



**TRL Compliance**  
part of TRAC global

**REPORT ON THE CERTIFICATION TESTING OF AN  
AERIAL FACILITIES LIMITED  
PRIVATE LAND MOBILE REPEATER.  
50-157401  
WITH RESPECT TO  
THE FCC RULES CFR 47, PART 90 Subpart I  
PRIVATE LAND MOBILE REPEATER.**



TEST REPORT NO: RU1409/8339  
COPY NO: 1  
ISSUE NO: 1  
FCC ID: NEO50 -1574SERIES

**REPORT ON THE CERTIFICATION TESTING OF A  
AERIAL FACILITIES LIMITED  
PRIVATE LAND MOBILE REPEATER.  
50-157401  
WITH RESPECT TO  
THE FCC RULES CFR 47, PART 90 Subpart I  
PRIVATE LAND MOBILE REPEATER.**

TEST DATE: 11<sup>th</sup> December 2007 – 2<sup>nd</sup> January 2008

TESTED BY: \_\_\_\_\_ S HODGKINSON  
APPROVED BY: \_\_\_\_\_ J CHARTERS  
RADIO SECTION  
LEADER  
DATE: 28<sup>th</sup> April 2008

Distribution:

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1. Aerial Facilities Limited
  2. TCB: TRL Compliance Limited
  3. TRL Compliance Ltd

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 <b>Notes:</b>		
1. Component failure during test	YES	<input type="checkbox"/>
	NO	<input checked="" type="checkbox"/>
2. If Yes, details of failure:		
3. The facilities used for the testing of the product contain in this report are FCC Listed.		



# TRL Compliance

part of TRAC global

## CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	NEO50-1574SERIES
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	FCC RULES CFR 47, Part 90 Subpart I
TEST RESULT:	Compliant to Specification
EQUIPMENT UNDER TEST:	50-157401
EQUIPMENT TYPE:	Private Land Mobile Repeater
MAXIMUM GAIN:	Uplink 83.61dB Downlink 91.02dB
MAXIMUM INPUT:	Uplink -55.18dBm Downlink -63.03dBm
MAXIMUM OUTPUT CONDUCTED:	Uplink 26.92dBm Downlink 25.19dBm
ANTENNA TYPE:	Uplink Downlink
CHANNEL SPACING:	Not Applicable, Wideband
FREQUENCY GENERATION:	N/A
MODULATION TYPE:	F3E
POWER SOURCE(s):	110Vac
TEST DATE(s):	11 <sup>th</sup> December 2007 – 2 <sup>nd</sup> January 2008
ORDER No(s):	47882
APPLICANT:	Aerial Facilities Limited
ADDRESS:	Aerial House Asheridge Road Chesham Buckinghamshire HP5 1TU
TESTED BY:	----- S HODGKINSON
APPROVED BY:	----- J CHARTERS RADIO SECTION LEADER

## APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT): 50-157401

EQUIPMENT TYPE: Private Land Mobile Repeater

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): 47882

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 Compliance Ltd

UKAS ACCREDITATION No: 0728

TEST DATE(s): 11<sup>th</sup> December 2007 – 2<sup>nd</sup> January 2008

TEST REPORT No: RU1409/8339

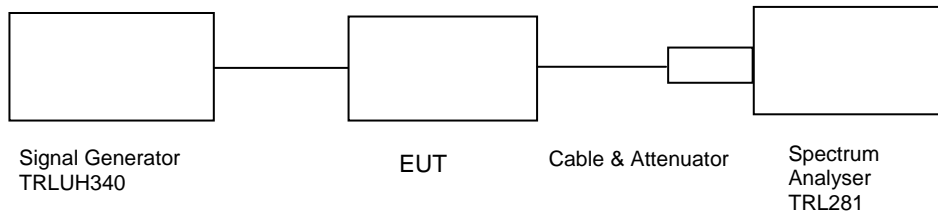


**COMPLIANCE TESTS**

**AMPLIFIER GAIN – CONDUCTED – PART 2.1046 –UHFLOW UPLINK**

Ambient temperature = 16°C  
 Relative humidity = 36%  
 Supply voltage = 110Vac  
 Channel number = See test results

Radio Laboratory



Frequency MHz	Signal Generator input level dBm	Input Cable Loss dB	Output Cable & Attenuator loss dB	Level at Spectrum Analyser dBm	Gain dB	Conducted Output Power dBm	Gain after 10dB input level increase dB
412.95	-57.79	0.30	40.57	-17.49	81.17	23.08	71.57
413.30	-57.29	0.30	40.57	-17.00	81.16	23.57	70.86
413.65	-57.38	0.30	40.57	-16.35	81.90	24.22	71.90

Notes: 1. The signal generator input was increased by 10dBs and the level of the output signal remeasured.

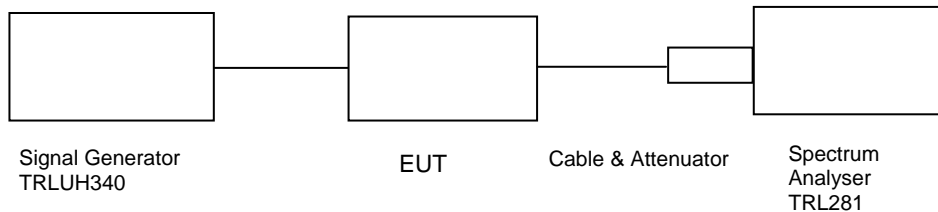
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU	200034	281	X
ATTENUATOR	BIRD	8308-200-N	N/A	103	X
ATTENUATOR	SPINNER	745357	D57224	225	X
SIGNAL GENERATOR	HEWLETT PACKARD	83630B	3722A00588	TRLUH340	X

## COMPLIANCE TESTS

### AMPLIFIER GAIN – CONDUCTED – PART 2.1046 –UHF MID UPLINK

Ambient temperature = 15°C  
 Relative humidity = 42%  
 Supply voltage = 110Vac  
 Channel number = See test results

Radio Laboratory



Frequency MHz	Signal Generator input level dBm	Input Cable Loss dB	Output Cable & Attenuator loss dB	Level at Spectrum Analyser dBm	Gain dB	Conducted Output Power dBm	Gain after 10dB input level increase dB
415.88	-56.50	0.30	40.59	-15.47	81.92	25.12	71.93
416.54	-56.39	0.30	40.59	-13.67	83.61	26.92	73.65
417.20	-56.49	0.30	40.59	-14.20	83.18	26.39	73.17

Notes: 1. The signal generator input was increased by 10dBs and the level of the output signal remeasured.

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU	200034	281	<b>X</b>
ATTENUATOR	BIRD	8308-200-N	N/A	103	<b>X</b>
ATTENUATOR	SPINNER	745357	D57224	225	<b>X</b>
SIGNAL GENERATOR	HEWLETT PACKARD	83630B	3722A00588	TRLUH340	<b>X</b>

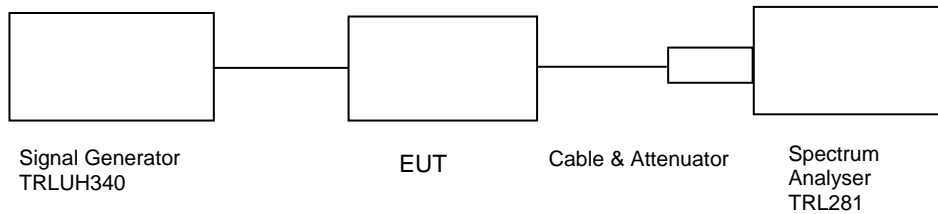


**COMPLIANCE TESTS**

**AMPLIFIER GAIN – CONDUCTED – PART 2.1046 –UHF HIGH UPLINK**

Ambient temperature = 15°C  
 Relative humidity = 42%  
 Supply voltage = 110Vac  
 Channel number = See test results

Radio Laboratory



Frequency MHz	Signal Generator input level dBm	Input Cable Loss dB	Output Cable & Attenuator loss dB	Level at Spectrum Analyser dBm	Gain dB	Conducted Output Power dBm	Gain after 10dB input level increase dB
419.05	-55.18	0.30	40.6	-14.55	81.53	26.05	71.62
419.525	-57.15	0.30	40.6	-14.67	83.38	25.93	73.36
420.00	-57.05	0.30	40.6	-14.40	83.55	26.20	73.54

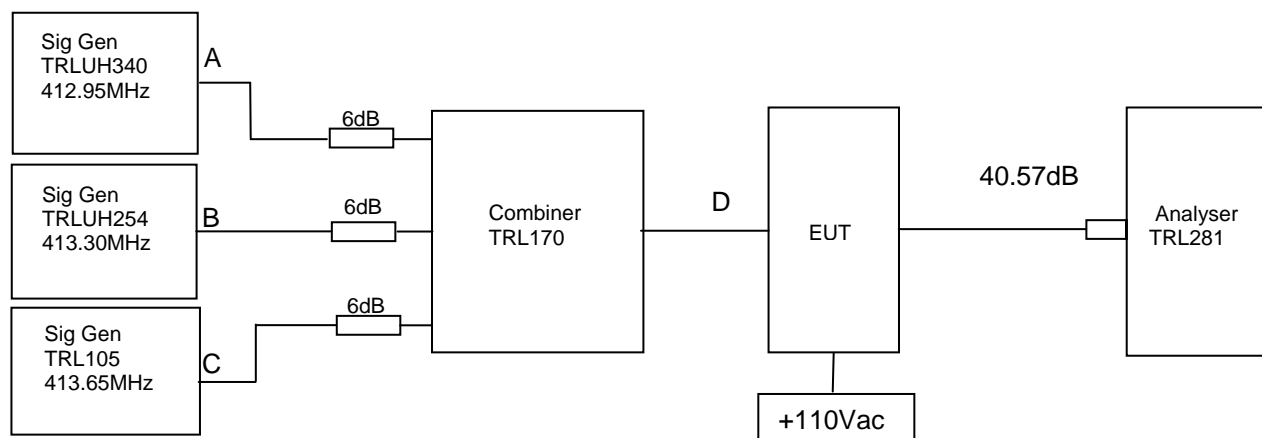
Notes: 1. The signal generator input was increased by 10dBs and the level of the output signal remeasured.

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU	200034	281	<b>X</b>
ATTENUATOR	BIRD	8308-200-N	N/A	103	<b>X</b>
ATTENUATOR	SPINNER	745357	D57224	225	<b>X</b>
SIGNAL GENERATOR	HEWLETT PACKARD	83630B	3722A00588	TRLUH340	<b>X</b>

**AMPLIFIER INTERMODULATION SPURIOUS EMISSIONS – CONDUCTED – PART 2.1053  
UHFLOW UPLINK**

Ambient temperature = 15°C  
Relative humidity = 42%  
Supply voltage = 110Vac

Radio Laboratory



The intermodulation and spurious products were measured with the amplifier operating at maximum gain. A three tone test was conducted using the equipment as above. The input power level was adjusted so the level at point D was 10dB above the maximum input of -57.20dBm. The cable and attenuator loss between the EUT and the spectrum analyser was 40.57dB.

RF Input Frequency (MHz)			Highest Intermodulation Product Level (dBm)	Limit (dBm)
412.95	413.30	413.65	-30.34@414.000MHz	-13

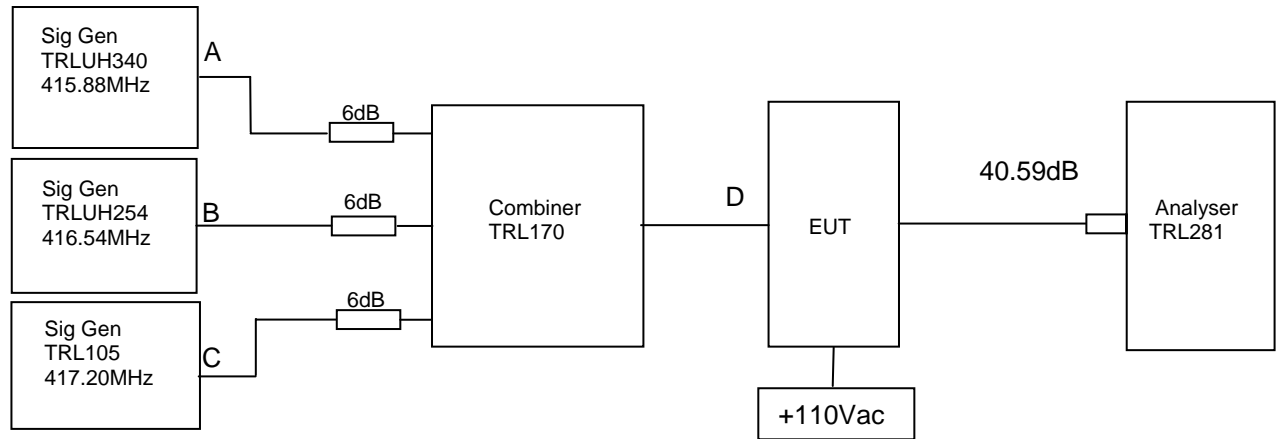
Test equipment used for intermodulation test

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
SIGNAL GENERATOR	HP	83630B	3722A00588	UH340	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
SIGNAL GENERATOR	MARCONI	2023	112224/040	UH105	X
CMTA	ROHDE & SCHWARZ	CMTA52	894715/033	05	
COMBINER	ELCOM	RC-4-50	N/A	170	X

**AMPLIFIER INTERMODULATION SPURIOUS EMISSIONS – CONDUCTED – PART 2.1053  
UHF MID UPLINK**

Ambient temperature = 15°C  
Relative humidity = 42%  
Supply voltage = 110Vac

Radio Laboratory



The intermodulation and spurious products were measured with the amplifier operating at maximum gain. A three tone test was conducted using the equipment as above. The input power level was adjusted so the level at point D was 10dB above the maximum input of -56.30dBm. The cable and attenuator loss between the EUT and the spectrum analyser was 40.59dB.

RF Input Frequency (MHz)			Highest Intermodulation Product Level (dBm)	Limit (dBm)
415.88	416.54	417.20	-29.74@416.7605MHz	-13

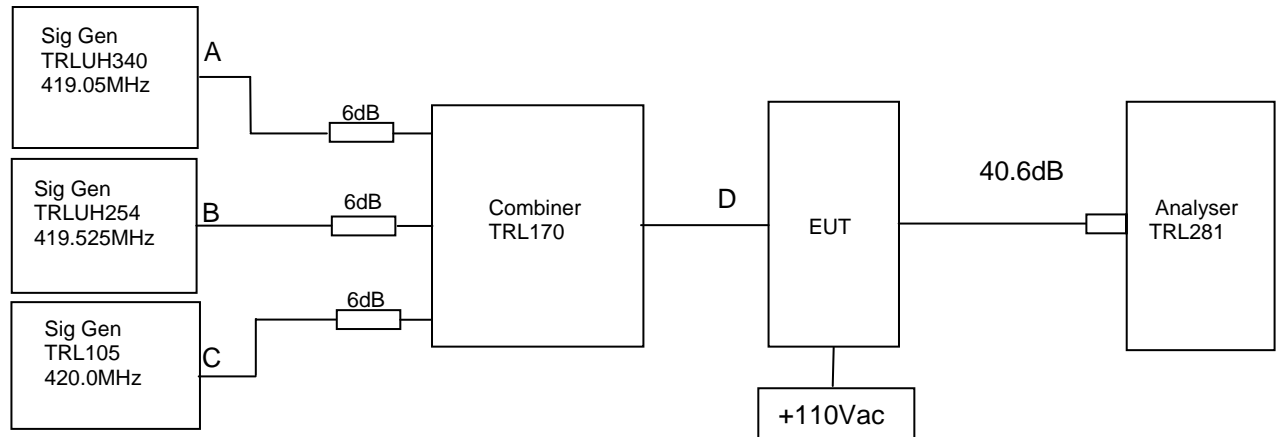
Test equipment used for intermodulation test

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
SIGNAL GENERATOR	HP	83630B	3722A00588	UH340	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
SIGNAL GENERATOR	MARCONI	2023	112224/040	UH105	X
CMTA	ROHDE & SCHWARZ	CMTA52	894715/033	05	
COMBINER	ELCOM	RC-4-50	N/A	170	X

**AMPLIFIER INTERMODULATION SPURIOUS EMISSIONS – CONDUCTED – PART 2.1053  
UHFHIGH UPLINK**

Ambient temperature = 15°C  
Relative humidity = 42%  
Supply voltage = 110Vac

Radio Laboratory



The intermodulation and spurious products were measured with the amplifier operating at maximum gain. A three tone test was conducted using the equipment as above. The input power level was adjusted so the level at point D was 10dB above the maximum input of -57.05dBm. The cable and attenuator loss between the EUT and the spectrum analyser was 40.6dB.

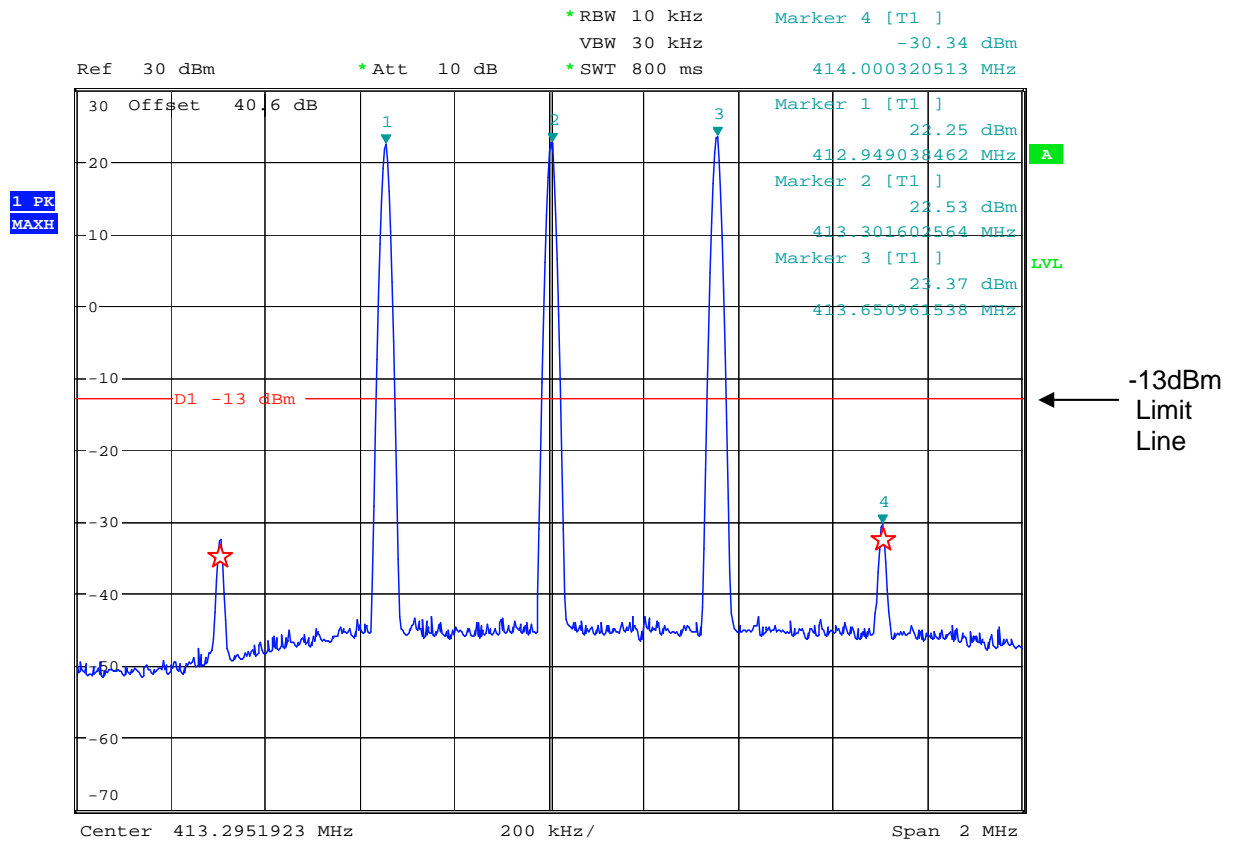
RF Input Frequency (MHz)			Highest Intermodulation Product Level (dBm)	Limit (dBm)
419.05	419.525	420.0	-15.36@420.4775MHz	-13

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	
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
SIGNAL GENERATOR	HP	83630B	3722A00588	UH340	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
SIGNAL GENERATOR	MARCONI	2023	112224/040	UH105	X
CMTA	ROHDE & SCHWARZ	CMTA52	894715/033	05	
COMBINER	ELCOM	RC-4-50	N/A	170	X

# Intermodulation Inband

## UHFLOW UPLINK

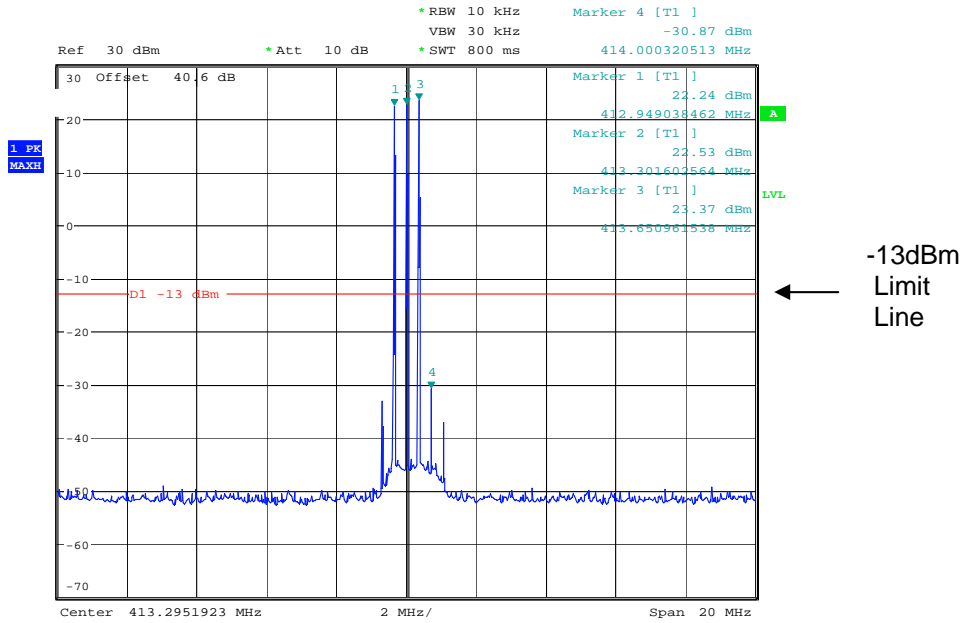


Date: 20.DEC.2007 11:20:45

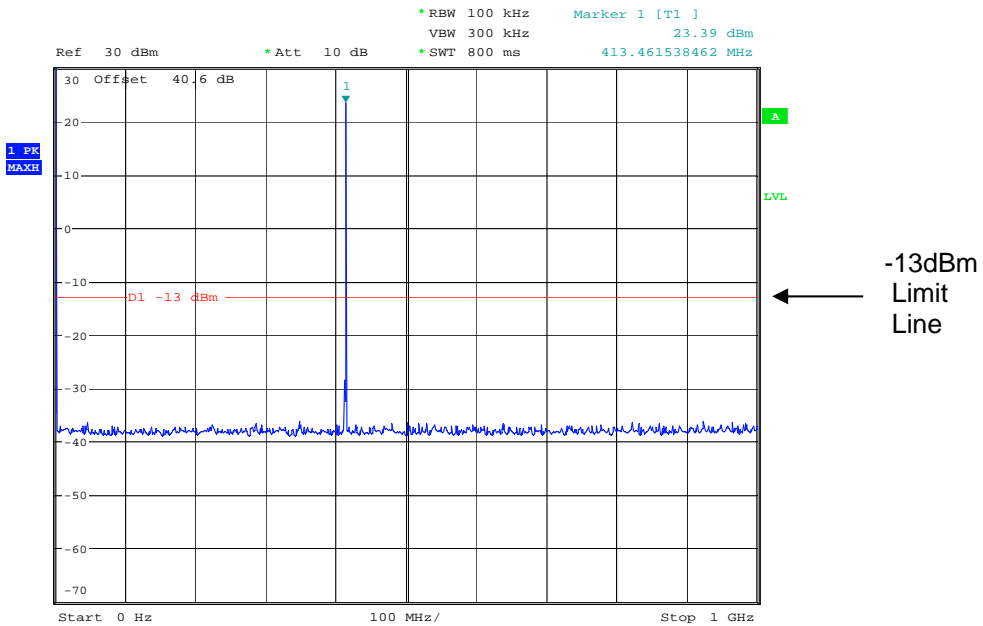
The above plot shows that all products (designated by ☆) are below the spurious limit.

UHFLOW UPLINK

Intermodulation Wideband



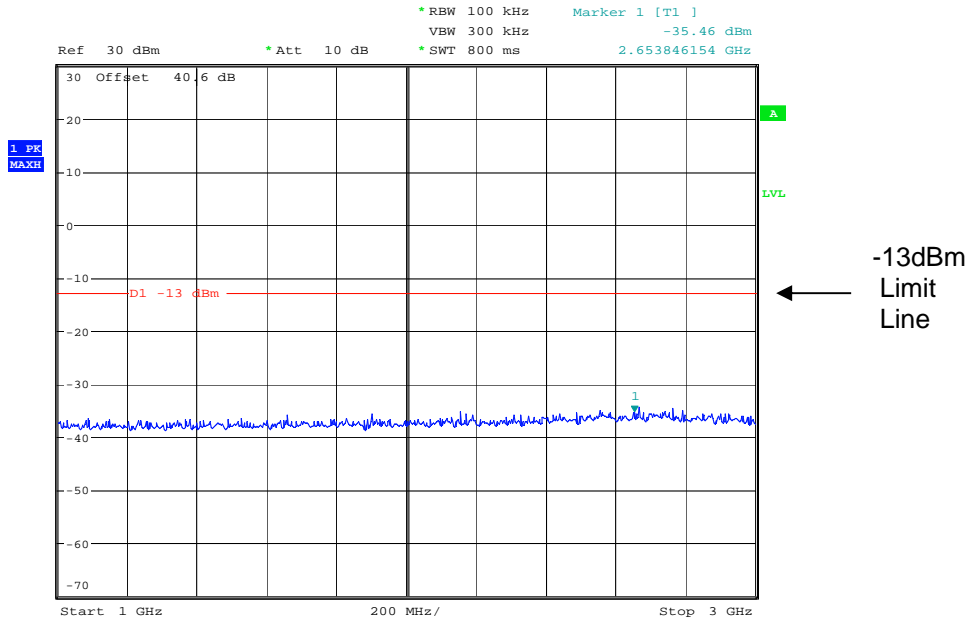
Date: 20.DEC.2007 11:22:33



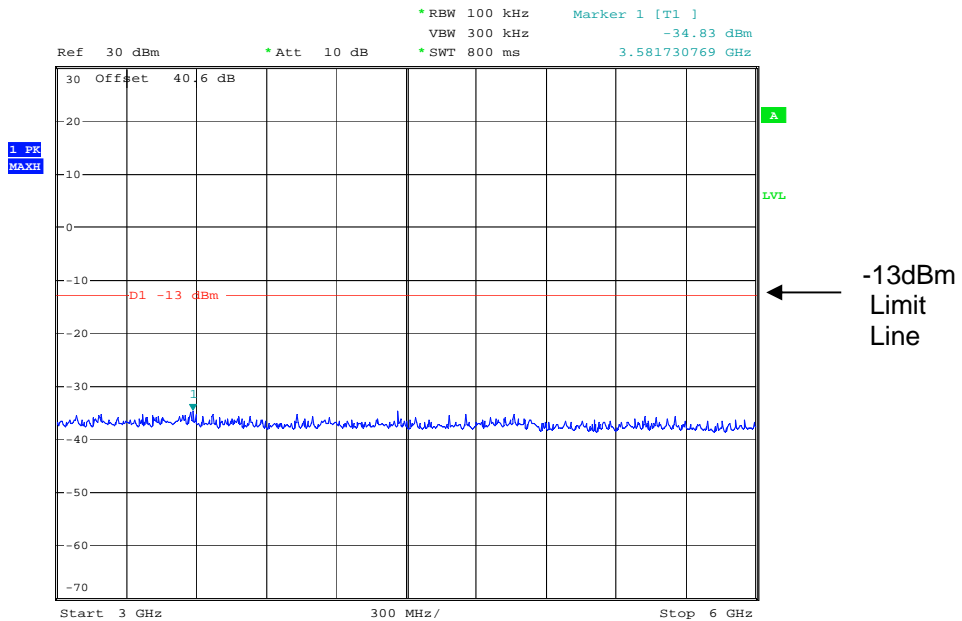
Date: 20.DEC.2007 11:23:39

# Intermodulation Wideband

## UHFLOW UPLINK



Date: 20.DEC.2007 11:24:32

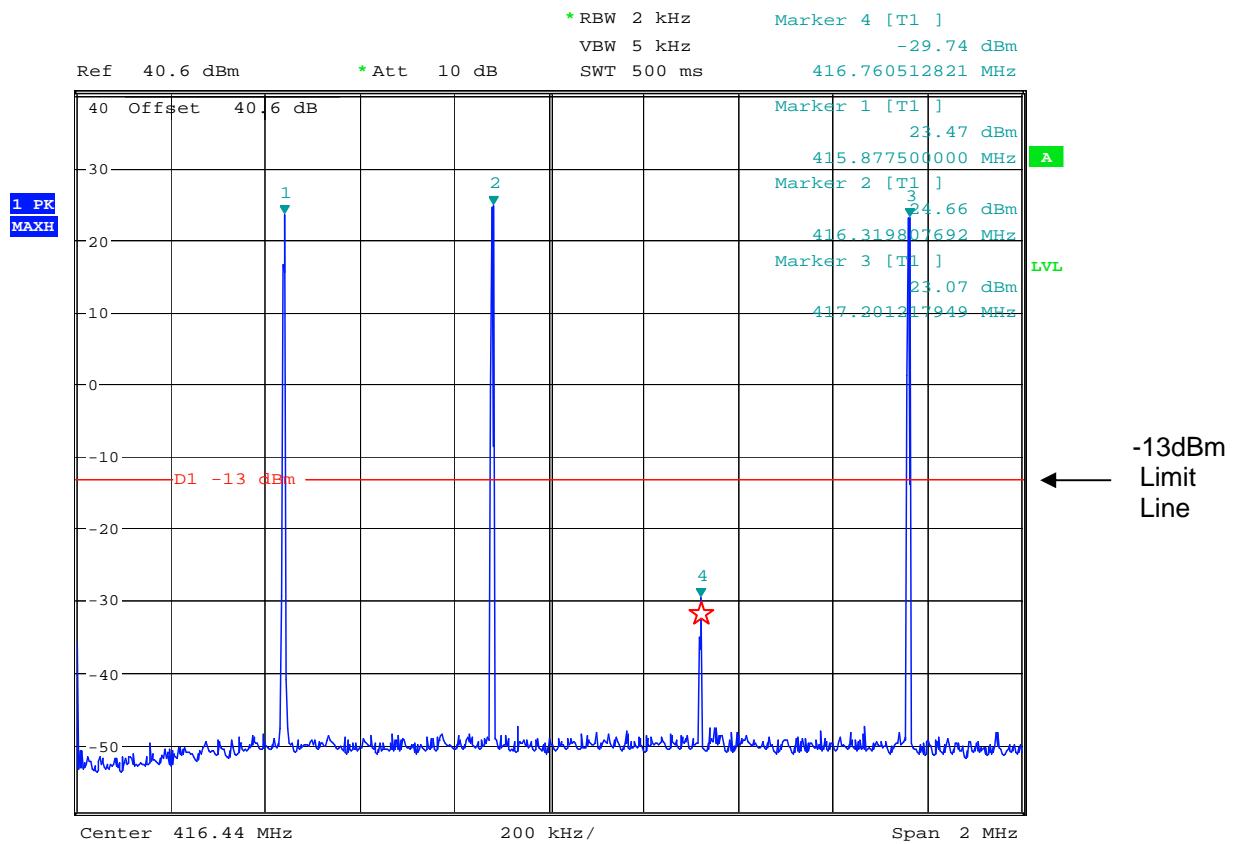


Date: 20.DEC.2007 11:25:12

The plot shows that there are no products outside the bands.

UHF MID UPLINK

Intermodulation Inband

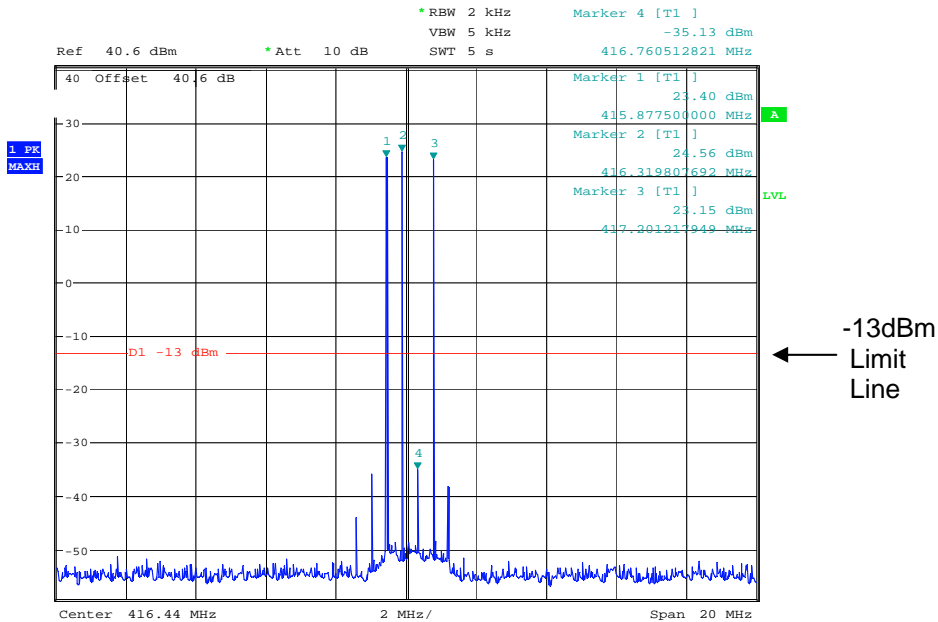


Date: 20.DEC.2007 13:36:06

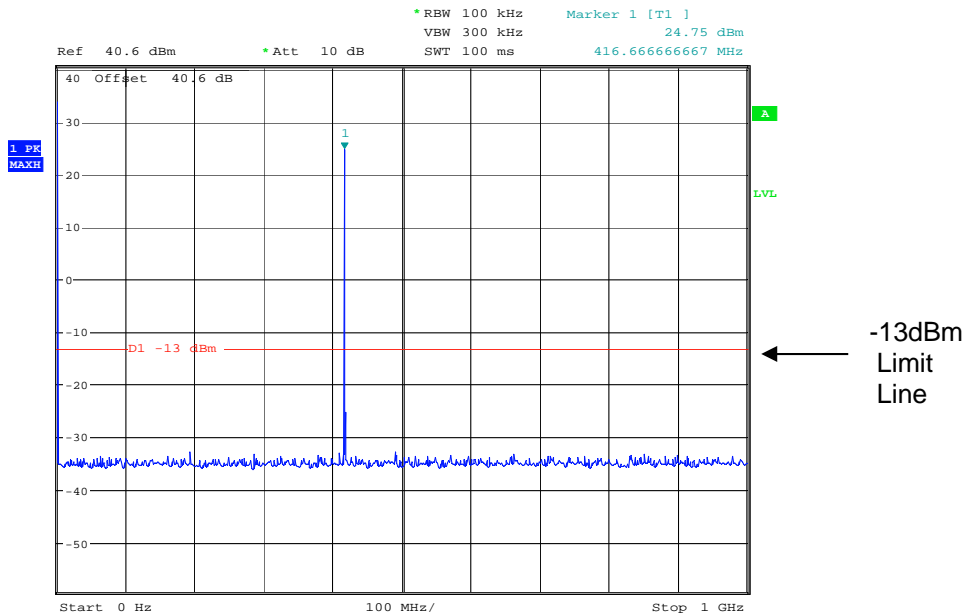
The above plot shows that all products (designated by ☆) are below the spurious limit.



