# RADIO TEST REPORT

## No. 1118080-2 ed. 3

**EQUIPMENT UNDER TEST**

| | |
|---|---|
| Equipment: | Medical implant |
| Type / model: | Ellipse™ VR, Model CD1275-36<br>Ellipse™ ST VR, Model CD1273-36Q<br>Ellipse™ DR, Model CD2275-36<br>Ellipse™ ST DR, Model CD2273-36Q<br><br>See appendix A for a list of other model names with identical hardware |
| Manufacturer: | St. Jude Medical |
| Tested by request of: | St. Jude Medical AB |

**SUMMARY**

All selected test cases specified in this report comply with the requirements according to the following standards:

FCC 47 CFR Part 95 (2010)
IC RSS-243 Issue 3 (February 2010)

Industry Canada listed test facility No. IC 2042G-1

Date of issue: April 18, 2012

Tested by: Stefan Andersson — Approved by: Henric Larsson, On behalf of Niklas Boström



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

**Revision History**

| Edition | Date | Description |
|---|---|---|
| 1 | 2011-11-04 | First release |
| 2 | 2012-02-16 | Result for output power in section 5.5 is also listed in microwatt EIRP |
| 3 | 2012-04-18 | Equation in section 5.5 corrected. As suggested by the FCC, equation and results according to §15.503(k) added |



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

CONTENTS





Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

## 1. CLIENT INFORMATION

The EUT has been tested by request of

| | |
|---|---|
| Company: | St. Jude Medical AB<br>SE-175 84 Järfälla<br>Sweden |
| Name of contact: | Per Burström |

## 2. EQUIPMENT UNDER TEST (EUT)

### 2.1 Identification of the EUT according to the manufacturer/client declaration

| | |
|---|---|
| Equipment: | Medical implant |
| Type and serial number*: | Ellipse™ VR, Model CD1275-36, S/N 206009<br>Ellipse™ ST VR, Model CD1273-36Q, S/N 206021<br>Ellipse™ DR, Model CD2275-36, S/N 206016<br>Ellipse™ ST DR, Model CD2273-36Q, S/N 206028<br><br>See appendix A for a list of models with identical hardware |
| Manufacturer: | St. Jude Medical |
| Rating/Supplying voltage: | Battery |
| External antenna connector: | No |
| Frequency range: | 402-405 MHz |
| Number of channels: | 10 |
| Modulation characteristics: | 2 FSK and 2 FSK fallback |

*Conducted tests was measured on Ellipse™ VR, Model CD1275-36 with wire access instead of battery and with SMA connector to RF antenna feed-through, s/n: 206036.

### 2.2 Modifications during the test

No modifications have been made during the tests



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

## 3. TEST SPECIFICATIONS

### 3.1 Standards

FCC 47 CFR Part 95 (2010)
IC RSS-243, Issue 3 (February 2010)

Measurements methods according to ANSI C63.4-2003 - Methods of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

### 3.2 Additions, deviations and exclusions from standards

The sidewall thickness of the torso simulator is 6.1 mm instead of 6.35 mm.

No other additions, deviations or exclusions have been made from standards.

### 3.3 Test setup and mode of operation

Test setup:
The EUT was suspended in a Plexiglas torso simulator comprised of a vertical cylinder 30 cm diameter by 79 cm height, with a sidewall thickness of 6.1 mm, bonded to a liquid-tight Plexiglas base. The cylinder was filled with fluid to 76 cm height. The simulator was constructed in accordance with FCC 95.639(a)(2)(i) and EN 301 839-1 A1.1.3. These are also references for the simulator fluid. The simulator fluid has been made and measured by St. Jude Medical AB to fulfill the standard, the measured values are $\sigma$ = 0.85 s/m and $\varepsilon'$ = 56.0.
Target value: $\sigma$ = 0.93 s/m and $\varepsilon'$ = 57.0 (according to FCC OET 65C).
The measured values are within 10 % from target values.

During testing the EUT was centered vertically in the Plexiglas cylinder and 6 cm from the sidewall. A plastic jig was used to position the EUT both vertically and horizontally in the cylinder. The electrodes were placed as a vertical coil of approximately 7 cm in diameter above the EUT.

Mode of operation:
Spurious emission and effective radiated power of the fundamental emission:
The EUT can transmit with 2FSK and 2FSK Fallback modulation. Spurious emission and effective radiated power of the fundamental emission was performed with 2FSK modulation which has the highest measured output power.

Frequency stability:
The EUT was transmitting without modulation.

Emission bandwidth and emission close to MICS band:
These tests were performed with 2FSK and 2FSK fallback modulation.

A fresh battery was used during radiated tests. During conducted tests the EUT was connected to a DC supply.



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

### 3.4 Operating environment

The tests in semi-anechoic chamber were performed under the following environmental conditions:

| | | |
|---|---|---|
| Air temperature: | 20-25 | °C |
| Relative humidity: | 40-60 | % |

The conducted tests were performed under the following environmental conditions:

Normal condition:

| | | |
|---|---|---|
| Air temperature: | 37 | °C |
| Relative humidity: | 40-60 | % |

Extreme condition:

| | | |
|---|---|---|
| Air temperature: | 25-45 | °C |
| Relative humidity: | 40-60 | % |



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

## 4. TEST SUMMARY

The results in this report apply only to the sample tested.

| FCC reference | IC reference | Test | Result |
|---|---|---|---|
| §95.635(d) | 5.5 | Unwanted radiation, Transmitter Unwanted Emissions | PASS |
| §95.639(f) | 5.4 | Maximum transmitter power, Transmitter Output Power | PASS |
| §95.633(e) | 5.1 | Emission Bandwidth | PASS |
| §95.628 | 5.3 | Frequency error | PASS |
| §95.628(a)(b) | 5.7 | MICS operation and duty cycle requirement | NA* |

* Only applicable for MICS controller/programmer



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

## 5. UNWANTED RADIATION AND MAXIMUM TRANSMITTER POWER

### 5.1 Measurement uncertainty

Radiated emission, field strength, 30 – 1 000 MHz: ± 4.6 dB
Radiated emission, field strength, 1 000 – 4 100 MHz: ± 6.2 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT.

Measurement uncertainty is calculated in accordance with EA-4/02-1997.
The measurement uncertainty is given with a confidence of 95%.

### 5.2 Test equipment

| Equipment | Manufacturer | Type | Intertek No. |
|---|---|---|---|
| *Test site: Semi-anechoic shielded chamber, 5.7 x 8.7 x 5.4 m (W x L x H)* | | | *30900* |
| Software: | Rohde & Schwarz | EMC 32 | N/A |
| Measurement receiver: | Rohde & Schwarz | FSU40 | 13178 |
| Antenna amplifier: | µCOMP NORDIC | N/A | 30939 |
| Antenna, bilog: | Chase | CBL6111B | 12474 |
| Antenna, horn: | EMCO | 3115 | 3006 |



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

### 5.3 Measurement set-up

Test site: Semi-anechoic shielded chamber (30 – 4100 MHz)

The radiated disturbance electric field intensity was measured in a semi-anechoic chamber at a distance of 3 m. The Plexiglas torso with the EUT was placed on a non-metallic table and the center of the torso and EUT was 1.5 m above the reference ground plane. The specified test mode was enabled. Test set-up photos are given below.

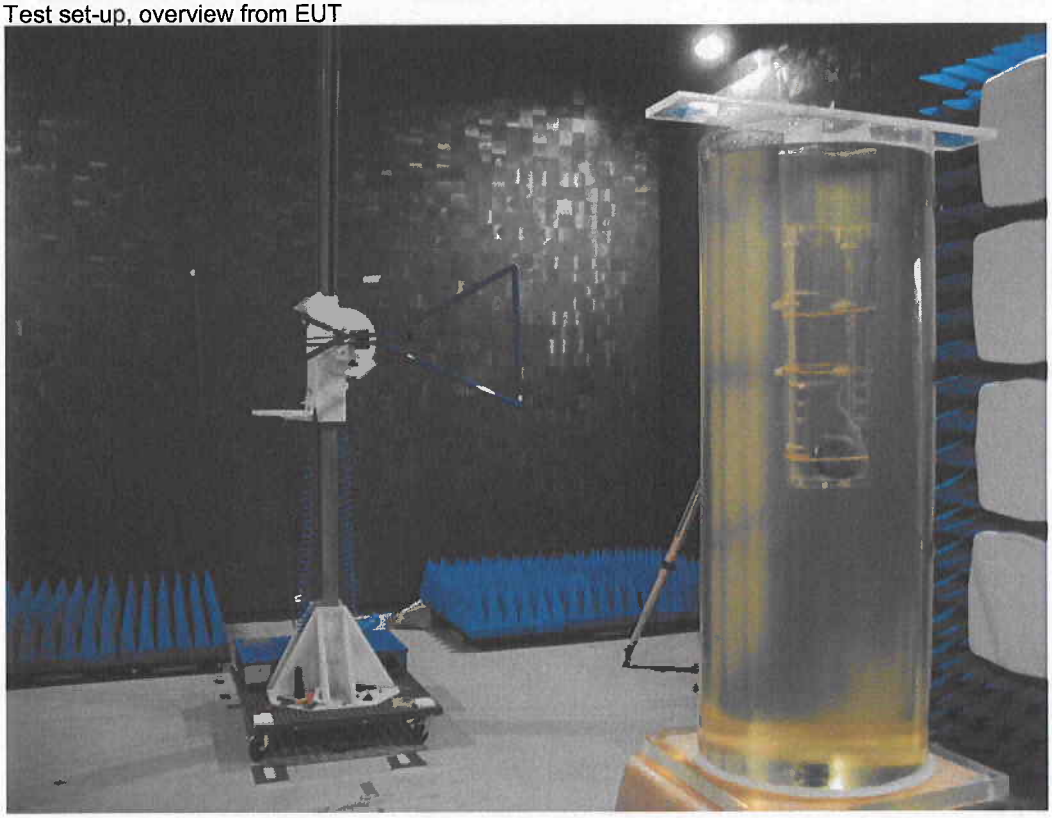
An overview sweep with peak detection of the electric field intensity was performed with the measurement receiver in max-hold and with the antenna placed 1.5 m, 2.5 m and 3.5 m above the floor. The polarization was horizontal and vertical. The measurements were repeated with the EUT rotated in 90-degree steps below 1 GHz and 45-degree steps above 1 GHz.

At the frequencies where high disturbance levels were found a search for max disturbance level was performed. With the EUT and antenna in the worst-case configuration new measurements with quasi-peak detector were carried out.

For maximum transmitter power measurement the turntable was turned 360 degrees and the antenna mast was moved from 1 m to 4 m to find the maximum power. The measurement was performed with both horizontal and vertical polarization.

