

# TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: DEB Dispenser Telemetry Module Model No. 1135-200

FCC ID: YPHDEB1135-200

To: FCC Part 15.247: 2009 Subpart C

**Test Report Serial No:**  
RFI-RPT-RP78528JD01A

**This Test Report Is Issued Under The Authority  
Of Scott D'Adamo, Operations Manager Global  
Approvals:**



Checked By:	Ian Watch
Signature:	
Date of Issue:	16 August 2010

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## **1. Customer Information**

<b>Company Name:</b>	TrimeriX Ltd
<b>Address:</b>	Unit 31 Cressex Enterprise Centre High Wycombe Buckinghamshire HP12 3RL United Kingdom

## 2. Summary of Testing

### 2.1. General Information

<b>Specification Reference:</b>	47CFR15.247
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2009: Part 15 Subpart C (Intentional Radiators) - Section 15.247
<b>Specification Reference:</b>	47CFR15.107 and 47CFR15.109
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2009: Part 15 Subpart B (Unintentional Radiators) - Sections 15.107 and 15.109
<b>Site Registration:</b>	FCC: 209735
<b>Location of Testing:</b>	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH, United Kingdom
<b>Test Dates:</b>	31 July 2010

### 2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.109	Receiver/Idle Mode Radiated Spurious Emissions	✓
Part 15.247(a)(2)	Transmitter 6 dB Bandwidth	✓
Part 15.247(e)	Transmitter Peak Power Spectral Density	✓
Part 15.247(b)(3)	Transmitter Maximum Peak Output Power	✓
Part 15.247(d) & 15.209(a)	Transmitter Radiated Emissions	✓
Part 15.247(d) & 15.209(a)	Transmitter Band Edge Radiated Emissions	✓

#### **Key to Results**

✓ = Complied    ✘ = Did not comply

### 2.3. Methods and Procedures

<b>Reference:</b>	ANSI C63.4 (2009)
<b>Title:</b>	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
<b>Reference:</b>	ANSI C63.10 (2009)
<b>Title:</b>	American National Standard for Testing Unlicensed Wireless Devices

### 2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

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

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

<b>Description:</b>	Dispenser Telemetry Module
<b>Brand Name:</b>	DEB
<b>Model Name or Number:</b>	1135-200
<b>Serial Numbers:</b>	20107587 (Transmit Mode) 20107390 (Receive Mode)
<b>Hardware Version Number:</b>	1135-200 V1.0
<b>Software Version Number:</b>	1135-SW-200V1.0
<b>FCC ID Number:</b>	YPHDEB1135-200

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

The equipment under test was a battery powered dispenser containing a telemetry module.

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

No modifications were applied to the EUT during testing.

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

<b>Tested Technology:</b>	Digitally modulated device operating in the 902 – 928 MHz band	
<b>Power Supply Requirement:</b>	Nominal	3.3V
<b>Type of Unit:</b>	Transceiver	
<b>Modulation:</b>	Digital Modulation	
<b>Maximum Transmit ERP:</b>	10.8 dBm (measured)	
<b>Transmit Frequency Range:</b>	905 MHz	
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Frequency (MHz)</b>
	Single Channel	905
<b>Receive Frequency Range:</b>	905 MHz	
<b>Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Frequency (MHz)</b>
	Single Channel	905

## **4. Operation and Monitoring of the EUT during Testing**

### **4.1. Operating Modes**

The EUT was tested in the following operating mode(s):

- Constantly transmitting at maximum power.
- Receive / idle mode.

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

The EUT was tested in the following configuration(s):

- Standalone
- A new battery was fitted before testing commenced. The battery voltage was monitored throughout the testing and the battery replaced as required.

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

### **5.1. General Comments**

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. Measurement Uncertainty* for details.

## 5.2. Test Results

### 5.2.1. Receiver/Idle Mode Radiated Spurious Emissions

#### Test Summary:

Test Engineer:	Fara Razally	Test Date:	31 July 2010
Test Sample Serial No:	20107390		

FCC Part:	15.109
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
Frequency Range:	30 MHz to 1000 MHz

