



**ELECTRONIC TECHNOLOGY SYSTEMS  
DR. GENZ GMBH**

# **TEST - REPORT**

**FCC RULES PART 15 / SUBPART C**

**FCC ID: EW780-5686-00**

**Test report no.:**

**G0M20502-9263-P-15**



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### **3 Test Results**

# 1 General Information

## 1.1 Notes

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.

The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.

Furthermore, there is no guarantee that a test sample which has Passed all the relevant tests conforms to a specification.

Neither is there any guarantee that such a test sample will interwork with other genuinely open systems.

The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that its performance generally conforms to representative cases of communications equipment.

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

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### Tester:

23.02.2005

N. Kaspar



Date

ETS-Lab.

Name

Signature

### Technical responsibility for area of testing:

23.02.2005

Dr. Genz



Date

ETS

Name

Signature

## **1.2 Testing laboratory**

### **1.2.1 Location**

ELECTRONIC TECHNOLOGY SYSTEM DR. GENZ GMBH (ETS)

Storkower Straße 38c

D-15526 Reichenwalde b. Berlin

Germany

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### **1.2.2 Details of accreditation status**

#### **ACCREDITED TESTING LABORATORY**

**DAR-REGISTRATION NUMBER:** TTI-P-G 126/96

#### **ACCREDITED COMPETENT BODY**

**DAR-REGISTRATION NUMBER:** BPT-ZE-026/96

**FCC FILED TEST LABORATORY REG. NO.** 96970

#### **BLUETOOTH QUALIFICATION TEST FACILITY (BQTF)**

ACCREDITED BY BLUETOOTH QUALIFICATION REVIEW BOARD

**INDUSTRY CANADA FILED TEST LABORATORY REG. NO.** IC 3470

**A2LA ACCREDITED** Certificate Number 1983-01

## **1.3 Details of approval holder**

|           |                                                               |
|-----------|---------------------------------------------------------------|
| Name      | : VTech Telecommunications Limited                            |
| Street    | : 23/F, Tai Ping Industrial Centre, Block 1, 57 Ting Kok Road |
| Town      | : Tai Po                                                      |
| Country   | : Hong Kong                                                   |
| Telephone | : +852 2680 1000                                              |
| Fax       | : +852 2664 5521                                              |
| Contact   | : Mr. Elvis Wong                                              |
| E-mail    | : elvis_wong@vtech.com                                        |

## 1.4 Application details

Date of receipt of application : 14.02.2005  
 Date of receipt of test item : 14.02.2005  
 Date of test : 14.02.2005 – 17.02.2005

## 1.5 Test item

Description of test item : 2.4 GHz Cordless VoIP Phone  
 Type identification : USB7100 (1HS + 1 BS), USB711 (1HS + charger)  
 Handset  
 Hardware version : V2RC  
 Software version : V0017  
 Serial number : without  
 Photos : See Appendix A

### Technical data

Frequency band : 2.4GHz – 2,4835GHz  
 Frequency ( ch A) : 2401.86 MHz  
 Frequency (ch B) : 2441.63 MHz  
 Frequency (ch C) : 2481.39 MHz

| <u>Transmitter</u>  | <u>Vnom</u>            | <u>Vnom</u>         |
|---------------------|------------------------|---------------------|
| <b>Power (ch A)</b> | : Conducted: 19.36 dBm | Radiated: 20.37 dBm |
| <b>Power (ch B)</b> | : Conducted: 19.06 dBm | Radiated: 17.77 dBm |
| <b>Power (ch C)</b> | : Conducted: 18.52 dBm | Radiated: 18.65 dBm |

Power supply : 2.4 V DC  
 Operating mode : duplex  
 Type of modulation : FHSS  
 Antenna type : internal planar inverted F type antenna  
 Antenna gain *Handset* : 1.5 dBi (typ.) (Manufacturer declaration)

Host device : none

Classification :

|                                              |                                     |
|----------------------------------------------|-------------------------------------|
| Fixed Device                                 | <input type="checkbox"/>            |
| Mobile Device (Human Body distance > 20cm)   | <input type="checkbox"/>            |
| Portable Device (Human Body distance < 20cm) | <input checked="" type="checkbox"/> |

**Manufacturer:**  
(if applicable)

Name :  
Street :  
Town :  
Country :

Additional information:

The test sample is designed as 2.4GHz Cordless Phone. Its pseudorandom hopping scheme, authentication, receiver parameters, synchronization procedure and other parameters are determined by FCC RULES PART 15 / SUBPART C § 15.247.

## 1.6 Test standards

Technical standard : FCC RULES PART 15 / SUBPART C § 15.247

## 2 Technical test

### 2.1 Summary of test results

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



or

The deviations as specified in 2.5 were ascertained in the course of the tests performed.



### 2.2 Test environment

Temperature : 25° C

Relative humidity content : 20 ... 75 %

Air pressure : 86 ... 103 kPa

Details of power supply : 2.4 V DC

Extreme conditions parameters: : test voltage - extreme min.: --  
max: --

## 2.3 Test equipment utilized

| No.      | Test equipment                | Type                 | Manufacturer     |
|----------|-------------------------------|----------------------|------------------|
| ETS 0001 | ESD Gun                       | SESD 30000           | Schlöder         |
| ETS 0002 | Test receiver                 | ESVP                 | Rohde & Schwarz  |
| ETS 0003 | Diode power sensor            | NRV-Z2               | Rohde & Schwarz  |
| ETS 0004 | Spectrum and network analyzer | FSMS 26              | Rohde & Schwarz  |
| ETS 0005 | Test receiver                 | SMV 11               | MEB              |
| ETS 0006 | Test receiver system          | SME 12               | MEB              |
| ETS 0007 | Horn antenna                  | AT 4004              | ar               |
| ETS 0008 | Antenna                       | Loop antenna         | Siemens          |
| ETS 0009 | Antenna                       | ARA 2                | MEB              |
| ETS 0010 | Antenna                       | Loop antenna         | MEB              |
| ETS 0011 | Antenna                       | van Veen/ Frame      | Rohde & Schwarz  |
| ETS 0012 | Antenna                       | HK 116               | Rohde & Schwarz  |
| ETS 0013 | Antenna                       | HL 223               | Rohde & Schwarz  |
| ETS 0014 | Antenna                       | HL 025               | Rohde & Schwarz  |
| ETS 0015 | Antenna                       | HL 025               | Rohde & Schwarz  |
| ETS 0016 | Precision antenna kit         | VHAP                 | Schwarzbeck      |
| ETS 0017 | Precision antenna kit         | UHAP                 | Schwarzbeck      |
| ETS 0018 | Horn antenna                  | BBHA 9120 D          | Schwarzbeck      |
| ETS 0019 | Horn antenna                  | BBHA 9120 D          | Schwarzbeck      |
| ETS 0020 | Antenna                       | DP 21                | MEB              |
| ETS 0021 | Antenna                       | DP 3                 | MEB              |
| ETS 0022 | Antenna                       | SAS-200/ 521         | A.H. Systeme+D65 |
| ETS 0023 | Antenna                       | DP 1                 | MEB              |
| ETS 0024 | Antenna mast                  | AF 2                 | MEB              |
| ETS 0025 | Antenna mast                  | AF 2                 | MEB              |
| ETS 0026 | Tripod                        |                      | Heinrich Deisel  |
| ETS 0027 | Tripod                        |                      | Heinrich Deisel  |
| ETS 0028 | Tripod                        | STA 2                | C. Lorenz AG     |
| ETS 0029 | Tripod                        |                      | Berlebach        |
| ETS 0030 | Antenna                       | HK 116               | Rohde & Schwarz  |
| ETS 0031 | Turn table                    | DS 412               | Heinrich Deisel  |
| ETS 0032 | Controller                    | HD 050               | Heinrich Deisel  |
| ETS 0033 | Calibr.Set CDN                | 3xAdapter 50-150 Ohm | ETS              |

