

# CETECOM ICT Services GmbH

Radio Satellite Communication

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RSC11

issue test report consist of

30 Pages

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**TTI-P-G166/98-30**

## **Accredited Bluetooth™ Test Facility (BQTF)**

**Test report no.: 4\_0602-01-03TX/02**

**FCC Part 15.242 / 95.1115**

**M2720A Avalon CTS Cordless Fetal Transducer System**

CETECOM – ICT Services GmbH

Untertürkheimerstr. 6-10

66117 Saarbrücken, Germany

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### **1 General information**

#### **1.1 Notes**

The test results of this test report relate exclusively to the item tested as specified in 1.5.

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# CETECOM ICT Services GmbH

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## 1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10

66117 Saarbrücken

Deutschland

Telefon : + 49 681 598 - 9100

Telefax : + 49 681 598 - 9075

E-mail : info@ict.cetecom.de

Internet : www.cetecom.de

**Accredited testing laboratory**

**DAR-registration number : TTI-P-G-166/98-30**

**Accredited Bluetooth™ Test Facility (BQTF)**

BLUETOOTH is a trademark owned by Bluetooth SIG, Inc. and licensed to CETECOM

## 1.3 Details of applicant

**Name** : Philips Medizinsysteme Böblingen GmbH

**Street** : Hewlett-Packard-Str.2

**City** : D-71034 Böblingen

**Country** : Germany

**Telephone** : +49(0)7031 / 463-0

**Telefax** : +49(0)7031 / 463-2944

**Contact** : Mr. Hansjörg Geywitz

**Telephone** : +49(0)7031 / 463-0

## 1.4 Application details

Date of receipt of application : 2002-07-25

Date of receipt of test item : 2002-07-25

Date of test : 2002-07-25

## 1.5 Test item

Type of equipment : Wireless medical telemetry system

Type designation : **M2720A Avalon CTS Cordless Fetal Transducer System consisting of three equal transmitters: M2725 Toco Transducer, M2726A US Transducer and M2727A ECG Transducer (tested) and M2720A Base Station (receiver)**

Product name : Avalon CTS Cordless Fetal Transducer System

**Additional informations:**

Frequency : 608.0125 – 613.9875 MHz/ Channel separation: 12.5 kHz  
10K0F2D

we tested 608.0125 MHz, 611.0 MHz and 613.9875 MHz

output power rad. max : QP: -15.4 dBm (0.03mW) / 82.1 dBµV/m at 3m EIRP

Number of channels : 478 (3 tested)

Antenna : Printed antenna on PCB (TX)

Power supply : Tx: Li-Ion rechargeable battery 4.2 V

## 1.6 Test standards

**FCC Part §15.242 / §95.1115**

## 2 Technical test

The radiated measurements were performed vertical and horizontal over the whole frequency range. We start at 1 m high with vertical receiving antenna and rotate the dish continuously. During rotation we use the antenna lift system to vary the high from 1 to 4 m. So we find maximum radiation output. At this points we do manual remeasurements. After this we do the same measurements in horizontal position of the receiving antenna. This (horizontal and vertical) is made for all the three planes of the test sample. We use the maximum received results. The radiated power was measured by substitution method according to FCC standard.

The detector function and selection of bandwidth are according ANSI C63.2-1996 / 8.2.1 and ANSI C63.4-1992 Item 4.2.

Antennas are conform with ANSI C63.2-1996 item 15.

150 kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth, passive loop antenna.

30 MHz - 200 MHz: Quasi Peak measurement, 120KHz Bandwidth, biconical antenna

200MHz - 1GHz: Quasi Peak measurement, 120KHz Bandwidth, log periodic antenna

>1GHz: Average, RBW 1MHz, VBW 10 MHz, waveguide horn

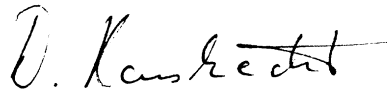
### 2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

### FINAL VERDICT : PASS

Technical responsibility for area of testing :

2002-11-11 RSC8412 Hausknecht D.



| Date | Section | Name | Signature |
|------|---------|------|-----------|
|------|---------|------|-----------|

2002-11-11 RSC8414 Ames H.



| Date | Section | Name | Signature |
|------|---------|------|-----------|
|------|---------|------|-----------|

## **2.2 Testreport**

### **TEST REPORT**

**FCC Part 15.242 / 95.1115**

**Testreport no.: 4\_0602-01-03TX/02**

## TEST REPORT REFERENCE

## LIST OF MEASUREMENTS

The list of measurements called for in FCC Part 15.242 / 95.1115 is given below.

| <b>Paragraph</b>        | <b>PARAMETER TO BE MEASURED</b>       | <b>PAGE</b> |
|-------------------------|---------------------------------------|-------------|
|                         | <b>Transmitter parameters</b>         |             |
| <b>§ 15.242/95.1115</b> | <b>Field strength - Radiated</b>      | <b>7</b>    |
| <b>§ 15.242/95.1115</b> | <b>Spurious radiations - Radiated</b> | <b>7</b>    |
|                         | <b>SAR statement</b>                  | <b>7</b>    |
| <b>§ 95.1115</b>        | <b>Channel use</b>                    | <b>20</b>   |
|                         | <b>Test equipment listing</b>         | <b>21</b>   |
|                         | <b>Photographs of the equipment</b>   | <b>23</b>   |

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## TRANSMITTER FIELD STRENGTH and OUTPUT POWER FCC Part 15.242/95.1115 RADIATED

**TX: M2727A ECG-Transducer**

| FIELD STRENGTH (µV/m)   |          |                |               |           |                |                  |          |                |
|-------------------------|----------|----------------|---------------|-----------|----------------|------------------|----------|----------------|
| low channel             |          |                | mid channel   |           |                | high channel     |          |                |
| f (MHz)                 | Detector | Level dBµV/m   | f (MHz)       | Detect or | Level dBµV/m   | f (MHz)          | Detector | Level dBµV/m   |
| 608.0125 Carrier        | QP       | 82.1           | 611.0 Carrier | QP        | 80.0           | 613.9875 Carrier | QP       | 80.9           |
| 128.5                   | QP       | 39.5           | 126.8         | QP        | 40.2           | 141.5            | QP       | 39.9           |
| 1217                    | AV       | 48.4           | 1222          | AV        | 51.9           | 1229             | AV       | 49.2           |
| 1824                    | AV       | 35.3           | 1833          | AV        | 40.2           | 1844             | AV       | 37.4           |
| 2433                    | AV       | 43.9           | 2444          | AV        | 44.0           | 2456             | AV       | 37.7           |
| 4864                    | AV       | 19.2           | 3055          | AV        | 40.6           |                  |          |                |
|                         |          |                |               |           |                |                  |          |                |
|                         |          |                |               |           |                |                  |          |                |
|                         |          |                |               |           |                |                  |          |                |
| carrier                 | QP       | -15.4 dBm EIRP | carrier       | QP        | -17.5 dBm EIRP | carrier          | QP       | -16.6 dBm EIRP |
|                         |          | 0.03mW EIRP    |               |           | 0.02 mW EIRP   |                  |          | 0.02 mW EIRP   |
|                         |          |                |               |           |                |                  |          |                |
| Measurement uncertainty |          |                | ±3 dB         |           |                |                  |          |                |

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

**Limit for carrier: 106 dBµV/m at 3m distance QP. (Part 95)**

**Limit for spurious: 46 dBµV/m at 3m distance QP below 960 MHz. (Part 95)**

**Limit for spurious: 54 dBµV/m at 3m distance AV above 960 MHz. (Part 95)**

**Limit for carrier: 106 dBµV/m at 3m distance QP. (Part 15)**

**Limit for spurious: see general limits 15.209. (Part 15)**

### RF Exposure compliance issues:

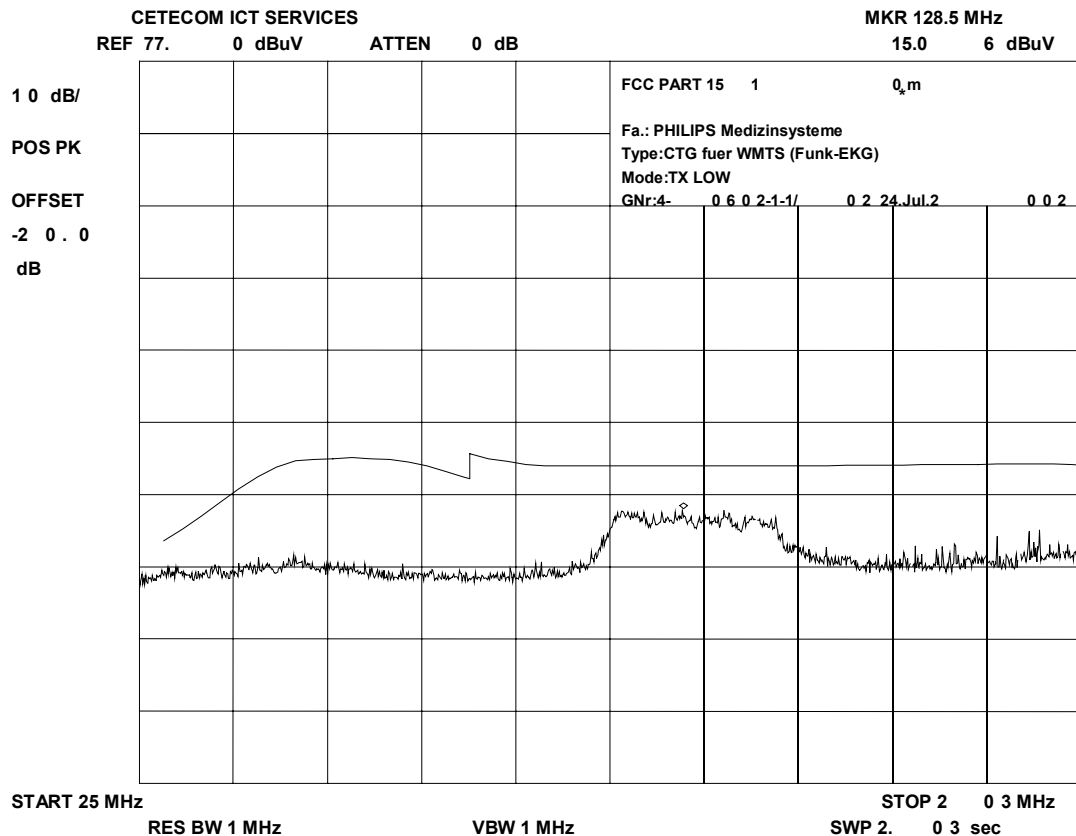
The max RF EIRP power output from the device is less than 1 mW. If the entire RF power were absorbed by 1 gram of tissue (not possible considering typical RF circuits) the SAR limit of 1.6 mW/g would still not be exceeded.

