

**EMI -- TEST REPORT****Test Report No. : T30555-00-01AA**

22. February 2006

Date of issue

Type / Model Name : E86N / E86N-P (Probe station)

Product Description : Transceiver

Applicant : Marposs S.p.A.

Address : Via Saliceto 13

40010 Bentivoglio Bo, Italia

Manufacturer : Marposs S.p.A.

Address : Via Saliceto 13

40010 Bentivoglio Bo, Italia

Licence holder : Marposs S.p.A.

Address : Via Saliceto 13

40010 Bentivoglio Bo, Italia

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

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.

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## **1 TEST STANDARDS**

The tests were performed according to following standards:

FCC Rules and Regulations Part 15 Subpart C - Intentional Radiators (October 01, 2004)

|                                    |                                                                                            |
|------------------------------------|--------------------------------------------------------------------------------------------|
| Part 15, Subpart C, Section 15.249 | Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz |
|------------------------------------|--------------------------------------------------------------------------------------------|

|                                      |                                             |
|--------------------------------------|---------------------------------------------|
| Part 15, Subpart C, Section 15.35(c) | Correction for Pulse Operation (Duty Cycle) |
|--------------------------------------|---------------------------------------------|

|                                       |                                          |
|---------------------------------------|------------------------------------------|
| Part 15, Subpart C, Section 15.209(a) | Radiated emissions, general requirements |
|---------------------------------------|------------------------------------------|

|                                 |                                 |
|---------------------------------|---------------------------------|
| ANSI C63.4-2003, Section 13.1.7 | Occupied bandwidth measurements |
|---------------------------------|---------------------------------|

FCC Rules and Regulations Part 15 Subpart B - Unintentional Radiators (October 01, 2004)

|                                       |                                          |
|---------------------------------------|------------------------------------------|
| Part 15, Subpart B, Section 15.109(a) | Radiated emissions, general requirements |
|---------------------------------------|------------------------------------------|

mikes

## 2 SUMMARY

### GENERAL REMARKS:

The frequency range was scanned from 1 MHz to 10 GHz.

All emissions not reported in this test report are at least 10 dB below the specified limits.

The EuT is working in transmit mode on 99 channels in the frequency band from 912.4 MHz to 917.55 MHz.  
The receive mode is on frequency of 915 MHz.

The EuT can be assembled with 2 different mechanical devices: standard (E86N) and compact (E86N-P).  
The electronic parts of the transceiver are identically.

### FINAL ASSESSMENT:

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

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

Testing commenced on : 01. February 2006

Testing concluded on : 03. February 2006

Checked by:

Tested by:

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Klaus Gegenfurtner  
Dipl.-Ing.(FH)  
Manager: Radio Group

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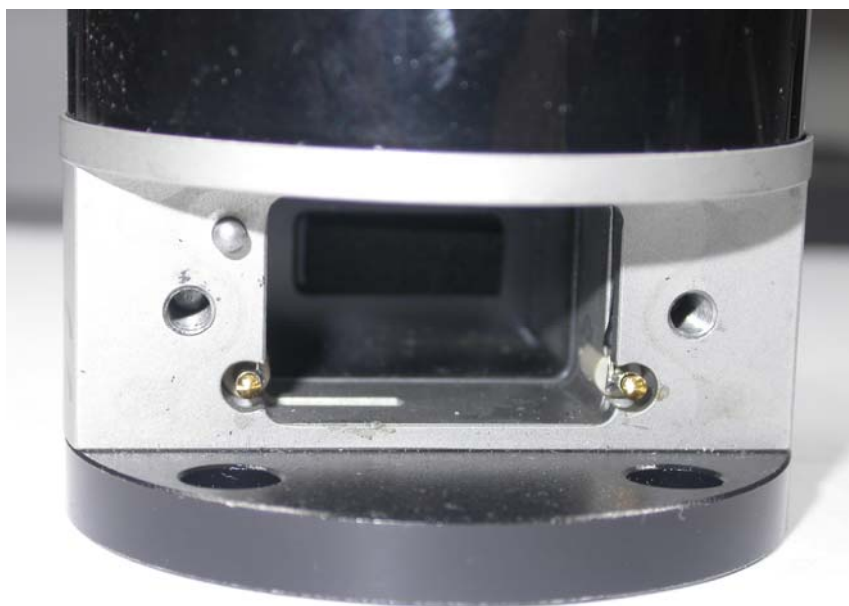
Anton Altmann  
Dipl.-Ing.(FH)

