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**REPORT ON THE CERTIFICATION TESTING OF A
60-174202
ON BEHALF OF
AXELL WIRELESS LIMITED
WITH RESPECT TO
THE FCC RULES CFR 47, PART 90 Subpart I
PRIVATE LAND MOBILE REPEATER.**



TEST REPORT NO: RU1495/8711
COPY NO: 1
ISSUE NO: 1
FCC ID: NEO60-1742SERIES

**REPORT ON THE CERTIFICATION TESTING OF A
60-174202
ON BEHALF OF
AXELL WIRELESS LIMITED
WITH RESPECT TO
THE FCC RULES CFR 47, PART 90 Subpart I
PRIVATE LAND MOBILE REPEATER.**

TEST DATE: 25th – 29th July 2008

TESTED BY: _____ S HODGKINSON
APPROVED BY: _____ J CHARTERS
RADIO SECTION
LEADER
DATE: 16th September 2008 _____

Distribution:

- Copy Nos:
1. Axell Wireless Limited
 2. TCB: TRL Compliance Limited
 3. TRL Compliance Ltd

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 Notes:			
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

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CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	NEO60-1742SERIES
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	FCC RULES CFR 47, Part 90 Subpart I
TEST RESULT:	Compliant to Specification
EQUIPMENT UNDER TEST:	60 -174202
EQUIPMENT TYPE:	Private Land Mobile Repeater
MAXIMUM GAIN:	Uplink 89.5dB Downlink 89.6dB
MAXIMUM INPUT:	Uplink -54.5dBm Downlink -55.5dBm
MAXIMUM OUTPUT CONDUCTED:	Uplink 35.0dBm Downlink 34.1dBm
CHANNEL SPACING:	Not Applicable, Wideband
FREQUENCY GENERATION:	N/A
MODULATION TYPE:	F3E
POWER SOURCE(s):	+12Vdc
TEST DATE(s):	25 th – 29 th July 2008
ORDER No(s):	51594
APPLICANT:	Axell Wireless Limited
ADDRESS:	Aerial House Asheridge Road Chesham Buckinghamshire HP5 2QD
TESTED BY:	----- S HODGKINSON
APPROVED BY:	----- J CHARTERS RADIO SECTION LEADER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT): 60 -174202

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): 51594

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

E-mail address: Peter.bradfield@axellwireless.com

APPLICANT: Axell Wireless Limited

ADDRESS: Aerial House
Asheridge Road
Chesham
Buckinghamshire
HP5 2QD
United Kingdom

TEL: +44 (0)1494 777000

FAX: +44 (0)1494 778456

MANUFACTURER: Axell Wireless Limited

EUT(s) COUNTRY OF ORIGIN: United Kingdom

TEST LABORATORY: TRL Compliance Ltd

UKAS ACCREDITATION No: 0728

TEST DATE(s): 25th – 29th July 2008

TEST REPORT No: RU1495/8711

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.	TEST/EXAMINATION	RULE PART	APPLICABILITY	RESULT
	RF Power Output	90.205	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	Yes	Complies
	Spurious Emissions at Antenna Terminals	90.210	Yes	Complies
	Field Strength of Spurious Emissions	90.210	Yes	Complies
	Frequency Stability	90.213	N/A(note 1)	N/A
	Transient behaviour	90.214	N/A(note 2)	N/A

Notes:

1 The EUT does not contain modulation circuitry, therefore the test was not performed.

2 The EUT is not a keyed carrier system, therefore the test was not performed.

- | | | | | |
|-----|--|----------------------------------|---|----------------------------------|
| 2. | Product class: | Uplink | Class A <input checked="" type="checkbox"/> | Class B <input type="checkbox"/> |
| | | Downlink | Class A <input checked="" type="checkbox"/> | Class B <input type="checkbox"/> |
| 3. | Product Use: | Private Land Mobile Repeater | | |
| 4. | Emission Designator: | F3E | | |
| 5. | Temperatures: | Ambient (Tnom) | 23°C | |
| 6. | Supply Voltages: | Vnom | +12Vdc | |
| | Note: Vnom voltages are as stated above unless otherwise shown on the test report page | | | |
| 7. | Equipment Category: | Single channel | <input type="checkbox"/> | |
| | | Two channel | <input type="checkbox"/> | |
| | | Multi-channel | <input checked="" type="checkbox"/> | |
| 8. | Channel spacing: | Narrowband | <input type="checkbox"/> | |
| | | Wideband | <input checked="" type="checkbox"/> | |
| 9. | Test Location | TRL Compliance Limited | | |
| | | Up Holland | <input checked="" type="checkbox"/> | |
| | | Malvern | <input type="checkbox"/> | |
| 10. | Modifications made during test program | No modifications were performed. | | |

System description:

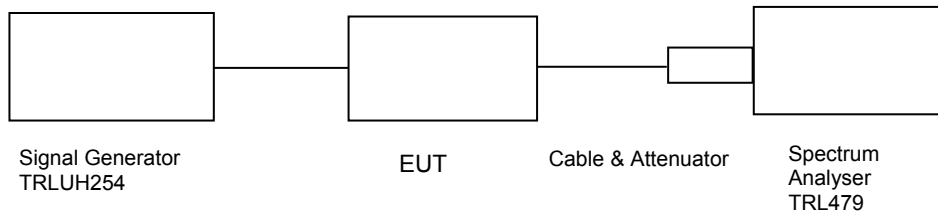
The 60 -174202 System employs an uplink and a downlink path. The uplink path operates over the frequency band 807.5MHz - 822.5MHz. The downlink path operates over the frequency band 852.5MHz - 867.5MHz.

COMPLIANCE TESTS

AMPLIFIER GAIN – CONDUCTED – PART 2.1046 – UPLINK

Ambient temperature = 23°C
 Relative humidity = 63%
 Supply voltage = +12Vdc
 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
807.5000	-54.50	0.22	50.0	-16.48	88.24	33.52	79.02
815.0125	-54.00	0.50	36.8	-1.80	89.50	35.00	80.10
822.5000	-54.00	0.50	36.8	-2.00	89.30	34.80	80.40

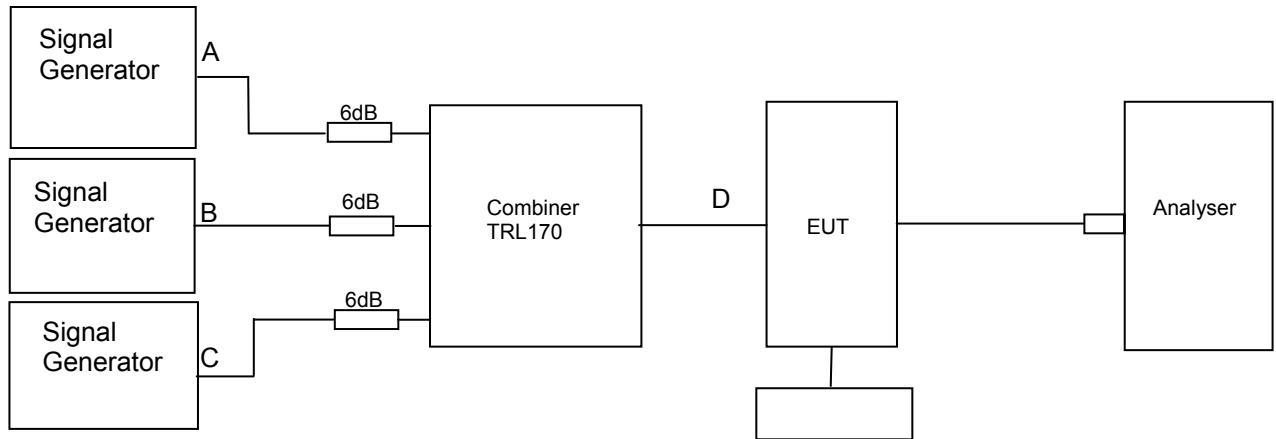
Notes: 1. The signal generator input was increased by 10dBs and the level of the output signal remeasured.

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU	200034	281	
ATTENUATOR	BIRD	8308-200-N	N/A	103	X
ATTENUATOR	SPINNER	745357	D57224	225	X
ATTENUATOR	BIRD	8304-100-N	N/A	222	X
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X

AMPLIFIER INTERMODULATION SPURIOUS EMISSIONS – CONDUCTED – PART 2.1053– UPLINK

Ambient temperature = N/A
 Relative humidity = N/A
 Supply voltage = N/A

Radio Laboratory



This test was not performed as there will only ever be one channel selected in both the uplink and downlink direction. The channel is selectable by setting the channel filter switches on the rear panel.

RF Input Frequency (MHz)			Highest Intermodulation Product Level (dBm)	Limit (dBm)
N/A	N/A	N/A	Not Applicable	-13

Sweep data is shown on the next page:

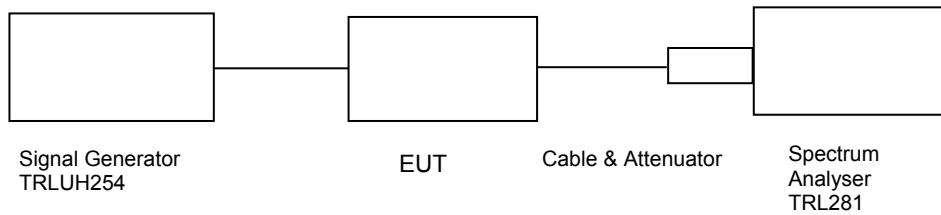
Test equipment used for intermodulation test

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

TRANSMITTER TESTS

AMPLIFIER MODULATED CHANNEL TEST – CONDUCTED – Part 2.1049– UPLINK

Ambient temperature = 23°C Radio Laboratory
 Relative humidity = 63%
 Supply voltage = +12Vdc
 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 (-44.5dBm) 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.

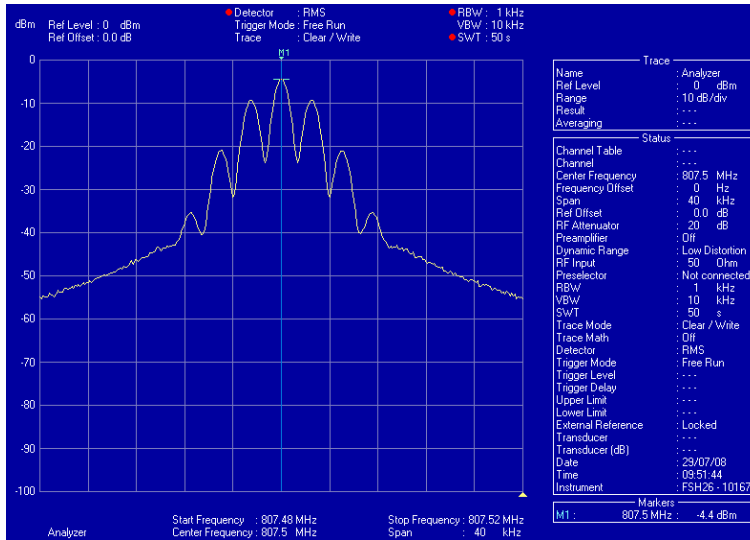
Note: The cables and attenuators had the following losses.

1. Cable and attenuator between EUT and spectrum analyser 50.0dB
2. Cable between signal generator and EUT 0.22dB

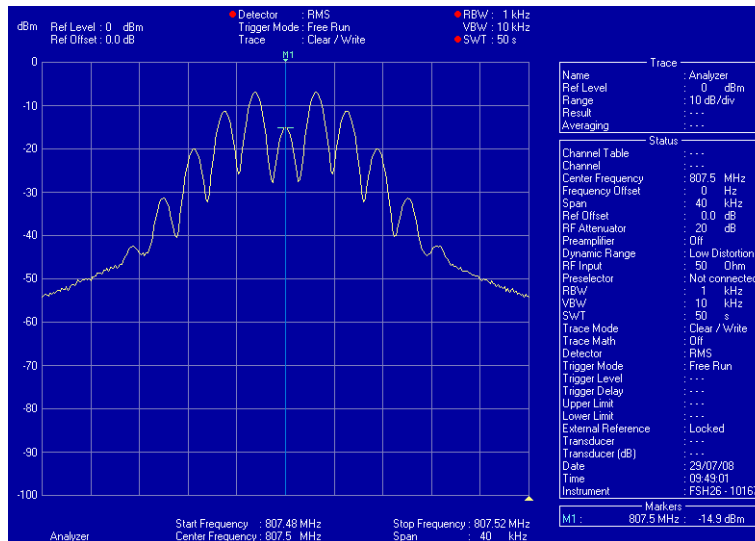
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
ATTENUATOR	SPINNER	745357	D57224	225	X
ATTENUATOR	BIRD	8308-200-N	N/A	103	X
ATTENUATOR	BIRD	8304-100-N	N/A	222	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
SPECTRUM ANALYSER	R&S	FSH6	101670	TRLUH357	X

800MHz Amplifier uplink

Bottom channel 807.5MHz Signal Generator and EUT, deviation set to 2.5kHz

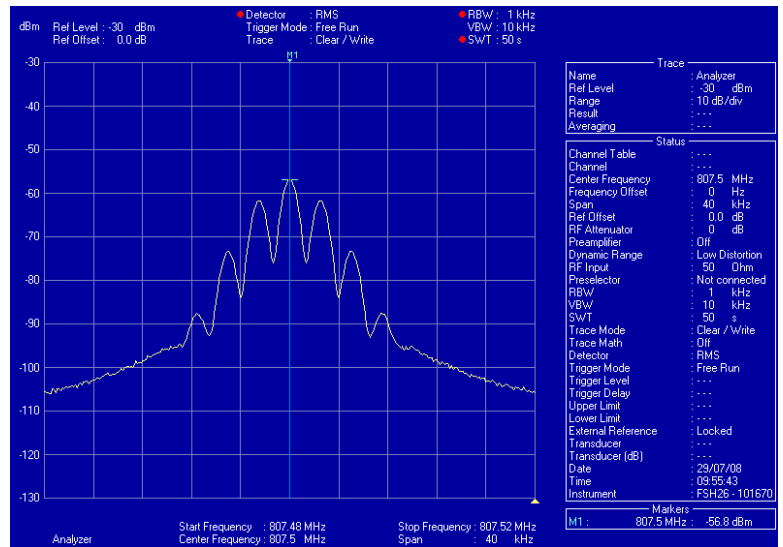


Bottom channel 807.5MHz Signal Generator and EUT, deviation set to 5kHz

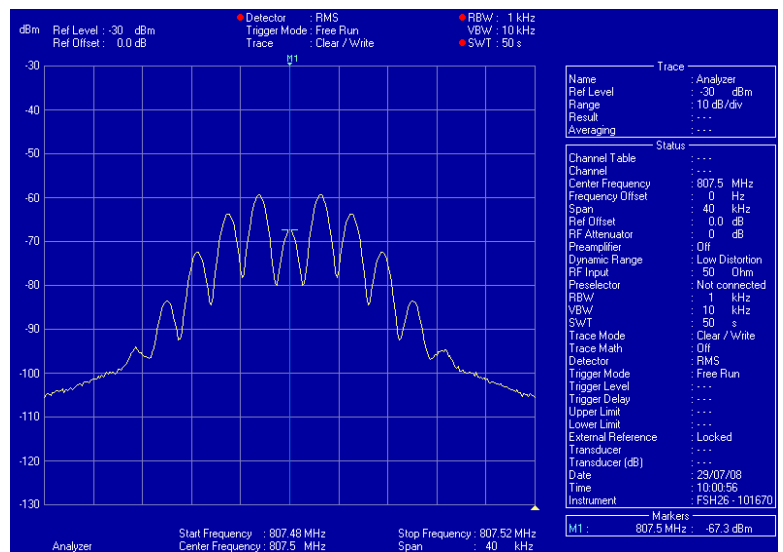


The above plots depicting the output wavelshape show no measurable distortion visible when compared to the input signal.

