

# Test Report

## T-0249-5106-00 JP

Type / Model Name: WT41-E

FCC ID: QOQWT41E

Product Description: Bluetooth module

Applicant: MSC Freiburg GmbH

## EMC -- TEST REPORT

|                                     |                             |
|-------------------------------------|-----------------------------|
| Test Report No. : T-0249-5106-00 JP | 2013-11-11<br>Date of issue |
|-------------------------------------|-----------------------------|

Type / Model Name : WT41-E

FCC ID: QOQWT41E

Product Description : Bluetooth module

Applicant : MSC Freiburg GmbH

Address : August-Wessels-Str. 17

86156 Augsburg

Germany

Manufacturer : Bluegiga Technologies Oy

Address : Sinikalliontie 5 A

FI-02630 Espoo

Finland

|                                                                           |          |
|---------------------------------------------------------------------------|----------|
| Test Result according to the standards listed in clause 1 test standards: | POSITIVE |
|---------------------------------------------------------------------------|----------|



Deutsche  
Akkreditierungsstelle  
D-PL-12141-01-01

The test report merely corresponds to the test sample.  
It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

File No. T-0249-5106-00 JP

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## **1 TEST STANDARDS**

The tests were performed according to following standards:

|                              |                                                                                                                                                                       |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FCC Part 15 Subpart A : 2012 | Code of Regulations Part 15 (Radio Frequency Devices), Subpart A (General) of the Federal Communication Commission (FCC)                                              |
| FCC Part 15 Subpart C : 2012 | Code of Regulations Part 15 (Radio Frequency Devices), Subpart C (Intentional Radiators) of the Federal Communication Commission (FCC)<br>Applied Paragraphs: §15.209 |
| ANSI C63.4-2003              | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz – 40 GHz     |

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## 2 OVERVIEW TEST RESULT

| Performed test(s)                      | Result |        |               |
|----------------------------------------|--------|--------|---------------|
|                                        | Passed | Failed | Not performed |
| Radiated disturbance (30MHz – 1000MHz) | X      |        |               |
| Radiated disturbance (1 GHz – 25 GHz)  | X      |        |               |

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### 3 SUMMARY

#### GENERAL REMARKS:

The frequency range was scanned from 30 MHz to 25GHz.

#### FINAL ASSESSMENT:

The equipment under test **fulfills** the EMC requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 2013-10-22

Testing concluded on : 2013-10-31

Checked by:

Tested by:

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Wolfgang Straubinger

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Jürgen Pessinger

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## 4 EQUIPMENT UNDER TEST

### 4.1 Photo documentation of the EuT

WT41-E module

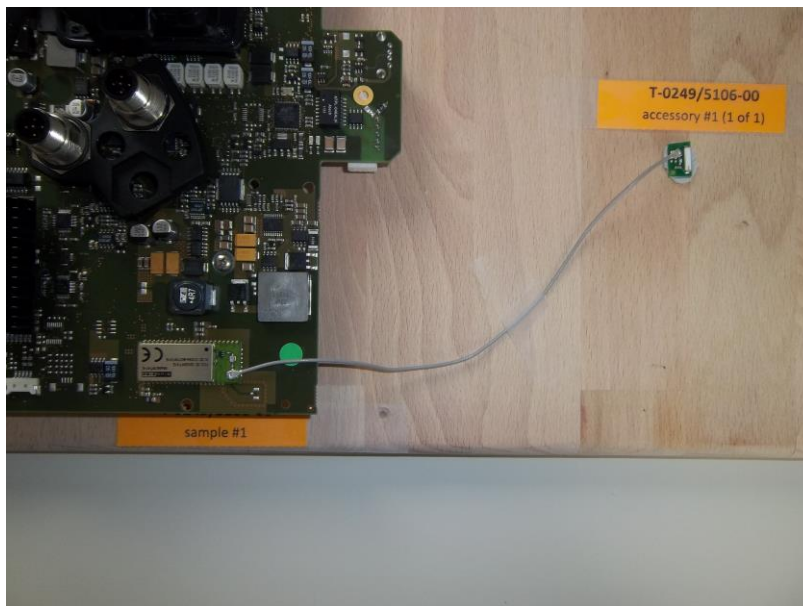


Antenna WE-MCA



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Periphery:



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## 4.2 Power supply system

Power supply voltage: 2,0 – 3,6 VDC

## 4.3 Short description of the Equipment under Test (EuT)

Number of tested samples: 1  
Serial number: none

Dimensions: L: 35,3mm W: 14,0mm H: 5,65mm

### Radio equipment characteristics

Frequency band(s): 2400 – 2483,5 MHz  
Operating frequency Range: 2402 – 2480 MHz  
Channel spacing: 1 MHz  
Number of RF-channels: 79  
Conducted power: 16 dBm  
Transmission technique FHSS  
Type of modulation: GFSK,  $\pi/4$  DQPSK, 8DPSK  
Type of antenna: SMD  
Size / length of antenna: 9,5 x 2,0 x 1,2 mm  
Antenna connector: U.FL  
Antenna gain: 3,0 dBi  
Comments: None

### Radio equipment classification

- ☐ fixed device  
☒ mobile device  
☐ portable device

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### **EuT operation mode:**

The equipment under test was operated during the measurement under the following conditions:

- TX mode CH low (2402MHz)

- TX mode CH mid (2441MHz)

- TX mode CH high (2480MHz)

### **EuT configuration:**

The following interface cables and peripheral devices were connected during the measurements:

#### Interface cables:

| Interface cable | Length<br>[m] | Type   | Line                                |                          | Line termination |
|-----------------|---------------|--------|-------------------------------------|--------------------------|------------------|
|                 |               |        | shielded                            | unshielded               |                  |
| antenna cable   | 0,2           | 1-wire | <input checked="" type="checkbox"/> | <input type="checkbox"/> | antenna          |

#### Peripheral devices:

| Kind of equipment |  | Model and/or Manufacturer                    |
|-------------------|--|----------------------------------------------|
| Motherboard       |  | NT01 motherboard, MSC Freiburg GmbH          |
| Antenna           |  | WE-MCA, Würth Elektronik eiSos GmbH          |
| Laptop            |  | Tecra A2, Toshiba, emitel ID 01-01/01-05-005 |
| Power supply      |  | HCS-3304, Manson, emitel ID 01-02/50-13-001  |

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## **5 TEST ENVIRONMENT**

### **5.1 Address of the test laboratory**

**emitel GmbH  
Ohmstrasse 1  
94342 STRASSKIRCHEN  
DEUTSCHLAND**

#### **Laboratory registration numbers:**

|                            |                  |
|----------------------------|------------------|
| DAkkS Registration number: | D-PL-12141-01-01 |
| KBA Registration number:   | KBA-P 00057-01   |
| SNCH Registration number:  | SNCH 001/2005    |
| FCC Registration number:   | 765810           |
| IC Registration number:    | IC 5066A-1       |

### **5.2 Statement regarding the usage of logos at test reports**

The logos of accreditation- and notification bodies displayed at this test reports are only valid for standards listed at the accreditation- or notification scope of emitel GmbH.

### **5.3 Environmental conditions**

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

All atmospheric pressure values refer to our Laboratory altitude of 324m.

### **5.4 Statement of the measurement uncertainty**

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer does have the sole responsibility for the continued compliance of the device.

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## 5.5 Measurement protocol for FCC / VCCI

### 5.5.1 General information

#### 5.5.1.1 Test methodology

Conducted and radiated disturbance testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22, European Standard EN 55022 as shown under section 1 of this report.

In compliance with 47 CFR Part 15 Subpart A Section 15.38 testing for FCC compliance may be done following the ANSI C63.4 procedures and using the CISPR 22 Limits.

In compliance with VCCI Technical requirement compliance may be done following the V3 as shown under section 1 of this report

#### 5.5.1.2 Justification

The Equipment under Test (EuT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

### 5.5.2 Details of test procedures

#### 5.5.2.1 General standard information

The test methods used comply with CISPR Publication 22, EN 55022 - "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement", with ANSI C63.4 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz." and / or VCCI V3

### 5.5.3 Conducted emission

#### 5.5.3.1 Description of measurement

The final level, expressed in dB $\mu$ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC Limit, CISPR or to the VCCI limit.

To convert between dB $\mu$ V and  $\mu$ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EuT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50  $\Omega$  / 50  $\mu$ H (CISPR 16) characteristics. The EUT was placed on the top surface of a setup table, 80 cm high from the horizontal reference plane, and was positioned at a distance of 0.4 m away from the vertical reference plane. Because the mains cable length of the AC adapter was more than 0.8 m, the AC adapter was placed on the tabletop surface 0.1 m away from the EUT. Then, this mains cable was connected to an artificial mains network and the excess of the cable was folded at the center into a bundle.. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emission are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

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#### 5.5.4 Radiated emission (electrical field 30 MHz - 1 GHz)

##### 5.5.4.1 Description of measurement

Spurious emission from the EuT is measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 metre non-conducting table 80 centimetres above the turntable / ground plane. Floor standing equipment is placed directly on the turntable / ground plane. The setup of the equipment under test is established in accordance with ANSI C63.4 and / or VCCI technical requirements. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so that they are at least 40 centimetres from the ground plane. The cables were laid out to attain the maximum level of radiated emission. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 metres horizontally from the EuT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres, measurement scans are made with both horizontal and vertical antenna polarization planes and the EuT is rotated 360 degrees.

The final level, expressed in dB $\mu$ V/m, is arrived at by taking the reading from the EMI receiver (Level dB $\mu$ V) and adding the correction factors and cable loss factor (Factor dB) to it. This is done automatically in the EMI receiver where the correction factors are stored. The FCC or CISPR limit is subtracted from this result in order to provide the limit margins listed in the measurement protocols.

The resolution bandwidth during the measurement is as follows:  
30 MHz – 1000 MHz: ResBW: 120 kHz

Example:

| Frequency<br>(MHz) | Reading level<br>(dB $\mu$ V) | + | Correction Factor<br>(dB/m) | = | Level<br>(dB $\mu$ V/m) | - | CISPR Limit<br>(dB $\mu$ V/m) | = | Delta<br>(dB) |
|--------------------|-------------------------------|---|-----------------------------|---|-------------------------|---|-------------------------------|---|---------------|
| 719.0              | 75.0                          | + | 32.6                        | = | 107.6                   | - | 110.0                         | = | -2.4          |

#### 5.5.5 Radiated emission (electrical field 1 GHz - 30 GHz)

##### 5.5.5.1 Description of measurement

Radiated emission from the EuT are measured in the frequency range of 1 GHz to the maximum frequency as specified in 47 CFR Part 15 Subpart A section 15.33, using a tuned receiver (Spectrum Analyser) and appropriate linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 metre non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is established in accordance with ANSI C63.4 and / or VCCI technical requirements.

The interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. The antenna is positioned 3 metres horizontally from the EuT.

Measurements are made in both the horizontal and vertical polarization planes in a fully anechoic room using a spectrum analyzer set to a peak detector function and a resolution and video bandwidth of 1 MHz. Hand-held or body-worn devices are rotated around three orthogonal axes in order to determine the position, angle and configuration having the maximum emission. The cables and equipment are placed and moved within the range of their likely positioning to find the maximum emission. These conditions will then be used for the final measurements. When the EuT is larger than the band width of the measuring antenna (see table) it will be moved over the surface for the four sides of the equipment. Where appropriate, the test distance may be reduced in order to demonstrate that emissions are under the limits at the specified test distance.

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## 6 TEST CONDITIONS AND RESULTS

### 6.1 Radiated disturbance (30MHz – 1000MHz)

For test instruments and accessories used see section 7 Part A 5.

#### 6.1.1 Description of the test location

Test location: OATS 1

Test distance: 3 metres

#### 6.1.2 Photo documentation of the test set-up



#### 6.1.3 Test specification

Environmental conditions: Temperature: 20 ° C Humidity: 61 % Atmospheric pressure: 101 kPa

Frequency range: 30 MHz - 1000 MHz

The test was carried out in the following operation mode(s):

- TX mode CH low (2402MHz)
- TX mode CH mid (2441MHz)
- TX mode CH high (2480MHz)

#### 6.1.4 Test result

Minimal margin to limit 2,2 dB at 65,999 MHz

The requirements are **FULFILLED**.

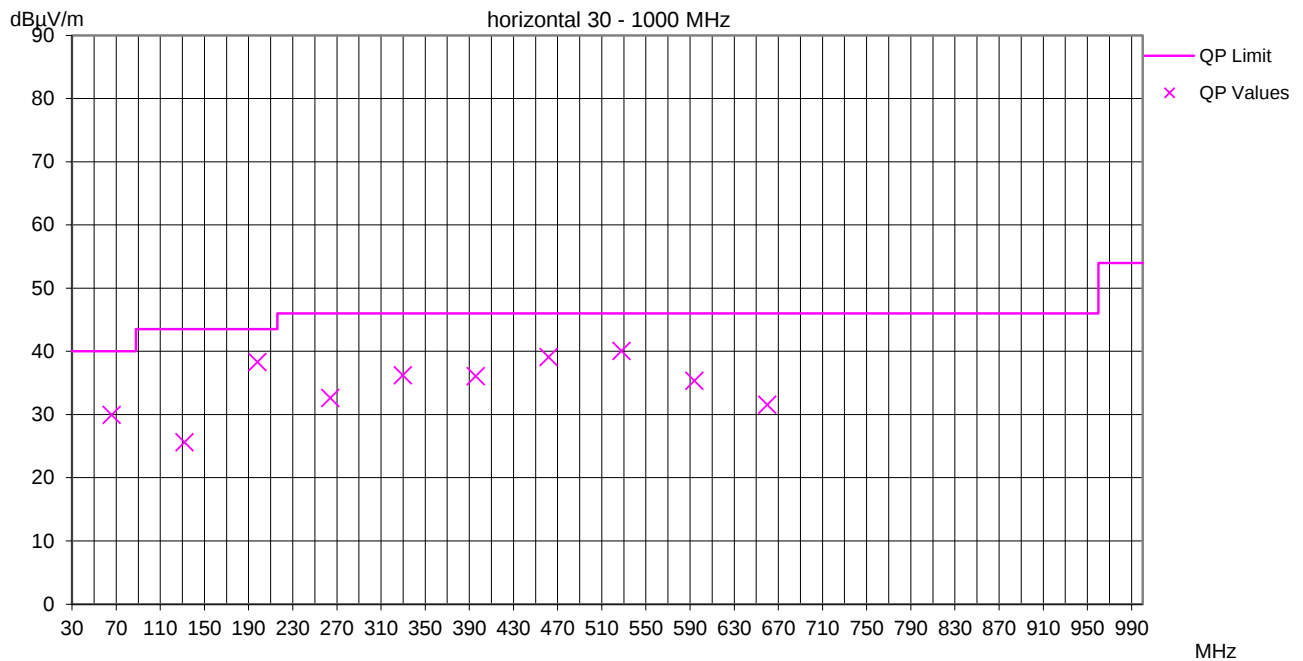
Remarks: none

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### 6.1.5 Test protocol

Operation mode: TX mode CH low (2402MHz)  
Remarks: GFSK  
Date: 2013-10-28  
Tested by: Pessinger Jürgen

Result: PASS



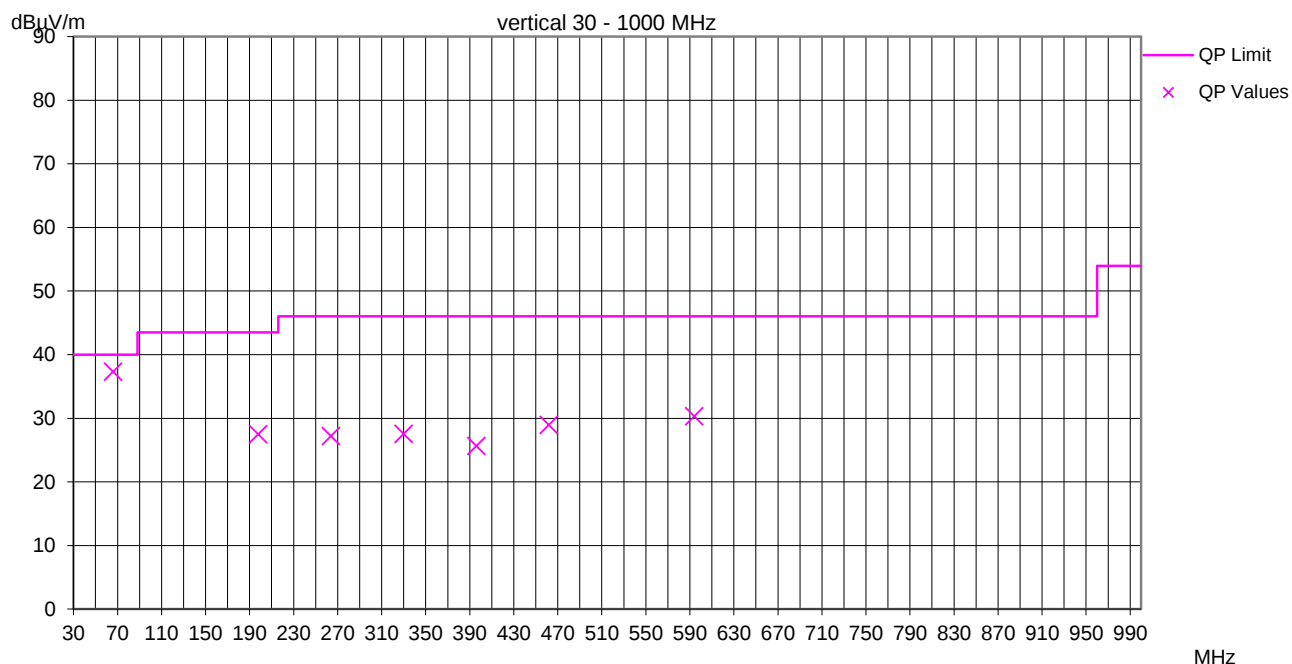
Minimum margin to limit: 5.2 dB

| Frequency [MHz] | Reading [dBμV] QP | Correction [dB] | Values [dBμV/m] QP | Limit [dBμV/m] QP | Margin [dB] QP |
|-----------------|-------------------|-----------------|--------------------|-------------------|----------------|
| 66.000          | 17.9              | 12.0            | 29.9               | 40.0              | 10.1           |
| 131.999         | 14.7              | 10.9            | 25.6               | 43.5              | 17.9           |
| 198.001         | 24.9              | 13.4            | 38.3               | 43.5              | 5.2            |
| 264.000         | 17.2              | 15.4            | 32.6               | 46.0              | 13.4           |
| 330.000         | 18.8              | 17.4            | 36.2               | 46.0              | 9.8            |
| 396.000         | 17.2              | 18.9            | 36.1               | 46.0              | 10.0           |
| 462.000         | 18.9              | 20.2            | 39.1               | 46.0              | 7.0            |
| 528.000         | 18.3              | 21.7            | 40.0               | 46.0              | 6.0            |
| 594.000         | 12.4              | 22.9            | 35.3               | 46.0              | 10.7           |
| 660.000         | 7.8               | 23.7            | 31.5               | 46.0              | 14.5           |

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Operation mode: TX mode CH low (2402MHz)  
Remarks: GFSK  
Date: 2013-10-28  
Tested by: Pessinger Jürgen

