



TEST REPORT NO: RU1201/6566  
COPY NO: .2.....  
ISSUE NO: 1  
FCC ID: NEOCCE-480N4

**REPORT ON THE CERTIFICATION TESTING OF  
AERIAL FACILITIES LIMITED  
60-055902  
UPLINK ONLY  
WITH RESPECT TO  
THE FCC RULES CFR 47, PART 90 SUBPART I**

TEST DATE: 14<sup>th</sup> – 18<sup>th</sup> September 2005

TESTED BY: ..... J CHARTERS  
APPROVED BY: ..... P GREEN  
PRODUCT MANAGER  
EMC  
DATE: 29<sup>th</sup> September 2005.....

Distribution:

- Copy Nos:
1. Aerial Facilities Limited
  2. TCB: CKC Certification Services
  3. TRL EMC

THIS DOCUMENT MAY BE REPRODUCED ONLY IN ITS ENTIRETY AND WITHOUT CHANGE



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| <b>Notes:</b>  |             |              |     |
| 1. Component failure during test   | YES         |              | [ ] |
|  | NO          |              | [X] |
| 2. If Yes, details of failure:   |             |              |     |
| 3. The facilities used for the testing of the product contain in this report are FCC Listed. |             |              |     |



**CERTIFICATE OF CONFORMITY & COMPLIANCE**

|                       |   |
|-----------------------|---|
| FCC IDENTITY:         | NEOCCE-480N4  |
| PURPOSE OF TEST:      | Certification   |
| TEST SPECIFICATION:   | FCC RULES CFR 47, PART 90 SUBPART I   |
| TEST RESULT:          | Compliant to Specification  |
| EQUIPMENT UNDER TEST: | 60-055902 (UPLINK only)   |
| EQUIPMENT TYPE:       | Booster with Fibre Optic Link   |
| MAXIMUM GAIN          | 32.65dB UPLINK  |
| MAXIMUM INPUT         | -14.0dBm UPLINK   |
| MAXIMUM OUTPUT        | 18.65dBm UPLINK   |
| ANTENNA TYPE:         | Not applicable  |
| CHANNEL SPACING:      | 25kHz   |
| NUMBER OF CHANNELS:   | 486.0625MHz<br>486.2875MHz<br>486.3125MHz<br>486,5625MHz                                  |
| FREQUENCY GENERATION: | N/A   |
| MODULATION TYPE:      | F3E   |
| POWER SOURCE(s):      | 110Vac  |
| TEST DATE(s):         | 14 <sup>th</sup> – 18 <sup>th</sup> September 2005  |
| ORDER No(s):          | 32747   |
| APPLICANT:            | Aerial Facilities Limited   |
| ADDRESS:              | Aerial House<br>Asheridge Road<br>Chesham<br>Buckinghamshire<br>HP5 1TU<br>United Kingdom |
| TESTED BY:            | ----- J CHARTERS  |
| APPROVED BY:          | ----- P GREEN<br>PRODUCT<br>MANAGER EMC   |

**APPLICANT'S SUMMARY**

EQUIPMENT UNDER TEST (EUT): 60-055902

EQUIPMENT TYPE: Booster with Fibre Optic Link

PURPOSE OF TEST: Certification

TEST SPECIFICATION(S): FCC RULES CFR 47, PART 90 SUBPART I

TEST RESULT: COMPLIANT Yes   
No

APPLICANT'S CATEGORY: MANUFACTURER   
IMPORTER   
DISTRIBUTOR   
TEST HOUSE   
AGENT

APPLICANT'S ORDER No(s): 31474

APPLICANT'S CONTACT PERSON(s): Mr Peter Bradfield

E-mail address: Peterb@aerial.co.uk

APPLICANT: Aerial Facilities Limited

ADDRESS: Aerial House  
Asheridge Road  
Chesham  
Buckinghamshire  
HP5 1TU  
United Kingdom

TEL: +44 (0)1494 777000

FAX: +44 (0)1494 778456

MANUFACTURER: Aerial Facilities Limited

EUT(S) COUNTRY OF ORIGIN: United Kingdom

TEST LABORATORY: TRL EMC

UKAS ACCREDITATION No: 0728

TEST DATE(S): 14<sup>th</sup> – 18<sup>th</sup> September 2005

TEST REPORT No: RU1201/6566

**EQUIPMENT TEST / EXAMINATIONS REQUIRED**

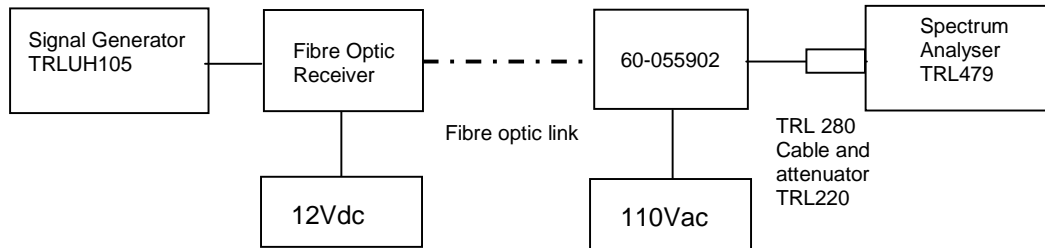
| 1. | TEST/EXAMINATION                        | RULE PART         | APPLICABILITY | RESULT   |
|----|---|-------------------|---------------|----------|
|    | RF Gain                                 | 90.205<br>2.1046  | Yes           | Complies |
|    | Audio Frequency Response                | TIA EIA-603.3.2.6 | N/A           | N/A      |
|    | Audio Low-Pass Filter Response          | TIA EIA-603.3.2.6 | N/A           | N/A      |
|    | Modulation Limiting                     | TIA EIA-603.3.2.6 | N/A           | N/A      |
|    | Occupied Bandwidth                      | 90.210<br>2.1049  | Yes           | Complies |
|    | Spurious Emissions at Antenna Terminals | 90.210            | Yes           | Complies |
|    | Field Strength of Spurious Emissions    | 90.210<br>2.1053  | Yes           | Complies |
|    | Frequency Stability                     | 90.213            | Yes           | Complies |
|    | Transient behaviour                     | 90.214            | Yes           | Complies |

2. Product Use: Private Land Mobile Repeater Link System
3. System Description: The system operates by taking a wanted light signal in. The signal light signal is then converted to RF and goes through channel filters and amplifiers. The remote site fibre optic receiver was included in the test setup to convert the light back to RF.
4. Emission Designator: F3E
5. Temperatures: Ambient (Tnom) 20°C
6. Supply Voltages: Vnom 110Vac
- Note: Vnom voltages are as stated above unless otherwise shown on the test report page
7. Equipment Category: Single channel [ ]  
Two channel [ ]  
Multi-channel [X]
8. Channel spacing: Narrowband [X]  
Wideband [ ]
9. Test Location: TRL Compliance Services  
Up Holland [X]  
Long Green [ ]
10. Modifications made during test program: No modifications were performed.

**COMPLIANCE TESTS**

**TRANSMITTER TEST – GAIN – CONDUCTED – PART 2.1046 – UPLINK**

Ambient temperature = 20°C Radio Laboratory  
 Relative humidity = 40%  
 Supply voltage = 110Vac  
 Channel number = See test results



| Frequency MHz | Signal Generator Input Level dBm | Cable & Attenuator Loss dB | Level at Spectrum Analyser dBm | Gain dB | Gain after 10dB increase input signal level dBm | Measured Output Power dBm |
|---------------|----------------------------------|----------------------------|--------------------------------|---------|---|---------------------------|
| 486.0625      | -14.0                            | 26.9                       | -8.94                          | 31.96   | 23.10   | 17.96                     |
| 486.3125      | -14.0                            | 26.9                       | -8.90                          | 32.00   | 23.62   | 18.00                     |
| 486.5625      | -14.0                            | 26.9                       | -8.25                          | 32.65   | 23.41   | 18.65                     |

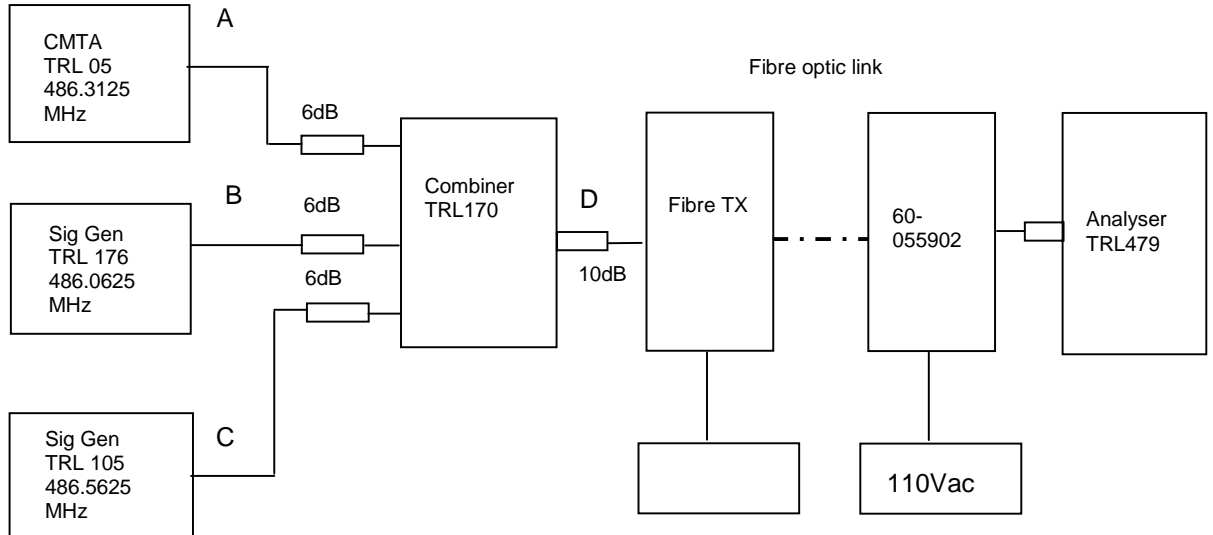
The test was setup as above. The signal generator was to simulate an input signal to the system from a transmitter and the analyzer used to obtain the output level from the system.

| TYPE OF EQUIPMENT | MAKER/SUPPLIER | MODEL No   | SERIAL No  | TRL No | ACTUAL EQUIPMENT USED |
|-------------------|----------------|------------|------------|--------|-----------------------|
| SPECTRUM ANALYSER | ANRITSU        | MS2665C    | MT26089    | 479    | <b>X</b>              |
| ATTENUATOR        | BIRD           | 8304-200   | N/A        | 103    |                       |
| ATTENUATOR        | BIRD           | 8304-300-N | N/A        | 220    | <b>X</b>              |
| CABLE             | ROSENBERGER    | MICRO COAX | N/A        | 280    | <b>X</b>              |
| SIGNAL GENERATOR  | MARCONI        | 2023       | 112224/040 | UH105  | <b>X</b>              |

**TRANSMITTER TEST - INTERMODULATION SPURIOUS EMISSIONS – CONDUCTED – PART 2.1053– UPLINK**

Ambient temperature = 22°C  
 Relative humidity = 62%  
 Supply voltage = 110Vac

Radio Laboratory



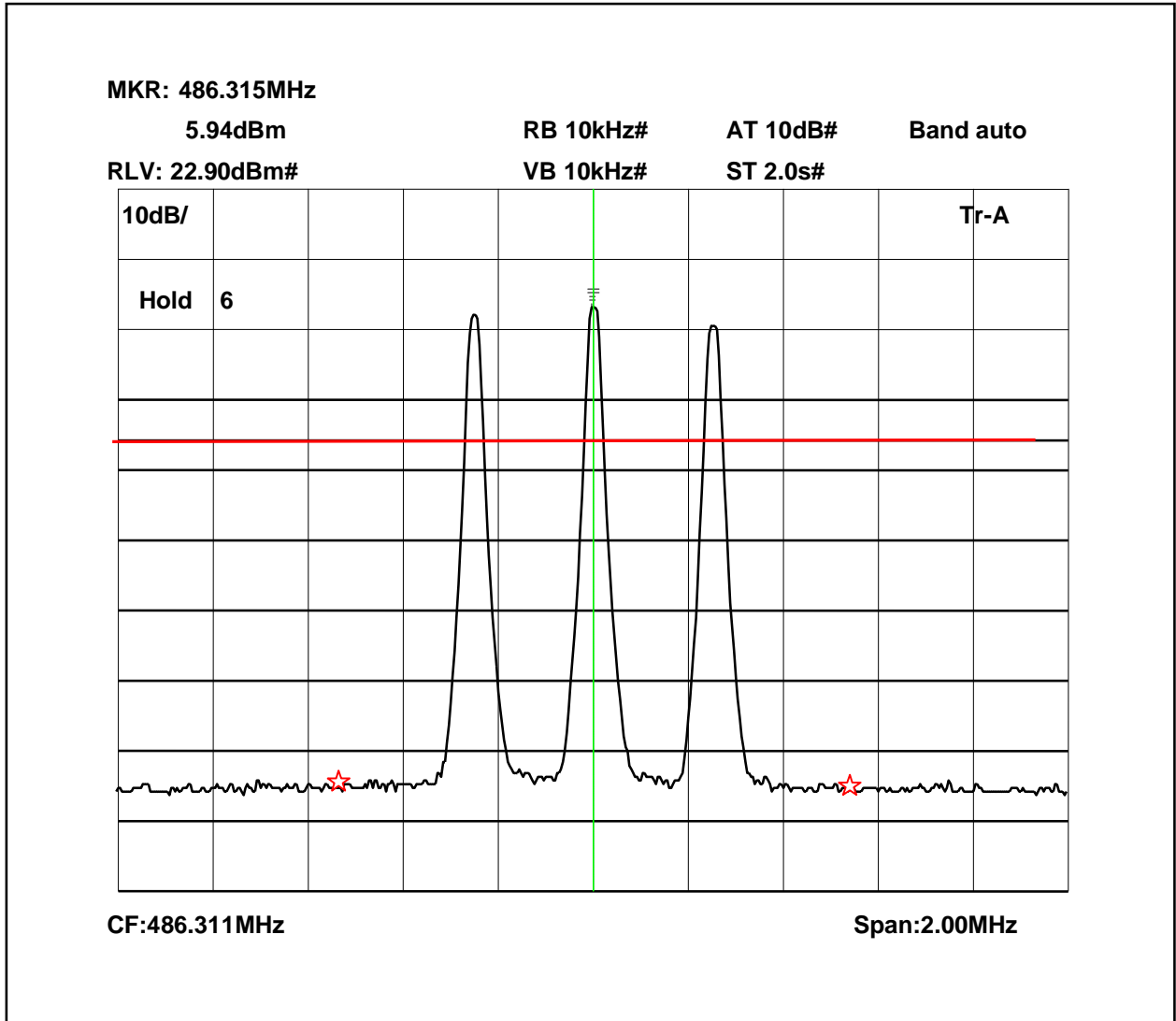
The Intermodulation and spurious products were measured with the fibre optic system operating at maximum input level. A three tone test was conducted using the equipment as above. The input power level was adjusted so the level at point D was the maximum input of -14.0dBm.

