

Certification Test Report

CFR 47 FCC Part 2 and Part 27, Subpart C

**Model: 2.3 GHz MX8 Base Station Transceiver
2.3-BTS3A-R1 (AC Unit)
2.3-BTS3T-R1 (24 VDC Unit)
2.3-BTS3F-R1 (-48 VDC Unit)**

FCC ID No.: PL6-2300-BTS3-R2

Project Code: W7443

Revision: 1

Prepared for: Navini Networks
2240 Campbell Creek Blvd.
Suite 110
Richardson, TX 75082

Author: Tom Tidwell, Manager of Wireless Services

Issued: 15 February, 2008

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

NTS Plano, 1701 E. Plano Pkwy., Plano, TX 75074 Tel: (972) 509-2566, Fax: (972) 509-0073

Report Summary

NTS Plano

Accreditation Numbers: FCC: 101741
 IC: 46405-4319 File # IC-4319A-1

Applicant: Navini Networks, Inc.
 2240 Campbell Creek Blvd.
 Suite 110
 Richardson, TX 75082

Customer Representative: Larry Zhou

EUT Description:

EUT Description	Manufacturer	Model	Revision	Serial Number
The equipment tested is a point-to-multipoint base station for data transmission.	Navini Networks	2.3-BTS3A-R1 (AC Unit) 2.3-BTS3T-R1 (24 VDC Unit) 2.3-BTS3F-R1 (-48 VDC Unit)	PN: 92-93448-00	061400001


This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Test Summary

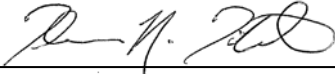
Appendix	Test/Requirement Description	Deviations from:			Pass / Fail	Applicable Rule Parts
		Base Standard	Test Basis	NTS Procedure		
A	RF Power Output	No	No	No	PASS	CFR 47, Part 2, Para. 2.1046 CFR 47, Part 27, Para. 27.50(a)
B	Modulation Characteristics	No	No	No	PASS	CFR 47, Part 2, Para. 2.1047
C	Occupied Bandwidth	No	No	No	PASS	CFR 47, Part 2, Para. 2.1049 CFR 47, Part 27, Para. 27.53(a)
D	Spurious Emissions at Antenna Terminals	No	No	No	PASS	CFR 47, Part 2, Para. 2.1051 CFR 47, Part 27, Para. 27.53(a)
E	Field Strength of Spurious Radiation	No	No	No	PASS	CFR 47, Part 2, Para. 2.1053 CFR 47, Part 27, Para. 27.53(a)
F	Frequency Stability	No	No	No	PASS	CFR 47, Part 2, Para. 2.1055 CFR 47, Part 24, Para. 27.54

Test Result: The product presented for testing complied with test requirements as shown above.

This is to certify that the preceding report is true and correct to the best of my knowledge.



 Robert Stevens,
 Quality Assurance Manager



 Tom Tidwell,
 Wireless Test Engineer

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Table of Contents

REPORT SUMMARY2

TEST SUMMARY.....3

REGISTER OF REVISIONS5

INTRODUCTION.....6

1.1 PURPOSE6

2.0 EUT DESCRIPTION6

2.1 CONFIGURATION6

2.1.1 EUT POWER6

2.2 EUT CABLES.....7

2.3 MODE OF OPERATION DURING TESTS7

3.0 SUPPORT EQUIPMENT8

3.1 CONFIGURATION8

3.2 TEST BED/PERIPHERAL CONFIGURATION.....8

4.0 FREQUENCY SPECTRUM9

APPENDICES10

APPENDIX A: 2.1046 RF POWER OUTPUT11

APPENDIX B: 2.1047 MODULATION CHARACTERISTICS14

APPENDIX C: 2.10.49 OCCUPIED BANDWIDTH.....16

APPENDIX D: 2.1051 SPURIOUS EMISSIONS AT ANTENNA TERMINALS.....27

APPENDIX E: 2.1053 FIELD STRENGTH OF SPURIOUS RADIATION.....52

APPENDIX F: 2.1055 FREQUENCY STABILITY.....57

APPENDIX G: TEST EQUIPMENT LIST72

END OF DOCUMENT73

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Register of revisions

Revision	Reason for Revision	Release Date
0	Original	12/17/2007
1	Added comments to spurious emissions plots for clarification. Added spectrum analyzer settings to rf power output measurement results.	2/15/08

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

INTRODUCTION

1.1 PURPOSE

The purpose of this document is to describe the tests applied by NTS Plano to demonstrate that the 2.3-BTS3A-R1, 2.3-BTS3T-R1, and 2.3-BTS3F-R1 base station transmitter continues to comply to FCC Part 27 Subparts C and M in accordance with the certification requirements of CFR 47, Part 2 following modification as described in the FCC filing. Modification was made to improve the spurious emission performance of the device. No modification was made to frequency-determining components.

2.0 EUT DESCRIPTION

2.1 CONFIGURATION

Description of EUT

	Name	Model	Revision	Serial Number
EUT	2.3 GHz MX8 Base Station	2.3-BTS3A-R1 (AC Unit) 2.3-BTS3T-R1 (+24 VDC Unit) 2.3-BTS3F-R1 (-48 VDC Unit)	PN: 92-93448-00	061400001
RF Exposure Classification	Fixed Outdoor			
Channels/Frequency Range	2305 – 2315 MHz 2350 – 2360 MHz			
Power	1.70 watts at antenna terminals (avg.) 16.9 watts at antenna terminals (peak)			
Emission Designator:	5M00W7D (OFDMA) 5M00F9W (CDMA)			
TX antenna details	The antenna is fixed-mounted on outdoor permanent structures. RF exposure is addressed at the time of licensing.			
Functional Description	The device tested is used to deliver broadband data services.			

2.1.1 EUT POWER

Voltage	120 Vac, 60 Hz
Number of Feeds	Single phase (L1 and Neutral)

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

2.2 EUT CABLES

Quantity	Model/Type	Routing		Shielded / Unshielded	Description	Cable Length (m)
		From	To			
1	Coaxial	EUT	Test equipment	Shielded	Coaxial cable	3
1	Ethernet	EUT	Support/configuration PC	unshielded		2

2.3 MODE OF OPERATION DURING TESTS

Frequencies: 2307.5 MHz (Low A), 2312.5 MHz (Low B), 2352.5 MHz (High A), 2357.5 MHz (High B),

Modulation Modes:

OFDMA (Orthogonal Frequency Division Multiple Access) QPSK. This mode was determined to produce worst-case results based on pre-testing.

CDMA (Code Division Multiple Access) – This is a proprietary CDMA modulation mode.

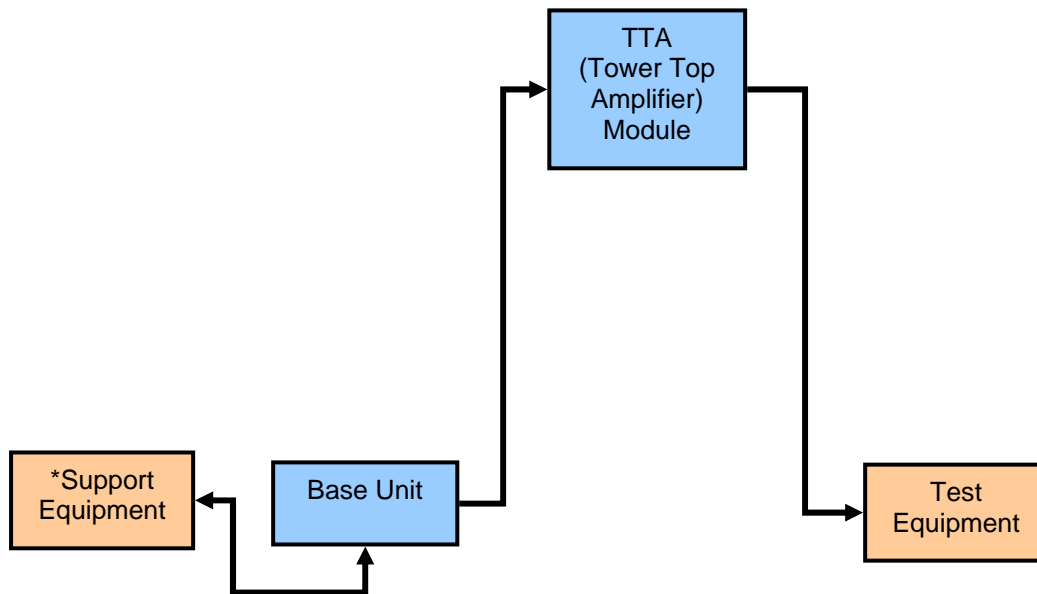
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

3.0 SUPPORT EQUIPMENT

3.1 CONFIGURATION

The radio was activated using customer-supplied test software. The software allowed the test engineer to change modulation modes and data rates and transmit channel.

3.2 TEST BED/PERIPHERAL CONFIGURATION

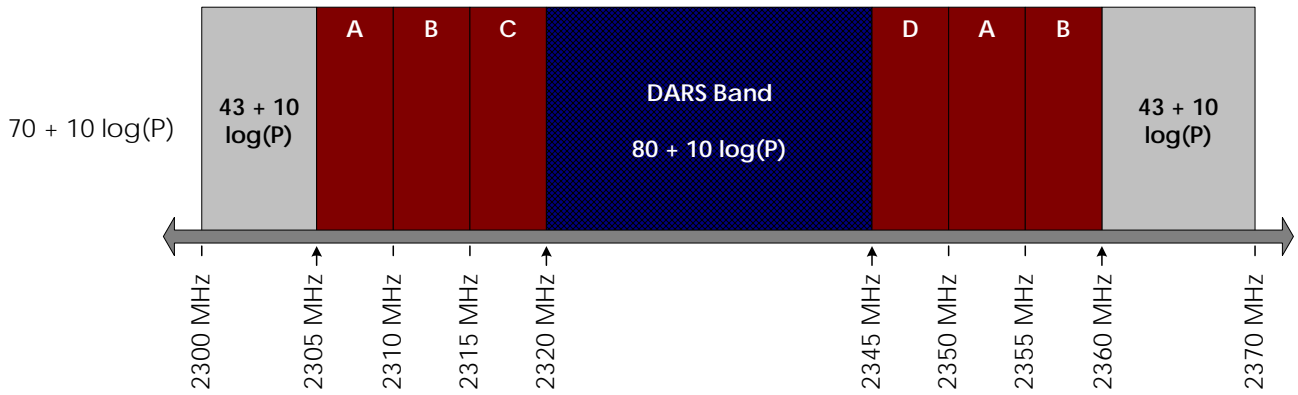


Support Equipment:

1. Hawking Technology Ethernet Switch, model # HFS5T;
2. Dell Laptop, model # Latitude C810.

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

4.0 FREQUENCY SPECTRUM



This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

APPENDICES

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

APPENDIX A: 2.1046 RF POWER OUTPUT

A.1. Base Standard & Test Basis

Base Standard	FCC PART 2.1046
Test Basis	TIA 603-C, 2004
Test Method	TIA 603-C, 2004

A.2. Specifications

27.50 Power and antenna height requirements

- (a) The following power limits apply to the 2305–2320 MHz and 2345–2360 MHz bands:
- (1) Fixed, land, and radiolocation land stations transmitting are limited to 2000 watts peak equivalent isotropically radiated power (EIRP).
 - (2) Mobile and radiolocation mobile stations transmitting are limited to 20 watts EIRP peak power.

Applicable RF Power Limit from Above: The maximum power is 2000 watts peak eirp.

-

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

A.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
None						

A.4. Test Procedure

TIA 603-C, 2004 and 27.50(h)(2)(i)

A.5. Test Results

Band	Frequency	Peak Power (dBm)	Peak Power (Watts)	Avg. Power (dBm)	Avg. Power (Watts)
Low Band A (OFDMA)	2.3075 GHz	41.16	13.1	31.83	1.52
High Band A (OFDMA)	2.3525 GHz	41.28	13.4	32.23	1.67
Low Band B (OFDMA)	2.3125 GHz	41.15	13.0	31.89	1.55
High Band B (OFDMA)	2.3575 GHz	41.61	14.5	32.30	1.70
Low Band A (CDMA)	2.3075 GHz	41.97	15.7	31.94	1.56
High Band A (CDMA)	2.3525 GHz	42.05	16.0	32.07	1.61
Low Band B (CDMA)	2.3125 GHz	41.90	15.5	31.74	1.49
High Band B (CDMA)	2.3575 GHz	42.23	16.7	32.13	1.63

Spectrum Analyzer Settings:

RBW: 10 MHz

VBW: 10 MHz

Detector: Max. Peak (for peak power measurement)

RMS (for average power measurement)

A.6. Operating Mode During Test

The transmitter was tested while in a continuous transmit mode.

A.7. Sample Calculation

$$Rf\ power(watts) = 10^{(rf\ power(dBm)/10)} / 1000$$

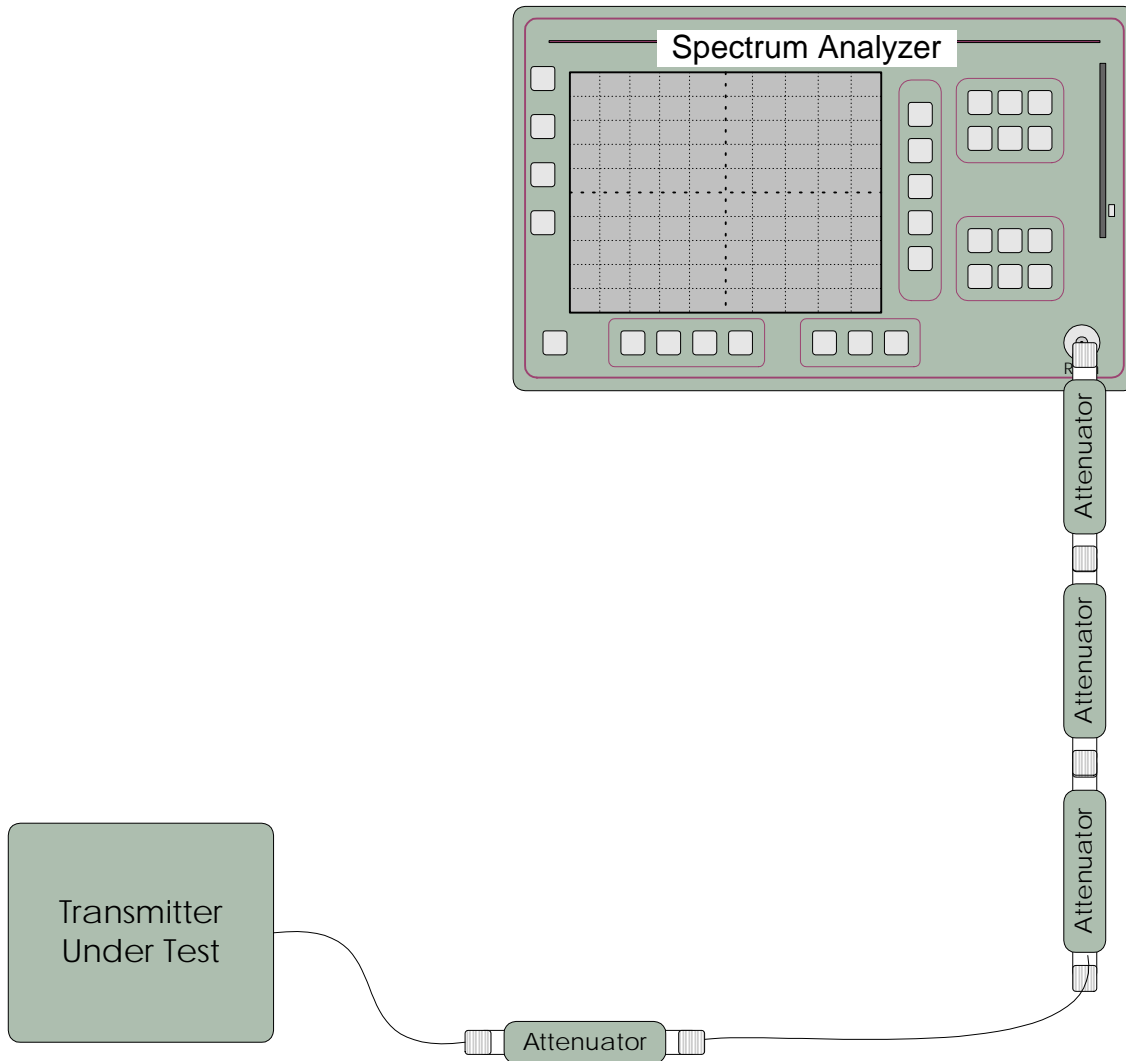
A.8. Test Data

Test Date: 11 December, 2007

Tested by: Dwaine Hartman, Wireless Technician

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

A.9. Test Diagram



A.10. Tested By

Test Date: 13 December, 2007
Tested by: Dwaine Hartman, Wireless Technician

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

APPENDIX B: 2.1047 MODULATION CHARACTERISTICS

B.1. Base Standard & Test Basis

Base Standard	FCC 2.1047
Test Basis	FCC 2.1047 Modulation Characteristics
Test Method	TIA 603-C, 2004

B.2. Specifications

2.1047 – Modulation Characteristics

(a) *Voice modulated communication equipment.* A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

(b) *Equipment which employs modulation limiting.* A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

(c) *Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power.* A curve showing the peak envelope power output versus the modulation input voltage shall be supplied. The modulating signals shall be the same in frequency as specified in paragraph (c) of §2.1049 for the occupied bandwidth tests.

(d) *Other types of equipment.* A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

B.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

B.4. Test Method

This device generates a complex digitally modulated waveform.

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

B.5. Test Results

Not applicable – The device does not produce an analogue modulated waveform.

Test Data Summary

Emission Designators: 5M00W7D (OFDMA)
5M00F9W (CDMA)

B.6. Test Diagram

N/A

B.7. Tested By

Test Date: 13 December, 2007

Tested by: Dwaine Hartman, Wireless Technician

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

v
APPENDIX C: 2.10.49 OCCUPIED BANDWIDTH

C.1. Base Standard & Test Basis

Base Standard	FCC 2.1049
Test Basis	FCC 2.1049 Occupied Bandwidth
Test Method	TIA 603-C, 2004

C.2. Specifications

27.53

(a) For operations in the bands 2305–2320 MHz and 2345–2360 MHz, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by the following amounts:

- (1) *For fixed, land, and radiolocation land stations:* By a factor not less than $80 + 10 \log(p)$ dB on all frequencies between 2320 and 2345 MHz;
- (2) *For mobile and radiolocation mobile stations:* By a factor not less than $110 + 10 \log(p)$ dB on all frequencies between 2320 and 2345 MHz;
- (3) *For fixed, land, mobile, radiolocation land and radiolocation mobile stations:* By a factor not less than $70 + 10 \log(p)$ dB on all frequencies below 2300 MHz and on all frequencies above 2370 MHz; and not less than $43 + 10 \log(p)$ dB on all frequencies between 2300 and 2320 MHz and on all frequencies between 2345 and 2370 MHz that are outside the licensed bands of operation;
- (4) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or less, but at least one percent of the emission bandwidth of the fundamental emission of the transmitter, provided the measured energy is integrated over a 1 MHz bandwidth;
- (5) In complying with the requirements in §27.53(a)(1) and §27.53(a)(2), WCS equipment that uses opposite sense circular polarization from that used by Satellite DARS systems in the 2320–2345 MHz band shall be permitted an allowance of 10 dB;
- (6) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the edges, both upper and lower, of the licensee's bands of operation as the design permits;
- (7) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power;

C.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

C.4. Test Method

TIA 603-C, 2004 and 27.53(a)

C.5. Test Results

Compliant.

C.6. Deviations from Normal Operating Mode During Test

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

None.

C.7. Sample Calculation

$$70 + 10 \log(P)$$

$$70 + 10 \log(2)$$

$$70 + 10 * 0.3$$

$$70 + 3 = 73 \text{ dB}$$

$$33 \text{ dBm} - 73 \text{ dB} = -40 \text{ dBm}$$

C.8. Test Data

See plots following.

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 1 A Band Low (OFDMA Mode)

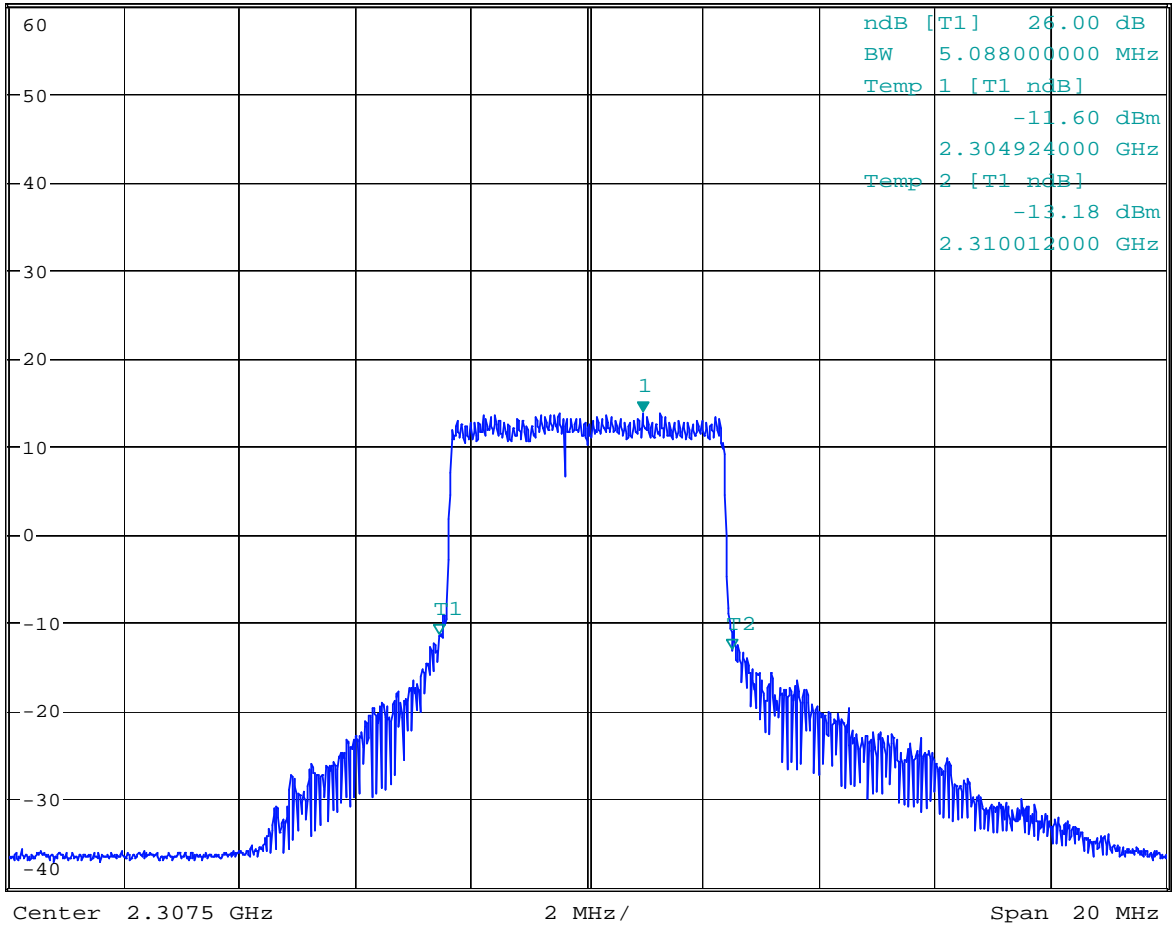


*RBW 50 kHz
 VBW 500 kHz
 *SWT 5 s
 Marker 1 [T1]
 13.71 dBm
 2.308460000 GHz

Ref 60 dBm

*Att 25 dB

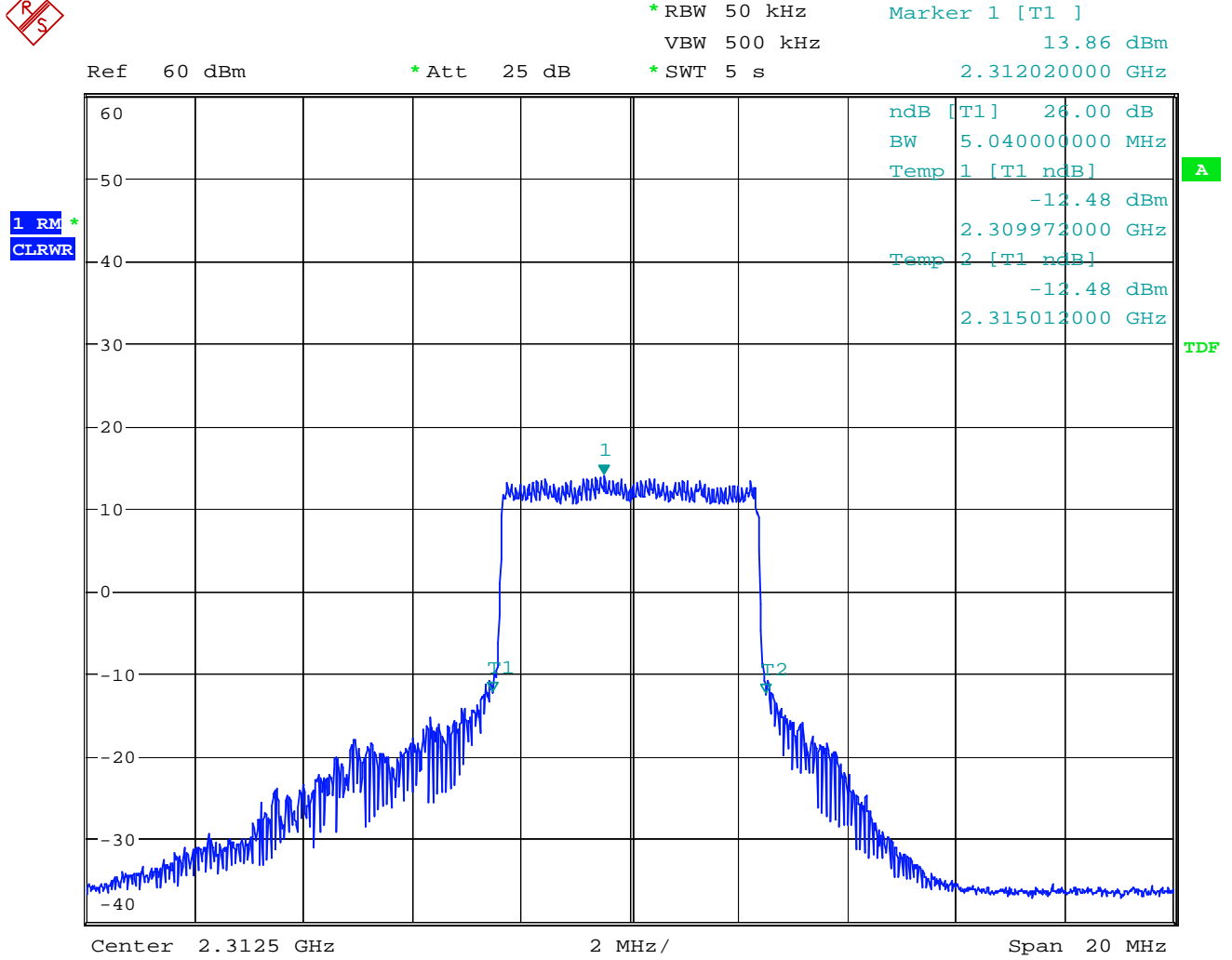
1 RM *
 CLRWR



Date: 13.DEC.2007 09:29:17

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 2 B Band Low (OFDMA Mode)



