



## TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: RFTRAQ Ltd  
RFID Tag

To: FCC Part 15.249 2007

**Test Report Serial No:**  
RFI/RPTE1/RP49504JD01A

<b>This Test Report Is Issued Under The Authority Of: Brian Watson, Operations Director</b>		
<b>Checked By:</b> Brian Watson		<b>Report Copy No: PDF01</b>
<b>Issue Date: 28 November 2007</b>		<b>Test Dates: 26 October 2007 to 02 November 2007</b>

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Registered in England and Wales. Company number: 2117901

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## **1. Client Information**

<b>Company Name:</b>	RFTRAQ Ltd
<b>Address:</b>	Unit 4 Cobbett Park 22-28 Moorfield Road Slyfield Industrial Estate Guildford Surrey GU1 1RU UK
<b>Contact Name:</b>	Mr A Mephram

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## **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)**

Description:	RFID Short Range Device
Brand Name:	RFTRAQ Ltd
Model Name or Number:	RFID Tag
Serial Number:	915-C
FCC ID Number:	VSNTAG100
Country of Manufacture:	Not stated
Date of Receipt:	26 October 2007

Description:	RFID Short Range Device
Brand Name:	RFTRAQ Ltd
Model Name or Number:	RFID Tag
Serial Number:	918-C
FCC ID Number:	VSNTAG100
Country of Manufacture:	Not stated
Date of Receipt:	26 October 2007

### **2.2. Description of EUT**

The equipment under test is an RFID tag.

### **2.3. Modifications Incorporated in EUT**

An external power cable was fitted to enable the EUT to be powered from an external supply as the internal battery would become discharged prematurely during testing.

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## 2.4. Additional Information Related to Testing

Power Supply Requirement:	3V DC from an internal battery		
Intended Operating Environment:	Inside/Outside		
Equipment Category:	Tracking device		
Type of Unit:	RFID Tag		
Transmit Frequency Range:	915 MHz to 918 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	Not applicable	915
	Top	Not applicable	918
Receive Frequency Range:	915 MHz to 918 MHz		
Receive Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	Not applicable	915
	Top	Not applicable	918
Highest Fundamental Frequency:	918 MHz		
Occupied Bandwidth:	246.492 kHz (measured)		
Transmitter Field Strength:	87.6 dBμV/m (measured)		

## 2.5. Port Identification

Port	Description	Type/Length	Applicable
1	Power	2 core / 200 mm	Yes

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### **3. Test Results**

<b>Reference:</b>	FCC Part 15 Subpart C: 2007 (Sections 15.249).
<b>Title:</b>	Code of Federal Regulations, Part 15 (47CFR215) Radio Frequency Devices.
<b>Comments:</b>	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.

#### **Methods and Procedures**

The methods and procedures used were as detailed in:

ANSI C63.2 (1987)

Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2001)

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.

Public Notice DA 00-705 (2000)

Title: Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

#### **3.1. 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**

There were no deviations from the test specification.

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## **5. Operation of the EUT during Testing**

### **5.1. Operating Modes**

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

Continuously transmitting. No receiver tests were carried out as the unit was set to continuously transmit.

### **5.2. Configuration and Peripherals**

The EUT was tested in the following configuration:

Set by the Client to continuously transmit and powered from an external power supply. Two units were supplied, one transmitting on the bottom channel and the other transmitting on the top channel.



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## **6. Summary of Test Results**

Range of Measurements	Specification Reference	Port Type	Compliance Status
Transmitter Fundamental Field Strength	Section 15.249(a)	Antenna	Complied
Transmitter 20 dB Bandwidth	Section 2.1049	Antenna	Complied
Transmitter Radiated Spurious Emissions	Section 15.249(a)(d)(e) & 15.209	Antenna	Complied
Transmitter Band Edge Radiated Emissions	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.

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

### **7.1. General Comments**

This section contains test results only.

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.

