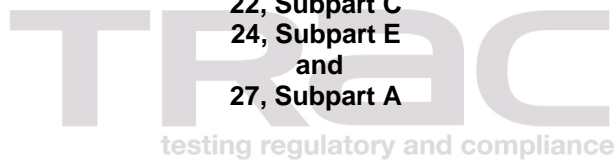




**REPORT ON THE CERTIFICATION TESTING OF A  
AXELL WIRELESS  
MBF TRI BAND REPEATER  
MBF-T-8-17-19S  
WITH RESPECT TO  
FCC RULES CFR 47, PARTS  
22, Subpart C  
24, Subpart E  
and  
27, Subpart A**

TEST REPORT NO: 8F2093WUS1  
COPY NO: 1  
ISSUE NO: 1  
FCC ID: NEOA207SERIES

**REPORT ON THE CERTIFICATION TESTING OF A  
AXELL WIRELESS  
MBF TRI BAND REPEATER  
MBF-T-8-17-19S  
WITH RESPECT TO  
FCC RULES CFR 47, PARTS  
22, Subpart C  
24, Subpart E  
and  
27, Subpart A**



TEST DATE: 4<sup>th</sup> – 23<sup>rd</sup> September 2009

TESTED BY: ..... D WINSTANLEY

APPROVED BY: ..... J CHARTERS  
RADIO PRODUCT  
MANAGER

DATE: 10<sup>th</sup> December 2009 .....

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

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



## CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY: NEOA207SERIES

PURPOSE OF TEST: Certification

TEST SPECIFICATION: FCC RULES CFR 47, Parts 2, 22, 24 &27

TEST RESULT: Compliant to Specification

EQUIPMENT UNDER TEST: MBF-T-8-17-19S

EQUIPMENT TYPE: Private Land Mobile Repeater

MAXIMUM GAIN:

800 MHz Uplink	32.65 dB
1700 MHz Uplink	28.52 dB
1800 MHz Uplink	26.81 dB
800 MHz Downlink	31.28 dB
1900 MHz Downlink	29.69 dB
2100 MHz Downlink	30.21 dB

MAXIMUM INPUT:

800 MHz Uplink	-61.65 dBm
1700 MHz Uplink	-58.88 dBm
1800 MHz Uplink	-59.20 dBm
800 MHz Downlink	+4.68 dBm
1900 MHz Downlink	+6.71 dBm
2100 MHz Downlink	+8.56 dBm

MAXIMUM OUTPUT CONDUCTED:

800 MHz Uplink	-29.00 dBm
1700 MHz Uplink	-30.36 dBm
1800 MHz Uplink	-32.39 dBm
800 MHz Downlink	+35.96 dBm
1900 MHz Downlink	+36.40 dBm
2100 MHz Downlink	+38.77 dBm

MAXIMUM NUMBER OF CHANNELS: Not Applicable, Wideband

CHANNEL SPACING: Not Applicable, Wideband

POWER SOURCE(s): +110Vac

TEST DATE(s): 4<sup>th</sup> – 23<sup>rd</sup> September 2009

APPLICANT: Axell Wireless

ADDRESS: Aerial House  
Asheridge Road  
Chesham  
Buckinghamshire  
HP5 1TU

TESTED BY: \_\_\_\_\_ D WINSTANLEY

APPROVED BY: \_\_\_\_\_ J CHARTERS  
RADIO  
PRODUCT  
MANAGER

## APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT): MBF-T-8-17-19S

EQUIPMENT TYPE: Private Land Mobile Repeater

PURPOSE OF TEST: Certification

TEST SPECIFICATION(s): FCC RULES CFR 47, Parts 2, 22, 24 &27

TEST RESULT: COMPLIANT Yes   
No

APPLICANT'S CATEGORY: MANUFACTURER   
IMPORTER   
DISTRIBUTOR   
TEST HOUSE   
AGENT

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

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

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): 4<sup>th</sup> – 23<sup>rd</sup> September 2009

TEST REPORT No: 8F2093WUS1

## RULE PART – FREQUENCY BAND

CFR 47 Rule Part	Uplink Frequency Band	Downlink Frequency Band
22, Subpart C	824.0 MHz – 849.0 MHz	869.0 MHz – 894.0 MHz
24, Subpart E	1850.0 MHz – 1910.0 MHz	1930.0 MHz – 1990.0 MHz
27, Subpart A	1710.0 MHz - 1755.0 MHz	2110.0 MHz – 2155.0 MHz

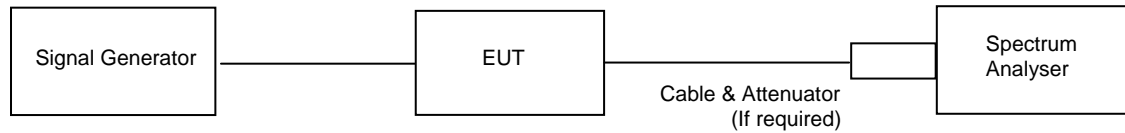


## COMPLIANCE TESTS

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

Ambient temperature = 20°C  
 Relative humidity = 63%  
 Supply voltage = +110Vac  
 Channel number = See test results

Radio Laboratory



#### 800 MHz UPLINK

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
824.0	-59.9	0.51	0.51	-29.43	31.49	-28.92	21.52
836.5	-61.2	0.45	0.48	-29.48	32.65	-29.00	22.68
849.0	-59.3	0.49	0.51	-29.63	30.68	-29.11	20.71

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

#### 1700 MHz UPLINK

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
1710.0	-58.15	0.65	0.77	-30.67	28.25	-29.90	18.25
1732.5	-58.88	0.77	0.77	-31.13	28.52	-30.36	18.55
1755.0	-58.46	0.59	0.59	-31.06	27.99	-30.47	18.01

Notes: 2. The signal generator input was increased by 10dBs and the level of the output signal remeasured.

#### 1800 MHz UPLINK

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
1850.0	-59.9	0.51	0.51	-29.43	31.49	-28.92	21.52
1880.0	-61.2	0.45	0.48	-29.48	32.65	-29.00	22.68
1910.0	-59.3	0.49	0.51	-29.63	30.68	-29.11	20.71

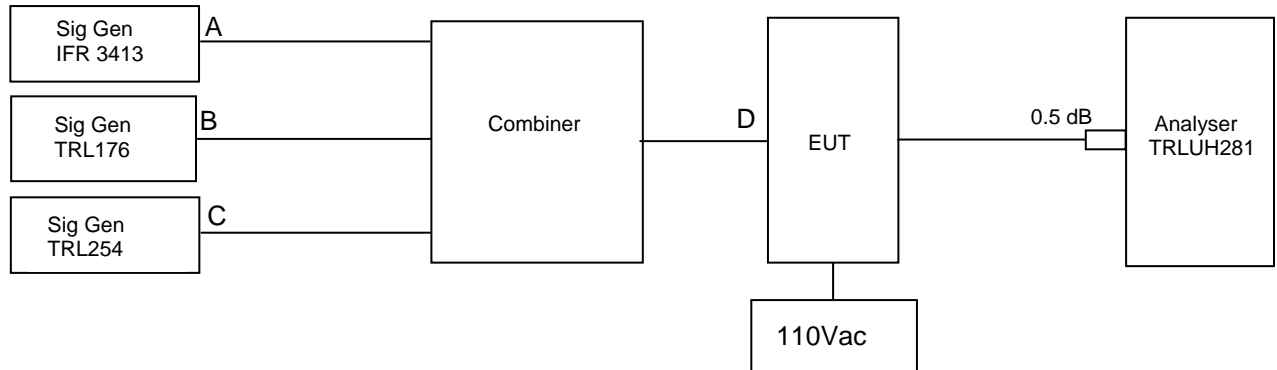
Notes: 3. The signal generator input was increased by 10dBs and the level of the output signal remeasured.

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	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 loss between the EUT and the spectrum analyser was 0.5dB.

RF Input Frequency (MHz)			Highest Intermodulation Product Level (dBm)	Limit (dBm)
824.0	832.3	849.0	No Significant Products Within 20dB of the Limit	-13
1710.0	1725.0	1755.0	No Significant Products Within 20dB of the Limit	-13
1850.0	1870.0	1910.0	No Significant Products Within 20dB of the Limit	-13
834.0	1732.5	1880.0	No Significant Products Within 20dB of the Limit	-13

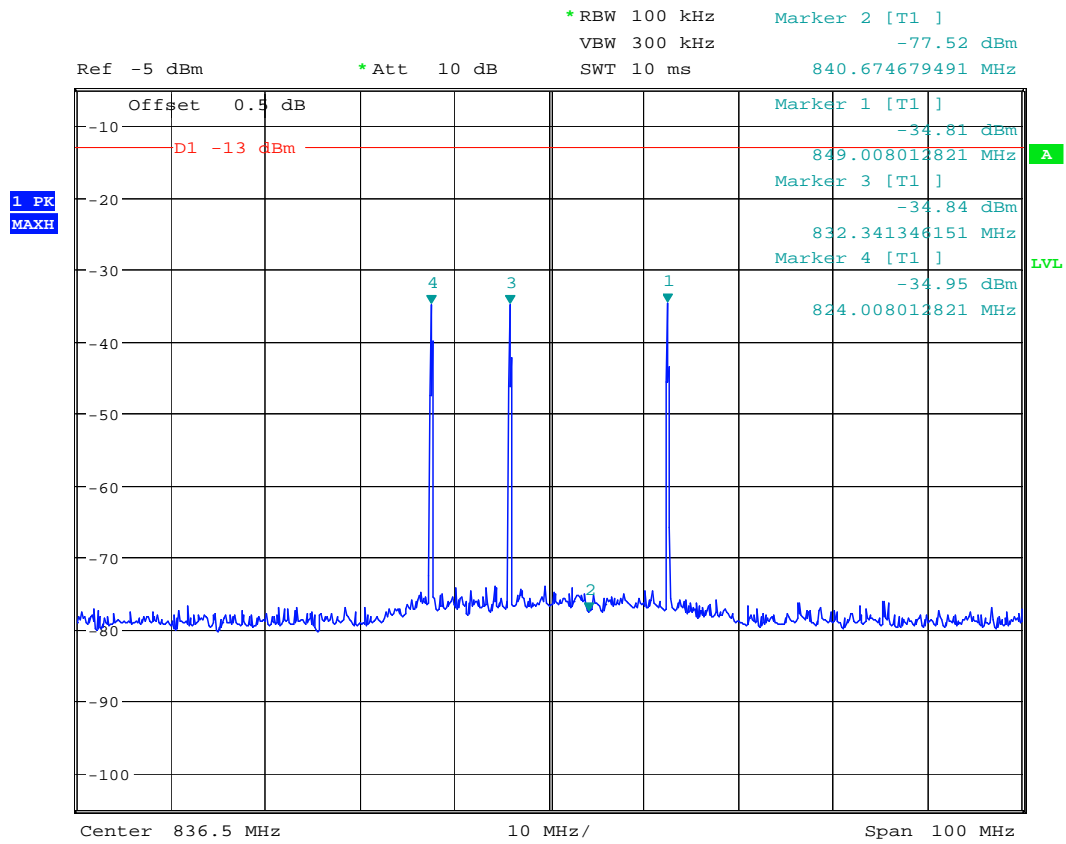
Sweep data is shown on the next page:

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
CABLE	TRaC	N/A	N/A	UH253	X
CABLE	TRaC	N/A	N/A	UH273	X
CABLE	TRaC	N/A	N/A	UH274	X
SIGNAL GENERATOR	IFR	3413	341001/261	N/A	X
COMBINER	AXELL	N/A	N/A	N/A	X



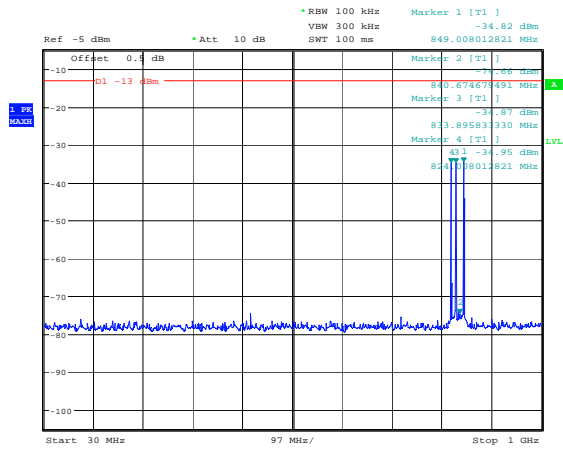
### Intermodulation Inband - 800 MHz Uplink Band



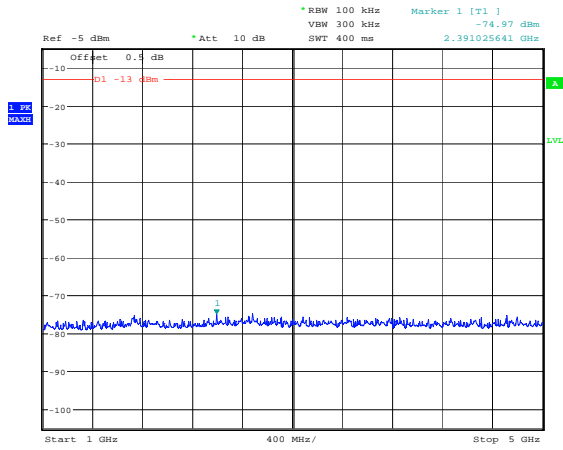
Date: 23.SEP.2009 10:49:37

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

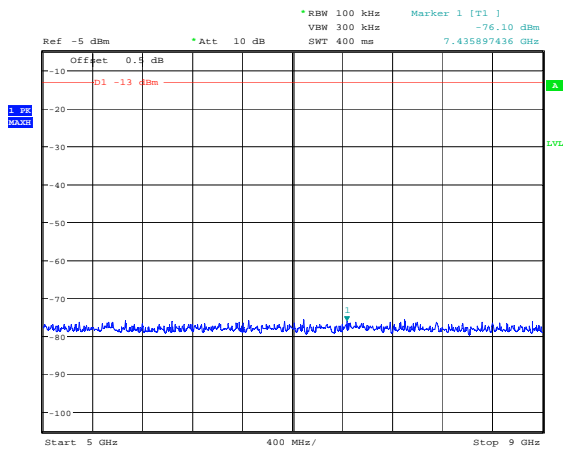
## Intermodulation Wideband - 800 MHz Uplink Band



Date: 23.SEP.2009 10:49:56



Date: 23.SEP.2009 10:50:10

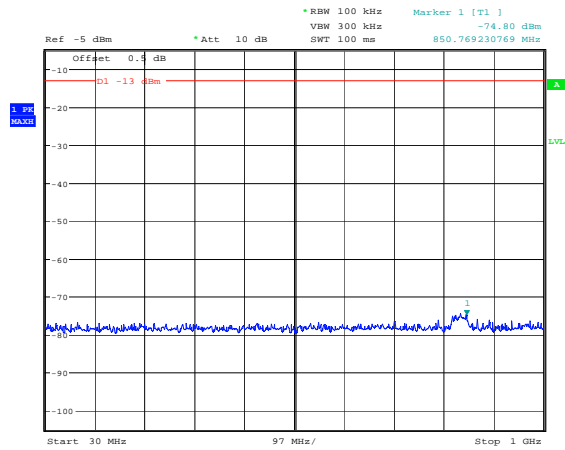


Date: 23.SEP.2009 10:50:22

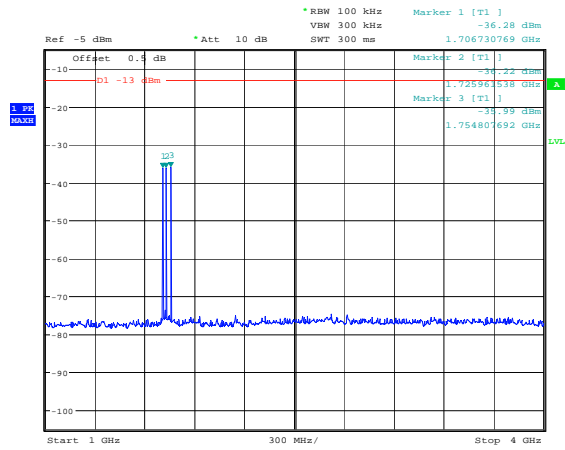
The above plot shows that there are no products outside the bands.



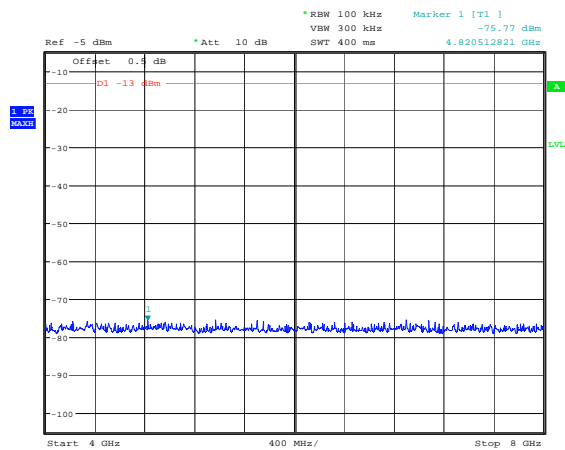
## Intermodulation Wideband - 1700 MHz Uplink Band



Date: 23.SEP.2009 10:57:30



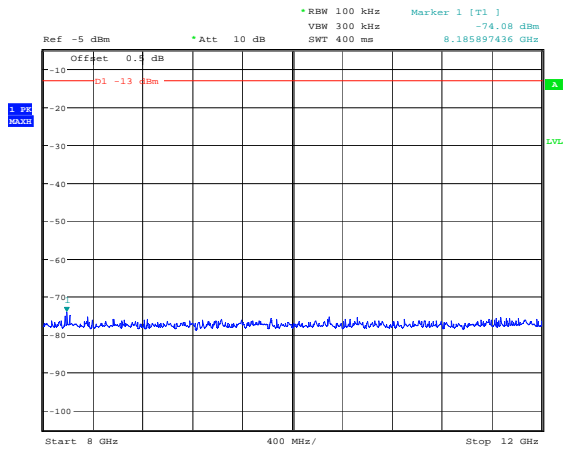
Date: 23.SEP.2009 10:59:25



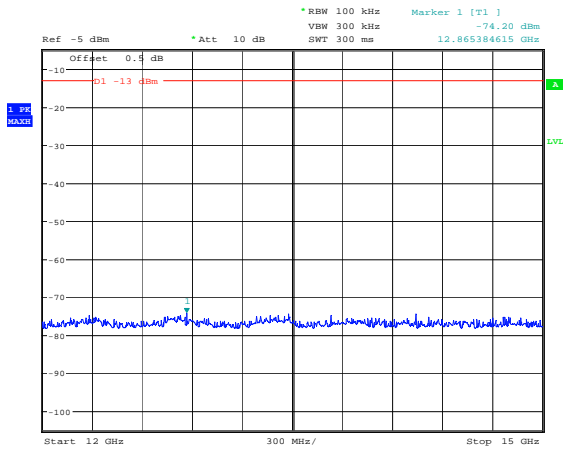
Date: 23.SEP.2009 11:00:00

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

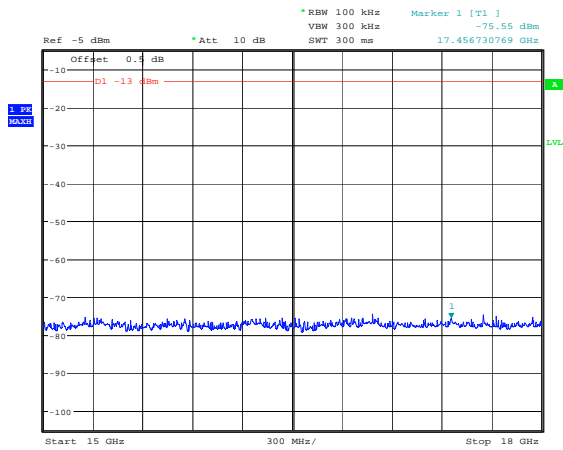
## Intermodulation Wideband - 1700 MHz Uplink Band



Date: 23.SEP.2009 11:00:22



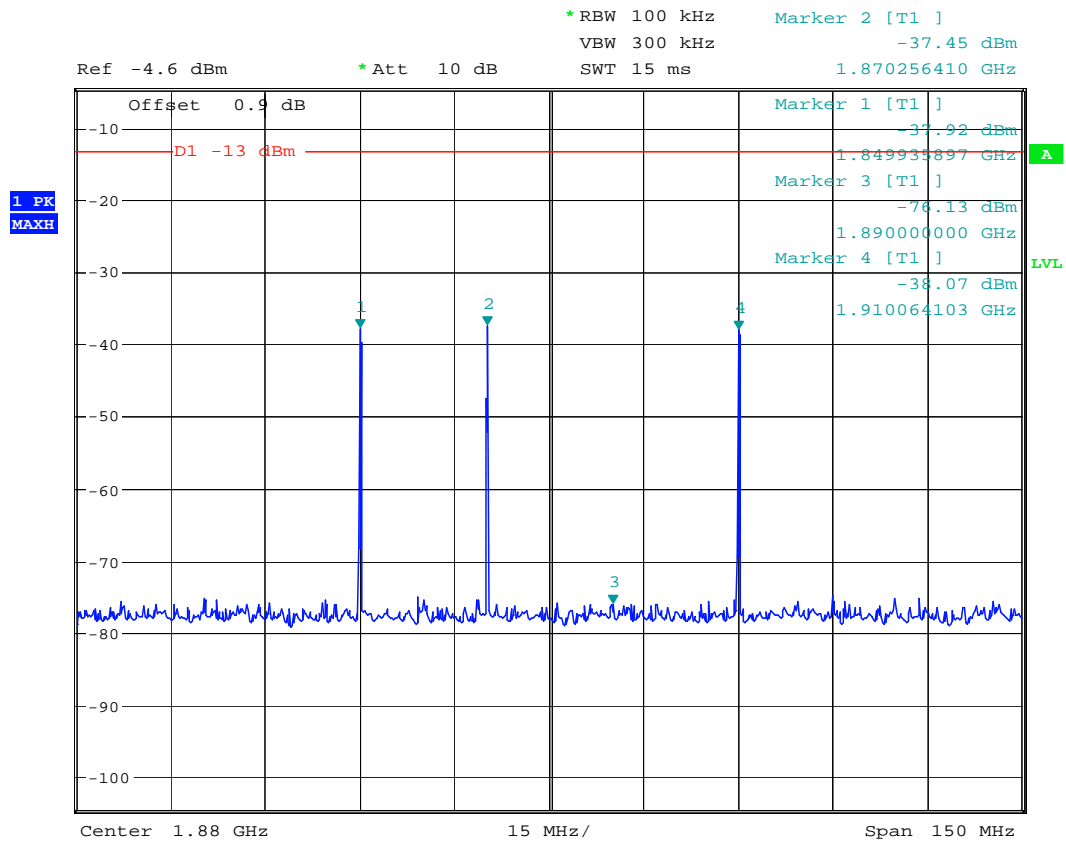
Date: 23.SEP.2009 11:00:58



Date: 23.SEP.2009 11:01:09

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

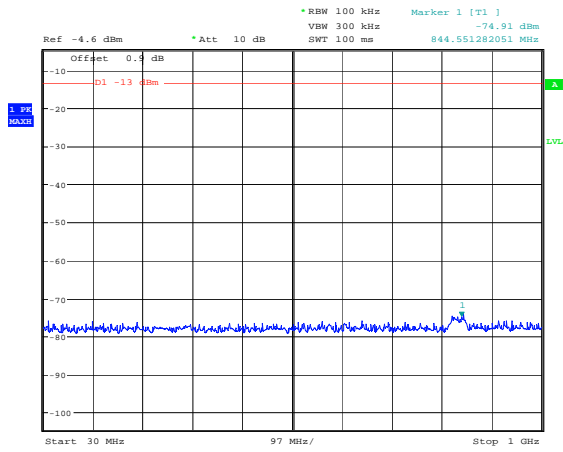
### Intermodulation Inband - 1800 MHz Uplink Band



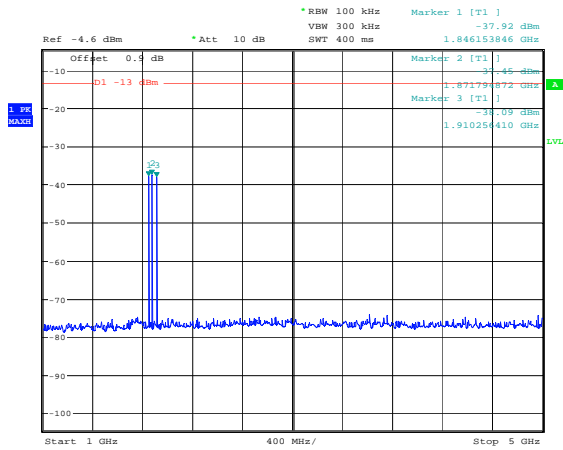
Date: 23.SEP.2009 11:08:55

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

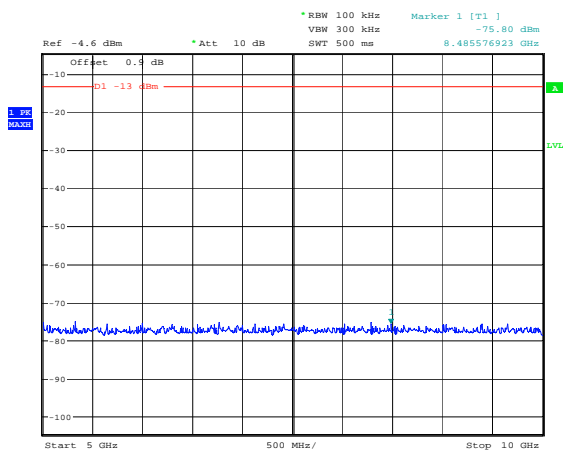
# Intermodulation Wideband - 1800 MHz Uplink Band



Date: 23.SEP.2009 11:09:29



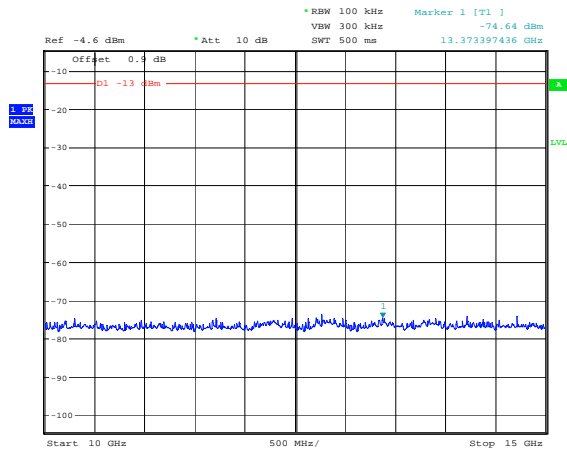
Date: 23.SEP.2009 11:09:49



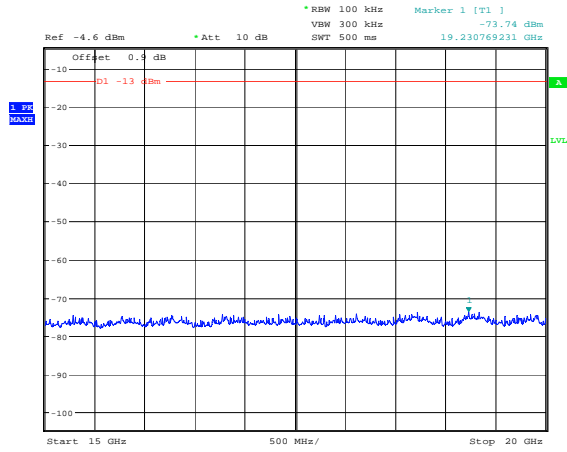
Date: 23.SEP.2009 11:10:03

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

## Intermodulation Wideband - 1800 MHz Uplink Band



Date: 23.SEP.2009 11:10:21



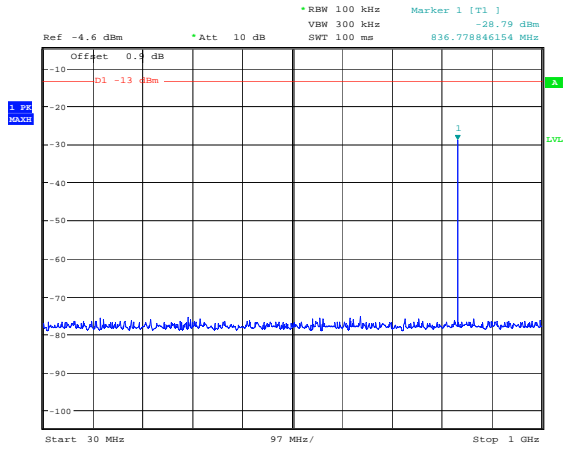
Date: 23.SEP.2009 11:10:39

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

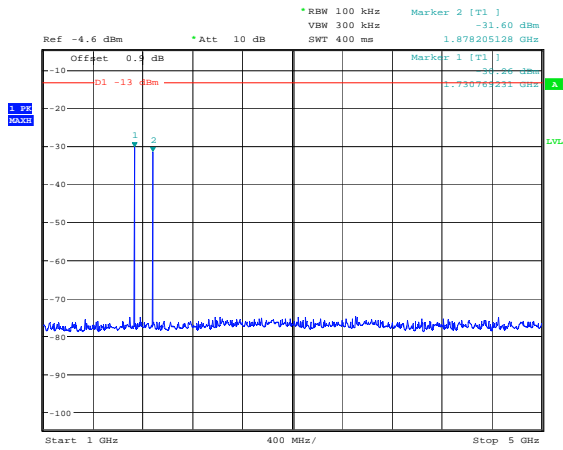




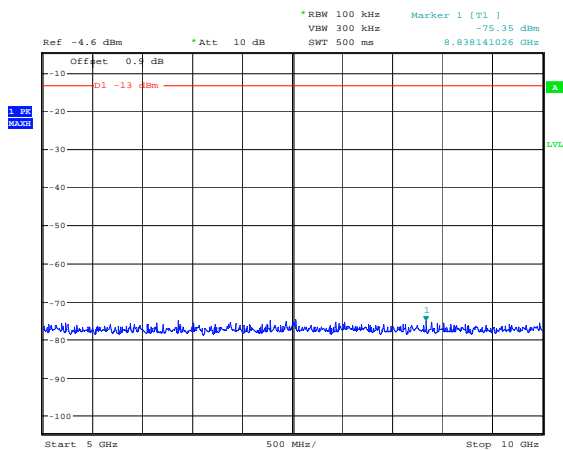
## Intermodulation - Uplink Cross Band



Date: 23.SEP.2009 11:21:45



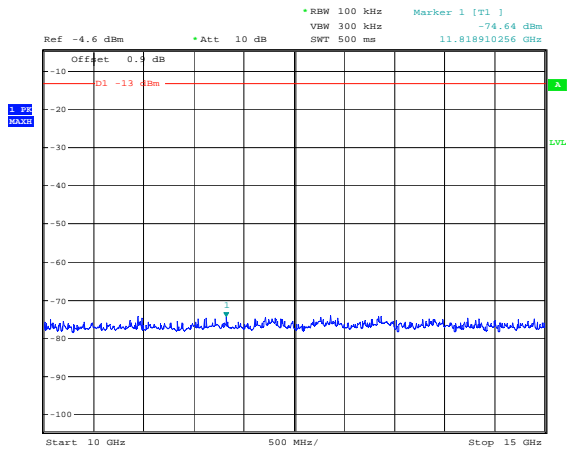
Date: 23.SEP.2009 11:21:57



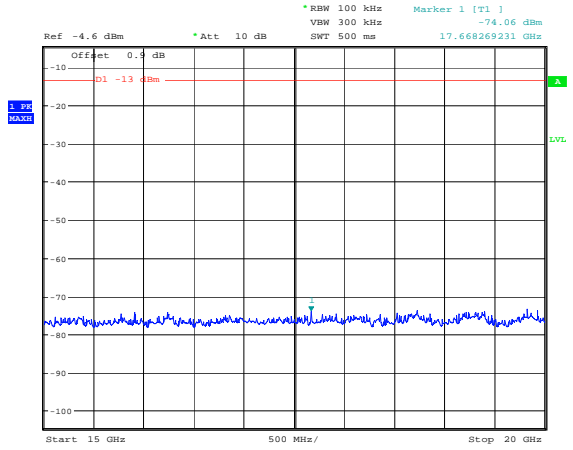
Date: 23.SEP.2009 11:22:08

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

### Intermodulation - Uplink Cross Band



Date: 23.SEP.2009 11:22:22



Date: 23.SEP.2009 11:22:37

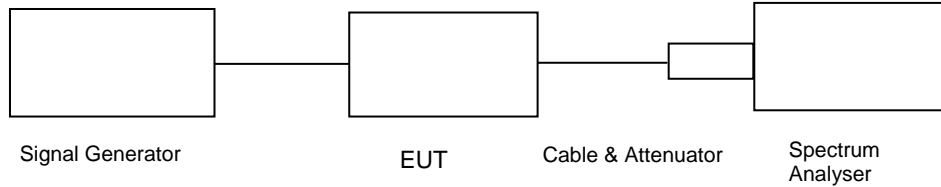
The above plot shows that there are no products outside the bands.