Therefore no warning labels, no RF exposure warnings in the manual or other protection measures are required for the transmitter.

## TRANSMITTER SPURIOUS RADIATION

FCC Part 15.242 / 95.1115

**Radiated**  
**low channel, 30 – 200 MHz vertical**



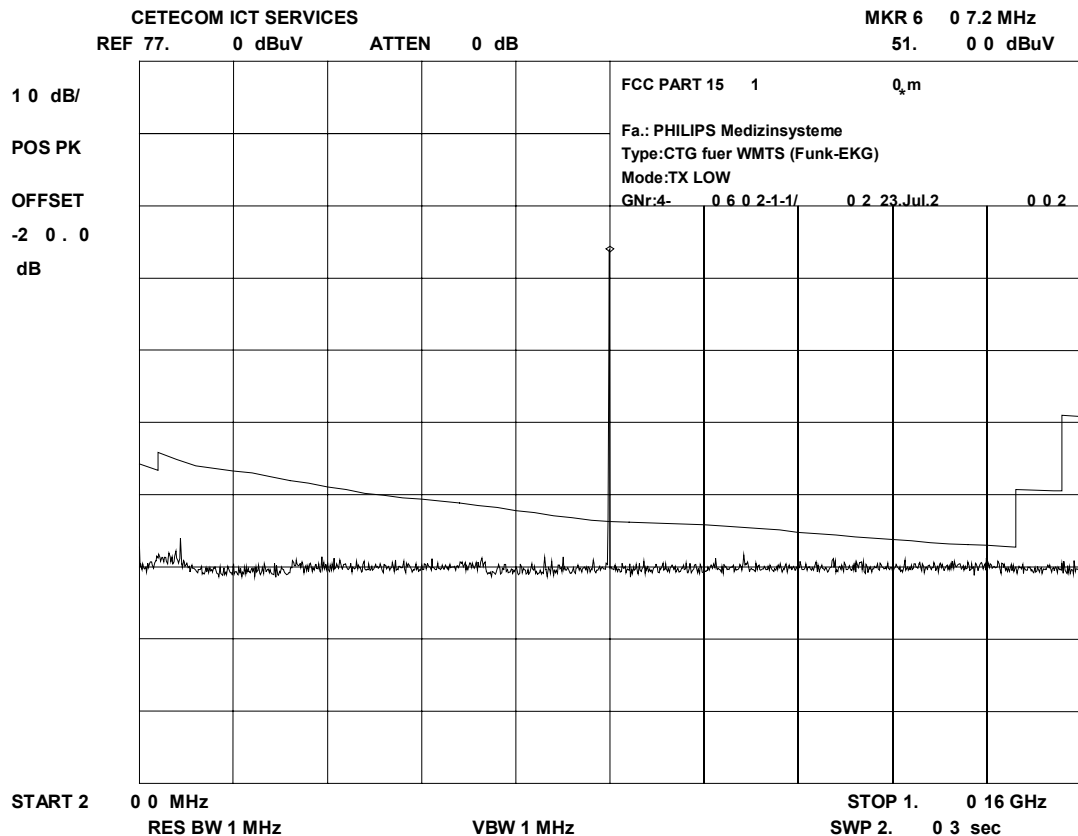
This plot shows peak values and the limit according to FCC15.209 at 10m distance. We made additional measurements with CISPR QP Detector and recalculated the results to 3m distance by adding 10.5 dB.

All peaks were below limit.

## TRANSMITTER SPURIOUS RADIATION

FCC Part 15.242 / 95.1115

**Radiated**  
low channel, 200 – 1000 MHz vertical



This plot shows peak values and the limit according to FCC15.209 at 10m distance. We made additional measurements with CISPR QP Detector and recalculated the results to 3m distance by adding 10.5 dB.

All peaks were below limit.

# CETECOM ICT Services GmbH

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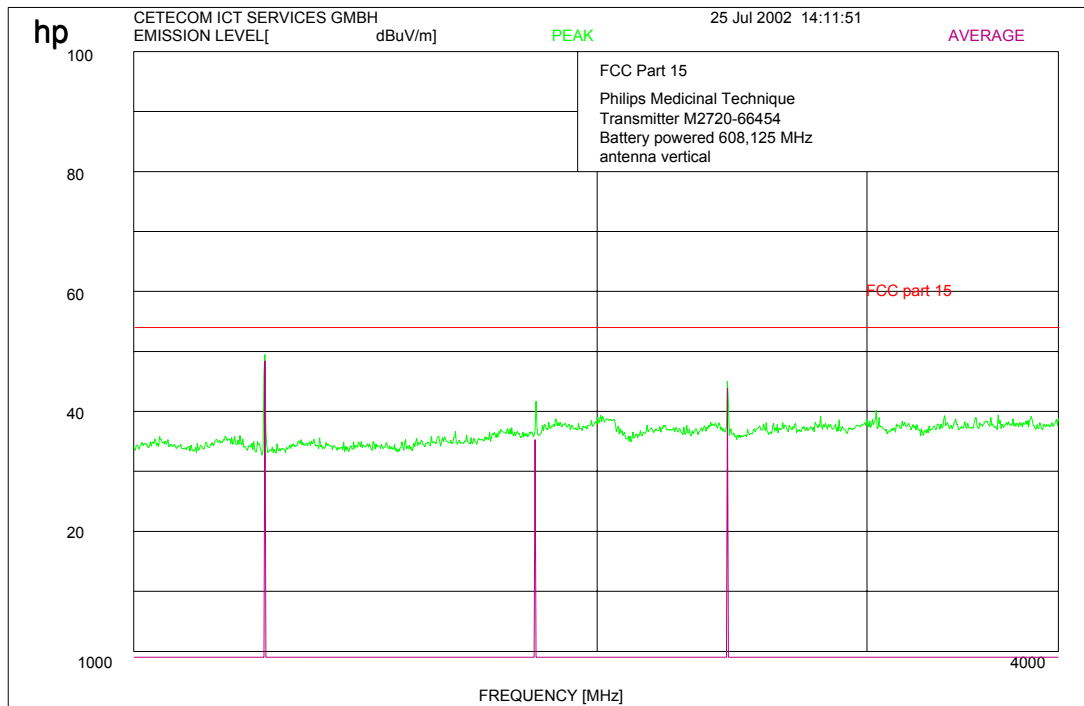
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## TRANSMITTER SPURIOUS RADIATION

FCC Part 15.242 / 95.1115

### Radiated

low channel, 1000 - 4000 MHz vertical



This plot shows peak values and the limit according to FCC15.209 at 3m distance. We made additional measurements with AV Detector.

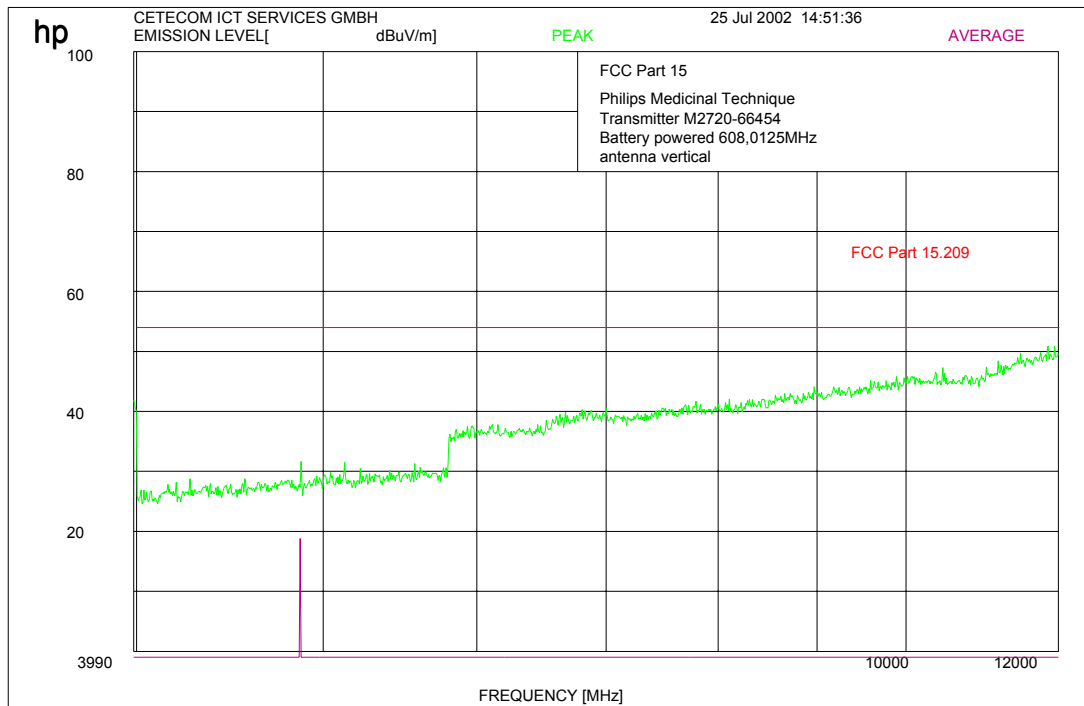
All peaks were below limit.

