

# FCC TEST REPORT

Company Name: Wavetrend Technologies Limited

Product: Tag - Asset - Small / TG801

|                      |                                                                       |
|----------------------|-----------------------------------------------------------------------|
| Test Report Number   | ETS/M1185/FCC                                                         |
| Issue Date:          | 21 March 2007                                                         |
| Applicable Standards | FCC Part 15 Subpart C: 2004 Section 15.231<br>(Intentional Radiators) |

## Revision Record

| Revision | Date       | Details         |
|----------|------------|-----------------|
| 1.0      | 21.03.2007 | Issue Version 1 |
|          |            |                 |

NOTE: This Test report consists of 44 pages. Results relate only to the items tested.  
The report shall not be reproduced except in full, without the written approval  
of Electromagnetic Testing Services Limited.

## **REPORT ON EMC MEASUREMENT CARRIED OUT ON AN TAG - ASSET - SMALL / TG801**

Produced on behalf of

Wavetrend Technologies Limited  
Parkshot House, 5 Kew Road, Richmond,  
Surrey, TW9 2PR, UK

By

Electromagnetic Testing Services Limited  
Pratts Fields, Lubberhedges Lane  
Stebbing, Dunmow, Essex, CM6 3BT, England, U K

Registered in England, No. 269 6255

Registered Office: Pratts Fields, Lubberhedges Lane, Stebbing, Dunmow, Essex, CM6 3BT, England, U K

Tel. +44 (0) 1371 856061  
E-mail: [info@etsemc.co.uk](mailto:info@etsemc.co.uk)

Fax: +44 (0) 1371 856144  
Web Site: [www.etsemc.co.uk](http://www.etsemc.co.uk)

Quality Control in the testing laboratory is implemented as per ISO/IEC 17025 : 2005-05-15  
"General requirements for the competence of testing and calibration laboratories".

This laboratory is:

- On file with and has being accepted by the F.C.C. (Federal Communications Commission) as per the requirements of section 2.948 of the Code Of Federal Regulations CFR 47 for Parts 15 & 18 under Registration Number 90580
- Registered under the Rail Industry Supplier Qualification and Registration Scheme for EMC Services, Section 780112
- Approved by the Vehicle Certification Agency for testing Automotive ESA Devices
- International associate of Radio Technical Commission for Aeronautics (RTCA)

Distribution:

Copy No. 01      Wavetrend Technologies Limited  
02      Electromagnetic Testing Services Limited

|                             |                                                                                                                                                                                                                                                                                                                           |       |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Tested By:                  | Bob Julier / Rob Harry / George Vassila<br>Test Engineer<br>   | Date: |
| Approved and Authorised By: | George Vassila<br>Technical Director<br>                                                                                                                                                                                              | Date: |



## FEDERAL COMMUNICATIONS COMMISSION (F.C.C.) STATEMENT OF CONFORMITY

Name: Wavetrend Technologies Limited

Address: Parkshot House, 5 Kew Road, Richmond, Surrey, TW9 2PR, UK

|                        |                                |
|------------------------|--------------------------------|
| Product Name:          | Tag - Asset - Small / TG801    |
| Product Type / Model:  | Active RFID Tag, TG801         |
| FCC ID                 | O6XTG801                       |
| Batch / Serial Number: | 4278612-322649, 4278612-322632 |
| Item Number (s):       | One                            |

This equipment has been tested and found to comply with the limits and requirements of digital device, pursuant to part 15.231 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

TEST REPORT NO: ETS/M1185/FCC

ISSUE DATE: 21 MARCH 2007

PAGE NUMBER: 3

|      |                                                                                                                                                                                                                                       | Page |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1.0  | Contents                                                                                                                                                                                                                              | 4    |
| 2.0  | Summary                                                                                                                                                                                                                               | 5    |
| 3.0  | Introduction                                                                                                                                                                                                                          | 6    |
| 4.0  | ID Label                                                                                                                                                                                                                              | 7    |
| 5.0  | Photographs<br>External<br>Internal<br>Test Set-Up                                                                                                                                                                                    | 8    |
| 6.0  | EUT Test Configuration                                                                                                                                                                                                                | 11   |
| 7.0  | User Manual                                                                                                                                                                                                                           | 12   |
| 8.0  | Equipment Under Test (EUT)<br>Identification of Apparatus<br>Description of Apparatus<br>Intended Use of Apparatus<br>Location of Apparatus<br>Description of Variants<br>Declared EUT Configuration<br>Declared Suppression Measures | 13   |
| 9.0  | Test Documentation - Emissions                                                                                                                                                                                                        | 16   |
| 10.0 | Test Results - Emissions<br>Radiated Emissions<br>Measurements of RF Frequency and Levels<br>Occupied Bandwidth<br>Transmitter Activation / Deactivation Time                                                                         | 17   |
| 11.0 | Conclusions                                                                                                                                                                                                                           | 32   |
| 12.0 | Appendix                                                                                                                                                                                                                              | 33   |

Electromagnetic radiated emissions and RF measurements were carried out on a Tag - Asset - Small / TG801, to assess compliance with the requirements of FCC Part 15 Subpart C:2004 Section 15.231 (Intentional Radiators).

The results obtained indicate compliance with the above standard requirements as follows:

| Test Type                                           | Standard / Specification Reference   | Result   | Comment                                            |
|-----------------------------------------------------|--------------------------------------|----------|----------------------------------------------------|
| Electric Field Radiated Emissions<br>30 MHz - 5 GHz | C.F.R. 47 F.C.C. Part 15.231(e):2004 | Complied | Negligible levels                                  |
| Measurements of RF Frequency and Levels             | C.F.R. 47 F.C.C. Part 15.231(e):2004 | Complied | Minimum compliance margin of -6.45 dBuV/m          |
| Occupied Bandwidth                                  | C.F.R. 47 F.C.C. Part 15.231(e):2004 | Complied | Minimum compliance margin of 844.93 kHz            |
| Transmitter Activation / Deactivation Time          | C.F.R. 47 F.C.C. Part 15.231(e):2004 | Complied | Activation time 7.82 ms<br>Repetitive rate 15.83 s |

Electromagnetic Compatibility and RF measurements were carried out on an Tag - Asset - Small / TG801, to assess compliance with the requirements of FCC Part 15 Subpart C:2004 Section 15.231 (Intentional Radiators). All tests were carried out for the purposes of certification.

The Tag - Asset - Small / TG801 is an Active RFID Tag which is used for asset tracking.

The model tested was a L-TG801.

The test results in this report relate to the test configuration illustrated in section 4. It consists of a single TG801 system powered from an internal 3V battery and connected as shown on the diagram in Section 6.

The EUT was received on 02 March 2007. All tests were carried out between 02 and 08 March 2007, at the Electromagnetic Testing Services Limited EMC Facilities, Stebbing, Essex, England. The work was carried out under ETS Test Number 03A07M053. All tests were carried out for the purposes of certification.

No representative from Wavetrend Technologies Limited was present during testing.

| Environmental Test Conditions: |               |
|--------------------------------|---------------|
| Ambient Temperature:           | 6 - 12°C      |
| EUT Temperature:               | 19 - 29°C     |
| Relative Humidity:             | 41 - 69% RH   |
| Atmospheric Pressure:          | 978 - 1008 mB |
| Weather Conditions:            | Variable      |

#### Operating Modes

The EUT was tested in the following operating modes as per the customers instructions:

- A) Normal Mode used for time domain measurements ( 3.0 milliseconds continuous transmit in a 15 second cycle).
- B) Forced Transmit Mode for spurious emissions and carrier power measurements ( 3.0 milliseconds continuous transmit in a 1.4 second cycle).

#### Operating Conditions

The EUT was tested under normal laboratory conditions.

Wavetrend  
Technologies  
Limited

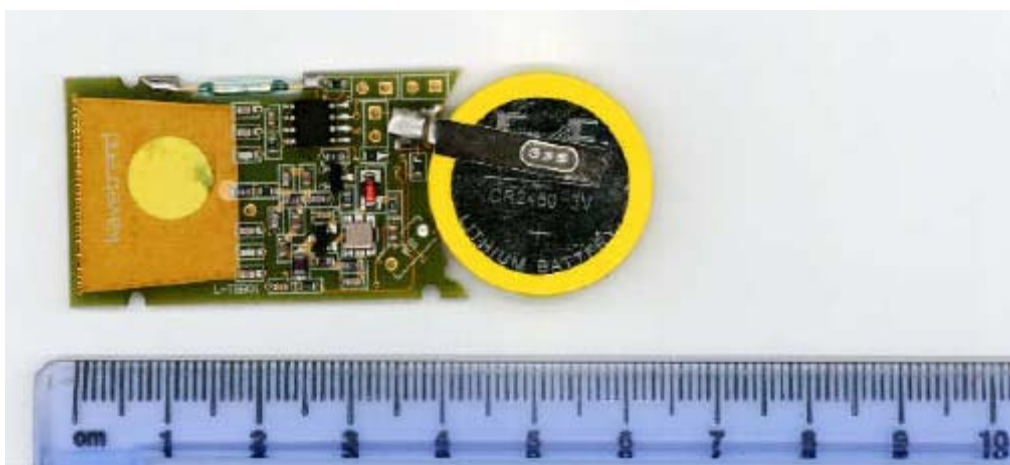
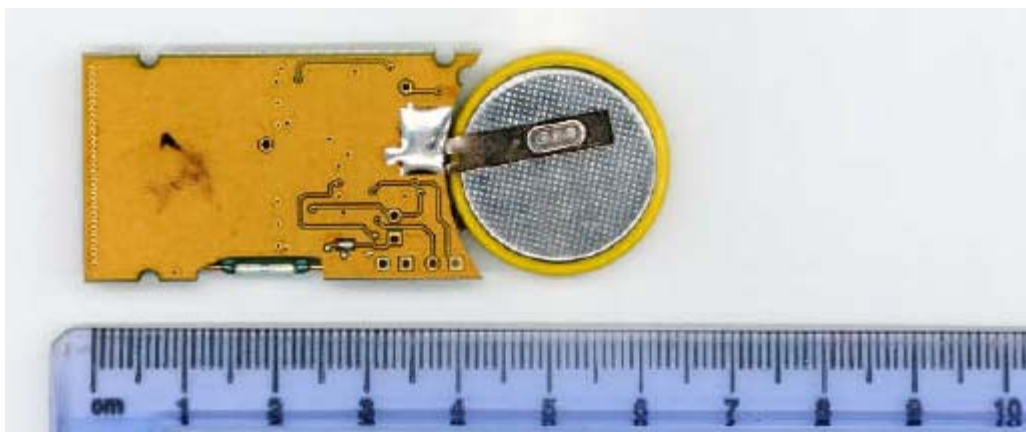
Tag - Asset -Small /  
TG801

