

PointRed Base Station Transmitter Class 2 Permissive Change Request

FCC ID: QDU-MCRD-BASE-2R5
Original Grant: 28 June 2002

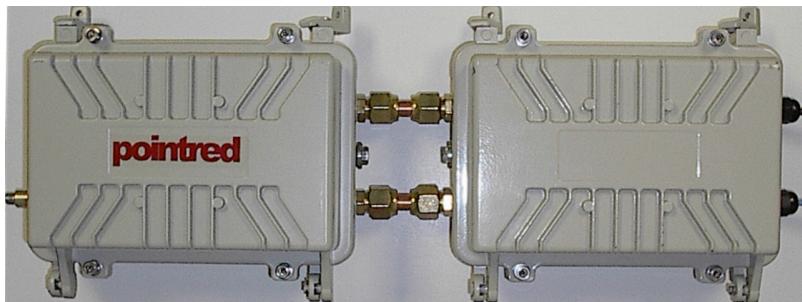
The following changes have been made to the original equipment:

- a) A new case has been designed for the outdoor radio transceiver unit.
- b) Different type and manufacturer for TX output filters
- c) Additional absorbing material installed on pcb and case lid

Antenna conducted and radiated emissions testing was performed. Radiated emissions were performed in the CCS five meter anechoic chamber. Conducted emissions were performed at the Pointred facility laboratory.

PointRed MMDS CPE Transmitter

The Base Station



The BASE STATION (BST) IF Unit contains an RF modem operating at 380 MHz, as both a receive and transmit device. The BST is a lightweight, robust ODU (outdoor unit) and is typically mounted on a structure or radio tower. The BST modem provides the interface to the Internet, Router, or other media types. The BST is combined with a transceiver unit to generate the pico cell base station.

The Transceiver Unit

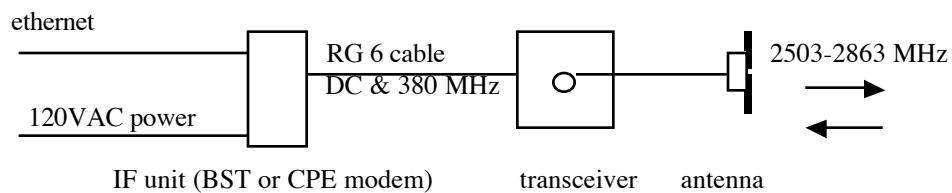


The Transceiver unit functions as the RF interface. The Transceiver can be configured with various antenna gain combinations and models and is powered with DC provided from the indoor unit.

The transceiver (radio unit) can be configured as either customer premises equipment (CPE) or as a base station unit (BST). The transceiver is identical for both applications.

The BST and subscriber (CPE) modem have different housings and power supplies,, but the IF output signals are the same and the transceiver used with them is identical.

Fig.1



Test Equipment:

Spectrum analyzer:	Agilent PSA E4460 3Hz – 26.5 GHz (radiated emissions above 1 GH)
EMI Receiver:	HP 8524E 20 Hz – 2.9 GHz
Spectrum analyzer:	HP 8563 20 Hz – 26.5 GHz (antenna output conducted)
Pre-amplifier:	Miteq NSP2600-SP 1- 26.5 GHz
Bilog antenna:	ARA LPB 2520/A
RX Horn Antenna	EMCO 3115 1-18 GHz
RX Horn Antenna	ARA 18 – 26.5 GHz horn
Signal Generator	Rohde&Schwarz SMP04
TX Horn Antenna;	EMC 3115

Section 2.1047 Modulation Characteristics**Requirement/Limit: 21.908(a)**

Maximum out of band emission:

At 6 MHz channel bandedge: -25 dB relative to average 6 MHz channel power level

Then linear slope of -40 dB for next 250 kHz

Then linear slope of -60 dB to 3MHz removed from highest or lowest 6 MHz channel edge

Then -60 dB beyond that

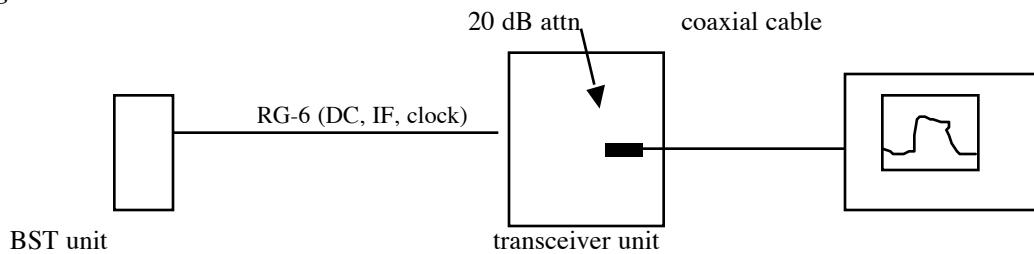
Measurement equipment used:

HP 8563E Spectrum Analyzer

Coaxial attenuator 1.5 ft (0.5 dB loss at 2.5 GHz)

Test set-up:

Figure 2

**Test Procedures**

Software was run to produce a continuous pseudo random bit stream (prbs).

Test Results

PASS. Refer to attached spectrum analyzer charts for two channels:

Lowest: 2503 MHz

Highest: 2683 MHz

Emissions masks at Lowest and Highest channels are shown with mask lines superimposed on spectrum analyzer charts.