Intermodulation Wideband



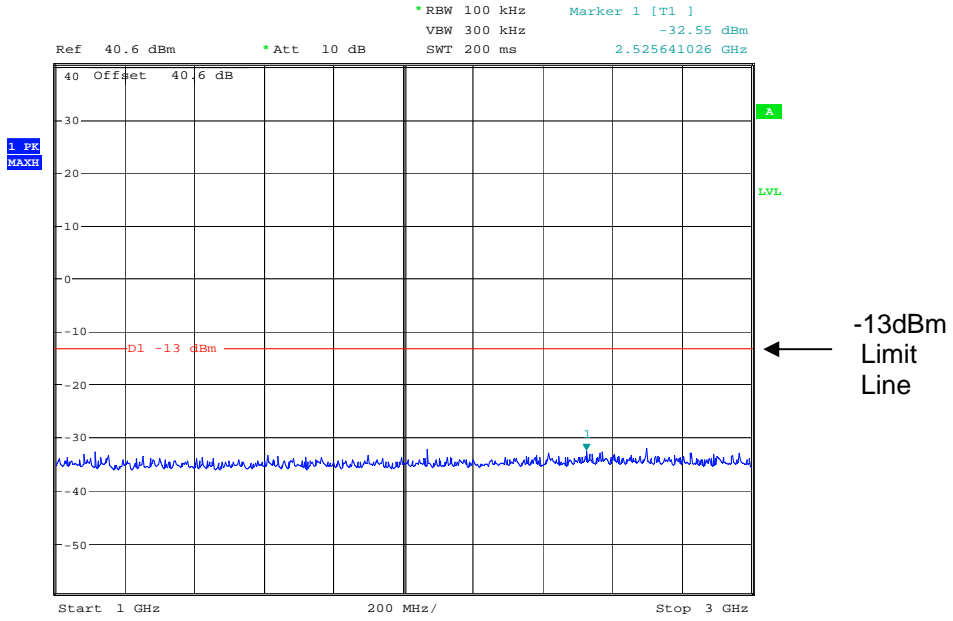
Date: 20.DEC.2007 13:37:01



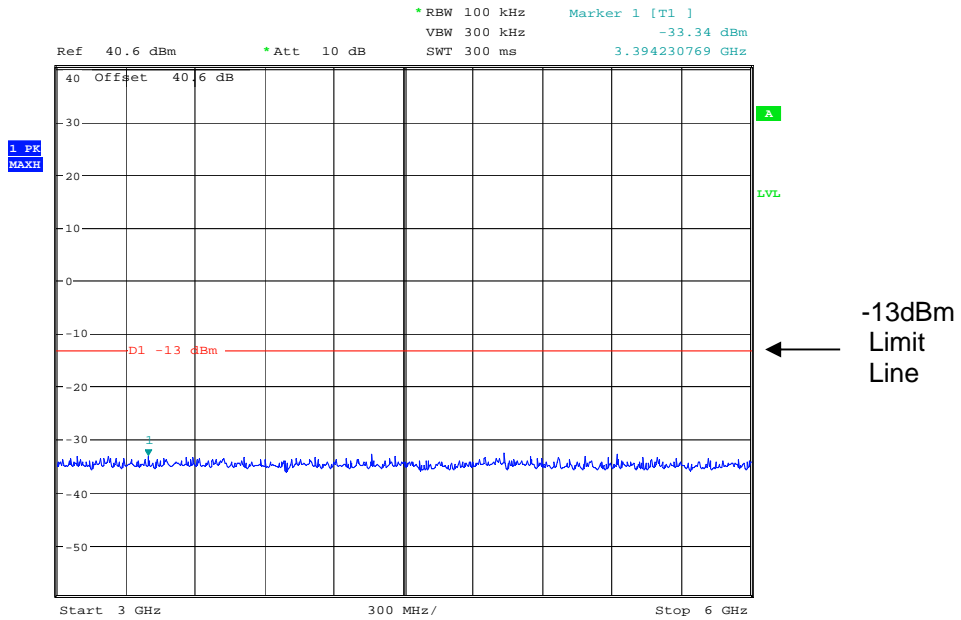
Date: 20.DEC.2007 13:53:43

UHF MID UPLINK

Intermodulation Wideband



Date: 20.DEC.2007 13:54:43

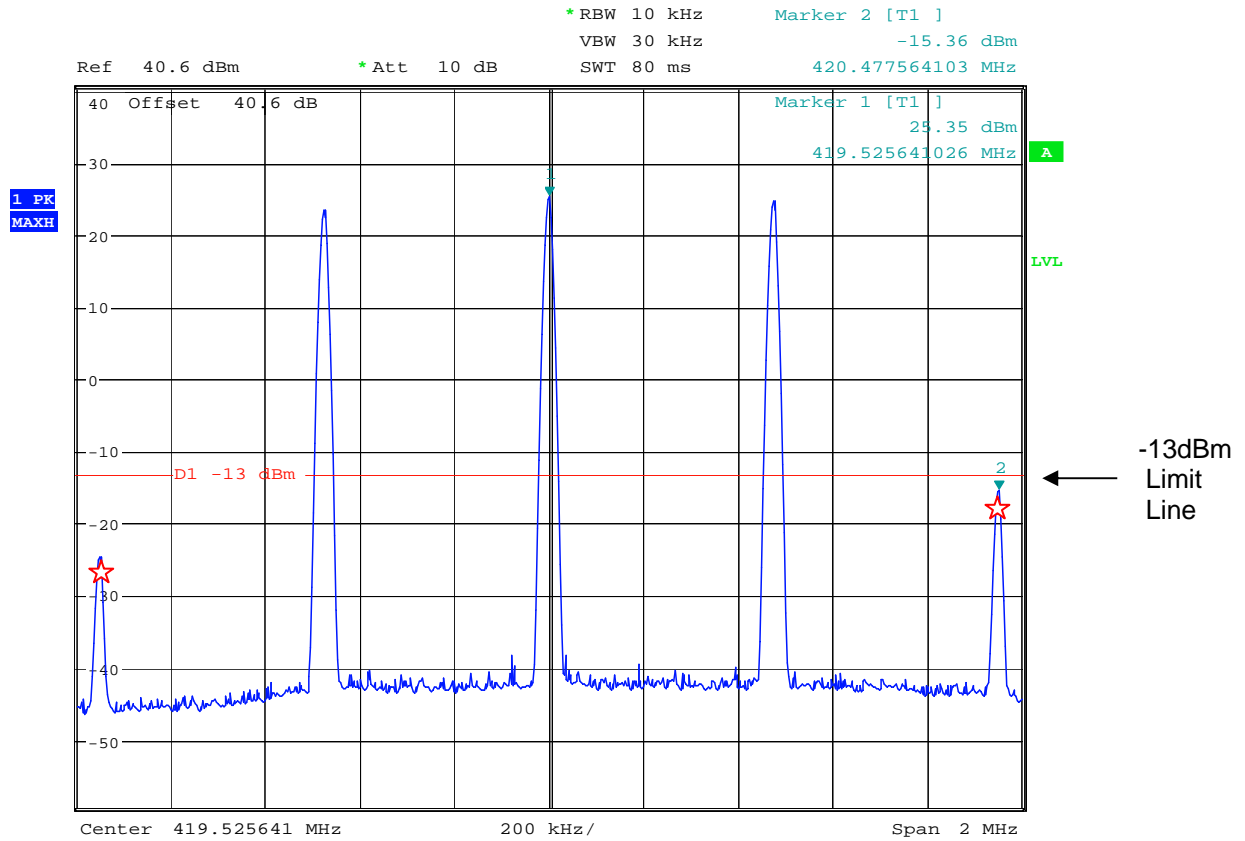


Date: 20.DEC.2007 13:55:19

The plot shows that there are no products outside the bands.

# Intermodulation Inband

## UHFHIGH UPLINK

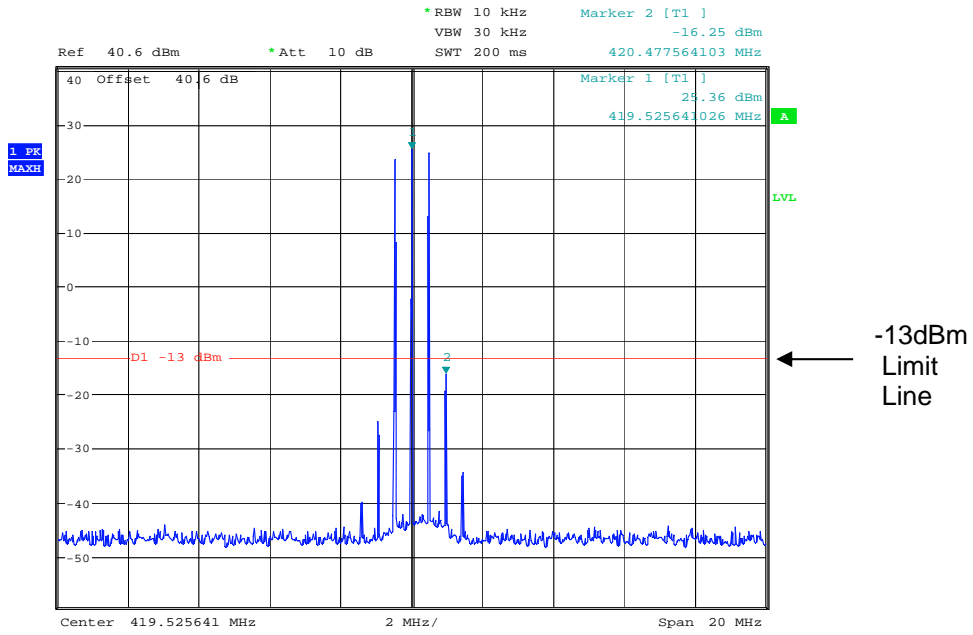


Date: 20.DEC.2007 14:29:41

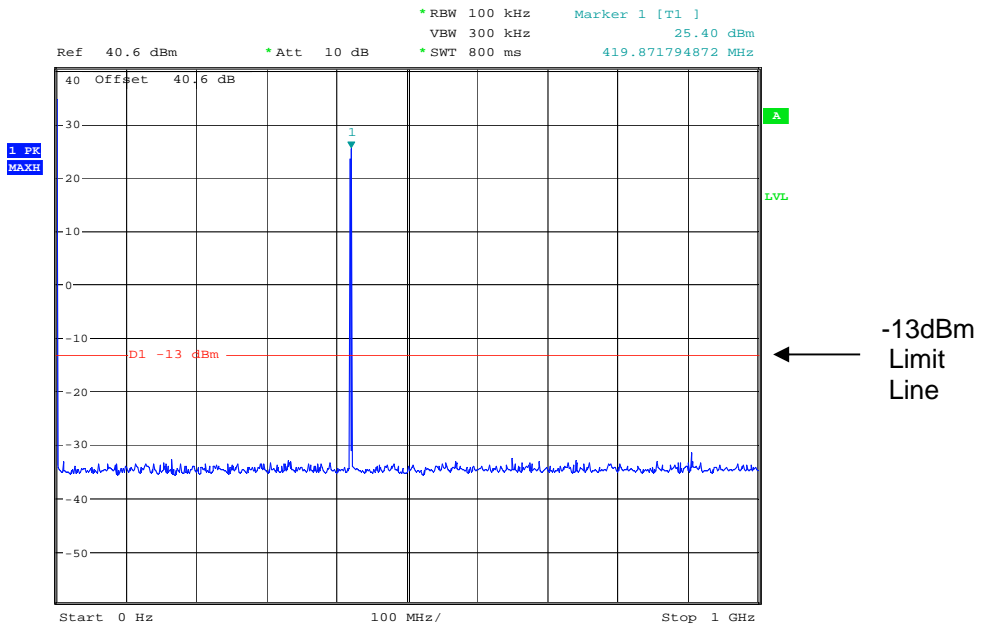
The above plot shows that all products (designated by☆) are below the spurious limit.

# UHFHIGH UPLINK

## Intermodulation Inband



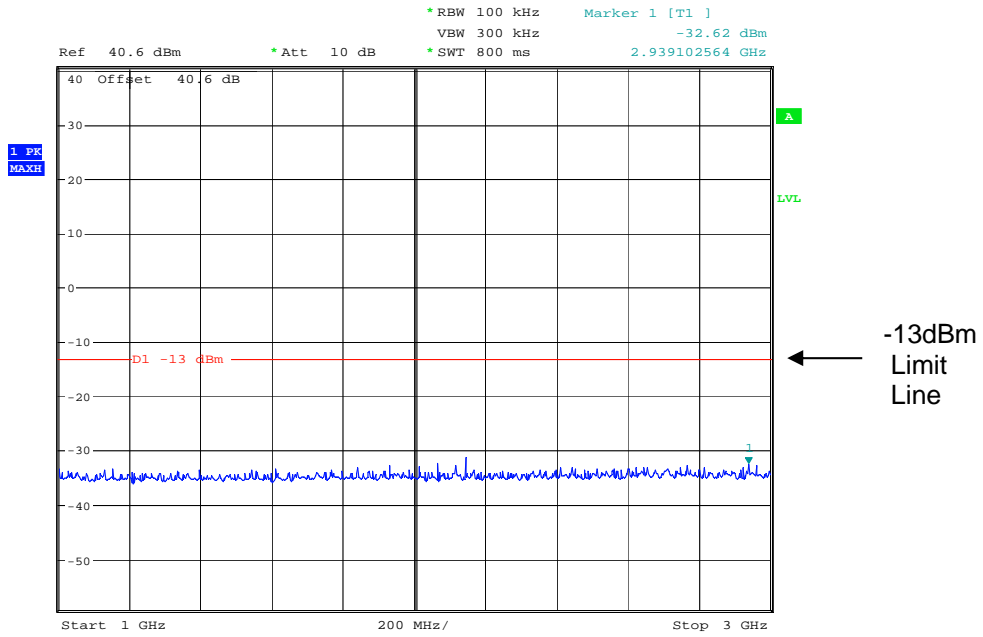
Date: 20.DEC.2007 14:30:26



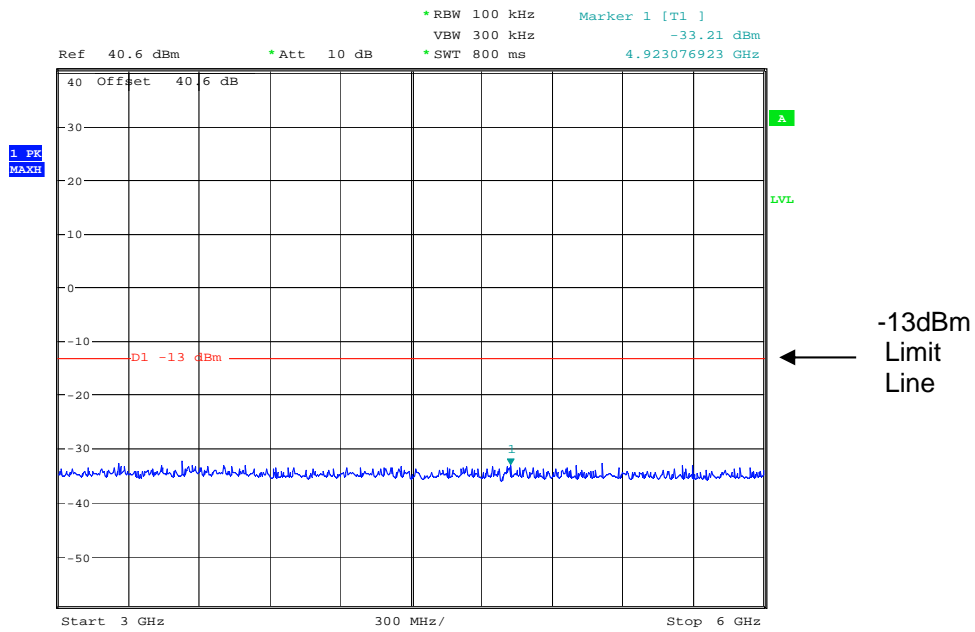
Date: 20.DEC.2007 14:32:08

UHFHIGH UPLINK

Intermodulation Inband



Date: 20.DEC.2007 14:32:31



Date: 20.DEC.2007 14:33:02

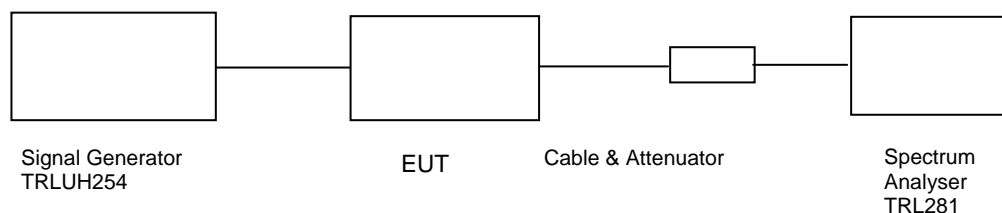
The plot shows that there are no products outside the bands.

## TRANSMITTER TESTS

### AMPLIFIER MODULATED CHANNEL TEST – CONDUCTED – Part 2.1049 UHFLOW UPLINK

Ambient temperature = 16°C  
 Relative humidity = 36%  
 Supply voltage = 110Vac  
 Channel number = See test results

Radio Laboratory



This test was performed to show that the amplifier does not alter the input signal in any way. The input signal was set to the maximum input level (-47.29dBm) 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 and attenuator between EUT and spectrum analyser 40.57dB
2. Cable between signal generator and EUT 0.30dB

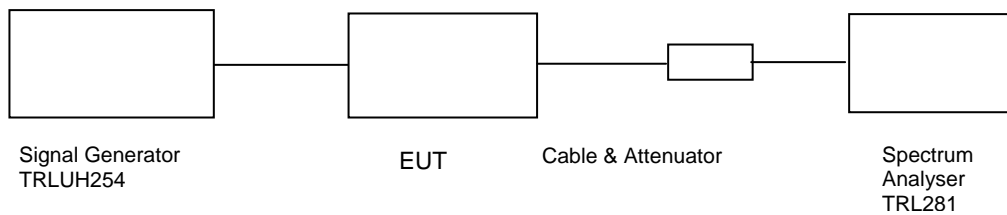
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
ATTENUATOR	SPINNER	745357	D57224	225	X
ATTENUATOR	BIRD	8308-200-N	N/A	103	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X

## TRANSMITTER TESTS

### AMPLIFIER MODULATED CHANNEL TEST – CONDUCTED – Part 2.1049 UHF MID UPLINK

Ambient temperature = 15°C  
 Relative humidity = 42%  
 Supply voltage = 110Vac  
 Channel number = See test results

Radio Laboratory



This test was performed to show that the amplifier does not alter the input signal in any way. The input signal was set to the maximum input level (-46.39dBm) 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.

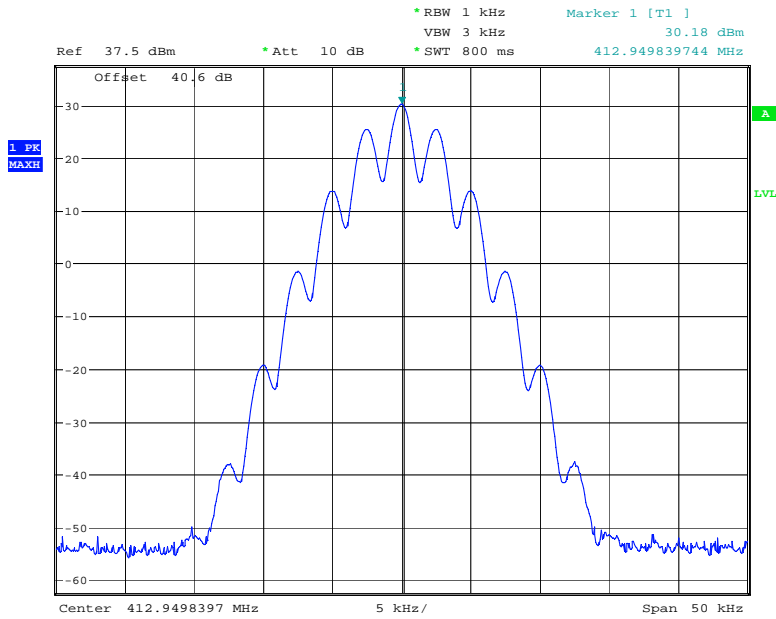
Note: The cables and attenuators had the following losses.

3. Cable and attenuator between EUT and spectrum analyser 40.59dB
4. Cable between signal generator and EUT 0.30dB

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	<b>X</b>
ATTENUATOR	SPINNER	745357	D57224	225	<b>X</b>
ATTENUATOR	BIRD	8308-200-N	N/A	103	<b>X</b>
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	<b>X</b>

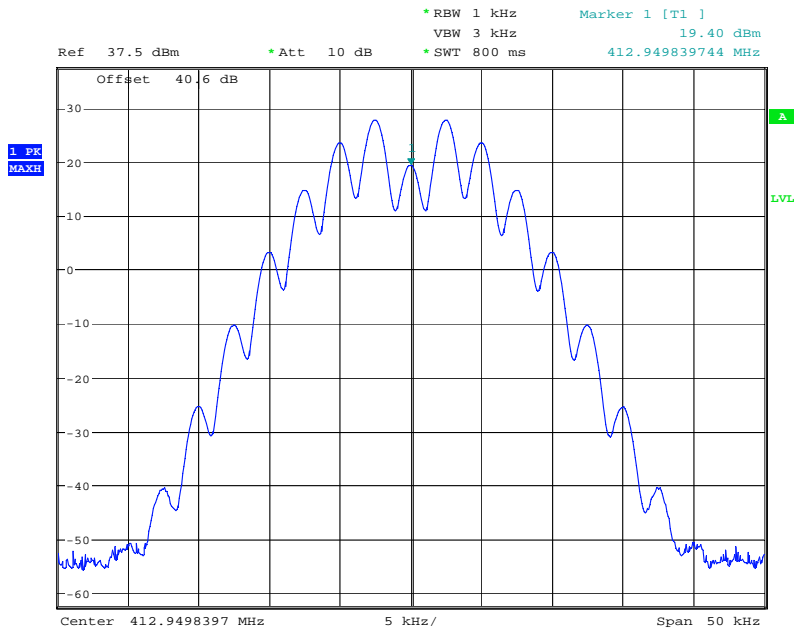
# UHFLOW UPLINK

Bottom channel 412.95MHz Signal Generator and EUT, deviation set to 2.5kHz



Date: 11.DEC.2007 17:01:17

Bottom channel 412.95MHz Signal Generator and EUT, deviation set to 5kHz



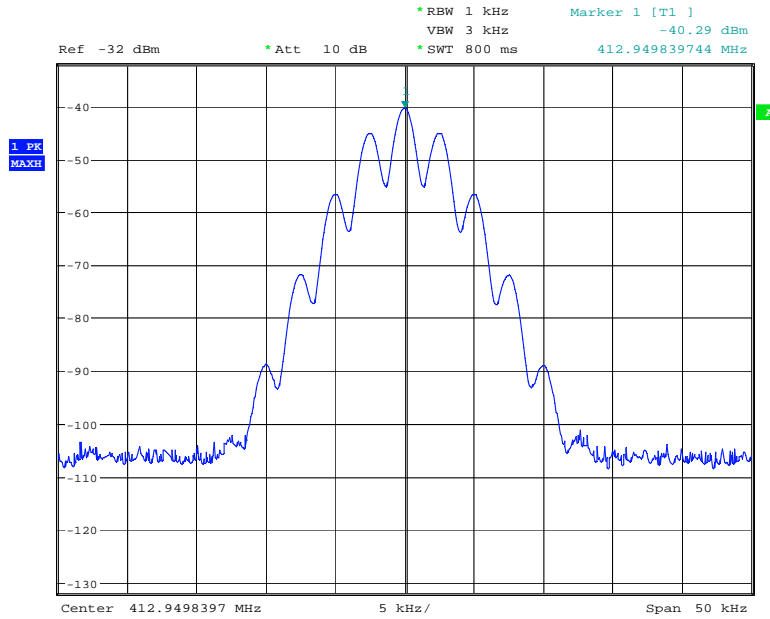
Date: 11.DEC.2007 17:03:49

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



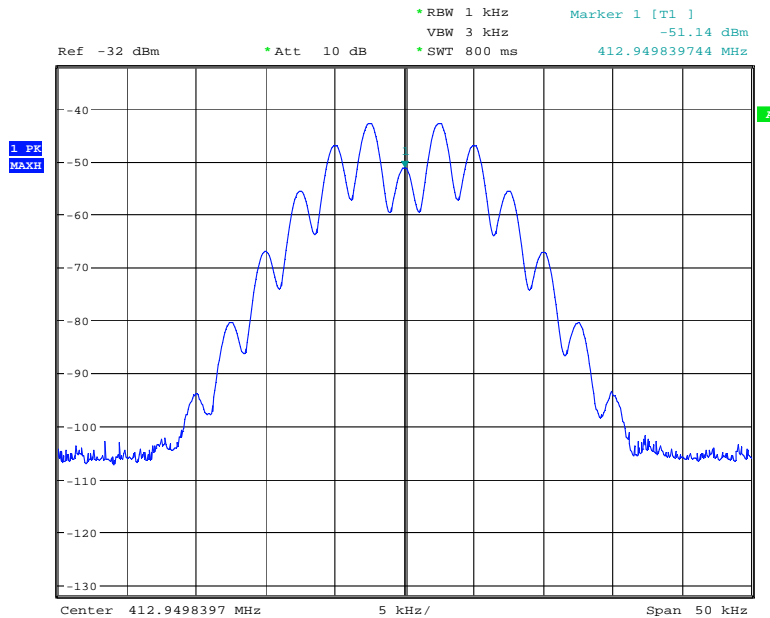
## UHFLOW UPLINK

Bottom channel 412.95MHz Signal Generator only, deviation set to 2.5kHz



Date: 12.DEC.2007 10:28:53

Bottom channel 412.95MHz Signal Generator only, deviation set to 5.0kHz

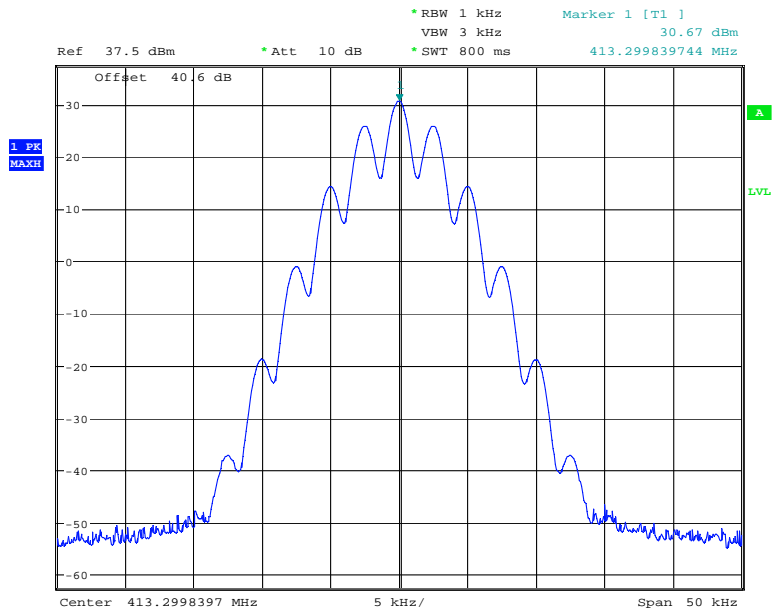


Date: 12.DEC.2007 10:30:50

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

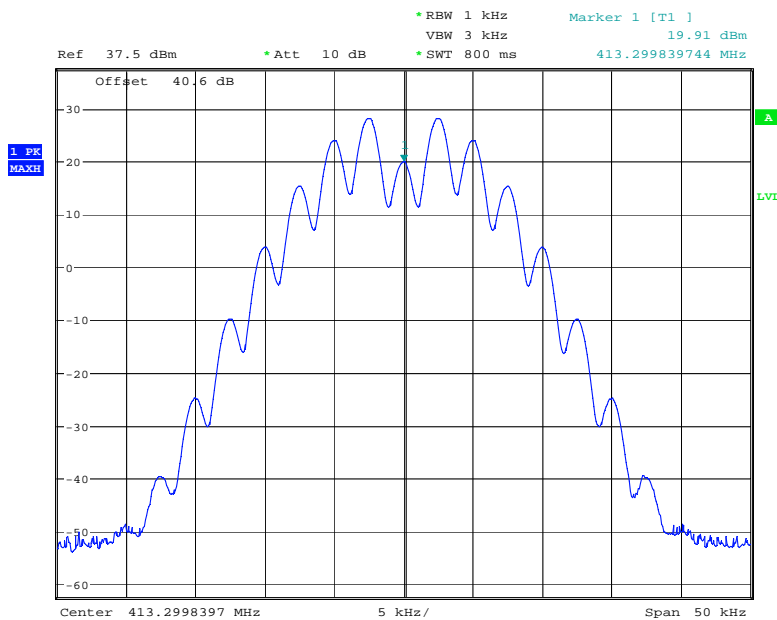
## UHFLOW UPLINK

Middle channel 413.30MHz Signal Generator and EUT, deviation set to 2.5kHz



Date: 11.DEC.2007 17:07:36

Middle channel 413.30MHz Signal Generator and EUT, deviation set to 5kHz

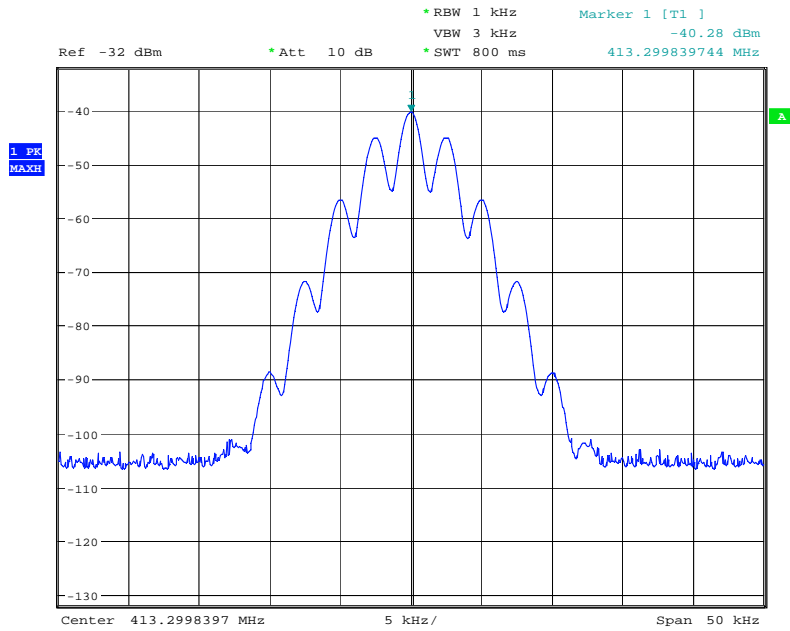


Date: 11.DEC.2007 17:11:34

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

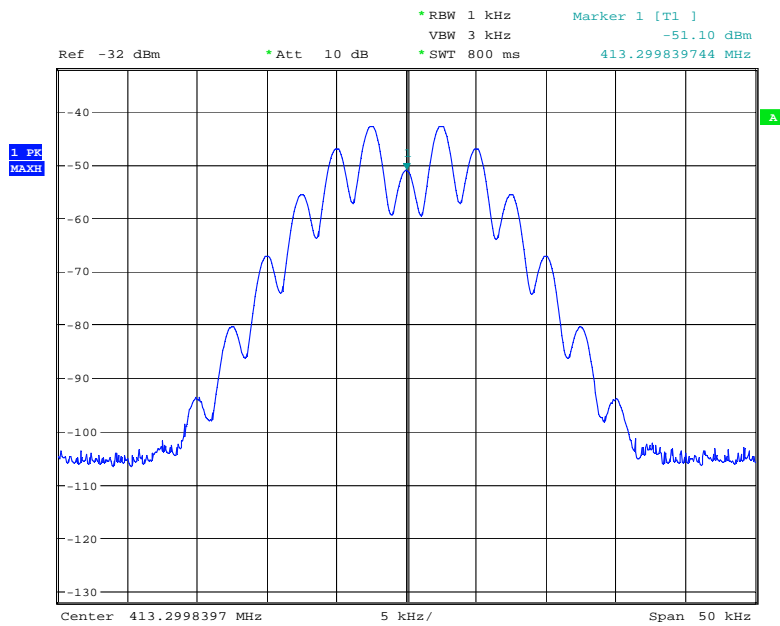
# UHFLOW UPLINK

Middle channel 413.30MHz Signal Generator, deviation set to 2.5kHz



Date: 12.DEC.2007 10:33:49

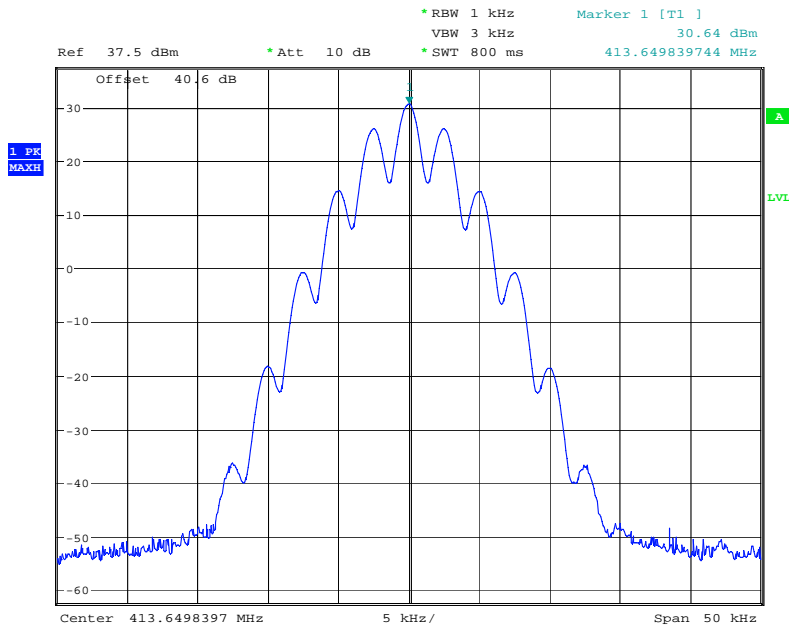
Middle channel 413.30MHz Signal Generator, deviation set to 5kHz