**FCC** Tested to Comply  
with FCC Standards

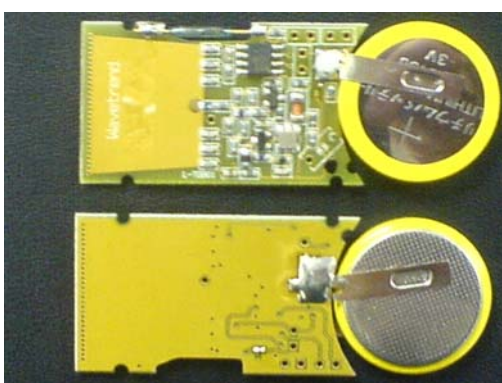
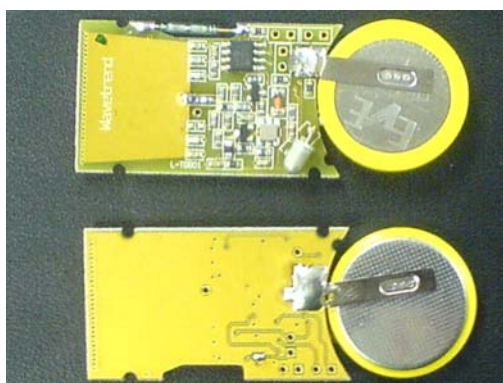
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions. (1) this device must not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC ID:O6XTG801





#### Variants



ELECTROMAGNETIC TESTING SERVICES LIMITED

EUT: TAG - ASSET - SMALL / TG801

COMPANY: WAVETREND TECHNOLOGIES LIMITED

TITLE OF SECTION: TEST SET-UP PHOTOS

TEST REPORT NO: ETS/M1185/FCC

PAGE: 10 OF 44

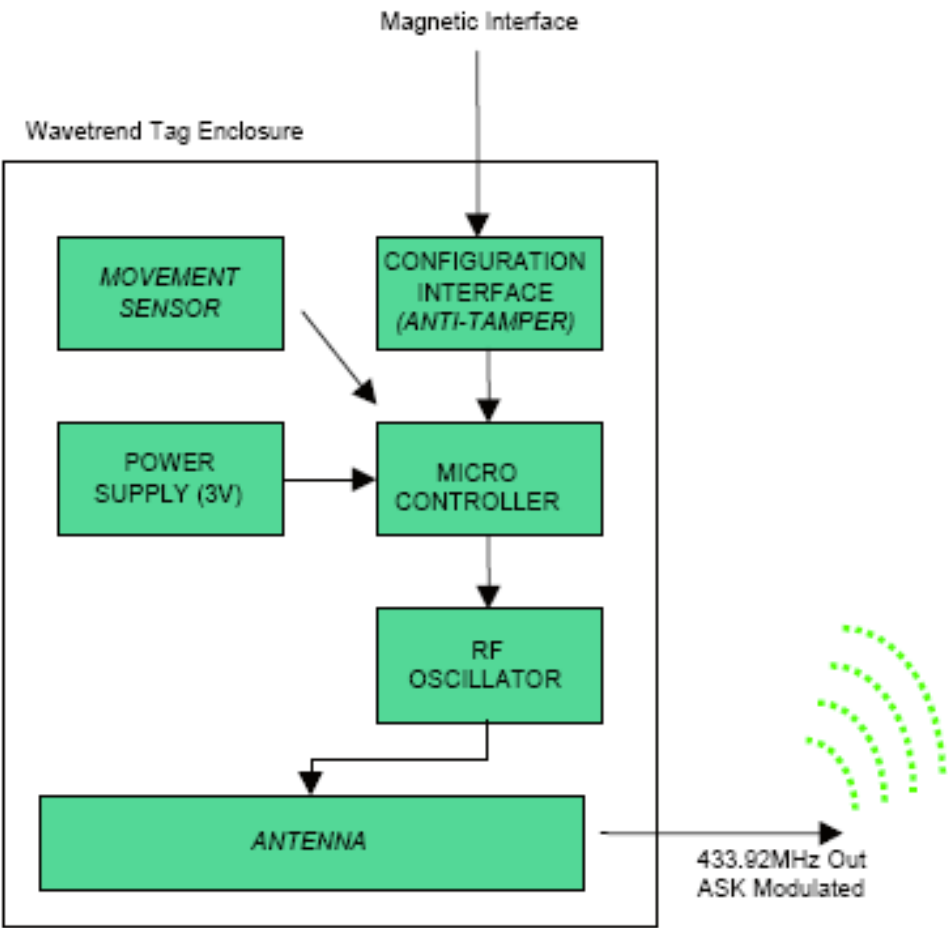
ISSUE DATE: 21 MARCH 2007

SECTION: 5.3

---



Block Diagram of the Wavetrend Tag:



LIST OF CABLES

| Ref. | Cable | Type | Length |
|------|-------|------|--------|
| 1    | None  | -    | -      |
| 2    |       |      |        |
| 3    |       |      |        |
| 4    |       |      |        |

ELECTROMAGNETIC TESTING SERVICES LIMITED

TEST REPORT NO: ETS/M1185/FCC

EUT: TAG - ASSET - SMALL / TG801

PAGE: 12 OF 44

COMPANY: WAVETREND TECHNOLOGIES LIMITED

ISSUE DATE: 21 MARCH 2007

TITLE OF SECTION: **USER MANUAL**

SECTION: 7.0

---

For User Manual please refer to Appendix F.

**8.1 Identification of Equipment**

|                                     |                                                                                                                        |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Nomenclature / Product Type         | : Active RFID Tag                                                                                                      |
| Brand Name                          | : Tag - Asset - Small                                                                                                  |
| Model Number                        | : L-TG801                                                                                                              |
| Serial Number                       | : 4278612-322649, 4278612-322632                                                                                       |
| Power Requirements                  | : 3V 550mA                                                                                                             |
| Manufacturer Name                   | : Wavetrend Technologies (Pty) Limited                                                                                 |
| Manufacturer Address                | : Wavetrend House<br>Building 816/3<br>Hammets Crossing Office Park<br>Selborne Road<br>Fourways, 2021<br>South Africa |
| FCC ID Number                       | : O6XTG801                                                                                                             |
| Type Of Unit:                       | Transmitter                                                                                                            |
| Dimensions:                         | 90 mm x 30mm x 8.6 mm                                                                                                  |
| Weight:                             | 18 g                                                                                                                   |
| Operating Frequency:                | 433.92 MHz                                                                                                             |
| Highest Operating / Used Frequency: | 433.92 MHz / $\pm$ 150 KHz                                                                                             |
| Duty Cycle:                         | 15s                                                                                                                    |
| Transmit Output Power               | 2089uW (micro watts)                                                                                                   |
| Photograph of EUT                   |                                                                                                                        |



**8.2 Description of Apparatus:** Active RFID for asset tracking.

**8.3 Intended Use of Apparatus:** Asset tracking.

**8.4 Physical Location of Installation:** Attach to an asset (e.g. laptop).

**8.5 Description of Variants:** L-TG801, L-TG801—MS, L-TG801-WM, L-TG801-WM-MS, W-TG801, W-TG801-MS, W-TG801-WM, W-TG801-WM-MS  
See Photographs, Page 9

**8.6 Declared EUT Configuration:**

| Item | Description of board/sub assemblies | Part Number | Revision No. |
|------|-------------------------------------|-------------|--------------|
| 1.   | PCB assemble                        | 10801-0100  | Issue 1      |
| 2.   | Housing top                         | 10801-0200  | Issue 1      |
| 3.   | Housing bottom                      | 10801-0300  | Issue 1      |

**8.7 Declared Suppression Measures:**

| Item | Description of board/sub assemblies | Part Number |
|------|-------------------------------------|-------------|
|      | None                                |             |

I certify that sections 8.6 and 8.7 are correct and describes the equipment tested and will be manufactured as stated.

Signature \_\_\_\_\_

Title \_\_\_\_\_

Tests were performed in accordance with the test specification, methods and procedures of the following standards:

|   |                                            |                                                                                                                                                                         |
|---|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| X | FCC, Part 15 Subpart C:2004 section 15.231 | Code of Federal Regulations, Part 15 Subpart C:2004 (Intentional Radiators), Section 15.231(e) - Periodic operation within the Band 40.66 to 40.70 MHz and above 70 MHz |
| X | ANSI C63.2                                 | American National Standard for Instrumentation– Electromagnetic noise and field strength.                                                                               |
| X | ANSI C63.4                                 | 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.    |
| X | CISPR 16-1                                 | Specification for radio disturbance and immunity measuring apparatus and methods. Part1. Radio disturbance and immunity measuring apparatus.                            |

Note:

The Electromagnetic Testing Services Ltd Facilities used for these tests are on file with and have being accepted by the F.C.C. (Federal Communications Commission) as per the requirements of section 2.948 of the Code Of Federal Regulations CFR 47:2004 for Parts 15 & 18 under Registration Number 90580

**10.1 Electric Field Radiated Emissions Results and Discussions**

| Plot No. | File Name | Frequency           | Polarisation | Detector   |
|----------|-----------|---------------------|--------------|------------|
| Plot 1a  | M053RV1L  | 30 MHz to 300 MHz   | Vertical     | Quasi Peak |
| Plot 1b  | M053RV1U  | 300 MHz to 1000 MHz | Vertical     | Quasi Peak |
| Plot 1c  | M053RVG1  | 1.0 GHz to 5 GHz    | Vertical     | Peak       |
| Plot 1d  | M053RVG2  | 1.0 GHz to 5 GHz    | Vertical     | Average    |
|          |           |                     |              |            |
| Plot 1e  | M053RH1L  | 30 MHz to 300 MHz   | Horizontal   | Quasi Peak |
| Plot 1f  | M053RH1U  | 300 MHz to 1000 MHz | Horizontal   | Quasi Peak |
| Plot 1g  | M053RHG1  | 1.0 GHz to 5 GHz    | Horizontal   | Peak       |
| Plot 1h  | M053RHG2  | 1.0 GHz to 5 GHz    | Horizontal   | Average    |