7/15/03

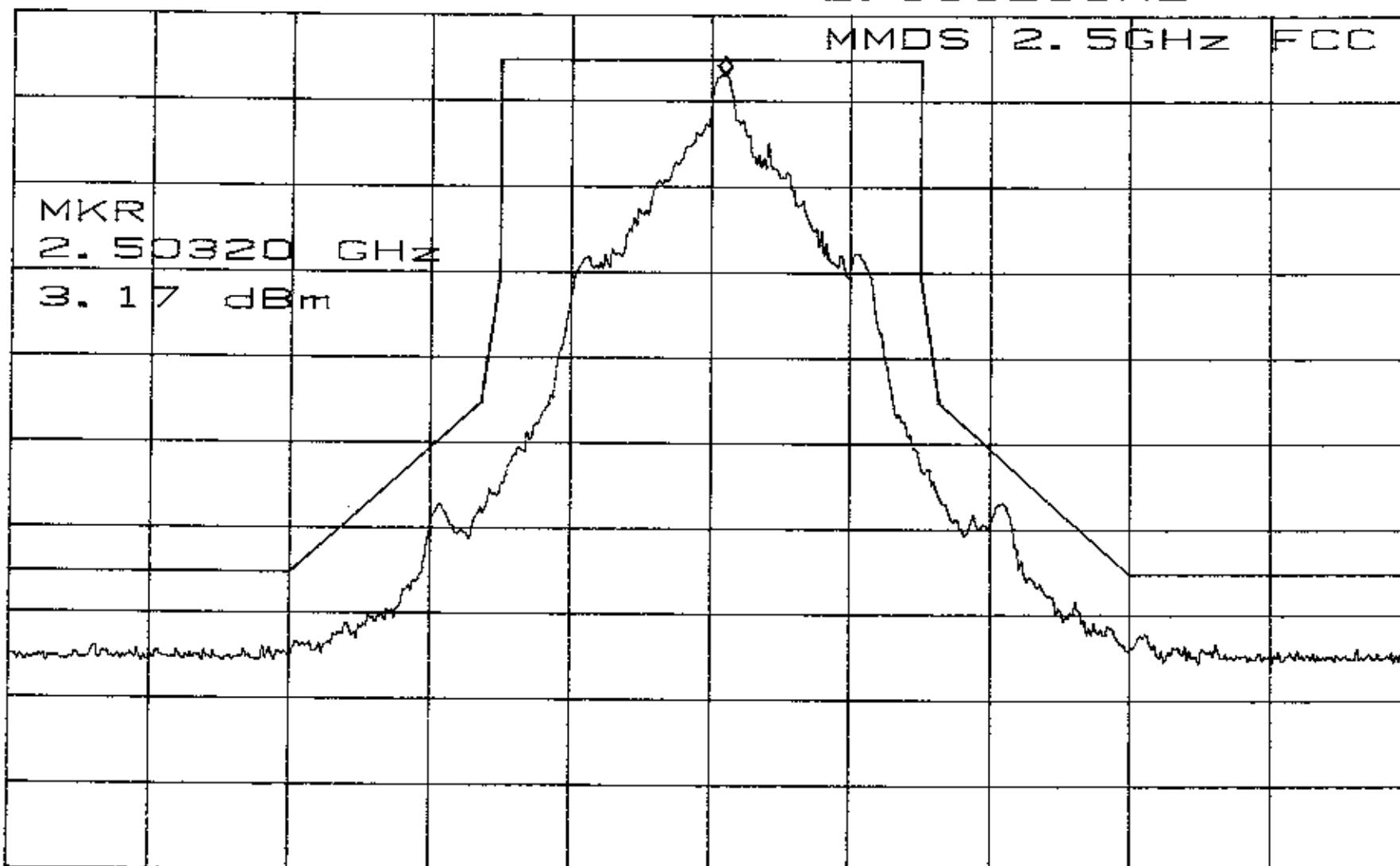
ATTEN 20dB

RL 10.0dBm

10dB/

MKR 3. 17dBm

2. 50320GHz



CENTER 2. 50300GHz

*RBW 100KHz

*VBW 30KHz

SPAN 20. 00MHz

*SWP 200ms

7/15/03

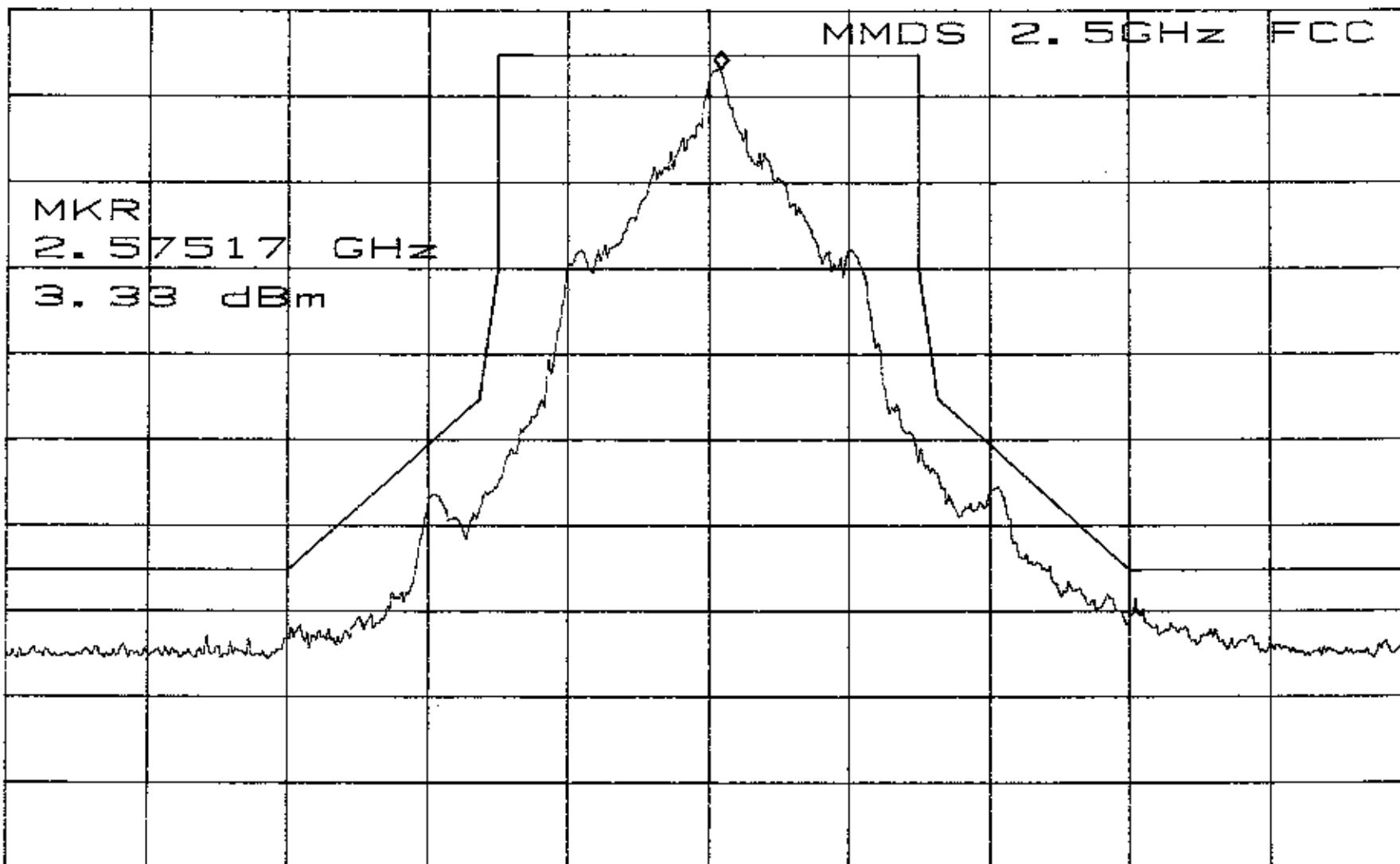
ATTEN 20dB

RL 10.0dBm

10dB/

MKR 3.33dBm

2.57517GHz



CENTER 2.57500GHz

*RBW 100kHz

*VBW 30kHz

SPAN 20.00MHz

*SWP 200ms