**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



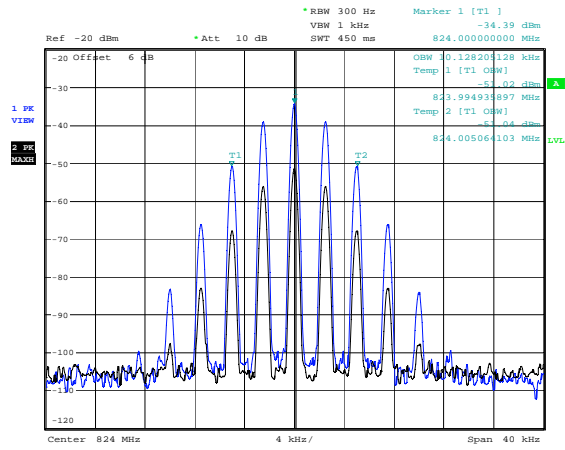
This test was performed to show that the amplifier does not alter the input signal in any way. The input signal was set to the maximum input. The following modulation schemes were produced, a 2500Hz FM tone with 2.5 and 5 kHz deviation, C4FM and TDMA Type.

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

Frequency Of Operational Channel	Modulation Type			
	2.5 kHz Deviation FM	2.5 kHz Deviation FM	CDMA	W-CDMA
824.0	10.128 kHz	15.256 kHz	1.275 MHz	4.144 MHz
836.5	10.128 kHz	15.256 kHz	1.272 MHz	4.163 MHz
849.0	10.128 kHz	15.256 kHz	1.272 MHz	4.163 MHz
1710.0	10.128 kHz	15.256 kHz	1.272 MHz	4.163 MHz
1732.5	10.128 kHz	15.256 kHz	1.272 MHz	4.163 MHz
1755.0	10.128 kHz	15.256 kHz	1.272 MHz	4.173 MHz
1850.0	10.128 kHz	15.256 kHz	1.277 MHz	4.182 MHz
1880.0	10.128 kHz	15.256 kHz	1.277 MHz	4.182 MHz
1910.0	10.128 kHz	15.256 kHz	1.275 MHz	4.182 MHz

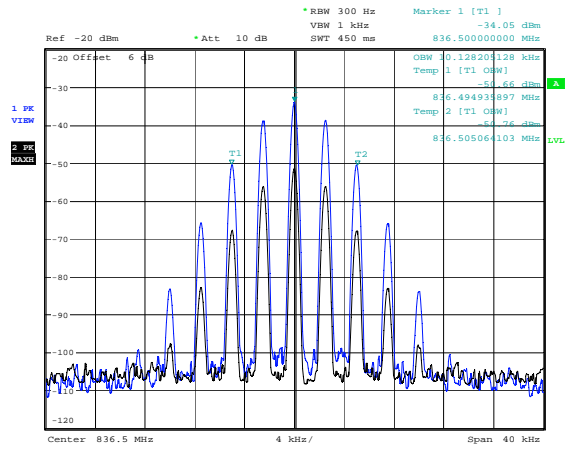
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	X
SIGNAL GENERATOR	IFR	3413	341001/261	N/A	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
CABLE	TRaC	N/A	N/A	UH273	X
CABLE	TRaC	N/A	N/A	UH274	X

824.0 FM deviation set to 2.5kHz



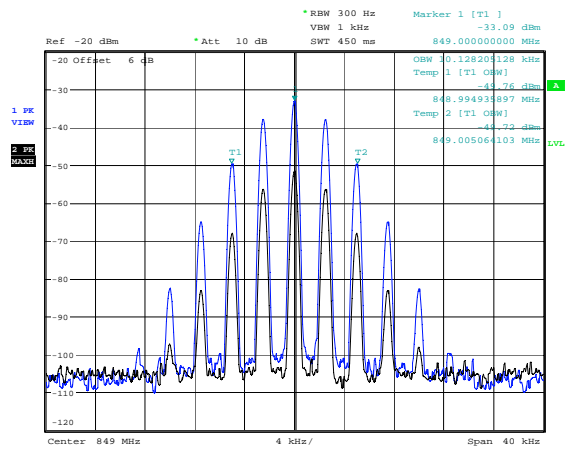
Date: 17\_SEP.2009 16:10:27

836.5 FM deviation set to 2.5kHz



Date: 17\_SEP.2009 16:12:15

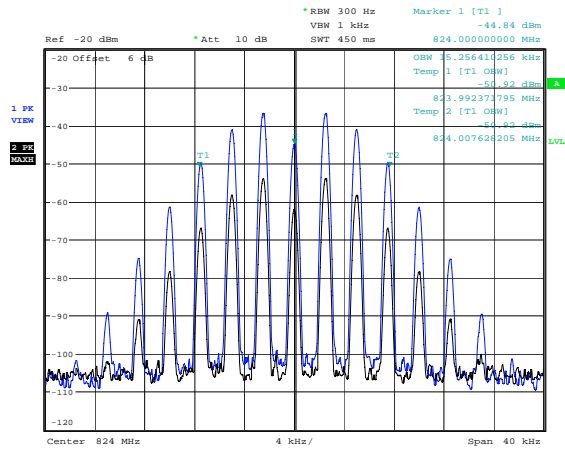
849.0 FM deviation set to 2.5kHz



Date: 17\_SEP.2009 16:13:06

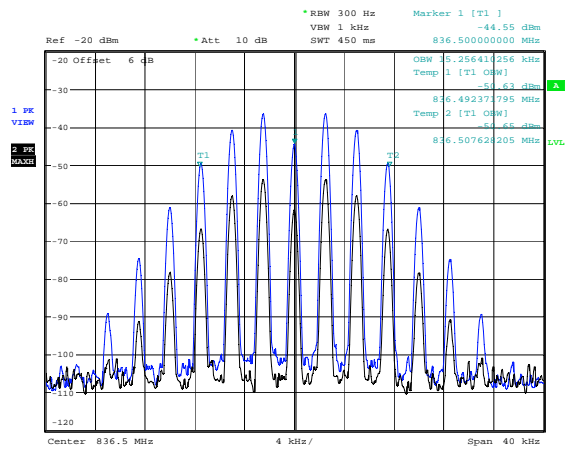
The above plots show no significant distortion visible when compared to the input signal.

### 824.0 FM deviation set to 5kHz



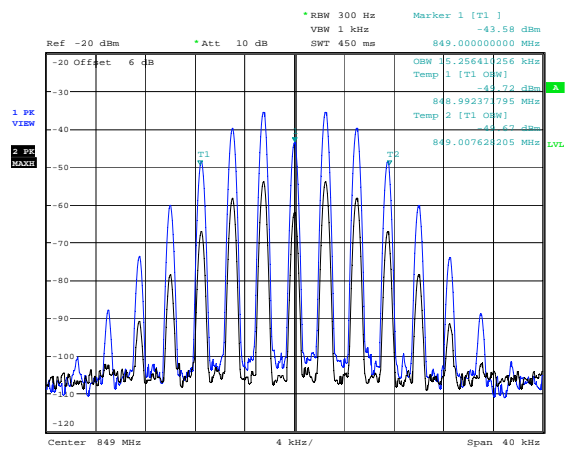
Date: 17\_SEP.2009 16:11:12

### 836.5 FM deviation set to 5kHz



Date: 17\_SEP.2009 16:11:48

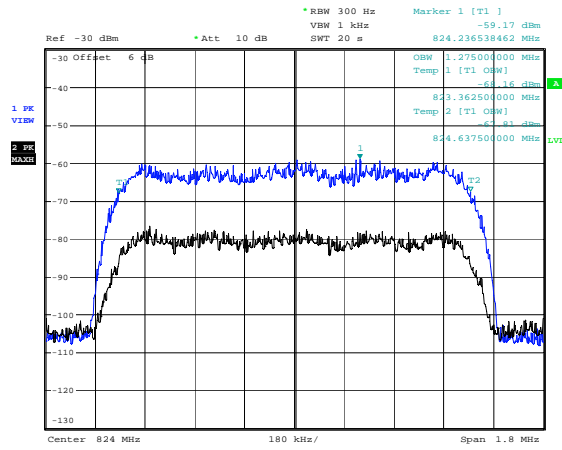
### 849.0 FM deviation set to 5kHz



Date: 17\_SEP.2009 16:13:37

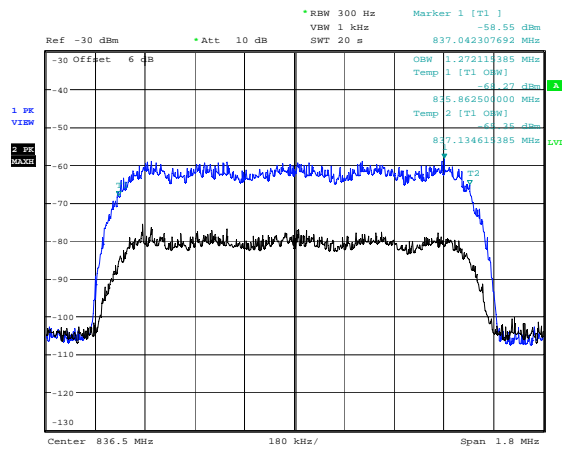
The above plots show no significant distortion visible when compared to the input signal.

### 824.0 CDMA Modulation



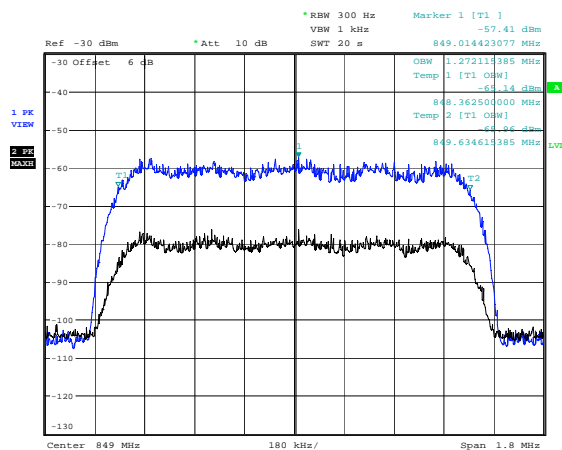
Date: 17\_SEP.2009 16:09:17

### 836.5 CDMA Modulation



Date: 17\_SEP.2009 16:06:28

### 849.0 CDMA Modulation

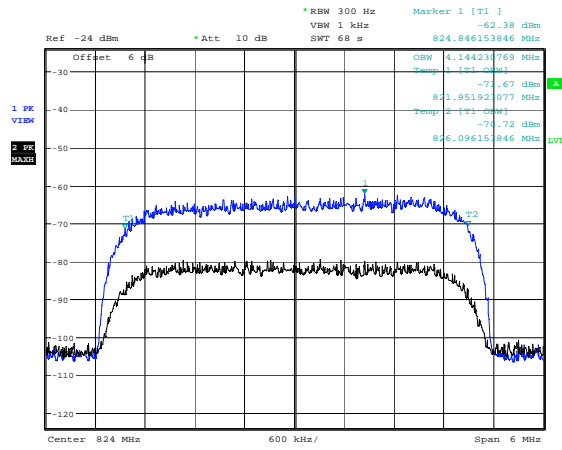


Date: 17\_SEP.2009 16:02:50

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

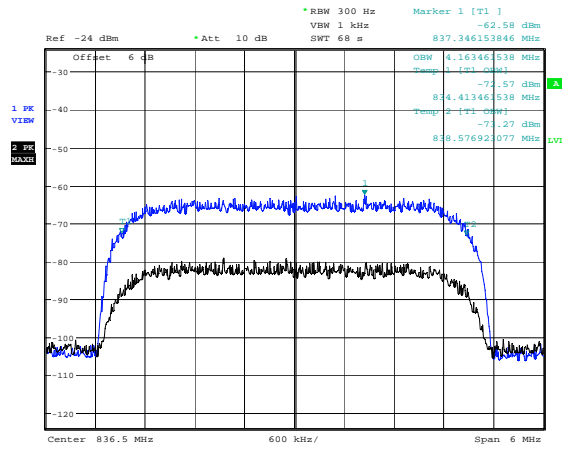


### 824.0 W-CDMA Modulation



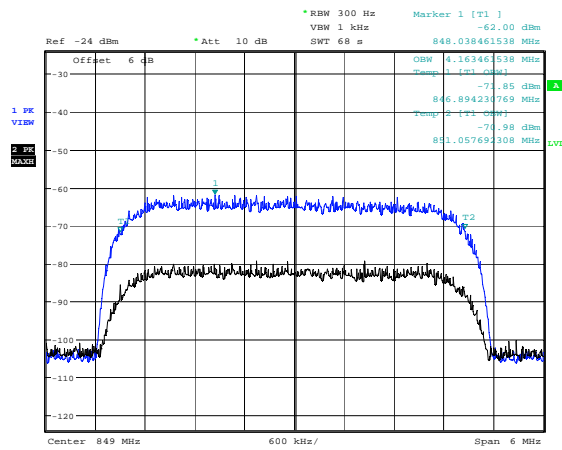
Date: 17\_SEP.2009 15:42:22

### 836.5 W-CDMA Modulation



Date: 17\_SEP.2009 15:48:42

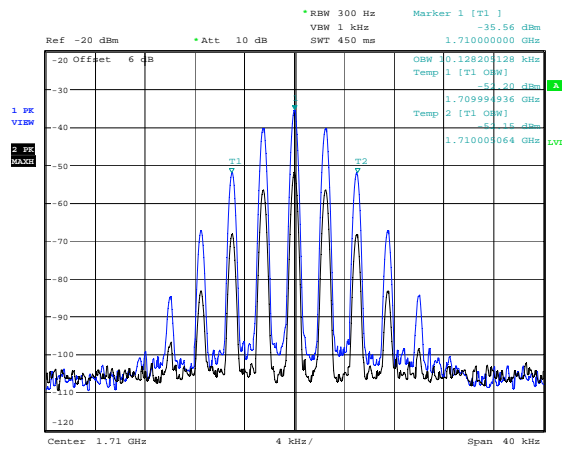
### 849.0 W-CDMA Modulation



Date: 17\_SEP.2009 15:55:23

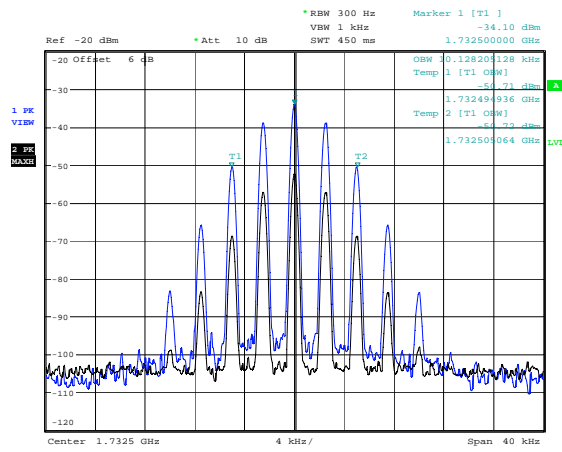
The above plots show no significant distortion visible when compared to the input signal.

1710.0 FM deviation set to 2.5kHz



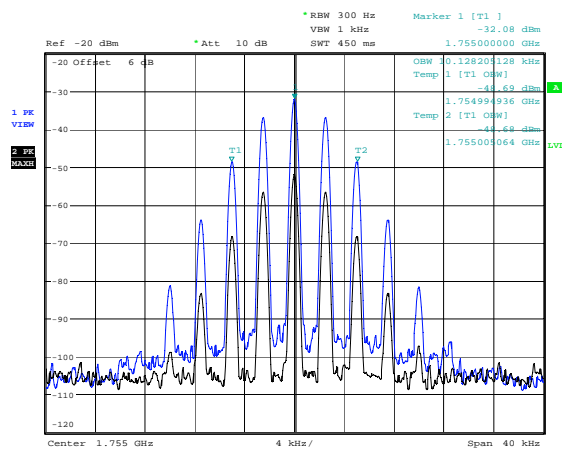
Date: 17\_SEP.2009 16:15:33

1732.5 FM deviation set to 2.5kHz



Date: 17\_SEP.2009 16:16:23

1755.0 FM deviation set to 2.5kHz

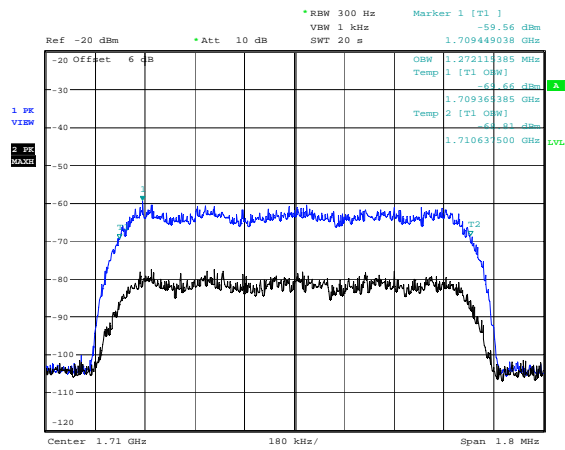


Date: 17\_SEP.2009 16:18:02

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

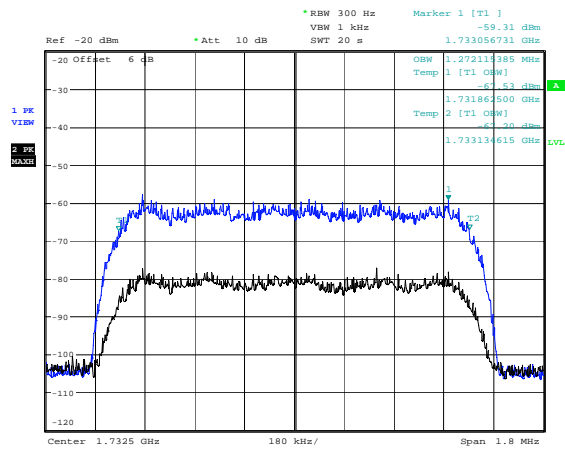


### 1710.0 CDMA Modulation



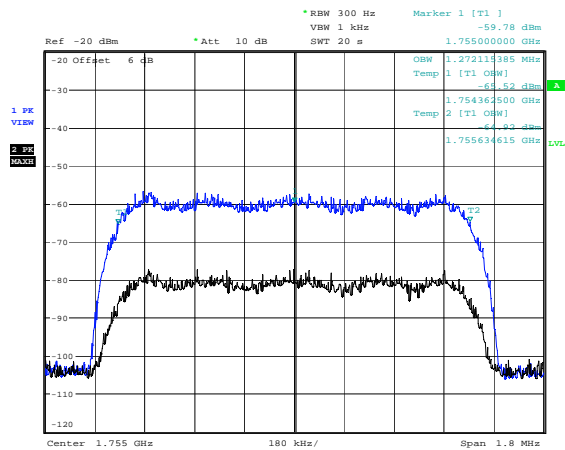
Date: 17\_SEP.2009 16:30:02

### 1732.5 CDMA Modulation



Date: 17\_SEP.2009 16:25:56

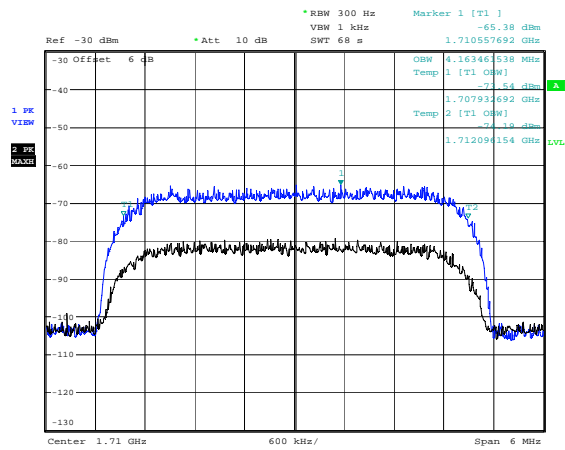
### 1755.0 CDMA Modulation



Date: 17\_SEP.2009 16:22:14

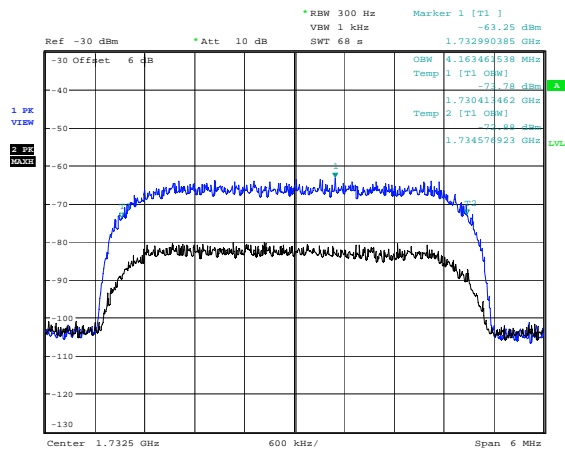
The above plots show no significant distortion visible when compared to the input signal.

### 1710.0 W-CDMA Modulation



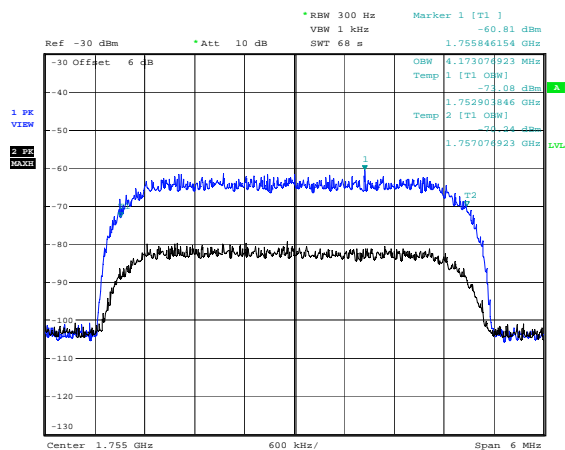
Date: 17\_SEP.2009 16:36:02

### 1732.5 W-CDMA Modulation



Date: 17\_SEP.2009 16:42:16

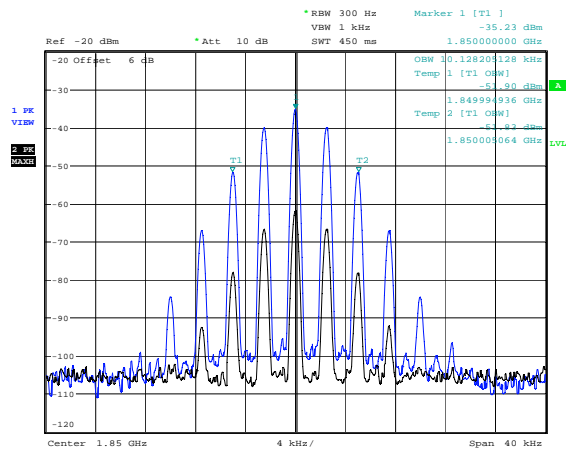
### 1755.0 W-CDMA Modulation



Date: 17\_SEP.2009 16:51:37

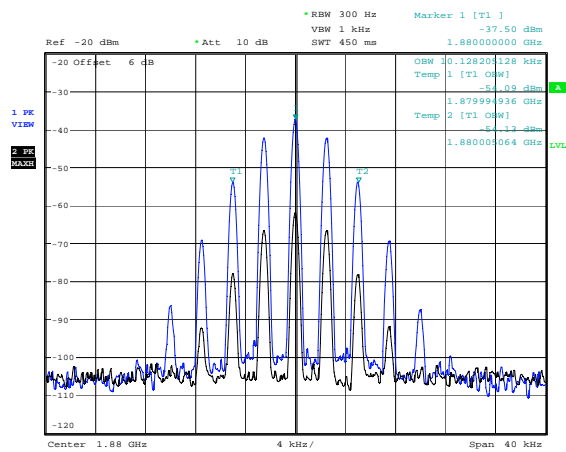
The above plots show no significant distortion visible when compared to the input signal.

1850.0 FM deviation set to 2.5kHz



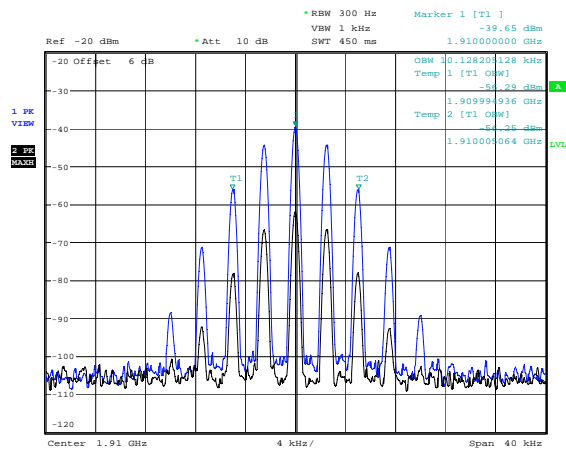
Date: 22.SEP.2009 12:12:56

1880.0 FM deviation set to 2.5kHz



Date: 22.SEP.2009 12:15:04

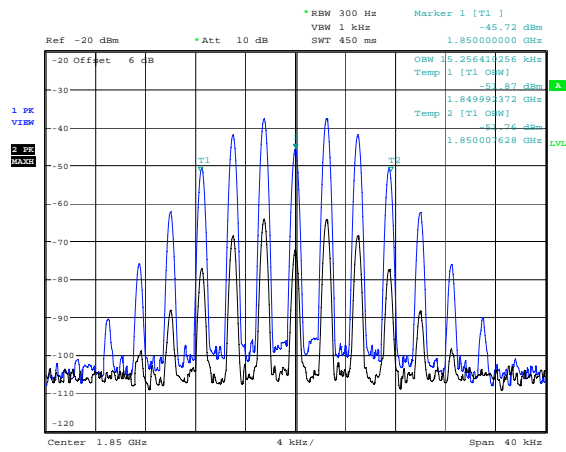
1910.0 FM deviation set to 2.5kHz



Date: 22.SEP.2009 12:15:40

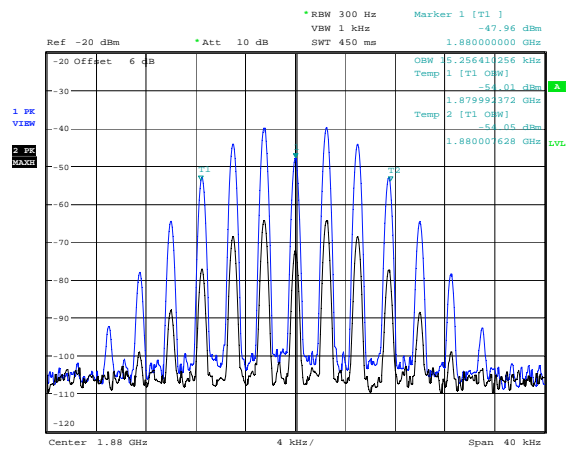
The above plots show no significant distortion visible when compared to the input signal.

1850.0 FM deviation set to 5kHz



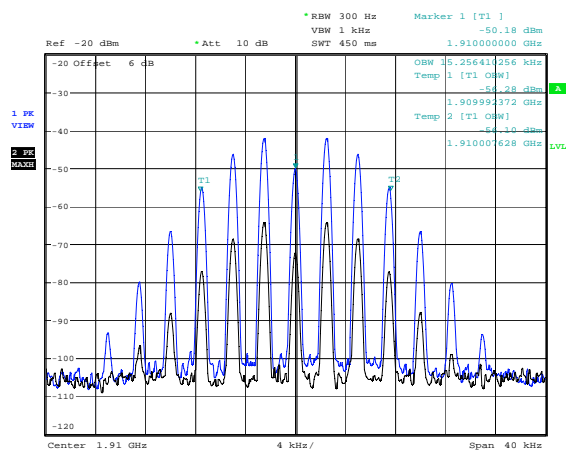
Date: 22.SEP.2009 12:13:42

1880.0 FM deviation set to 5kHz



Date: 22.SEP.2009 12:14:14

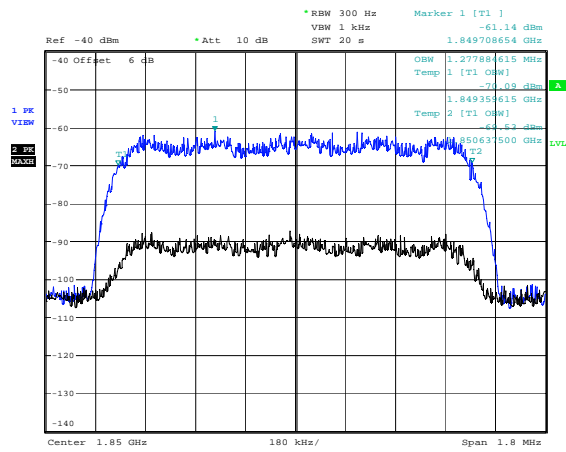
1910.0 FM deviation set to 5kHz



Date: 22.SEP.2009 12:16:16

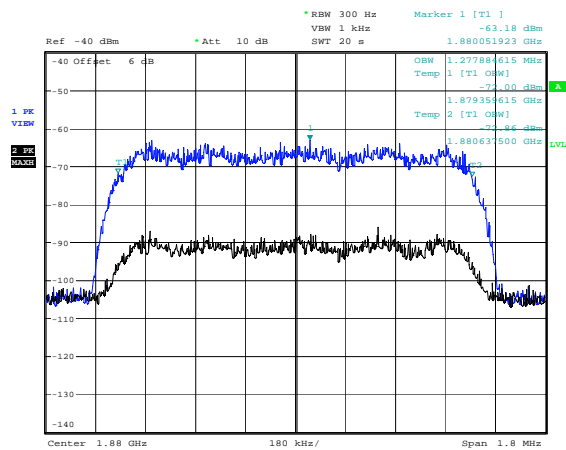
The above plots show no significant distortion visible when compared to the input signal.