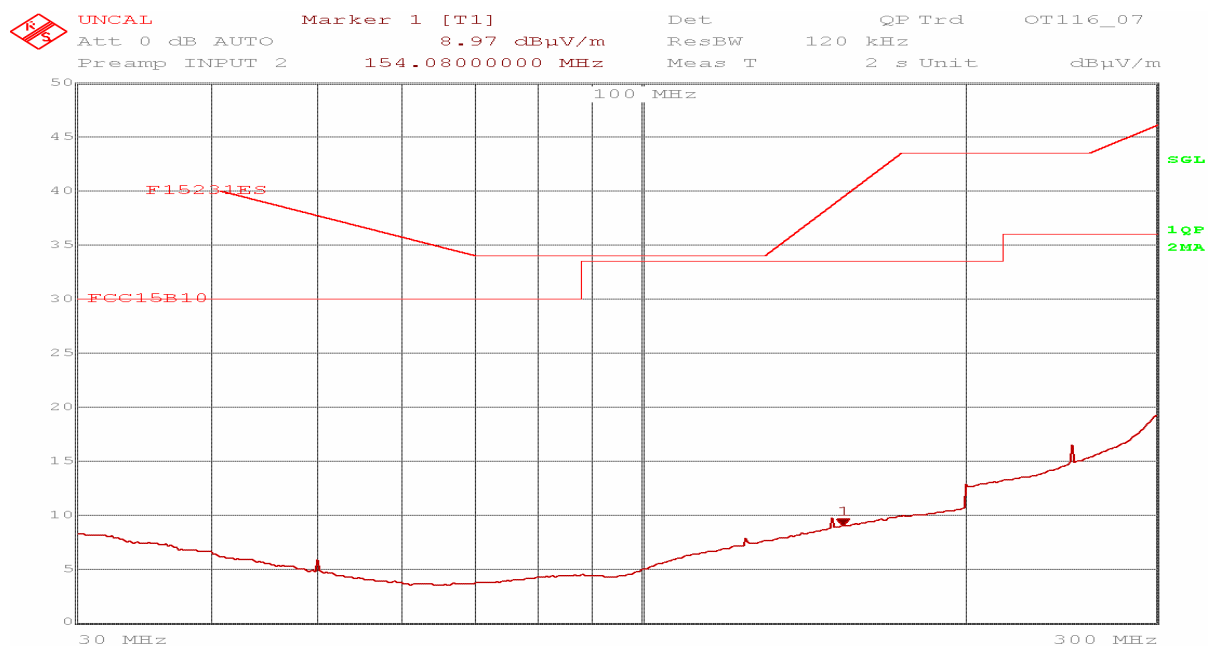
On all of the result plots the red trace represents the emissions from the equipment under test (EUT). The FCC Part 15.231 Section E, Fundamental Limit Line and Spurious Limit Line are also illustrated.

As it can be seen from plots 1a to 1h, all the spurious emission levels from the EUT were below the class B limit line with negligible levels.

The EUT achieved compliance as per case A, where the measured results are below the specified limit by a margin greater than the measurement uncertainty (see appendix A).

F15231EF - FCC Part 15.231 Section E, Fundamental Limit Line  
F15231ES - FCC Part 15.231 Section E, Spurious Limit Line  
FCC15B10 - FCC Part 15, Class B Limit Line

