



Nemko Test Report: 6L0183RUS1 rev5

Applicant: Navini Networks Inc
2240 Campbell Creek Blvd. Suite 110
Richardson, TX
United States of America

**Equipment Under Test:
(E.U.T.)** 2.4-BTS3A-R1 (EUT tested)
2.4-BTS3T-R1
2.4-BTS3F-R1

In Accordance With: **FCC Part 15, Subpart C, 15.247**
Spread Spectrum Transmitters

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

TESTED BY:  DATE: 20 Oct 2006
Kevin Rose, Wireless Engineer

APPROVED BY:  DATE: 20 Oct 2006
David Light, Senior Wireless Engineer

Total Number of Pages: 64





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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Section 1. Summary of Test Results

Manufacturer: Navini Networks Inc

Model No.: 2.4-BTS3A-R1

Serial No.: N/A

REMARKS:

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 Part 15, Subpart C, Paragraph 15.247 for Direct Sequence Spread Spectrum devices. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

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

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

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE. NONE
See " Summary of Test Data".

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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
Powerline Conducted Emissions	15.207(a)	Complies
Minimum 6 dB Bandwidth	15.247(a)(2)	Complies
Maximum Peak Power Output	15.247(b)(1)	Complies
Spurious Emissions (Antenna Conducted)	15.247(c)	Complies Note 1
Spurious Emissions (Restricted Bands)	15.247(c)	Complies
Peak Power Spectral Density	15.247(d)	Complies

Footnotes:

Note 1 There is a 250 kHz offset for the lower channel measurements to show band edge compliance. The software used for testing was limited in channel selection. All 8 transmitters are transmitting a single beam to a single user (i.e. receive antenna) at the maximum output power. The antenna is rotated during testing to ensure maximum signal strength is received.



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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Frequency Band: 2402.5 to 2480.5 MHz Center to Center

Standard Test Voltage: 120 Vac

Channel Spacing: 250 kHz

User Frequency Adjustment: Software controlled

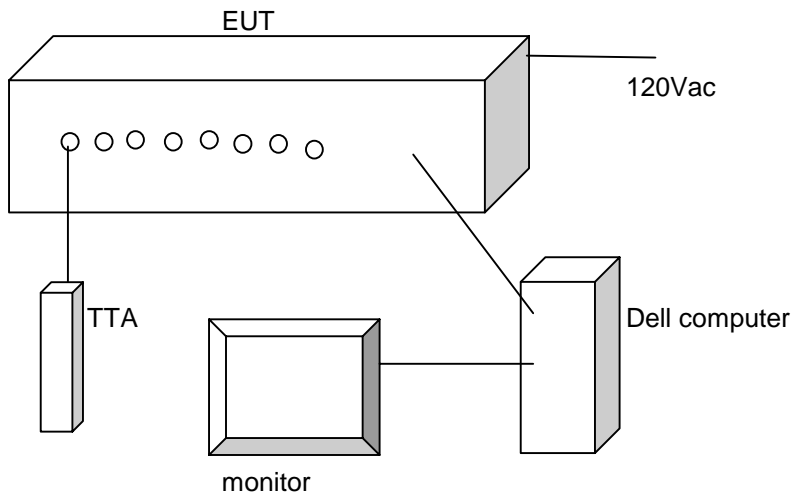
Description of EUT

2.4-BTS3A-R1 (120AC POWERED BASE STATION), was the EUT tested.

2.4-BTS3T-R1 (24VDC POWERED BASE STATION)

2.4-BTS3F-R1 (-48VDC POWERED BASE STATION)

System Diagram





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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Section 3. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
TESTED BY: Kevin Rose	DATE: October 4, 2006

Test Results: Complies.

Measurement Data: See attached plots.

Measurement Uncertainty: +/-1.7dB

Equipment Used: 1258-1555-1284-1998-674



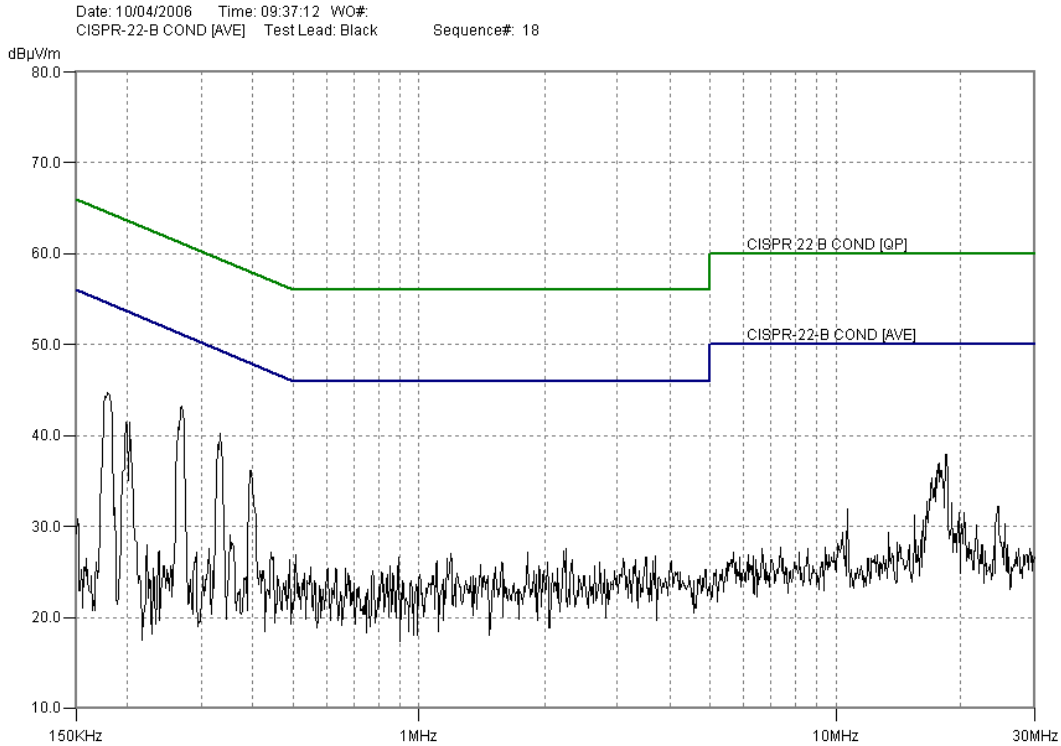
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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Test Data – Powerline Conducted Emissions

Neutral line



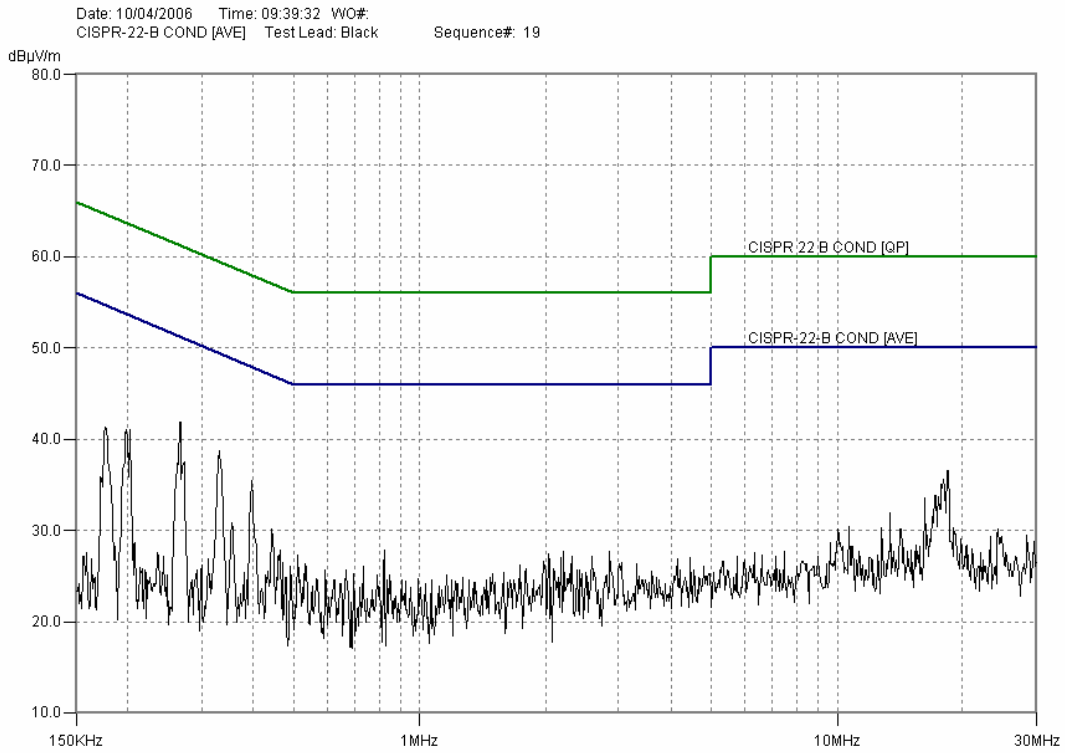


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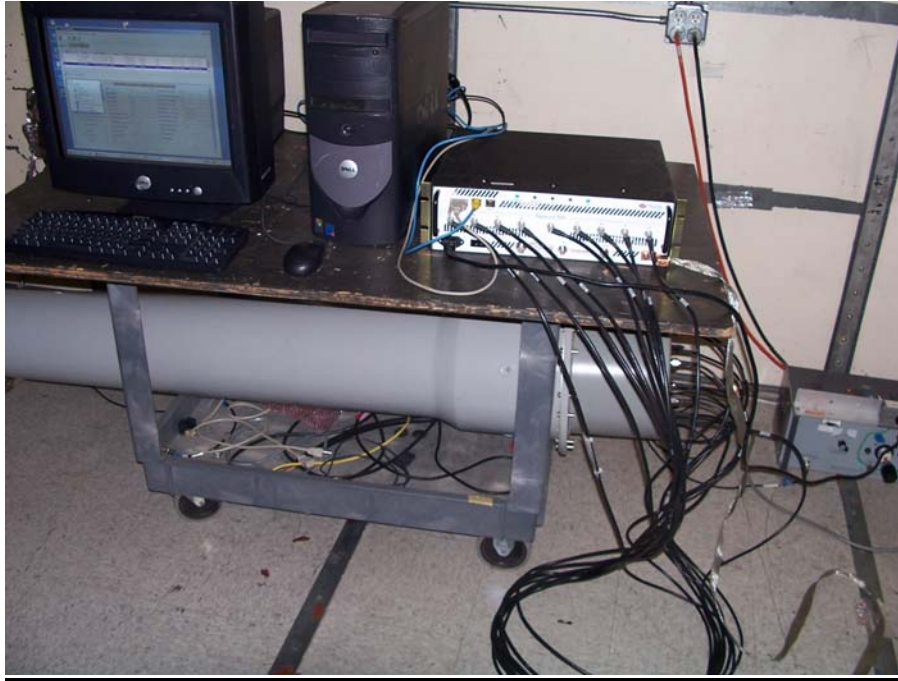
EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Hot line



Photos – Powerline Conducted Emissions





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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Section 4. Minimum 6 dB Bandwidth

NAME OF TEST: Minimum 6 dB Bandwidth	PARA. NO.: 15.247(a)(2)
TESTED BY: Kevin Rose	DATE: September 7 2006

Test Results: Complies.

Measurement Data: See 6 dB BW plot

Equipment Used: 1659-1081-1474-1471



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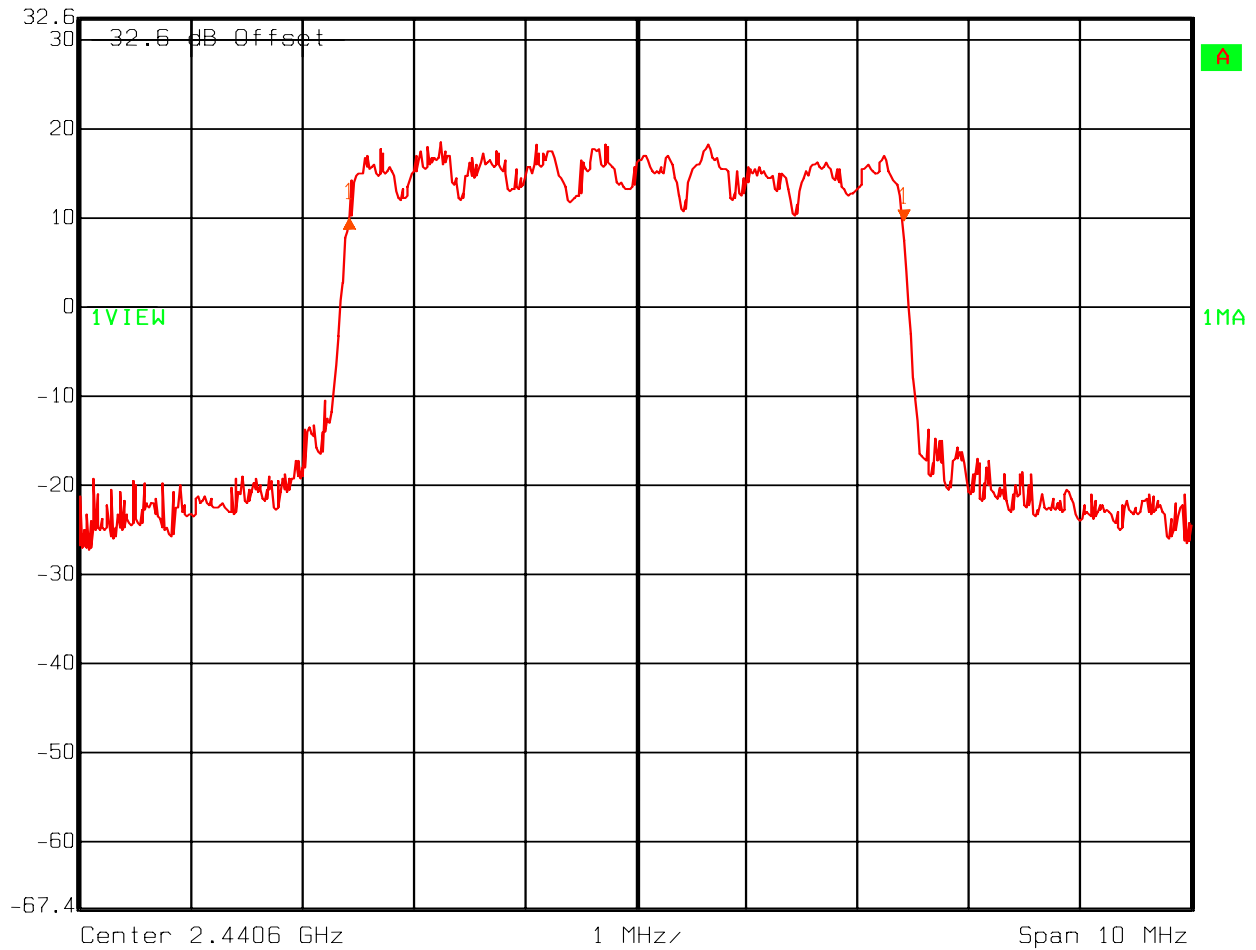
EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Test Data – Occupied Bandwidth

CDMA MID CHANNEL

RS	Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	10 dB
	32.6 dBm	0.35 dB	VBW	100 kHz		
		-4.98997996 MHz	SWT	5 ms	Unit	dBm



Date: 07.SEP.2006 15:26:37



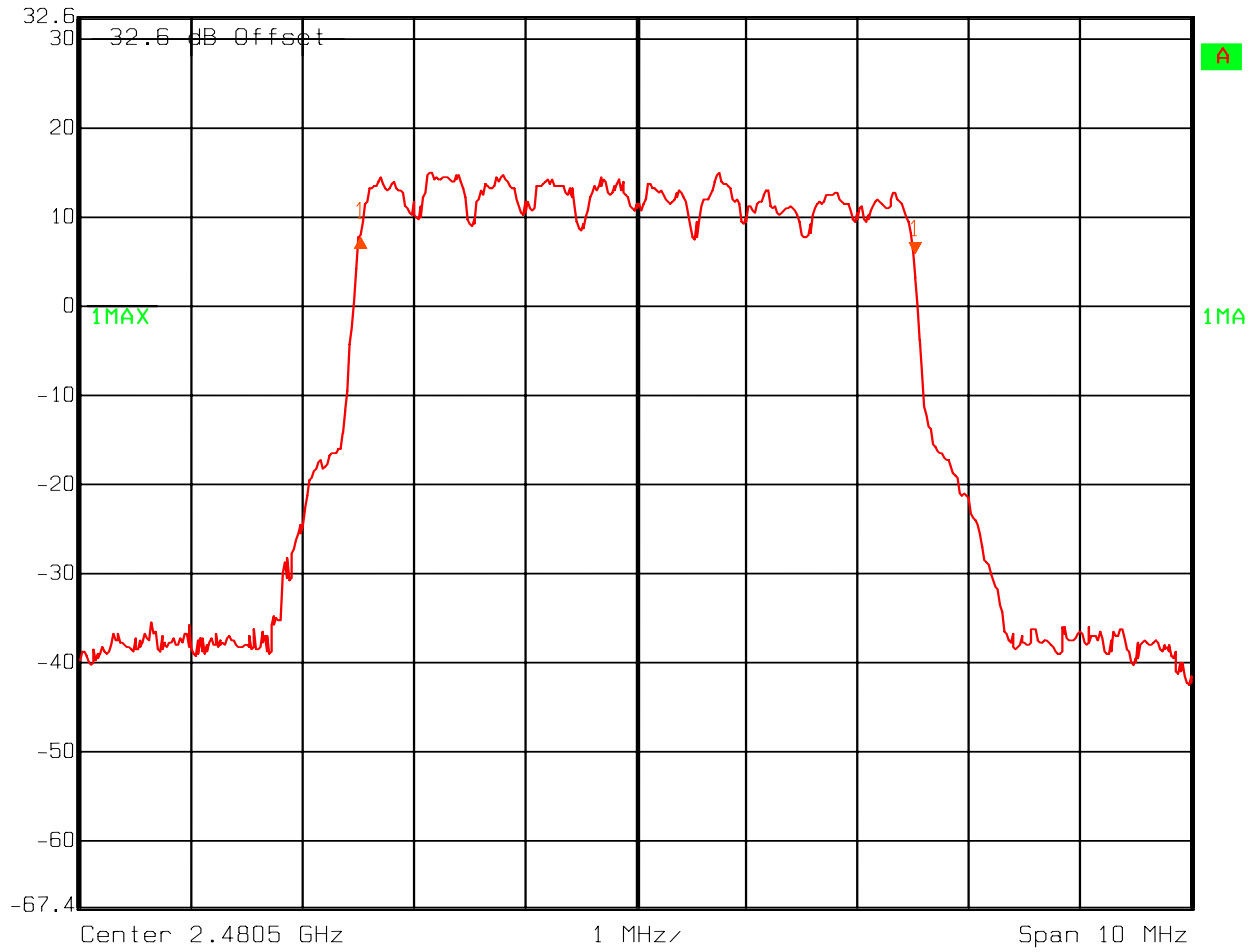
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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

CDMA HIGH CHANNEL

	Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	10 dB
	32.6 dBm	1.96 dB	VBW	100 kHz		
		-4.98997996 MHz	SWT	5 ms	Unit	dBm



Date: 07.SEP.2006 15:31:06



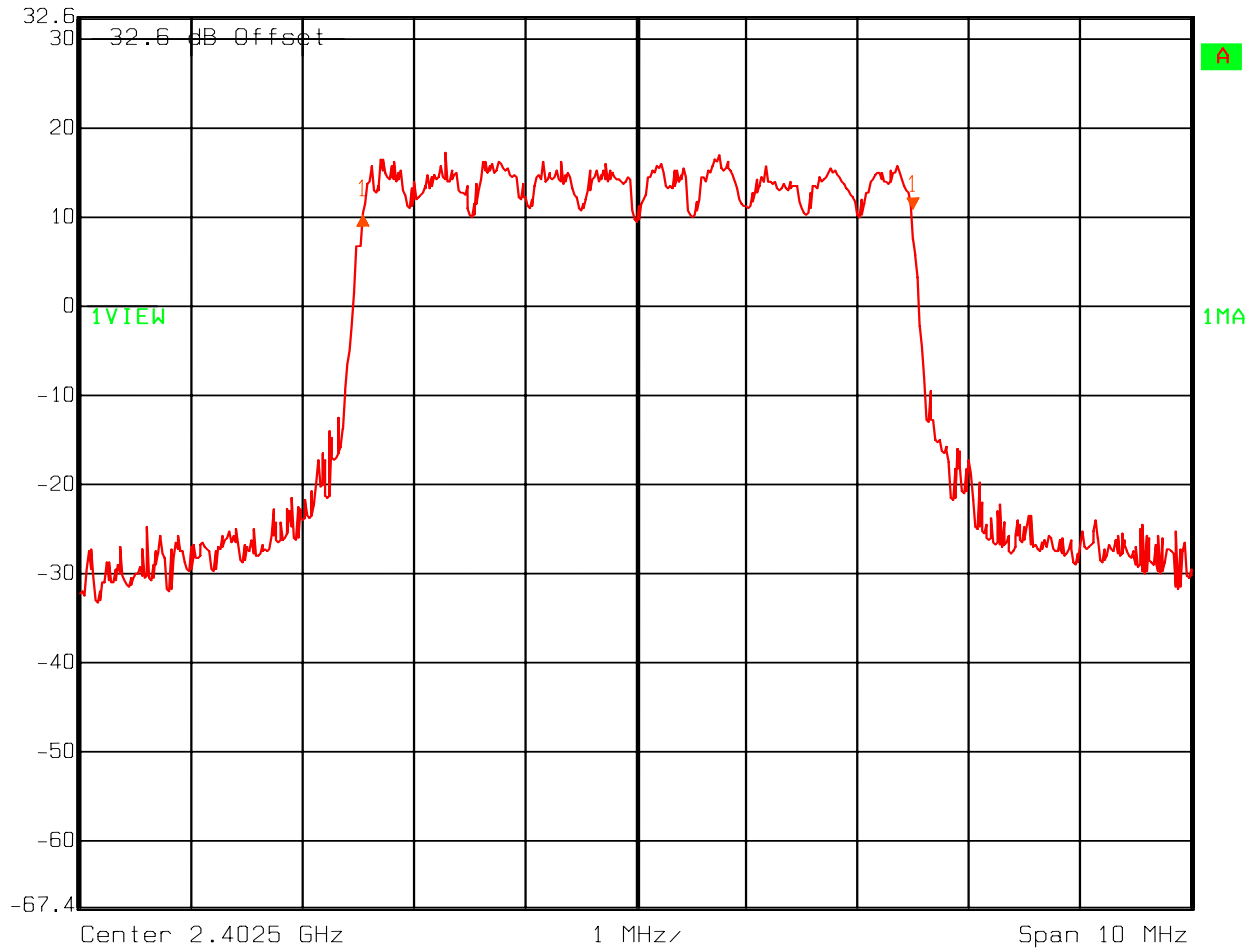
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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