| No.      | Test equipment               | Type            | Manufacturer        |
|----------|------------------------------|-----------------|---------------------|
| ETS 0034 | RF generator/ Amplifier      | SMLR            | Rohde & Schwarz     |
| ETS 0035 | RF generator/ Amplifier      | SMLM            | Rohde & Schwarz     |
| ETS 0036 | Zirc. Antenna                | 3102            | EMCO                |
| ETS 0037 | Zirc. Antenna                | 3102L           | EMCO                |
| ETS 0038 | RF amplifier                 | 150L            | Amplifier Research  |
| ETS 0039 | Absorbing clamp              | MDS 21          | Rohde & Schwarz     |
| ETS 0040 | Artificial mains             | ESH3-Z5         | Rohde & Schwarz     |
| ETS 0041 | Artificial mains             | ESH3-Z4         | Rohde & Schwarz     |
| ETS 0042 | Artificial mains             | ESH3-Z6         | Rohde & Schwarz     |
| ETS 0043 | Directional coupler          | 1850            | KRYTAR              |
| ETS 0044 | Artificial mains             | NNB 111         | MEB                 |
| ETS 0045 | Stripe line                  | IEC 801-3       | ETS                 |
| ETS 0046 | Power supply                 | LTS 006         | RFT                 |
| ETS 0047 | Power supply                 | TG 20/ 1        | Statron             |
| ETS 0048 | Power supply                 | TG 20/ 1        | Statron             |
| ETS 0049 | Power supply                 | T 102           | TPW                 |
| ETS 0050 | Power supply                 | T 101b          | TPW                 |
| ETS 0051 | Oscilloscope                 | TDS 640A        | Tektronix           |
| ETS 0053 | ECAT Control center          | CE 40           | Keytek/ EMV         |
| ETS 0054 | EFT simulator                | E 412           | Keytek/ EMV         |
| ETS 0055 | Module network coupler       | E 4551          | Keytek/ EMV         |
| ETS 0056 | Blank plug-in                |                 | Keytek/ EMV         |
| ETS 0057 | Module SURGE with DC coupler | E 501           | Keytek/ EMV         |
| ETS 0058 | Capacitive coupling clamp    | E 502 B         | Keytek/ EMV         |
| ETS 0059 | Kikusui amplifier            | PCR 2000L       | Keytek/ EMV         |
| ETS 0060 | Xitron power analyzer        |                 | Keytek/ EMV         |
| ETS 0061 | Power/ Arb (Harm., Ramp)     |                 | Keytek/ EMV         |
| ETS 0062 | Reference impedance          |                 | Keytek/ EMV         |
| ETS 0063 | Blank plug-in                |                 | Keytek/ EMV         |
| ETS 0064 | CDN IEC 1000-4-6             |                 | Keytek/ EMV         |
| ETS 0065 | ESD-generator minizap        |                 | Keytek/ EMV         |
| ETS 0066 | EM Injection Clamp           |                 | FCC/ EMV            |
| ETS 0067 | Calibration Fixture          | IEC 801-2031 CF | FCC/ EMV            |
| ETS 0068 | CDN IEC 1000-4-6             | CDN             | FCC/ EMV            |
| ETS 0069 | EM Radiation Monitor         | EMR-20          | Wandel & Goltermann |

| No.      | Test equipment                   | Type           | Manufacturer          |
|----------|----------------------------------|----------------|-----------------------|
| ETS 0070 | PC Transfer set EMR-20           | EMR-20         | Wandel & Goltermann   |
| ETS 0071 | Video camera system              | KMB012         | Kocom                 |
| ETS 0072 | Interphone system                | JS-1400        | Jiuh Sheng            |
| ETS 0073 | Audio noise meter                | GSM 2          | MKD/ RFT              |
| ETS 0074 | RF millivoltmeter                | QRV 2          | MKD/ RFT              |
| ETS 0075 | NF generator                     | GF 22          | Präcitronic           |
| ETS 0076 | Feeding bridge A                 | SBA 1000       | ESP                   |
| ETS 0078 | LCR meter                        | SR 720         | SRS                   |
| ETS 0079 | Functional generator             | MX-2020        | Maxcom                |
| ETS 0080 | EMI Software                     | ES-K1          | Rohde & Schwarz       |
| ETS 0081 | EMI Software                     | ES-K10         | Rohde & Schwarz       |
| ETS 0082 | PC system                        | Novell         | Esotronic             |
| ETS 0083 | Apple computer system            | Performa 630   | Macintosh             |
| ETS 0084 | Process controller               | PSA 15         | Rohde & Schwarz       |
| ETS 0085 | Shielded room                    | SR 1           | Frankonia             |
| ETS 0086 | Anechoic chamber                 | AC 1           | Frankonia             |
| ETS 0087 | Climatic cell                    | HC 4033        | Heraeus               |
| ETS 0088 | Color TV pattern generator       | PM 5518-TX VPS | Philips               |
| ETS 0089 | Radio communication tester       | CMS 54         | Rohde & Schwarz       |
| ETS 0090 | DECT type approval CTR06         | TS 8930        | Rohde & Schwarz       |
| ETS 0091 | RF signal generator              | SME 03         | Rohde & Schwarz       |
| ETS 0092 | Power amplifier                  | 150W1000       | AR Amplifier Research |
| ETS 0093 | Attenuator                       | 57-20-33       | Weinschel             |
| ETS 0094 | Power sensor                     | NRV-Z55        | Rohde & Schwarz       |
| ETS 0095 | DECT system controller           | PSMD           | Rohde & Schwarz       |
| ETS 0096 | DECT Signaling unit              | PSMD-B11       | Rohde & Schwarz       |
| ETS 0097 | Rack, 19", 36 HU                 | TS 89RA        | Rohde & Schwarz       |
| ETS 0098 | System engineering and software  | CS 893BE       | Rohde & Schwarz       |
| ETS 0099 | Extension unit for basic version | TS 8930B       | Rohde & Schwarz       |
| ETS 0100 | RF signal generator              | SME-06         | Rohde & Schwarz       |
| ETS 0101 | Power amplifier                  | 50W1000B       | AR Amplifier Research |
| ETS 0102 | CDN                              | M3-801/6       | MEB                   |
| ETS 0103 | Magnetic field test set          | MF1000         | EMC Partner           |
| ETS 0105 | High power synthesizer/ sweeper  | SMP 22 / 02    | Rohde & Schwarz       |
| ETS 0108 | DECT protocol tester TBR 22      | TS 1220        | Rohde & Schwarz       |

| No.      | Test equipment                        | Type          | Manufacturer    |
|----------|---------------------------------------|---------------|-----------------|
| ETS 0109 | Process controller                    | PSM 2         | Rohde & Schwarz |
| ETS 0110 | Real time signaling unit              | PSMD-B2       | Rohde & Schwarz |
| ETS 0111 | PCM Real-time audio interface for PSM | PSMD-B3       | Rohde & Schwarz |
| ETS 0112 | Synthesizer Module                    | PSMD-B4       | Rohde & Schwarz |
| ETS 0113 | Keyboard                              | PSA-Z2        | Rohde & Schwarz |
| ETS 0114 | RF step attenuator                    | RSG           | Rohde & Schwarz |
| ETS 0115 | Glide path                            |               | Rohde & Schwarz |
| ETS 0117 | Insertion unit                        | URV-Z2        | Rohde & Schwarz |
| ETS 0118 | Mixer                                 | MFC 1000      | Avcom           |
| ETS 0119 | Mixer                                 | MFC 2000      | Avcom           |
| ETS 0120 | RF step attenuator                    | TRI-50-20     | INCO            |
| ETS 0121 | Oscilloscope                          | EO 147A       | Serute          |
| ETS 0122 | Oscilloscope                          | 5201          | Dagatron        |
| ETS 0123 | RF step attenuator                    | RBU           | Rohde & Schwarz |
| ETS 0124 | Tripod                                | STA 2         | Rohde & Schwarz |
| ETS 0125 | Small components                      |               |                 |
| ETS 0126 | Uninterruptible power supply          | UPS - 1500    | Sendon          |
| ETS 0127 | Uninterruptible power supply          | UPS - 1000 LC | Sendon          |
| ETS 0128 | Uninterruptible power supply          | UPS - 1000    | Sendon          |
| ETS 0129 | Uninterruptible power supply          | UPS - 500     | Sendon          |
| ETS 0130 | Uninterruptible power supply          | Power saver   | Sendon          |
| ETS 0131 | Telephone connection box              |               | Systel          |
| ETS 0132 | Frequency doubler                     | TR-0616       | EMG             |
| ETS 0133 | Probe body                            | P6015         | Tektronix       |
| ETS 0135 | Measuring switching point             | AK 11         | RFT             |
| ETS 0136 | Attenuator                            | 33-6-34       | Weinschel       |
| ETS 0137 | Multimeter                            | YX-360TRA     | Mastech         |
| ETS 0138 | Multimeter                            | DT-9410       | Diditec         |
| ETS 0139 | Multimeter                            | ST-9202       | Standard        |
| ETS 0140 | High voltage generator                | IP 6Wa        | TPW             |
| ETS 0141 | Sliding bridge                        | J 573         | RFT             |
| ETS 0142 | Impedance converter                   | TK 11         | RFT             |
| ETS 0143 | Impedance converter                   | TK 12         | RFT             |
| ETS 0146 | Active RF probe                       | ESH2-Z2       | Rohde & Schwarz |
| ETS 0147 | Probe                                 | TK 103        | MEB             |

