



## APPROVALS

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Vito Scaringi

Manager, Network & Regional Compliance Group

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### **MANDATORY REVIEWERS**

The following people or an authorized delegate must review this document:

- 1) Manager: Network and Regional Compliance.

### **INTERESTED PARTIES**

The following people must be notified of the final review of this document but are not required to attend the review;

- 1) Director of Product Integrity
- 2) All Approvals Groups' staff

## **ABSTRACT**

This document provides the test procedure and test report used to fulfill the requirements of the Network Approvals Group personnel and the product designers to **38GHZ CROSS-POL BASE STATION** during Network Approvals testing.

The test data contained in this report is evidence of compliance to specified Network standards for the units described herein.

## GLOSSARY

|              |                                                                                                                     |
|--------------|---------------------------------------------------------------------------------------------------------------------|
| <b>AMD</b>   | ATM Modulator Demodulator, ATM modem cards in 7390 base station.                                                    |
| <b>ANSA</b>  | Alcatel Networks SA (Alcatel France)                                                                                |
| <b>ANSI</b>  | American National Standards Institute                                                                               |
| <b>ANT</b>   | ATM Network Termination, OC3/STM-1 interface card in 7390 base station                                              |
| <b>BS</b>    | Base Station. The Centre office unit, it is the combination of DBS and RBS.                                         |
| <b>CTR</b>   | Common Technical Regulation                                                                                         |
| <b>DBS</b>   | Digital Base Station. The indoor unit of 7390 base station, it is a combination of chassis, TNT, ANT, AMD, IBS etc. |
| <b>ETS</b>   | European Telecommunications Standard                                                                                |
| <b>ETSI</b>  | European Telecommunications Standard Institute                                                                      |
| <b>FCC</b>   | Federal Communications Commission                                                                                   |
| <b>EN</b>    | European Standard                                                                                                   |
| <b>EUT</b>   | <i>Equipment Under Test</i>                                                                                         |
| <b>IBS</b>   | Intermediate frequency Base Station, IF turner card in 7390 base station                                            |
| <b>IC</b>    | Industry Canada (formerly DOC)                                                                                      |
| <b>IEC</b>   | International Electrotechnical Commission                                                                           |
| <b>ITU</b>   | International Telecommunications Union                                                                              |
| <b>ITU-R</b> | International Telecommunications Union, Radiocommunication standardization sector                                   |
| <b>ITU-T</b> | International Telecommunications Union, Telecommunication standardization sector                                    |
| <b>LMDS</b>  | Local multipoint Distribution System                                                                                |
| <b>LT</b>    | <i>Local Terminal. Windows NT based 7390 LMDS management software.</i>                                              |
| <b>NT</b>    | Network Terminal. It is the indoor customer unit, which provides wireline connection to outside network.            |
| <b>OTU</b>   | Outdoor Transmitter Unit, It is the radio transmitter module of RBS in the 7390 base station.                       |
| <b>ORU</b>   | Outdoor Receiver Unit, It is the radio receiver module of RBS in the 7390 base station                              |
| <b>PSU</b>   | <i>Power Supply Unit. It is a DC to DC converter/distributor.</i>                                                   |

|            |                                                                                                                                                                                             |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PTS</b> | Problem Tracking System. A centralized problem tracking database system used by Newbridge to manage the problems found in the field as well as within Newbridge (Design, PI, AppEng, etc.). |
| <b>RBS</b> | Radio Base Station. It is the radio transmit/receive portion of the 7390 base station. It consists of OTU and ORU in cross-pol solution.                                                    |
| <b>RT</b>  | Radio Terminal. The radio transceiver unit installed at customer side.                                                                                                                      |
| <b>TNT</b> | TDM Network Termination, TDM T1/E1 interface card in 7390 base station.                                                                                                                     |
| <b>TS</b>  | Terminal Station, ----the customer premise unit. It is the combination of NT and RT.                                                                                                        |

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## **1 INTRODUCTION**

### **1.1 Purpose**

This document provides a test report on Network Approvals for **38GHZ CROSS-POL BASE STATION** (39.300~40.000/39.000~39.300 GHz) according to applicable technical requirements in FCC part 101.

### **1.2 Scope**

This document shall be used to demonstrate compliance for **38GHZ CROSS-POL BASE STATION** to the test requirements contained in applicable FCC standards. This report is to show compliance for the 39.300 ~ 40.000 / 39.000 ~ 39.300 GHz band only.

### **1.3 Deviations from the Test Plan**

None

## **2 EQUIPMENT UNDER TEST (EUT)**

### **2.1 Equipment Description**

The Alcatel 7390 LMDS is a multiservice broadband wireless access solution. It connects Base Station and Terminal Station via wireless links. And both sides connect to outside network via wired link.

The system consists of TDM QPSK Downlinks and TDMA D-QPSK Uplinks.

The Base Station consists of DBS and RBS.

DBS is the indoor unit housing in a 19" shelf and contains the following main elements:

ANT cards: Provides ATM connection to ATM switch and functions like a control centre.

TNT cards: Provides TDM T1/E1 connection to switch.

AMD cards: ATM modem card.

IBS cards: Intermediate Frequency Tuner card. It connects to IF combiner/splitter complex, which is used to interface to the OTU and ORU.

CPL cards: Optical coupler card. Provides redundancy fiber connection for master and slave ANT.

RBS is the outdoor radio Unit. It is made of OTU and ORU. They are located on pole mounts such that each sector has dedicated transmitters and receivers. The OTU, ORU are mounted directly onto their respective sector antennas.

The RBS is developed/provided by an OEM supplier. The OEM supplier for the RBS TX and RX that has been tested and mentioned within this report is:

Telaxis Communication Corporation

20 Industrial Drive East

P.O. Box 109

South Deerfield Massachusetts 01373-0109, USA

### **2.2 EUT Configuration**

The maximum configuration including 2 X ANT, 4 X TNT, 8 X AMD, 1 X CPL and 8 X IBS.

The number of AMD/IBS cards required depends on the number of users supported. Today's system configuration can handle up to 6 AMD/IBS with one OTU.

| Model Number   | Name and Description | S/N         | EUT Software |
|----------------|----------------------|-------------|--------------|
| 3CC09908AAAA   | DBS shelf            | CU001907833 | N/A          |
| 3CC09743ADAA   | ANT card             | CU002309748 | V2_B2_07     |
| 3CC09744ACAA   | T1 TNT card          | CU001808767 | V2_B2_07     |
| 3CC09915ABAA   | CPL card             | CU002301382 | N/A          |
| 3CC11656AAAA   | AMD card             | CU005203040 | V2_B2_07     |
| 3CC11656AAAA   | AMD card             | CU010701494 | V2_B2_07     |
| 3CC11656AAAA   | AMD card             | CU010701469 | V2_B2_07     |
| 3CC11656AAAA   | AMD card             | CU010701489 | V2_B2_07     |
| 3CC11656AAAA   | AMD card             | CU010701492 | V2_B2_07     |
| 3CC11656AAAA   | AMD card             | CU010701507 | V2_B2_07     |
| 3CC11815AAAA   | IBS card             | CU010704480 | N/A          |
| 3CC11815AAAA   | IBS card             | CU010704491 | N/A          |
| 3CC11815AAAA   | IBS card             | CU010704485 | N/A          |
| 3CC11815AAAA   | IBS card             | CU010704487 | N/A          |
| 3CC11815AAAA   | IBS card             | CU011103600 | N/A          |
| 3CC11815AAAA   | IBS card             | None        | N/A          |
| 1AF01899AAAA   | PSU                  | 00000989    | N/A          |
| 1AF01899AAAA   | PSU                  | 00000961    | N/A          |
| 3CC10101AAAA   | Fan Unit             | CU002100780 | N/A          |
| PS6-A19 (9832) | Combiner / Splitter  | None        | N/A          |
| PS6-A19(9832)  | Combiner / Splitter  | None        | N/A          |
| 90-7163-01     | 38GHz ORU            | A002007464  | N/A          |
| 90-7162-01     | 38GHz OTU            | B002216243  | N/A          |
| 90-7162-01     | 38GHz OTU            | C011098044  | N/A          |

## 2.3 EUT Accessories

| Part Number | Name     | Brief Descriptions | Quantity |
|-------------|----------|--------------------|----------|
| N/A         | Bias Tee | Feed DC in RBS     | 3        |
| N/A         | IF cable | SMA, 6 feet        | 15       |

|     |                              |                                             |   |
|-----|------------------------------|---------------------------------------------|---|
| N/A | 50ohm load                   |                                             | 2 |
| N/A | RJ45 cable                   | 5 meter                                     | 1 |
| N/A | RS 422 cable                 | Radio activation control , 5 meters         | 1 |
| N/A | Waveguide to coaxial adapter | WR-28 to k type coaxial                     | 1 |
| N/A | Waveguide attenuator         | WR-28, 20 dB                                | 1 |
| N/A | RF cable                     | V type connector cable, up to 50GHz, 6 feet | 1 |

## 2.4 EUT Setup

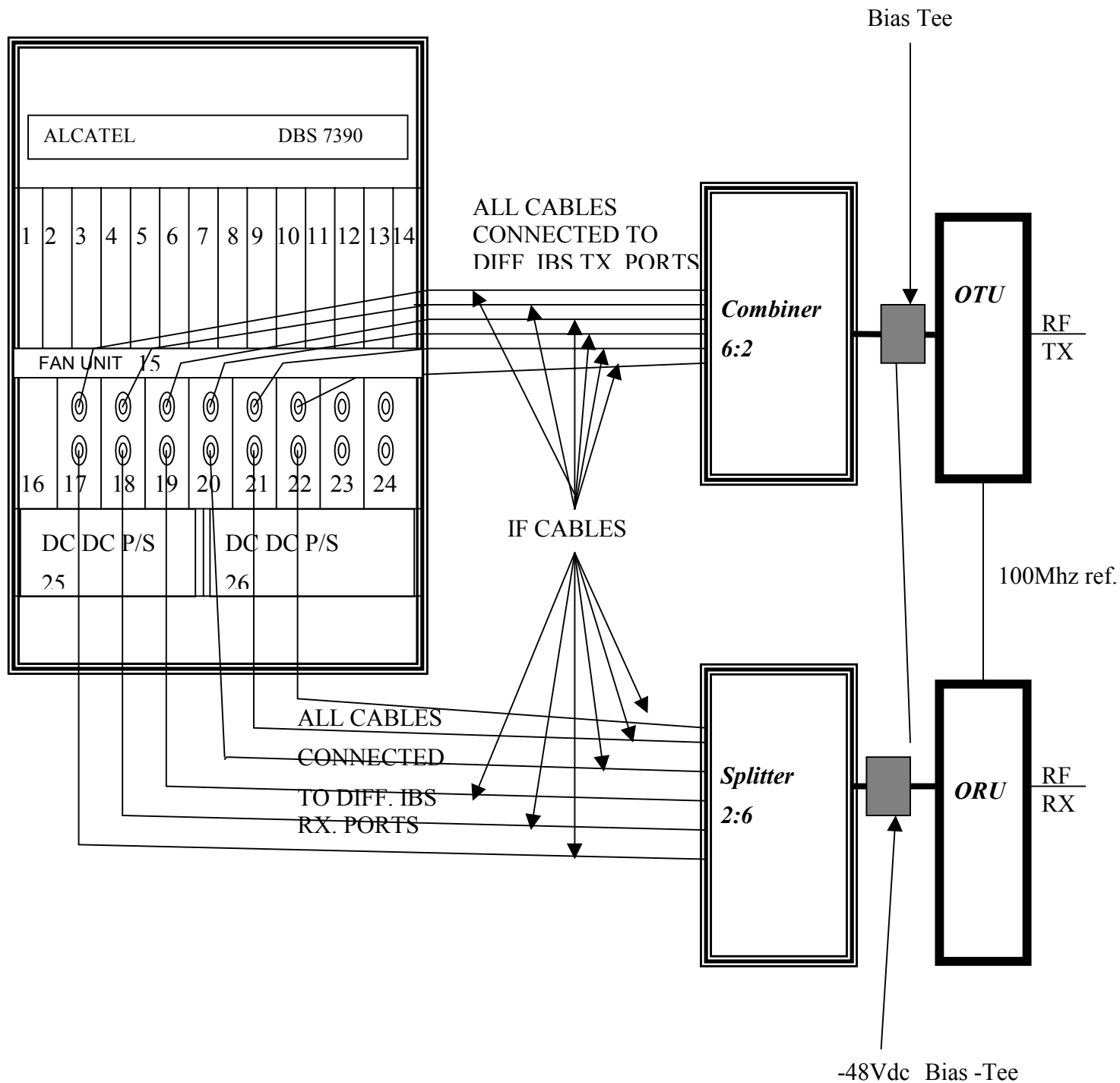


Figure 1 7390 LMDS Cross-Pol BS setup ---- General

## 2.6 EUT Data Path

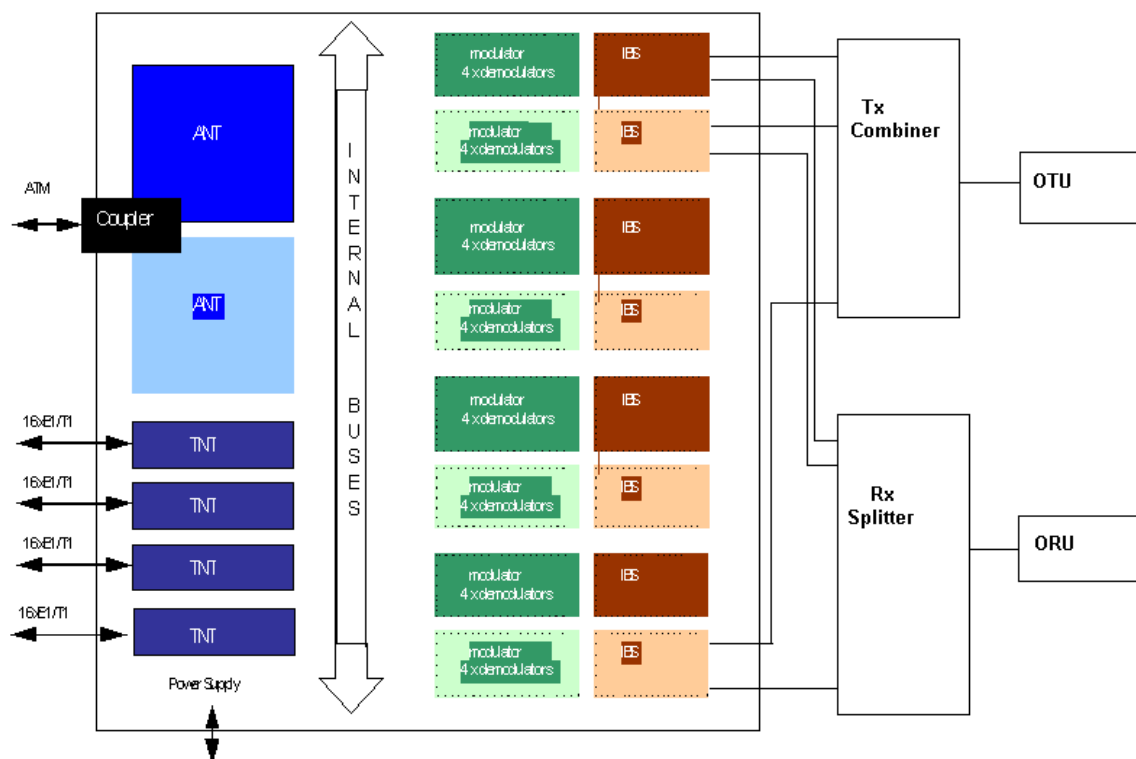


Figure 2 7390 LMDS BS Data Path

## 2.6 EUT modifications

No changes required for compliance or to achieve compliance to FCC part 101.

### 3 NETWORK COMPLIANCE SUMMARY

This report has been read and approved by the following departments responsible for its implementation. All changes made to the EUT for compliance must be escalated via the PTS. The EUT mentioned in this report meets the requirements of standards indicated below.

| Basic Standard          | Compliance |
|-------------------------|------------|
| FCC Part 101, Subpart C | Yes        |

#### Declaration of Compliance

*“ This equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations. To the best of my knowledge, these tests were performed using measurement procedures consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards. . Each unit manufactured, imported or marketed, as defined in the Commission’s regulations, will conform to the sample(s) tested within the variations that can be expected due to quantity production and testing on a statistical basis. I further certify that the necessary measurements were made by Alcatel Canada Inc., 600 March Road, Kanata, Ontario, K2K2E6 and Nemko Canada Inc., 3325 River Road RR#5, Ottawa, Ontario, K1V 1H2 ”*

| Standard                        | Measurement Type                   | Method/ Limit                                       | Pass/Fail Criteria |
|---------------------------------|------------------------------------|-----------------------------------------------------|--------------------|
| FCC Part 101<br>&<br>FCC Part 2 | Output Power                       | Section 2.1046 / Section 101.113                    | Pass               |
|                                 | Spectrum Mask (Occupied Bandwidth) | Section 2.1049 / Section 101.111(a)(2)(ii)          | Pass               |
|                                 | Radiated Spurious                  | Section 2.1053 & 2.1057 / Section 101.111(a)(2)(ii) | Pass               |
|                                 | Conducted Spurious                 | Section 2.1051 & 2.1057 / Section 101.111(a)(2)(ii) | Pass               |
|                                 | Frequency Stability                | Section 2.1055 / Section 101.107                    | Pass               |

#### Regulatory Compliance Requirements

**Test Engineer:** Frank Li  
Network / Wireless Approvals Specialist

**Date:** July 24<sup>th</sup>, 2001

**Contact Address:** 600 March Road  
Kanata, Ontario, Canada, K2K 2E6

**Reviewer:** Vito Scaringi  
Manager, Network and Regional Compliance Group

**Date:** July 24<sup>th</sup>, 2001

**Contact Address:** 600 March Road  
Kanata, Ontario, Canada, K2K 2E6

## 4 TEST DATA

**Standards:** FCC Part 101(10-1-98 Edition): Fixed Microwave Services  
**Subpart C:** Technical Standards

### 4.1 RF Output Power

Limit: + 55dBW (Maximum EIRP)  
Measured Value:  $22.6 \text{ dBm} + 22 \text{ dBi} = 14.6 \text{ dBW}$   
Criteria: **Pass**

#### 4.1.1 Test Procedure

The RF output power was adjusted to have each carrier set at approximately +17 dBm.

The OTU can support maximum 6 carriers or less with 28 or 14 MHz carrier bandwidth. Due to the limitation of 50MHz of FCC's authorized bandwidth at 38GHz band, the test was performed with 1 X 28 MHz and 3 X 14 MHz configurations to achieve the maximum power within 50MHz authorized bandwidth.

All power measurements were taken in normal operation (modulated).

Note: The maximum antenna gain is 22 dBi.

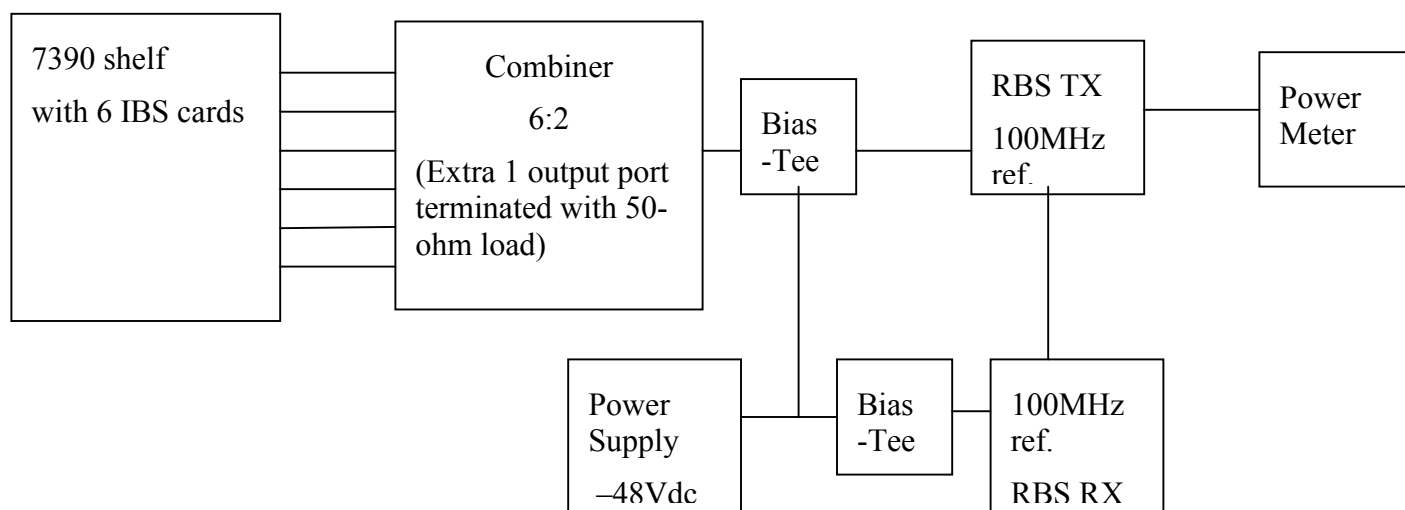


Figure – 3 RF Power Output Test Setup

- (1) Calibrate power meter to the proper frequency of transmission.
- (2) Enable RBS TX and add the appropriate attenuation at the antenna port to avoid damage to the power meter.
- (3) Measure output power at the low and high end of the band of operation of the RBS TX.  
Measure the attenuator and compensate with an offset.

#### 4.1.2 Test Condition

|                      |                                                                                                |
|----------------------|------------------------------------------------------------------------------------------------|
| Temperature          | 22 °C                                                                                          |
| Relative Humidity    | 65 %                                                                                           |
| Atmospheric Pressure | 101 k Pa                                                                                       |
| Test Location        | Product Integrity Laboratory<br>Alcatel Canada Inc<br>600 March Road, Kanata, Ontario, K2K 2E6 |
| Test Engineer        | Frank Li<br>Network / Wireless Approvals Specialist                                            |

#### 4.1.3 Test Equipment

| Instrument   | Mfr./Model / S/N           | Calibration                         |
|--------------|----------------------------|-------------------------------------|
| Power Meter  | HP EP4419B<br>Tool #: 8067 | Last: 2000/12/03<br>Due: 2001/12/03 |
| Power Sensor | HP 8487A<br>Tool #: 10419  | Last: 2000/09/26<br>Due: 2001/09/26 |

#### 4.1.4 Test Data

| Unit under Test                              | Frequency Band (MHz) | Maximum Power Level                                                                                          |
|----------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------|
| RBS TX<br>Telaxis BaseStation<br>Transmitter | 39300 to 40000       | 22.6dBm(-7.4 dBW) maximum<br>( 3 X 14 MHz carriers)<br>17.5 dBm (-12.5 dBW) maximum<br>( 1 X 28 MHz carrier) |

## 4.2 Spectrum Mask

Limit: See Mask Template in test data.