### 1850.0 CDMA Modulation



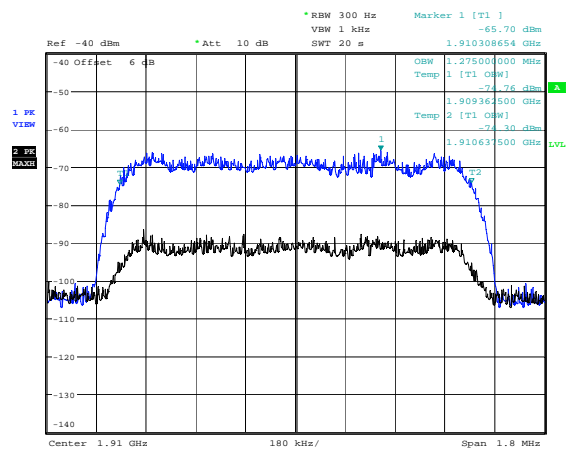
Date: 22.SEP.2009 12:11:55

### 1880.0 CDMA Modulation



Date: 22.SEP.2009 12:10:02

### 1910.0 CDMA Modulation

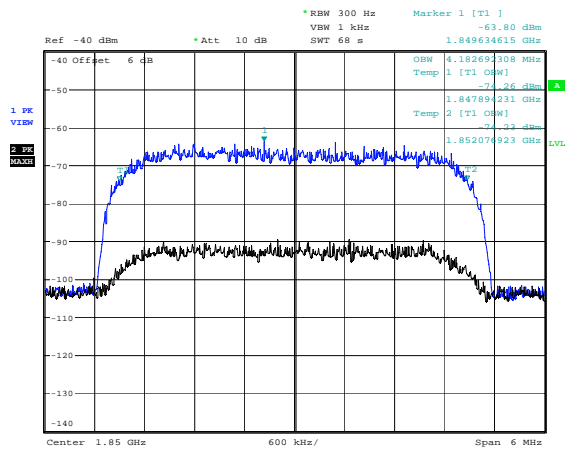


Date: 22.SEP.2009 12:08:07

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

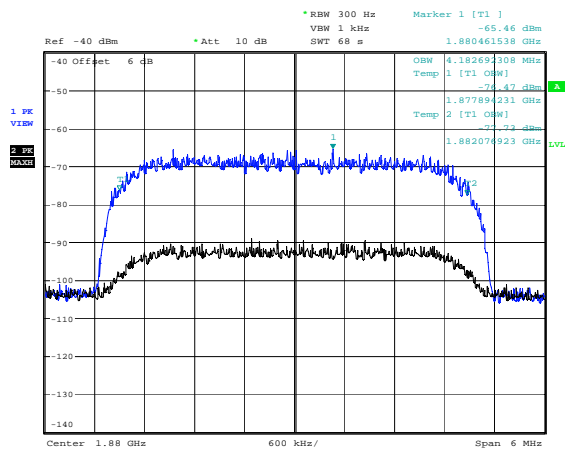


### 1850.0 W-CDMA Modulation



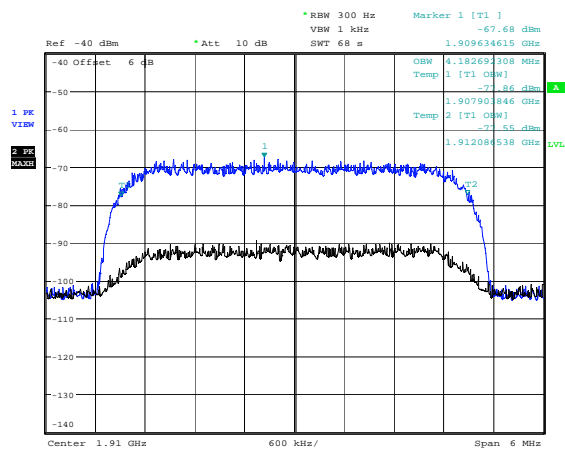
Date: 22.SEP.2009 11:54:04

### 1880.0 W-CDMA Modulation



Date: 22.SEP.2009 11:58:59

### 1910.0 W-CDMA Modulation



Date: 22.SEP.2009 12:05:17

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 = 68%  
 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  $43 + 10 \log P_{dB}$

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

## RESULTS

### 800MHz 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	No Significant Emissions Within 20 dB of the Limit					-13

### 1700MHz Band

FREQUENCY RANGE	EUT FREQ (MHz)	EMISSION FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTEN & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
30 MHz – 18 GHz	No Significant Emissions Within 20 dB of the Limit					-13

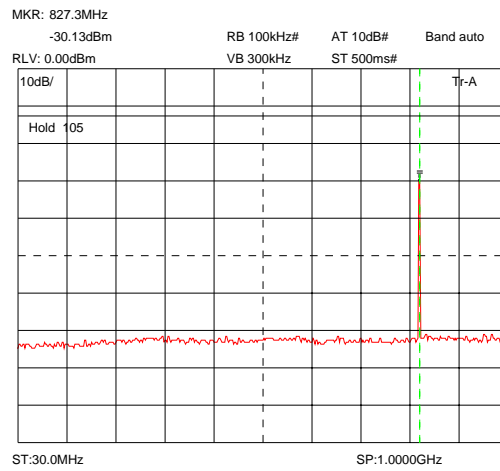
### 1800MHz Band

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

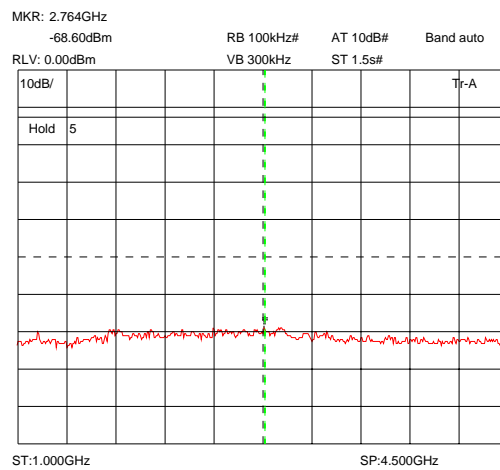
The test equipment used for the Transmitter Conducted Emissions:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
CABLE	TRaC	N/A	N/A	UH273	X
CABLE	TRaC	N/A	N/A	UH274	X

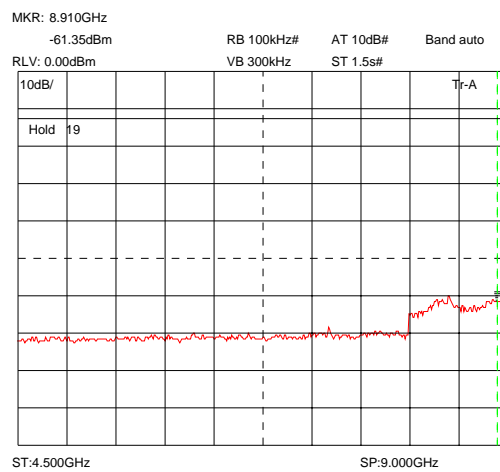
### Conducted emissions 824.0 MHz 30MHz – 1GHz



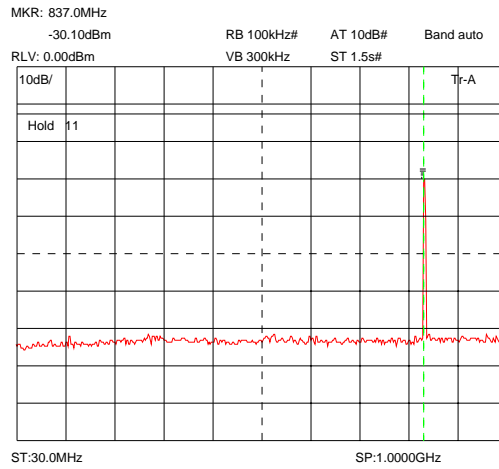
### Conducted emissions 824.0 MHz 1 – 4.5GHz



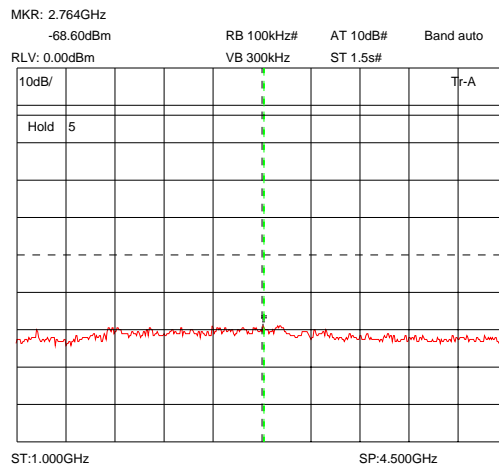
### Conducted emissions 824.0 MHz 4.5 – 9GHz



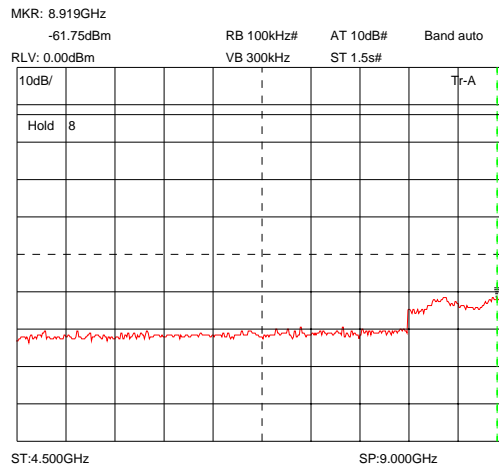
Conducted emissions 836.5 MHz 30MHz – 1GHz



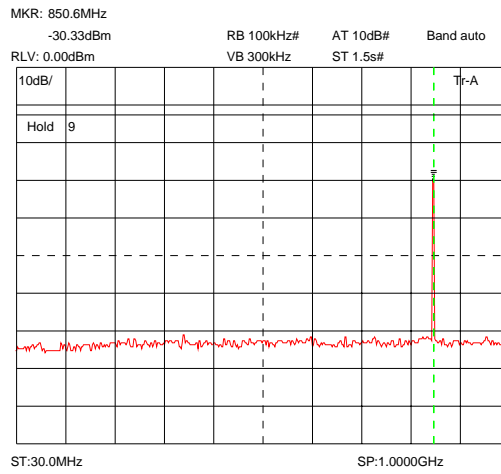
Conducted emissions 836.5 MHz 1 – 4.5GHz



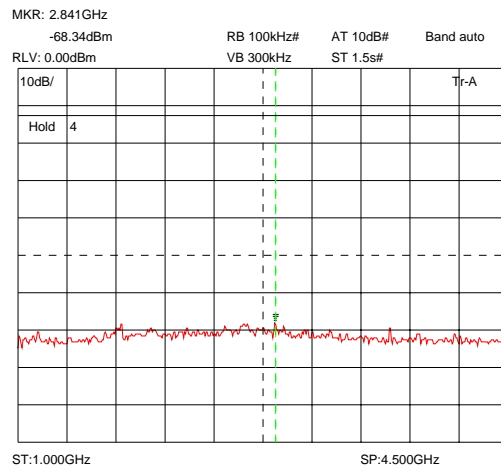
Conducted emissions 836.5 MHz 4.5 – 9GHz



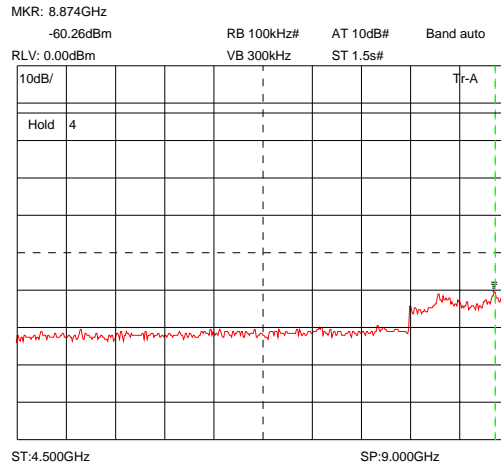
### Conducted emissions 849.0 MHz 30MHz – 1GHz



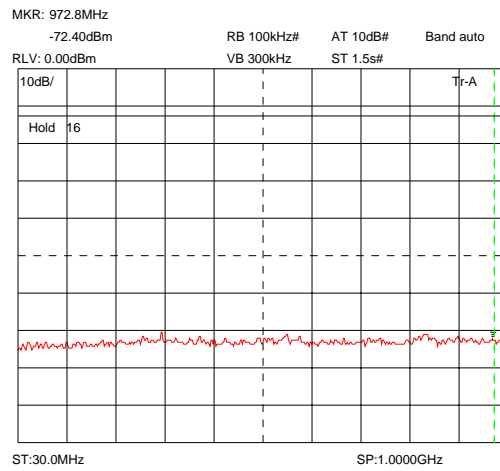
### Conducted emissions 849.0 MHz 1 – 4.5GHz



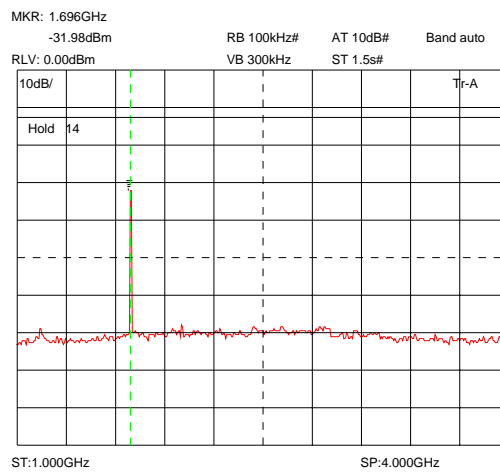
### Conducted emissions 849.0 MHz 4.5 – 9GHz



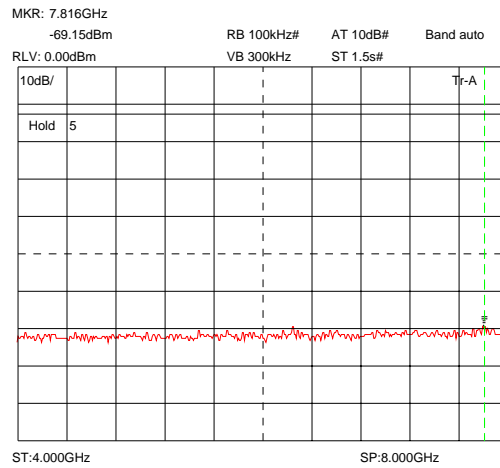
### Conducted emissions 1710.0 MHz 30MHz – 1GHz



### Conducted emissions 1710.0 MHz 1 – 4GHz

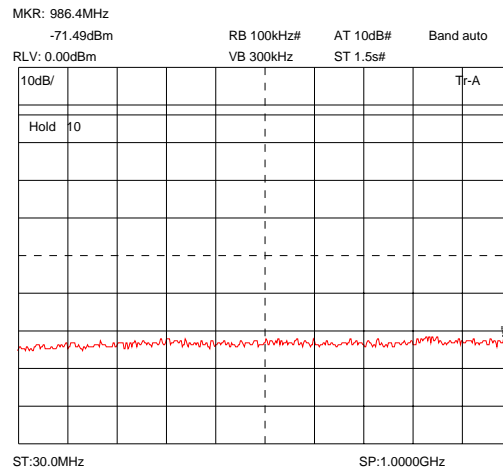


### Conducted emissions 1710.0 MHz 4 – 8GHz

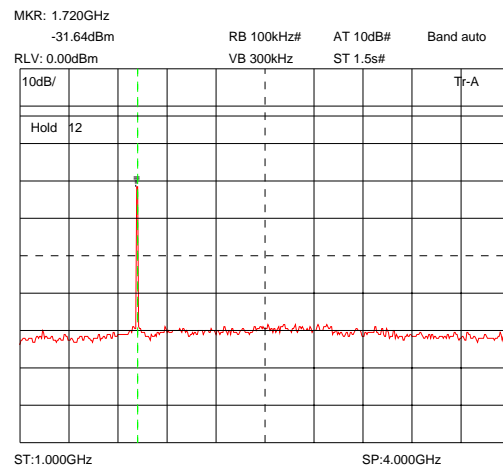




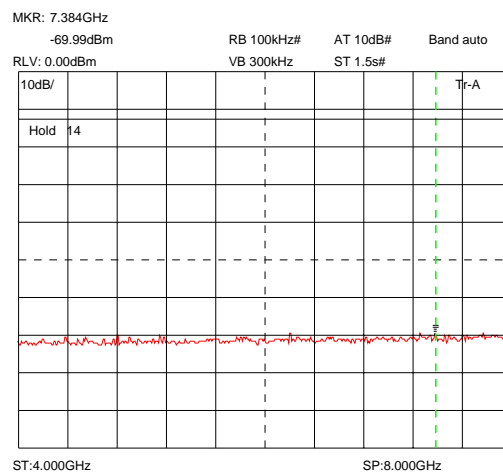
### Conducted emissions 1732.5 MHz 30MHz – 1GHz



### Conducted emissions 1732.5 MHz 1 – 4GHz

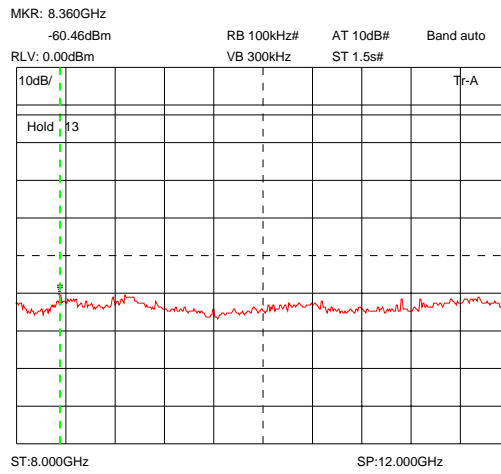


### Conducted emissions 1732.5 MHz 4 – 8GHz

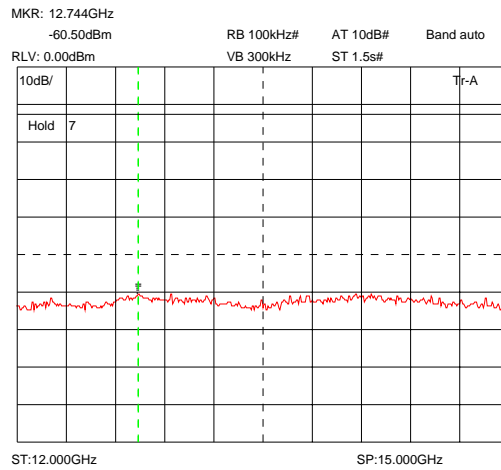




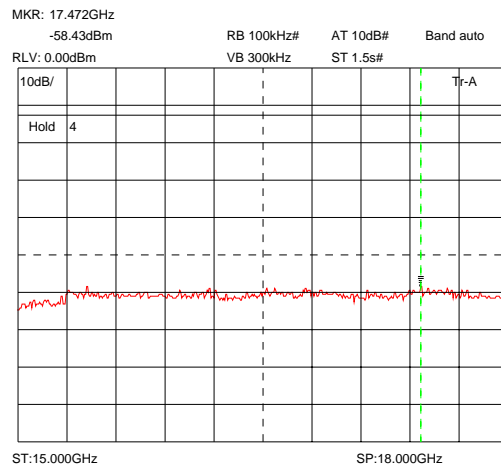
Conducted emissions 1732.5 MHz 8 – 12GHz



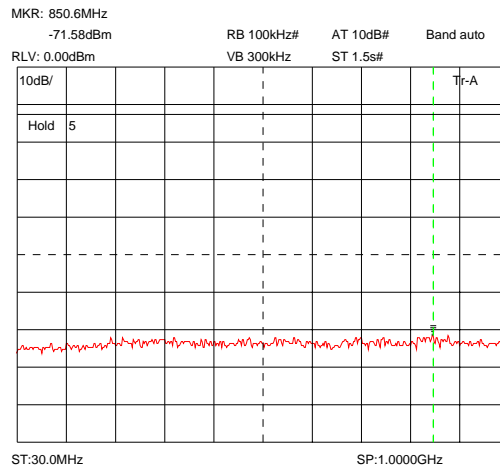
Conducted emissions 1732.5 MHz 12 – 15GHz



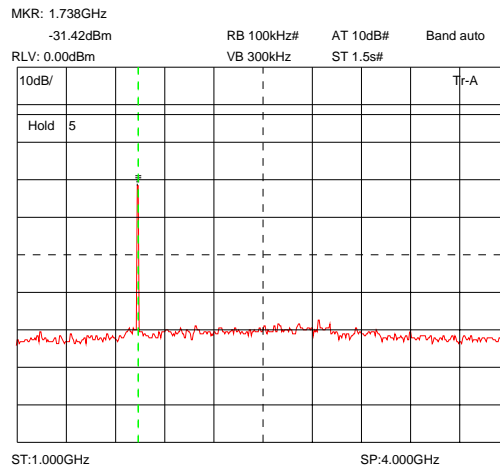
Conducted emissions 1732.5 MHz 15 – 18GHz



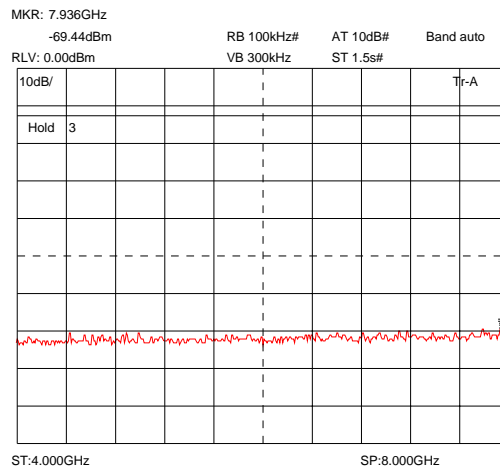
### Conducted emissions 1755.0 MHz 30MHz – 1GHz



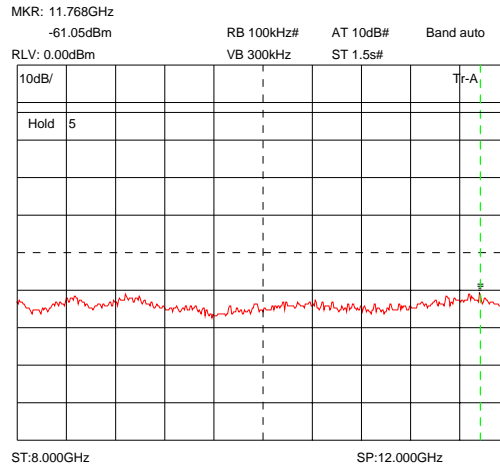
### Conducted emissions 1755.0 MHz 1 – 4GHz



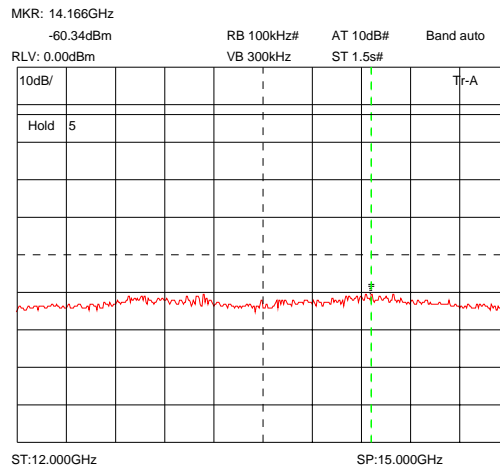
### Conducted emissions 1755.0 MHz 4 – 8GHz



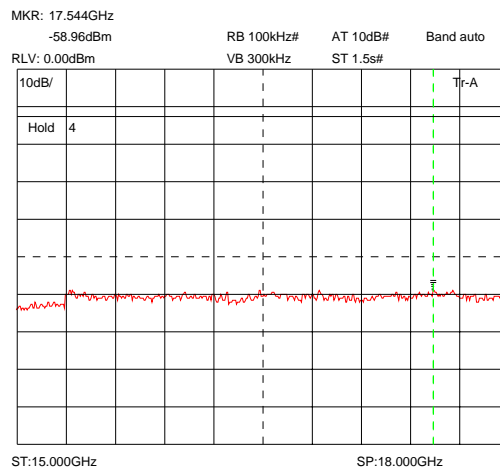
### Conducted emissions 1755.0 MHz 8 – 12GHz



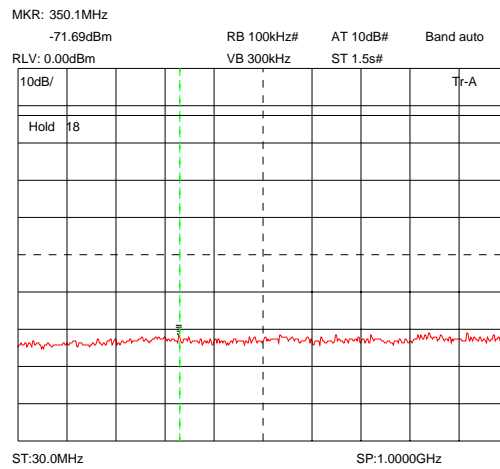
### Conducted emissions 1755.0 MHz 12 – 15GHz



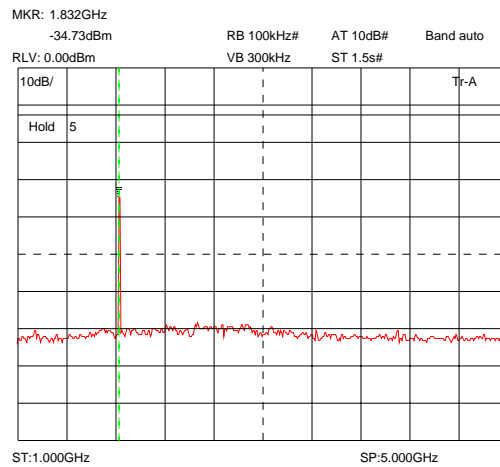
### Conducted emissions 1755.0 MHz 15 – 18GHz



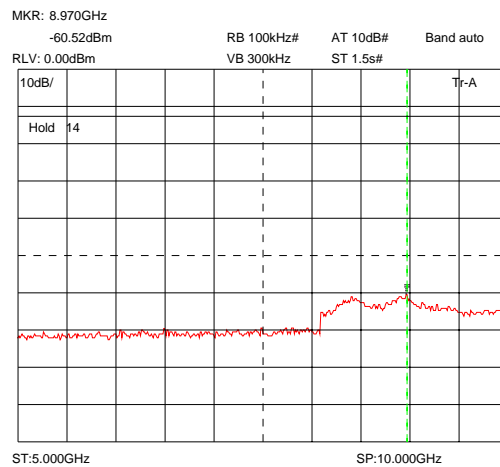
### Conducted emissions 1850.0 MHz 30MHz – 1GHz



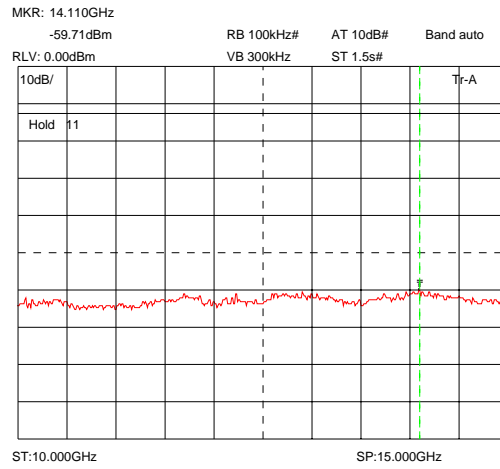
### Conducted emissions 1850.0 MHz 1 – 5GHz



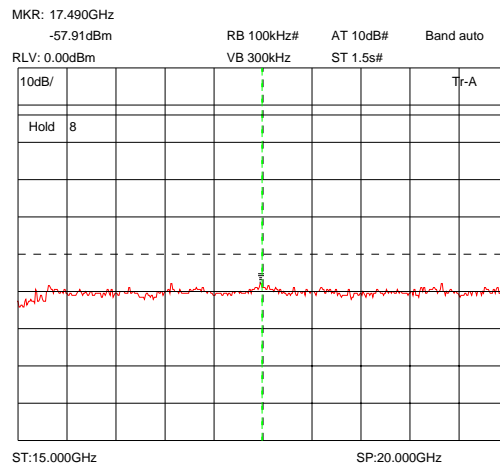
### Conducted emissions 1850.0 MHz 5 – 10GHz



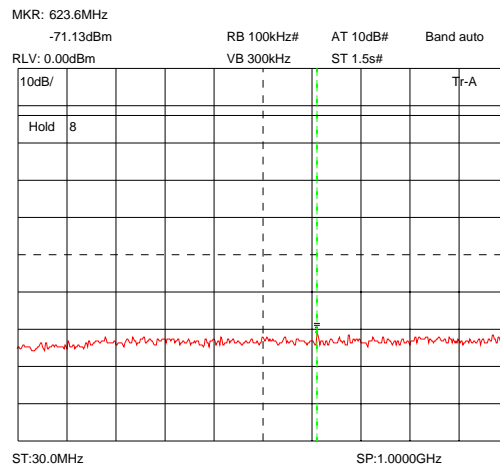
Conducted emissions 1850.0 MHz 10 – 15GHz



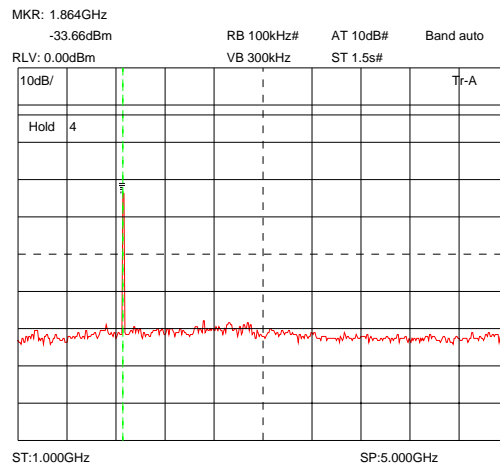
Conducted emissions 1850.0 MHz 15 – 20GHz



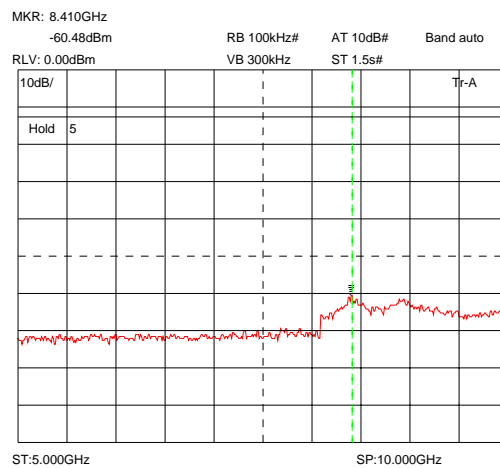
Conducted emissions 1880.0 MHz 30MHz – 1GHz



Conducted emissions 1880.0 MHz 1 – 5GHz

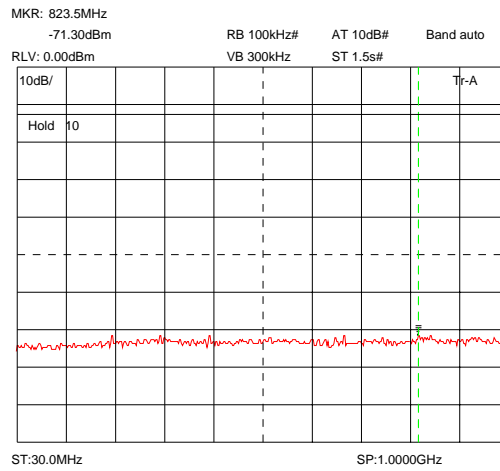


Conducted emissions 1880.0 MHz 5 – 10GHz

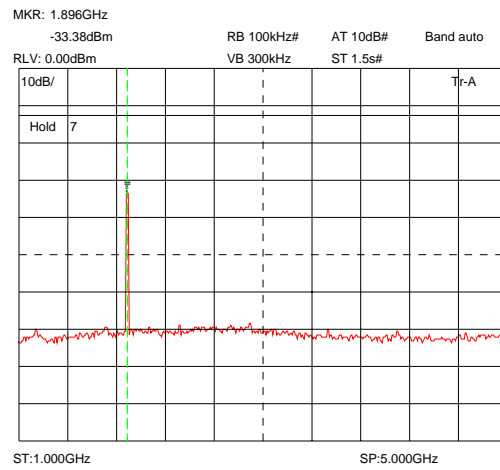




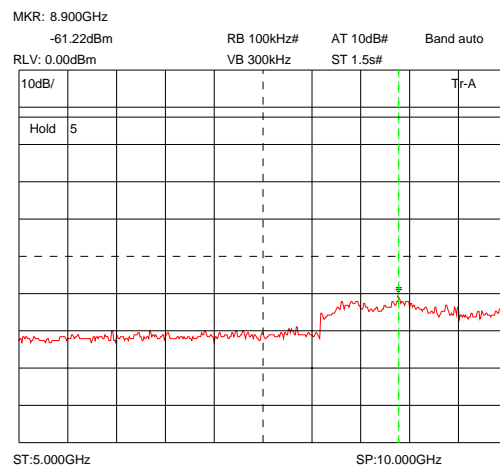
### Conducted emissions 1910.0 MHz 30MHz – 1GHz



### Conducted emissions 1910.0 MHz 1 – 5GHz



### Conducted emissions 1910.0 MHz 5 – 10GHz



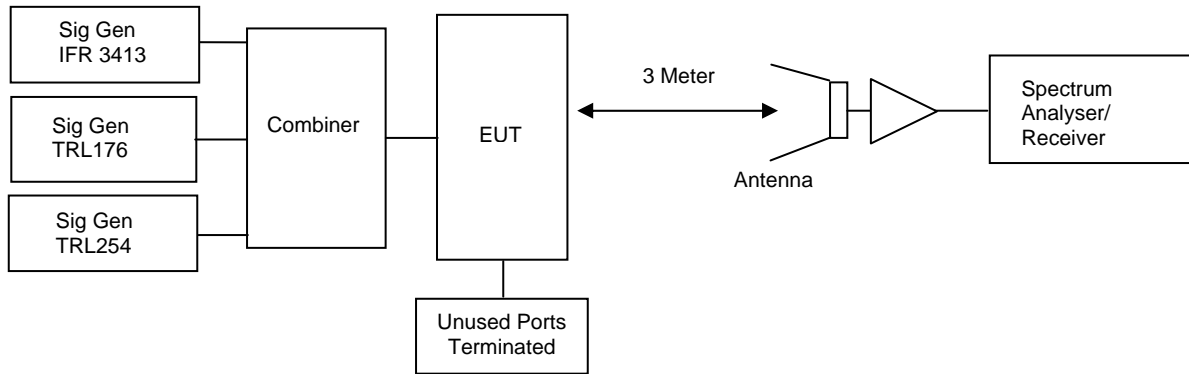




## TRANSMITTER TESTS

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

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 & combiner. The unit was tested at maximum power. The signal generators were set to produce the lowest, middle or highest frequency within each band and a 50 ohm load on the output. The unit was also tested with the signal generators 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  $43 + 10 \log P_{dB}$