#### Environmental Conditions:

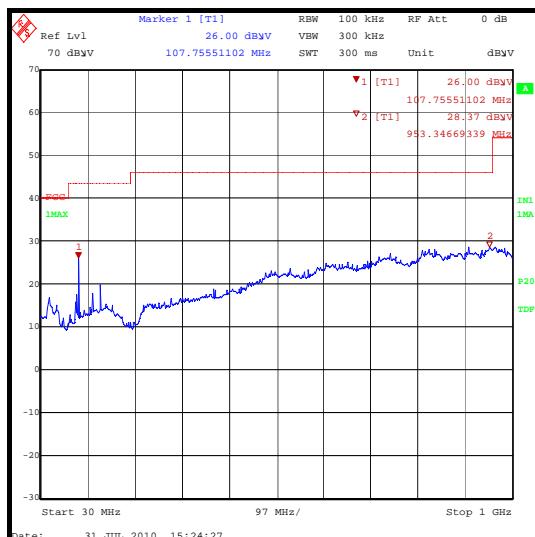
Temperature (°C):	29
Relative Humidity (%):	29

#### Results: Quasi Peak Detector Measurements

Frequency (MHz)	Antenna Polarity	Quasi-peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
107.583	Horizontal	26.5	43.5	17.0	Complied

#### Note(s):

1. All other emissions were >20 dB below the applicable limits or below the level of the measurement system noise floor.



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

**Receiver/Idle Mode Radiated Spurious Emissions (continued)****Test Summary:**

<b>Test Engineer:</b>	Fara Razally	<b>Test Date:</b>	31 July 2010
<b>Test Sample Serial No:</b>	20107390		

**Test Summary:**

<b>FCC Part:</b>	15.109
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
<b>Frequency Range:</b>	1 GHz to 4.7 GHz

**Environmental Conditions:**

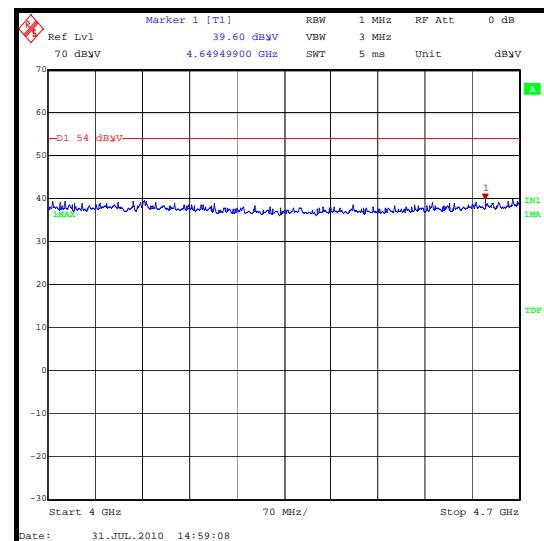
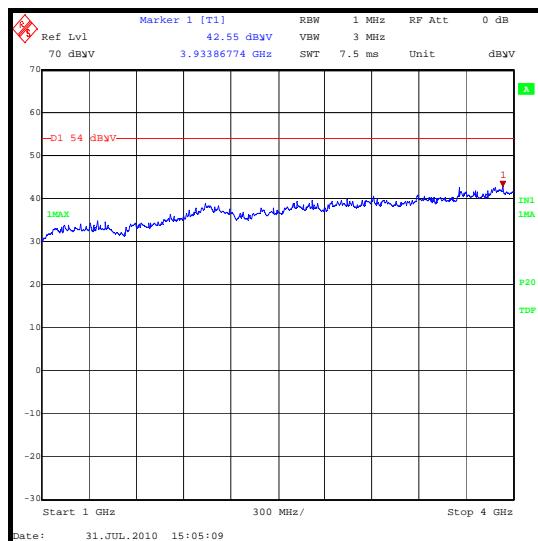
<b>Temperature (°C):</b>	29
<b>Relative Humidity (%):</b>	29

**Results:**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
3933.868	Vertical	42.6	54.0	11.4	Complied

**Note(s):**

1. 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. 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.



### **5.2.2. Transmitter 6 dB Bandwidth**

#### **Test Summary:**

<b>Test Engineer:</b>	Fara Razally	<b>Test Date:</b>	31 July 2010
<b>Test Sample Serial No:</b>	20107587		

