



Registration No. DAT-P-207/05

EMI -- TEST REPORT

- FCC Part 15B -

Test Report No. : T33962-00-13AA	02. July 2010
	Date of issue

Type / Model Name : Toyota Wireless Teach Pendant

Product Description : Mobile Human Machine Interface

Applicant : Siemens AG, I IA AS RD ST TT

Address : Werner-von-Siemens-Str. 50

92224 AMBERG, GERMANY

Manufacturer : Siemens AG, I IA AS

Address : Gleiwitzer Str. 555

90475 NUERNBERG, GERMANY

Licence holder : Siemens AG, I IA AS RD ST TT

Address : Werner-von-Siemens-Str. 50

92224 AMBERG, GERMANY

Test Result according to the standards listed in clause 1 test standards:	POSITIVE
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DAT-P-207/05-00

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15 Subpart A - General (October 01, 2008)

Part 15, Subpart A, Section 15.31	Measurement standards
Part 15, Subpart A, Section 15.33	Frequency range of radiated measurements
Part 15, Subpart A, Section 15.35	Measurement detector functions and bandwidths

FCC Rules and Regulations Part 15 Subpart B - Unintentional Radiators (October 01, 2008)

Part 15, Subpart B, Section 15.107	AC Line conducted emissions <input type="checkbox"/> Class A device <input checked="" type="checkbox"/> Class B device
Part 15, Subpart B, Section 15.109	Radiated emissions, general requirements

ANSI C63.4: 2009	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
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ANSI C95.1:1992	IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
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CISPR 16-4-2: 2003	Uncertainty in EMC measurement
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CISPR 22: 2005 EN 55022: 2006	Information technology equipment
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2 SUMMARY

GENERAL REMARKS:

The USB and Ethernet interfaces are only used for maintenance and setup. No cables can be connected while docking station is mounted with Mobile Panel. In that time RFID and WLAN are in standby mode. In case that a PC is connected to the EuT for data transmission over USB or Ethernet, the highest occurring frequency is 520 MHz. Therefore the unwanted emissions have been investigated up to 5000 MHz.

FINAL ASSESSMENT:

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

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

Testing commenced on : 21 December 2009

Testing concluded on : 12 March 2010

Checked by:

Tested by:

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

Anton Altmann
Dipl.-Ing.(FH)

3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EUT - Detailed photos see Attachment A

3.2 Power supply system utilised

Power supply voltage : 8.4 VDC (battery)

3.3 Short description of the equipment under test (EUT)

The EUT consists of one WLAN Module working in 2.4 and 5 GHz frequency band and one RFID Module working at 13.56 MHz.

Number of tested samples: 1
Serial number: Prototype

EUT operation mode:

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

- Data transmission between EuT and Notebook

EUT configuration:

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

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

- USB and Ethernet cable Model : Notebook (mikes-testingpartners gmbh)
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____
- _____ Model : _____

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

mikes-testingpartners gmbh
Ohmstrasse 2-4
94342 STRASSKIRCHEN
GERMANY

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader may notice that tolerances within the calibration of the equipment and facilities may cause additional uncertainty. The measurement uncertainty is calculated for all measurements listed in this test report acc. to CISPR 16-4-2 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurement“ and documented in the mikes-testingpartners gmbh quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, mikes-testingpartners gmbh, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component diversity and modifications in production processes may result in additional deviation. If necessary, refer to the test lab for the actual measurement uncertainty for specific tests. The manufacturer has the sole responsibility of continued compliance of the EUT.

4.4 Measurement protocol for FCC, VCCI and AUSTEL

4.4.1 GENERAL INFORMATION

4.4.1.1 Test methodology

Conducted and radiated disturbance testing is performed according to the procedures set out by the International Special Committee on Radio Interference (CISPR) Publication 22, European Standard EN 55022 as shown under section 1 of this report.

4.4.1.2 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.4.2 DETAILS OF TEST PROCEDURES

General Standard information

The test methods used comply with CISPR Publication 22, EN 55022 - "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement" and with ANSI C63.4 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". In compliance with 47 CFR Part 15 Subpart A, Section 15.38 testing for FCC compliance may be achieved by following the procedures set out in ANSI C63.4 and applying the CISPR 22 limits.

4.4.3 Conducted emission

Description of measurement

The final level, expressed in dB μ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC limit or to the CISPR limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\begin{aligned} \text{dB}\mu\text{V} &= 20 \cdot \log(\mu\text{V}); \\ \mu\text{V} &= 10^{(\text{dB}\mu\text{V}/20)}; \end{aligned}$$

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50 Ω /50 μ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin of a peak mode measurement appears to be less than 20 dB, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

4.4.4 Radiated emission (electrical field 30 MHz - 1 GHz)

Description of measurement

Spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is established in accordance with ANSI C63.4. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so that they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 meters horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters and the EUT is rotated 360 degrees.