CDMA LOW CHANNEL

	Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	10 dB
	32.6 dBm	-0.54 dB	VBW	100 kHz		
		-4.94989980 MHz	SWT	5 ms	Unit	dBm



Date: 07.SEP.2006 15:28:11



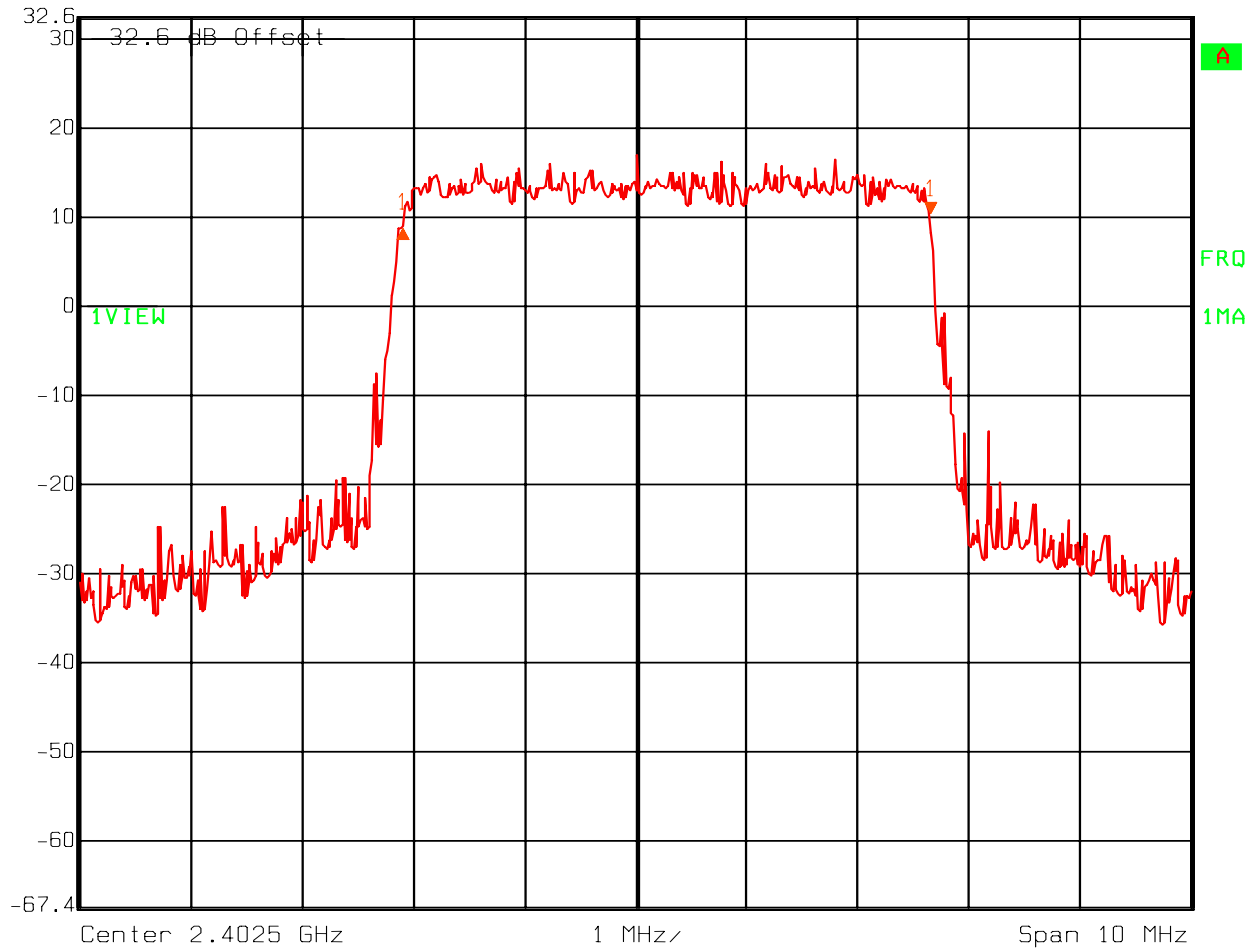
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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

OFDM LOW CHANNEL

	Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	20 dB
	32.6 dBm	-1.41 dB	VBW	100 kHz		
		-4.74949900 MHz	SWT	5 ms	Unit	dBm



Date: 08.SEP.2006 13:14:20



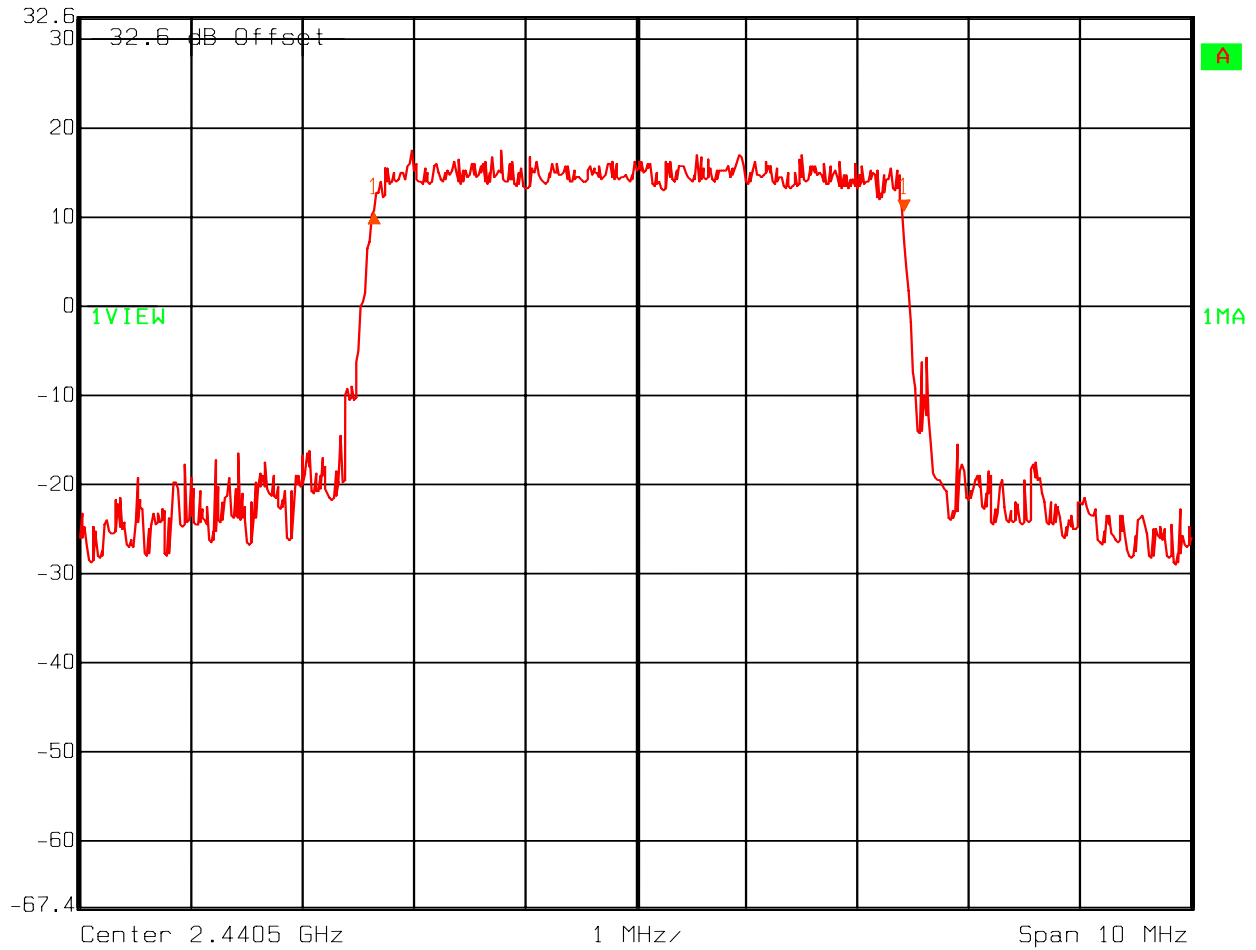
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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

OFDM MID CHANNEL

	Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	20 dB
	32.6 dBm	-0.00 dB	VBW	100 kHz		
		-4.76953908 MHz	SWT	5 ms	Unit	dBm



Date: 08.SEP.2006 13:11:03



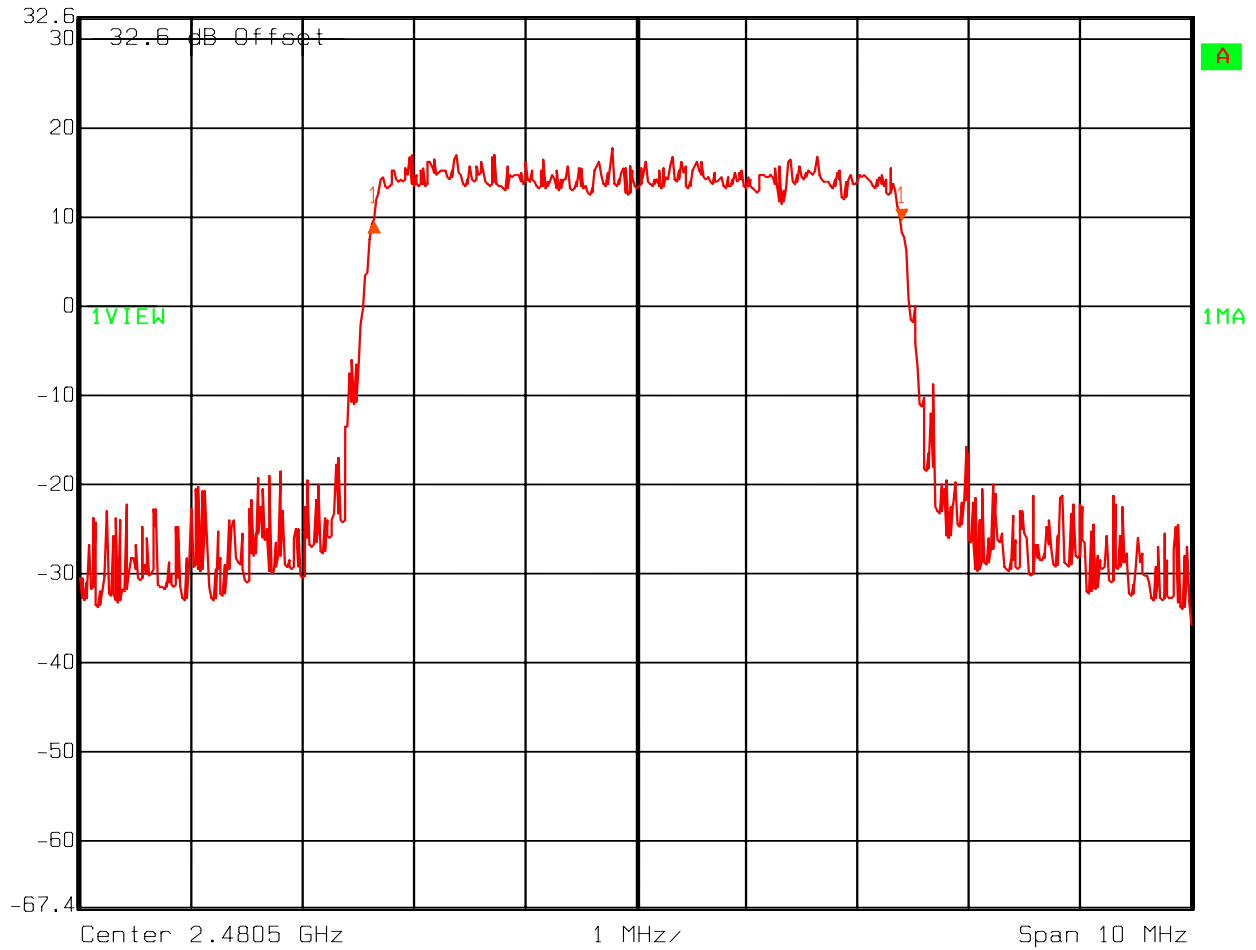
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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

OFDM HIGH CHANNEL

	Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	20 dB
	32.6 dBm	0.09 dB	VBW	100 kHz		
		-4.74949900 MHz	SWT	5 ms	Unit	dBm



Date: 08.SEP.2006 13:08:51



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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Section 5. Maximum Peak Output Power

NAME OF TEST: Maximum Peak Output power	PARA. NO.: 15.247(b)(1)
TESTED BY: Kevin Rose	DATE: September 7 2006

Test Results: Complies.

Equipment Used: 1029-1081-1474-1471

Measurement Uncertainty: +/-1.7 dB

Temperature: 21 °C

Relative Humidity: 42 %



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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Test Data – Peak Output Power

Antenna: CDMA OMNI SINGLE CHANNEL ALL CHANNEL WERE CHECK

Frequency (MHz)	Antenna Gain (dBi)	Conducted Peak Power (dBm)
2402.75	8	25.27
2440.5	8	25.25
2480.5	8	25.26

Antenna: CDMA OMNI ALL 8 CHANNELS OPERATIONAL

Frequency (MHz)	Antenna Gain (dBi)	Conducted Peak Power (dBm)
2402.75	8	27.68
2440.5	8	27.74
2480.5	8	27.8

Antenna: CDMA SECTOR

Frequency (MHz)	Antenna Gain (dBi)	Conducted Peak Power (dBm)
2402.75	16	22.5
2440.5	16	22.52
2480.5	16	22.25

Antenna: OFDM OMNI ONE CHANNEL ALL CHANNELS WERE CHECK

Frequency (MHz)	Antenna Gain (dBi)	Conducted Peak Power (dBm)
2402.75	8	24.95
2440.5	8	24.78
2480.5	8	25.25



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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Antenna: OFDM OMNI ALL 8 CHANNELS

Frequency (MHz)	Antenna Gain (dBi)	Conducted Peak Power (dBm)
2402.75	8	26.2
2440.5	8	26.6
2480.5	8	26.9

Antenna: OFDM SECTOR

Frequency (MHz)	Antenna Gain (dBi)	Conducted Peak Power (dBm)
2402.75	16	22.2
2440.5	16	22.38
2480.5	16	22.63

Note: The AC supply to the device was varied from 102 Vac to 138 Vac will rf output power was monitored. There was no variation of rf output power noted.

RBW=VBW = 10MHz



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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Section 6. Spurious Emissions (conducted)

NAME OF TEST: Spurious Emissions (conducted)	PARA. NO.: 15.247(c)
TESTED BY: Kevin Rose	DATE: September 8 2006

Test Results: Complies.

Measurement Data: See attached plots.

Equipment Used: 1629-1081-1474-1471

Measurement Uncertainty: +/-1.7 dB

Temperature: 21 °C

Relative Humidity: 42 %

Note: There is a 250 kHz offset for the lower channel measurements to show band edge compliance. The software used for testing was limited in channel selection. Testing was performed on both a single channel and on all 8 channels.



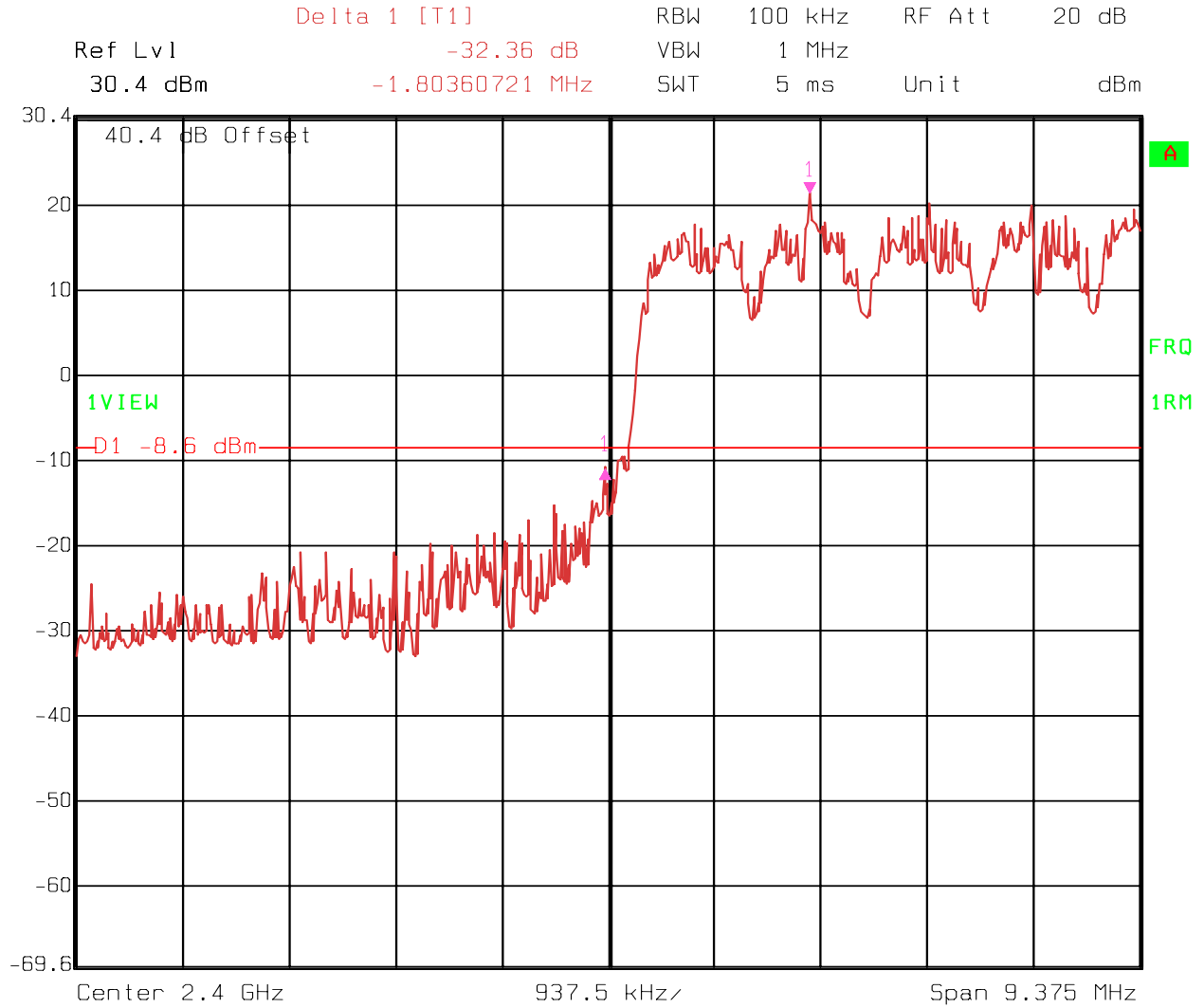
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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Test Data – Spurious Emissions at Antenna Terminals

Low Channel Band edge (8 channels)



Date: 09.JAN.2007 16:34:45

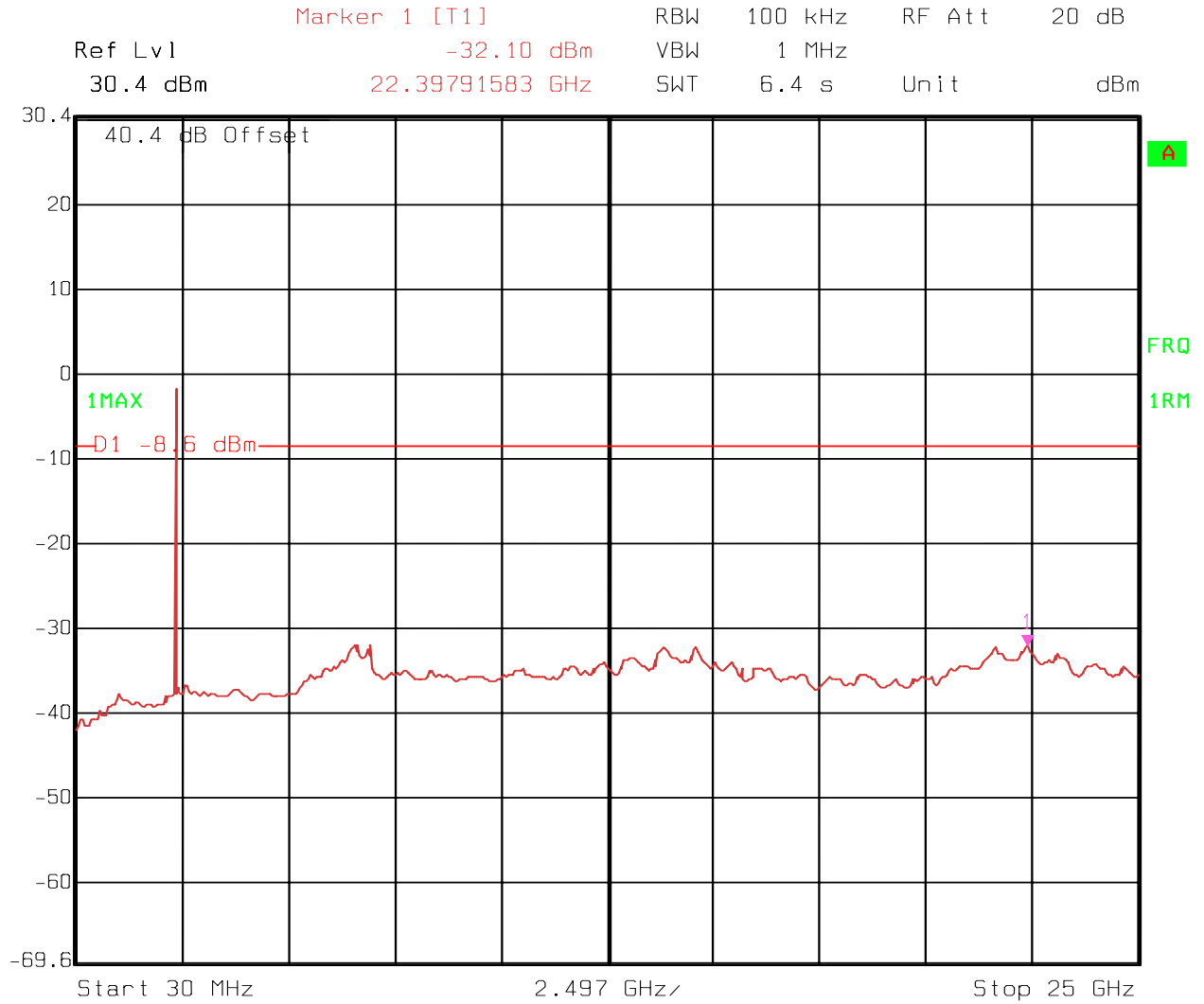


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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Low Channel Spurious 30 MHz to 25 GHz (8 Channels)



