



Nemko Test Report: 38396RUS1rev1

Applicant: Alcatel USA
3400 West Plano Pkwy
Plano, TX, 75075
USA

Equipment Under Test: MDR-8000

In Accordance With: FCC PART 27, Subpart C/D
Wireless Communication
Services (WCS)

Tested By: Nemko USA, Inc.
802 N. Kealy
Lewisville, Texas 75057
USA

TESTED BY: 

David Light, Senior Wireless Engineer

DATE: 13 April 2010

APPROVED BY: 

Tom Tidwell, Telecom Direct

DATE: 14 April 2010

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EQUIPMENT: MDR-8000

Section 1. Summary of Test Results

Manufacturer: Alcatel USA

Model No.: MDR-8000

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 27, Subpart C.

- | | |
|---|---|
| <input checked="" type="checkbox"/> New Submission | <input type="checkbox"/> Production Unit |
| <input type="checkbox"/> Class II Permissive Change | <input checked="" type="checkbox"/> Pre-Production Unit |

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE. NONE

Rev1: added data to cover lower WCS band.

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This report applies only to the items tested.



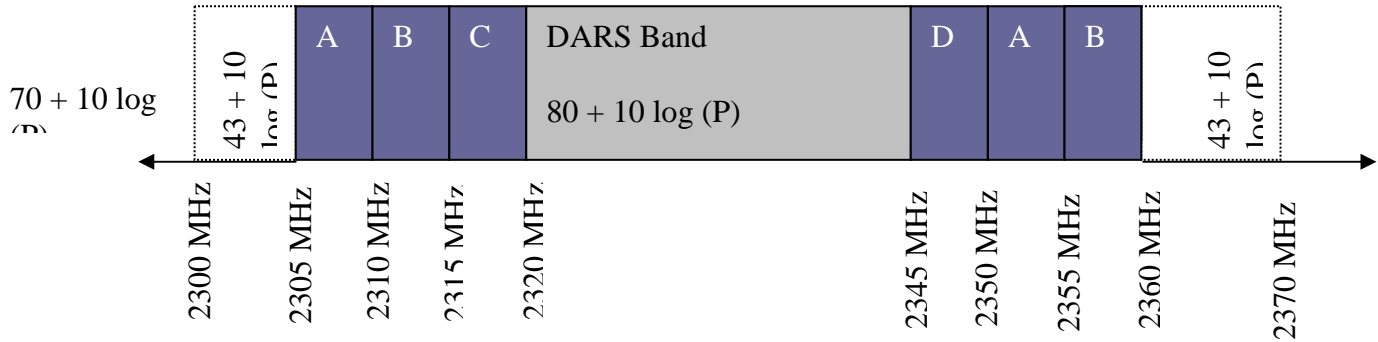
NVLAP Lab Code 100426-0

EQUIPMENT: MDR-8000

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC. LIMIT	RESULT
RF Power Output	27.50	2kW EIRP	Complies
Occupied Bandwidth	2.1049	Not specified	Complies
Spurious Emissions @ Antenna Terminals	27.53	-50 dBm 2320 to 2345 MHz -40 dBm <2300 MHz and >2370 MHz (Refer to graph below)	Complies
Field Strength of Spurious Radiation	27.53	50 dBm 2320 to 2345 MHz -40 dBm <2300 MHz and >2370 MHz	Complies
Frequency Stability	27.54	Must remain within authorized bandwidth	Complies

Footnotes:



Section 2. General Equipment Specification

Power Supply	-48 Vdc
Frequency Range	2310 MHz and 2355 MHz fixed
Emission Designator:	8M50D7W
Output Impedance:	50 ohms
RF Power Output:	1 Watt
Selection Of Operating Frequency:	Single Channel
Power Output Adjustment Capability:	Fixed

Description of EUT

The MDR-8X02 is Alcatel-Lucent's premier digital microwave radio for long-haul, point-to-point wireless communications. The flexible platform offers features designed to provide robust operation, while also reducing your total cost of ownership. With a common platform that supports virtually all frequency bands from 2-11 GHz, the MDR-8X02 operates on a single channel in the 2.305 - 2.360 GHz WCS band. It also offers customers transmission capacity from 2-16 DS1s, and 10/100/1000 Base-T Ethernet, with the ability to upgrade capacity simply by changing Capacity Keys™.

System Diagram

Refer to separate exhibit.

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 27.50
TESTED BY: David Light	DATE: 24 February 2010 13 April 2010

Test Results:	Complies. The maximum measured rf output power is +29.8 dBm (955 mW)
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Measurement Data: See graph below

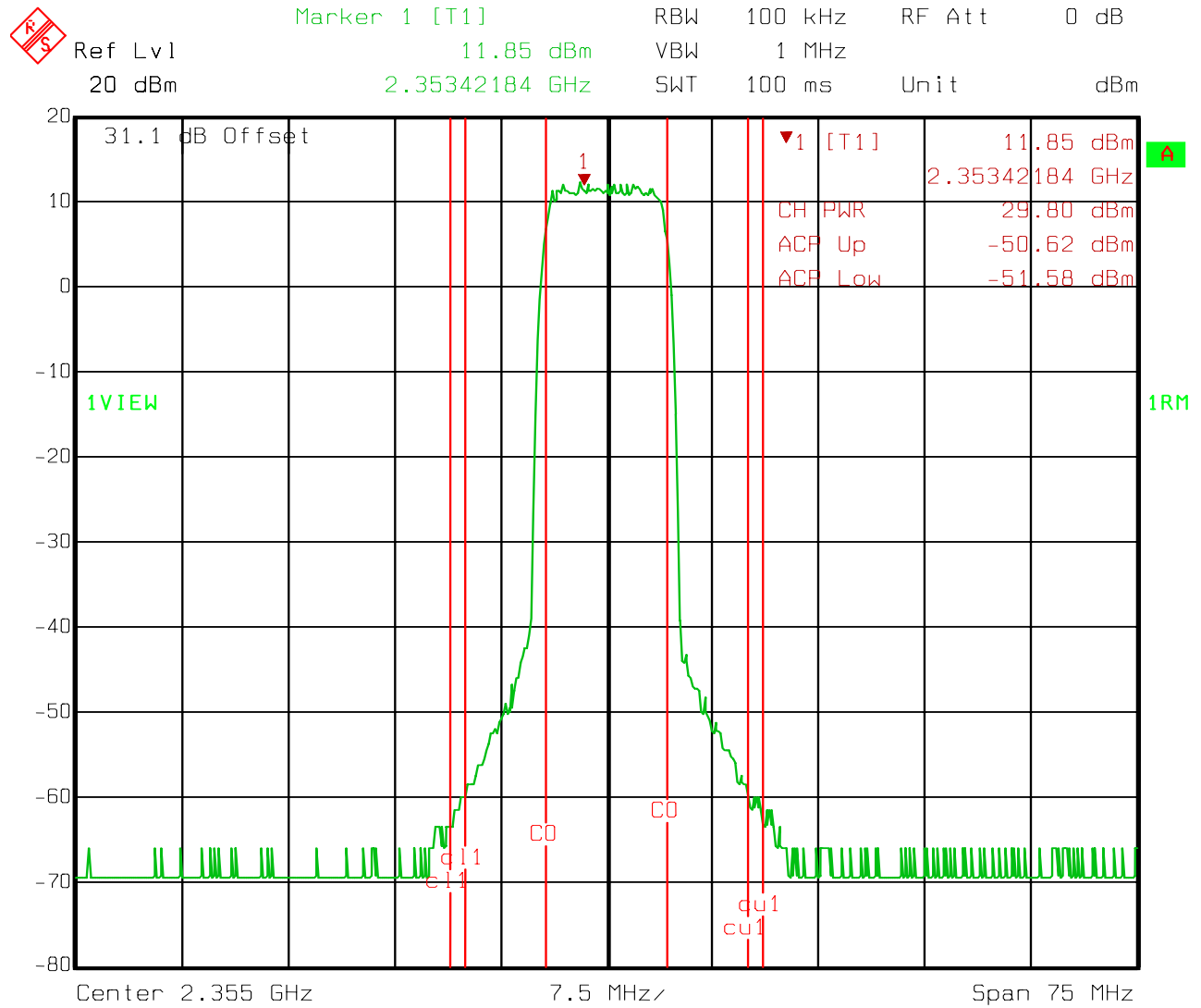
Test Equipment: 1036-1472-1469-1082

Test Conditions: 22°C
45% RH

EQUIPMENT: MDR-8000

Test Data – RF Power Output

Upper WCS band

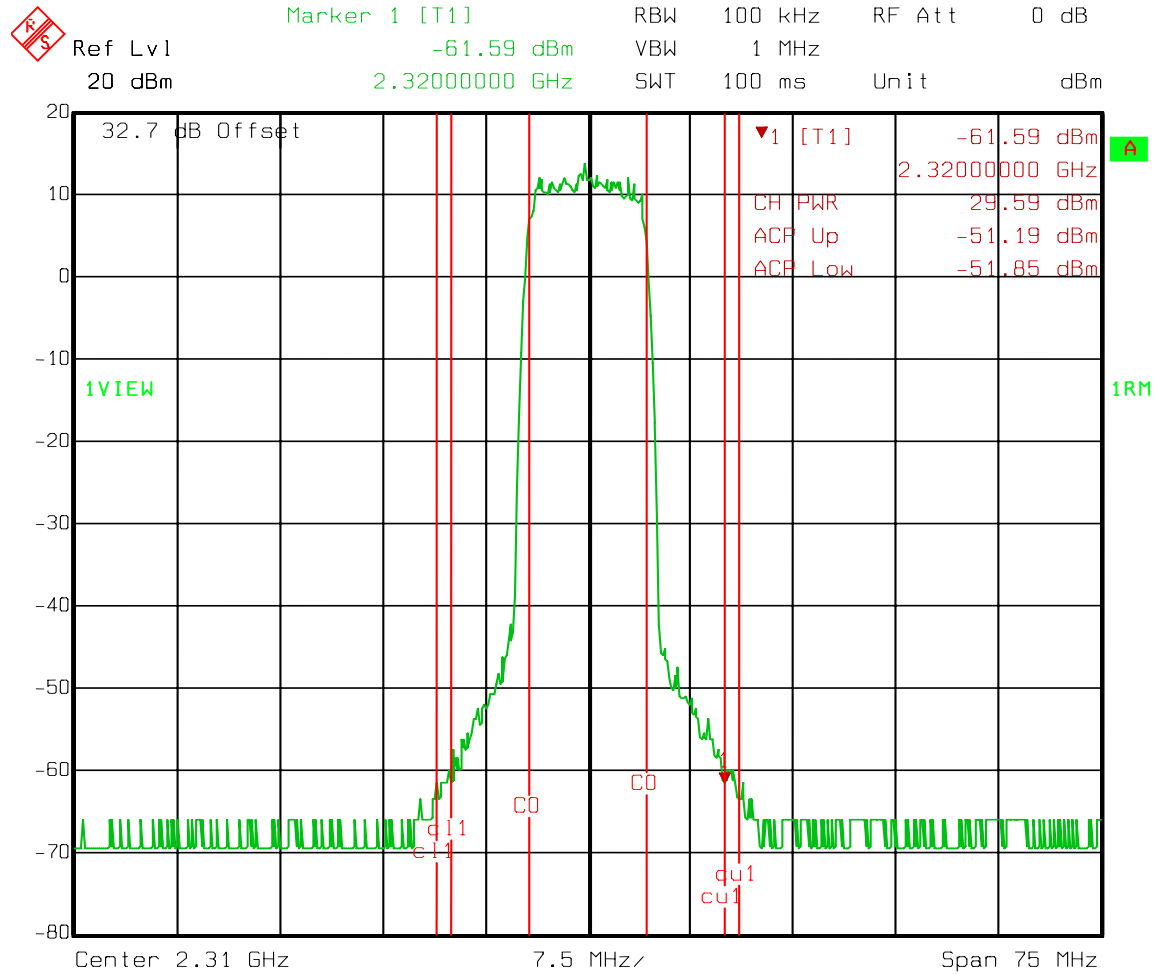


Date: 24.FEB.2010 15:48:08

EQUIPMENT: MDR-8000

Test Data – RF Power Output

Lower WCS band.



Date: 13.APR.2010 10:19:08

Section 4. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 27.53
TESTED BY: David Light	DATE: 24 February 2010 13 April 2010

Test Results: Complies

Spurious emission in DARS band: -51.8 dBm (-81.38 dBc). The worst-case harmonic level is -47.61 dBm.