## TRANSMITTER SPURIOUS RADIATION

FCC Part 15.242 / 95.1115

### Radiated

low channel, 4000 - 12000 MHz vertical



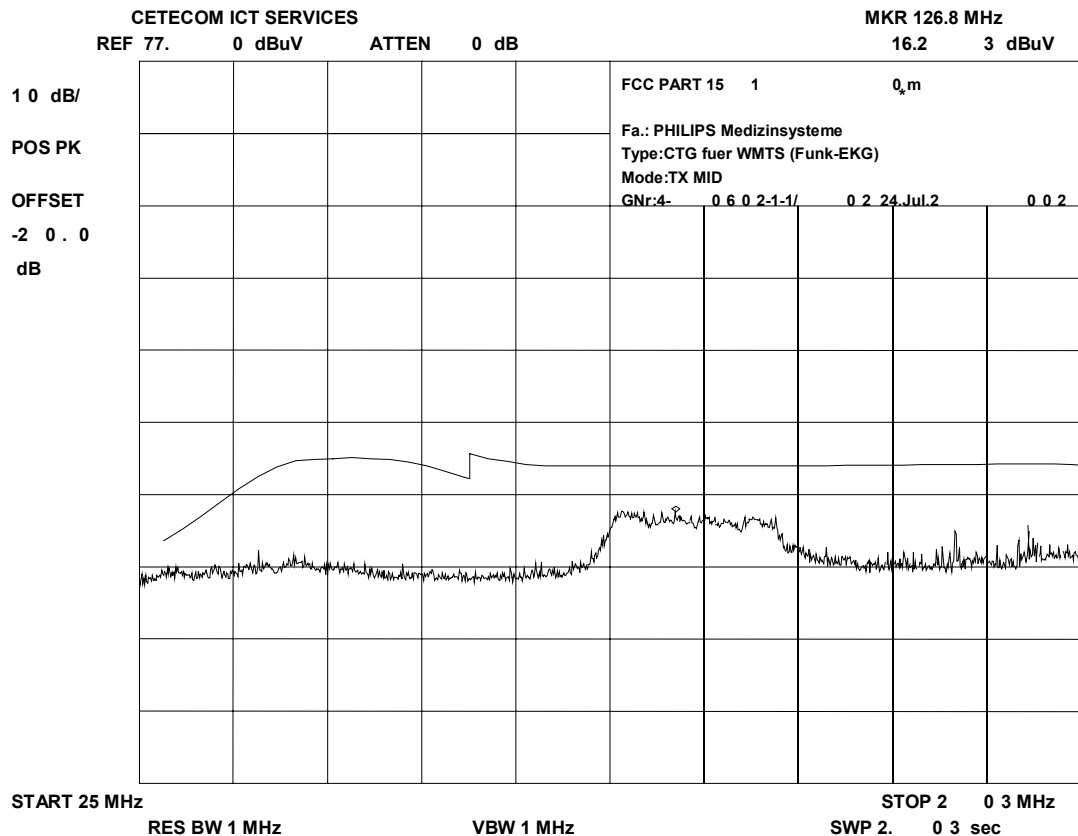
This plot shows peak values and the limit according to FCC15.209 at 3m distance. We made additional measurements with AV Detector.

All peaks were below limit.

## TRANSMITTER SPURIOUS RADIATION

FCC Part 15.242 / 95.1115

**Radiated**  
mid channel, 30 - 200 MHz vertical



This plot shows peak values and the limit according to FCC15.209 at 10m distance. We made additional measurements with CISPR QP Detector and recalculated the results to 3m distance by adding 10.5 dB.

All peaks were below limit.

# CETECOM ICT Services GmbH

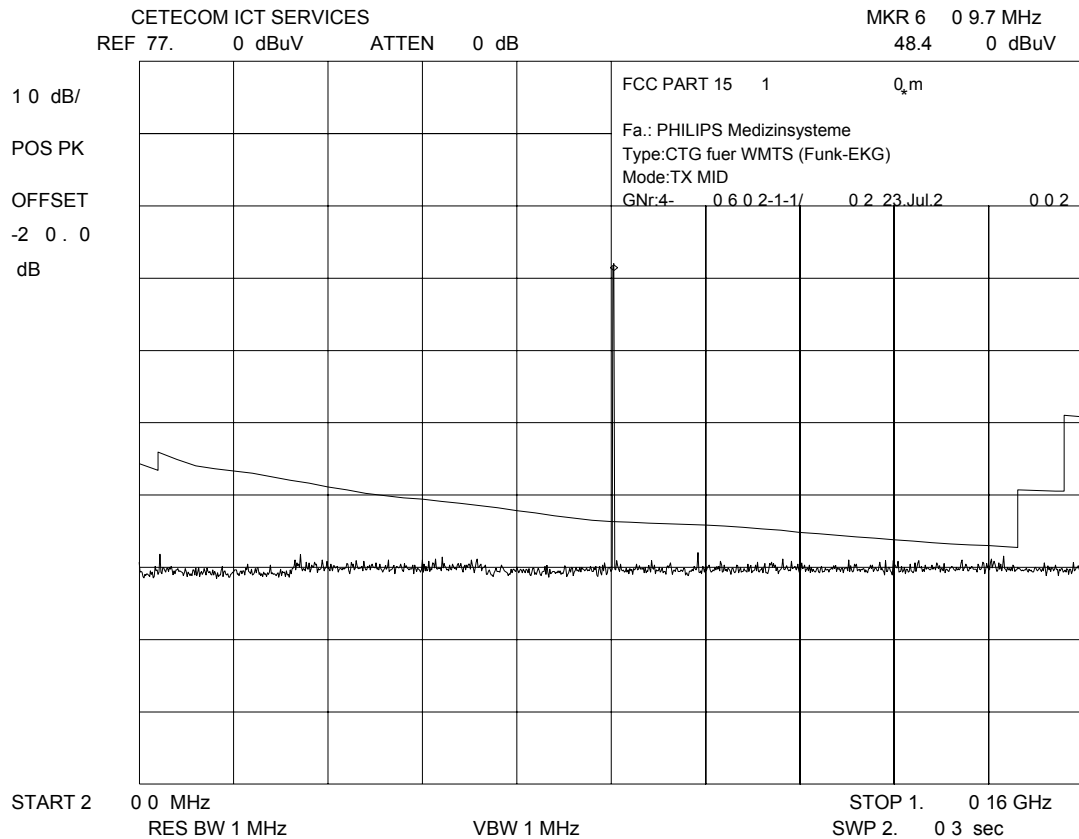
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## TRANSMITTER SPURIOUS RADIATION

FCC Part 15.242 / 95.1115

**Radiated**  
**mid channel, 200 – 1000 MHz vertical**



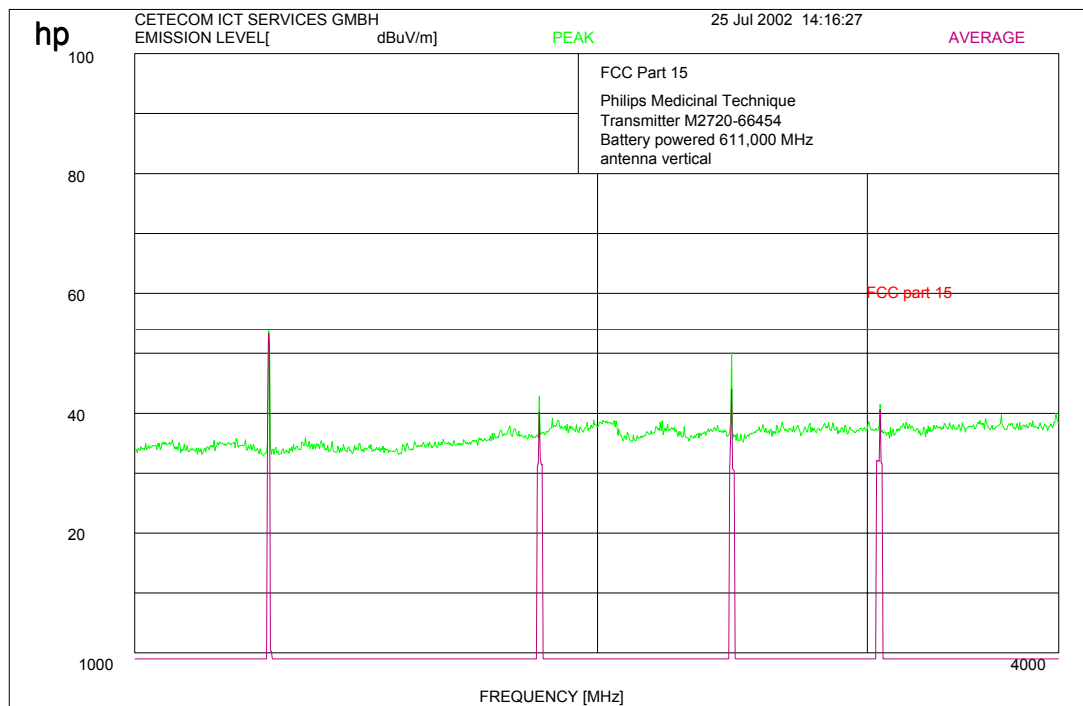
This plot shows peak values and the limit according to FCC 15.209 at 10m distance. We made additional measurements with CISPR QP Detector and recalculated the results to 3m distance by adding 10.5 dB.