Sweep data is shown on the next page:

Test equipment used for intermodulation test

| TYPE OF EQUIPMENT | MAKER/SUPPLIER  | MODEL No | SERIAL No  | TRL No | ACTUAL EQUIPMENT USED |
|-------------------|-----------------|----------|------------|--------|-----------------------|
| SPECTRUM ANALYSER | ANRITSU         | MS2665C  | MT26089    | 479    | <b>X</b>              |
| SIGNAL GENERATOR  | MARCONI         | 2042     | 119562/02  | 254    | <b>X</b>              |
| CMTA              | ROHDE & SCHWARZ | CMTA52   | 894715/033 | 05     | <b>X</b>              |
| SIGNAL GENERATOR  | MARCONI         | 2023     | 112224/040 | UH105  | <b>X</b>              |
| COMBINER          | ELCOM           | RC-4-50  | N/A        | 170    | <b>X</b>              |

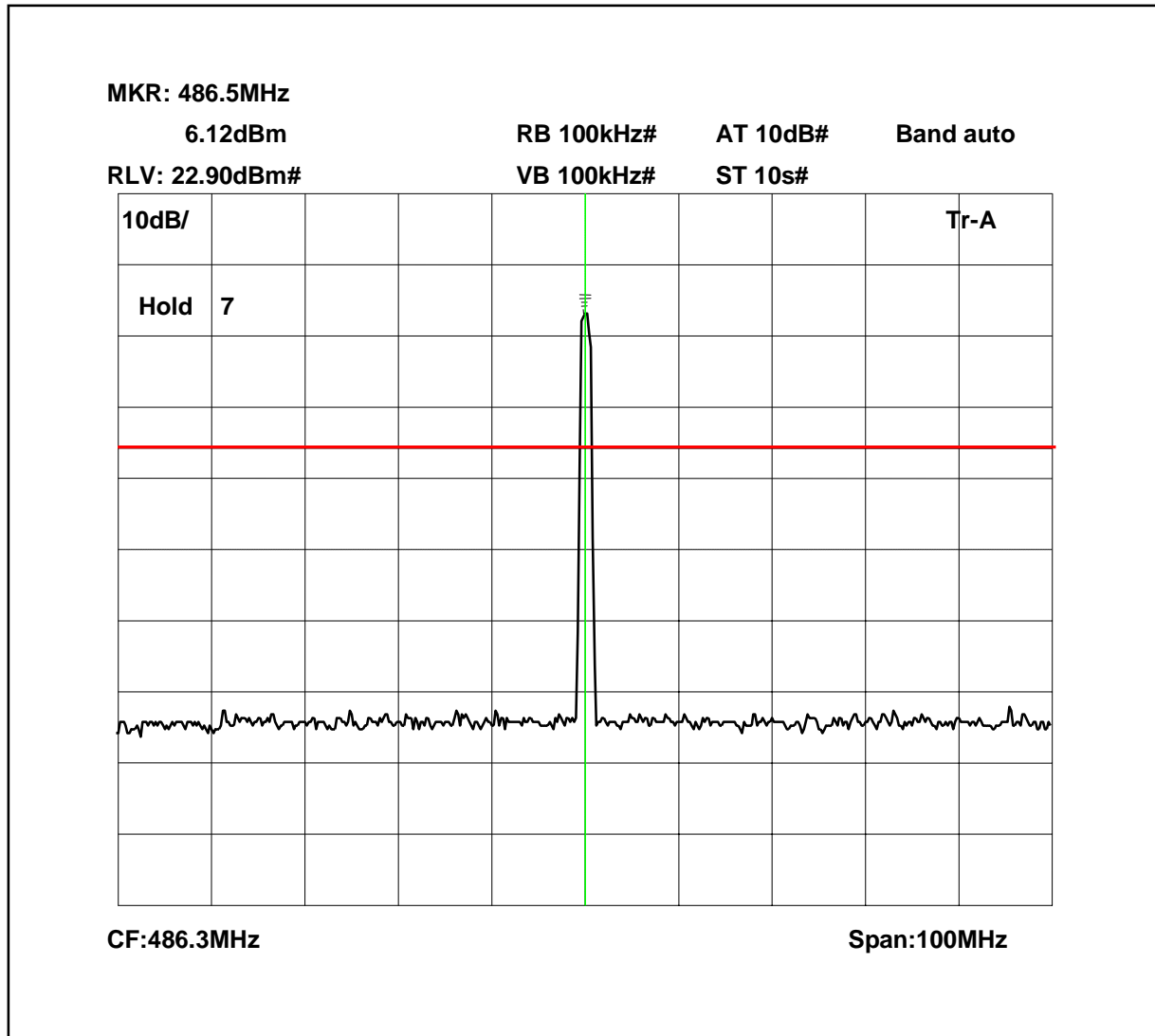
Intermodulation In Band



The above plot shows that all products (designated by ☆) are at least 40dB below the spurious limit. Based on the maximum input to the system.



Intermodulation Wideband



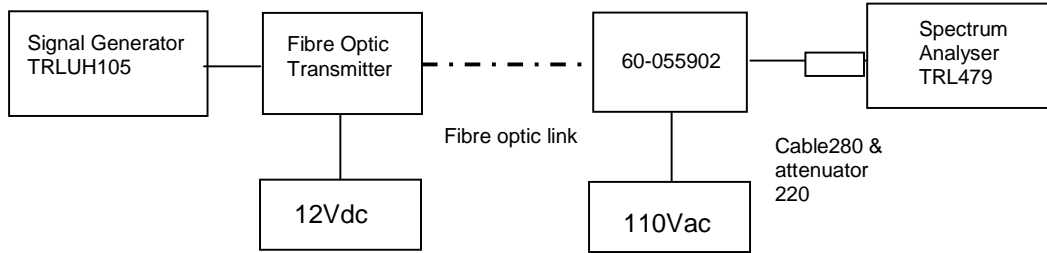
The above plot shows that there are no products outside the bands.  
Based on the maximum input to the system.

**TRANSMITTER TESTS**

**MODULATED BANDWIDTH TEST – CONDUCTED – Part 2.1049– UPLINK**

Ambient temperature = 20°C  
 Relative humidity = 48%  
 Supply voltage = 110Vac  
 Channel number = See test results

Radio Laboratory



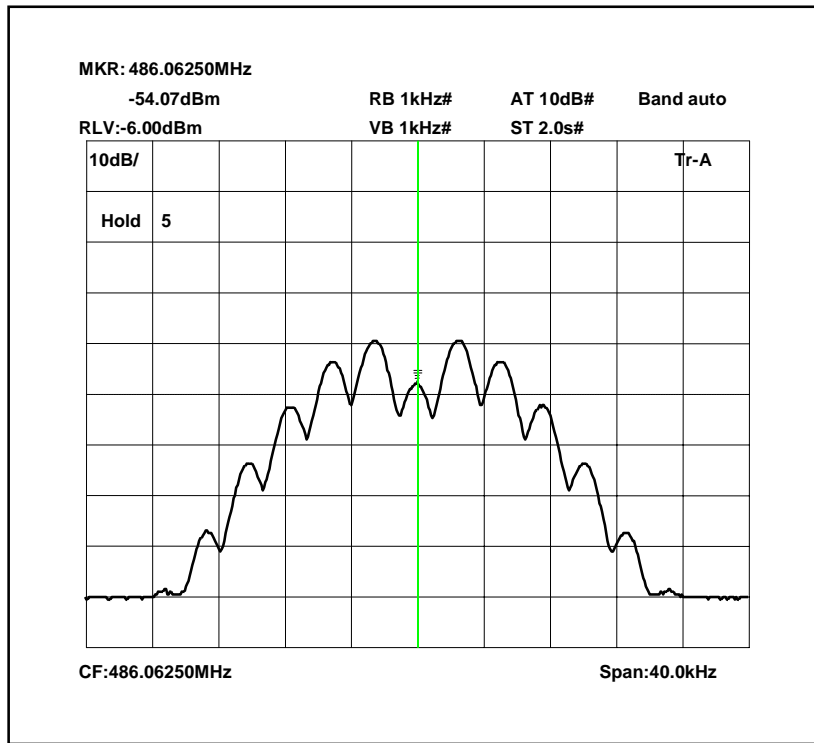
This test was performed to show that the fibre optic system does not alter the input signal in any way. The input signal was set to the maximum input level (-14dBm) and modulated with a 2500Hz tone. The plots show the signal measured at the signal generator and the signal measured at the output of the EUT.

Note: The cables and attenuators had the following losses.

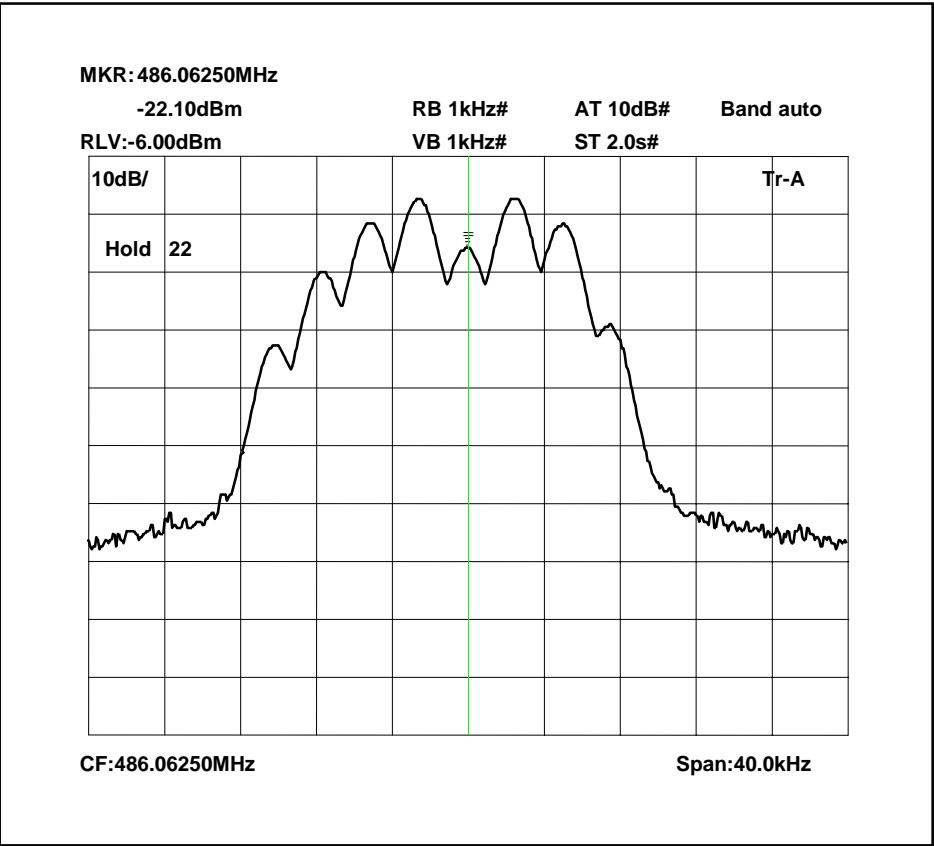
1. Cable TRL280 and Attenuator TRL220 between EUT and spectrum analyser= 26.9dB
2. Cable between signal generator and EUT = 0.22dB

| TYPE OF EQUIPMENT | MAKER/SUPPLIER | MODEL No   | SERIAL No  | TRL No | ACTUAL EQUIPMENT USED |
|-------------------|----------------|------------|------------|--------|-----------------------|
| SPECTRUM ANALYSER | ANRITSU        | MS2665C    | MT26089    | 479    | <b>X</b>              |
| ATTENUATOR        | BIRD           | 8304-200   | N/A        | 103    |                       |
| ATTENUATOR        | BIRD           | 8304-300-N | N/A        | 220    | <b>X</b>              |
| CABLE             | ROSENBERGER    | MICRO COAX | N/A        | 280    | <b>X</b>              |
| SIGNAL GENERATOR  | MARCONI        | 2023       | 112224/040 | UH105  | <b>X</b>              |