Measured Value: See Test Data

Criteria: **Pass**

### 4.2.1 Test Procedure

The measurements were done with 6 IBS cards inserted in the 7390 shelf and the 6:2 combiner. Each carrier was adjusted at the RF output to approximately +17dBm, which gave a measured total power at the antenna port of + 22 dBm with 3 carriers.

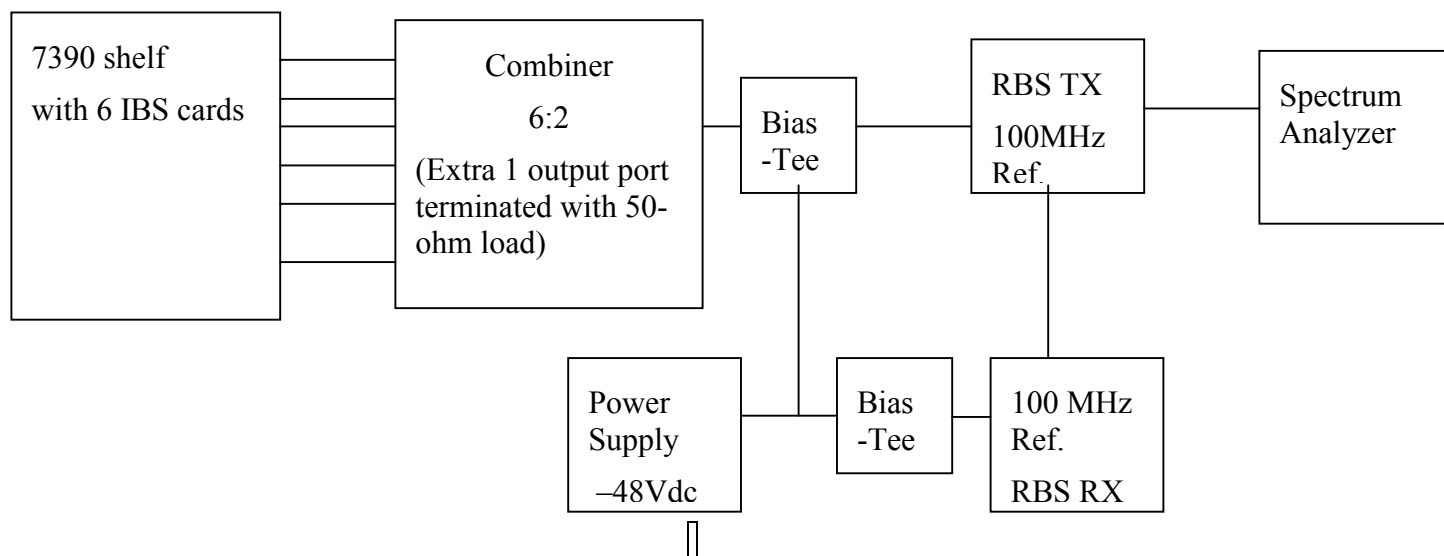


Figure – 4 Spectrum Mask measurement setup

(1) Set the settings of a spectrum analyzer as follows:

|                      |                                                                                       |
|----------------------|---------------------------------------------------------------------------------------|
| Center frequency     | Set center frequency at the middle of channel or carrier to get the best test result. |
| Sweeping time        | Automatic                                                                             |
| Resolution bandwidth | 1 MHz                                                                                 |
| Video bandwidth      | $\geq$ 300 kHz (video averaging of display is allowed)                                |
| Y scale              | 10 dB/Div                                                                             |

- (1) Connect spectrum analyzer at the antenna port and record the spectrum shape. Perform measurements at the edge of the frequency block with all carriers grouped side by side near the higher end of the assigned band. Repeat measurements at the lower end of the assigned band or to the lowest frequency the transmitter can operate at.
- (2) Overlay the FCC mask and verify that it does not exceed the limits.

#### 4.2.2 Test Condition

|                      |                                                                                                |
|----------------------|------------------------------------------------------------------------------------------------|
| Temperature          | 22 °C                                                                                          |
| Relative Humidity    | 65 %                                                                                           |
| Atmospheric Pressure | 101 k Pa                                                                                       |
| Test Location        | Product Integrity Laboratory<br>Alcatel Canada Inc<br>600 March Road, Kanata, Ontario, K2K 2E6 |
| Test Engineer        | Frank Li<br>Network / Wireless Approvals Specialist                                            |

#### 4.2.3 Test Equipment

| Instrument        | Mfr./Model / S/N        | Calibration                         |
|-------------------|-------------------------|-------------------------------------|
| Spectrum Analyzer | HP 8564E<br>Tool # 9169 | Last: 2000/08/24<br>Due: 2001/08/24 |

#### 4.2.4 Test Data

Transmission Frequency Range: 39,300 to 40,000 MHz.

The center frequency of 28 MHz carrier will be 14 MHz away from the edge of the authorized frequency block, which is 50 MHz at 38MHz band.

For 14 MHz carrier, the center frequency of carrier will be 7 MHz away from the edge of the authorized frequency block. And in the multicarriers configuration, carriers will be grouped one by one with 14MHz spacing between centre frequencies.

To demonstrate the system performance meets the technical standard requirement, by engineering judgement, test is performed with the maximum configuration (1 X 28 MHz, 1 X 14 MHz and 3 X 14 MHz) to provide the worst possible test result.

And test is performed separately at three different 50MHz authorized blocks, which locate at lower end, middle, and upper end of the designed band 39,300 to 40,000 MHz.

**See Appendix A for test plots.**

Note:

The insertion loss of waveguide attenuator and RF coaxial cable at 39 MHz band are 28.04 dB, and have been set as offset in spectrum analyzer.

### 4.3 Conducted Spurious

Limit: -13 dBm / 4 kHz

Measured Value: See Test Data

Criteria: **Pass**

#### 4.3.1 Test Procedure

The conducted spurious are measured at the antenna port of the RBS TX in normal operation.

The measurements were done with 3 X 14 MHz multicarriers configuration. Each carrier was adjusted at the RF output to approximately  $\geq +17$ dBm, which gave a measured total power at the antenna port of +22dBm maximum.

Measured emissions at the frequencies, which are outside the occupied bandwidth up to 200GHz.



Figure – 5 Conducted Spurious measurement setup

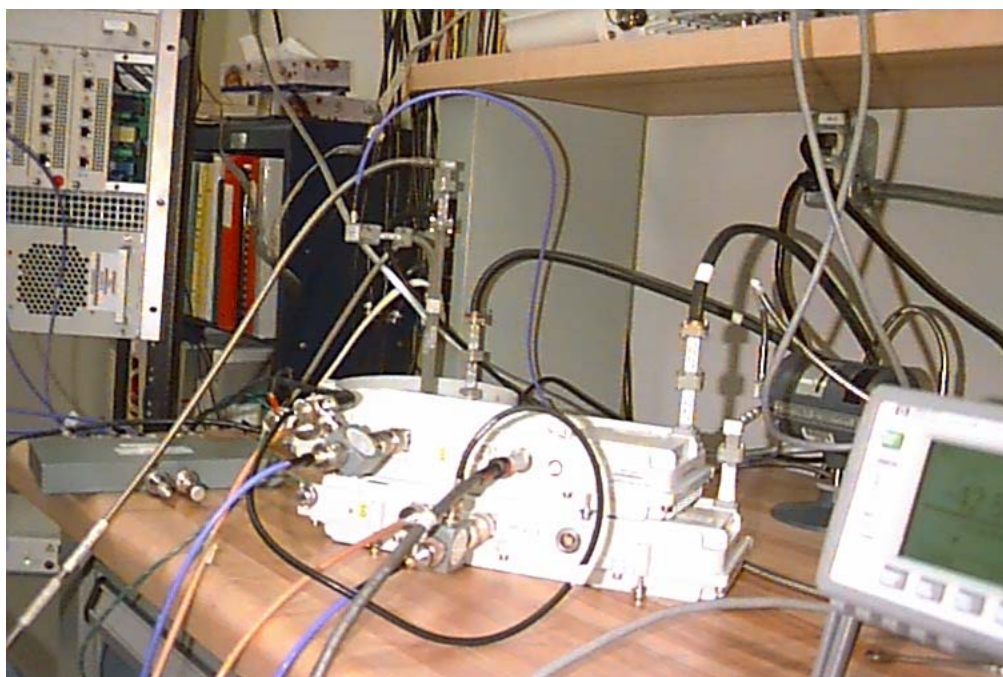
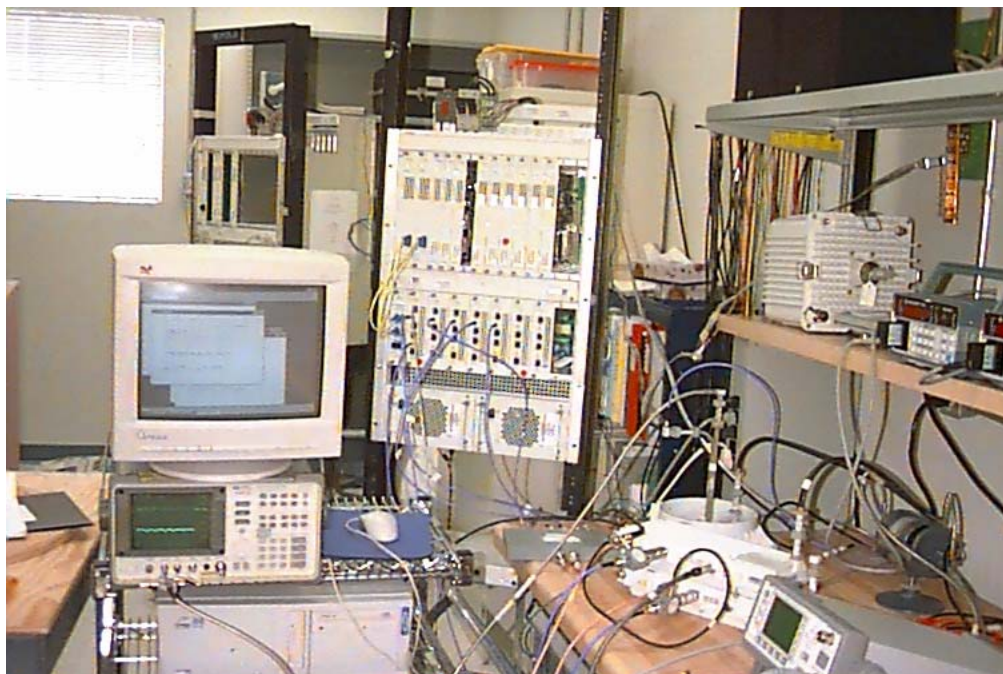


Figure – 6 Conducted Spurious Setup at Nemko Canada Inc. Laboratories

#### 4.3.2 Test Condition

**Temperature** 22 °C  
**Relative Humidity** 65 %  
**Atmospheric Pressure** 101 k Pa  
**Test Location** Nemko Canada Inc.  
3325 River Road , Ottawa, Ontario K1V 1H2  
**Test Engineer** Glen Westwell

#### 4.3.3 Test Equipment

| Cal Cycle | Equipment                     | Manufacturer       | Model            | Serial No.     | Last Cal.     | Next Cal.     |
|-----------|-------------------------------|--------------------|------------------|----------------|---------------|---------------|
| 3 Year    | Mixer/Antenna<br>40-60Ghz     | Olsen – OML        | M19HWA<br>(H.P.) |                | Mar.<br>15/00 | Mar.<br>15/03 |
| 3 Year    | Mixer /Antenna<br>60-90Ghz    | Olsen – OML        | M12HWA<br>(H.P.) |                | Mar.<br>15/00 | Mar.<br>15/03 |
| 3 Year    | Mixer / Antenna<br>90-140Ghz  | Olsen – OML        | M08HWA<br>(H.P.) |                | Mar.<br>15/00 | Mar.<br>15/03 |
| 3 Year    | Mixer / Antenna<br>140-220Ghz | Olsen – OML        | M05HWA<br>(H.P.) |                | Mar.<br>15/00 | Mar.<br>15/03 |
| 1 Year    | Spectrum Analyzer             | Hewlett<br>Packard | 8564E            | 3846A014<br>07 | May 31/00     | Nov.<br>30/01 |

#### 4.3.4 Test Data

Test was performed from 30 MHz to 200 GHz.

**See Appendix B for test plots.**

Note:

The insertion loss of waveguide attenuator and RF coaxial cable has been set as offset in spectrum analyzer.

#### 4.4 Radiated Emissions

Limit: -13 dBm / 4 kHz  
Measured Value: See Test Data  
Criteria: **Pass**

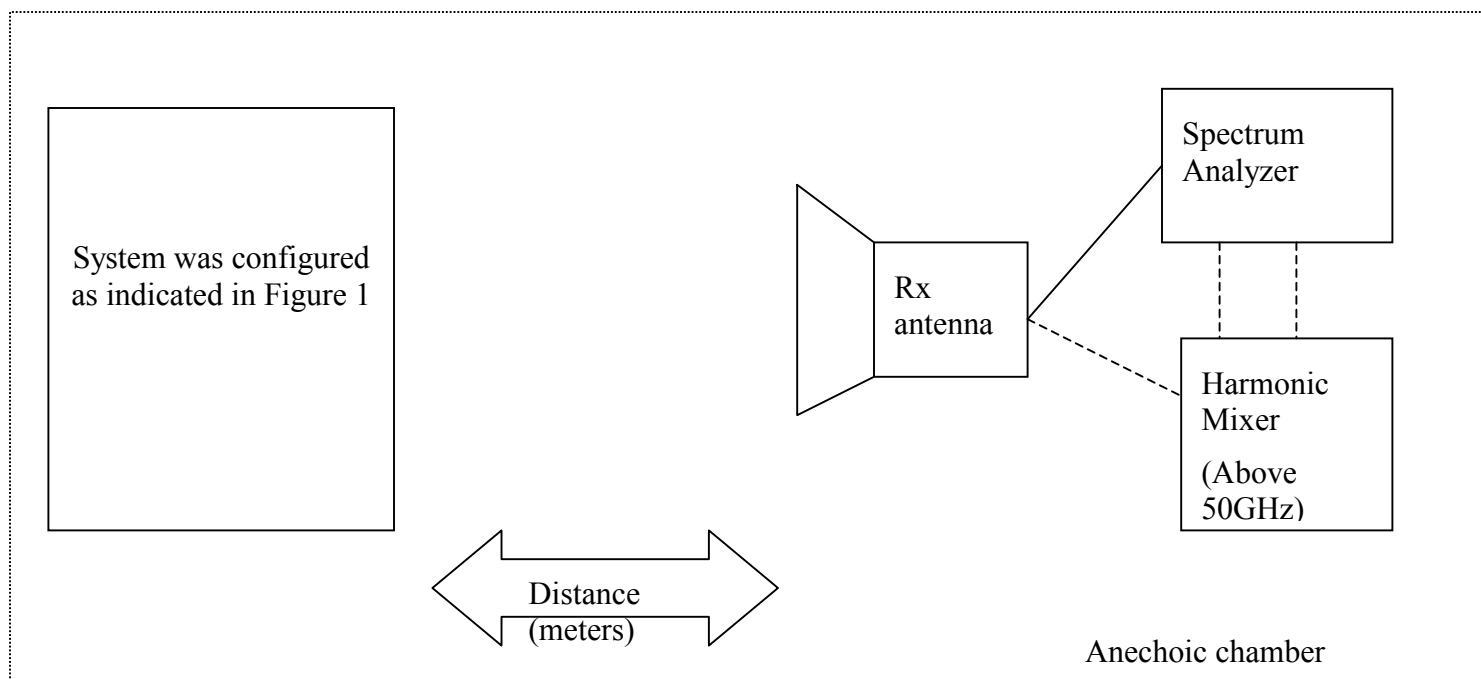
##### 4.4.1 Test Procedure

The measurements were done with 3 X 14 MHz multicarriers configuration. Each carrier was adjusted at the RF output to approximately  $\geq +17$ dBm, which gave a measured total power at the antenna port of +22dBm maximum.

The reference level was measured with the vertical polarized 90-degree sector antenna that had a gain of 21dBi. Once the reference level was defined, the final measurements were taken with the RBS TX port terminated with a 50 $\Omega$  load.

All radiated spurious measurements were taken in semi-anechoic room at a distance of 3, 1 or 0.3 meters in the vertical and horizontal polarization.

The system was setup in maximum configuration as indicated in figure 1.



Radiated Spurious measurement setup

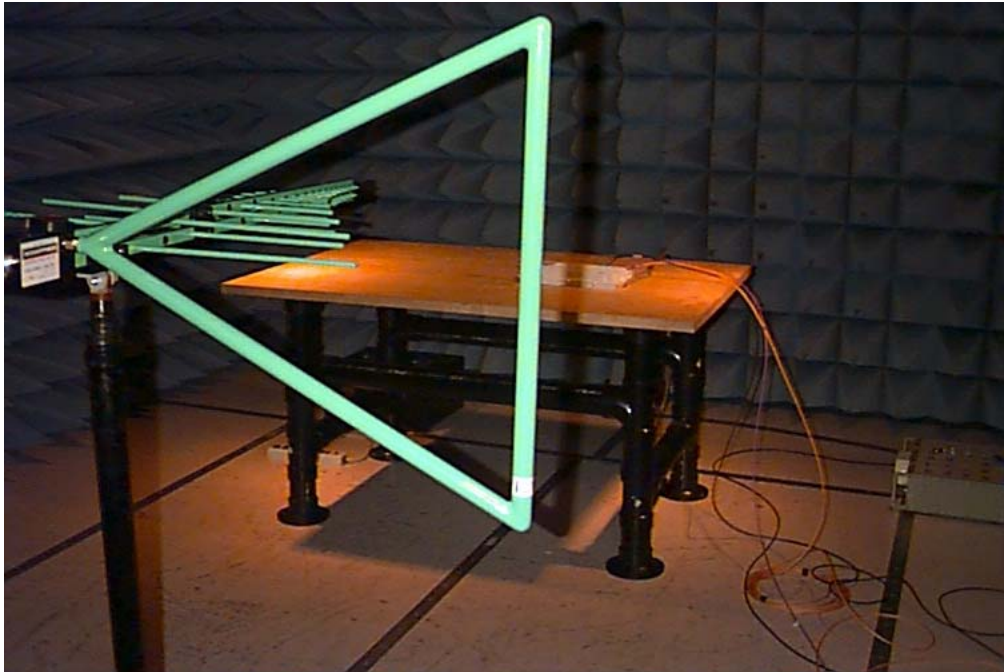


Figure – 7 Radiated Spurious Setup in a Semi- Anechoic Chamber at Nemko Canada Inc. Laboratories

#### 4.4.2 Test Condition

**Temperature** 22 °C  
**Relative Humidity** 65 %  
**Atmospheric Pressure** 101 k Pa  
**Test Location** Nemko Canada Inc.  
3325 River Road , Ottawa, Ontario K1V 1H2  
**Test Engineer** Glen Westwell

#### 4.4.3 Test Equipment

| CAL CYCLE | EQUIPMENT                  | MANUFACTURER    | MODEL         | SERIAL     | LAST CAL.  | NEXT CAL.  |
|-----------|----------------------------|-----------------|---------------|------------|------------|------------|
| 1 Year    | Spectrum Analyzer          | Hewlett Packard | 8564E         | 3846A01407 | May 31/00  | Nov. 30/01 |
| 1 Year    | Horn Antenna               | EMCO #1         | 3115          | 3132       | Dec. 11/00 | Dec. 11/01 |
| 1 Year    | Log Periodic Antenna 1     | EMCO            | LPA-25        | 1141       | Aug. 3/00  | Aug. 3/01  |
| 3 Year    | Diplexer                   | Olsen - OML     | DPL.26 (H.P.) |            | Mar. 15/00 | Mar 15/03  |
| 3 Year    | Mixer/Antenna 40-60Ghz     | Olsen – OML     | M19HWA (H.P.) |            | Mar. 15/00 | Mar. 15/03 |
| 3 Year    | Mixer /Antenna 60-90Ghz    | Olsen – OML     | M12HWA (H.P.) |            | Mar. 15/00 | Mar. 15/03 |
| 3 Year    | Mixer / Antenna 90-140Ghz  | Olsen – OML     | M08HWA (H.P.) |            | Mar. 15/00 | Mar. 15/03 |
| 3 Year    | Mixer / Antenna 140-220Ghz | Olsen – OML     | M05HWA (H.P.) |            | Mar. 15/00 | Mar. 15/03 |

|        |               |          |              |      |           |           |
|--------|---------------|----------|--------------|------|-----------|-----------|
| 3 Year | Bilog Antenna | Shaftner | CBL6112<br>B | 2651 | Jan. 6/00 | Jan. 6/03 |
|--------|---------------|----------|--------------|------|-----------|-----------|

NA: Not Applicable

NCR: No Cal Required

COU: CAL On Use

#### 4.4.4 Test Data

The spurious emissions were verified from 30MHz to 200 GHz and were below the specification Limit.

##### Calculation:

For power of -13 dBm, the Electric field at far field is:

$$E_{v/m} = (30 P_t G_t)^{0.5} / R$$

Where: Pt: -13 dBm = 50  $\mu$ W

Gt: Numeric gain of Transmitting Antenna, which is 50ohm load in this case. G t = 1 when frequency > 1 GHz and G t = 1.64 when frequency < 1 GHz

R: distance between transmitter and receiver.

Then, the limit -13 dBm is equivalent to:

$$E_{v/m} = 84.4 \text{ dB}\mu\text{V /m} \quad @3 \text{ meter below 1 GHz}$$

$$E_{v/m} = 82.2 \text{ dB}\mu\text{V /m} \quad @3 \text{ meter above 1 GHz}$$

$$E_{v/m} = 91.8 \text{ dB}\mu\text{V /m} \quad @1 \text{ meter above 1 GHz}$$

$$E_{v/m} = 102.3 \text{ dB}\mu\text{V /m} \quad @0.3 \text{ meter above 1 GHz}$$

Due to the reading result in spectrum analyzer is dB $\mu$ V, so the actual test result is:

$$E = V_{dB_v} + Af$$

Where:

V<sub>dB v</sub>: reading result

Af: antenna factor, which varies with frequency

E shall be less than the limit of Electric field E<sub>v/m</sub> calculated above.

**See Appendix C for test plots across 30 MHz to 200 GHz and associated test result.**

## 4.5 Frequency Stability

Limit:  $\pm 10$  ppm  
Measured Value: less than  $\pm 1$  ppm  
Criteria: **Pass**

### 4.5.1 Test Procedure

For the frequency stability measurements, an external source was used to provide an IF CW to the radio units. Only the RBS TX and RBS RX were placed in the temperature chamber during this specific test due to the 7390 shelf will be in a temperature-controlled environment, and can operate within a range of  $-10^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$ .