Test set-up photos:

Test set-up, overview from EUT





Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

Test set-up, EUT in Plexiglas cylinder



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

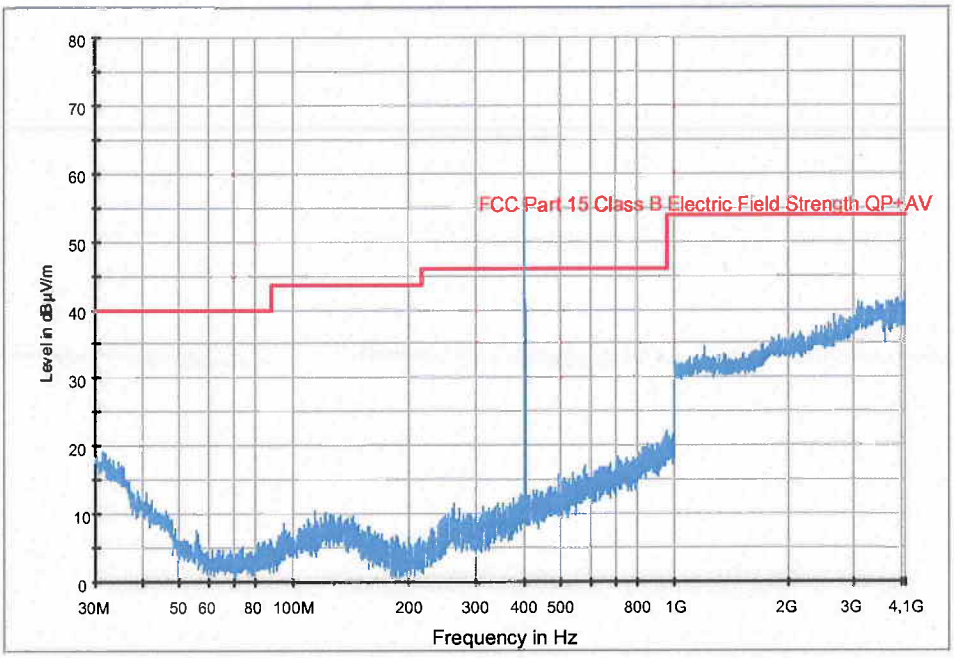
### 5.4 Test protocol, Unwanted radiation

Semi-anechoic shielded chamber

Date of test: 2011-10-14 and 2011-10-17

30 – 4100 MHz, max peak at a distance of 3 m, Ellipse™ VR, Model CD1275-36, S/N 206009, vertical position

1 mics spur 30M-1G-4G w.uComp preamp_110523

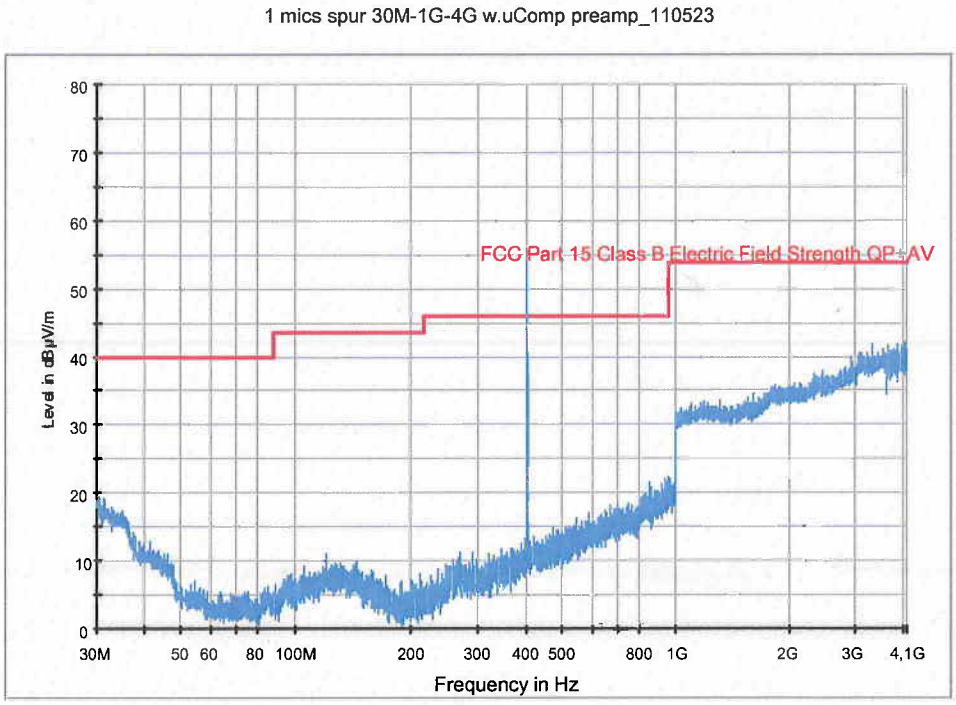



| Field strength of spurious emissions | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| [MHz] | [kHz] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | |
| 403.650 | - | - | - | - | - | Carrier |
| 30 - 4100 | - | - | - | - | - | No peaks above noise floor |



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

30 – 4100 MHz, max peak at a distance of 3 m, Ellipse™ VR, Model CD1275-36, S/N 206009, horizontal position



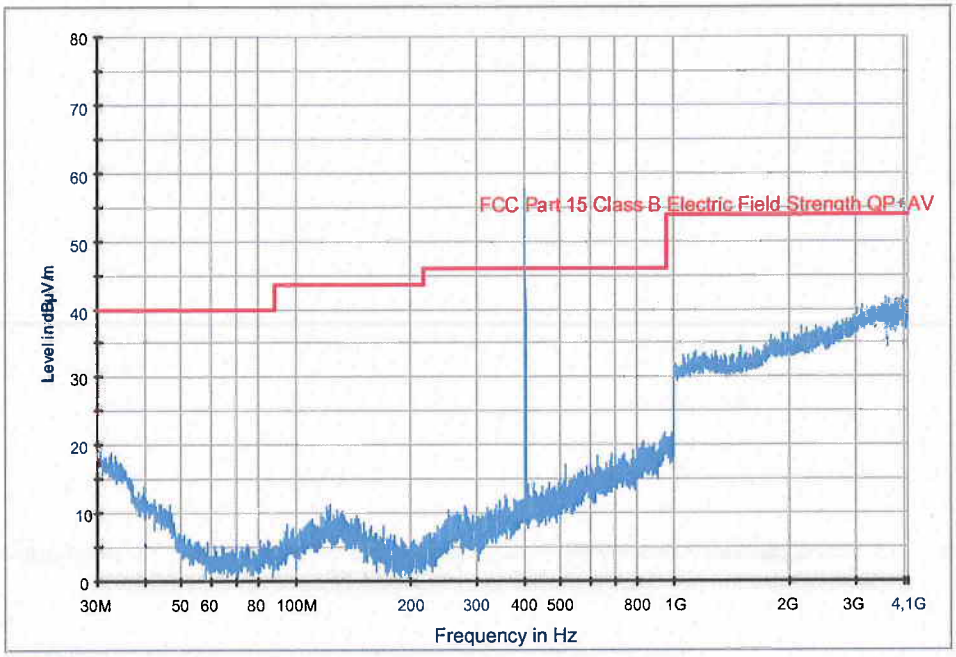

| Field strength of spurious emissions | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| | | Peak | QP/AV | Peak | QP/AV | |
| [MHz] | [kHz] | [dB(µV/m)] | [dB(µV/m)] | [dB(µV/m)] | [dB(µV/m)] | |
| 403.650 | - | - | - | - | - | Carrier |
| 30 - 4100 | - | - | - | - | - | No peaks above noise floor |



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

30 – 4100 MHz, max peak at a distance of 3 m, Ellipse™ ST VR, Model CD1273-36Q, S/N 206021, vertical position

1 mics spur 30M-1G-4G w.uComp preamp_110523

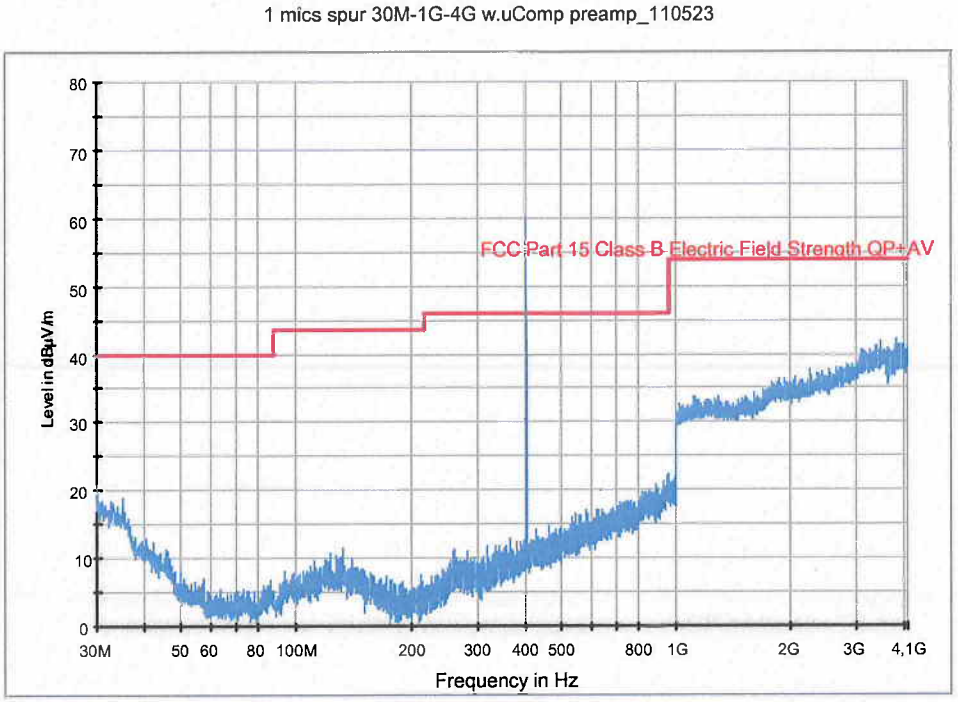



| Field strength of spurious emissions | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| | | Peak | QP/AV | Peak | QP/AV | |
| [MHz] | [kHz] | [dB(µV/m)] | [dB(µV/m)] | [dB(µV/m)] | [dB(µV/m)] | |
| 403.650 | - | - | - | - | - | Carrier |
| 30 - 4100 | - | - | - | - | - | No peaks above noise floor |



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.interiek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

30 – 4100 MHz, max peak at a distance of 3 m, Ellipse™ ST VR, Model CD1273-36Q, S/N 206021, horizontal position

