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RACOM
RADIO DATA NETWORKS

# TEST REPORT

## Racom_271114TR_FCC version: A

## Test of RipEX-900 Radio modem

**The tests have been carried out with reference to 47CFR Parts 101**

Measured by: Radek Holý

Approved by: Karel Daněk

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## 1.1 Technical Summary

| | |
|---|---|
| Applicant: | **Racom s.r.o.**<br>**Mírová 1283**<br>**592 31 Nové Město na Moravě** |
| Manufacturer: | **Racom s.r.o.**<br>**Mírová 1283**<br>**592 31 Nové Město na Moravě**<br>**Czech Republic** |
| Produced By: | **Racom s.r.o., Czech Republic** |
| Kind Of Equipment: | **Radio modem** |
| Type Designation(s): | **RipEX-900** |
| Code: | **RipEX-928S** |
| RF Power: | **4-CPFSK 0.1 W to 8 W**<br>**16-DEQAM 0.5W to 2W**<br>**D8PSK 0.5W to 2W**<br>**π/4-DQPSK 0.5W to 2W** |
| Alignment Range: | **928.000 to 960.000 MHz** |
| Switching Range: | **32 MHz** |
| Number Of Units: | **1** |
| Test made in | **Racom s.r.o.**<br>**Mírová 1283**<br>**592 31 Nové Město na Moravě** |
| Finish Of Test**:** | **27.11. 2014** |
| Date Of Test Report: | **10.12.2014** |

## 1.2 Test Results

| | |
|---|---|
| Type Designation: | **RipEX-900** |
| Code: | **RipEX-928S** |
| Serial No.: | **12292421** |
| Channel Separation: | **12.5 kHz; 25 kHz; 50 kHz** |
| FW version | **1.4.4.0** |
| | |
| Transmitter Part: | |
| CH 1 | **928.025 MHz** |
| CH 2 | **943.025 MHz** |
| CH 3 | **959.975 MHz** |
| | |
| Receiver Part: | |
| CH 1 | **928.025 MHz** |
| CH 2 | **943.025 MHz** |
| CH 3 | **959.975 MHz** |
| | |
| Power Supply Range: | **Vnom = 20.0 V DC** |
| | **Vmin = 10.0 V DC** |
| | **Vmax = 30.0 V DC** |
| | |
| Temperature Range: | **Tnom = Ambient temperature** |
| | **Tmin = -30 °C** |
| | **Tmax = +60 °C** |

## 1.2.1. **RF POWER OUTPUT AT TERMINALS (8.0 W)**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

Rated output power: 8.0 W (unmodulated carrier)

RULE PART NUMBER: 2.1046; 101.113 (a)

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02, 5.2.3

TEST RESULTS:

| TEST CONDITIONS | | TRANSMITTER POWER [W] | | |
|---|---|---|---|---|
| | | CH 1 | CH 2 | CH 3 |
| Tnom | Vnom | 7.50 | 7.56 | 7.29 |
| Measurement uncertainty | | ±0.6 dB | | |

**LIMIT:** The output power shall be within +/-1 dB of the manufacturers rated power.

TEST EQUIPMENT USED: 34; 35; 4

REMARKS: - -

## 1.2.2. **RF POWER OUTPUT AT TERMINALS (2.0 W)**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

Rated output power: 2.0 W (unmodulated carrier)

RULE PART NUMBER: 2.1046; 101.113 (a)

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02, 5.2.3

TEST RESULTS:

| TEST CONDITIONS | | TRANSMITTER POWER [W] | | |
|---|---|---|---|---|
| | | CH 1 | CH 2 | CH 3 |
| Tnom | Vnom | 2.38 | 2.32 | 2.30 |
| Measurement uncertainty | | ±0.6 dB | | |

**LIMIT:** The output power shall be within +/-1 dB of the manufacturers rated power.

TEST EQUIPMENT USED: 34; 35; 4

REMARKS: - -

## 1.2.3. **FREQUENCY STABILITY WITH TEMPERATURE VARIATION**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

The measurement was carried out at maximum power level

RULE PART NUMBER: 2.1055; 101.107

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02, 9

TEST RESULTS:

| TEST CONDITIONS | FREQUENCY ERROR [ppm] | | |
|---|---|---|---|
| Temperature [°C] | CH 1 | CH 2 | CH 3 |
| -30 | 0.40 | 0.36 | 0.35 |
| -25 | 0.13 | 0.13 | 0.14 |
| -20 | 0.15 | 0.16 | 0.15 |
| -15 | 0.24 | 0.28 | 0.28 |
| -10 | 0.26 | 0.29 | 0.30 |
| -5 | 0.19 | 0.20 | 0.21 |
| 0 | 0.10 | 0.13 | 0.13 |
| 5 | 0.07 | 0.09 | 0.08 |
| 10 | 0.09 | 0.09 | 0.10 |
| 15 | 0.10 | 0.11 | 0.11 |
| 20 | 0.09 | 0.07 | 0.08 |
| 25 | 0.07 | 0.06 | 0.07 |
| 30 | 0.03 | 0.00 | 0.00 |
| 35 | -0.06 | -0.06 | -0.05 |
| 40 | -0.03 | -0.08 | -0.08 |
| 45 | -0.02 | -0.10 | -0.11 |
| 50 | -0.13 | -0.13 | -0.12 |
| 55 | -0.19 | -0.19 | -0.20 |
| 60 | -0.24 | -0.23 | -0.24 |
| Maximum frequency error | -0.24/+0.40 (limit 1.5 ppm) | | |
| Measurement uncertainty | ±45 Hz | | |

**LIMIT:**

| Frequency (MHz) | Frequency tolerance (%) |
|---|---|
| 928.0 - 929.0[5] | 0.00050 |
| 932.0 - 932.5 | 0.00015 |
| 941.0 – 941.5 | 0.00025 |
| 941.5 – 944.0 | 0.00015 |
| 952.0 – 960.0 | 0.00050 |
| Note: [5,] FCC Part 101.107 | |

TEST EQUIPMENT USED: 1; 35; 4

REMARKS: - -

## 1.2.4. **FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

The measurement was carried out at maximum power level

RULE PART NUMBER: 2.1055; 101.107

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02, 9

TEST RESULTS:

| TEST CONDITIONS | FREQUENCY ERROR [ppm] | | |
|---|---|---|---|
| VOLTAGE [V] | CH 1 | CH 2 | CH 3 |
| 10.0 | 0.01 | 0.02 | 0.01 |
| 15.0 | 0.01 | 0.01 | 0.01 |
| 20.0 | 0.01 | 0.01 | 0.01 |
| 25.0 | 0.01 | 0.01 | 0.01 |
| 30.0 | 0.01 | 0.02 | 0.01 |
| Maximum frequency error | 0.02 (limit 1.5 ppm) | | |
| Measurement uncertainty | ±45 Hz | | |

**LIMIT:**

| **Frequency (MHz)** | **Frequency tolerance (%)** |
|---|---|
| 928.0 - 929.0[5] | 0.00050 |
| 932.0 - 932.5 | 0.00015 |
| 941.0 – 941.5 | 0.00025 |
| 941.5 – 944.0 | 0.00015 |
| 952.0 – 960.0 | 0.00050 |
| Note: [5,] FCC Part 101.107 | |

TEST EQUIPMENT USED: 1; 35; 4

REMARKS: - -

## 1.2.5. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (0.1 W)**

Ambient temperature: (22±1) °C Relative humidity: (50±10) %

Rated output power: 0.1 W

Test signal: 4-CPFSK, 10.42kbps; Random bit sequence

RULE PART NUMBER: 2.1051, 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02, 6

TEST RESULTS:

| SPURIOUS EMISSIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CH1 | | | CH2 | | | CH3 | | |
| Freq. [MHz] | Bandwidth [kHz] | Level [dBm] | Freq. [MHz] | Bandwidth [kHz] | Level [dBm] | Freq. [MHz] | Bandwidth [kHz] | Level [dBm] |
| For all other frequencies the spurious emissions were detected at least 20 dB below the limit. | | | | | | | | |
| Measurement uncertainty | | | +2.8 dB/-3.3 dB | | | | | |

**LIMIT:**

| CHANNEL BANDWIDTH | 12.5 kHz | > 12.5 kHz |
|---|---|---|
| FREQUENCY RANGE | $f_o$ > 15.0 kHz | $f_o$ > 250%Bw |
| SPURIOUS EMISSION LEVEL [dBc] | 50+10log$_{10}$ (P) or 70 | 43+10log$_{10}$ (P) or 80 |

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(0.1)= 40 dBc; where P = RF output power in watts

$Limit_{(dBm)}$= 10log$_{10}$($P_{mW}$)-$Limit_{(dBc)}$=10log$_{10}$(100)-40= -20 dBm; where $P_{mW}$ = RF output power in mW

$Limit_{(dBc)}$= 43+10log$_{10}$(P)= 43+10log$_{10}$(0.1)= 33 dBc; where P = RF output power in watts

$Limit_{(dBm)}$= 10log$_{10}$($P_{mW}$)-$Limit_{(dBc)}$=10log$_{10}$(100)-33= -13 dBm; where $P_{mW}$ = RF output power in mW

TEST EQUIPMENT USED: 36; 11; 35; 37

REMARKS: - -

## 1.2.6. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (8.0 W)**

Ambient temperature: (22±1) °C Relative humidity: (50±10) %

Rated output power: 8 W

Test signal: 4-CPFSK, 10.42kbps; Random bit sequence

RULE PART NUMBER: 2.1051, 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02, 6

TEST RESULTS:

| SPURIOUS EMISSIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CH1 | | | CH2 | | | CH3 | | |
| Freq. [MHz] | Bandwidth [kHz] | Level [dBm] | Freq. [MHz] | Bandwidth [kHz] | Level [dBm] | Freq. [MHz] | Bandwidth [kHz] | Level [dBm] |
| 1856.05 | 1000 | -31.0 | 1886.05 | 1000 | -33.2 | 1919.95 | 1000 | -33.5 |
| For all other frequencies the spurious emissions were detected at least 20 dB below the limit. | | | | | | | | |
| Measurement uncertainty | | | +2.8 dB/-3.3 dB | | | | | |

**LIMIT:**

| CHANNEL BANDWIDTH | 12.5 kHz | > 12.5 kHz |
|---|---|---|
| FREQUENCY RANGE | $f_o$ > 15.0 kHz | $f_o$ > 250%Bw |
| SPURIOUS EMISSION LEVEL [dBc] | 50+10log$_{10}$ (P) or 70 | 43+10log$_{10}$ (P) or 80 |

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(8)= 59 dBc; where P = RF output power in watts

$Limit_{(dBm)}$= 10log$_{10}$($P_{mW}$)-$Limit_{(dBc)}$=10log$_{10}$(8000)-59= -20 dBm; where $P_{mW}$ = RF output power in mW

$Limit_{(dBc)}$= 43+10log$_{10}$(P)= 43+10log$_{10}$(8)= 52 dBc; where P = RF output power in watts

$Limit_{(dBm)}$= 10log$_{10}$($P_{mW}$)-$Limit_{(dBc)}$=10log$_{10}$(8000)-59= -13 dBm; where $P_{mW}$ = RF output power in mW

TEST EQUIPMENT USED: 36; 11; 35; 37

REMARKS: - -

## 1.2.7. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (2.0 W)**

Ambient temperature: (22±1) °C Relative humidity: (60±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 34.72kbps; Random bit sequence

RULE PART NUMBER: 2.1051, 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02, 6

TEST RESULTS:

| SPURIOUS EMISSIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CH1 | | | CH2 | | | CH3 | | |
| Freq. [MHz] | Bandwidth [kHz] | Level [dBm] | Freq. [MHz] | Bandwidth [kHz] | Level [dBm] | Freq. [MHz] | Bandwidth [kHz] | Level [dBm] |
| For all other frequencies the spurious emissions were detected at least 20 dB below the limit. | | | | | | | | |
| Measurement uncertainty | | | +2.8 dB/-3.3 dB | | | | | |

**LIMIT:**

| CHANNEL BANDWIDTH | 12.5 kHz | > 12.5 kHz |
|---|---|---|
| FREQUENCY RANGE | $f_o$ > 15.0 kHz | $f_o$ > 250%Bw |
| SPURIOUS EMISSION LEVEL [dBc] | 50+10log$_{10}$ (P) or 70 | 43+10log$_{10}$ (P) or 80 |

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(2)= 53 dBc; where P = RF output power in watts

$Limit_{(dBm)}$= 10log$_{10}$($P_{mW}$)-$Limit_{(dBc)}$=10log$_{10}$(2000)-5.3= -20 dBm; where $P_{mW}$ = RF output power in mW

$Limit_{(dBc)}$= 43+10log$_{10}$(P)= 43+10log$_{10}$(2)= 46 dBc; where P = RF output power in watts

$Limit_{(dBm)}$= 10log$_{10}$($P_{mW}$)-$Limit_{(dBc)}$=10log$_{10}$(2000)-46= -13 dBm; where $P_{mW}$ = RF output power in mW

TEST EQUIPMENT USED: 36; 11; 35; 37

REMARKS: - -

## 1.2.8. **TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS (0.5 W)**

Ambient temperature: (22±1) °C Relative humidity: (60±10) %

Rated output power: 0.5 W

Test signal: 16-DEQAM 34.72kbps; Random bit sequence

RULE PART NUMBER: 2.1051, 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02, 6

TEST RESULTS:

| SPURIOUS EMISSIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CH1 | | | CH2 | | | CH3 | | |
| Freq. [MHz] | Bandwidth [kHz] | Level [dBm] | Freq. [MHz] | Bandwidth [kHz] | Level [dBm] | Freq. [MHz] | Bandwidth [kHz] | Level [dBm] |
| For all other frequencies the spurious emissions were detected at least 20 dB below the limit. | | | | | | | | |
| Measurement uncertainty | | | +2.8 dB/-3.3 dB | | | | | |

**LIMIT:**

| CHANNEL BANDWIDTH | 12.5 kHz | > 12.5 kHz |
|---|---|---|
| FREQUENCY RANGE | $f_o$ > 15.0 kHz | $f_o$ > 250%Bw |
| SPURIOUS EMISSION LEVEL [dBc] | 50+10log$_{10}$ (P) or 70 | 43+10log$_{10}$ (P) or 80 |

$Limit_{(dBc)}$= 50+10log$_{10}$(P)= 50+10log$_{10}$(0.5)= 47 dBc; where P = RF output power in watts

$Limit_{(dBm)}$= 10log$_{10}$($P_{mW}$)-$Limit_{(dBc)}$=10log$_{10}$(500)-47= -20 dBm; where $P_{mW}$ = RF output power in mW

$Limit_{(dBc)}$= 43+10log$_{10}$(P)= 43+10log$_{10}$(0.5)= 40 dBc; where P = RF output power in watts

$Limit_{(dBm)}$= 10log$_{10}$($P_{mW}$)-$Limit_{(dBc)}$=10log$_{10}$(500)-40= -13 dBm; where $P_{mW}$ = RF output power in mW

TEST EQUIPMENT USED: 36; 11; 35; 37

REMARKS: - -

## 1.2.9. **TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS (0.1 W)**

Ambient temperature: (22±1) °C Relative humidity: (60±10) %

Transmitter operating unmodulated

The measurement was carried out at minimum power level

RULE PART NUMBER: 2.1053

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02, 6

TEST RESULTS:

| SPURIOUS EMISSIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CH1 | | | CH2 | | | CH3 | | |
| Freq. [MHz] | Bandwidth [kHz] | Level [dBm] | Freq. [MHz] | Bandwidth [kHz] | Level [dBm] | Freq. [MHz] | Bandwidth [kHz] | Level [dBm] |
| For all frequencies the spurious emissions were detected at least 10 dB below the limit. | | | | | | | | |
| Measurement uncertainty | | | +4.4 dB/-4.5 dB | | | | | |

**LIMIT:**

| CHANNEL BANDWIDTH | 12.5 kHz | > 12.5 kHz |
|---|---|---|
| FREQUENCY RANGE | $f_o$ > 15.0 kHz | $f_o$ > 250%Bw |
| SPURIOUS EMISSION LEVEL [dBc] | 50+10log$_{10}$ (P) or 70 | 43+10log$_{10}$ (P) or 80 |

TEST EQUIPMENT USED: - -

REMARKS: Measured in Laboratory VÚS Banská Bystrica; Test report reference number: 068/608/2014/LRB(R)_Eng

## 1.2.10. **TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS (8.0 W)**

Ambient temperature: (22±1) °C Relative humidity: (60±10) %

Transmitter operating unmodulated

The measurement was carried out at maximum power level

RULE PART NUMBER: 2.1053

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02, 6

TEST RESULTS:

| SPURIOUS EMISSIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CH1 | | | CH2 | | | CH3 | | |
| Freq. [MHz] | Bandwidth [kHz] | Level [dBm] | Freq. [MHz] | Bandwidth [kHz] | Level [dBm] | Freq. [MHz] | Bandwidth [kHz] | Level [dBm] |
| For all frequencies the spurious emissions were detected at least 10 dB below the limit. | | | | | | | | |
| Measurement uncertainty | | | | | | | | |