Date: 12.DEC.2007 10:36:37

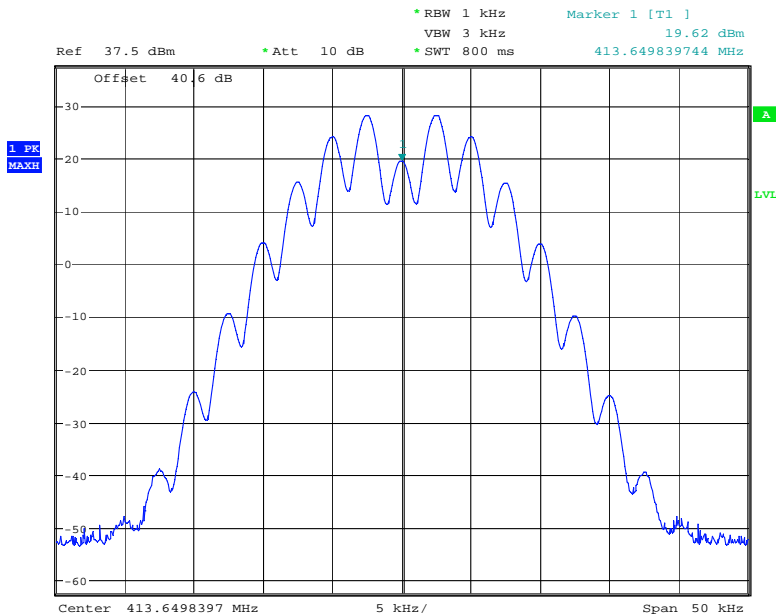
# UHFLOW UPLINK

Top channel 413.65MHz Signal Generator and EUT, deviation set to 2.5kHz



Date: 11.DEC.2007 17:13:41

Top channel 413.65MHz Signal Generator and EUT, deviation set to 5kHz

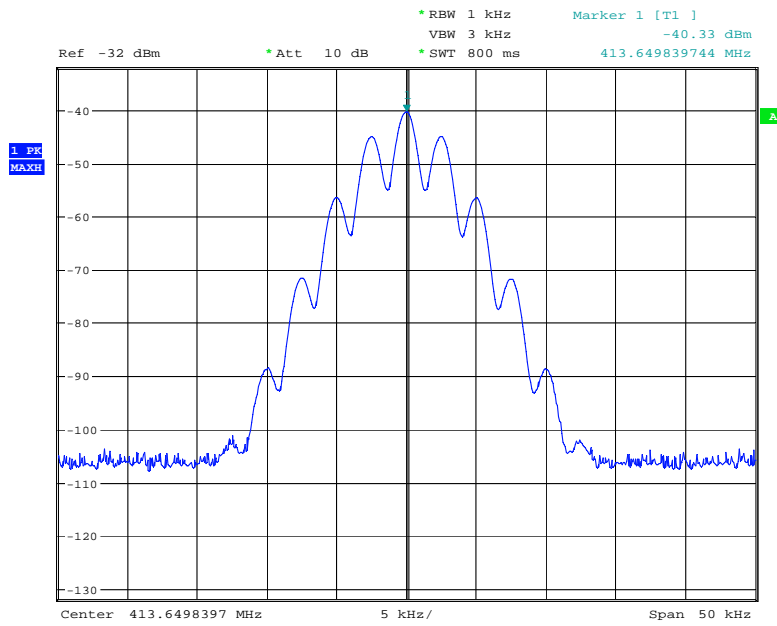


Date: 11.DEC.2007 17:17:30

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

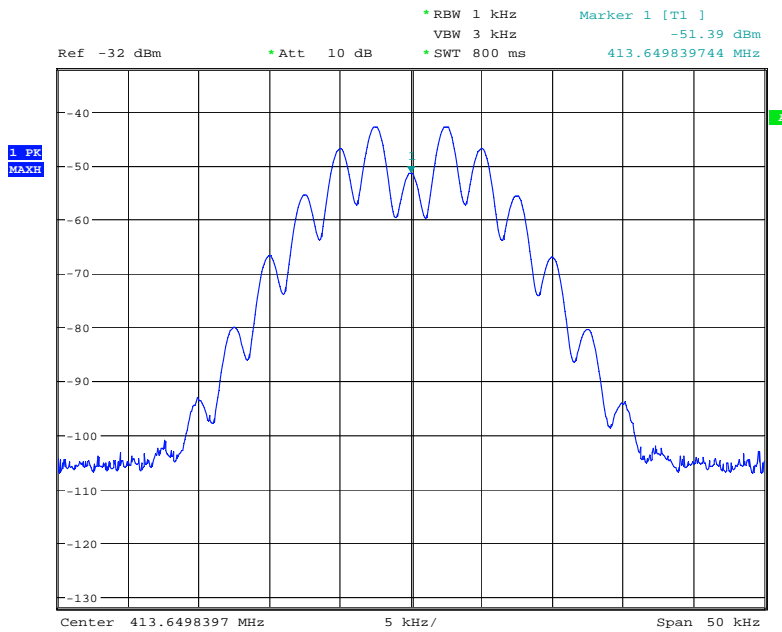
# UHFLOW UPLINK

Top channel 413.65MHz Signal Generator, deviation set to 2.5kHz



Date: 12.DEC.2007 10:39:02

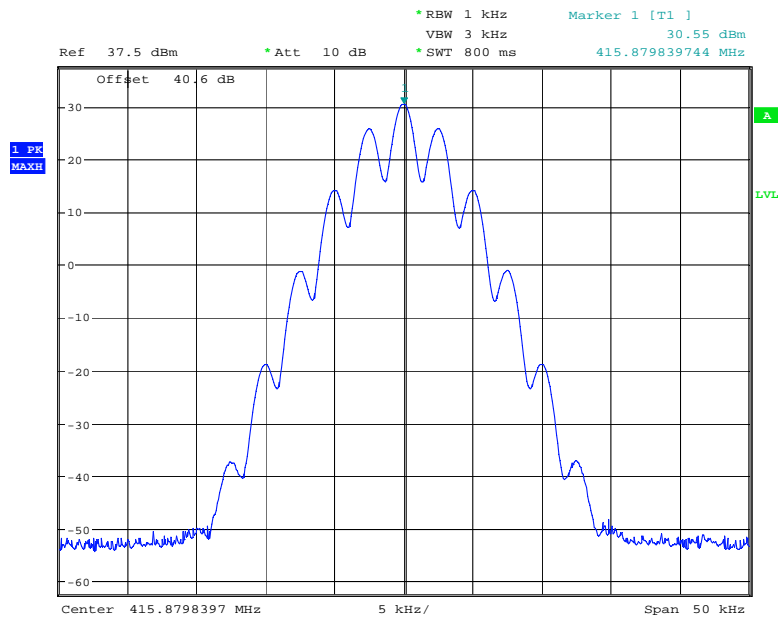
Top channel 413.65MHz Signal Generator, deviation set to 5kHz



Date: 12.DEC.2007 10:42:31

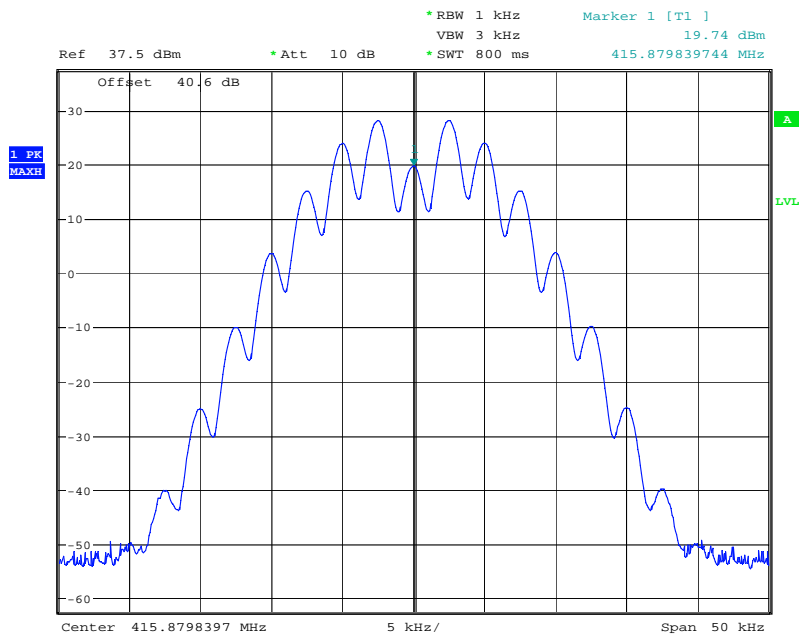
## UHF MID UPLINK

Bottom channel 415.88MHz Signal Generator and EUT, deviation set to 2.5kHz



Date: 11.DEC.2007 17:23:18

Bottom channel 415.88MHz Signal Generator and EUT, deviation set to 5kHz

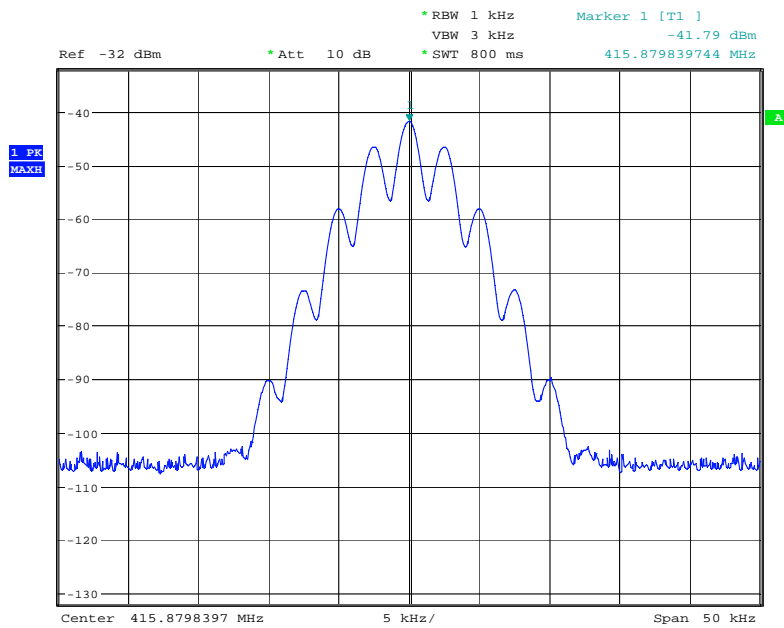


Date: 11.DEC.2007 17:26:00

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

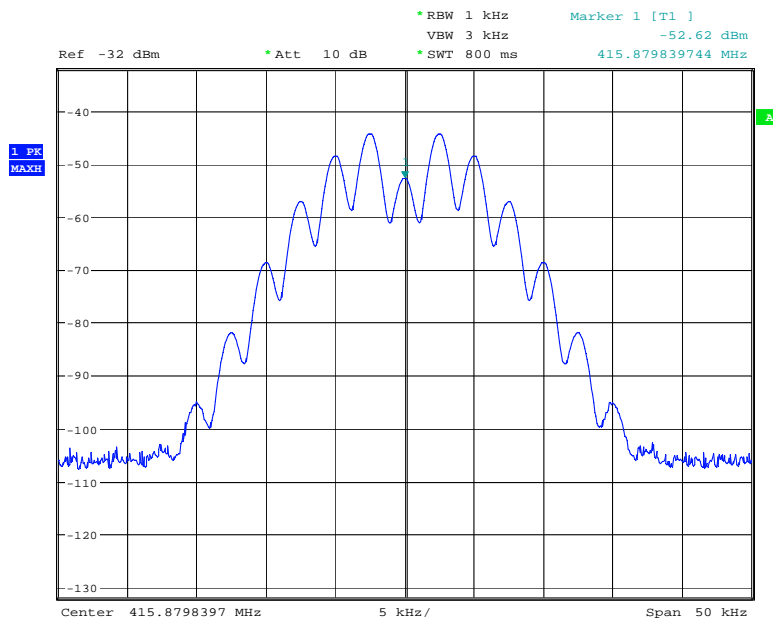
# UHF MID UPLINK

Bottom channel 415.88MHz Signal Generator, deviation set to 2.5kHz



Date: 12.DEC.2007 10:45:44

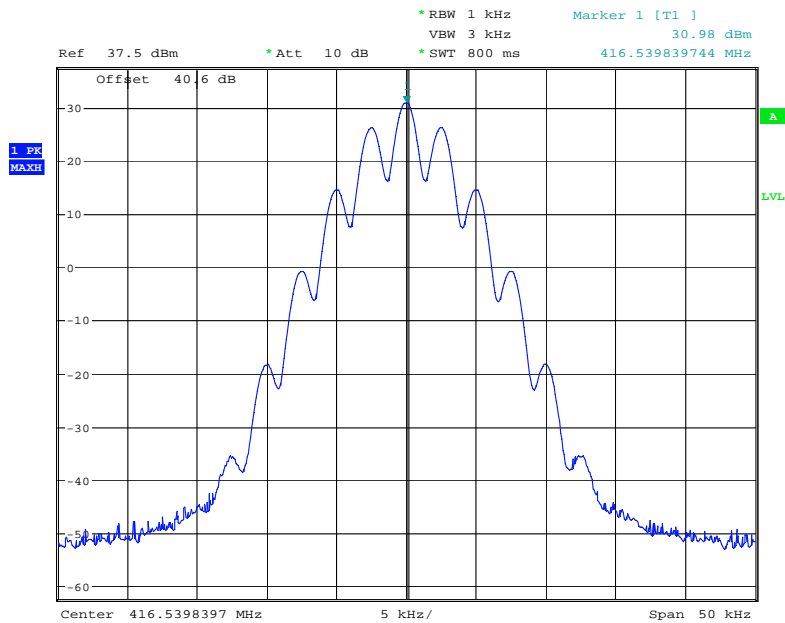
Bottom channel 415.88MHz Signal Generator, deviation set to 5kHz



Date: 12.DEC.2007 10:47:16

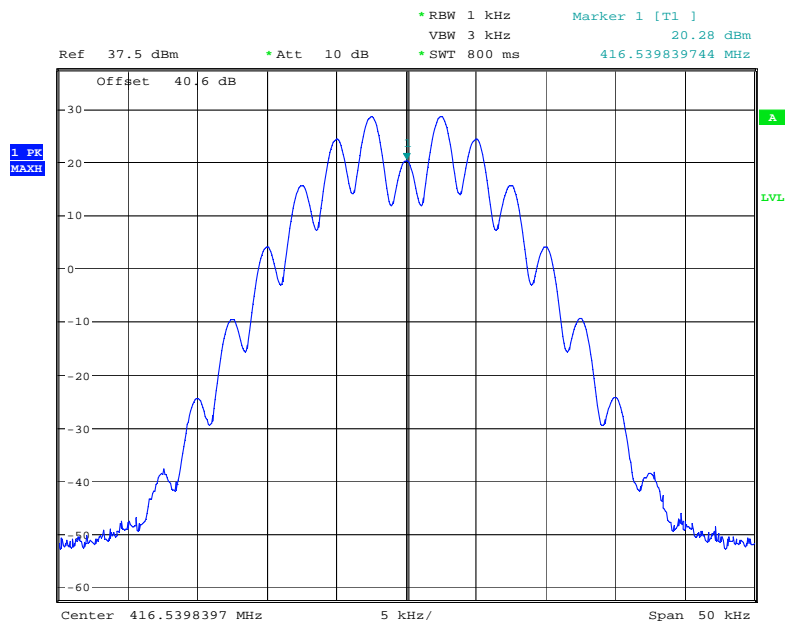
## UHF MID UPLINK

Middle channel 416.54MHz Signal Generator and EUT, deviation set to 2.5kHz



Date: 11.DEC.2007 17:28:57

Middle channel 416.54MHz Signal Generator and EUT, deviation set to 5kHz



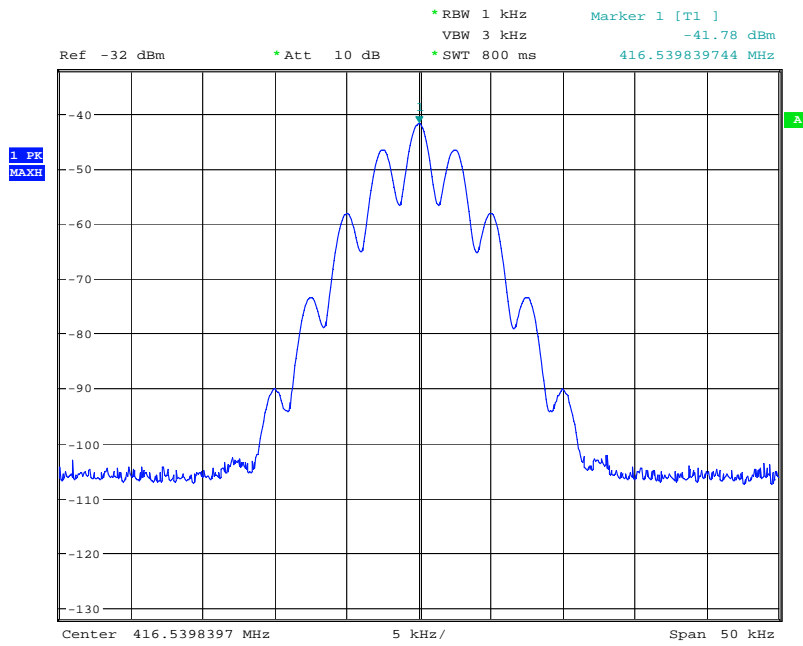
Date: 11.DEC.2007 17:31:13

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



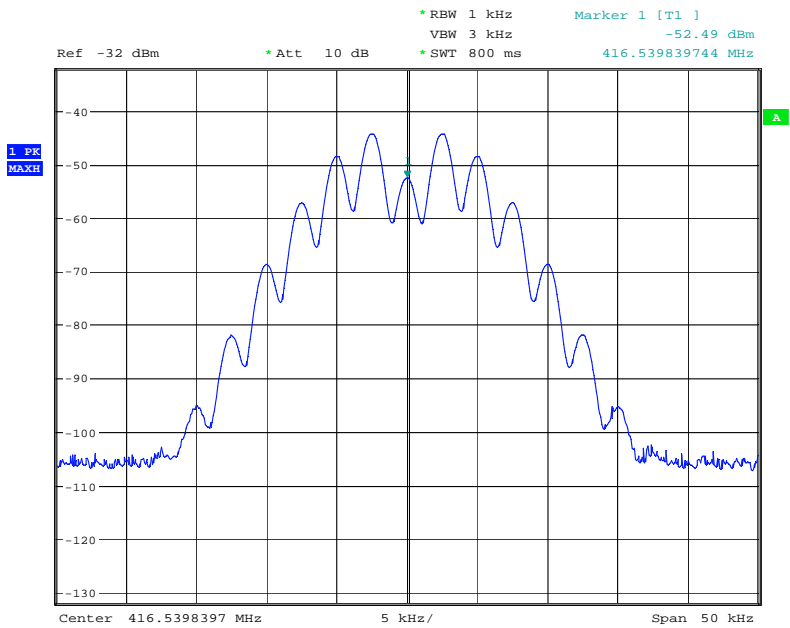
# UHF MID UPLINK

Middle channel 416.54MHz Signal Generator, deviation set to 2.5kHz



Date: 12.DEC.2007 10:49:42

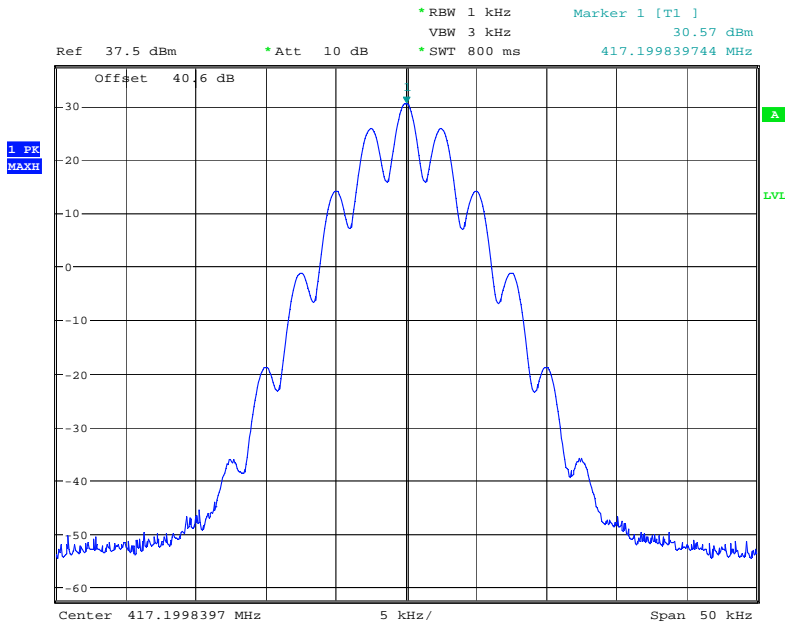
Middle channel 416.54MHz Signal Generator, deviation set to 5kHz



Date: 12.DEC.2007 10:51:57

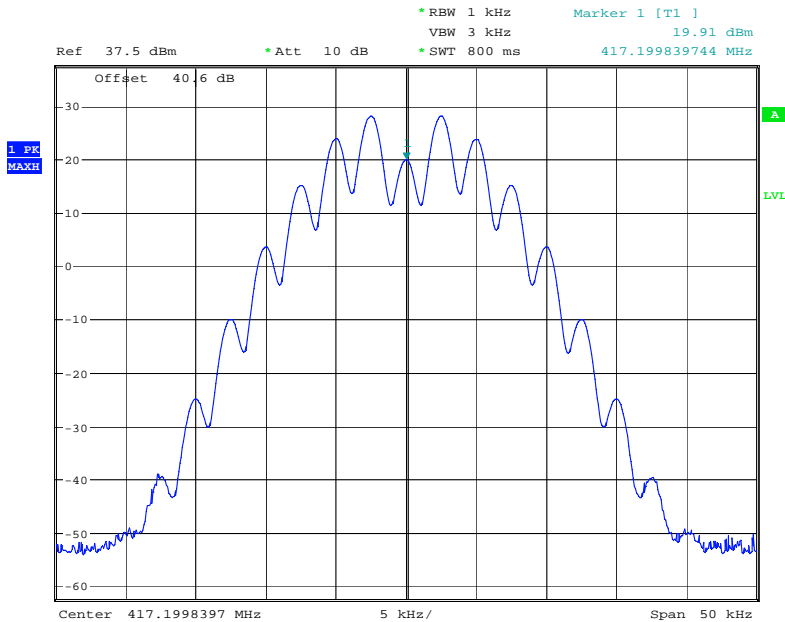
# UHF MID UPLINK

Top channel 417.20MHz Signal Generator and EUT, deviation set to 2.5kHz



Date: 11.DEC.2007 17:33:13

Top channel 417.20MHz Signal Generator and EUT, deviation set to 5kHz

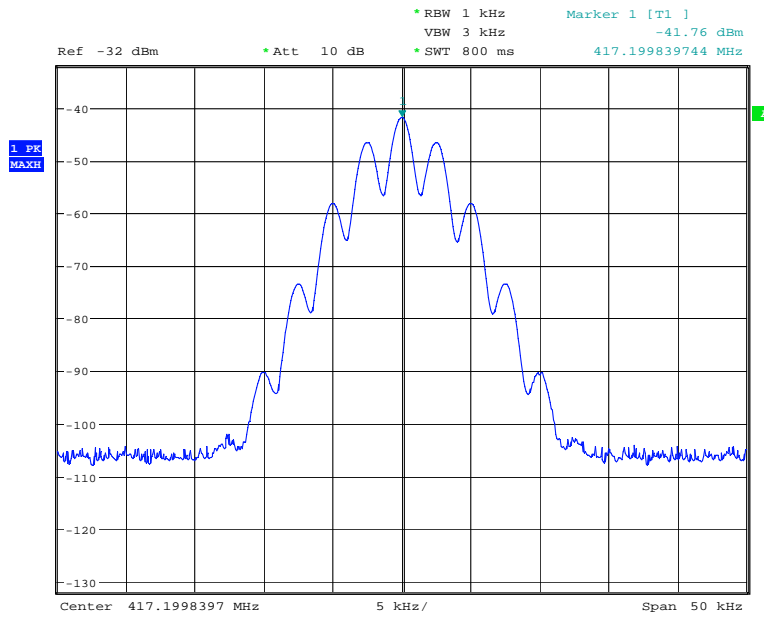


Date: 11.DEC.2007 17:34:47

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

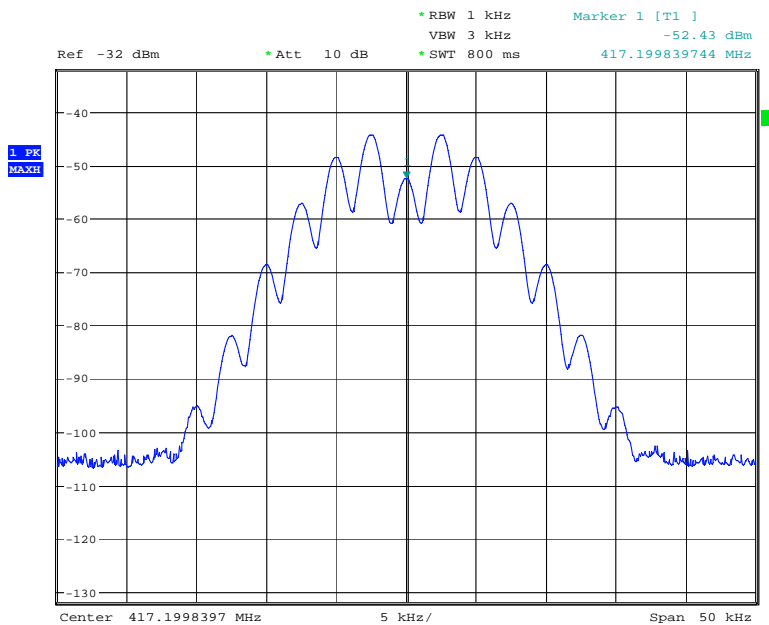
# UHF MID UPLINK

Top channel 417.20MHz Signal Generator, deviation set to 2.5kHz



Date: 12.DEC.2007 10:53:48

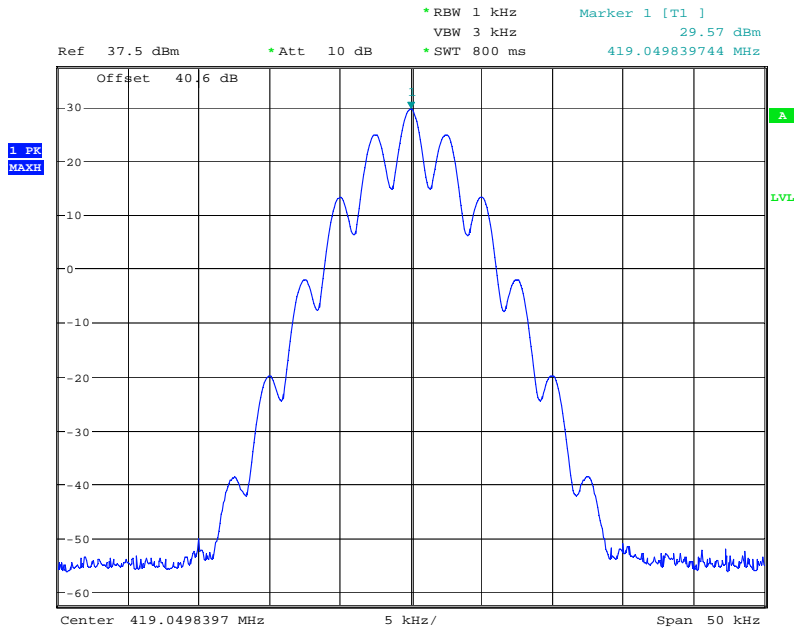
Top channel 417.20MHz Signal Generator, deviation set to 5kHz



Date: 12.DEC.2007 10:57:06

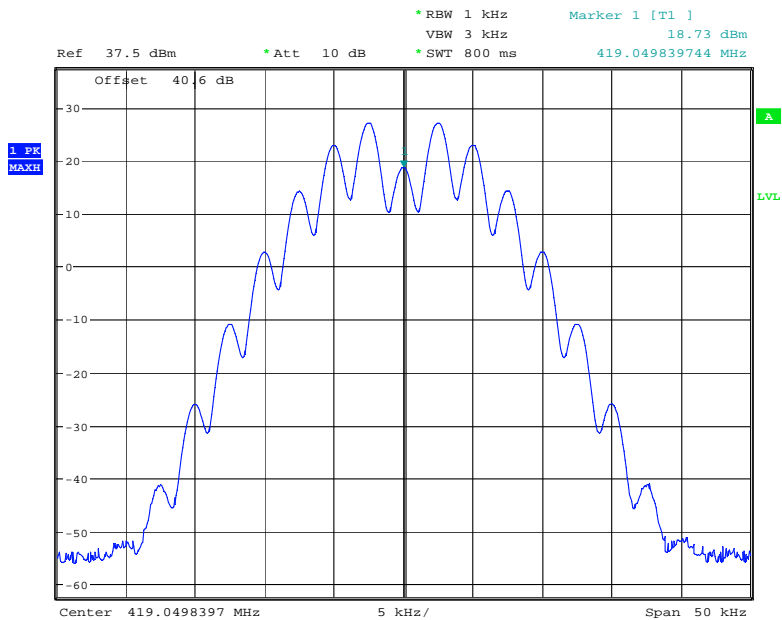
**UHFHIGH UPLINK**

Bottom channel 419.05MHz Signal Generator and EUT, deviation set to 2.5kHz



Date: 12.DEC.2007 10:11:19

Bottom channel 419.05MHz Signal Generator and EUT, deviation set to 5kHz

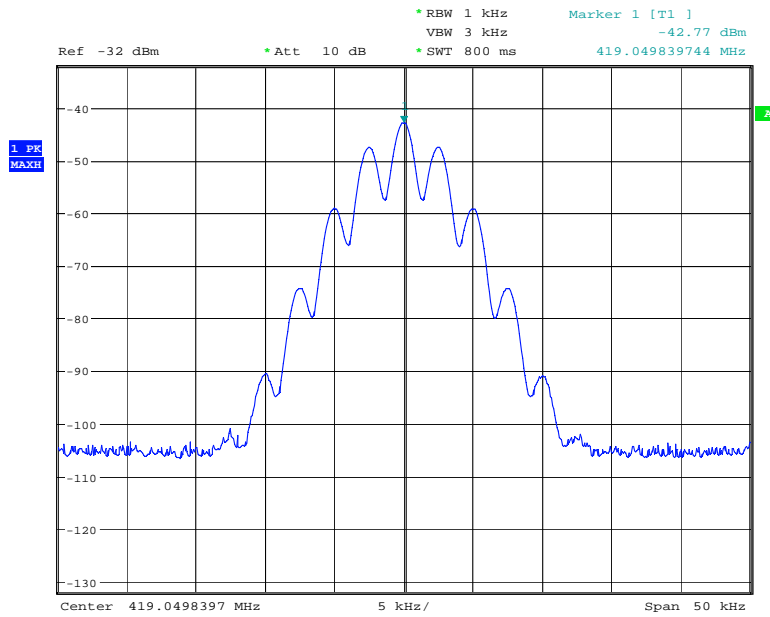


Date: 12.DEC.2007 10:14:26

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

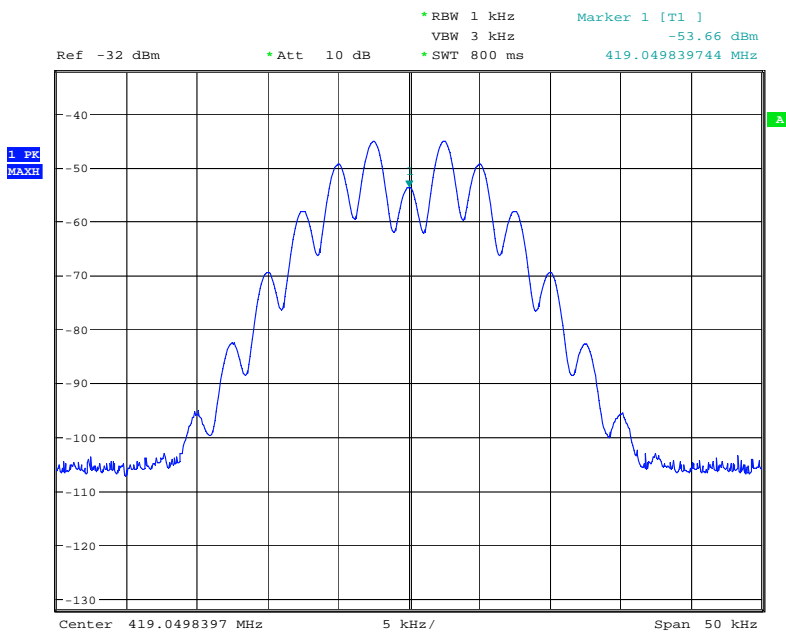
# UHFHIGH UPLINK

Bottom channel 419.05MHz Signal Generator, deviation set to 2.5kHz



Date: 12.DEC.2007 11:03:04

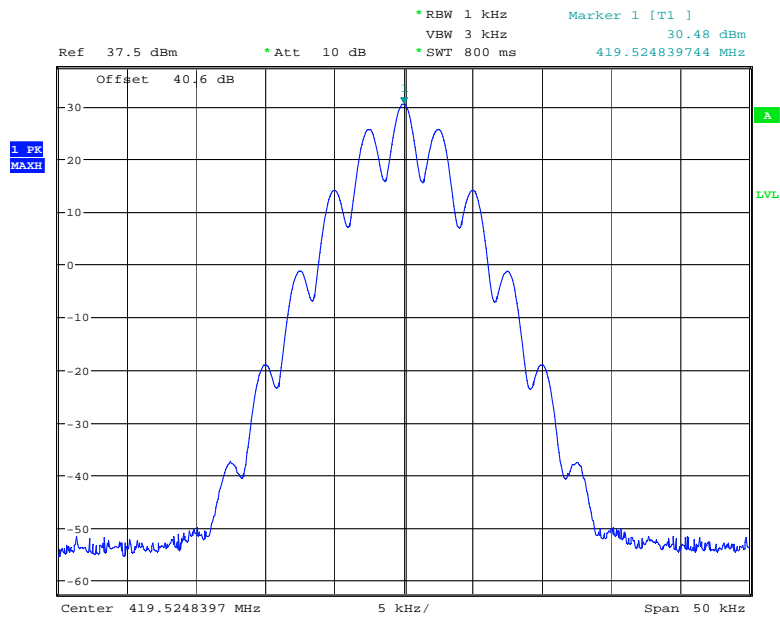
Bottom channel 419.05MHz Signal Generator, deviation set to 5kHz