Date: 13.DEC.2007 10:04:00

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

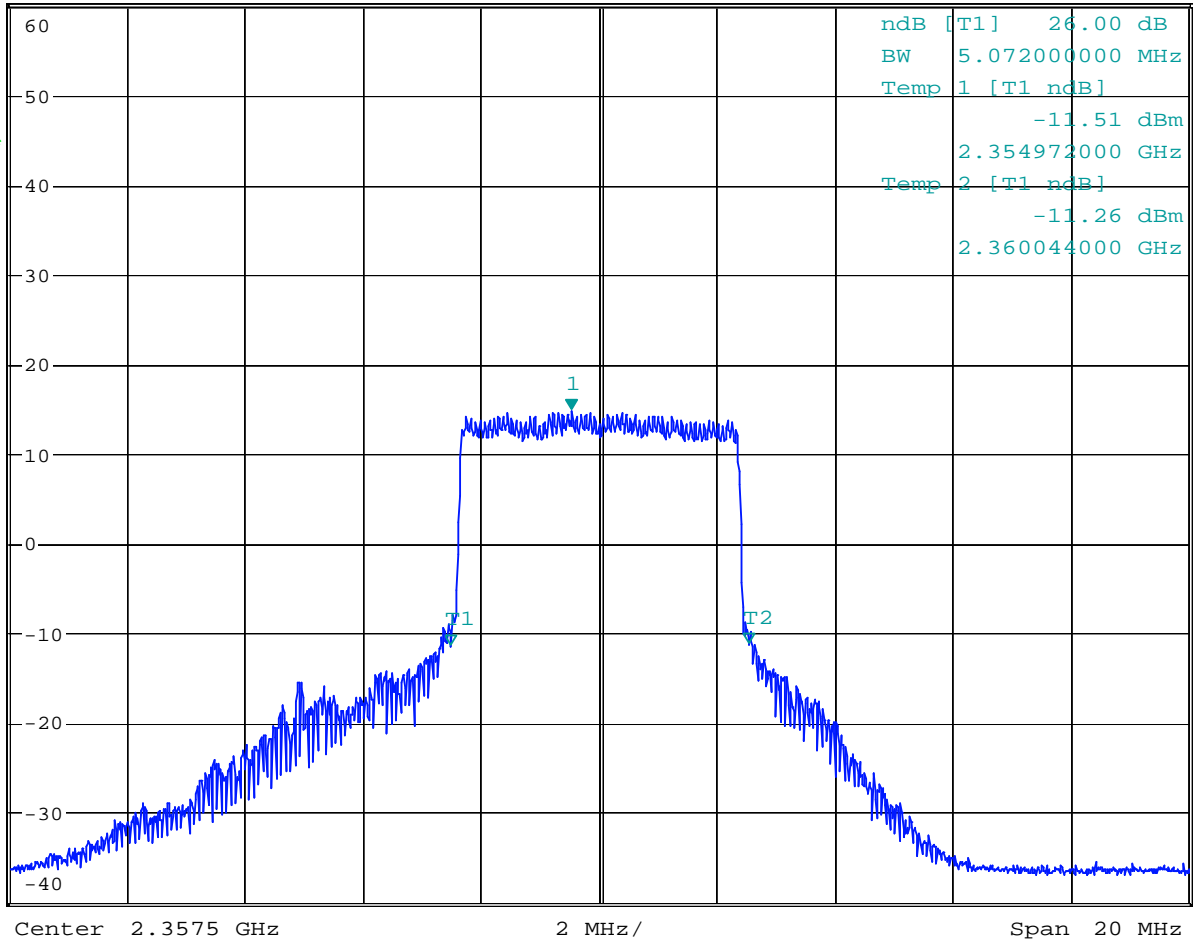
Figure 3 B Band High (OFDMA Mode)



*RBW 50 kHz
*Att 25 dB
*SWT 5 s
Marker 1 [T1]
14.81 dBm
2.357020000 GHz

Ref 60 dBm

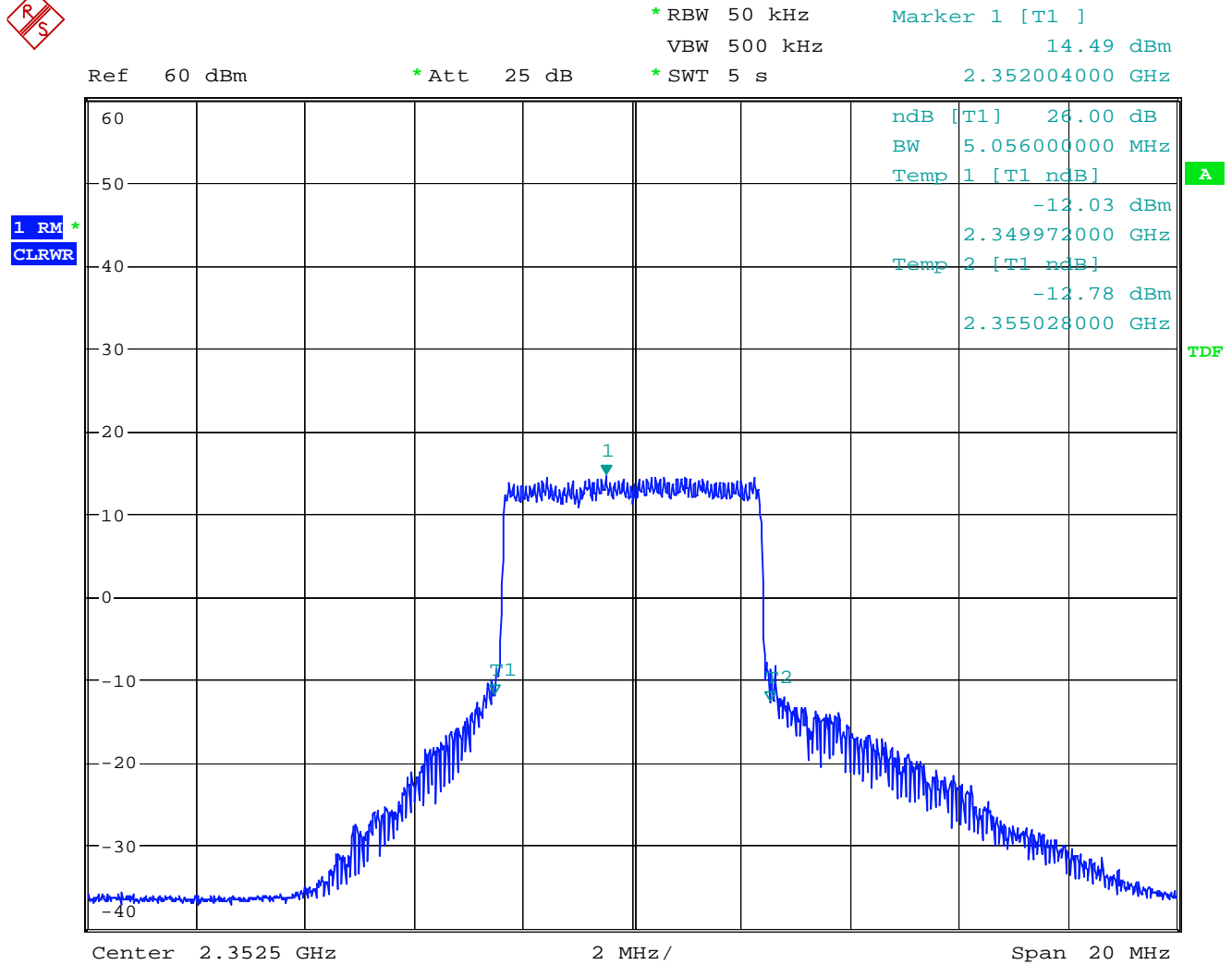
1 RM *
CLRWR



Date: 13.DEC.2007 10:21:08

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 4 A Band High (OFDMA Mode)



Date: 13.DEC.2007 10:14:06

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 5 A Band Low (CDMA Mode)

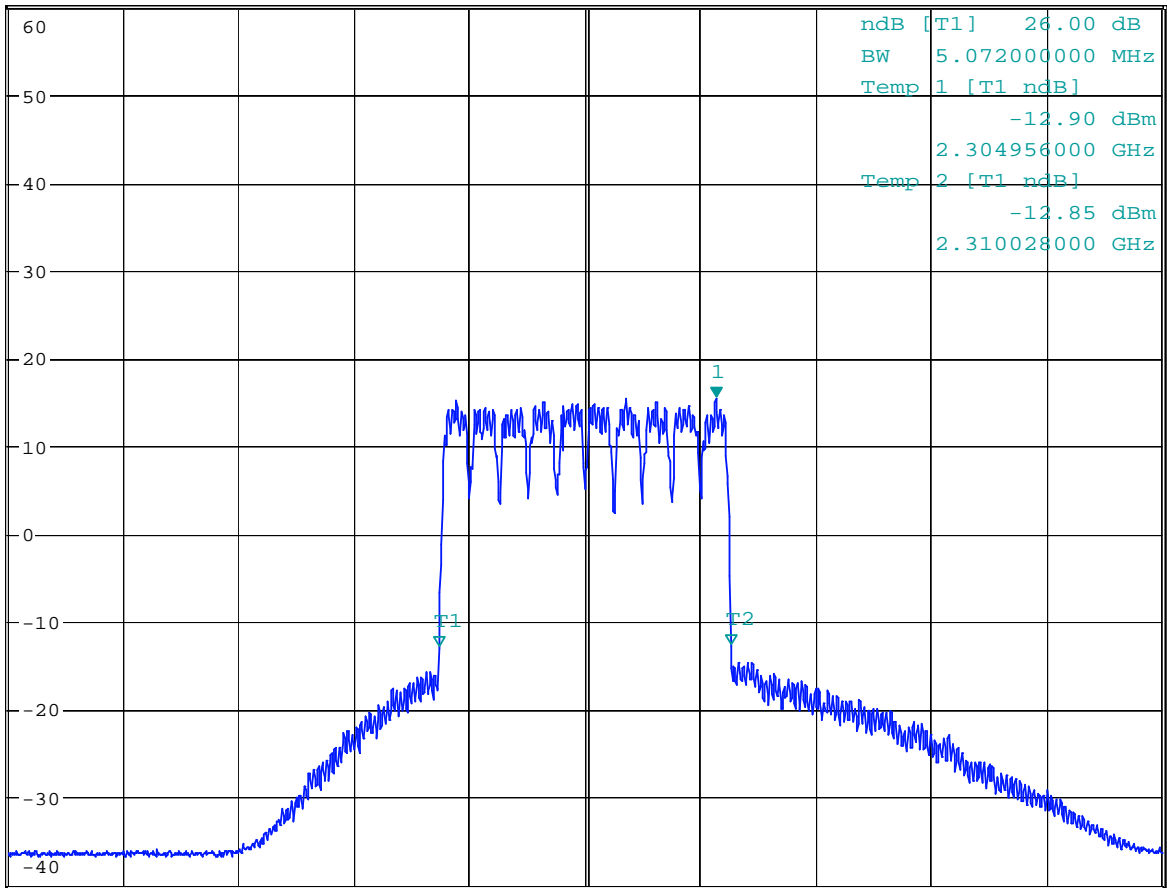


*RBW 50 kHz Marker 1 [T1]
VBW 500 kHz 15.37 dBm
*SWT 10 s 2.309772000 GHz

Ref 60 dBm

*Att 25 dB

1 RM *
CLRWR



A

TDF

Center 2.3075 GHz

2 MHz/

Span 20 MHz

Date: 13.DEC.2007 14:03:15

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 6 B Band Low (CDMA Mode)

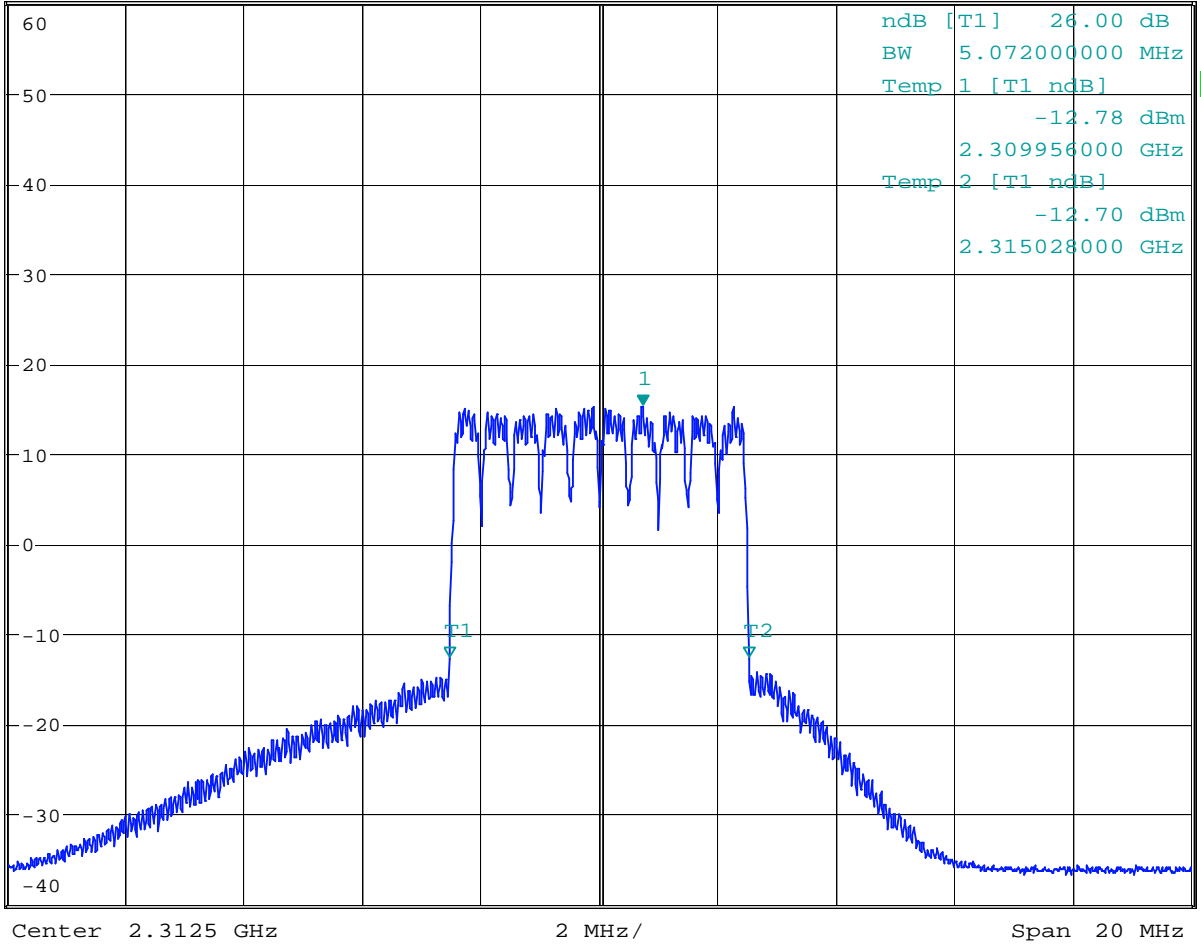


* RBW 50 kHz
 * Att 25 dB
 * SWT 10 s

Marker 1 [T1]
 15.18 dBm
 2.313236000 GHz

Ref 60 dBm

1 RM *
 CLRWR



Date: 13.DEC.2007 14:13:53

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

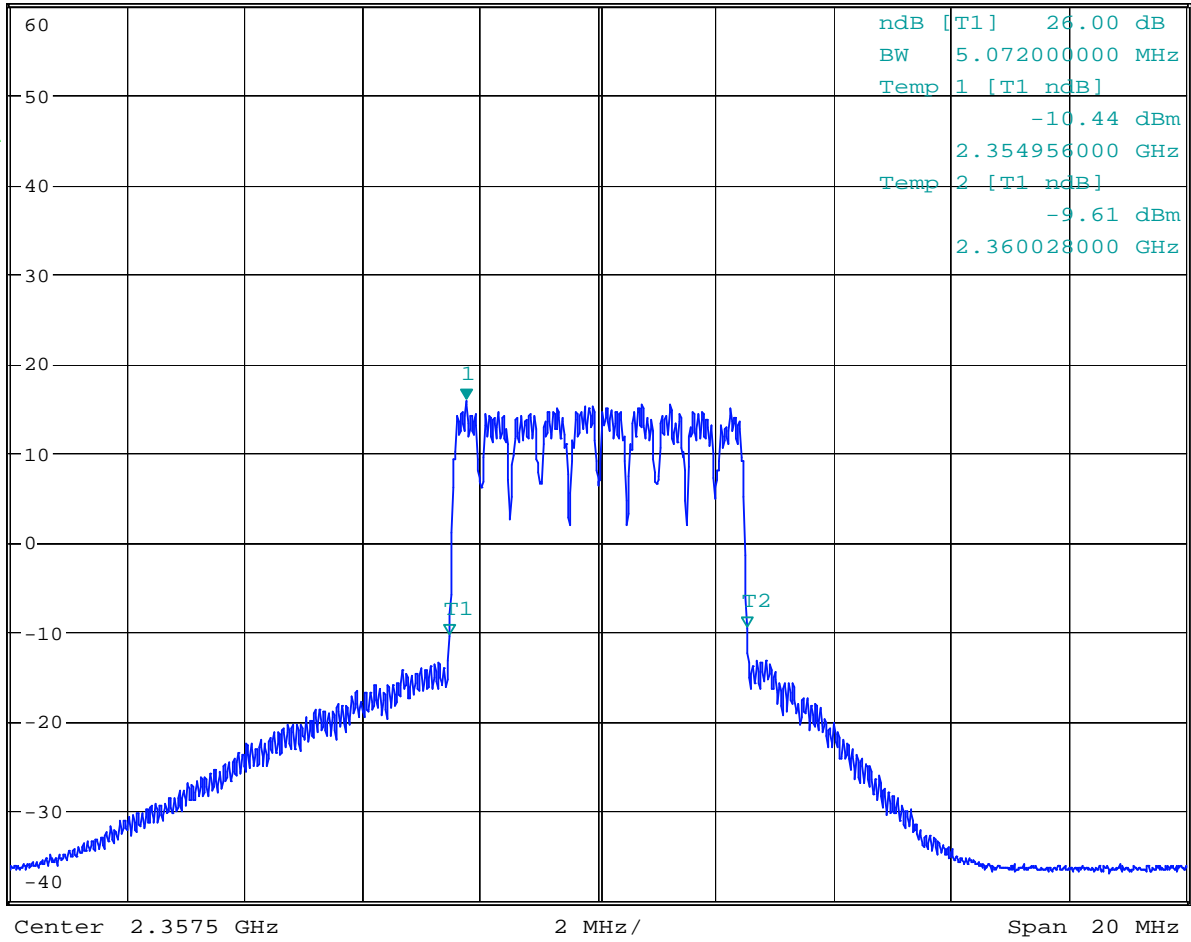
Figure 7 B Band High (CDMA Mode)



* RBW 50 kHz Marker 1 [T1]
VBW 500 kHz 15.68 dBm
* Att 25 dB * SWT 10 s 2.355244000 GHz

Ref 60 dBm

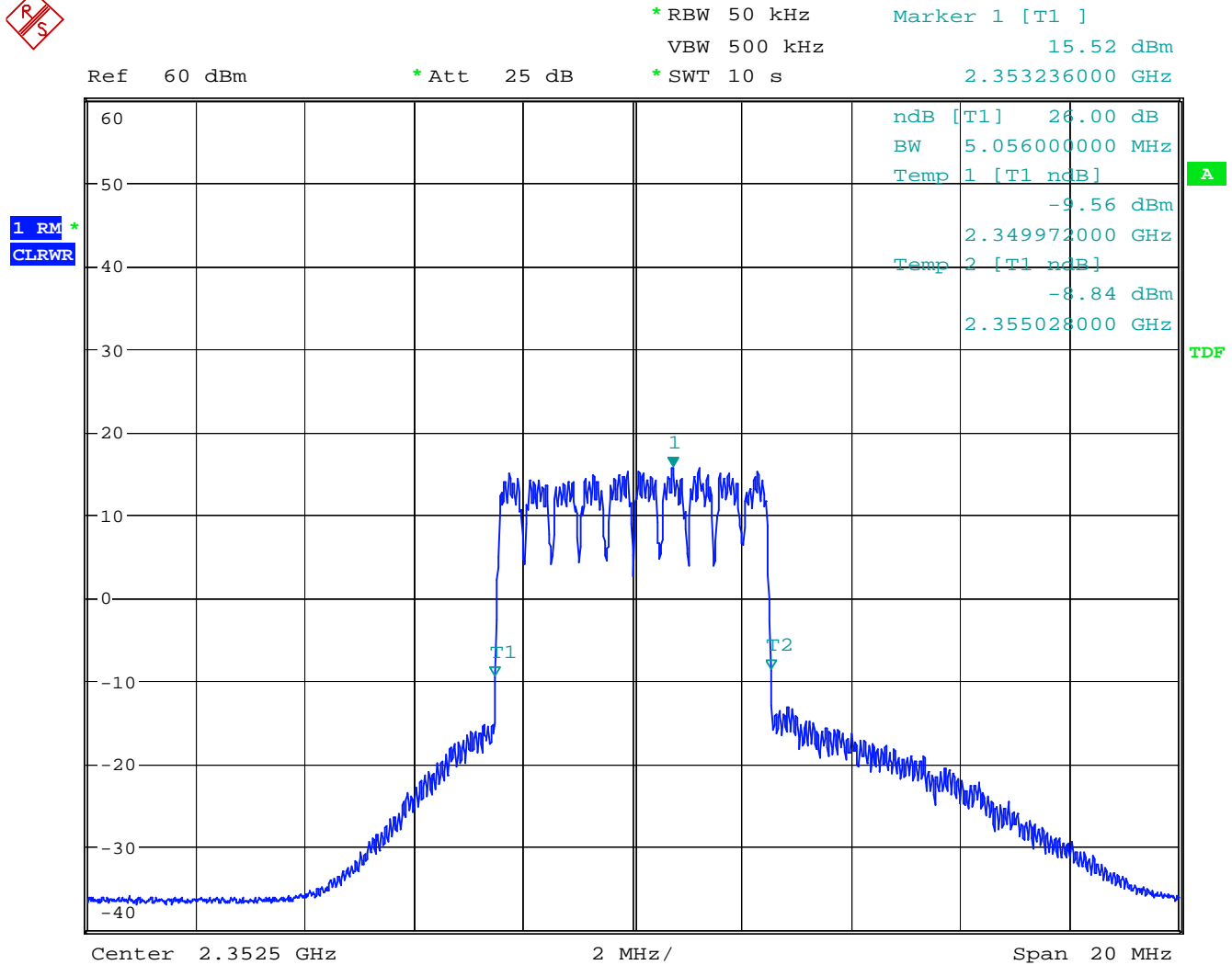
1. RM *
CLRWR



Date: 13.DEC.2007 14:30:07

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

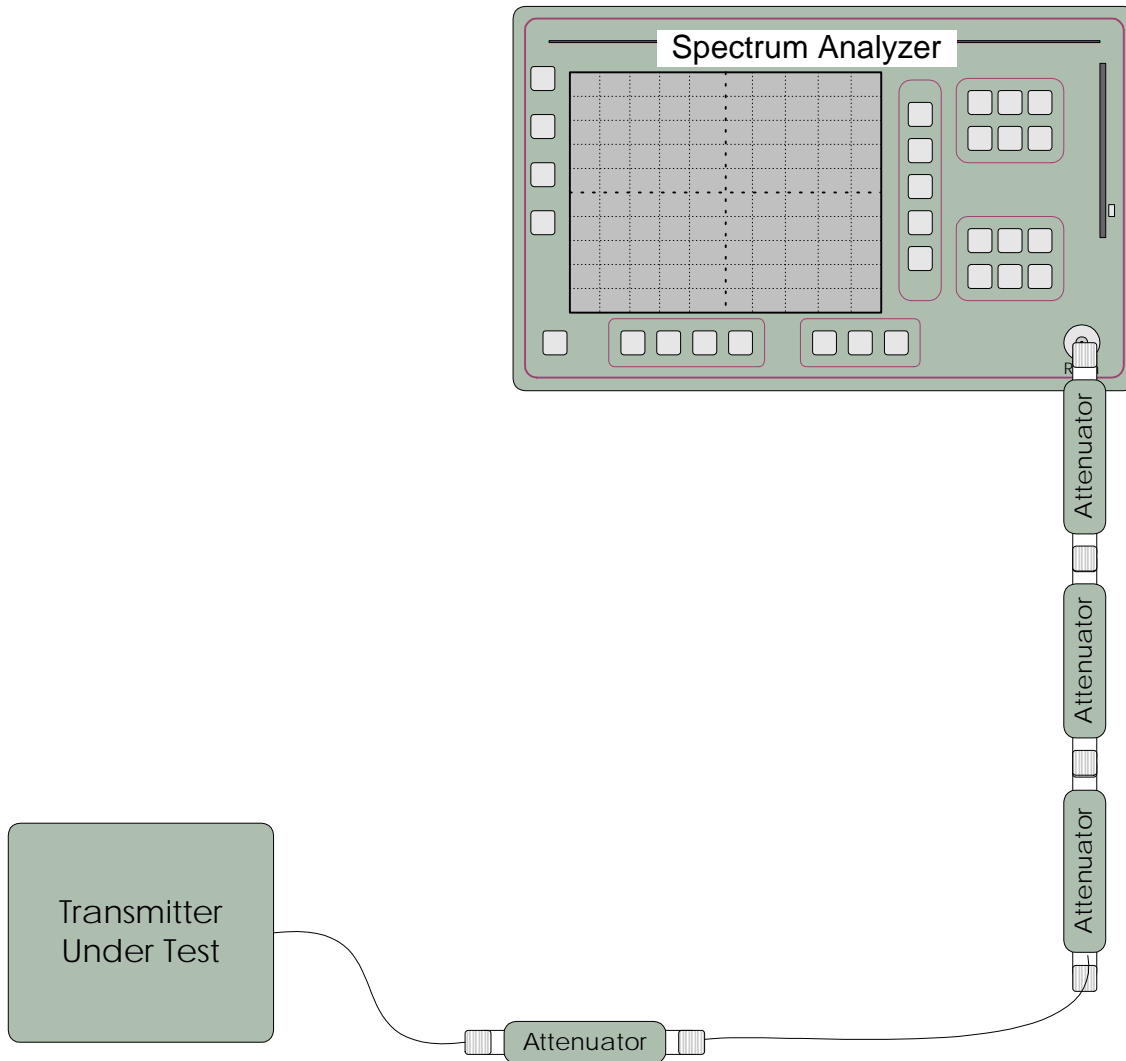
Figure 8 A Band High (CDMA Mode)



Date: 13.DEC.2007 14:23:11

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

C.9. Test Diagram



C.10. Tested By

Test Date: 13 December, 2007

Tested by: Dwaine Hartman, Wireless Technician

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

APPENDIX D: 2.1051 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

D.1. Base Standard & Test Basis

Base Standard	FCC 2.1051
Test Basis	FCC 2.1051 Spurious Emissions at Antenna Terminals
Test Method	TIA 603-C, 2004

D.2. Specifications

27.53

(a) For operations in the bands 2305–2320 MHz and 2345–2360 MHz, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by the following amounts:

- (1) *For fixed, land, and radiolocation land stations:* By a factor not less than $80 + 10 \log (p)$ dB on all frequencies between 2320 and 2345 MHz;
- (2) *For mobile and radiolocation mobile stations:* By a factor not less than $110 + 10 \log (p)$ dB on all frequencies between 2320 and 2345 MHz;
- (3) *For fixed, land, mobile, radiolocation land and radiolocation mobile stations:* By a factor not less than $70 + 10 \log (p)$ dB on all frequencies below 2300 MHz and on all frequencies above 2370 MHz; and not less than $43 + 10 \log (p)$ dB on all frequencies between 2300 and 2320 MHz and on all frequencies between 2345 and 2370 MHz that are outside the licensed bands of operation;
- (4) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or less, but at least one percent of the emission bandwidth of the fundamental emission of the transmitter, provided the measured energy is integrated over a 1 MHz bandwidth;
- (5) In complying with the requirements in §27.53(a)(1) and §27.53(a)(2), WCS equipment that uses opposite sense circular polarization from that used by Satellite DARS systems in the 2320–2345 MHz band shall be permitted an allowance of 10 dB;
- (6) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the edges, both upper and lower, of the licensee's bands of operation as the design permits;
- (7) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power;

D.3. Measurement Uncertainty

Expanded Uncertainty (K=2)
+1.11/-1.22

D.4. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

D.5. Test Results

Complies. All emissions meet the out of band limits.