<b>FCC Part:</b>	15.247(a)(2)
<b>Test Method Used:</b>	See Note 1 below

#### **Environmental Conditions:**

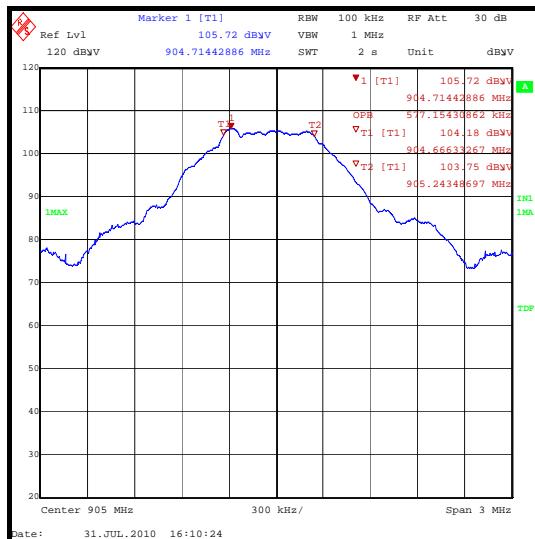
<b>Temperature (°C):</b>	28
<b>Relative Humidity (%):</b>	31

#### **Results:**

Transmitter 6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
577.154	≥500	77.154	Complied

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

1. In lieu of the test method detailed in ANSI C63.10 Section 6.9.1 the 6 dB bandwidth was measured using the Occupied Bandwidth function a the spectrum analyser.
2. Measurement bandwidths were set automatically by the spectrum analyser.



### **5.2.3. Transmitter Peak Power Spectral Density**

#### **Test Summary:**

<b>Test Engineer:</b>	Fara Razally	<b>Test Date:</b>	31 July 2010
<b>Test Sample Serial No:</b>	20107587		

<b>FCC Part:</b>	15.247(e)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.11.2

#### **Environmental Conditions:**

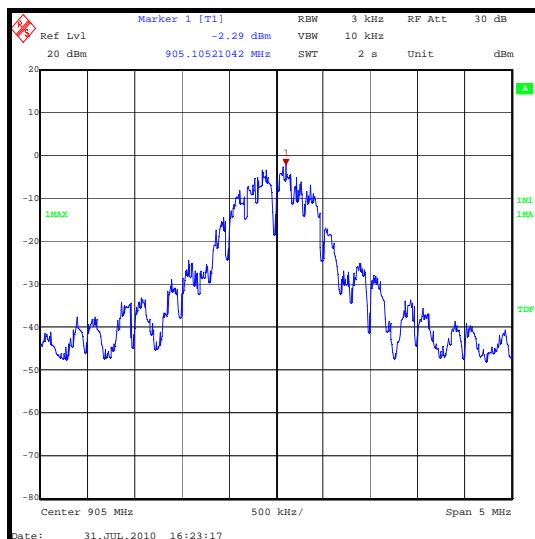
<b>Temperature (°C):</b>	29
<b>Relative Humidity (%):</b>	29

#### **Results: Battery Powered Devices**

<b>Output Power (dBm/3 kHz)</b>	<b>Limit (dBm/3 kHz)</b>	<b>Margin (dB)</b>	<b>Result</b>
-2.3	8.0	10.3	Complied

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

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



### **5.2.4. Transmitter Maximum Peak Output Power (ERP)**

#### **Test Summary:**

<b>Test Engineer:</b>	Fara Razally	<b>Test Date:</b>	31 July 2010
<b>Test Sample Serial No:</b>	20107587		

<b>FCC Part:</b>	15.247(b)(3)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4 (see note 2 below)

#### **Environmental Conditions:**

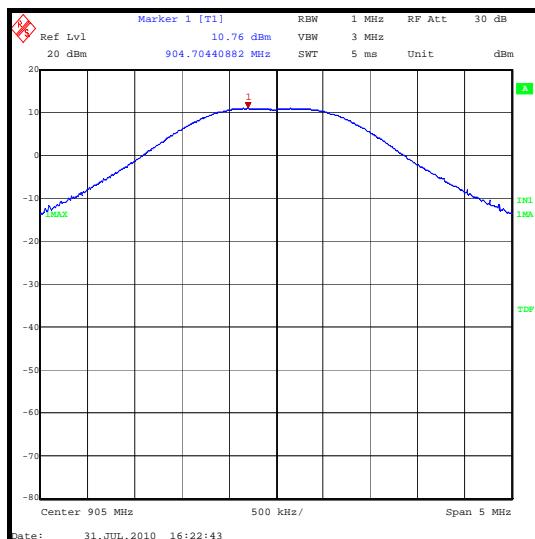
<b>Temperature (°C):</b>	28
<b>Relative Humidity (%):</b>	31

#### **Results: Battery Powered Devices**

<b>ERP (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Result</b>
10.8	30.0	19.2	Complied

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

1. These tests were performed radiated; therefore the EUT antenna gain is encompassed in the final result and not measurable.
2. Tests were performed using the test methods described in ANSI C63.10 Sections 6.3 and 6.6 in lieu of the test method for a conducted measurement described in ANSI C63.10 Section 6.10.1.