### **3 EQUIPMENT UNDER TEST**

#### **3.1 Photo documentation of the EuT**



FCC ID: NXIE86NP



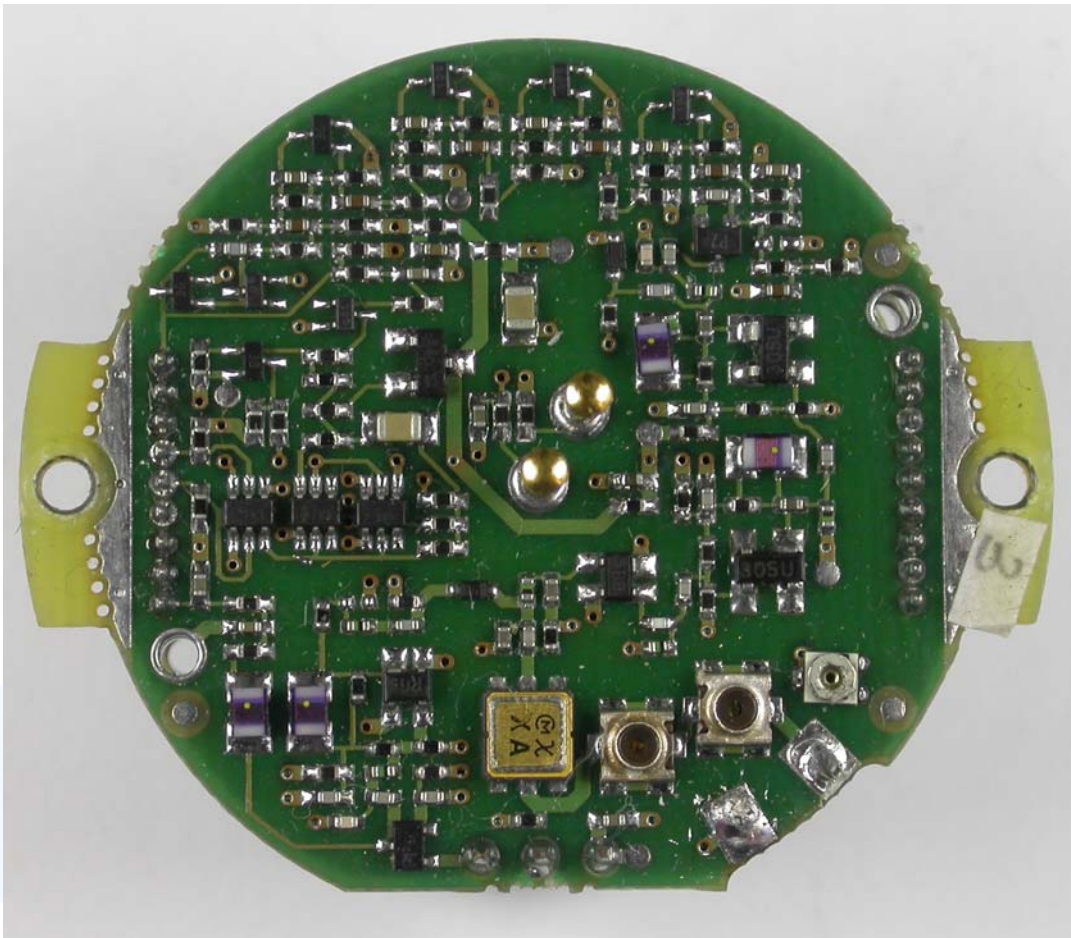
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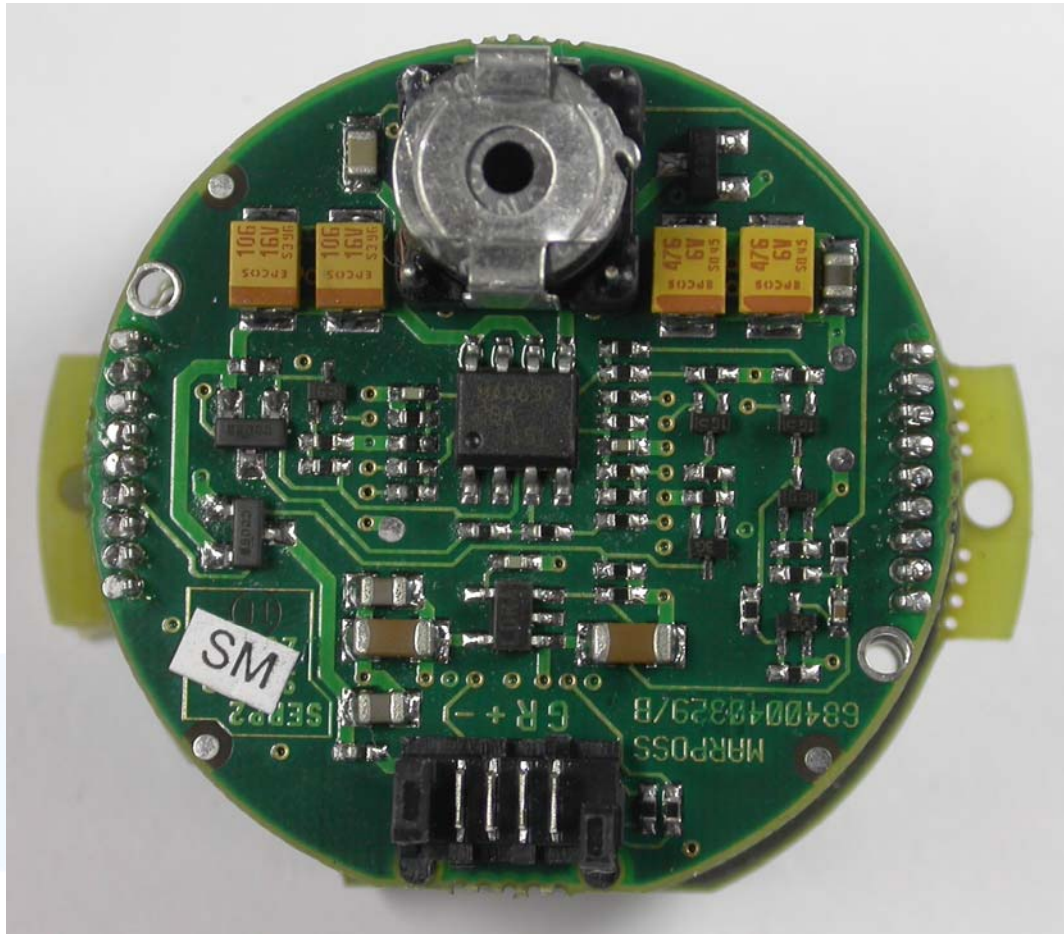
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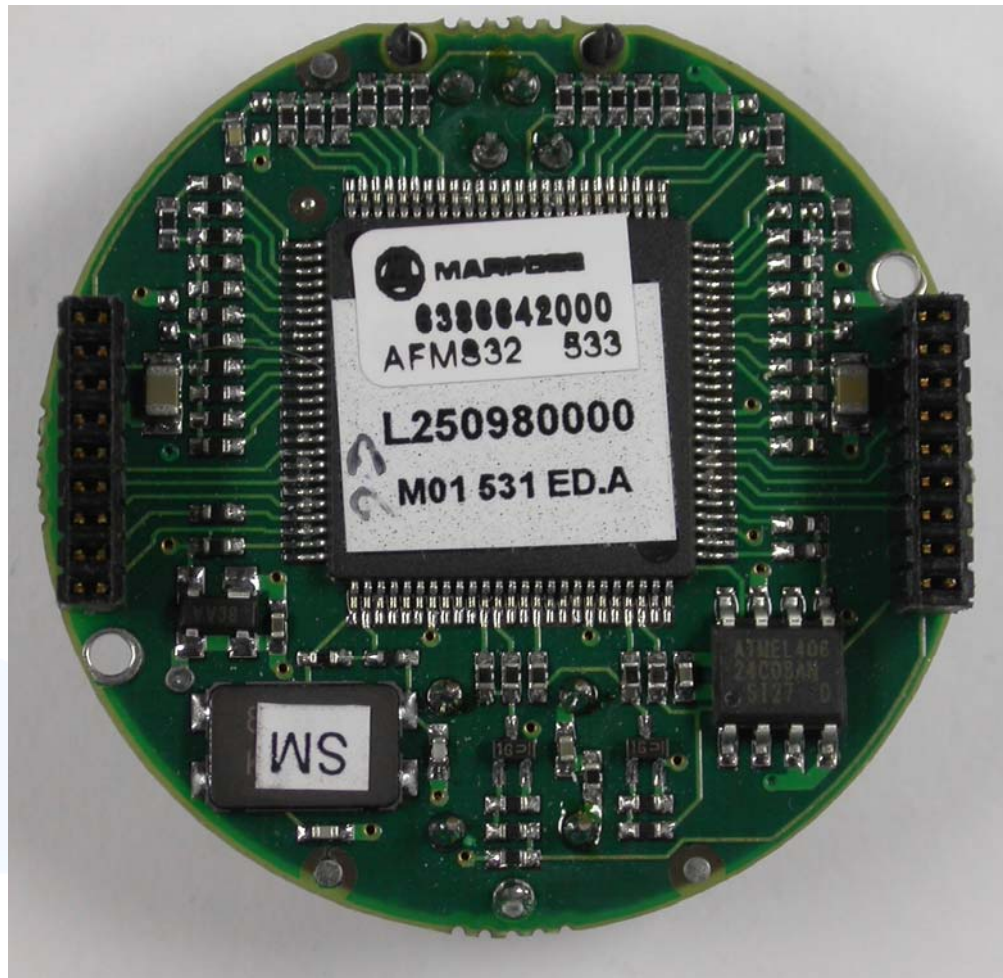