**LIMIT:**

| CHANNEL BANDWIDTH | 12.5 kHz | > 12.5 kHz |
|---|---|---|
| FREQUENCY RANGE | $f_o$ > 15.0 kHz | $f_o$ > 250%Bw |
| SPURIOUS EMISSION LEVEL [dBc] | 50+10log$_{10}$ (P) or 70 | 43+10log$_{10}$ (P) or 80 |

TEST EQUIPMENT USED: - -

REMARKS: Measured in Laboratory VÚS Banská Bystrica; Test report reference number: 068/608/2014/LRB(R)_Eng

## 1.2.11. **TRANSMITTER OCCUPIED BANDWIDTH**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

The measurement at maximum power level

RULE PART NUMBER: 2.202; 2.1049; 101.109; 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02, 4.2

TEST RESULTS:

| Channel Spacing | | 12.5 kHz | 25 kHz | 50.0 kHz | 12.5 kHz | 12.5 kHz |
|---|---|---|---|---|---|---|
| Emission Type | | 8K90F1D | 16K2F1D | 29K0F1D | 10K0D1D | 10K0G1D |
| Modulation | | 4-CPFSK | 4-CPFSK | 4-CPFSK | 16-DEQAM | D8PSK |
| Data Rate | | 10.42 kbit/s | 20.83 kbit/s | 41.67 kbit/s | 34.72 kbit/s | 26.04 kbit/s |
| Measured Peak Deviation | | 4.10 kHz | 7.20 kHz | 12.7 kHz | --- | --- |
| Measured 99% Occupied BW | CH1 | 8.85 kHz | 16.2 kHz | 29.0 kHz | 10.00 kHz | 9.99 kHz |
| | CH2 | 8.80 kHz | 16.2 kHz | 29.0 kHz | 9.99 kHz | 9.95 kHz |
| | CH3 | 8.85 kHz | 16.2 kHz | 29.0 kHz | 9.99 kHz | 9.95 kHz |

| Channel Spacing | | 12.5 kHz | 25.0 kHz | 25.0 kHz | 25.0 kHz | 50.0 kH |
|---|---|---|---|---|---|---|
| Emission Type | | 10K0G1D | 16K0D1D | 16K0G1D | 16K0G1D | 40K0D1D |
| Modulation | | π/4-DQPSK | 16-DEQAM | D8PSK | π/4-DQPSK | 16-DEQAM |
| Data Rate | | 17.36 kbit/s | 69.44 kbit/s | 52.08 kbit/s | 34.72 kbit/s | 138.89 kbit/s |
| Measured Peak Deviation | | --- | --- | --- | --- | --- |
| Measured 99% Occupied BW | CH1 | 9.99 kHz | 15.8 kHz | 15.8 kHz | 15.9 kHz | 39.9 kHz |
| | CH2 | 9.95 kHz | 15.8 kHz | 15.9 kHz | 15.8 kHz | 39.9 kHz |
| | CH3 | 9.95 kHz | 15.8 kHz | 15.9 kHz | 15.9 kHz | 39.8 kHz |

| Channel Spacing | | 50.0 kHz | 50.0 kHz |
|---|---|---|---|
| Emission Type | | 40K0G1D | 40K0D1D |
| Modulation | | D8PSK | π/4-DQPSK |
| Data Rate | | 104.17 kbit/s | 69.44 kbit/s |
| Measured Peak Deviation | | --- | --- |
| Measured 99% Occupied BW | CH1 | 39.6 kHz | 39.6 kHz |
| | CH2 | 39.8 kHz | 39.6 kHz |
| | CH3 | 39.6 kHz | 39.6 kHz |

TEST EQUIPMENT USED: 36; 7; 35; 4

REMARKS: - -

## 1.2.12. **TRANSMITTER OCCUPIED BANDWIDTH (4-CPFSK, 10.0 W, 50 kHz)**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

Rated output power: 10.0 W

Test signal: 4-CPFSK 41.67kbps; Random bit sequence

RULE PART NUMBER: 2.202; 2.1049; 101.109(c)6; 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 1, GRAPH 13, GRAPH 25)

**LIMIT:**

| | Attenuator [dB] | Frequency offset [kHz] |
|---|---|---|
| 12.5kHz | 0.0 dB | $f_o < 2.5$ |
| | $53*\log_{10}(f_d/2.5kHz)$ | $2.5 < f_o < 6.25$ |
| | $103*\log_{10}(f_d/3.9kHz)$ | $6.25 < f_o < 9.5$ |
| | $157*\log_{10}(f_d/5.3kHz)$ | $9.5 < f_o < 15.0$ |
| | $50+10*\log_{10}(P)$ or 70 | $f_o > 15.0$ |
| 25.0kHz | 0.0 dB | $f_o < 5.0$ |
| | $83*\log_{10}(f_d/5)$ | $5.0 < f_o < 10.0$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $10 < f_o < 2.5*25$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*25$ |
| 50.0kHz | 0.0 dB | $f_o < 17.5$ |
| | $83*\log_{10}(f_d/5)$ | $17.5 < f_o < 22.5$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $22.5 < f_o < 2.5*50$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*50$ |
| | *Note: P is output power in W; $f_d$ displacement frequency in kHz* | |

TEST EQUIPMENT USED: 36; 4; 35

REMARKS: - -

## 1.2.13. **TRANSMITTER OCCUPIED BANDWIDTH (16-DEQAM, 2.0 W, 50 kHz)**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 138.89kbps; Random bit sequence

RULE PART NUMBER: 2.202; 2.1049; 101.109(c)6; 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 2, GRAPH 14, GRAPH 26)

**LIMIT:**

| | Attenuator [dB] | Frequency offset [kHz] |
|---|---|---|
| 12.5kHz | 0.0 dB | $f_o < 2.5$ |
| | $53*\log_{10}(f_d/2.5kHz)$ | $2.5 < f_o < 6.25$ |
| | $103*\log_{10}(f_d/3.9kHz)$ | $6.25 < f_o < 9.5$ |
| | $157*\log_{10}(f_d/5.3kHz)$ | $9.5 < f_o < 15.0$ |
| | $50+10*\log_{10}(P)$ or 70 | $f_o > 15.0$ |
| 25.0kHz | 0.0 dB | $f_o < 5.0$ |
| | $83*\log_{10}(f_d/5)$ | $5.0 < f_o < 10.0$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $10 < f_o < 2.5*25$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*25$ |
| 50.0kHz | 0.0 dB | $f_o < 17.5$ |
| | $83*\log_{10}(f_d/5)$ | $17.5 < f_o < 22.5$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $22.5 < f_o < 2.5*50$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*50$ |
| | *Note: P is output power in W; $f_d$ displacement frequency in kHz* | |

TEST EQUIPMENT USED: 36; 4; 35

REMARKS: - -

## 1.2.14. **TRANSMITTER OCCUPIED BANDWIDTH (D8PSK, 2.0 W, 50 kHz)**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

Rated output power: 2.0 W

Test signal: D8PSK 104.17kbps; Random bit sequence

RULE PART NUMBER: 2.202; 2.1049; 101.109(c)6; 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 3, GRAPH 15, GRAPH 27)

**LIMIT:**

| | Attenuator [dB] | Frequency offset [kHz] |
|---|---|---|
| 12.5kHz | 0.0 dB | $f_o < 2.5$ |
| | $53*\log_{10}(f_d/2.5kHz)$ | $2.5 < f_o < 6.25$ |
| | $103*\log_{10}(f_d/3.9kHz)$ | $6.25 < f_o < 9.5$ |
| | $157*\log_{10}(f_d/5.3kHz)$ | $9.5 < f_o < 15.0$ |
| | $50+10*\log_{10}(P)$ or 70 | $f_o > 15.0$ |
| 25.0kHz | 0.0 dB | $f_o < 5.0$ |
| | $83*\log_{10}(f_d/5)$ | $5.0 < f_o < 10.0$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $10 < f_o < 2.5*25$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*25$ |
| 50.0kHz | 0.0 dB | $f_o < 17.5$ |
| | $83*\log_{10}(f_d/5)$ | $17.5 < f_o < 22.5$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $22.5 < f_o < 2.5*50$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*50$ |
| | *Note: P is output power in W; $f_d$ displacement frequency in kHz* | |

TEST EQUIPMENT USED: 36; 4; 35

REMARKS: - -

## 1.2.15. **TRANSMITTER OCCUPIED BANDWIDTH (π/4-DQPSK, 2.0 W, 50 kHz)**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

Rated output power: 2.0 W

Test signal: π/4-DQPSK 69.44kbps; Random bit sequence

RULE PART NUMBER: 2.202; 2.1049; 101.109(c)6; 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 4, GRAPH 16, GRAPH 28)

**LIMIT:**

| | Attenuator [dB] | Frequency offset [kHz] |
|---|---|---|
| 12.5kHz | 0.0 dB | $f_o < 2.5$ |
| | $53*\log_{10}(f_d/2.5kHz)$ | $2.5 < f_o < 6.25$ |
| | $103*\log_{10}(f_d/3.9kHz)$ | $6.25 < f_o < 9.5$ |
| | $157*\log_{10}(f_d/5.3kHz)$ | $9.5 < f_o < 15.0$ |
| | $50+10*\log_{10}(P)$ or 70 | $f_o > 15.0$ |
| 25.0kHz | 0.0 dB | $f_o < 5.0$ |
| | $83*\log_{10}(f_d/5)$ | $5.0 < f_o < 10.0$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $10 < f_o < 2.5*25$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*25$ |
| 50.0kHz | 0.0 dB | $f_o < 17.5$ |
| | $83*\log_{10}(f_d/5)$ | $17.5 < f_o < 22.5$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $22.5 < f_o < 2.5*50$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*50$ |
| | *Note: P is output power in W; $f_d$ displacement frequency in kHz* | |

TEST EQUIPMENT USED: 36; 4; 35

REMARKS: - -

## 1.2.16. **TRANSMITTER OCCUPIED BANDWIDTH (4-CPFSK, 10.0 W, 25.0 kHz)**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

Rated output power: 10 W

Test signal: 4-CPFSK 20.83kbps; Random bit sequence

RULE PART NUMBER: 2.202; 2.1049; 101.109(c)6; 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 5, GRAPH 17, GRAPH 29)

**LIMIT:**

| | Attenuator [dB] | Frequency offset [kHz] |
|---|---|---|
| 12.5kHz | 0.0 dB | $f_o < 2.5$ |
| | $53*\log_{10}(f_d/2.5kHz)$ | $2.5 < f_o < 6.25$ |
| | $103*\log_{10}(f_d/3.9kHz)$ | $6.25 < f_o < 9.5$ |
| | $157*\log_{10}(f_d/5.3kHz)$ | $9.5 < f_o < 15.0$ |
| | $50+10*\log_{10}(P)$ or 70 | $f_o > 15.0$ |
| 25.0kHz | 0.0 dB | $f_o < 5.0$ |
| | $83*\log_{10}(f_d/5)$ | $5.0 < f_o < 10.0$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $10 < f_o < 2.5*25$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*25$ |
| 50.0kHz | 0.0 dB | $f_o < 17.5$ |
| | $83*\log_{10}(f_d/5)$ | $17.5 < f_o < 22.5$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $22.5 < f_o < 2.5*50$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*50$ |
| | *Note: P is output power in W; $f_d$ displacement frequency in kHz* | |

TEST EQUIPMENT USED: 36; 4; 35

REMARKS: - -

## 1.2.17. **TRANSMITTER OCCUPIED BANDWIDTH (16-DEQAM, 2.0 W, 25.0 kHz)**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 69.44kbps; Random bit sequence

RULE PART NUMBER: 2.202; 2.1049; 101.109(c)6; 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 6, GRAPH 18, GRAPH 30)

**LIMIT:**

| | Attenuator [dB] | Frequency offset [kHz] |
|---|---|---|
| 12.5kHz | 0.0 dB | $f_o < 2.5$ |
| | $53*\log_{10}(f_d/2.5kHz)$ | $2.5 < f_o < 6.25$ |
| | $103*\log_{10}(f_d/3.9kHz)$ | $6.25 < f_o < 9.5$ |
| | $157*\log_{10}(f_d/5.3kHz)$ | $9.5 < f_o < 15.0$ |
| | $50+10*\log_{10}(P)$ or 70 | $f_o > 15.0$ |
| 25.0kHz | 0.0 dB | $f_o < 5.0$ |
| | $83*\log_{10}(f_d/5)$ | $5.0 < f_o < 10.0$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $10 < f_o < 2.5*25$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*25$ |
| 50.0kHz | 0.0 dB | $f_o < 17.5$ |
| | $83*\log_{10}(f_d/5)$ | $17.5 < f_o < 22.5$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $22.5 < f_o < 2.5*50$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*50$ |
| | *Note: P is output power in W; $f_d$ displacement frequency in kHz* | |

TEST EQUIPMENT USED: 36; 4; 35

REMARKS: - -

## 1.2.18. **TRANSMITTER OCCUPIED BANDWIDTH (D8PSK, 2.0 W, 25.0 kHz)**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

Rated output power: 2.0 W

Test signal: D8PSK 52.08kbps; Random bit sequence

RULE PART NUMBER: 2.202; 2.1049; 101.109(c)6; 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 7, GRAPH 19, GRAPH 31)

**LIMIT:**

| | Attenuator [dB] | Frequency offset [kHz] |
|---|---|---|
| 12.5kHz | 0.0 dB | $f_o < 2.5$ |
| | $53*\log_{10}(f_d/2.5kHz)$ | $2.5 < f_o < 6.25$ |
| | $103*\log_{10}(f_d/3.9kHz)$ | $6.25 < f_o < 9.5$ |
| | $157*\log_{10}(f_d/5.3kHz)$ | $9.5 < f_o < 15.0$ |
| | $50+10*\log_{10}(P)$ or 70 | $f_o > 15.0$ |
| 25.0kHz | 0.0 dB | $f_o < 5.0$ |
| | $83*\log_{10}(f_d/5)$ | $5.0 < f_o < 10.0$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $10 < f_o < 2.5*25$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*25$ |
| 50.0kHz | 0.0 dB | $f_o < 17.5$ |
| | $83*\log_{10}(f_d/5)$ | $17.5 < f_o < 22.5$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $22.5 < f_o < 2.5*50$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*50$ |
| | *Note: P is output power in W; $f_d$ displacement frequency in kHz* | |

TEST EQUIPMENT USED: 36; 4; 35

REMARKS: - -

## 1.2.19. **TRANSMITTER OCCUPIED BANDWIDTH (π/4-DQPSK, 2.0 W, 25.0 kHz)**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

Rated output power: 2.0 W

Test signal: π/4-DQPSK 34.72kbps; Random bit sequence

RULE PART NUMBER: 2.202; 2.1049; 101.109(c)6; 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 8, GRAPH 20, GRAPH 32)

**LIMIT:**

| | Attenuator [dB] | Frequency offset [kHz] |
|---|---|---|
| 12.5kHz | 0.0 dB | $f_o < 2.5$ |
| | $53*\log_{10}(f_d/2.5kHz)$ | $2.5 < f_o < 6.25$ |
| | $103*\log_{10}(f_d/3.9kHz)$ | $6.25 < f_o < 9.5$ |
| | $157*\log_{10}(f_d/5.3kHz)$ | $9.5 < f_o < 15.0$ |
| | $50+10*\log_{10}(P)$ or 70 | $f_o > 15.0$ |
| 25.0kHz | 0.0 dB | $f_o < 5.0$ |
| | $83*\log_{10}(f_d/5)$ | $5.0 < f_o < 10.0$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $10 < f_o < 2.5*25$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*25$ |
| 50.0kHz | 0.0 dB | $f_o < 17.5$ |
| | $83*\log_{10}(f_d/5)$ | $17.5 < f_o < 22.5$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $22.5 < f_o < 2.5*50$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*50$ |
| | *Note: P is output power in W; $f_d$ displacement frequency in kHz* | |

TEST EQUIPMENT USED: 36; 4; 35

REMARKS: - -

## 1.2.20. **TRANSMITTER OCCUPIED BANDWIDTH (4-CPFSK, 8.0 W, 12.5 kHz)**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

Rated output power: 8 W

Test signal: 4-CPFSK 10.42kbps; Random bit sequence

RULE PART NUMBER: 2.202; 2.1049; 101.109(c)6; 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 9, GRAPH 21, GRAPH 33)

**LIMIT:**

| | Attenuator [dB] | Frequency offset [kHz] |
|---|---|---|
| 12.5kHz | 0.0 dB | $f_o < 2.5$ |
| | $53*\log_{10}(f_d/2.5kHz)$ | $2.5 < f_o < 6.25$ |
| | $103*\log_{10}(f_d/3.9kHz)$ | $6.25 < f_o < 9.5$ |
| | $157*\log_{10}(f_d/5.3kHz)$ | $9.5 < f_o < 15.0$ |
| | $50+10*\log_{10}(P)$ or 70 | $f_o > 15.0$ |
| 25.0kHz | 0.0 dB | $f_o < 5.0$ |
| | $83*\log_{10}(f_d/5)$ | $5.0 < f_o < 10.0$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $10 < f_o < 2.5*25$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*25$ |
| 50.0kHz | 0.0 dB | $f_o < 17.5$ |
| | $83*\log_{10}(f_d/5)$ | $17.5 < f_o < 22.5$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $22.5 < f_o < 2.5*50$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*50$ |
| | *Note: P is output power in W; $f_d$ displacement frequency in kHz* | |