All peaks were below limit.

## TRANSMITTER SPURIOUS RADIATION

FCC Part 15.242 / 95.1115

**Radiated**  
**mid channel, 1000 - 4000 MHz vertical**



**This plot shows peak values and the limit according to FCC15.209 at 3m distance. We made additional measurements with AV Detector.**

**All peaks were below limit.**

# CETECOM ICT Services GmbH

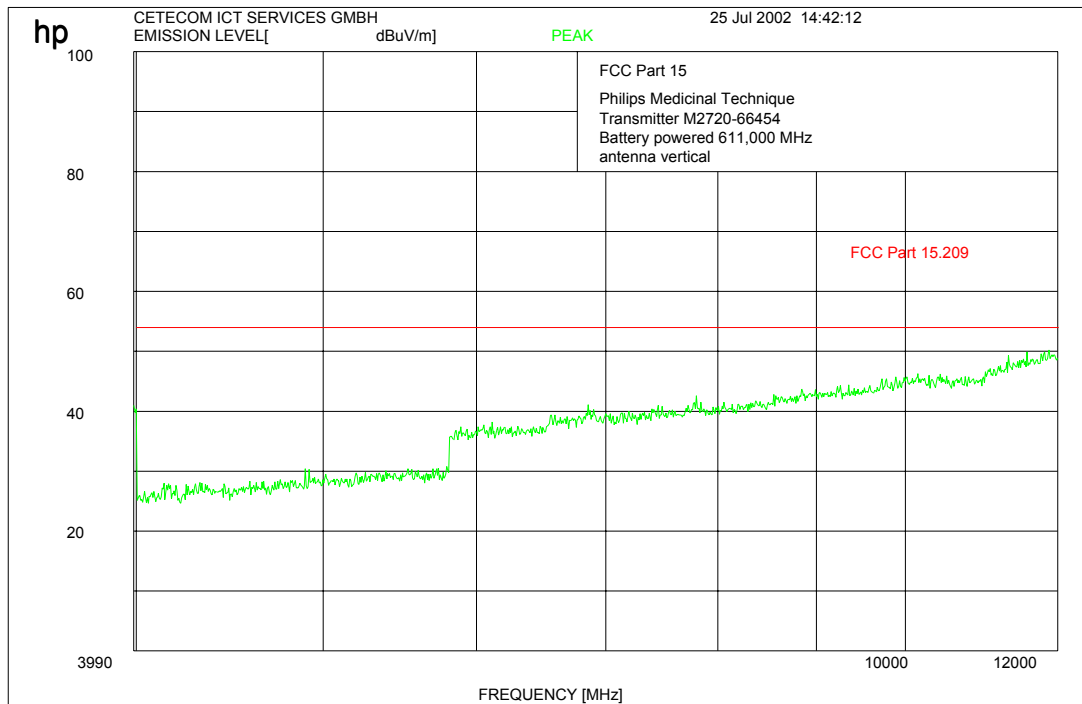
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## TRANSMITTER SPURIOUS RADIATION

FCC Part 15.242 / 95.1115

**Radiated**  
**mid channel, 4000 - 12000 MHz vertical**



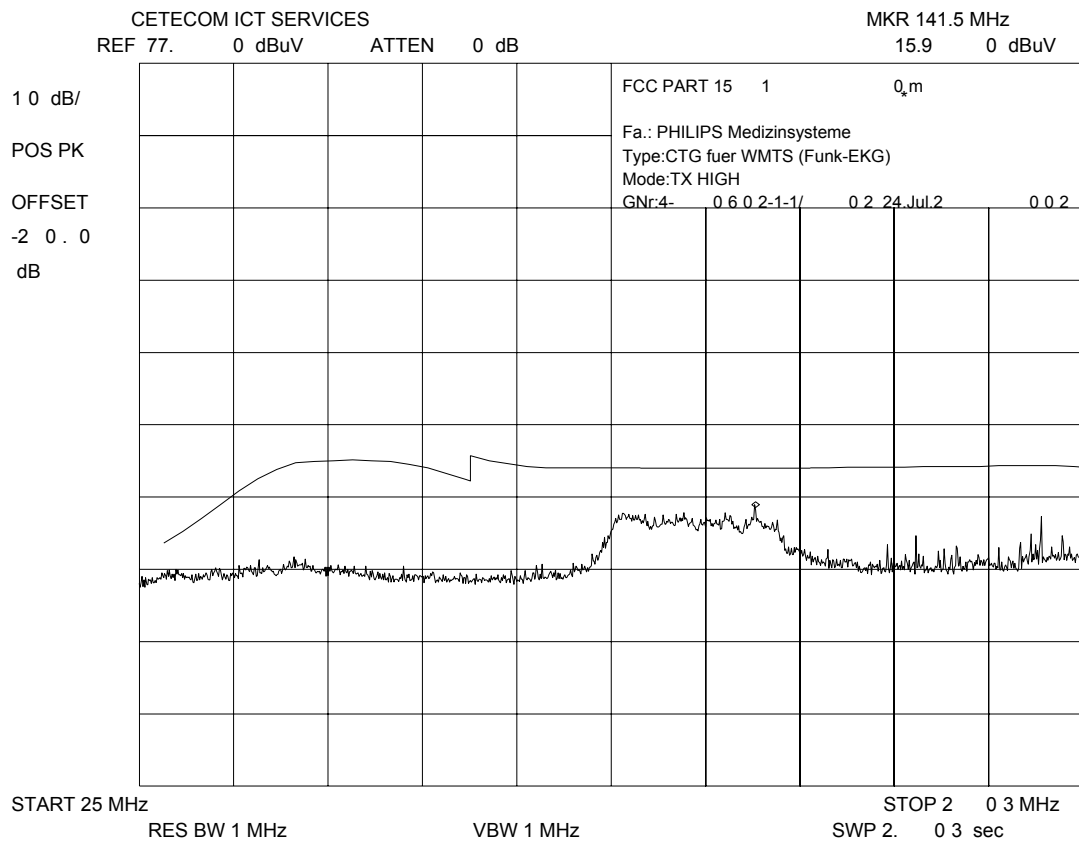
**This plot shows peak values and the limit according to FCC15.209 at 3m distance. We made additional measurements with AV Detector.**

**All peaks were below limit.**

## TRANSMITTER SPURIOUS RADIATION

FCC Part 15.242 / 95.1115

**Radiated**  
**high channel, 30 - 200 MHz vertical**



This plot shows peak values and the limit according to FCC15.209 at 10m distance. We made additional measurements with CISPR QP Detector and recalculated the results to 3m distance by adding 10.5 dB.

All peaks were below limit.

# CETECOM ICT Services GmbH

Test report no.: 4\_0602-01-03TX/02 Issue Date: 11.11.2002

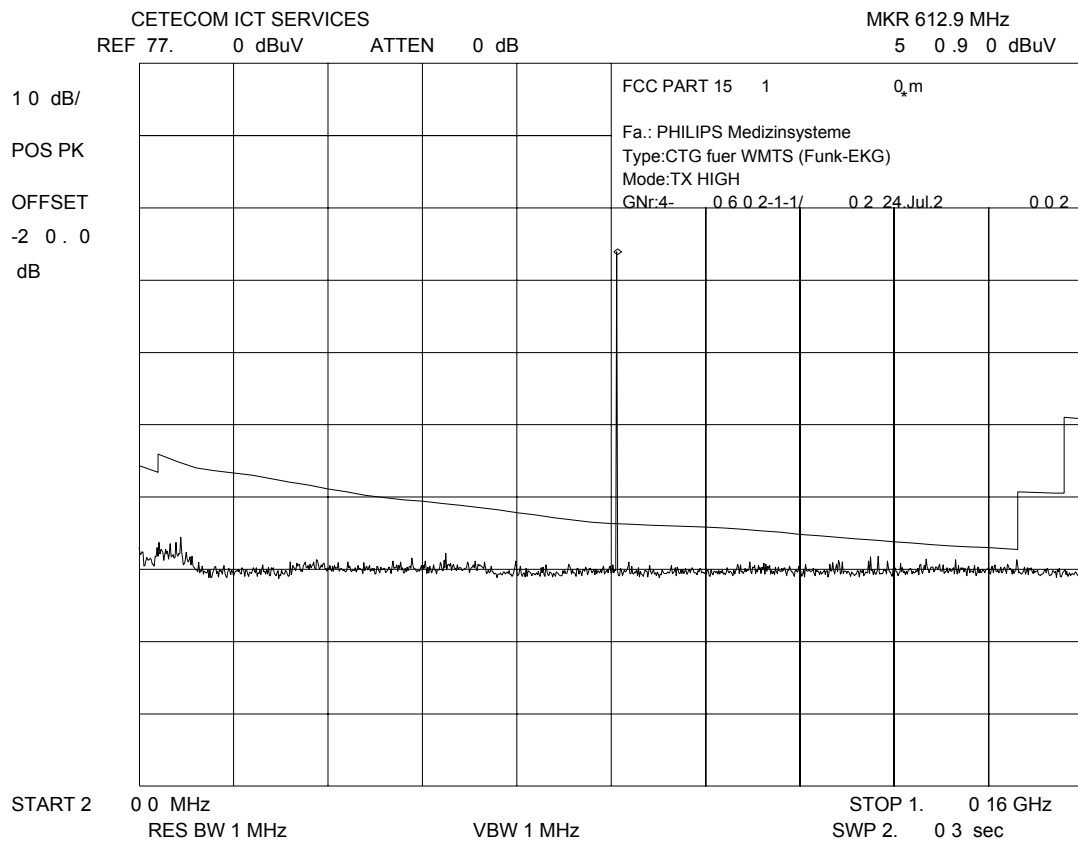
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## TRANSMITTER SPURIOUS RADIATION