All measurements were taken according to the method mentioned in the FCC Part 2, where a reading was taken at every  $10^{\circ}\text{C}$  intervals and the supply voltage was varied to the range of  $-38\text{Vdc}$  to  $-56\text{Vdc}$ .

**Note:** The BS operates only on DC, therefore the DC supply was varied to show that the frequency is not affected by voltage fluctuation.

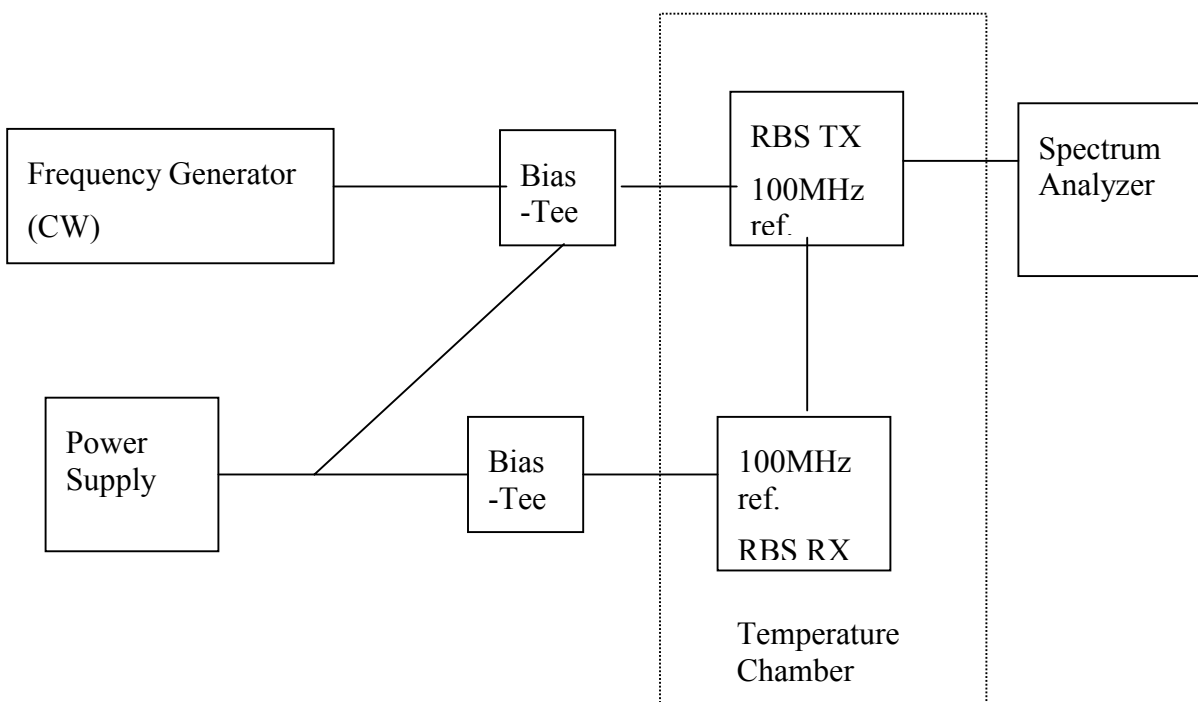


Figure – 8 Frequency Stability measurement setup

#### 4.5.2 Test Condition

|                      |                                                                                                |
|----------------------|------------------------------------------------------------------------------------------------|
| Temperature          | 22 °C                                                                                          |
| Relative Humidity    | 65 %                                                                                           |
| Atmospheric Pressure | 101 k Pa                                                                                       |
| Test Location        | Product Integrity Laboratory<br>Alcatel Canada Inc<br>600 March Road, Kanata, Ontario, K2K 2E6 |
| Test Engineer        | Frank Li<br>Network / Wireless Approvals Specialist                                            |

#### 4.5.3 Test Equipment

| Instrument          | Mfr./Model / S/N               | Calibration                         |
|---------------------|--------------------------------|-------------------------------------|
| Spectrum Analyzer   | HP 8564E<br>Tool # 9169        | Last: 2000/08/24<br>Due: 2001/08/24 |
| Frequency Generator | HP 83640B<br>S/N # 3844A 00761 | Last: 2001/01/19<br>Due: 2002/01/19 |
| Temperature Chamber | Tool # 7263                    | Last: 2000/09/07<br>Due: 2002/03/07 |

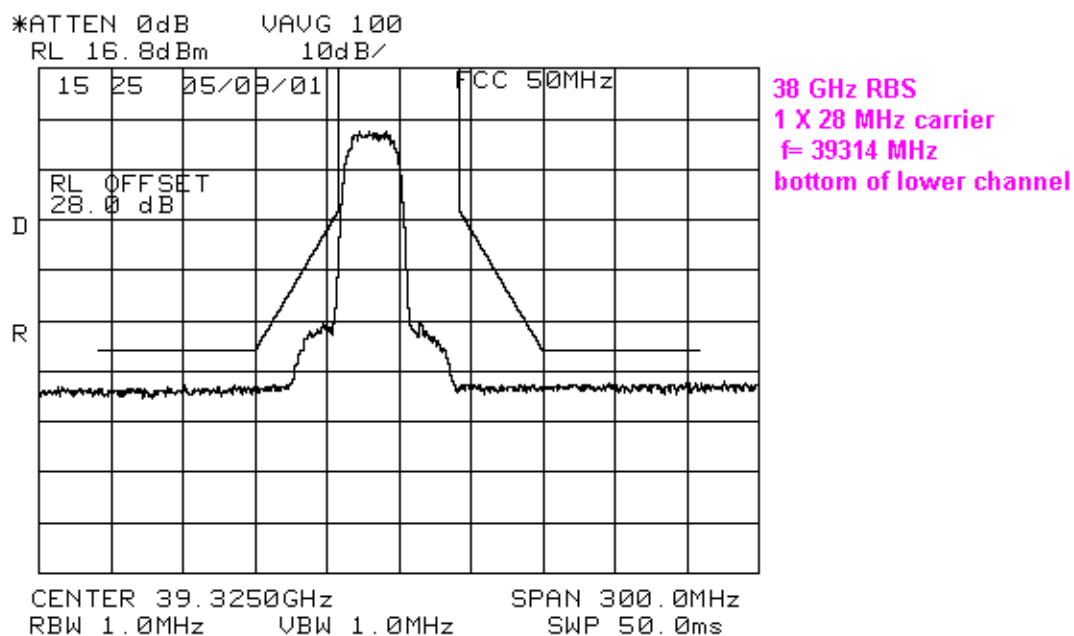
#### 4.5.4 Test Data

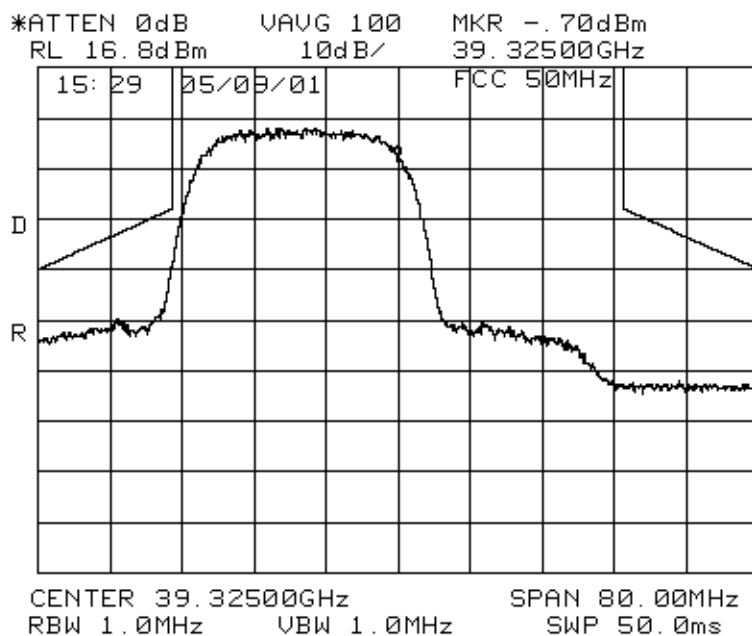
|                                                                            |                    |                          |           |
|----------------------------------------------------------------------------|--------------------|--------------------------|-----------|
| Nominal DC Supply Voltage to Radio is –48Vdc                               |                    |                          |           |
| Note: An external supply was used to vary the DC source from –38V to –56V. |                    |                          |           |
| Temperature<br>(°C)                                                        | Frequency<br>(kHz) | Measured Frequency (kHz) | Tolerance |

|     | Supply voltage |              |              | Limit<br>(+/-10ppm) |
|-----|----------------|--------------|--------------|---------------------|
|     | -48 VDC        | -40.8 VDC    | -55.2 VDC    |                     |
| -30 | 39 650 025.7   | 39 650 025.5 | 39 650 025.7 | <1ppm               |
| -20 | 39 650 025.7   | 39 650 025.5 | 39 650 025.3 | <1ppm               |
| -10 | 39 650 025.5   | 39 650 025.3 | 39 650 025.5 | <1ppm               |
| 0   | 39 650 025.2   | 39 650 025.2 | 39 650 025.2 | <1ppm               |
| 10  | 39 650 016.7   | 39 650 016.7 | 39 650 016.7 | <1ppm               |
| 20  | 39 650 022.0   | 39 650 022.0 | 39 650 022.0 | <1ppm               |
| 30  | 39 650 020.6   | 39 650 020.6 | 39 650 020.6 | <1ppm               |
| 40  | 39 650 019.2   | 39 650 019.2 | 39 650 019.2 | <1ppm               |
| 50  | 39 650 018.2   | 38 650 018.5 | 39 650 018.2 | <1ppm               |

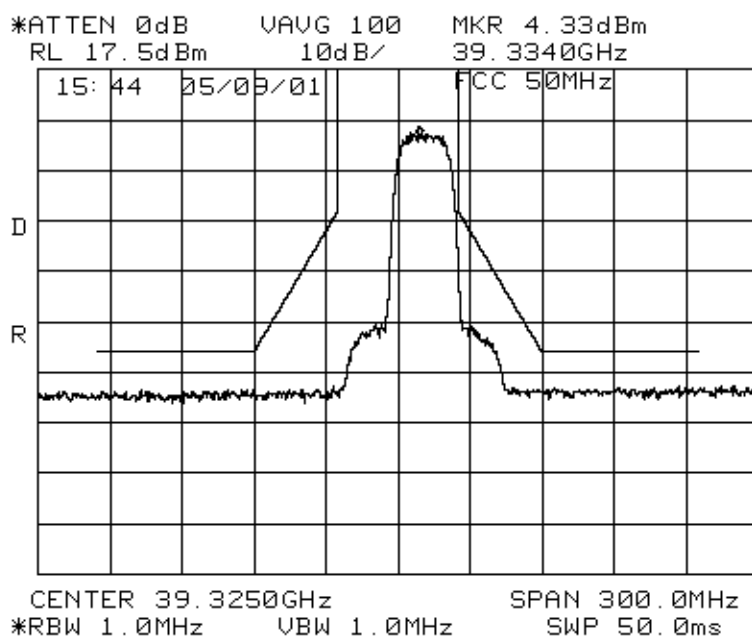
## APPENDIX A: TEST RESULT OF SPECTRAL MASK

### A – 1: Lower Block (39,300 ~ 39,350 MHz)

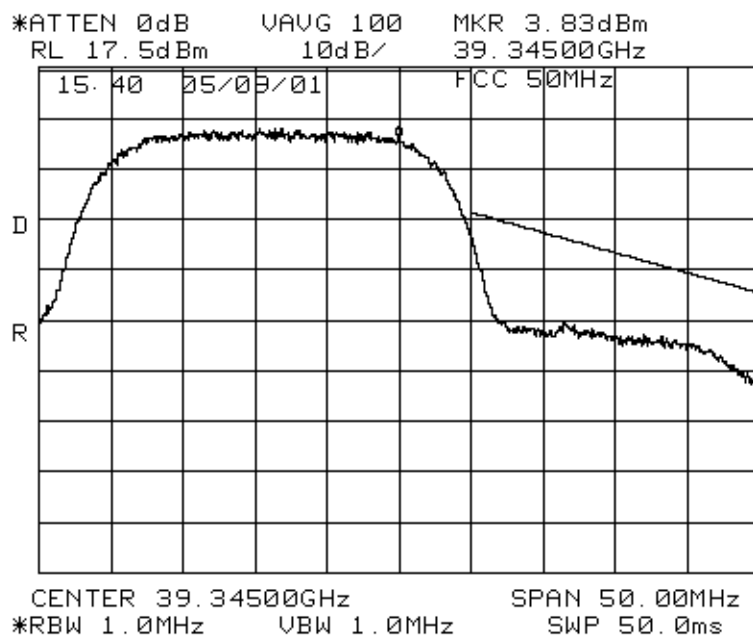




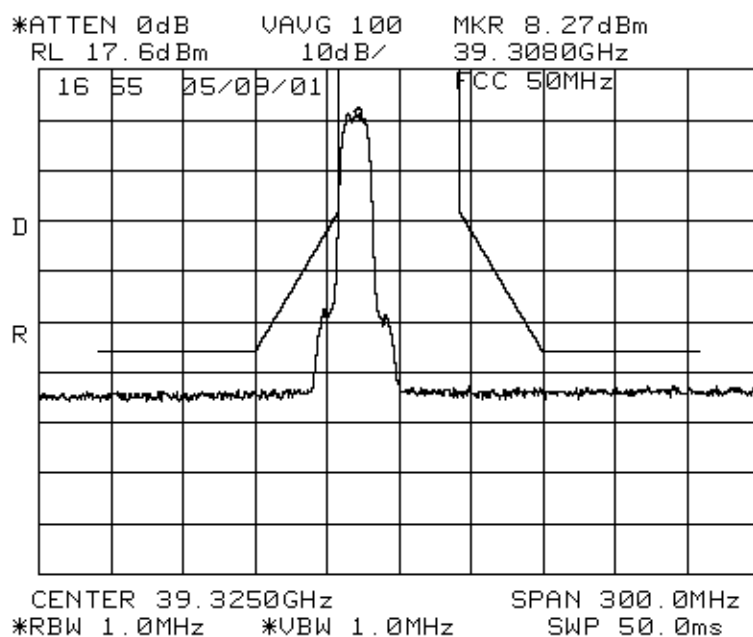
38 GHz RBS  
1 X 28 MHz carrier  
f = 39314 MHz  
bottom of lower channel



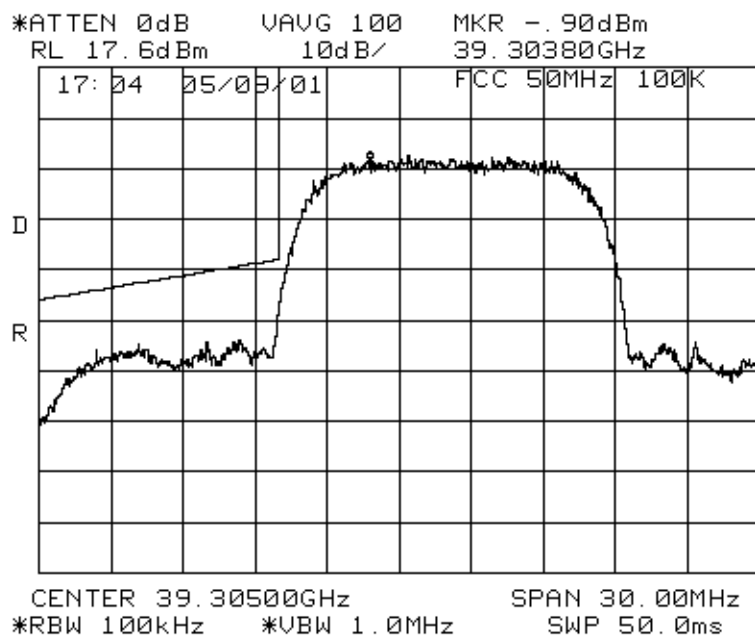
38 GHz RBS  
1 X 28 MHz carrier  
f = 39336 MHz  
upper of lower channel



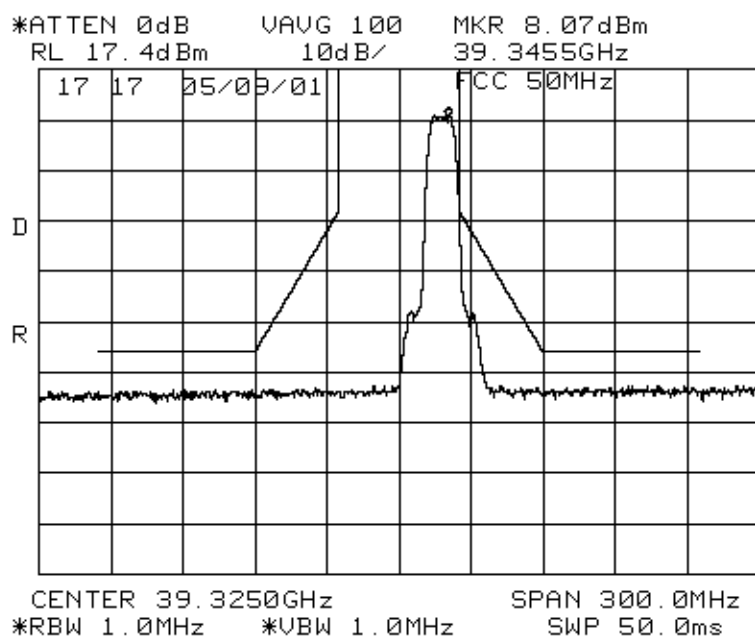
38 GHz RBS  
1 X 28 MHz carrier  
f = 39336 MHz  
upper of lower channel



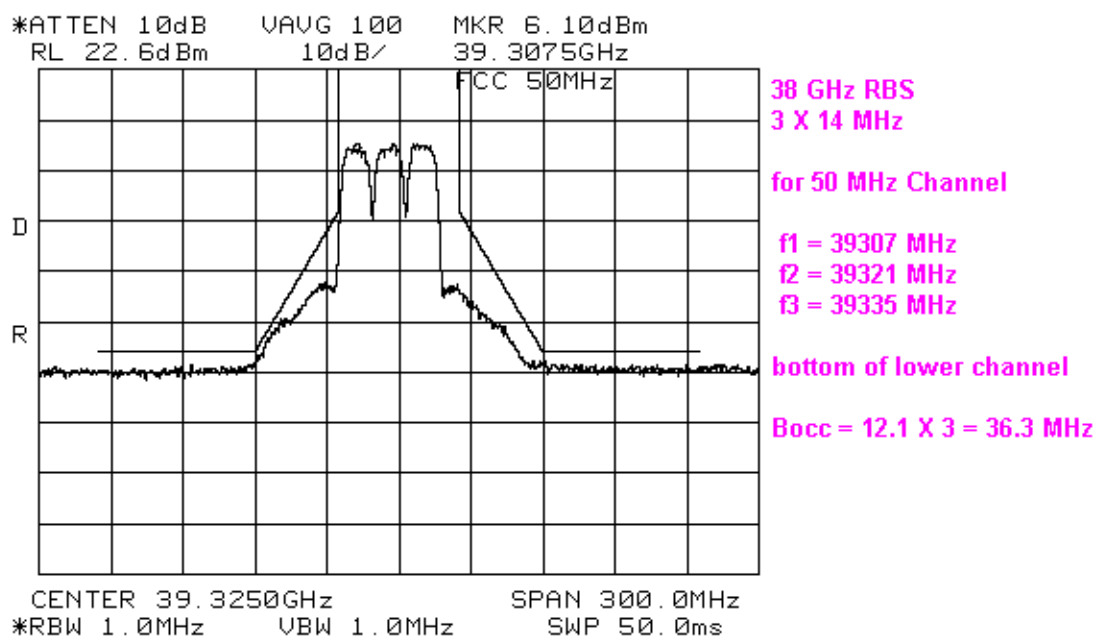
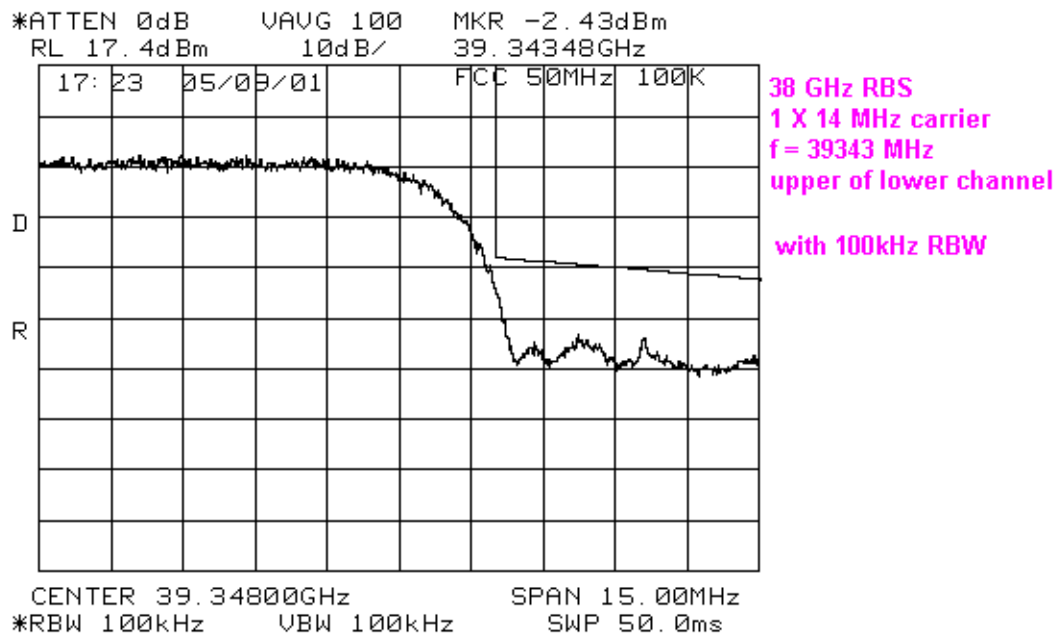
38 GHz RBS  
1 X 14 MHz carrier  
f = 39307 MHz  
bottom of lower channel