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## **7.2. Test Results**

### **7.2.1. Transmitter Fundamental Field Strength**

Tests were performed using the test methods detailed in ANSI C63.4 Section 8

#### **Results:**

Channel	Field strength (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Result
Bottom	87.4	94	6.6	Complied
Top	87.6	94	6.4	Complied

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

1. *These tests were performed radiated; therefore the EUT antenna gain is encompassed in the final result and not measurable.*

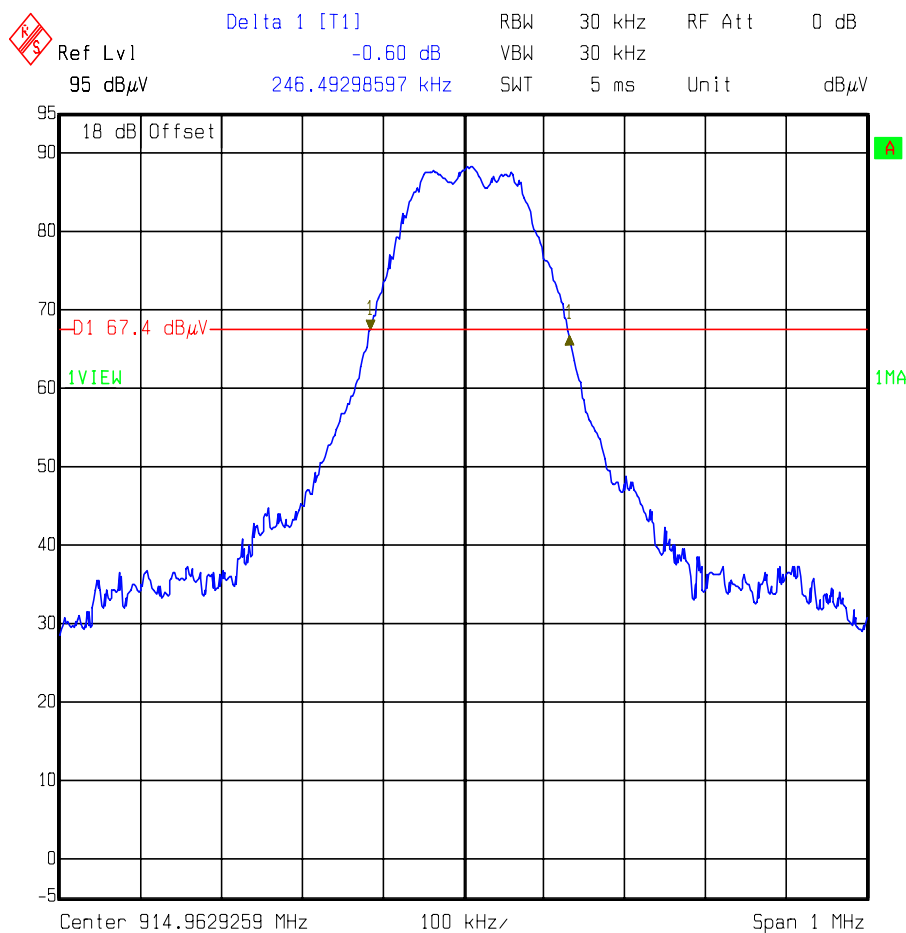
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### 7.2.2. Transmitter 20 dB Bandwidth

Tests were performed using the test methods detailed in Public Notice DA 00-705 (2000)

#### Results:

Transmitter 20 dB Bandwidth (kHz)
246.492



Title: 49504JD01 FCC 15.249  
Comment A: TRANSMITTER 20dB BANDWIDTH  
Date: 01.NOV.2007 15:48:23

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### **7.2.3. Transmitter Radiated Emissions**

#### **Electric Field Strength Measurements: 30 MHz to 1000 MHz**

Tests were performed using the test methods detailed in ANSI C63.4 Section 8

#### **Results:**

Frequency (MHz)	Antenna Polarity	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
143.995	Horizontal	22.6	43.5	20.9	Complied
175.993	Horizontal	23.3	43.5	20.2	Complied
239.990	Horizontal	22.3	46.0	23.7	Complied
255.990	Horizontal	20.2	46.0	25.8	Complied
271.989	Horizontal	25.6	46.0	20.4	Complied
287.989	Horizontal	23.1	46.0	22.9	Complied

