



**REPORT ON THE CERTIFICATION TESTING OF A
AXELL WIRELESS
CHANNEL SELECTIVE REPEATER
60-228701
WITH RESPECT TO
THE FCC RULES CFR 47, PART 90 Subpart I
PRIVATE LAND MOBILE REPEATER.**

TEST REPORT NO: 9F2843WUS1
COPY NO: 1
ISSUE NO: 1
FCC ID: NEO60-2287SERIES

**REPORT ON THE CERTIFICATION TESTING OF A
AXELL WIRELESS
CHANNEL SELECTIVE REPEATER
60-228701
WITH RESPECT TO
THE FCC RULES CFR 47, PART 90 Subpart I
PRIVATE LAND MOBILE REPEATER.**

TEST DATE: 19th – 20th November 2009



APPROVED BY:

J CHARTERS
RADIO PRODUCT
MANAGER

DATE: 17th June 2010

Distribution:

- Copy Nos:
1. Axell Wireless
 2. TCB: TRaC EMC & Safety
 3. TRaC Telecoms & Radio

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

The results herein relate only to the sample tested. Full results are contained in the relevant works order file.

UP HOLLAND

Moss View, Nipe Lane, Up Holland, West Lancashire, WN8 9PY, UK.
T +44 (0)1695 556666 F +44 (0)1695 557077 E test@tracglobal.com
www.tracglobal.com

CONTENTS

	PAGE		
CERTIFICATE OF CONFORMITY & COMPLIANCE	4		
APPLICANT'S SUMMARY	5		
EQUIPMENT TEST CONDITIONS	6		
TESTS REQUIRED	6		
TEST RESULTS	7 - 80		
		ANNEX	
PHOTOGRAPHS		A	
PHOTOGRAPH No. 1: Test setup			
PHOTOGRAPH No. 2: Overview			
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.			

CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	NEO60-2287SERIES
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	FCC RULES CFR 47, Part 90 Subpart I
TEST RESULT:	Compliant to Specification
EQUIPMENT UNDER TEST:	60-228701
EQUIPMENT TYPE:	Private Land Mobile Repeater
MAXIMUM GAIN:	493MHz Band Uplink 91.95 dB
	499MHz Band Uplink 93.44 dB
	490MHz Band Downlink 90.44 dB
	496MHz Band Downlink 90.59 dB
MAXIMUM INPUT:	493MHz Band Uplink -72.9 dBm
	499MHz Band Uplink -73.6 dBm
	490MHz Band Downlink -65.7 dBm
	496MHz Band Downlink -65.1 dBm
MAXIMUM OUTPUT CONDUCTED:	493MHz Band Uplink 19.05 dBm
	499MHz Band Uplink 19.84 dBm
	490MHz Band Downlink 24.74 dBm
	496MHz Band Downlink 25.49 dBm
MAXIMUM NUMBER OF CHANNELS:	8
CHANNEL BANDWIDTH:	30 kHz
POWER SOURCE(s):	+110Vac
TEST DATE(s):	19 th – 20 th November 2009
APPLICANT:	Axell Wireless
ADDRESS:	Aerial House Asheridge Road Chesham Buckinghamshire HP5 1TU

APPROVED BY:



J CHARTERS
RADIO
PRODUCT
MANAGER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT): 60-228701

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 CONTACT PERSON(s): Mr G Dawson

E-mail address: Graham.Dawson@axellwireless.com

APPLICANT: Axell Wireless

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

TEL: +44 (0)1494 777000

FAX: +44 (0)1494 778456

MANUFACTURER: Axell Wireless

EUT(s) COUNTRY OF ORIGIN: United Kingdom

TEST LABORATORY: TRaC Telecoms & Radio, Up Holland

UKAS ACCREDITATION No: 0971

TEST DATE(s): 19th – 20th November 2009

TEST REPORT No: 9F2843WUS1

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) | 20°C | |
| 6. | Supply Voltages: | Vnom | +110Vac | |

Note: Vnom voltages are as stated above unless otherwise shown on the test report page

- | | | | | |
|----|---------------------|-----------------------|-------------------------------------|--------|
| 7. | Equipment Category: | Single channel | [] | |
| | | Two channel | [] | |
| | | Multi-channel | <input checked="" type="checkbox"/> | |
| 8. | Channel Bandwidth: | Narrowband | <input checked="" type="checkbox"/> | 30 kHz |
| | | Wideband | [] | |
| 9. | Test Location | TRaC Telecoms & Radio | | |
| | | Up Holland | <input checked="" type="checkbox"/> | |
| | | Hull | [] | |

- | | | |
|-----|--|----------------------------------|
| 10. | Modifications made during test program | No modifications were performed. |
|-----|--|----------------------------------|

System description:

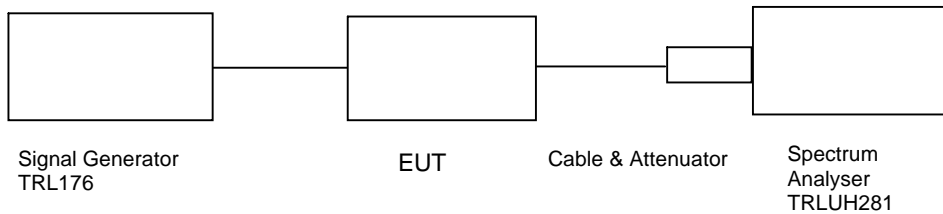
The 60.228701 is bi directional repeater covering two bands in the uplink direction and two bands in the downlink direction. The uplink bands each have 8 channels. The channels in the lowest band are between 492.5125MHz and 493.9625MHz and in the higher band 499.3375MHz and 499.6125MHz. The downlink bands each have 8 channels. The channels in the lowest band are between 489.5125MHz and 490.9625MHz and in the higher band 496.3375MHz and 496.6125MHz.

COMPLIANCE TESTS

AMPLIFIER GAIN – CONDUCTED – PART 2.1046 – UPLINK

Ambient temperature = 20°C
 Relative humidity = 58%
 Supply voltage = +110Vac
 Channel number = See test results

Radio Laboratory



493 MHz Band

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
492.5125	-71.6	0.4	30.3	-11.30	91.00	19.00	80.44
493.7875	-71.5	0.4	30.3	-10.60	91.60	19.70	80.80
493.9625	-72.5	0.4	30.3	-11.25	91.95	19.05	81.15

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

499 MHz Band

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
499.3375	-73.0	0.4	30.3	-10.68	93.02	19.62	82.35
499.4875	-73.2	0.4	30.3	-10.48	93.44	19.84	83.22
499.6125	-72.7	0.4	30.3	-10.20	93.20	20.10	82.65

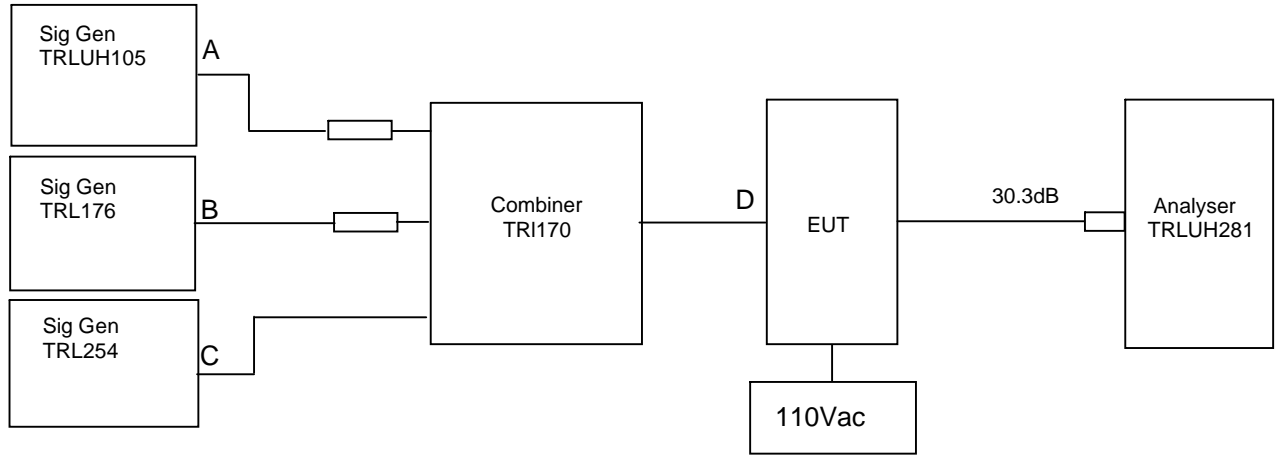
Notes: 1. The signal generator input was increased by 10dBs and the level of the output signal remeasured.

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
ATTENUATOR	BIRD	8308-200	N/A	103	X
ATTENUATOR	BIRD	830-100-N	N/A	222	X
CABLE	TRaC	N/A	N/A	UH273	X
CABLE	TRaC	N/A	N/A	UH274	X

AMPLIFIER INTERMODULATION SPURIOUS EMISSIONS – CONDUCTED – PART 2.1053– UPLINK

Ambient temperature = 24°C
 Relative humidity = 56%
 Supply voltage = +110Vac

Radio Laboratory



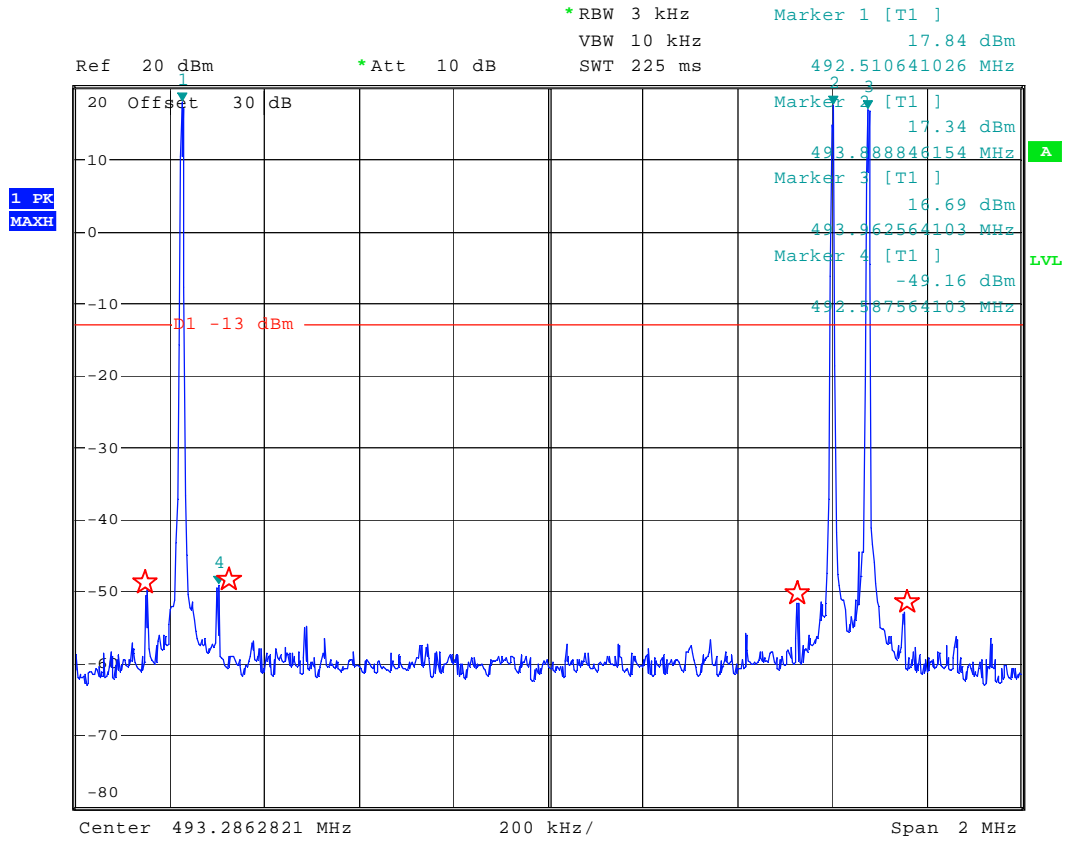
The intermodulation and spurious products were measured with the amplifier operating at maximum gain. A three tone test was conducted using the equipment as above. The input power level was adjusted so the level at point D was 10dB above the maximum input. The cable and attenuator loss between the EUT and the spectrum analyser was 30.3dB.

RF Input Frequency (MHz)			Highest Intermodulation Product Level (dBm)	Limit (dBm)
492.5125	493.8875	493.9625	No Significant Emissions Within 20 dB of Limit	-13
499.3375	499.5875	499.6215	No Significant Emissions Within 20 dB of Limit	-13
492.5125	493.9625	499.6215	No Significant Emissions Within 20 dB of Limit	-13

Test equipment used for intermodulation test

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	REF 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
COMBINER	ELCOM	RC-4-50	N/A	170	X
ATTENUATOR	BIRD	8308-200	N/A	103	X
ATTENUATOR	BIRD	830-100-N	N/A	222	X
CABLE	TRaC	N/A	N/A	UH253	X
CABLE	TRaC	N/A	N/A	UH254	X
CABLE	TRaC	N/A	N/A	UH269	X
CABLE	TRaC	N/A	N/A	UH273	X
CABLE	TRaC	N/A	N/A	UH274	X

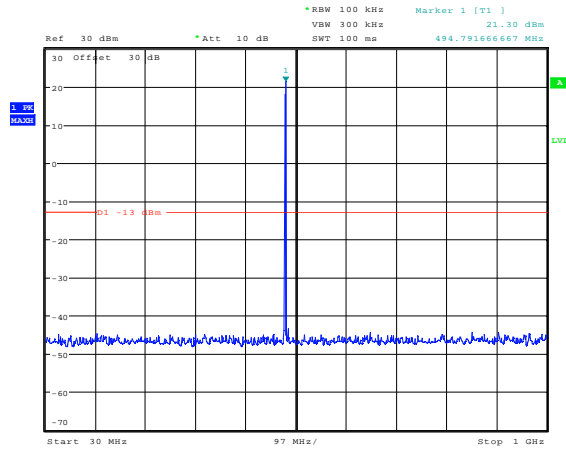
Intermodulation Inband – 493MHz Band



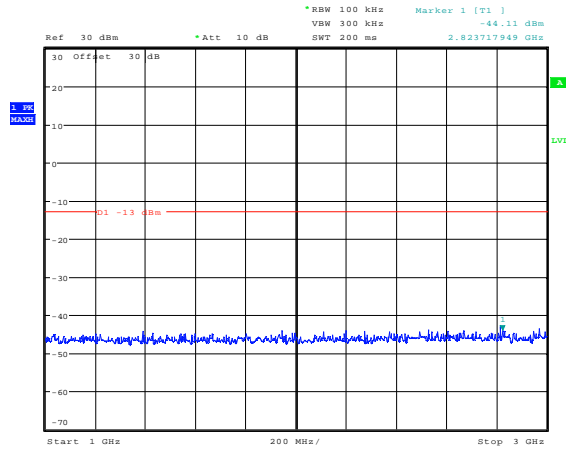
Date: 19.NOV.2009 14:35:18

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

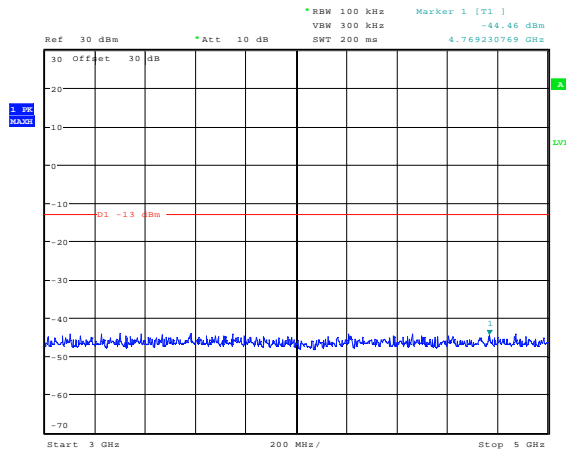
Intermodulation Wideband – 493MHz Band



Date: 19.NOV.2009 14:34:48



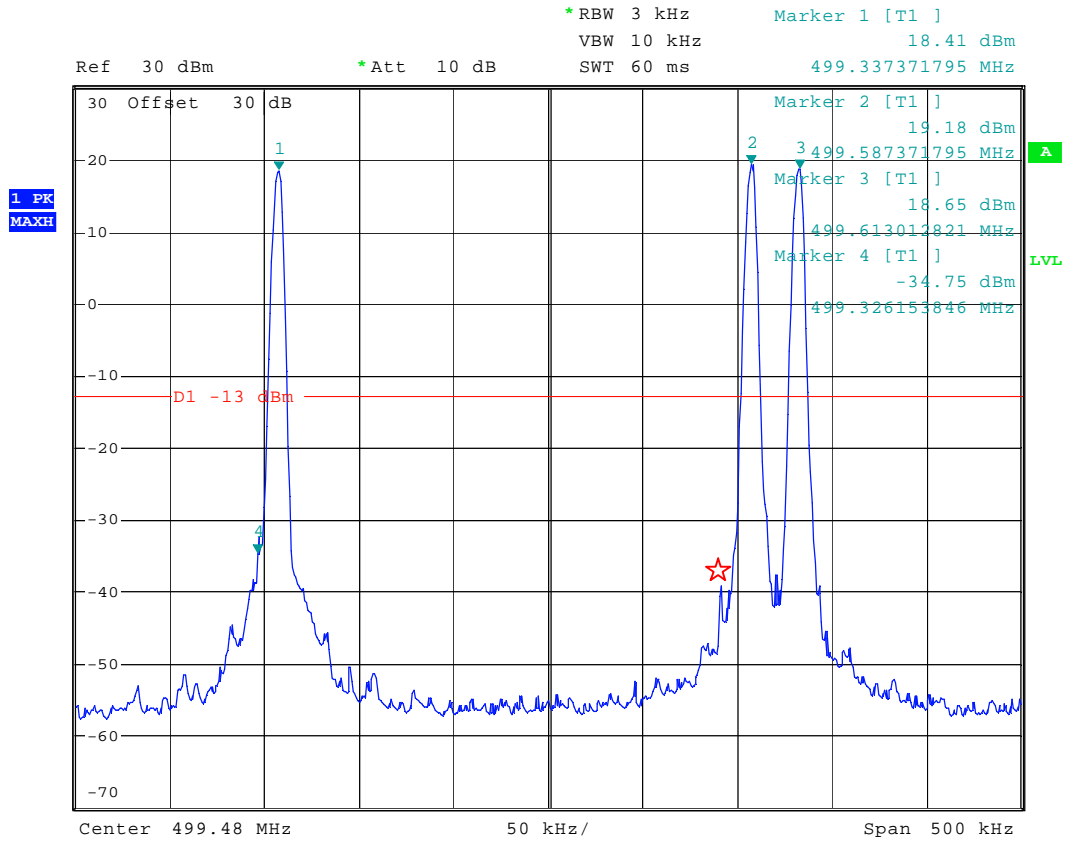
Date: 19.NOV.2009 14:34:37



Date: 19.NOV.2009 14:34:28

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

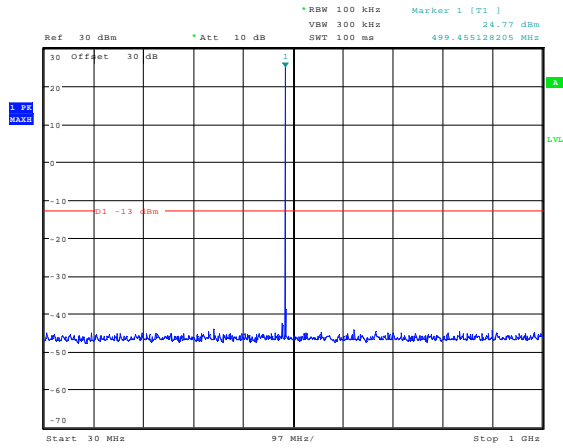
Intermodulation Inband – 499MHz Band



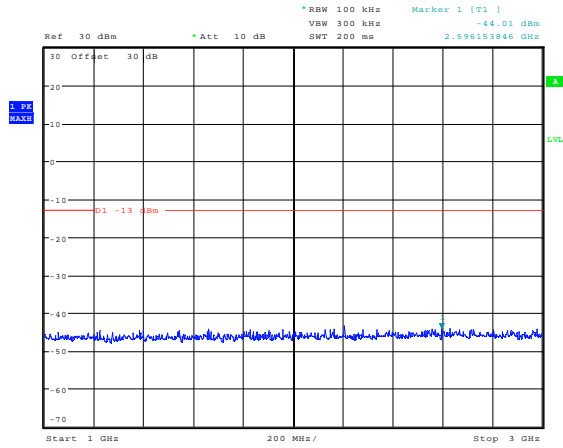
Date: 19.NOV.2009 14:42:56

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

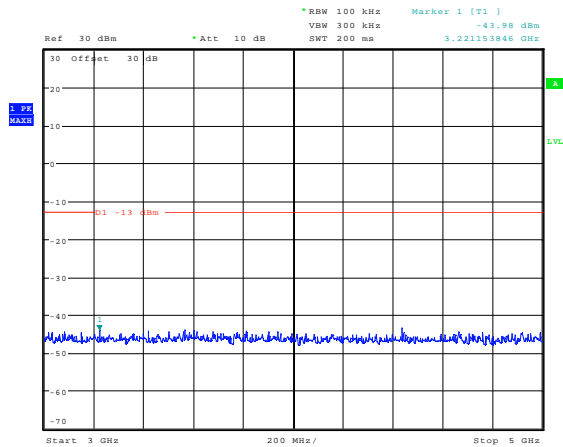
Intermodulation Wideband – 499MHz Band



Date: 19.NOV.2009 14:43:27



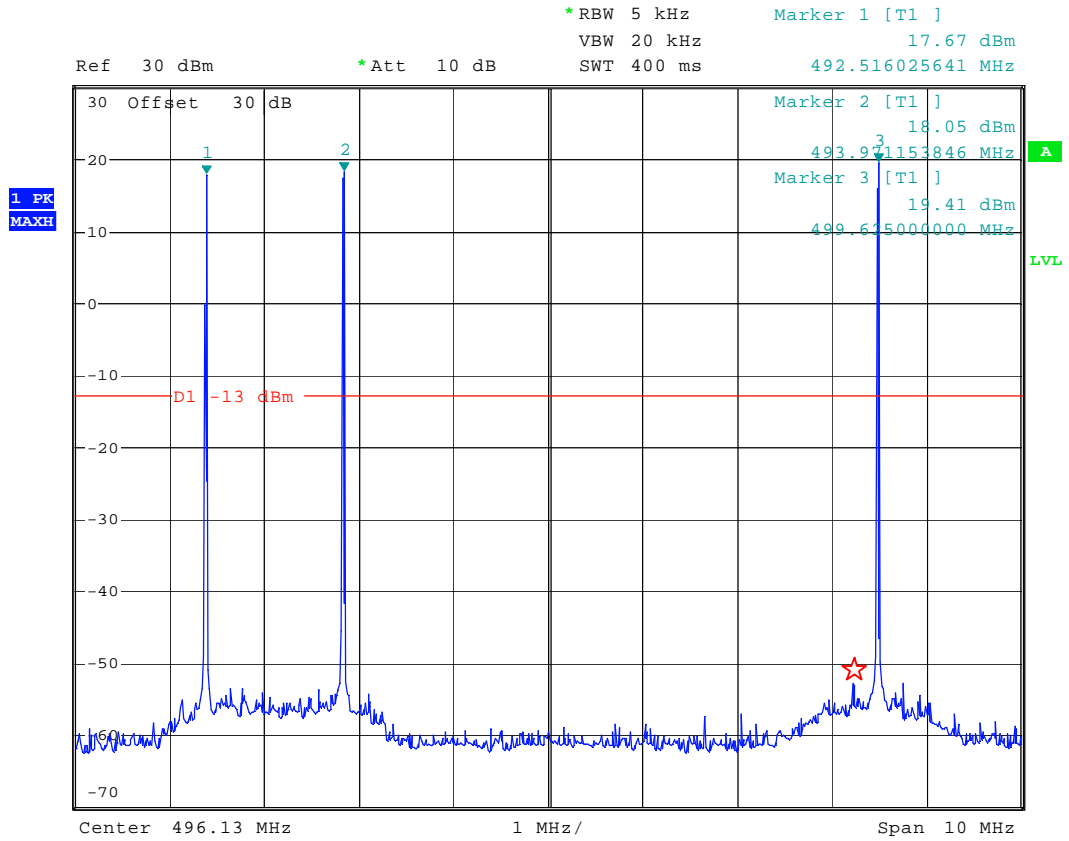
Date: 19.NOV.2009 14:43:41



Date: 19.NOV.2009 14:43:53

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

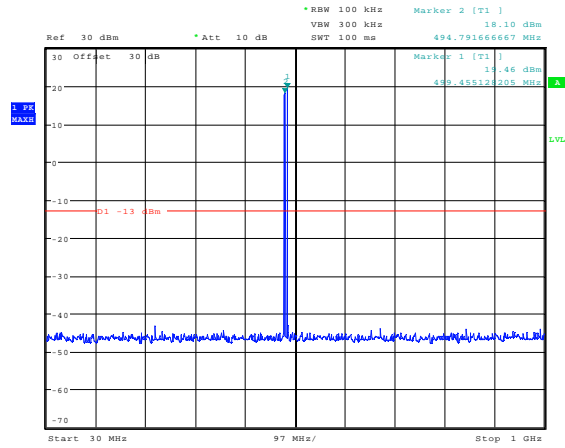
Intermodulation Inband – Cross Band



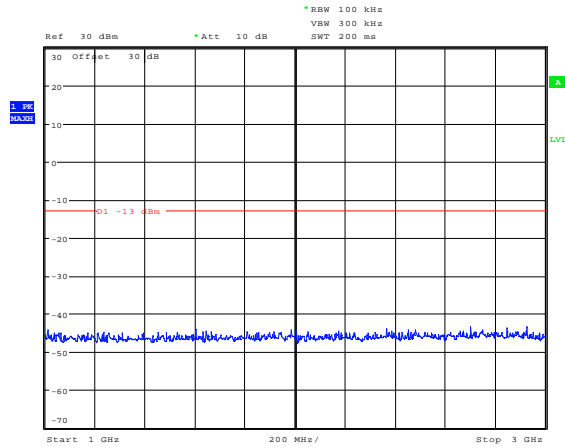
Date: 19.NOV.2009 14:47:26

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

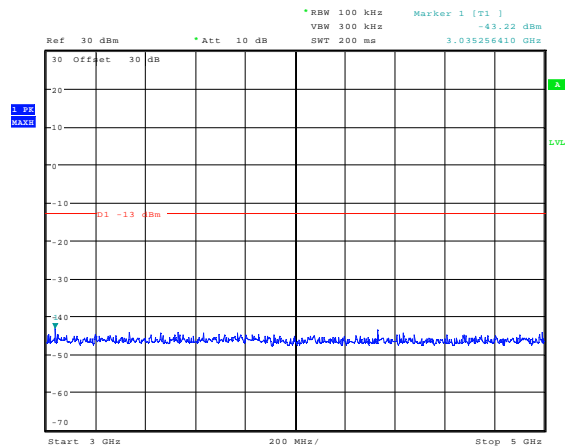
Intermodulation Wideband – Cross Band



Date: 19.NOV.2009 14:47:55



Date: 19.NOV.2009 14:48:08



Date: 19.NOV.2009 14:48:19

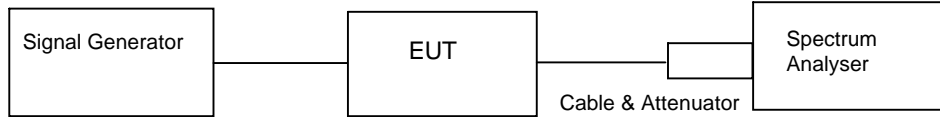
The above plot shows that there are no products outside the bands.

TRANSMITTER TESTS

AMPLIFIER MODULATED CHANNEL TEST – CONDUCTED – Part 2.1049– UPLINK

Ambient temperature = 24°C
 Relative humidity = 56%
 Supply voltage = +110Vac
 Channel number = See test results

Radio Laboratory



This test was performed to show that the amplifier does not alter the input signal in any way. The input signal was set to the maximum input. The following modulation schemes were produced, a 2500Hz FM tone with 2.5 and 5 kHz deviation.

