TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: Stewart Golf Ltd.
X3R

To: FCC Part 15.249

Test Report Serial No:
RFI/MPTE1/RP47810JD02A

This Test Report Is Issued Under The Authority Of Andrew Brown, Operations Manager: 	
Tested By: Steven Wong 	**Checked By: Tony Henriques** 
Report Copy No: PDF01	
Issue Date: 23 May 2006	**Test Dates: 28 March 2006 to 12 May 2006**

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Test of: Stewart Golf Ltd.
X3R
To: FCC Part 15.249

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1. Client Information

Company Name:	Stewart Golf Ltd.
Address:	The Coach House Ryeford Road South Kings Stanley Gloucestershire GL10 3HG
Contact Name:	Mr Funnell

2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

2.1. Identification of Equipment Under Test (EUT)

Brand Name:	Stewart Golf
Model Name or Number:	X3R (Transmitter)
Serial Number:	None Stated
Country of Manufacture:	UK
FCC ID Number:	T36-X3T
Date of Receipt:	28 March 2006

Brand Name:	Stewart Golf
Model Name or Number:	X3R (Receiver)
Serial Number:	None Stated
Country of Manufacture:	UK
Date of Receipt:	28 March 2006

2.2. Description of EUT

The equipment under test is a remotely controlled electrically powered golf trolley. Functions enable the user to control the golf trolley forwards, backwards, left, right and stop.

2.3. Modifications Incorporated in the EUT

During the course of testing the EUT was not modified.

2.4. Additional Information Related to Testing

Power Supply Requirement:	Internal battery supply of 9 V (TX) and 12 V (RX)		
Intended Operating Environment:	Golf Courses		
Equipment Category:	Transmitter and receiver		
Type of Unit:	Portable (Standalone battery powered device)		
Interface Ports:	None		
Transmit Frequency Range:	Internal battery supply of 9 V (TX) and 12 V (RX)		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Single Frequency	Not Applicable	914.5
Receive Frequency Range:	Single Frequency 914.5 MHz		
Receive Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Single Frequency	Not Applicable	914.5
Highest Unintentionally Generated Frequency:	914.5 MHz		
Highest Fundamental Frequency:	914.5 MHz		
Occupied Bandwidth:	33.254 kHz		

2.5. Support Equipment

No support equipment was used to exercise the EUT during testing.

3. Test Specification, Methods and Procedures

3.1. Test Specifications

Reference:	FCC Part 15 Subpart C: 2004 (Sections 15.249).
Title:	Code of Federal Regulations, Part 15 (47CFR215) Radio Frequency Devices.
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.

3.2. Methods and Procedures

The methods and procedures used were as detailed in:

ANSI/TIA-603-B-2003
Land Mobile Communications Equipment, Measurements and performance Standards

ANSI C63.2 (1996)
Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2003)
Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1988)
Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)
Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)
Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

DA00-705 (2000)
Title: Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

3.3. Definition of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the Methods & Procedures section above. Appendix 1 contains a list of the test equipment used.

4. Deviations from the Test Specification

None.

5. Operation of the EUT During Testing

5.1. Operating Modes

The EUT was tested in the following operating modes, unless otherwise stated.

For transmit tests, the EUT transmitter was set to transmit continuously with modulation.

For receiver tests, the EUT receiver unit was set receive mode with the motor running in top speed.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

Both the transmitter and receiver were configured as standalone.

6. Summary of Test Results

Range of Measurements	Specification Reference	Port Type	Compliancy Status
Receiver Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.109	Enclosure	Complied
Transmitter Fundamental Fieldstrength	C.F.R. 47 FCC Part 15: 2004 Section 15.249(a)	Antenna	Complied
Transmitter 20 dB Bandwidth	C.F.R. 47 FCC Part 2: 2004 Section 2.1049	Antenna	Complied
Transmitter Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.249(a)(d)(e) & 15.209	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.249(d) & 15.209	Antenna	Complied

6.1. Location of Tests

All the measurements described in this report were performed at the premises of
RFI Global Services Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

7. Measurements, Examinations and Derived Results

7.1. General Comments

7.1.1. This section contains test results only.

7.1.2. Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 8 for details of measurement uncertainties.

