



TEST REPORT

Test Report No. : UL-RPT-RP10013375JD01A

Manufacturer : Airspan Communications Ltd
Model No. : Airsynergy SYN-3N-00-0A49-000
FCC ID : O2J-495AS
Technology : P2PM Broadband Wireless Access Base-station
Test Standard(s) : FCC Parts 90, 15.207(a), 15.209

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2. The results in this report apply only to the sample(s) tested.
3. This sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 1.0

Date of Issue: 07 June 2013

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Issued by :

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This laboratory is accredited by UKAS.
The tests reported herein have been
performed in accordance with its' terms
of accreditation.

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1. Customer Information





Company Name:	Sulis Consultants Ltd
Address:	Mead House Longwater Road Eversley Hampshire RG27 0NW United Kingdom

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR90Y
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) Part 90 Subpart Y – Regulations governing licensing and use of frequencies in the 4940 – 4990 MHz Band
Specification Reference:	47CFR15.107 and 47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2012 Part 15 Subpart B (Unintentional Radiators) - Sections 15.107 and 15.209
Site Registration:	FCC: 209735
Location of Testing:	UL VS LTD, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	23 May 2013

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
15.107(a)	Receiver/Idle Mode AC Conducted Emissions	
15.209	Transmitter Radiated Emissions	
Key to Results		
 = Complied  = Did not comply		

2.3. Methods and Procedures

Reference:	ANSI/TIA-603-C-2004
Title:	Land Mobile FM or PM – Communications Equipment – Measurement and Performance Standards.
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

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:	Airspan Communications Ltd
Model Name or Number:	SYN-3N-00-0A49-000
Serial Number:	6BEAD5FFEFA8
Hardware Version Number:	Rev A
Software Version Number:	Not applicable
FCC ID Number:	O2J-495AS

Description:	Mains-48V PSU
Brand Name:	Powerbox
Model Name or Number:	PBUS-LUV-54V/100W-SN-QNA
Serial Number:	P1131CV022587

3.2. Description of EUT

The equipment under test was a P2PM Broadband Wireless Access Base-station.

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:	WiMax	
Type of Equipment	Base Station	
Channel Bandwidth:	5 MHz, 10 MHz	
Modulation Type:	OFDM / 64QAM5/6	
Duty Cycle:	60 %	
Antenna Type:	Dual Port, Omni, +/-45° Polarisation, Fixed Tilt	
Antenna Gain:	<26.0 dBi	
Power Supply Requirement:	Nominal	120 V
Transmit Frequency Range:	4940 MHz to 4990 MHz	
Transmit Channels Tested:	Channel	Channel Frequency (MHz)
	Bottom	4942.5
	Top	4987.5
Receive Frequency Range:	4940 MHz to 4990 MHz	
Receive Channels Tested:	Channel	Channel Frequency (MHz)
	Bottom	4945.0
	Top	4985.0

3.5. Support Equipment

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

Description:	Laptop
Brand Name:	Dell
Model Name or Number:	Latitude
Serial Number:	Airspan 005837

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- 5 MHz channel bandwidth operation tested using a commissioning test mode with 64QAM5/6 modulation.
- 10MHz channel bandwidth operation tested using a commission test, mode with 64QAM5/6 modulation.

4.2. Configuration and Peripherals

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

- The EUT was controlled from via a laptop PC, using bespoke software supplied by the Customer.
- The EUT was connected to a test laptop by using an Ethernet extension cable and the laptop was connected to 120 VAC 60 Hz AC supply.
- Transmitter AC Conducted was tested at 10MHz channel bandwidth as customer stated that that was the worst case
- Transmitter Emissions was tested with both 5 MHz channel bandwidth and a 10MHz channel bandwidth signal separately

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.

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

5.2. Test Results**5.2.1. Transmitter AC Conducted Spurious Emissions****Test Summary:**

Test Engineer:	Mark Percival	Test Date:	23 May 2013
Test Sample Serial Number:	6BEAD5FFEFA8		

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

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	37

Results: Live / Quasi Peak 10MHz

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.154	Live	31.2	65.8	34.6	Complied
0.357	Live	29.3	58.8	29.5	Complied
0.586	Live	30.3	56.0	25.7	Complied
0.838	Live	31.9	56.0	24.1	Complied
1.077	Live	30.7	56.0	25.3	Complied
1.459	Live	28.5	56.0	27.5	Complied
2.238	Live	22.9	56.0	33.1	Complied
8.241	Live	12.2	60.0	47.8	Complied
24.234	Live	23.1	60.0	36.9	Complied

Results: Live / Average 10MHz

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.276	Live	17.5	50.9	33.4	Complied
0.352	Live	20.6	48.9	28.3	Complied
0.591	Live	19.3	46.0	26.7	Complied
0.780	Live	18.9	46.0	27.1	Complied
1.000	Live	18.2	46.0	27.8	Complied
1.446	Live	15.2	46.0	30.8	Complied
1.891	Live	11.8	46.0	34.2	Complied
4.348	Live	15.1	46.0	30.9	Complied
23.910	Live	21.5	50.0	28.5	Complied

