




Nemko Test Report: 5L0176RUS1 REV 5

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

**Equipment Under Test:
(E.U.T.)** 2305-2385 MHz TTA-BTS w/2.3 TTA RFS

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

Tested By: Nemko Dallas Inc.
802 N. Kealy
Lewisville, Texas 75057-3136

Authorized By: 
Brian Boyea, Resource Manager

Date: 26 September, 2005

Table of Contents

Section 1.	Summary of Test Results	3
Section 2.	General Equipment Specification	5
Section 3.	RF Power Output	7
Section 4.	EIRP Power.....	8
Section 5.	Spurious Emissions at Antenna Terminals	10
Section 6.	Field Strength of Spurious	40
Section 7.	Occupied Bandwidth.....	43
Section 8.	Frequency Stability	48
Section 9.	Test Equipment List.....	57
ANNEX A - TEST DETAILS		58
ANNEX B - TEST DIAGRAMS.....		64

Section 1. Summary of Test Results

Manufacturer: Navini Networks

Model No.: 2.3 BTS2-R1

Serial No.: 1

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

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



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit

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

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

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This report applies only to the items tested.

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC. LIMIT	RESULT
RF Power Output	2.1046	33 dBW + 10log(X/Y) dBW	Complies
Occupied Bandwidth	2.1049	5.5 MHz	Complies
Spurious Emissions @ Antenna Terminals	2.1051	-13 dBm	Complies
Field Strength of Spurious Radiation	2.1053	-13 dBm	Complies
Frequency Stability	2.1055	Must remain within authorized bandwidth	Complies

Footnotes:

Section 2. General Equipment Specification

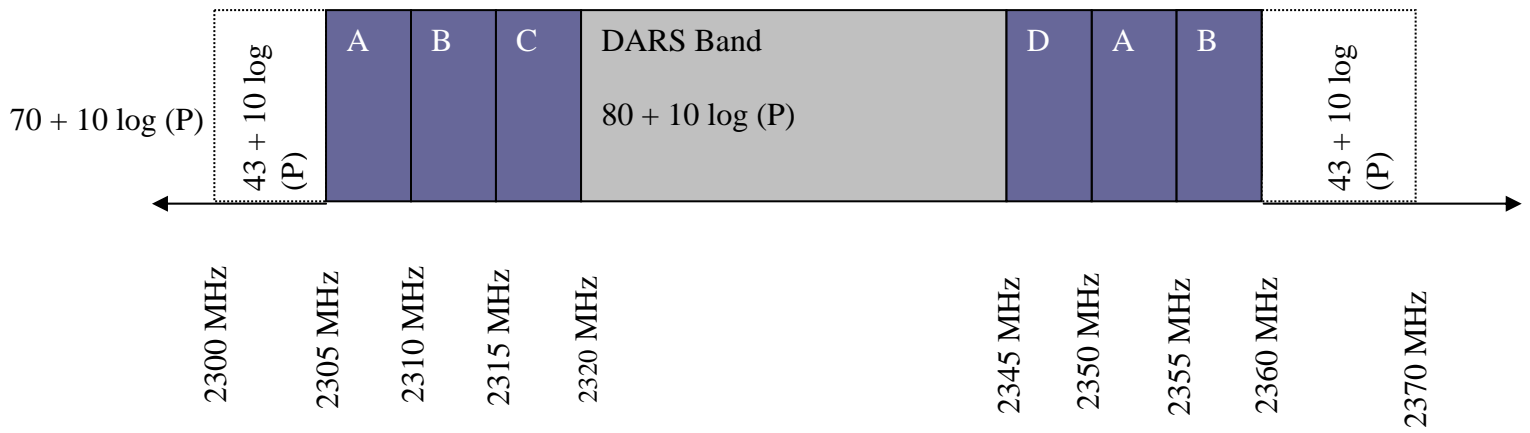
Power Supply	24 Vdc										
Frequency Range (See note below):	2305-2385 MHz										
Type(s) of Modulation:	<table><thead><tr><th>F3E (Voice)</th><th>F1D</th><th>F2D</th><th>D7W (QAM)</th><th>F9W</th></tr></thead><tbody><tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input checked="" type="checkbox"/></td></tr></tbody></table>	F3E (Voice)	F1D	F2D	D7W (QAM)	F9W	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
F3E (Voice)	F1D	F2D	D7W (QAM)	F9W							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>							
Emission Designator:	5M00F9W										
Output Impedance:	50 ohms										
RF Power Output:	31 dBm Conducted										
Antenna	+17 dbi =48dbm=63.1watts										
Duty Cycle:	50% TDD										
Selection Of Operating Frequency:	Not selectable by operator										
Power Output Adjustment Capability:	Not selectable by operator										

Description of EUT

Navini's 2305-2385 MHz TTA-BTS w/2.3 TTA RFS is a Base Station Tranciever

System Diagram

Refer to separate exhibit.



Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: Kevin Rose	DATE: 06/27/2005

Test Results: Complies

Measurement Data: See Tables.

Test Equipment: 1628, 1474,1081.

MAX RF POWER OUTPUT

Freq	Power (dBm)	Power (Watts)
A Low	31.8	1.513
A High	31.9	1.55
B Low	31.8	1.513
B High	31.6	1.45
C	31.5	1.43
D	31.23	1.33

Section 4. EIRP Power

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: Kevin Rose	DATE: 06/27/2005

Test Results: Complies

Measurement Data: See Tables.

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: Kevin Rose	DATE: 08/26/2005

Test Results: Complies

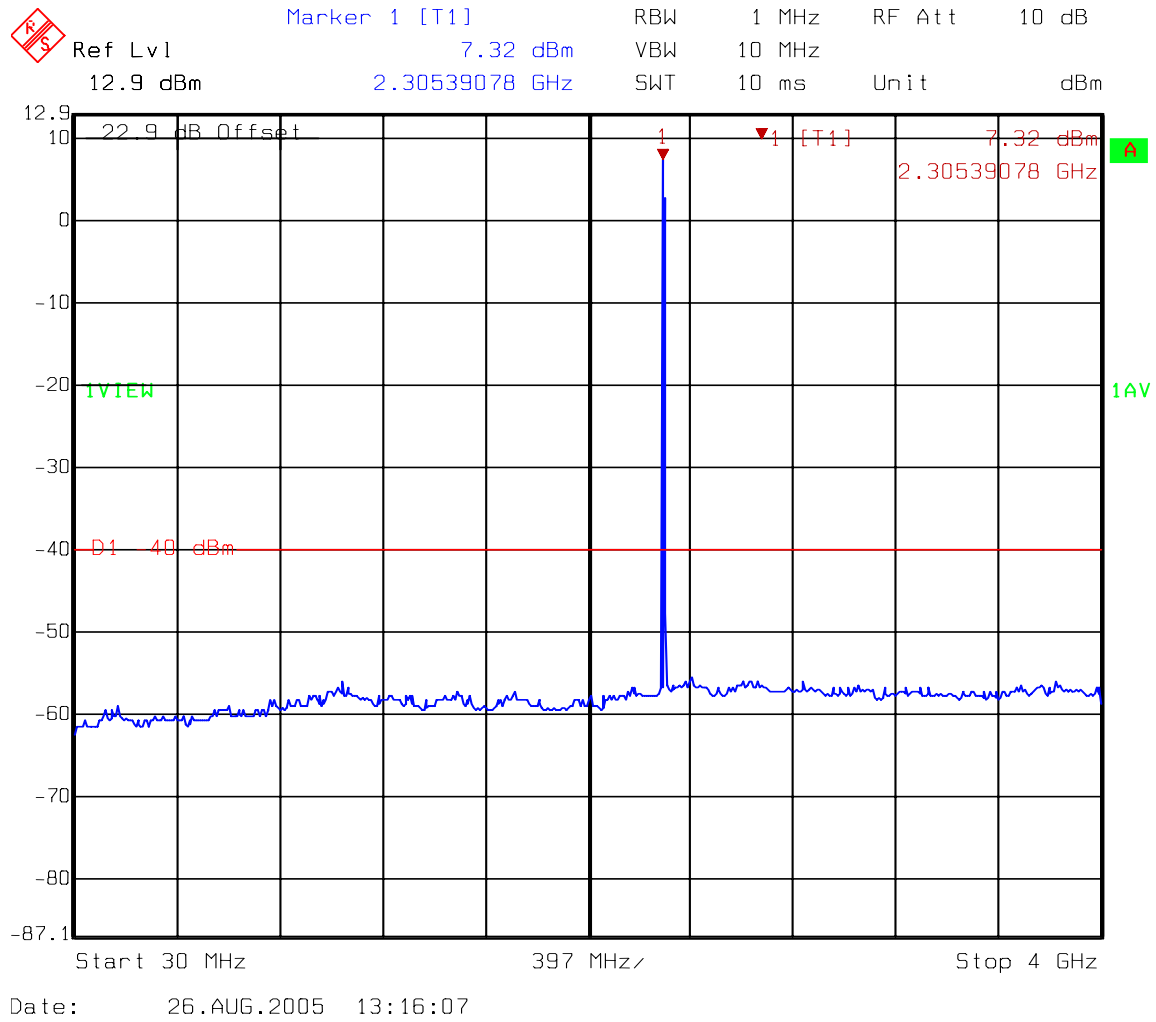
Measurement Data: See attached plots.

Test Equipment: 1036, 1470, 1045, 1083, 1482, 1064

Notes: Device operating at 2.3GHz and 30dBm conducted power. Frequency Range scanned from 9kHz to 24GHz.

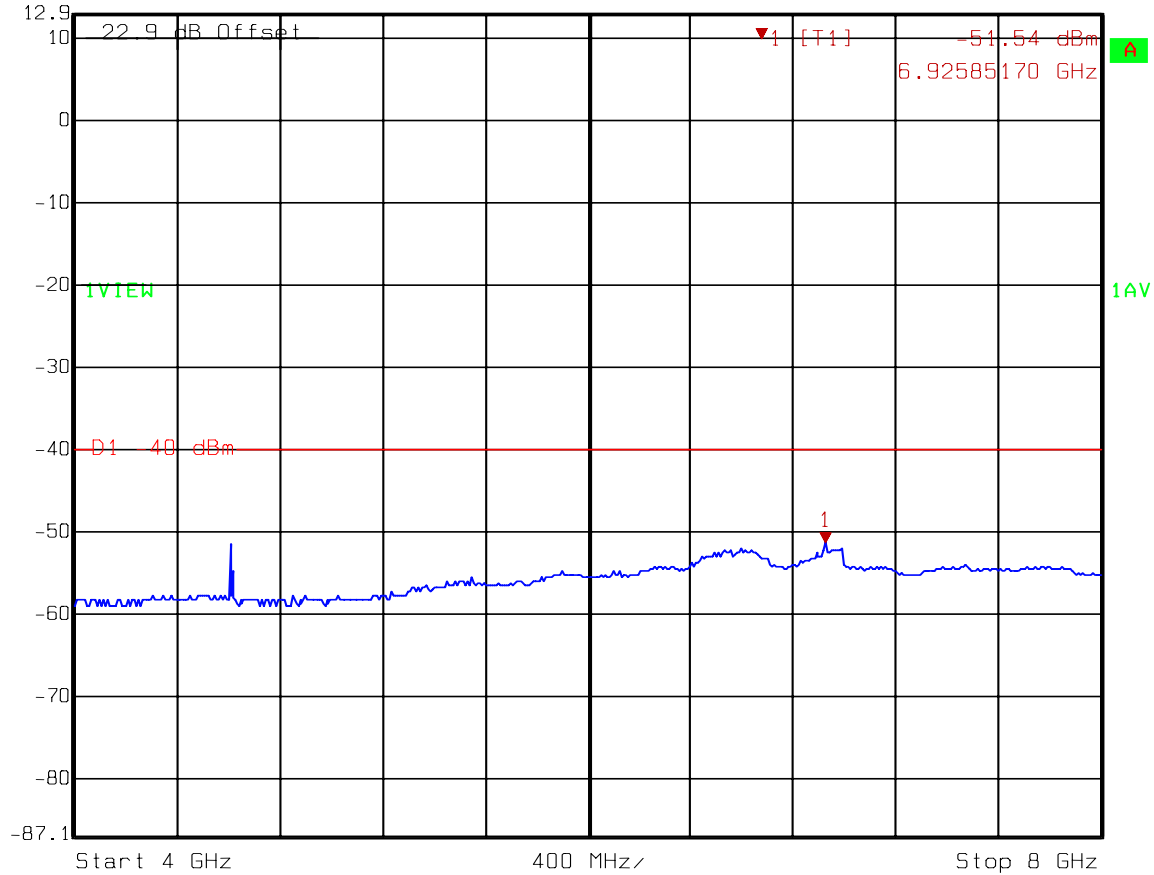
EQUIPMENT USED 1036, 1470, 1045, 1083, 1482, 1064.

A LOW BAND 1 of 3



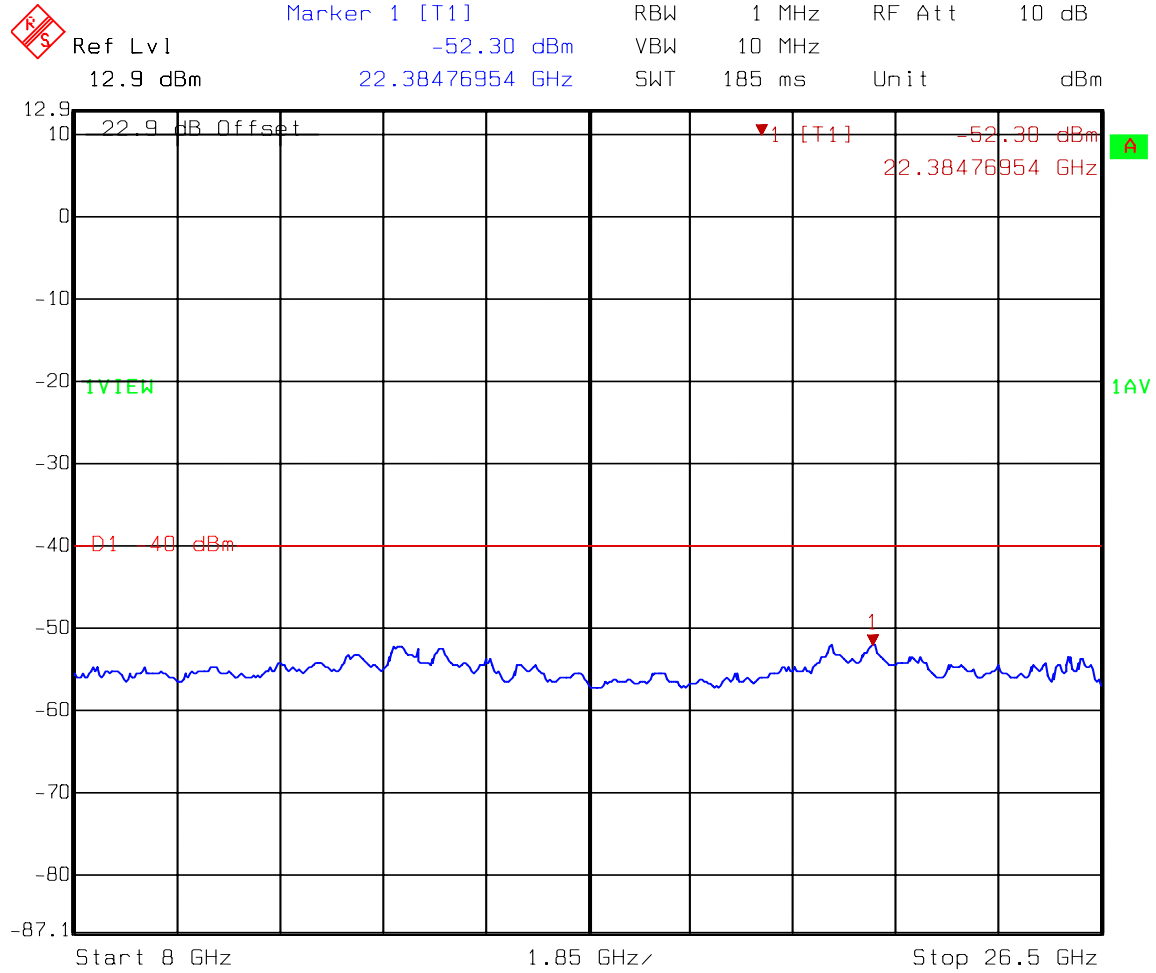
A LOW BAND 2 of 3

 Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl -51.54 dBm VBW 10 MHz
12.9 dBm 6.92585170 GHz SWT 40 ms Unit dBm