486.0625MHz Signal Generator deviation set to 5kHz

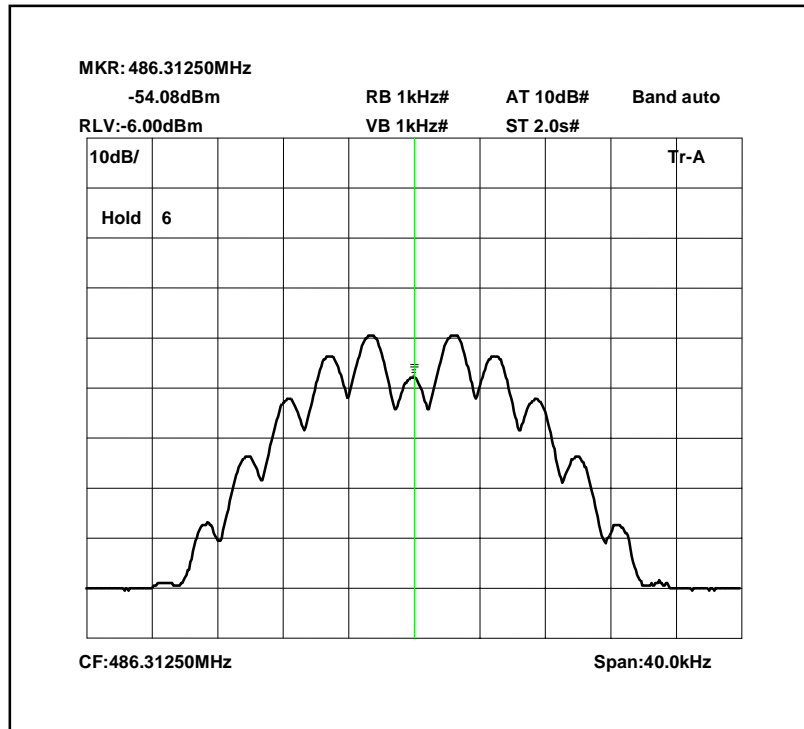


486.0625MHz Signal Generator amplifier and fibre optic system deviation set to 5kHz

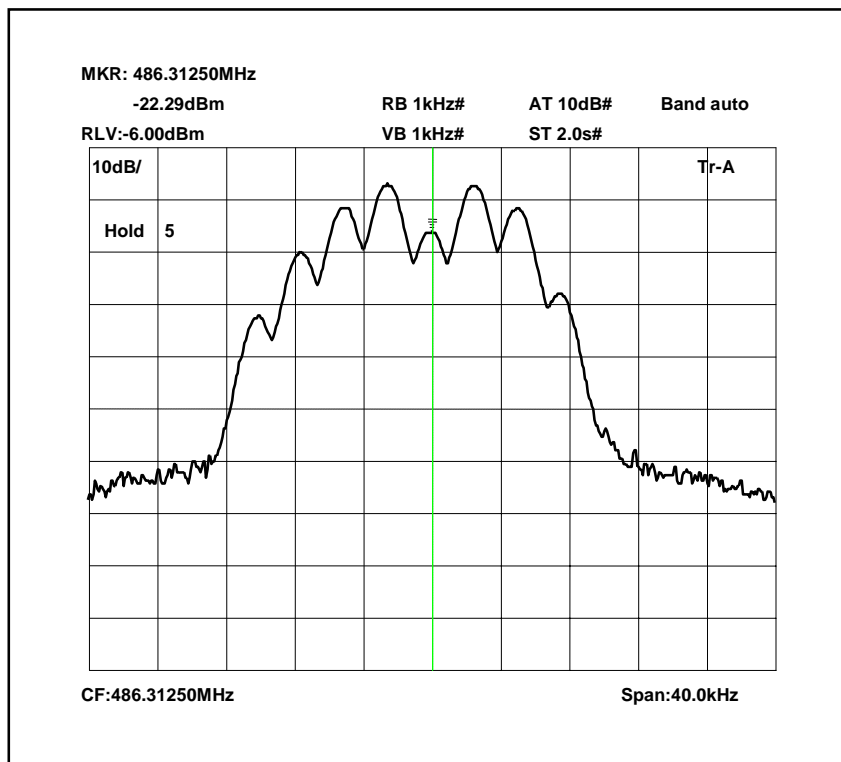


The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

486.3125MHz Signal Generator deviation set to 5kHz

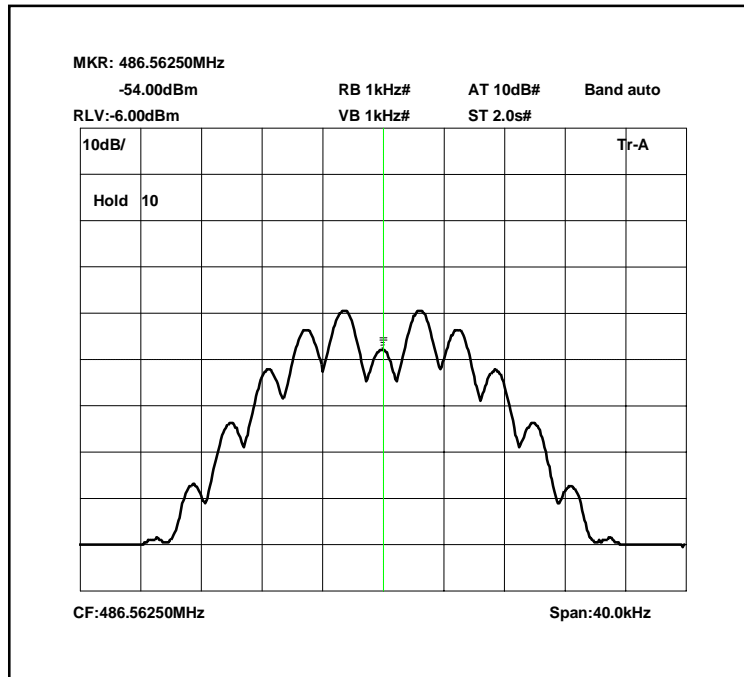


486.3125MHz Signal Generator amplifier and fibre optic system deviation set to 5kHz

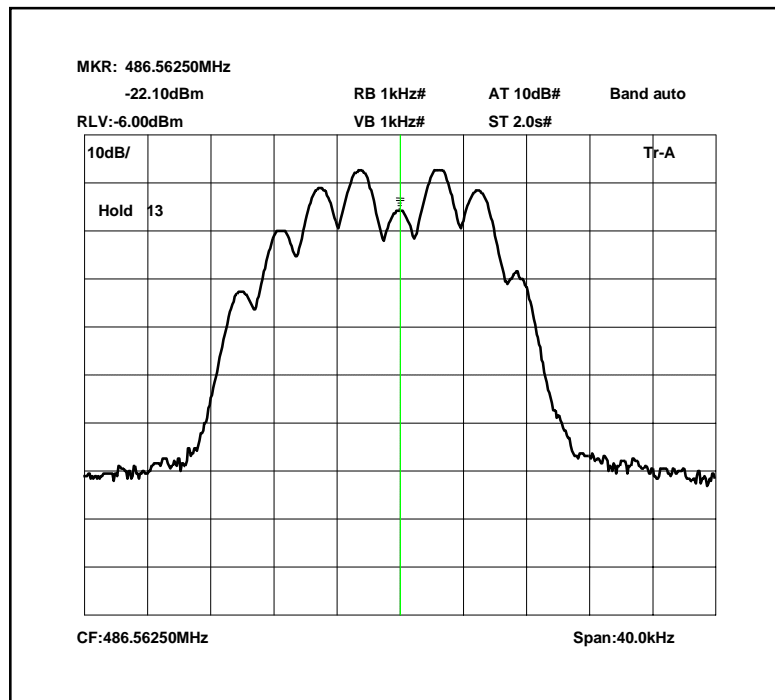


The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

486.5625MHz Signal Generator deviation set to 5kHz



486.5625MHz Signal Generator amplifier and fibre optic system deviation set to 5kHz



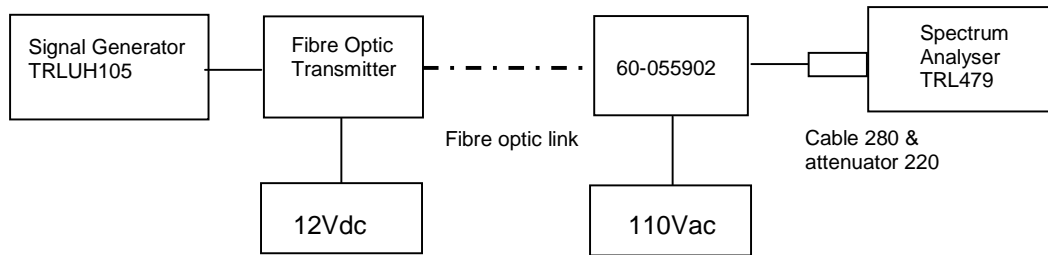
The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

**TRANSMITTER TESTS**

**FIBRE OPTIC SYSTEM SPURIOUS EMISSIONS – CONDUCTED – Part 2.1053 – UPLINK**

Ambient temperature = 26°C  
 Relative humidity = 40%  
 Supply voltage = 110Vac

Radio Laboratory  
 Test Signal = F3E



The test was set up as per the diagram. The level at the input was adjusted to compensate for the loss of the interconnecting cable. The unit was tested operating at maximum power and on three test frequencies.

The Spurious limit was calculated as follows:

On any frequency removed from the assigned frequency by more than 250% of the authorised bandwidth

At least 43 + 10 log PdB

$$(10\log P_{\text{watts}}) - (43 + 10\log (P_{\text{watts}} * 1000)) = \text{LIMIT} = -13 \text{ dBm}$$

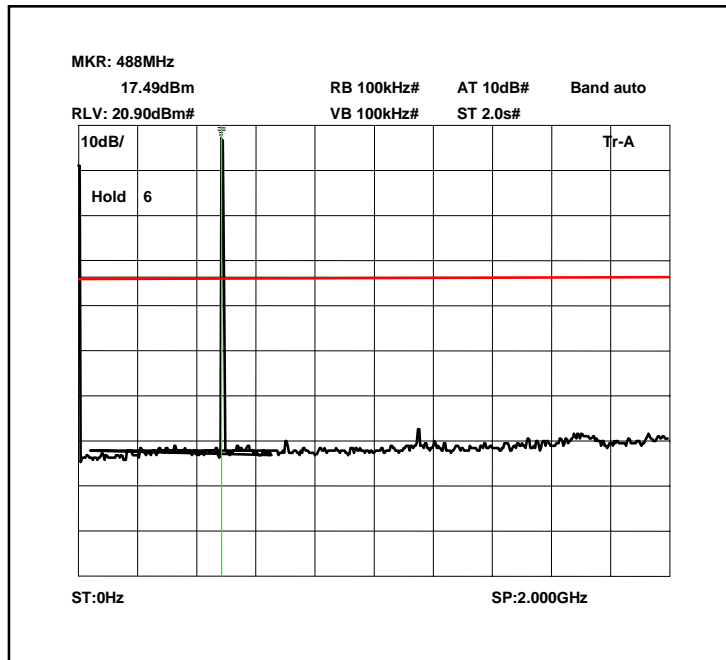
Test Result

No significant emissions within 20dBm of limit.

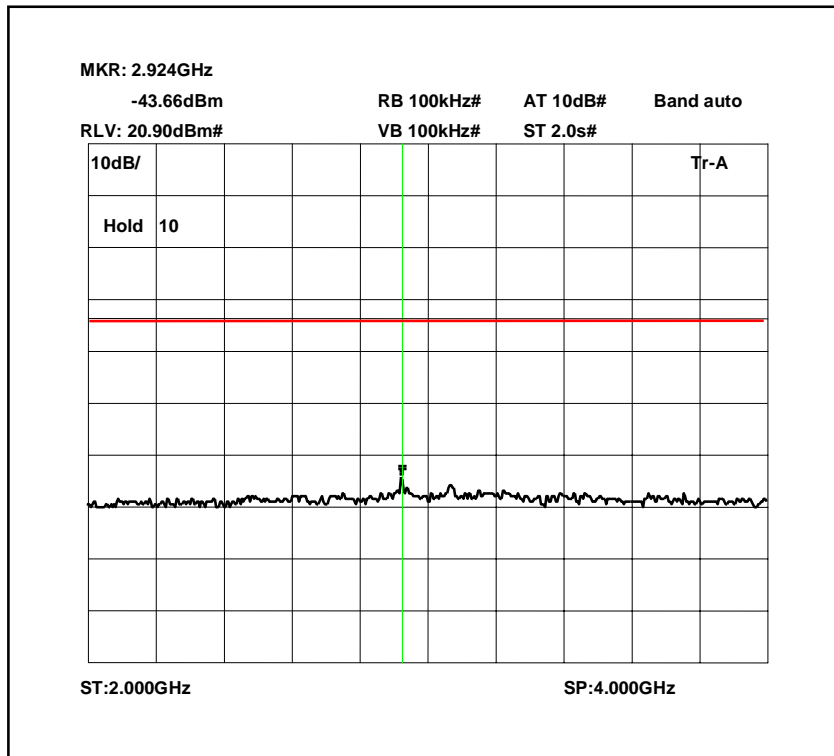
The test equipment used for the Transmitter Conducted Emissions:

| TYPE OF EQUIPMENT | MAKER/SUPPLIER | MODEL No   | SERIAL No  | TRL No | ACTUAL EQUIPMENT USED |
|-------------------|----------------|------------|------------|--------|-----------------------|
| SPECTRUM ANALYSER | ANRITSU        | MS2665C    | MT26089    | 479    | <b>X</b>              |
| ATTENUATOR        | BIRD           | 8304-200   | N/A        | 103    |                       |
| ATTENUATOR        | BIRD           | 8304-300-N | N/A        | 220    | <b>X</b>              |
| CABLE             | ROSENBERGER    | MICRO COAX | N/A        | 280    | <b>X</b>              |
| SIGNAL GENERATOR  | MARCONI        | 2023       | 112224/040 | UH105  | <b>X</b>              |