| No.      | Test equipment                         | Type           | Manufacturer    |
|----------|----------------------------------------|----------------|-----------------|
| ETS 0149 | Power divider                          | ZAPD-21        | MCL             |
| ETS 0150 | Switcher                               | HR07-720       | Wisi            |
| ETS 0151 | Interference pulse generator           | NSG 500C       | Schaffner       |
| ETS 0155 | Signal generator                       | SMG            | Rohde & Schwarz |
| ETS 0157 | TV and Sat-Signalgenerator             | VTG 700        | Grundig         |
| ETS 0158 | TV and Sat Signalgenerator             | VTG 700        | Grundig         |
| ETS 0156 | Adjacent channel power meter           | NKS            | Rohde & Schwarz |
| ETS 0159 | Programmable power supply              | TOE 8815       | Toellner        |
| ETS 0160 | Protective wire and isolation tester   | PI 6001 D      | SPS electronic  |
| ETS 0161 | Harmonic / Flicker Analyser            | HFA 3000       | Schlöder        |
| ETS 0162 | Acoustic chamber                       | 403-A          | IAC             |
| ETS 0163 | Test head                              | BK 4602        | Brüel & Kjær    |
| ETS 0164 | Simulator ear                          | BK 4185        | Brüel & Kjær    |
| ETS 0165 | Simulator mouth                        | BK 4227        | Brüel & Kjær    |
| ETS 0166 | Acoustic calibrator                    | BK 4231        | Brüel & Kjær    |
| ETS 0167 | Communication Analysis System          | CAS TE I       | HEAD acoustics  |
| ETS 0168 | Acoustical test for DECT               | CTR 10         | HEAD acoustics  |
| ETS 0169 | Measurement - Front-end (analogue)     | MFE III        | HEAD acoustics  |
| ETS 0170 | Measurement - Front-end (digital)      | MFE IV         | HEAD acoustics  |
| ETS 0171 | Electronic test cradle                 | TEH            | HEAD acoustics  |
| ETS 0172 | Noise generator                        | HNG III.1      | HEAD acoustics  |
| ETS 0173 | Speaker                                | Canton S Pluss | HEAD acoustics  |
| ETS 0174 | Measurement - Front-end line interface | MFE V          | HEAD acoustics  |
| ETS 0175 | Software line interface (analogue)     | COPTZV5        | HEAD acoustics  |
| ETS 0176 | Acoustic volt meter                    | COP 4          | HEAD acoustics  |
| ETS 0177 | Feeding bridge B                       | SBB 1000       | ESP             |
| ETS 0178 | Open area test side                    | 10m            | ETS             |
| ETS 0180 | Artificial mains                       | NNB01/RFZ      | RFZ             |
| ETS 0181 | Test pin for protective wire           | PE 156-i       | SPS electronic  |
| ETS 0182 | Power supply                           | MX-9300        | Maxcom          |
| ETS 0183 | Frequency counter                      | MX-9300        | Maxcom          |
| ETS 0184 | Function generator                     | MX-9300        | Maxcom          |
| ETS 0185 | Digital multimeter                     | MX-9300        | Maxcom          |
| ETS 0186 | Power supply                           | DF 1730        | WJG             |

| No.      | Test equipment                    | Type      | Manufacturer    |
|----------|-----------------------------------|-----------|-----------------|
| ETS 0187 | Power supply                      |           | TPW/RFT         |
| ETS 0188 | High voltage generator            |           |                 |
| ETS 0189 | Spectrum analyzer                 | FSEB      | Rohde & Schwarz |
| ETS 0190 | Function generator                | MX 2020   | Maxcom          |
| ETS 0191 | Sweep function generator          | 7202      | Dagatron        |
| ETS 0192 | Audio generator                   | 7101      | Dagatron        |
| ETS 0193 | Vibration table                   | N1-201-M  | Sandox          |
| ETS 0194 | Digital multimeter                | PMM 208   | Dagatron        |
| ETS 0195 | Thermo hygro recorder             |           | Amarell         |
| ETS 0196 | Digital thermometer               | AK-688    | KD              |
| ETS 0197 | Digital thermometer               |           | Prima           |
| ETS 0198 | Digital thermometer               | ad 170th  | ama-digit       |
| ETS 0199 | Digital thermometer               | ad 31th   | ama-digit       |
| ETS 0200 | Digital thermometer / hygro meter | ad 90h    | ama-digit       |
| ETS 0201 | Digital thermometer / hygro meter | 37950-10  | Cole Parmer     |
| ETS 0202 | Digital thermometer               | ad 15th   | ama-digit       |
| ETS 0204 | Digital thermometer               | ad 20th   | ama-digit       |
| ETS 0205 | High voltage test generator       | HA 3300 D | SPS electronic  |
| ETS 0206 | High voltage test accessories     | HVGZ 312  | SPS electronic  |
| ETS 0207 | Socket outlet torque balance      | F 37.13   | PTL             |
| ETS 0208 | Unjointed Finger probe            | P 10.05   | PTL             |
| ETS 0209 | Flexible Finger probe             | P 10.01   | PTL             |
| ETS 0210 | Spring operated impact hammer     | P 22.50   | PTL             |
| ETS 0211 | Metallic ball                     | F 53.32   | PTL             |
| ETS 0212 | Hazardous live probe              | P 10.06   | PTL             |
| ETS 0213 | Hazardous live probe              | P 10.11   | PTL             |
| ETS 0214 | Ball pressure test apparatus      | T 10.02   | PTL             |
| ETS 0215 | Glow Wire tester                  | T 03.14   | PTL             |
| ETS 0216 | Force indicator 50N               | P 10.31   | PTL             |
| ETS 0218 | RF probe                          | URV5-Z7   | Rohde & Schwarz |
| ETS 0219 | Power sensor                      | NRV-Z2    | Rohde & Schwarz |
| ETS 0221 | ISDN-S0-Analyzer                  | K1403     | Siemens         |
| ETS 0222 | ISDN Protocol Analyzer            | TE965     | Tekelec Teleco. |
| ETS 0223 | GSM/ PCN/ PCS-Simul.              | TS8915B   | Rohde & Schwarz |
| ETS0224A | Millivolt meter                   | URV5      | Rohde & Schwarz |
| ETS0224B | Diode Power Sensor                | NRV-Z1    | Rohde & Schwarz |