Date: 12.DEC.2007 11:05:40

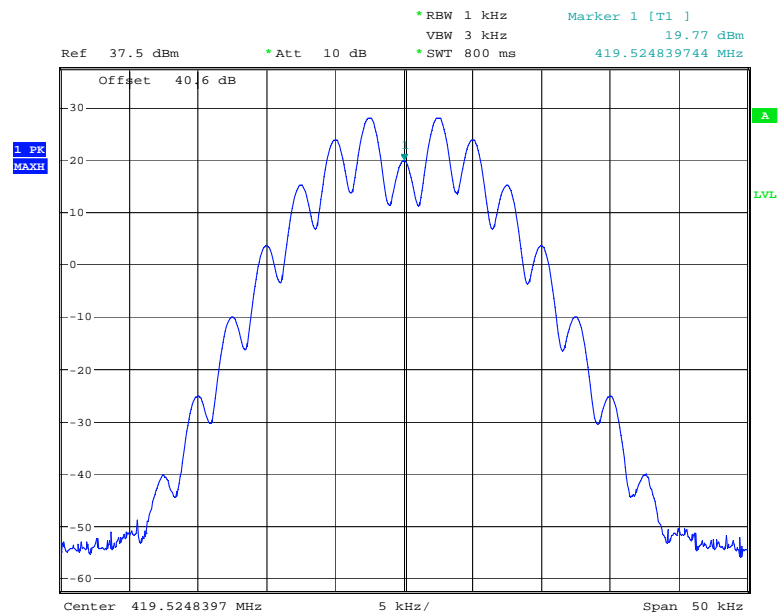
## UHFHIGH UPLINK

Middle channel 419.525MHz Signal Generator and EUT, deviation set to 2.5kHz



Date: 12.DEC.2007 10:17:28

Middle channel 419.525MHz Signal Generator and EUT, deviation set to 5kHz

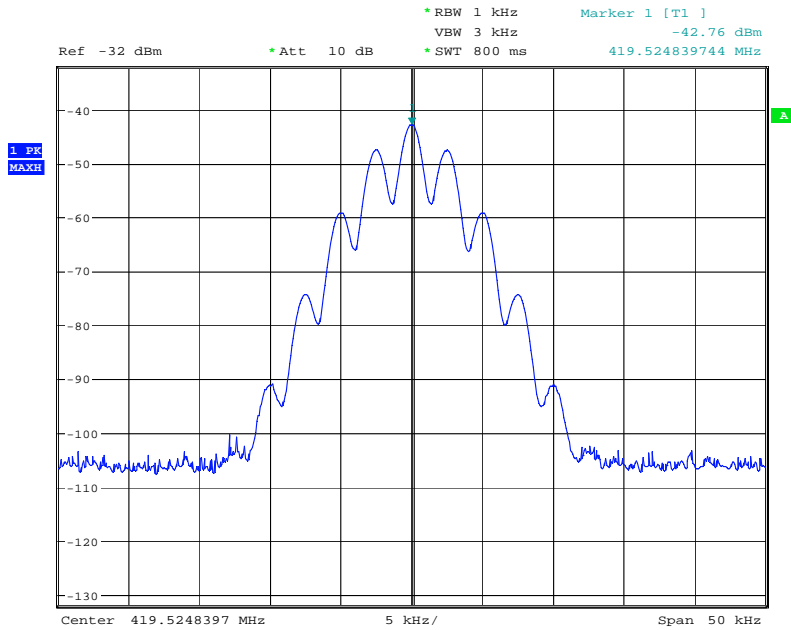


Date: 12.DEC.2007 10:19:19

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

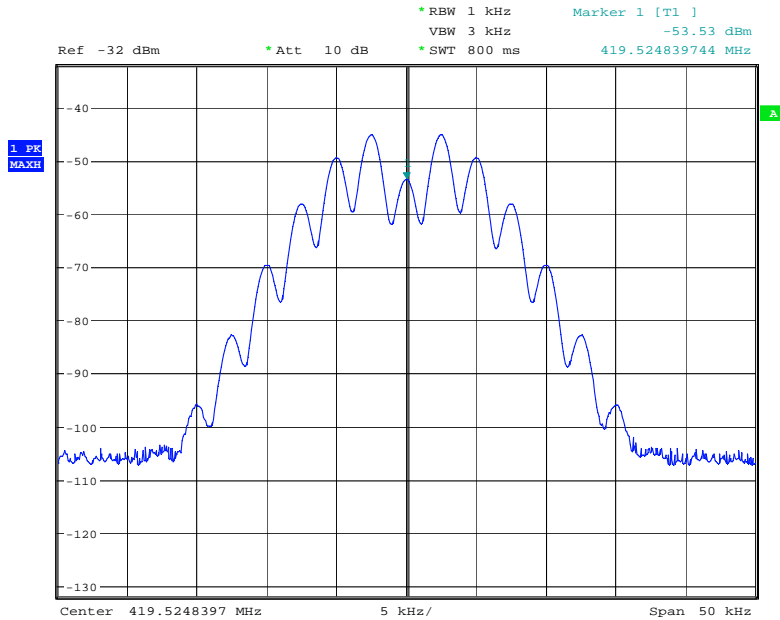
# UHFHIGH UPLINK

Middle channel 419.525MHz Signal Generator, deviation set to 2.5kHz



Date: 12.DEC.2007 11:07:39

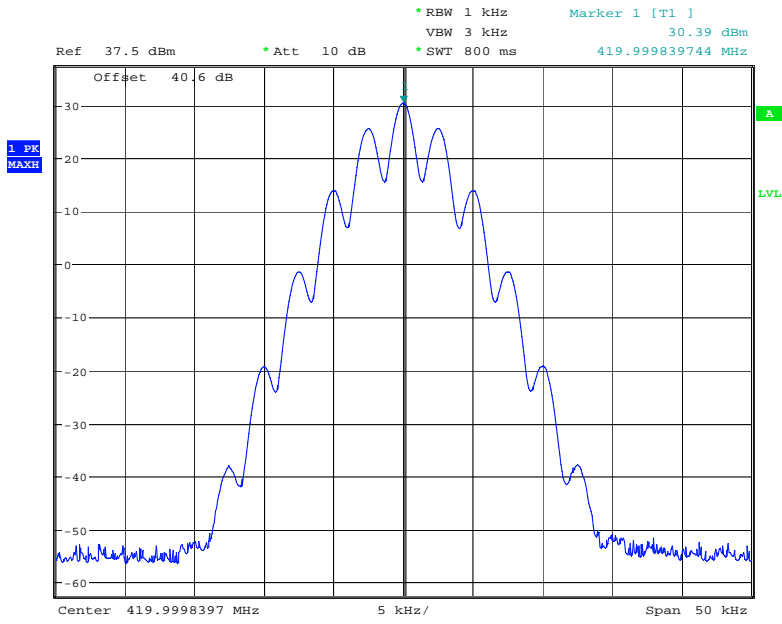
Middle channel 419.525MHz Signal Generator, deviation set to 5kHz



Date: 12.DEC.2007 11:09:15

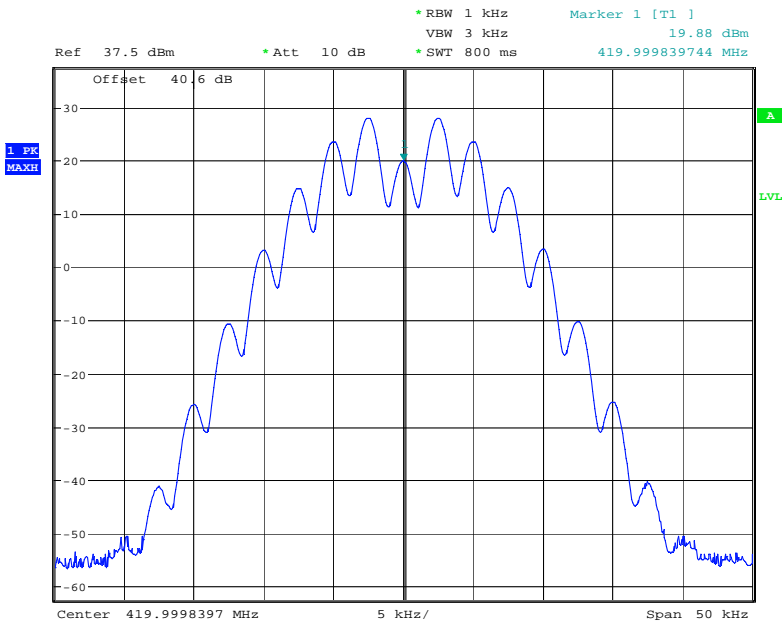
# UHFHIGH UPLINK

Top channel 420.0MHz Signal Generator and EUT, deviation set to 2.5kHz



Date: 12.DEC.2007 10:21:21

Top channel 420.0MHz Signal Generator and EUT, deviation set to 5kHz



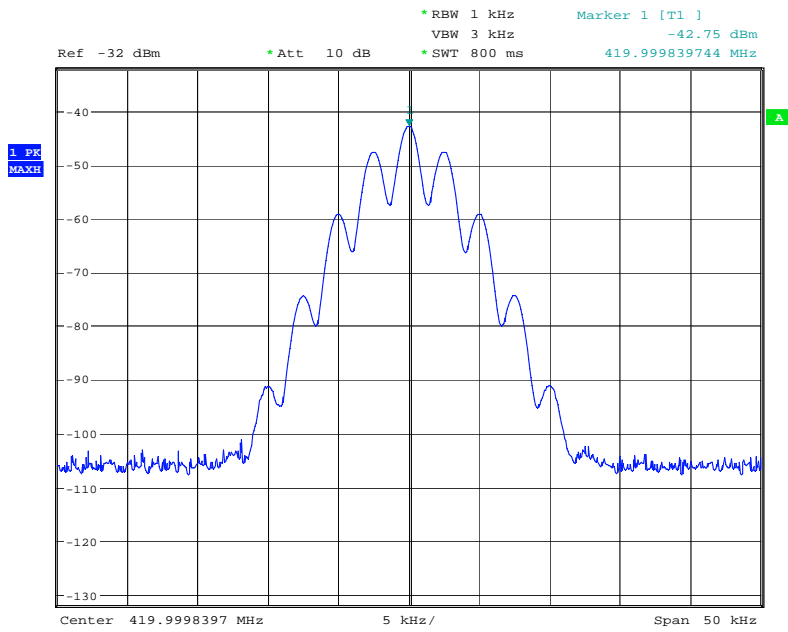
Date: 12.DEC.2007 10:22:47

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



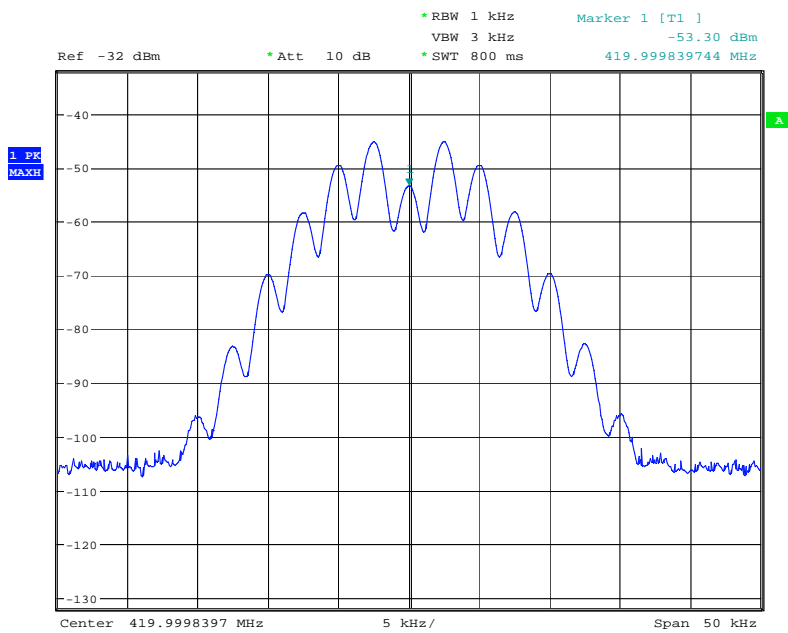
# UHFHIGH UPLINK

Top channel 420.0MHz Signal Generator, deviation set to 2.5kHz



Date: 12.DEC.2007 11:11:04

Top channel 420.0MHz Signal Generator, deviation set to 5kHz



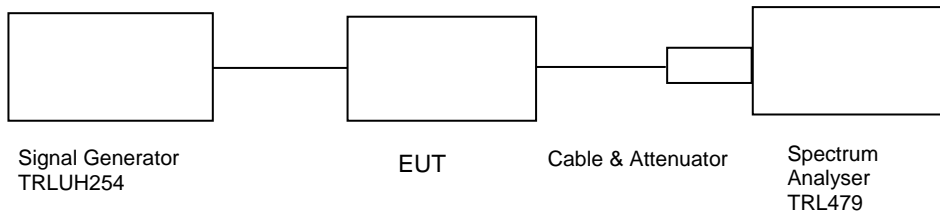
Date: 12.DEC.2007 11:13:28

## TRANSMITTER TESTS

### AMPLIFIER SPURIOUS EMISSIONS – CONDUCTED – Part 2.1053 UHFLOW UPLINK

Ambient temperature = 20°C  
 Relative humidity = 55%  
 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 that 250% of the authorised bandwidth

At least  $43 + 10 \log P_{dB}$

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

## RESULTS

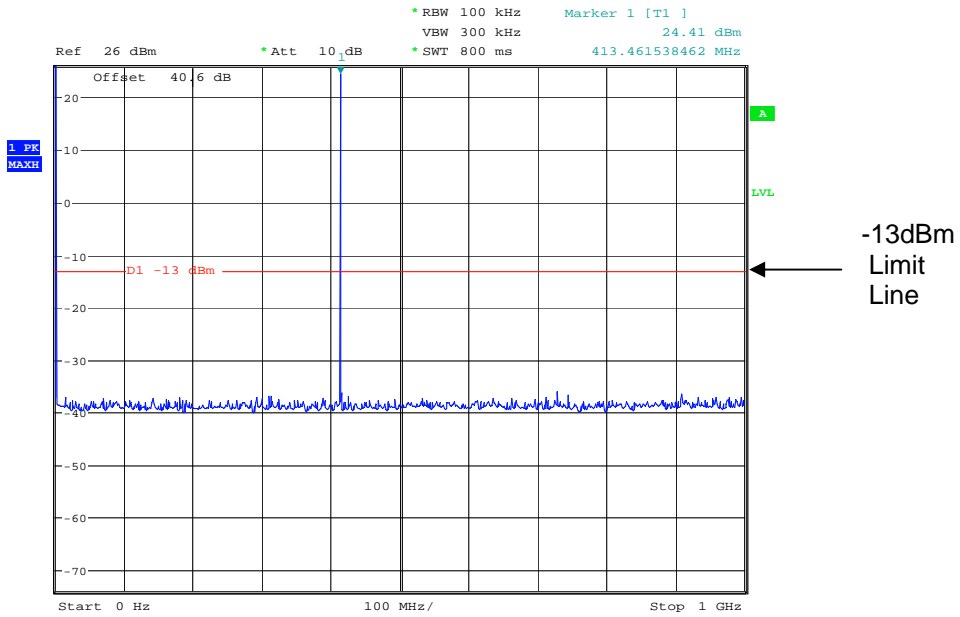
FREQUENCY RANGE	FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTENUATOR & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
0Hz – 5GHz	No Significant Emissions Within 20 dB of the Limit				-13

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	R&S	FSU46	200034	UH281	<b>X</b>
ATTENUATOR	SPINNER	745357	D57224	225	<b>X</b>
ATTENUATOR	BIRD	8308-200-N	N/A	103	<b>X</b>
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	<b>X</b>

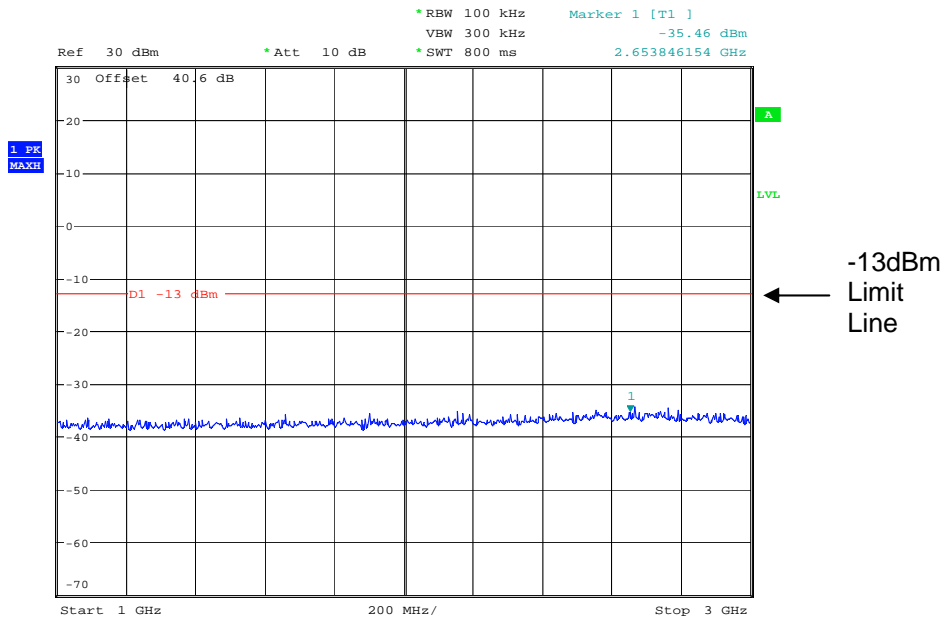
# UHFLOW UPLINK

Conducted emissions bottom channel 412.95MHz 0MHz – 1GHz



Date: 20.DEC.2007 15:42:30

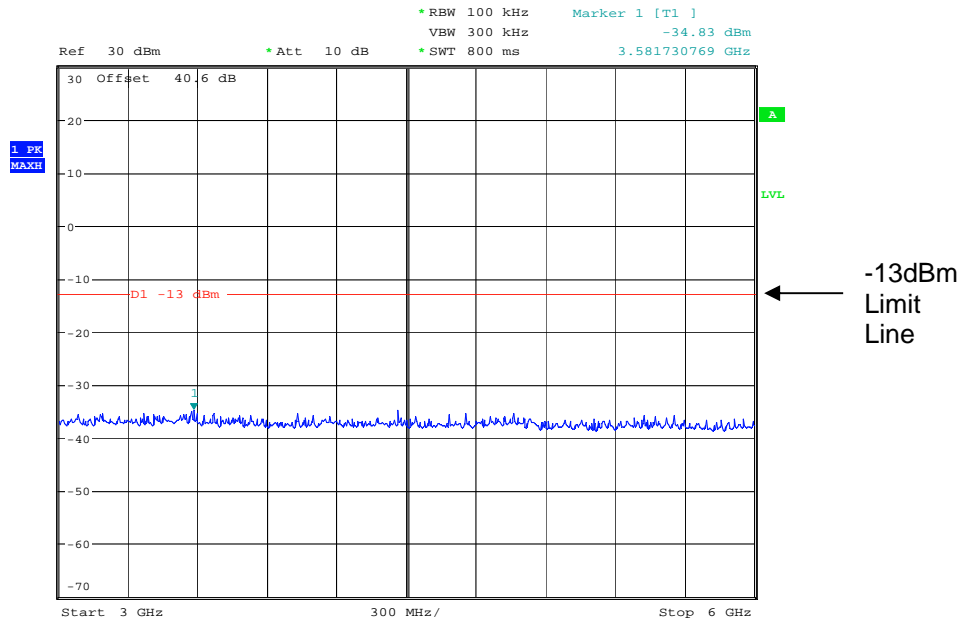
Conducted emissions bottom channel 412.95MHz 1 - 3GHz



Date: 20.DEC.2007 11:24:32

# UHFLOW UPLINK

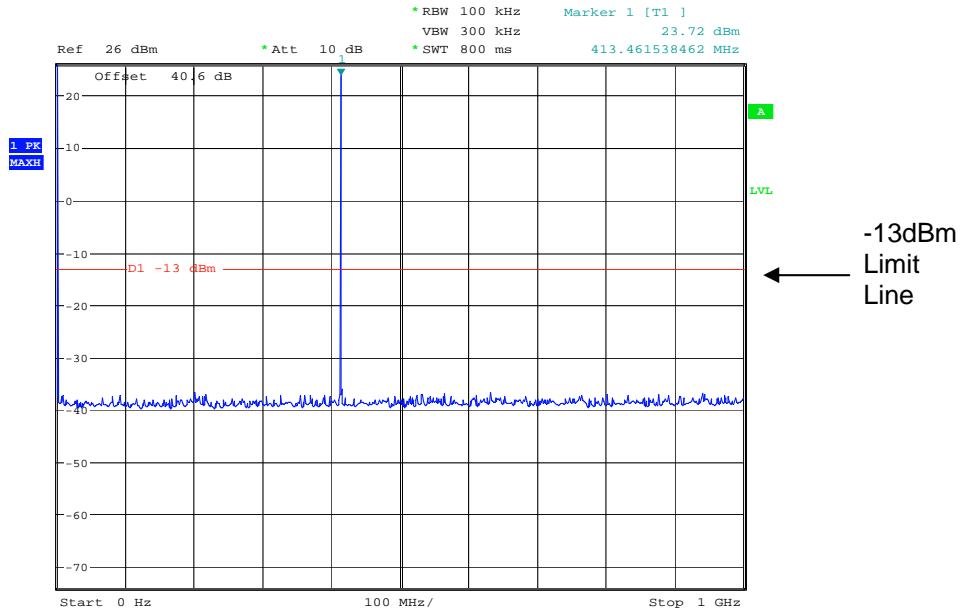
Conducted emissions bottom channel 412.95MHz 3 - 6GHz



Date: 20.DEC.2007 11:25:12

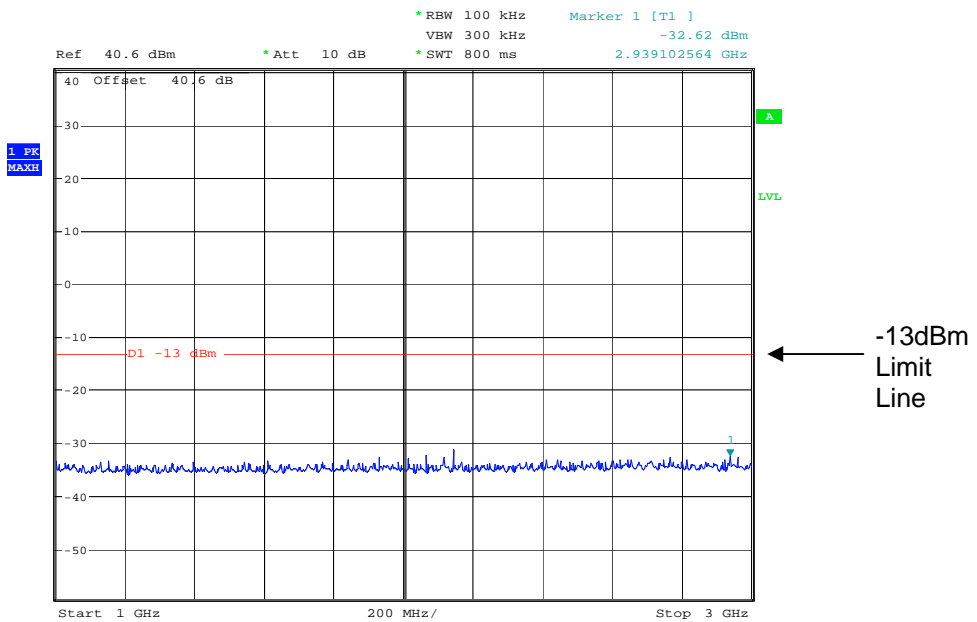
# UHFLOW UPLINK

## Conducted emissions Middle channel 413.3MHz 0MHz - 1GHz



Date: 20.DEC.2007 15:41:55

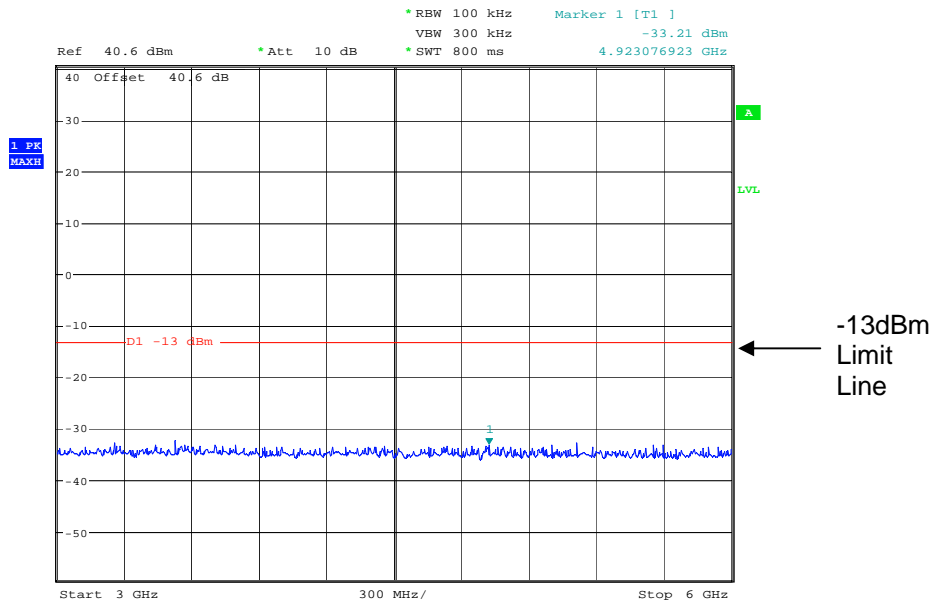
## Conducted emissions Middle channel 413.3MHz 1 - 3GHz



Date: 20.DEC.2007 14:32:31

# UHFLOW UPLINK

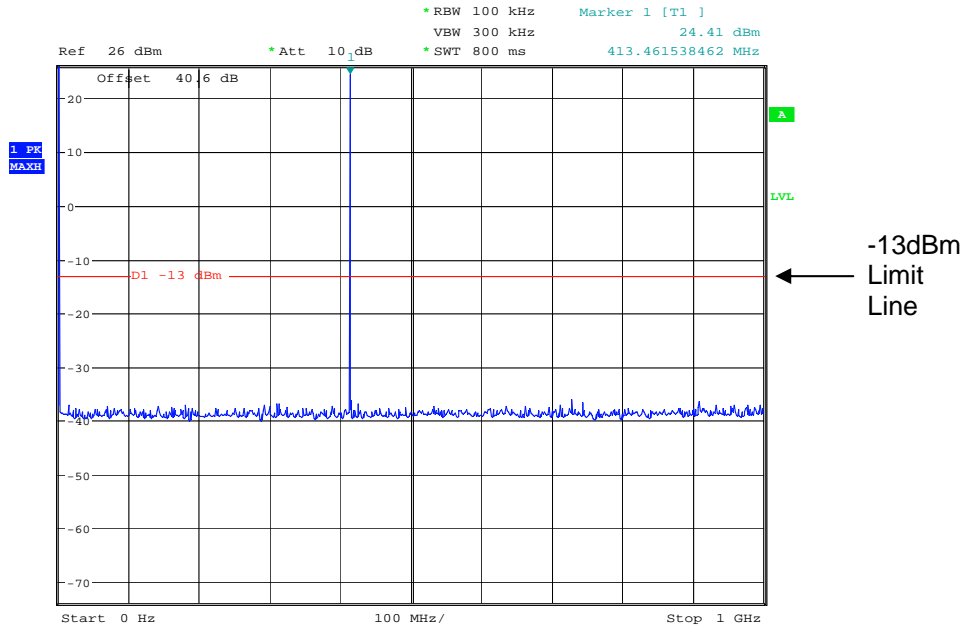
## Conducted emissions Middle channel 413.3MHz 3 - 6GHz



Date: 20.DEC.2007 14:33:02

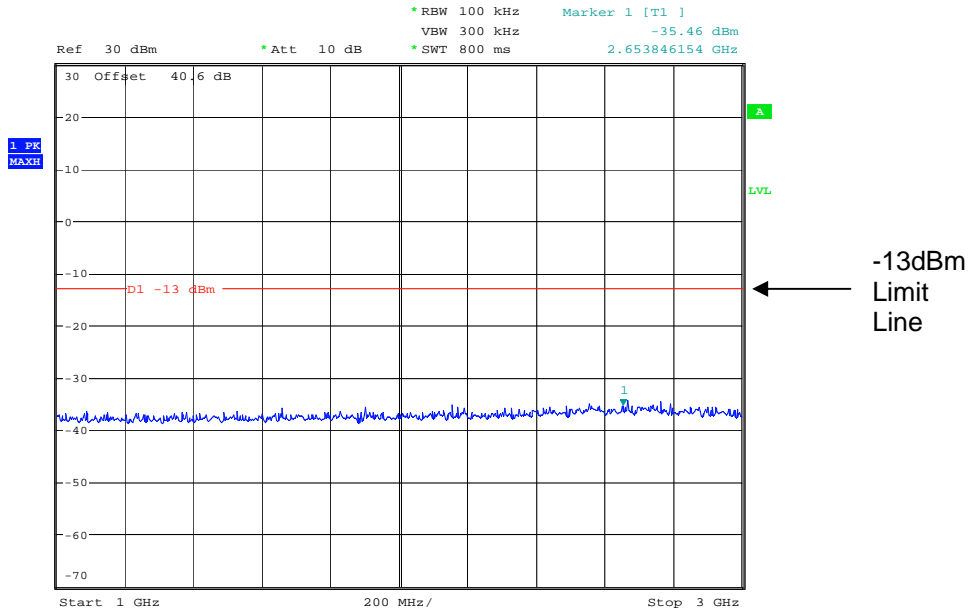
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

### Conducted emissions Top channel 413.65MHz 0MHz - 1GHz



Date: 20.DEC.2007 15:42:30

### Conducted emissions Top channel 413.65MHz 1 - 3GHz

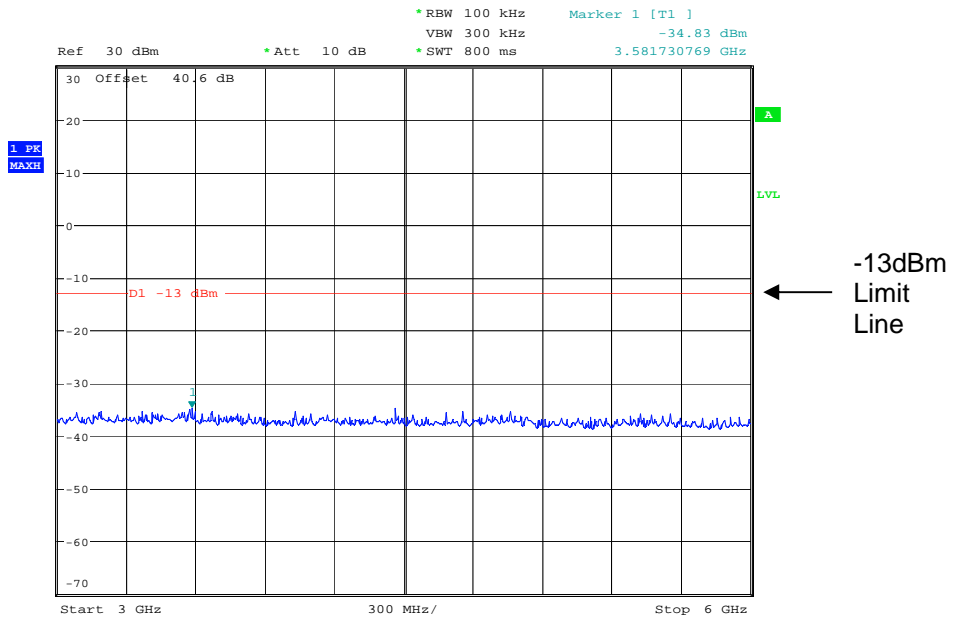


Date: 20.DEC.2007 11:24:32

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

# UHFLOW UPLINK

## Conducted emissions Top channel 413.65MHz 3 - 6GHz



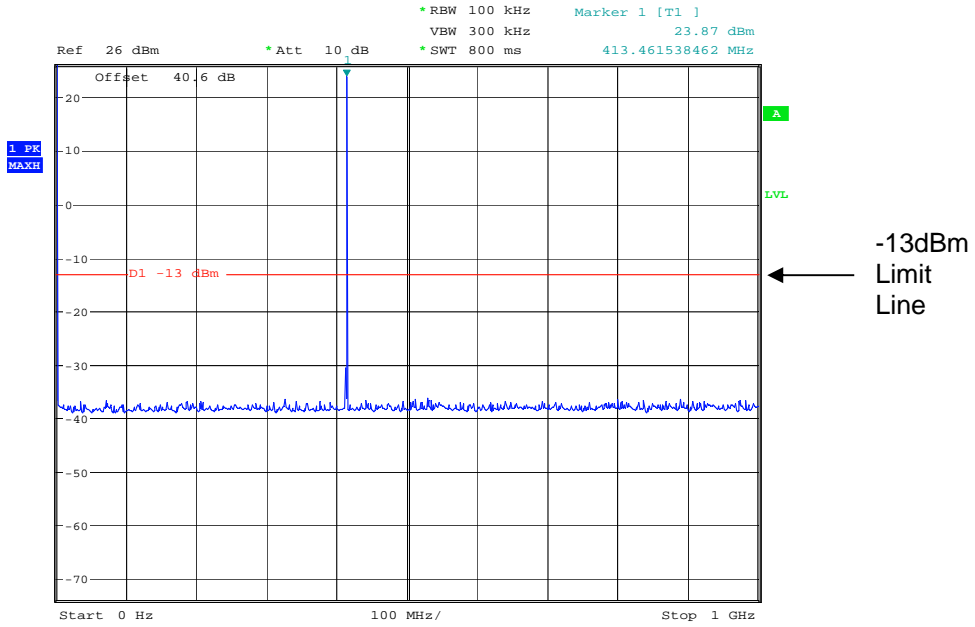
Date: 20.DEC.2007 11:25:12

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



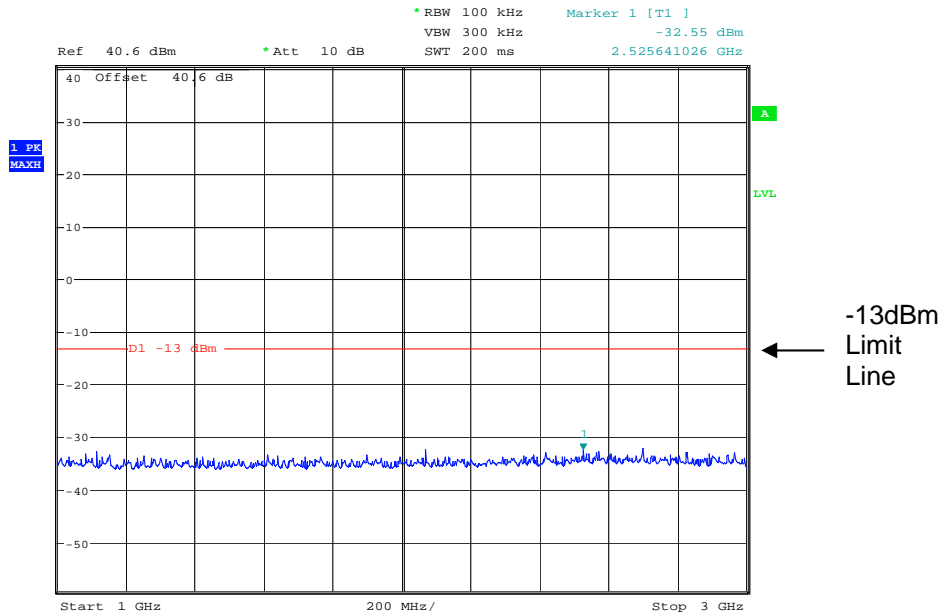
# UHF MID UPLINK

Conducted emissions bottom channel 415.88MHz 0MHz – 1GHz



Date: 20.DEC.2007 15:40:35

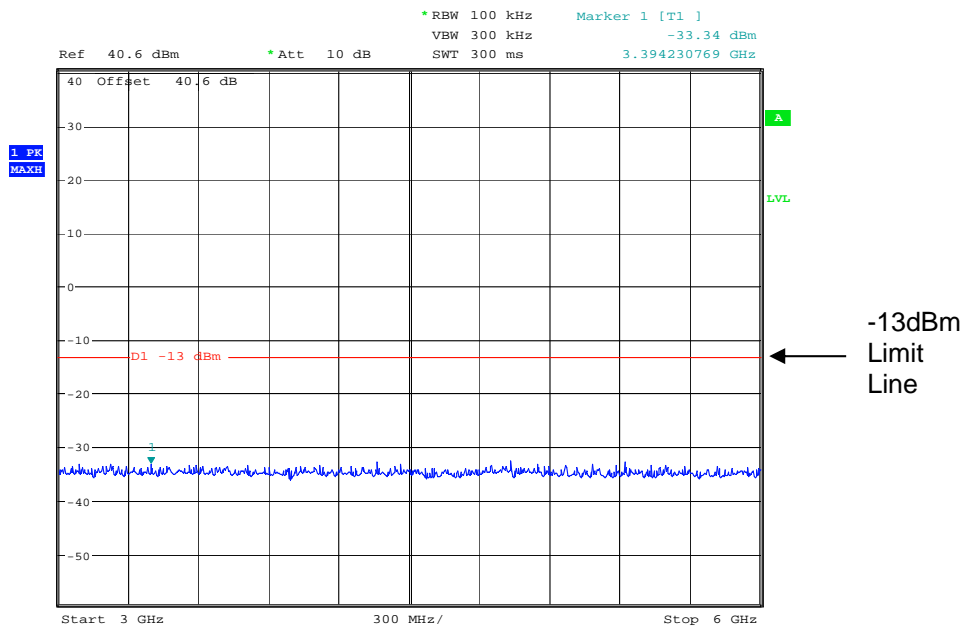
Conducted emissions bottom channel 415.88MHz 1 – 3GHz



