



TRL Compliance
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**REPORT ON THE CERTIFICATION TESTING OF A
60 - 174303 Amplifier
60 - 174203 Amplifier
60 - 214802 Amplifier
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: RU1495/8715
COPY NO: 1
ISSUE NO: 1
FCC ID: NEO60-2148SERIES

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60 - 174303 Amplifier
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60 - 214802 Amplifier
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:

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

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CONTENTS

	PAGE		
CERTIFICATE OF CONFORMITY & COMPLIANCE	3		
APPLICANT'S SUMMARY	4		
EQUIPMENT TEST CONDITIONS	5		
TESTS REQUIRED	5		
TEST RESULTS	7-98		
		ANNEX	
PHOTOGRAPHS		A	
PHOTOGRAPH No. 1: Test setup			
PHOTOGRAPH No. 2: Test setup			
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST		B	
EQUIPMENT CALIBRATION		C	
MEASUREMENT UNCERTAINTY		D	
 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: NEO60-2148SERIES

PURPOSE OF TEST: Certification

TEST SPECIFICATION: FCC RULES CFR 47, Part 90 Subpart I

TEST RESULT: Compliant to Specification

EQUIPMENT UNDER TEST: 60 – 174303 Full testing 60 – 174203 Radiated emissions 60 – 214802 Radiated emissions

EQUIPMENT TYPE: Private Land Mobile Repeater

MAXIMUM GAIN: 60 – 174303 Uplink 57.35dB
Downlink 56.41dB

MAXIMUM INPUT: 60 – 174303 Uplink -25.52dBm
Downlink -23.76dBm

MAXIMUM OUTPUT CONDUCTED: 60 – 174303 Uplink 31.83dBm
Downlink 32.38dBm

CHANNEL SPACING: Not Applicable, Wideband

FREQUENCY GENERATION: N/A

MODULATION TYPE: F3E

POWER SOURCE(s): +12Vdc

TEST DATE(s): 25th – 29th 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 -174303

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

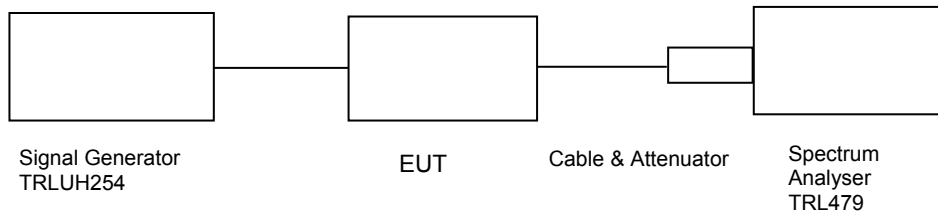
TEST REPORT No: RU1495/8715

COMPLIANCE TESTS

AMPLIFIER GAIN – CONDUCTED – PART 2.1046 – UPLINK

Ambient temperature = 27°C
 Relative humidity = 55%
 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
806.0	-25.5	0.22	50.0	-19.17	56.55	30.83	47.82
815.0	-25.3	0.22	50.0	-18.17	57.35	31.83	49.02
824.0	-25.4	0.22	50.0	-19.20	56.42	30.80	47.75

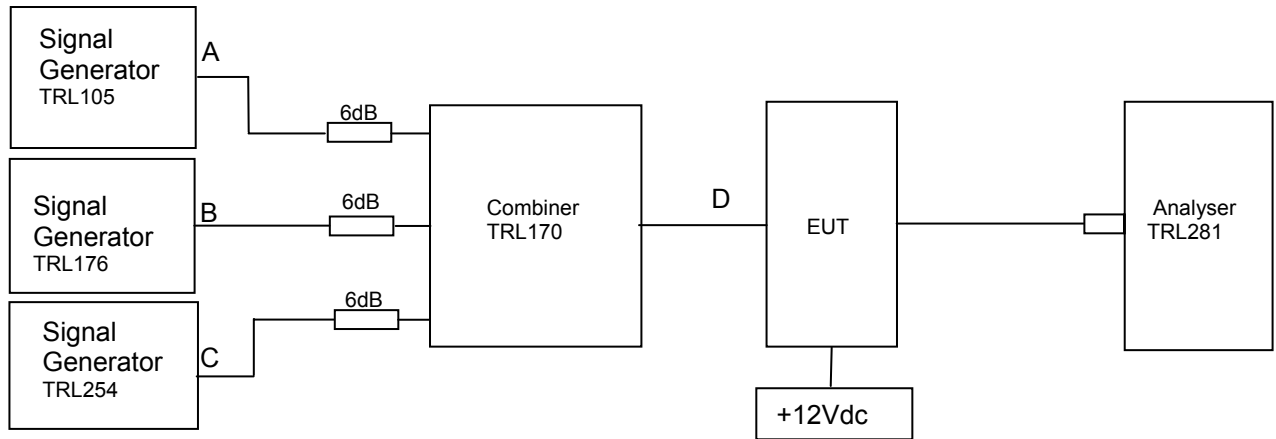
Notes: 1. The signal generator input was increased by 10dBs and the level of the output signal remeasured.

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 = 26°C
 Relative humidity = 63%
 Supply voltage = +12Vdc

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 signal input power level was adjusted until the amplifier reached the +1dB compression point across the three carriers, the signal input power level was then increased by 10dB. The cable and attenuator loss between the EUT and the spectrum analyser was 40.0 dB.

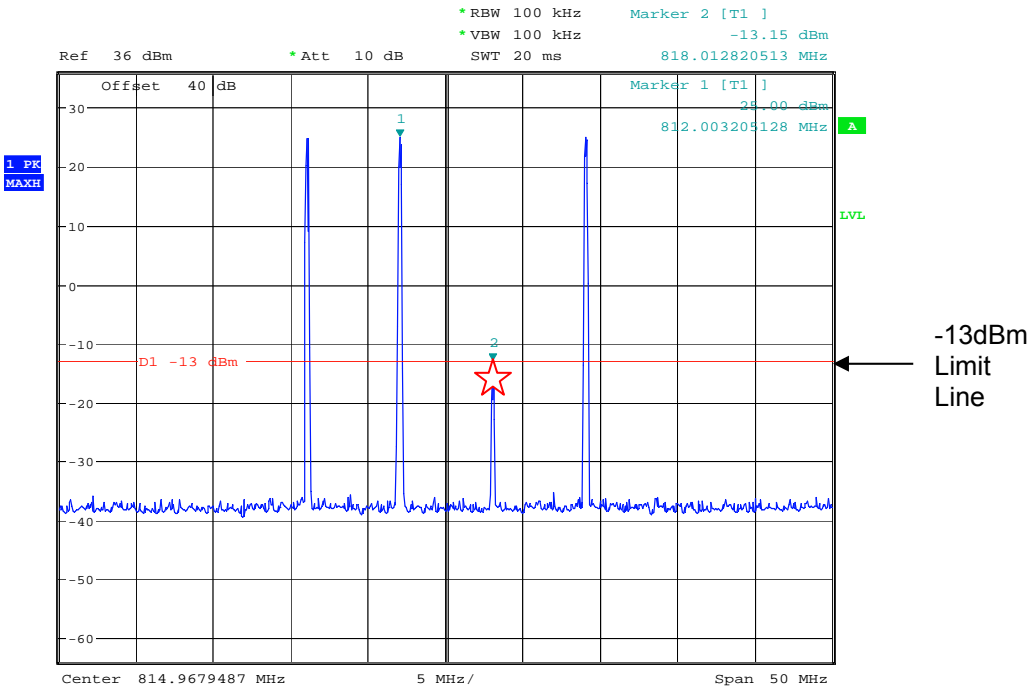
RF Input Frequency (MHz)			Highest Intermodulation Product Level (dBm)	Limit (dBm)
806.0	815.0	824.0	-13.15dBm@817.9967MHz	-13

Sweep data is shown on the next page:

Test equipment used for intermodulation test

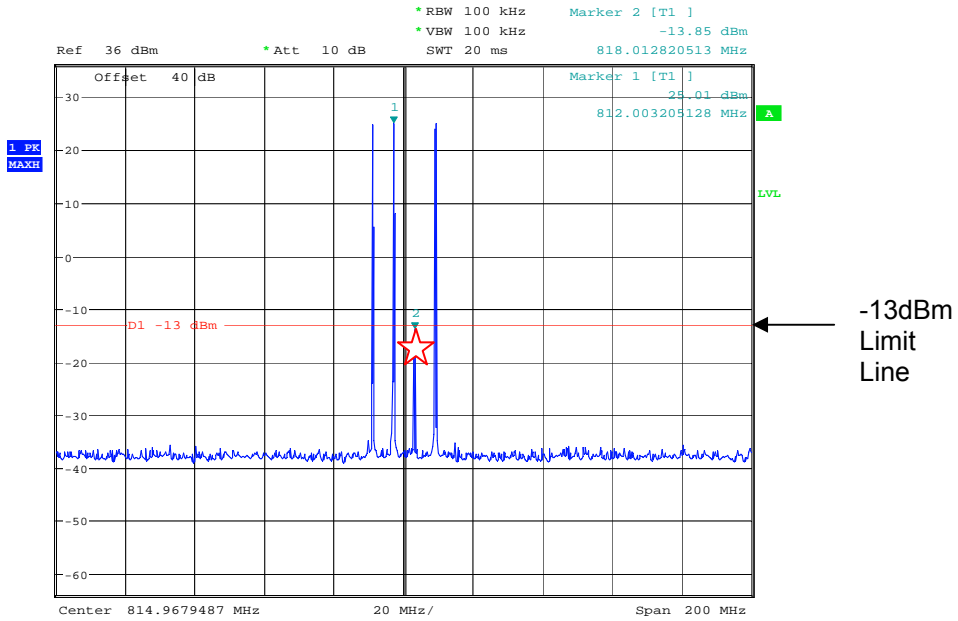
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
SIGNAL GENERATOR	MARCONI	2023	112224/040	UH105	X
CMTA	ROHDE & SCHWARZ	CMTA52	894715/033	05	
COMBINER	ELCOM	RC-4-50	N/A	170	X
ATTENUATOR	BIRD	8308-200-N	N/A	103	X
ATTENUATOR	SPINNER	745357	D57224	225	X

Intermodulation inband

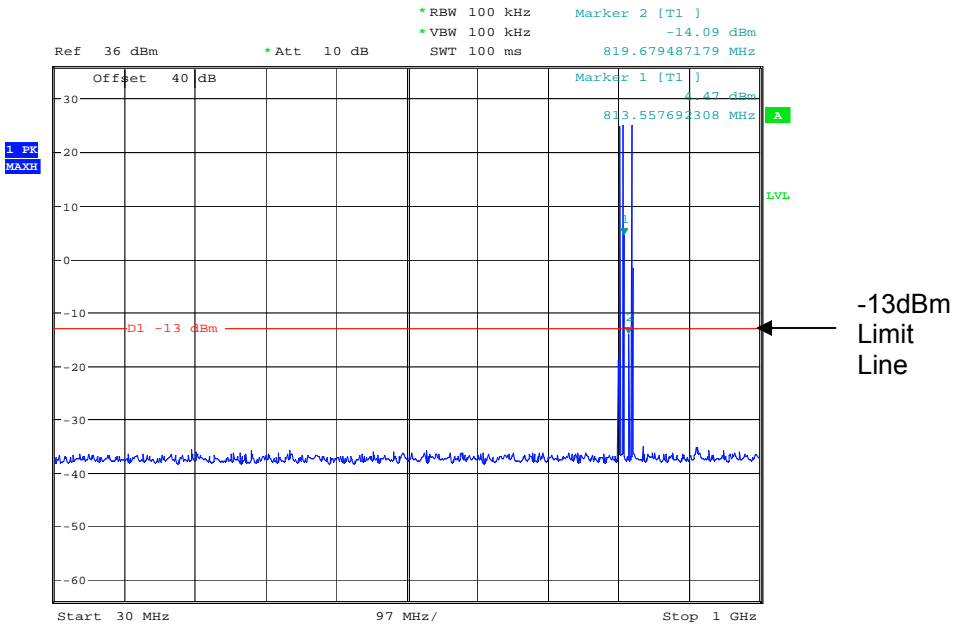


Date: 28.JUL.2008 16:56:08

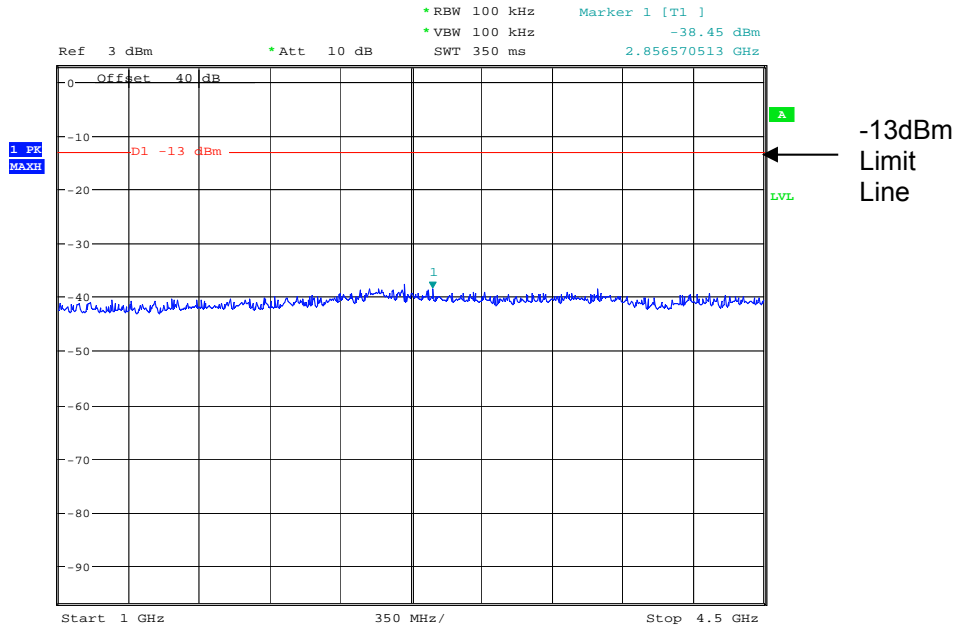
Intermodulation Wideband



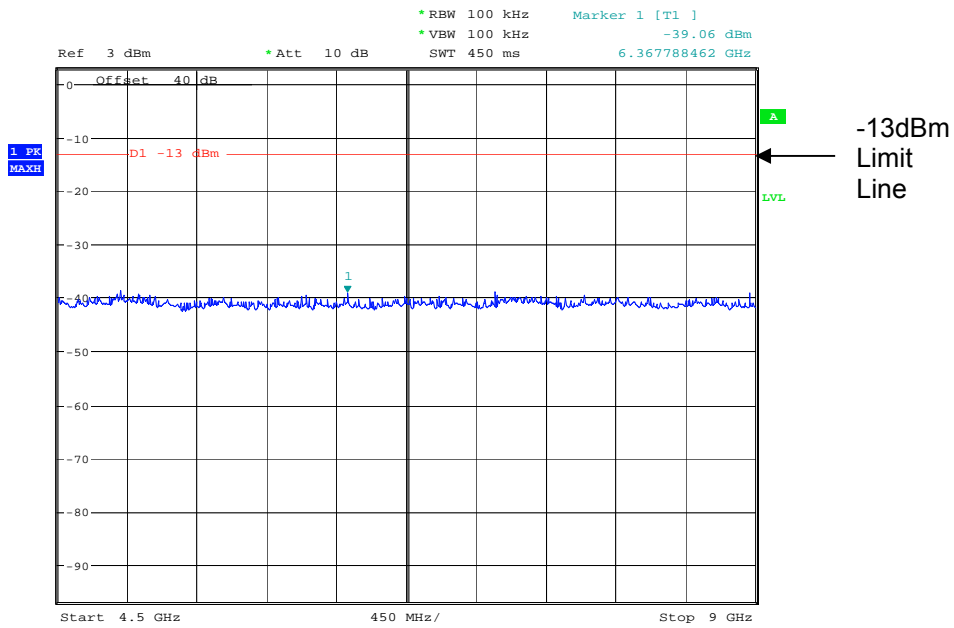
Date: 28.JUL.2008 16:56:46



Date: 28.JUL.2008 16:57:44



Date: 28.JUL.2008 16:58:29



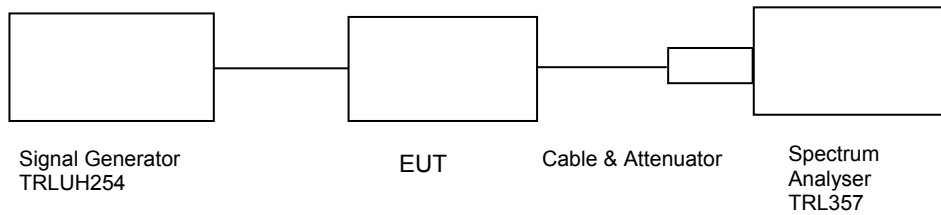
Date: 28.JUL.2008 16:59:18

TRANSMITTER TESTS

AMPLIFIER MODULATED CHANNEL TEST – CONDUCTED – Part 2.1049– UPLINK

Ambient temperature = 23°C
 Relative humidity = 63%
 Supply voltage = +12Vdc
 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 (-15.3dBm) 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.

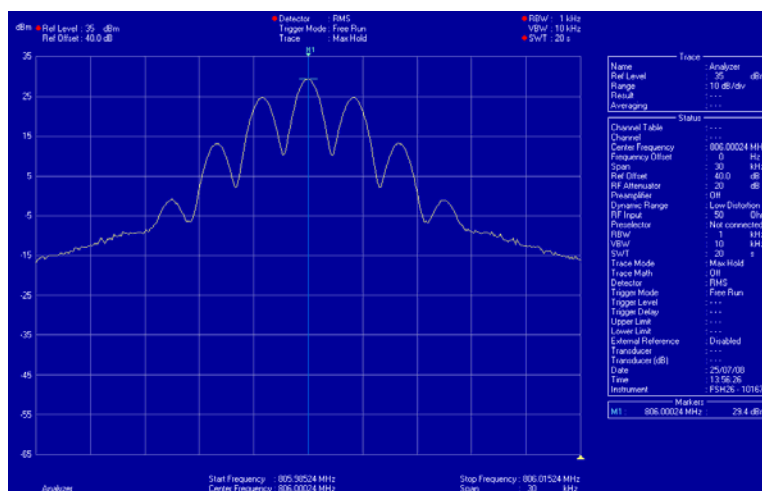
Note: The cables and attenuators had the following losses.

1. Cable and attenuator between EUT and spectrum analyser 40.0dB
2. Cable between signal generator and EUT 0.22dB

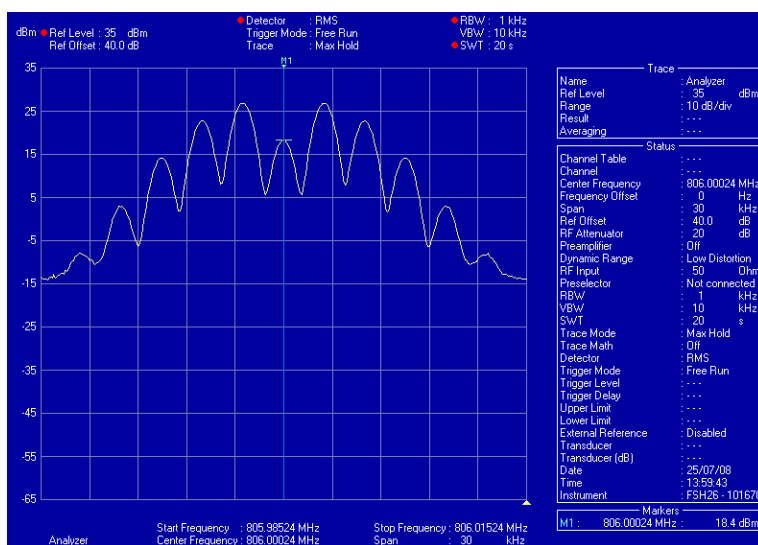
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	
ATTENUATOR	SPINNER	745357	D57224	225	X
ATTENUATOR	BIRD	8308-200-N	N/A	103	X
ATTENUATOR	BIRD	8304-100-N	N/A	222	
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
SPECTRUM ANALYSER	R&S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

800MHz Amplifier uplink

Bottom channel 806.0MHz Signal Generator and EUT, deviation set to 2.5kHz

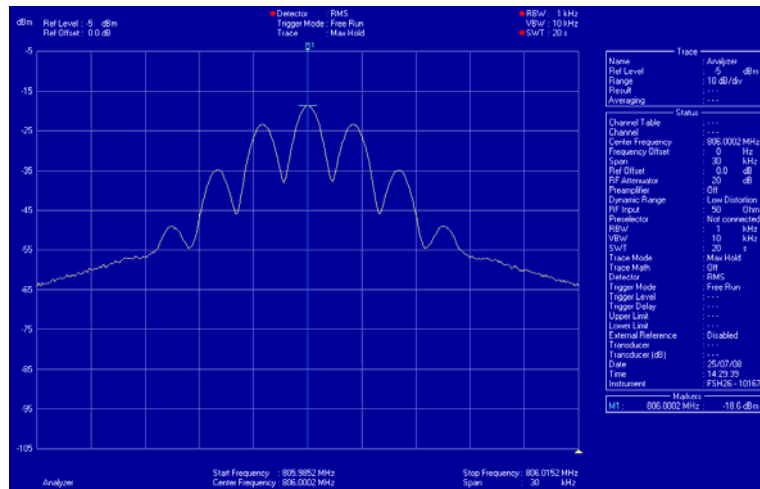


Bottom channel 806.0MHz Signal Generator and EUT, deviation set to 5kHz

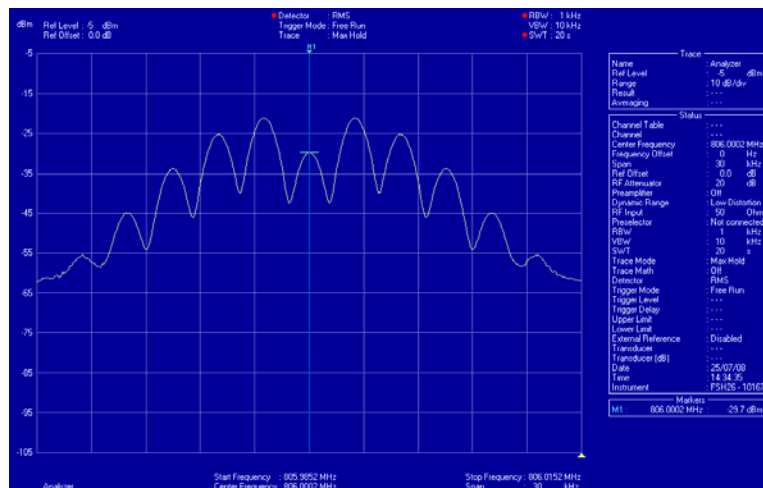


The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

Bottom channel 806.0MHz Signal Generator only, deviation set to 2.5kHz

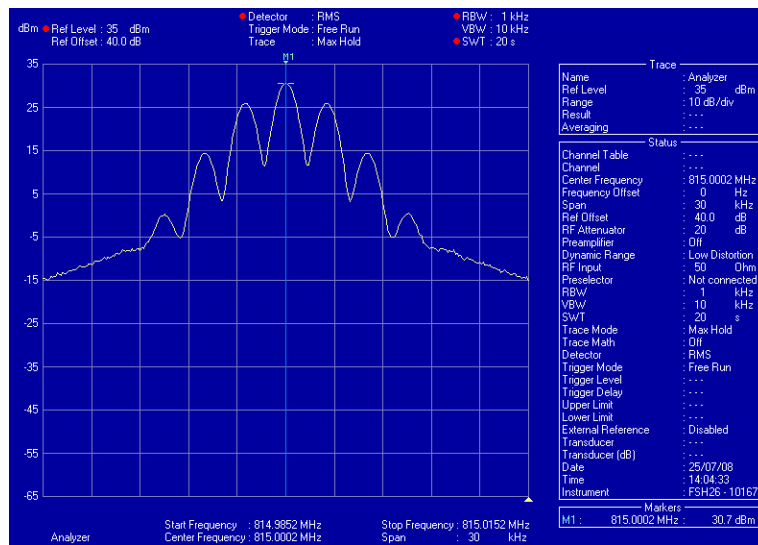


Bottom channel 806.0MHz Signal Generator only, deviation set to 5.0kHz

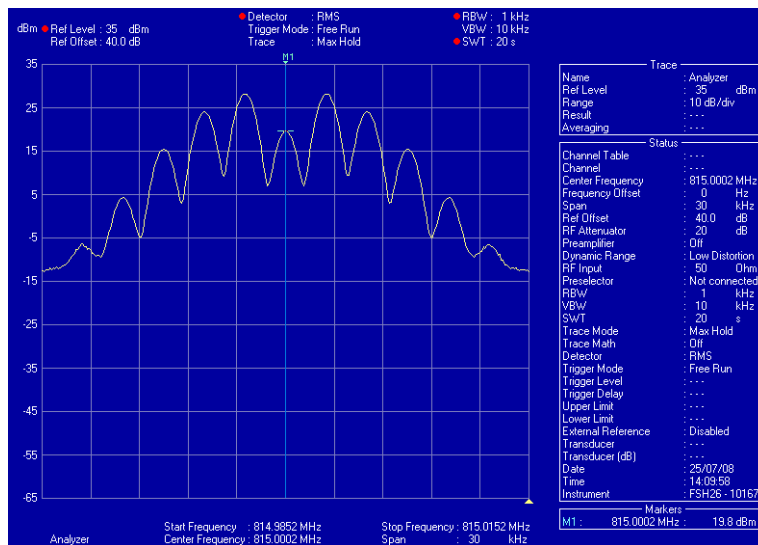


The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

Middle channel 815.0MHz Signal Generator and EUT, deviation set to 2.5kHz

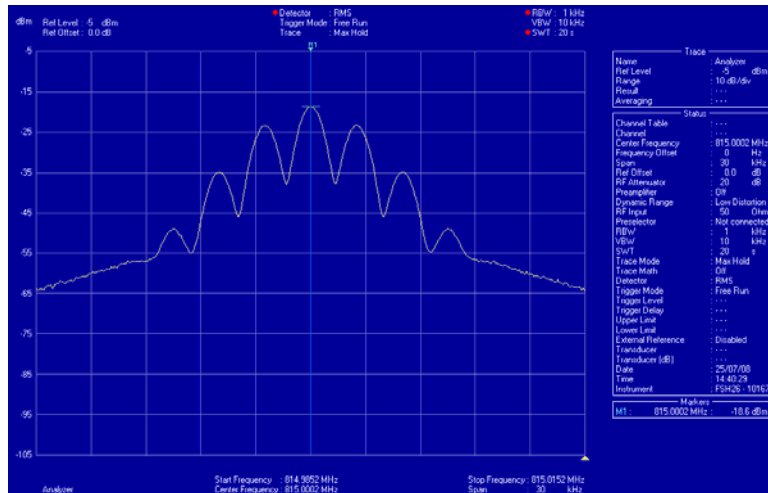


Middle channel 815.0MHz Signal Generator and EUT, deviation set to 5kHz

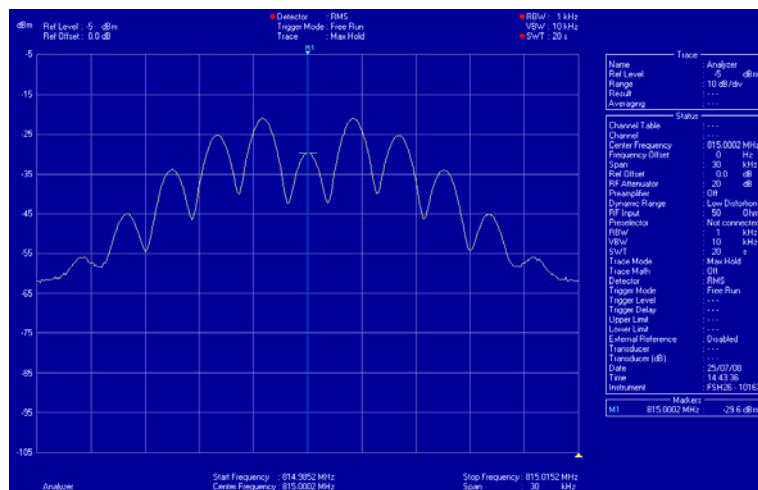


The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

Middle channel 815.0MHz Signal Generator, deviation set to 2.5kHz

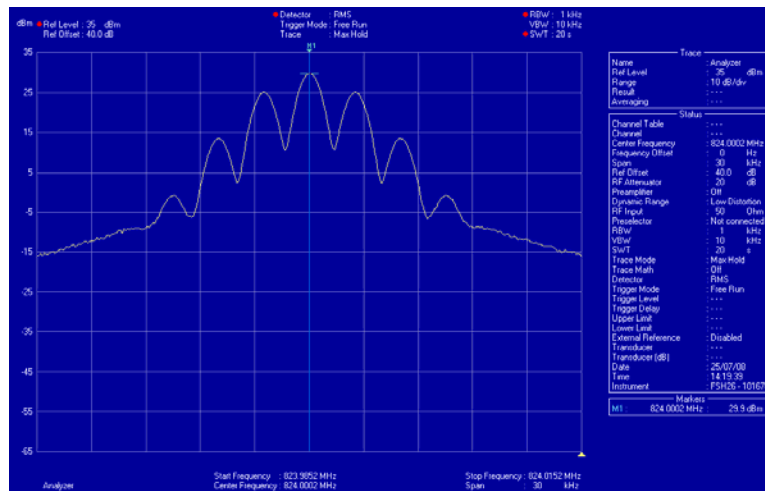


Middle channel 815.0MHz Signal Generator, deviation set to 5kHz

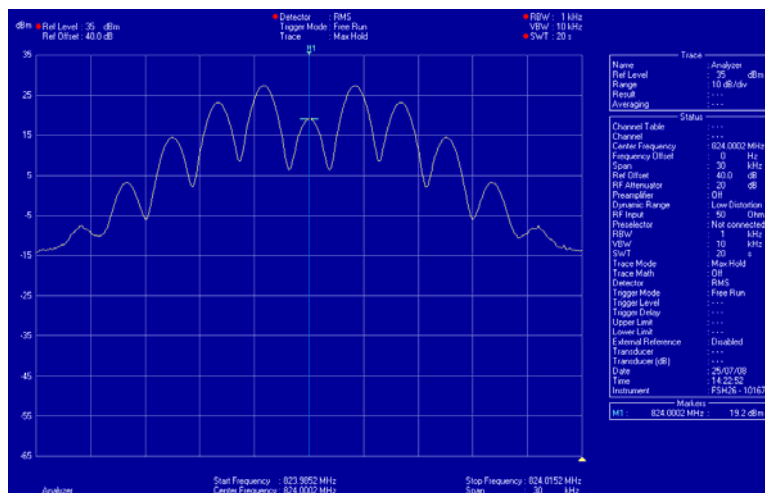


The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

Top channel 824.0MHz Signal Generator and EUT, deviation set to 2.5kHz

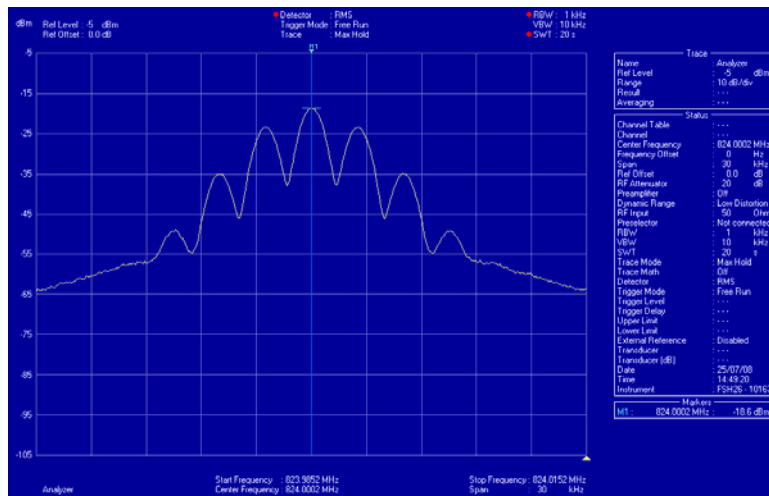


Top channel 824.0MHz Signal Generator and EUT, deviation set to 5kHz

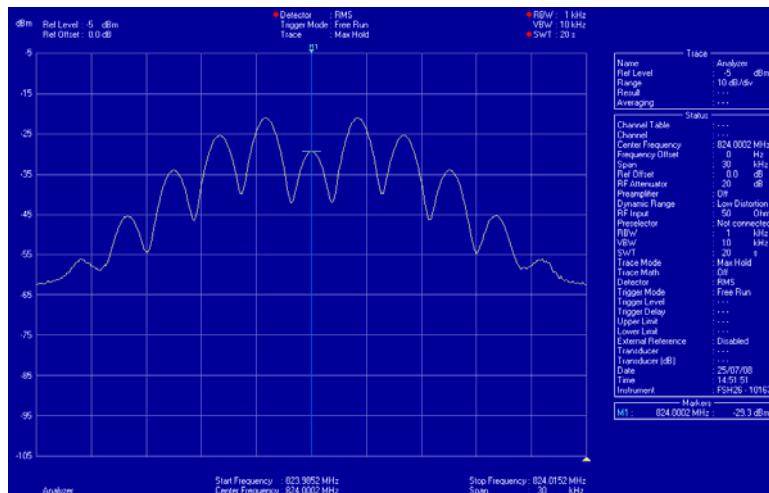


The above plots depicting the output wavsshape show no measurable distortion visible when compared to the input signal.