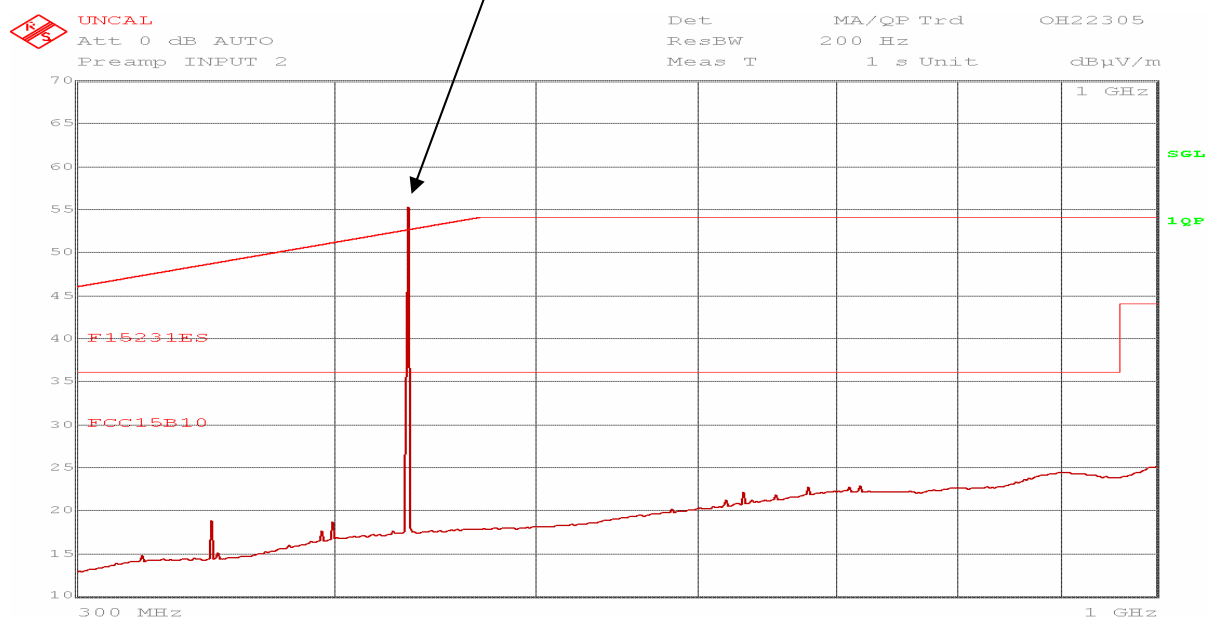
Plot 1a - M053RV1L



Date: 20.MAR.2007 17:39:12

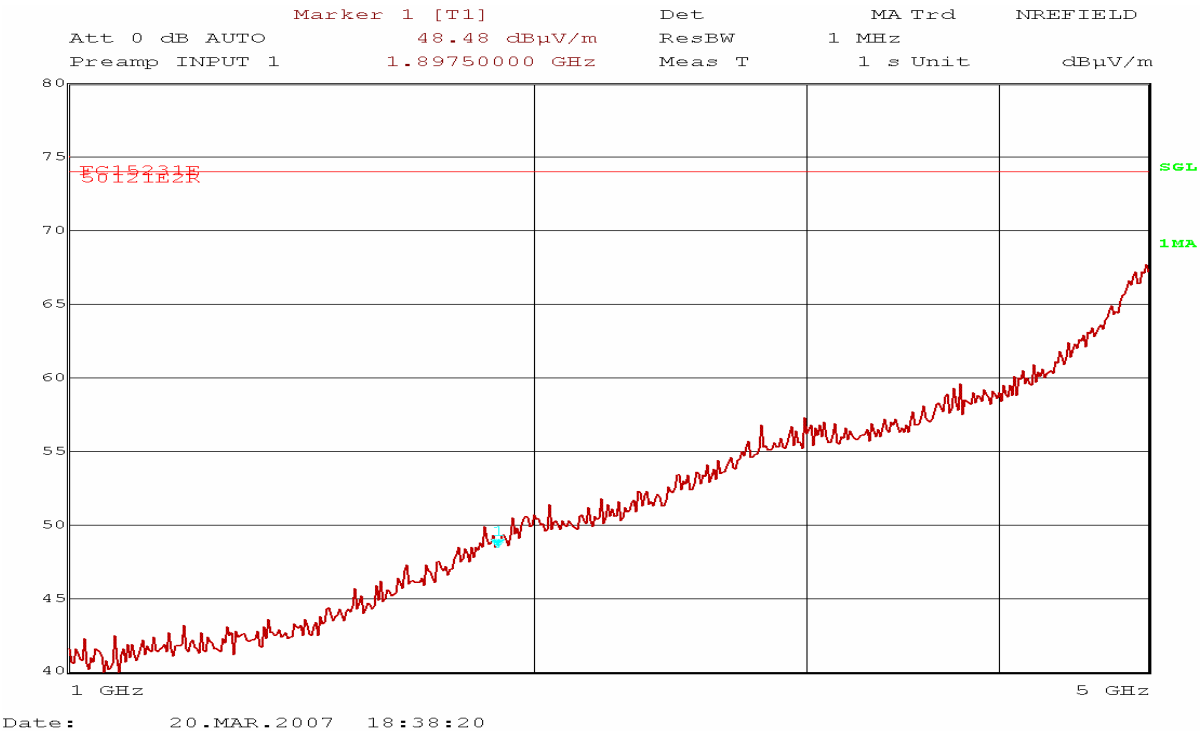
Plot 1b - M053RV1U

Tag Intentional Transmission

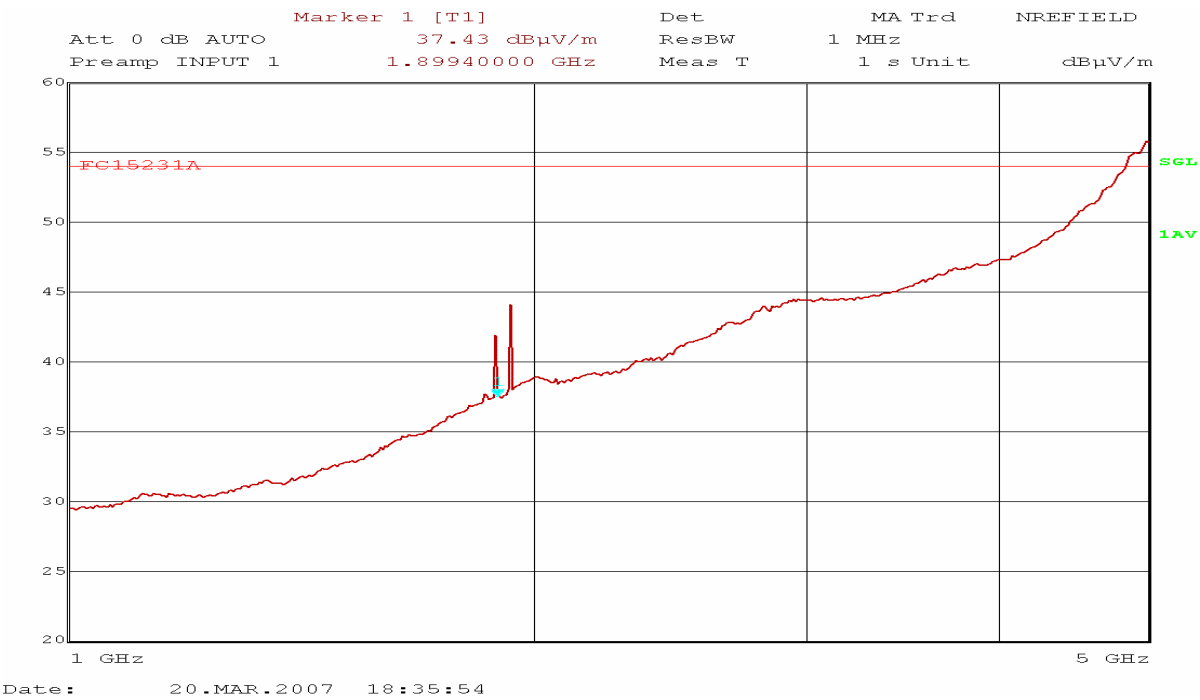


Date: 20.MAR.2007 18:07:52

Plot 1c - M053RVG1



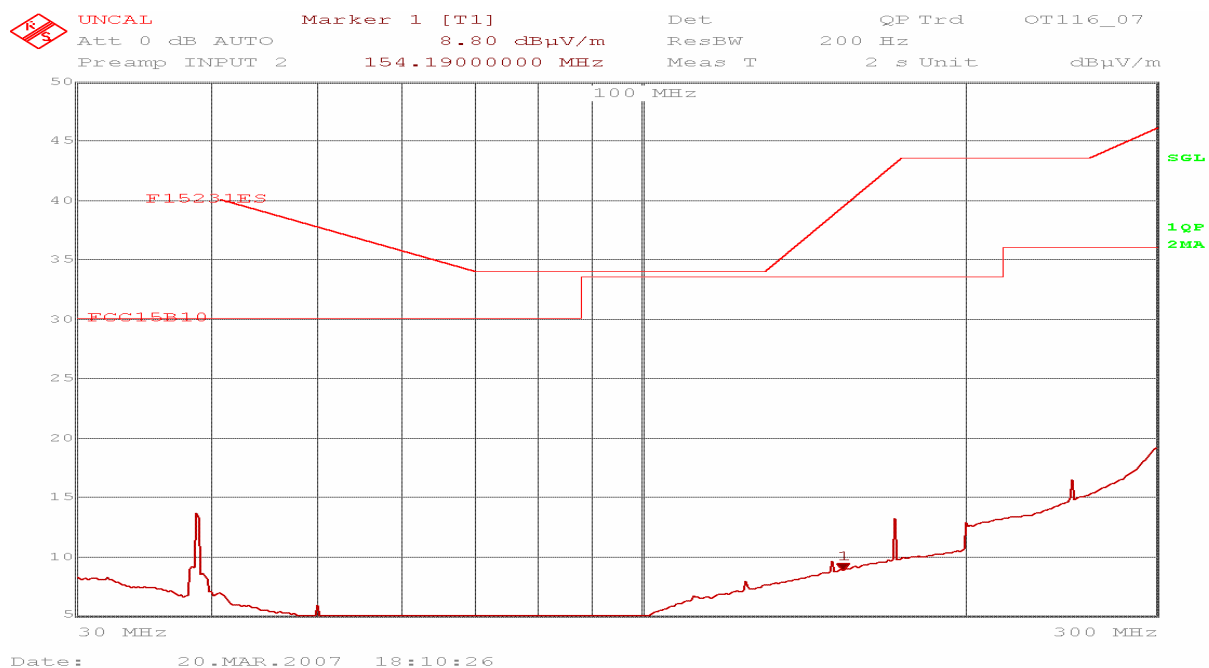
Plot 1d - M053RVG2



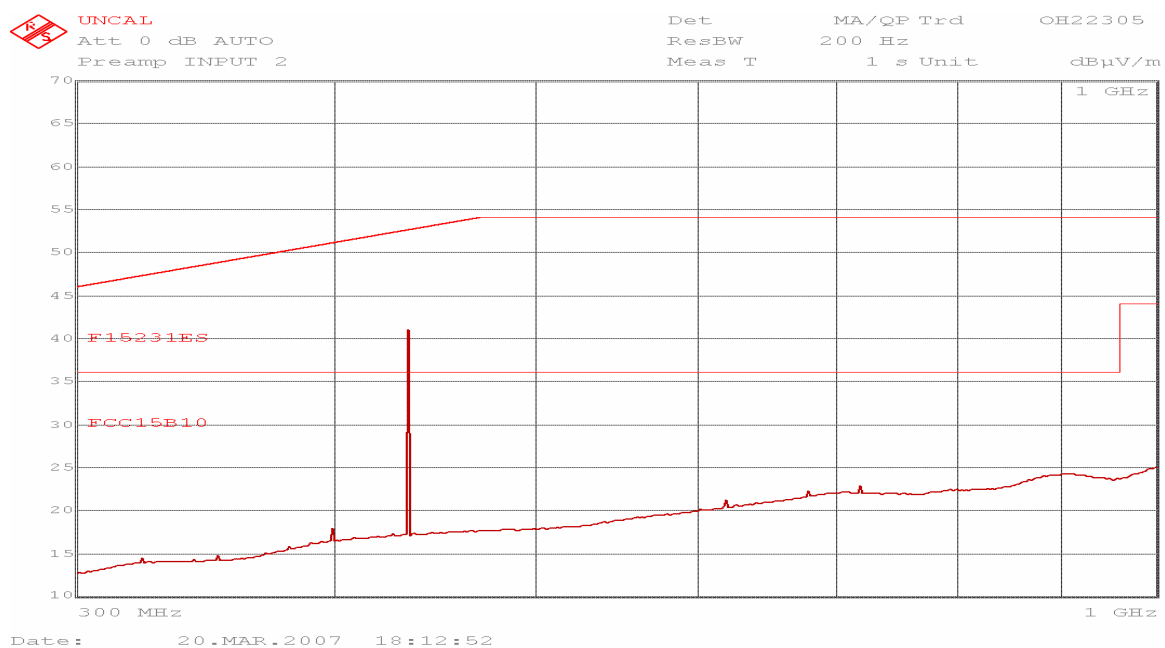
### Maximised Table of Results - Vertical

| Frequency | Level | Delta | Limit |
|-----------|-------|-------|-------|
| 433.87MHz | 55.22 | 19.22 | 36.00 |

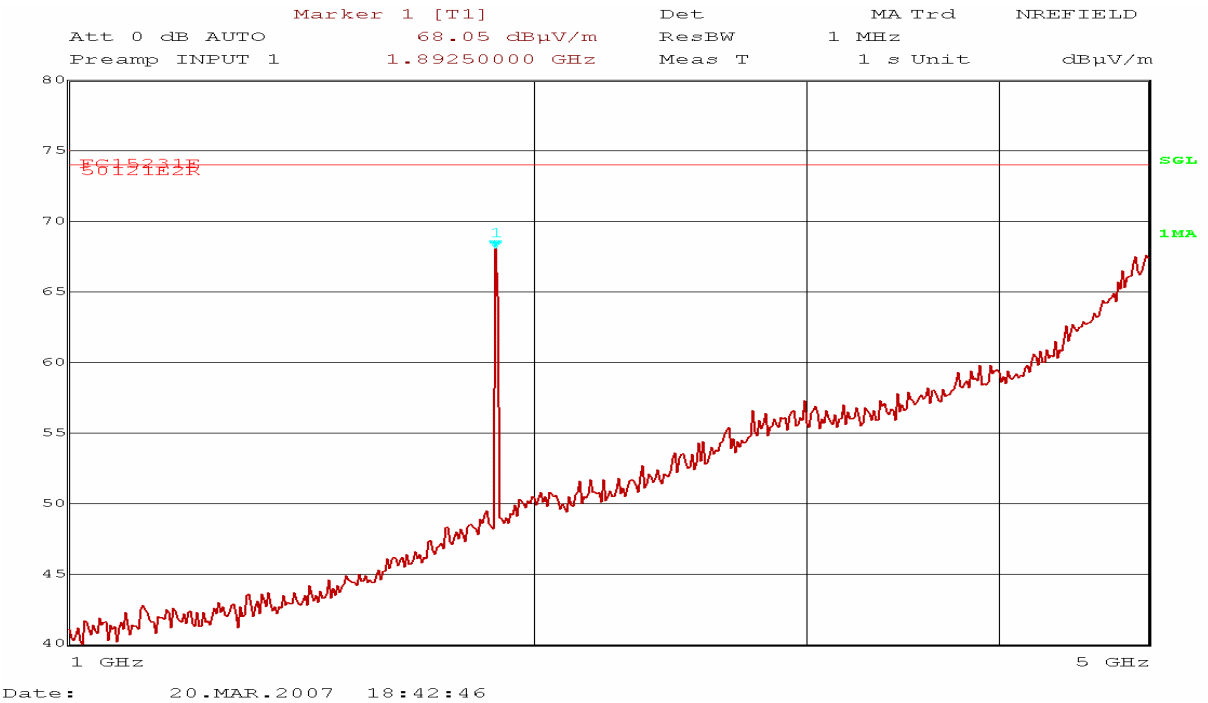
Plot 1e - M053RH1L



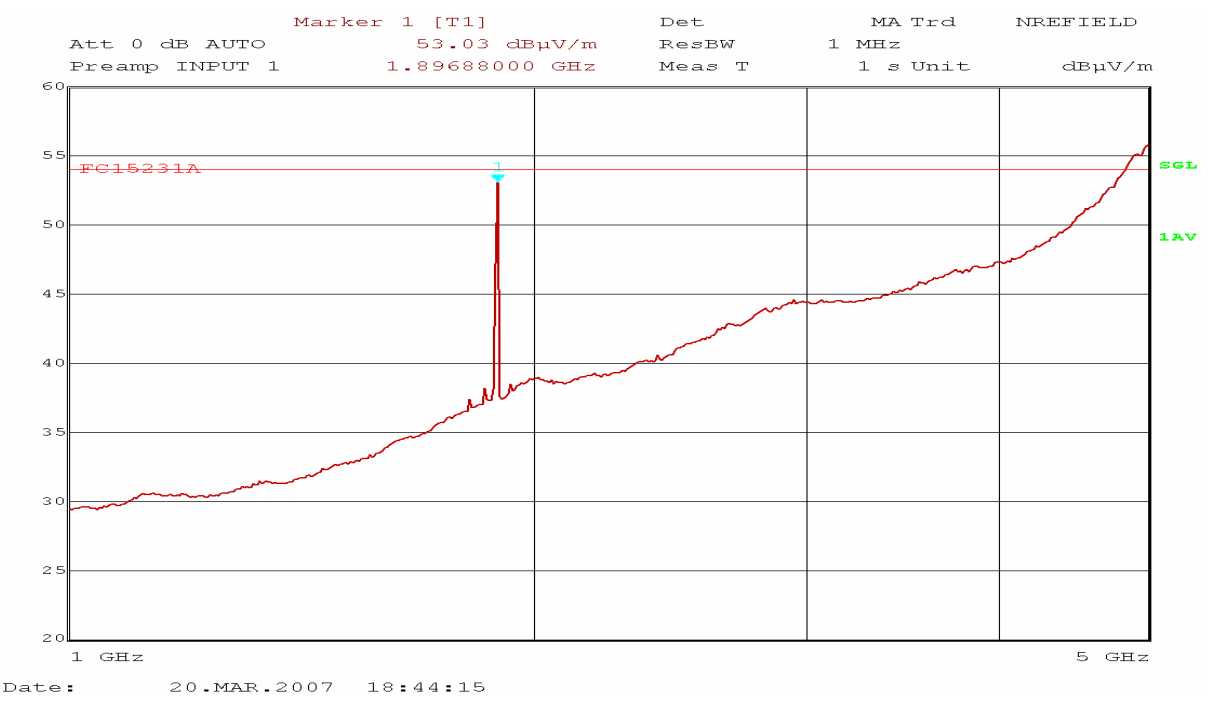
Plot 1f - M053RH1U



Plot 1g - M053RHG1



Plot 1h - M053RHG2





## 10.2 Measurements of RF Frequency and Levels Results and Discussions

| Plot No. | Test File | Frequency (MHz) | Unit   | Polarisation | Level (dBuV/m) | Limit (dBuV/m) | Compliance Margin (dBuV/m) |
|----------|-----------|-----------------|--------|--------------|----------------|----------------|----------------------------|
| Plot 2a  | M053V3RF  | 434.00 MHz      | 322649 | Vertical     | 66.05          | 72.49          | -6.45                      |
| Plot 2b  | M053V3RF  | 433.94 MHz      | 322649 | Horizontal   | 46.53          | 72.49          | -25.97                     |

