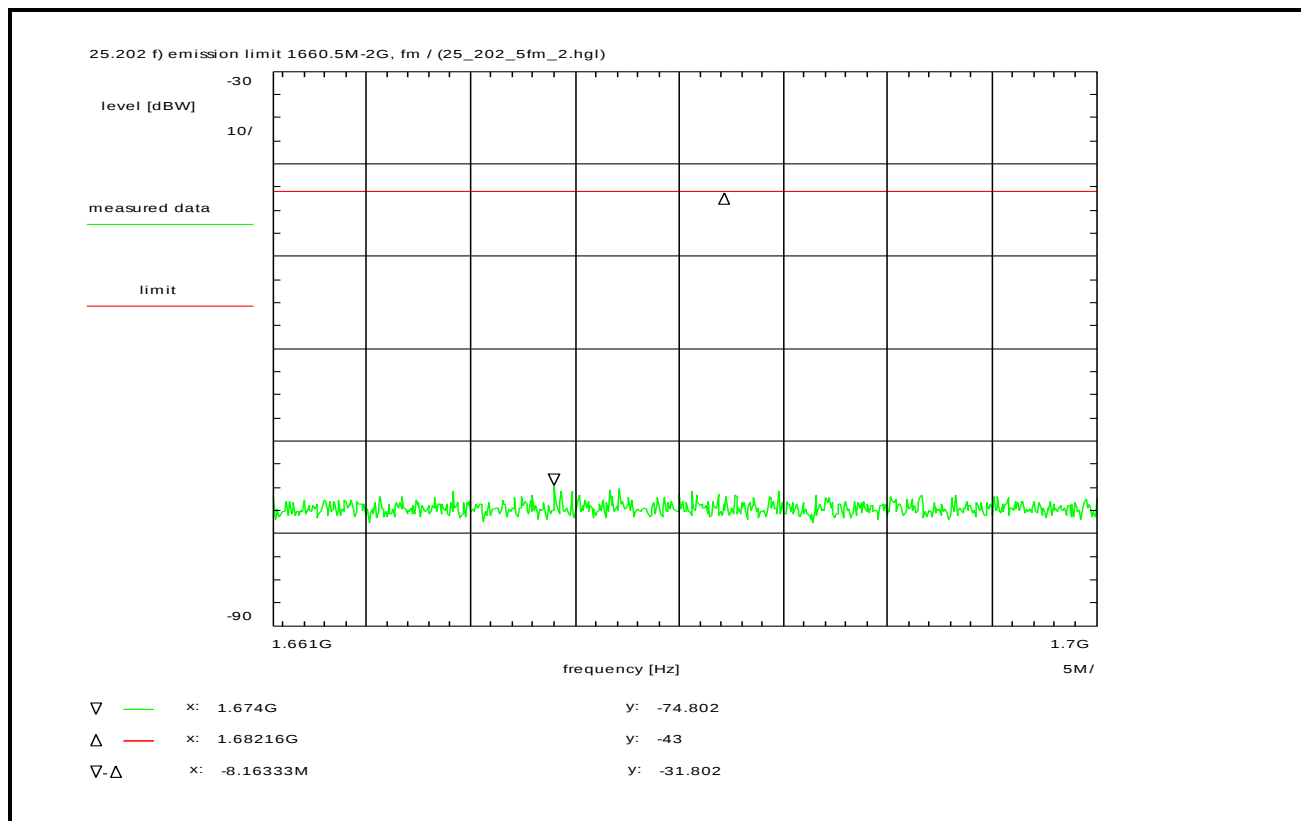
Carrier-on state / Carrier in the middle of the band (fm)

For EIRP calculation:

'worst-case' = maximum antenna gain

Rather left the plot shows the upper edge of the band stop filter.