Top channel 824.0MHz Signal Generator, deviation set to 2.5kHz



Top channel 824.0MHz Signal Generator, deviation set to 5kHz



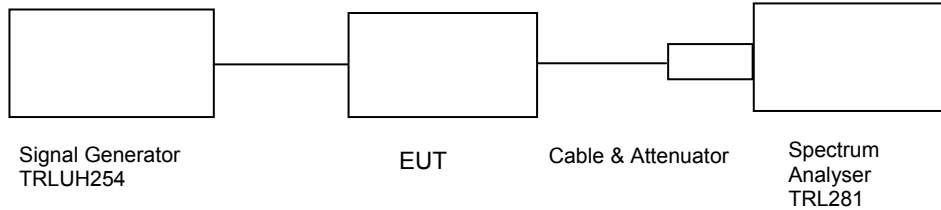
The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – CONDUCTED – Part 2.1053 – UPLINK

Ambient temperature = 23°C
 Relative humidity = 63%
 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 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

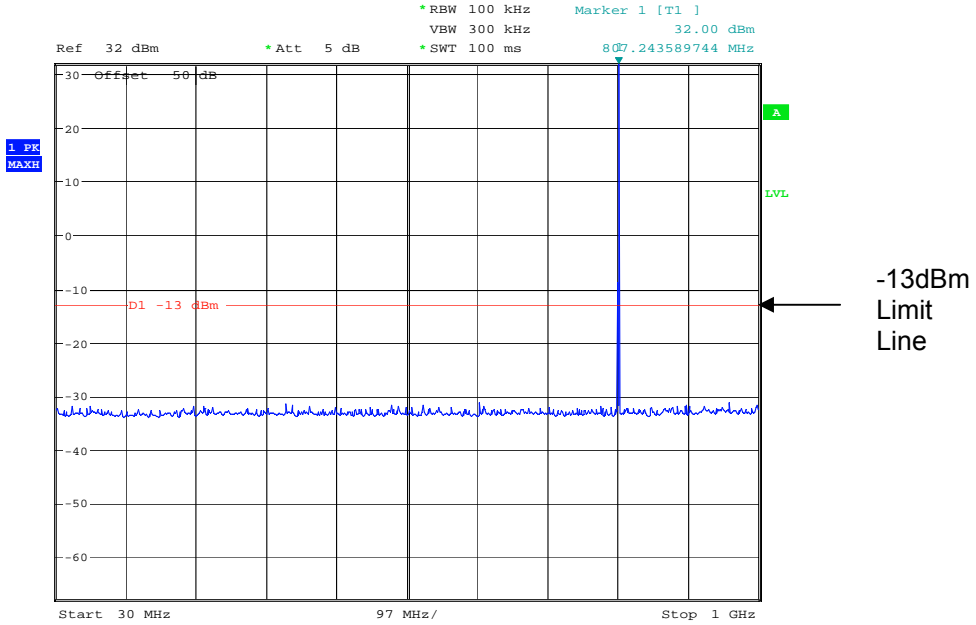
FREQUENCY RANGE	FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTENUATOR & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
0Hz – 9GHz	No Significant Emissions Within 20 dB of the Limit				-13

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

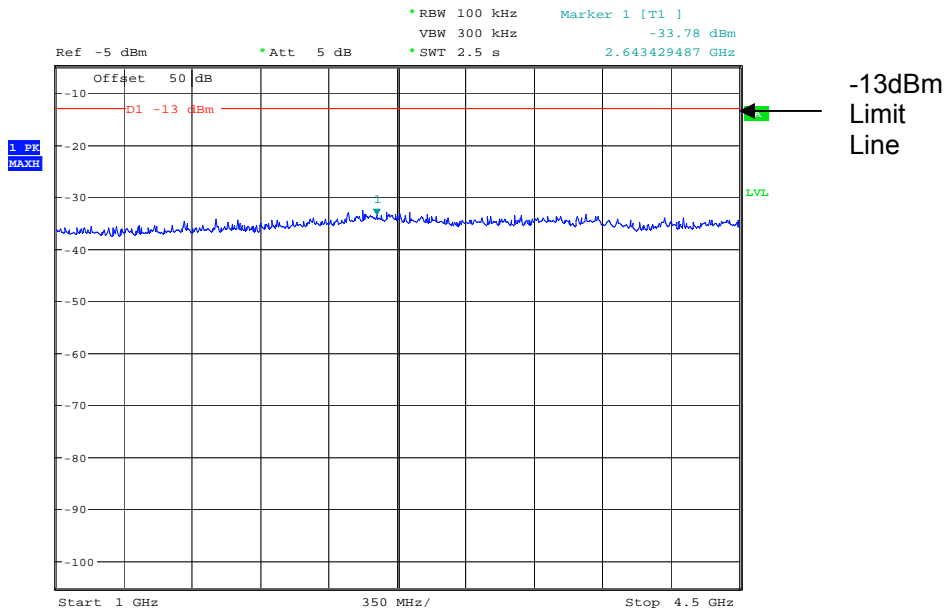
800MHz Amplifier uplink

Conducted emissions bottom channel 806.0MHz 30MHz – 1GHz



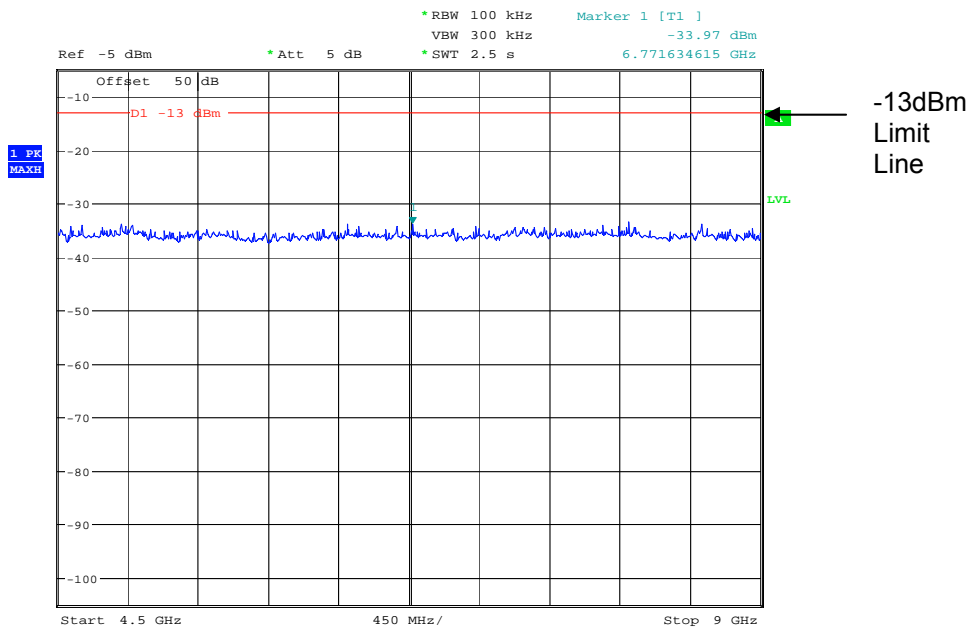
Date: 28.JUL.2008 10:14:49

Conducted emissions bottom channel 806.0MHz 1 – 4.5GHz



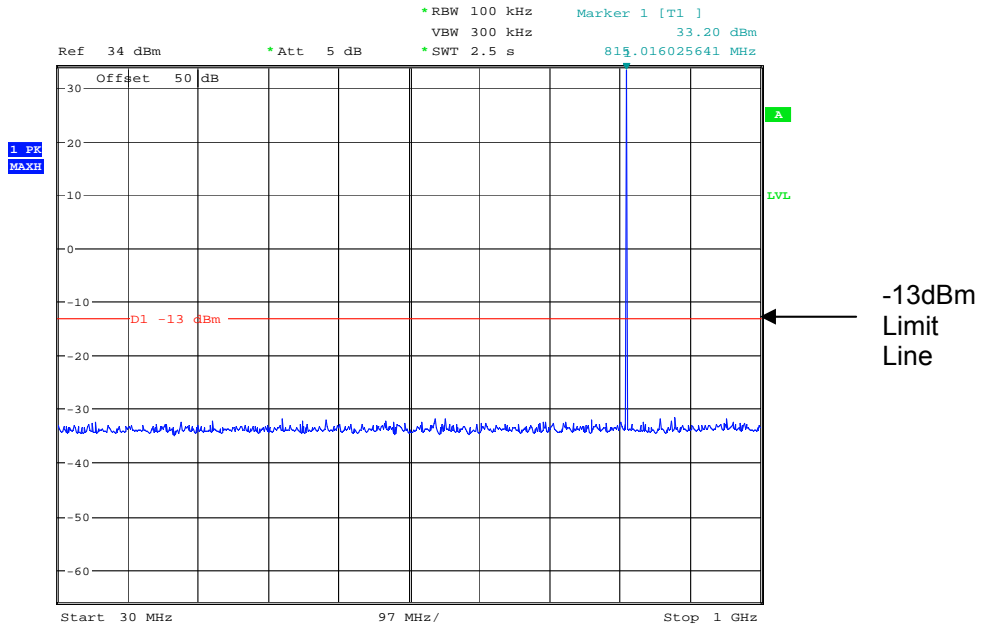
Date: 28.JUL.2008 10:17:09

Conducted emissions bottom channel 806.0MHz 4.5 -9GHz



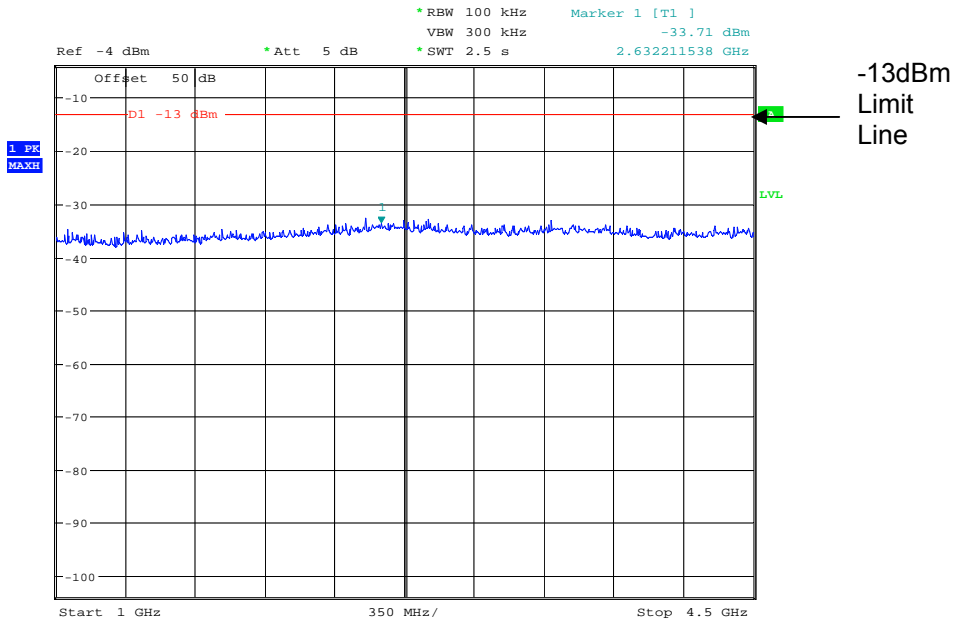
Date: 28.JUL.2008 10:18:01

Conducted emissions Middle channel 815.0MHz 30MHz – 1GHz



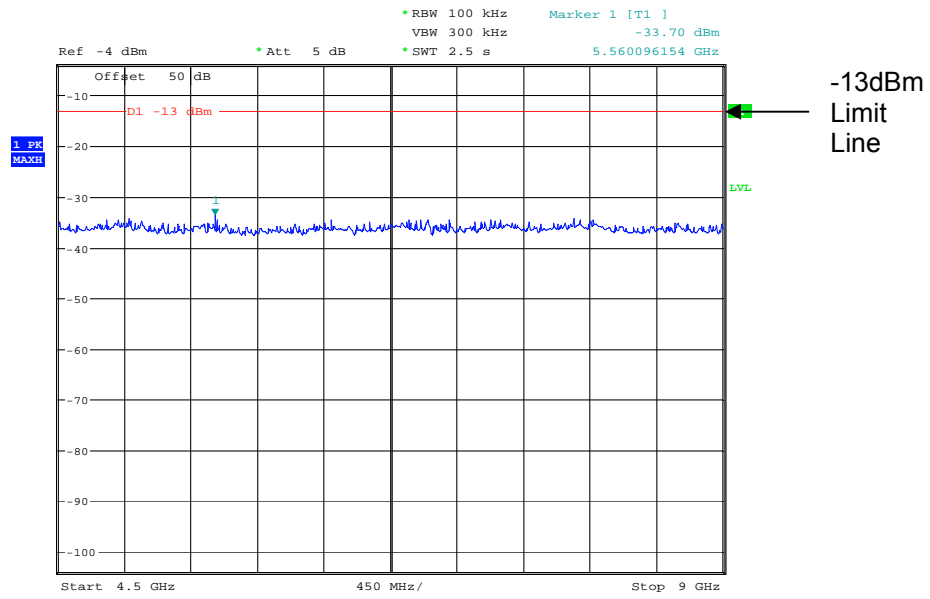
Date: 28.JUL.2008 10:20:26

Conducted emissions Middle channel 815.0MHz 1 – 4.5GHz



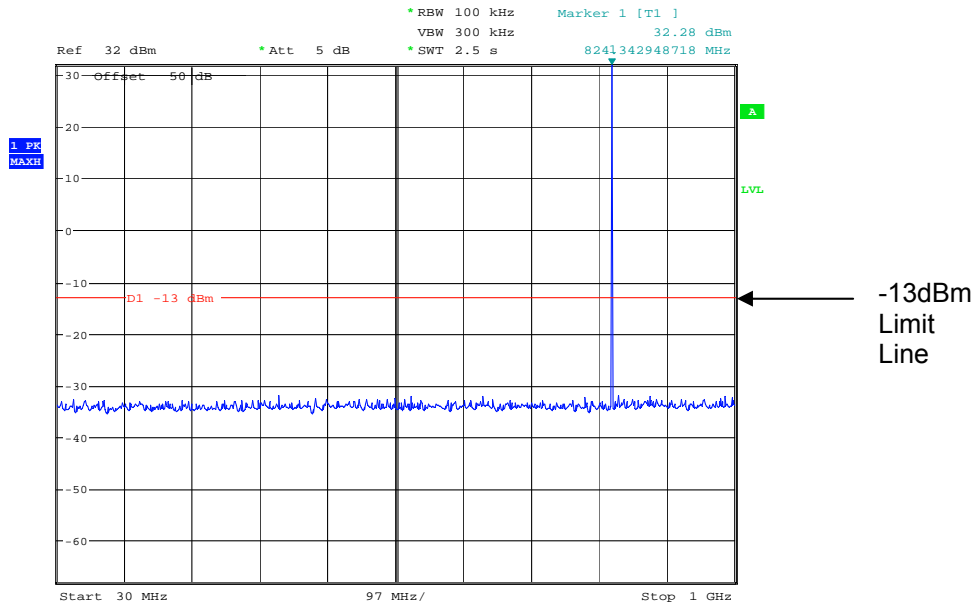
Date: 28.JUL.2008 10:21:46

Conducted emissions Middle channel 815.0MHz 4.5 – 9GHz



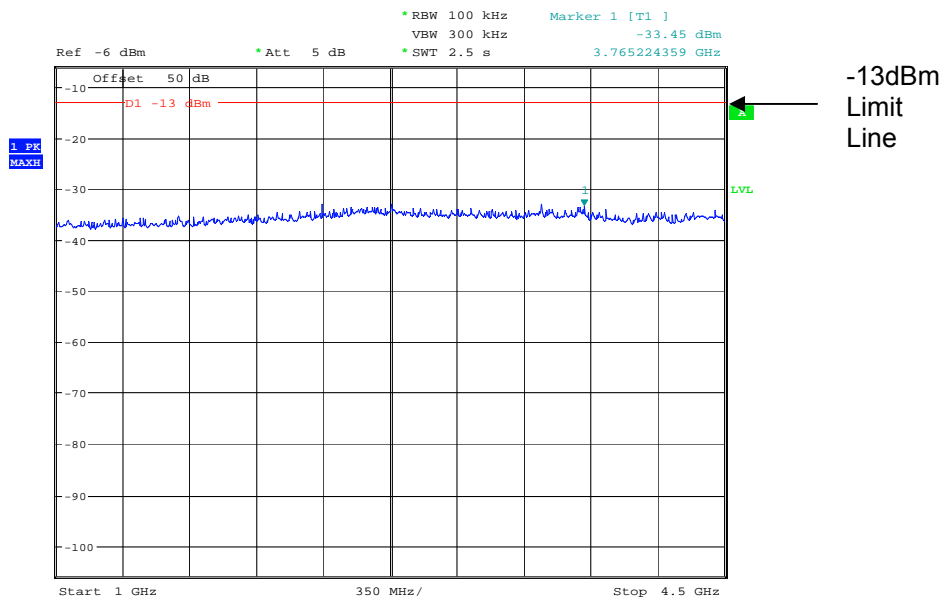
Date: 28.JUL.2008 10:22:25

Conducted emissions Top channel 824.0MHz 30MHz – 1GHz



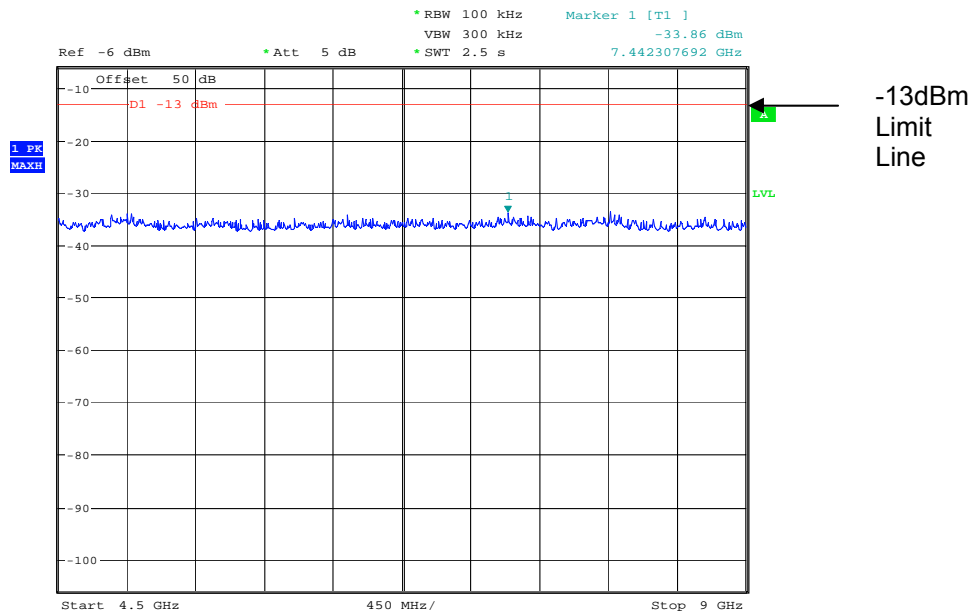
Date: 28.JUL.2008 10:25:03

Conducted emissions Top channel 824.0MHz 1GHz – 4.5GHz



Date: 28.JUL.2008 10:25:59

Conducted emissions Top channel 824.0MHz 4.5 – 9GHz



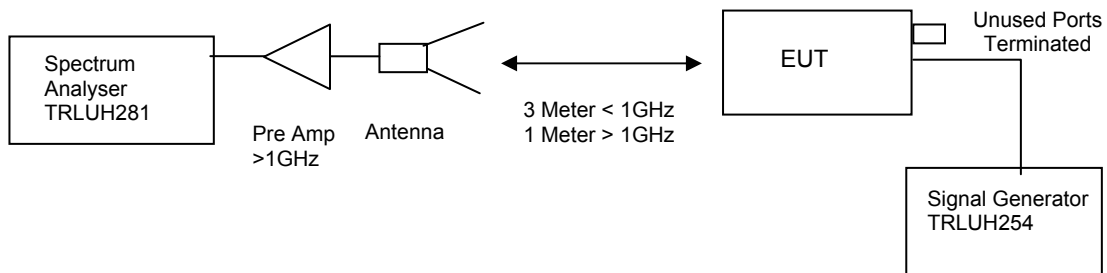
Date: 28.JUL.2008 10:26:45

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 60 – 174303 unit

Ambient temperature = 23°C Test Signal = F3E
 Relative humidity = 62%
 Conditions = OATS
 Supply voltage = +12Vdc
 Supply Frequency = N/A



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

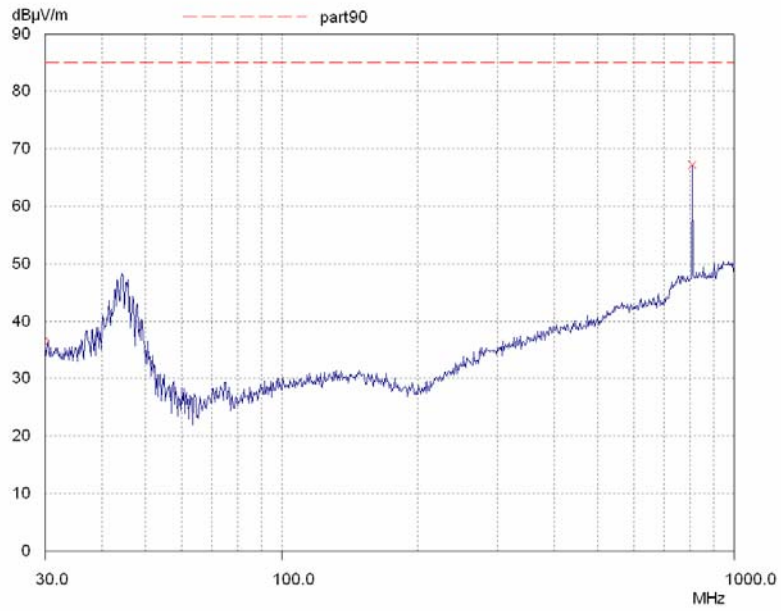
FREQUENCY RANGE	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	CALCULATED EIRP (dBm)	LIMIT (dBm)
30MHz – 9GHz	No Significant Emissions Within 20 dB of the Limit						-13dBm

The test equipment used for the Transmitter Spurious Emissions:

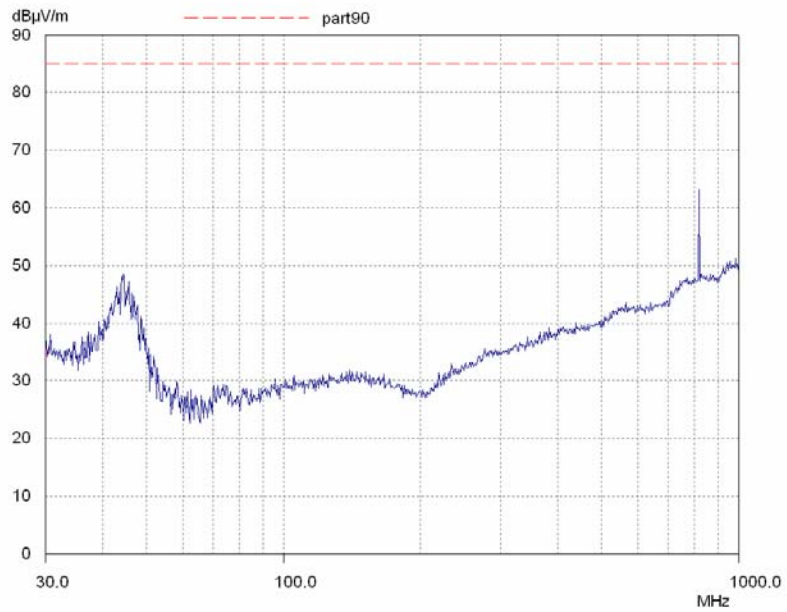
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
RECEIVER	R&S	ESVS10	825892/006	TRL04	X
HORN	EMCO	3115	9010-3580	138	X
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
PRE AMPLIFIER	HP	8449B	3008A016	572	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
ANTENNA	YORK	CBL611/A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

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– UPLINK 30-1GHz SCAN 60 - 174303