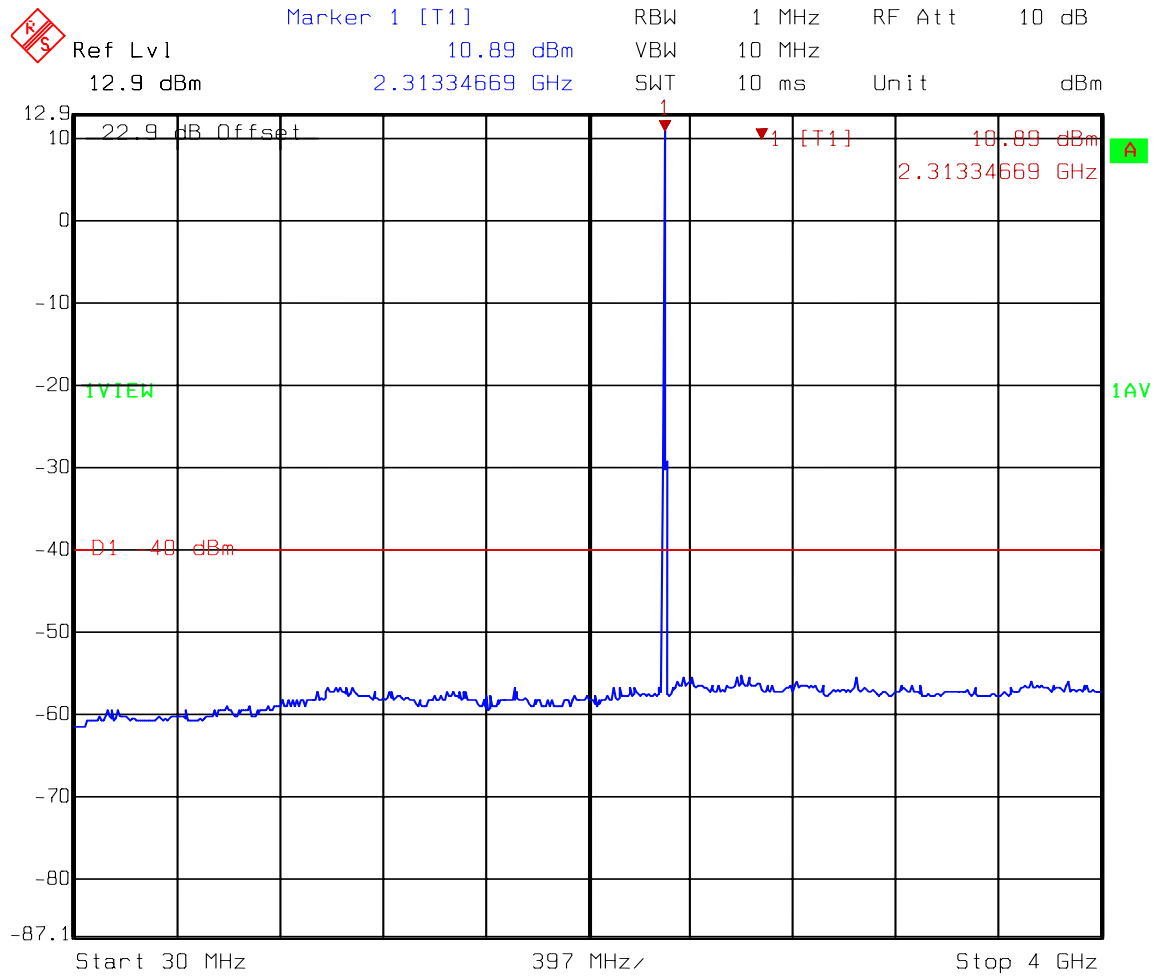
Date: 26.AUG.2005 13:14:17

A LOW BAND 3 of 3



Date: 26.AUG.2005 13:11:15

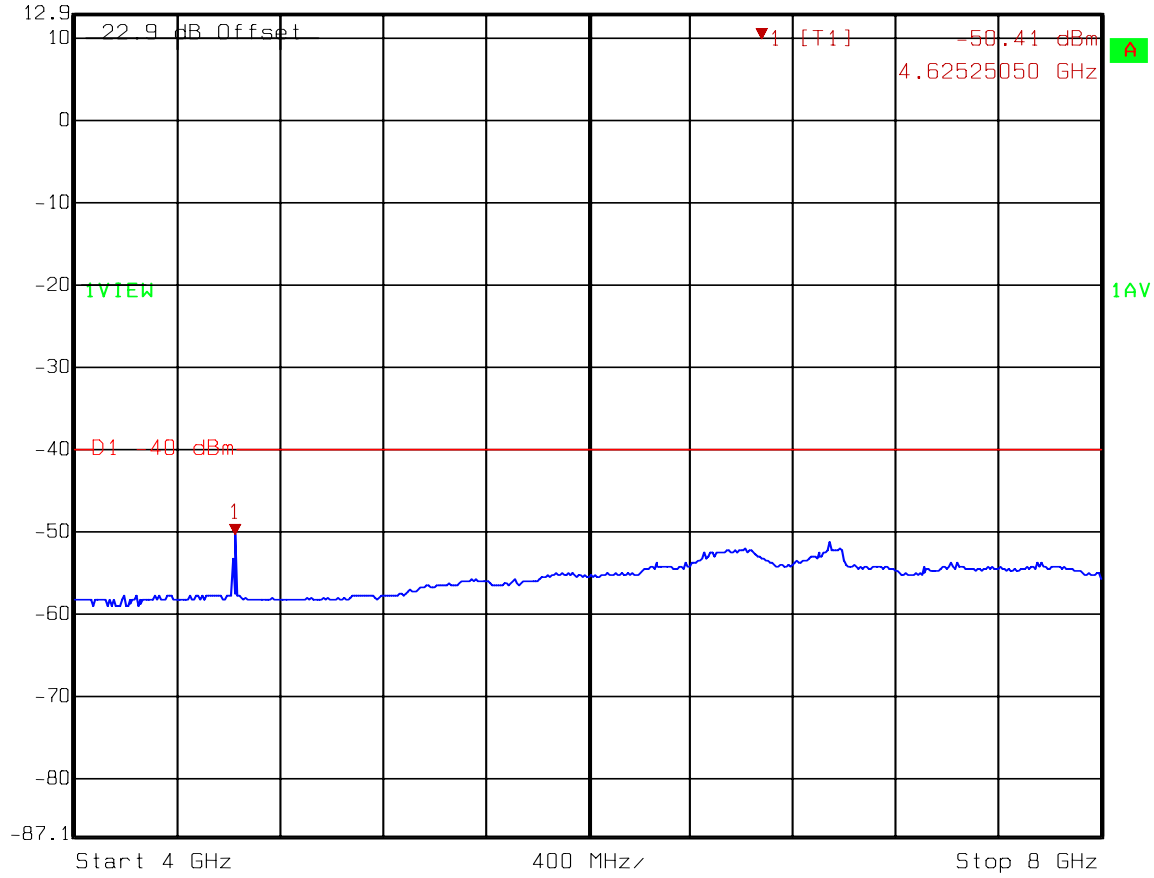
B LOW BAND 1 of 3



Date: 26.AUG.2005 13:17:16

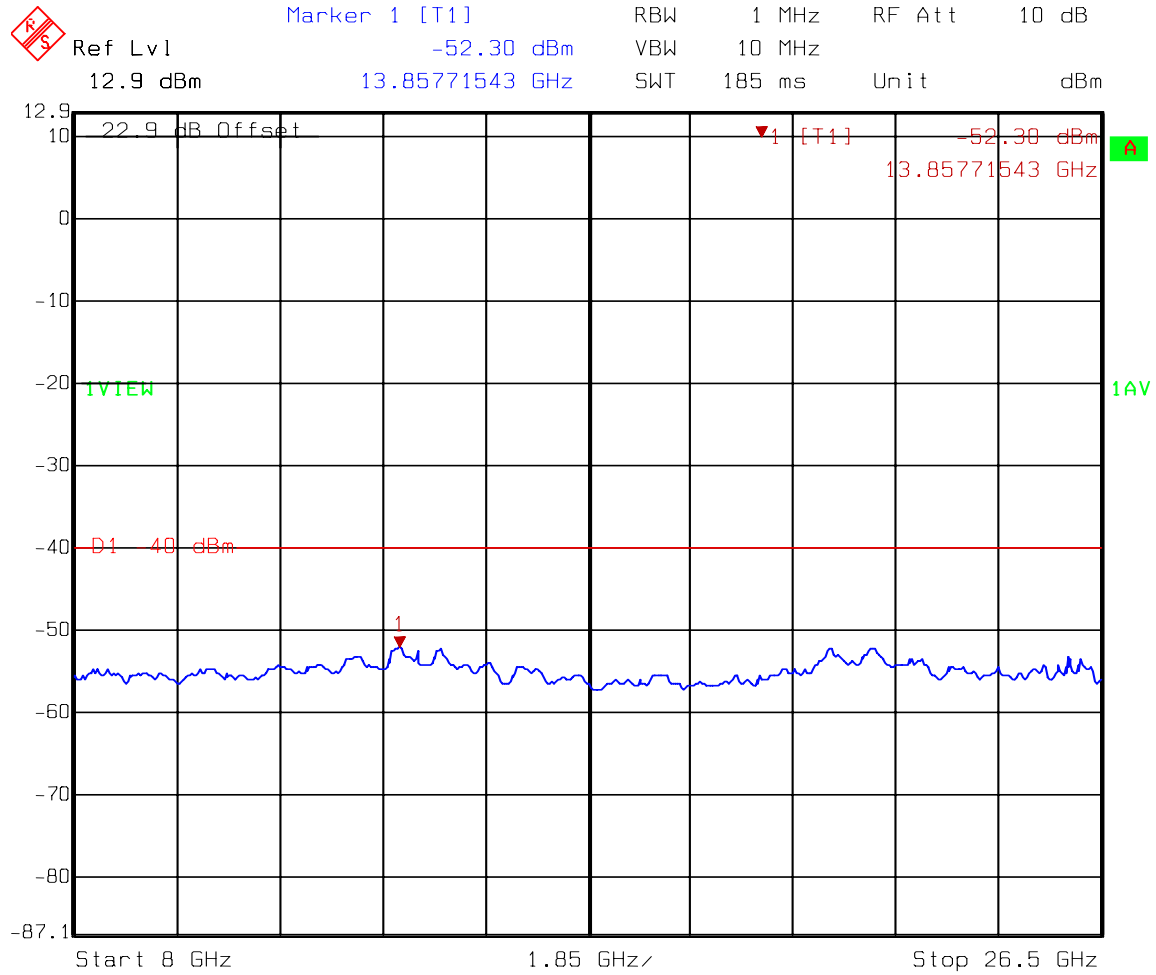
B LOW BAND 2 of 3

 Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl -50.41 dBm VBW 10 MHz
12.9 dBm 4.62525050 GHz SWT 40 ms Unit dBm



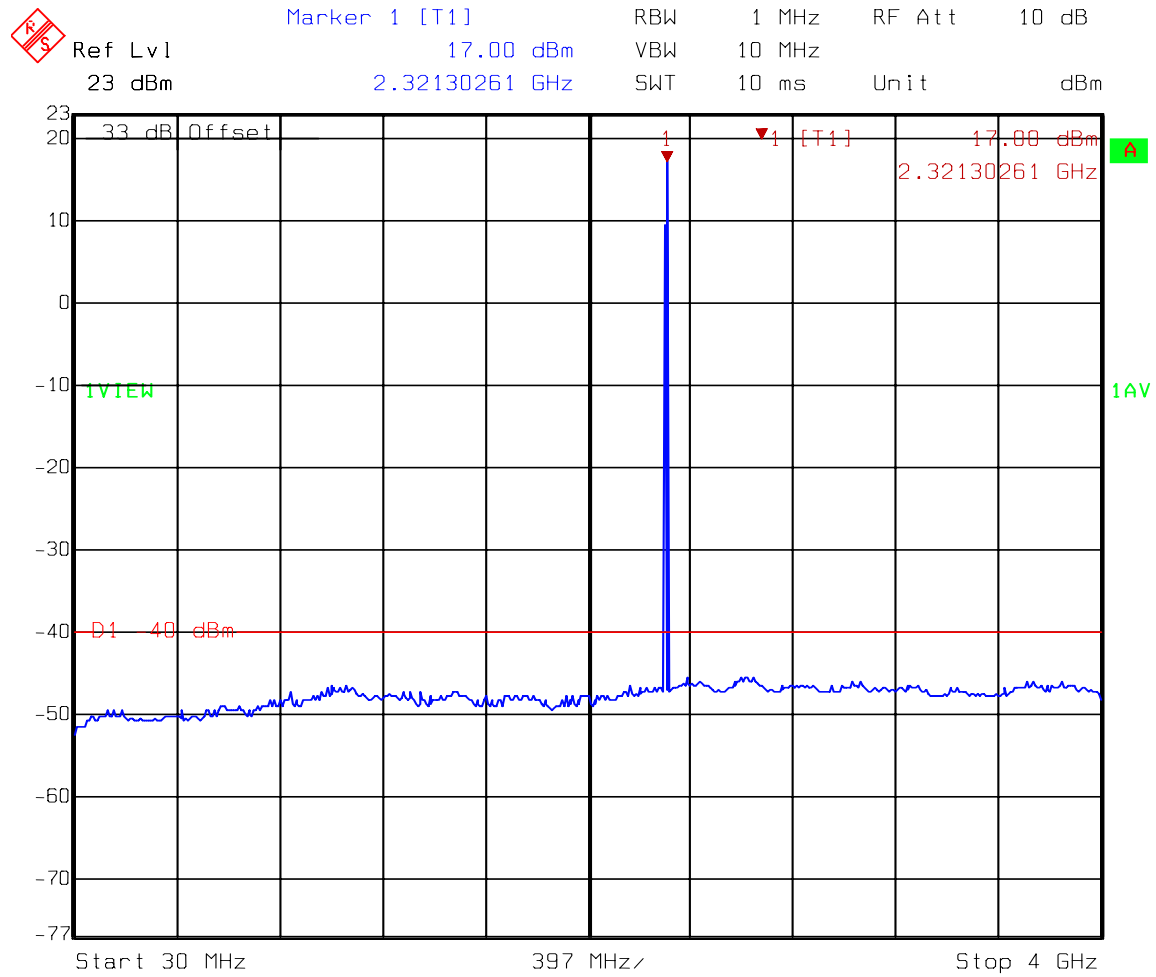
Date: 26.AUG.2005 13:13:24

B LOW BAND 3 of 3



Date: 26.AUG.2005 13:12:15

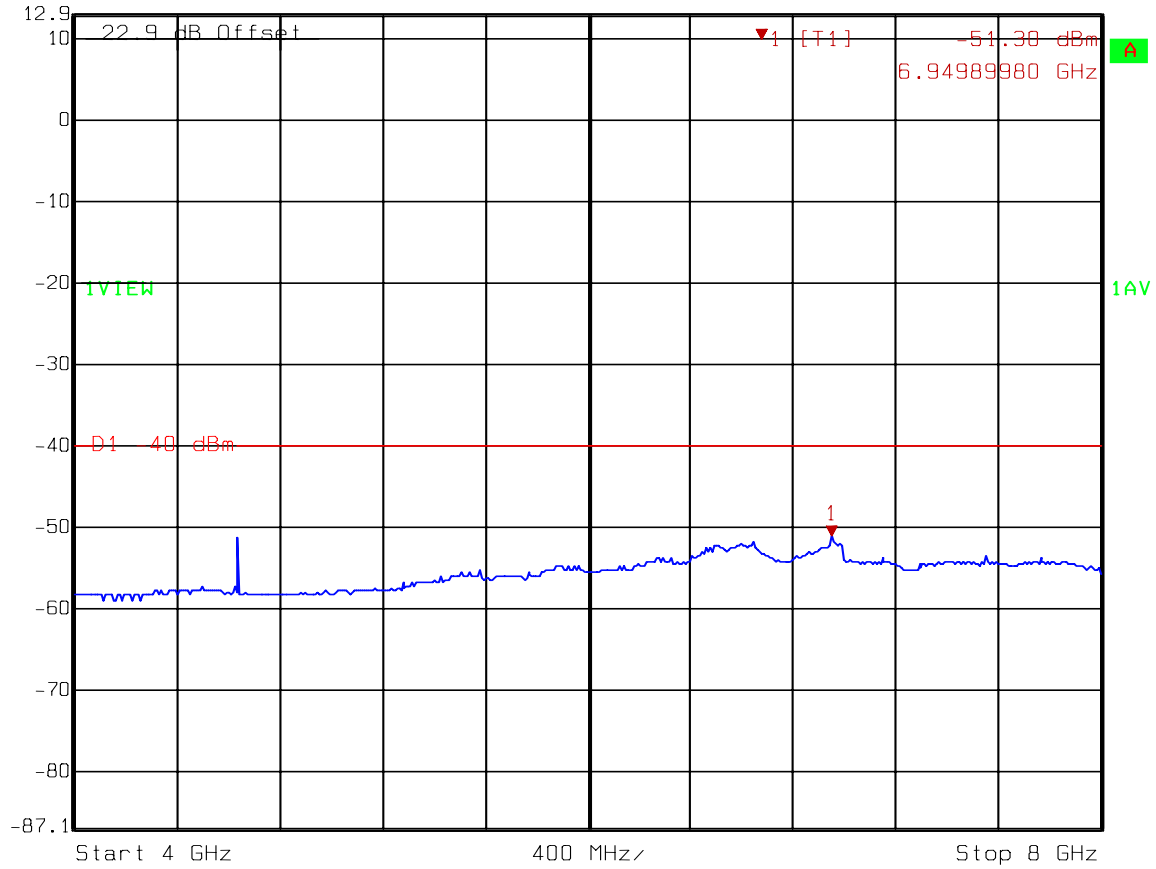
C BAND 1 of 3



Date: 26.AUG.2005 12:59:17

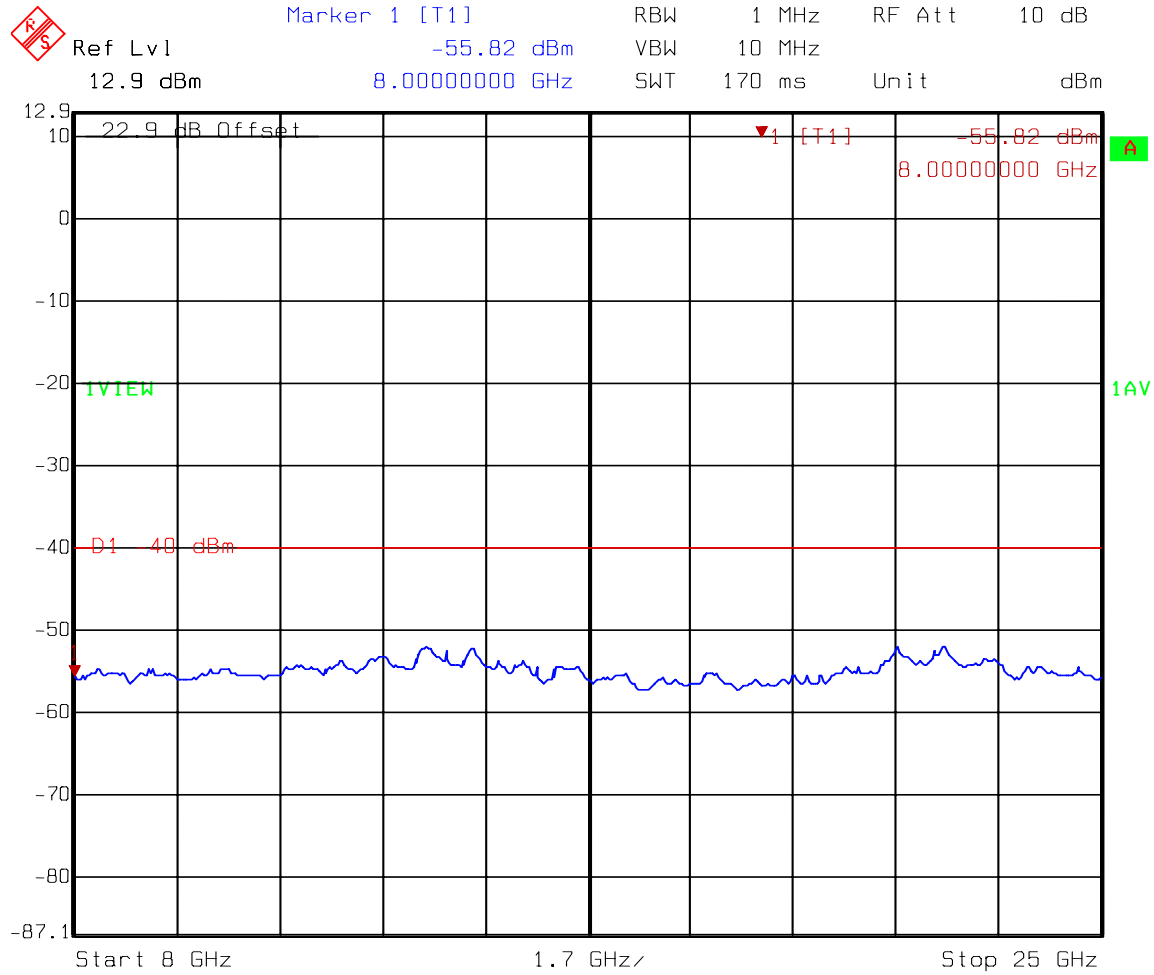
C BAND 2 of 3

 Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl -51.30 dBm VBW 10 MHz
12.9 dBm 6.94989980 GHz SWT 40 ms Unit dBm