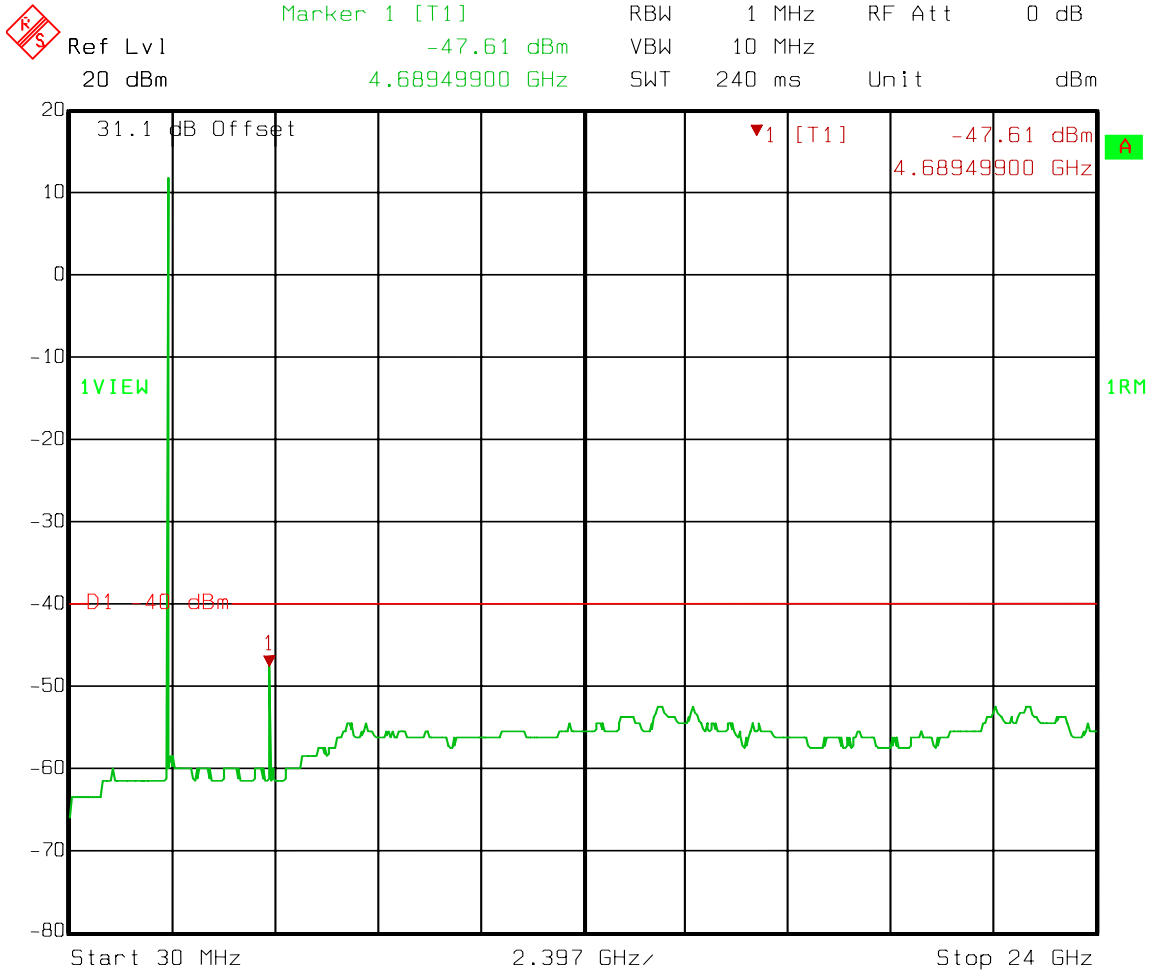
Measurement Data: See graph below

Test Equipment: 1036-1472-1469-1082

Test Conditions: 22°C
45% RH

EQUIPMENT: MDR-8000

Test Data – Spurious Emissions

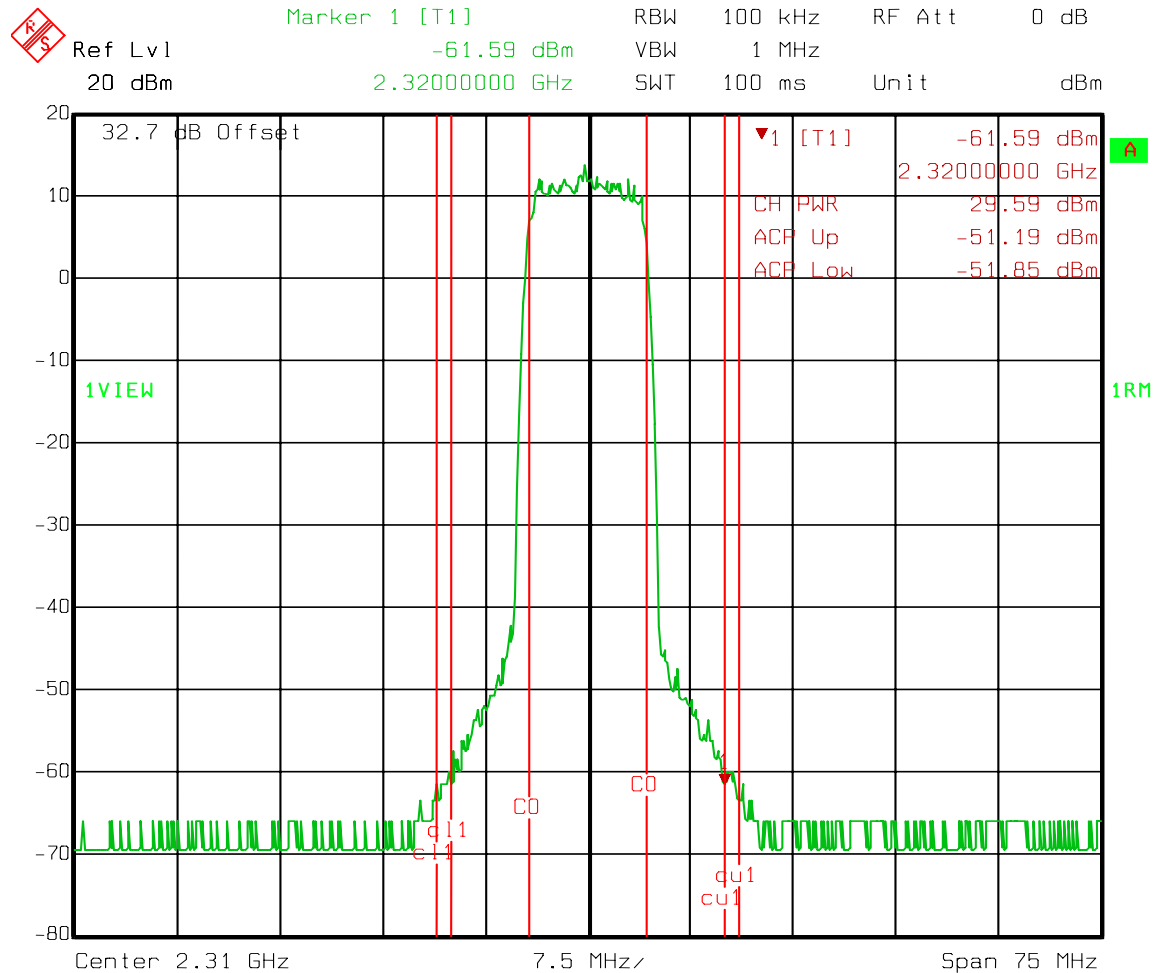


Date: 24.FEB.2010 15:52:30

EQUIPMENT: MDR-8000

Test Data – Spurious Emissions

Lower WCS band
DARS Band Edge



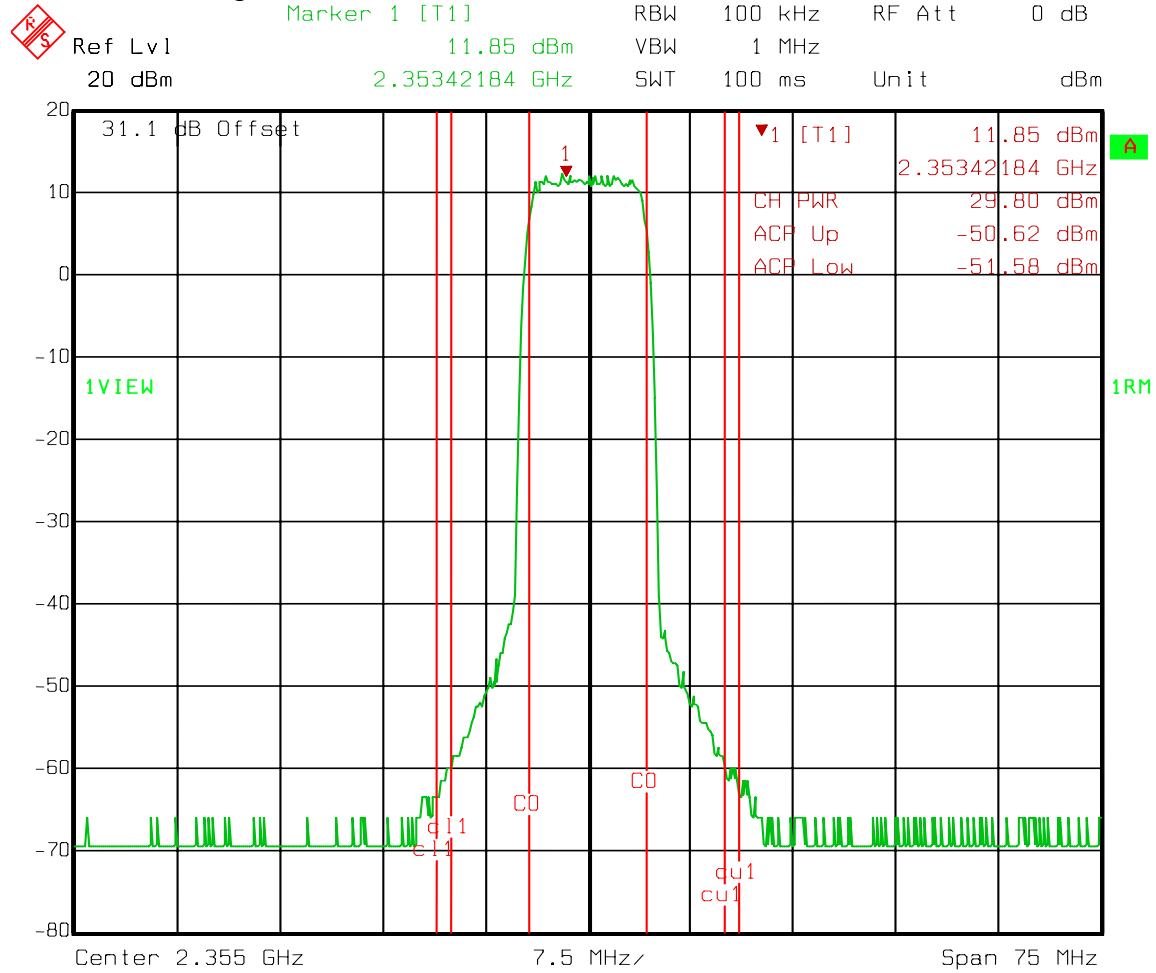
Date: 13.APR.2010 10:19:08

ACP Up is the 1 MHz channel power at the DARS band of 2344 to 2345 MHz.

EQUIPMENT: MDR-8000

Test Data – Spurious Emissions

Upper WCS band
 DARS Band Edge



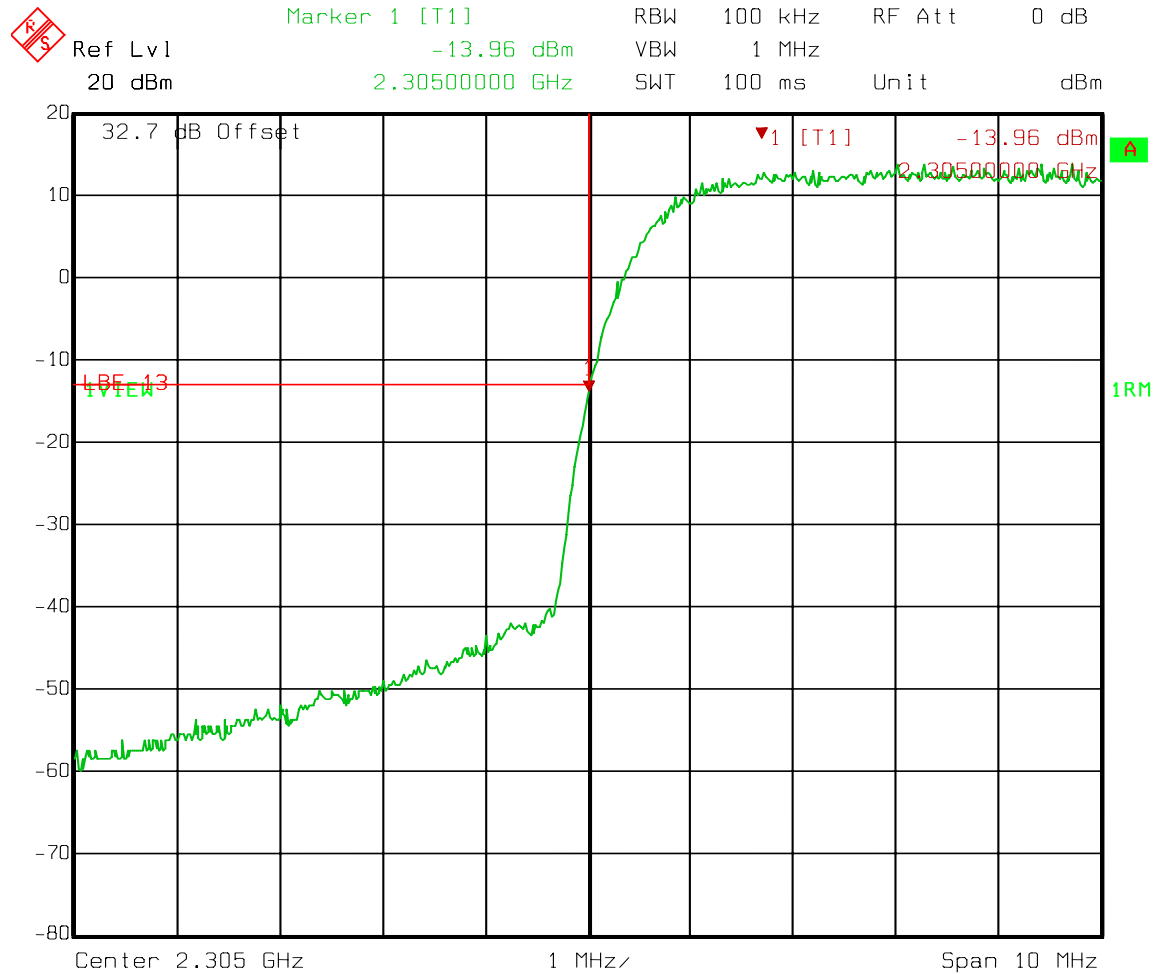
Date: 24.FEB.2010 15:48:08

ACP Low is the 1 MHz channel power at the DARS band of 2344 to 2345 MHz.

EQUIPMENT: MDR-8000

Test Data – Spurious Emissions

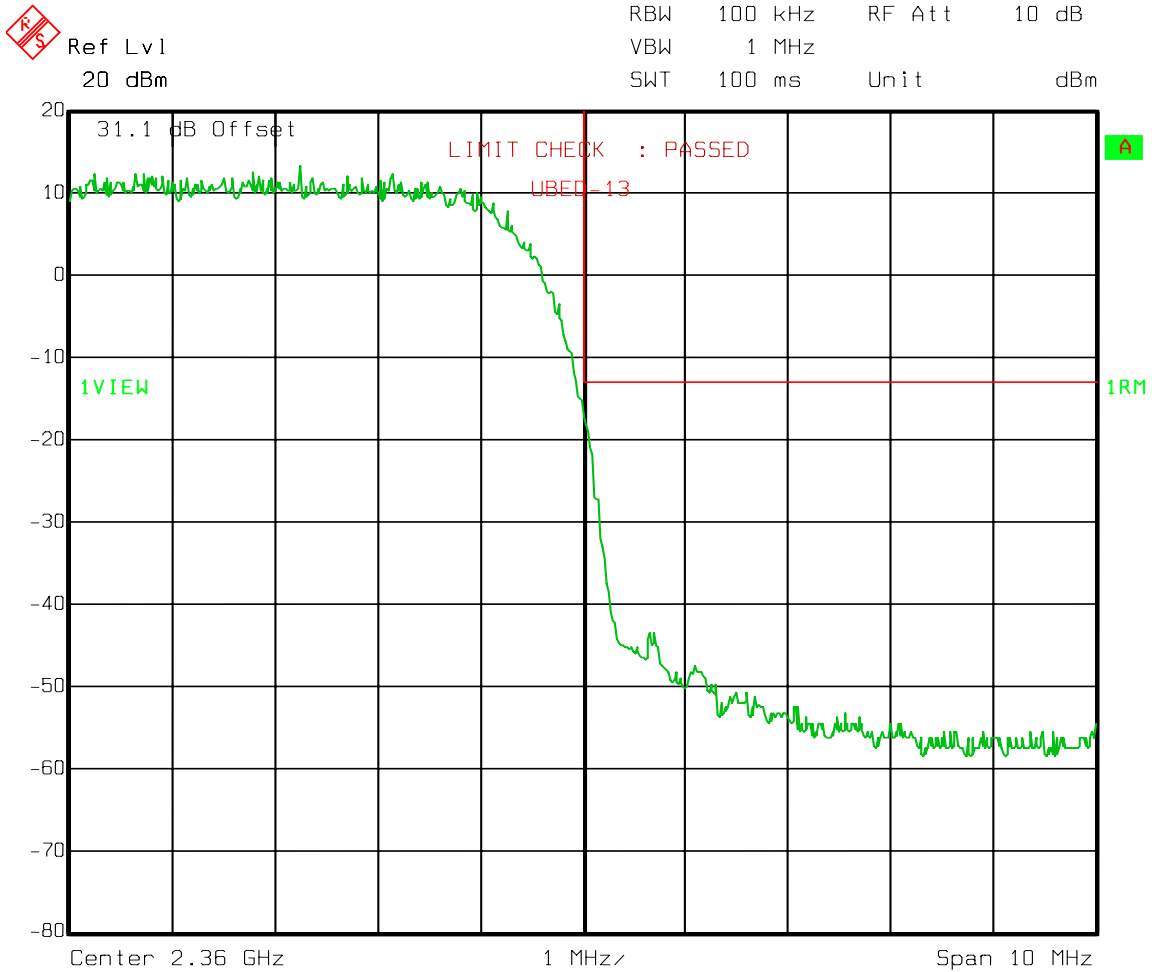
Lower Band Edge



Date: 13.APR.2010 10:20:57

EQUIPMENT: MDR-8000

Test Data – Spurious Emissions
Upper Band Edge



Date: 24.FEB.2010 15:50:47

EQUIPMENT: MDR-8000

Section 5. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 27.53
TESTED BY: David Light	DATE: 25 February 2010

Test Results: Complies

Measurement Data:

Frequency (MHz)	Meter Reading (dBm)	Substitution Level (dBm)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarity	Comments
4710	-64.3	-54.2		31.3	11.3	-42.9	-40.0	-2.9400	V	
4710	-62.0	-58.3		31.3	11.3	-47.0	-40.0	-7.0400	H	
Notes: All emissions within 20 dB of the specification limit are reported.										

The spectrum was searched from 30 MHz to 24 GHz.