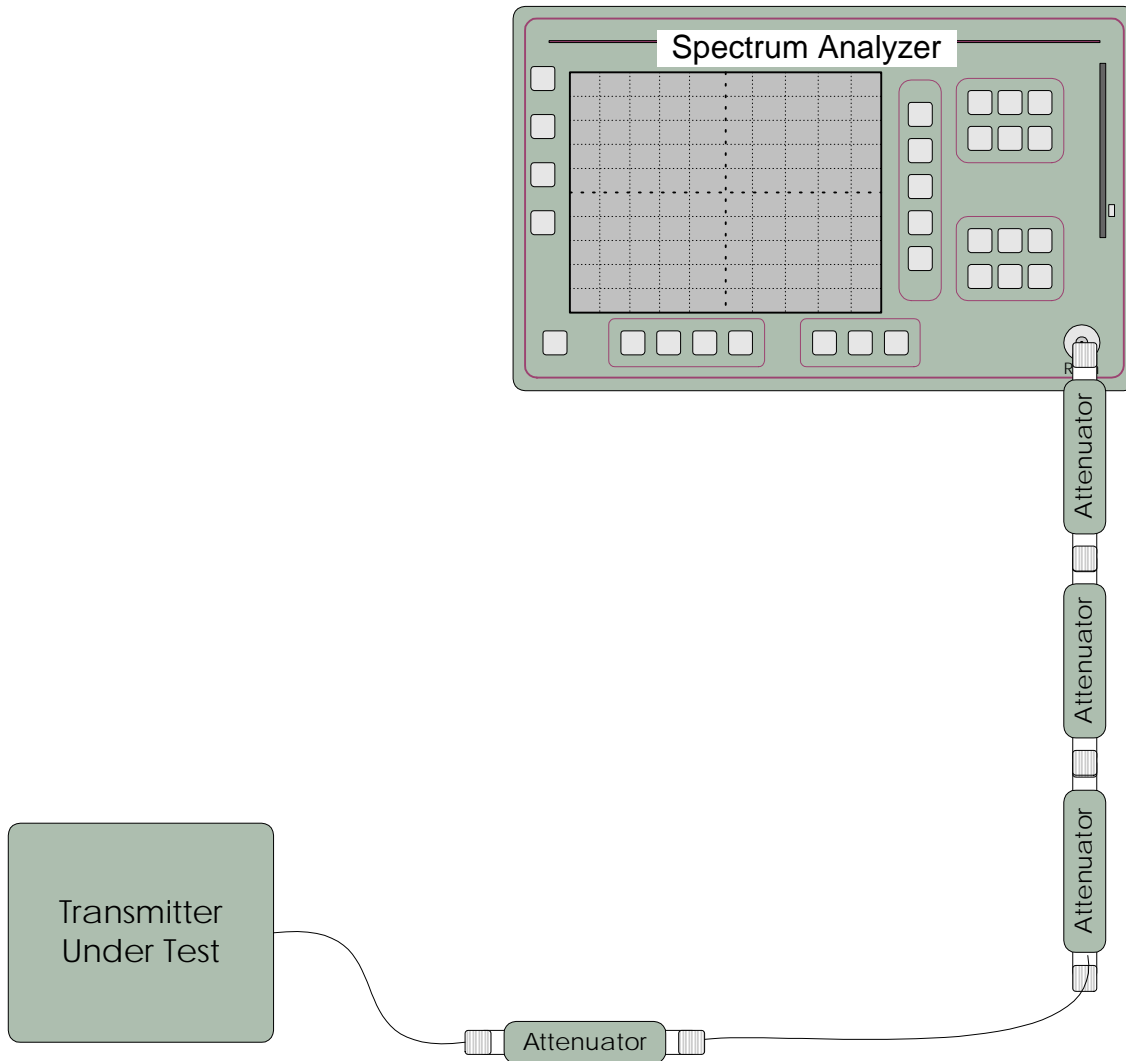
$43 + 10 \log(P)$ relates to -13 dBm absolute power

$70 + 10 \log(P)$ relates to -40 dBm absolute power.

$80 + 10 \log(P)$ relates to -50 dBm absolute power.

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

D.6. Test Diagram

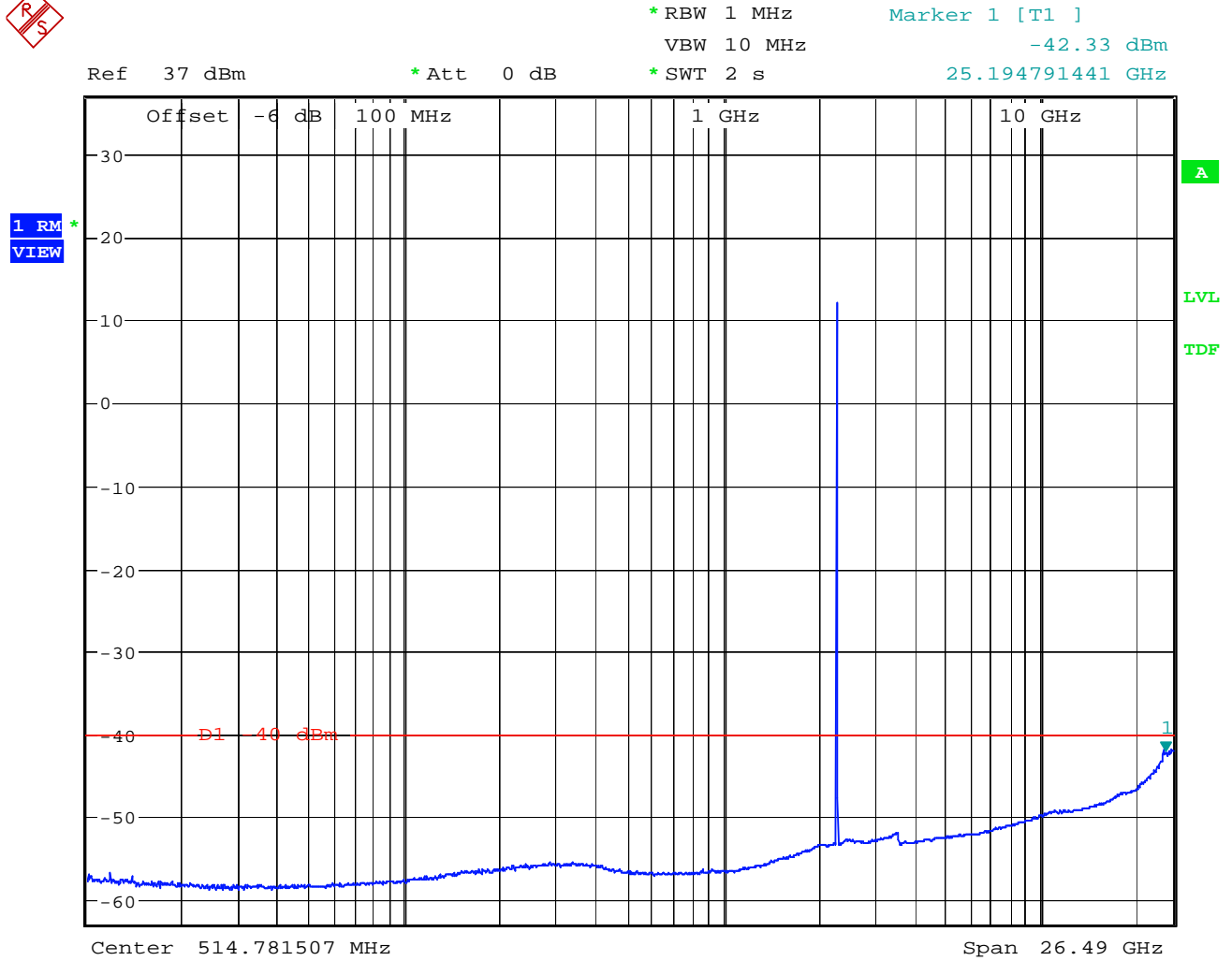


D.7. Test Data

See following pages.

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 9 A Band Low - (OFDMA Mode)



This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 10 B Band Low (OFDMA Mode)

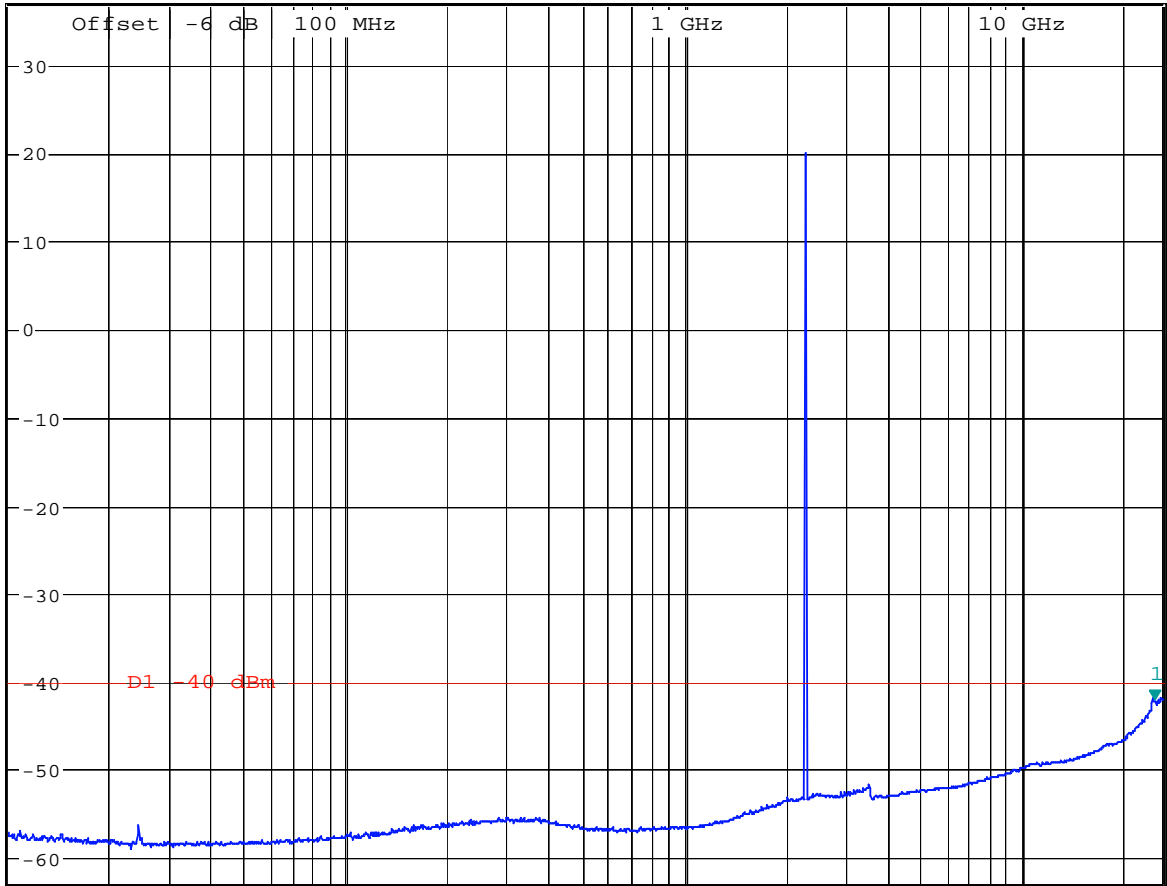


*RBW 1 MHz
VBW 10 MHz
*SWT 2 s
Marker 1 [T1]
-42.29 dBm
25.194791441 GHz

Ref 37 dBm

*Att 0 dB

1 RM *
VIEW



Center 514.781507 MHz

Span 26.49 GHz

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 11 A High Band (OFDMA Mode)



* RBW 1 MHz

Marker 1 [T1]

VBW 10 MHz

-42.26 dBm

* SWT 2 s

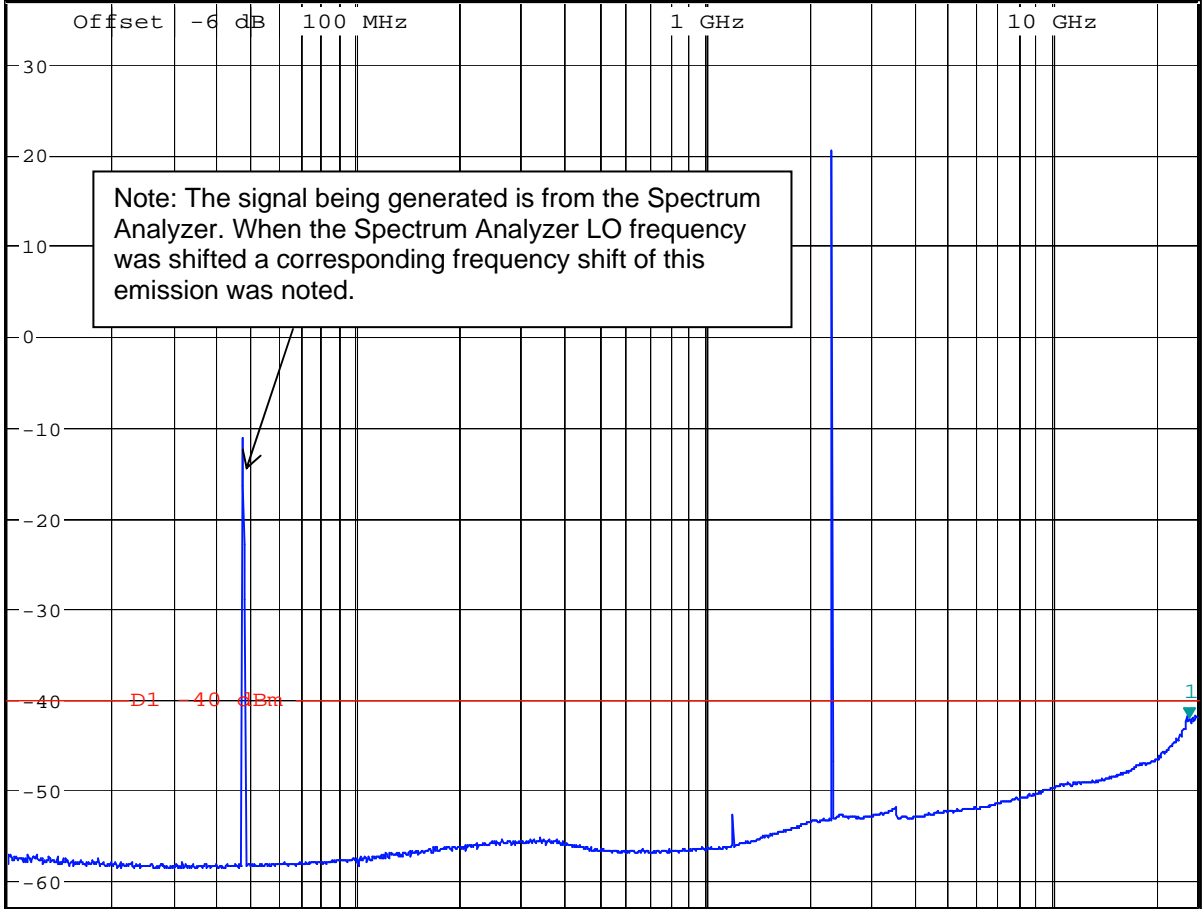
25.194791441 GHz

Ref 37 dBm

* Att 0 dB

1 RM
VIEW

Note: The signal being generated is from the Spectrum Analyzer. When the Spectrum Analyzer LO frequency was shifted a corresponding frequency shift of this emission was noted.



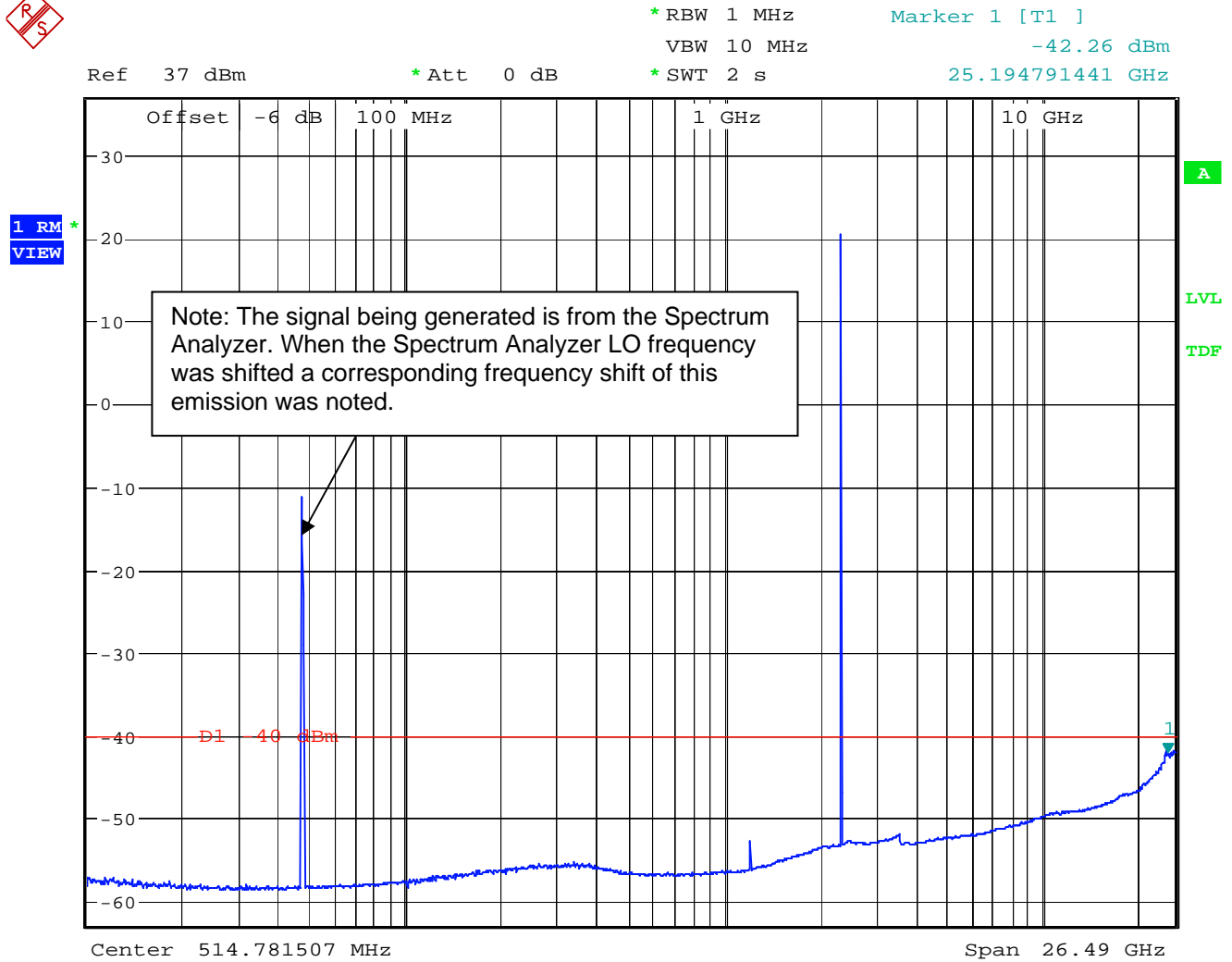
A
LVL
TDF

Center 514.781507 MHz

Span 26.49 GHz

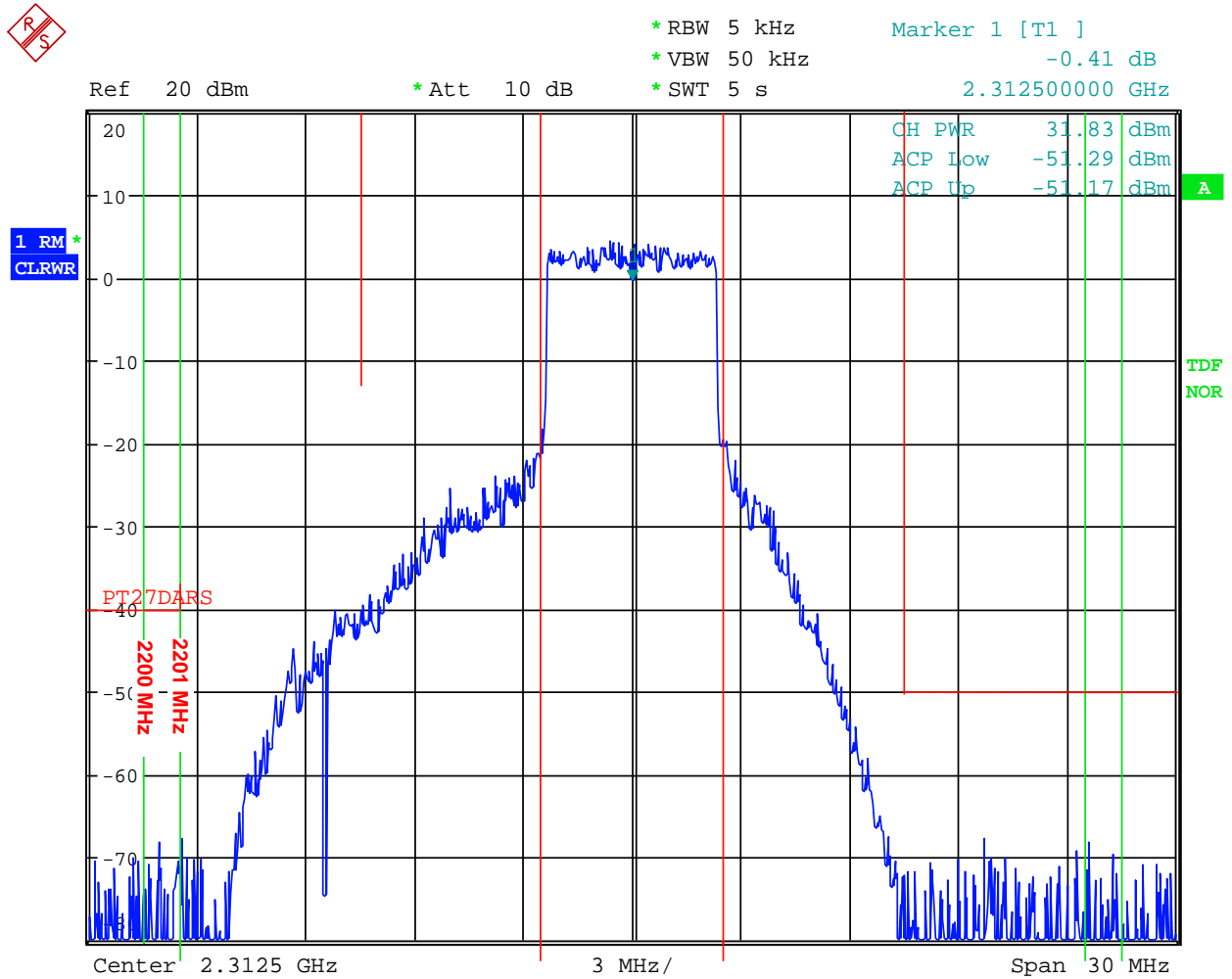
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 12 B High Band (OFDMA Mode)