Result: PASS



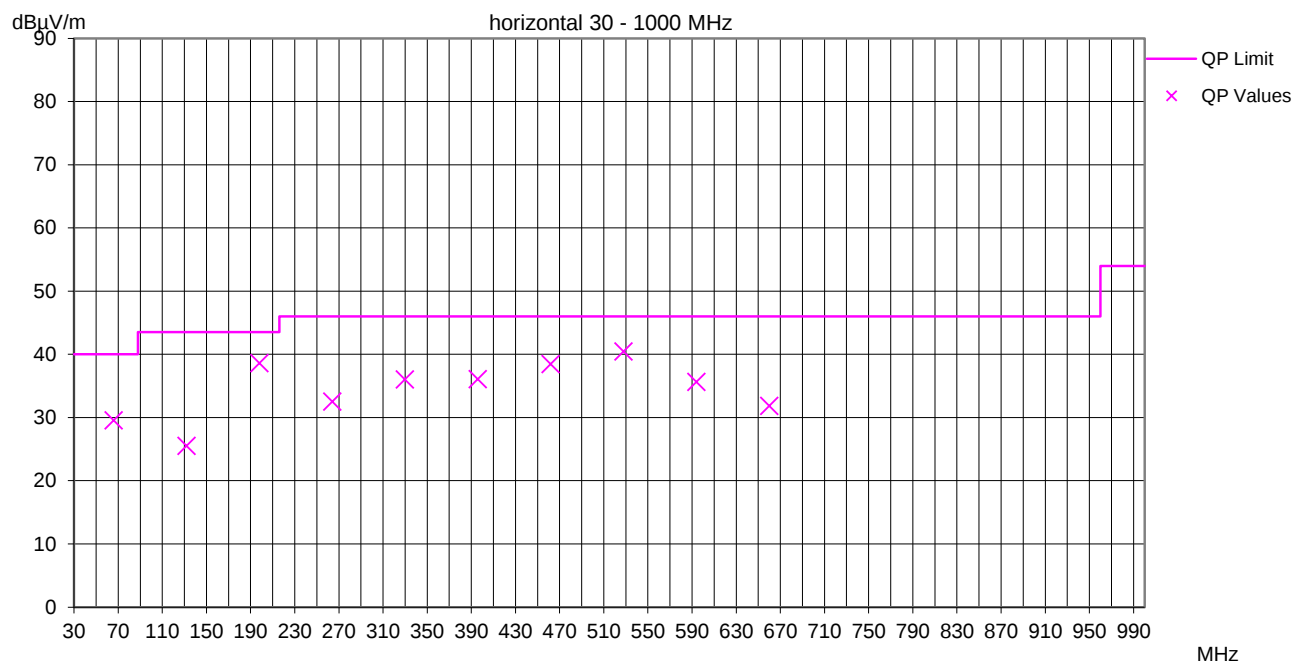
Minimum margin to limit: 2.7 dB

| Frequency<br>[MHz] | Reading [dBµV]<br>QP | Correction<br>[dB] | Values [dBµV/m]<br>QP | Limit [dBµV/m]<br>QP | Margin [dB]<br>QP |
|--------------------|----------------------|--------------------|-----------------------|----------------------|-------------------|
| 65.999             | 25.3                 | 12.0               | 37.3                  | 40.0                 | 2.7               |
| 198.002            | 14.1                 | 13.4               | 27.5                  | 43.5                 | 16.0              |
| 264.002            | 11.8                 | 15.4               | 27.2                  | 46.0                 | 18.8              |
| 330.002            | 10.1                 | 17.4               | 27.5                  | 46.0                 | 18.5              |
| 396.002            | 6.8                  | 18.9               | 25.7                  | 46.0                 | 20.4              |
| 462.000            | 8.8                  | 20.2               | 29.0                  | 46.0                 | 17.1              |
| 594.002            | 7.4                  | 22.9               | 30.3                  | 46.0                 | 15.7              |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH mid (2441MHz)  
 Remarks: GFSK  
 Date: 2013-10-28  
 Tested by: Pessinger Jürgen

Result: PASS



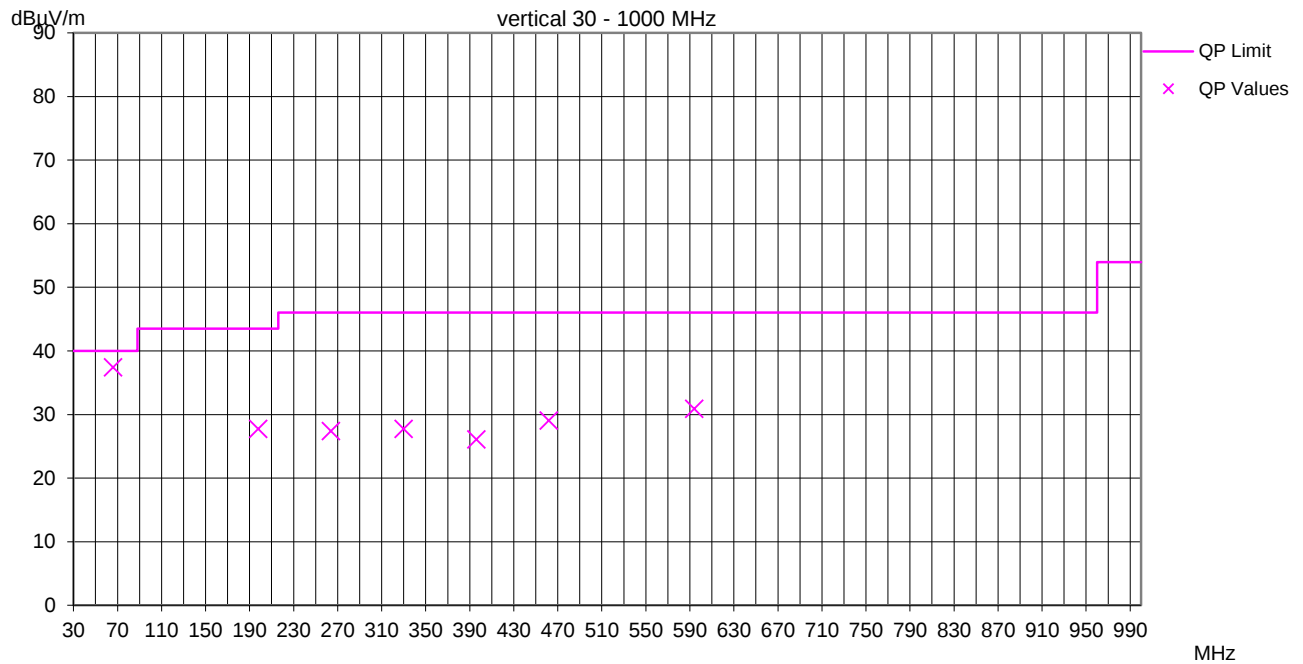
Minimum margin to limit: 4.9 dB

| Frequency [MHz] | Reading [dBµV] QP | Correction [dB] | Values [dBµV/m] QP | Limit [dBµV/m] QP | Margin [dB] QP |
|-----------------|-------------------|-----------------|--------------------|-------------------|----------------|
| 66.000          | 17.5              | 12.0            | 29.5               | 40.0              | 10.5           |
| 131.999         | 14.6              | 10.9            | 25.5               | 43.5              | 18.0           |
| 198.001         | 25.2              | 13.4            | 38.6               | 43.5              | 4.9            |
| 264.000         | 17.1              | 15.4            | 32.5               | 46.0              | 13.5           |
| 330.000         | 18.6              | 17.4            | 36.0               | 46.0              | 10.0           |
| 396.000         | 17.2              | 18.9            | 36.1               | 46.0              | 10.0           |
| 462.000         | 18.3              | 20.2            | 38.5               | 46.0              | 7.6            |
| 528.000         | 18.7              | 21.7            | 40.4               | 46.0              | 5.6            |
| 594.000         | 12.7              | 22.9            | 35.6               | 46.0              | 10.4           |
| 660.000         | 8.1               | 23.7            | 31.8               | 46.0              | 14.2           |

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Operation mode: TX mode CH mid (2441MHz)  
 Remarks: GFSK  
 Date: 2013-10-28  
 Tested by: Pessinger Jürgen

Result: PASS

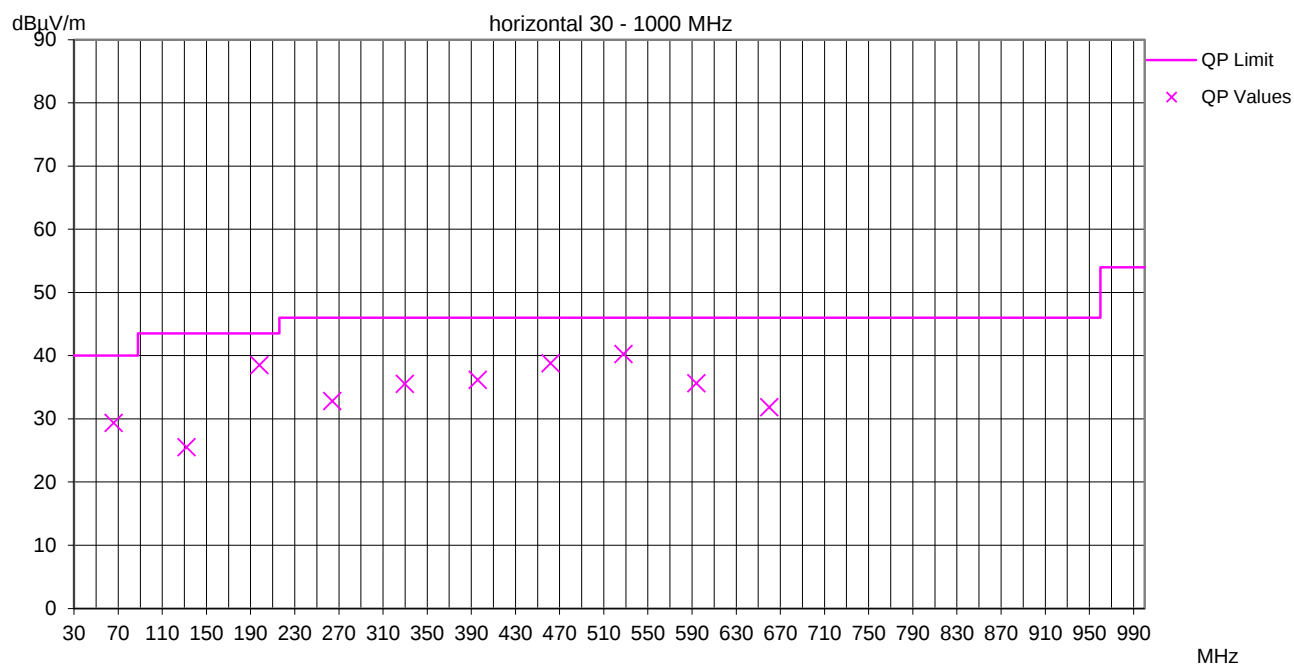


| Minimum margin to limit: 2.6 dB |                   |                 |                    |                   |                |
|---------------------------------|-------------------|-----------------|--------------------|-------------------|----------------|
| Frequency [MHz]                 | Reading [dBµV] QP | Correction [dB] | Values [dBµV/m] QP | Limit [dBµV/m] QP | Margin [dB] QP |
| 65.999                          | 25.4              | 12.0            | 37.4               | 40.0              | 2.6            |
| 198.002                         | 14.3              | 13.4            | 27.7               | 43.5              | 15.8           |
| 264.002                         | 12.0              | 15.4            | 27.4               | 46.0              | 18.6           |
| 330.002                         | 10.3              | 17.4            | 27.7               | 46.0              | 18.3           |
| 396.002                         | 7.2               | 18.9            | 26.1               | 46.0              | 20.0           |
| 462.000                         | 8.9               | 20.2            | 29.1               | 46.0              | 17.0           |
| 594.002                         | 8.0               | 22.9            | 30.9               | 46.0              | 15.1           |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH high (2480MHz)  
 Remarks: GFSK  
 Date: 2013-10-28  
 Tested by: Pessinger Jürgen

Result: PASS



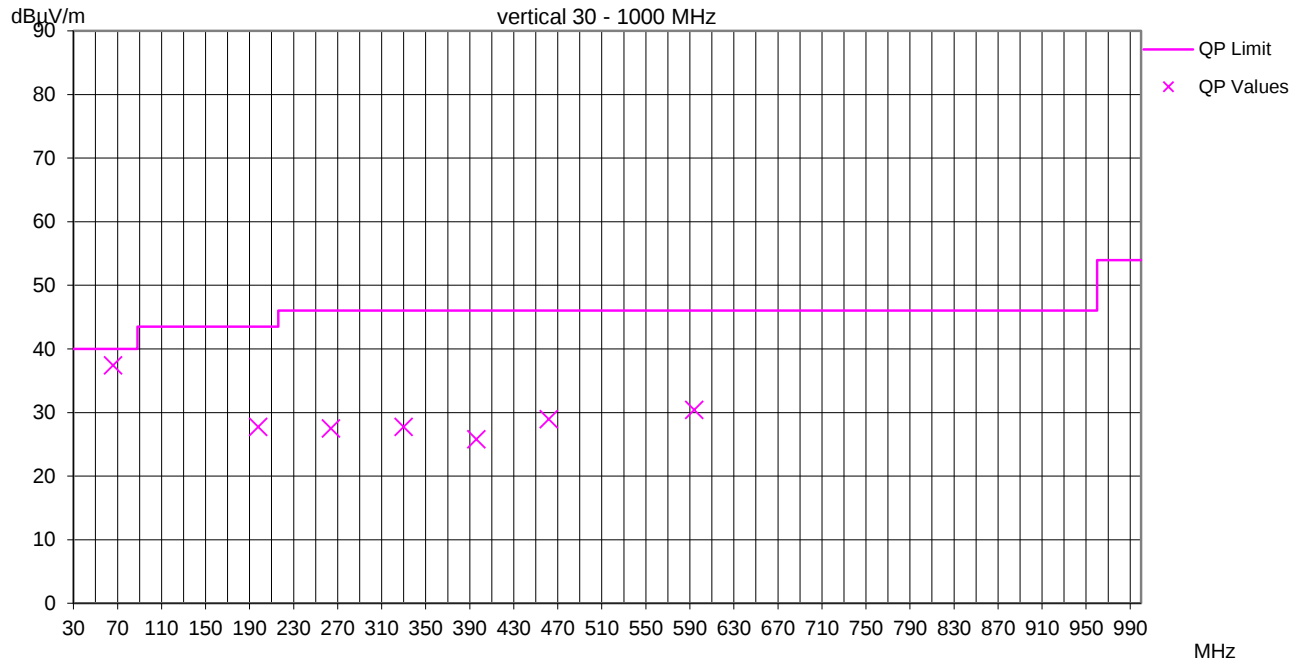
Minimum margin to limit: 5.0 dB

| Frequency [MHz] | Reading [dBµV] QP | Correction [dB] | Values [dBµV/m] QP | Limit [dBµV/m] QP | Margin [dB] QP |
|-----------------|-------------------|-----------------|--------------------|-------------------|----------------|
| 66.000          | 17.3              | 12.0            | 29.3               | 40.0              | 10.7           |
| 131.999         | 14.6              | 10.9            | 25.5               | 43.5              | 18.0           |
| 198.001         | 25.1              | 13.4            | 38.5               | 43.5              | 5.0            |
| 264.000         | 17.4              | 15.4            | 32.8               | 46.0              | 13.2           |
| 330.000         | 18.1              | 17.4            | 35.5               | 46.0              | 10.5           |
| 396.000         | 17.3              | 18.9            | 36.2               | 46.0              | 9.9            |
| 462.000         | 18.6              | 20.2            | 38.8               | 46.0              | 7.3            |
| 528.000         | 18.5              | 21.7            | 40.2               | 46.0              | 5.8            |
| 594.000         | 12.7              | 22.9            | 35.6               | 46.0              | 10.4           |
| 660.000         | 8.1               | 23.7            | 31.8               | 46.0              | 14.2           |

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Operation mode: TX mode CH high (2480MHz)  
Remarks: GFSK  
Date: 2013-10-28  
Tested by: Pessinger Jürgen

Result: PASS

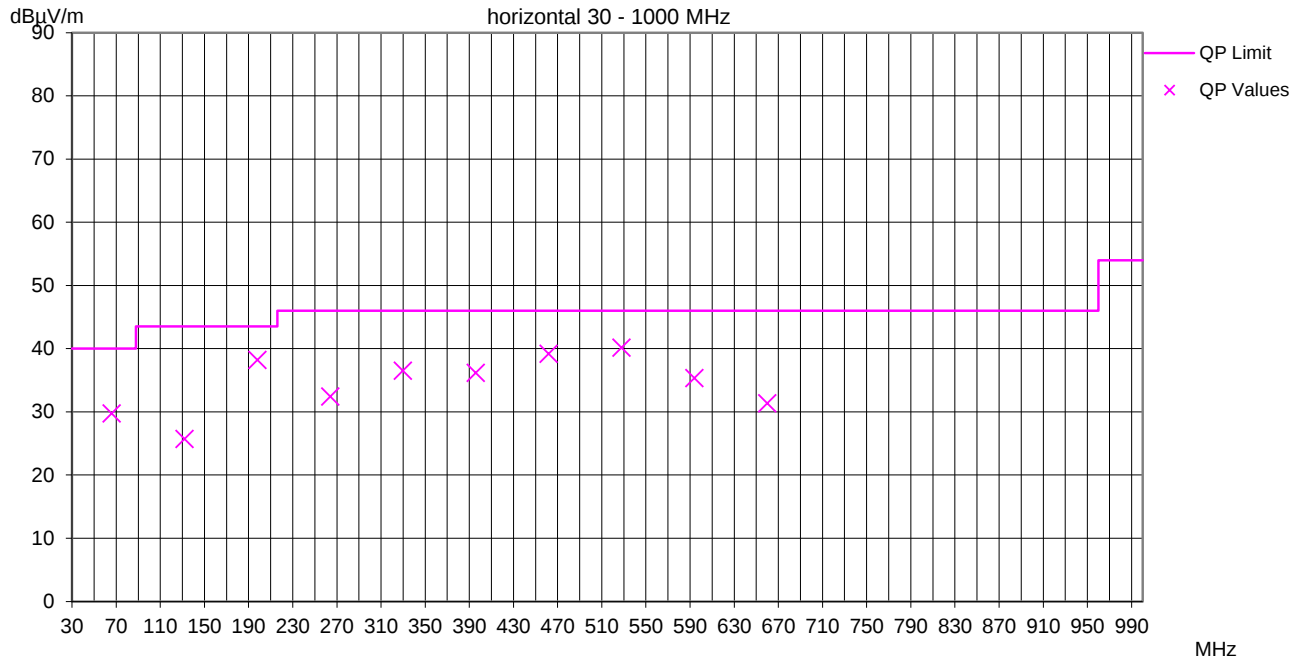


| Minimum margin to limit: 2.6 dB |                   |                 |                    |                   |                |
|---------------------------------|-------------------|-----------------|--------------------|-------------------|----------------|
| Frequency [MHz]                 | Reading [dBµV] QP | Correction [dB] | Values [dBµV/m] QP | Limit [dBµV/m] QP | Margin [dB] QP |
| 65.999                          | 25.4              | 12.0            | 37.4               | 40.0              | 2.6            |
| 198.002                         | 14.3              | 13.4            | 27.7               | 43.5              | 15.8           |
| 264.002                         | 12.1              | 15.4            | 27.5               | 46.0              | 18.5           |
| 330.002                         | 10.3              | 17.4            | 27.7               | 46.0              | 18.3           |
| 396.002                         | 6.9               | 18.9            | 25.8               | 46.0              | 20.3           |
| 462.000                         | 8.8               | 20.2            | 29.0               | 46.0              | 17.1           |
| 594.002                         | 7.5               | 22.9            | 30.4               | 46.0              | 15.6           |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH low (2402MHz)  
 Remarks:  $\pi/4$  DQPSK  
 Date: 2013-10-28  
 Tested by: Pessinger Jürgen

Result: PASS



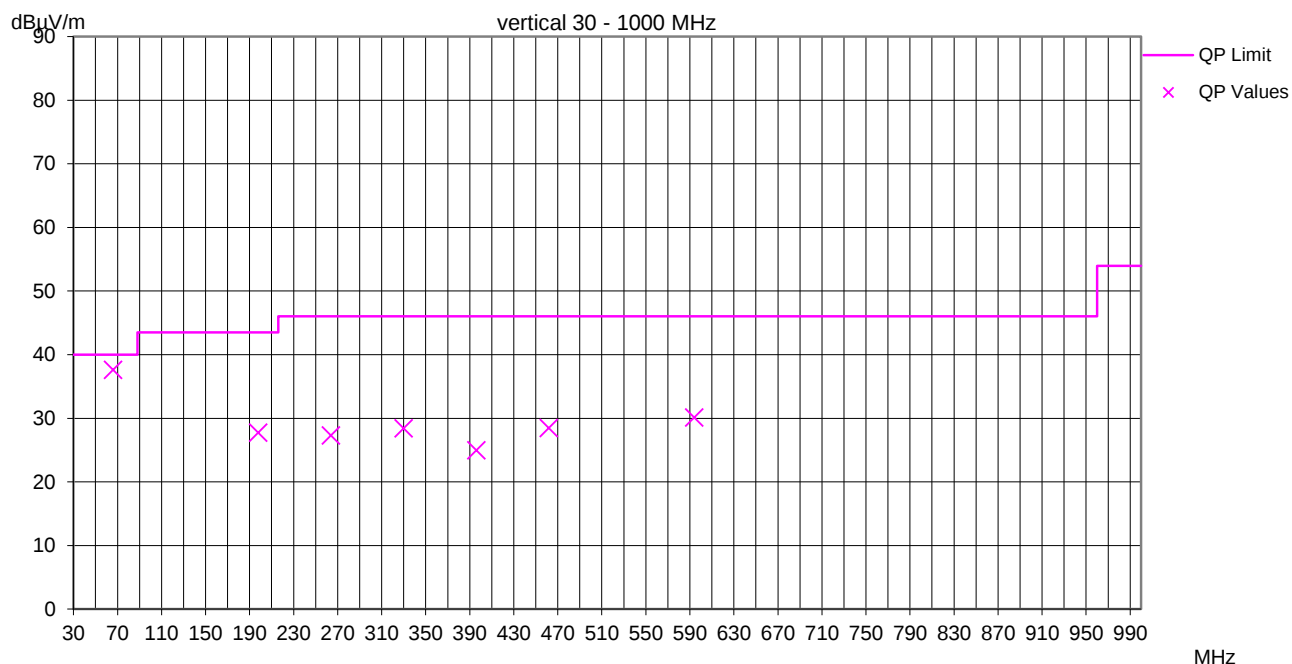
Minimum margin to limit: 5.3 dB

| Frequency<br>[MHz] | Reading [dB $\mu$ V]<br>QP | Correction<br>[dB] | Values [dB $\mu$ V/m]<br>QP | Limit [dB $\mu$ V/m]<br>QP | Margin [dB]<br>QP |
|--------------------|----------------------------|--------------------|-----------------------------|----------------------------|-------------------|
| 66.000             | 17.7                       | 12.0               | 29.7                        | 40.0                       | 10.3              |
| 131.999            | 14.8                       | 10.9               | 25.7                        | 43.5                       | 17.8              |
| 198.001            | 24.8                       | 13.4               | 38.2                        | 43.5                       | 5.3               |
| 264.000            | 17.0                       | 15.4               | 32.4                        | 46.0                       | 13.6              |
| 330.000            | 19.1                       | 17.4               | 36.5                        | 46.0                       | 9.5               |
| 396.000            | 17.3                       | 18.9               | 36.2                        | 46.0                       | 9.9               |
| 462.000            | 19.0                       | 20.2               | 39.2                        | 46.0                       | 6.9               |
| 528.000            | 18.4                       | 21.7               | 40.1                        | 46.0                       | 5.9               |
| 594.000            | 12.4                       | 22.9               | 35.3                        | 46.0                       | 10.7              |
| 660.000            | 7.6                        | 23.7               | 31.3                        | 46.0                       | 14.7              |