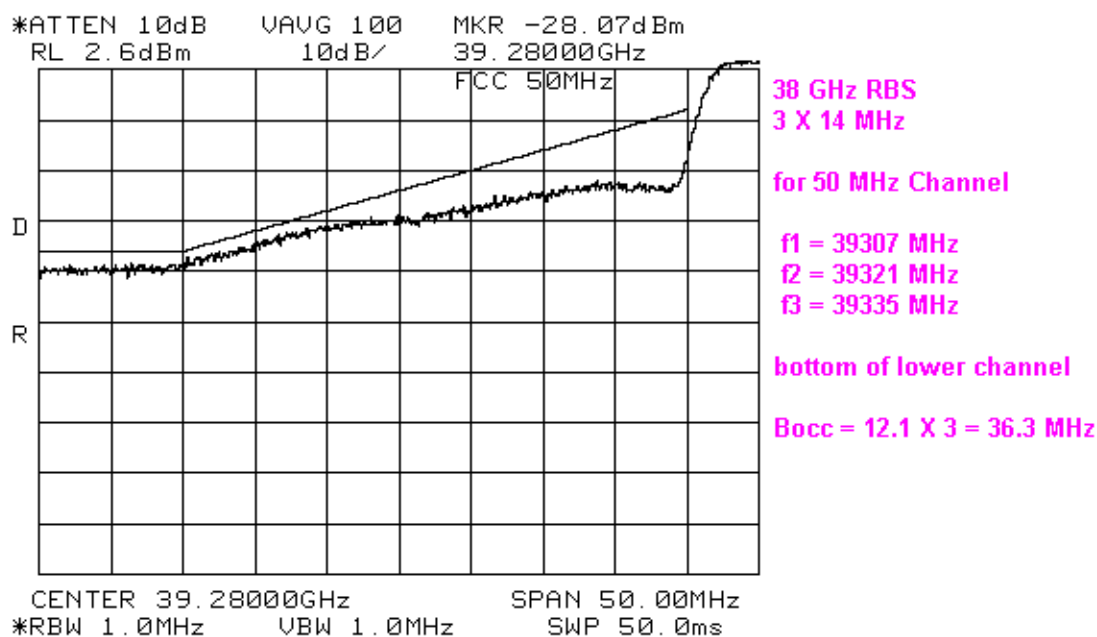
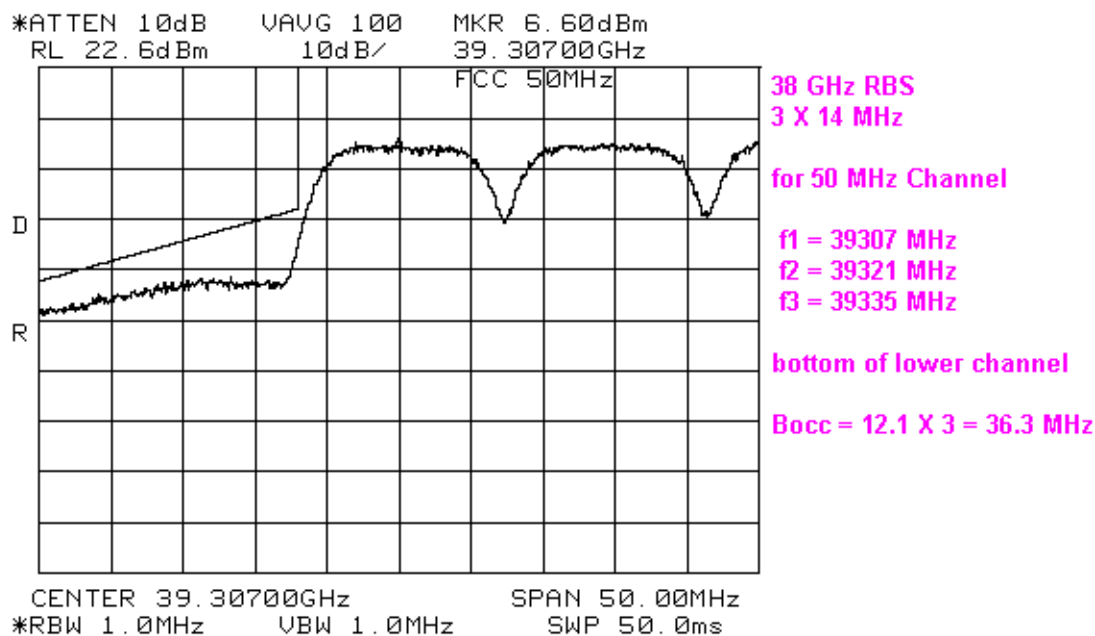


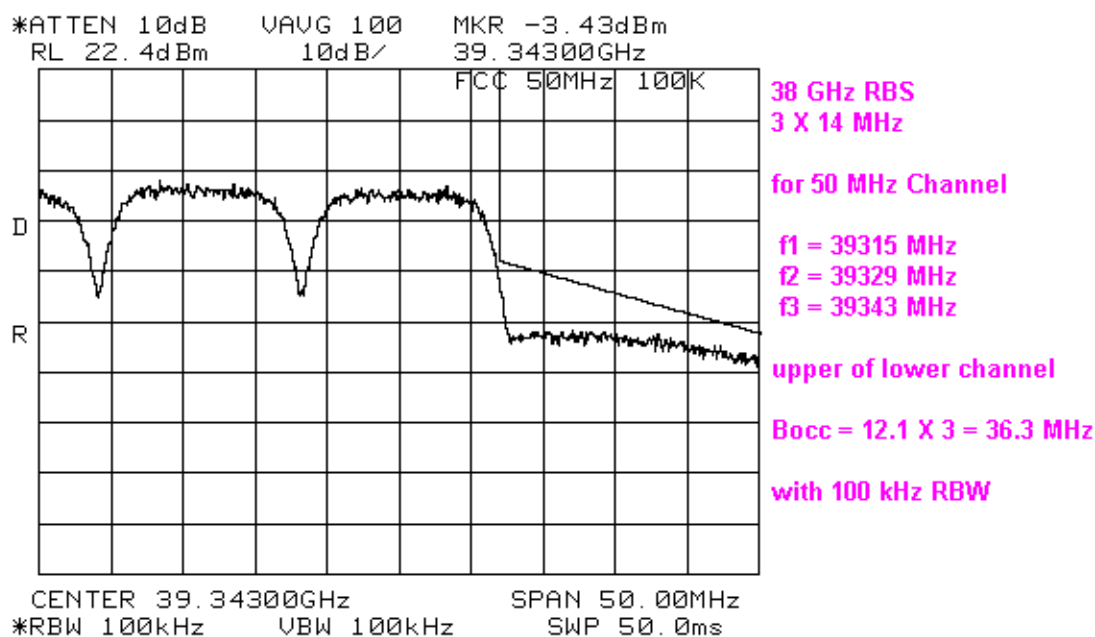
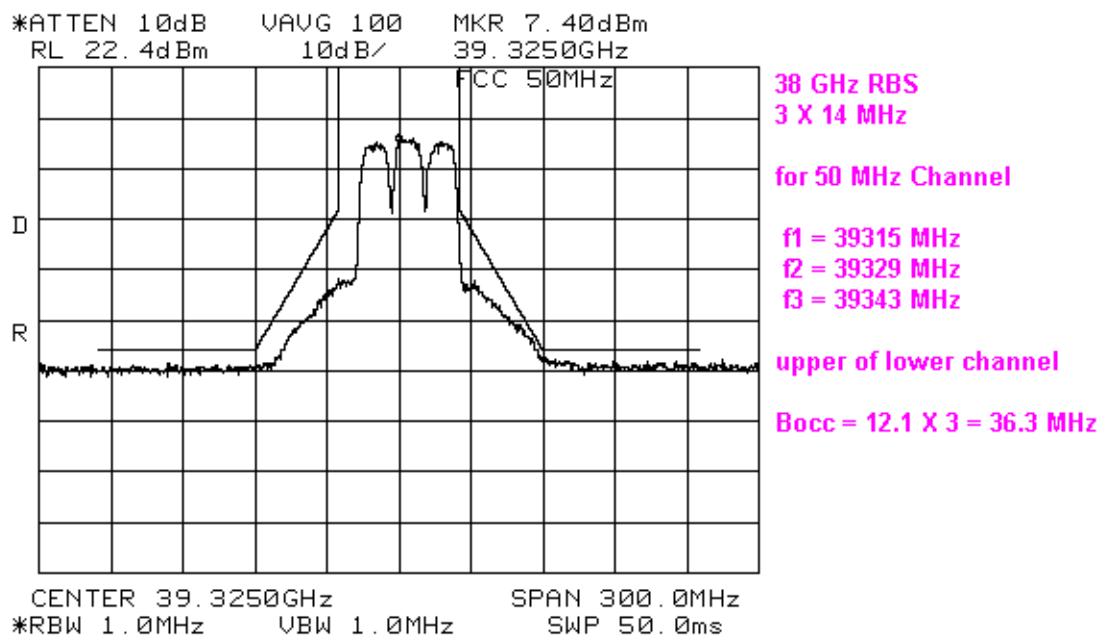
38 GHz RBS  
1 X 14 MHz carrier  
f = 39307 MHz  
bottom of lower channel  
100kHz RBW

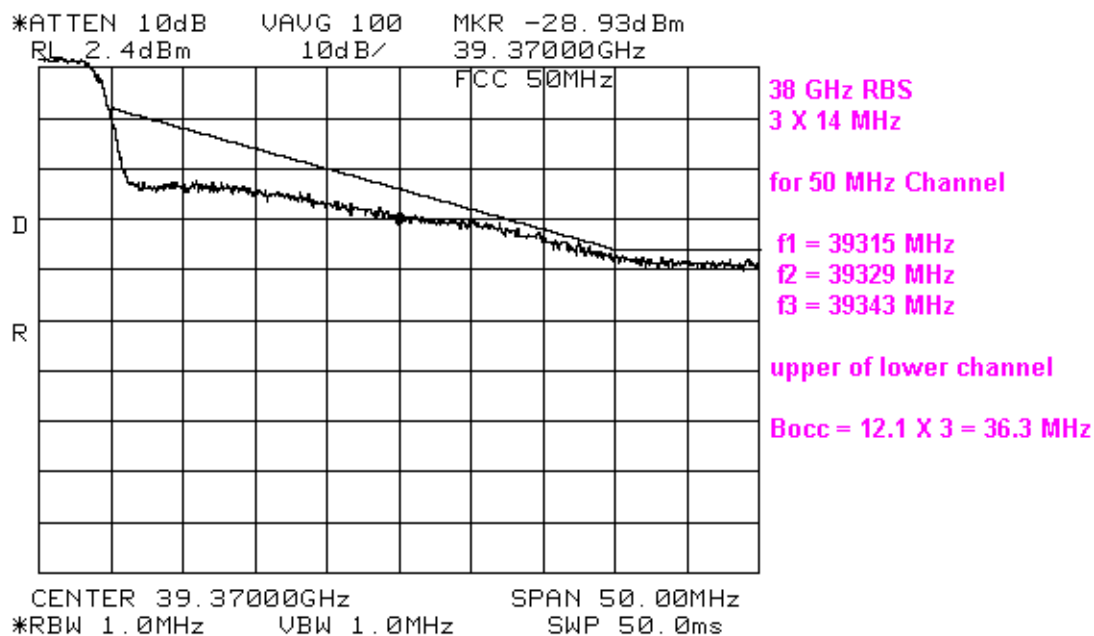


38 GHz RBS  
1 X 14 MHz carrier  
f = 39343 MHz  
Upper of lower channel

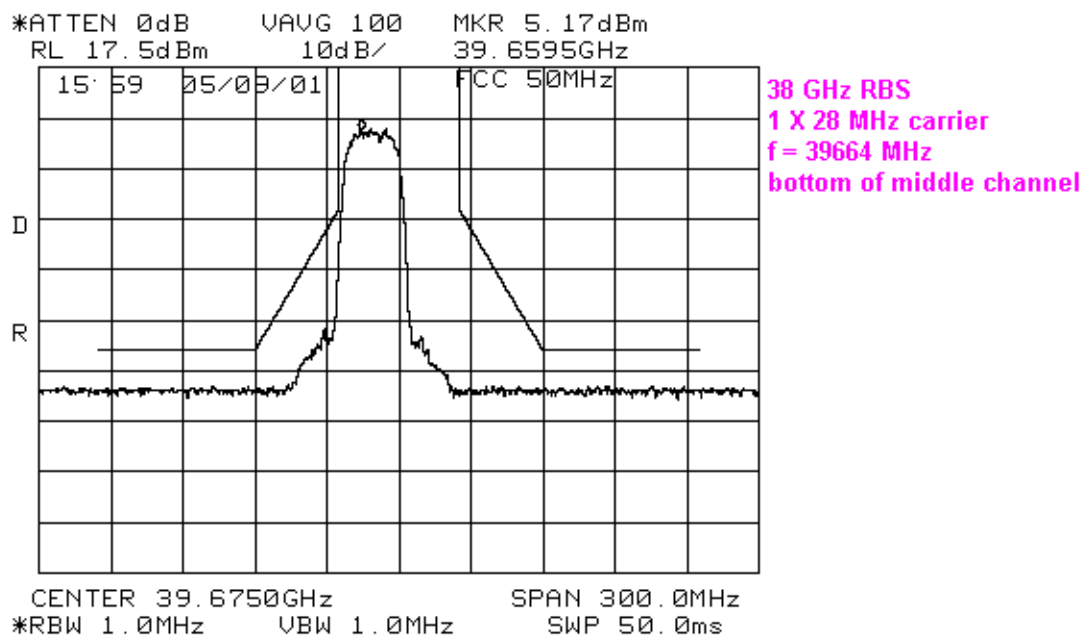


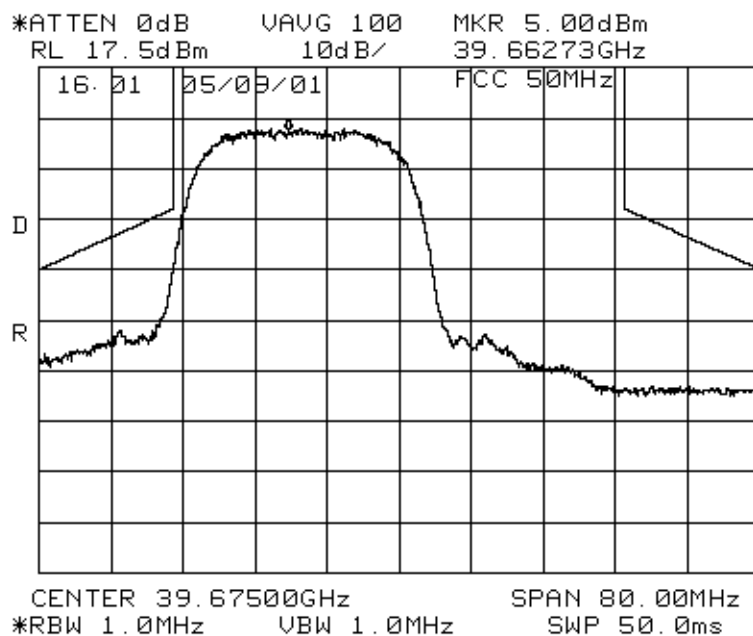




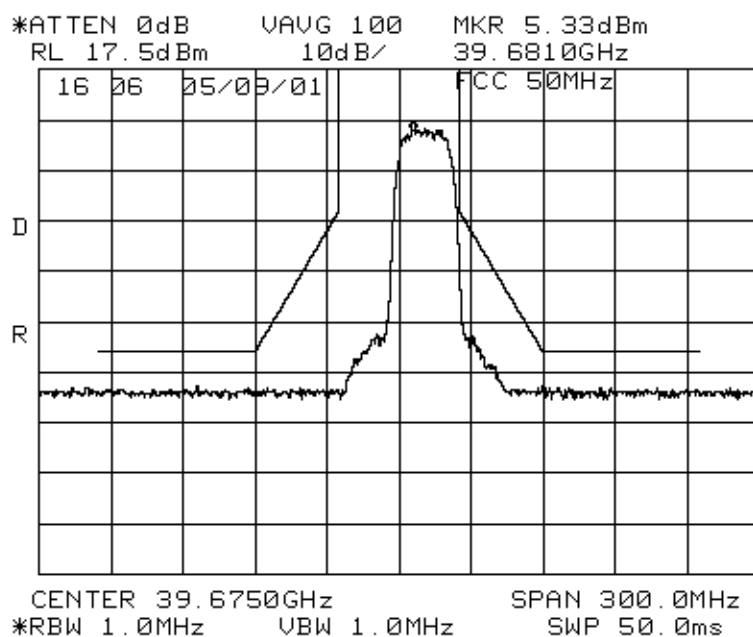


## A – 2: Middle Block (39,650 ~ 39,700 MHz)

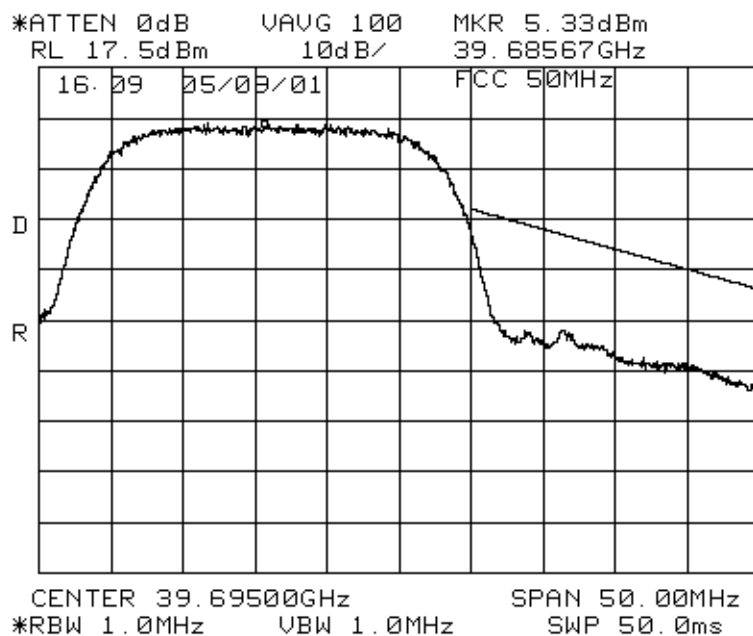




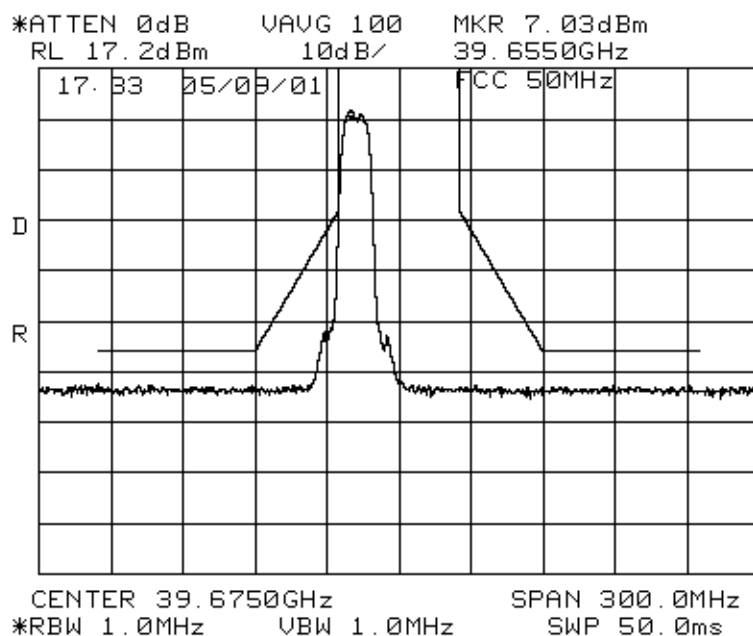
38 GHz RBS  
1 X 28 MHz carrier  
f = 39664 MHz  
bottom of middle channel



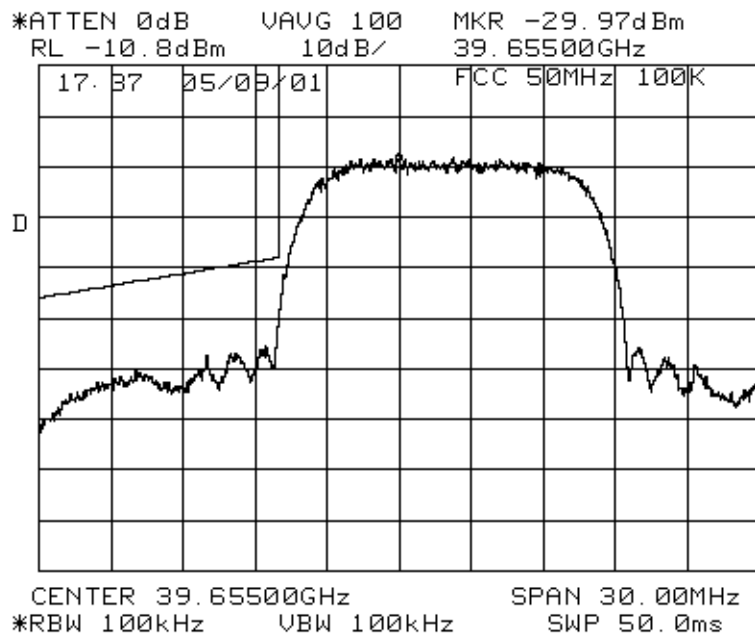
38 GHz RBS  
1 X 28 MHz carrier  
f = 39686 MHz  
upper of middle channel



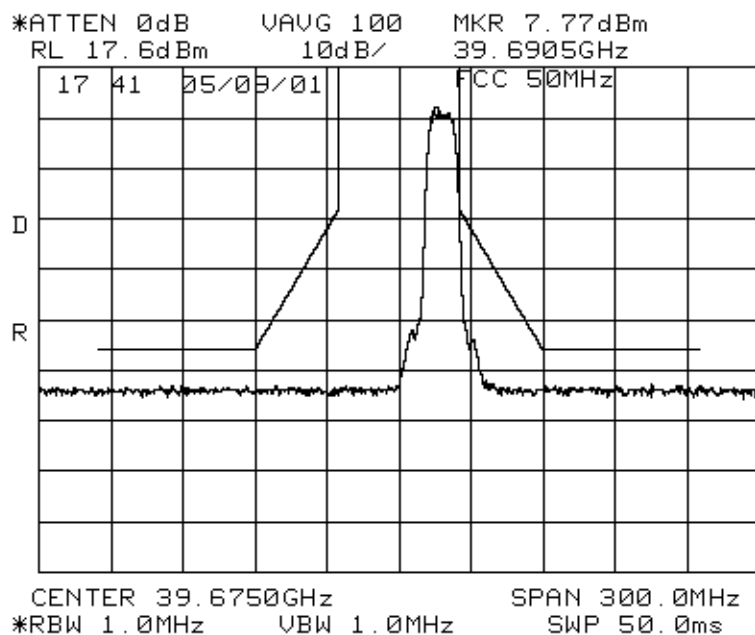
38 GHz RBS  
1 X 28 MHz carrier  
f = 39686 MHz  
upper of middle channel