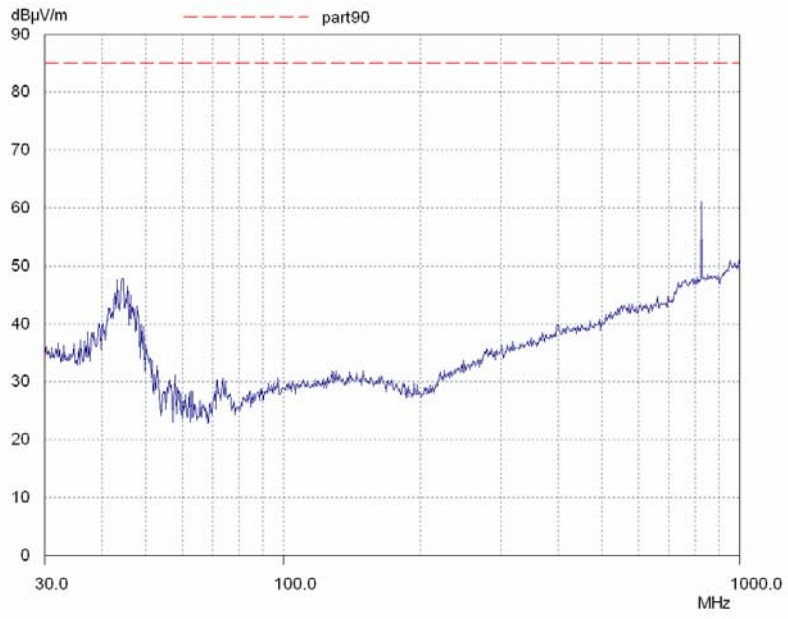
Bottom Channel 30MHz – 1GHz



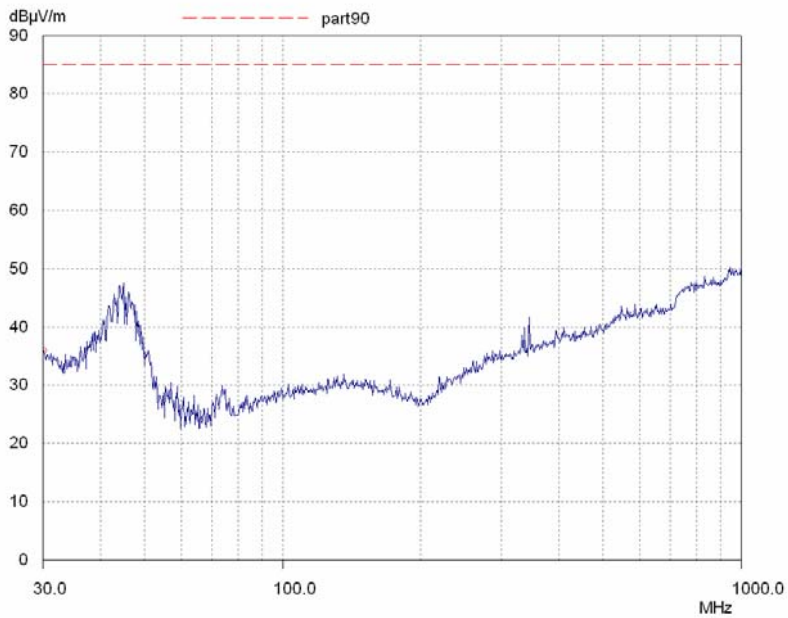
Middle Channel 30MHz – 1GHz



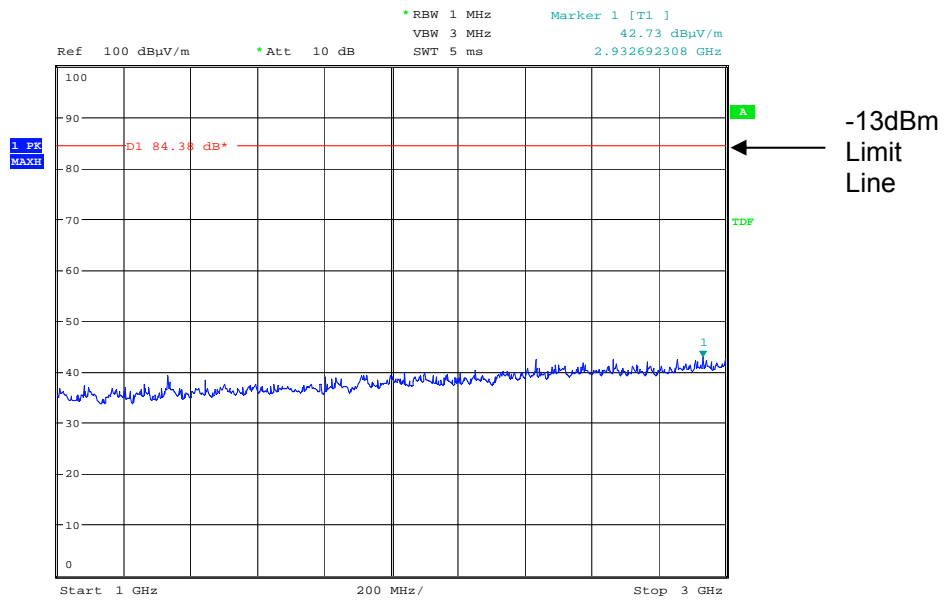
Top Channel 30MHz – 1GHz



No signal, input terminals terminated into 50Ω 30MHz – 1GHz

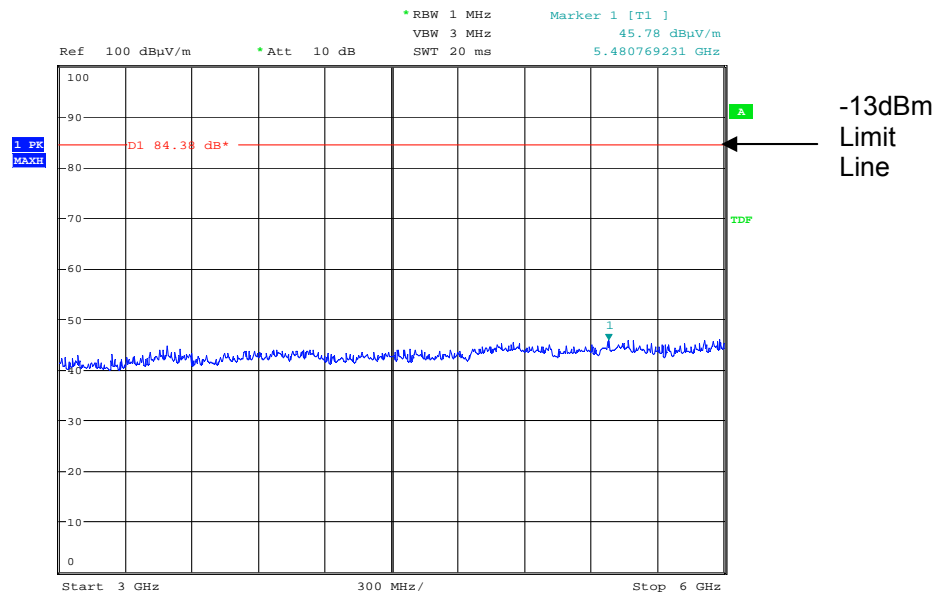


Radiated emissions bottom channel 806.0MHz 1 – 3GHz



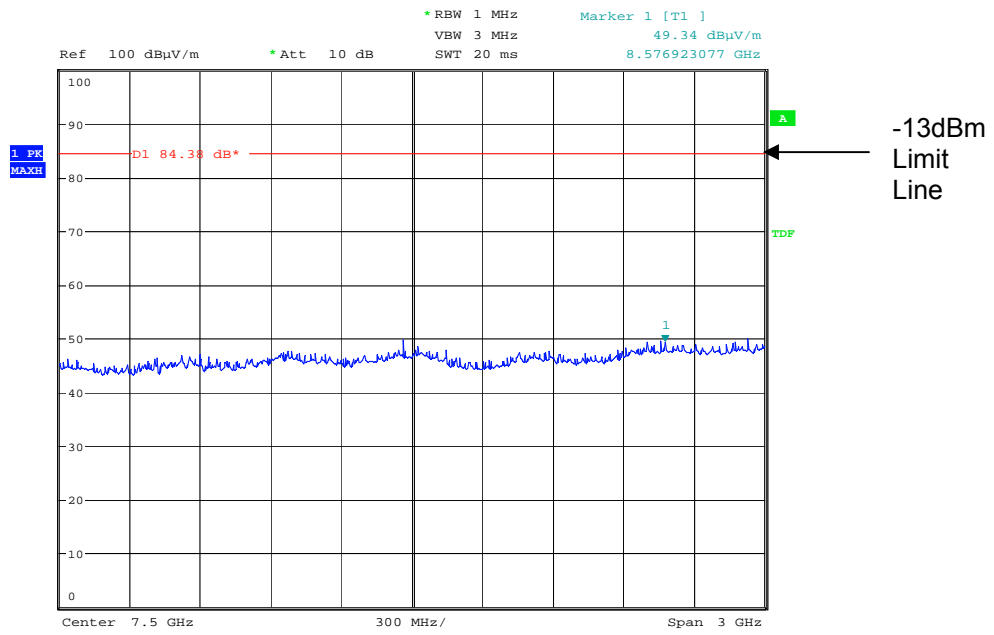
Date: 29.JUL.2008 16:40:15

Radiated emissions bottom channel 806.0MHz 3 – 6GHz



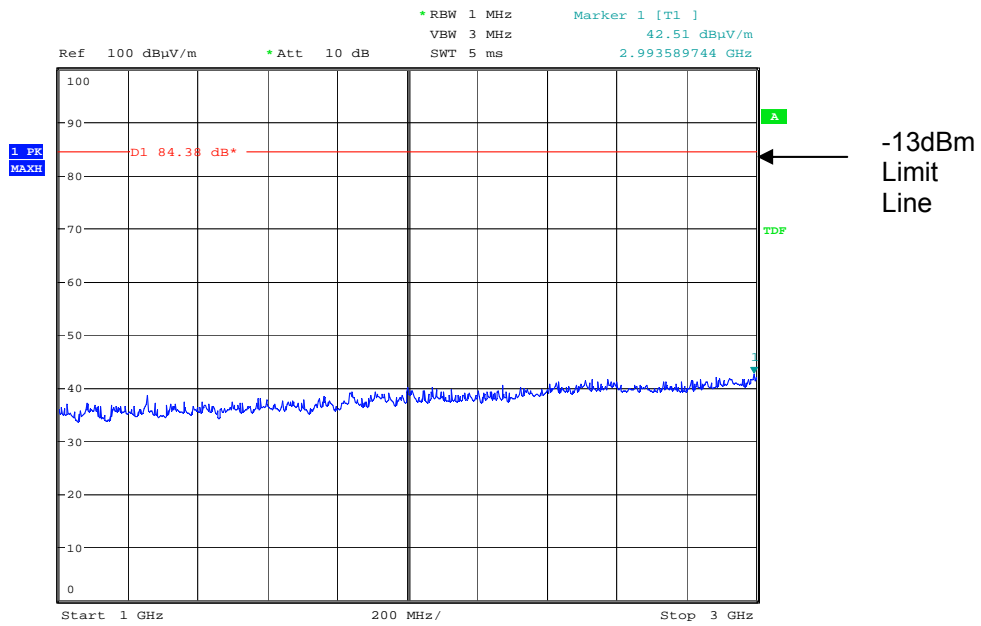
Date: 29.JUL.2008 16:40:32

Radiated emissions bottom channel 806.0MHz 3 – 9GHz



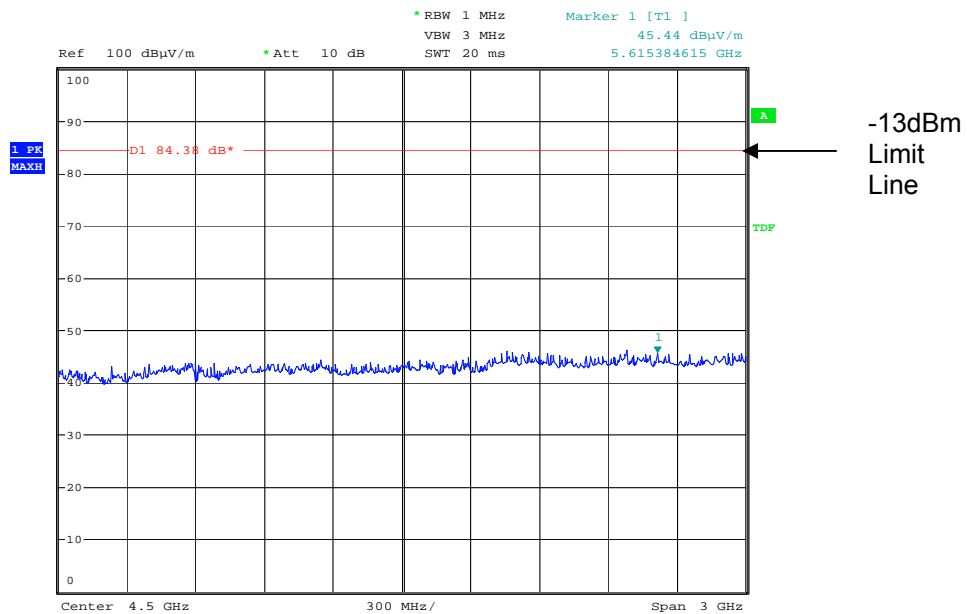
Date: 29.JUL.2008 16:40:54

Radiated emissions middle channel 815.0MHz 1 – 3GHz



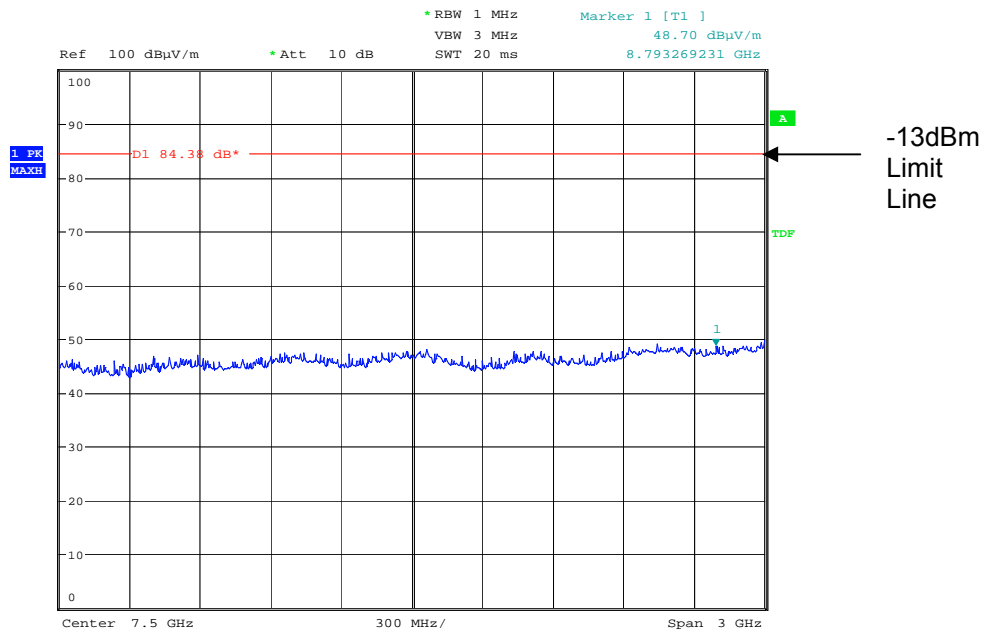
Date: 29.JUL.2008 16:39:52

Radiated emissions middle channel 815.0MHz 3 – 6GHz



Date: 29.JUL.2008 16:39:34

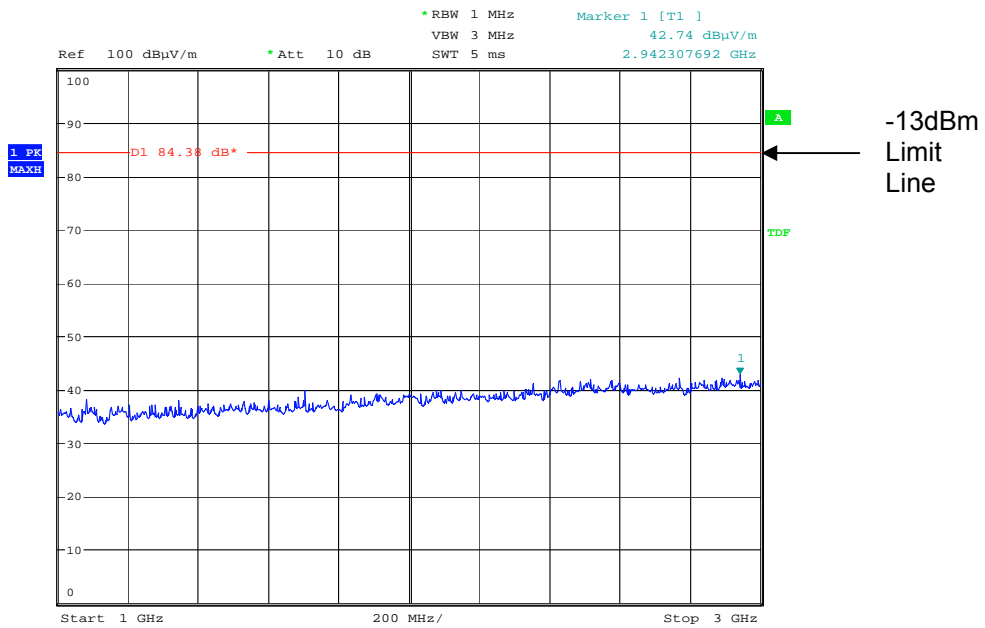
Radiated emissions middle channel 815.0MHz 6 – 9GHz



Date: 29.JUL.2008 16:39:13

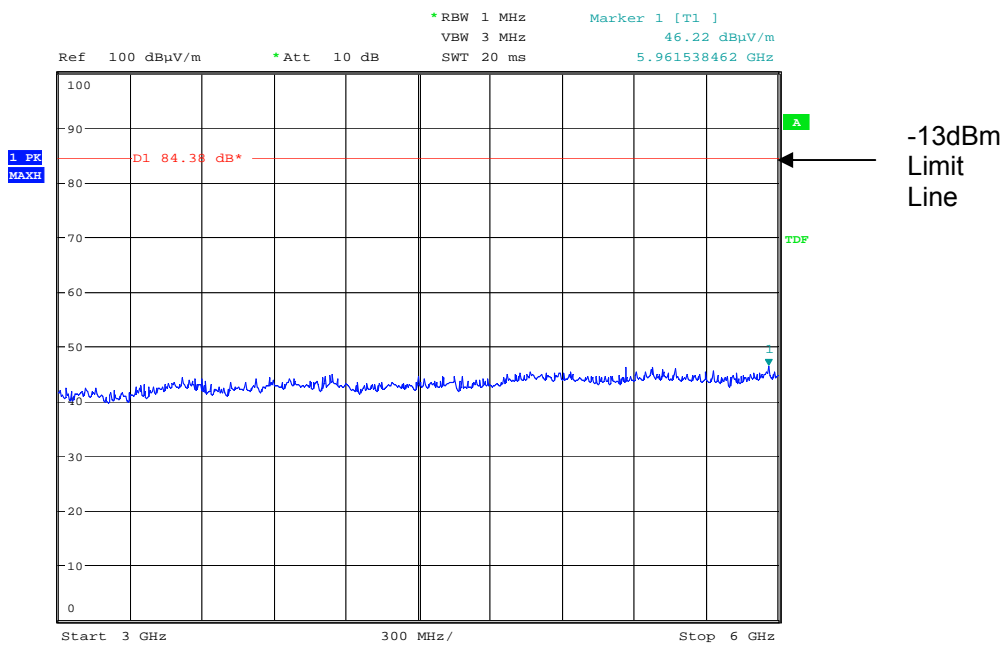
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions Top channel 824.0MHz 1 – 3GHz



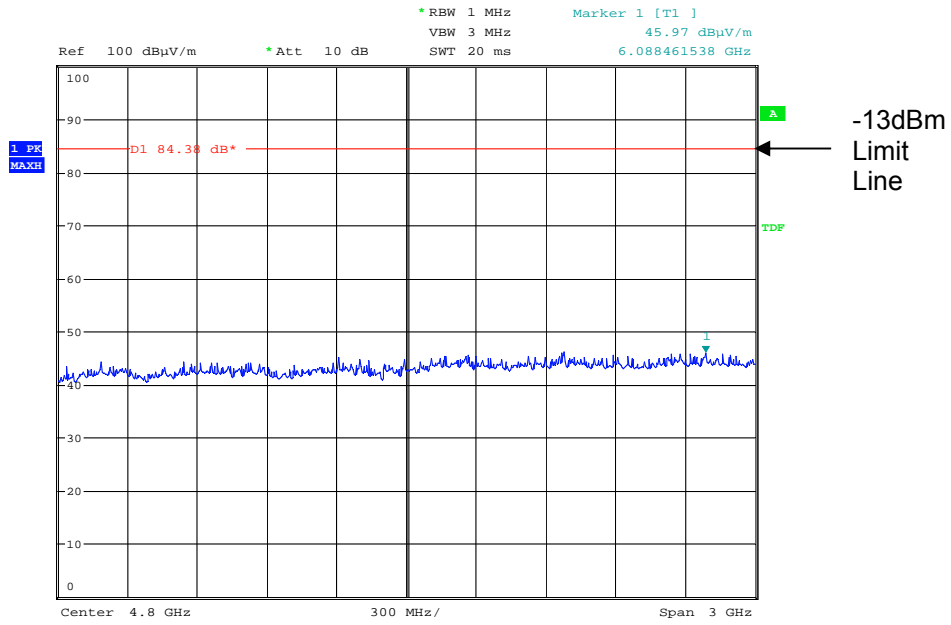
Date: 29.JUL.2008 16:35:24

Radiated emissions Top channel 824.0MHz 3 – 6GHz



Date: 29.JUL.2008 16:35:51

Radiated emissions Top channel 824.0MHz 6 – 9GHz

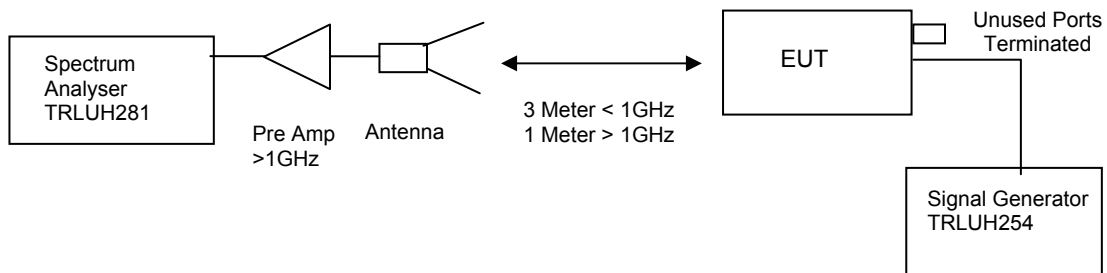


Date: 29.JUL.2008 16:36:23

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– UPLINK 60 – 174203 Unit

Ambient temperature = 23°C Test Signal = F3E
 Relative humidity = 62%
 Conditions = OATS
 Supply voltage = +12Vdc
 Supply Frequency = N/A



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

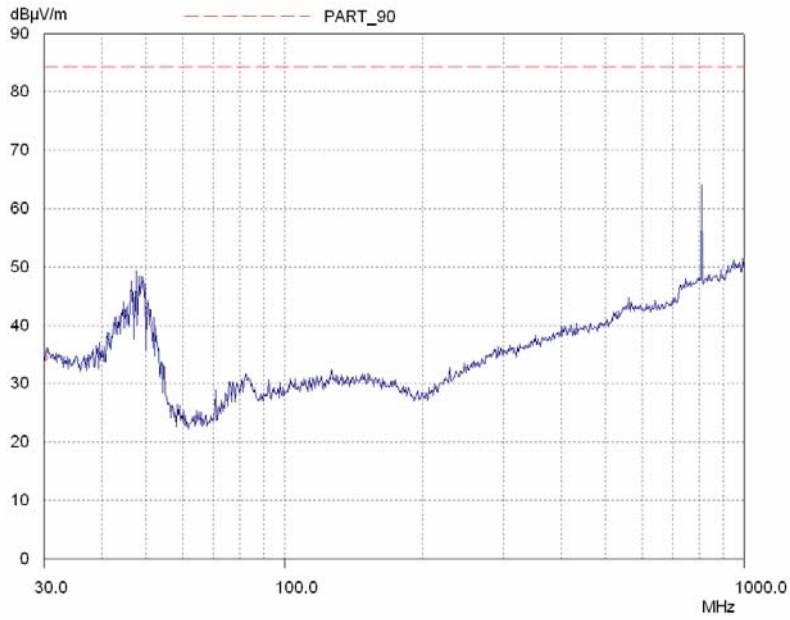
FREQUENCY RANGE	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	CALCULATED EIRP (dBm)	LIMIT (dBm)
30MHz – 9GHz	No Significant Emissions Within 20 dB of the Limit						-13dBm

The test equipment used for the Transmitter Spurious Emissions:

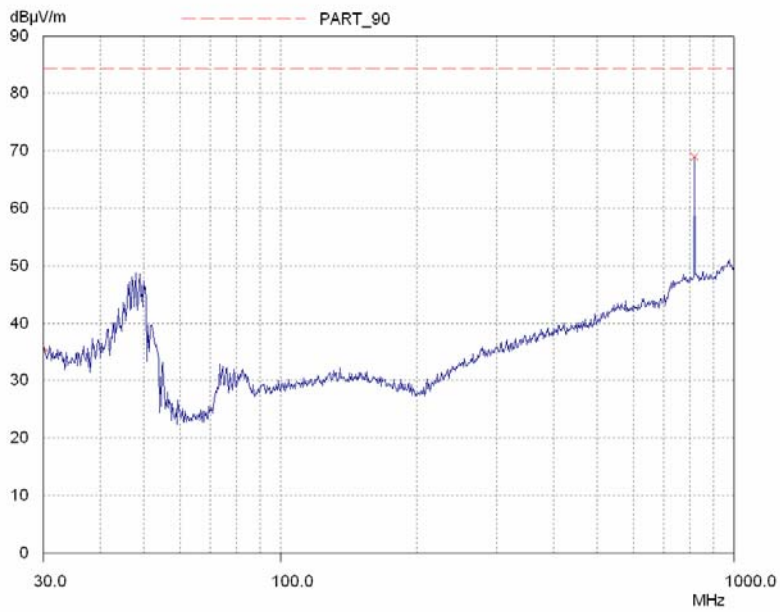
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
RECEIVER	R&S	ESVS10	825892/006	TRL04	X
HORN	EMCO	3115	9010-3580	138	X
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
PRE AMPLIFIER	HP	8449B	3008A016	572	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
ANTENNA	YORK	CBL611/A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

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– UPLINK 30-1GHz SCAN 60 – 174203 Unit