File No. T-0249-5106-00 JP

Operation mode: TX mode CH low (2402MHz)  
 Remarks:  $\pi/4$  DQPSK  
 Date: 2013-10-28  
 Tested by: Pessinger Jürgen

Result: PASS

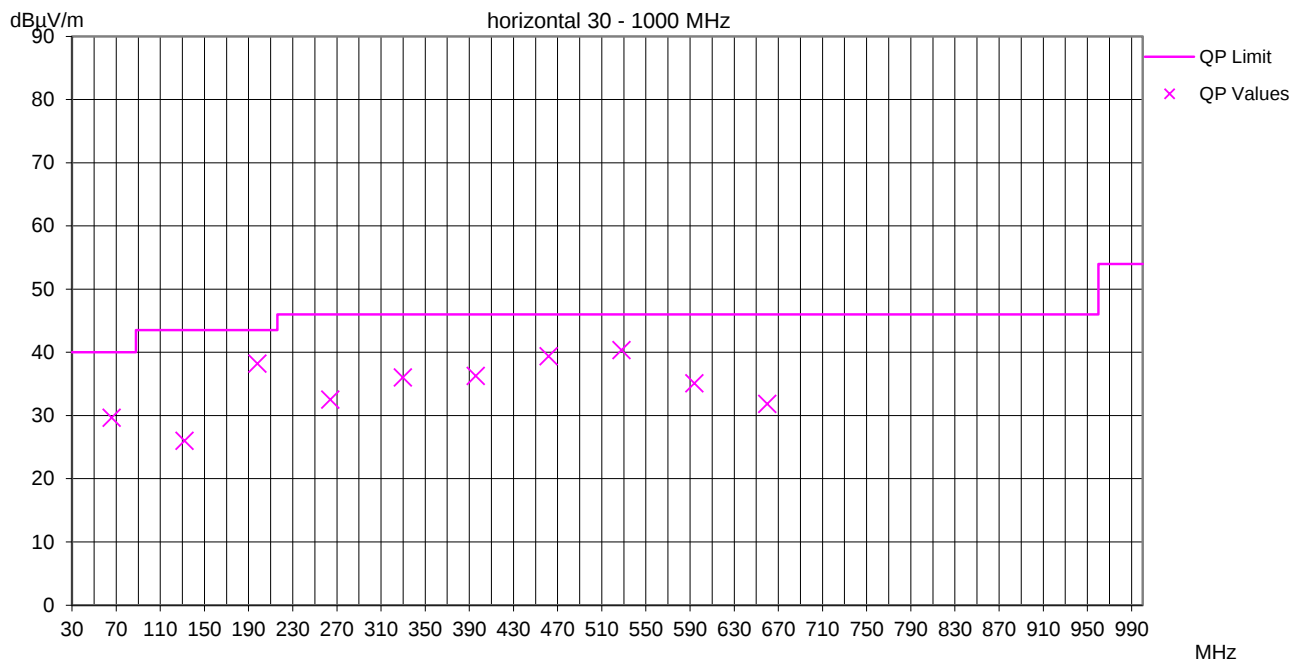


| Minimum margin to limit: 2.4 dB |                         |                 |                          |                         |                |
|---------------------------------|-------------------------|-----------------|--------------------------|-------------------------|----------------|
| Frequency [MHz]                 | Reading [dB $\mu$ V] QP | Correction [dB] | Values [dB $\mu$ V/m] QP | Limit [dB $\mu$ V/m] QP | Margin [dB] QP |
| 65.999                          | 25.6                    | 12.0            | 37.6                     | 40.0                    | 2.4            |
| 198.002                         | 14.3                    | 13.4            | 27.7                     | 43.5                    | 15.8           |
| 264.002                         | 11.9                    | 15.4            | 27.3                     | 46.0                    | 18.7           |
| 330.002                         | 11.0                    | 17.4            | 28.4                     | 46.0                    | 17.6           |
| 396.002                         | 6.1                     | 18.9            | 25.0                     | 46.0                    | 21.1           |
| 462.000                         | 8.3                     | 20.2            | 28.5                     | 46.0                    | 17.6           |
| 594.002                         | 7.2                     | 22.9            | 30.1                     | 46.0                    | 15.9           |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH mid (2441MHz)  
Remarks:  $\pi/4$  DQPSK  
Date: 2013-10-28  
Tested by: Pessinger Jürgen

Result: PASS



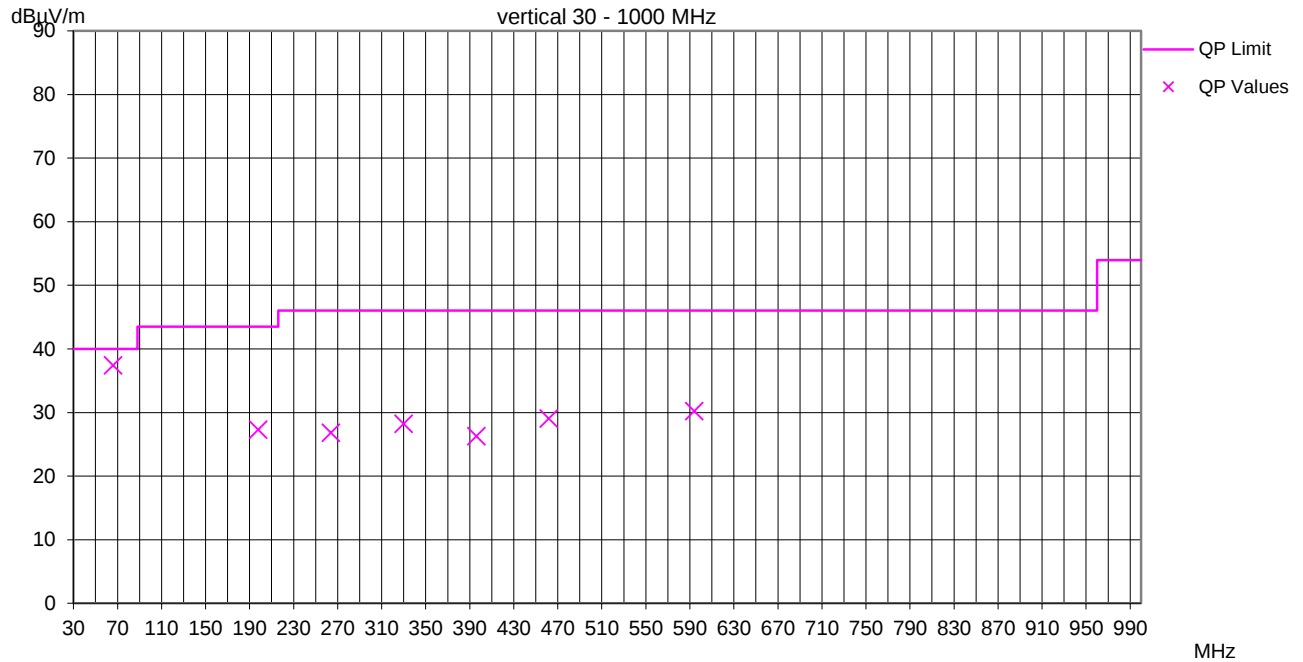
Minimum margin to limit: 5.3 dB

| Frequency [MHz] | Reading [dBμV] QP | Correction [dB] | Values [dBμV/m] QP | Limit [dBμV/m] QP | Margin [dB] QP |
|-----------------|-------------------|-----------------|--------------------|-------------------|----------------|
| 66.000          | 17.6              | 12.0            | 29.6               | 40.0              | 10.4           |
| 131.999         | 15.1              | 10.9            | 26.0               | 43.5              | 17.5           |
| 198.001         | 24.8              | 13.4            | 38.2               | 43.5              | 5.3            |
| 264.000         | 17.1              | 15.4            | 32.5               | 46.0              | 13.5           |
| 330.000         | 18.6              | 17.4            | 36.0               | 46.0              | 10.0           |
| 396.000         | 17.4              | 18.9            | 36.3               | 46.0              | 9.8            |
| 462.000         | 19.2              | 20.2            | 39.4               | 46.0              | 6.7            |
| 528.000         | 18.6              | 21.7            | 40.3               | 46.0              | 5.7            |
| 594.000         | 12.2              | 22.9            | 35.1               | 46.0              | 10.9           |
| 660.000         | 8.1               | 23.7            | 31.8               | 46.0              | 14.2           |

File No. T-0249-5106-00 JP

Operation mode: TX mode CH mid (2441MHz)  
Remarks:  $\pi/4$  DQPSK  
Date: 2013-10-28  
Tested by: Pessinger Jürgen

Result: PASS

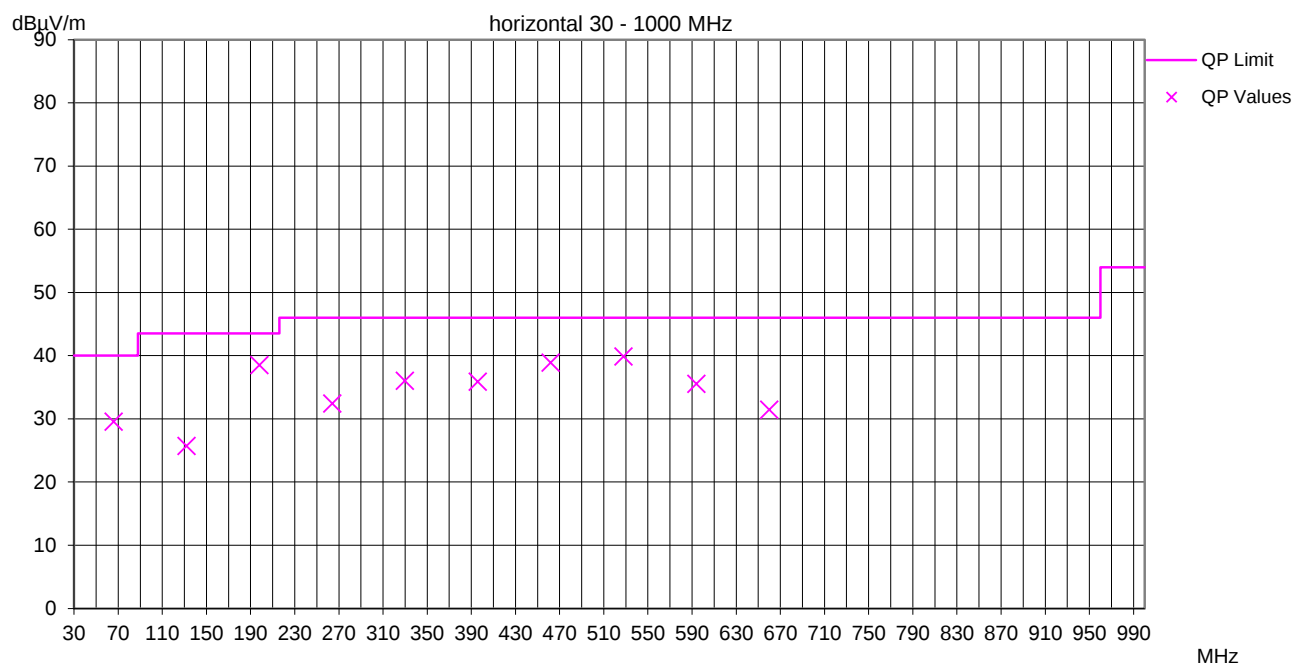


| Minimum margin to limit: 2.6 dB |                         |                 |                          |                         |                |
|---------------------------------|-------------------------|-----------------|--------------------------|-------------------------|----------------|
| Frequency [MHz]                 | Reading [dB $\mu$ V] QP | Correction [dB] | Values [dB $\mu$ V/m] QP | Limit [dB $\mu$ V/m] QP | Margin [dB] QP |
| 65.999                          | 25.4                    | 12.0            | 37.4                     | 40.0                    | 2.6            |
| 198.002                         | 13.9                    | 13.4            | 27.3                     | 43.5                    | 16.2           |
| 264.002                         | 11.4                    | 15.4            | 26.8                     | 46.0                    | 19.2           |
| 330.002                         | 10.8                    | 17.4            | 28.2                     | 46.0                    | 17.8           |
| 396.002                         | 7.4                     | 18.9            | 26.3                     | 46.0                    | 19.8           |
| 462.000                         | 8.9                     | 20.2            | 29.1                     | 46.0                    | 17.0           |
| 594.002                         | 7.3                     | 22.9            | 30.2                     | 46.0                    | 15.8           |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH high (2480MHz)  
 Remarks:  $\pi/4$  DQPSK  
 Date: 2013-10-28  
 Tested by: Pessinger Jürgen

Result: PASS



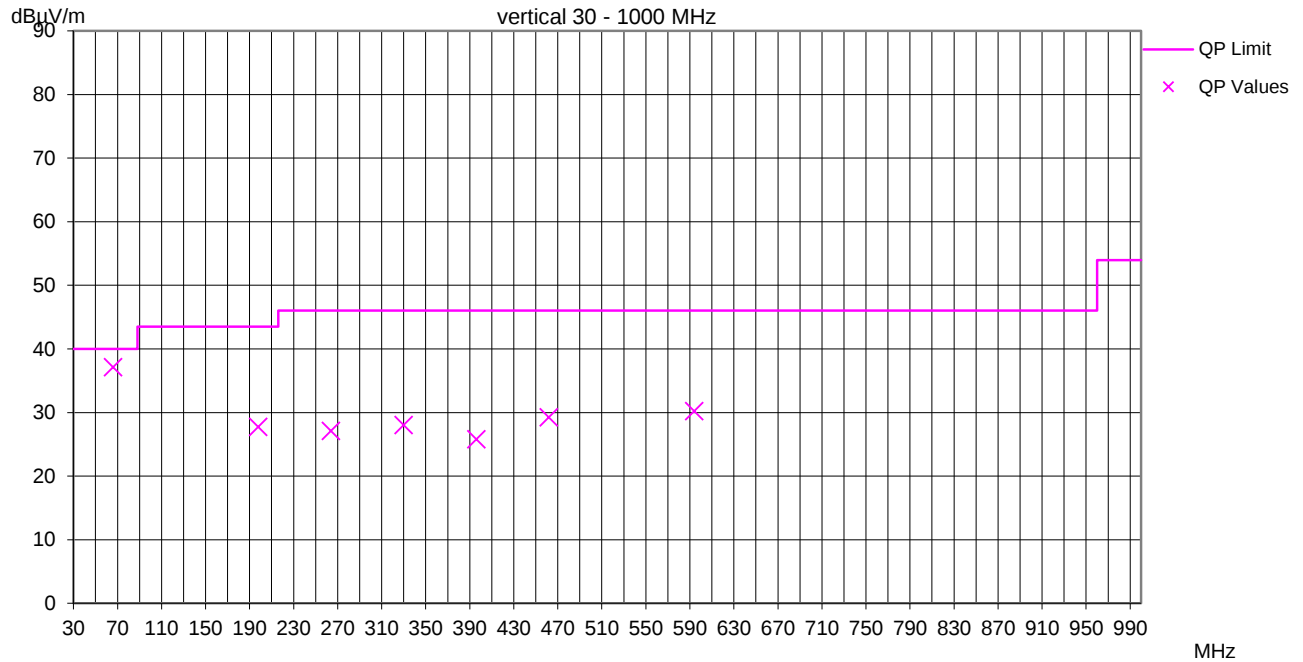
Minimum margin to limit: 5.0 dB

| Frequency [MHz] | Reading [dB $\mu$ V] QP | Correction [dB] | Values [dB $\mu$ V/m] QP | Limit [dB $\mu$ V/m] QP | Margin [dB] QP |
|-----------------|-------------------------|-----------------|--------------------------|-------------------------|----------------|
| 66.000          | 17.5                    | 12.0            | 29.5                     | 40.0                    | 10.5           |
| 131.999         | 14.8                    | 10.9            | 25.7                     | 43.5                    | 17.8           |
| 198.001         | 25.1                    | 13.4            | 38.5                     | 43.5                    | 5.0            |
| 264.000         | 17.0                    | 15.4            | 32.4                     | 46.0                    | 13.6           |
| 330.000         | 18.6                    | 17.4            | 36.0                     | 46.0                    | 10.0           |
| 396.000         | 17.0                    | 18.9            | 35.9                     | 46.0                    | 10.2           |
| 462.000         | 18.7                    | 20.2            | 38.9                     | 46.0                    | 7.2            |
| 528.000         | 18.1                    | 21.7            | 39.8                     | 46.0                    | 6.2            |
| 594.000         | 12.6                    | 22.9            | 35.5                     | 46.0                    | 10.5           |
| 660.000         | 7.7                     | 23.7            | 31.4                     | 46.0                    | 14.6           |

File No. T-0249-5106-00 JP

Operation mode: TX mode CH high (2480MHz)  
Remarks:  $\pi/4$  DQPSK  
Date: 2013-10-28  
Tested by: Pessinger Jürgen

Result: PASS

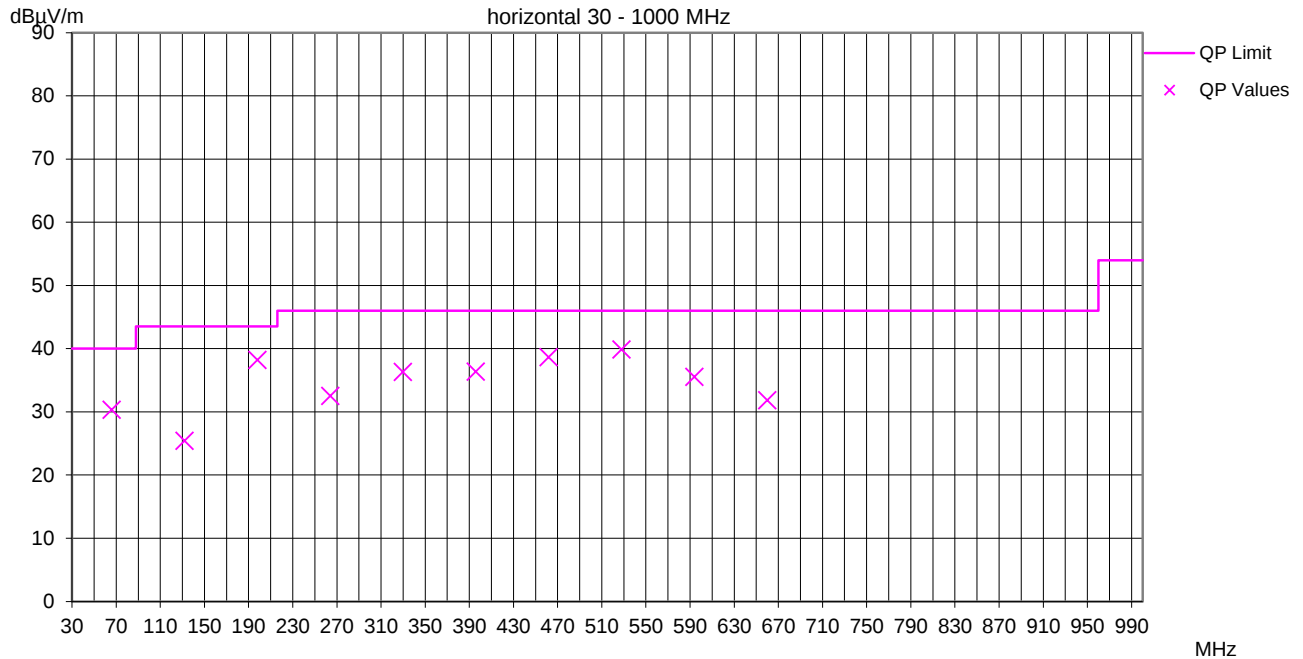


| Minimum margin to limit: |                         |                 |                          |                         | 2.9 dB         |
|--------------------------|-------------------------|-----------------|--------------------------|-------------------------|----------------|
| Frequency [MHz]          | Reading [dB $\mu$ V] QP | Correction [dB] | Values [dB $\mu$ V/m] QP | Limit [dB $\mu$ V/m] QP | Margin [dB] QP |
| 65.999                   | 25.1                    | 12.0            | 37.1                     | 40.0                    | 2.9            |
| 198.002                  | 14.3                    | 13.4            | 27.7                     | 43.5                    | 15.8           |
| 264.002                  | 11.7                    | 15.4            | 27.1                     | 46.0                    | 18.9           |
| 330.002                  | 10.6                    | 17.4            | 28.0                     | 46.0                    | 18.0           |
| 396.002                  | 6.9                     | 18.9            | 25.8                     | 46.0                    | 20.3           |
| 462.000                  | 9.1                     | 20.2            | 29.3                     | 46.0                    | 16.8           |
| 594.002                  | 7.3                     | 22.9            | 30.2                     | 46.0                    | 15.8           |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH low (2402MHz)  
Remarks: 8DPSK  
Date: 2013-10-28  
Tested by: Pessinger Jürgen