7/15/03

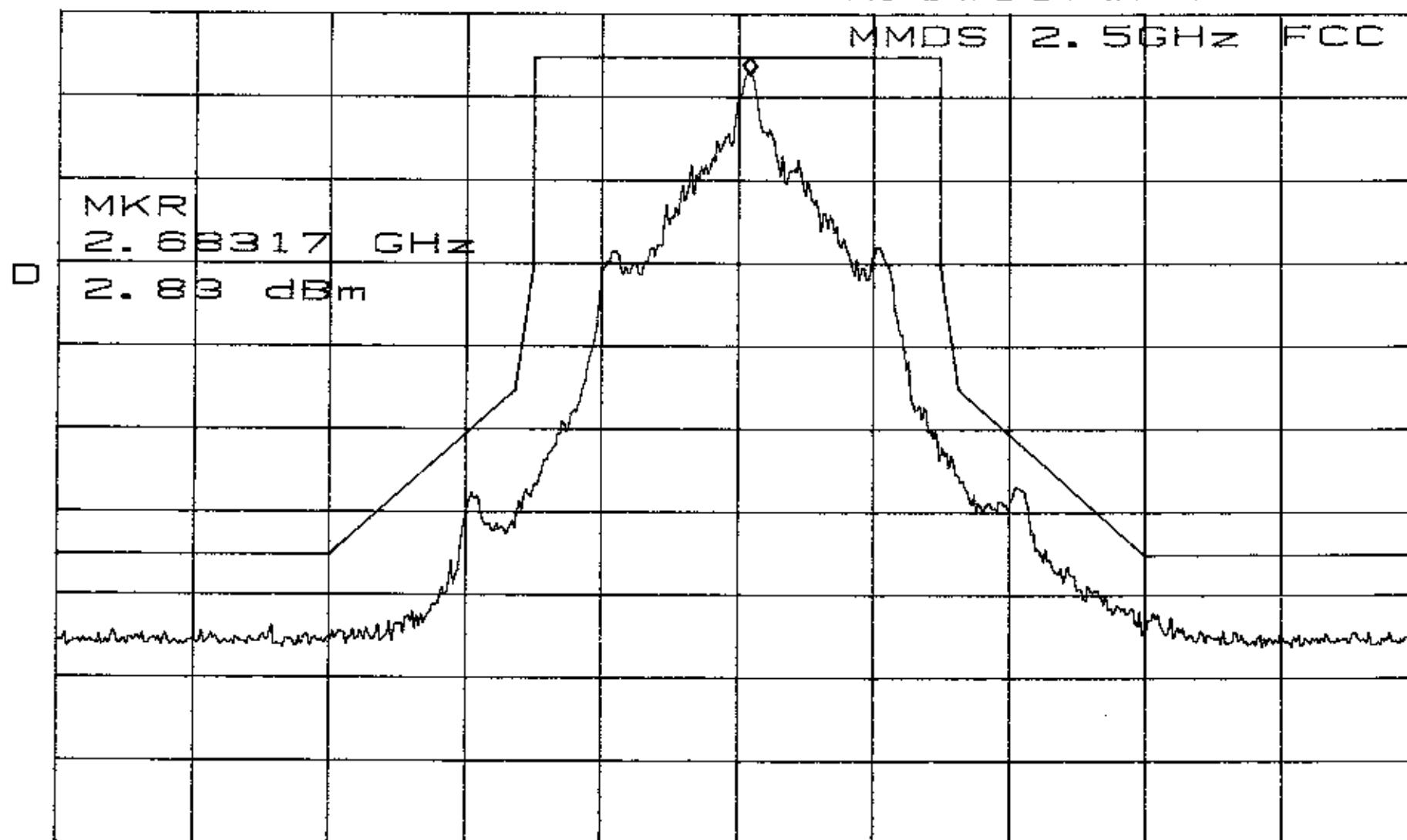
ATTEN 20dB

RF 10. 00dBm

10dB/

MKR 2. 83dBm

2. 68317GHz



CENTER 2. 68300GHz

*RBW 100kHz

*VBW 30kHz

SPAN 20. 00MHz

*SWP 200ms

Section 2.1046 RF Output Power**Measurement Equipment Used**

HP 8563E Spectrum Analyzer

Coaxial attenuator, 20 dB

Coaxial cable, 1.5ft

Test Set-up

Refer to Figure 2.