TEST EQUIPMENT USED: 36; 4; 35

REMARKS: - -

## 1.2.21. **TRANSMITTER OCCUPIED BANDWIDTH (16-DEQAM, 2.0 W, 12.5 kHz)**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

Rated output power: 2.0 W

Test signal: 16-DEQAM 34.72kbps; Random bit sequence

RULE PART NUMBER: 2.202; 2.1049; 101.109(c)6; 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 10, GRAPH 22, GRAPH 34)

**LIMIT:**

| | Attenuator [dB] | Frequency offset [kHz] |
|---|---|---|
| 12.5kHz | 0.0 dB | $f_o < 2.5$ |
| | $53*\log_{10}(f_d/2.5kHz)$ | $2.5 < f_o < 6.25$ |
| | $103*\log_{10}(f_d/3.9kHz)$ | $6.25 < f_o < 9.5$ |
| | $157*\log_{10}(f_d/5.3kHz)$ | $9.5 < f_o < 15.0$ |
| | $50+10*\log_{10}(P)$ or 70 | $f_o > 15.0$ |
| 25.0kHz | 0.0 dB | $f_o < 5.0$ |
| | $83*\log_{10}(f_d/5)$ | $5.0 < f_o < 10.0$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $10 < f_o < 2.5*25$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*25$ |
| 50.0kHz | 0.0 dB | $f_o < 17.5$ |
| | $83*\log_{10}(f_d/5)$ | $17.5 < f_o < 22.5$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $22.5 < f_o < 2.5*50$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*50$ |
| | *Note: P is output power in W; $f_d$ displacement frequency in kHz* | |

TEST EQUIPMENT USED: 36; 4; 35

REMARKS: - -

## 1.2.22. **TRANSMITTER OCCUPIED BANDWIDTH (D8PSK, 2.0 W, 12.5 kHz)**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

Rated output power: 2.0 W

Test signal: D8PSK 26.04kbps; Random bit sequence

RULE PART NUMBER: 2.202; 2.1049; 101.109(c)6; 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 11, GRAPH 23, GRAPH 35)

**LIMIT:**

| | Attenuator [dB] | Frequency offset [kHz] |
|---|---|---|
| 12.5kHz | 0.0 dB | $f_o < 2.5$ |
| | $53*\log_{10}(f_d/2.5kHz)$ | $2.5 < f_o < 6.25$ |
| | $103*\log_{10}(f_d/3.9kHz)$ | $6.25 < f_o < 9.5$ |
| | $157*\log_{10}(f_d/5.3kHz)$ | $9.5 < f_o < 15.0$ |
| | $50+10*\log_{10}(P)$ or 70 | $f_o > 15.0$ |
| 25.0kHz | 0.0 dB | $f_o < 5.0$ |
| | $83*\log_{10}(f_d/5)$ | $5.0 < f_o < 10.0$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $10 < f_o < 2.5*25$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*25$ |
| 50.0kHz | 0.0 dB | $f_o < 17.5$ |
| | $83*\log_{10}(f_d/5)$ | $17.5 < f_o < 22.5$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $22.5 < f_o < 2.5*50$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*50$ |
| | *Note: P is output power in W; $f_d$ displacement frequency in kHz* | |

TEST EQUIPMENT USED: 36; 4; 35

REMARKS: - -

## 1.2.23. **TRANSMITTER OCCUPIED BANDWIDTH (π/4-DQPSK, 2.0 W, 12.5 kHz)**

Ambient temperature: (22±1) °C Relative humidity: (55±10) %

Rated output power: 2.0 W

Test signal: π/4-DQPSK 17.36kbps; Random bit sequence

RULE PART NUMBER: 2.202; 2.1049; 101.109(c)6; 101.111

TEST METHOD: 971168 D01 Power Meas License Digital Systems v02r02

TEST RESULTS: Meets minimum standards (See chapter 4, GRAPH 12, GRAPH 24, GRAPH 36)

**LIMIT:**

| | Attenuator [dB] | Frequency offset [kHz] |
|---|---|---|
| 12.5kHz | 0.0 dB | $f_o < 2.5$ |
| | $53*\log_{10}(f_d/2.5kHz)$ | $2.5 < f_o < 6.25$ |
| | $103*\log_{10}(f_d/3.9kHz)$ | $6.25 < f_o < 9.5$ |
| | $157*\log_{10}(f_d/5.3kHz)$ | $9.5 < f_o < 15.0$ |
| | $50+10*\log_{10}(P)$ or 70 | $f_o > 15.0$ |
| 25.0kHz | 0.0 dB | $f_o < 5.0$ |
| | $83*\log_{10}(f_d/5)$ | $5.0 < f_o < 10.0$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $10 < f_o < 2.5*25$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*25$ |
| 50.0kHz | 0.0 dB | $f_o < 17.5$ |
| | $83*\log_{10}(f_d/5)$ | $17.5 < f_o < 22.5$ |
| | $116*\log_{10}(f_d/6.1)$ or $50+10*\log_{10}(P)$ or 70 | $22.5 < f_o < 2.5*50$ |
| | $43+10*\log_{10}(P)$ or 80 | $f_o > 2.5*50$ |
| | *Note: P is output power in W; $f_d$ displacement frequency in kHz* | |

TEST EQUIPMENT USED: 36; 4; 35

REMARKS: - -

## 1.3 Summary of Test Results

P = Complied with the requirements of the specification for this test

U = The results were within measurement uncertainties

F = Not complied with the requirements of the specification for this test

N/A = Not applicable

Unit No. 1 (154.0125 MHz)

RF POWER OUTPUT AT TERMINALS ..... P
FREQUENCY STABILITY WITH PRIMARY VOLTAGE VARIATION ..... P
TRANSMITTER UNWANTED EMISSIONS: CONDUCTED SPURIOUS ..... P
TRANSMITTER UNWANTED EMISSIONS: RADIATED SPURIOUS ..... P
TRANSMITTER OCCUPIED BANDWIDTH ..... P
TRANSMITTER OCCUPIED BANDWIDTH FOR EMISSION DESIGNATORS ..... P

# 2. Test Equipment

| No. | Id. No. | Test equipment | Type | Manufacturer | Serial No. | Calibration valid |
|---|---|---|---|---|---|---|
| 1 | 10258 | Signal Analyzer | FSIQ3 | R&S | 830790/0001 | 23.9.2015 |
| 2 | 10237 | Spectrum Analyzer | FSP3 | R&S | 100767 | |
| 3 | 10219/1 | Spectrum Analyzer | FSP30 | R&S | 100015 | |
| 4 | 900000574 | Attenuator 30dB/100W | PE7021-30 | Pasternack | - - | |
| 5 | 10276 | Spectrum Analyzer | E4446A | Agilent | MY48250231 | |
| 6 | 10172 | Stabilock 4040 | SI 4040 | Wavetek | 2025057 | |
| 7 | 10173 | Stabilock 4040 | SI 4040 | Schlumbeger | 1825233 | 27.4.2015 |
| 8 | 900000611 | Attenuator 30dB/40W | ATE30dB/40W | APEX | 051103 | |
| 9 | 900000349 | Attenuator 30dB/40W | ATE30dB/40W | APEX | 051106 | |
| 10 | 900000613 | Attenuator 30dB/40W | ATE30dB/40W | APEX | 051102 | |
| 11 | 900000682 | Attenuator 30dB/10W | PE7015-20 | Pasternack | - - | |
| 12 | 900000575 | Step Attenuator | PE7033-2 | Pasternack | 900000575 | |
| 13 | - - | Heating Chamber | - - | - - | - - | |
| 14 | 10161 | Freezing Box | - - | - - | - - | |
| 15 | 699385 | Digital Multimeter | M-3850 | Metex | EB 127 259 | |
| 16 | - - | 4-Port Junction Pad | - - | - - | - - | |
| 17 | 10291 | Mixed Signal Oscilloscope | MSO 2024 | Tektronix | - - | |
| 18 | 10293 | Dig. Phosphor Oscilloscope | DPO 2024 | Tektronix | - - | |
| 19 | 10203 | Digital Oscilloscope | TDS2014 | Tektronix | C032141 | |
| 20 | 10240 | Signal Generator | IFR 2023B | IRF | 202306/936 | |
| 21 | 10046 | Signal Generator | 8640B | HP | 2250A20733 | |
| 22 | 10238 | Signal Generator | E4438 | Agilent | MY45091475 | |
| 23 | 10219/2 | Signal Generator | SML03 | R&S | 100560 | |
| 24 | - - | Power Splitter | - - | - - | - - | |
| 25 | - - | Termination 50 Ohm/1 W | - - | - - | - - | |
| 26 | - - | Termination 50 Ohm/1 W | - - | - - | - - | |
| 27 | - - | Termination 50 Ohm/1 W | - - | - - | - - | |
| 28 | - - | Isolating Transformer | - - | - - | - - | |
| 29 | - - | Interval Counter | - - | - - | - - | |
| 30 | 900000609 | Power Supply | Statron | Statron | 0308023 | |
| 31 | 900000457 | Power Supply | Statron | Statron | 0510006 | |
| 32 | - - | High Pass Filter (400MHz) | - - | - - | - - | |
| 33 | - - | High Pass Filter (160MHz) | - - | - - | - - | |
| 34 | 10377 | Wideband Power Sensor | NRP-Z85 | R&S | 101183 | 18.10.2016 |
| 35 | 900001390 | Power Supply | SDP2603 | Manson | G291101202 | |
| 36 | 10375 | Singal & spectrum Analyzer | FSW | R&S | 100608 | 25.4.2015 |
| 37 | - - | Signal Generator | SMB 100A | R&S | 176216 | 12.2.2016 |
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# 3. Additional Information

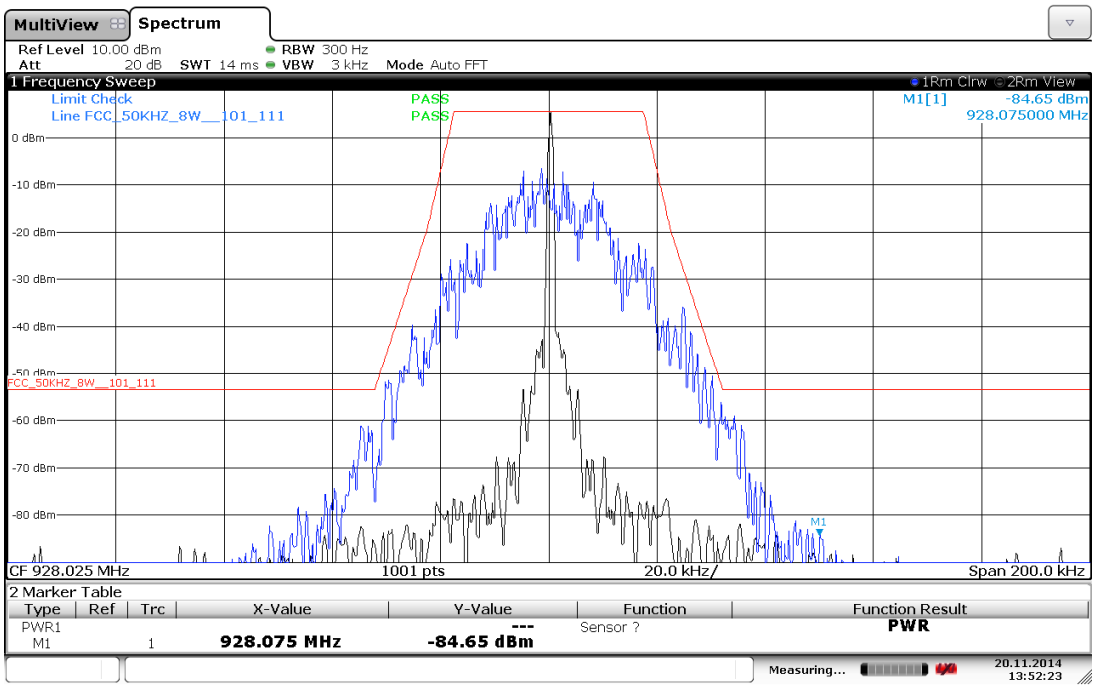
# 4. Graphs

List of graphs:

# 4.1 Graphs **928.025MHz**

## GRAPH 1: Spectrum Emission for 50 kHz 4-CPFSK

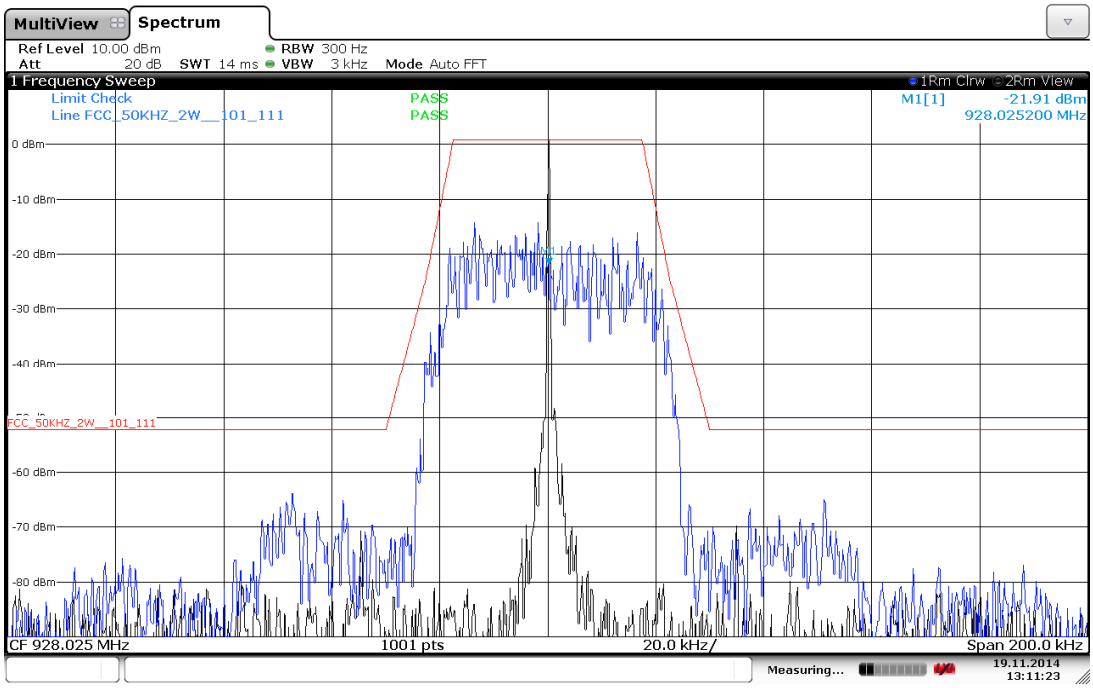
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 20.NOV.2014 13:52:23

## GRAPH 2: Spectrum Emission for 50 kHz 16-DEQAM

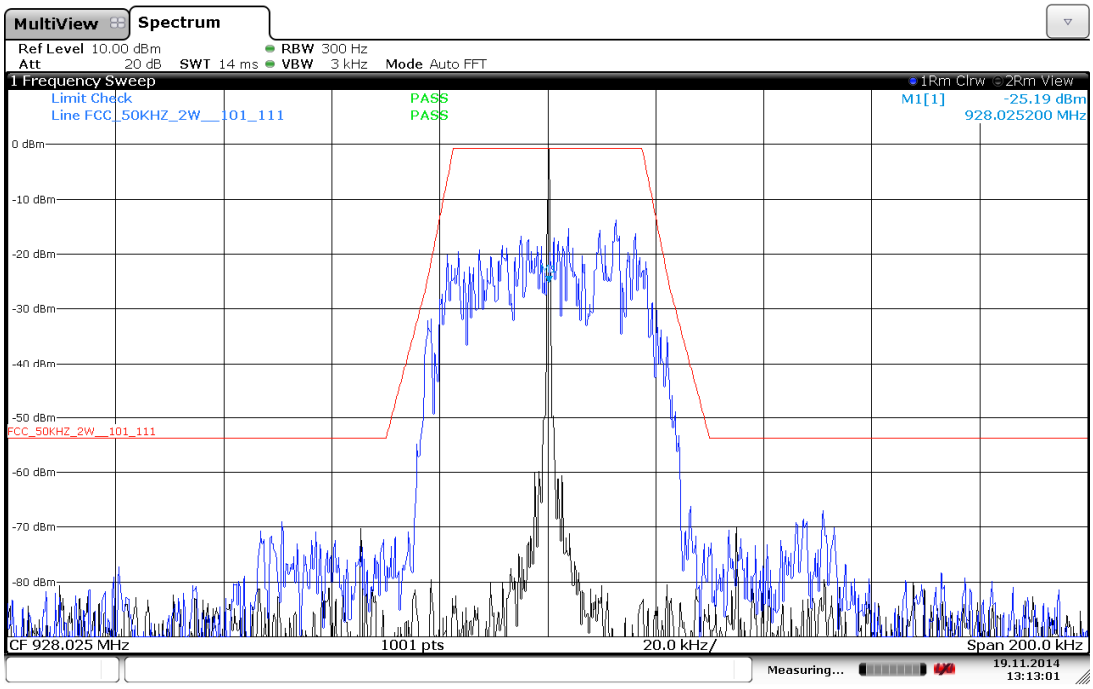
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 13:11:23