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

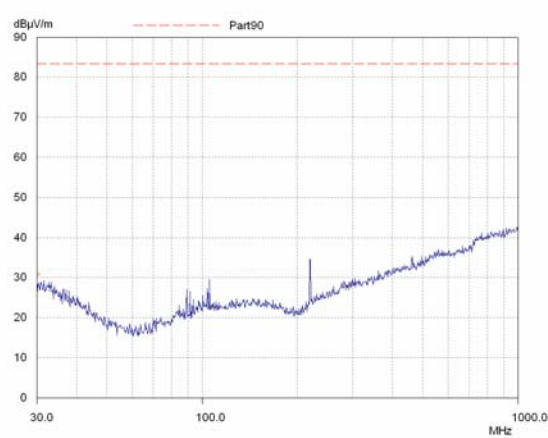
## RESULTS

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

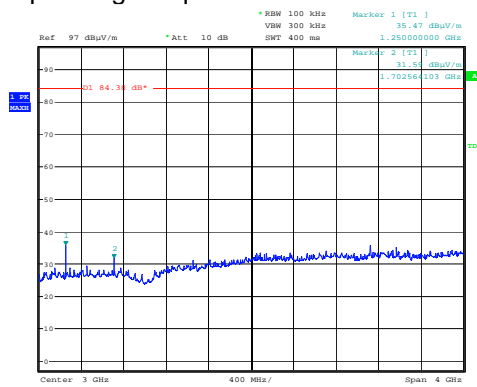
The test equipment used for the Transmitter Spurious Emissions:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
HORN	EMCO	3115	9010-3580	138	X
PRE AMPLIFIER	HP	8449B	3008A016	572	X
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
SIGNAL GENERATOR	IFR	3413	341001/261	N/A	X
ANTENNA	YORK	CBL611/A	1618	UH191	X
PRE AMPLIFIER	WATRKINS JOHNSON	6201-69	2740	UH372	X
RECEIVER	RHODE & SCHWARZ	ESVS10	825890/006	UH04	X

### Radiated emissions Lowest Operating Frequencies 30MHz – 1GHz

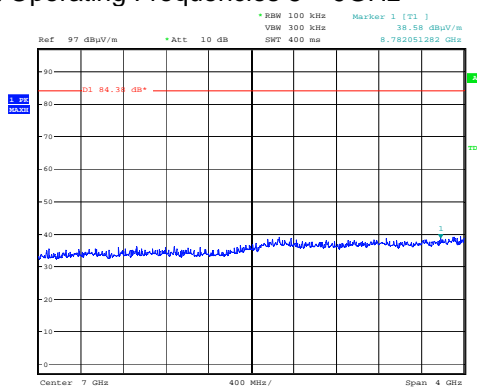


### Radiated emissions Lowest Operating Frequencies 1 – 5GHz



Date: 24.SEP.2009 12:05:21

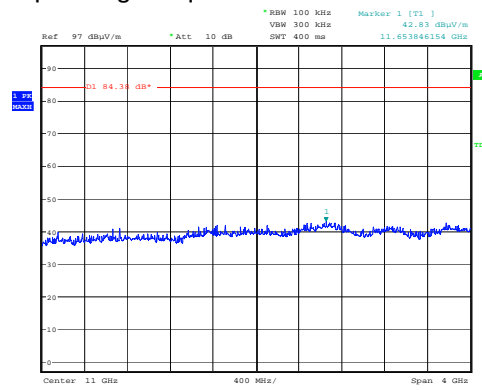
### Radiated emissions Lowest Operating Frequencies 5 – 9GHz



Date: 24.SEP.2009 12:05:02

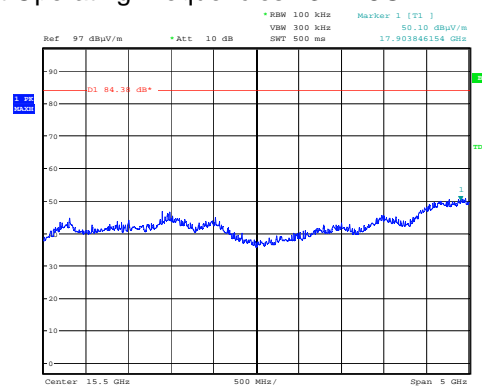
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

### Radiated emissions Lowest Operating Frequencies 9 – 13GHz



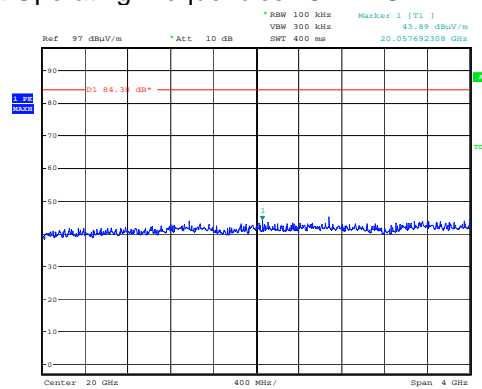
Date: 24.SEP.2009 12:04:47

### Radiated emissions Lowest Operating Frequencies 13 – 18GHz



Date: 24.SEP.2009 12:04:36

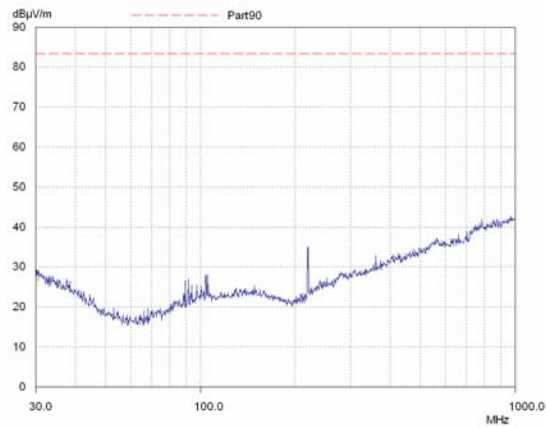
### Radiated emissions Lowest Operating Frequencies 18 – 22GHz



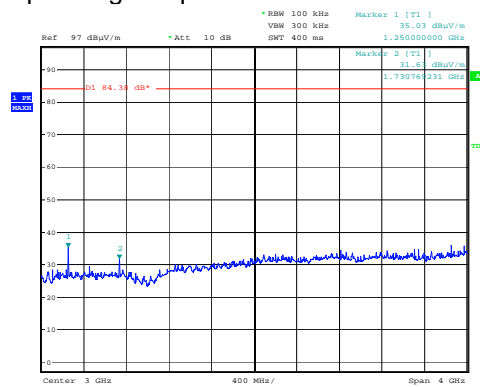
Date: 24.SEP.2009 11:50:53

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

### Radiated emissions Middle Operating Frequencies 30MHz – 1GHz

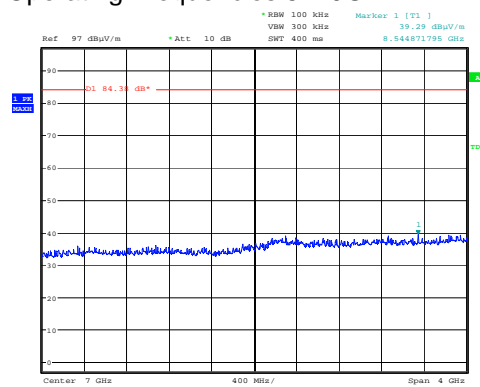


### Radiated emissions Middle Operating Frequencies 1 – 5GHz



Date: 24.SEP.2009 11:59:39

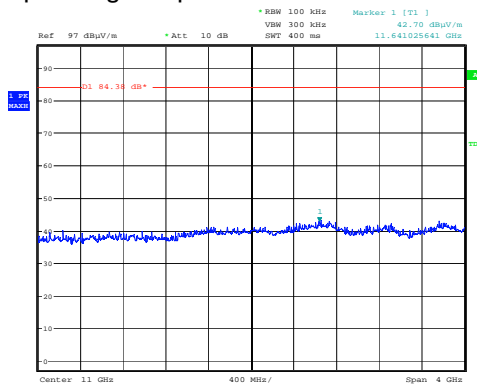
### Radiated emissions Middle Operating Frequencies 5 – 9GHz



Date: 24.SEP.2009 11:59:54

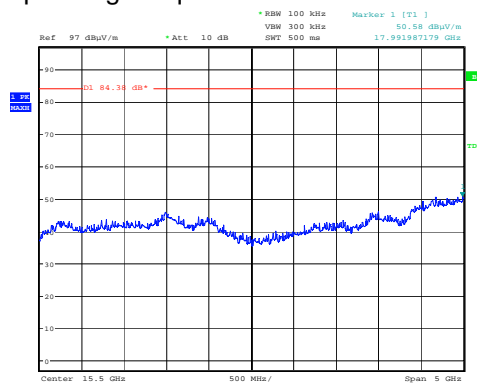
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

### Radiated emissions Middle Operating Frequencies 9 – 13GHz



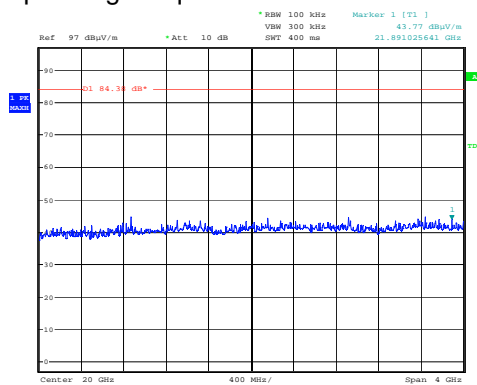
Date: 24.SEP.2009 12:00:06

### Radiated emissions Middle Operating Frequencies 13 – 18GHz



Date: 24.SEP.2009 12:00:19

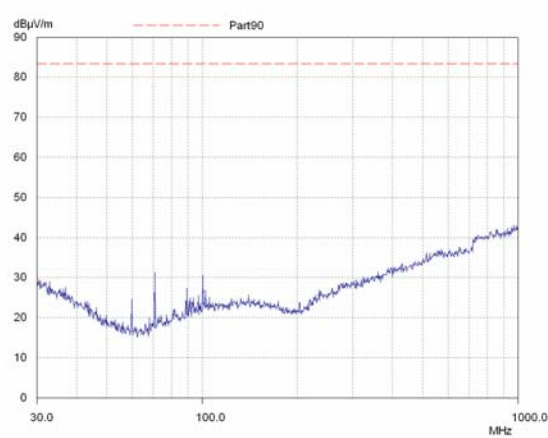
### Radiated emissions Middle Operating Frequencies 18 – 22GHz



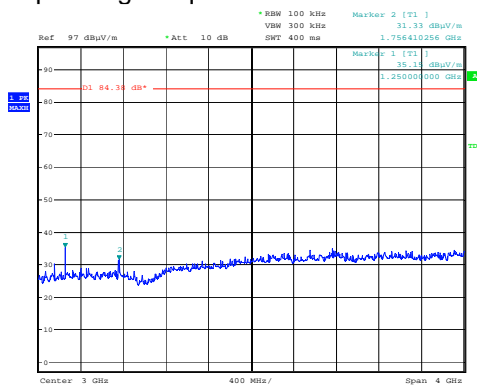
Date: 24.SEP.2009 11:52:24

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

### Radiated emissions Highest Operating Frequencies 30MHz – 1GHz

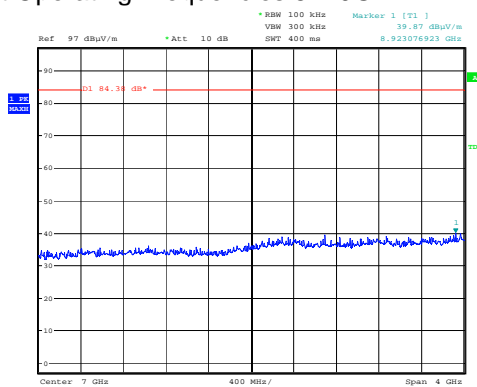


### Radiated emissions Highest Operating Frequencies 1 – 5GHz



Date: 24.SEP.2009 11:59:04

### Radiated emissions Highest Operating Frequencies 5 – 9GHz

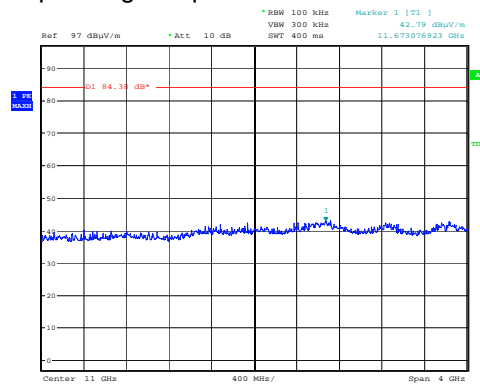


Date: 24.SEP.2009 11:58:48

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

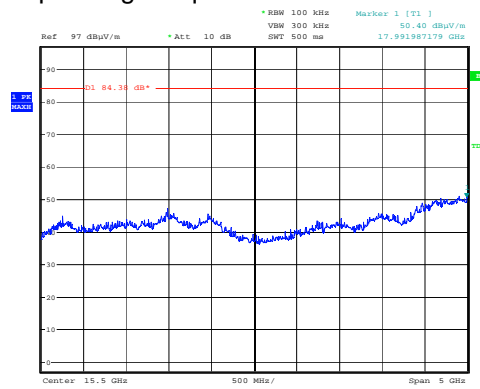


### Radiated emissions Highest Operating Frequencies 9 – 13GHz



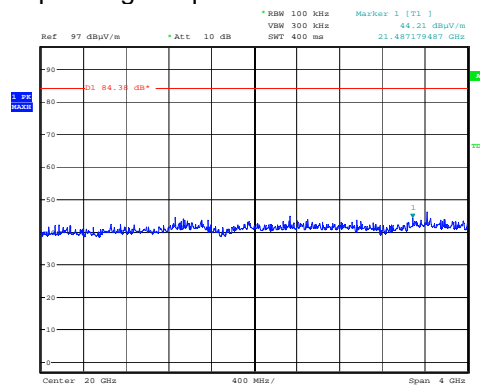
Date: 24.SEP.2009 11:58:34

### Radiated emissions Highest Operating Frequencies 13 – 18GHz



Date: 24.SEP.2009 11:58:16

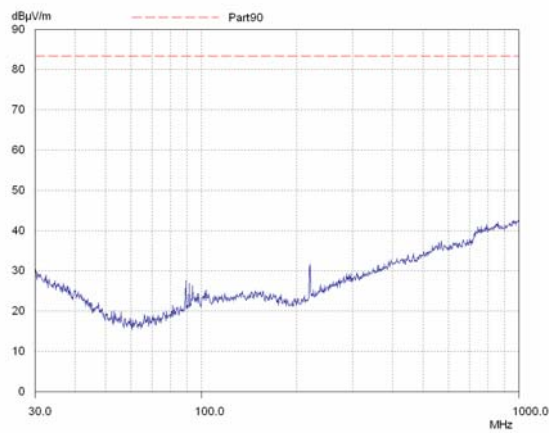
### Radiated emissions Highest Operating Frequencies 18 – 22GHz



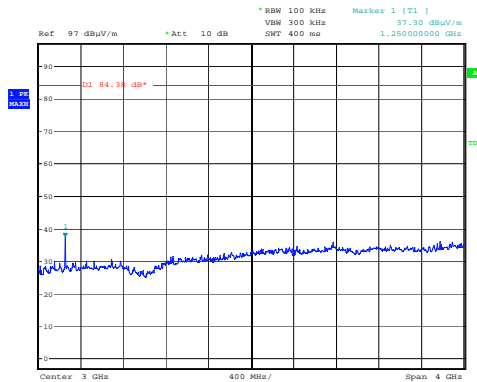
Date: 24.SEP.2009 11:53:01

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

### Radiated emissions No Input 30MHz – 1GHz

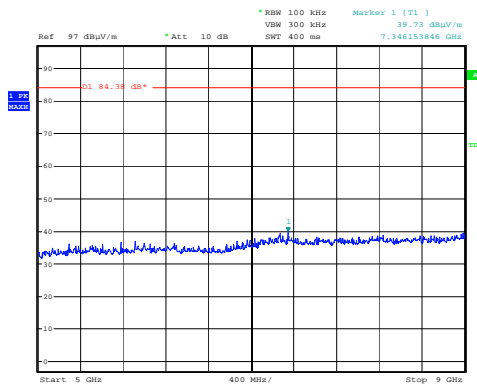


### Radiated emissions No Input 1 – 5GHz



Date: 24.SEP.2009 11:11:12

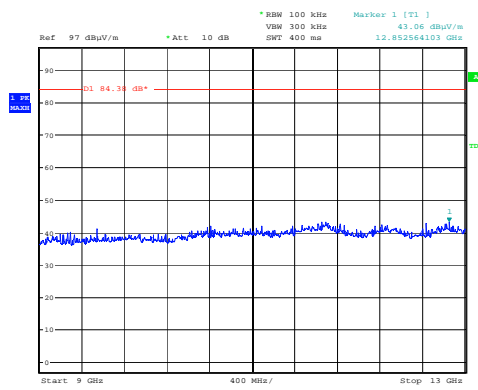
### Radiated emissions No Input 5 – 9GHz



Date: 24.SEP.2009 11:11:29

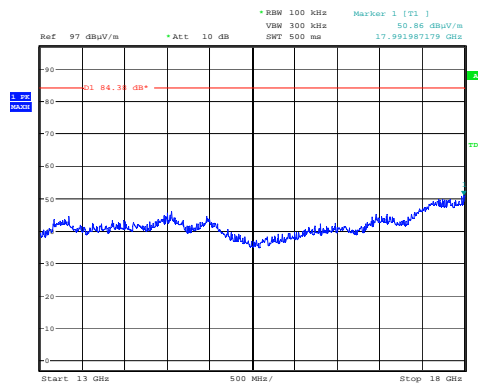
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

### Radiated emissions No Input 9 – 13GHz



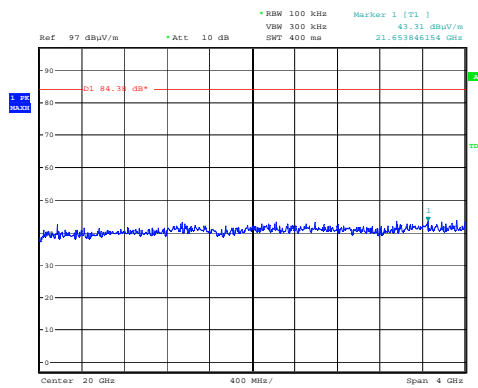
Date: 24.SEP.2009 11:11:45

### Radiated emissions No Input 13 – 18GHz



Date: 24.SEP.2009 11:12:03

### Radiated emissions No Input 18 – 22GHz



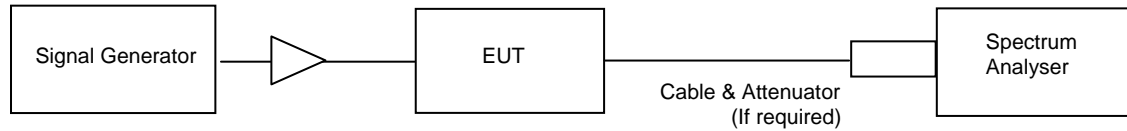
Date: 24.SEP.2009 11:46:33

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

## AMPLIFIER GAIN – CONDUCTED – PART 2.1046 – DOWNLINK – 800 MHz

Ambient temperature = 24°C  
 Relative humidity = 58%  
 Supply voltage = +110Vac  
 Channel number = See test results

Radio Laboratory



### 800 MHz DOWNLINK

Frequency MHz	Signal Generator input level dBm	Input Gain dB	Output Cable & Attenuator loss dB	Level at Spectrum Analyser dBm	Gain dB	Conducted Output Power dBm	Gain after 10dB input level increase dB
869.0	-25.10	29.98	41.07	-5.80	30.39	35.27	20.40
881.5	-25.10	29.78	41.39	-5.43	31.28	35.96	21.28
894.0	-25.10	29.50	41.40	-6.19	30.81	35.21	21.48

Notes: 4. The signal generator input was increased by 10dBs and the level of the output signal remeasured.

### 1900 MHz DOWNLINK

Frequency MHz	Signal Generator input level dBm	Input Gain dB	Output Cable & Attenuator loss dB	Level at Spectrum Analyser dBm	Gain dB	Conducted Output Power dBm	Gain after 10dB input level increase dB
1930.0	-40.30	49.09	41.65	-6.10	26.79	35.55	16.80
1960.0	-42.40	49.11	41.75	-5.35	29.69	36.40	19.73
1990.0	-41.70	48.96	41.86	-5.86	28.74	36.00	36.04

Notes: 5. The signal generator input was increased by 10dBs and the level of the output signal remeasured.

### 2100 MHz DOWNLINK

Frequency MHz	Signal Generator input level dBm	Input Gain dB	Output Cable & Attenuator loss dB	Level at Spectrum Analyser dBm	Gain dB	Conducted Output Power dBm	Gain after 10dB input level increase dB
2110.0	-39.20	49.33	41.84	-3.74	27.97	38.10	18.00
2132.5	-40.70	49.26	41.88	-3.11	30.21	38.77	20.25
2155.0	-39.00	49.69	42.00	-3.31	28.00	38.69	18.03

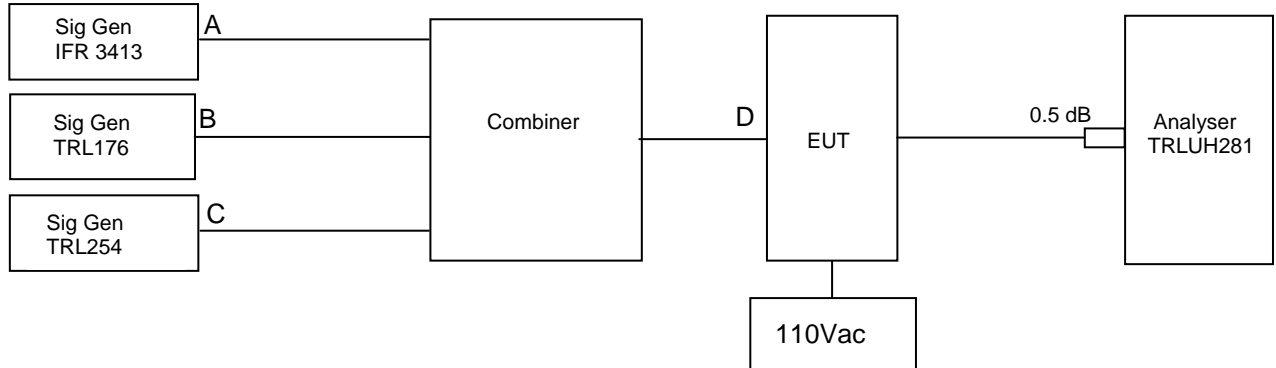
Notes: 6. The signal generator input was increased by 10dBs and the level of the output signal remeasured.

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
ATTENUATOR	SPINNER	745357	57224	U225	X
ATTENUATOR	AXELL	20 dB 100W	N/A	N/A	X
1900/2100 MHz AMPLIFIER	AMPLIFIER RESEARCH	50S1G4A	303825	UH167	X
CABLE	TRaC	N/A	N/A	UH269	X
CABLE	TRaC	N/A	N/A	UH271	X
CABLE	TRaC	N/A	N/A	UH273	X
CABLE	TRaC	N/A	N/A	UH274	X
800 MHz AMPLIFIER	AXELL	N/A	N/A	N/A	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 loss between the EUT and the spectrum analyser was 0.5dB.

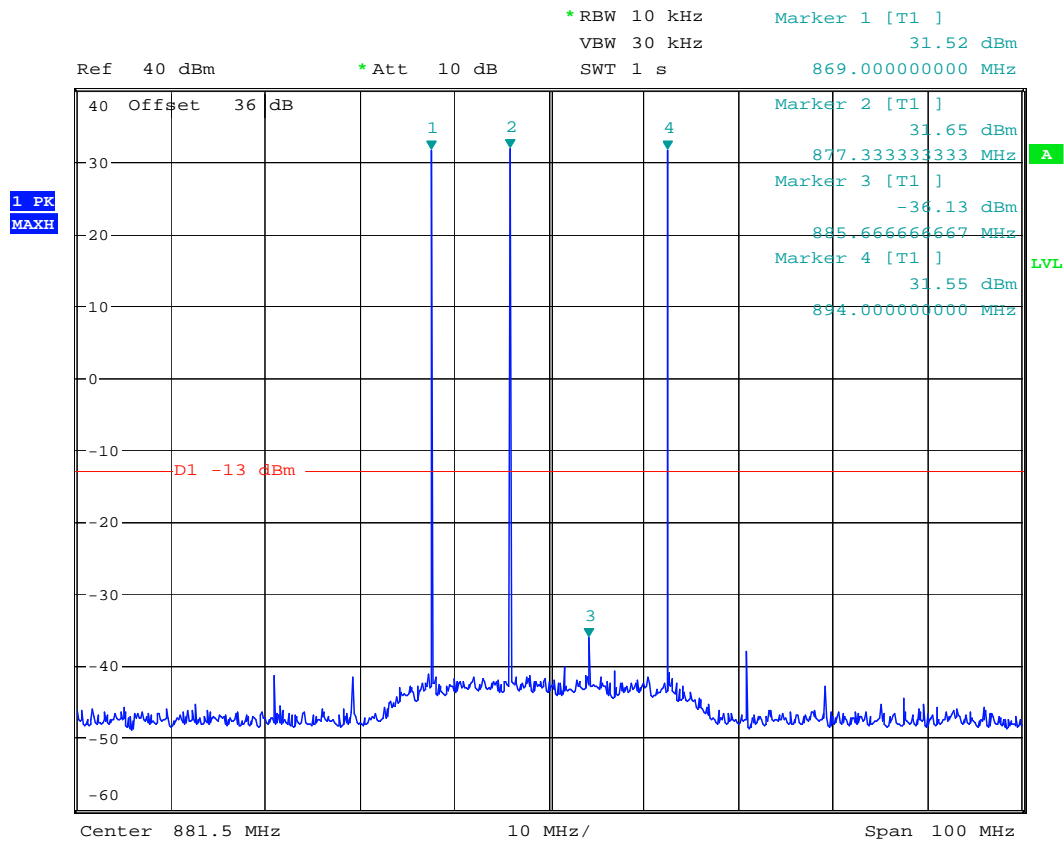
RF Input Frequency (MHz)			Highest Intermodulation Product Level (dBm)	Limit (dBm)
869.0	877.3	894.0	-14.35dBm @ 1939.004 MHz	-13
1930.0	1950.0	1990.0	-15.08dbm @ 884.967 MHz	-13
2110.0	2125.0	2155.0	-25.38dbm @ 2140.000 MHz	-13
881.5	1960.0	2132.5	No Significant Products Within 20dB of the Limit	-13

Sweep data is shown on the next page:

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
CABLE	TRaC	N/A	N/A	UH253	X
CABLE	TRaC	N/A	N/A	UH273	X
CABLE	TRaC	N/A	N/A	UH274	X
SIGNAL GENERATOR	IFR	3413	341001/261	N/A	X
COMBINER	AXELL	N/A	N/A	N/A	X
ATTENUATOR	SPINNER	745357	57224	U225	X
ATTENUATOR	AXELL	20 dB 100W	N/A	N/A	X

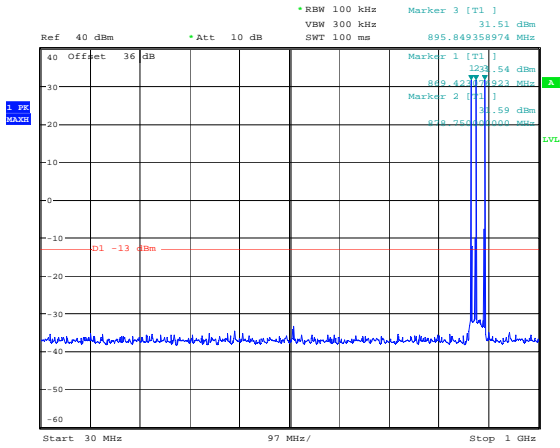
### Intermodulation Inband - 800 MHz Downlink Band



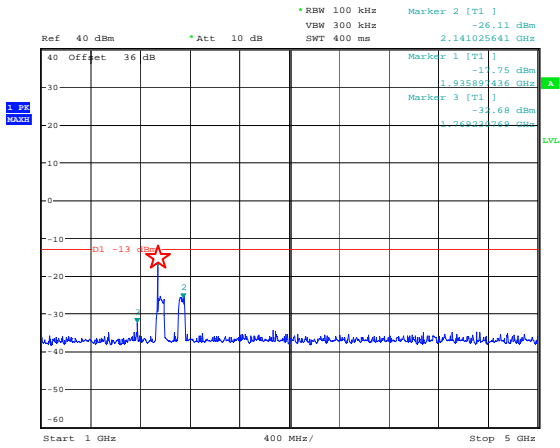
Date: 23.SEP.2009 13:35:41

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

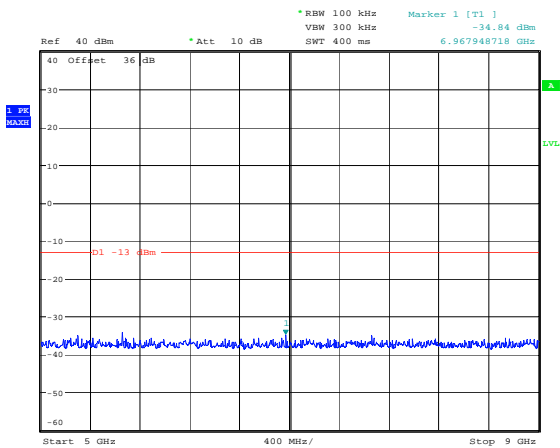
## Intermodulation Wideband - 800 MHz Downlink Band



Date: 23\_SEP.2009 13:36:09



Date: 23\_SEP.2009 13:44:05

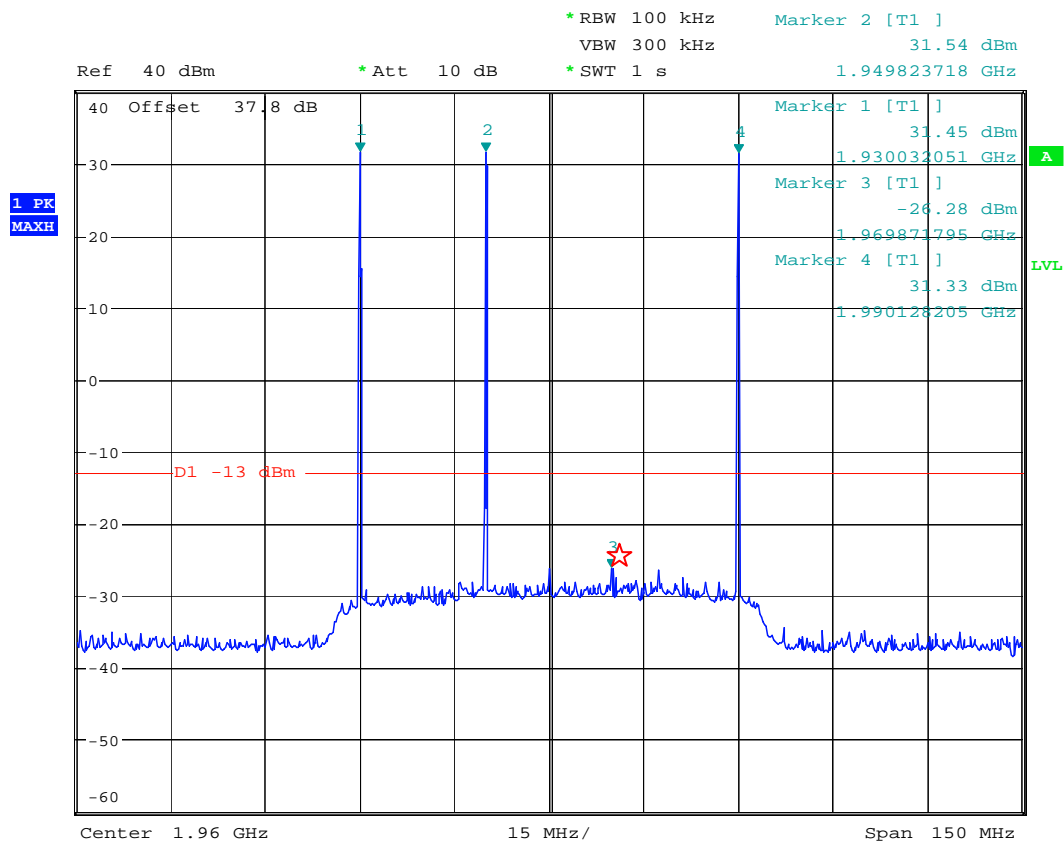


Date: 23\_SEP.2009 13:46:16

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



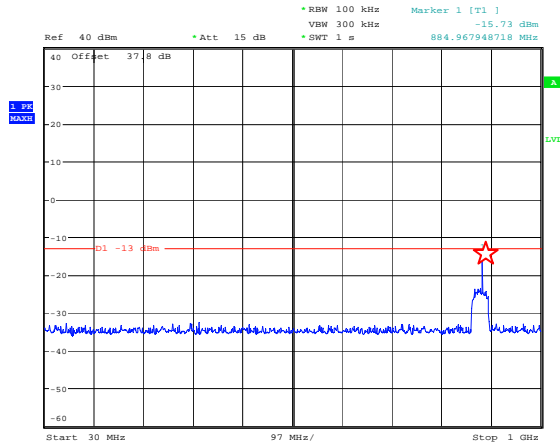
### Intermodulation Inband - 1900 MHz Downlink Band