The plots show the signal measured at the signal generator and the signal measured at the output of the EUT.

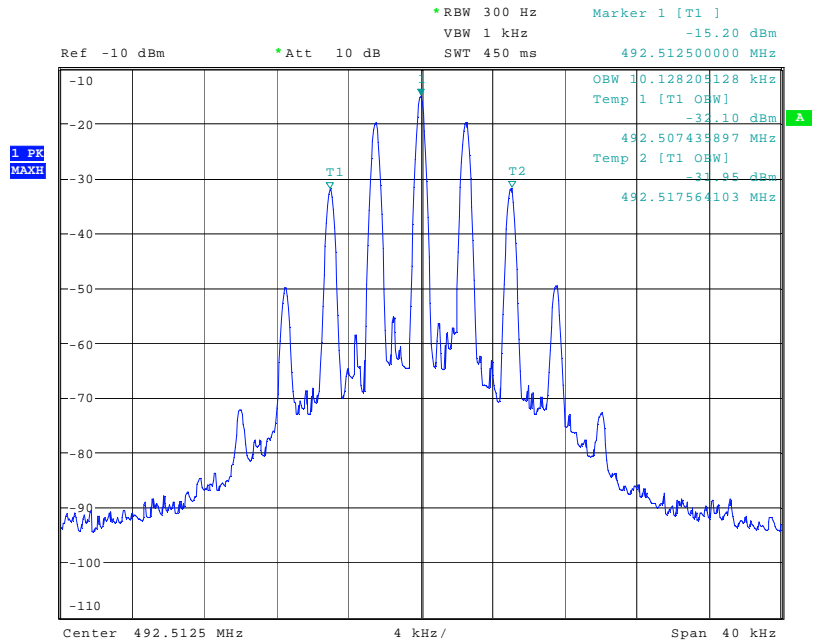
Note: The cables and attenuators had the following losses.

1. Cable and attenuator between EUT and spectrum analyser 30.3dB
2. Cable between signal generator and EUT 0.4dB

Frequency Of Operational Channel	Modulation Type	
	2.5 kHz FM	5 kHz FM
492.5125	10.128 kHz	15.000 kHz
493.7875	10.128 kHz	15.256 kHz
493.9625	10.128 kHz	15.256 kHz
499.3375	10.128 kHz	15.256 kHz
499.4875	10.128 kHz	15.256 kHz
499.6125	10.128 kHz	15.000 kHz

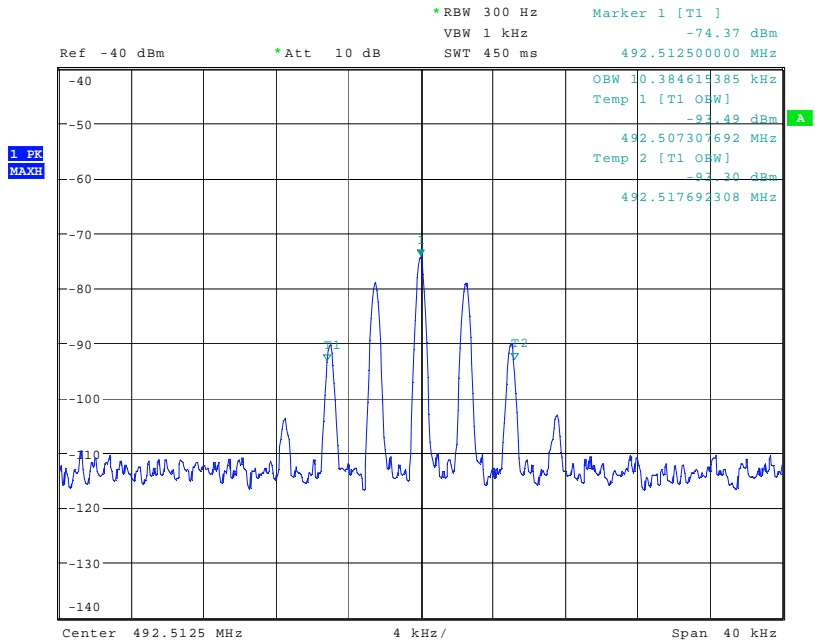
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
ATTENUATOR	BIRD	8308-200	N/A	103	X
ATTENUATOR	BIRD	830-100-N	N/A	222	X
CABLE	TRaC	N/A	N/A	UH273	X
CABLE	TRaC	N/A	N/A	UH274	X

492.5125 FM deviation set to 2.5kHz, EUT and Signal Generator



Date: 19.NOV.2009 10:48:30

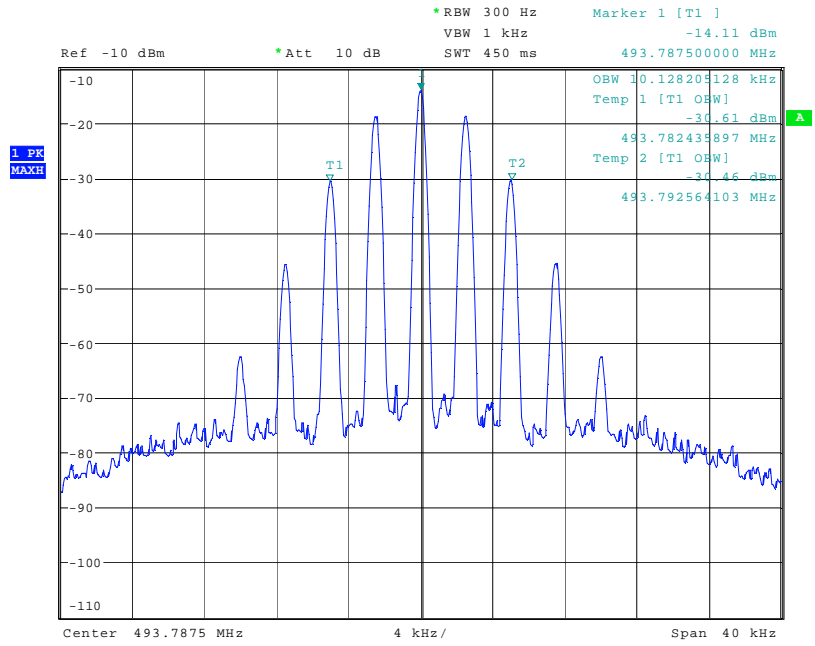
492.5125 FM deviation set to 2.5kHz, Signal Generator



Date: 19.NOV.2009 11:50:08

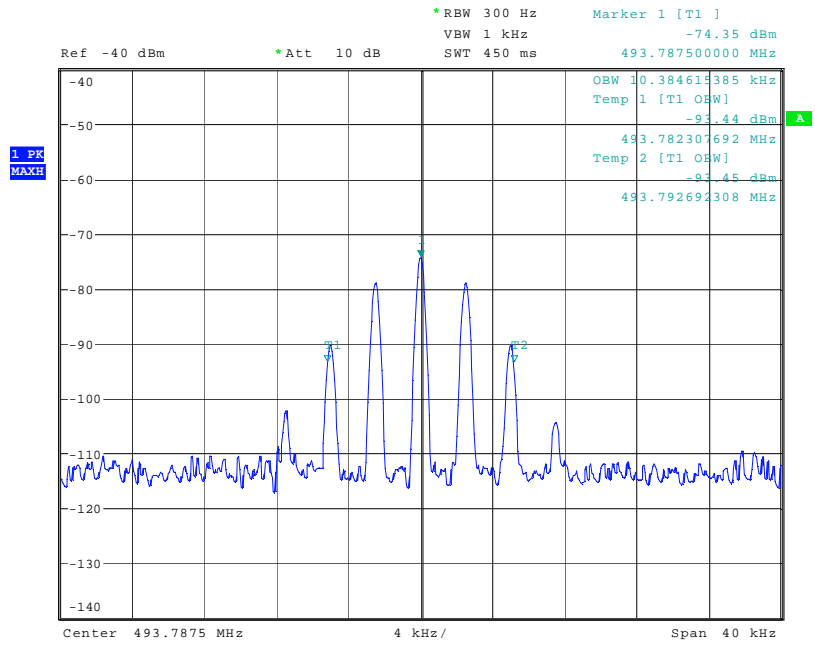
The above plots show no significant distortion visible when compared to the input signal.

493.7875 FM deviation set to 2.5kHz, EUT and Signal Generator



Date: 19.NOV.2009 10:46:14

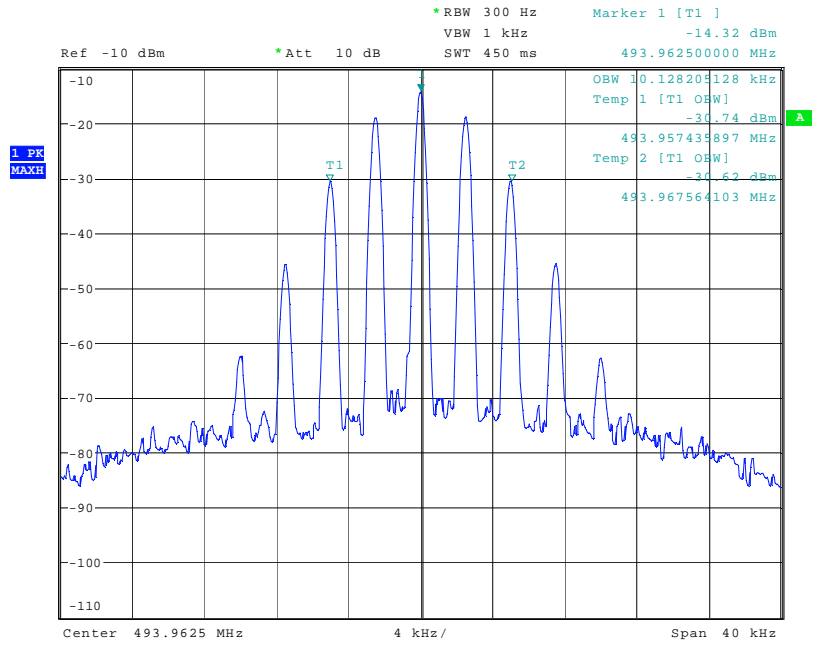
493.7875 FM deviation set to 2.5kHz, Signal Generator



Date: 19.NOV.2009 11:51:05

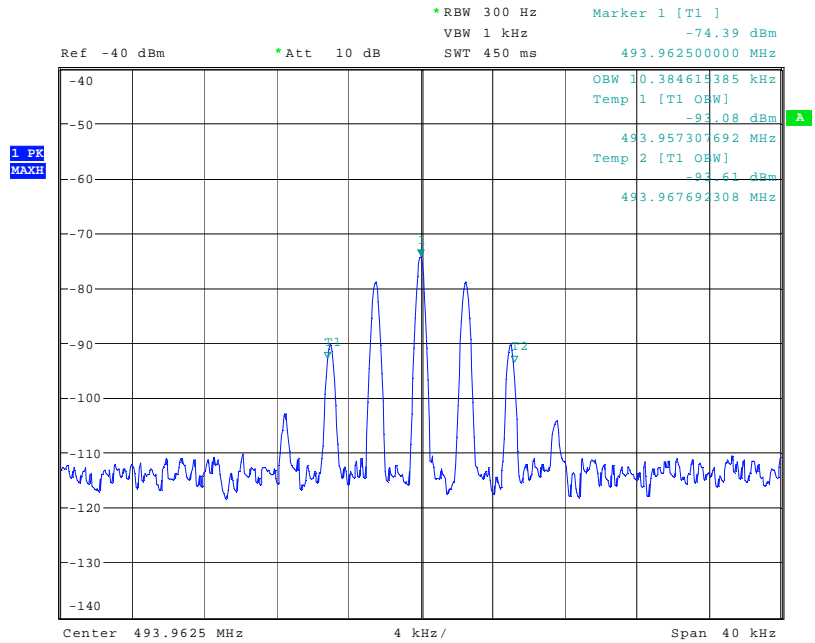
The above plots show no significant distortion visible when compared to the input signal.

493.9625 FM deviation set to 2.5kHz, EUT and Signal Generator



Date: 19.NOV.2009 10:45:50

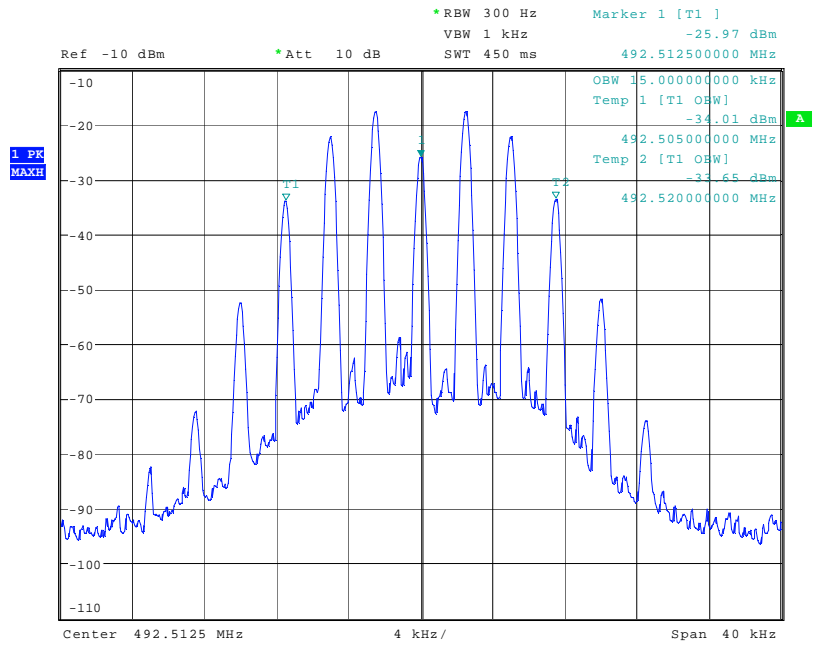
493.9625 FM deviation set to 2.5kHz, Signal Generator



Date: 19.NOV.2009 11:51:51

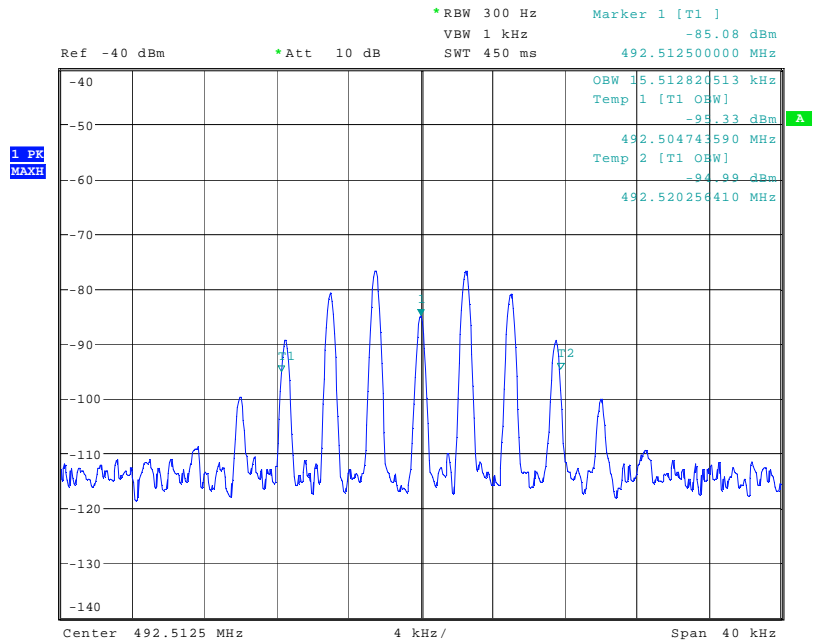
The above plots show no significant distortion visible when compared to the input signal.

492.5125 FM deviation set to 5kHz, EUT and Signal Generator



Date: 19.NOV.2009 10:49:24

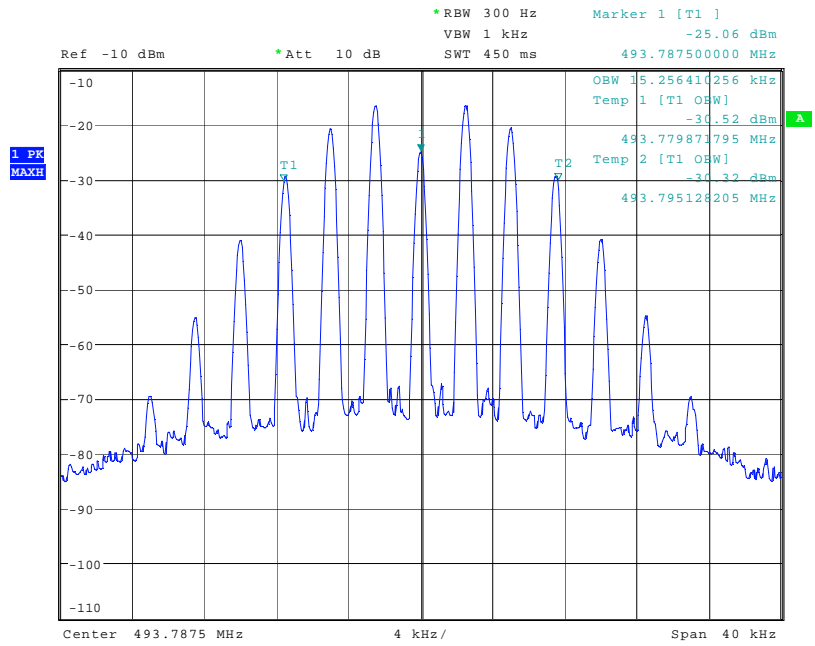
492.5125 FM deviation set to 5kHz, Signal Generator



Date: 19.NOV.2009 11:50:18

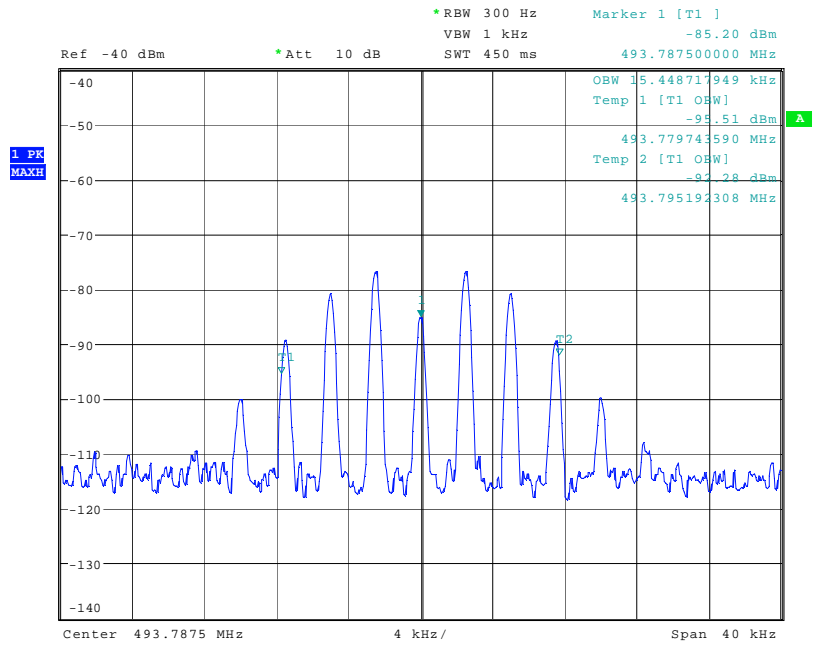
The above plots show no significant distortion visible when compared to the input signal.

493.7875 FM deviation set to 5kHz, EUT and Signal Generator



Date: 19.NOV.2009 10:46:47

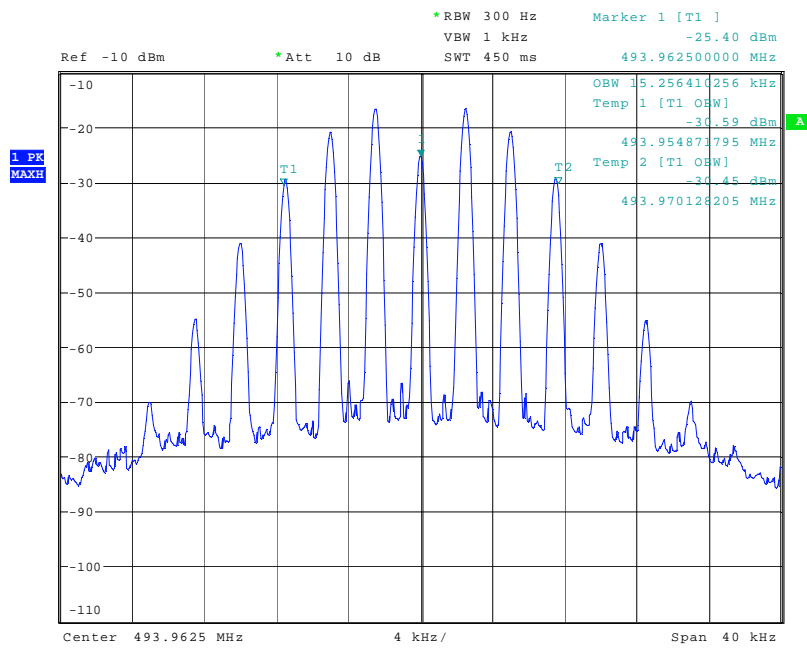
493.7875 FM deviation set to 5kHz, Signal Generator



Date: 19.NOV.2009 11:51:15

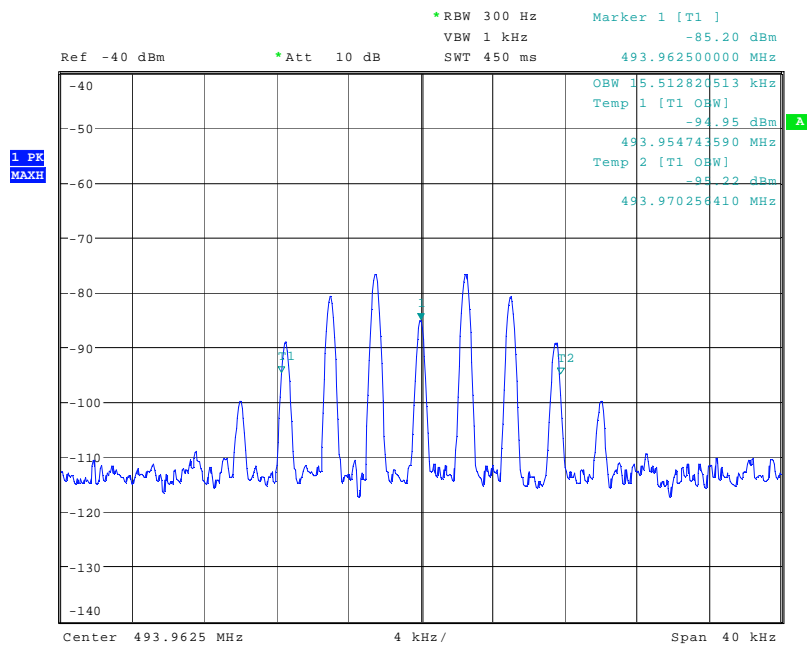
The above plots show no significant distortion visible when compared to the input signal.

493.9625 FM deviation set to 5kHz, EUT and Signal Generator



Date: 19.NOV.2009 10:45:29

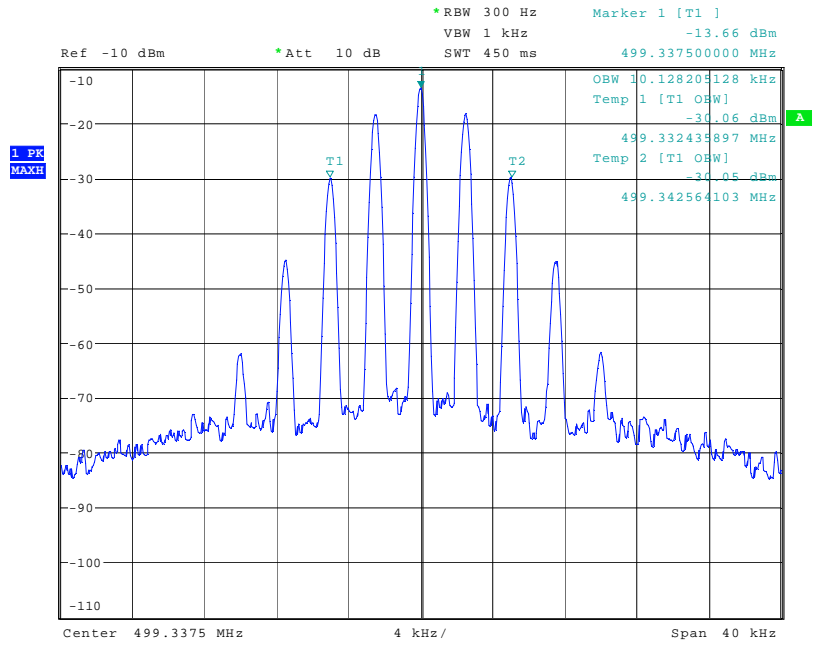
493.9625 FM deviation set to 5kHz, Signal Generator



Date: 19.NOV.2009 11:51:36

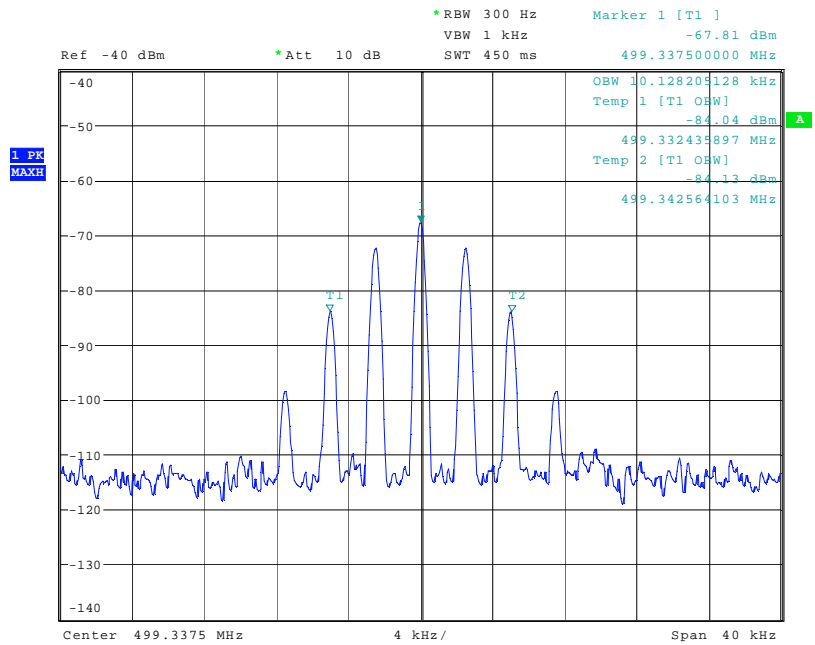
The above plots show no significant distortion visible when compared to the input signal.