Conducted emissions 486.0625 MHz 0 – 2 GHz

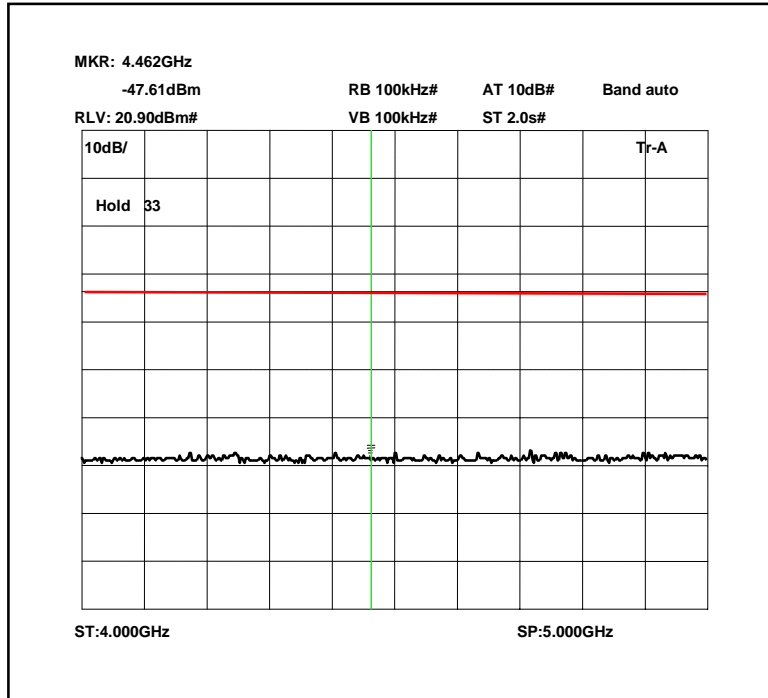


Conducted emissions 486.0625 MHz 2 – 4 GHz

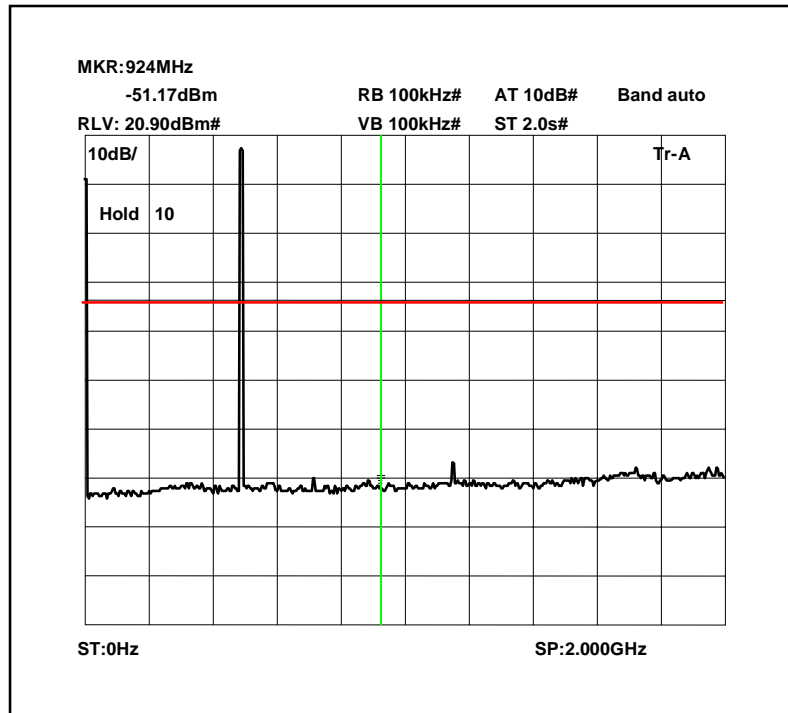




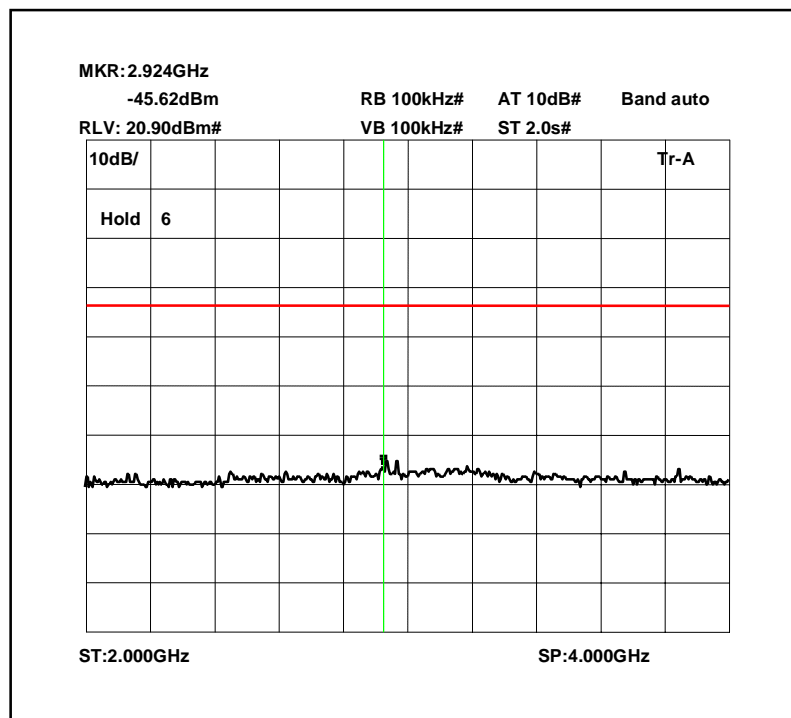
Conducted emissions 486.0625 MHz 4-5 GHz



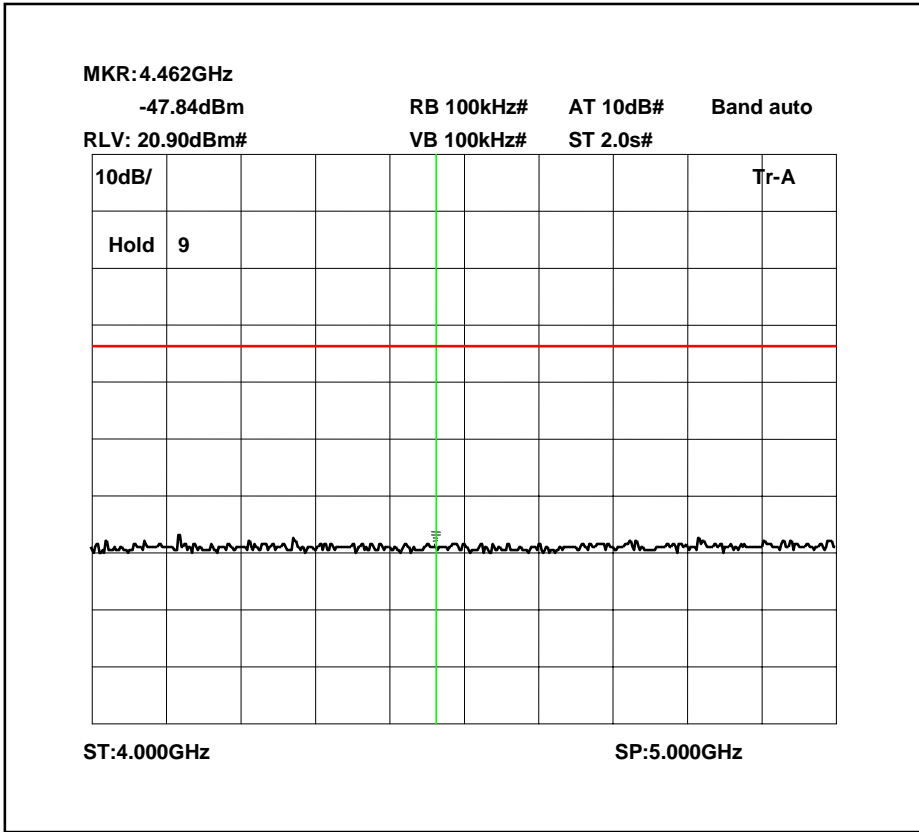
Conducted emissions 486.3125 MHz 0 – 2.0 GHz



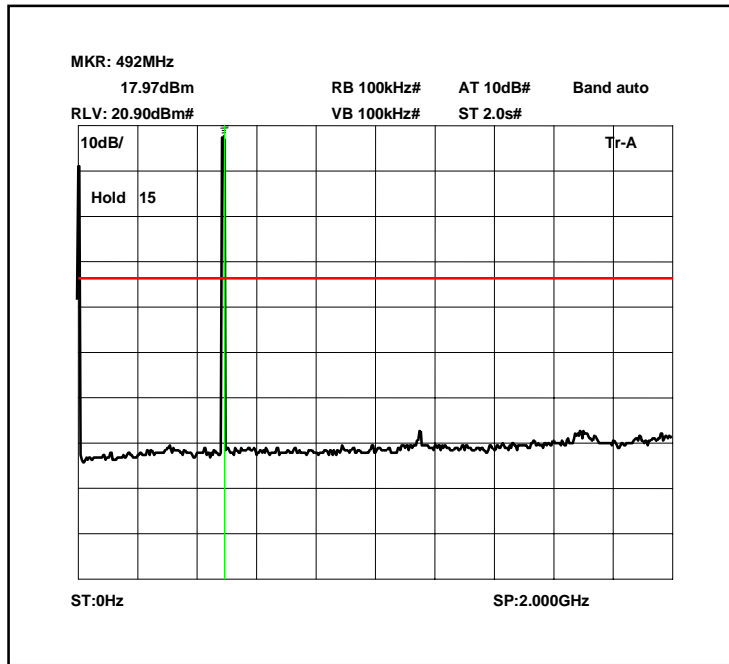
Conducted emissions 486.3125 MHz 2.0 – 4.0 GHz



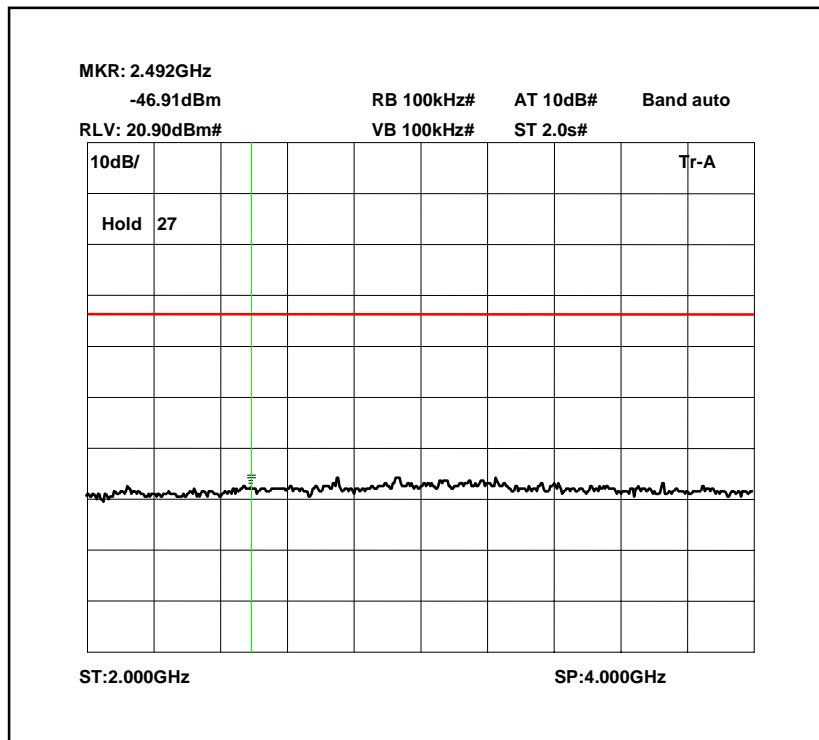
Conducted emissions 486.3125 MHz 4.0 – 5.0GHz



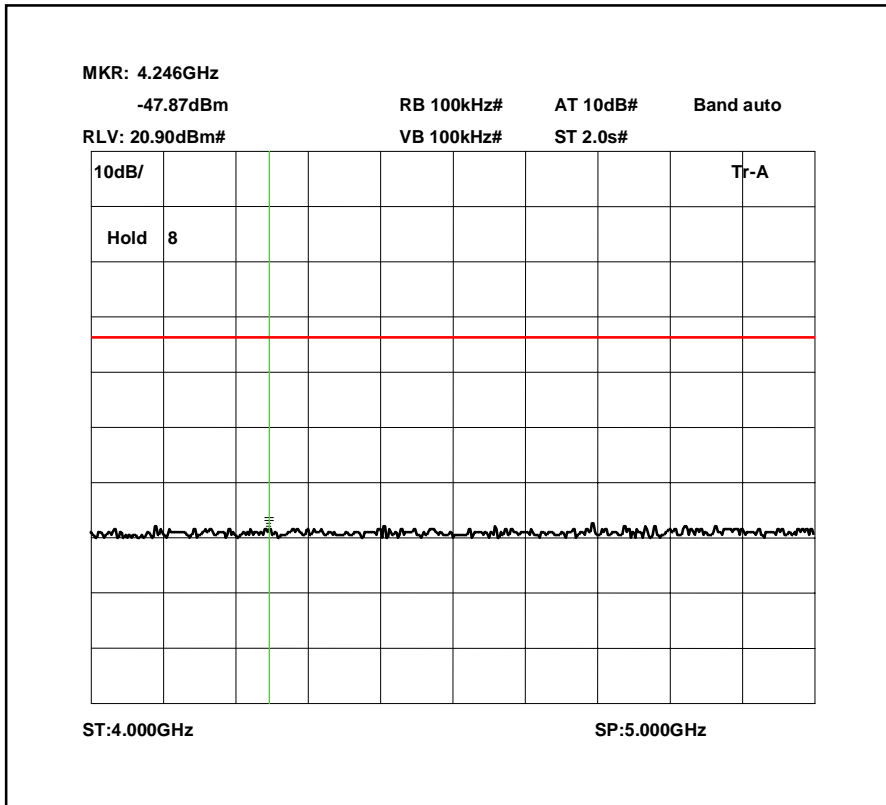
Conducted emissions 486.5625 MHz 0 – 2 GHz



Conducted emissions 486.5625 MHz 2 – 4 GHz



Conducted emissions 486.5625 MHz 4 – 5 GHz

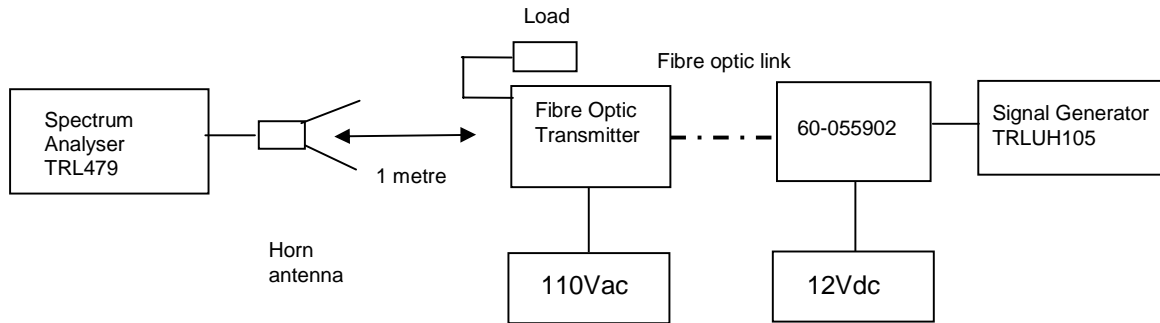


## TRANSMITTER TESTS

### TRANSMITTER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– UPLINK

Ambient temperature = 20°C  
 Relative humidity = 34%  
 Conditions = OATS  
 Supply voltage = 110Vac  
 Supply Frequency = N/A

Test Signal = F3E



The test was set up as per the diagram. The level at the input was adjusted to compensate for the loss of the interconnecting cable. The unit was tested operating maximum power on three test frequencies with a 50 ohm load on the output. The unit was also tested with the signal generator replaced by another 50ohm load.