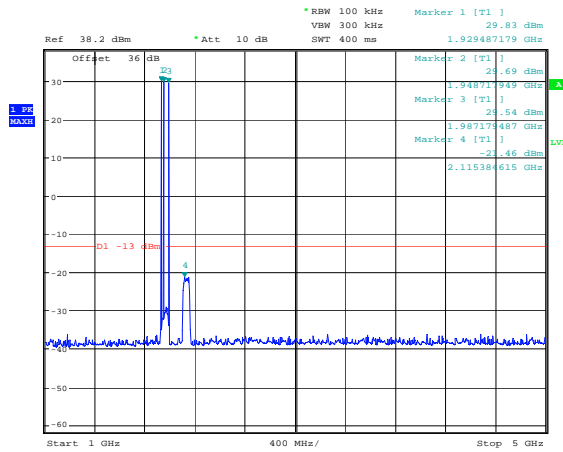
Date: 23.SEP.2009 14:12:26

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

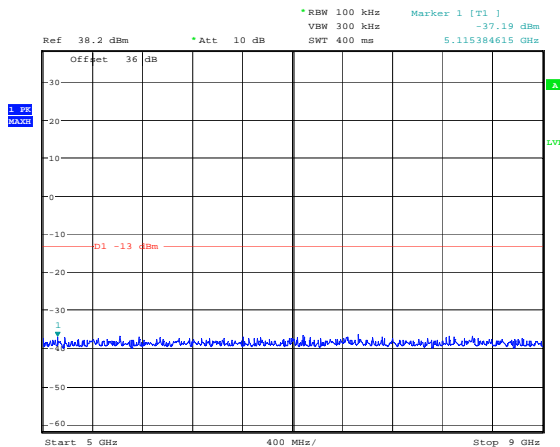
## Intermodulation Wideband - 1900 MHz Downlink Band



Date: 23.SEP.2009 14:55:23



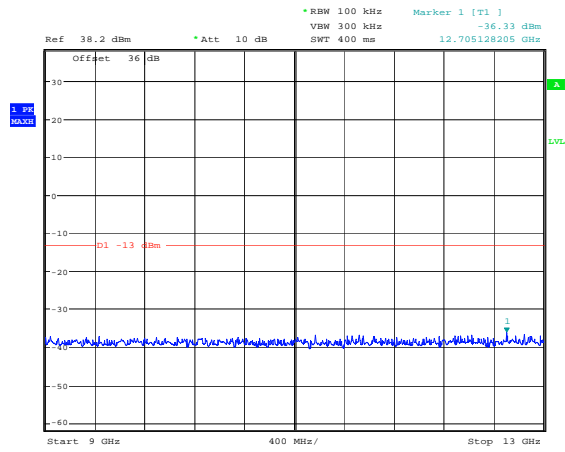
Date: 23.SEP.2009 14:26:20



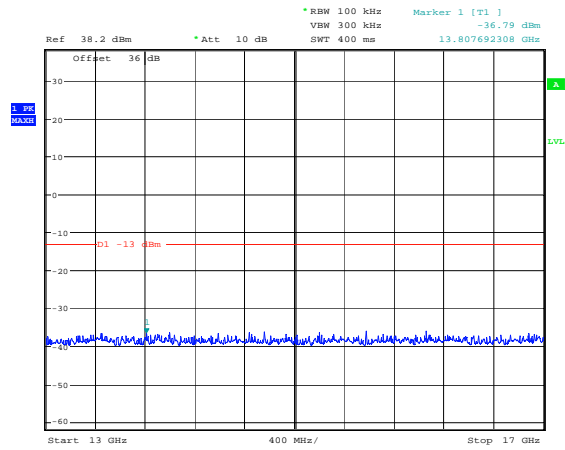
Date: 23.SEP.2009 14:24:57

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

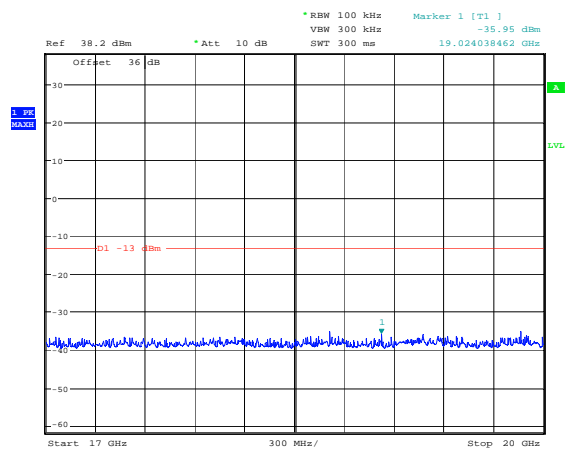
## Intermodulation Wideband - 1900 MHz Downlink Band



Date: 23.SEP.2009 14:25:08



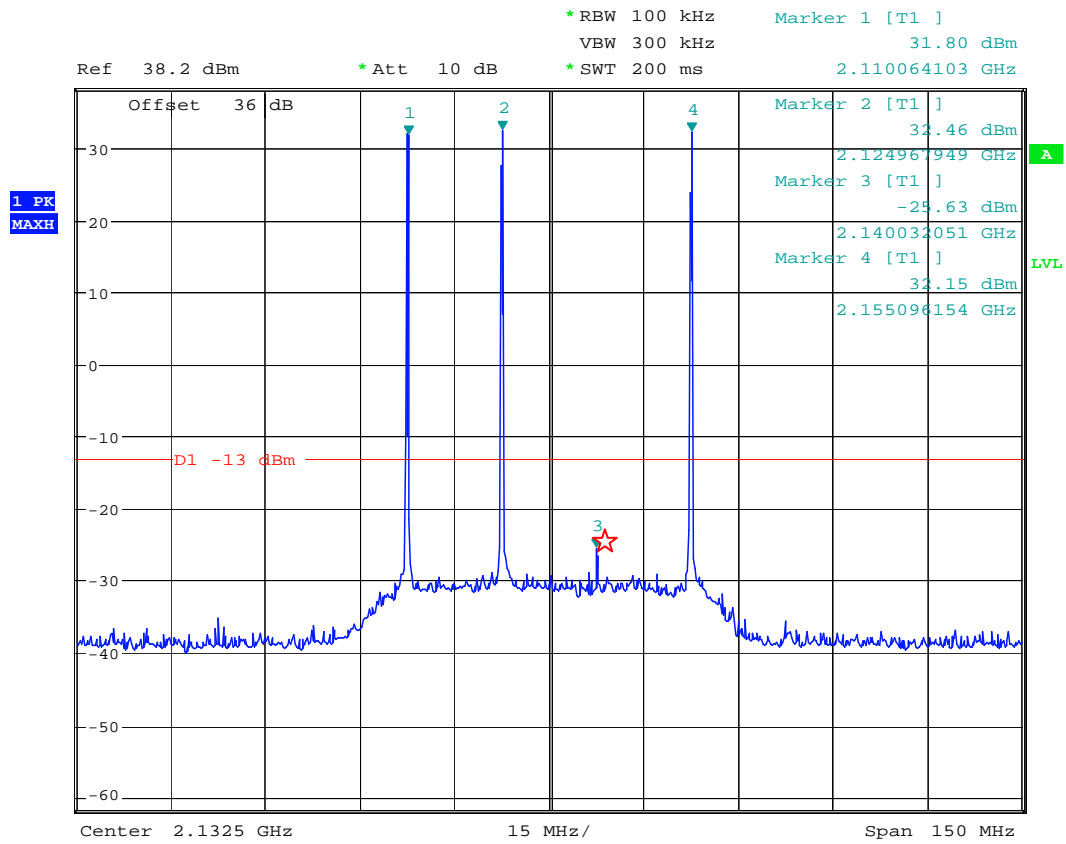
Date: 23.SEP.2009 14:25:23



Date: 23.SEP.2009 14:25:42

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

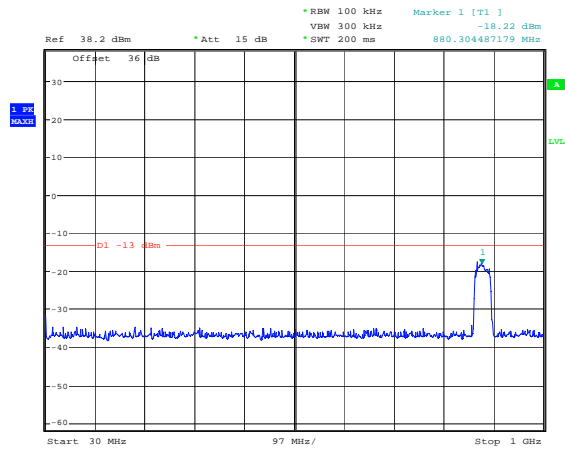
### Intermodulation Inband - 2100 MHz Downlink Band



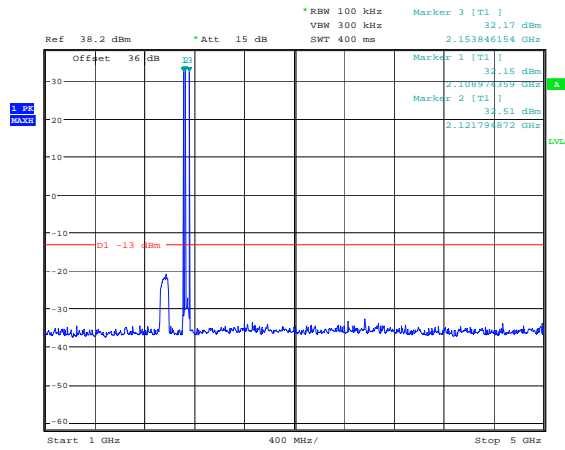
Date: 23.SEP.2009 14:30:49

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

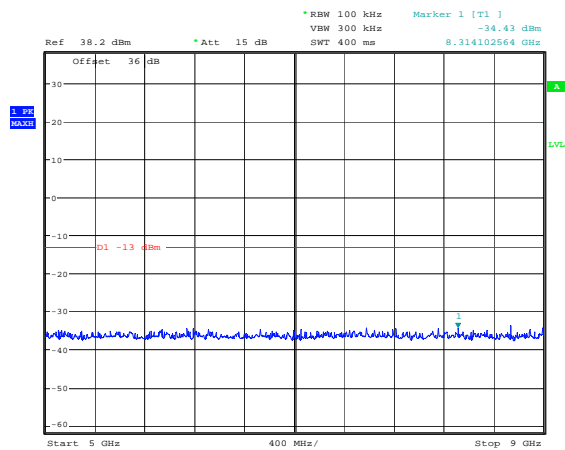
## Intermodulation Wideband - 2100 MHz Downlink Band



Date: 23.SEP.2009 14:31:11



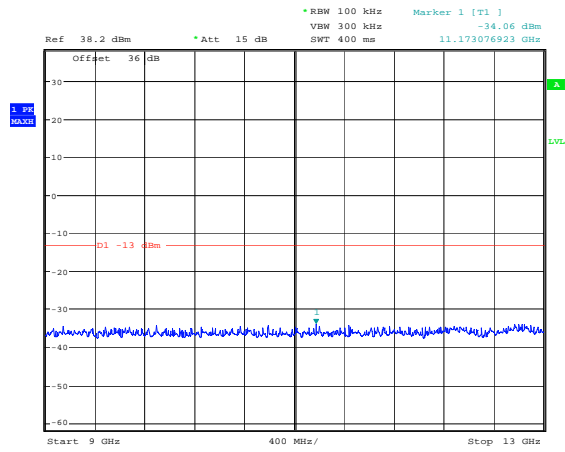
Date: 23.SEP.2009 14:31:44



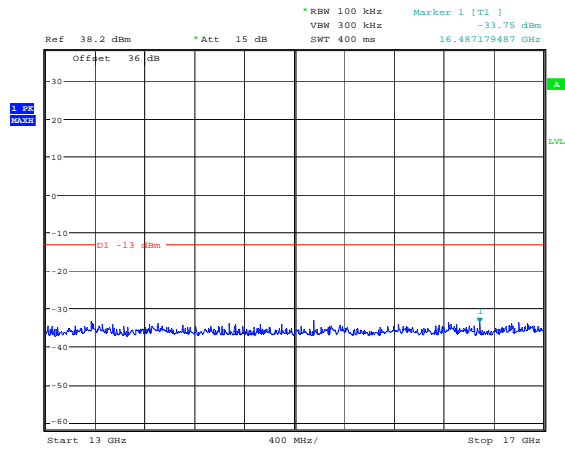
Date: 23.SEP.2009 14:31:56

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

## Intermodulation Wideband - 2100 MHz Downlink Band



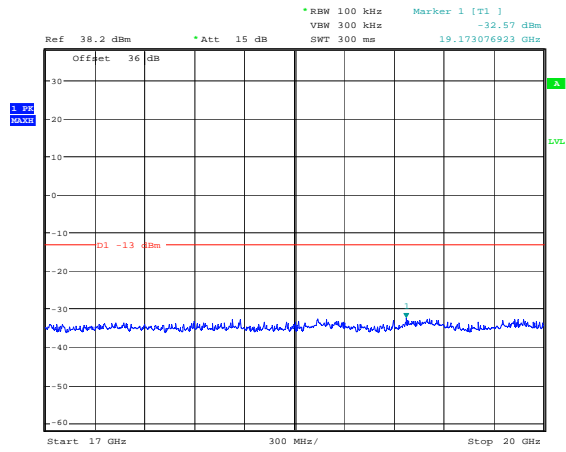
Date: 23.SEP.2009 14:32:08



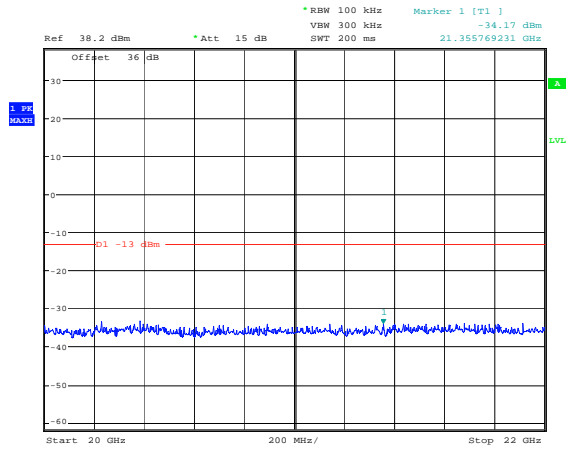
Date: 23.SEP.2009 14:32:22

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

## Intermodulation Wideband - 2100 MHz Downlink Band



Date: 23.SEP.2009 14:33:04



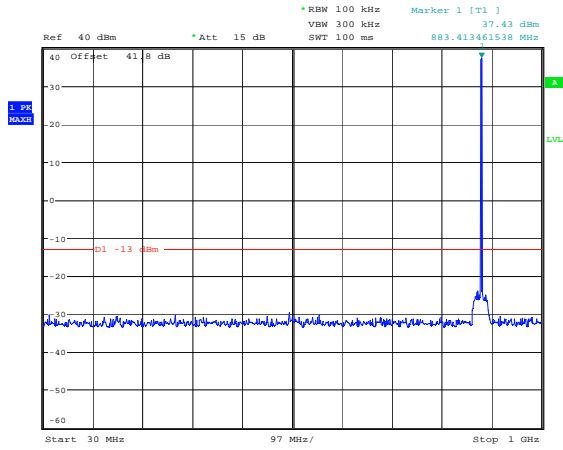
Date: 23.SEP.2009 14:33:14

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

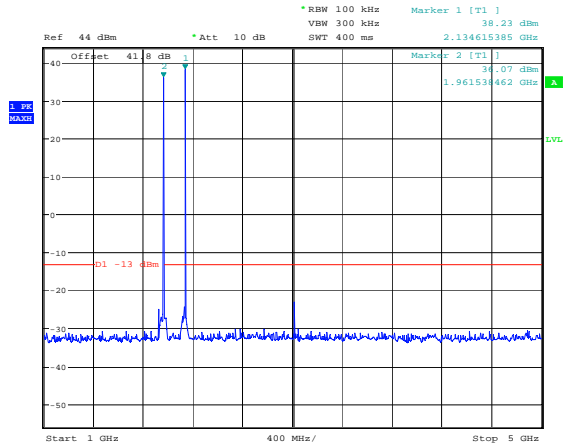




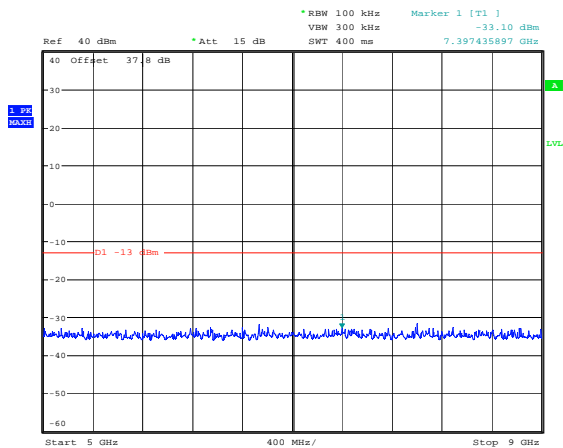
## Intermodulation - Uplink Cross Band



Date: 23.SEP.2009 15:23:03



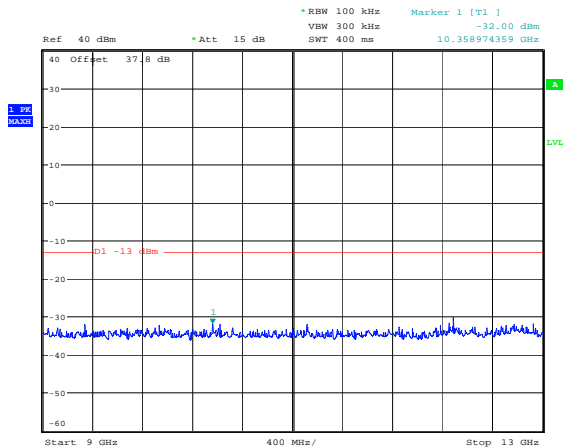
Date: 23.SEP.2009 15:22:15



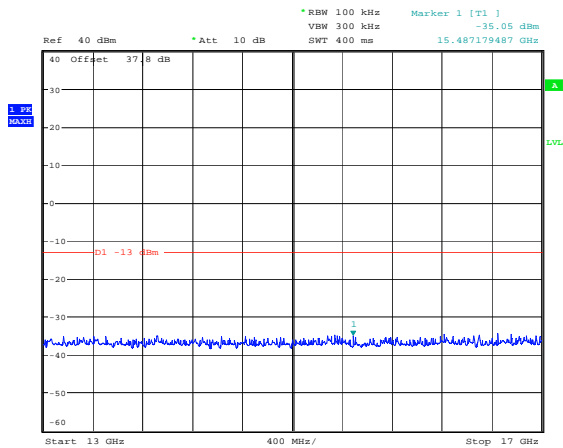
Date: 23.SEP.2009 15:14:10

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

### Intermodulation - Uplink Cross Band



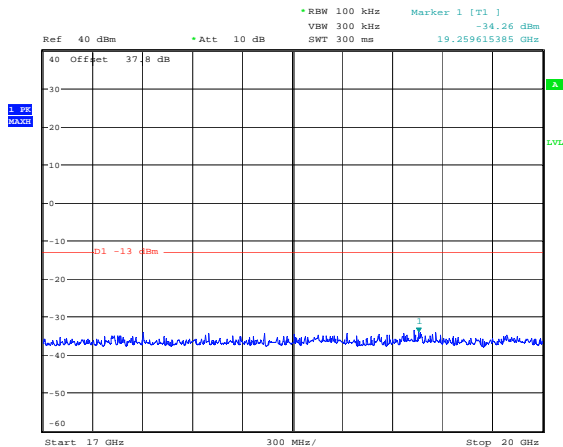
Date: 23.SEP.2009 15:14:22



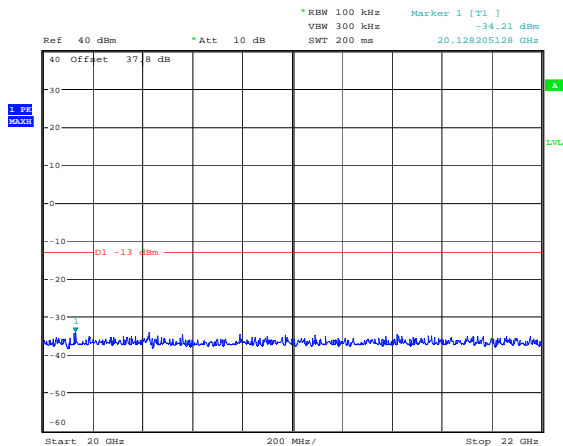
Date: 23.SEP.2009 15:14:51

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

### Intermodulation - Uplink Cross Band



Date: 23.SEP.2009 15:15:03



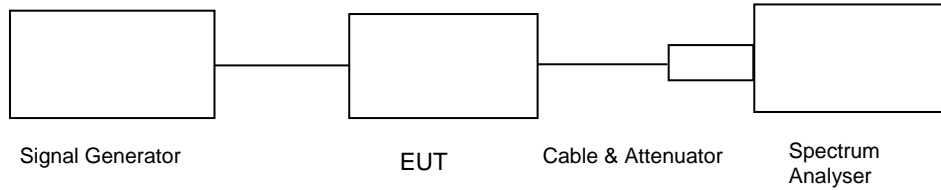
Date: 23.SEP.2009 15:15:15

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

**TRANSMITTER TESTS**

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

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



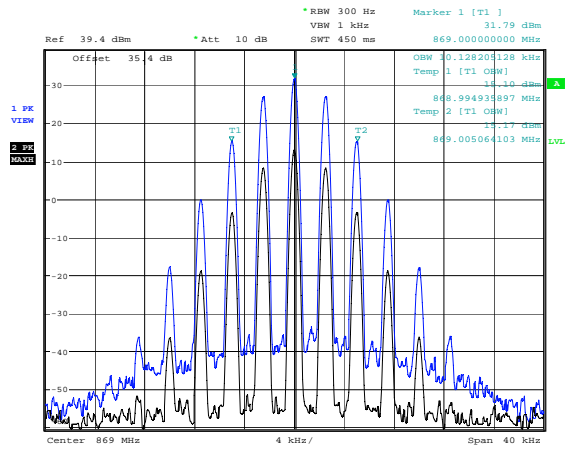
This test was performed to show that the amplifier does not alter the input signal in any way. The input signal was set to the maximum input. The following modulation schemes were produced, a 2500Hz FM tone with 2.5 and 5 kHz deviation, C4FM and TDMA Type.

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

Frequency Of Operational Channel	Modulation Type			
	2.5 kHz Deviation FM	5 kHz Deviation FM	CDMA	W-CDMA
869.0	10.128 kHz	15.256 kHz	1.272 MHz	4.163 MHz
881.5	10.128 kHz	15.256 kHz	1.262 MHz	4.153 MHz
894.0	10.128 kHz	15.256 kHz	1.277 MHz	4.144 MHz
1930.0	10.128 kHz	15.256 kHz	1.272 MHz	4.163 MHz
1960.0	10.128 kHz	15.256 kHz	1.272 MHz	4.182 MHz
1990.0	10.128 kHz	15.256 kHz	1.272 MHz	4.153 MHz
2110.0	10.128 kHz	15.256 kHz	1.272 MHz	4.163 MHz
2132.5	10.128 kHz	15.256 kHz	1.275 MHz	4.163 MHz
2155.0	10.128 kHz	15.256 kHz	1.277 MHz	4.163 MHz

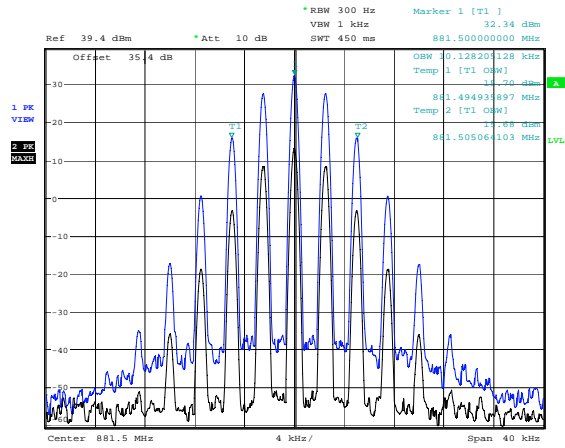
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	X
SIGNAL GENERATOR	IFR	3413	341001/261	N/A	X
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
CABLE	TRaC	N/A	N/A	UH273	X
CABLE	TRaC	N/A	N/A	UH274	X
ATTENUATOR	SPINNER	745357	57224	U225	X
ATTENUATOR	AXELL	20 dB 100W	N/A	N/A	X

869.0 FM deviation set to 2.5kHz



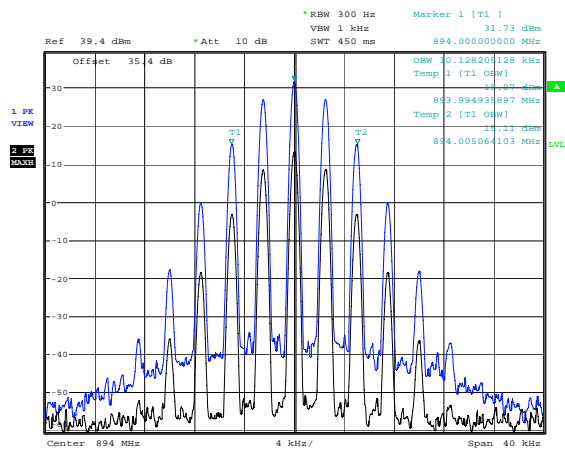
Date: 22.SEP.2009 14:15:38

881.5 FM deviation set to 2.5kHz



Date: 22.SEP.2009 14:16:04

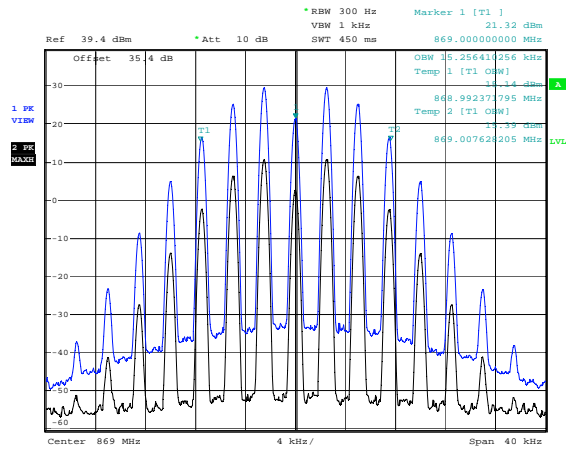
894.0 FM deviation set to 2.5kHz



Date: 22.SEP.2009 14:18:03

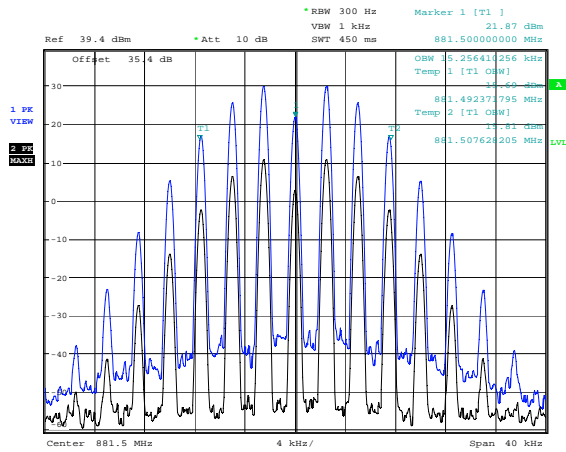
The above plots show no significant distortion visible when compared to the input signal.

869.0 FM deviation set to 5kHz



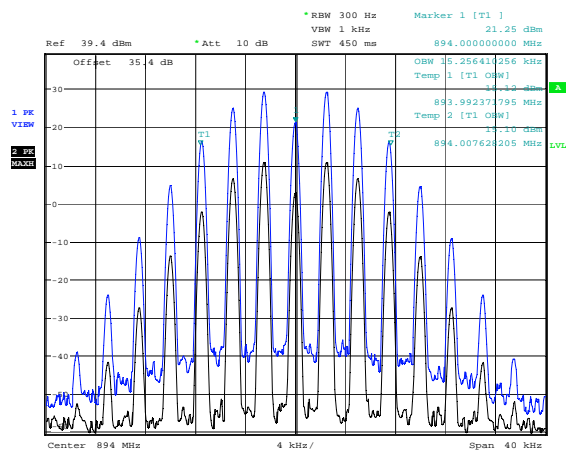
Date: 22.SEP.2009 14:15:11

881.5 FM deviation set to 5kHz



Date: 22.SEP.2009 14:16:49

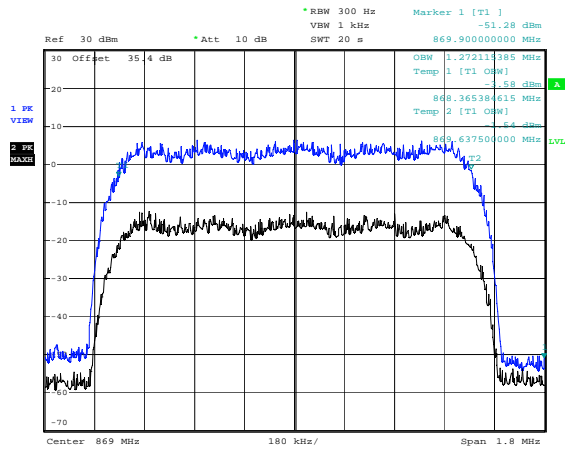
894.0 FM deviation set to 5kHz



Date: 22.SEP.2009 14:17:37

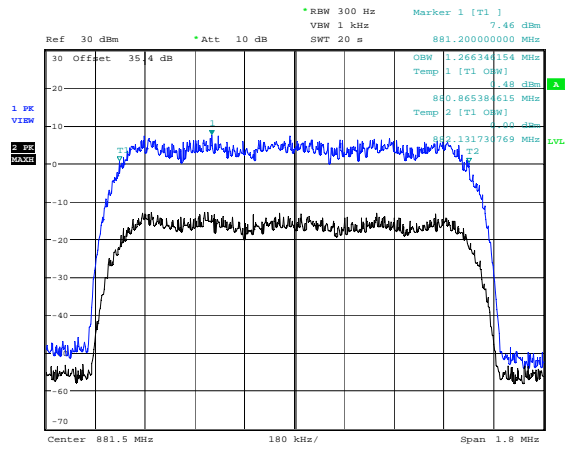
The above plots show no significant distortion visible when compared to the input signal.

