

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART E REQUIREMENT**

OF

802.11a/b/g PCI ADAPTER

MODEL No.: DWL-AG520, PC22ag, WPC-D11 v.C1

FCC ID: KA22002080002-2

REPORT NO: 030041-RF-ID

ISSUE DATE: April 07, 2003

Prepared for

D-LINK Corporation

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Hsinchu, Taiwan, R.O.C.**

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VERIFICATION OF COMPLIANCE

Applicant: **D-LINK Corporation**
No.8,Li-shing Road VII, Science-based Industrial Park,Hsinchu,Taiwan

Product Description: IEEE 802.11 a/b/g PCI Adapter

Model No.: DWL-AG520, PC22ag, WPC-D11 v.C1

Serial Number: N/A

File Number: 030041-RF-ID

Date of test: April 2, 2003 ~April 07, 2003

We hereby certify that:

The above equipment was tested by C&C Laboratory Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2000) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements set forth in CFR 47, Part 15, Subpart E. The equipment in the configuration described in this report, shows the measured emission levels emanating from the equipment do not exceed the specified limit. The test results of this report relate only to the tested sample identified in this report.

Approved By

A handwritten signature in black ink that reads 'Vincent Su'.

Vincent Su / Vice Manager
C&C Laboratory Co., Ltd..

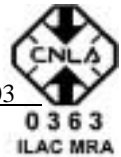


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1. GENERAL INFORMATION

1.1 Product Description

The D-LINK Corporation Model: DWL-AG520, PC22ag, WPC-D11 v.C1 (referred to as the EUT in this report) is a IEEE802.11a/b/g PCI Adapter.

A major technical descriptions of EUT is described as following:

A). Operation Frequency:

5.15 GHz – 5.35 GHz					
	Base Mode			Turbo Mode	
1	5180		1	5210	
2	5200		2	5250	
3	5220		3	5290	
4	5240				
5	5260				
6	5280				
7	5300				
8	5320				

B). Transmit Power: 17dBm

C). Modulation type: OFDM

D). Transition Speed: up to 54Mbps(108Mbps:Turbo mode)

E). Antenna Designation: Tow provides dipole Antenna and Patch antenna; Non-User Replaceable (Fixed), The antennas are diversity transmitter or receiver mode.

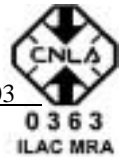
Power Supply: DC3.3V from PCI port of PC system for EUT

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: KA22002080002-2 filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.

1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (2000) and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, and 2.407.



1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of C&C Laboratory, Co., Ltd. No. 81-1, 210 Lane, Pa-de 2nd Road, Lu-Chu Hsiang, Taoyuan, Taiwan, R.O.C.. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2000 and CISPR 22/EN 55022 requirements.

1.5 Measurement Uncertainty

All the measurement equipments and accessories have been carefully selected to meet the maximum measurement uncertainty specified below:

Radiated Emission, valid up to 1GHz	+/- 2.16 dB
Radiated Emission, valid up to 26GHz	+/- 3.5 dB
Power Line Conducted Emission, valid up to 30MHz	+/- 2.8 dB
RF Frequency	+/- 2 X 10 ⁻⁶
RF Peak Power (Conducted)	+/- 0.221 dB
Power Density (Conducted)	+/- 2.0022 dB
Frequency Stability V.S. Voltage	+/- 0.3538 %
Frequency Stability V.S. temperature	+/- 1.8974 %

P.S. Uncertainty figures are valid to confidence level of 95% calculated according to the methods described in the ETR 028[7]

1.6 Special Accessories

Not available for this EUT intended for grant.

1.7 Equipment Modifications

Not available for this EUT intended for grant.



2. SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2000. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-2000.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System
Antenna Antenna

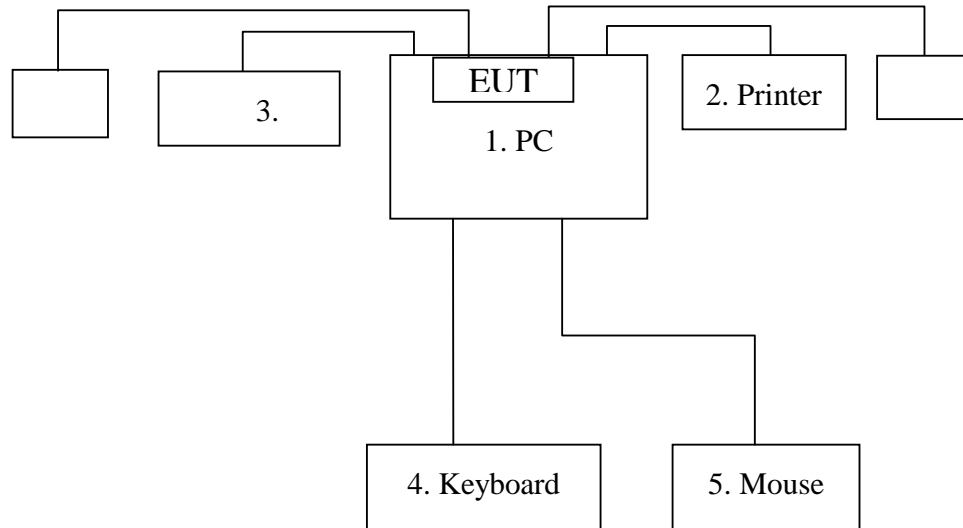


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	FCC ID	Series No.	Data Cable	Power Cord
1	PC	COMPAQ	EVO D300	DoC	6K1BKF83F10T	N/A	Unshielded, 1.8m AC power cable
2	Printer	EPSON	C20SX	N/A	DW4E126664	Shielded, 1.8m	Unshielded, 1.8m
3	Modem	Hayes	231AA	BFJ9D9308US	A08431083982	Shielded, 1.8m	Unshielded, 1.8m
4	Keyboard	IBM	SK-8805	N/A	00037822	Shielded, 1.8m	N/A
5	Mouse	LOGITECH	M-BB48	N/A	LZE01450987	Shielded, 1.8m	N/A



3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.403(c)	Emission Bandwidth	Compliant
§15.407(a)	Power Measurement	Compliant
§15.407(a)	Peak Power Spectral Density Measurement	Compliant
§15.407(a)	Peak Excursion Measurement	Compliant
§15.407(b)	Undesirable Emission – Conducted Measurement	Compliant
§15.407(b)	Undesirable Emission – Radiated Measurement	Compliant
§15.407(c)	Transmission in case of Absence of Information	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.4079d)	Antenna Requirement	Compliant
§1.1310 and §2.1093	RF exposures	Compliant

4. DESCRIPTION OF TEST MODES

The EUT has been tested under engineering test mode. Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Base mode of frequency band 5.15GHz – 5.35GHz: Channel 1(5180MHz)、4(5240MHz)、5(5260MHz) and 8(5320MHz) with 54Mbps highest data rate are chosen for full testing.(A and B antenna port)

Turbo mode of frequency band 5.15GHz – 5.35GHz: Channel 1(5210MHz)、2(5250MHz) and 3(5290MHz) with 108Mbps highest data rate are chosen for full testing.(A and B antenna port)

AC Power port conducted emission and Radiated Spurious Emission are measured with PC.

5. AC POWER LINE CONDUCTED EMISSION TEST

5.1 Standard Applicable

Any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207. According to §15.207 frequency within 150KHz to 30MHz shall not exceed

Frequency range (MHz)	Limits (dBuV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

1. The lower limit shall apply at the transition frequencies
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

5.2 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2000.
2. The EUT was plug-in the host PC system via PCI port. The host PC system was placed on the center of the back edge on the test table. The peripherals like printer, modem, K/B, and mouse were placed on the side of the host PC system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The keyboard was placed directly in the front of the PC, flushed with the front tabletop. The mouse was placed next to the Keyboard, flushed with the back of keyboard.
4. The spacing between the peripherals was 10 centimeters.
5. External I/O cables were draped along the edge of the test table and bundle when necessary.
6. The host PC system was connected with 110Vac/60Hz power source.

5.3 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.



5.4 Measurement Equipment Used:

Conducted Emission Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESHS30	828144/003	08/08/2002	08/07/2003
LISN	R&S	ESH2-Z5	843285/010	10/17/2002	10/16/2003
LISN	EMCO	3825/2	9003-1628	07/26/2002	07/25/2003
Spectrum Analyzer	ADVANTEST	R3261A	91720031	N/A	N/A
2X2 WIRE ISN	R&S	ENY22	100020	06/20/2002	06/19/2003
FOUR WIRE ISN	R&S	ENY41	100006	06/20/2002	06/19/2003

5.5 Measurement Result

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Operation Mode: TX + RX Mode
 Temperature : 21
 Humidity : 56%

Test Date : Mar. 06 2003
 Test By: James

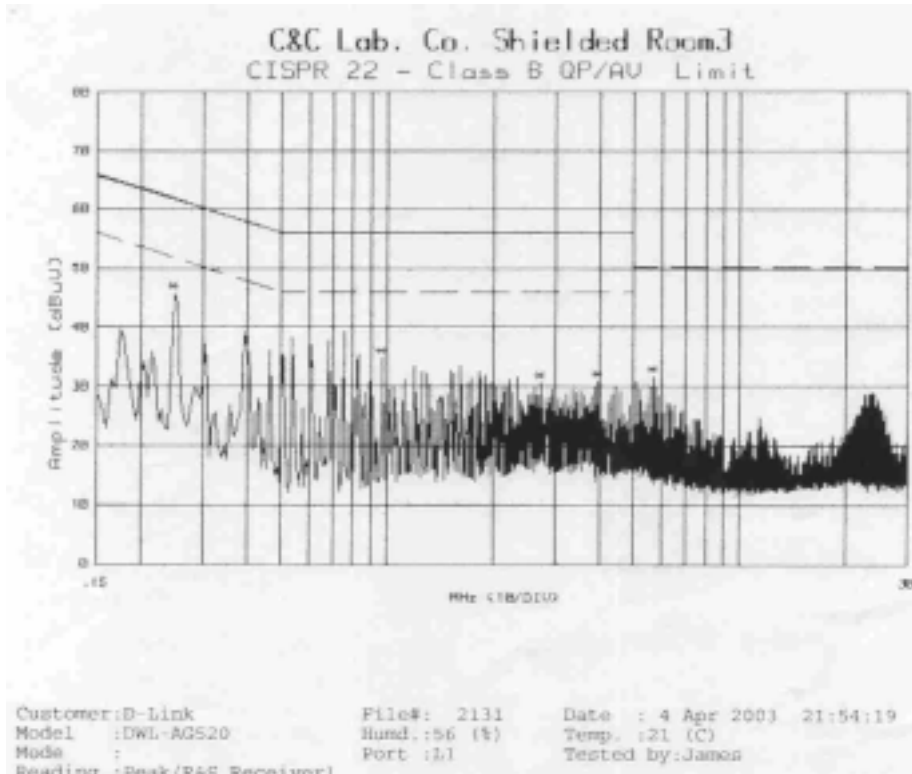
FREQ MHz	Q.P. Raw dBuV	AVG Raw dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.25088	45.00	42.10	61.80	51.80	-16.80	-9.70	L1
0.97241	34.10	32.00	56.00	46.00	-21.90	-14.00	L1
2.7399	28.90	25.10	56.00	46.00	-27.10	-20.90	L1
3.96183	30.30	26.00	60.00	50.00	-29.70	-24.00	L1
5.68933	30.20	28.40	60.00	50.00	-29.80	-21.60	L1
23.97816	27.60	27.10	60.00	50.00	-32.40	-22.90	L1
0.25164	44.10	41.50	61.80	51.80	-17.70	-10.30	L2
0.97126	33.50	31.90	56.00	46.00	-22.50	-14.10	L2
5.07998	32.50	30.60	56.00	46.00	-23.50	-15.40	L2
5.68903	31.20	29.60	60.00	50.00	-28.80	-20.40	L2
23.57191	31.30	30.50	60.00	50.00	-28.70	-19.50	L2
23.97742	31.20	30.70	60.00	50.00	-28.80	-19.30	L2

Remark :

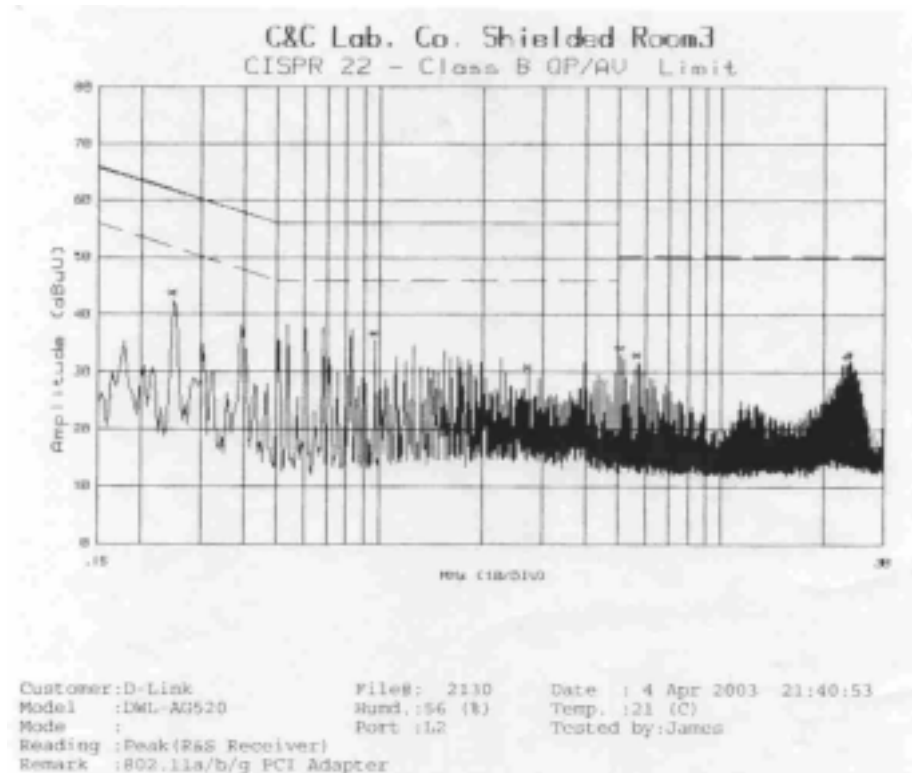
- (1) Measuring frequencies from 0.15 MHz to 30MHz.
- (2) The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-Peak detector and Average detector.
- (3) “---” denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.
- (4) The IF bandwidth of SPA between 0.15MHz to 30MHz was 10KHz;
The IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9KHz;
- (5) L1 = Line One (Hot side) / L2 = Line Two (Neutral side)



Conducted Emission Test Data L1



Conducted Emission Test Data L2



6. 26 dB EMISSION Bandwidth Measurement

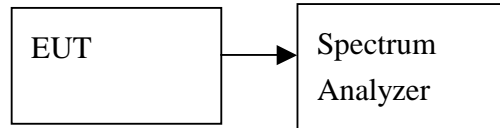
6.1 Standard Applicable

According to §15.403(C). No Limit required.

6.2 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	Advantest	R3182	110600647	11/16/2002	11/15/2003
Spectrum Analyzer	R&S	FSP30	1093.4495.30	07/23/2002	07/22/2003

6.3 Test Set-up:



The EUT was connected to a spectrum analyzer through a 50 Ω RF cable.

6.4 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=1%EBW, VBW = RBW, Span=50MHz/100MHz(Turbo Mode), Sweep=auto.
4. Mark the peak frequency and -26dBc (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

6.5 Measurement Result

A-antenna Port

Base Mode of 5.15GHz - 5.35GHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Power Limit (dBm)
Low	5180	31.34	14.96	18.96	17
Middle	5240	32.86	15.17	19.17	17
Middle	5260	35.03	15.44	26.44	24
High	5320	31.42	14.97	25.97	24

Turbo Mode of 5.15GHz – 5.35GHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Power Limit (dBm)
Low	5210	62.6	17.97	21.97	17
Middle	5250	61.2	17.87	21.87	17
High	5290	58.6	17.68	28.68	24

B-antenna port

Base Mode of 5.15GHz - 5.35GHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Power Limit (dBm)
Low	5180	31.5	14.98	18.98	17
Middle	5240	35.03	15.44	19.44	17
Middle	5260	32.7	15.15	26.15	24
High	5320	32.85	15.17	26.17	24

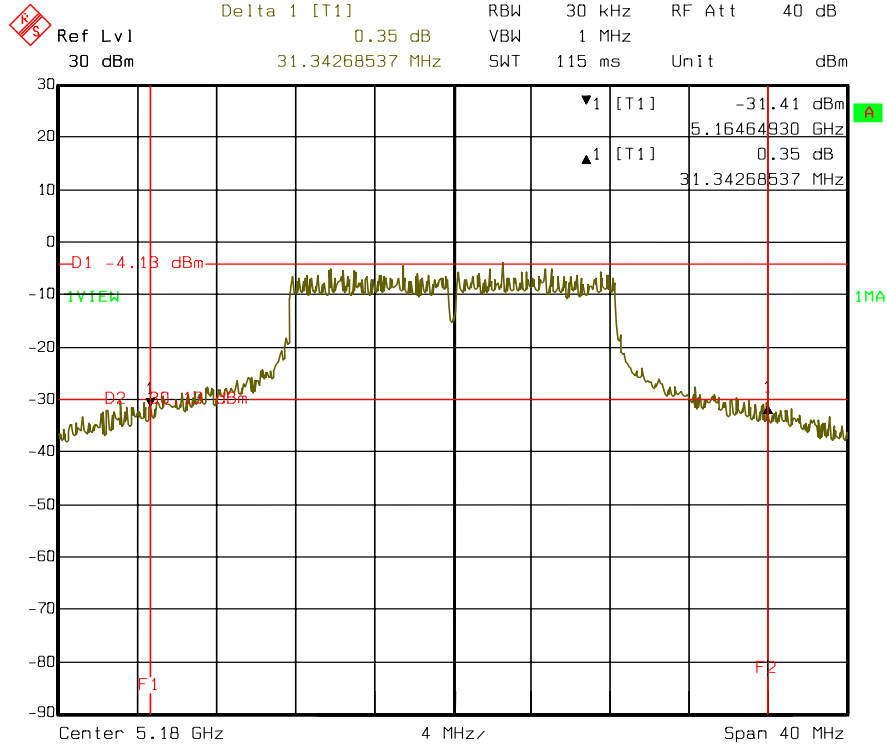
Turbo Mode of 5.15GHz – 5.35GHz

Channel	Frequency (MHz)	Bandwidth(B) (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Power Limit (dBm)
Low	5210	64.16	18.07	22.07	17
Middle	5250	64	18.06	22.06	17
High	5290	65.28	18.15	29.15	24



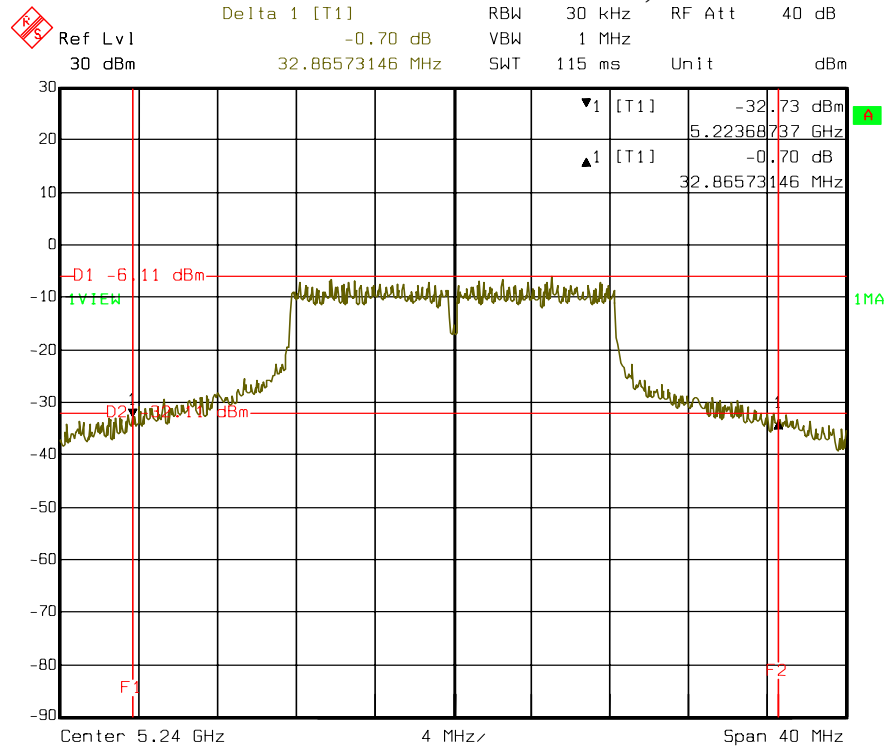
A-antenna Port

Base Mode of 5.15GHz - 5.35 GHz, CH-Low



Date: 24.APR.2003 19:46:50

Base Mode of 5.15GHz - 5.35 GHz, CH-Mid

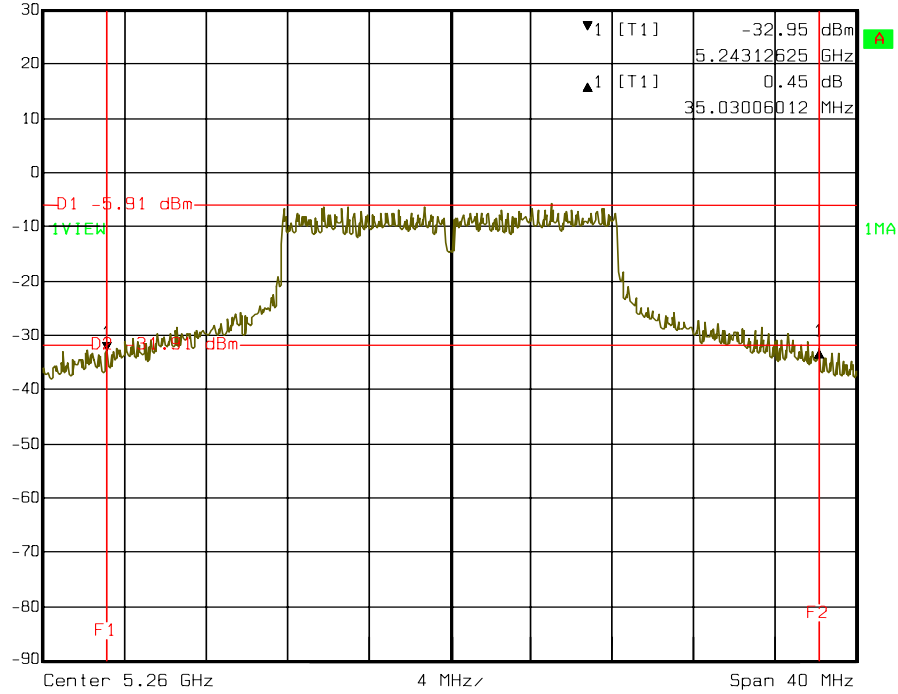


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Base Mode of 5.15GHz - 5.35 GHz, CH-Mid