Date: 09.JAN.2007 16:36:28



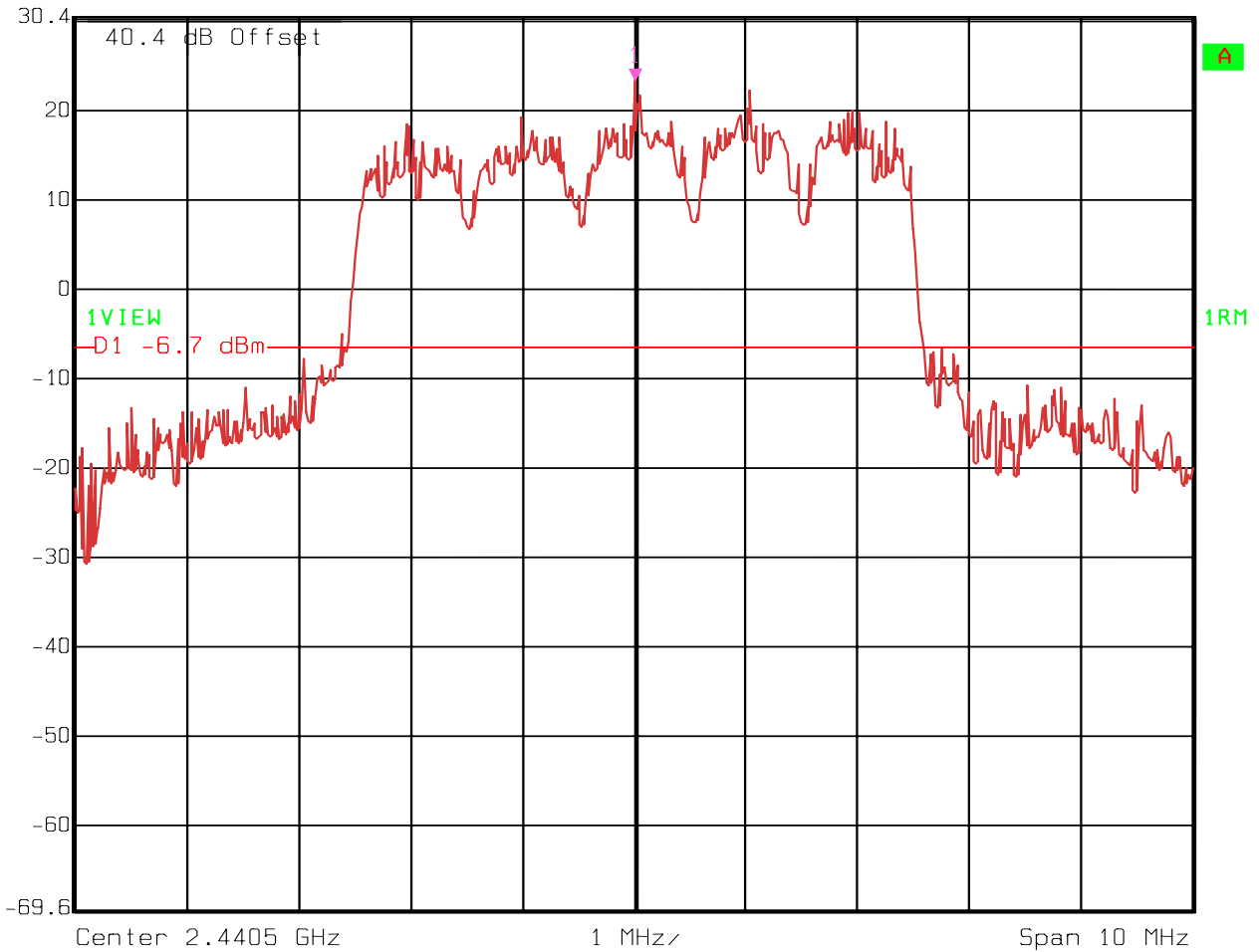
Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

MID CHANNEL CDMA (8 Channels)

	Marker 1 [T1]	RBW	100 kHz	RF Att	20 dB
Ref Lvl	23.33 dBm	VBW	1 MHz		
30.4 dBm	2.44051002 GHz	SWT	5 ms	Unit	dBm



Date: 09.JAN.2007 16:38:38

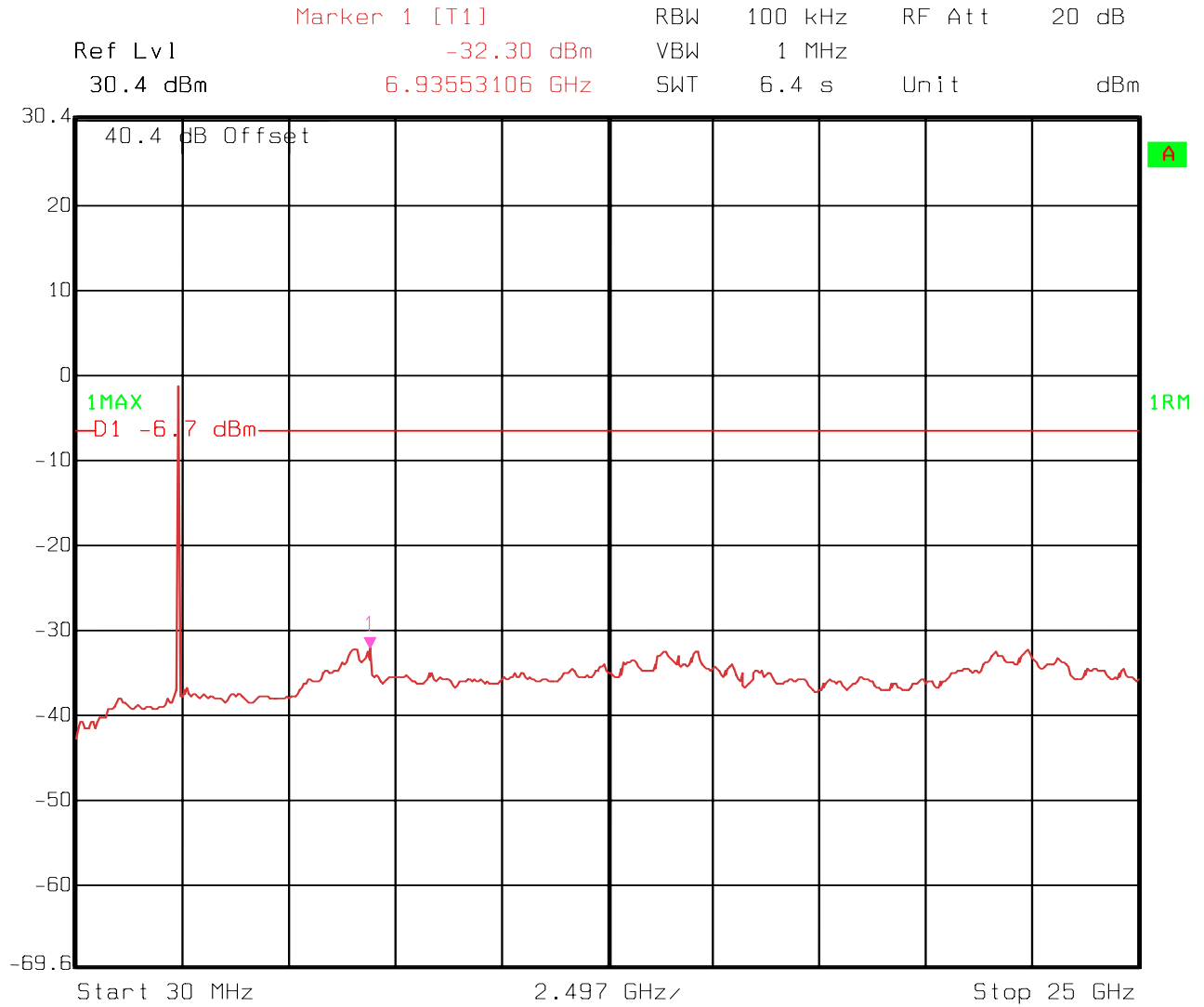
MID CHANNEL CDMA SPURIOUS 30 MHz to 25 GHz



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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5



Date: 09.JAN.2007 16:39:35



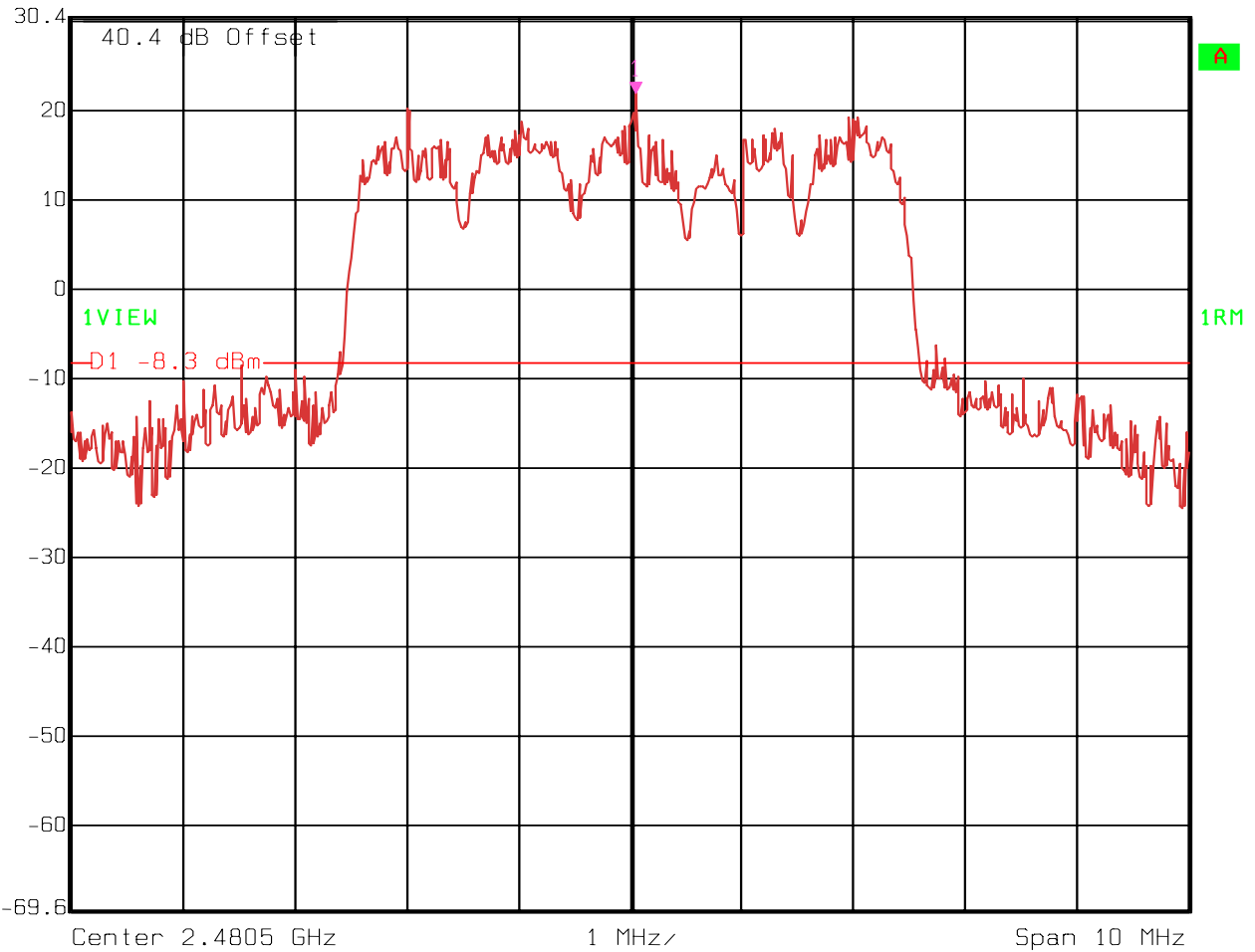
Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

HIGH CHANNEL CDMA SPURIOUS (8 Channels)

Ref Lvl	21.66 dBm	RBW	100 kHz	RF Att	20 dB
30.4 dBm	2.48055010 GHz	VBW	1 MHz	Unit	dBm
		SWT	5 ms		



Date: 09.JAN.2007 16:40:54



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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

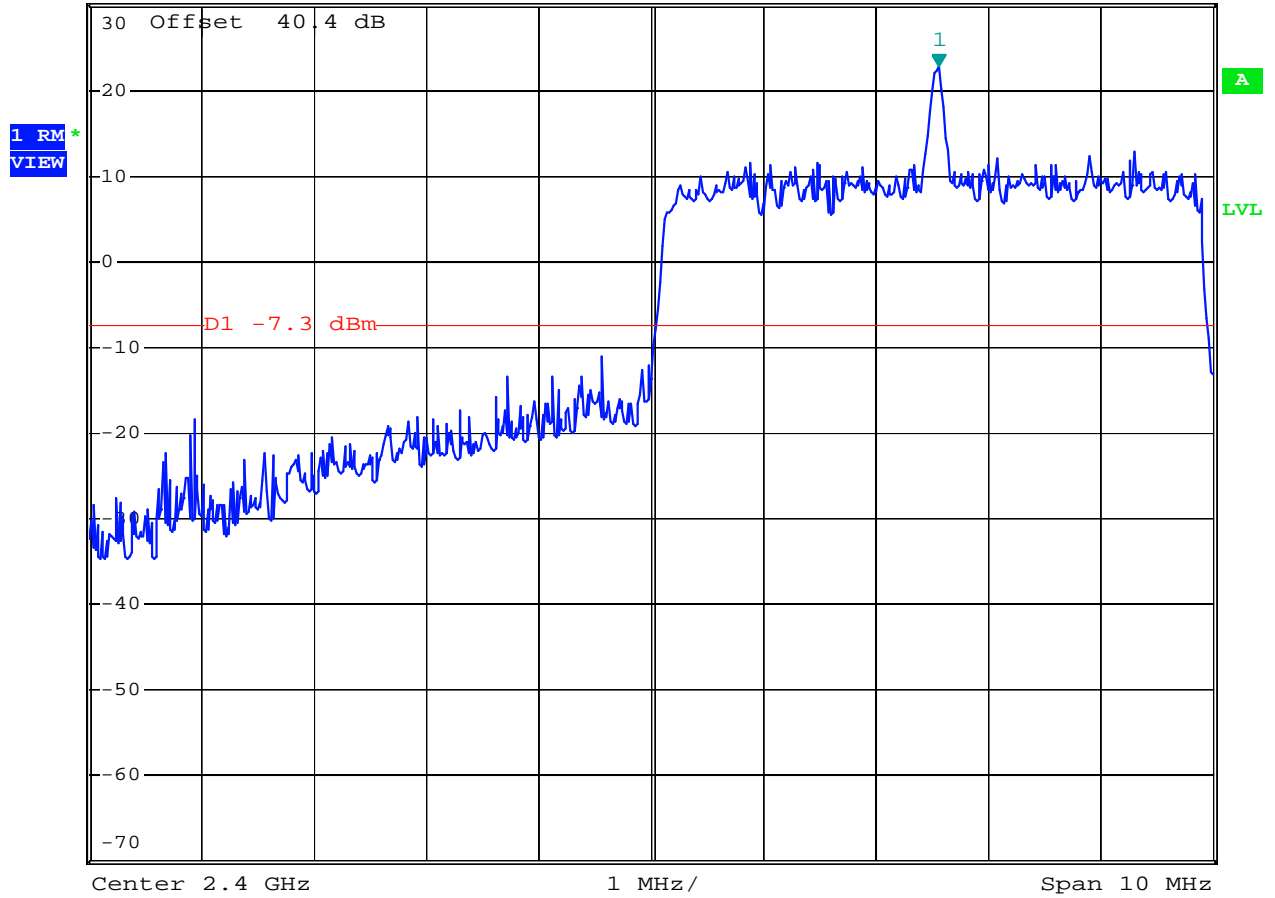
LOW CHANNEL OFDM SPURIOUS (8 Channels)



DISPLAY LINE 1
-7.3 dBm

*RBW 100 kHz Marker 1 [T1]
VBW 1 MHz 22.70 dBm
SWT 2.5 ms 2.402560000 GHz

Ref 30 dBm Att 20 dB



Date: 9.JAN.2007 14:53:40



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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

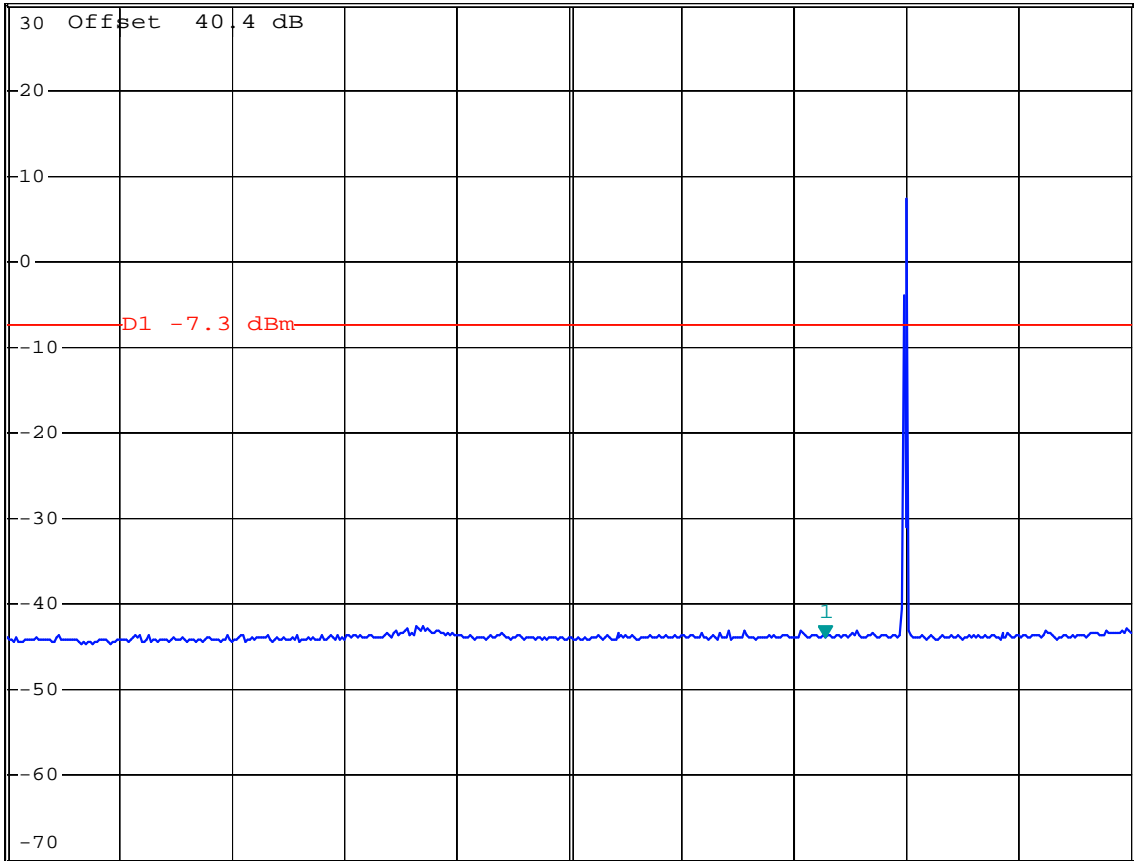
LOW CHANNEL OFDM SPURIOUS 30 MHz to 3 GHz (8 Channels)



MARKER 1
2.19216 GHz
Ref 30 dBm Att 20 dB

*RBW 100 kHz Marker 1 [T1]
VBW 1 MHz -43.92 dBm
SWT 300 ms 2.192160000 GHz

1 RM*
MAXH



Center 1.515 GHz 297 MHz/ Span 2.97 GHz

Date: 9.JAN.2007 14:56:45

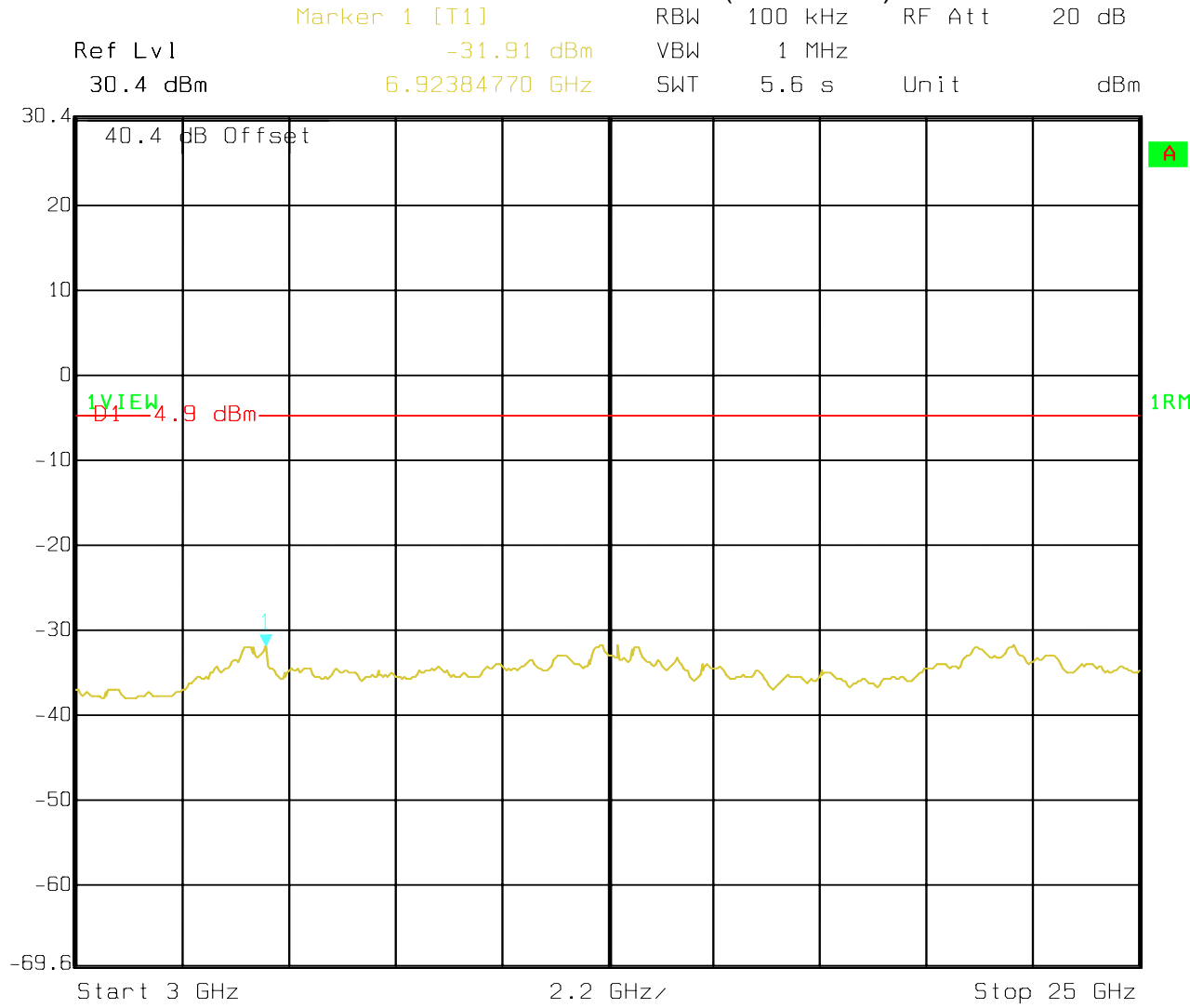


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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