The Spurious limit was calculated as follows:

On any frequency removed from the assigned frequency by more that 250% of the authorised bandwidth

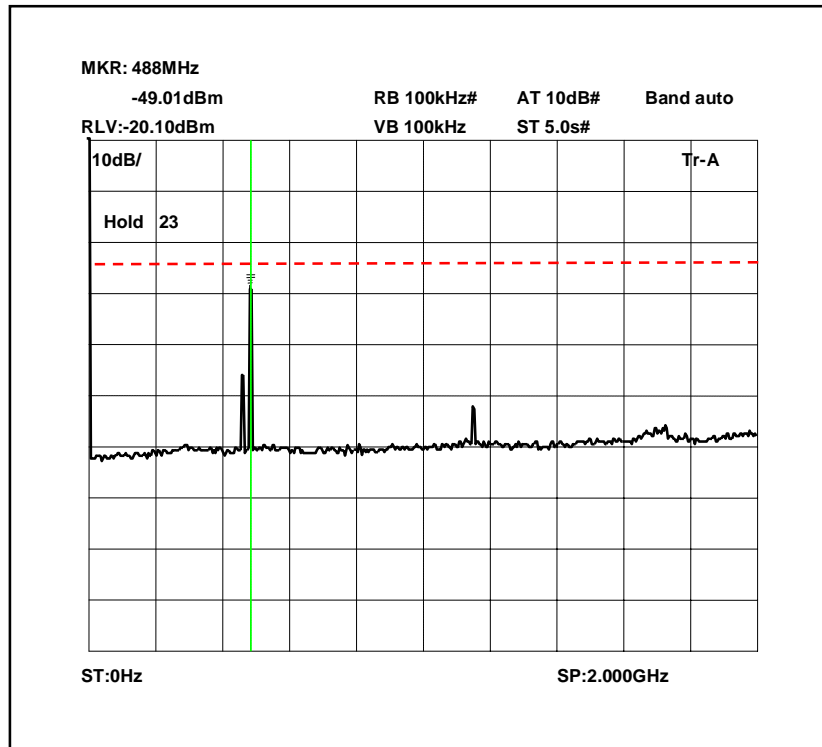
At least 43 + 10 log PdB

$$(10\log P_{\text{watts}}) - (43+10\log (P_{\text{watts}} * 1000)) = \text{LIMIT} = -13 \text{ dBm}$$

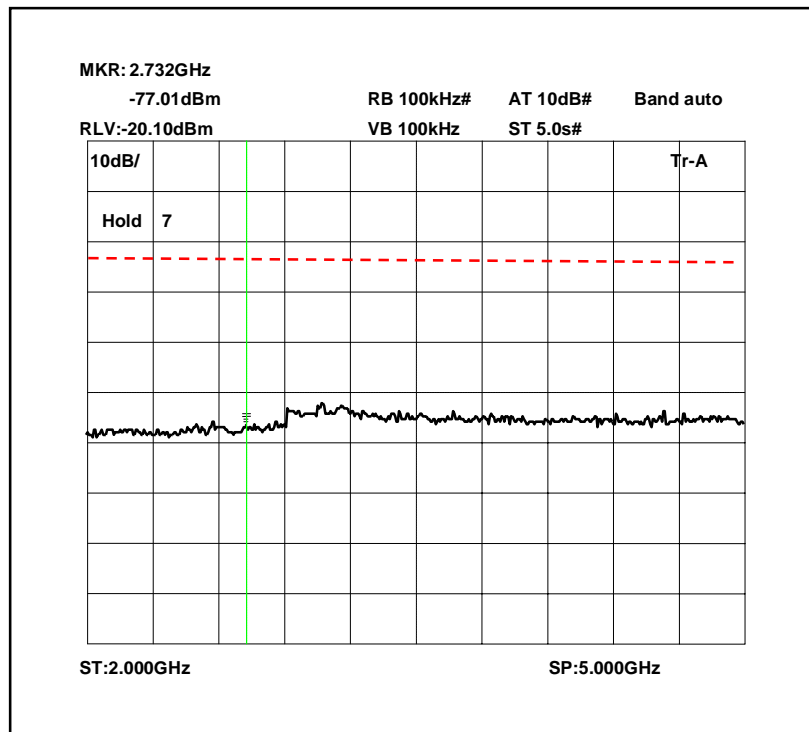
The test equipment used for the Transmitter Spurious Emissions:

| TYPE OF EQUIPMENT | MAKER/SUPPLIER | MODEL No   | SERIAL No  | TRL No | ACTUAL EQUIPMENT USED |
|-------------------|----------------|------------|------------|--------|-----------------------|
| SPECTRUM ANALYSER | ANRITSU        | MS2665C    | MT26089    | 479    | <b>X</b>              |
| HORN              | EMCO           | 3115       | 9010-3581  | 139    | <b>X</b>              |
| ATTENUATOR        | BIRD           | 8304-300-N | N/A        | 220    | <b>X</b>              |
| ATTENUATOR        | BIRD           | 8308-100   | N/A        | 112    | <b>X</b>              |
| CABLE             | ROSENBERGER    | MICRO COAX | N/A        | 280    | <b>X</b>              |
| SIGNAL GENERATOR  | MARCONI        | 2023       | 112224/040 | UH105  | <b>X</b>              |

Radiated emissions 486.0625 MHz 0 – 2 GHz

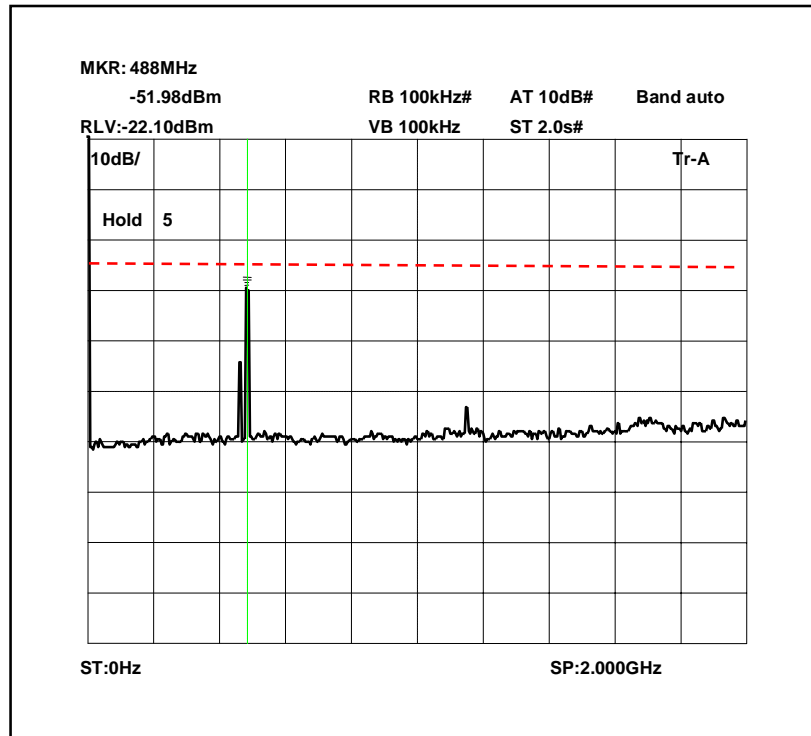


Radiated emissions 486.0625 MHz 2 – 5 GHz

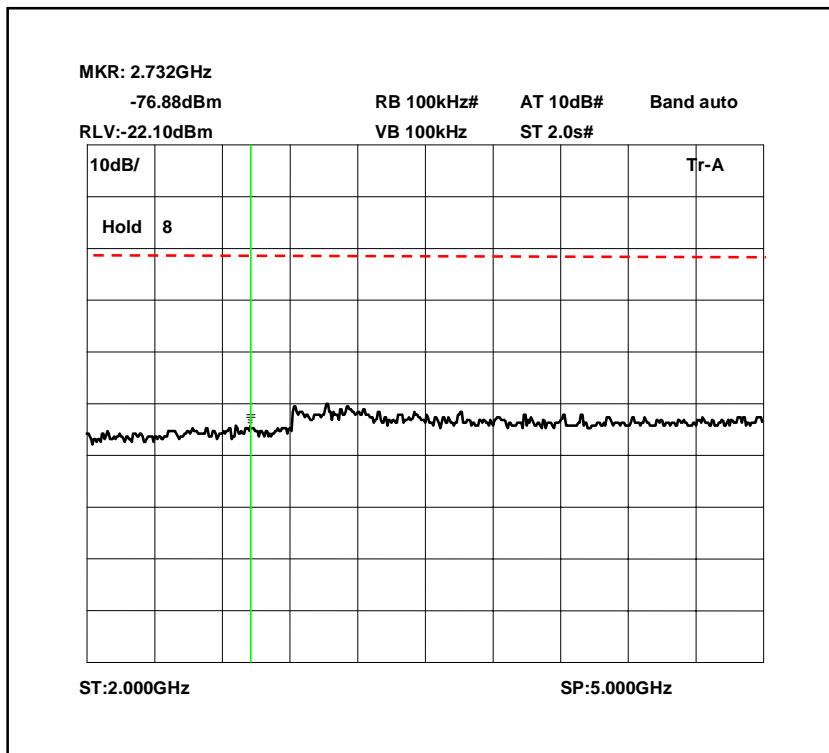


The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions 486.5625 MHz 0 – 2 GHz



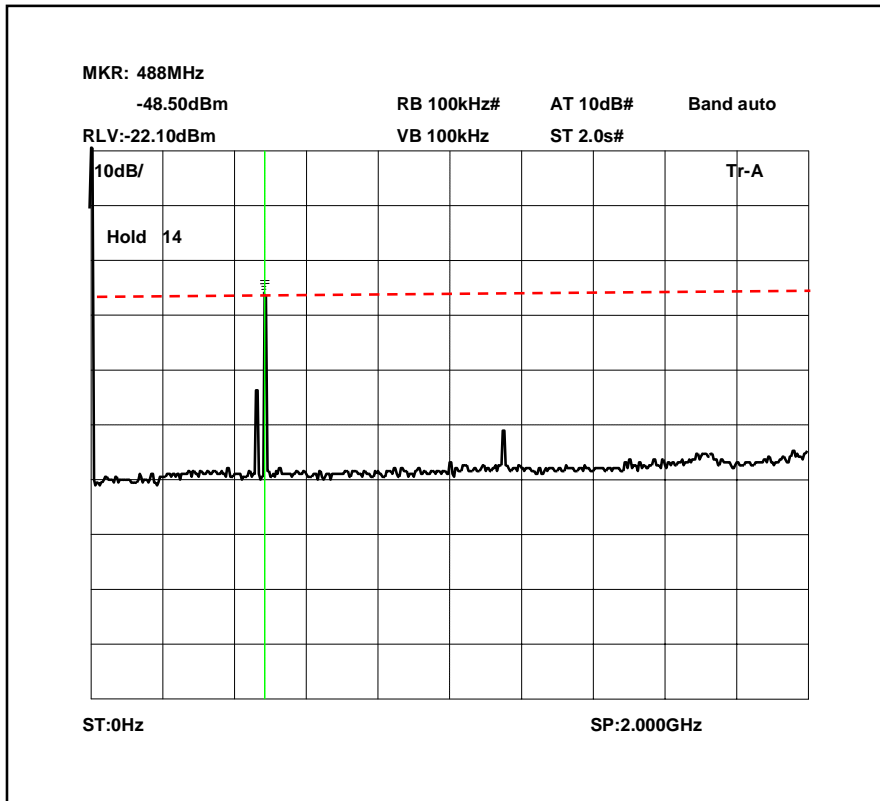
Radiated emissions 486.5625 MHz 2 – 5 GHz



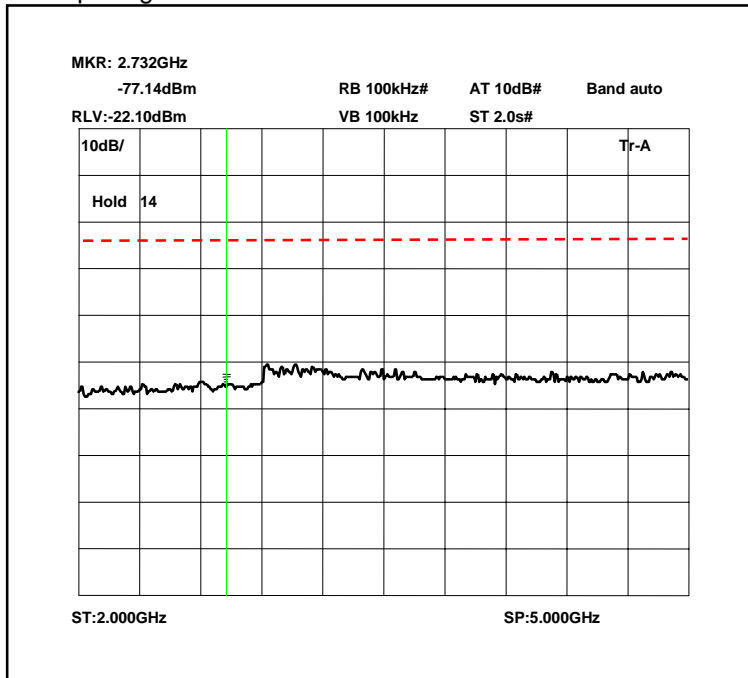
The above test results show that there were no emissions within 20dBs of the -13dBm limit.