7.2. Receiver Radiated Spurious Emissions: Section 15.109

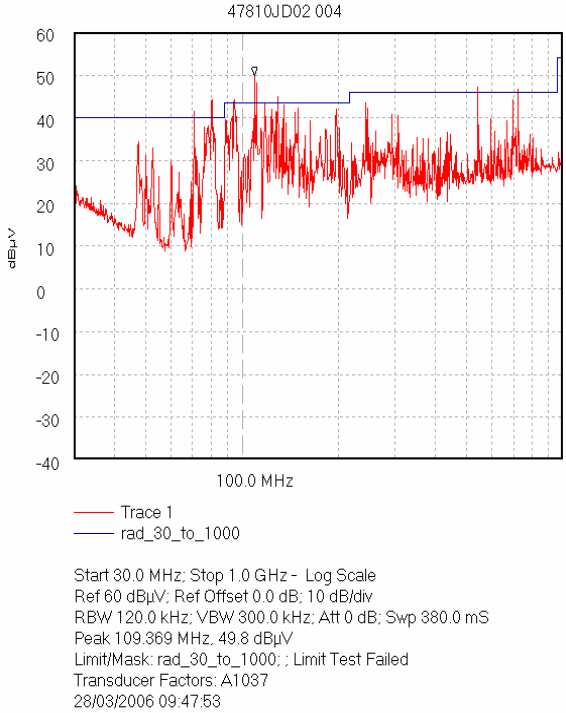
7.2.1. Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)

7.2.1.1. The EUT was configured for radiated emissions testing as described in Section 8 of this report.

7.2.1.2. Tests were performed to identify the maximum receiver or standby radiated emission levels.

Results:

Frequency (MHz)	Antenna Polarity	Q-P Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
71.955	Vert.	20.5	40.0	19.5	Complied
80.005	Horiz.	34.0	40.0	6.0	Complied
108.022	Vert.	20.8	43.5	22.7	Complied
128.844	Horiz.	26.3	43.5	17.2	Complied
198.770	Horiz.	23.0	43.5	20.5	Complied
242.436	Horiz.	26.6	46.0	19.4	Complied
545.893	Horiz.	33.0	46.0	13.0	Complied
702.330	Horiz.	30.0	46.0	16.0	Complied
730.030	Horiz.	27.0	46.0	19.0	Complied



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

7.3. Receiver Radiated Spurious Emissions: Section 15.109 (Continued)

7.3.1. Electric Field Strength Measurements (Frequency Range: 1 to 5 GHz)

Results:

Highest Peak Level:

Frequency (MHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1031.503	Vert.	62.1	-12.4	49.7	74.0	24.3	Complied
1214.997	Vert.	51.7	-12.4	39.3	74.0	34.7	Complied
1263.685	Vert.	65.7	-12.4	53.3	74.0	20.7	Complied
1354.725	Vert.	68.1	-12.0	56.1	74.0	17.9	Complied
4474.374	Vert.	44.4	-6.3	38.1	74.0	35.9	Complied

Highest Average Level:

Frequency (MHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1031.503	Vert.	39.0	-12.4	26.6	54.0	27.3	Complied
1214.997	Vert.	39.8	-12.4	27.4	54.0	26.6	Complied
1263.685	Vert.	44.9	-12.4	32.5	54.0	21.5	Complied
1354.725	Vert.	37.2	-12.0	25.2	54.0	28.8	Complied
4474.374	Vert.	31.8	-6.3	25.5	54.0	28.5	Complied

Note(s):

