

TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: OCR640



FCC ID: ZEROOCR640

IC Certification Number: 9653A-OCR640

To: FCC Part 15.225: 2011 Subpart C, RSS-210 Issue 8 December 2010
& RSS-Gen Issue 3 December 2010

Test Report Serial No.:
RFI-RPT-RP82375JD01A V4.0

Version 4.0 Supersedes All Previous Versions

This Test Report Is Issued Under The Authority Of John Newell, Group Quality Manager:		
Checked By:	Ian Watch	
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Date of Issue:	13 August 2012	

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Table of Contents

1. Customer Information	4
2. Summary of Testing	5
2.1. General Information	5
2.2. Summary of Test Results	5
2.3. Methods and Procedures	6
2.4. Deviations from the Test Specification	6
3. Equipment Under Test (EUT)	7
3.1. Identification of Equipment Under Test (EUT)	7
3.2. Description of EUT	7
3.3. Modifications Incorporated in the EUT	7
3.4. Additional Information Related to Testing	8
3.5. Support Equipment	8
4. Operation and Monitoring of the EUT during Testing	9
4.1. Operating Modes	9
4.2. Configuration and Peripherals	9
5. Measurements, Examinations and Derived Results	10
5.1. General Comments	10
5.2. Test Results	11
5.2.1. Transmitter AC Conducted Spurious Emissions	11
5.2.2. Transmitter Fundamental Field Strength	14
5.2.3. Transmitter Radiated Spurious Emissions	16
5.2.4. Transmitter Band Edge Radiated Emissions	19
5.2.5. Transmitter 20 dB Bandwidth	20
5.2.6. Transmitter Frequency Stability (Temperature & Voltage Variation)	21
6. Measurement Uncertainty	22
Appendix 1. Test Equipment Used	23

1. Customer Information









Company Name:	Access-IS
Address:	18 Suttons Business Park Reading Berkshire RG6 1AZ United Kingdom

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.225
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart C (Radio Frequency Devices) - Section 15.225
Specification Reference:	47CFR15.107 and 47CFR15.109
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart B (Radio Frequency Devices) - Sections 15.107 and 15.109
Specification Reference:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart C (Intentional Radiators) - Section 15.209
Specification Reference:	RSS-Gen Issue 3 December 2010
Specification Title:	General Requirements and Information for the Certification of Radio Apparatus
Specification Reference:	RSS-210 Issue 8 December 2010
Specification Title:	Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment.
Site Registration:	FCC: 209735; Industry Canada: 3245B-2
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	07 July 2011 to 16 July 2012

2.2. Summary of Test Results

FCC Reference (47CFR)	IC Reference	Measurement	Result
Part 15.207	RSS-Gen 7.2.4	Transmitter AC Conducted Emissions	
Part 15.225(a)(b)(c)(d)	RSS-Gen 4.8 RSS-210 A2.6	Transmitter Fundamental Field Strength	
Part 15.209(a)/ 15.225(d)	RSS-Gen 4.9 RSS-210 A2.6	Transmitter Radiated Emissions	
Part 15.209(a)/ 15.225(c)(d)	RSS-Gen 4.9 RSS-210 A2.6	Transmitter Band Edge Radiated Emissions	
Part 2.1049	RSS-Gen 4.6.1/4.6.3	Transmitter 20 dB Bandwidth	
Part 15.225(e)	RSS-Gen 4.7 RSS-210 A2.6	Transmitter Frequency Stability (Temperature & Voltage Variation)	
Key to Results  = Complied  = Did not comply			

2.3. Methods and Procedures

Reference:	ANSI C63.4 (2009)
Title:	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
Reference:	ANSI C63.10 (2009)
Title:	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)

Brand Name:	Access-IS
Model Name or Number:	OCR640
Serial Number:	ENG001
Hardware Version Number:	ENG001
Software Version Number:	RFID : 1.16 Camera : 2.04
FCC ID:	ZEROOCR640
IC Certification Number:	9653A-OCR640

Brand Name:	Access-IS
Model Name or Number:	OCR640
Serial Number:	AKEAUSK870/1
Hardware Version Number:	ENG001
Software Version Number:	RFID : 1.16 Camera : 2.04
FCC ID:	ZEROOCR640
IC Certification Number:	9653A-OCR640

Description:	USB/DC cable
Brand Name:	Access-IS
Model Name or Number:	MICR Host cable
Serial Number:	Not marked or stated