Analyzer Settings: RBW/VBW = 1 MHz, Detector MAX PEAK

Test Equipment: 1464-1484-1485-1480-791-1016-993

Test Conditions: 22°C
 45% RH

Section 6. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: David Light	DATE: 24 February 2010

Test Results: Complies

Measurement Data: See graph below

Test Equipment: 1036-1472-1469-1082

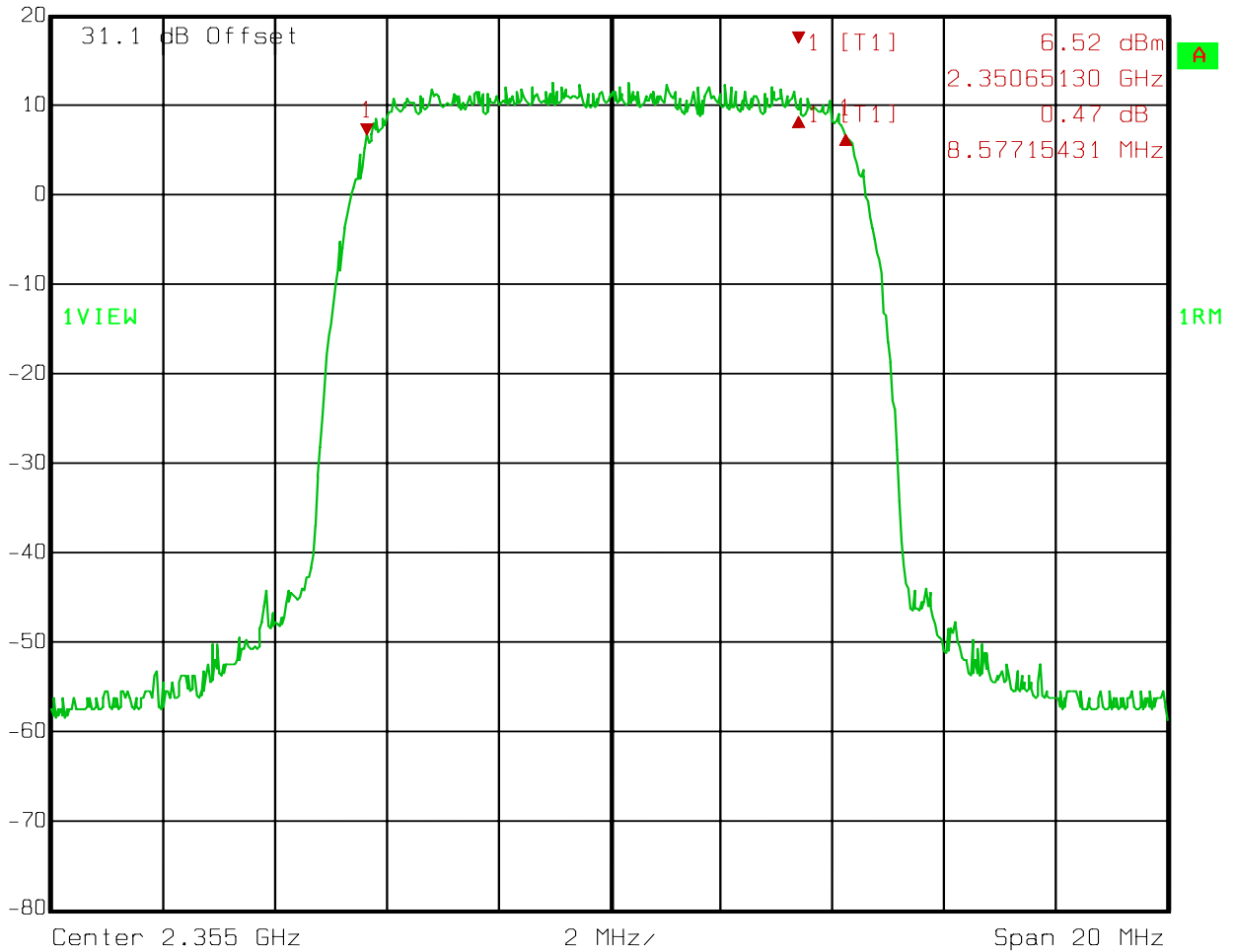
Test Conditions: 22°C
45% RH

EQUIPMENT: MDR-8000

Test Data – Occupied Bandwidth



Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	10 dB
20 dBm	0.47 dB	VBW	1 MHz		
	8.57715431 MHz	SWT	100 ms	Unit	dBm



Date: 24.FEB.2010 15:49:44

Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 27.54
TESTED BY: David Light	DATE: 25 February 2010

Test Results: Complies

Measurement Data: See graphs below

Test Equipment: 1036-1472-1469-1082-283

Test Conditions: 22°C
 45% RH

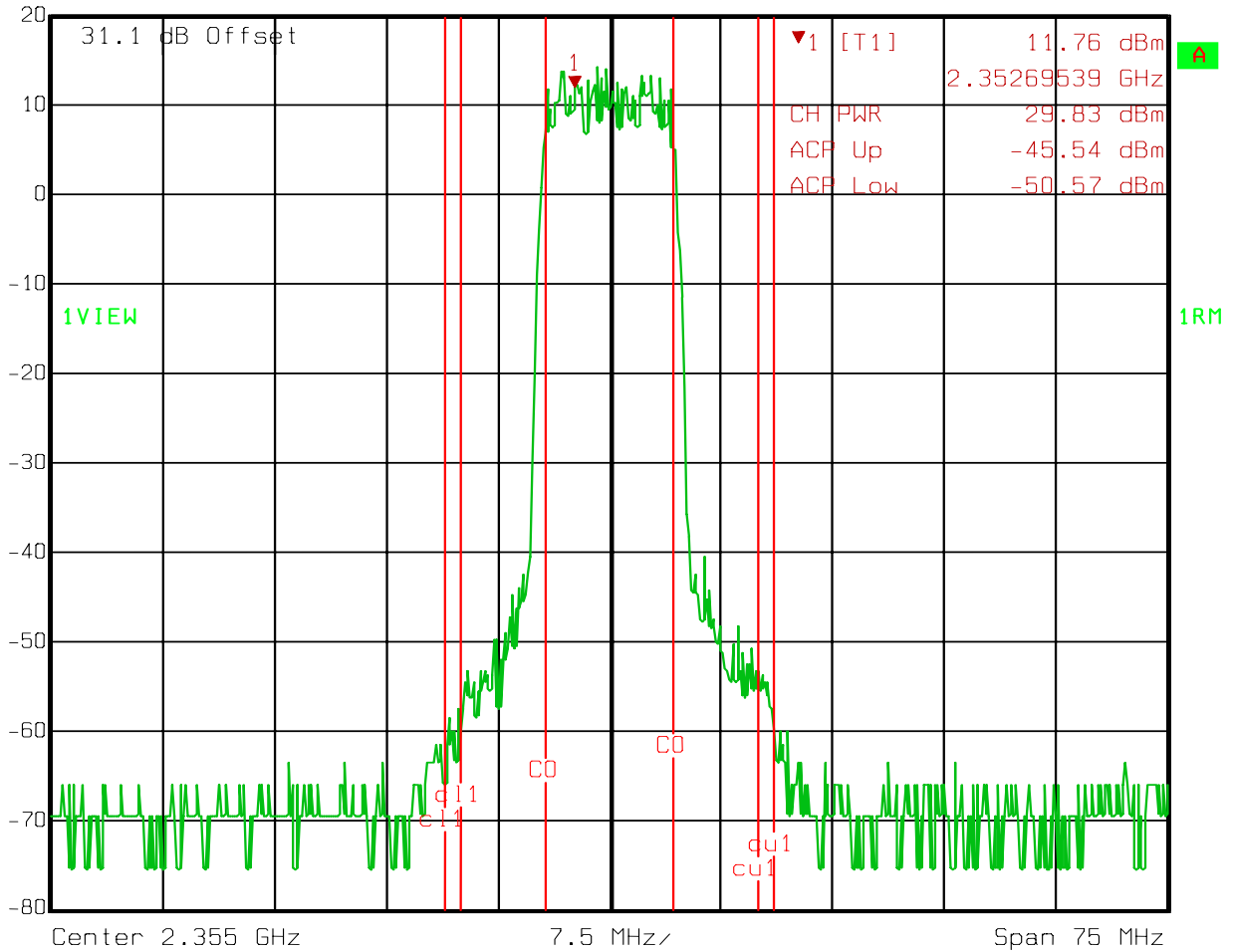
EQUIPMENT: MDR-8000

Test Data – Frequency Stability

-30° C

Lower (DARS) Edge

 Ref Lvl 20 dBm Marker 1 [T1] 11.76 dBm RBW 100 kHz RF Att 0 dB
2.35269539 GHz VBW 1 MHz Unit dBm
SWT 19 ms



Date: 25.FEB.2010 14:00:42

ACP Low is the 1 MHz channel power at the DARS band of 2344 to 2345 MHz.

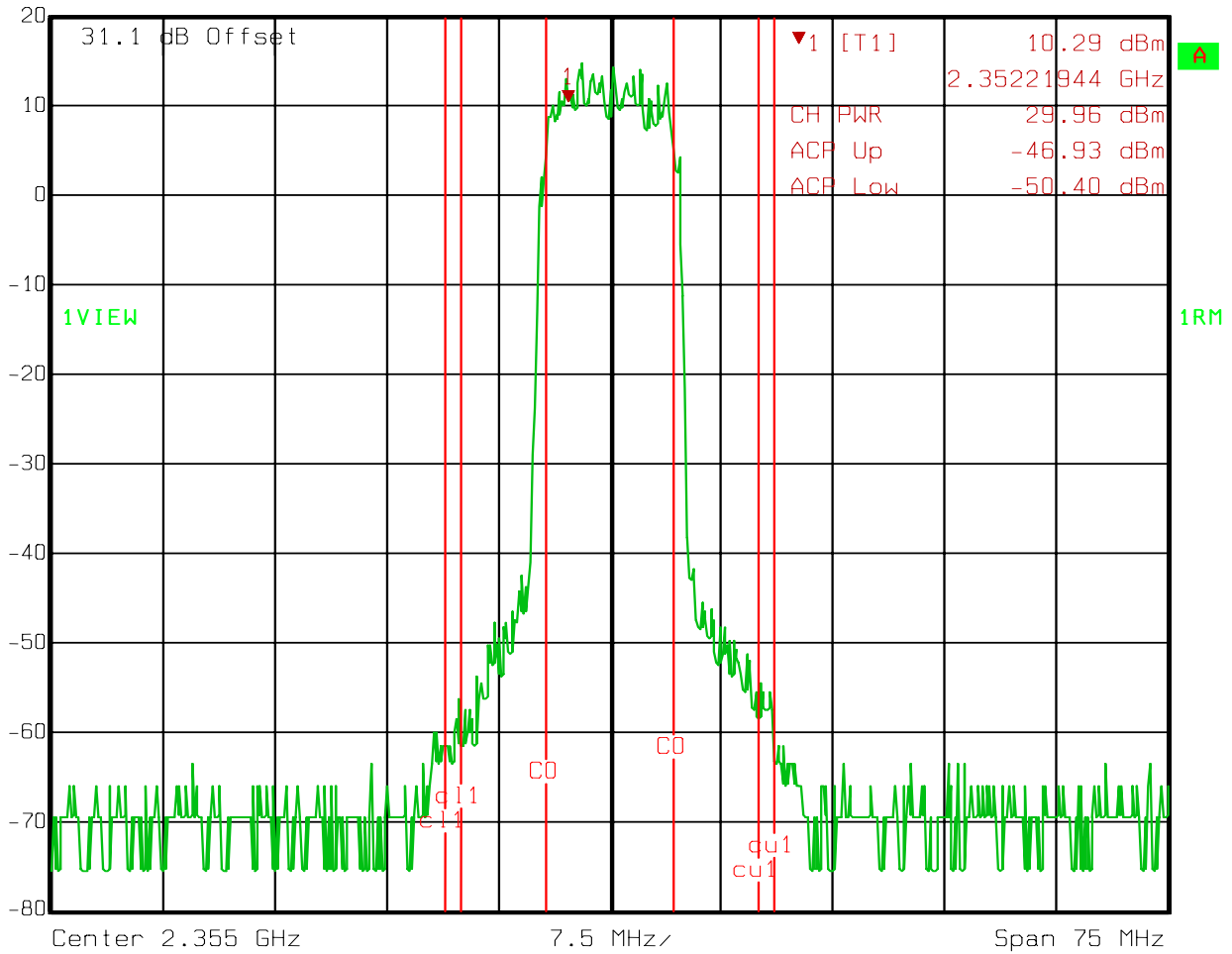
EQUIPMENT: MDR-8000

Test Data – Frequency Stability

-20° C

Lower (DARS) Edge

	Marker 1 [T1]	RBW	100 kHz	RF Att	0 dB
	Ref Lvl	10.29 dBm	VBW	1 MHz	
	20 dBm	2.35221944 GHz	SWT	19 ms	Unit dBm



Date: 25.FEB.2010 14:08:05

ACP Low is the 1 MHz channel power at the DARS band of 2344 to 2345 MHz.

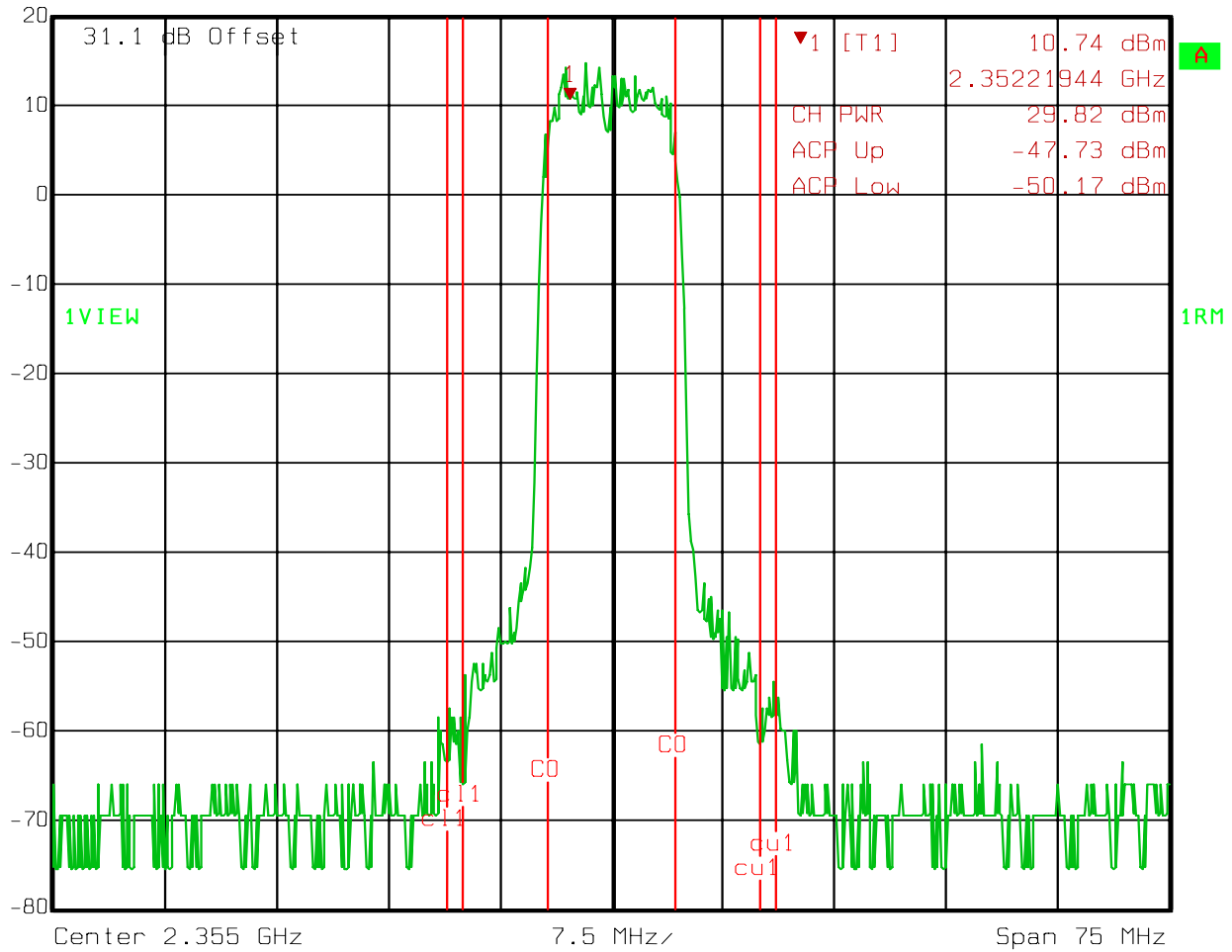
EQUIPMENT: MDR-8000

Test Data – Frequency Stability

-10 °C

Lower (DARS) Edge

	Marker 1 [T1]	RBW	100 kHz	RF Att	0 dB
	Ref Lvl	10.74 dBm	VBW	1 MHz	
	20 dBm	2.35221944 GHz	SWT	19 ms	Unit dBm