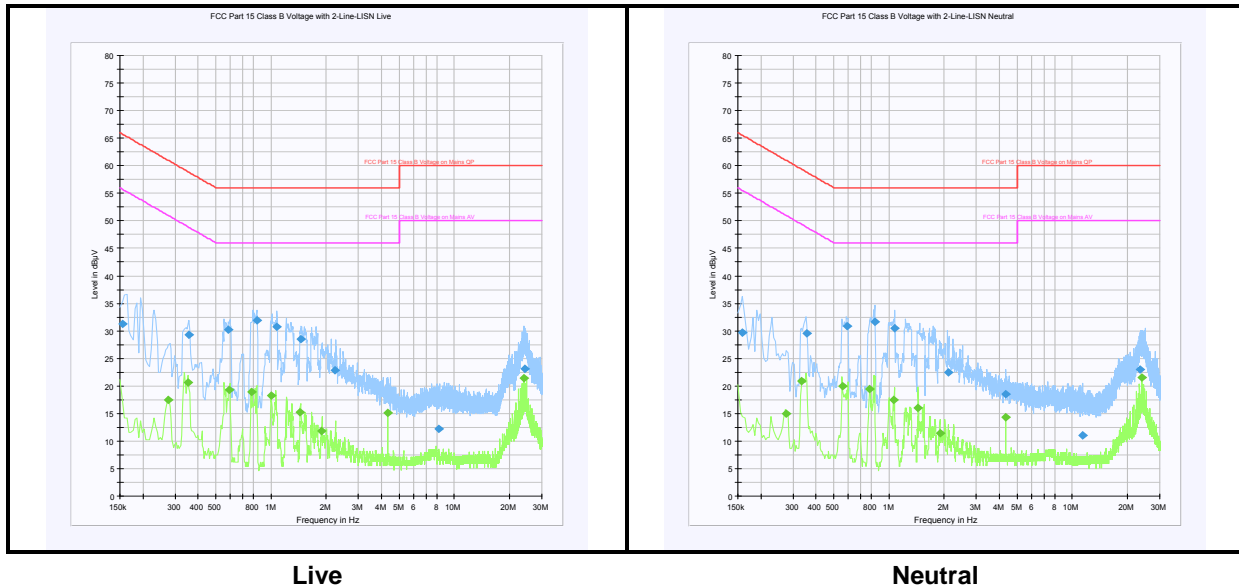
Transmitter AC Conducted Spurious Emissions (continued)**Results: Neutral / Quasi Peak 10MHz**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.159	Neutral	29.7	65.5	35.8	Complied
0.357	Neutral	29.5	58.8	29.3	Complied
0.591	Neutral	30.9	56.0	25.1	Complied
0.838	Neutral	31.6	56.0	24.4	Complied
1.072	Neutral	30.4	56.0	25.6	Complied
2.116	Neutral	22.5	56.0	33.5	Complied
4.348	Neutral	18.6	56.0	37.4	Complied
11.359	Neutral	11.0	60.0	49.0	Complied
23.482	Neutral	23.0	60.0	37.0	Complied

Results: Neutral / Average 10MHz

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.276	Neutral	15.0	50.9	35.9	Complied
0.334	Neutral	20.9	49.3	28.4	Complied
0.559	Neutral	20.0	46.0	26.0	Complied
0.780	Neutral	19.4	46.0	26.6	Complied
1.059	Neutral	17.5	46.0	28.5	Complied
1.446	Neutral	16.0	46.0	30.0	Complied
1.896	Neutral	11.5	46.0	34.5	Complied
4.348	Neutral	14.3	46.0	31.7	Complied
23.905	Neutral	21.6	50.0	28.4	Complied

Transmitter AC Conducted Spurious Emissions (continued)



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

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	09 Aug 2013	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	19 Feb 2014	12
A004	LISN	Rohde & Schwarz	ESH3-Z5	890604/027	30 Oct 2013	12

5.2.2. Transmitter Radiated Emissions**Test Summary:**

Test Engineer:	Mark Percival	Test Date:	23 May 2013
Test Sample Serial Number:	6BEAD5FFEFA8		

FCC Part:	15.209, 2.1053 and 90.210 (m)
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
Frequency Range:	30 MHz to 40 GHz

Environmental Conditions:

Temperature (°C):	22 to 24
Relative Humidity (%):	29 to 40

Note(s):

1. 5 MHz channel bandwidth operation tested using a commissioning test mode with 64QAM5/6 modulation.
2. 10MHz channel bandwidth operation tested using a commission test, mode with 64QAM5/6 modulation.
3. The emission seen on the 4 GHz to 6 GHz plot at approximately 4.985 GHz is the EUT carrier.
4. All emissions were at least 20 dB below the specification limit or below the measurement system noise floor.
5. Measurements below 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.
6. Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 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.
7. The limit was calculated using $55+10\log(p)$, as stated in 90.210 (m)