Description:	120 VAC 60 Hz Power supply
Brand Name:	Ideal Power
Model Name or Number:	SA06-12S05R-V
Serial Number:	Not marked or stated

3.2. Description of EUT

The equipment under test was an RFID ePassport reader.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Tested Technology:	RFID	
Category of Equipment:	Transceiver	
Channel Spacing:	Single channel device	
Transmit Frequency Range:	13.56 MHz	
Power Supply Requirement:	Nominal	120 VAC 60 Hz
	Minimum	102 VAC 60 Hz
	Maximum	138 VAC 60 Hz
Tested Temperature Range:	Minimum	-20°C
	Maximum	50°C

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Dell Laptop
Brand Name:	Dell
Model Name or Number:	D410
Serial Number:	2836C2J

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

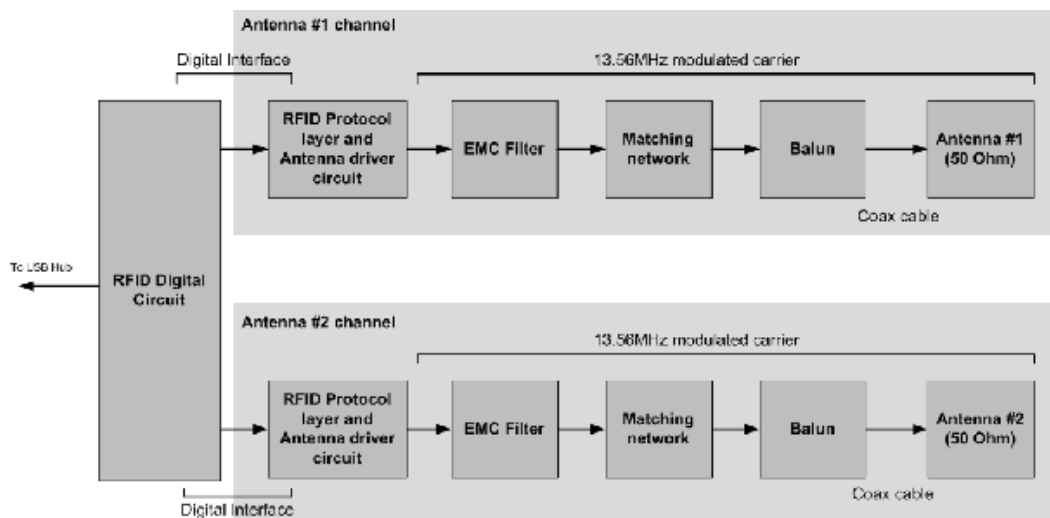
The EUT was tested in the following operating mode(s):

- Constantly transmitting and receiving at maximum power with a modulated carrier in RFID test mode.
- Frequency tolerance tests were performed with the EUT transmitting an un-modulated carrier. All other tests were performed with the EUT transmitting with normal modulation.

4.2. Configuration and Peripherals

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

- A laptop PC running customer specific test software (Iscape) was used to control the transceiver function of the EUT during testing via the MICR Host cable. The camera function was enabled during all tests.
- AC conducted emissions tests were performed with a dummy load attached to the antenna port in accordance with FCC KDB 174176.
- A modified USB cable with DC breakout was used for voltage extremes tests. This cable was connected to a bench power supply in order to vary the voltage to the EUT.
- The unit has two integral antennas with two identical transmit paths as shown in the block diagram below. The carrier is continually switched between the two paths.
- Antenna #2 was used to make the measurements as it emitted a higher level RF field strength than Antenna #1.



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 Uncertainties* for details.

5.2. Test Results

5.2.1. Transmitter AC Conducted Spurious Emissions

Test Summary:

Test Engineer:	David Doyle	Test Date:	13 July 2012
Test Sample Serial No:	AKEAUSK870/1		

FCC Part:	15.207
Test Method Used:	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	52

Results: Live - Quasi Peak

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.191	Live	42.7	64.0	21.3	Complied
0.501	Live	45.8	56.0	10.2	Complied
0.573	Live	43.6	56.0	12.4	Complied
10.073	Live	44.5	60.0	15.5	Complied
10.145	Live	44.6	60.0	15.4	Complied
10.361	Live	44.0	60.0	16.0	Complied
10.469	Live	39.5	60.0	20.5	Complied
10.505	Live	44.2	60.0	15.8	Complied
10.572	Live	43.2	60.0	16.8	Complied