The final level in dBµV/m is calculated by taking the reading from the EMI receiver (Level dBµV) and adding the correction factors and cable loss factor (dB). The FCC or CISPR limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:

30 MHz – 1000 MHz: RBW: 120 kHz

Example:

Frequency (MHz)	Level (dBµV)	+	Factor (dB)	=	Level (dBµV/m)	-	CISPR Limit (dBµV/m)	=	Delta (dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

4.4.5 Radiated emission (electrical field 1 GHz - 40 GHz)

Description of measurement

Radiated emissions from the EUT are measured in the frequency range 1 GHz up to the maximum frequency as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 metre non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is following set out in ANSI C63.4. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. Measurements are made in both the horizontal and vertical polarization planes in a fully anechoic room using a spectrum analyser set to max peak detector function and a resolution 1 MHz and video bandwidth 3 MHz for peak and 10 Hz for average measurement. The conditions determined as worst case will then be used for the final measurements. When the EUT is larger than the beam width of the measuring antenna it will be moved over the surface for the four sides of the equipment. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty and are calculated at the specified test distance.

5 TEST CONDITIONS AND RESULTS

5.1 Conducted emissions

5.1.1 Applicable standard

According to FCC Part 15, Section 15.107(a):

Except as shown in paragraphs (b) and (c) of this Section, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the Table 1 below:

Remarks: This test is not applicable because the EuT is battery powered.

While docking station is mounted with Mobile Panel no interface cables can be connected.

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5.2 Radiated emissions

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

5.2.1 Description of the test location

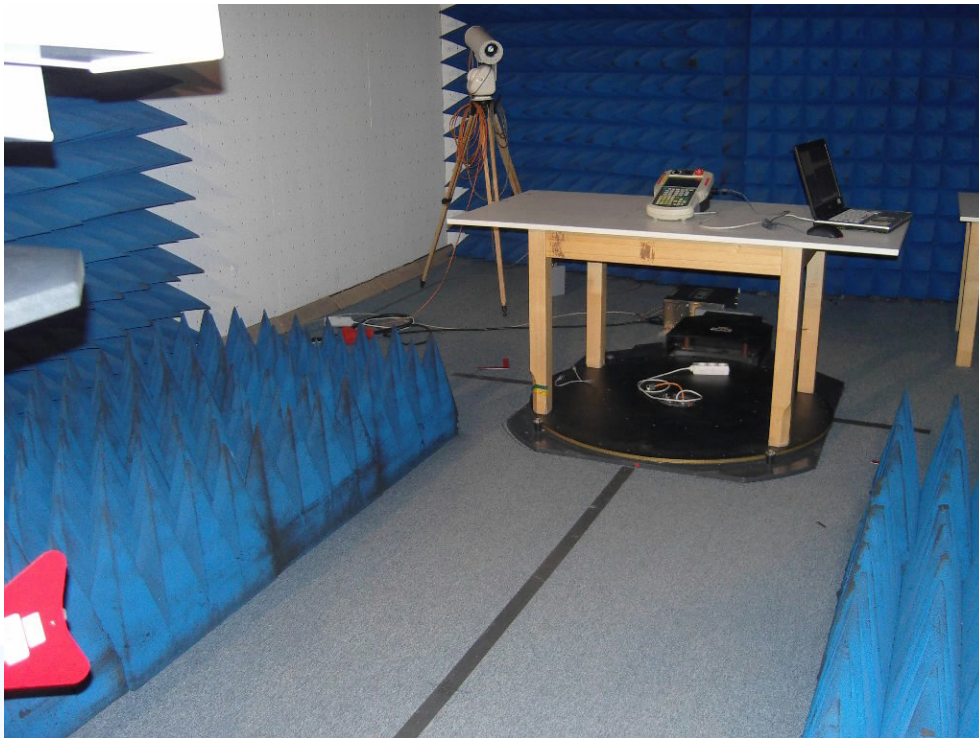
Test location: OATS1
Test location: Anechoic Chamber A2

Test distance: 3 metres

5.2.2 Photo documentation of the test set-up

WTP (peripheral device) connected to PC





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5.2.3 Applicable standard

According to FCC Part 15B, Section 15.109 (a):

Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 m shall not exceed the limit in Table 1 below.

5.2.4 Description of Measurement

Radiated spurious emissions from the EuT are measured in the frequency range of 9 kHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. The measurements are made with 120 kHz/6 dB bandwidth and quasi-peak detection. The EuT is placed on a 1.0 X 1.5 meter non-conducting table 80 centimetres above the ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003.