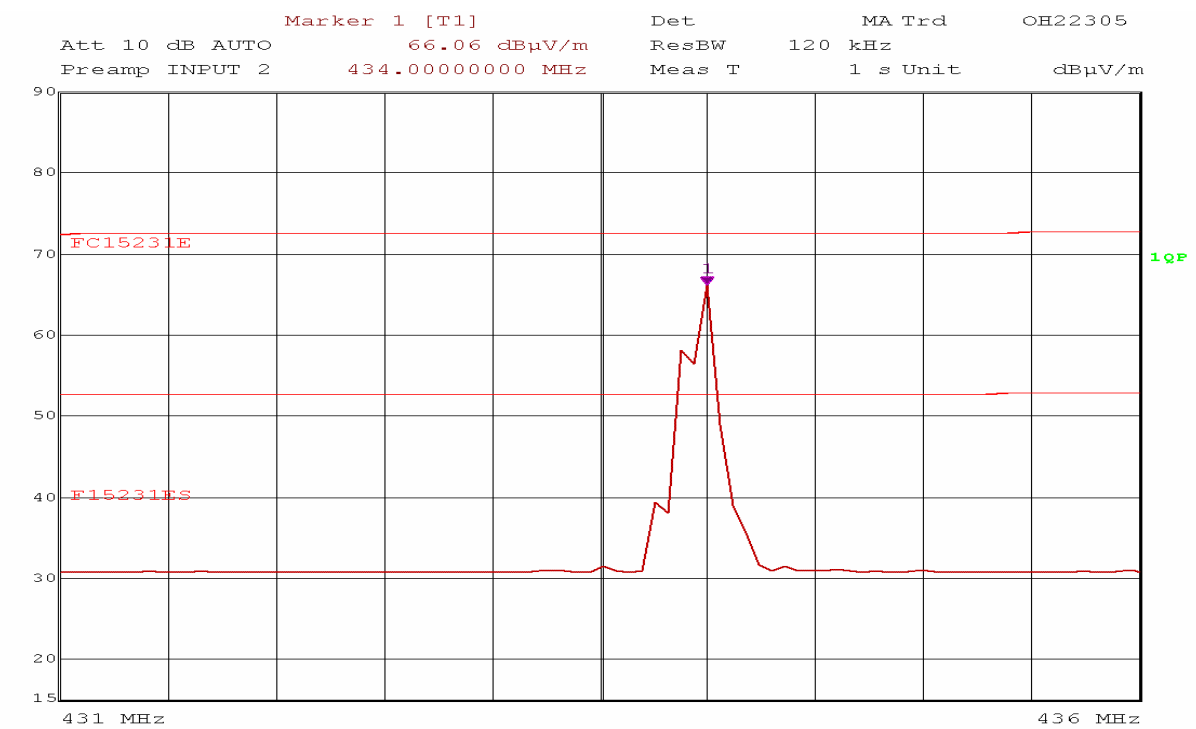
As it can be seen from plots 2a to 2b, the measured RF frequency and level by the intentional transmitted frequency from the EUT was within the specified limits of the C.F.R. 47 F.C.C. Part 15.231(e):2004.

The narrowest compliance margin in the vertical polarisation was xxdBuV/m.

The narrowest compliance margin in the horizontal polarisation was xx dBuV/m.

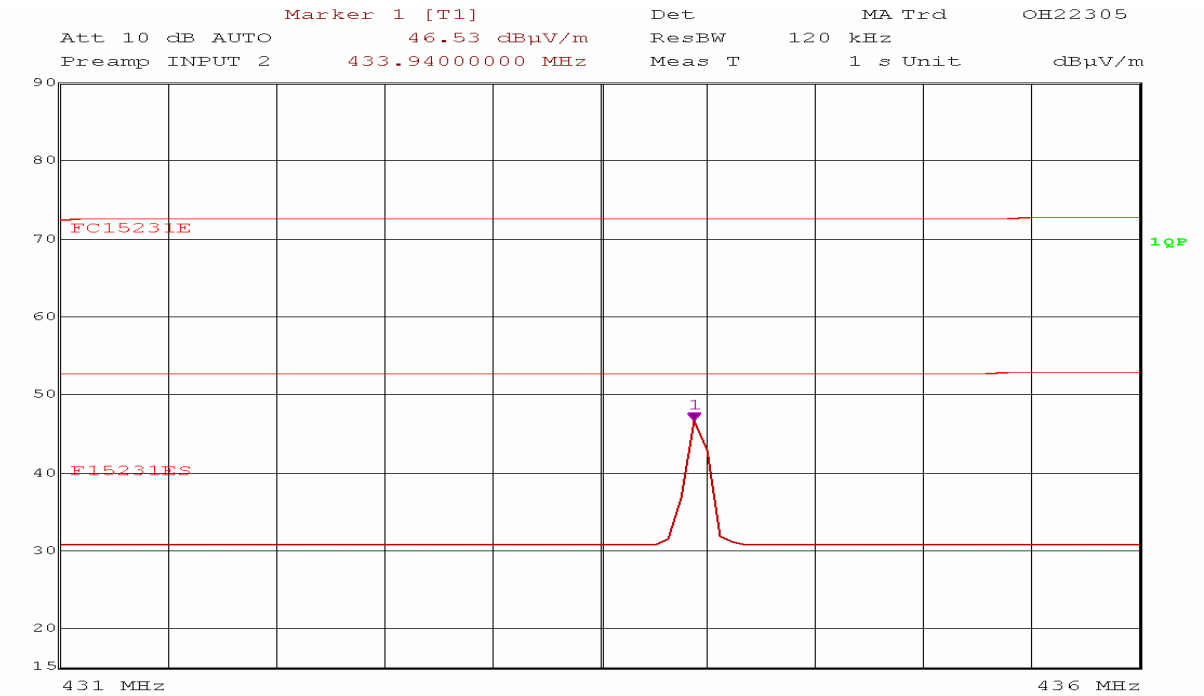
The EUT achieved compliance as per case B, where the measured results are below the specified limit by a margin less than the measurement uncertainty (see appendix A).

Plot 2a - M053V3RF



| Frequency | Level | Delta | Limit |
|-----------|-------|-------|-------|
| 434MHz    | 66.06 | -6.45 | 72.50 |

Plot 2b - M053H3RF



| Frequency | Level | Delta  | Limit |
|-----------|-------|--------|-------|
| 433.94MHz | 46.53 | -25.97 | 72.50 |

### 10.3 Occupied Bandwidth Results and Discussions

| Plot No. | Test File | Frequency (MHz) | Polarisation | Receiver Resolution BW (kHz) | 20 dB BW (kHz) | 0.25% Centre Frequency Limit (kHz) | Compliance Margin (kHz) |
|----------|-----------|-----------------|--------------|------------------------------|----------------|------------------------------------|-------------------------|
| Plot 3a  | M053V1BW  | 433.99          | Vertical     | 120                          | 180            | 1084.97                            | 869.97                  |
| Plot 3b  | M053H1BW  | 433.97          | Horizontal   | 120                          | 240            | 1084.93                            | 844.93                  |
| Plot 3c  | M053V2BW  | 433.965         | Vertical     | 10                           | 85             | 1084.92                            | 999.92                  |
| Plot 3d  | M053H2BW  | 433.965         | Horizontal   | 10                           | 85             | 1084.92                            | 999.92                  |

As it can be seen from plots 3a to 3d, the occupied bandwidth by the intentional transmitted frequency from the EUT was within the specified limits of the C.F.R. 47 F.C.C. Part 15.231(e):2004.

The narrowest compliance margin with a measurement resolution bandwidth of 120 kHz was 844.93 kHz.

The narrowest compliance margin with a measurement resolution bandwidth of 10 kHz was 999.92.

The EUT achieved compliance as per case A, where the measured results are below the specified limit by a margin greater than the measurement uncertainty (see appendix A).

EUT: TAG - ASSET - SMALL / TG801

PAGE:

28 OF 44

COMPANY: WAVETREND TECHNOLOGIES LIMITED

ISSUE DATE:

21 MARCH 2007

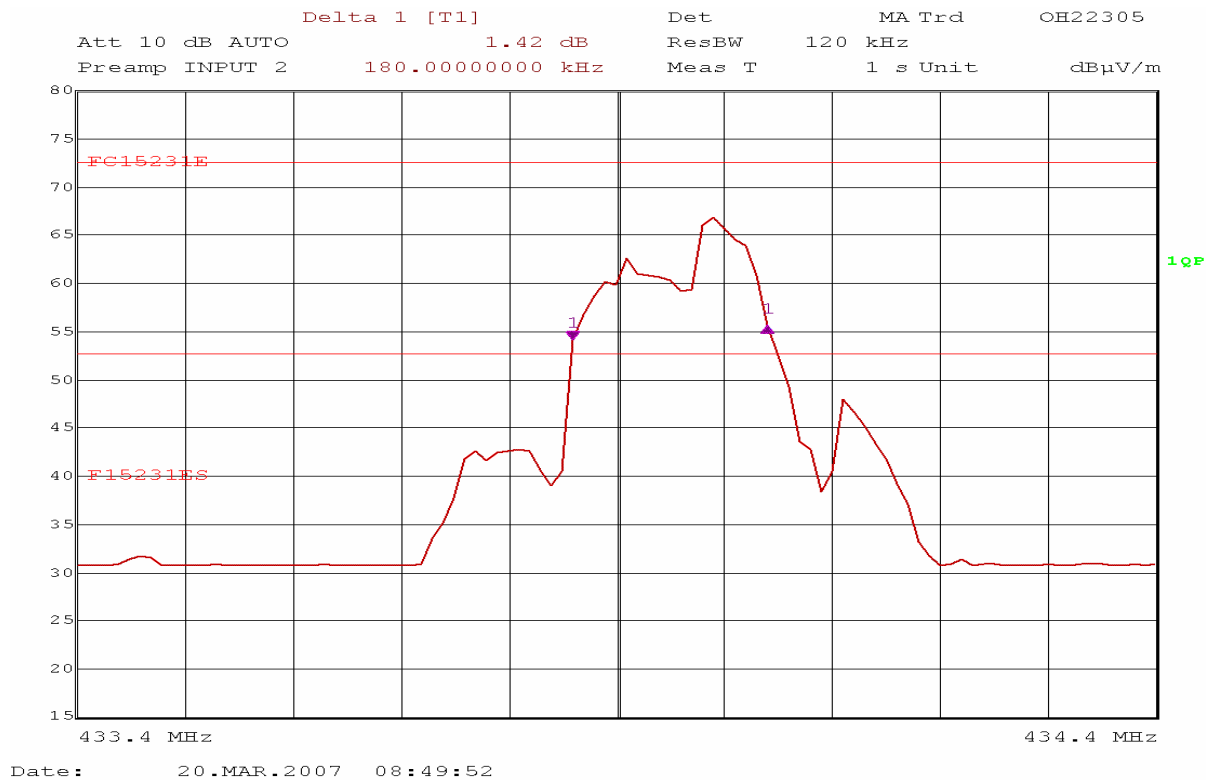
TITLE OF SECTION:

TEST RESULTS - EMISSIONS

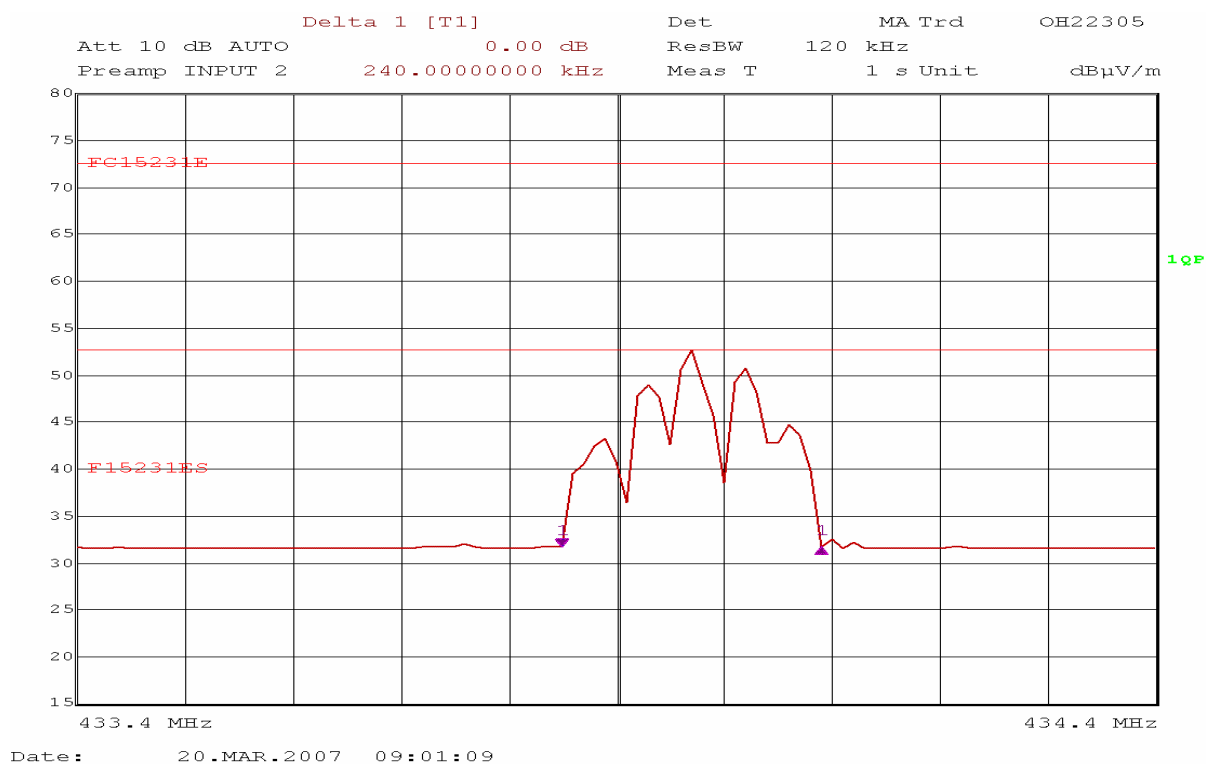
SECTION:

10.0

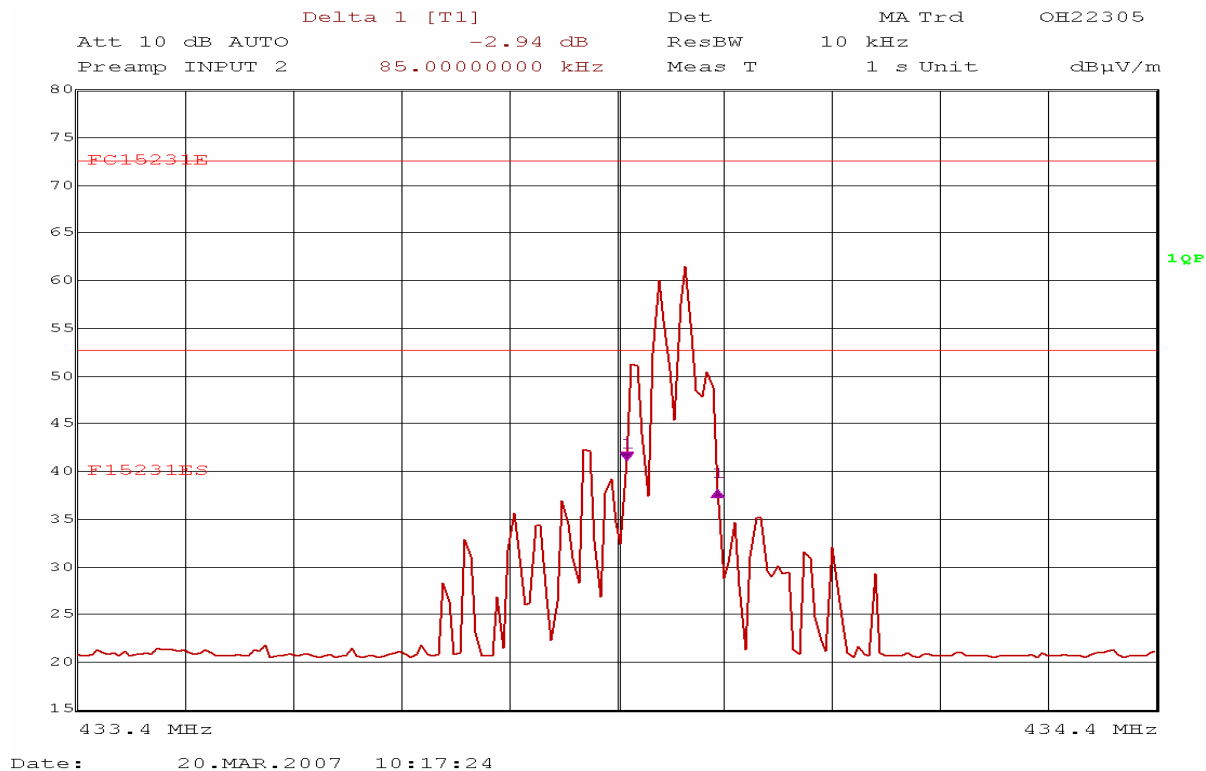
Plot 3a - M053V1BW



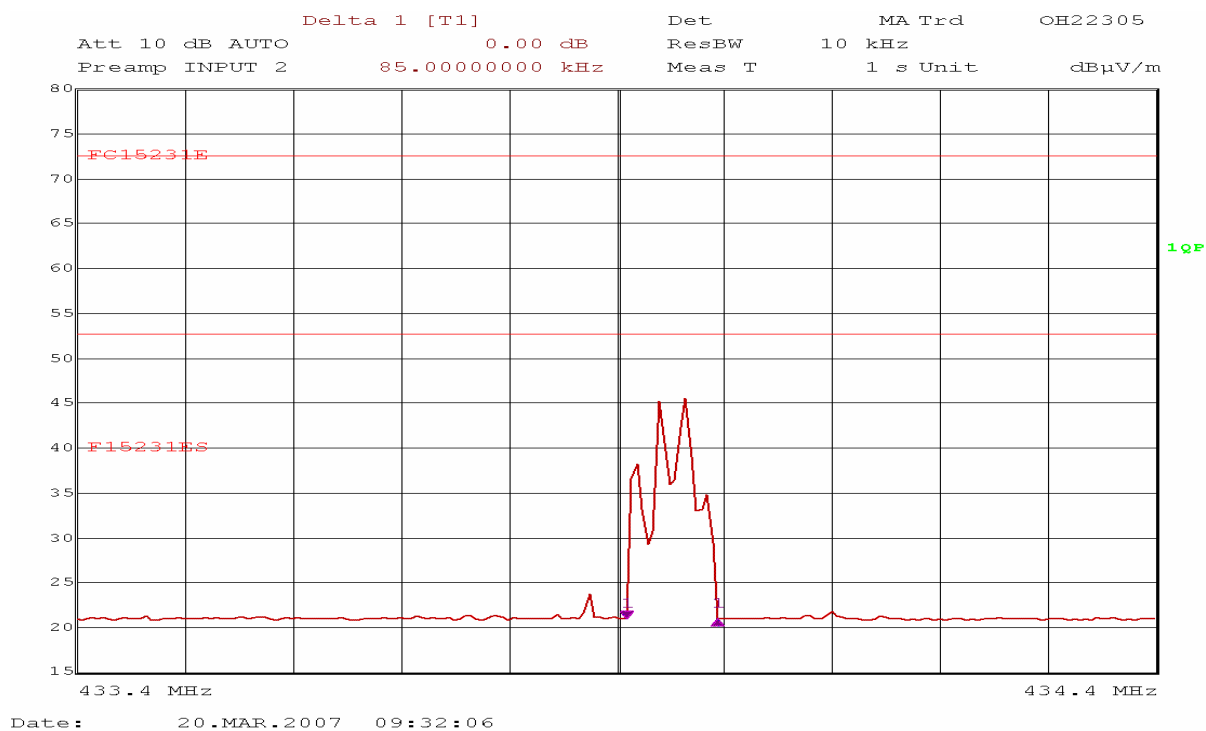
Plot 3b - M053H1BW



Plot 3c - M053V2BW



Plot 3d - M053H2BW



**10.4 Transmitter Activation / Deactivation Time Results and Discussions**

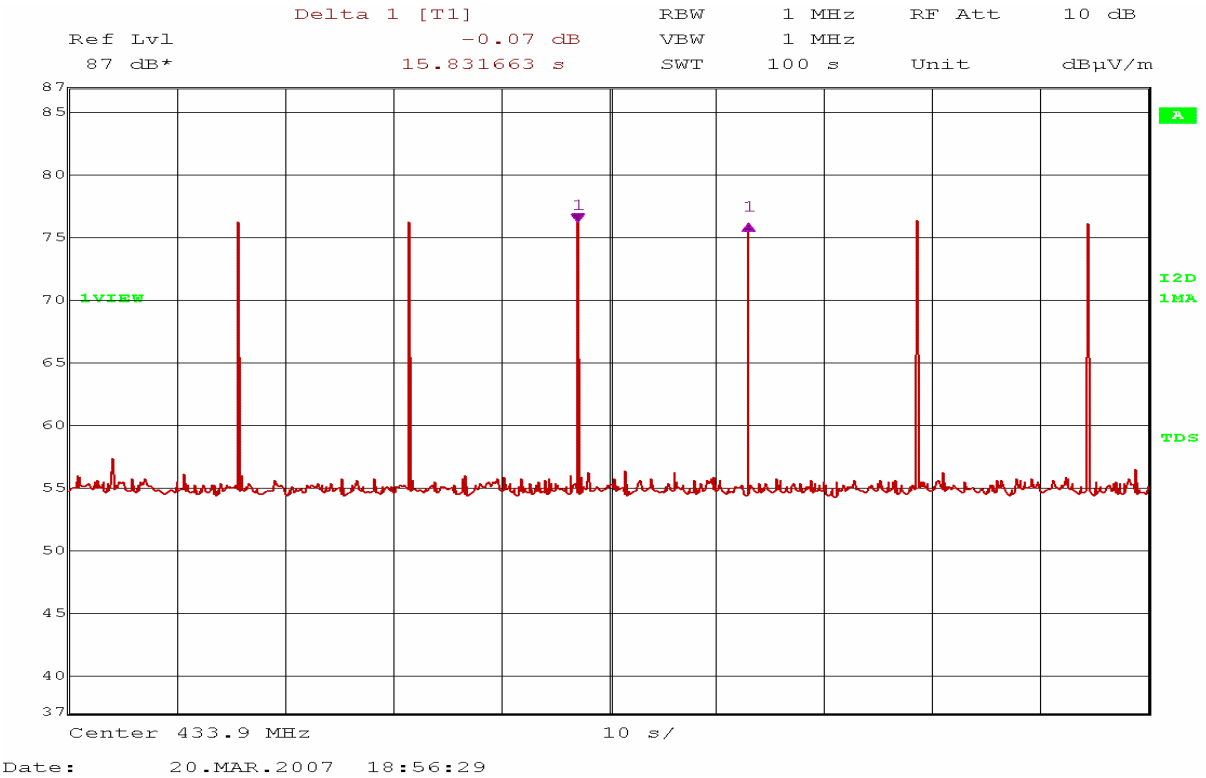
| Plot No. | Test File | Repetitive rate | Activation Time |
|----------|-----------|-----------------|-----------------|
| Plot 4a  | M053AT01  | 15.83 seconds   |                 |
| Plot 4b  | M053AT02  |                 | 7.82 ms         |

As it can be seen from plot 4a the emission repetition rate from the EUT was every 15.83 seconds. This was the client's normal operating mode.

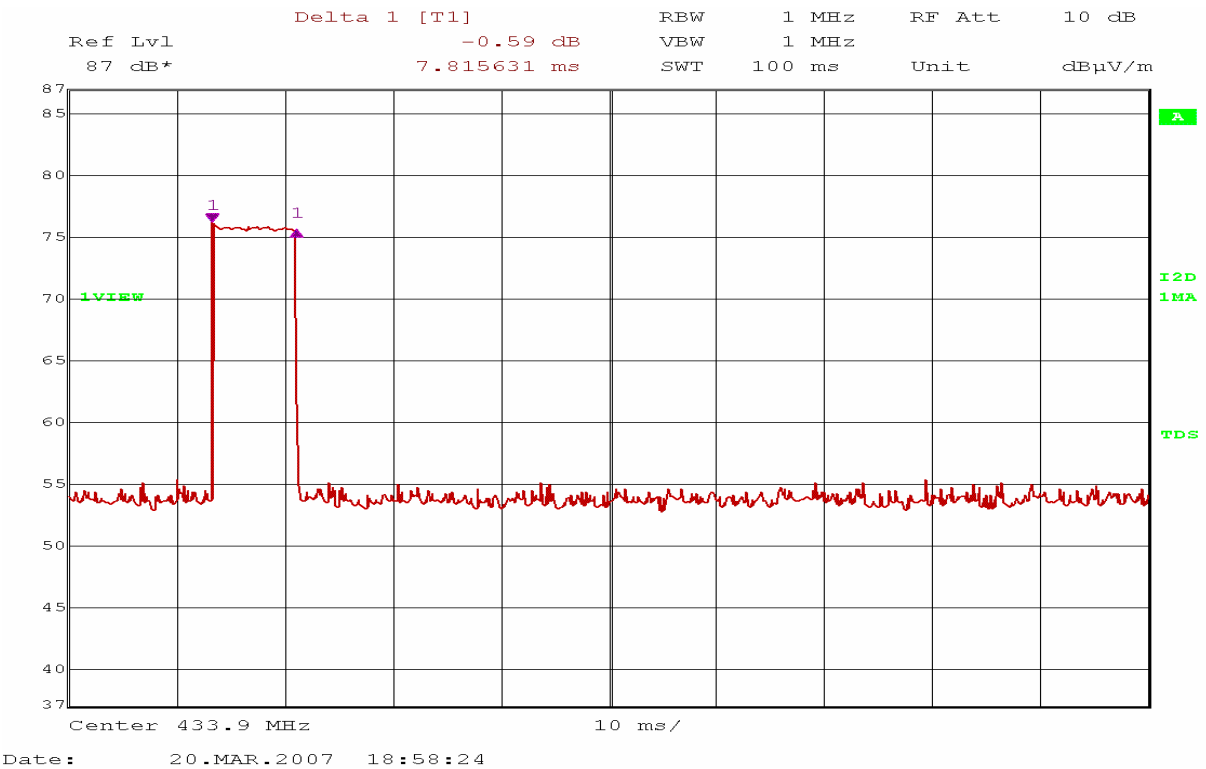
As it can be seen from plot 4b the activation time over the 15 second repetition rate was 7.82 ms.

The EUT achieved compliance as per case A, where the measured results are below the specified limit by a margin greater than the measurement uncertainty (see appendix A).

Plot 4a - M053AT01



Plot 4b - M053AT02



From the results obtained, the TG801 system tested, was found to be compliant with the following test requirements:

| Test Type                                           | Standard / Specification Reference   | Result   | Comment                                            |
|-----------------------------------------------------|--------------------------------------|----------|----------------------------------------------------|
| Electric Field Radiated Emissions<br>30 MHz - 5 GHz | C.F.R. 47 F.C.C. Part 15.231(e):2004 | Complied | Negligible levels                                  |
| Measurements of RF Frequency and Levels             | C.F.R. 47 F.C.C. Part 15.231(e):2004 | Complied | Minimum compliance margin of -6.45 dBuV/m          |
| Occupied Bandwidth                                  | C.F.R. 47 F.C.C. Part 15.231(e):2004 | Complied | Minimum compliance margin of 844.93 kHz            |
| Transmitter Activation / Deactivation Time          | C.F.R. 47 F.C.C. Part 15.231(e):2004 | Complied | Activation time 7.82 ms<br>Repetitive rate 15.83 s |

The EUT achieved compliance as per case B, where the measured results are below the specified limit by a margin less than the measurement uncertainty.

|                   |                                                                                                                                                                                  |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                                                                                                                                                                                  |
| <b>Appendix A</b> | <b>Measurement Uncertainty</b>                                                                                                                                                   |
| <b>Appendix B</b> | <b>List of Equipment Used</b>                                                                                                                                                    |
| <b>Appendix C</b> | <b>Support Equipment</b>                                                                                                                                                         |
| <b>Appendix D</b> | <b>Modification Record</b>                                                                                                                                                       |
| <b>Appendix E</b> | <b>Emissions - Test Procedures / Set-Up</b><br>Radiated Emissions<br>Measurements of RF Frequency and Levels<br>Occupied Bandwidth<br>Transmitter Activation / Deactivation Time |
| <b>Appendix F</b> | <b>User Manual</b>                                                                                                                                                               |

## **RADIATED EMISSION MEASUREMENT UNCERTAINTY**

ETS' Policy, as based on the NAMAS Accreditation Standard, M10, Paragraph 12.11, states that Test Reports shall include estimated uncertainty of the calibration or test result (this information need only appear in test reports and test certificates where it is relevant to the validity or application of the test result, where a client's instructions so require or where uncertainty affects compliance to a specification or limit).

The global uncertainties have been calculated in accordance with UK NIS 81 (Edition 1, May 1994) as follows:

Measurement uncertainties have been applied to each test result. In accordance with NAMAS document NIS 81 (edition 1, May 1994), in the absence of any specification criteria, guidance, or code of practice,

compliance has been judged on the following uncertainty criterion:

The methods used to calculate the above uncertainties are in line with those used for calibration laboratories contained in NAMAS document NIS 3003 "The Expression of Uncertainty and Confidence in Measurement" May 1991, which align with international recommendations "Guide to the Expression of Uncertainty in Measurement".

| Measurement Type                               | Frequency Range | Confidence Level | Calculated Measurement Uncertainty |
|------------------------------------------------|-----------------|------------------|------------------------------------|
| Radiated Emissions:<br>Electric Field Strength | 30 MHz to       | 95%              | + 3.4 / - 3.4 dB                   |

| Case   | Condition                                                                                                                      | Result                                                                                                                                                                                            |
|--------|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Case A | <b>Complied.</b> The measurement is below the specified limit by a margin which is greater than the measurement uncertainty.   | The product complied.                                                                                                                                                                             |
| Case B | <b>Indeterminate.</b> The measurement is below the specified limit by a margin which is less than the measurement uncertainty. | It is not possible to determine compliance with 95% confidence. However, the measured result indicates a higher probability that the product tested complies with the specification limit.        |
| Case C | <b>Indeterminate.</b> The measurement is above the specified limit by a margin which is less than the measurement uncertainty. | It is not possible to determine compliance with 95% confidence. However, the measured result indicates a higher probability that the product tested does not comply with the specification limit. |
| Case D | <b>Did not comply.</b> The measurement is above the specified limit by a margin which is greater than the measurement          | The product did not comply.                                                                                                                                                                       |