Date: 26.AUG.2005 12:56:14

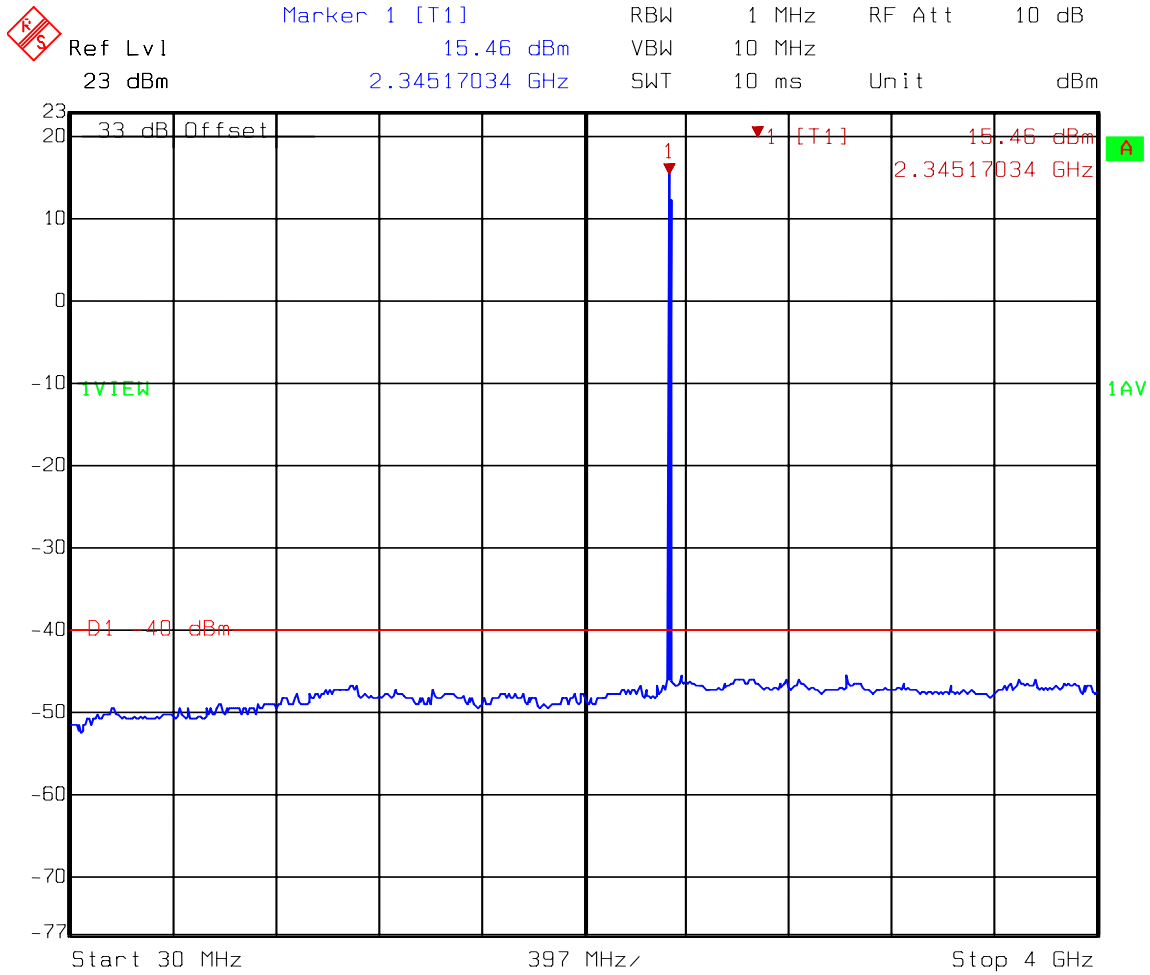
C BAND 3 of 3



Date: 26.AUG.2005 12:57:09

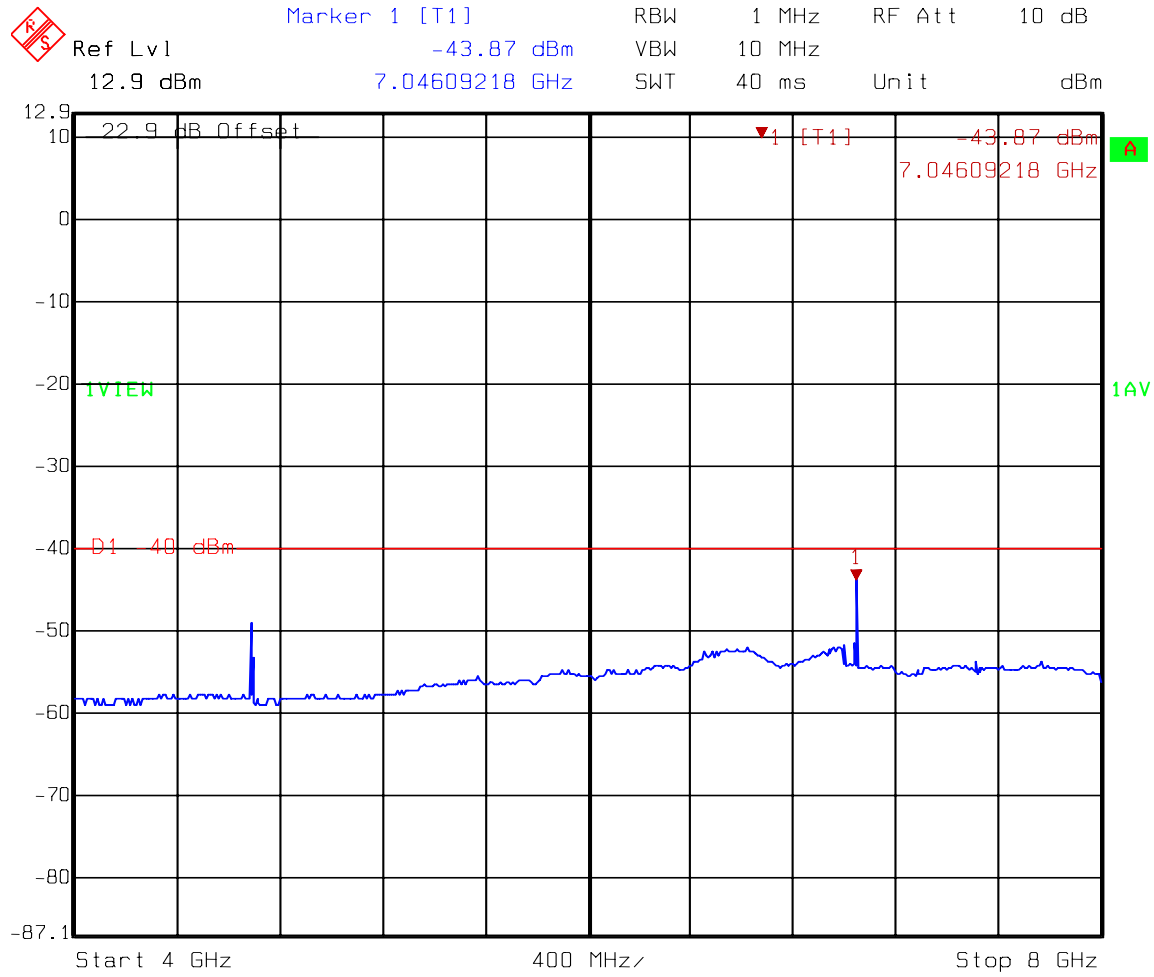
]

D BAND 1 of 3



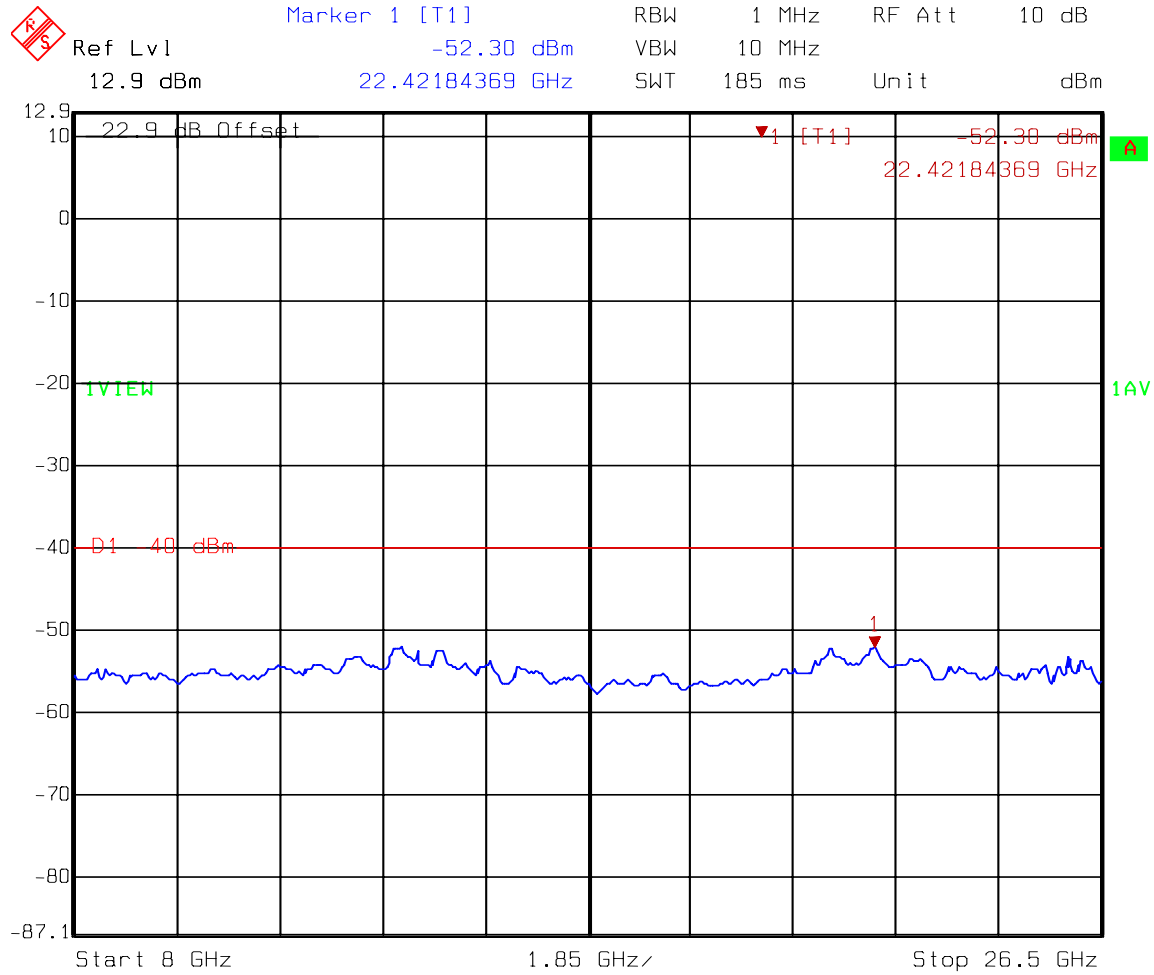
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D BAND 2 of 3



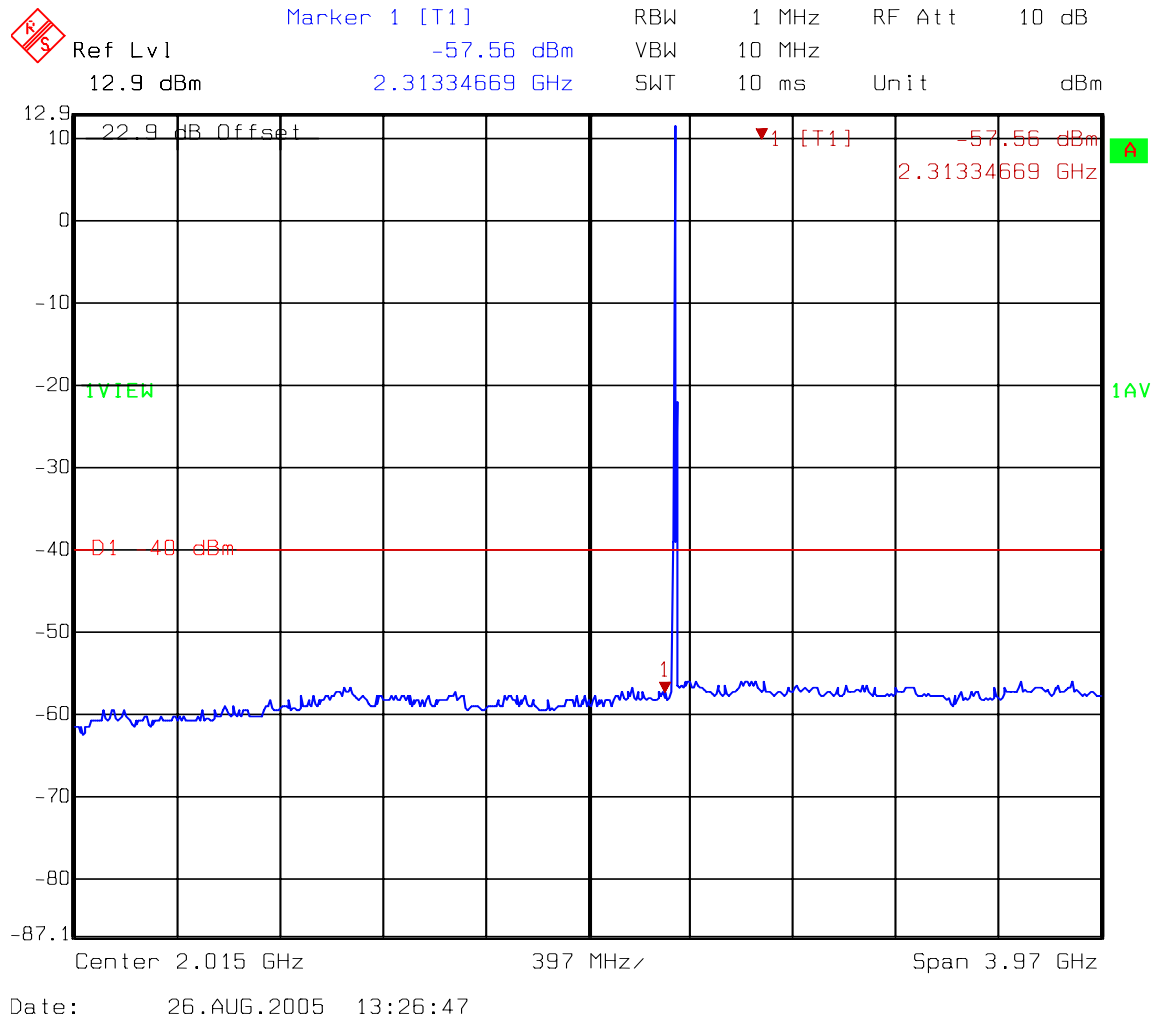
Date: 26.AUG.2005 13:08:48

D BAND 3 of 3

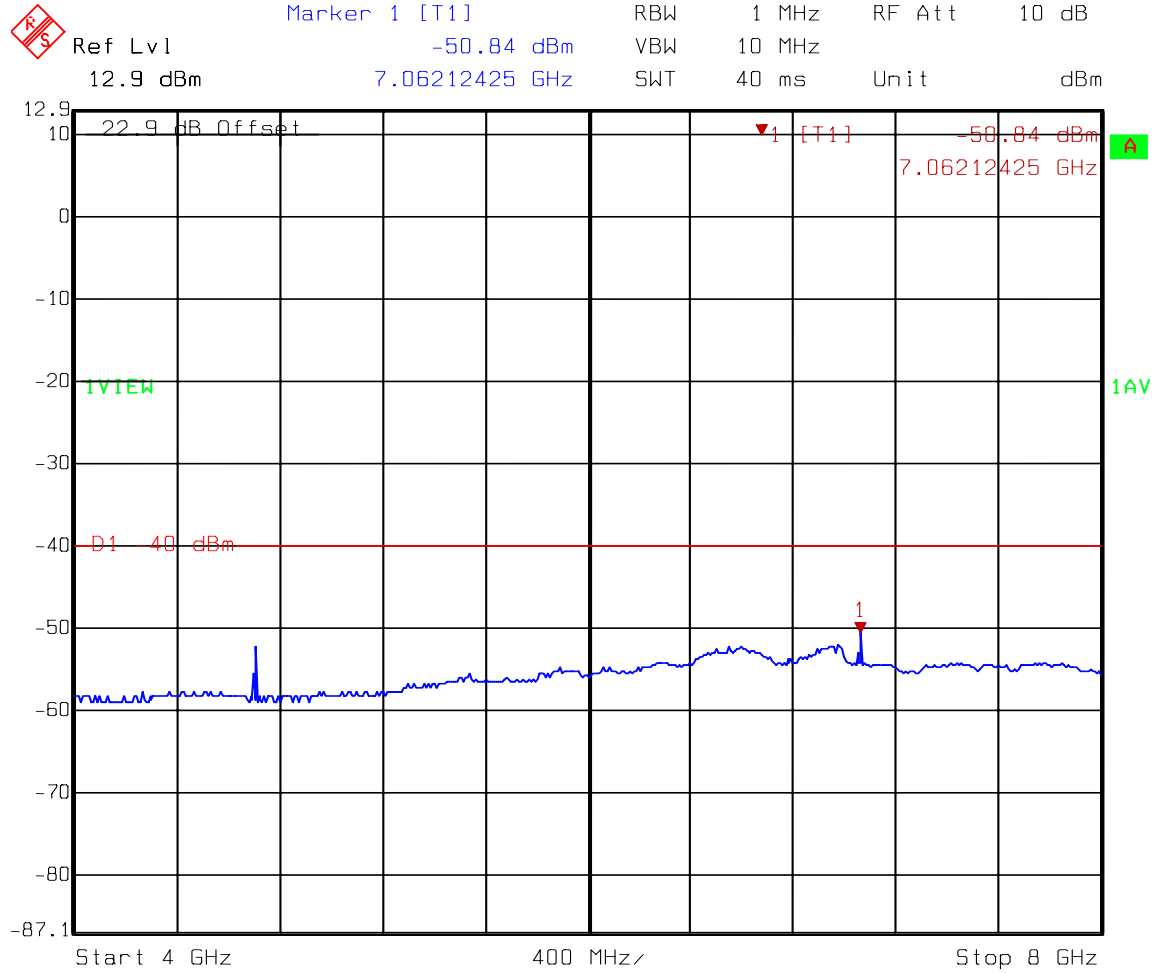


Date: 26.AUG.2005 13:09:33

A HIGH BAND 1 of 3

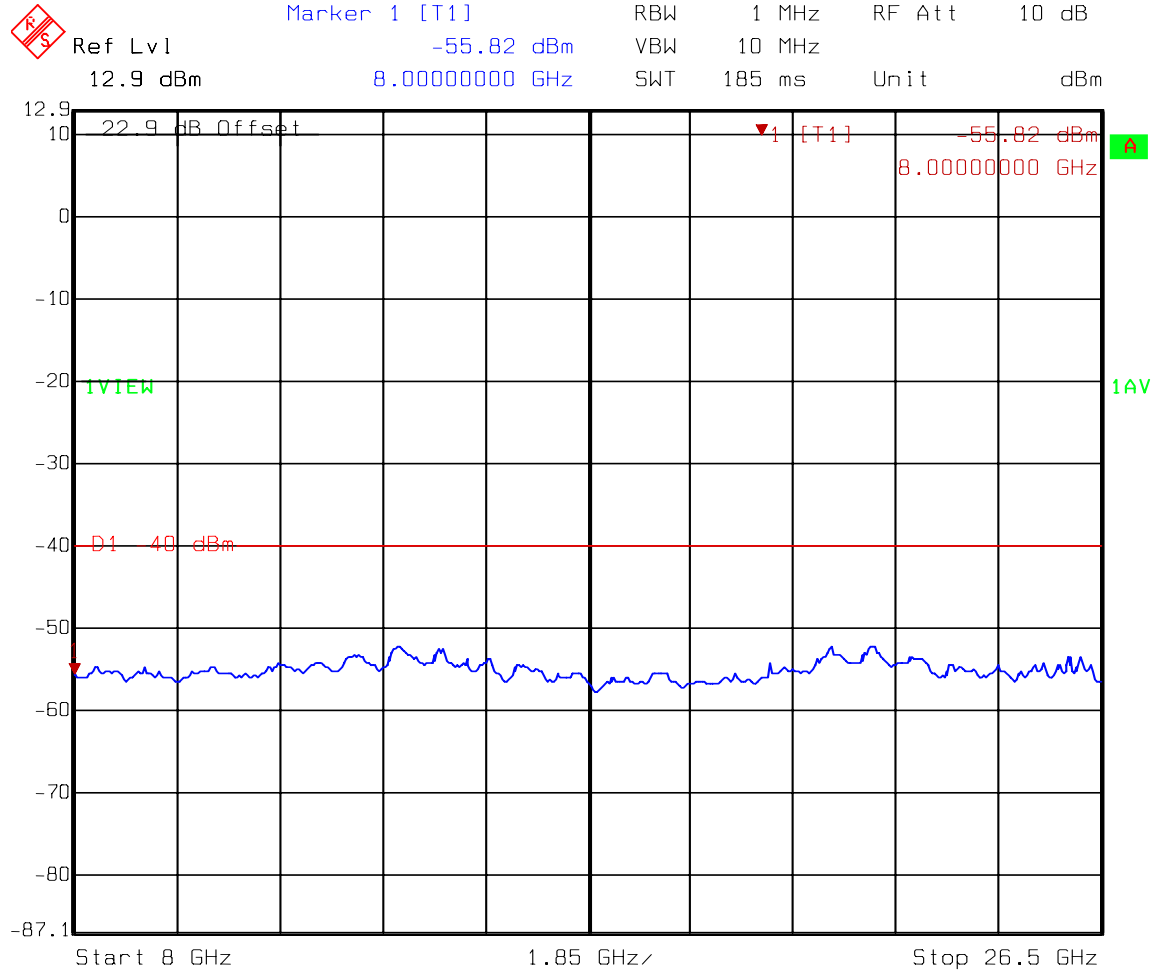


A HIGH BAND 2 of 3



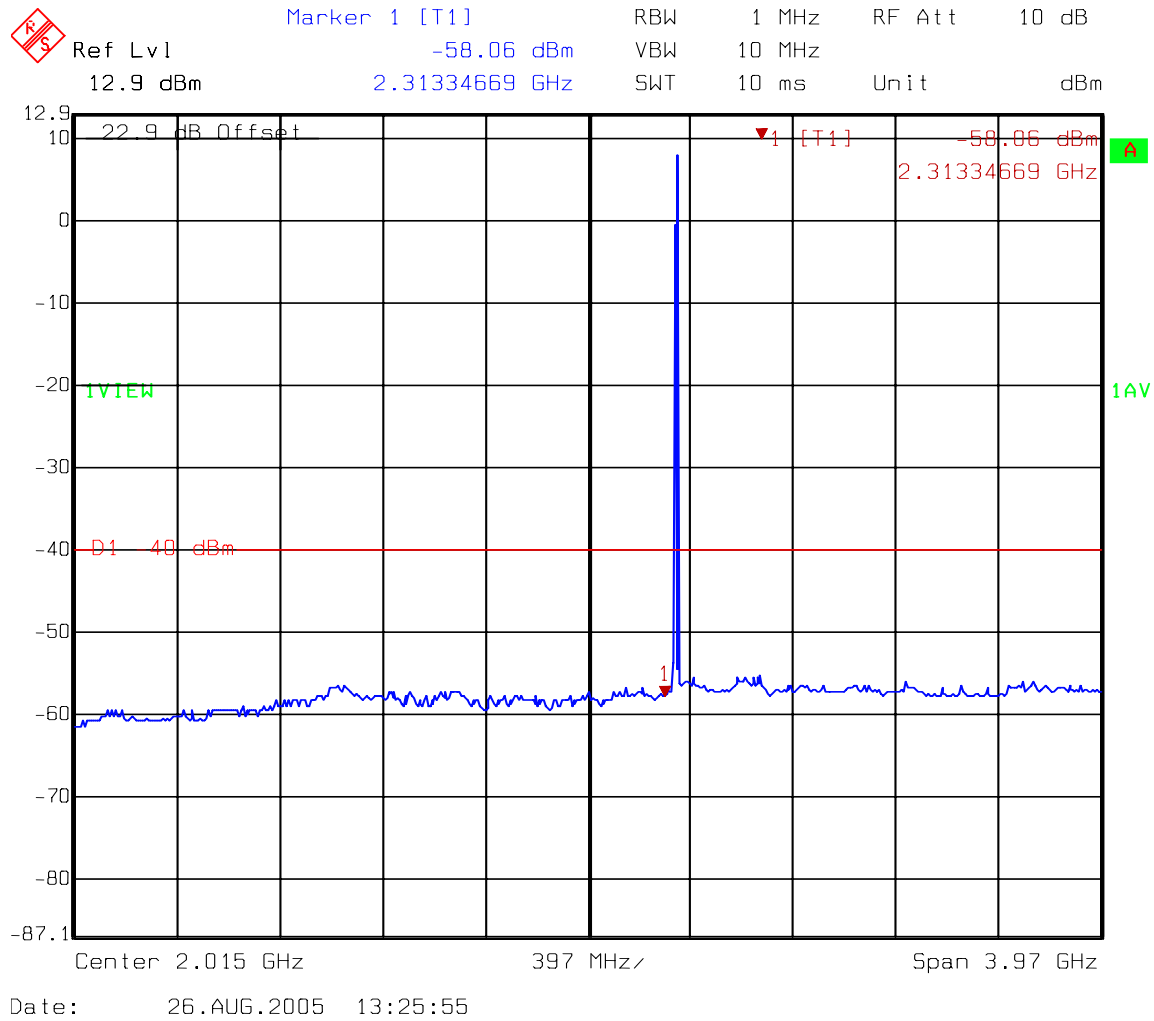
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A HIGH BAND 3 of 3