### **5.2.5. Transmitter Radiated Emissions**

#### **Test Summary:**

<b>Test Engineer:</b>	Fara Razally	<b>Test Date:</b>	31 July 2010
<b>Test Sample Serial No:</b>	20107587		

<b>FCC Part:</b>	15.247(d) & 15.209(a)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
<b>Frequency Range</b>	30 MHz to 1000 MHz

#### **Environmental Conditions:**

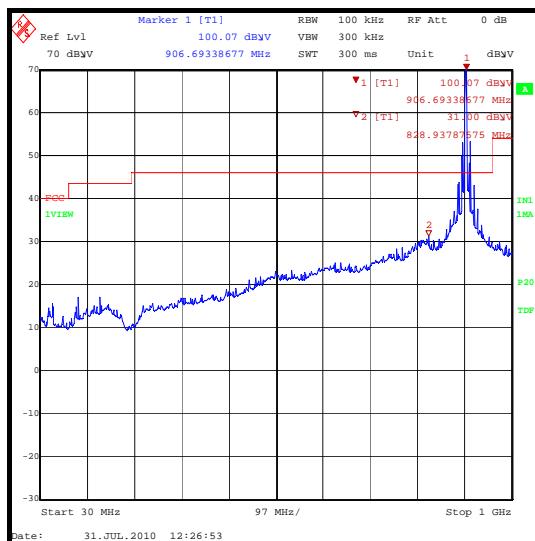
<b>Temperature (°C):</b>	28
<b>Relative Humidity (%):</b>	31

#### **Results:**

Frequency (MHz)	Antenna Polarity	Quasi-Peak Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
828.937	Vertical	31.0	54.0	23.0	Complied

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

1. The carrier is shown on the pre-scan plot at approximately 906.7 MHz.
2. Any other emissions shown on the pre-scan plot were investigated and found to be >20 dB below the applicable limits or below the noise floor of the measurement system, therefore the highest emission level was recorded as shown in the table above.



**Transmitter Radiated Emissions (continued)****Test Summary:**

<b>Test Engineer:</b>	Fara Razally	<b>Test Date:</b>	31 July 2010
<b>Test Sample Serial No:</b>	20107587		

<b>FCC Part:</b>	15.247(d) & 15.209(a)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
<b>Frequency Range</b>	1 GHz to 9.30 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	28
<b>Relative Humidity (%):</b>	31

**Results: Highest Peak Level**

Frequency (MHz)	Antenna Polarity	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1809.950	Horizontal	84.2	88.2*	4.0	Complied
2714.934	Vertical	58.8	74.0	15.2	Complied
3619.998	Vertical	57.8	74.0	16.2	Complied
4524.016	Vertical	60.6	74.0	13.4	Complied
5429.950	Horizontal	52.9	74.0	21.1	Complied
6334.882	Horizontal	63.4	88.2*	24.8	Complied
7239.868	Horizontal	55.4	88.2*	32.8	Complied
9049.862	Horizontal	60.3	74.0	13.7	Complied

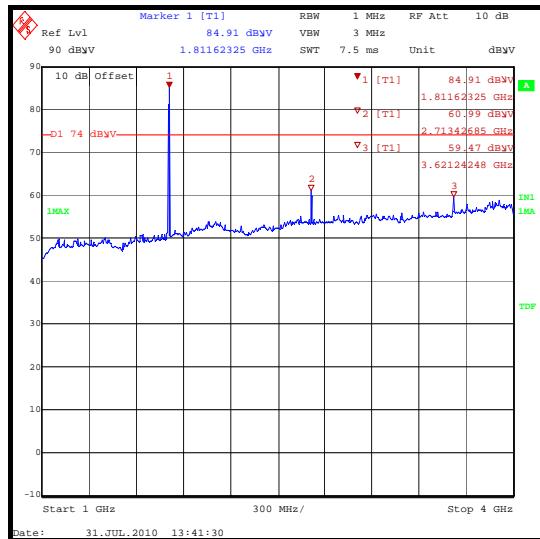
**Results: Highest Average Level**

Frequency (MHz)	Antenna Polarity	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2714.934	Vertical	50.9	54.0	3.1	Complied
3619.998	Vertical	50.8	54.0	3.2	Complied
4524.016	Vertical	53.7	54.0	0.3	Complied
5429.950	Horizontal	47.1	54.0	6.9	Complied
9049.862	Horizontal	51.6	54.0	2.4	Complied