### 869.0 CDMA Modulation



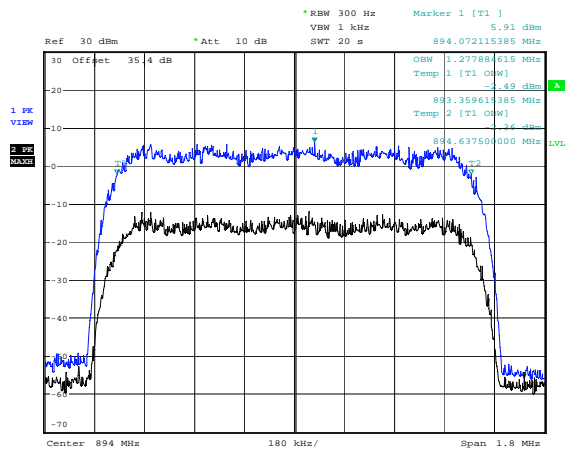
Date: 22.SEP.2009 14:27:05

### 881.5 CDMA Modulation



Date: 22.SEP.2009 14:24:20

### 894.0 CDMA Modulation

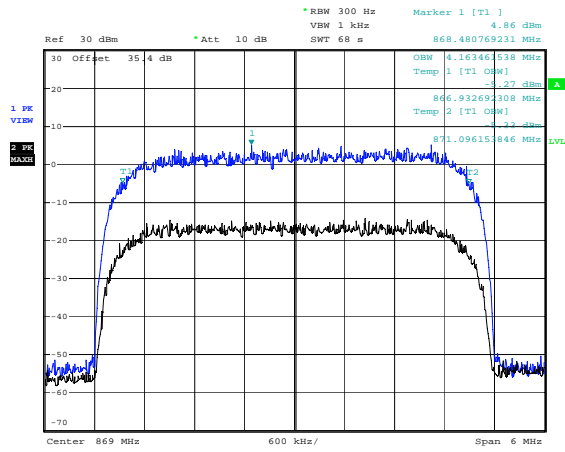


Date: 22.SEP.2009 14:22:03

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

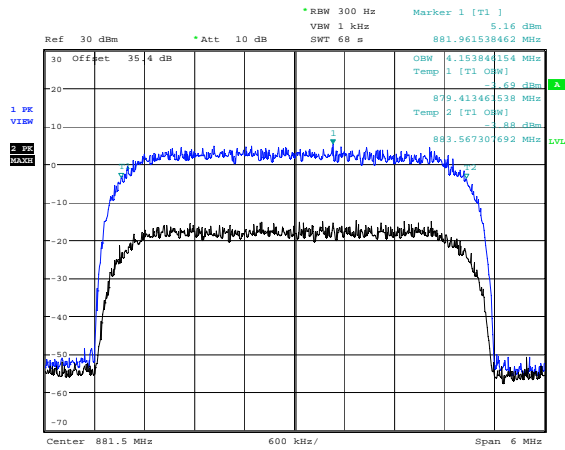


### 869.0 W-CDMA Modulation



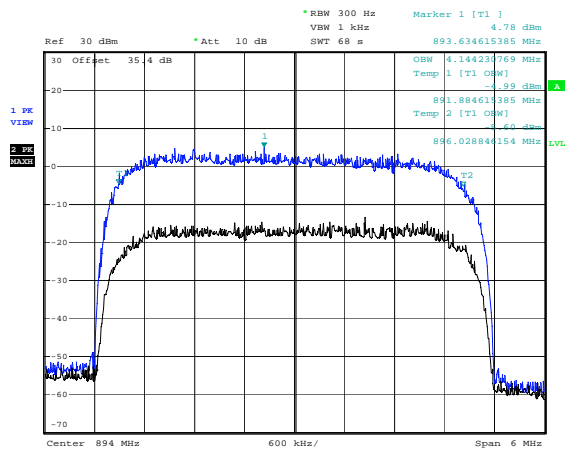
Date: 22.SEP.2009 14:38:21

### 881.5 W-CDMA Modulation



Date: 22.SEP.2009 14:50:11

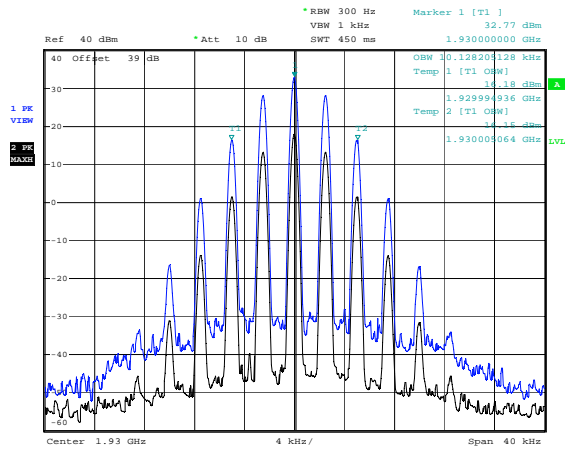
### 894.0 W-CDMA Modulation



Date: 22.SEP.2009 14:56:36

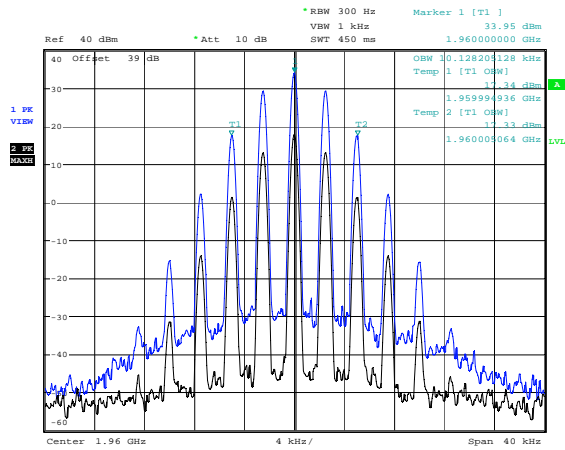
The above plots show no significant distortion visible when compared to the input signal.

1930.0 FM deviation set to 2.5kHz



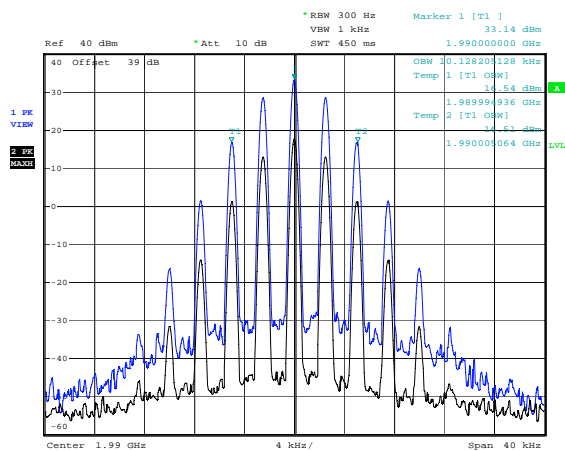
Date: 22.SEP.2009 16:02:48

1960.0 FM deviation set to 2.5kHz



Date: 22.SEP.2009 16:04:03

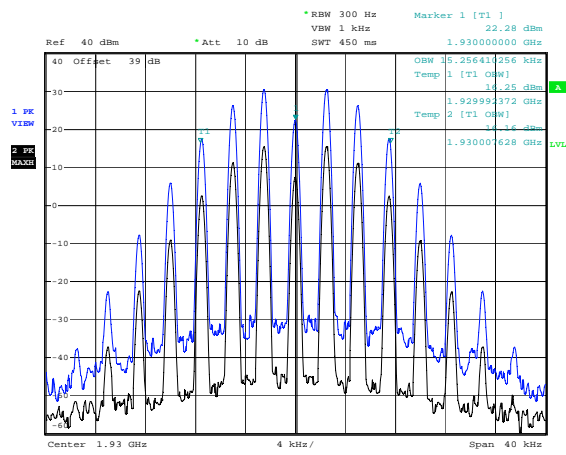
1990.0 FM deviation set to 2.5kHz



Date: 22.SEP.2009 16:04:39

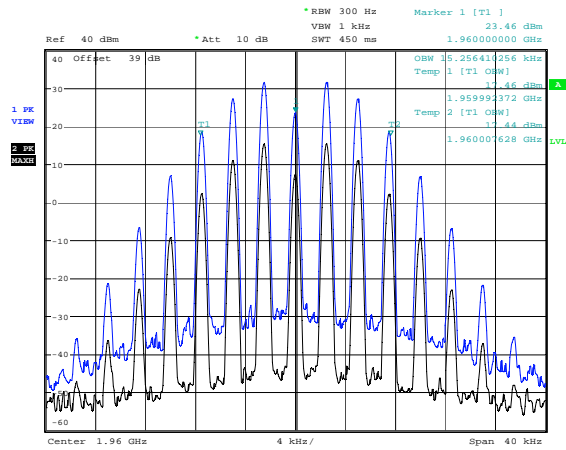
The above plots show no significant distortion visible when compared to the input signal.

1930.0 FM deviation set to 5kHz



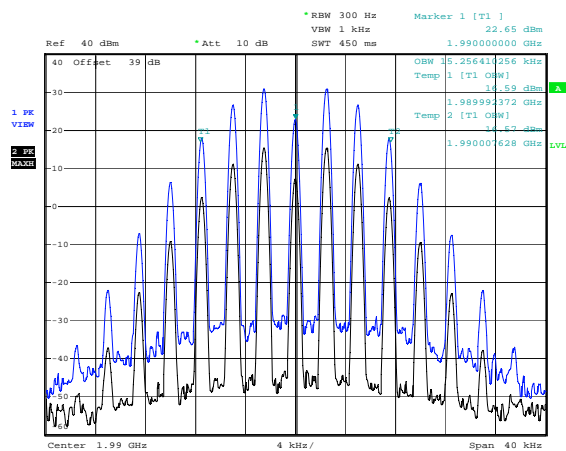
Date: 22.SEP.2009 16:03:10

1960.0 FM deviation set to 5kHz



Date: 22.SEP.2009 16:03:39

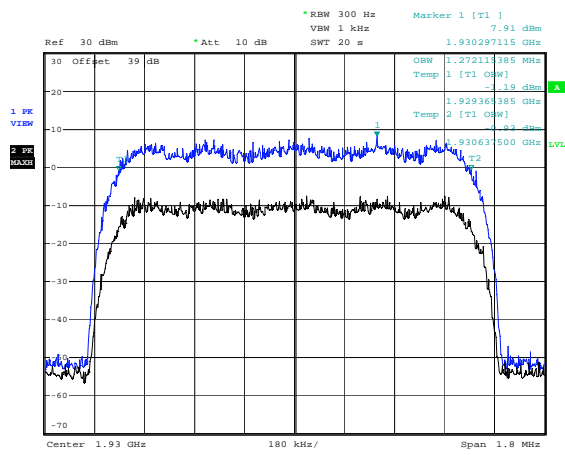
1990.0 FM deviation set to 5kHz



Date: 22.SEP.2009 16:05:06

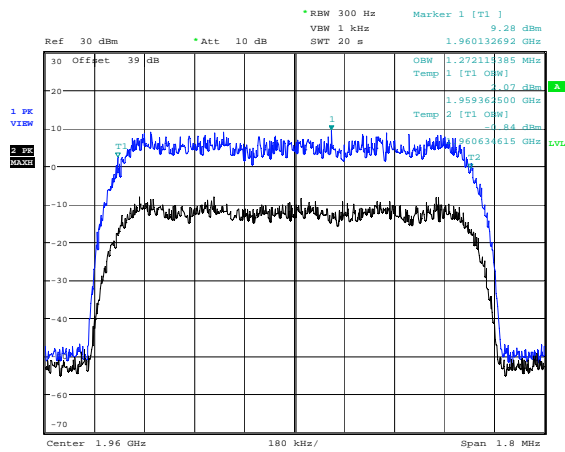
The above plots show no significant distortion visible when compared to the input signal.

### 1930.0 CDMA Modulation



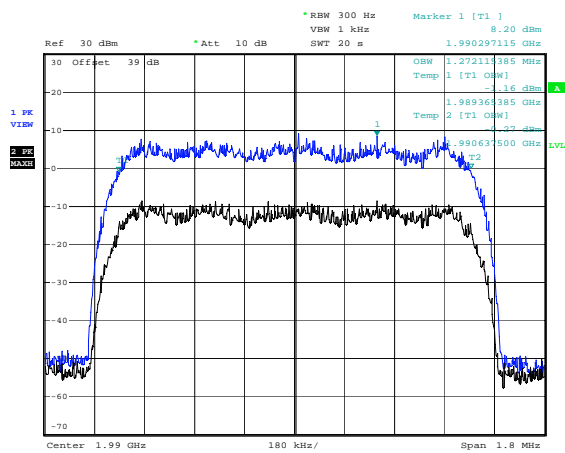
Date: 22.SEP.2009 15:40:45

### 1960.0 CDMA Modulation



Date: 22.SEP.2009 15:42:34

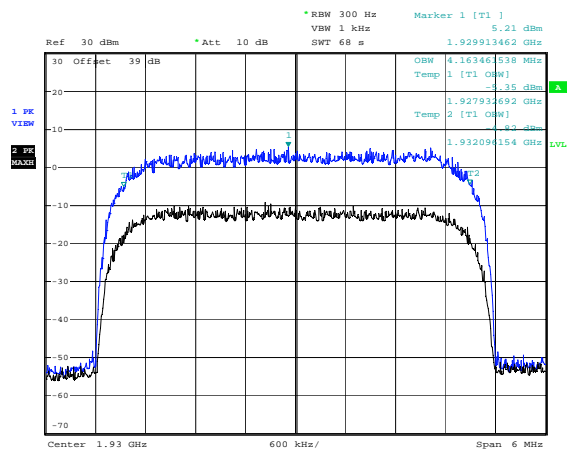
### 1990.0 CDMA Modulation



Date: 22.SEP.2009 15:44:32

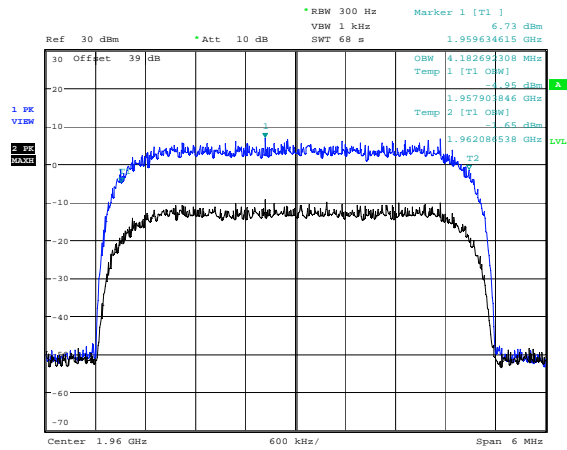
The above plots show no significant distortion visible when compared to the input signal.

### 1930.0 W-CDMA Modulation



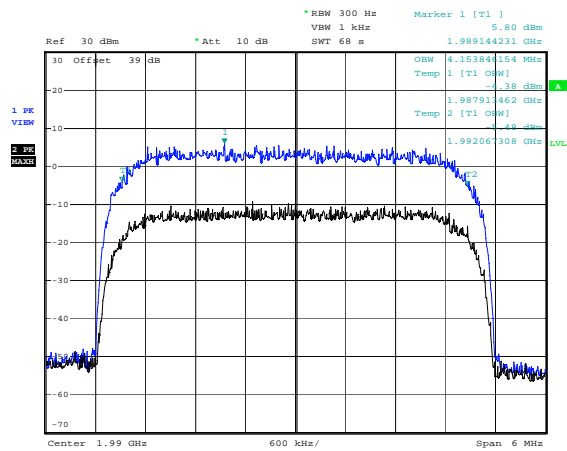
Date: 22.SEP.2009 16:02:12

### 1960.0 W-CDMA Modulation



Date: 22.SEP.2009 15:55:48

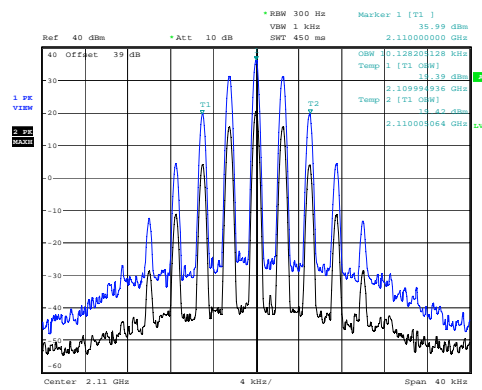
### 1990.0 W-CDMA Modulation



Date: 22.SEP.2009 15:50:14

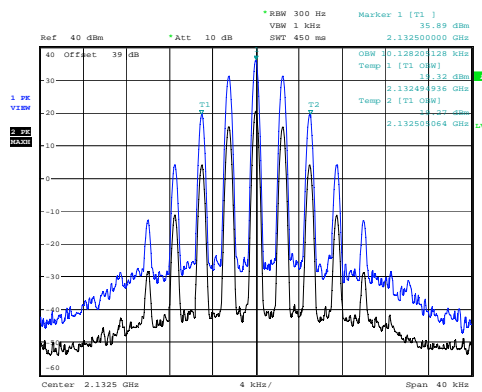
The above plots show no significant distortion visible when compared to the input signal.

2110.0 FM deviation set to 2.5kHz



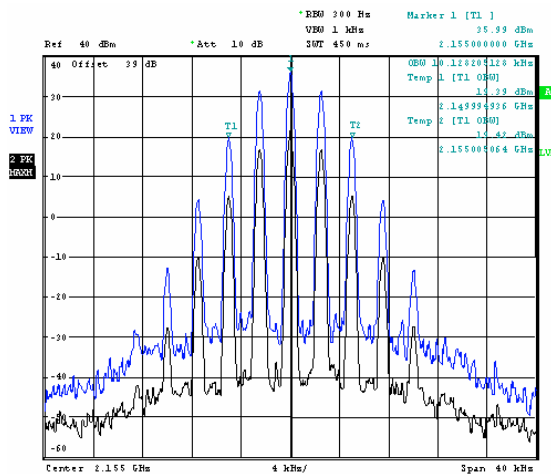
Date: 22.SEP.2009 16:09:55

2132.5 FM deviation set to 2.5kHz



Date: 22.SEP.2009 16:08:33

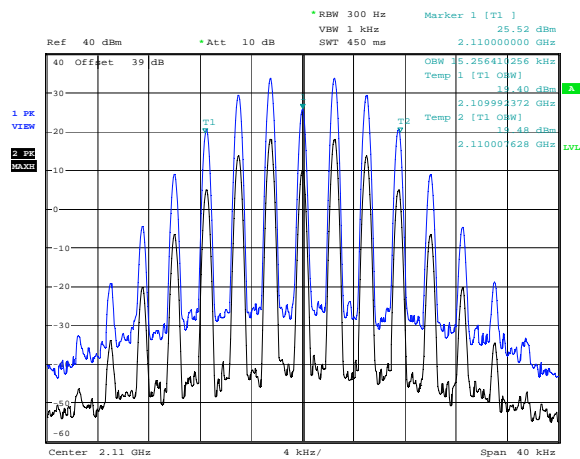
2155.0 FM deviation set to 2.5kHz



Date: 22.SEP.2009 16:09:55

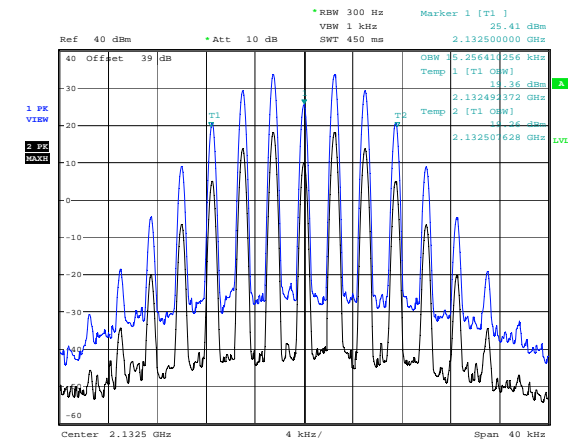
The above plots show no significant distortion visible when compared to the input signal.

2110.0 FM deviation set to 5kHz



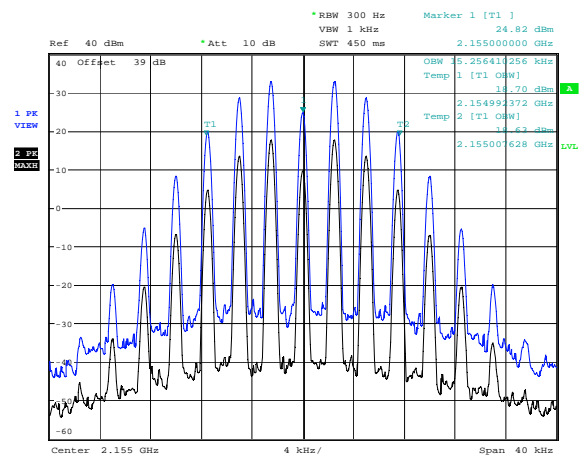
Date: 22.SEP.2009 16:09:29

2132.5 FM deviation set to 5kHz



Date: 22.SEP.2009 16:09:02

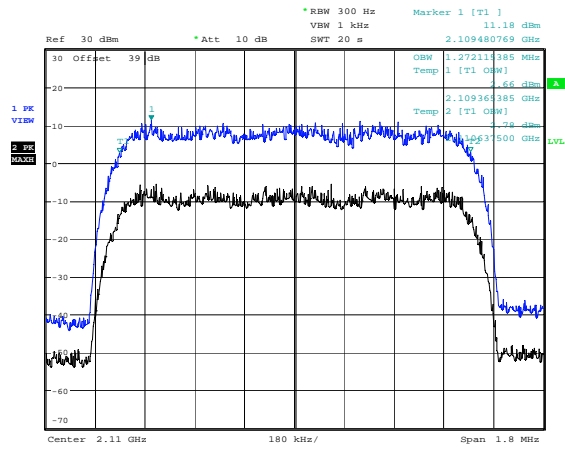
2155.0 FM deviation set to 5kHz



Date: 22.SEP.2009 16:06:59

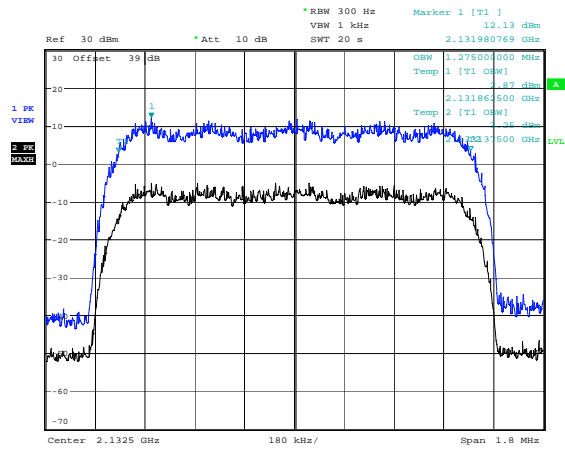
The above plots show no significant distortion visible when compared to the input signal.

### 2110.0 CDMA Modulation



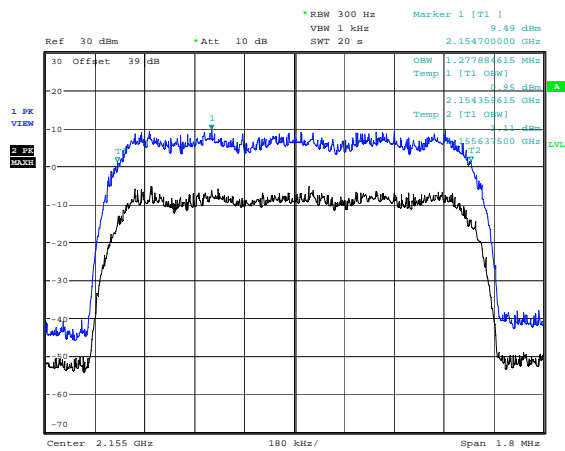
Date: 22.SEP.2009 16:38:20

### 2132.5 CDMA Modulation



Date: 22.SEP.2009 16:35:51

### 2155.0 CDMA Modulation

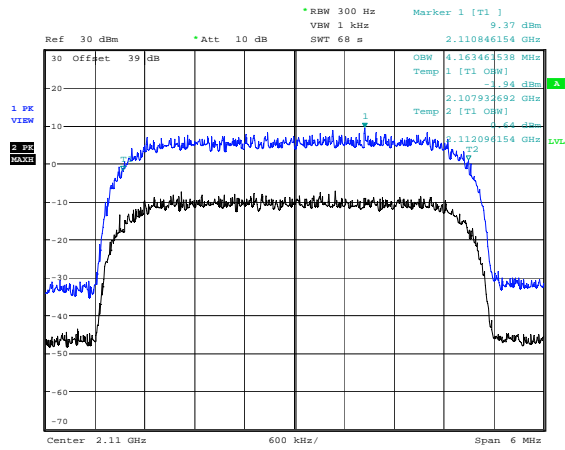


Date: 22.SEP.2009 16:32:28

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

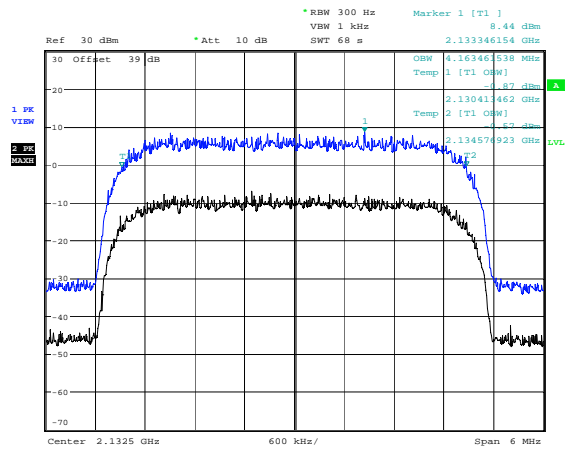


## 2110.0 W-CDMA Modulation



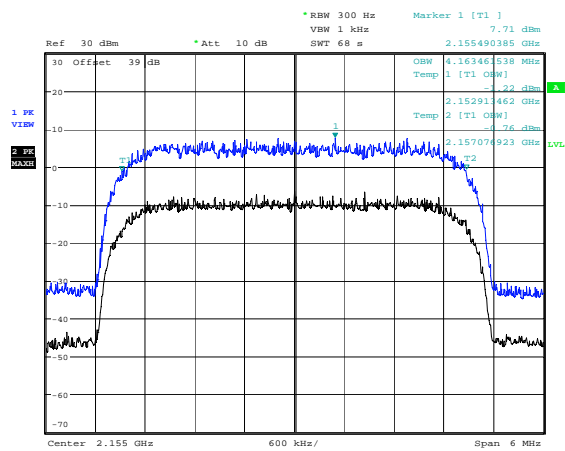
Date: 22.SEP.2009 16:15:15

## 2132.5 W-CDMA Modulation



Date: 22.SEP.2009 16:20:45

## 2155.0 W-CDMA Modulation



Date: 22.SEP.2009 16:28:39

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 = 20°C  
 Relative humidity = 68%  
 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

### 800MHz 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	869.0	1737.996	-70.44	37.7	-32.74	-13
	881.5	1762.988	-69.12	37.7	-31.42	
	894.0	1787.993	-65.65	37.7	-27.95	

### 1900MHz Band

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

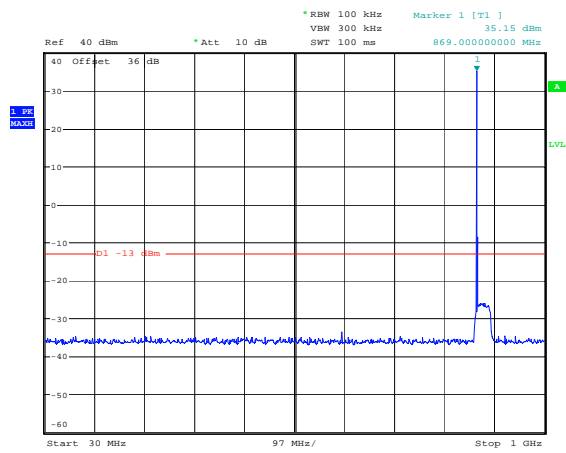
### 2100MHz Band

FREQUENCY RANGE	EUT FREQ (MHz)	EMISSION FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTEN & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
30 MHz - 22 GHz	No Significant Emissions Within 20 dB of the Limit					-13

The test equipment used for the Transmitter Conducted Emissions:

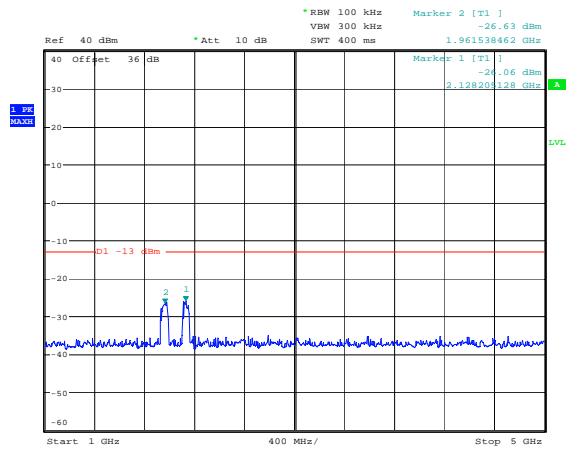
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	REF No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	<b>X</b>
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	<b>X</b>
CABLE	TRaC	N/A	N/A	UH273	<b>X</b>
CABLE	TRaC	N/A	N/A	UH274	<b>X</b>
ATTENUATOR	SPINNER	745357	57224	U225	<b>X</b>
ATTENUATOR	AXELL	20 dB 100W	N/A	N/A	<b>X</b>