Radiated emissions no input signal 0 – 2 GHz



Radiated emissions no input signal 2 – 4 GHz



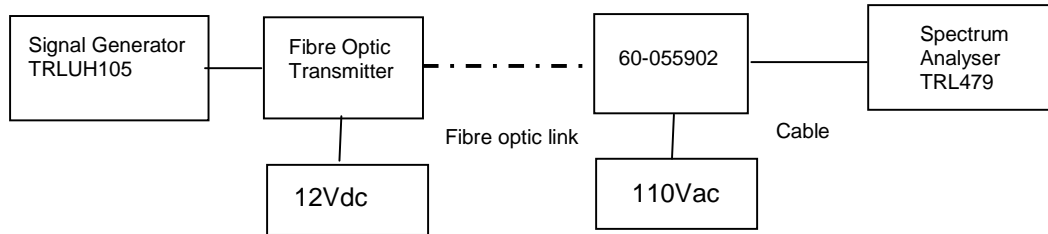
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

**TRANSMITTER TESTS**

**FIBRE OPTIC SYSTEM FREQUENCY STABILITY – VOLTAGE – Part 90.213– UPLINK**

Ambient temperature = 23°C  
 Relative humidity = 56%  
 Supply voltage = 110Vac

Radio Laboratory  
 Test Signal = F3E

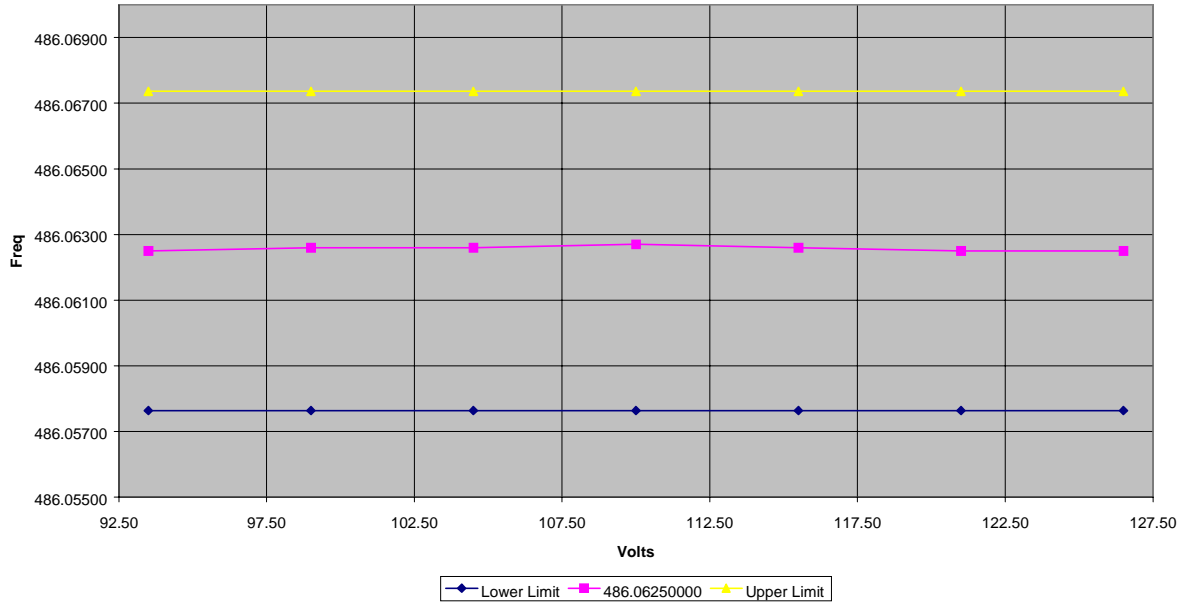


The test was set up as per the diagram. The level at the input was set to 0 dBm. The units were tested operating maximum power on the frequencies as per the table below. One unit was held constant at its nominal operating voltage, 110Vac, while the nominal operating voltage of the other unit, +12Vdc was varied over the range 85% to 115%. The units were then tested with the +12Vdc unit held constant at its nominal voltage and the other unit voltage varied over the 85% to 115%. The results can be seen in the tables below and on the plots overleaf. For reference the frequency variations are compared to a 2.5ppm limit in the plots.

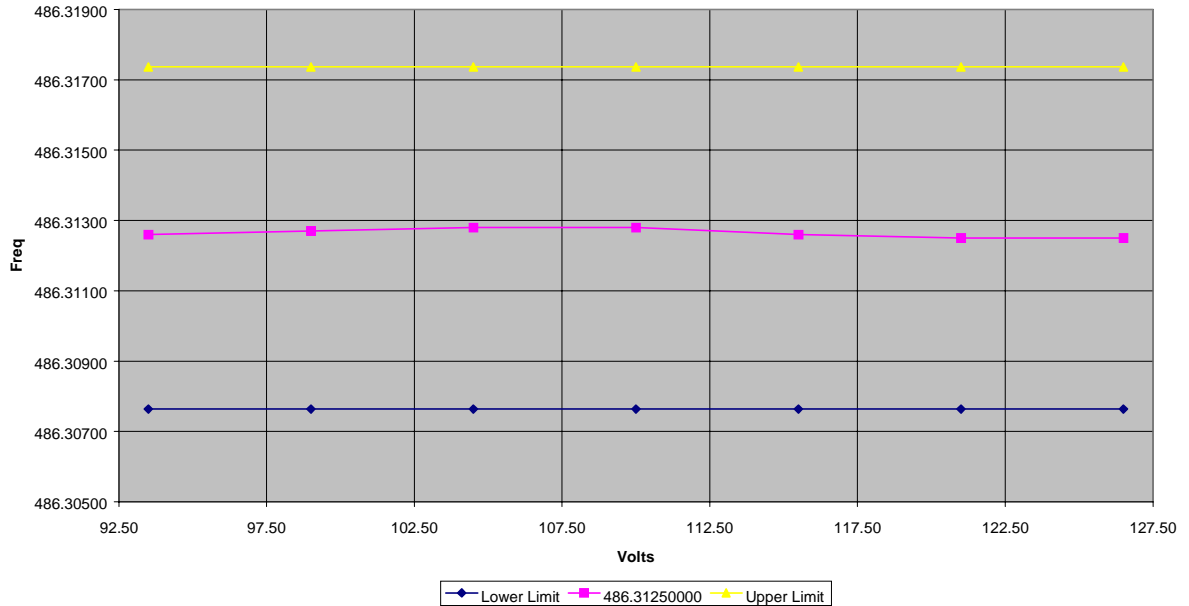
Results for 60-055902 +110Vac varied over the 85% - 115 % range.

| VOLTAGE % | FREQUENCY 486.0625MHz | PPM | FREQUENCY 486.3125MHz | PPM | FREQUENCY 486.5625MHz | PPM |
|-----------|-----------------------|-----|-----------------------|-----|-----------------------|-----|
| 85        | 486.0625              | 0   | 486.3126              | 0.2 | 486.5628              | 0.6 |
| 90        | 486.0626              | 0.2 | 486.3127              | 0.4 | 486.5628              | 0.6 |
| 95        | 486.0626              | 0.2 | 486.3128              | 0.6 | 486.5629              | 0.8 |
| 100       | 486.0627              | 0.4 | 486.3128              | 0.6 | 486.5628              | 0.6 |
| 105       | 486.0626              | 0.2 | 486.3126              | 0.2 | 486.5628              | 0.6 |
| 110       | 486.0625              | 0   | 486.3125              | 0   | 486.5629              | 0.8 |
| 115       | 486.0625              | 0   | 486.3125              | 0   | 486.5629              | 0.8 |

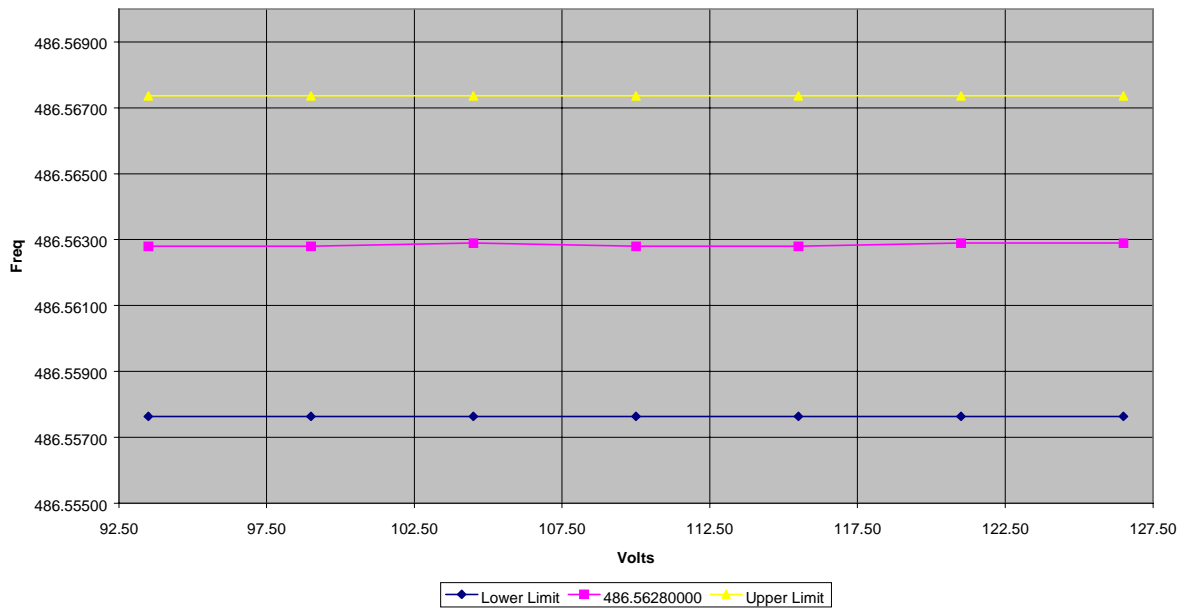
Uplink - 60-055902 - 486.0625MHz Frequency Stability - Voltage



Uplink - 60-055902 - 486.3125MHz Frequency Stability - Voltage



**Uplink - 60-055902 - 486.5625MHz Frequency Stability - Voltage**



Test equipment used for frequency stability testing:

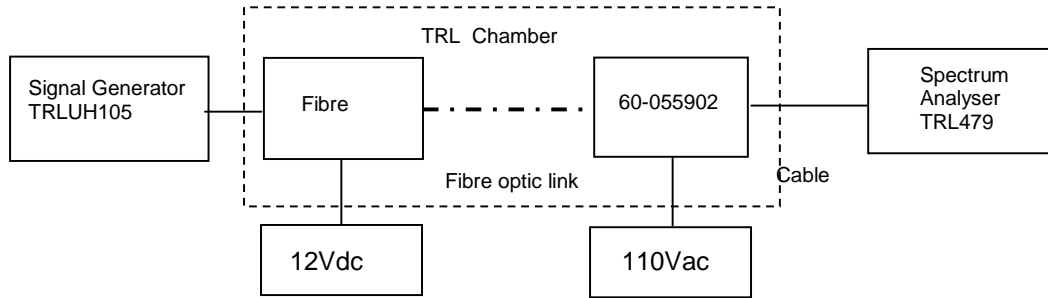
| TYPE OF EQUIPMENT    | MAKER/SUPPLIER | MODEL No   | SERIAL No  | TRL No | ACTUAL EQUIPMENT USED |
|----------------------|----------------|------------|------------|--------|-----------------------|
| SPECTRUM ANALYSER    | ANRITSU        | MS2665C    | MT26089    | 479    | <b>X</b>              |
| VARIABLE TRANSFORMER | RS COMPONENTS  | 8A         | 207-914    | UH34   | <b>X</b>              |
| ATTENUATOR           | BIRD           | 8304-300-N | N/A        | 220    | <b>X</b>              |
| ATTENUATOR           | BIRD           | 8308-100   | N/A        | 112    | <b>X</b>              |
| CABLE                | ROSENBERGER    | MICRO COAX | N/A        | 280    | <b>X</b>              |
| SIGNAL GENERATOR     | MARCONI        | 2023       | 112224/040 | UH105  | <b>X</b>              |

**TRANSMITTER TESTS**

**FIBRE OPTIC SYSTEM FREQUENCY STABILITY – TEMPERATURE – Part 90.213– UPLINK**

Ambient temperature = N/A  
 Relative humidity = N/A  
 Conditions = OATS  
 Supply voltage = 110Vac