38 GHz RBS  
1 X 14 MHz carrier  
f = 39657 MHz  
bottom of middle band

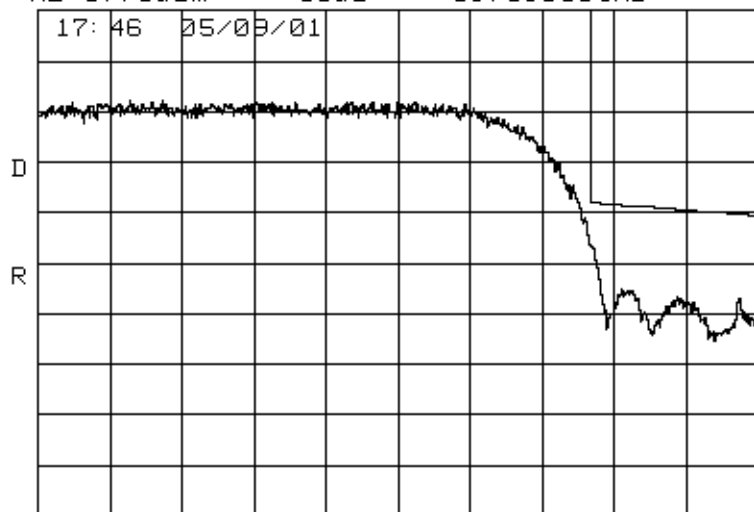


38 GHz RBS  
1 X 14 MHz carrier  
f = 39657 MHz  
bottom of middle band  
with 100kHz RBW



38 GHz RBS  
1 X 14 MHz carrier  
f = 39693 MHz  
upper of middle channel

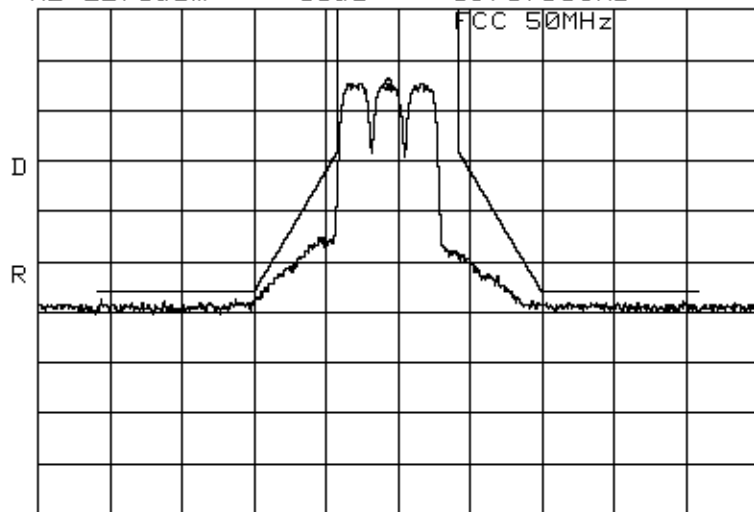
\*ATTEN 0dB VAUG 100 MKR -2.57dBm  
RL 17.6dBm 10dB/ 39.69635GHz



38 GHz RBS  
1 X 14 MHz carrier  
f = 39693 MHz  
upper of middle channel  
with 100kHz RBW

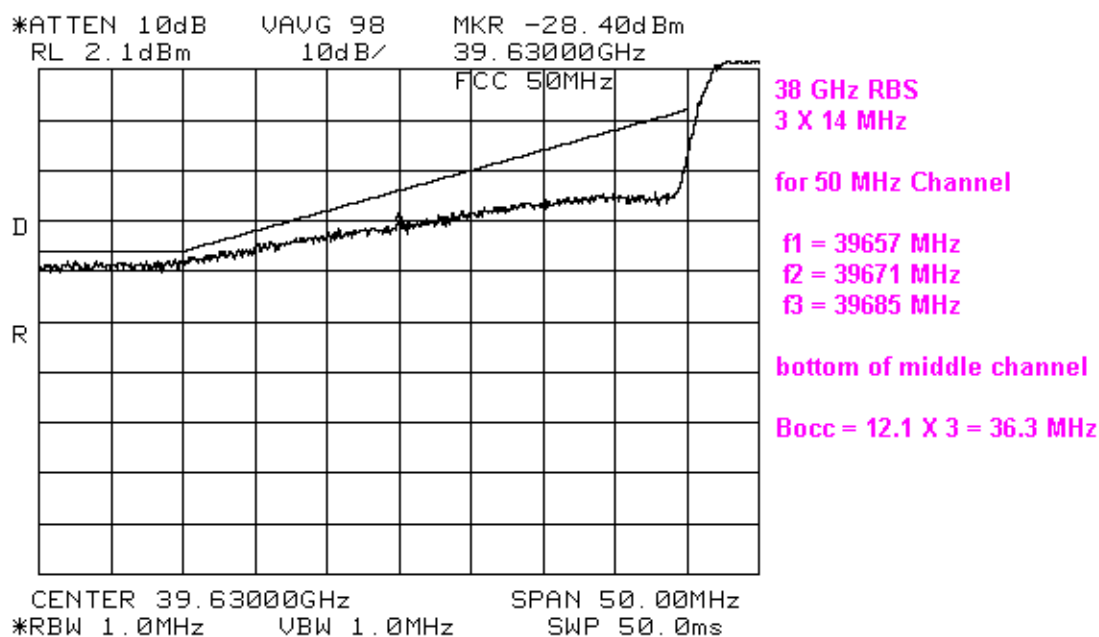
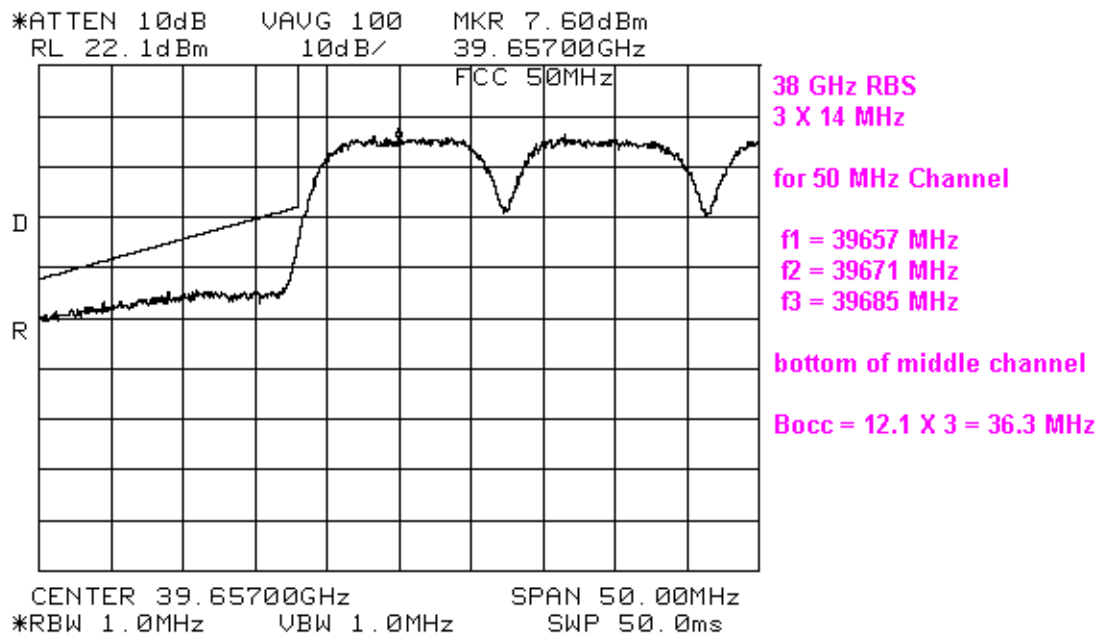
CENTER 39.69600GHz SPAN 15.00MHz  
\*RBW 100kHz VBW 100kHz SWP 50.0ms

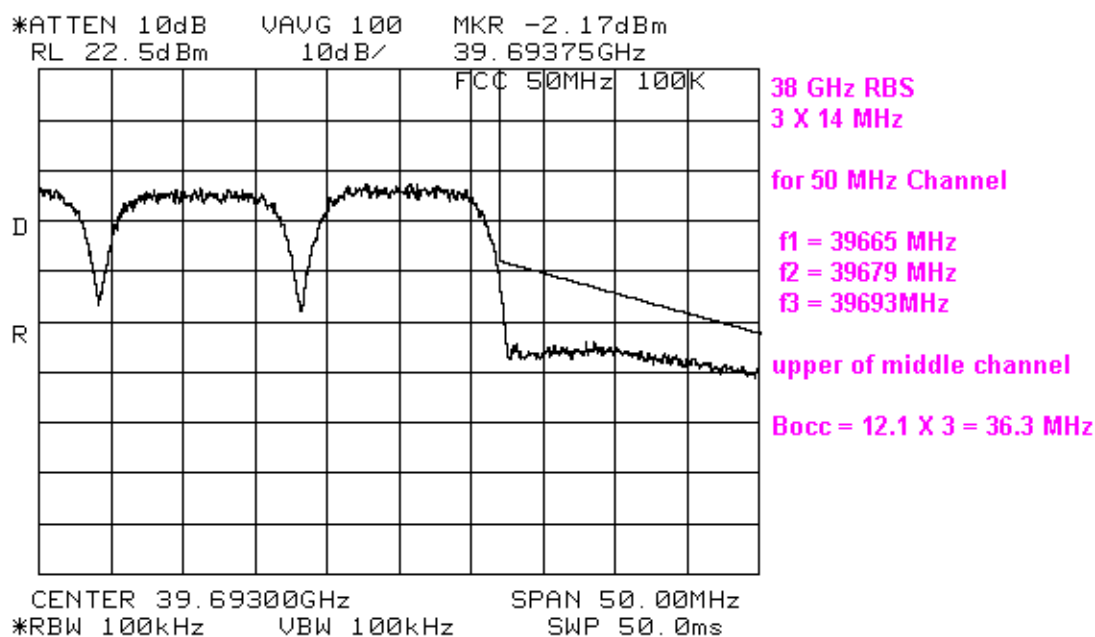
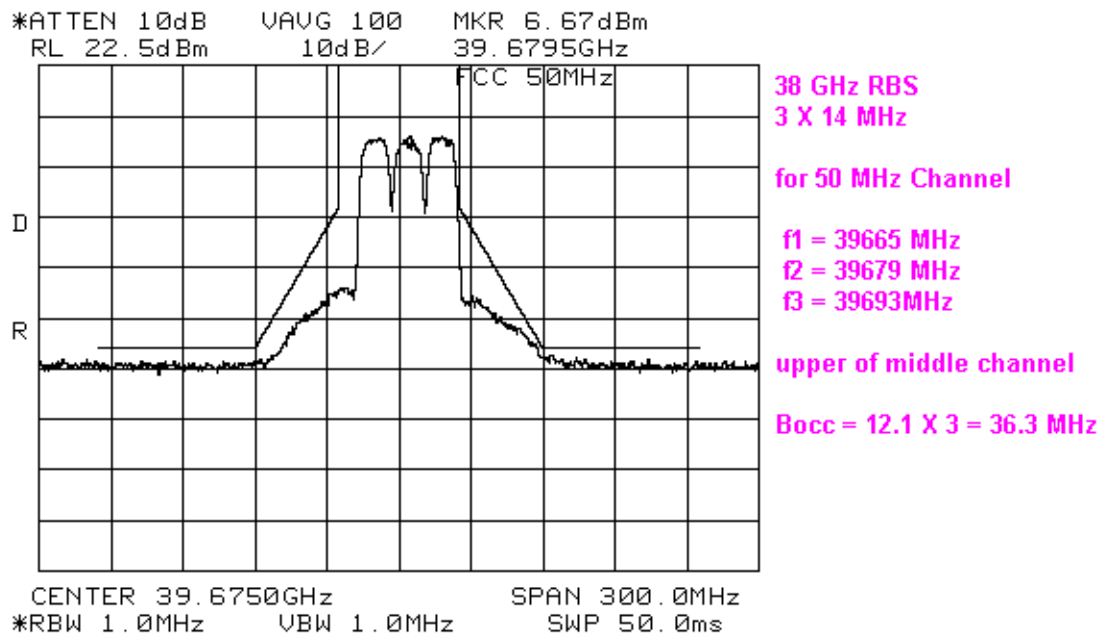
\*ATTEN 10dB VAUG 100 MKR 6.60dBm  
RL 22.1dBm 10dB/ 39.6710GHz

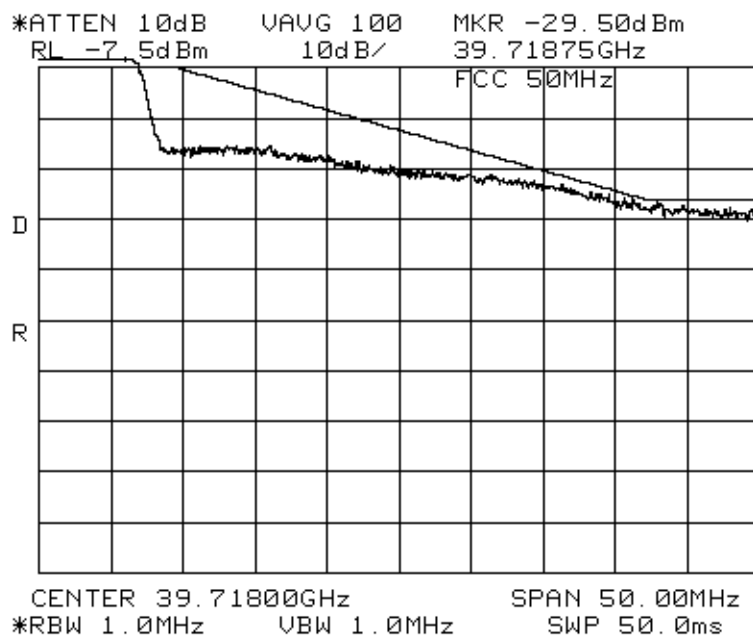


38 GHz RBS  
3 X 14 MHz  
for 50 MHz Channel  
f1 = 39657 MHz  
f2 = 39671 MHz  
f3 = 39685 MHz  
bottom of middle channel  
Bocc = 12.1 X 3 = 36.3 MHz

CENTER 39.6750GHz SPAN 300.00MHz  
\*RBW 1.0MHz VBW 1.0MHz SWP 50.0ms







38 GHz RBS  
3 X 14 MHz

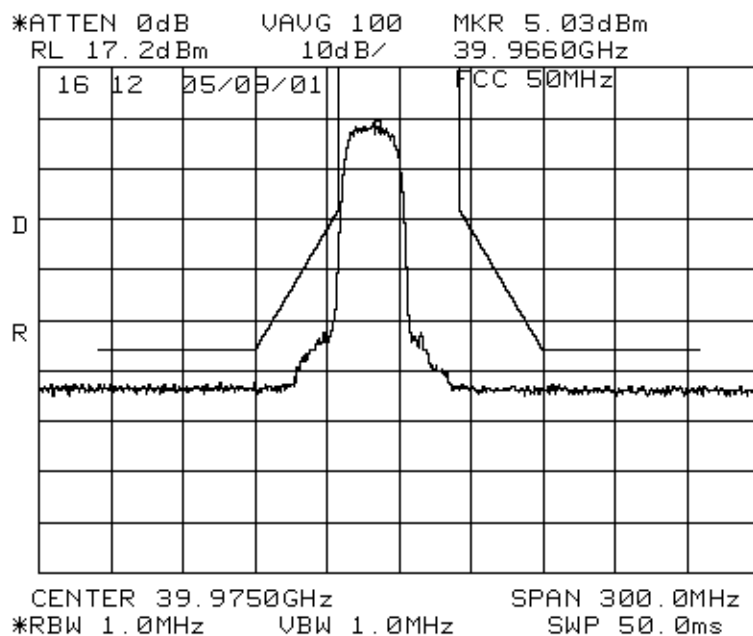
for 50 MHz Channel

f1 = 39665 MHz  
f2 = 39679 MHz  
f3 = 39693MHz

upper of middle channel

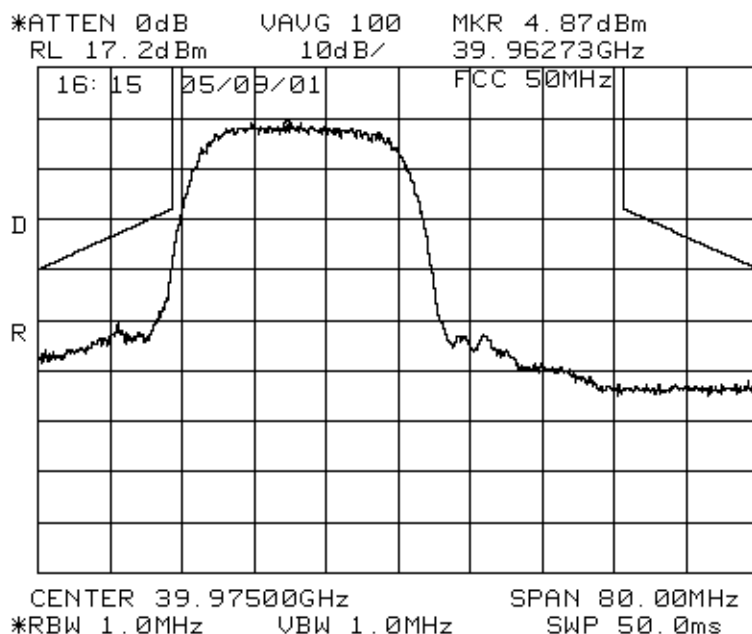
Bocc = 12.1 X 3 = 36.3 MHz

### A – 3: Higher Block (39,950 ~ 40,000 MHz)

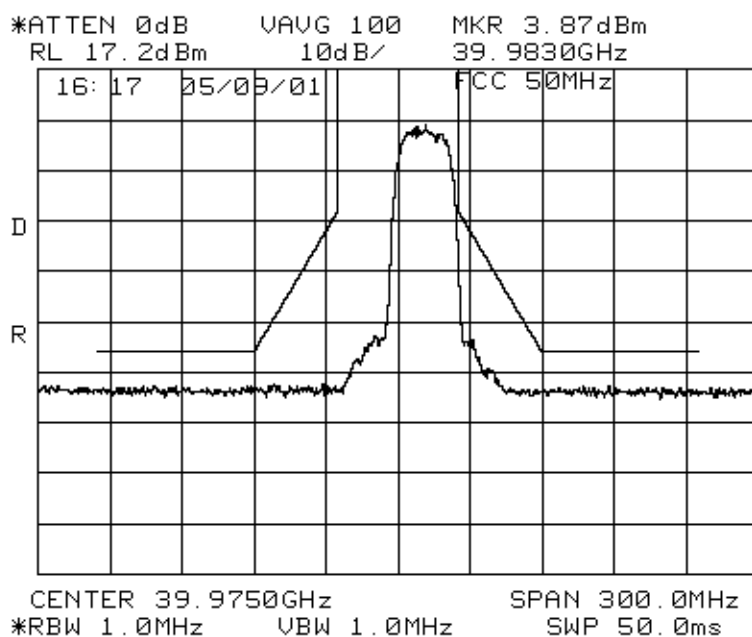


38 GHz RBS  
1 X 28 MHz carrier  
f = 39964 MHz

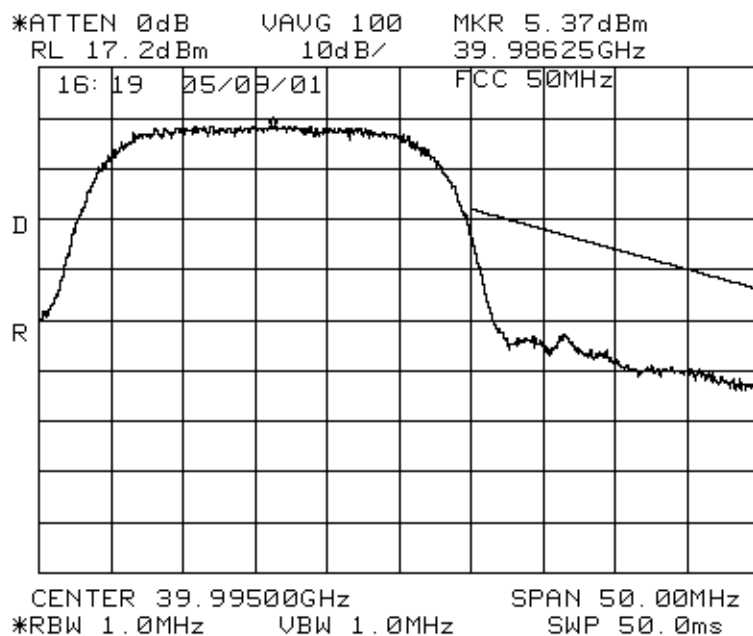
bottom of higher channel



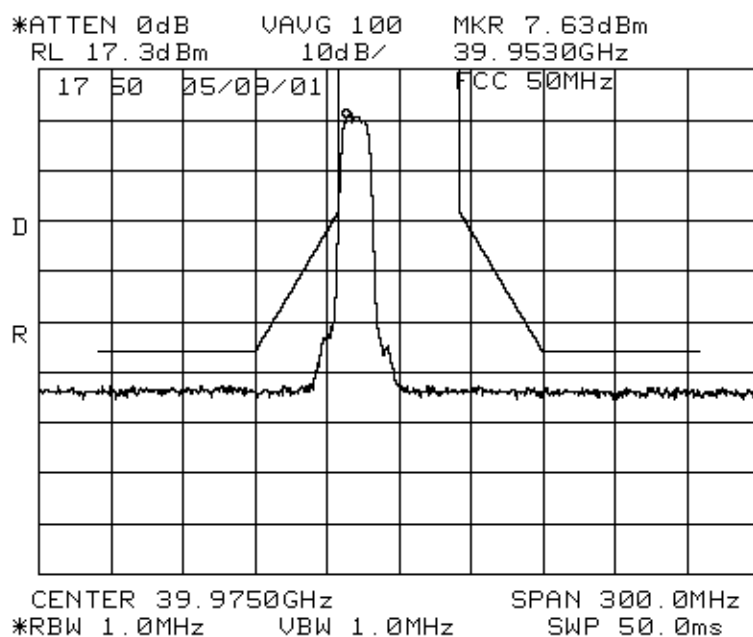
38 GHz RBS  
1 X 28 MHz carrier  
f = 39964 MHz  
bottom of higher channel



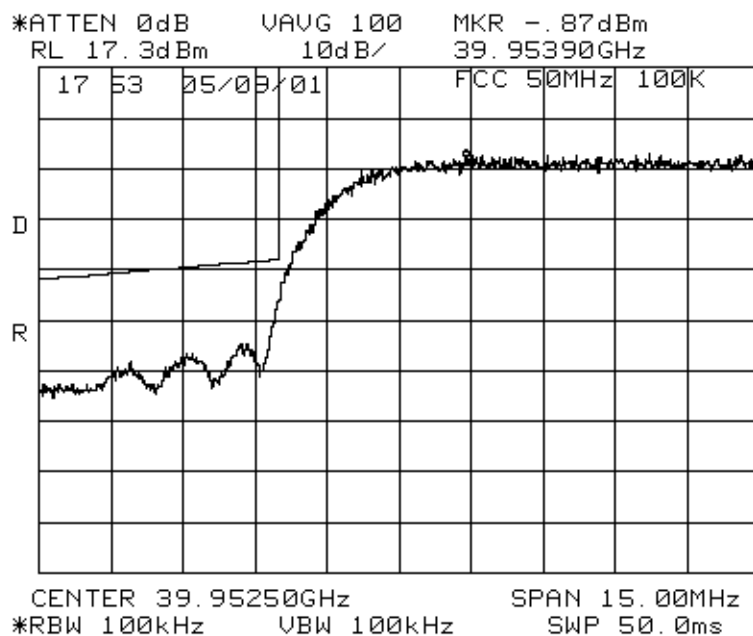
38 GHz RBS  
1 X 28 MHz carrier  
f = 39986 MHz  
upper of higher channel



