



ELECTRONIC TECHNOLOGY SYSTEMS
DR. GENZ GMBH

TEST - REPORT

FCC RULES PART 15 / SUBPART C

Test report no.:

G0M20012-3597-T-47

FCC

TABLE OF CONTENTS

1 General information

- 1.1 Notes
- 1.2 Testing laboratory
- 1.3 Details of approval holder
- 1.4 Application details
- 1.5 Test item
- 1.6 Test standards

2 Technical test

- 2.1 Summary of test results
- 2.2 Test environment
- 2.3 Test equipment utilized
- 2.4 Test Procedure

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.

The test report may only be reproduced or published in full.

Reproduction or publication of extracts from the report requires the prior written approval of the ELECTRONIC TECHNOLOGY SYSTEMS DR. GENZ GMBH.

Tester:

24.01.2001

N. Kaspar



Date

ETS-Lab.

Name

Signature

Technical responsibility for area of testing:

24.01.2001

Dr. Genz



Date

ETS

Name

Signature

1.2 Testing laboratory

1.2.1 Location

ELECTRONIC TECHNOLOGY SYSTEM DR. GENZ GMBH (ETTS)
Storkower Straße 38c
D-15526 Reichenwalde b. Berlin
Germany
Telefon : +49 33631 888 00
Telefax : +49 33631 888 66

1.2.2 Details of accreditation status

ACCREDITED TESTING LABORATORY

Accredited by: Bundesamt für Post und Telekommunikation (BAPT)

DAR-REGISTRATION NUMBER: TTI-P-G 126/96-30

ACCREDITED COMPETENT BODY

Accredited by: Bundesamt für Post und Telekommunikation (BAPT)

DAR-REGISTRATION NUMBER: BPT-ZE-026/96-00

1.3 Details of approval holder

| | |
|-----------|-------------------------|
| Name | : Höft & Wessel AG |
| Street | : Rotenburger Straße 20 |
| Town | : D-30659 Hannover |
| Country | : Germany |
| Telephone | : 0511/6102-323 |
| Fax | : 0511 6102-411 |
| Contact | : Herr Buhmann |
| Telephone | : 0511/6102-323 |

1.4 Application details

Date of receipt of application : 11.12.2000
Date of receipt of test item : 11.12.2000
Date of test : 27.12.2000

1.5 Test item

Description of test item : Portable Terminal with RF-Data Module, operating in the 2,45 GHz-ISM-Band
Type identification : HW 90196
Serial number : Test model without serial number.
Photos : See annex

Technical data

Frequency range : 2,4000 – 2,4835 MHz
Frequency (ch A) : 2404,45 MHz
Frequency (ch B) : 2441,65 MHz
Frequency (ch C) : 2466,70 MHz

Transmitter

| | | | |
|--------------|--------------|-----------|-----------|
| Power (ch A) | : Conducted: | Radiated: | 20,64 dBm |
| Power (ch B) | : Conducted: | Radiated: | 20,01 dBm |
| Power (ch C) | : Conducted: | Radiated: | 2,15 dBm |

Antenna transmitter : (internal antenna)
Antenna receiver : (internal antenna)
Power supply : 3,2 DC
Operating mode : GFSK
T nom : 22 °C

Manufacturer:
(if applicable)

Name :
Street :
Town :
Country :

Additional information:

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.