FCC Part 15.242 / 95.1115

### Radiated

high channel, 200 – 1000 MHz vertical



This plot shows peak values and the limit according to FCC15.209 at 10m distance. We made additional measurements with CISPR QP Detector and recalculated the results to 3m distance by adding 10.5 dB.

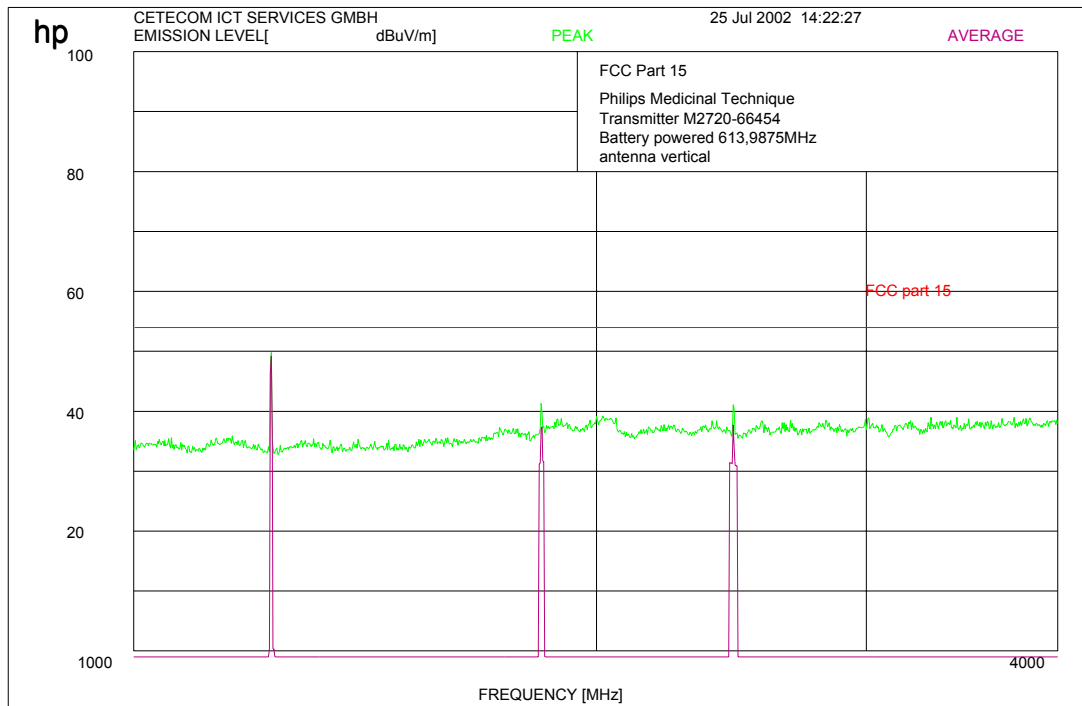
All peaks were below limit.

## TRANSMITTER SPURIOUS RADIATION

FCC Part 15.242 / 95.1115

### Radiated

high channel, 1000 - 4000 MHz vertical



This plot shows peak values and the limit according to FCC15.209 at 3m distance. We made additional measurements with AV Detector.

All peaks were below limit.

# CETECOM ICT Services GmbH

Test report no.: 4\_0602-01-03TX/02 Issue Date: 11.11.2002

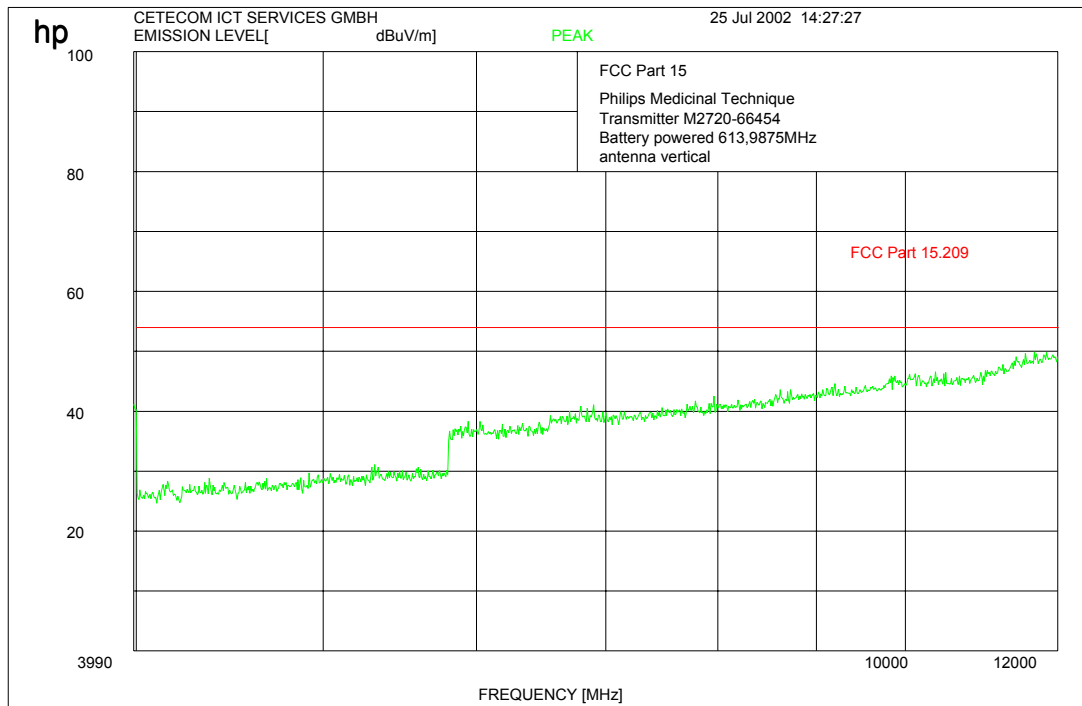
Page 19 (30)

## TRANSMITTER SPURIOUS RADIATION

FCC Part 15.242 / 95.1115

### Radiated

high channel, 4000 - 12000 MHz vertical



This plot shows peak values and the limit according to FCC15.209 at 3m distance. We made additional measurements with AV Detector.

All peaks were below limit.

# CETECOM ICT Services GmbH

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**CHANNEL USE**

**FCC Part 95/1115**

**The transmitters are designed to operate in the 4 channels according to FCC 95.1115.**

**The transmitters have a used bandwidth of 10 kHz. They are able to work with a channel separation of 12.5 kHz.**

**So they fulfill the requirements of the new FCC Part 95.1115.**

## TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

| No | Instrument/Ancillary  | Type      | Manufacturer    | Serial No.  |
|----|-----------------------|-----------|-----------------|-------------|
| 01 | Spectrum Analyzer     | 8566 A    | Hewlett-Packard | 1925A00257  |
| 02 | Analyzer Display      | 8566 A    | Hewlett-Packard | 1925A00860  |
| 03 | Oscilloscope          | 7633      | Tektronix       | 230054      |
| 04 | Radio Analyzer        | CMTA 54   | Rohde & Schwarz | 894 043/010 |
| 05 | System Power Supply   | 6038 A    | Hewlett-Packard | 2848A07027  |
| 06 | Signal Generator      | 8111 A    | Hewlett-Packard | 2215G00867  |
| 07 | Signal Generator      | 8662 A    | Hewlett-Packard | 2224A01012  |
| 08 | Funktionsgenerator    | AFGU      | Rohde & Schwarz | 862 480/032 |
| 09 | Regeltrenntrafo       | MPL       | Erfi            | 91350       |
| 10 | Netznachbildung       | NNLA 8120 | Schwarzbeck     | 8120331     |
| 11 | Relais-Matrix         | PSU       | Rohde & Schwarz | 893 285/020 |
| 12 | Power-Meter           | 436 A     | Hewlett-Packard | 2101A12378  |
| 13 | Power-Sensor          | 8484 A    | Hewlett-Packard | 2237A10156  |
| 14 | Power-Sensor          | 8482 A    | Hewlett-Packard | 2237A00616  |
| 15 | Modulationsmeter      | 9008      | Racal-Dana      | 2647        |
| 16 | Frequenzzähler        | 5340 A    | Hewlett-Packard | 1532A03899  |
| 17 | Absorber Schirmkabine | ---       | MWB             | 87400/002   |
| 18 | Spectrum Analyzer     | 85660 B   | Hewlett-Packard | 2747A05306  |
| 19 | Analyzer Display      | 85662 A   | Hewlett-Packard | 2816A16541  |
| 20 | Quasi Peak Adapter    | 85650 A   | Hewlett-Packard | 2811A01131  |
| 21 | RF-Preselector        | 85685 A   | Hewlett-Packard | 2833A00768  |
| 22 | Biconical Antenne     | 3104      | Emco            | 3758        |
| 23 | Log. Per. Antenne     | 3146      | Emco            | 2130        |
| 24 | Double Ridge Horn     | 3115      | Emco            | 3088        |
| 25 | EMI-Testreceiver      | ESAI      | Rohde & Schwarz | 863 180/013 |
| 26 | EMI-Analyzer-Display  | ESAI-D    | Rohde & Schwarz | 862 771/008 |
| 27 | Biconical Antenne     | HK 116    | Rohde & Schwarz | 888 945/013 |
| 28 | Log. Per. Antenne     | HL 223    | Rohde & Schwarz | 825 584/002 |
| 29 | Relais-Switch-Unit    | RSU       | Rohde & Schwarz | 375 339/002 |
| 30 | Highpass              | HM985955  | FSY Microwave   | 001         |
| 31 | Amplifier             | P42-GA29  | Tron-Tech       | B 23602     |
| 32 | Absorber Schirmkabine |           | Frankonia       |             |
| 33 | Steuerrechner         | PSM 7     | Rohde & Schwarz | 834 621/004 |
| 34 | EMI Test Receiver     | ESMI      | Rohde & Schwarz | 827 063/010 |
| 35 | EMI Test Receiver     | Display   | Rohde & Schwarz | 829 808/010 |