Result: PASS



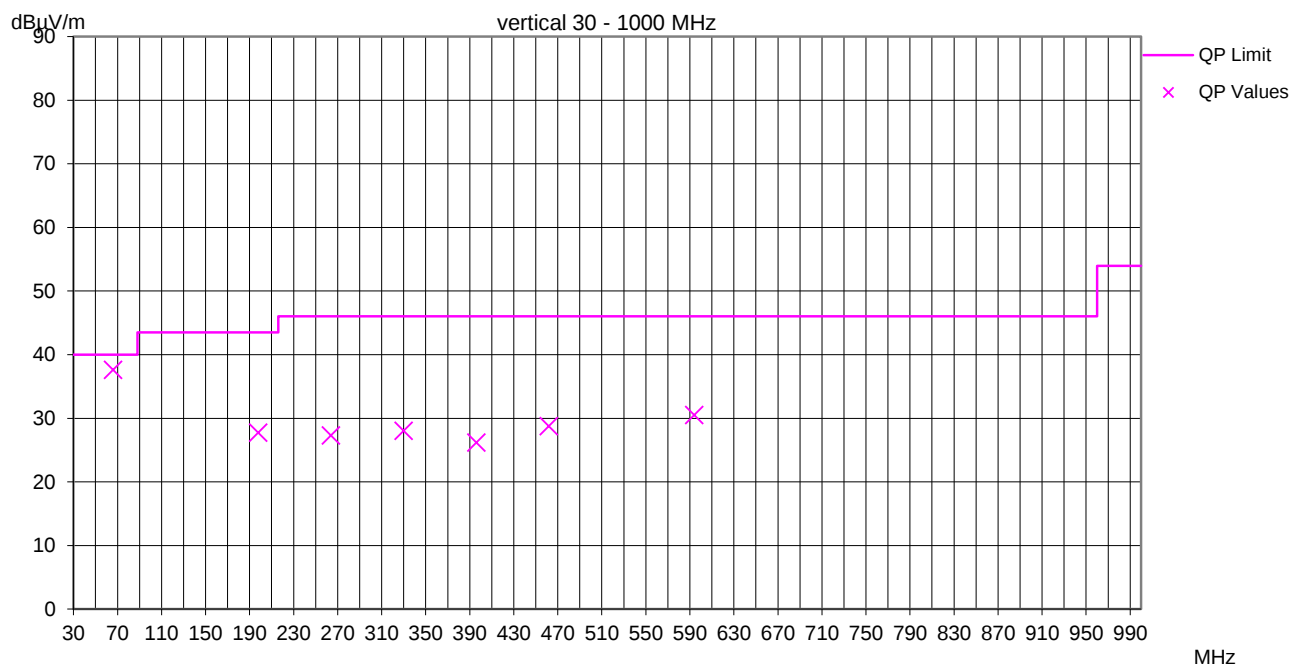
Minimum margin to limit: 5.3 dB

| Frequency<br>[MHz] | Reading [dBµV]<br>QP | Correction<br>[dB] | Values [dBµV/m]<br>QP | Limit [dBµV/m]<br>QP | Margin [dB]<br>QP |
|--------------------|----------------------|--------------------|-----------------------|----------------------|-------------------|
| 66.000             | 18.3                 | 12.0               | 30.3                  | 40.0                 | 9.7               |
| 131.999            | 14.5                 | 10.9               | 25.4                  | 43.5                 | 18.1              |
| 198.001            | 24.8                 | 13.4               | 38.2                  | 43.5                 | 5.3               |
| 264.000            | 17.1                 | 15.4               | 32.5                  | 46.0                 | 13.5              |
| 330.000            | 18.9                 | 17.4               | 36.3                  | 46.0                 | 9.7               |
| 396.000            | 17.5                 | 18.9               | 36.4                  | 46.0                 | 9.7               |
| 462.000            | 18.5                 | 20.2               | 38.7                  | 46.0                 | 7.4               |
| 528.000            | 18.1                 | 21.7               | 39.8                  | 46.0                 | 6.2               |
| 594.000            | 12.6                 | 22.9               | 35.5                  | 46.0                 | 10.5              |
| 660.000            | 8.1                  | 23.7               | 31.8                  | 46.0                 | 14.2              |

File No. T-0249-5106-00 JP

Operation mode: TX mode CH low (2402MHz)  
Remarks: 8DPSK  
Date: 2013-10-28  
Tested by: Pessinger Jürgen

Result: PASS

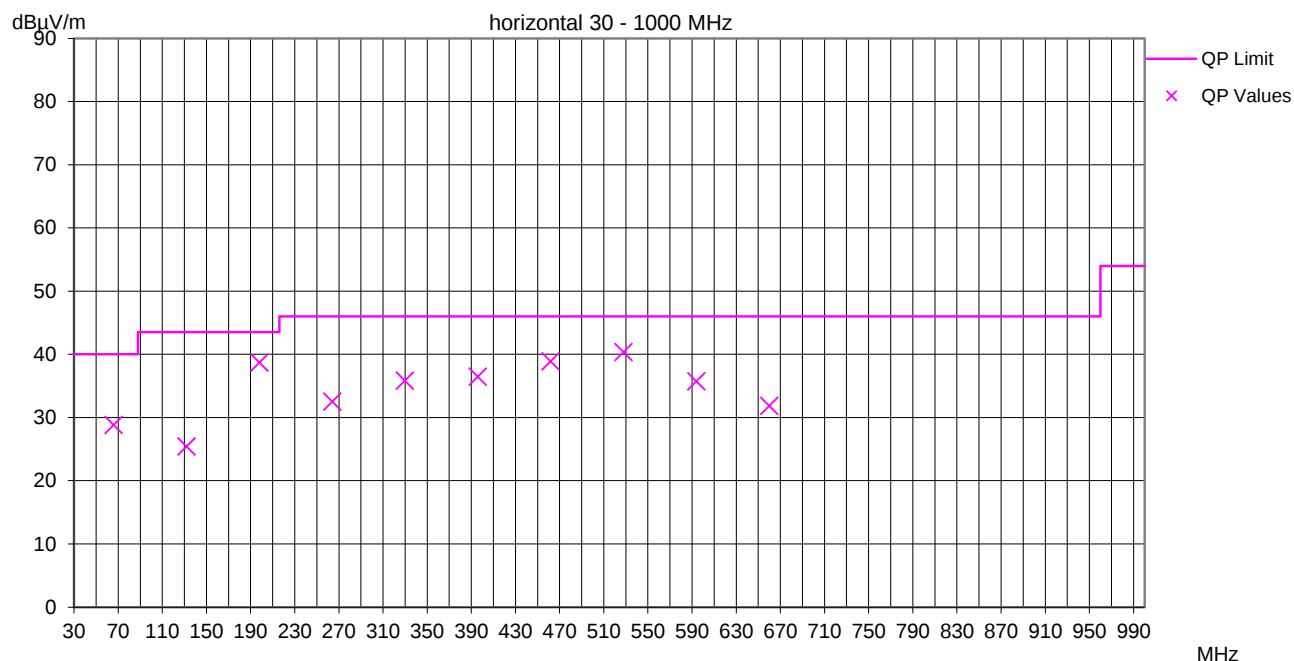


| Minimum margin to limit: 2.4 dB |                   |                 |                    |                   |                |
|---------------------------------|-------------------|-----------------|--------------------|-------------------|----------------|
| Frequency [MHz]                 | Reading [dBµV] QP | Correction [dB] | Values [dBµV/m] QP | Limit [dBµV/m] QP | Margin [dB] QP |
| 65.999                          | 25.6              | 12.0            | 37.6               | 40.0              | 2.4            |
| 198.002                         | 14.3              | 13.4            | 27.7               | 43.5              | 15.8           |
| 264.002                         | 11.9              | 15.4            | 27.3               | 46.0              | 18.7           |
| 330.002                         | 10.6              | 17.4            | 28.0               | 46.0              | 18.0           |
| 396.002                         | 7.3               | 18.9            | 26.2               | 46.0              | 19.9           |
| 462.000                         | 8.6               | 20.2            | 28.8               | 46.0              | 17.3           |
| 594.002                         | 7.6               | 22.9            | 30.5               | 46.0              | 15.5           |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH mid (2441MHz)  
 Remarks: 8DPSK  
 Date: 2013-10-28  
 Tested by: Pessinger Jürgen

Result: PASS



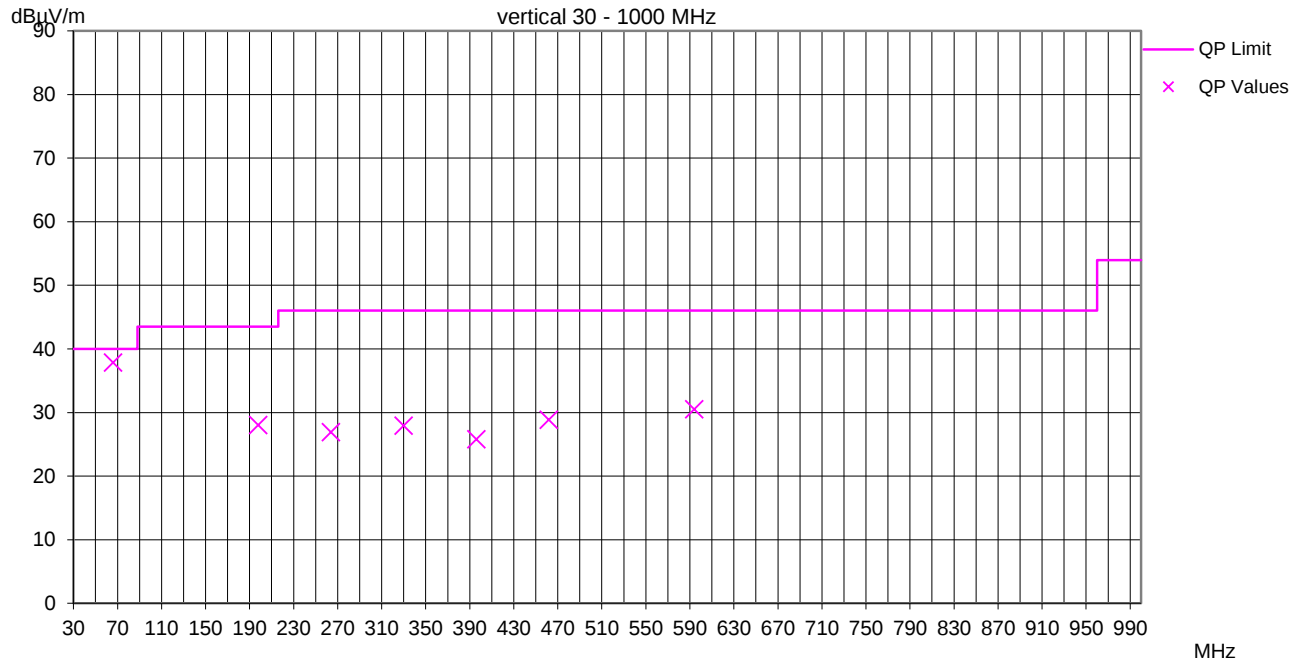
Minimum margin to limit: 4.8 dB

| Frequency [MHz] | Reading [dBµV] QP | Correction [dB] | Values [dBµV/m] QP | Limit [dBµV/m] QP | Margin [dB] QP |
|-----------------|-------------------|-----------------|--------------------|-------------------|----------------|
| 66.000          | 16.8              | 12.0            | 28.8               | 40.0              | 11.2           |
| 131.999         | 14.5              | 10.9            | 25.4               | 43.5              | 18.1           |
| 198.001         | 25.3              | 13.4            | 38.7               | 43.5              | 4.8            |
| 264.000         | 17.1              | 15.4            | 32.5               | 46.0              | 13.5           |
| 330.000         | 18.4              | 17.4            | 35.8               | 46.0              | 10.2           |
| 396.000         | 17.6              | 18.9            | 36.5               | 46.0              | 9.6            |
| 462.000         | 18.7              | 20.2            | 38.9               | 46.0              | 7.2            |
| 528.000         | 18.6              | 21.7            | 40.3               | 46.0              | 5.7            |
| 594.000         | 12.8              | 22.9            | 35.7               | 46.0              | 10.3           |
| 660.000         | 8.1               | 23.7            | 31.8               | 46.0              | 14.2           |

File No. T-0249-5106-00 JP

Operation mode: TX mode CH mid (2441MHz)  
Remarks: 8DPSK  
Date: 2013-10-28  
Tested by: Pessinger Jürgen

Result: PASS

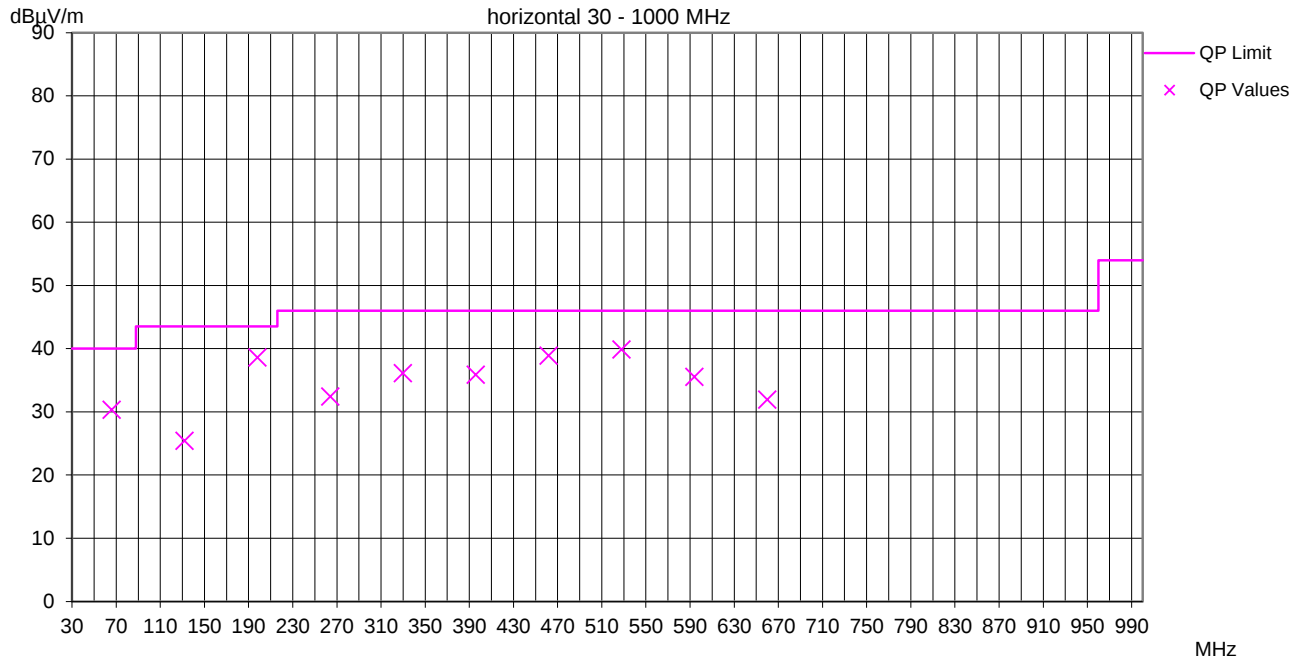


| Minimum margin to limit: |                   |                 |                    |                   | 2.2 dB         |
|--------------------------|-------------------|-----------------|--------------------|-------------------|----------------|
| Frequency [MHz]          | Reading [dBµV] QP | Correction [dB] | Values [dBµV/m] QP | Limit [dBµV/m] QP | Margin [dB] QP |
| 65.999                   | 25.8              | 12.0            | 37.8               | 40.0              | 2.2            |
| 198.002                  | 14.6              | 13.4            | 28.0               | 43.5              | 15.5           |
| 264.002                  | 11.5              | 15.4            | 26.9               | 46.0              | 19.1           |
| 330.002                  | 10.5              | 17.4            | 27.9               | 46.0              | 18.1           |
| 396.002                  | 6.9               | 18.9            | 25.8               | 46.0              | 20.3           |
| 462.000                  | 8.7               | 20.2            | 28.9               | 46.0              | 17.2           |
| 594.002                  | 7.6               | 22.9            | 30.5               | 46.0              | 15.5           |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH high (2480MHz)  
Remarks: 8DPSK  
Date: 2013-10-28  
Tested by: Pessinger Jürgen

Result: PASS



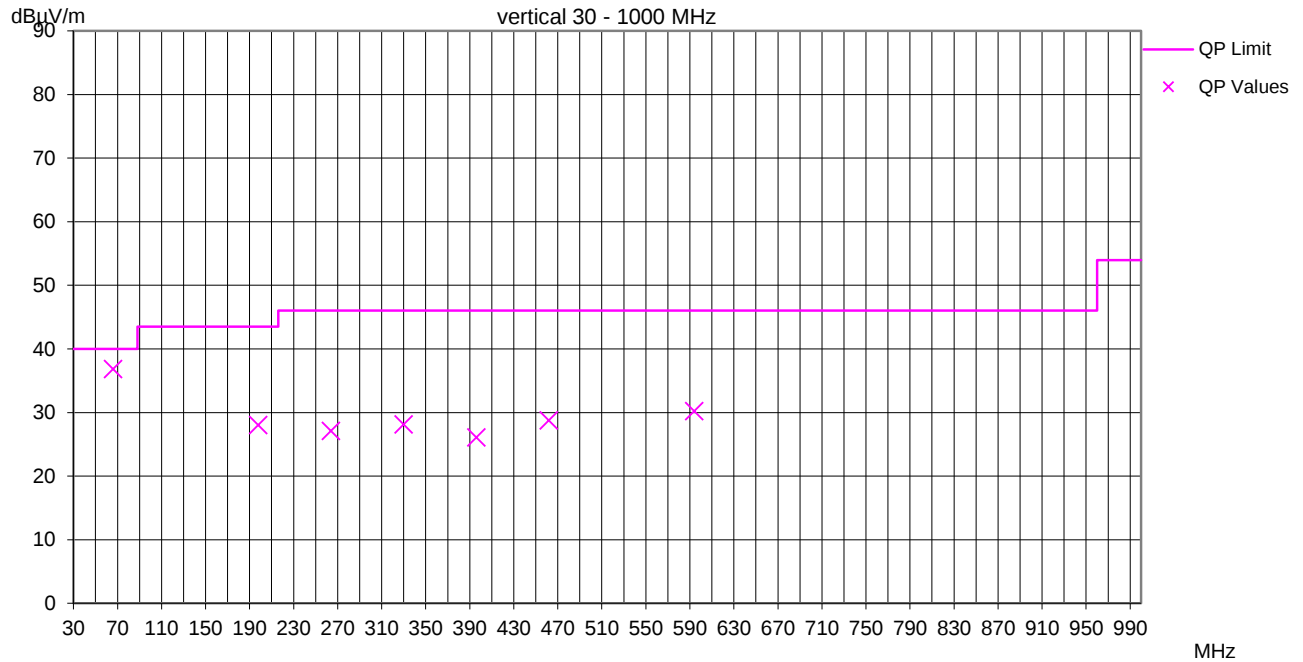
Minimum margin to limit: 4.9 dB

| Frequency [MHz] | Reading [dBµV] QP | Correction [dB] | Values [dBµV/m] QP | Limit [dBµV/m] QP | Margin [dB] QP |
|-----------------|-------------------|-----------------|--------------------|-------------------|----------------|
| 66.000          | 18.3              | 12.0            | 30.3               | 40.0              | 9.7            |
| 131.999         | 14.5              | 10.9            | 25.4               | 43.5              | 18.1           |
| 198.001         | 25.2              | 13.4            | 38.6               | 43.5              | 4.9            |
| 264.000         | 17.0              | 15.4            | 32.4               | 46.0              | 13.6           |
| 330.000         | 18.7              | 17.4            | 36.1               | 46.0              | 9.9            |
| 396.000         | 17.0              | 18.9            | 35.9               | 46.0              | 10.2           |
| 462.000         | 18.7              | 20.2            | 38.9               | 46.0              | 7.2            |
| 528.000         | 18.1              | 21.7            | 39.8               | 46.0              | 6.2            |
| 594.000         | 12.6              | 22.9            | 35.5               | 46.0              | 10.5           |
| 660.000         | 8.2               | 23.7            | 31.9               | 46.0              | 14.1           |