499.3375 FM deviation set to 2.5kHz, EUT and Signal Generator



Date: 19.NOV.2009 10:50:26

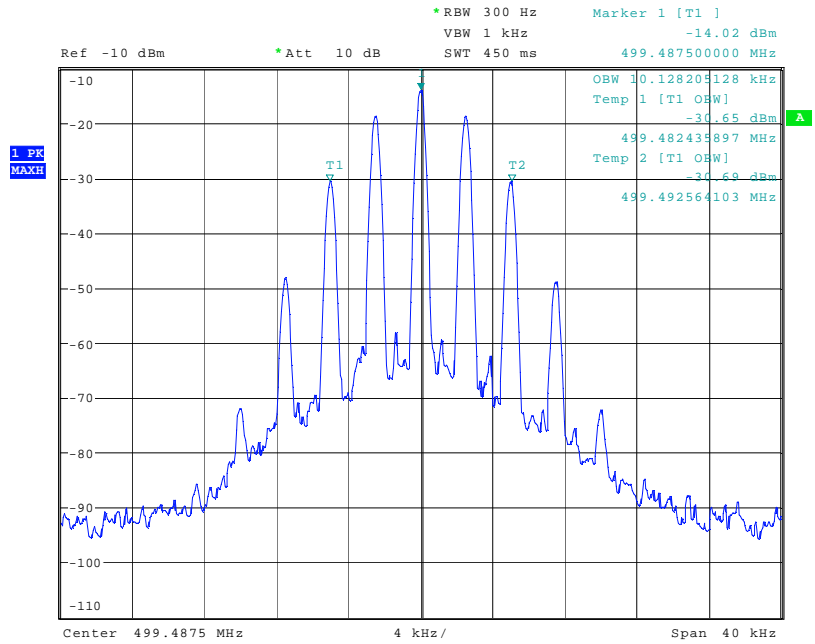
499.3375 FM deviation set to 2.5kHz, Signal Generator



Date: 19.NOV.2009 11:47:46

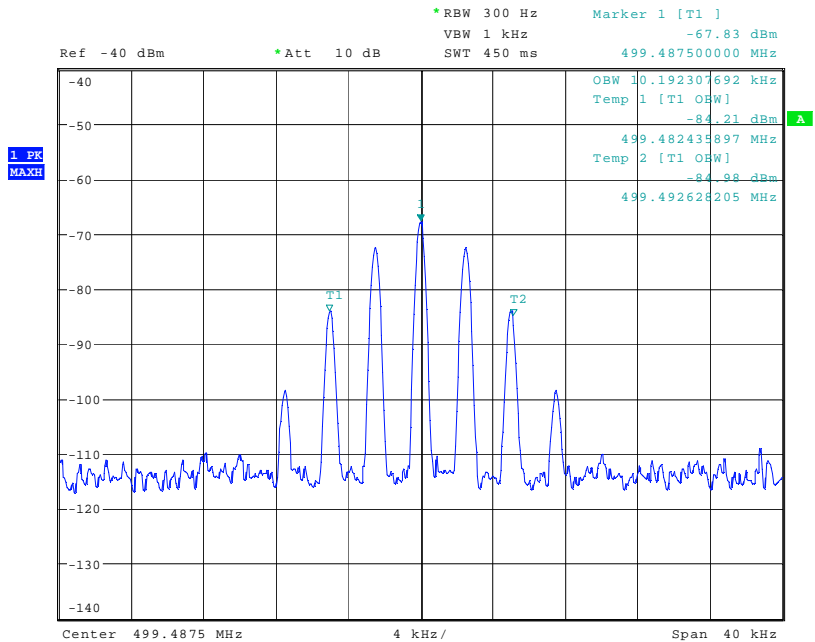
The above plots show no significant distortion visible when compared to the input signal.

499.4875 FM deviation set to 2.5kHz, EUT and Signal Generator



Date: 19.NOV.2009 10:50:53

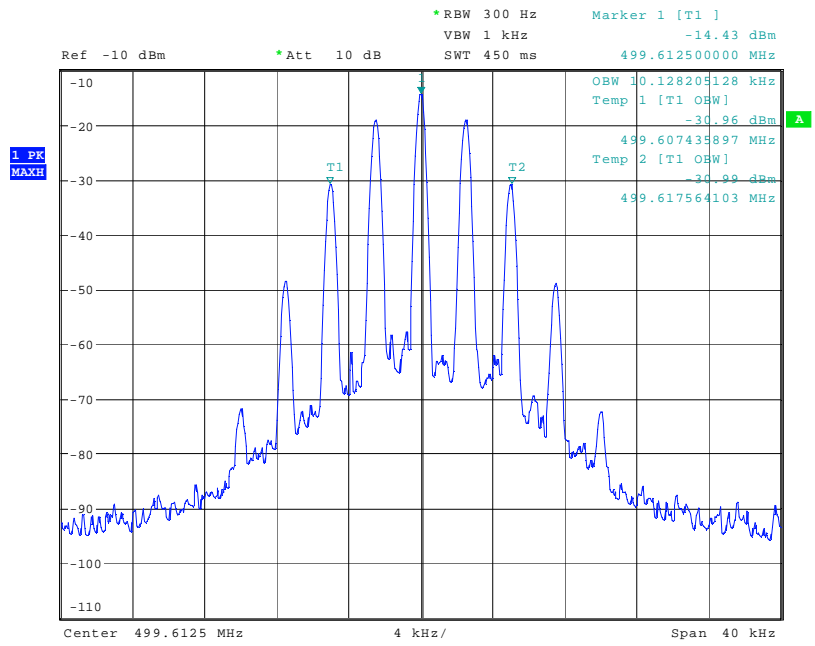
499.4875 FM deviation set to 2.5kHz, Signal Generator



Date: 19.NOV.2009 11:48:07

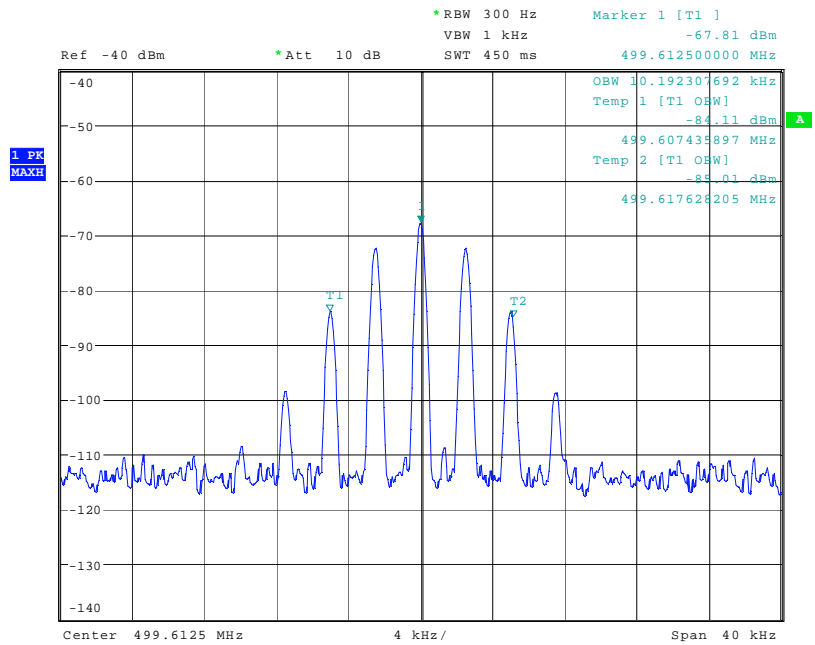
The above plots show no significant distortion visible when compared to the input signal.

499.6125 FM deviation set to 2.5kHz, EUT and Signal Generator



Date: 19.NOV.2009 10:52:06

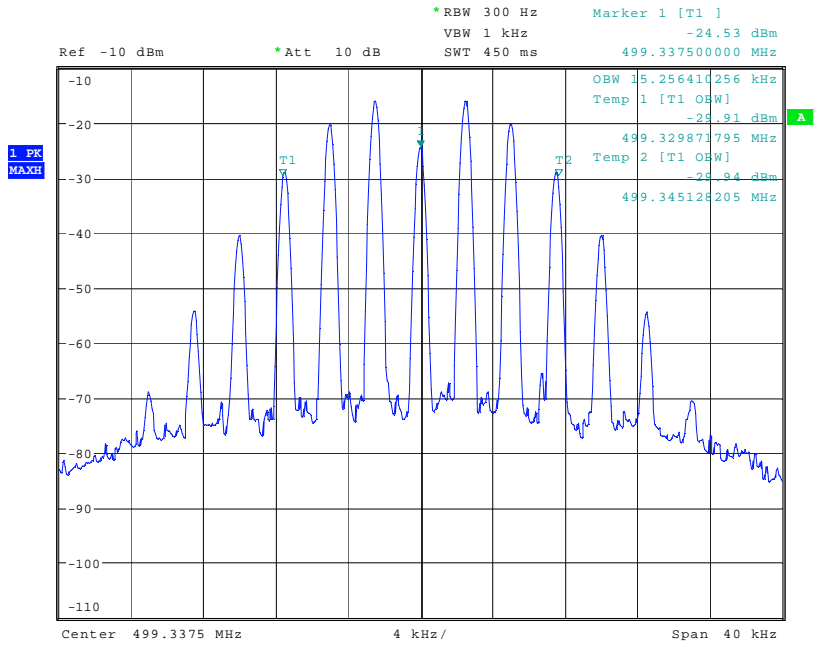
499.6125 FM deviation set to 2.5kHz, Signal Generator



Date: 19.NOV.2009 11:49:15

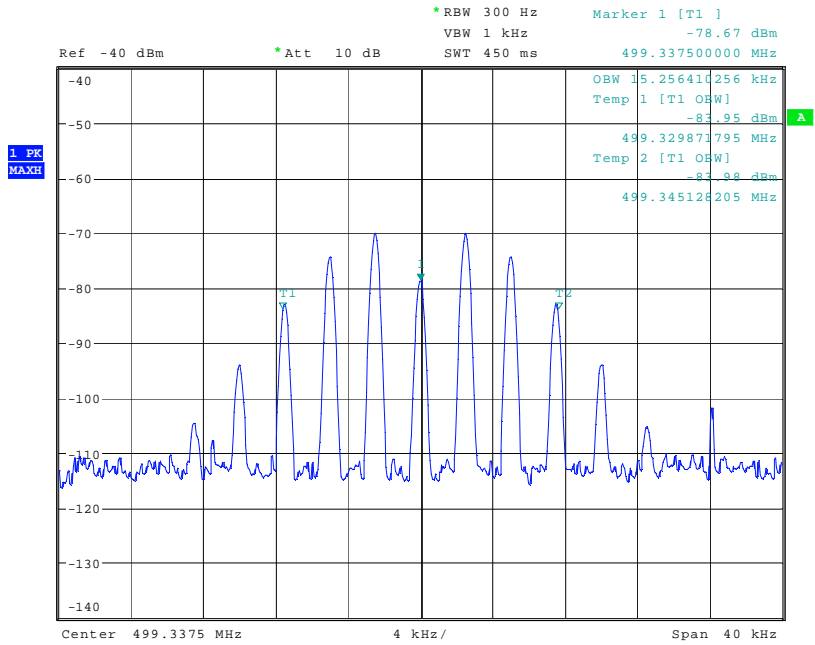
The above plots show no significant distortion visible when compared to the input signal.

499.3375 FM deviation set to 5kHz, EUT and Signal Generator



Date: 19.NOV.2009 10:50:06

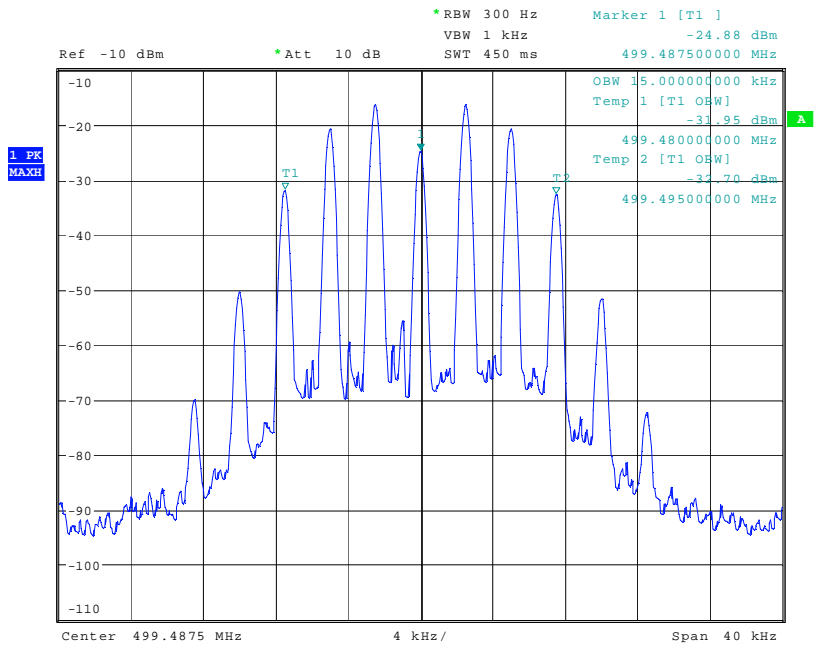
499.3375 FM deviation set to 5kHz, Signal Generator



Date: 19.NOV.2009 11:47:34

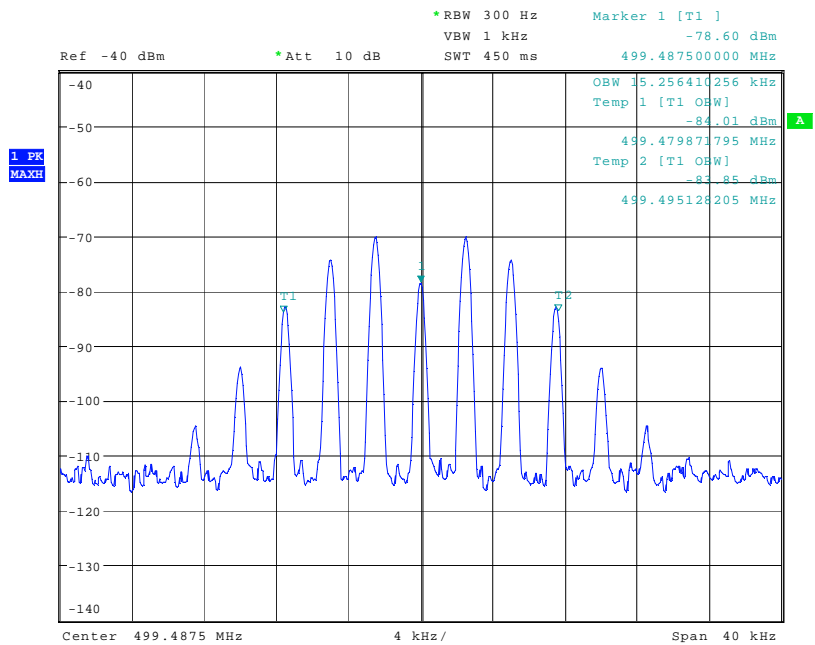
The above plots show no significant distortion visible when compared to the input signal.

499.4875 FM deviation set to 5kHz, EUT and Signal Generator



Date: 19.NOV.2009 10:51:14

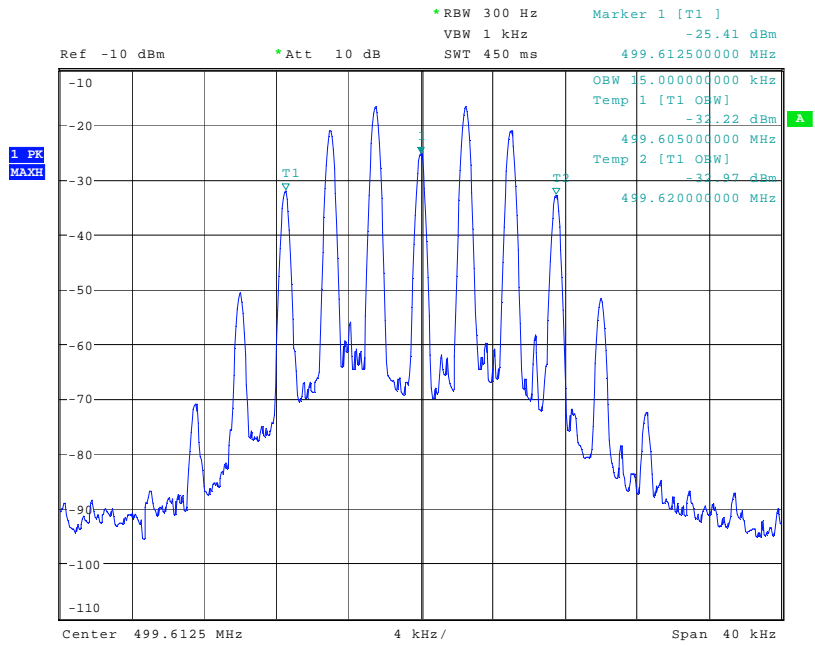
499.4875 FM deviation set to 5kHz, Signal Generator



Date: 19.NOV.2009 11:48:24

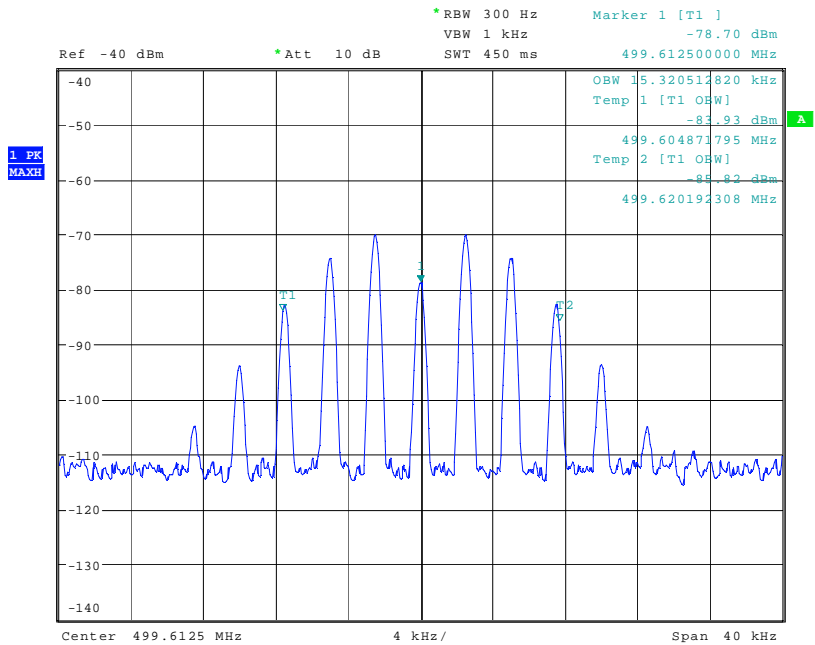
The above plots show no significant distortion visible when compared to the input signal.

499.6125 FM deviation set to 5kHz, EUT and Signal Generator



Date: 19.NOV.2009 10:51:45

499.6125 FM deviation set to 5kHz, Signal Generator



Date: 19.NOV.2009 11:49:01

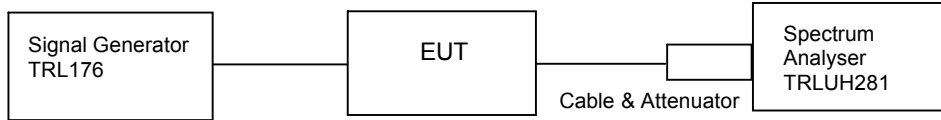
The above plots show no significant distortion visible when compared to the input signal.

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – CONDUCTED – Part 2.1053 – UPLINK

Ambient temperature = 20°C
 Relative humidity = 45%
 Supply voltage = +110Vac

Radio Laboratory



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

493 MHz Band

FREQUENCY RANGE	EUT FREQ (MHz)	EMISSION FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTEN & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
30 MHz - 9 GHz	492.5125	493.962517	-60.15	30.3	-19.45	-13
	493.9625	492.512516	-60.75	30.3	-20.05	-13

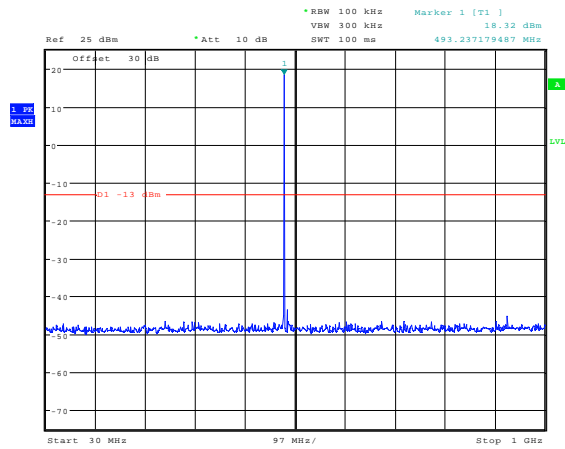
499 MHz Band

FREQUENCY RANGE	EUT FREQ (MHz)	EMISSION FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTEN & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
30 MHz - 9 GHz	492.5125	493.962517	-60.15	30.3	-19.45	-13
	493.9625	492.512516	-60.75	30.3	-20.05	-13

The test equipment used for the Transmitter Conducted Emissions:

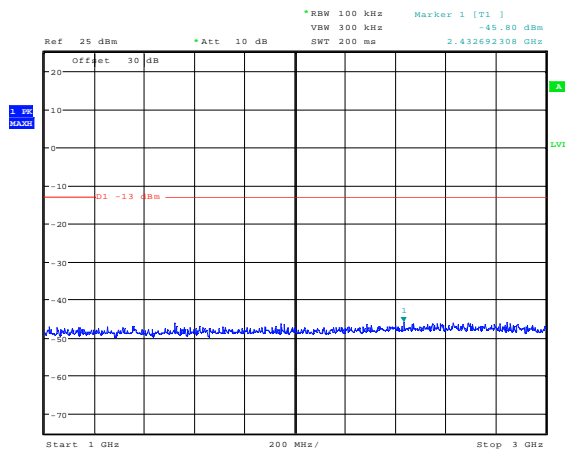
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
ATTENUATOR	BIRD	8308-200	N/A	103	X
ATTENUATOR	BIRD	830-100-N	N/A	222	X
CABLE	TRaC	N/A	N/A	UH273	X
CABLE	TRaC	N/A	N/A	UH274	X