LOW CHANNEL OFDM SPURIOUS 3GHz to 25 GHz (8 Channels)



Date: 09.JAN.2007 16:22:39

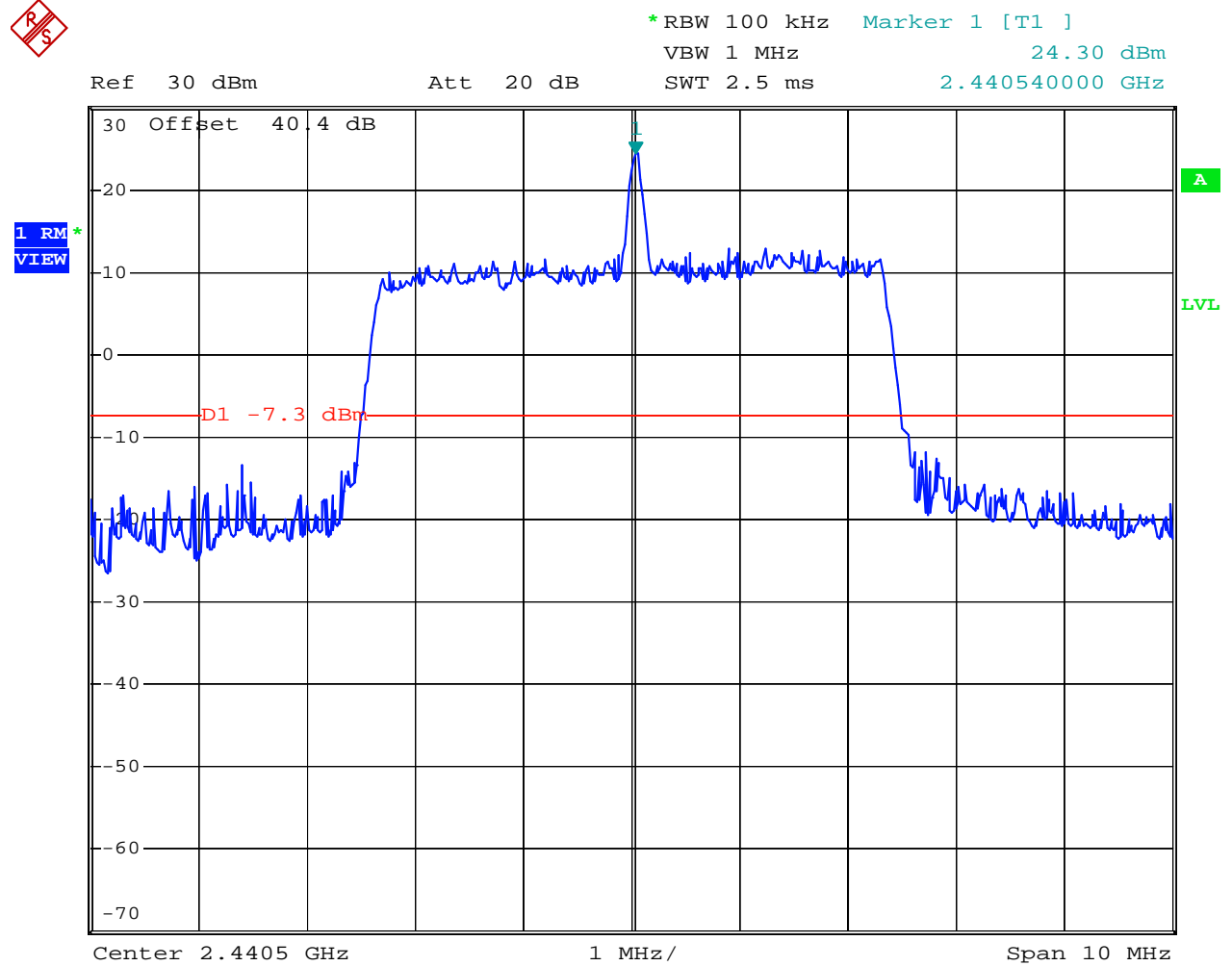


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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

MID CHANNEL OFDM SPURIOUS (8 Channels)



Date: 9.JAN.2007 14:58:19



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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

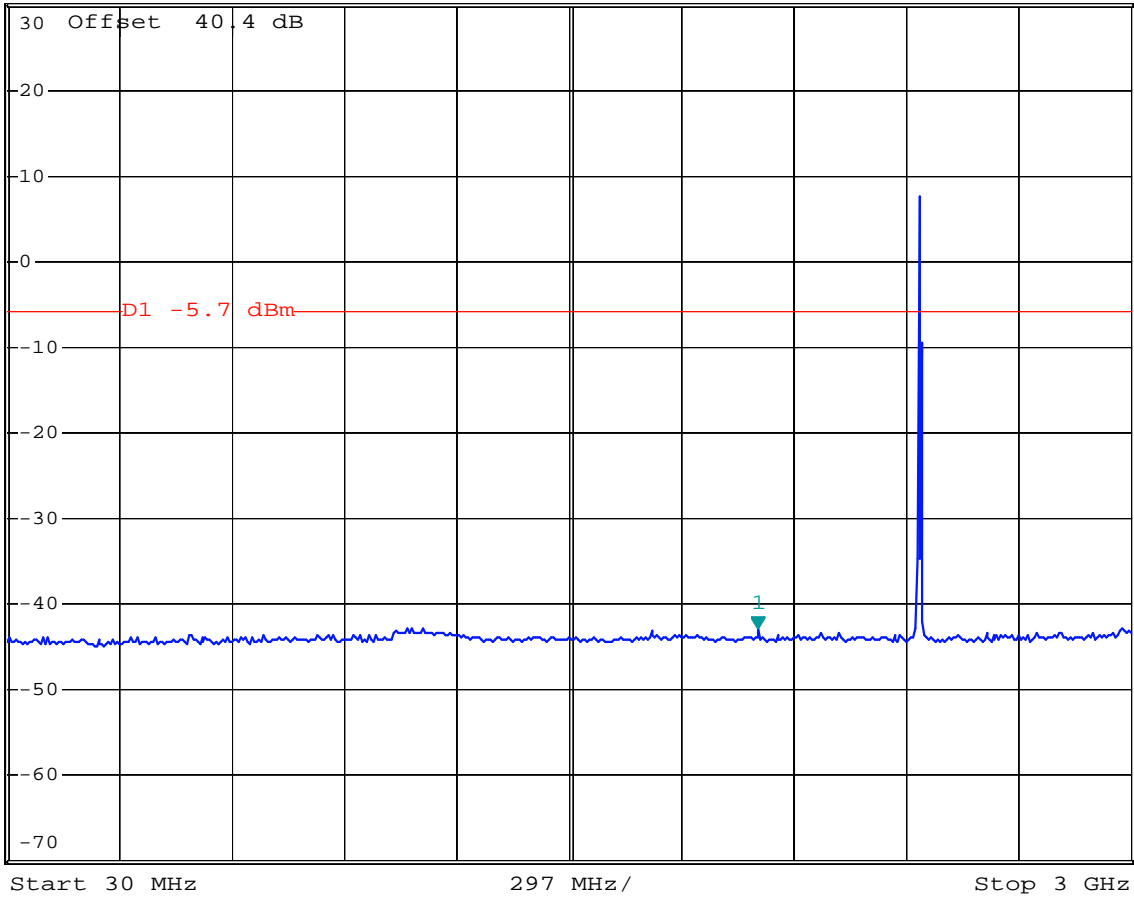
MID CHANNEL OFDM SPURIOUS 30MHz to 3 GHz (8 Channels)



MARKER 1
2.01286 GHz
Ref 30 dBm Att 20 dB

*RBW 100 kHz Marker 1 [T1]
VBW 1 MHz -42.72 dBm
SWT 300 ms 2.012860000 GHz

1 RM*
MAXH



Date: 9.JAN.2007 14:59:40



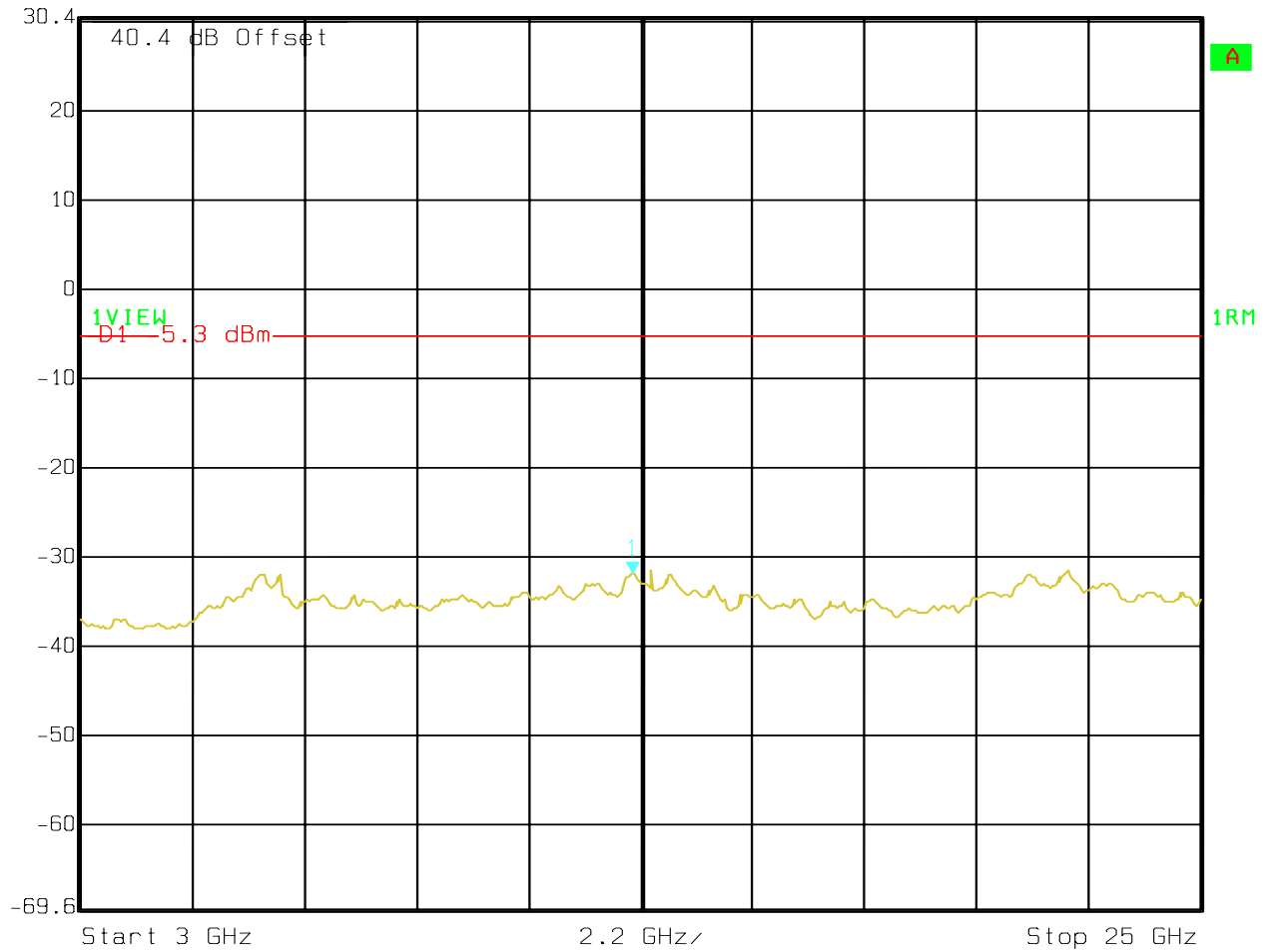
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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

MID CHANNEL OFDM SPURIOUS 3GHz to 25 GHz (8 Channels)

Ref Lvl	30.4 dBm	Marker 1 [T1]	-31.91 dBm	RBW	100 kHz	RF Att	20 dB
			13.84569138 GHz	VBW	1 MHz		
				SWT	5.6 s	Unit	dBm



Date: 09.JAN.2007 16:21:40



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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

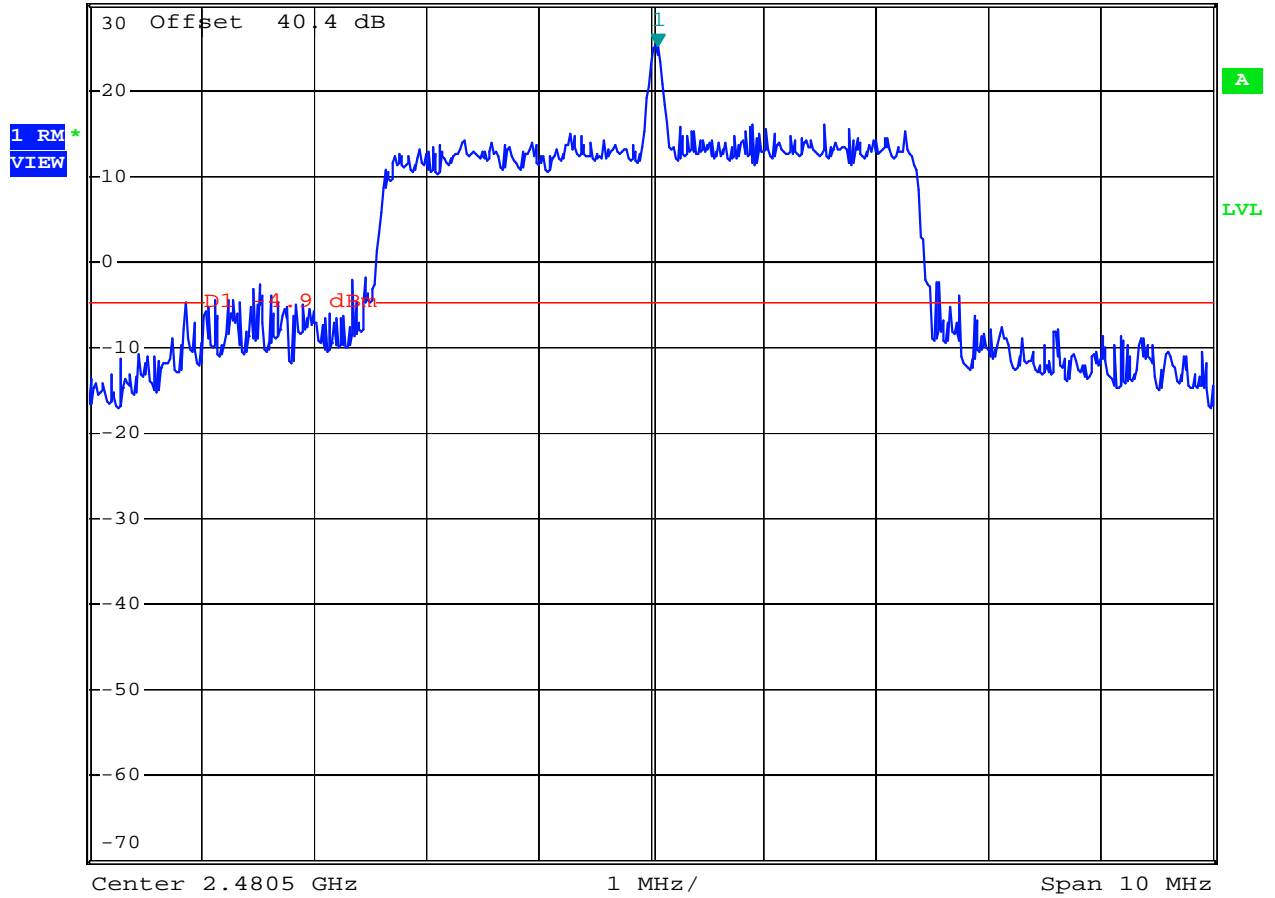
PROJECT NO. 6L0183RUS1 rev5

HIGH CHANNEL OFDM SPURIOUS (8 Channels)



DISPLAY LINE 1
-4.9 dBm
Ref 30 dBm Att 20 dB

*RBW 100 kHz Marker 1 [T1]
VBW 1 MHz 25.23 dBm
SWT 2.5 ms 2.480560000 GHz



Date: 9.JAN.2007 15:01:52



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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

HIGH CHANNEL OFDM SPURIOUS 30 MHz to 3 GHz (8 Channels)

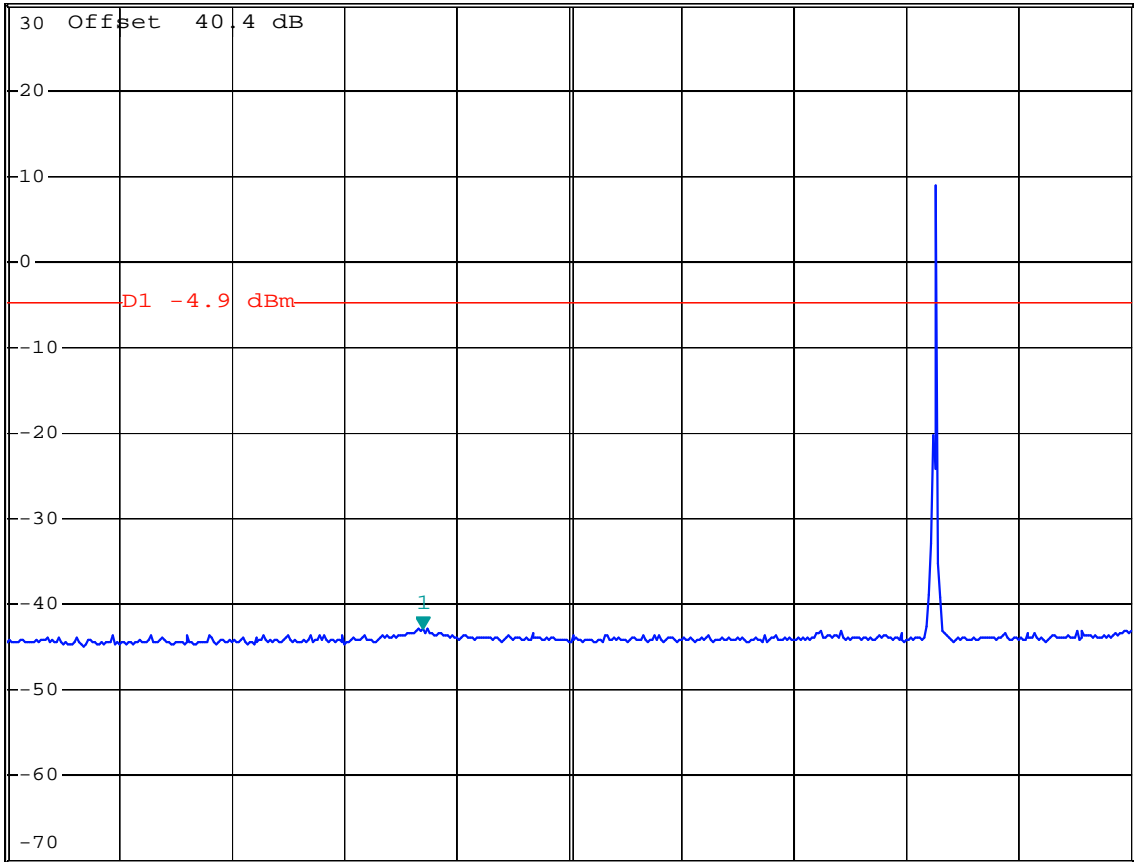


MARKER 1
1.12624 GHz

*RBW 100 kHz Marker 1 [T1]
VBW 1 MHz -42.96 dBm
SWT 300 ms 1.126240000 GHz

Ref 30 dBm Att 20 dB

1 RM*
MAXH



Start 30 MHz 297 MHz/ Stop 3 GHz

Date: 9.JAN.2007 15:05:19

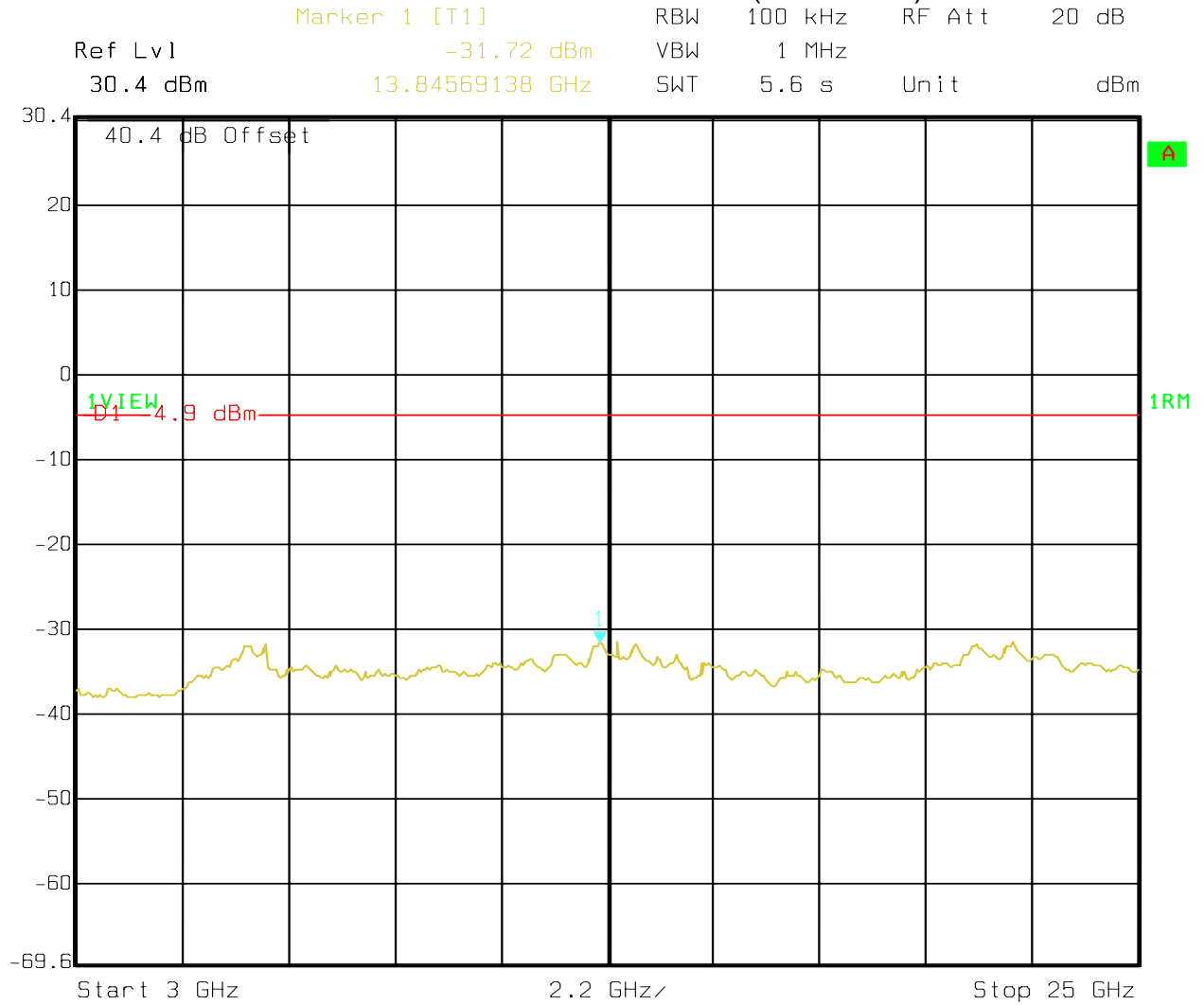


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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