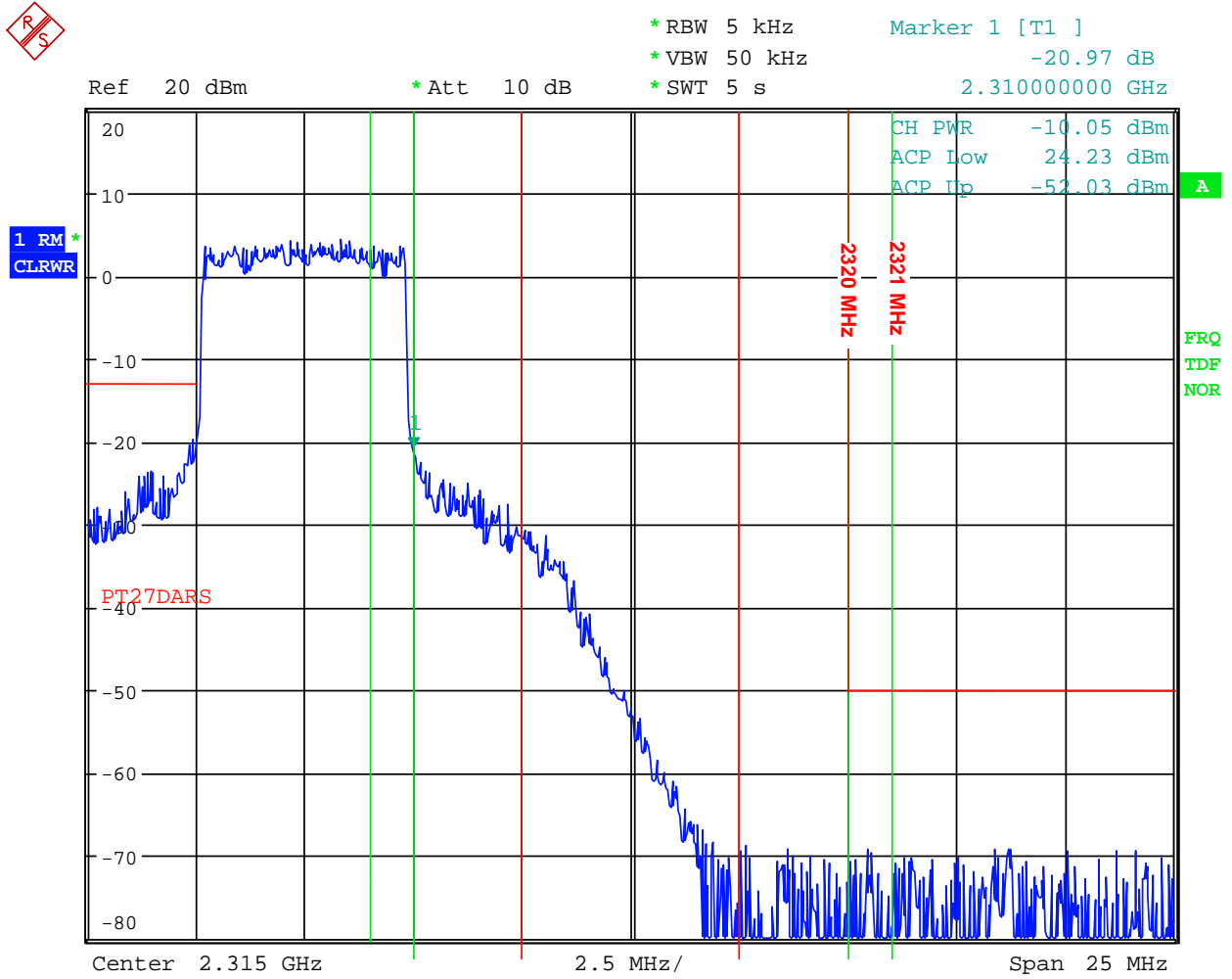
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 13 B Low Band Edge (OFDMA Mode) to show compliance with -40 dBm limit 2200-2300 MHz



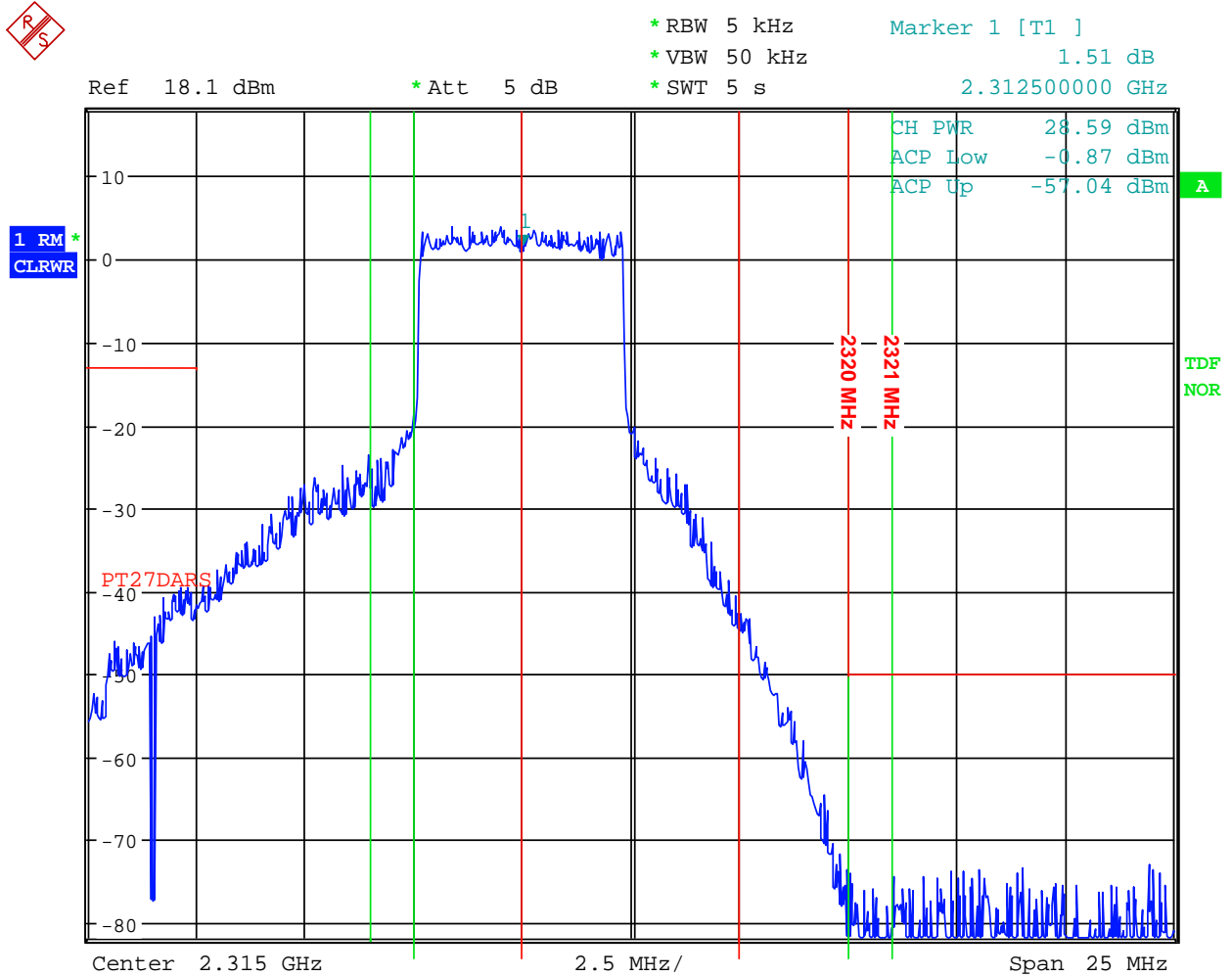
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 14 A Low DARS Band Edge (OFDMA Mode) to show compliance with -50 dBm limit in DARS band 2320 MHz to 2321 MHz



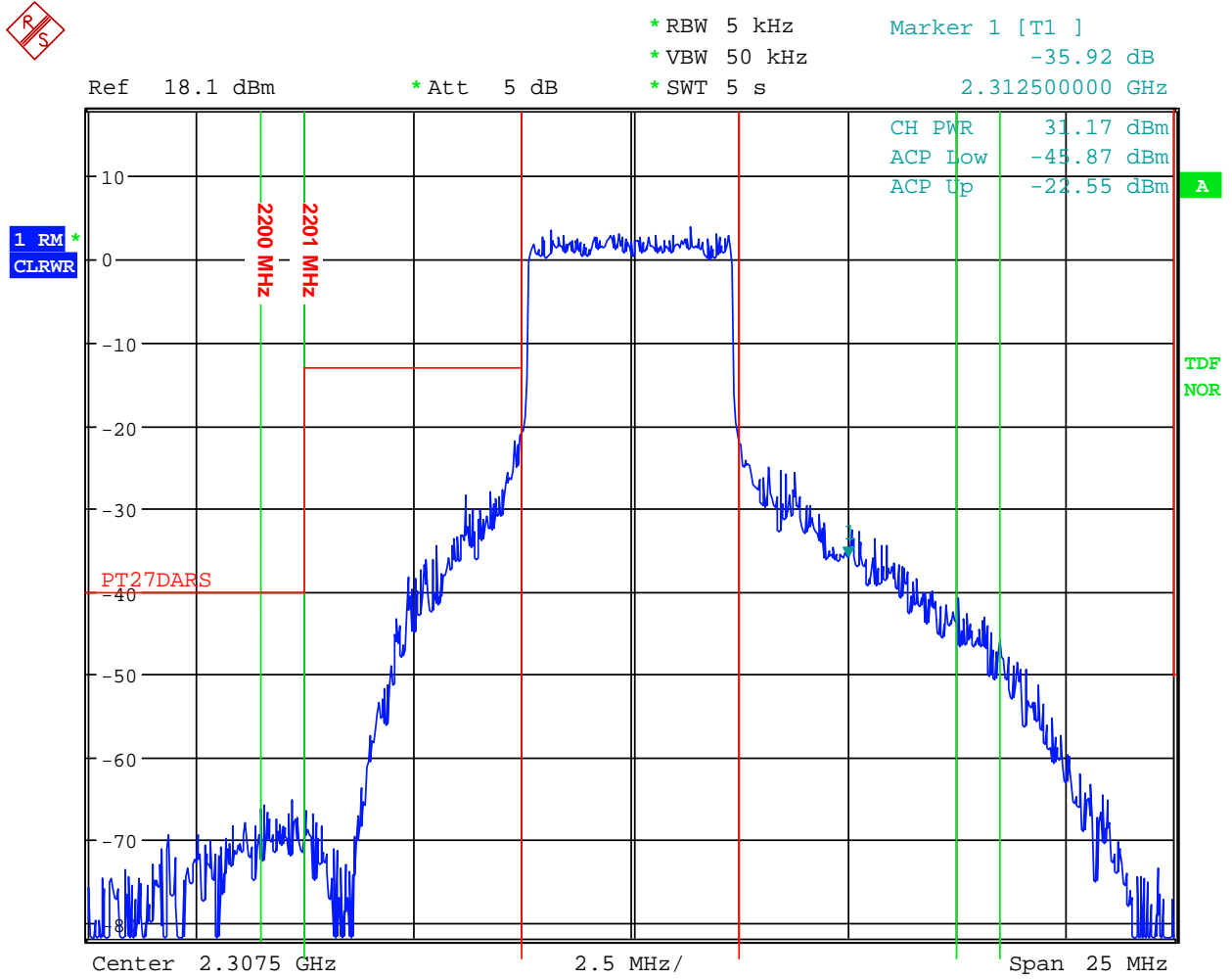
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 15 B Low DARS Band Edge (OFDMA Mode)) to show compliance with -50 dBm limit in DARS band 2320 MHz to 2321 MHz



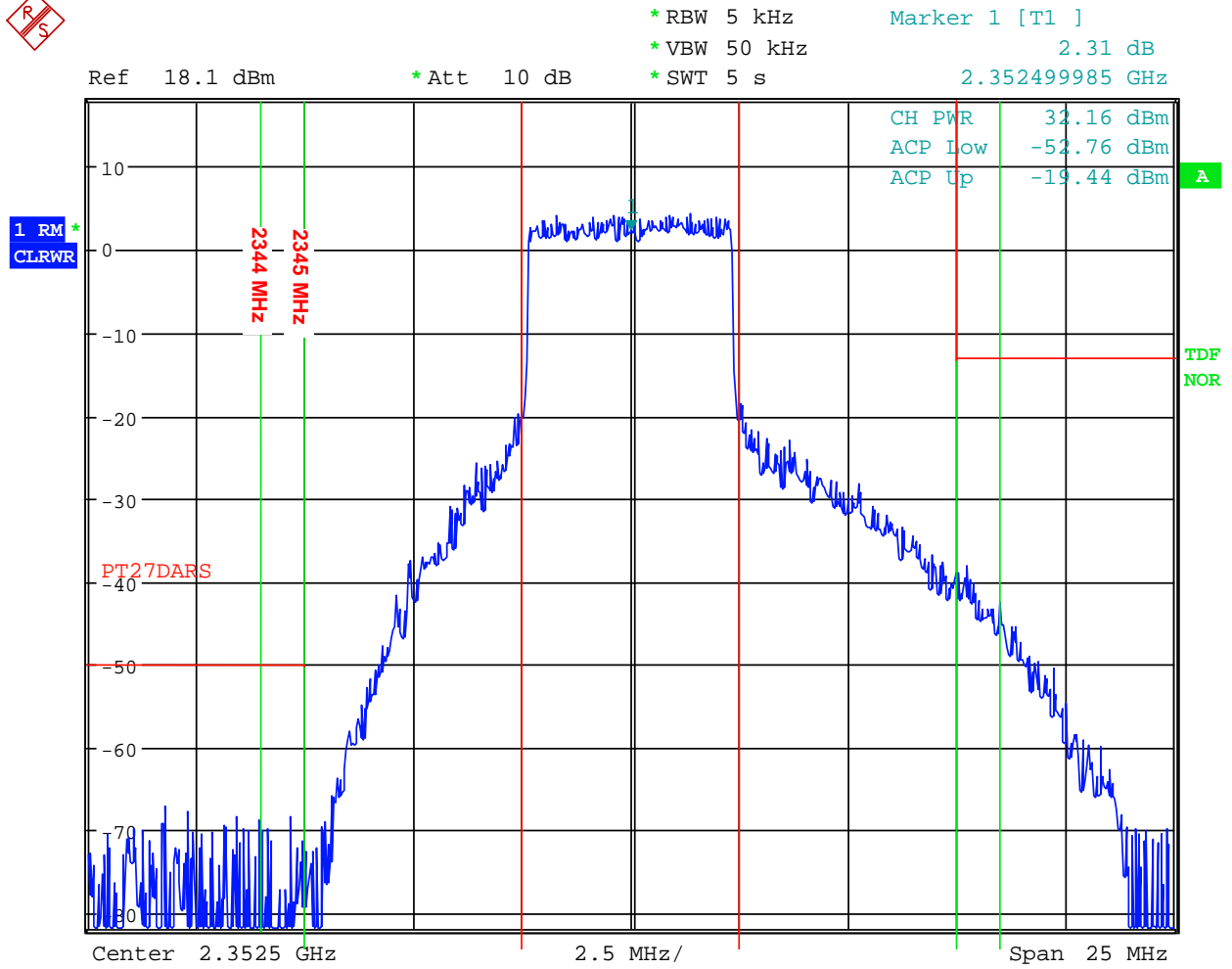
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 16 A Low Band Edge (OFDMA Mode) to show compliance with -40 dBm limit 2200 MHz to 2300 MHz



This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 17 A High DARS Band Edge (OFDMA Mode) to demonstrate compliance with -50 dBm limit 2344 – 2345 MHz

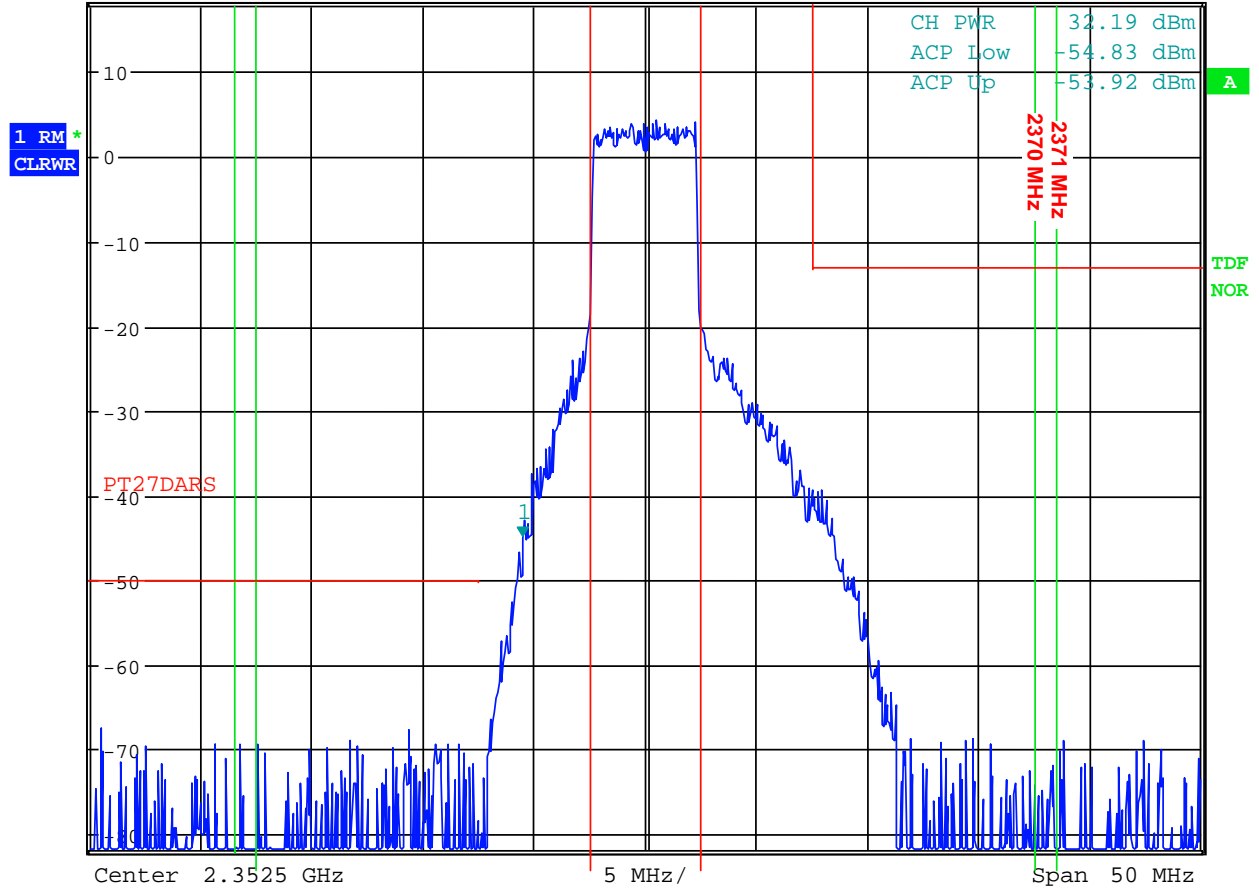


This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 18 A High Band Edge (OFDMA Mode) to demonstrate compliance with -13 dBm limit 2370 – 2371 MHz

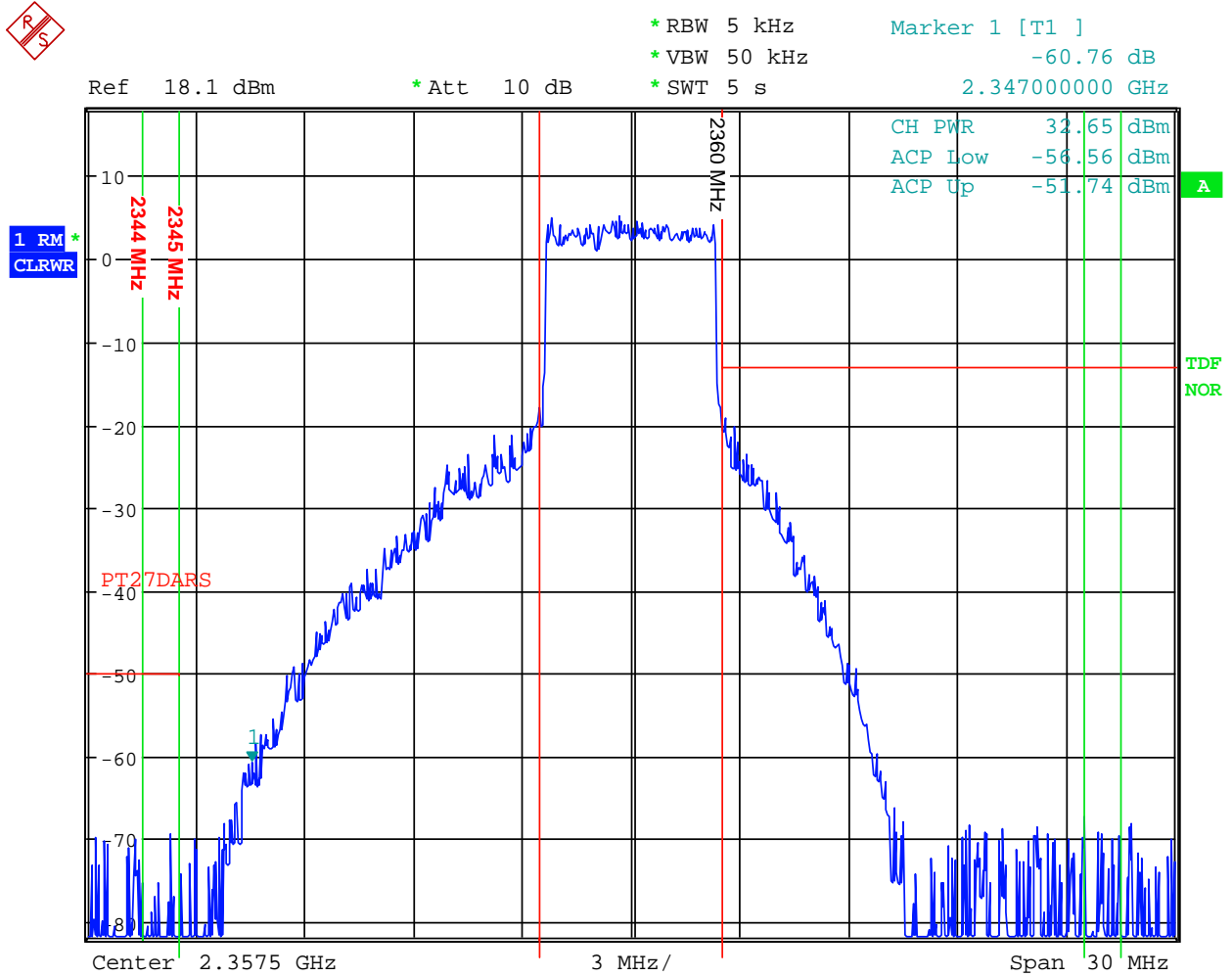


Ref 18.1 dBm * Att 10 dB * RBW 5 kHz Marker 1 [T1]
 * VBW 50 kHz -45.12 dB
 * SWT 5 s 2.347000000 GHz



This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 19 B High DARS and Band Edge (OFDMA Mode) to demonstrate compliance with -50 dBm limit 2344 – 2345 MHz and -13 dBm limit 2360 – 2370 MHz



This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

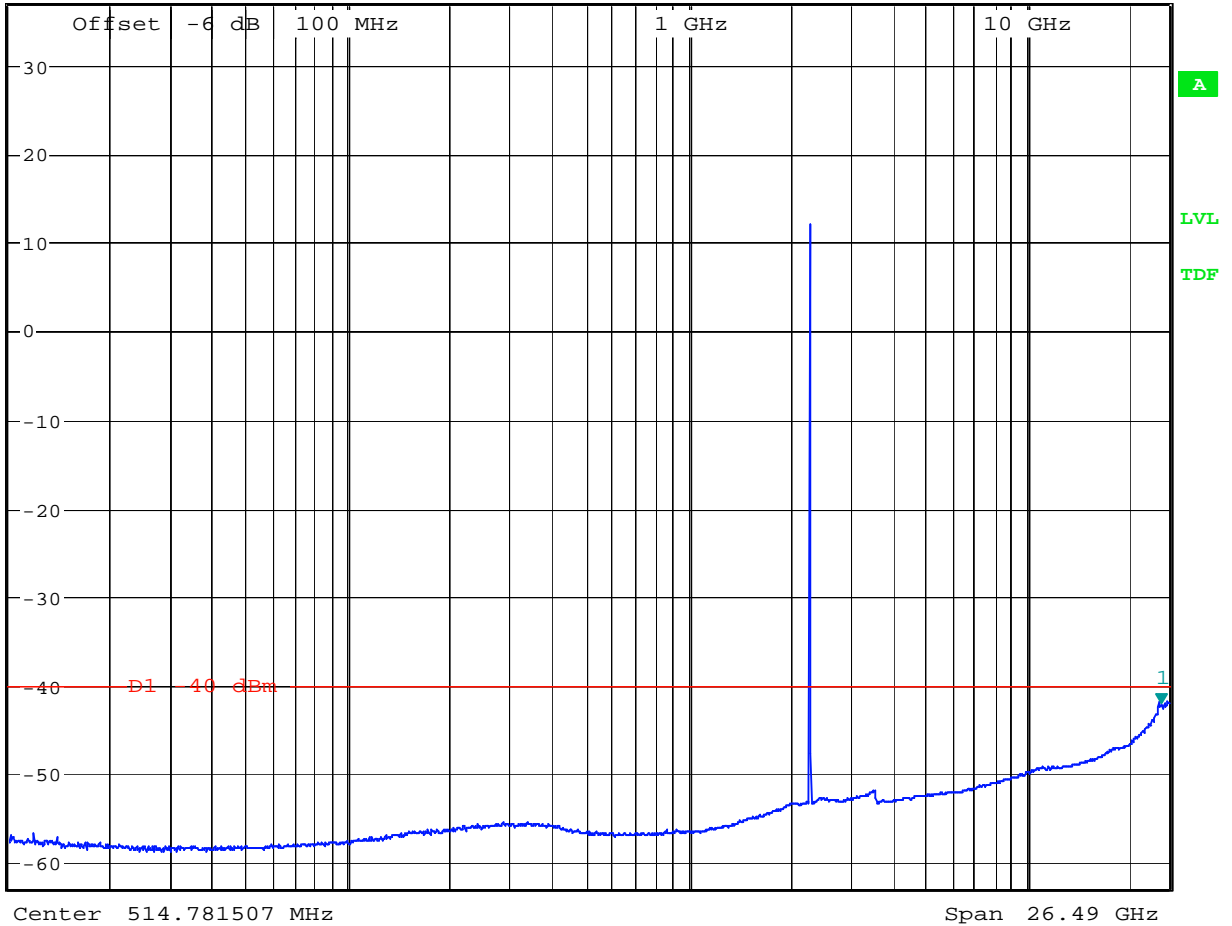
Figure 20 A Band Low - (CDMA Mode)