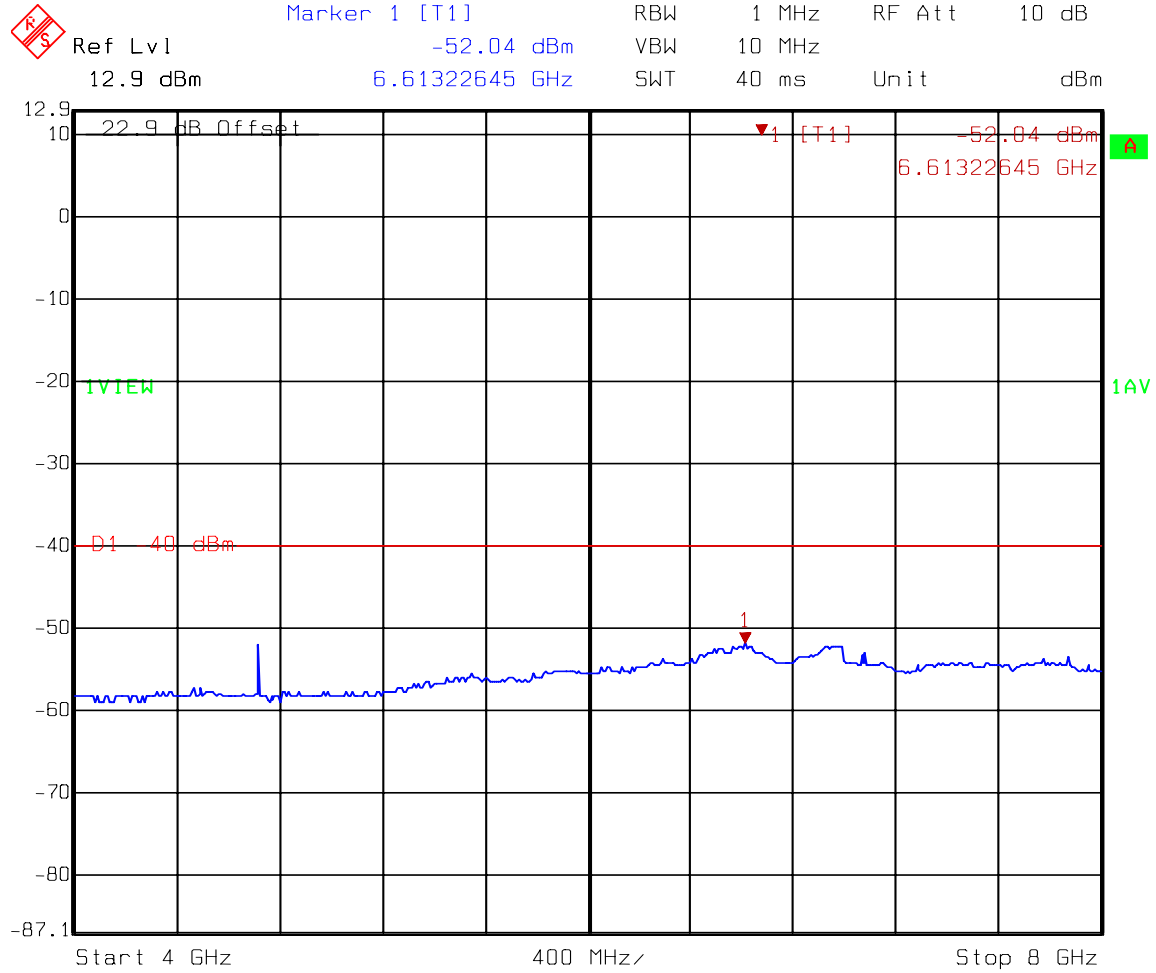


Date: 26.AUG.2005 13:30:06

B HIGH BAND 1 of 3



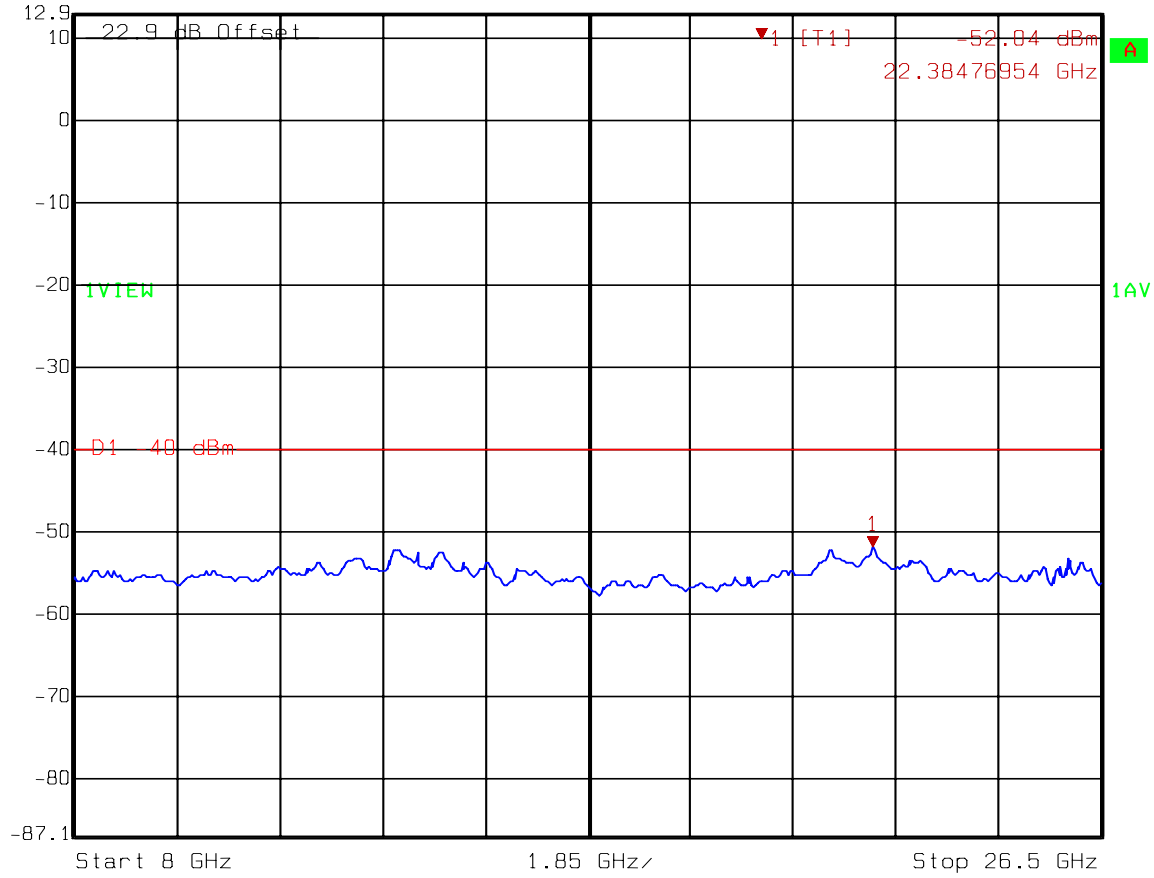
B HIGH BAND 2 of 3



Date: 26.AUG.2005 13:31:36

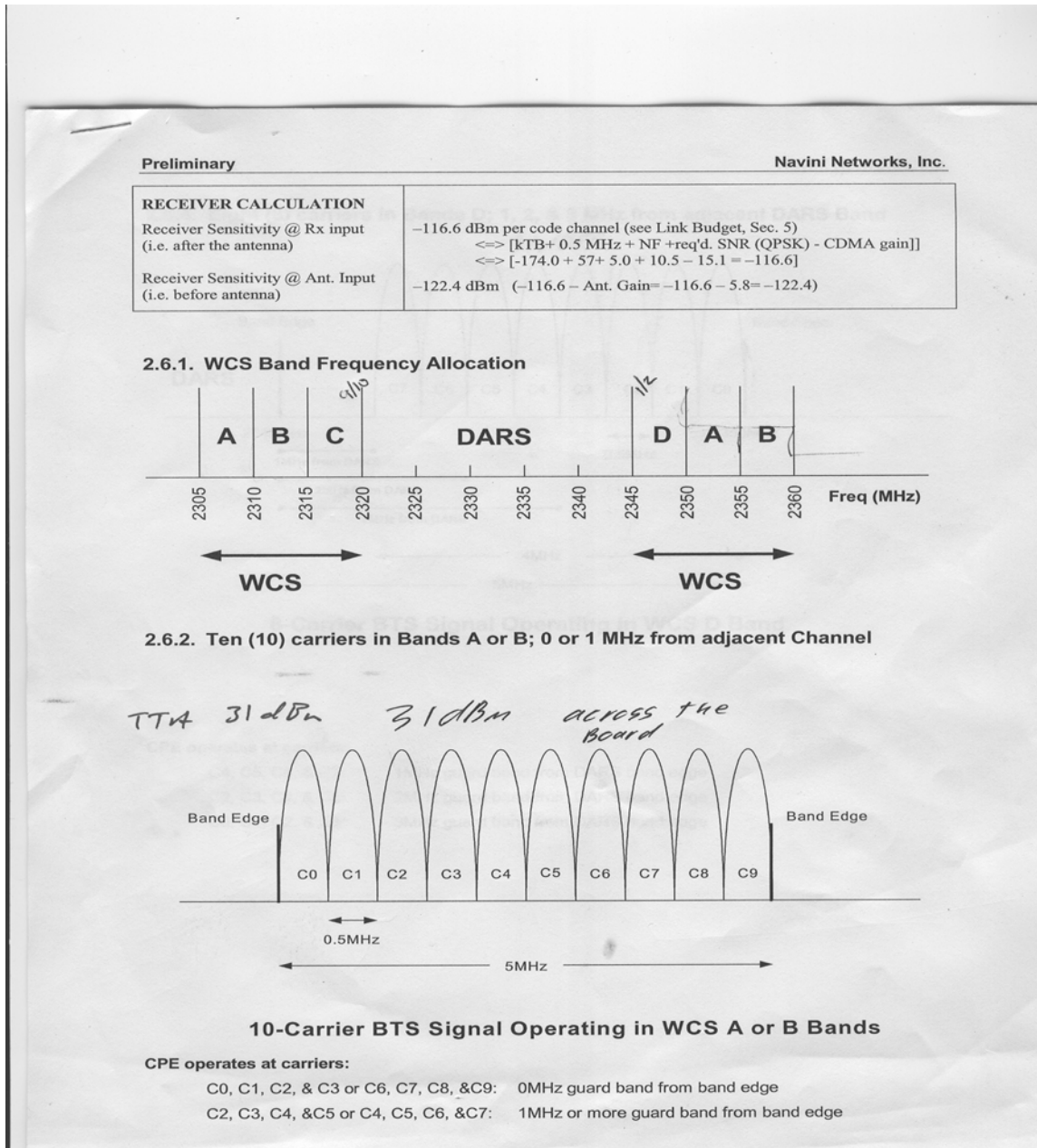
B HIGH BAND 3 of 3

 Ref Lvl 12.9 dBm Marker 1 [T1] 22.38476954 GHz RBW 1 MHz RF Att 10 dB
-52.04 dBm VBW 10 MHz Unit dBm
SWT 185 ms



Date: 26.AUG.2005 13:30:54

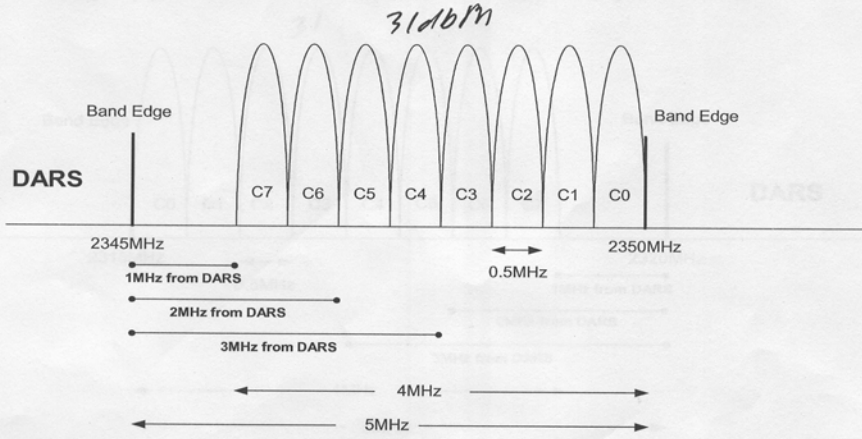
Test Data – Spurious Emissions at Antenna Terminals - Emissions Mask



Preliminary

Navini Networks, Inc.

2.6.4. Eight (8) carriers in Bands D; 1, 2, & 3 MHz from adjacent DARS Band



8-Carrier BTS Signal Operating in WCS D Band

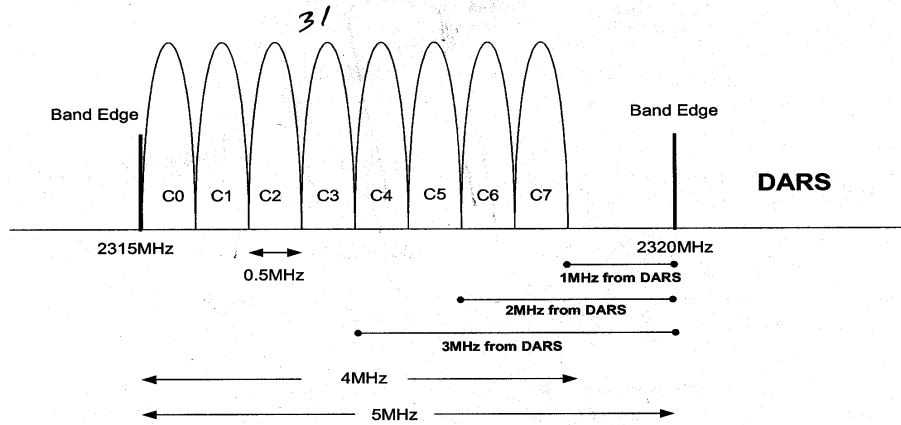
CPE operates at carriers:

- C4, C5, C6, & C7: 1MHz guard band from DARS band edge
- C2, C3, C4, & C5: 2MHz guard band from DARS band edge
- C0, C1, C2, & C3: 3MHz guard band from DARS band edge

Preliminary

Navini Networks, Inc.

2.6.3. Eight (8) carriers in Bands C; 1, 2, & 3 MHz from adjacent DARS Band

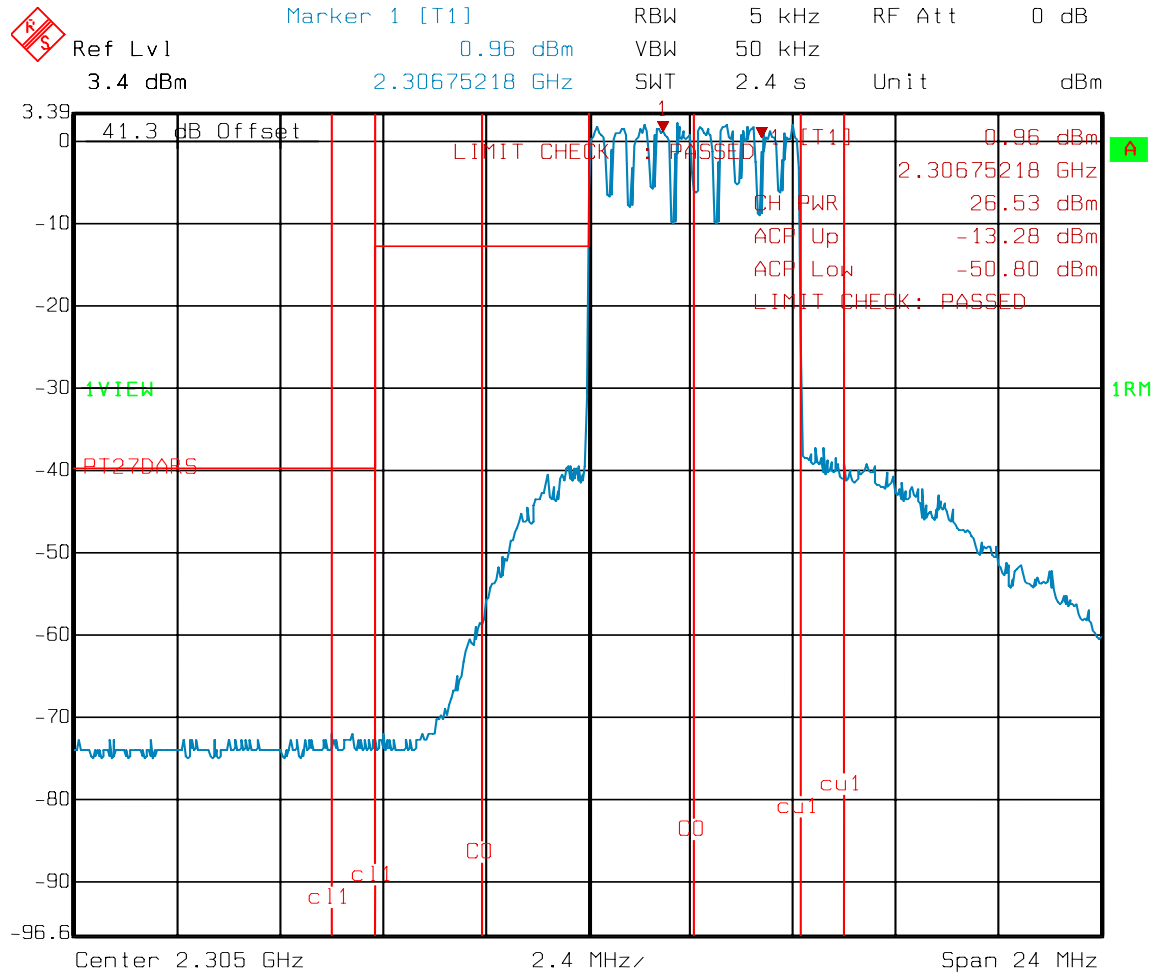


8-Carrier BTS Signal Operating in WCS C Band

CPE operates at carriers:

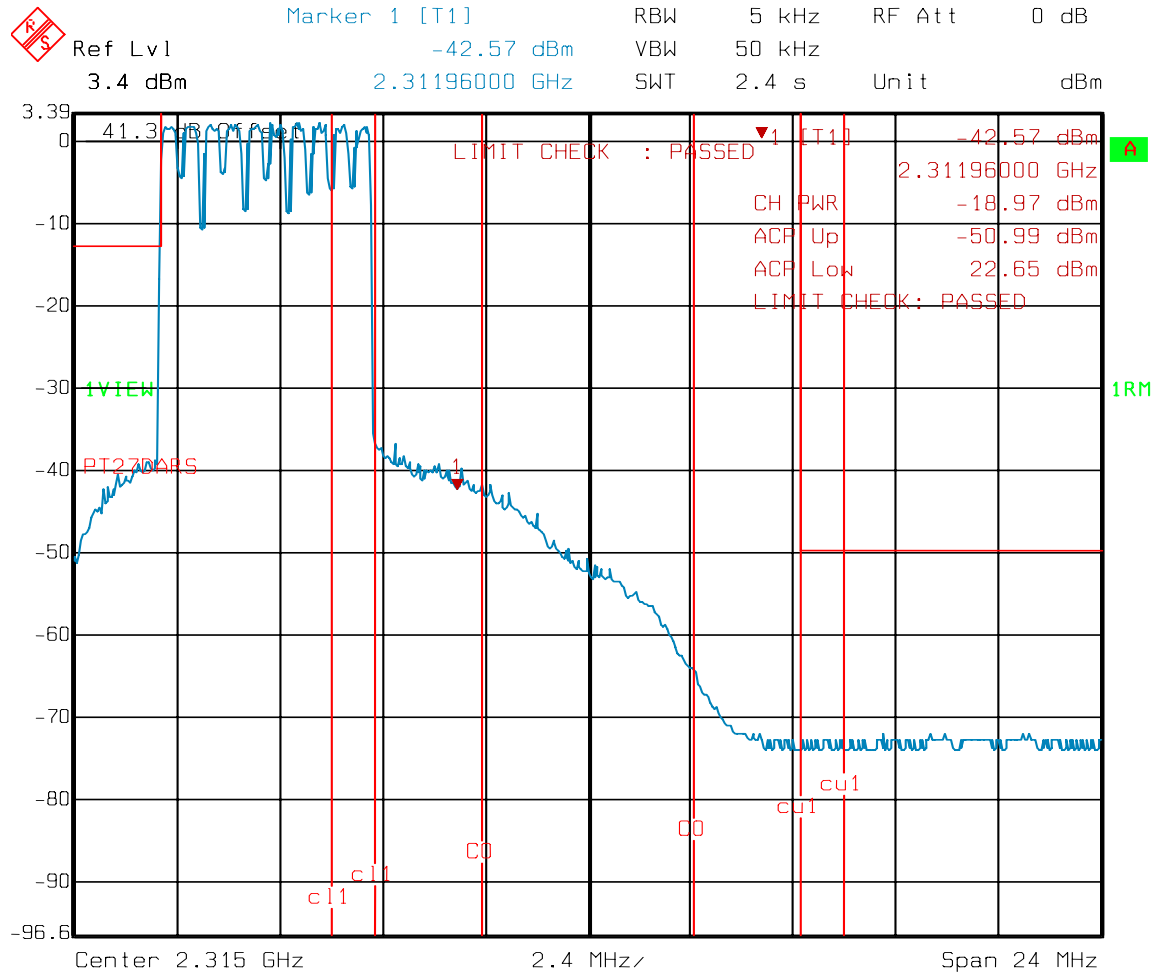
- C4, C5, C6, & C7: 1MHz guard band from DARS band edge
- C2, C3, C4, & C5: 2MHz guard band from DARS band edge
- C0, C1, C2, & C3: 3MHz guard band from DARS band edge