HIGH CHANNEL OFDM SPURIOUS 3 GHz to 25 GHz (8 Channels)



Date: 09.JAN.2007 16:20:37



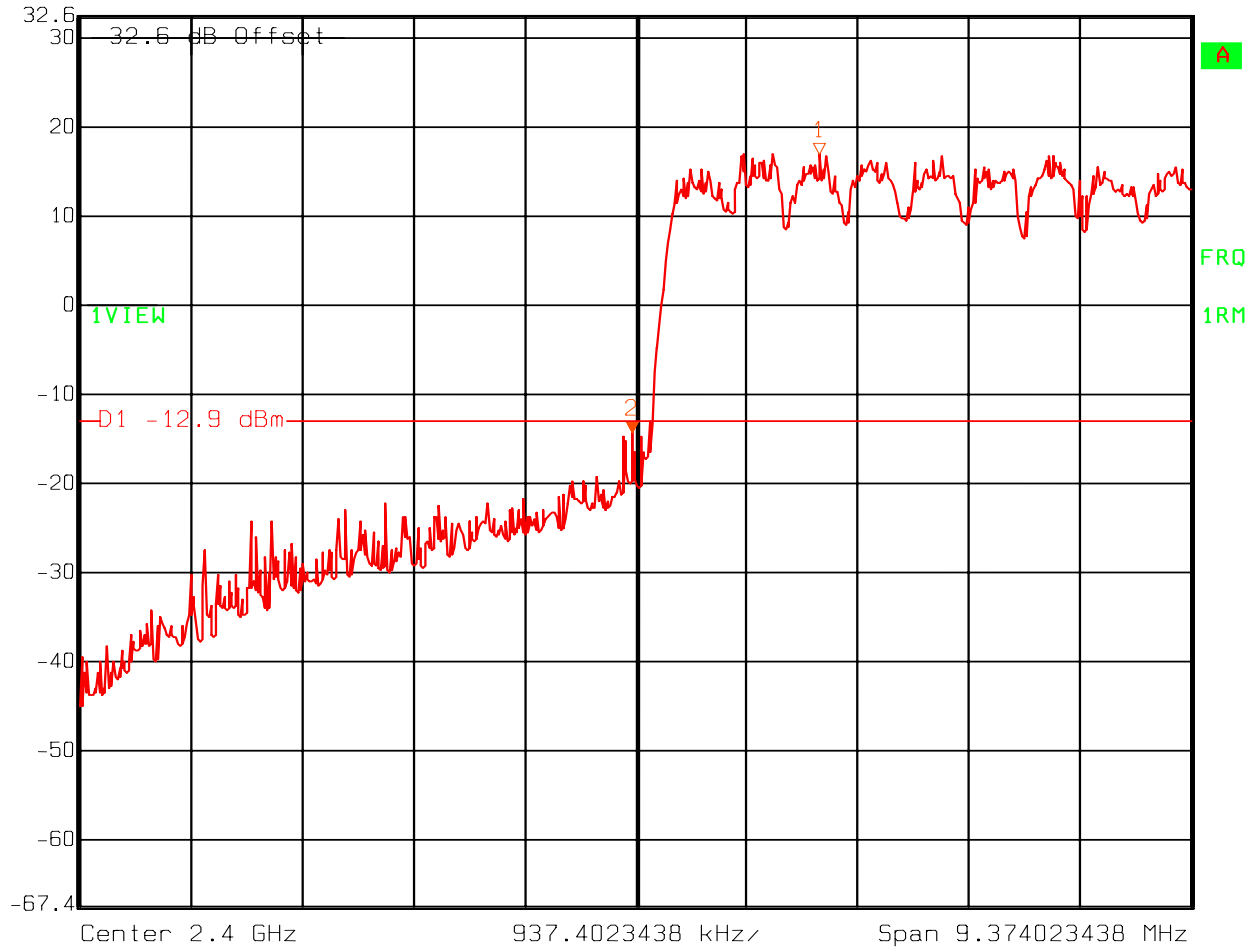
Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Low Channel (single) CDMA Bandedge

	Ref Lvl	32.6 dBm	Marker 2 [T1]	-14.27 dBm	RBW	100 kHz	RF Att	10 dB
			2.39997182 GHz		VBW	1 MHz		
					SWT	5 ms	Unit	dBm



Date: 08.SEP.2006 09:44:04



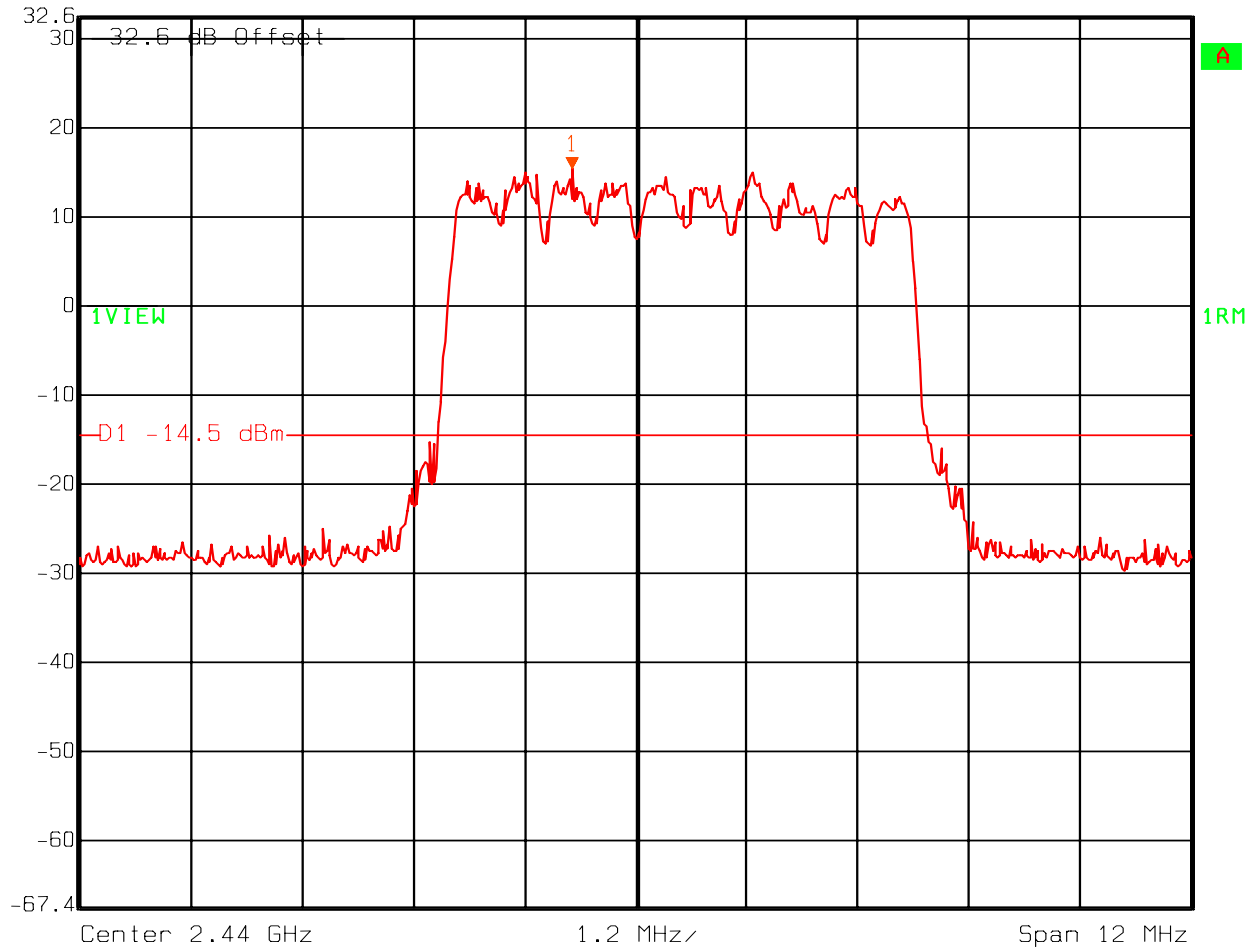
Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

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Mid Channel (single) CDMA

	Ref Lvl	15.56 dBm	RBW	100 kHz	RF Att	30 dB
	32.6 dBm	2.43931463 GHz	VBW	1 MHz		
			SWT	5 ms	Unit	dBm



Date: 08.SEP.2006 10:11:08



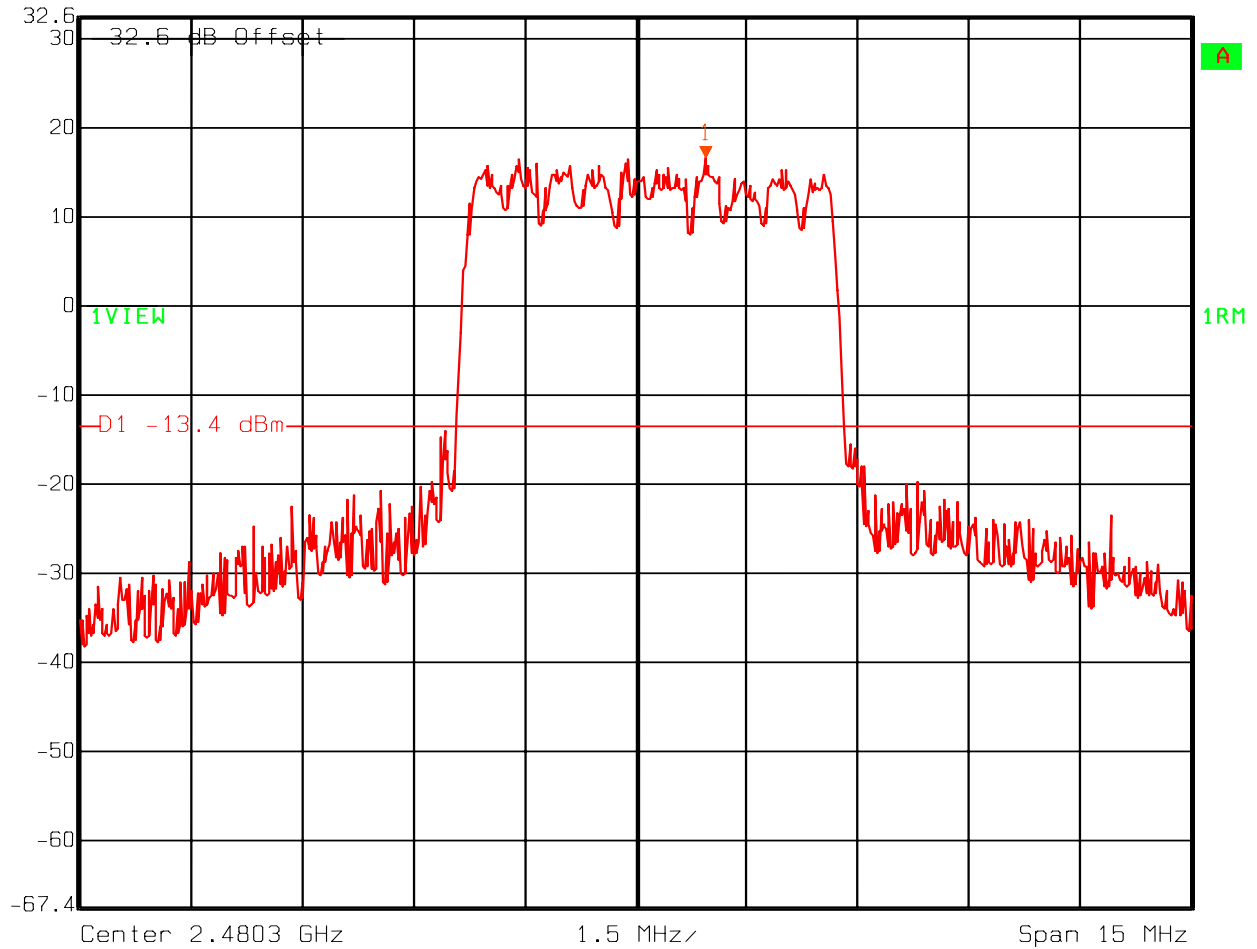
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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

High Channel (single) CDMA

 Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl 16.64 dBm VBW 1 MHz
32.6 dBm 2.48124689 GHz SWT 5 ms Unit dBm



Date: 08.SEP.2006 10:27:46



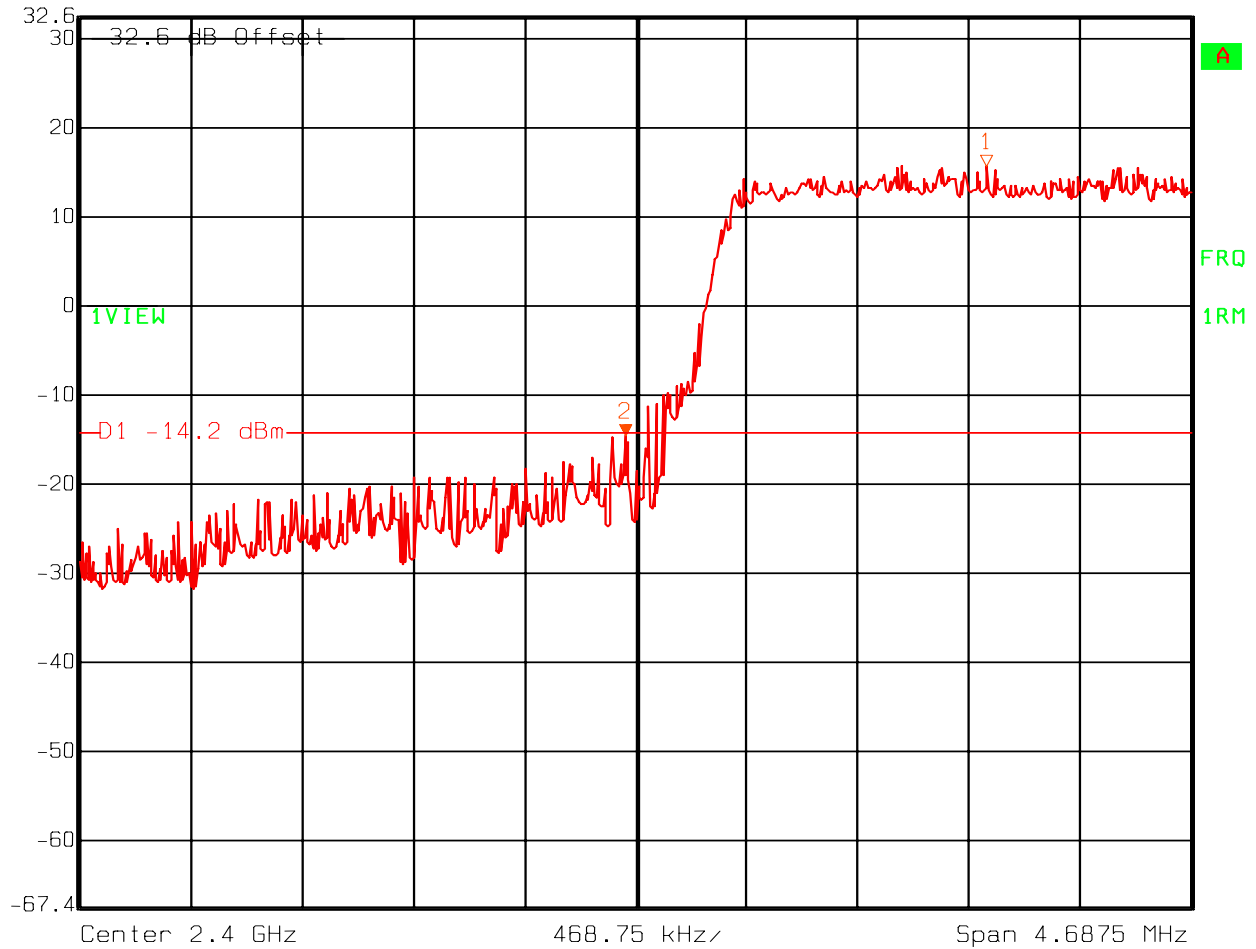
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EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

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Low Channel (single) OFDM Bandedge

	Ref Lvl	-14.57 dBm	RBW	100 kHz	RF Att	10 dB
	32.6 dBm	2.39995773 GHz	VBW	1 MHz		
			SWT	5 ms	Unit	dBm



Date: 08.SEP.2006 11:46:07



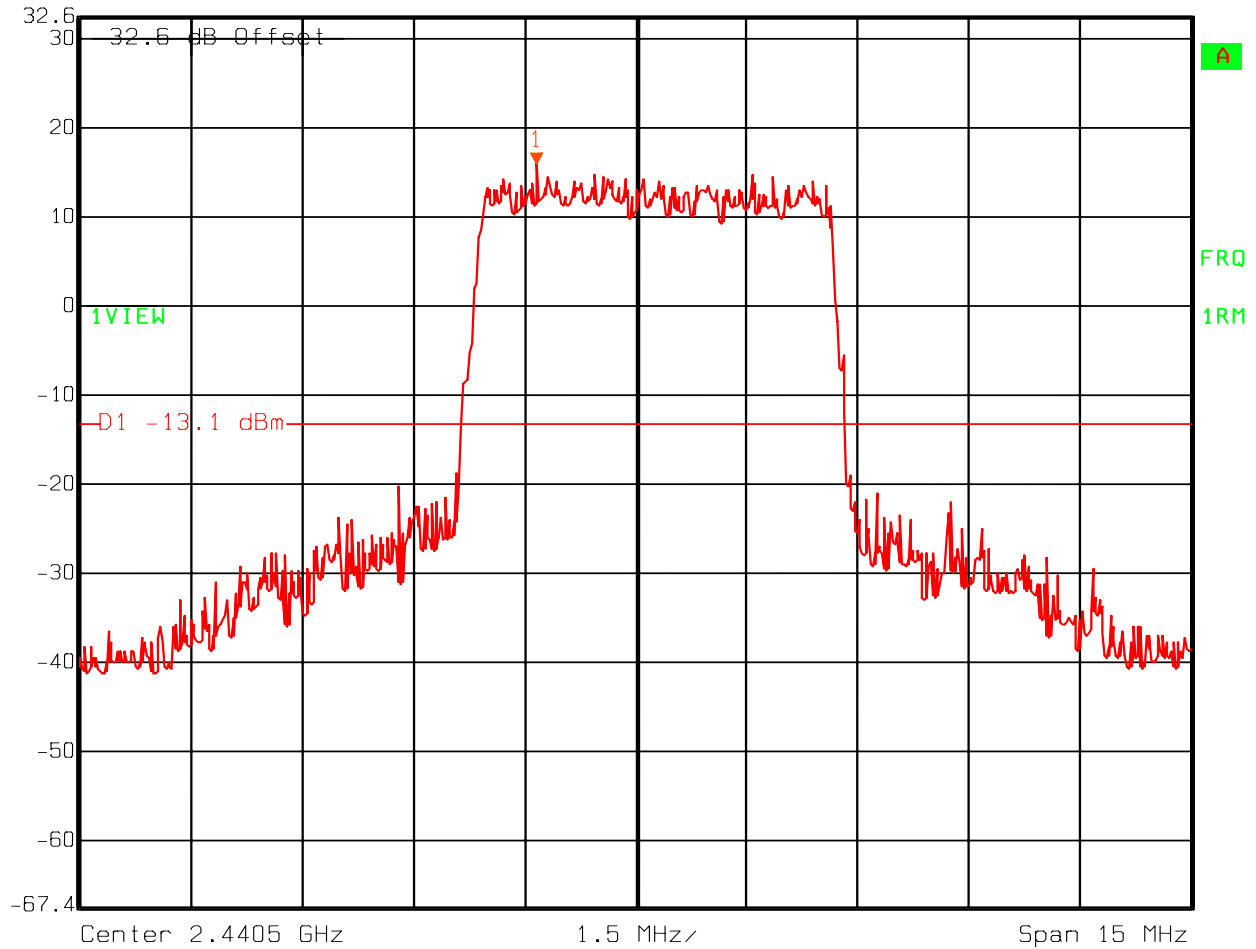
Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Mid Channel (single) OFDM