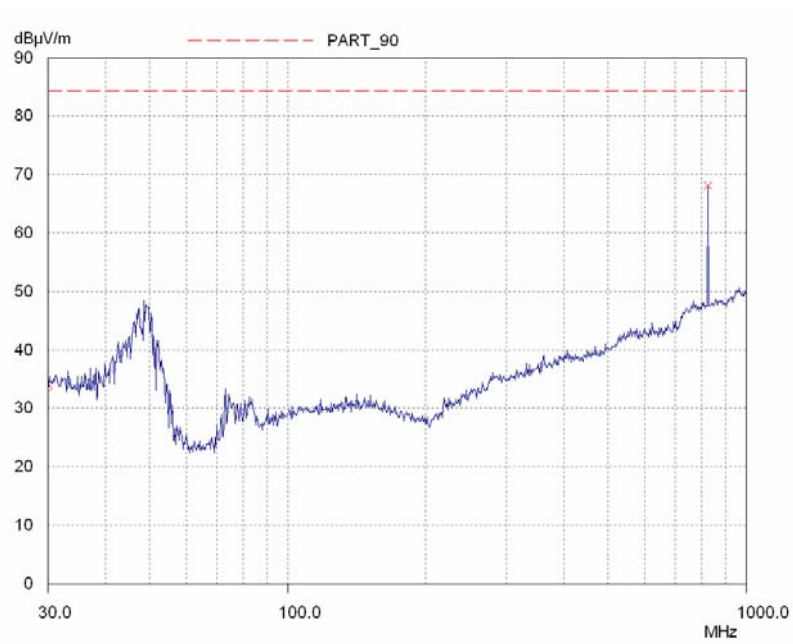
Bottom Channel 30MHz – 1GHz



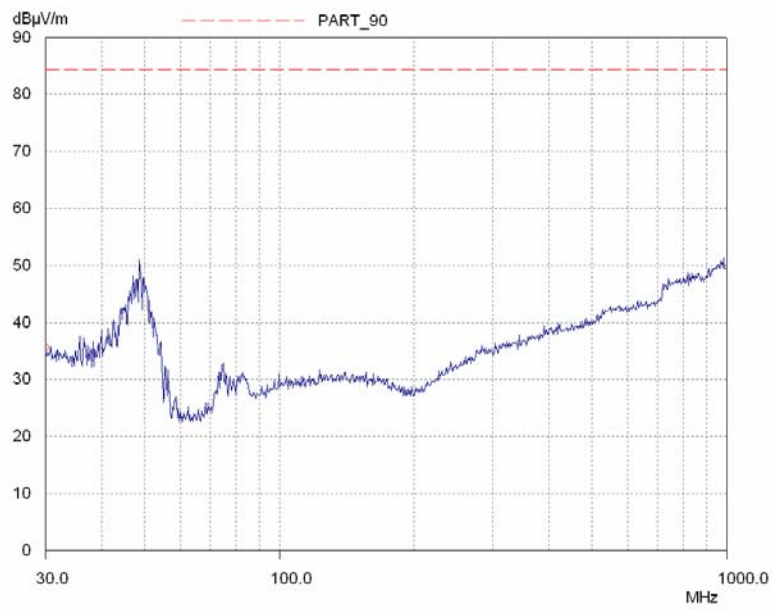
Middle Channel 30MHz – 1GHz



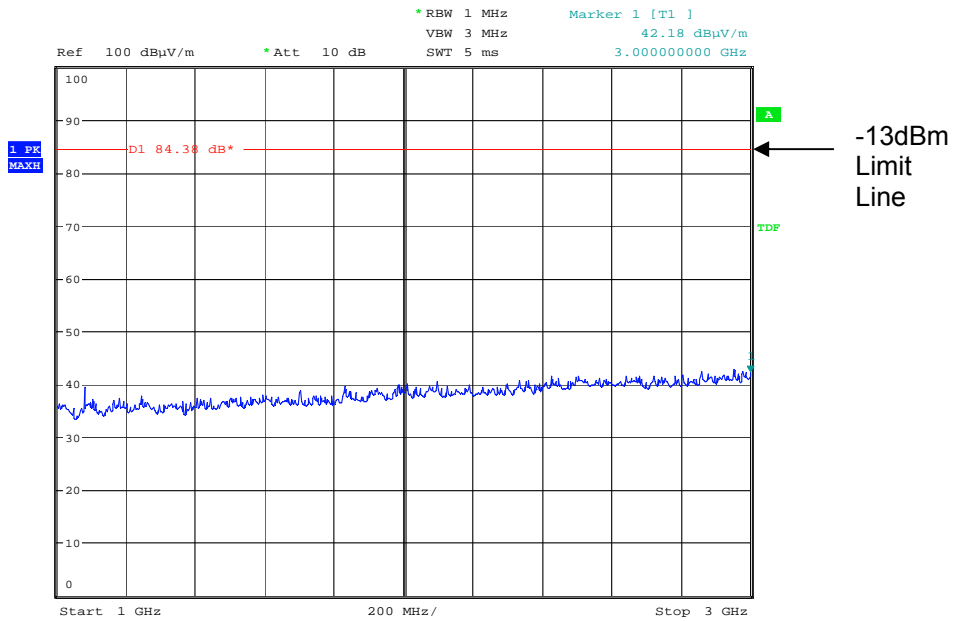
Top Channel 30MHz – 1GHz



No signal, input terminals terminated into 50Ω 30MHz – 1GHz

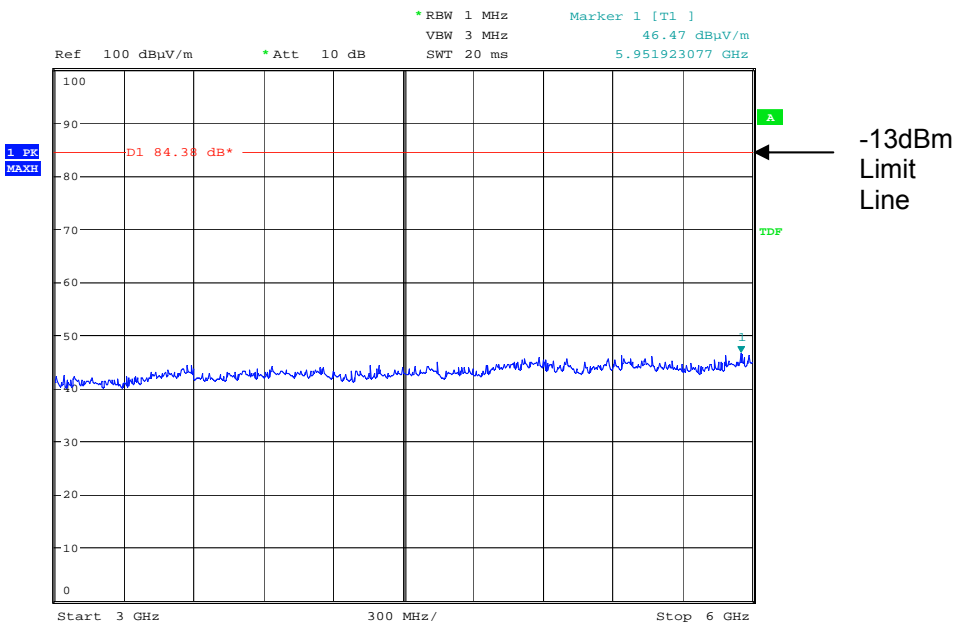


Radiated emissions bottom channel 806.0MHz 1 – 3GHz



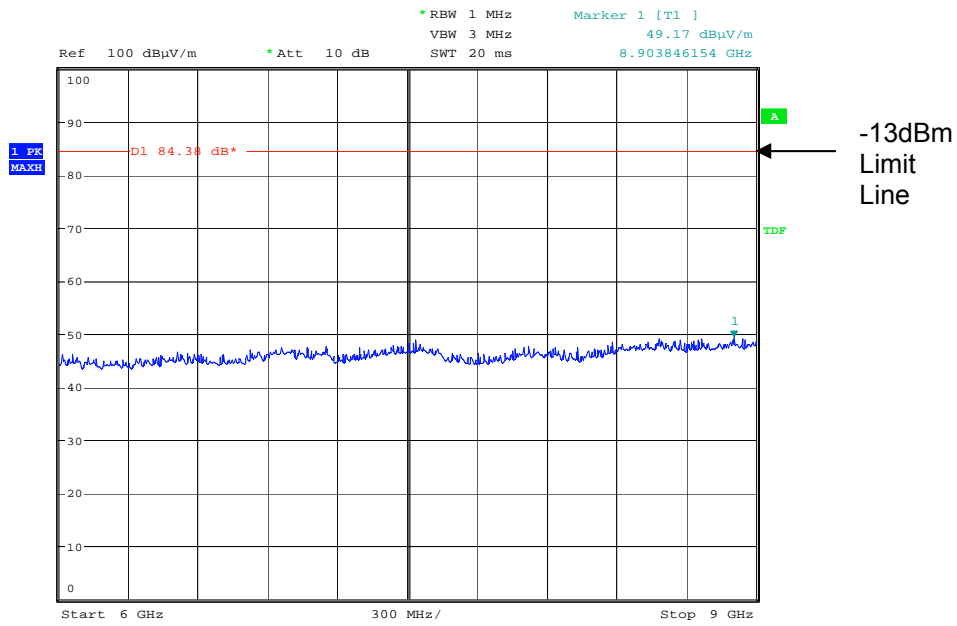
Date: 29.JUL.2008 15:47:10

Radiated emissions bottom channel 806.0MHz 3 – 6GHz



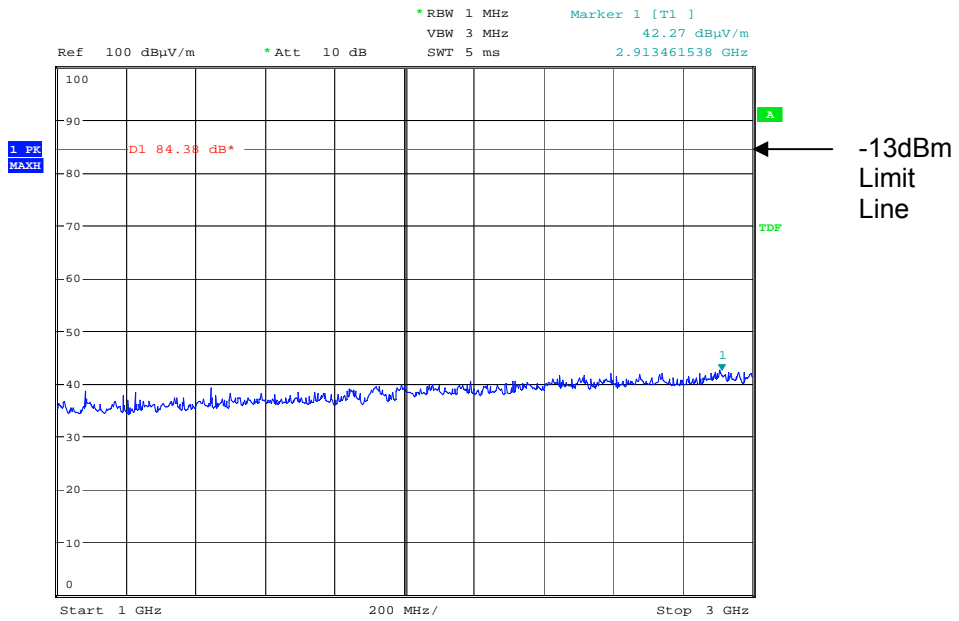
Date: 29.JUL.2008 15:47:32

Radiated emissions bottom channel 806.0MHz 6 – 9GHz



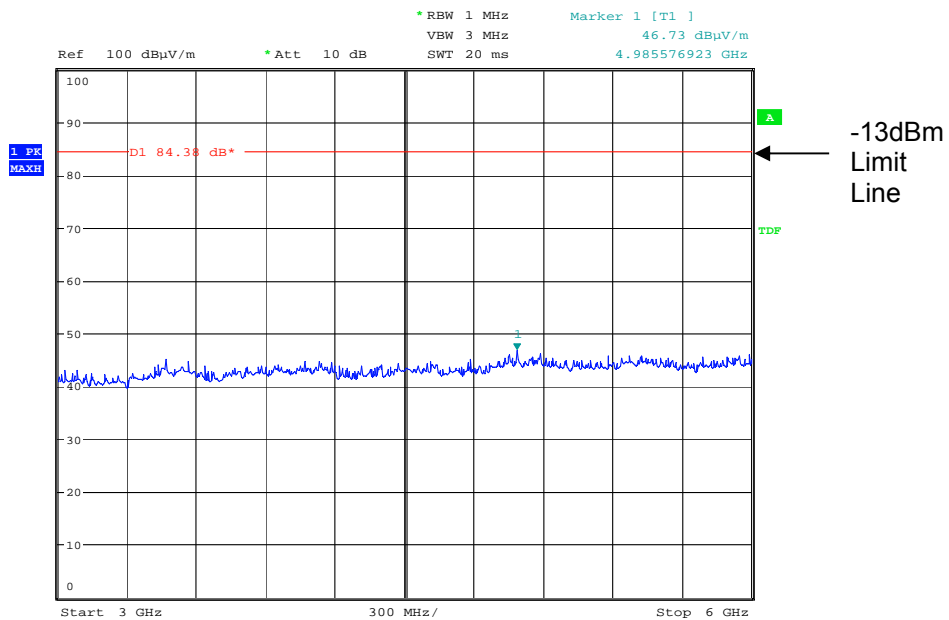
Date: 29.JUL.2008 15:48:00

Radiated emissions middle channel 815.0MHz 1 – 3GHz



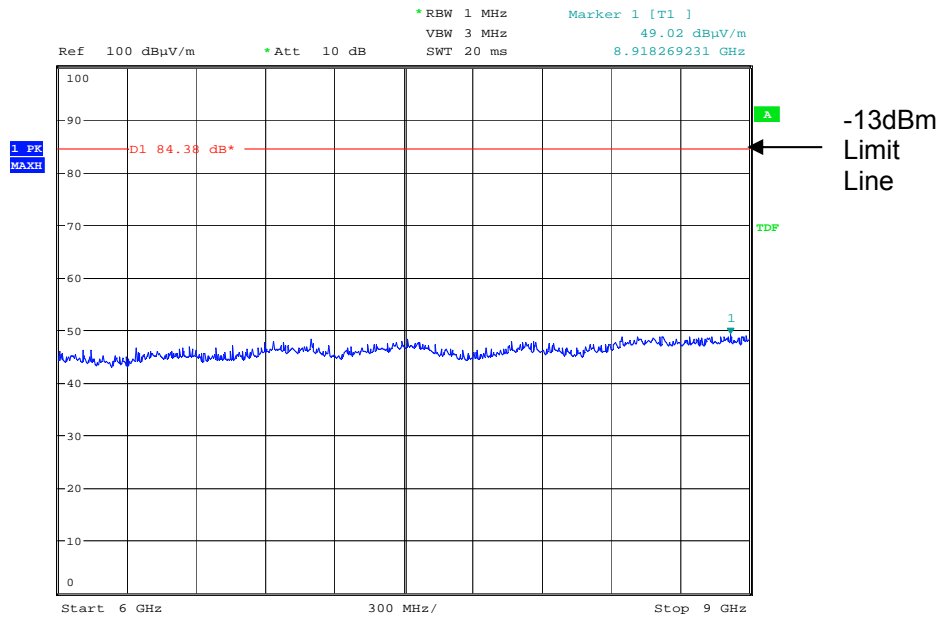
Date: 29.JUL.2008 15:52:32

Radiated emissions middle channel 815.0MHz 3 – 6GHz



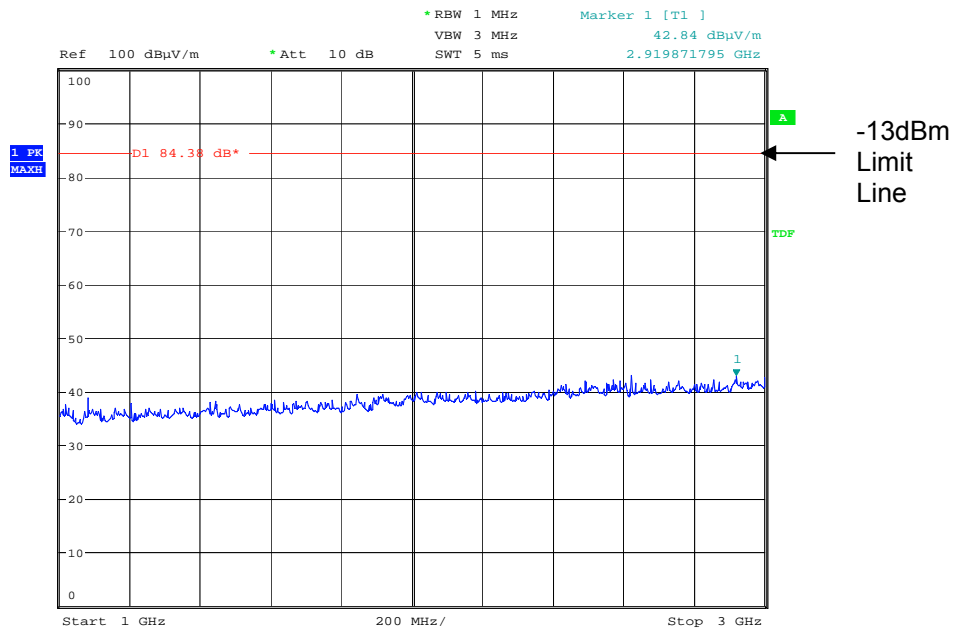
Date: 29.JUL.2008 15:52:56

Radiated emissions middle channel 815.0MHz 6 – 9GHz



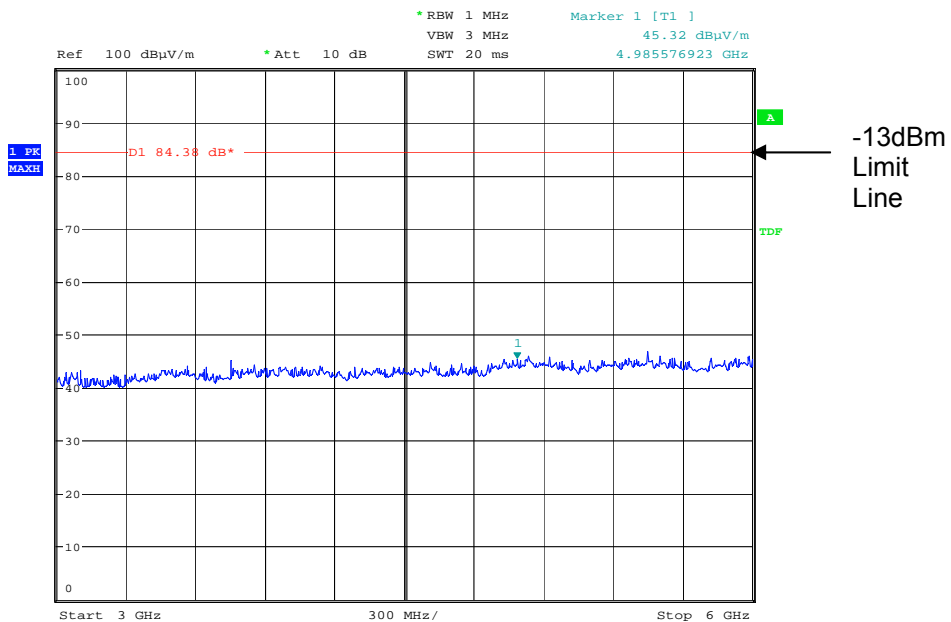
Date: 29.JUL.2008 15:53:18

Radiated emissions top channel 824.0MHz 1 – 3GHz



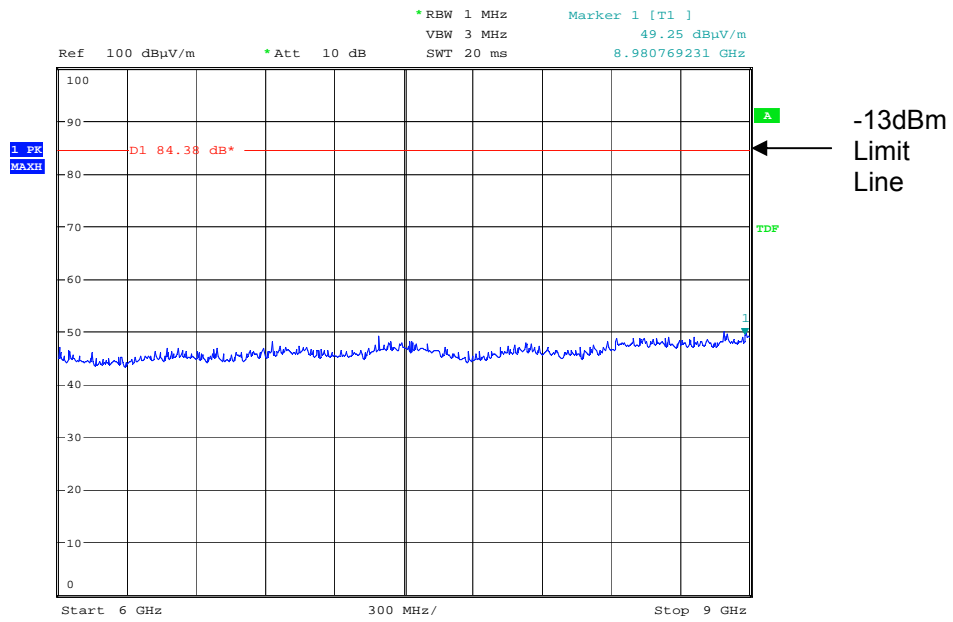
Date: 29.JUL.2008 15:56:33

Radiated emissions top channel 824.0MHz 3 – 6GHz



Date: 29.JUL.2008 15:57:07

Radiated emissions top channel 824.0MHz 6 – 9GHz

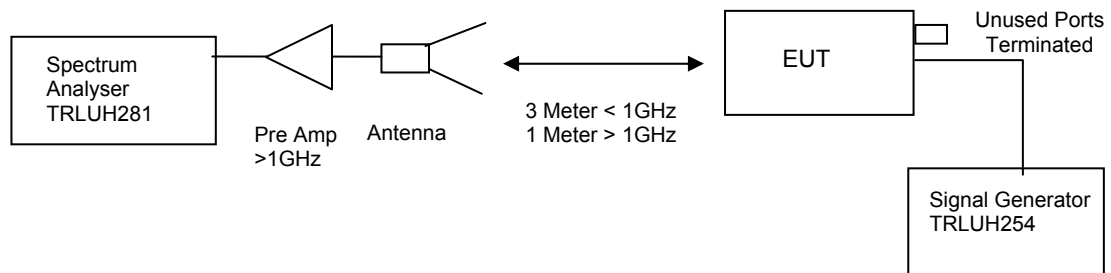


Date: 29.JUL.2008 15:57:33

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– UPLINK 60 – 214802 Unit

Ambient temperature	=	23°C	Test Signal	=	F3E
Relative humidity	=	62%			
Conditions	=	OATS			
Supply voltage	=	+12Vdc			
Supply Frequency	=	N/A			



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

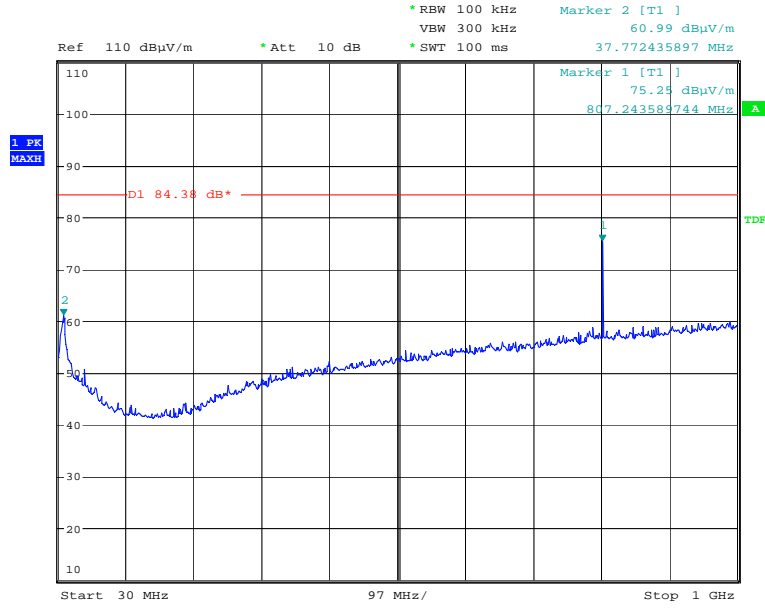
FREQUENCY RANGE	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	CALCULATED EIRP (dBm)	LIMIT (dBm)
30MHz – 9GHz	No Significant Emissions Within 20 dB of the Limit						-13dBm

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

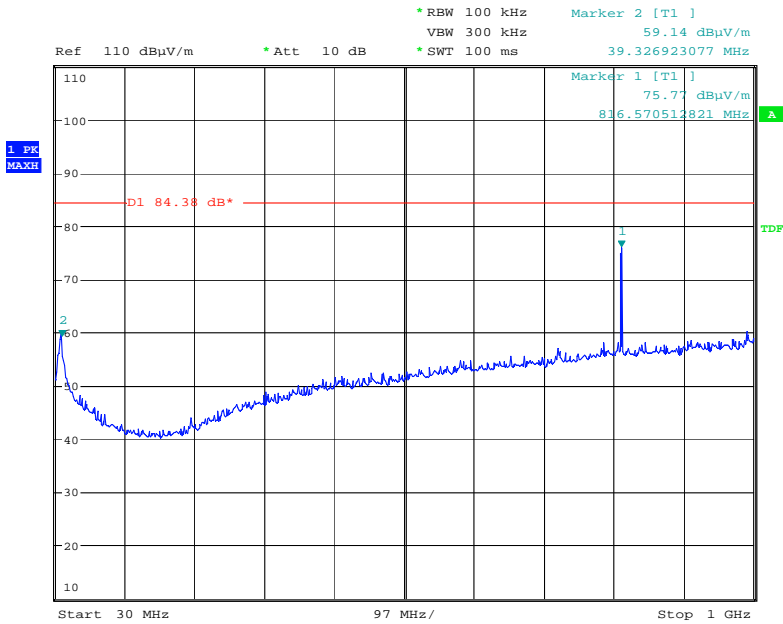
AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– UPLINK 30-1GHz SCAN 60 – 214802 Unit

Bottom Channel 30MHz – 1GHz



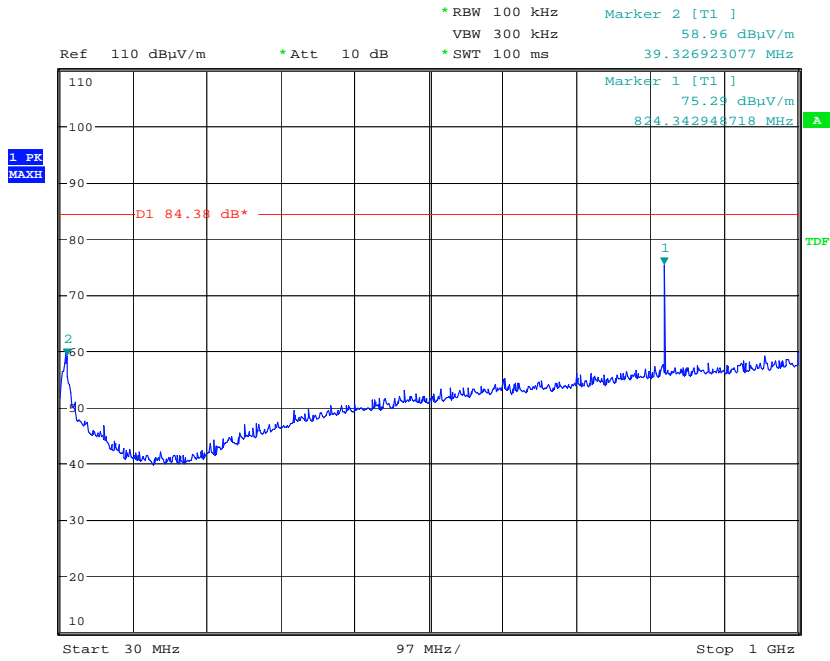
Date: 25.JUL.2008 14:49:41

Middle Channel 30MHz – 1GHz



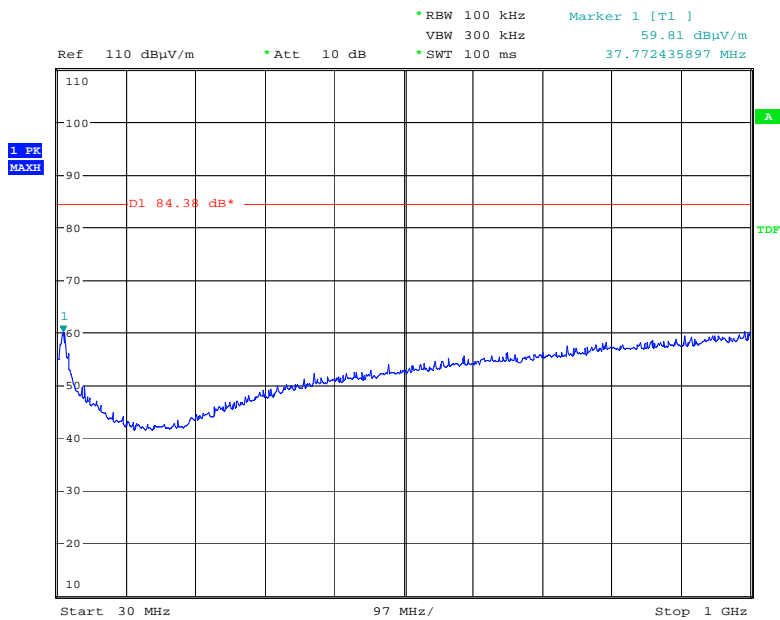
Date: 25.JUL.2008 14:50:32

Top Channel 30MHz – 1GHz



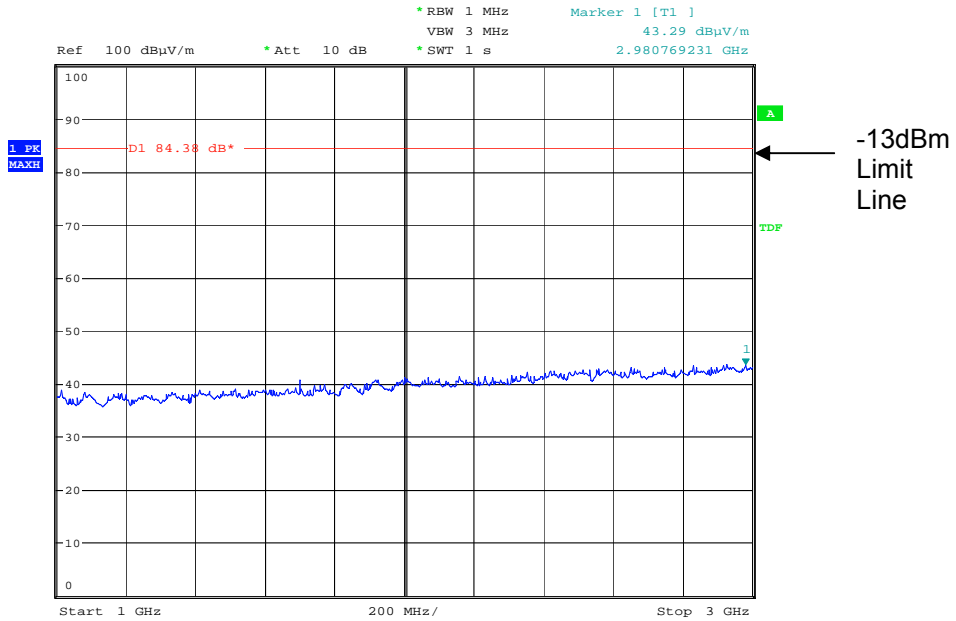
Date: 25.JUL.2008 14:50:57

No signal, input terminals terminated into 50Ω 30MHz – 1GHz



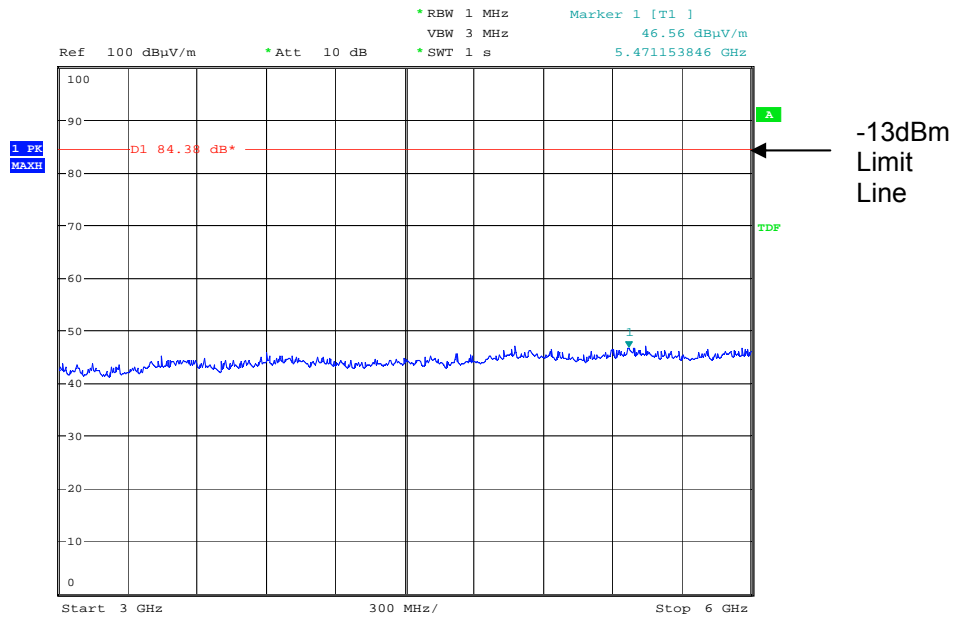
Date: 25.JUL.2008 14:46:06

Radiated emissions bottom channel 806.0MHz 1 – 3GHz



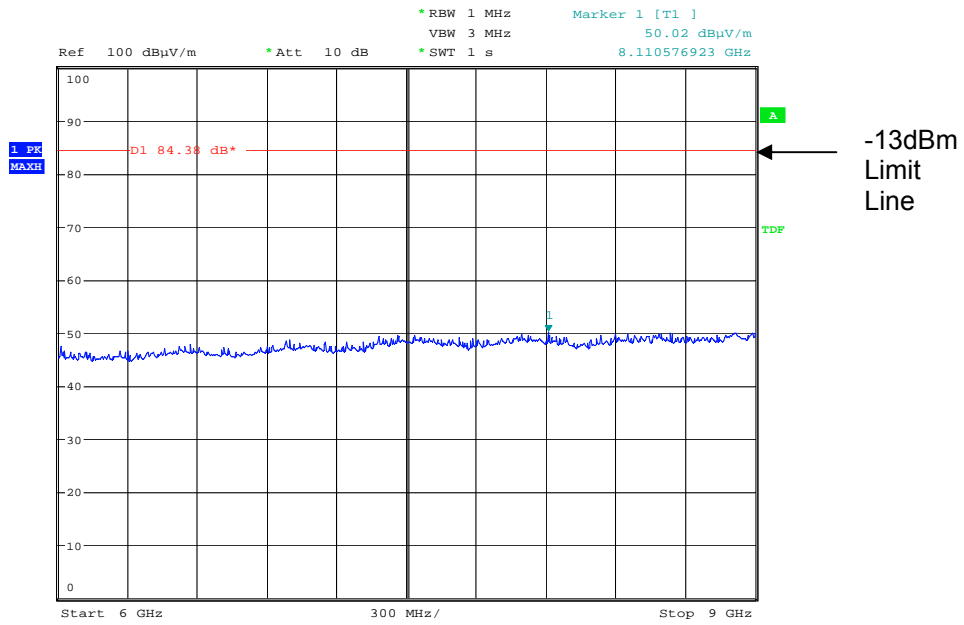
Date: 25.JUL.2008 13:56:28

Radiated emissions bottom channel 806.0MHz 3 – 6GHz



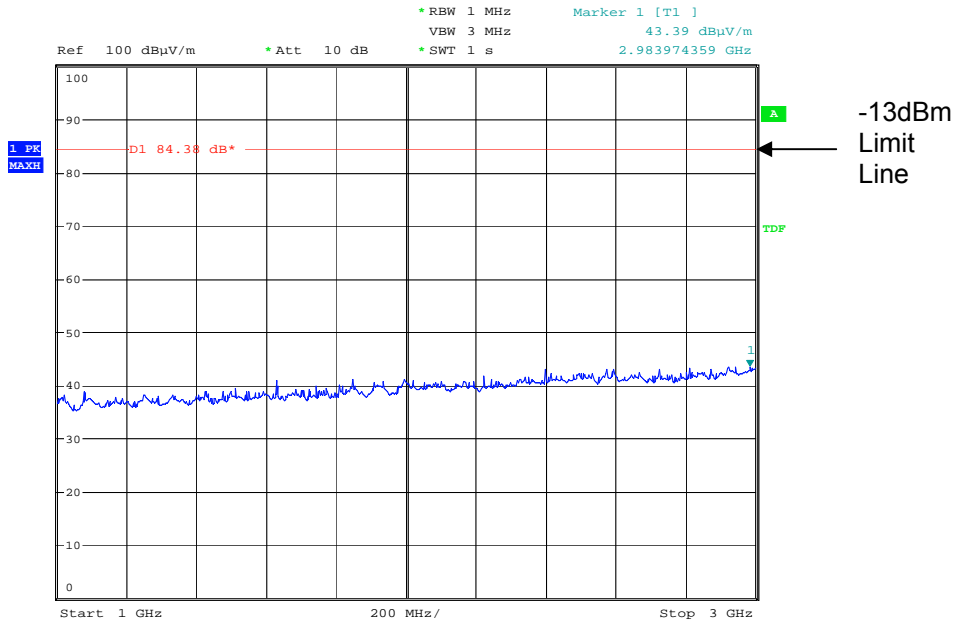
Date: 25.JUL.2008 13:56:47

Radiated emissions bottom channel 806.0MHz 6 – 9GHz



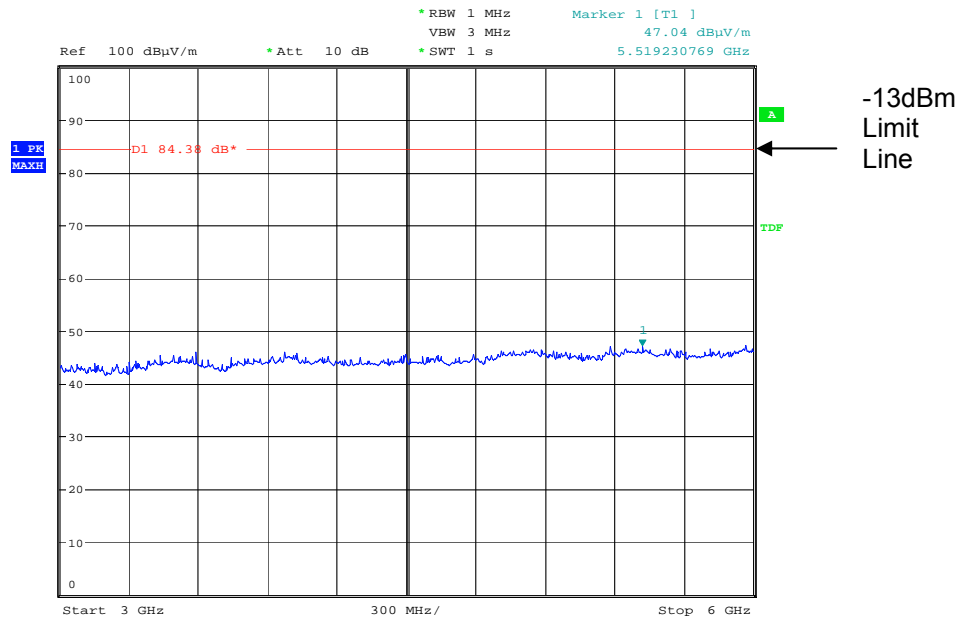
Date: 25.JUL.2008 13:57:04

Radiated emissions middle channel 815.0MHz 1 – 3GHz



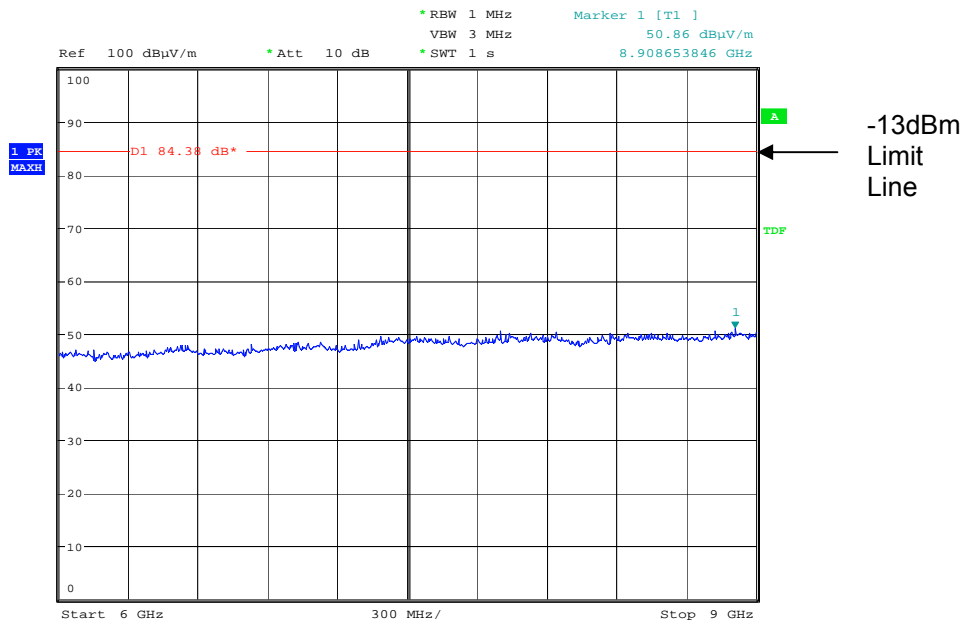
Date: 25.JUL.2008 14:02:51

Radiated emissions middle channel 815.0MHz 3 – 6GHz



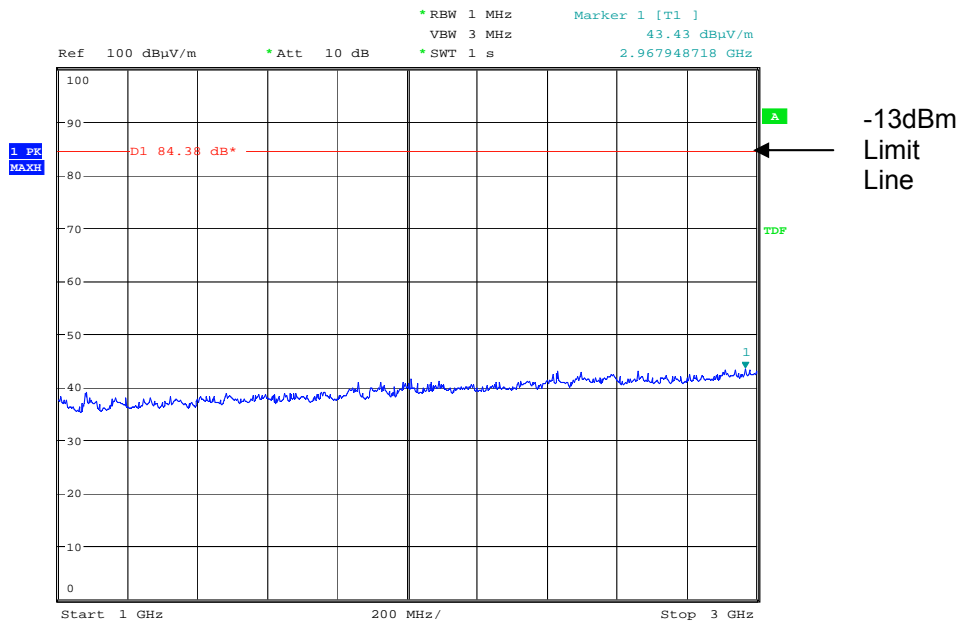
Date: 25.JUL.2008 14:02:18

Radiated emissions middle channel 815.0MHz 6 – 9GHz



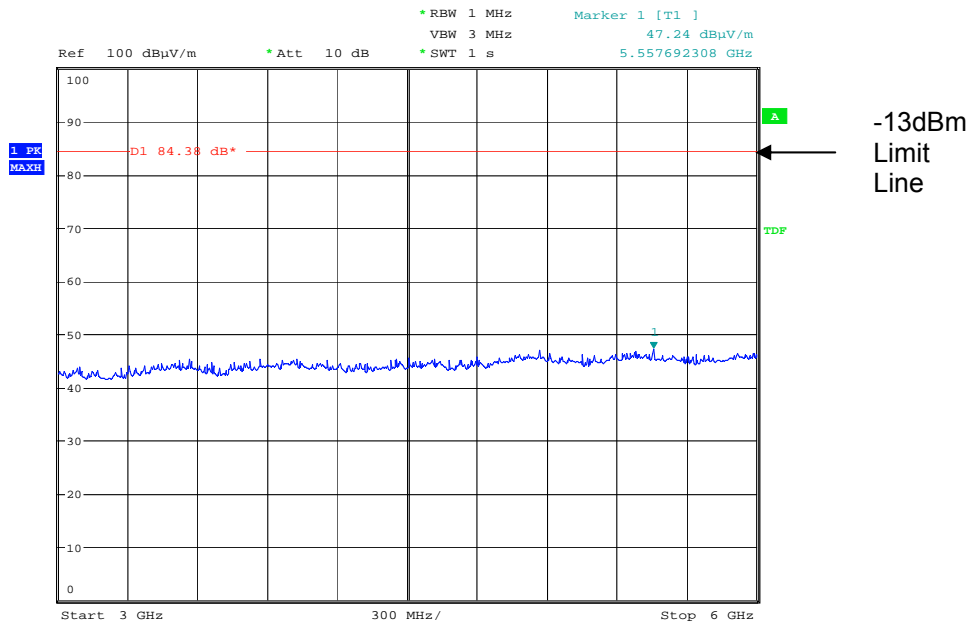
Date: 25.JUL.2008 14:01:28

Radiated emissions top channel 824.0MHz 1 – 3GHz



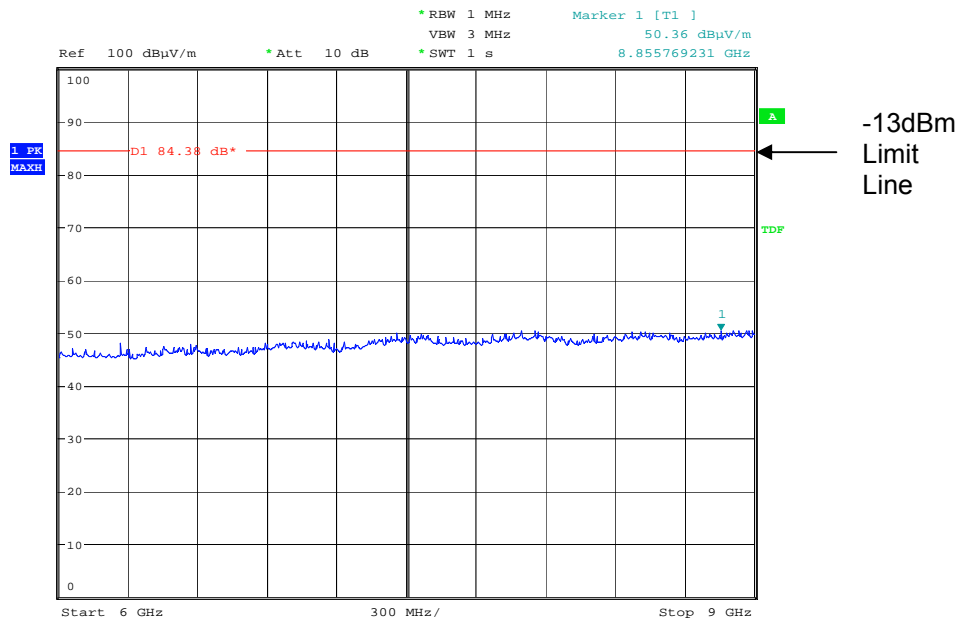
Date: 25.JUL.2008 14:03:51

Radiated emissions top channel 824.0MHz 3 – 6GHz



Date: 25.JUL.2008 14:04:20

Radiated emissions top channel 824.0MHz 6 – 9GHz

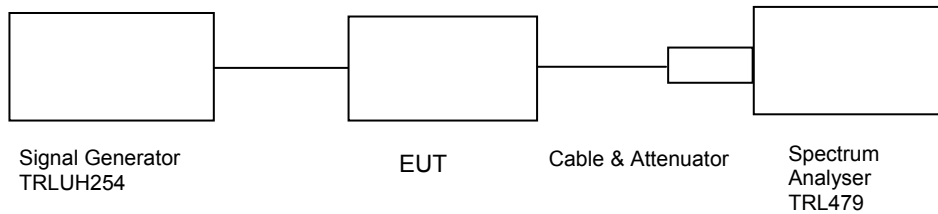


Date: 25.JUL.2008 14:04:53

AMPLIFIER GAIN – CONDUCTED – PART 2.1046 – DOWNLINK

Ambient temperature = 27°C
 Relative humidity = 53%
 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
851.0	-23.8	0.26	49.50	-17.15	56.41	32.35	47.46
860.0	-24.86	0.26	49.50	-18.15	56.21	31.35	48.66
869.0	-23.5	0.26	49.50	-17.12	56.14	32.38	47.06

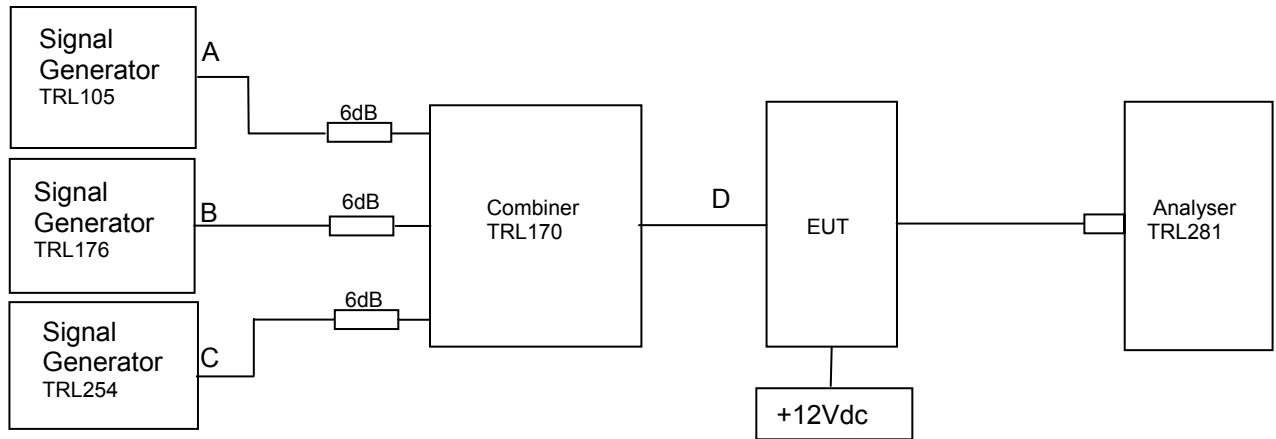
Notes: 1. The signal generator input was increased by 10dBs and the level of the output signal remeasured.