Date: 25.FEB.2010 14:39:00

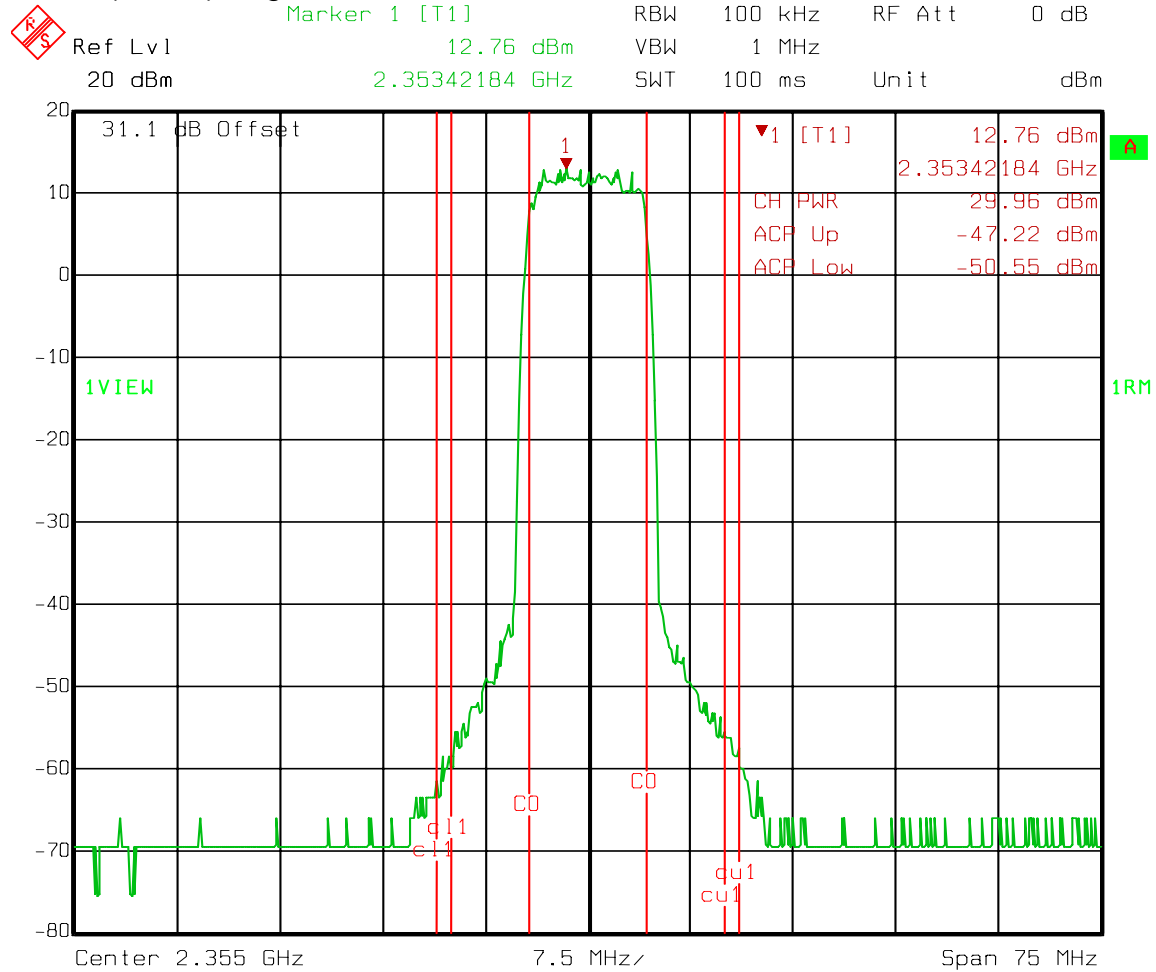
ACP Low is the 1 MHz channel power at the DARS band of 2344 to 2345 MHz.

EQUIPMENT: MDR-8000

Test Data – Frequency Stability

0 ° C

Lower (DARS) Edge



Date: 25.FEB.2010 15:05:21

ACF Low is the 1 MHz channel power at the DARS band of 2344 to 2345 MHz.

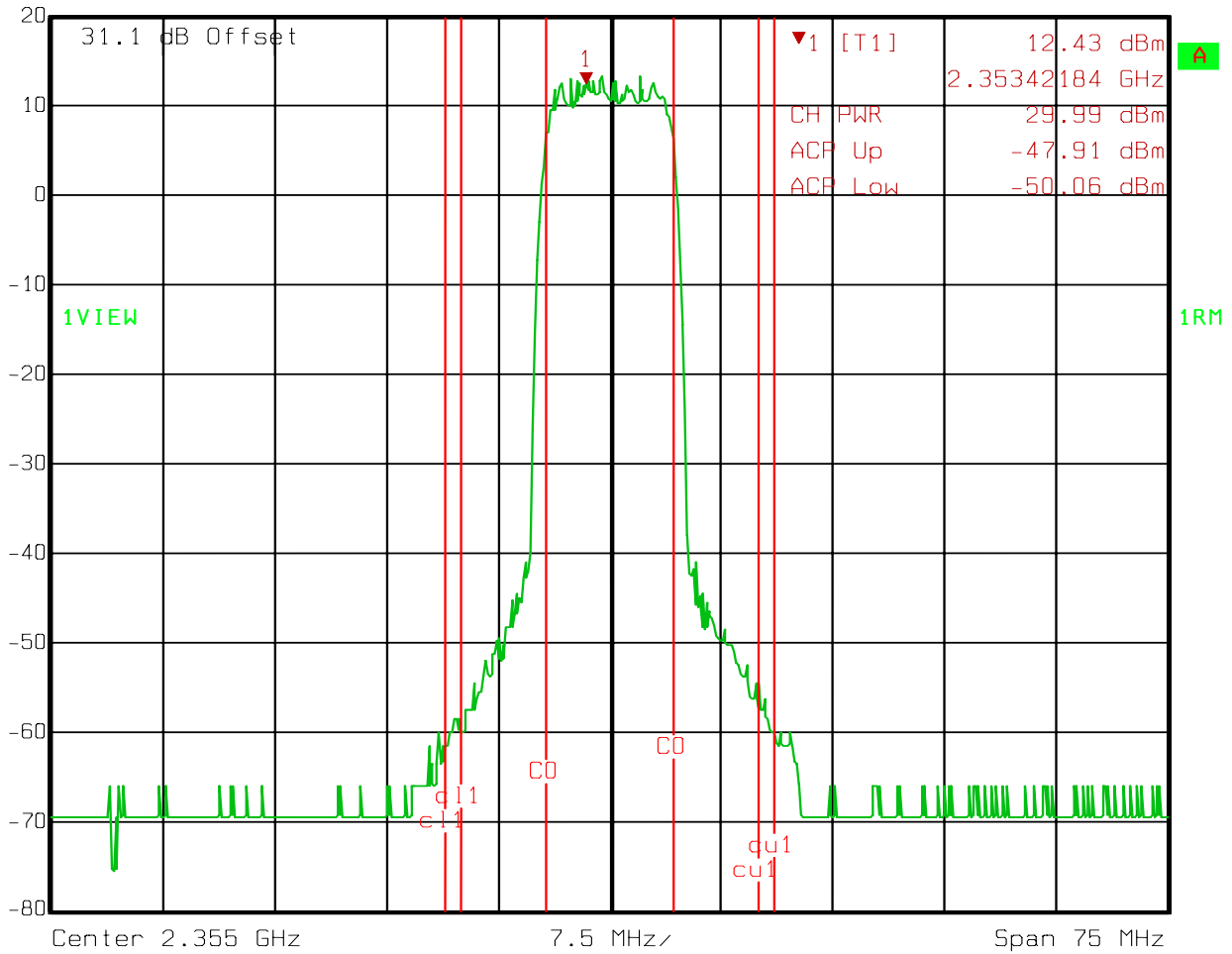
EQUIPMENT: MDR-8000

Test Data – Frequency Stability

+10 °C

Lower (DARS) Edge

	Marker 1 [T1]	RBW	100 kHz	RF Att	0 dB
	Ref Lvl	12.43 dBm	VBW	1 MHz	
	20 dBm	2.35342184 GHz	SWT	100 ms	Unit dBm



Date: 25.FEB.2010 15:30:19

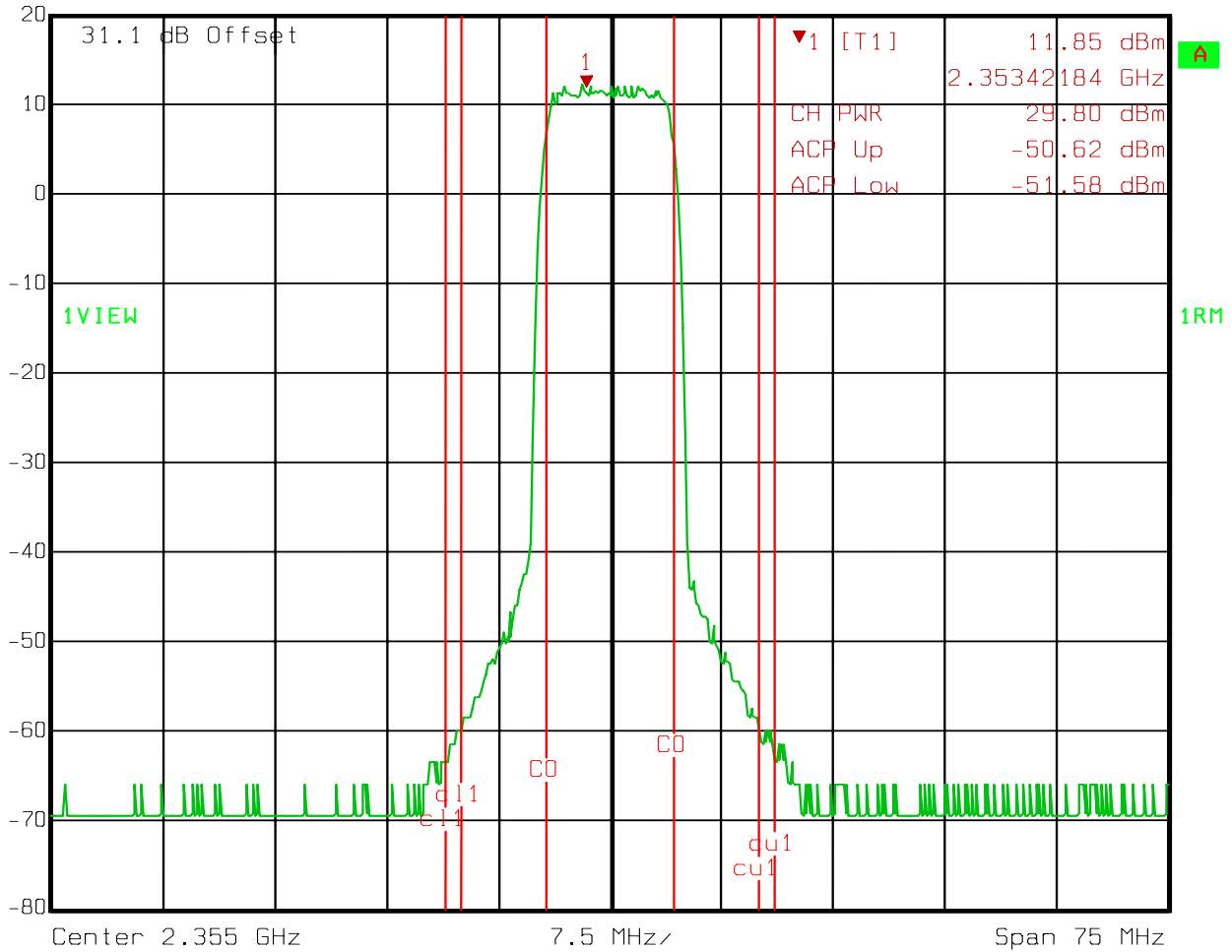
ACP Low is the 1 MHz channel power at the DARS band of 2344 to 2345 MHz.

EQUIPMENT: MDR-8000

Test Data – Frequency Stability

+20 ° C/-48 Vdc
 Lower (DARS) Edge

	Marker 1 [T1]	RBW	100 kHz	RF Att	0 dB
	Ref Lvl	11.85 dBm	VBW	1 MHz	
	20 dBm	2.35342184 GHz	SWT	100 ms	Unit dBm



Date: 24.FEB.2010 15:48:08

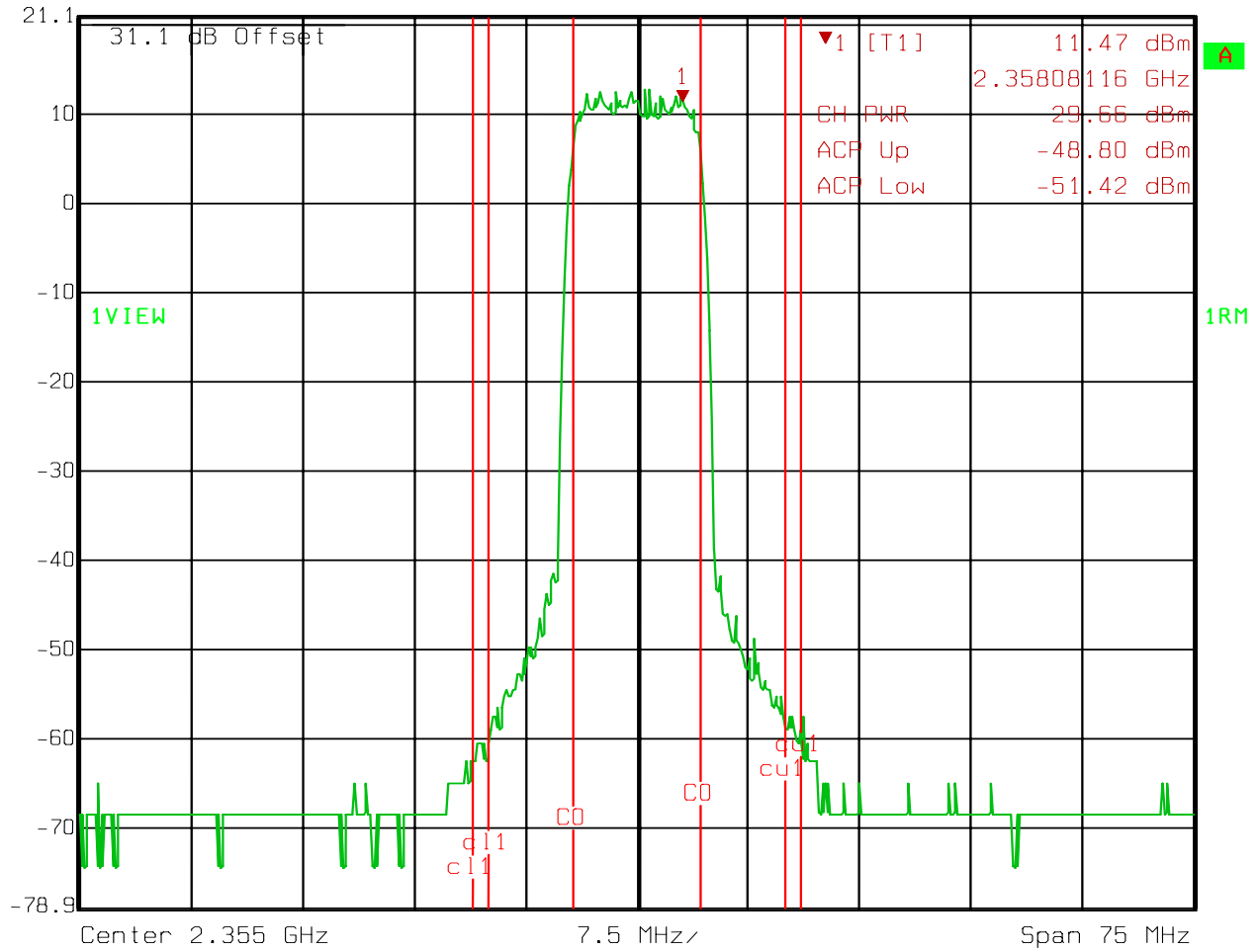
ACP Low is the 1 MHz channel power at the DARS band of 2344 to 2345 MHz.