## GRAPH 3: Spectrum Emission for 50 kHz D8PSK

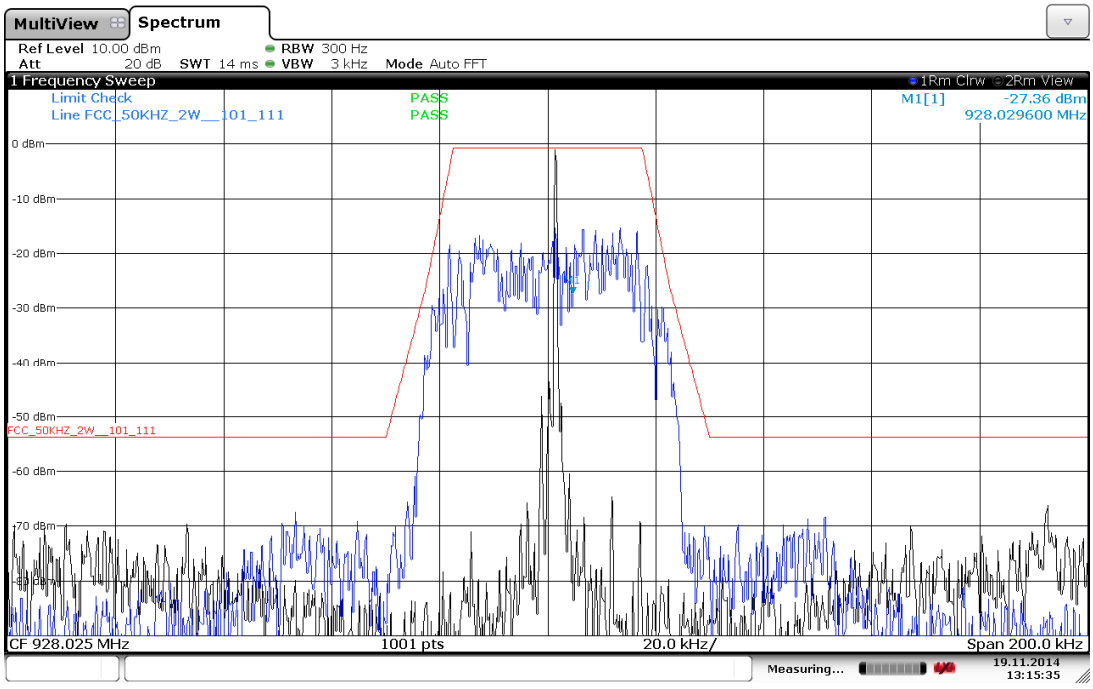
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 13:13:01

## GRAPH 4: Spectrum Emission for 50 kHz π/4-DQPSK

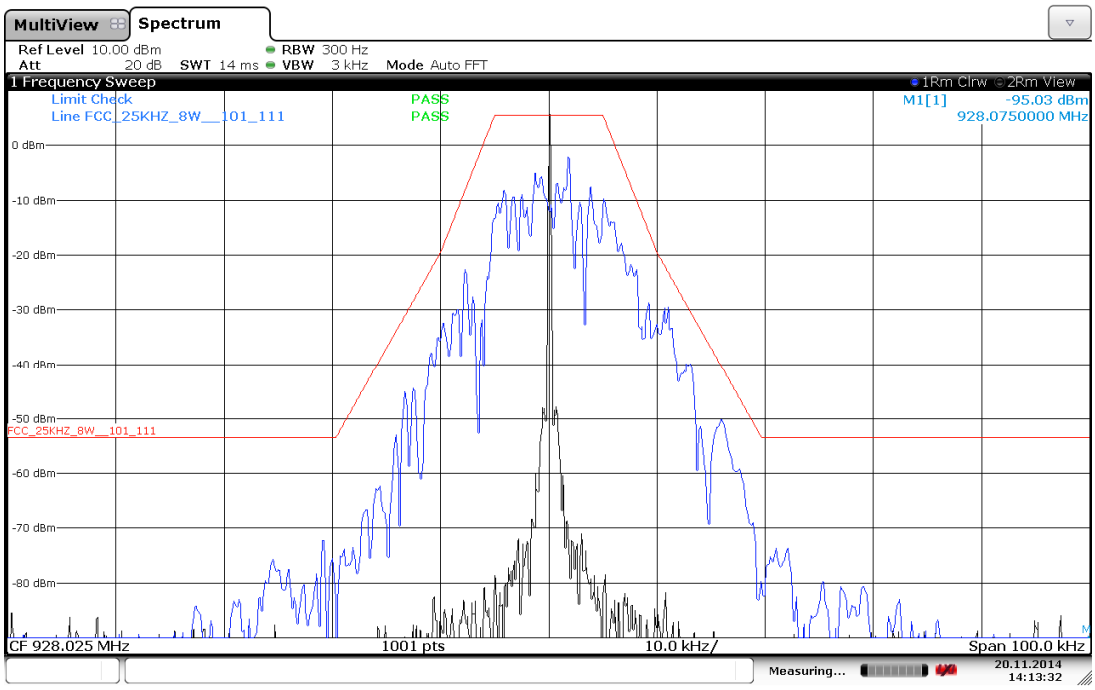
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 13:15:36

## GRAPH 5: Spectrum Emission for 25 kHz 4-CPFSK

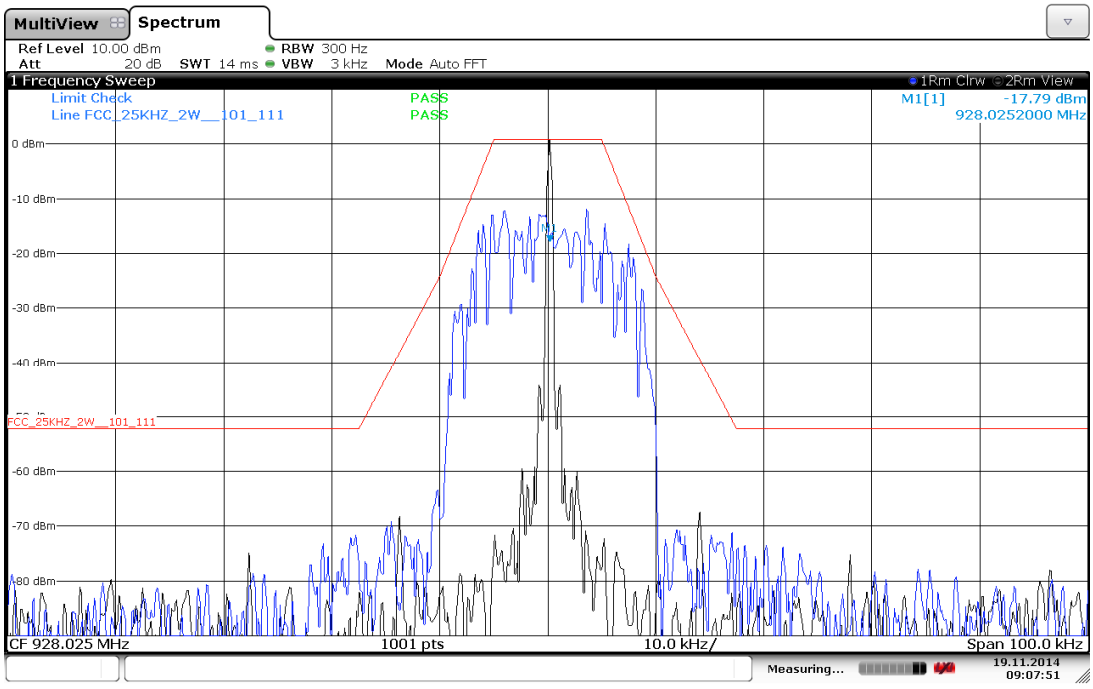
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 20.NOV.2014 14:13:33

## GRAPH 6: Spectrum Emission for 25 kHz 16-DEQAM

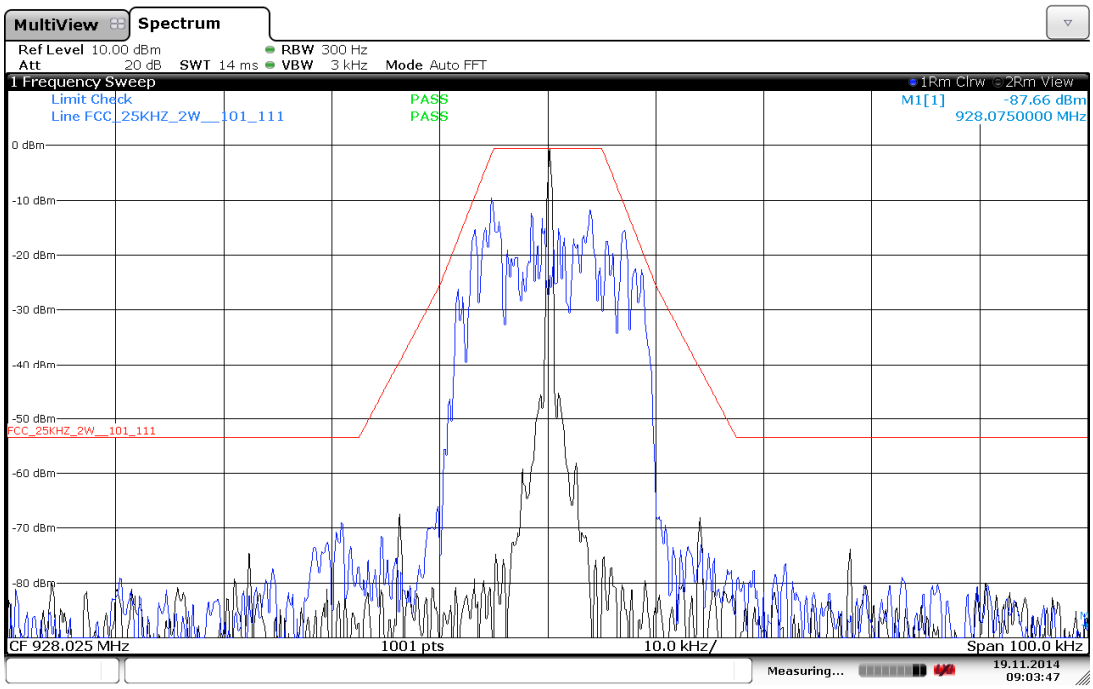
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 09:07:51

## GRAPH 7: Spectrum Emission for 25 kHz D8PSK

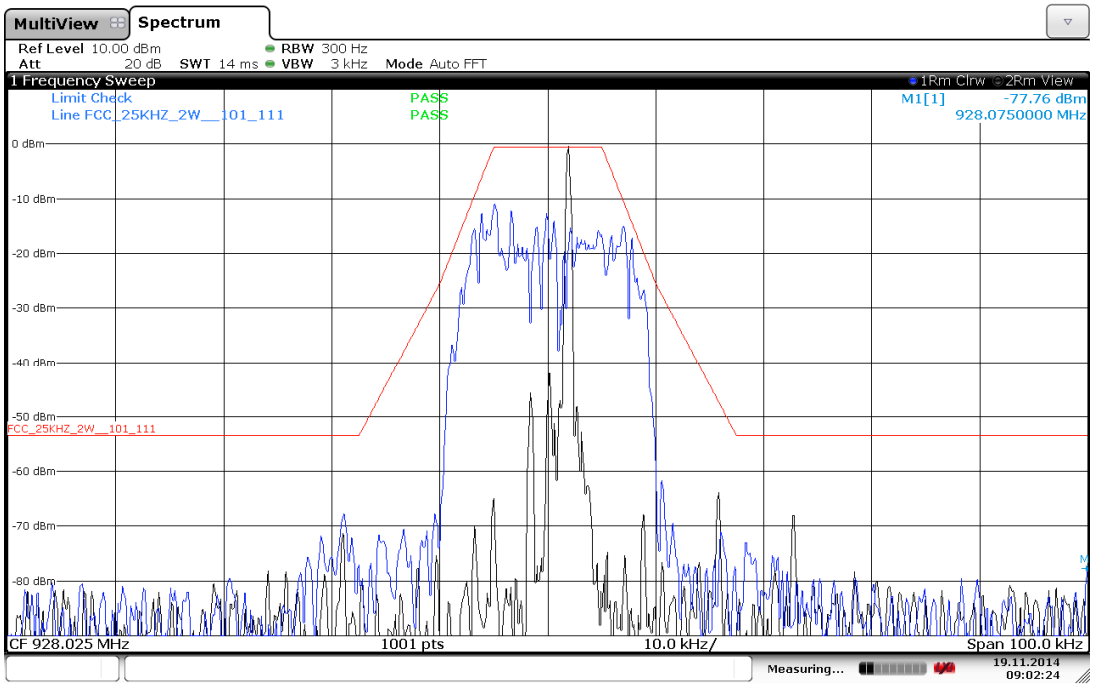
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 09:03:47

## GRAPH 8: Spectrum Emission for 25 kHz π/4-DQPSK

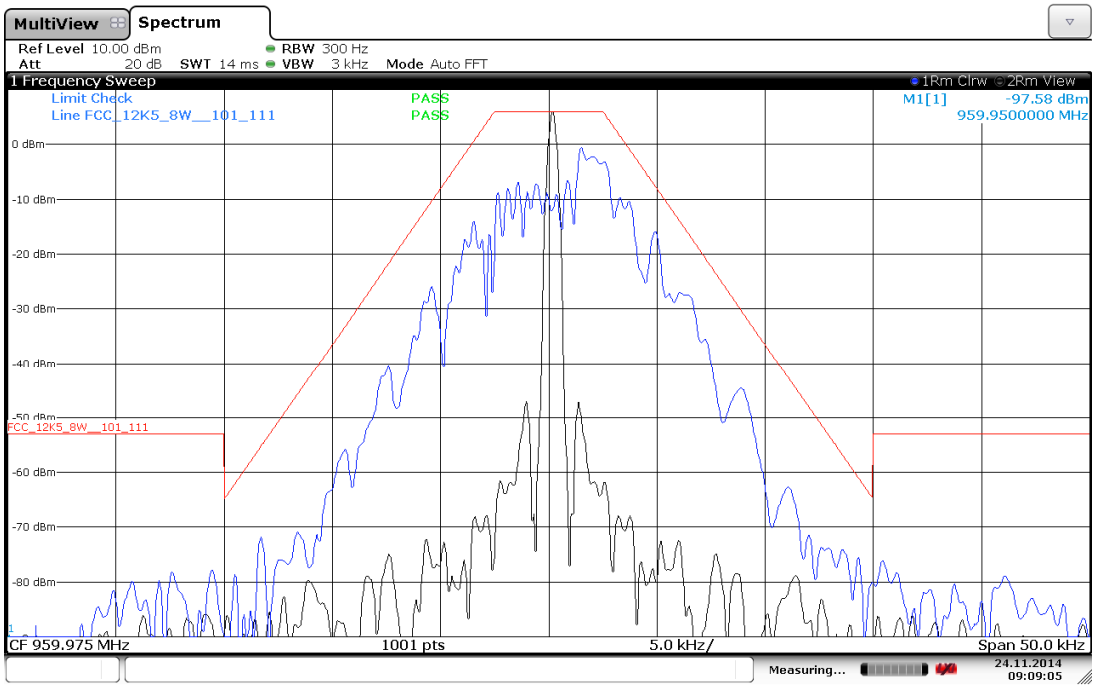
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 09:02:24