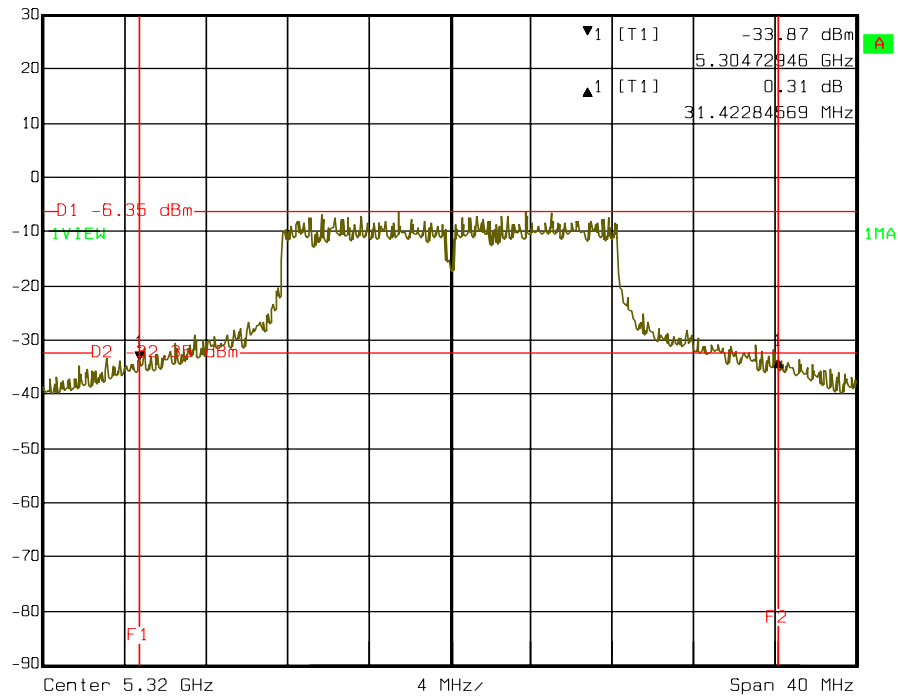
RS
 Delta 1 [T1] RBW 30 kHz RF Att 40 dB
 Ref Lvl 0.45 dB VBW 1 MHz
 30 dBm 35.03006012 MHz SWT 115 ms Unit dBm



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Base Mode of 5.15GHz - 5.35 GHz, CH-High

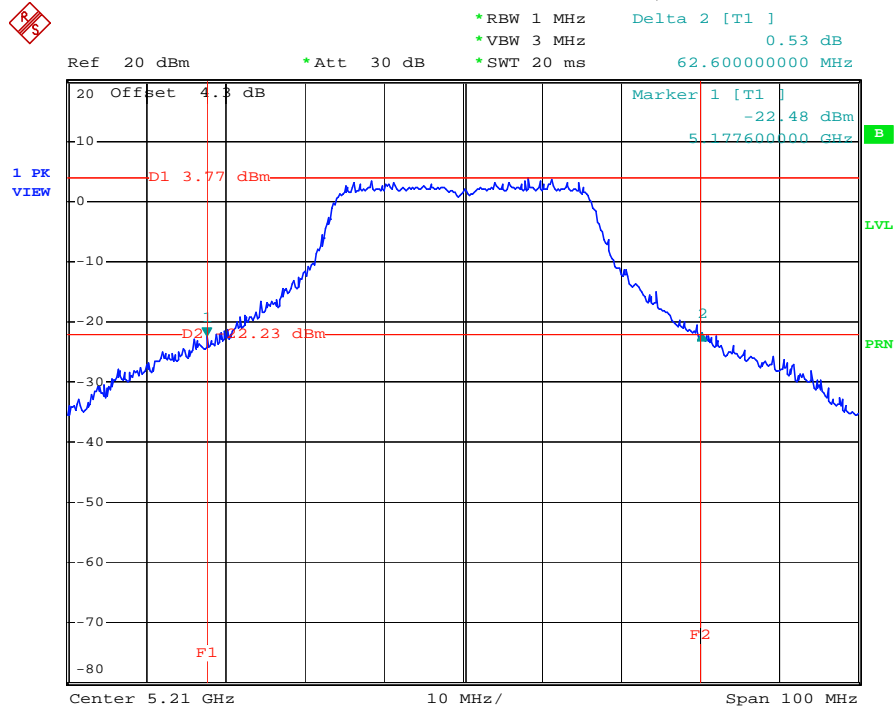
RS
 Delta 1 [T1] RBW 30 kHz RF Att 40 dB
 Ref Lvl 0.31 dB VBW 1 MHz
 30 dBm 31.42284569 MHz SWT 115 ms Unit dBm



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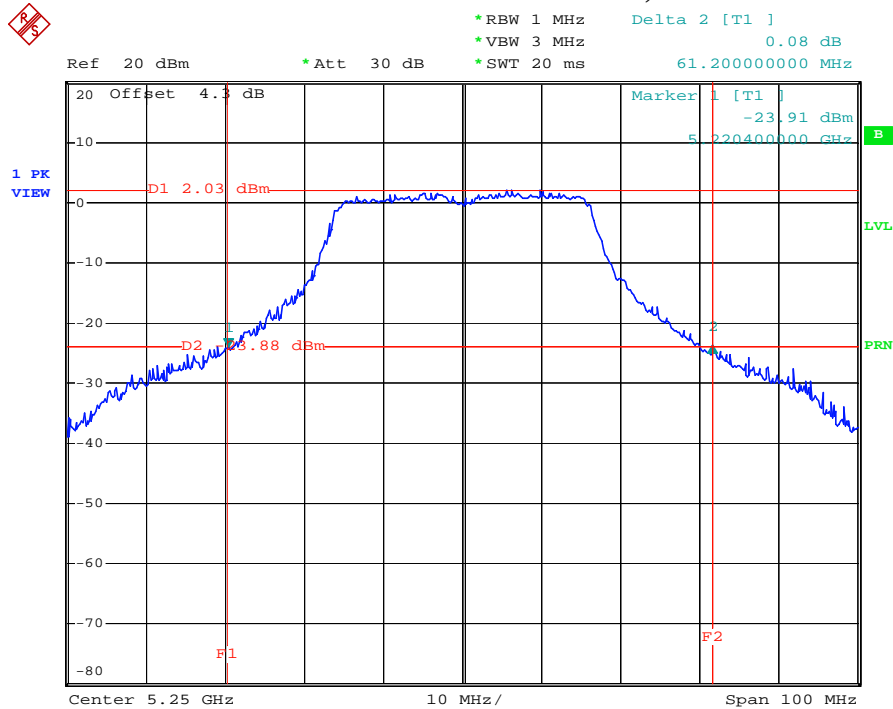


Turbo Mode of 5.15GHz - 5.35 GHz, CH-Low



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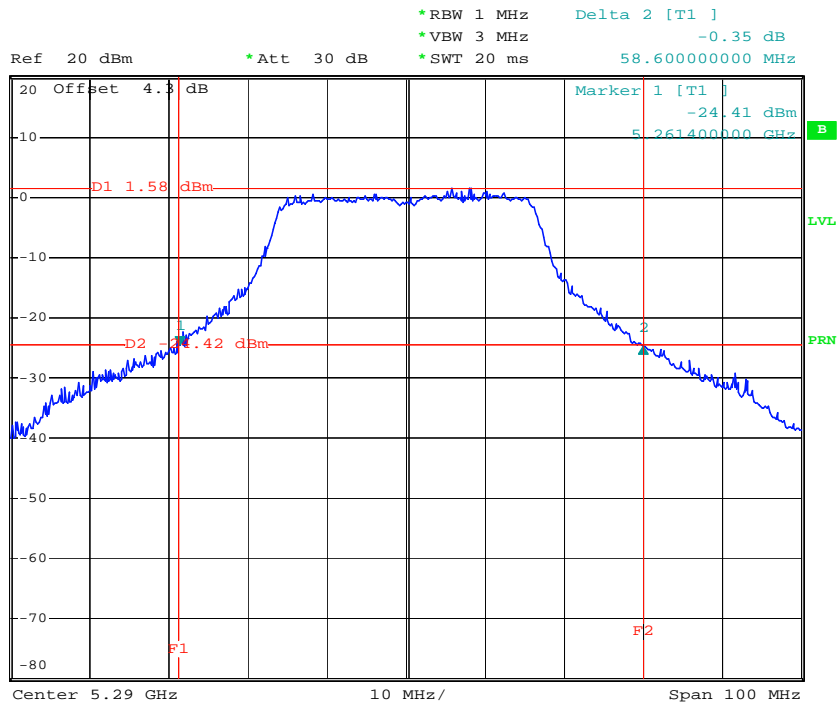
Turbo Mode of 5.15GHz - 5.35 GHz, CH-Mid



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Turbo Mode of 5.15GHz - 5.35 GHz, CH-High

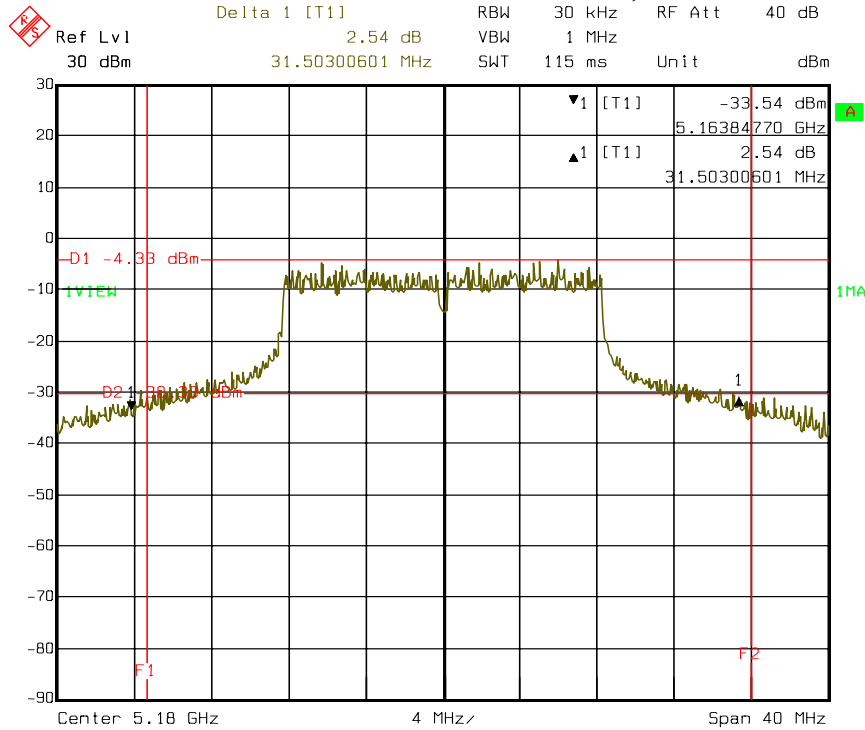


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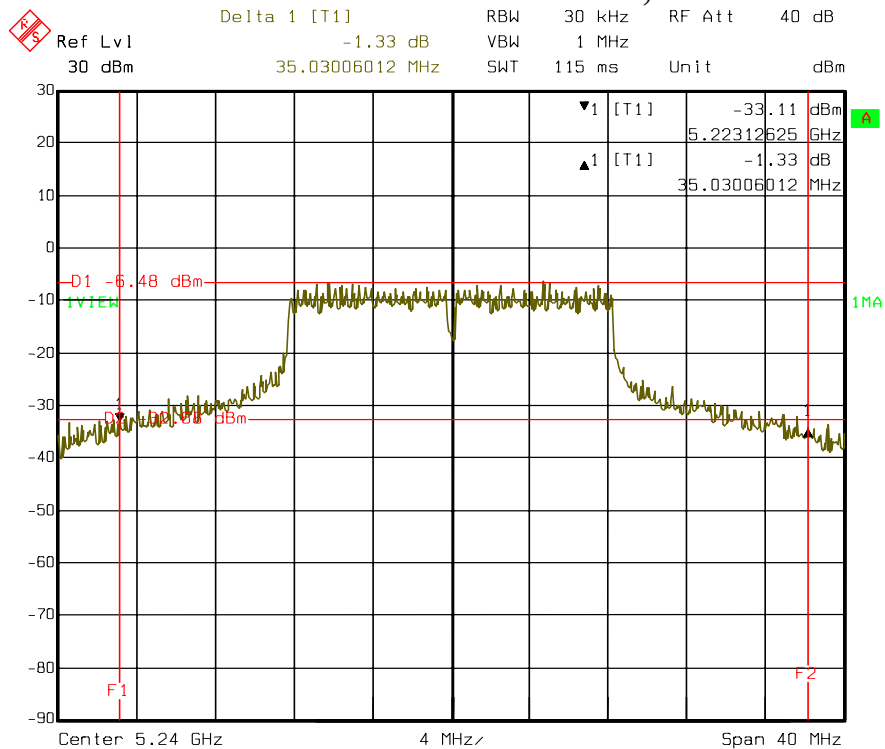
B-antenna Port

Base Mode of 5.15GHz - 5.35 GHz, CH-Low



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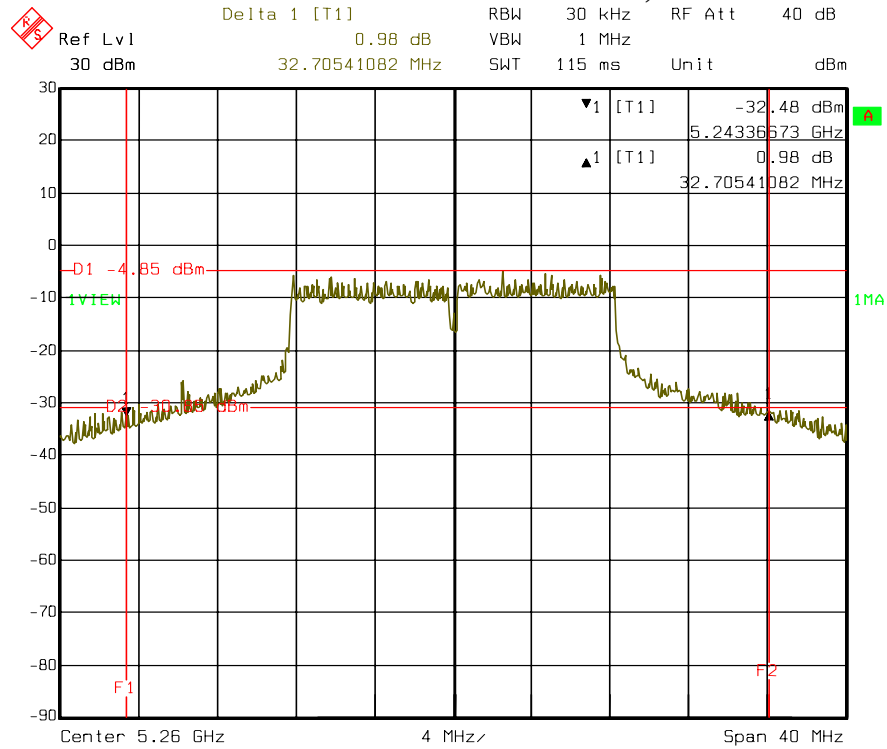
Base Mode of 5.15GHz - 5.35 GHz, CH-Mid



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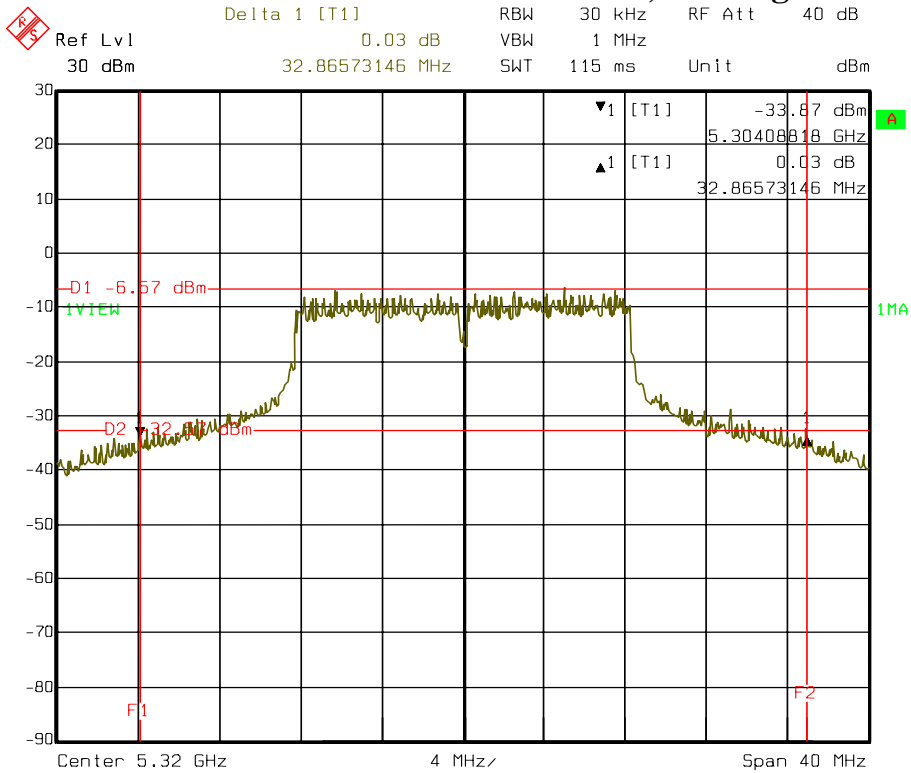


Base Mode of 5.15GHz - 5.35 GHz, CH-Mid



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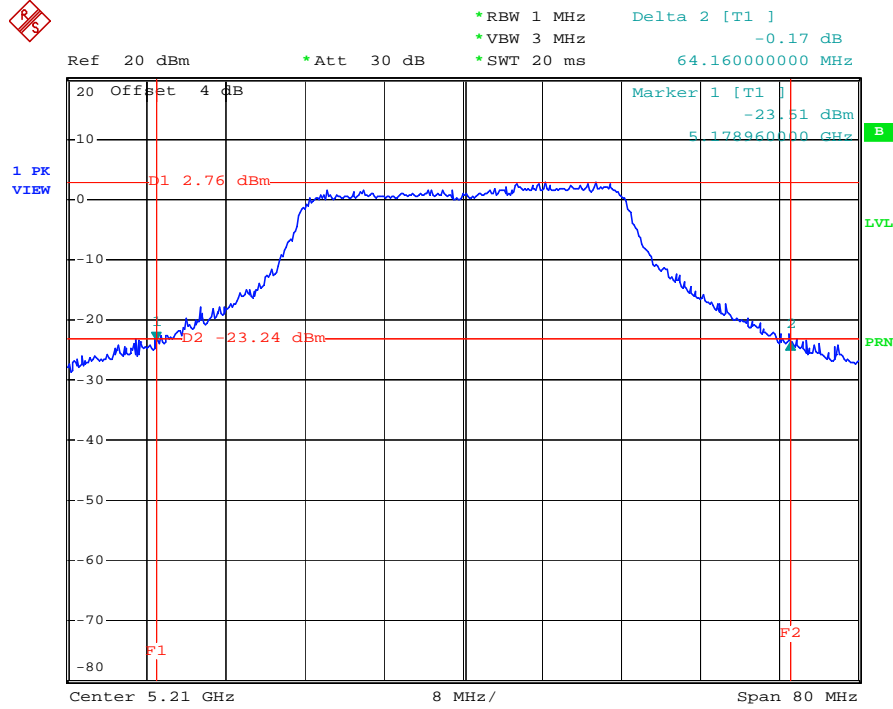
Base Mode of 5.15GHz - 5.35 GHz, CH-High