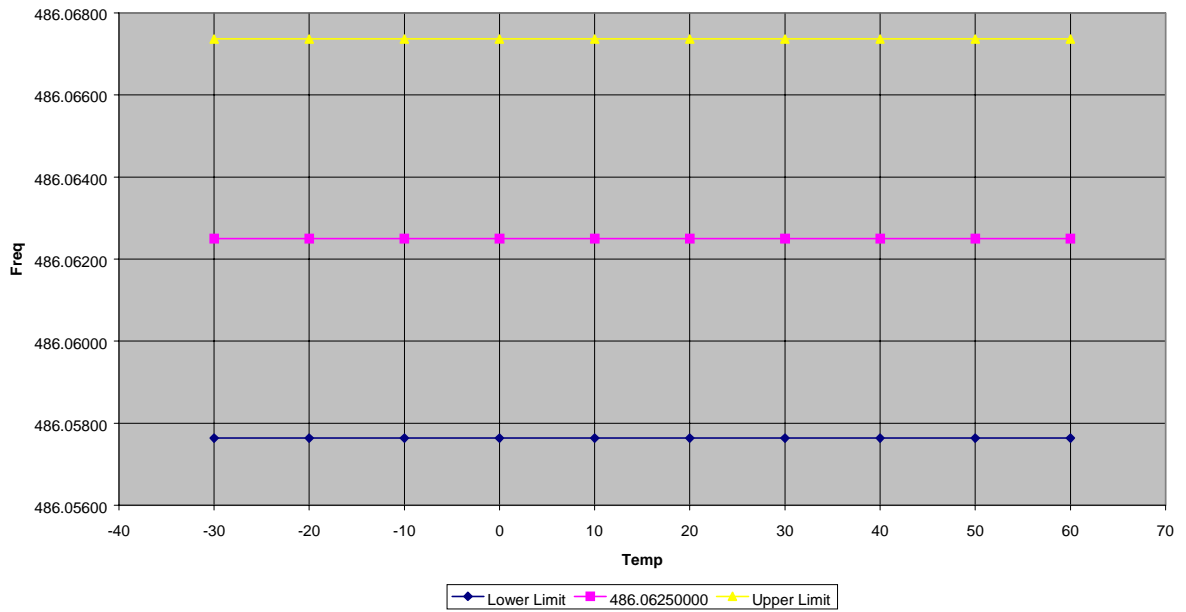
Radio Laboratory  
 Test Signal = F3E



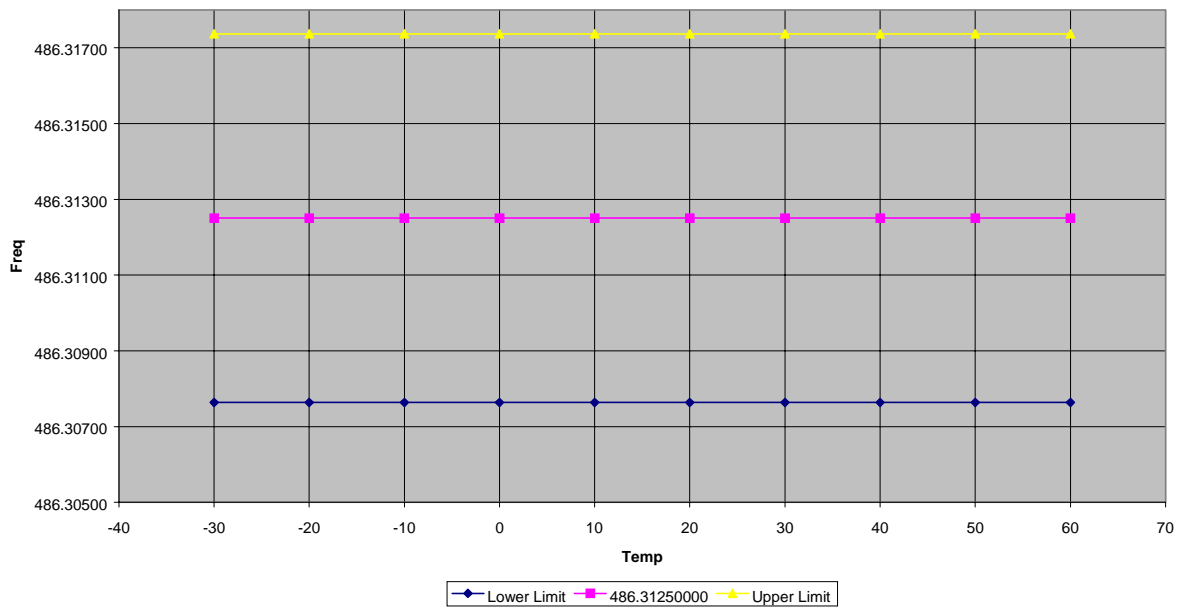
The test was set up as per the diagram. The level at the input was set to -14 dBm. The units were tested operating maximum power on the frequencies as per the table below. Both units were held constant at their nominal operating voltages, 110V. The units were then tested with the ambient temperature varied over the range -30°C to +60°C. The results can be seen in the table below and on the plots over leaf. For reference the frequency variations are compared to a 2.5ppm limit in the plots.

| TEMP<br>°C | FREQUENCY<br>486.0625MHz | PPM | FREQUENCY<br>486.3125MHz | PPM | FREQUENCY<br>486.5625MHz | PPM |
|------------|--------------------------|-----|--------------------------|-----|--------------------------|-----|
| -30        | 486.0625                 | 0   | 486.3125                 | 0   | 486.5625                 | 0   |
| -20        | 486.0625                 | 0   | 486.3125                 | 0   | 486.5625                 | 0   |
| -10        | 486.0625                 | 0   | 486.3125                 | 0   | 486.5625                 | 0   |
| 0          | 486.0625                 | 0   | 486.3125                 | 0   | 486.5625                 | 0   |
| 10         | 486.0625                 | 0   | 486.3125                 | 0   | 486.5625                 | 0   |
| 20         | 486.0625                 | 0   | 486.3125                 | 0   | 486.5625                 | 0   |
| 30         | 486.0625                 | 0   | 486.3125                 | 0   | 486.5625                 | 0   |
| 40         | 486.0625                 | 0   | 486.3125                 | 0   | 486.5625                 | 0   |
| 50         | 486.0625                 | 0   | 486.3125                 | 0   | 486.5625                 | 0   |
| 60         | 486.0625                 | 0   | 486.3125                 | 0   | 486.5625                 | 0   |

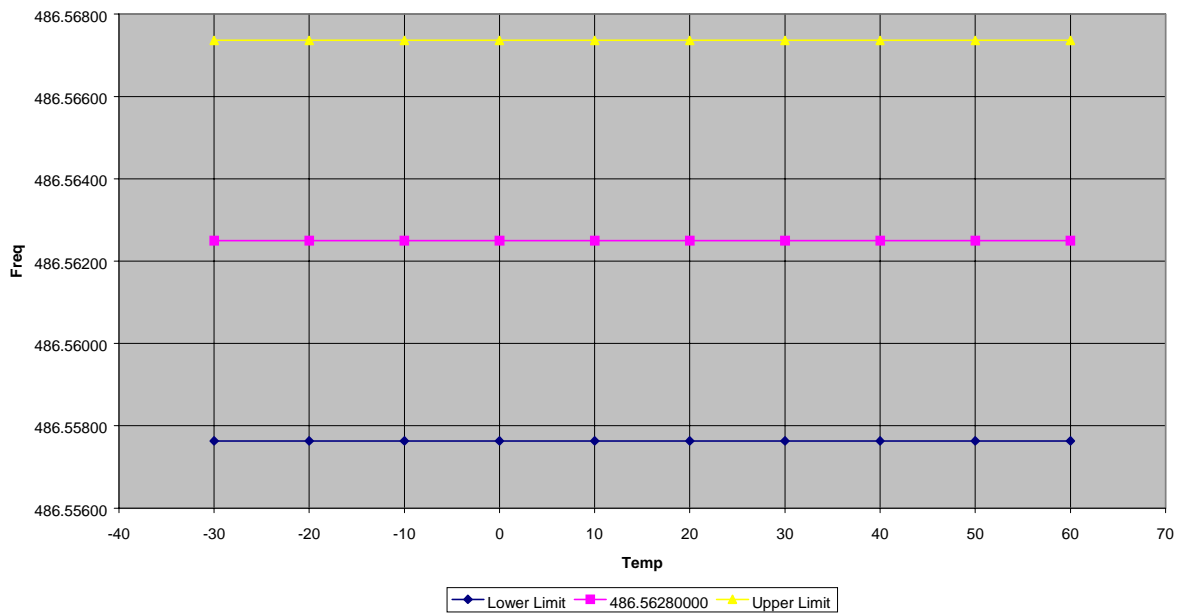
Uplink - 486.0625MHz Frequency Stability - Temperature



Uplink - 486.3125MHz Frequency Stability - Temperature



Uplink - 486.5625MHz Frequency Stability - Temperature



Test equipment used for frequency stability testing:

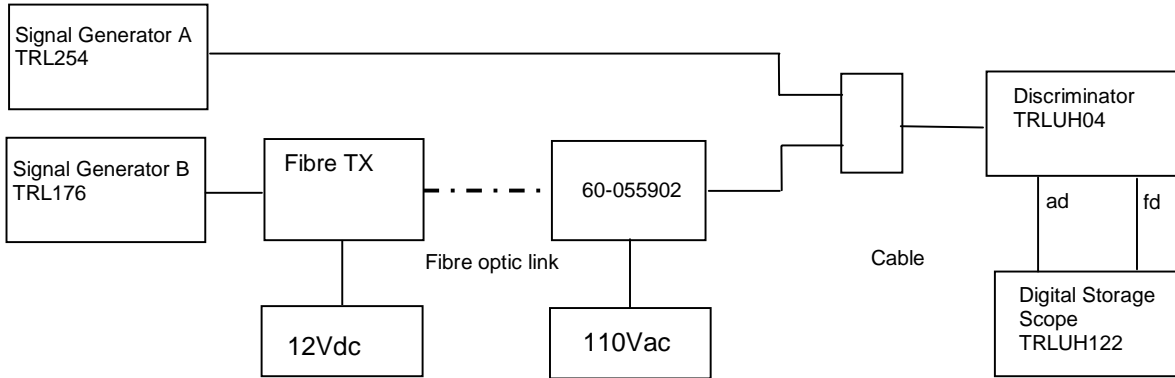
| TYPE OF EQUIPMENT   | MAKER/SUPPLIER | MODEL No     | SERIAL No  | TRL No | ACTUAL EQUIPMENT USED |
|---------------------|----------------|--------------|------------|--------|-----------------------|
| SPECTRUM ANALYSER   | ANRITSU        | MS2665C      | MT26089    | 479    | <b>X</b>              |
| TEMPERATURE CHAMBER | SHARETREE      | TTC 125-815P | CS203      | 11     | <b>X</b>              |
| ATTENUATOR          | BIRD           | 8304-300-N   | N/A        | 220    | <b>X</b>              |
| ATTENUATOR          | BIRD           | 8308-100     | N/A        | 112    | <b>X</b>              |
| CABLE               | ROSENBERGER    | MICRO COAX   | N/A        | 280    | <b>X</b>              |
| SIGNAL GENERATOR    | MARCONI        | 2023         | 112224/040 | UH105  | <b>X</b>              |

## TRANSMITTER TESTS

### FIBRE OPTIC SYSTEM TRANSIENT FREQUENCY BEHAVIOUR – Part 90.214 – UPLINK

Ambient temperature = 21°C  
 Relative humidity = 38%  
 Conditions = OATS  
 Supply voltage = 110Vac

Radio Laboratory  
 Test Signal = F3E



The test equipment was connected as above. Signal generator A was tuned to the centre frequency of the channel selected on the EUT. The signal was modulated with a 1 kHz tone with an FM deviation that corresponds to the EUT operational channel spacing. The power level of the signal is adjusted to 0.1% of the power of the transmitter under test. Signal Generator B was used to mimic the switching on of a transmitter into the EUT.

Both signals were fed into the input of an RF discriminator via a combiner. The discriminator was connected to two channels of the digital storage oscilloscope (DSO) One channel monitored the frequency difference (fd) and the second monitored the audio difference (ad). The DSO is set to display the channel corresponding to the fd input up to  $\pm 1$  channel frequency difference. The DSO is set to 10ms/div and to trigger at 1 div from the left edge of the display.