Date: 20.DEC.2007 13:54:43

# UHF MID UPLINK

Conducted emissions bottom channel 415.88MHz 3 – 6GHz

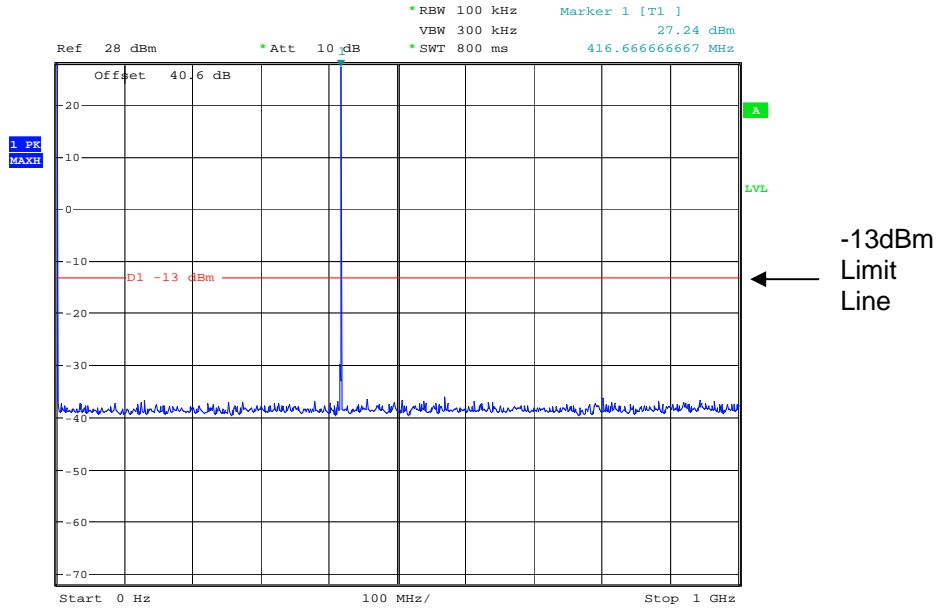


Date: 20.DEC.2007 13:55:19

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

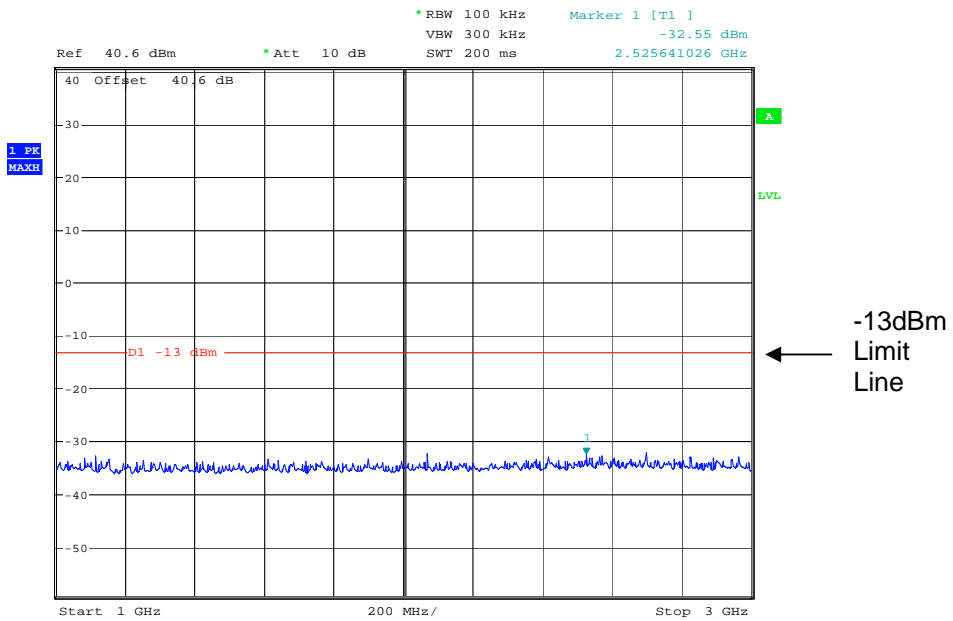
# UHF MID UPLINK

## Conducted emissions Middle channel 416.54MHz 0MHz – 1GHz



Date: 20.DEC.2007 15:51:30

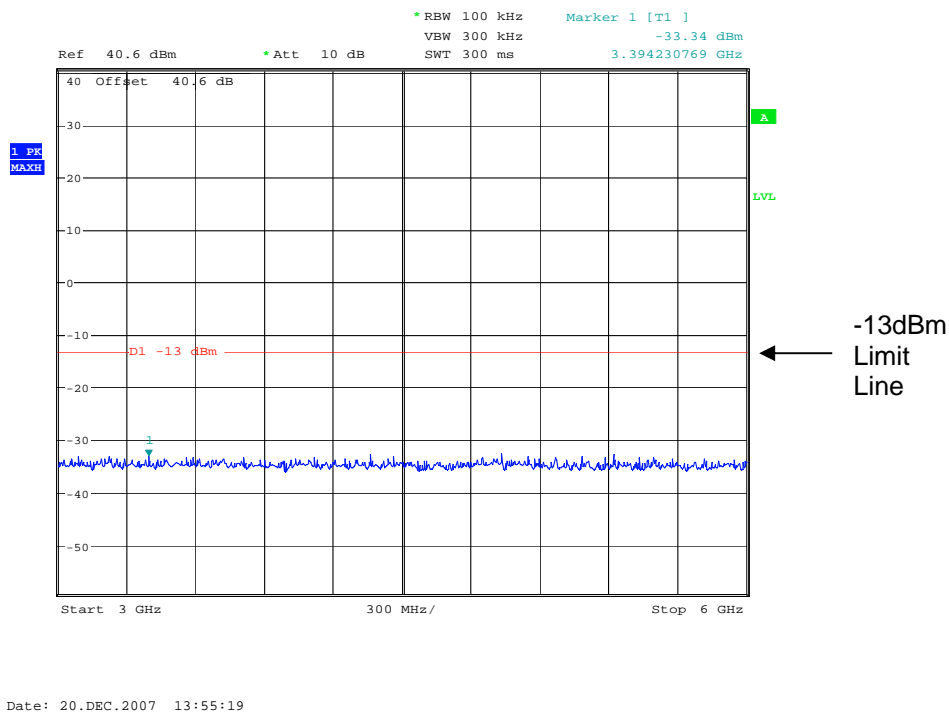
## Conducted emissions Middle channel 416.54MHz 1 – 3GHz



Date: 20.DEC.2007 13:54:43

# UHF MID UPLINK

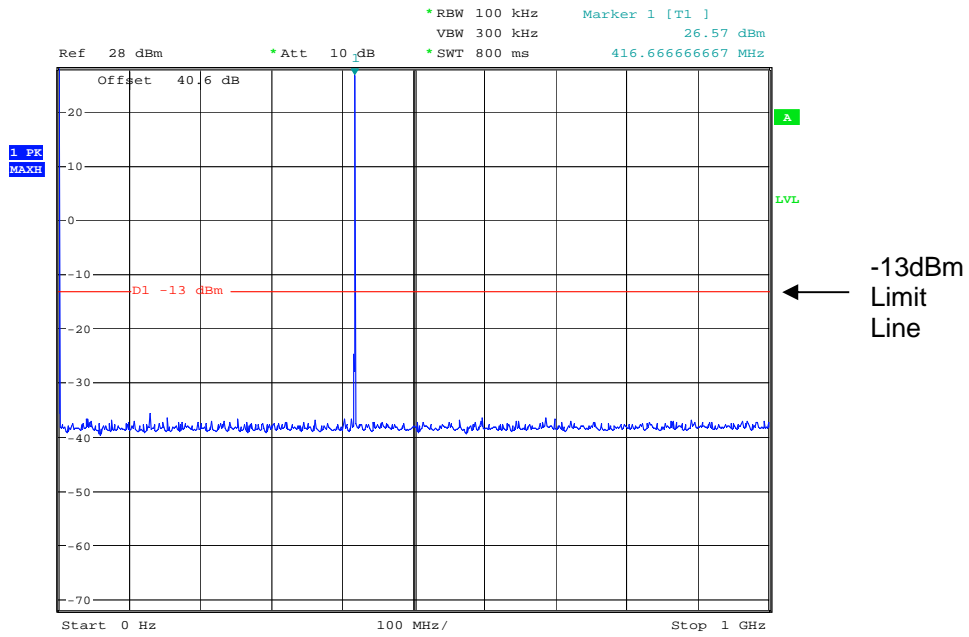
Conducted emissions Middle channel 416.54MHz 3 – 6GHz



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

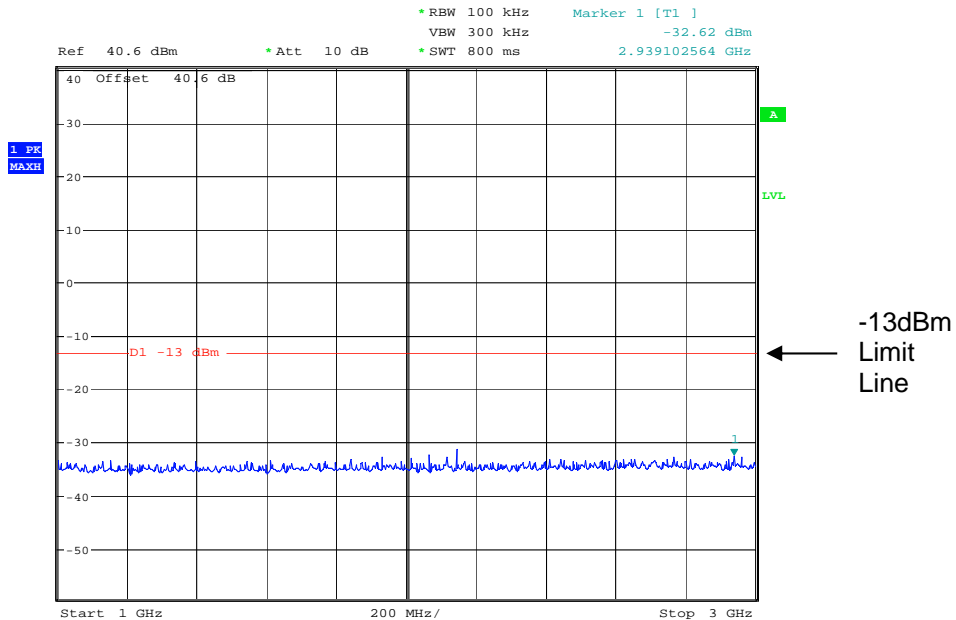
# UHF MID UPLINK

## Conducted emissions Top channel 417.2MHz 0MHz – 1GHz



Date: 20.DEC.2007 15:52:19

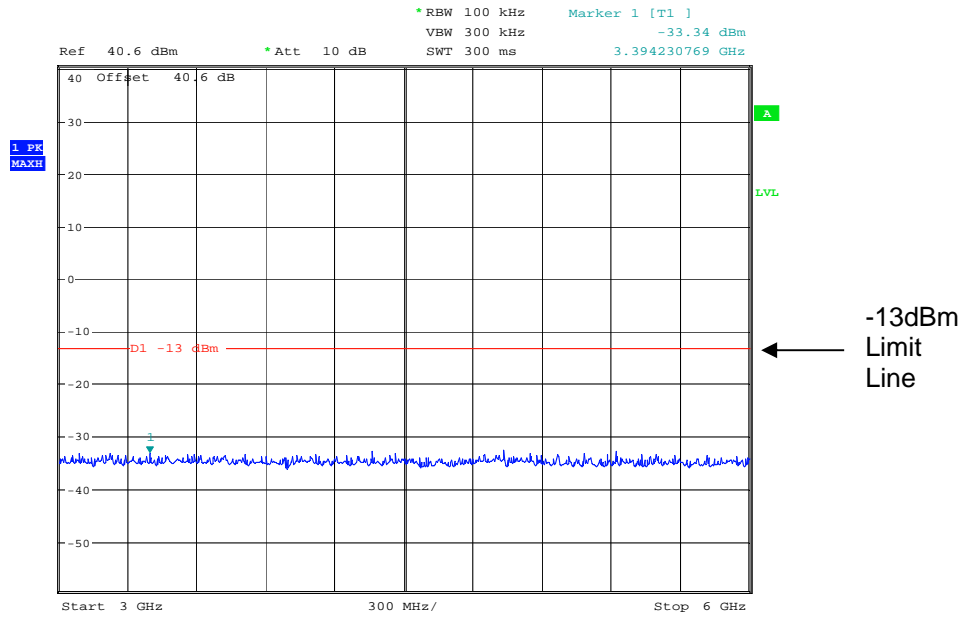
## Conducted emissions Top channel 417.2MHz 1 – 3GHz



Date: 20.DEC.2007 14:32:31

# UHF MID UPLINK

Conducted emissions Top channel 417.2MHz 3– 6GHz

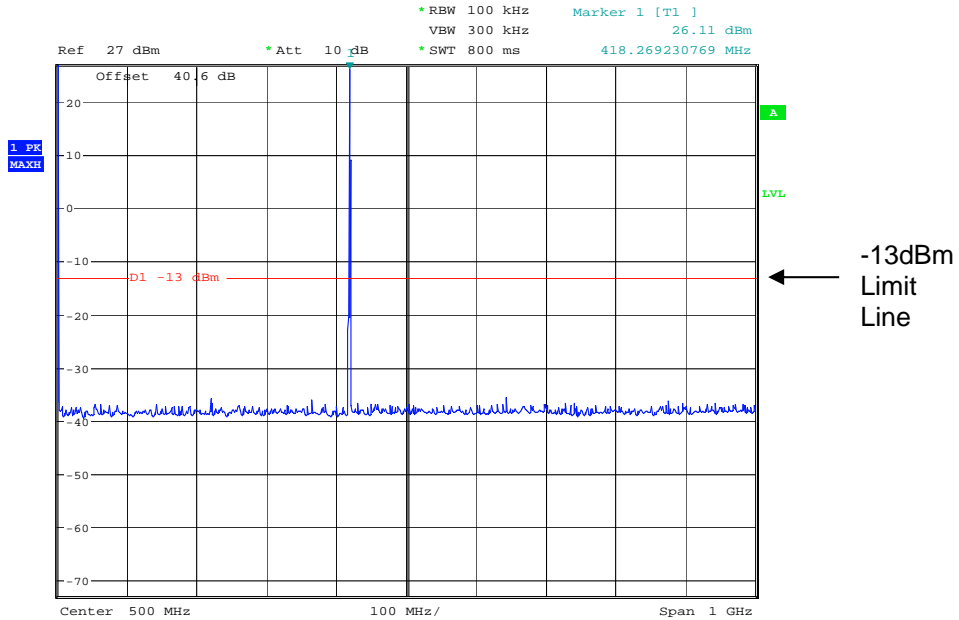


Date: 20.DEC.2007 13:55:19

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

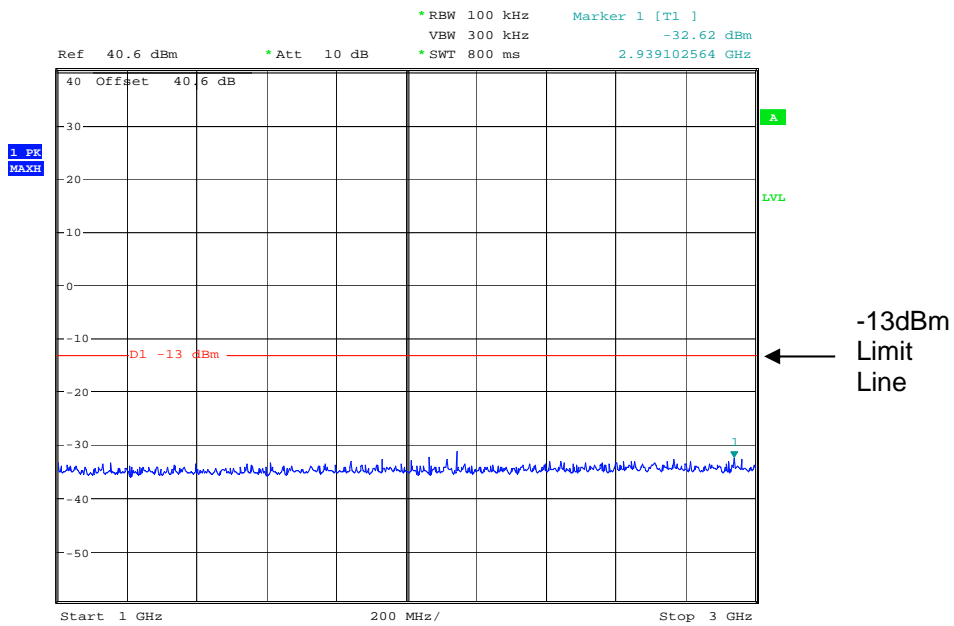
# UHFHIGH UPLINK

Conducted emissions bottom channel 419.05MHz 0MHz – 1GHz



Date: 20.DEC.2007 16:10:53

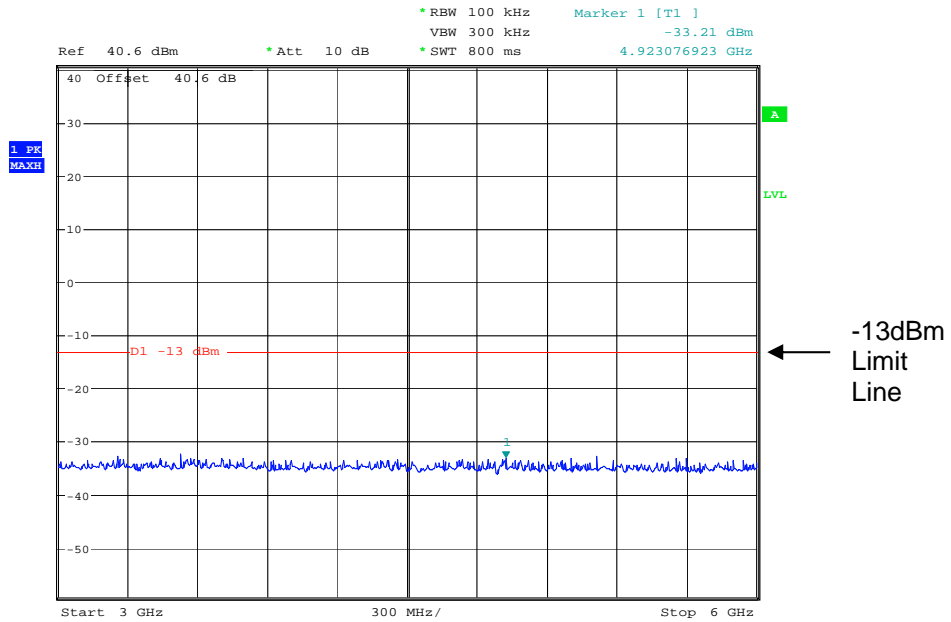
Conducted emissions bottom channel 419.05MHz 1 – 3GHz



Date: 20.DEC.2007 14:32:31

# UHFHIGH UPLINK

Conducted emissions bottom channel 419.05MHz 3 – 6GHz



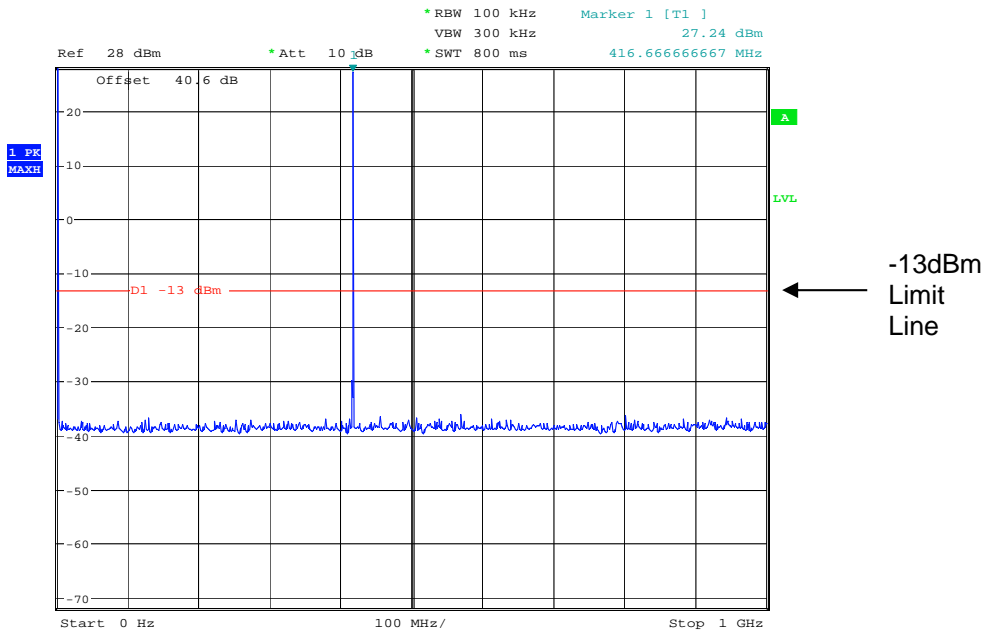
Date: 20.DEC.2007 14:33:02

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



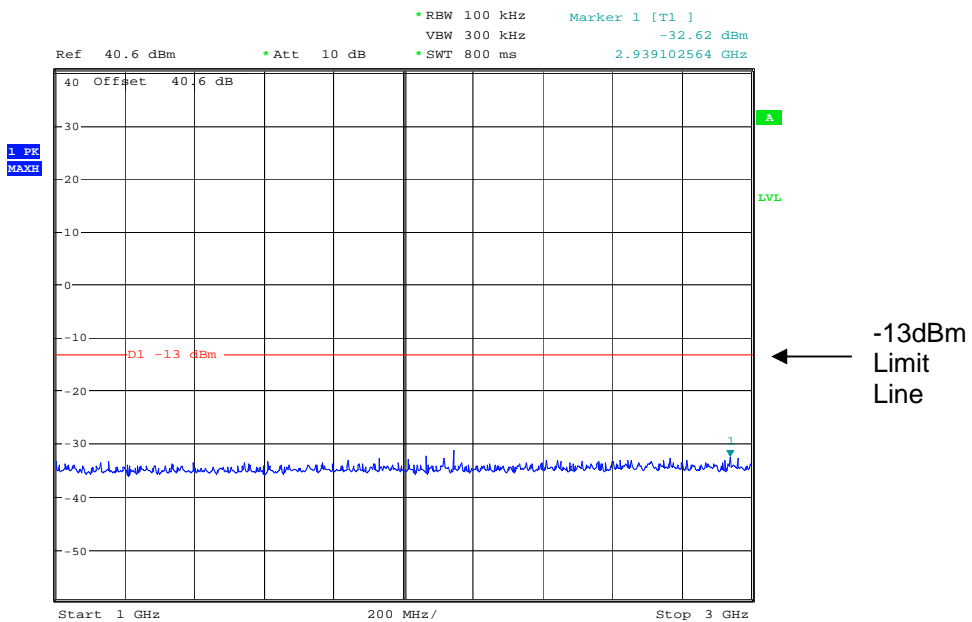
# UHFHIGH UPLINK

## Conducted emissions Middle channel 419.525MHz 0MHz – 1GHz



Date: 20.DEC.2007 15:51:30

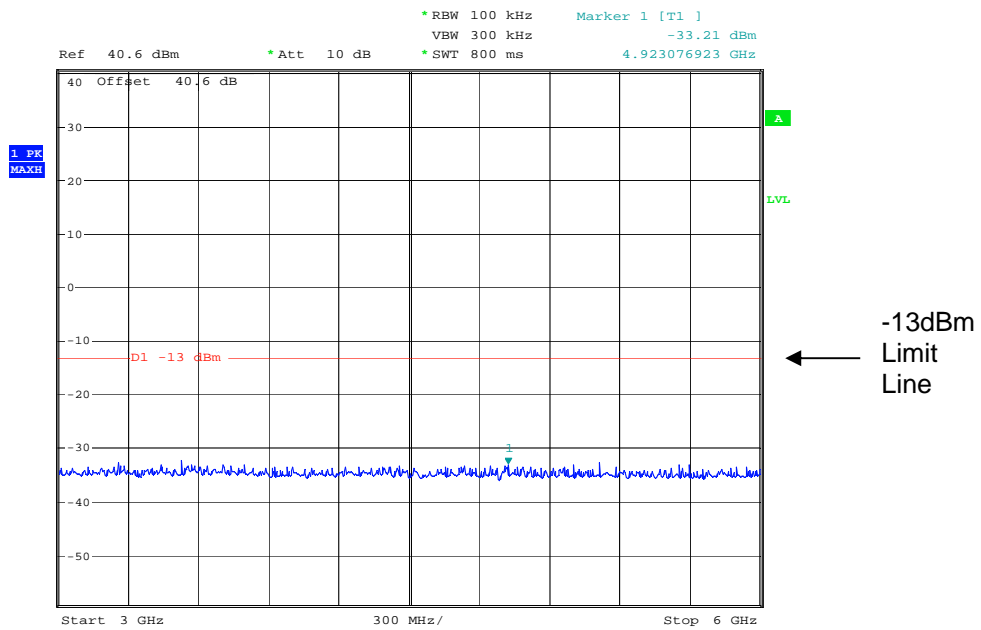
## Conducted emissions Middle channel 419.525MHz 1 – 3GHz



Date: 20.DEC.2007 14:32:31

# UHFHIGH UPLINK

## Conducted emissions Middle channel 419.525MHz 3 – 6GHz

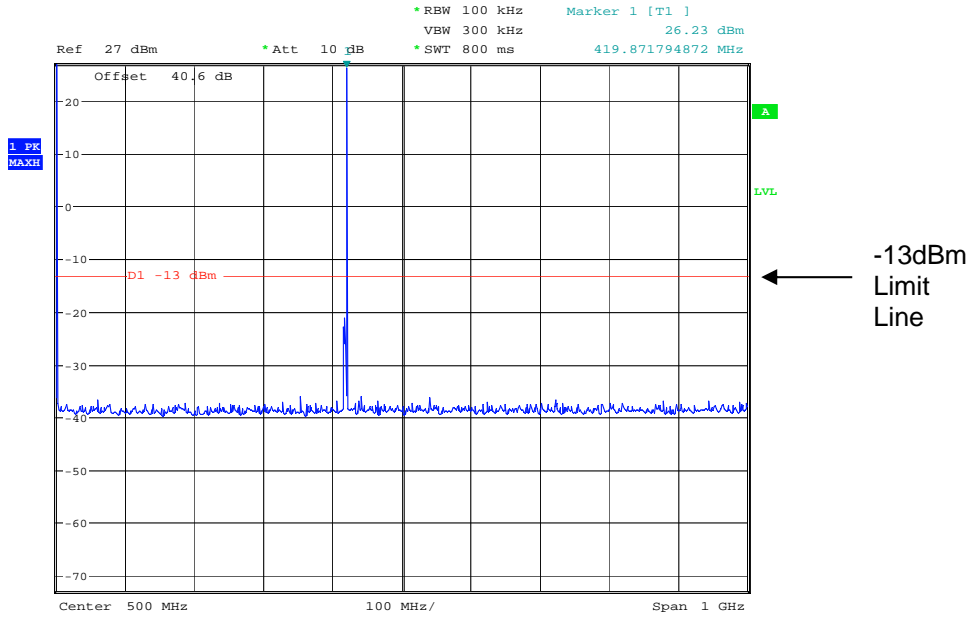


Date: 20.DEC.2007 14:33:02

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

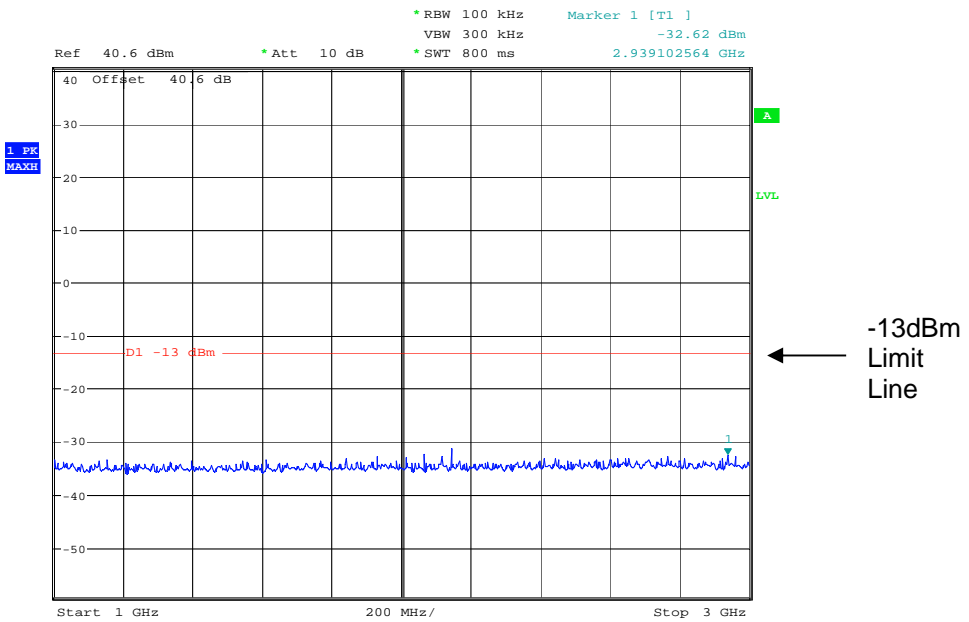
# UHFHIGH UPLINK

## Conducted emissions Top channel 420.0MHz 0MHz – 1GHz



Date: 20.DEC.2007 16:12:56

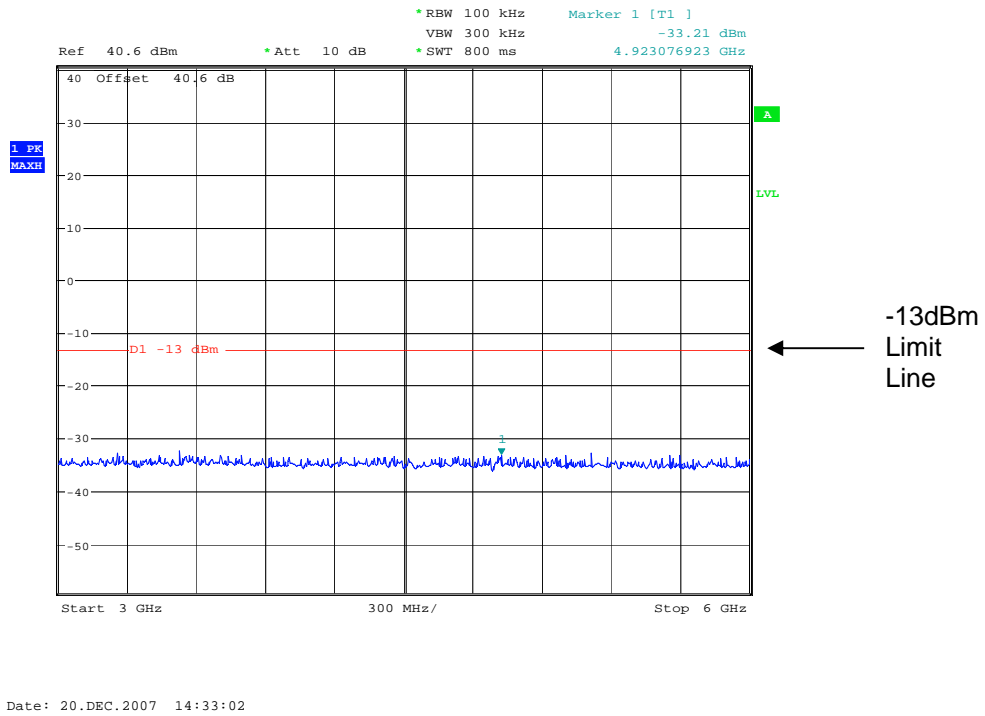
## Conducted emissions Top channel 420.0MHz 1 – 3GHz



Date: 20.DEC.2007 14:32:31

# UHFHIGH UPLINK

Conducted emissions Top channel 420.0MHz 3 – 6GHz



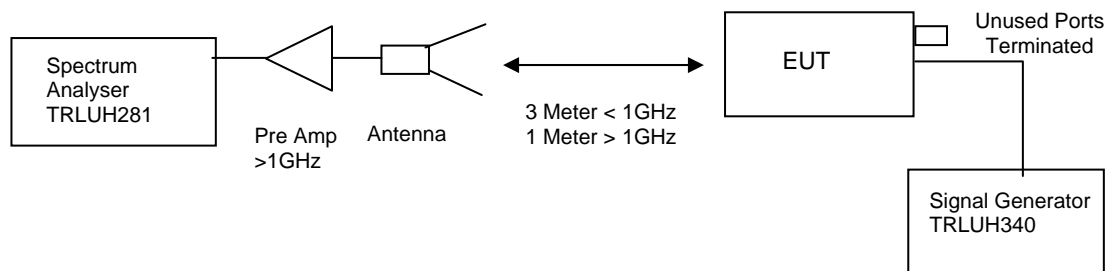
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

## TRANSMITTER TESTS

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

Ambient temperature = 17°C  
 Relative humidity = 44%  
 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  $43 + 10 \log P_{dB}$

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

## RESULTS

FREQUENCY RANGE	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	CALCULATED EIRP (dBm)	LIMIT (dBm)
30MHz – 5GHz	No Significant Emissions Within 20 dB of the Limit						-13dBm

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	X
HORN	EMCO	3115	9010-3580	138	X
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	
PRE AMPLIFIER	HP	8449B	3008A016	572	X
SIGNAL GENERATOR	HP	83630B	3722A00588	UH340	X
ANTENNA	YORK	CBL611/A	1618	UH191	X

**UHFLOW UPLINK**

**Radiated emissions bottom channel 412.95 30MHz – 1GHz**

TRL Compliance Ltd

02 Jan 2008 09:11

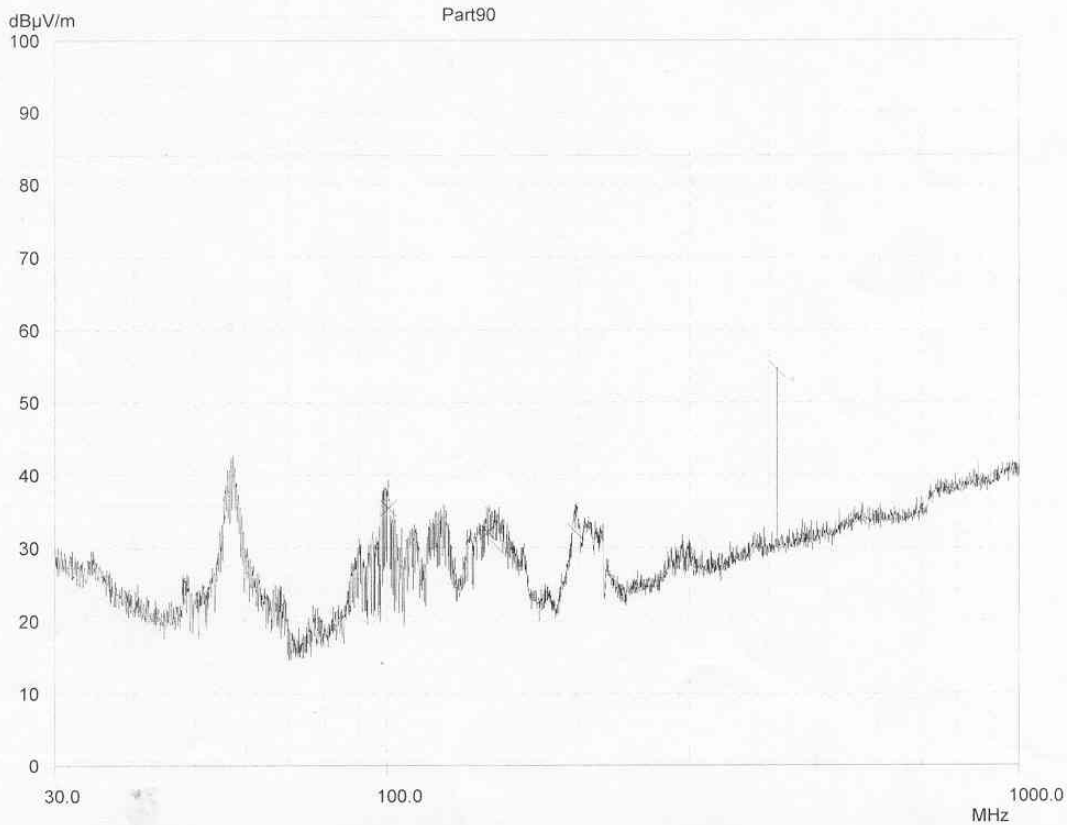
**E-Field Radiation (30MHz-1GHz)**

EUT: TRAVIS AFB  
Manuf: Aerial Facilities Ltd  
Op Cond: Prescan 30MHz - 1000MHz  
Operator: S Hodgkinson  
Test Spec: Part 90  
Comment: All channel filters enabled, uplink amplifiers enabled, all ports terminated. Bottom channel uplink selected.  
Rx antenna Vertical.