## Plot No. 10 ( 13 )



**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:  $-43+10\log(P_{max})\text{dBc/4kHz} = -43\text{ dBW}$

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:

R5T1X, fm, see section 8.2

Test setup:

see section 9.1: 1.2 hgj

Test equipment:

see annex A: C219, R001, U005

Remark:

**Test result:** Test passed

Environment condition:

Date & Time: Wed 02/Dec/2015 09:42:12  
Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat  
Temperature: 22 °C  
Humidity: 55 %  
Voltage: 230 Vac

Setup of measurement equipment:

Start frequency: 1.6605 GHz  
Stop frequency: 1.7 GHz  
Center frequency: 1.68025 GHz  
Frequency span: 39.5 MHz  
Input attenuation: 10 dB  
Resolution-BW: 10 kHz  
Video-BW: 10 kHz  
Video-Average: 1 sweep(s) (>1)  
Detector-Mode: 2 Pos Peak (Maximum-Hold)

Correction (average):

|                                  |            |
|----------------------------------|------------|
| Directional coupler              | + 0.0 dB   |
| Coaxial cable (C219)             | + 0.7 dB   |
| DUT-Antenna (on-axis)            | + 11.2 dBi |
| Test antenna                     | + 0.0 dB   |
| BW correction factor (10k -> 4k) | - 4.0 dB   |
| Atten. between HPA and feedhorn  | + 0.0 dB   |
| Attenuator (U005)                | + 29.8 dB  |
| (                                | + 0.0 dB   |
| TOTAL CORRECTION:                | + 37.7 dB  |

Remarks:

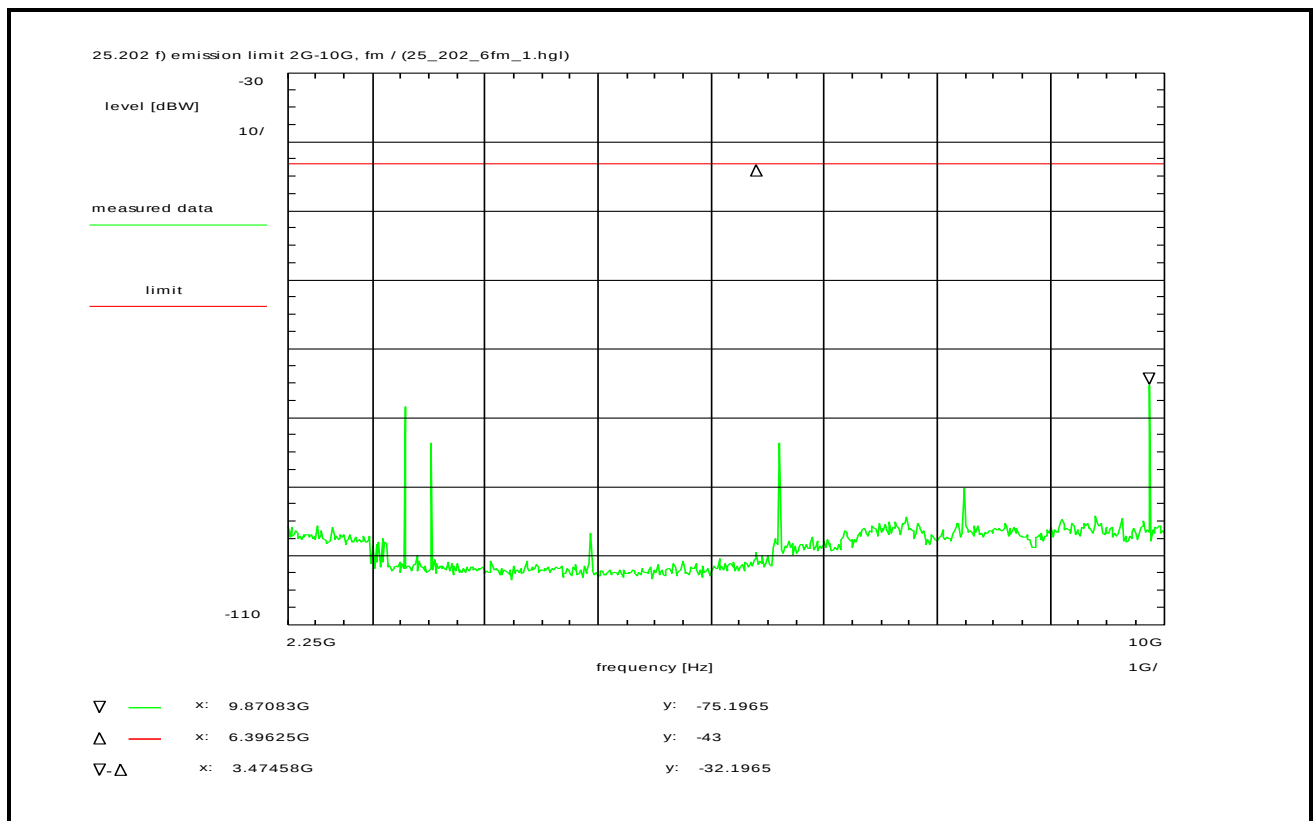
Carrier-on state / Carrier in the middle of the band (fm)

For EIRP calculation:

'worst-case' = maximum antenna gain

Retest without band stop filter.