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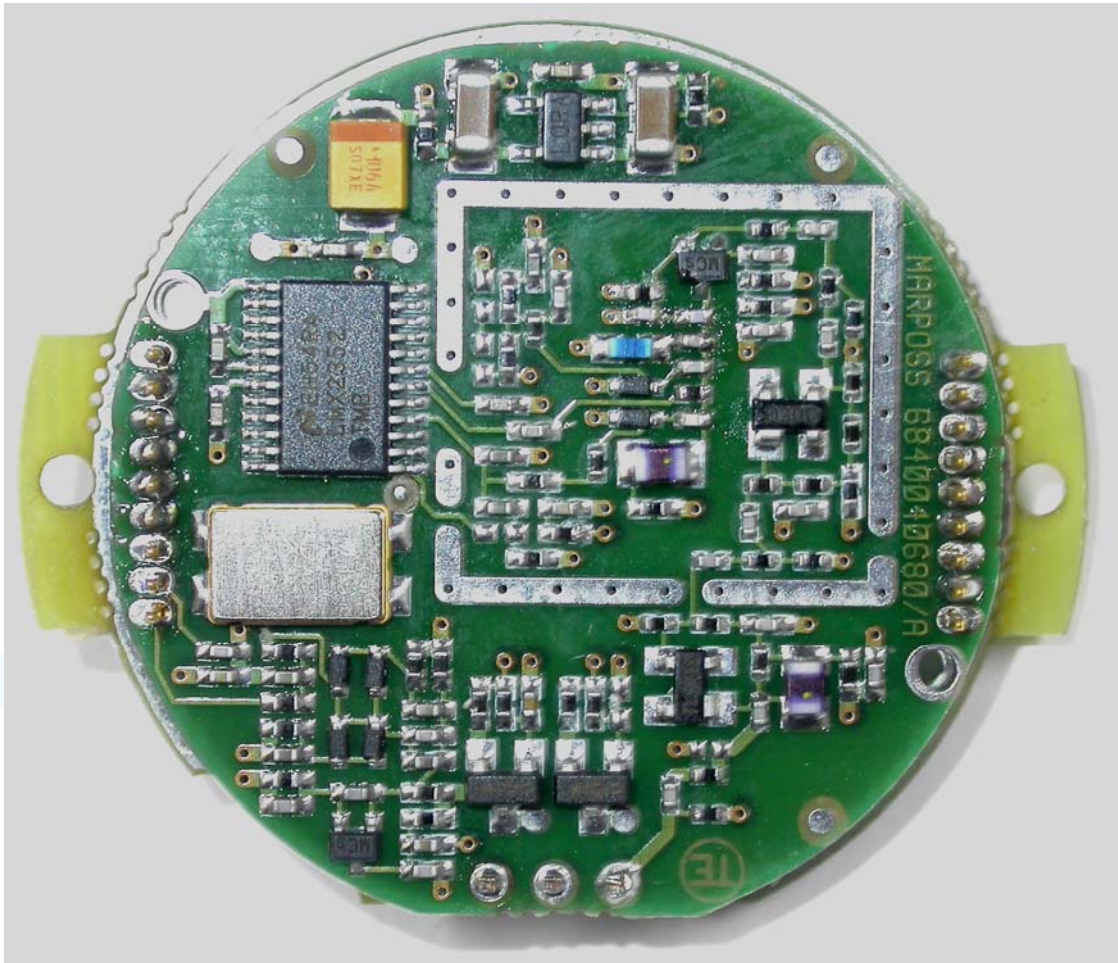
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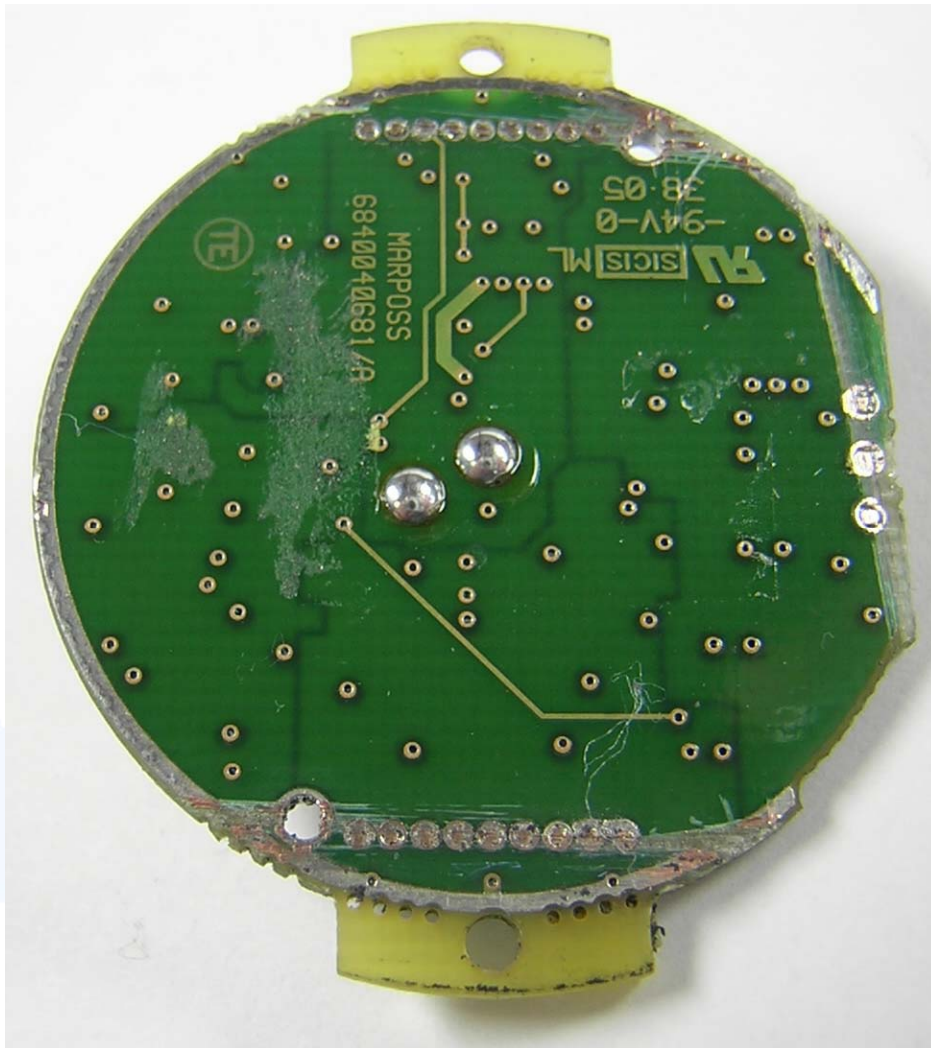
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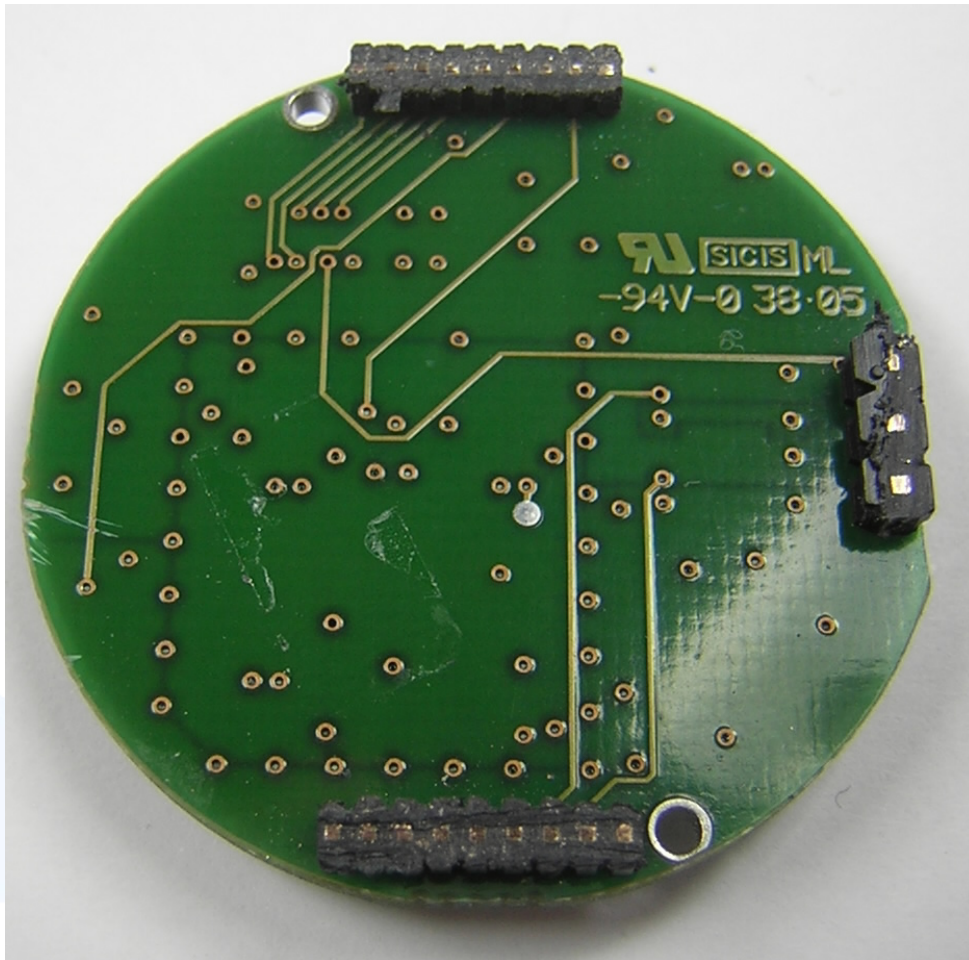
FCC ID: NXIE86NP