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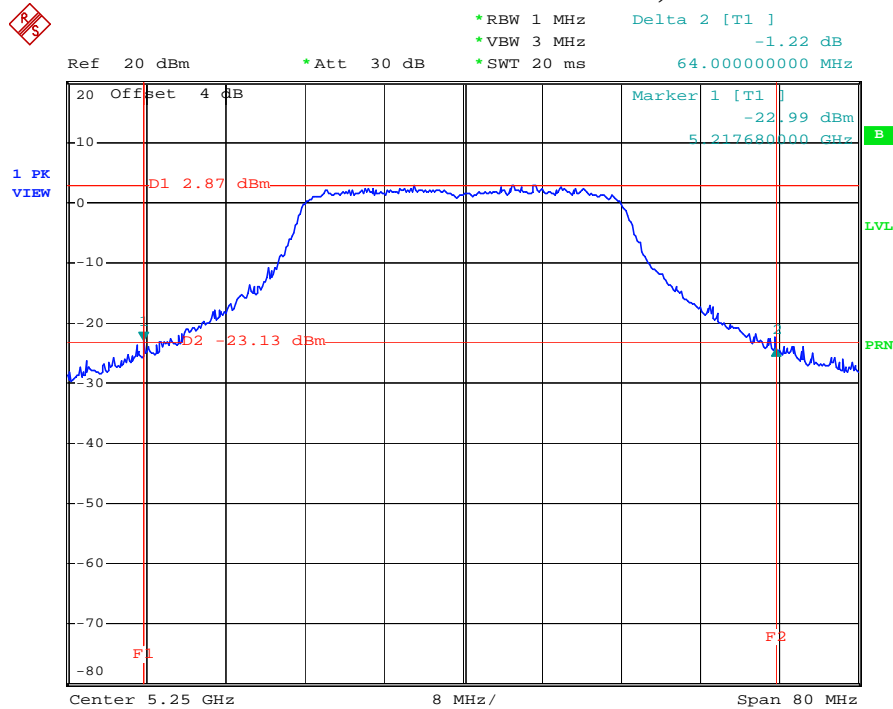


Turbo Mode of 5.15GHz - 5.35 GHz, CH-Low



Date: 3.APR.2003 22:09:07

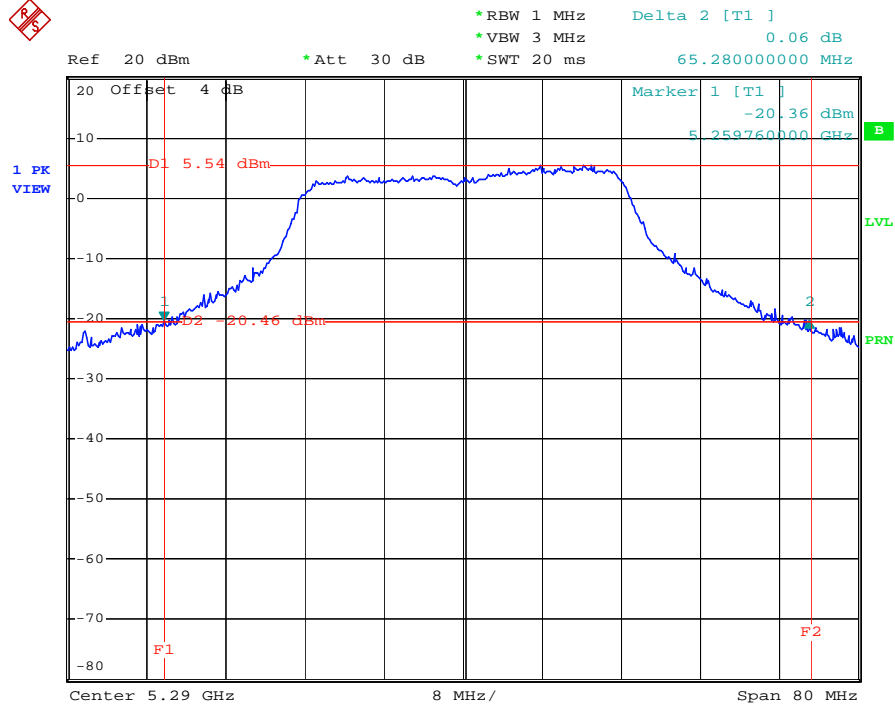
Turbo Mode of 5.15GHz - 5.35 GHz, CH-Mid



Date: 3.APR.2003 22:07:51



Turbo Mode of 5.15GHz - 5.35 GHz, CH-High



Date: 3.APR.2003 22:06:17

7. PEAK OUTPUT POWER MEASUREMENT

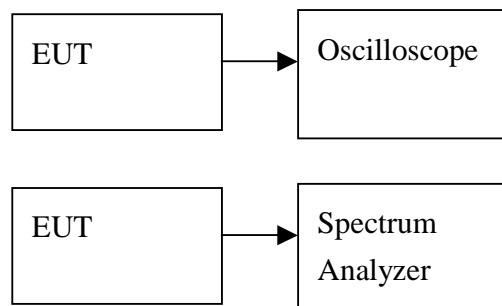
7.1 Standard Applicable

The determine test method is according to the FCC 15.407 peat output power measurement, method #3. Detail test modes are as below:

- (1) For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log B.
- (2) For the band 5.25-5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10log B.
- (3) For the band 5.725-5.825 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 1W (30dBm) or 17 dBm + 10log B.

Where B is the -26dBc emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.2 Test Set-up:



The EUT was connected to a spectrum analyzer through a 50 Ω RF cable.

7.3 Measurement Procedure

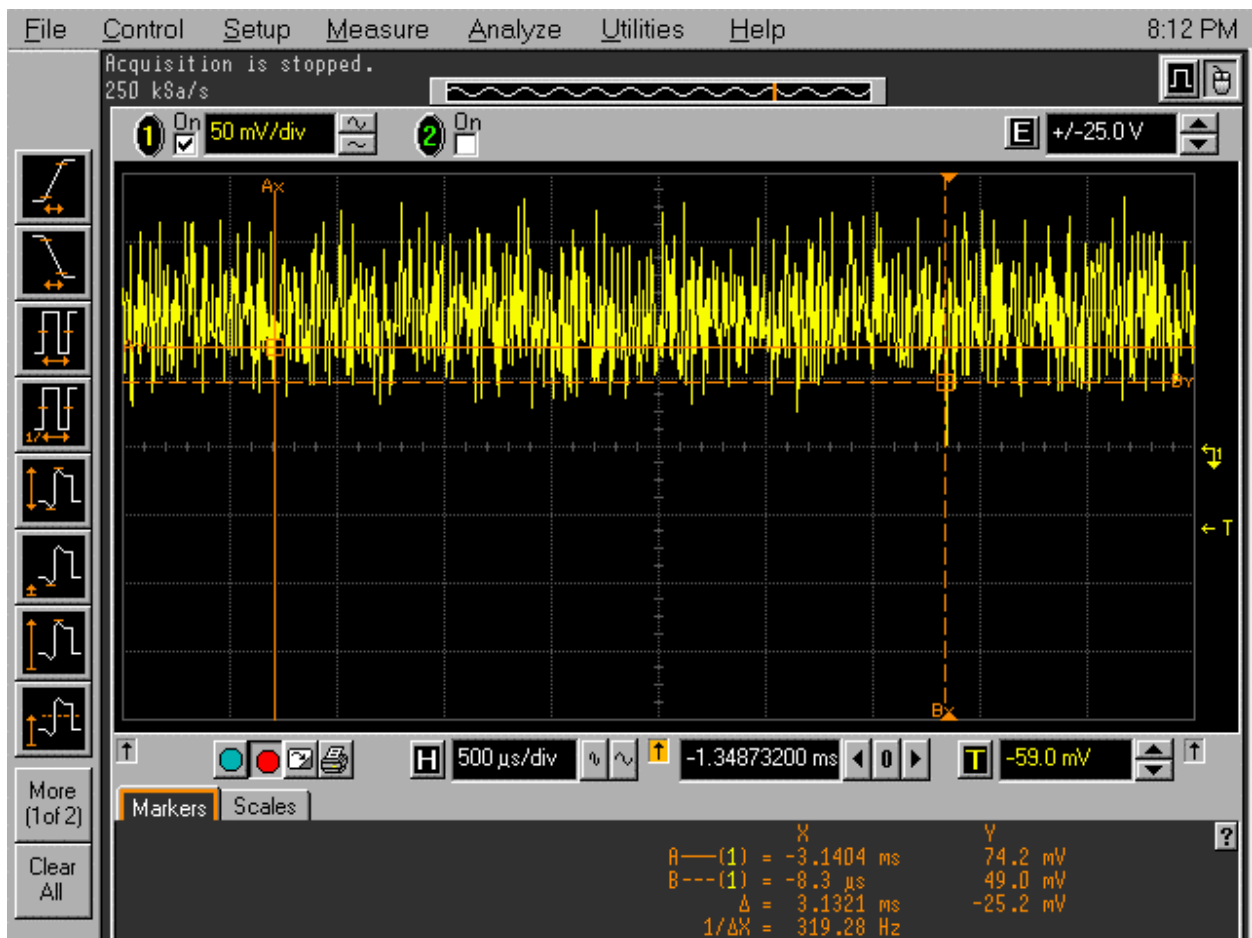
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Channel Power Function, RBW=1MHz,VBW=3MHz, CP Bandwidth =26dB Emission Bandwidth)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.



7.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	Advantest	R3182	110600647	11/16/2002	11/15/2003
Spectrum Analyzer	R&S	FSP30	1093.4495.30	07/23/2002	07/22/2003
Oscilloscope	HP	infinium	US39190174	02/26/2003	02/25/2004

7.5 Transmission pulse duration result



delta A=-3.1404ms

delta B=-8.3us

T=3.1321ms

Note: This test was followed method #3 VBW 1/T and the test result has met method #3's requirement.

7.6 Specification Limit:**SMT (A-antenna)**

Base Mode

Channel	Frequency (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Power Limit (dBm)
Low	5180	15.34	19.34	17
Middle	5240	15.33	19.33	17
Middle	5260	15.40	26.40	24
High	5320	15.30	26.30	24

Turbo Mode

Channel	Frequency (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Power Limit (dBm)
Low	5210	17.97	21.97	17
Middle	5250	17.87	21.87	17
High	5290	17.68	28.68	24

Joymax (B-antenna)

Base Mode

Channel	Frequency (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Power Limit (dBm)
Low	5180	15.27	19.27	17
Middle	5240	15.15	19.15	17
Middle	5260	15.35	26.35	24
High	5320	15.20	26.20	24

Turbo Mode

Channel	Frequency (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Power Limit (dBm)
Low	5210	18.07	22.07	17
Middle	5250	18.06	22.05	17
High	5290	18.15	29.15	24

SMT (A-antenna)

Base Mode of 5.15GHz – 5.35GHz

Channel	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	14.80	17	-2.20
Middle	5240	13.79	17	-3.21
Middle	5260	14.73	24	-9.27
High	5320	14.53	24	-9.47

Turbo Mode of 5.15GHz – 5.35GHz

Channel	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	5210	14.27	17	-2.73
Middle	5250	12.75	17	-4.25
High	5290	14.24	24	-9.76

Joymax (B-antenna)**Base Mode of 5.15GHz – 5.35GHz**

Channel	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	12.58	17	-4.42
Middle	5240	12.69	17	-4.31
Middle	5260	20.12	24	-3.88
High	5320	19.82	24	-4.18

Turbo Mode of 5.15GHz – 5.35GHz

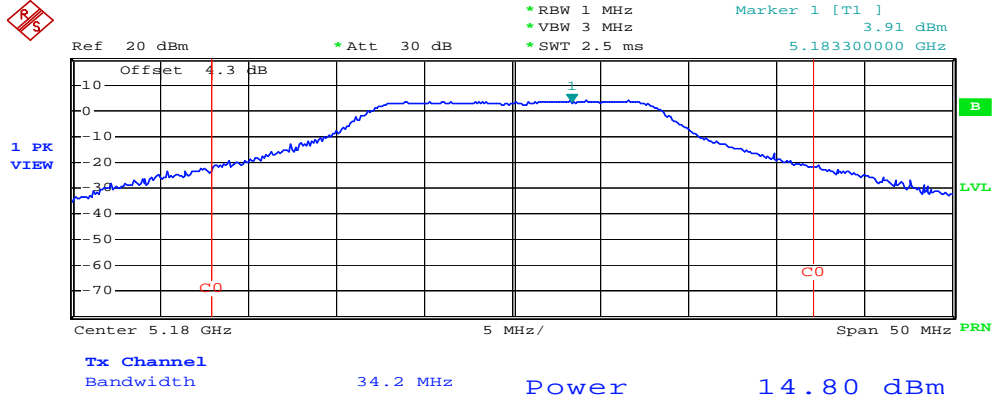
Channel	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	5210	15.76	17	-1.24
Middle	5250	16.32	17	-0.68
High	5290	18.39	24	-5.61

Maximum antenna gain = 5 dBi(A-antenna), 3.25 dBi(B-antenna), therefore there is no reduction due to antenna gain.



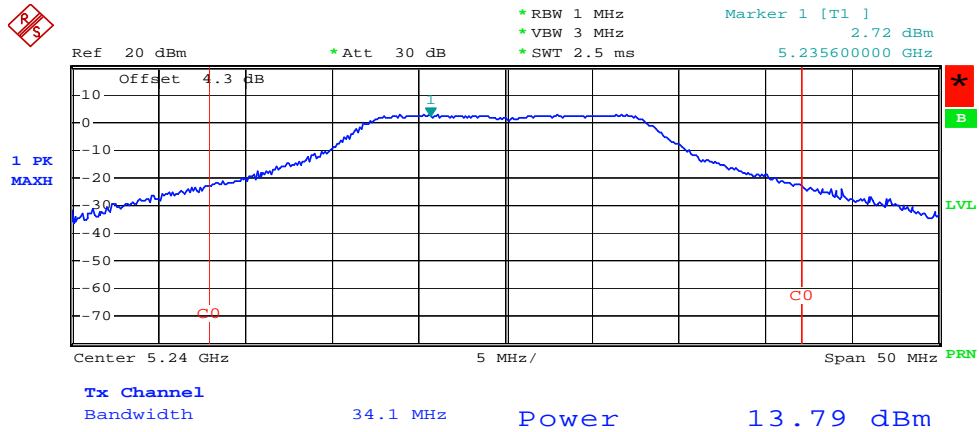
SMT (A-antenna)

Base Mode of 5.15GHz - 5.35 GHz, CH-Low



Date: 3.APR.2003 19:39:13

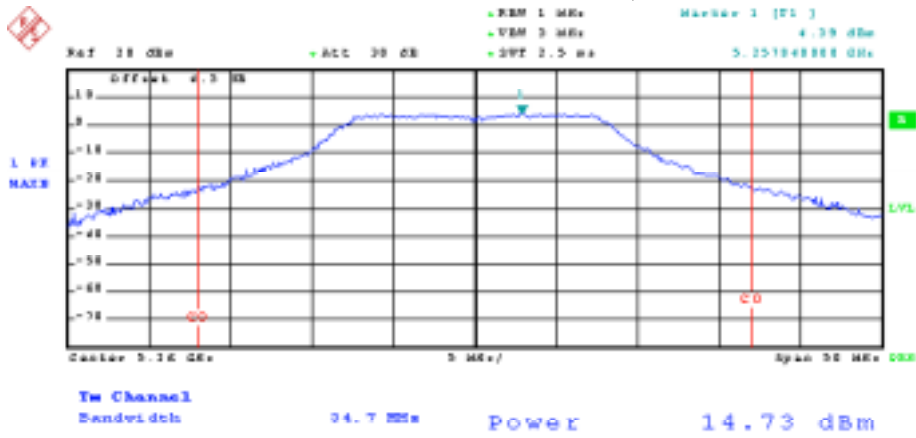
Base Mode of 5.15GHz - 5.35 GHz, CH-Middle



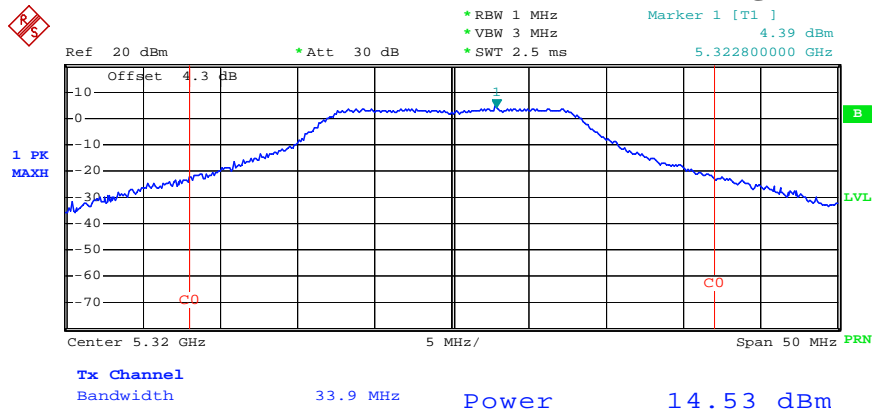
Date: 3.APR.2003 19:41:08



Base Mode of 5.15GHz - 5.35 GHz, CH-Middle



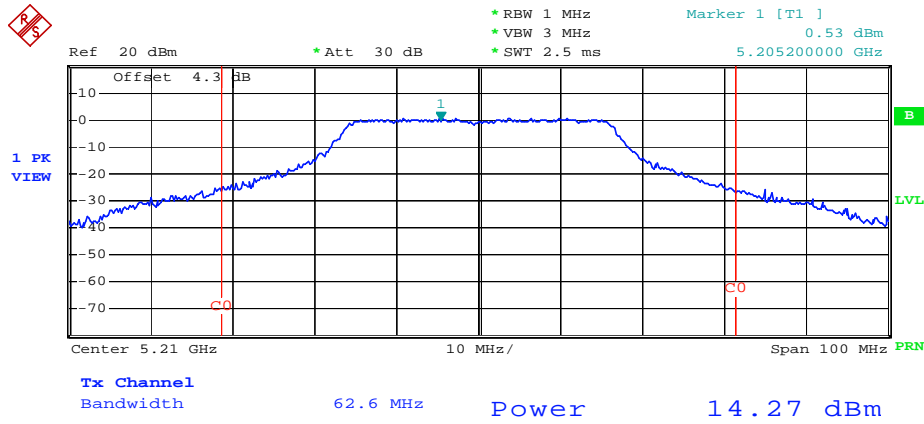
Base Mode of 5.15GHz - 5.35 GHz, CH-High



Date: 3.APR.2003 19:44:03

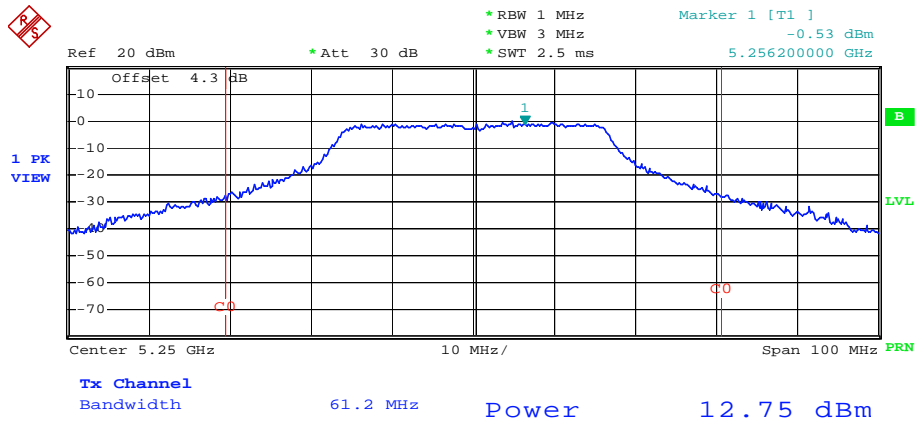


Turbo Mode of 5.15GHz - 5.35 GHz, CH-Low



Date: 3.APR.2003 19:49:23

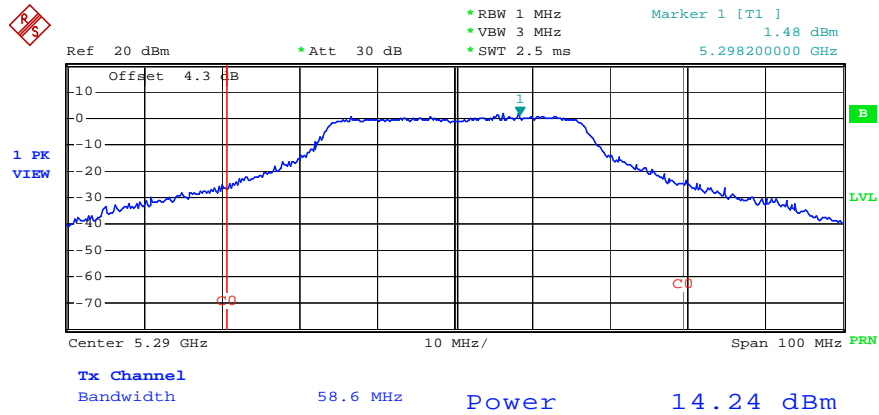
Turbo Mode of 5.15GHz - 5.35 GHz, CH-Middle



Date: 3.APR.2003 19:47:20



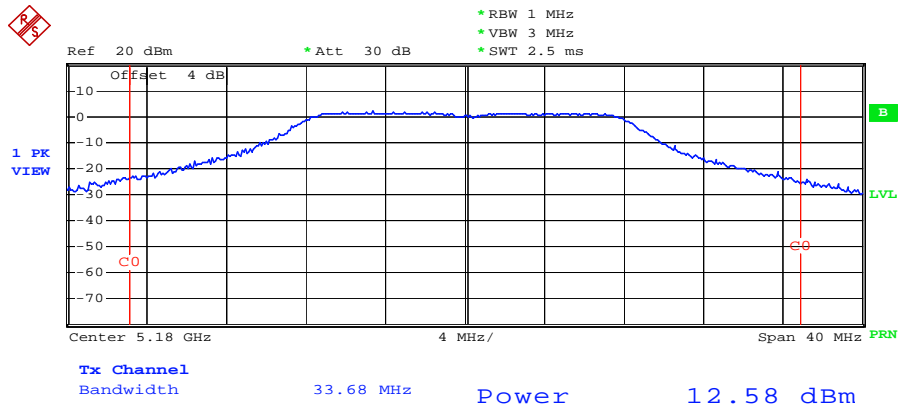
Turbo Mode of 5.15GHz - 5.35 GHz, CH-High



Date: 3.APR.2003 19:46:21

Joymax (B-antenna)