* RBW 1 MHz
VBW 10 MHz
* SWT 2 s
Marker 1 [T1]
-42.33 dBm
25.194791441 GHz

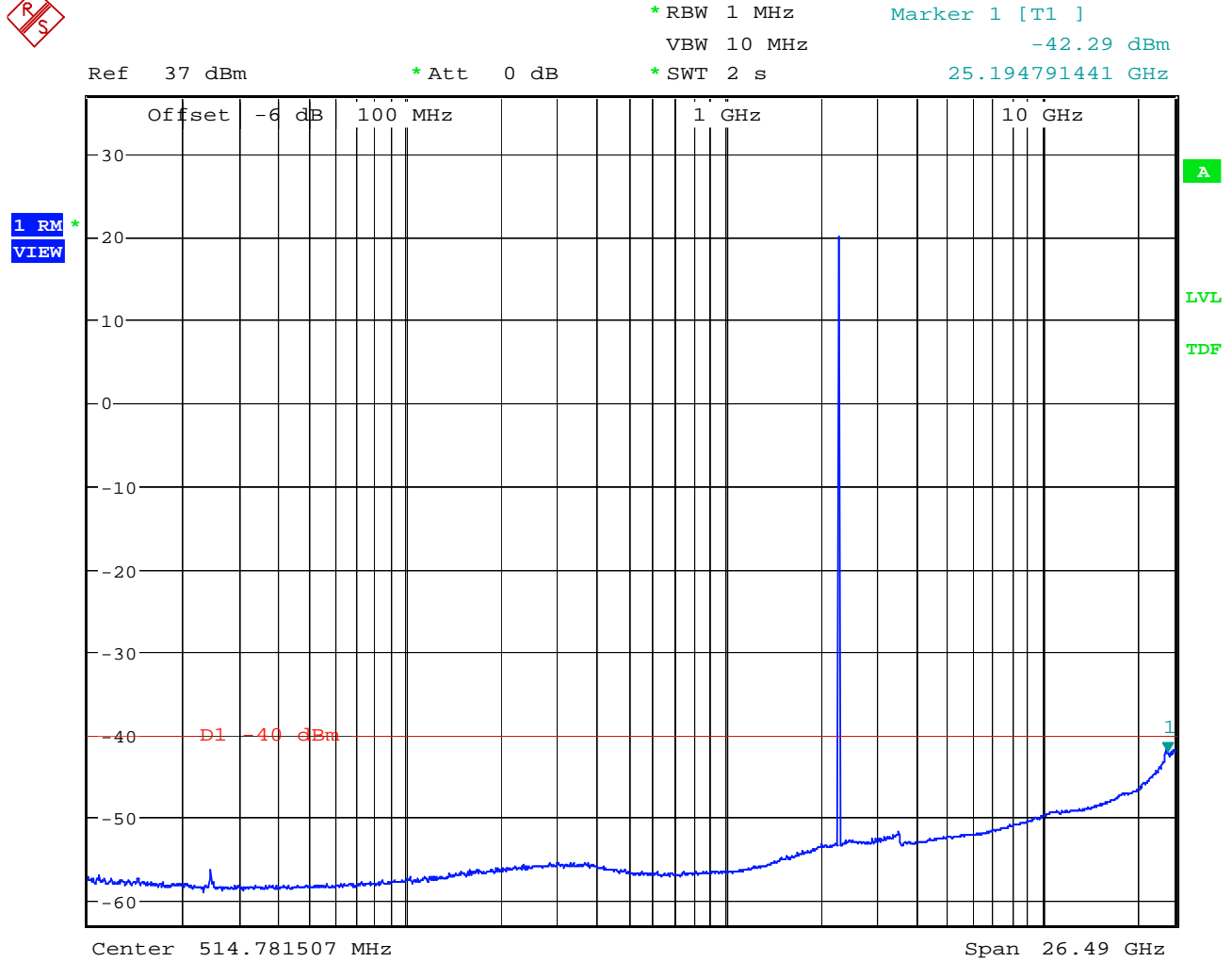
Ref 37 dBm * Att 0 dB

1 RM *
VIEW



This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 21 B Band Low (CDMA Mode)



This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

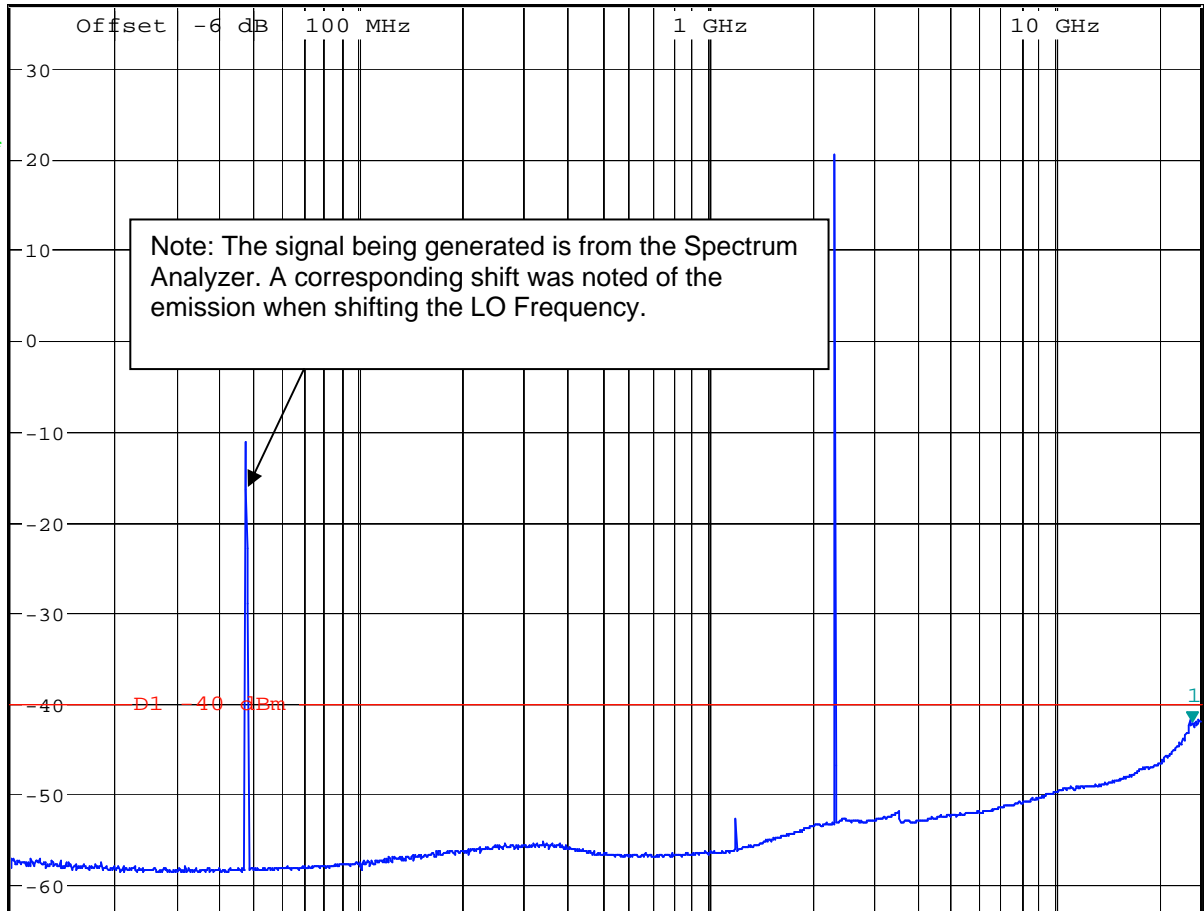
Figure 22 A High Band (CDMA Mode)



* RBW 1 MHz
* Att 0 dB
* SWT 2 s
Marker 1 [T1]
-42.26 dBm
25.194791441 GHz

Ref 37 dBm

1 RM *
VIEW



Center 514.781507 MHz

Span 26.49 GHz

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

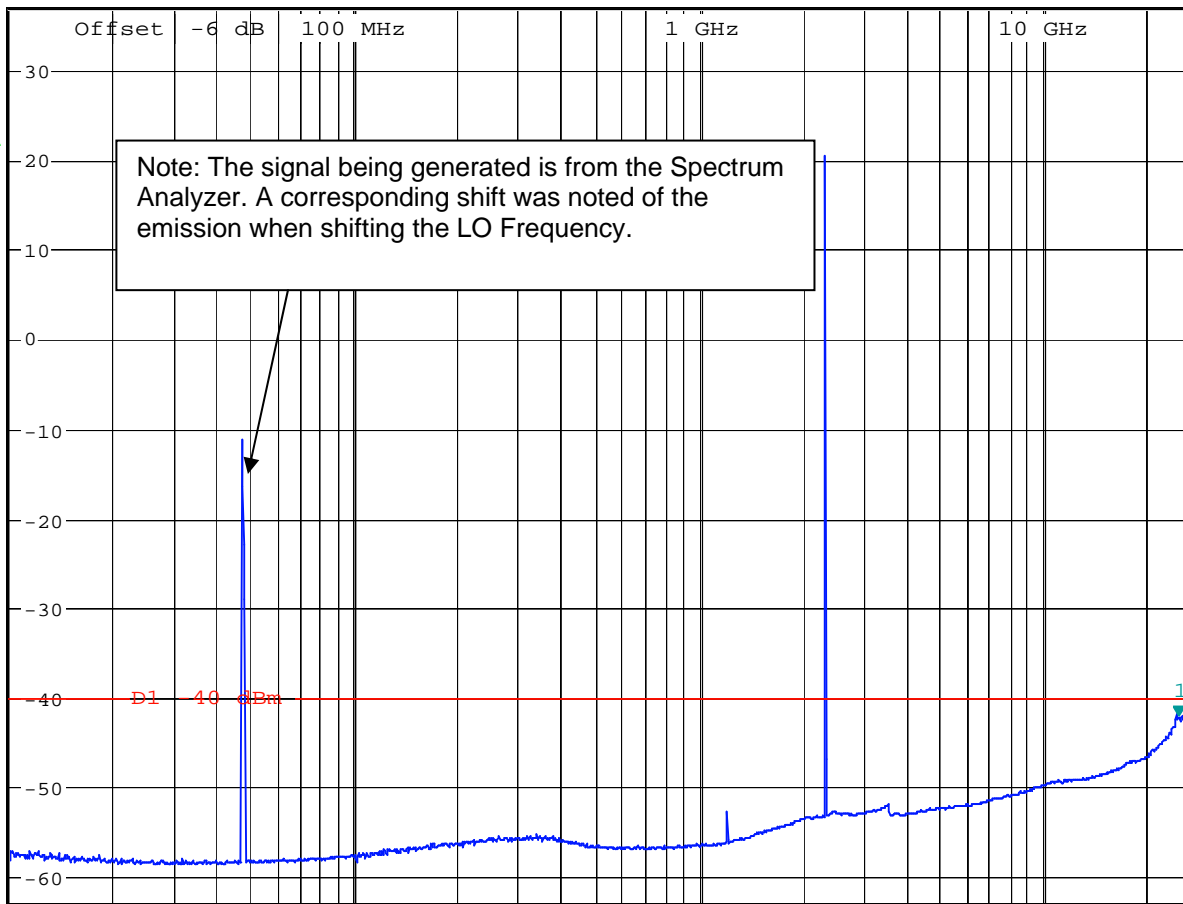
Figure 23 B High Band (CDMA Mode)



* RBW 1 MHz
* Att 0 dB
* SWT 2 s
Marker 1 [T1]
-42.26 dBm
25.194791441 GHz

Ref 37 dBm

1 RM *
VIEW



A

LVL

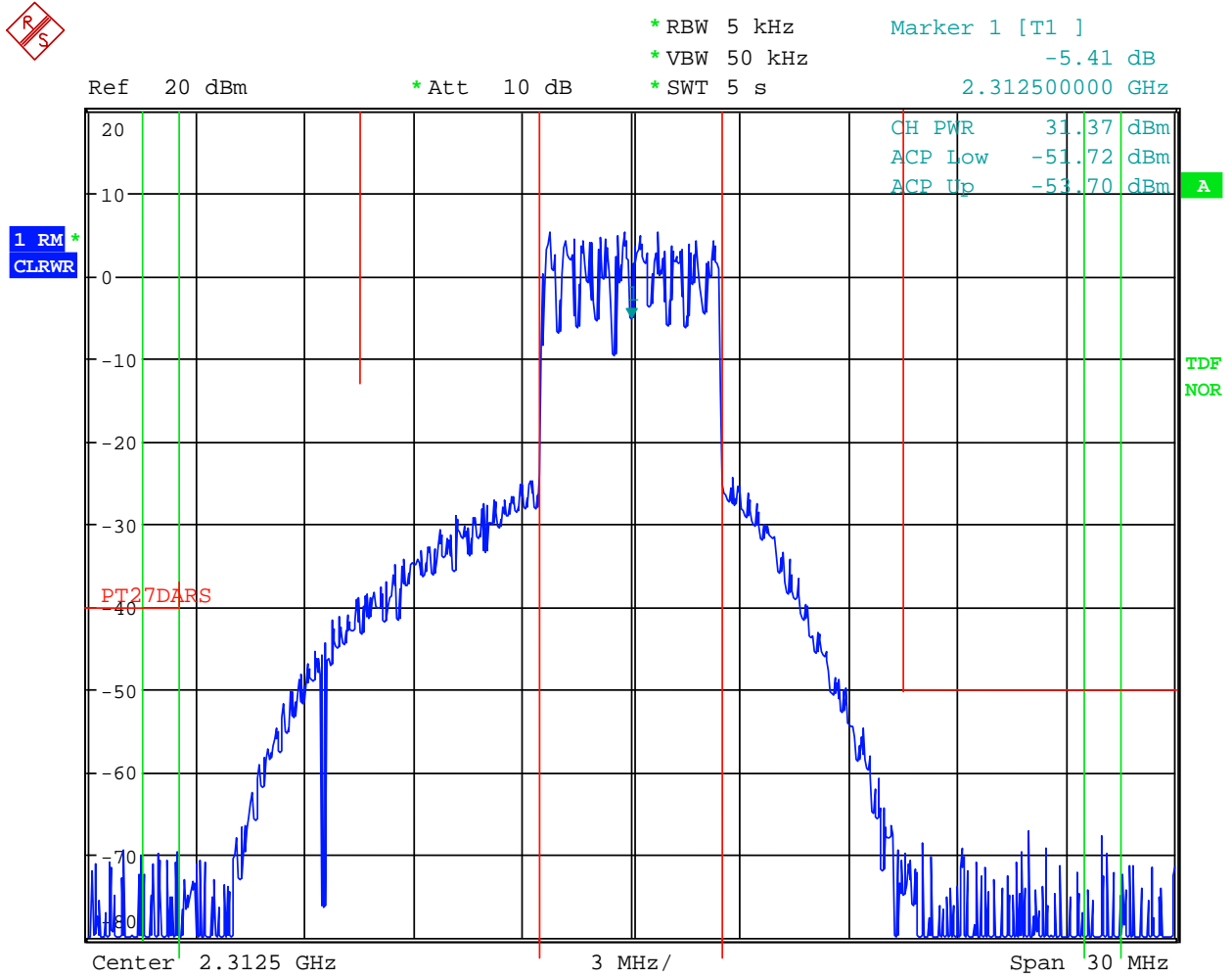
TDF

Center 514.781507 MHz

Span 26.49 GHz

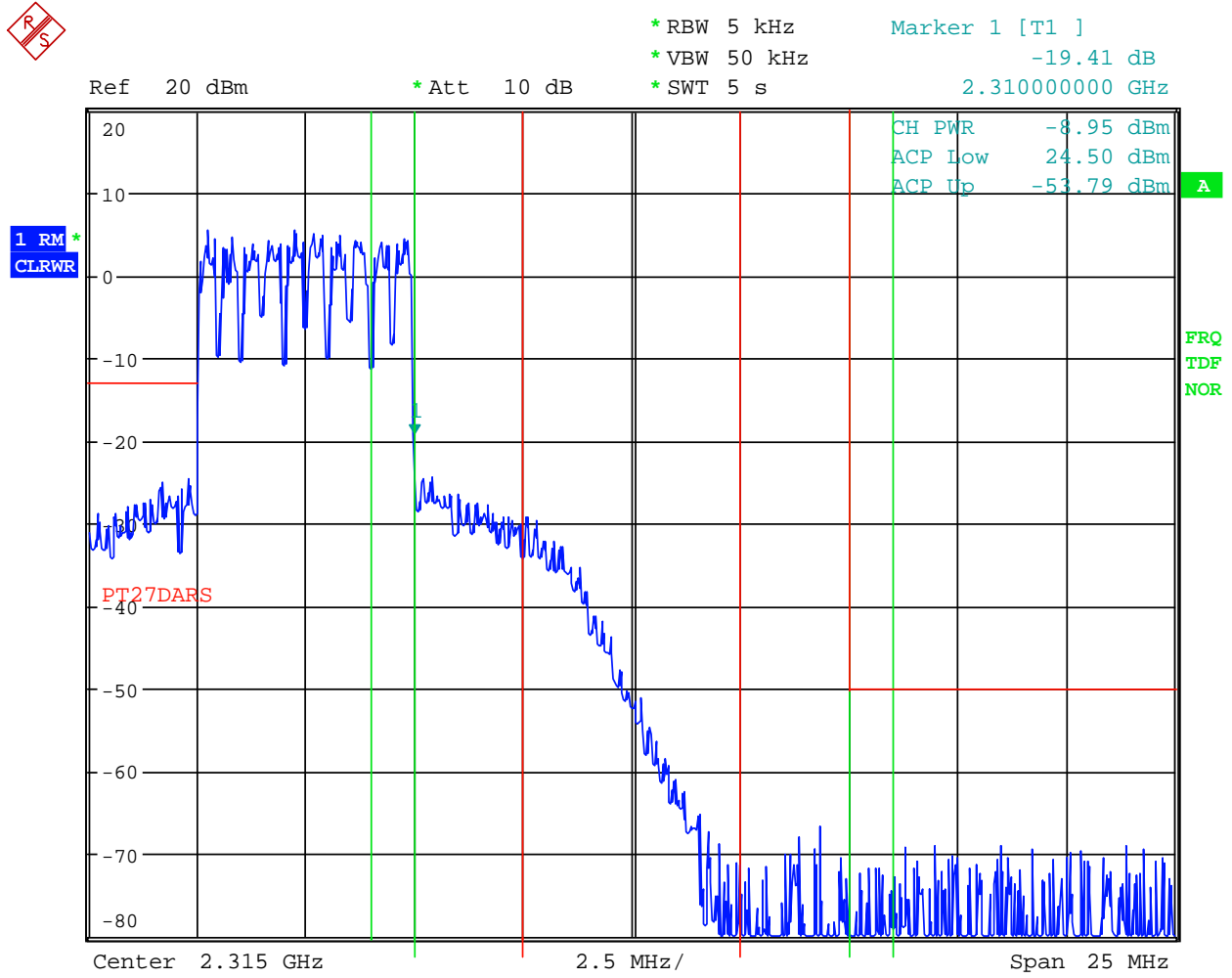
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 24 B Low Band Edge (CDMA Mode) to show compliance with -40 dBm limit 2200-2300 MHz



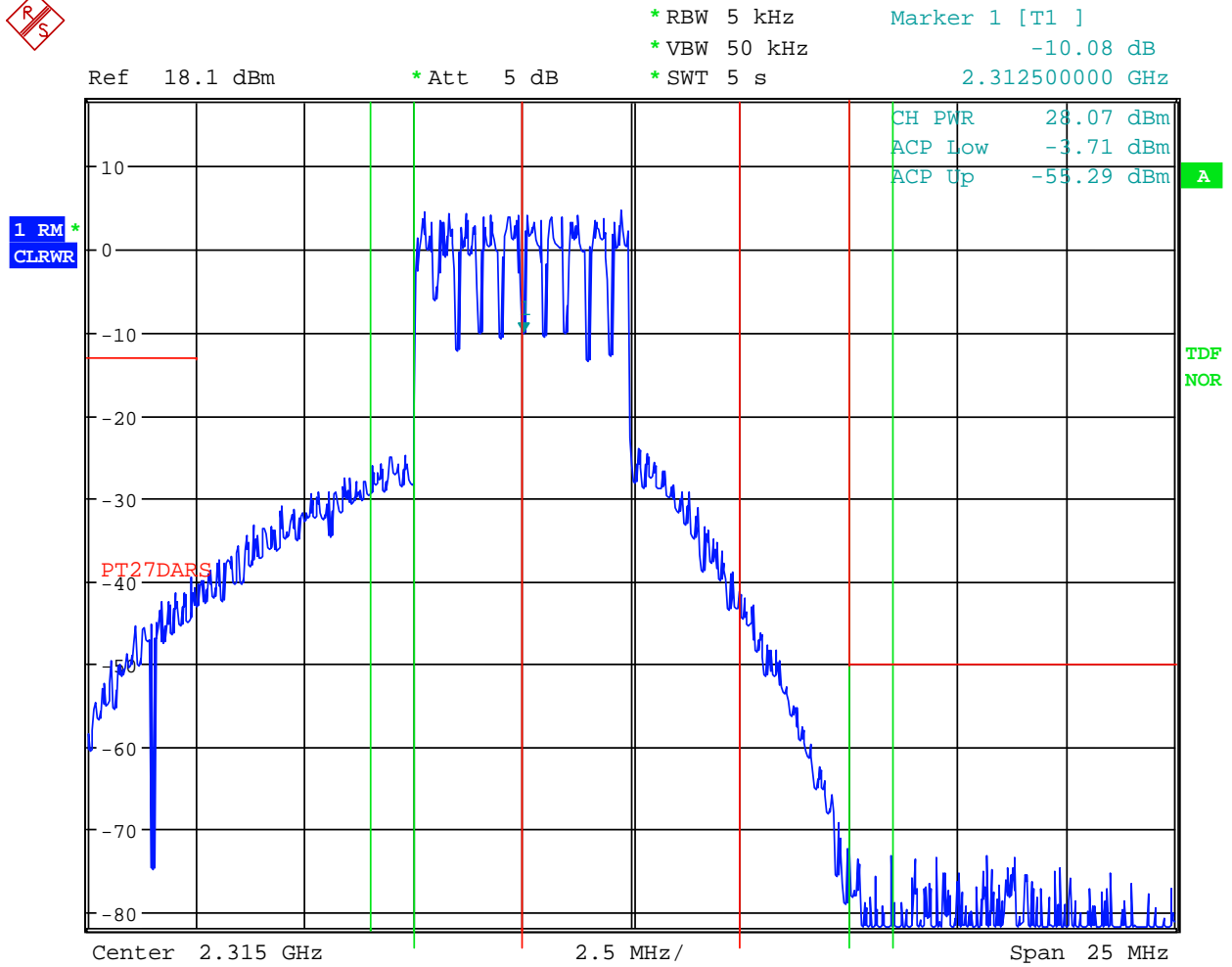
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 25 A Low DARS Band Edge (CDMA Mode) to show compliance with -50 dBm limit in DARS band 2320 MHz to 2321 MHz



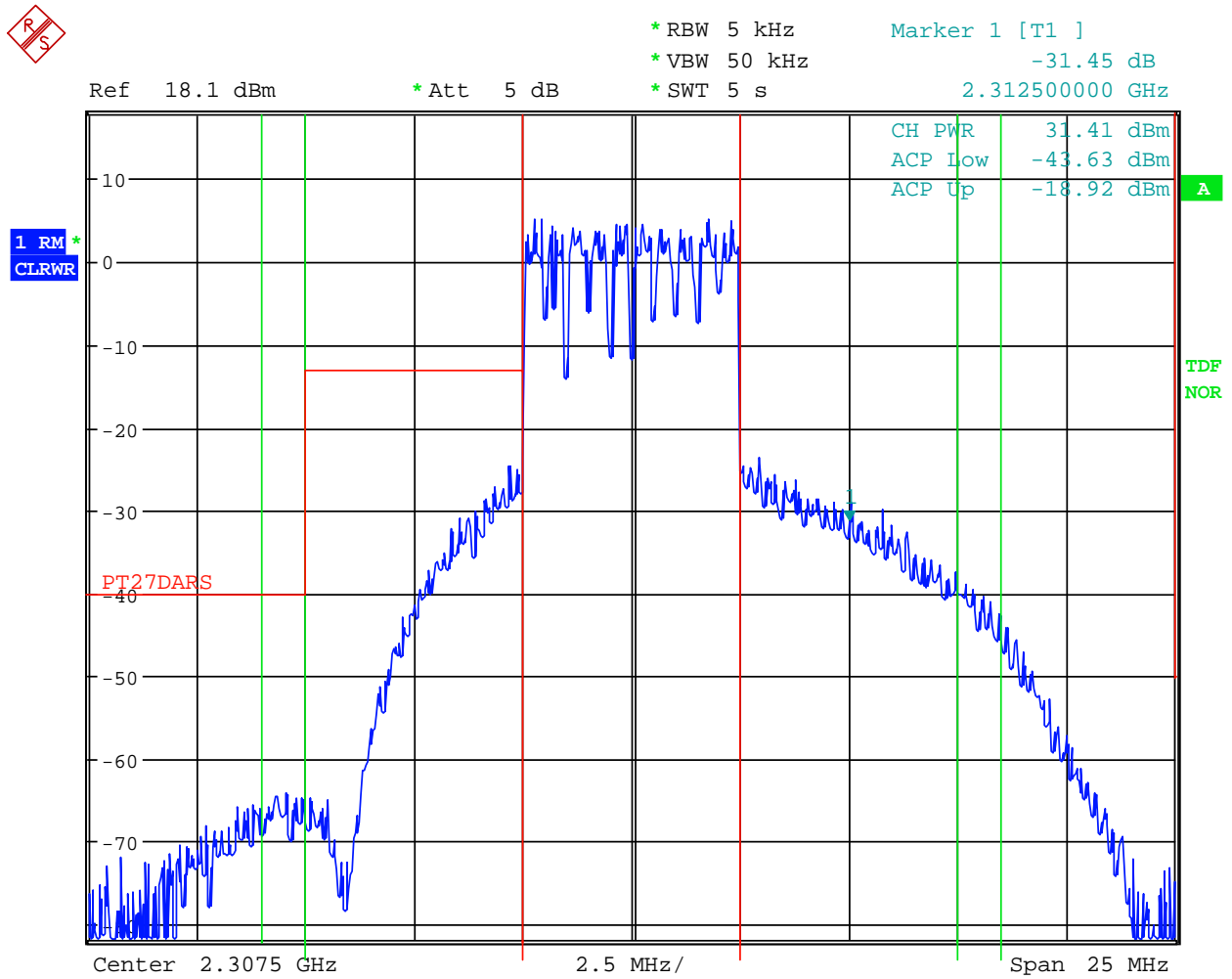
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 26 B Low DARS Band Edge (CDMA Mode) to show compliance with -50 dBm limit in DARS band 2320 MHz to 2321 MHz