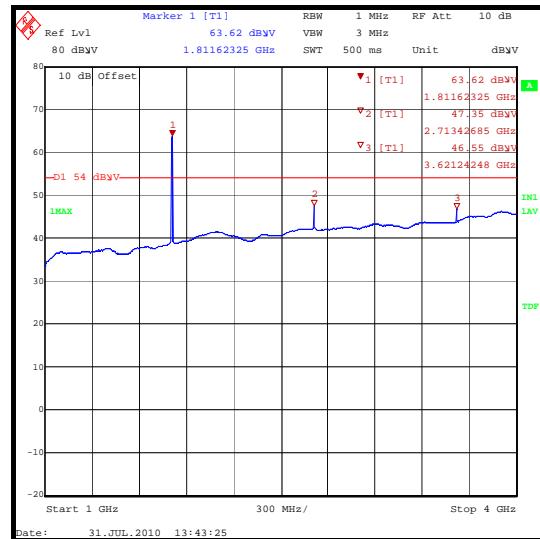
**Note(s):**

1. \*-20 dBc limit.
2. Final measurements were performed using appropriate high pass RF filters and attenuators.
3. Any other emissions shown on the pre-scan plots were investigated and found to be >20 dB below the applicable limits or below the noise floor of the measurement system.

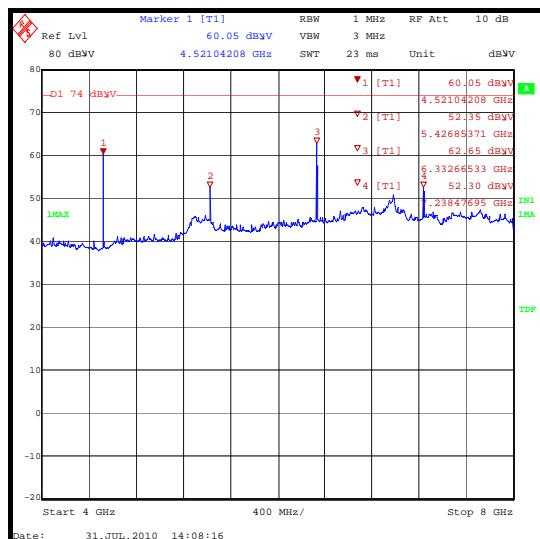
## Transmitter Radiated Emissions (continued)