Scan Settings			(1 Range)		Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto	ON	60dB

Transducer	No.	Start	Stop	Name
1	21	30MHz	1000MHz	UH72
	22	30MHz	1000MHz	UH191

Final Measurement:      Detector: X QP  
                                 Meas Time: 2sec  
                                 Subranges: 50  
                                 Acc Margin: 10 dB



**UHF MID UPLINK**

**Radiated emissions Middle channel 416.54 30MHz – 1GHz**

TRL Compliance Ltd

02 Jan 2008 09:25

**E-Field Radiation (30MHz-1GHz)**

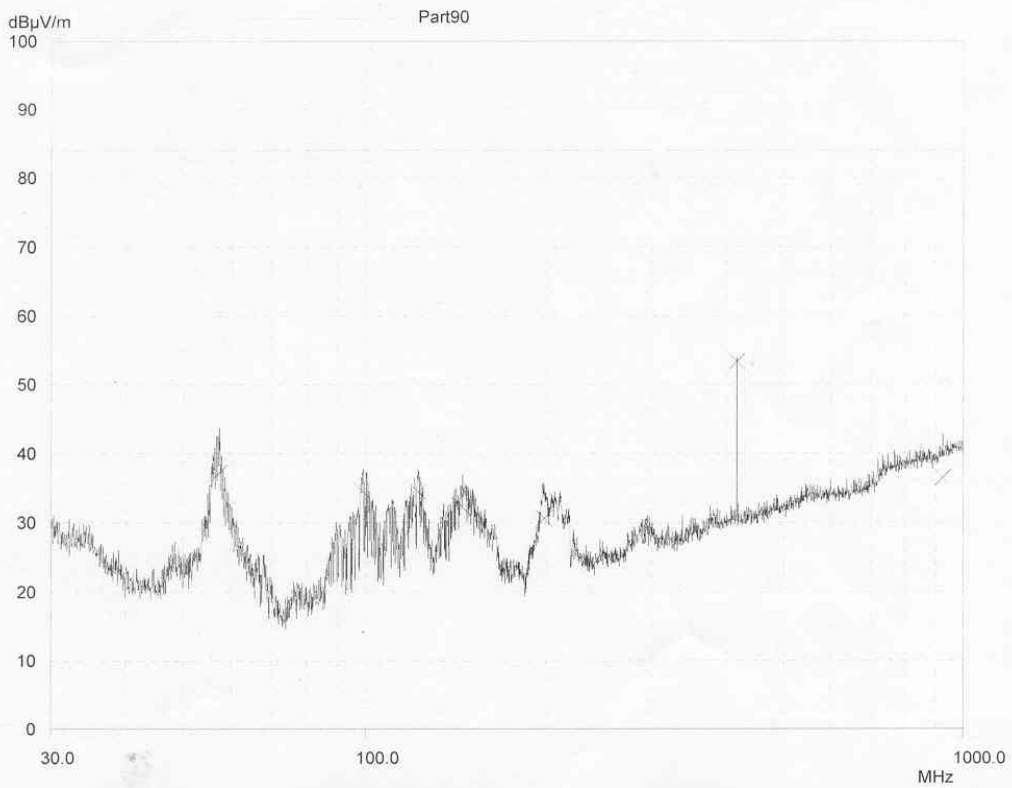
EUT: TRAVIS AFB  
Manuf: Aerial Facilities Ltd  
Op Cond: Prescan 30MHz - 1000MHz  
Operator: S Hodgkinson  
Test Spec: Part 90  
Comment: All channel filters enabled, uplink amplifiers enabled, all ports terminated. Middle channel uplink selected.  
Rx antenna Vertical.

Scan Settings (1 Range)

Frequencies				Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto	ON	60dB

Transducer	No.	Start	Stop	Name
1	21	30MHz	1000MHz	UH72
	22	30MHz	1000MHz	UH191

Final Measurement:      Detector: X QP  
                                 Meas Time: 2sec  
                                 Subranges: 50  
                                 Acc Margin: 10 dB



**UHFTOP UPLINK**

**Radiated emissions Top channel 420.0 30MHz – 1GHz**

TRL Compliance Ltd

02 Jan 2008 09:46

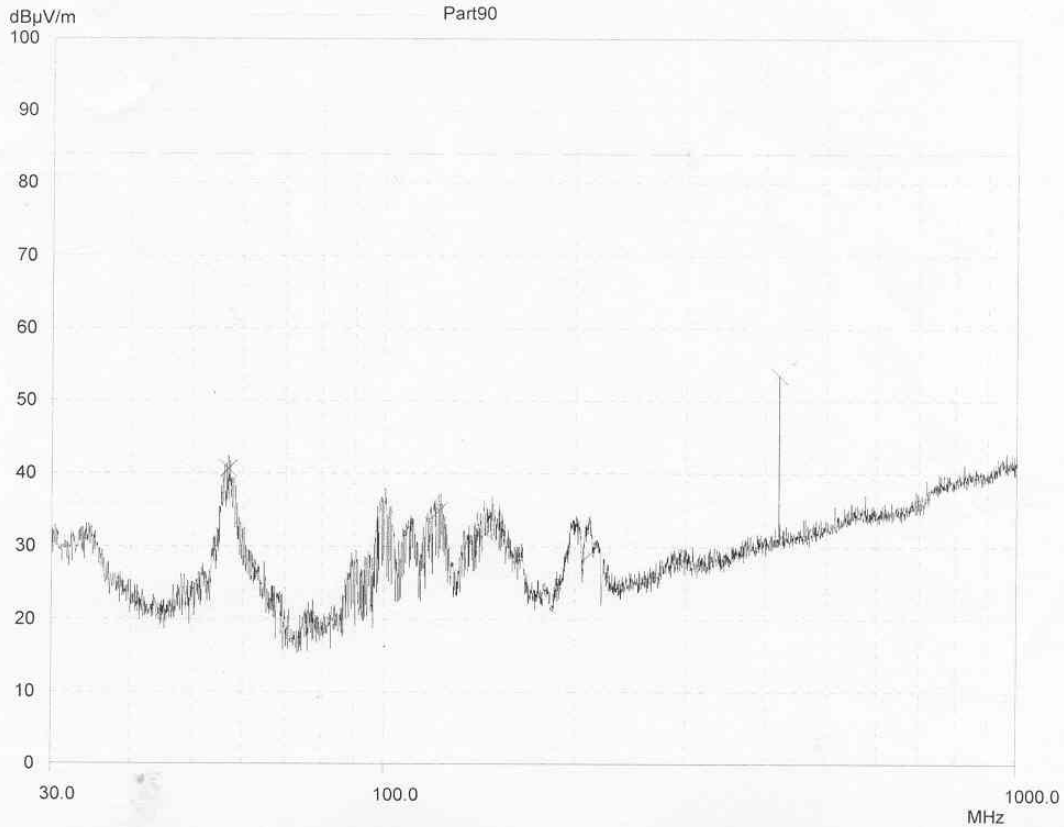
**E-Field Radiation (30MHz-1GHz)**

EUT: TRAVIS AFB  
 Manuf: Aerial Facilities Ltd  
 Op Cond: Prescan 30MHz - 1000MHz  
 Operator: S Hodgkinson  
 Test Spec: Part 90  
 Comment: All channel filters enabled, uplink amplifiers enabled, all ports terminated, top channel uplink selected.  
 Rx antenna Vertical.

Scan Settings		(1 Range)			Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto	ON	60dB

Transducer	No.	Start	Stop	Name
1	21	30MHz	1000MHz	UH72
	22	30MHz	1000MHz	UH191

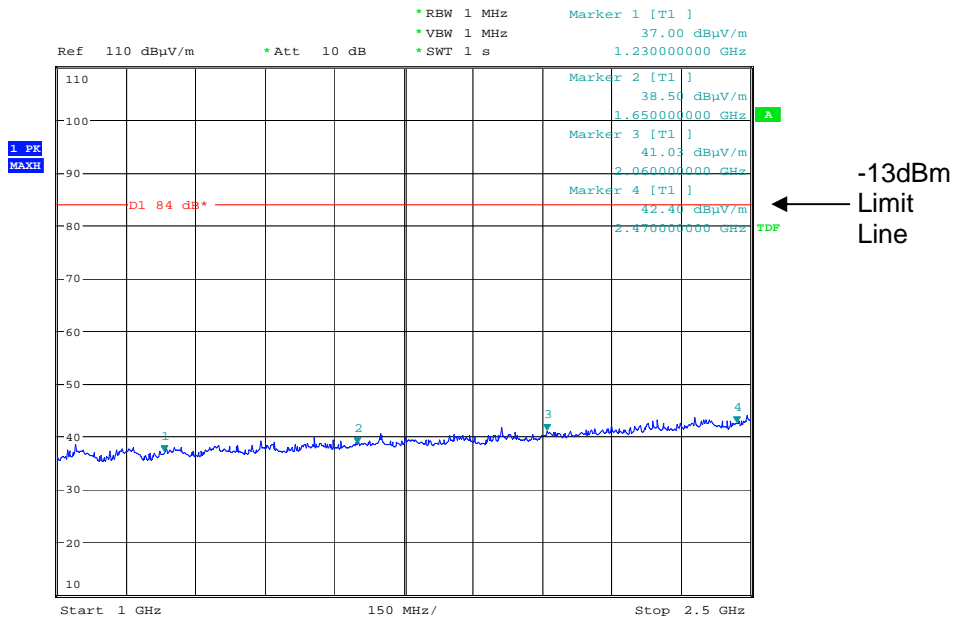
Final Measurement: Detector: X QP  
 Meas Time: 2sec  
 Subranges: 50  
 Acc Margin: 10 dB





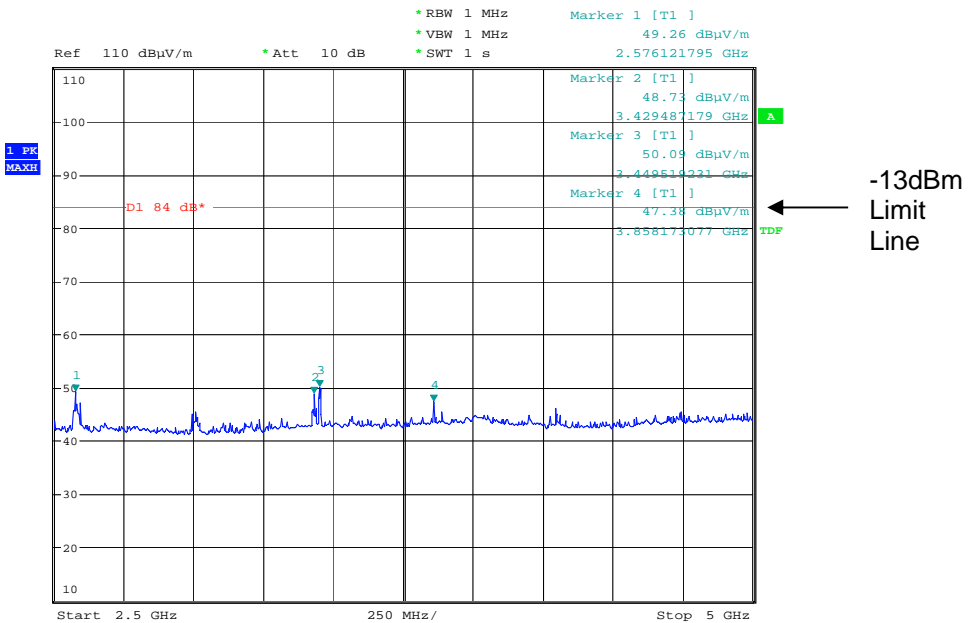
# UHFLOW UPLINK

## Radiated emissions bottom channel 412.95MHz 1GHz – 2.5 GHz



Date: 2.JAN.2008 14:53:29

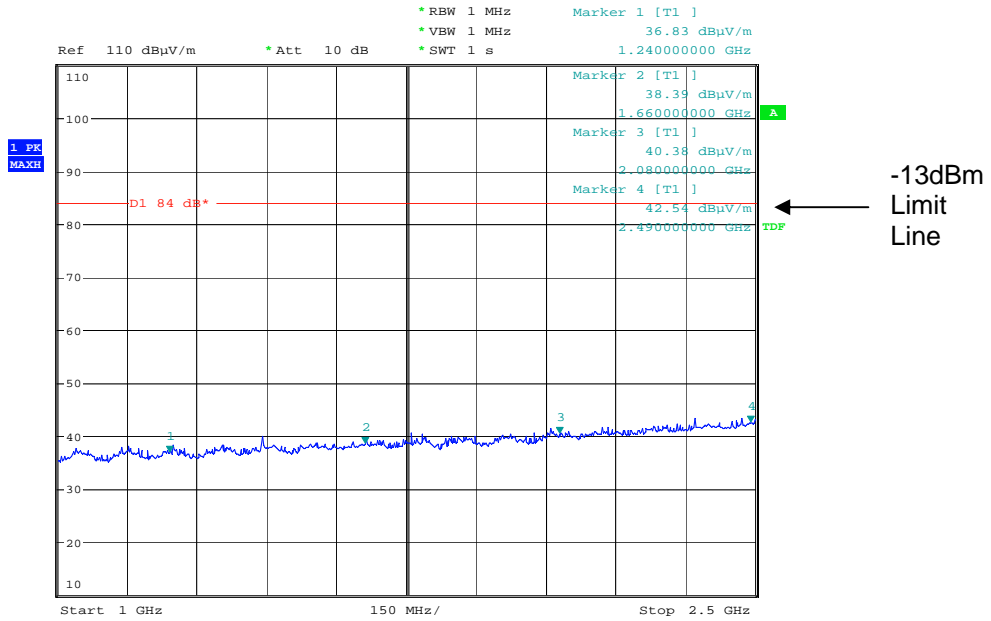
## Radiated emissions bottom channel 412.95MHz 2.5GHz – 5 GHz



Date: 2.JAN.2008 14:55:41

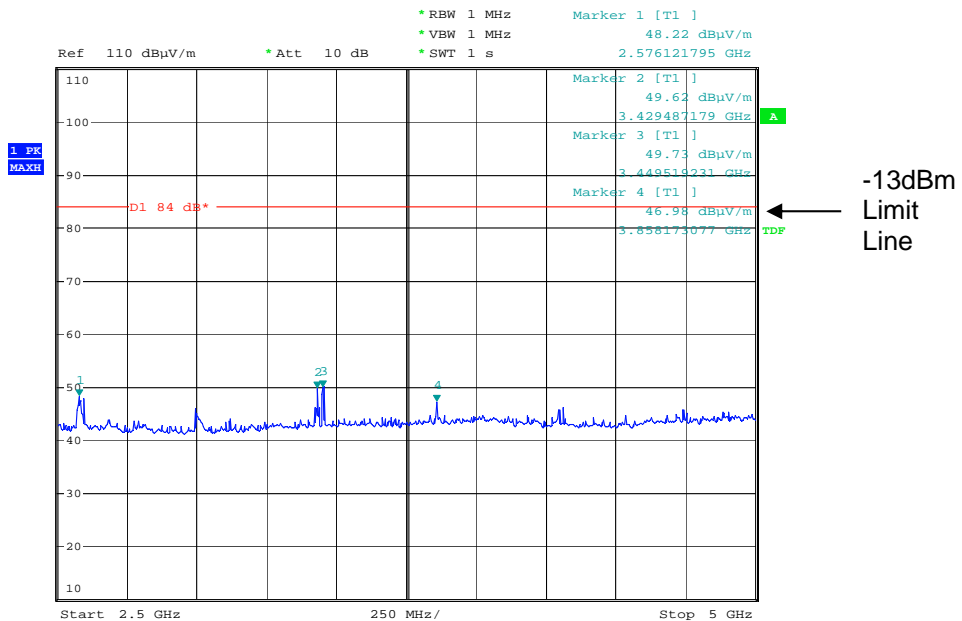
# UHF MID UPLINK

## Radiated emissions Middle channel 416.54MHz 1GHz – 2.5GHz



Date: 2.JAN.2008 15:02:03

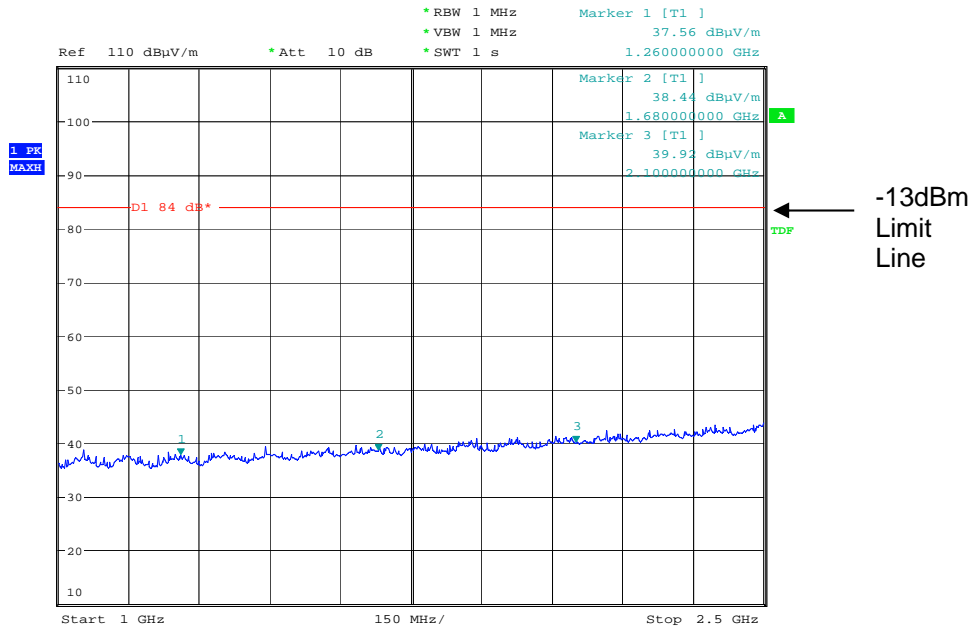
## Radiated emissions Middle channel 416.54MHz 2.5GHz – 5GHz



Date: 2.JAN.2008 15:03:40

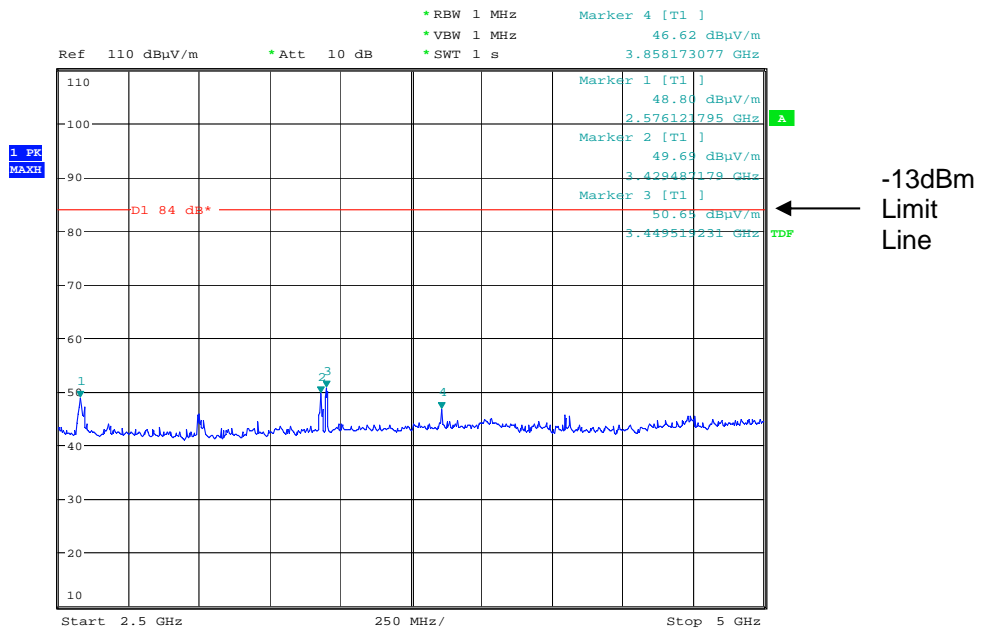
**UHFTOP UPLINK**

**Radiated emissions Top channel 420.0MHz 1GHz – 2.5GHz**



Date: 2.JAN.2008 15:10:30

**Radiated emissions Top channel 420.0MHz 2.5GHz –5GHz**



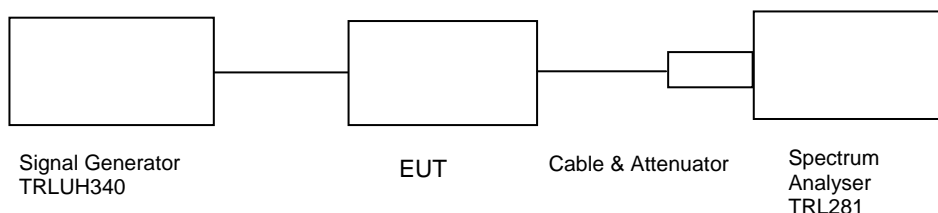
Date: 2.JAN.2008 15:12:30

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

**AMPLIFIER GAIN – CONDUCTED – PART 2.1046 – DOWNLINK**

Ambient temperature = 15°C  
 Relative humidity = 44%  
 Supply voltage = 110Vac  
 Channel number = See test results

Radio Laboratory



Frequency MHz	Signal Generator input level dBm	Input Cable Loss dB	Output Cable & Attenuator loss dB	Level at Spectrum Analyser dBm	Gain dB	Conducted Output Power dBm	Gain after 10dB input level increase dB
406.575	-66.50	0.30	40.57	-16.35	91.02	24.22	81.99
408.25	-65.13	0.30	40.57	-15.38	90.62	25.19	80.78
410.85	-63.03	0.30	40.57	-15.94	87.96	24.63	78.14

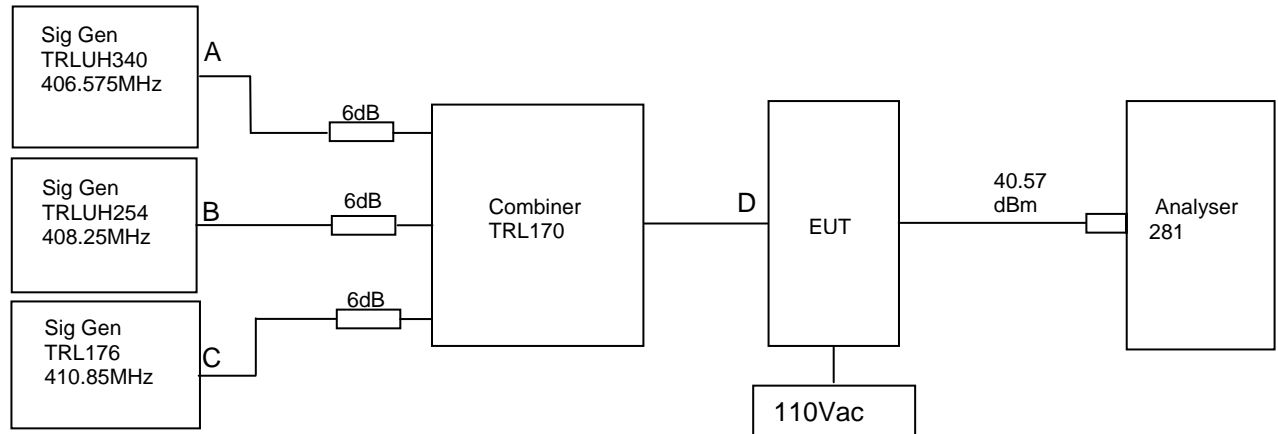
Notes: 1. The signal generator input was increased by 10dBs and the level of the output signal remeasured.

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU	200034	281	X
ATTENUATOR	BIRD	8308-200-N	N/A	103	X
ATTENUATOR	SPINNER	745357	D57224	225	X
SIGNAL GENERATOR	HEWLETT PACKARD	83630B	3722A00588	TRLUH340	X

**AMPLIFIER INTERMODULATION SPURIOUS EMISSIONS – CONDUCTED – PART 2.1053– DOWNLINK**

Ambient temperature = 20°C  
 Relative humidity = 30%  
 Supply voltage = 110Vac

Radio Laboratory



The intermodulation and spurious products were measured with the amplifier operating at maximum gain. A three tone test was conducted using the equipment as above. The input power level was adjusted so the level at point D was 10dB above the maximum input of -63.03dBm. The cable and attenuator loss between the EUT and the spectrum analyser was 40.57dB.

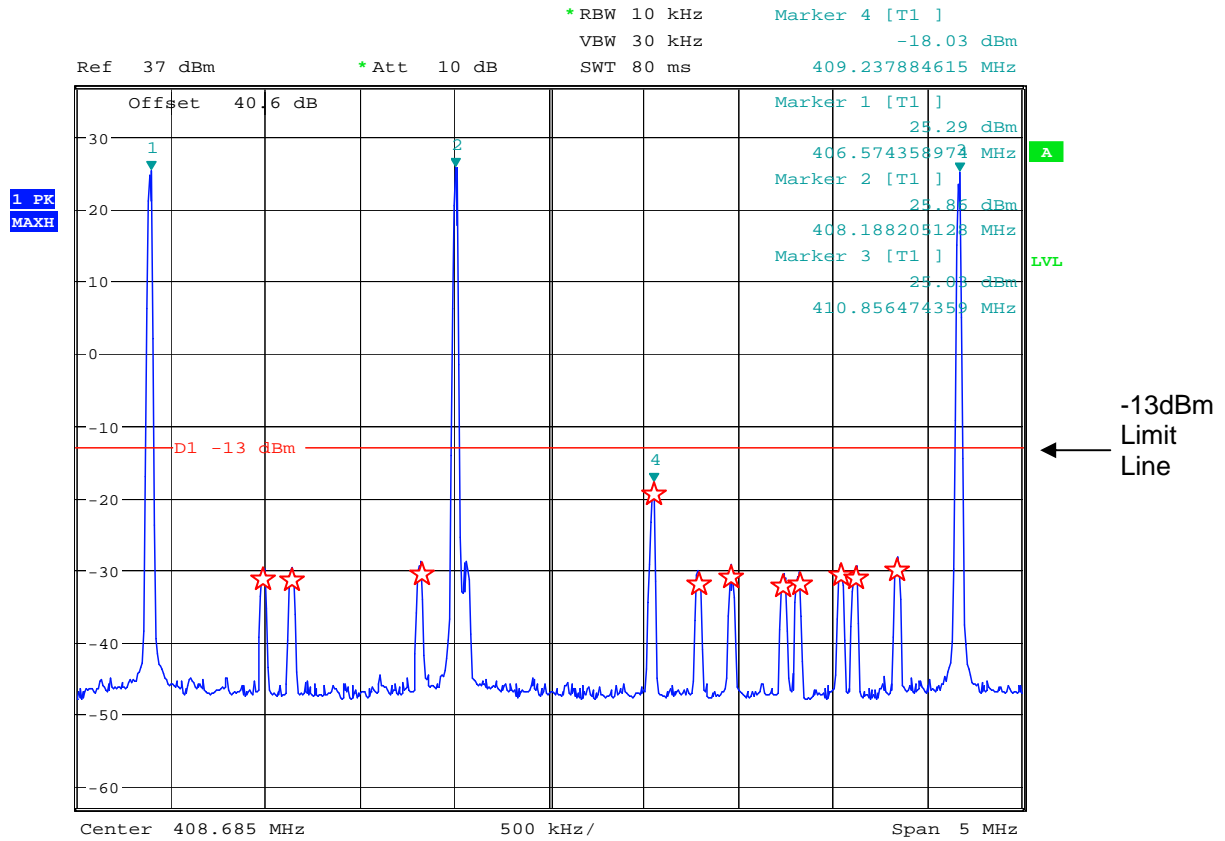
RF Input Frequency (MHz)			Highest Intermodulation Product Level (dBm)	Limit (dBm)
406.575	408.25	410.85	-18.03@409.2378MHz	-13

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	
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	<b>X</b>
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	<b>X</b>
SIGNAL GENERATOR	HP	83630B	3722A00588	UH340	<b>X</b>
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	<b>X</b>
SIGNAL GENERATOR	MARCONI	2023	112224/040	UH105	
CMTA	ROHDE & SCHWARZ	CMTA52	894715/033	05	
COMBINER	ELCOM	RC-4-50	N/A	170	<b>X</b>

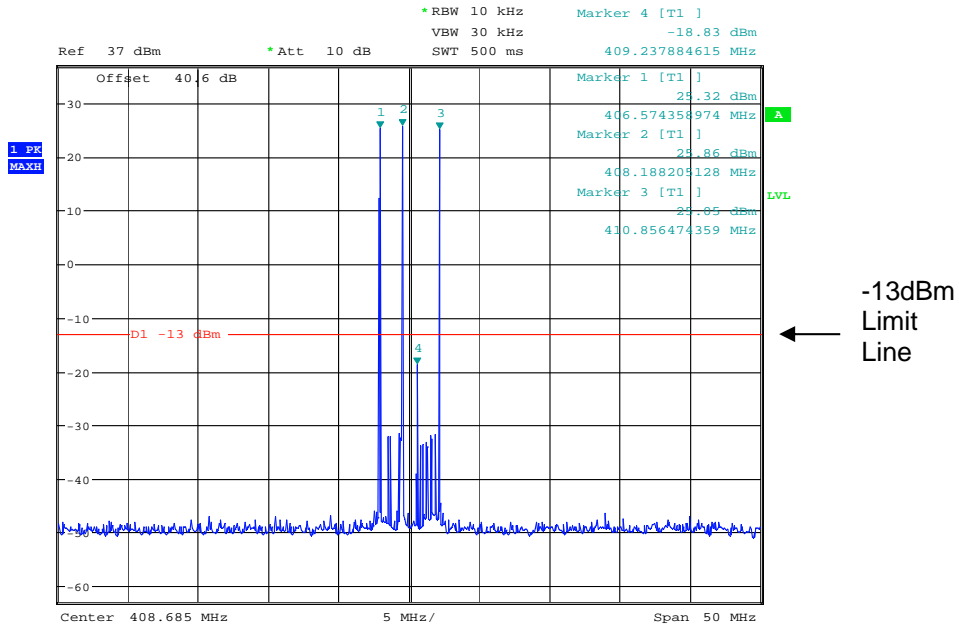
# Intermodulation Inband



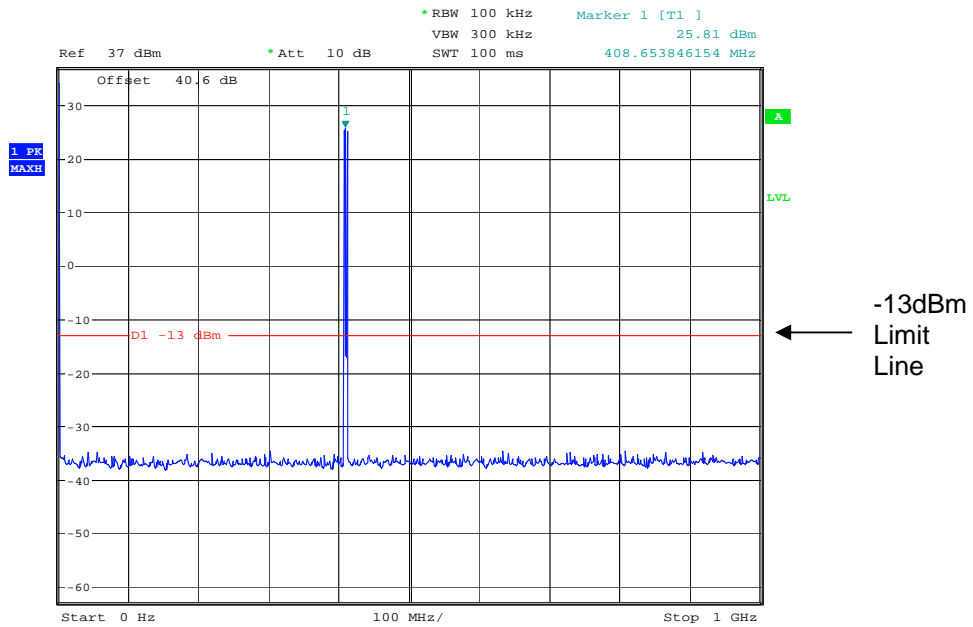
Date: 13.DEC.2007 15:45:31

The above plot shows that all products (designated by ☆) are below the spurious limit.