## GRAPH 9: Spectrum Emission for 12.5 kHz 4-CPFSK

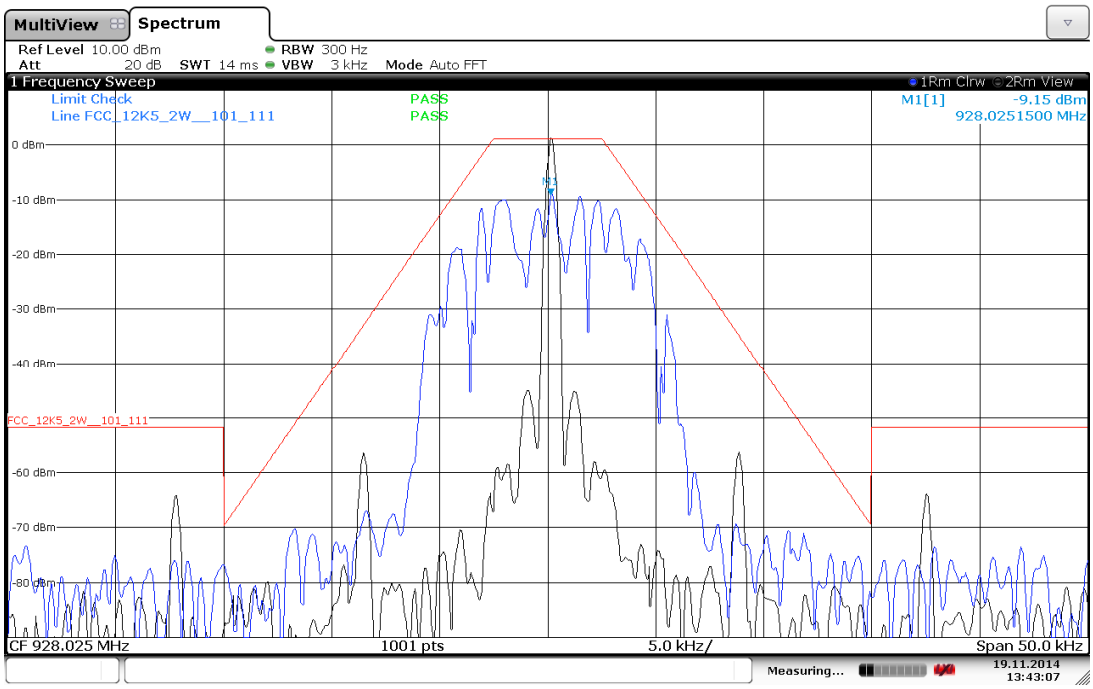
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 24.NOV.2014 09:09:05

## GRAPH 10: Spectrum Emission for 12.5 kHz 16-DEQAM

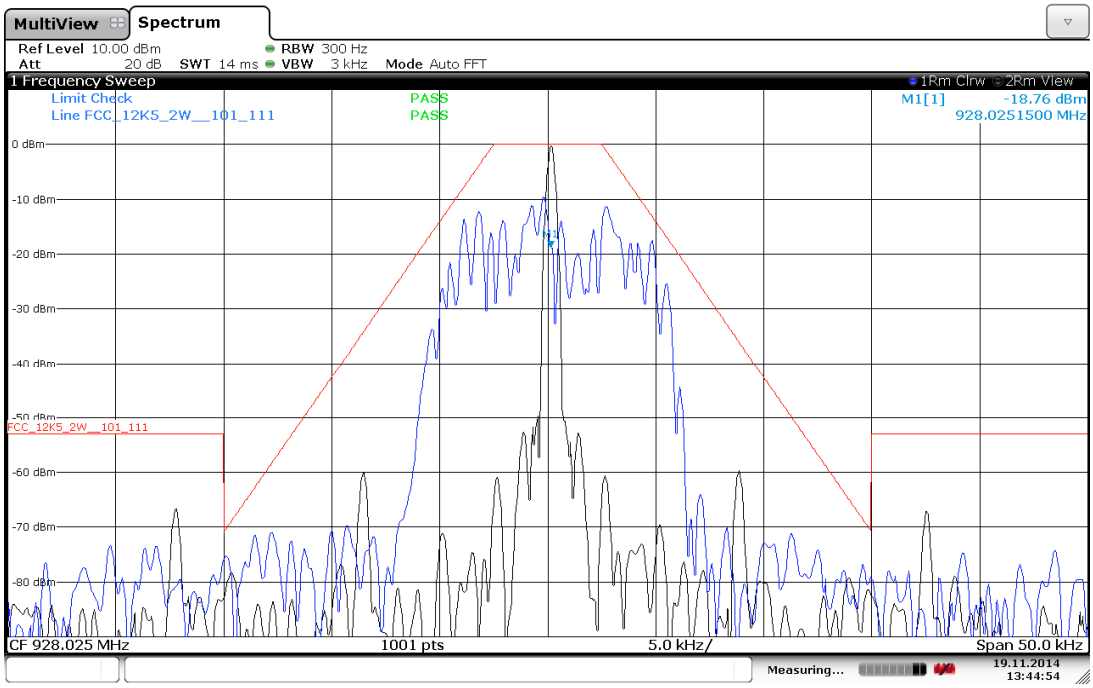
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 13:43:07

## GRAPH 11: Spectrum Emission for 12.5 kHz D8PSK

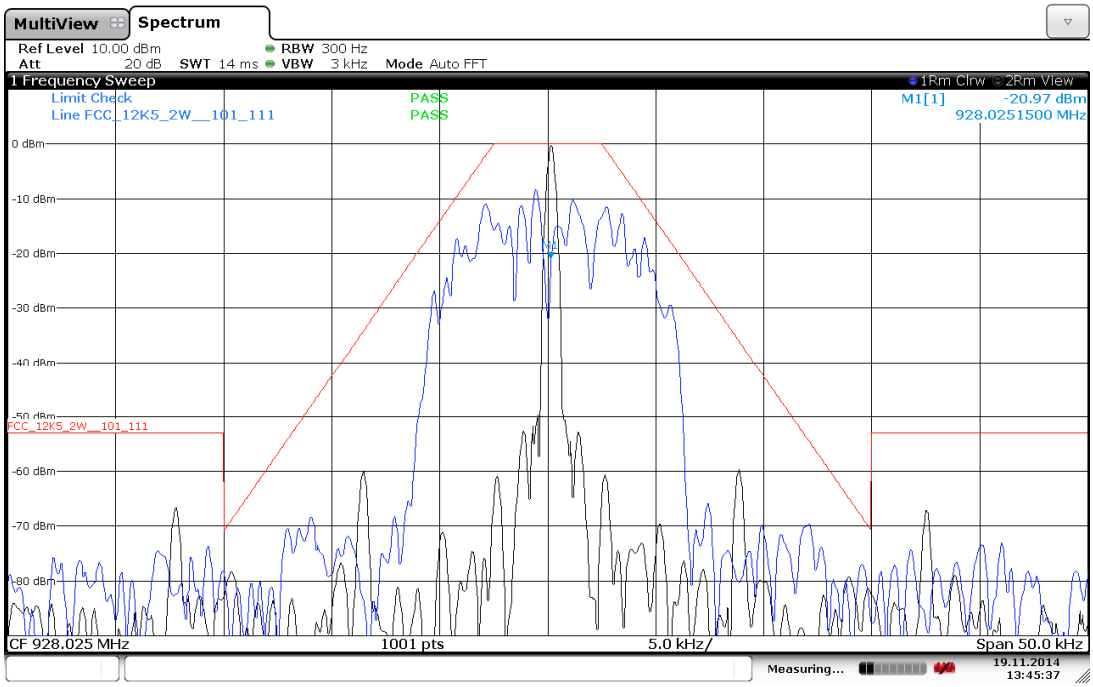
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 13:44:53

## GRAPH 12: Spectrum Emission for 12.5 kHz π/4-DQPSK

The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.

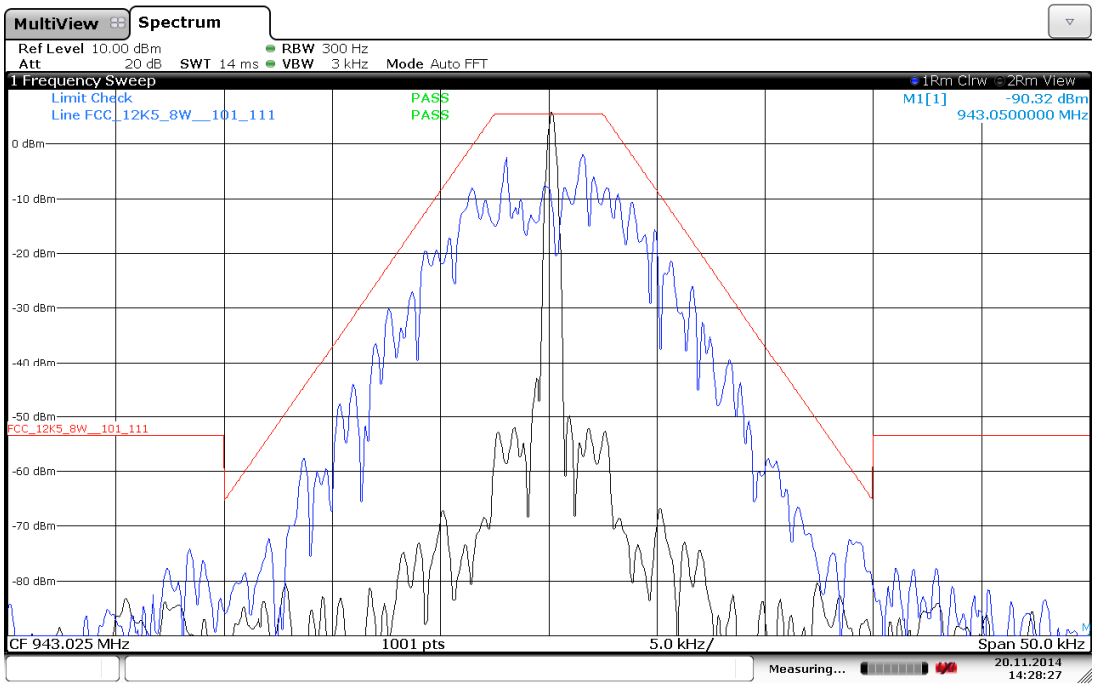



Date: 19.NOV.2014 13:45:37

# 4.2 Graphs **943.025MHz**

## GRAPH 13: Spectrum Emission for 50 kHz 4-CPFSK

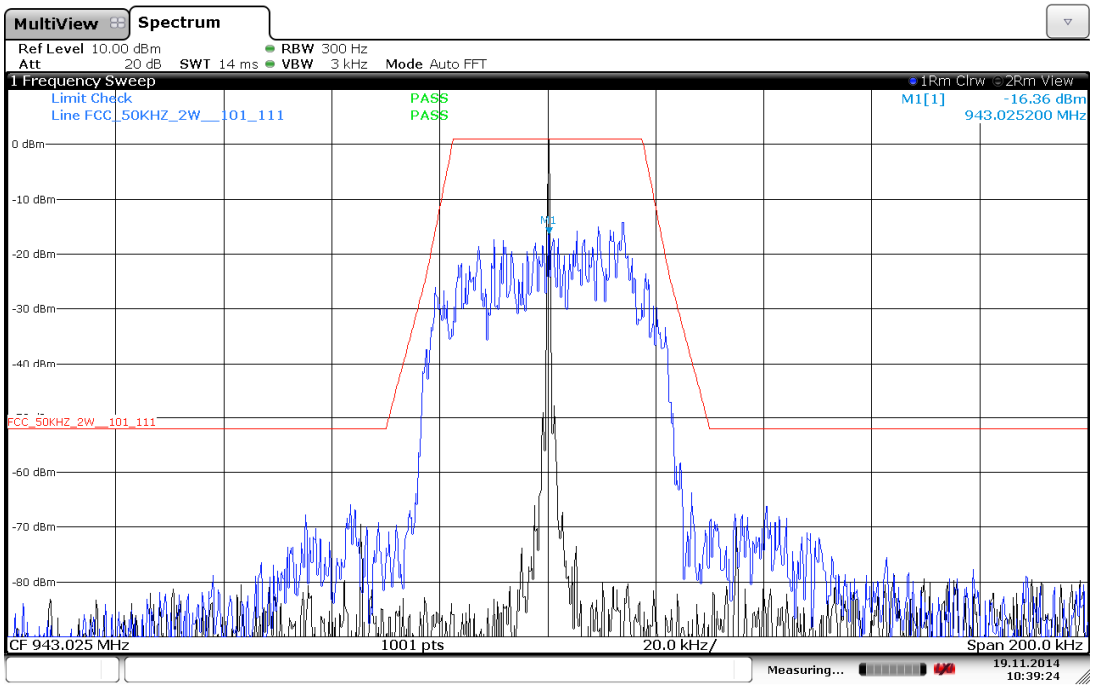
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 20.NOV.2014 14:28:27

## GRAPH 14: Spectrum Emission for 50 kHz 16-DEQAM

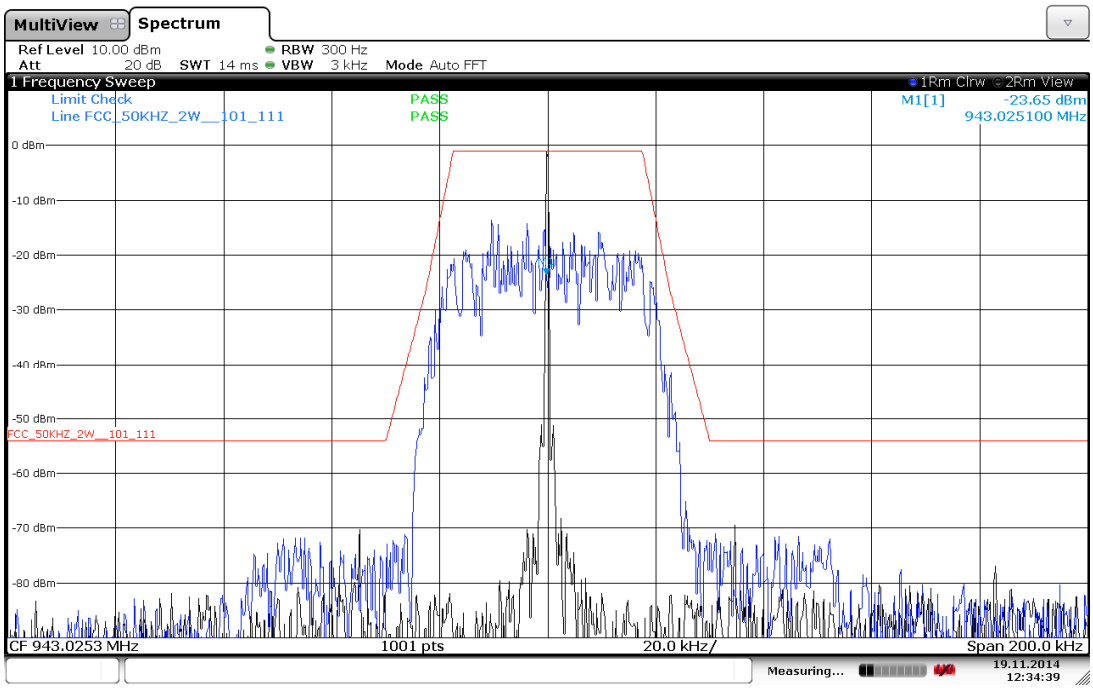
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 10:39:24

## GRAPH 15: Spectrum Emission for 50 kHz D8PSK

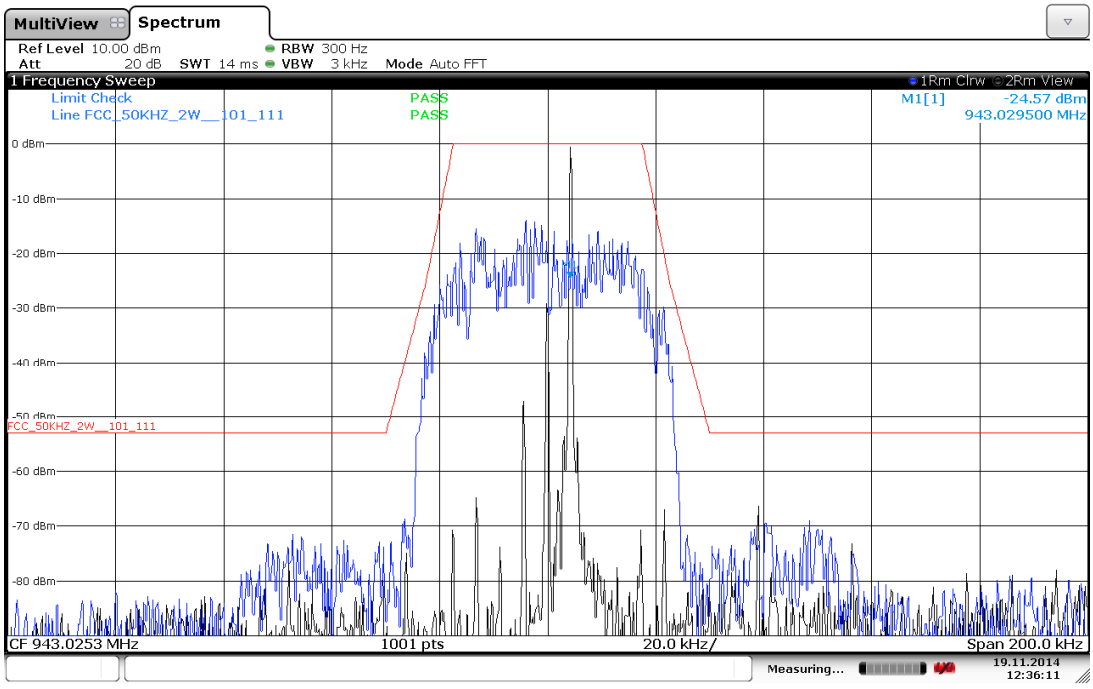
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 12:34:38