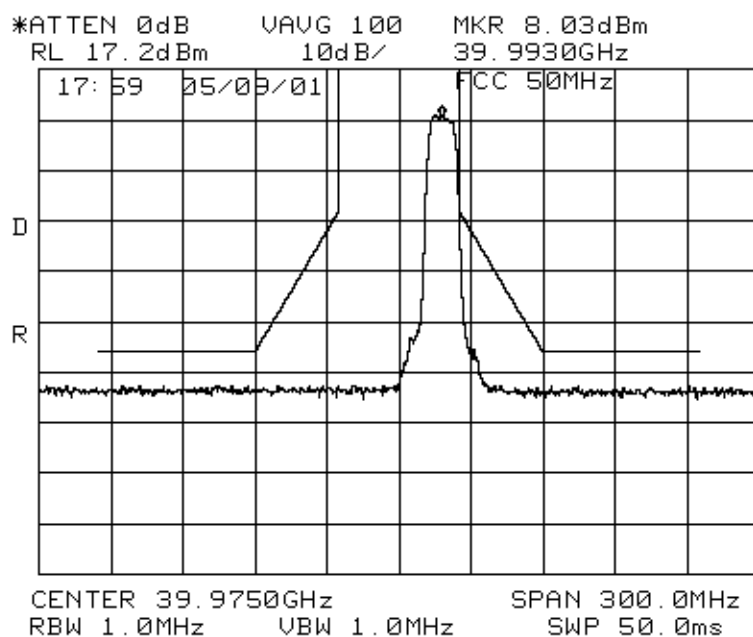
38 GHz RBS  
1 X 28 MHz carrier  
f = 39986 MHz  
upper of higher channel



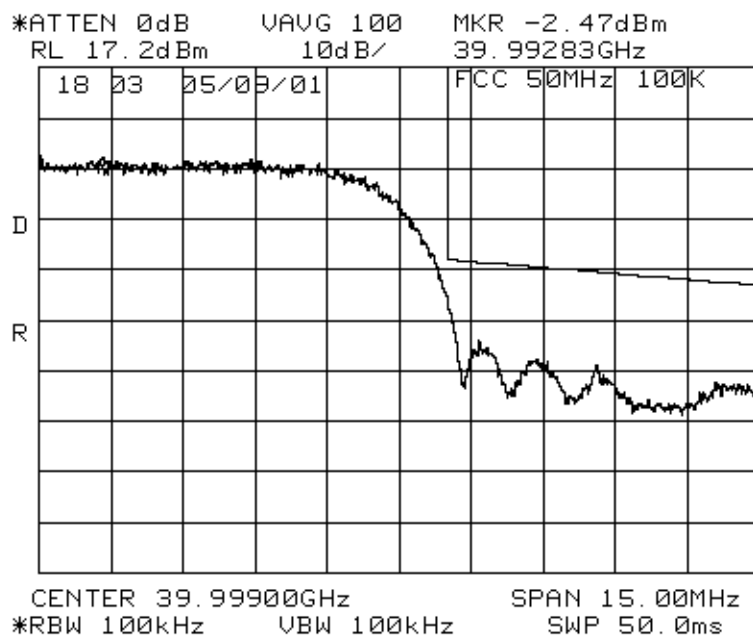
38 GHz RBS  
1 X 14 MHz carrier  
f = 39957 MHz  
bottom of higher channel



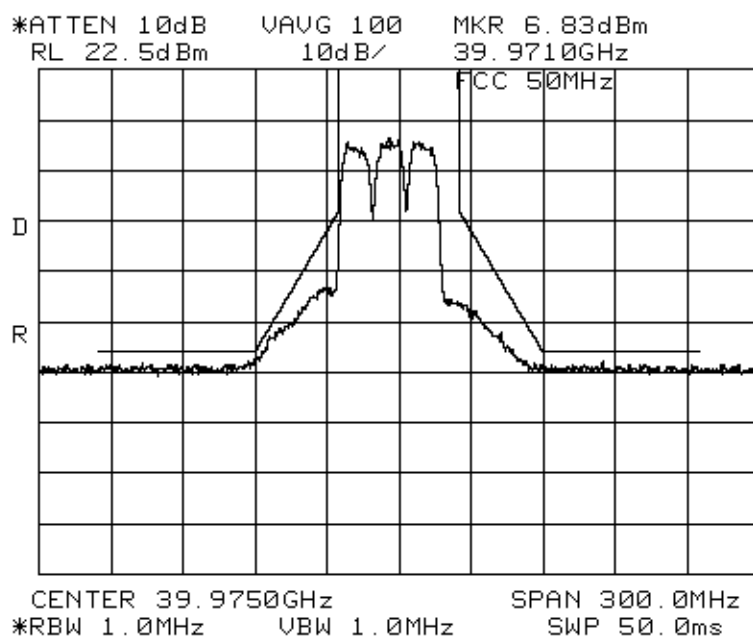
38 GHz RBS  
1 X 14 MHz carrier  
f = 39957 MHz  
bottom of higher channel  
with 100 kHz RBW



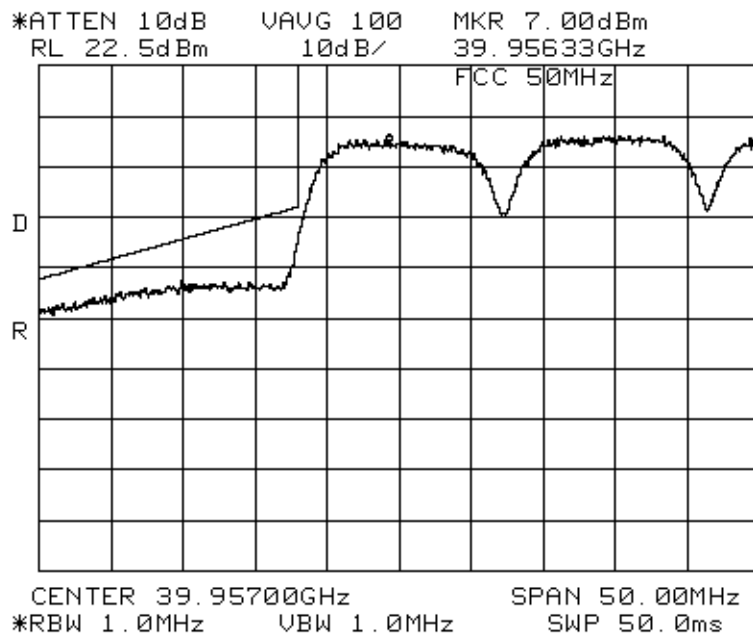
38 GHz RBS  
1 X 14 MHz carrier  
f = 39993 MHz  
upper of higher channel



38 GHz RBS  
1 X 14 MHz carrier  
f = 39993 MHz  
upper of higher channel  
with 100kHz RBW



38 GHz RBS  
3 X 14 MHz  
for 50 MHz Channel  
f1 = 39957 MHz  
f2 = 39971 MHz  
f3 = 39985 MHz  
bottom of higher channel  
Bocc = 12.1 X 3 = 36.3 MHz



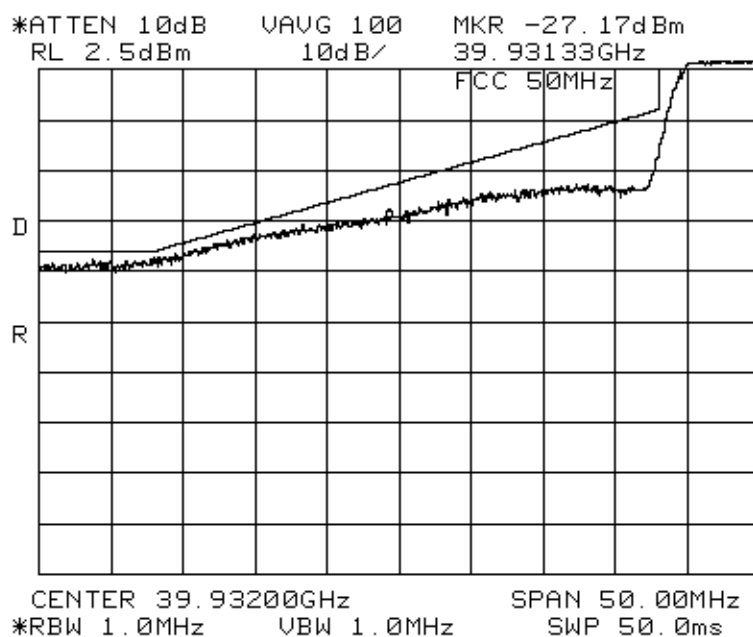
38 GHz RBS  
3 X 14 MHz

for 50 MHz Channel

f1 = 39957 MHz  
f2 = 39971 MHz  
f3 = 39985 MHz

bottom of higher channel

Bocc = 12.1 X 3 = 36.3 MHz



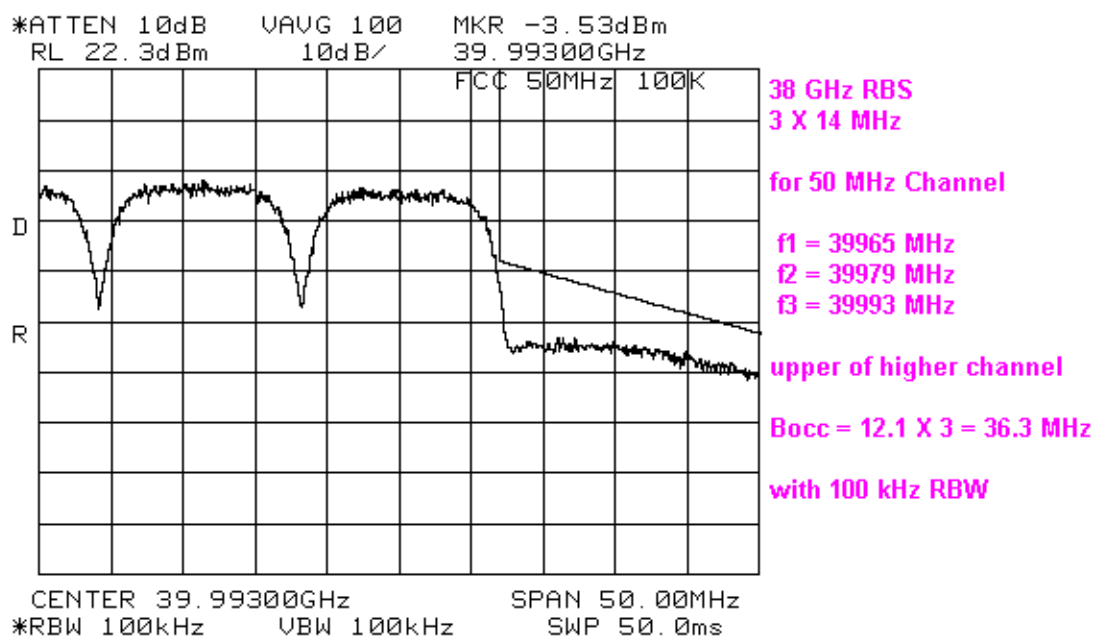
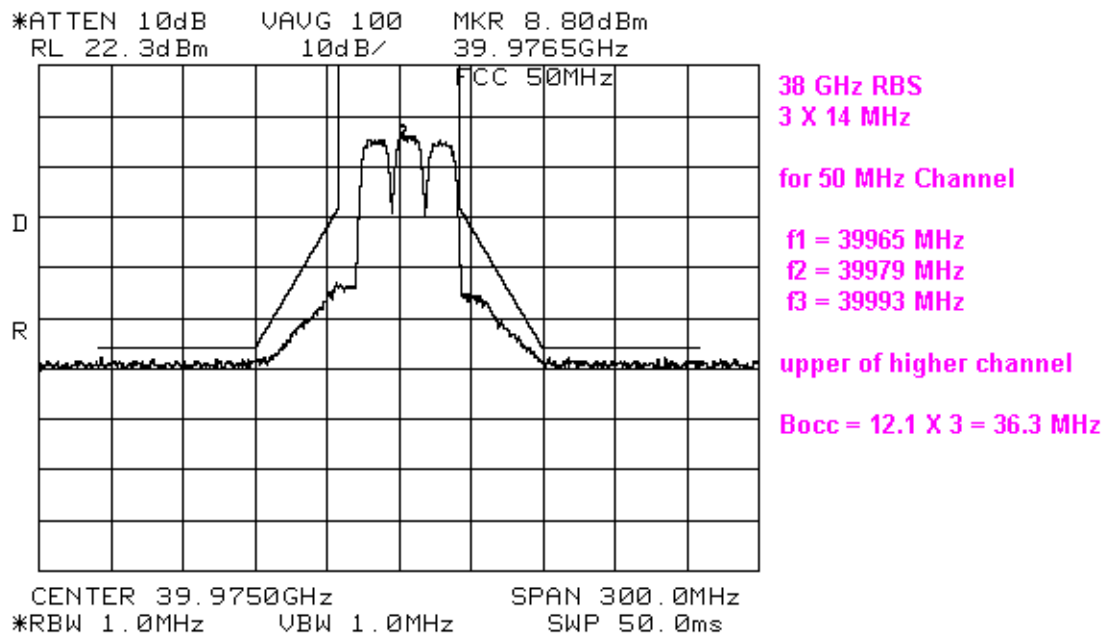
38 GHz RBS  
3 X 14 MHz

for 50 MHz Channel

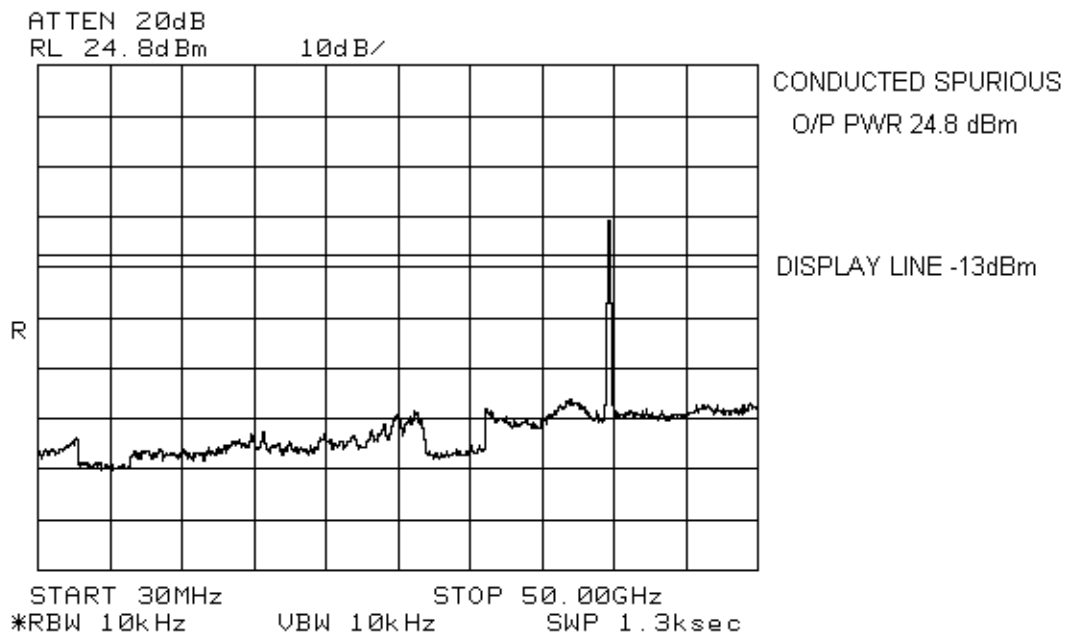
f1 = 39957 MHz  
f2 = 39971 MHz  
f3 = 39985 MHz

bottom of higher channel

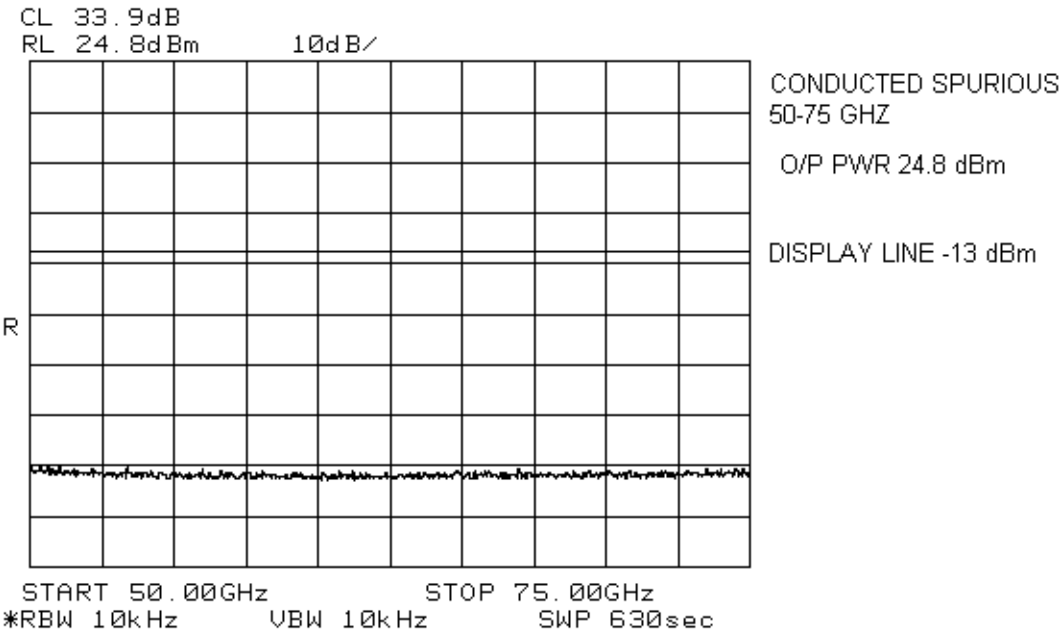
Bocc = 12.1 X 3 = 36.3 MHz

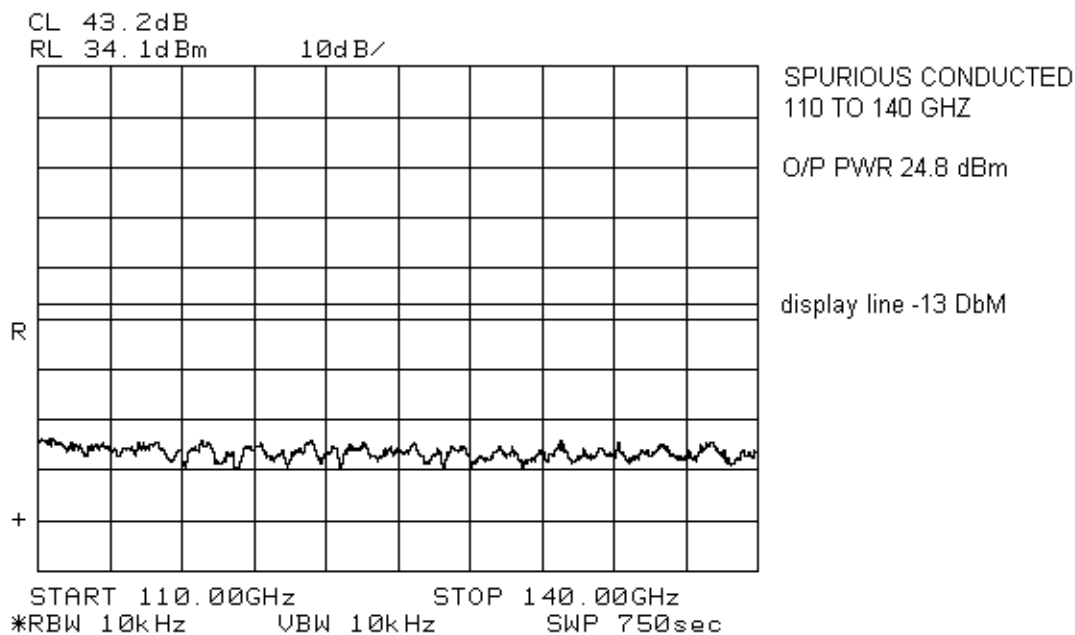
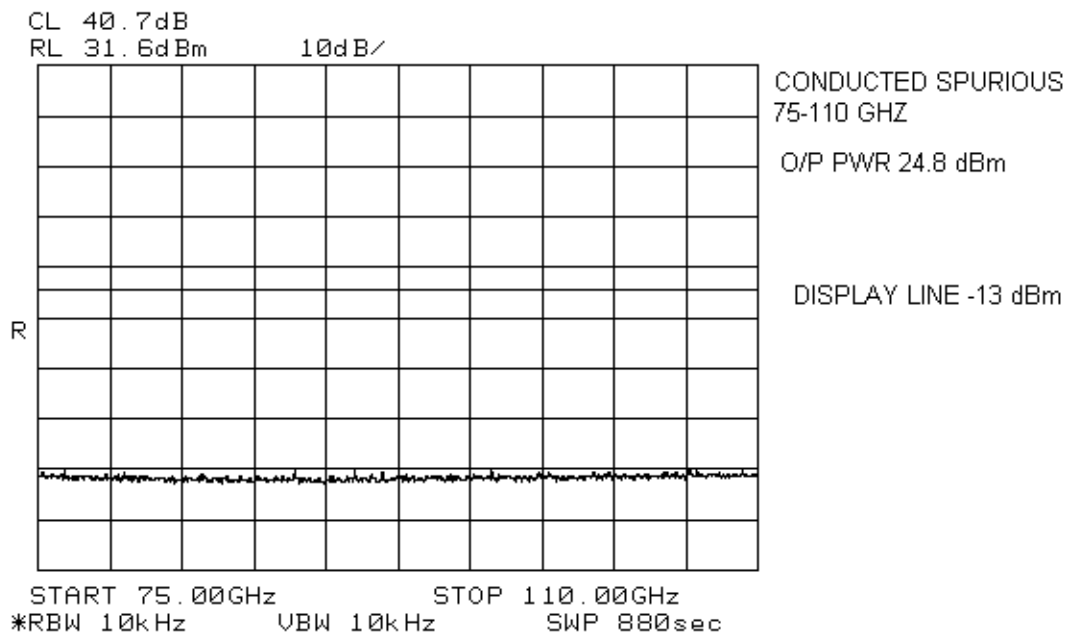