EQUIPMENT: MDR-8000

Test Data – Frequency Stability

+20 ° C/-55.2 Vdc
 Lower (DARS) Edge

	Marker 1 [T1]	RBW	100 kHz	RF Att	0 dB
	Ref Lvl	11.47 dBm	VBW	1 MHz	
	21.1 dBm	2.35808116 GHz	SWT	100 ms	Unit dBm



Date: 26.FEB.2010 09:28:57

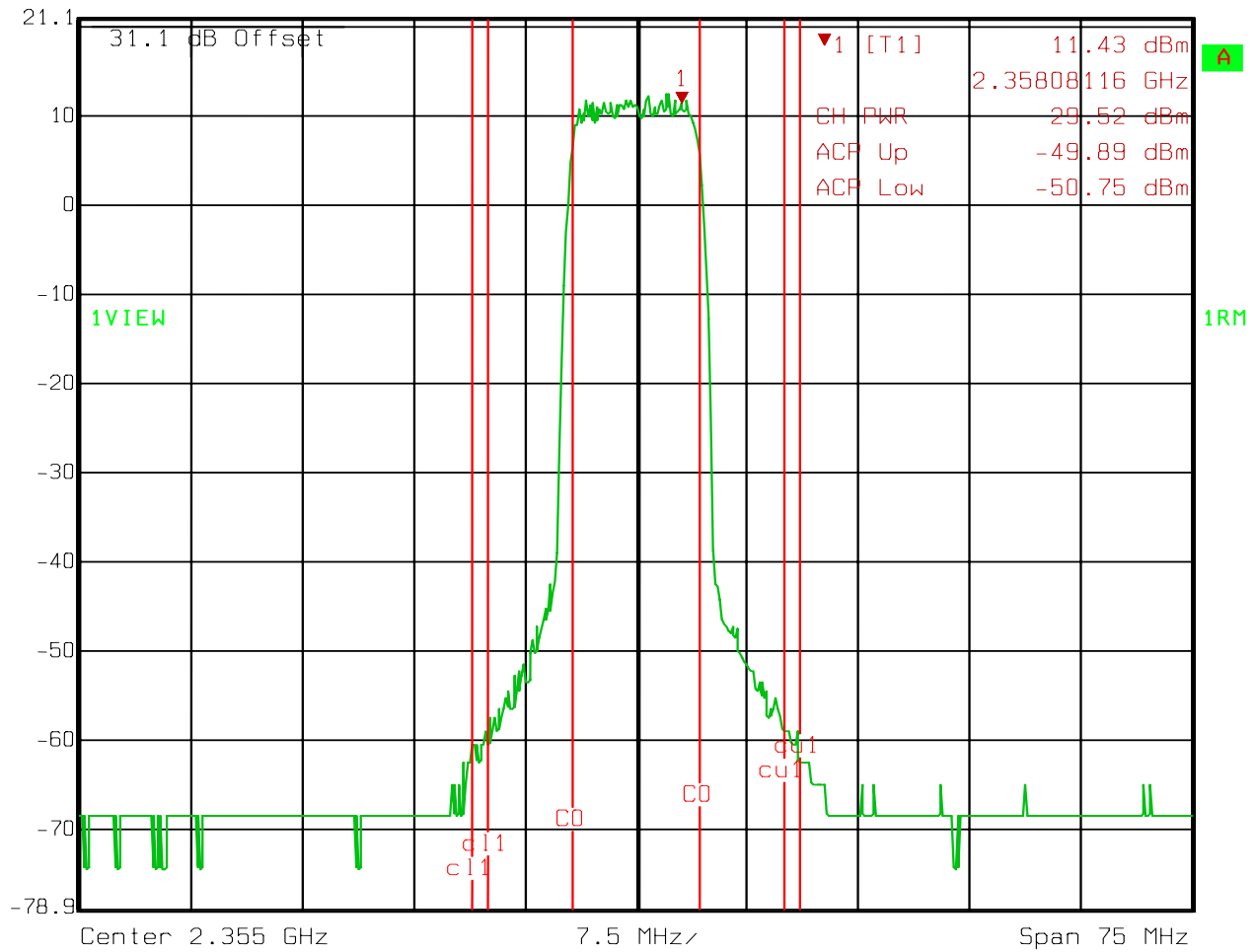
ACP Low is the 1 MHz channel power at the DARS band of 2344 to 2345 MHz.

EQUIPMENT: MDR-8000

Test Data – Frequency Stability

+20 ° C/-40.8 Vdc
 Lower (DARS) Edge

RS	Marker 1 [T1]	RBW	100 kHz	RF Att	0 dB
	Ref Lvl	11.43 dBm	VBW	1 MHz	
	21.1 dBm	2.35808116 GHz	SWT	100 ms	Unit dBm



Date: 26.FEB.2010 09:30:23

ACP Low is the 1 MHz channel power at the DARS band of 2344 to 2345 MHz.

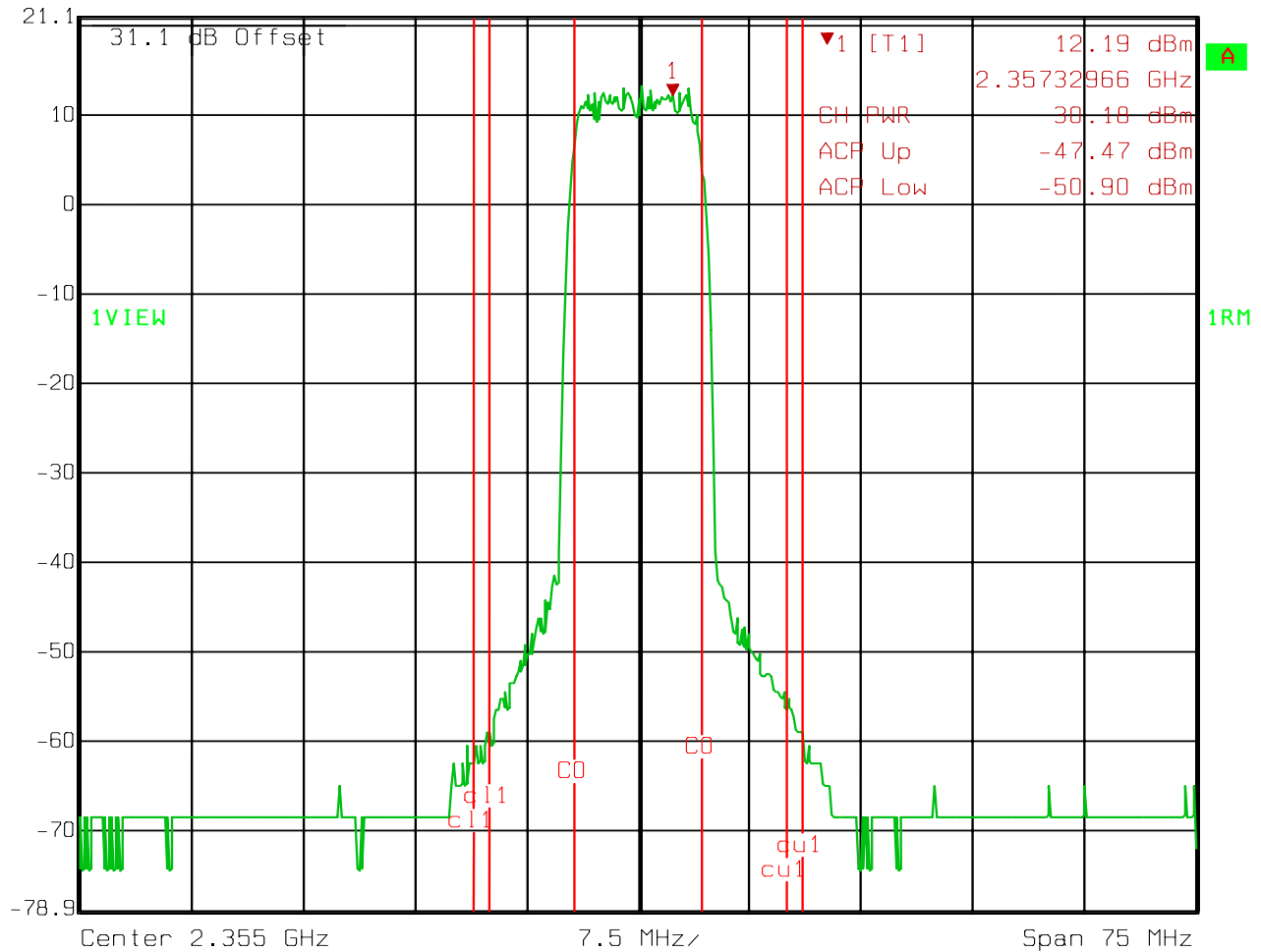
EQUIPMENT: MDR-8000

Test Data – Frequency Stability

+30 °C

Lower (DARS) Edge

RS	Marker 1 [T1]	RBW	100 kHz	RF Att	0 dB
	Ref Lvl	12.19 dBm	VBW	1 MHz	
	21.1 dBm	2.35732966 GHz	SWT	100 ms	Unit dBm



Date: 25.FEB.2010 16:06:28

ACP Low is the 1 MHz channel power at the DARS band of 2344 to 2345 MHz.

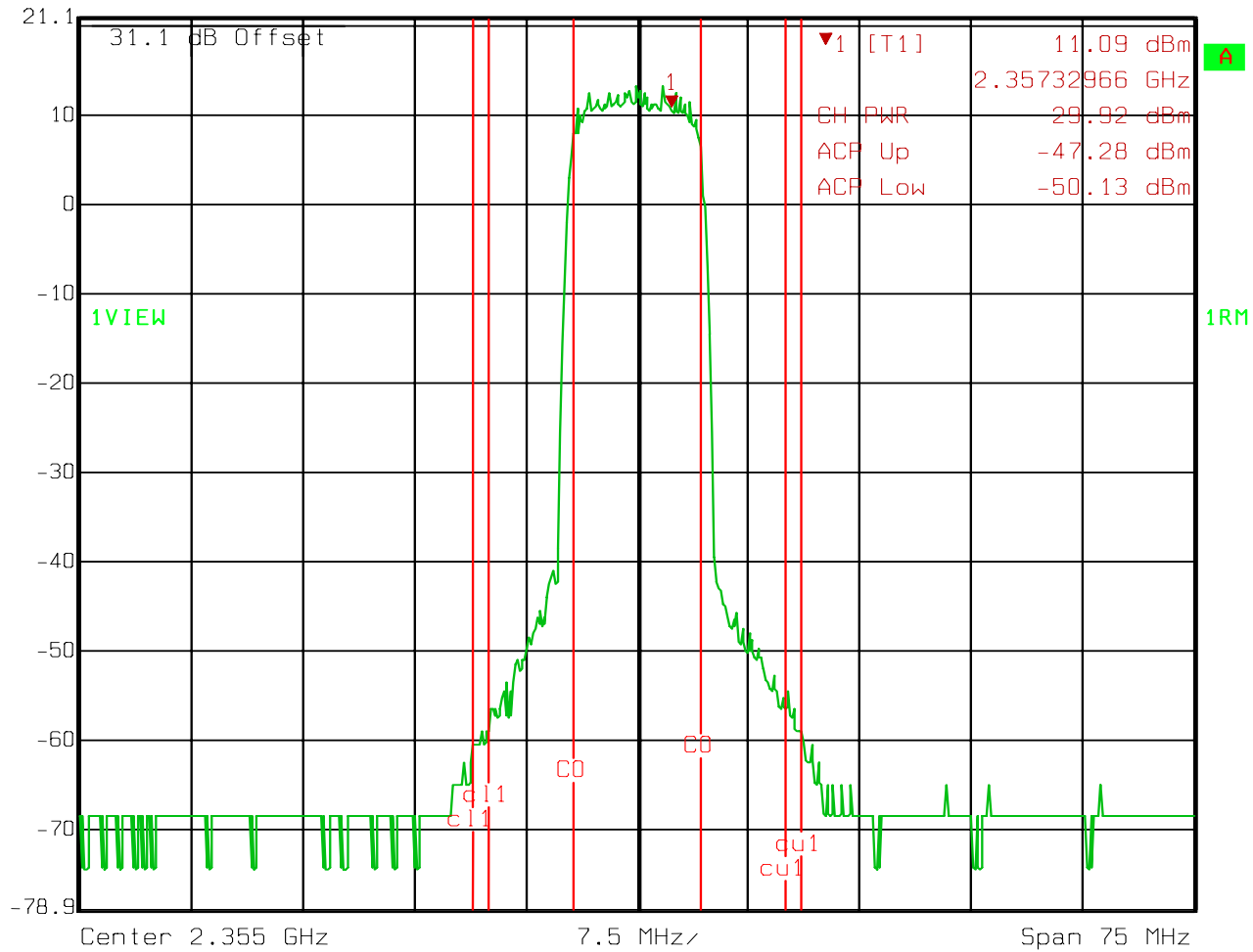
EQUIPMENT: MDR-8000

Test Data – Frequency Stability

+40 ° C

Lower (DARS) Edge

	Marker 1 [T1]	RBW	100 kHz	RF Att	0 dB
	Ref Lvl	11.09 dBm	VBW	1 MHz	
	21.1 dBm	2.35732966 GHz	SWT	100 ms	Unit dBm



Date: 25.FEB.2010 16:24:58

ACP Low is the 1 MHz channel power at the DARS band of 2344 to 2345 MHz.

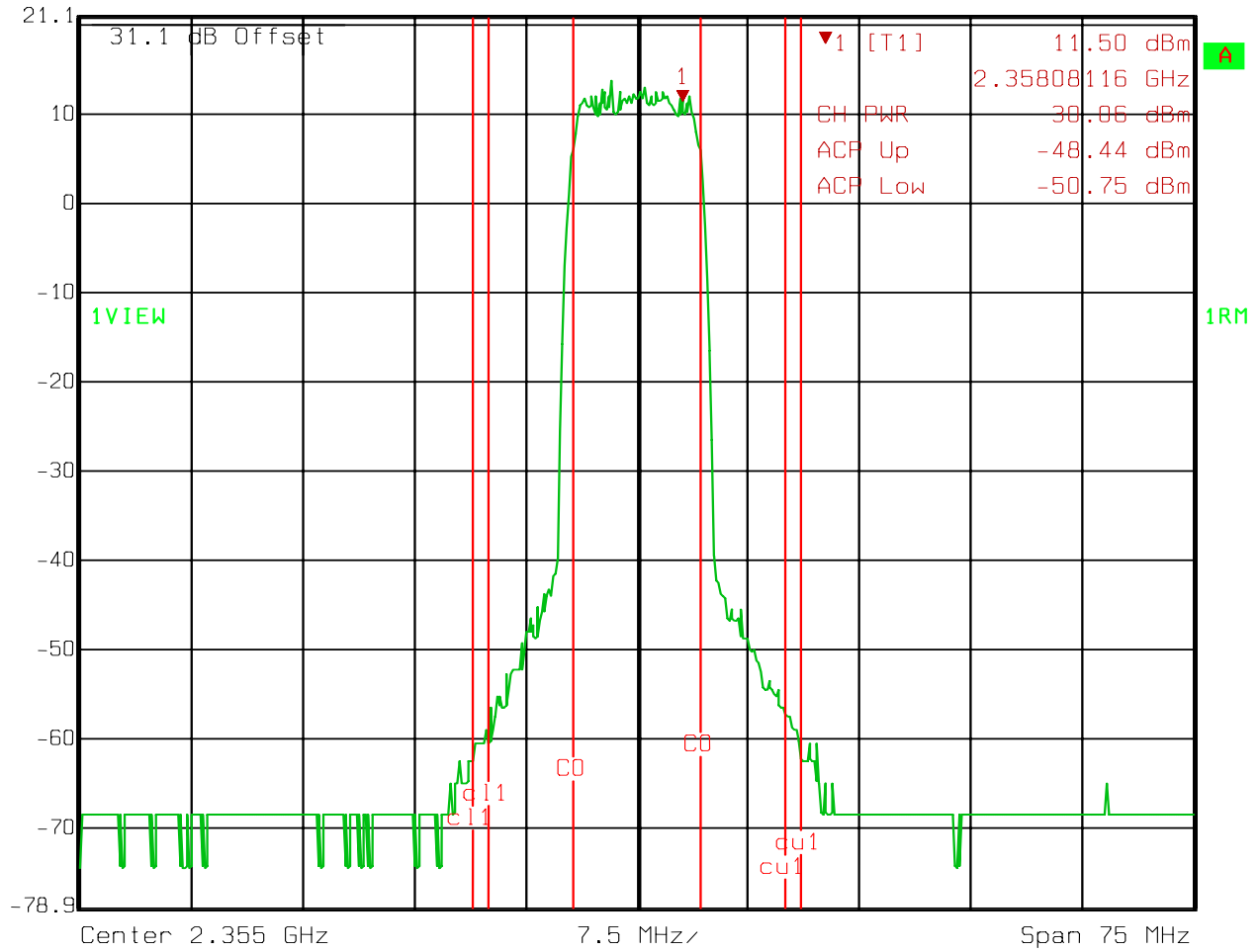
EQUIPMENT: MDR-8000

Test Data – Frequency Stability

+50 °C

Lower (DARS) Edge

	Ref Lvl	21.1 dBm	Marker 1 [T1]	11.50 dBm	RBW	100 kHz	RF Att	0 dB
			2.35808116 GHz		VBW	1 MHz		
					SWT	100 ms	Unit	dBm



Date: 25.FEB.2010 16:49:24

ACP Low is the 1 MHz channel power at the DARS band of 2344 to 2345 MHz.