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 = 26°C
 Relative humidity = 63%
 Supply voltage = +12Vdc

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 signal input power level was adjusted until the amplifier reached the +1dB compression point across the three carriers, the signal input power level was then increased by 10dB. The cable and attenuator loss between the EUT and the spectrum analyser was 40.0dB.

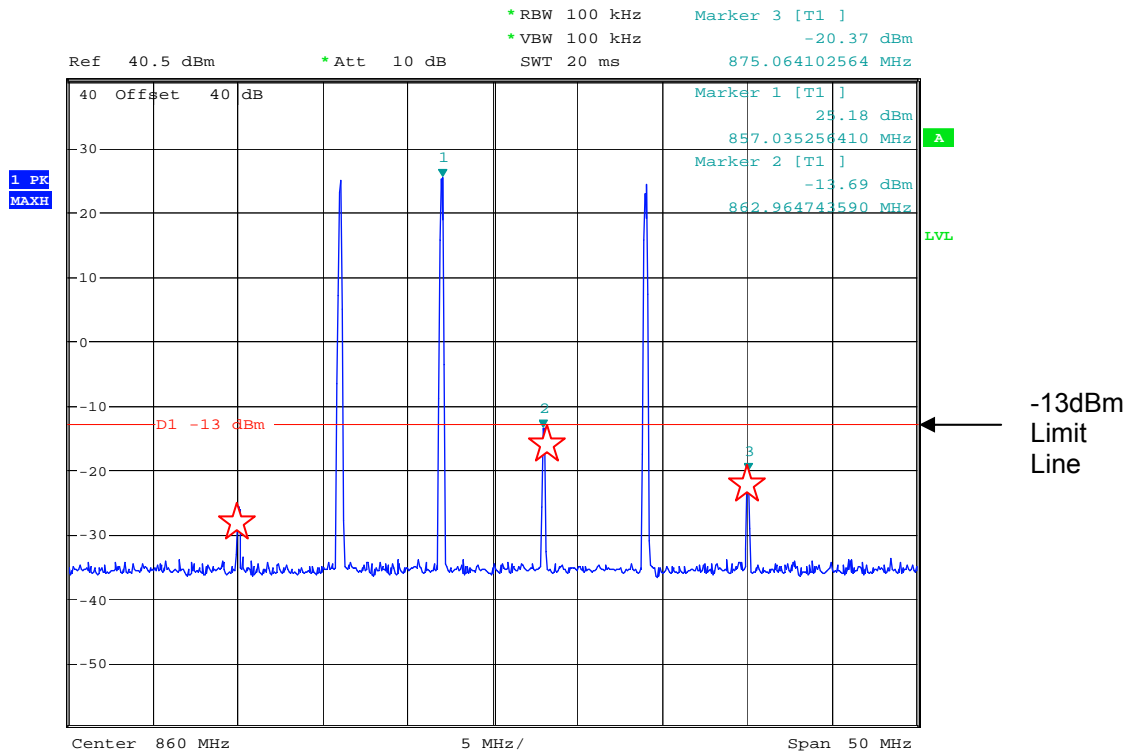
RF Input Frequency (MHz)			Highest Intermodulation Product Level (dBm)	Limit (dBm)
851.0	860.0	869.0	-13.70dBm@863.044871MHz	-13

Sweep data is shown on the next page:

Test equipment used for intermodulation test

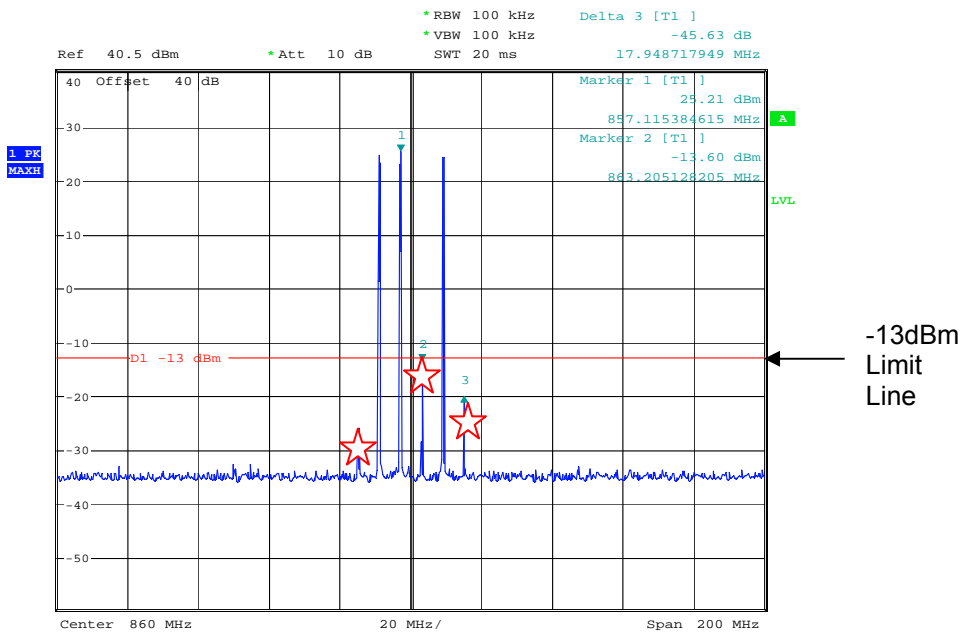
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
SIGNAL GENERATOR	MARCONI	2023	112224/040	UH105	X
CMTA	ROHDE & SCHWARZ	CMTA52	894715/033	05	
COMBINER	ELCOM	RC-4-50	N/A	170	X
ATTENUATOR	BIRD	8308-200-N	N/A	103	X
ATTENUATOR	SPINNER	745357	D57224	225	X

Intermodulation Inband

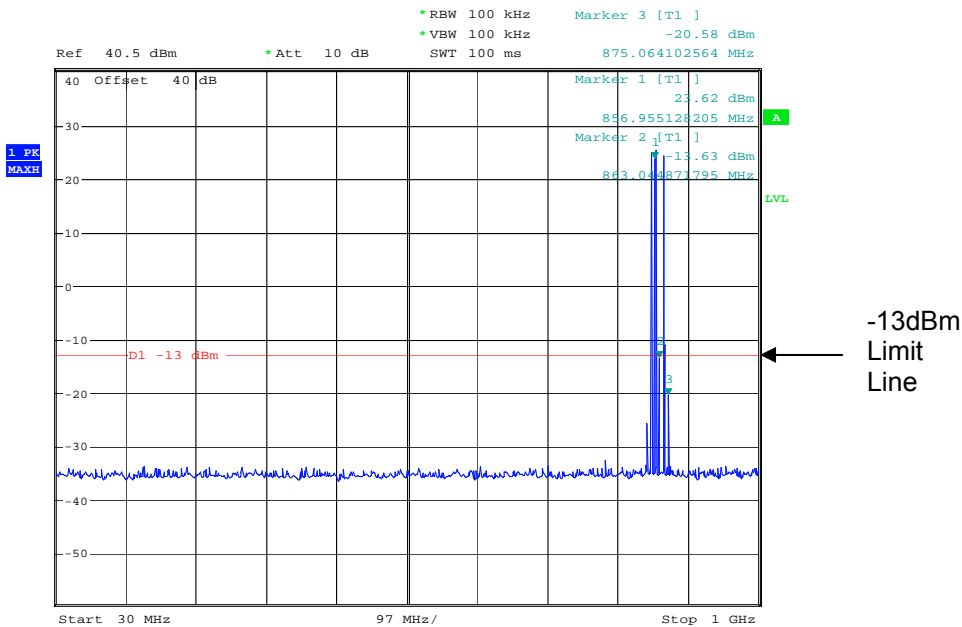


Date: 28.JUL.2008 15:56:19

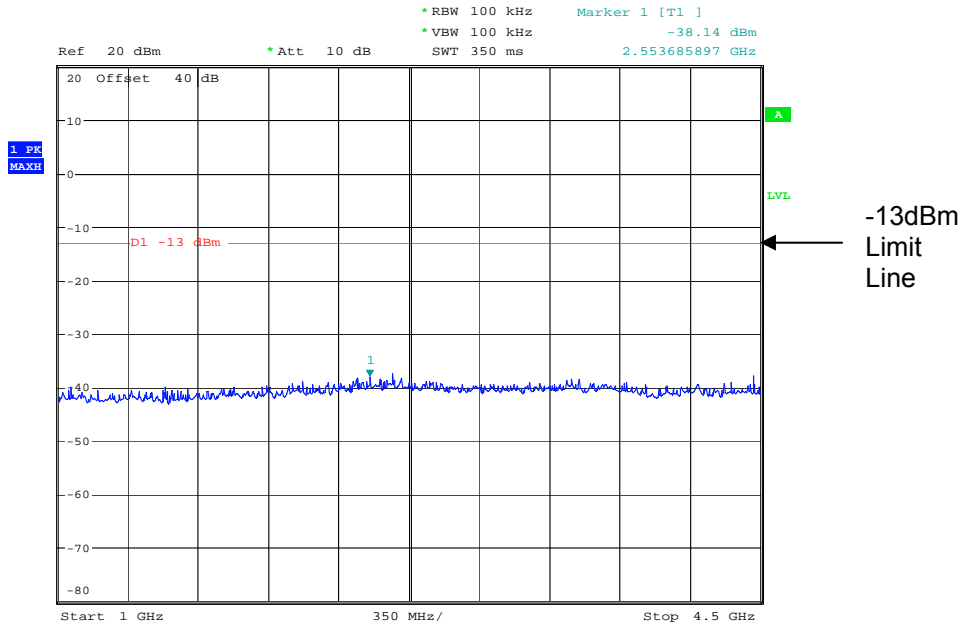
Intermodulation Wideband



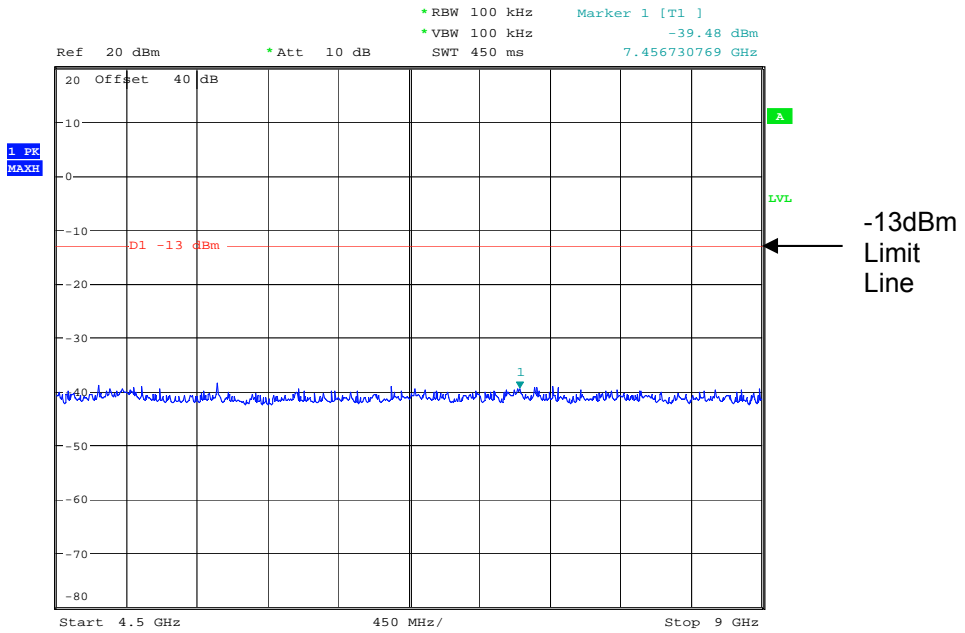
Date: 28.JUL.2008 15:58:08



Date: 28.JUL.2008 16:00:48



Date: 28.JUL.2008 16:01:38

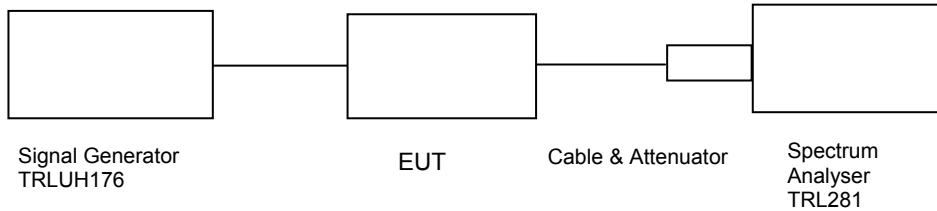


Date: 28.JUL.2008 16:02:17

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 (-13.5dBm) 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.

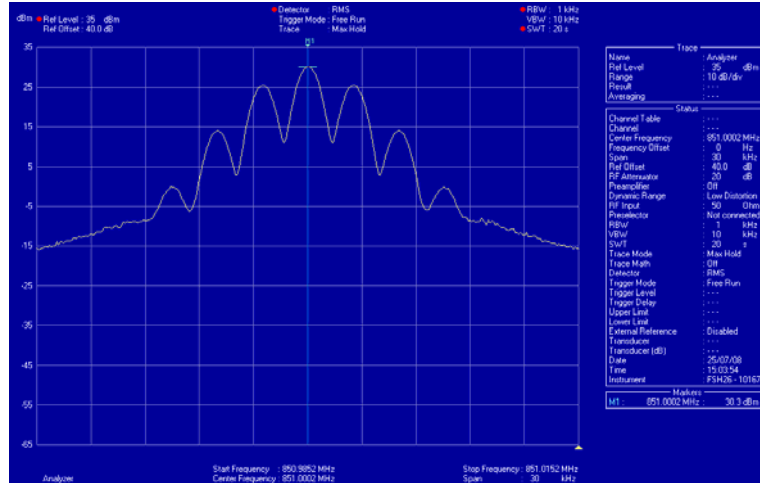
Note: The cables and attenuators had the following losses.

1. Cable and attenuator between EUT and spectrum analyser 40.0dB
2. Cable between signal generator and EUT 0.26dB

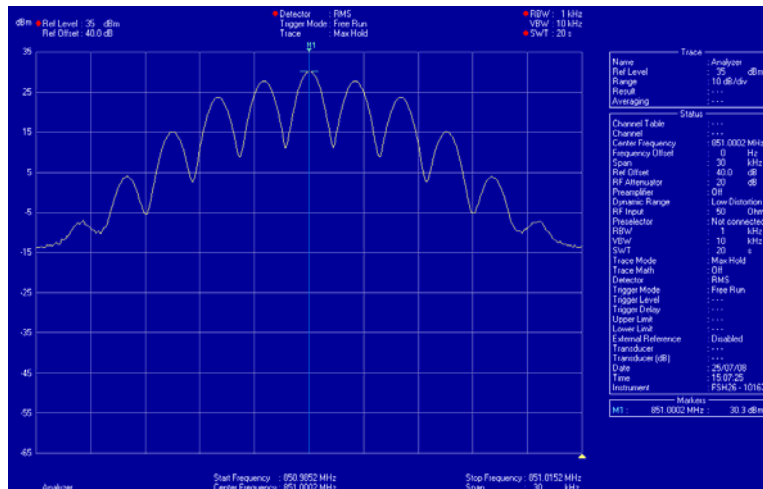
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
ATTENUATOR	SPINNER	745357	D57224	225	X
ATTENUATOR	BIRD	8308-200-N	N/A	103	X
ATTENUATOR	BIRD	8304-100-N	N/A	222	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
SPECTRUM ANALYSER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

800MHz Amplifier downlink

Bottom channel 851.0MHz Signal Generator and EUT, deviation set to 2.5kHz

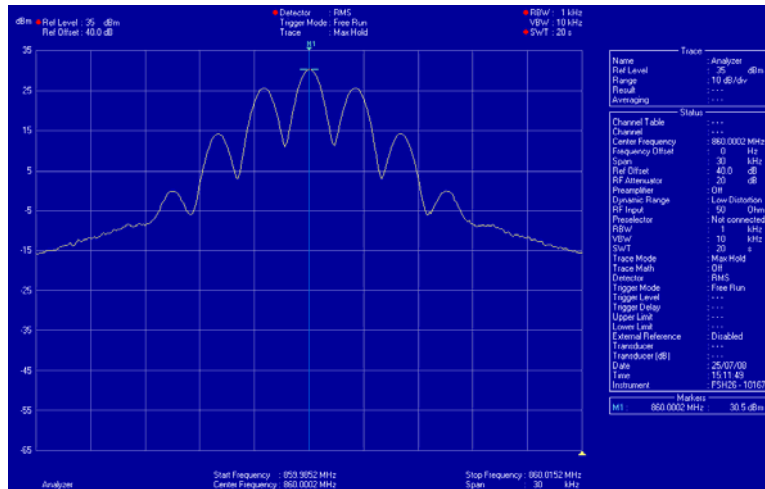


Bottom channel 851.0MHz Signal Generator and EUT, deviation set to 5kHz

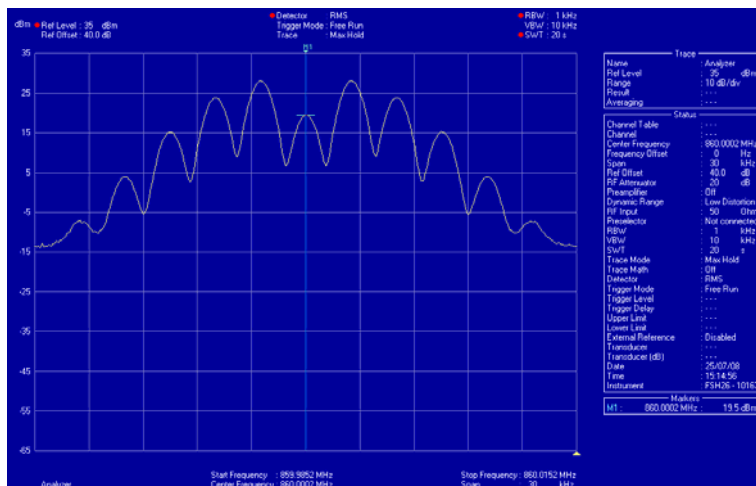


The above plots depicting the output wavelshape show no measurable distortion visible when compared to the input signal.

Middle channel 860.0MHz Signal Generator and EUT, deviation set to 2.5kHz

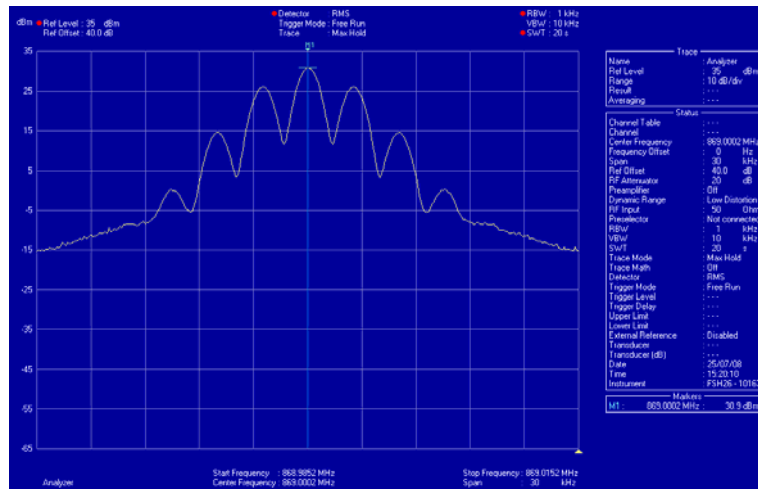


Middle channel 860.0MHz Signal Generator and EUT, deviation set to 5kHz

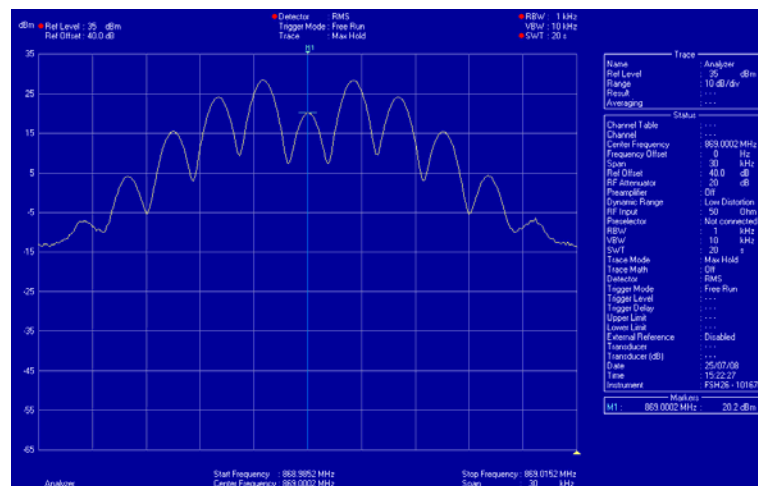


The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

Top channel 869.0MHz Signal Generator and EUT, deviation set to 2.5kHz

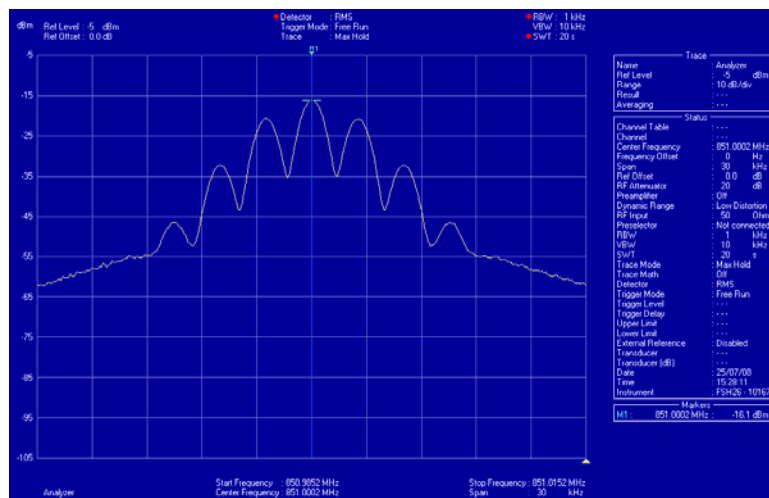


Top channel 869.0MHz Signal Generator and EUT, deviation set to 5kHz

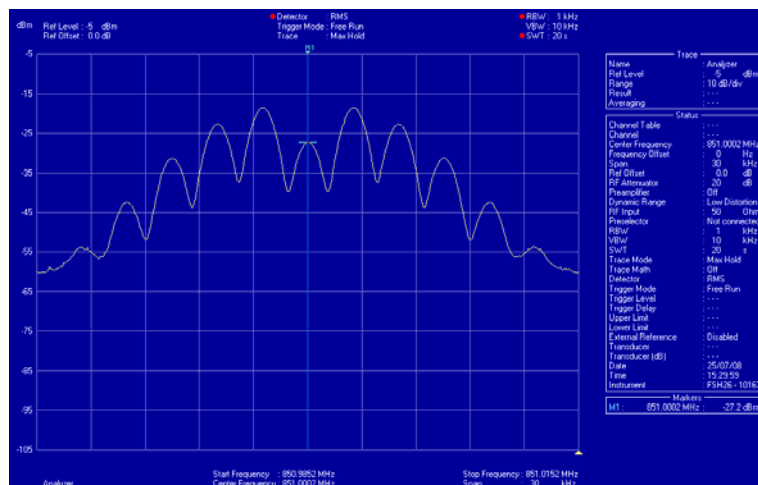


The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

Bottom channel 851.0MHz Signal Generator, deviation set to 2.5kHz

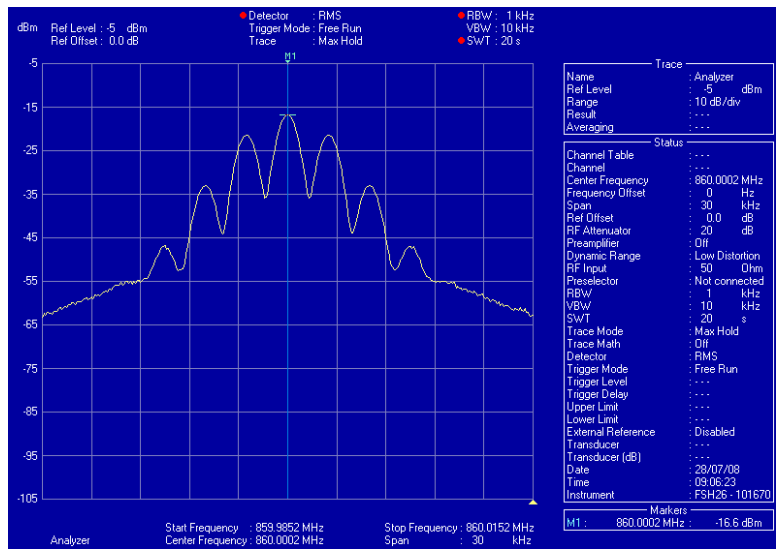


Bottom channel 851.0MHz Signal Generator, deviation set to 5kHz

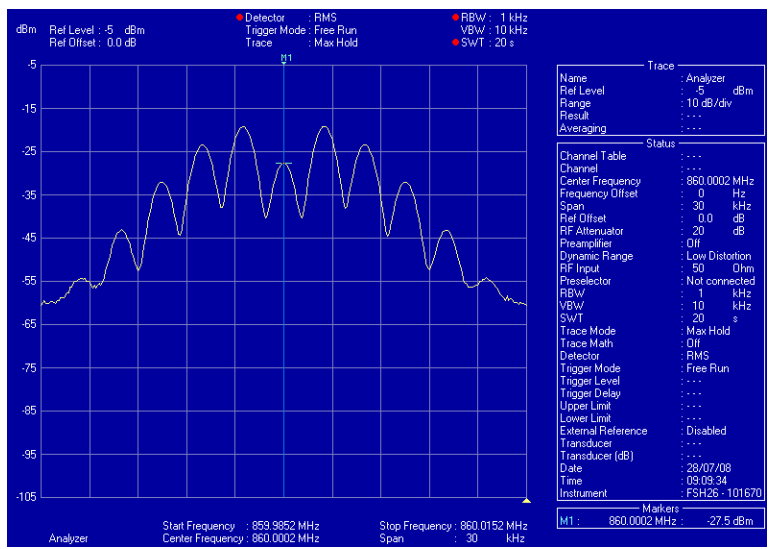


The above plots depicting the output wavelshape show no measurable distortion visible when compared to the input signal.

Middle channel 860.0MHz Signal Generator, deviation set to 2.5kHz

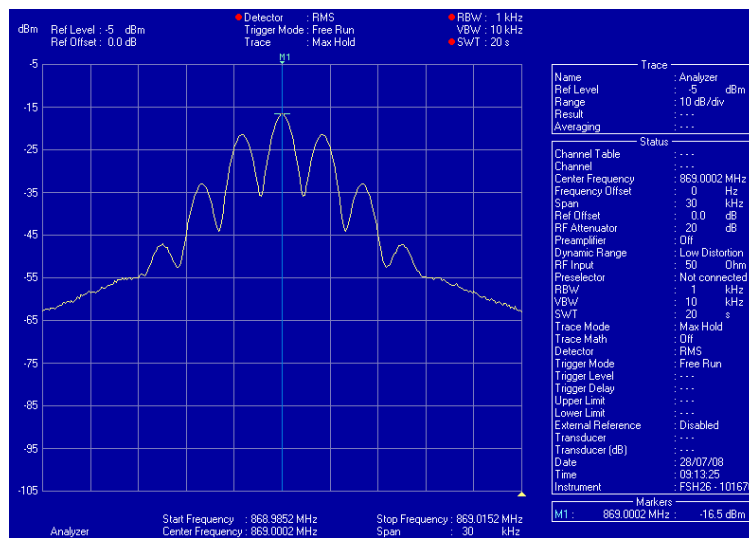


Middle channel 860.0MHz Signal Generator, deviation set to 5kHz

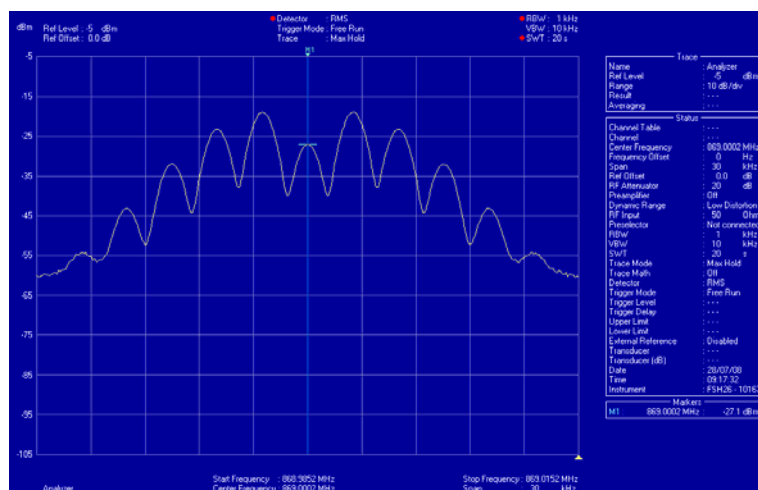


The above plots depicting the output waveshape show no measurable distortion visible when compared to the input signal.

Top channel 869.0MHz Signal Generator, deviation set to 2.5kHz



Top channel 869.0MHz Signal Generator, deviation set to 5kHz



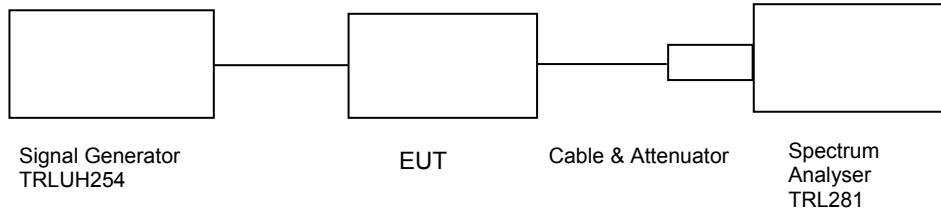
The above plots depicting the output wavelshape show no measurable distortion visible when compared to the input signal.