Bottom channel 807.5MHz Signal Generator only, deviation set to 2.5kHz

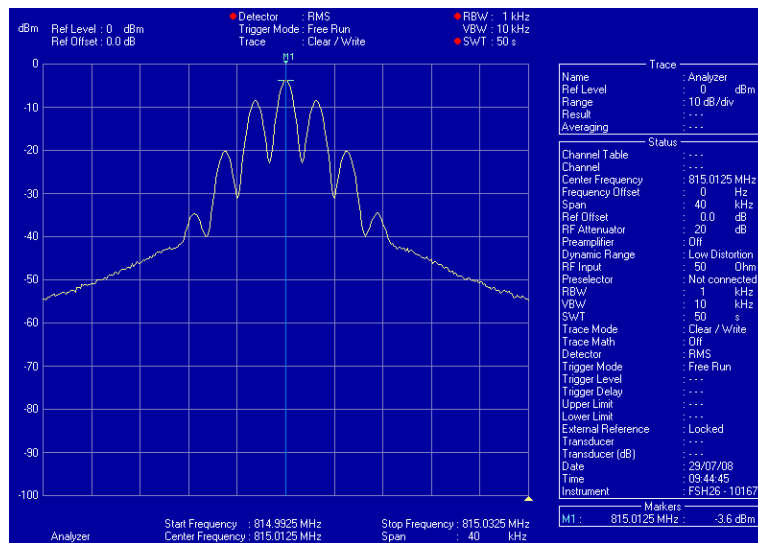


Bottom channel 807.5MHz Signal Generator only, deviation set to 5.0kHz

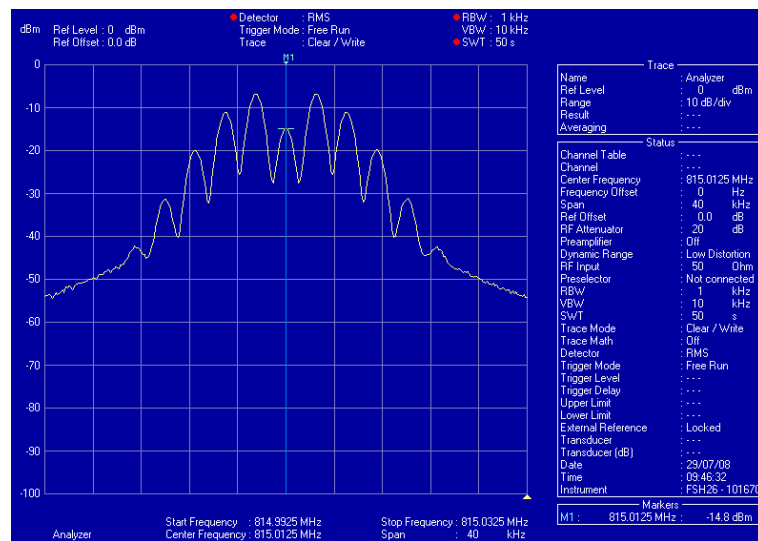


The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

Middle channel 815.0125MHz Signal Generator and EUT, deviation set to 2.5kHz

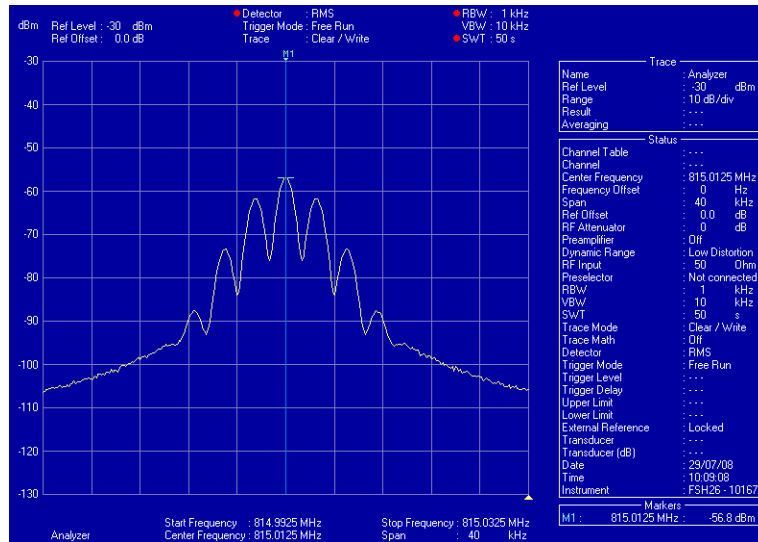


Middle channel 815.0125MHz Signal Generator and EUT, deviation set to 5kHz

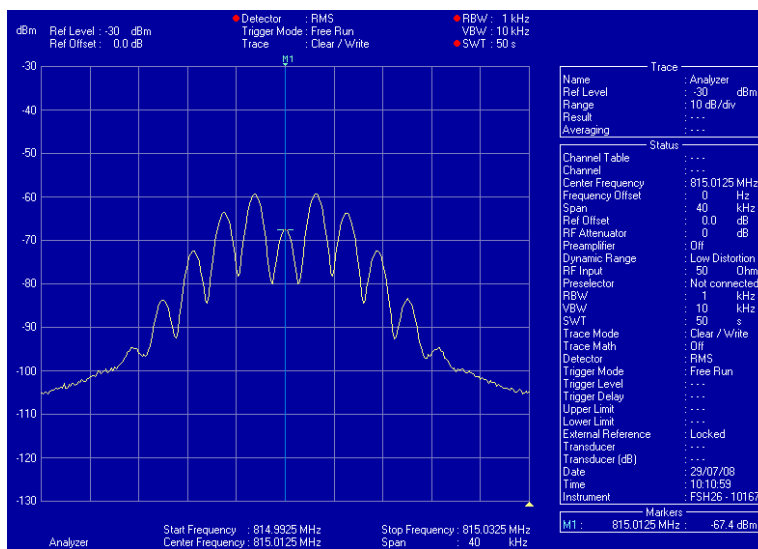


The above plots depicting the output wavelshape show no measurable distortion visible when compared to the input signal.

Middle channel 815.0125MHz Signal Generator, deviation set to 2.5kHz

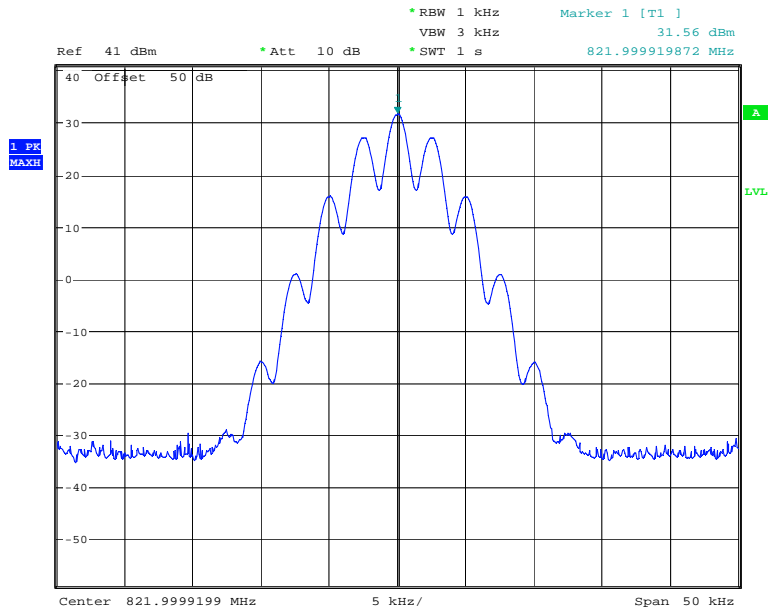


Middle channel 815.0125MHz Signal Generator, deviation set to 5kHz



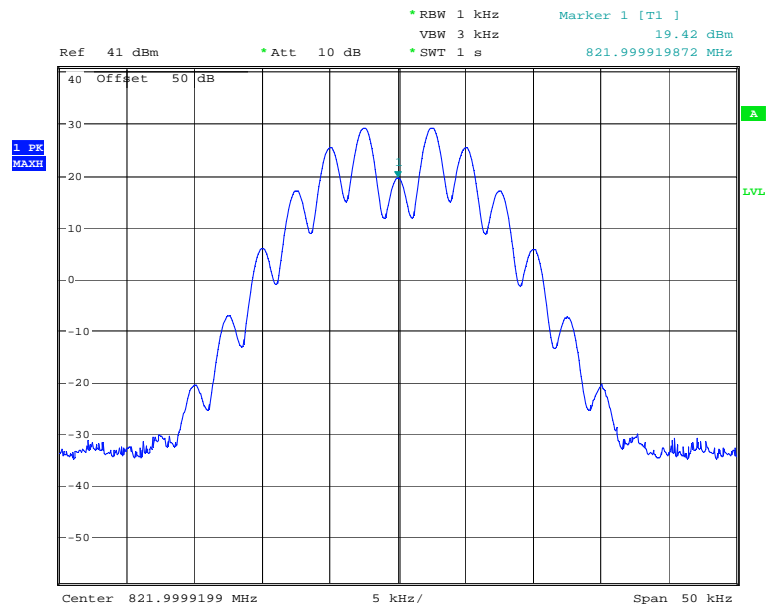
The above plots depicting the output wavelshape show no measurable distortion visible when compared to the input signal.

Top channel 822.5MHz Signal Generator and EUT, deviation set to 2.5kHz



Date: 25.JUL.2008 11:18:54

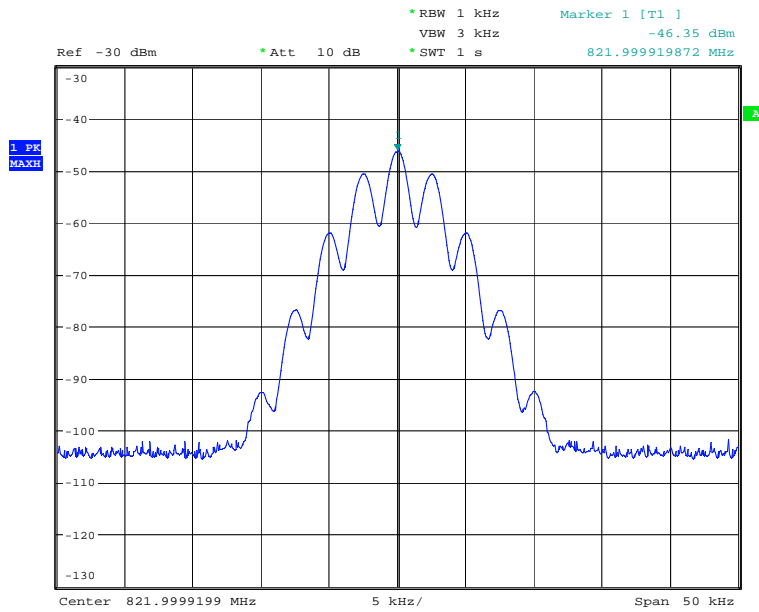
Top channel 822.5MHz Signal Generator and EUT, deviation set to 5kHz



Date: 25.JUL.2008 11:27:55

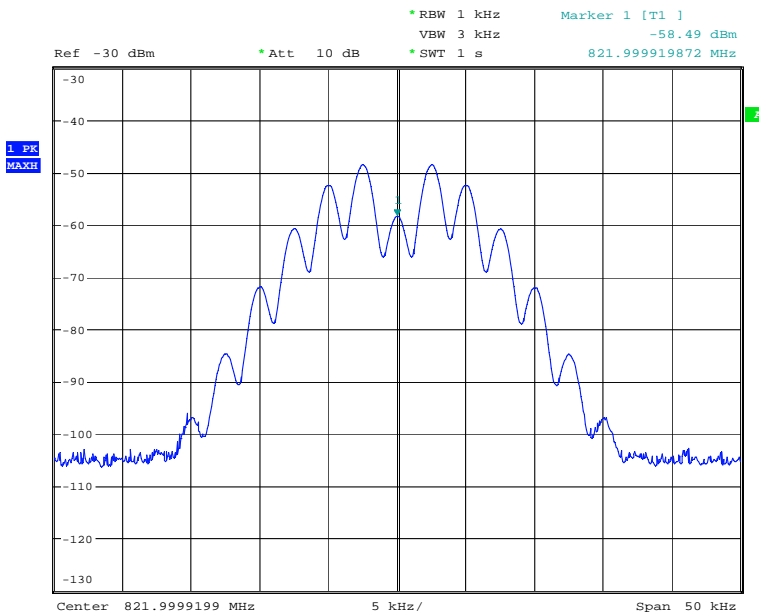
The above plots depicting the output wavelshape show no measurable distortion visible when compared to the input signal.

Top channel 822.5MHz Signal Generator, deviation set to 2.5kHz



Date: 25.JUL.2008 11:36:27

Top channel 822.5MHz Signal Generator, deviation set to 5kHz



Date: 25.JUL.2008 11:38:56

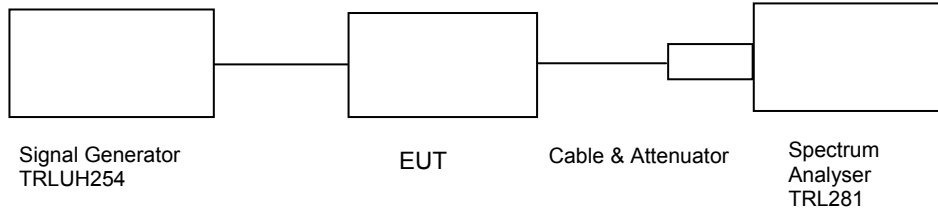
The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – CONDUCTED – Part 2.1053 – UPLINK

Ambient temperature = 25°C
 Relative humidity = 59%
 Supply voltage = +12Vdc

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 $43 + 10 \log P_{dB}$

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

RESULTS

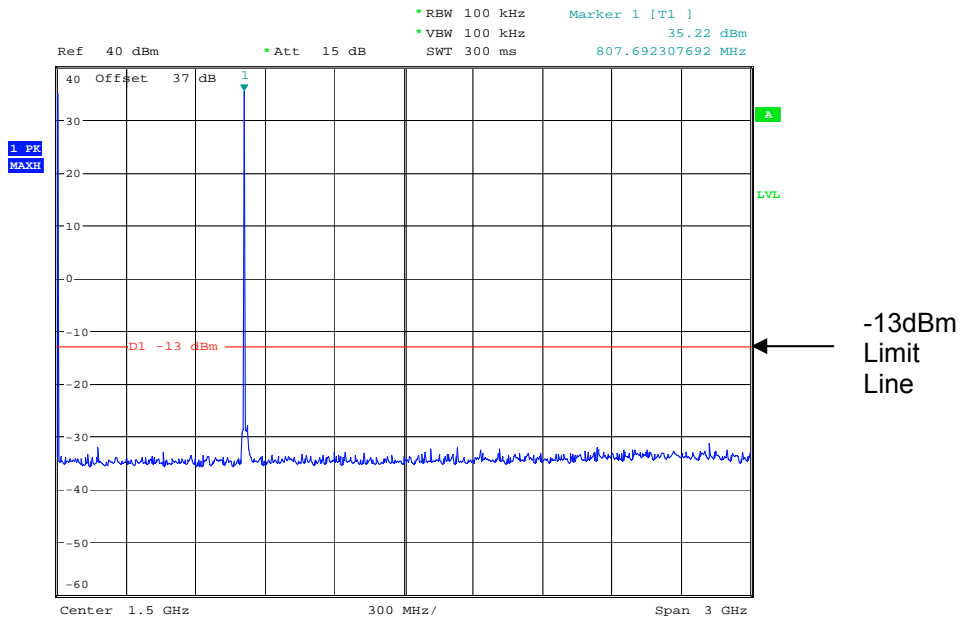
FREQUENCY RANGE	FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTENUATOR & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
0Hz – 9GHz	No Significant Emissions Within 20 dB of the Limit				-13

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
ATTENUATOR	BIRD	8304-100-N	N/A	222	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X