# CETECOM ICT Services GmbH

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## TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

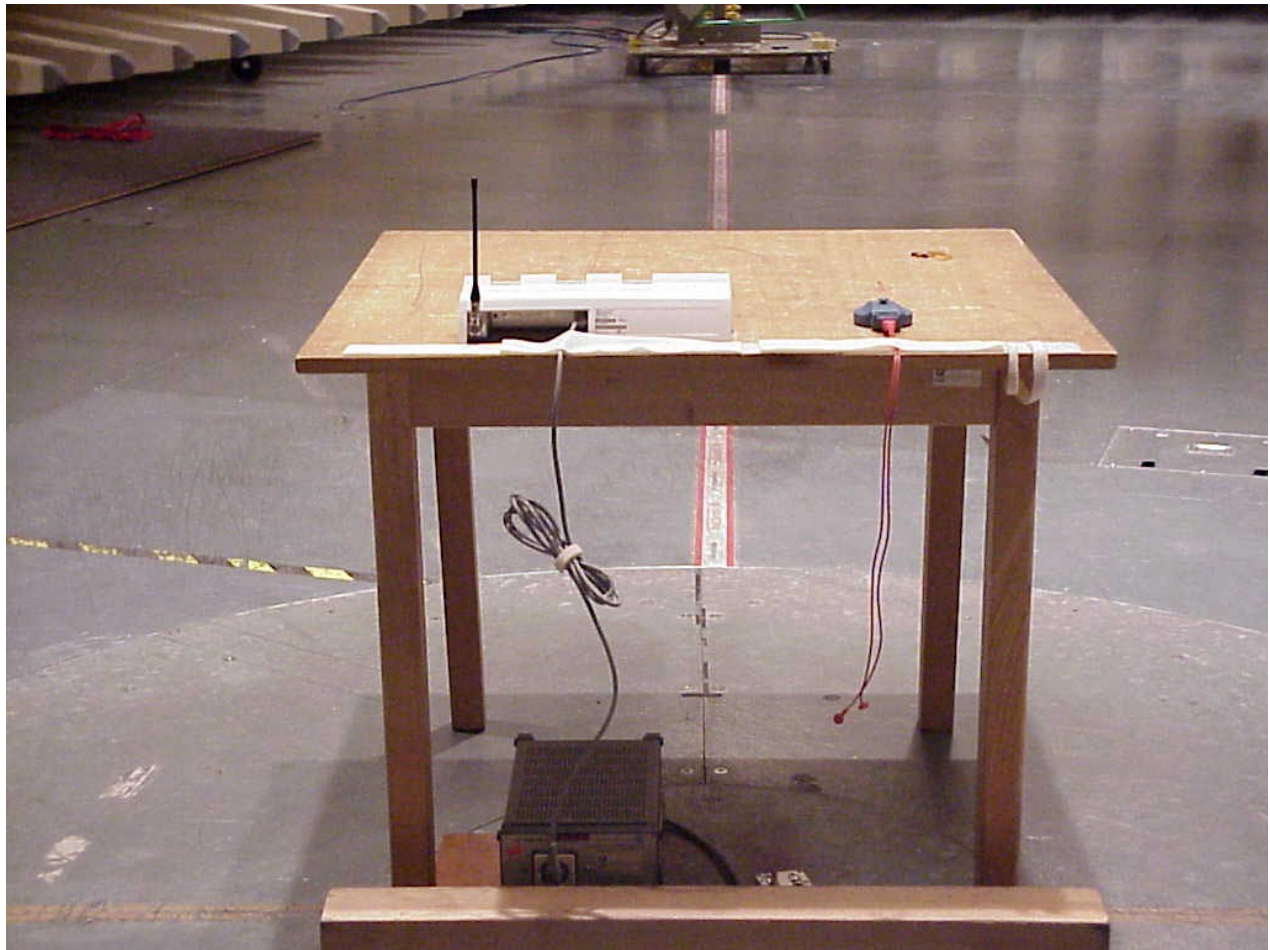
To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

| No | Instrument/Ancillary                  | Type      | Manufacturer    | Serial No.   |
|----|---------------------------------------|-----------|-----------------|--------------|
| 36 | Control Computer                      | HD 100    | Deisel          | 100/322/93   |
| 37 | Relay Matrix                          | PSN       | Rohde & Schwarz | 829 065/003  |
| 38 | Control Unit                          | GB 016 A2 | Rohde & Schwarz | 344 122/008  |
| 39 | Relay Switch Unit                     | RSU       | Rohde & Schwarz | 316 790/001  |
| 40 | Power Supply                          | 6032A     | Hewlett Packard | 2846A04063   |
| 41 | Spectrum Monitor                      | EZM       | Rohde & Schwarz | 883 720/006  |
| 42 | Measuring Receiver                    | ESH 3     | Rohde & Schwarz | 890 174/002  |
| 43 | Measuring Receiver                    | ESVP      | Rohde & Schwarz | 891 752/005  |
| 44 | Bicon Ant. 20-300MHz                  | HK 116    | Rohde & Schwarz | 833 162/011  |
| 45 | Logper Ant. 0.3-1 GHz                 | HL 223    | Rohde & Schwarz | 832 914/010  |
| 46 | Amplifier 0.1-4 GHz                   | AFS4      | Miteq Inc.      | 206461       |
| 47 | Logper Ant. 1-18 GHz                  | HL 024 A2 | Rohde & Schwarz | 342 662/002  |
| 48 | Polarisation Network                  | HL 024 Z1 | Rohde & Schwarz | 341 570/002  |
| 49 | Double Ridged Horn Antenna 1-26.5 GHz | 3115      | EMCO            | 9107-3696    |
| 50 | Microw. Sys. Amplifier 0.5- 26.5 GHz  | 8317A     | Hewlett Packard | 3123A00105   |
| 51 | Audio Analyzer                        | UPD       | Rohde & Schwarz | 1030.7500.04 |
| 52 | Controler                             | PSM 7     | Rohde & Schwarz | 883 086/026  |
| 53 | DC V-Network                          | ESH3-Z6   | Rohde & Schwarz | 861 406/005  |
| 54 | DC V-Network                          | ESH3-Z6   | Rohde & Schwarz | 893 689/012  |
| 55 | AC 2 Phase V-Network                  | ESH3-Z5   | Rohde & Schwarz | 861 189/014  |
| 56 | AC 2 Phase V-Network                  | ESH3-Z5   | Rohde & Schwarz | 894 981/019  |
| 57 | AC-3 Phase V-Network                  | ESH2-Z5   | Rohde & Schwarz | 882 394/007  |
| 58 | Power Supply                          | 6032A     | Rohde & Schwarz | 2933A05441   |
| 59 | RF-Test Receiver                      | ESVP.52   | Rohde & Schwarz | 881 487/021  |
| 60 | Spectrum Monitor                      | EZM       | Rohde & Schwarz | 883 086/026  |
| 61 | RF-Test Receiver                      | ESH3      | Rohde & Schwarz | 881 515/002  |
| 62 | Relay Matrix                          | PSU       | Rohde & Schwarz | 882 943/029  |
| 63 | Relay Matrix                          | PSU       | Rohde & Schwarz | 828 628/007  |
| 64 | Spectrum Analyzer                     | FSIQ 26   | Rohde & Schwarz | 119.6001.27  |
| 65 | Spectrum Analyzer                     | HP 8565E  | Hewlett Packard | 3473A00773   |
| 66 |                                       |           |                 |              |
| 67 |                                       |           |                 |              |
| 68 |                                       |           |                 |              |