Results: Live - Average

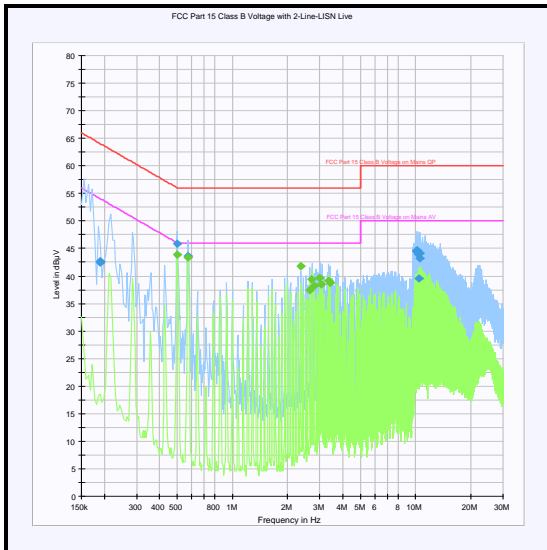
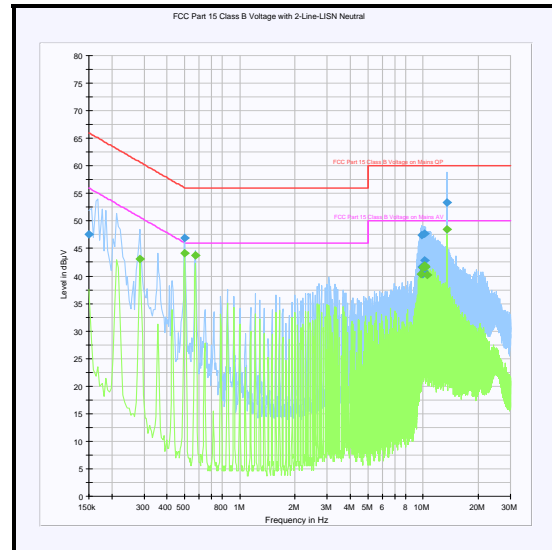
Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.501	Live	43.9	46.0	2.1	Complied
0.573	Live	43.4	46.0	2.6	Complied
2.360	Live	41.7	46.0	4.3	Complied
2.643	Live	37.4	46.0	8.6	Complied
2.715	Live	39.4	46.0	6.6	Complied
2.787	Live	38.3	46.0	7.7	Complied
3.003	Live	39.6	46.0	6.4	Complied
3.071	Live	38.5	46.0	7.5	Complied
3.359	Live	39.1	46.0	6.9	Complied
3.431	Live	38.7	46.0	7.3	Complied

Transmitter AC Conducted Spurious Emissions (continued)**Results: Neutral - Quasi Peak**

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.150	Neutral	47.5	66.0	18.5	Complied
0.501	Neutral	46.9	56.0	9.1	Complied
9.830	Neutral	41.6	60.0	18.4	Complied
9.861	Neutral	47.5	60.0	12.5	Complied
9.956	Neutral	40.3	60.0	19.7	Complied
10.028	Neutral	40.8	60.0	19.2	Complied
10.145	Neutral	47.7	60.0	12.3	Complied
10.181	Neutral	42.8	60.0	17.2	Complied
10.244	Neutral	41.7	60.0	18.3	Complied
13.565	Neutral	53.3	60.0	6.7	Complied

Results: Neutral - Average

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.285	Neutral	43.0	50.7	7.7	Complied
0.501	Neutral	44.2	46.0	1.8	Complied
0.573	Neutral	43.7	46.0	2.3	Complied
9.713	Neutral	40.3	50.0	9.7	Complied
10.001	Neutral	41.5	50.0	8.5	Complied
10.140	Neutral	41.7	50.0	8.3	Complied
10.212	Neutral	41.9	50.0	8.1	Complied
10.284	Neutral	41.7	50.0	8.3	Complied
10.568	Neutral	40.1	50.0	9.9	Complied
13.560	Neutral	48.5	50.0	1.5	Complied

Transmitter AC Conducted Spurious Emissions (continued)**Live****Neutral**

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

5.2.2. Transmitter Fundamental Field Strength**Test Summary:**

Test Engineer:	Crawford Lindsay	Test Date:	07 July 2011
Test Sample Serial No:	ENG001		

FCC Part:	15.225(a)(b)(c)(d)
Test Method Used:	As detailed in ANSI C63.10 Section 6.4

Environmental Conditions:

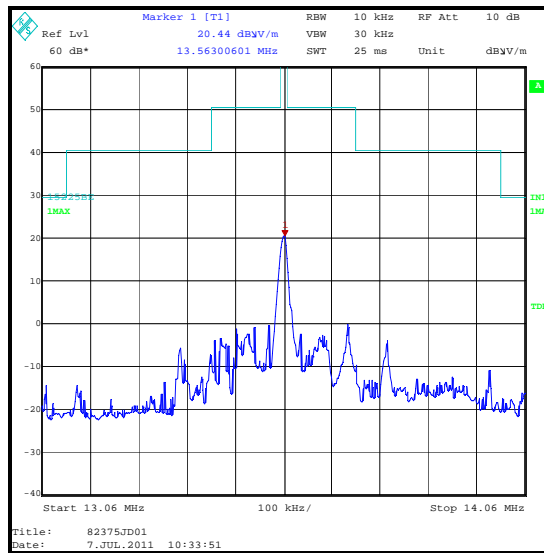
Temperature (°C):	29
Relative Humidity (%):	33

Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit at 30 m (dB μ V/m)	Margin (dB)	Result
13.56	90° to EUT	19.3	84.0	64.7	Complied

Note(s):

1. The limit is specified at a test distance of 30 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40 dB/decade).
2. A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to a distance of 30 metres. A distance extrapolation factor of 40 dB was used.
3. The fundamental field strength was maximised when the tips of the measurement antenna were positioned at 90°/270° with respect to the direction of the EUT.
4. Pre-scan measurements were performed using a spectrum analyser with a peak detector and measurement bandwidth of 10 kHz. The fundamental field strength was maximized by rotating the measurement antenna and EUT. A peak level of 20.4 dB μ V/m was recorded and shown on the pre-scan plot below. The peak level was also compared to requirements of the spectrum mask. The spectrum analyser was then switched to test receiver mode and the final measurement on the maximized level was performed. In accordance with ANSI C63.10 Clause 4.2.3.2.1 and CISPR 16-1-1, a quasi-peak detector was used in conjunction with a measurement bandwidth of 9 kHz and 0.2 second sweep time. A quasi-peak level of 19.3 dB μ V/m was recorded. The difference between the peak level of 20.4 dB μ V/m and quasi-peak level of 19.3 dB μ V/m was due to the fact that the EUT was not transmitting with a 100% duty cycle.

Transmitter Fundamental Field Strength (continued)

5.2.3. Transmitter Radiated Spurious Emissions**Test Summary:**

Test Engineer:	David Doyle	Test Date:	16 July 2012
Test Sample Serial No:	AKEAUSK870/1		

FCC Part:	15.225(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3, 6.4 and 6.5 referencing ANSI C63.4
Frequency Range:	9 kHz to 1000 MHz

Environmental Conditions:

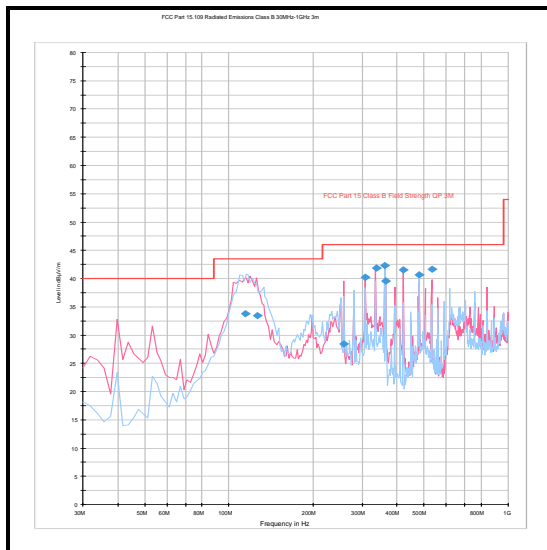
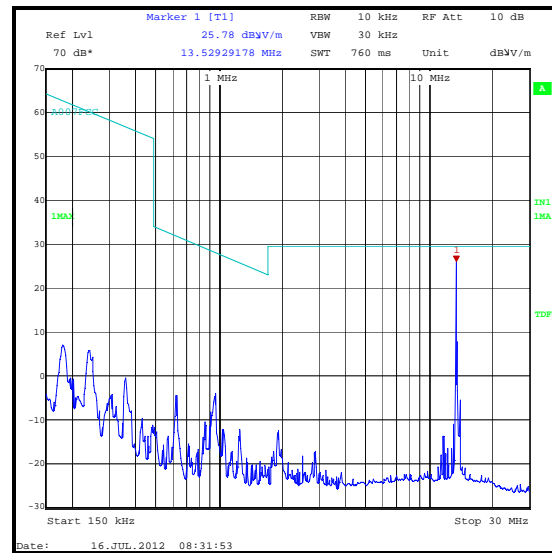
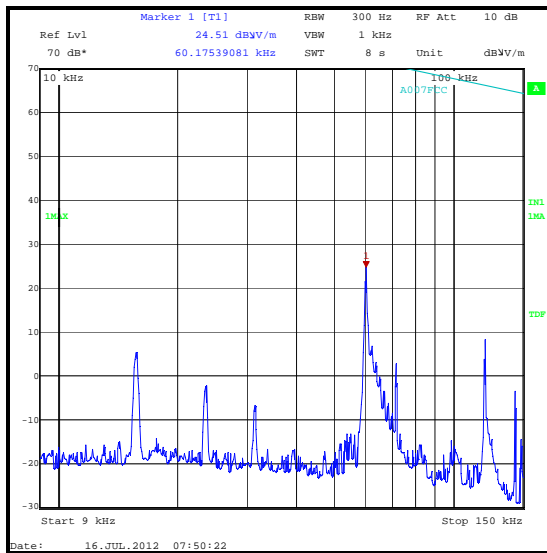
Temperature (°C):	25
Relative Humidity (%):	47

Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
114.391	Horizontal	33.8	43.500	9.700	Complied
126.612	Vertical	33.5	43.500	10.000	Complied
257.594	Vertical	28.4	46.000	17.600	Complied
308.000	Vertical	40.2	46.000	5.800	Complied
336.022	Vertical	41.9	46.000	4.100	Complied
360.014	Vertical	42.3	46.000	3.700	Complied
364.017	Vertical	39.5	46.000	6.500	Complied
420.024	Vertical	41.5	46.000	4.500	Complied
480.025	Horizontal	40.6	46.000	5.400	Complied
532.010	Vertical	41.7	46.000	4.300	Complied

Transmitter Radiated Spurious Emissions (continued)**Note(s):**

1. Limits below 30 MHz are specified at a test distance of 30 metres, whilst below 0.49 MHz they are specified at a test distance of 300 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40dB/decade).
2. A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to a distance of 30 metres where required. A distance extrapolation factor of 40 dB was used.
3. Final measurement values include corrections for antenna factor and cable losses.
4. The emission shown at approximately 13.56 MHz is the fundamental.
5. All emissions on the 9 kHz to 150 kHz plot were investigated and found to be radiating from the test site turntable.
6. All other emissions shown on the pre-scan plots were investigated and found to be >20 dB below the applicable limit or below the measurement system noise floor.
7. Measurements in the range 30 MHz to 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

Transmitter Radiated Spurious Emissions (continued)

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

5.2.4. Transmitter Band Edge Radiated Emissions**Test Summary:**

Test Engineer:	Crawford Lindsay	Test Date:	07 July 2011
Test Sample Serial No:	ENG001		

FCC Part:	15.225(c)(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.10 Section 6.9.2

Environmental Conditions:

Temperature (°C):	29
Relative Humidity (%):	33

Results: Quasi Peak Lower Band Edge

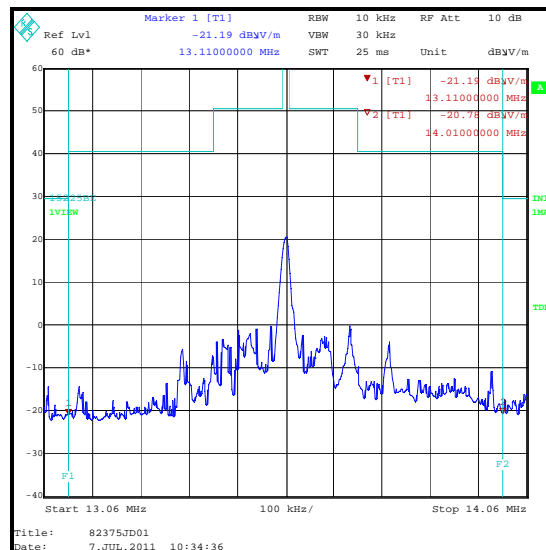
Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
13.11	-21.2	29.5	50.7	Complied

Results: Quasi Peak Upper Band Edge

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
14.01	-20.8	29.5	50.3	Complied

Note(s):

1. A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to a distance of 30 metres where required.
2. A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to a distance of 30 metres where required. A distance extrapolation factor of 40 dB was used.