Conducted emissions 492.5125 MHz 30MHz – 1GHz



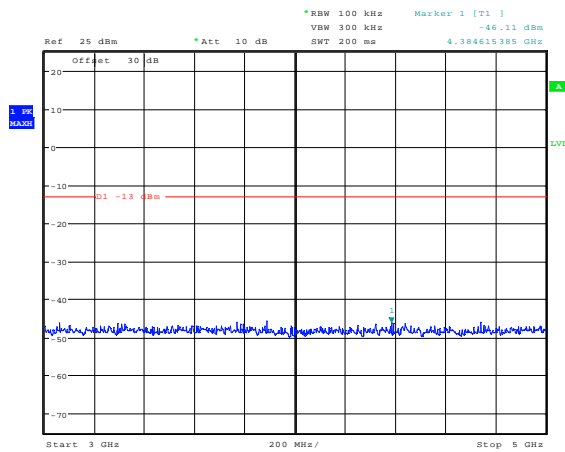
Date: 19.NOV.2009 10:25:41

Conducted emissions 492.5125 MHz 1 – 3GHz



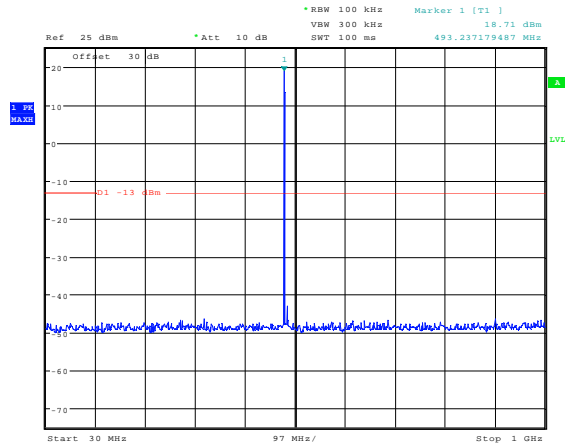
Date: 19.NOV.2009 10:25:58

Conducted emissions 492.5125 MHz 3 – 5GHz



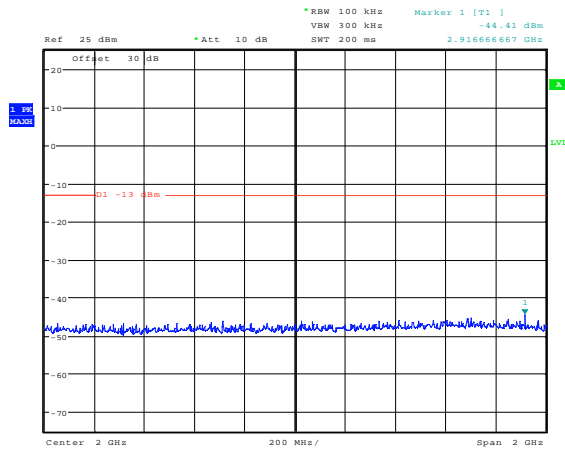
Date: 19.NOV.2009 10:26:12

Conducted emissions 493.7875 MHz 30MHz – 1GHz



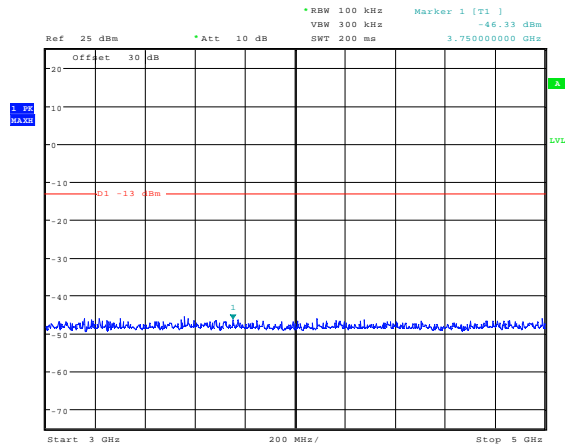
Date: 19.NOV.2009 10:27:57

Conducted emissions 493.7875 MHz 1 – 3GHz



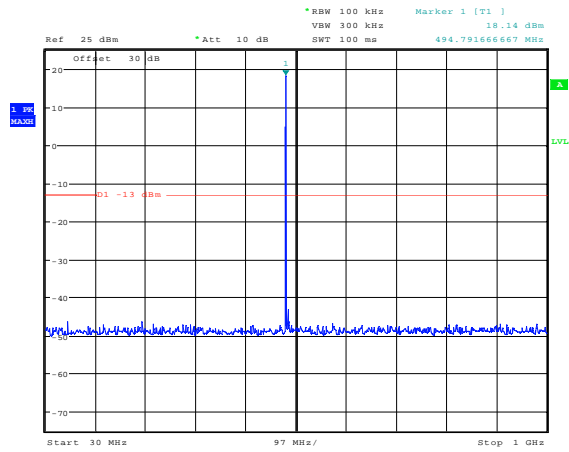
Date: 19.NOV.2009 10:27:35

Conducted emissions 493.7875 MHz 3 – 5GHz



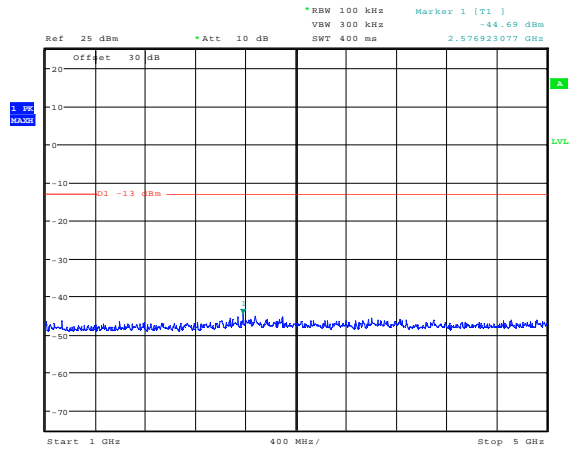
Date: 19.NOV.2009 10:27:15

Conducted emissions 493.9625 MHz 30MHz – 1GHz



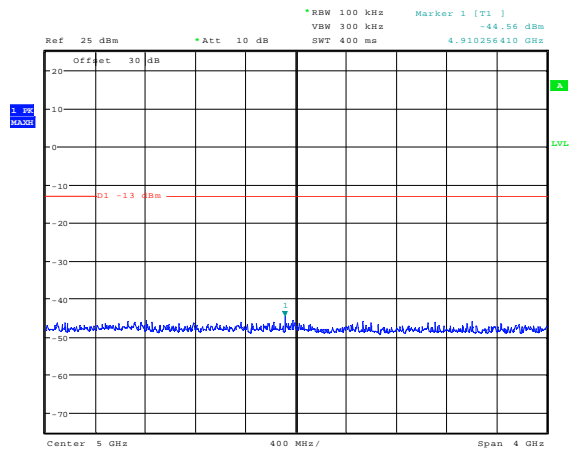
Date: 19.NOV.2009 10:28:52

Conducted emissions 493.9625 MHz 1 – 3GHz



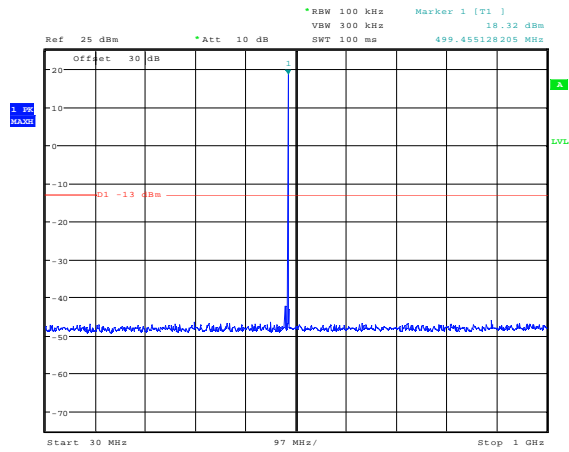
Date: 19.NOV.2009 10:29:25

Conducted emissions 493.9625 MHz 3 – 5GHz



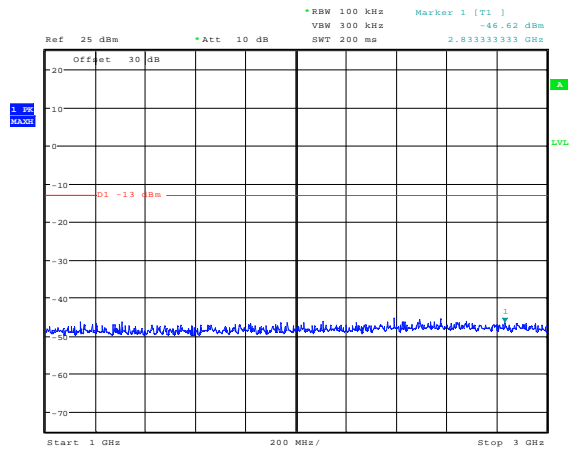
Date: 19.NOV.2009 10:29:46

Conducted emissions 499.3375 MHz 30MHz – 1GHz



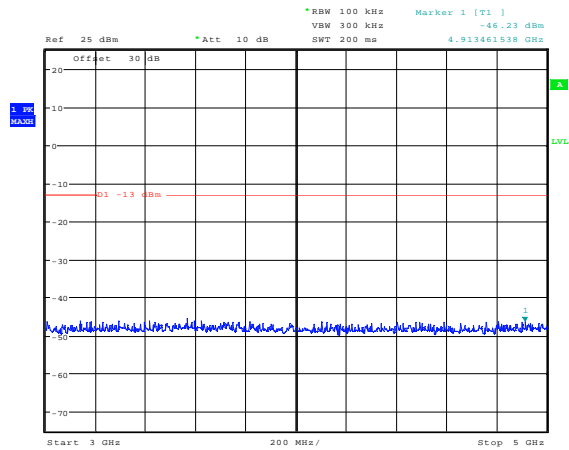
Date: 19.NOV.2009 10:19:23

Conducted emissions 499.3375 MHz 1 – 3GHz



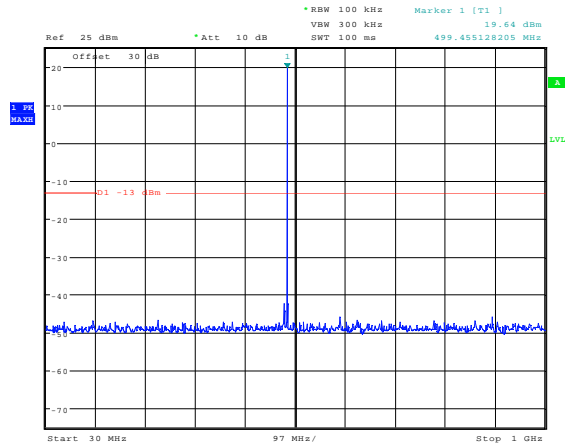
Date: 19.NOV.2009 10:19:36

Conducted emissions 499.3375 MHz 3 – 5GHz



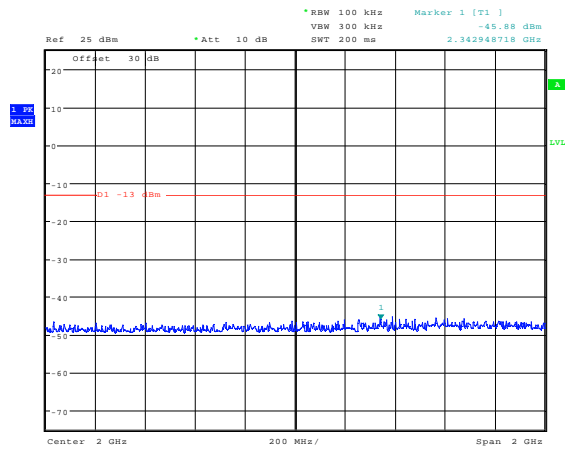
Date: 19.NOV.2009 10:19:52

Conducted emissions 499.4875 MHz 30MHz – 1GHz



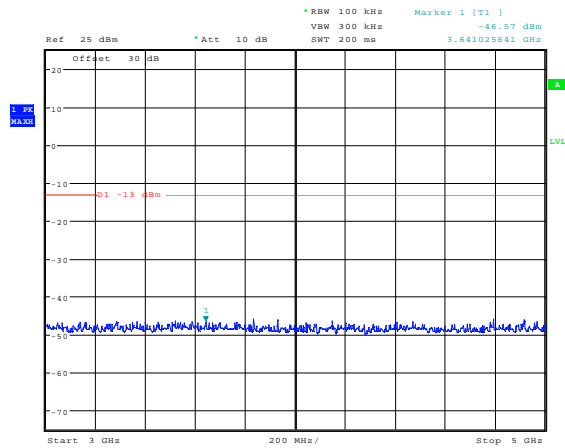
Date: 19.NOV.2009 10:21:43

Conducted emissions 499.4875 MHz 1 – 3GHz



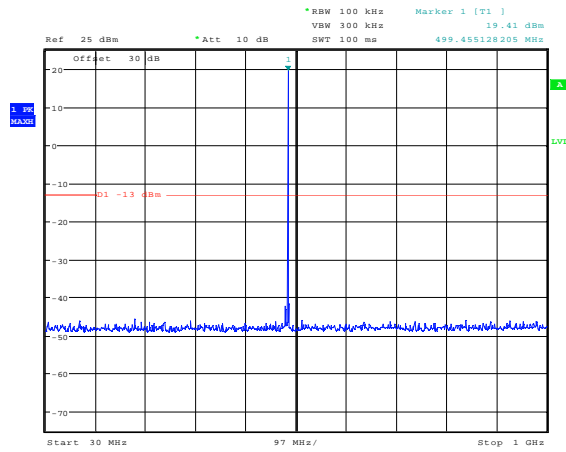
Date: 19.NOV.2009 10:21:05

Conducted emissions 499.4875 MHz 3 – 5GHz



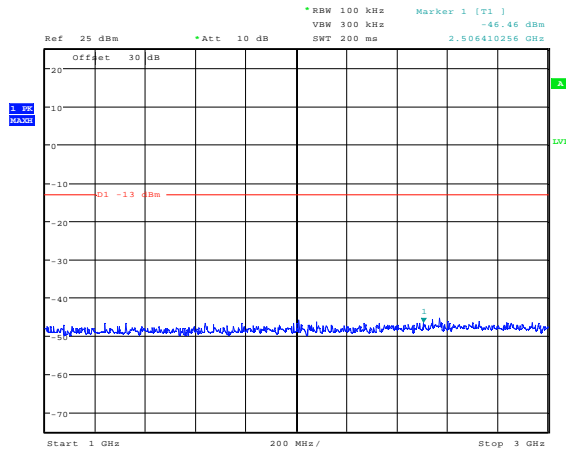
Date: 19.NOV.2009 10:20:43

Conducted emissions 499.6125 MHz 30MHz – 1GHz



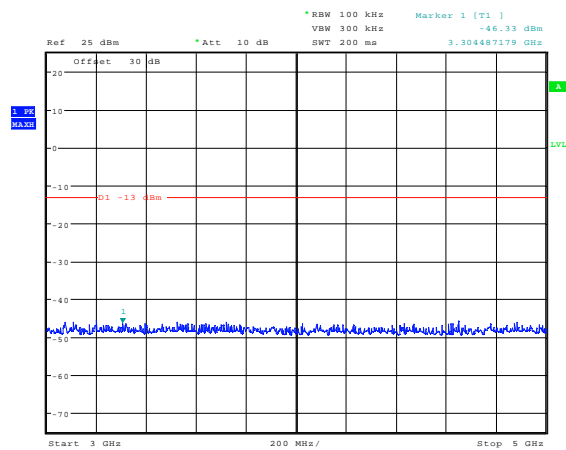
Date: 19.NOV.2009 10:23:02

Conducted emissions 499.6125 MHz 1 – 3GHz



Date: 19.NOV.2009 10:23:17

Conducted emissions 499.6125 MHz 3 – 5GHz

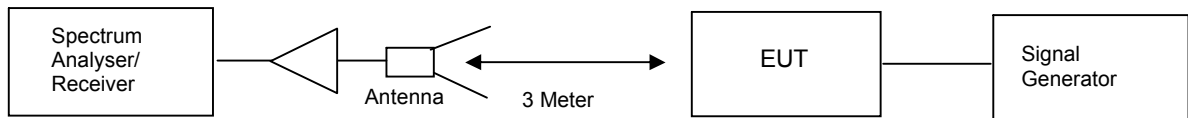


Date: 19.NOV.2009 10:23:32

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– UPLINK

Ambient temperature = 15°C
 Relative humidity = 45%
 Conditions = OATS
 Supply voltage = +110Vac
 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

493 MHz Band

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

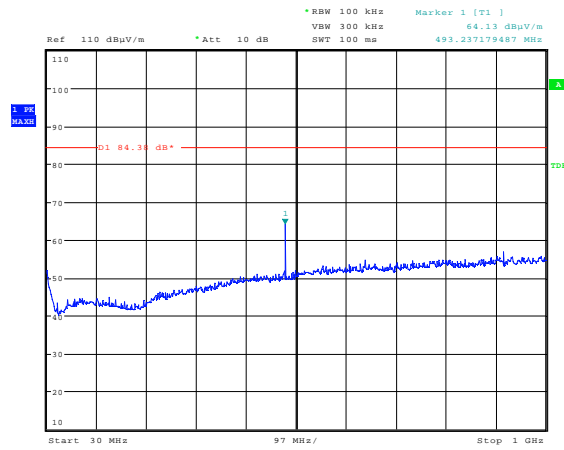
499 MHz Band

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

The test equipment used for the Transmitter Spurious Emissions:

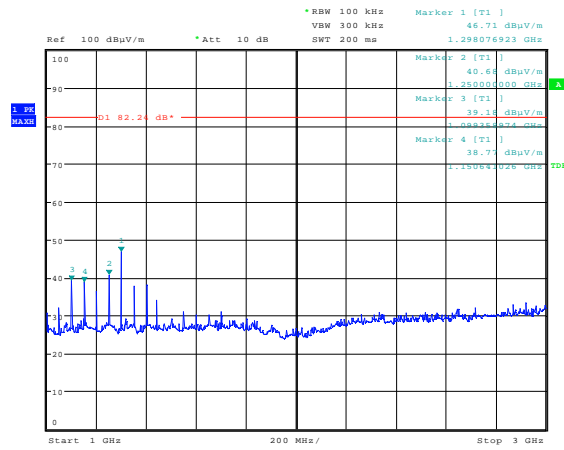
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	X
HORN	EMCO	3115	9010-3580	138	X
PRE AMPLIFIER	HP	8449B	3008A016	572	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
ANTENNA	CHASE	CBL6112B	2803	UH93	X

Radiated emissions 492.5125 30MHz – 1GHz



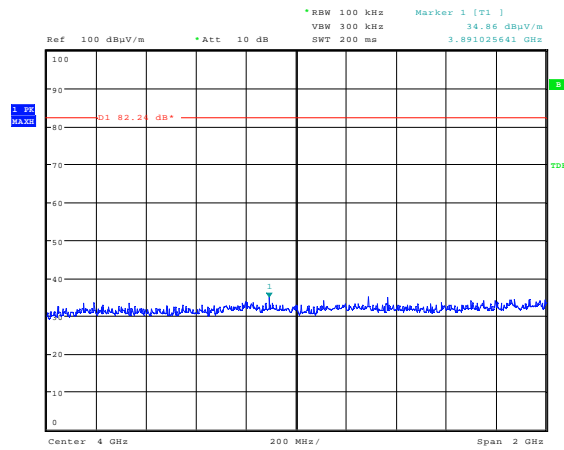
Date: 20.NOV.2009 09:01:29

Radiated emissions 492.5125 1 – 3GHz



Date: 19.NOV.2009 16:08:08

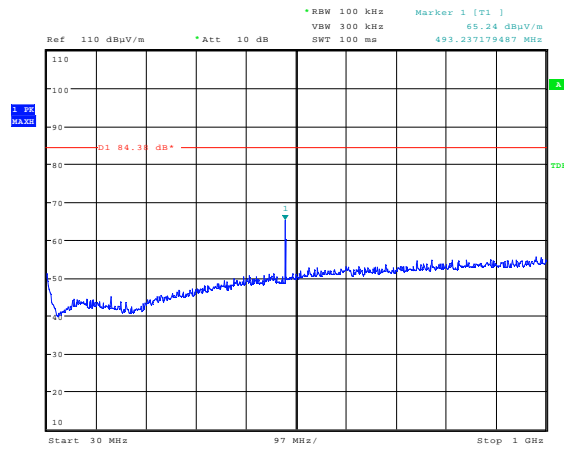
Radiated emissions 492.5125 3 – 5GHz



Date: 19.NOV.2009 16:08:21

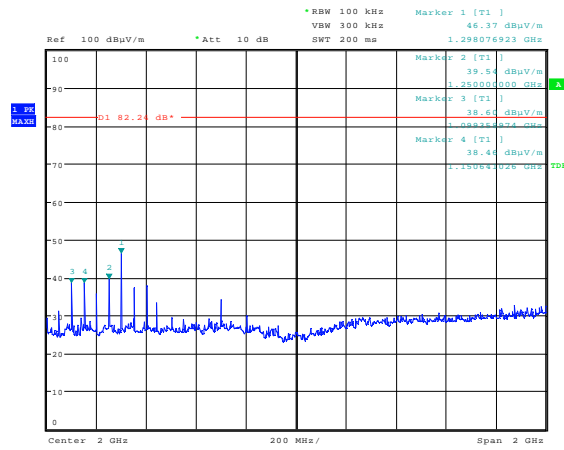
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions 493.7875 30MHz – 1GHz



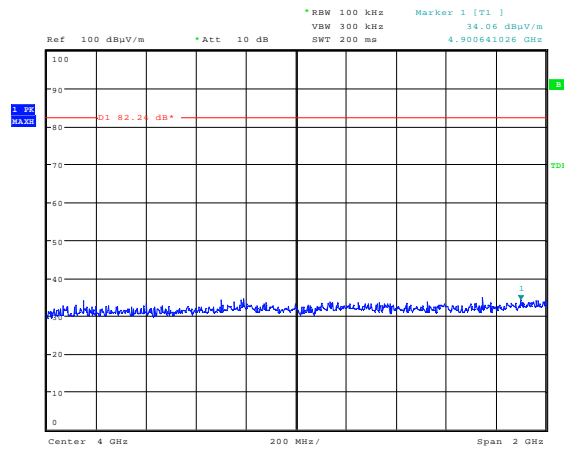
Date: 20.NOV.2009 09:03:13

Radiated emissions 493.7875 1 – 3GHz



Date: 19.NOV.2009 16:08:59

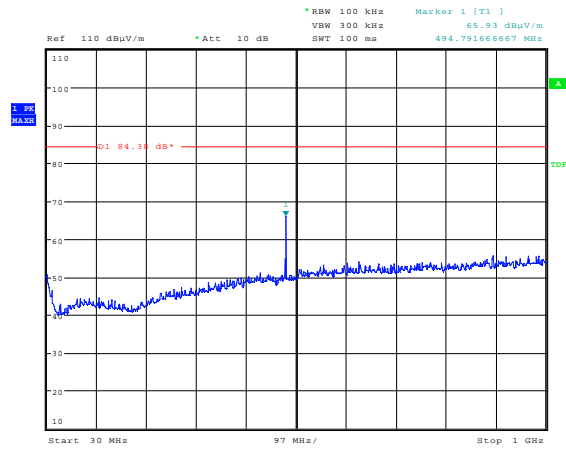
Radiated emissions 493.7875 3 – 5GHz



Date: 19.NOV.2009 16:08:48

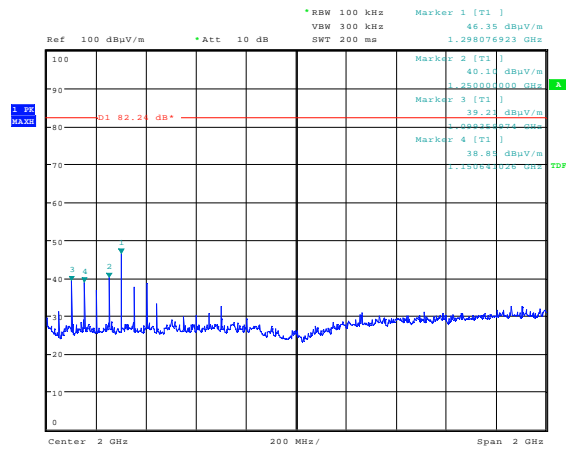
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions 493.9625 30MHz – 1GHz



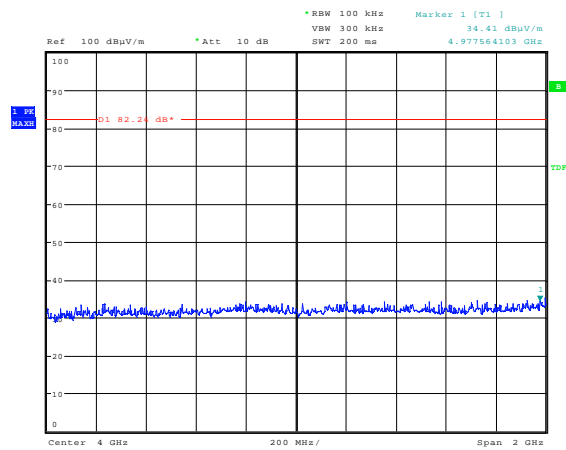
Date: 20.NOV.2009 09:03:32

Radiated emissions 493.9625 1 – 3GHz



Date: 19.NOV.2009 16:09:20

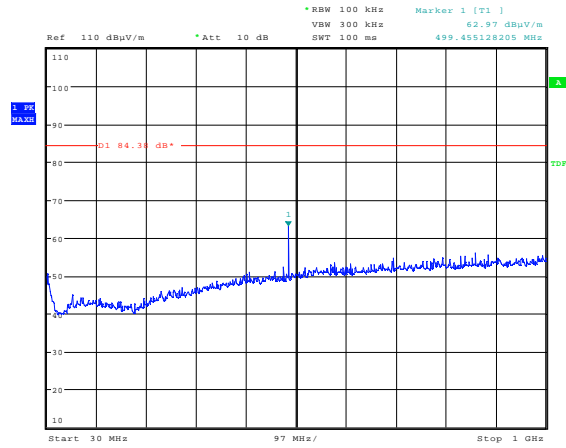
Radiated emissions 493.7875 3 – 5GHz



Date: 19.NOV.2009 16:09:34

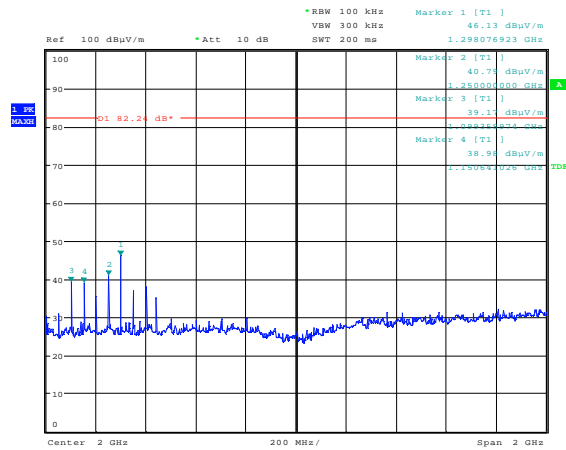
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions 499.3375 30MHz – 1GHz



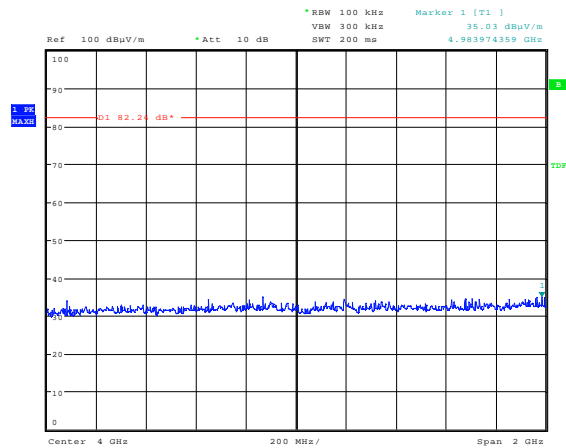
Date: 20.NOV.2009 09:04:52

Radiated emissions 499.3375 1 – 3GHz



Date: 19.NOV.2009 16:16:30

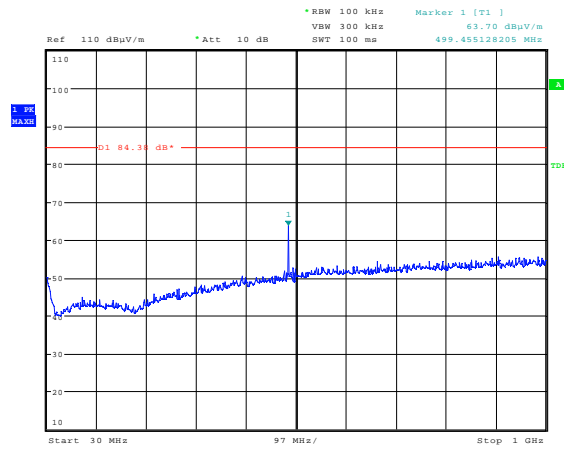
Radiated emissions 499.3375 3 – 5GHz



Date: 19.NOV.2009 16:16:15

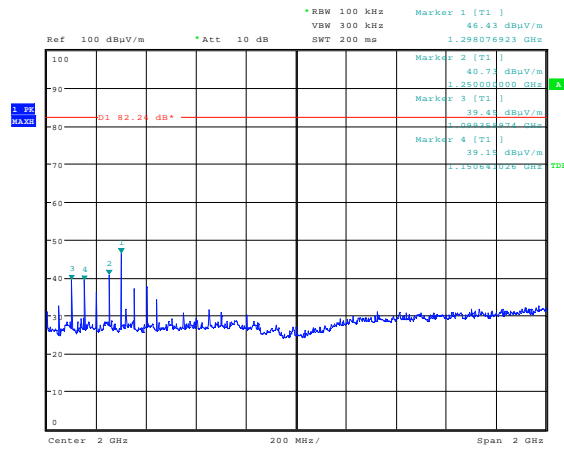
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions 499.4875 30MHz – 1GHz



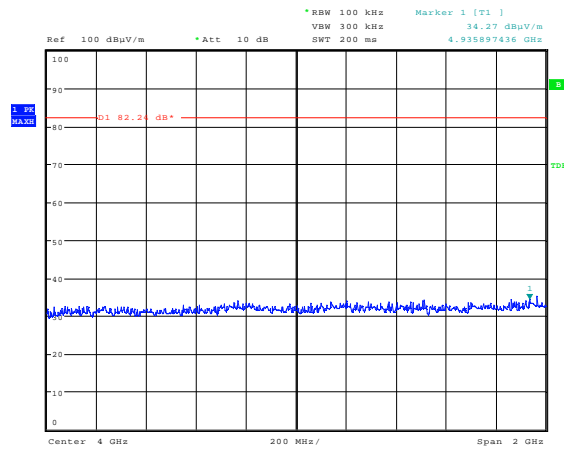
Date: 20.NOV.2009 09:05:16

Radiated emissions 499.4875 1 – 3GHz



Date: 19.NOV.2009 16:15:20

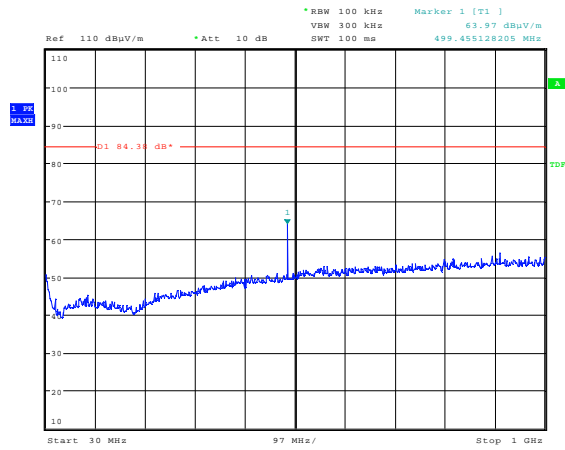
Radiated emissions 499.4875 3 – 5GHz



Date: 19.NOV.2009 16:15:35

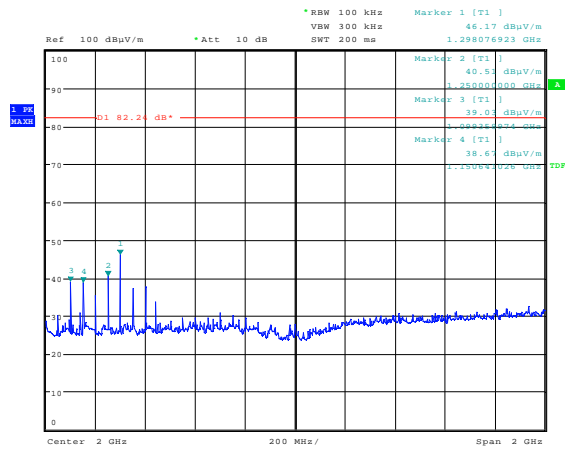
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions 499.6125 30MHz – 1GHz



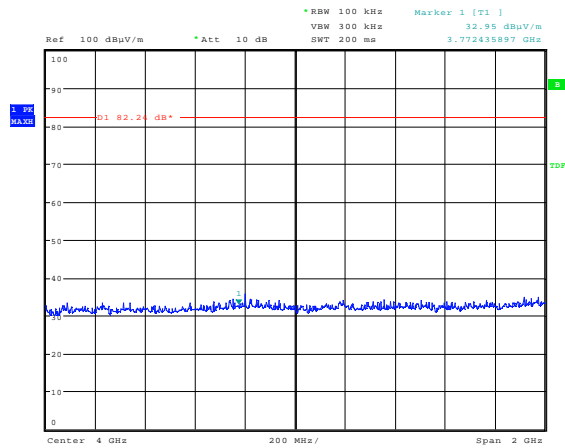
Date: 20.NOV.2009 09:06:12

Radiated emissions 499.6125 1 – 3GHz



Date: 19.NOV.2009 16:14:35

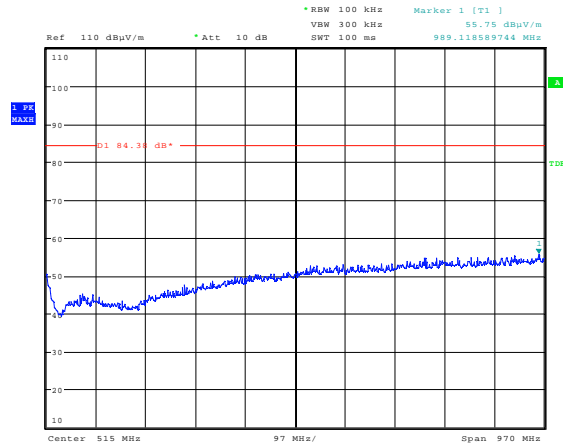
Radiated emissions 499.6125 3 – 5GHz



Date: 19.NOV.2009 16:14:21

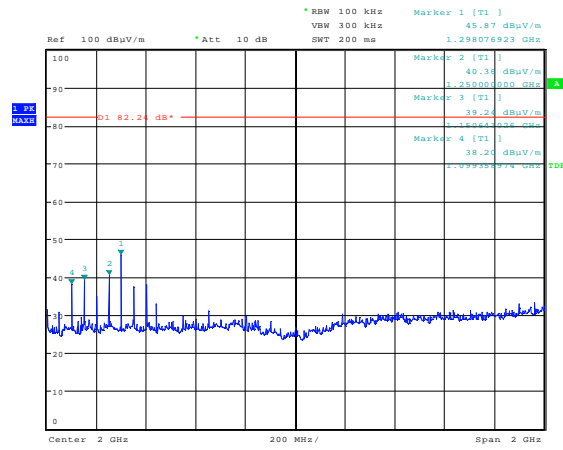
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions no input signal 30MHz – 1GHz