1. The transducer factor incorporates the antenna factor, cables losses, pre-amplifier gain and attenuations.

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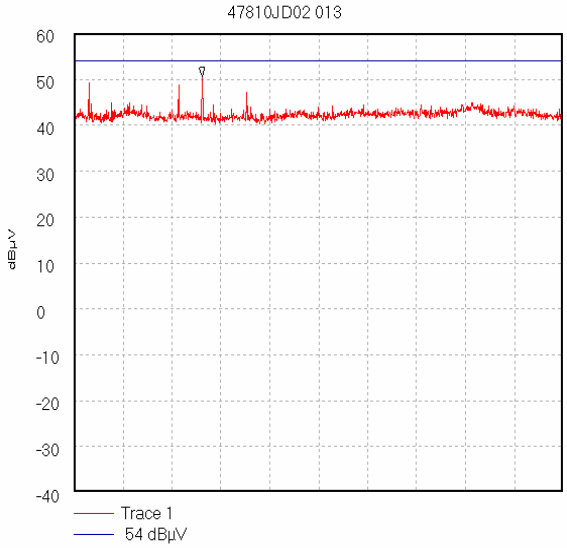
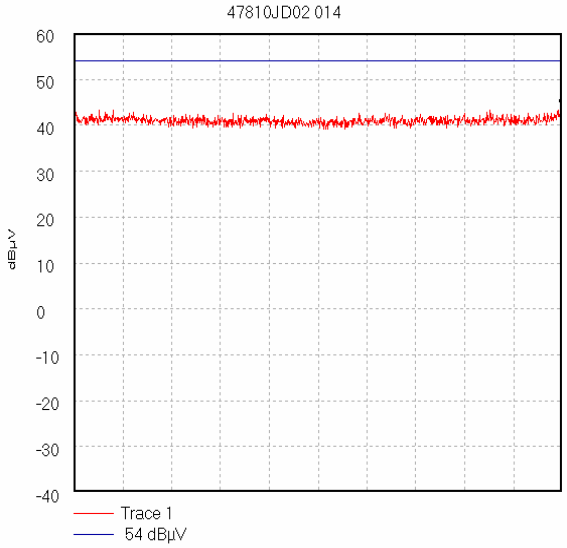
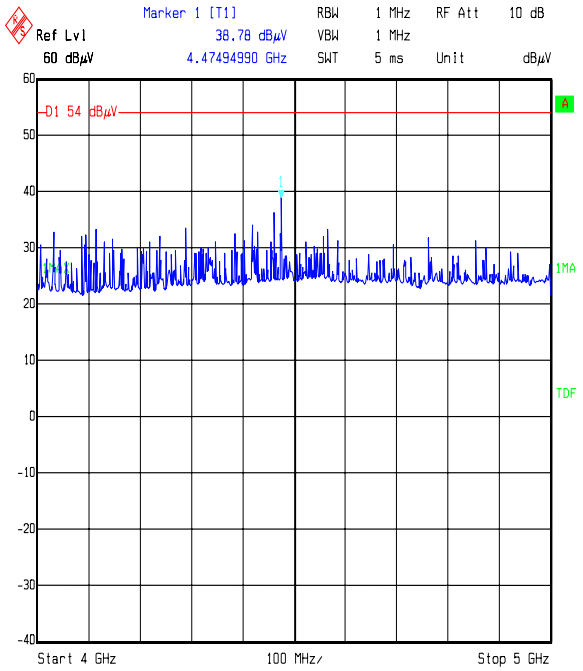
Receiver Radiated Spurious Emissions: Section 15.109 (Continued)



Start 1.0 GHz; Stop 2.0 GHz
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.262 GHz, 50.66 dBµV
Display Line: 54 dBµV; ; Limit Test Passed
Transducer Factors: A1037
28/03/2006 11:01:25



Start 2.0 GHz; Stop 4.0 GHz
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 4.0 GHz, 43.58 dBµV
Display Line: 54 dBµV; ; Limit Test Passed
Transducer Factors: A1037
28/03/2006 11:05:28



Title: Stewart Golf EUT: X3R. FCC P15.249 Rad Emissions
Comment A: 47810JD02 Receiver
Date: 12.MAY 2006 16:33:38

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

7.4. Transmitter Fundamental Fieldstrength Section 15.249(a)

7.4.1. The EUT was configured for radiated emissions testing as described in Section 8 of this report.

7.4.2. Tests were performed to identify the maximum fieldstrength of the fundamental frequency.

Results:

Battery Powered Devices

Frequency (MHz)	Antenna Polarity	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
914.5	Vert.	89.8	94.0	4.2	Complied

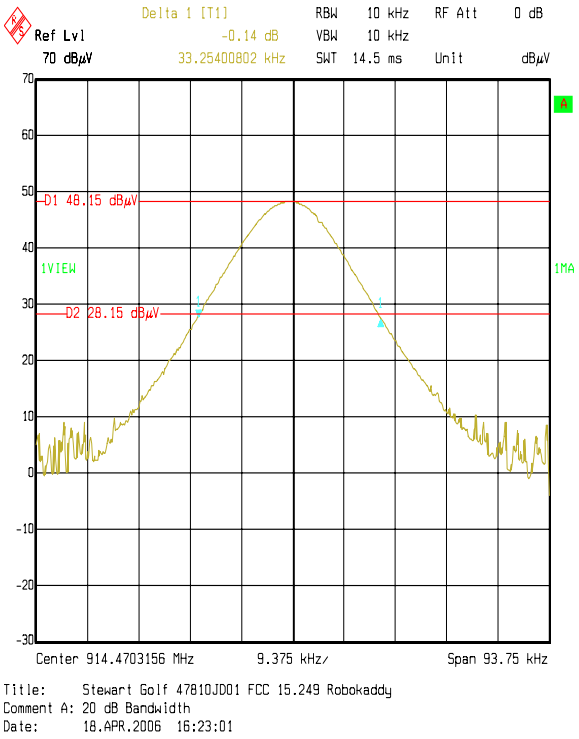
7.5. Transmitter 20 dB Bandwidth: Section 2.1049