Transmitter Radiated Emissions (continued)**Results: 10 MHz**

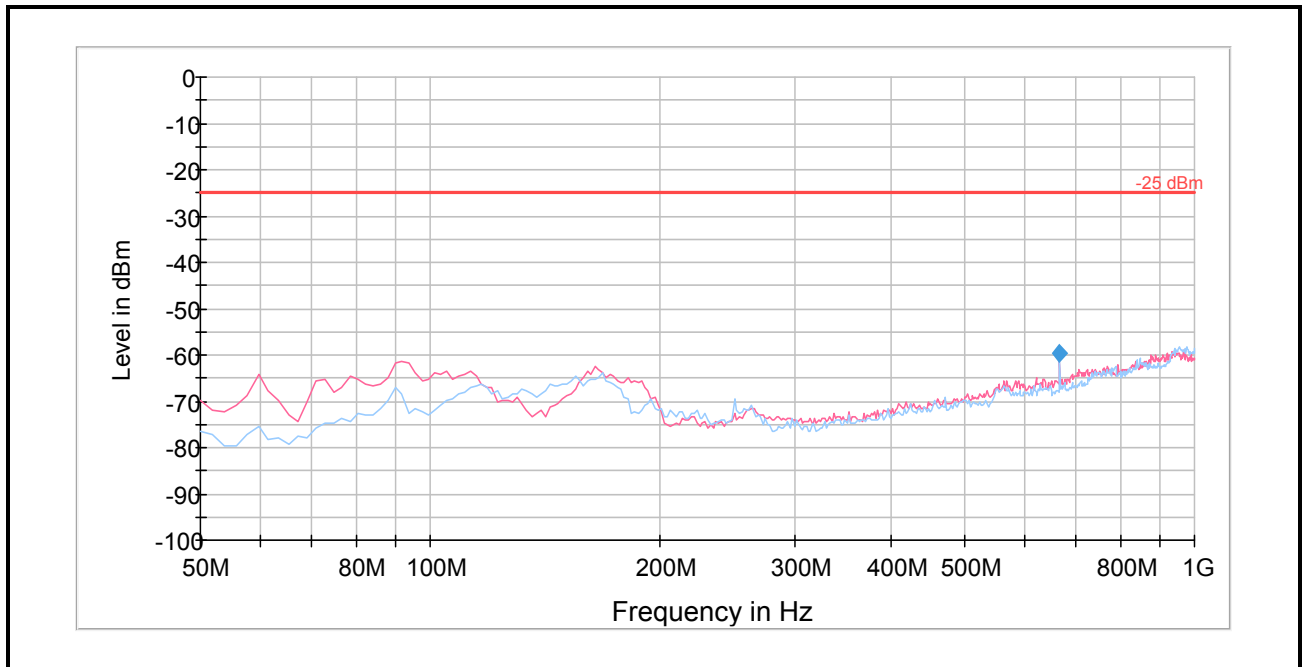
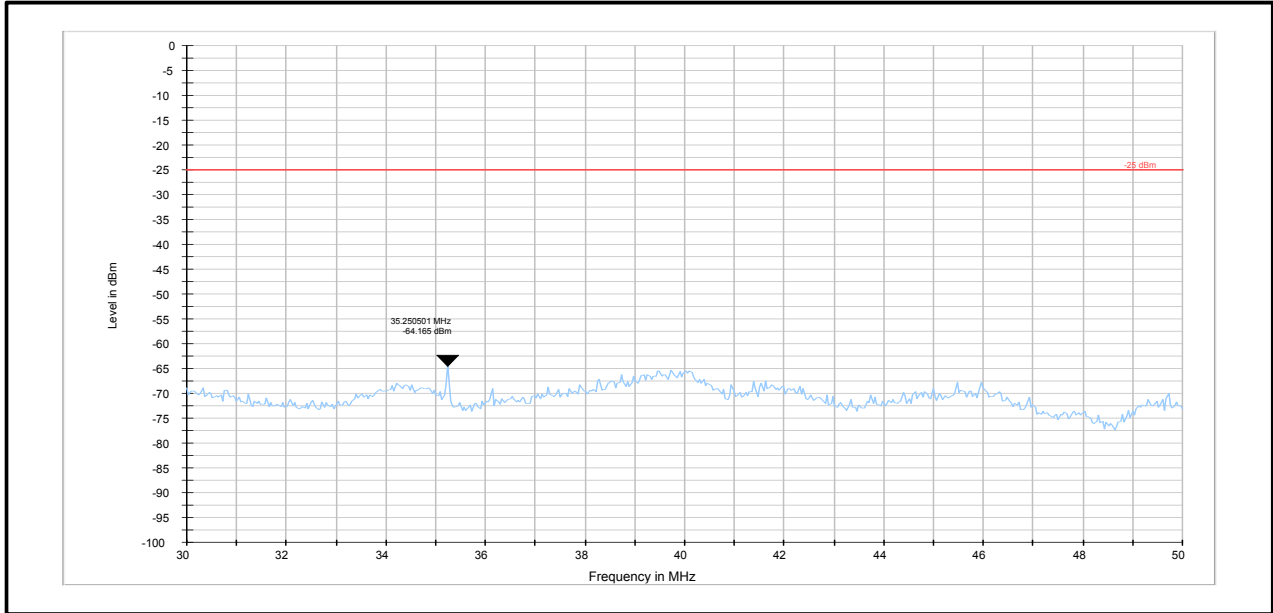
Frequency (MHz)	Antenna Polarisation	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
37267.535	Vertical	-44.6	-25.0	19.6	Complied