x

or

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

1

2.2 Test environment

Temperature : 22°C

Relative humidity content : 20 ... 75 %

Air pressure : 86 ... 103 kPa

Details of power supply : 3,2V DC

Extrem conditions parameters: ; --

2.3 Test equipment utilized

| No. | Measurement device: | Type: | Manufacturer: |
|----------|--------------------------------|-----------------|--------------------|
| ETS 0001 | Test receiver | ESHS 10 | Rohde&Schwarz |
| ETS 0002 | Test receiver | ESVP | Rohde&Schwarz |
| ETS 0003 | Test receiver | ESVS 10 | Rohde&Schwarz |
| ETS 0004 | Spektrum- and Network-Analyzer | FSMS 26 | Rohde&Schwarz |
| ETS 0005 | Test receiver | SMV 11 | MEB |
| ETS 0006 | Test receiver system | SME 12 | MEB |
| ETS 0007 | Spectrum analyzer | PSA-65A | Avcom |
| ETS 0008 | Antenna | Loop antenna | Siemens |
| ETS 0009 | Antenna | Loop antenna | MEB |
| ETS 0010 | Antenna | Loop antenna | MEB |
| ETS 0011 | Antenna | van Veen/ Frame | ETS |
| 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 | Antenna | VHAP | Schwarzbeck |
| ETS 0017 | Antenna | VHAP | Schwarzbeck |
| ETS 0018 | Antenna | UHAP | Schwarzbeck |
| ETS 0019 | Antenna | UHAP | Schwarzbeck |
| ETS 0020 | Antenna | DP 21 | MEB |
| ETS 0021 | Antenna | DP 3 | MEB |
| ETS 0022 | Antenna | SAS-200/ 521 | A.H. Systeme / USA |
| 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 | Turn table | TT 1 | ETS |
| ETS 0031 | Turn table | DS 412 | Heinrich Deisel |
| ETS 0032 | Controller | HD 050 | Heinrich Deisel |
| ETS 0033 | RF generator | SMG | Rohde&Schwarz |
| ETS 0034 | RF generator/ Amplifier | SMLR | Rohde&Schwarz |
| ETS 0035 | RF generator/ Amplifier | SMLM | Rohde&Schwarz |
| ETS 0036 | RF amplifier | 10W 1000AM2 | Amplifier Research |
| ETS 0037 | RF amplifier | 50W 1000 | Amplifier Research |
| ETS 0038 | RF amplifier | 150L | Amplifier Research |
| ETS 0039 | Absorbing clamp | MDS 21 | Rohde&Schwarz |
| ETS 0040 | Artifical mains | ESH3-Z5 | Rohde&Schwarz |
| ETS 0041 | Artifical mains | ESH3-Z4 | Rohde&Schwarz |
| ETS 0042 | Artifical mains | ESH3-Z6 | Rohde&Schwarz |
| ETS 0043 | Artifical mains | NNB 11 | MEB |
| ETS 0044 | Artifical mains | NNB 111 | MEB |
| ETS 0045 | Stripe line | IEC 801-3 | ETS |
| ETS 0046 | Power supply | LTS 006 | RFT |

| No. | Measurement device: | Type: | Manufacturer: |
|----------|------------------------------|-----------------|-------------------|
| 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 | Tektronic |
| ETS 0052 | Audio analyzer | UPA 4 | Rohde&Schwarz |
| ETS 0053 | ECAT Controlcentre | | Keytek/ EMV |
| ETS 0054 | EFT simulator | | Keytek/ EMV |
| ETS 0055 | Modul network coupler | | Keytek/ EMV |
| ETS 0056 | Blank plug-in | | Keytek/ EMV |
| ETS 0057 | Module SURGE with DC coupler | | Keytek/ EMV |
| ETS 0058 | Capacitive coupling clamp | | Keytek/ EMV |
| ETS 0059 | Kikusui amplfier | 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 | Filter system 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 | Filter system IEC 1000-4-6 | CDN | FCC/ EMV |
| ETS 0069 | EM Radiation Monitor | EMR-20 | Wandel&Goltermann |
| ETS 0070 | PC Transfer set EMR-20 | EMR-20 | Wandel&Goltermann |
| ETS 0071 | Videocamera system | KMB012 | Kocom |
| ETS 0072 | Interphone system | JS-1400 | Jiu Sheng |
| ETS 0073 | Audio noise meter | GSM 2 | MKD/ RFT |
| ETS 0074 | RF milivoltmeter | QRV 2 | MKD/ RFT |
| ETS 0075 | NF generator | GF 22 | Präcitronic |
| ETS 0076 | Feeding bridge A | SBA 1000 | ESP |
| ETS 0077 | Audio/ Video Filter | AV 55020 | ETS |
| 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 Novell network system | Novell | Esotronic |
| ETS 0083 | Apple computer sstem | Performa 630 | Macintosh |
| ETS 0084 | Processcontroller | 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 | Colour TV pattern generator | PM 5518-TX VPS | Philips |
| ETS 0089 | Radiocommunication 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 | DM-Coder | SME-B11 | Rohde&Schwarz |
| ETS 0093 | Pulse Modulator | SM-B8 | Rohde&Schwarz |
| ETS 0094 | Rearpanel connectors | SME-B19 | Rohde&Schwarz |
| ETS 0095 | DECT system controller | PSMD | Rohde&Schwarz |