File No. T-0249-5106-00 JP

Operation mode: TX mode CH high (2480MHz)  
Remarks: 8DPSK  
Date: 2013-10-28  
Tested by: Pessinger Jürgen

Result: PASS



| Minimum margin to limit: 3.2 dB |                   |                 |                    |                   |                |
|---------------------------------|-------------------|-----------------|--------------------|-------------------|----------------|
| Frequency [MHz]                 | Reading [dBµV] QP | Correction [dB] | Values [dBµV/m] QP | Limit [dBµV/m] QP | Margin [dB] QP |
| 65.999                          | 24.8              | 12.0            | 36.8               | 40.0              | 3.2            |
| 198.002                         | 14.6              | 13.4            | 28.0               | 43.5              | 15.5           |
| 264.002                         | 11.7              | 15.4            | 27.1               | 46.0              | 18.9           |
| 330.002                         | 10.7              | 17.4            | 28.1               | 46.0              | 17.9           |
| 396.002                         | 7.2               | 18.9            | 26.1               | 46.0              | 20.0           |
| 462.000                         | 8.6               | 20.2            | 28.8               | 46.0              | 17.3           |
| 594.002                         | 7.3               | 22.9            | 30.2               | 46.0              | 15.8           |

File No. **T-0249-5106-00 JP**

## 6.2 Radiated disturbance (1 GHz – 25 GHz)

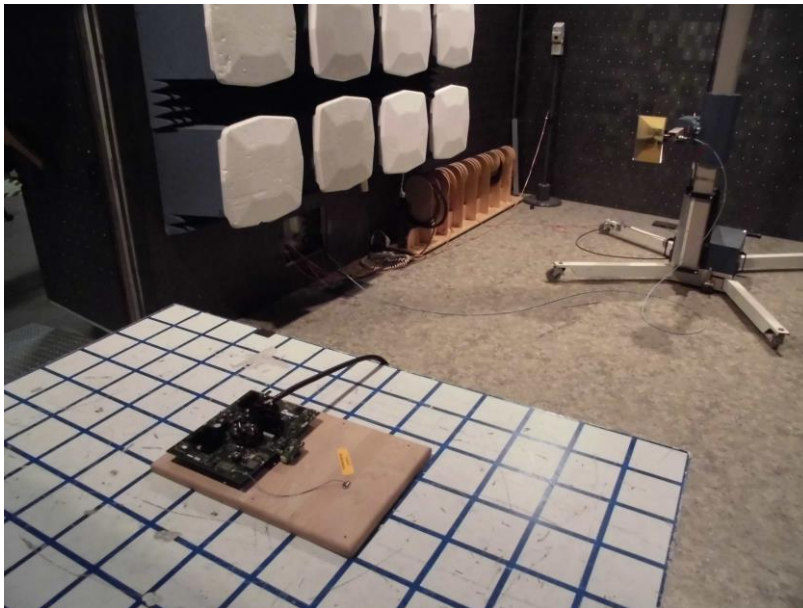
For test instruments and accessories used see section 7 Part SER 3.

### 6.2.1 Description of the test location

Test location: Anechoic Chamber A4

Test distance: 3 metres

### 6.2.2 Photo documentation of the test set-up



### 6.2.3 Test specification

Environmental conditions: Temperature: 23 ° C Humidity: 58 % Atmospheric pressure: 101 kPa

Frequency range: 1000 MHz - 25000 MHz

The test was carried out in the following operation mode(s):

- TX mode CH low (2402MHz)
- TX mode CH mid (2441MHz)
- TX mode CH high (2480MHz)

### 6.2.4 Test result

Minimal margin to limit 2,2 dB at 12010,1 MHz

The requirements are **FULFILLED**.

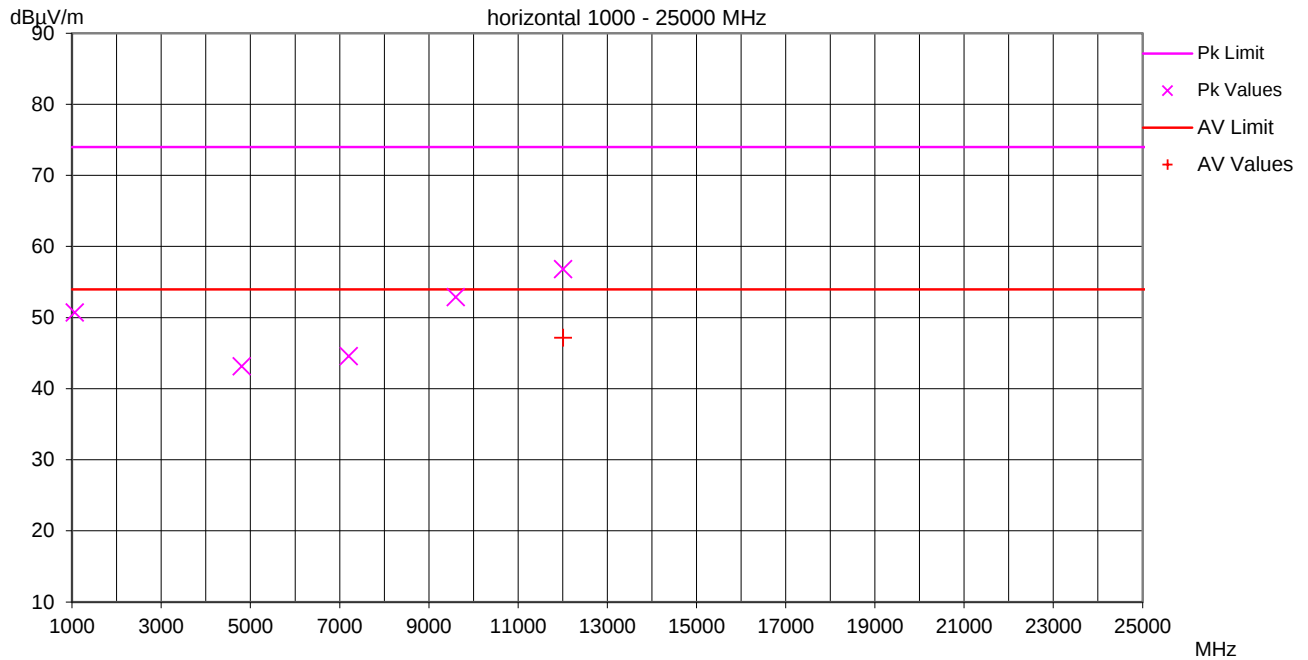
Remarks: No average measurement was performed for frequencies with peak values below average limit.

File No. **T-0249-5106-00 JP**

## 6.2.5 Test protocol

Operation mode: TX mode CH low (2402MHz)  
Remarks: GFSK  
Date: 2013-10-31  
Tested by: Pessinger Jürgen

Result: PASS



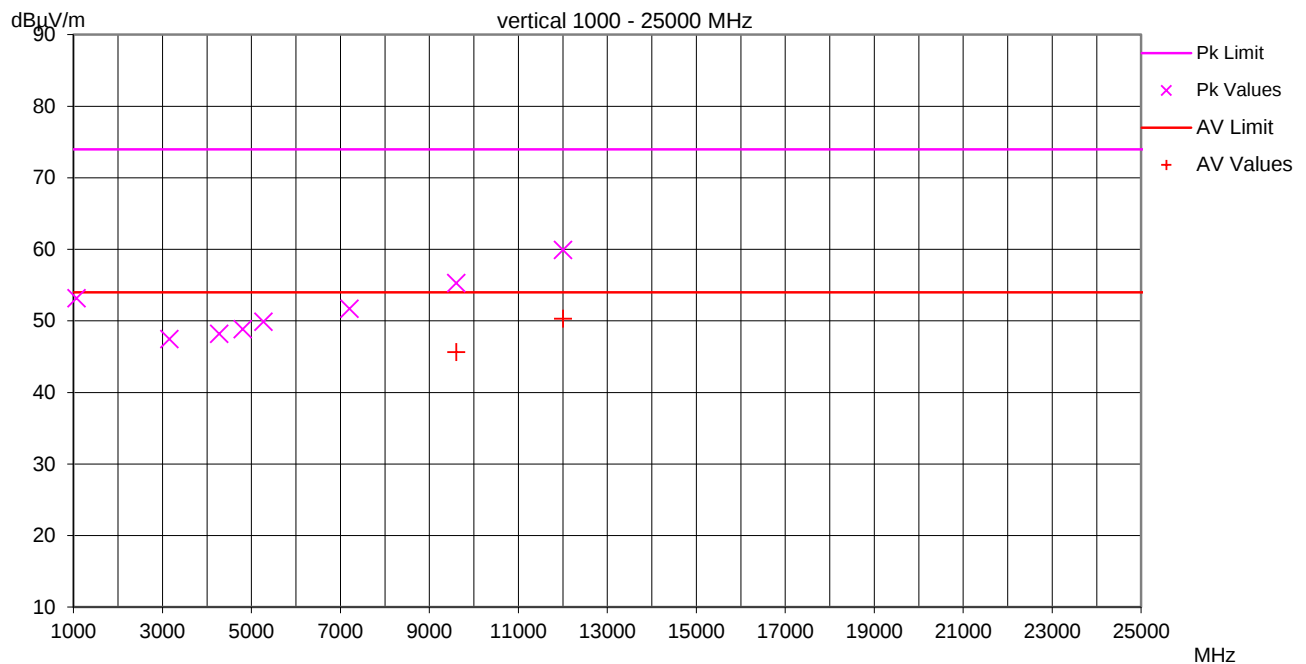
Minimum margin to limit: **6.8 dB**

| Frequency<br>[MHz] | Reading [dBμV] |      | Correction<br>[dB] | Values [dBμV/m] |      | Limit [dBμV/m] |      | Margin [dB] |     |
|--------------------|----------------|------|--------------------|-----------------|------|----------------|------|-------------|-----|
|                    | Pk             | AV   |                    | Pk              | AV   | Pk             | AV   | Pk          | AV  |
| 1064.000           | 60.4           |      | -9.7               | 50.7            |      | 74.0           | 54.0 | 23.3        |     |
| 4804.010           | 41.6           |      | 1.5                | 43.1            |      | 74.0           | 54.0 | 30.8        |     |
| 7206.300           | 37.5           |      | 7.1                | 44.6            |      | 74.0           | 54.0 | 29.4        |     |
| 9608.400           | 43.4           |      | 9.5                | 52.9            |      | 74.0           | 54.0 | 21.1        |     |
| 12010.200          | 45.1           | 35.5 | 11.7               | 56.8            | 47.1 | 74.0           | 54.0 | 17.2        | 6.8 |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH low (2402MHz)  
Remarks: GFSK  
Date: 2013-10-31  
Tested by: Pessinger Jürgen

Result: PASS



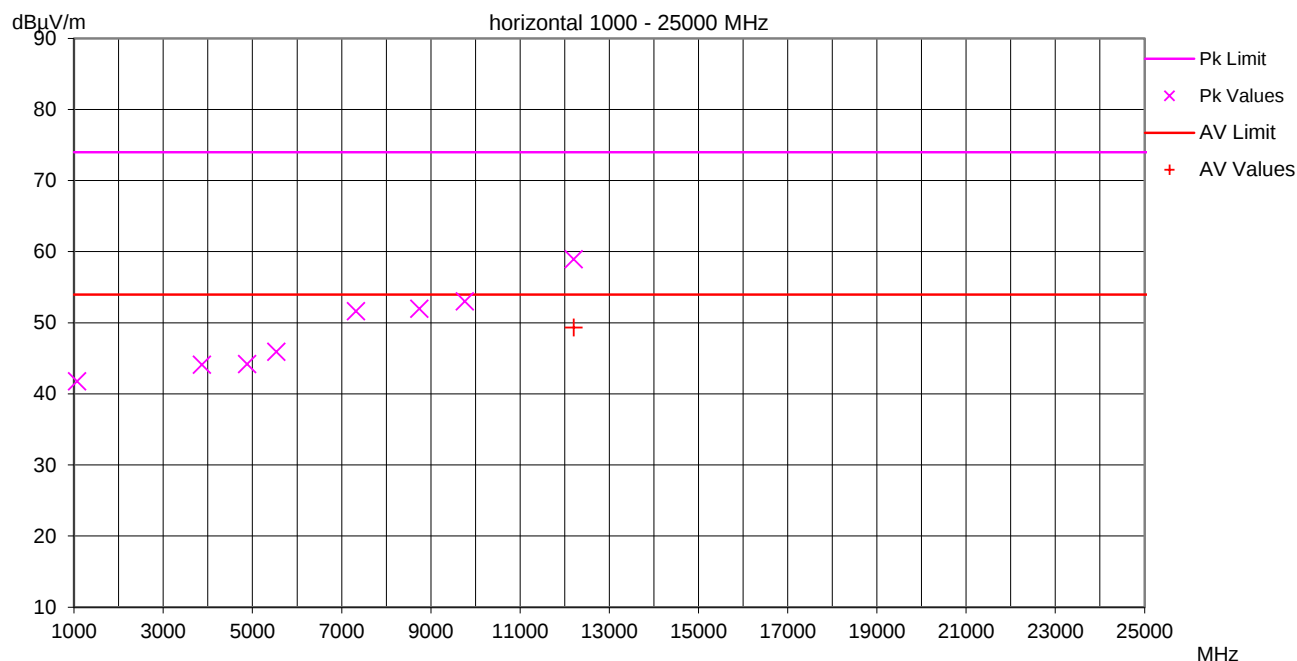
Minimum margin to limit: 3.7 dB

| Frequency<br>[MHz] | Reading [dBμV] |      | Correction<br>[dB] | Values [dBμV/m] |      | Limit [dBμV/m] |      | Margin [dB] |     |
|--------------------|----------------|------|--------------------|-----------------|------|----------------|------|-------------|-----|
|                    | Pk             | AV   |                    | Pk              | AV   | Pk             | AV   | Pk          | AV  |
| 1072.000           | 62.8           |      | -9.6               | 53.2            |      | 74.0           | 54.0 | 20.8        |     |
| 3160.200           | 48.3           |      | -0.9               | 47.4            |      | 74.0           | 54.0 | 26.5        |     |
| 4280.000           | 48.2           |      | 0.0                | 48.2            |      | 74.0           | 54.0 | 25.8        |     |
| 4804.200           | 47.3           |      | 1.5                | 48.8            |      | 74.0           | 54.0 | 25.1        |     |
| 5271.300           | 47.3           |      | 2.6                | 49.9            |      | 74.0           | 54.0 | 24.1        |     |
| 7206.150           | 44.6           |      | 7.1                | 51.7            |      | 74.0           | 54.0 | 22.3        |     |
| 9608.400           | 45.8           | 36.2 | 9.5                | 55.3            | 45.6 | 74.0           | 54.0 | 18.7        | 8.4 |
| 12010.100          | 48.2           | 38.6 | 11.7               | 59.9            | 50.3 | 74.0           | 54.0 | 14.1        | 3.7 |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH mid (2441MHz)  
 Remarks: GFSK  
 Date: 2013-10-31  
 Tested by: Pessinger Jürgen

Result: PASS



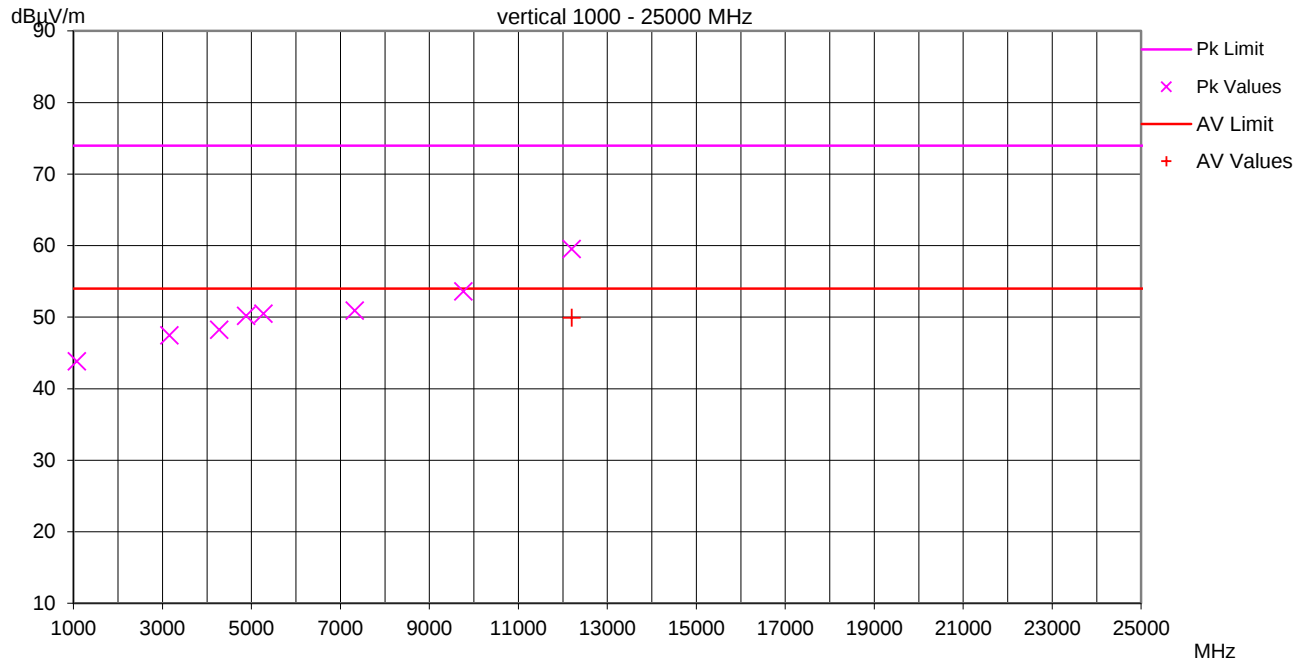
Minimum margin to limit: 4.7 dB

| Frequency<br>[MHz] | Reading [dBμV] |      | Correction<br>[dB] | Values [dBμV/m] |      | Limit [dBμV/m] |      | Margin [dB] |     |
|--------------------|----------------|------|--------------------|-----------------|------|----------------|------|-------------|-----|
|                    | Pk             | AV   |                    | Pk              | AV   | Pk             | AV   | Pk          | AV  |
| 1072.000           | 51.4           |      | -9.6               | 41.7            |      | 74.0           | 54.0 | 32.2        |     |
| 3870.100           | 43.3           |      | 0.8                | 44.1            |      | 74.0           | 54.0 | 29.9        |     |
| 4881.800           | 42.4           |      | 1.8                | 44.2            |      | 74.0           | 54.0 | 29.8        |     |
| 5540.600           | 42.9           |      | 3.0                | 45.9            |      | 74.0           | 54.0 | 28.1        |     |
| 7323.000           | 43.9           |      | 7.7                | 51.6            |      | 74.0           | 54.0 | 22.4        |     |
| 8740.800           | 43.1           |      | 8.8                | 51.9            |      | 74.0           | 54.0 | 22.0        |     |
| 9764.100           | 43.3           |      | 9.7                | 53.0            |      | 74.0           | 54.0 | 21.0        |     |
| 12205.000          | 47.8           | 38.2 | 11.1               | 58.9            | 49.3 | 74.0           | 54.0 | 15.1        | 4.7 |

File No. T-0249-5106-00 JP

Operation mode: TX mode CH mid (2441MHz)  
Remarks: GFSK  
Date: 2013-10-31  
Tested by: Pessinger Jürgen