Results: 5 MHz

Frequency (MHz)	Antenna Polarisation	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
37565.130	Vertical	-45.1	-25.0	20.1	Complied

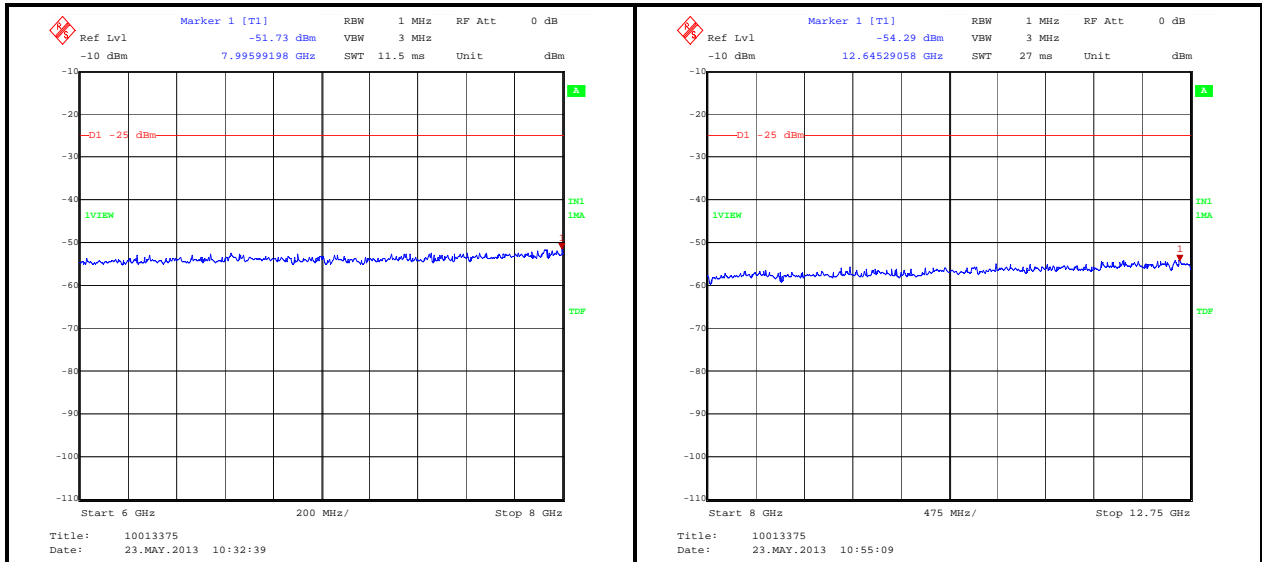
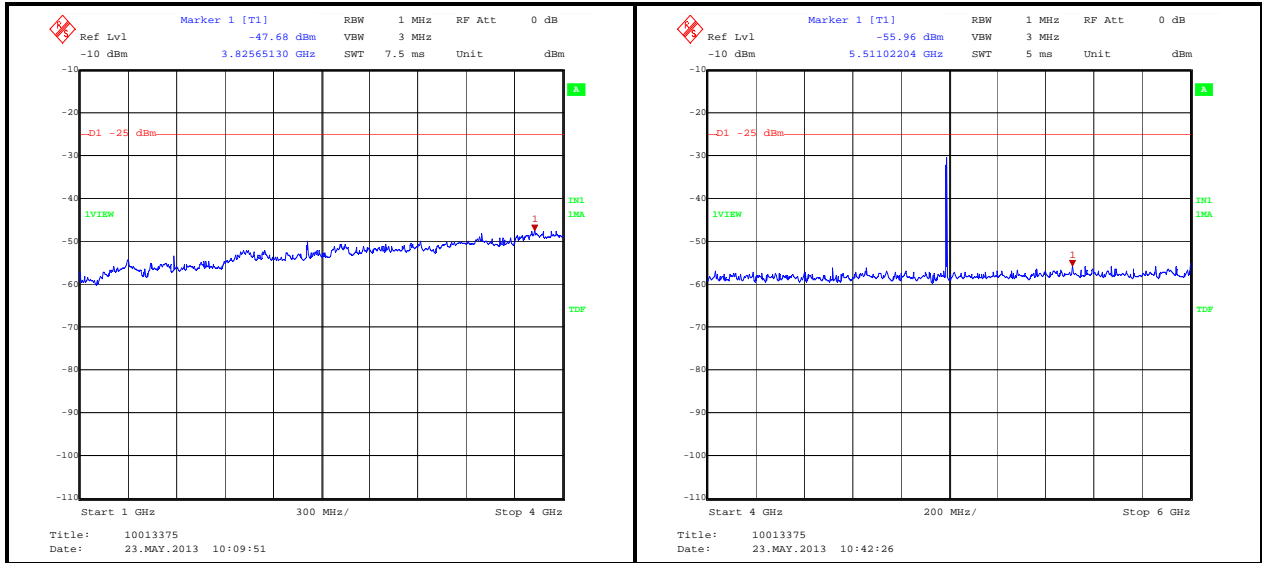
Transmitter Radiated Emissions (continued)