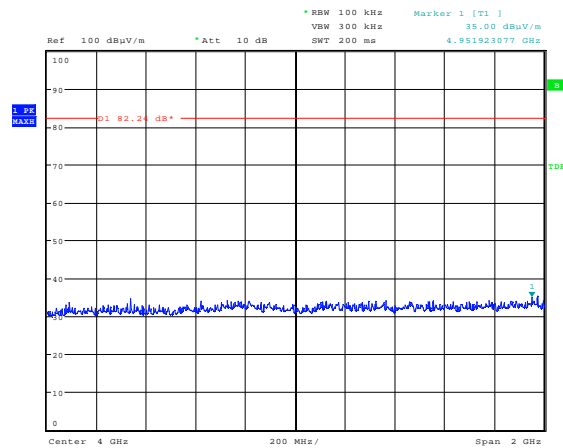
Date: 20.NOV.2009 08:59:34

Radiated emissions no input signal 1 – 3GHz



Date: 19.NOV.2009 15:53:36

Radiated emissions no input signal 3 – 5GHz



Date: 19.NOV.2009 15:53:23

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

AMPLIFIER GAIN – CONDUCTED – PART 2.1046 – DOWNLINK

Ambient temperature = 20°C
 Relative humidity = 45%
 Supply voltage = +110Vac
 Channel number = See test results

Radio Laboratory



490 MHz Band

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
489.5125	-65.0	0.4	30.3	-5.79	89.91	24.51	79.51
490.7875	-65.3	0.4	30.3	-5.56	90.44	24.74	79.64
490.9625	-65.0	0.4	30.3	-5.70	90.00	24.60	79.93

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

496 MHz Band

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
496.3375	-64.6	0.4	30.3	-4.46	90.22	25.22	80.12
496.4875	-64.7	0.4	30.3	-4.16	90.55	25.45	80.02
496.6125	-64.7	0.4	30.3	-5.55	90.59	25.49	80.45

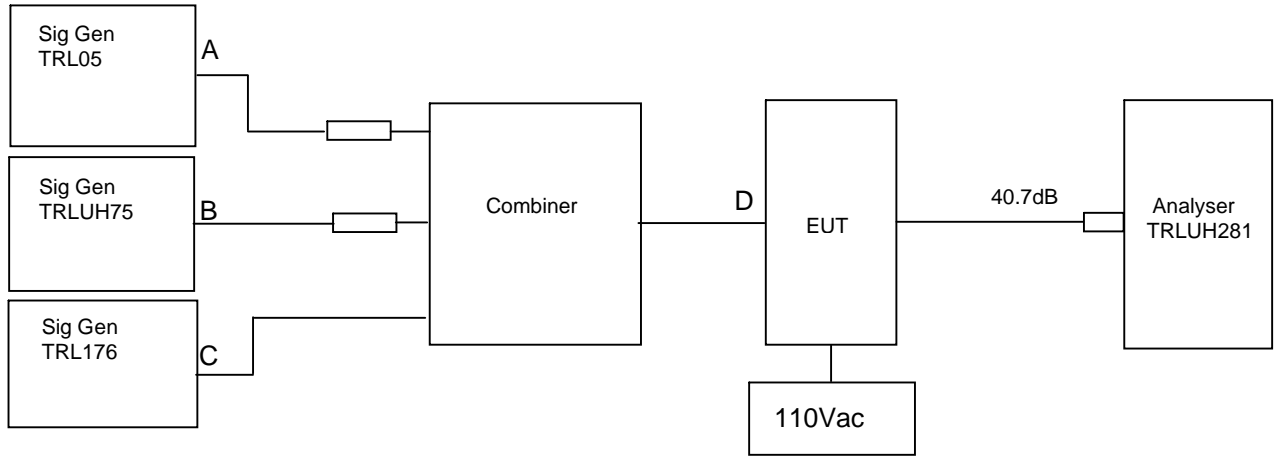
Notes: 1. The signal generator input was increased by 10dBs and the level of the output signal remeasured.

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
ATTENUATOR	BIRD	8308-200	N/A	103	X
ATTENUATOR	BIRD	830-100-N	N/A	222	X
CABLE	TRaC	N/A	N/A	UH273	X
CABLE	TRaC	N/A	N/A	UH274	X

AMPLIFIER INTERMODULATION SPURIOUS EMISSIONS – CONDUCTED – PART 2.1053– DOWNLINK

Ambient temperature = 24°C
 Relative humidity = 56%
 Supply voltage = +110Vac

Radio Laboratory



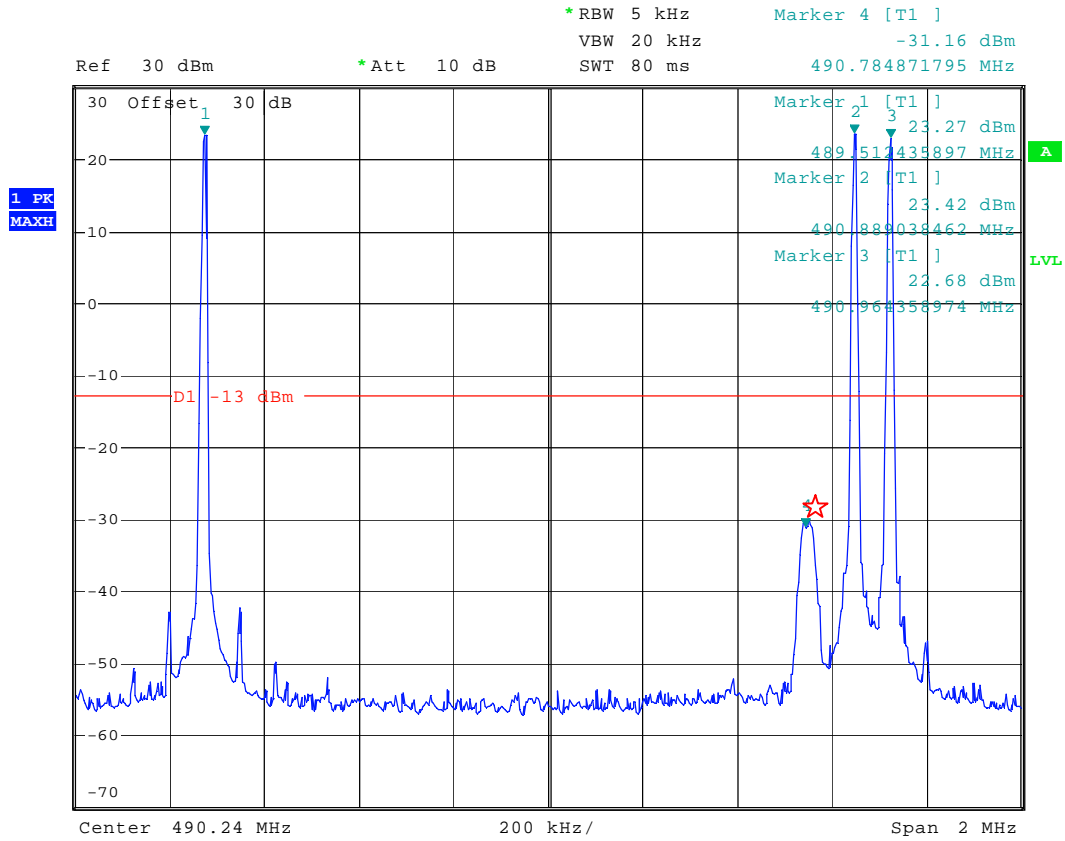
The intermodulation and spurious products were measured with the amplifier operating at maximum gain. A three tone test was conducted using the equipment as above. The input power level was adjusted so the level at point D was 10dB above the maximum input. The cable and attenuator loss between the EUT and the spectrum analyser was 30.3dB.

Downlink Band	RF Input Frequency (MHz)			Highest Intermodulation Product Level (dBm)	Limit (dBm)
490	489.5125	490.8875	490.9625	-31.16 dBm @ 490.748 MHz	-13
496	496.3375	496.5875	496.6125	-30.17 dBm @ 496.438 MHz	-13
Cross Band	489.5125	490.9125	496.6125	No Significant Emissions Within 20 dB of the limit	-13

Test equipment used for intermodulation test

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	REF 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
COMBINER	ELCOM	RC-4-50	N/A	170	X
ATTENUATOR	BIRD	8308-200	N/A	103	X
ATTENUATOR	BIRD	830-100-N	N/A	222	X
CABLE	TRaC	N/A	N/A	UH253	X
CABLE	TRaC	N/A	N/A	UH254	X
CABLE	TRaC	N/A	N/A	UH269	X
CABLE	TRaC	N/A	N/A	UH273	X
CABLE	TRaC	N/A	N/A	UH274	X

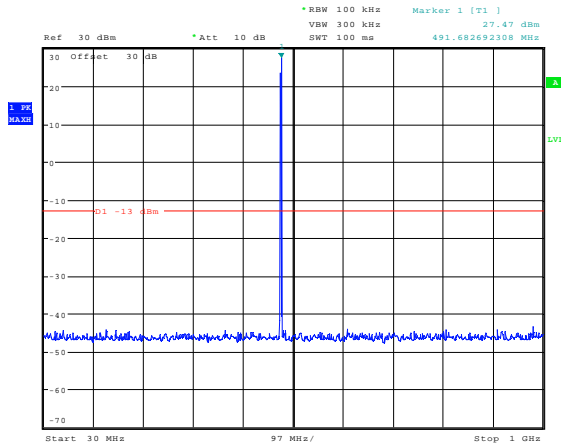
Intermodulation Inband – 490 MHz Downlink Band



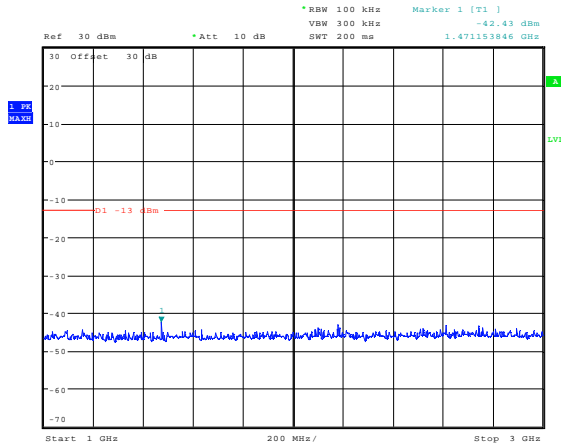
Date: 19.NOV.2009 13:56:31

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

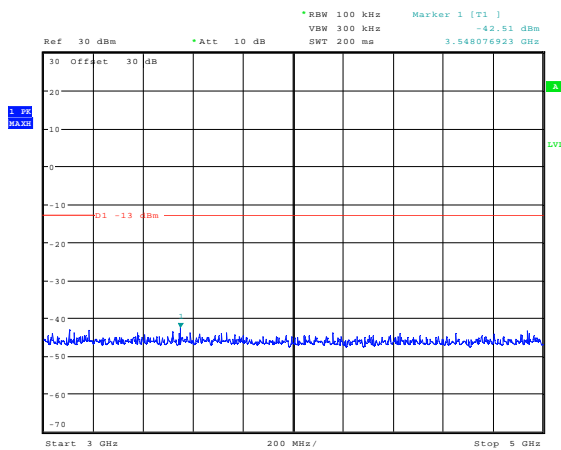
Intermodulation Wideband – 490 MHz Downlink Band



Date: 19.NOV.2009 13:57:07



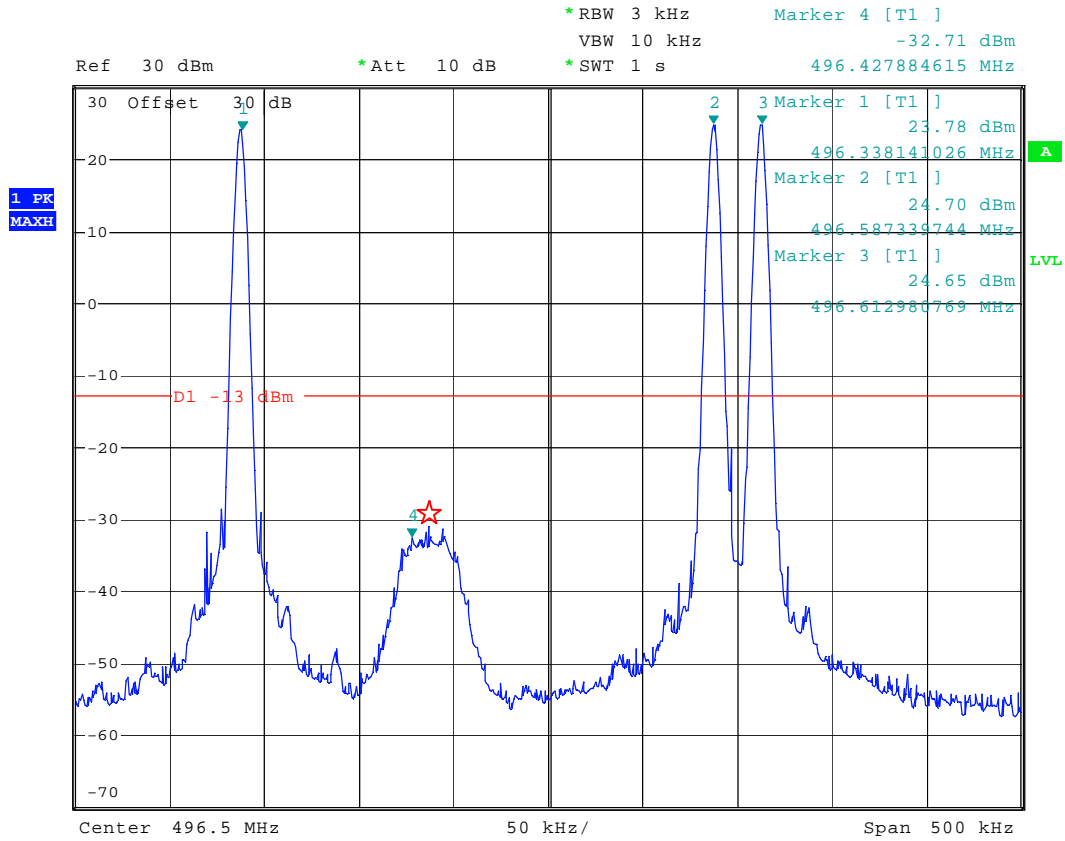
Date: 19.NOV.2009 13:57:26



Date: 19.NOV.2009 13:57:40

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

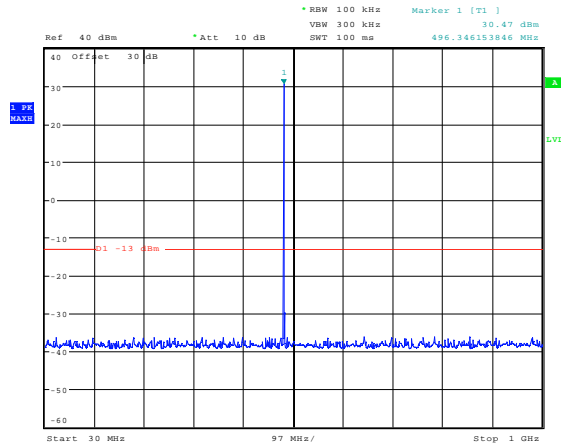
Intermodulation Inband – 800 MHz Downlink Band



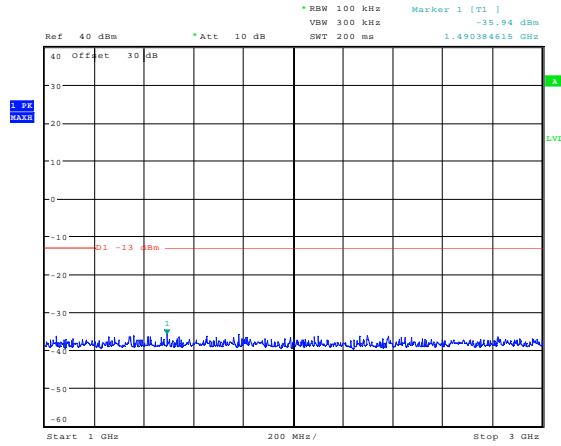
Date: 19.NOV.2009 14:12:12

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

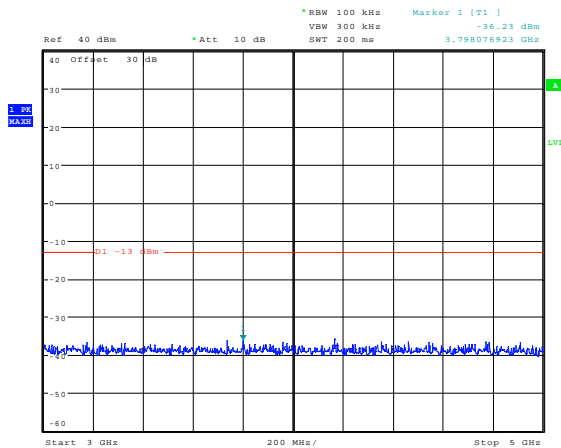
Intermodulation Wideband – 800 MHz Downlink Band



Date: 19.NOV.2009 14:13:04



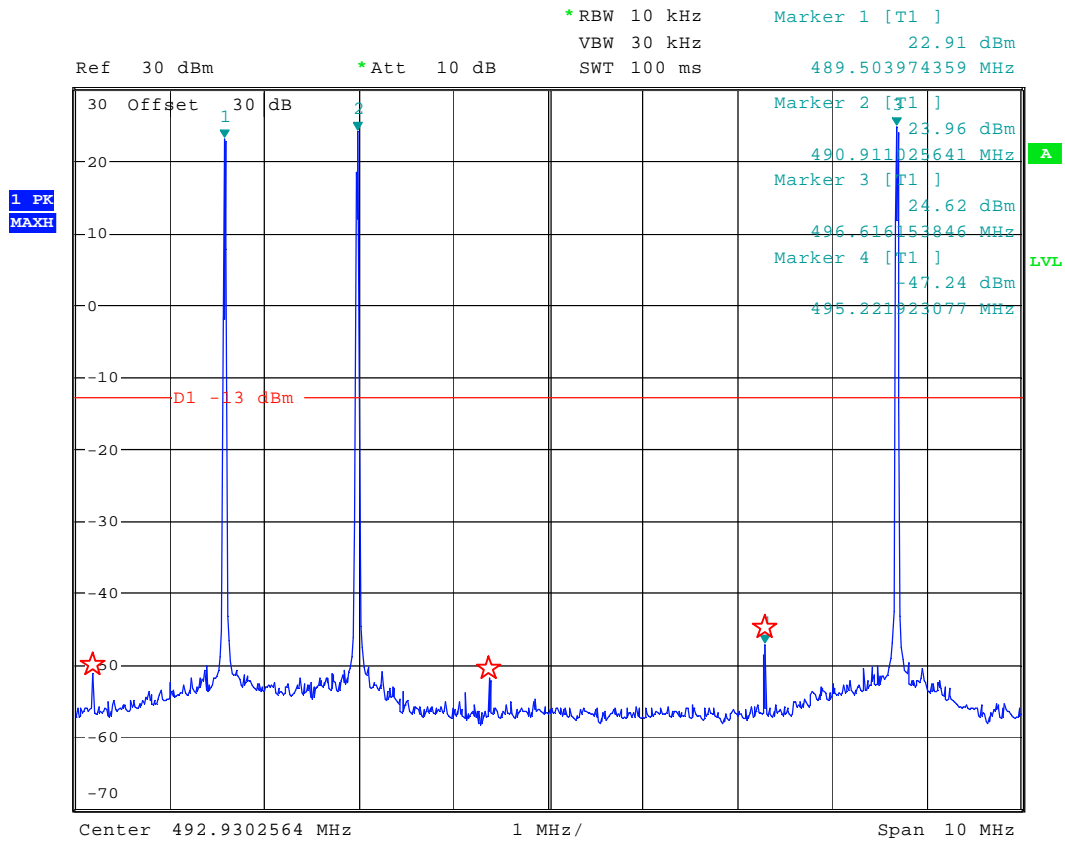
Date: 19.NOV.2009 14:13:16



Date: 19.NOV.2009 14:13:27

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

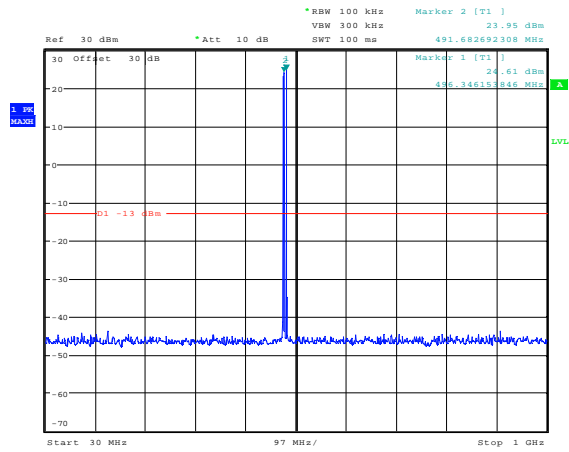
Intermodulation Inband – Cross Band



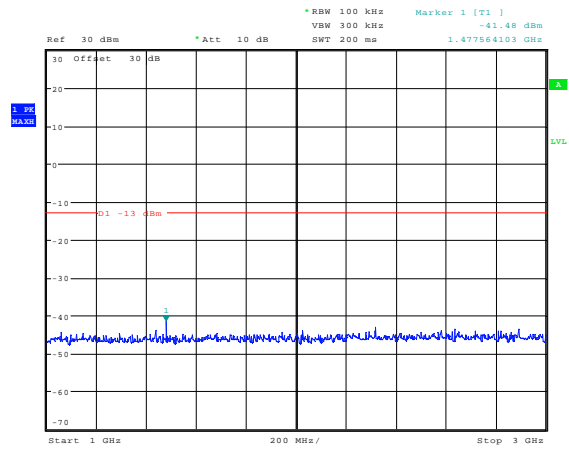
Date: 19.NOV.2009 14:22:05

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

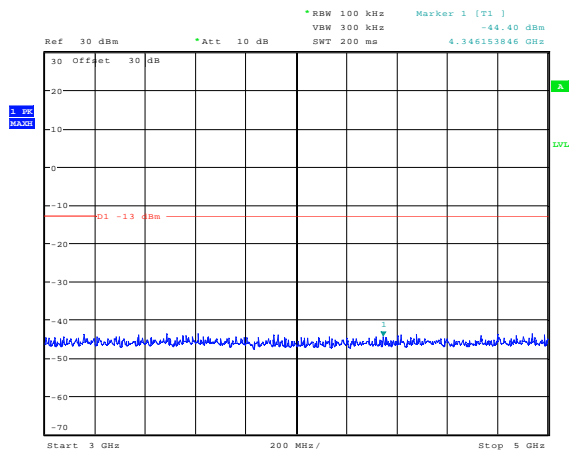
Intermodulation Wideband – Cross Band



Date: 19.NOV.2009 14:22:48



Date: 19.NOV.2009 14:23:04



Date: 19.NOV.2009 14:23:18

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

TRANSMITTER TESTS

AMPLIFIER MODULATED CHANNEL TEST – CONDUCTED – Part 2.1049– DOWNLINK

Ambient temperature = 24°C
 Relative humidity = 56%
 Supply voltage = +110Vac
 Channel number = See test results

Radio Laboratory



This test was performed to show that the amplifier does not alter the input signal in any way. The input signal was set to the maximum input. The following modulation schemes were produced, a 2500Hz FM tone with 2.5 and 5 kHz deviation.

The plots show the signal measured at the signal generator (Black trace) and the signal measured at the output of the EUT (Blue Trace).

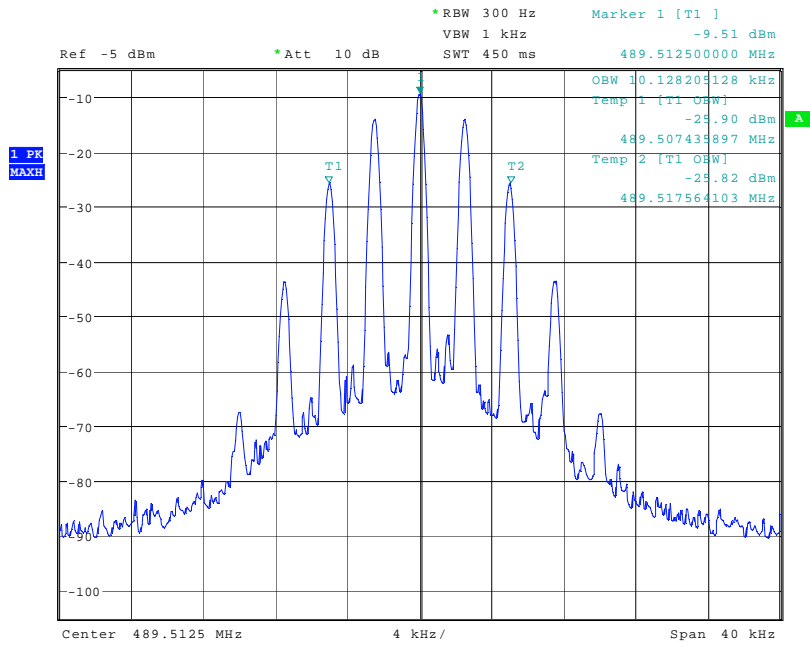
Note: The cables and attenuators had the following losses.