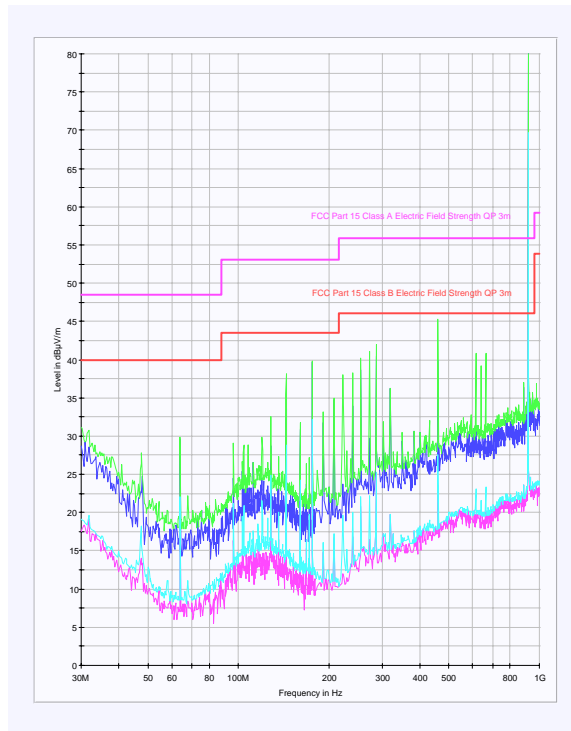
#### **Note(s):**

1. All other emissions were found to be ambient signals or more than 10 dB below the specified limit.

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### Transmitter Radiated Emissions (Continued)



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

*Some ambient signals were observed and are shown on this plot. Investigations were performed to confirm they were not coming from the EUT.*

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**Transmitter Radiated Emissions (Continued)****Electric Field Strength Measurements (Frequency Range: 1 GHz to 10 GHz)****Results:****Highest Average Level Bottom Channel:**

Frequency (MHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Antenna Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1372.457	Vertical	44.0	-8.0	36.0	54.0	18.0	Complied
2744.920	Vertical	55.6	-8.4	47.2	54.0	6.8	Complied
4574.829	Vertical	46.4	-4.0	42.4	54.0	11.6	Complied
5490.225	Vertical	42.4	-3.0	39.4	54.0	14.6	Complied