	Ref Lvl	15.94 dBm	RBW	100 kHz	RF Att	20 dB
	32.6 dBm	2.43916232 GHz	VBW	1 MHz	Unit	dBm
			SWT	5 ms		



Date: 08.SEP.2006 12:51:16



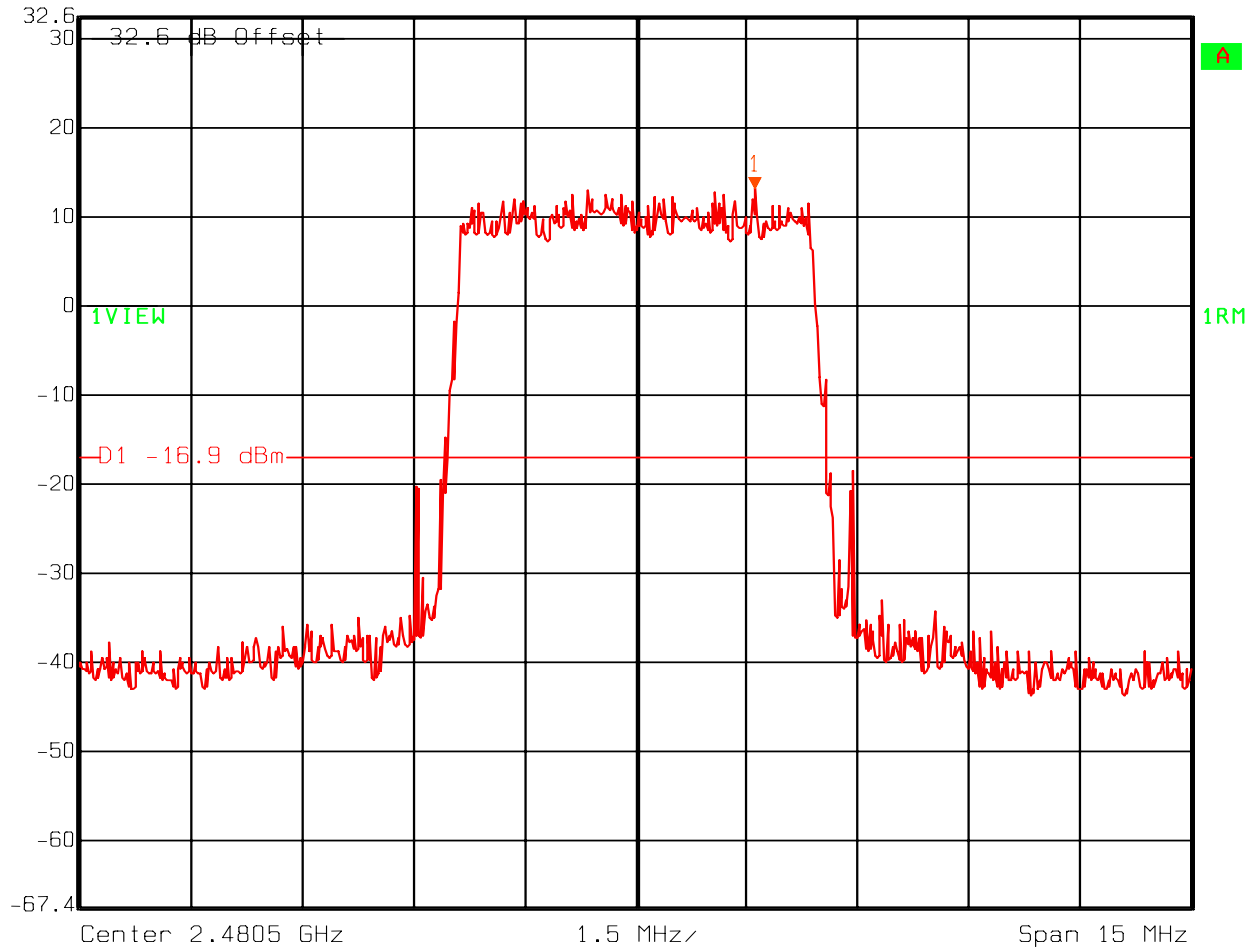
Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

High Channel (single) OFDM

	Ref Lvl	32.6 dBm	Marker 1 [T1]	13.10 dBm	RBW	100 kHz	RF Att	20 dB
			2.48210822 GHz		VBW	1 MHz		
					SWT	5 ms	Unit	dBm



Date: 08.SEP.2006 13:05:19



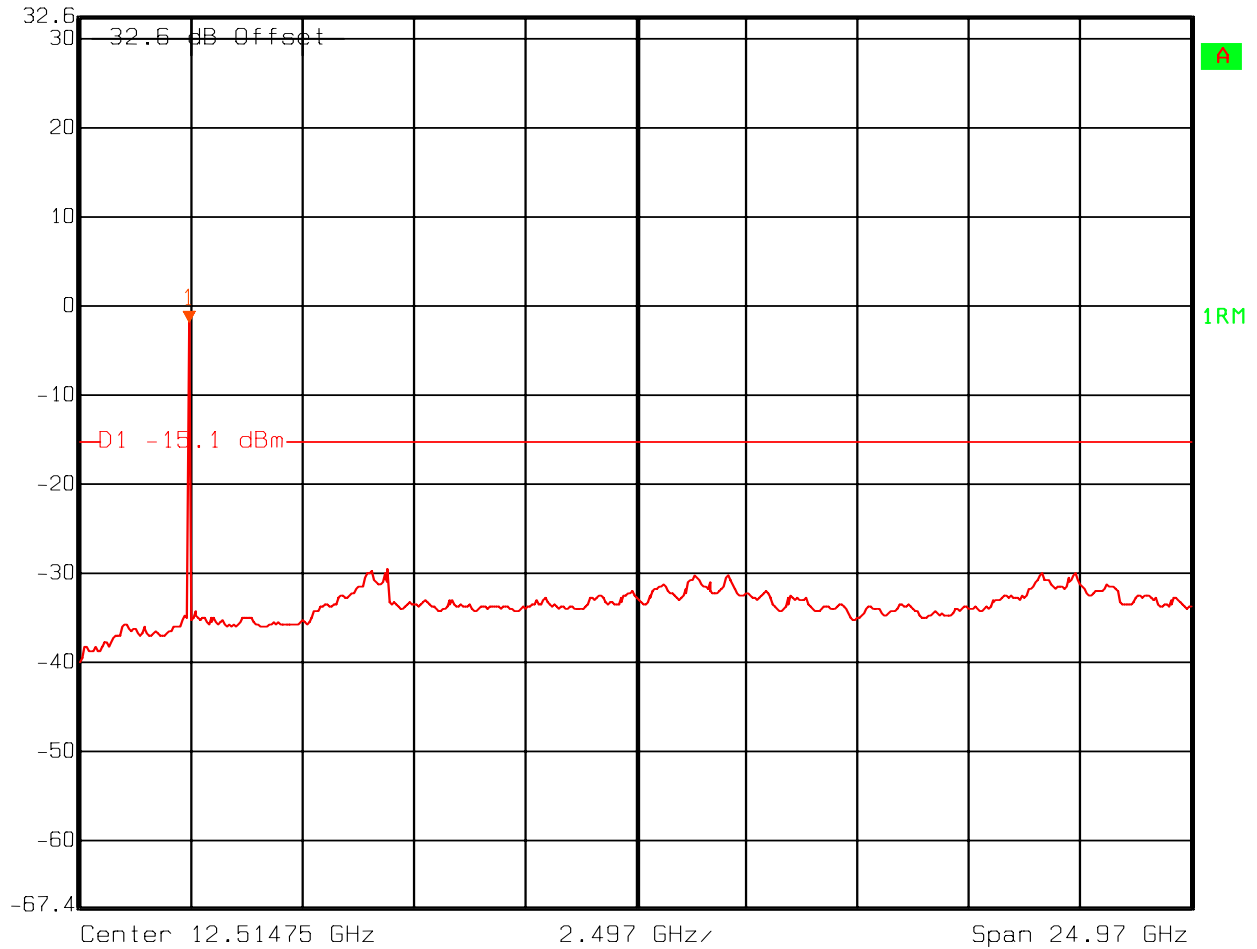
Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

High Channel (single) OFDM 12.5 GHz to 25 GHz

	Ref Lvl	-1.66 dBm	RBW	100 kHz	RF Att	30 dB
	32.6 dBm	2.48100150 GHz	VBW	1 MHz		
			SWT	6.4 s	Unit	dBm



Date: 08.SEP.2006 13:03:02



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Section 7. Spurious Emissions (Restricted Bands)

NAME OF TEST: Spurious Emissions (Restricted Bands)	PARA. NO.: 15.247 (c)
TESTED BY: Kevin Rose	DATE: September 7 06

Test Results: Complies.

Measurement Data: See attached table.

Test Equipment Used:	1464-1304-1016-1484-1485-759-1195-791
-----------------------------	---------------------------------------

Measurement Uncertainty: +/-1.7 dB

Temperature: 21 °C

Relative Humidity: 42 %

RBW=VBW=100 kHz below 1000 MHz

RBW=VBW=1 MHz above 1000 MHz

-6 dB duty cycle correction was used for average measurements.

Customer supplied duty cycle in separate exhibit. (Technical Description)



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Test Data – Radiated Emissions

#	Freq MHz	Rdng dBµV	Cable dB	Cable dB	Horn dB	Dist Table	Corr dBµV/ m	Spec dBµV/m	Margin dB	Polar Ant
1	2483.500	15.8	+0.8	+2.3	+29.0	+0.0	47.9	74.0	-26.1	Vert
								ofdm omni antenna		
2	2483.500 Ave	9.8	+0.8	+2.3	+29.0	+0.0	41.9	54.0	-12.1	Vert
								marker delta was used		
3	2483.500	6.9	+0.8	+2.3	+29.0	+0.0	39.0	74.0	-35.0	Horiz
4	2483.500 Ave	0.9	+0.8	+2.3	+29.0	+0.0	33.0	54.0	-21.0	Horiz
5	2483.500	26.8	+0.8	+2.3	+29.0	+0.0	58.9	74.0	-15.1	Vert
								cdma mode omni antenna		
6	2483.500 Ave	20.6	+0.8	+2.3	+29.0	+0.0	52.7	54.0	-1.3	Vert
7	2483.500	10.7	+0.8	+2.3	+29.0	+0.0	42.8	74.0	-31.2	Horiz
8	2483.500 Ave	4.7	+0.8	+2.3	+29.0	+0.0	36.8	54.0	-17.2	Horiz
9	2483.500	14.3	+0.8	+2.3	+29.0	+0.0	46.4	74.0	-27.6	Horiz
								cdma sector antenna		
10	2483.500 Ave	8.3	+0.8	+2.3	+29.0	+0.0	40.4	54.0	-13.6	Horiz
11	2483.500	25.4	+0.8	+2.3	+29.0	+0.0	57.5	74.0	-16.5	Vert
12	2483.500 Ave	19.4	+0.8	+2.3	+29.0	+0.0	51.5	54.0	-2.5	Horiz
13	2483.500	-4.3	+0.8	+2.3	+29.0	+0.0	27.8	74.0	-46.2	Vert
								ofdm mode sector antenna		
14	2483.500	19.8	+0.8	+2.3	+29.0	+0.0	51.9	74.0	-22.1	Horiz

The spectrum was searched from 30 MHz to the tenth harmonic of the carrier. There were no emissions detected above the noise floor which was at least 20 dB below the specification limit.

Spectrum was searched from 30MHz to 25GHz

Setup Photos





Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Section 8. Peak Power Spectral Density

NAME OF TEST: Peak Power Spectral Density	PARA. NO.: 15.247(d)
TESTED BY: Kevin Rose	DATE: September 7 2006

Test Results: Complies.

Measurement Data: See attached plots.

Equipment Used: 1629-1081-1474-1471



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

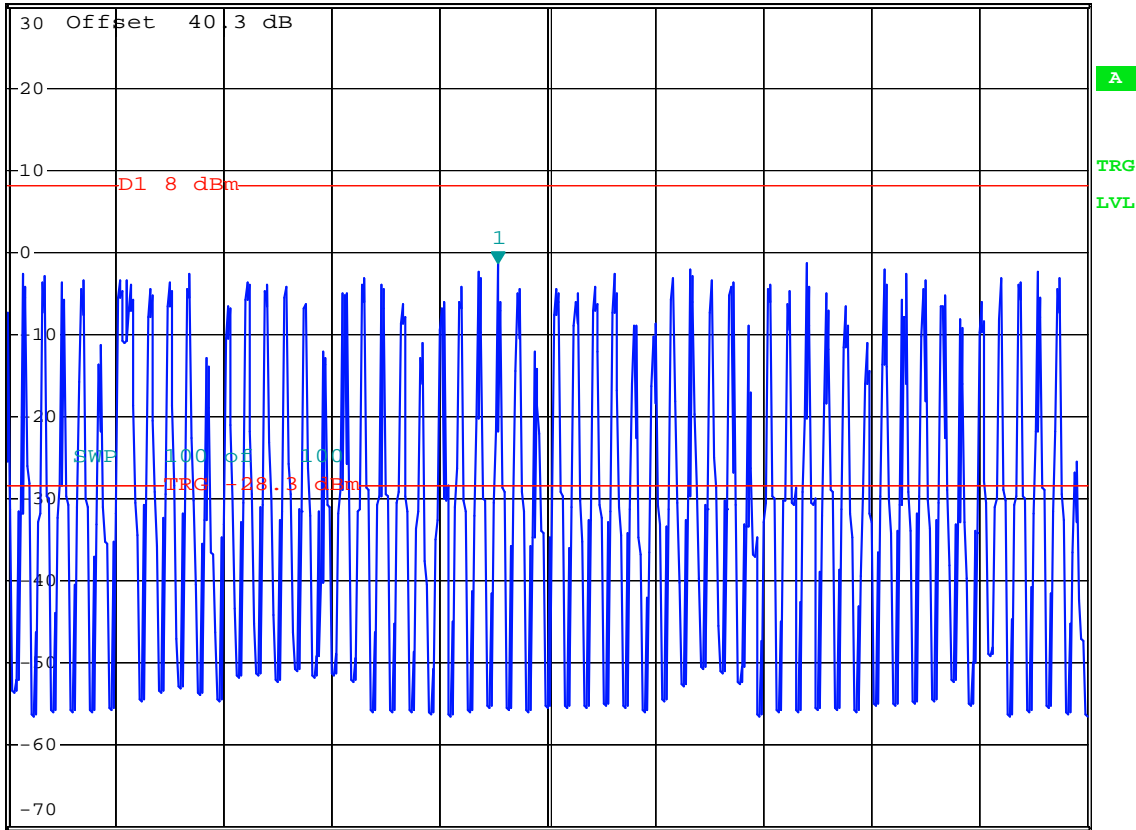
Test Data – Spectral Density HIGH CHANNEL CDMA SINGLE CHANNEL PSD



MARKER 1
2.48032 GHz
Ref 30 dBm
Att 20 dB

*RBW 3 kHz	Marker 1 [T1]
VBW 10 kHz	-1.32 dBm
SWT 560 ms	2.480320000 GHz

1 PK*
VIEW



Center 2.48055 GHz 500 kHz/ Span 5 MHz

Date: 9.JAN.2007 11:46:10



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

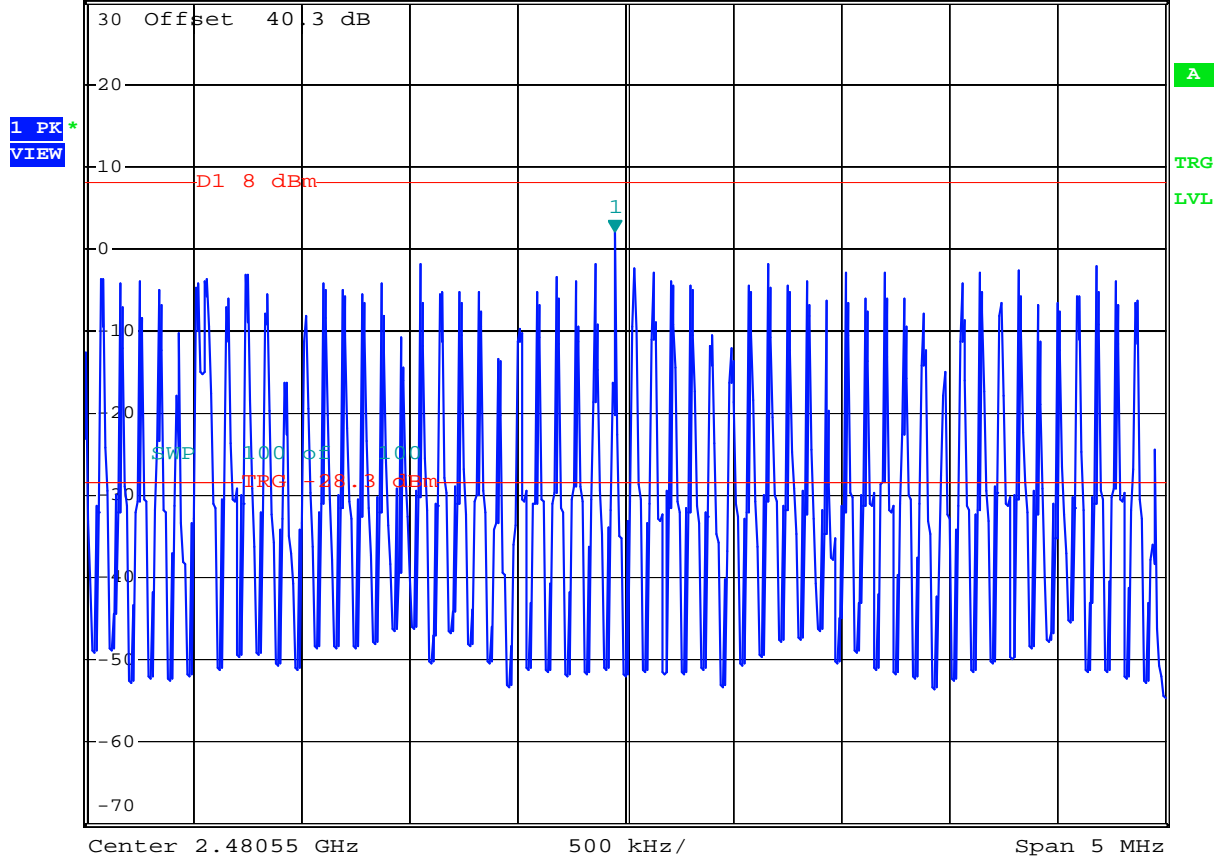
PROJECT NO. 6L0183RUS1 rev5

HIGH CHANNEL CDMA ALL 8 PSD



MARKER 1
2.4805 GHz
Ref 30 dBm
Att 20 dB

*RBW 3 kHz	Marker 1 [T1]
VBW 10 kHz	2.15 dBm
SWT 560 ms	2.480500000 GHz



Date: 9.JAN.2007 11:50:51



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Test Data – Spectral Density