1. Cable and attenuator between EUT and spectrum analyser 30.3dB
2. Cable between signal generator and EUT 0.4dB

Frequency Of Operational Channel	Modulation Type	
	2.5 kHz FM	5 kHz FM
489.5125	10.128 kHz	15.000 kHz
490.7875	10.128 kHz	15.256 kHz
490.9625	10.128 kHz	15.000 kHz
496.3375	10.128 kHz	15.256 kHz
496.4875	10.128 kHz	15.000 kHz
496.6125	10.128 kHz	15.000 kHz

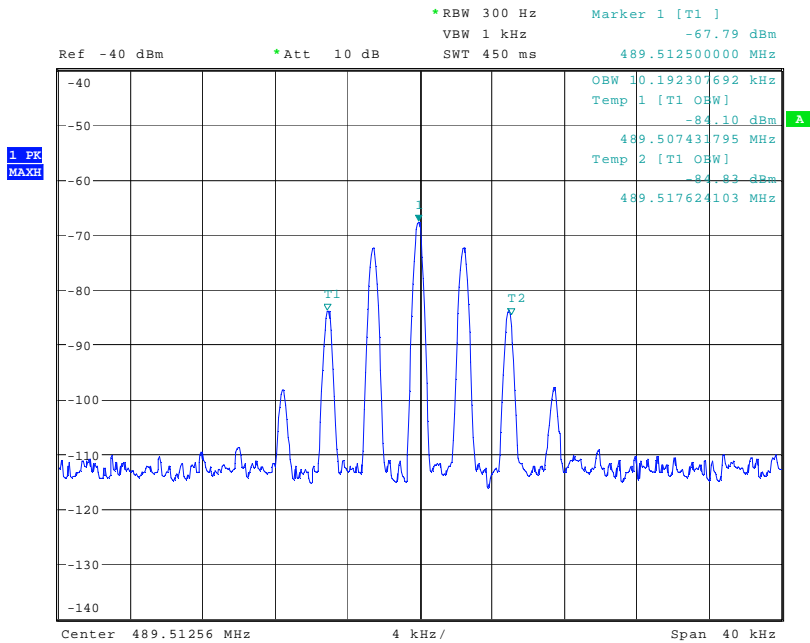
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
ATTENUATOR	BIRD	8308-200	N/A	103	X
ATTENUATOR	BIRD	830-100-N	N/A	222	X
CABLE	TRaC	N/A	N/A	UH273	X
CABLE	TRaC	N/A	N/A	UH274	X

489.5125 FM deviation set to 2.5kHz, EUT and Signal Generator



Date: 19.NOV.2009 11:11:42

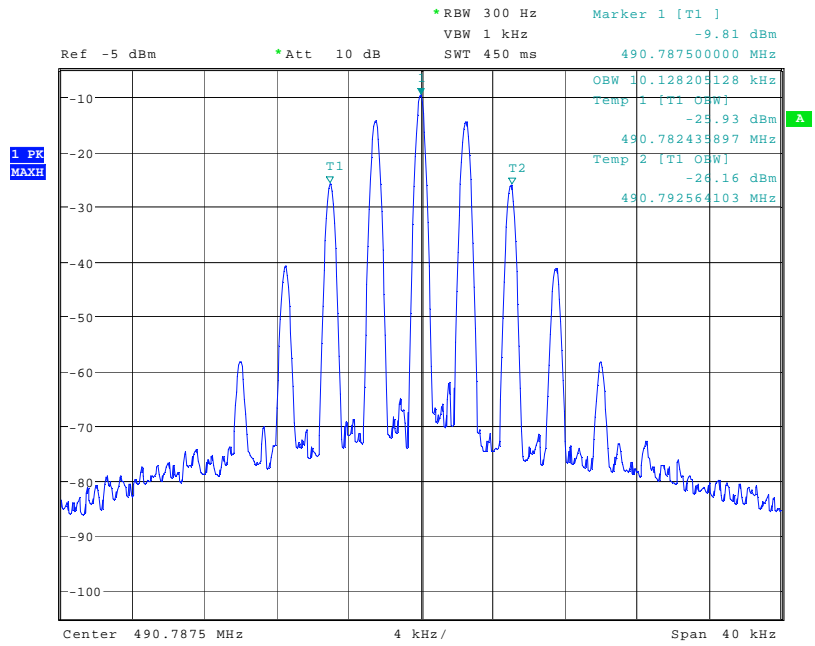
489.5125 FM deviation set to 2.5kHz, Signal Generator



Date: 19.NOV.2009 11:36:19

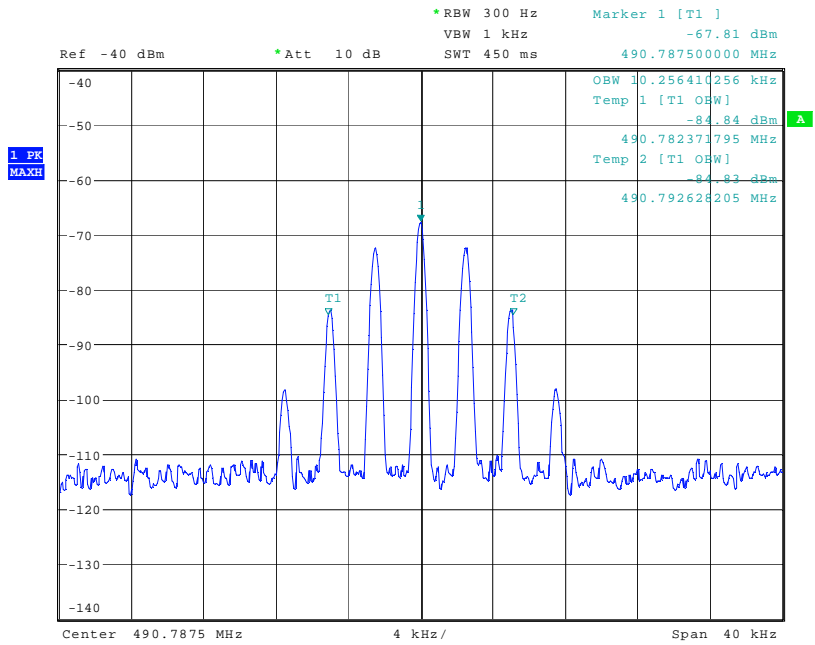
The above plots show no significant distortion visible when compared to the input signal.

490.7875 FM deviation set to 2.5kHz, EUT and Signal Generator



Date: 19.NOV.2009 11:12:54

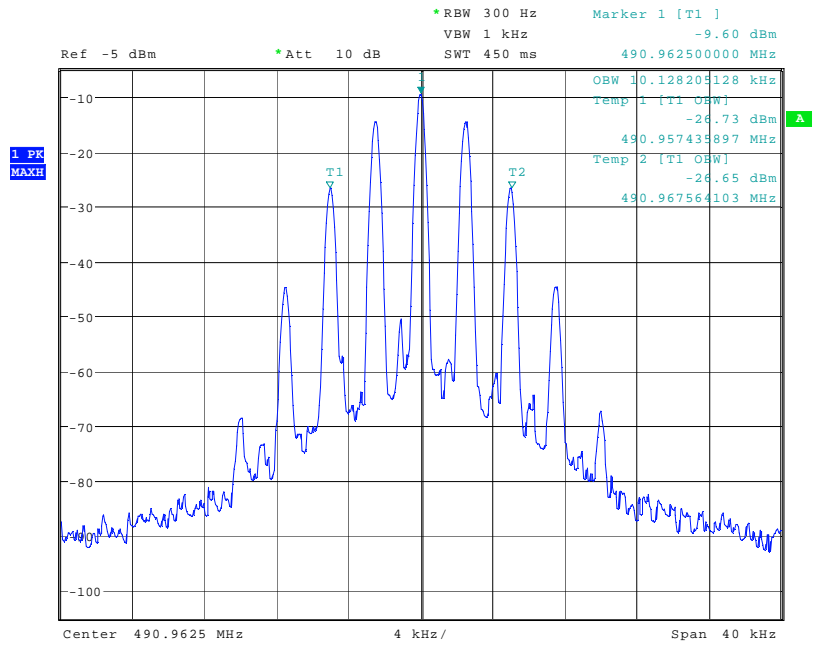
490.7875 FM deviation set to 2.5kHz, Signal Generator



Date: 19.NOV.2009 11:37:24

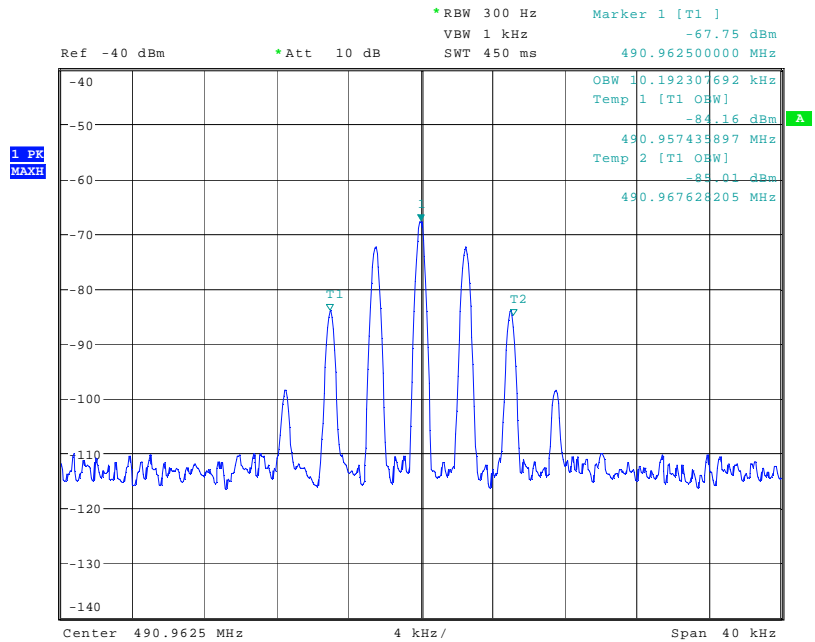
The above plots show no significant distortion visible when compared to the input signal.

490.9625 FM deviation set to 2.5kHz, EUT and Signal Generator



Date: 19.NOV.2009 11:13:31

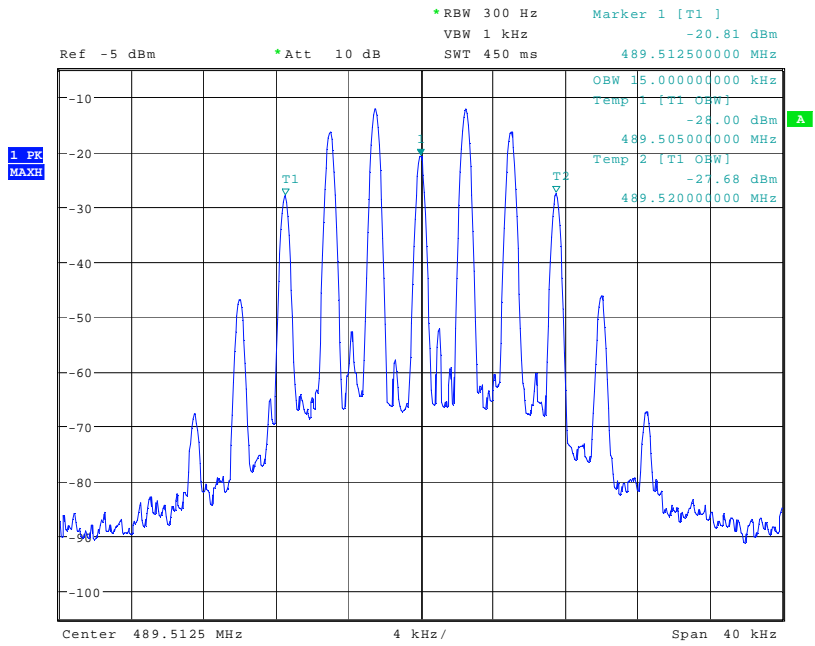
490.9625 FM deviation set to 2.5kHz, Signal Generator



Date: 19.NOV.2009 11:37:50

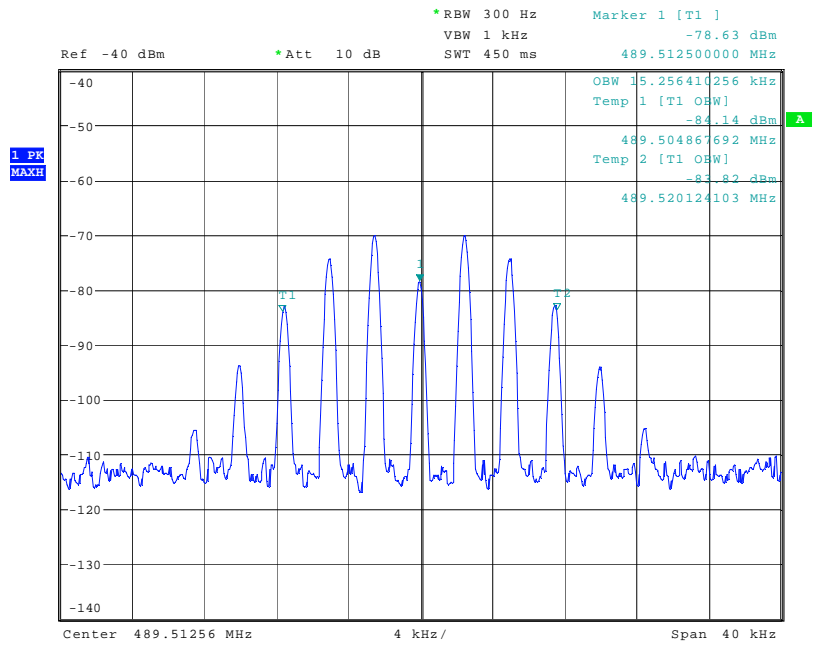
The above plots show no significant distortion visible when compared to the input signal.

489.5125 FM deviation set to 5kHz, EUT and Signal Generator



Date: 19.NOV.2009 11:12:04

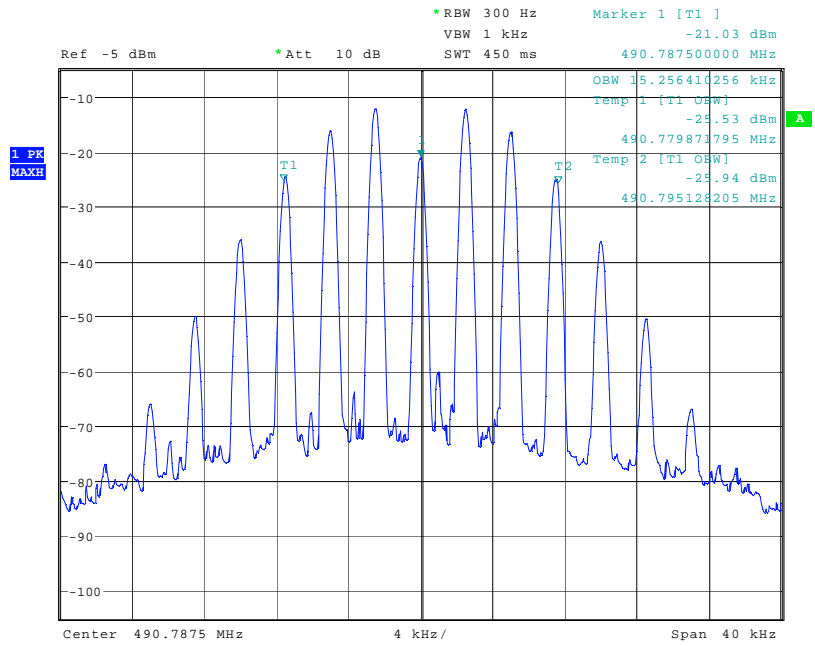
489.5125 FM deviation set to 5kHz, Signal Generator



Date: 19.NOV.2009 11:36:38

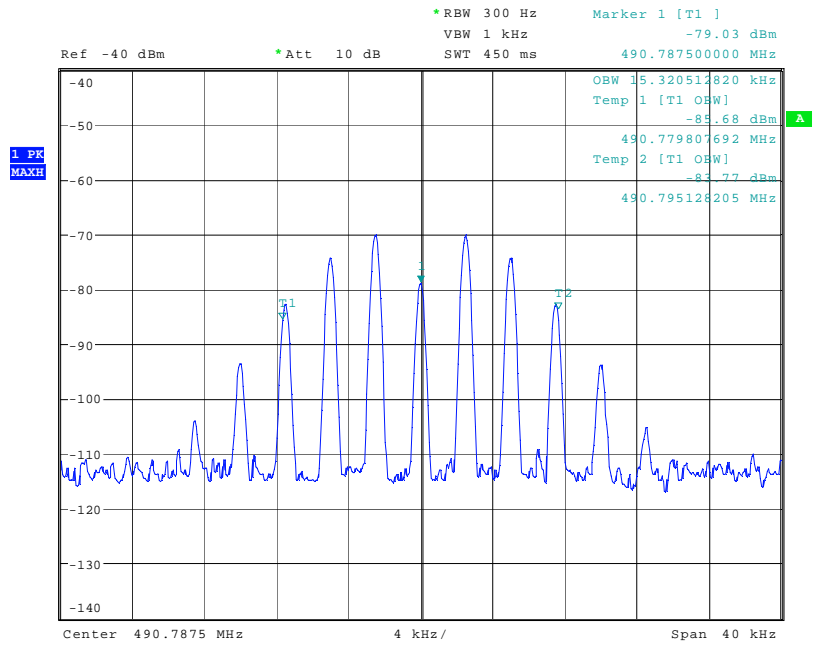
The above plots show no significant distortion visible when compared to the input signal.

490.7875 FM deviation set to 5kHz, EUT and Signal Generator



Date: 19.NOV.2009 11:12:34

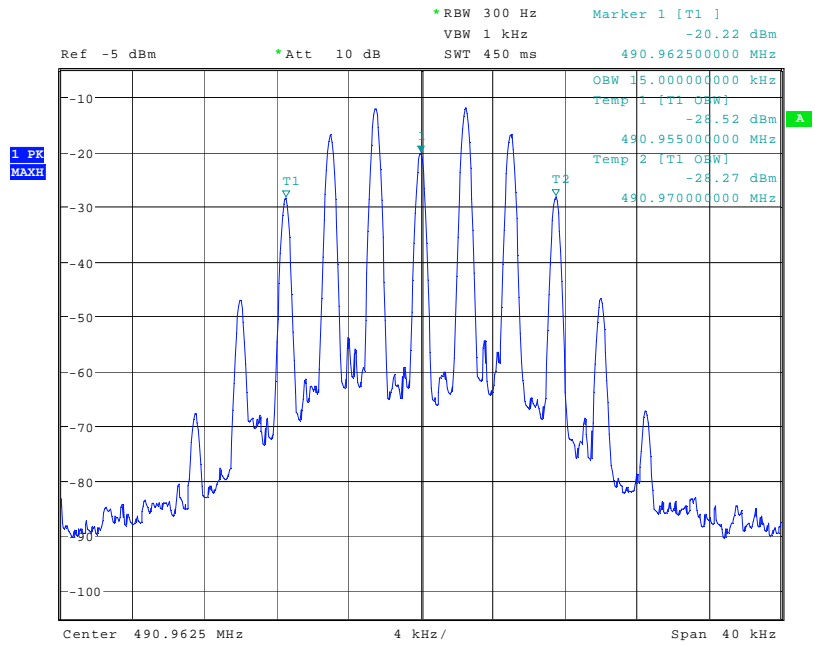
490.7875 FM deviation set to 5kHz, Signal Generator



Date: 19.NOV.2009 11:37:04

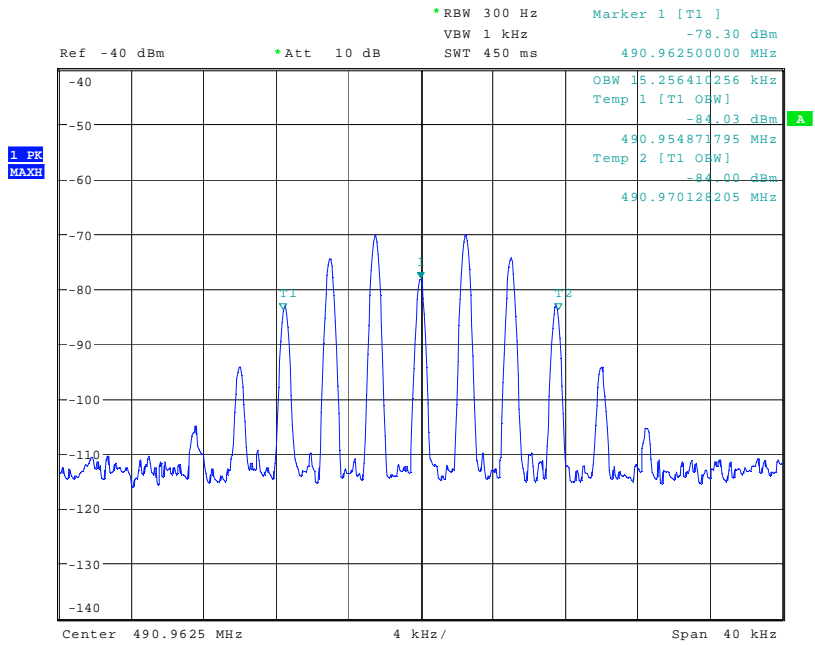
The above plots show no significant distortion visible when compared to the input signal.

490.9625 FM deviation set to 5kHz, EUT and Signal Generator



Date: 19.NOV.2009 11:14:13

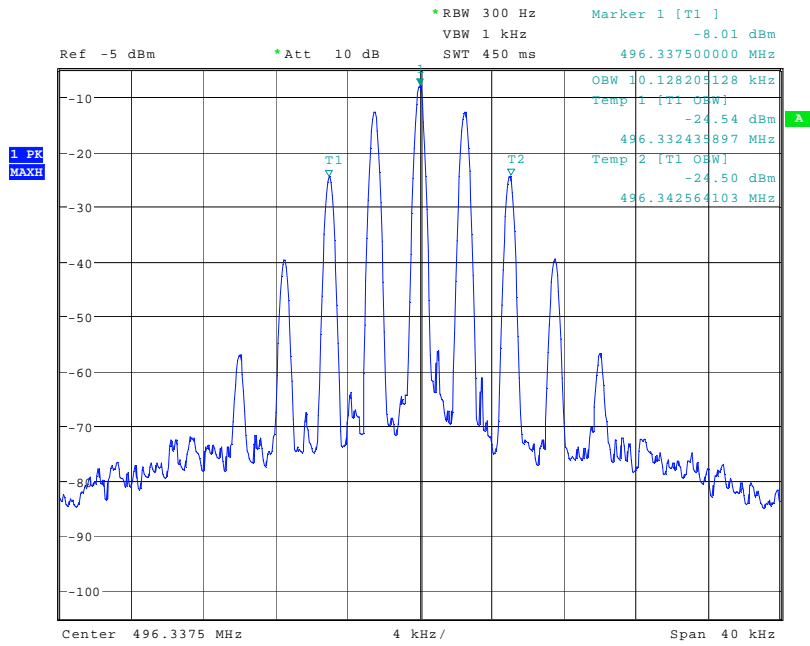
490.9625 FM deviation set to 5kHz, Signal Generator



Date: 19.NOV.2009 11:38:13

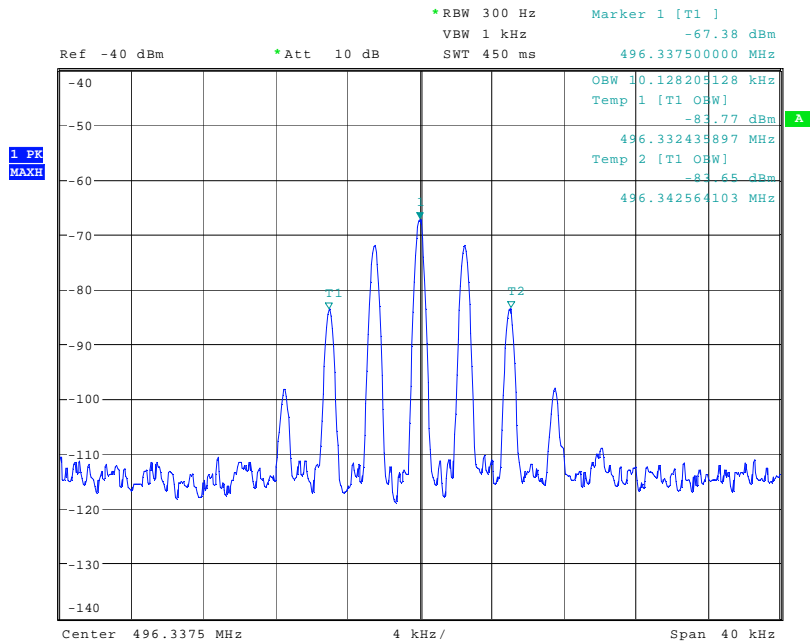
The above plots show no significant distortion visible when compared to the input signal.

496.3375 FM deviation set to 2.5kHz, EUT and Signal Generator



Date: 19.NOV.2009 11:15:18

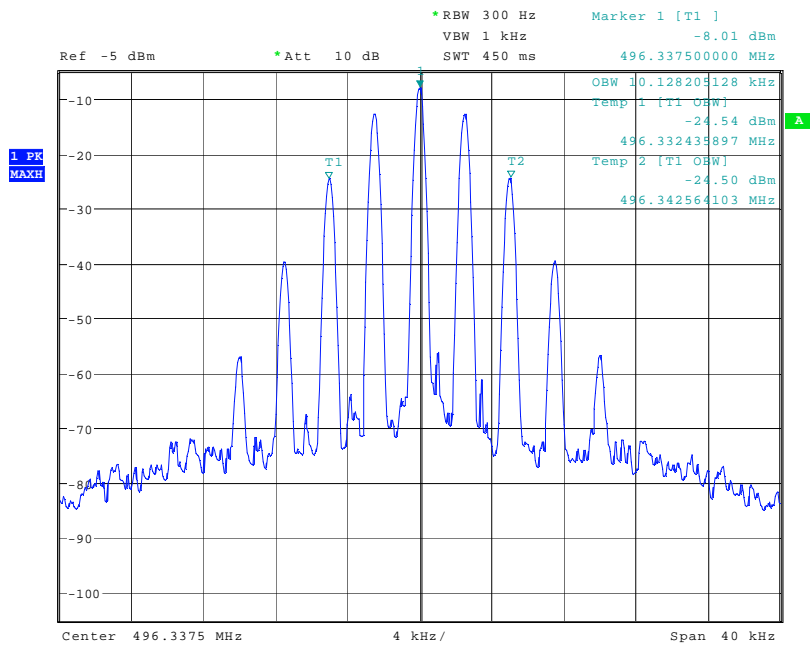
496.3375 FM deviation set to 2.5kHz, Signal Generator



Date: 19.NOV.2009 11:34:58

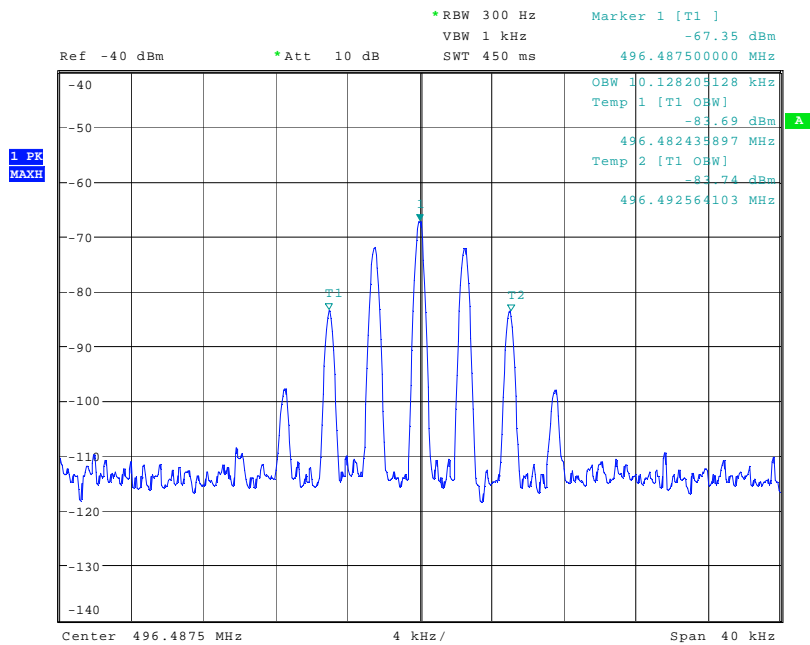
The above plots show no significant distortion visible when compared to the input signal.

496.4875 FM deviation set to 2.5kHz, EUT and Signal Generator



Date: 19.NOV.2009 11:15:18

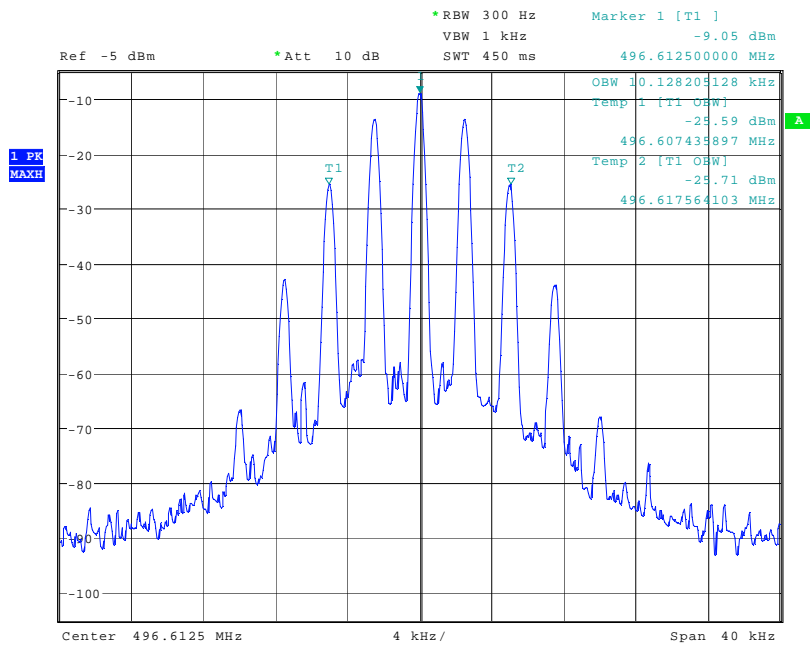
496.4875 FM deviation set to 2.5kHz, Signal Generator



Date: 19.NOV.2009 11:34:40

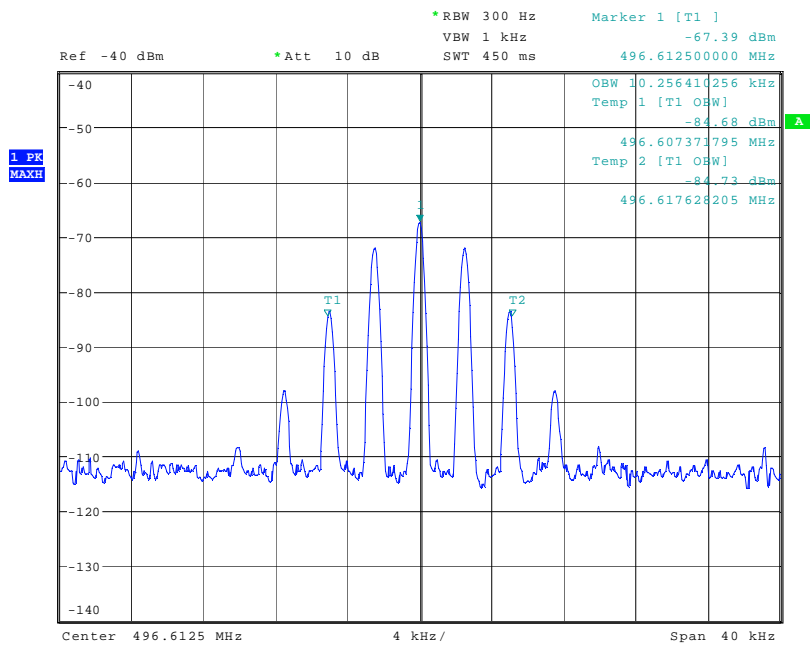
The above plots show no significant distortion visible when compared to the input signal.