FCC ID: NXIE86NP



FCC ID: NXIE86NP



### 3.2 Power supply system utilised

Power supply voltage : 9 VDC

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

The complete system consists of three single units: Base station, Probe station and Interface.  
The system is used when there is the need to measure the workpiece after or during its machining. The main function of the system is the transmission of the touch probe status (contact open or contact close), that is mounted on the probe station, to the machine numeric control.

Number of tested samples: 3  
Serial number: 6871982010 (p1)  
6871982014 (p2)  
6871983010 (p3)

### EuT operation mode:

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

- continuous wave, modulated

- receive mode

### EuT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

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

|         |               |
|---------|---------------|
| - _____ | Model : _____ |
| - _____ | Model : _____ |
| - _____ | Model : _____ |
| - _____ | Model : _____ |
| - _____ | Model : _____ |
| - _____ | Model : _____ |

## **4 TEST ENVIRONMENT**

### **4.1 Address of the test laboratory**

**mikes-testingpartners gmbh**  
**Ohmstrasse 2-4**  
**94342 Strasskirchen**  
**Germany**

### **4.2 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

### **4.3 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 /11.2003 „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 has the sole responsibility of continued compliance of the device.

### **4.4 Measurement Protocol for FCC, VCCI and AUSTEL**

#### **4.4.1 GENERAL INFORMATION**

##### **4.4.1.1 Test Methodology**

Conducted and radiated disturbance testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22 (1997), European Standard EN 55022 and Australian Standard AS 3548 (which are based on CISPR 22).

The Japanese standard, "Voluntary Control Council for Interference (VCCI) by Data Processing Equipment and Electronic Office Machines, Technical Requirements" is technically equivalent to CISPR 22 (1997). For official compliance, a conformance report must be sent to and accepted by the VCCI.

In compliance with FCC Docket 92-152, "Harmonization of Rules for Digital Devices Incorporate International Standards", testing for FCC compliance may be done following the ANSI C63.4-2003 procedures and using the CISPR 22 Limits.

#### 4.4.1.2 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 into it's characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum disturbances from the unit.

#### **4.4.2 DETAILS OF TEST PROCEDURES**

##### 4.4.2.1 General Standard Information

The test methods used comply with CISPR Publication 22 (1997), EN 55022 (2001) and AS 3548 (1992) - "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment" and with ANSI C63.4-2003 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

#### **4.5 Discovery of worst case measurement conditions**

The fundamental of three units (p1, p2, p3) have been measured. The standard probe unit (p1) showed the highest power output and has been declared as the worst case. All measurements have been carried out with the p1-unit.

## **5 TEST CONDITIONS AND RESULTS**

### **5.1 Conducted emissions**

For test instruments and accessories used see section 6 Part A 4.

#### **5.1.1 Description of the test location**

Test location:

#### **5.1.2 Photo documentation of the test set-up**

#### **5.1.3 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 or to the CISPR limit, which is equivalent to the Australian AS 3548 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. Table top equipment is placed on a non-conducting table 80 centimeter's above the floor and is positioned 40 centimeter's from the vertical ground plane (wall) of the screen room. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

#### **5.1.4 Test result**

Frequency range:

Min. limit margin

The requirements are

**Remarks:** The measurement is not applicable. The EuT is battery powered.

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## 5.2 Radiated power of the fundamental wave

For test instruments and accessories used see section 6 Part CPR 2.

### 5.2.1 Description of the test location

Test location: OATS1

Test distance: 3 metres

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



### 5.2.3 Description of Measurement

The radiated power of the fundamental wave from the EUT is measured in the frequency range of 30 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 meter non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003.

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 screen room located outside the test area. The antenna was positioned 3, 10 or 30 meters horizontally from the EuT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarization's and the EuT are rotated 360 degrees.

The final level, expressed in dB $\mu$ V/m, is arrived 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. This result then has the FCC or CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets at page.

The radiated power of the fundamental wave from the EUT is measured in the frequency range above 1 GHz using a tuned receiver (Spectrum Analyser) and appropriate linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003.

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 screen room located outside the test area. The antenna was positioned 3 horizontally from the EuT.

Measurement are made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 1 MHz. All tests are performed at a test-distance of 3 meters. Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration procedure the highest emission relative the limit and therefore shall be used for final testing. During the tests the EUT is rotated all around to find the maximum levels of emissions. The cables and equipment were placed and moved within the range of position likely to find their maximum emissions. When the EuT is larger than the beamwidth of the measuring antenna, the measurement antenna will be moved over the surfaces for the four sides or the test distance will be reduced to demonstrate that emissions were at maximum at the limit distance.

