

# TEST REPORT FROM RFI GLOBAL SERVICES LTD

Partial Test of: Smiths Detection – EQO 1

To: FCC Part 15.249: 2008 Subpart C

**Test Report Serial No:**  
RFI/RPT2/RP73630JD01B

**Supersedes Test Report Serial No:**  
RFI/RPT1/RP73630JD01B

**This Test Report Is Issued Under The Authority  
Of Brian Watson, Operations Director:**

  
pp

Checked By:	Nigel Davison
Signature:	
Date of Issue:	10 August 2009

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## **1. Customer Information**

<b>Company Name:</b>	Compliance Engineering Ireland Ltd.
<b>Address:</b>	Raystown Ratoath Road Ashbourne Co. Meath Ireland

### **1.1. Manufacturers Information**

<b>Company Name:</b>	Smiths Detection Group Ltd.
<b>Address:</b>	64 Clarendon Road Watford Herts WD17 1DA UK

## 2. Summary of Testing

### 2.1. General Information

<b>Specification Reference:</b>	FCC Part 15.249: 2008 Subpart C
<b>Specification Title:</b>	Code of Federal Regulations (CFR47) Radio Frequency Devices.
<b>Site Registration:</b>	FCC: 209735
<b>Location of Testing:</b>	Compliance Engineering Ireland Ltd, Raystown, Ratoath Road, Ashbourne, Co. Meath, Ireland.
<b>Test Date:</b>	13 February 2009

### 2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Port Type	Result
Part 15.249(a)	Transmitter Fundamental Field Strength	Antenna	✓
Part 15.249 & 15.209	Transmitter Radiated Spurious Emissions	Antenna	✓

**Key to Results**

✓ = Complied   ✘ = Did not comply

#### **Note(s):**

- Only requested parts of the standard were tested as specified by the customer.

### 2.3. Methods and Procedures

<b>Reference:</b>	ANSI C63.4 (2003)
<b>Title:</b>	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.

### 2.4. Deviations from the Test Specification

Section 5.2.2 radiated emissions covers only the frequency 18 GHz to 100 GHz as instructed by the customer.

### **3. Equipment Under Test (EUT)**

#### **3.1. Identification of Equipment Under Test (EUT)**

<b>Description:</b>	Full Body Scanner
<b>Brand Name:</b>	Smiths Detection
<b>Model Name or Number:</b>	EQO 1
<b>Serial Number:</b>	93977
<b>FCC ID:</b>	XM7-SD-E0001

#### **3.2. Description of EUT**

The equipment under test was a full body security scanning system operating in the 24 GHz band.

#### **3.3. Modifications Incorporated in the EUT**

During the course of testing the EUT was not modified.

#### **3.4. Support Equipment**

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

#### **3.5. Additional Information Related to Testing**

<b>Power Supply Requirement:</b>	120 V AC 60 Hz
<b>Intended Operating Environment:</b>	Industry / Commercial
<b>Equipment Category:</b>	Security System
<b>Type of Unit:</b>	Full Body Scanner
<b>Transmit Frequency Range:</b>	24.0 to 24.25 GHz
<b>Transmit Channel Tested:</b>	24.12 GHz
<b>Declared Field Strength:</b>	95.3 dB $\mu$ V/m

## **4. Operation of the EUT During Testing**

### **4.1. Operating Modes**

The EUT was tested in the following operating modes:

- Permanent transceiver mode. The EUT was operating at continuous maximum output power with the scanning function displayed on the display monitor. Both the transmitter and receiver sections of this EUT were operating concurrently. The EUT operates with a non-spread spectrum dual RF carriers, which measures the millimetre wave echoes to generate a full motion image of the subject under inspection.

### **4.2. Configuration and Peripherals**

The EUT was tested in the following configuration:

- Standalone. The EUT was connected to the AC mains supply via a standard power lead into the 120 V AC 60 Hz supply. The EUT was isolated from the ground plane via a 10mm wide section of insulation.

## **5. Measurements, Examinations and Derived Results**

### **5.1. General Comments**

5.1.1. This section contains test results only.

5.1.2. 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 6 for details of measurement uncertainties.