7.5.1. The EUT was configured for 20 dB bandwidth measurements as described in Section 8 of this report.

7.5.2. Tests were performed to identify the 20 dB bandwidth.

Results:

Transmitter 20 dB Bandwidth (kHz)
33.254



7.6. Transmitter Radiated Emissions: Section 15.249(a)(d)(e) & Section 15.209

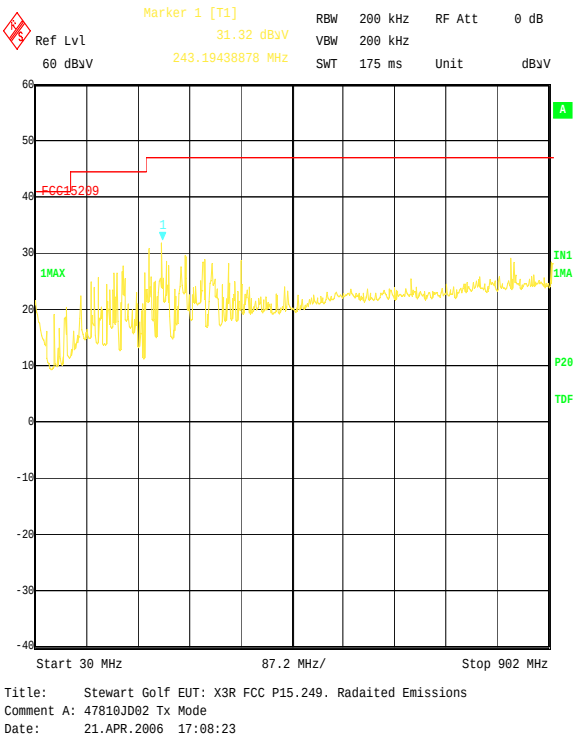
7.6.1. Electric Field Strength Measurements: 30 to 1000 MHz

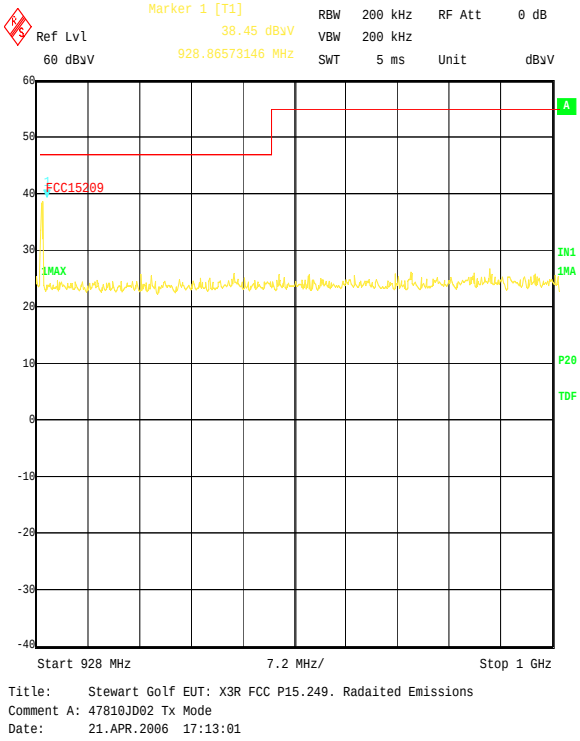
7.6.1.1. The EUT was configured for radiated emissions testing as described in Section 8 of this report.