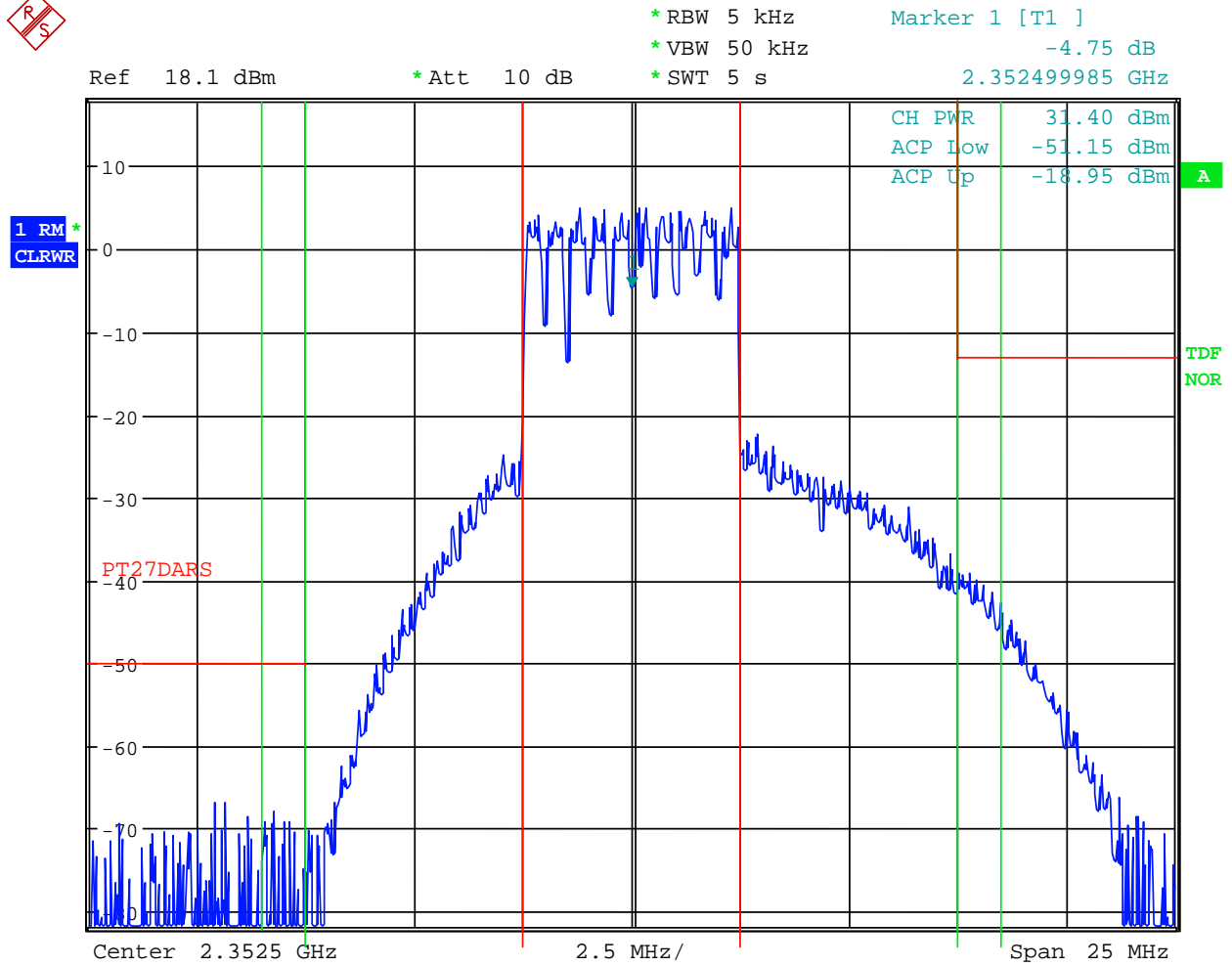
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 27 A Low Band Edge (CDMA Mode) to show compliance with -40 dBm limit 2200 MHz to 2300 MHz



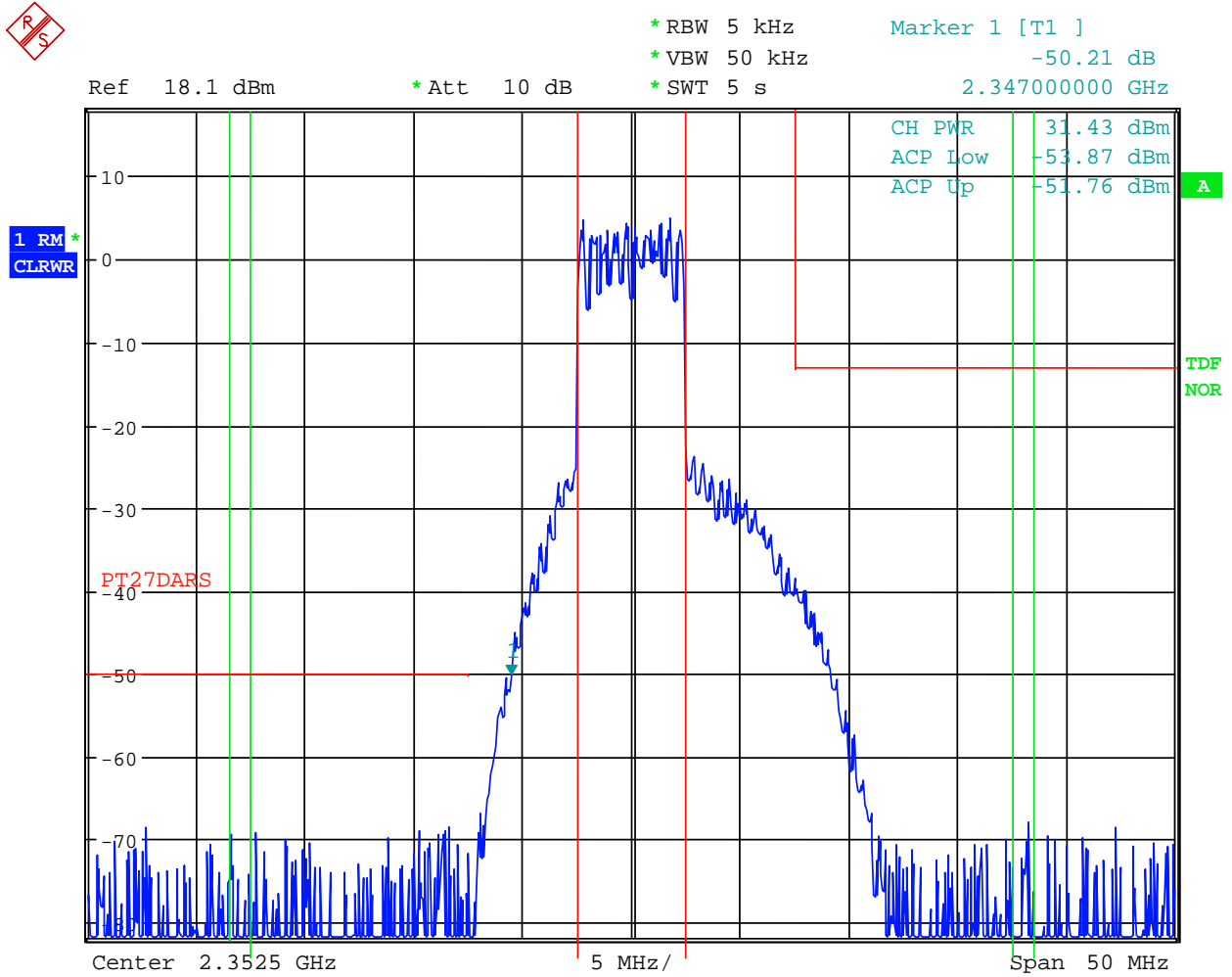
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 28 A High DARS Band Edge (CDMA Mode) to demonstrate compliance with -50 dBm limit 2344 – 2345 MHz



This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

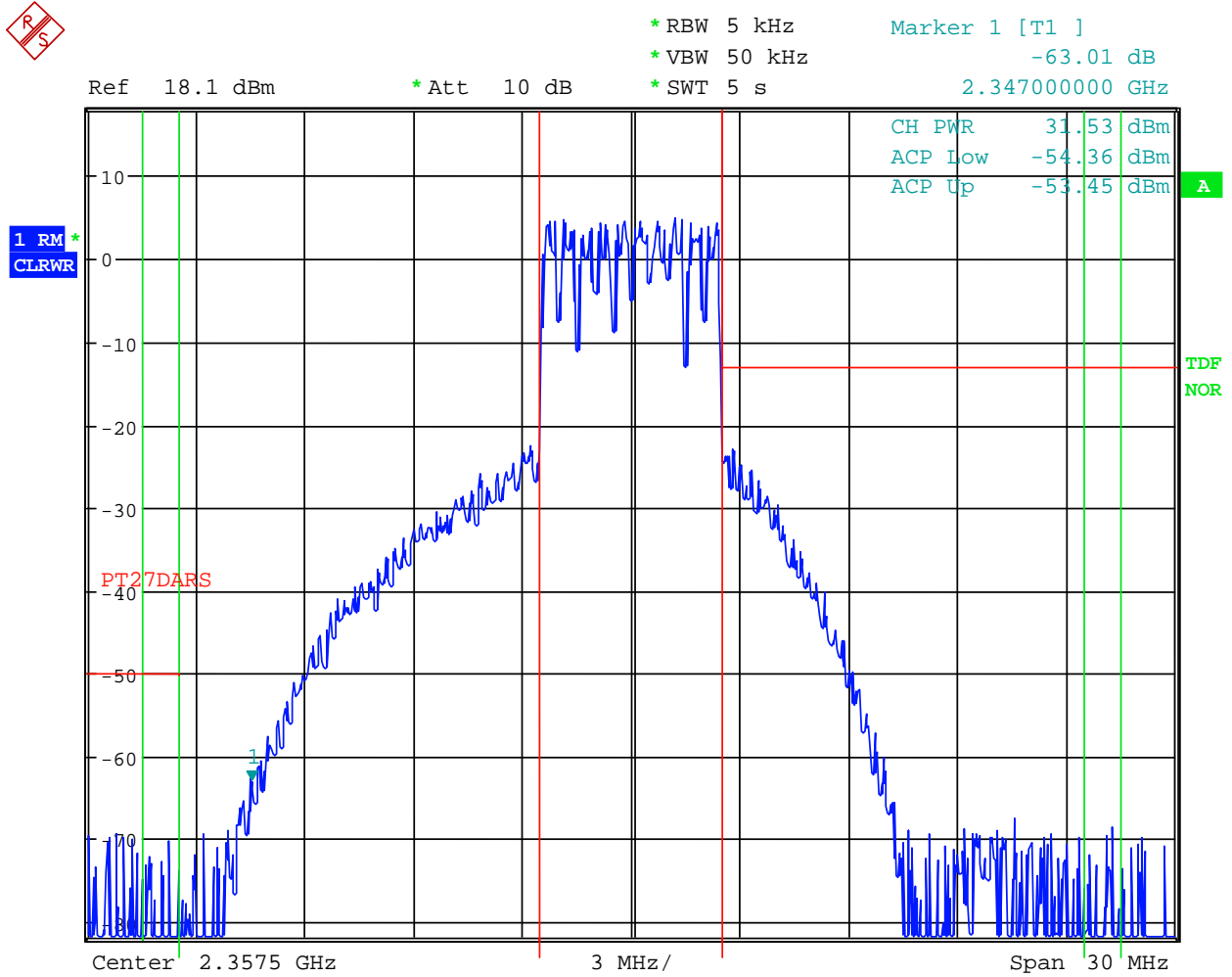
Figure 29 A High Band Edge (CDMA Mode) to demonstrate compliance with -13 dBm limit 2370 – 2371 MHz



This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

NTS Plano, 1701 E. Plano Pkwy., Plano, TX 75074 Tel: (972) 509-2566, Fax: (972) 509-0073

Figure 30 B High and DARS Band Edge (CDMA Mode) to demonstrate compliance with -50 dBm limit 2344 – 2345 MHz and -13 dBm limit 2360 – 2370 MHz



D.8. Tested By

Test Date: 11 December, 2007
 Tested by: Dwaine Hartman, Wireless Technician

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

APPENDIX E: 2.1053 FIELD STRENGTH OF SPURIOUS RADIATION

E.1. Base Standard & Test Basis

Base Standard	FCC 2.1053
Test Basis	FCC 2.1053 Field Strength of Spurious Radiation
Test Method	TIA 603-C, 2004 Substitution Antenna Method

E.2. Limits

27.53

(a) For operations in the bands 2305–2320 MHz and 2345–2360 MHz, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by the following amounts:

- (1) *For fixed, land, and radiolocation land stations:* By a factor not less than $80 + 10 \log (p)$ dB on all frequencies between 2320 and 2345 MHz;
- (2) *For mobile and radiolocation mobile stations:* By a factor not less than $110 + 10 \log (p)$ dB on all frequencies between 2320 and 2345 MHz;
- (3) *For fixed, land, mobile, radiolocation land and radiolocation mobile stations:* By a factor not less than $70 + 10 \log (p)$ dB on all frequencies below 2300 MHz and on all frequencies above 2370 MHz; and not less than $43 + 10 \log (p)$ dB on all frequencies between 2300 and 2320 MHz and on all frequencies between 2345 and 2370 MHz that are outside the licensed bands of operation;
- (4) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or less, but at least one percent of the emission bandwidth of the fundamental emission of the transmitter, provided the measured energy is integrated over a 1 MHz bandwidth;
- (5) In complying with the requirements in §27.53(a)(1) and §27.53(a)(2), WCS equipment that uses opposite sense circular polarization from that used by Satellite DARS systems in the 2320–2345 MHz band shall be permitted an allowance of 10 dB;
- (6) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the edges, both upper and lower, of the licensee's bands of operation as the design permits;
- (7) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power;

E.3. Test Results

Compliant. The worst-case spurious emission level was -52.7 dBm at 4715 MHz. This level is 12.7 dB below the specification limit of -40 dBm. The spectrum was searched from 30 MHz up to 26.5 GHz.

E.4. Deviations from Normal Operating Mode During Test

None.

E.5. Sample Calculation

Final measured value (dBm) = Substitution level (dBm) + Antenna Gain (dBd)

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

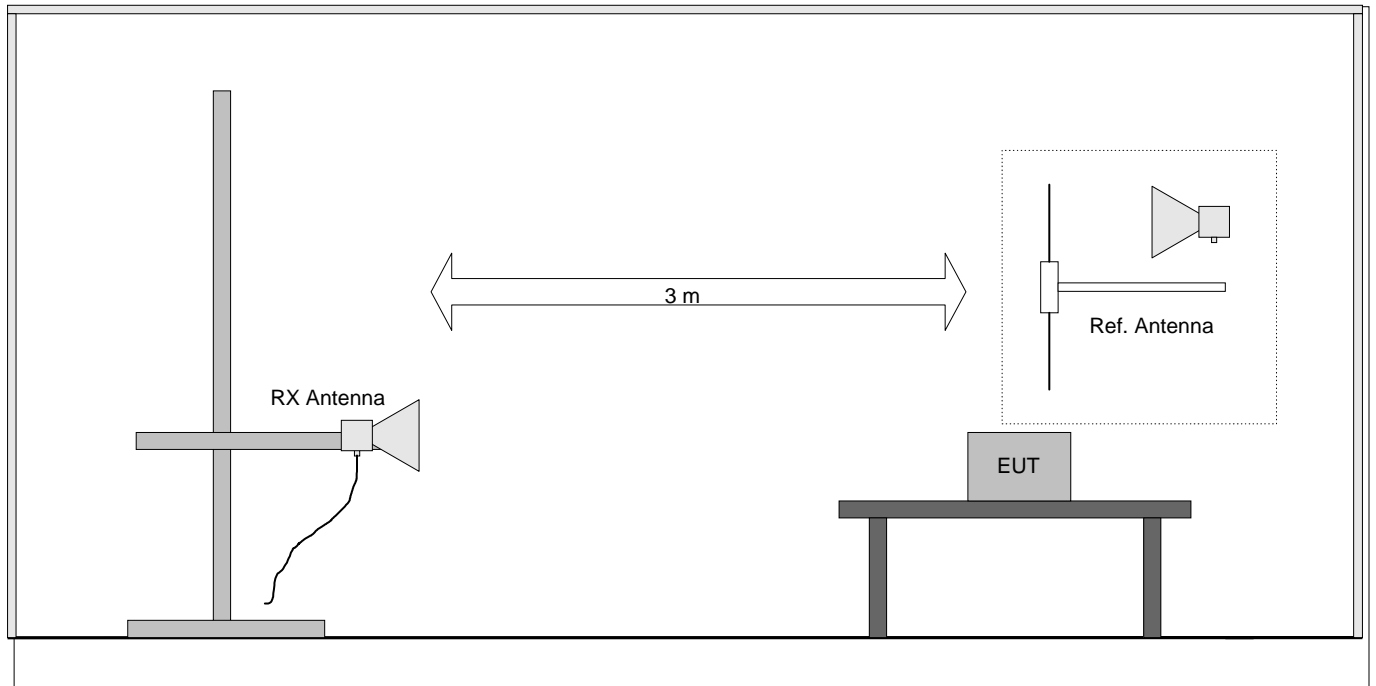
Minimum attenuation limit (dB) = 70 + 10 log(P) where P = Peak power of the carrier in watts.

Min. Atten. Limit dB = 70 + 10 * log(2 watts)
= 70 + 10 * 0.3
= 70 + 3
= 73 dB

33 dBm – 73 dB = -40 dBm

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

E.6. Test Diagram



Note: The EUT is set to repeat a signal at maximum rf output power into a coaxial load for this testing.

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

E.7. Test Data

	Project No:	Navini Networks W7443
	Model:	2.3 GHz MX8 BTS
	Comments:	Transmit at full rf output power, CDMA Mode
	Date:	12/14/2007

Distance:	3 m	Standard:	CFR 47, Part 2.1053	RBW: (unless < 1 GHz = 120 kHz noted) 1 GHz = 1 MHz	>	VBW: (unless noted) Peak = RBW Avg. = 10Hz
-----------	-----	-----------	---------------------	---	---	--

Antenna	Polarization	Frequency	Measured	Substitution Level	Substitution Antenna Gain	Final Measured Value		Peak Carrier Power		Minimum Attenuation Limit	Margin
						(dBm)	(nanowatts)	(dBm)	(watts)		
Ref. E1019	V	4715	-134.7	-61.42	8.73	-52.7	5.38	32.1	1.6	72.1	12.7
Ref. E1019	H	4715	-134.7	-61.42	8.73	-52.7	5.38	32.1	1.6	72.1	12.7
Ref. E1019	V	7072.5	-140.5	-69.21	9.77	-59.4	1.14	32.1	1.6	72.1	19.4
Ref. E1019	H	7072.5	-140.5	-69.21	9.77	-59.4	1.14	32.1	1.6	72.1	19.4
Ref. E1019	V	9430	-138	-68.26	9.49	-58.8	1.33	32.1	1.6	72.1	18.8
Ref. E1019	H	9430	-138	-68.26	9.49	-58.8	1.33	32.1	1.6	72.1	18.8
Ref. E1019	V	11787.5	-137.2	-69.17	10.59	-58.6	1.39	32.1	1.6	72.1	18.6
Ref. E1019	H	11787.5	-137.2	-69.17	10.59	-58.6	1.39	32.1	1.6	72.1	18.6
Ref. E1019	V	14145	-137.3	-71.82	9.45	-62.4	0.58	32.1	1.6	72.1	22.4
Ref. E1019	H	14145	-137.3	-71.82	9.45	-62.4	0.58	32.1	1.6	72.1	22.4
Ref. E1019	V	16502.50	-134.2	-69.09	13.99	-55.1	3.09	32.1	1.6	72.1	15.1
Ref. E1019	H	16502.50	-134.2	-69.09	13.99	-55.1	3.09	32.1	1.6	72.1	15.1

Notes: (1) A positive margin indicates a passing result
 (2) Spurious emissions were measured with average detection and compared to the maximum average fundamental power of 2 watts.
 (3) The minimum threshold of sensitivity was sufficient to detect signals within 10 dB of the -40 dBm limit over the frequency range 30 MHz - 26.5 GHz.

	Project No:	Navini Networks W7443
	Model:	2.3 GHz MX8 BTS
	Comments:	Transmit at full rf output power OFDMA Mode
	Date:	12/14/2007

Distance:	3m	Standard:	CFR 47, Part 2.1053	RBW: (unless < 1 GHz = 120 kHz noted) 1 GHz = 1 MHz	>	VBW: (unless noted) Peak = RBW Avg. = 10Hz
-----------	----	-----------	---------------------	---	---	--

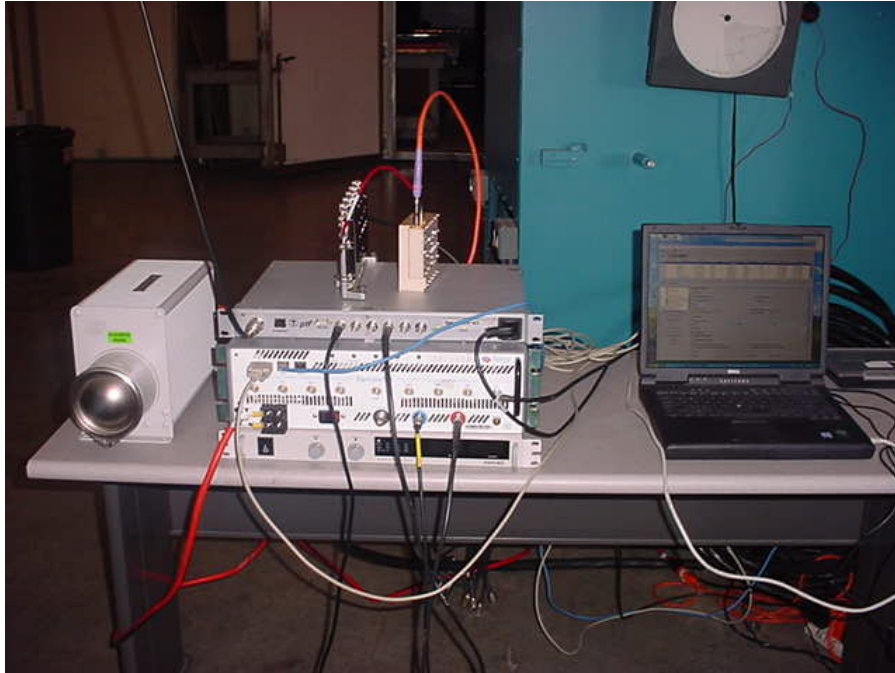
Antenna	Polarization	Frequency	Measured	Substitution Level	Substitution Antenna Gain	Final Measured Value		Peak Carrier Power		Minimum Attenuation Limit	Margin
						(dBm)	(nanowatts)	(dBm)	(watts)		
Ref. E1019	V	4715	-134.7	-61.42	8.73	-52.7	5.4	32.3	1.7	72.3	12.7
Ref. E1019	H	4715	-134.7	-61.42	8.73	-52.7	5.4	32.3	1.7	72.3	12.7
Ref. E1019	V	7072.5	-140.5	-69.21	9.77	-59.4	1.1	32.3	1.7	72.3	19.4
Ref. E1019	H	7072.5	-140.5	-69.21	9.77	-59.4	1.1	32.3	1.7	72.3	19.4
Ref. E1019	V	9430	-138	-68.26	9.49	-58.8	1.3	32.3	1.7	72.3	18.8
Ref. E1019	H	9430	-138	-68.26	9.49	-58.8	1.3	32.3	1.7	72.3	18.8
Ref. E1019	V	11787.5	-137.2	-69.17	10.59	-58.6	1.4	32.3	1.7	72.3	18.6
Ref. E1019	H	11787.5	-137.2	-69.17	10.59	-58.6	1.4	32.3	1.7	72.3	18.6
Ref. E1019	V	14145	-137.3	-71.82	9.45	-62.4	0.6	32.3	1.7	72.3	22.4
Ref. E1019	H	14145	-137.3	-71.82	9.45	-62.4	0.6	32.3	1.7	72.3	22.4
Ref. E1019	V	16502.50	-134.2	-69.09	13.99	-55.1	3.1	32.3	1.7	72.3	15.1
Ref. E1019	H	16502.50	-134.2	-69.09	13.99	-55.1	3.1	32.3	1.7	72.3	15.1

Notes: (1) A positive margin indicates a passing result
 (2) Spurious emissions were measured with average detection and compared to the maximum average fundamental power of 2 watts.
 (3) The minimum threshold of sensitivity was sufficient to detect signals within 10 dB of the -40 dBm limit over the frequency range 30 MHz - 26.5 GHz.

Note: Emissions were checked at 4 frequencies across the band. The data presented above was the worst-case result which was with maximum rf power output at 2357.5 MHz. The spectrum was searched from 30 MHz up to 26.5 GHz.

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

E.8. Test Photo



E.9. Tested By

Test Date: 11 December, 2007

Tested by: Dwaine Hartman, Wireless Technician

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

NTS Plano, 1701 E. Plano Pkwy., Plano, TX 75074 Tel: (972) 509-2566, Fax: (972) 509-0073

APPENDIX F: 2.1055 FREQUENCY STABILITY

F.1. Base Standard & Test Basis

Base Standard	FCC 2.1055
Test Method	TIA 603-C, 2004

Specifications

27.54 Frequency Stability

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

F.2. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

F.3. Test Results

Complies

F.4. Observations

It was verified that the BTS ceases to transmit when the ambient temperature is below 0 degrees.

F.5. Deviations from Normal Operating Mode During Test

None.