| No.      | Test equipment                            | Type        | Manufacturer       |
|----------|-------------------------------------------|-------------|--------------------|
| ETS0224C | Programmable high resolution time counter | PM6654G     | Philips            |
| ETS0224D | RF Stepp Attenuator                       | RSP         | Rohde & Schwarz    |
| ETS 0225 | SIM Simulator                             |             | Orga               |
| ETS 0226 | SIM Editor                                |             | Orga               |
| ETS 0227 | Vibration table                           | TIRA vib    | GenRad             |
| ETS 0228 | Climatic chamber                          | VT 4010     | Vötsch             |
| ETS 0229 | Radio commun. tester                      | CMT 54      | Rohde & Schwarz    |
| ETS 0230 | Radio commun. tester                      | CMD 65      | Rohde & Schwarz    |
| ETS 0232 | Radiation test source                     | VSQ 1       | MEB                |
| ETS 0233 | Direction coupler                         | RK 100      | MEB                |
| ETS 0234 | Power meter                               | NRVD        | Rohde & Schwarz    |
| ETS 0235 | RF network-analyzer                       | 8752 C      | Hewlett Packard    |
| ETS 0236 | RF amplifier                              | 100A100     | Amplifier Research |
| ETS 0237 | RF amplifier                              | 100W1000M1  | Amplifier Research |
| ETS 0238 | Field strong meter                        | FM 2000     | Amplifier Research |
| ETS 0239 | Isotr. field probe 40 GHz                 | FP 2080 Kit | Amplifier Research |
| ETS 0240 | Isotr. field probe 1 GHz                  | FP 2000 Kit | Amplifier Research |
| ETS 0241 | Pulse Generator                           | 4050        | PicoSecond PL      |
| ETS 0242 | Harmonics analyzer                        | F 41B       | Fluke              |
| ETS 0243 | AC-clamp 1000 A                           | 80i 1000s   | Fluke              |
| ETS 0244 | Burst generator                           | EFT 200     | EM-Test            |
| ETS 0245 | Load dump generator                       | LD 200      | EM-Test            |
| ETS 0246 | Voltage drop simulator                    | VDS 200     | EM-Test            |
| ETS 0247 | Microsecond generator                     | MPG 200     | EM-Test            |
| ETS 0248 | Switch unit                               | AN 200      | EM-Test            |
| ETS 0249 | Coupling network                          | CNA 200     | EM-Test            |
| ETS 0250 | Coupling clamp                            | ACC         | EM-Test            |
| ETS 0251 | Climatic chamber                          | VT 4004     | Vötsch             |
| ETS 0252 | System controller                         | PSM 12      | Rohde & Schwarz    |
| ETS 0253 | Spectrum analyzer                         | FSIQ        | Rohde & Schwarz    |
| ETS 0254 | RF generator                              | SMIQ 03     | Rohde & Schwarz    |
| ETS 0255 | RF generator                              | SMIQ 03     | Rohde & Schwarz    |
| ETS 0256 | RF generator                              | SMP 03      | Rohde & Schwarz    |
| ETS 0257 | Step attenuator                           | RSP         | Rohde & Schwarz    |
| ETS 0258 | Rubidium standard                         | RSTU        | DATUM GmbH         |

| No.      | Test equipment            | Type      | Manufacturer    |
|----------|---------------------------|-----------|-----------------|
| ETS 0259 | Power meter               | NRVD      | Rohde & Schwarz |
| ETS 0260 | Power sensor              | NRVD-Z1   | Rohde & Schwarz |
| ETS 0261 | Power sensor              | NRVD-Z1   | Rohde & Schwarz |
| ETS 0262 | Switching unit            | SSCU      | Rohde & Schwarz |
| ETS 0263 | Signaling unit            | PTW60     | Rohde & Schwarz |
| ETS 0264 | Spectrum analyzer         | F 1048    | HAMEG           |
| ETS 0265 | Loop antenna              | HFRA 9150 | Schwarzbeck     |
| ETS 0266 | Measurement adapter 1:100 | 50 Ohm    |                 |
| ETS 0267 | RF signal generator       | SMT 03    | Rohde & Schwarz |
| ETS 0268 | RF signal generator       | SMP 02    | Rohde & Schwarz |
| ETS 0269 | RF bridge 50 Ohm          | 86205 A   | Aglient         |
| ETS 0270 | RF signal generator       | SMP 04    | Rohde & Schwarz |
| ETS 0271 | Spectrum analyser         | FSEK30    | Rohde & Schwarz |
| ETS 0272 | RF signal generator       | SME 03    | Rohde & Schwarz |
| ETS 0273 | RF signal generator       | SME 03    | Rohde & Schwarz |
| ETS 0274 | RF signal generator       | SMY 01    | Rohde & Schwarz |
| ETS 0275 | Power sensor              | NRV-Z51   | Rohde & Schwarz |
| ETS 0276 | Audio analyzer            | UPL       | Rohde & Schwarz |
| ETS 0277 | Power sensor              | NRV-Z1    | Rohde & Schwarz |
| ETS 0278 | Power sensor              | NRV-Z31   | Rohde & Schwarz |
| ETS 0279 | Step attenuator           | RSP       | Rohde & Schwarz |
| ETS 0280 | Power meter               | NRVD      | Rohde & Schwarz |
| ETS 0281 | Spectrum analyzer         | FSM       | Rohde & Schwarz |
| ETS 0282 | RF bridge 75 Ohm          | 86207 A   | Hewlett Packard |
| ETS 0283 | RF bridge 50 Ohm          | 86205 A   | Hewlett Packard |
| ETS 0284 | Field probe               | 11940 A   | Hewlett Packard |
| ETS 0285 | Field probe               | 11941 A   | Hewlett Packard |
| ETS 0286 | Limiter                   | 11867 A   | Hewlett Packard |
| ETS 0287 | Test receiver             | ESHS 10   | Rohde & Schwarz |
| ETS 0288 | Artificial mains          | ESH2-Z5   | Rohde & Schwarz |
| ETS 0289 | Audio generator           | TAG 101   | Troneer         |
| ETS 0290 | Audio generator           | TAG 101   | Troneer         |
| ETS 0291 | Loop antenna              | HFH2-Z2   | Rohde & Schwarz |
| ETS 0292 | RF generator              | SMHU      | Rohde & Schwarz |
| ETS 0293 | Artificial mains          | NNBM 8125 | Schwarzbeck     |

| No.      | Test equipment             | Type         | Manufacturer             |
|----------|----------------------------|--------------|--------------------------|
| ETS 0294 | Biconical antenna          | HK 116       | Rohde & Schwarz          |
| ETS 0295 | LPD antenna                | HL 223       | Rohde & Schwarz          |
| ETS 0297 | Power pulse generator      | IGUF 2910    | Schwarzbeck              |
| ETS 0298 | ICO tester                 | TS 1232      | Rohde & Schwarz          |
| ETS 0299 | DECT protocol tester       | TS 1220      | Rohde & Schwarz          |
| ETS 0300 | RF amplifier               | 75 A 250     | Amplifier Research       |
| ETS 0301 | Relay switch unit          | RSU          | Rohde & Schwarz          |
| ETS 0302 | Data line CDN              | CM-I/O CD    | Keytek                   |
| ETS 0303 | Telecom line CDN           | CM-TEL CD    | Keytek                   |
| ETS 0304 | Test receiver              | ESHS 10      | Rohde & Schwarz          |
| ETS 0305 | Test receiver              | ESVS 10      | Rohde & Schwarz          |
| ETS 0306 | Function generator         | HP 33120A    | Hewlett Packard          |
| ETS 0307 | Commu. Sign. Analyzer      | CSA 803 A    | Tektronix                |
| ETS 0308 | Spectrum analyzer          | R 3361A      | Advantest                |
| ETS 0309 | Anechoic chamber           | AC 2         | Frankonia                |
| ETS 0310 | Anechoic chamber           | AC 3         | Frankonia                |
| ETS 0311 | Anechoic chamber           | AC 4         | Frankonia                |
| ETS 0312 | Climatic chamber           | VC 0033      | Vötsch                   |
| ETS 0313 | Power sensor               | NRV-Z51      | Rohde & Schwarz          |
| ETS 0314 | LPD antenna                | HL 223       | Rohde & Schwarz          |
| ETS 0315 | Biconical antenna          | HK 116       | Rohde & Schwarz          |
| ETS 0316 | Switcher                   | Hr 07-720    | WISI                     |
| ETS 0318 | Dial pulse/ DTMF tester    | 210          | HE                       |
| ETS 0319 | Opto link                  | GPIB 140     | NI                       |
| ETS 0320 | Opto link                  | GPIB 140     | NI                       |
| ETS 0322 | Insertion unit             | URV5-Z4      | Rohde & Schwarz          |
| ETS 0323 | DECT portable part         | Gigaset 1000 | SIEMENS                  |
| ETS 0324 | DECT fix part              | Gigaset 1000 | SIEMENS                  |
| ETS 0325 | DECT portable part         |              | Philipps                 |
| ETS 0326 | DECT fix part              |              | Philipps                 |
| ETS 0327 | Blue Unit                  | V 2.0        | Nokia                    |
| ETS 0328 | ELF Field Strenght System  | HI-3604      | Holaday Industries, INC. |
| ETS 0329 | VDT/VLF Radiation System   | HI-3603      | Holaday Industries, INC. |
| ETS 0330 | Fiber Optic Remote Control | HI.3616      | Holaday Industries, INC. |
| ETS 0331 | TS 1220                    |              |                          |