| No. | Measurement device: | Type: | Manufacturer: |
|----------|--------------------------------------|---------------|---------------|
| ETS 0096 | DECT Signalling 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 | DM-Coder | SME-B11 | Rohde&Schwarz |
| ETS 0102 | Pulse modulator | SM-B8 | Rohde&Schwarz |
| ETS 0103 | Pulse generator | SM-B4 | Rohde&Schwarz |
| ETS 0104 | Rearpanel connectors | SME-B19 | Rohde&Schwarz |
| ETS 0105 | High power synthesizer/ sweeper | SMP 22 | Rohde&Schwarz |
| ETS 0106 | Frequency extension | SMP-B11 | Rohde&Schwarz |
| ETS 0107 | RF attenuator for SMP 22 | SMP-B15 | Rohde&Schwarz |
| ETS 0108 | DECT protocol tester TBR 22 | TS 1220 | Rohde&Schwarz |
| ETS 0109 | Process controller | PSM 2 | Rohde&Schwarz |
| ETS 0110 | Real time signalling unit | PSMD-B2 | Rohde&Schwarz |
| ETS 0111 | PCM Realtime 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 | | ETS |
| ETS 0116 | RF Millivoltmeter | URV 55 | 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 | Uninterruptable power supply | UPS - 1500 | Sendon |
| ETS 0127 | Uninterruptable power supply | UPS - 1000 LC | Sendon |
| ETS 0128 | Uninterruptable power supply | UPS - 1000 | Sendon |
| ETS 0129 | Uninterruptable power supply | UPS - 500 | Sendon |
| ETS 0130 | Uninterruptable 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 0134 | Mains filter | MSF | Erika Fiedler |
| ETS 0135 | Measureing 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 | Impedanz converter | TK 11 | RFT |
| ETS 0143 | Impedanz converter | TK 12 | RFT |
| ETS 0144 | | | |

| No. | Measurement device: | Type: | Manufacturer: |
|----------|---------------------------------------|----------------|----------------|
| ETS 0145 | | | |
| ETS 0146 | Probe | TK 103 | MEB |
| ETS 0147 | Active probe | ESH2-Z2 | Rohde&Schwarz |
| ETS 0148 | Test TV | 21PT4301/00 | Philips |
| ETS 0149 | Power divider | ZAPD-21 | MCL |
| ETS 0150 | Switcher | HR07-720 | Wisi |
| ETS 0151 | Interference pulse generator | NSG 500C | Schaffner |
| ETS 0152 | Simulator for Load-Dump-Impulse | NSG 506C (I) | Schaffner |
| ETS 0153 | Simulator for Load-Dump-Impulse | NSG 506C (II) | Schaffner |
| ETS 0154 | Signalgenerator | SMG | Rohde&Schwarz |
| ETS 0155 | Signalgenerator | SMG | Rohde&Schwarz |
| ETS 0156 | Adjacent channel power meter | NKS | Rohde&Schwarz |
| ETS 0157 | TV and Sat-Signalgenerator | VTG 700 | Grundig |
| ETS 0158 | TV and Sat Signalgenerator | VTG 700 | Grundig |
| ETS 0159 | Programmable power supply | TOE 8815 | Toellner |
| ETS 0160 | Protective wire and isolation tester | PI 6001 D | SPS electronic |
| ETS 0161 | Filter system / consumer electronic | | Fiedler |
| 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 - Frontend (analog) | MFE III | HEAD acoustics |
| ETS 0170 | Measurement - Frontend (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 - Frontend line interface | MFE V | HEAD acoustics |
| ETS 0175 | Software Line interface (analog) | COPTZV5 | HEAD acoustics |
| ETS 0176 | Acoustic volt meter | COP 4 | HEAD acoustics |
| ETS 0177 | Feeding bridge B | SBA 1000 | ESP |
| ETS 0178 | Open area test side | 30m | ETS |
| ETS 0179 | Open area test side | 30m | ETS |
| ETS 0180 | Artifical mains | NNB01/RFZ | ETS |
| 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 |
| ETS 0187 | Power suppy | | 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 |