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – CONDUCTED – Part 2.1053 – DOWNLINK

Ambient temperature = 24°C
 Relative humidity = 63%
 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

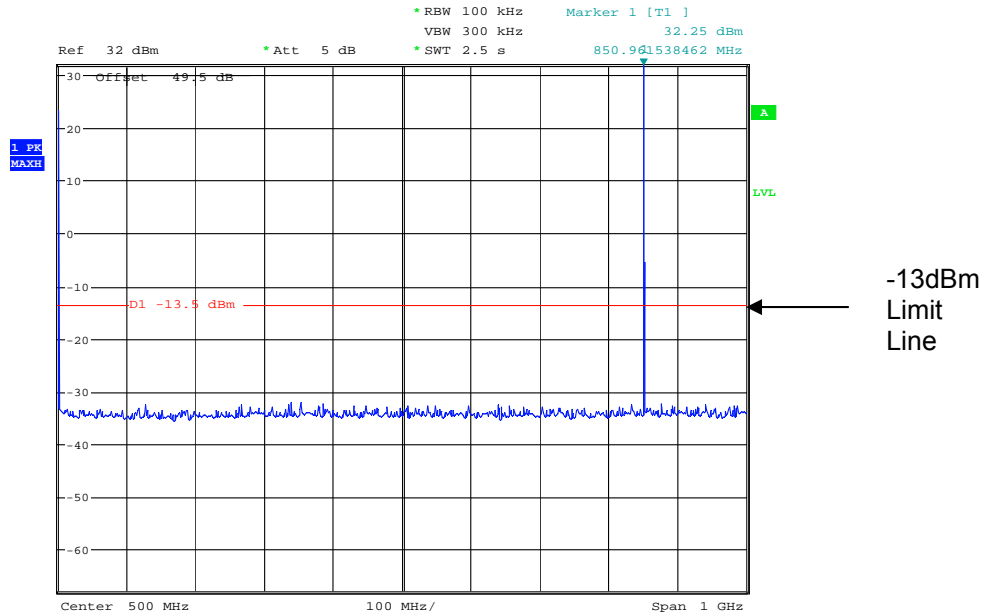
FREQUENCY RANGE	FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTENUATOR & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
0Hz – 9GHz	No Significant Emissions Within 20 dB of the limit				-13

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
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X

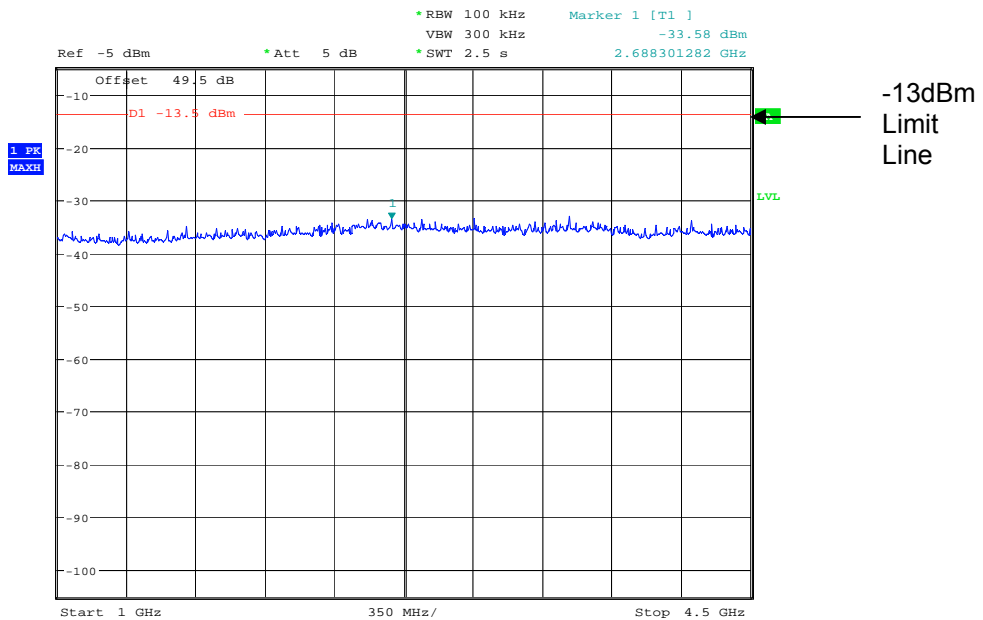
800MHz Amplifier Downlink

Conducted emissions bottom channel 851.0MHz 0MHz – 1GHz



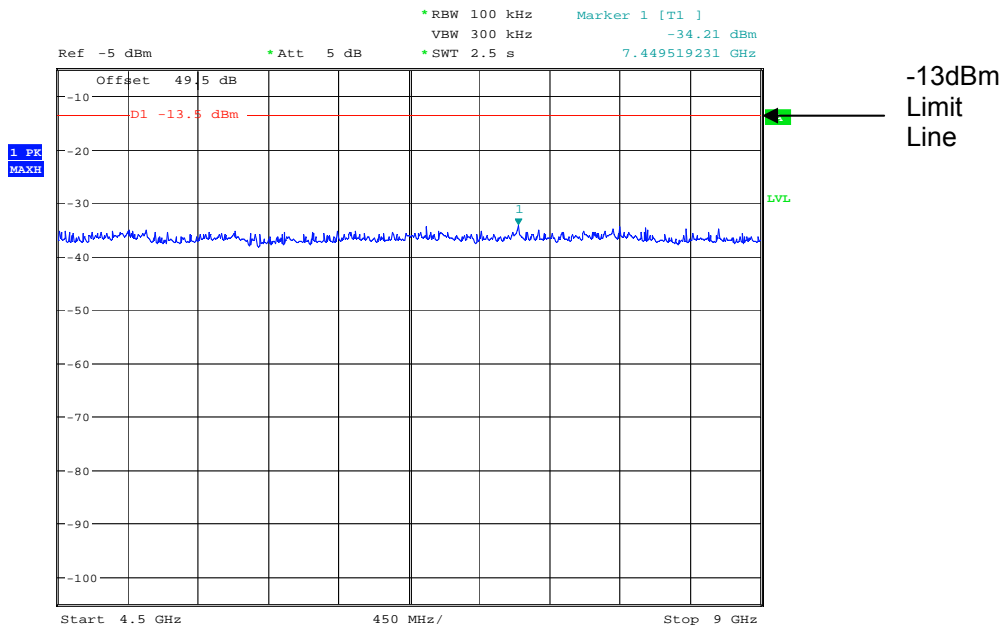
Date: 28.JUL.2008 11:18:16

Conducted emissions bottom channel 851.0MHz 1GHz – 4.5GHz



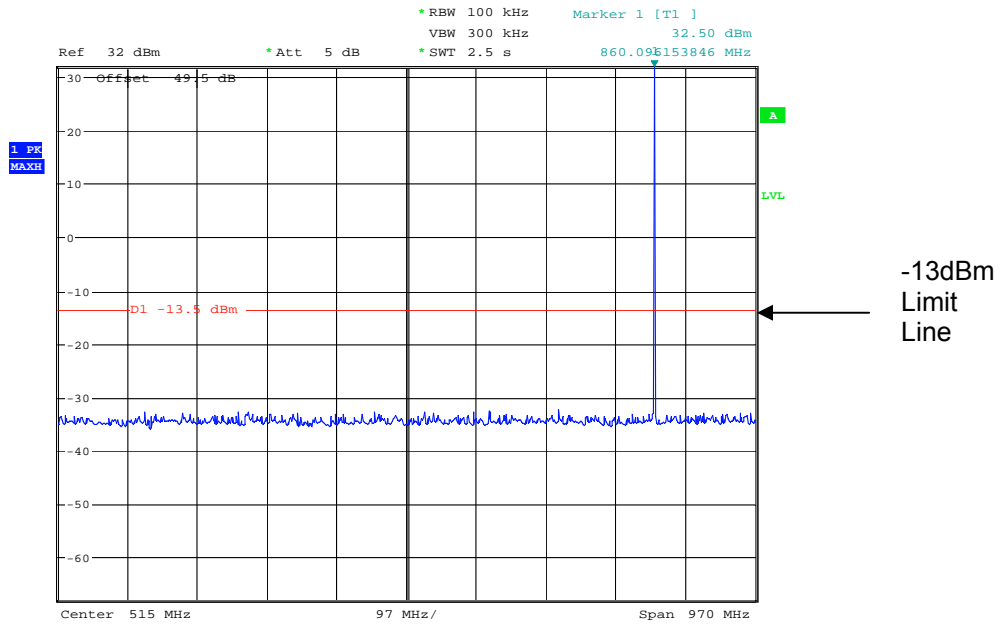
Date: 28.JUL.2008 11:19:03

Conducted emissions bottom channel 851.0MHz 4.5GHz – 9GHz



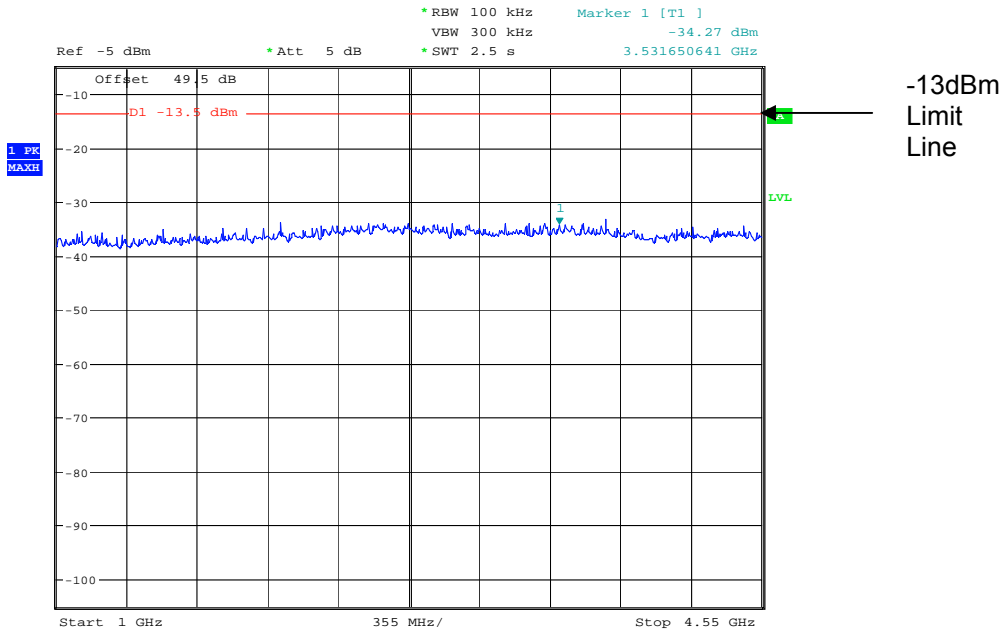
Date: 28.JUL.2008 11:19:41

Conducted emissions Middle channel 860.0MHz 30MHz – 1GHz



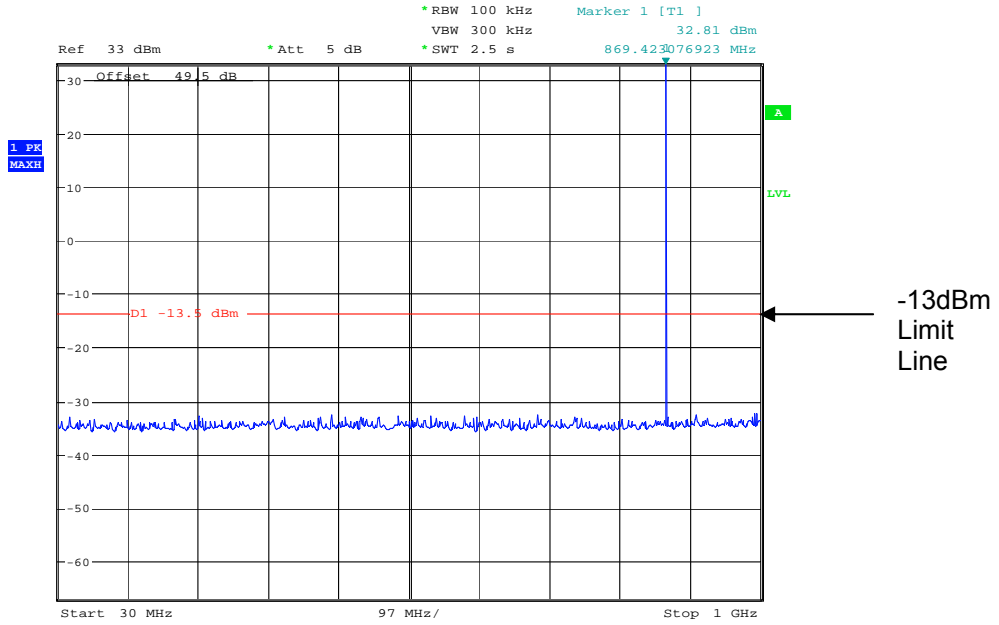
Date: 28.JUL.2008 11:22:55

Conducted emissions Middle channel 860.0MHz 1GHz – 4.5GHz



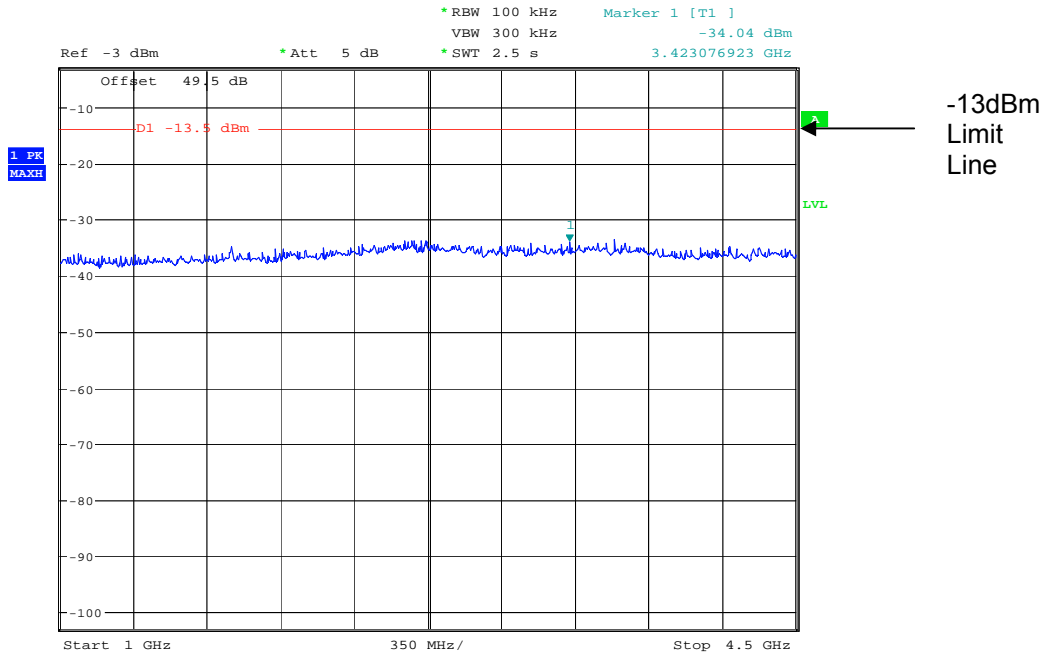
Date: 28.JUL.2008 11:23:50

Conducted emissions Top channel 869.0MHz 30MHz – 1GHz



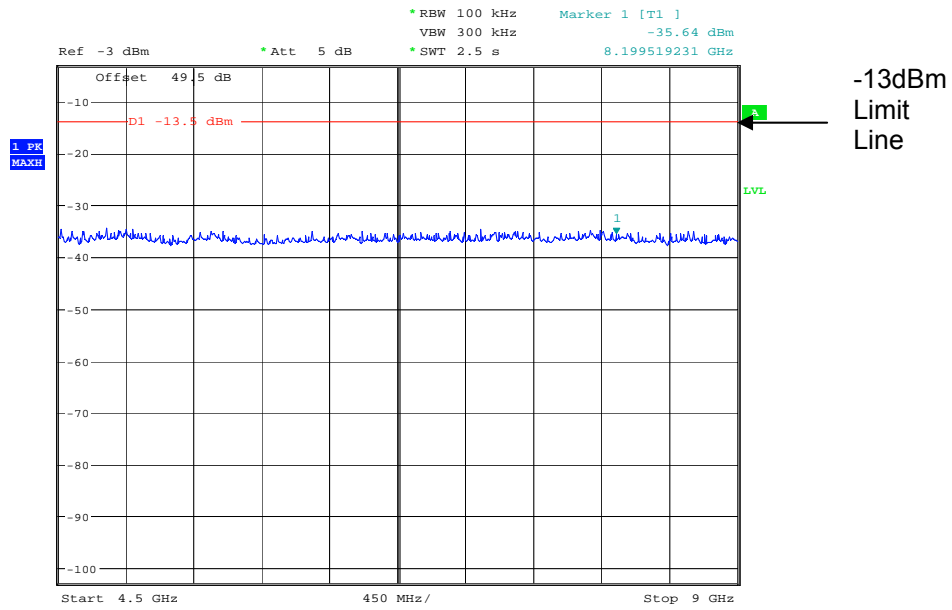
Date: 28.JUL.2008 11:26:24

Conducted emissions Top channel 869.0MHz 1GHz – 4.5GHz



Date: 28.JUL.2008 11:27:09

Conducted emissions Top channel 867.5MHz 4.5GHz – 9GHz



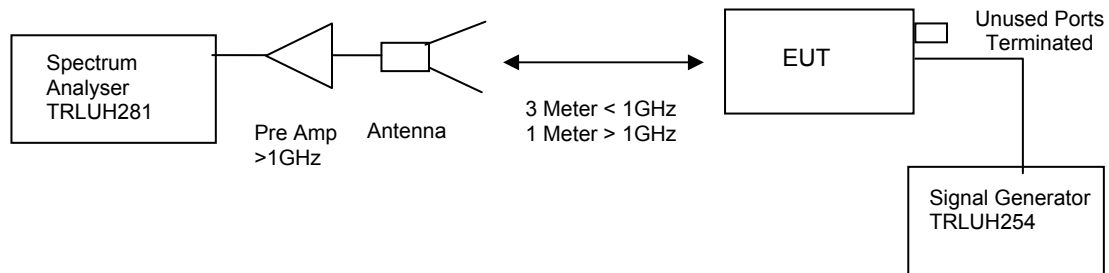
Date: 28.JUL.2008 11:28:05

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 60 – 174303 unit

Ambient temperature = 24°C Test Signal = F3E
 Relative humidity = 60%
 Conditions = OATS
 Supply voltage = +12Vdc
 Supply Frequency = N/A



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 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

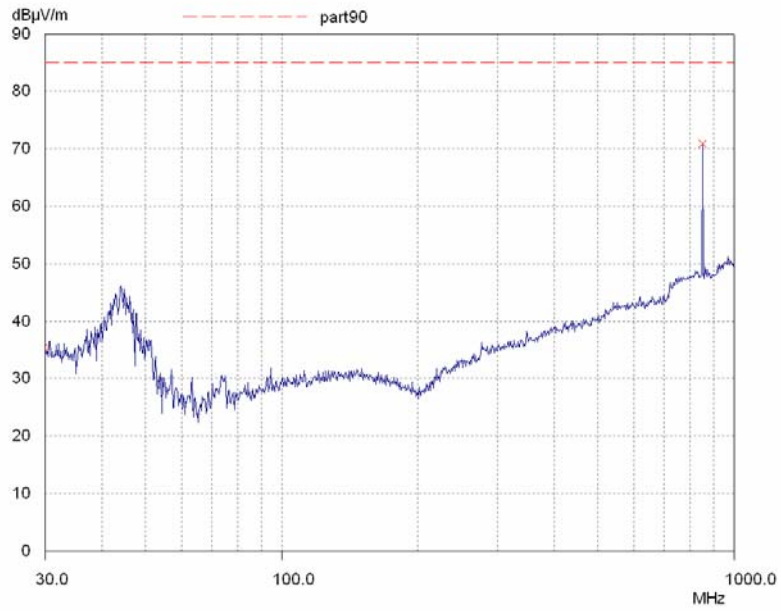
FREQUENCY RANGE	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	CALCULATED EIRP (dBm)	LIMIT (dBm)
30MHz – 9GHz	No Significant Emissions Within 20dBs of the Limit						-13dBm

The test equipment used for the Transmitter Spurious Emissions:

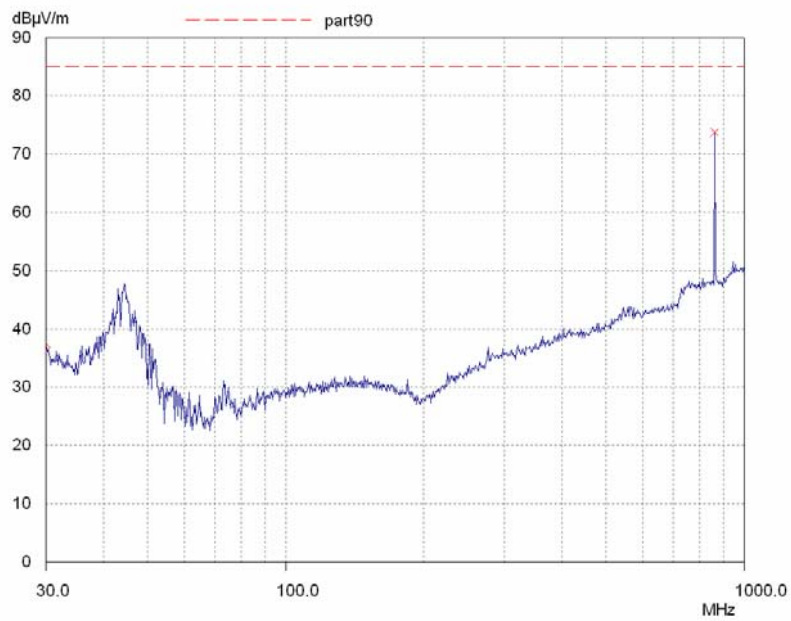
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
RECEIVER	R&S	ESVS10	825892/006	TRL04	X
HORN	EMCO	3115	9010-3580	138	X
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
PRE AMPLIFIER	HP	8449B	3008A016	572	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
ANTENNA	YORK	CBL611/A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

