TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: Flexipanel Ltd.
EasyBee

To: FCC Part 15.247: 2005

Test Report Serial No:
RFI/MPTE3/RP48015JD04A

Supersedes Test Report Serial No:
RFI/MPTE2/RP48015JD04A

This Test Report Is Issued Under The Authority Of Andrew Brown, Operations Manager: 	
Tested By: Fara Razally **pp.** 	**Checked By: Tony Henriques** 
Report Copy No: PDF01	
Issue Date: 14 November 2006	**Test Dates: 24 May 2006 to 06 June 2006**

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This report may be copied in full. The results in this report apply only to the sample(s) tested.

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1. Client Information

Company Name:	Flexipanel Ltd
Address:	Suite 120 242 Acklam Road London W14 5JJ
Contact Name:	Mr R Hoptroff

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:	IEEE 802.15.4 Transceiver
Model Name or Number:	EasyBee
Serial Number:	None Stated
FCC ID Number:	UGAZBMr10
Country of Manufacture:	Not Stated
Date of Receipt:	19 April 2006

2.2. Description of EUT

The equipment under test is an IEEE 802.15.4 ZigBee transceiver operating in the 2.4 GHz ISM band.

2.3. Modifications Incorporated in EUT

Two samples were supplied for testing, one un-modified unit for radiated tests and one unit modified with a temporary antenna port to enable conducted measurements to be made.

2.4. Additional Information Related to Testing

Power Supply Requirement:	DC supply of 3.3 V		
Equipment Category:	ZigBee		
Type of Unit:	Transceiver Module		
Transmit Frequency Range:	2405 to 2480 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	1	2405
	Middle	8	2440
	Top	16	2480
Receive Frequency Range:	2405 to 2480 MHz		
Receive Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	1	2405
	Middle	8	2440
	Top	16	2480
Maximum Peak Power Output (EIRP)	-4.3 dBm		

2.5. Support Equipment

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

Description:	Custom interface board (EUT was mounted and controlled through this)
Brand Name:	PICDEM-Z
Connected to:	Edge connector

3. Test Results

Reference:	FCC Part 15.247: 2005 Subpart C
Title:	Code of Federal Regulations, Part 15.247 (47CFR22) (Intentional Radiators operating within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz)

3.1. 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 (2003)
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.

3.2. 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

None.

5. Operation of the EUT during Testing

5.1. Operating Modes

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

Transmitting and receiving on bottom, middle and top channels as required.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

Standalone.

6. Summary of Test Results

Range of Measurements	Specification Reference	Port Type	Compliancy Status
Receiver Mode Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2005 Section 15.109	Antenna	Complied
Transmitter Minimum 6 dB Bandwidth	C.F.R. 47 FCC Part 15: 2005 Section 15.247(a)(2)	Antenna Terminals	Complied
Transmitter 20 dB Bandwidth	C.F.R. 47 FCC Part 15: 2005 Section 2.1049	Antenna Terminals	Complied
Transmitter Peak Power Spectral Density	C.F.R. 47 FCC Part 15: 2005 Section 15.247(e)	Antenna Terminals	Complied
Transmitter Maximum Peak Output Power	C.F.R. 47 FCC Part 15: 2005 Section 15.247(b)(3)	Antenna	Complied
Transmitter Radiated Emissions	C.F.R. 47 FCC Part 15: 2005 Sections 15.247(d) & 15.209(a)	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 15: 2005 Sections 15.247(d) & 15.209(a)	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, England.

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.

7.2. Test Results

7.2.1. Receiver Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)

The EUT was configured as for radiated emission testing as described in section 9 of this report.

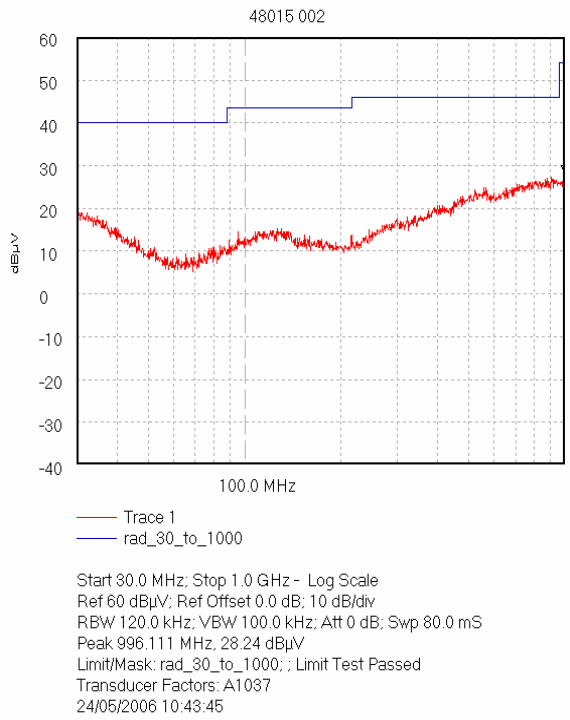
Tests were performed to identify the maximum receiver or standby radiated emission levels.

Results:

Frequency (MHz)	Antenna Polarity	Q-P Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
996.111	Vertical	28.3	54.0	25.7	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.*



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

7.2.2. Receiver Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 18 GHz)

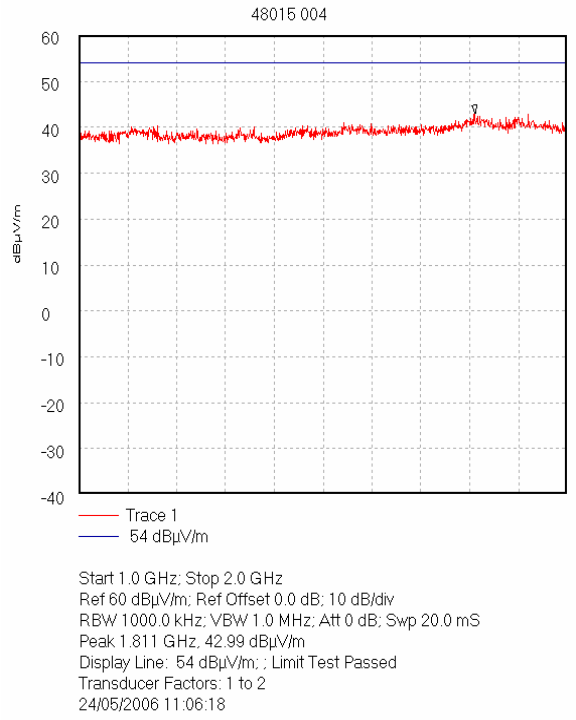
Results:

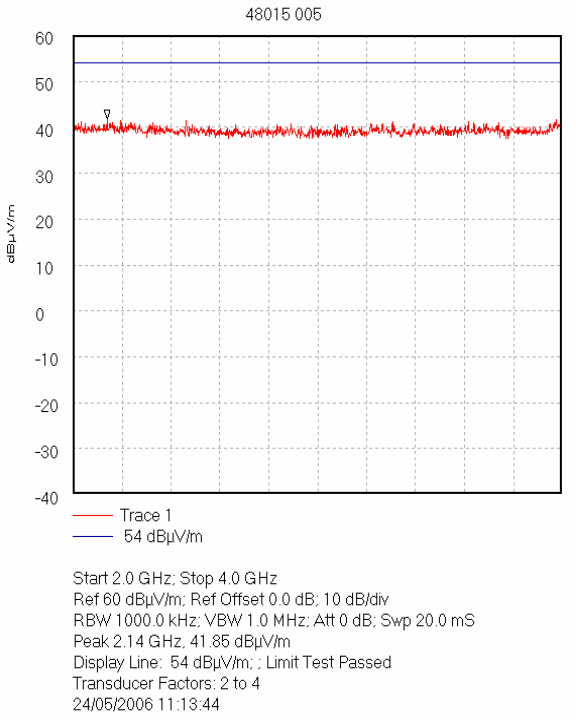
Highest Peak Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
4.9561	Vertical	46.1	-3.6	42.5	74.0	31.5	Complied