| No.      | Test equipment               | Type              | Manufacturer    |
|----------|------------------------------|-------------------|-----------------|
| ETS 0332 | PSM                          |                   |                 |
| ETS 0333 | turn table                   | DE 350            | Heinrich Deisel |
| ETS 0334 | Controller                   | HD 100            | Heinrich Deisel |
| ETS 0335 | BT development kit           | CASIRA            | CSR             |
| ETS 0336 | LPD Antenna                  | HL 223            | Rohde & Schwarz |
| ETS 0337 | Professional Power Amplifier | SE-1200           | Wharfedale Pro  |
| ETS 0338 | Coupling network             | KN002             | ETS             |
| ETS 0339 | Isolating transformer        | KN003             | ETS             |
| ETS 0340 | Thermometer                  |                   | Proficell       |
| ETS 0341 | Thermometer                  |                   | Proficell       |
| ETS 0342 | Thermometer                  |                   | Proficell       |
| ETS 0343 | Thermometer                  |                   | Proficell       |
| ETS 0344 | Thermometer                  |                   | Proficell       |
| ETS 0345 | Thermometer                  |                   | Proficell       |
| ETS 0346 | Thermometer                  |                   | Proficell       |
| ETS 0347 | Current Probe                | EZ-17             | Rohde & Schwarz |
| ETS 0348 | RF millivoltmeter            | URV 55            | Rohde & Schwarz |
| ETS 0349 | Insertion unit               | URV5-Z4           | Rohde & Schwarz |
| ETS 0350 | Horn Antenna                 | BBHA 9120-C       | Schwarzbeck     |
| ETS 0351 | RF amplifier                 | DWT-1857          | Microwave       |
| ETS 0354 | RF amplifier                 | DBS-0408N423      | Microwave       |
| ETS 0355 | high pass                    | H03G12G3          | Microwave       |
| ETS 0356 | high pass                    | H03G12G3          | Microwave       |
| ETS 0357 | high pass                    | H08G18G3          | Microwave       |
| ETS 0358 | RF amplifier                 | AFD3-010040-15-ln | MITEQ           |
| ETS 0359 | RF amplifier                 | M/N AM-1331       | MITEQ           |
| ETS 0360 | RF amplifier                 | DBS-0408N423      | Microwave       |
| ETS 0361 | RF amplifier                 | DBS 1826N515      | Microwave       |
| ETS 0362 | high pass                    | H03G12G3          | Microwave       |
| ETS 0363 | high pass                    | H08G18G3          | Microwave       |
| ETS 0364 | high pass                    | H08G18G3          | Microwave       |
| ETS 0365 | Notch filter 2.4 GHz         | WRCT2.40/248      | Wain Wright     |
| ETS 0366 | high pass                    | H08G18G3          | Microwave       |
| ETS 0367 | high pass                    | H03G12G3          | Microwave       |
| ETS 0368 | Notch filter 0.5-1 GHz       | BN86883           | Schomandl       |
| ETS 0369 | Notch filter 210-500 MHz     | BN86882           | Schomandl       |
| ETS 0370 | Notch filter 15-90 MHz       | BN86880           | Schomandl       |
| ETS 0371 | Notch filter 85-250 MHz      | BN86881           | Schomandl       |
| ETS 0372 | Direction coupler            | RK 100            | MEB             |
| ETS 0373 | Direction coupler            | DC3001            | emv             |
| ETS 0374 | Power Supply                 | NGSM32            | Rohde & Schwarz |

| No.      | Test equipment                  | Type              | Manufacturer    |
|----------|---------------------------------|-------------------|-----------------|
| ETS 0375 | Vector Signal Generator         | SMIQ03B           | Rohde & Schwarz |
| ETS 0376 | Signal Generator                | SMP22             | Rohde & Schwarz |
| ETS 0377 | Advanced Signal Condi. Unit     | ASCU850           | Rohde & Schwarz |
| ETS 0378 | Advanced Signal Condi. Unit     | ASCU190           | Rohde & Schwarz |
| ETS 0379 | Advanced Signal Condi. Unit     | ASCU180           | Rohde & Schwarz |
| ETS 0380 | Advanced Signal Condi. Unit     | ASCU900           | Rohde & Schwarz |
| ETS 0381 | Ethernet HUB                    | CS-HUB            | Rohde & Schwarz |
| ETS 0382 | Vector Signal Generator         | SMIQ03B           | Rohde & Schwarz |
| ETS 0383 | Spectrum Analyzer               | FSU26             | Rohde & Schwarz |
| ETS 0384 | Main Frame Signal and Con. Unit | SSCU-GW           | Rohde & Schwarz |
| ETS 0385 | Universal Protocol Tester       | CRTU-RU           | Rohde & Schwarz |
| ETS 0386 | Power meter                     | NRVD              | Rohde & Schwarz |
| ETS 0387 | Power sensor                    | NRV-Z1            | Rohde & Schwarz |
| ETS 0388 | Power sensor                    | NRV-Z1            | Rohde & Schwarz |
| ETS 0389 | Fading Simulator                | ABFS              | Rohde & Schwarz |
| ETS 0390 | System PC PC3600                | TS-PC36           | Rohde & Schwarz |
| ETS 0391 | Rubidium Frequency Standard     | DATUM 8040        | DATUM GmbH      |
| ETS 0392 | RF Distribution                 | DATUM 6502        | DATUM GmbH      |
| ETS 0393 | Insertion unit                  | URV5-Z4           | Rohde & Schwarz |
| ETS 0394 | Advanced Signal Cond. Unit      | ASCUFDD-WCDMA     | Rohde & Schwarz |
| ETS 0395 | Universal Protocol Tester       | CRTU-RU           | Rohde & Schwarz |
| ETS 0396 | Universal Protocol Tester       | CRTU-RU           | Rohde & Schwarz |
| ETS 0397 | Universal Protocol Tester       | CRTU-RU           | Rohde & Schwarz |
| ETS 0398 | Fading Simulator                | ABFS              | Rohde & Schwarz |
| ETS 0399 | Universal Protocol Tester       | CRTU-PU           | Rohde & Schwarz |
| ETS 0400 | Universal Protocol Tester       | CRTU-W            | Rohde & Schwarz |
| ETS 0418 | High pass filter 4-8GHz         |                   | Microwave       |
| ETS 0419 | High pass filter 8-18 GHz       |                   | Microwave       |
| ETS 0420 | Amplifier 0.1-1 GHz             | M/N AM-1331       | MITEC           |
| ETS 0421 | Amplifier 1-4 GHz               | AFD3-010040-15-LN | MITEC           |
| ETS 0422 | Amplifier 4-8 GHz               | DBS-0408N423      | Narda           |
| ETS 0423 | Amplifier 8-18 GHz              | DWT-18057         | Narda           |
| ETS 0424 | Amplifier 18-26.5 GHz           | DBS-1826N515      | Narda           |
| ETS 0425 | T-network                       | ESH 3-Z4          | R&S             |
| ETS 0426 | CDN                             | T4 HF             | MEB             |
| ETS 0427 | Power sensor                    | NRV-Z6            | Rohde & Schwarz |
| ETS 0428 | 4-WIRE ISN with B1              | ENY41             | Rohde & Schwarz |
| ETS 0429 | Current probe test jig          | SW14 7LY          | Chase           |
| ETS 0430 | RF signal generator             | SML02             | R&S             |
| ETS 0431 | AC mains adapter                | BS5733            | Travel Emporium |
| ETS 0432 | RF amplifier matrix             | RSU-ETS-BT        | ETS             |
| ETS 0433 | RF amplifier matrix             | RSU-ETS-CTR6      | ETS             |
| ETS 0434 | Reserved Tre                    | RSU-ETS-GSM       |                 |