496.6125 FM deviation set to 2.5kHz, EUT and Signal Generator



Date: 19.NOV.2009 11:32:27

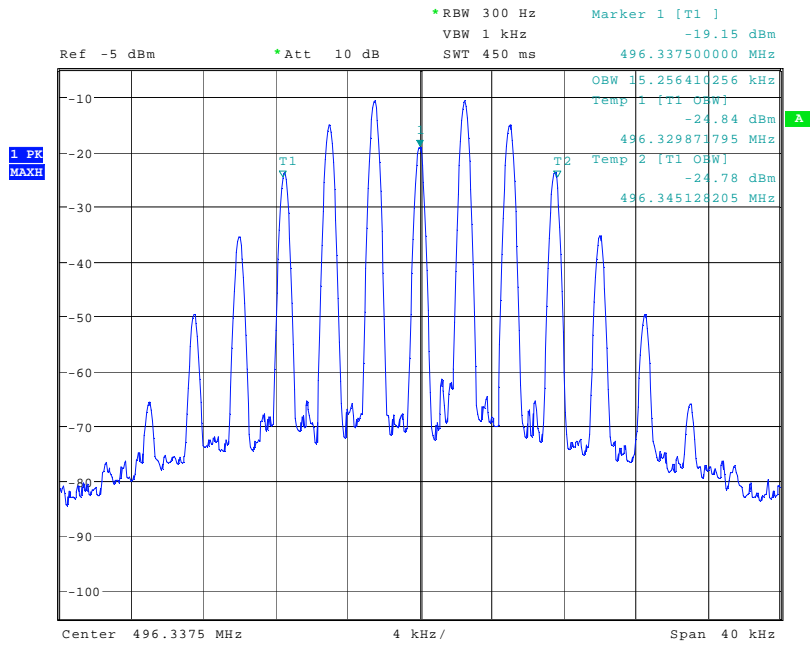
496.6125 FM deviation set to 2.5kHz, Signal Generator



Date: 19.NOV.2009 11:33:33

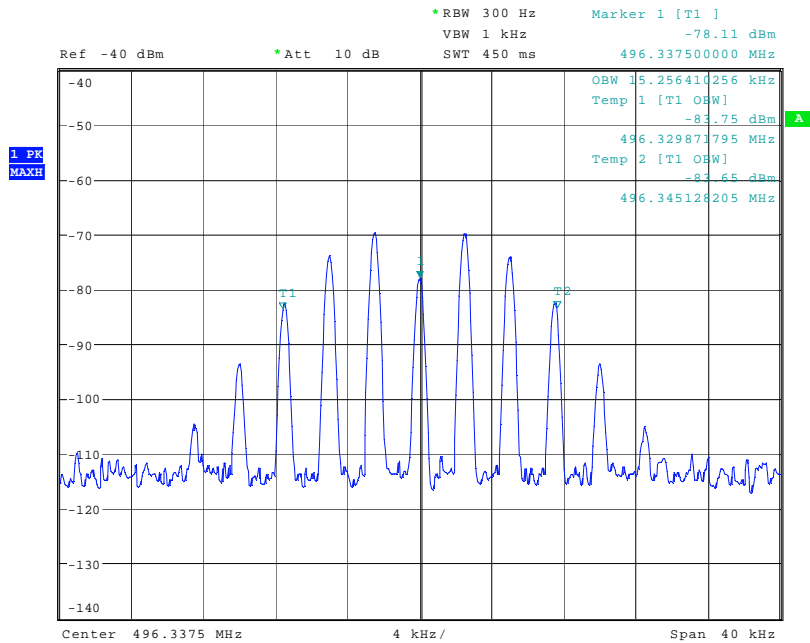
The above plots show no significant distortion visible when compared to the input signal.

496.3375 FM deviation set to 5kHz, EUT and Signal Generator



Date: 19.NOV.2009 11:14:55

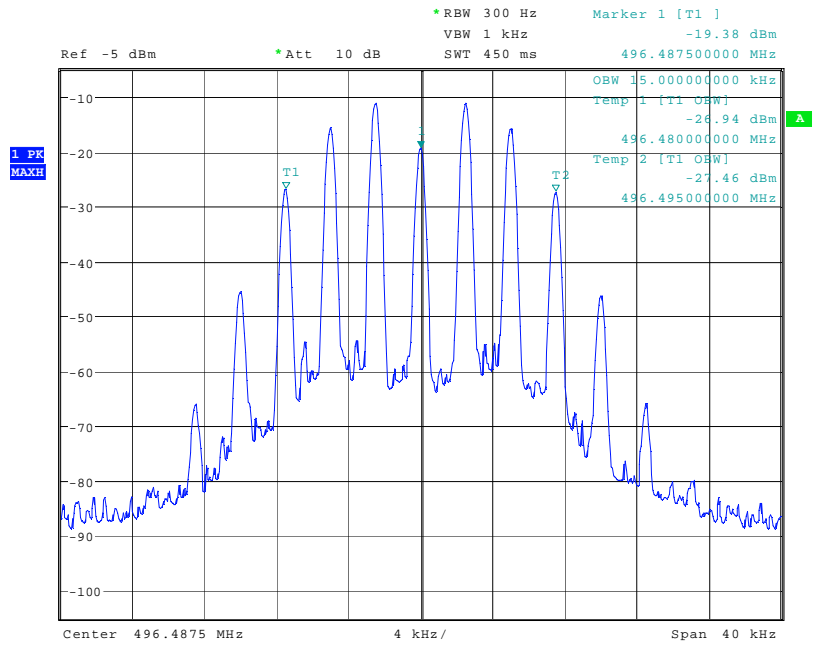
496.3375 FM deviation set to 5kHz, Signal Generator



Date: 19.NOV.2009 11:35:13

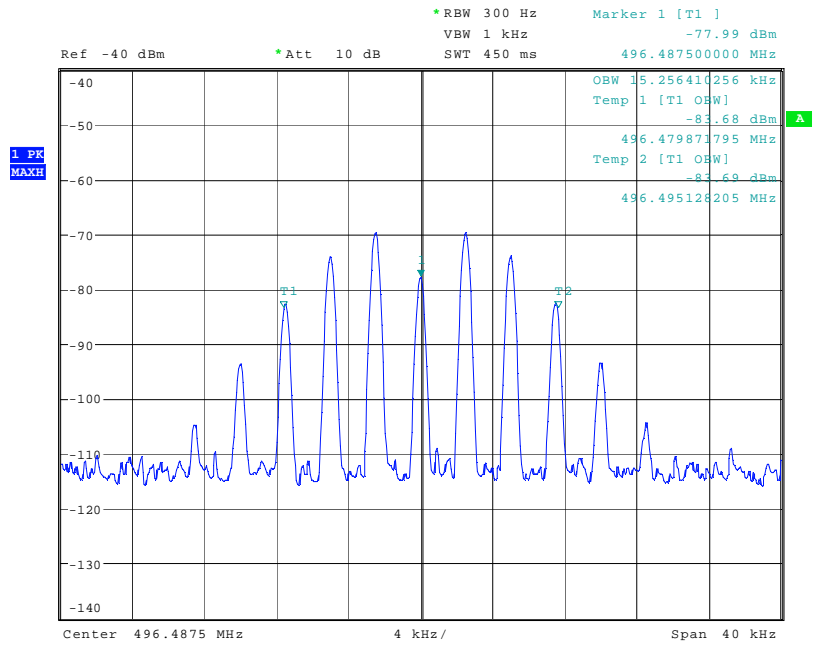
The above plots show no significant distortion visible when compared to the input signal.

496.4875 FM deviation set to 5kHz, EUT and Signal Generator



Date: 19.NOV.2009 11:16:26

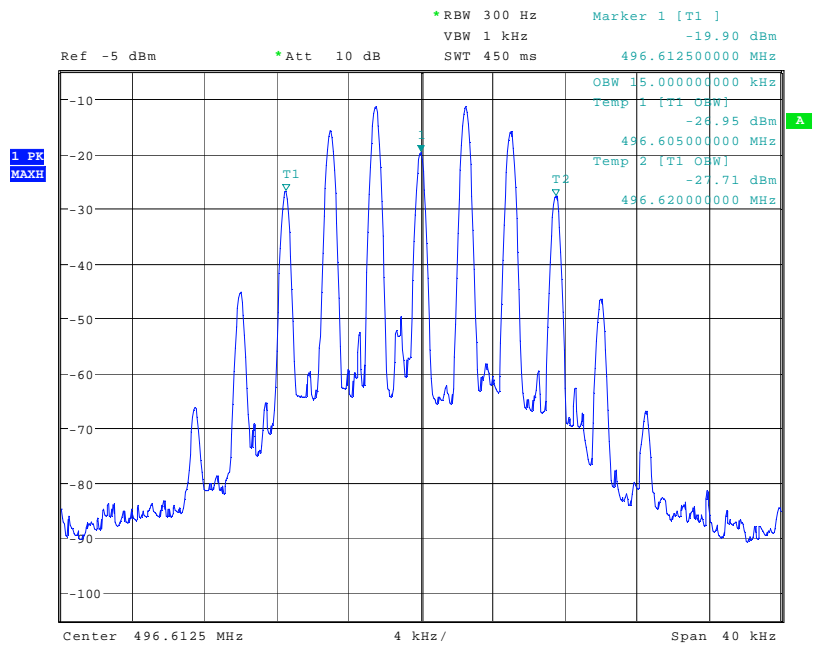
496.4875 FM deviation set to 5kHz, Signal Generator



Date: 19.NOV.2009 11:34:22

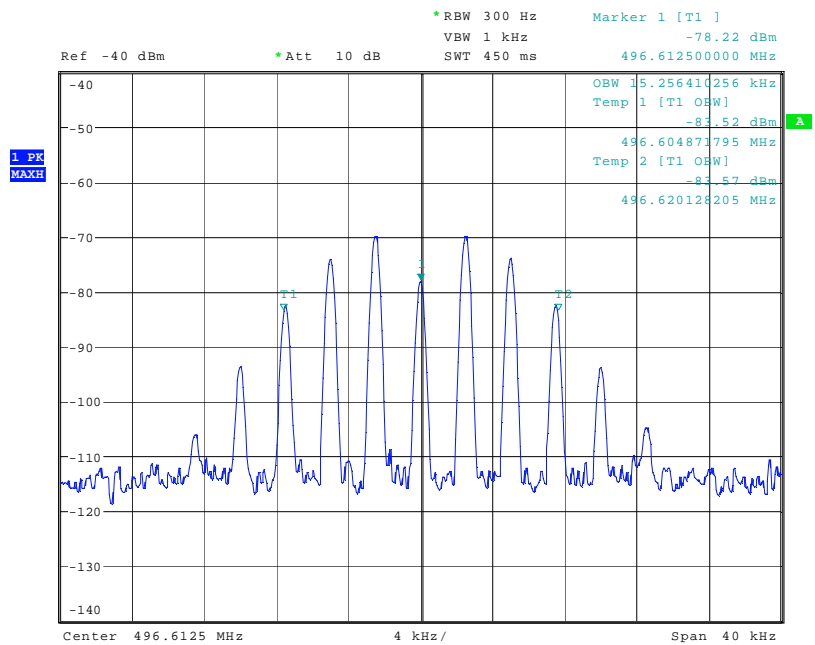
The above plots show no significant distortion visible when compared to the input signal.

496.6125 FM deviation set to 5kHz, EUT and Signal Generator



Date: 19.NOV.2009 11:32:12

496.6125 FM deviation set to 5kHz, Signal Generator



Date: 19.NOV.2009 11:33:44

The above plots show no significant distortion visible when compared to the input signal.

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – CONDUCTED – Part 2.1053 – DOWNLINK

Ambient temperature = 24°C
 Relative humidity = 56%
 Supply voltage = +110Vac

Radio Laboratory
 Test Signal = F3E



The test was set up as per the diagram. The level at the input was 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

490MHz Downlink

FREQUENCY RANGE	FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTENUATOR & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
30MHz – 5 GHz	No Significant Emissions Within 20 dB of the Limit				-13

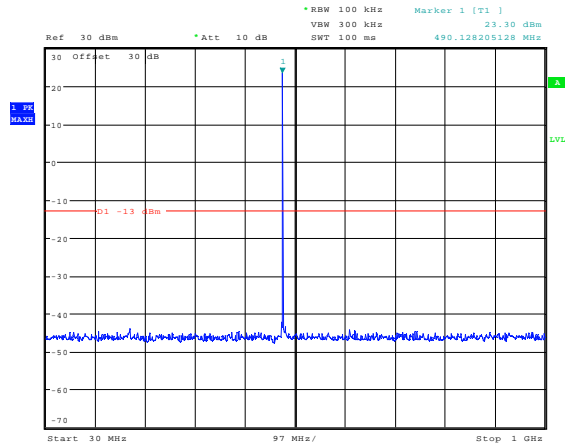
800MHz Downlink

FREQUENCY RANGE	FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTENUATOR & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
30MHz – 5 GHz	No Significant Emissions Within 20 dB of the Limit				-13

The test equipment used for the Transmitter Conducted Emissions:

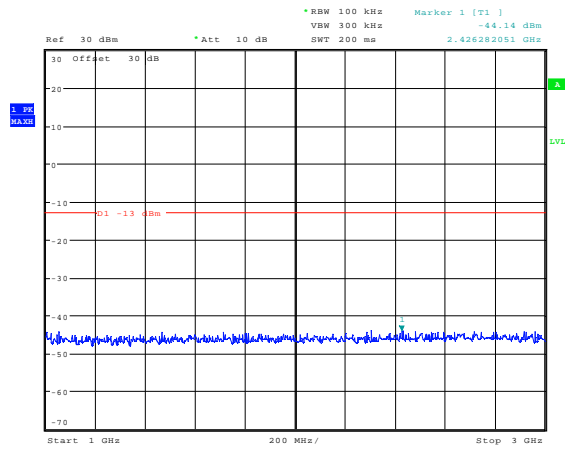
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
ATTENUATOR	BIRD	8308-200	N/A	103	X
ATTENUATOR	BIRD	830-100-N	N/A	222	X
CABLE	TRaC	N/A	N/A	UH273	X
CABLE	TRaC	N/A	N/A	UH274	X

490 MHz Downlink Conducted emissions 489.5125 30 MHz – 1GHz



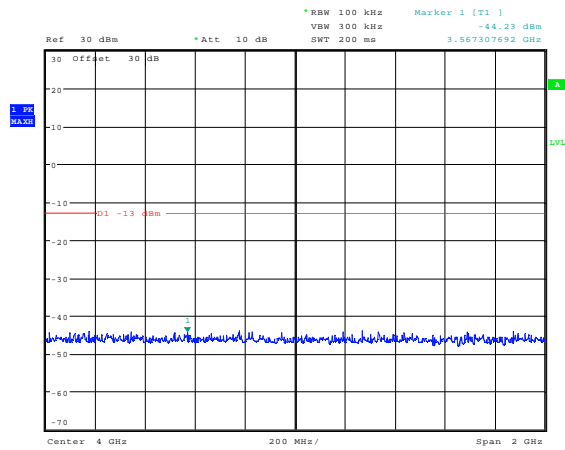
Date: 19.NOV.2009 10:13:23

490 MHz Downlink Conducted emissions 489.5125 1 – 3GHz



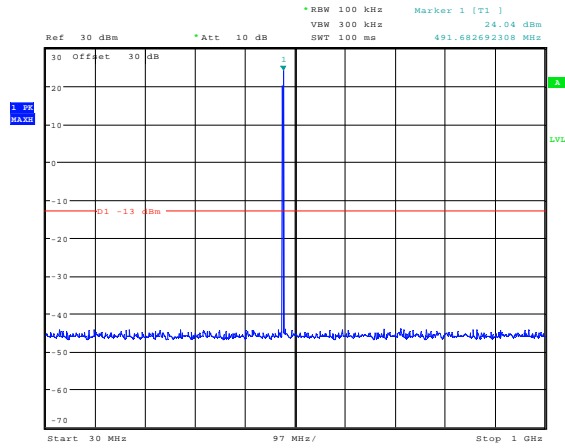
Date: 19.NOV.2009 10:13:39

490 MHz Downlink Conducted emissions 489.5125 3 – 5GHz



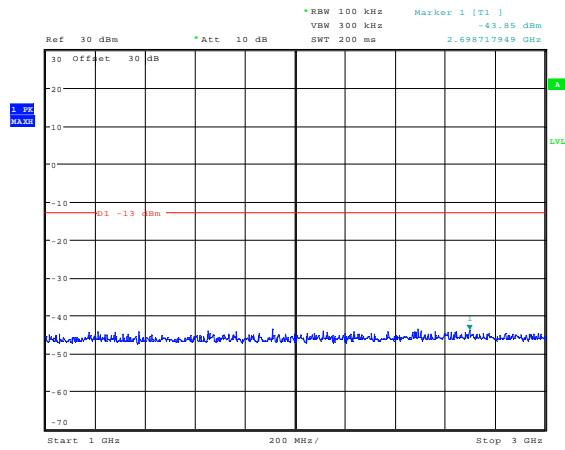
Date: 19.NOV.2009 10:13:59

490 MHz Downlink Conducted emissions 490.7875 30 MHz – 1GHz



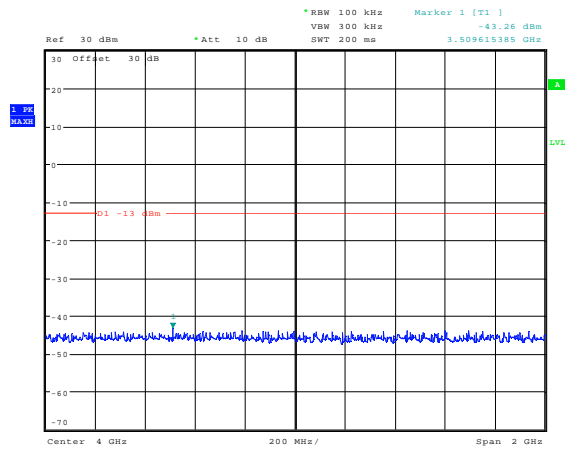
Date: 19.NOV.2009 10:10:09

490 MHz Downlink Conducted emissions 490.7875 1 – 3GHz



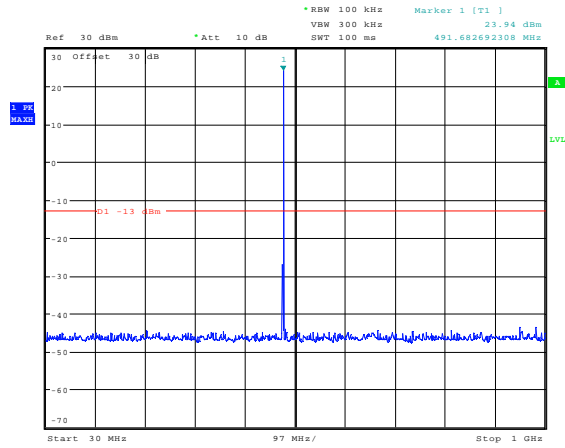
Date: 19.NOV.2009 10:10:25

490 MHz Downlink Conducted emissions 490.7875 3 – 5GHz



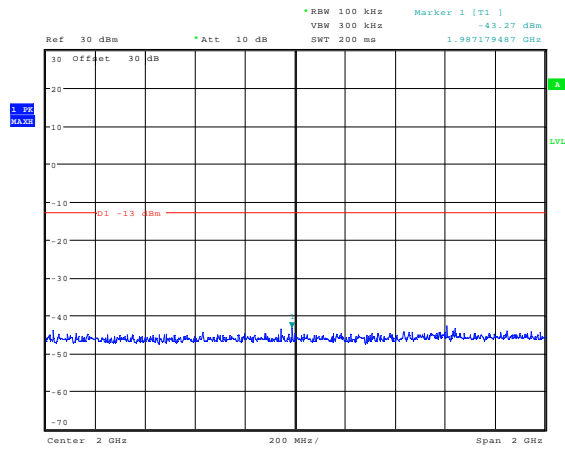
Date: 19.NOV.2009 10:10:48

490 MHz Downlink Conducted emissions 490.9625 30 MHz – 1GHz



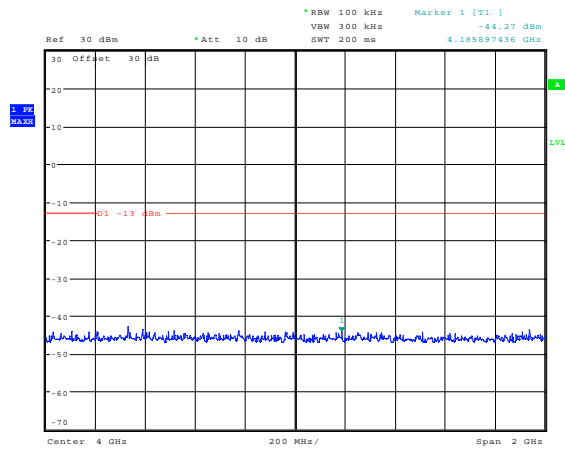
Date: 19.NOV.2009 10:08:58

490 MHz Downlink Conducted emissions 490.9625 1 – 3GHz



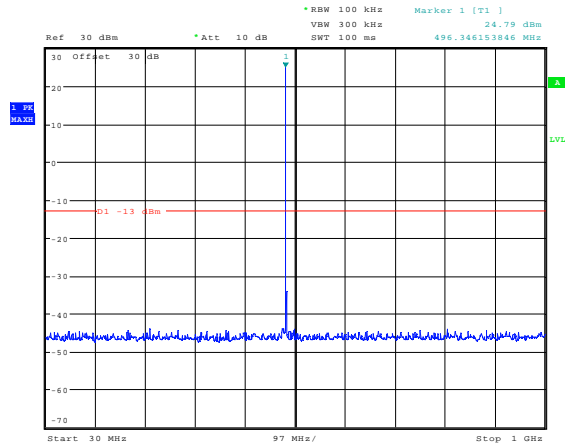
Date: 19.NOV.2009 10:08:40

490 MHz Downlink Conducted emissions 490.9625 3 – 5GHz



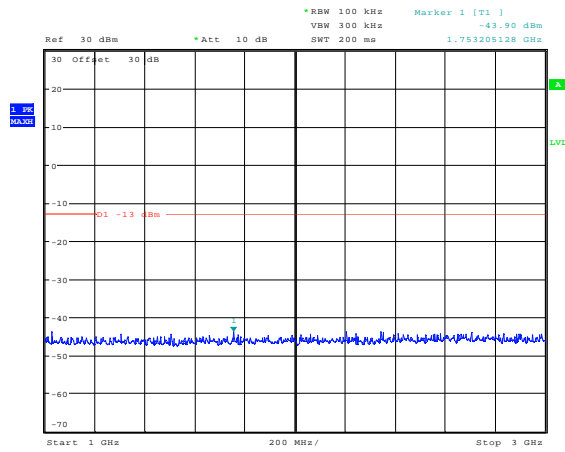
Date: 19.NOV.2009 10:08:26

496 MHz Downlink Conducted emissions 496.3375 30 MHz – 1GHz



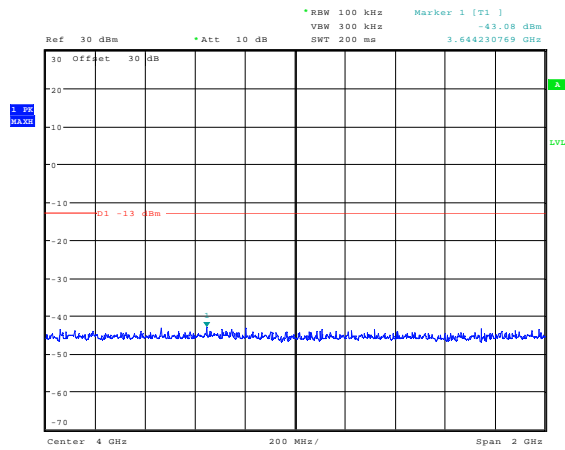
Date: 19.NOV.2009 10:04:14

496 MHz Downlink Conducted emissions 496.3375 1 – 3GHz



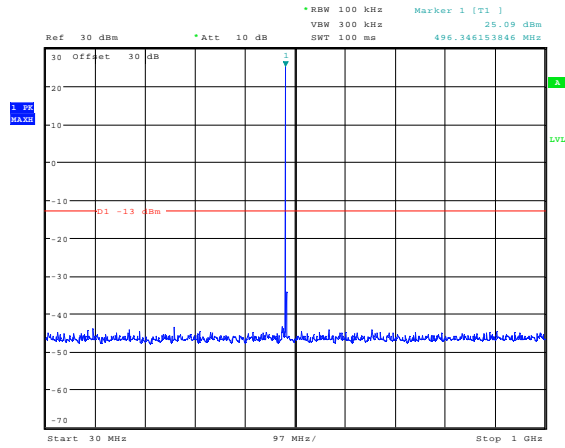
Date: 19.NOV.2009 10:04:29

496 MHz Downlink Conducted emissions 496.3375 3 – 5GHz



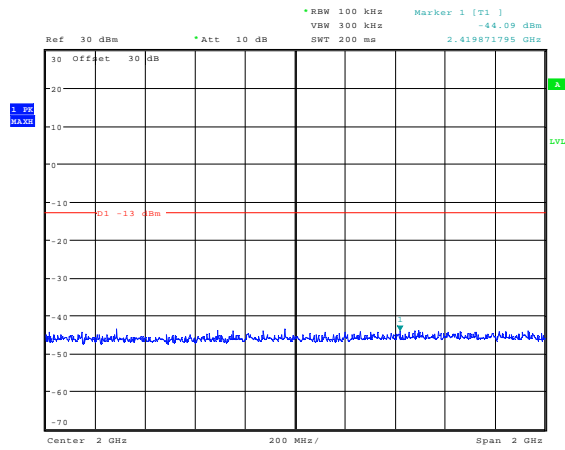
Date: 19.NOV.2009 10:05:30

496 MHz Downlink Conducted emissions 496.4875 30 MHz – 1GHz



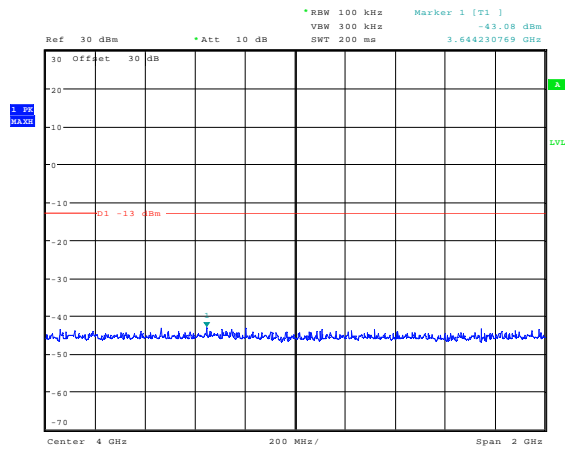
Date: 19.NOV.2009 10:03:08

496 MHz Downlink Conducted emissions 496.4875 1 – 3GHz



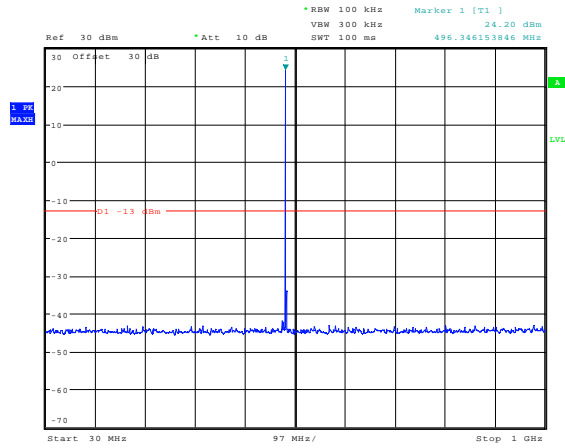
Date: 19.NOV.2009 10:02:51

496 MHz Downlink Conducted emissions 496.4875 3 – 5GHz



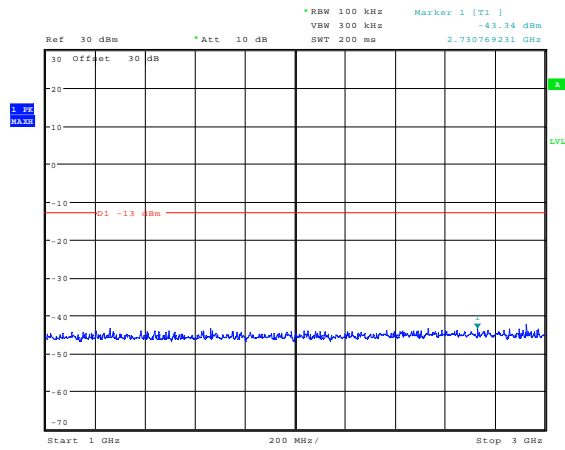
Date: 19.NOV.2009 10:05:30

496 MHz Downlink Conducted emissions 496.6125 30 MHz – 1GHz



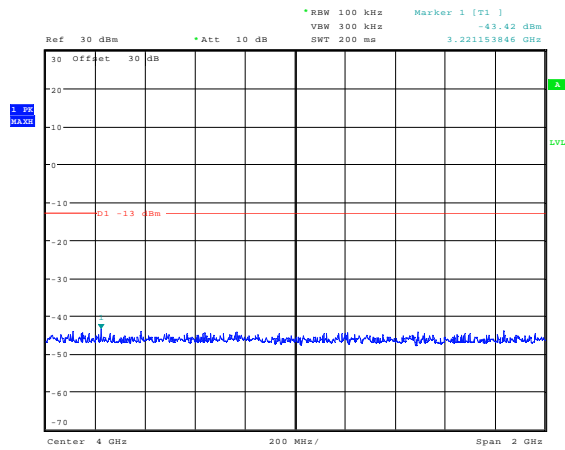
Date: 19.NOV.2009 10:00:40

496 MHz Downlink Conducted emissions 496.6125 1 – 3GHz



Date: 19.NOV.2009 10:01:25

496 MHz Downlink Conducted emissions 496.6125 3 – 5GHz

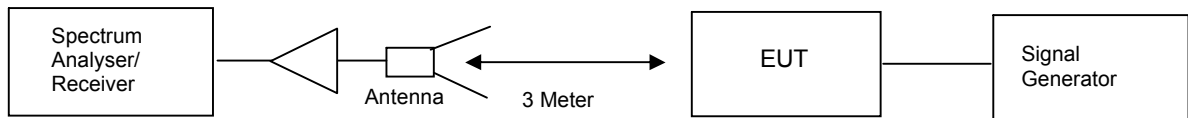


Date: 19.NOV.2009 10:06:17

TRANSMITTER TESTS

AMPLIFIER SPURIOUS EMISSIONS – RADIATED – Part 2.1053– DOWNLINK

Ambient temperature = 17°C
 Relative humidity = 48%
 Conditions = OATS
 Supply voltage = +110Vac
 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