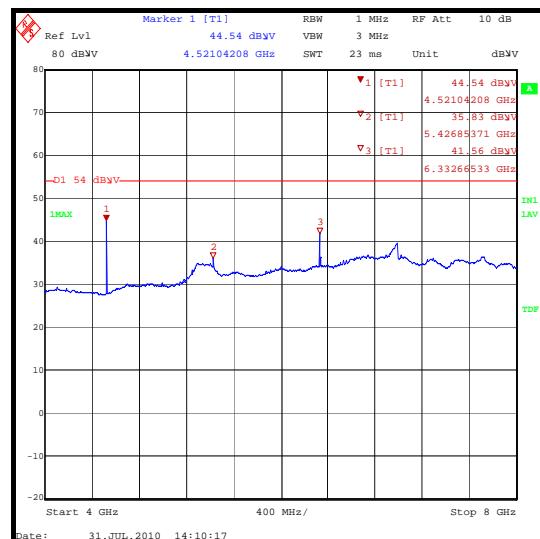
Peak Detector



Average Detector

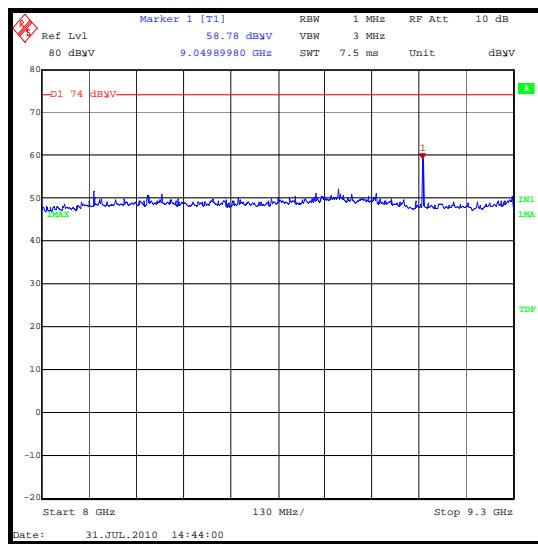
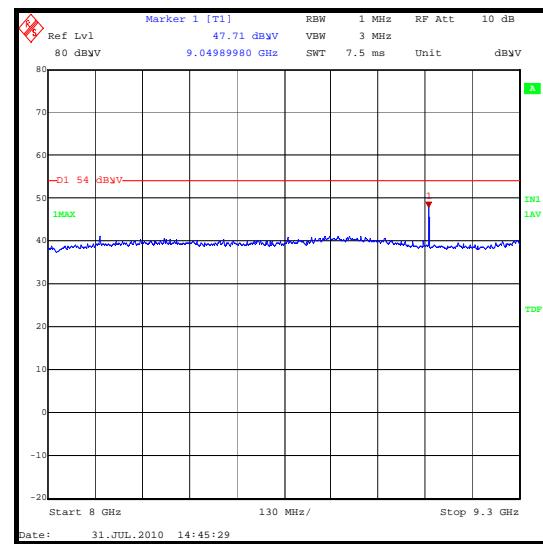


Peak Detector



Average Detector

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

**Transmitter Radiated Emissions (continued)****Peak Detector****Average Detector**

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

### **5.2.6. Transmitter Band Edge Radiated Emissions**

#### **Test Summary:**

<b>Test Engineer:</b>	Fara Razally	<b>Test Date:</b>	31 July 2010
<b>Test Sample Serial No:</b>	20107587		

<b>FCC Part:</b>	15.247(d)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.9.2

#### **Environmental Conditions:**

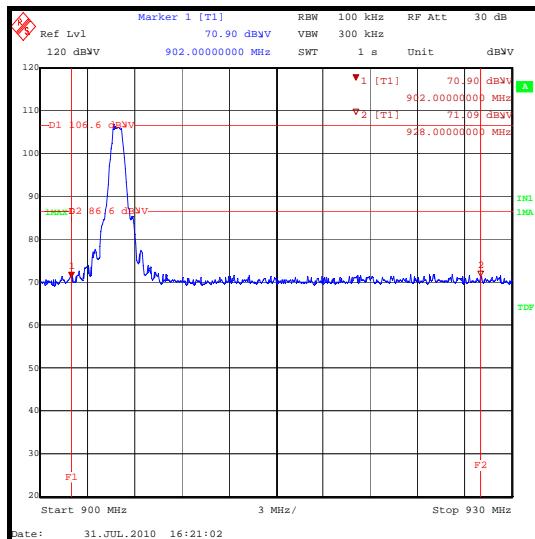
<b>Temperature (°C):</b>	28
<b>Relative Humidity (%):</b>	31

#### **Results:**

Frequency (MHz)	Emission Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
902	70.9	86.6	15.7	Complied
928	71.1	86.6	15.5	Complied

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

1. The limit lines shown in the plot below were set to a level 20 dB below the measured fundamental peak power when measured in a 100 kHz bandwidth.



## **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
Transmitter Maximum Peak Output Power	902 to 928 MHz	95%	$\pm 2.94$ dB
Spectral Power Density	902 to 928 MHz	95%	$\pm 0.28$ dB
6 dB Bandwidth	902 to 928 MHz	95%	$\pm 0.92$ ppm
Radiated Spurious Emissions	30 MHz to 9.3 GHz	95%	$\pm 2.94$ 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 Calibration Due	Cal. Interval (Months)
A057	High Pass Filter	AFL	950-5N	4389B	Calibration not required	-
A1396	Attenuator	Huber & Suhner	757987	6810.17.B	Calibrated before use	-
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	Calibrated before use	-
A1818	Antenna	EMCO	3115	00075692	27 Nov 2010	12
A1932	High Pass Filter	AtlanTec	AFH-02000	20r-JFBD04-002	21 Feb 2011	12
A288	Antenna	Chase	CBL6111A	1589	16 Mar 2011	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	01 Sep 2010	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESI26	100046K	22 Apr 2011	12
M1273	Test Receiver	Rhode & Schwarz	ESIB 26	100275	08 Apr 2011	12

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