## GRAPH 16: Spectrum Emission for 50 kHz π/4-DQPSK

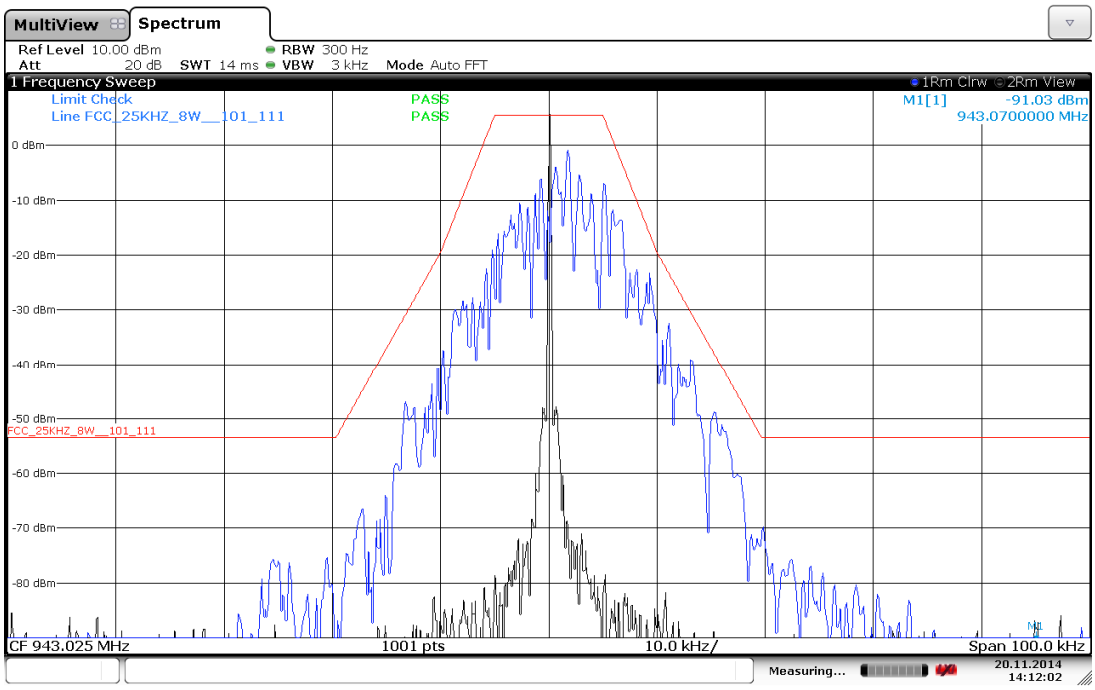
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 12:36:10

## GRAPH 17: Spectrum Emission for 25 kHz 4-CPFSK

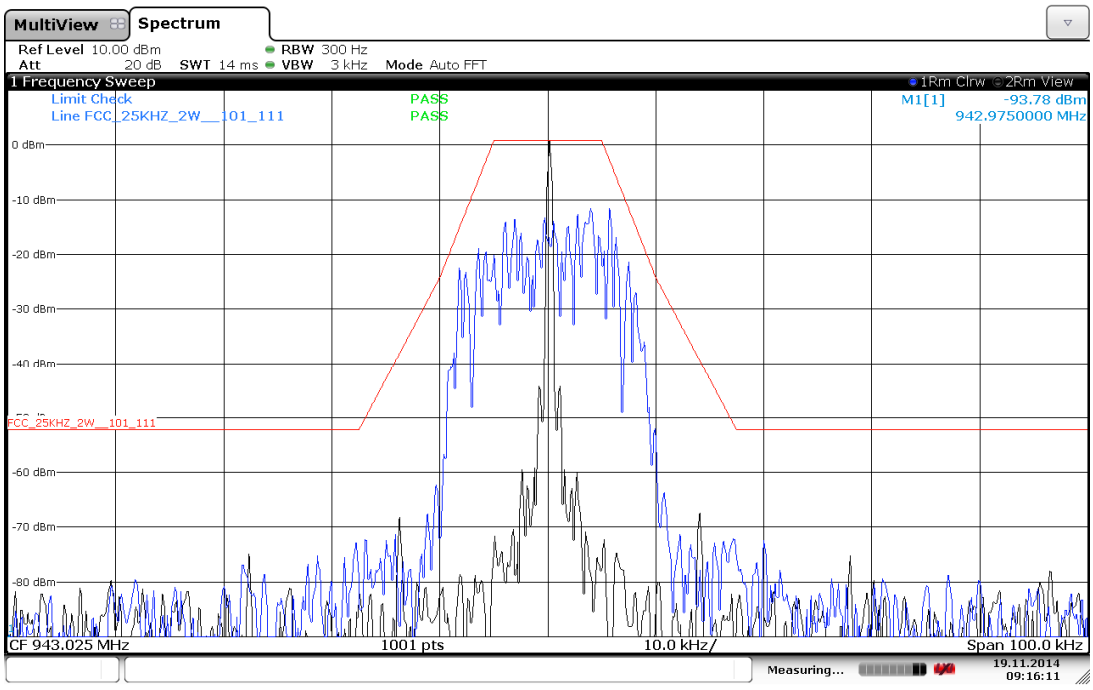
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 20.NOV.2014 14:12:02

## GRAPH 18: Spectrum Emission for 25 kHz 16-DEQAM

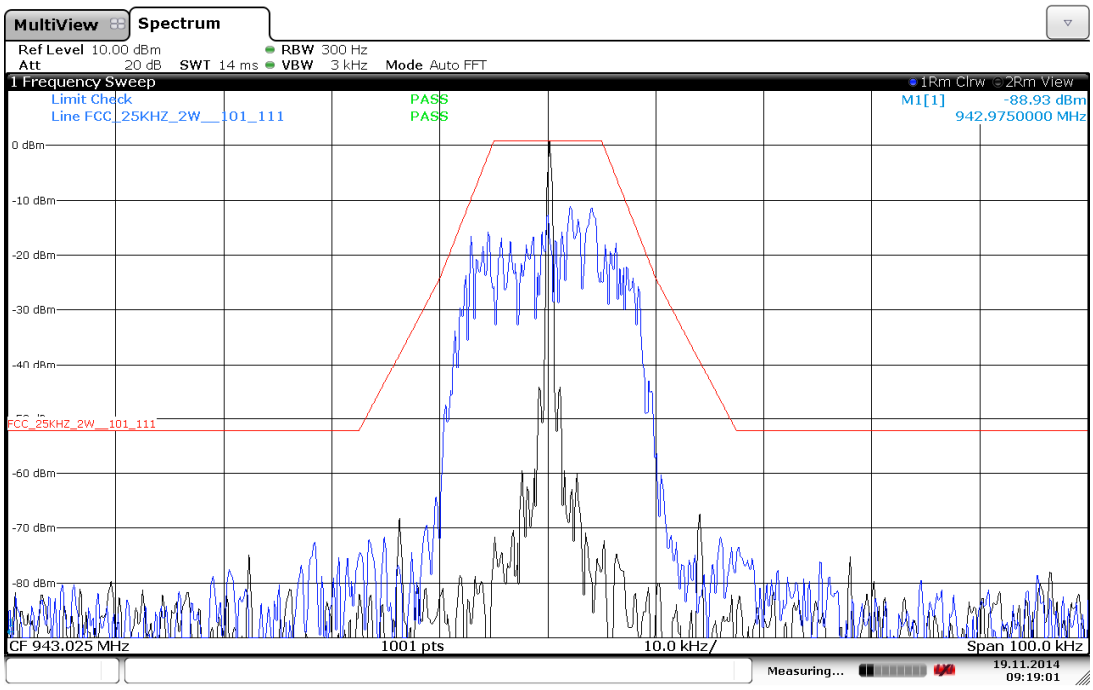
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.52 dB.




Date: 19.NOV.2014 09:16:11

## GRAPH 19: Spectrum Emission for 25 kHz D8PSK

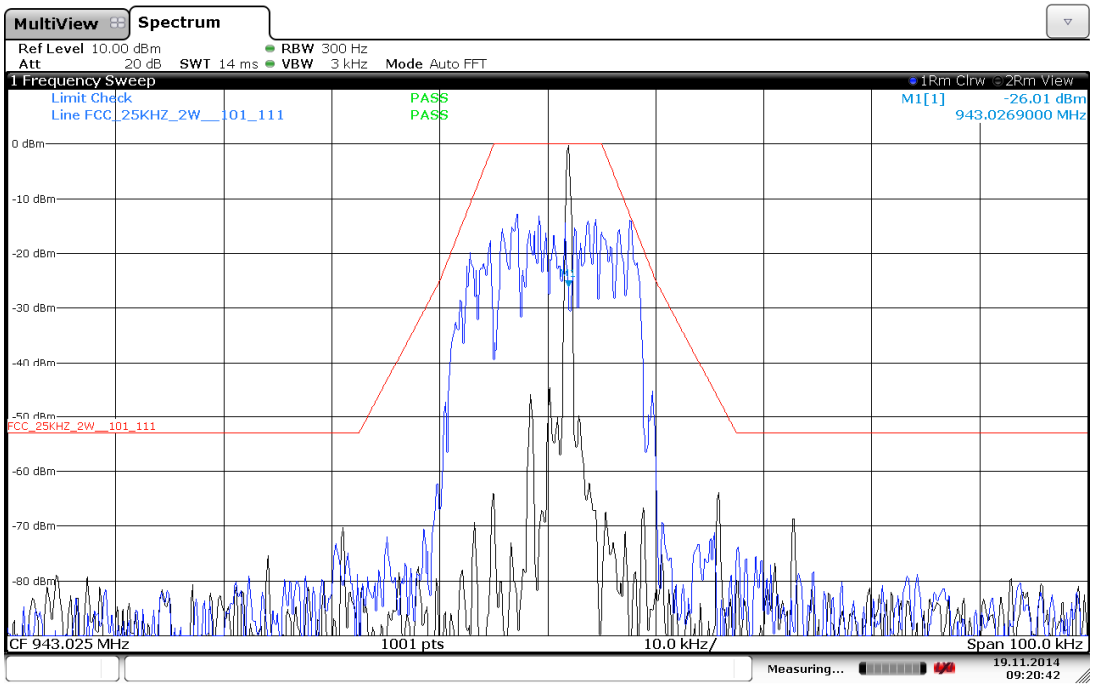
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 09:19:02

## GRAPH 20: Spectrum Emission for 25 kHz π/4-DQPSK

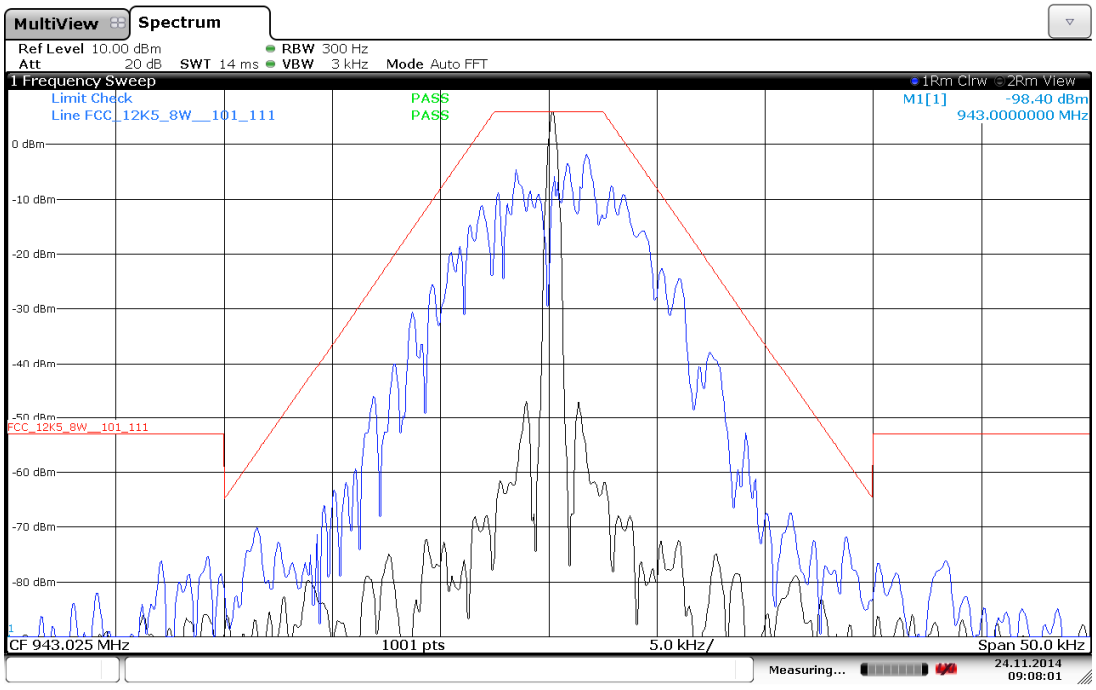
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 09:20:42

## GRAPH 21: Spectrum Emission for 12.5 kHz 4-CPFSK

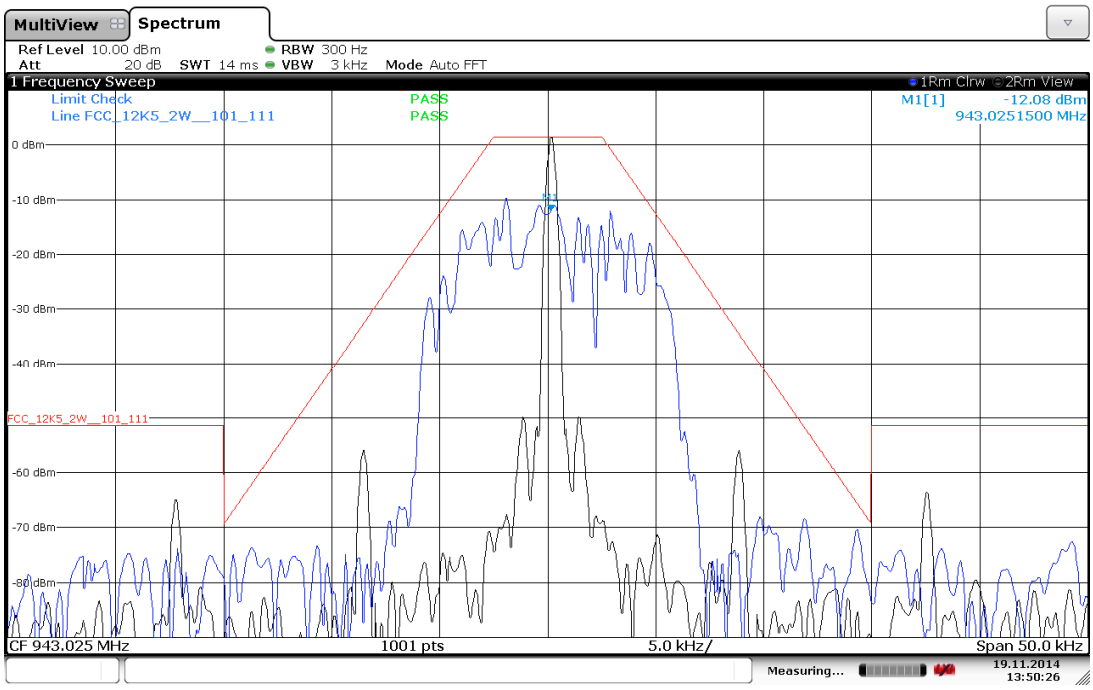
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 24.NOV.2014 09:08:01

## GRAPH 22: Spectrum Emission for 12.5 kHz 16-DEQAM

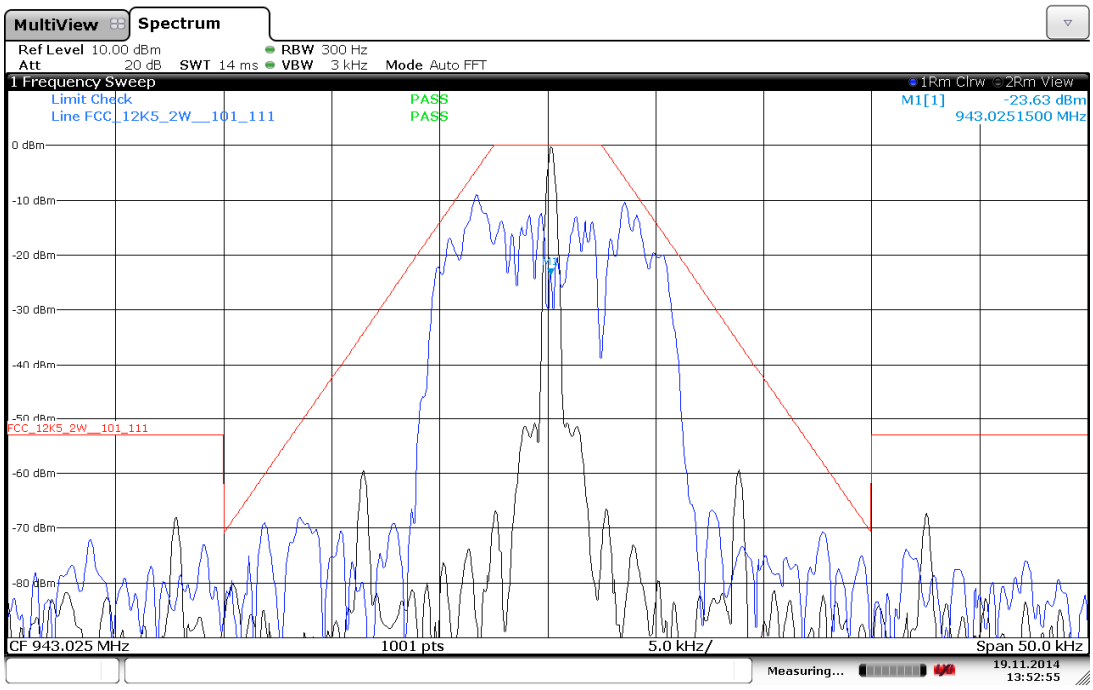
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 13:50:27