The resolution bandwidth during the measurement is as follows:

|                    |                |
|--------------------|----------------|
| 30 MHz – 1000 MHz: | ResBW: 120 kHz |
| 1000 MHz – 40 GHz  | ResBW: 1 MHz   |

#### 5.2.4 Test result

Channel 2: 912.45 MHz  
Channel 98: 917.50 MHz

| Frequency [MHz] | Reading Level Qp [dBμV] | Band-width [kHz] | Correct. Factor [dB] | Corrected Level Qp [dBμV/m] | Limit Qp [dBμV/m] | Delta [dB] |
|-----------------|-------------------------|------------------|----------------------|-----------------------------|-------------------|------------|
| 912.45          | 58.0                    | 120              | 27.5                 | 85.5                        | 94.0              | -8.5       |
| 917.50          | 56.2                    | 120              | 27.5                 | 83.7                        | 94.0              | -10.3      |

Quasipeak-Limit according to FCC Subpart 15.249(a) for fundamental and harmonics

| Frequency (MHz) | Fieldstrength of fundamental |           | Fieldstrength of harmonics |           |
|-----------------|------------------------------|-----------|----------------------------|-----------|
|                 | (mV/m)                       | dB (μV/m) | (μV/m)                     | dB (μV/m) |
| 902-928         | 50                           | 94        | 500                        | 54        |
| 2400-2483.5     | 50                           | 94        | 500                        | 54        |
| 5725-5875       | 50                           | 94        | 500                        | 54        |

The requirements are **FULFILLED**.

Remarks:

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### 5.3 Radiated emissions (electric field) 9 kHz – 40 GHz

For test instruments and accessories used see section 6 Part SER 1, SER 2, SER 3.

#### 5.3.1 Description of the test location

Test location: OATS1  
Test location: Anechoic Chamber A2

Test distance: 3 metres

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

OATS1



FCC ID: NXIE86NP

Anechoic chamber A2



### 5.3.3 Description of Measurement

Radiated spurious emissions from the EuT are measured in the frequency range of 9 kHz 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 meter non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003. 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 screen room located outside the test area. The antenna was positioned 3, 10 or 30 meters horizontally from the EuT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarization's and the EuT are rotated 360 degrees.

The final level, expressed in dB $\mu$ V/m, is arrived 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. This result then has the FCC or CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets at page.

The radiated emissions from the EuT are measured in the frequency range of 1 GHz to maximum frequency as specified in 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 meter non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003.

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 screen room located outside the test area. The antenna was positioned 3 horizontally from the EuT.

Measurement are made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 1 MHz. All tests are performed at a test-distance of 3 meters. Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration procedure the highest emission relative the limit and therefore shall be used for final testing. During the tests the EUT is rotated all around to find the maximum levels of emissions. The cables and equipment were placed and moved within the range of position likely to find their maximum emissions. When the EuT is larger than the beamwidth of the measuring antenna, the measurement antenna will be moved over the surfaces for the four sides or the test distance will be reduced to demonstrate that emissions were at maximum at the limit distance.

The resolution bandwidth during the measurement is as follows:

|                      |                |
|----------------------|----------------|
| 30 MHz – 1000 MHz:   | ResBW: 120 kHz |
| 1000 MHz – 40000 MHz | ResBW: 1 MHz   |

### 5.3.4 Test result

No emissions found between the lowest internal frequency (8 MHz) and 30 MHz.

#### Testresult in detail: (<1GHz)

| Channel 2/98    |                         |                         |                 |                      |                             |                             |                |            |
|-----------------|-------------------------|-------------------------|-----------------|----------------------|-----------------------------|-----------------------------|----------------|------------|
| Frequency [MHz] | Reading Level QP [dBμV] | Reading Level AV [dBμV] | Bandwidth [kHz] | Correct. factor [dB] | Corrected Level QP [dBμV/m] | Corrected Level AV [dBμV/m] | Limit [dBμV/m] | Delta [dB] |
| 30-1000         | ---                     | ---                     | 120             | ---                  | ---                         | ---                         | 54             | ---        |

**Remarks:** No emissions could be measured!

Quasipeak-Limit according to FCC Subpart 15.249(a) for fundamental and harmonics

| Frequency (MHz) | Fieldstrength of fundamental |           | Fieldstrength of harmonics |           |
|-----------------|------------------------------|-----------|----------------------------|-----------|
|                 | (mV/m)                       | dB (μV/m) | (μV/m)                     | dB (μV/m) |
| 902-928         | 50                           | 94        | 500                        | 54        |
| 2400-2483.5     | 50                           | 94        | 500                        | 54        |
| 5725-5875       | 50                           | 94        | 500                        | 54        |

#### Testresult in detail: (>1GHz)

| Channel 2/98    |                         |                       |                              |                 |                      |                             |                             |                   |                   |            |
|-----------------|-------------------------|-----------------------|------------------------------|-----------------|----------------------|-----------------------------|-----------------------------|-------------------|-------------------|------------|
| Frequency [GHz] | Reading Level PK [dBμV] | Corr. Duty Cycle [dB] | Level AV [dBμV <sup>*)</sup> | Bandwidth [kHz] | Correct. Factor [dB] | Corrected Level PK [dBμV/m] | Corrected Level AV [dBμV/m] | Limit PK [dBμV/m] | Limit AV [dBμV/m] | Delta [dB] |
| 1-10            | ---                     | ---                   | ---                          | 1000            | ---                  | ---                         | ---                         | ---               | ---               | ---        |

**Remarks:** No emissions could be measured!

Average-Limit according to FCC Subpart 15.249(a)

| Frequency (MHz) | Fieldstrength of fundamental |           | Fieldstrength of harmonics |           |
|-----------------|------------------------------|-----------|----------------------------|-----------|
|                 | (mV/m)                       | dB (μV/m) | (μV/m)                     | dB (μV/m) |
| 902-928         | 50                           | 94        | 500                        | 54        |
| 2400-2483.5     | 50                           | 94        | 500                        | 54        |
| 5725-5875       | 50                           | 94        | 500                        | 54        |

Peak-Limit according to FCC Subpart 15.249(a), Subpart 15.249(e)

| Frequency (MHz) | Fieldstrength of fundamental |           | Fieldstrength of harmonics |           |
|-----------------|------------------------------|-----------|----------------------------|-----------|
|                 | (mV/m)                       | dB (μV/m) | (μV/m)                     | dB (μV/m) |
| 902-928         | 500                          | 114       | 5000                       | 74        |
| 2400-2483.5     | 500                          | 114       | 5000                       | 74        |
| 5725-5875       | 500                          | 114       | 5000                       | 74        |

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Average-Limit according to FCC Subpart 15.249(d) for spurious emissions outside of the specified frequency band:

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

| Frequency [MHz] | 50dB below of the fundamental [dB $\mu$ V/m] | 15.209 Limits [dB $\mu$ V/m] | General Radiated Limits [dB $\mu$ V/m] |
|-----------------|----------------------------------------------|------------------------------|----------------------------------------|
| 30-88           | 35.5                                         | 40                           | 44                                     |
| 88-216          | 35.5                                         | 43,5                         | 44                                     |
| 216-960         | 35.5                                         | 46                           | 46                                     |
| Above 960       | 35.5                                         | 54                           | 54                                     |

#### Restricted bands of operation:

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209

| MHz                   | MHz             | GHz           |
|-----------------------|-----------------|---------------|
| 25.5 – 25.67          | 960 – 1240      | 4.5 – 5.15    |
| 37.5 – 38.25          | 1300 – 1427     | 5.35 – 5.46   |
| 73 – 74.6             | 1435 – 1626.5   | 7.25 – 7.75   |
| 74.8 – 75.2           | 1645.5 – 1646.5 | 8.025 – 8.5   |
| 108 – 121.94          | 1660 – 1710     | 9.0 – 9.2     |
| 123 – 138             | 1718.8 – 1722.2 | 9.3 – 9.5     |
| 149.9 – 150.05        | 2200 – 2300     | 10.6 – 12.7   |
| 156.52475 – 156.52525 | 2310 – 2390     | 13.25 – 13.4  |
| 156.7 – 156.9         | 2483.5 – 2500   | 14.47 – 14.5  |
| 162.0125 – 167.17     | 2655 – 2900     | 15.35 – 16.2  |
| 167.72 – 173.2        | 3260 – 3267     | 17.7 – 21.4   |
| 240 – 285             | 3332 – 3339     | 22.01 – 23.12 |
| 322 – 335.4           | 3345.8 – 3358   | 23.6 – 24.0   |
| 399.9 – 410           | 3600 – 4400     | 31.2 – 31.8   |
| 608 – 614             |                 | 36.43 – 36.5  |

The requirements are **FULFILLED**.