## PHOTOGRAPHS OF THE EQUIPMENT

### Radiation test site

Photograph no.: 1



## PHOTOGRAPHS OF THE EQUIPMENT

### M2727A ECG-Transducer

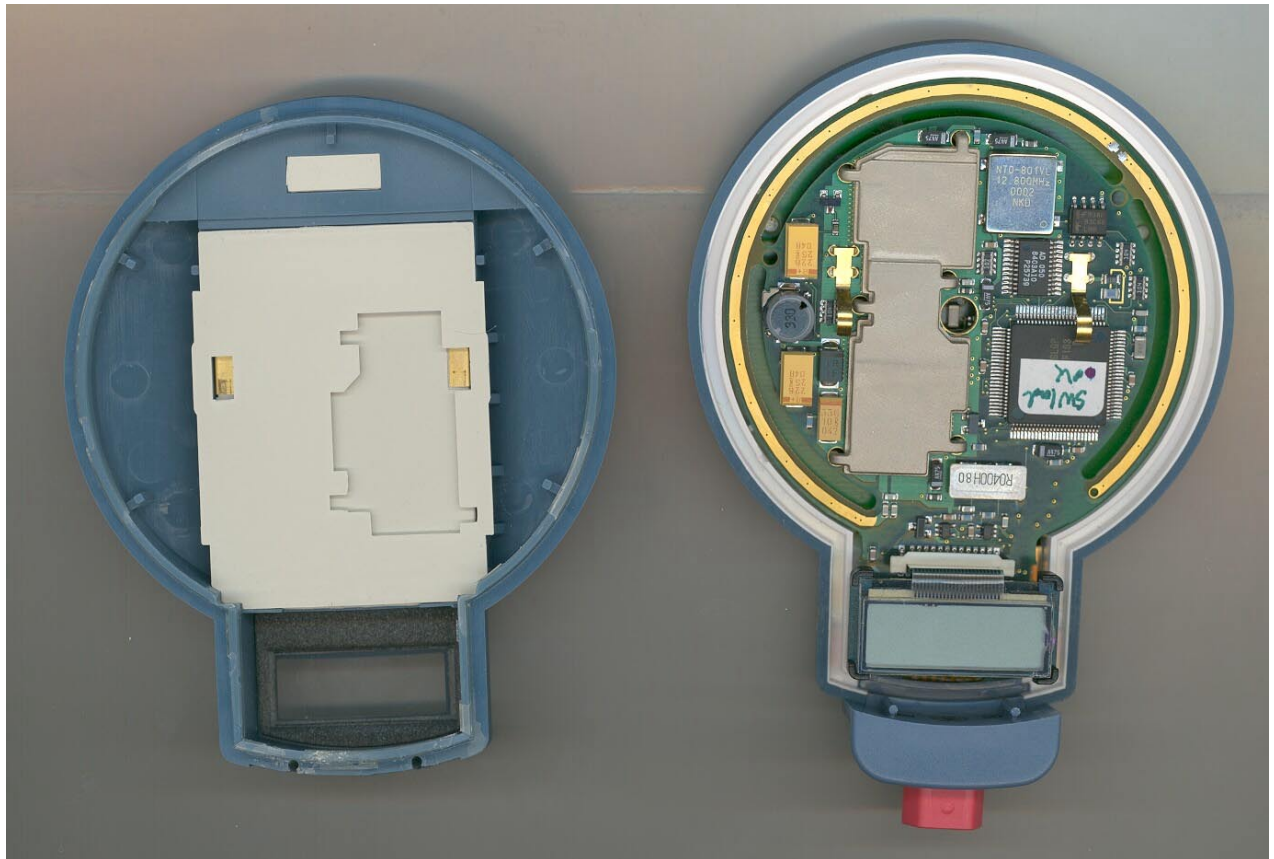
Photograph no.: 2



## PHOTOGRAPHS OF THE EQUIPMENT

### M2727A ECG-Transducer

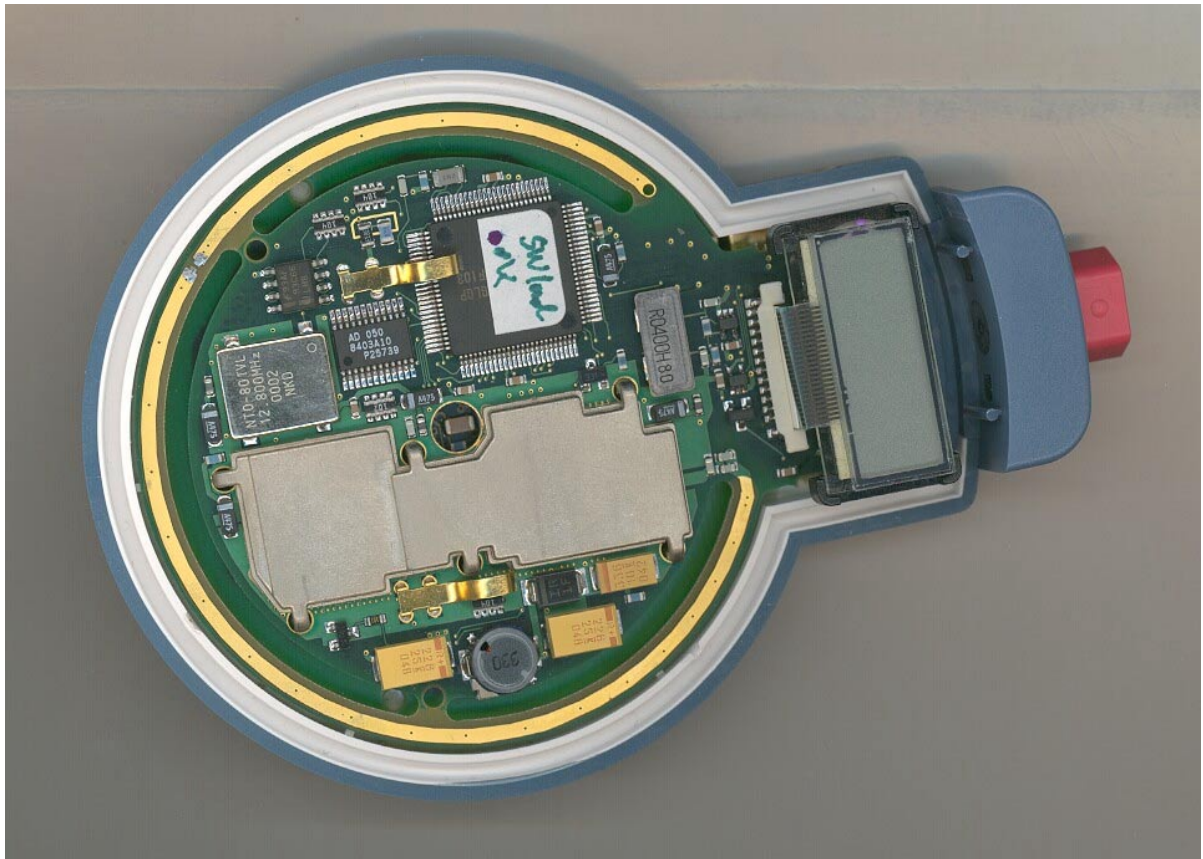
Photograph no.: 3



## PHOTOGRAPHS OF THE EQUIPMENT

### M2727A ECG-Transducer

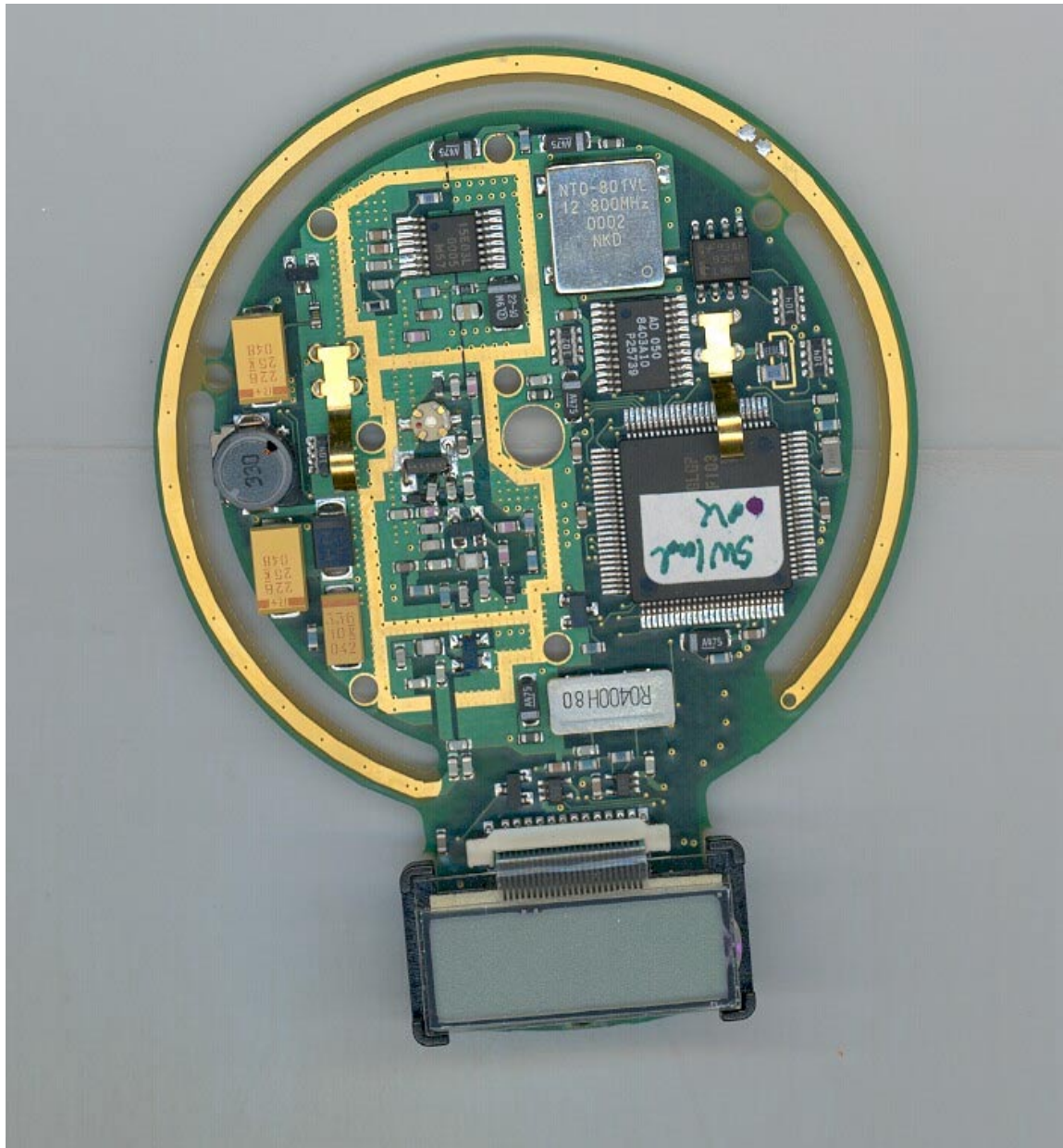