493 MHz Band

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

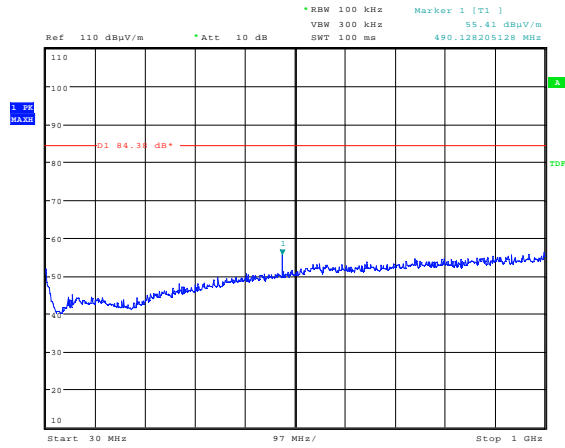
499 MHz Band

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

The test equipment used for the Transmitter Spurious Emissions:

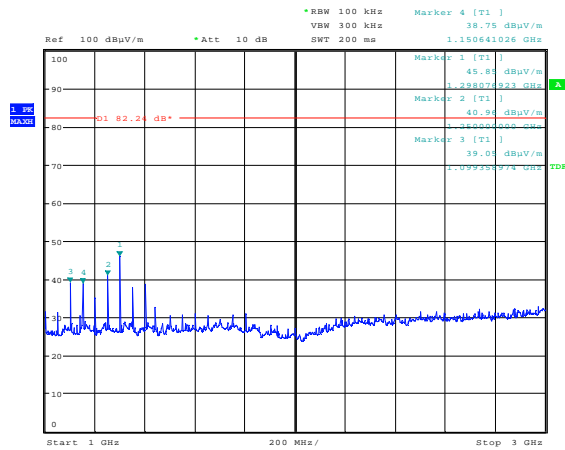
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	X
HORN	EMCO	3115	9010-3580	138	X
PRE AMPLIFIER	HP	8449B	3008A016	572	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
ANTENNA	CHASE	CBL6112B	2803	UH93	X

Radiated emissions 489.5125 30MHz – 1GHz



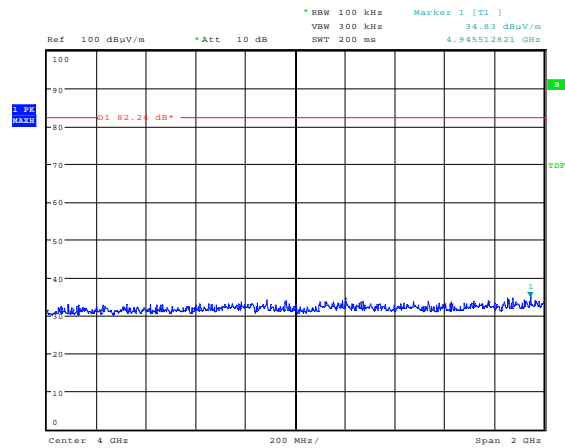
Date: 20.NOV.2009 09:08:17

Radiated emissions 489.5125 1 – 3GHz



Date: 19.NOV.2009 15:54:54

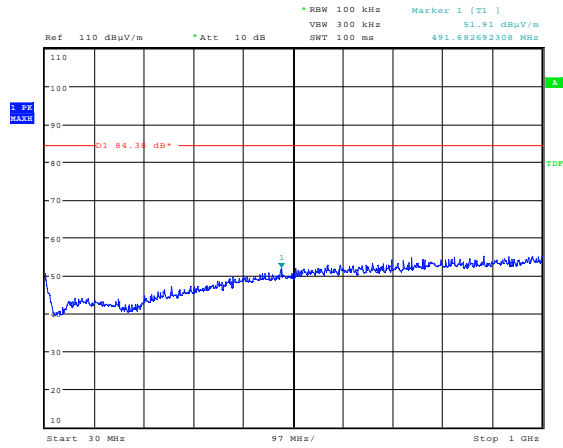
Radiated emissions 489.5125 3 – 5GHz



Date: 19.NOV.2009 15:55:07

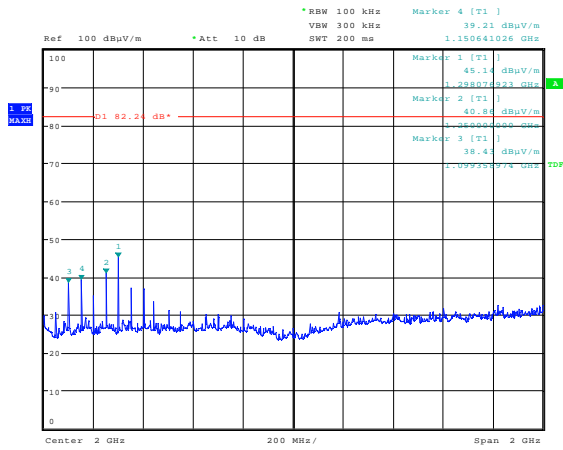
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions 490.7875 30MHz – 1GHz



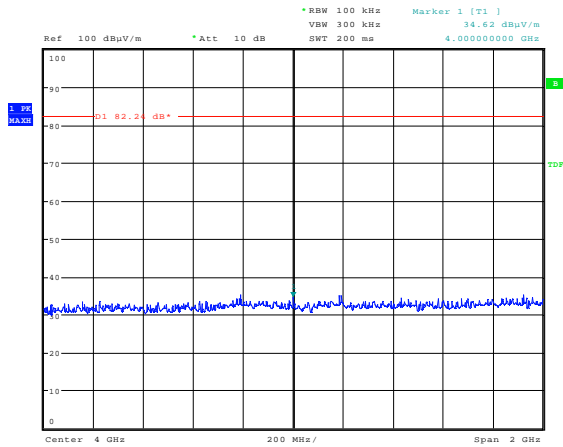
Date: 20.NOV.2009 09:09:10

Radiated emissions 490.7875 1 – 3GHz



Date: 19.NOV.2009 15:56:51

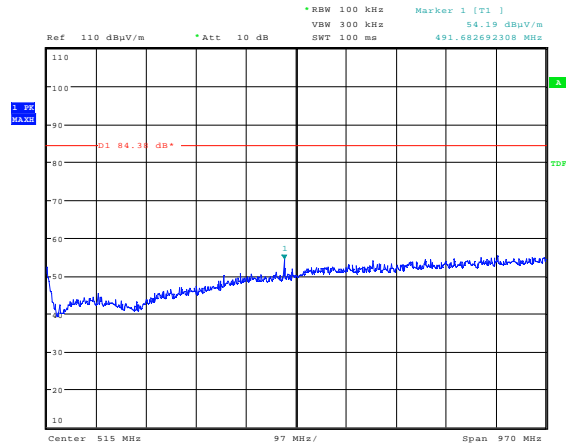
Radiated emissions 490.7875 3 – 5GHz



Date: 19.NOV.2009 15:58:44

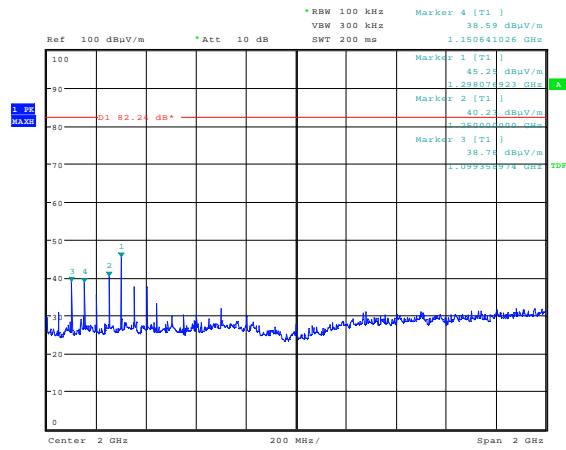
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions 490.9625 30MHz – 1GHz



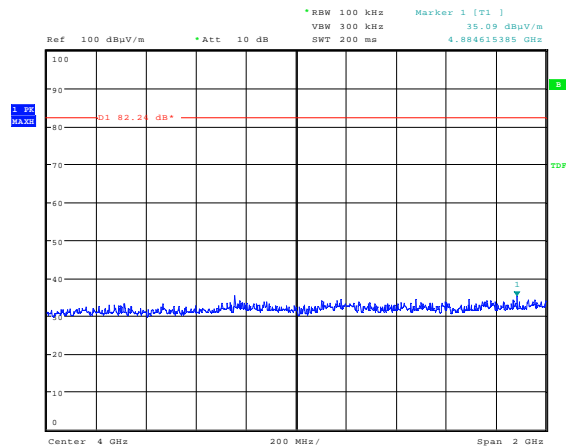
Date: 20.NOV.2009 09:09:30

Radiated emissions 490.9625 1 – 3GHz



Date: 19.NOV.2009 15:57:11

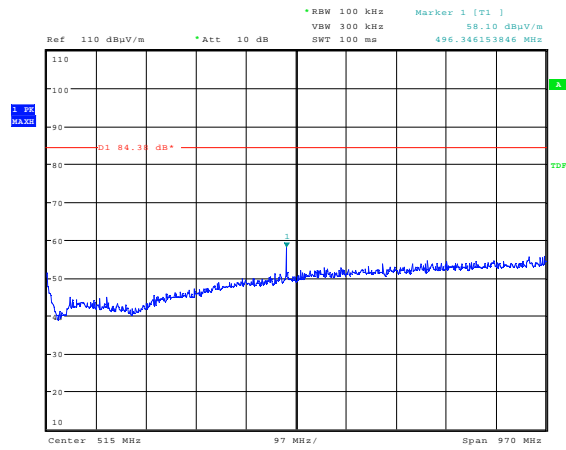
Radiated emissions 490.9625 3 – 5GHz



Date: 19.NOV.2009 15:57:23

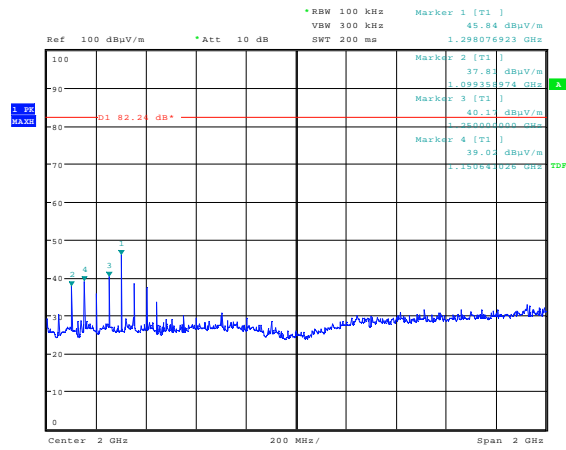
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions 496.3375 30MHz – 1GHz



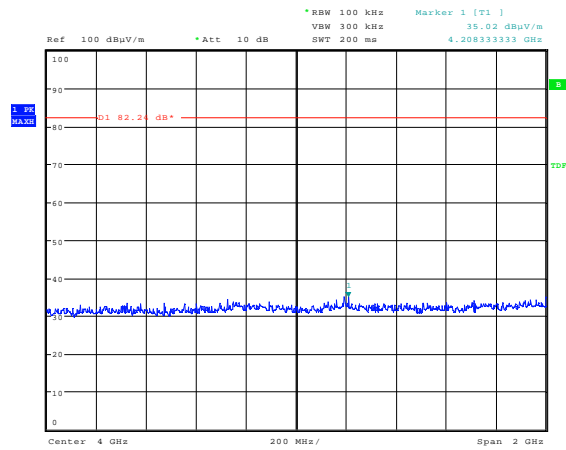
Date: 20.NOV.2009 09:10:29

Radiated emissions 496.3375 1 – 3GHz



Date: 19.NOV.2009 16:05:05

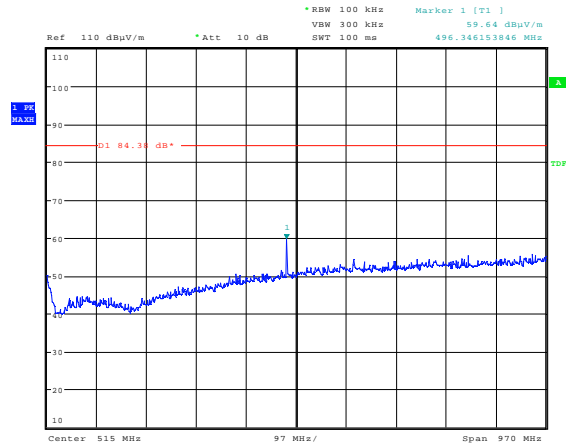
Radiated emissions 496.3375 3 – 5GHz



Date: 19.NOV.2009 16:04:52

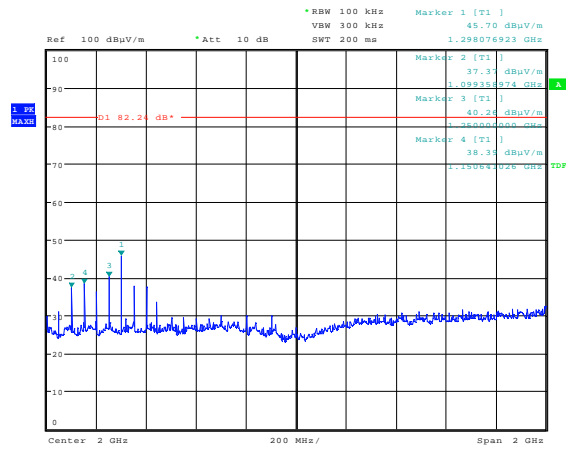
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions 496.4875 30MHz – 1GHz



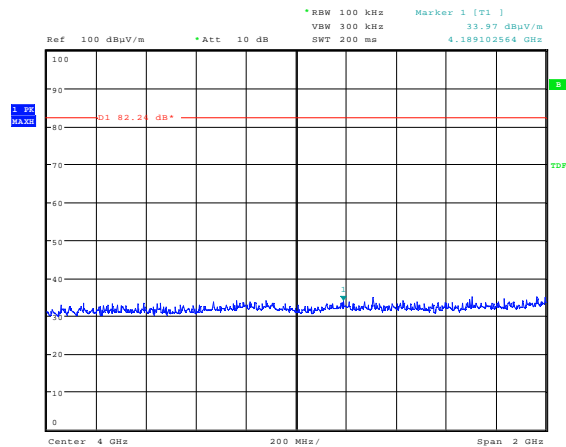
Date: 20.NOV.2009 09:11:46

Radiated emissions 496.4875 1 – 3GHz



Date: 19.NOV.2009 16:03:53

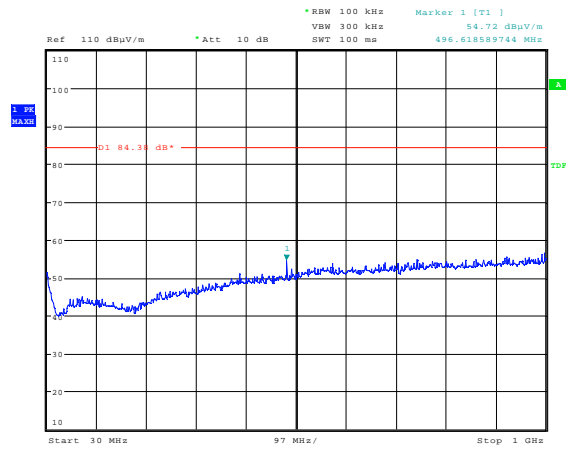
Radiated emissions 496.4875 3 – 5GHz



Date: 19.NOV.2009 16:04:09

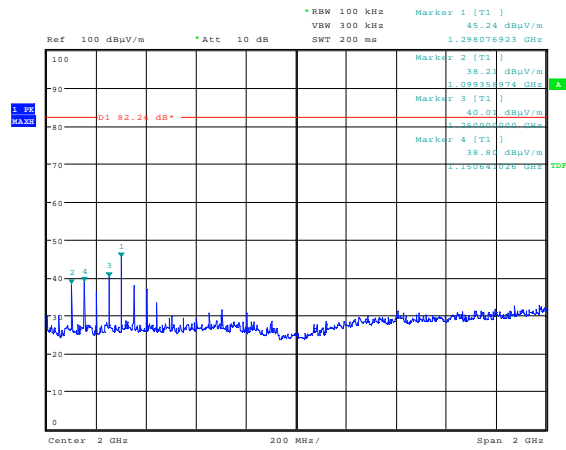
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions 496.6125 30MHz – 1GHz



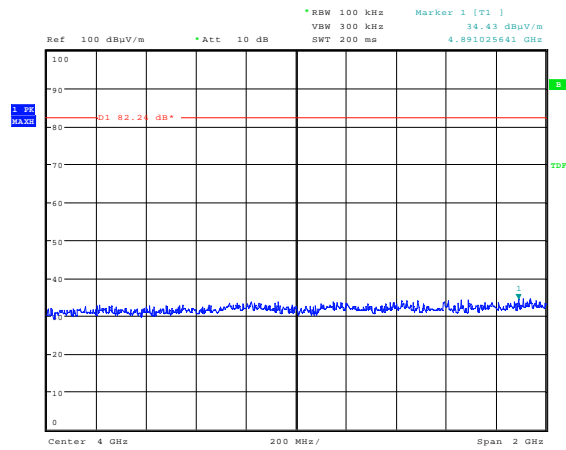
Date: 20.NOV.2009 09:13:52

Radiated emissions 496.6125 1 – 3GHz



Date: 19.NOV.2009 16:03:28

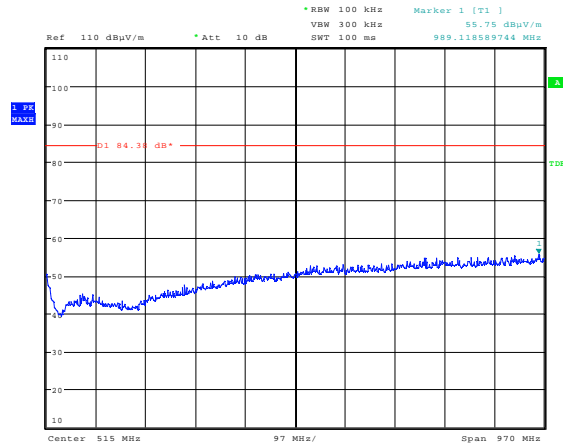
Radiated emissions 496.6125 3 – 5GHz



Date: 19.NOV.2009 16:03:15

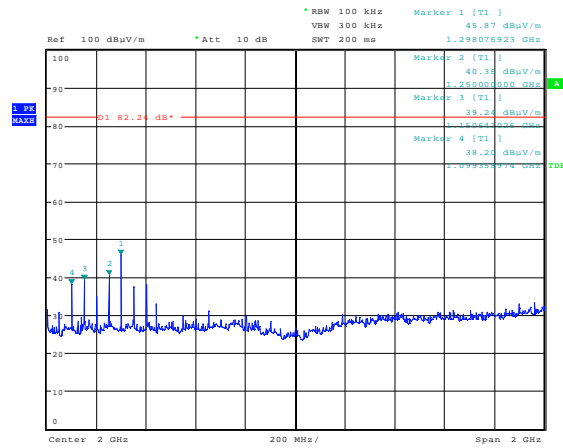
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

Radiated emissions no input signal 30MHz – 1GHz



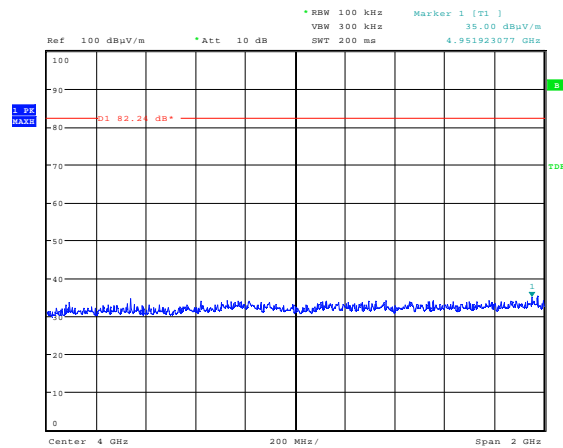
Date: 20.NOV.2009 08:59:34

Radiated emissions no input signal 1 – 3GHz



Date: 19.NOV.2009 15:53:36

Radiated emissions no input signal 3 – 5GHz



Date: 19.NOV.2009 15:53:23

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

ANNEX A
PHOTOGRAPHS





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	-		[]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[]
e.	LABELLING	-	PHOTOGRAPHS	[X]
		-	DECLARATION	[]
		-	DRAWINGS	[]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	-	Tx	[X]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
h.	CIRCUIT DIAGRAMS	-	Tx	[X]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
i.	COMPONENT LOCATION	-	Tx	[X]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
j.	PCB TRACK LAYOUT	-	Tx	[X]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
k.	BILL OF MATERIALS	-	Tx	[X]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
l.	USER INSTALLATION / OPERATING INSTRUCTIONS	-		[X]

ANNEX C
EQUIPMENT CALIBRATION

Number	Equipment Type	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH06/07	IC OATS Submission	TRaC	02/07/2009	24	02/07/2011
UH06/07	NSA Calibration	TRaC	19/06/2009	12	19/06/2010
UH028	Log Periodic Ant	Schwarbeck	14/08/2009	24	14/08/2011
UH029	Bicone Antenna	Schwarbeck	13/08/2009	24	13/08/2011
UH093	Bilog	Chase	03/06/2009	24	03/06/2010
UH105	Signal Generator	Marconi	23/06/2009	12	23/06/2010
UH162	ERP Cable Cal	TRaC	01/03/2009	12	01/03/2010
UH225	Attenuator	Spinner	Calibrate In Use		
UH253	1m Cable N type	TRaC	15/07/2009	12	15/07/2010
UH254	1m Cable N type	TRaC	15/07/2009	12	15/07/2010
UH269	1m Cable N type	TRaC	15/07/2009	12	15/07/2010
UH270	1m Cable N type	TRaC	15/07/2009	12	15/07/2010
UH271	1.5m Cable N type	TRaC	15/07/2009	12	15/07/2010
UH272	1.5m Cable N type	TRaC	15/07/2009	12	15/07/2010
UH273	2m Cable N type	TRaC	15/07/2009	12	15/07/2010
UH274	2m Cable N type	TRaC	15/07/2009	12	15/07/2010
UH281	Spectrum Analyser	R&S	28/10/2008	12	28/10/2009
UH288	1m Cable N type	N/A	15/07/2009	12	15/07/2010
UH291	K-Type Cable	Succoflex	15/07/2009	12	15/07/2010
UH293	K-Type Cable	Megaphase	15/07/2009	12	15/07/2010
UH372	Pre Amplifier	Watkins Johnson	27/11/2008	12	27/11/2009
L103	Attenuator	Bird	Calibrate in Use		
L138	1-18GHz Horn	EMCO	10/09/2009	24	10/09/2011
L139	1-18GHz Horn	EMCO	17/08/2009	24	17/08/2011
L170	Combiner	Elcom	Calibrate in Use		
L176	Signal Generator	Marconi	23/06/2009	12	23/06/2010
L193	Bicone Antenna	Chase	06/05/2008	24	06/05/2010
L203	Log Periodic Ant	Chase	06/05/2008	24	06/05/2010
L479	Analyser	Anritsu	02/10/2009	12	02/10/2010
L222	Attenuator	Bird	Calibrate in Use		
L254	Signal Generator	Marconi	25/02/2009	12	25/02/2010
L572	Pre Amp	Agilent	15/07/2009	12	15/07/2010

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 - TRACUH120) = **2.18dB**

Uncertainty in test result (Equipment – TRAC05) = **1.08dB**

Uncertainty in test result (Equipment – TRAC479) = **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 - TRACUH120) = **119ppm**

Uncertainty in test result (Equipment – TRAC05) = **0.113ppm**

Uncertainty in test result (Equipment – TRAC479) = **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 TRAC479) Up to 8.1GHz = **3.31dB**

Uncertainty in test result (Equipment TRAC479) 8.1GHz – 15.3GHz = **4.43dB**

Uncertainty in test result (Equipment TRAC479) 15.3GHz – 21GHz = **5.34dB**

Uncertainty in test result (Equipment TRACUH120) 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%**