Highest Average Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Antenna Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
4.9561	Vertical	45.2	-3.6	41.6	54.0	12.4	Complied

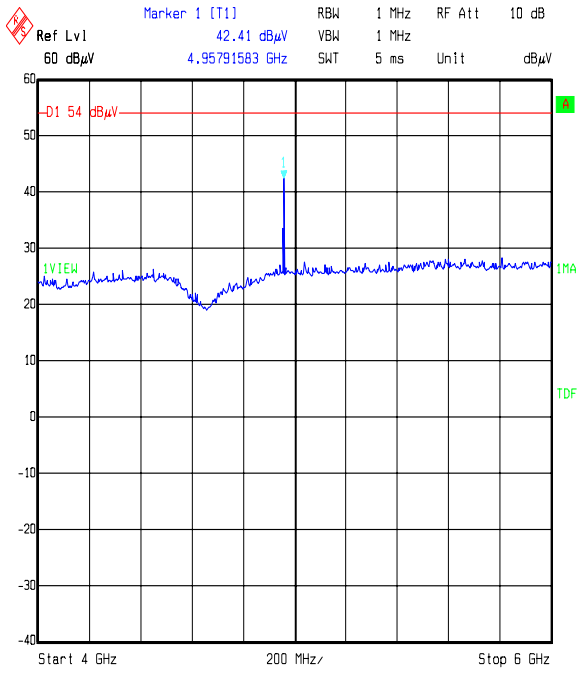




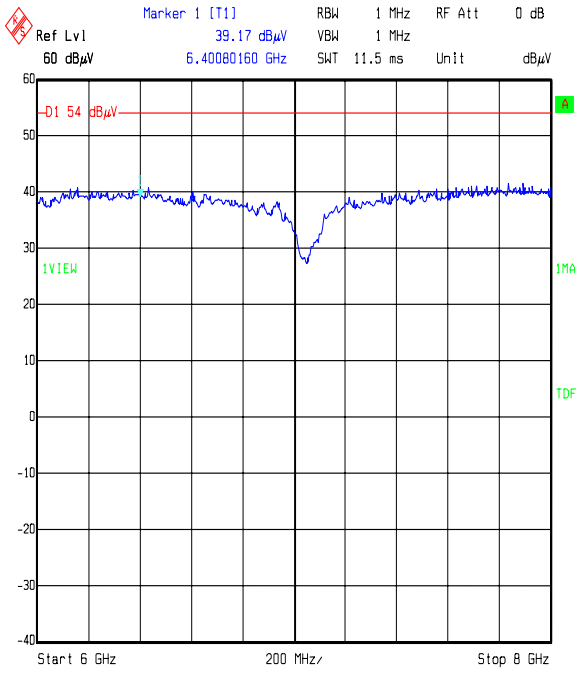
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Test of: **Flexipanel Ltd.**
EasyBee
To: **FCC Part 15.247: 2005**

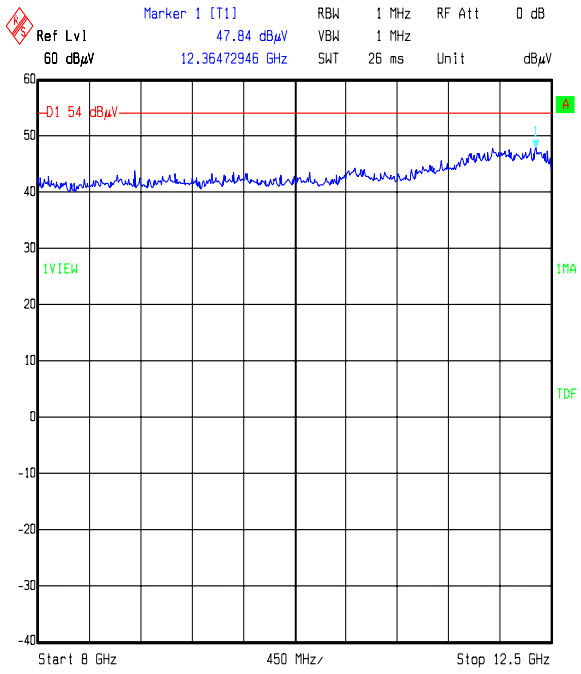
Receiver Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 18 GHz) (Continued)



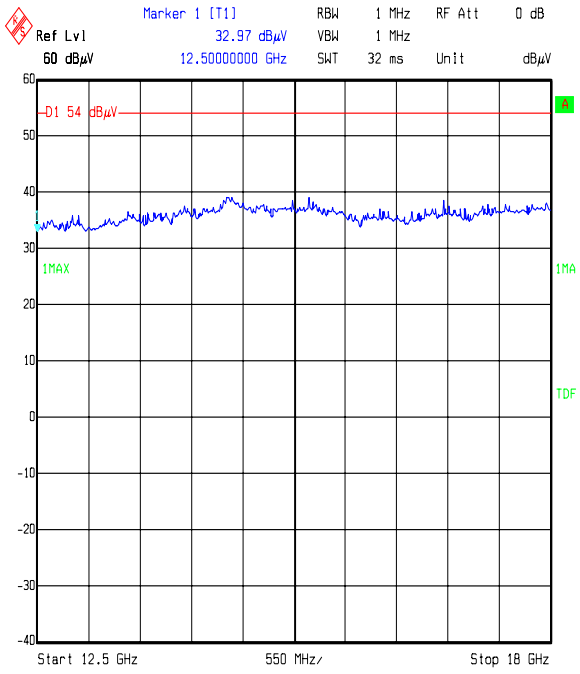
Title: FlexiPanel 48015JD04 FCC Part 15.247
Comment A: Radiated Spurious Emissions RX Mode Top Channel
Date: 24.MAY 2006 15:01:51



Title: FlexiPanel EasyBee FCC PART 15.247
Comment A: Radiated Spurious Emissions RX Mode Top Channel
Date: 25.MAY 2006 12:05:44



Title: FlexiPanel EasyBee FCC PART 15.247
Comment A: Radiated Spurious Emissions RX Mode Top Channel
Date: 25.MAY 2006 15:40:42



Title: FlexiPanel EasyBee FCC PART 15.247
Comment A: Radiated Spurious Emissions RX Mode Top Channel
Date: 25.MAY 2006 15:55:18

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

7.2.3. Transmitter Minimum 6 dB Bandwidth: Section 15.247(a)(2)

The EUT was configured for 6 dB bandwidth measurements as described in section 9 of this report.