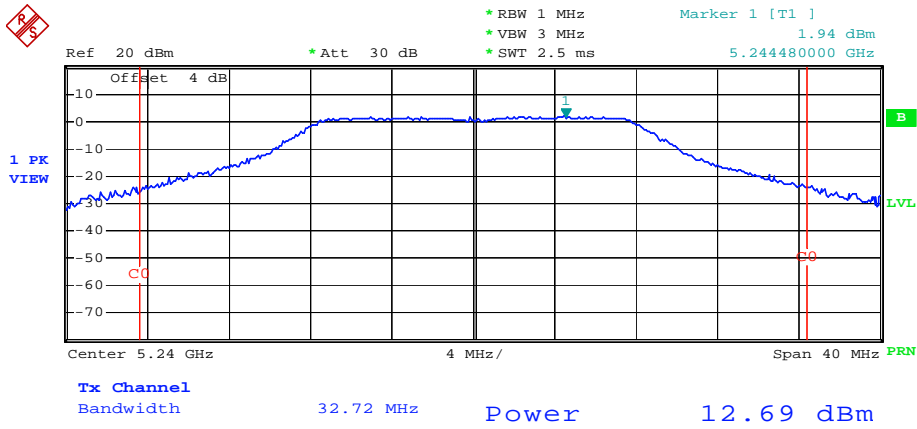
Base Mode of 5.15GHz - 5.35 GHz, CH-Low



Date: 3.APR.2003 22:22:29

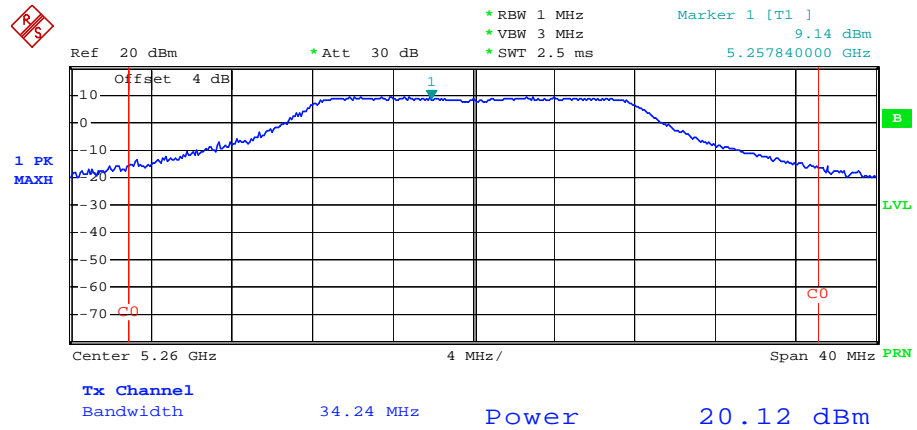


Base Mode of 5.15GHz - 5.35 GHz, CH-Middle



Date: 3.APR.2003 22:21:17

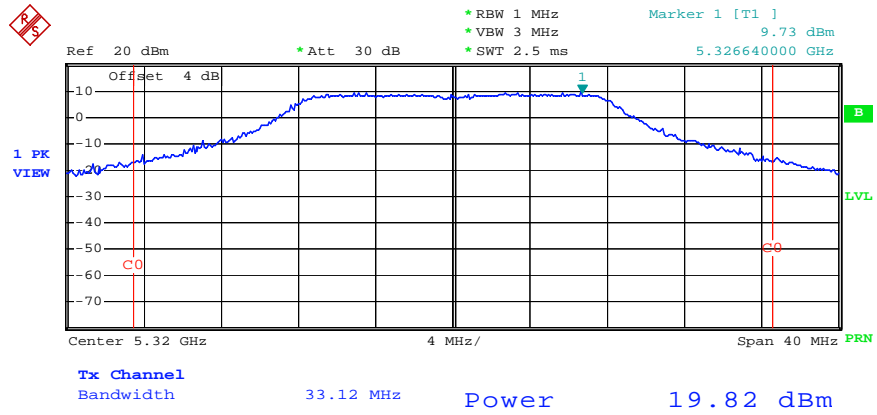
Base Mode of 5.15GHz - 5.35 GHz, CH-Middle



Date: 3.APR.2003 22:32:49

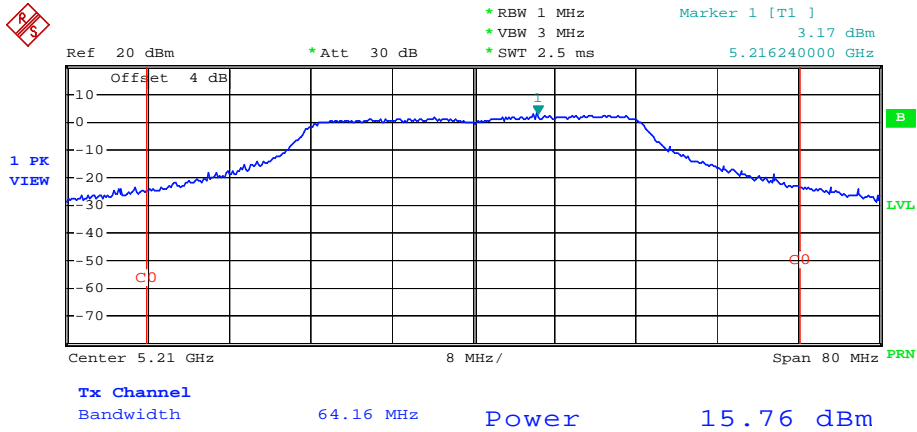


Base Mode of 5.15GHz - 5.35 GHz, CH-High



Date: 3.APR.2003 22:20:08

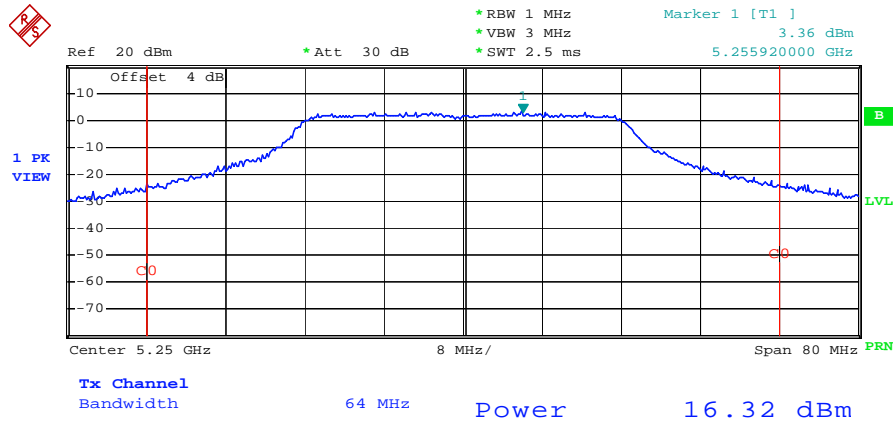
Turbo Mode of 5.15GHz - 5.35 GHz, CH-Low



Date: 3.APR.2003 22:23:49

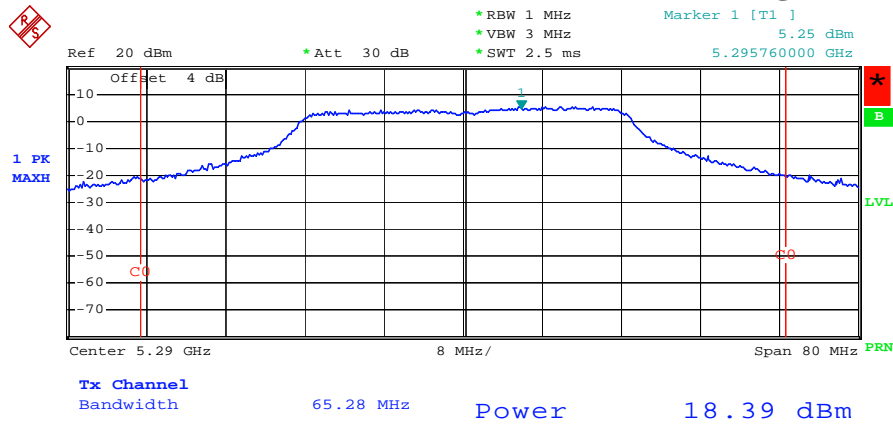


Turbo Mode of 5.15GHz - 5.35 GHz, CH-Middle



Date: 3.APR.2003 22:24:47

Turbo Mode of 5.15GHz - 5.35 GHz, CH-High



Date: 3.APR.2003 22:26:52



8. PEAK POWER SPECTRAL DENSITY MEASUREMENT

8.1 Standard Applicable

- (1) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band.
- (2) For the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band.
- (3) For the band 5.725-5.825 GHz, the peak power spectral density shall not exceed 17 dBm in any 1-MHz band.

Where B is the -26dBc emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
3. Set RBW=1MHz, VBW=3MHz, Span=30MHz (Base Mode)/ 50MHz (Turbo Mode), Sweep time = Auto.
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.

8.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	Advantest	R3182	110600647	11/16/2002	11/15/2003
Spectrum Analyzer	R&S	FSP30	1093.4495.30	07/23/2002	07/22/2003

8.4 Test Results:**SMT(A-antenna)**

Base Mode of 5.15GHz - 5.35 GHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.28	4	-0.72
Middle	5240	2.84	4	-1.16
Middle	5260	4.83	11	-6.17
High	5320	3.66	11	-7.34

Turbo Mode of 5.15GHz - 5.35 GHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5210	2.47	4	-1.53
Middle	5250	2.80	4	-1.20
High	5290	5.06	11	-5.94

Joymax(B-antenna)

Base Mode of 5.15GHz - 5.35 GHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	2.10	4	-1.90
Middle	5240	2.65	4	-1.35
Middle	5260	9.74	11	-1.26
High	5320	9.65	11	-1.35

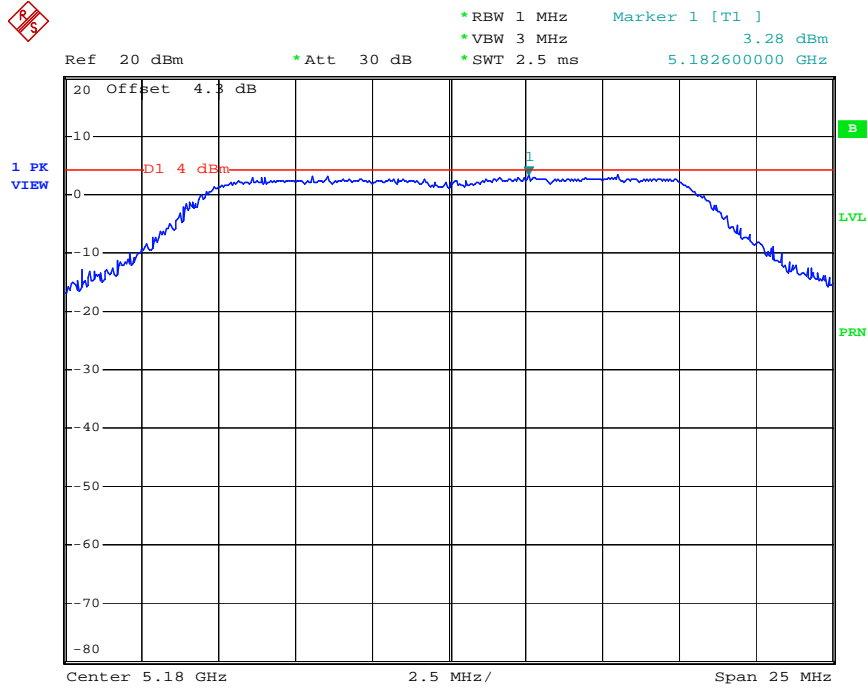
Turbo Mode of 5.15GHz - 5.35 GHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5210	3.22	4	-0.78
Middle	5250	2.97	4	-1.03
High	5290	7.09	11	-3.91



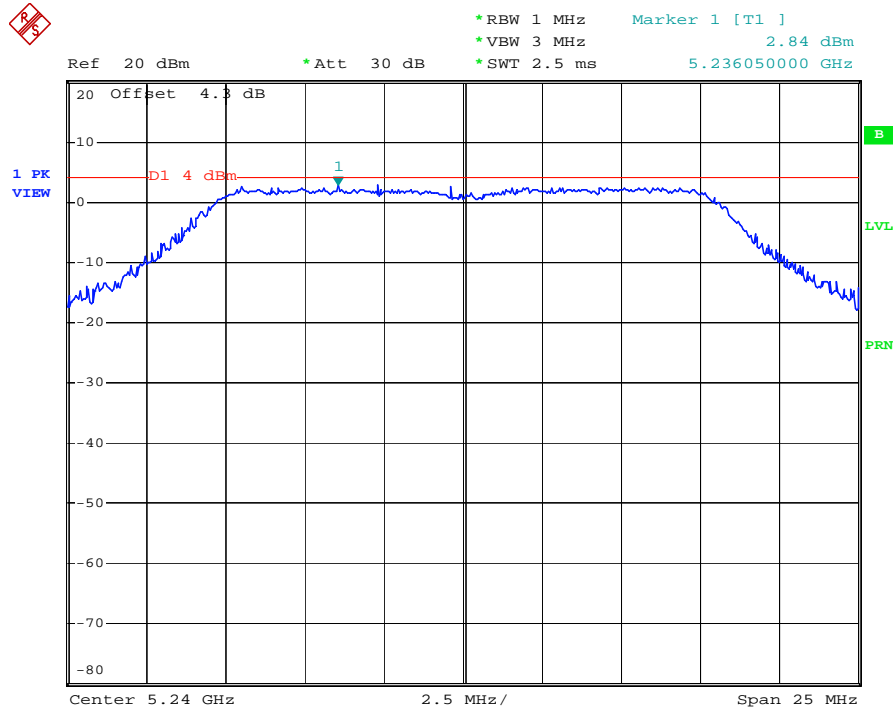
SMT(A-antenna)

Base Mode of 5.15GHz - 5.35 GHz, CH-Low



Date: 3.APR.2003 19:36:12

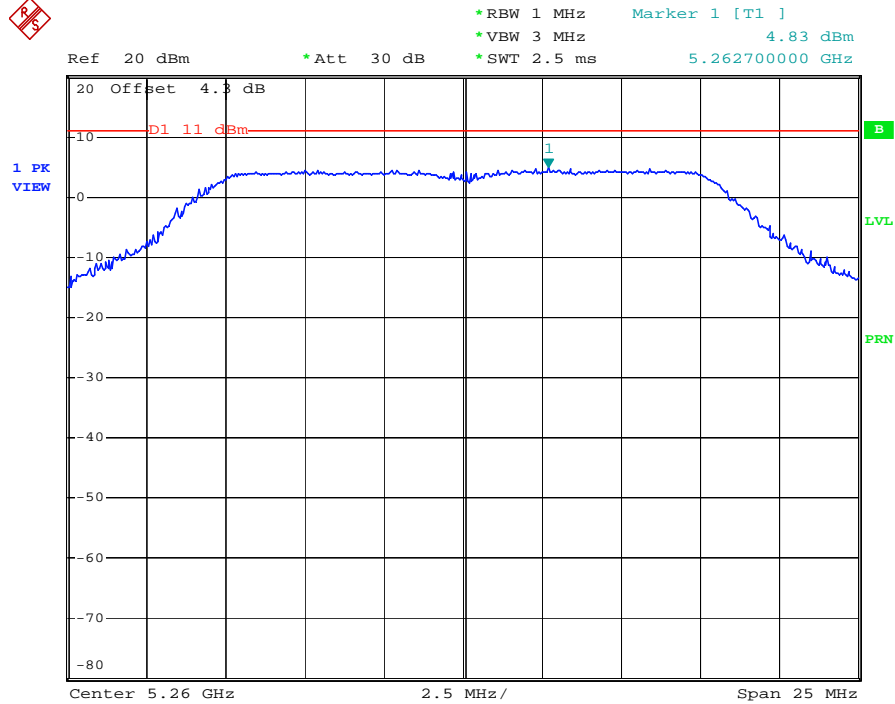
Base Mode of 5.15GHz - 5.35 GHz, CH-Middle



Date: 3.APR.2003 19:35:20

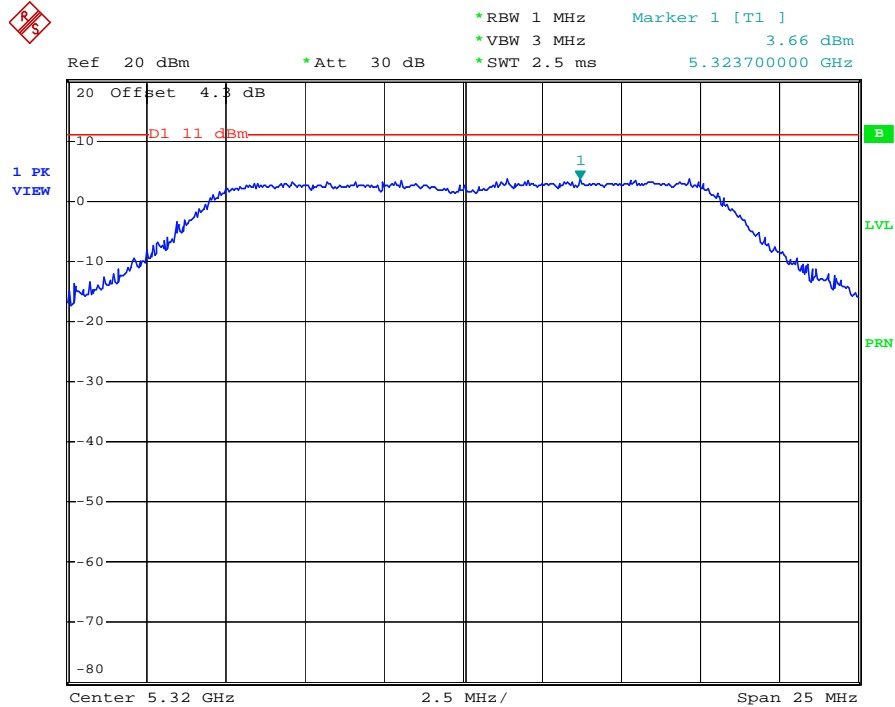


Base Mode of 5.15GHz - 5.35 GHz, CH-Middle



Date: 3.APR.2003 19:27:29

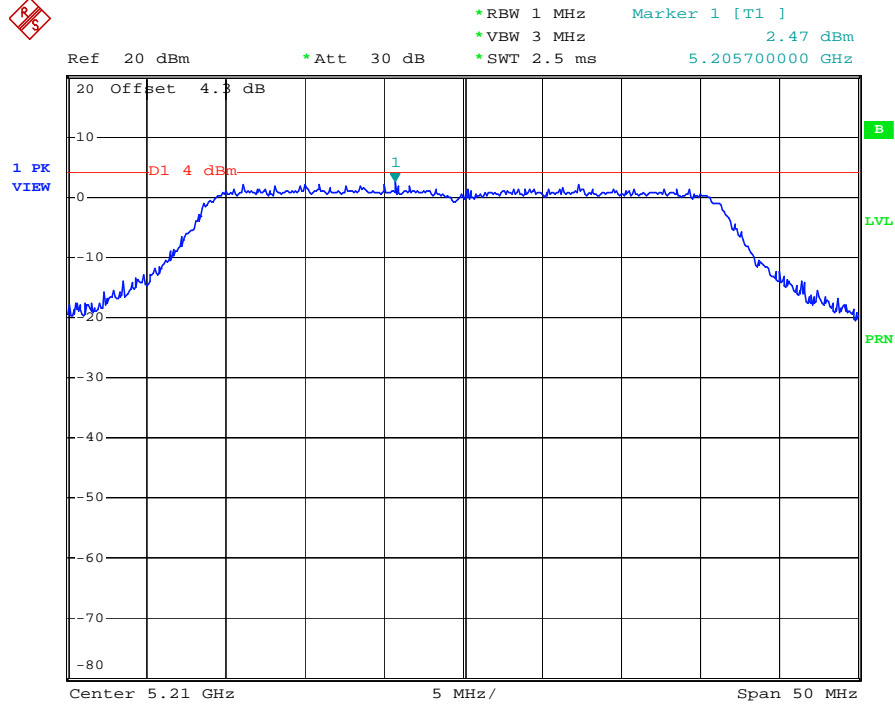
Base Mode of 5.15GHz - 5.35 GHz, CH-High