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

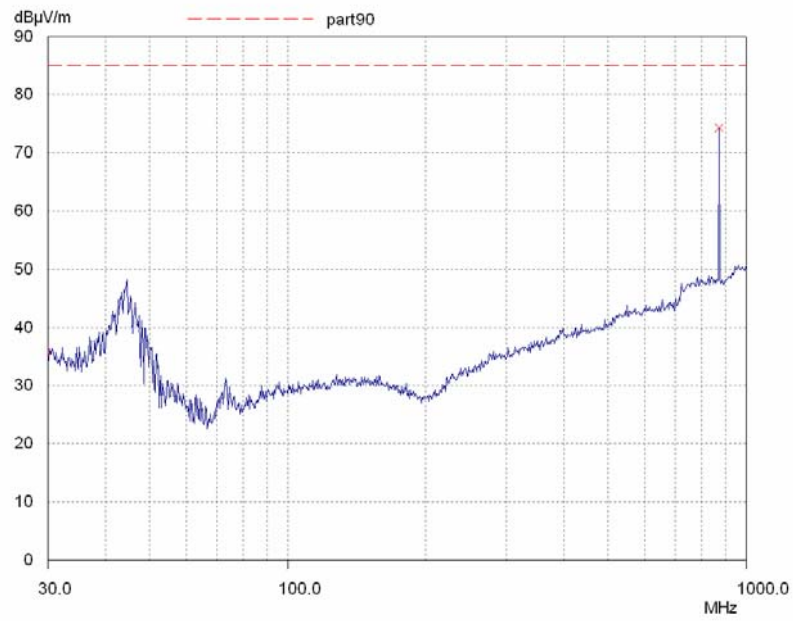
Bottom Channel 30MHz – 1GHz



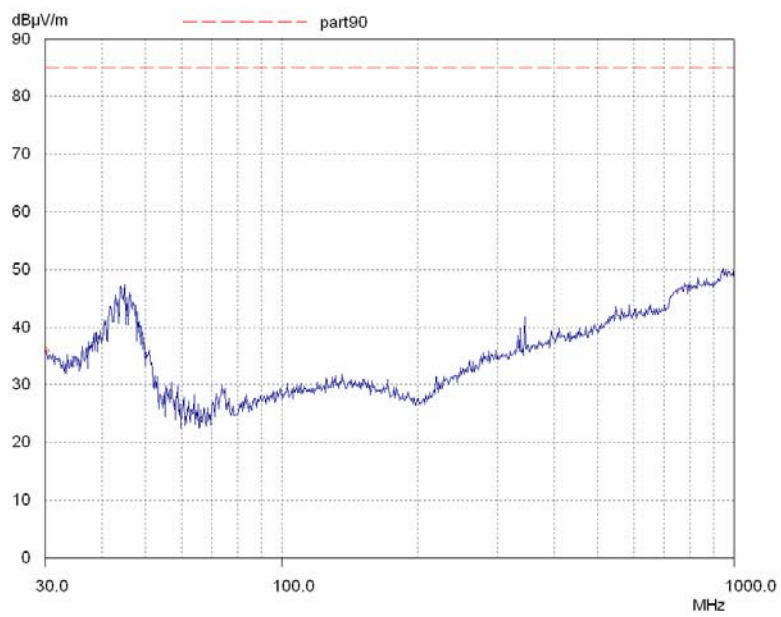
Middle Channel 30MHz – 1GHz



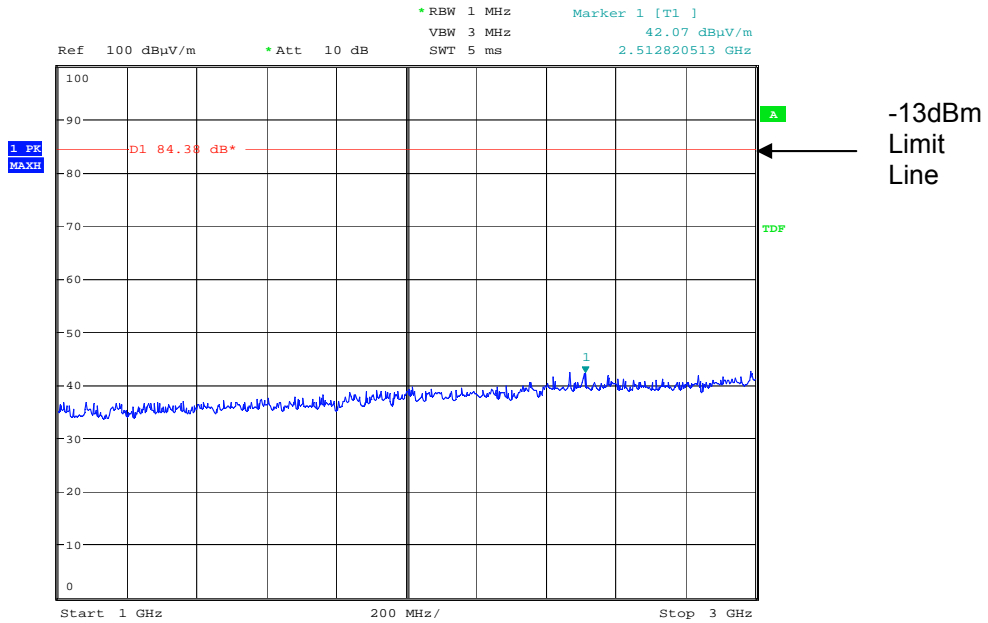
Top Channel 30MHz – 1GHz



No signal, input terminals terminated into 50 Ω 30MHz – 1GHz

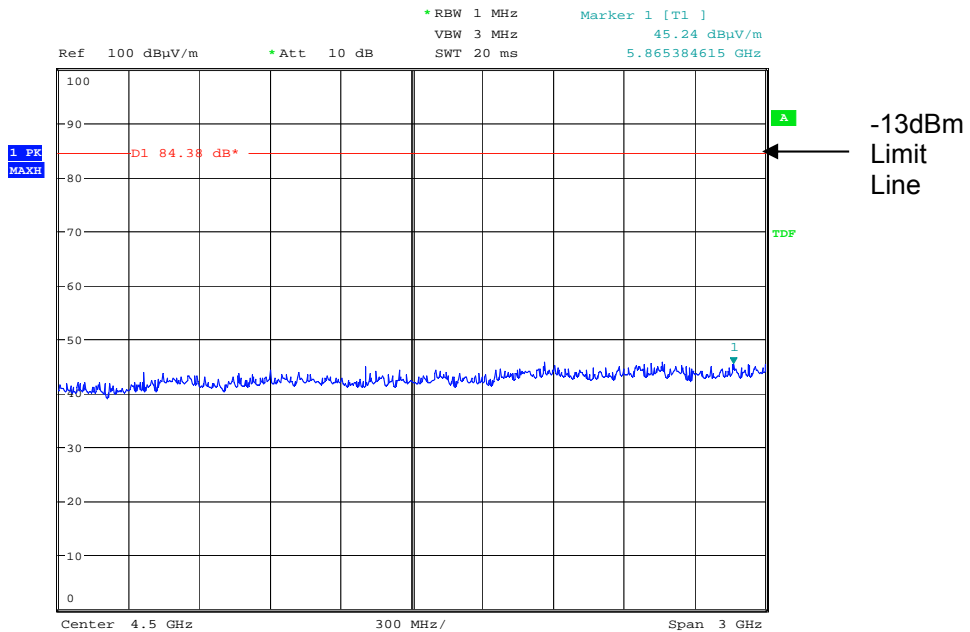


Radiated emissions bottom channel 851.0MHz 1GHz – 3GHz



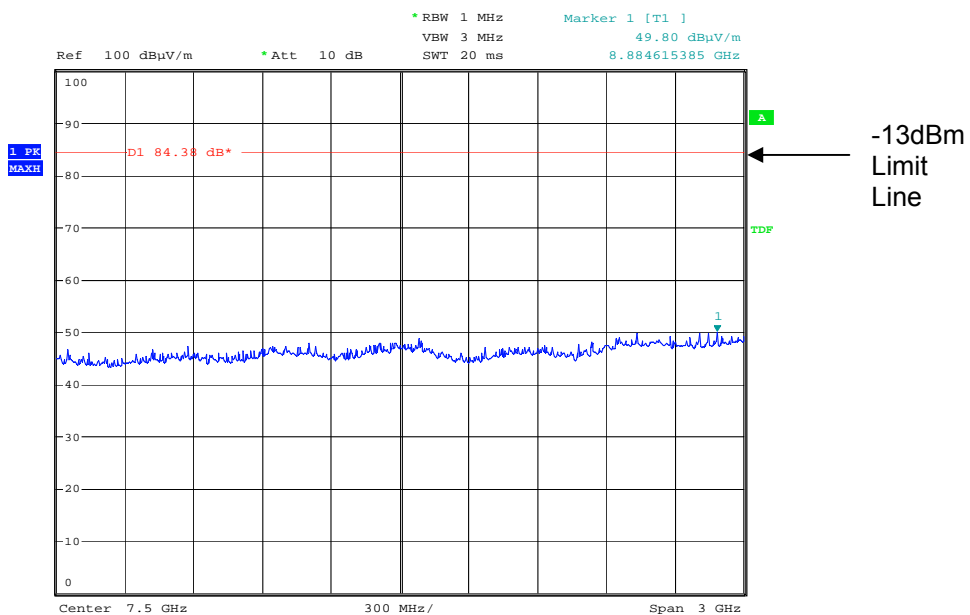
Date: 29.JUL.2008 16:45:12

Radiated emissions bottom channel 851.0MHz 3GHz – 6GHz



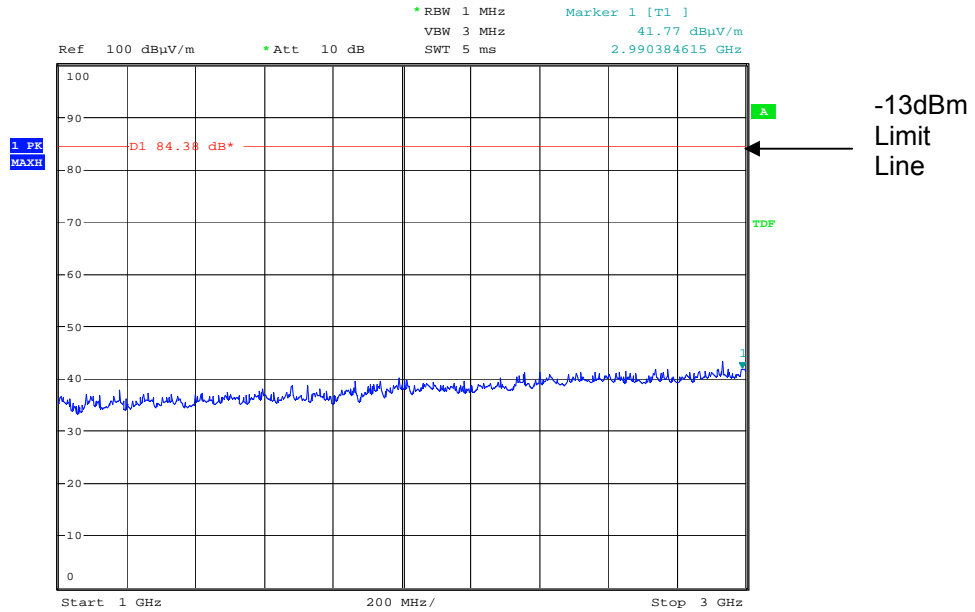
Date: 29.JUL.2008 16:44:58

Radiated emissions bottom channel 851.0MHz 6GHz – 9GHz



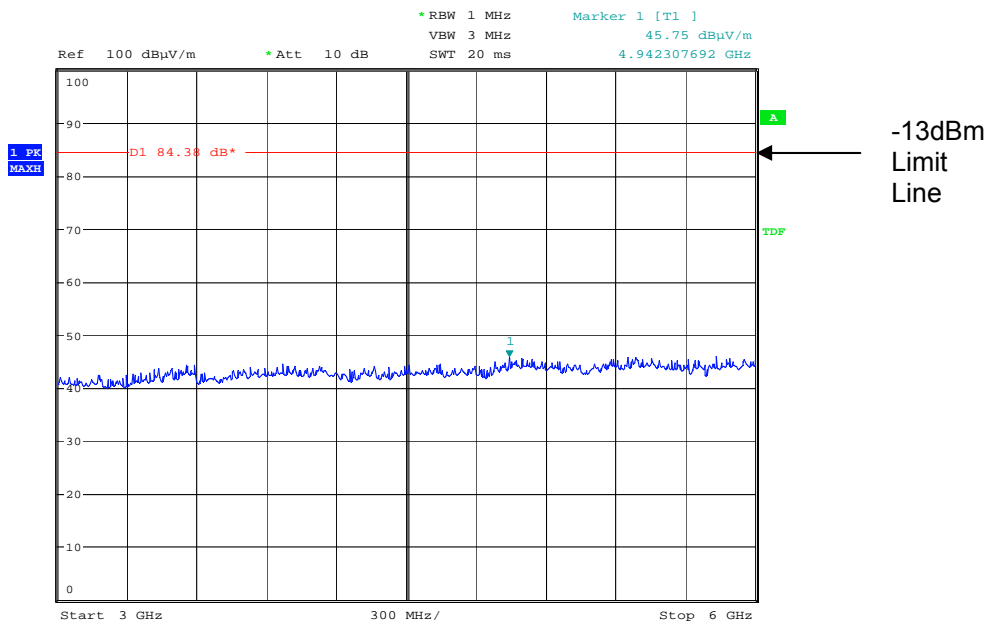
Date: 29.JUL.2008 16:44:46

Radiated emissions Middle channel 860.0MHz 1GHz – 3GHz



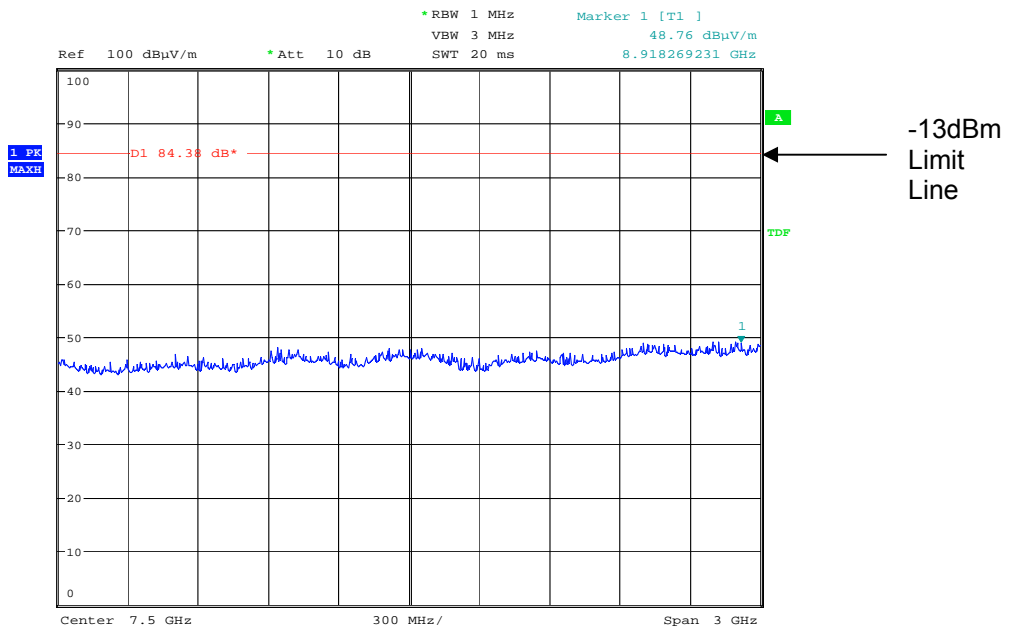
Date: 29.JUL.2008 16:46:13

Radiated emissions Middle channel 860.0MHz 3GHz – 6GHz



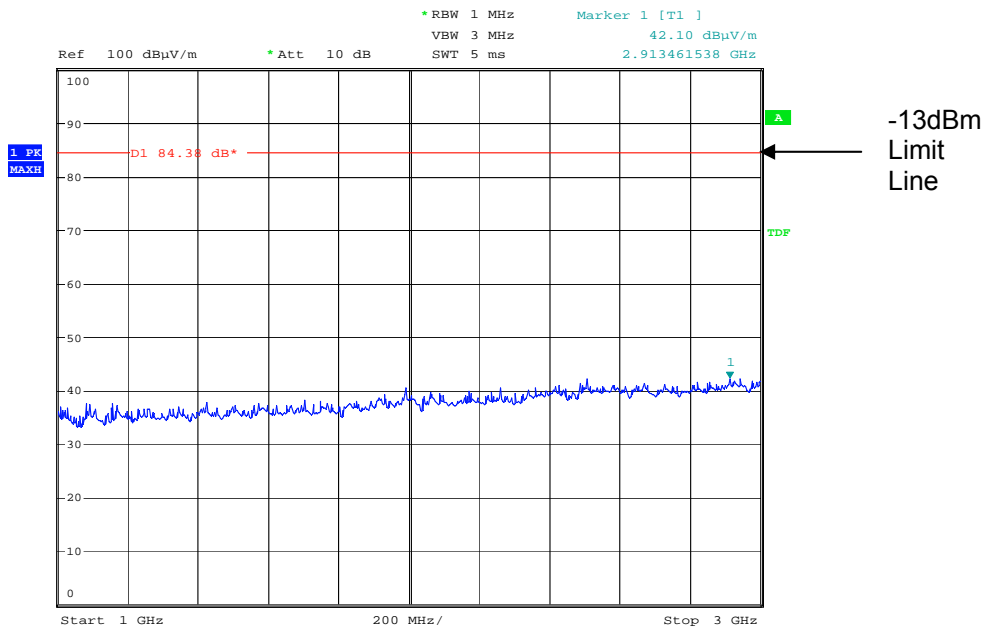
Date: 29.JUL.2008 16:46:34

Radiated emissions Middle channel 860.0MHz 6GHz – 9GHz



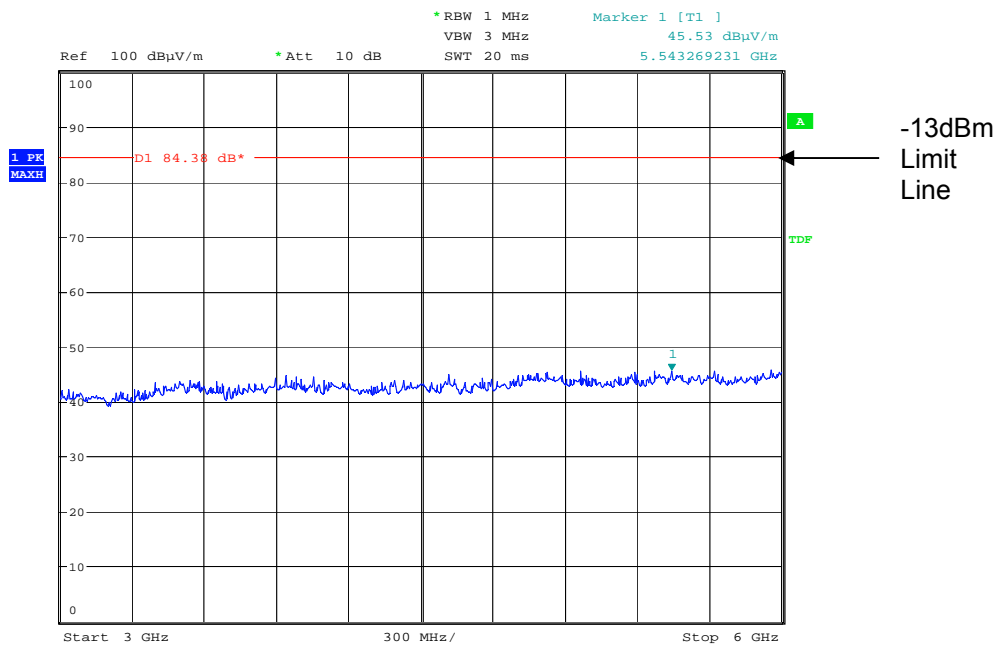
Date: 29.JUL.2008 16:46:45

Radiated emissions Top channel 869.0MHz 1GHz – 3GHz



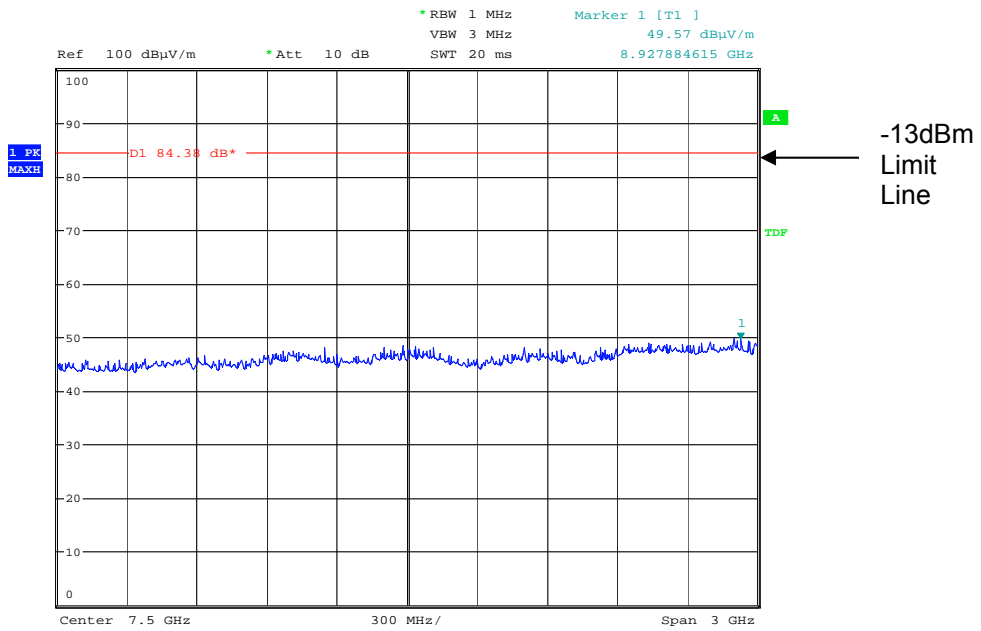
Date: 29.JUL.2008 16:51:17

Radiated emissions Top channel 869.0MHz 3GHz – 6GHz



Date: 29.JUL.2008 16:49:20

Radiated emissions Top channel 869.0MHz 6GHz – 9GHz



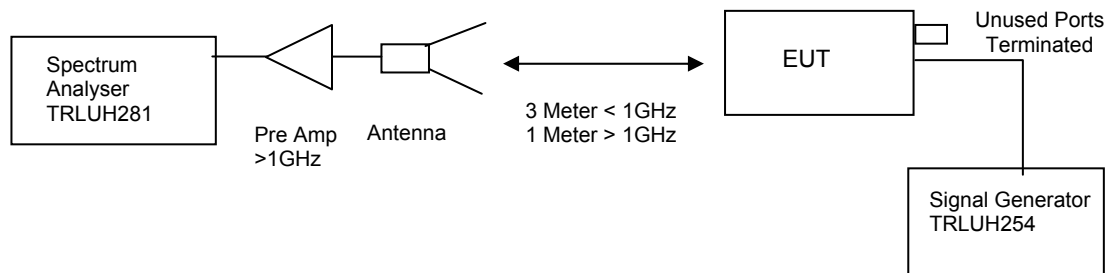
Date: 29.JUL.2008 16:50:33

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 60 – 174203 Unit

Ambient temperature	=	23°C	Test Signal	=	F3E
Relative humidity	=	62%			
Conditions	=	OATS			
Supply voltage	=	+12Vdc			
Supply Frequency	=	N/A			



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

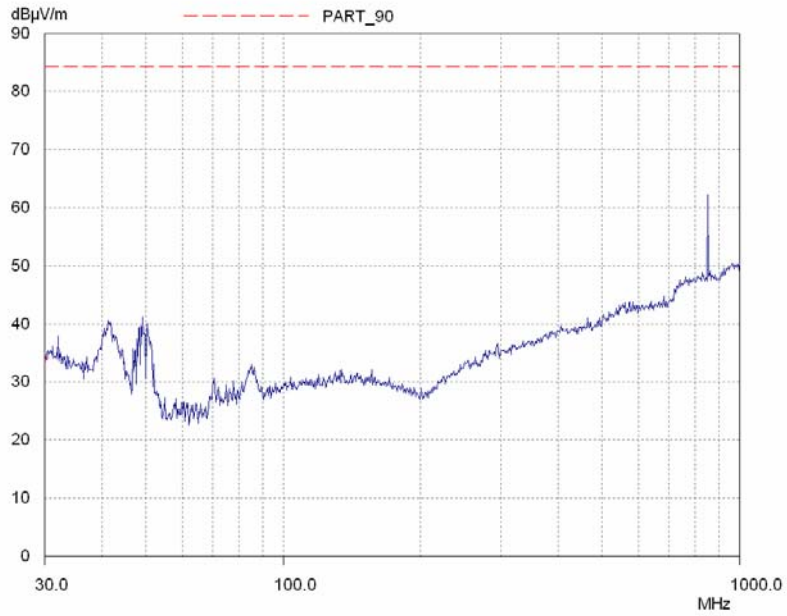
FREQUENCY RANGE	FREQ. (MHz)	MEAS. Rx. (dBμV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBμV/m)	CALCULATED EIRP (dBm)	LIMIT (dBm)
30MHz – 9GHz	No Significant Emissions Within 20 dB of the Limit						-13dBm

The test equipment used for the Transmitter Spurious Emissions:

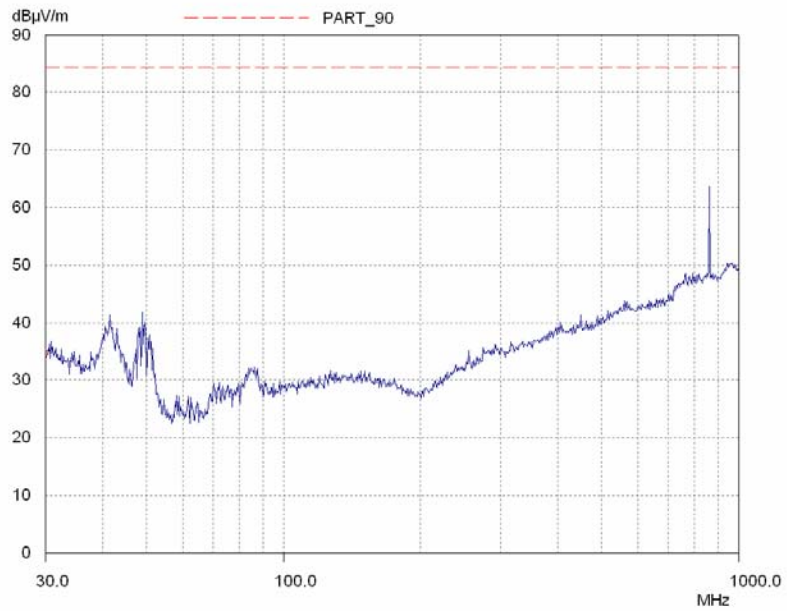
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
RECEIVER	R&S	ESVS10	825892/006	TRL04	X
HORN	EMCO	3115	9010-3580	138	X
SPECTRUM ANALYSER	R&S	FSU46	200034	UH281	X
PRE AMPLIFIER	HP	8449B	3008A016	572	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
ANTENNA	YORK	CBL611/A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

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053–DOWNLINK 60 – 174203 Unit