7.6.1.2. Tests were performed to identify the maximum radiated spurious emission levels.

Results:

Frequency (MHz)	Antenna Polarity	Q-P Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
177.224	Vert.	16.2	43.5	27.3	Complied
244.026	Vert.	12.3	46.0	33.7	Complied
355.850	Vert.	15.1	46.0	30.9	Complied
836.637	Vert.	35.8	46.0	10.2	Complied
900.228	Vert.	34.0	46.0	12.0	Complied
928.818	Vert.	41.9	46.0	4.1	Complied





Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Emissions: Section 15.249(a)(d)(e) & Section 15.209 (Continued)

7.6.2. Electric Field Strength Measurements (Frequency Range: 1 to 10 GHz)

Results:

Highest Peak Level:

Frequency (MHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1828.876	Vert.	51.4	-9.1	42.3	74.0	31.7	Complied
4572.169	Horiz.	48.0	-6.0	42.0	74.0	32.0	Complied
5486.769	Horiz.	43.1	-5.4	37.7	74.0	36.3	Complied

Highest Average Level:

Frequency (MHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1828.876	Vert.	51.0	-9.1	41.9	54.0	12.1	Complied
4572.169	Horiz.	47.4	-6.0	41.4	54.0	12.6	Complied
5486.769	Horiz.	41.9	-5.4	36.5	54.0	17.5	Complied

Note(s):

1. The transducer factor incorporates the antenna factor, cables losses, pre-amplifier gain and attenuations.

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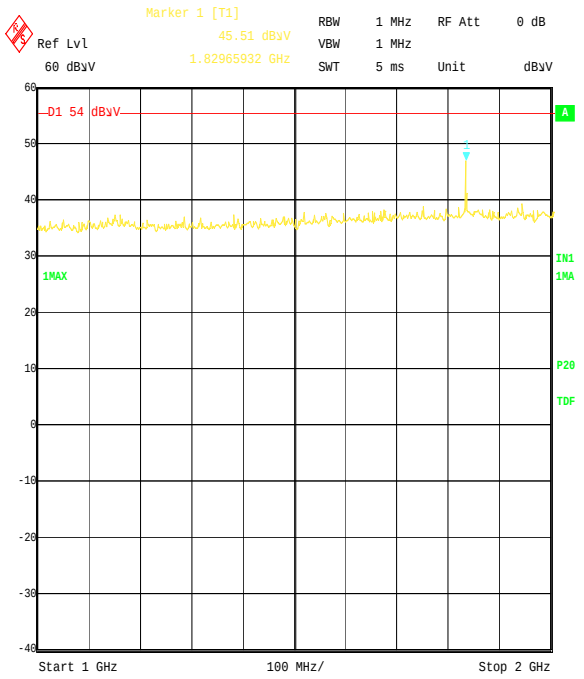
Transmitter Radiated Emissions: Section 15.249(a)(d)(e) & Section 15.209 (Continued)



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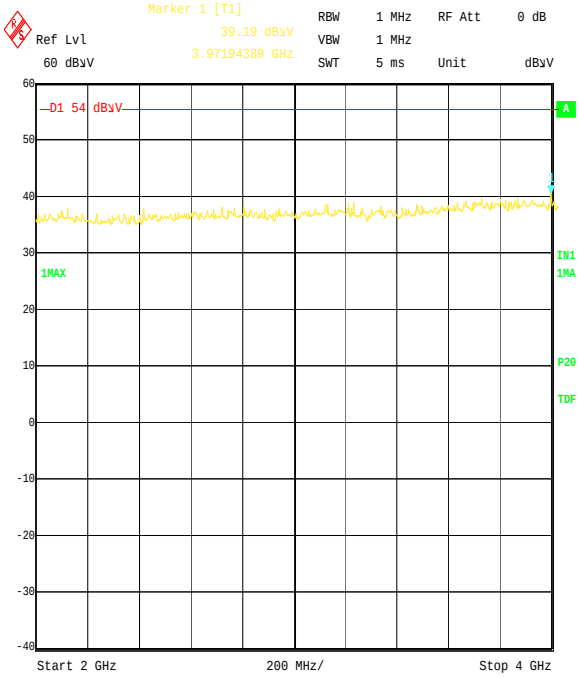
Comment A: 47810JD02 Tx Mode
Date: 21.APR.2006 18:14:30