Date: 3.APR.2003 19:28:29

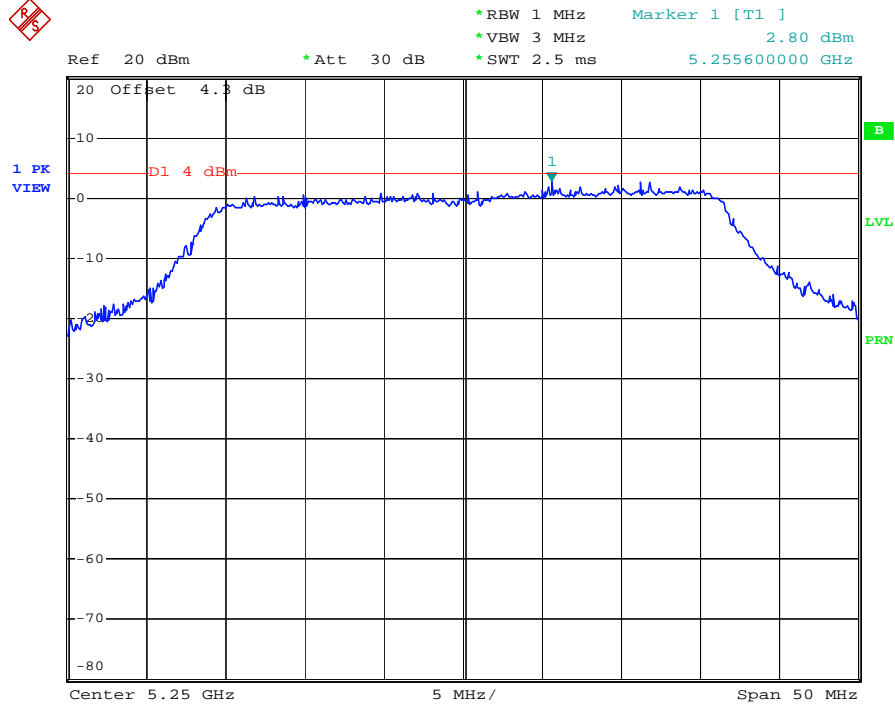


Turbo Mode of 5.15GHz - 5.35 GHz, CH-Low



Date: 3.APR.2003 20:54:24

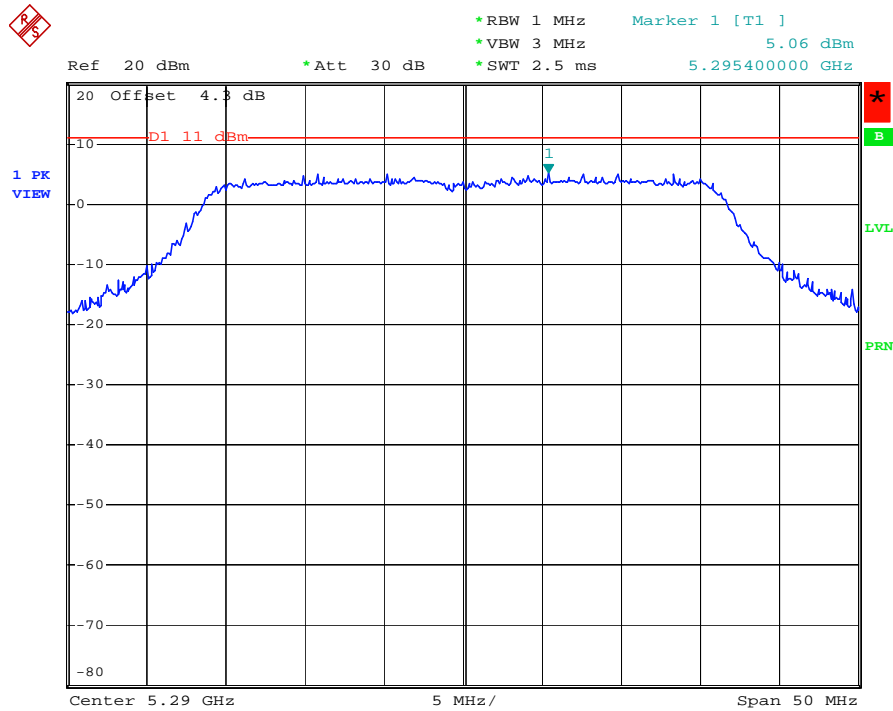
Turbo Mode of 5.15GHz - 5.35 GHz, CH-Middle



Date: 3.APR.2003 20:53:36



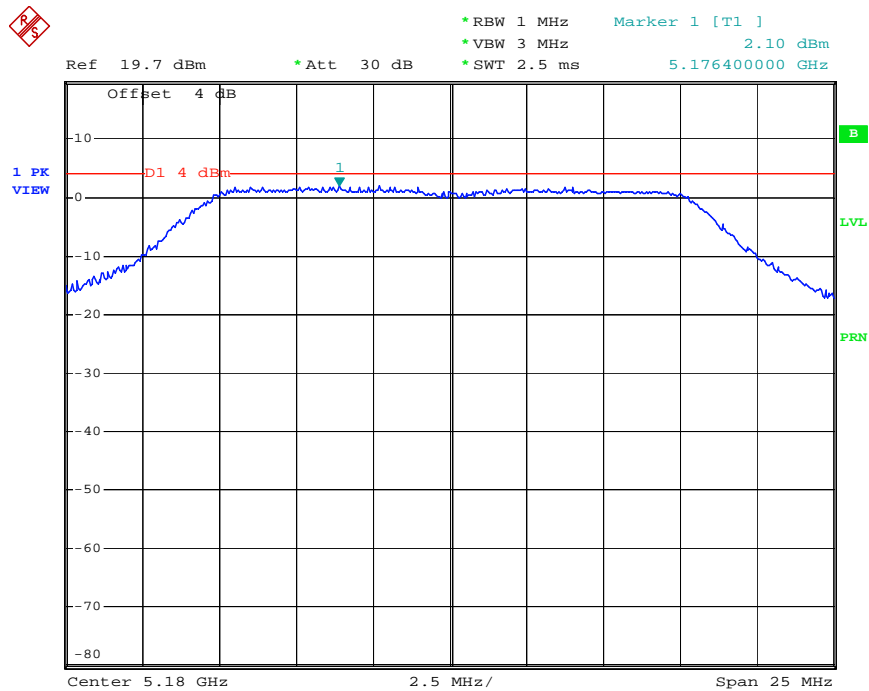
Turbo Mode of 5.15GHz - 5.35 GHz, CH-High



Date: 3.APR.2003 20:55:31

Joymax(B-antenna)

Base Mode of 5.15GHz - 5.35 GHz, CH-Low



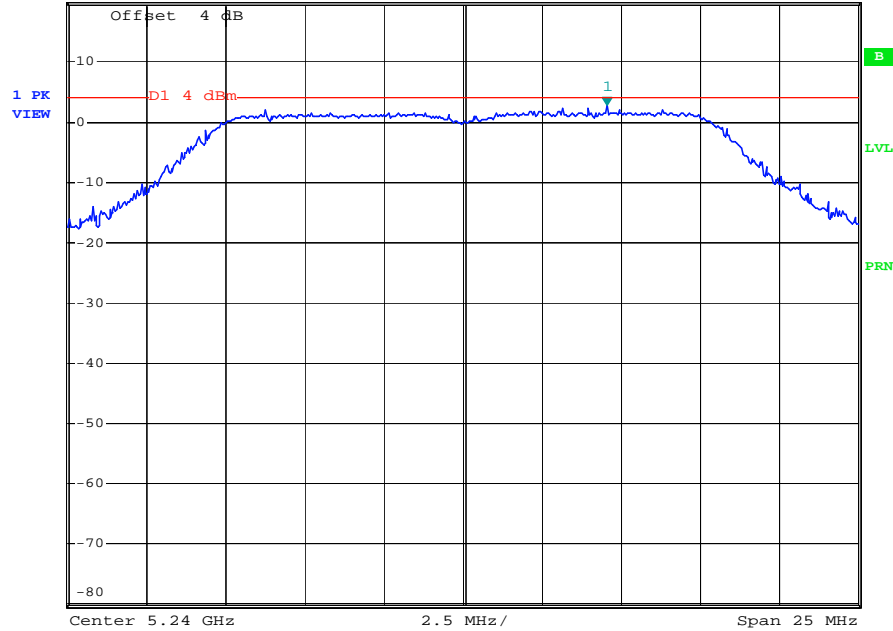
Date: 3.APR.2003 21:02:27



Base Mode of 5.15GHz - 5.35 GHz, CH-Middle



Ref 19.7 dBm *Att 30 dB *RBW 1 MHz Marker 1 [T1] 2.65 dBm
*VBW 3 MHz
*SWT 2.5 ms 5.244550000 GHz

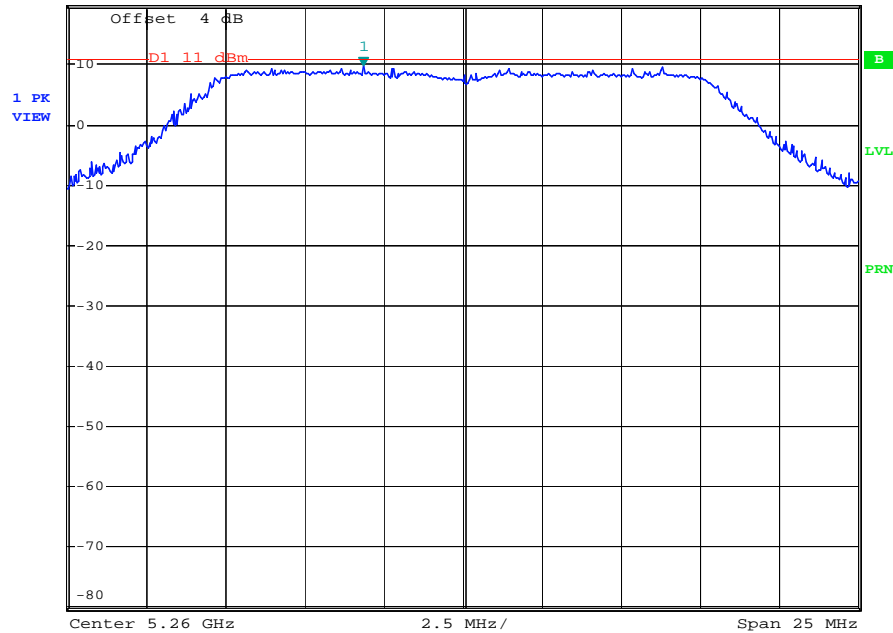


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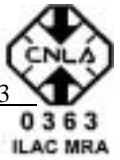
Base Mode of 5.15GHz - 5.35 GHz, CH-Middle



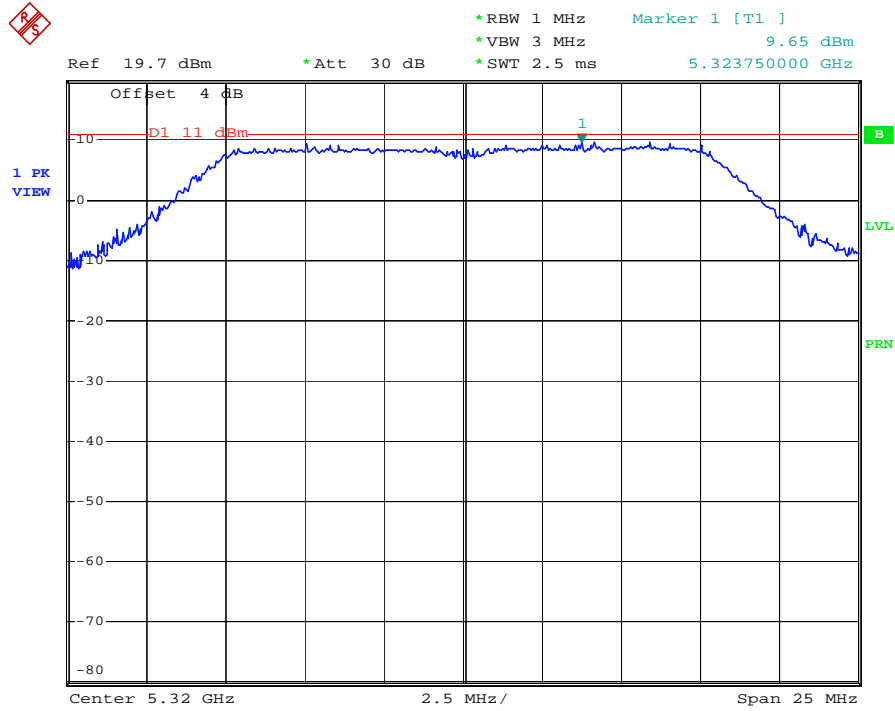
Ref 19.7 dBm *Att 30 dB *RBW 1 MHz Marker 1 [T1] 9.74 dBm
*VBW 3 MHz
*SWT 2.5 ms 5.256850000 GHz



Date: 3.APR.2003 21:04:46

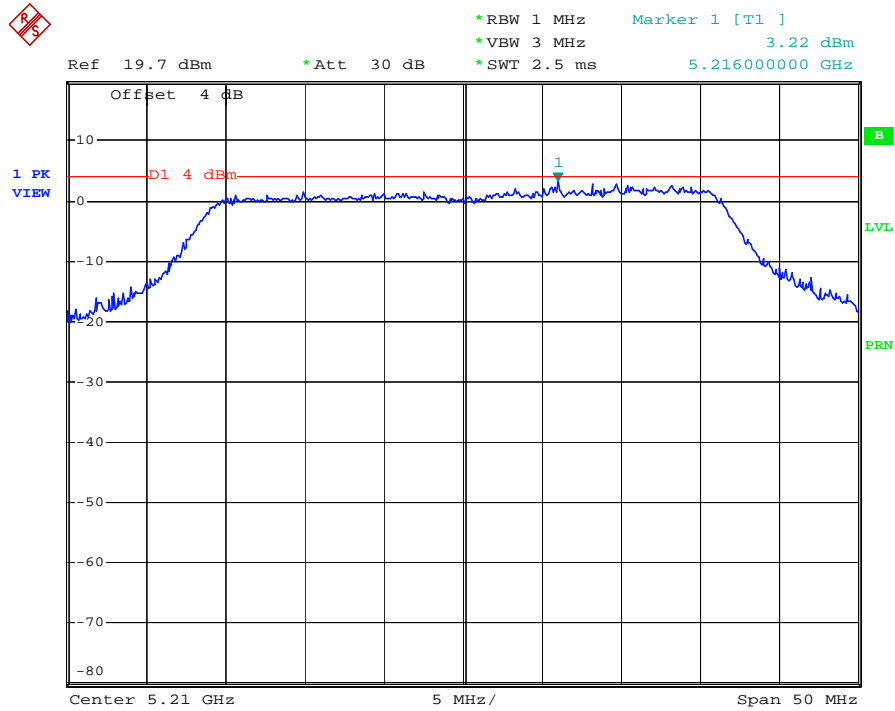


Base Mode of 5.15GHz - 5.35 GHz, CH-High



Date: 3.APR.2003 21:05:47

Turbo Mode of 5.15GHz - 5.35 GHz, CH-Low



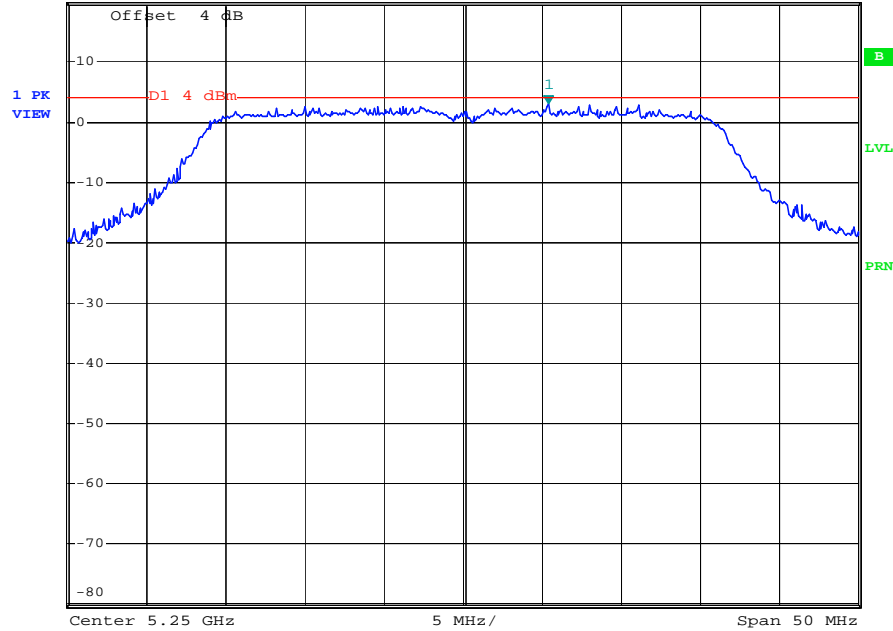
Date: 3.APR.2003 21:00:08



Turbo Mode of 5.15GHz - 5.35 GHz, CH-Middle



Ref 19.7 dBm *Att 30 dB *RBW 1 MHz Marker 1 [T1] 2.97 dBm
*VBW 3 MHz
*SWT 2.5 ms 5.255400000 GHz

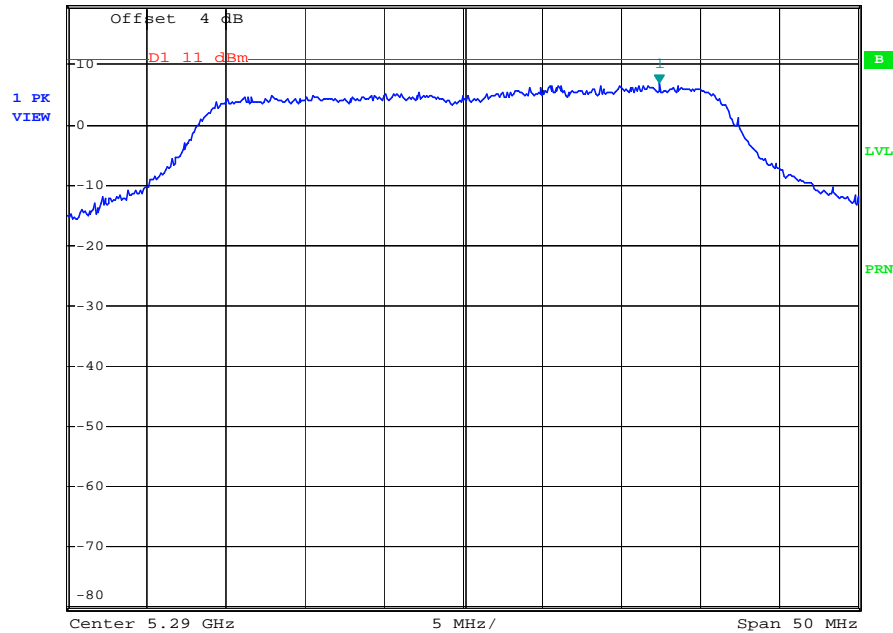


Date: 3.APR.2003 20:58:46

Turbo Mode of 5.15GHz - 5.35 GHz, CH-High



Ref 19.7 dBm *Att 30 dB *RBW 1 MHz Marker 1 [T1] 7.09 dBm
*VBW 3 MHz
*SWT 2.5 ms 5.302400000 GHz



Date: 3.APR.2003 20:57:45



9. PEAK EXCURSION MEASUREMENT

9.1 Standard Applicable

15.407(a)(6) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

9.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum.
3. Trace A, Set RBW=1MHz, VBW = 3MHz, Span = 25MHz(Base Mode)/50MHz(Turbo Mode), Max. hold.
4. Trace B, Set RBW=1MHz, VBW = 30KHz, Span =25MHz(Base Mode)/50MHz(Turbo Mode), Max. hold..
5. Delta Mark trace A Maximum frequency and trace B same frequency.
6. Repeat above procedures until all frequency measured were complete.

9.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	Advantest	R3182	110600647	11/16/2002	11/15/2003
Spectrum Analyzer	R&S	FSP30	1093.4495.30	07/23/2002	07/22/2003

9.4 Test Results:**(A-antenna Port)**

Base Mode of 5.15GHz - 5.35 GHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.21	13	-3.79
Middle	5240	9.09	13	-3.92
Middle	5260	8.61	13	-4.39
High	5320	8.98	13	-4.02

Turbo Mode of 5.15GHz - 5.35 GHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5210	8.45	13	-4.55
Middle	5250	8.41	13	-4.59
High	5290	8.3	13	-4.7

(B-antenna Port)

Base Mode of 5.15GHz - 5.35 GHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	8.52	13	-4.48
Middle	5240	8.09	13	-4.91
Middle	5260	8.89	13	-4.11
High	5320	8.8	13	-4.2

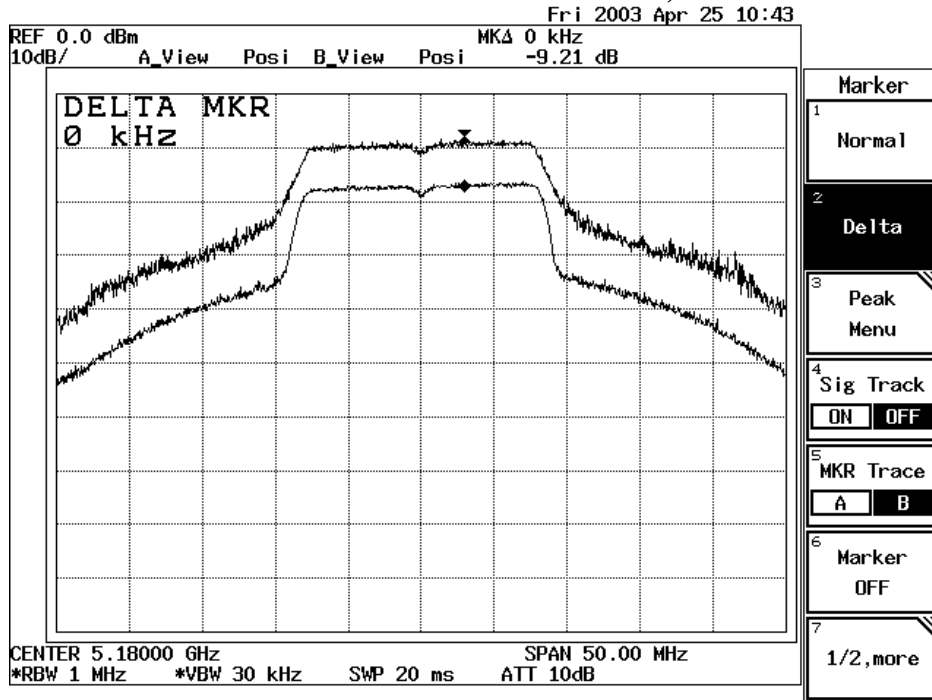
Turbo Mode of 5.15GHz - 5.35 GHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5210	8.18	13	-4.82
Middle	5250	8.15	13	-4.85
High	5290	9.05	13	-3.95