| No.      | Test equipment                   | Type              | Manufacturer                |
|----------|----------------------------------|-------------------|-----------------------------|
| ETS 0435 | HP-Filter                        | H1G04G01          | Microwave                   |
| ETS 0436 | HP-Filter                        | H1G04G01          | Microwave                   |
| ETS 0437 | HP-Filter                        | H0G408G1          | Microwave                   |
| ETS 0438 | HP-Filter                        | H0G408G1          | Microwave                   |
| ETS 0439 | Amplifier                        | DBS-1826N515      | Narda-DBS-Microwave         |
| ETS 0440 | Amplifier                        | AM-1331           | MITEQ                       |
| ETS 0441 | Bluetooth Protocol Tester        | PTW 60            | Rohde & Schwarz             |
| ETS 0442 | Nokia Tester for Bluetooth 1.1   | DTL - 1           | Nokia                       |
| ETS 0443 | IBM BT PC Card                   | BTPCN101          | IBM / Motorola              |
| ETS 0444 | Sony BT DUN Modem                | BTA- NW 1         | Sony                        |
| ETS 0445 | RF attenuator 6dB                | 50FH-006-300      | JFK                         |
| ETS 0446 | RF attenuator 30dB               | 50FH-030-300      | JFK                         |
| ETS 0447 | Motor vehicle artificial network | LN-KFZ/200        | R. Heine Hochfrequenztechn. |
| ETS 0448 | RF power amplifier               | AR 60S1G3         | AR Amplifier Resarch        |
| ETS 0449 | Stäubli robot                    | RX90B L           | Stäubli                     |
| ETS 0450 | Stäubli robot controller         | CS/MBs&p          | Stäubli                     |
| ETS 0451 | DASY 4 measurement server        |                   | Schmidt & Partner           |
| ETS 0452 | Control pendant                  |                   | Stäubli                     |
| ETS 0453 | Compaq computer                  | Pentium IV 2 GHz  | Schmidt & Partner           |
| ETS 0454 | Dabu acquisition electronics     | DAE3V1            | Schmidt & Partner           |
| ETS 0455 | Dummy probe                      |                   | Schmidt & Partner           |
| ETS 0456 | Dosimetric E-field probe         | ET3DV6            | Schmidt & Partner           |
| ETS 0457 | Dosimetric E-field probe         | ET3DV6            | Schmidt & Partner           |
| ETS 0458 | Dosimetric H-field probe         | H3DV6             | Schmidt & Partner           |
| ETS 0459 | System validation kit            | D900V2            | Schmidt & Partner           |
| ETS 0460 | System validation kit            | D1800V2           | Schmidt & Partner           |
| ETS 0461 | System validation kit            | D1900V2           | Schmidt & Partner           |
| ETS 0462 | System validation kit            | D2450V2           | Schmidt & Partner           |
| ETS 0463 | Probe alignment unit             | LBV2              | Schmidt & Partner           |
| ETS 0464 | SAM twin phantom                 | V4.0              |                             |
| ETS 0465 | Mounting device                  | V 3.1             |                             |
| ETS 0466 | Directional coupler              | HP 87300B         |                             |
| ETS 0468 | Isotropic E-Field Probe          | ER3DV6            | Schmid&Partner              |
| ETS 0469 | Dielectric probe kit             | 85070D            | Agilent                     |
| ETS 0470 | Amplifier                        | AM-1300-1103      | MITEQ                       |
| ETS 0472 | Antenna                          | BTA-H             | Frankonia                   |
| ETS 0473 | GSM / UMTS system simulator      | TS 8950           | Rohde & Schwarz             |
| ETS 0474 | EMI test receiver                | ESCS30            | Rohde & Schwarz             |
| ETS 0475 | Amplifier                        | AFS4-00101800-U   | MITEQ                       |
| ETS 0476 | Test receiver                    | ESCS 30           | Rohde & Schwarz             |
| ETS 0477 | GPS system (active GPS antenna)  | 4490              | HOPF                        |
| ETS 0478 | Crystal filter                   | MQF 127.50-2400/F | Vectron International       |
| ETS 0480 | Validation dipole                | DB 3              | EMCO                        |

| No.      | Test equipment                          | Type                    | Manufacturer       |
|----------|-----------------------------------------|-------------------------|--------------------|
| ETS 0481 | 40GHz standard gain horn with amplifier | 22240-25<br>CBL26402075 | Flann Microwave    |
| ETS 0482 | 40GHz high gain antenna                 | AT4560                  | Amplifier research |
| ETS 0483 | Amplifier                               | AFD3010040-15-LN        | MITEQ              |
| ETS 0485 | Radio Communication Tester              | CMU 200                 | Rohde & Schwarz    |

## 2.4 General Test Procedure

**POWER LINE CONDUCTED INTERFERENCE:** The procedure used was ANSI STANDARD C63.4-2003 5.2 using a 50 $\mu$ H LISN (if necessary). Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

**RADIATION INTERFERENCE:** The test procedure used was ANSI STANDARD C63.4-2003 6.4 using a spectrum analyzer. The resolution bandwidth of the spectrum analyzer was 100 kHz for measurements below 1 GHz and RBW 1 MHz was used above 1 GHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The ambient temperature of the UUT was 25°C with a humidity of 40 %.

**FORMULA OF CONVERSION FACTORS:** The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dB $\mu$ V) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB.

Example:

|             |                                                          |
|-------------|----------------------------------------------------------|
| Freq. (MHz) | METER READING + ACF + CABLE LOSS (to the receiver) = FS  |
| 33          | 20 dB $\mu$ V + 10.36 dB + 6 dB = 36.36 dB $\mu$ V/m @3m |

**ANSI STANDARD C63.4-2003 6.2.1 MEASUREMENT PROCEDURES:** The UUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m (non metallic table). The UUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to 10<sup>th</sup> harmonic of the fundamental.

Peak readings were taken in three (3) orthogonal planes and the highest readings.

Measurements were made by ETS Dr. Genz GmbH at the registered open field test site located at Storkower Str. 38c, 15526 Reichenwalde, Germany.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

**ANTENNA & GROUND:**

This unit uses internal antenna. There is no provision for an external antenna (see photo).

### 3 Test results (enclosure)

| TEST CASE                                            | Required                            | Test passed                         | Test failed              |
|------------------------------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| Peak Output Power                                    | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Equivalent radiated power                            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Spurious Emissions radiated - Transmitter operating  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Spurious Emissions conducted - Transmitter operating | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> |
| Carrier Frequency Separation                         | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Number of Hopping Frequencies                        | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Time of Occupancy (Dwell Time)                       | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 20 dB Bandwidth                                      | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Band-edge Compliance of RF Emissions                 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Conducted Measurement at (AC) Power Line             | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

### 3.1 Peak Output Power (transmitter)

This measurement applies to equipment with an integral antenna and to equipment with an antenna connector and equipped with an antenna as declared by the applicant.

The power was measured with modulation (declared by the applicant).

| Test conditions                |                          | Conducted Power    |                    |                    |
|--------------------------------|--------------------------|--------------------|--------------------|--------------------|
|                                |                          | Channel A<br>[dBm] | Channel B<br>[dBm] | Channel C<br>[dBm] |
| $T_{nom} = 25^{\circ}\text{C}$ | $V_{nom} = 2.4\text{ V}$ | 19.36              | 19.06              | 18.52              |
| Measurement uncertainty        |                          | < 3 dB             |                    |                    |

| Test conditions                |                          | Radiated Power Antenna |                    |                    |
|--------------------------------|--------------------------|------------------------|--------------------|--------------------|
|                                |                          | Channel A<br>[dBm]     | Channel B<br>[dBm] | Channel C<br>[dBm] |
| $T_{nom} = 25^{\circ}\text{C}$ | $V_{nom} = 2.4\text{ V}$ | 20.37                  | 17.77              | 18.65              |
| Measurement uncertainty        |                          | < 3 dB                 |                    |                    |

| Test Conditions                                           | Signal Field strength TX highest power mode |
|-----------------------------------------------------------|---------------------------------------------|
| $T_{nom} = 25^{\circ}\text{C}$ , $V_{nom} = 2.4\text{ V}$ | dB $\mu\text{V/m}$                          |
| Frequency [MHz]                                           |                                             |
| 2402                                                      | 111.19                                      |
| Measurement uncertainty                                   | < 3 dB                                      |

The diagrams for the field strength measurements are included in Appendix C.

## Maximum Peak Output Power

Limits:

| Frequency<br>MHz | Number of hopping channels |           |              |              |
|------------------|----------------------------|-----------|--------------|--------------|
|                  | $\geq 75$                  | $\geq 50$ | $49 \geq 25$ | $74 \geq 15$ |
| 902 –928         | -                          | 30 dBm    | 24 dBm       |              |
| 2400-2483.5 MHz  | 30 dBm                     | -         |              | 21 dbm       |
| 5725-5850 MHz    | 30 dBm                     | -         |              |              |

In case of employing transmitter antennas having antenna gain  $> 6$  dBi and using fixed point-to-point operation consider §15.247 (b).

Test equipment used: ETS 0125, ETS 0340

### 3.2 De facto Equivalent isotropic radiated power

Because using an internal antenna there are no deviations from the radiated test results according 3.1.