## GRAPH 23: Spectrum Emission for 12.5 kHz D8PSK

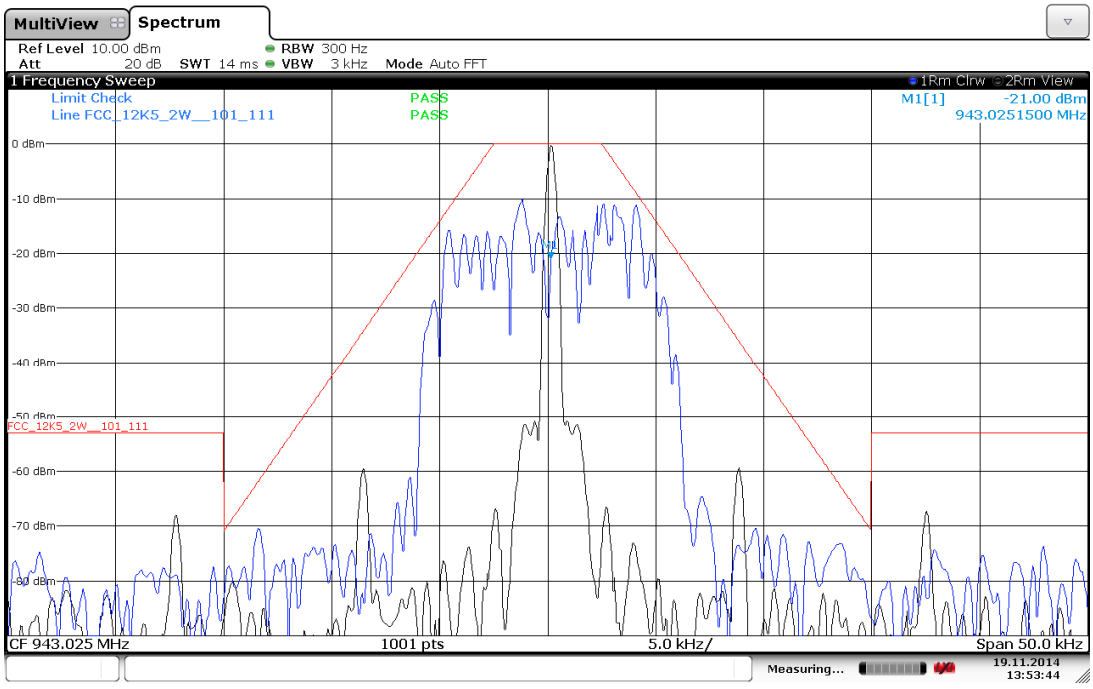
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 13:52:55

## GRAPH 24: Spectrum Emission for 12.5 kHz π/4-DQPSK

The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.

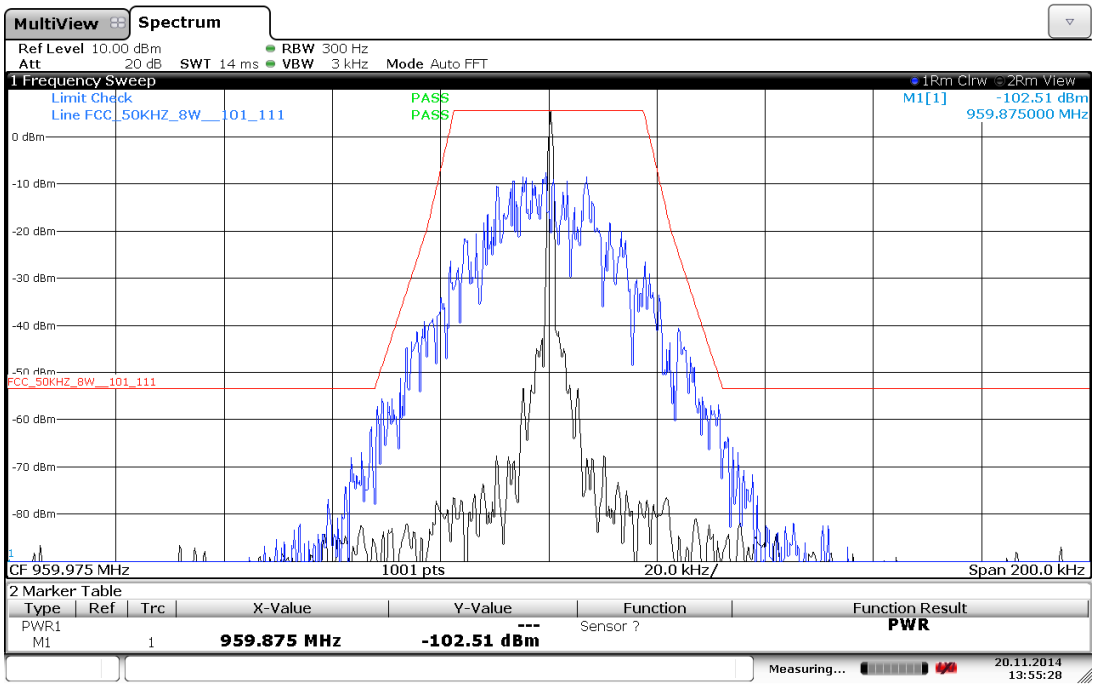



Date: 19.NOV.2014 13:53:44

# 4.1 Graphs **959.975MHz**

## GRAPH 25: Spectrum Emission for 50 kHz 4-CPFSK

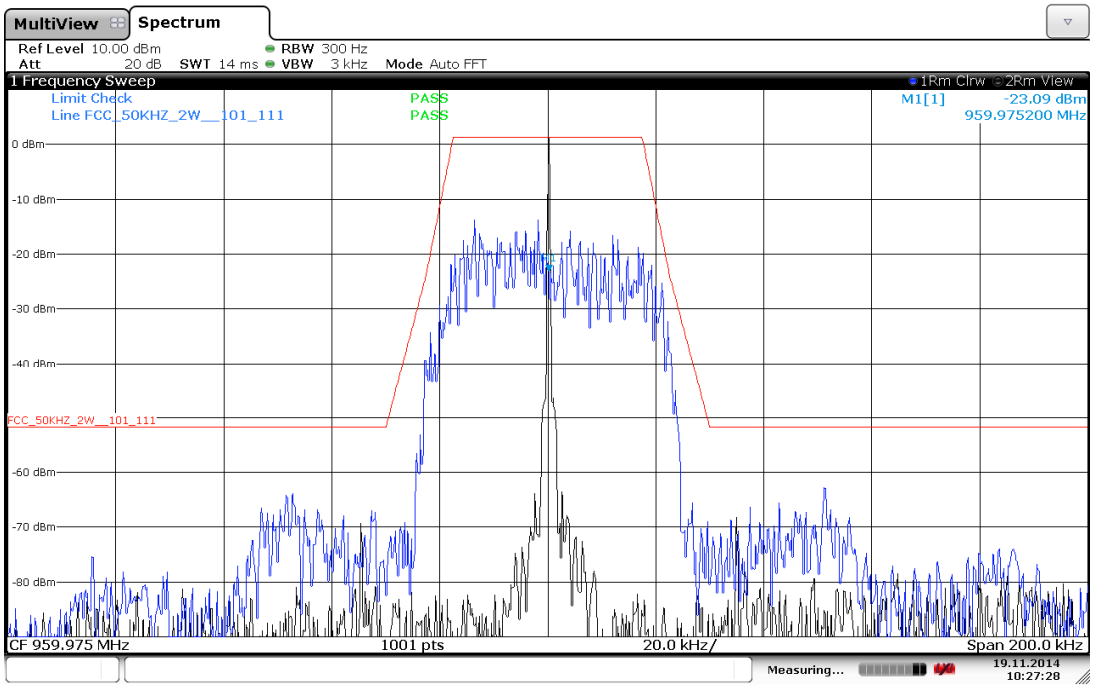
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 20.NOV.2014 13:55:28

## GRAPH 26: Spectrum Emission for 50 kHz 16-DEQAM

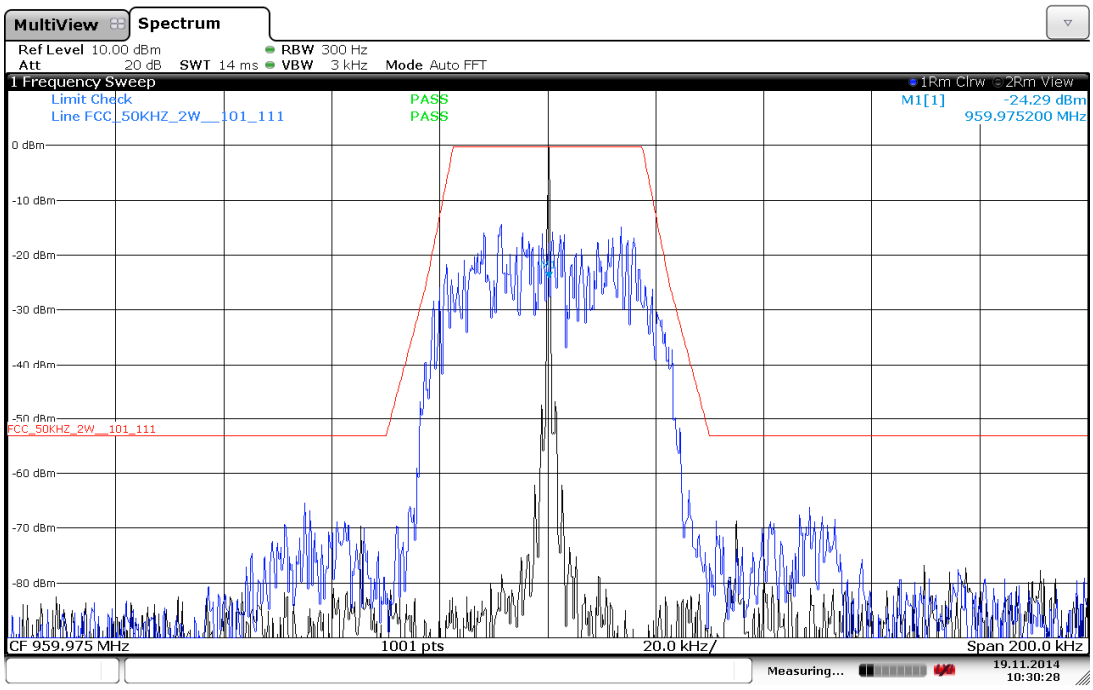
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 10:27:28

## GRAPH 27: Spectrum Emission for 50 kHz D8PSK

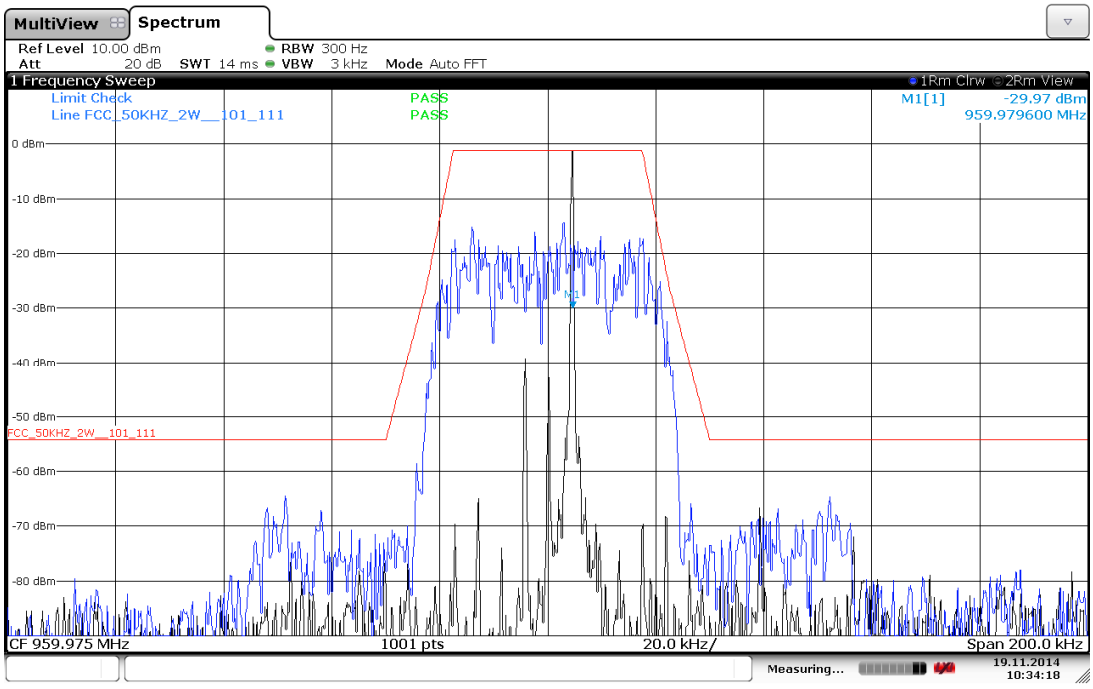
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 10:30:28

## GRAPH 28: Spectrum Emission for 50 kHz π/4-DQPSK

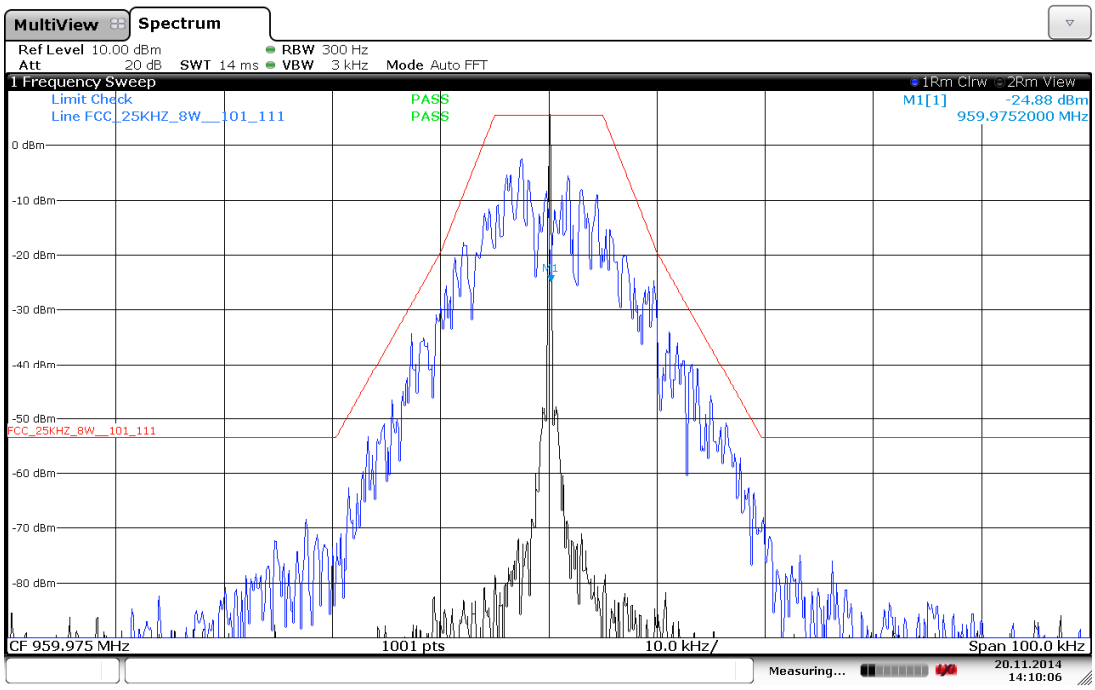
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 10:34:17