### Conducted emissions 869.0 MHz 30MHz – 1GHz



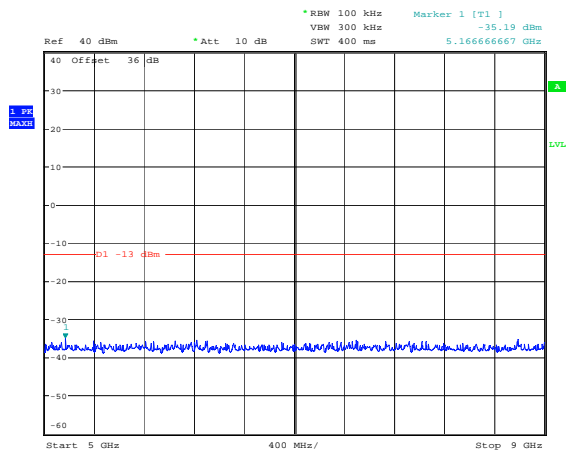
Date: 23.SEP.2009 09:36:02

### Conducted emissions 869.0 MHz 1 – 5GHz



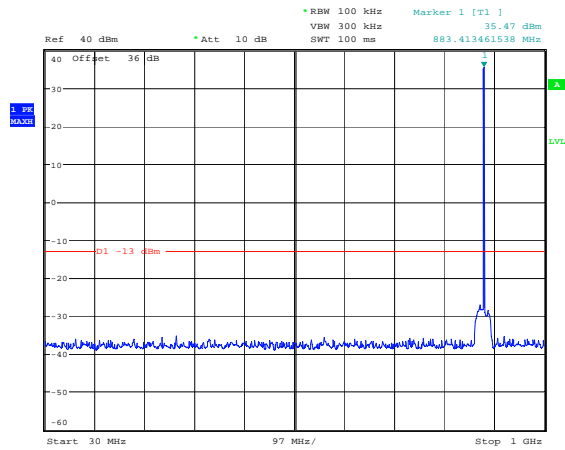
Date: 23.SEP.2009 09:36:32

### Conducted emissions 869.0 MHz 5 – 9GHz



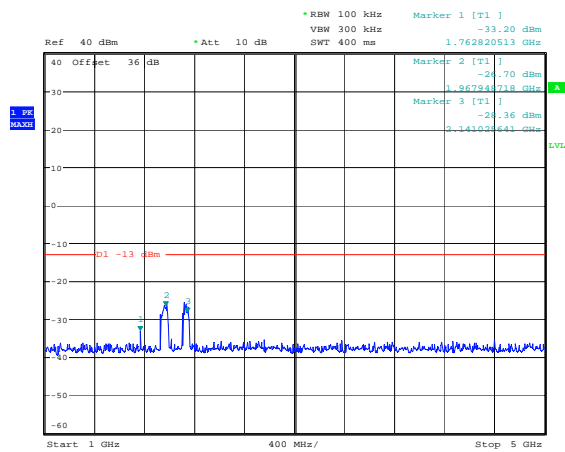
Date: 23.SEP.2009 09:36:44

### Conducted emissions 881.5 MHz 30MHz – 1GHz



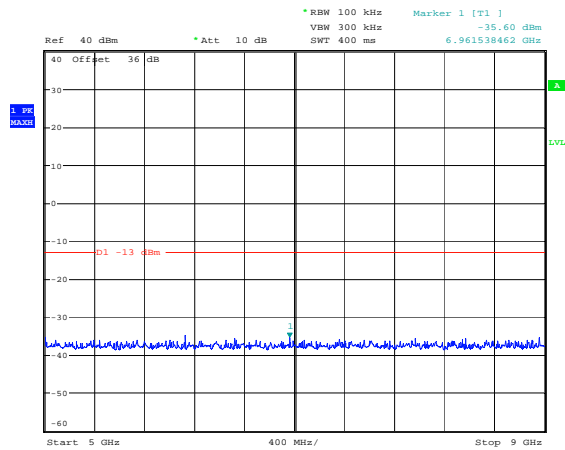
Date: 23.SEP.2009 09:38:17

### Conducted emissions 881.5 MHz 1 – 5GHz



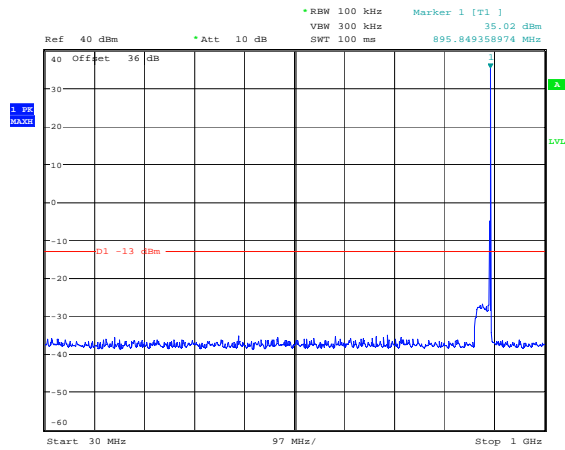
Date: 23.SEP.2009 09:37:57

### Conducted emissions 881.5 MHz 5 – 9GHz



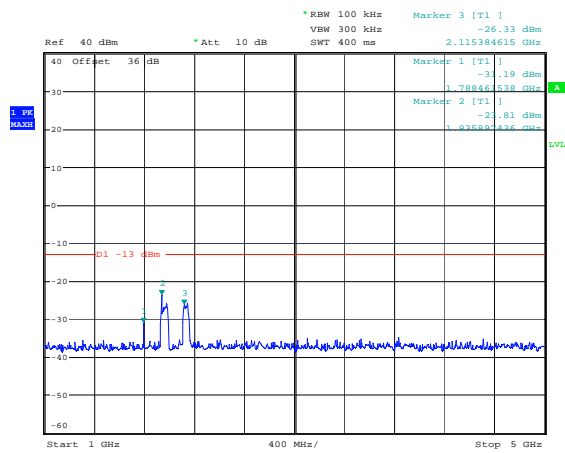
Date: 23.SEP.2009 09:37:06

### Conducted emissions 894.0 MHz 30MHz – 1GHz



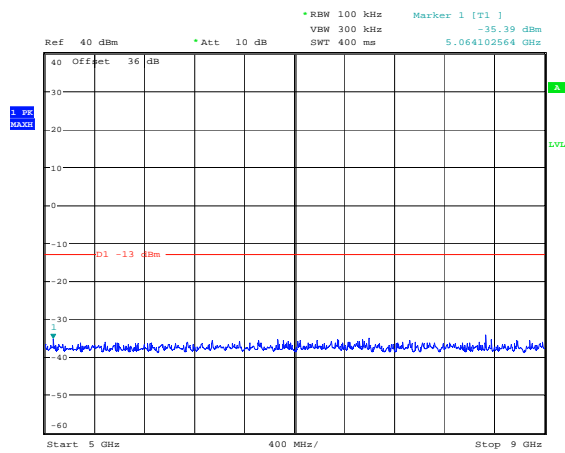
Date: 23.SEP.2009 09:38:46

### Conducted emissions 894.0 MHz 1 – 5GHz



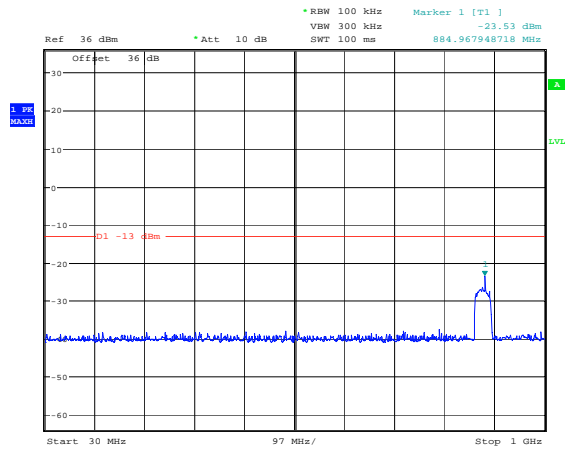
Date: 23.SEP.2009 09:39:04

### Conducted emissions 894.0 MHz 5 – 9GHz



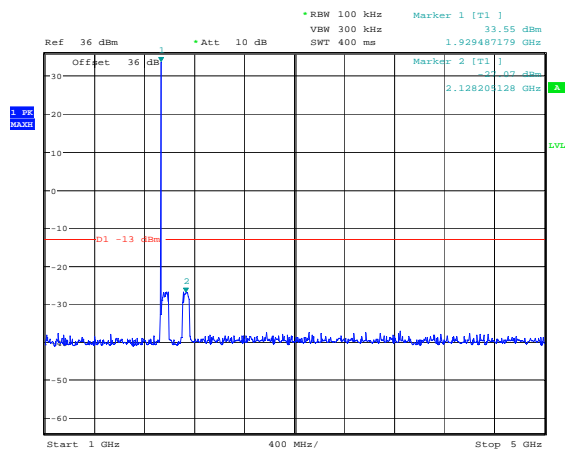
Date: 23.SEP.2009 09:39:16

### Conducted emissions 1930.0 MHz 30MHz – 1GHz



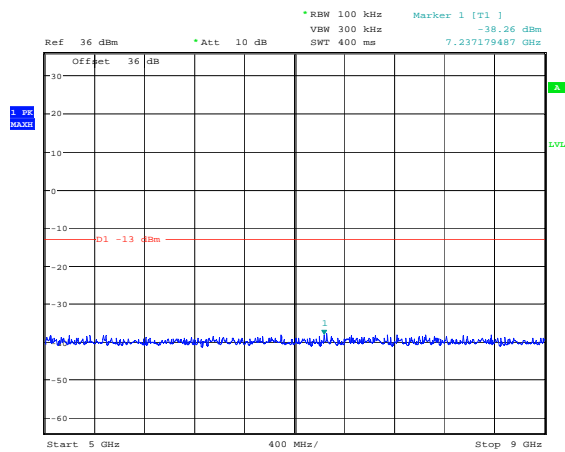
Date: 23.SEP.2009 09:50:53

### Conducted emissions 1930.0 MHz 1 – 5GHz



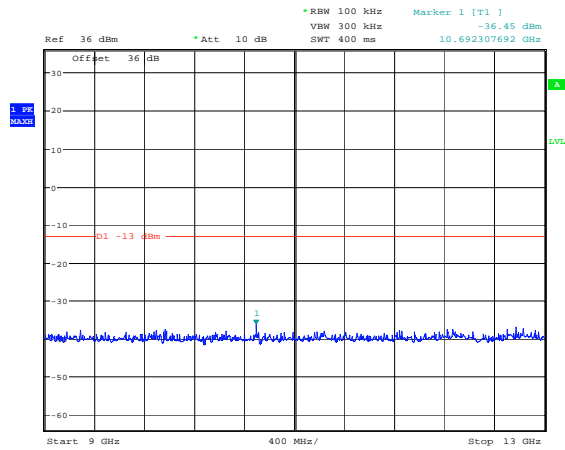
Date: 23.SEP.2009 09:51:18

### Conducted emissions 1930.0 MHz 5 – 9GHz



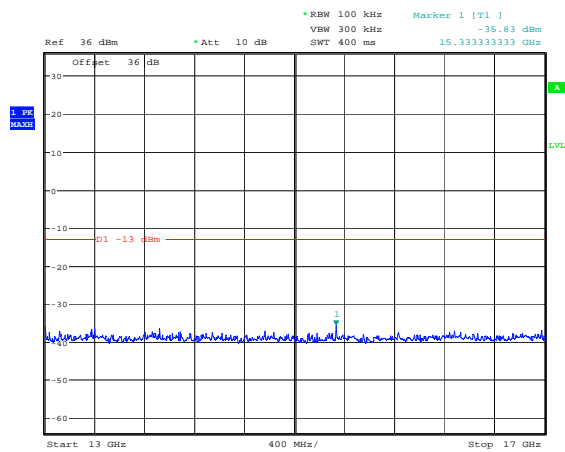
Date: 23.SEP.2009 09:51:33

### Conducted emissions 1930.0 MHz 9 – 13GHz



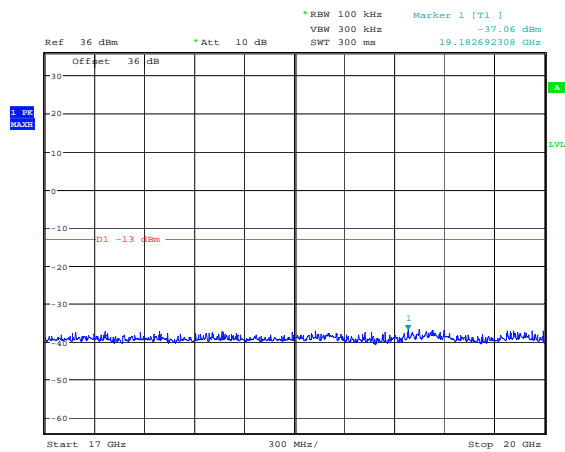
Date: 23.SEP.2009 09:51:53

### Conducted emissions 1930.0 MHz 13 – 17GHz



Date: 23.SEP.2009 09:52:40

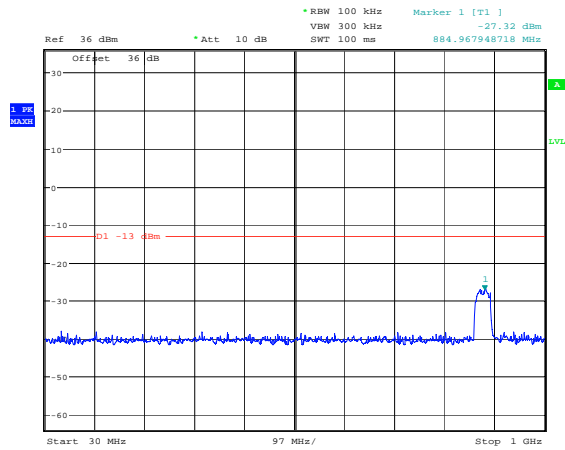
### Conducted emissions 1930.0 MHz 17 – 20GHz



Date: 23.SEP.2009 09:53:08

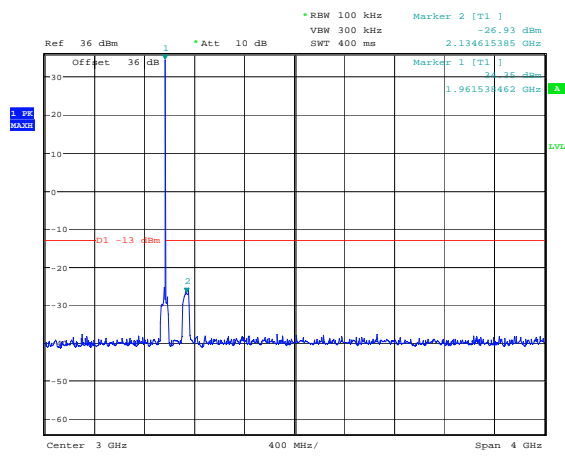


### Conducted emissions 1960.0 MHz 30MHz – 1GHz



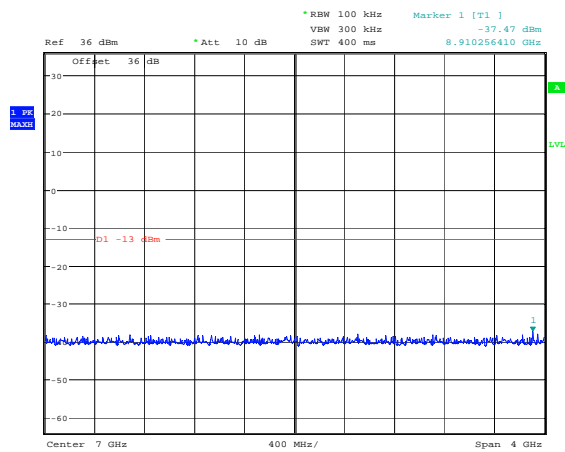
Date: 23.SEP.2009 09:53:59

### Conducted emissions 1960.0 MHz 1 – 5GHz



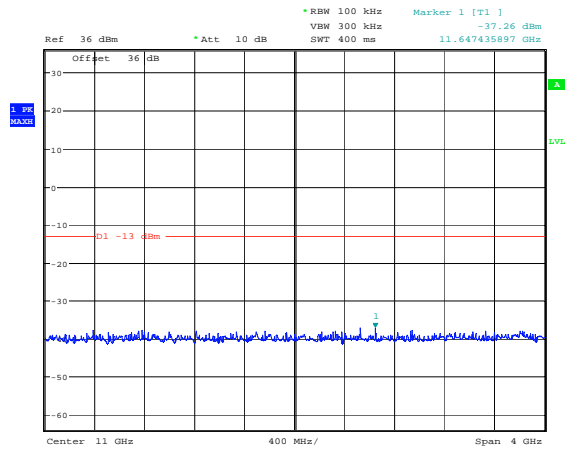
Date: 23.SEP.2009 09:54:17

### Conducted emissions 1960.0 MHz 5 – 9GHz



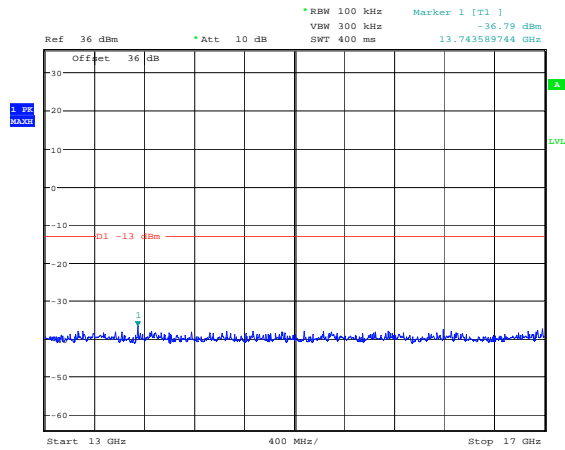
Date: 23.SEP.2009 09:54:30

### Conducted emissions 1960.0 MHz 9 – 13GHz



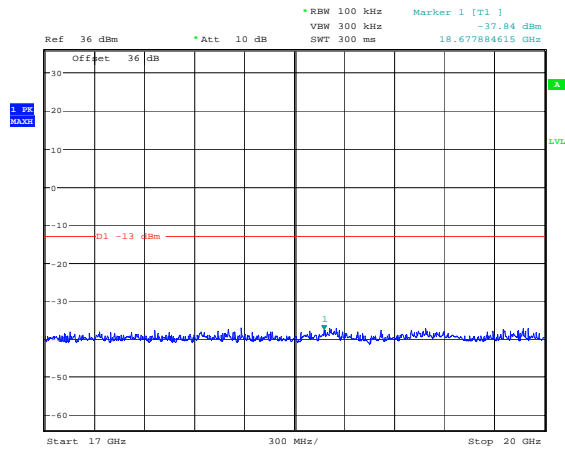
Date: 23.SEP.2009 09:54:43

### Conducted emissions 1960.0 MHz 13 – 17GHz



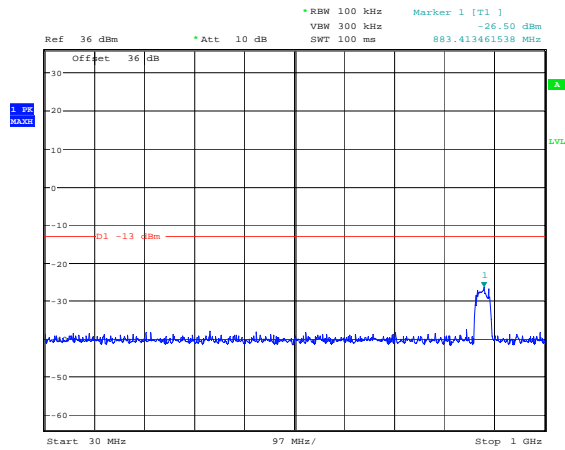
Date: 23.SEP.2009 09:54:57

### Conducted emissions 1960.0 MHz 17 – 20GHz



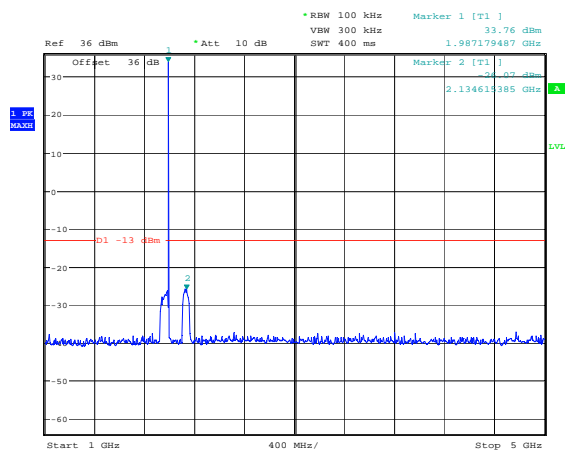
Date: 23.SEP.2009 09:55:10

### Conducted emissions 1990.0 MHz 30MHz – 1GHz



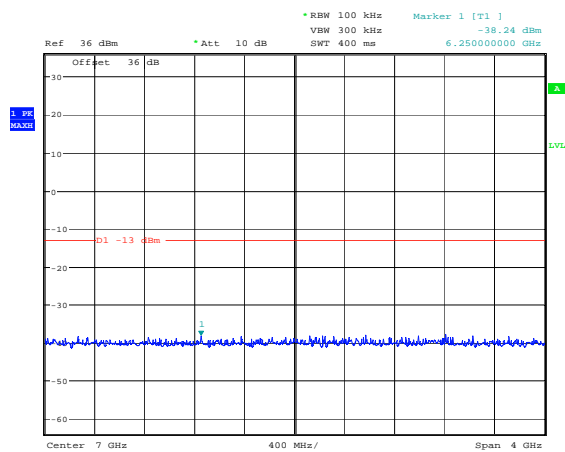
Date: 23.SEP.2009 09:56:43

### Conducted emissions 1990.0 MHz 1 – 5GHz



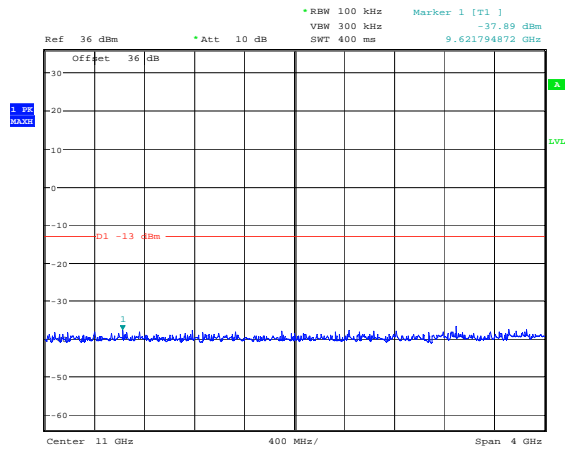
Date: 23.SEP.2009 09:57:08

### Conducted emissions 1990.0 MHz 5 – 9GHz



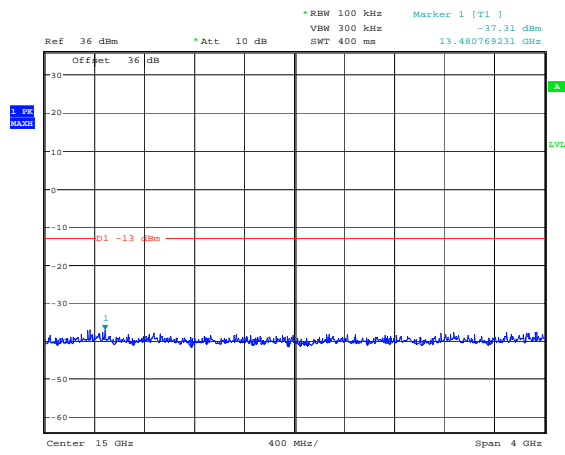
Date: 23.SEP.2009 09:57:24

### Conducted emissions 1990.0 MHz 9 – 13GHz



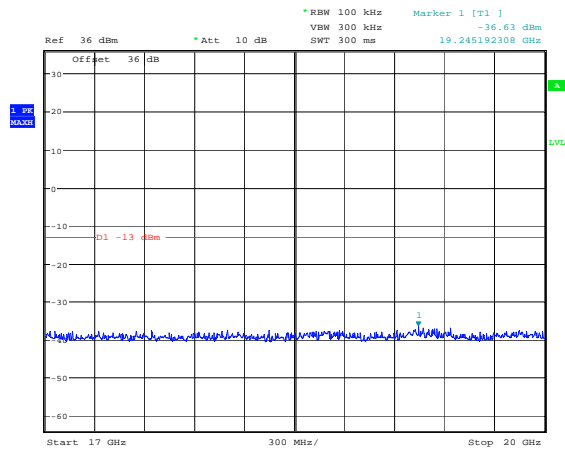
Date: 23.SEP.2009 09:57:38

### Conducted emissions 1990.0 MHz 13 – 17GHz



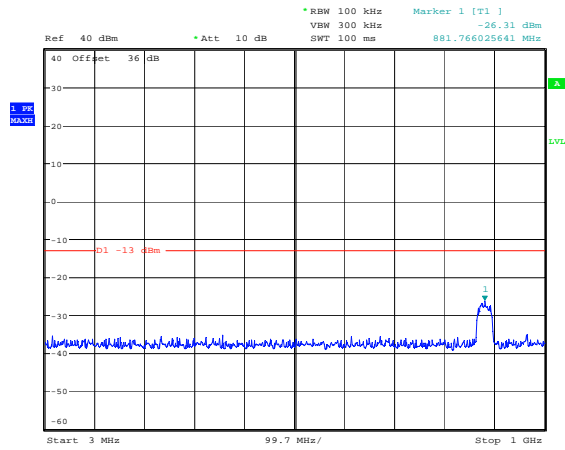
Date: 23.SEP.2009 09:57:49

### Conducted emissions 1990.0 MHz 17 – 20GHz



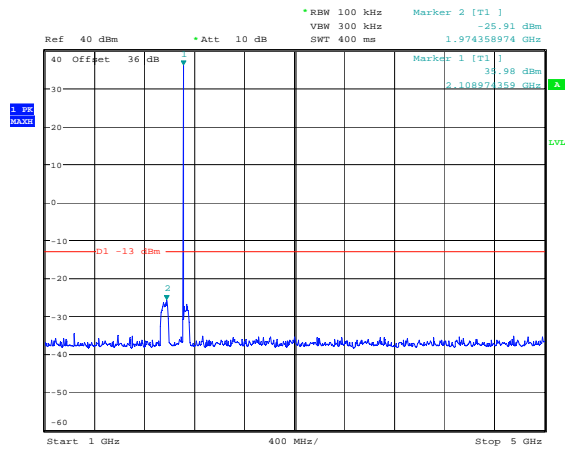
Date: 23.SEP.2009 09:58:10

### Conducted emissions 2110.0 MHz 30MHz – 1GHz



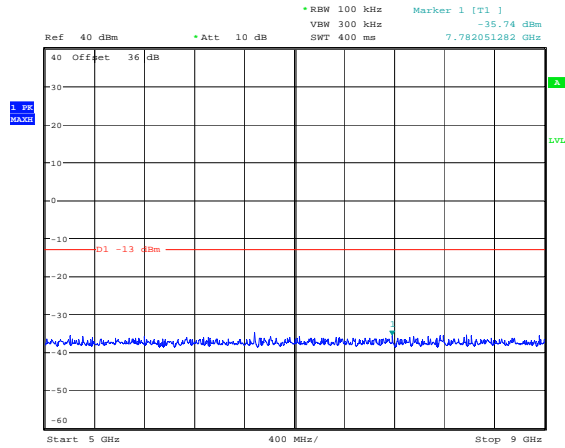
Date: 23.SEP.2009 10:04:24

### Conducted emissions 2110.0 MHz 1 – 5GHz



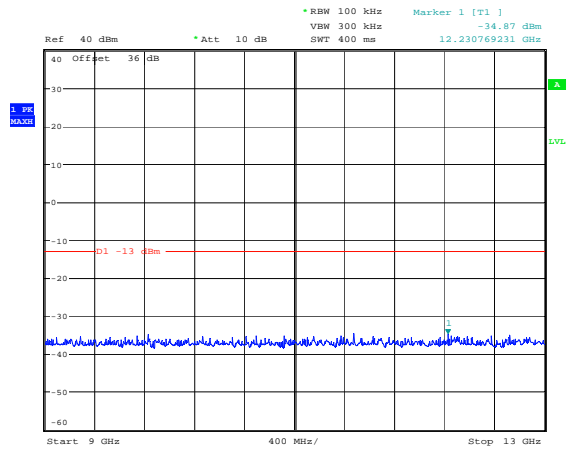
Date: 23.SEP.2009 10:04:42

### Conducted emissions 2110.0 MHz 5 – 9GHz



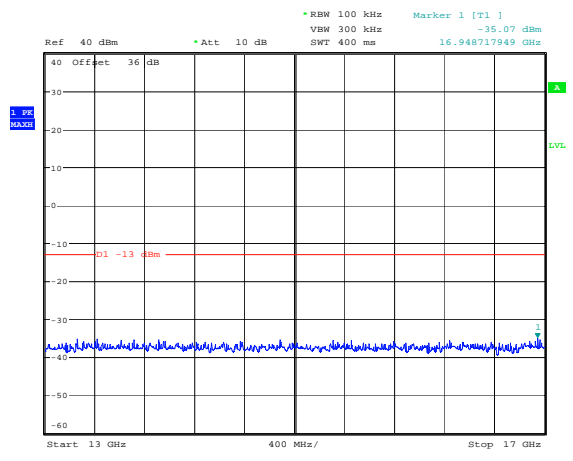
Date: 23.SEP.2009 10:04:57

### Conducted emissions 2110.0 MHz 9 – 13GHz



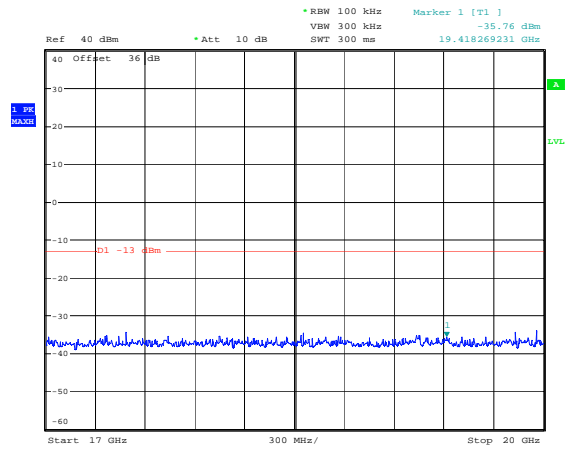
Date: 23.SEP.2009 10:05:17

### Conducted emissions 2110.0 MHz 13 – 17GHz



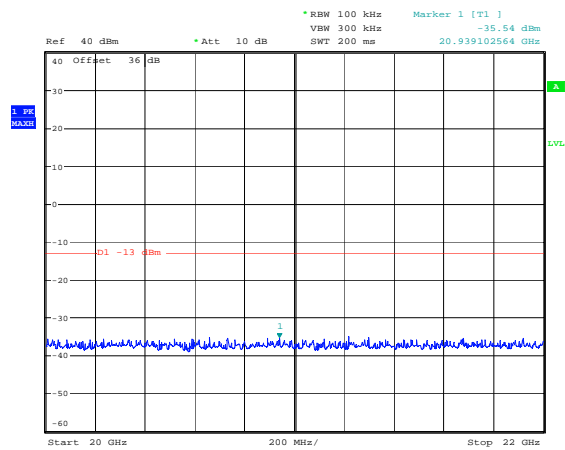
Date: 23.SEP.2009 10:05:31

### Conducted emissions 2110.0 MHz 17 – 20GHz



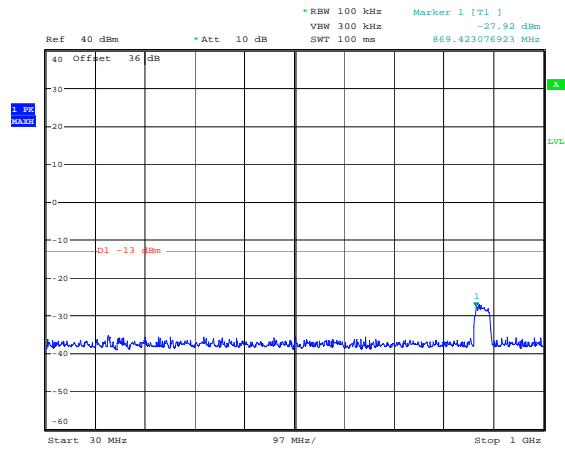
Date: 23.SEP.2009 10:05:51

### Conducted emissions 2110.0 MHz 20 – 22GHz



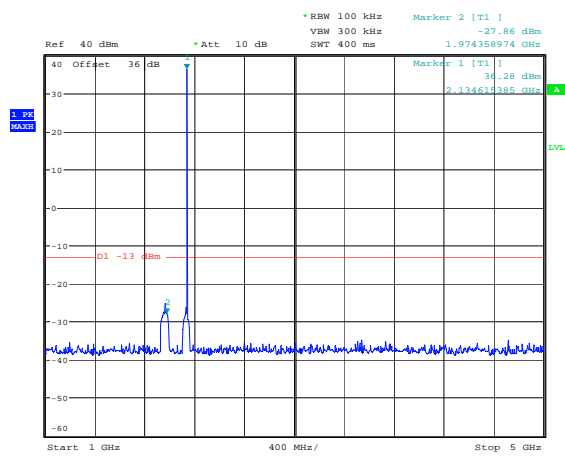
Date: 23.SEP.2009 10:06:07

### Conducted emissions 2132.5 MHz 30MHz – 1GHz



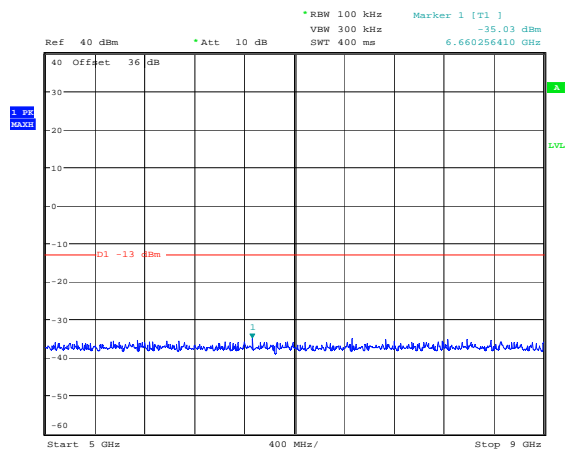
Date: 23.SEP.2009 10:02:18

### Conducted emissions 2132.5 MHz 1 – 5GHz



Date: 23.SEP.2009 10:02:31

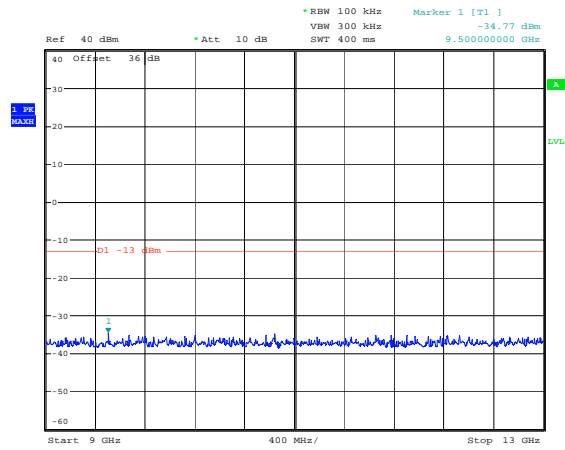
### Conducted emissions 2132.5 MHz 5 – 9GHz