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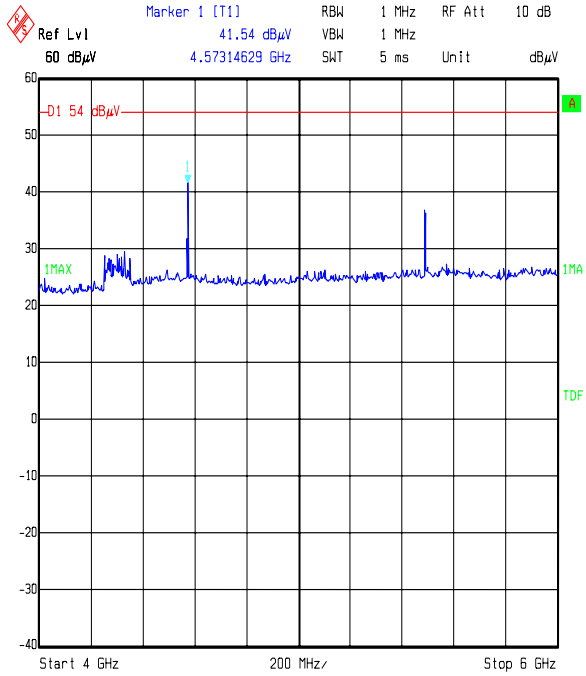
Comment A: 47810JD02 Tx Mode
Date: 21.APR.2006 18:12:36



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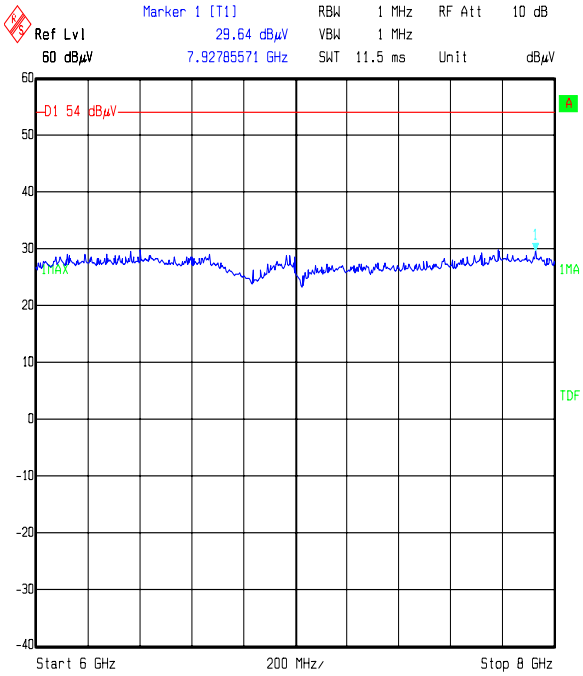
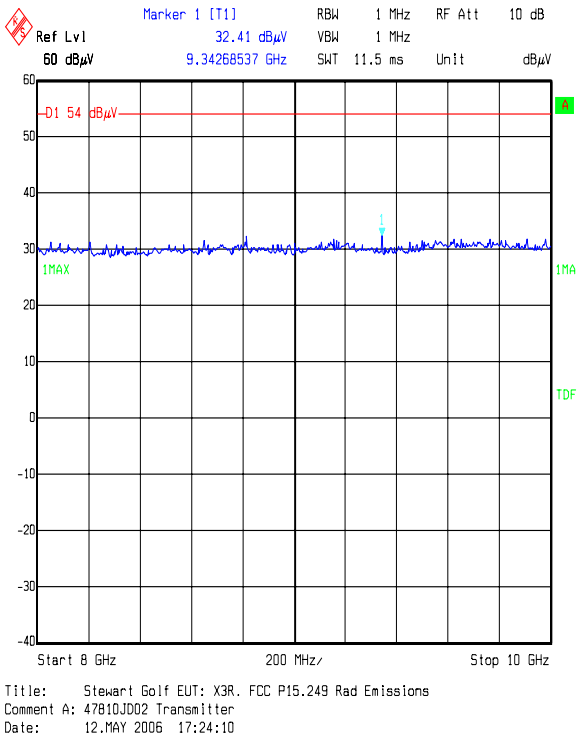
Comment A: 47810JD02 Transmitter
Date: 12.MAY 2006 17:15:21



Title: Stewart Golf EUT: X3R. FCC P15.249 Rad Emissions
Comment A: 47810JD02 Transmitter
Date: 12.MAY 2006 17:21:54

Test of: **Stewart Golf Ltd.**
X3R
To: **FCC Part 15.249**

Transmitter Radiated Emissions: Section 15.249(a)(d)(e) & Section 15.209 (Continued)



Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

7.7. Transmitter Radiated Emissions at Band Edges: Section 15.249(d) & 15.209

7.7.1. The EUT was configured for transmitter radiated emissions testing described in Section 8 of this report.

7.7.2. Tests were performed to identify the maximum emissions level at the band edges of the frequency band that the EUT will operate over.