5.2.5. Transmitter 20 dB Bandwidth**Test Summary:**

Test Engineer:	Crawford Lindsay	Test Date:	07 July 2011
Test Sample Serial No:	ENG001		

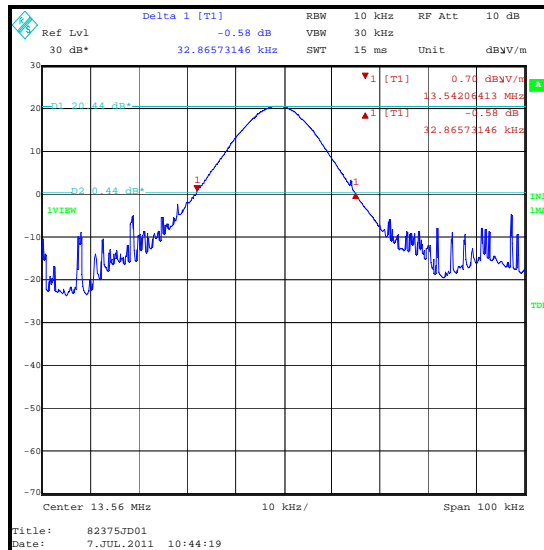
FCC Part:	2.1049
Test Method Used:	As detailed in ANSI C63.10 Section 6.9.1

Environmental Conditions:

Temperature (°C):	29
Relative Humidity (%):	33

Results:

20 dB Bandwidth (kHz)
32.865



5.2.6. Transmitter Frequency Stability (Temperature & Voltage Variation)**Test Summary:**

Test Engineer:	Crawford Lindsay	Test Date:	11 July 2011
Test Sample Serial No:	ENG001		

FCC Part:	15.225(e)
Test Method Used:	As detailed in ANSI C63.10 Section 6.8.1 and 6.8.2

Environmental Conditions:

Ambient Temperature (°C):	20
Ambient Relative Humidity (%):	30

Results: Maximum frequency error of the EUT with variations in ambient temperature

Temperature (°C)	Time after Start-up			
	0 minutes	2 minutes	5 minutes	10 minutes
-20	13.558373 MHz	13.558394 MHz	13.558401 MHz	13.558405 MHz
20	13.558372 MHz	13.558370 MHz	13.558368 MHz	13.558366 MHz
50	13.558384 MHz	13.558374 MHz	13.558366 MHz	13.558363 MHz

Frequency with Worst Case Deviation (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Margin (%)	Result
13.558405	33	0.009757	0.01	0.000243	Complied

Results: Maximum frequency error of the EUT with variations in nominal operating voltage at an ambient temperature of 20°C

Supply Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Margin (%)	Result
102	13.558372	13.558366	6	0.000044	0.01	0.009956	Complied
120	13.558372	13.558372	0	0	0.01	0.01	Complied
138	13.558372	13.558366	6	0.000044	0.01	0.009956	Complied

Note(s):

1. All measurements performed at extremes were referenced to the frequency measured at nominal temperature and nominal voltage.

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
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±3.25 dB
20 dB Bandwidth	13 MHz to 14 MHz	95%	±0.92 ppm
Frequency Stability	13 MHz to 14 MHz	95%	±0.92 ppm
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	±3.53 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±2.94 dB
Transmitter Fundamental Field Strength	13 MHz to 14 MHz	95%	±3.53 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
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002	08 Jun 2013	12
A1817	Antenna	EMCO	3115	00075694	12 May 2013	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	25 Feb 2013	12
A1834	Attenuator	Hewlett Packard	8491B	10444	Calibrated Before use	-
A553	Antenna	Chase	CBL6111A	1593	15 Feb 2013	12
E013	Environmental Chamber	Sanyo	ATMOS chamber	None	Calibrated Before use	-
G0543	Amplifier	Sonoma	310N	230801	15 Oct 2012	3
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	31 Aug 2012	12
M1068	Thermometer	Iso-Tech	RS55	93102884	10 Nov 2011	12
M1229	Digital Multimeter	Fluke	179	87640015	21 Jun 2012	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	03 Feb 2013	12
M1379	Test Receiver	Rohde & Schwarz	ESIB 7	100330	20 Oct 2012	12
M1568	Magnetic Loop	Rohde & Schwarz	HFH2-Z2	879284/2	27 Jan 2013	12
S0539	PSU	Kikusui	PCR 1000L	13010170	Calibrated Before use	-

NB In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the current or previous calibration period on the date of testing.