## GRAPH 29: Spectrum Emission for 25 kHz 4-CPFSK

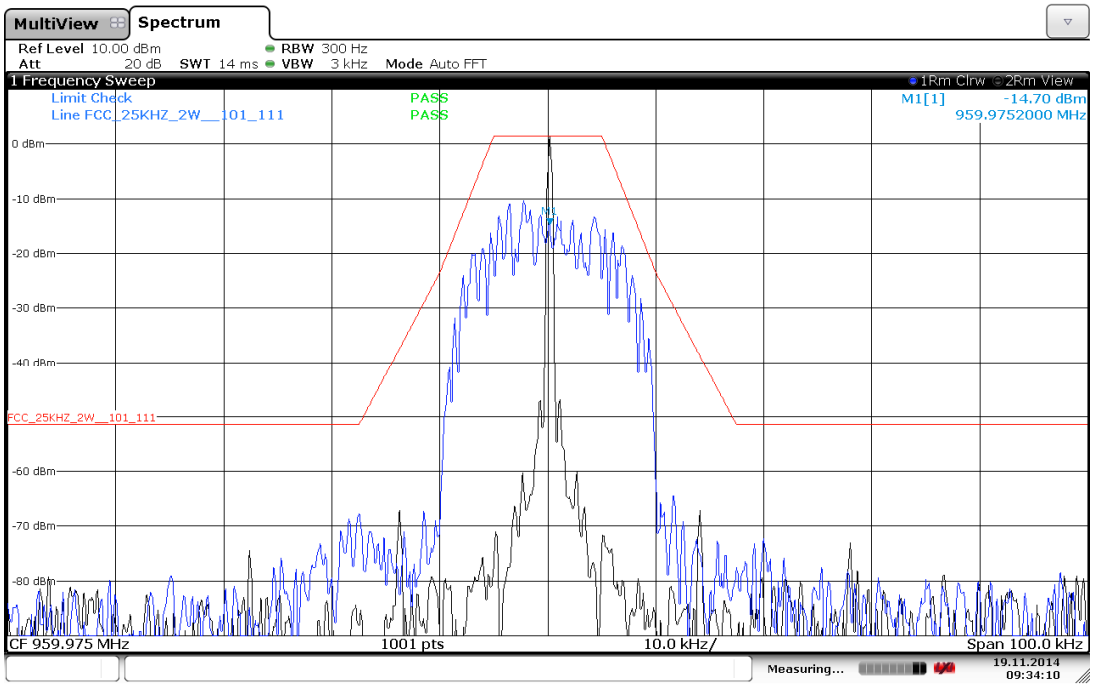
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 20.NOV.2014 14:10:06

## GRAPH 30: Spectrum Emission for 25 kHz 16-DEQAM

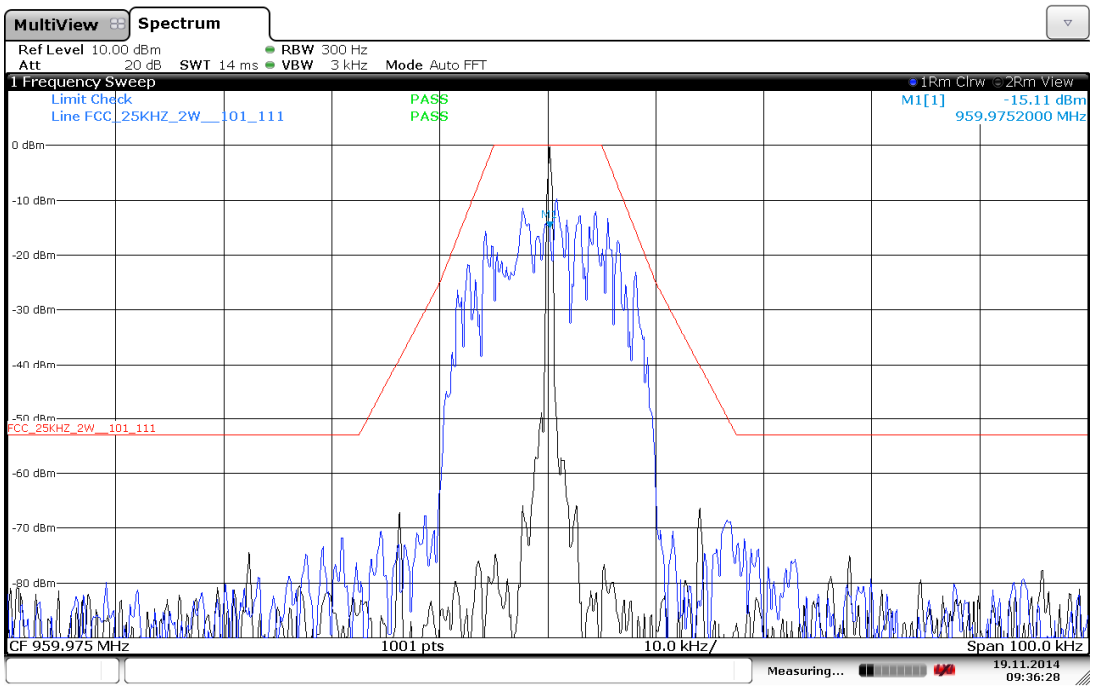
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 09:34:10

## GRAPH 31: Spectrum Emission for 25 kHz D8PSK

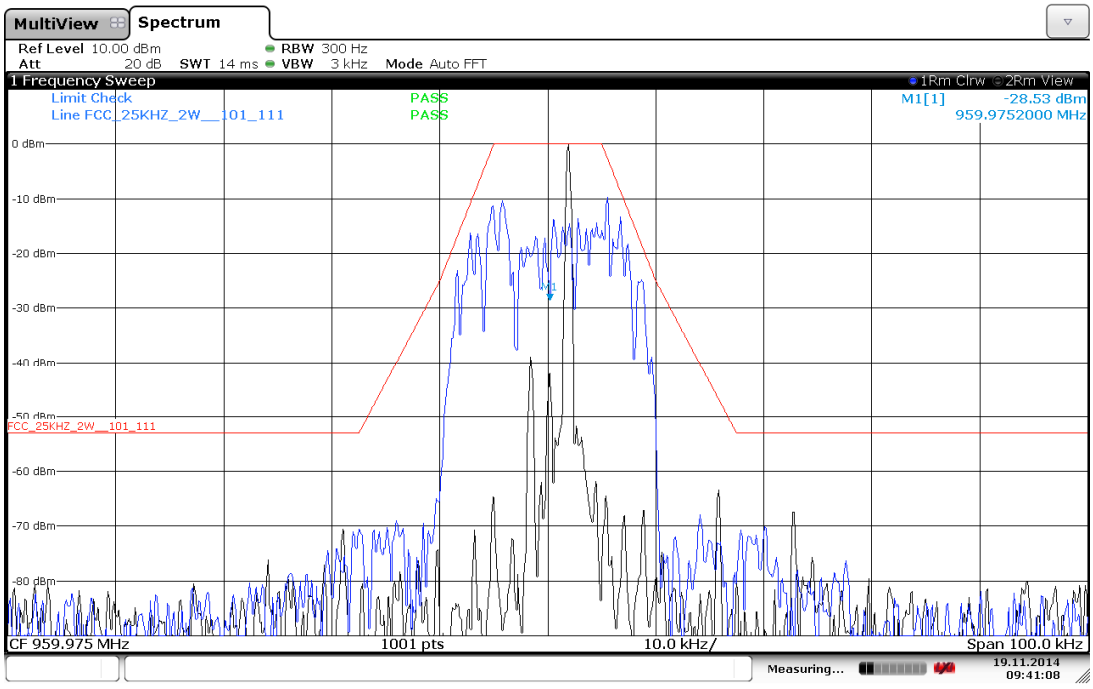
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 09:36:28

## GRAPH 32: Spectrum Emission for 25 kHz π/4-DQPSK

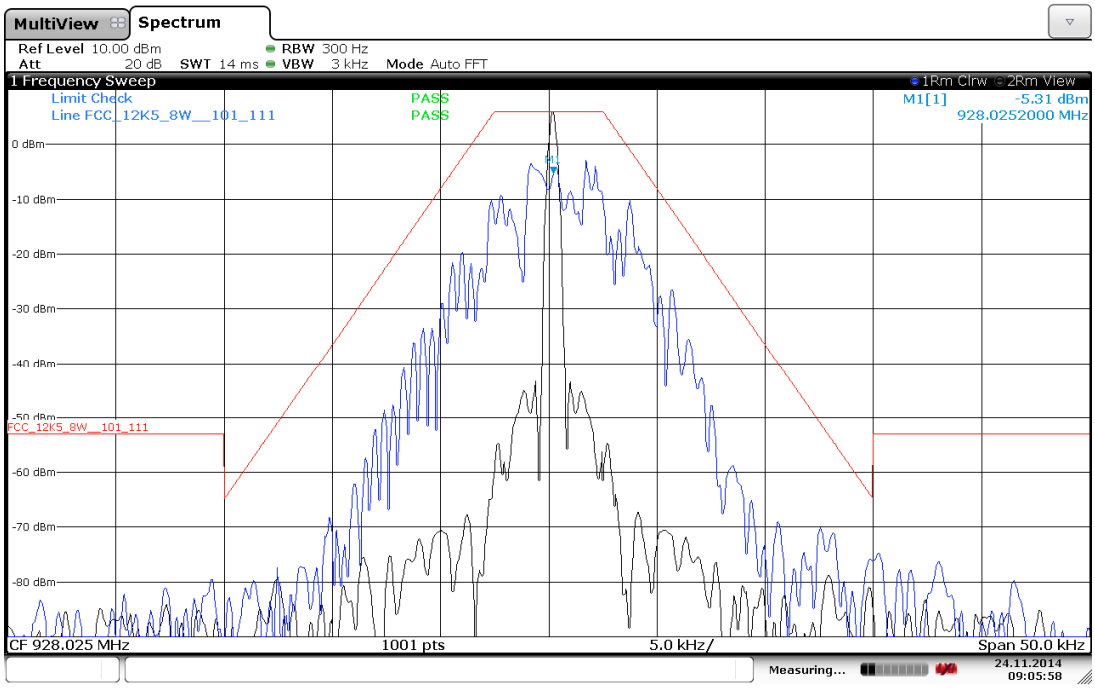
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 09:41:08

## GRAPH 33: Spectrum Emission for 12.5 kHz 4-CPFSK

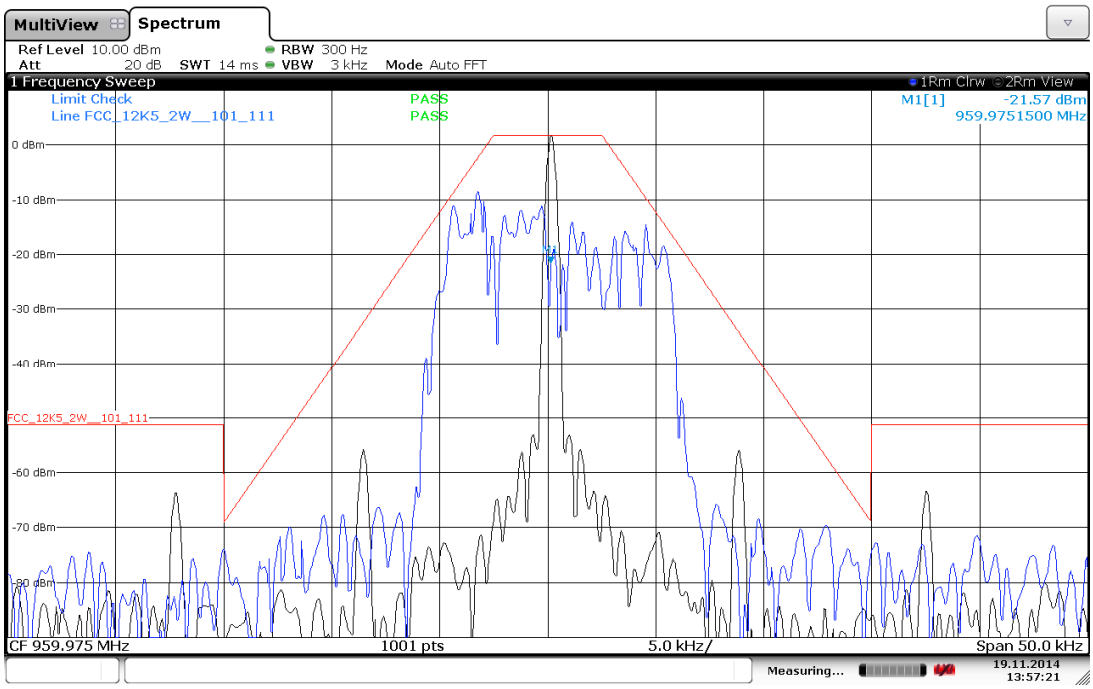
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 24.NOV.2014 09:05:59

## GRAPH 34: Spectrum Emission for 12.5 kHz 16-DEQAM

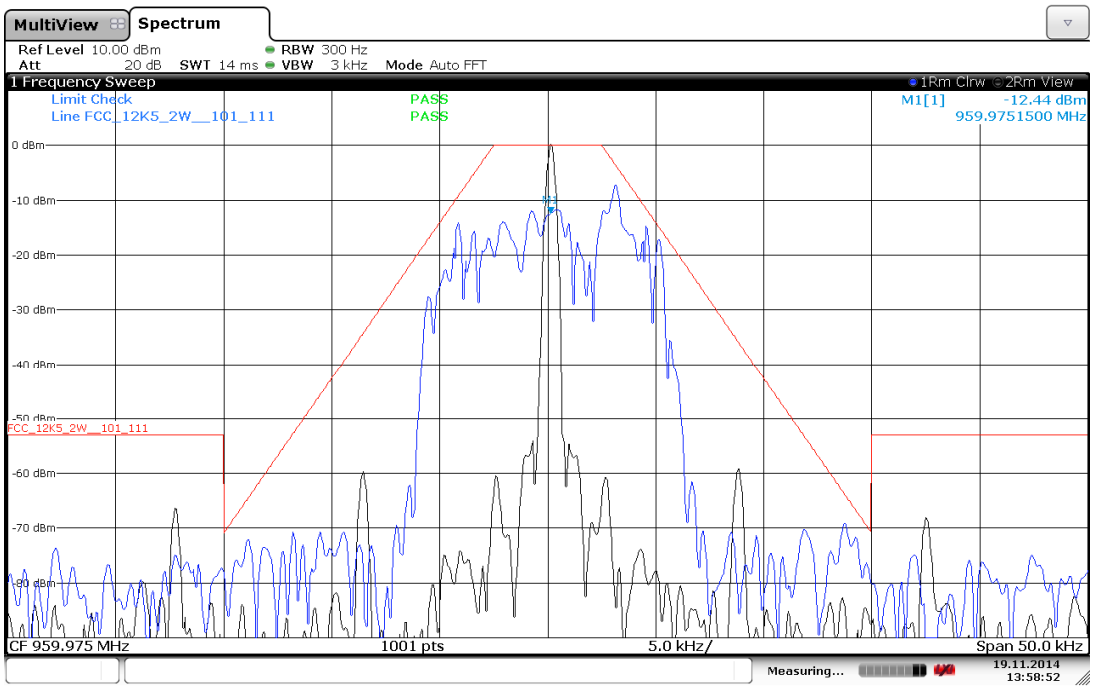
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 13:57:21

## GRAPH 35: Spectrum Emission for 12.5 kHz D8PSK

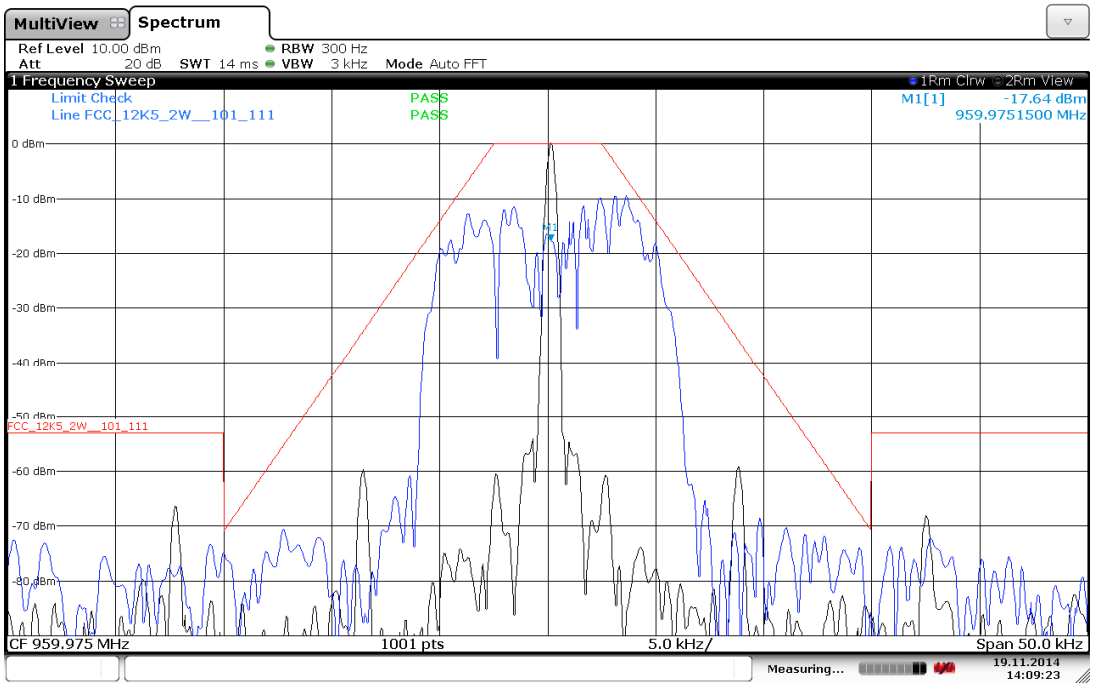
The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 13:58:52

## GRAPH 36: Spectrum Emission for 12.5 kHz π/4-DQPSK

The total attenuation of the complete measuring assembly (at the frequency of the measurement), consisting of the 30dB attenuator, the losses of the measuring cables and connectors, is 32.5 dB.




Date: 19.NOV.2014 14:09:23