Results: 10MHz

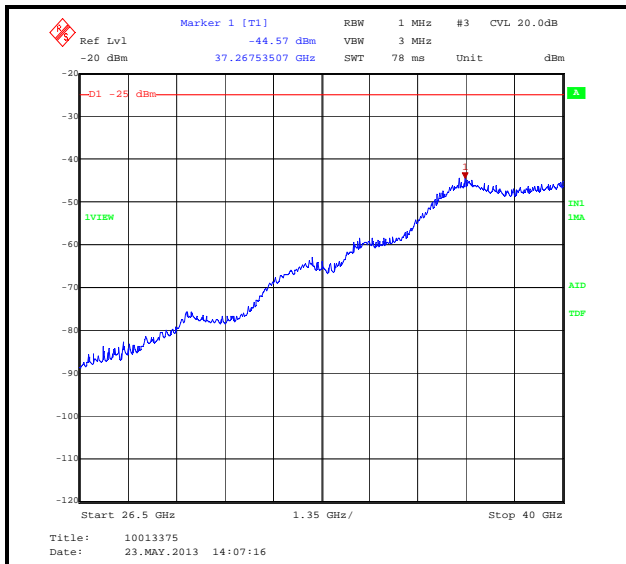
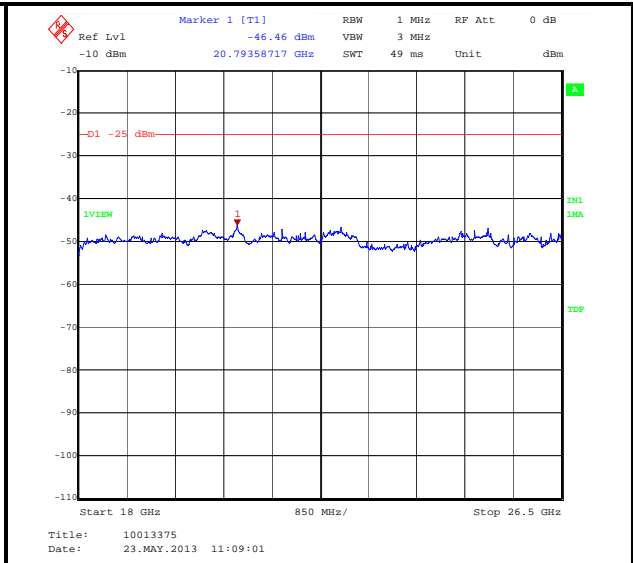
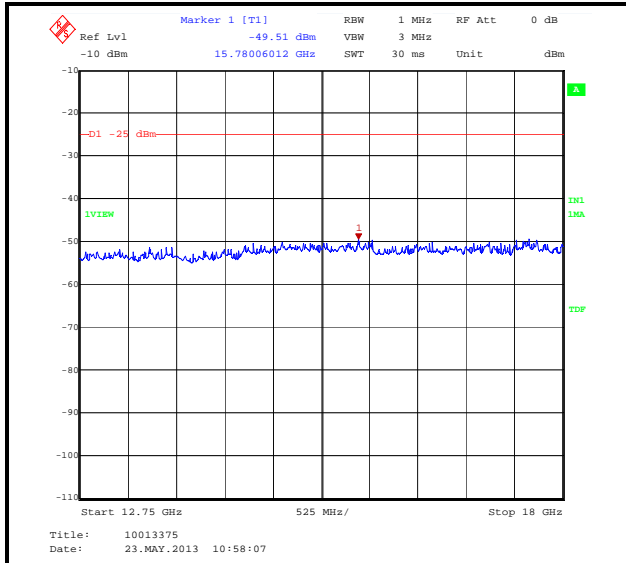