Date: 23.SEP.2009 10:02:47

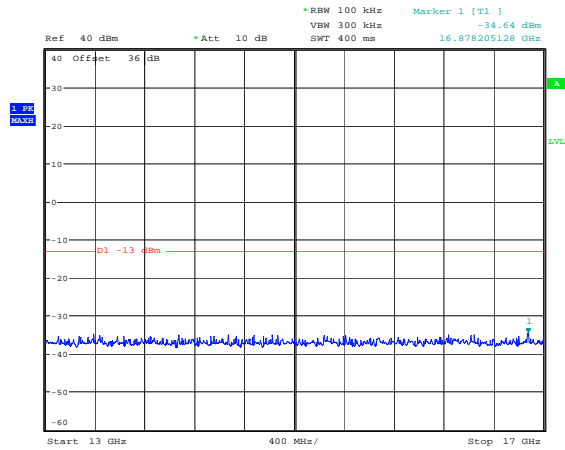


### Conducted emissions 2132.5 MHz 9 – 13GHz



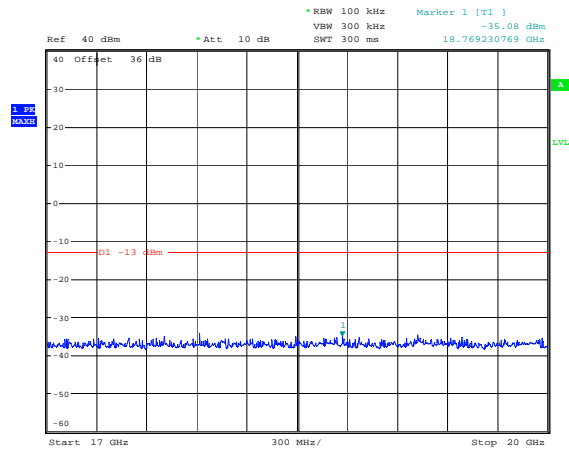
Date: 23.SEP.2009 10:03:06

### Conducted emissions 2132.5 MHz 13 – 17GHz



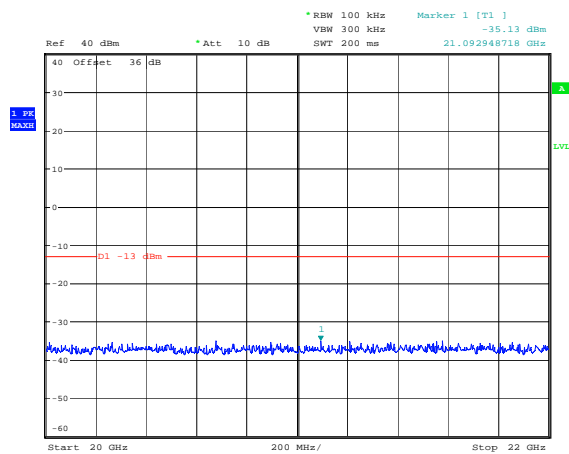
Date: 23.SEP.2009 10:03:26

### Conducted emissions 2132.5 MHz 17 – 20GHz



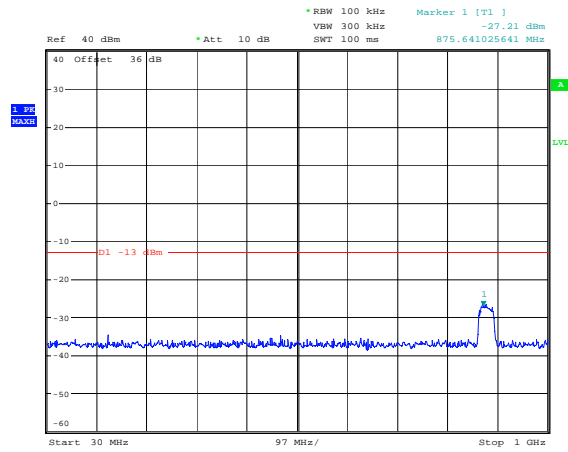
Date: 23.SEP.2009 10:03:53

### Conducted emissions 2132.5 MHz 20 – 22GHz



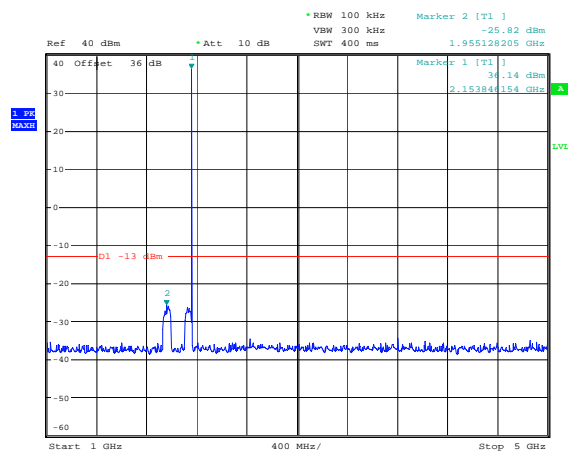
Date: 23.SEP.2009 10:04:08

### Conducted emissions 2155.0 MHz 30MHz – 1GHz



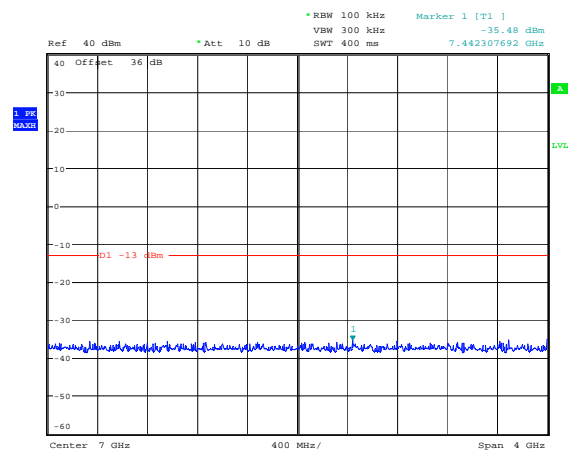
Date: 23.SEP.2009 09:59:28

### Conducted emissions 2155.0 MHz 1 – 5GHz



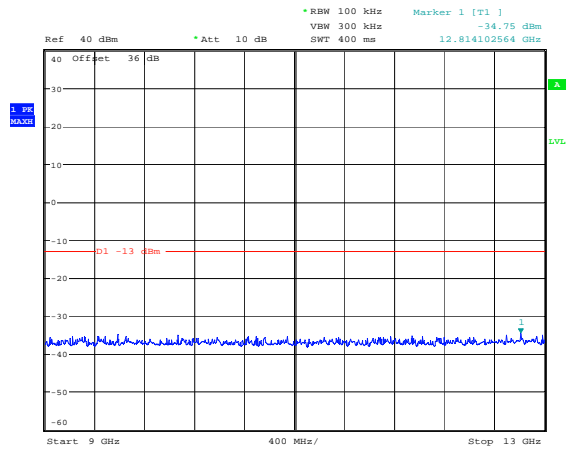
Date: 23.SEP.2009 09:59:48

### Conducted emissions 2155.0 MHz 5 – 9GHz



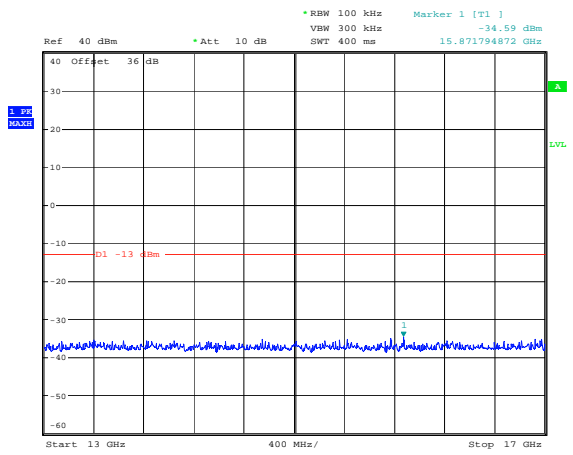
Date: 23.SEP.2009 10:00:04

### Conducted emissions 2155.0 MHz 9 – 13GHz



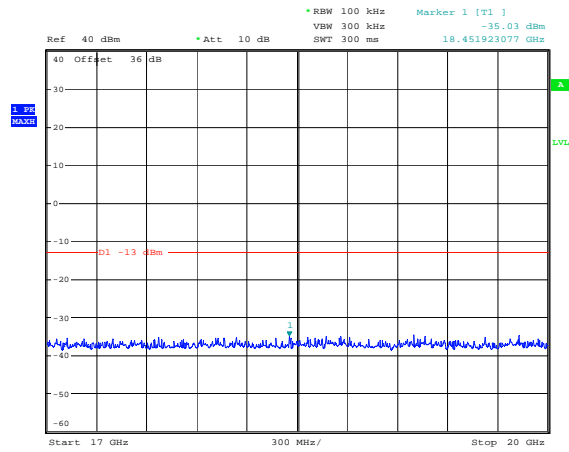
Date: 23.SEP.2009 10:00:31

### Conducted emissions 2155.0 MHz 13 – 17GHz



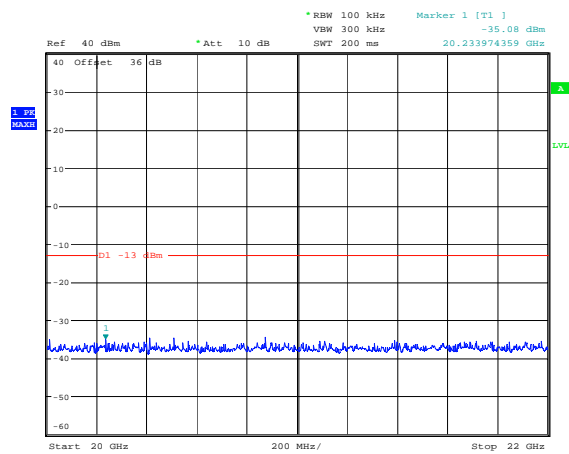
Date: 23.SEP.2009 10:00:42

### Conducted emissions 2155.0 MHz 17 – 20GHz



Date: 23.SEP.2009 10:00:54

### Conducted emissions 2155.0 MHz 20 – 22GHz

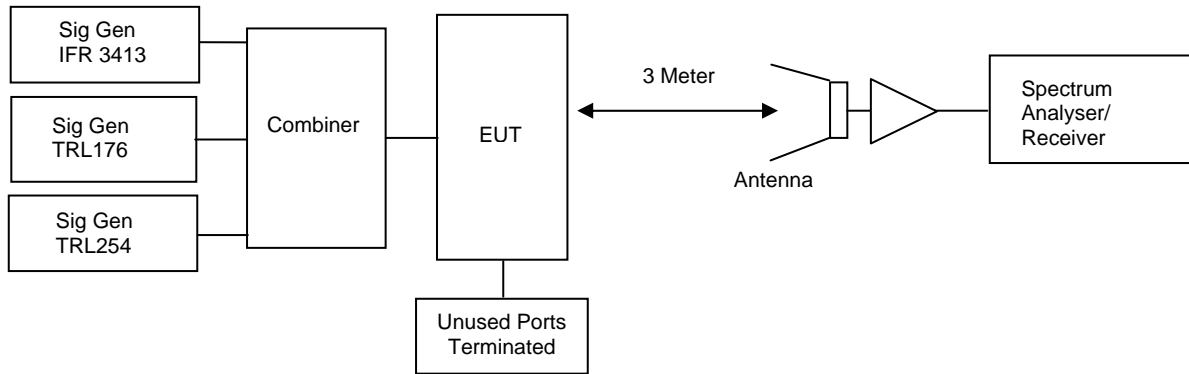


Date: 23.SEP.2009 10:01:07

## 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 & combiner. The unit was tested at maximum power. The signal generators were set to produce the lowest, middle or highest frequency within each band and a 50 ohm load on the output. The unit was also tested with the signal generators 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  $43 + 10 \log P_{dB}$

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

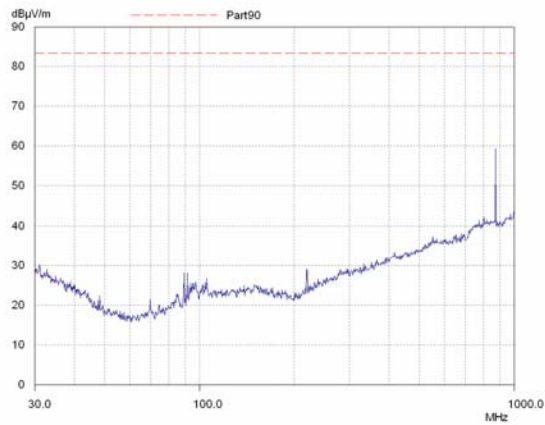
## RESULTS

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

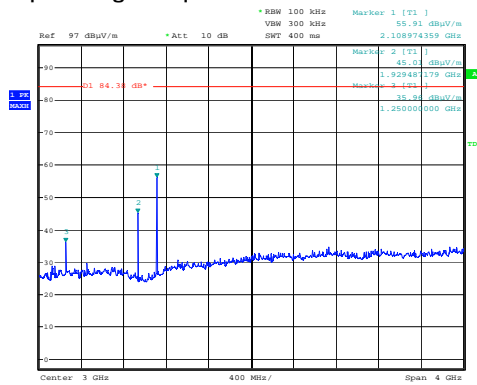
The test equipment used for the Transmitter Spurious Emissions:

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
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	X
SIGNAL GENERATOR	IFR	3413	341001/261	N/A	X
ANTENNA	YORK	CBL611/A	1618	UH191	X
PRE AMPLIFIER	WATRKINS JOHNSON	6201-69	2740	UH372	X
RECEIVER	RHODE & SCHWARZ	ESVS10	825890/006	UH04	X

### Radiated emissions Lowest Operating Frequencies 30MHz – 1GHz

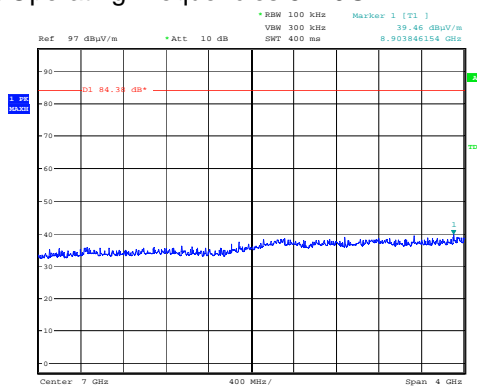


### Radiated emissions Lowest Operating Frequencies 1 – 5GHz



Date: 24.SEP.2009 11:36:32

### Radiated emissions Lowest Operating Frequencies 5 – 9GHz

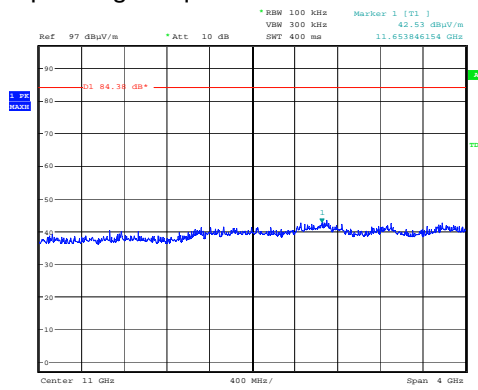


Date: 24.SEP.2009 11:36:17

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

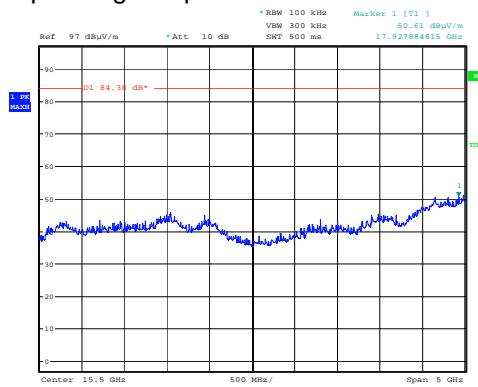


### Radiated emissions Lowest Operating Frequencies 9 – 13GHz



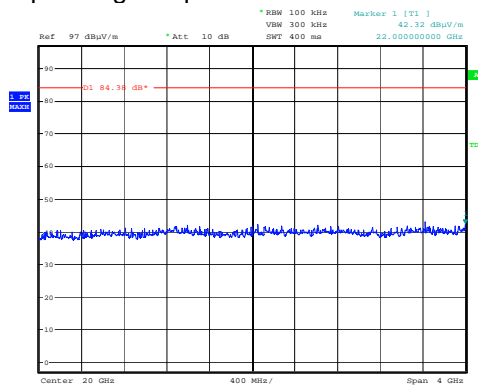
Date: 24.SEP.2009 11:36:02

### Radiated emissions Lowest Operating Frequencies 13 – 18GHz



Date: 24.SEP.2009 11:35:46

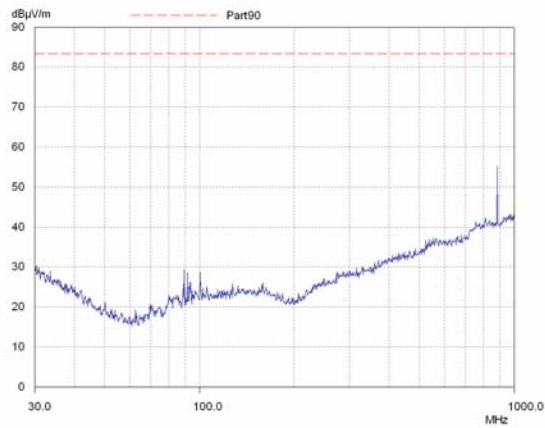
### Radiated emissions Lowest Operating Frequencies 18 – 22GHz



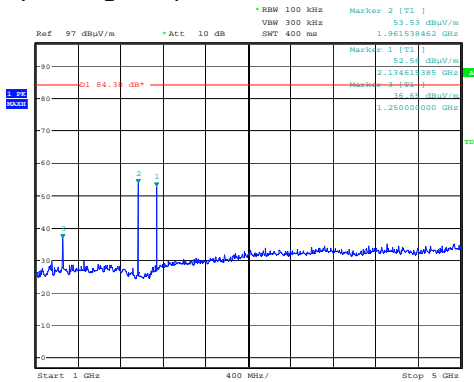
Date: 24.SEP.2009 11:42:42

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

### Radiated emissions Middle Operating Frequencies 30MHz – 1GHz

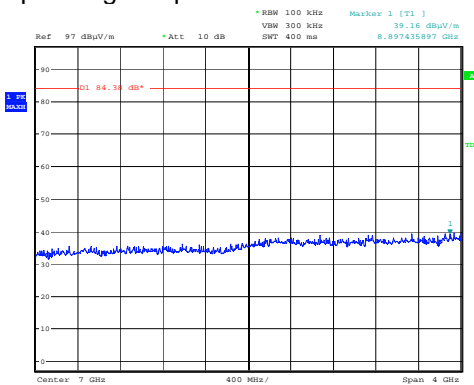


### Radiated emissions Middle Operating Frequencies 1 – 5GHz



Date: 24.SEP.2009 11:30:51

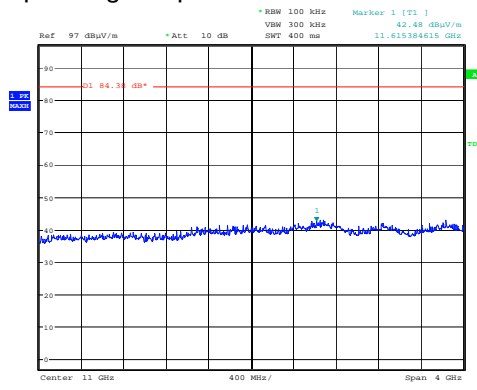
### Radiated emissions Middle Operating Frequencies 5 – 9GHz



Date: 24.SEP.2009 11:31:08

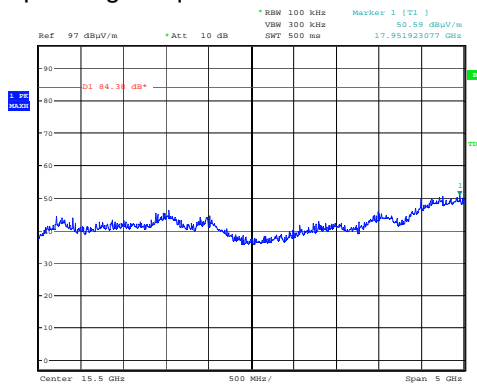
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

### Radiated emissions Middle Operating Frequencies 9 – 13GHz



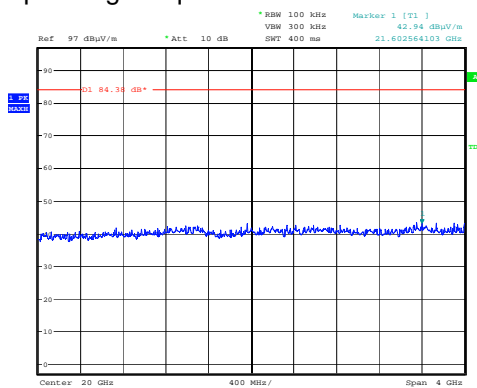
Date: 24.SEP.2009 11:32:16

### Radiated emissions Middle Operating Frequencies 13 – 18GHz



Date: 24.SEP.2009 11:32:27

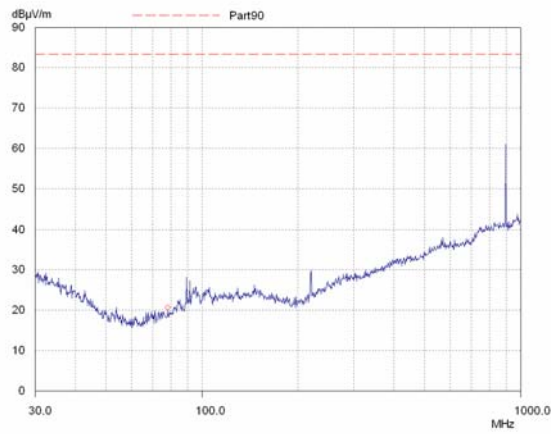
### Radiated emissions Middle Operating Frequencies 18 – 22GHz



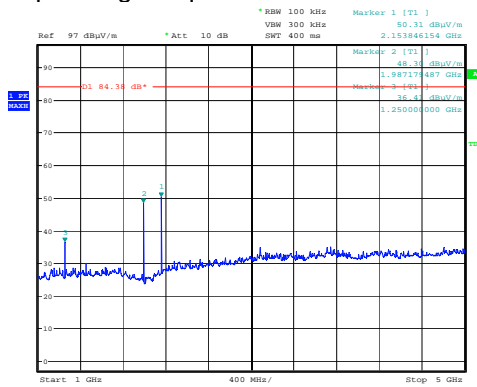
Date: 24.SEP.2009 11:44:31

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

### Radiated emissions Highest Operating Frequencies 30MHz – 1GHz

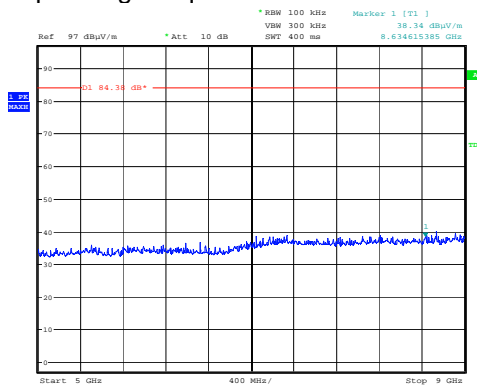


### Radiated emissions Highest Operating Frequencies 1 – 5GHz



Date: 24.SEP.2009 11:29:55

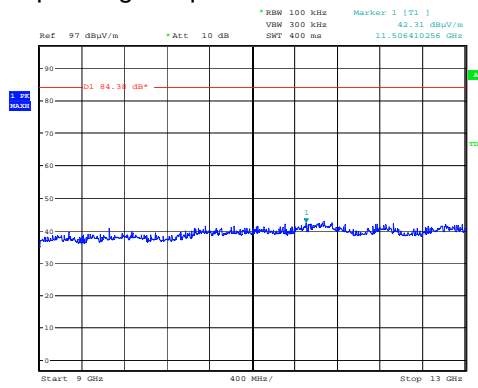
### Radiated emissions Highest Operating Frequencies 5 – 9GHz



Date: 24.SEP.2009 11:29:30

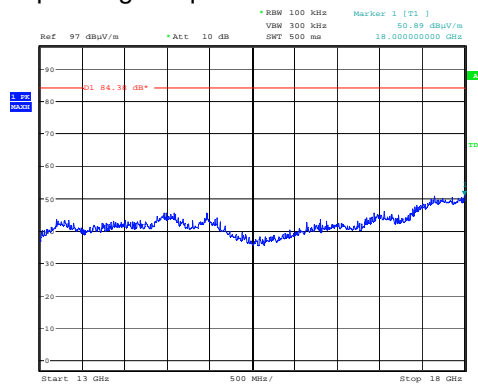
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

### Radiated emissions Highest Operating Frequencies 9 – 13GHz



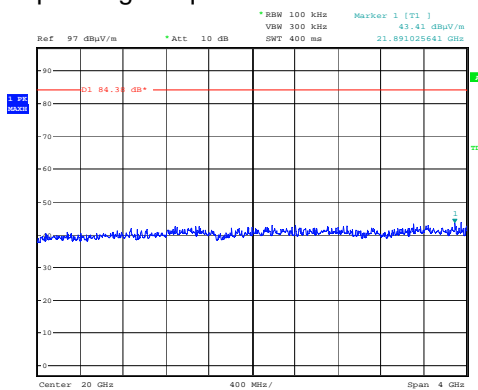
Date: 24.SEP.2009 11:29:15

### Radiated emissions Highest Operating Frequencies 13 – 18GHz



Date: 24.SEP.2009 11:29:02

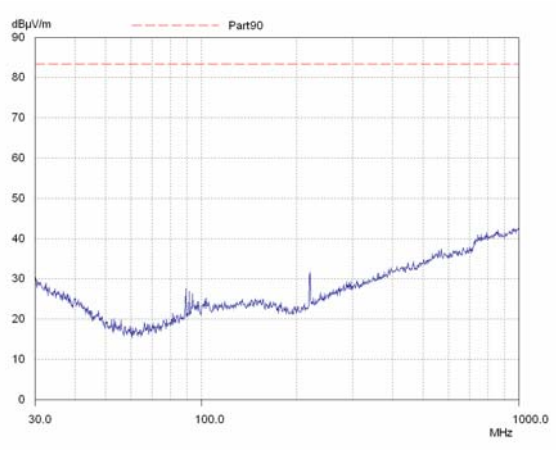
### Radiated emissions Highest Operating Frequencies 18 – 22GHz



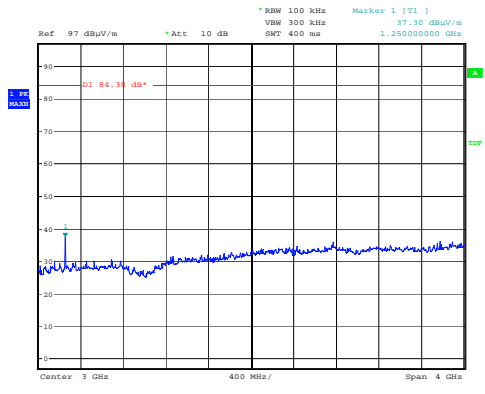
Date: 24.SEP.2009 11:45:05

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

### Radiated emissions No Input 30MHz – 1GHz

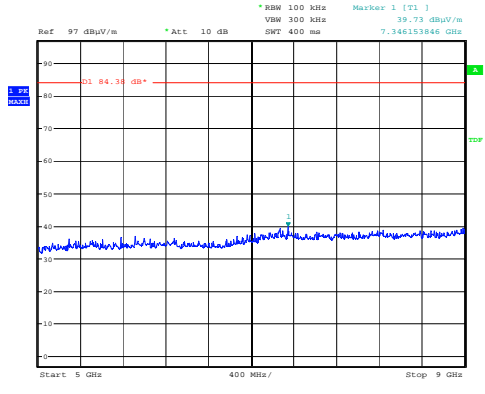


### Radiated emissions No Input 1 – 5GHz



Date: 24.SEP.2009 11:11:12

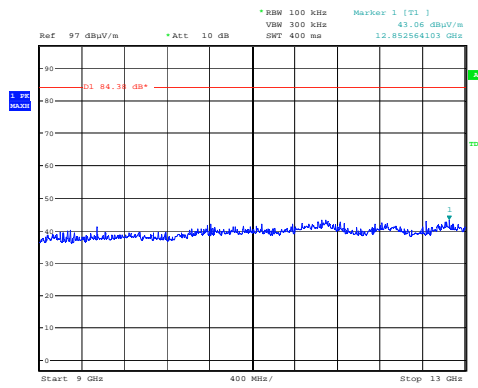
### Radiated emissions No Input 5 – 9GHz



Date: 24.SEP.2009 11:11:29

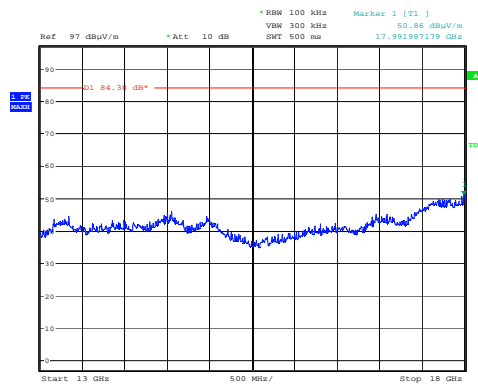
The above test results show that there were no emissions within 20dBs of the -13dBm limit.

### Radiated emissions No Input 9 – 13GHz



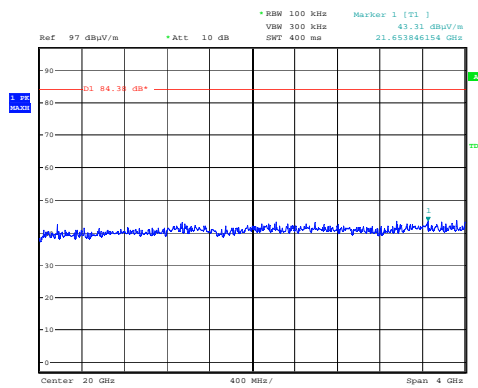
Date: 24.SEP.2009 11:11:45

### Radiated emissions No Input 13 – 18GHz



Date: 24.SEP.2009 11:12:03

### Radiated emissions No Input 18 – 22GHz



Date: 24.SEP.2009 11:46:33

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
UH04	Receiver	R&S	19/11/2008	12	19/11/2009
UH06/07	IC OATS Submission	TRL	02/07/2009	24	02/07/2011
UH06/07	NSA Calibration	TRL	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
UH075	Signal Generator	Marconi	20/01/2009	12	20/01/2010
UH162	ERP Cable Cal	TRL	01/03/2009	12	01/03/2010
UH167	Amplifier	AR		Calibrate In Use	
UH191	Bilog	York	01/10/2008	24	01/10/2010
UH225	Attenuator	Spinner		Calibrate In Use	
UH253	1m Cable N type	TRL	15/07/2009	12	15/07/2010
UH254	1m Cable N type	TRL	15/07/2009	12	15/07/2010
UH269	1m Cable N type	TRL	15/07/2009	12	15/07/2010
UH270	1m Cable N type	TRL	15/07/2009	12	15/07/2010
UH271	1.5m Cable N type	TRL	15/07/2009	12	15/07/2010
UH272	1.5m Cable N type	TRL	15/07/2009	12	15/07/2010
UH273	2m Cable N type	TRL	15/07/2009	12	15/07/2010
UH274	2m Cable N type	TRL	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
L005	CMTA	R&S	29/10/2008	12	29/10/2009
L138	1-18GHz Horn	EMCO	10/09/2009	24	10/09/2011
L139	1-18GHz Horn	EMCO	17/08/2009	24	17/08/2011
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
L254	Signal Generator	Marconi	25/02/2009	12	25/02/2010
L479	Analyser	Anritsu	02/10/2009	12	02/10/2010
L572	Pre Amp	Agilent	15/07/2009	12	15/07/2010
REF844	Signal Generator	Agilent	05/03/2008	24	05/03/2010
N/A	Signal Generator	IFR 3413	07/11/2008	24	07/11/2010
N/A	Attenuator	Axell		Calibrate In Use	
N/A	Combiners	Axell		Calibrate In Use	
N/A	Circulators	Axell		Calibrate In Use	

**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%**