Test Procedure

The EUT was set to set to produce maximum output power in CW mode, which is maximum output power since the EUT used FM modulation (FSK) which has constant envelope output power.

Test Results

Maximum power = $3.83 \text{ dBm} + 20 \text{ dB attn} + 0.5 \text{ CL} = 24.33 \text{ dBm}$. This is within 1 dB or less of previously reported value.

Section 2.1051 Spurious and Harmonic Emissions at Antenna Terminals

Requirement/Limit: 21.908(a)

All emissions -60 dBc.

Measurement equipment used:

HP 8563E Spectrum Analyzer

Coaxial attenuator, 20 dB

Coaxial cable, 1.5 ft

Test set-up:

Refer to Figure 2 above

Test Procedures

Section 21.908(e) requires that for a minimum 100 kHz measurement bandwidth, all emissions removed from the channel edge by more than 3 MHz must be attenuated at least 60 dB below the channel emission flat top.

1. Set spectrum analyzer to TX output center frequency, RES BW $\geq 100 \text{ kHz}$
2. Set DISPLAY LINE to a level 60 dB below flat top peak
3. Record transmitter output spectrum from 1 MHz to 10th harmonic of TX output frequency
4. Plot spectrum analyzer output traces.
5. Perform 1-4 for LOW, MID, and HIGH channels

Test Results

PASS. Refer to attached data plots.