#### 3.2.1 Transmitter

##### Integral Antenna:

At the transmitter the measurement was transacted with the modulation declared by the manufacturer and the maximum available output power of the EUT.

In this arrangement the EUT fulfils the requirements of the FCC rules § 15.247, subpart c, section b. This unit uses internal antenna. There is no provision for an external antenna (see photo).

### 3.3 RF Exposure Compliance Requirements

According to Supplement C, Edition 01-01 to OET Bulletin 65, Edition 97-01 this spread spectrum transmitter is categorically excluded from routine environmental evaluation because of the low power level, where there is a high likelihood of compliance with RF exposure standards.

### 3.4 Out of Band Radiated Emissions

FCC Rule: 15.247(c) , 15.35

For out of band emissions that are close to or that exceed the 20 dB attenuation requirement described in the specification, radiated measurements were performed at a 3 m separation distance to determine whether these emissions complied with the general radiated emission requirement.

Limits:

For frequencies below 1GHz :

Max. reading – 20 dB

111.19 dB $\mu$ V/m- 20 dB = 91.19 dB $\mu$ V/m

Guidance on Measurement of FHSS Systems:

“If the emission is pulsed, modify the unit for continuous operation , use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.” Here the correction was added to the limit instead subtracted from the reading.

Duty Cycle correction =  $20 \log (\text{dwell time}/100\text{ms})$

For frequencies above 1GHz (Peak measurements).

Limit = max. aver. reading-20dB +20dB(because Peak detector is used)

111.19 dB $\mu$ V/m

For frequencies above 1GHz (Average measurements).

Max. reading – 20 dB - duty cycle correction:

No duty cycle correction was added to the reading

111.19 dB $\mu$ V/m - 20 dB = 91.19 dB $\mu$ V/m

Remarks: See attached diagrams.

Test equipment used: ETS 0125, ETS 0271

### 3.5 Transmitter Radiated Emissions in restricted Bands

FCC Rules: 15.247 (c), 15.205, 15.209, 15.35

Radiated emission measurements were performed from 30 MHz to 26000 MHz.

For radiated emission tests, the analyzer setting was as followings:

RES BW VID BW

Frequency <1 GHz 100 kHz 100 kHz (Peak measurements)

Frequency >1 GHz 1 MHz 1 MHz (Peak measurements)

1 MHz 1 MHz (Average measurements)

Limits:

For frequencies below 1GHz :

| Frequency of Emission<br>(MHz) | Field strength<br>(microvolts/meter) | Field Strength<br>(dB microvolts/meter) |
|--------------------------------|--------------------------------------|-----------------------------------------|
| 30 – 88                        | 100                                  | 40.0                                    |
| 88 – 216                       | 150                                  | 43.5                                    |
| 216 – 960                      | 200                                  | 46.0                                    |
| Above 960                      | 500                                  | 54.0                                    |

For frequencies above 1GHz (Average measurements).

Guidance on Measurement of FHSS Systems:

“If the emission is pulsed, modify the unit for continuous operation , use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.” Here the correction was added to the limit instead subtracted from the reading.

Duty cycle correction =  $20 \log (\text{dwell time}/100\text{ms})$

For frequencies above 1GHz (Average measurements).

Limit – duty cycle correction

No duty cycle correction was added to the reading.

54.0dBμV/m

For frequencies above 1GHz (Peak measurements).

Limit + 20dB

$54.0\text{dB}\mu\text{V/m} + 20 \text{ dB} = 74 \text{ dB}\mu\text{V/m}$

Remarks: See attached diagrams.

Test equipment used: ETS 0125, ETS 0271

### 3.6 Spurious emissions (tx)

Spurious emission was measured with modulation (declared by manufacturer).

According to 47 CFR 15, Part 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

SAMPLE CALCULATION OF LIMIT. All results will be updated by an automatic measuring system in accordance with point 2.3.

Calculation of test results:

Such factors like antenna correction, cable loss, external attenuation etc. are already included in the provided measurement results. This is done by using validated test software and calibrated test system according the accreditation requirements.

The peak and average spurious emission plots was measured with the average limits.

In the Table being listed the critical peak and average value an exhibit the compliance with the above calculated Limits.

If in the column's correction factor states a value then the max. Field strength in the same row is corrected by a value gained from the "Marker-Delta-Method" or the „Duty-Cycle Correction Factor“.

**Summary table with radiated data of the test plots**

| Freq. | Used Ch. | Frequency Marker [GHz] | Polarization | $\Delta$ corrections dB | Max. Field Strength [dB $\mu$ V/m] | Compliance Limit [dB $\mu$ V/m] | Detector | BW [MHz] | Margin [dB]   |
|-------|----------|------------------------|--------------|-------------------------|------------------------------------|---------------------------------|----------|----------|---------------|
| 3     | 0        | 2.400                  | H            |                         | 49.63                              | 91.19                           | AV       | 1        | <u>-41.56</u> |
| 3     | 0        | 2.352                  | V            |                         | 45.06                              | 54                              | AV       | 1        | <u>-8.94</u>  |
| 3     | 0        | 2.385                  | H            |                         | 60.60                              | 74                              | P        | 1        | <u>-13.50</u> |
| 3     | 0        | 2.380                  | V            |                         | 55.95                              | 74                              | P        | 1        | <u>-18.05</u> |
| 3     | 23       | 2.327                  | H            |                         | 57.34                              | 74                              | P        | 1        | <u>-16.66</u> |
| 3     | 23       | 2.338                  | H            |                         | 47.58                              | 54                              | AV       | 1        | <u>-6.42</u>  |
| 3     | 23       | 2.490                  | V            |                         | 54.45                              | 74                              | P        | 1        | <u>-19.55</u> |
| 3     | 23       | 2.511                  | V            |                         | 44.22                              | 54                              | AV       | 1        | <u>-9.78</u>  |

| Freq. | Used Ch. | Frequency Marker [GHz] | Polarization | $\Delta$ corrections dB | Max. Field Strength [dB $\mu$ V/m] | Compliance Limit [dB $\mu$ V/m] | Detector | BW [MHz] | Margin [dB]   |
|-------|----------|------------------------|--------------|-------------------------|------------------------------------|---------------------------------|----------|----------|---------------|
| 3     | 46       | 2.4835                 | V            | 56.65                   | 81.64                              | 74                              | P        | 1        | <u>-49.01</u> |
| 3     | 46       | 2.4835                 | V            | 56.65                   | 76.12                              | 54                              | AV       | 1        | <u>-34.53</u> |
| 3     | 46       | 2.4835                 | H            | 56.65                   | 81.82                              | 74                              | P        | 1        | <u>-48.83</u> |
| 3     | 46       | 2.4835                 | H            | 56.65                   | 75.28                              | 54                              | AV       | 1        | <u>-35.37</u> |

### Freq. – Frequency Range:

|    |     |   |          |
|----|-----|---|----------|
| 1: | 30  | – | 200 MHz  |
| 2: | 200 | – | 1000 MHz |
| 3: | 1   | – | 4 GHz    |
| 4: | 4   | – | 8 GHz    |
| 5: | 8   | – | 12 GHz   |
| 6: | 12  | – | 17 GHz   |
| 7: | 17  | – | 26,5 GHz |

All other not noted test plots do not contain significant test results in relation to the limits.

**TEST RESULT (Transmitter):** The unit DOES meet the FCC requirements.

Comment: See attached diagrams.

Test equipment used: ETS 0125, ETS 0340, ETS 0271

### 3.7 Carrier Frequency Separation

Carrier Frequency Separation was measured with modulation (declared by manufacturer).

According to 47 CFR 15, Part 15.247 (a)(1): frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

| Test conditions                       |                                  | Channel Separation |             |
|---------------------------------------|----------------------------------|--------------------|-------------|
|                                       |                                  | Channel B          | Channel B+1 |
| $T_{\text{nom}} = 25^{\circ}\text{C}$ | $V_{\text{nom}} = 2.4 \text{ V}$ | 1.73787575 MHz     |             |
| Measurement uncertainty               |                                  | < 10 Hz            |             |

#### Limits:

| Frequency Range<br>MHz       | Limits                   |                          |
|------------------------------|--------------------------|--------------------------|
|                              | 20 dB bandwidth < 25 kHz | 20 dB bandwidth > 25 kHz |
| 902 - 928                    | 25 kHz                   | 20 dB bandwidth          |
| 2400 – 2483,5<br>5725 – 5850 | 25 kHz                   | 20 dB bandwidth          |

Test equipment used: ETS 0125, ETS 0271

Comment: See attached diagrams in Appendix E.