**EMISSIONS TEST EQUIPMENT**

| ITEM USED                      | EQUIPMENT                                     | DESCRIPTION            | MANUFACTURER | SERIAL NUMBER      | CALIBRATION DUE |
|--------------------------------|-----------------------------------------------|------------------------|--------------|--------------------|-----------------|
| <b>RF RECEIVERS</b>            |                                               |                        |              |                    |                 |
|                                | ESVS10                                        | 20 MHz - 1.0 GHz       | R & S        | 843207/012         | 07-09-07        |
| X                              | ESIB7                                         | 20 Hz - 7.0 GHz        | R & S        | 100074             | 06-10-07        |
| X                              | ESIB26                                        | 20 Hz - 26.0 GHz       | R & S        | 100087             | 17-11-07        |
|                                | ESPC                                          | 9 KHz - 250 MHz        | R & S        | 848553/010         | 17-02-07        |
|                                | PAM-0207 Pre-Amplifier                        | DC to 7 GHz            | A H Systems  | 2640               | 15-02-07        |
| <b>ANTENNAE</b>                |                                               |                        |              |                    |                 |
|                                | HK116 BICONICAL                               | 20 MHz - 300 MHz       | R&S          | 843562/010         | 15-02-08        |
|                                | HL223 LOG PERIODIC                            | 200 MHz - 1.0 GHz      | R&S          | 843990/012         | 15-02-08        |
|                                | ALA-130 LOOP                                  | 1 kHz- 30 MHz          | ARA          | 1010               |                 |
| X                              | ALPB-2513 BI LOG                              | 25 MHz - 1.3 GHz       | ARA          | 1020               | 15-02-08        |
| X                              | ARA DRG-118A HORN                             | 1.0 GHz - 18 GHz       | ARA          | ETS0801            | 01-02-08        |
|                                | EMCO LOOP 7604                                | 20 Hz - 100 kHz        | ETS EMCO     | 2565               |                 |
|                                | SAS-521F-7 Bilogical                          | 25 MHz - 7 GHz         | A H Systems  | 2613               | 15-02-08        |
|                                | CBL6112A Bilog                                | 30 MHz - 3 GHz         | Chase        | 2298               |                 |
| <b>LISNs</b>                   |                                               |                        |              |                    |                 |
|                                | LISN 7225-1                                   | LISN                   | SOLAR        | —                  | 03-02-07        |
|                                | LISN 7225-1                                   | LISN                   | SOLAR        | —                  | 03-02-07        |
|                                | LISN NNLK 8121                                |                        |              | 030-031            | 03-02-07        |
|                                | ESHS-Z5                                       | LISN                   | R & S        | 848773/020         | 03-02-07        |
| <b>TEST SITE</b>               |                                               |                        |              |                    |                 |
|                                | ETS OATS                                      | EMISSIONS              | ETS          | SITE 1             | 20-09-07        |
|                                | CONDUCTED EMISSIONS                           | EMISSIONS              | ETS          | SITE 2             | n/a             |
|                                | G STRIP                                       |                        | COMTEST      | SITE 3             | 17-08-07        |
|                                | CONDUCTED IMMUNITY                            |                        | COMTEST      | SITE 4             | 17-08-07        |
| X                              | ANECHOIC CHAMBER                              | EMISSIONS / IMMUNITY   | ETS/ GLOBAL  | SITE 5             | 20-09-07        |
|                                | HARMONICS & FLICKER                           |                        | Schaffner    | SITE 6             | 06-09-07        |
| <b>HARMONICS &amp; FLICKER</b> |                                               |                        |              |                    |                 |
|                                | PROFLINE 2105-400<br>INCLUDES NSG1007/CCN1000 | HARMONICS &<br>FLICKER | SCHAFFNER    | HK54006,<br>X71825 | 06-09-07        |
| <b>CURRENT PROBE</b>           |                                               |                        |              |                    |                 |
|                                | FCC F73 RF CURRENT PROBE                      |                        |              | 40                 | 11-07-07        |
|                                | CURRENT INJECTION CLAMP                       |                        |              | 952242-1           | 12-07-07        |
|                                | CIC9851 EM Injection Clamp                    | 10 KHz - 1 GHz         | Chase EMC    | 17                 | 09-01-08        |



This form lists the modifications made to the Wavetrend Technologies Limited, TG801 since the declaration of conformity was made on 21 March 2007.

[illegible]



## Radiated Emissions Measurements - 30 to 1000 MHz

### Objectives

The objectives are to determine the level of radiated emissions from the enclosure and cable ports of the EUT in the frequency range 30 MHz - 1 GHz. Measured levels are evaluated against the applicable limits of the BS EN55022: 1998 standard and amendments A1:2000 and A2:2003 and the BS EN61000-6-3:2001 standard.

### Test Method

Radiated emissions measurements are made over the frequency range 30 MHz - 1 GHz in accordance with EN55022:1998 amendments A1:2000 and A2:2003 and the BS EN61000-6-3:2001 standard. Prior to the commencement of tests the test equipment, EUT and support equipment are switched on and allowed to warm up for a minimum of thirty minutes. The RF test receiver parameters are set as per the requirements of CISPR 22/EN55022 and summarised in the table below:

Radiated emissions spurious limits stated in section 15.231(e) shall not exceed a level of 20 dB below the fundamental carrier limit, or the limit specified in section 15.209, whichever is the higher limit. If the frequency of the spurious emission is located in one the restricted bands of operation stated in section 15.205, then the level of emissions shall not exceed the limit specified in section 15.209.

As stated in 15.231(b(2)) measurements were made using a peak detector. A duty cycle correction factor of XXXX dB has been applied to correct the peak levels to average levels.

### Test Set Up

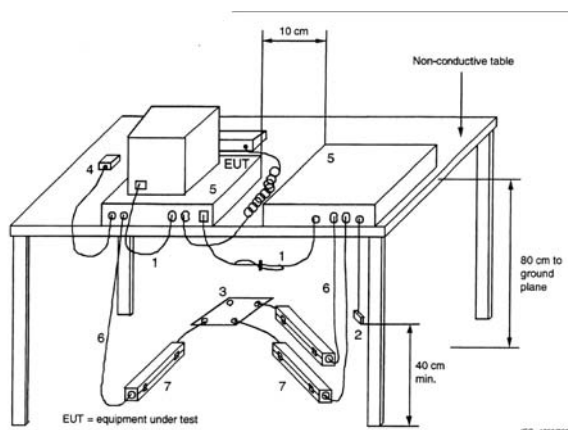


Table top equipment

## Radiated Emissions Measurements - 1000 to 5000 MHz

### Objectives

The objectives are to determine the level of radiated emissions from the enclosure and cable ports of the EUT in the frequency range 30 MHz - 1 GHz. Measured levels are evaluated against the applicable limits of the BS EN55022: 1998 standard and amendments A1:2000 and A2:2003 and the BS EN61000-6-3:2001 standard.

### Test Method

Radiated emissions measurements are made over the frequency range 30 MHz - 1 GHz in accordance with EN55022:1998 amendments A1:2000 and A2:2003 and the BS EN61000-6-3:2001 standard. Prior to the commencement of tests the test equipment, EUT and support equipment are switched on and allowed to warm up for a minimum of thirty minutes. The RF test receiver parameters are set as per the requirements of CISPR 22/EN55022 and summarised in the table below:

The customer has stated that the highest clock frequency for the EUT was 433.895 MHz, therefore tests were performed up to 5000 MHz.

Radiated emissions spurious limits stated in section 15.231(e) shall not exceed a level of 20 dB below the fundamental carrier limit, or the limit specified in section 15.209, whichever is the higher limit. If the frequency of the spurious emission is located in one the restricted bands of operation stated in section 15.205, then the level of emissions shall not exceed the limit specified in section 15.209.

### Test Set Up

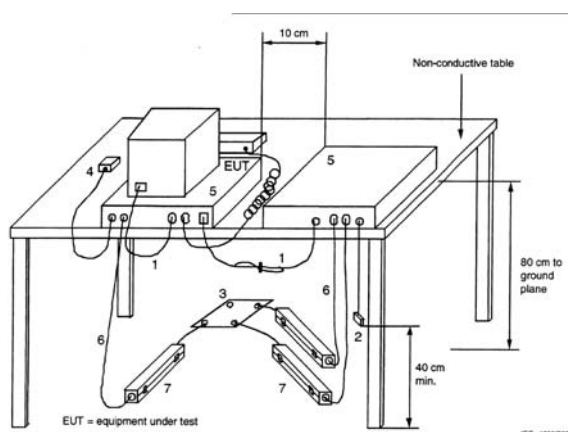


Table top equipment

### Measurements of RF Frequency and Levels

The EUT was placed on a non-conductive table 0.8 m above ground in the Anechoic Chamber. Max hold scans were carried out close to the declared intentional transmitted frequencies.

The recorded results were plotted against the specified applicable limit.

|                                                                                 | Port      | Fundamental Frequency (MHz) | Field Strength of Fundamental (uV/m) | Field Strength of Fundamental (dBuV/m) | Field strength of spurious emissions (uV/m) | Field strength of spurious emissions (dBuV/m) |
|---------------------------------------------------------------------------------|-----------|-----------------------------|--------------------------------------|----------------------------------------|---------------------------------------------|-----------------------------------------------|
| Radiated Emissions<br>FCC Part 15<br>Intentional emissions limits<br>15.231 (e) | Enclosure | 40.66 - 40.70               | 1,000                                | 60                                     | 100                                         | 40                                            |
|                                                                                 |           | 70 - 130                    | 500                                  | 54                                     | 50                                          | 34                                            |
|                                                                                 |           | 130 - 174                   | 500 - 1,500                          | 54 - 63.5                              | 50 - 150                                    | 34 - 43.5                                     |
|                                                                                 |           | 174 - 260                   | 1,500                                | 63.5                                   | 150                                         | 43.5                                          |
|                                                                                 |           | 260 - 470                   | 1,500 - 5,000                        | 63.5 - 74                              | 150 - 500                                   | 43.5 - 54                                     |
|                                                                                 |           | Above 470                   | 5,000                                | 74                                     | 500                                         | 54                                            |

## Occupied Bandwidth

Tests were performed to the limits specified in section 15.231 (c).

The EUT was placed on a non-conductive table 0.8 m above ground in the Anechoic Chamber. Max hold scans were carried out close to the declared intentional transmitted frequencies.

The bandwidth was recorded from the results plots.

The bandwidth of the emission shall be no wider than 0.25% of the centre frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

**Transmitter Activation / Deactivation Time**

Tests were performed to the limits specified in section 15.231 (e).

The EUT was placed on a non-conductive table 0.8 m above ground in the Anechoic Chamber. Max hold scans were carried out close to the declared intentional transmitted frequencies.

The test receiver was set in the spectrum analyser mode and tuned at the fixed intentionally transmitted frequencies.

The repetition rate time interval was recorded. The activation time was also recorded.

ELECTROMAGNETIC TESTING SERVICES LIMITED

TEST REPORT NO: ETS/M1185/FCC

EUT: TAG - ASSET - SMALL / TG801

PAGE: 44 OF 44

COMPANY: WAVETREND TECHNOLOGIES LIMITED

ISSUE DATE: 21 MARCH 2007

TITLE OF SECTION: **USER MANUAL**

SECTION: APPENDIX F

---