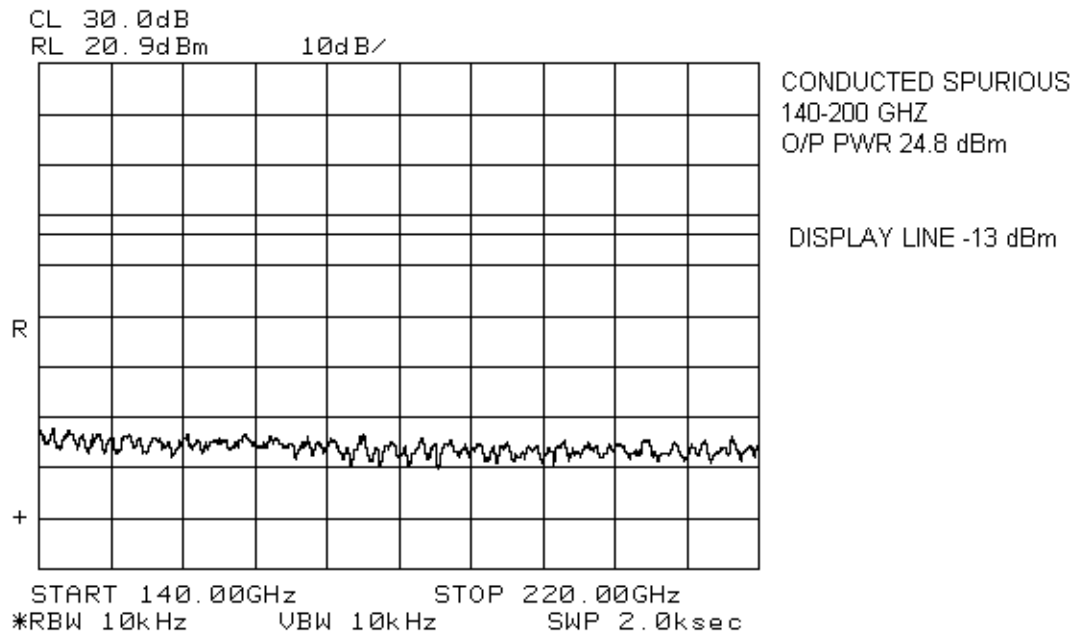
## APPENDIX B: TEST RESULT OF CONDUCTED SPURIOUS



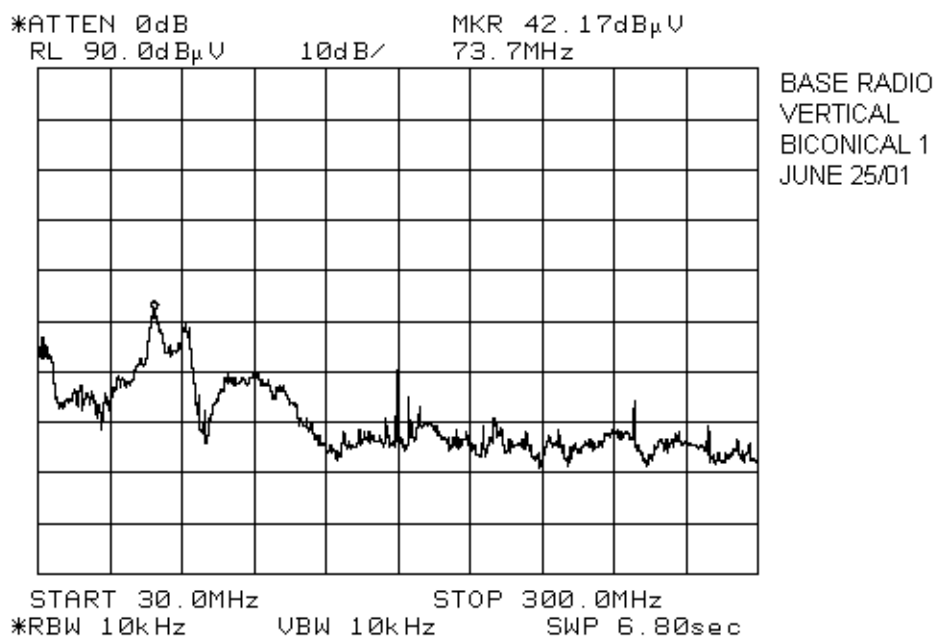
Note: The signal in the spectrum is the operating carriers







## APPENDIX C: TEST RESULT OF RADIATED EMISSIONS



### 3 Meter Below 1GHz

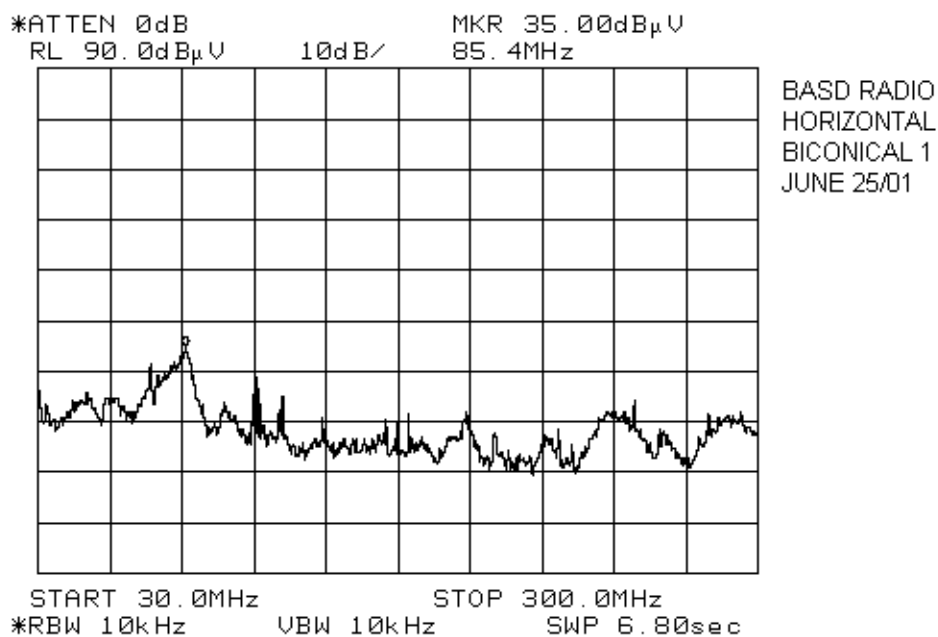
Limit = 84.4 dBμV/m

RBW Correction Factor = 4dB

Peak Emission = 42.2

Af = 7.5

| Peak Emissions Level |     |           |        |            |             |
|----------------------|-----|-----------|--------|------------|-------------|
| Reading              | Af  | RBW Corr. | Result | Limit dBμV | Margin (dB) |
| 42.2                 | 7.5 | -4        | 45.7   | 84.4       | 38.7        |



### 3 Meter Below 1GHz

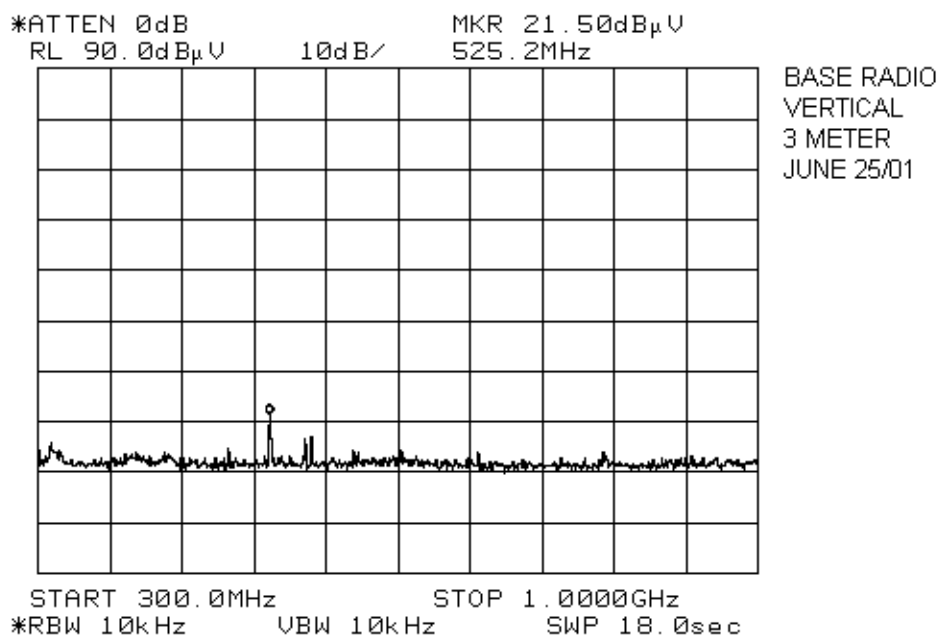
Limit = 84.4 dBμV/m

RBW Correction Factor = 4dB

Peak Emission = 35.0

Af = 7.2

| Peak Emissions Level |     |           |        |            |             |
|----------------------|-----|-----------|--------|------------|-------------|
| Reading              | Af  | RBW Corr. | Result | Limit dBμV | Margin (dB) |
| 35.0                 | 7.2 | -4        | 38.2   | 84.4       | 46.2        |



### 3 Meter Below 1GHz

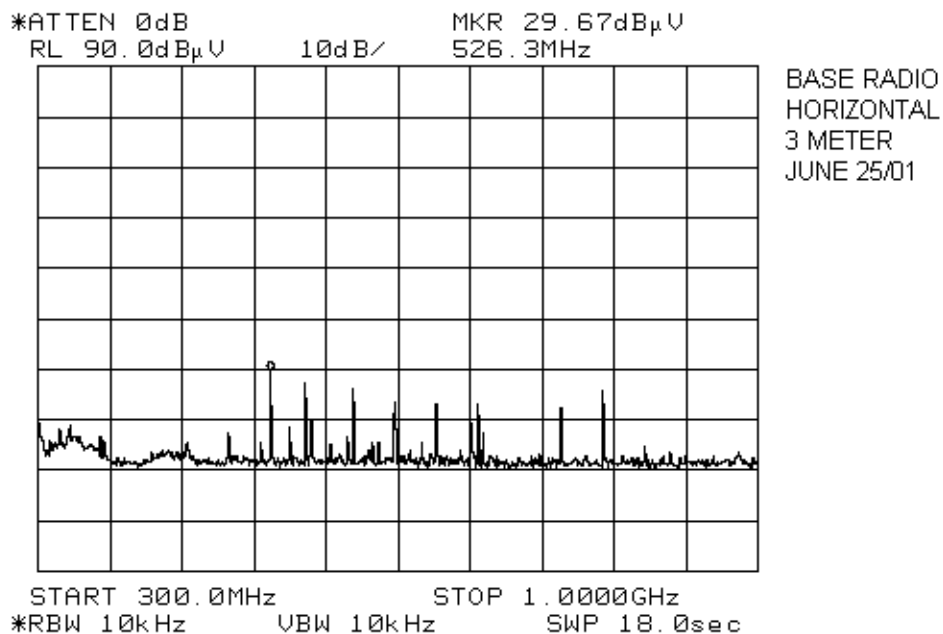
Limit = 84.4 dBμV/m

RBW Correction Factor = 4dB

Peak Emission = 21.5

Af = 19.0

| Peak Emissions Level |      |           |        |            |             |
|----------------------|------|-----------|--------|------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dBμV | Margin (dB) |
| 21.5                 | 19.0 | -4        | 36.5   | 84.4       | 47.9        |



### 3 Meter Below 1GHz

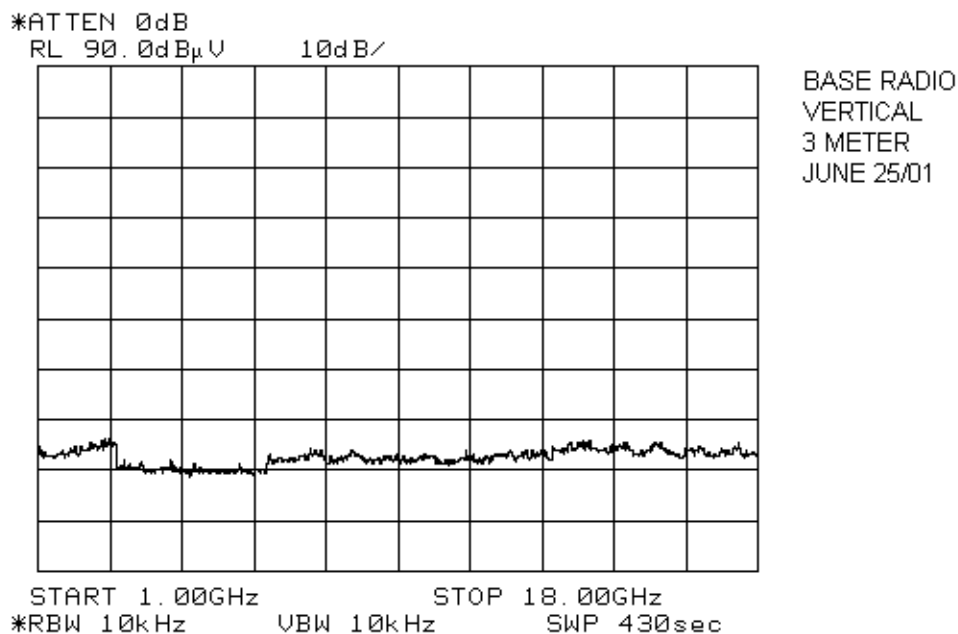
Limit = 84.4 dBμV/m

RBW Correction Factor = 4dB

Peak Emission = 29.7

Af = 19.0

| Peak Emissions Level |      |           |        |            |             |
|----------------------|------|-----------|--------|------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dBμV | Margin (dB) |
| 29.7                 | 19.0 | -4        | 44.7   | 84.4       | 39.7        |



### 3 Meter Above 1GHz

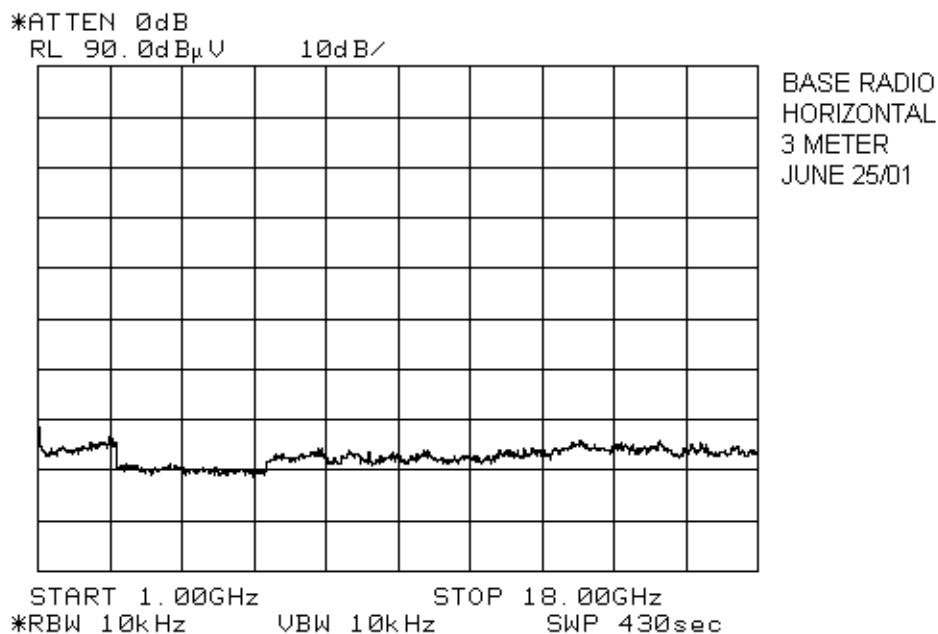
Limit = 82.2 dBμV/m

RBW Correction Factor = 4dB

Peak Emission = 15 dBμV

Af = 44.6 Maximum

| Peak Emissions Level |      |           |        |            |             |
|----------------------|------|-----------|--------|------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dBμV | Margin (dB) |
| 15.0                 | 44.6 | -4        | 55.6   | 82.2       | 26.6        |



### 3 METER ABOVE 1GHZ

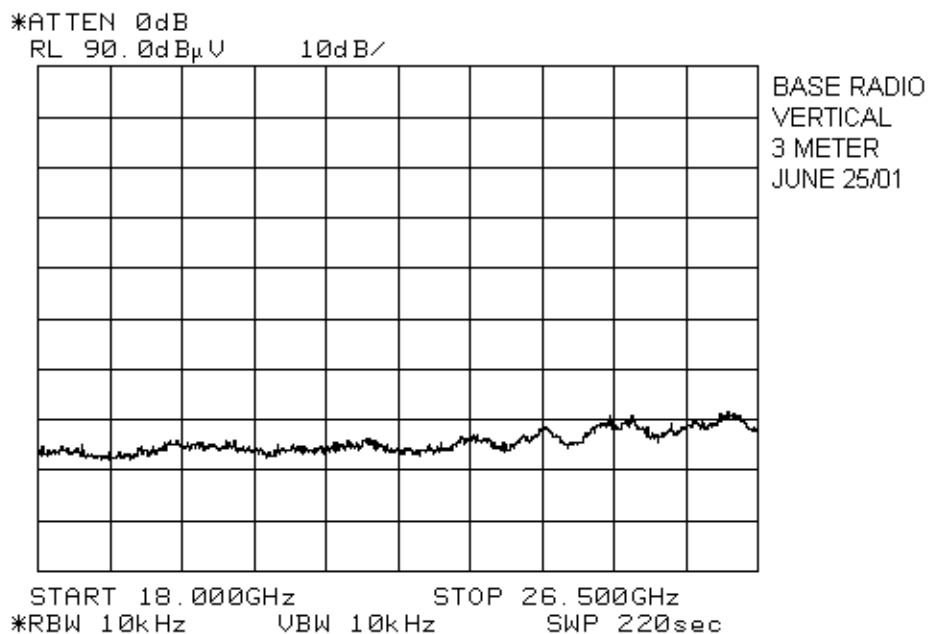
Limit = 82.2 dBμV/m

RBW Correction Factor = 4dB

Peak Emission = 15 dBμV

Af = 44.6 Maximum

| Peak Emissions Level |      |           |        |            |             |
|----------------------|------|-----------|--------|------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dBμV | Margin (dB) |
| 15.0                 | 44.6 | -4        | 55.6   | 82.2       | 26.6        |



### 3 METER ABOVE 1GHZ

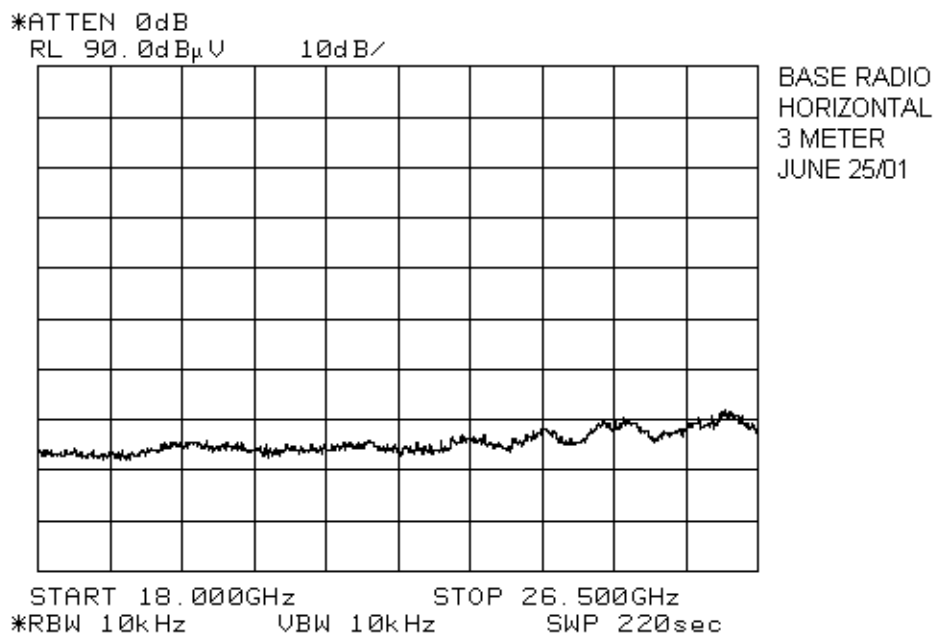
Limit = 82.2 dBμV/m

RBW Correction Factor = 4dB

Peak Emission = 21 dBμV

Af = 40.7 Maximum

| Peak Emissions Level |      |           |        |            |             |
|----------------------|------|-----------|--------|------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dBμV | Margin (dB) |
| 21.0                 | 40.7 | -4        | 57.7   | 82.2       | 24.5        |



### 3 Meter Above 1GHz

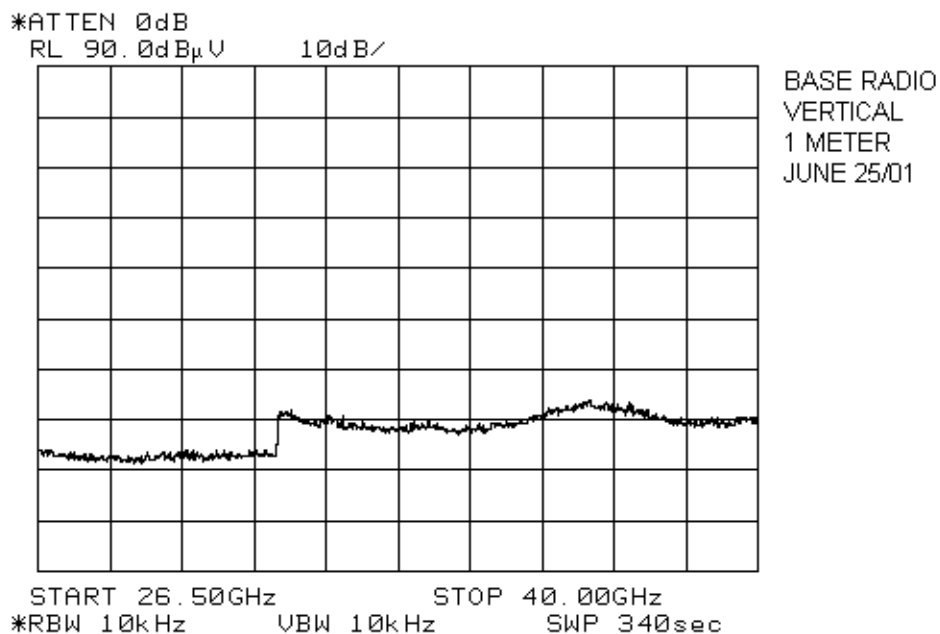
Limit = 82.2 dBμV/m

RBW Correction Factor = 4dB

Peak Emission = 21 dBμV

Af = 40.7 Maximum

| Peak Emissions Level |      |           |        |            |             |
|----------------------|------|-----------|--------|------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dBμV | Margin (dB) |
| 21.0                 | 40.7 | -4        | 57.7   | 82.2       | 24.5        |