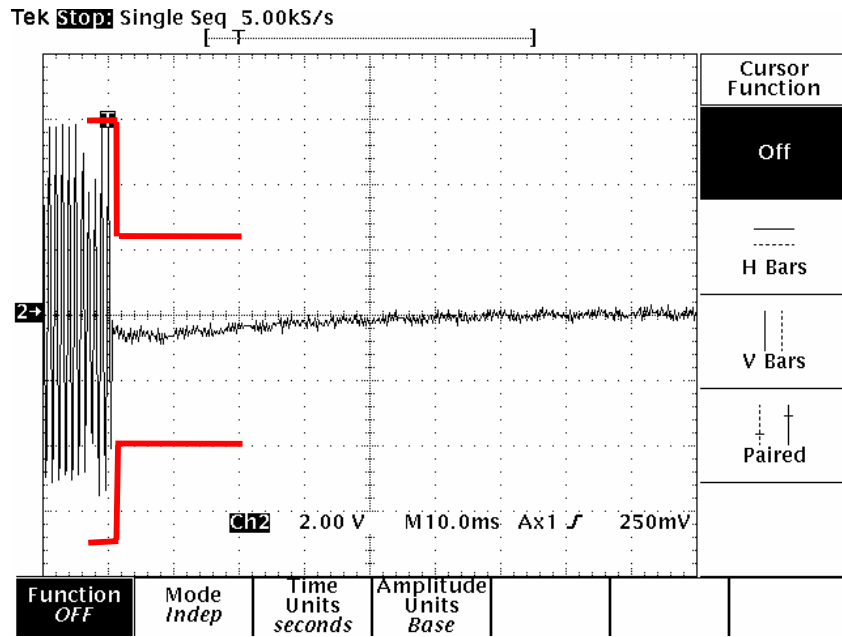
The display will show the 1 kHz test signal continuously. The DSO is then set to trigger on the ad input at a low input rising. The transmitter is then turned on without modulation. Due to the ratio between the 1 kHz test signal and the wanted signal the test signal will be suppressed. The resulting plots were recorded and compared to the limit. See overleaf for plot data.

| Time intervals <sup>1,2</sup>  | Maximum Frequency Difference <sup>3</sup>  | All Equipment  |                |
|--|--|----------------|----------------|
|  |  | 150 to 174 MHz | 421 to 512 MHz |
| Transient Frequency Behaviour for Equipment Designed to operate on 25 kHz Channels   |  |                |                |
| $t_1^4$  | $\pm 25.0$ kHz   | 5.0 ms         | 10.0 ms        |
| $t_2^4$  | $\pm 12.5$ kHz   | 20.0 ms        | 25.0 ms        |
| $t_3^4$  | $\pm 25.0$ kHz   | 5.0 ms         | 10.0 ms        |
| Transient Frequency Behaviour for Equipment Designed to operate on 12.5 kHz Channels |  |                |                |
| $t_1^4$  | $\pm 12.5$ kHz   | 5.0 ms         | 10.0 ms        |
| $t_2^4$  | $\pm 6.25$ kHz   | 20.0 ms        | 25.0 ms        |
| $t_3^4$  | $\pm 12.5$ kHz   | 5.0 ms         | 10.0 ms        |
| Notes  | $t_{on}$ is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.<br>$t_1$ is the time period immediately following $t_{on}$<br>$t_2$ is the time period immediately following $t_1$<br>$t_3$ is the time period from when the transmitter is turned off until $t_{off}$<br>$t_{off}$ is the instant when the 1 kHz test signal starts to rise |                |                |

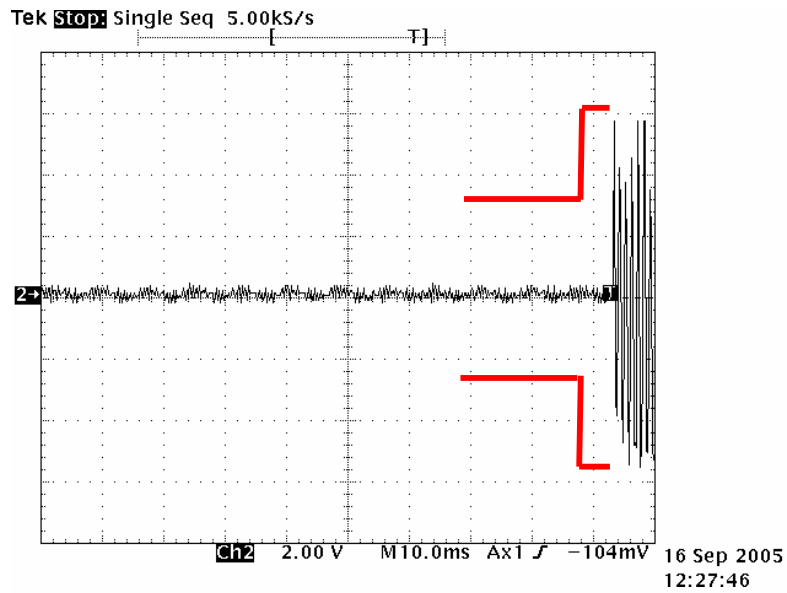


Frequency of operation = 486.0625MHz

Channel Spacing = 12.5 kHz



Ton

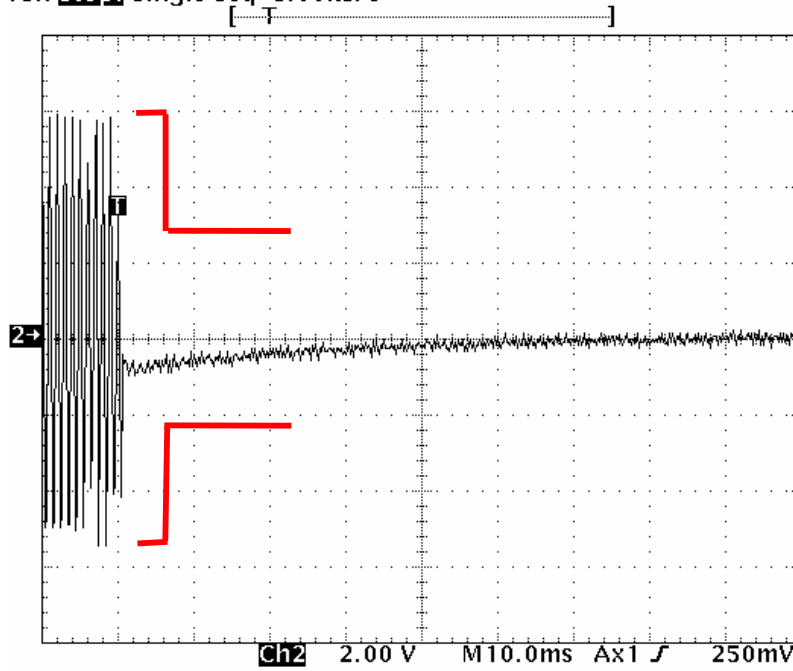


Toff

Frequency of operation = 483.2875MHz

Channel Spacing = 12.5 kHz

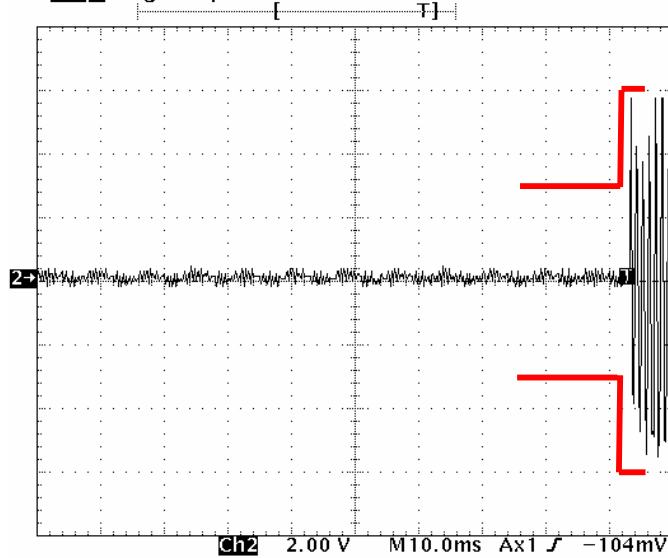
Tek **Stop**: Single Seq 5.00kS/s



16 Sep 2005  
12:09:13

**Ton**

Tek **Stop**: Single Seq 5.00kS/s



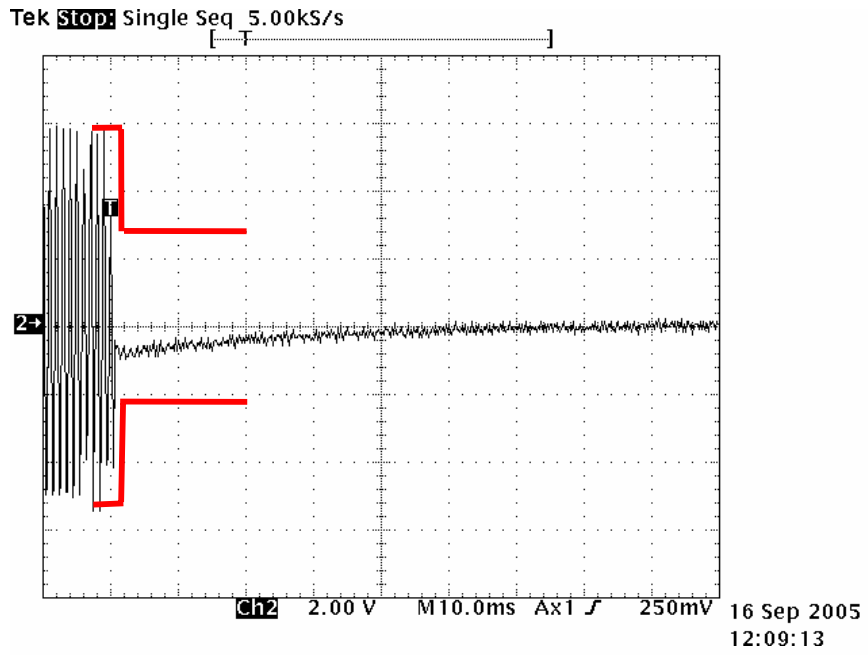
16 Sep 2005  
12:27:46

**Toff**

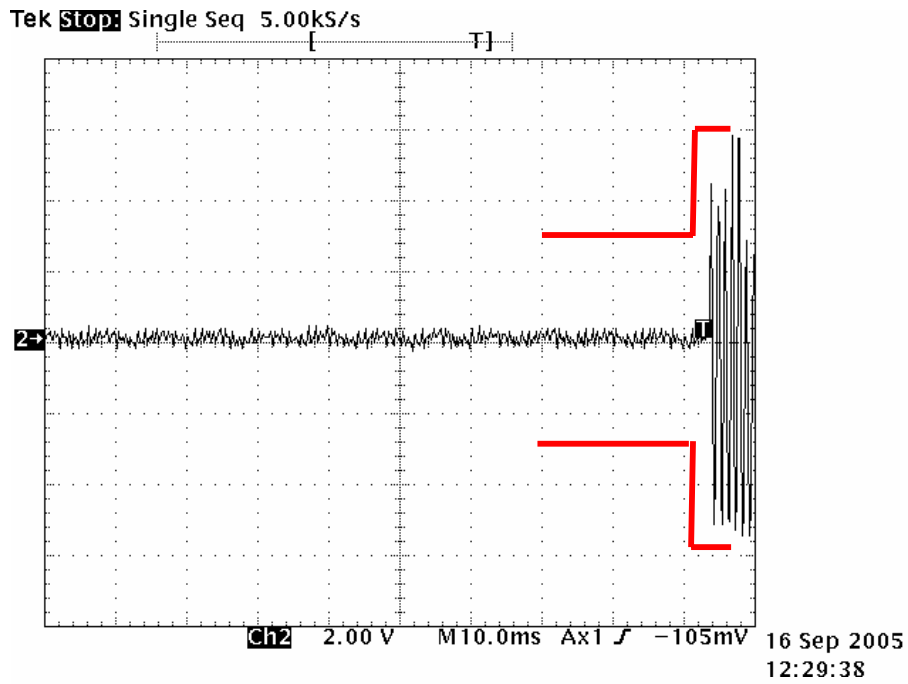
Frequency of operation = 483.5625 MHz

Channel Spacing = 12.5 kHz

Ton



Ton



Toff

Test equipment used for frequency stability testing:

| TYPE OF EQUIPMENT | MAKER/SUPPLIER  | MODEL No   | SERIAL No  | TRL No | ACTUAL EQUIPMENT USED |
|-------------------|-----------------|------------|------------|--------|-----------------------|
| SPECTRUM ANALYSER | ANRITSU         | MS2665C    | MT26089    | 479    | <b>X</b>              |
| RECEIVER          | RHODE & SCHWARZ | ESVS10     | 825892/003 | UH04   | <b>x</b>              |
| ATTENUATOR        | BIRD            | 8304-300-N | N/A        | 220    | <b>X</b>              |
| ATTENUATOR        | BIRD            | 8308-100   | N/A        | 112    | <b>X</b>              |
| CABLE             | ROSENBERGER     | MICRO COAX | N/A        | 280    | <b>X</b>              |
| SIGNAL GENERATOR  | MARCONI         | 2023       | 112224/040 | UH105  | <b>X</b>              |

**ANNEX A**  
**PHOTOGRAPHS**

PHOTOGRAPH No. 1

TEST SETUP



PHOTOGRAPH No. 2

TEST SETUP



**ANNEX B**  
**TEST EQUIPMENT CALIBRATION DETAILS**



### TEST EQUIPMENT CALIBRATION DETAILS

| TRL Number | Equipment Type    | Manufacturer | Last Cal Calibration | Calibration Period |
|------------|-------------------|--------------|----------------------|--------------------|
|            | 3m Range ERP      |              |                      |                    |
| UH006      | CAL               | TRL          | 01/03/05             | 12                 |
| UH028      | Log Periodic Ant  | Schwarbeck   | 28/04/05             | 24                 |
| UH029      | Bicone Antenna    | Schwarbeck   | 27/04/05             | 24                 |
| UH041      | Multimeter        | AVOmeter     | 14/12/04             | 12                 |
| UH120      | Spectrum Analyser | Marconi      | 15/03/05             | 12                 |
| UH122      | Oscilloscope      | Tektronix    | 07/06/05             | 24                 |
| UH162      | ERP Cable Cal     | TRL          | 23/05/05             | 12                 |
| UH179      | Power Sensor      | Marconi      | 14/12/04             | 12                 |
| UH228      | Power Sensor      | Marconi      | 17/01/05             | 12                 |
| UH253      | 1m Cable N type   | TRL          | 10/01/05             | 12                 |
| UH254      | 1m Cable N type   | TRL          | 10/01/05             | 12                 |
| L005       | CMTA              | R&S          | 22/10/04             | 12                 |
| L007       | Loop Antenna      | R&S          | 29/03/05             | 24                 |
| L138       | 1-18GHz Horn      | EMCO         | 15/04/05             | 24                 |
| L139       | 1-18GHz Horn      | EMCO         | 03/05/05             | 24                 |
| L176       | Signal Generator  | Marconi      | 31/01/05             | 12                 |
| L193       | Bicone Antenna    | Chase        | 12/10/03             | 24                 |
| L203       | Log Periodic Ant  | Chase        | 21/10/03             | 24                 |
| L254       | Signal Generator  | Marconi      | 13/12/04             | 12                 |
| L280       | 18GHz Cable       | Rosenberger  | 10/01/05             | 12                 |
| L343       | CCIR Noise Filter | TRL          | 07/06/05             | 12                 |
|            | Temperature       |              |                      |                    |
| L426       | Indicator         | Fluke        | 14/12/04             | 12                 |
| L478       | Signal Generator  | R&S          | 19/05/04             | 12                 |
| L479       | Analyser          | Anritsu      | 05/10/04             | 12                 |
| L552       | Signal Generator  | Agilent      | 25/04/05             | 12                 |