Transmitter Radiated Emissions (continued)

Results:

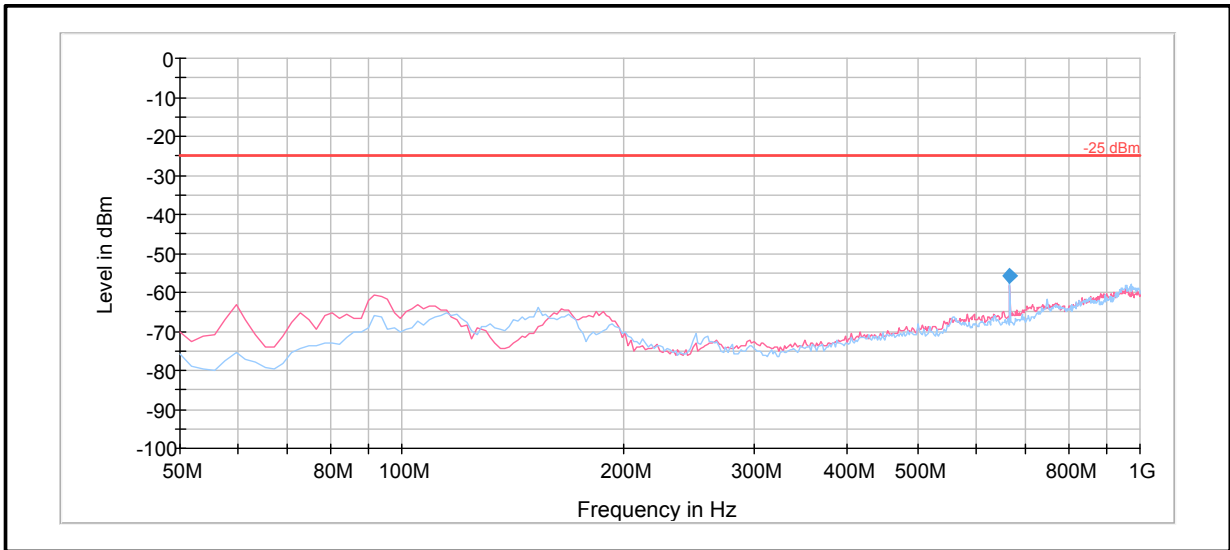
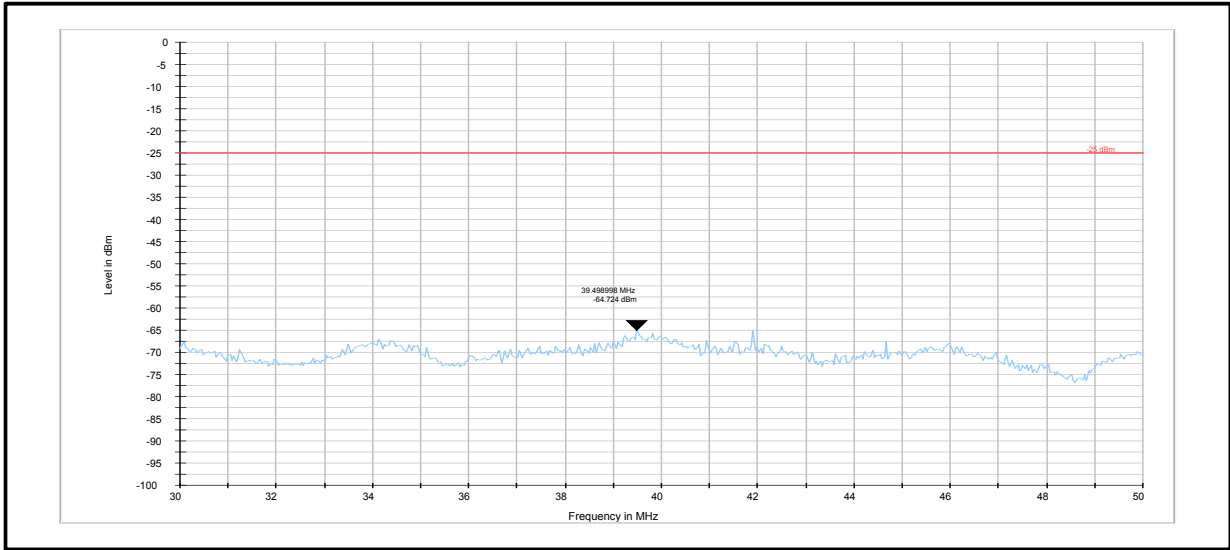


Transmitter Radiated Emissions (continued)