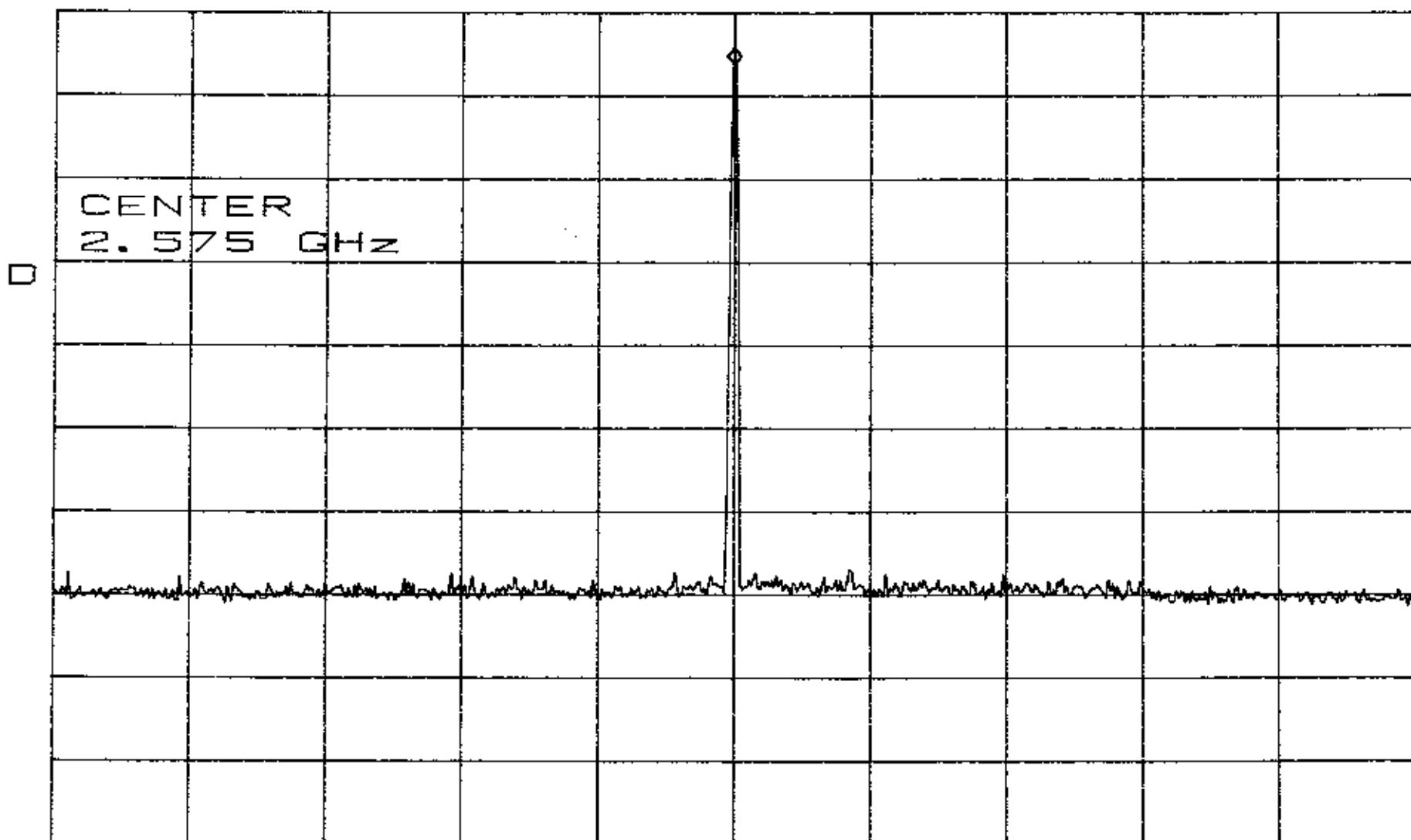
ATTEN 20dB

RL 10.0dBm

10dB/

MKR 3.83dBm

2.575GHz



CENTER 2.575GHz

*RBW 300kHz

*VBW 300kHz

SPAN 1.000GHz

*SWP 50.0ms

Output Freq @ 2575 MHz

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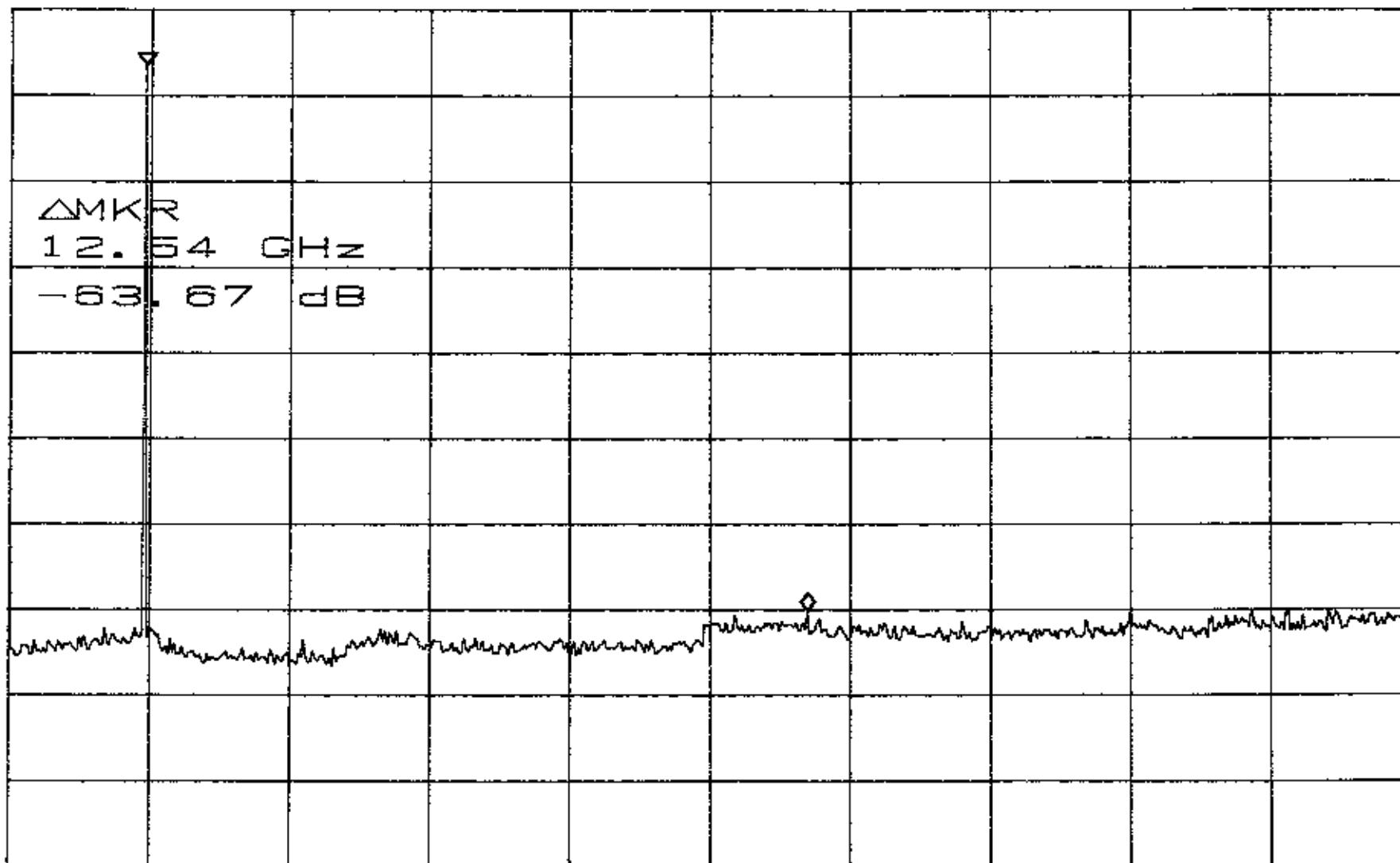
ATTEN 20dB