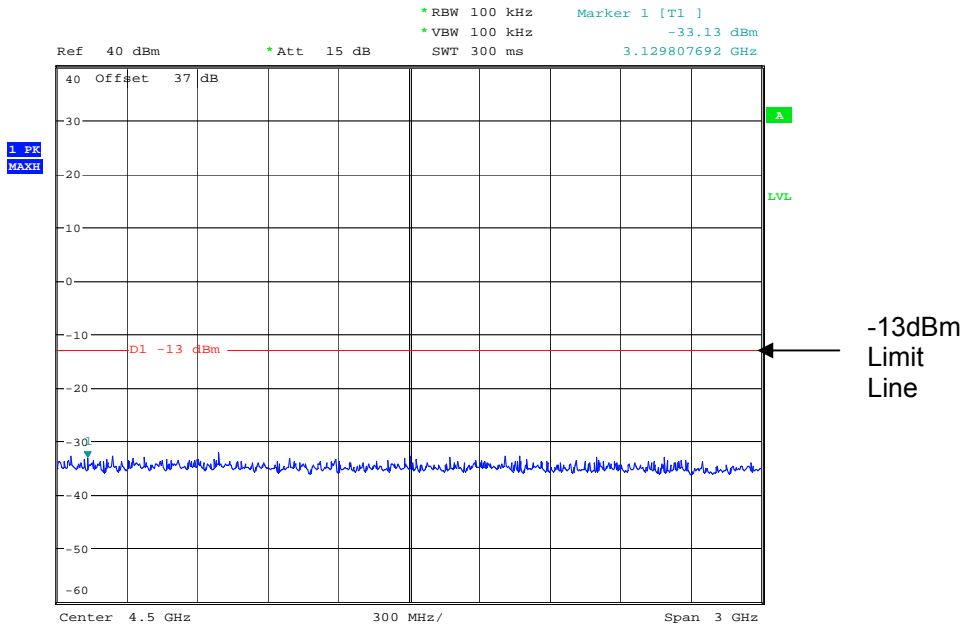
800MHz Amplifier uplink

Conducted emissions bottom channel 807.5MHz 0MHz – 3GHz



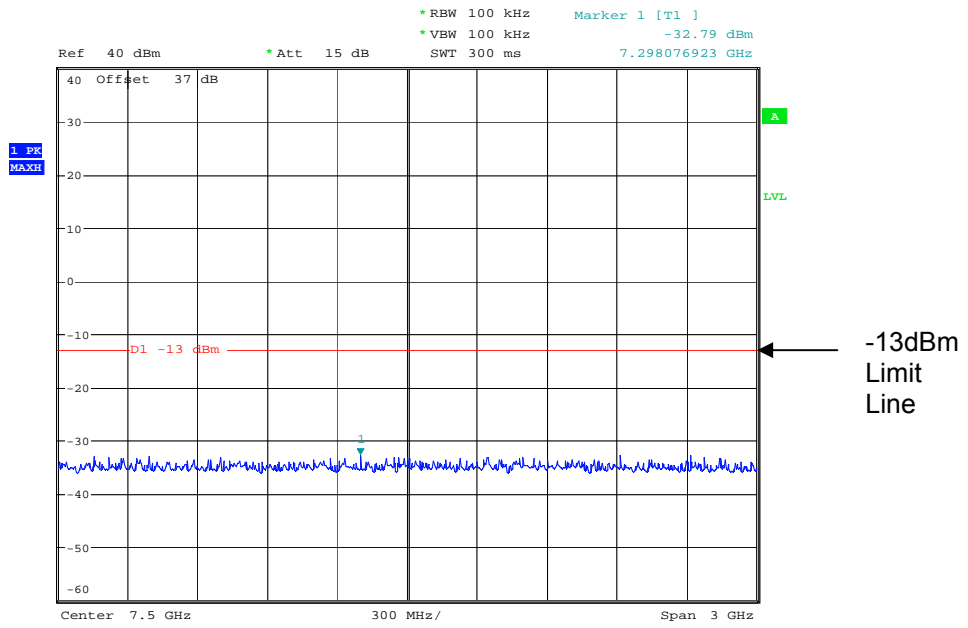
Date: 29.JUL.2008 12:29:04

Conducted emissions bottom channel 807.5MHz 3 - 6GHz



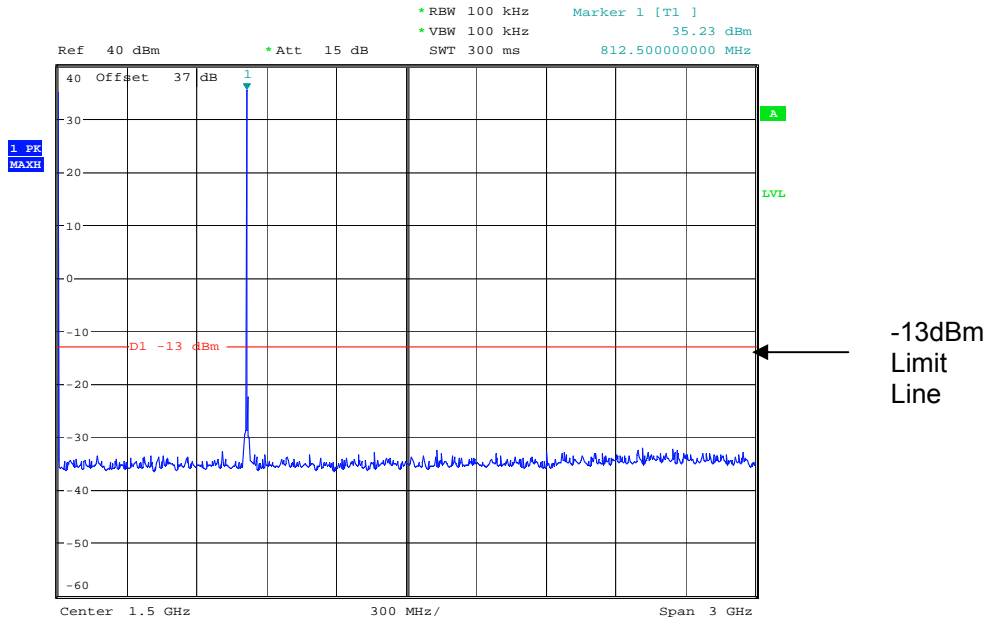
Date: 29.JUL.2008 12:29:24

Conducted emissions bottom channel 807.5MHz 6 - 9GHz



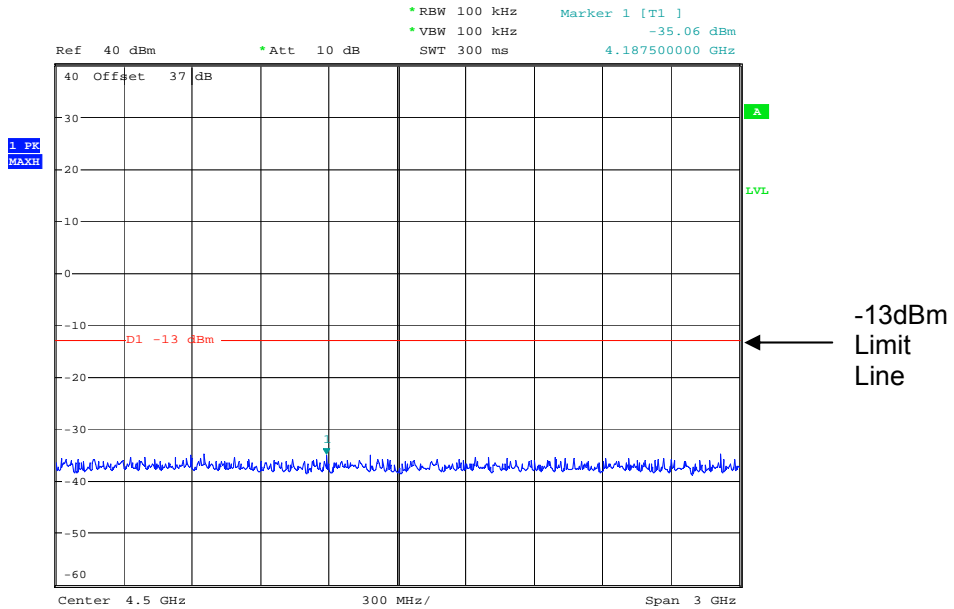
Date: 29.JUL.2008 12:29:42

Conducted emissions Middle channel 815.0125MHz 0MHz - 3GHz



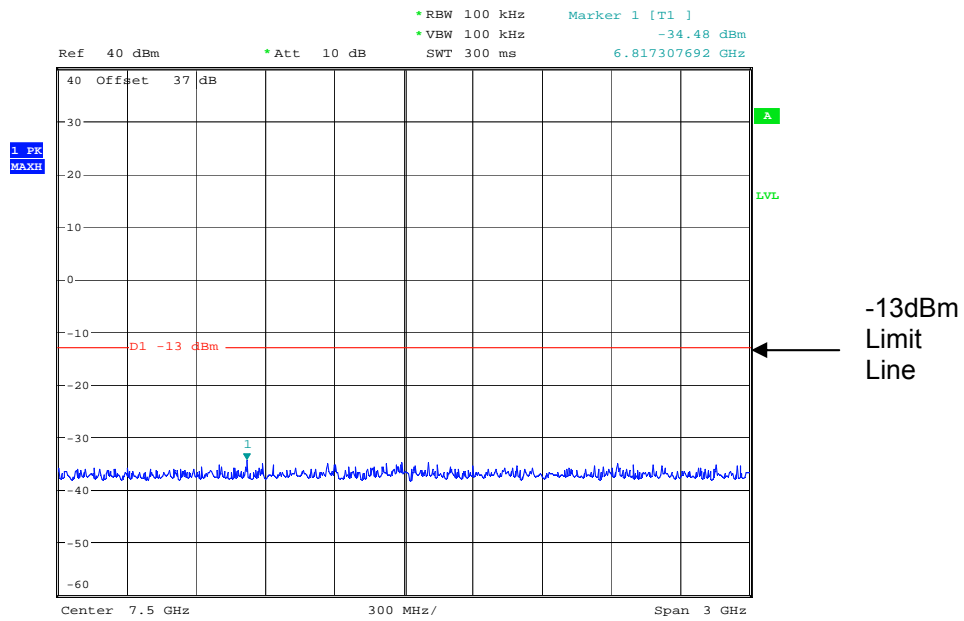
Date: 29.JUL.2008 12:30:43

Conducted emissions Middle channel 815.0125MHz 3 - 6GHz



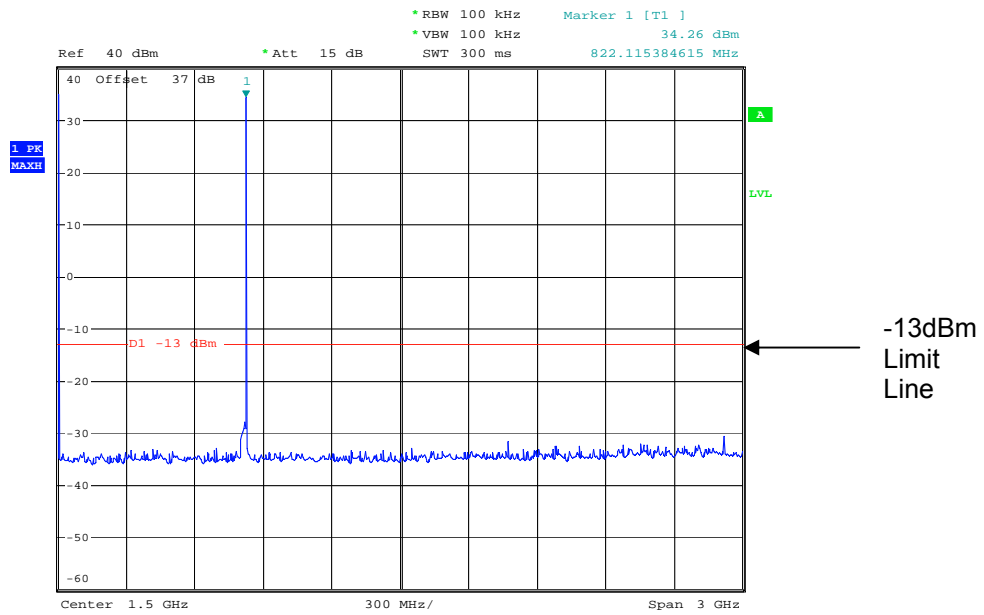
Date: 29.JUL.2008 12:31:09

Conducted emissions Middle channel 815.0125MHz 6 – 9GHz



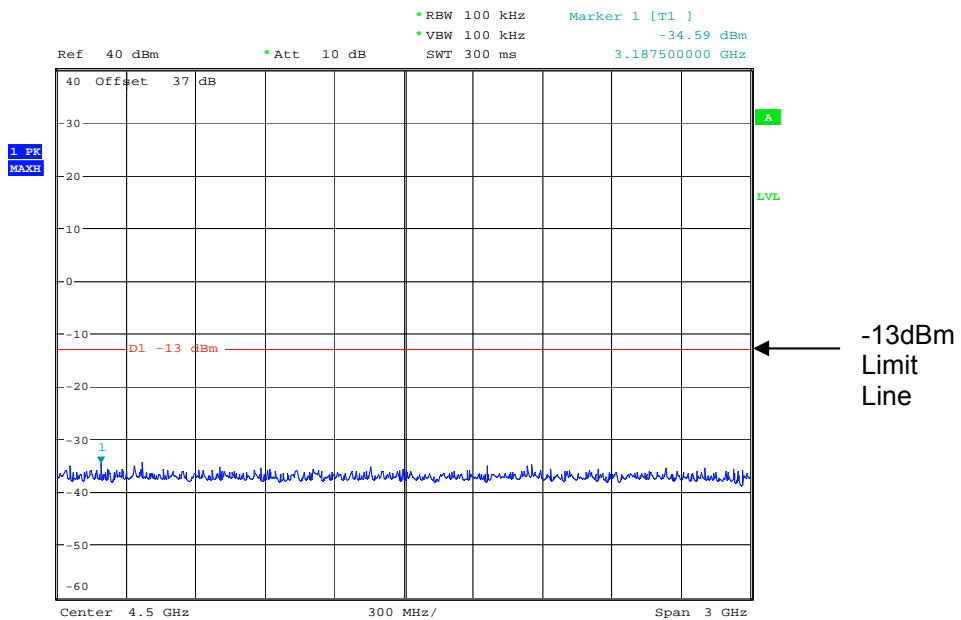
Date: 29.JUL.2008 12:31:23

Conducted emissions Top channel 822.5MHz 0MHz - 3GHz



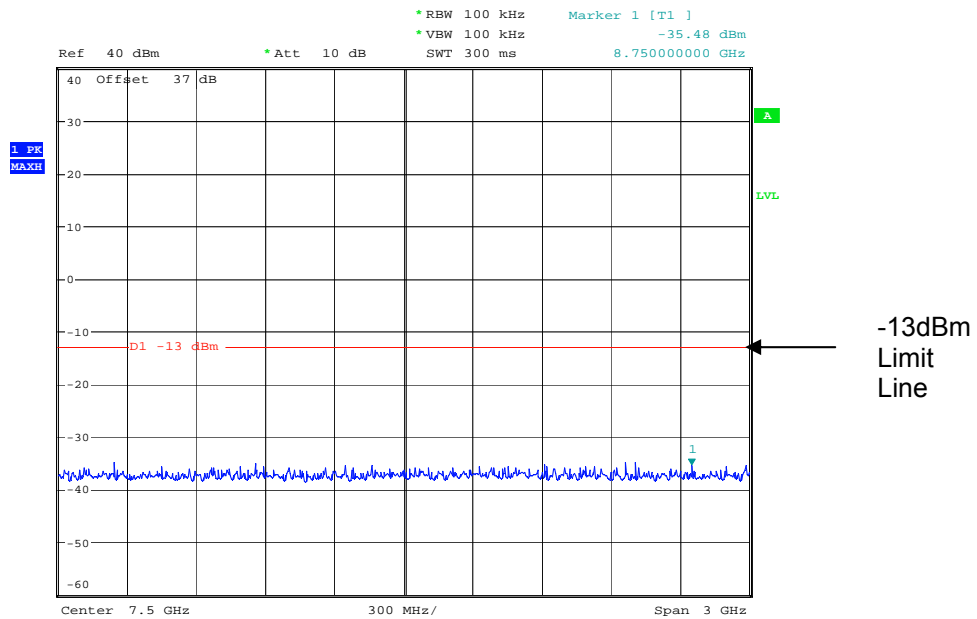
Date: 29.JUL.2008 12:32:13

Conducted emissions Top channel 822.5MHz 3GHz - 6GHz



Date: 29.JUL.2008 12:32:31

Conducted emissions Top channel 822.5MHz 6 – 9GHz



Date: 29.JUL.2008 12:32:49

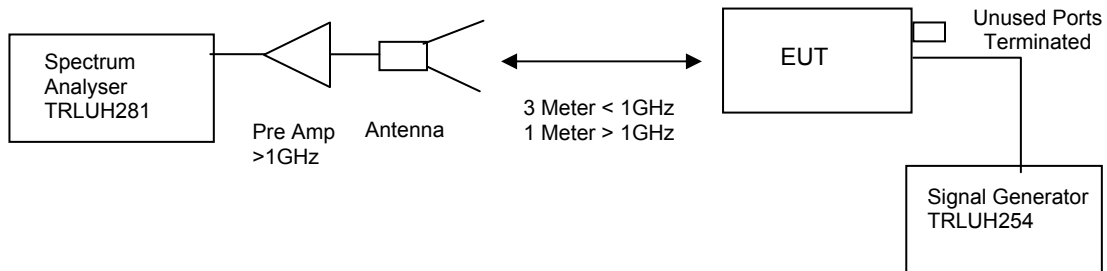
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– UPLINK

Ambient temperature = 23°C
 Relative humidity = 62%
 Conditions = OATS
 Supply voltage = +12Vdc
 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

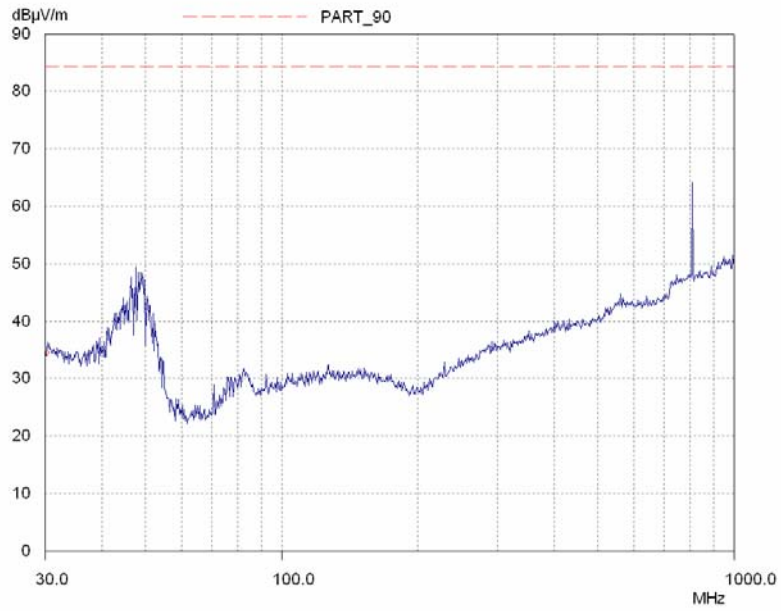
FREQUENCY RANGE	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	CALCULATED EIRP (dBm)	LIMIT (dBm)
30MHz – 9GHz	No Significant Emissions Within 20 dB of the Limit						-13dBm

The test equipment used for the Transmitter Spurious Emissions:

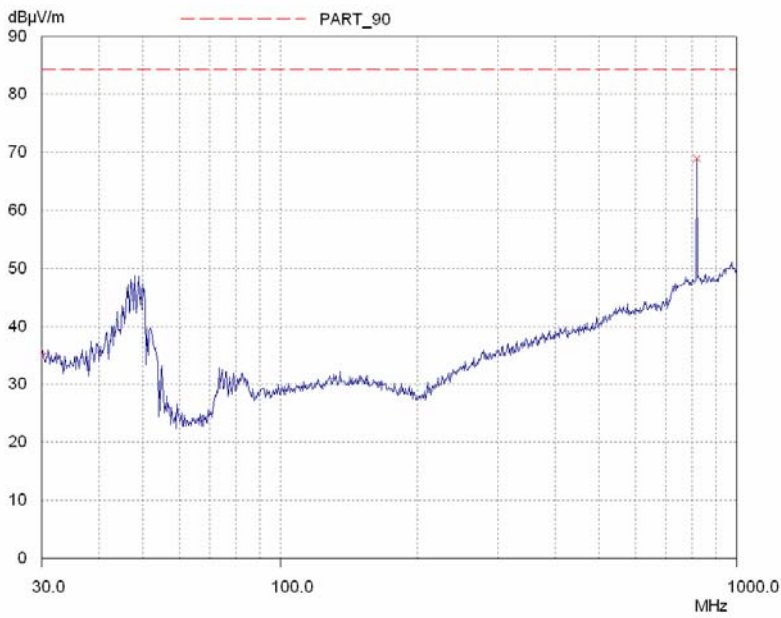
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
RECEIVER	R&S	ESVS10	825892/006	TRL04	X
HORN	EMCO	3115	9010-3580	138	X
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
PRE AMPLIFIER	HP	8449B	3008A016	572	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
ANTENNA	YORK	CBL611/A	1618	UH191	X