| No. | Measurement device: | Type: | Manufacturer: |
|----------|-----------------------------------|-------------------|----------------|
| 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 0203 | Digital thermometer | Type K | Amarell |
| ETS 0204 | Digital thermometer | ad 20th | ama-digit |
| ETS 0205 | High voltage test generator | HA 3300 D | SPS electronic |
| ETS 0206 | High voltage test accessoires | 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 | Flixible 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 0217 | Millivolt meter | URV 55 | Rohde&Schwarz |
| ETS 0218 | RF probe | URV5-Z7 | Rohde&Schwarz |
| ETS 0219 | Power sensor | NRV-Z2 | Rohde&Schwarz |
| ETS 0220 | Insertion unit | URV5-Z4 | Rohde&Schwarz |
| ETS 0221 | EN 61000-4-8 Test System | F-1000-4-8/9/10-L | Fisher Custom |

2.4 Test Procedure

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-1992 using a 50 μ 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 C63.4-1992 using a spectrum analyzer. The bandwidth of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was the 100 kHz and the video bandwidth was 300 kHz. The ambient temperature of the UUT was 23°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 μ 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 μ V + 10.36 dB + 6 dB = 36.36 dB μ V/m @3m |

ANSI STANDARD C63.4-1992 10.1.7 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 10th 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"/> |
| 20dB Bandwidth | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Band-edge Compliance of RF Conducted Emissions | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Conducted Measurement at (AC) Power Line | <input type="checkbox"/> | <input 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 | | Radiated Power | | | |
|-------------------------|--------------------------|----------------|------|-----------|----|
| | | Channel A | | Channel B | |
| [dBm] | [mW] | [dBm] | [mW] | | |
| T _{nom} =22 °C | V _{nom} = 3,2 V | 20,64 | -- | 20,01 | -- |
| Measurement uncertainty | | < 3 dB | | | |

| Test conditions | | Radiated Power | |
|-------------------------|-------------------------|----------------|----|
| | | Channel C | |
| [dBm] | [mW] | | |
| T _{nom} =22 °C | V _{nom} =3,2 V | 2,15 | -- |
| Measurement uncertainty | | < 3 dB | |

| | | Radiated Power | | | |
|-------------------------------------|----------------------|----------------|--------|-----------|------|
| Test conditions | | Channel A | | Channel B | |
| | | [dBm] | [mW] | [dBm] | [mW] |
| $T_{\text{nom}} = 22^\circ\text{C}$ | $V_{\text{min}} =$ V | | -- | | -- |
| Measurement uncertainty | | | < 3 dB | | |

| | | Radiated Power | |
|-------------------------------------|----------------------|----------------|------|
| Test conditions | | Channel C | |
| | | [dBm] | [mW] |
| $T_{\text{nom}} = 22^\circ\text{C}$ | $V_{\text{min}} =$ V | | -- |
| Measurement uncertainty | | < 3 dB | |

