1 of 13

EMC TEST REPORT

RADIO PERFORMANCE MEASUREMENTS ON THE SAITEK SZ02 WIRELESS TRANSCEIVER

D Legge

Test Report 03011850 (e)

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Report approved by:

K Newman Manager EMC Testing

> 15 January 2004 DAL/tta/03011850(e)doc

REPORT SUMMARY

| Customer: Customer's Representative: | Saitek Plc Units 3 & 4 West Point Row Great park Road Almondsbury Bristol BS32 4QG United Kingdom Martin Mannix |
|---|--|
| Customer's Purchase Order: | Proforma Invoice |
| Description of Equipment Under Test: | Wireless Transceiver |
| Type Number(s): | SZ02 |
| Serial Number(s): | None |
| Test Specification(s): | DA 00 -705,CFR47 Part 15 |
| Equipment Received: | 11 September 2003 |
| Test Date(s): | 11 – 12 September 2003 and 22 January 2004 |

The results of the tests are summarised as follows:

| Transmitter Parameters | CFR47-15 Clause Number | EN300 440-1 Clause Number | Compliance |
|--|---------------------------|------------------------------|------------|
| Equivalent Isotropically Radiated Power | 15.247 | 7.1 | Pass |
| Permitted range of operation frequencies | 15.249 | 7.2 | Pass |
| Spurious Emissions | 15.249 | 7.3 | Pass |
| Receiver parameters | | | |
| Spurious Emissions(Conducted) | 15.207 | 8.4 | Pass |
| Spurious Emissions(Radiated) | 15.209 | - | Pass |

| Test Engineer(s): | D A Legge | |
|--------------------|-----------|--|
| Report Written by: | D A Legge | |
| Checked by: | R Orchard | |

CONTENTS

| 1 | INTRODU | CTION | | 4 |
|---|----------|---|---------------------|-------------|
| 2 | TEST PRO | DCEDURE | | 4 |
| | 2.1 | Relevant Performance Specifica | tion | 4 |
| | 2.2 | Test Environment | | 4 |
| | 2.3 | Configuration of Test Sample | | 4 |
| | 2.4 | Test Frequency | | 4 |
| | 2.5 | Test Power Sources | | 5 |
| | 2.6 | Measurement Uncertainty | | 5 |
| 3 | RESULTS | OF TRANSMITTER TESTS | | 5 |
| | 3.1 | Equivalent Isotropic Radiated Po | ower | 5 |
| | 3.2 | Permitted Range of Operating F | requencies | 6 |
| | 3.3 | Spurious Emissions | | 7 |
| 4 | RESULTS | OF RECEIVER TESTS | | 9 |
| | 4.1 | Spurious Emissions | | 9 |
| 5 | ANNEX 1 | | | 10 |
| | 5.1 | Plots of occupied operating frequencies | uencies | 10 |
| 6 | ANNEX 2 | | ERROR! BOOKMARK NOT | DEFINED. |
| | 6.1 | Spurious emission plots | Error! Bookmark no | ot defined. |

RADIO PERFORMANCE MEASUREMENTS ON THE SAITEK SZ02 WIRELESS TRANSCEIVER

1 INTRODUCTION

Intertek Testing & Certification Ltd on behalf of Saitek Plc tested the Saitek SZ02 hub, dongle and joystick wireless transceiver in conjunction with a Sony Playstation2, which used Spread Spectrum Technology. The samples were tested to the relevant performance specification published by the European Telecommunications Standards Institute. This report contains the results of these tests and is submitted to Saitek Plc as the final test results.

2 TEST PROCEDURE

2.1 Relevant Performance Specification

The relevant performance specification for the Saitek Plc SZ02 is FCC CFR47 Part 15. The tests performed are those required to demonstrate compliance with the essential requirements of CFR47 Part 15 for regulatory purposes.

2.2 Test Environment

The tests were performed in the EMC Test Department Test Facility at Intertek Testing & Certification Ltd laboratories in Leatherhead. The samples were subjected to the ambient conditions in the laboratory and indoor test site except during tests at extremes of temperatures, When the EUT was placed in an environmental chamber. The temperature and relative humidity recorded during the period of each test are given in the results.

2.3 Configuration of Test Sample

The test sample consisted of a SZ02 Hub a Dongle and a joystick designed to operate with a Sony Playstation (PS2) and upto 2 PS2 compatible gamepad units

F

2.4 Test Frequency

The samples supplied operated in the frequency band 2400.0 – 2483.5MHz.

2.5 Test Power Sources

The sample is intended to operate from an internal battery 6.0vdc for the Hub unit, whilst the Dongle derives 3.5vdc and 8 vdc from the Playstation2.

2.6 Measurement Uncertainty

All measurement uncertainties stated in this report are estimated to a 95% confidence level.

3 RESULTS OF TRANSMITTER TESTS

3.1 Equivalent Isotropic Radiated Power

The tests were carried out under normal test conditions in a fully lined anechoic chamber using a test range of 1.0 m.

The EUT was set to transmit and rotated through 360° in a vertical axis to find the maximum radiated power. The Equivalent Isotropic Radiated Power was then calculated and extrapolated for a 3m test distance.

Laboratory Conditions: Temperature 23.0°C Humidity 42%

3.1.1 EIRP

| Fundamental MHz | Field mV/m | Limit mV/m |
|------------------|------------|------------|
| 2448.6 | 3.162 | 50.0 |
| Ist Harmonic MHz | Field µV/m | Limit µV/m |
| 4867.6 | 128.8 | 500.0 |

| Lower Channel MHz | Field mV/m | Upper Channel MHz | Field mV/m | Limit mV/m |
|-------------------|------------|-------------------|------------|------------|
| 2401.6 | 2.98 | 2478.7 | 2.85 | 50.0 |

Note: Emissions above 1GHz are manual measurements made using a spectrum analyser with RBW 1MHz, VBW 3MHz, Peak Detector. As all peak detected levels are lower than the average limits, no average measurements were made.