A LOW BAND BAND EDGE



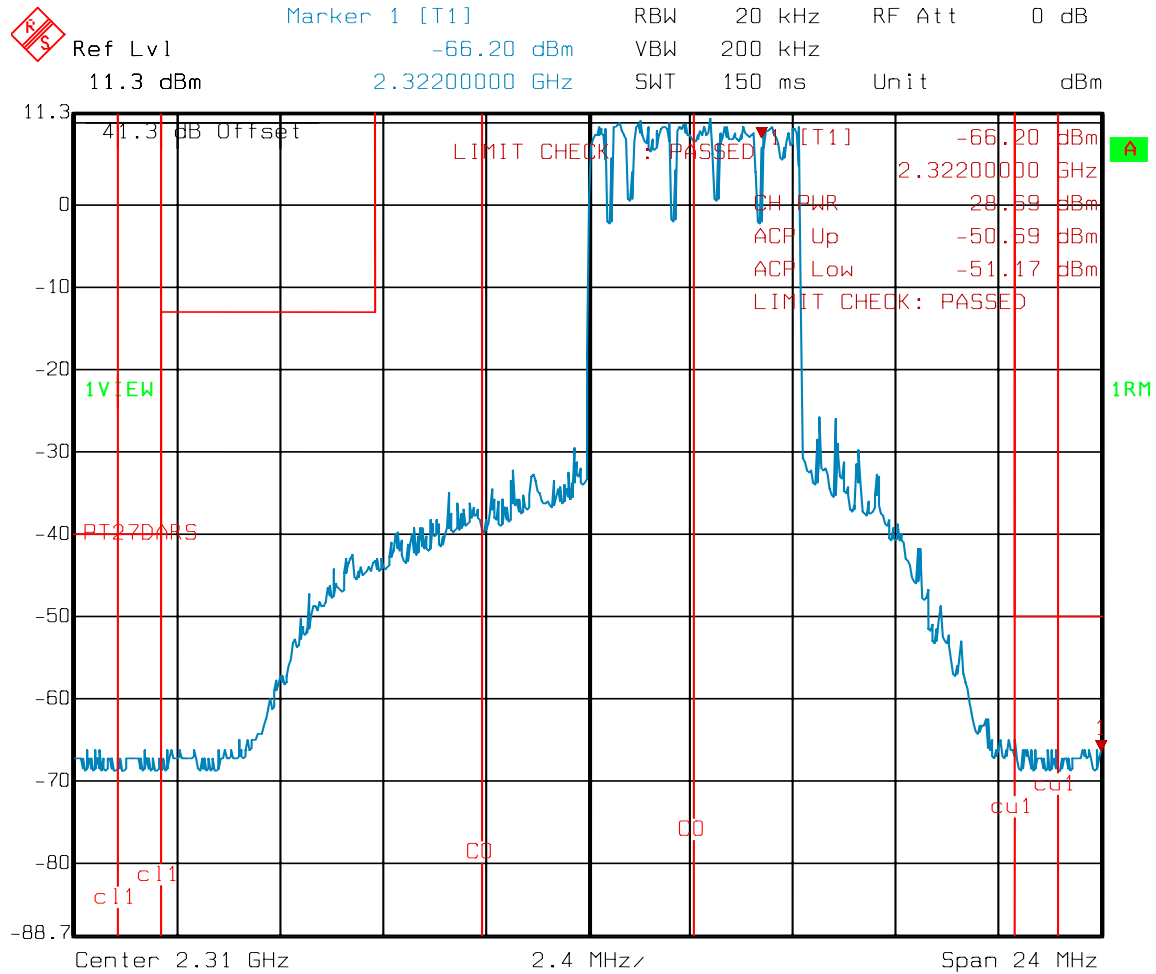
Date: 22.JUN.2005 18:05:43

A LOW BAND DARS



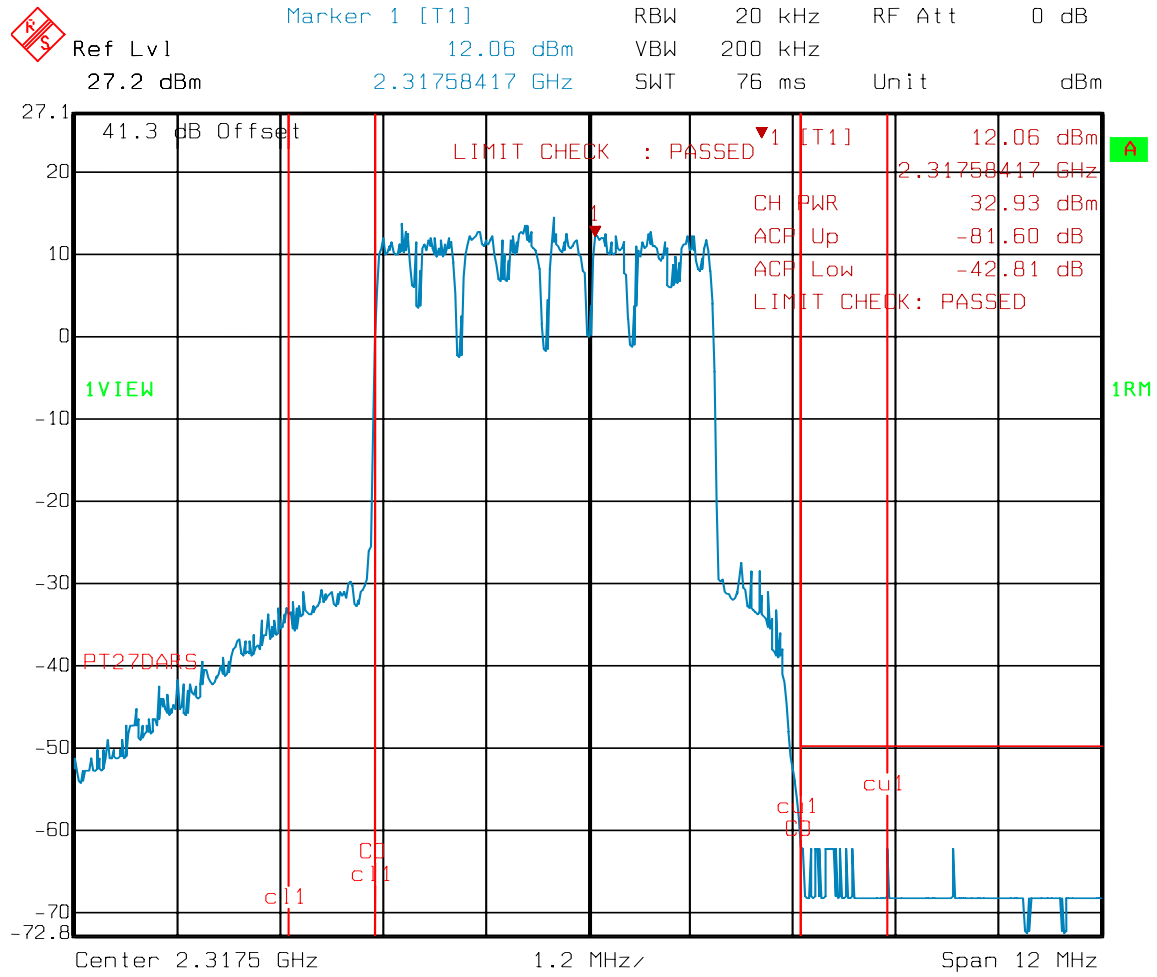
Date: 22.JUN.2005 18:08:08

B LOW BAND BAND EDGE AND DARS



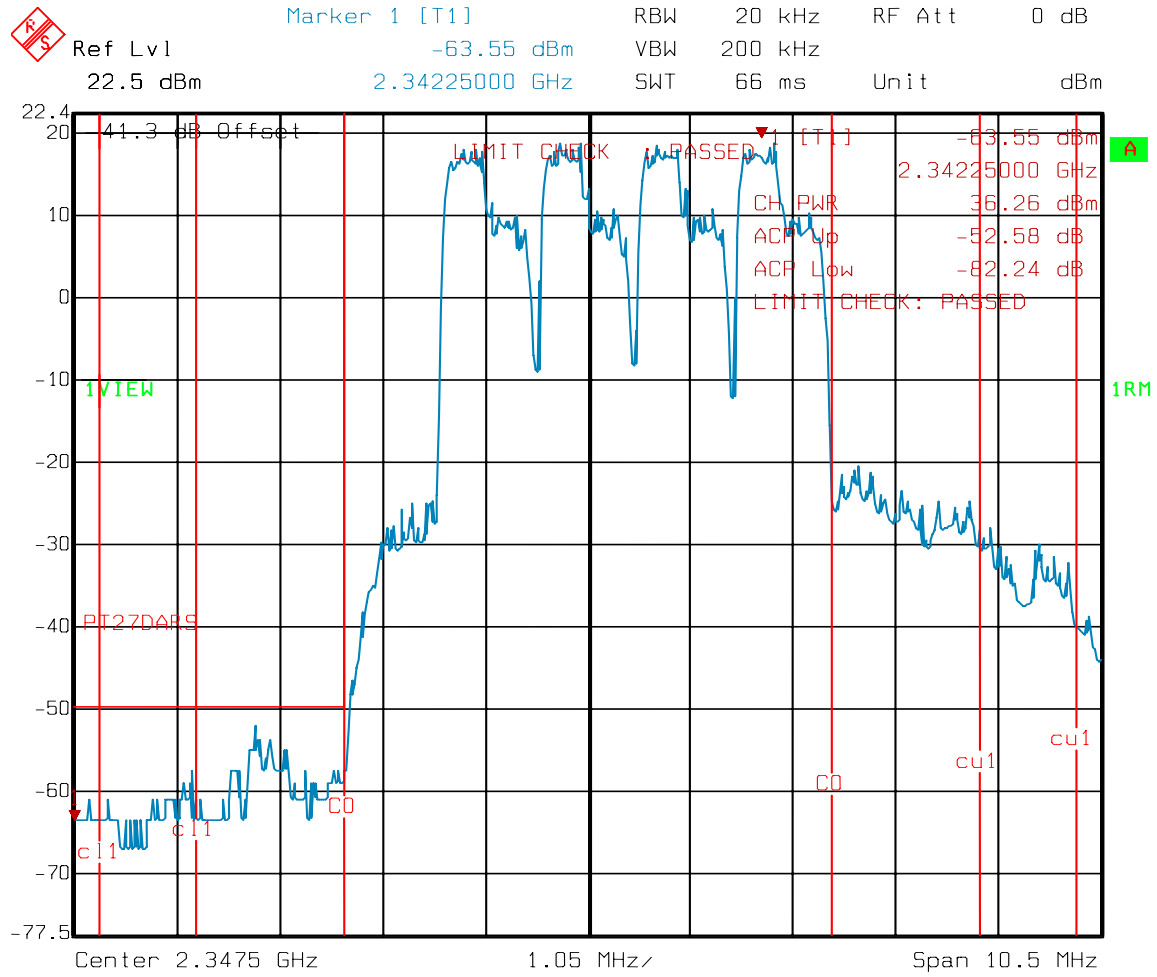
Date: 22.JUN.2005 18:12:58

C BAND DARS



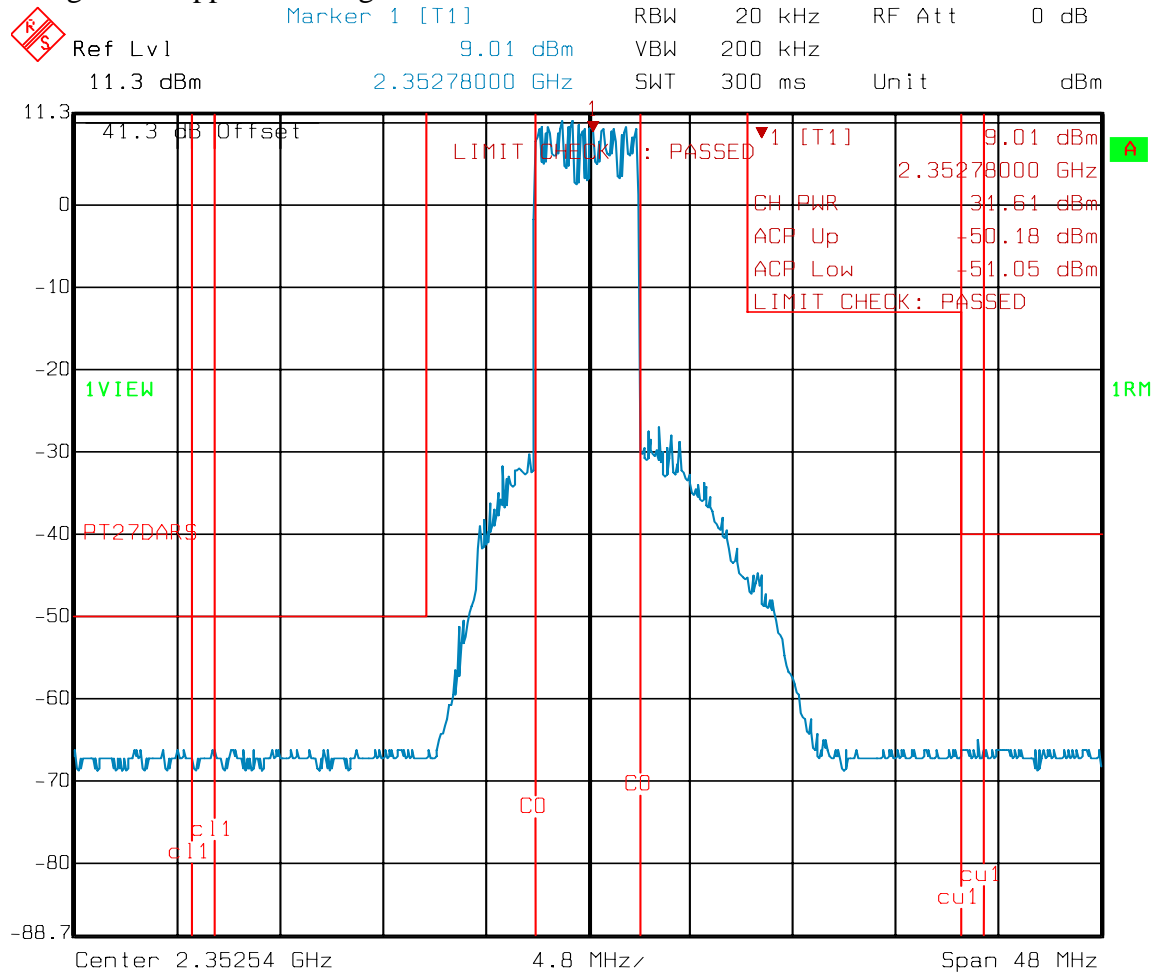
Date: 22.JUN.2005 17:40:52

D BAND DARS



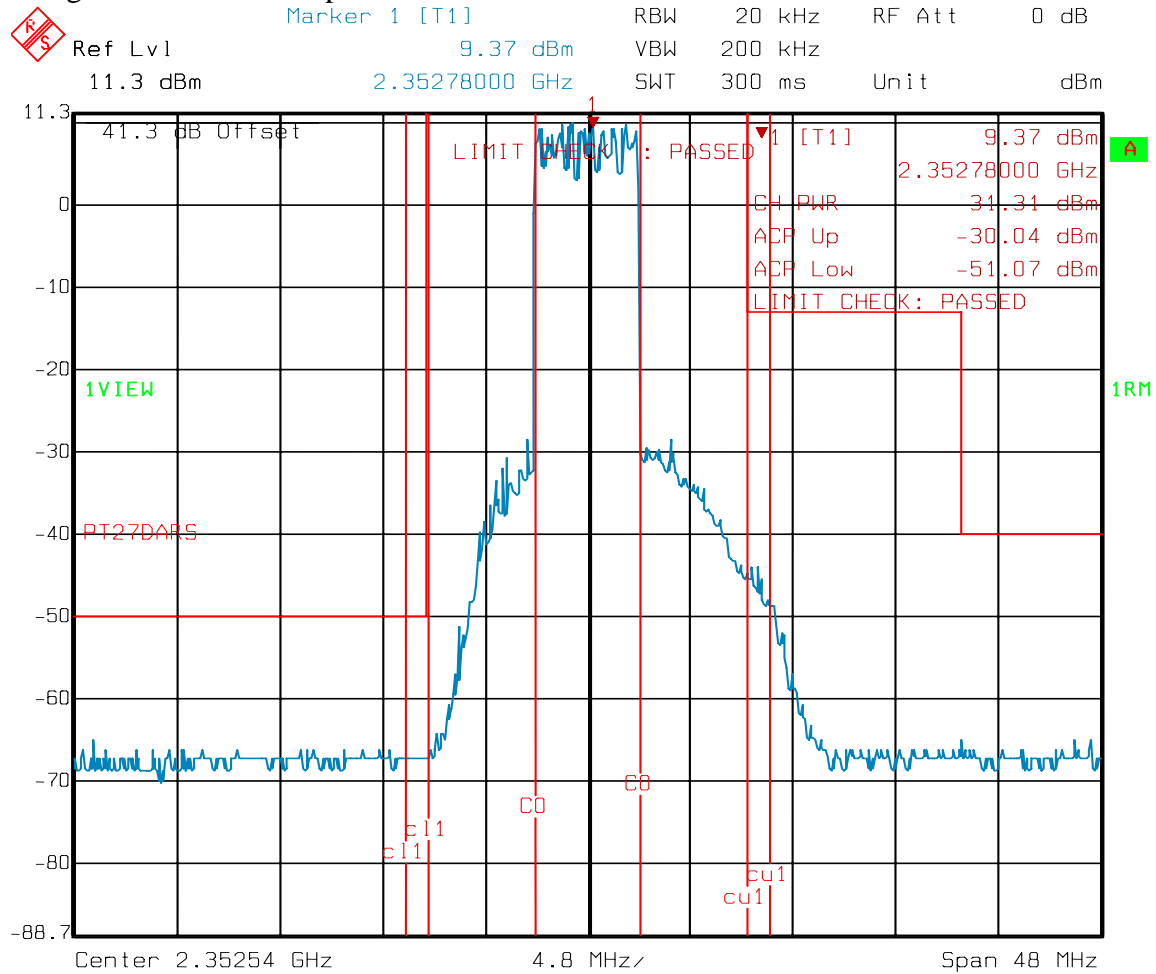
Date: 22.JUN.2005 16:59:08

A high band upper band edge



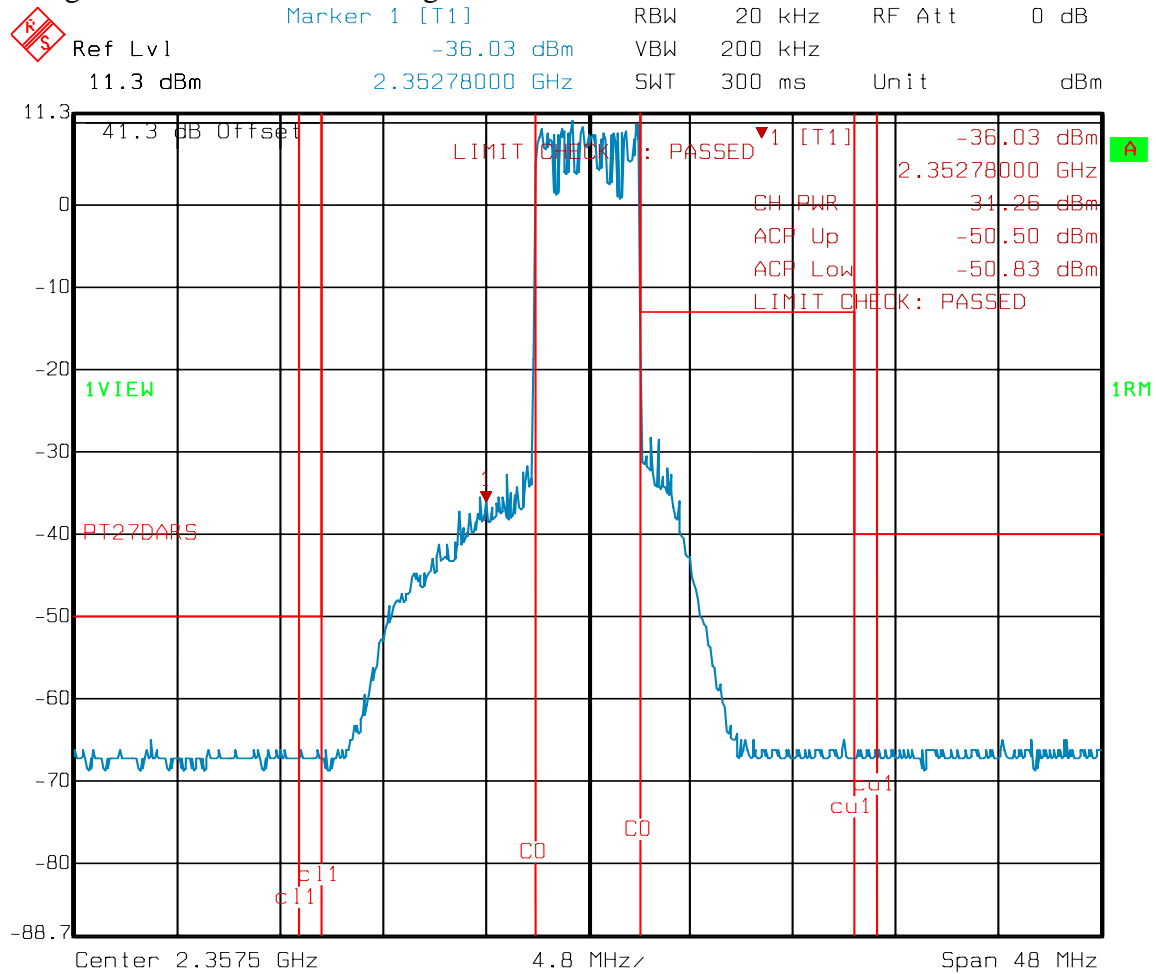
Date: 22.JUN.2005 17:50:10

A high band DARS compliance



Date: 22.JUN.2005 17:52:02

B high band DARS and band edge



Date: 22.JUN.2005 17:58:38

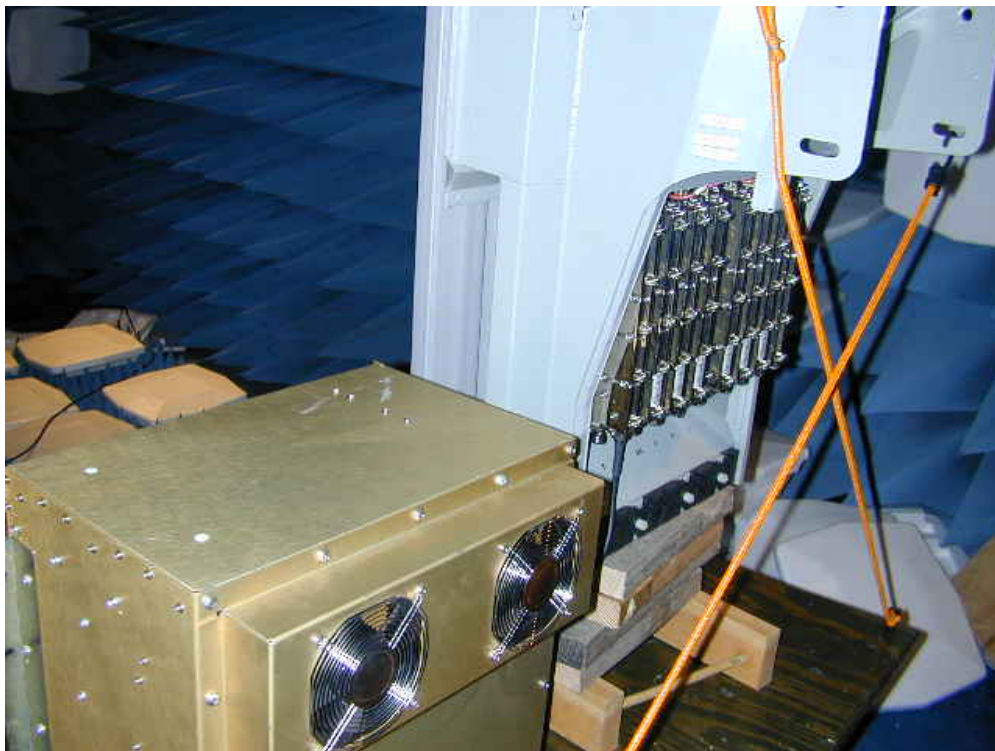
Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1053
TESTED BY: Kevin Rose	DATE: 06/27/2005

Test Results: Complies