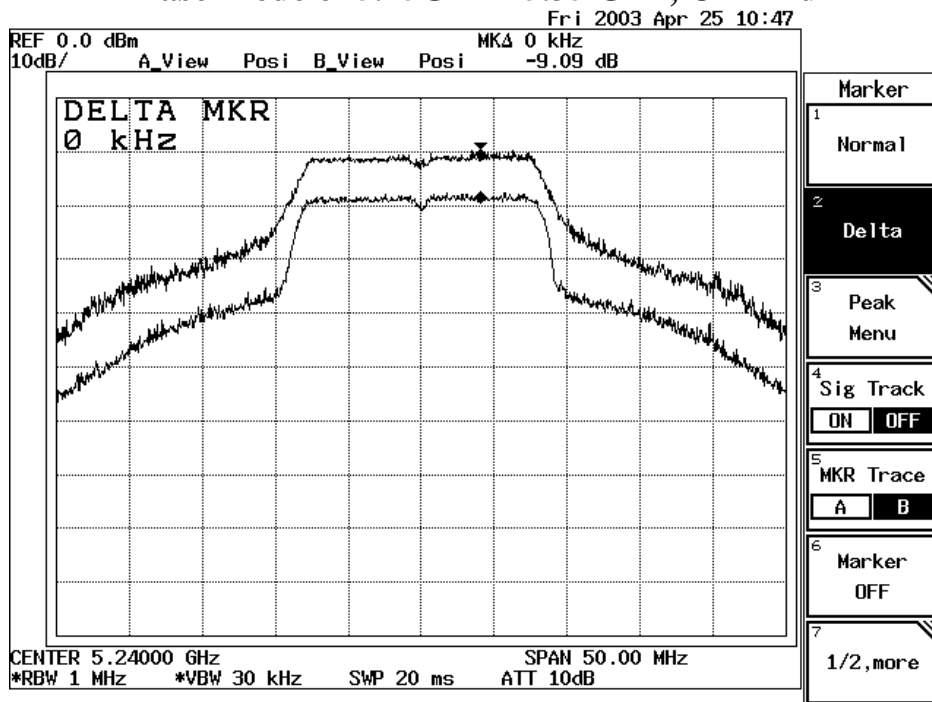


(A-antenna port)

Base Mode of 5.15GHz - 5.35 GHz, CH-Low

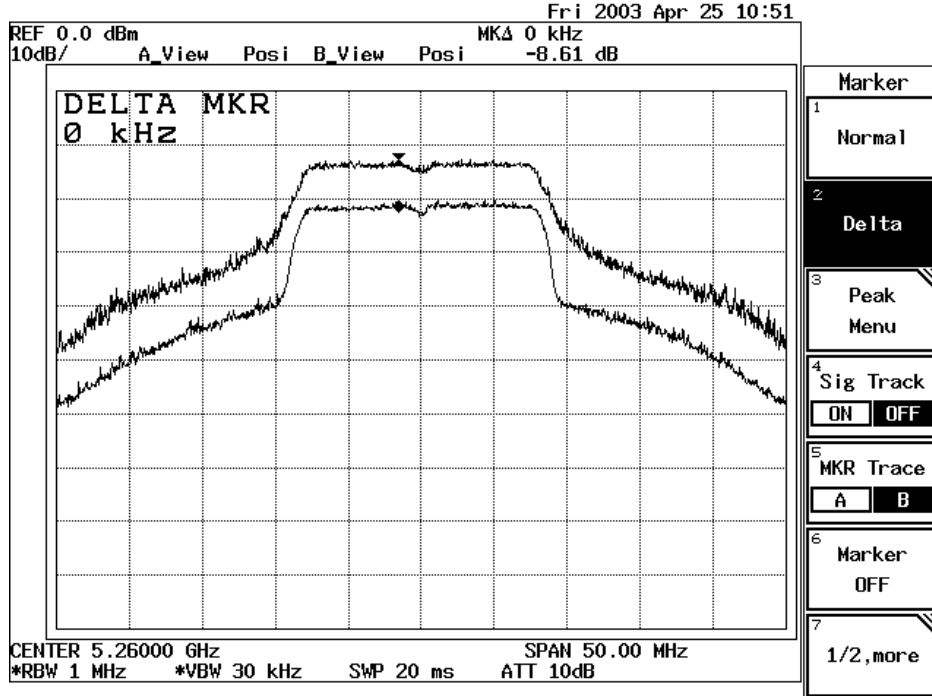


Base Mode of 5.15GHz - 5.35 GHz, CH-Mid

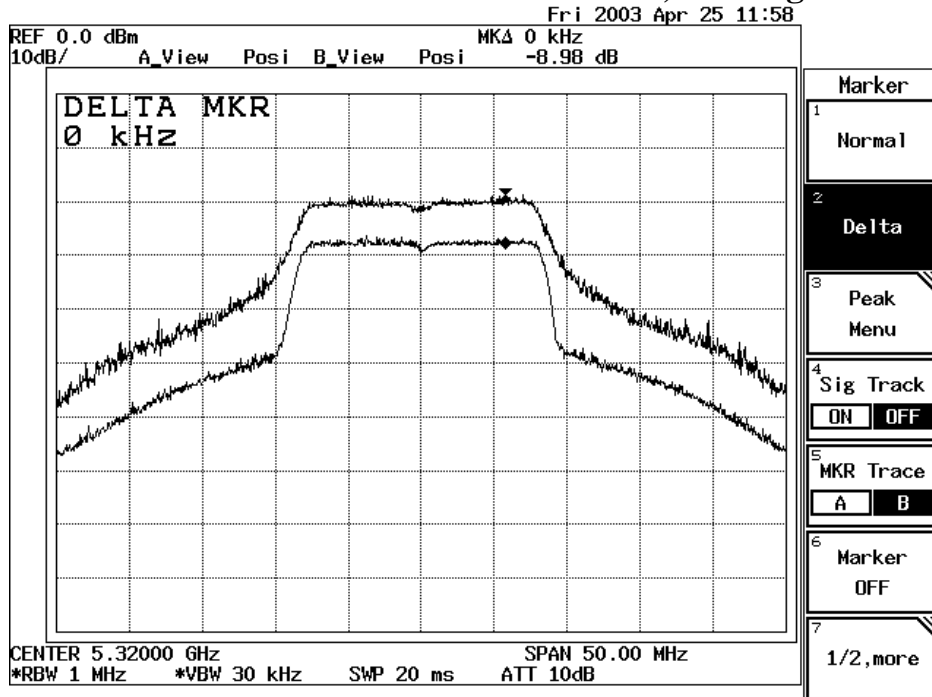




Base Mode of 5.15GHz - 5.35 GHz, CH-Mid

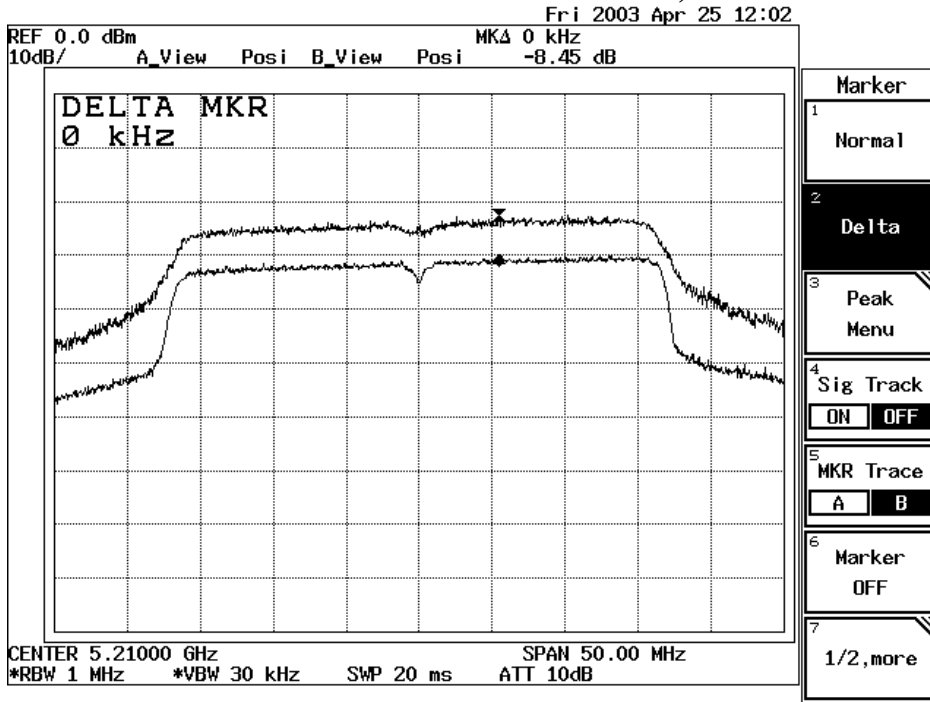


Base Mode of 5.15GHz - 5.35 GHz, CH-High

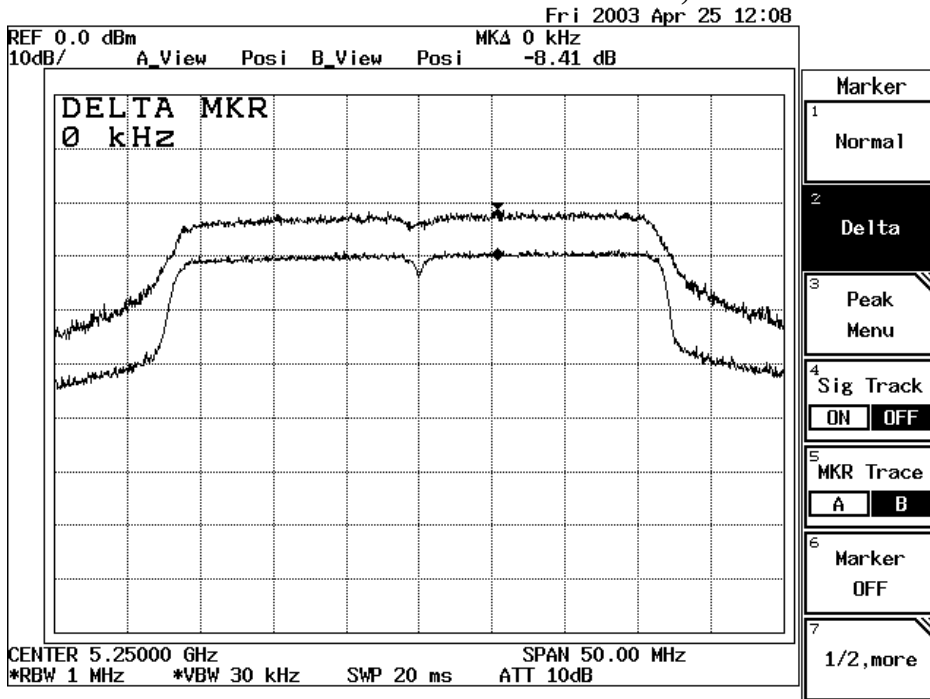




Turbo Mode of 5.15GHz - 5.35 GHz, CH-Low



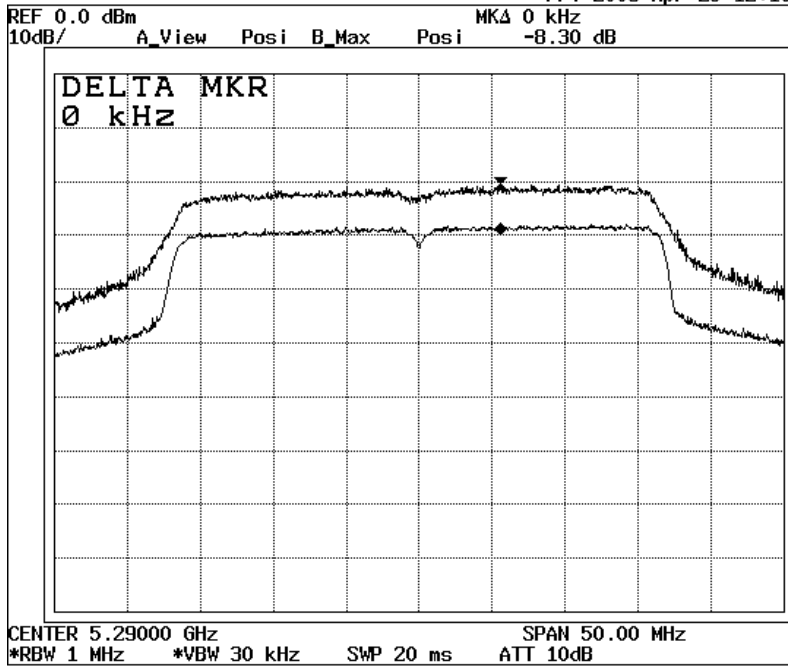
Turbo Mode of 5.15GHz - 5.35 GHz, CH-Mid





Turbo Mode of 5.15GHz - 5.35 GHz, CH-High

Fri 2003 Apr 25 12:10

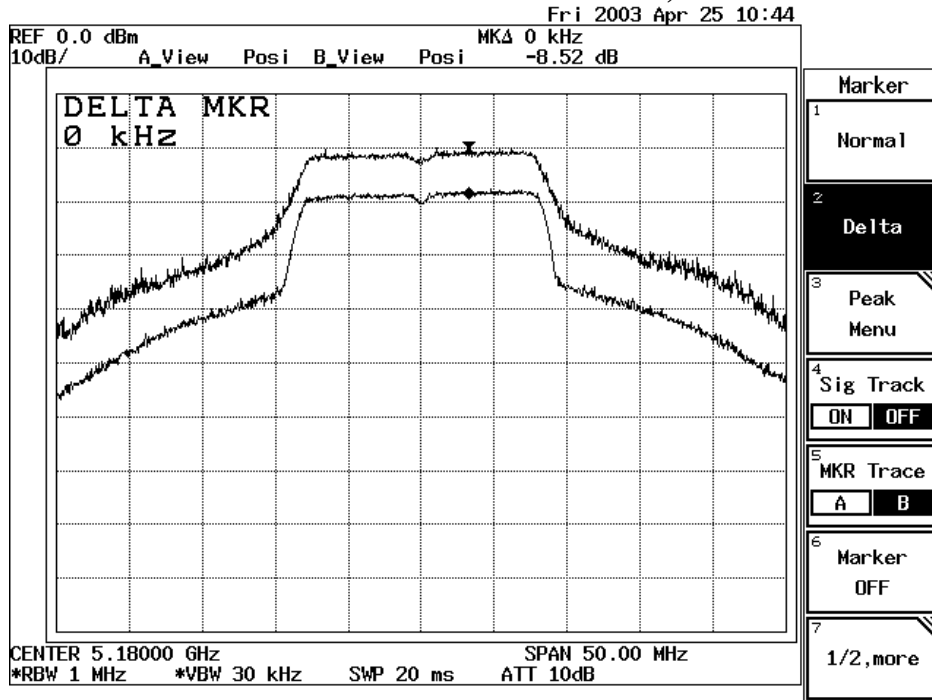


Marker
1 Normal
2 Delta
3 Peak Menu
4 Sig Track ON OFF
5 MKR Trace A B
6 Marker OFF
7 1/2, more

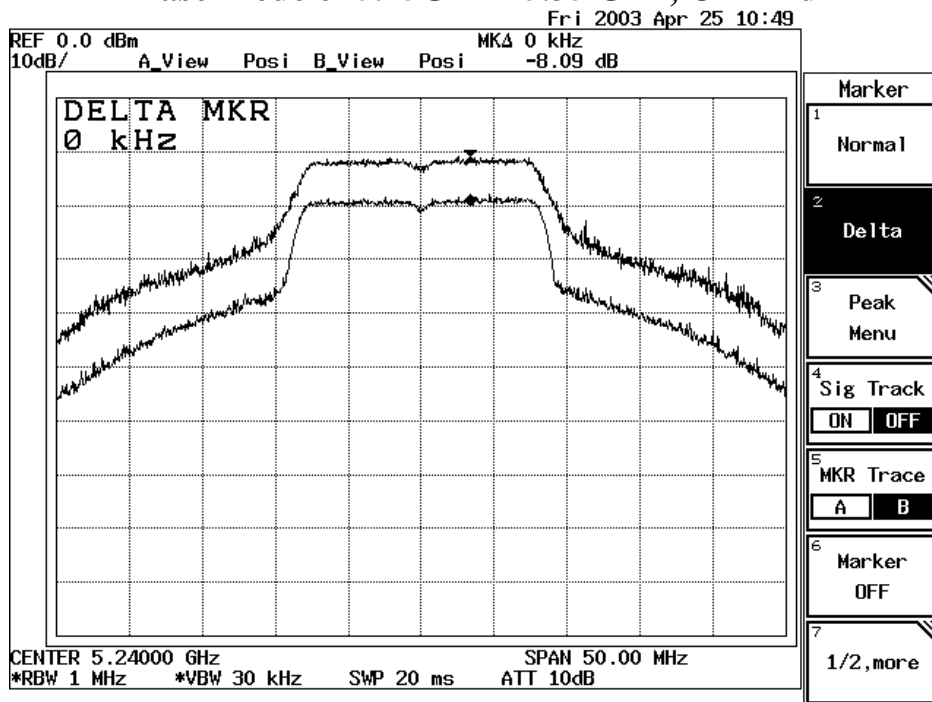


(B-antenna port)