### Intermodulation Wideband

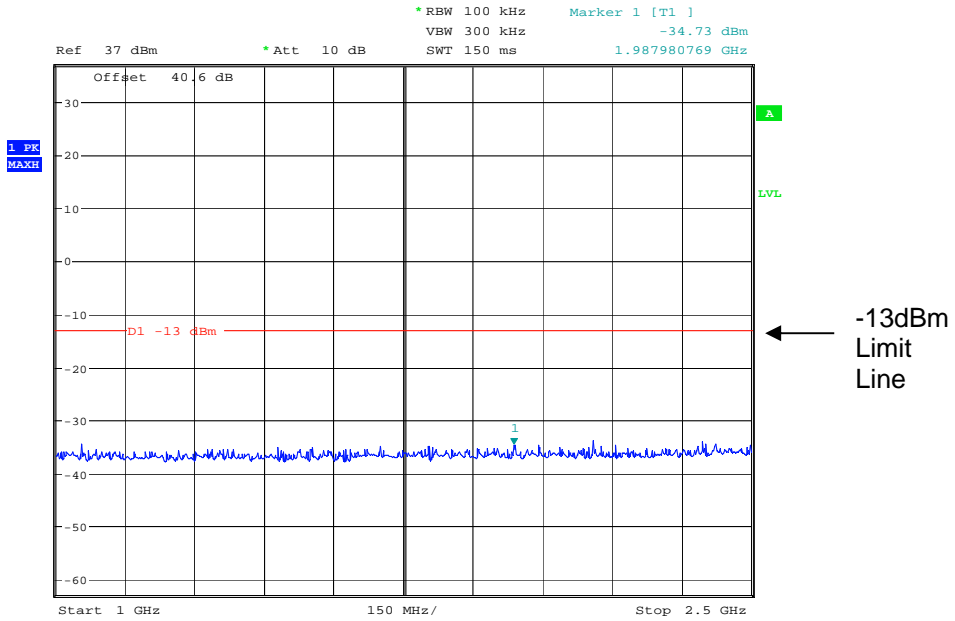


Date: 13.DEC.2007 15:46:08

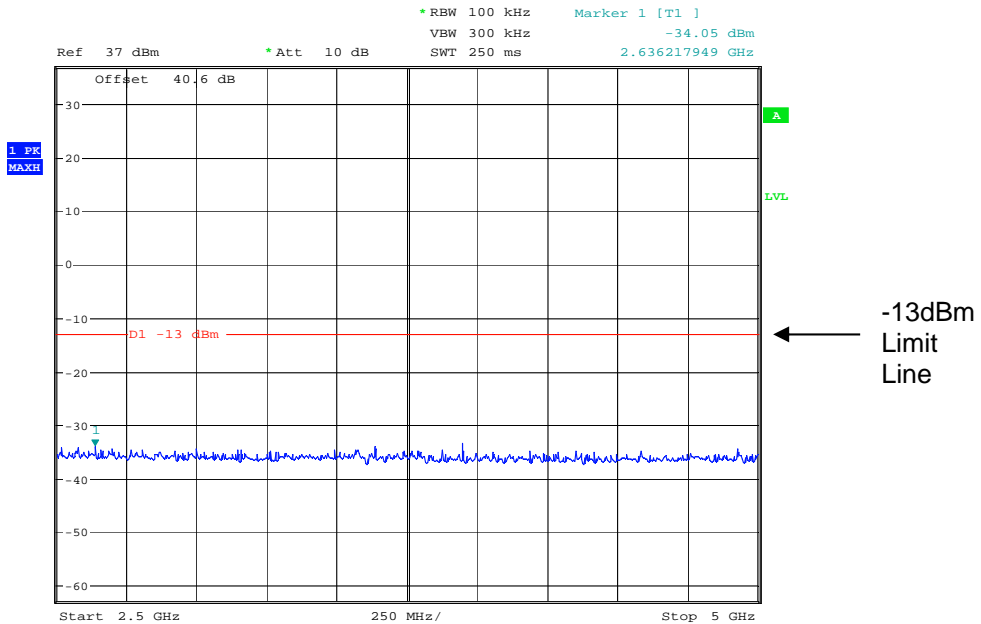


Date: 13.DEC.2007 15:47:03

# Intermodulation Wideband



Date: 13.DEC.2007 15:48:06



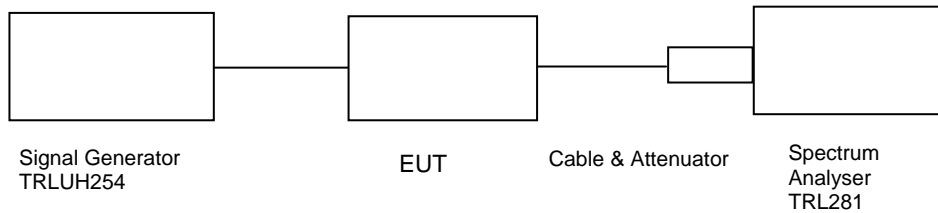
Date: 13.DEC.2007 15:49:07



**TRANSMITTER TESTS**

**AMPLIFIER MODULATED CHANNEL TEST – CONDUCTED – Part 2.1049– DOWNLINK**

Ambient temperature = 15°C Radio Laboratory  
 Relative humidity = 44%  
 Supply voltage = 110Vac  
 Channel number = See test results



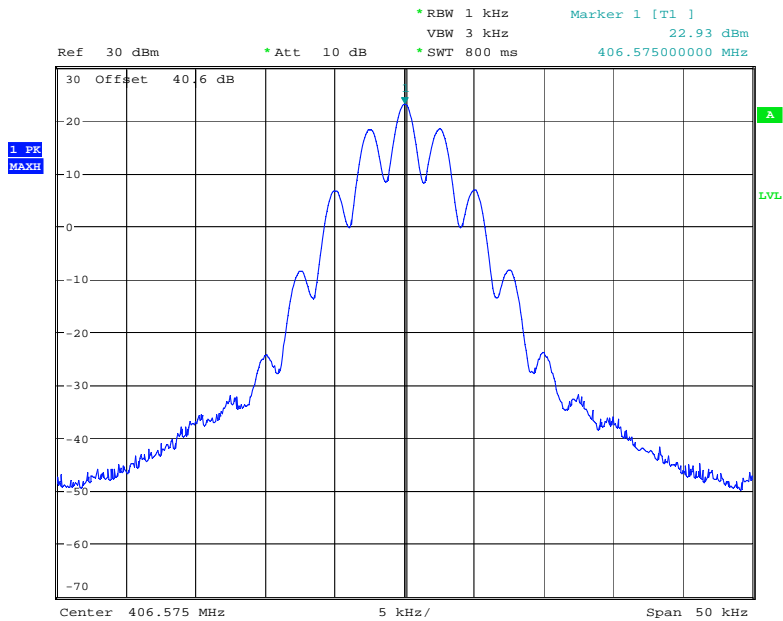
This test was performed to show that the amplifier does not alter the input signal in any way. The input signal was set to the maximum input level (-53.03dBm) and modulated with a 2500Hz tone. The plots show the signal measured at the signal generator and the signal measured at the output of the EUT.

Note: The cables and attenuators had the following losses.

1. Cable and attenuator between EUT and spectrum analyser 40.57dB
2. Cable between signal generator and EUT 0.30dB

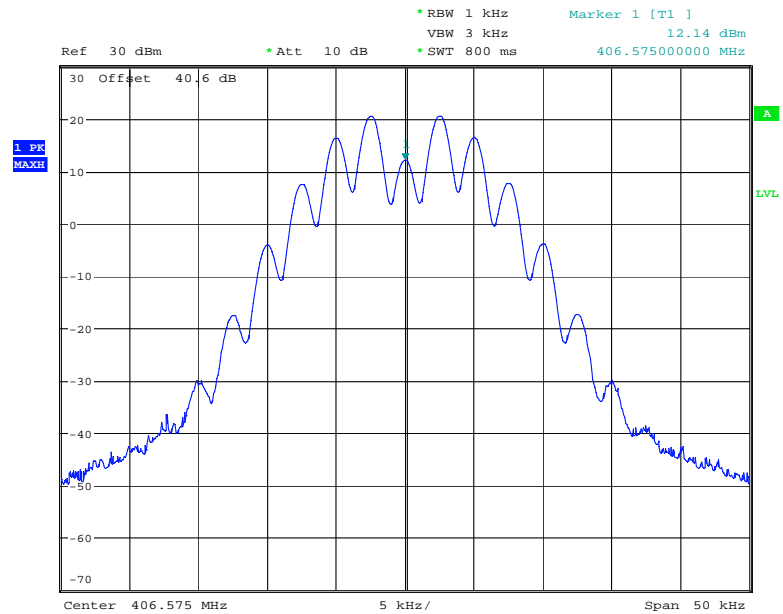
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
ATTENUATOR	SPINNER	745357	D57224	225	X
ATTENUATOR	BIRD	8308-200-N	N/A	103	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X

Bottom channel 406.575MHz Signal Generator and EUT, deviation set to 2.5kHz



Date: 12.DEC.2007 15:36:57

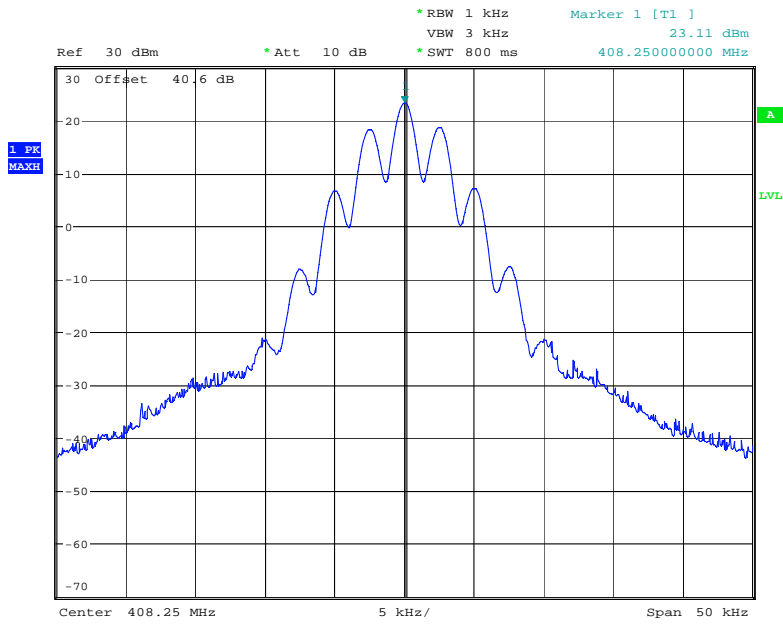
Bottom channel 406.575MHz Signal Generator and EUT, deviation set to 5kHz



Date: 12.DEC.2007 15:40:55

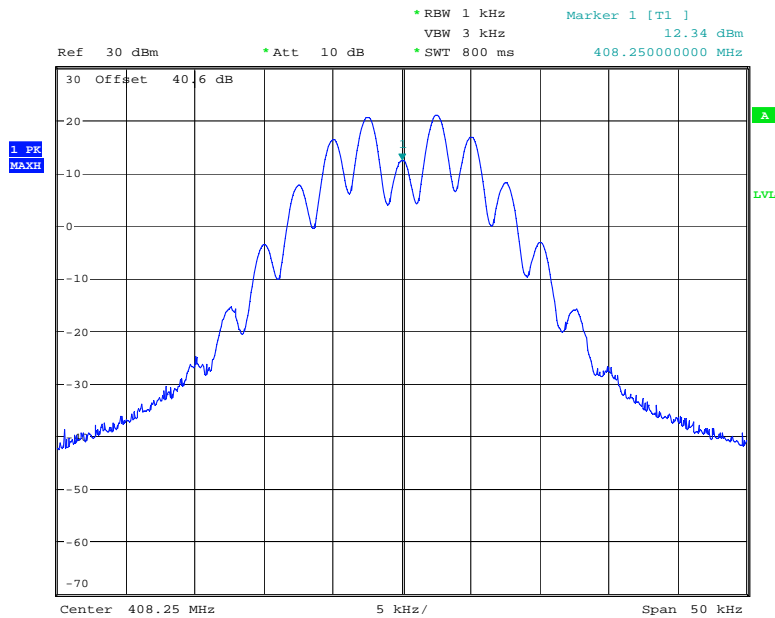
The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

Middle channel 408.25MHz Signal Generator and EUT, deviation set to 2.5kHz



Date: 12.DEC.2007 15:44:54

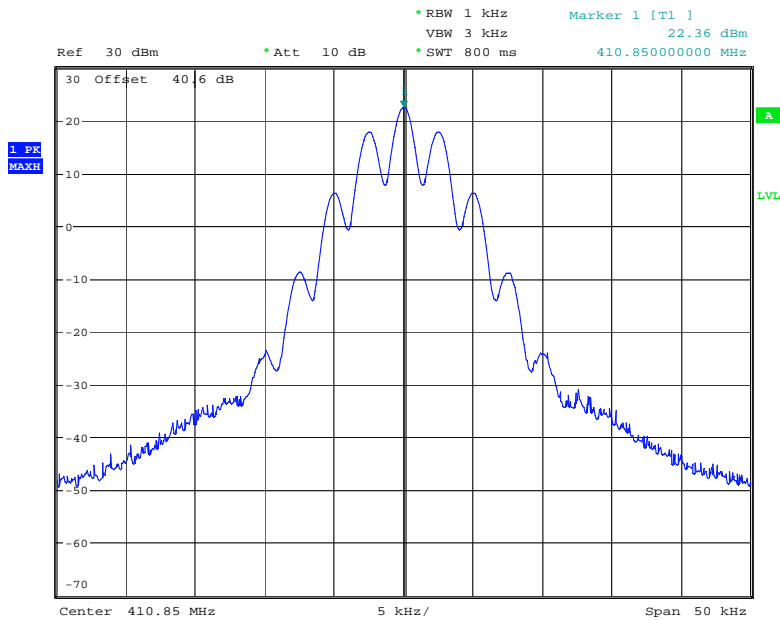
Middle channel 408.25MHz Signal Generator and EUT, deviation set to 5kHz



Date: 12.DEC.2007 15:50:08

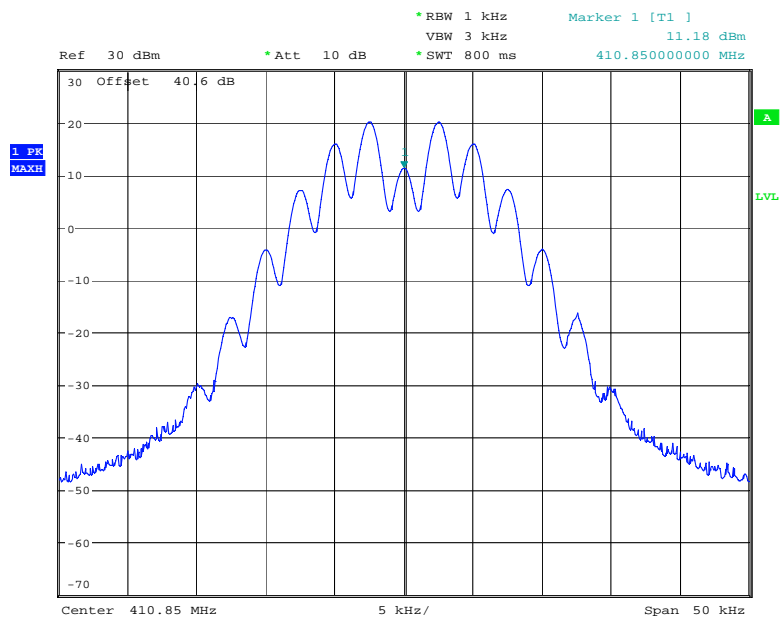
The above plots depicting the output wavelshape show no measurable distortion visible when compared to the input signal.

Top channel 410.85MHz Signal Generator and EUT, deviation set to 2.5kHz



Date: 12.DEC.2007 15:52:19

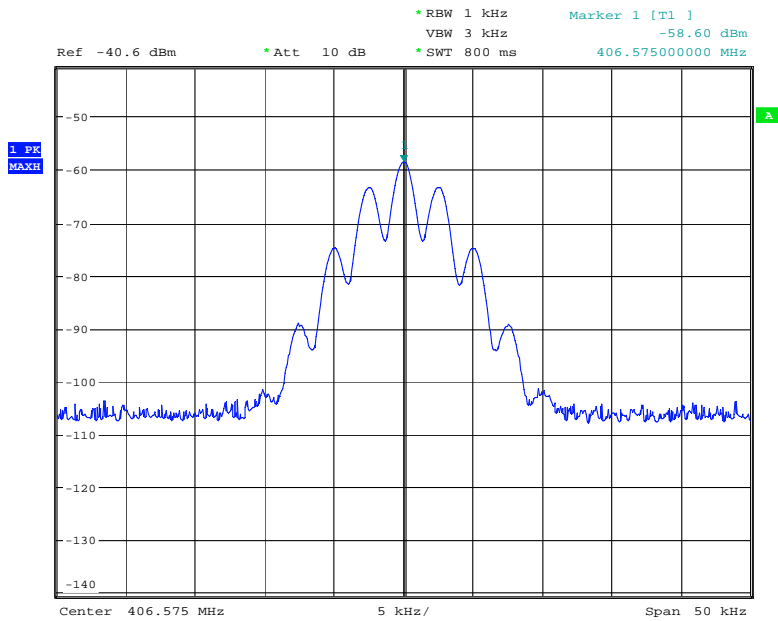
Top channel 410.85MHz Signal Generator and EUT, deviation set to 5kHz



Date: 12.DEC.2007 15:53:27

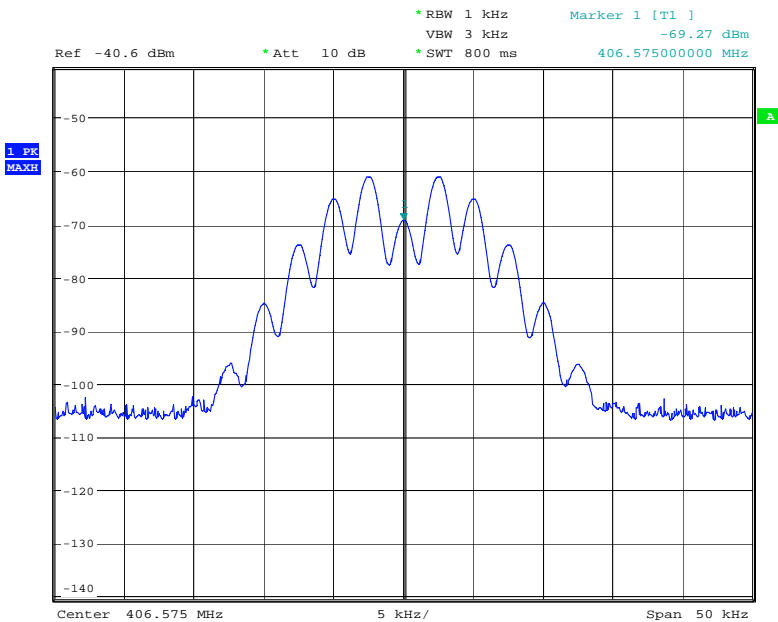
The above plots depicting the output wavelshape show no measurable distortion visible when compared to the input signal.

Bottom channel 406.575MHz Signal Generator, deviation set to 2.5kHz



Date: 12.DEC.2007 15:56:07

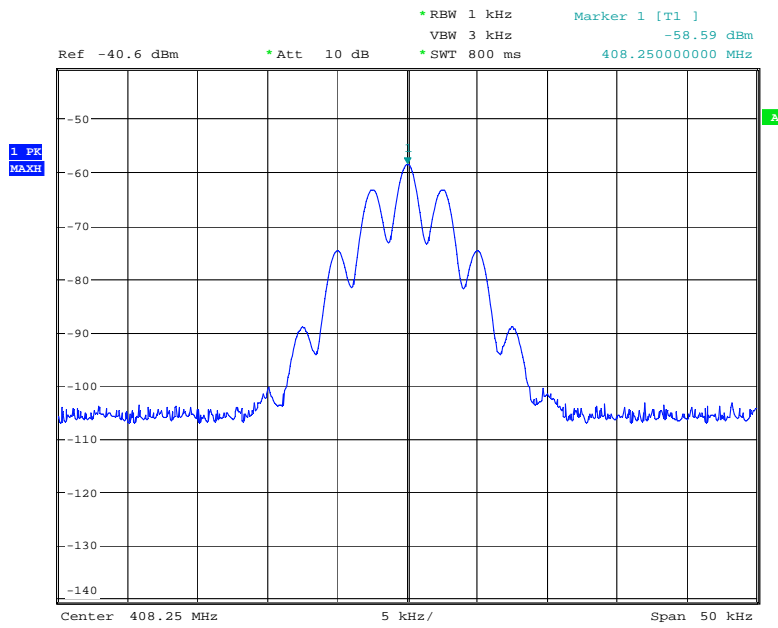
Bottom channel 406.575MHz Signal Generator, deviation set to 5kHz



Date: 12.DEC.2007 15:58:46

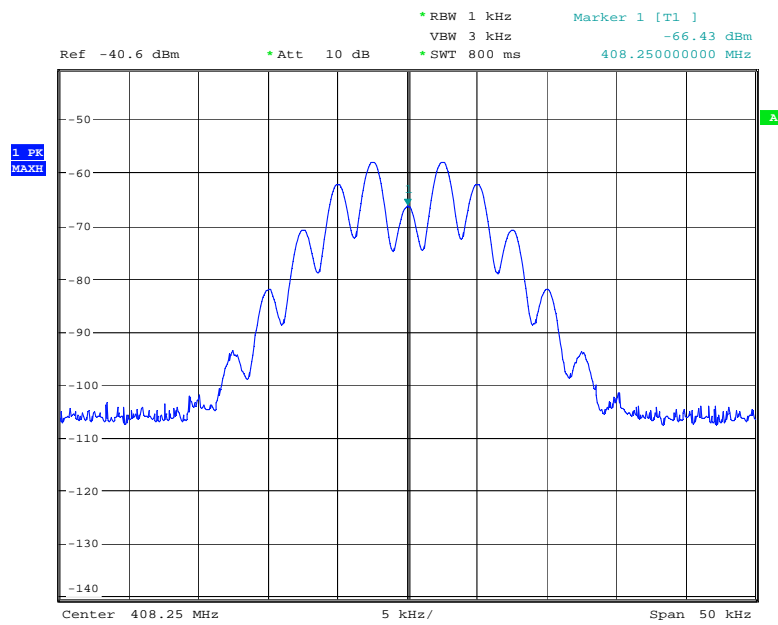
The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

### Middle channel 408.25MHz Signal Generator, deviation set to 2.5kHz



Date: 12.DEC.2007 16:01:33

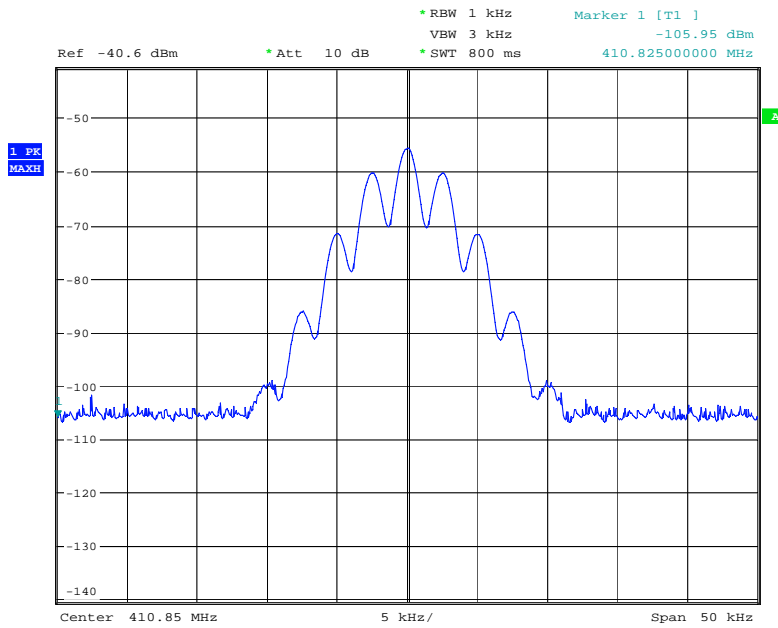
### Middle channel 408.25MHz Signal Generator, deviation set to 5kHz



Date: 12.DEC.2007 16:03:20

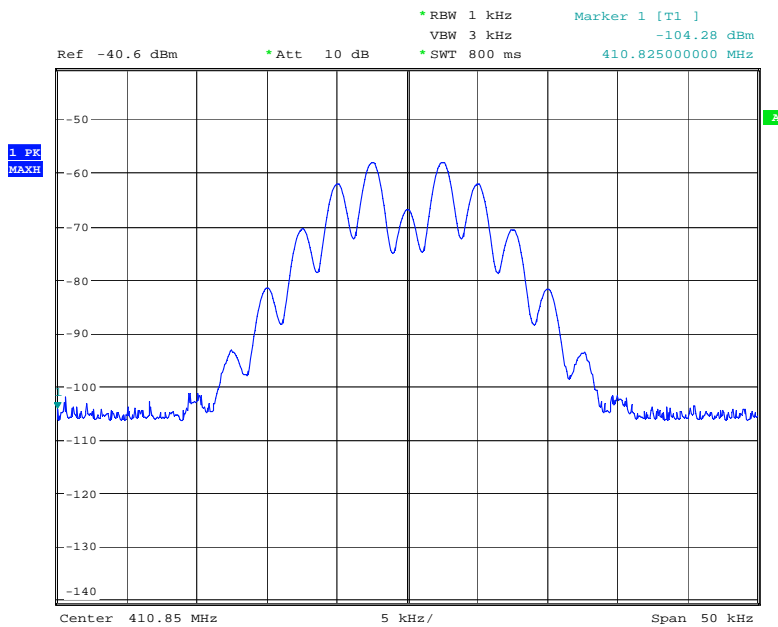
The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

### Top channel 410.85MHz Signal Generator, deviation set to 2.5kHz



Date: 12.DEC.2007 16:06:50

### Top channel 410.85MHz Signal Generator, deviation set to 5kHz



Date: 12.DEC.2007 16:09:47

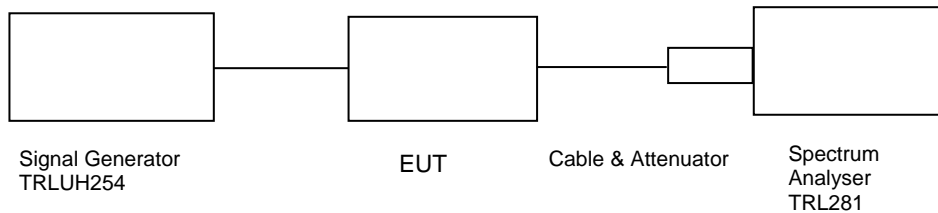
The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

## TRANSMITTER TESTS

### AMPLIFIER SPURIOUS EMISSIONS – CONDUCTED – Part 2.1053 – DOWNLINK

Ambient temperature = 17°C  
 Relative humidity = 43%  
 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

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

## RESULTS

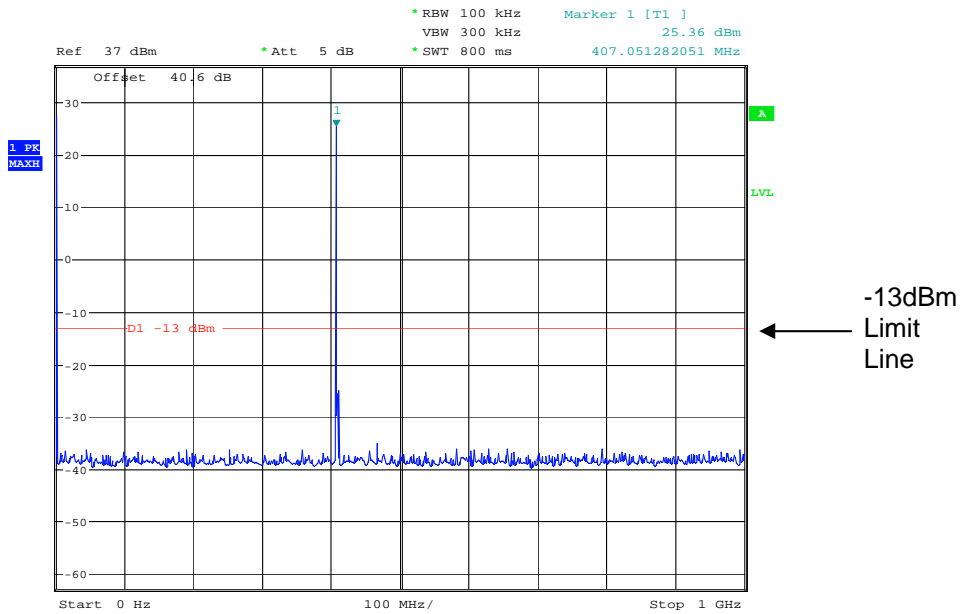
FREQUENCY RANGE	FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTENUATOR & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
0Hz – 5GHz	No Significant Emissions Within 20 dB of the limit				-13

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	R&S	FSU46	200034	UH281	X
ATTENUATOR	SPINNER	745357	D57224	225	X
ATTENUATOR	BIRD	8308-200-N	N/A	103	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X