### 1 Meter Above 1GHz

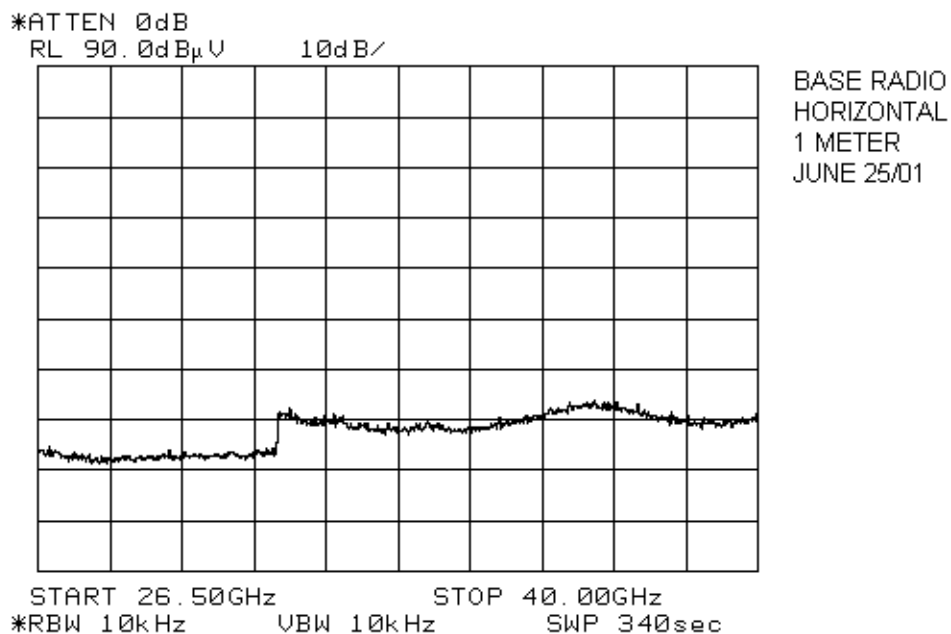
Limit = 91.8 dBμV/m

RBW Correction Factor = 4dB

Peak Emission = 23

Af = 44.2 Maximum

| Peak Emissions Level |      |           |        |            |             |
|----------------------|------|-----------|--------|------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dBμV | Margin (dB) |
| 23.0                 | 44.2 | -4        | 63.2   | 91.8       | 28.6        |



### 1 Meter Above 1GHz

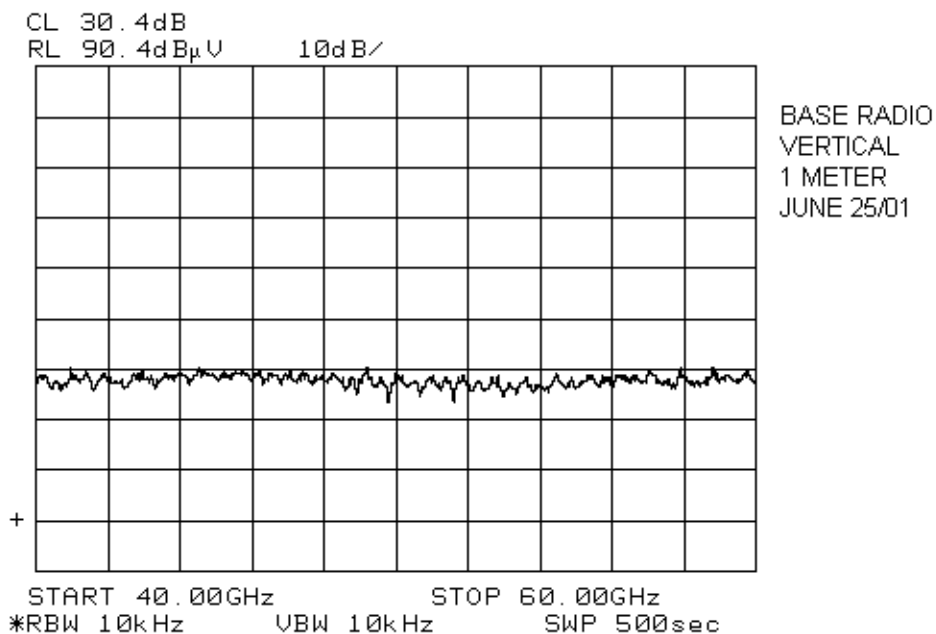
Limit = 91.8 dBμV/m

RBW Correction Factor = 4dB

Peak Emission = 23

Af = 44.2 Maximum

| Peak Emissions Level |      |           |        |            |             |
|----------------------|------|-----------|--------|------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dBμV | Margin (dB) |
| 23.0                 | 44.2 | -4        | 63.2   | 91.8       | 28.6        |



### 1 Meter Above 1GHz

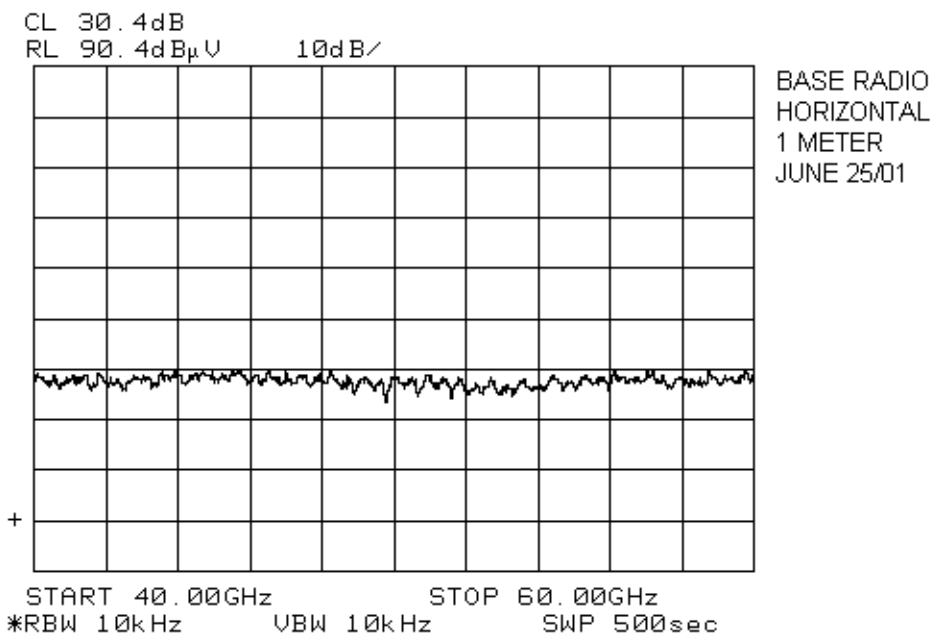
Limit = 91.8 dB $\mu$ V/m

RBW Correction Factor = 4dB

Peak Emission = 30

Af = 40.6

| Peak Emissions Level |      |           |        |                  |             |
|----------------------|------|-----------|--------|------------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dB $\mu$ V | Margin (dB) |
| 30.0                 | 40.6 | -4        | 66.6   | 91.8             | 25.2        |



## 1 Meter Above 1GHz

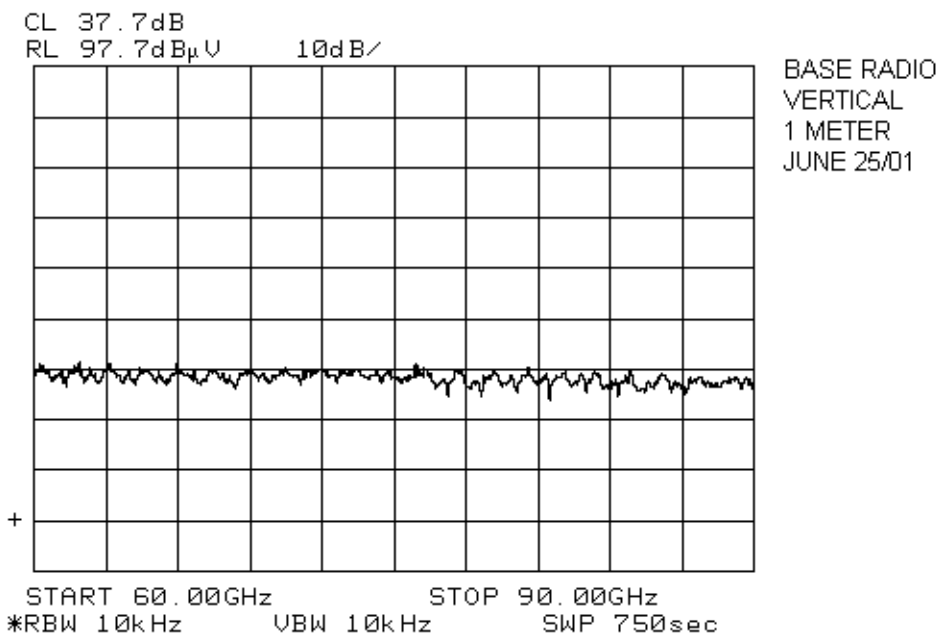
Limit = 91.8 dB $\mu$ V/m

RBW Correction Factor = 4dB

Peak Emission = 30

Af = 40.6

| Peak Emissions Level |      |           |        |                  |             |
|----------------------|------|-----------|--------|------------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dB $\mu$ V | Margin (dB) |
| 30.0                 | 40.6 | -4        | 66.6   | 91.8             | 25.2        |



### 1 Meter Above 1GHz

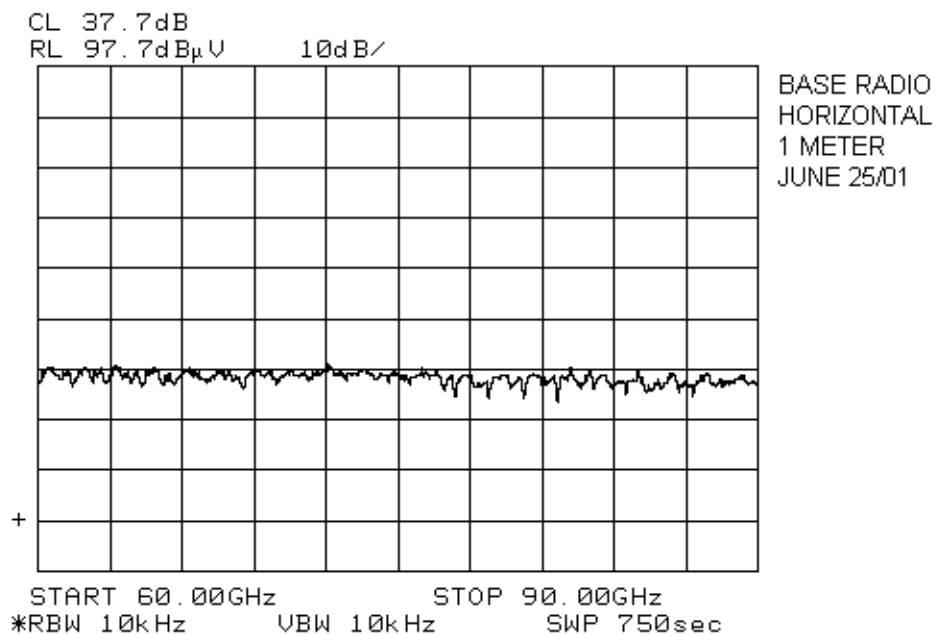
Limit = 91.8 dB $\mu$ V/m

RBW Correction Factor = 4dB

Peak Emission = 30

Af = 44.6

| Peak Emissions Level |      |           |        |                  |             |
|----------------------|------|-----------|--------|------------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dB $\mu$ V | Margin (dB) |
| 30.0                 | 44.6 | -4        | 70.6   | 91.8             | 21.2        |



### 1 Meter Above 1GHz

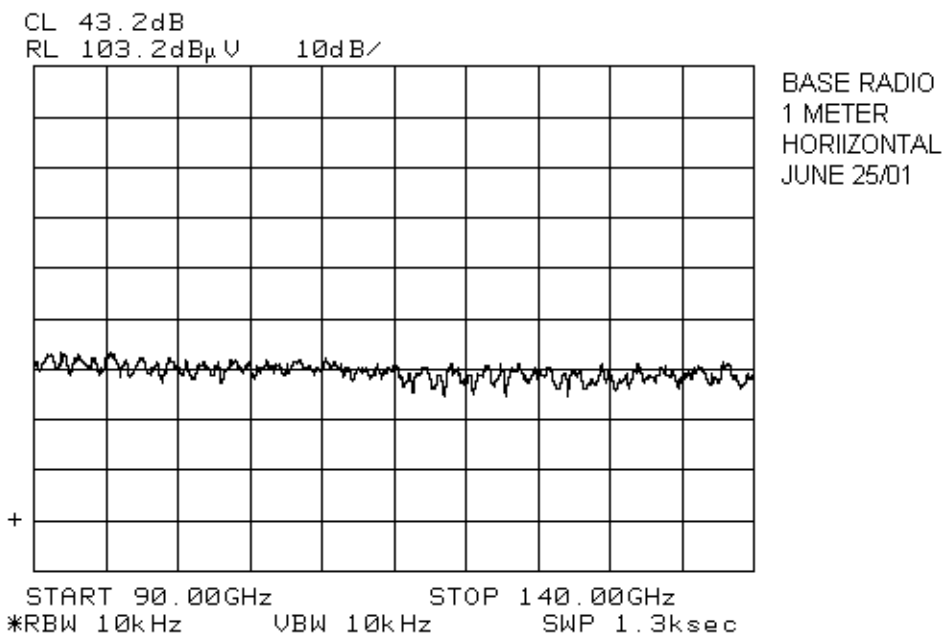
Limit = 91.8 dB $\mu$ V/m

RBW Correction Factor = 4dB

Peak Emission = 30

Af = 44.6

| Peak Emissions Level |      |           |        |                  |             |
|----------------------|------|-----------|--------|------------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dB $\mu$ V | Margin (dB) |
| 30                   | 44.6 | -4        | 70.6   | 91.8             | 21.2        |



## 1 Meter Above 1GHz

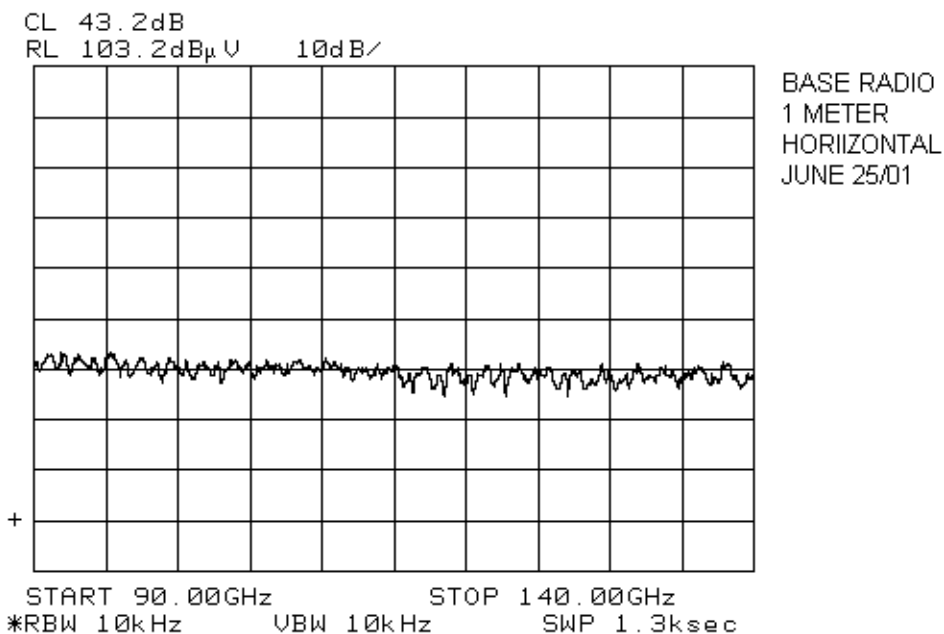
Limit = 91.8 dB $\mu$ V/m

RBW Correction Factor = 4dB

Peak Emission = 45

Af = 48.6

| Peak Emissions Level |      |           |        |                  |             |
|----------------------|------|-----------|--------|------------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dB $\mu$ V | Margin (dB) |
| 45.0                 | 48.6 | -4        | 89.6   | 91.8             | 2.2         |



## 1 Meter Above 1GHz

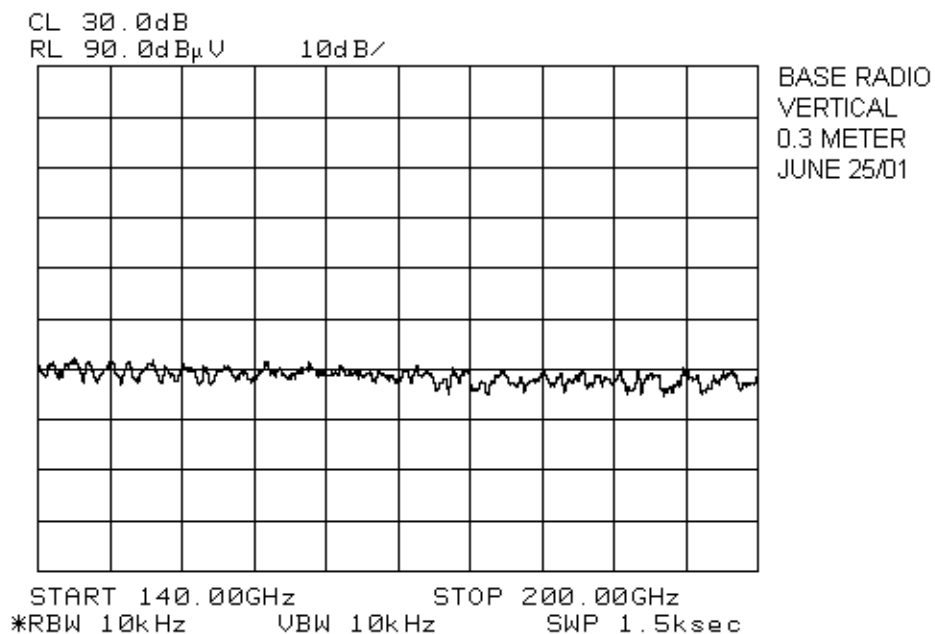
Limit = 91.8 dB $\mu$ V/m

RBW Correction Factor = 4dB

Peak Emission = 45

Af = 48.6

| Peak Emissions Level |      |           |        |                  |             |
|----------------------|------|-----------|--------|------------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dB $\mu$ V | Margin (dB) |
| 45.0                 | 48.6 | -4        | 89.6   | 91.8             | 2.2         |



### 0.3 Meter Above 1GHz

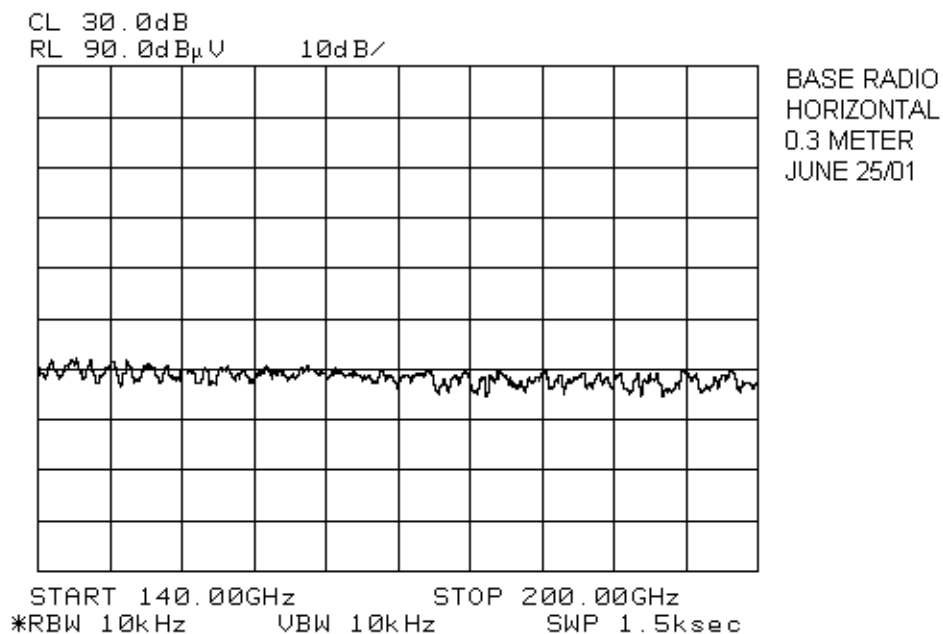
Limit = 102.3 dB $\mu$ V/m

RBW Correction Factor = 4dB

Peak Emission = 33

Af = 52.0

| Peak Emissions Level |      |           |        |                  |             |
|----------------------|------|-----------|--------|------------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dB $\mu$ V | Margin (dB) |
| 33.0                 | 52.0 | -4        | 81.0   | 102.3            | 21.3        |



### 0.3 Meter Above 1GHz

Limit = 102.3 dB $\mu$ V/m

RBW Correction Factor = 4dB

Peak Emission = 33

Af = 52.0

| Peak Emissions Level |      |           |        |                  |             |
|----------------------|------|-----------|--------|------------------|-------------|
| Reading              | Af   | RBW Corr. | Result | Limit dB $\mu$ V | Margin (dB) |
| 33.0                 | 52.0 | -4        | 81.0   | 102.3            | 21.3        |



## REFERENCES

- [1] Alcatel internal document AQP0001, Regulatory Approvals Overview, D. Moncion.  
(Formally HQP0009)
- [2] Alcatel internal document, GTN0039, EMC Test Report Template
- [3] Alcatel Internal document, GQP 0001 Document Template.
- [4] Alcatel Internal document, GTP 0004 Network Interface Compliance Test Plan Template.
- [5] Alcatel Internal document, GTN 0379 Detailed list of Network Interface Conformance Standards.
- [7] Alcatel Internal Document, GTN 0380 Network Approvals Test Report Template
- [8] FCC, 47 CFR Part101 Fixed Microwave Services, edition 10-1-00
- [9] FCC, 47 CFR Part 2 Frequency Allocation and Radio Treaty Matters: General Rules and Regulations, edition 10-1-99
- [10] Industry Canada, RSS-191 Issue: 1 (Provisional Feb.5, 2000)  
(Local Multipoint Communication Systems in 28GHz Band; Point to Point and Point to Multipoint Broadband Communication Systems in the 24 GHz and 38 GHz Bands)
- [11] Telecordia GR -1089 Electromagnetic Compatibility and Electrical Safety  
Generic Criteria for Network Telecommunications Equipment.

## HISTORY

This document was created from the document template GQP0001, version 12.1.1.

| Version   | Date       | Person   | Reason       |
|-----------|------------|----------|--------------|
| Draft 1.0 | 2001.07.24 | Frank Li | Creation     |
| Issued1.0 | 2001.09.24 | Frank Li | Modification |