## Plot No. 11 ( 13 )



**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:

R5T1X, fm, see section 8.2

Test setup:

see section 9.1: 1.2 hijg

Test equipment:

see annex A: C219, F227, R001

Remark:

**Test result:** Test passed

Environment condition:

Date & Time: Wed 02/Dec/2015 10:03:47

Location: CETECOM ICT Services GmbH, Laboratory RSC-Sat

Temperature: 22 °C

Humidity: 55 %

Voltage: 230 Vac

Setup of measurement equipment:

Start frequency: 2.25 GHz

Stop frequency: 10 GHz

Center frequency: 6.125 GHz

Frequency span: 7.75 GHz

Input attenuation: 10 dB

Resolution-BW: 10 kHz

Video-BW: 10 kHz

Video-Average: 1 sweep(s) (>1)

Detector-Mode: 2 Pos Peak (Maximum-Hold)

Correction (average):

Directional coupler + 0.0 dB

Coaxial cable (C219) + 1.4 dB

DUT-Antenna (on-axis) + 11.2 dBi

Test antenna + 0.0 dB

BW correction factor (10k -> 4k) - 4.0 dB

Atten. between HPA and feedhorn + 0.0 dB

Attenuator + 6.0 dB

High pass filter (F227) + 1.3 dB

TOTAL CORRECTION: + 15.9 dB

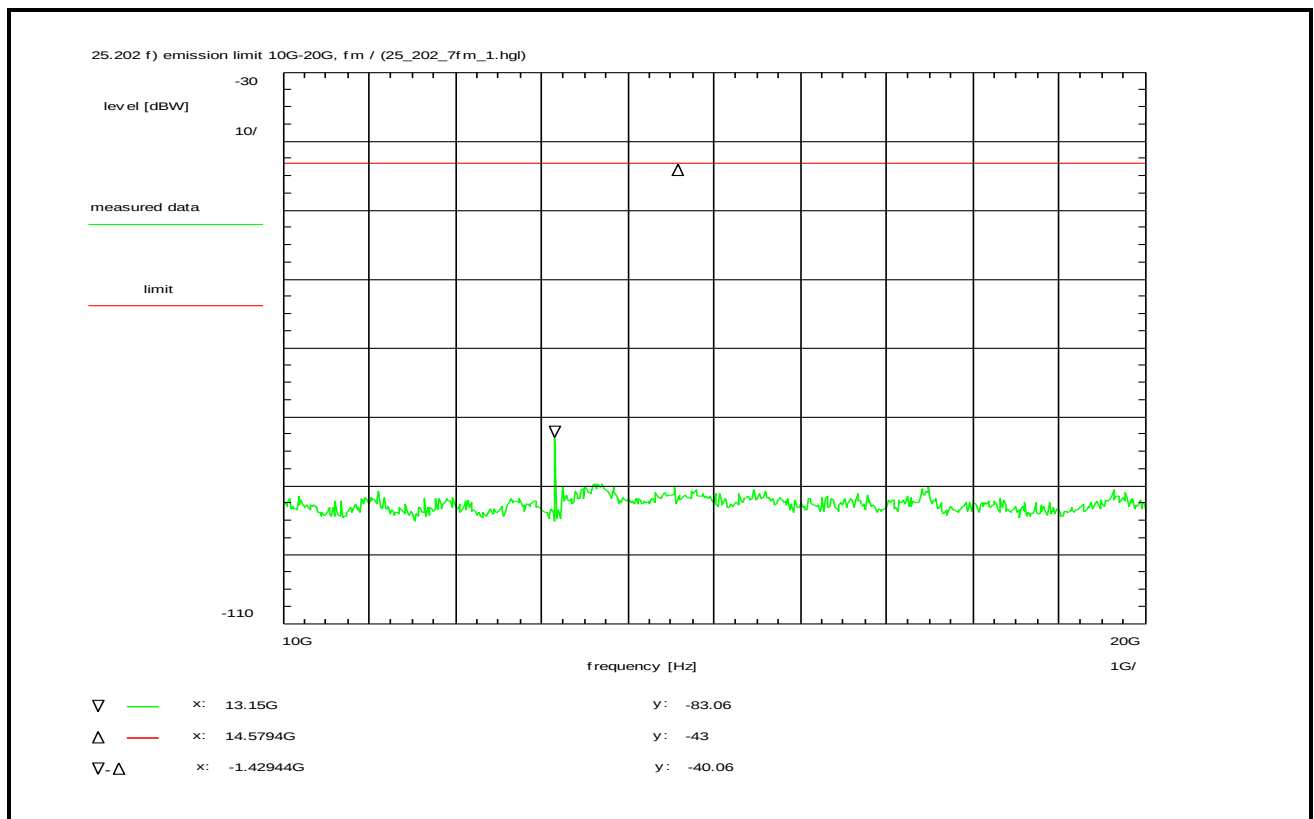
Remarks:

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

For EIRP calculation:

'worst-case' = maximum antenna gain

## Plot No. 12 ( 13 )



**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:  $-43+10\log(P_{max})\text{dBc/4kHz} = -43\text{ dBW}$

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:

R5T1X, fm, see section 8.2

Test setup:

see section 9.1: 1.2 hgl

Test equipment:

see annex A: C219, F227, R001

Remark:

**Test result:** Test passed

Environment condition:

Date & Time: Wed 02/Dec/2015 10:12:21

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: 20 GHz

Center frequency: 15 GHz

Frequency span: 10 GHz

Input attenuation: 10 dB

Resolution-BW: 10 kHz

Video-BW: 10 kHz

Video-Average: 1 sweep(s) (>1)

Detector-Mode: 2 Pos Peak (Maximum-Hold)

Correction (average):

Directional coupler + 0.0 dB

Coaxial cable (C219) + 2.3 dB

DUT-Antenna (on-axis) + 11.2 dBi

Test antenna + 0.0 dB

BW correction factor (10k -> 4k) - 4.0 dB

Atten. between HPA and feedhorn + 0.0 dB

Attenuator + 6.0 dB

High pass filter (F227) + 4.6 dB

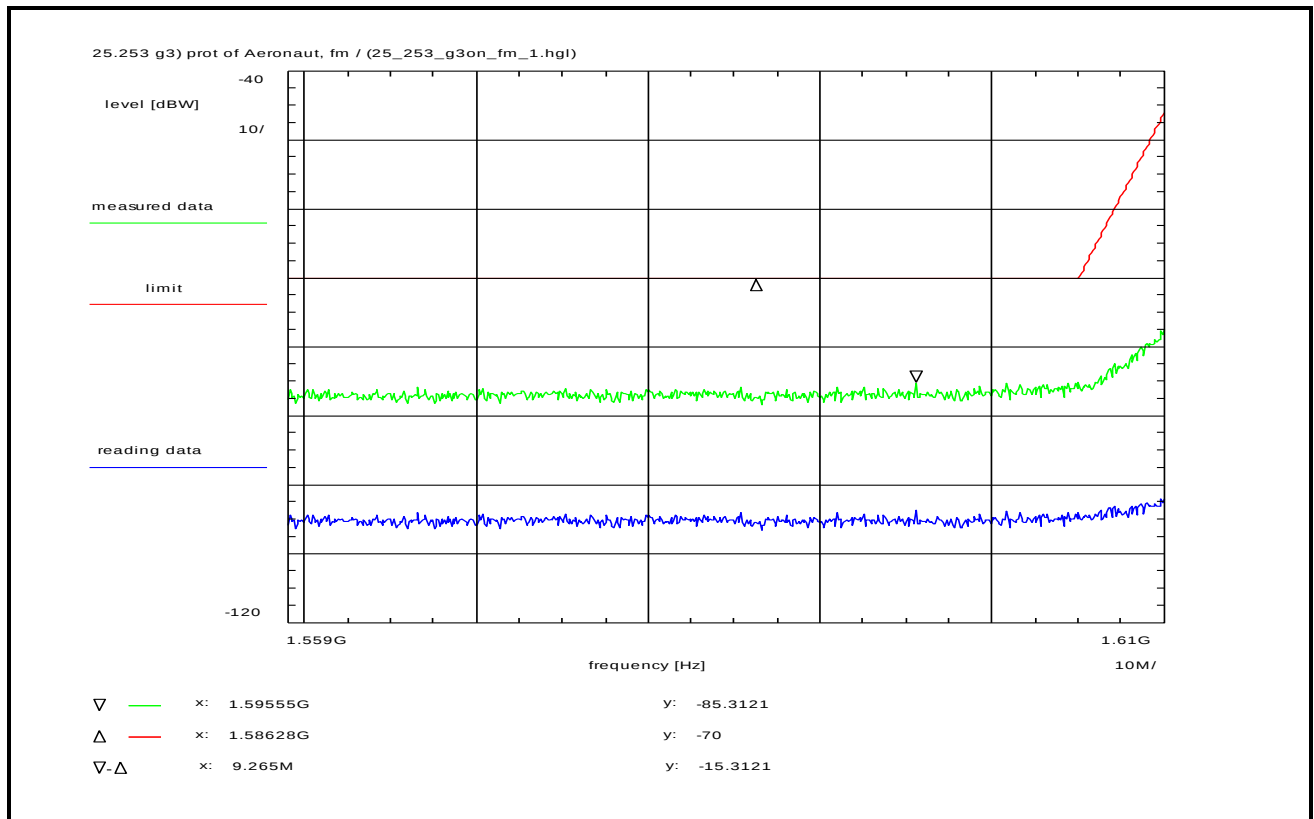
TOTAL CORRECTION: + 20.1 dB

Remarks:

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

For EIRP calculation:

'worst-case' = maximum antenna gain

**Plot No. 13 ( 13 )**

Subclause: 25.253 g3) Special requirements for ancillary terrestrial components operating in the 1626.5-1660.5 MHz / 1525-1559 MHz bands  
Carrier-on state, modulated carrier in the middle of the band (fm)  
Conducted measurement at the antenna-connector

Limit:

Limit according to 25.253 g3):

1559.0 - 1605.0MHz: -70dBW/1MHz

1605.0 - 1610MHz: -70 to -46dBW/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:

R5T1X, fm, see section 8.2

Test setup:

see section 9.1: 1.2 higj

Test equipment:

see annex A: C219, FCob, R001

Remark:

**Test result:** Test passed

Environment condition:

Date & Time: Wed 02/Dec/2015 06:55:21

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

Input attenuation: 10 dB

Resolution-BW: 1 MHz

Video-BW: 1 MHz

Video-Average: 100 sweep(s) (>1)

Detector-Mode: 1 Sample (VidAvg / VidBW<300Hz)

Correction (average):

Directional coupler + 0.0 dB

Coaxial cable (C219) + 0.7 dB

DUT-Antenna (on-axis) + 11.2 dBi

Test antenna + 0.0 dB