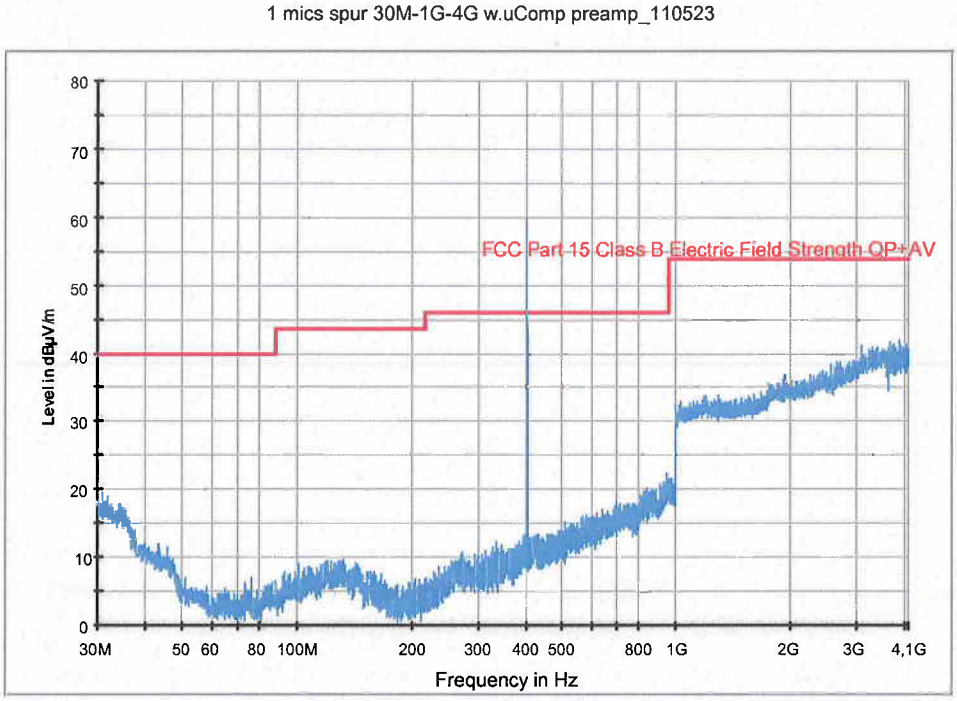



| Field strength of spurious emissions | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| [MHz] | [kHz] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | |
| 403.650 | - | - | - | - | - | Carrier |
| 30 - 4100 | - | - | - | - | - | No peaks above noise floor |



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

30 – 4100 MHz, max peak at a distance of 3 m, Ellipse™ DR, Model CD2275-36, S/N 206016, vertical position

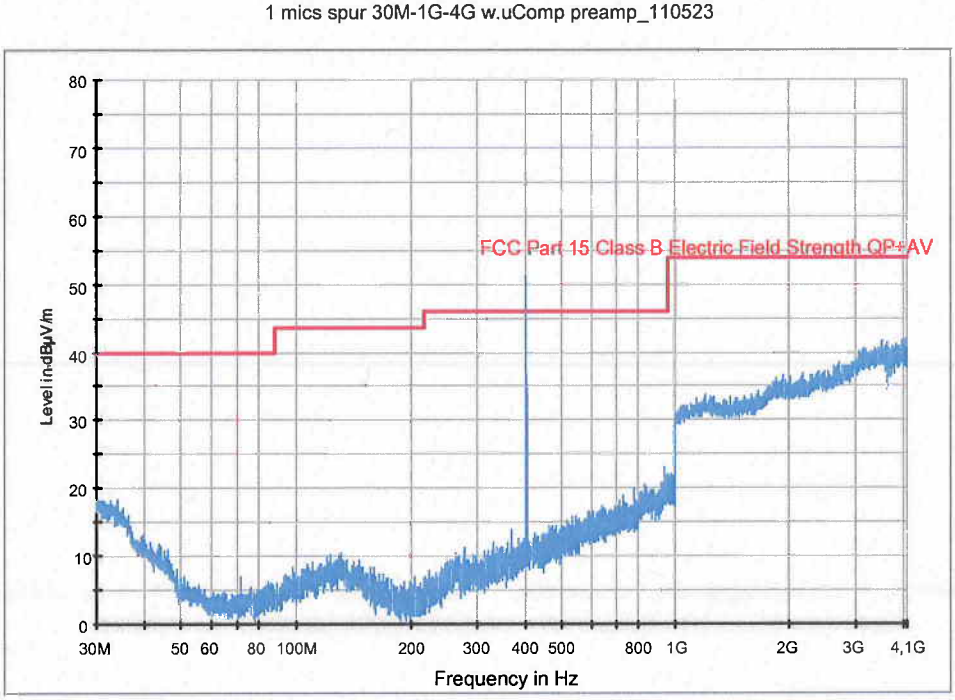



| Field strength of spurious emissions | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| [MHz] | [kHz] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | |
| 403.650 | - | - | - | - | - | Carrier |
| 30 - 4100 | - | - | - | - | - | No peaks above noise floor |



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

30 – 4100 MHz, max peak at a distance of 3 m, Ellipse™ DR, Model CD2275-36, S/N 206016, horizontal position

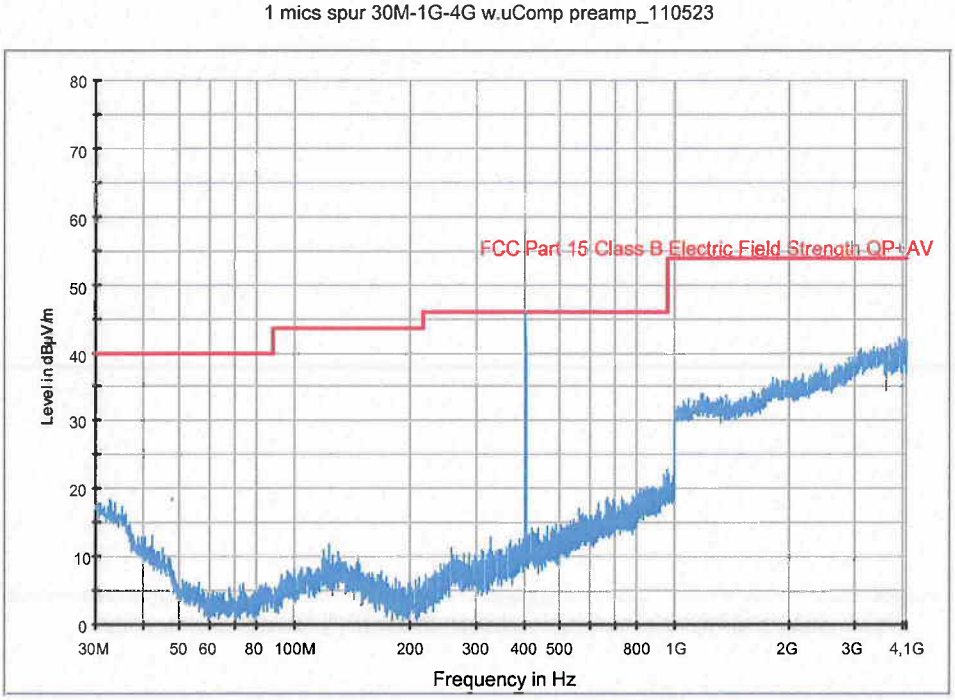



| Field strength of spurious emissions | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| [MHz] | [kHz] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | |
| 403.650 | - | - | - | - | - | Carrier |
| 30 - 4100 | - | - | - | - | - | No peaks above noise floor |



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

30 – 4100 MHz, max peak at a distance of 3 m, Ellipse™ ST DR, Model CD2273-36Q, S/N 206028, vertical position

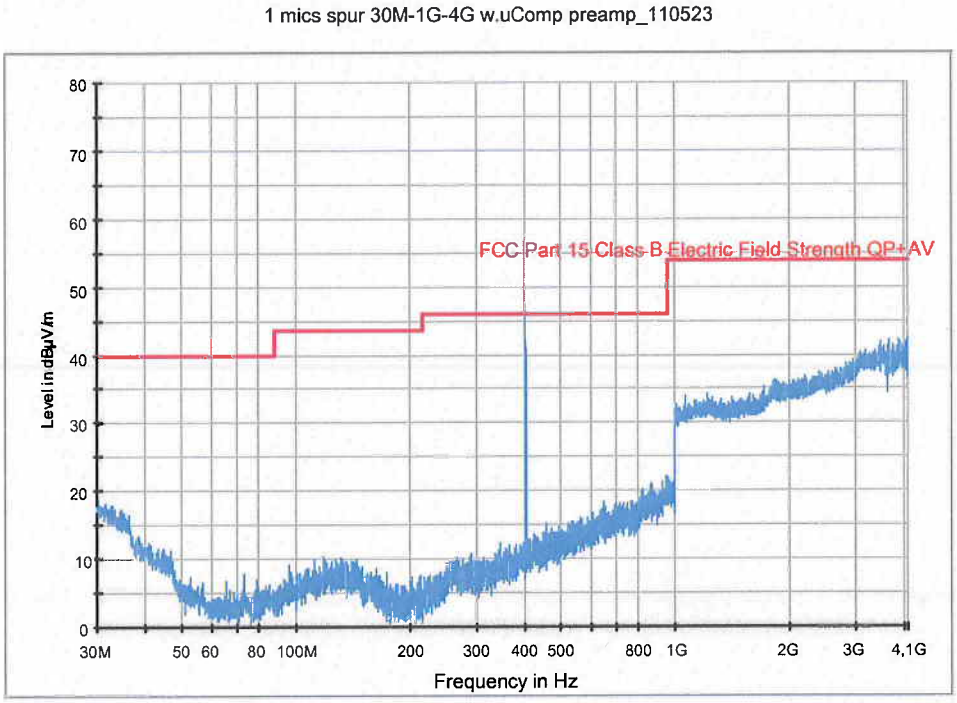



| Field strength of spurious emissions | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| [MHz] | [kHz] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | |
| 403.650 | - | - | - | - | - | Carrier |
| 30 - 4100 | - | - | - | - | - | No peaks above noise floor |



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

30 – 4100 MHz, max peak at a distance of 3 m, Ellipse™ ST DR, Model CD2273-36Q, S/N 206028, horizontal position




| Field strength of spurious emissions | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| [MHz] | [kHz] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | |
| 403.650 | - | - | - | - | - | Carrier |
| 30 - 4100 | - | - | - | - | - | No peaks above noise floor |

Example calculation:

Measured level [dBµV/m] = Analyzer reading [dBµV] + cable loss [dB] – preamplifier gain [dB] + antenna factor [1/m]

**Fulfil requirements: YES**



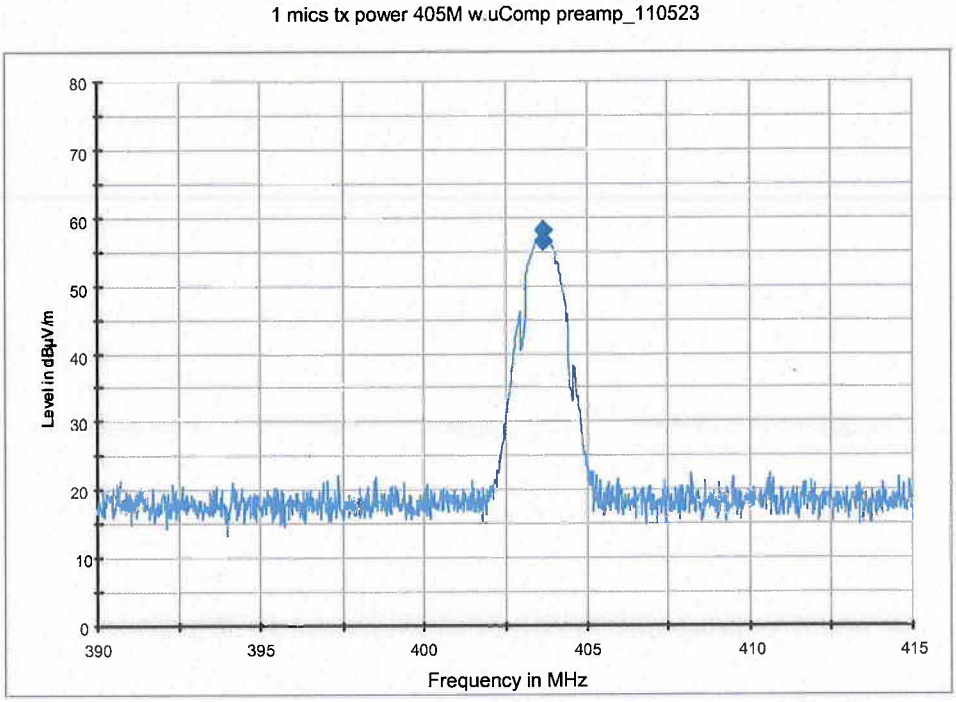
Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