Results:

Bottom Band Edge

Frequency (MHz)	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
902	32.6	46.0	13.4	Complied

Top Band Edge

Frequency (MHz)	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
928	42.5	46.0	3.5	Complied

Note(s):

1. No emissions plots were taken for this test as the measurement was performed using a test receiver with Quasi Peak detector, which only indicates the measured values.

8. Measurement Methods

8.1. Radiated Emissions

Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Initial measurements covering the entire measurement band in the form of swept scans in a shielded enclosure were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies on which the EUT should be re-measured in full on the open area test site. In order to minimise the time taken for the swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. Following the initial scans, graphs were produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. Any emission within 20 dB of the limit were then measured on the open area test site, except in cases where the noise floor was within 20 dB of the limit, in these cases the highest point of the noise floor was measured.

In either case the measurement was made at the appropriate distance using a measuring receiver with a Quasi-Peak detector for measurements below 1000 MHz and an Average detector for measurements above 1000 MHz.

For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2001 Clause 5.4.

All measurements on the open area test site were performed using broadband antennas.

On the open area test site, at each frequency where a signal was to be measured, the trace was maximised by rotating a turntable through 360°. The angle at which the maximum signal was observed was locked out. For frequencies below 1000 MHz the test antenna was varied in height between 1 m and 4 m in order to further maximise the target emission.

For frequencies above 1000 MHz where a horn antenna was used, height searching was performed to locate the optimal height of the horn with respect to the EUT. At this point the horn was locked off and the turntable was again rotated through 360° to maximise the target signal. It should be noted that the received signal from the EUT would diminish very quickly after it exits the beam width of the horn antenna, for this reason it may not be necessary to fully height search with the horns.

At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT.

Scans were performed to the upper frequency limits as stated in Section 15.33

The final field strength was determined as the indicated level in dBμV plus cable loss and antenna factor.

Radiated Emissions (Continued)

The test equipment settings for radiated emissions measurements were as follows:

Receiver Function	**Initial Scan**	**Final Measurements Below 1 GHz**	**Final Measurements Above 1 GHz**
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak / Average
Mode:	Max Hold	Not applicable	Max Hold
Bandwidth:	(120 kHz < 1 GHz) (1 MHz > 1 GHz)	120 kHz	1 MHz
Amplitude Range:	100 dB	100 dB	100 dB
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

8.2. Transmitter 20 dB Bandwidth

The EUT and spectrum analyser was configured as for transmitter radiated emissions measurements.

To determine the occupied bandwidth, a resolution bandwidth of 10 kHz was used, which is greater than 1% of the 20 dB bandwidth. A video bandwidth of a least the same value was used. The analyser was set for a maximum hold scan to capture the profile of the signal. The peak level was then determined, and a reference line was drawn 20 dB below the peak level. The bandwidth was determined at the points where the 20 dB reference crossed the profile of the emission.

9. Measurement Uncertainty

9.1. No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

9.2. The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

9.3. The uncertainty of the result may need to be taken into account when interpreting the measurement results.

9.4. The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	**Range**	**Confidence Level (%)**	**Calculated Uncertainty**
Occupied Bandwidth	N/A	95%	+/- 0.12 %
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	+/- 1.78 dB

9.5. The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A027	Horn Antenna	Eaton	9188-2	301
A028	Horn Antenna	Eaton	91888-2	304
A031	Horn Antenna	Eaton	91889-2	557
A059	Log Periodic Antenna	EMCO	3146	8902-2378
A1037	Bilog Antenna	Chase EMC	CBL6112B	2413
A1534	Preamplifier 1-26.5 GHz	Hewlett Packard	8449B OPT H02	3008A00405
A254	Horn Antenna	Flann Microwave	14240-20	139
A259	Bilog Antenna	Chase	CBL6111	1513
A392	Attenuator	Suhner	6803.17.B	None
A428	Horn Antenna	Flann	12240-20	134
A429	Horn Antenna	Flann	16240-20	561
M003	Spectrum Monitor	Rohde & Schwarz	EZM	883 580/008
M044	Test Receiver	Rohde & Schwarz	ESVP	891 845/026
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986_022
M505/ M506	Test Receiver	Rohde & Schwarz	ESBI	825316/010 (DU) 827060/004 (RF)
S201	Site 1	RFI	1	
S202	Site 2	RFI	2	S202-15011990