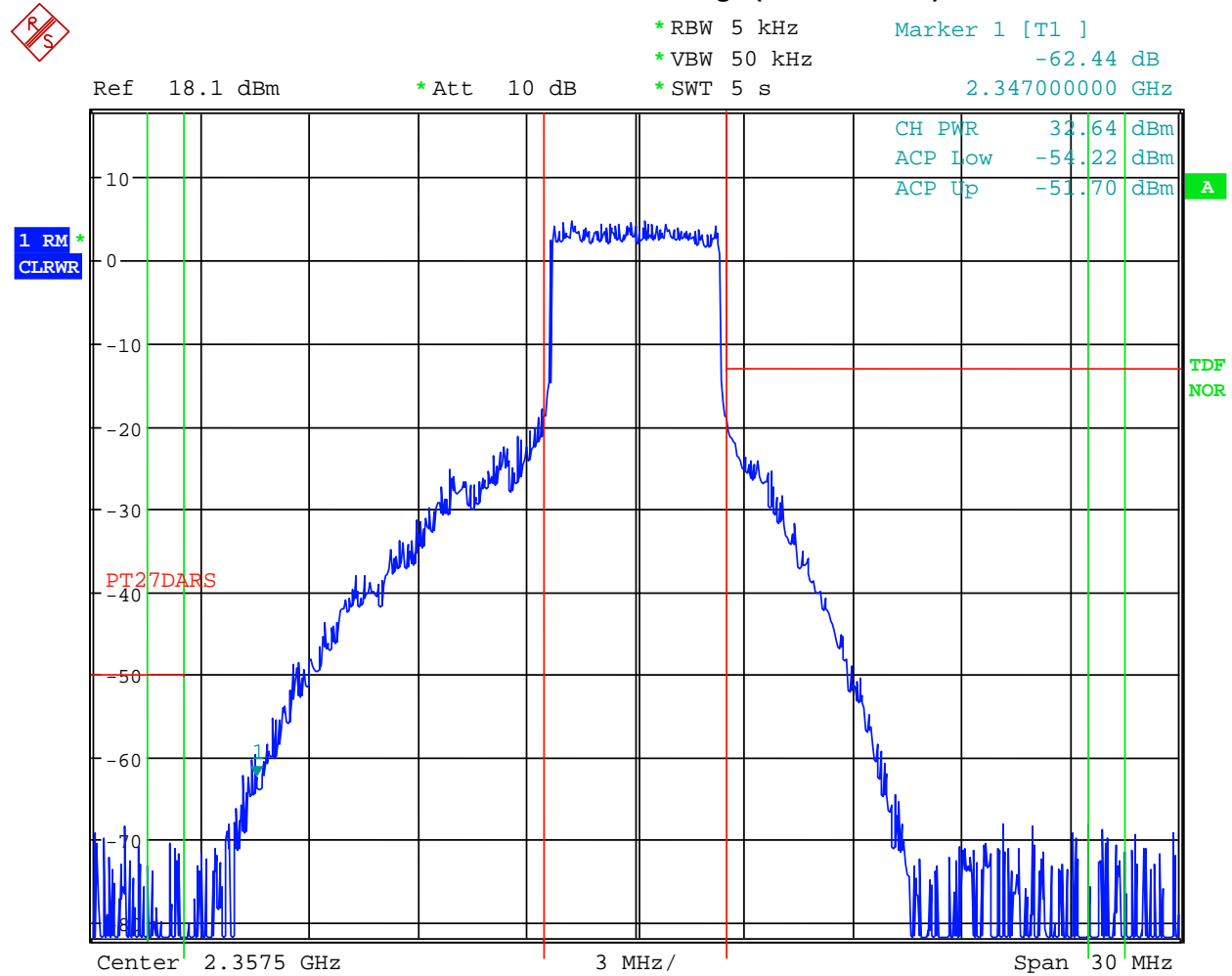
F.6. Sample Calculation

Frequency drift (ppm) = Frequency Drift (Hz)/Authorized frequency (MHz)

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

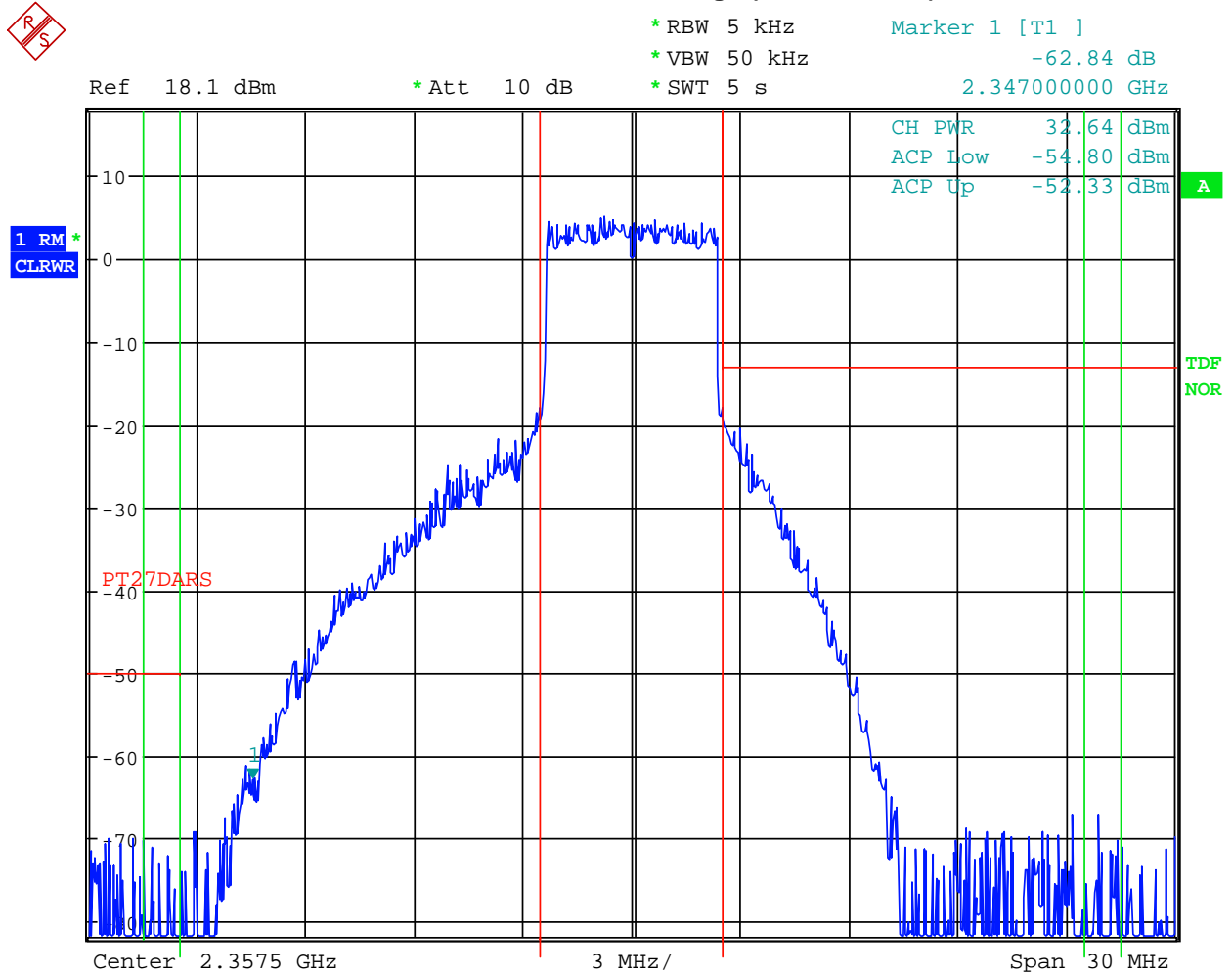
F.7. Test Data

Figure 31 Low Voltage (-40.8 VDC), Ambient Temperature, High B DARS and Band Edge (OFDMA Mode)



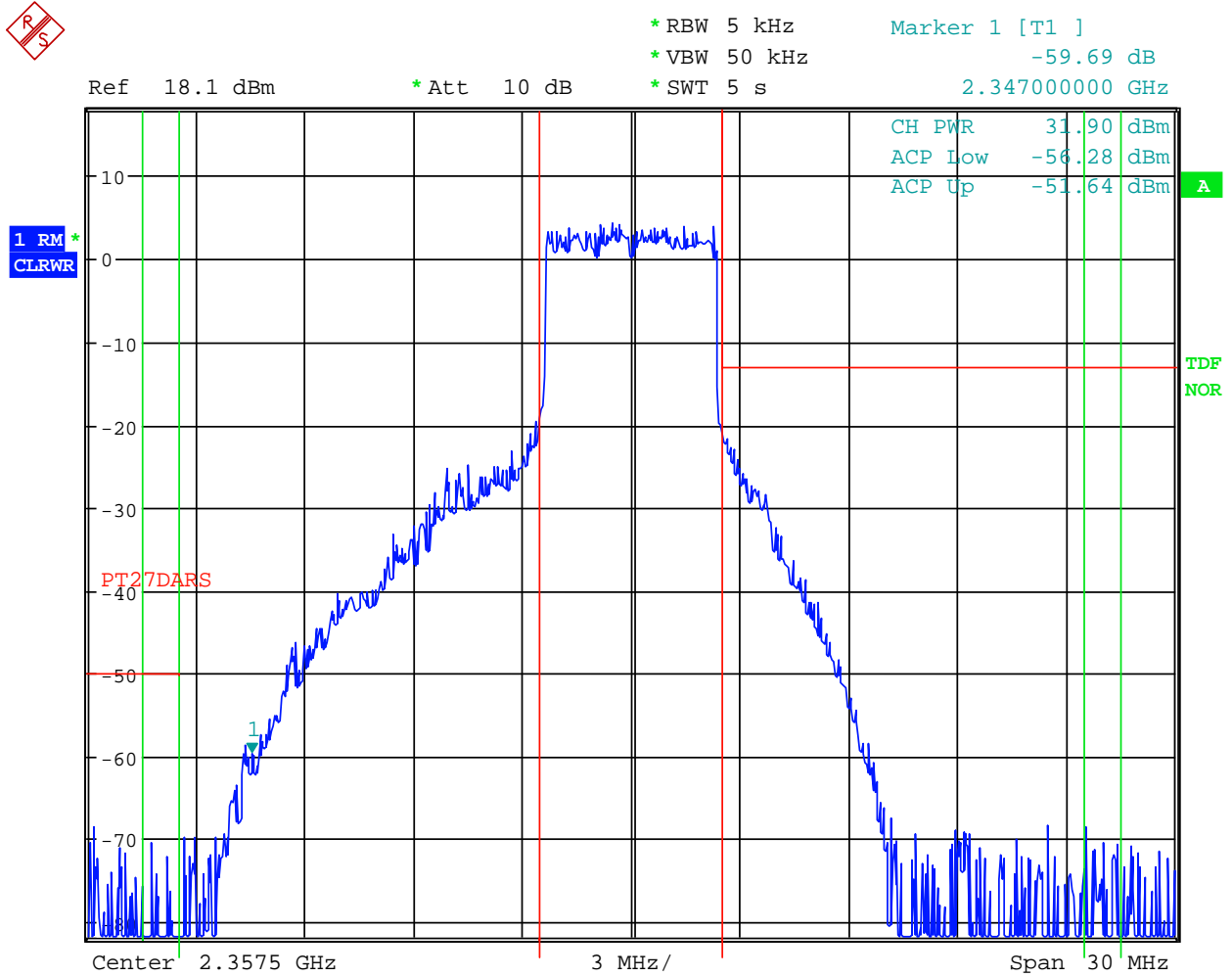
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 32 High Voltage (-55.2 VDC), Ambient Temperature, High B DARS and Band Edge (OFDMA Mode)



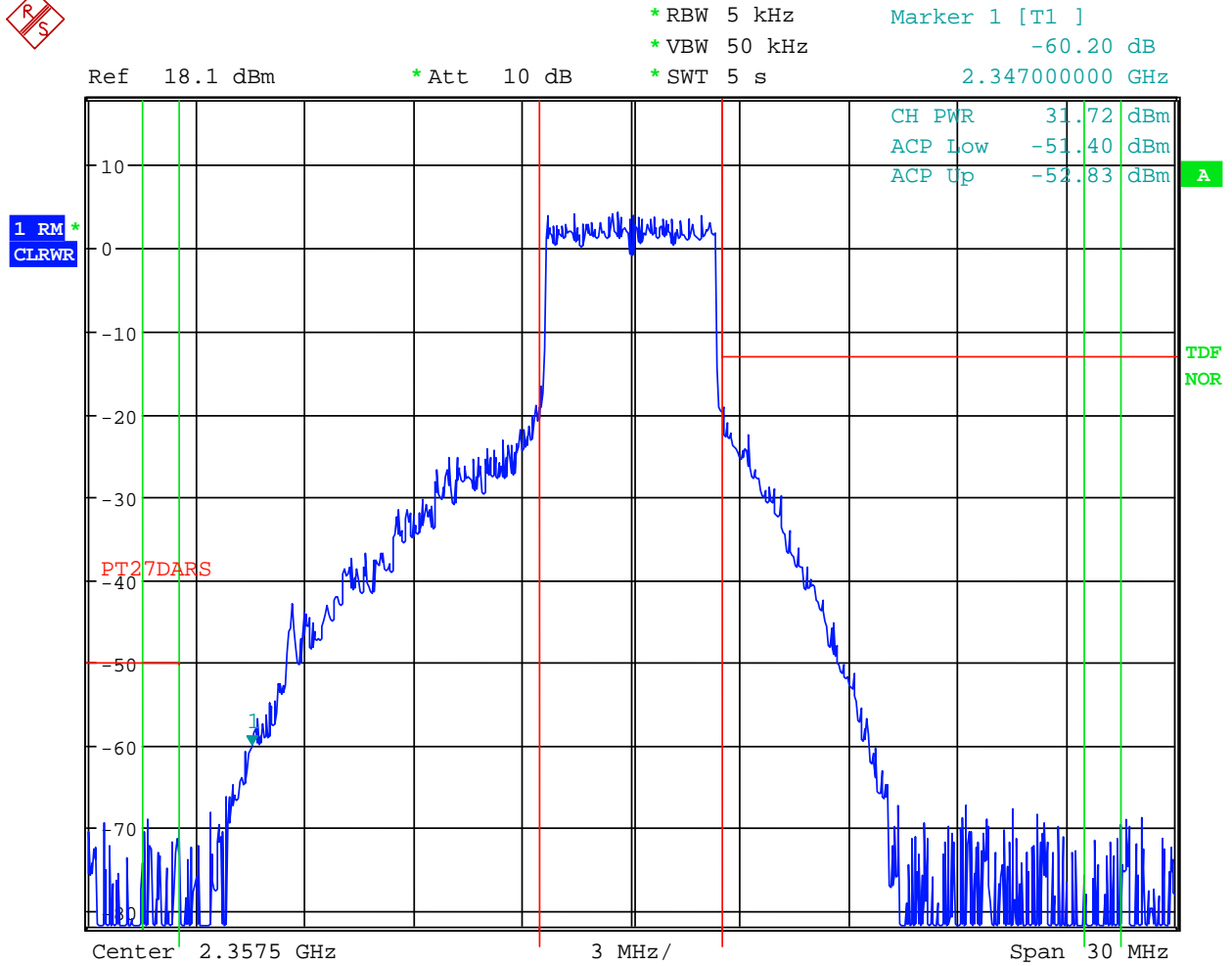
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 33 Normal Voltage (-48 VDC), +50 C degree Temperature, High B DARS and Band Edge (OFDMA Mode)



This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 34 Normal Voltage (-48 VDC), +40 C degree Temperature High B DARS and Band Edge (OFDMA Mode)

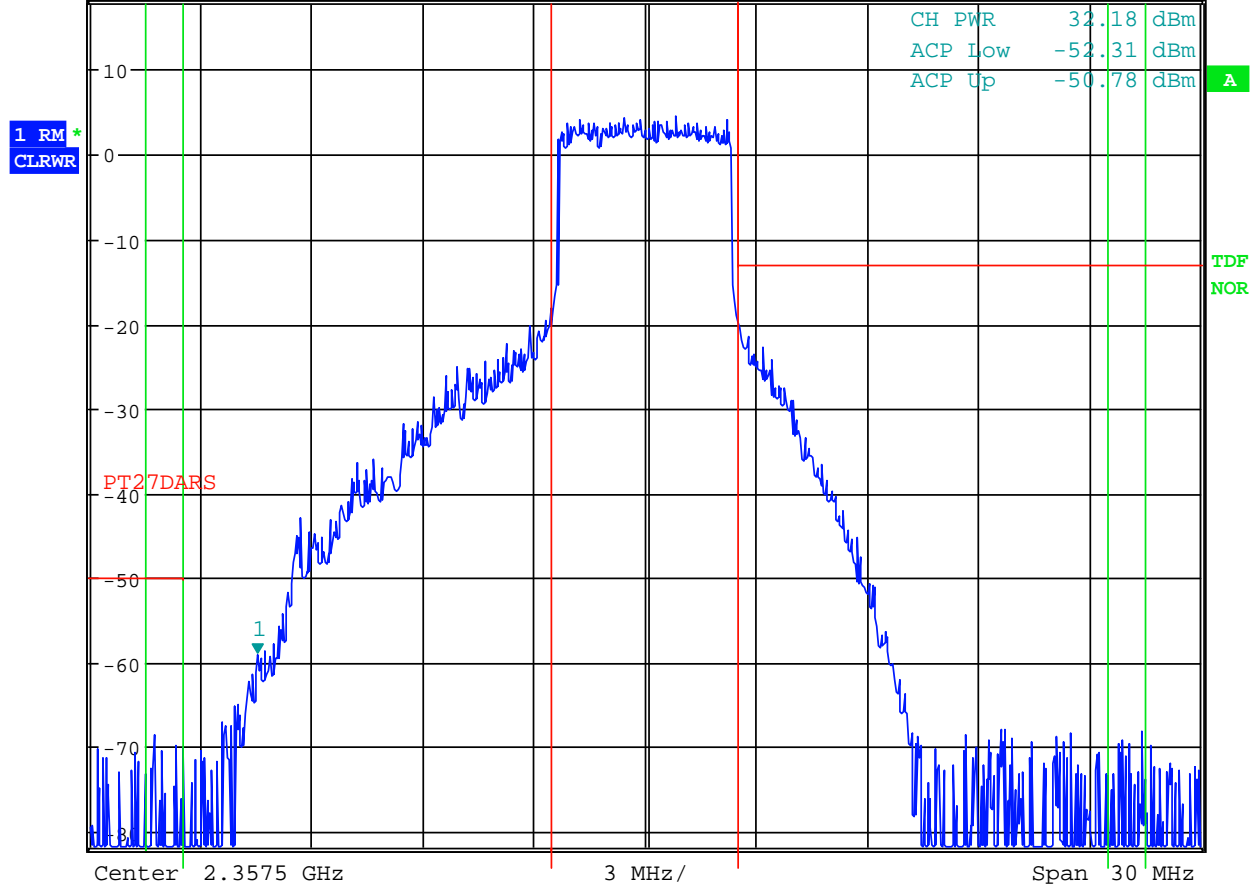


This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 35 Normal Voltage (-48 VDC), +30 C degree Temperature, High B DARS and Band Edge (OFDMA Mode)

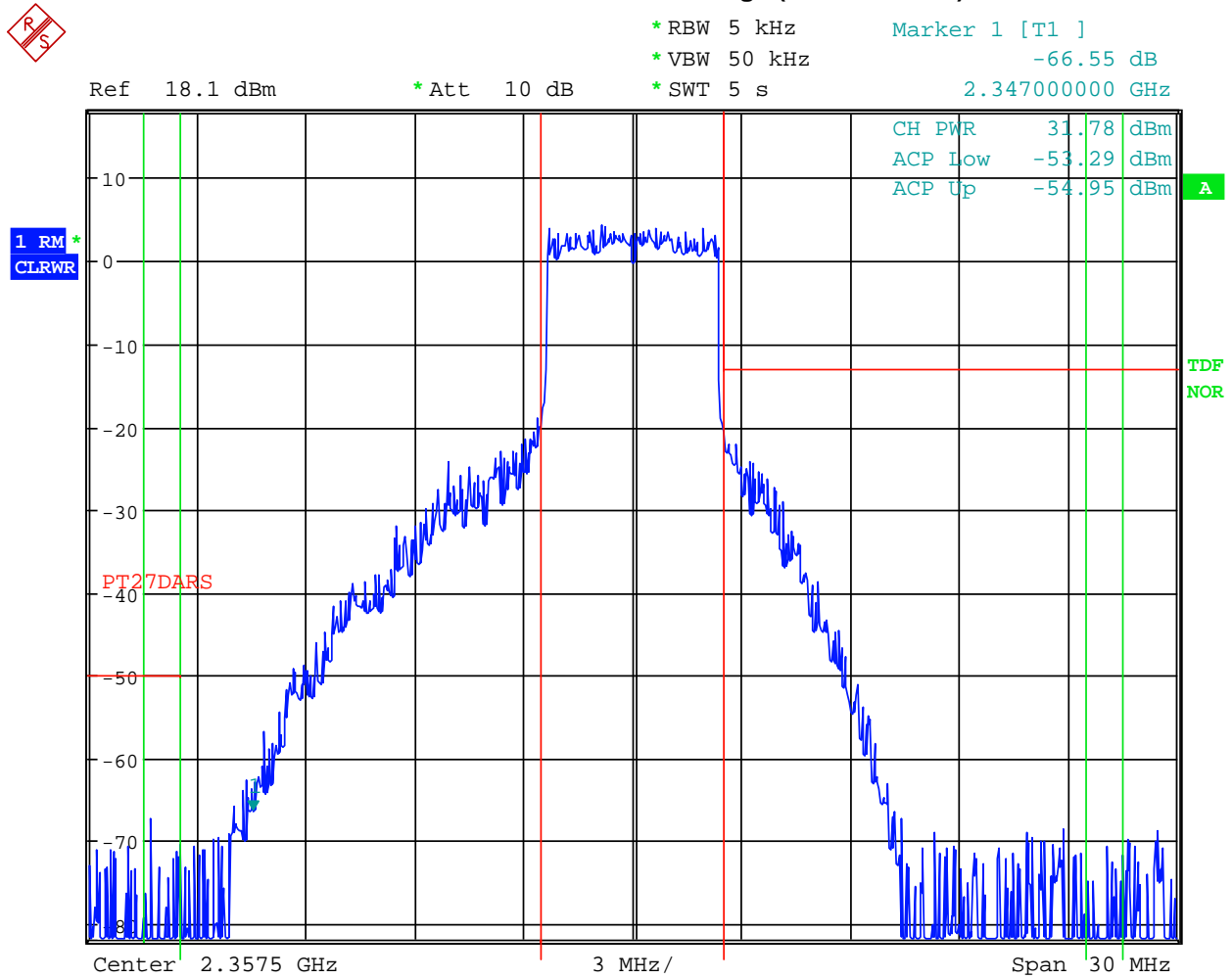


Ref 18.1 dBm * Att 10 dB * RBW 5 kHz Marker 1 [T1]
 * VBW 50 kHz -59.18 dB
 * SWT 5 s 2.347000000 GHz



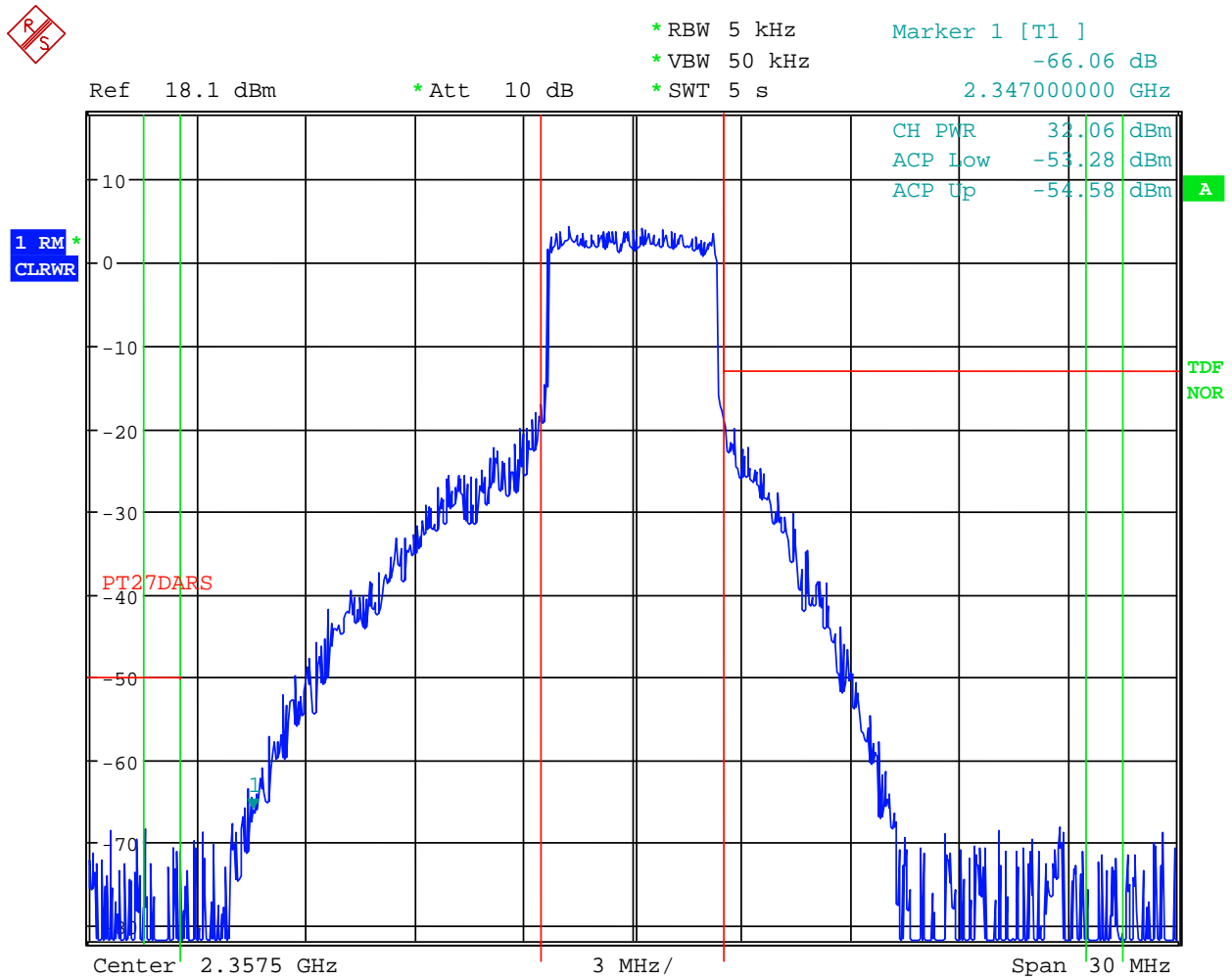
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 36 Normal Voltage (-48 VDC), +10 C degree Temperature, High B DARS and Band Edge (OFDMA Mode)