## **5.2. Test Results**

### **5.2.1. Transmitter Fundamental Field Strength**

#### **Test Summary:**

FCC Part:	Section 15.249(a)
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes

#### **Environmental Conditions:**

Temperature Range (°C):	14
Relative Humidity Range (%):	39

#### **Results: Peak Level**

Antenna Polarity (H/V)	Detector Level (dB $\mu$ V/m)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
Horizontal	95.7	-3.0	92.7	108.0	15.3	Complied

### 5.2.2. Transmitter Radiated Emissions

#### Test Summary:

FCC Part:	15.249 and 15.209
Test Method Used:	ANSI C63.4 Section 8
Frequency Range:	N/A Single Channel

#### Environmental Conditions:

Temperature (°C):	14
Relative Humidity (%):	39

#### Results: Highest Peak Level

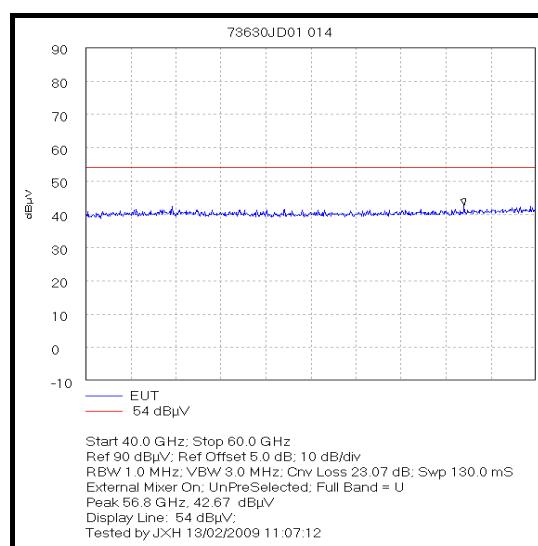
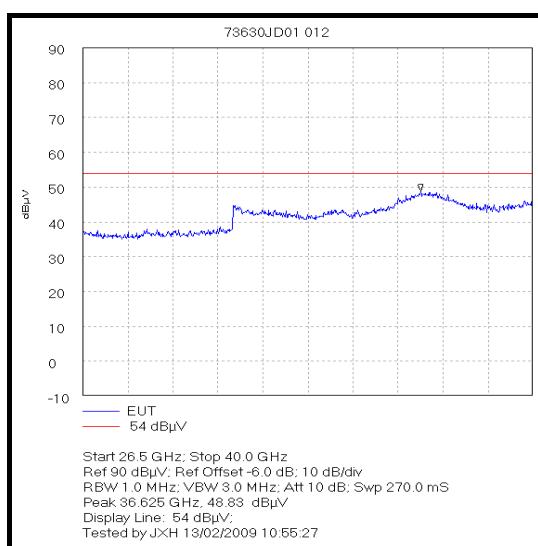
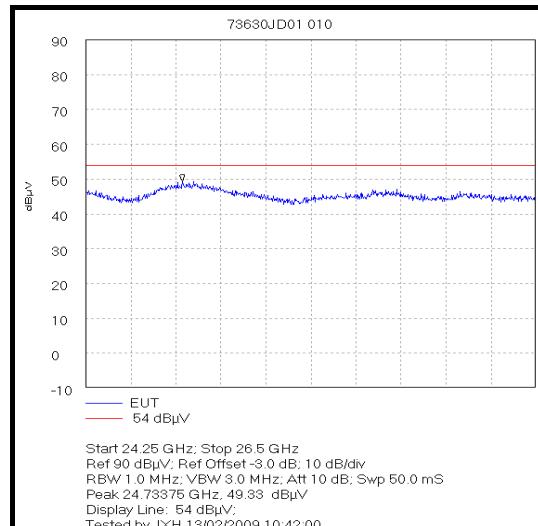
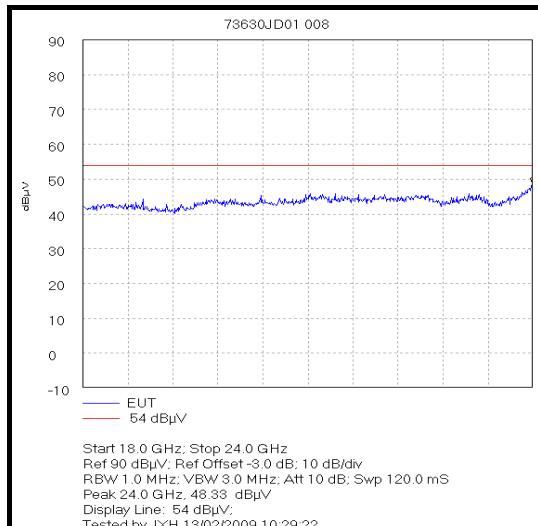
Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
88.500	Vertical	55.7	-7.0	48.7	74.0	25.3	Complied