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

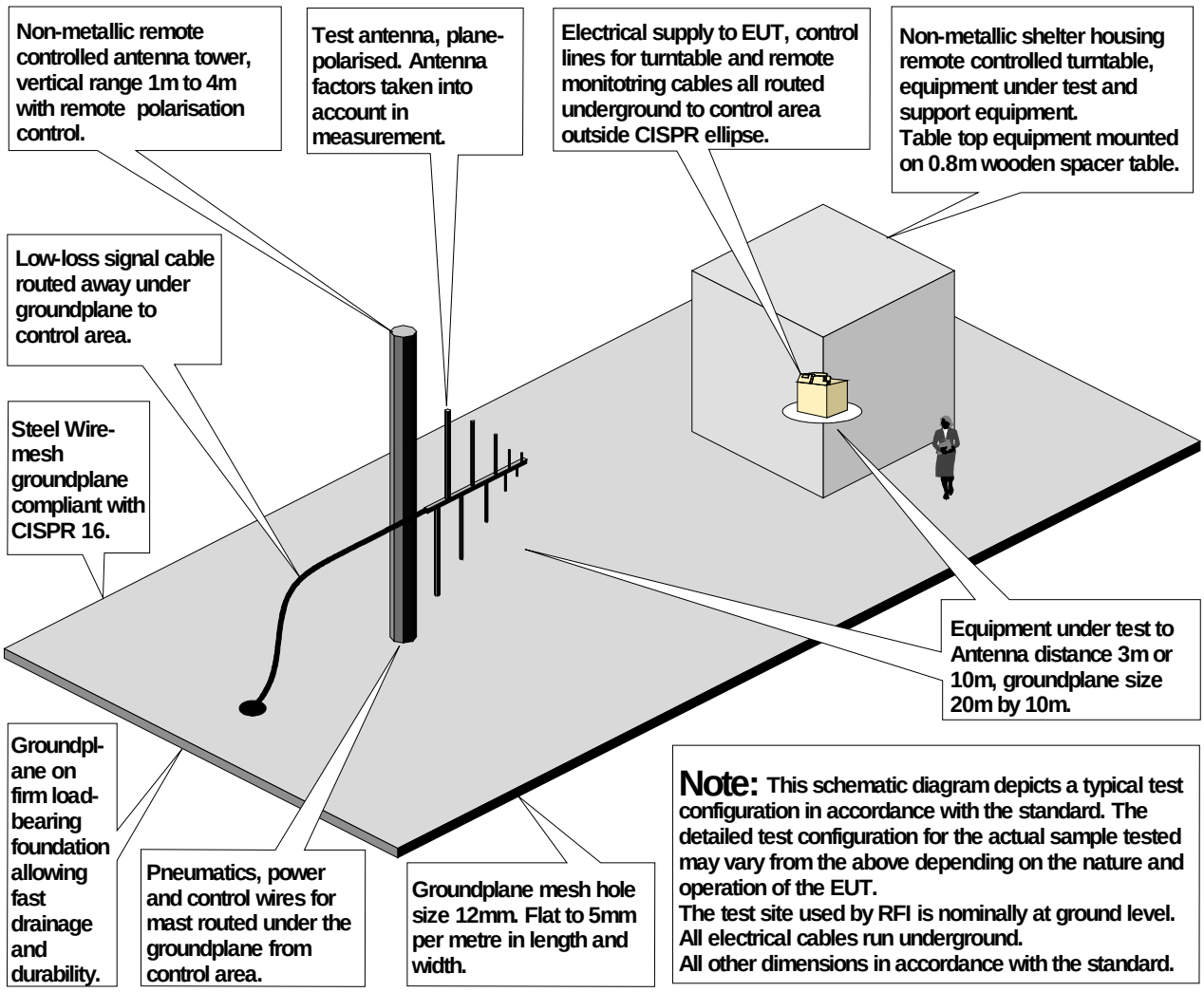
Appendix 2. Test Configuration Drawing

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\47810JD02\EMIRAD	Test configuration for measurement of radiated emissions.

Test of: Stewart Golf Ltd.
X3R
To: FCC Part 15.249

DRG\47810JD02\EMIRAD



Note: This schematic diagram depicts a typical test configuration in accordance with the standard. The detailed test configuration for the actual sample tested may vary from the above depending on the nature and operation of the EUT.
The test site used by RFI is nominally at ground level.
All electrical cables run underground.
All other dimensions in accordance with the standard.

Test Configuration For Radiated Emissions Measurements

Reflection-free area: >60m by 52m (CISPR ellipse)
Groundplane Earthed
Control room outside CISPR ellipse