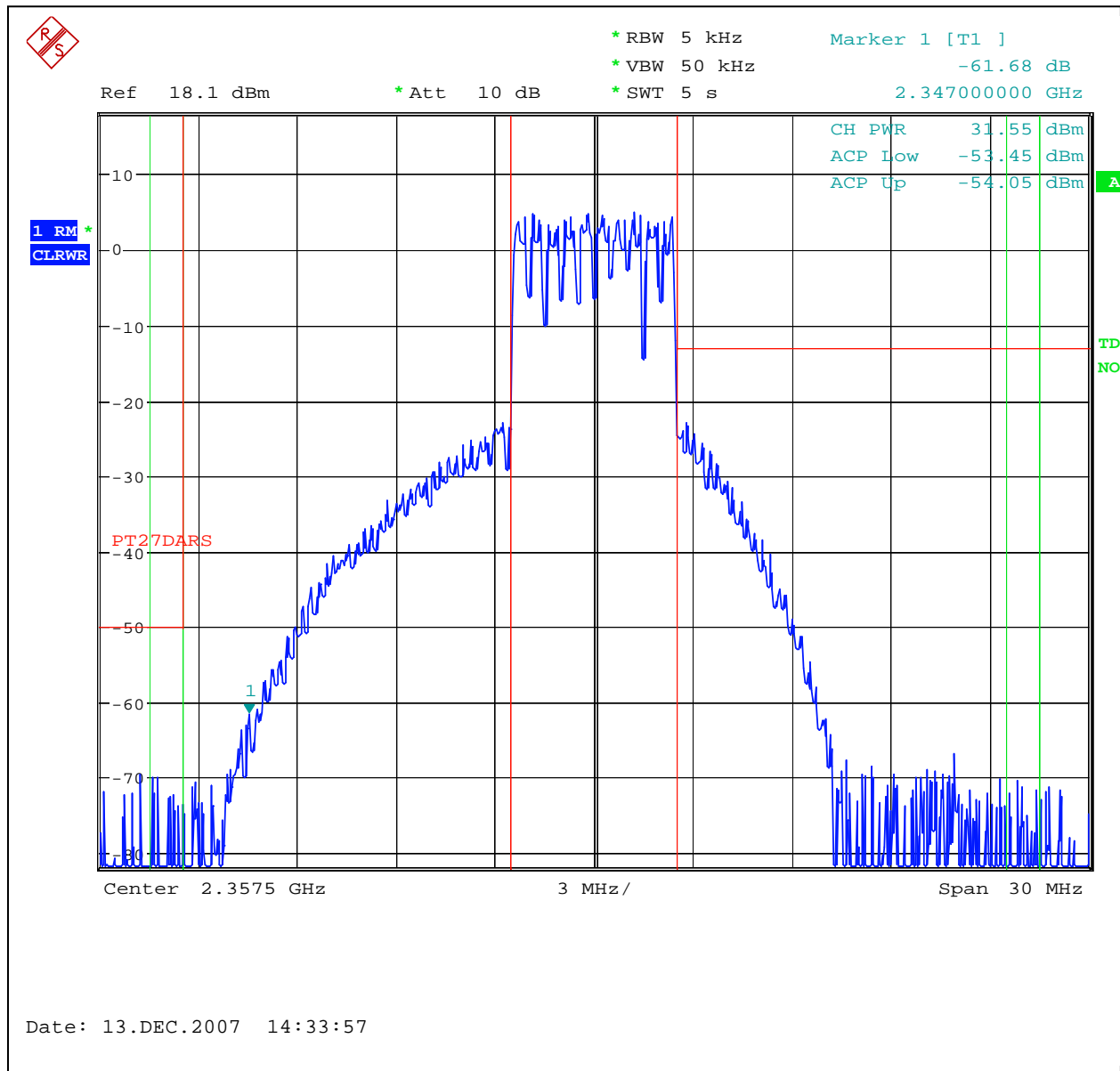
This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 37 Normal Voltage (-48 VDC), 0 C degree Temperature, High B DARS and Band Edge (OFDMA Mode)



This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

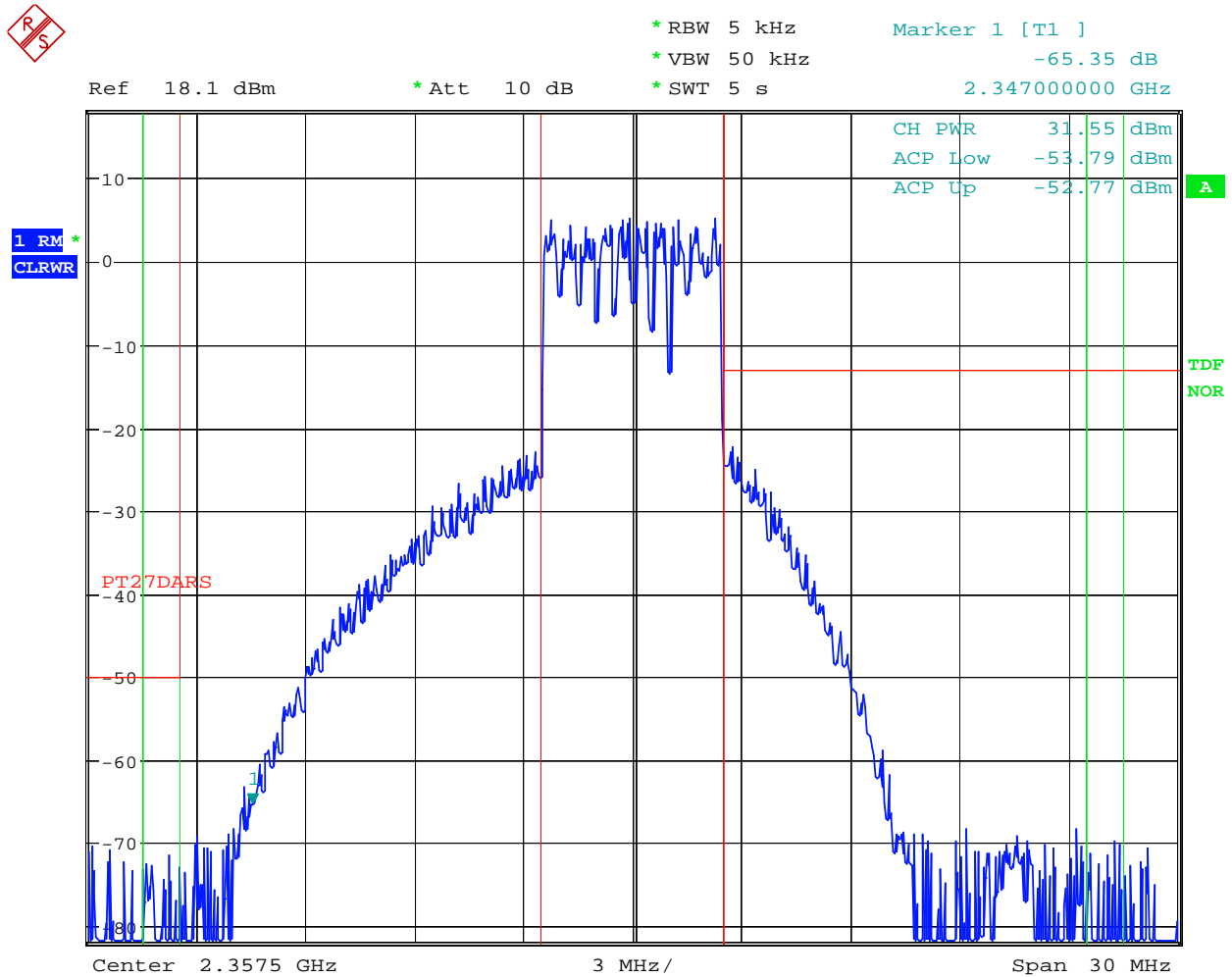
Figure 38 Low Voltage (-40.8 VDC), Ambient Temperature, High B



DARS and Band Edge (CDMA Mode)

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

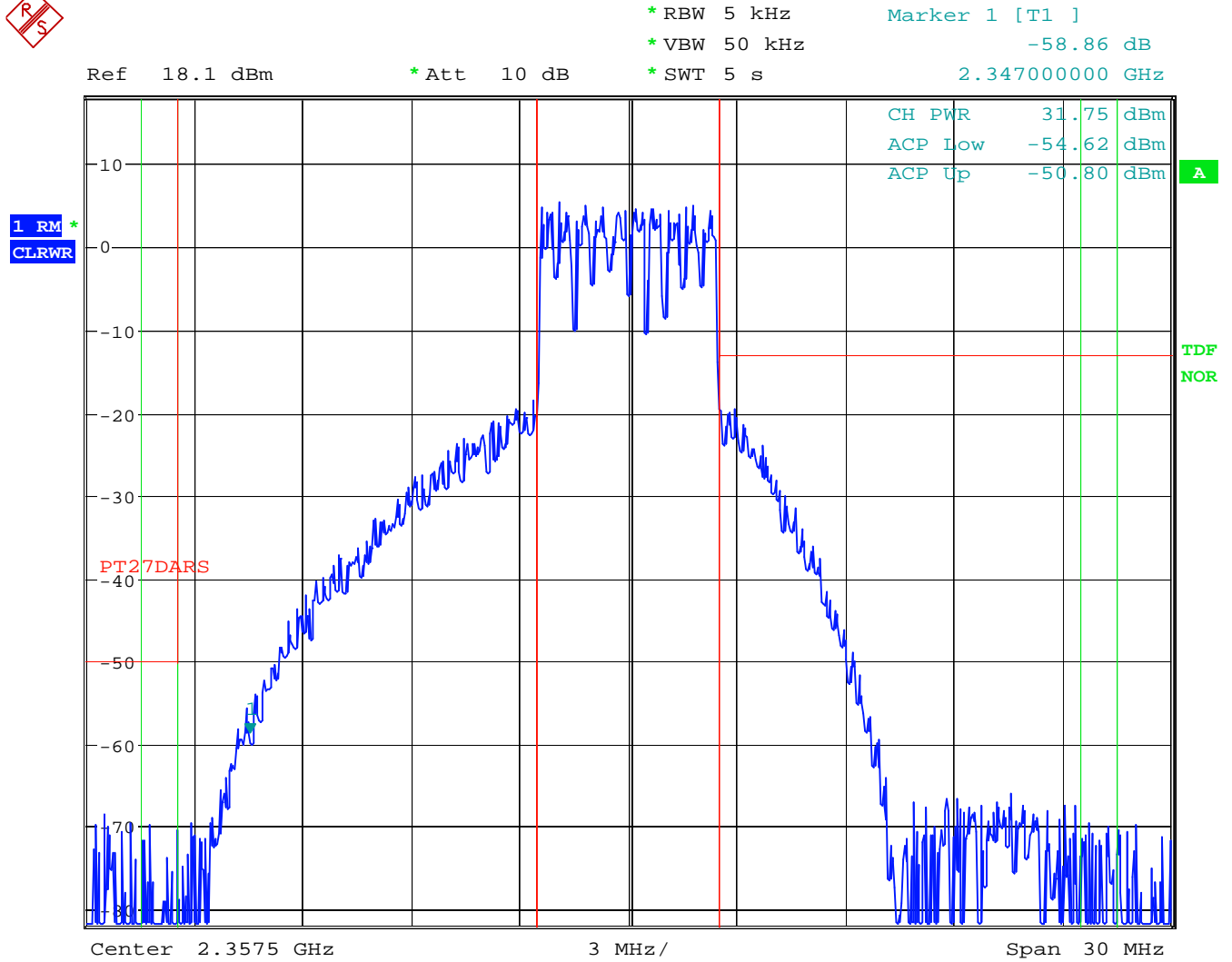
Figure 39 High Voltage (-55.2 VDC), Ambient Temperature, High B DARS and Band Edge (CDMA Mode)



Date: 13.DEC.2007 14:34:39

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

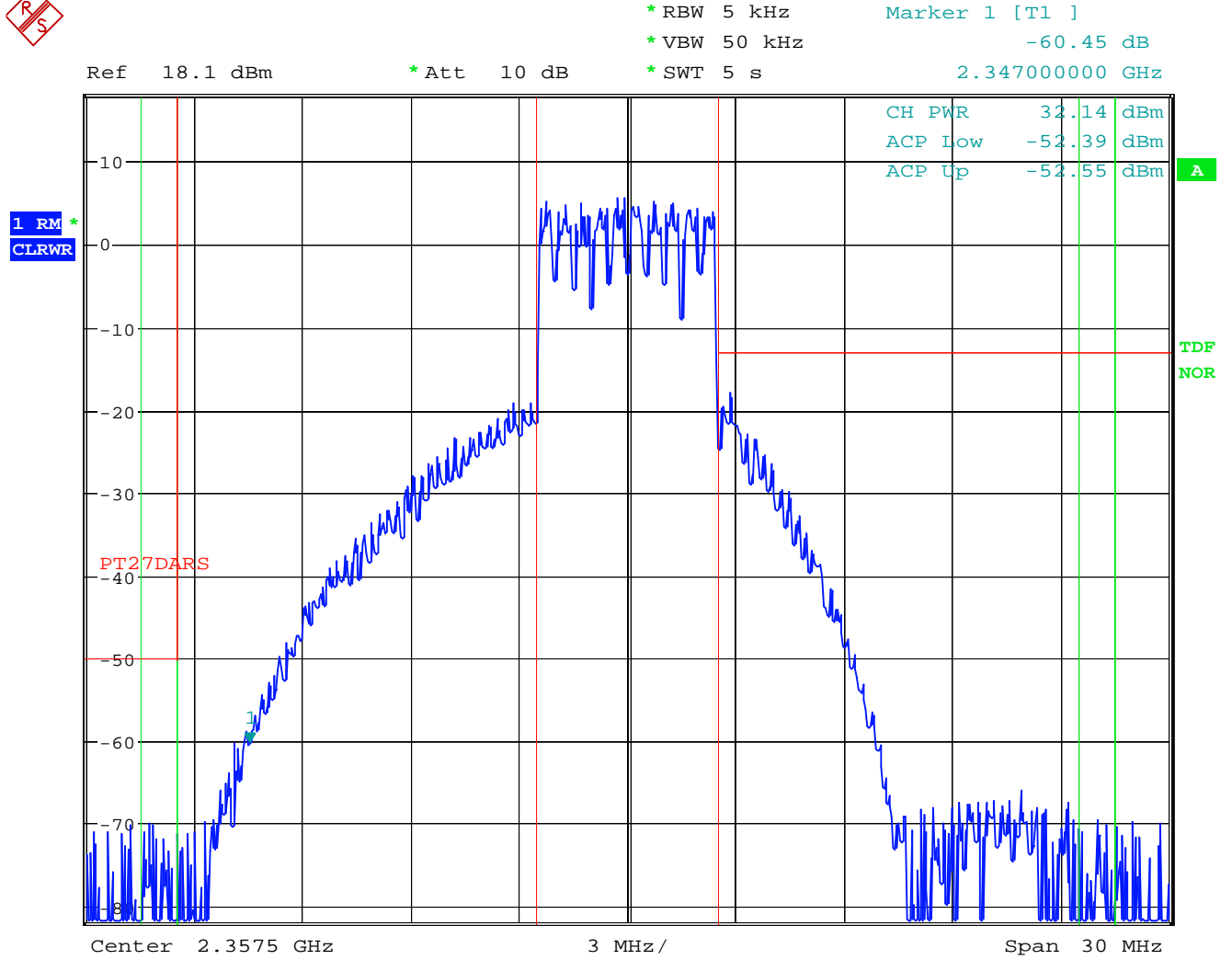
Figure 40 Normal Voltage (-48 VDC), +50 C degree Temperature, High B DARS and Band Edge (CDMA Mode)



Date: 13.DEC.2007 15:04:59

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

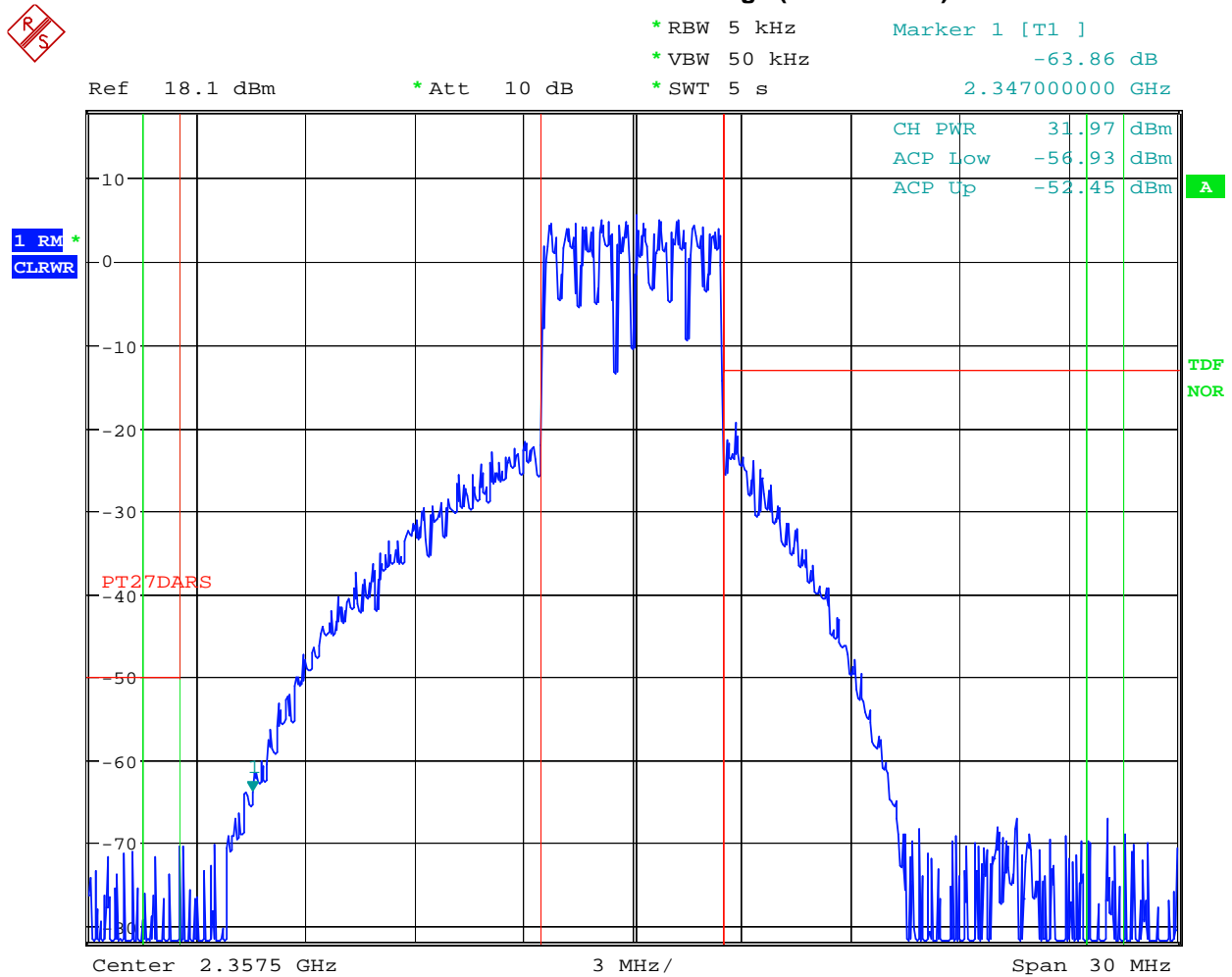
Figure 42 Normal Voltage (-48 VDC), +30 C degree Temperature, High B DARS and Band Edge (CDMA Mode)



Date: 13.DEC.2007 15:23:45

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

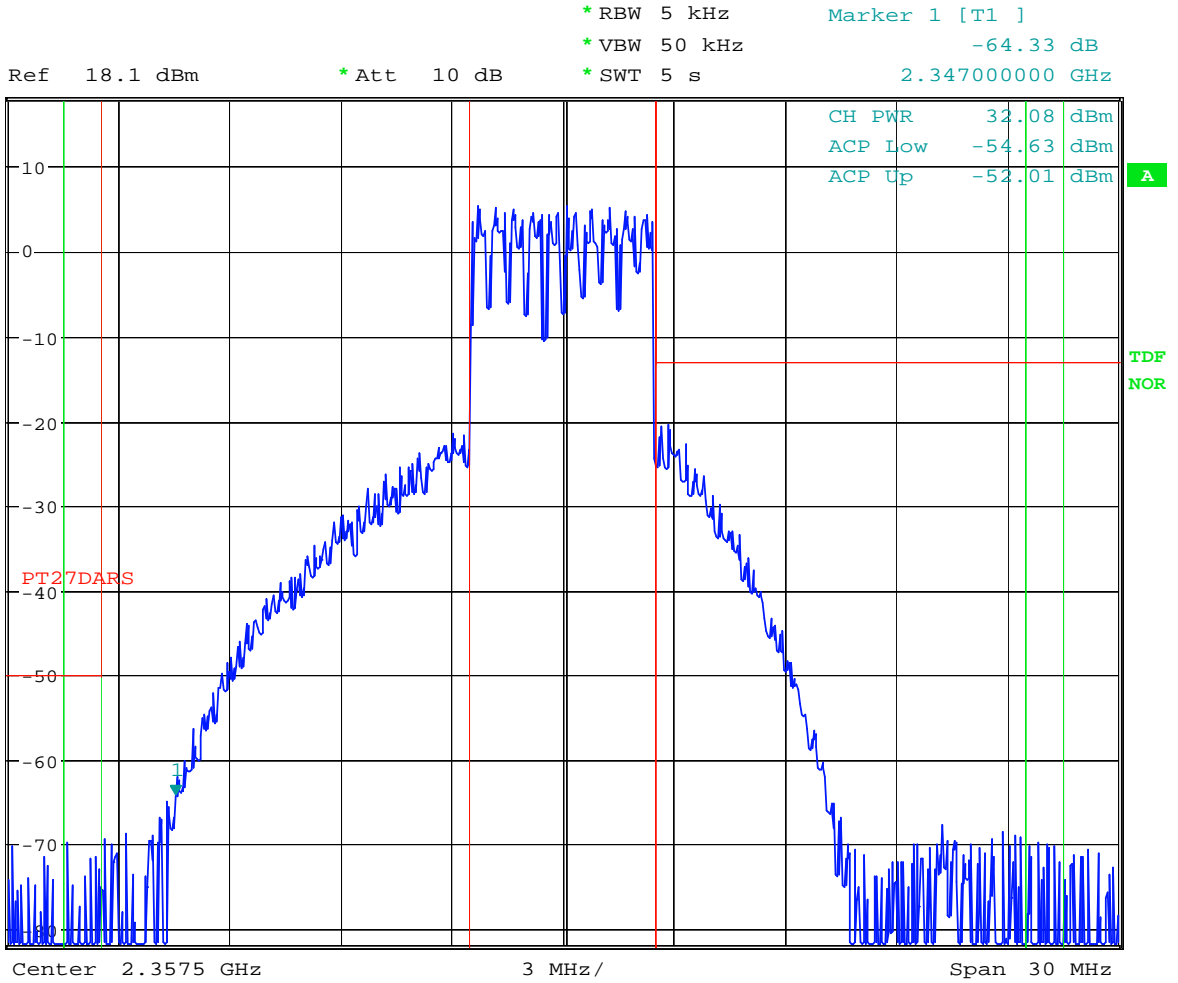
Figure 43 Normal Voltage (-48 VDC), +10 C degree Temperature, High B DARS and Band Edge (CDMA Mode)



Date: 13.DEC.2007 15:36:20

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

Figure 44 Normal Voltage (-48 VDC), 0 C degree Temperature, High B DARS and Band Edge (CDMA Mode)



Date: 13.DEC.2007 15:44:15

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

F.8. Test Diagram

None

F.9. Tested By

Test Date: 13 December, 2007

Tested by: Dwaine Hartman, Wireless Technician

APPENDIX G: TEST EQUIPMENT LIST**G.1. Field Strength of Spurious Emissions 30 MHz – 26.5 GHz Measurement Equipment**

Description	Manufacturer	Type/Model	Calibration Frequency	Cal Due	NTS Control No.
3m ANECHOIC CHAMBER					
RX Bilog Antenna	ETS	3142C	12 Months	9/21/08	E1288P
Ref. Horn Antenna	ETS	3115	12 Months	9/05/08	E1049P
RX Horn Antenna	ETS	3115	12 Months	9/05/08	E1049P
High Frequency Cable	MegaPhase	TM26-3135-144	12 Months	2/28/08	W1011P
Reference Antenna	ETS	3121 Dipole Set	12 months	12/14/07	E1022P
CONTROL ROOM					
Test Receiver	Rohde & Schwarz	FSQ 26	12 Months	12/31/07	W1020P
High Frequency - Cable 2	MegaPhase	NA	12 Months	8/23/08	W1011P
Amplifier	HP	8449B	12 Months	6/30/08	E1010P

G.2. Antenna Conducted Emissions Measurement Equipment

Instrument	Manufacturer	Model	Calibration Frequency	Cal Due	NTS Control No.
ANTENNA CONDUCTED EMISSIONS					
Spectrum Analyzer	Rohde & Schwarz	FSQ 26	12 Months	12/31/07	W1020P
High Frequency - Cable 1	MegaPhase	TM26-3135-144	12 Months	8/23/08	W1011P
Climate Chamber	Tenney	T-14	No Cal Req'd	No Cal Req'd	ENV-1053P
Temperature Sensor	Honeywell	Trueline	24 Months	5/13/08	ENV-1053P
50 ohm loads	Amphenol	50R	12 Months	n/a	
20 dB attenuator	INMET	26A-20	12 Months	10/24/08	W1019P
10 dB attenuator	INMET	26A-10	12 Months	10/24/08	W1018P

*This device was not used for calibrated measurements.

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

END OF DOCUMENT

This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full.

NTS Plano, 1701 E. Plano Pkwy., Plano, TX 75074 Tel: (972) 509-2566, Fax: (972) 509-0073