Result: PASS

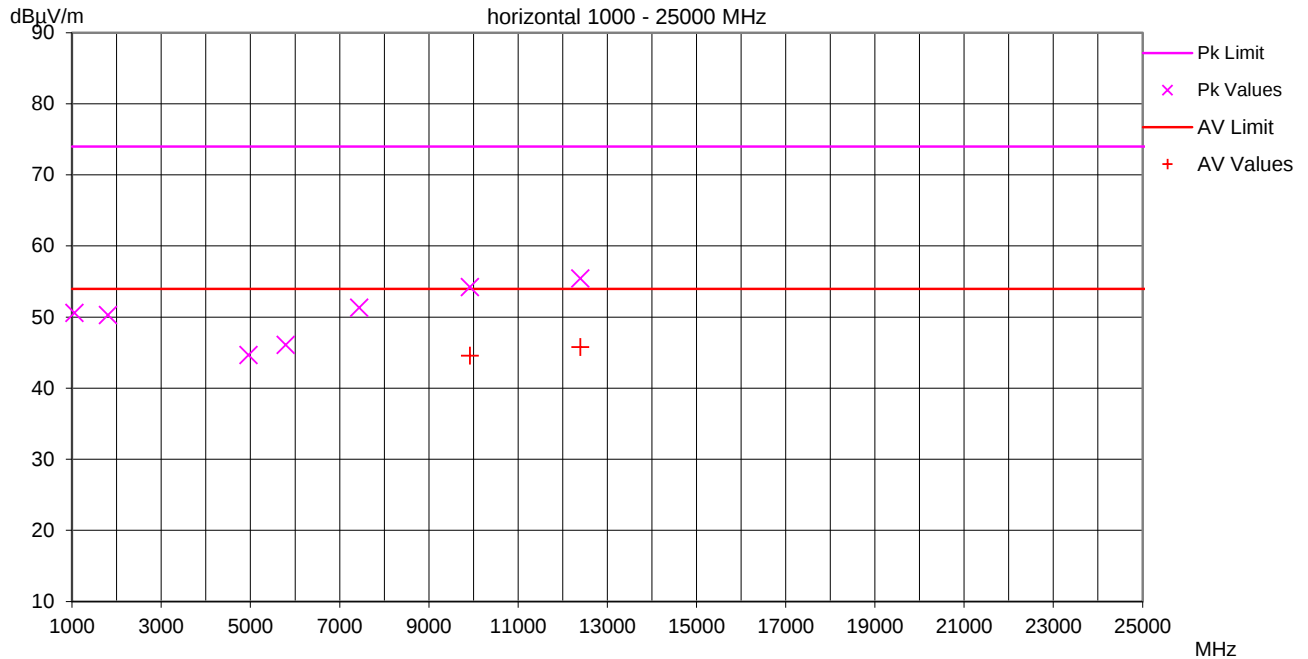


| Minimum margin to limit: |                |                 |                 |                |               |     | 4.1 dB |    |
|--------------------------|----------------|-----------------|-----------------|----------------|---------------|-----|--------|----|
| Frequency [MHz]          | Reading [dBµV] | Correction [dB] | Values [dBµV/m] | Limit [dBµV/m] | Marginal [dB] |     | Pk     | AV |
|                          | Pk             | AV              | Pk              | AV             |               |     |        |    |
| 1076.300                 | 53.4           |                 | 43.8            | 74.0           | 30.2          |     |        |    |
| 3160.700                 | 48.3           |                 | 47.5            | 74.0           | 26.5          |     |        |    |
| 4281.200                 | 48.2           |                 | 48.2            | 74.0           | 25.8          |     |        |    |
| 4882.100                 | 48.4           |                 | 50.2            | 74.0           | 23.8          |     |        |    |
| 5270.300                 | 47.9           |                 | 50.5            | 74.0           | 23.5          |     |        |    |
| 7323.000                 | 43.2           |                 | 50.9            | 74.0           | 23.1          |     |        |    |
| 9764.000                 | 43.9           |                 | 53.6            | 74.0           | 20.4          |     |        |    |
| 12205.050                | 48.4           | 38.8            | 59.5            | 74.0           | 14.5          | 4.1 |        |    |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH high (2480MHz)  
Remarks: GFSK  
Date: 2013-10-31  
Tested by: Pessinger Jürgen

Result: PASS



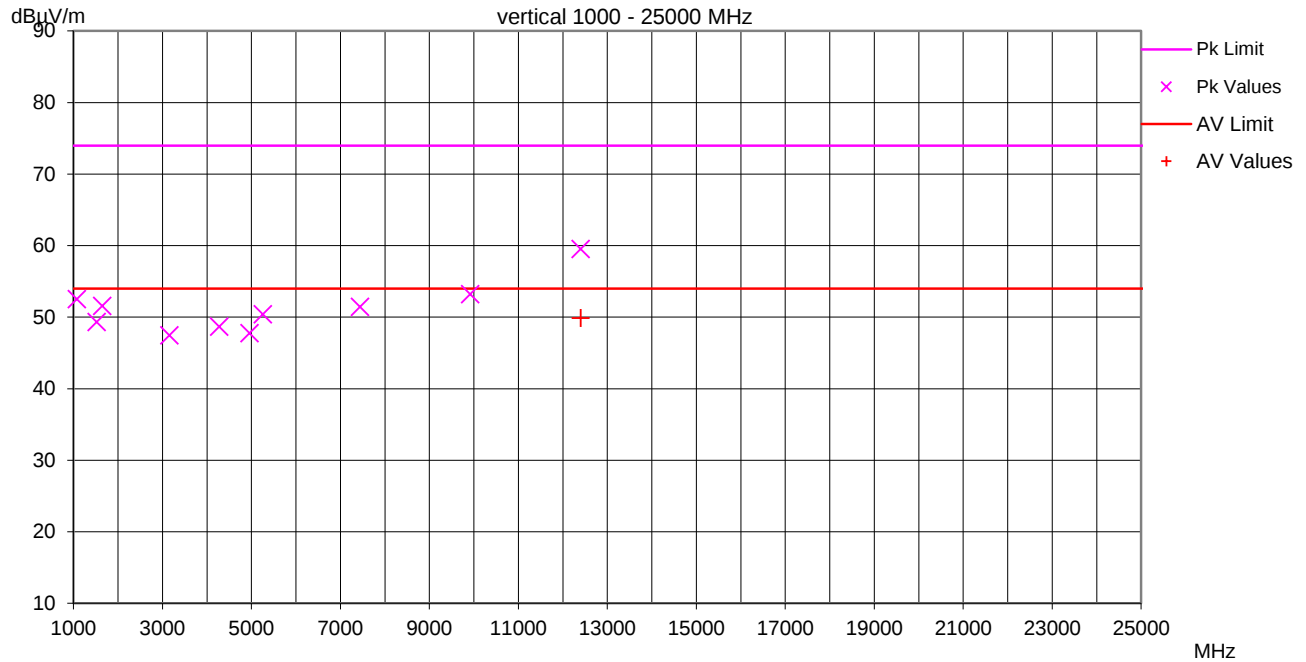
Minimum margin to limit: 8.2 dB

| Frequency<br>[MHz] | Reading [dBµV] |      | Correction<br>[dB] | Values [dBµV/m] |      | Limit [dBµV/m] |      | Margin [dB] |     |
|--------------------|----------------|------|--------------------|-----------------|------|----------------|------|-------------|-----|
|                    | Pk             | AV   |                    | Pk              | AV   | Pk             | AV   | Pk          | AV  |
| 1060.300           | 60.3           |      | -9.7               | 50.6            |      | 74.0           | 54.0 | 23.4        |     |
| 1808.600           | 56.0           |      | -5.8               | 50.2            |      | 74.0           | 54.0 | 23.7        |     |
| 4960.100           | 42.6           |      | 2.0                | 44.6            |      | 74.0           | 54.0 | 29.3        |     |
| 5790.300           | 43.2           |      | 2.9                | 46.1            |      | 74.0           | 54.0 | 27.9        |     |
| 7440.200           | 43.3           |      | 8.0                | 51.3            |      | 74.0           | 54.0 | 22.7        |     |
| 9920.000           | 44.2           | 34.6 | 10.0               | 54.2            | 44.5 | 74.0           | 54.0 | 19.8        | 9.4 |
| 12400.000          | 44.5           | 34.9 | 10.9               | 55.4            | 45.8 | 74.0           | 54.0 | 18.6        | 8.2 |

File No. T-0249-5106-00 JP

Operation mode: TX mode CH high (2480MHz)  
 Remarks: GFSK  
 Date: 2013-10-31  
 Tested by: Pessinger Jürgen

Result: PASS

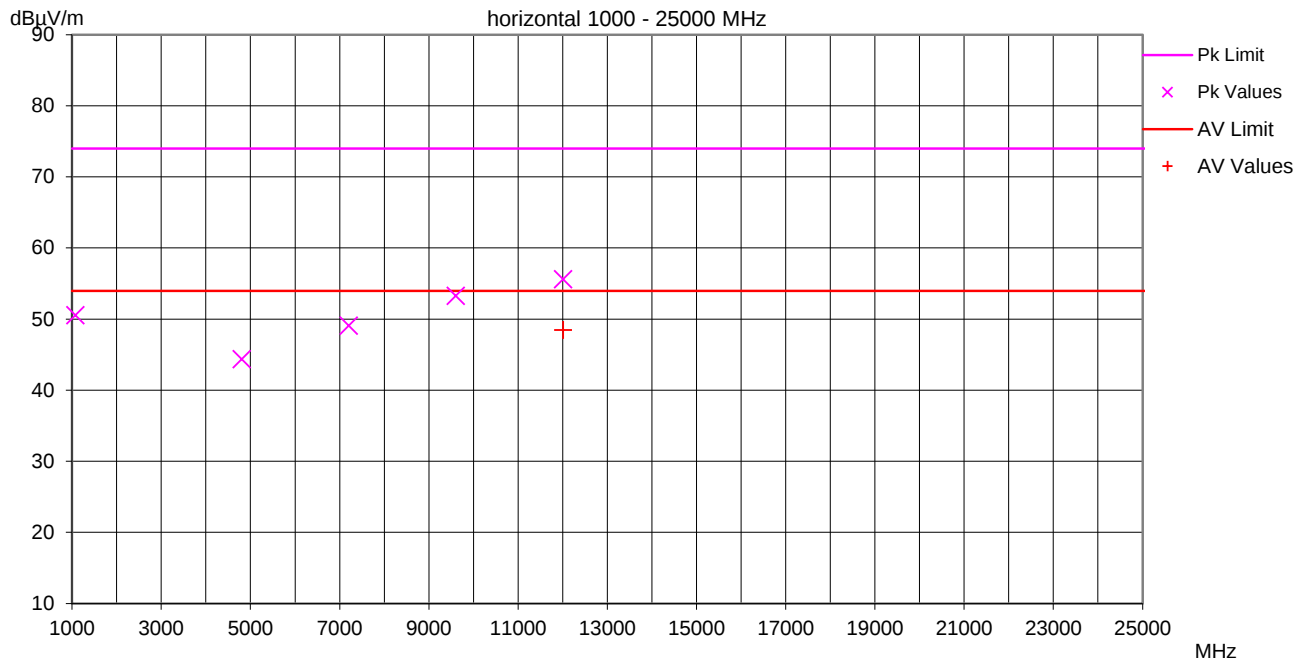


| Minimum margin to limit: |                |      |                    |                 |      |                |      | 4.1 dB      |     |
|--------------------------|----------------|------|--------------------|-----------------|------|----------------|------|-------------|-----|
| Frequency<br>[MHz]       | Reading [dBµV] |      | Correction<br>[dB] | Values [dBµV/m] |      | Limit [dBµV/m] |      | Margin [dB] |     |
|                          | Pk             | AV   |                    | Pk              | AV   | Pk             | AV   | Pk          | AV  |
| 1076.400                 | 62.1           |      | -9.6               | 52.5            |      | 74.0           | 54.0 | 21.5        |     |
| 1524.700                 | 57.1           |      | -7.8               | 49.3            |      | 74.0           | 54.0 | 24.7        |     |
| 1648.800                 | 58.7           |      | -7.2               | 51.5            |      | 74.0           | 54.0 | 22.4        |     |
| 3160.400                 | 48.3           |      | -0.8               | 47.5            |      | 74.0           | 54.0 | 26.5        |     |
| 4279.900                 | 48.7           |      | 0.0                | 48.7            |      | 74.0           | 54.0 | 25.3        |     |
| 4960.200                 | 45.7           |      | 2.0                | 47.7            |      | 74.0           | 54.0 | 26.2        |     |
| 5260.300                 | 47.8           |      | 2.6                | 50.4            |      | 74.0           | 54.0 | 23.6        |     |
| 7440.100                 | 43.4           |      | 8.0                | 51.4            |      | 74.0           | 54.0 | 22.6        |     |
| 9920.200                 | 43.2           |      | 10.0               | 53.2            |      | 74.0           | 54.0 | 20.8        |     |
| 12400.040                | 48.6           | 39.0 | 10.9               | 59.5            | 49.9 | 74.0           | 54.0 | 14.5        | 4.1 |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH low (2402MHz)  
 Remarks:  $\pi/4$  DQPSK  
 Date: 2013-10-31  
 Tested by: Pessinger Jürgen

Result: PASS

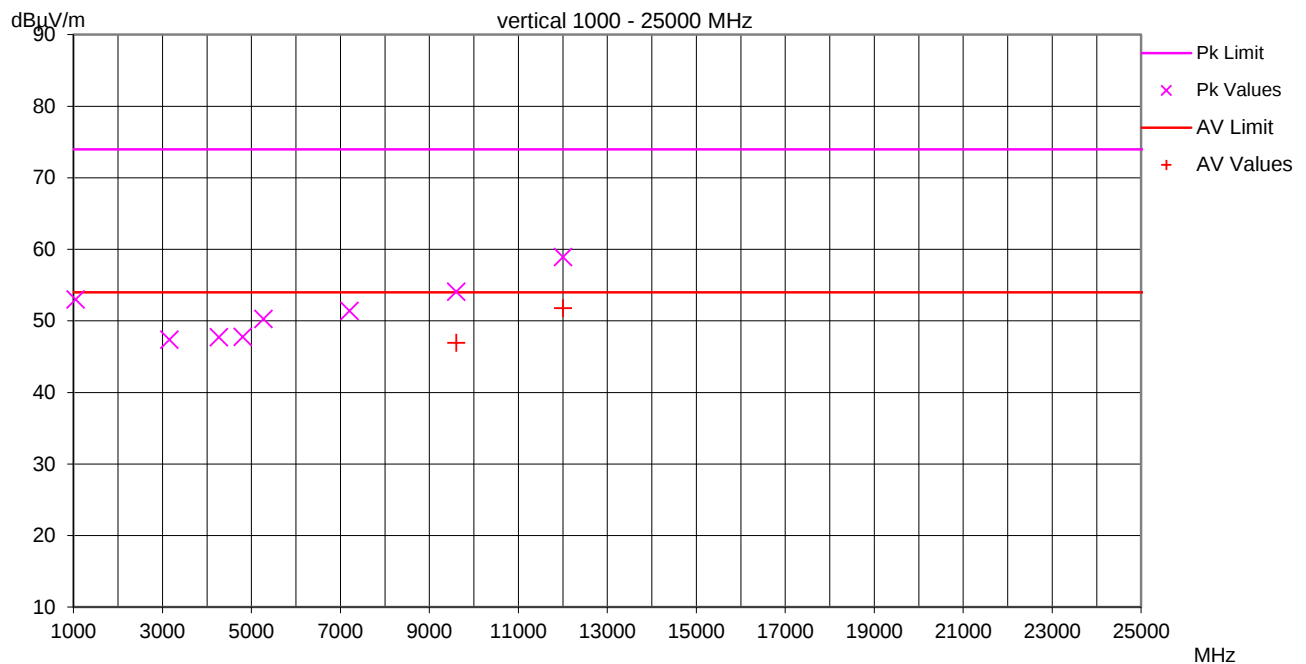


| Minimum margin to limit: |                |      |                    |                 |      |                |      | 5.5         | dB  |
|--------------------------|----------------|------|--------------------|-----------------|------|----------------|------|-------------|-----|
| Frequency<br>[MHz]       | Reading [dBμV] |      | Correction<br>[dB] | Values [dBμV/m] |      | Limit [dBμV/m] |      | Margin [dB] |     |
|                          | Pk             | AV   |                    | Pk              | AV   | Pk             | AV   | Pk          | AV  |
| 1076.200                 | 60.1           |      | -9.6               | 50.5            |      | 74.0           | 54.0 | 23.5        |     |
| 4804.200                 | 42.8           |      | 1.5                | 44.3            |      | 74.0           | 54.0 | 29.6        |     |
| 7206.100                 | 42.0           |      | 7.1                | 49.1            |      | 74.0           | 54.0 | 24.9        |     |
| 9608.800                 | 43.8           |      | 9.5                | 53.3            |      | 74.0           | 54.0 | 20.7        |     |
| 12010.000                | 43.9           | 36.8 | 11.7               | 55.6            | 48.4 | 74.0           | 54.0 | 18.4        | 5.5 |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH low (2402MHz)  
Remarks:  $\pi/4$  DQPSK  
Date: 2013-10-31  
Tested by: Pessinger Jürgen

Result: PASS

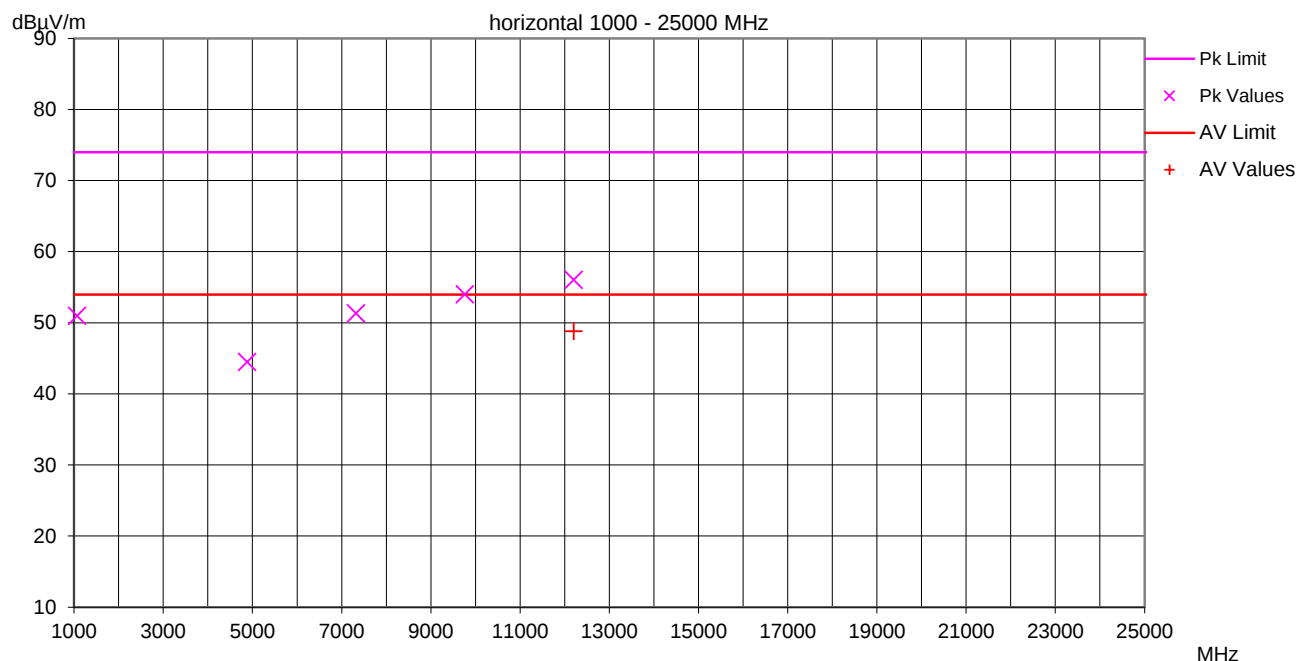


| Minimum margin to limit: |                |      |                    |                 |      |                |      | 2.2 dB      |     |
|--------------------------|----------------|------|--------------------|-----------------|------|----------------|------|-------------|-----|
| Frequency<br>[MHz]       | Reading [dBμV] |      | Correction<br>[dB] | Values [dBμV/m] |      | Limit [dBμV/m] |      | Margin [dB] |     |
|                          | Pk             | AV   |                    | Pk              | AV   | Pk             | AV   | Pk          | AV  |
| 1052.400                 | 62.8           |      | -9.8               | 53.0            |      | 74.0           | 54.0 | 21.0        |     |
| 3160.800                 | 48.2           |      | -0.8               | 47.4            |      | 74.0           | 54.0 | 26.6        |     |
| 4270.300                 | 47.7           |      | 0.0                | 47.7            |      | 74.0           | 54.0 | 26.3        |     |
| 4803.700                 | 46.2           |      | 1.5                | 47.7            |      | 74.0           | 54.0 | 26.2        |     |
| 5271.000                 | 47.7           |      | 2.6                | 50.3            |      | 74.0           | 54.0 | 23.7        |     |
| 7206.100                 | 44.3           |      | 7.1                | 51.4            |      | 74.0           | 54.0 | 22.6        |     |
| 9608.400                 | 44.6           | 37.5 | 9.5                | 54.1            | 46.9 | 74.0           | 54.0 | 19.9        | 7.1 |
| 12010.100                | 47.2           | 40.1 | 11.7               | 58.9            | 51.7 | 74.0           | 54.0 | 15.1        | 2.2 |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH mid (2441MHz)  
 Remarks:  $\pi/4$  DQPSK  
 Date: 2013-10-31  
 Tested by: Pessinger Jürgen