| | | Radiated Power | | | |
|-------------------------------------|----------------------|----------------|--------|-----------|------|
| Test conditions | | Channel A | | Channel B | |
| | | [dBm] | [mW] | [dBm] | [mW] |
| $T_{\text{nom}} = 22^\circ\text{C}$ | $V_{\text{max}} =$ V | | -- | | -- |
| Measurement uncertainty | | | < 3 dB | | |

| | | Radiated Power | | | |
|-------------------------------------|----------------------|----------------|--------|----|--|
| Test conditions | | Channel C | | | |
| | | [dBm] | [mW] | | |
| $T_{\text{nom}} = 22^\circ\text{C}$ | $V_{\text{max}} =$ V | | | -- | |
| Measurement uncertainty | | | < 3 dB | | |

3.2 De facto Equivalent isotropic radiated power

3.2.1 Transmitter

External Antenna:

At the transmitter the measurement was transact 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.

On account of the used low transmitting power the use of a general antenna connection seems to be possible. Even by using an extrem bunched antenna the upper limit value won't be exceeded. In addition, the sample will be operated by authorized staff (test engineers).

3.3 RF Exposure Compliance Requirements

Because of the verry low transmitted power of ca 20 dBm this device complies with the MPE requirements not possible

3.4 Spurious emissions (tx)

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

In any 100 kHz bandwidth outside the frequency band in which the intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB 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. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

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

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

Comment: see attached diagrams

Test equipment used: ETS 0004, ETS 0109, ETS 0125, ETS 0012, ETS 0013, ETS 0014

3.5 Carrier Frequency Separation

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

According to FCC rules part 15 subpart C §15.247 frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or 20 dB bandwidth of the hopping channel, whichever is greater.

| Test conditions | | Channel Separation | |
|--|--|----------------------------------|-------------|
| | | Channel B | Channel B+1 |
| $T_{\text{nom}} = 22 \text{ }^{\circ}\text{C}$ | | $V_{\text{nom}} = 3,2 \text{ V}$ | |
| Measurement uncertainty | | < 10 Hz | |

Limits:

| Frequency Range | Limits | |
|------------------------------------|--------------------------|--------------------------|
| | 20 dB bandwidth < 25 kHz | 20 dB bandwidth > 25 kHz |
| 2400-2483.5 MHz 5725-5850.0 MHz | 25 kHz | 20 dB bandwidth |
| 902-928 MHz | 25 kHz | 20 dB bandwidth |

Test equipment used: ETS 0004, ETS 0109, ETS 0125

Comment: see attached diagram

3.6 Number of Hopping Frequencies

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

According FCC 00-312 appendix B systems in the 2400 – 2483,5 MHz band may utilize hopping channels whose 20 dB bandwidth is greater than 1 MHz provide the systems use at least 15 non-overlapping channels.

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 | | Number of Channels |
|---|---------------------------------|--------------------|
| $T_{\text{nom}}=22\text{ }^{\circ}\text{C}$ | $V_{\text{nom}} = 3,2\text{ V}$ | 47 |

Limits:

| Frequency Range | Limit | | |
|------------------------------------|-----------------------------|---|---|
| | max 20dB | | 20dB Bandwidth < 250 kHz 20 s periode |
| | 30 s periode | 20dB Bandwidth ≥ 250 kHz 10 s periode | |
| 2400-2483.5 MHz 5725-5850.0 MHz | Bandwidth ≤ MHz: ≥ 75 | Bandwidth >1MHz ≥ 15 | - |
| 902-928 MHz | - | 50 | ≥ 25 |

Test equipment used: ETS 0004, ETS 0109, ETS 0125

Comment: see attached diagrams

3.7 Time of Occupancy (Dwell Time)

According to FCC rules part 15 subpart C §15.247 frequency hopping systems operating in the 2400-2483.5 MHz and 5725-5850 MHz bands shall use an average time of occupancy on any frequency not greater than 0.4 seconds within a 30 second periode.

