

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
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REPORT SUMMARY

Customer: Saitek Plc
Units 3 & 4 West Point Row
Great park Road
Almondsbury
Bristol
BS32 4QG
United Kingdom

Customer's Representative: 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	

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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

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
1st Harmonic MHz	Field μ V/m	Limit μ V/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 Uncertainty: ± 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 Uncertainty: ± 500 Hz		

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

3.3 Spurious Emissions

3.3.1 Conducted – Line/Neutral/Ground

Measured Frequency (MHz)	Emission (dB μ V)	Limits (dB μ V)	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 : ± 4.4 dB			

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

3.3.2 Radiated - Transmitter Operating

Laboratory Conditions: Temperature 23°C; Humidity 42%

Frequency (MHz)	Emission ($\mu\text{V/m}$)	Limits ($\mu\text{V/m}$)	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 $\pm 5.1\text{dB}$			

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 (dB μ V)	Limits (dB μ V)	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: ± 4.4 dB			

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

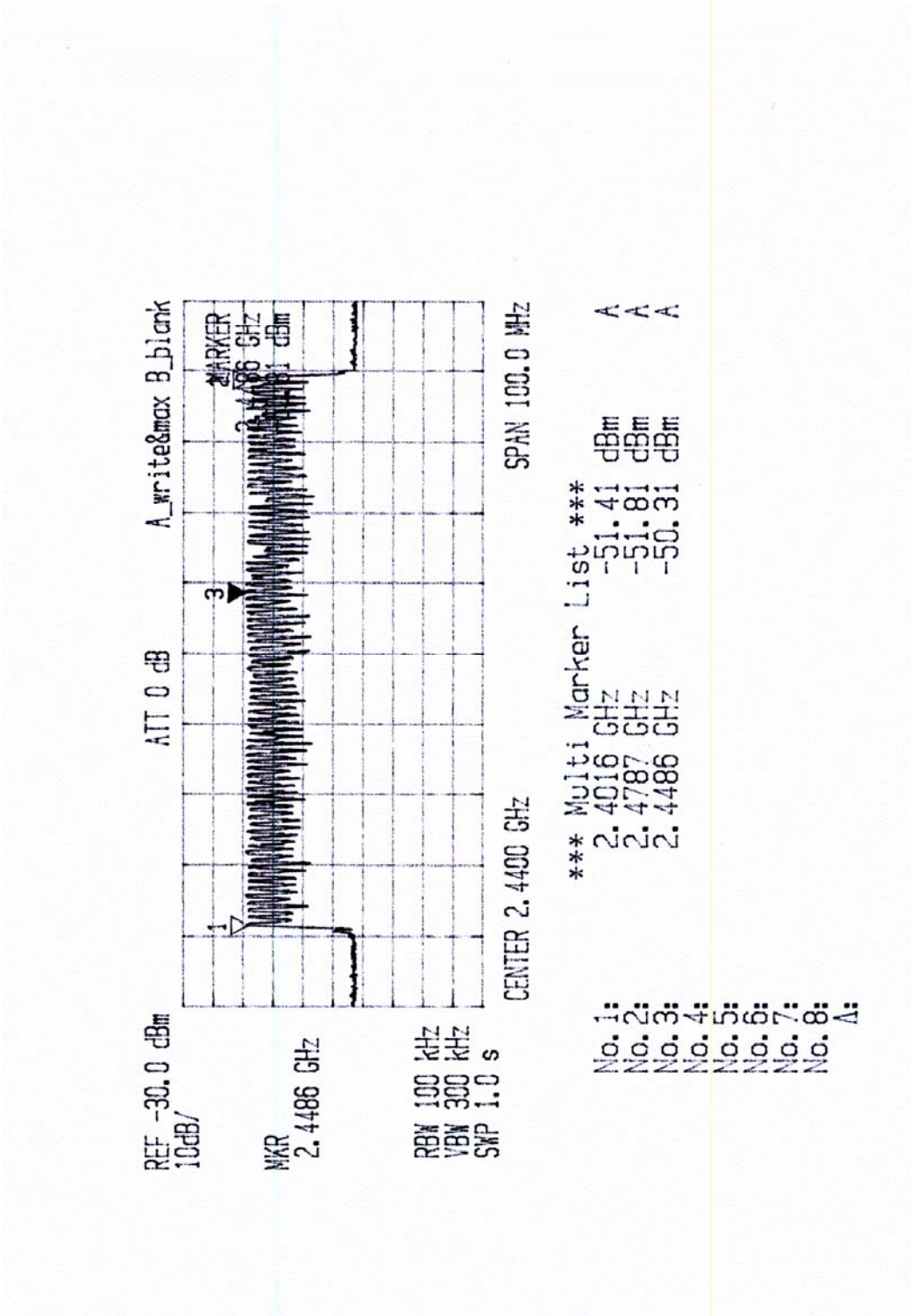
4.1.2 Radiated Emissions – Receive mode

There were no emissions above measuring system noise, minimum 700 μ V.

5 ANNEX 1

5.1 Plots of occupied operating frequencies

Operating Frequencies (EIRP)



Operating Frequencies (-30dBm)