### 3.8 Number of Hopping Frequencies

According to FCC rules part 15 subpart C §15.247 frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping frequencies. Frequency hopping systems in 5725-5850 MHz band shall use least 75 hopping frequencies.

For frequency hopping systems operating in the 902-928 MHz band: if the 20dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies; if the 20dB bandwidth of the hopping channel 250 kHz or greater, the system shall use at least 25 hopping frequencies.

| Test conditions                |                          | Operating Mode      | Number of Channels |
|--------------------------------|--------------------------|---------------------|--------------------|
| $T_{nom} = 25^{\circ}\text{C}$ | $V_{nom} = 2.4\text{ V}$ | normal transmitting | 46                 |
| $T_{nom} = 25^{\circ}\text{C}$ | $V_{nom} = 2.4\text{ V}$ | inquiry mode        | --                 |

#### Limits:

| Frequency Range<br>MHz | Limit          |     |                             |                             |
|------------------------|----------------|-----|-----------------------------|-----------------------------|
|                        | 20dB Bandwidth |     | 20dB Bandwidth<br>< 250 kHz | 20dB Bandwidth<br>≥ 250 kHz |
|                        | ≤ 1 MHz        |     |                             |                             |
| 902 - 928 MHz          |                |     | ≥ 50                        | ≥ 25                        |
| 2400 – 2483,5          | ≥15            | ≥15 | -                           | -                           |
| 5725 - 5850 MHz        | ≥75            | -   | -                           | -                           |

Test equipment used: ETS 0125, ETS 0340

Comment: See attached diagrams in appendix F.

#### 3.8.1 Pseudorandom Frequency Hopping Sequence

The generation of the hopping sequence is determined by the Bluetooth core specification and complies with the FCC requirements.

#### 3.8.2 Coordination of hopping sequences to other transmitters

According to the Bluetooth core specification V1.1 such a coordination is not possible. During scatternet function only one of the two hopping sequences will be used at a definite moment.

#### 3.8.3 System Receiver Hopping Capability

According to the Bluetooth core specification the system receivers shift frequencies in synchronization with the transmitted signals.

### 3.9 Time of Occupancy (Dwell Time)

Frequency hopping systems operating in the 5725-5850 MHz band shall use an average time of occupancy on any frequency not greater than 0.4 seconds within a 30 second period.

In 2400-2483,5 MHz band the average time of occupancy on any channel shall not be greater than 0,4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

For frequency hopping systems operating in the 902-928 MHz band: if the 20dB bandwidth of the hopping channel is less than 250 kHz, the average time of occupancy on any frequency shall not greater than 0.4 seconds within a 20 second period; if the 20dB bandwidth of the hopping channel is 250 kHz or greater, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

| Test conditions                                                         | Operating mode      | Measurement period | Time of Occupancy |
|-------------------------------------------------------------------------|---------------------|--------------------|-------------------|
| $T_{nom} = 25^{\circ}\text{C}$<br>$V_{nom} = 2.4\text{ V}$<br>Channel B | normal transmitting | 18,4 s             | 35.08 ms          |
|                                                                         | inquiry mode        | -- s               | -- ms             |
| Measurement uncertainty                                                 | < 1 $\mu\text{s}$   |                    |                   |

#### Limits and measurement periods:

| Frequency MHz | Number of channels | Measurement Period              | Limit |
|---------------|--------------------|---------------------------------|-------|
| 902 – 928     | $\geq 50$          | 20 s                            | 0,4 s |
|               | $49 \geq 25$       | 10 s                            | 0,4 s |
| 2400 – 2483,5 | $\geq 15$          | 0,4 s * number of used channels | 0,4 s |
| 5725- 5850    | $\geq 75$          | 30 s                            | 0,4s  |

Test equipment used: ETS 0125, ETS 0271

#### Comment:

See attached diagram, which show the On-time and the number of counted events during the measurement period.

### 3.10 20dB Bandwidth

Frequency hopping systems operating in the 5725-5850 MHz bands shall use a maximum 20dB bandwidth of 1 MHz.

The 20dB bandwidth is measured on the lowest, middle and highest hopping channel.

For frequency hopping systems operating in the 902-928 MHz band the maximum 20dB bandwidth of the hopping channel is 500 kHz.

| Test conditions                       |                                  | 20 dB Bandwidth |                |                |
|---------------------------------------|----------------------------------|-----------------|----------------|----------------|
|                                       |                                  | Channel A       | Channel B      | Channel C      |
| $T_{\text{nom}} = 25^{\circ}\text{C}$ | $V_{\text{nom}} = 2.4 \text{ V}$ | 1.18661323 MHz  | 1.19038076 MHz | 1.19919840 MHz |
| Measurement uncertainty               |                                  | < 10 Hz         |                |                |

#### Limits:

| Frequency Range / MHz | Number of channels | Limit                  |
|-----------------------|--------------------|------------------------|
| 902 – 928             | < 50               | < 250 kHz              |
|                       | $49 \geq 25$       | 500 kHz $\geq$ 250 kHz |
| 2400 – 2483,5         | $\geq 15$          | not determined         |
| 5725 - 5850           | 75                 | $\leq 1\text{MHz}$     |

Test equipment used: ETS 0125, ETS 0271

Comment: See attached diagrams in appendix H.

#### 3.10.1 System Receiver Input Bandwidth

It is determined in the Bluetooth core specification. The value matches to the bandwidth of transmitter signal.

### 3.11 Band-edge Compliance of RF Emissions

According to 47 CFR 15, Part 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If

the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

| Test conditions                |                          | Attenuation at or outside band-edges |                 |
|--------------------------------|--------------------------|--------------------------------------|-----------------|
|                                |                          | <u>Single Frequency</u>              |                 |
|                                |                          | Lower Band-edge                      | Upper Band-edge |
| $T_{nom} = 25^{\circ}\text{C}$ | $V_{nom} = 2.4\text{ V}$ | 53.64 dB                             | 50.96 dB        |
| Measurement uncertainty        |                          | < 100 Hz                             |                 |

| Test conditions                |                          | Attenuation at or outside band-edges |                 |
|--------------------------------|--------------------------|--------------------------------------|-----------------|
|                                |                          | <u>Hopping Frequency</u>             |                 |
|                                |                          | Lower Band-edge                      | Upper Band-edge |
| $T_{nom} = 25^{\circ}\text{C}$ | $V_{nom} = 2.4\text{ V}$ | 54.51 dB                             | 53.83 dB        |
| Measurement uncertainty        |                          | < 100 Hz                             |                 |

#### Limits:

| Frequency Range / MHz | Limit   |
|-----------------------|---------|
| 902 – 928             | - 20 dB |
| 2400 – 2483.5         |         |
| 5725 - 5850           |         |

Test equipment used: ETS 0125, ETS 0271

Comment: See attached diagrams in appendix I.

#### 4 Conducted Measurement at (AC) Power Line

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the table below. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

This measurement was transact first with instrumentation using an average and peak detector and a 10 kHz bandwidth. If the peak detector achieves a calculated level, the measurement is repeated by an instrumentation using a quasi-peak detector.

| Frequency | Level            |                  |
|-----------|------------------|------------------|
|           | quasi-peak       | average          |
| 150 kHz   | lower limit line | lower limit line |

#### Limits:

| Frequency of Emission (MHz) | Conducted Limit (dBuV) |          |
|-----------------------------|------------------------|----------|
|                             | Quasi Peak             | Average  |
| 0.15-0.5                    | 66 to 56               | 56 to 46 |
| 0.5-5                       | 56                     | 46       |
| 5-30                        | 60                     | 50       |

Test equipment used: ETS 0003, ETS 0040, ETS 0109, ETS 0125

Comment: See attached diagram in appendix J.

## **Appendix**

- A Pictures
- B Peak Output Power
- C Spurious Emissions radiated - Transmitter operating
- D Spurious Emissions conducted - Transmitter operating
- E Carrier Frequency Separation
- F Number of Hopping Frequencies
- G Time of Occupancy (Dwell Time)
- H 20dB Bandwidth
- I Band-edge Compliance of RF Conducted Emissions
- J Conducted Measurement at (AC) Power Line