EQUIPMENT: MDR-8000

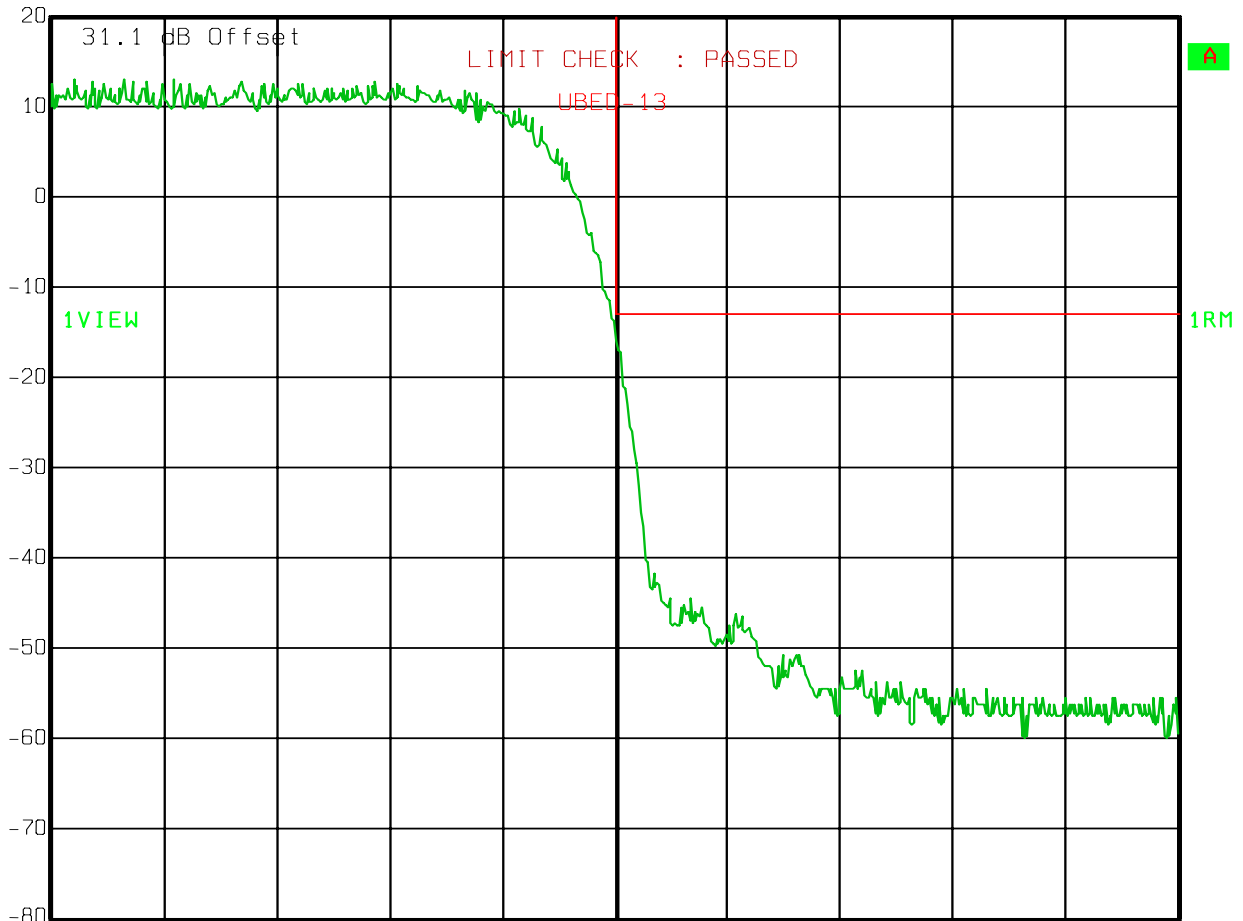
Test Data – Frequency Stability

-30° C
Upper Edge



Ref Lvl
20 dBm

RBW 100 kHz RF Att 10 dB
VBW 1 MHz
SWT 100 ms Unit dBm



Center 2.36 GHz 1 MHz Span 10 MHz

Date: 25.FEB.2010 14:03:34

EQUIPMENT: MDR-8000

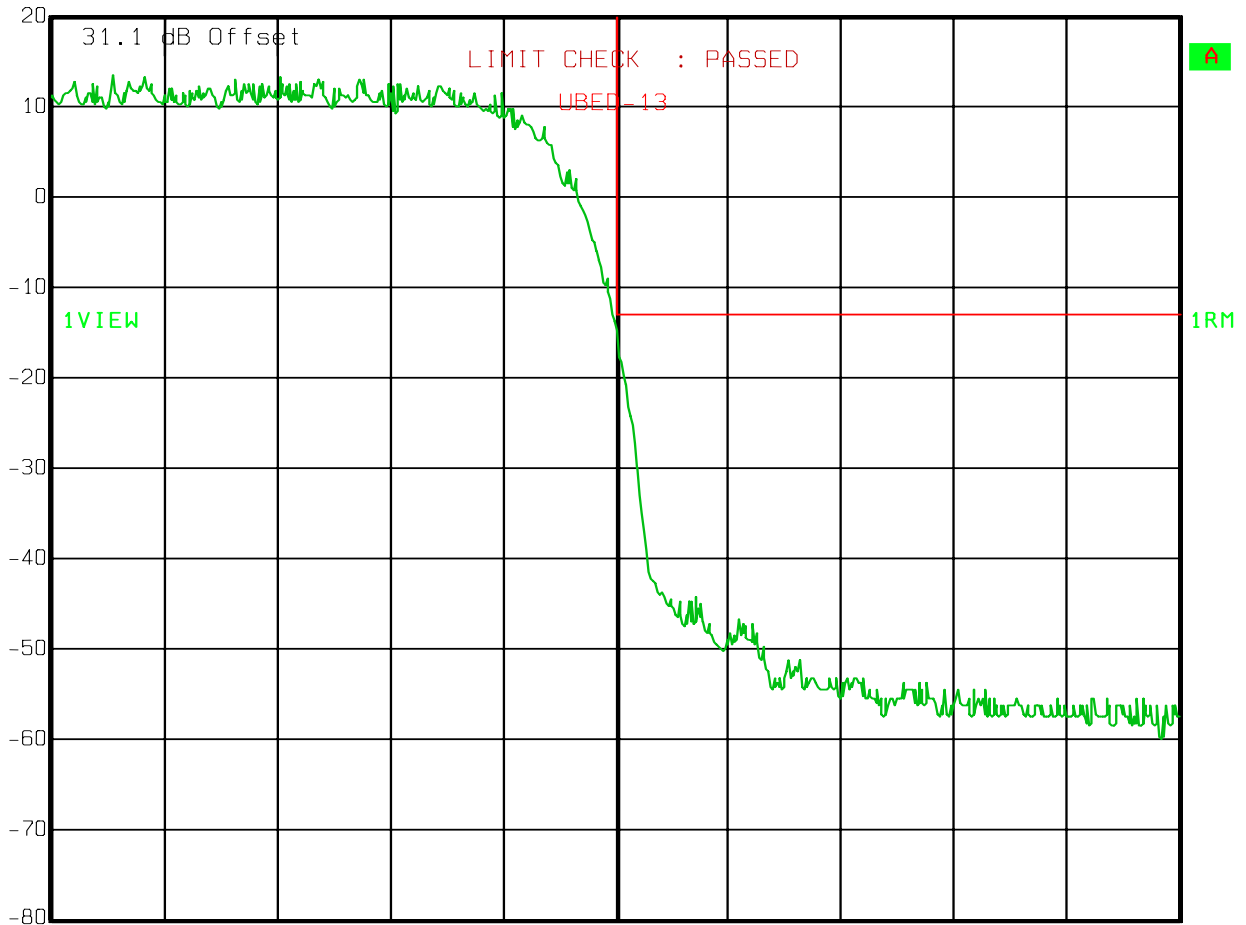
Test Data – Frequency Stability

-20° C
Upper Edge



Ref Lvl
20 dBm

RBW 100 kHz RF Att 10 dB
VBW 1 MHz
SWT 100 ms Unit dBm



Center 2.36 GHz 1 MHz Span 10 MHz

Date: 25.FEB.2010 14:05:47

EQUIPMENT: MDR-8000

Test Data – Frequency Stability

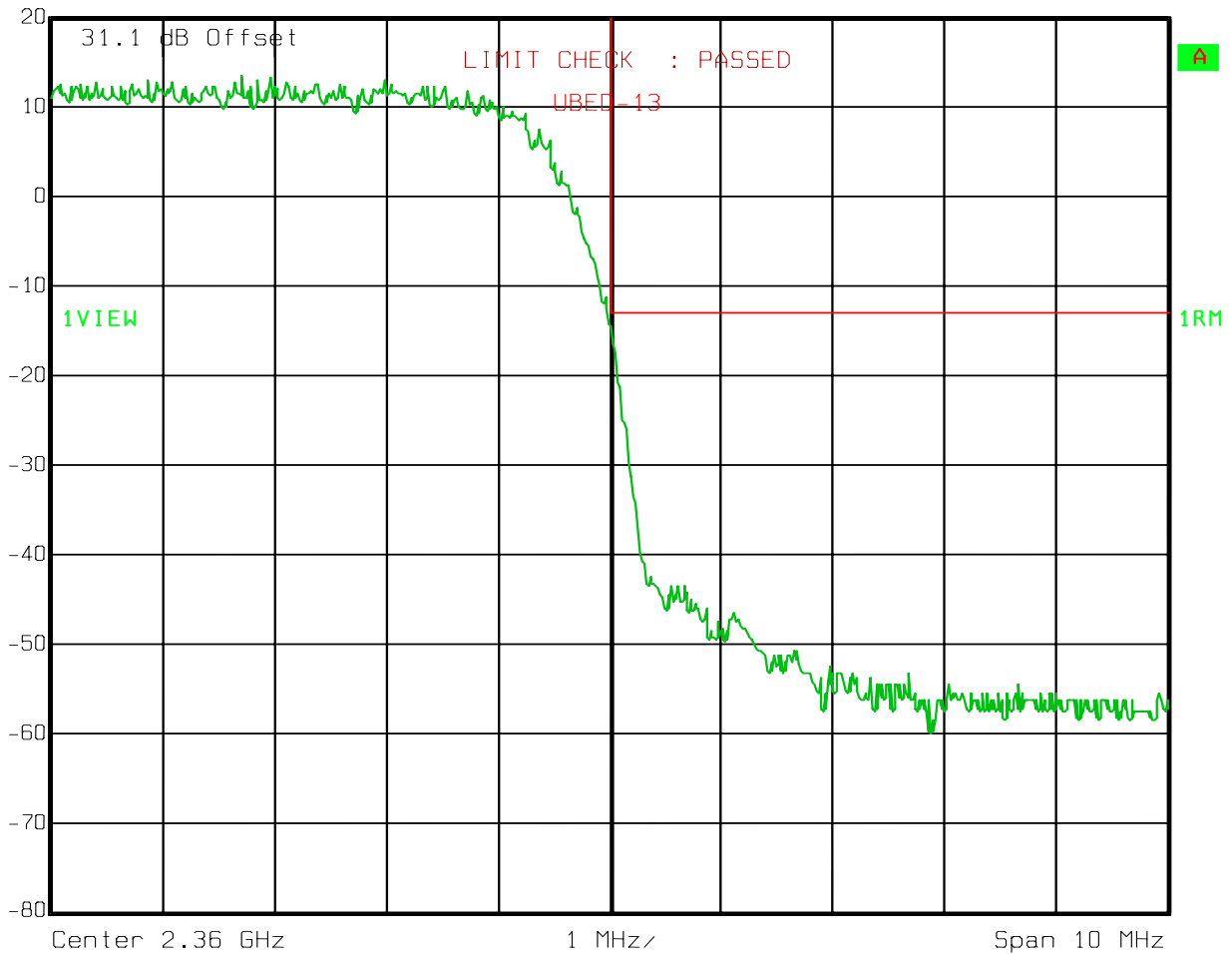
-10 °C

Upper Edge



Ref Lvl
20 dBm

RBW 100 kHz RF Att 10 dB
VBW 1 MHz
SWT 100 ms Unit dBm



Date: 25.FEB.2010 14:40:24

EQUIPMENT: MDR-8000

Test Data – Frequency Stability

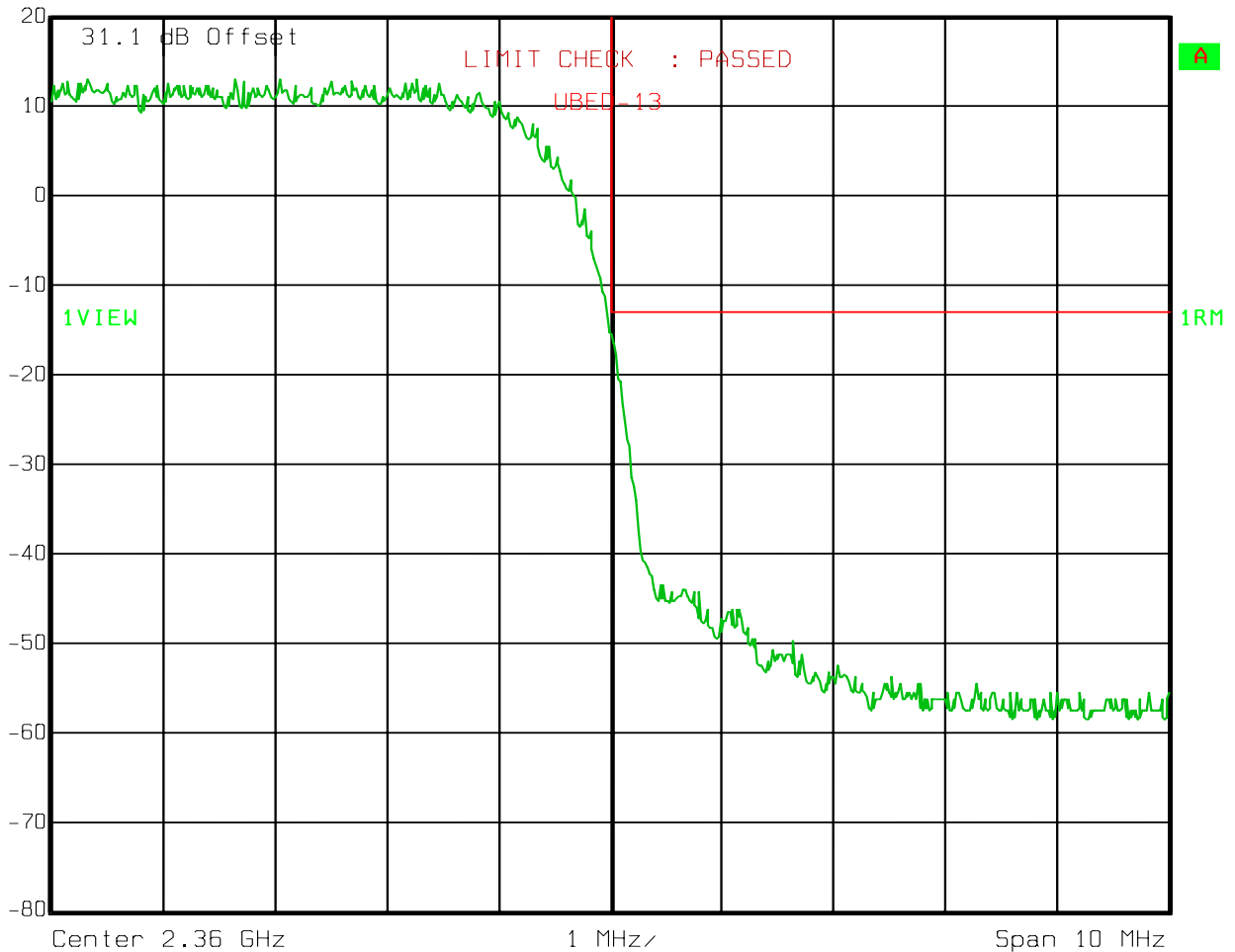
0 ° C

Upper Edge



Ref Lvl
20 dBm

RBW 100 kHz RF Att 10 dB
VBW 1 MHz
SWT 100 ms Unit dBm



Date: 25.FEB.2010 15:04:13

EQUIPMENT: MDR-8000

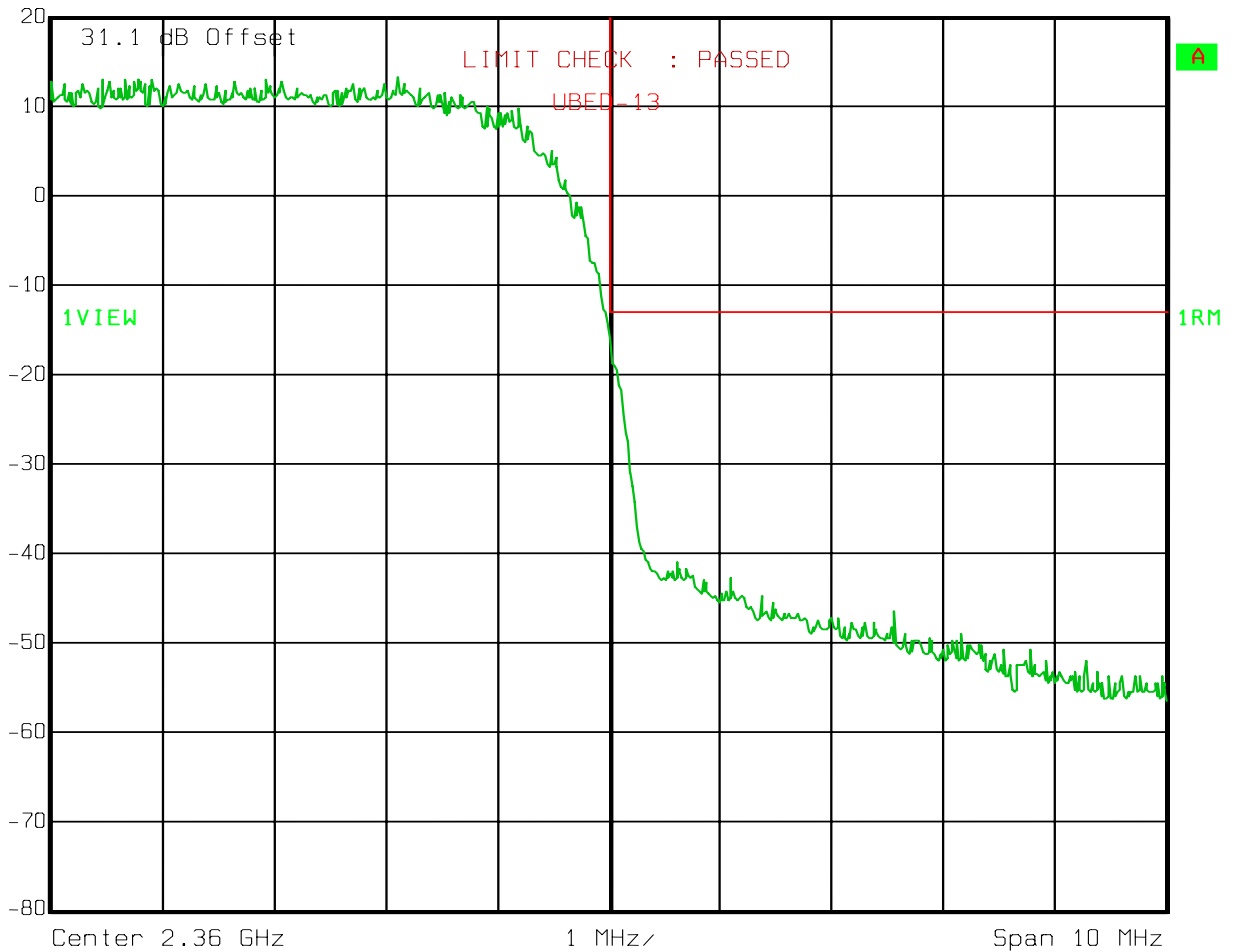
Test Data – Frequency Stability

+10 ° C
Upper Edge



Ref Lvl
20 dBm

RBW 100 kHz RF Att 0 dB
VBW 1 MHz
SWT 100 ms Unit dBm



Date: 25.FEB.2010 15:31:17

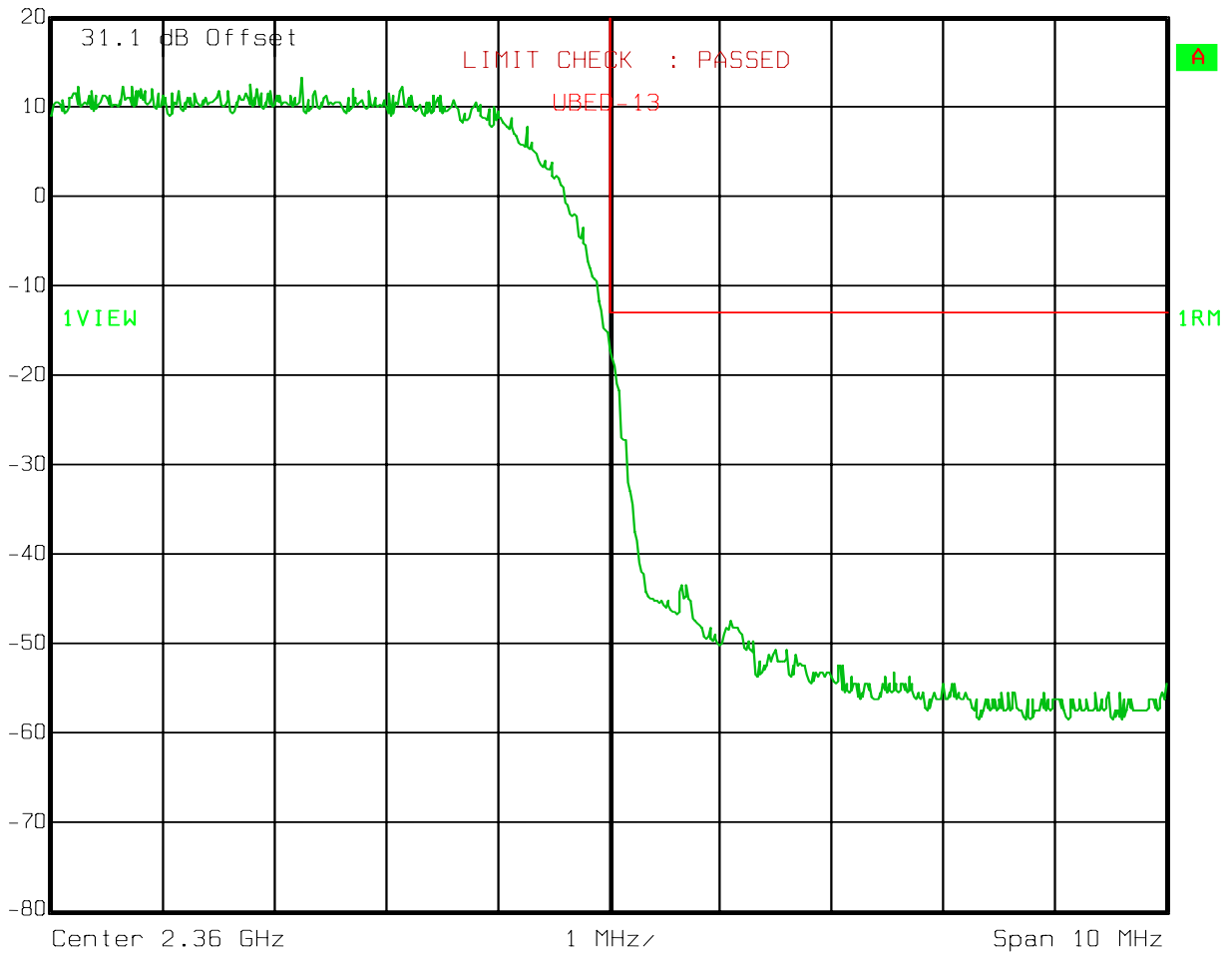
EQUIPMENT: MDR-8000

Test Data – Frequency Stability

+20 ° C/-48 Vdc
Upper Edge



Ref Lvl	RBW	100 kHz	RF Att	10 dB
20 dBm	VBW	1 MHz	Unit	dBm
	SWT	100 ms		



Date: 24.FEB.2010 15:50:47

EQUIPMENT: MDR-8000

Test Data – Frequency Stability

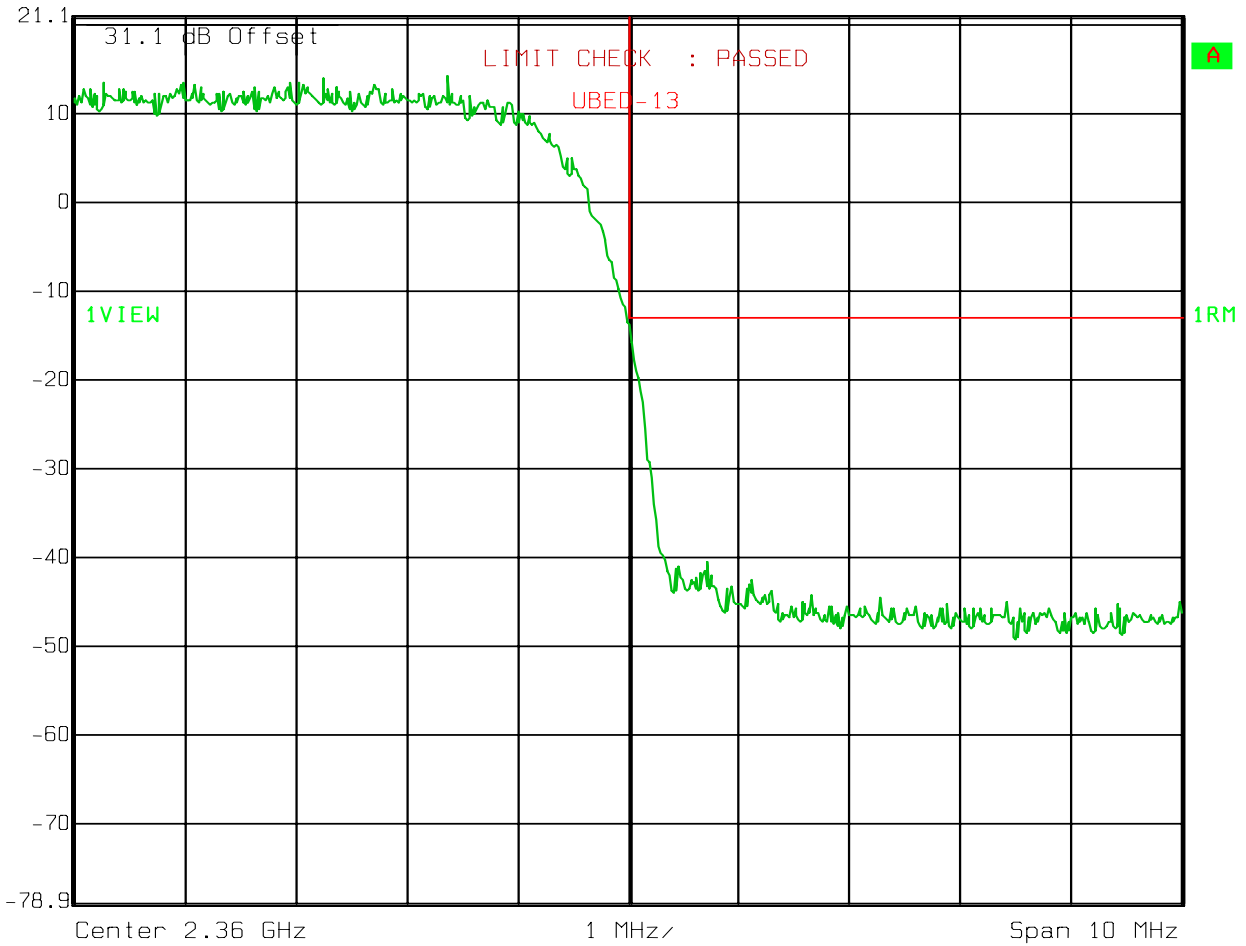
+20 ° C/-55.2 Vdc

Upper Edge



Ref Lvl
21.1 dBm

RBW 100 kHz RF Att 20 dB
VBW 1 MHz
SWT 100 ms Unit dBm



Date: 26.FEB.2010 09:33:02

EQUIPMENT: MDR-8000

Test Data – Frequency Stability

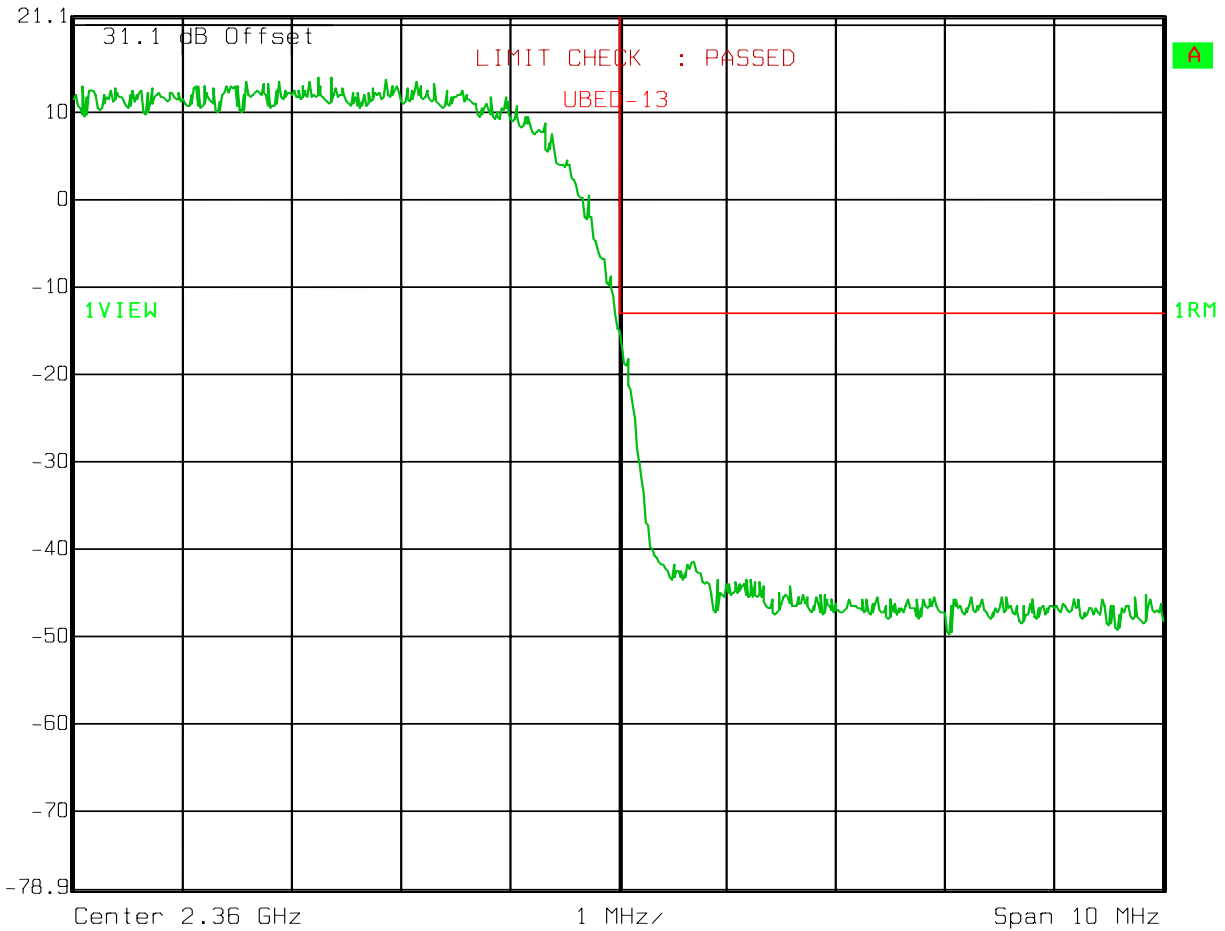
+20 ° C/-40.8 Vdc

Upper Edge



Ref Lvl
21.1 dBm

RBW 100 kHz RF Att 20 dB
VBW 1 MHz
SWT 100 ms Unit dBm



Date: 26.FEB.2010 09:32:33

EQUIPMENT: MDR-8000

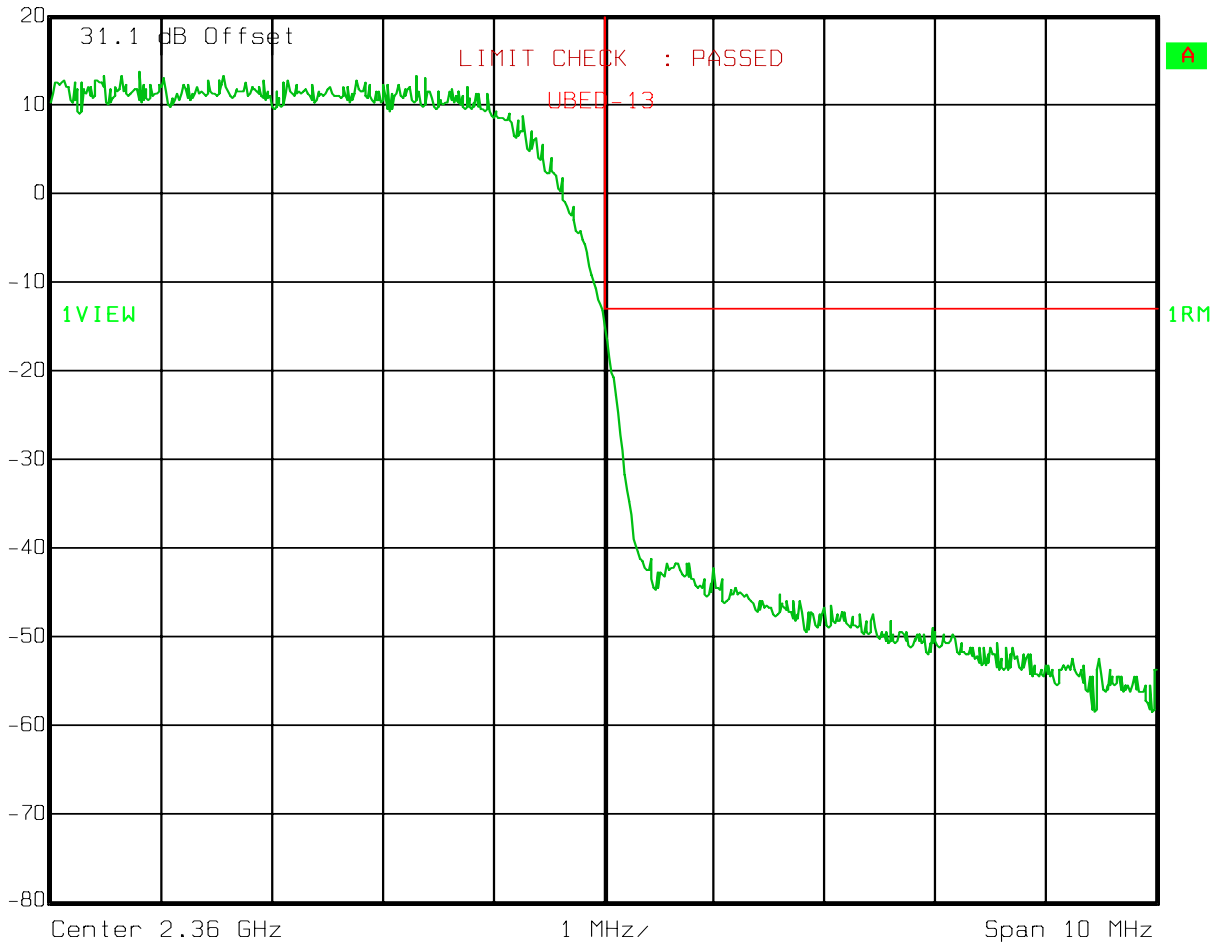
Test Data – Frequency Stability

+30 °C
Upper Edge



Ref Lvl
20 dBm

RBW 100 kHz RF Att 0 dB
VBW 1 MHz
SWT 100 ms Unit dBm



Date: 25.FEB.2010 16:02:53

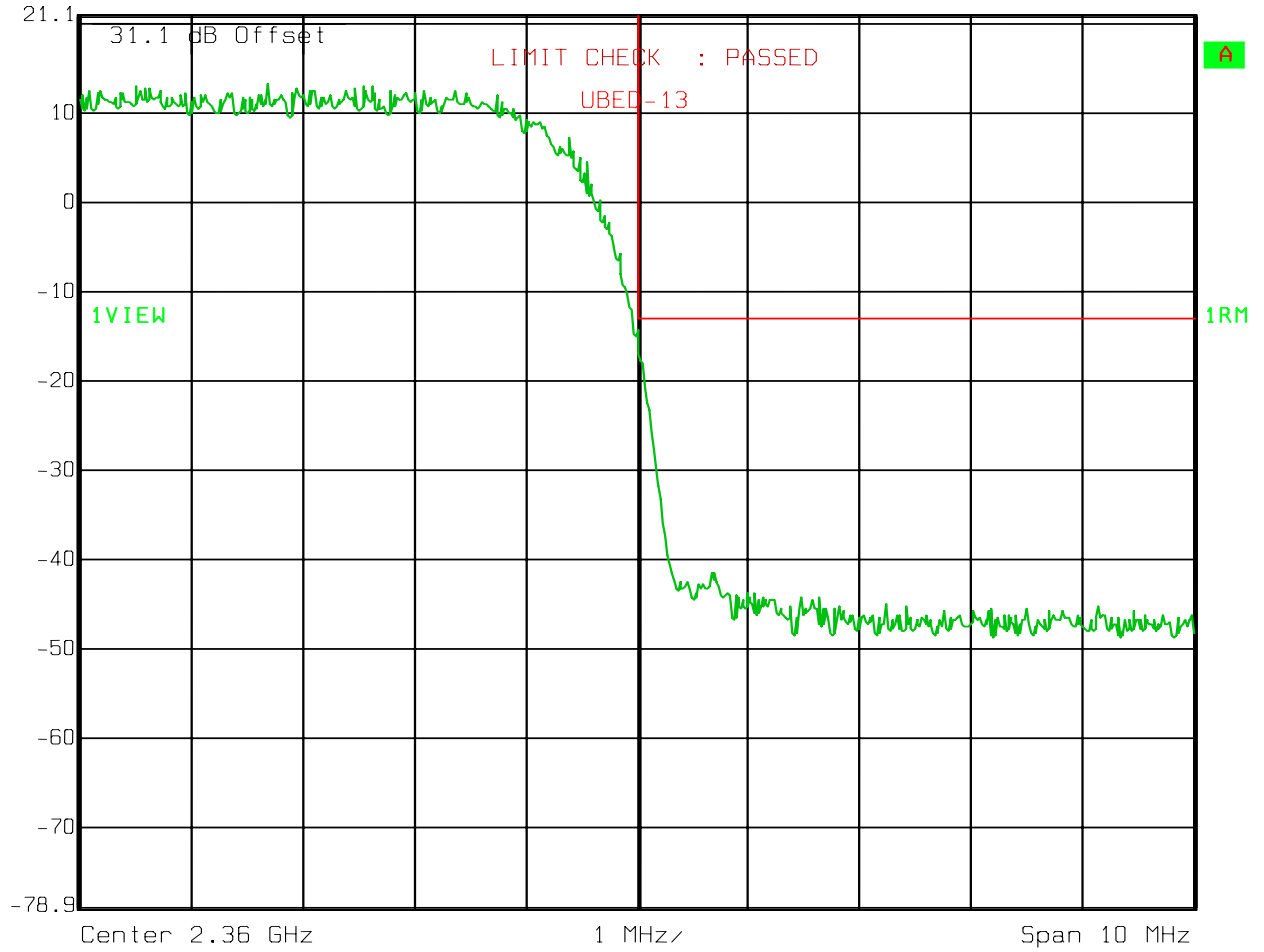
EQUIPMENT: MDR-8000