### 5.5 Test protocol, Maximum transmitter power

Semi-anechoic shielded chamber

Date of test: 2011-05-24 and 2011-05-25

Maximum transmitter power at a distance of 3 m, Ellipse™ VR, Model CD1275-36, S/N 206009, vertical position




| Maximum transmitting power | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| | | Peak | QP/AV | Peak | QP/AV | |
| [MHz] | [kHz] | [dB(µV/m)] | [dB(µV/m)] | [dB(µV/m)] | [dB(µV/m)] | |
| 403.650 | 1000 | 58.1 | - | 85.2 | - | |

Field strength to EIRP calculation:

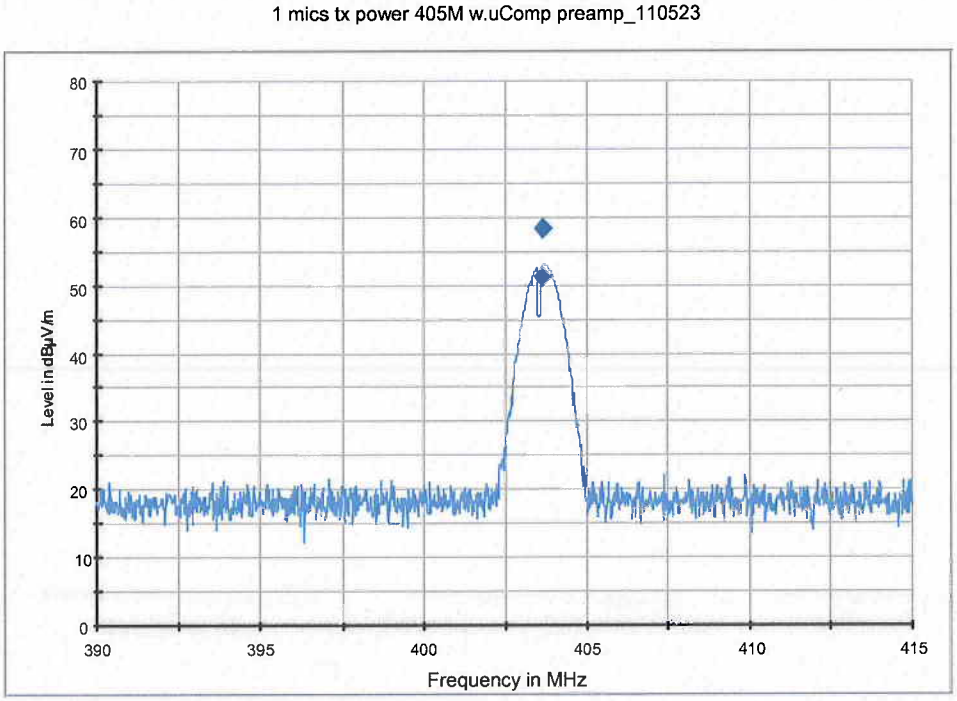
According to FCC § 95.628(g)(3):
25 microwatts EIRP corresponds to 18.2 mV/m at 3 m measuring distance in a semi-anechoic chamber (reflecting floor).
EIRP [dBm] = E [dBµV/m] - 101.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 101.2)/10)
P = 0.0487 µW EIRP

According to FCC §15.503(k):
EIRP [dBm] = E [dBµV/m] - 95.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 95.2)/10)
(This equation is not counting with the reflecting floor in the chamber)
P = 0.195 µW EIRP



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

Maximum transmitter power at a distance of 3 m, Ellipse™ VR, Model CD1275-36, S/N 206009, horizontal position




| Maximum transmitting power | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| | | Peak | QP/AV | Peak | QP/AV | |
| [MHz] | [kHz] | [dB(µV/m)] | [dB(µV/m)] | [dB(µV/m)] | [dB(µV/m)] | |
| 403.650 | 1000 | 58.3 | - | 85.2 | - | |

Field strength to EIRP calculation:

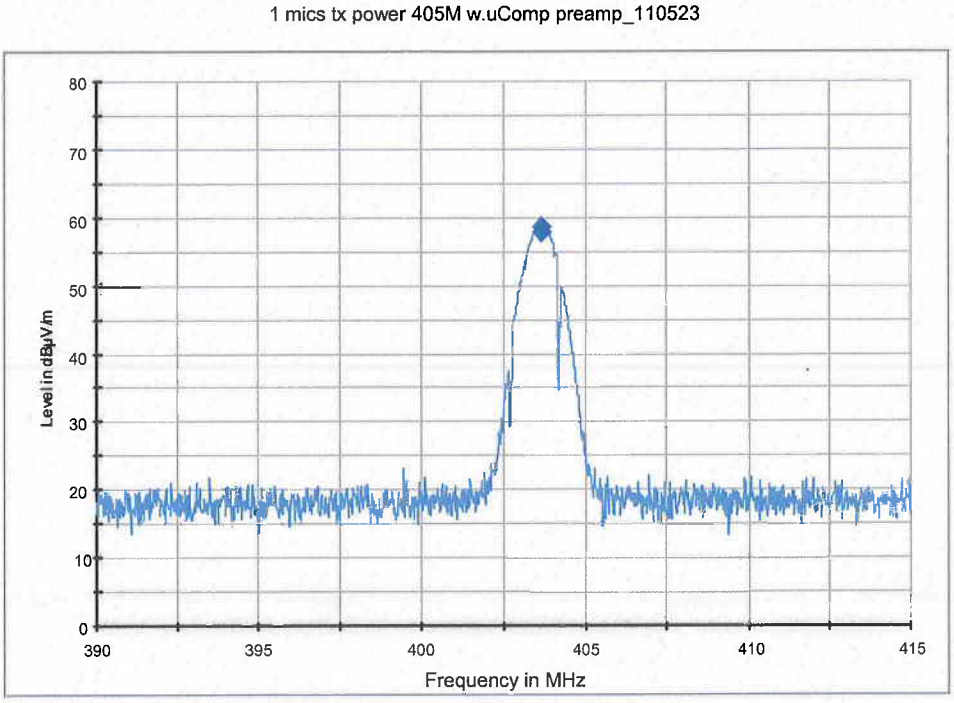
According to FCC § 95.628(g)(3):
25 microwatts EIRP corresponds to 18.2 mV/m at 3 m measuring distance in a semi-anechoic chamber (reflecting floor).
EIRP [dBm] = E [dBµV/m] - 101.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 101.2)/10)
P = 0.0510 µW EIRP

According to FCC §15.503(k):
EIRP [dBm] = E [dBµV/m] - 95.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 95.2)/10)
(This equation is not counting with the reflecting floor in the chamber)
P = 0.204 µW EIRP



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

Maximum transmitter power at a distance of 3 m, Ellipse™ ST VR, Model CD1273-36Q, S/N 206021, vertical position




| Maximum transmitting power | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| [MHz] | [kHz] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | |
| 403.650 | 1000 | 58.6 | - | 85.2 | - | |

Field strength to EIRP calculation:

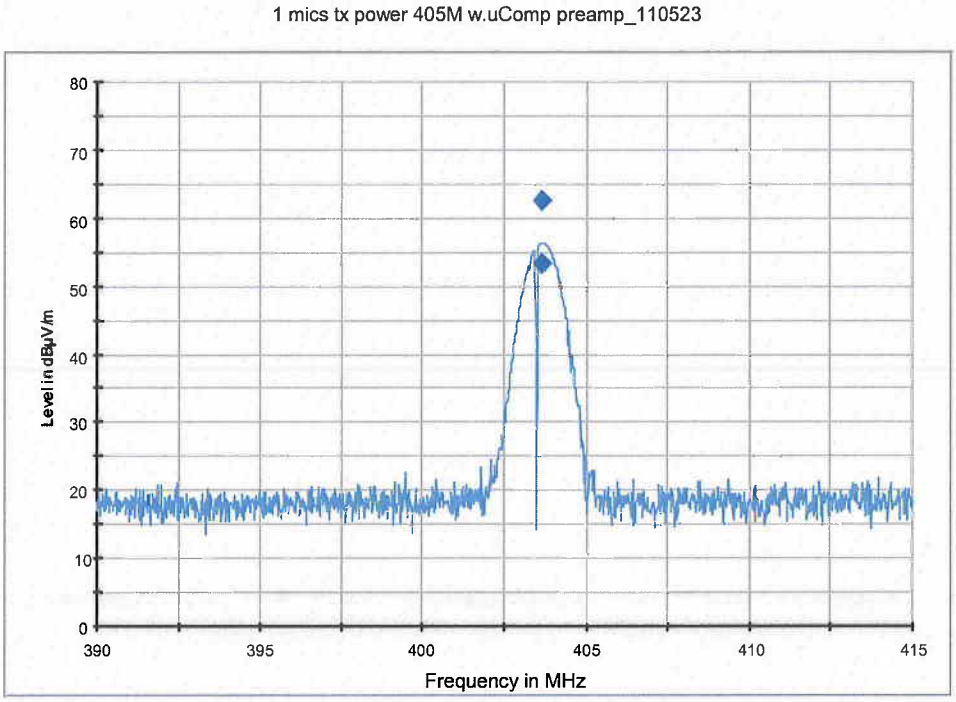
According to FCC § 95.628(g)(3):
25 microwatts EIRP corresponds to 18.2 mV/m at 3 m measuring distance in a semi-anechoic chamber (reflecting floor).
EIRP [dBm] = E [dBµV/m] - 101.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 101.2)/10)
P = 0.0547 µW EIRP

According to FCC §15.503(k):
EIRP [dBm] = E [dBµV/m] - 95.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 95.2)/10)
(This equation is not counting with the reflecting floor in the chamber)
P = 0.219 µW EIRP



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

Maximum transmitter power at a distance of 3 m, Ellipse™ ST VR, Model CD1273-36Q, S/N 206021, horizontal position




| Maximum transmitting power | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| [MHz] | [kHz] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | |
| 403.650 | 1000 | 62.7 | - | 85.2 | - | |

Field strength to EIRP calculation:

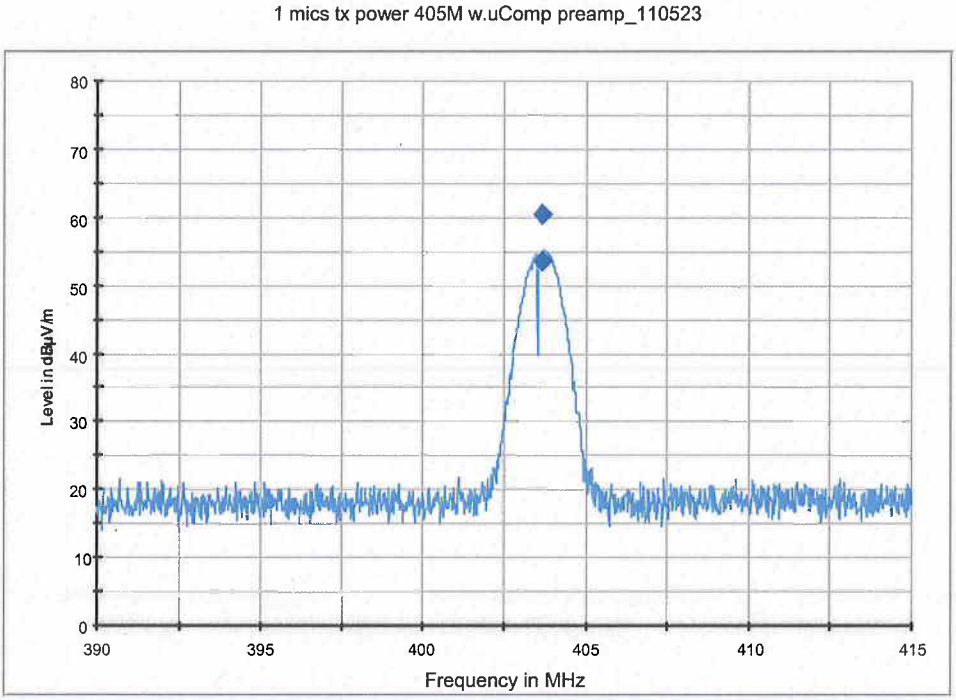
According to FCC § 95.628(g)(3):
25 microwatts EIRP corresponds to 18.2 mV/m at 3 m measuring distance in a semi-anechoic chamber (reflecting floor).
EIRP [dBm] = E [dBµV/m] - 101.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 101.2)/10))
P = 0.141 µW EIRP

According to FCC §15.503(k):
EIRP [dBm] = E [dBµV/m] - 95.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 95.2)/10)
(This equation is not counting with the reflecting floor in the chamber)
P = 0.562 µW EIRP



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

Maximum transmitter power at a distance of 3 m, Ellipse™ DR, Model CD2275-36, S/N 206016, vertical position




| Maximum transmitting power | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| [MHz] | [kHz] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | |
| 403.650 | 1000 | 60.4 | - | 85.2 | - | |

Field strength to EIRP calculation:

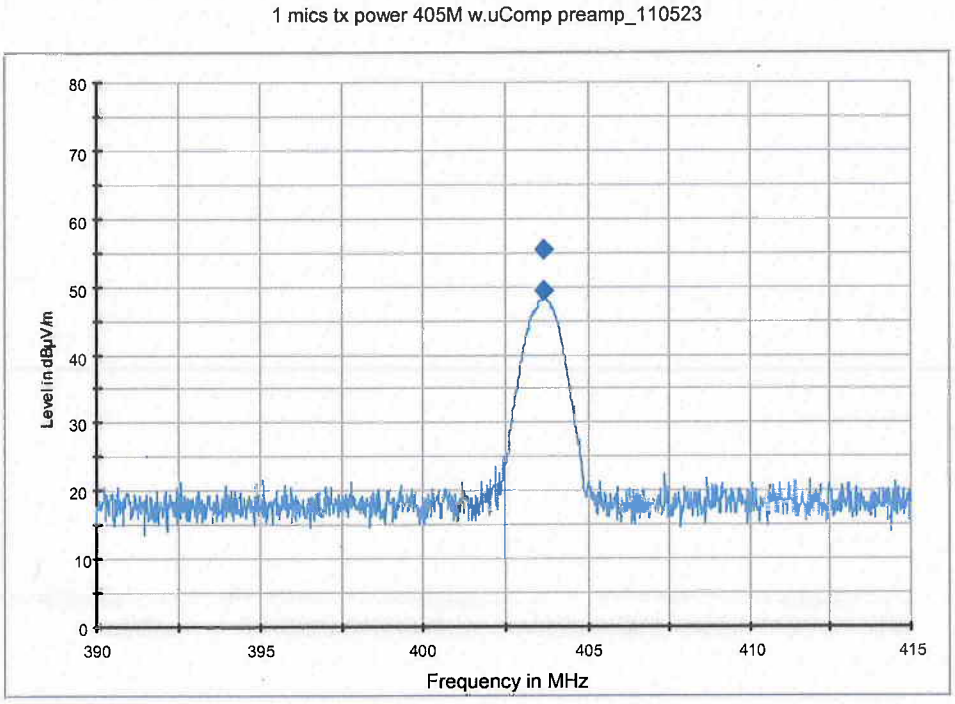
According to FCC § 95.628(g)(3):
25 microwatts EIRP corresponds to 18.2 mV/m at 3 m measuring distance in a semi-anechoic chamber (reflecting floor).
EIRP [dBm] = E [dBµV/m] - 101.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 101.2)/10)
P = 0.0828 µW EIRP

According to FCC §15.503(k):
EIRP [dBm] = E [dBµV/m] - 95.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 95.2)/10)
(This equation is not counting with the reflecting floor in the chamber)
P = 0.331 µW EIRP



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

Maximum transmitter power at a distance of 3 m, Ellipse™ DR, Model CD2275-36, S/N 206016, horizontal position




| Maximum transmitting power | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| [MHz] | [kHz] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | |
| 403.650 | 1000 | 55.4 | - | 85.2 | - | |

Field strength to EIRP calculation:

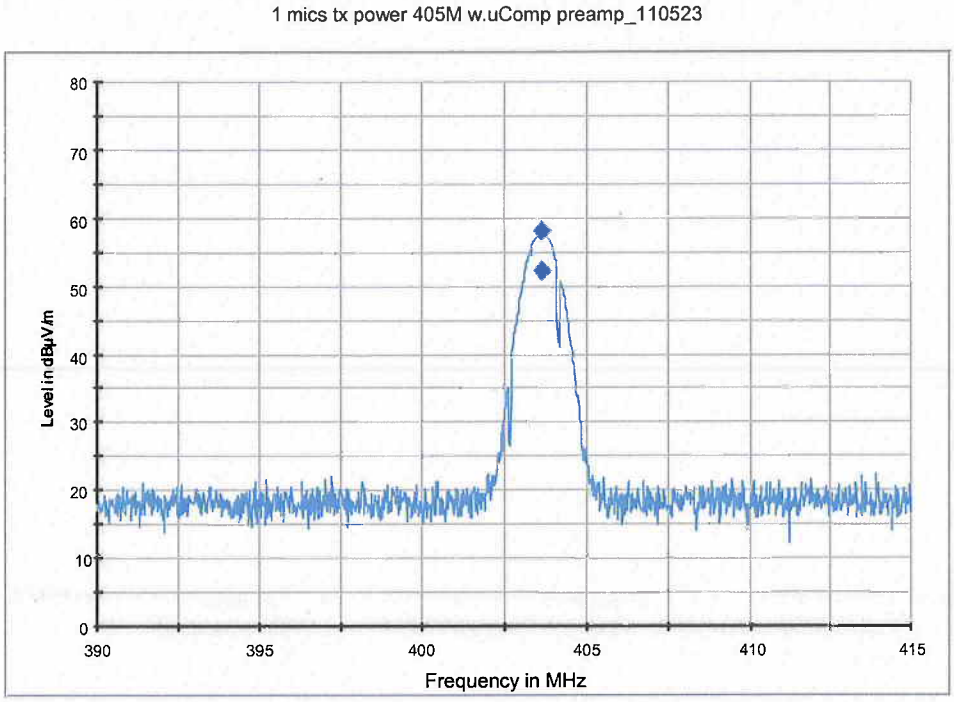
According to FCC § 95.628(g)(3):
25 microwatts EIRP corresponds to 18.2 mV/m at 3 m measuring distance in a semi-anechoic chamber (reflecting floor).
EIRP [dBm] = E [dBµV/m] - 101.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 101.2)/10)
P = 0.0262 µW EIRP

According to FCC §15.503(k):
EIRP [dBm] = E [dBµV/m] - 95.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 95.2)/10)
(This equation is not counting with the reflecting floor in the chamber)
P = 0.105 µW EIRP



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

Maximum transmitter power at a distance of 3 m, Ellipse™ ST DR, Model CD2273-36Q, S/N 206028, vertical position




| Maximum transmitting power | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| [MHz] | [kHz] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | Peak [dB(µV/m)] | QP/AV [dB(µV/m)] | |
| 403.650 | 1000 | 58.1 | - | 85.2 | - | |

Field strength to EIRP calculation:

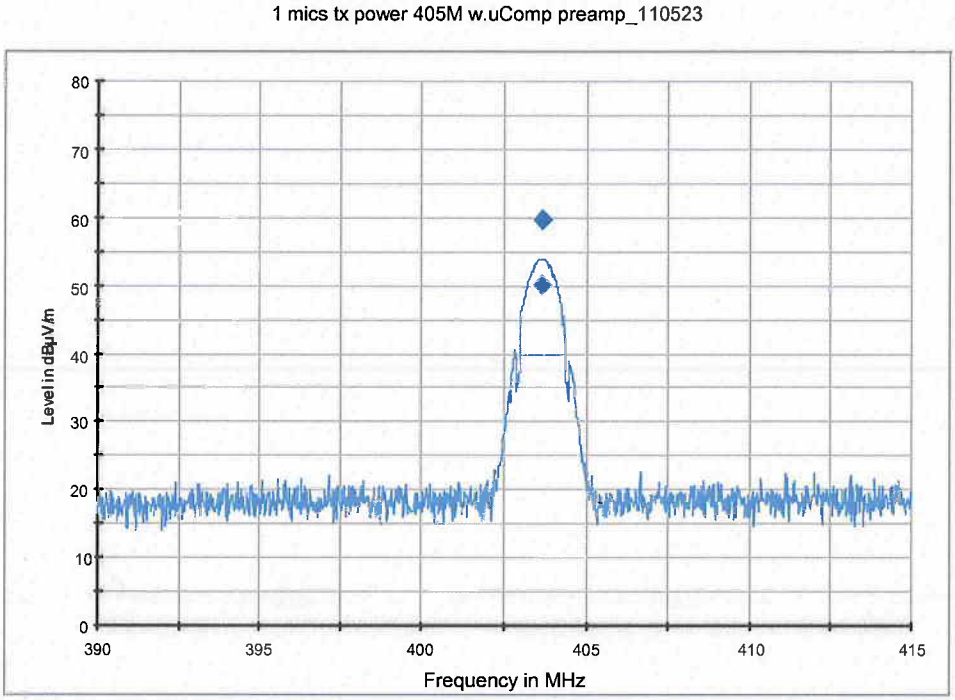
According to FCC § 95.628(g)(3):
25 microwatts EIRP corresponds to 18.2 mV/m at 3 m measuring distance in a semi-anechoic chamber (reflecting floor).
EIRP [dBm] = E [dBµV/m] - 101.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 101.2)/10)
P = 0.0487 µW EIRP