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– UPLINK 30-1GHz SCAN

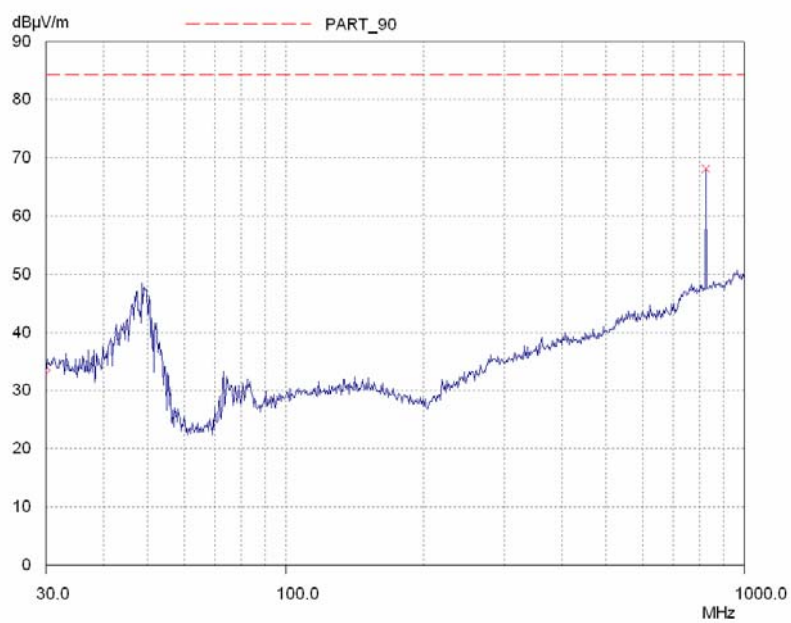
Bottom Channel



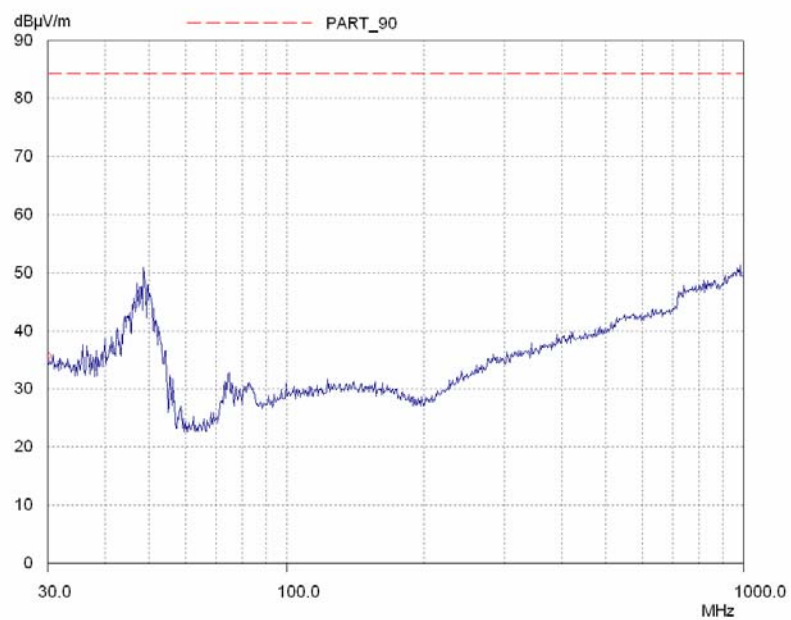
Middle Channel



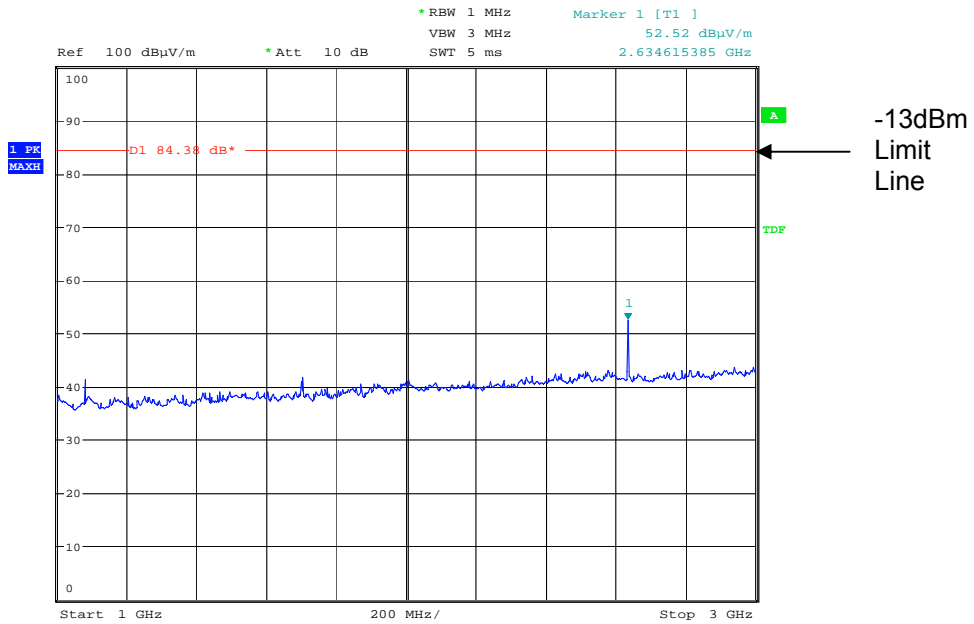
Top Channel



No signal, input terminals terminated into 50Ω

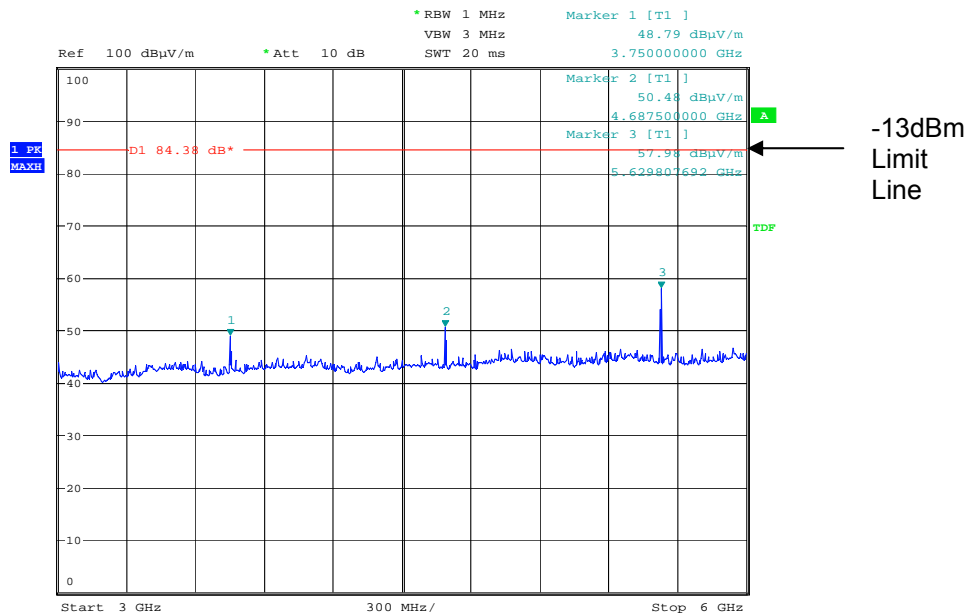


Radiated emissions bottom channel 807.5MHz 1 – 3GHz



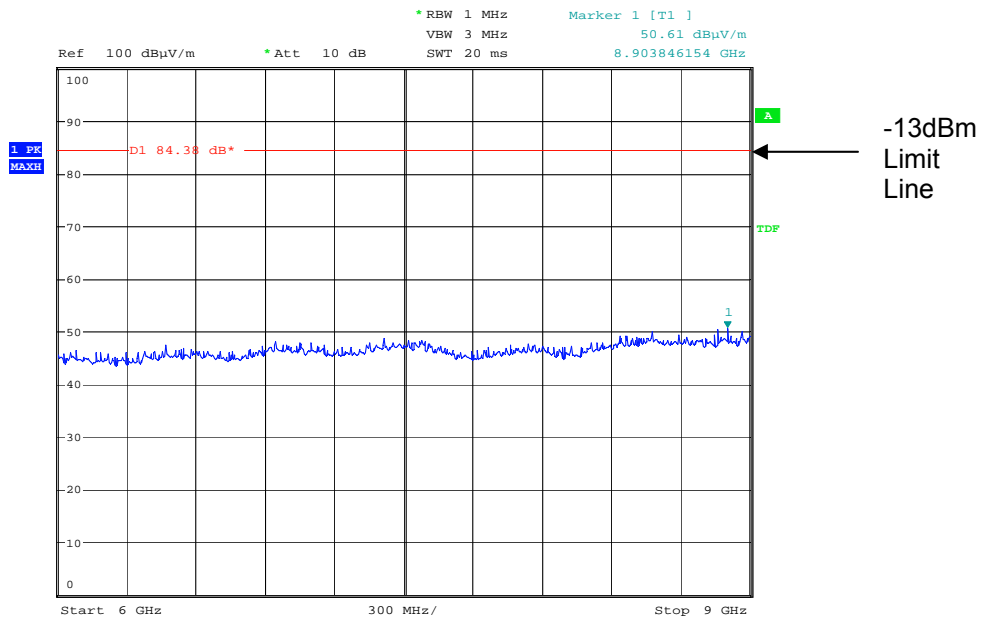
Date: 30.JUL.2008 10:45:32

Radiated emissions bottom channel 807.5MHz 3 – 6GHz



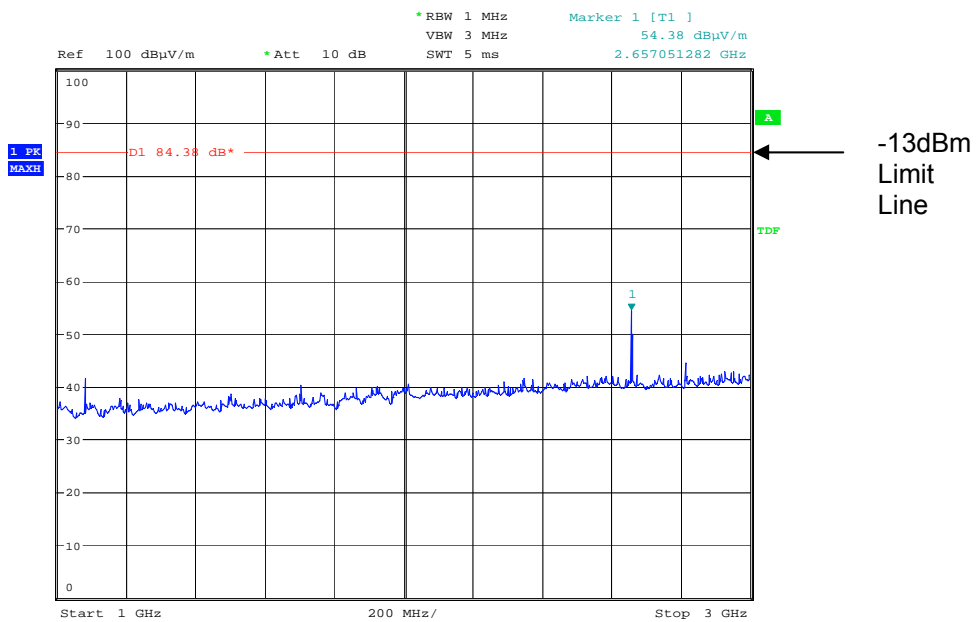
Date: 30.JUL.2008 10:46:14

Radiated emissions bottom channel 807.5MHz 3 – 9GHz



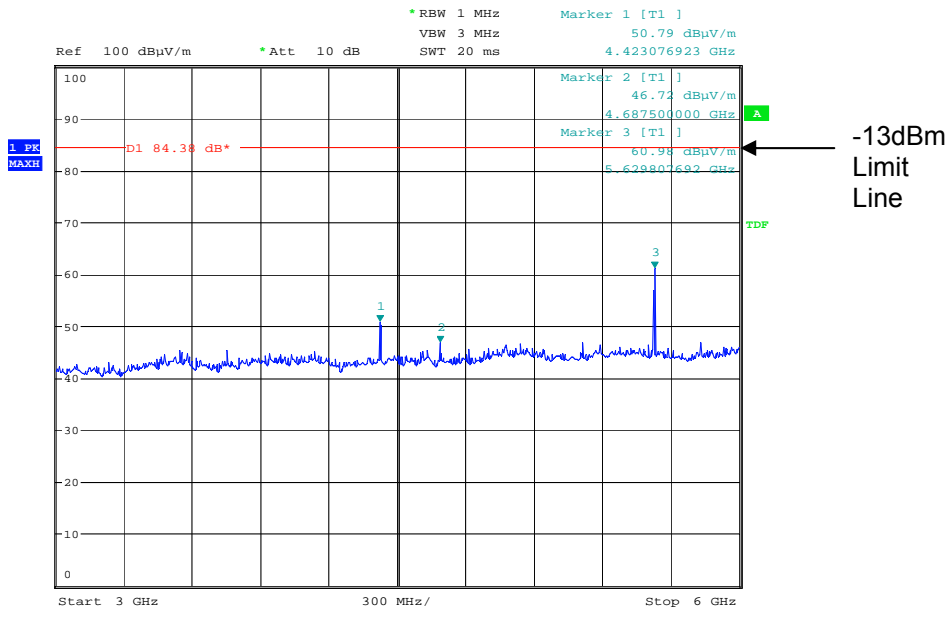
Date: 30.JUL.2008 10:46:53

Radiated emissions middle channel 815.0125MHz 1 – 3GHz



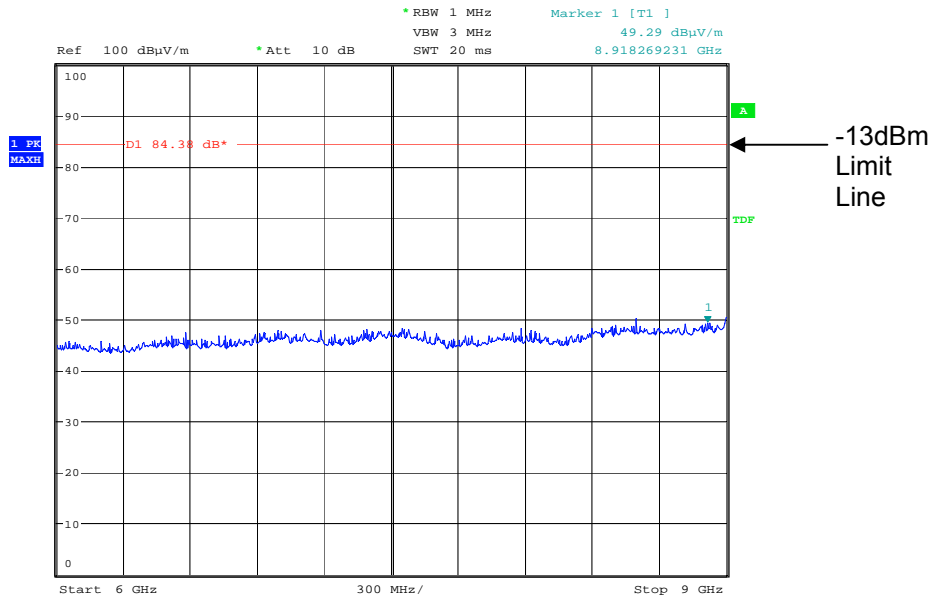
Date: 30.JUL.2008 10:51:57

Radiated emissions middle channel 815.0125MHz 3 – 6GHz



Date: 30.JUL.2008 10:52:47

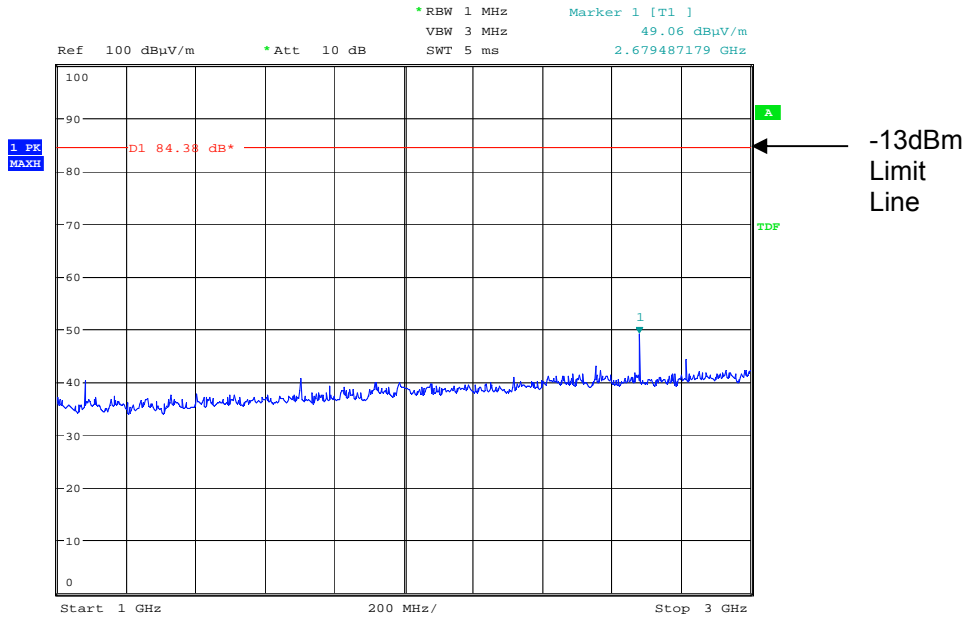
Radiated emissions middle channel 815.0125MHz 6 – 9GHz



Date: 30.JUL.2008 10:53:16

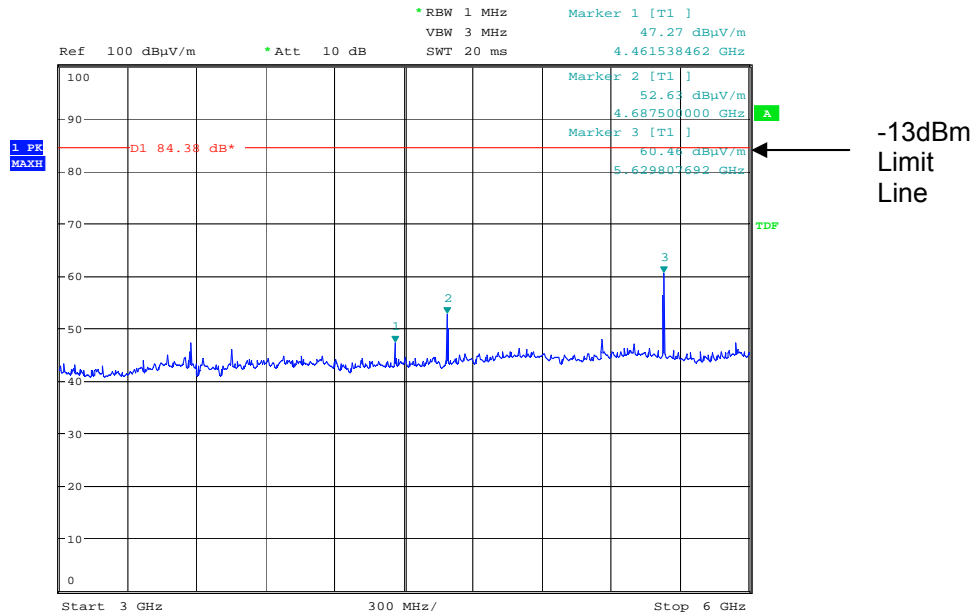
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions Top channel 822.5MHz 1 – 3GHz