**Remarks:** During the test, the EuT was set into continuous transmitting mode with modulation.

The measurement was performed up to the 10<sup>th</sup> harmonic (9180 MHz).

## 5.4 Emission Bandwidth

For test instruments and accessories used see section 6 Part MB.

### 5.4.1 Description of the test location

Test location: AREA4

### 5.4.2 Description of Measurement

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio of -20 dB. The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or the first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.

The resolution bandwidth of measuring instrument was set to a value as shown in the following table below according to ANSI C63.4-2003.

| Fundamental frequency | Minimum resolution bandwidth |
|-----------------------|------------------------------|
| 9 kHz to 30 MHz       | 1kHz                         |
| 30 to 1000 MHz        | 10 kHz                       |
| 1000 MHz to 40 GHz    | 100 kHz                      |

### 5.4.3 Test result

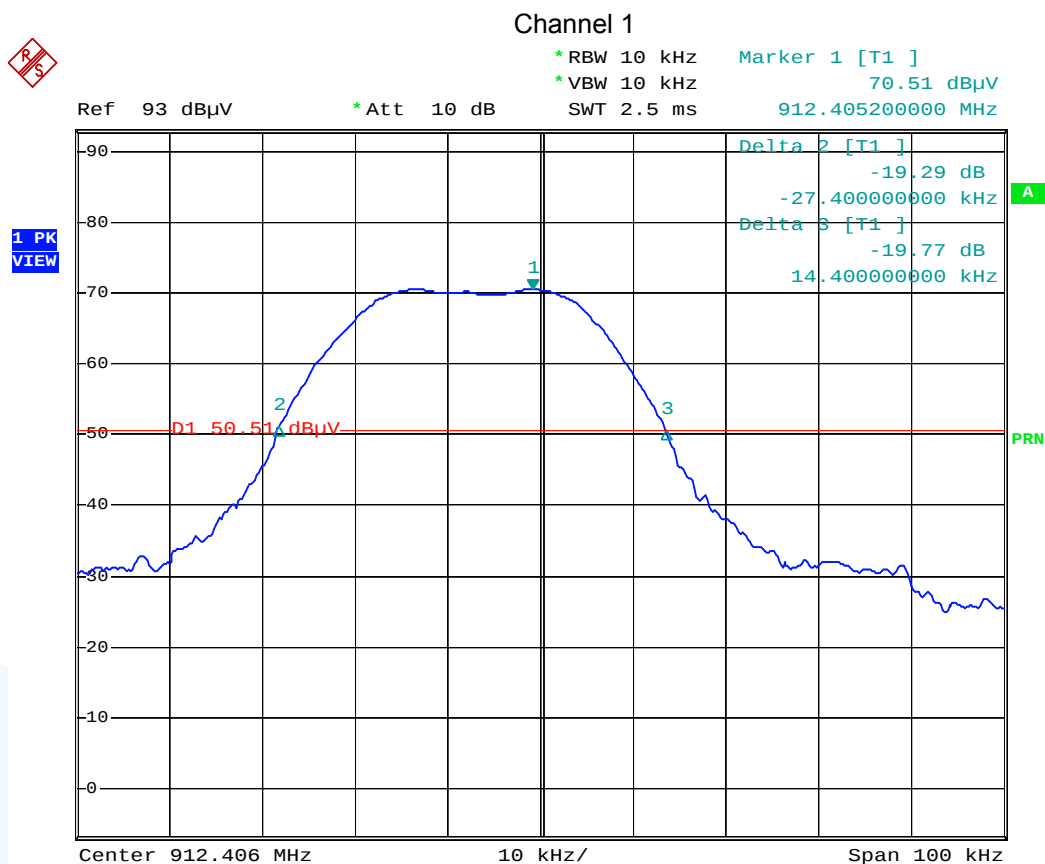
| Channel 1 Frequency<br>[MHz] | 20 dB Bandwidth<br>[kHz] |
|------------------------------|--------------------------|
| 912.4                        | 41.8                     |

**Remarks:** For the bandwidth there is no limit defined in Part 15.249. This measurement is informative only.

For detailed test result refer to following test protocol.

FCC ID: NXIE86NP

#### 5.4.4 Test protocol



Date: 2.FEB.2006 15:15:43

## 5.5 Band edge test

For test instruments and accessories used see section 6 Part MB.

### 5.5.1 Description of the test location

Test location: AREA4

### 5.5.2 Description of Measurement

The spectrum analyzer receives the signal from the EuT by a connected antenna. The span of the spectrum analyzer is set wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation. The highest amplitude appearing on spectral display is measured and it is set as the reference level for the emission mask. It is allowed the trace to stabilize and after then it is set the emission mask on the reference level to show the compliance with the bandedge requirements.

Further settings on the spectrum analyzer:

RBW:  $\geq 1\%$  of the span

VBW:  $\geq$  RBW

Sweep: Auto

Detector function: Peak

### 5.5.3 Test result

| Frequency [MHz] | Peak Power Output [dB $\mu$ V/m] | Spurious emission read value [dB $\mu$ V/m] | Result of Band edge [dBc] | Band edge LIMIT [dBc] |
|-----------------|----------------------------------|---------------------------------------------|---------------------------|-----------------------|
| < 902           | 77.0                             | 15 (noise)                                  | 62                        | >50                   |
| > 928           | 77.0                             | 15 (noise)                                  | 62                        | >50                   |

Peak-Limit according to FCC Subpart 15.249(d)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

The requirements are **FULFILLED**.