Test Data – Frequency Stability

+40 °C
Upper Edge



Ref Lvl	RBW	100 kHz	RF Att	20 dB
21.1 dBm	VBW	1 MHz	Unit	dBm
	SWT	100 ms		



Date: 25.FEB.2010 16:25:50

EQUIPMENT: MDR-8000

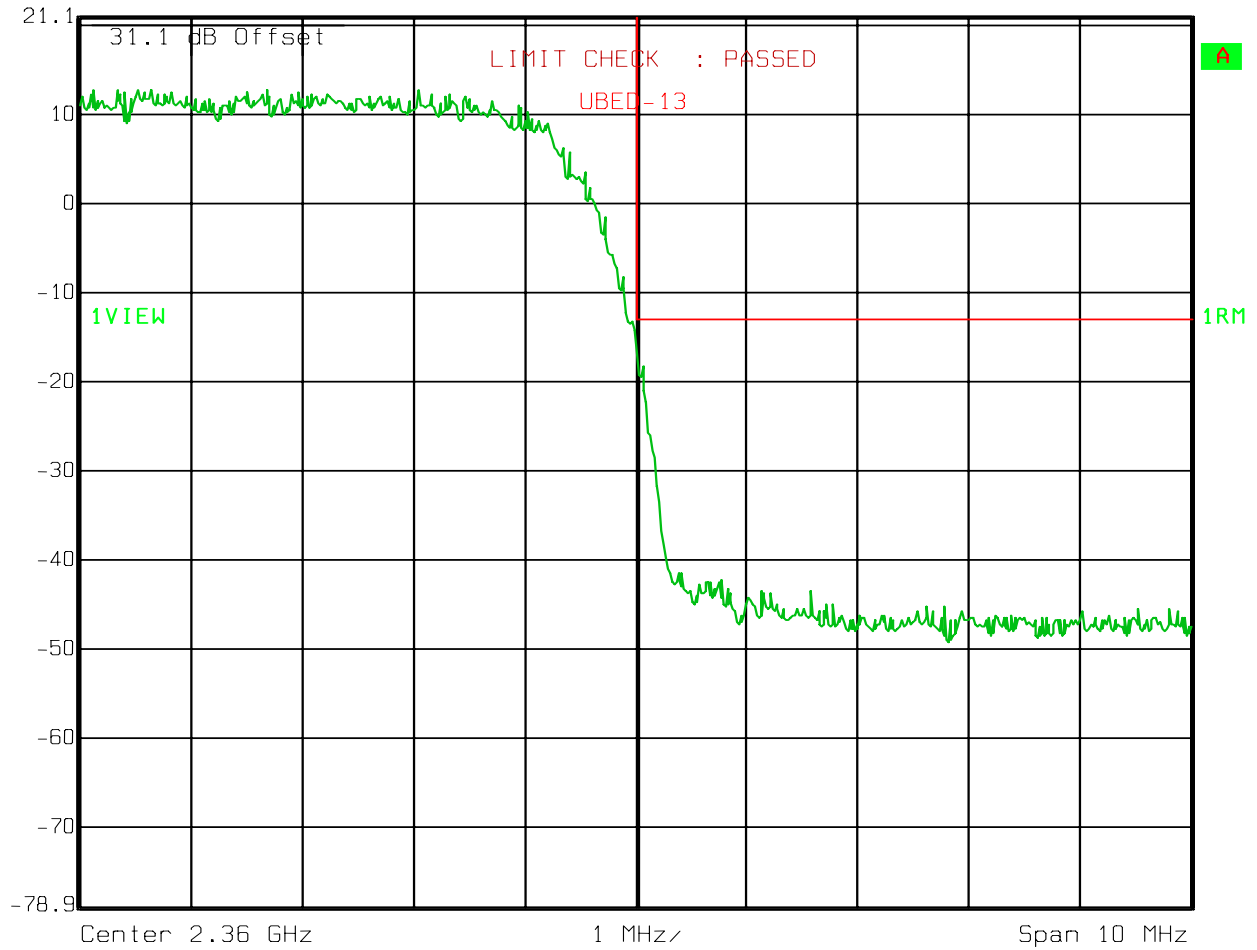
Test Data – Frequency Stability

+50 ° C
Upper Edge



Ref Lvl
21.1 dBm

RBW 100 kHz RF Att 20 dB
VBW 1 MHz
SWT 100 ms Unit dBm



Date: 25.FEB.2010 16:48:14

EQUIPMENT: MDR-8000**Section 8. Test Equipment List**

Asset Tag	Description	Manufacturer	Model	Serial #	Last Cal	Next Cal
283	Environmental Chamber with controller # 1190489	Envirotronics	SH27 & 2030-22844	129010083	06-Oct-2009	06-Oct-2010
993	Antenna, Horn	A.H. Systems	SAS-200/571	162	09-Sep-2009	09-Sep-2011
1016	Preamplifier	Hewlett Packard	8449A	2749A00159	23-Jun-2009	23-Jun-2010
1025	Preamplifier, 25dB	Nemko USA, Inc.	LNA25	399	02-Jul-2009	02-Jul-2010
1036	Spectrum Analyzer	Rohde & Schwartz	FSEK30	830844/006	10-Jan-2009	10-Jan-2010
1082	Cable, 2m	Astrolab	32027-2-29094-72TC		N/R	
1464	Spectrum Analyzer	Hewlett Packard	8563E	3551A04428	27-Feb-2009	27-Feb-2011
1469	Attenuator, 10 dB, DC 18 GHz	MCL Inc.	BW-S10W2 10db-2WDC		N/R	
1472	Attenuator, 20dB, DC 18 GHz	Omni Spectra	20600-20db		N/R	
1480	Antenna, Bilog	Schaffner-Chase	CBL6111C	2572	18-Jan-2010	18-Jan-2011
1484	Cable	Storm	PR90-010-072		23-Jun-2009	23-Jun-2010
1485	Cable	Storm	PR90-010-216		23-Jun-2009	23-Jun-2010

ANNEX A - TEST DETAILS

NAME OF TEST: RF Power Output

PARA. NO.: 2.1046

Method Of Measurement:

Antenna Conducted:

The peak power at antenna terminals is measured using a Spectrum Analyzer or Power Meter. Power output is measured with the maximum rated input level.

E.I.R.P.:

Test Method:

The maximum field strength of the spurious emission is measured at a distance of 3 meters. The device under test is then replaced with a substitution antenna of known gain with respect to a $\frac{1}{4}$ wave dipole antenna. A calibrated signal source is used to feed the substitution antenna. The rf level to the substitution antenna is adjusted to repeat the previously measured field strength. The rf input level to the substitution antenna is the effective radiated power of the spurious emission after any correction for substitution antenna gain against a $\frac{1}{4}$ wave dipole.