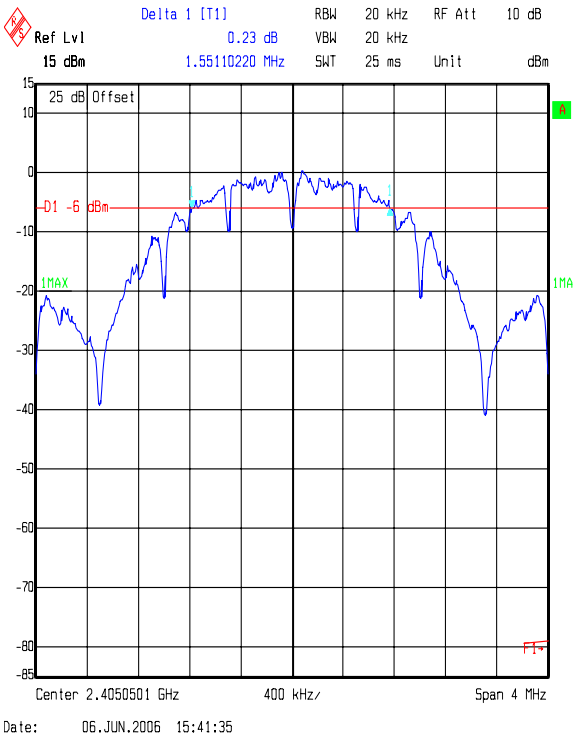
Tests were performed to identify the 6 dB bandwidth.

Results:

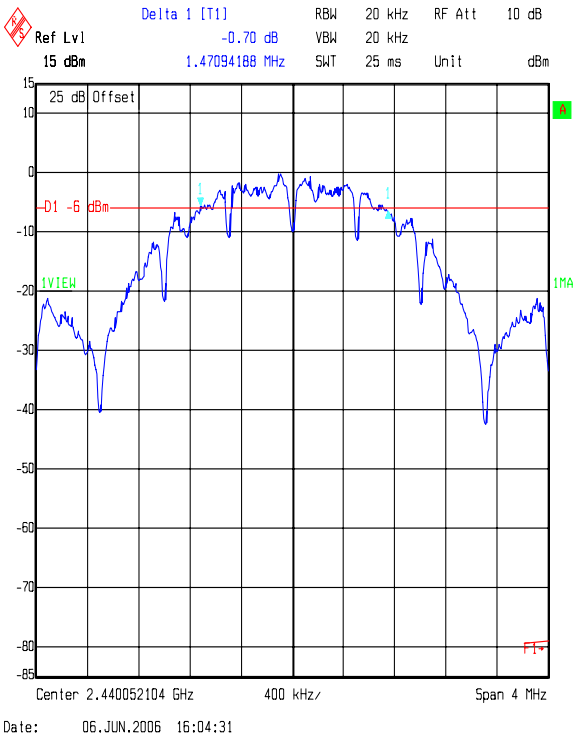
Channel	Transmitter 6 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
Bottom	1.551	≥0.5	1.051	Complied
Middle	1.471	≥0.5	0.971	Complied
Top	1.551	≥0.5	1.051	Complied

Test of: Flexipanel Ltd.
EasyBee
To: FCC Part 15.247: 2005

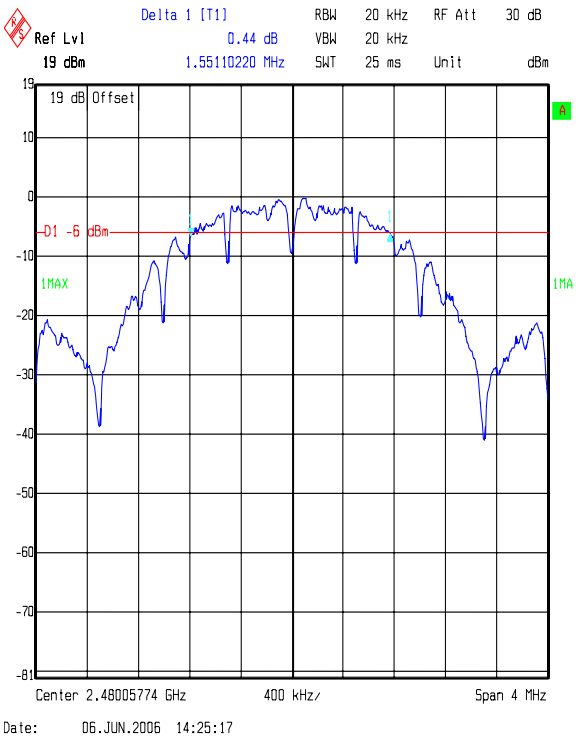
Transmitter Minimum 6 dB Bandwidth: Section 15.247(a)(2) (Continued)



Date: 06.JUN.2006 15:41:35



Date: 06.JUN.2006 16:04:31



Date: 06.JUN.2006 14:25:17

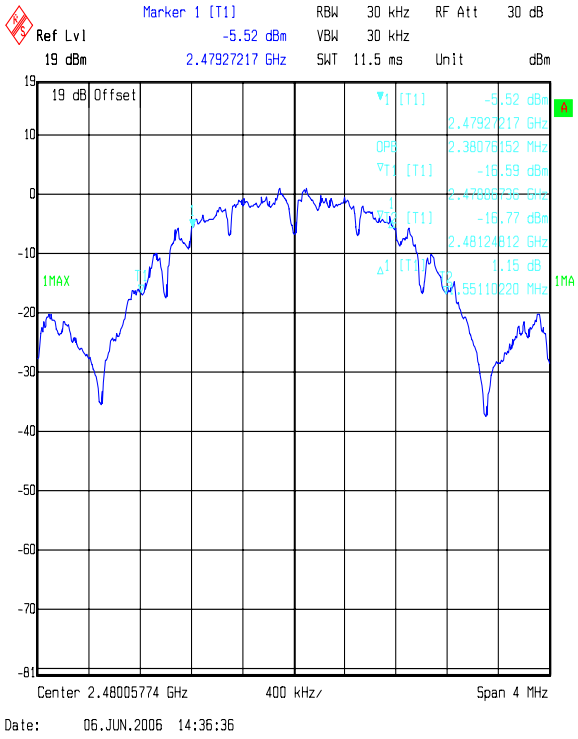
7.2.4. Transmitter 20 dB Bandwidth: Section 2.1049

The EUT was configured for 20 dB bandwidth measurements as described in section 9 of this report.

Tests were performed to identify the 20 dB bandwidth.

Results:

Transmitter 20 dB Bandwidth (kHz)
2380.762



7.2.5. Transmitter Peak Power Spectral Density: Section 15.247(e)

The EUT was configured for transmitter peak power spectral density measurements as described in section 9 of this report.

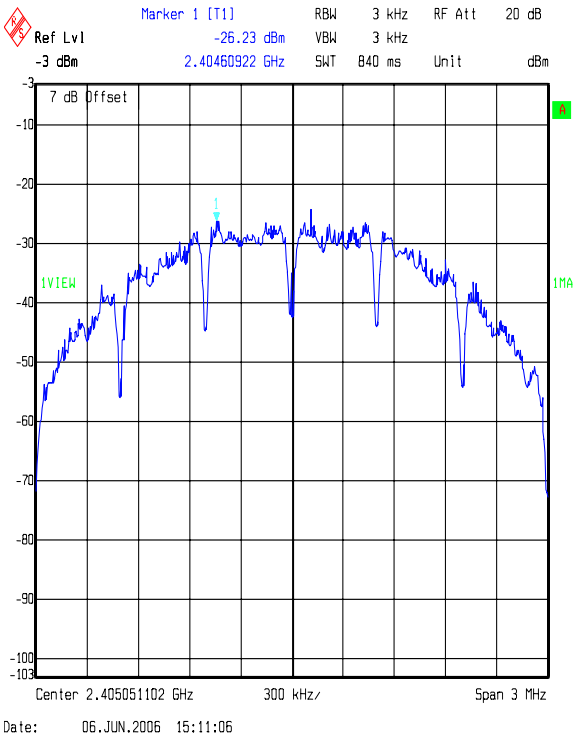
Tests were performed to identify the transmitter peak power spectral density.