Measurement Data: See attached table.

Photos – Radiated Emissions



Section 7. Occupied Bandwidth

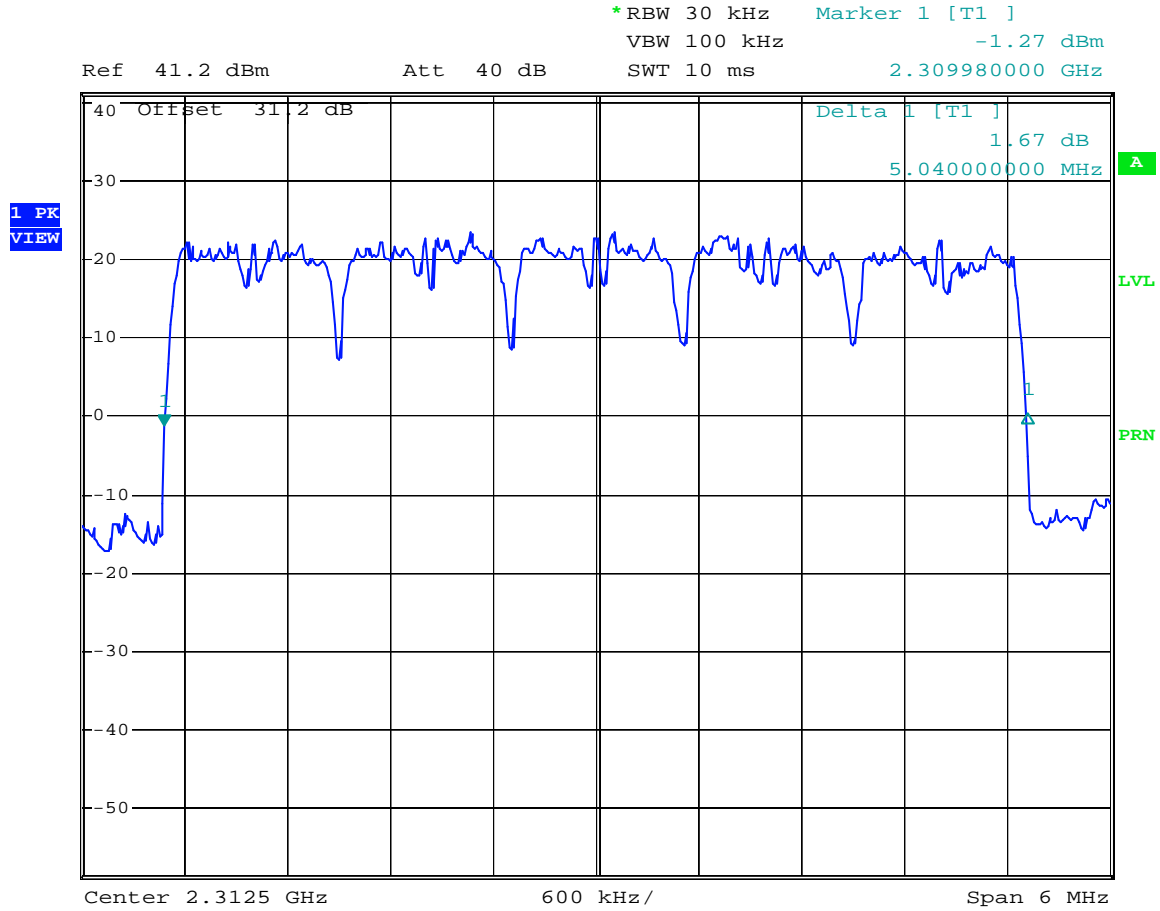
NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: Kevin Rose	DATE: 08/09/2005

Test Results: Complies

Measurement Data: See attached plots.

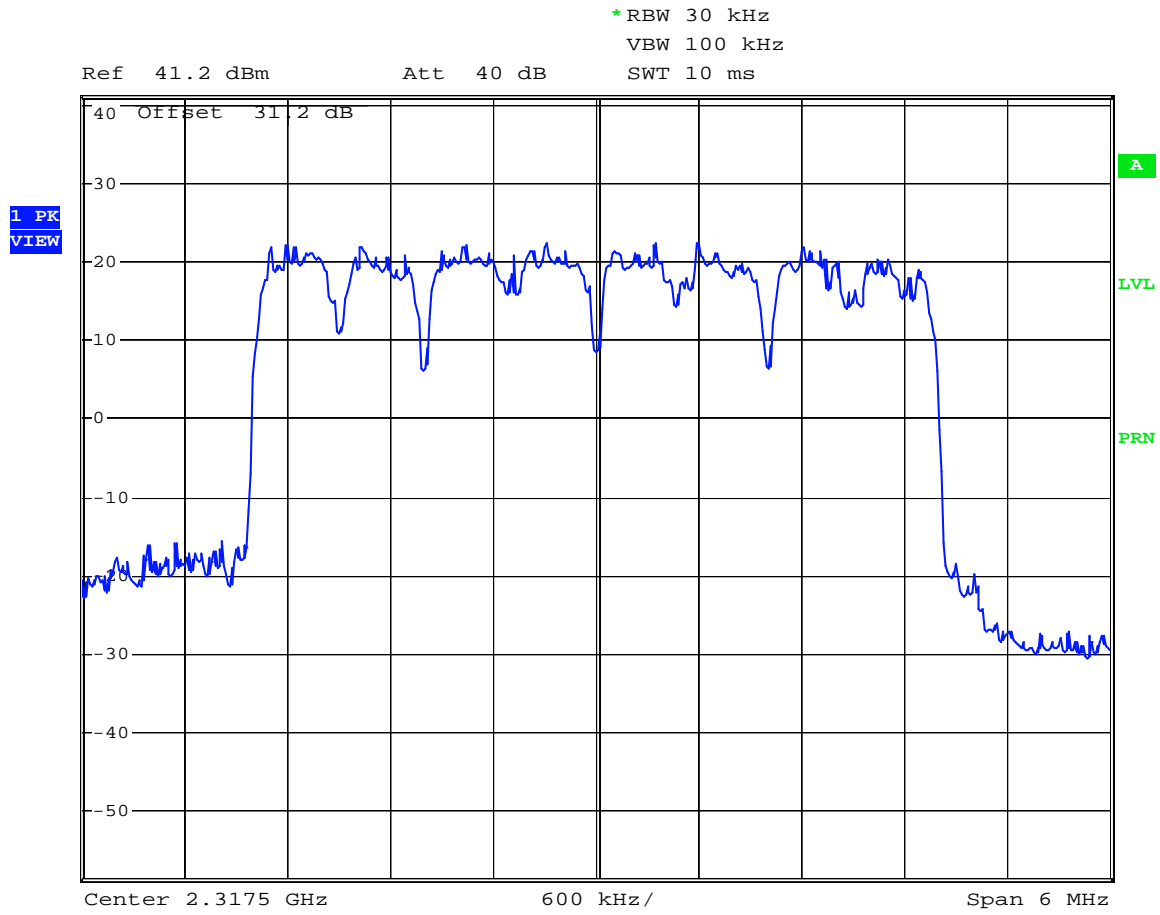
Test Equipment Used: 1036-1469-1474-1081

OBW B LOW BAND



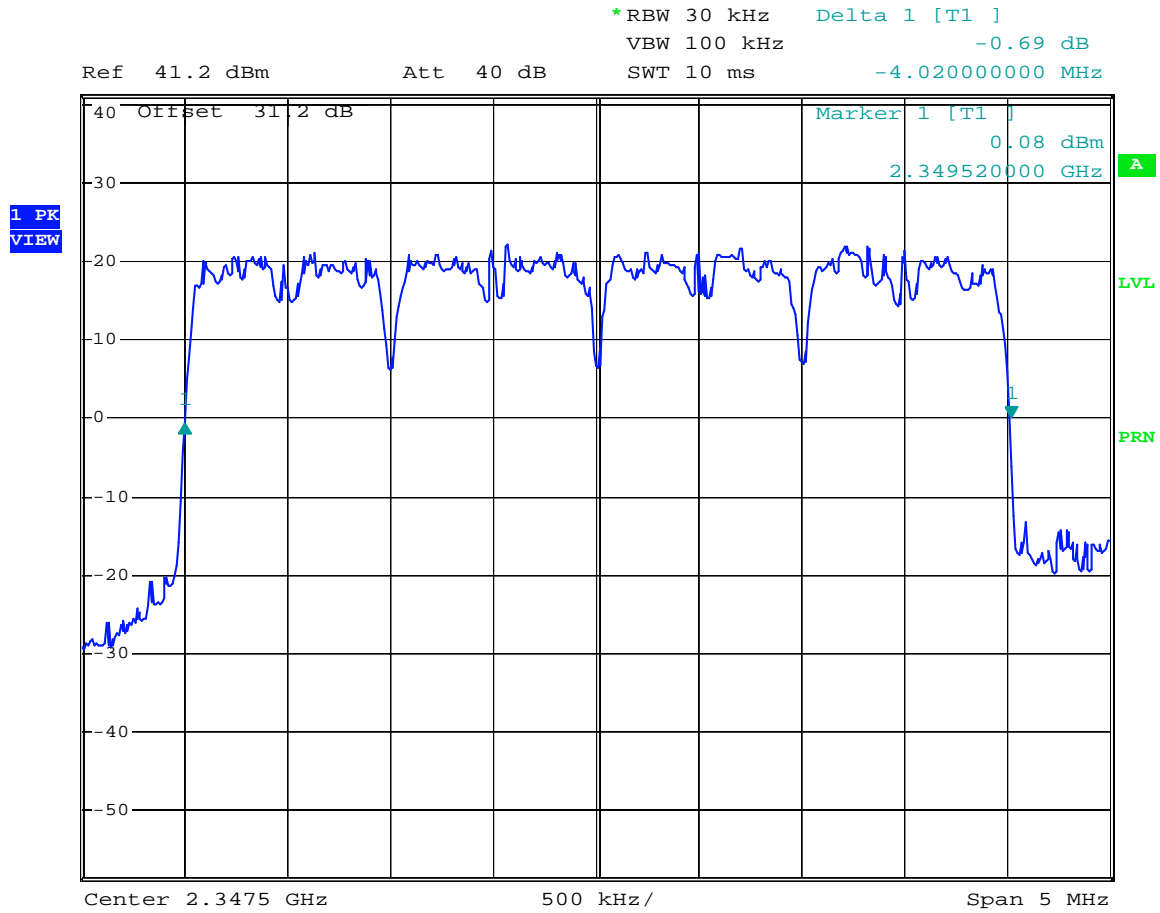
Comment: Quasi Peak
Date: 9.AUG.2005 13:20:38

OBW C BAND



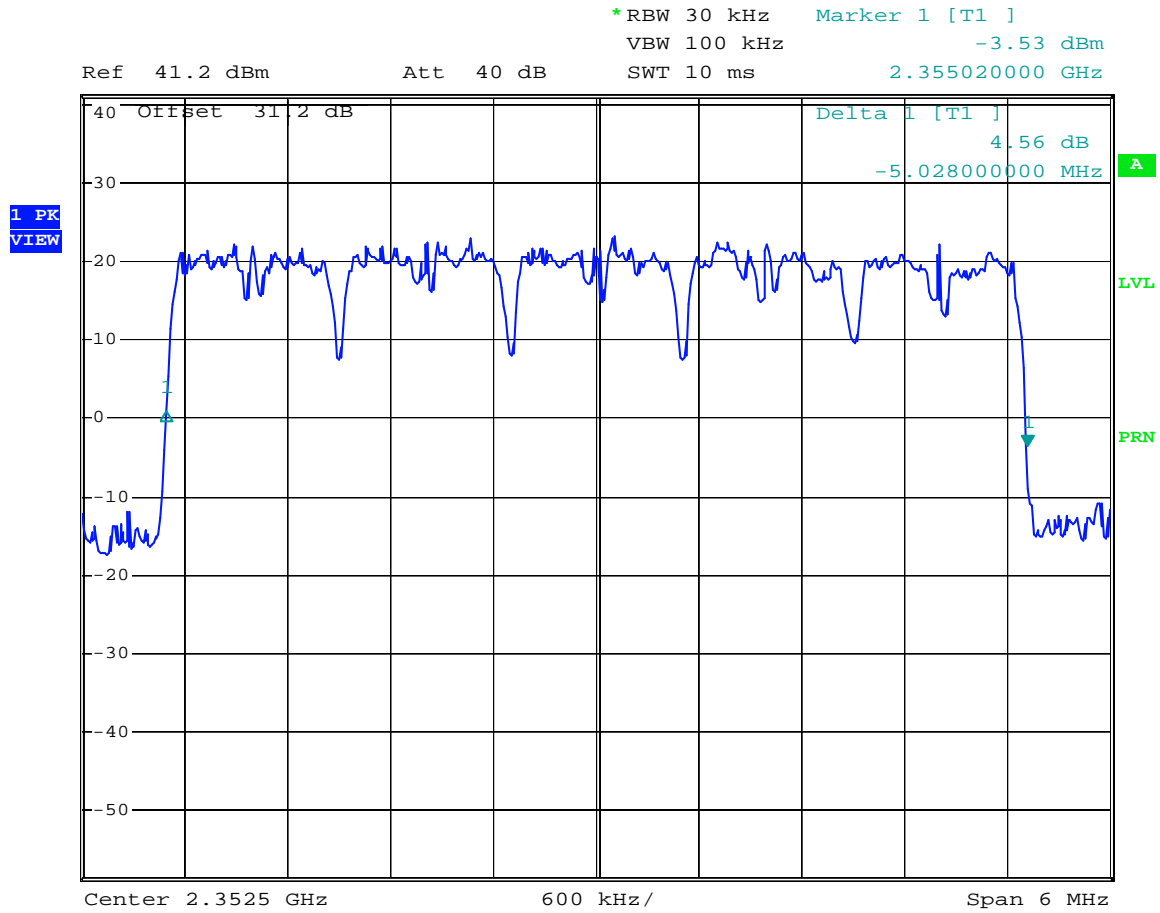
Comment: Quasi Peak
Date: 9.AUG.2005 13:24:46

OBW D BAND



Comment: Quasi Peak
Date: 9.AUG.2005 13:14:47

OBW A HIGH BAND



Comment: Quasi Peak
Date: 9.AUG.2005 13:17:50

Section 8. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
TESTED BY: Kevin Rose	DATE: 6/27/2005

Test Results: Complies

Measurement Data: See attached plots.