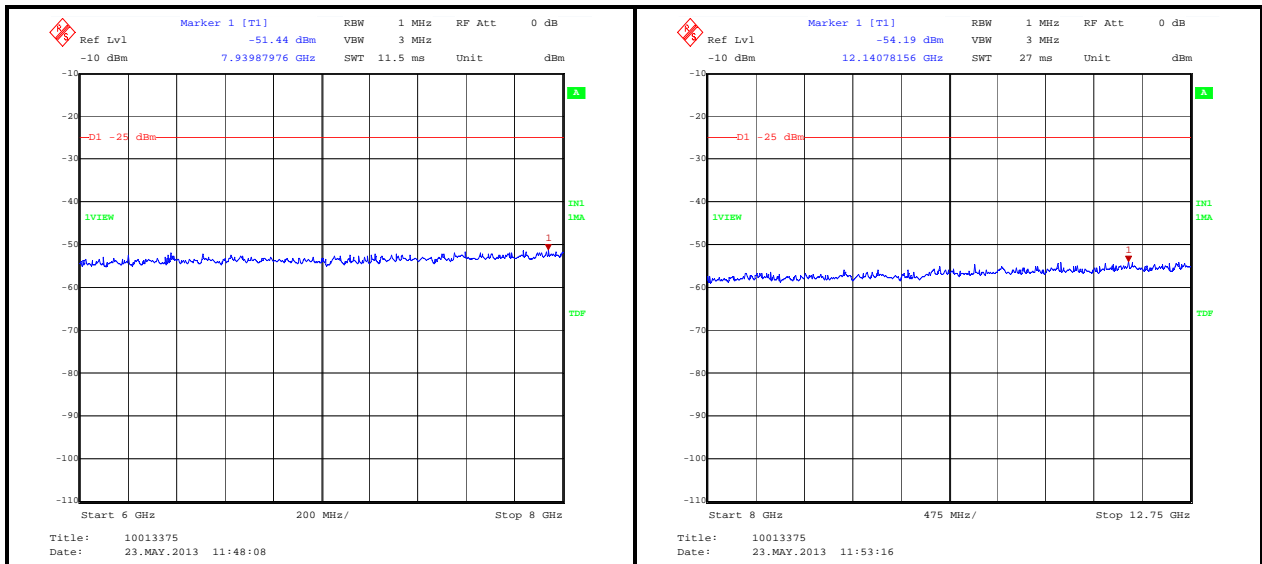
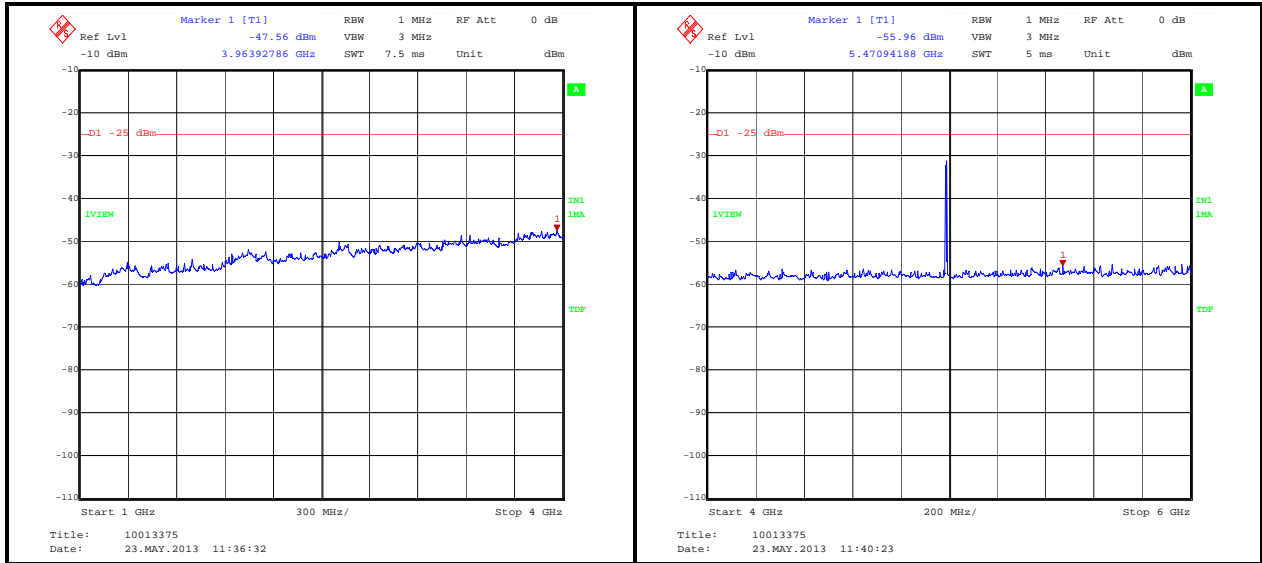
Transmitter Radiated Emissions