Base Mode of 5.15GHz - 5.35 GHz, CH-Low

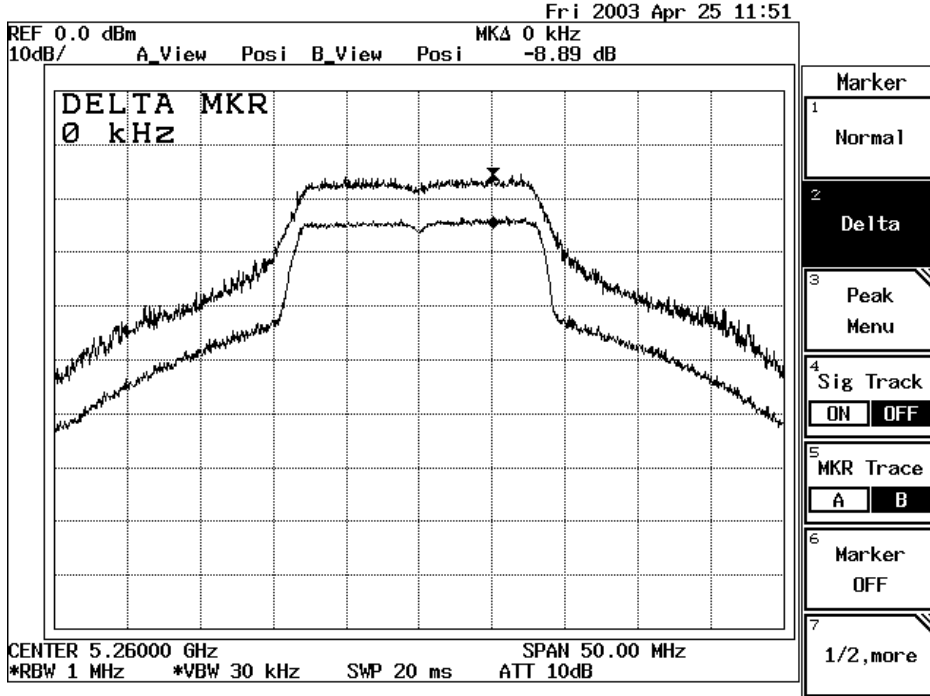


Base Mode of 5.15GHz - 5.35 GHz, CH-Mid

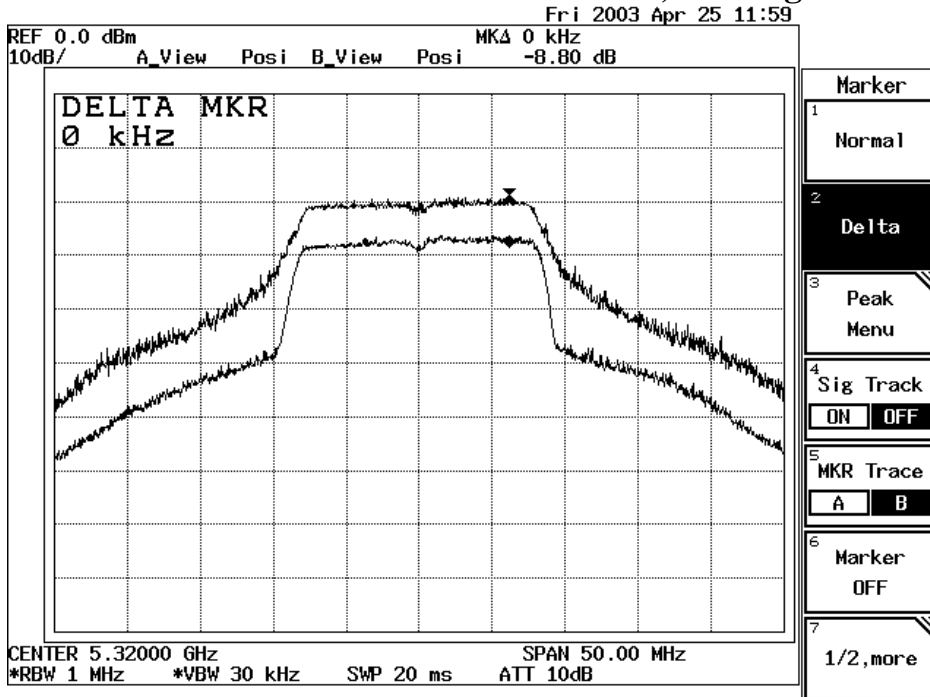




Base Mode of 5.15GHz - 5.35 GHz, CH-Mid

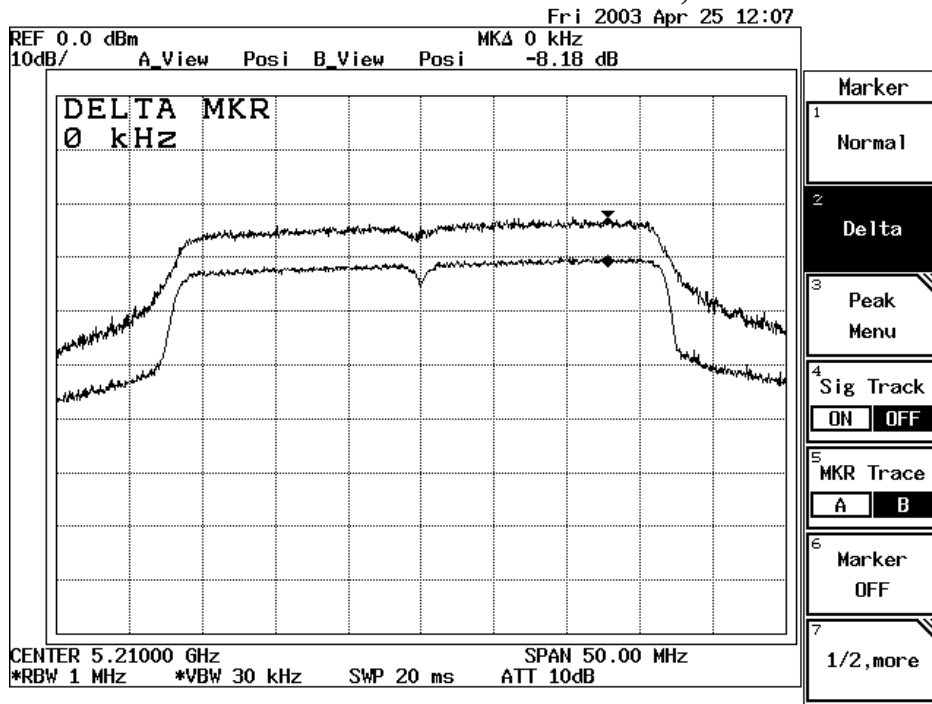


Base Mode of 5.15GHz - 5.35 GHz, CH-High

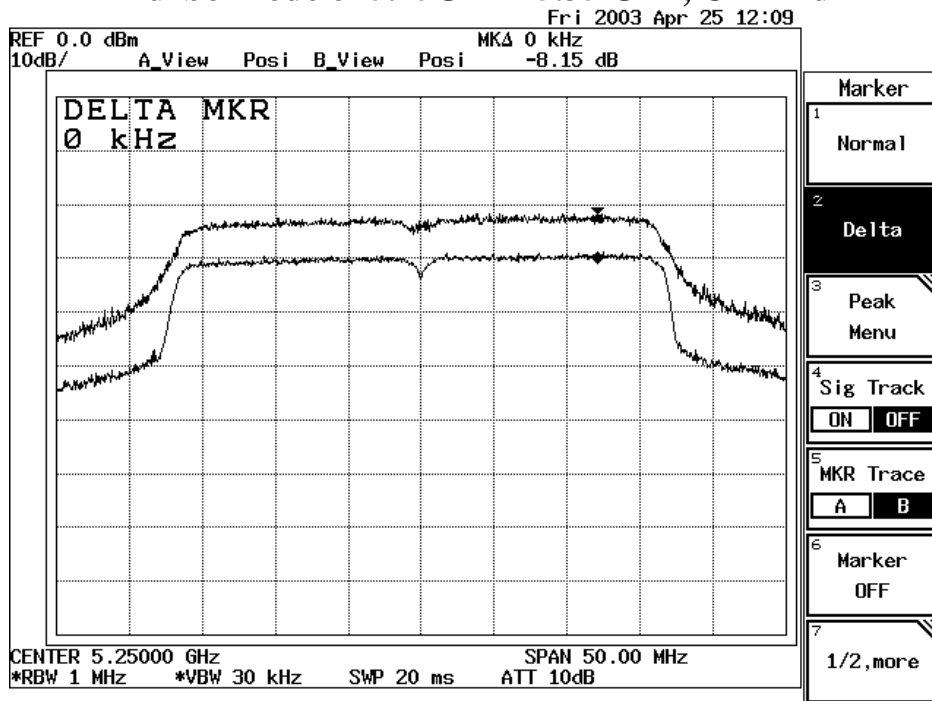




Turbo Mode of 5.15GHz - 5.35 GHz, CH-Low



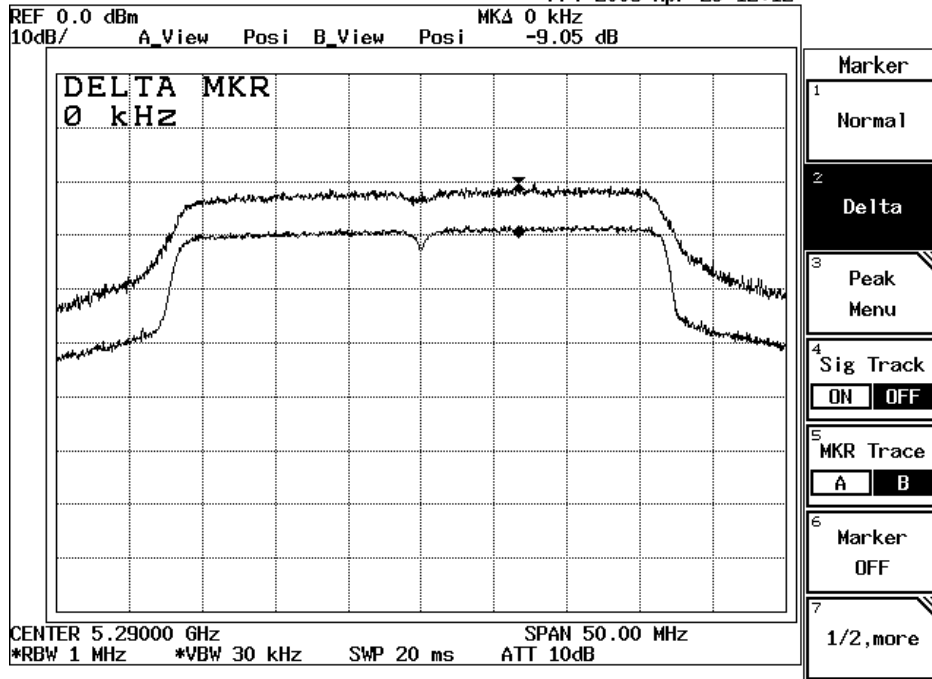
Turbo Mode of 5.15GHz - 5.35 GHz, CH-Mid





Turbo Mode of 5.15GHz - 5.35 GHz, CH-High

Fri 2003 Apr 25 12:12

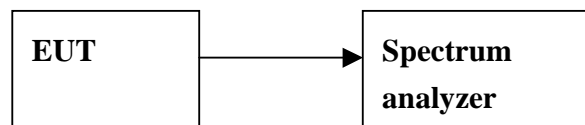


10. BAND EDGES MEASUREMENT

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation and measurements on the radiated emissions site.

10.1 Test Setup

1. Conducted test



The EUT was connected to the spectrum analyzer through a 50 Ω RF cable.

2. Radiation test

The EUT is placed on the wooden table. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4/2000.

10.2 Measurement Procedure

1. Conducted test:

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1MHz and the VBW is set to 1MHz for peak measurements. The RBW is set to 1MHz and the VBW is set to 10Hz for average measurements. The sweep time is coupled.

2. Radiation test

For measurements above 1 GHz, the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

**10.3 Measurement Equipment Used:**

Open Area Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3261A	N/A	03/18/2003	03/17/2004
Spectrum Analyzer	Advantest	R3182	110600647	11/16/2002	11/15/2003
Spectrum Analyzer	ROHDE & SCHWARZ	FSP30	100112	06/29/2002	06/28/2003
EMI Test Receiver	R&S	ESVS20	838804/004	01/04/2003	01/03/2004
Pre-Amplifier	HP	8447D	2944A09173	03/03/2003	03/02/2004
Bi-log Antenna	SCHWAZBECK	VULB9163	145	07/06/2002	07/05/2003
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R	N.C.R
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R	N.C.R
Controller	EMCO	2090	9709-1256	N.C.R	N.C.R
RF Switch	ANRITSU	MP59B	M53867	N.C.R	N.C.R
Site NSA	C&C	N/A	N/A	11/17/2002	11/16/2003
Horn antenna	Schwarzbeck	BBHA 9120	D210	2/23/2003	2/22/2004
Horn antenna	EMCO	3116	2487	11/11/2002	11/10/2003
Pre-Amplifier	HP	8449B	3008B00965	10/01/2002	10/02/2003

10.4 Measurement Result

Base Mode

SMT(A-antenna)

1. Conducted test

Frequency (MHz)	Reading (dBm)		Ant. Gain (dBi)	Emission (dBm)		Limit Line (dBm)		Margin (dBm)	
	PK	AV		PK	AV	PK	AV	PK	AV
5119.92	-47.56	N/A	3.5	-44.06	N/A	-21	-41	-23.06	N/A
5148.88	-38.85	-57.40	3.5	-35.35	-53.90	-21	-41	-14.35	-12.90
5148.08	N/A	-57.61	3.5	N/A	-54.11	-21	-41	N/A	-13.11
5351.60	-40.11	-54.34	3.5	-36.61	-49.84	-21	-41	-15.61	-8.84
5376.24	-43.41	-54.17	3.5	-39.91	-49.67	-21	-41	-18.91	-8.67

2. Radiation test:

Operation Mode: TX Low & High Mode Test Date : April 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: SMT (A-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5150.00	2.15	33.90	35.53	60.14	42.98	H	60.66	43.50	74.0	54.0	-13.34	-10.50
5350.00	2.15	33.90	35.53	64.56	48.72	H	65.08	49.24	74.0	54.0	-8.92	-4.76
5376.80	2.15	33.90	35.53	55.40	46.08	H	55.92	46.60	74.0	54.0	-18.08	-7.40
5150.00	2.15	33.90	35.53	50.99	40.21	V	51.51	40.73	74.0	54.0	-22.49	-13.27
5350.00	2.15	33.90	35.53	48.68	36.97	V	49.20	37.49	74.0	54.0	-24.80	-16.51

**Joymax(B-antenna)****1. Conducted test**

Frequency (MHz)	Reading (dBm)		Ant. Gain (dBi)	Emission (dBm)		Limit Line (dBm)		Margin (dBm)	
	PK	AV		PK	AV	PK	AV	PK	AV
5120.80	-47.12	-56.77	5	-42.12	-51.77	-21	-41	-21.12	-10.77
5148.56	-42.57	-59.09	5	-37.57	-54.09	-21	-41	-16.57	-13.09
5350.16	-30.06	N/A	5	-25.06	N/A	-21	-41	-4.06	N/A
5351.76	N/A	-48.98	5	N/A	-43.98	-21	-41	N/A	-2.98
5376.40	-38.90	-50.20	5	-33.90	-45.20	-21	-41	-12.90	-4.20

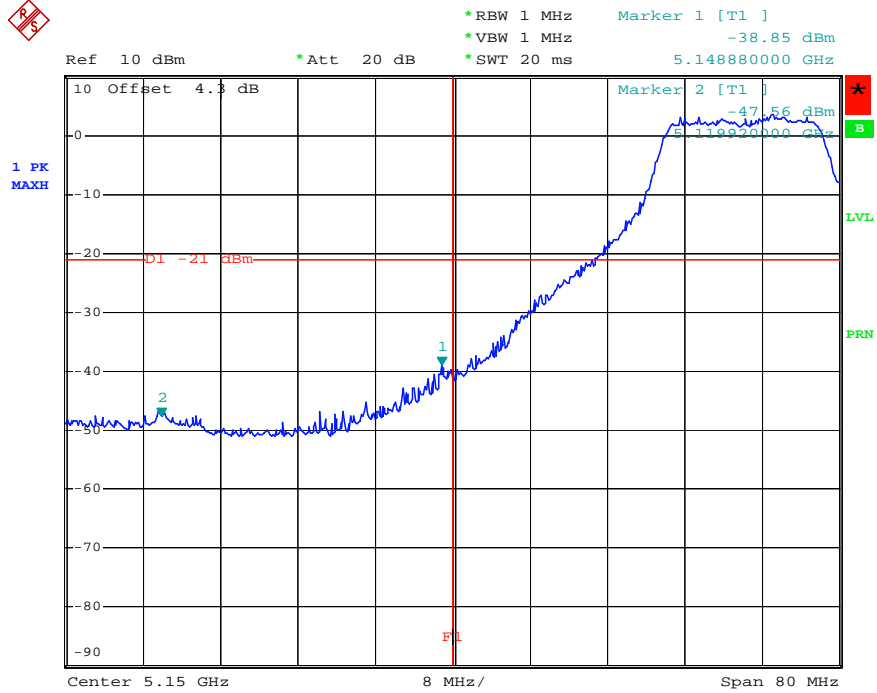
2. Radiation test:

Operation Mode: TX Low & High Mode Test Date : April 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: Joymax (B-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5087.60	2.15	33.90	35.53	48.25	39.15	H	48.77	39.67	74.0	54.0	-25.23	-14.33
5150.00	2.15	33.90	35.53	54.86	41.79	H	55.38	42.31	74.0	54.0	-18.62	-11.69
5152.00	2.15	33.90	35.53	44.67	36.08	H	45.19	36.60	74.0	54.0	-28.81	-17.40
5350.00	2.15	33.90	35.53	54.45	39.58	H	54.97	40.10	74.0	54.0	-19.03	-13.90
5388.00	2.15	33.90	35.53	46.63	38.07	H	47.15	38.59	74.0	54.0	-26.85	-15.41
5409.00	2.15	33.90	35.53	48.63	40.43	H	49.15	40.95	74.0	54.0	-24.85	-13.05
5472.00	2.15	33.90	35.53	48.16	39.28	H	48.68	39.80	74.0	54.0	-25.32	-14.20
5536.00	2.25	34.60	35.54	48.24	40.15	H	49.55	41.46	74.0	54.0	-24.45	-12.54
5600.00	2.25	34.60	35.54	48.69	39.61	H	50.00	40.92	74.0	54.0	-24.00	-13.08
5088.00	2.15	33.90	35.53	50.22	43.69	V	50.74	44.21	74.0	54.0	-23.26	-9.79
5150.00	2.15	33.90	35.53	62.15	48.63	V	62.67	49.15	74.0	54.0	-11.33	-4.85
5152.00	2.15	33.90	35.53	49.83	42.55	V	50.35	43.07	74.0	54.0	-23.65	-10.93
5249.60	2.15	33.90	35.53	54.45	44.95	V	54.97	45.47	74.0	54.0	-19.03	-8.53
5350.00	2.15	33.90	35.53	62.34	49.07	V	62.86	49.59	74.0	54.0	-11.14	-4.41
5471.20	2.15	33.90	35.53	55.96	45.50	V	56.48	46.02	74.0	54.0	-17.52	-7.98
5536.00	2.25	34.60	35.54	58.13	48.36	V	59.44	49.67	74.0	54.0	-14.56	-4.33
5537.60	2.25	34.60	35.54	54.86	45.09	V	56.17	46.40	74.0	54.0	-17.83	-7.60

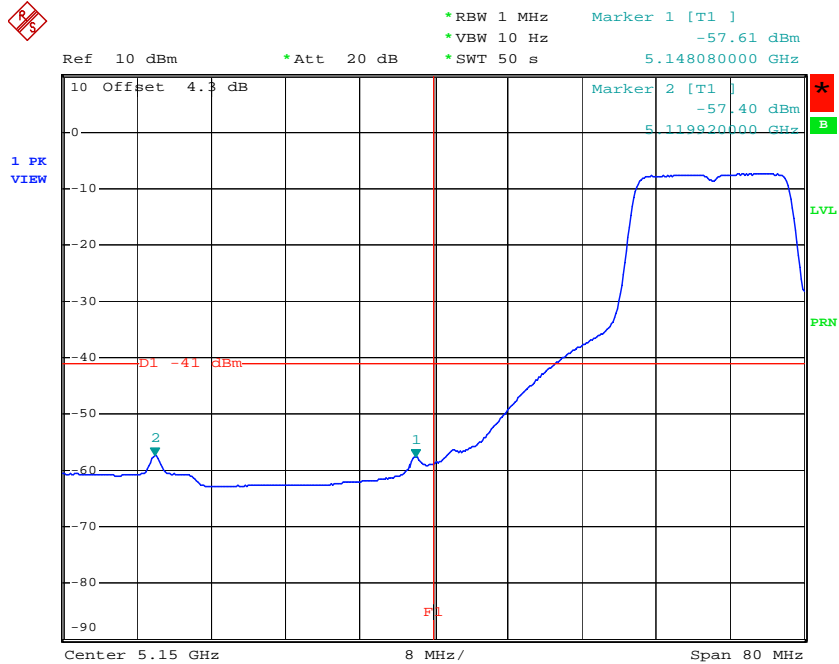


SMT (A-antenna) Conducted Band Edge Measurement Result Base Mode CH Lowest (Peak Mode)



Date: 3.APR.2003 20:07:49

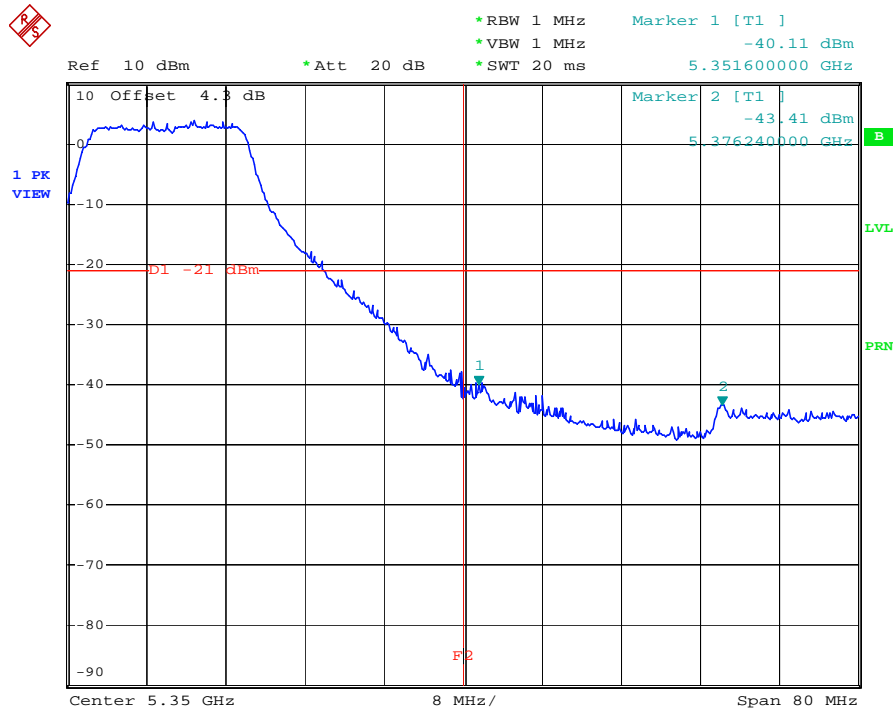
Base Mode CH Lowest (Average Mode)



Date: 3.APR.2003 20:06:41

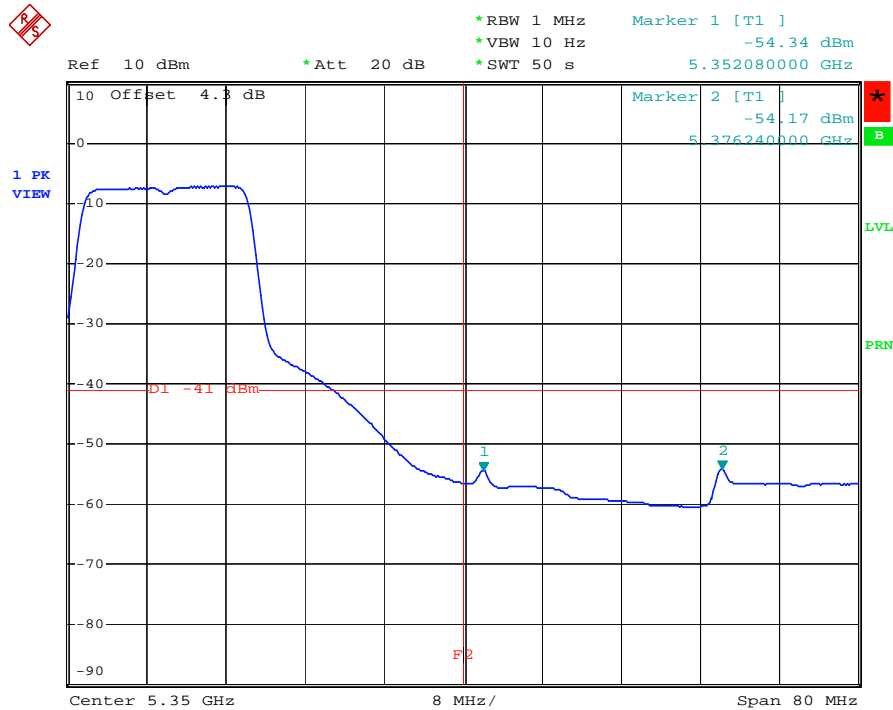


Base Mode CH Highest (Peak Mode)



Date: 3.APR.2003 20:01:27

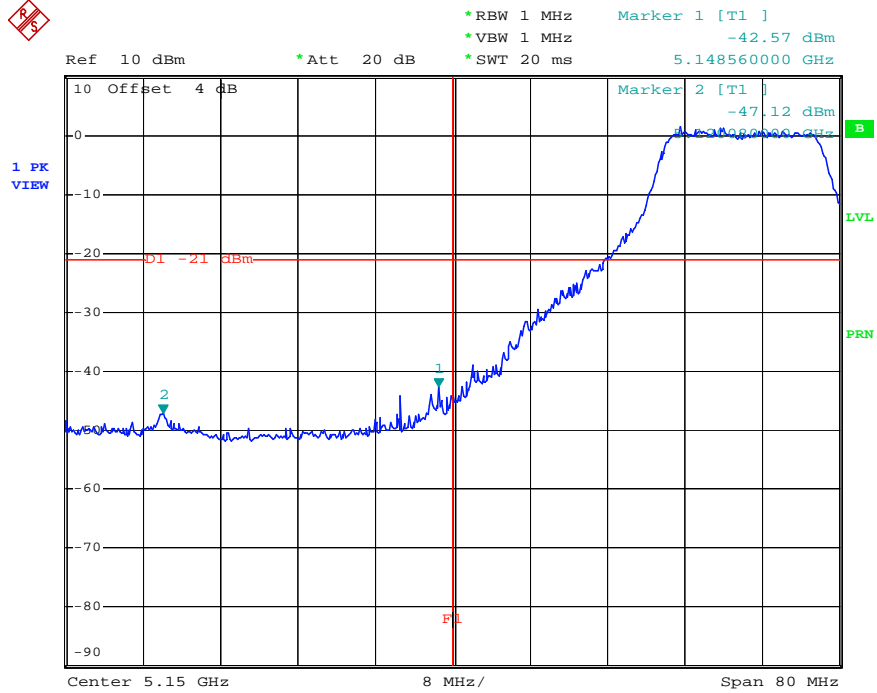
Base Mode CH Highest (Average Mode)