Test Equipment Used: 1036-1469-1474-1081-1625-283-619

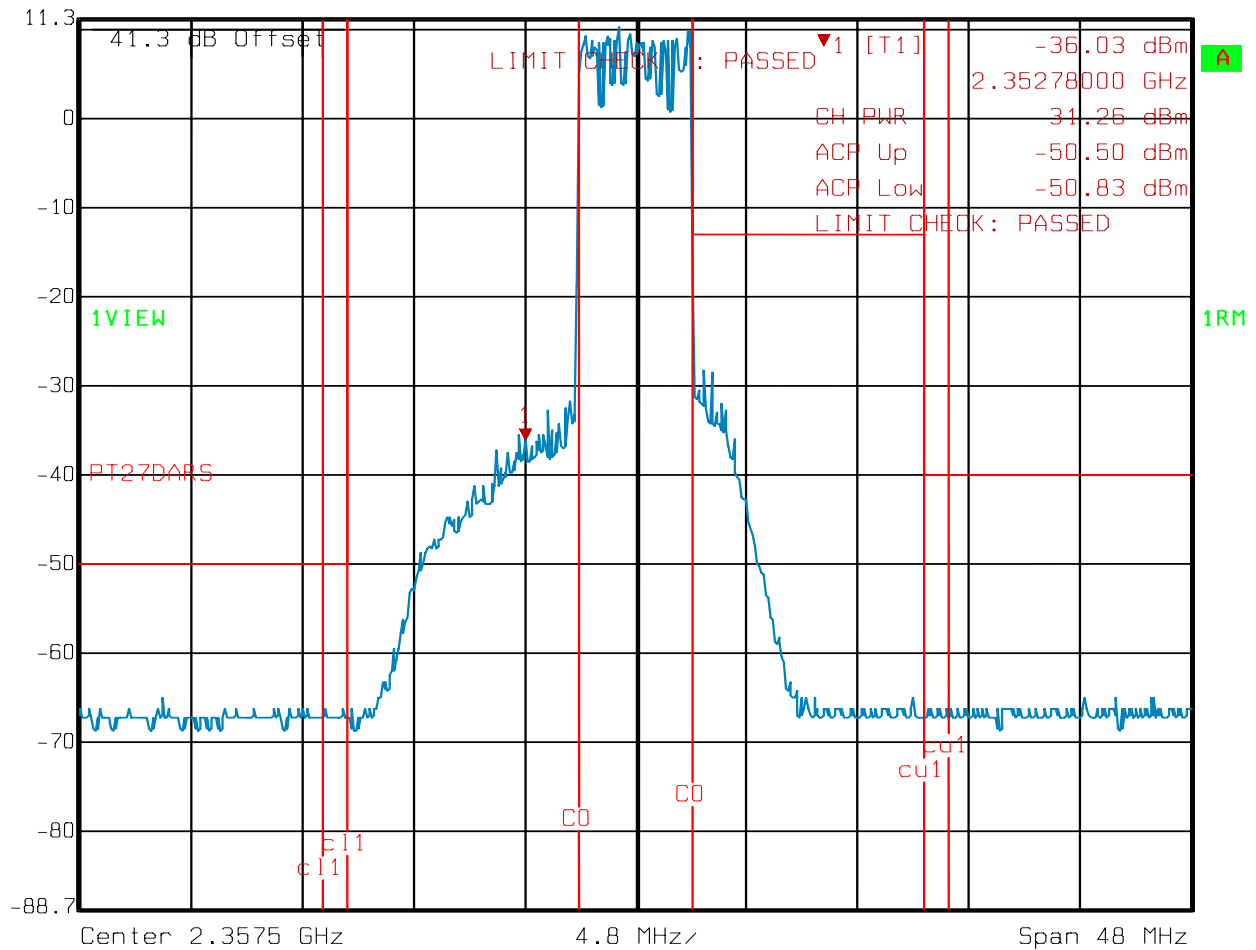
Standard Supply Voltage: 24 Vdc

Environmental Conditions: 20 °Celsius
50 % RH

Test Data – Frequency Stability

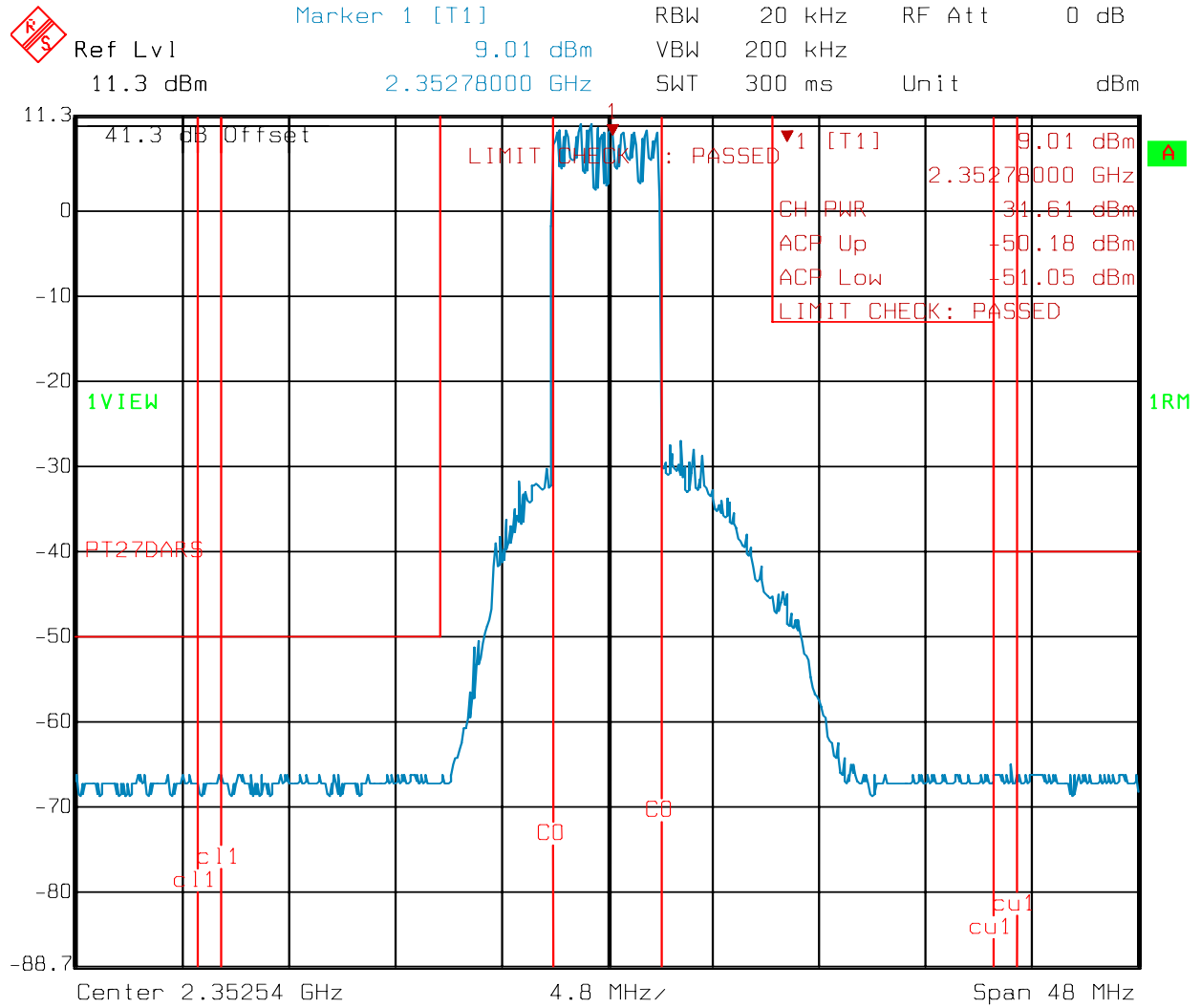
20C/24 Vdc

	Marker 1 [T1]	RBW	20 kHz	RF Att	0 dB
	Ref Lvl	-36.03 dBm	VBW	200 kHz	
	11.3 dBm	2.35278000 GHz	SWT	300 ms	Unit dBm