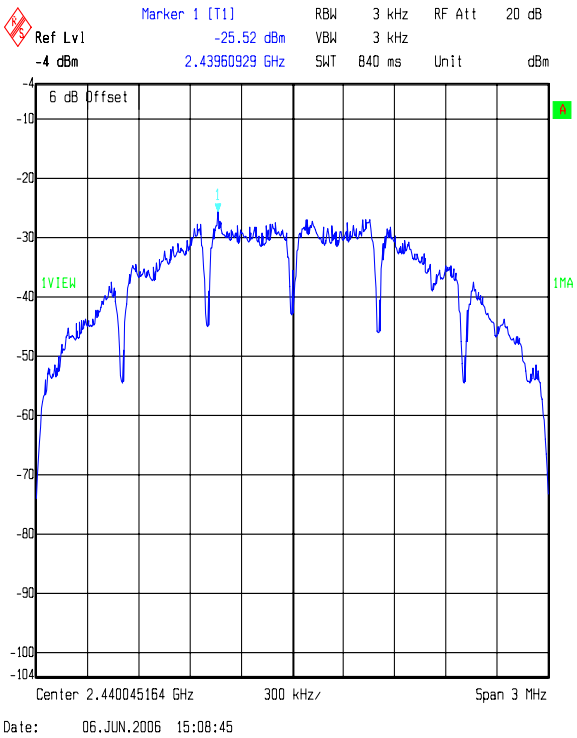
Results:

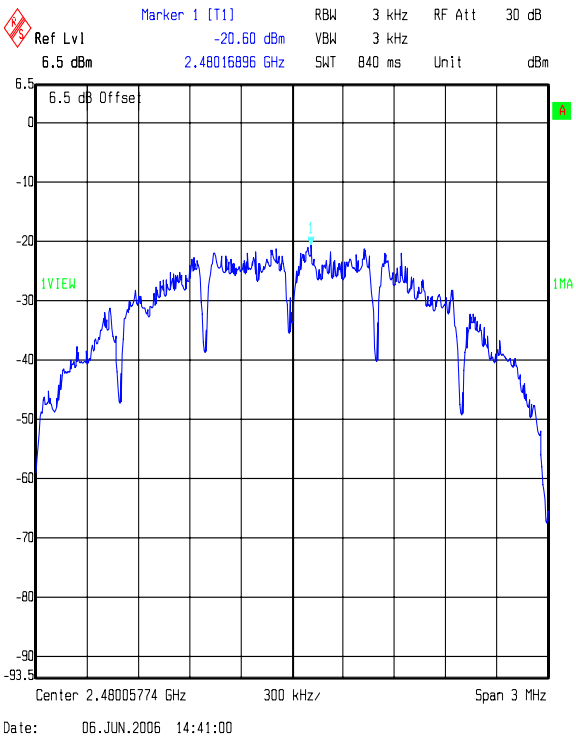
Channel	Output Power (dBm/3 kHz)	Limit (dBm/3 kHz)	Margin (dB)	Result
Bottom	-26.2	8.0	34.2	Complied
Middle	-25.5	8.0	33.5	Complied
Top	-20.6	8.0	28.6	Complied

Test of: Flexipanel Ltd.
EasyBee
To: FCC Part 15.247: 2005

Transmitter Peak Power Spectral Density: Section 15.247(e) (Continued)







7.2.6. Transmitter Maximum Peak Output Power: (EIRP) Section 15.247(b)(3)

The EUT was configured for transmitter peak output power measurements as described in Section 9 of this report.

Tests were performed to identify the transmitter maximum peak output power (EIRP) of the EUT.

Results:

Channel	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	-8.8	30.0	38.8	Complied
Middle	-9.0	30.0	39.0	Complied
Top	-4.3	30.0	34.3	Complied

Note(s):

1. *These tests were performed radiated; therefore the EUT antenna gain is encompassed within the final result.*

7.2.7. Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) - Electric Field Strength Measurements: 30 to 1000 MHz (emissions occurring in the restricted bands)

The EUT was configured for radiated emission testing as described in section 9 of this report.

Tests were performed to identify the maximum transmitter radiated emission levels.

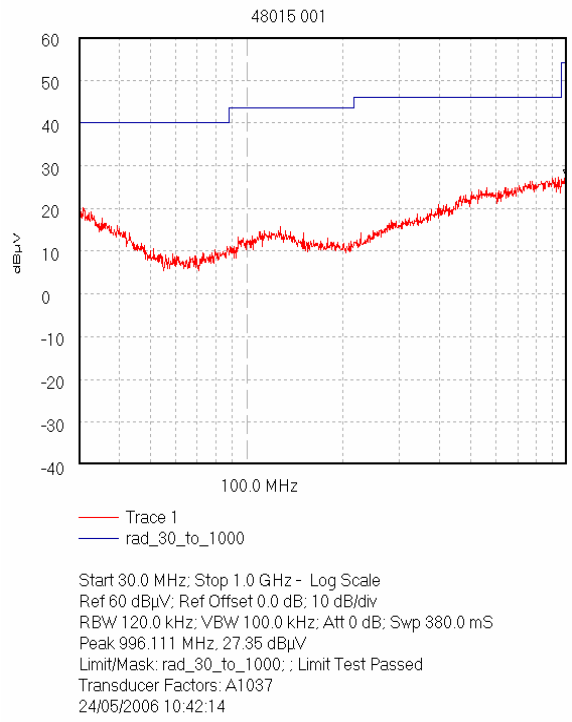
Results:

Top Channel

Frequency (MHz)	Antenna Polarity	Q-P Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
996.111	Vertical	27.4	54.0	16.6	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 and compared to the average limit as shown in the table above.*



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

7.2.8. Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) - Electric Field Strength Measurements (Frequency Range: 1 to 25 GHz) (emissions occurring in the restricted bands)

The EUT was configured for radiated emission testing as described in section 9 of this report.

Tests were performed to identify the maximum transmitter radiated emission levels.

Results:

Highest Peak Level: Bottom Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
4.8101	Vertical	50.2	-4.3	45.9	74.0	28.1	Complied

Highest Average Level: Bottom Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
4.8101	Vertical	49.1	-4.3	44.8	54.0	9.2	Complied

Highest Peak Level: Middle Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
4.8805	Vertical	52.3	-4.3	48.0	74.0	26.0	Complied
7.3202	Vertical	55.1	-2.1	53.0	74.0	21.0	Complied

Highest Average Level: Middle Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
4.8805	Vertical	49.3	-4.3	45.0	54.0	9.0	Complied
7.3202	Vertical	54.3	-2.1	52.1	54.0	1.9	Complied

Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) - Electric Field Strength Measurements (Frequency Range: 1 to 25 GHz) (emissions occurring in the restricted bands) (Continued)

Highest Peak Level: Top Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
4.9600	Vertical	55.8	-3.6	52.2	74.0	21.8	Complied
7.4400	Vertical	64.4	-2.1	62.3	74.0	11.7	Complied

Highest Average Level: Top Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
4.9600	Vertical	49.0	-3.6	45.4	54.0	8.6	Complied
7.4400	Vertical	55.5	-2.1	53.4	54.0	0.6	Complied

7.2.9. Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) - Electric Field Strength Measurements (Frequency Range: 1 to 25 GHz) (emissions outside the restricted bands)

The EUT was configured for radiated emission testing as described in section 9 of this report.