3.2 Permitted Range of Operating Frequencies

Laboratory Conditions: Temperature 23°C; Humidity 42 %

3.2.1 Occupied Operating Frequencies(EIRP)

| Measured frequency MHz - fL | Measured frequency MHz - fH | Limit 2400.0 – 2483.5 MHz |
|--------------------------------|--------------------------------|------------------------------|
| 2401.6 | 2478.7 | Pass |
| Measurement Uncerta | ainty: ± 500 Hz | |

3.2.2 Occupied Operating Frequencies (-30dBm)

| Measured frequency MHz - fL | Measured frequency MHz - fH | Limit 2400.0 – 2483.5 MHz |
|--------------------------------|--------------------------------|------------------------------|
| 2401.0 | 2479.4 | Pass |
| Measurement Uncerta | ainty: ± 500 Hz | |

Note: Plots showing the occupied operating frequencies are shown in Annex 1

Spurious Emissions 3.3

3.3.1 Conducted – Line/Neutral/Ground

| Measured Frequency (MHz) | Emission (dBµV) | Limits (dBµV) | Comment | |
|--|-----------------|---------------|---------|--|
| 0.45 | 29.2 | 48.0 | Pass | |
| 0.51 | 28.73 | 48.0 | Pass | |
| 0.56 | 30.02 | 48.0 | Pass | |
| 1.1 | 23.89 | 48.0 | Pass | |
| 1.58 | 28.15 | 48.0 | Pass | |
| 1.92 | 27.87 | 48.0 | Pass | |
| 2.59 | 27.75 | 48.0 | Pass | |
| 2.93 | 23.25 | 48.0 | Pass | |
| 3.78 | 20.98 | 48.0 | Pass | |
| 5.0 | 30.05 | 48.0 | Pass | |
| 6.94 | 15.79 | 48.0 | Pass | |
| 10.21 | 9.50 | 48.0 | Pass | |
| 15.0 | 35.07 | 48.0 | Pass | |
| 20.94 | 16.86 | 48.0 | Pass | |
| 25.0 | 39.51 | 48.0 | Pass | |
| 30.0 | 27.0 | 48.0 | Pass | |
| All other emissions were at least 15 dB within specification | | | | |
| Measurement uncertainty : ± 4.4dB | | | | |

Note: A plot of the conducted emissions is shown in Annex 2

3.3.2 Radiated - Transmitter Operating

| Frequency (MHz) | Emission (µV/m) | Limits (µv/m) | Comment | |
|--|------------------|---------------|---------|--|
| 30.3 | 35.48 | 100 | Pass | |
| 701.22 | 66.22 | 200 | Pass | |
| 728.52 | 87.39 | 200 | Pass | |
| 805.74 | 85.40 | 200 | Pass | |
| 855.48 | 95.80 | 200 | Pass | |
| 923.04 | 103.7 | 200 | Pass | |
| 949.02 | 110.3 | 200 | Pass | |
| 1171.0 | 101.15 | 500 | Pass | |
| 1463.0 | 134.90 | 500 | Pass | |
| 1769.4 | 78.85 | 500 | Pass | |
| 2050.0 | 120.64 | 500 | Pass | |
| All other emissions were at least 20 dB within specification | | | | |
| Measurement uncertainty based on substitution method ±5.1dB | | | | |

Laboratory Conditions: Temperature 23°C; Humidity 42%

Note: A plot of the radiated emissions for the frequency range 30 – 1000MHz is shown in annex 2. Emissions above 1GHz are manual measurements made using a spectrum analyser with a RBW of 1MHz and a VBW of 3MHz. As all peak values are lower than the average limits, no average measurements were made.

3.3.3 Radiated - Transmitter Standby

There were no emissions found above system measuring level (at least 10 dB below limit).

4 RESULTS OF RECEIVER TESTS

4.1 Spurious Emissions

4.1.1 Conducted – Line/Neutral/Ground

Laboratory Conditions: Temperature 25.5°C; Humidity 40%

| Measured Frequency (MHz) | Emission (dBµV) | Limits (dBµV) | Comment | |
|--|-----------------|---------------|---------|--|
| 0.45 | 29.2 | 48.0 | Pass | |
| 0.51 | 28.73 | 48.0 | Pass | |
| 0.56 | 30.02 | 48.0 | Pass | |
| 1.1 | 23.89 | 48.0 | Pass | |
| 1.58 | 28.15 | 48.0 | Pass | |
| 1.92 | 27.87 | 48.0 | Pass | |
| 2.59 | 27.75 | 48.0 | Pass | |
| 2.93 | 23.25 | 48.0 | Pass | |
| 3.78 | 20.98 | 48.0 | Pass | |
| 5.0 | 30.05 | 48.0 | Pass | |
| 6.94 | 15.79 | 48.0 | Pass | |
| 10.21 | 9.5 | 48.0 | Pass | |
| 15.0 | 35.07 | 48.0 | Pass | |
| 20.94 | 16.86 | 48.0 | Pass | |
| 25.0 | 39.51 | 48.0 | Pass | |
| 30.0 | 27.0 | 48.0 | Pass | |
| All other emissions were at least 15 dB within specification | | | | |
| Measurement uncertainty: ± 4.4dB | | | | |

Note: A plot of the conducted results is shown in annex 2.

4.1.2 Radiated Emissions – Receive mode

There were no emissions above measuring system noise, minimum $700\mu V$.

5 ANNEX 1

5.1 Plots of occupied operating frequencies

Operating Frequencies (EIRP)





Operating Frequencies (-30dBm)