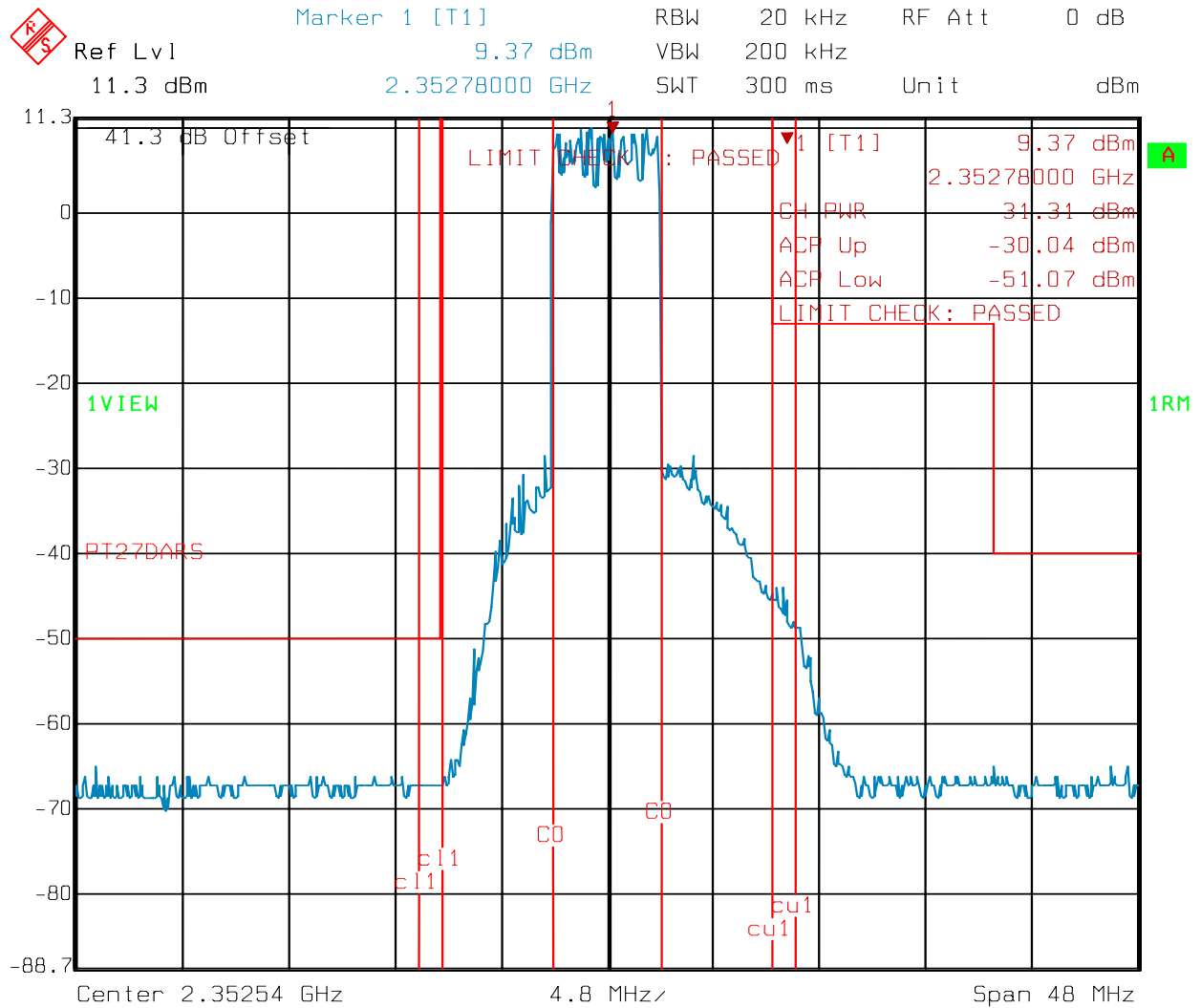
Date: 22.JUN.2005 17:58:38

20C/20.4Vdc



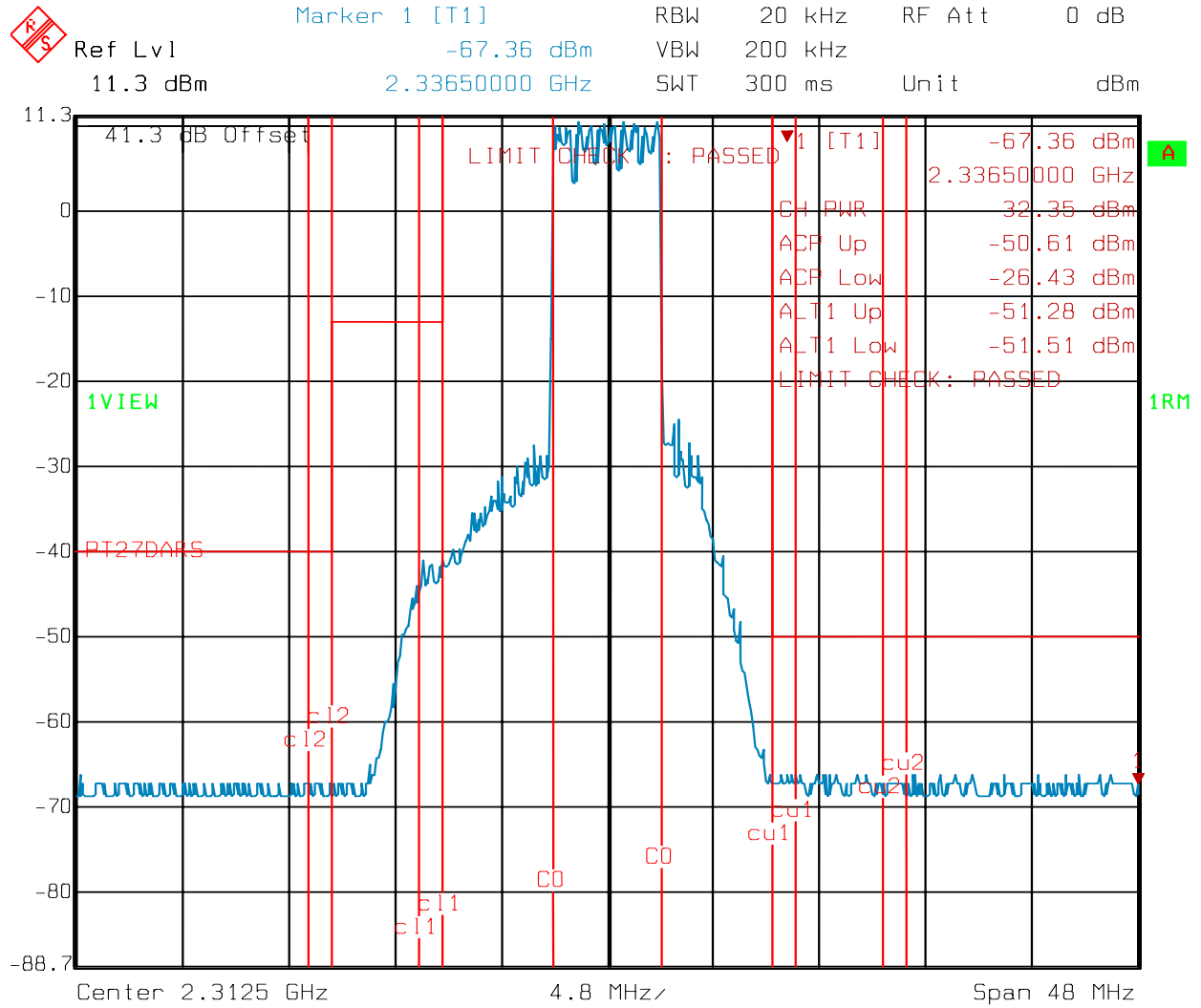
Date: 22.JUN.2005 17:50:10

20C/27.6 Vdc



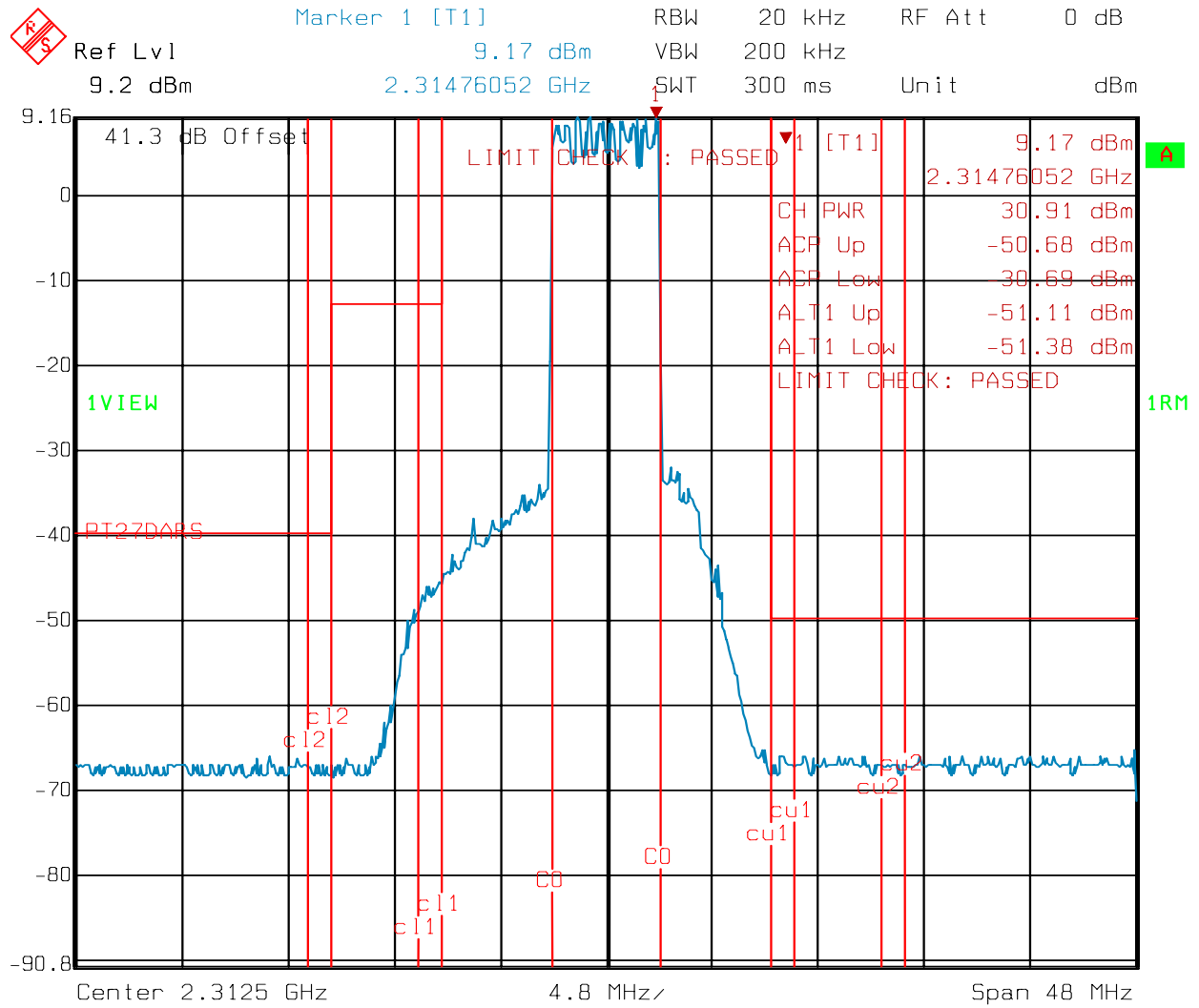
Date: 22.JUN.2005 17:52:02

50C



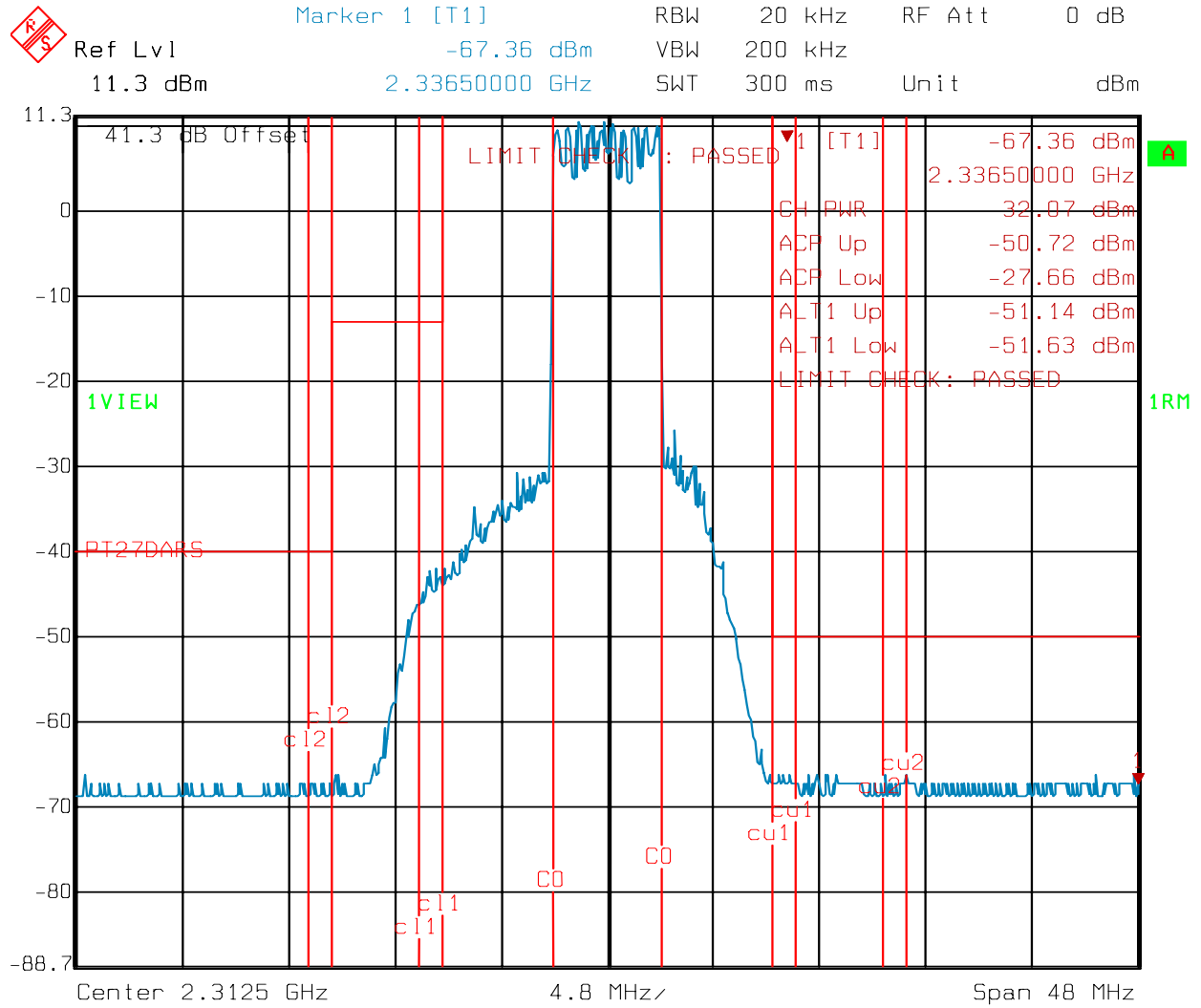
Date: 29.JUN.2005 15:14:59

40C



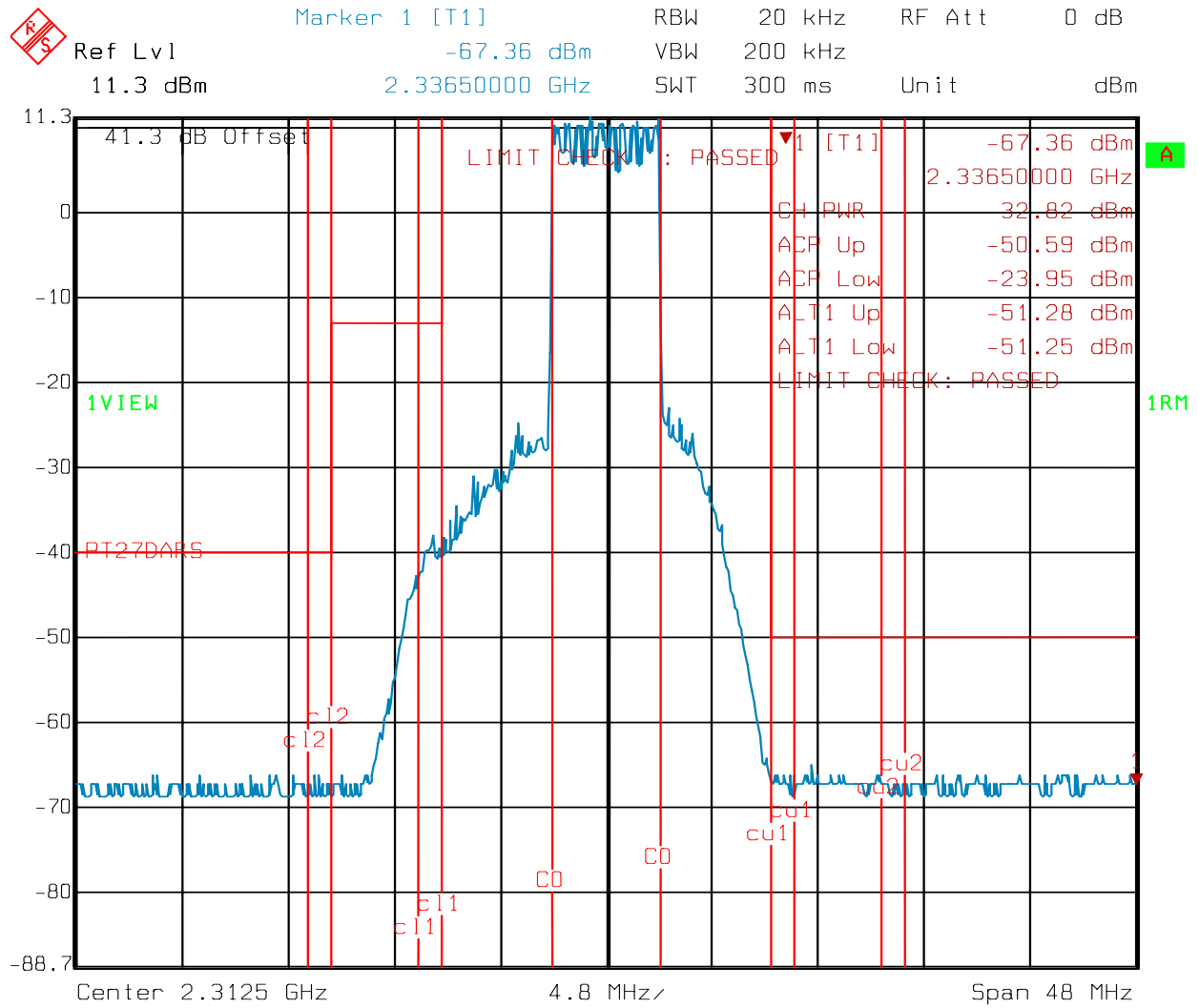
Date: 27.JUN.2005 18:35:20

30C



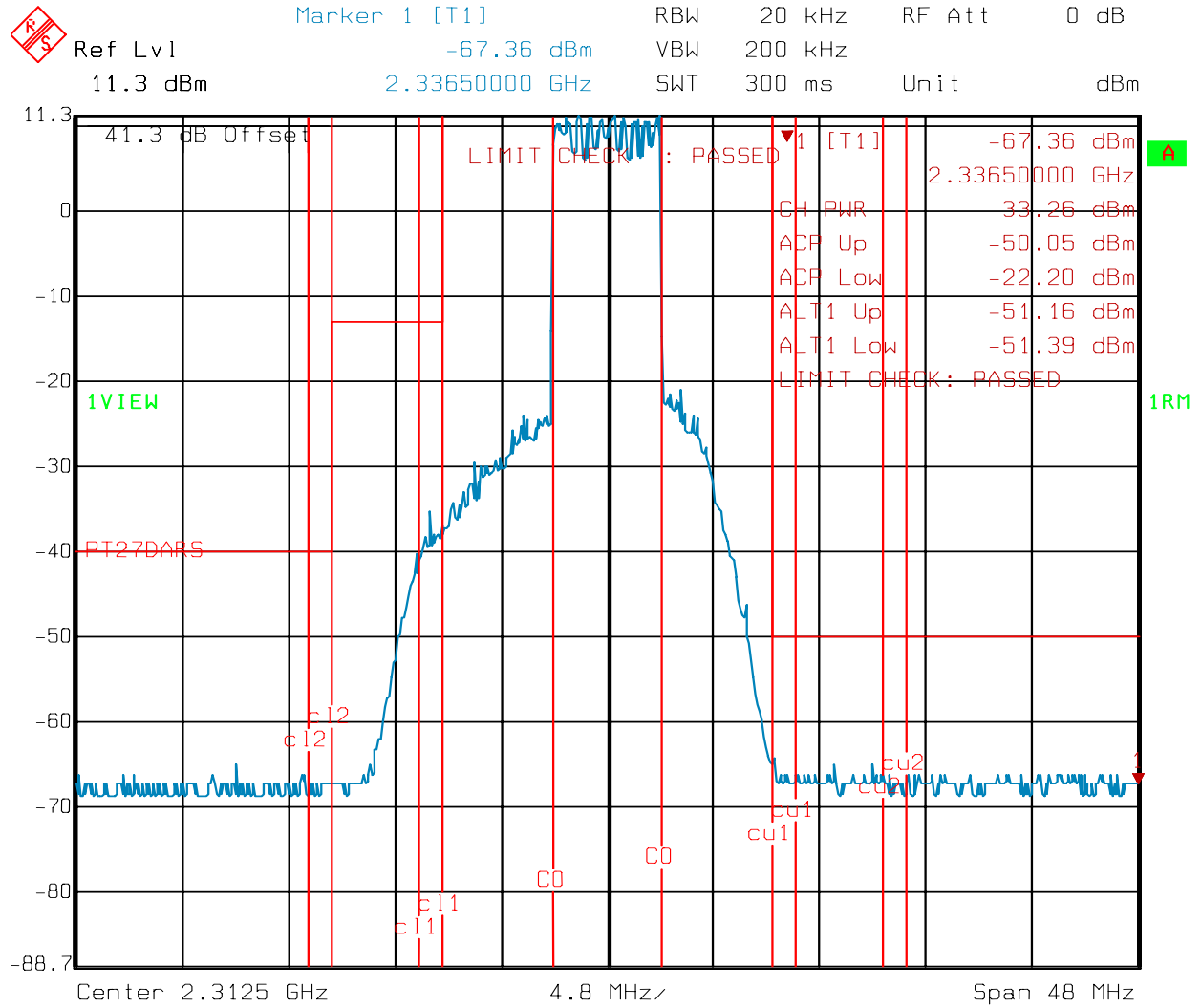
Date: 27.JUN.2005 16:57:44

10C



Date: 27.JUN.2005 16:57:11

0C



Date: 27.JUN.2005 16:19:09

Section 9. Test Equipment List

Nemko ID	Description	Manufacturer		Serial Number	Calibration Date	Calibration Due
		Model Number				
1304	HORN ANTENNA	ELECTRO METRICS		6151	09/22/03	09/22/05
		RGA-60				
1016	Pre-Amp	HEWLETT PACKARD		2749A00159	11/12/04	11/12/05
		8449A				
1464	Spectrum analyzer	Hewlett Packard		3551A04428	01/14/05	01/15/07
		8563E				
1484	Cable 2.0-18.0 Ghz	Storm		N/A	08/26/04	08/26/05
		PR90-010-072				
1485	Cable 2.0-18.0 Ghz	Storm		N/A	08/02/04	08/02/05
		PR90-010-216				
1034	ANTENNA,LP	A. H. SYSTEMS		121	01/27/05	01/27/06
		SAS-200/510				
760	Antenna biconical	Electro Metrics		477	01/27/05	01/27/06
		MFC-25				
791	PREAMP, 25dB	ICC		398	11/12/04	11/12/05
		LNA25				
1514	CABLE ASSY, LAB 2- B OATS	KTL		N/A	04/21/05	04/21/06
		SITE B OATS				
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ		830844/006	03/22/04	03/23/06
		FSEK30				
1064	ATTENUATOR	NARDA		NONE	CBU	N/A
		776B-20				
1628	CABLE, 6 ft	MEGAPHASE		N/A	CBU	N/A
		TM26 S1S5 72				
1482	Band Pass Filter	K & L		2	Cal B4 Use	N/A
		11SH10-4000/T12000-0/0				
1469	10 db Attenuator DC 18 Ghz	MCL Inc.		NONE	CBU	N/A
		BW-S10W2 10db-2WDC				
1474	20db Attenuator DC 18 Ghz	MCL Inc.		NONE	CBU	N/A
		BW-S20W2				
1625	CABLE, 18 ft	MEGAPHASE		N/A	08/02/04	08/02/05
		10311 1GVT4				
283	Environmental Chamber with controller # 1189006	ENVIROTRONICS		129010083	04/22/03	04/21/04
		SH27 & 2030-22844				
619	THERMOMETER	FLUKE		4520028	09/16/04	09/16/05
		51				

ANNEX A - TEST DETAILS

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
--------------------------------------	--------------------------

Method Of Measurement:

Antenna Conducted:

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

E.I.R.P.:

Test Method:

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

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

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

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

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

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

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

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

If the antenna is detachable from the transmitter, it is removed and replaced with a 50 ohm load.

Emissions are measured up to the 10th harmonic of the highest transmit frequency that the transmitter is capable of producing.

If the antenna is not detachable from the transmitter, emissions are measured radiated only at a distance of 3 meters.

Test Method:

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

NAME OF TEST: Frequency Stability	2.1055
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Method Of Measurement:

Frequency Stability With Voltage Variation:

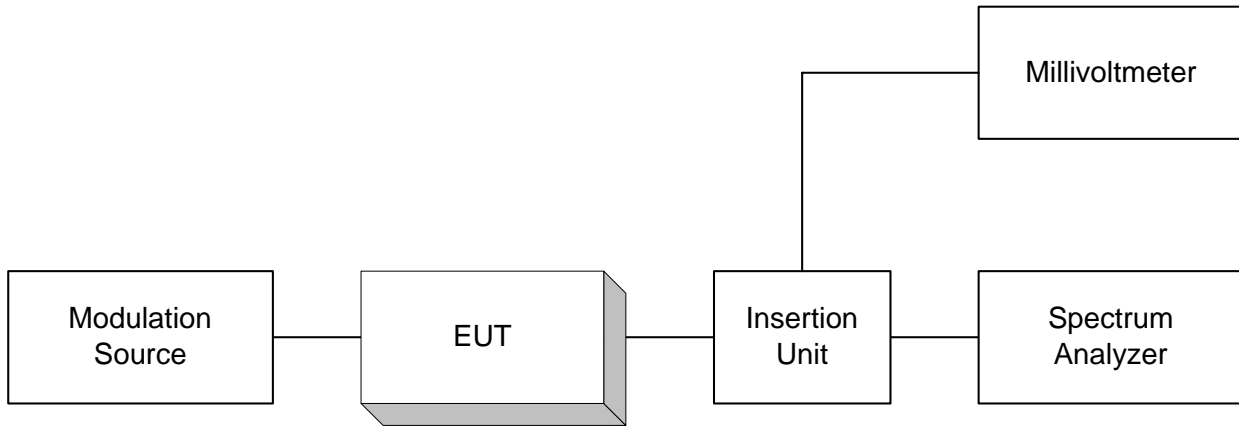
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the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

Frequency Stability With Temperature Variation:

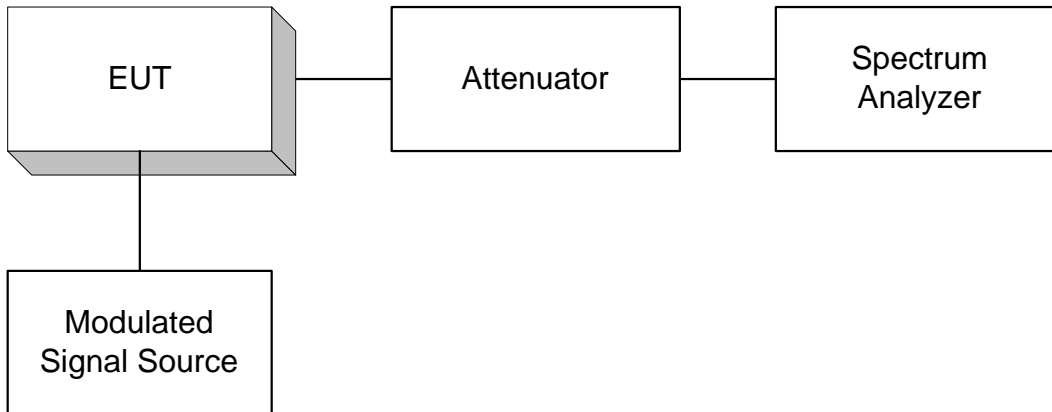
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

ANNEX B - TEST DIAGRAMS

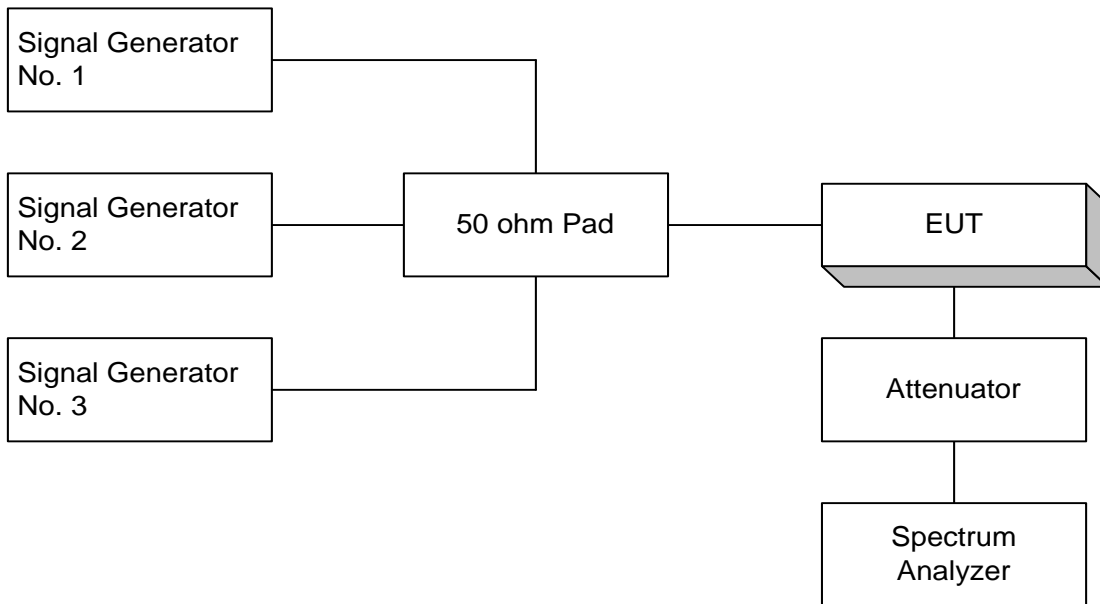
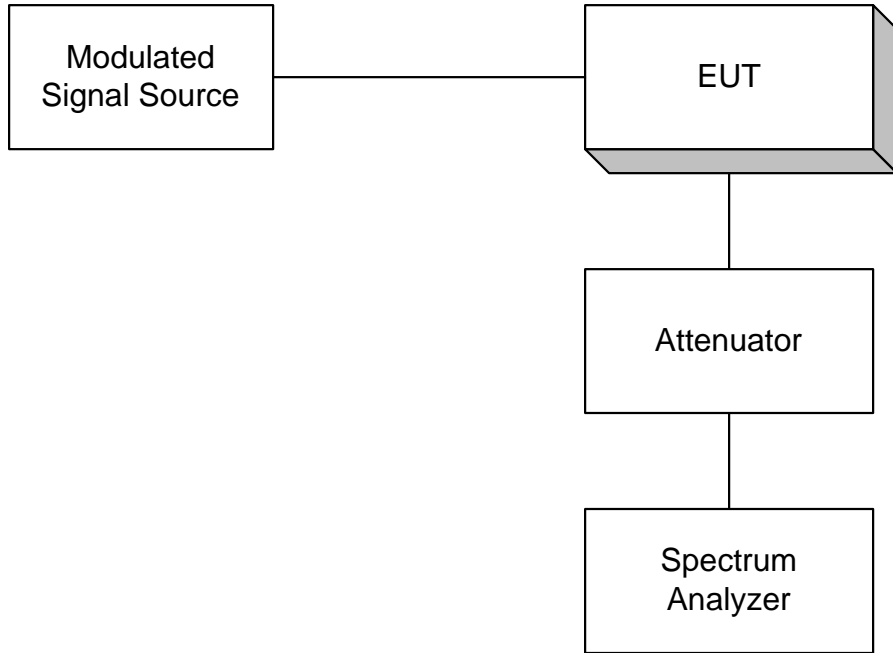
Para. No. 2.1046 - R.F. Power Output



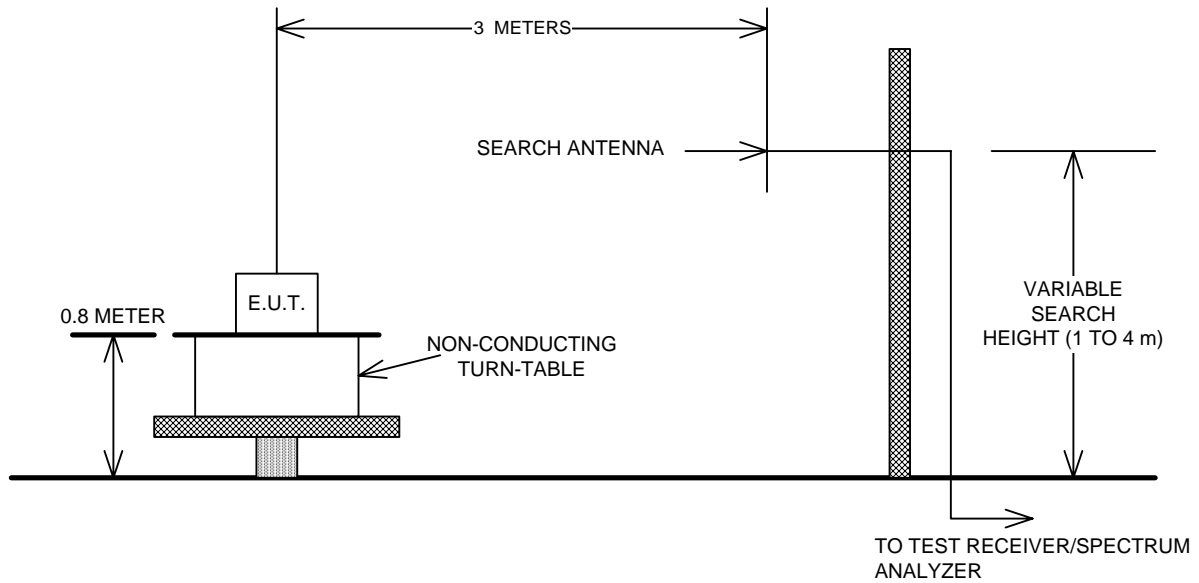
Para. No. 2.1049 - Occupied Bandwidth



Para. No. 2.1051 - Spurious Emissions at Antenna Terminals



Para. No. 2.1053 - Field Strength of Radiation



Para. No. 2.1055 - Frequency Stability