**Highest Average Level Top Channel:**

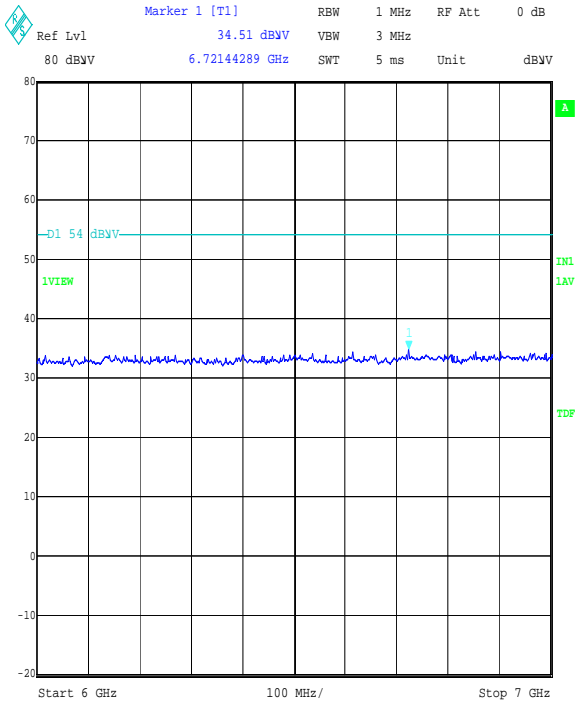
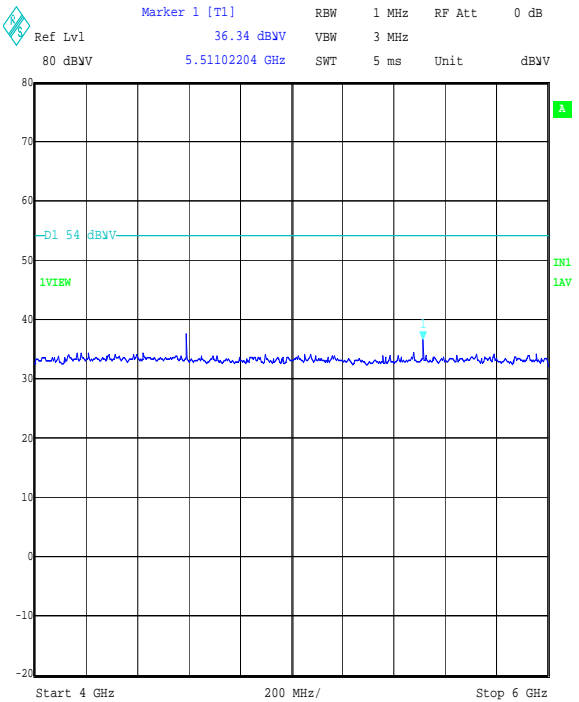
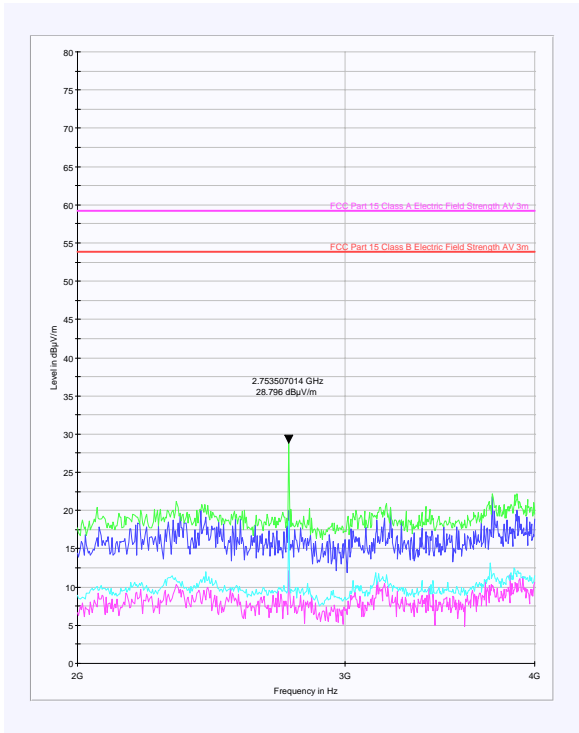
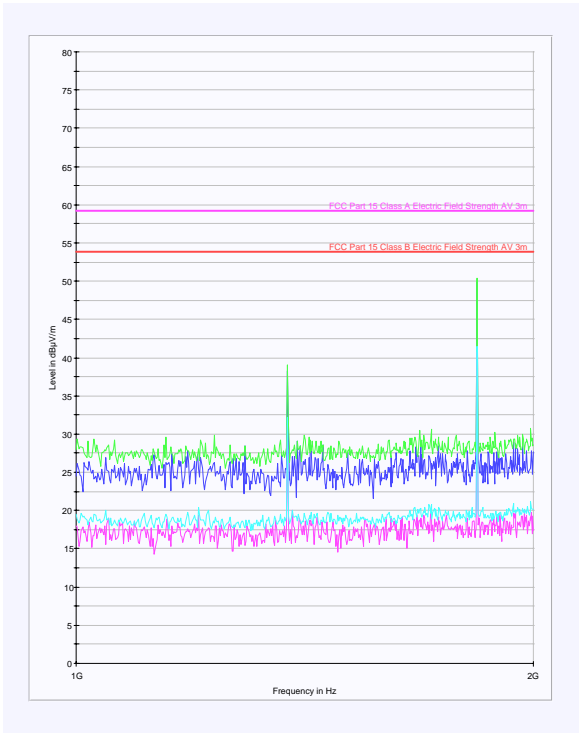
Frequency (MHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Antenna Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1376.990	Vertical	43.3	-8.0	35.3	54.0	18.7	Complied
2753.876	Vertical	57.6	-8.4	49.2	54.0	4.8	Complied
4589.720	Vertical	47.5	-4.0	43.5	54.0	10.5	Complied
5507.750	Vertical	42.4	-3.0	39.4	54.0	14.6	Complied

**Note(s):**

1. All other emissions were found to be at least 10 dB below the applicable limit.

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Transmitter Radiated Emissions (Continued)