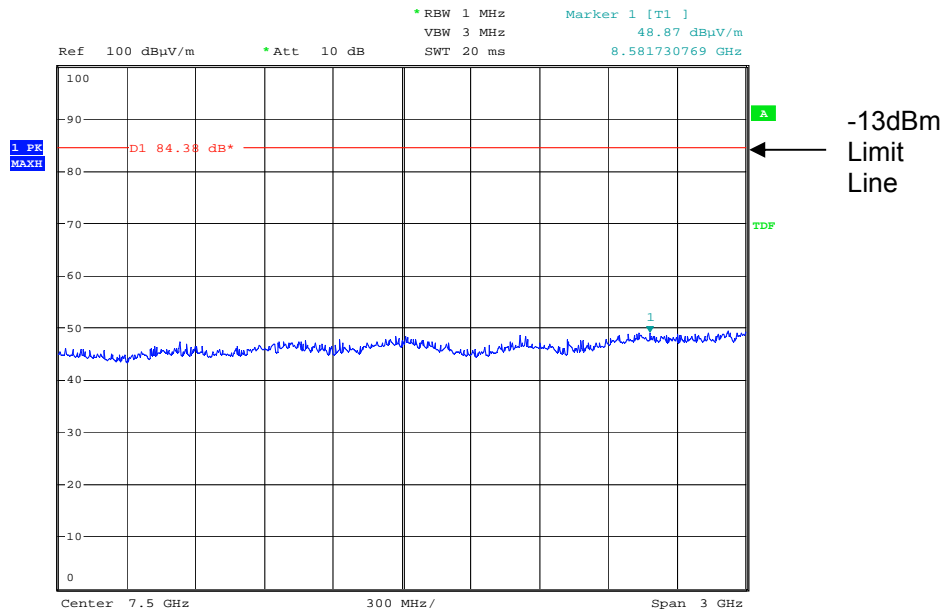
Date: 30.JUL.2008 10:58:23

Radiated emissions Top channel 822.5MHz 3 – 6GHz



Date: 30.JUL.2008 10:59:27

Radiated emissions Top channel 822.5MHz 6 – 9GHz

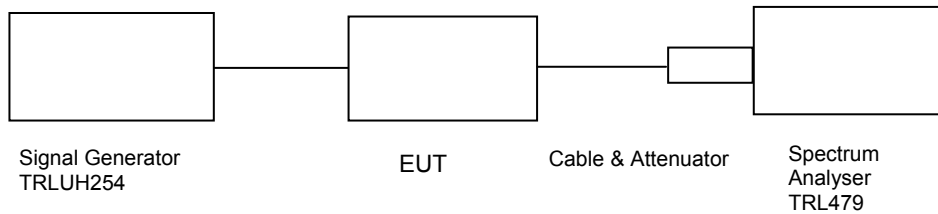


Date: 30.JUL.2008 10:59:55

AMPLIFIER GAIN – CONDUCTED – PART 2.1046 – DOWNLINK

Ambient temperature = 23°C
 Relative humidity = 63%
 Supply voltage = +12Vdc
 Channel number = See test results

Radio Laboratory



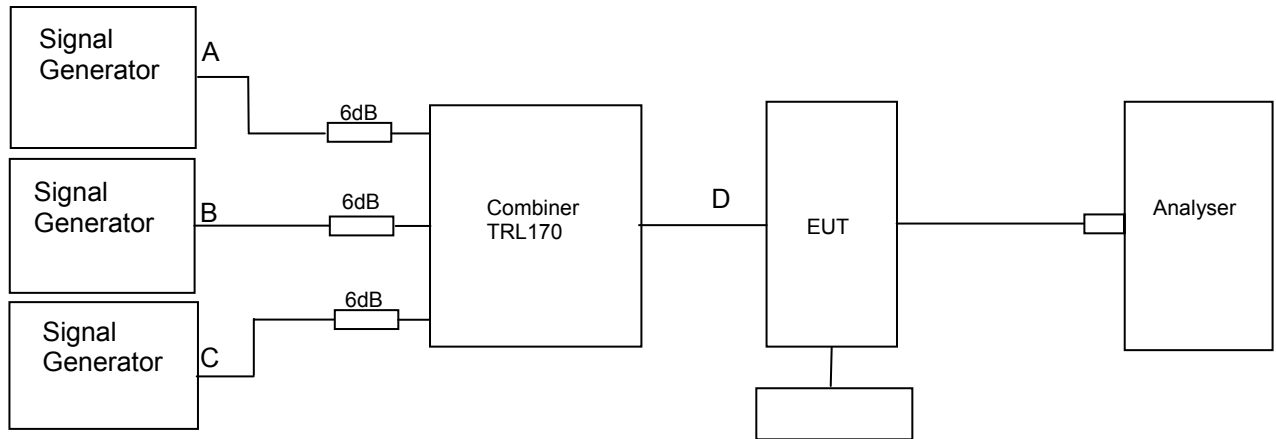
Frequency MHz	Signal Generator input level dBm	Input Cable Loss dB	Output Cable & Attenuator loss dB	Level at Spectrum Analyser dBm	Gain dB	Conducted Output Power dBm	Gain after 10dB input level increase dB
852.5000	-55.30	0.26	49.50	-16.50	88.56	33.00	33.74
860.0125	-55.00	0.50	36.80	-2.70	89.60	34.10	34.70
867.5000	-55.00	0.50	36.50	-2.90	89.40	33.90	34.70

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	
ATTENUATOR	BIRD	8308-200-N	N/A	103	X
ATTENUATOR	SPINNER	745357	D57224	225	X
ATTENUATOR	BIRD	8304-100-N	N/A	222	X
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X

AMPLIFIER INTERMODULATION SPURIOUS EMISSIONS – CONDUCTED – PART 2.1053– UPLINK

Ambient temperature = N/A
 Relative humidity = N/A
 Supply voltage = N/A
 Radio Laboratory



This test was not performed as there will only ever be one channel selected in both the uplink and downlink direction. The channel is selectable by setting the channel filter switches on the rear panel.

RF Input Frequency (MHz)			Highest Intermodulation Product Level (dBm)	Limit (dBm)
N/A	N/A	N/A	Not Applicable	-13

Sweep data is shown on the next page:

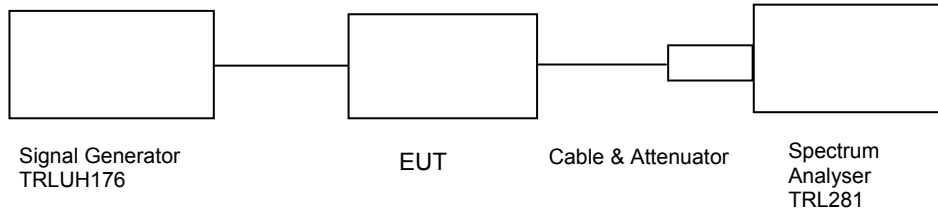
Test equipment used for intermodulation test

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

TRANSMITTER TESTS

AMPLIFIER MODULATED CHANNEL TEST – CONDUCTED – Part 2.1049– DOWNLINK

Ambient temperature = 23°C Radio Laboratory
 Relative humidity = 63%
 Supply voltage = +12Vdc
 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 (-55.5dBm) 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.

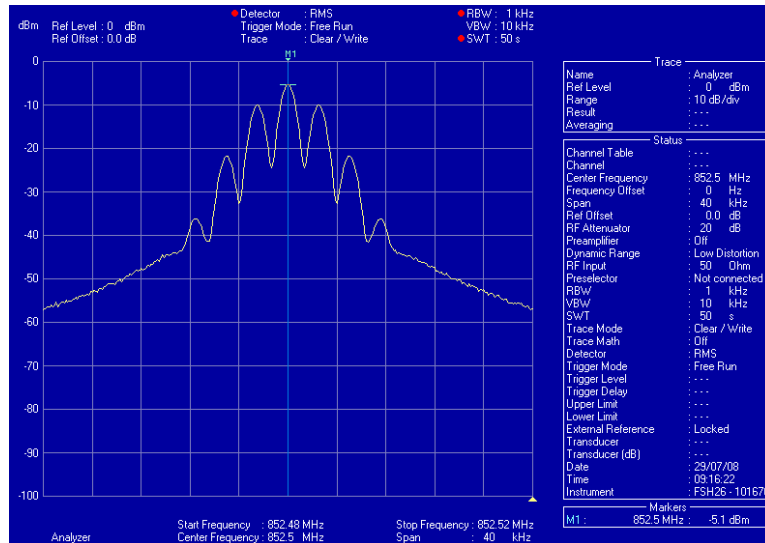
Note: The cables and attenuators had the following losses.

1. Cable and attenuator between EUT and spectrum analyser 49.50dB
2. Cable between signal generator and EUT 0.26dB

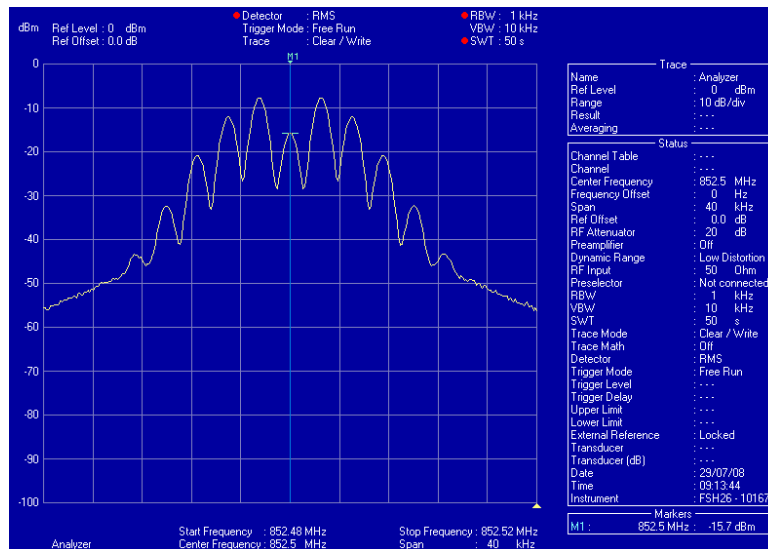
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
ATTENUATOR	SPINNER	745357	D57224	225	X
ATTENUATOR	BIRD	8308-200-N	N/A	103	X
ATTENUATOR	BIRD	8304-100-N	N/A	222	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
SPECTRUM ANALYSER	R&S	FSH6	101670	TRLUH357	X

800MHz Amplifier downlink

Bottom channel 852.5MHz Signal Generator and EUT, deviation set to 2.5kHz

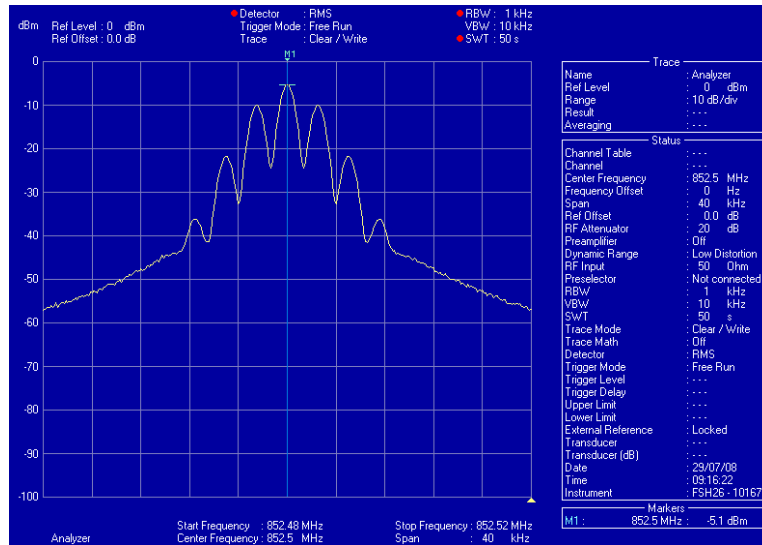


Bottom channel 852.5MHz Signal Generator and EUT, deviation set to 5kHz

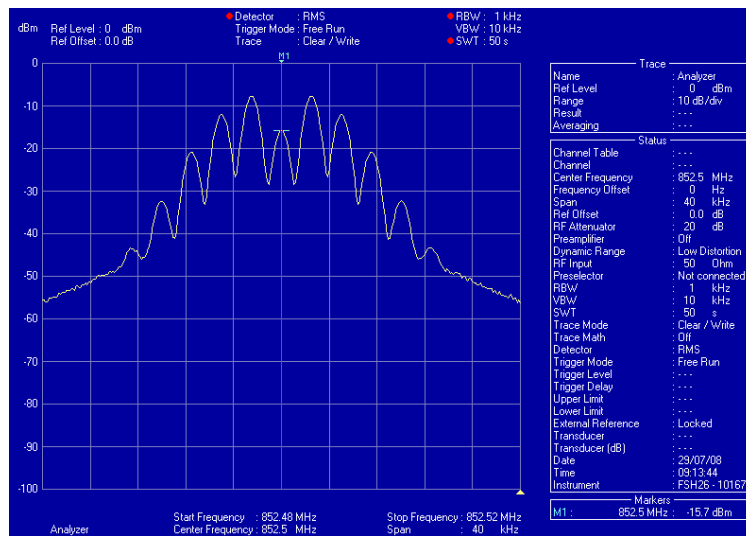


The above plots depicting the output wavelshape show no measurable distortion visible when compared to the input signal.

Middle channel 860.0125MHz Signal Generator and EUT, deviation set to 2.5kHz

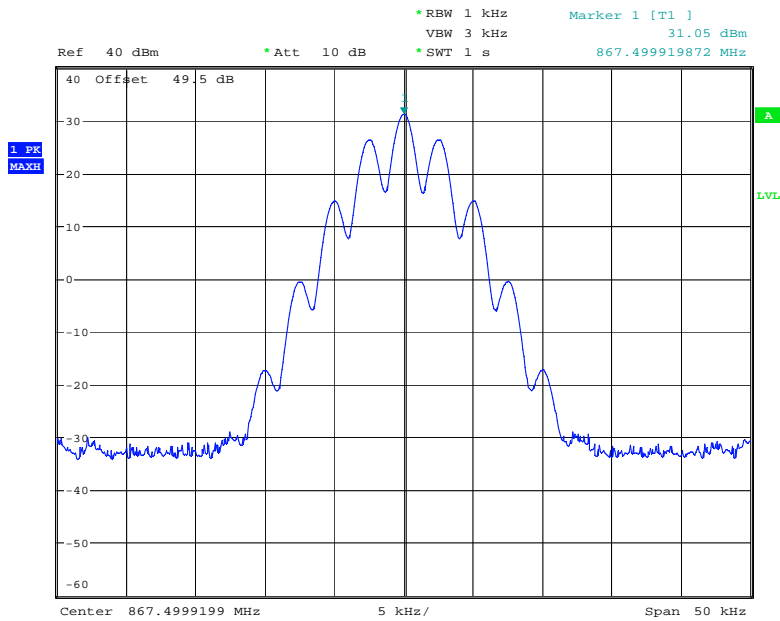


Middle channel 860.0125MHz Signal Generator and EUT, deviation set to 5kHz



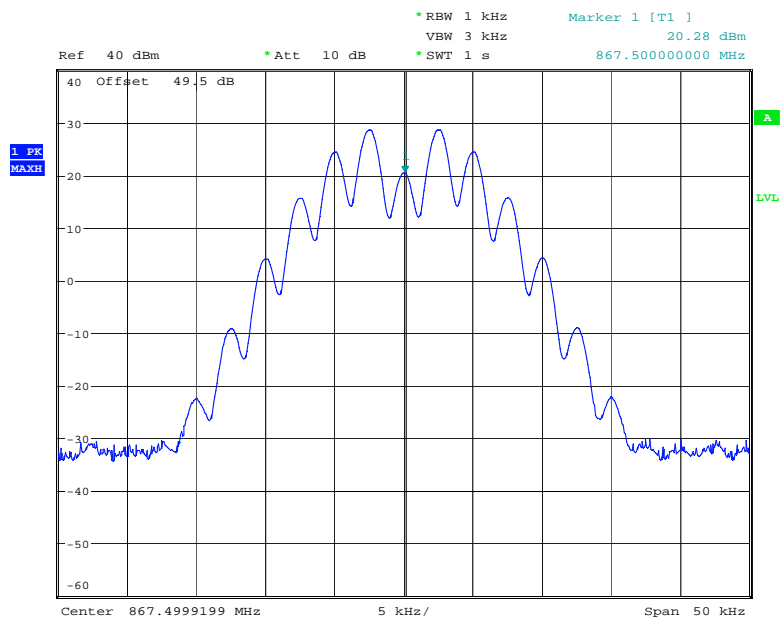
The above plots depicting the output wavelshape show no measurable distortion visible when compared to the input signal.

Top channel 867.5MHz Signal Generator and EUT, deviation set to 2.5kHz



Date: 25.JUL.2008 12:02:38

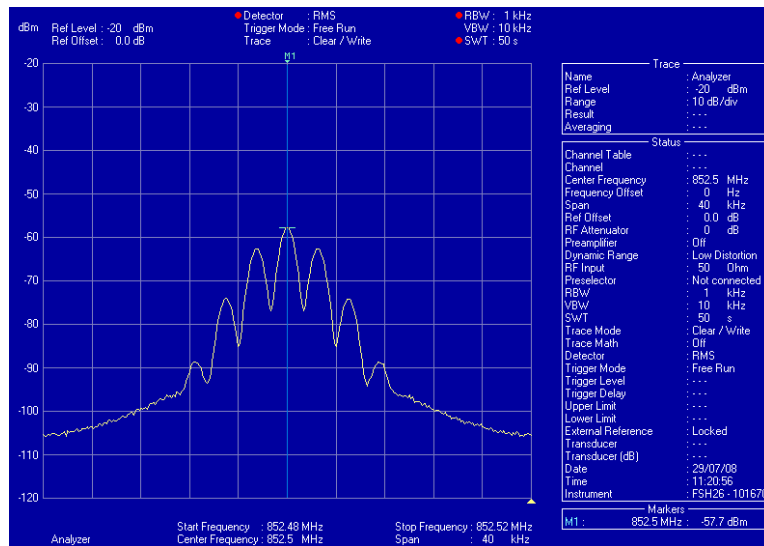
Top channel 867.5MHz Signal Generator and EUT, deviation set to 5kHz