**Remarks:** For detailed test result please refer to following test protocol.

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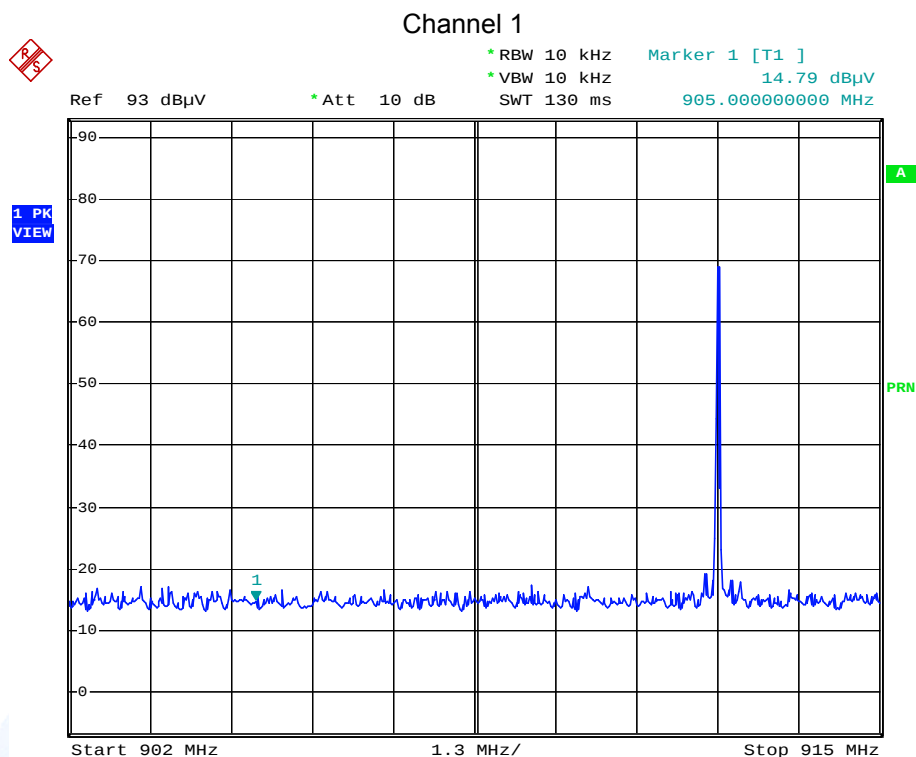
---



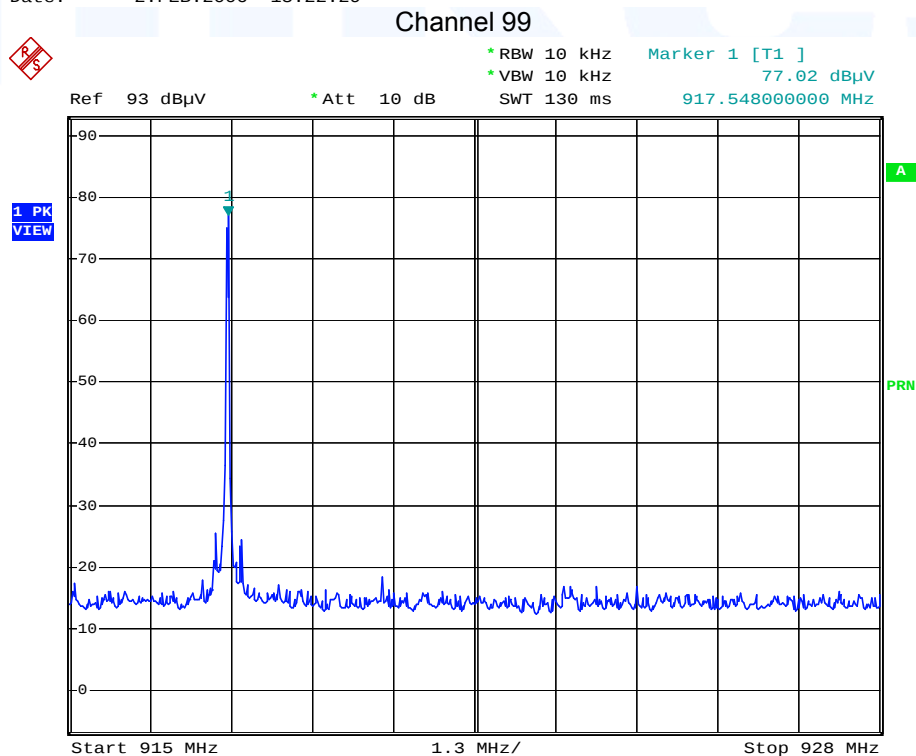
---

FCC ID: NXIE86NP

## 5.5.4 Test protocol



Date: 2.FEB.2006 15:22:29



Date: 2.FEB.2006 15:28:05

## 5.6 Correction for Pulse Operation (Duty Cycle)

For test instruments and accessories used see section 6 Part DC.

### 5.6.1 Description of the test location

Test location: Manufacturer site

### 5.6.2 Description of Measurement

The Duty cycle factor, expressed in dB, is arrived by taking the following formula:

$$KE = 20 \log [(t_{IB} \cdot p) / T_w]$$

KE: pulse operation correction factor [dB]  
 $t_{IW}$ : pulse duration for one complete pulse track [msec]  
 $t_{IB}$ : pulse duration for one pulse [μsec]  
 $T_w$ : a period of the pulse track [msec]  
 $p$ : number of pulses in one train

### 5.6.3 Test result

| $t_{IW}$ [μsec] | $T_w$ [msec] | $t_{IB}$ [μsec] | $p$ | KE [dB / %] |
|-----------------|--------------|-----------------|-----|-------------|
| 100             | 100          | 10              | 1   | -20 / 10    |
|                 |              |                 |     |             |

Remarks: For detailed results, please see the test protocol below.

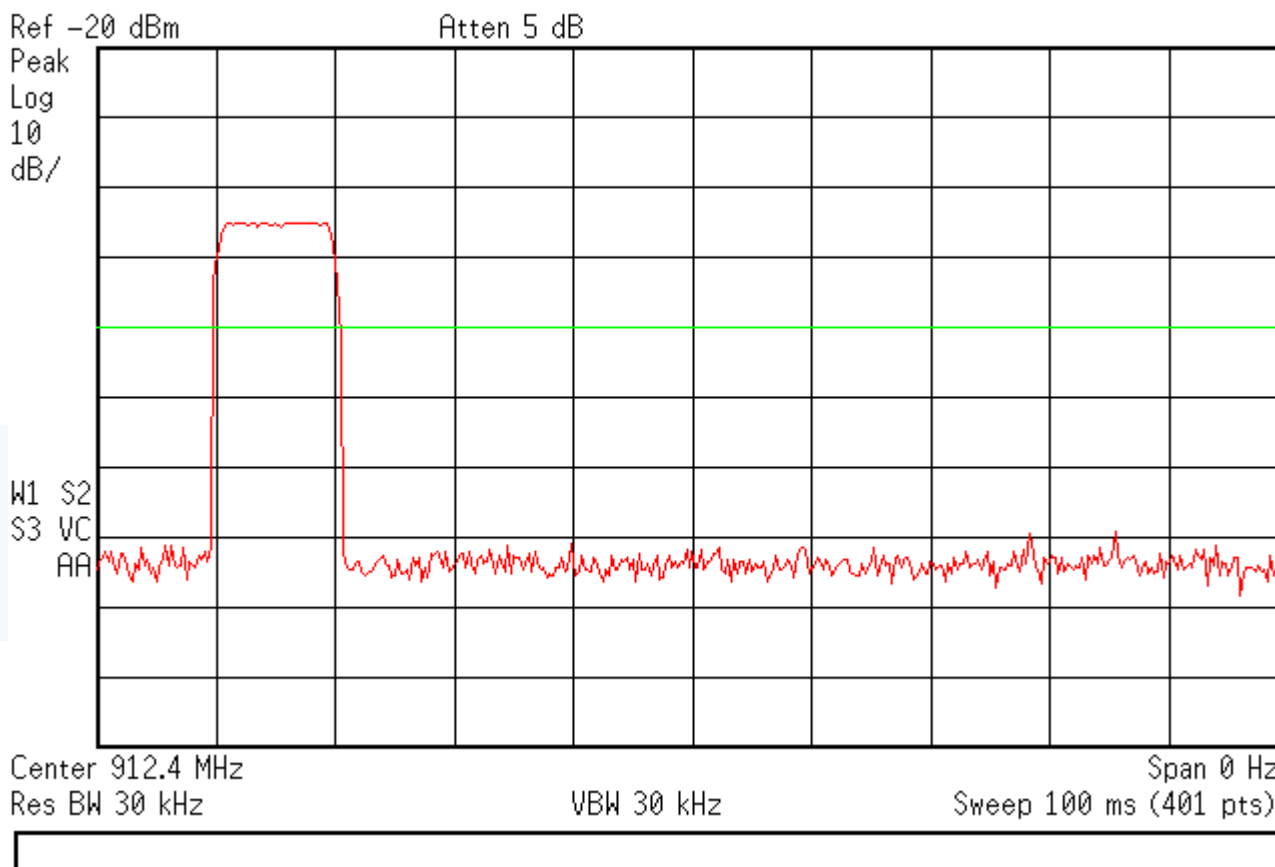
The duty cycle has been recorded by the manufacturer.