Date: 1.NOV.2007 10:57:19

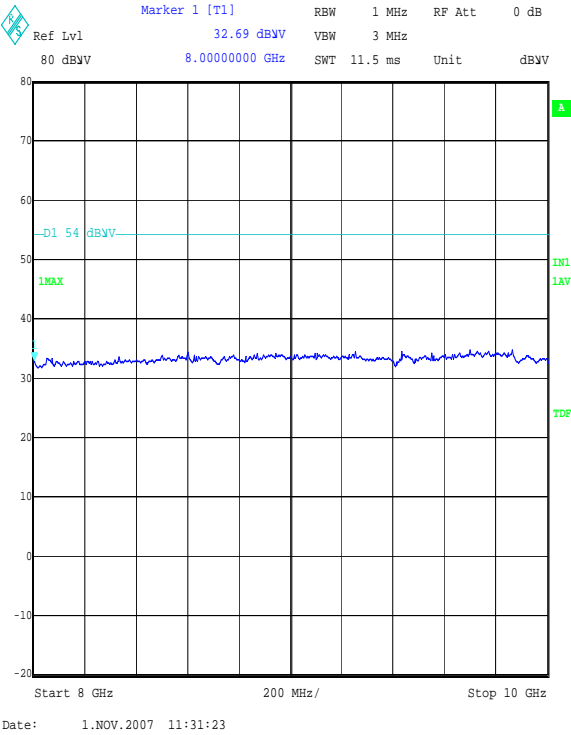
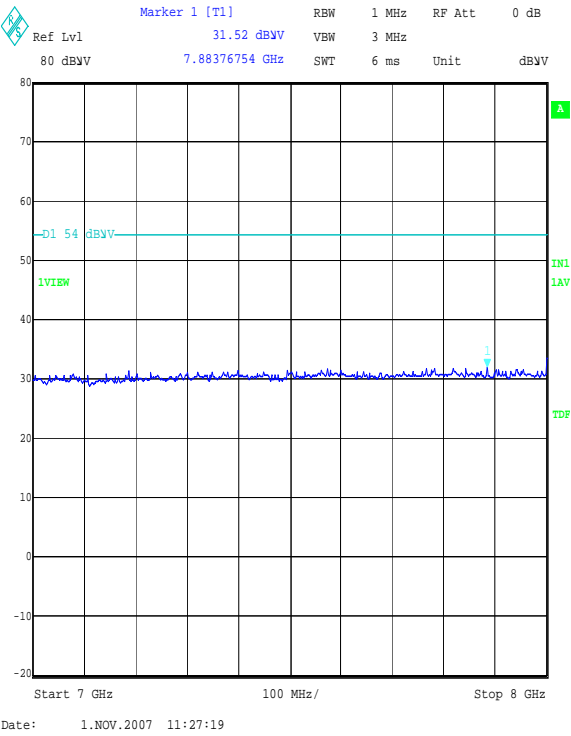
Date: 1.NOV.2007 11:25:05

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



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Transmitter Radiated Emissions (Continued)



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

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**7.2.4. Transmitter Radiated Emissions at Band Edges**

Tests were performed using the test methods detailed in ANSI C63.4 Section 8

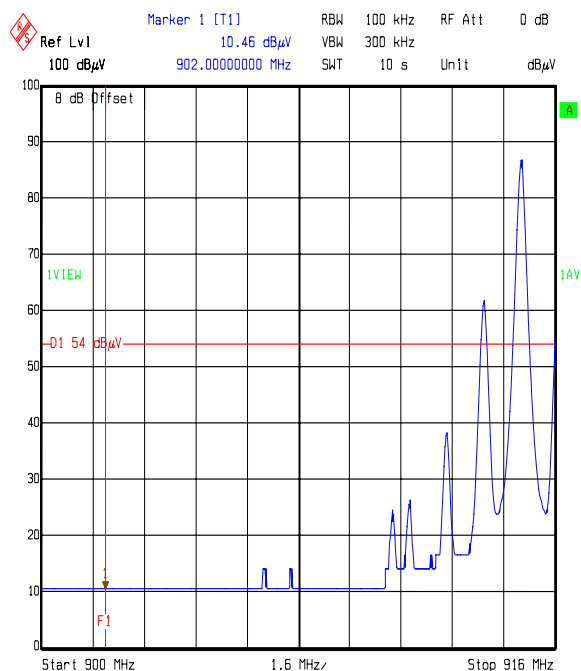
**Results:****Bottom Band Edge**

Frequency (MHz)	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
902	10.5	54	43.5	Complied