According to FCC §15.503(k):
EIRP [dBm] = E [dBµV/m] - 95.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 95.2)/10)
(This equation is not counting with the reflecting floor in the chamber)
P = 0.195 µW EIRP



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

Maximum transmitter power at a distance of 3 m, Ellipse™ ST DR, Model CD2273-36Q, S/N 206028, horizontal position




| Maximum transmitting power | | | | | | |
|---|---|---|---|---|---|---|
| Frequency | RBW | Measured level | | Limit | | Note |
| | | Peak | QP/AV | Peak | QP/AV | |
| [MHz] | [kHz] | [dB(µV/m)] | [dB(µV/m)] | [dB(µV/m)] | [dB(µV/m)] | |
| 403.620 | 1000 | 59.7 | - | 85.2 | - | |

Field strength to EIRP calculation:

According to FCC § 95.628(g)(3):
25 microwatts EIRP corresponds to 18.2 mV/m at 3 m measuring distance in a semi-anechoic chamber (reflecting floor).
EIRP [dBm] = E [dBµV/m] - 101.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 101.2)/10)
P = 0.0704 µW EIRP

According to FCC §15.503(k):
EIRP [dBm] = E [dBµV/m] - 95.2 => EIRP [µW] = 1000*10^(( E [dBµV/m] - 95.2)/10)
(This equation is not counting with the reflecting floor in the chamber)
P = 0.282 µW EIRP

Example calculation, measured level:
Measured level [dBµV/m] = Analyzer reading [dBµV] + cable loss [dB] – preamplifier gain [dB] + antenna factor [1/m]

Limit: 25 µW e.i.r.p. correspond to 85.2 dB(µV/m) at 3 m antenna distance.
**Fulfil requirements: YES**



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

## 6. FREQUENCY ERROR

### 6.1 Measurement uncertainty

Frequency uncertainty at 400 MHz < 1 Hz

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT.

Measurement uncertainty is calculated in accordance with EA-4/02-1997.
The measurement uncertainty is given with a confidence of 95%.

### 6.2 Test equipment

| Equipment | Manufacturer | Type | SEMKO No. |
|---|---|---|---|
| Frequency counter: | Philips | PM6685R | 5616 |

### 6.3 Test protocol

Date of test: 2011-10-04

| Test conditions | | Frequency (MHz) | Frequency drift (kHz) |
|---|---|---|---|
| | | Middle channel | |
| $T_{nom}$ 37°C | $V_{nom}$ 2,8 V | 403,6520 | - |
| $T_{min}$ 25°C | $V_{min}$ 2,35 V | 403,6506 | -1,4 |
| | $V_{max}$ 2,8 V | 403,6507 | -1,3 |
| $T_{max}$ 45°C | $V_{min}$ 2,35 V | 403,6511 | -0,9 |
| | $V_{max}$ 2,8 V | 403,6511 | -0,9 |

### 6.4 Limit

The frequency error shall not exceed ±100 ppm (40 kHz) under normal and extreme condition.

Fulfil requirements: Yes



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

## 7. EMISSION BANDWIDTH

### 7.1 Measurement uncertainty

Frequency uncertainty at 400 MHz < 1 Hz

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT.

Measurement uncertainty is calculated in accordance with EA-4/02-1997.
The measurement uncertainty is given with a confidence of 95%.

### 7.2 Test equipment

| Equipment | Manufacturer | Type | SEMKO No. |
|---|---|---|---|
| Measurement receiver: | Rohde & Schwarz | FSIQ | 12793 |
| Rubidium oscillator | Datum | N/A | 40032 |



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

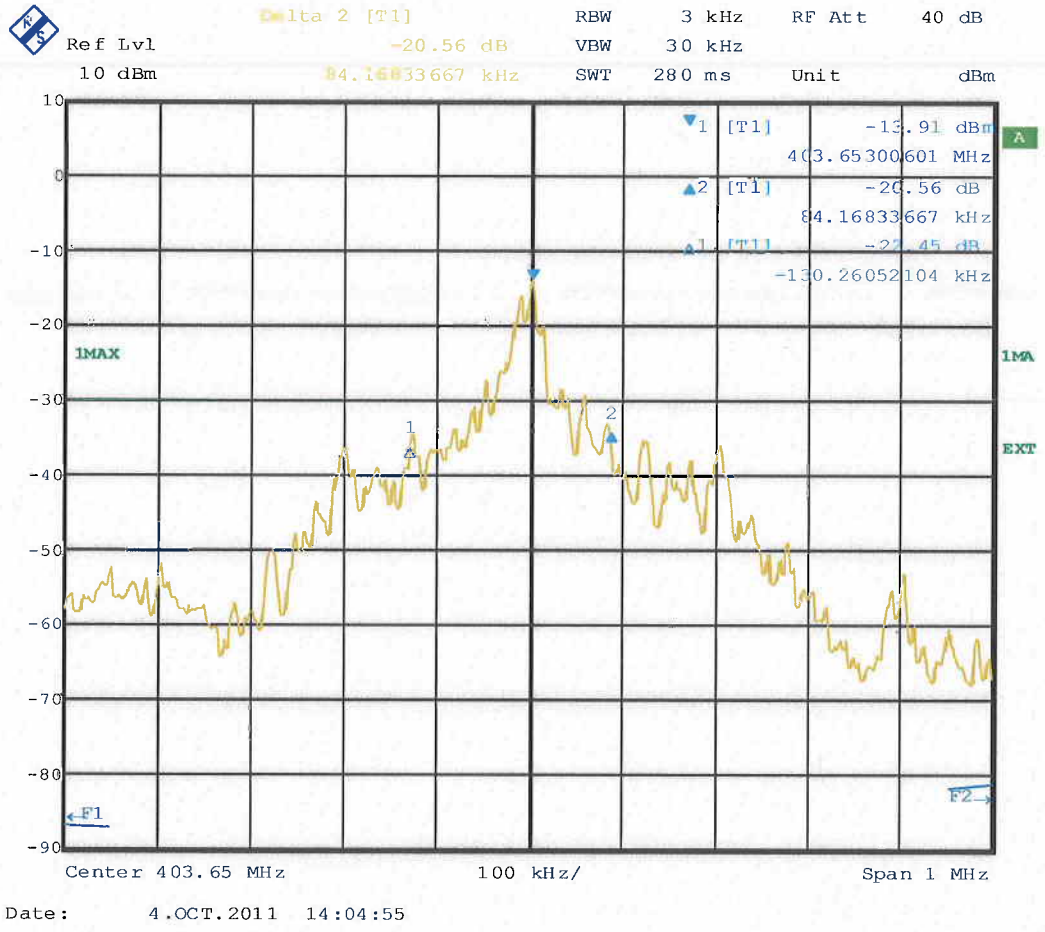
### 7.3 Test protocol

Date of test: 2011-10-04

**20 dB Bandwidth:**

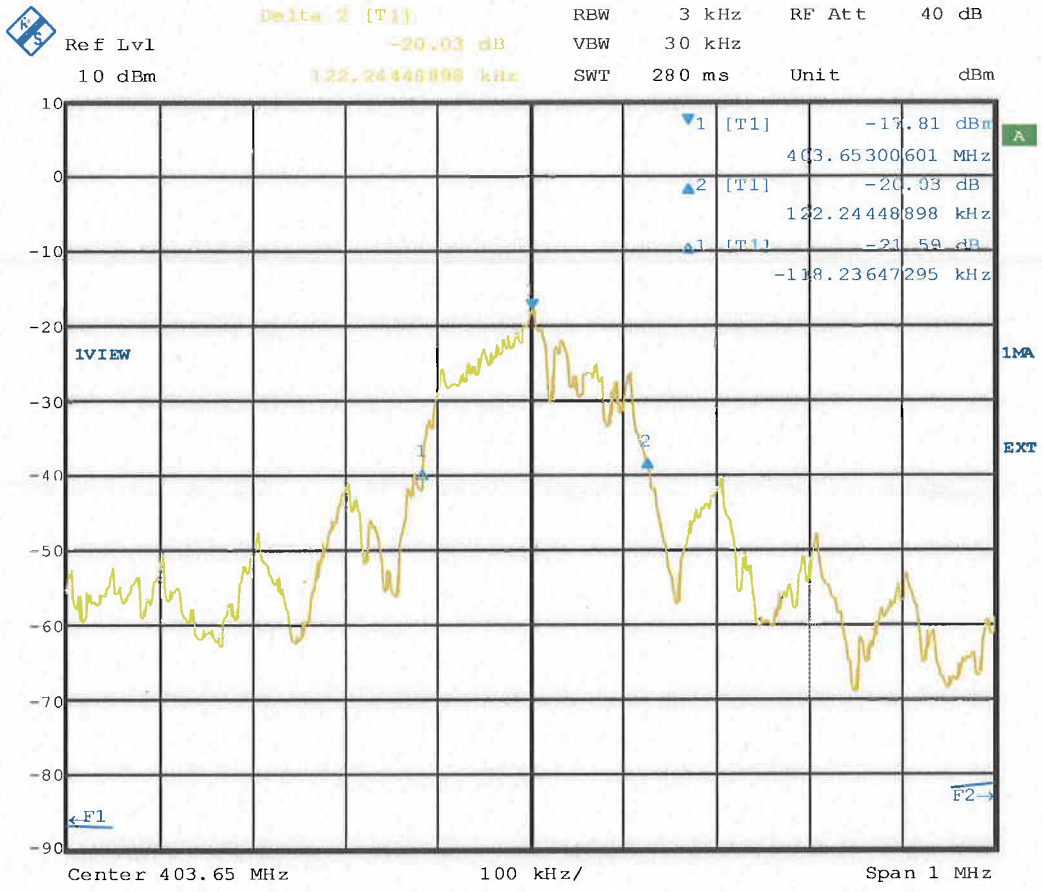
**Middle Channel. 2FSK**

| Test conditions | | Emission bandwidth |
|---|---|---|
| $T_{nom}$ 37°C | $V_{nom}$ 2.8 V | 214.4 kHz |



**Middle Channel. 2FSK fallback**

| Test conditions | | Emission bandwidth |
|---|---|---|
| $T_{nom}$ 37°C | $V_{nom}$ 2,8 V | 240,5 kHz |




## 7.4 Limits

The maximum permitted emission bandwidth shall be 300 kHz.

Fulfil requirements: Yes



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

## 8. UNWANTED EMISSION WITHIN MICS BAND

### 8.1 Measurement uncertainty

Measurement uncertainty: < 1 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT.

Measurement uncertainty is calculated in accordance with EA-4/02-1997.
The measurement uncertainty is given with a confidence of 95%.