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 periode; if the 20dB bandwidth of the hopping channel is 250 kHz or greater, the average time of occupancy on any frequency shall not greater than 0.4 seconds within a 10 second periode.

| Test conditions | | | Time of Occupancy |
|---|---------------------------------|-----------|-----------------------|
| $T_{\text{nom}}=22\text{ }^{\circ}\text{C}$ | $V_{\text{nom}} = 3,2\text{ V}$ | Channel B | 355,556 μs |
| Measurement uncertainty | | | < 1 μs |

Limits:

| Frequency Range | Limit | | |
|------------------------------------|--|---|---|
| | max 20dB Bandwidth 1000 kHz 30 s periode | 20dB Bandwidth < 250 kHz 20 s periode | 20dB Bandwidth ≥ 250 kHz 10 s periode |
| 2400-2483.5 MHz 5725-5850.0 MHz | 400 ms | - | - |
| 902-928 MHz | - | 400 ms | 400 ms |

Test equipment used: ETS 0004, ETS 0109, ETS 0125

Comment: see attached diagram

3.8 20dB Bandwidth

According to FCC rules part 15 subpart C §15.247 frequency hopping systems operating in the 2400-2483.5 MHz and 5725-5850 MHz bands shall use a maximum 20dB bandwidth of 1 MHz. According FCC 00-312 frequency hopping systems operating in the 2400-2483.5 MHz shall use a maximum 20dB bandwidth of 1 MHz or more.

The 20dB bandwidth was 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 |
| $T_{nom}=22\text{ }^{\circ}\text{C}$ $V_{nom} = 3,2\text{ V}$ | 1,326667 MHz | 1,350000 MHz | 1,346667 MHz |
| Measurement uncertainty | < 10 Hz | | |

Limits:

| Frequency Range | Limit |
|-----------------------------------|---------------|
| 2400-2483.5 MHz and 5725-5850 MHz | 1 MHz or more |
| 902-928 MHz | 0.5 MHz |

Test equipment used: ETS 0004, ETS 0109, ETS 0125

Comment: see attached diagram

3.9 Band-edge Compliance of RF Conducted Emissions

According to FCC rules part 15 subpart C §15.247(c) in any 100 kHz bandwidth outside the frequency band in which the intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB 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. Attenuation below the general limits specified in § 15.209(a) is not required.

| Test conditions | Frequency at band edges -20 dB | |
|---|---------------------------------|---------------|
| | Channel A | Channel C |
| $T_{\text{nom}}=22\text{ }^{\circ}\text{C}$ | $V_{\text{nom}} = 3,2\text{ V}$ | 2,4030669 GHz |
| Measurement uncertainty | < 100 Hz | |

Limits:

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

Test equipment used: ETS 0004, ETS 0109, ETS 0125

Comment: see attached diagrams

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 450 kHz to 30 MHz shall not exceed 250 microvolts. 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.

If the level of the emission measured using the quasi-peak instrumentation is 6dB, or more higher than the level of the same emission measured with instrumentation having an average detector and a 9 kHz minimum bandwidth, that emission is considered broadband and the level obtained with the quasi-peak detector may be reduced by 13dB for comparison to the limits.

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. The level of the quasi-peak measurement will be decreased by 13dB if the difference between average and quasi-peak is 6dB or greater.

| Frequency | Level | | |
|-----------|---------------|---------------|------------------|
| | quasi-peak | average | quasi-peak -13dB |
| 450 kHz | -- dB μ V | -- dB μ V | -- dB μ V |

Limits:

| Frequency Range | Quasi-Peak Limit |
|------------------|------------------|
| 450 kHz – 30 MHz | 48 dB μ V |

Test is not required the sample is battery used

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

Comment: see attached diagram