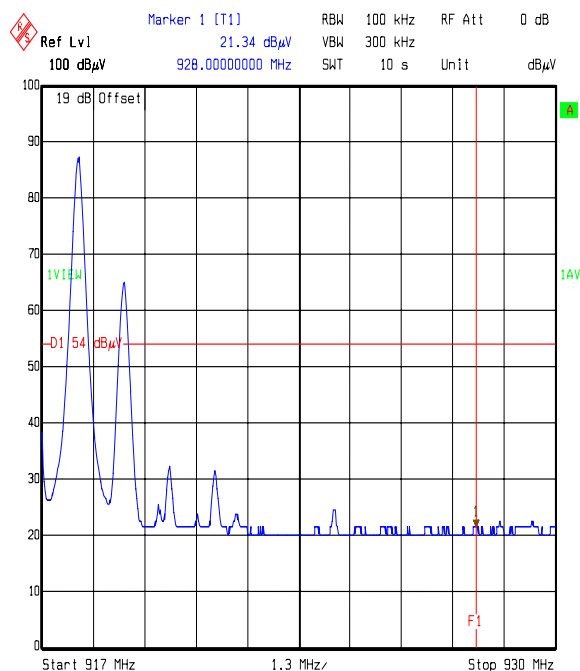
**Top Band Edge**

Frequency (MHz)	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
928	21.3	54	32.7	Complied

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**Transmitter Radiated Emissions at Band Edges (Continued)**

Title: 49504JD01 FCC 15.249  
Comment A: TRANSMITTER RADIATED EMISSIONS AT LOWER BAND EDGE  
Date: 01.NOV.2007 16:27:49



Title: 49504JD01 FCC 15.249  
Comment A: TRANSMITTER RADIATED EMISSIONS AT UPPER BAND EDGE  
Date: 01.NOV.2007 16:21:59

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## **8. 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
Transmitter Fundamental Field Strength	N/A	95%	$\pm 2.94$
Occupied Bandwidth	N/A	95%	$\pm 0.12 \%$
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	$\pm 5.26 \text{ dB}$
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	$\pm 1.78 \text{ dB}$

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.

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### Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A028	Horn Antenna	Eaton	91888-2	304	08 Jun 2006	36
A031	Horn Antenna	Eaton	91889-2	557	08 Jun 2006	36
A1037	Bilog Antenna	Chase EMC Ltd	CBL6112B	2413	20 Sep 2006	15
A1534	Preamplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A254	Horn Antenna	Flann Microwave	14240-20	139	17 Nov 2006	36
A255	Horn Antenna	Flann Microwave	16240-20	519	17 Nov 2006	36
A259	Bilog Antenna	Chase	CBL6111	1513	13 Mar 2007	12
C1167	Cable	Rosenberger Micro-Coax	FA210A1030007 070	43190-01	05 Jun 2007	12
C1198	Cable	Utiflex	FA147A1015M20 20	3502 27138-4	04 Jun 2007	12
C151	Cable	Rosenberger	UFA210A-1-1181-70x70	None	Calibrated before use	-
C160	Cable	Rosenberger	UFA210A-1-1181-70x70	None	Calibrated before use	-
C172	Cable	Rosenberger	UFA210A-1-1181-70x70	None	Calibrated before use	-
C341	Cable	Andrews	None	None	Calibrated before use	-
C348	Cable	Rosenberger	UFA210A-1-1181-70x70	2993	Calibrated before use	-
C468	Cable	Rosenberger	UFA210A-1-3937-504504	98L0440	Calibrated before use	-
M024	Spectrum Monitor	Rohde & Schwarz	EZM	873 952/006	Calibrated before use	-
M044	Receiver	Rohde & Schwarz	ESVP	891 845/026	06 Mar 2007	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	20 Dec 2006	12

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**Test Equipment Used (Continued)**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
M1263	EMI Test Receiver	Rohde & Schwarz	ESIB7	100265	25 Jan 2007	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	15 Aug 2007	12
S201	Open Area Test Site	RFI	1	-	25 May 2007	12
S202	Open Area Test Site	RFI	2	S202-15011990	17 Nov 2006	12
S207	Bench Site	RFI	7	-	Calibration not required	-
S212	Screened Room	RFI	12	-	Calibrated before use	-

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