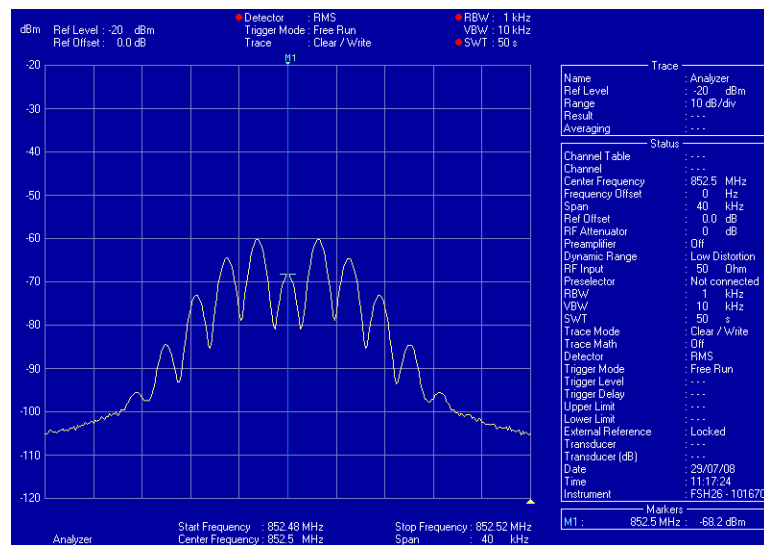
Date: 25.JUL.2008 12:08:04

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

Bottom channel 852.5MHz Signal Generator, deviation set to 2.5kHz

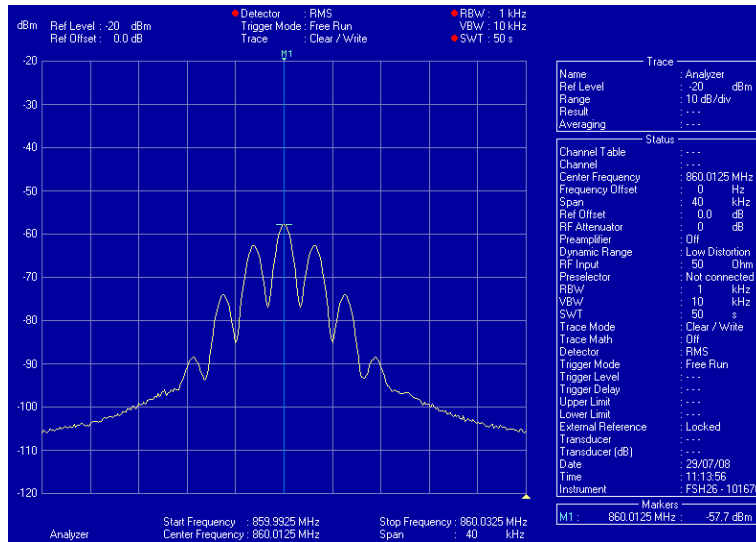


Bottom channel 852.5MHz Signal Generator, deviation set to 5kHz

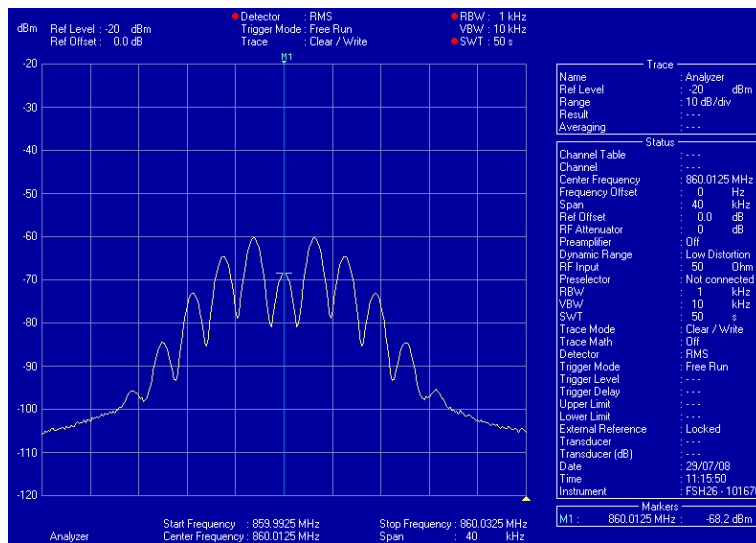


The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

Middle channel 860.0125MHz Signal Generator, deviation set to 2.5kHz

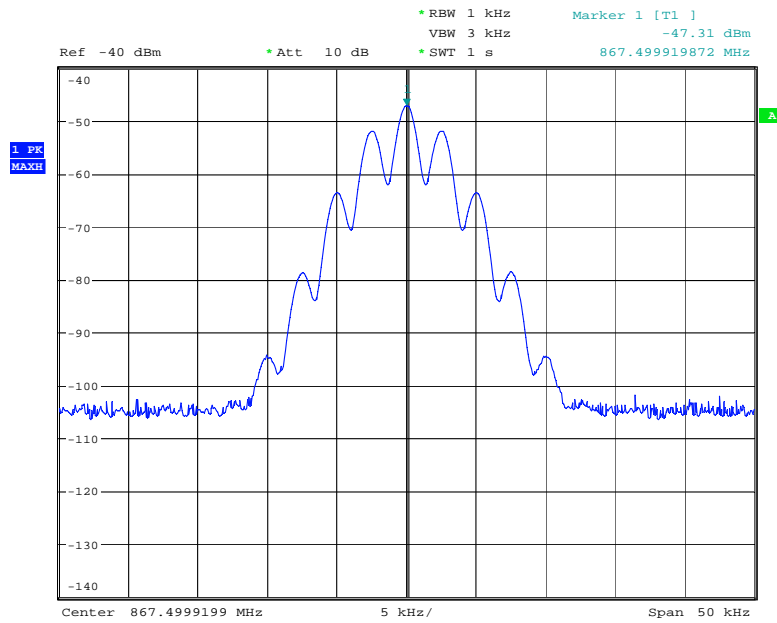


Middle channel 860.0125MHz Signal Generator, deviation set to 5kHz



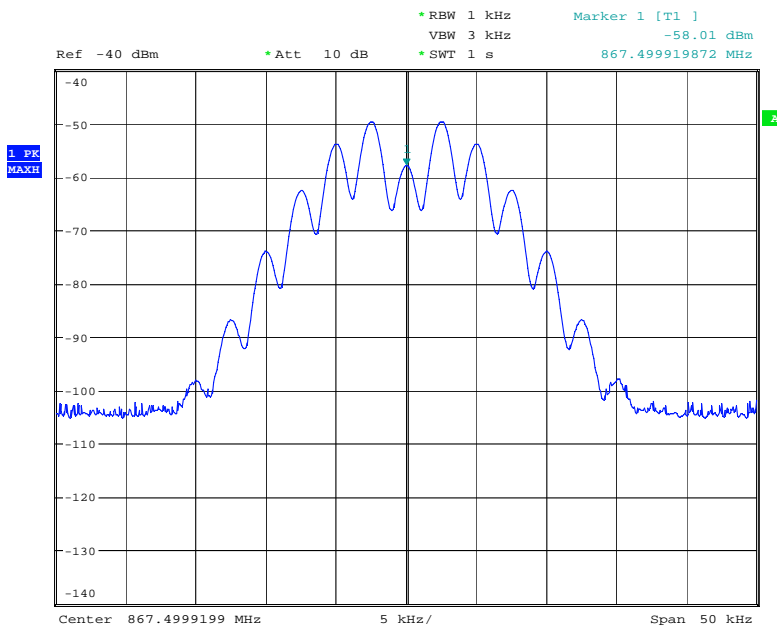
The above plots depicting the output wavelshape show no measurable distortion visible when compared to the input signal.

Top channel 867.5MHz Signal Generator, deviation set to 2.5kHz



Date: 25.JUL.2008 12:13:16

Top channel 867.5MHz Signal Generator, deviation set to 5kHz



Date: 25.JUL.2008 12:20:28

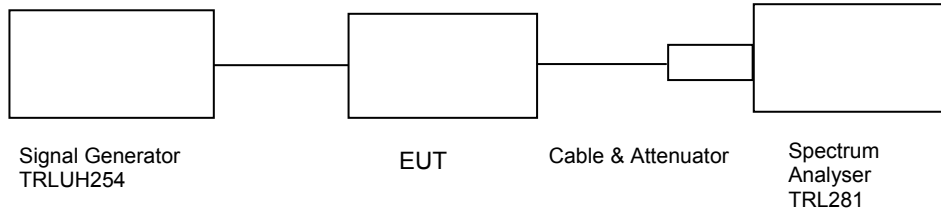
The above plots depicting the output wavelshape show no measurable distortion visible when compared to the input signal.

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – CONDUCTED – Part 2.1053 – DOWNLINK

Ambient temperature = 24°C
 Relative humidity = 60%
 Supply voltage = +12Vdc

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

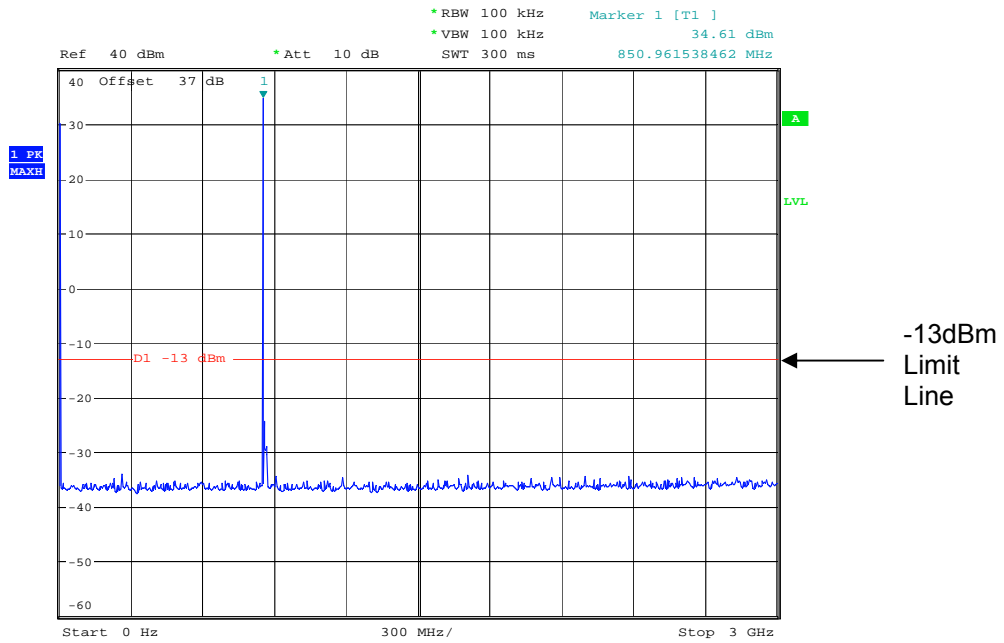
FREQUENCY RANGE	FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTENUATOR & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
0Hz – 9GHz	No Significant Emissions Within 20 dB of the limit				-13

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
ATTENUATOR	BIRD	8304-100-N	N/A	222	X