#### Results: Highest Average Level

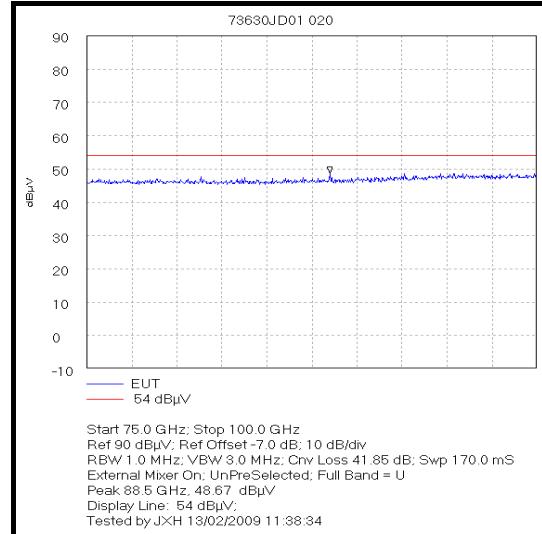
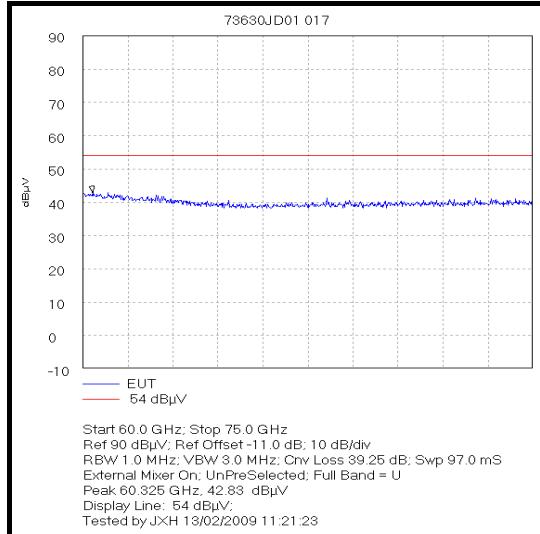
Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
88.500	Vertical	55.7	-7.0	48.7	54.0	5.3	Complied

#### Note(s):

1. \*Note: No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above.  
\*\*Note: The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.
2. 15.249(d) states a spurious emissions limit of 50dBc or the general spurious emission limits stated in 15.209 apply, whichever has the lesser attenuation. The general limits listed in 15.209 were used in this case as the general limits had the lesser attenuation.
3. Note that 88.5 GHz resides within a restricted band and as such the general limits applied to this result.

**Transmitter Radiated Emissions (continued)**

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

**Transmitter Radiated Emissions (continued)**

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

## **6. Measurement Uncertainty**

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.

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

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

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
Radiated Spurious Emissions	18 GHz to 40 GHz	95%	± 1.78 dB
Radiated Spurious Emissions	40 GHz to 100 GHz	95%	± 4.81 dB
Fundamental Field Strength	1 GHz to 40 GHz	95%	± 5.1 dB

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.	Date Last Calibrated	Cal. Interval (Months)
A1033	Harmonic Mixer	Hewlett Packard	11970W	2521A01380	12 Jun 2008	12
A1227	Pre Amplifier	Agilent	8449B	3008A01566	01 Oct 2008	12
A1916	Waveguide Horn Antenna	Flann Ltd.	25240-25	166399	Calibrated before use	-
A201	Antenna	Flann Microwave Ltd	20240-20	266	Calibrated before use	-
A202	Antenna	Flann Microwave Ltd	24240-20	116	Calibrated before use	-
A203	Antenna	Flann Microwave Ltd	22240-20	343	Calibrated before use	-
C1125	Cable	Rosenberger	FA147a 1020002 02	1704 34842-02	Calibrated before use	-
C1169	Cable	Microcoax	n/a	n/a	Calibrated before use	-
M1253	Spectrum Analyser	HP	8564E	3442A00262	21 Oct 2008	12
M166	Thermometer/Barometer /Hygrometer	EuroCom	None	None	18 Jun 2008	12
M194	Harmonic Mixer	Hewlett Packard	11970V	2521A01005	12 Jun 2008	12
M197	Mixer	Hewlett Packard	11970U	2332A00782	13 Jun 2008	12

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