Result: PASS



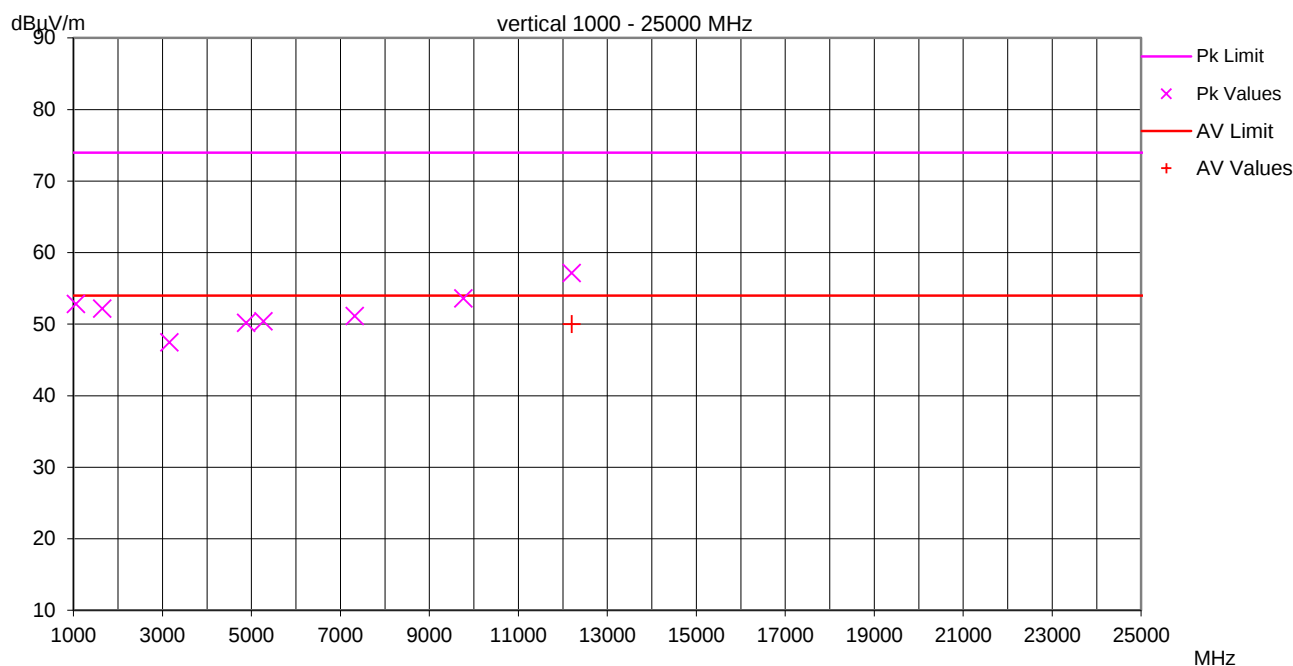
Minimum margin to limit: 5.2 dB

| Frequency<br>[MHz] | Reading [dB $\mu$ V] |      | Correction<br>[dB] | Values [dB $\mu$ V/m] |      | Limit [dB $\mu$ V/m] |      | Margin [dB] |     |
|--------------------|----------------------|------|--------------------|-----------------------|------|----------------------|------|-------------|-----|
|                    | Pk                   | AV   |                    | Pk                    | AV   | Pk                   | AV   | Pk          | AV  |
| 1072.000           | 60.6                 |      | -9.6               | 51.0                  |      | 74.0                 | 54.0 | 23.0        |     |
| 4882.010           | 42.7                 |      | 1.8                | 44.5                  |      | 74.0                 | 54.0 | 29.5        |     |
| 7323.000           | 43.6                 |      | 7.7                | 51.3                  |      | 74.0                 | 54.0 | 22.7        |     |
| 9764.000           | 44.3                 |      | 9.7                | 54.0                  |      | 74.0                 | 54.0 | 20.0        |     |
| 12205.200          | 44.9                 | 37.7 | 11.1               | 56.0                  | 48.8 | 74.0                 | 54.0 | 18.0        | 5.2 |

File No. T-0249-5106-00 JP

Operation mode: TX mode CH mid (2441MHz)  
 Remarks:  $\pi/4$  DQPSK  
 Date: 2013-10-31  
 Tested by: Pessinger Jürgen

Result: PASS

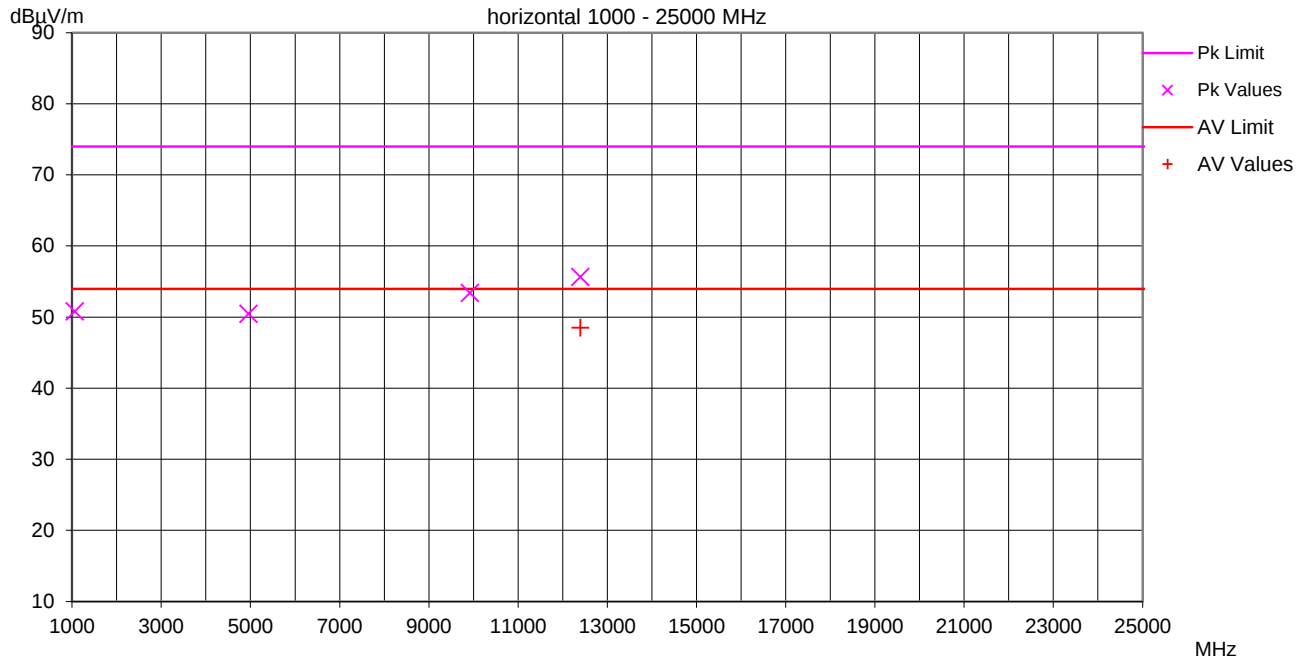


| Minimum margin to limit: |                |      |                    |                 |      |                |      | 4.0 dB      |     |
|--------------------------|----------------|------|--------------------|-----------------|------|----------------|------|-------------|-----|
| Frequency<br>[MHz]       | Reading [dBμV] |      | Correction<br>[dB] | Values [dBμV/m] |      | Limit [dBμV/m] |      | Margin [dB] |     |
|                          | Pk             | AV   |                    | Pk              | AV   | Pk             | AV   | Pk          | AV  |
| 1056.000                 | 62.6           |      | -9.8               | 52.8            |      | 74.0           | 54.0 | 21.2        |     |
| 1648.000                 | 59.3           |      | -7.2               | 52.1            |      | 74.0           | 54.0 | 21.8        |     |
| 3160.500                 | 48.3           |      | -0.8               | 47.5            |      | 74.0           | 54.0 | 26.5        |     |
| 4882.000                 | 48.4           |      | 1.8                | 50.2            |      | 74.0           | 54.0 | 23.8        |     |
| 5270.000                 | 47.8           |      | 2.6                | 50.4            |      | 74.0           | 54.0 | 23.6        |     |
| 7323.000                 | 43.4           |      | 7.7                | 51.1            |      | 74.0           | 54.0 | 22.9        |     |
| 9764.100                 | 43.9           |      | 9.7                | 53.6            |      | 74.0           | 54.0 | 20.4        |     |
| 12205.025                | 46.0           | 38.9 | 11.1               | 57.1            | 50.0 | 74.0           | 54.0 | 16.9        | 4.0 |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH high (2480MHz)  
 Remarks:  $\pi/4$  DQPSK  
 Date: 2013-10-31  
 Tested by: Pessinger Jürgen

Result: PASS

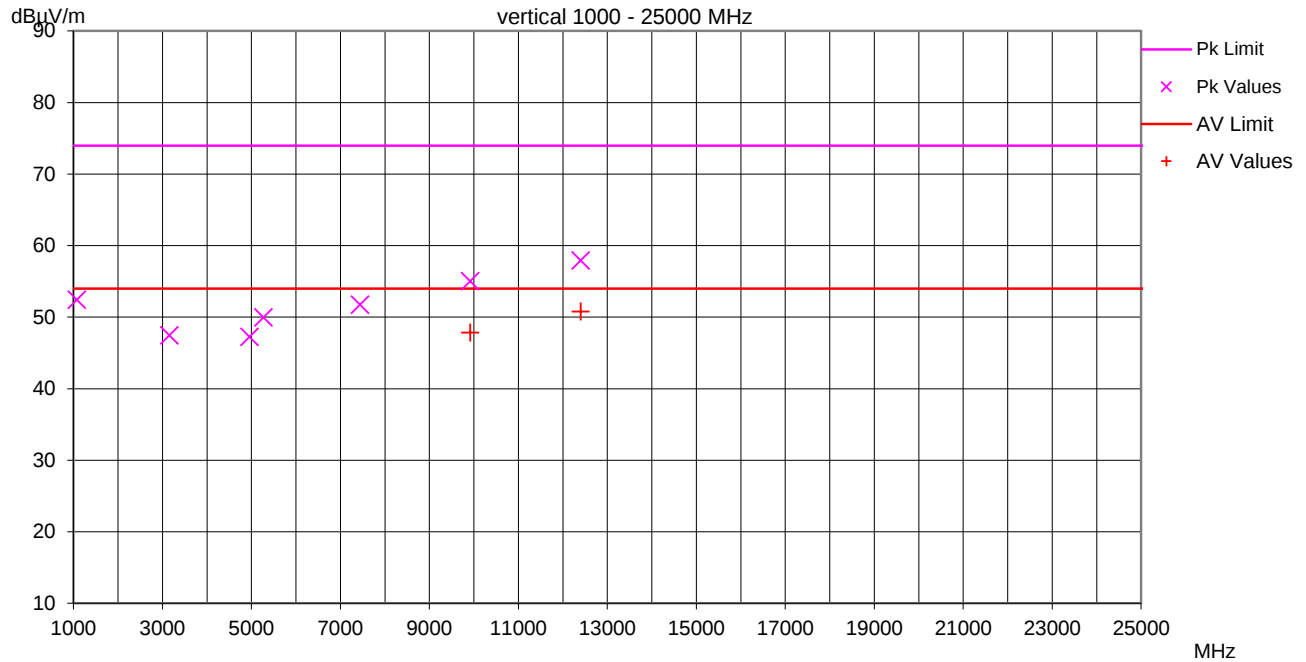


| Minimum margin to limit: |                |      |                    |                 |      |                |      | 5.5         | dB  |
|--------------------------|----------------|------|--------------------|-----------------|------|----------------|------|-------------|-----|
| Frequency<br>[MHz]       | Reading [dBμV] |      | Correction<br>[dB] | Values [dBμV/m] |      | Limit [dBμV/m] |      | Margin [dB] |     |
|                          | Pk             | AV   |                    | Pk              | AV   | Pk             | AV   | Pk          | AV  |
| 1064.000                 | 60.5           |      | -9.7               | 50.8            |      | 74.0           | 54.0 | 23.2        |     |
| 4960.000                 | 48.4           |      | 2.0                | 50.4            |      | 74.0           | 54.0 | 23.5        |     |
| 9920.000                 | 43.4           |      | 10.0               | 53.4            |      | 74.0           | 54.0 | 20.6        |     |
| 12400.000                | 44.7           | 37.6 | 10.9               | 55.6            | 48.5 | 74.0           | 54.0 | 18.4        | 5.5 |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH high (2480MHz)  
Remarks:  $\pi/4$  DQPSK  
Date: 2013-10-31  
Tested by: Pessinger Jürgen

Result: PASS

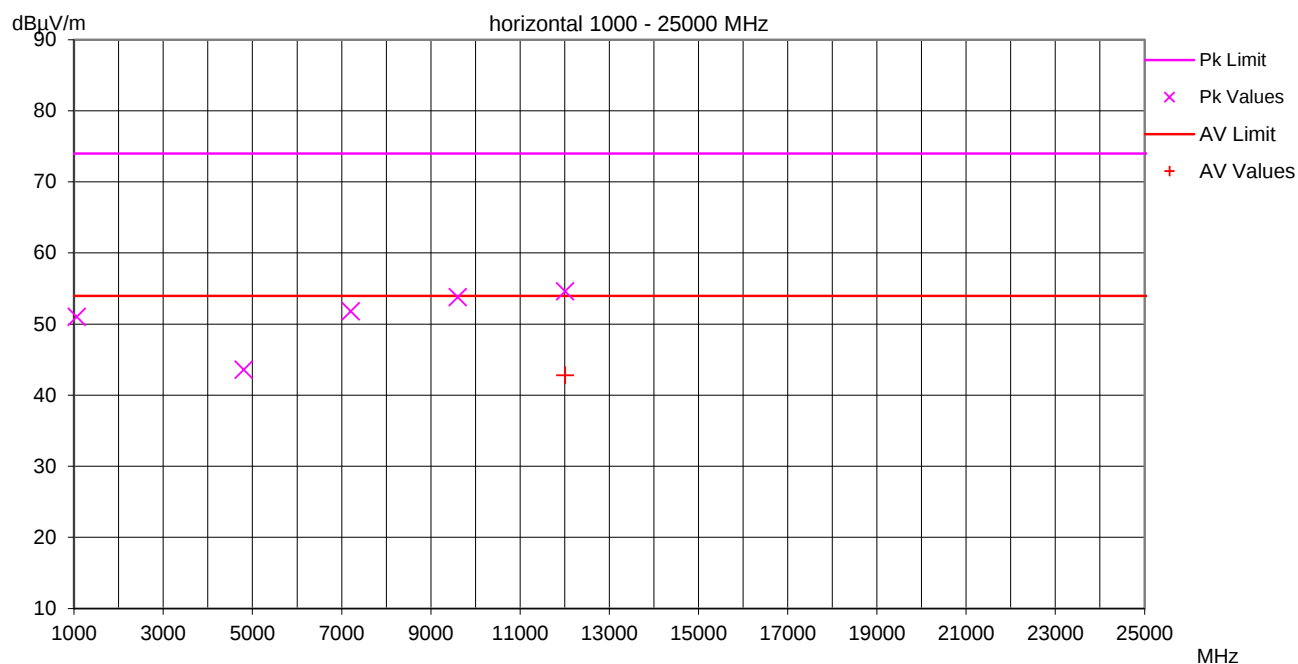


| Minimum margin to limit: |                |      |                    |                 |      |                | 3.2  | dB          |     |
|--------------------------|----------------|------|--------------------|-----------------|------|----------------|------|-------------|-----|
| Frequency<br>[MHz]       | Reading [dBμV] |      | Correction<br>[dB] | Values [dBμV/m] |      | Limit [dBμV/m] |      | Margin [dB] |     |
|                          | Pk             | AV   |                    | Pk              | AV   | Pk             | AV   | Pk          | AV  |
| 1076.000                 | 62.0           |      | -9.6               | 52.4            |      | 74.0           | 54.0 | 21.6        |     |
| 3160.000                 | 48.3           |      | -0.9               | 47.4            |      | 74.0           | 54.0 | 26.5        |     |
| 4960.000                 | 45.2           |      | 2.0                | 47.2            |      | 74.0           | 54.0 | 26.7        |     |
| 5270.000                 | 47.4           |      | 2.6                | 50.0            |      | 74.0           | 54.0 | 24.0        |     |
| 7440.000                 | 43.7           |      | 8.0                | 51.7            |      | 74.0           | 54.0 | 22.3        |     |
| 9920.000                 | 45.0           | 37.9 | 10.0               | 55.0            | 47.8 | 74.0           | 54.0 | 19.0        | 6.1 |
| 12400.000                | 47.0           | 39.9 | 10.9               | 57.9            | 50.8 | 74.0           | 54.0 | 16.1        | 3.2 |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH low (2402MHz)  
 Remarks: 8DPSK  
 Date: 2013-10-31  
 Tested by: Pessinger Jürgen

Result: PASS



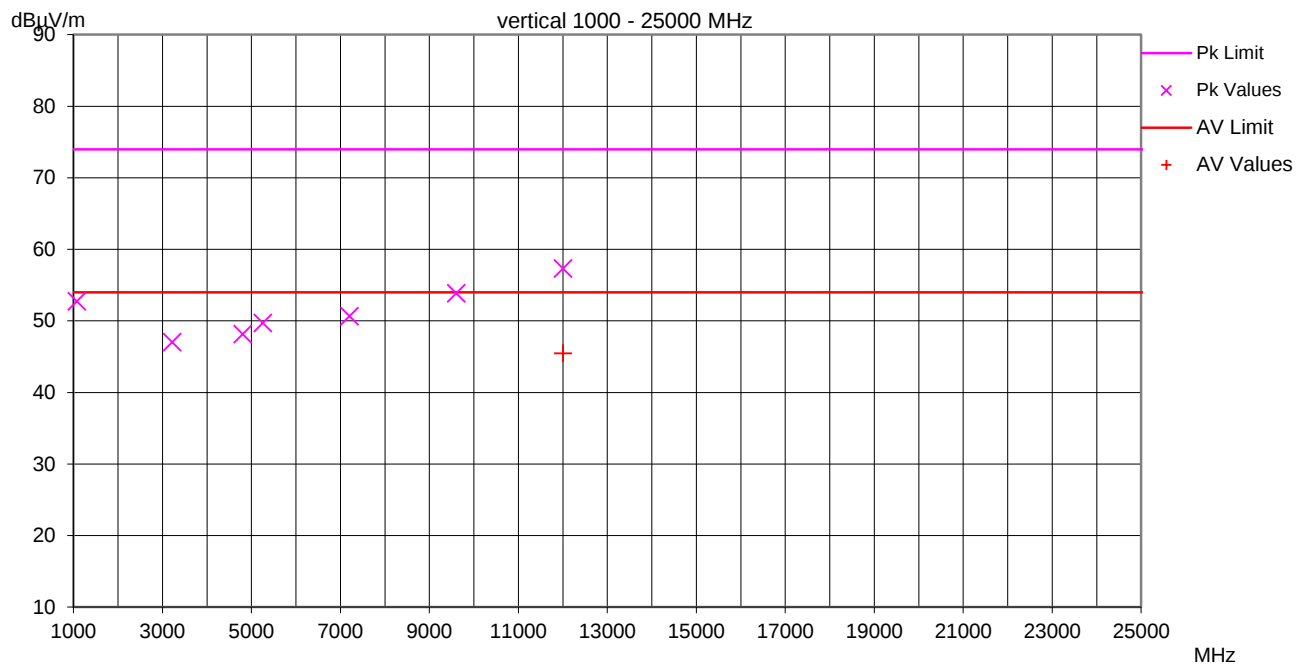
Minimum margin to limit: 11.2 dB

| Frequency<br>[MHz] | Reading [dBµV] |      | Correction<br>[dB] | Values [dBµV/m] |      | Limit [dBµV/m] |      | Margin [dB] |      |
|--------------------|----------------|------|--------------------|-----------------|------|----------------|------|-------------|------|
|                    | Pk             | AV   |                    | Pk              | AV   | Pk             | AV   | Pk          | AV   |
| 1064.000           | 60.7           |      | -9.7               | 51.0            |      | 74.0           | 54.0 | 23.0        |      |
| 4804.000           | 42.0           |      | 1.5                | 43.5            |      | 74.0           | 54.0 | 30.4        |      |
| 7206.000           | 44.7           |      | 7.1                | 51.8            |      | 74.0           | 54.0 | 22.2        |      |
| 9608.200           | 44.3           |      | 9.5                | 53.8            |      | 74.0           | 54.0 | 20.2        |      |
| 12010.000          | 42.9           | 31.1 | 11.7               | 54.6            | 42.8 | 74.0           | 54.0 | 19.4        | 11.2 |