Tests were performed to identify the maximum transmitter radiated emission levels.

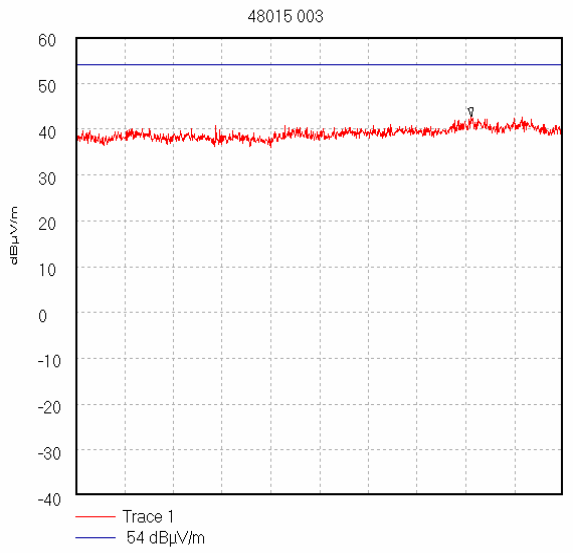
Results:

Highest Peak Level: Bottom Channel

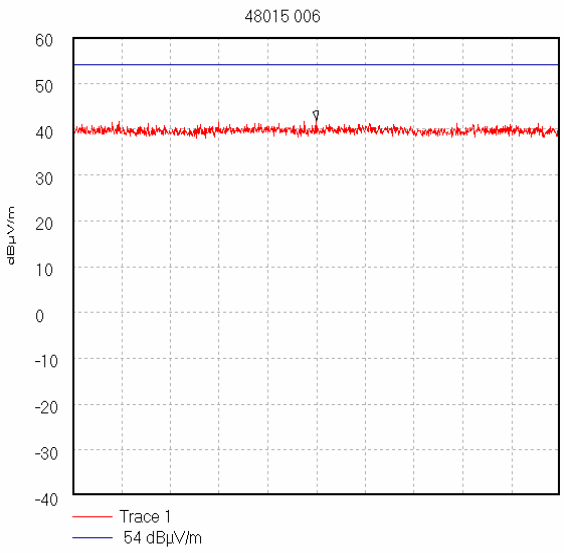
Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	-20 dBc Limit (dBμV/m)	Margin (dB)	Result
7.2152	Vertical	53.0	-2.2	50.8	62.4	11.6	Complied

Test of: **Flexipanel Ltd.**
EasyBee
To: **FCC Part 15.247: 2005**

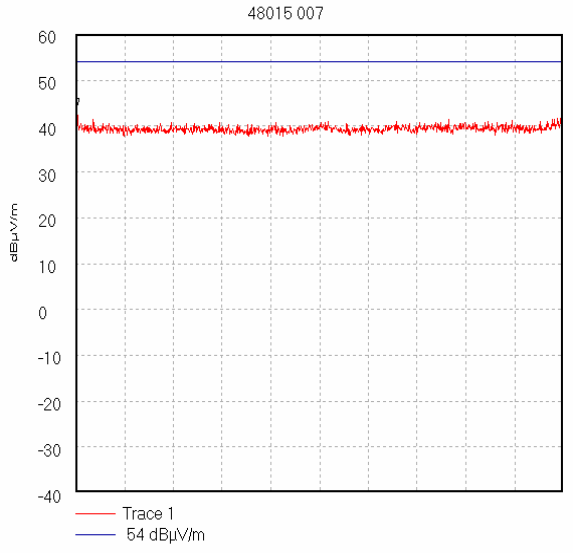
Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) - Electric Field Strength Measurements (Frequency Range: 1 to 25 GHz) (emissions outside the restricted bands) (Continued)



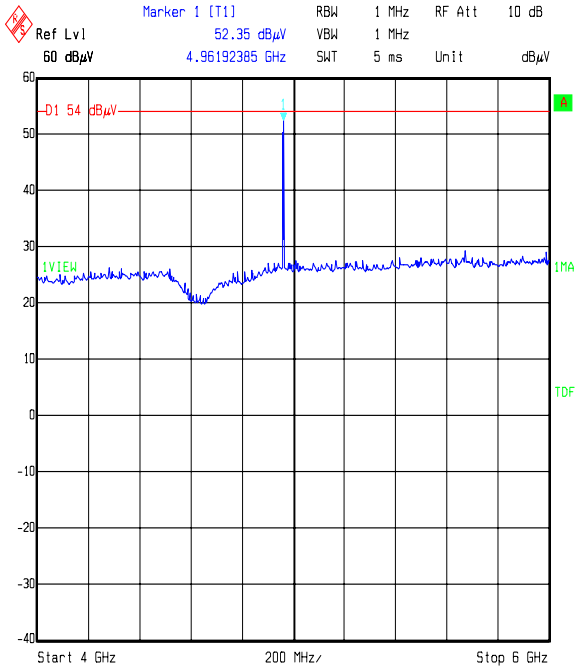
Start 1.0 GHz; Stop 2.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.811 GHz, 42.71 dBµV/m
Display Line: 54 dBµV/m; ; Limit Test Passed
Transducer Factors: 1 to 2
24/05/2006 11:04:24



Start 2.0 GHz; Stop 2.4 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 2.2 GHz, 41.92 dBµV/m
Display Line: 54 dBµV/m; ; Limit Test Passed
Transducer Factors: 2 to 4
24/05/2006 11:15:34



Start 2.4835 GHz; Stop 4.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 2.4869 GHz, 44.11 dBµV/m
Display Line: 54 dBµV/m; ; Limit Test Passed
Transducer Factors: 2 to 4
24/05/2006 11:16:44

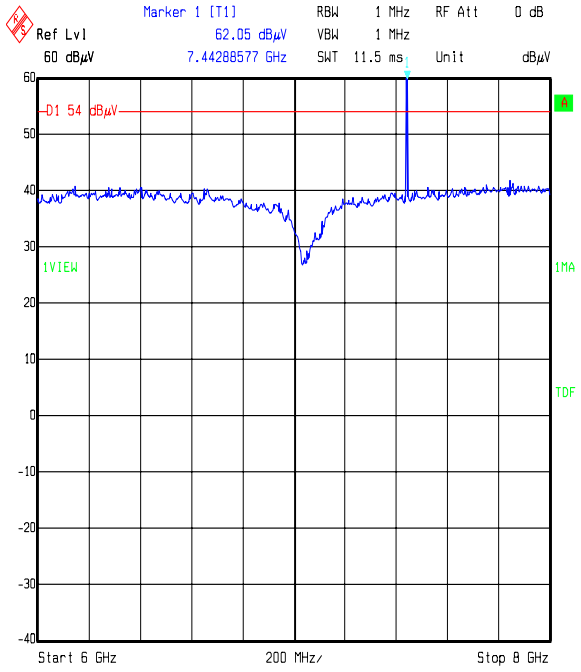


Title: FlexiPanel 48015JD04 FCC Part 15.247
Comment A: Radiated Spurious Emissions TX Mode Top Channel
Date: 24.MAY 2006 14:46:49