BW correction factor + 0.0 dB

Atten. between HPA and feedhorn + 0.0 dB

Attenuation + 6.0 dB

Band stop filter (FCob) + 0.3 dB

TOTAL CORRECTION: + 18.2 dB

Remarks:

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

Measurement with 1 MHz resolution/video filter and noise averaging.

For EIRP calculation:

'worst-case' = maximum antenna gain

**Annex B Document history**

| Version | Applied changes                              | Date of release |
|---------|----------------------------------------------|-----------------|
| DRAFT   | Initial release - DRAFT                      | 2016-01-11      |
|         | minor changes based on manufacturer comments | 2016-01-22      |

**Annex C Further information****Glossary**

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

## Annex D Accreditation Certificate

Front side of certificate

Back side of certificate



Deutsche Akkreditierungsstelle GmbH

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

### Akkreditierung



Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

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

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

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

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem 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

Date of issue of the certificate

Im Auftrag D-PL-12076-01-00  
 Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Standort Berlin  
 Spittelmarkt 10  
 10117 Berlin

Standort Frankfurt am Main  
 Gartenstraße 6  
 60594 Frankfurt am Main

Standort Braunschweig  
 Bundesallee 100  
 38115 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 uneingeschränkte 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 Akkreditierungsstellen (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 (Abt. L 218 vom 9. Juli 2008, S. 30).  
 Die DAkkS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der  
 European Cooperation 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](http://www.european-accreditation.org)  
 ILAC: [www.ilac.org](http://www.ilac.org)  
 IAF: [www.iaf.eu](http://www.iaf.eu)

### Note:

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

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