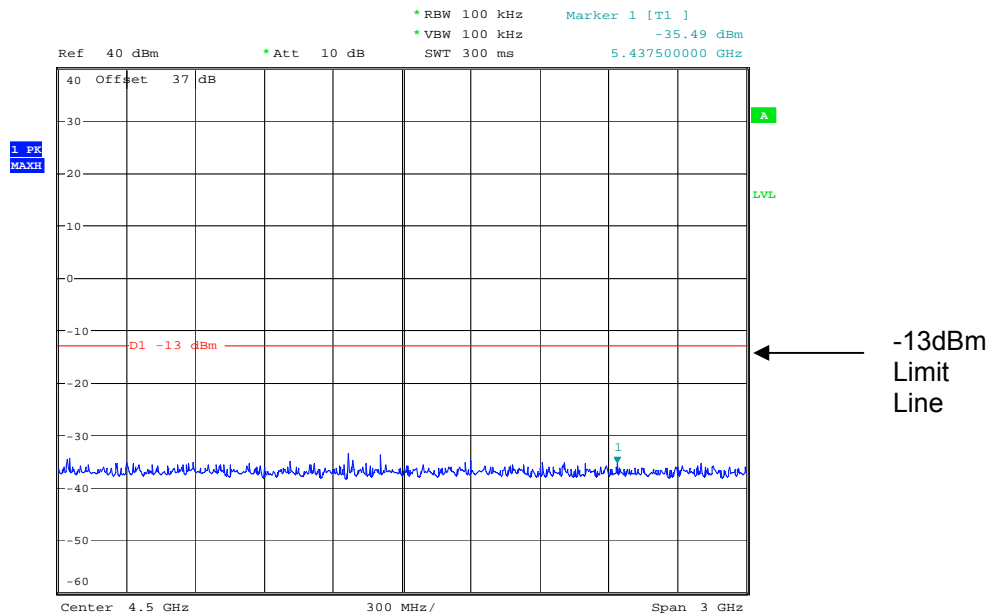
800MHz Amplifier Downlink

Conducted emissions bottom channel 852.5MHz 0MHz – 3GHz



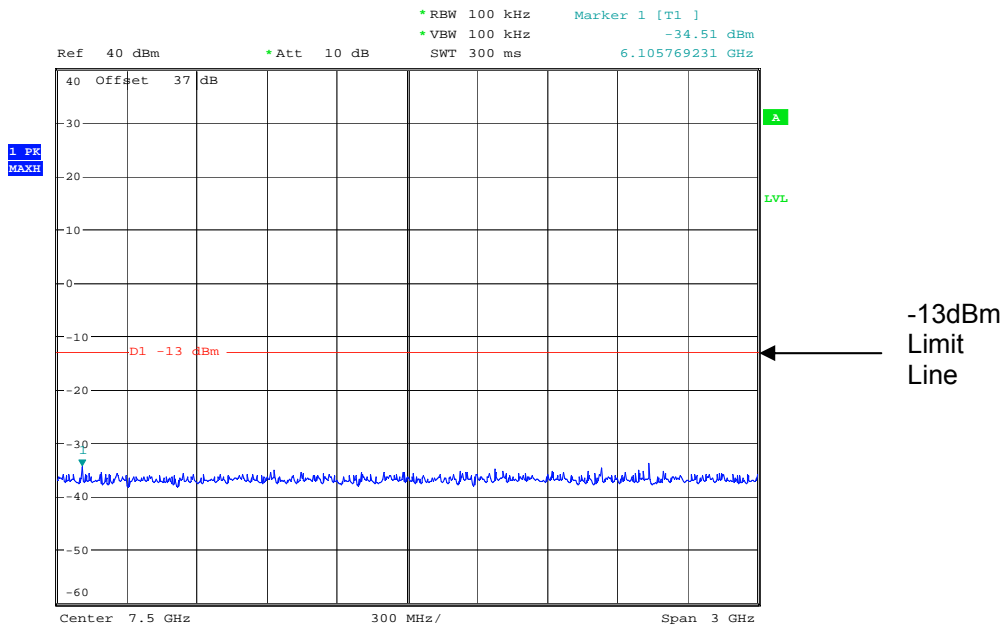
Date: 29.JUL.2008 12:22:17

Conducted emissions bottom channel 852.5MHz 3GHz – 6GHz



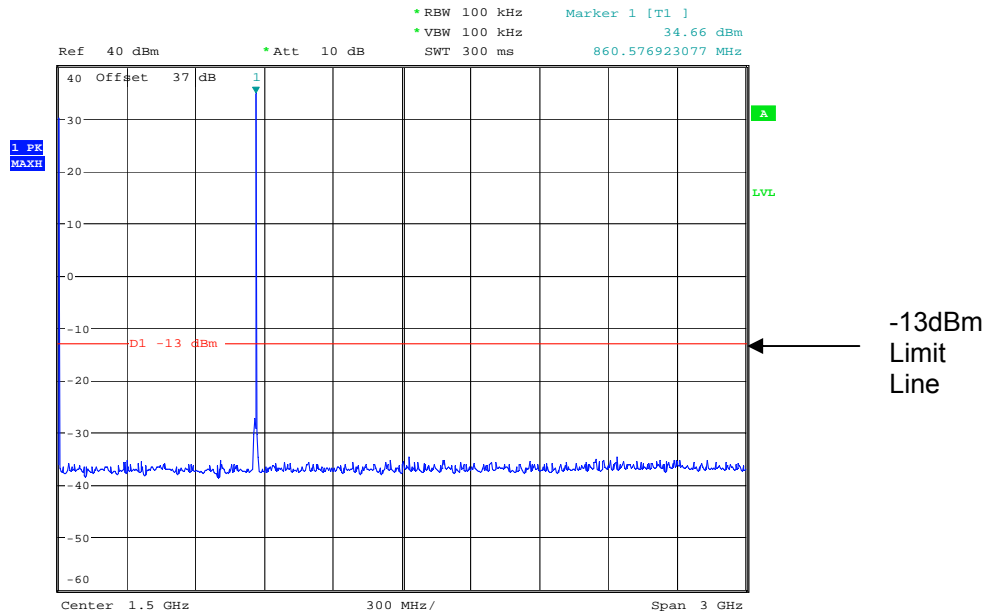
Date: 29.JUL.2008 12:22:49

Conducted emissions bottom channel 852.5MHz 6GHz – 9GHz



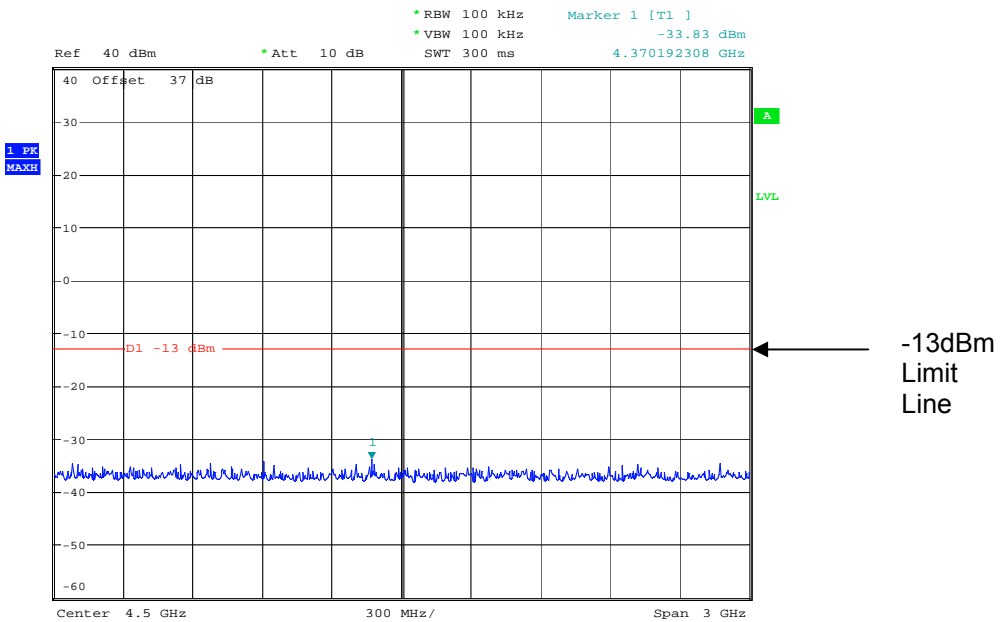
Date: 29.JUL.2008 12:23:13

Conducted emissions Middle channel 860.0125MHz 0MHz – 3GHz



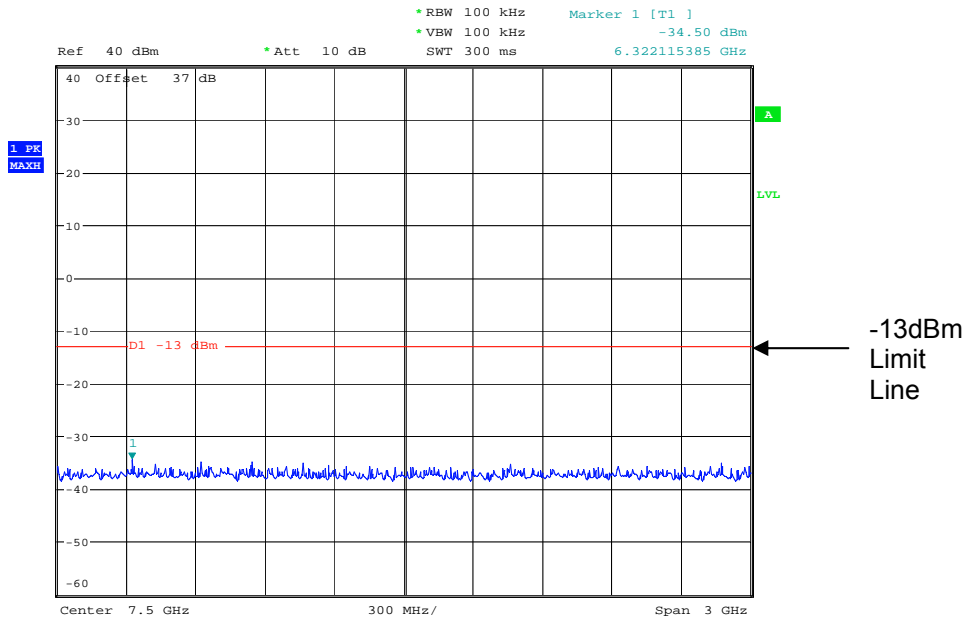
Date: 29.JUL.2008 12:24:06

Conducted emissions Middle channel 860.0125MHz 3GHz – 6GHz



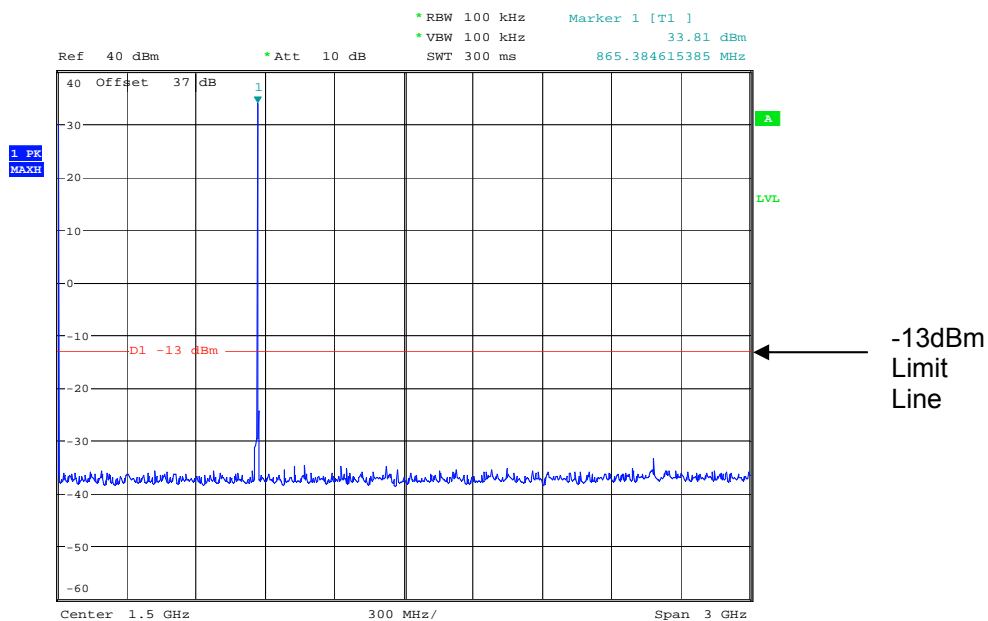
Date: 29.JUL.2008 12:24:22

Conducted emissions Middle channel 860.0125MHz 6GHz – 9GHz



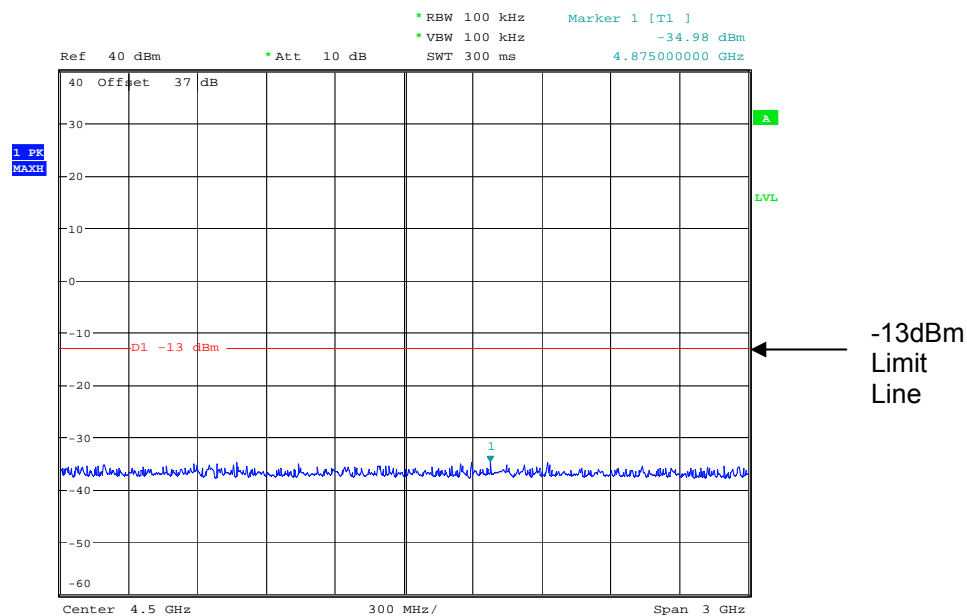
Date: 29.JUL.2008 12:24:37

Conducted emissions Top channel 867.5MHz 0MHz – 3GHz



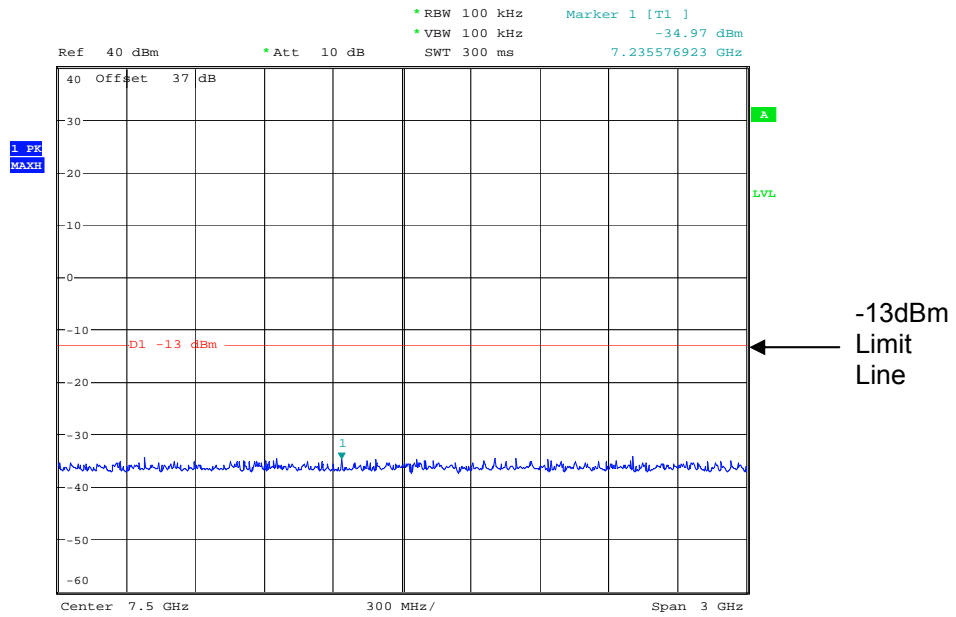
Date: 29.JUL.2008 12:25:19

Conducted emissions Top channel 867.5MHz 3GHz – 6GHz



Date: 29.JUL.2008 12:26:12

Conducted emissions Top channel 867.5MHz 6GHz – 9GHz



Date: 29.JUL.2008 12:27:15

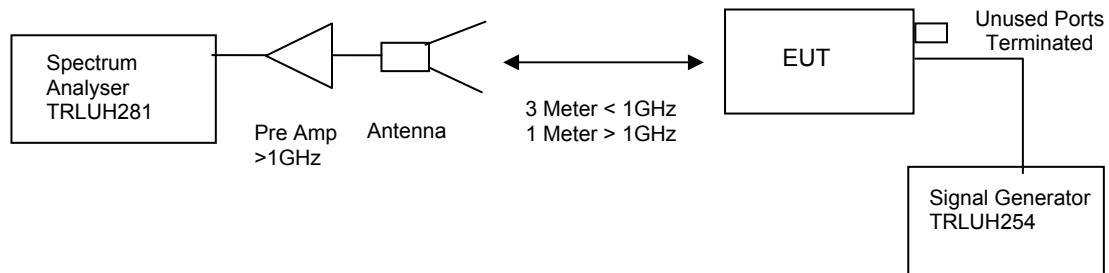
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– DOWNLINK

Ambient temperature = 24°C
 Relative humidity = 60%
 Conditions = OATS
 Supply voltage = +12Vdc
 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 50 ohm load.

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 $43 + 10 \log P_{dB}$

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

RESULTS

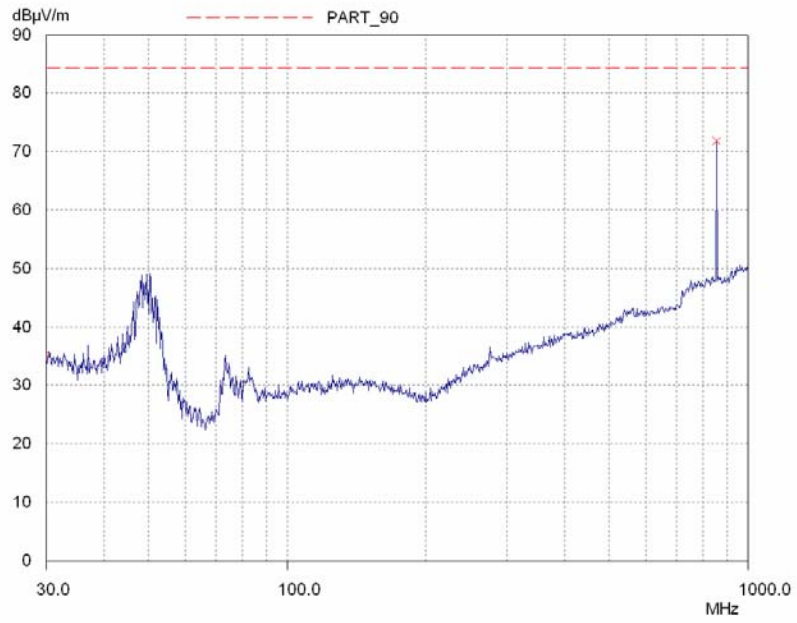
FREQUENCY RANGE	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	CALCULATED EIRP (dBm)	LIMIT (dBm)
30MHz – 9GHz	No Significant Emissions Within 20dBs of the Limit						-13dBm

The test equipment used for the Transmitter Spurious Emissions:

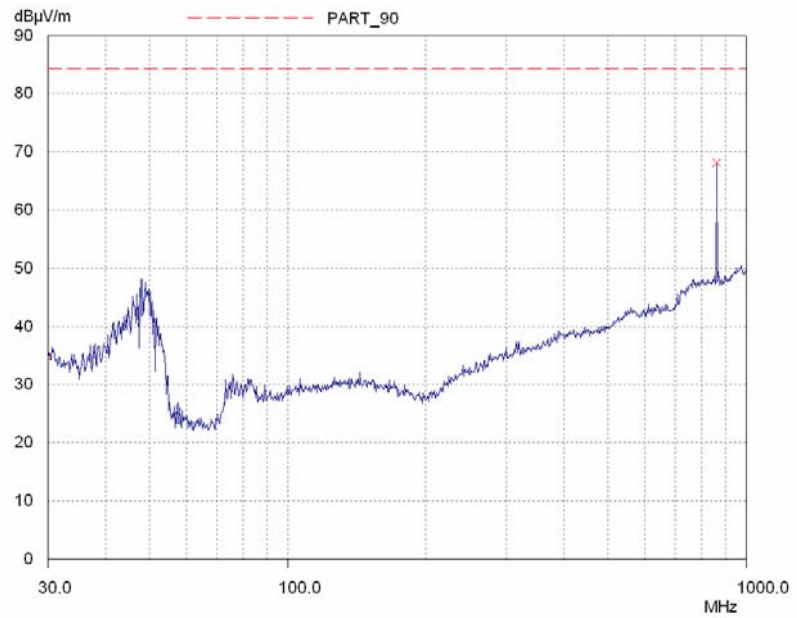
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
RECEIVER	R&S	ESVS10	825892/006	TRL04	X
HORN	EMCO	3115	9010-3580	138	X
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
PRE AMPLIFIER	HP	8449B	3008A016	572	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
ANTENNA	YORK	CBL611/A	1618	UH191	X