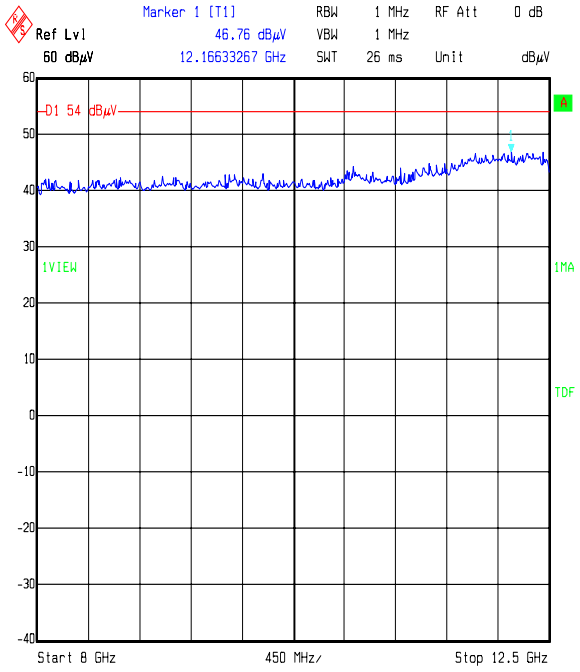
Note: All these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Test of: **Flexipanel Ltd.**
EasyBee
To: **FCC Part 15.247: 2005**

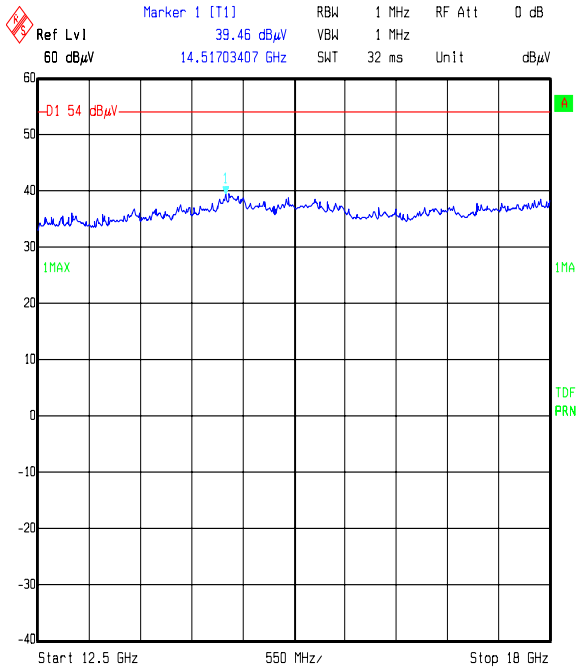
Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) - Electric Field Strength Measurements (Frequency Range: 1 to 25 GHz) (emissions outside the restricted bands) (Continued)



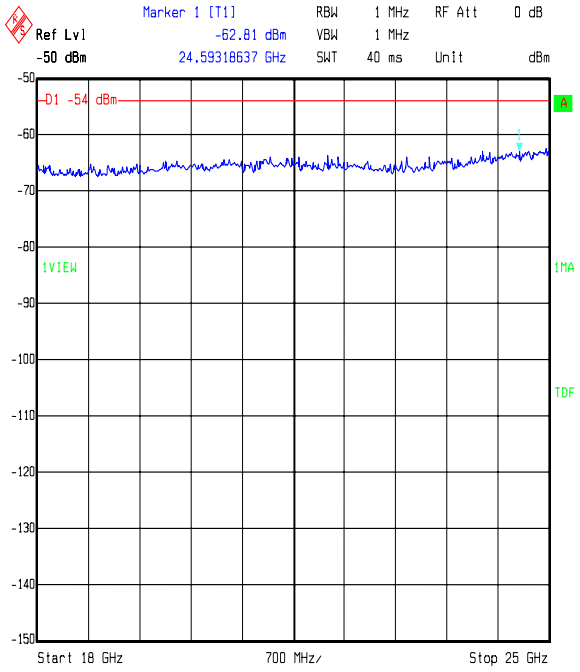
Title: FlexiPanel EasyBee FCC PART 15.247
Comment A: Radiated Spurious Emissions RX Mode Top Channel
Date: 25.MAY 2006 12:07:15



Title: FlexiPanel EasyBee FCC PART 15.247
Comment A: Radiated Spurious Emissions TX Mode Top Channel
Date: 25.MAY 2006 15:38:27



Title: FlexiPanel EasyBee FCC PART 15.247
Comment A: Radiated Spurious Emissions TX Mode Top Channel
Date: 25.MAY 2006 15:56:38



Title: FlexiPanel EasyBee FCC PART 15.247
Comment A: Radiated Spurious Emissions TX Mode Top Channel
Date: 25.MAY 2006 15:59:27

Note: The 6 GHz to 8 GHz plot above is incorrectly labelled 'RX Mode', this is a typographical error and it is confirmed that this is a plot of TX Mode in this band.

7.2.10. Transmitter Band Edge Radiated Emissions: Section 15.247(d) & 15.209(a) - Electric Field Strength Measurements

The EUT was configured for band edge compliance of radiated emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum radiated band edge emissions.

Results:

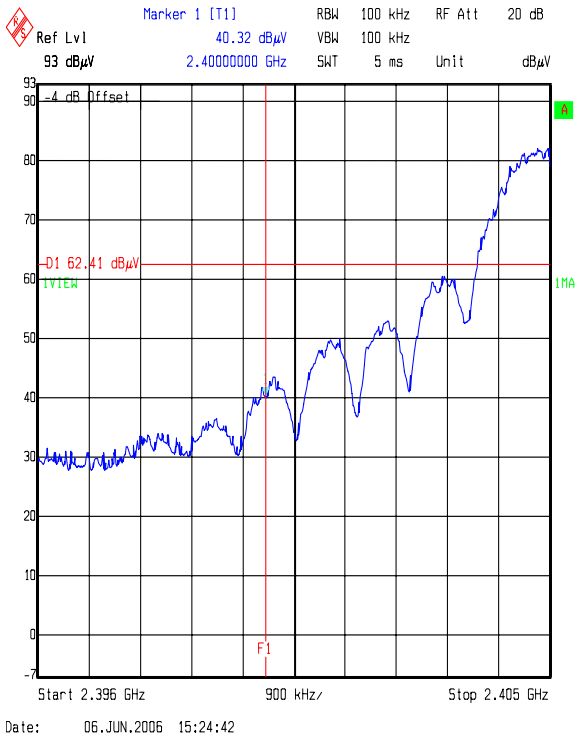
Peak Power Level Static Mode:

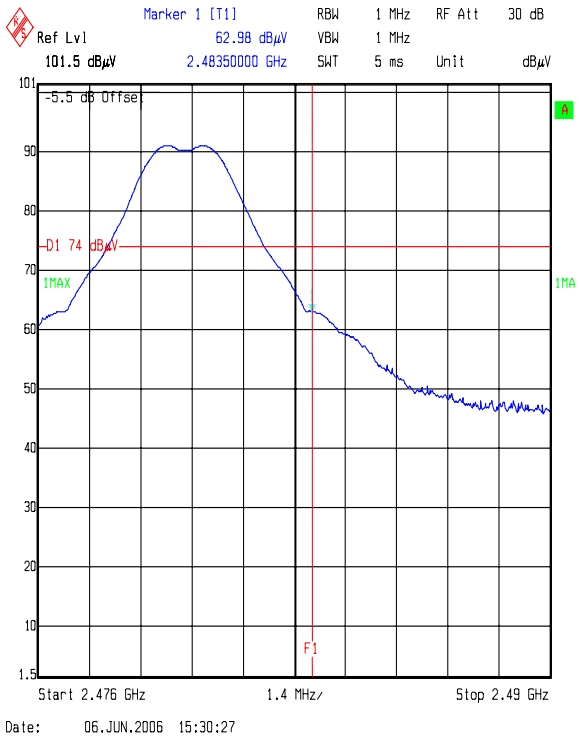
Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2.4000	Vertical	51.3	-11.0	40.3	62.4*	22.1	Complied
2.4835	Vertical	74.0	-11.0	63.0	74.0	11.0	Complied

**-20 dBc limit*

Average Power Level Static Mode:

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2.4835	Vertical	64.7	-11.0	53.7	54.0	0.3	Complied





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 Maximum Peak Output Power	Not applicable	95%	±2.94 dB
Spectral Power Density	Not applicable	95%	±1.2 dB
6 dB/20 dB Bandwidth	Not applicable	95%	±0.12 %
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±5.26 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	±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.

9. Measurement Methods

9.1. Radiated Emissions

Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Initial measurements covering the entire measurement band in the form of swept scans in a shielded enclosure were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies on which the EUT should be re-measured in full on the open area test site. In order to minimise the time taken for the swept measurements, a peak detector was used in conjunction with the appropriate detector IF measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. Following the initial scans, graphs were produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. Any emission within 20 dB of the limit were then measured on the open area test site, except in cases where the noise floor was within 20 dB of the limit, in these cases the highest point of the noise floor was measured.

Where an emission fell inside a restricted band, measurements were made at the appropriate test distance using a measuring receiver with a quasi peak detector for measurements below 1000 MHz and an average and peak detector for measurements above 1000 MHz. A peak detector was used for all other measurements.

For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2003 Clause 5.4.

All measurements on the open area test site were performed using broadband antennas in both vertical and horizontal polarisations.

On the open area test site, at each frequency where a signal was to be measured, the trace was maximised by rotating a turntable through 360°. The angle at which the maximum signal was observed was locked out. For frequencies below 1000 MHz the test antenna was varied in height between 1 m and 4 m in order to further maximise the target emission.

For frequencies above 1000 MHz where a horn antenna was used, height searching was performed to locate the optimal height of the horn with respect to the EUT. At this point the horn was locked off and the turntable was again rotated through 360° to maximise the target signal. It should be noted that the received signal from the EUT would diminish very quickly after it exits the beam width of the horn antenna, for this reason it may not be necessary to fully height search with the horns.

Radiated Emissions (Continued)

At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT.

Scans were performed to the upper frequency limits as stated in section 15.33

The final field strength was determined as the indicated level in dBμV plus cable loss and antenna factor.

The test equipment settings for radiated emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements <1 GHz	Final Measurements ≥1 GHz
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak / Average
Mode:	Max Hold	Not applicable	Max Hold
Bandwidth:	(120 kHz <1 GHz) (1 MHz ≥1 GHz)	120 kHz	1 MHz
Amplitude Range:	100 dB	100 dB	100 dB
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

Minimum 6 dB Bandwidth

The EUT and spectrum analyser were configured as for conducted antenna port emissions.

Prior to testing being performed a suitable RF attenuator and cables were calibrated for the required frequencies. For each frequency the calibrated level of the attenuator and cable were entered as an offset into the spectrum analyser to compensate for the losses in the measurement set up.

To determine the 6 dB bandwidth, the analyser was set to a span of greater than twice the 6 dB bandwidth and for a maximum hold scan to capture the profile of the signal. The peak level was then determined, and a reference established 6 dB below the peak level. The bandwidth was determined at the points where the 6 dB reference crossed the profile of the emission.

9.2. Transmitter 20 dB Bandwidth

The EUT and spectrum analyser was configured as for transmitter conducted antenna port emissions

The occupied bandwidth was measured using the built in occupied bandwidth function of the Rohde and Schwarz FSEB or ESIB spectrum analyser. It was set to measure the bandwidth where 99% of the signal power was contained. The analyser settings were set as per those outlined in the spectrum analyser user manual for this measurement, i.e. RBW ≥1% of occupied bandwidth. A value of ?? kHz was used.

9.3. Spectral Power Density

The EUT and spectrum analyser were configured as for conducted antenna port emissions measurements.

Prior to testing being performed a suitable RF attenuator and cables were calibrated for the required frequencies. For each frequency the calibrated level of the attenuator and cable were entered as an offset into the spectrum analyser to compensate for the losses in the measurement set up.

Prior to the measurement being taken the spectrum analyser was tuned to the fundamental frequency of the EUT.

A resolution bandwidth of 3 kHz was selected and the analyser was set to a span greater than twice the 6 dB bandwidth. The trace was max held and a reading was taken at the peak point of the trace.

9.4. Band Edge Compliance of RF Radiated Emissions

The EUT and spectrum analyser were configured as for radiated measurements.

To determine band edge compliance, the analyser resolution bandwidth was set to >= 1% of the analyser span. The video bandwidth was set to be ≥ to the resolution bandwidth. The sweep was set to auto and the detector to peak. The trace was set to max hold and a trace was produced.

Plots of the lower and upper band edge of the allocated frequency band were produced. A marker was set to the level of the highest in band emission with a limit line set to 20 dB below this. The marker was then placed on the highest out of band emission (the specification states that either the band edge level must be measured or the highest out of band emission, whichever is the greater). The plots show that the highest out of band emission complies with the -20 dBc Limit.

The above procedure was then repeated for the upper band edge except that, as the upper band edge fell on a restricted band edge (as defined in section 15.205(a)), the limit for the restricted band was applied instead of the 20 dBc limit i.e. the general limits defined in section 15.209(a).

Final measurements were performed on the worst-case configuration as described in part 15.31(i).

9.5. Effective Radiated Power (ERP)

ERP measurements were performed in accordance with the standard, against appropriate limits.

The ERP was measured with the EUT arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2003 Clause 5.4. The transmitter was fitted with an integral antenna; as such all radiated tests were performed with the unit operating into the integral antenna.

The level of the ERP was measured using a spectrum analyser.

The test antenna was positioned in the horizontal plane. The EUT was oriented in the X plane. The test antenna was then raised and lowered until a maximum peak was observed. The turntable was then rotated through 360 degrees and the maximum peak reading obtained. The height search was then repeated to take into consideration the new angular position of the turntable. The maximum reading observed was then recorded. This procedure was then repeated with the EUT oriented in the Y and Z planes. The highest reading taken in all 3 planes was recorded. The entire procedure was then repeated with the test antenna set in the vertical polarity.

Once the final amplitude (maximised) had been obtained, the EUT was substituted with a substitution antenna. For ERP measurements a dipole antenna was used. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was matched into a signal generator using a 6 dB or greater PAD. The signal generator was tuned to the EUT's frequency under test.