### 8.2 Test equipment

| Equipment | Manufacturer | Type | SEMKO No. |
|---|---|---|---|
| Measurement receiver: | Rohde & Schwarz | FSIQ | 12793 |
| Rubidium oscillator | Datum | N/A | 40032 |

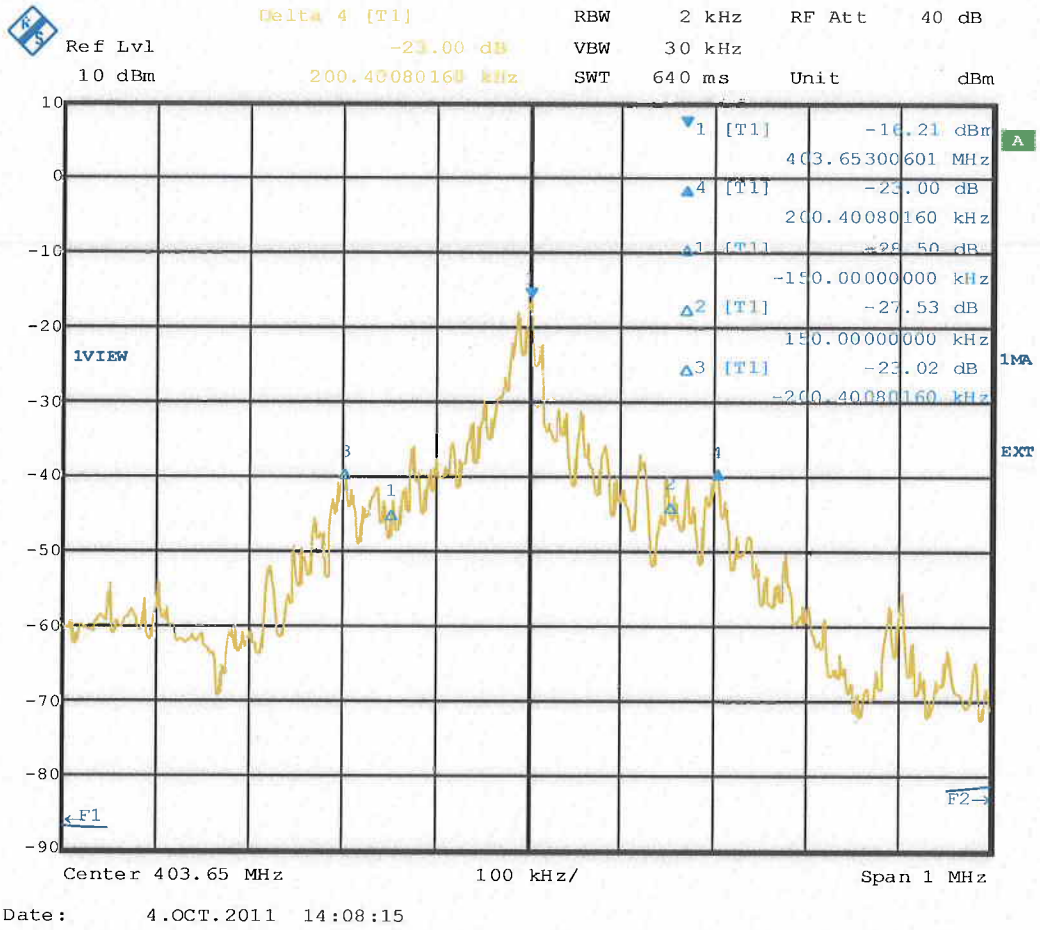


Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

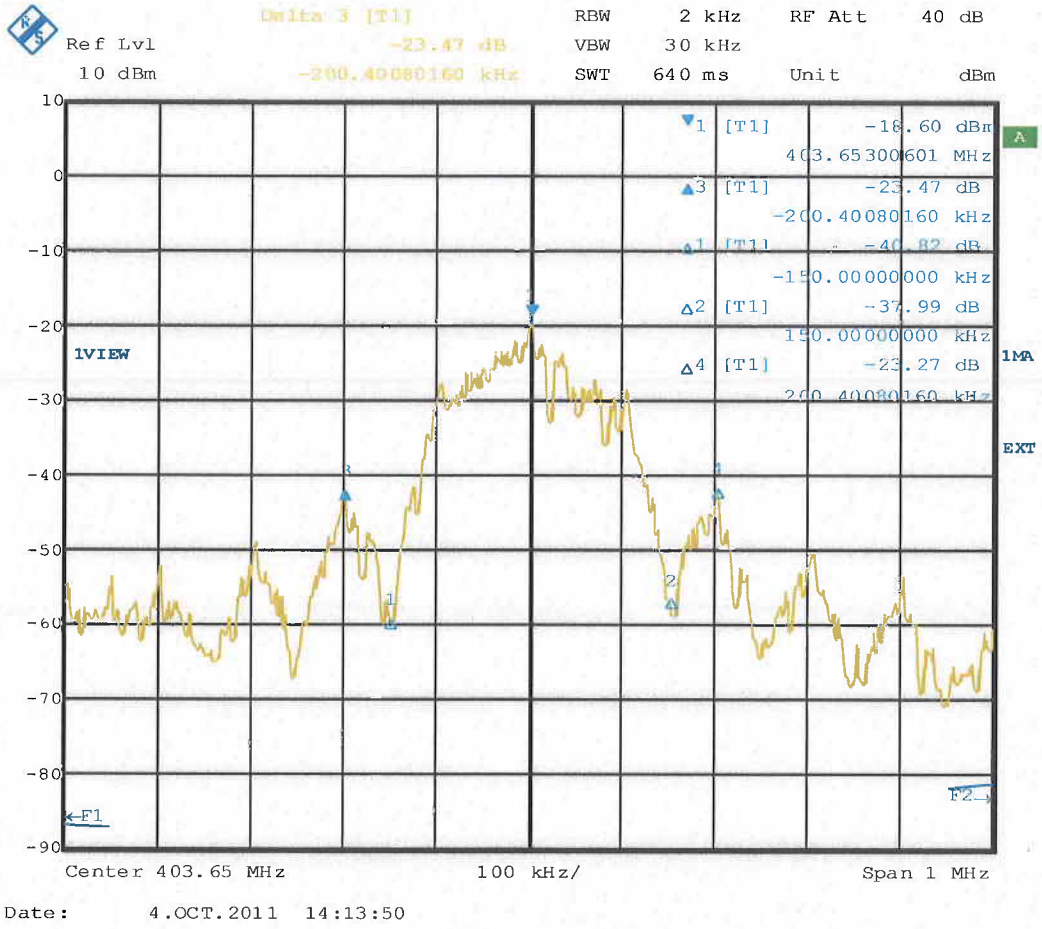
### 8.3 Test protocol

Date of test: 2011-10-04

**Middle Channel. 2FSK**



**Middle Channel. 2FSK fallback**




## 8.4 Limits

Emission within MICS band more than 150 kHz away from center frequency of the spectrum the transmission is intended to occupy, will be attenuated below the transmitter output power by at least 20 dB.

Fulfil requirements: Yes



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

## 9. UNWANTED EMISSION CLOSE TO MICS BAND

### 9.1 Measurement uncertainty

Measurement uncertainty: < 1 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT.

Measurement uncertainty is calculated in accordance with EA-4/02-1997.
The measurement uncertainty is given with a confidence of 95%.

### 9.2 Test equipment

| Equipment | Manufacturer | Type | SEMKO No. |
|---|---|---|---|
| Measurement receiver: | Rohde & Schwarz | FSIQ | 12793 |
| Rubidium oscillator | Datum | N/A | 40032 |