File No. T-0249-5106-00 JP

Operation mode: TX mode CH low (2402MHz)  
Remarks: 8DPSK  
Date: 2013-10-31  
Tested by: Pessinger Jürgen

Result: PASS

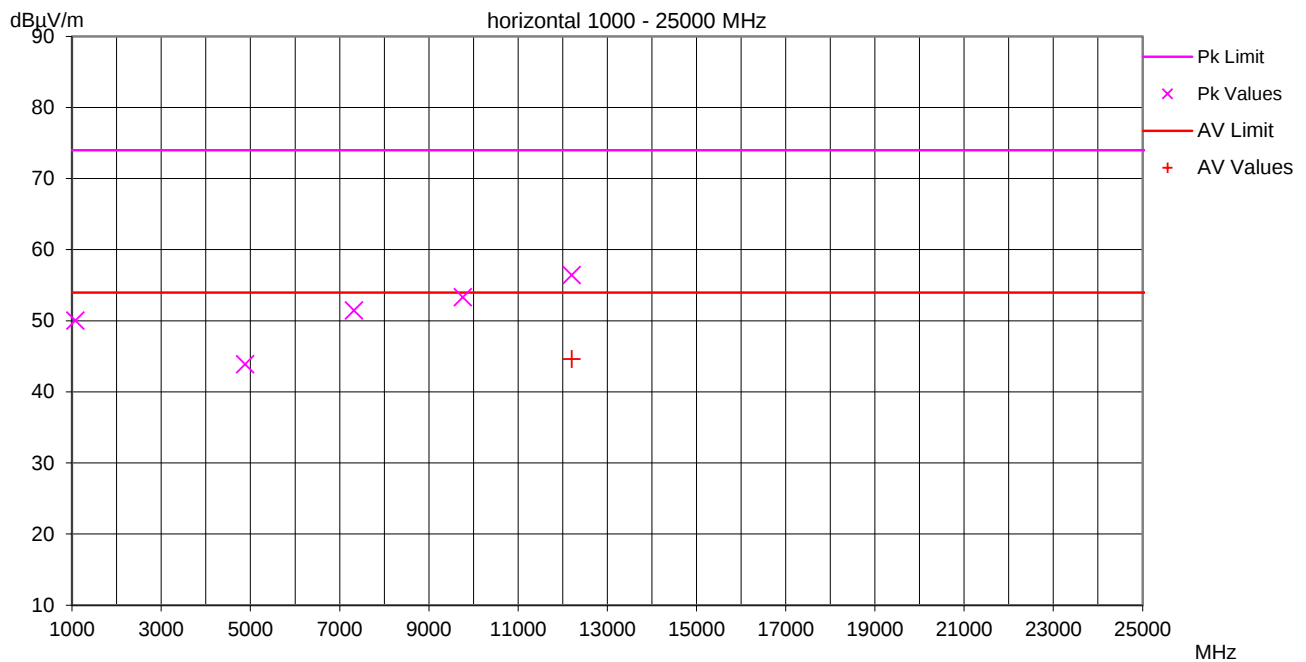


| Minimum margin to limit: |                |      |                    |                 |      |                |      | 8.5 dB      |     |
|--------------------------|----------------|------|--------------------|-----------------|------|----------------|------|-------------|-----|
| Frequency<br>[MHz]       | Reading [dBμV] |      | Correction<br>[dB] | Values [dBμV/m] |      | Limit [dBμV/m] |      | Margin [dB] |     |
|                          | Pk             | AV   |                    | Pk              | AV   | Pk             | AV   | Pk          | AV  |
| 1076.000                 | 62.3           |      | -9.6               | 52.7            |      | 74.0           | 54.0 | 21.3        |     |
| 3220.400                 | 47.8           |      | -0.8               | 47.0            |      | 74.0           | 54.0 | 27.0        |     |
| 4803.800                 | 46.6           |      | 1.5                | 48.1            |      | 74.0           | 54.0 | 25.8        |     |
| 5260.000                 | 47.1           |      | 2.6                | 49.7            |      | 74.0           | 54.0 | 24.3        |     |
| 7206.000                 | 43.6           |      | 7.1                | 50.7            |      | 74.0           | 54.0 | 23.3        |     |
| 9608.000                 | 44.4           |      | 9.5                | 53.9            |      | 74.0           | 54.0 | 20.1        |     |
| 12010.000                | 45.6           | 33.8 | 11.7               | 57.3            | 45.5 | 74.0           | 54.0 | 16.7        | 8.5 |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH mid (2441MHz)  
Remarks: 8DPSK  
Date: 2013-10-31  
Tested by: Pessinger Jürgen

Result: PASS



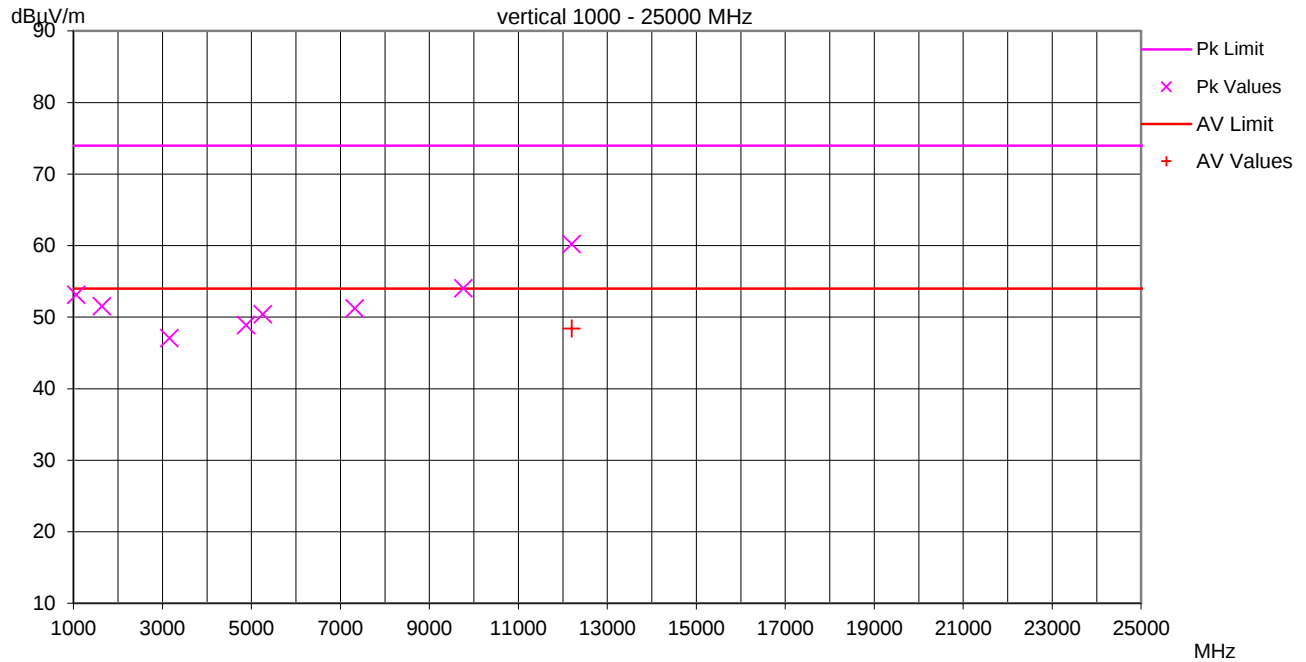
Minimum margin to limit: 9.4 dB

| Frequency<br>[MHz] | Reading [dBµV] |      | Correction<br>[dB] | Values [dBµV/m] |      | Limit [dBµV/m] |      | Margin [dB] |     |
|--------------------|----------------|------|--------------------|-----------------|------|----------------|------|-------------|-----|
|                    | Pk             | AV   |                    | Pk              | AV   | Pk             | AV   | Pk          | AV  |
| 1076.000           | 59.6           |      | -9.6               | 50.0            |      | 74.0           | 54.0 | 24.0        |     |
| 4882.000           | 42.1           |      | 1.8                | 43.9            |      | 74.0           | 54.0 | 30.1        |     |
| 7323.100           | 43.7           |      | 7.7                | 51.4            |      | 74.0           | 54.0 | 22.6        |     |
| 9764.200           | 43.6           |      | 9.7                | 53.3            |      | 74.0           | 54.0 | 20.7        |     |
| 12205.000          | 45.3           | 33.5 | 11.1               | 56.4            | 44.6 | 74.0           | 54.0 | 17.6        | 9.4 |

File No. T-0249-5106-00 JP

Operation mode: TX mode CH mid (2441MHz)  
Remarks: 8DPSK  
Date: 2013-10-31  
Tested by: Pessinger Jürgen

Result: PASS

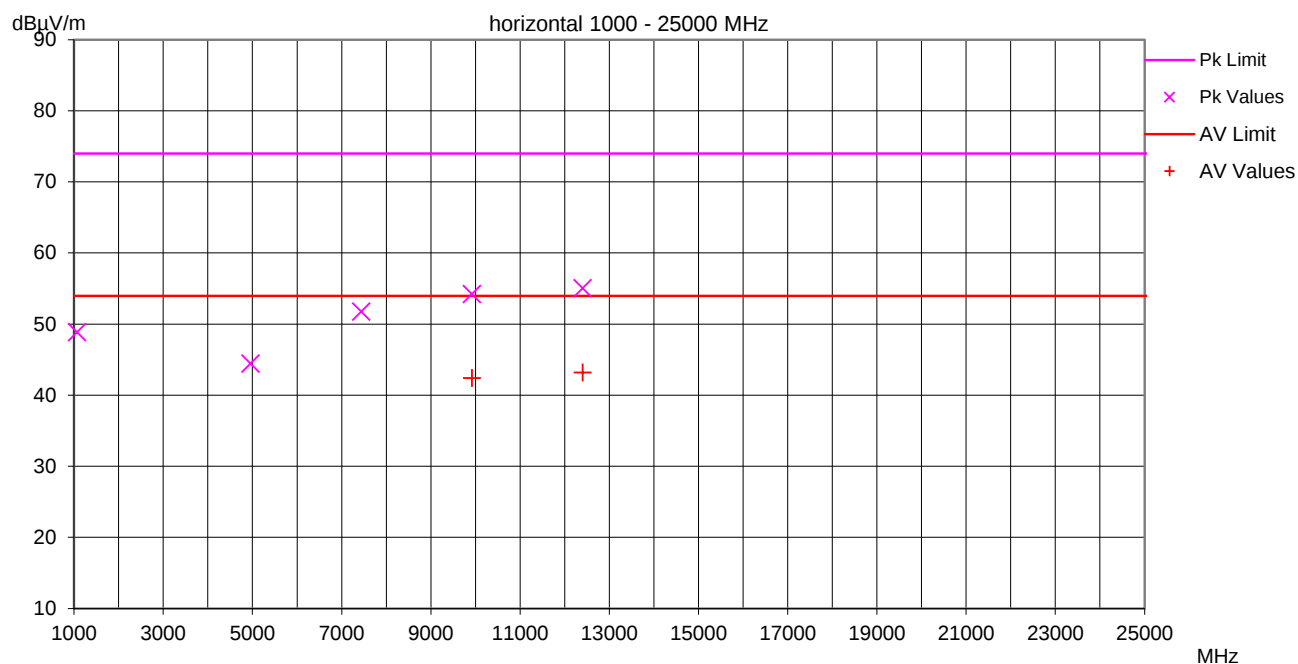


| Minimum margin to limit: |                |      |                 |                 |      |                |      | 5.6 dB      |     |
|--------------------------|----------------|------|-----------------|-----------------|------|----------------|------|-------------|-----|
| Frequency [MHz]          | Reading [dBµV] |      | Correction [dB] | Values [dBµV/m] |      | Limit [dBµV/m] |      | Margin [dB] |     |
|                          | Pk             | AV   |                 | Pk              | AV   | Pk             | AV   | Pk          | AV  |
| 1064.000                 | 62.8           |      | -9.7            | 53.1            |      | 74.0           | 54.0 | 20.9        |     |
| 1644.000                 | 58.7           |      | -7.2            | 51.5            |      | 74.0           | 54.0 | 22.5        |     |
| 3160.400                 | 47.9           |      | -0.8            | 47.1            |      | 74.0           | 54.0 | 26.9        |     |
| 4882.000                 | 47.1           |      | 1.8             | 48.9            |      | 74.0           | 54.0 | 25.1        |     |
| 5260.600                 | 47.8           |      | 2.6             | 50.4            |      | 74.0           | 54.0 | 23.6        |     |
| 7323.100                 | 43.5           |      | 7.7             | 51.2            |      | 74.0           | 54.0 | 22.8        |     |
| 9764.100                 | 44.3           |      | 9.7             | 54.0            |      | 74.0           | 54.0 | 20.0        |     |
| 12205.000                | 49.1           | 37.3 | 11.1            | 60.2            | 48.4 | 74.0           | 54.0 | 13.8        | 5.6 |

File No. **T-0249-5106-00 JP**

Operation mode: TX mode CH high (2480MHz)  
 Remarks: 8DPSK  
 Date: 2013-10-31  
 Tested by: Pessinger Jürgen

Result: PASS



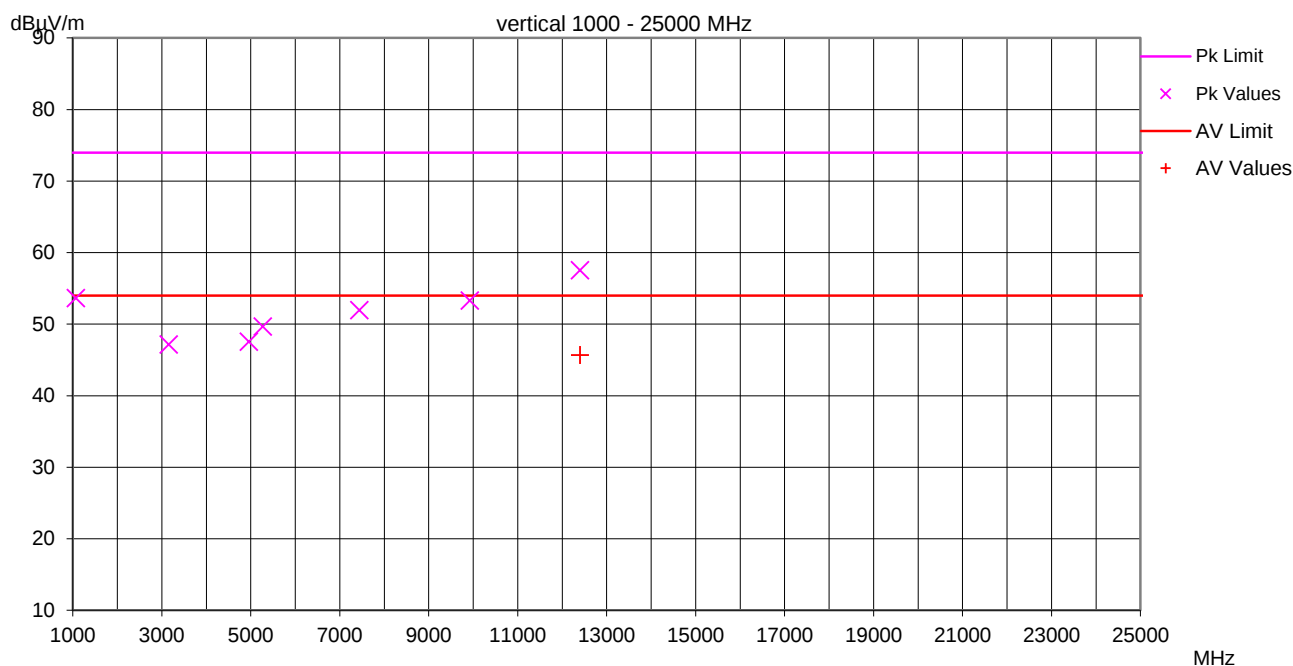
Minimum margin to limit: 10.8 dB

| Frequency<br>[MHz] | Reading [dBµV] |      | Correction<br>[dB] | Values [dBµV/m] |      | Limit [dBµV/m] |      | Margin [dB] |      |
|--------------------|----------------|------|--------------------|-----------------|------|----------------|------|-------------|------|
|                    | Pk             | AV   |                    | Pk              | AV   | Pk             | AV   | Pk          | AV   |
| 1068.000           | 58.5           |      | -9.7               | 48.8            |      | 74.0           | 54.0 | 25.1        |      |
| 4962.000           | 42.4           |      | 2.0                | 44.4            |      | 74.0           | 54.0 | 29.5        |      |
| 7443.000           | 43.7           |      | 8.0                | 51.7            |      | 74.0           | 54.0 | 22.3        |      |
| 9924.000           | 44.2           | 32.4 | 10.0               | 54.2            | 42.4 | 74.0           | 54.0 | 19.8        | 11.6 |
| 12405.300          | 44.1           | 32.3 | 10.9               | 55.0            | 43.2 | 74.0           | 54.0 | 19.0        | 10.8 |

File No. T-0249-5106-00 JP

Operation mode: TX mode CH high (2480MHz)  
 Remarks: 8DPSK  
 Date: 2013-10-31  
 Tested by: Pessinger Jürgen

Result: PASS



| Minimum margin to limit: |                |      |                 |                 |      |                |      | 8.3 dB      |     |
|--------------------------|----------------|------|-----------------|-----------------|------|----------------|------|-------------|-----|
| Frequency [MHz]          | Reading [dBµV] |      | Correction [dB] | Values [dBµV/m] |      | Limit [dBµV/m] |      | Margin [dB] |     |
|                          | Pk             | AV   |                 | Pk              | AV   | Pk             | AV   | Pk          | AV  |
| 1068.000                 | 63.3           |      | -9.7            | 53.6            |      | 74.0           | 54.0 | 20.3        |     |
| 3160.000                 | 48.0           |      | -0.9            | 47.1            |      | 74.0           | 54.0 | 26.8        |     |
| 4962.100                 | 45.5           |      | 2.0             | 47.5            |      | 74.0           | 54.0 | 26.4        |     |
| 5270.000                 | 47.1           |      | 2.6             | 49.7            |      | 74.0           | 54.0 | 24.3        |     |
| 7443.000                 | 43.9           |      | 8.0             | 51.9            |      | 74.0           | 54.0 | 22.1        |     |
| 9924.000                 | 43.3           |      | 10.0            | 53.3            |      | 74.0           | 54.0 | 20.7        |     |
| 12405.300                | 46.6           | 34.8 | 10.9            | 57.5            | 45.7 | 74.0           | 54.0 | 16.5        | 8.3 |

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## 7 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

| Test ID | Model Type            | Equipment No.   | Next Calib. | Last Calib. | Next Verif. | Last Verif. |
|---------|-----------------------|-----------------|-------------|-------------|-------------|-------------|
| A 5     | ESVP                  | 01-02/03-01-002 | 18/03/2014  | 18/03/2013  |             |             |
|         | HM 5012               | 01-02/11-01-001 |             |             |             |             |
|         | N-40000-N             | 01-02/50-05-043 |             |             |             |             |
|         | N-30000-N             | 01-02/50-05-044 |             |             |             |             |
|         | Tile Version 3.4K20   | 01-02/68-09-001 |             |             |             |             |
|         | emitel ESW V31        | 01-02/68-09-002 |             |             |             |             |
|         | VULB 9168             | 02-02/24-05-005 | 11/04/2014  | 11/04/2013  | 04/03/2014  | 04/09/2013  |
| SER 3   | AMF-40-005-180-24-10P | 01-02/17-02-009 |             |             | 24/04/2014  | 24/04/2013  |
|         | 3115                  | 01-02/24-01-011 | 17/05/2018  | 17/05/2013  |             |             |
|         | HCC                   | 01-02/50-01-021 |             |             |             |             |
|         | FA210A0020000000      | 01-02/50-06-065 |             |             |             |             |
|         | FA210A0050000000      | 01-02/50-10-005 |             |             |             |             |
|         | RST 070               | 01-05/60-02-003 |             |             |             |             |
|         | FSP 30                | 02-02/11-05-001 | 24/10/2014  | 24/10/2013  |             |             |
|         | R1_18 - 40 GHz        | 02-02/30-09-002 |             |             | 08/01/2014  | 08/01/2013  |

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