The antenna was positioned 3 meters horizontally from the EuT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarization`s and the EuT are rotated 360 degrees.

The final level, expressed in dB μ V/m, is arrived by taking the reading from the EMI receiver (Level dB μ V) and adding the correction factors and cable loss factor (Factor dB) to it. This is done automatically in the EMI receiver, where the correction factors are stored.

The radiated emissions from the EuT are measured in the frequency range of 1 GHz to maximum frequency as specified in section 15.33, using a Spectrum Analyzer and appropriate linearly polarized antennas. The EuT is placed on a 1.0 X 1.5 meter non-conducting table 80 centimetres above the ground plane. The set up of the EuT will be in accordance to ANSI C63.4-2003. The antenna was positioned 3 m horizontally from the EuT.

Instrument settings:

9 kHz – 150 kHz:	RBW: 200 Hz
150 kHz – 30 MHz:	RBW: 9 kHz
30 MHz – 1000 MHz:	RBW: 120 kHz
1000 MHz – 2000 MHz	RBW: 1 MHz

5.2.5 Test result

f < 1 GHz

Frequency (MHz)	L: QP (dB μ V)	L: AV (dB μ V)	Bandwidth (kHz)	Correct. (dB)	L: QP dB(μ V/m)	L: AV dB(μ V/m)	Limit dB(μ V/m)	Delta (dB)
18-30	---	---						
30-1000	---	---						

f > 1 GHz

Frequency (GHz)	L: PK (dB μ V)	L: AV (dB μ V)	Bandwidth (kHz)	Correct. (dB)	L: PK dB(μ V/m)	L: AV dB(μ V/m)	Limit AV dB(μ V/m)	Delta (dB)
1-5	---	---						

Remarks: No unwanted emissions could be measured.

Limit according to FCC Part 15B, Section 15.109(a):

Table 1:

Frequency (MHz)	Limit (μ V/m)	Limit dB(μ V/m)
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

The requirements are **FULFILLED**.

Remarks: According to FCC Part 15.33(b) the measurement was performed up to 5 GHz.

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Kind of Equipment	Manufacturer	Equipment No.
SER 1	FMZB 1516 ESCI	Magnetic Field Antenna	Schwarzbeck Mess-Elektronik	01-02/24-01-018
		EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-004
SER 2	ESVS 30 VULB 9168 S10162-B KK-EF393-21N-16 NW-2000-NB	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-006
		Trilog Broad Band Antenna	Schwarzbeck Mess-Elektronik	02-02/24-05-005
		RF Cable 33 m	Huber + Suhner	02-02/50-05-031
		RF Cable 20 m	Huber + Suhner	02-02/50-05-033
		RF Cable	Huber + Suhner	02-02/50-05-113
SER 3	FSP 30 AFS4-01000400-10-10P-4 AMF-4F-04001200-15-10P AFS5-12001800-18-10P-6 3117 Sucoflex N-1600-SMA Sucoflex N-2000-SMA	Spectrum Analyzer	Rohde & Schwarz München	02-02/11-05-001
		RF Amplifier 1 - 4 GHz	PARZICH GMBH	02-02/17-05-003
		RF Amplifier 4 - 12 GHz	PARZICH GMBH	02-02/17-05-004
		RF Amplifier 12 - 18 GHz	PARZICH GMBH	02-02/17-06-002
		Horn Antenna 1-18 GHz	EMCO Elektronik GmbH	02-02/24-05-009
		RF Cable	novotronik Signalverarbeitung	02-02/50-05-073
		RF Cable	novotronik Signalverarbeitung	02-02/50-05-075

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
SER 1	FMZB 1516 ESCI	01-02/24-01-018			02/15/2011	02/15/2010
		02-02/03-05-004	02/09/2011	02/09/2010		
SER 2	ESVS 30 VULB 9168 S10162-B KK-EF393-21N-16 NW-2000-NB	02-02/03-05-006	08/05/2010	08/05/2009		
		02-02/24-05-005	05/06/2011	05/06/2008	04/08/2010	10/08/2009
		02-02/50-05-031				
		02-02/50-05-033				
		02-02/50-05-113				
SER 3	FSP 30 AFS4-01000400-10-10P-4 AMF-4F-04001200-15-10P AFS5-12001800-18-10P-6 3117 Sucoflex N-1600-SMA Sucoflex N-2000-SMA	02-02/11-05-001	04/20/2010	04/20/2009		
		02-02/17-05-003				
		02-02/17-05-004				
		02-02/17-06-002				
		02-02/24-05-009	02/10/2011	02/10/2010		
		02-02/50-05-073				
		02-02/50-05-075				