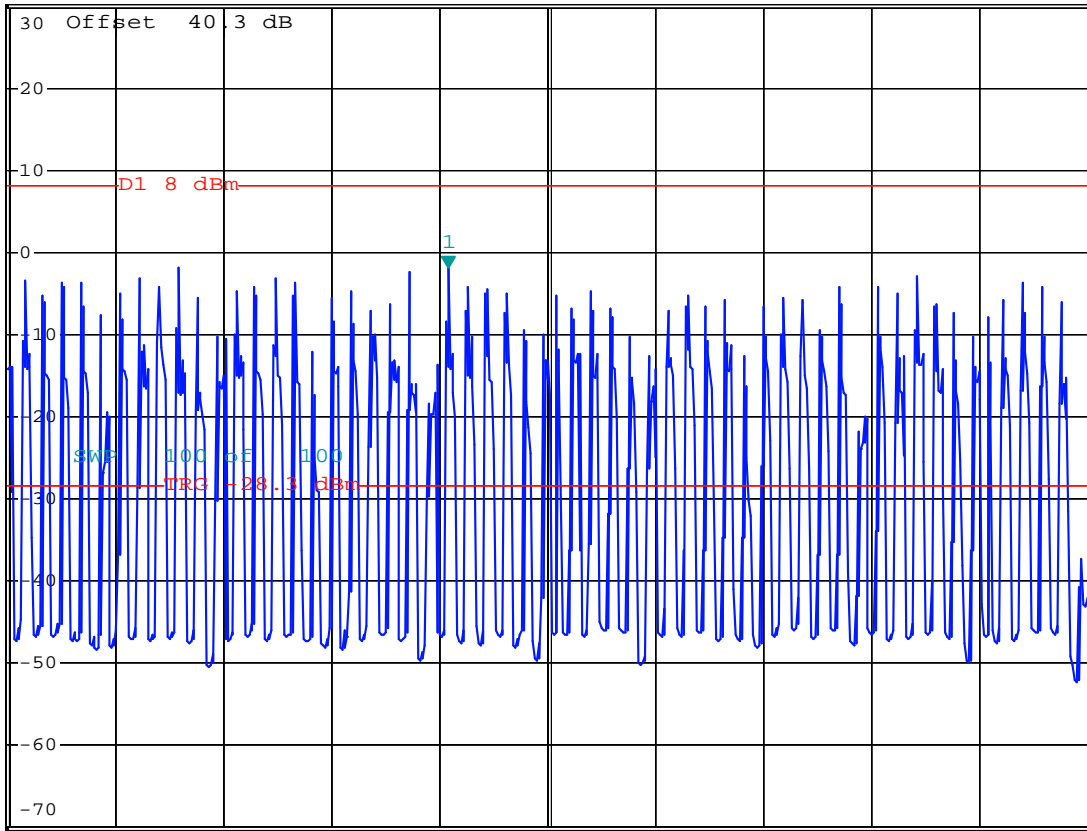
MID CHANNEL CDMA SINGLE PSD



MARKER 1	
2.4401 GHz	
Ref 30 dBm	Att 20 dB

*RBW 3 kHz	Marker 1 [T1]
VBW 10 kHz	-1.94 dBm
SWT 560 ms	2.440100000 GHz

1 PK
VIEW



Center 2.44056 GHz 500 kHz/ Span 5 MHz

Date: 9.JAN.2007 11:35:07



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

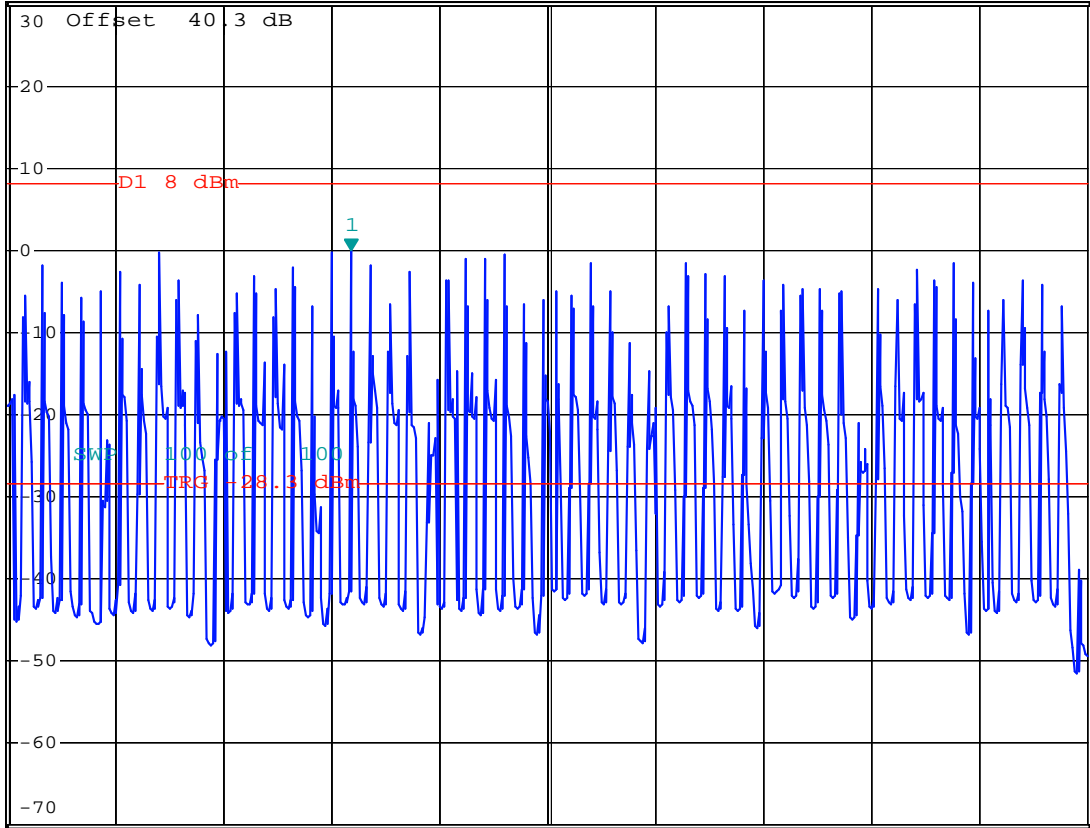
MID CHANNEL CDMA ALL 8 PSD



MARKER 1
2.43965 GHz
Ref 30 dBm
Att 20 dB

*RBW 3 kHz	Marker 1 [T1]
VBW 10 kHz	-0.04 dBm
SWT 560 ms	2.439650000 GHz

1 PK*
VIEW



Center 2.44056 GHz 500 kHz/ Span 5 MHz

Date: 9.JAN.2007 11:38:17



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

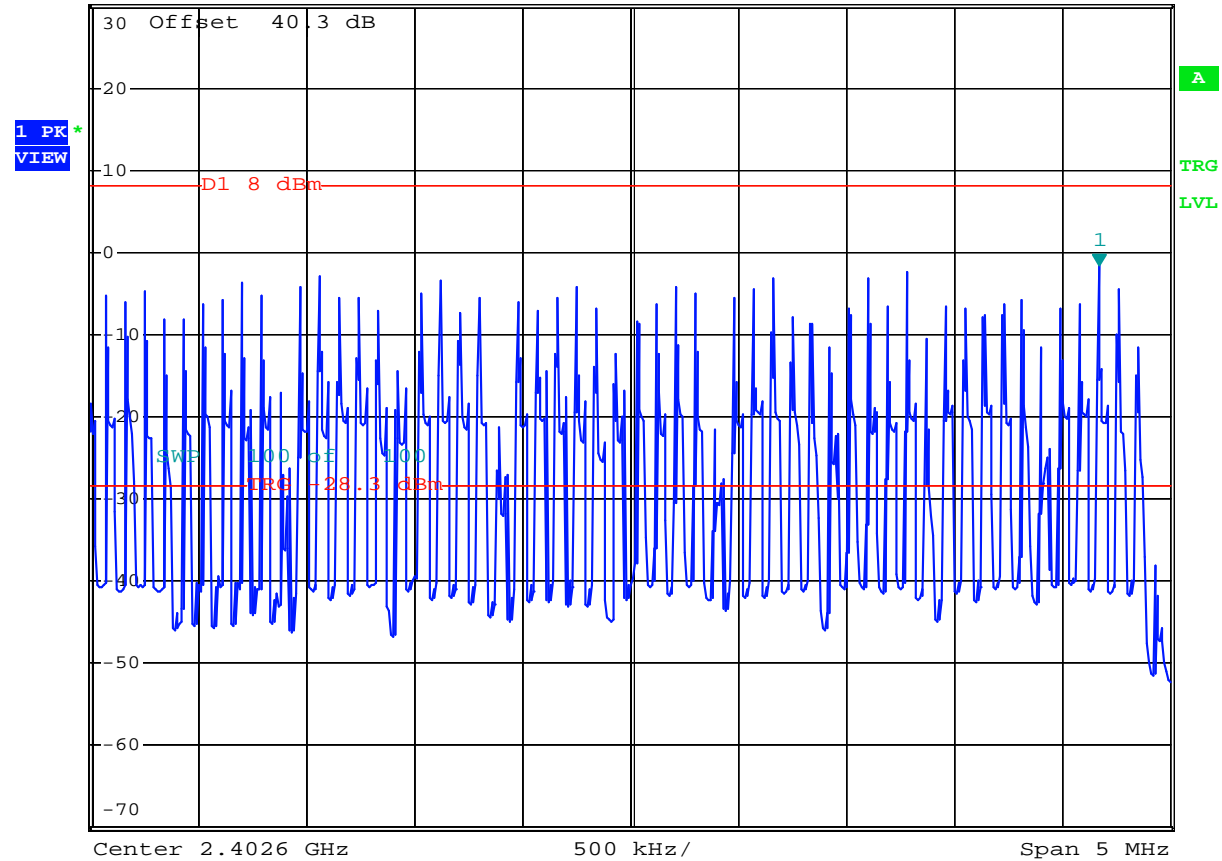
Test Data – Spectral Density

LOW CHANNEL CDMA SINGLE PSD



MARKER 1	
2.40477 GHz	
Ref 30 dBm	Att 20 dB

*RBW 3 kHz	Marker 1 [T1]
VBW 10 kHz	-1.64 dBm
SWT 560 ms	2.404770000 GHz



Date: 9.JAN.2007 11:43:16



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

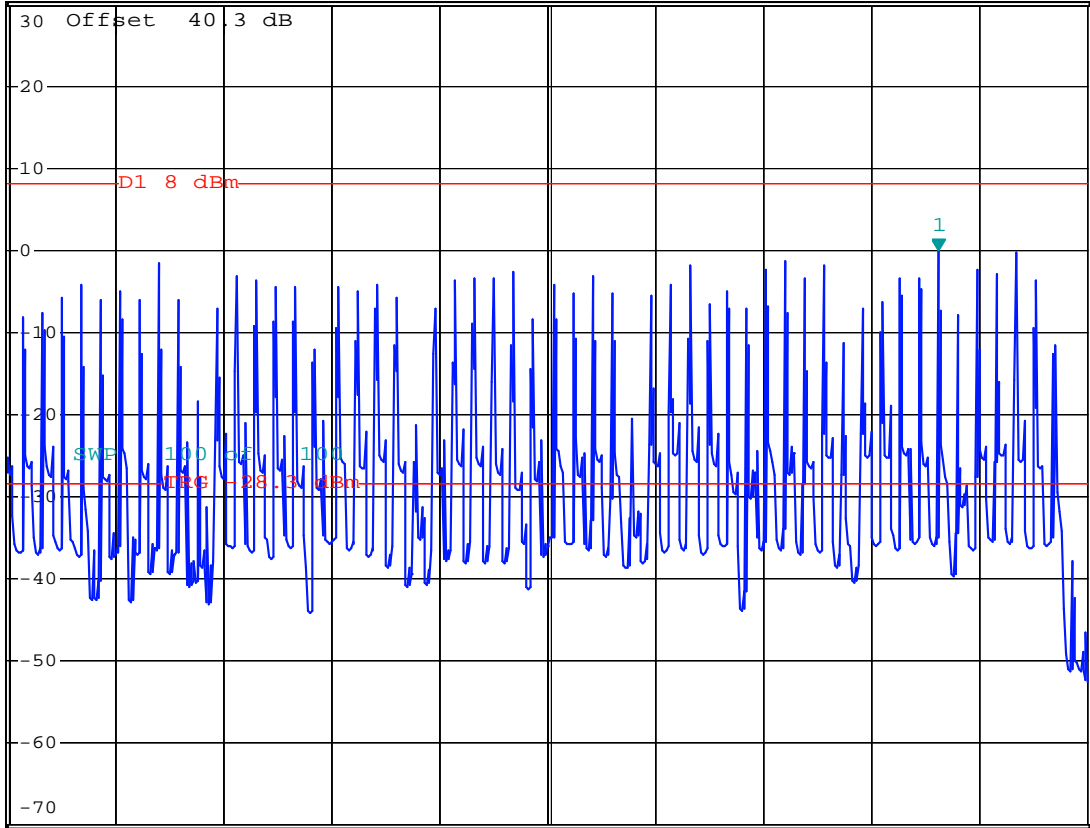
LOW CHANNEL CDMA ALL 8 PSD



MARKER 1
2.40441 GHz
Ref 30 dBm Att 20 dB

*RBW 3 kHz	Marker 1 [T1]
VBW 10 kHz	-0.11 dBm
SWT 560 ms	2.404410000 GHz

1 PK*
VIEW



Center 2.4026 GHz 500 kHz/ Span 5 MHz

Date: 9.JAN.2007 11:41:19



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

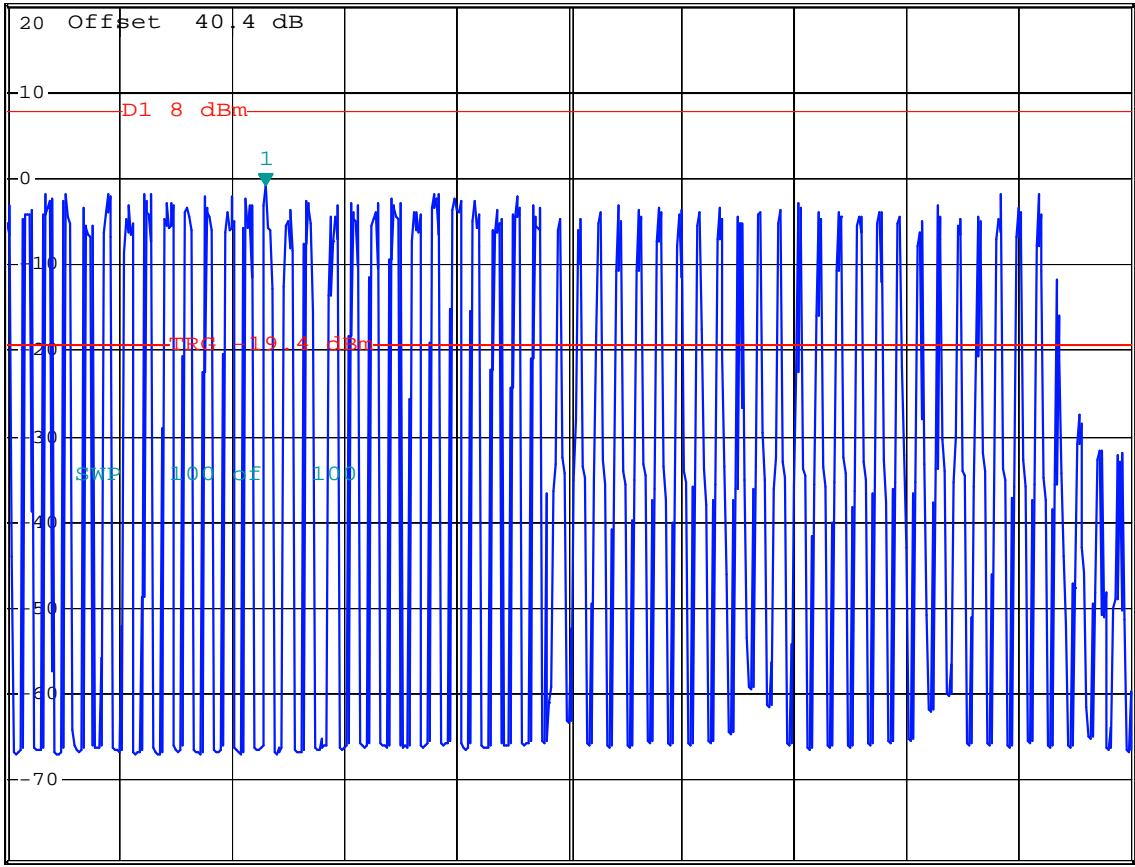
OFDM LOW CHANNEL SINGAL PSD



MARKER 1	
2.40135 GHz	
Ref 20.4 dBm	Att 10 dB

*RBW 3 kHz	Marker 1 [T1]
VBW 10 kHz	-0.83 dBm
SWT 560 ms	2.401350000 GHz

1 PK*
VIEW



Center 2.4027 GHz 500 kHz/ Span 5 MHz

Date: 9.JAN.2007 14:43:39



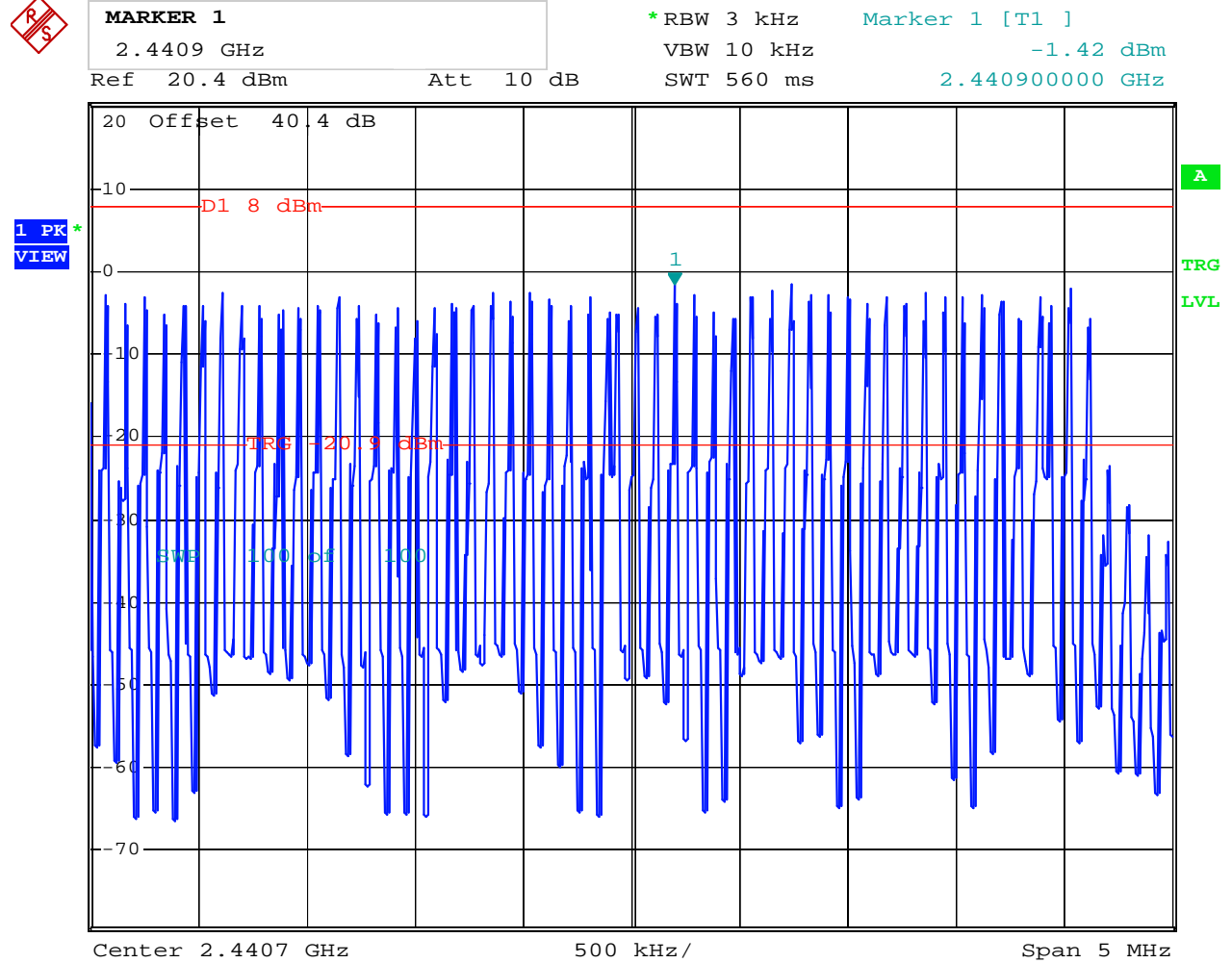
Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Test Data – Spectral Density