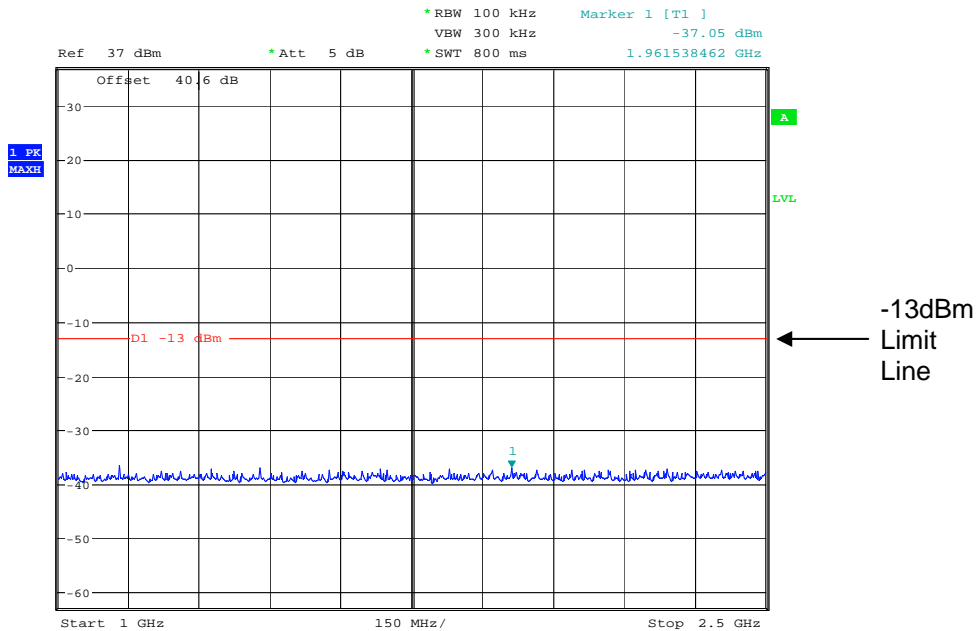


Conducted emissions bottom channel 406.575MHz 0MHz – 1GHz



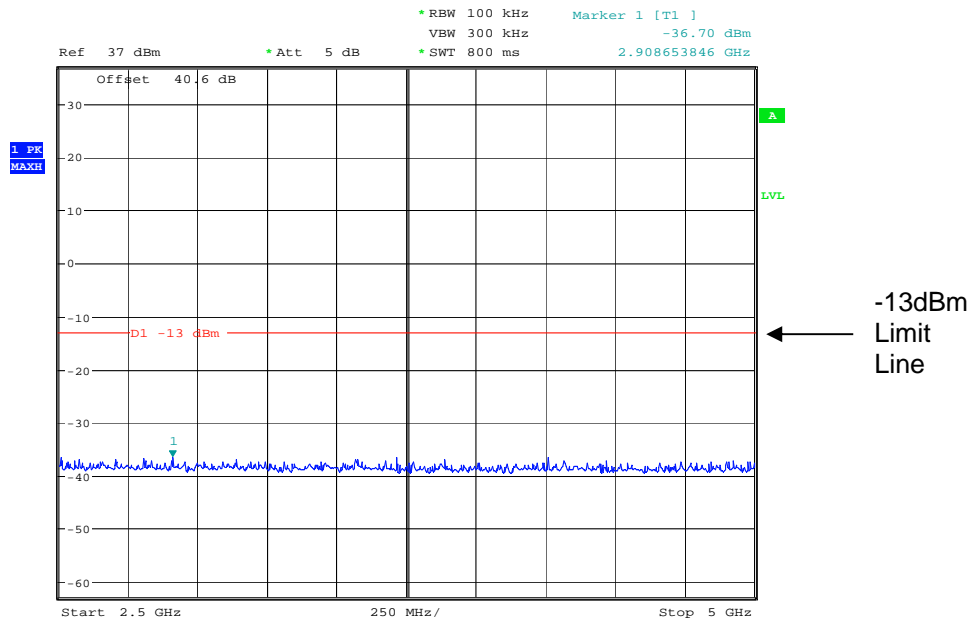
Date: 13.DEC.2007 16:31:57

Conducted emissions bottom channel 406.575MHz 1GHz – 2.5GHz



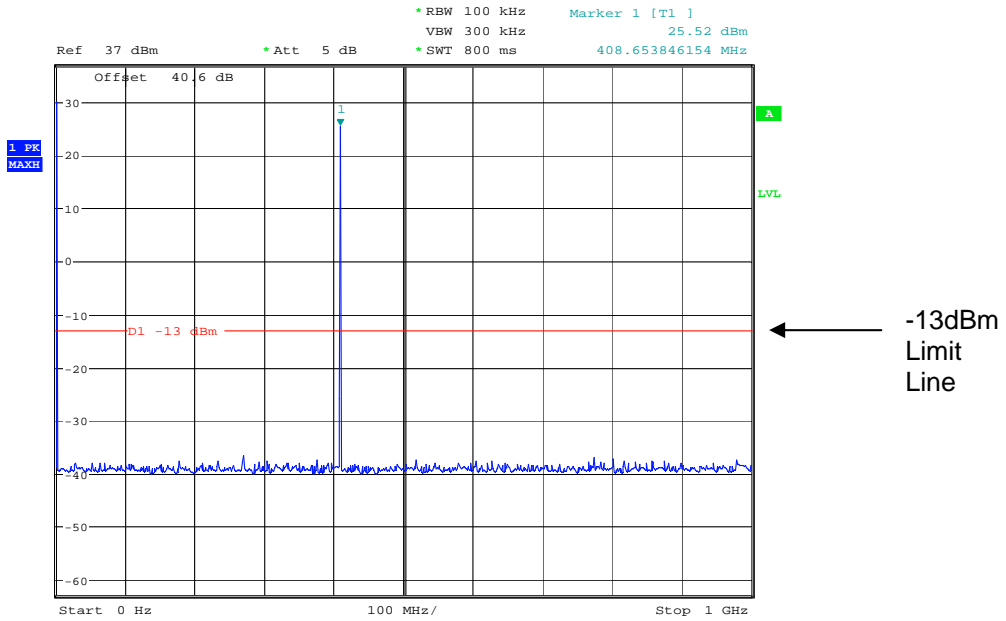
Date: 13.DEC.2007 16:32:57

Conducted emissions bottom channel 406.575MHz 2.5GHz – 5GHz



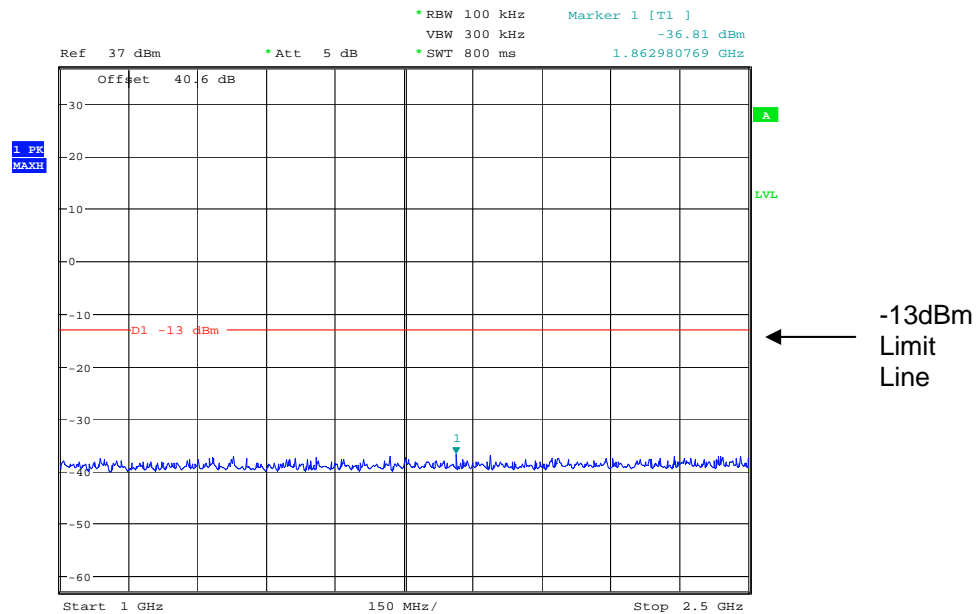
Date: 13.DEC.2007 16:33:50

Conducted emissions Middle channel 408.25MHz 0MHz – 1GHz



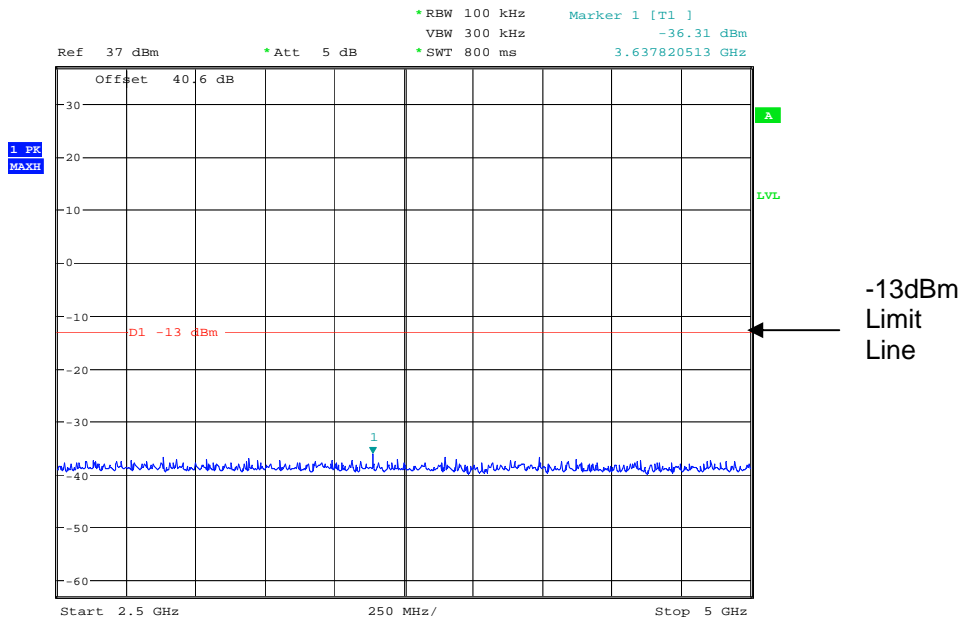
Date: 13.DEC.2007 16:35:05

Conducted emissions Middle channel 408.25MHz 1GHz – 2.5GHz



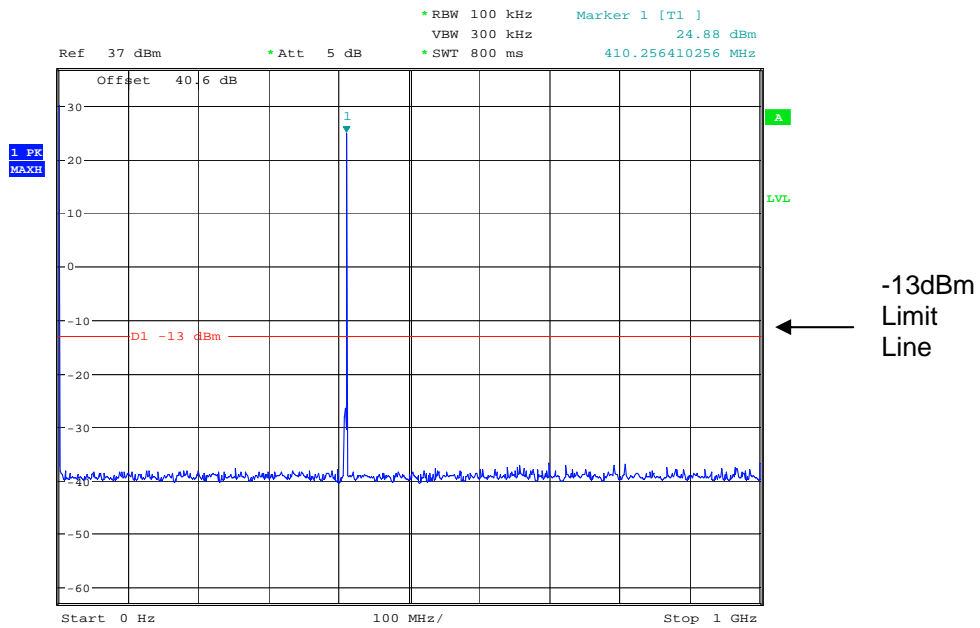
Date: 13.DEC.2007 16:35:47

# Conducted emissions Middle channel 408.25MHz 2.5GHz – 5GHz



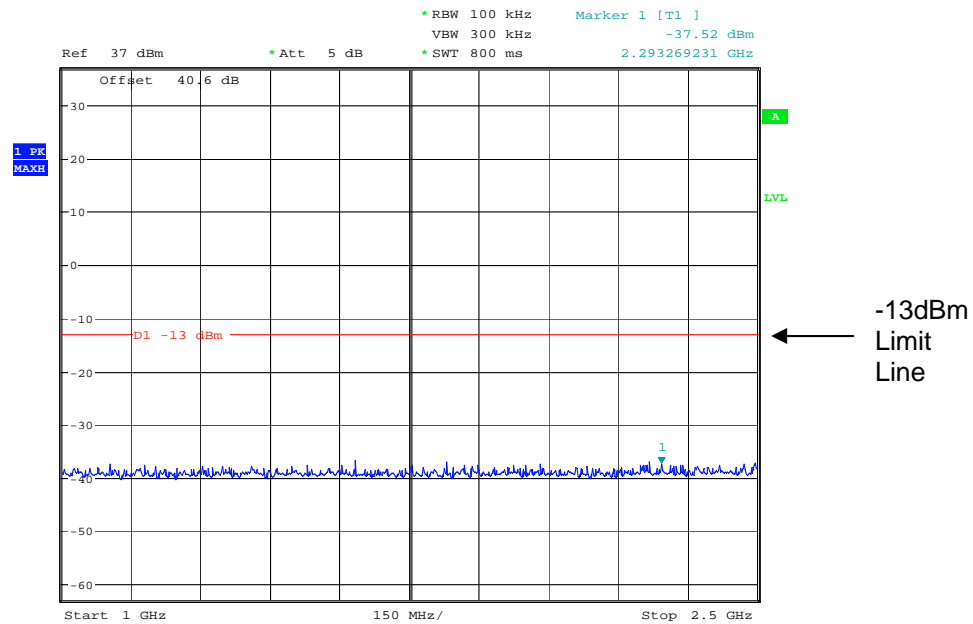
Date: 13.DEC.2007 16:36:21

### Conducted emissions Top channel 410.85MHz 0MHz – 1GHz



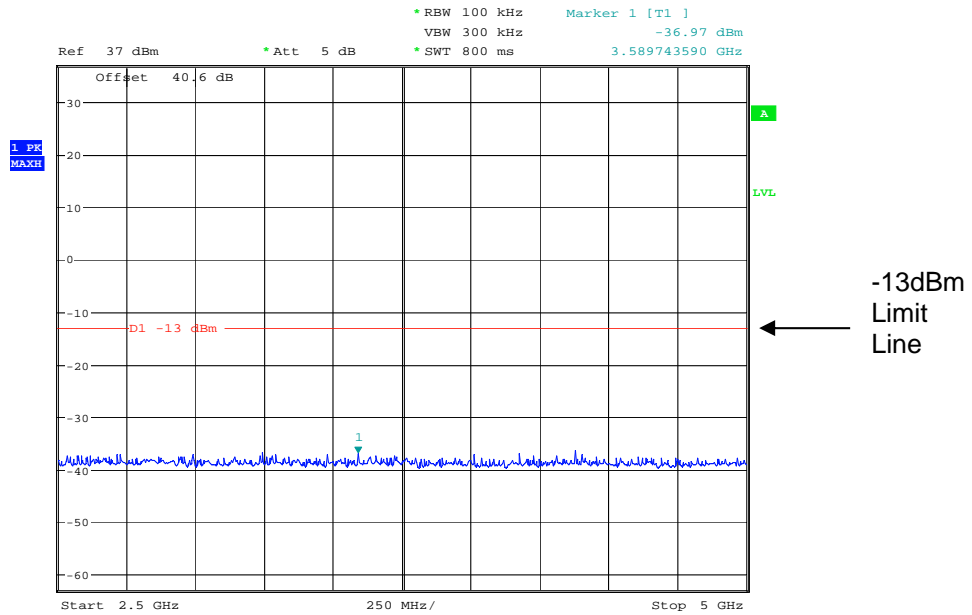
Date: 13.DEC.2007 16:37:27

### Conducted emissions Top channel 410.85MHz 1GHz – 2.5GHz



Date: 13.DEC.2007 16:37:56

# Conducted emissions Top channel 410.85MHz 2.5GHz – 5GHz



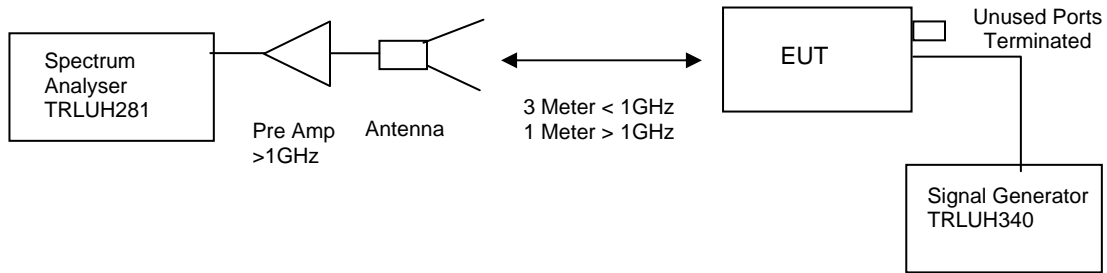
Date: 13.DEC.2007 16:38:35

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

**TRANSMITTER TESTS**

**AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– DOWNLINK**

Ambient temperature = 17°C  
 Relative humidity = 44%  
 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

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

**RESULTS**

FREQUENCY RANGE	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	CALCULATED EIRP (dBm)	LIMIT (dBm)
30MHz – 5GHz	No Significant Emissions Within 20dBs of the Limit						-13dBm

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	R&S	FSU46	200034	UH281	<b>X</b>
HORN	EMCO	3115	9010-3580	138	<b>X</b>
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	
PRE AMPLIFIER	HP	8449B	3008A016	572	<b>X</b>
SIGNAL GENERATOR	HP	83630B	3722A00588	UH340	<b>X</b>
ANTENNA	YORK	CBL611/A	1618	UH191	<b>X</b>

Radiated emissions bottom channel 406.575MHz 30MHz – 1GHz

TRL Compliance Ltd

02 Jan 2008 10:06

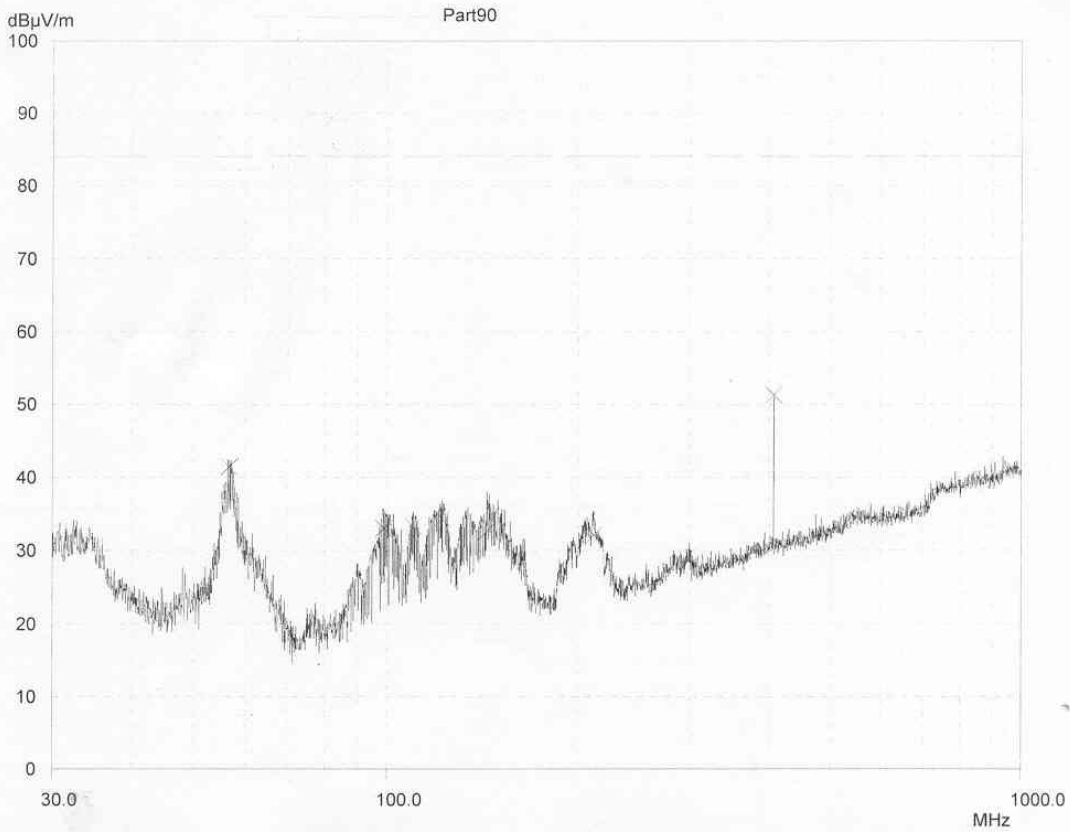
E-Field Radiation (30MHz-1GHz)

EUT: TRAVIS AFB  
 Manuf: Aerial Facilities Ltd  
 Op Cond: Prescan 30MHz - 1000MHz  
 Operator: S Hodgkinson  
 Test Spec: Part 90  
 Comment: All channel filters enabled, uplink amplifiers enabled, all ports terminated. Bottom channel downlink selected.  
 Rx antenna Vertical.

Scan Settings			(1 Range) Frequencies		Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto	ON	60dB

Transducer	No.	Start	Stop	Name
1	21	30MHz	1000MHz	UH72
	22	30MHz	1000MHz	UH191

Final Measurement: Detector: X QP  
 Meas Time: 2sec  
 Subranges: 50  
 Acc Margin: 10 dB





Radiated emissions Middle channel 408.25MHz 30MHz – 1GHz



Radiated emissions Top channel 410.85MHz 30MHz – 1GHz

TRL Compliance Ltd

02 Jan 2008 10:42

E-Field Radiation (30MHz-1GHz)

EUT: TRAVIS AFB  
 Manuf: Aerial Facilities Ltd  
 Op Cond: Prescan 30MHz - 1000MHz  
 Operator: S Hodgkinson  
 Test Spec: Part 90  
 Comment: All channel filters enabled, uplink amplifiers enabled, all ports terminated Top channel downlink selected.  
 Rx antenna Vertical.

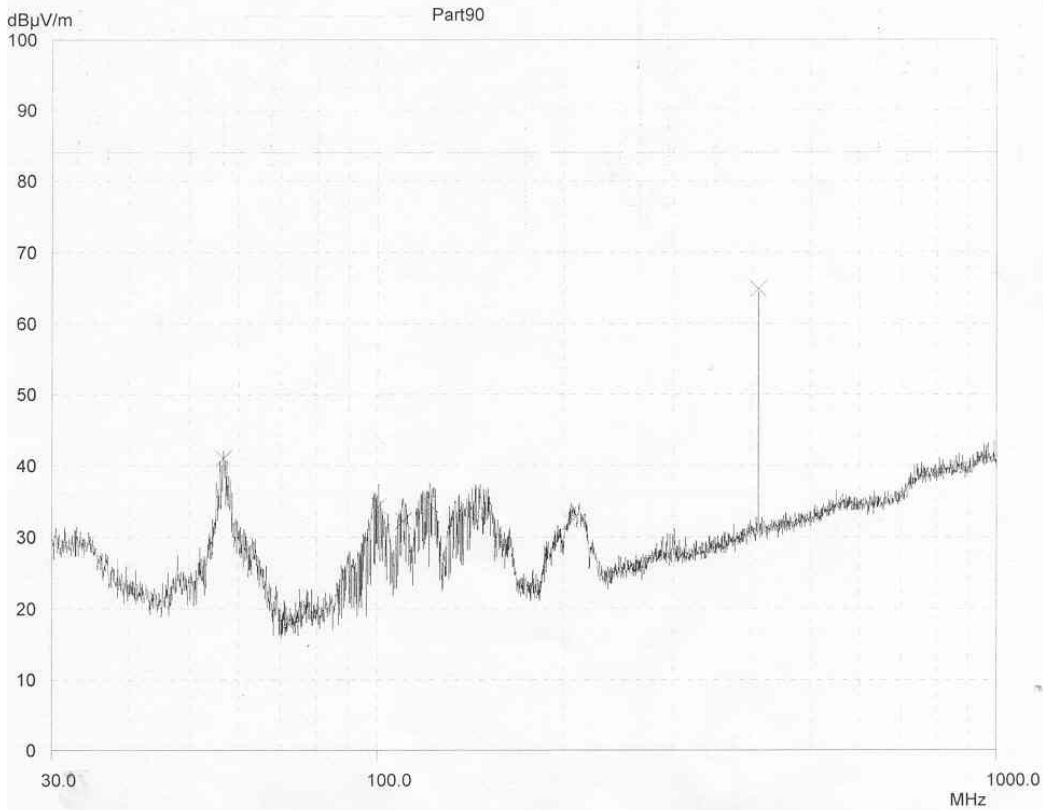
Scan Settings (1 Range)				Receiver Settings					
Frequencies		Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
Start	Stop								
30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto	ON	60dB	

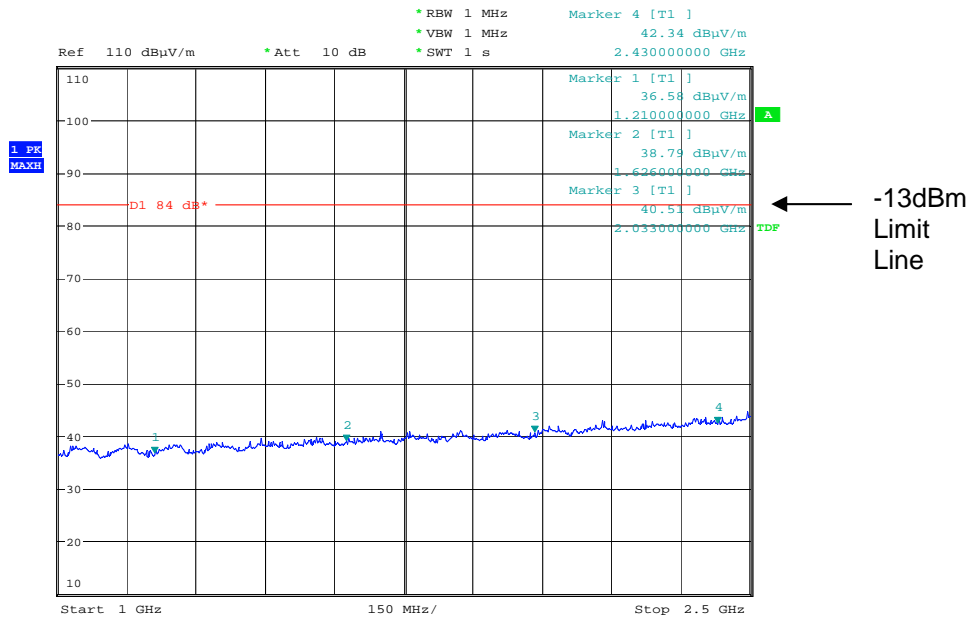
Transducer	No.	Start	Stop	Name
1	21	30MHz	1000MHz	UH72
	22	30MHz	1000MHz	UH191

Final Measurement:	Detector:	X QP
	Meas Time:	2sec
	Subranges:	50
	Acc Margin:	10 dB

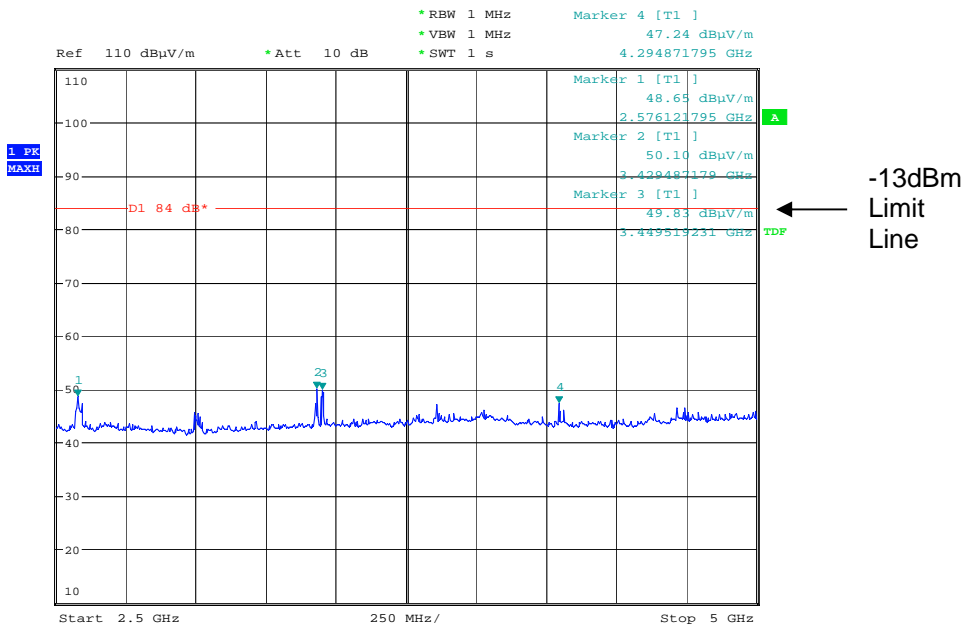


Radiated emissions bottom channel 406.575MHz 1GHz – 2.5GHz



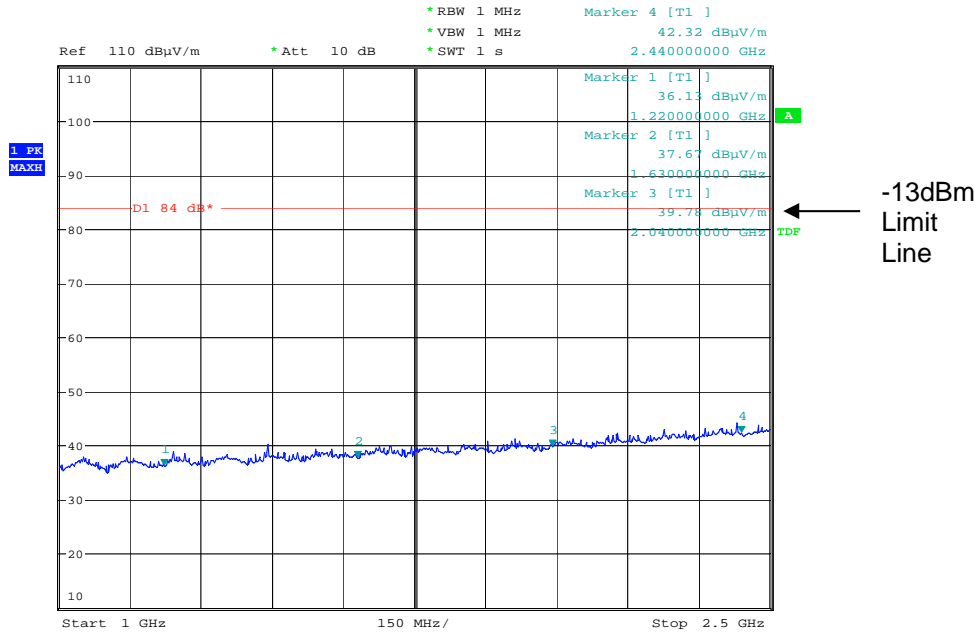
Date: 2.JAN.2008 12:39:28

Radiated emissions bottom channel 406.575MHz 2.5GHz – 5GHz



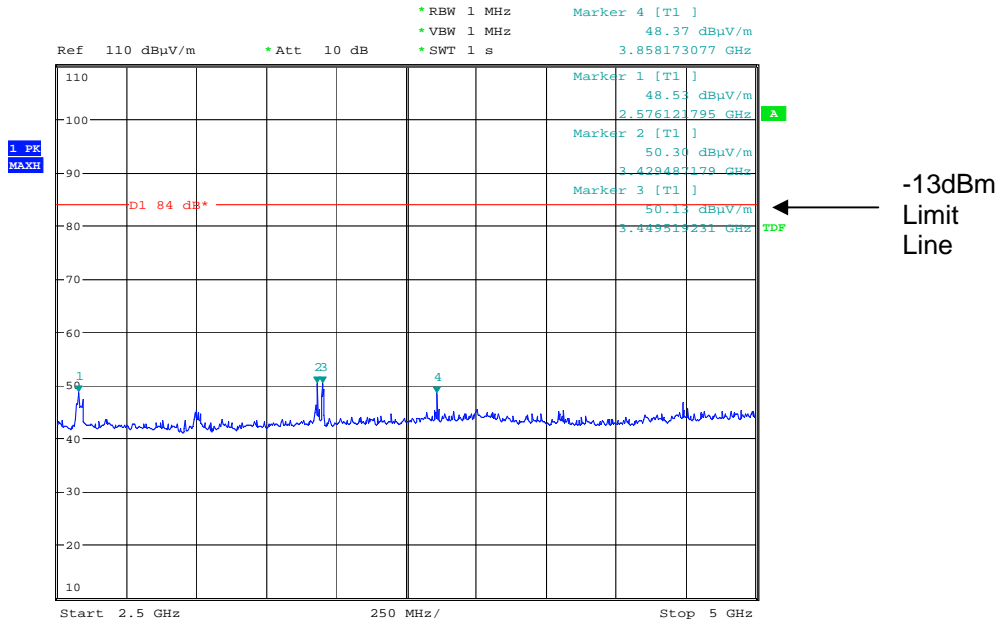
Date: 2.JAN.2008 12:46:18

Radiated emissions Middle channel 408.25MHz 1.5GHz – 2.5GHz



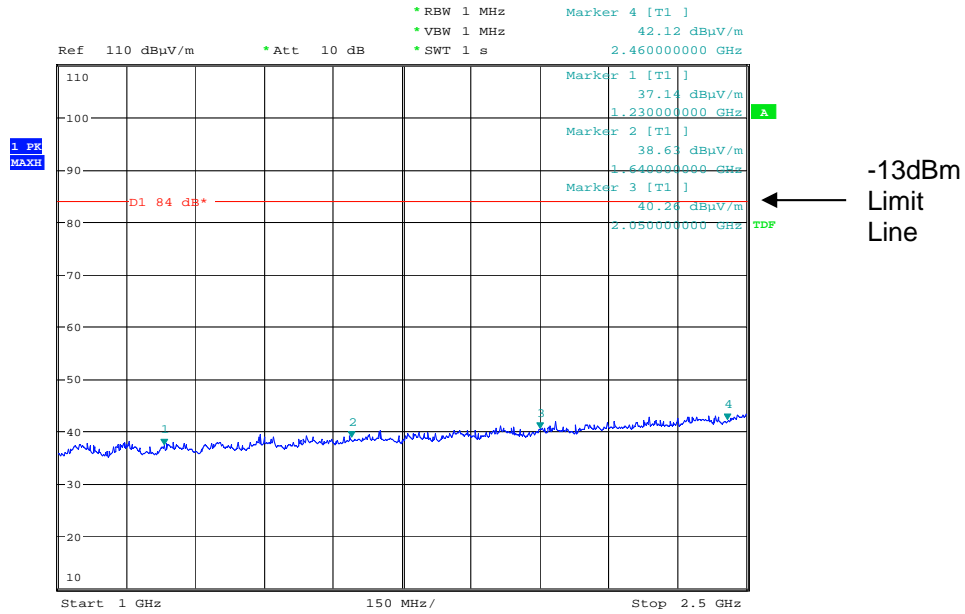
Date: 2.JAN.2008 14:12:52

Radiated emissions Middle channel 408.25MHz 2.5GHz – 5GHz



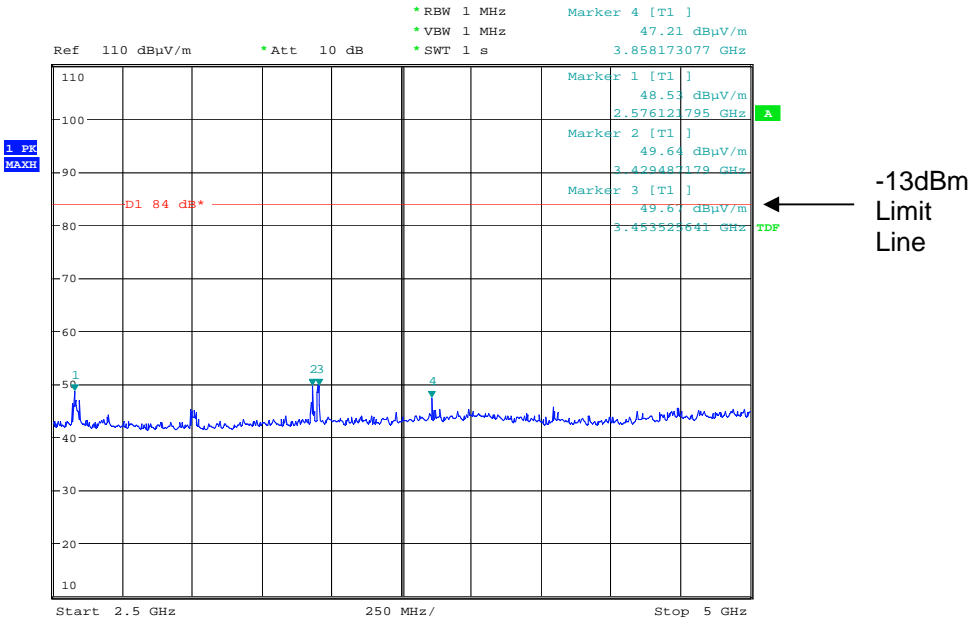
Date: 2.JAN.2008 14:14:54

Radiated emissions Top channel 410.85MHz 1GHz – 2.5GHz



Date: 2.JAN.2008 14:22:58

Radiated emissions Top channel 410.85MHz 2.5GHz – 5GHz



Date: 2.JAN.2008 14:24:41

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

**ANNEX A**  
**PHOTOGRAPHS**







**ANNEX B**  
**SYSTEM DIAGRAM**



**ANNEX C**  
**APPLICANT'S SUBMISSION OF DOCUMENTATION LIST**

### APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

a.	TCB	-	APPLICATION	[X]
		-	FEE	[X]
b.	AGENT'S LETTER OF AUTHORISATION	-		[X]
c.	MODEL(s) vs IDENTITY	-		[ ]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[ ]
e.	LABELLING	-	PHOTOGRAPHS	[X]
		-	DECLARATION	[ ]
		-	DRAWINGS	[ ]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
h.	CIRCUIT DIAGRAMS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
i.	COMPONENT LOCATION	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
j.	PCB TRACK LAYOUT	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
k.	BILL OF MATERIALS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
l.	USER INSTALLATION / OPERATING INSTRUCTIONS	-		[X]

**ANNEX D**  
**EQUIPMENT CALIBRATION**

TRL Number	Equipment Type	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH06/07	IC OATS Submission	TRL	01/06/2007	24	01/06/2009
UH006	3m Range ERP CAL	TRL	08/12/2006	12	08/12/2007
UH028	Log Periodic Ant	Schwarbeck	30/05/2007	24	30/05/2009
UH029	Bicone Antenna	Schwarbeck	22/05/2007	24	22/05/2009
UH041	Multimeter	AVOmeter	04/01/2007	12	04/01/2008
UH089	Signal Generator	Marconi	09/01/2007	12	09/01/2008
UH093	Bilog Antenna	Chase	21/05/2007	24	21/05/2009
UH105	Signal Generator	Marconi	31/05/2007	12	31/05/2008
UH132	Power meter	Marconi	10/01/2007	12	10/01/2008
UH162	ERP Cable Cal	TRL	02/01/2007	12	02/01/2008
UH228	Power Sensor	Marconi	15/01/2007	12	15/01/2008
UH253	1m Cable N type	TRL	07/12/2006	12	07/12/2007
UH254	1m Cable N type	TRL	07/12/2006	12	07/12/2007
UH265	Notch filer	Telonic	11/01/2006	24	11/01/2008
UH269	1m Cable N type	TRL	07/12/2006	12	07/12/2007
UH270	1m Cable N type	TRL	07/12/2006	12	07/12/2007
UH271	1.5m Cable N type	TRL	07/12/2006	12	07/12/2007
UH272	1.5m Cable N type	TRL	07/12/2006	12	07/12/2007
UH273	2m Cable N type	TRL	07/12/2006	12	07/12/2007
UH274	2m Cable N type	TRL	07/12/2006	12	07/12/2007
UH281	Spectrum Analyser	R&S	24/07/2006	12	24/07/2007
UH297	Signal Generator	R&S	30/05/2007	12	30/05/2008
UH340	Signal Generator	HP	29/06/2006	12	29/06/2007
L005	CMTA	R&S	10/01/2007	12	10/01/2008
L007	Loop Antenna	R&S	22/05/2007	24	22/05/2009
L103	Attenuator	Bird		Calibrate in Use	
L112	Attenuator	Bird		Calibrate in Use	
L138	1-18GHz Horn	EMCO	23/05/2007	24	23/05/2009
L139	1-18GHz Horn	EMCO	23/05/2007	24	23/05/2009
L170	Combiner	Elcom		Calibrate in Use	
L176	Signal Generator	Marconi	01/03/2007	12	01/03/2008
L220	Attenuator	Bird		Calibrate in Use	
L426	Temperature Indicator	Fluke	09/01/2007	12	09/01/2008
L479	Analyser	Anritsu	09/01/2007	12	09/01/2008
L572	Pre Amplifier	HP		Calibrate in Use	

**ANNEX E**  
**MEASUREMENT UNCERTAINTY**

## Radio Testing – General Uncertainty Schedule

All statements of uncertainty are expanded standard uncertainty using a coverage factor of 1.96 to give a 95% confidence where no required test level exists.

### **[1] Adjacent Channel Power**

Uncertainty in test result = **1.86dB**

### **[2] Carrier Power**

Uncertainty in test result (Equipment - TRLUH120) = **2.18dB**

Uncertainty in test result (Equipment – TRL05) = **1.08dB**

Uncertainty in test result (Equipment – TRL479) = **2.48dB**

### **[3] Effective Radiated Power**

Uncertainty in test result = **4.71dB**

### **[4] Spurious Emissions**

Uncertainty in test result = **4.75dB**

### **[5] Maximum frequency error**

Uncertainty in test result (Equipment - TRLUH120) = **119ppm**

Uncertainty in test result (Equipment – TRL05) = **0.113ppm**

Uncertainty in test result (Equipment – TRL479) = **0.265ppm**

### **[6] Radiated Emissions, field strength OATS 14kHz-18GHz Electric Field**

Uncertainty in test result (14kHz – 30MHz) = **4.8dB**, Uncertainty in test result (30MHz – 1GHz) = **4.6dB**,

Uncertainty in test result (1GHz-18GHz) = **4.7dB**

### **[7] Frequency deviation**

Uncertainty in test result = **3.2%**

### **[8] Magnetic Field Emissions**

Uncertainty in test result = **2.3dB**

### **[9] Conducted Spurious**

Uncertainty in test result (Equipment TRL479) Up to 8.1GHz = **3.31dB**

Uncertainty in test result (Equipment TRL479) 8.1GHz – 15.3GHz = **4.43dB**

Uncertainty in test result (Equipment TRL479) 15.3GHz – 21GHz = **5.34dB**

Uncertainty in test result (Equipment TRLUH120) Up to 26GHz = **3.14dB**

### **[10] Channel Bandwidth**

Uncertainty in test result = **15.5%**

### **[11] Amplitude and Time Measurement – Oscilloscope**

Uncertainty in overall test level = **2.1dB**, Uncertainty in time measurement = **0.59%**, Uncertainty in Amplitude measurement = **0.82%**

### **[11] Power Line Conduction**

Uncertainty in test result = **3.4dB**



**[12] Spectrum Mask Measurements**

Uncertainty in test result = **2.59% (frequency)**  
Uncertainty in test result = **1.32dB (amplitude)**

**[13] Adjacent Sub Band Selectivity**

Uncertainty in test result = **1.24dB**

**[14] Receiver Blocking – Listen Mode, Radiated**

Uncertainty in test result = **3.42dB**

**[15] Receiver Blocking – Talk Mode, Radiated**

Uncertainty in test result = **3.36dB**

**[16] Receiver Blocking – Talk Mode, Conducted**

Uncertainty in test result = **1.24dB**

**[17] Receiver Threshold**

Uncertainty in test result = **3.23dB**

**[18] Transmission Time Measurement**

Uncertainty in test result = **7.98%**