The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the maximum recorded EUT level was observed. The signal generator level was noted. This procedure was repeated with both test antenna and substitution antenna vertically polarised. The ERP was calculated as:-

ERP = Signal Generator Level - Cable Loss + Antenna Gain

Effective Radiated Power (ERP) (Continued)

Circumstances where the signal generator could not produce the desired power substitution was performed with the signal generator set to 0 dBm. The radiated signal was maximised as previously described. The level indicated on the measuring receiver was noted. The delta between this level and the maximum level for the EUT was calculated and also noted. The ERP of the signal generator was calculated using the above formulae. The recorded delta was added to the calculated ERP to obtain the substituted EUT ERP.

Delta (dB) = EUT – SG

Where :

EUT = spectrum analyser indicated EUT raw level

SG = spectrum analyser indicated signal generator raw level

The signal generator actual ERP is calculated as:

ERP SG= Signal Generator Level - Cable Loss + Antenna Gain

The EUT ERP is calculated as:

ERP EUT = ERP SG + Delta.

The test equipment settings for ERP measurements were as follows:

Receiver Function	Setting
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	$\geq$ Emission Bandwidth
Amplitude Range:	100 dB
Sweep Time:	Coupled

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval
A027	Horn Antenna	Eaton	9188-2	301	06 October 2003	36
A031	2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	557	06 October 2003	36
A1037	Chase Bilog Antenna	Chase EMC Ltd	CBL6112 B	2413	03.October.05	12
A1534	Preamplifier 1-26.5 GHz	Hewlett Packard	8449B OPT H02	3008A0040 5	29 July 2005	12
A254	WG 14 Microwave Horn	Flann Microwave	14240-20	139	06 October 2003	36
A255	WG 16 Microwave Horn	Flann Microwave	16240-20	519	06 October 2003	36
A259	Bilog Antenna	Chase	CBL6111	1513	03 March 2006	12
A392	3 dB attenuator (9)	Suhner	6803.17.B	None	16 June 2005	12
A428	WG 12 horn	Flann	12240-20	134	06 October 2003	36
A436	WG 20 horn	Flann	20240-20	330	19 June 2003	36
M003	Spectrum Monitor	Rohde & Schwarz	EZM	883 580/008	Not Applicable	-
M023	ESVP Receiver	Rohde & Schwarz	ESVP	872 991/027	10 April 2006	12
M1242	FSEM30 Spectrum Analyser	Rohde & Schwarz, Inc.	FSEM30	845986_02 2	22 September 2005	12
M1267	Thermal Power Sensor	Rohde and Schwarz	NRV-Z52	100155	21 February 2006	12
M1269	True RMS Multimeter	Fluke	179	90250210	16 February 2006	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	07 August 2005	12
M505	Analyser Display Unit	Rohde & Schwarz	ESAI-D	825316/01 0	17 March 2006	12
M506	RF unit	Rohde & Schwarz	ESBI-RF	827060/00 4	17 March 2006	12
S0520	DC Power Supply	GW instek	GPC-3030	E835141	Cal before use	-
S201	Site 1	RFI	1	-	15 December 2005	12
S202	Site 2	RFI	2	S202-15011990	Cal before use	-

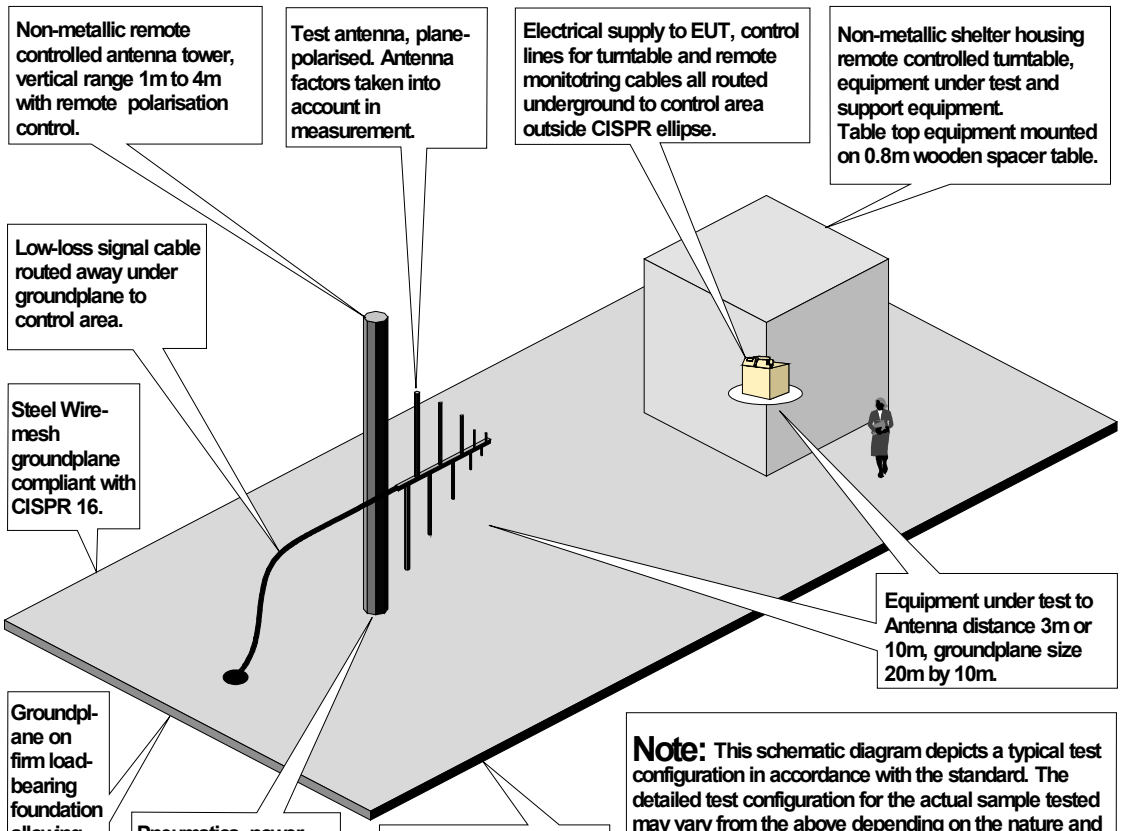
NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. Test Configuration Drawings

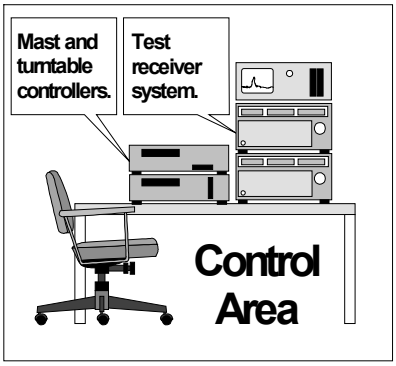
This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\48015JD04\EMIRAD	Test configuration for measurement of radiated emissions.

DRG\48015JD04\EMIRAD



Note: This schematic diagram depicts a typical test configuration in accordance with the standard. The detailed test configuration for the actual sample tested may vary from the above depending on the nature and operation of the EUT.
The test site used by RFI is nominally at ground level.
All electrical cables run underground.
All other dimensions in accordance with the standard.



Test Configuration For Radiated Emissions Measurements

Reflection-free area: >60m by 52m
(CISPR ellipse)
Groundplane Earthed
Control room outside CISPR ellipse

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