Results: 5 MHz

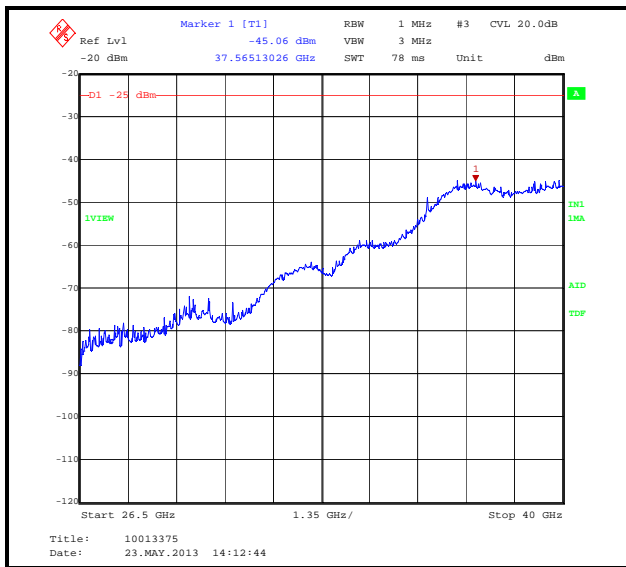
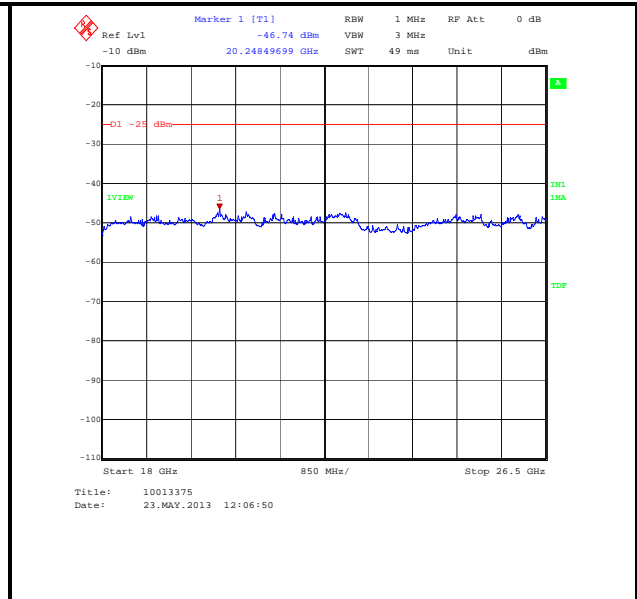
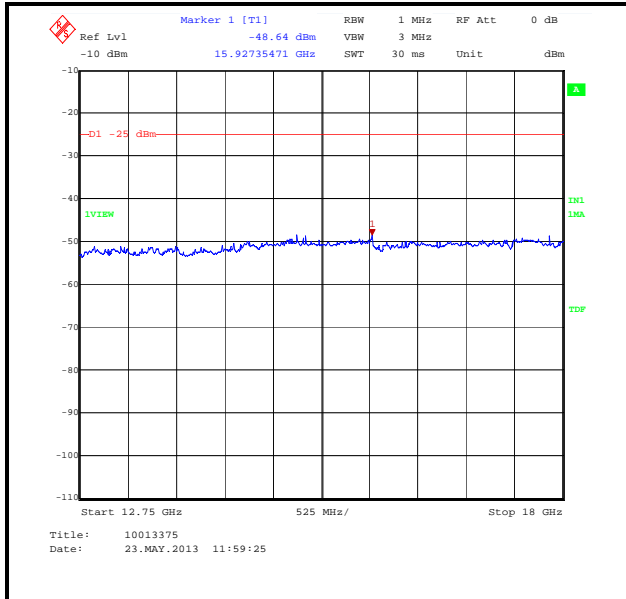


Transmitter Radiated Emissions (continued)

Results: 5 MHz



Transmitter Radiated Emissions (continued)



Transmitter Radiated Emissions (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046K	14 Aug 2013	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	04 Nov 2013	12
A1818	Antenna	EMCO	3115	00075692	04 Nov 2013	12
A253	Antenna	Flann	12240-20	128	04 Nov 2013	12
A254	Antenna	Flann	14240-20	139	04 Nov 2013	12
A255	Antenna	Flann	16240-20	519	04 Nov 2013	12
A256	Antenna	Flann	18240-20	400	04 Nov 2013	12
A436	Antenna	Flann	20240-20	330	04 Nov 2013	12
A366	Antenna	MRI	FRR-400	169	Calibration not required	12
K0002	RSE Chamber	Rainford	N/A	N/A	04 Nov 2013	12
K0001	RSE Chamber	Rainford	N/A	N/A	24 Oct 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	07 Feb 2014	12
G0543	Pre Amplifier	Sonoma	310N	230801	04 Jul 2013	3
A1834	Attenuator	Hewlett Packard	8491B	10444	27 Jan 2014	12
A490	Antenna	Chase	CBL6111A	CBL6111A	18 Apr 2014	12

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%	± 4.69 dB
Radiated Emissions	30 MHz to 40 GHz	95%	± 5.65 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.

7. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	-	-	Initial Version