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– UPLINK 30 MHz-1GHz SCAN

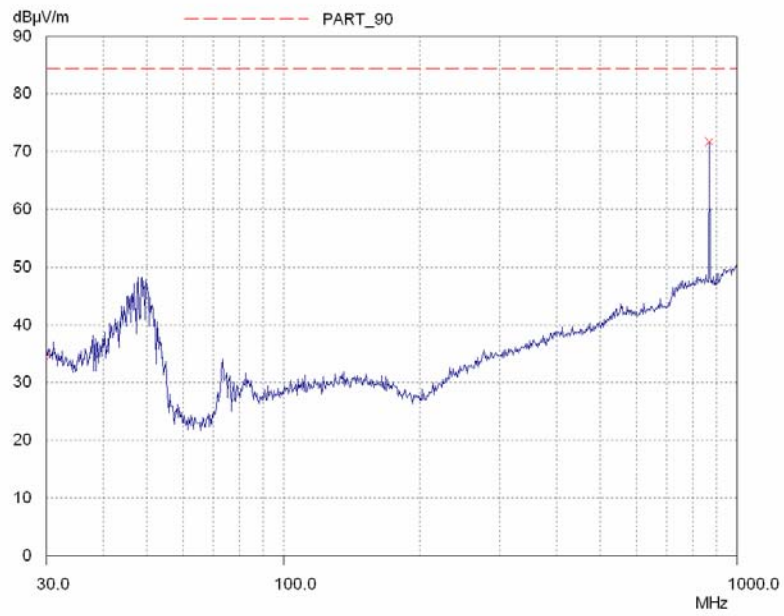
Bottom Channel



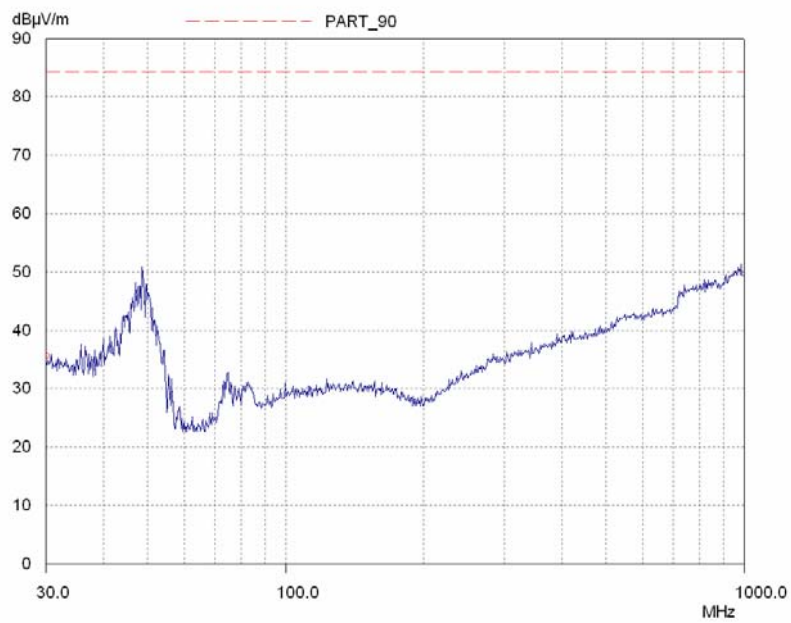
Middle Channel



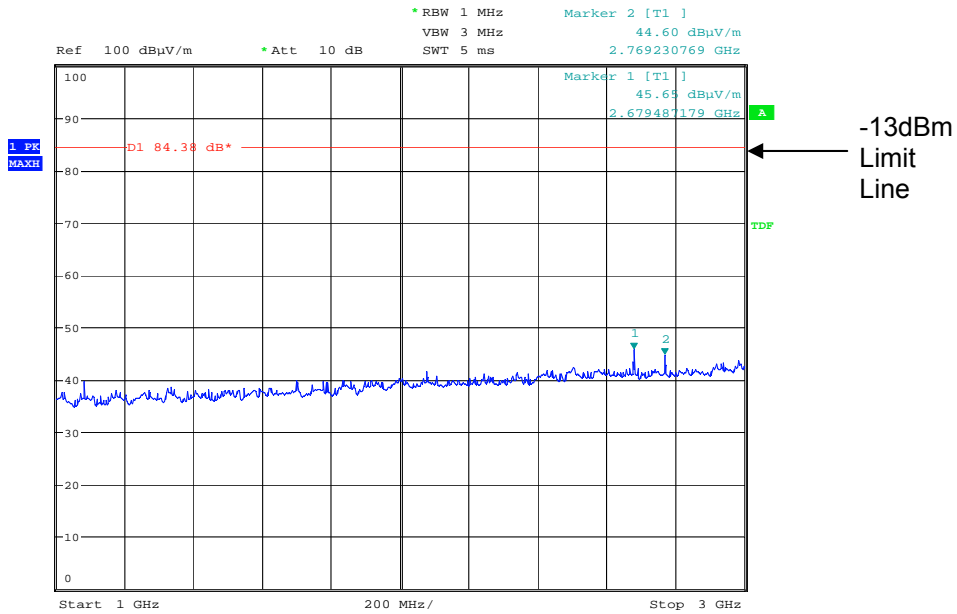
Top Channel



No signal, input terminals terminated into 50 Ω

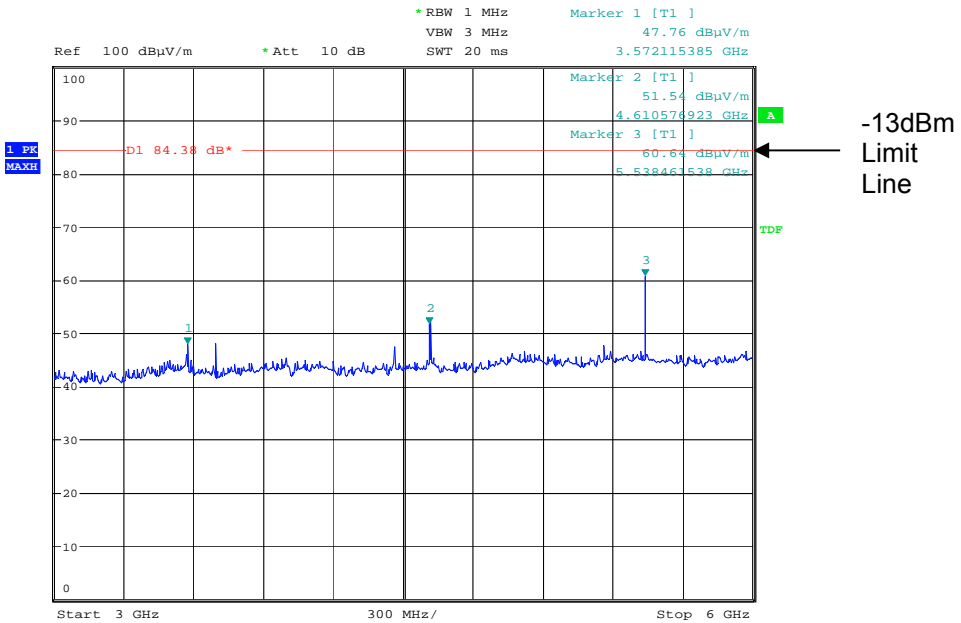


Radiated emissions bottom channel 852.5MHz 1GHz – 3GHz



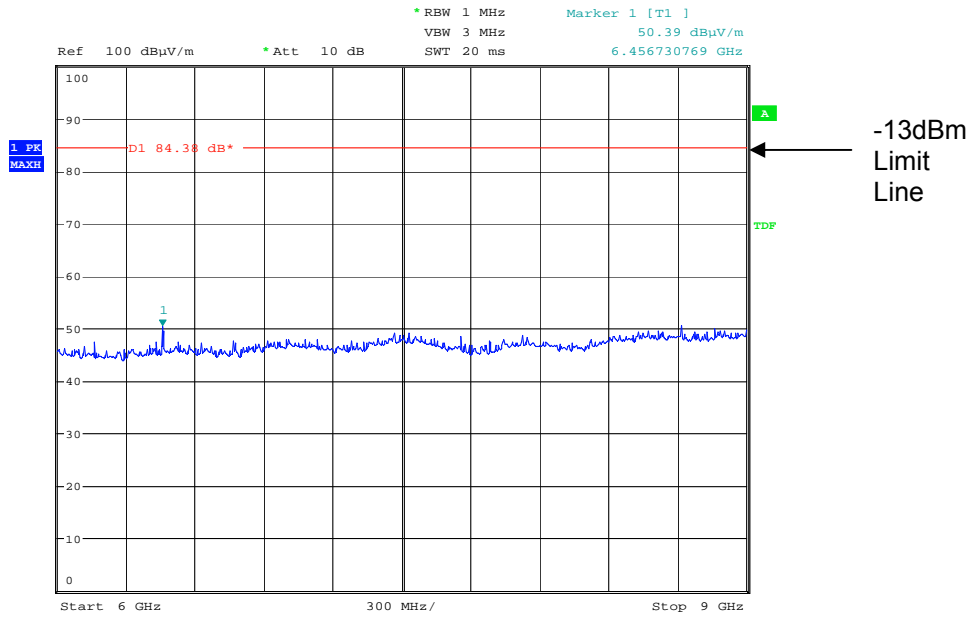
Date: 30.JUL.2008 09:45:18

Radiated emissions bottom channel 852.5MHz 3GHz – 6GHz



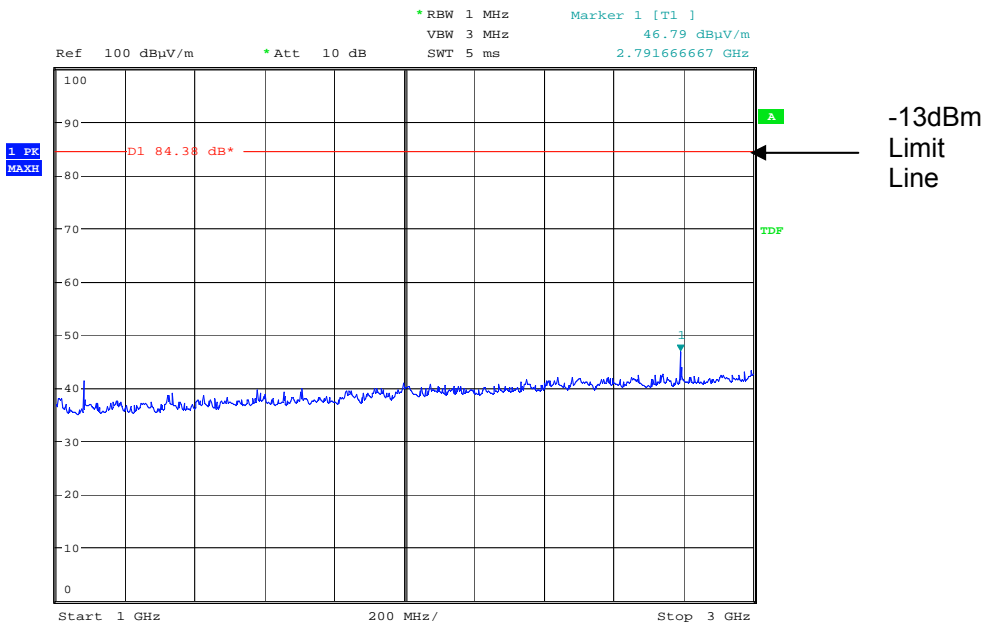
Date: 30.JUL.2008 10:00:24

Radiated emissions bottom channel 852.5MHz 6GHz – 9GHz



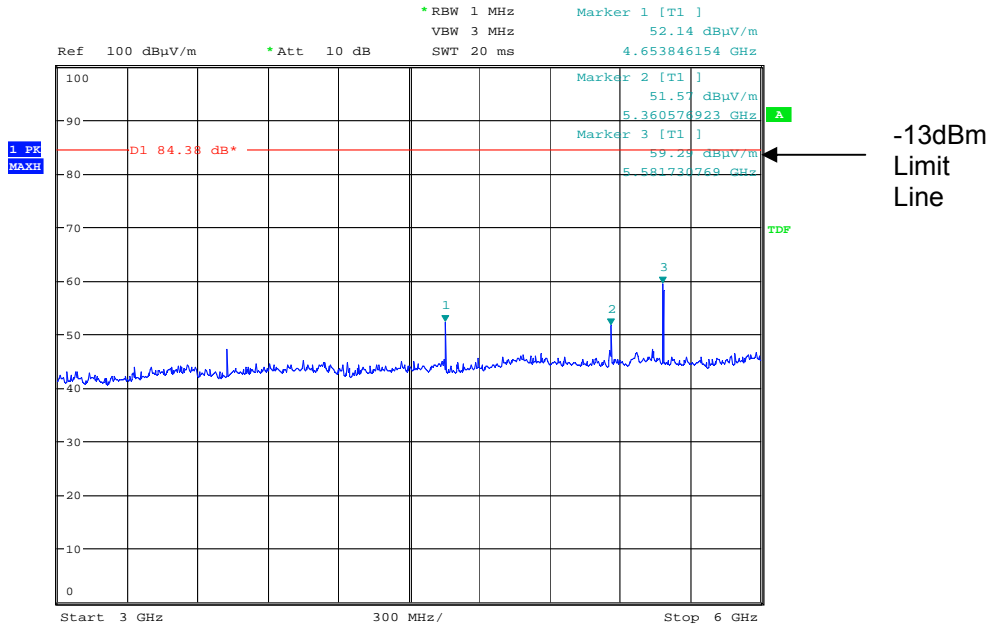
Date: 30.JUL.2008 10:01:28

Radiated emissions Middle channel 860.0125MHz 1GHz – 3GHz



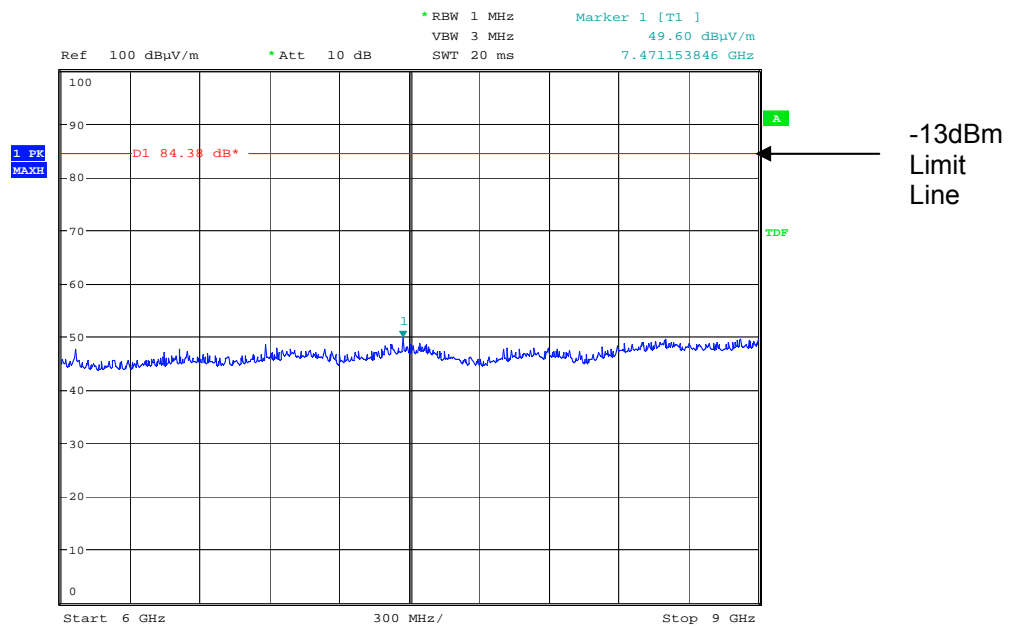
Date: 30.JUL.2008 10:09:58

Radiated emissions Middle channel 860.0125MHz 3GHz – 6GHz



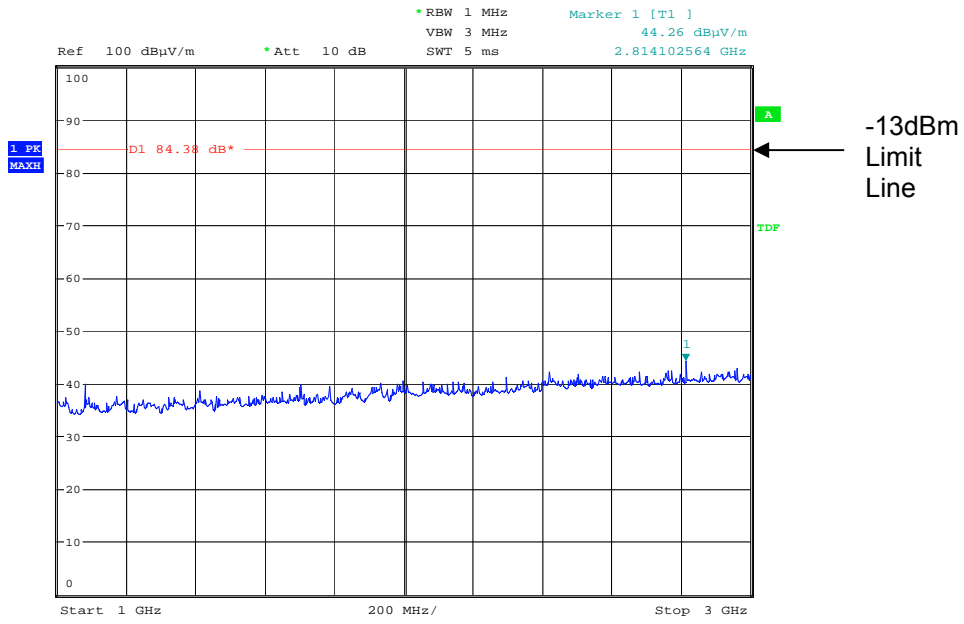
Date: 30.JUL.2008 10:13:10

Radiated emissions Middle channel 860.0125MHz 6GHz – 9GHz



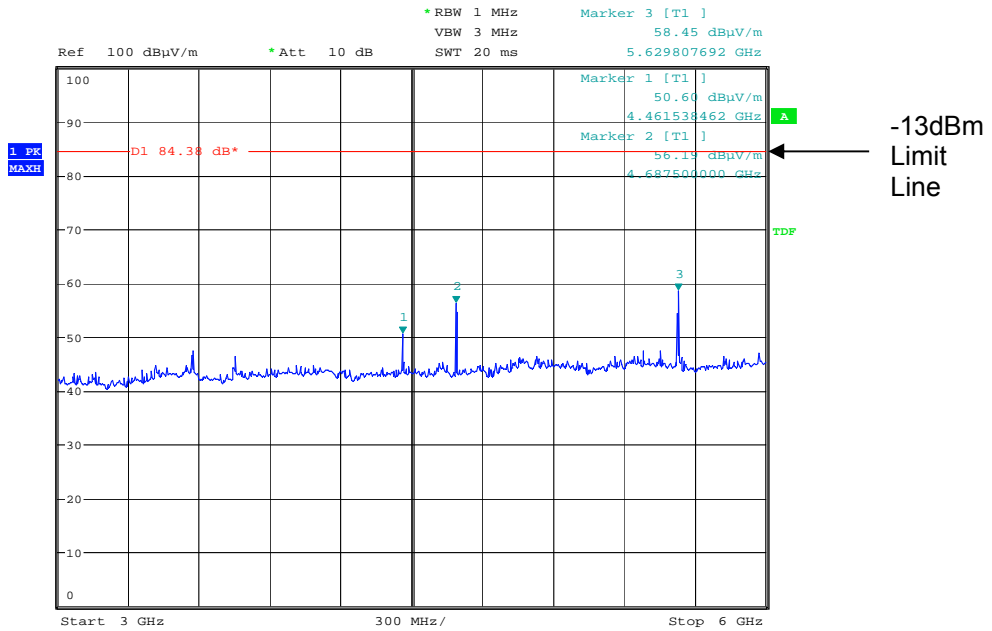
Date: 30.JUL.2008 10:11:33

Radiated emissions Top channel 867.5MHz 1GHz – 3GHz



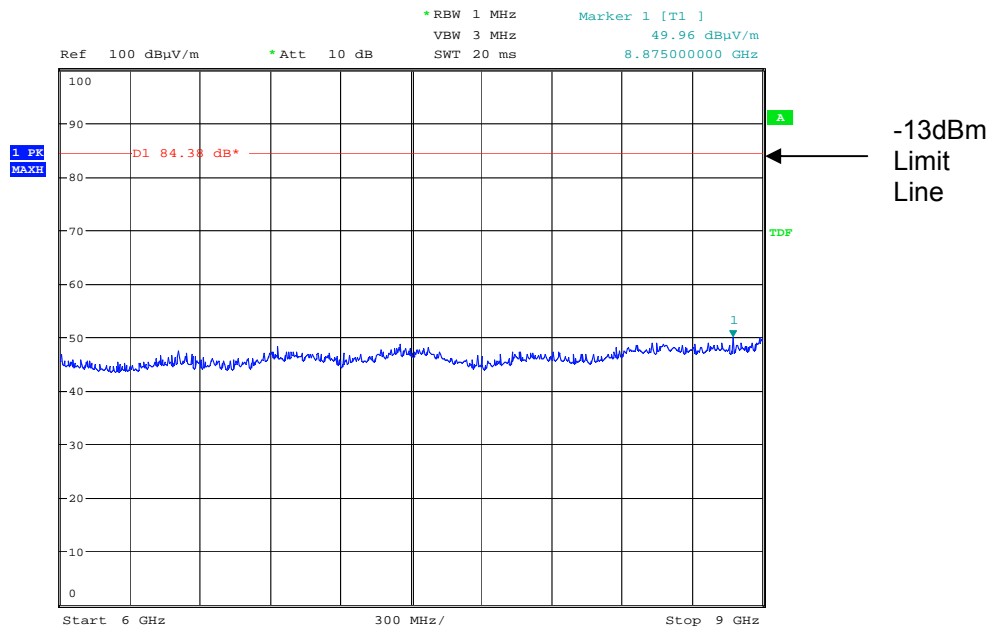
Date: 30.JUL.2008 10:18:34

Radiated emissions Top channel 867.5MHz 3GHz – 6GHz



Date: 30.JUL.2008 10:19:28

Radiated emissions Top channel 867.5MHz 6GHz – 9GHz



Date: 30.JUL.2008 10:19:55

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

ANNEX A
PHOTOGRAPHS



PHOTOGRAPH No. 2

TEST SETUP



ANNEX B
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	-		[X]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[]
e.	LABELLING	-	PHOTOGRAPHS	[X]
		-	DECLARATION	[X]
		-	DRAWINGS	[X]
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 C
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
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	15/01/2008	12	15/01/2009
UH093	Bilog Antenna	Chase	21/05/2007	24	21/05/2009
UH105	Signal Generator	Marconi	04/06/2008	12	04/06/2009
UH162	ERP Cable Cal	TRL	02/01/2007	12	02/01/2008
UH253	1m Cable N type	TRL	18/01/2008	12	20/01/2009
UH254	1m Cable N type	TRL	18/01/2008	12	20/01/2009
UH269	1m Cable N type	TRL	18/01/2008	12	20/01/2009
UH270	1m Cable N type	TRL	18/01/2008	12	20/01/2009
UH271	1.5m Cable N type	TRL	18/01/2008	12	20/01/2009
UH272	1.5m Cable N type	TRL	18/01/2008	12	20/01/2009
UH273	2m Cable N type	TRL	18/01/2008	12	20/01/2009
UH274	2m Cable N type	TRL	18/01/2008	12	20/01/2009
UH281	Spectrum Analyser	R&S	25/10/2007	12	25/10/2008
L005	CMTA	R&S	30/10/2007	12	30/10/2008
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	06/06/2008	12	06/06/2009
L220	Attenuator	Bird		Calibrate in Use	
L426	Temperature Indicator	Fluke	22/01/2008	12	22/01/2009
L479	Analyser	Anritsu	11/12/2007	12	11/12/2008
L572	Pre Amplifier	HP		Calibrate in Use	
TRL254	Signal Generator	Marconi	04/06/2008	12	04/06/2009
TRL225	Attenuator	Spinner		Calibrate in Use	
TRL246	Attenuator	Bird		Calibrate in Use	
UH191	Bilog Antenna	Chase	11/08/2006	24	11/08/2008

ANNEX D
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%**