ΔMKR -63.67dB

RL 10.0dBm

10dB/

12.54GHz



START 0Hz

STOP 26.50GHz

*RBW 100kHz

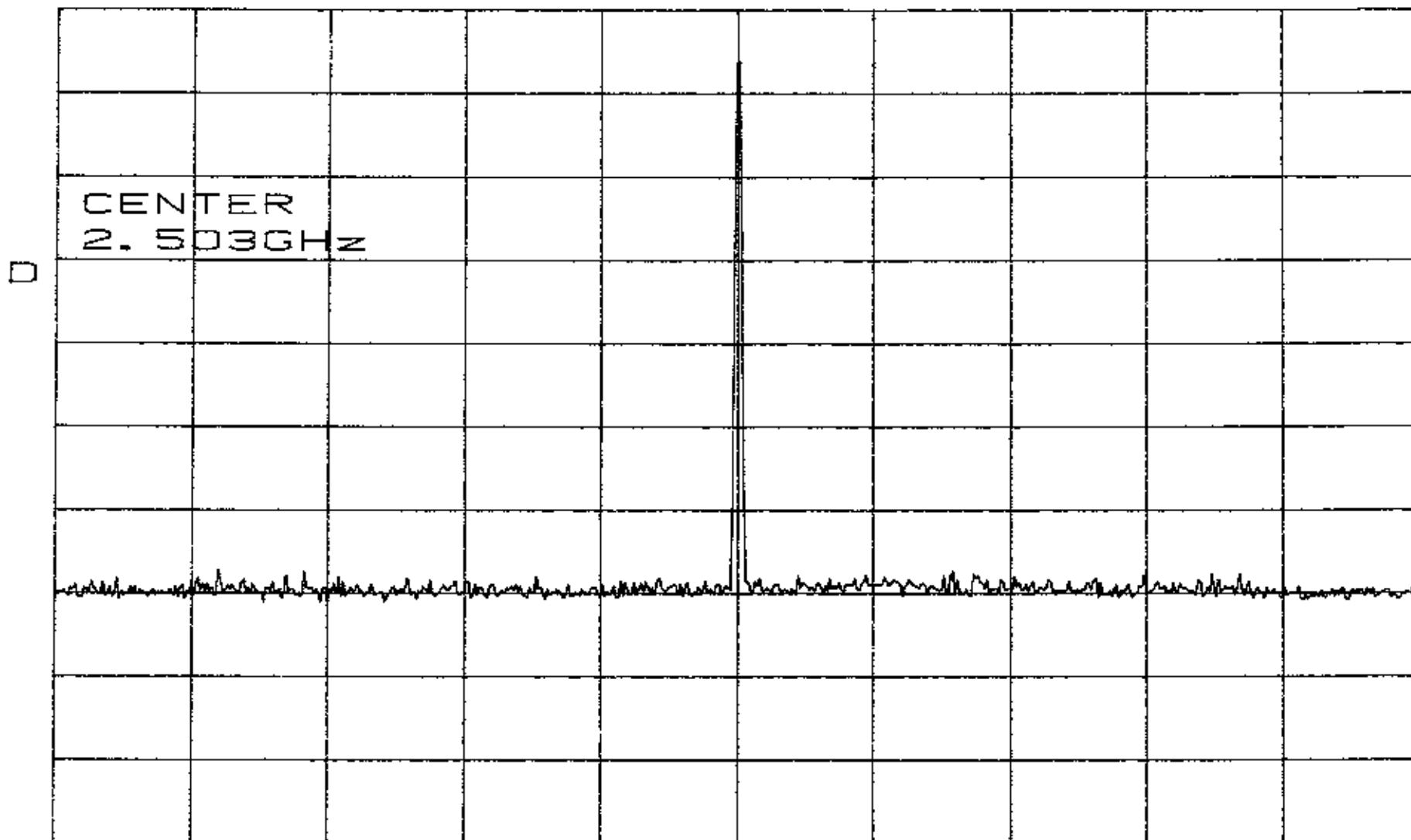
*VBW 100kHz

SWP 6.70sec

ATTEN 20dB

RF 10.0dBm

10dB/



CENTER N. 503GHz

SPAN 1.000GHz

*RBW 300kHz

*VBW 300kHz

*SWP 50.0ms

7/15/03

Output Freq @ 2503 MHz

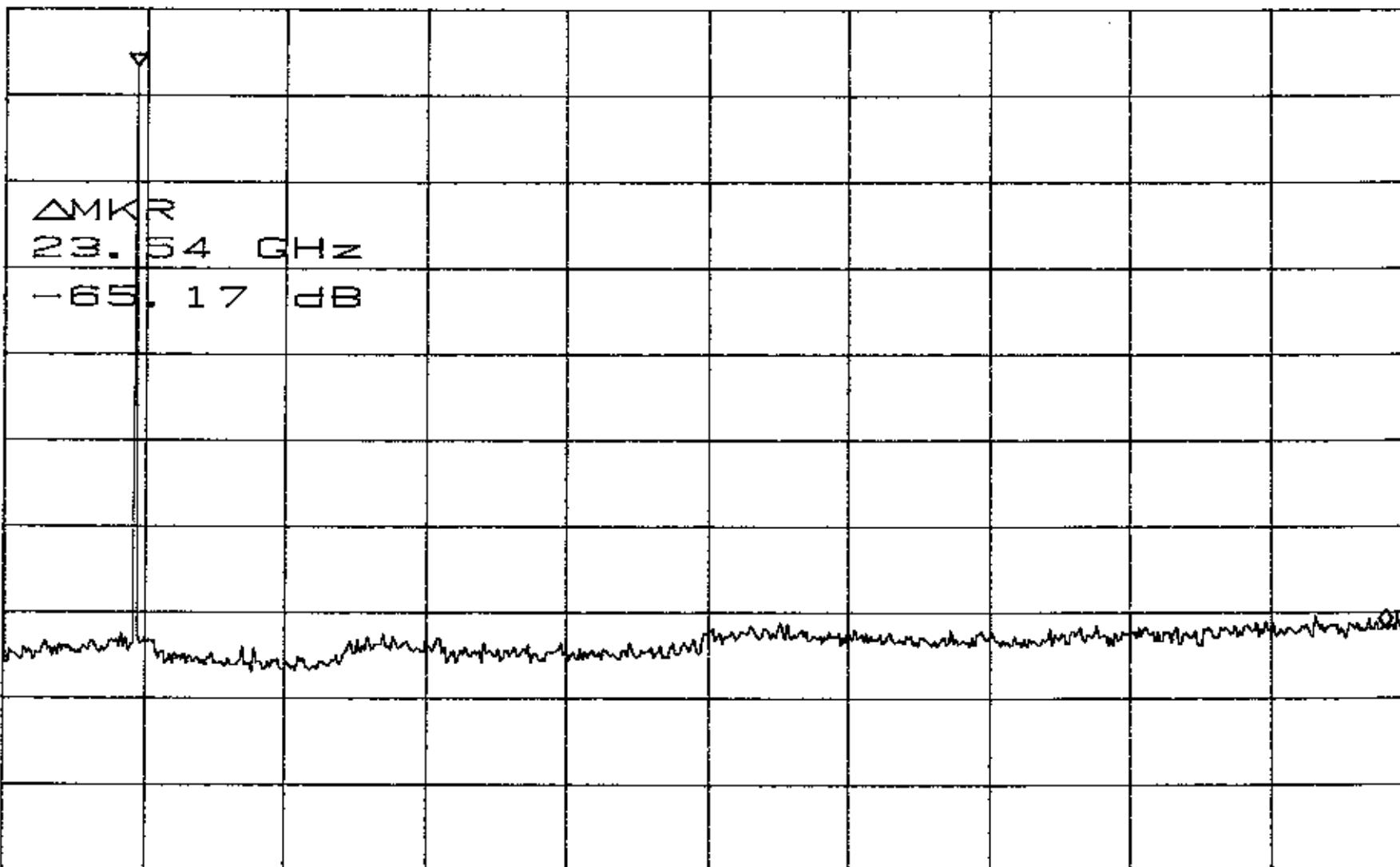
ATTEN 20dB

ΔMKR -65.17dB

RL 10.0dBm

10dB/

23.54GHz



START 0Hz

STOP 26.50GHz

*RBW 100kHz

*VBW 100kHz

SWP 6.70sec

Output Freq @ 2683 MHz

7/15/03

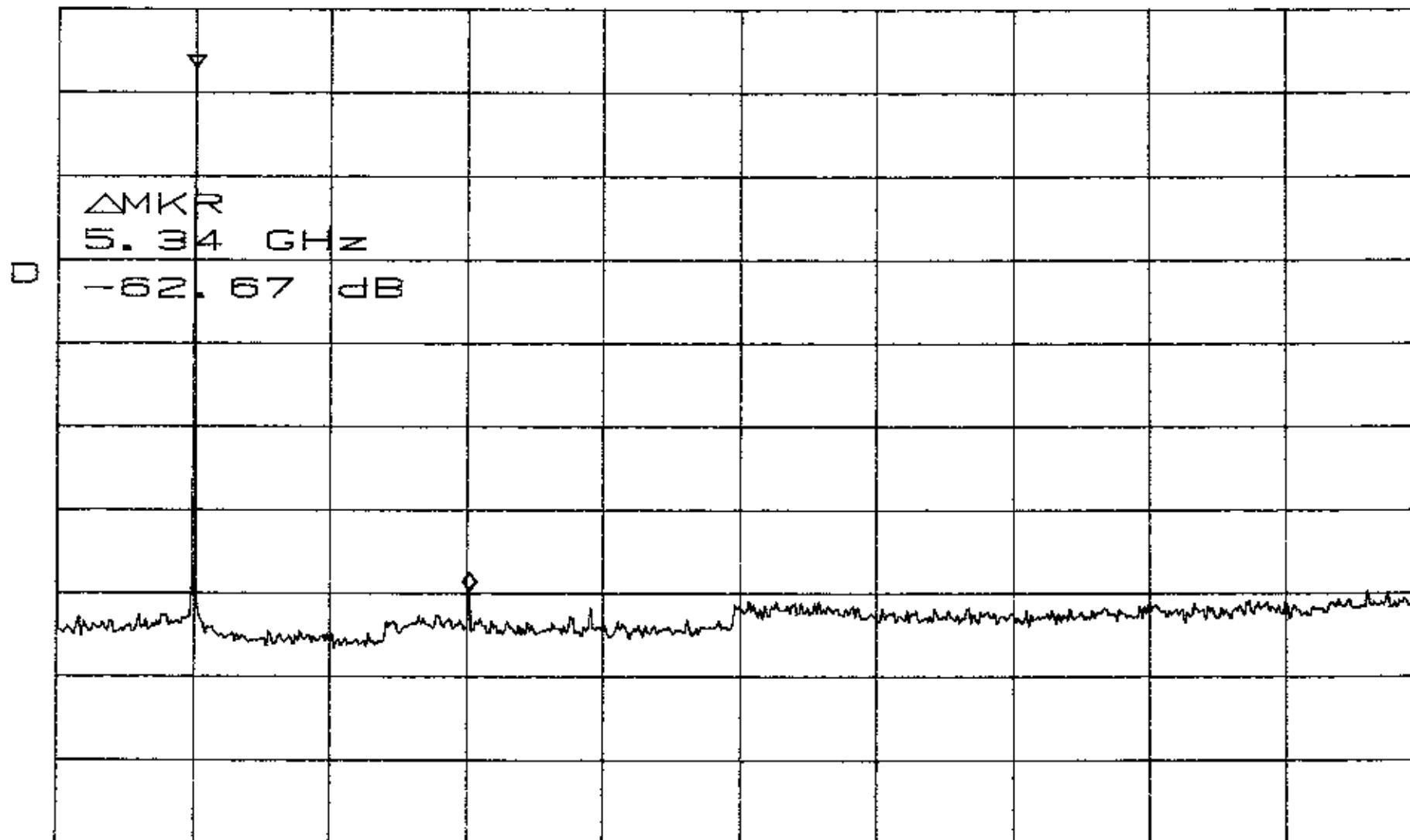
ATTEN 20dB

ΔMKR -62.67dB

RL 10.0dBm

10dB/

5.34GHz



CENTER 13.25GHz

SPAN 26.50GHz

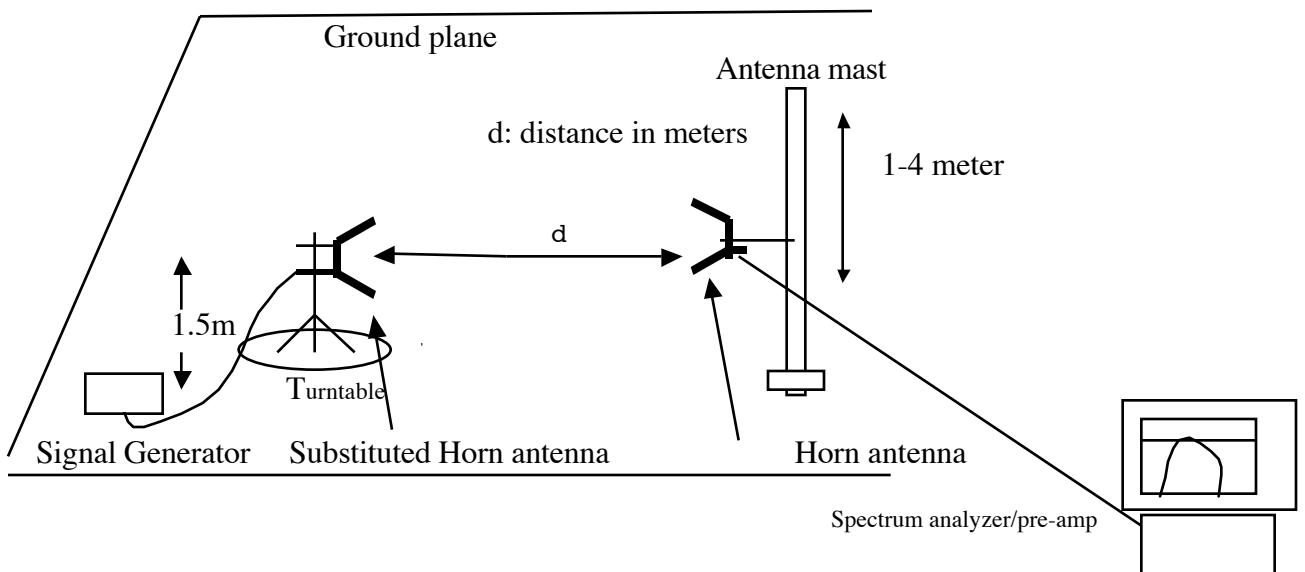
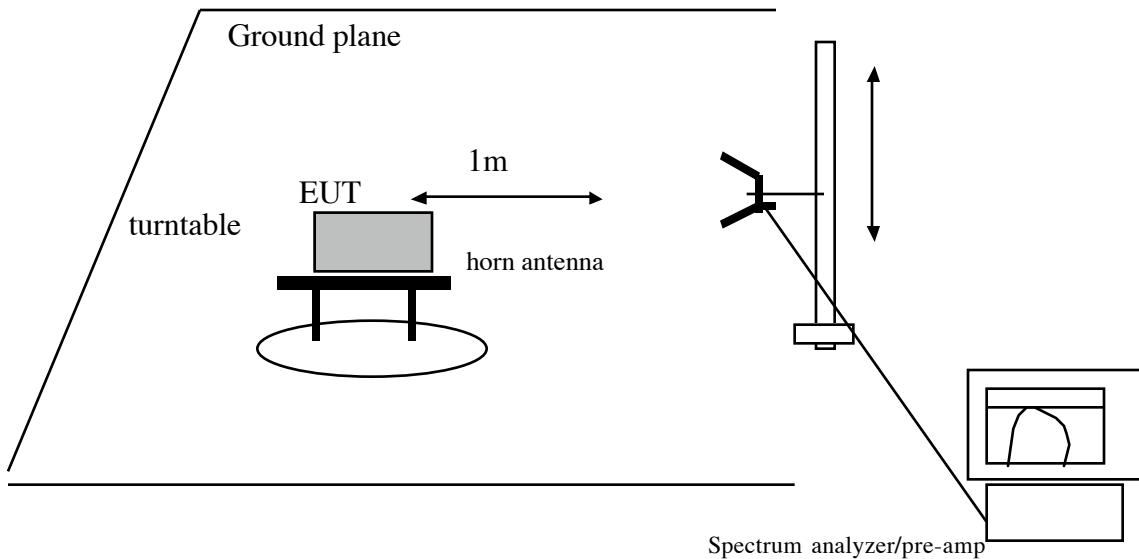
*RBW 100kHz

*VBW 100kHz

SWP 8.70sec

Section 2.1053 Field Strength of Spurious and Harmonic Radiation