Photograph no.: 4



## PHOTOGRAPHS OF THE EQUIPMENT

### M2727A ECG-Transducer

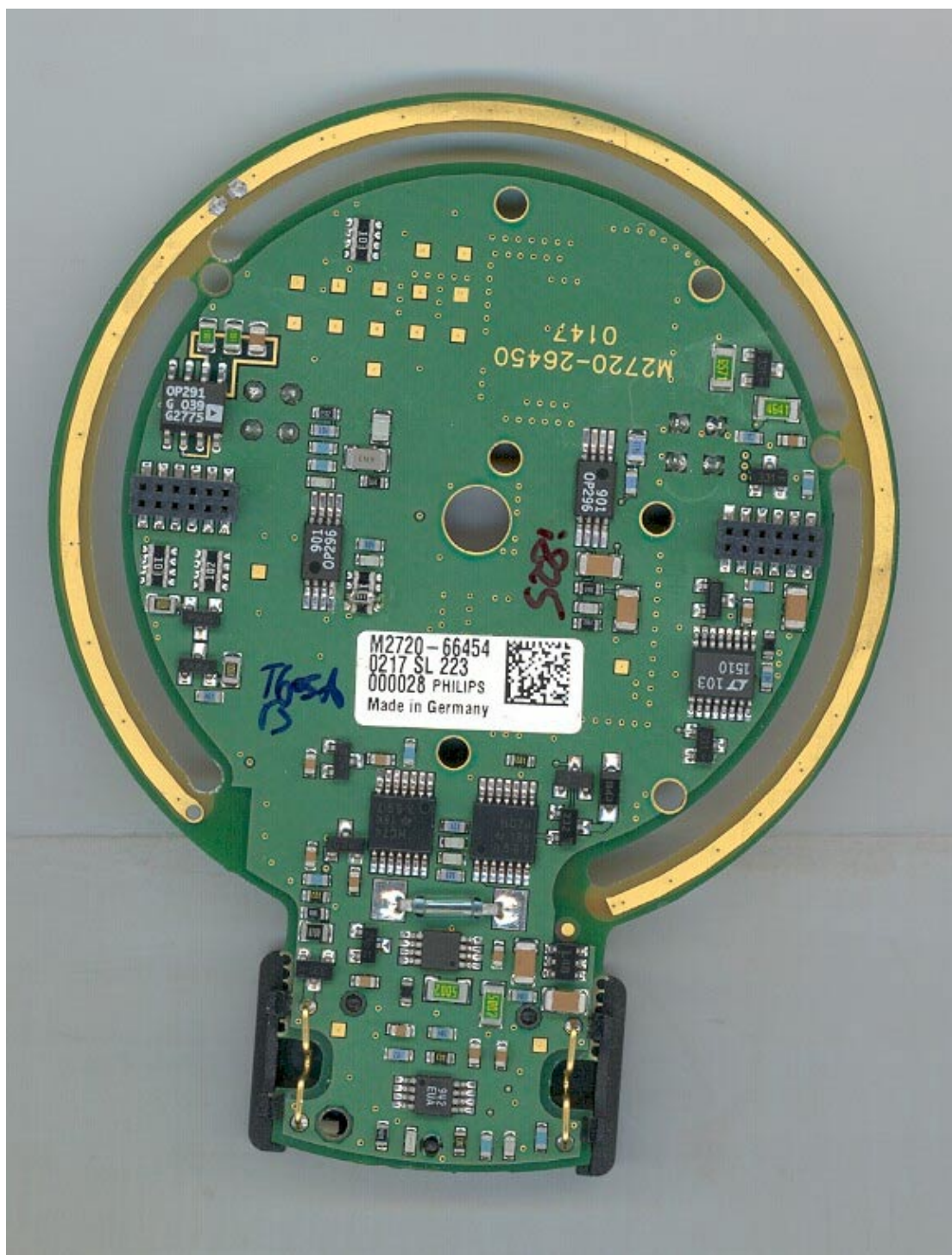
Photograph no.: 5



## PHOTOGRAPHS OF THE EQUIPMENT

### M2727A ECG-Transducer

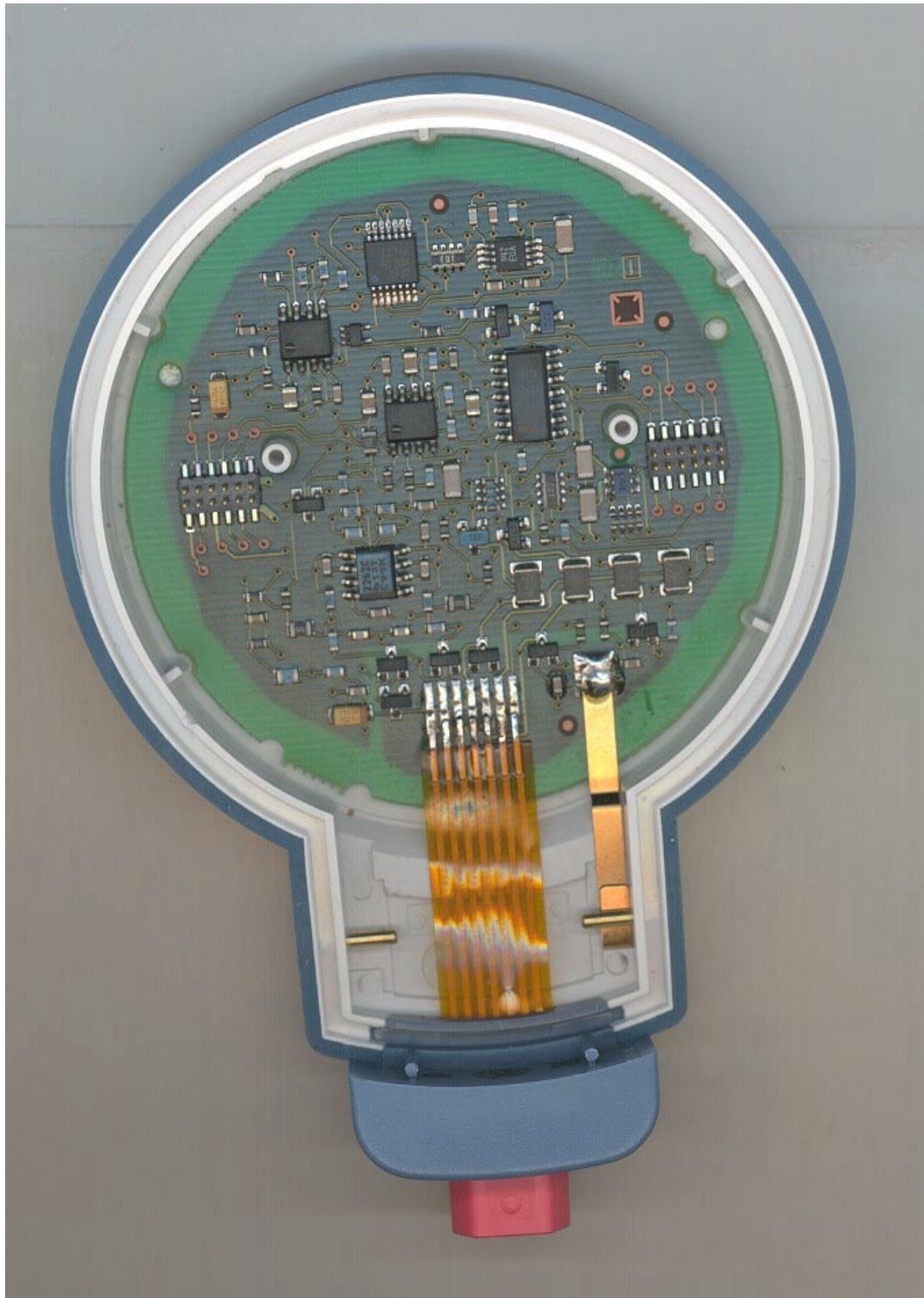
Photograph no.: 6



## PHOTOGRAPHS OF THE EQUIPMENT

### M2727A ECG-Transducer

Photograph no.: 7



## PHOTOGRAPHS OF THE EQUIPMENT

### M2727A ECG-Transducer

Photograph no.: 8