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
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Method Of Measurement:

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of at least 1% of the bandwidth of the transmitted signal. The resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform.

The appropriate bandwidth mask is applied to the output waveform to verify compliance.

NAME OF TEST: Spurious Emission at Antenna Terminals PARA. NO.: 2.1051

Antenna Conducted:

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of 1 MHz for emissions above 1 GHz. Below 1 GHz the resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform.

The appropriate limit line is applied to the output waveform to verify compliance.

NAME OF TEST: Field Strength of Spurious Radiation PARA. NO.: 2.1053

Test Method:

The maximum field strength of the spurious emission is measured at a distance of 3 meters. The device under test is then replaced with a substitution antenna of known gain with respect to a ¼ wave dipole antenna. A calibrated signal source is used to feed the substitution antenna. The rf level to the substitution antenna is adjusted to repeat the previously measured field strength. The rf input level to the substitution antenna is the effective radiated power of the spurious emission after any correction for substitution antenna gain against a ¼ wave dipole.

NAME OF TEST: Frequency Stability	2.1055
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Method Of Measurement:

Frequency Stability With Voltage Variation:

The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation:

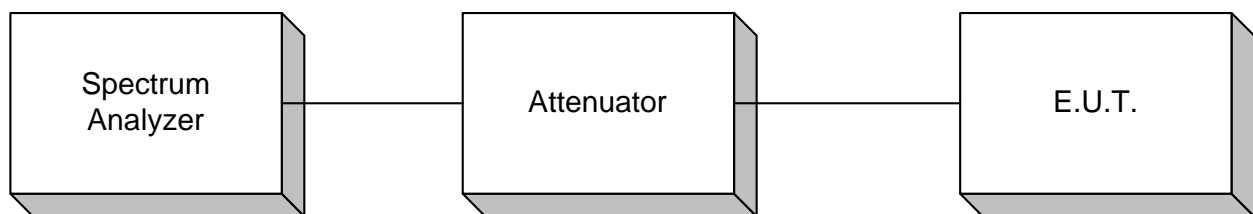
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

ANNEX B - TEST DIAGRAMS

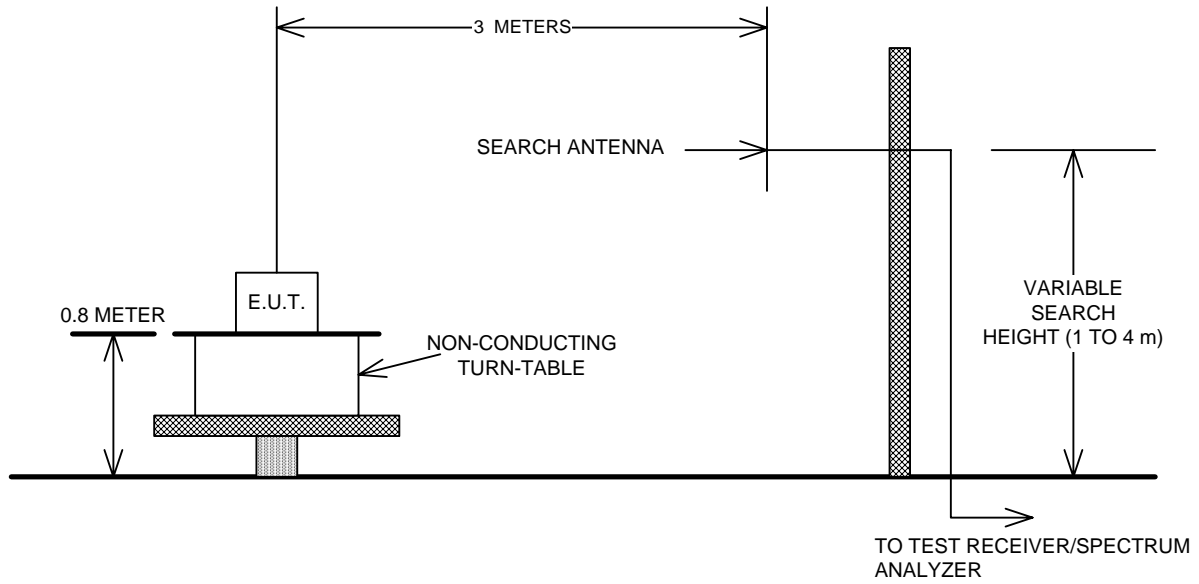
Para. No. 2.1046 - R.F. Power Output

Para. No. 2.1049 - Occupied Bandwidth

Para. No. 2.1051 - Spurious Emissions at Antenna Terminals



Para. No. 2.1053 - Field Strength of Spurious Emissions



Para. No. 2.1055 - Frequency Stability