Requirement/Limit: 21.909(e)

Test Set-Up



Minimum Requirement

The magnitude of each spurious and harmonic emission detected as being radiated from the EUT must be at a level more than 60 dB below channel output power.

Output power: 24.3 dBm

Limit: $(24.3 - 60) \text{ dBm} = -35.7 \text{ dBm ERP}$

Test Method

The antenna output port of the EUT was terminated with a 50 ohm load. With the transmitter operating at full power, the EUT was rotated 360° and the search antenna was raised and lowered in both polarities, all in an attempt to maximize the levels of the received emission for each harmonic and spurious emission up to 10 fo.

Test Results

Pass.

Below 1 GHz: no emissions detected from EUT

Above 1 GHz: Refer to attached spread sheet. Worst case margin -3.1 dBm.

07/22/03 High Frequency Substitution Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:William Zhuang

Project #:03U2141

Company:Pointred

EUT Descrip.:Pointred outdoor 2.5 GHz MMDS radio unit (ODU)
EUT M/N:ODU-MCRP-CPE-2B5-8-ODU-MCRP-BASE-2B5-(C2RCM)

EUT M/N:QDU-MCRD-CPE-2R5 & QDU-MCRD-BASE-2R5 (C2PC)
Test Target:

Test Target:
Mode Oper:

Mode Oper:

Test Equipment:

Test Site

All testing was performed at PointRed Technologies (antenna conducted measurement) and at Compliance Certification Services (radiated emissions) either by me or under my supervision. Conducted and radiated emissions were performed using test equipment with calibration traceable to NIST, and following test procedures accepted by the industry.

THOMAS N. COKENIAS
Consultant, EMC&Radio Type Approvals
Agent for PointRed Technologies