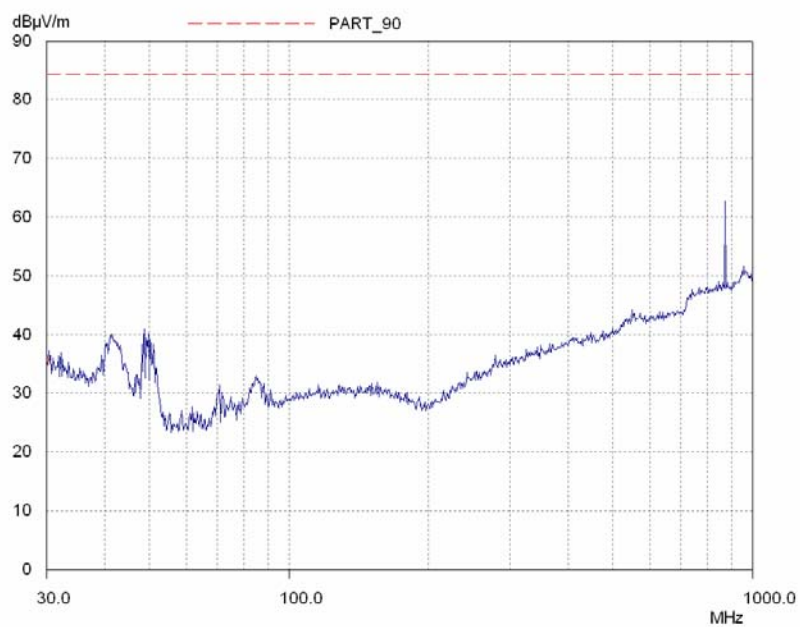
Bottom Channel 30MHz – 1GHz



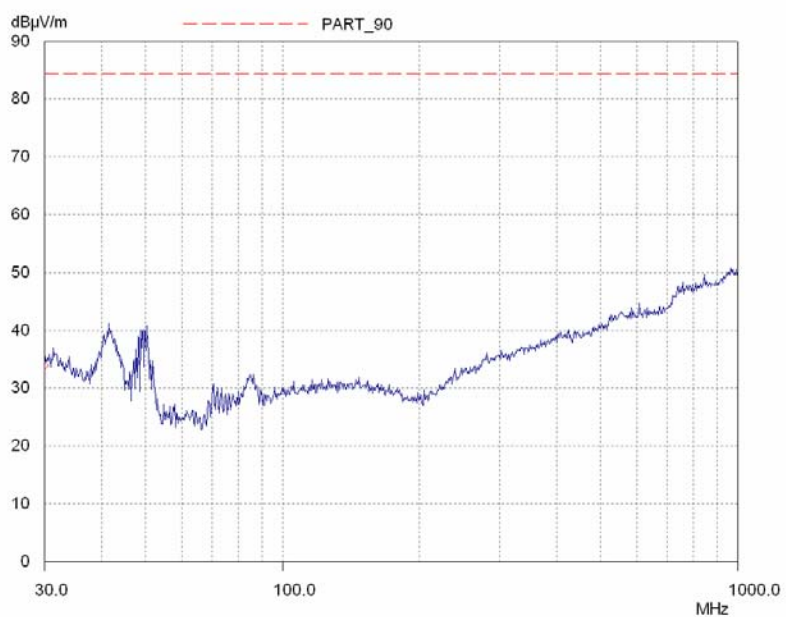
Middle Channel 30MHz – 1GHz



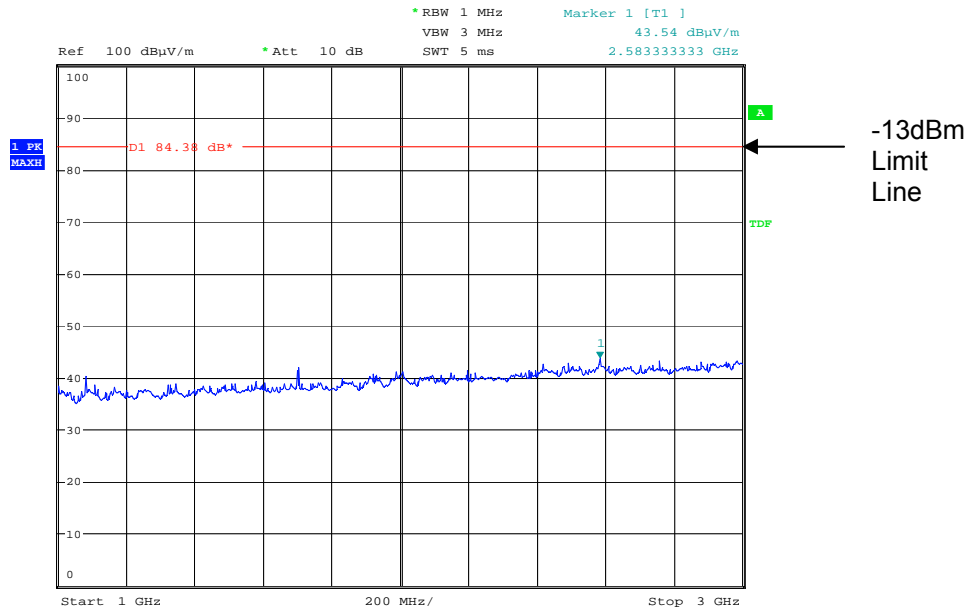
Top Channel 30MHz – 1GHz



No signal, input terminals terminated into 50 Ω 30MHz – 1GHz

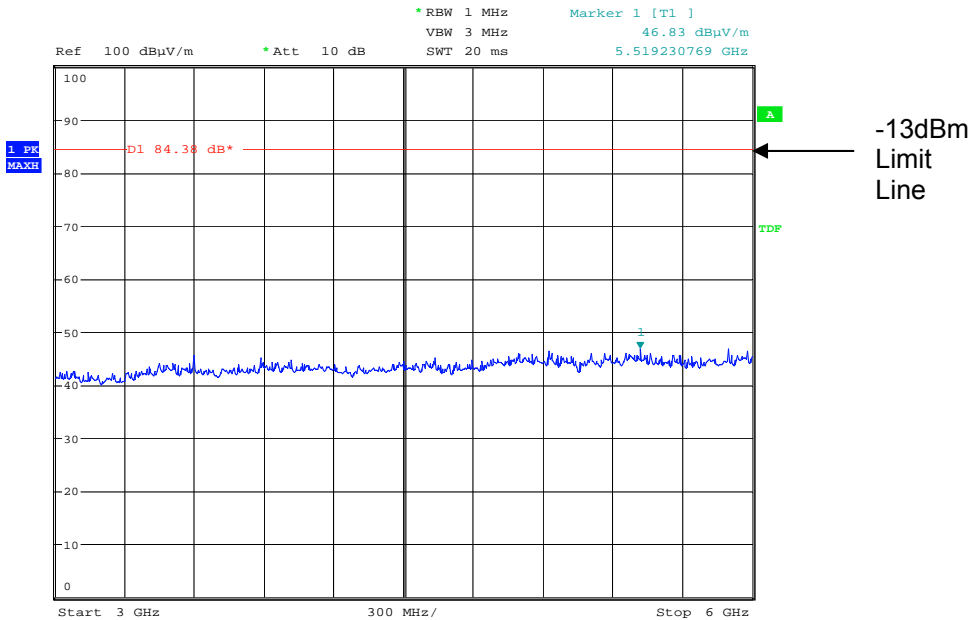


Radiated emissions bottom channel 851.0MHz 1GHz – 3GHz



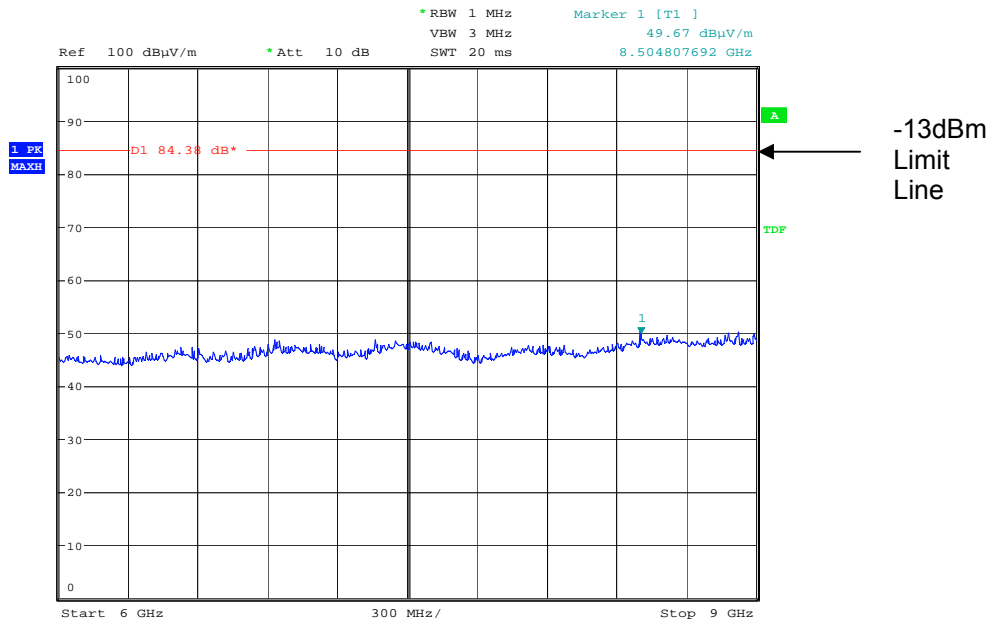
Date: 29.JUL.2008 15:06:55

Radiated emissions bottom channel 851.0MHz 3GHz – 6GHz



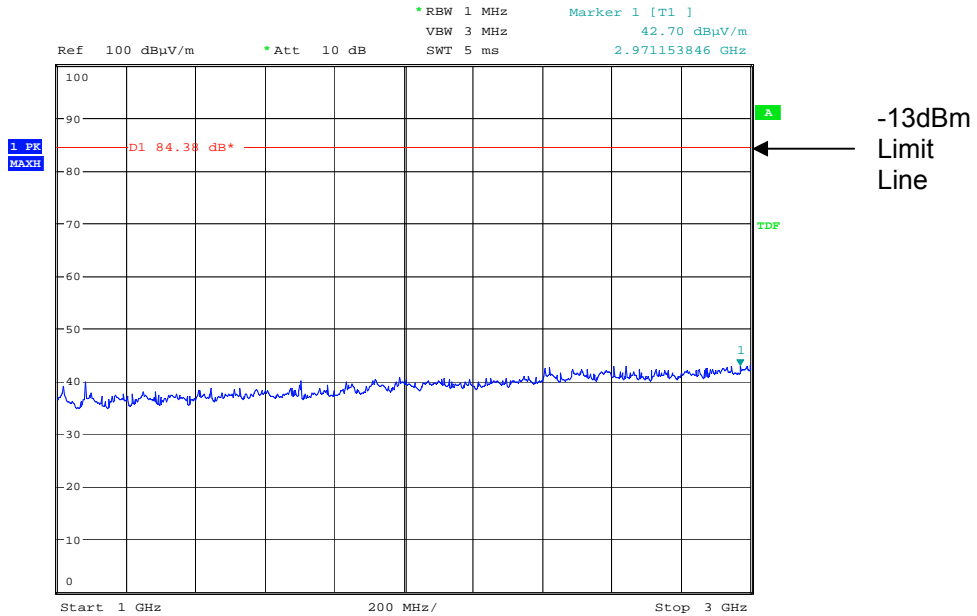
Date: 29.JUL.2008 15:07:23

Radiated emissions bottom channel 851.0MHz 6GHz – 9GHz



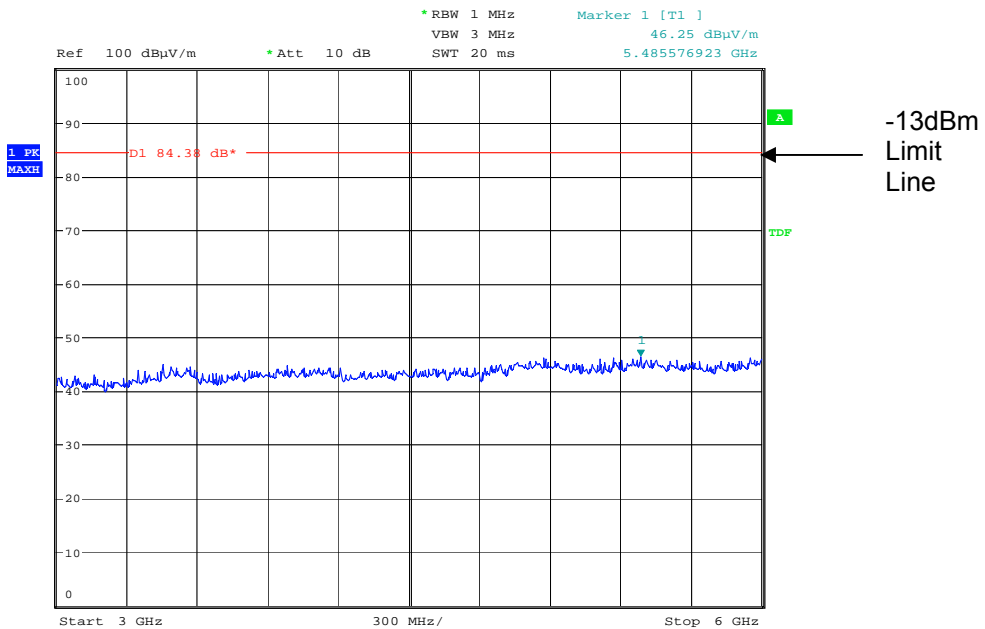
Date: 29.JUL.2008 15:07:55

Radiated emissions middle channel 860.0MHz 1GHz – 3GHz



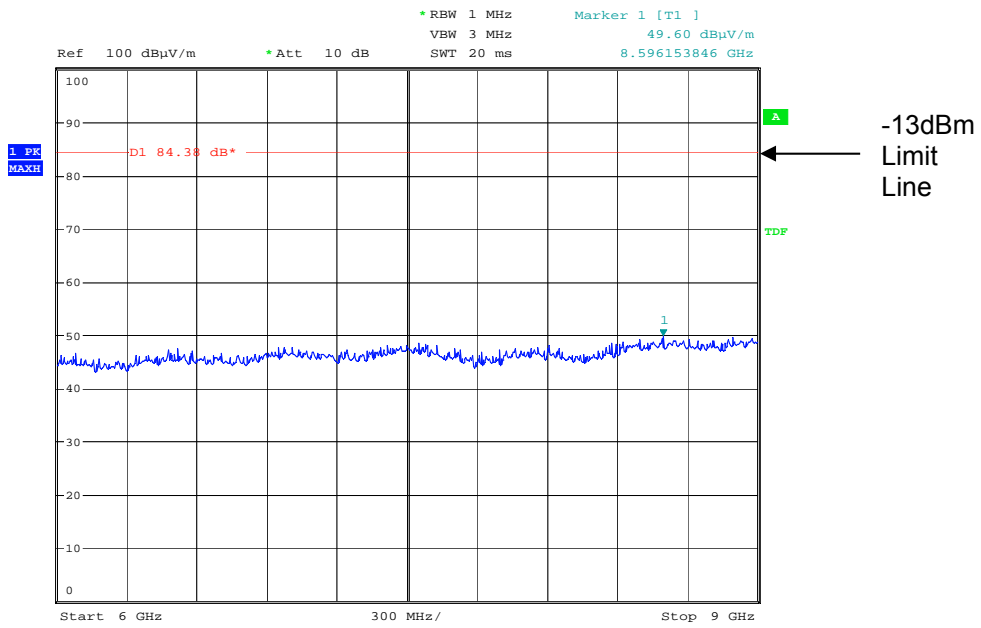
Date: 29.JUL.2008 15:12:34

Radiated emissions middle channel 860.0MHz 3GHz – 6GHz



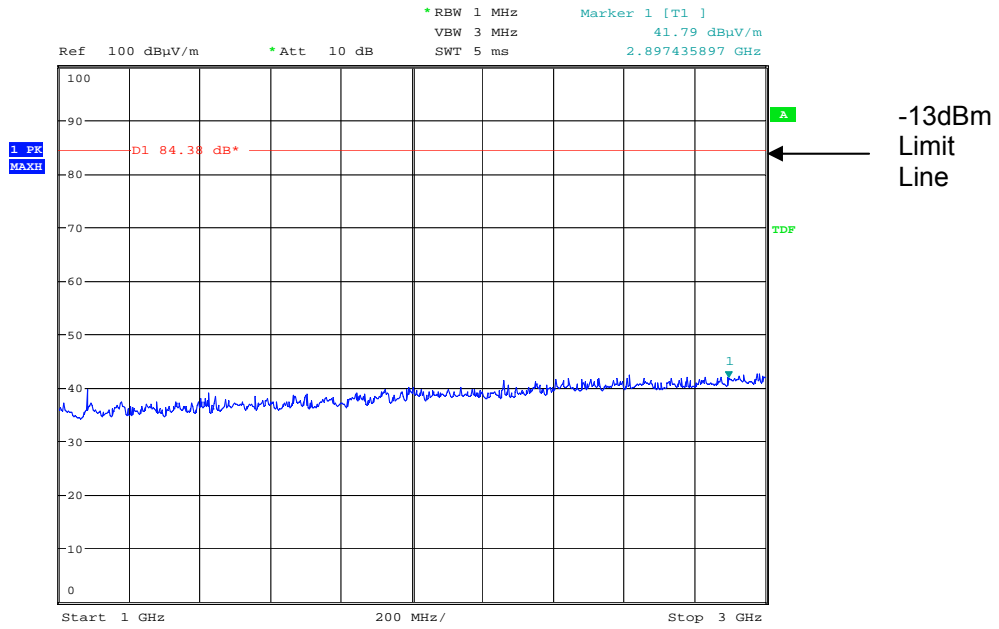
Date: 29.JUL.2008 15:13:02

Radiated emissions middle channel 860.0MHz 6GHz – 9GHz



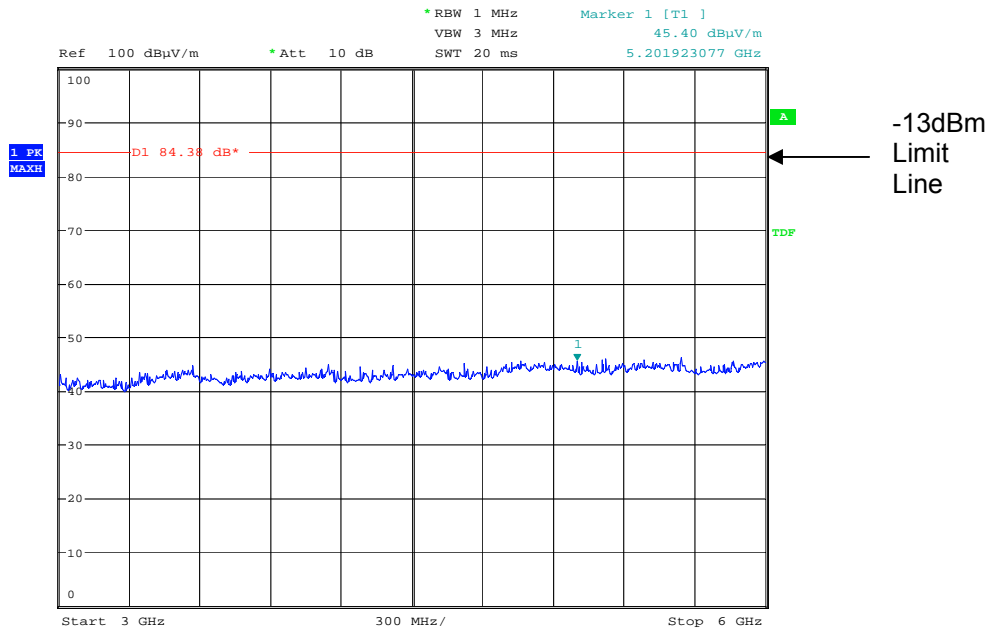
Date: 29.JUL.2008 15:13:24

Radiated emissions top channel 860.0MHz 1GHz – 3GHz



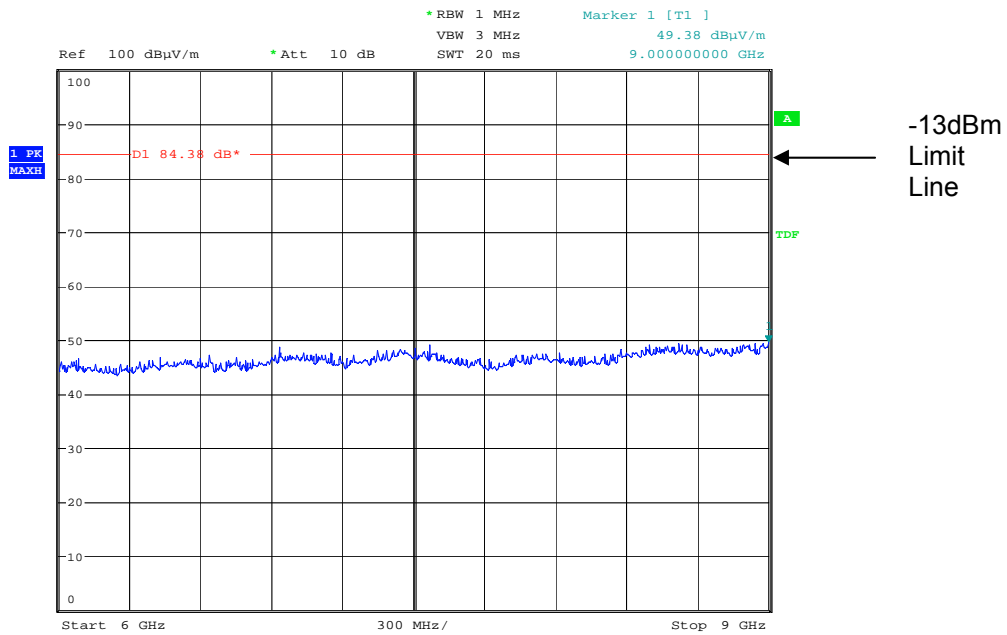
Date: 29.JUL.2008 15:17:12

Radiated emissions top channel 860.0MHz 3GHz – 6GHz



Date: 29.JUL.2008 15:17:50

Radiated emissions top channel 860.0MHz 6GHz – 9GHz

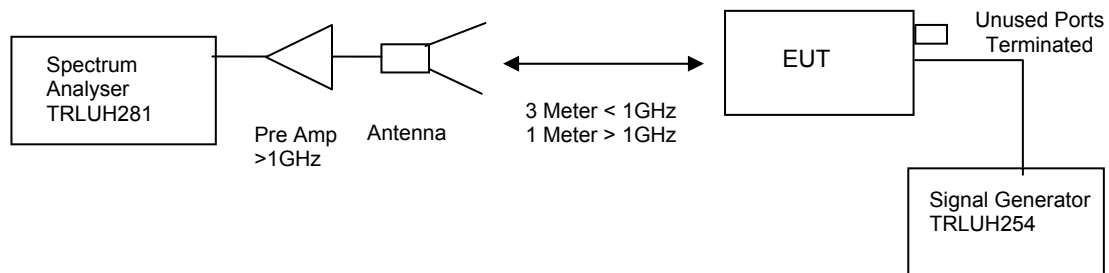


Date: 29.JUL.2008 15:18:22

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– UPLINK 60 – 214802 Unit

Ambient temperature = 23°C Test Signal = F3E
 Relative humidity = 62%
 Conditions = OATS
 Supply voltage = +12Vdc
 Supply Frequency = N/A



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

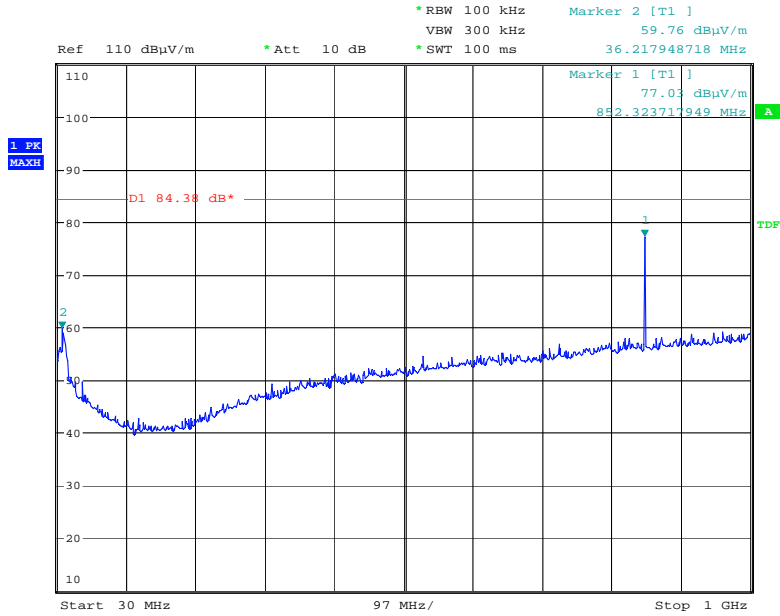
FREQUENCY RANGE	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	CALCULATED EIRP (dBm)	LIMIT (dBm)
30MHz – 9GHz	No Significant Emissions Within 20 dB of the Limit						-13dBm

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

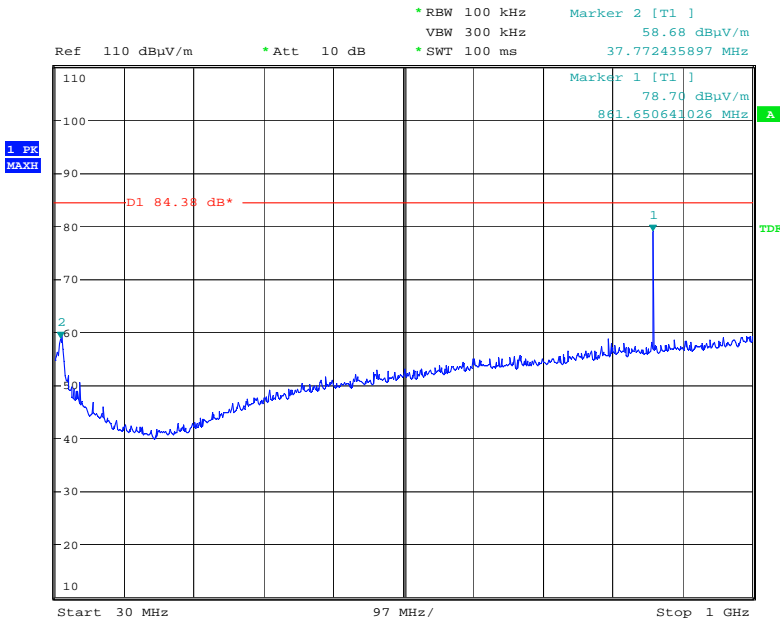
AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– UPLINK 60 – 214802 Unit

Bottom Channel 30MHz – 1GHz



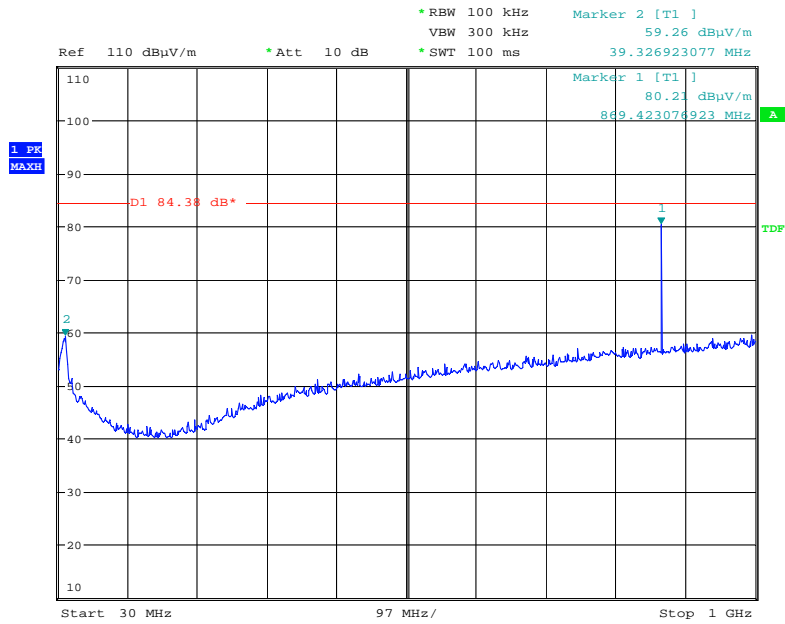
Date: 25.JUL.2008 14:40:38

Middle Channel 30MHz – 1GHz



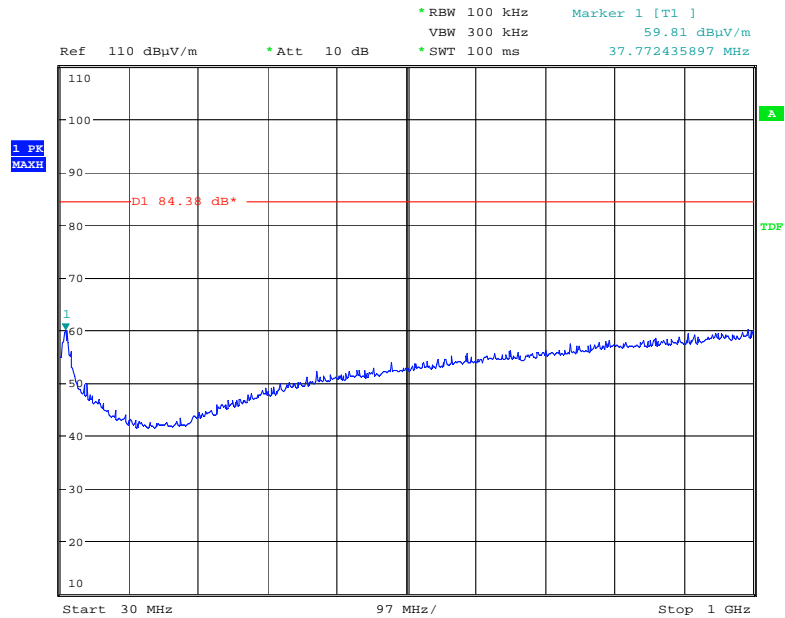
Date: 25.JUL.2008 14:39:58

Top Channel 30MHz – 1GHz



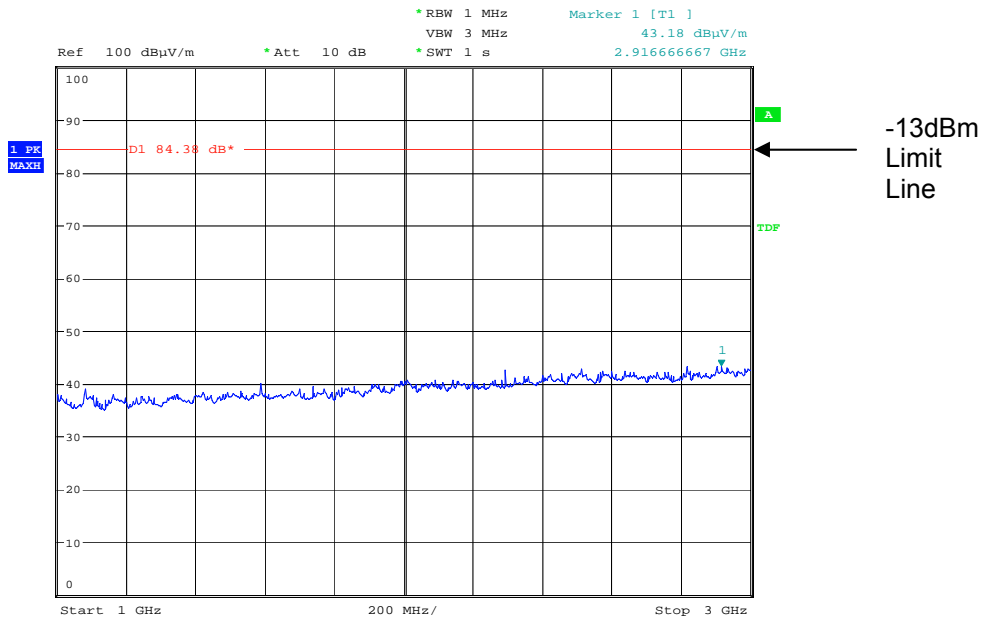
Date: 25.JUL.2008 14:38:37

No signal, input terminals terminated into 50 Ω 30MHz – 1GHz



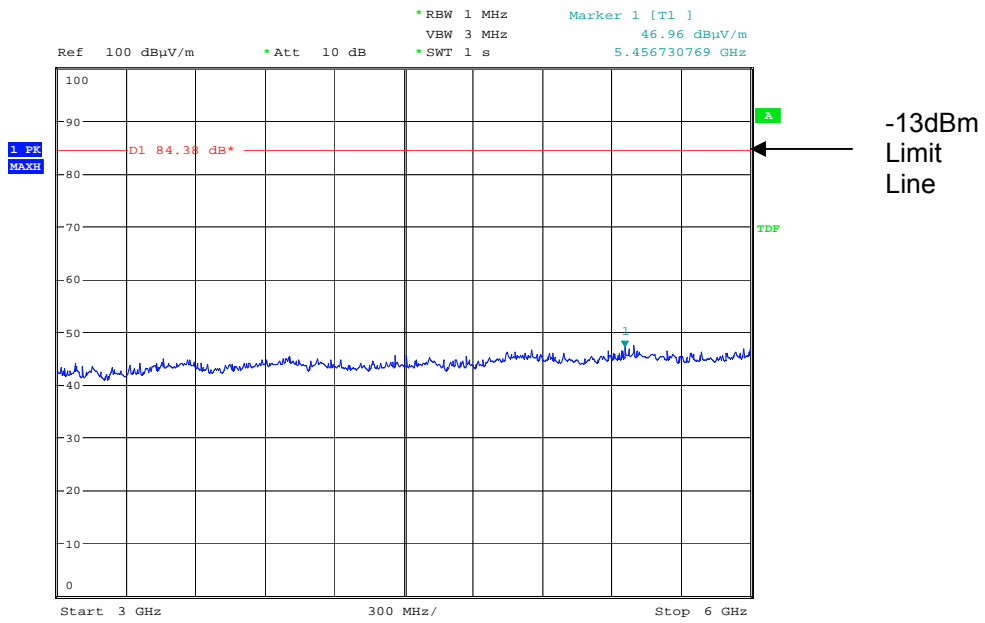
Date: 25.JUL.2008 14:46:06

Radiated emissions bottom channel 851.0MHz 1GHz – 3GHz



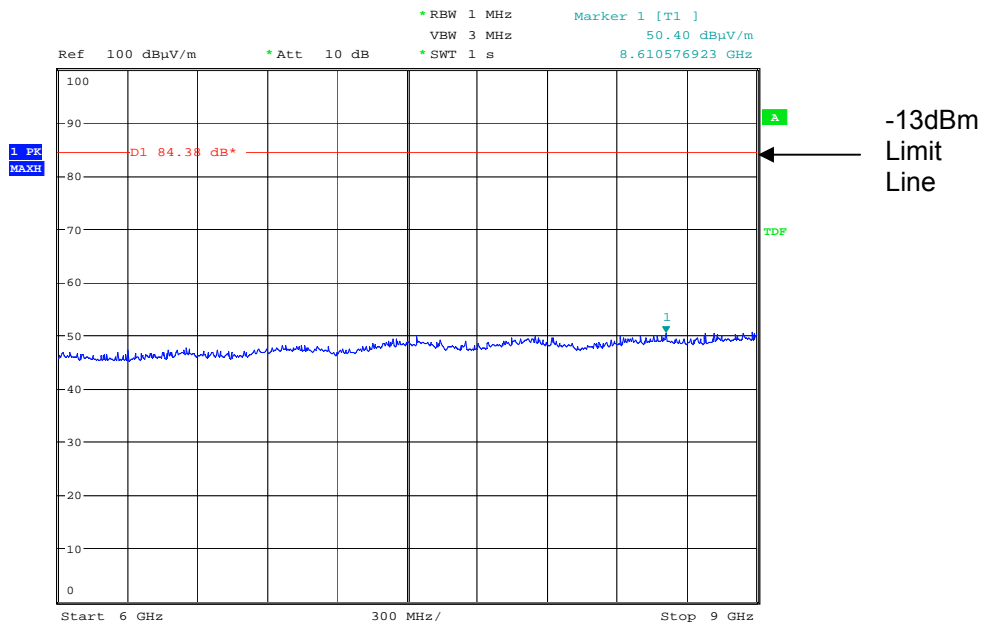
Date: 25.JUL.2008 14:19:04

Radiated emissions bottom channel 851.0MHz 3GHz – 6GHz



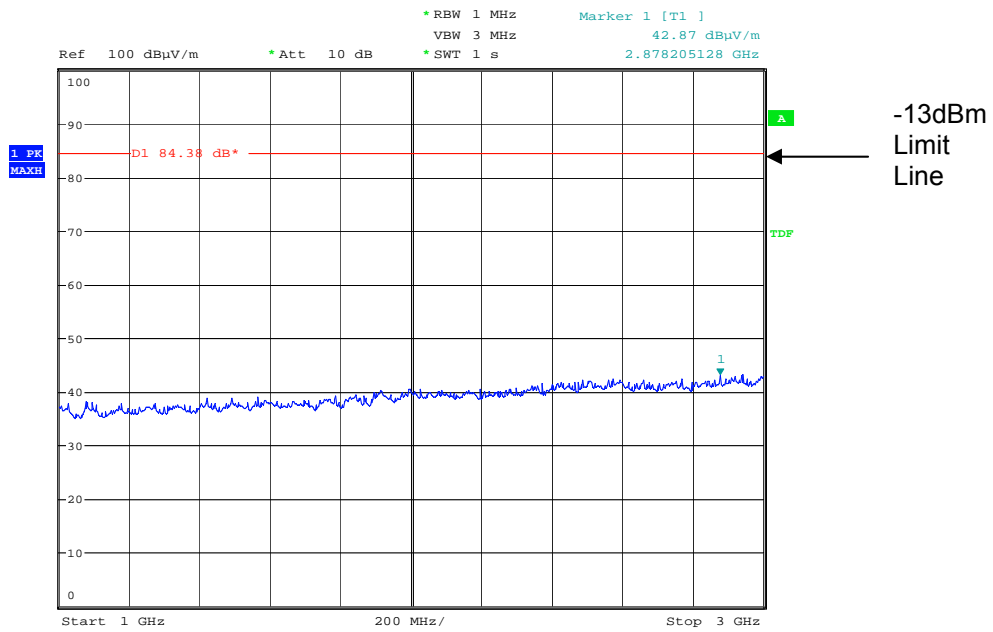
Date: 25.JUL.2008 14:19:24

Radiated emissions bottom channel 851.0MHz 6GHz – 9GHz



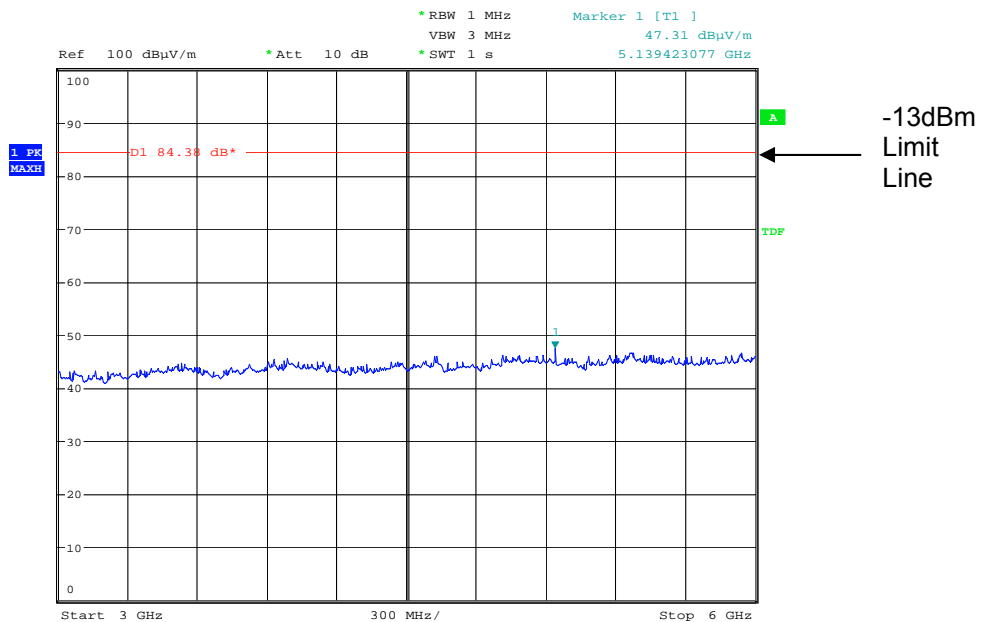
Date: 25.JUL.2008 14:20:09

Radiated emissions middle channel 860.0MHz 1GHz – 3GHz



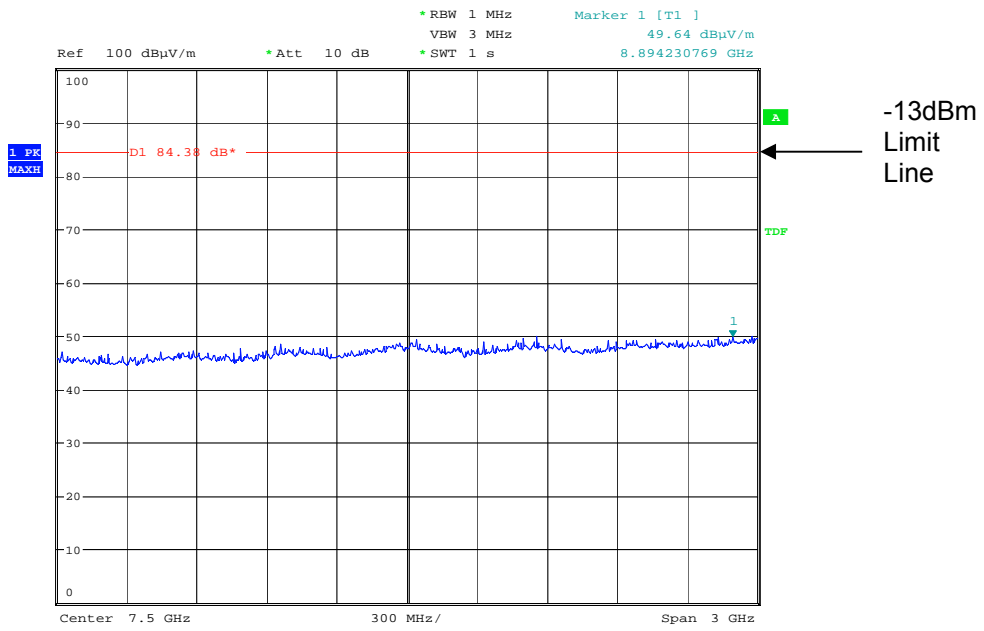
Date: 25.JUL.2008 14:24:49

Radiated emissions middle channel 860.0MHz 3GHz – 6GHz



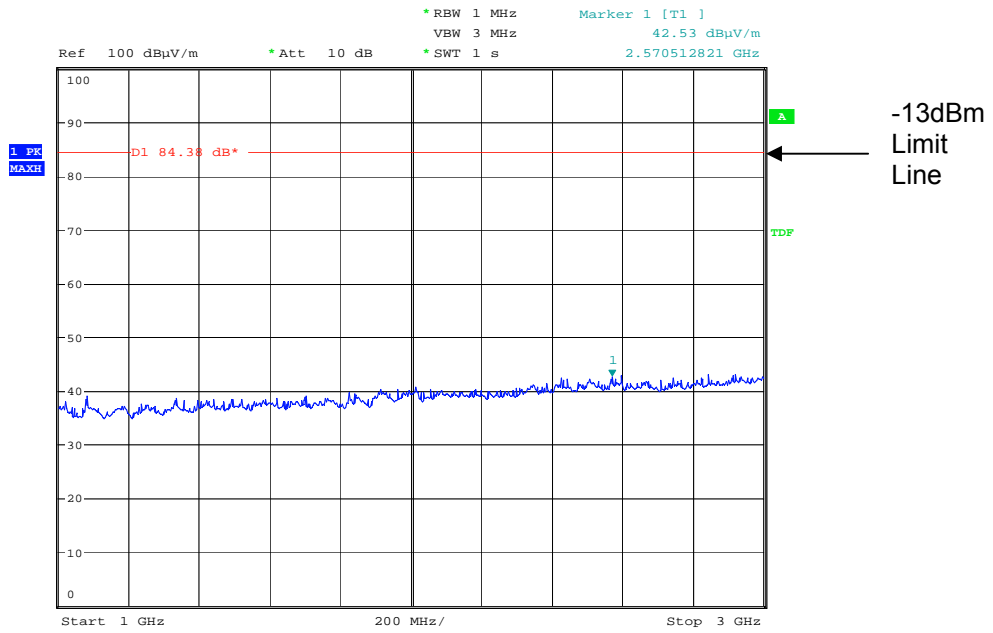
Date: 25.JUL.2008 14:24:31

Radiated emissions middle channel 860.0MHz 6GHz – 9GHz



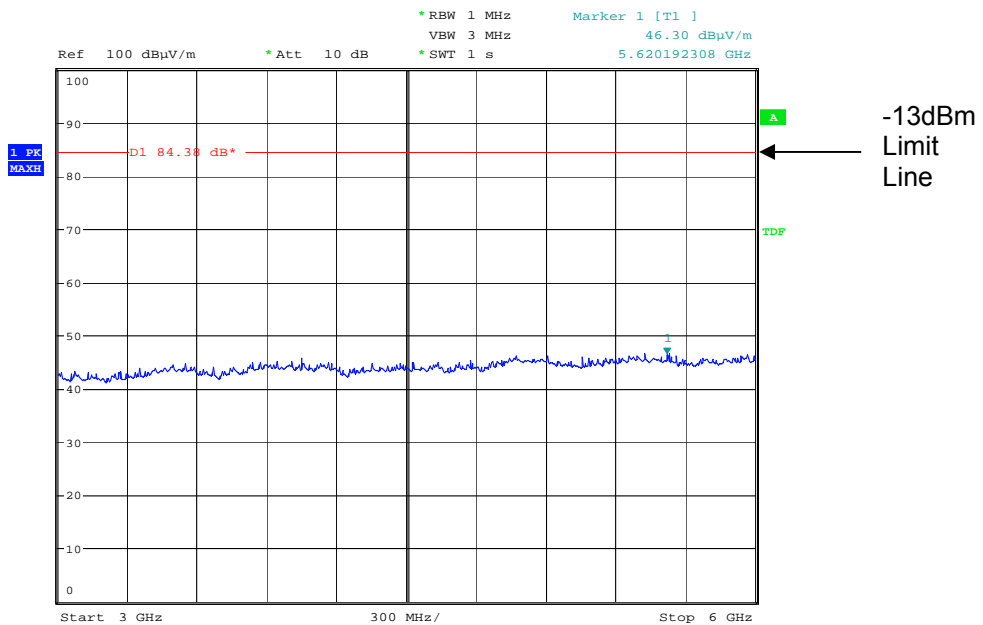
Date: 25.JUL.2008 14:24:09

Radiated emissions top channel 869.0MHz 1GHz – 3GHz



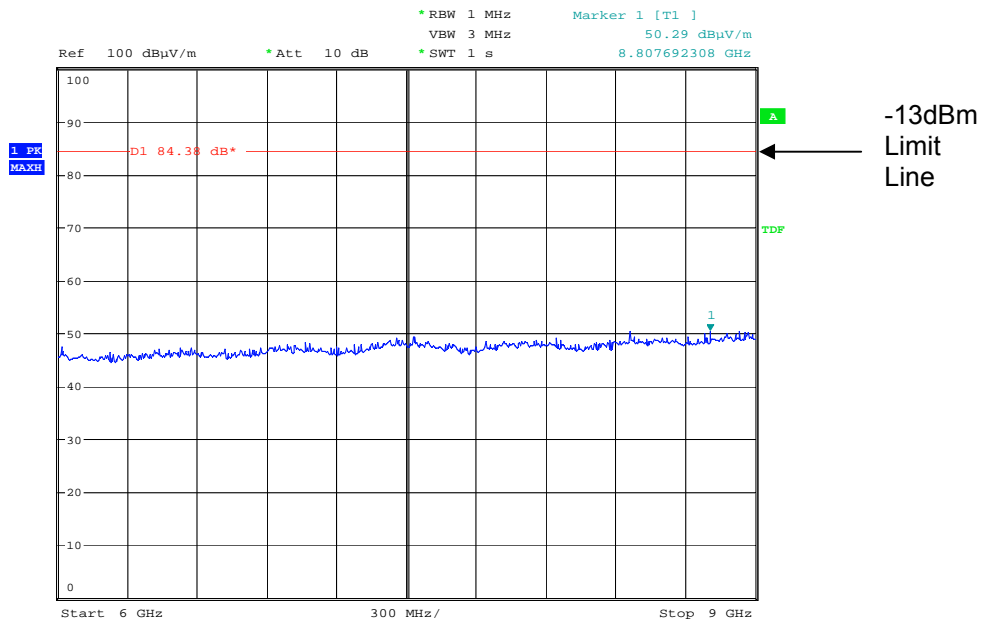
Date: 25.JUL.2008 14:25:28

Radiated emissions top channel 869.0MHz 3GHz – 6GHz



Date: 25.JUL.2008 14:25:48

Radiated emissions top channel 869.0MHz 6GHz – 9GHz



Date: 25.JUL.2008 14:26:06

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%**