OFDM MID CHANNEL Single PSD



Date: 9.JAN.2007 14:34:41



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

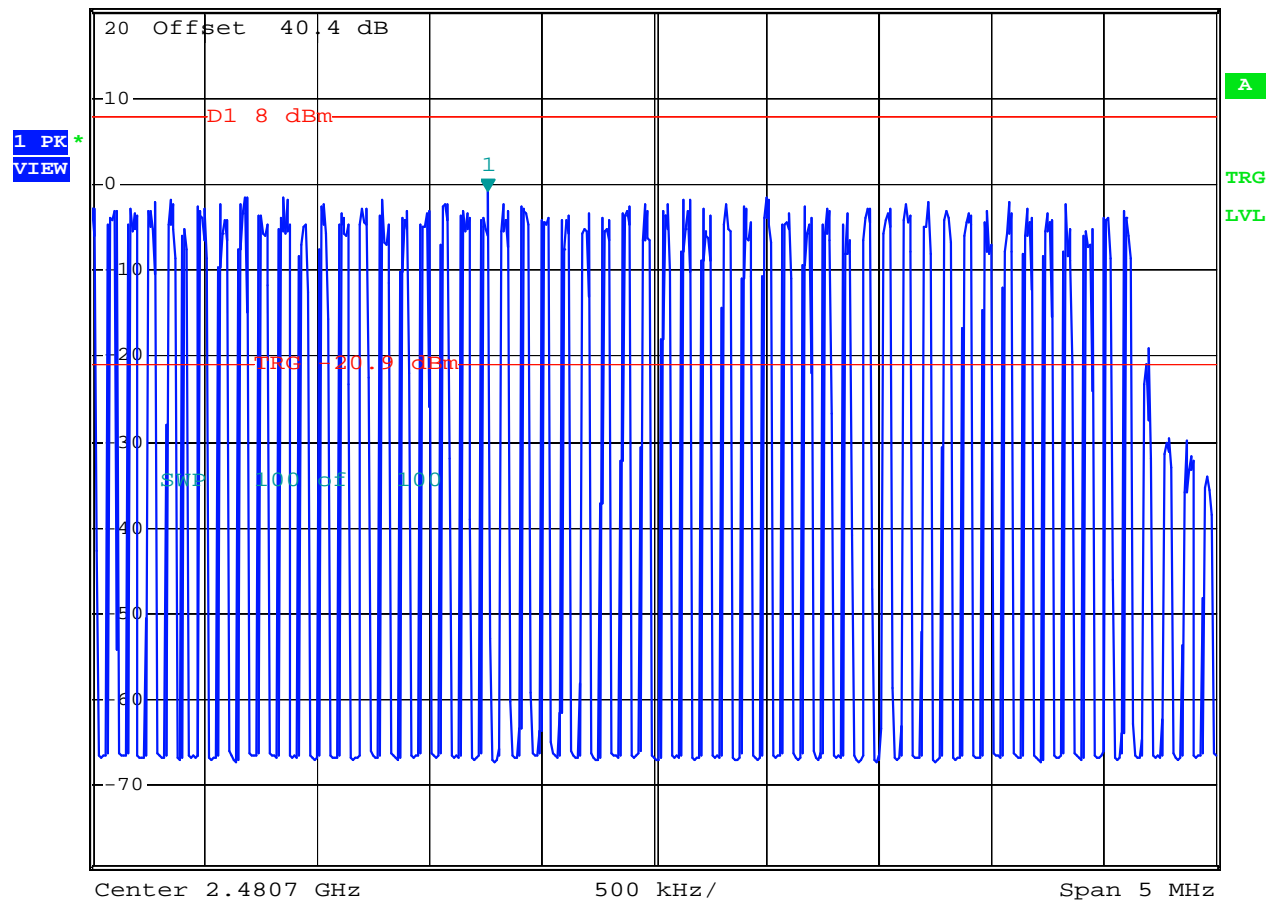
Test Data – Spectral Density

OFDM HIGH CHANNEL SINGAL PSD



MARKER 1
2.47996 GHz
Ref 20.4 dBm
Att 10 dB

*RBW 3 kHz	Marker 1 [T1]
VBW 10 kHz	-0.68 dBm
SWT 560 ms	2.479960000 GHz



Date: 9.JAN.2007 14:31:41

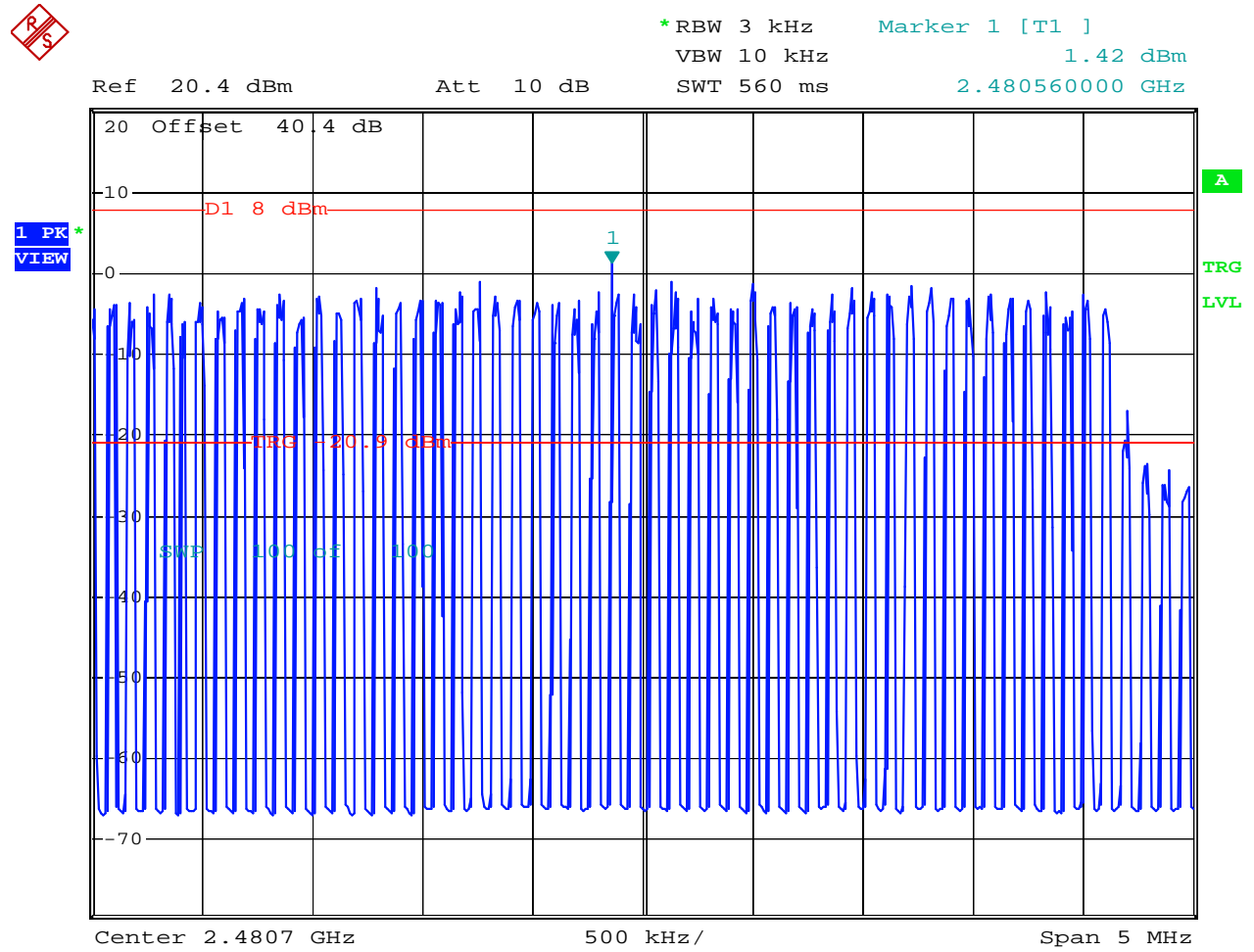


Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

HIGH CHANNEL OFDM ALL 8 CHANNELS PSD



Date: 9.JAN.2007 14:29:55

MID CHANNEL OFDM ALL 8 CHANNELS PSD



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

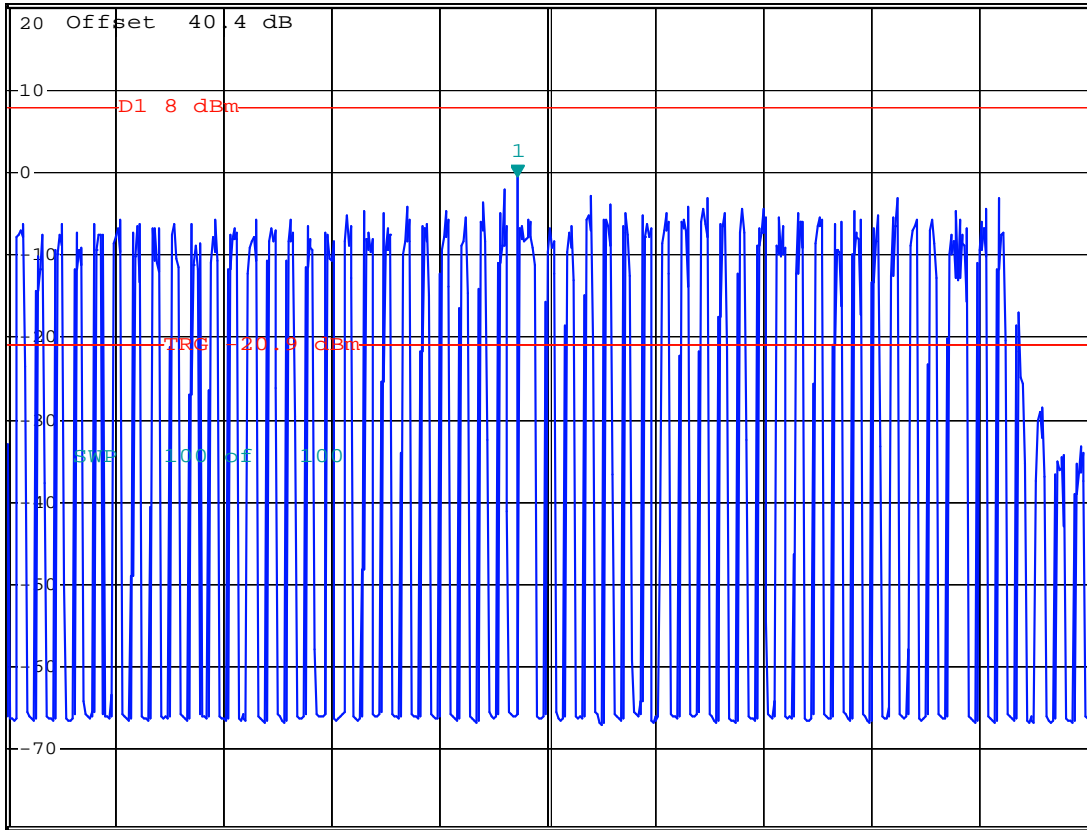
PROJECT NO. 6L0183RUS1 rev5



MARKER 1
2.44056 GHz
Ref 20.4 dBm Att 10 dB

*RBW 3 kHz	Marker 1 [T1]
VBW 10 kHz	-0.58 dBm
SWT 560 ms	2.440560000 GHz

1 PK*
VIEW



Date: 9.JAN.2007 14:36:28

LOW CHANNEL OFDM ALL 8 CHANNELS PSD



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

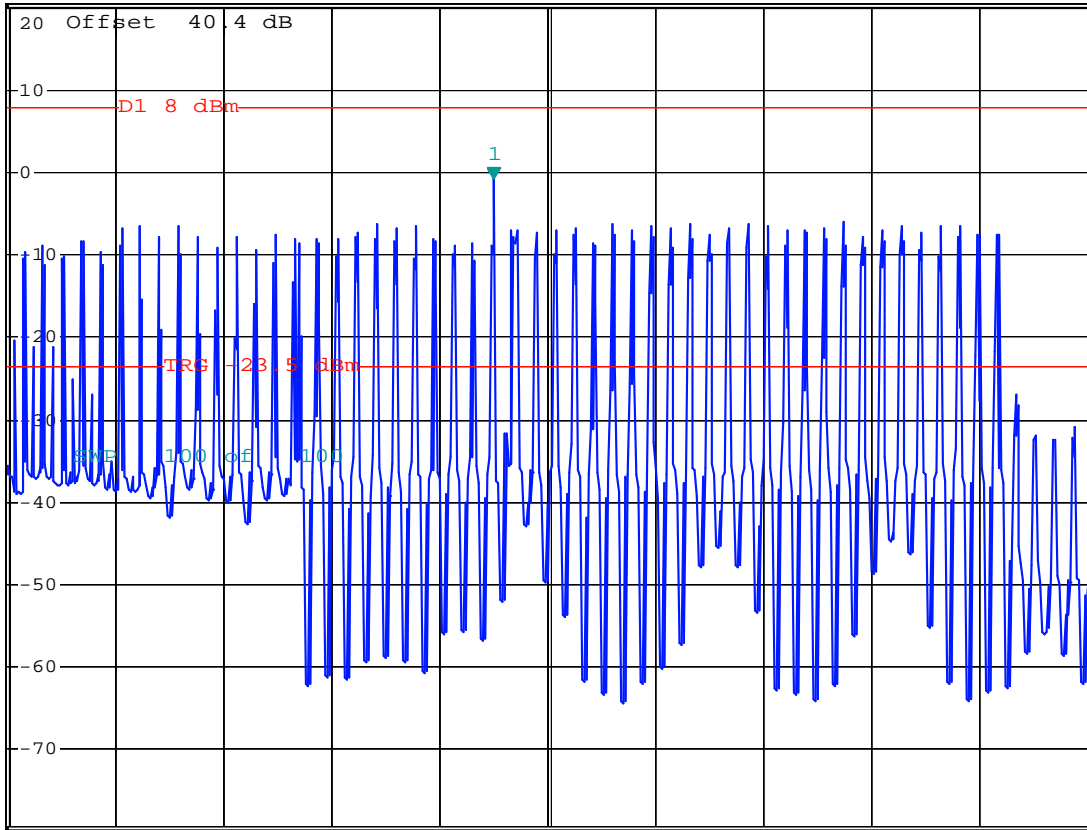
PROJECT NO. 6L0183RUS1 rev5



MARKER 1
 2.4025 GHz
 Ref 20.4 dBm Att 10 dB

*RBW 3 kHz Marker 1 [T1]
 VBW 10 kHz -0.61 dBm
 SWT 560 ms 2.402500000 GHz

1 PK*
VIEW



Date: 9.JAN.2007 14:49:19



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

Section 9. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1029	PEAK POWER METER	HP 8900D	3303U0012	09/14/05	09/14/06
1284	Spectrum analyzer display	Hewlett Packard 8566B	1811A00223	08/04/06	08/04/07
1081	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	06/15/06	06/15/07
1474	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W2	NONE	CBU	N/A
1471	10 db Attenuator DC 18 Ghz	MCL Inc. BW-S10W2 10db-2WDC	NONE	CBU	N/A
1258	LISN .15mhz-30mhz	EMCO 0	1305	04/19/06	04/19/07
1555	Filter high pass 5KHz	Solar Electronics 7930-5.0	933125	04/20/06	04/20/07
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	04/20/06	04/20/07
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	07/28/06	07/28/08
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	04/20/06	04/20/07
1195	Antenna biconical	A.H. SYSTEMS	235	02/10/06	02/10/07
759	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	556	02/13/06	02/13/07
1998	CABLE, 1m	Nemko USA, Inc. RG223	N/A	CBU	N/A
1997	CABLE, 1.5M	Nemko USA, Inc. RG213	N/A	CBU	N/A
1484	Cable	Storm PR90-010-072	N/A	10/02/06	10/02/07
1485	Cable	Storm PR90-010-216	N/A	10/02/06	10/02/07
1659	Spectrum Analyzer	Rhode & Schwarz FSP	973353	01/10/06	01/10/07
674	LIMITER	HP 11947A	3107A02200	04/19/06	04/19/07



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

FCC PART 15, SUBPART C
SPREAD SPECTRUM TRANSMITTER

PROJECT NO. 6L0183RUS1 rev5

ANNEX A - TEST DETAILS



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
---	----------------------

Minimum Standard: §15.207 Conducted limits.

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 mH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of Conducted Emission (MHz)	Limit (dBmV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 mV within the frequency band 535-1705 kHz, as measured using a 50 mH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits as provided in §15.205 and §§15.209, 15.221, 15.223, 15.225 or 15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(2)
----------------------------------	-------------------------

Minimum Standard: The minimum 6 dB bandwidth shall be at least 500 kHz



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

NAME OF TEST: Maximum Peak Output Power	PARA. NO.: 15.247(b)(3)
---	-------------------------

Minimum Standard: The maximum peak output power shall not exceed 1 watt.

If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point to point operation may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceed 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operation may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Direct Measurement Method For Detachable Antennas:

If the antenna is detachable, a peak power meter is used to measure the power output with the transmitter operating into a 50 ohm load. The dBi gain of the antenna(s) employed shall be reported.

Substitution Antenna Method for Integral Antennas:

The peak field strength of the carrier is measured in a worst-case configuration with a RBW > 5 times the occupied bandwidth of the transmitted waveform. For cases where the RBW of the test instrument is not sufficient, the power is measured using a peak power meter instead of the spectrum analyzer.

The RBW of the spectrum analyzer shall be set to a value greater than the measured 6 dB occupied bandwidth of the E.U.T.

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(2)
----------------------------------	-------------------------

Minimum Standard: Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Method Of Measurement:

The spectrum analyzer is set as follows:

- RBW = VBW = 100 kHz.
- Span: Sufficient to display 6 dB bandwidth
- LOG dB/div.: 10 dB
- Sweep: Auto

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

NAME OF TEST: Spurious Emissions(conducted)	PARA. NO.: 15.247(d)
---	----------------------

Minimum Standard: In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits. Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$ @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

THE SPECTRUM IS SEARCHED TO THE 10th HARMONIC OF THE HIGHEST FREQUENCY GENERATED IN THE EUT.

Method Of Measurement:

30 MHz - 10th harmonic plot

RBW: 100 kHz

VBW: 300 kHz

Sweep: Auto

Display line: -20 dBc

Lower Band Edge

RBW: At least 1% of span/div.

VBW: >RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 902 MHz, 2400 MHz, or 5725 MHz

Marker: Peak of fundamental emission

Marker Δ : Peak of highest spurious level below center frequency.

Upper Band Edge

RBW: At least 1% of span/div.

VBW: >RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 928 MHz, 2483.5 MHz, or 5850 MHz

Marker: Peak of fundamental emission

Marker Δ : Peak of highest spurious level above center frequency.

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

NAME OF TEST: Radiated Spurious Emissions	PARA. NO.: 15.247(c)
---	----------------------

Minimum Standard: In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits:

Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$ @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC

15.205 Restricted Bands

MHz	MHz	MHz	GHz
0.09-0.11	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.125-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41	1718		

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom



Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

PROJECT NO. 6L0183RUS1 rev5

NAME OF TEST: Transmitter Power Density	PARA. NO.: 15.247(d)
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Minimum Standard: The transmitted power density averaged over any 1 second interval shall not be greater than +8 dBm in any 3 kHz bandwidth.

Method Of Measurement: The spectrum analyzer is set as follows:

- RBW: 3 kHz
- VBW: >3 kHz
- Span: => measured 6 dB bandwidth
- Sweep: Span(kHz)/3 (i.e. for a span of 1.5 MHz the sweep rate is 1500/3 = 500 sec.
- LOG dB/div.: 2 dB

Note: For devices with spectrum line spacing =< 3 kHz, the RBW of the analyzer is reduced until the spectral lines are resolved. The measurement data is normalized to 3 kHz by summing the power of all the individual spectral lines within a 3 kHz band in linear power units.

For Devices With Integral Antenna:

For devices with non-detachable antennas, the received field strength is peaked and the spectrum analyzer is set as above. The peak emission level is then measured and converted to a field strength by adding the appropriate antenna factor and cable loss. This field strength is then converted to an equivalent isotropic radiated power using the same method as described for Peak Power output.

Number of channels tested:

Tuning Range	Number Of Channels Tested	Channel Location In Band
1 MHz or Less	1	Middle
1 to 10 MHz	2	Top And Bottom
More Than 10 MHz	3	Top, Middle, Bottom



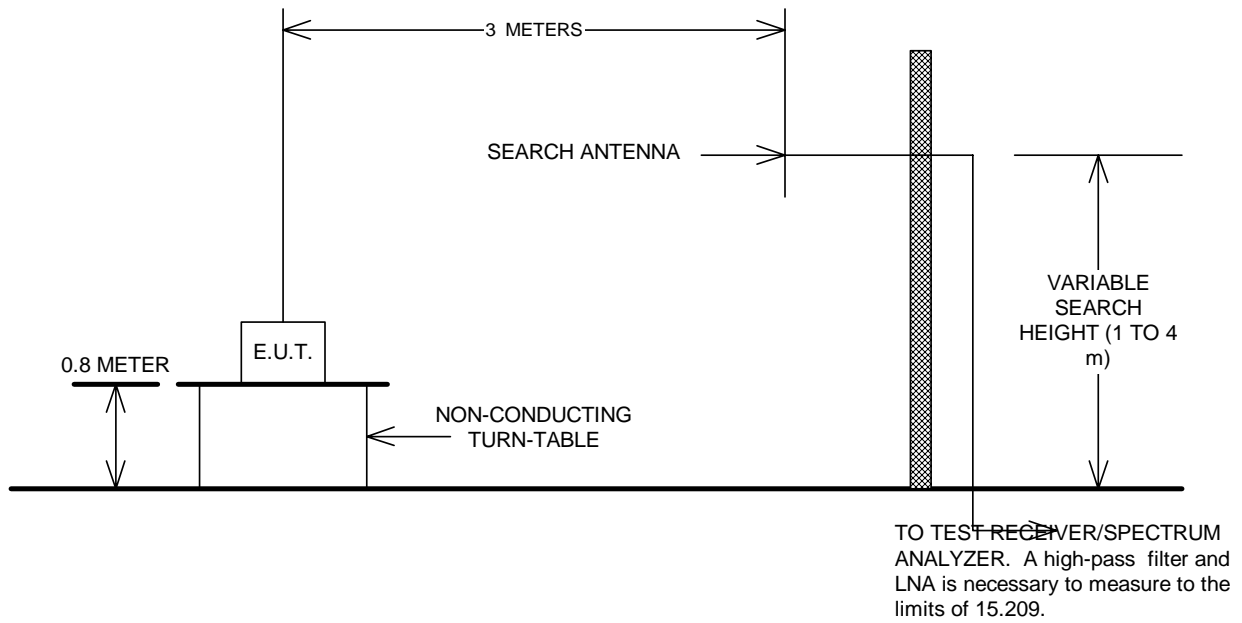
Nemko USA

EQUIPMENT: 2.4-BTS3A-R1 (EUT tested)

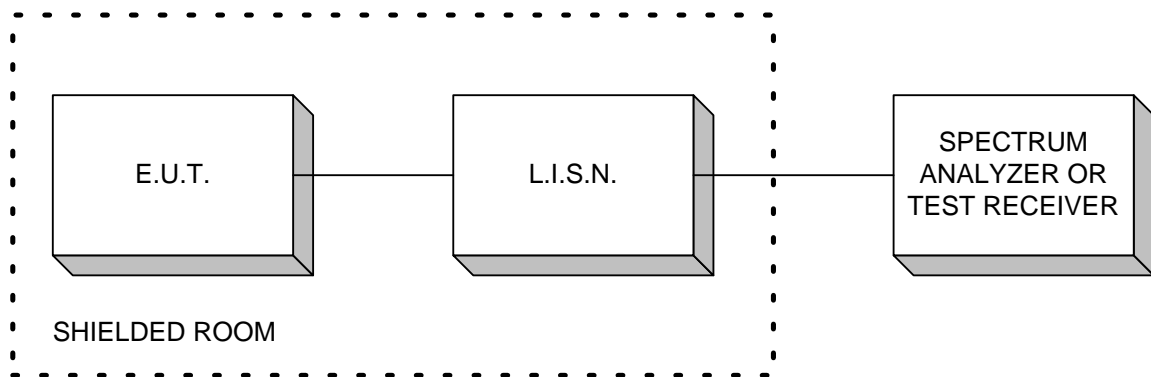
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ANNEX B - TEST DIAGRAMS

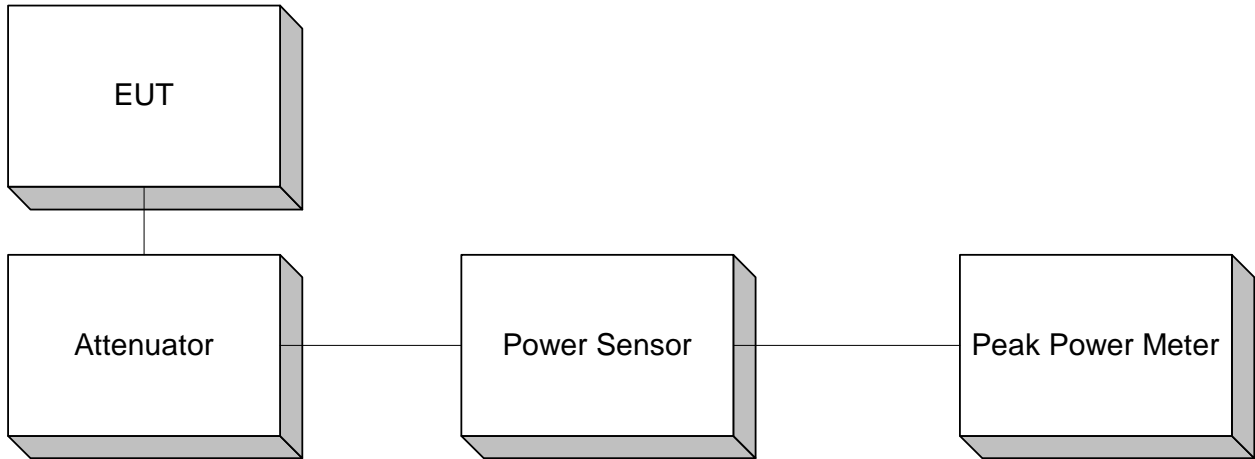
Test Site For Radiated Emissions



Conducted Emissions



Peak Power At Antenna Terminals



**Minimum 6 dB Bandwidth
Peak Power Spectral Density
Spurious Emissions (conducted)**