There is no need for any correction with duty cycle.

## 5.6.4 Test protocol

### Record of Duty Cycle FCC Part 15 Subpart 15.35(c)

✱ Agilent 16:17:06 3 Feb 2006



## 5.7 Antenna application

### 5.7.1 Antenna requirements

The EUT's antenna is met the requirement of FCC Part 15 C section 15.203 and 15.204

### 5.7.2 Result

The antenna is mounted inside the case. There is no possibility to connect other antennas by the user.

## 5.8 Receiver conducted disturbances 0.15 - 30 MHz

For test instruments and accessories used see section 6 Part A 4.

### 5.8.1 Description of the test location

Test location:

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

### 5.8.3 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 or to the CISPR limit, which is equivalent to the Australian AS 3548 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. Table top equipment is placed on a non-conducting table 80 centimeter's above the floor and is positioned 40 centimeter's from the vertical ground plane (wall) of the screen room. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

### 5.8.4 Test result

Frequency range:

Min. limit margin

The requirements are

**Remarks:** The measurement is not applicable. The EuT is battery powered.

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## 5.9 Receiver radiated emissions (electric field) 30 MHz - 40 GHz

For test instruments and accessories used see section 6 Part SER2 and SER3.

### 5.9.1 Description of the test location

Test location: OATS1  
Test location: Anechoic Chamber A2  
Test distance: 3 metres

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



FCC ID: NXIE86NP



FCC ID: NXIE86NP

### 5.9.3 Test result

Receive frequency 915.0 MHz

#### Testresult in detail: (<1GHz)

| Frequency [MHz] | Reading Level QP [dBμV] | Reading Level AV [dBμV] | Bandwidth [kHz] | Correct. factor [dB] | Corrected Level QP [dBμV/m] | Corrected Level AV [dBμV/m] | Limit [dBμV/m] | Delta [dB] |
|-----------------|-------------------------|-------------------------|-----------------|----------------------|-----------------------------|-----------------------------|----------------|------------|
| 30-1000         | ---                     | ---                     | 120             | ---                  | ---                         | ---                         | ---            | ---        |

**Remarks:** No emissions could be measured!

#### Test result >1GHz

| Frequency [GHz] | Reading Level PK [dBμV] | Bandwidth [kHz] | Correct. factor [dB] | Corrected Level PK [dBμV/m] | Limit [dBμV/m] | Delta [dB] |
|-----------------|-------------------------|-----------------|----------------------|-----------------------------|----------------|------------|
| 1-5             | ---                     | 1000            | ---                  | ---                         | ---            | ---        |

**Remarks:** No emissions could be measured!

Limit according to FCC Subpart 15.109(a)

| Frequency of emission [MHz] | Field strength Limits [μV/m] | Field strength Limits [dBμV/m] |
|-----------------------------|------------------------------|--------------------------------|
| 30-88                       | 100                          | 40                             |
| 88-216                      | 150                          | 44                             |
| 216-960                     | 200                          | 46                             |
| Above 960                   | 500                          | 54                             |

 The requirements are **FULFILLED**.

**Remarks:** The measurement was performed up to the 5<sup>th</sup> harmonic (4586 MHz).

## 6 USED TEST EQUIPMENT AND ACCESSORIES

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

The calibration intervals and the calibration history will be given out on request.

| Test ID | Model / Type                | Kind of Equipment        | Manufacturer                  | Equipment No.   |
|---------|-----------------------------|--------------------------|-------------------------------|-----------------|
| CPR 2   | ESVS 30                     | EMI Test Receiver        | Rohde & Schwarz München       | 02-02/03-05-006 |
|         | VULB 9168                   | Trilog-Broadband Antenna | Schwarzbeck Mess-Elektronik   | 02-02/24-05-005 |
|         | S10162-B / +11N-50-10-5 / + | RF Cable 33m             | Huber + Suhner                | 02-02/50-05-031 |
|         | KK-EF393-21N-16             | RF Cable 20m             | Huber + Suhner                | 02-02/50-05-033 |
|         | NW-2000-NB                  | RF Cable                 | Huber + Suhner                | 02-02/50-05-113 |
| MB      | FSP 30                      | Spectrum Analyzer        | Rohde & Schwarz München       | 02-02/11-05-001 |
| SER 2   | ESVS 30                     | EMI Test Receiver        | Rohde & Schwarz München       | 02-02/03-05-006 |
|         | VULB 9168                   | Trilog-Broadband Antenna | Schwarzbeck Mess-Elektronik   | 02-02/24-05-005 |
|         | S10162-B / +11N-50-10-5 / + | RF Cable 33m             | Huber + Suhner                | 02-02/50-05-031 |
|         | KK-EF393-21N-16             | RF Cable 20m             | Huber + Suhner                | 02-02/50-05-033 |
|         | NW-2000-NB                  | RF Cable                 | Huber + Suhner                | 02-02/50-05-113 |
| SER 3   | FSP 30                      | Spectrum Analyzer        | Rohde & Schwarz München       | 02-02/11-05-001 |
|         | AFS4-01000400-10-10P-4      | RF Amplifier 1-4 GHz     | PARZICH GMBH                  | 02-02/17-05-003 |
|         | AMF-4F-04001200-15-10P      | RF Amplifier 4-12 GHz    | PARZICH GMBH                  | 02-02/17-05-004 |
|         | BBHA 9120 E 251             | Broad-Band Horn Antenna  | Schwarzbeck Mess-Elektronik   | 02-02/24-05-006 |
|         | WBH218H N                   | Horn Antenna 2-18 GHz    | Q-par Angus Ltd               | 02-02/24-05-007 |
|         | Sucoflex N-2000-SMA         | RF Cable                 | novotronik Signalverarbeitung | 02-02/50-05-075 |
|         | Sucoflex N-2000-SMA         | RF Cable                 | novotronik Signalverarbeitung | 02-02/50-05-083 |
|         | Sucoflex N-2000-SMA         | RF Cable                 | novotronik Signalverarbeitung | 02-02/50-05-088 |