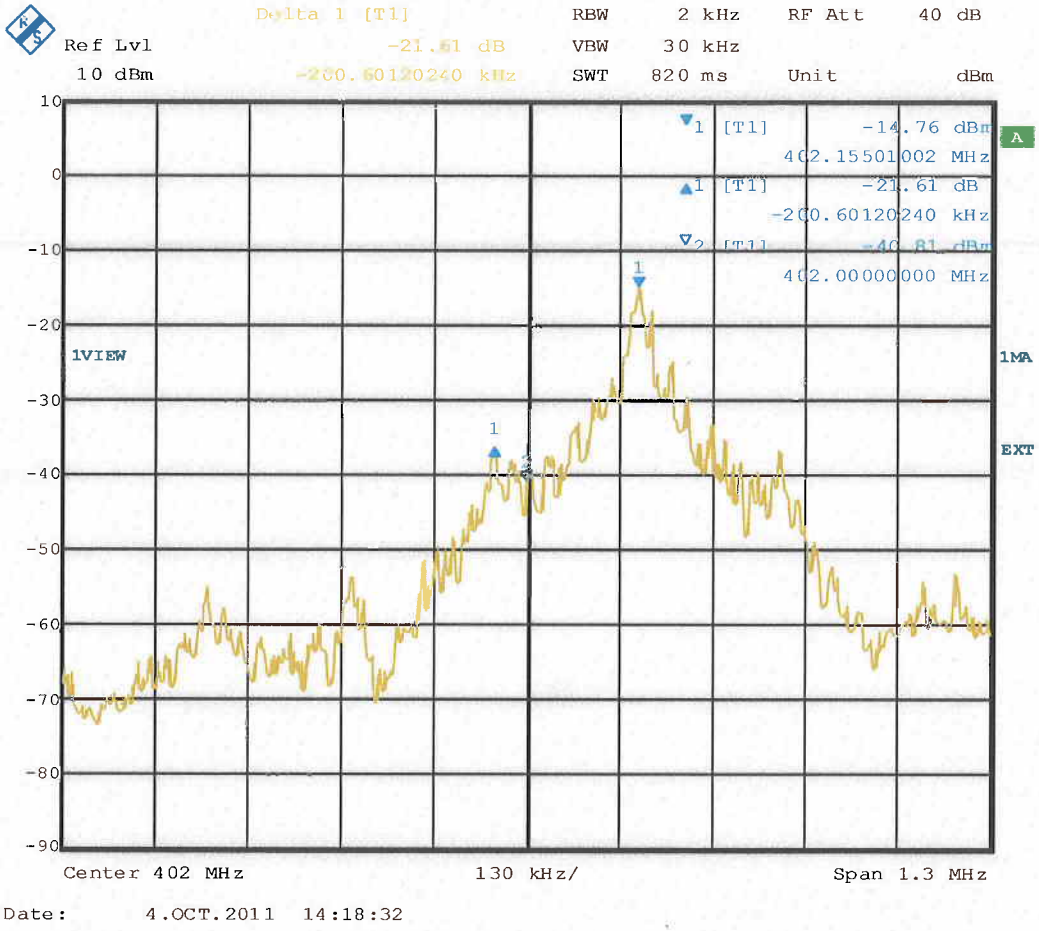


Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

### 9.3 Test protocol

Date of test: 2011-10-04

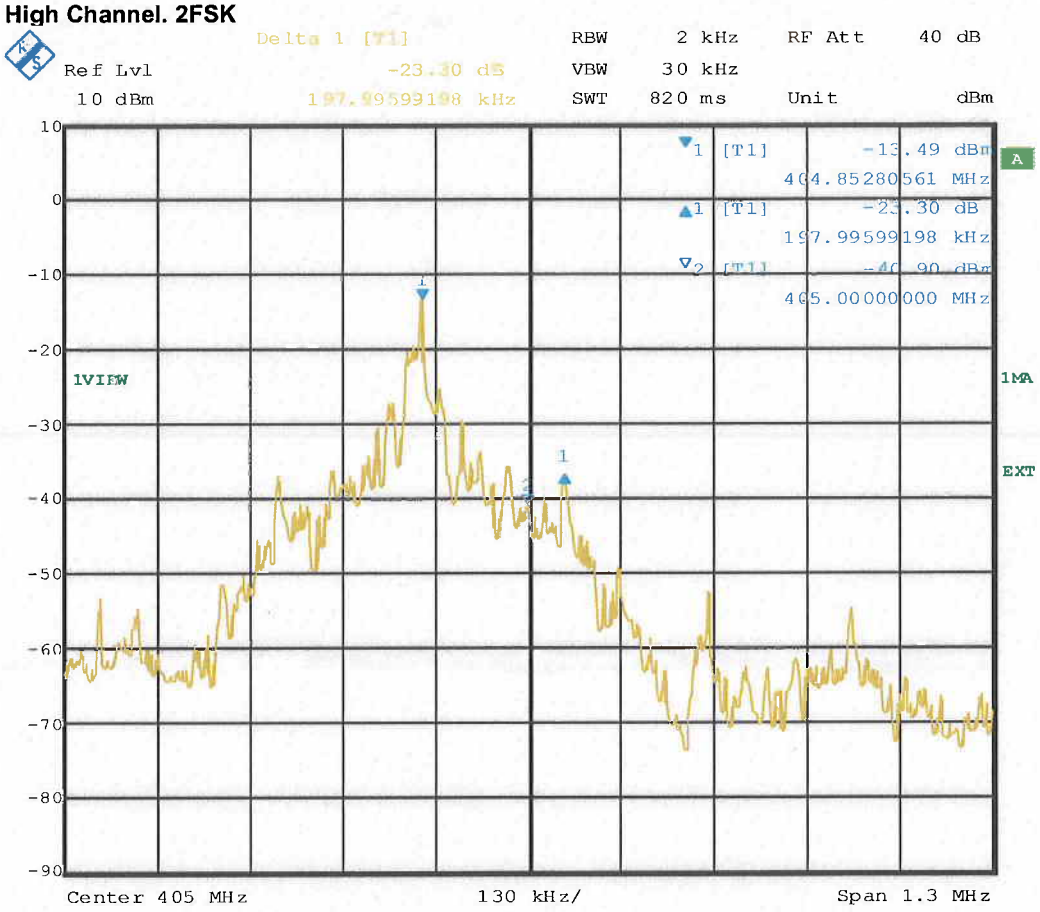
**Low Channel. 2FSK**






Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

**High Channel. 2FSK**

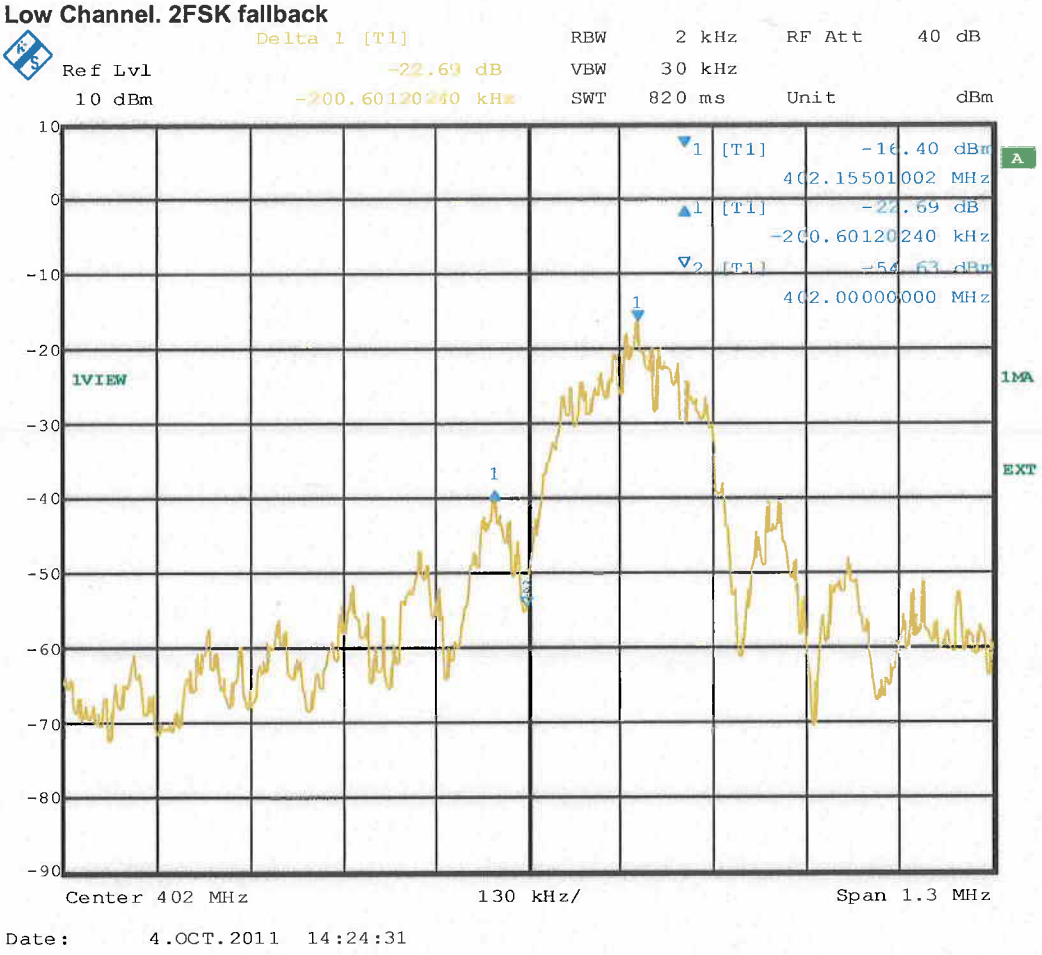



Date: 4.OCT.2011 14:21:25



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

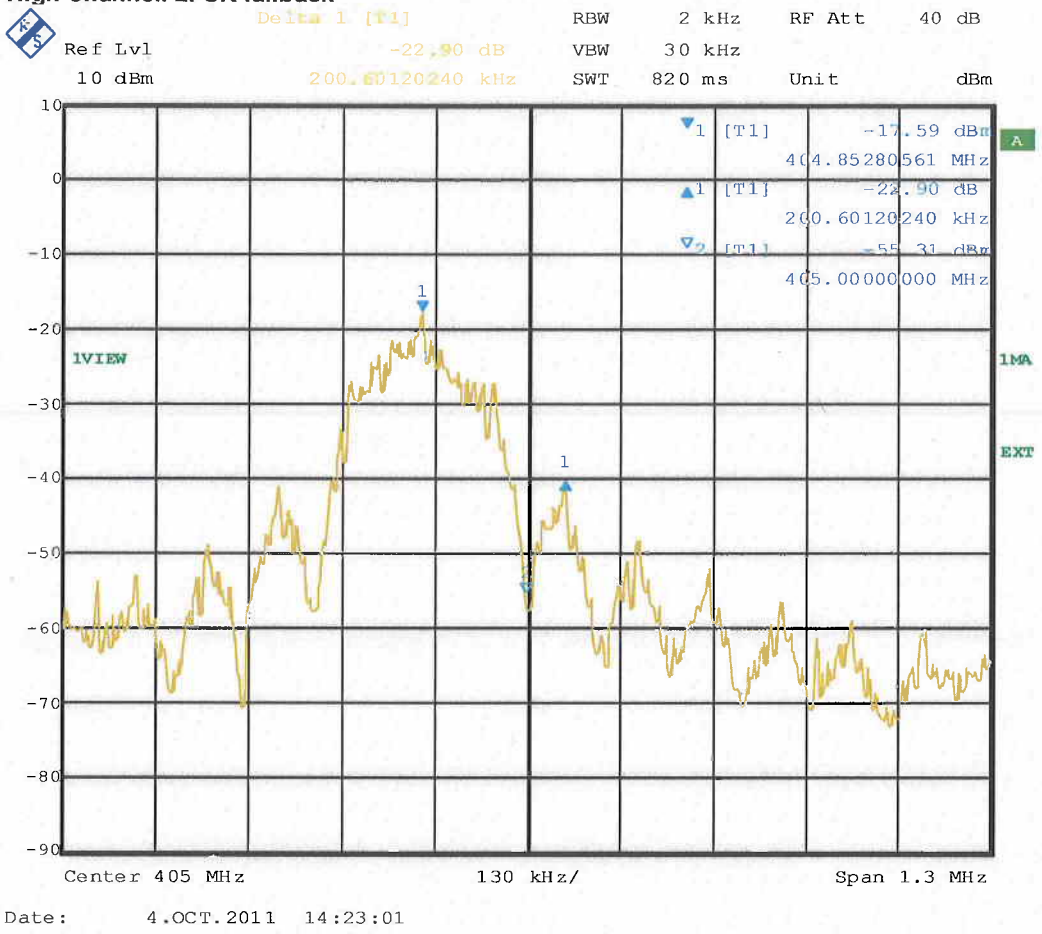
**Low Channel. 2FSK fallback**






Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

**High Channel. 2FSK fallback**




## 9.4 Limits

Emission 250 kHz or less that are above and below the MICS band will be attenuated below the maximum permitted output power by at least 20 dB.

Fulfil requirements: Yes



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address

## APPENDIX A

According to the manufacturer the hardware of the following models are identical with the tested samples:

| Tested model: | Hardware identical with: |
|---|---|
| Ellipse™ VR, Model CD1275-36 | Ellipse™ ST VR, Model CD1273-36<br>Ellipse™ VR, Model CD1277-36<br>Ellipse™ VR, Model CD1279-36<br>Ellipse™ ST VR, Model CD1309-36<br>Ellipse™ VR, Model CD1311-36 |
| Ellipse™ ST VR, Model CD1273-36Q | Ellipse™ VR, Model CD1275-36Q<br>Ellipse™ VR, Model CD1277-36Q<br>Ellipse™ VR, Model CD1279-36Q<br>Ellipse™ ST VR, Model CD1309-36Q<br>Ellipse™ VR, Model CD1311-36Q |
| Ellipse™ DR, Model CD2275-36 | Ellipse™ ST DR, Model CD2273-36<br>Ellipse™ DR, Model CD2277-36<br>Ellipse™ DR, Model CD2279-36<br>Ellipse™ ST DR, Model CD2309-36<br>Ellipse™ DR, Model CD2311-36 |
| Ellipse™ ST DR, Model CD2273-36Q | Ellipse™ DR, Model CD2275-36Q<br>Ellipse™ DR, Model CD2277-36Q<br>Ellipse™ DR, Model CD2279-36Q<br>Ellipse™ ST DR, Model CD2309-36Q<br>Ellipse™ DR, Model CD2311-36Q |



Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30
www.intertek.se
Registered in Sweden: No: SE556024059901, Registered office: As address