Date: 3.APR.2003 20:03:26

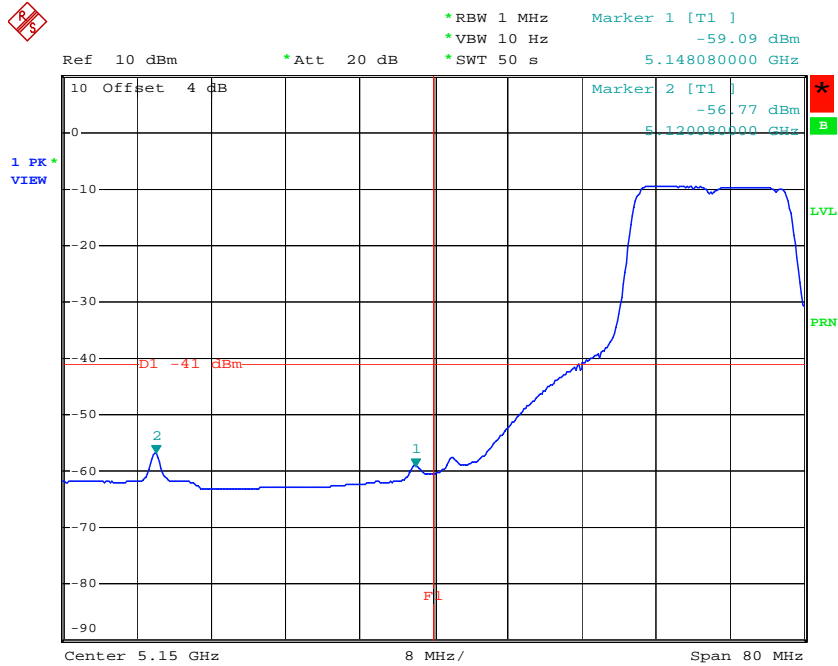


Joymax (B-antenna) Conducted Band Edge Measurement Result Base Mode CH Lowest (Peak Mode)



Date: 3.APR.2003 21:35:58

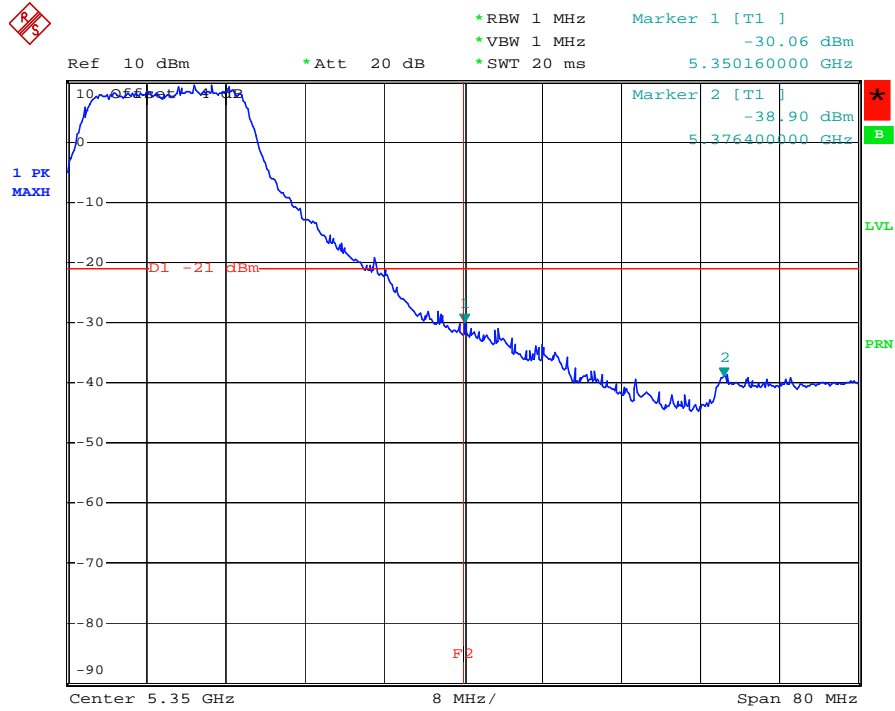
Base Mode CH Lowest (Average Mode)



Date: 3.APR.2003 21:35:02

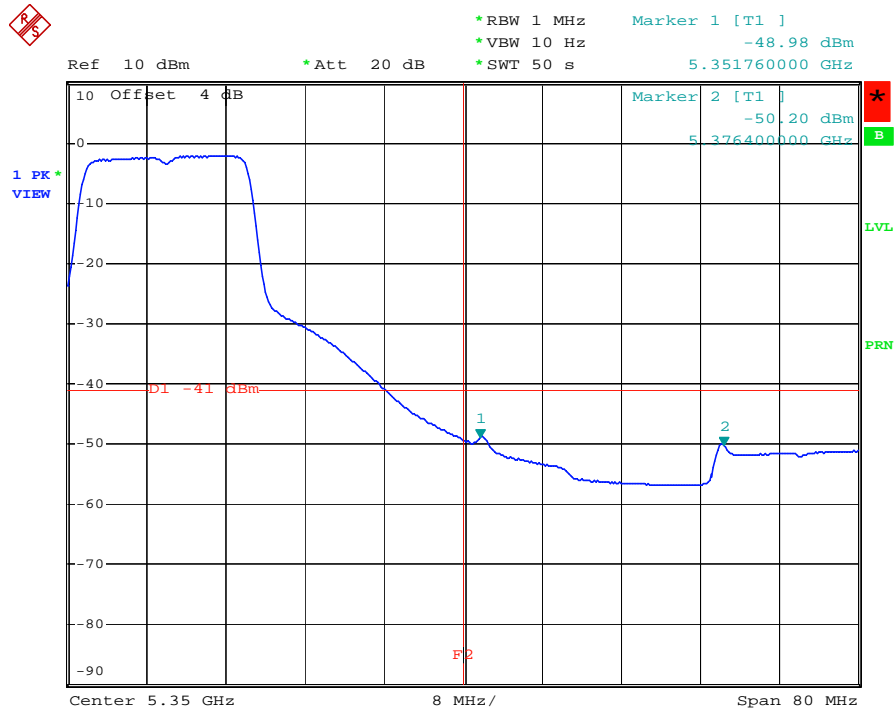


Turbo Mode CH Highest (Peak Mode)



Date: 3.APR.2003 21:31:10

Turbo Mode CH Highest (Average Mode)



Date: 3.APR.2003 21:32:58

Turbo Mode**SMT(A-antenna)****1. Conducted test**

Frequency (MHz)	Reading (dBm)		Ant. Gain (dBi)	Emission (dBm)		Limit Line (dBm)		Margin (dBm)	
	PK	AV		PK	AV	PK	AV	PK	AV
5087.92	-48.24	-57.80	3.5	-44.74	-54.30	-21	-41	-23.74	-13.30
5148.08	-41.07	N/A	3.5	-37.57	N/A	-21	-41	-16.57	N/A
5119.92	N/A	-58.42	3.5	N/A	-54.92	-21	-41	N/A	-13.92
5150.00	N/A	-59.79	3.5	N/A	-56.29	-21	-41	N/A	-15.29
5350.00	-44.03	-57.29	3.5	-40.53	-53.79	-21	-41	-19.53	-12.79
5376.24	-46.99	-55.80	3.5	-53.49	-52.30	-21	-41	-32.49	-11.30
5408.24	-47.46	-59.59	3.5	-43.96	-56.09	-21	-41	-22.96	-12.09

2. Radiation test:

Operation Mode: TX Low & High Mode(Turbo Mode) Test Date : Mar. 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: SMT (A-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5150.00	2.15	33.90	35.53	59.10	45.50	H	59.62	46.02	74.0	54.0	-14.38	-7.98
5350.00	2.15	33.90	35.53	60.12	47.59	H	60.64	48.11	74.0	54.0	-13.36	-5.89
5150.00	2.15	33.90	35.53	51.40	40.44	V	51.92	40.96	74.0	54.0	-22.08	-13.04
5350.00	2.15	33.90	35.53	50.00	40.00	V	50.52	40.52	74.0	54.0	-23.48	-13.48

Joymax(B-antenna)**1. Conducted test**

Frequency (MHz)	Reading (dBm)		Ant. Gain (dBi)	Emission (dBm)		Limit Line (dBm)		Margin (dBm)	
	PK	AV		PK	AV	PK	AV	PK	AV
5088.24	-48.06	-57.82	5	-43.06	-52.82	-21	-41	-22.06	-11.82
5120.29	N/A	-58.50	5	N/A	-52.50	-21	-41	N/A	-11.50
5148.10	-38.29	N/A	5	-33.29	N/A	-21	-41	-12.29	N/A
5150.00	N/A	-55.25	5	N/A	-50.25	-21	-41	N/A	-9.25
5350.00	-33.33	-48.70	5	-28.33	-43.70	-21	-41	-7.33	-2.70
5375.92	N/A	-51.87	5	N/A	-46.87	-21	-41	N/A	-5.87
5388.08	-40.55	N/A	5	-35.55	N/A	-21	-41	-14.55	N/A

2. Radiation test:

Operation Mode: TX Low Mode(Turbo Mode) Test Date : Mar. 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: Joymax (B-antenna)

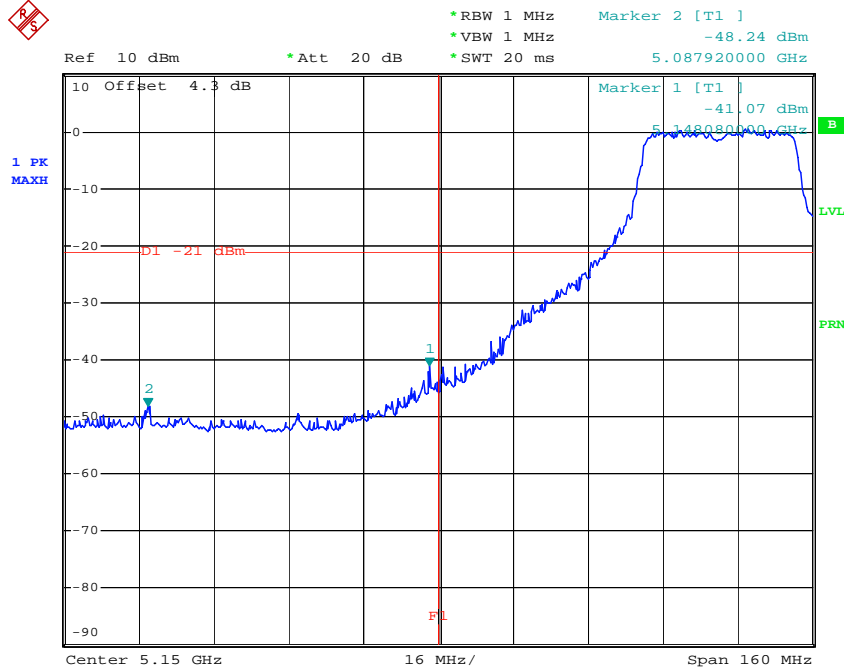
Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5087.60	2.15	33.90	35.53	46.99	38.34	H	47.51	38.86	74.0	54.0	-26.49	-15.14
5088.00	2.15	33.90	35.53	47.70	38.37	H	48.22	38.89	74.0	54.0	-25.78	-15.11
5150.00	2.15	33.90	35.53	50.91	39.22	H	51.43	39.74	74.0	54.0	-22.57	-14.26
5409.20	2.15	33.90	35.53	48.69	40.06	H	49.21	40.58	74.0	54.0	-24.79	-13.42
5472.00	2.15	33.90	35.53	49.19	40.72	H	49.71	41.24	74.0	54.0	-24.29	-12.76
5024.00	2.15	33.90	35.53	53.17	45.66	V	53.69	46.18	74.0	54.0	-20.31	-7.82
5150.00	2.15	33.90	35.53	57.98	45.03	V	58.50	45.55	74.0	54.0	-15.50	-8.45
5152.00	2.15	33.90	35.53	49.95	41.85	V	50.47	42.37	74.0	54.0	-23.53	-11.63
5350.00	2.15	33.90	35.53	59.05	47.39	V	59.57	47.91	74.0	54.0	-14.43	-6.09
5408.00	2.15	33.90	35.53	55.81	47.43	V	56.33	47.95	74.0	54.0	-17.67	-6.05
5472.00	2.15	33.90	35.53	56.27	48.86	V	56.79	49.38	74.0	54.0	-17.21	-4.62
5472.80	2.15	33.90	35.53	56.09	49.71	V	56.61	50.23	74.0	54.0	-17.39	-3.77
5536.00	2.25	34.60	35.54	55.20	47.94	V	56.51	49.25	74.0	54.0	-17.49	-4.75



SMT (A-antenna)

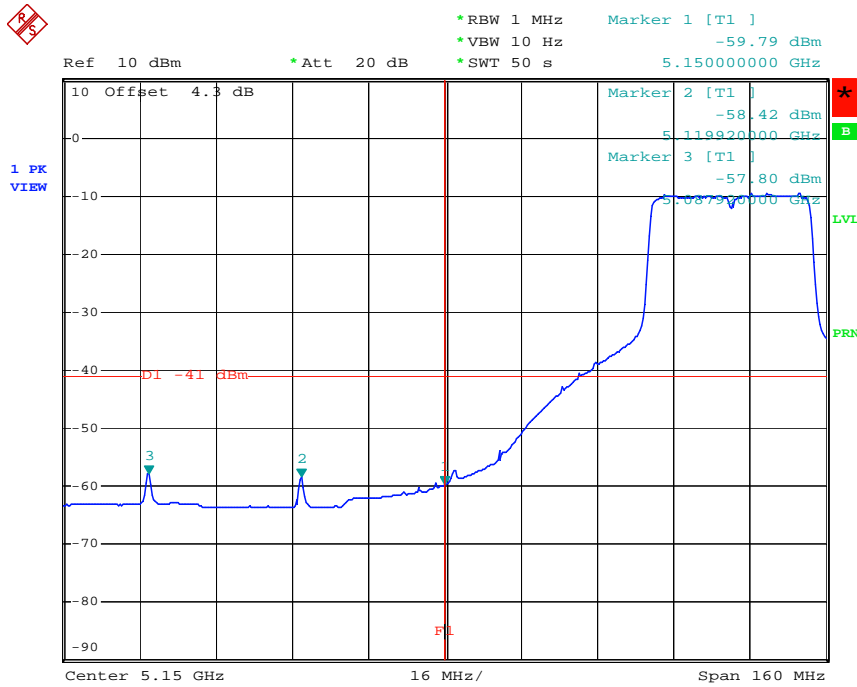
Conducted Band Edge Measurement Result

Turbo Mode CH Lowest (Peak Mode)



Date: 3.APR.2003 19:54:13

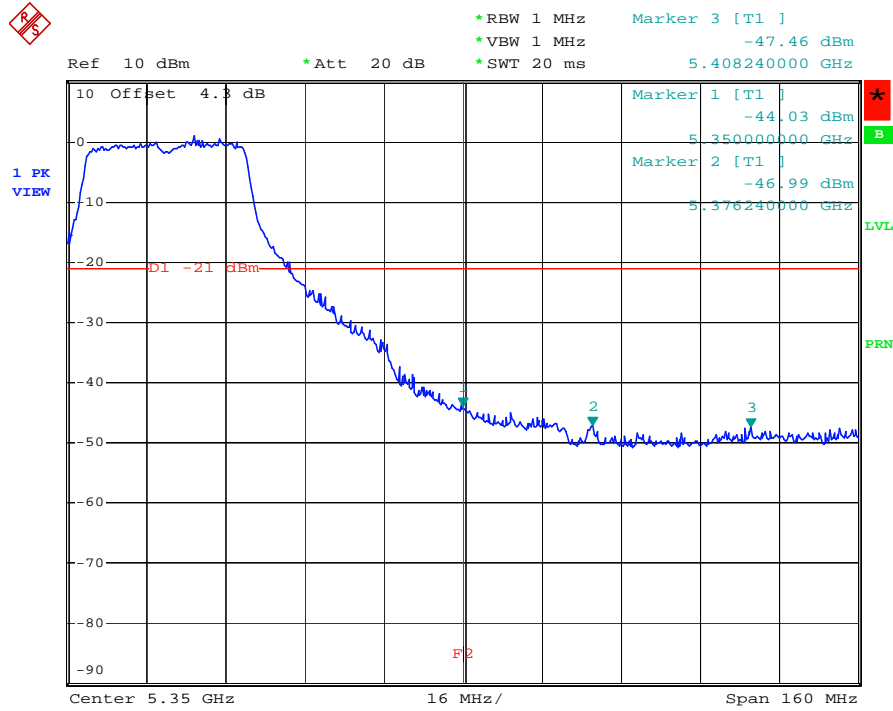
Turbo Mode CH Lowest (Average Mode)



Date: 3.APR.2003 19:56:25

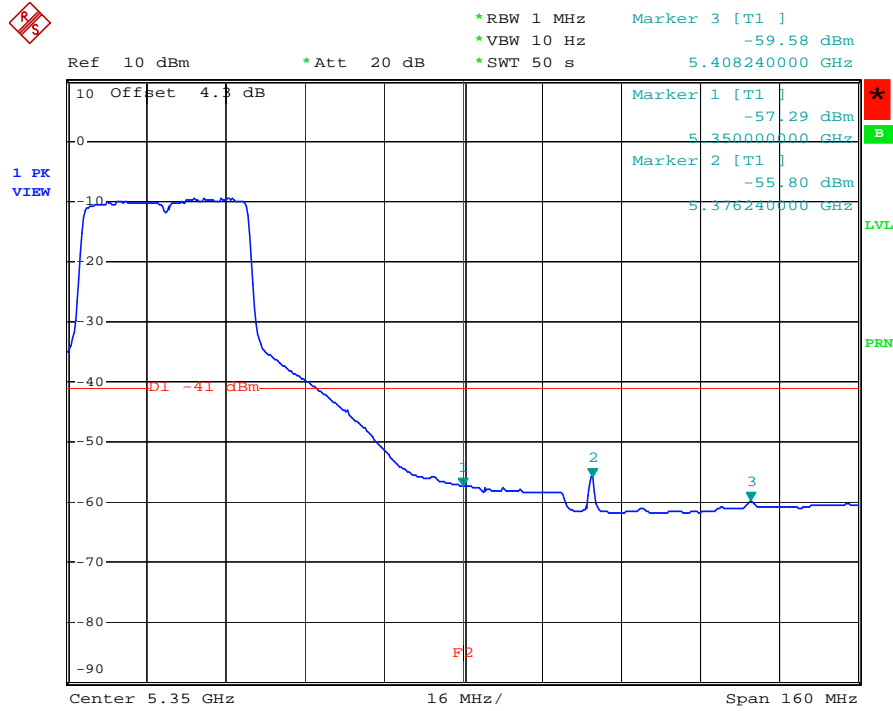


Turbo Mode CH Highest (Peak Mode)



Date: 3.APR.2003 19:59:17

Turbo Mode CH Highest (Average Mode)



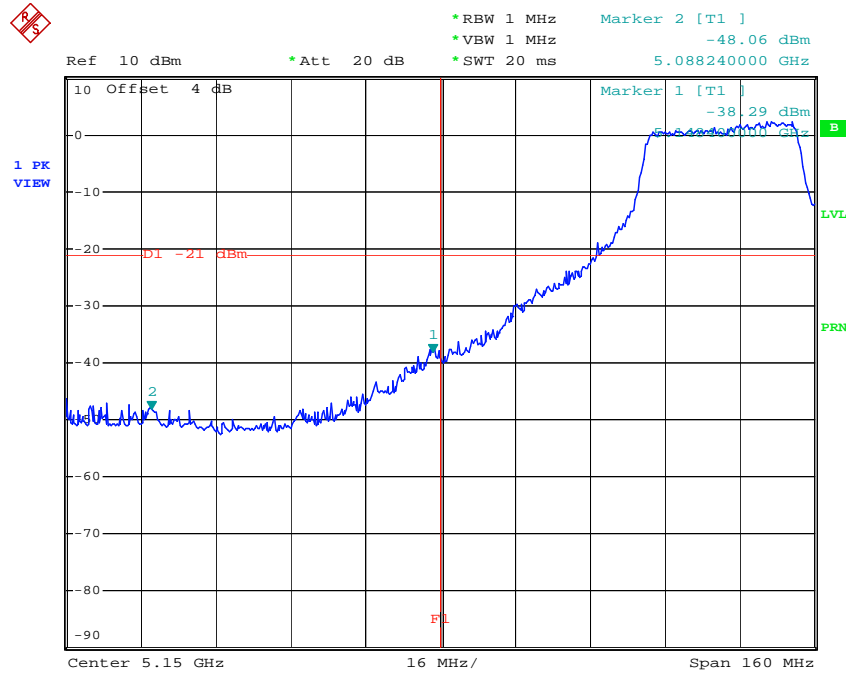
Date: 3.APR.2003 19:58:25



Joymax (B-antenna)

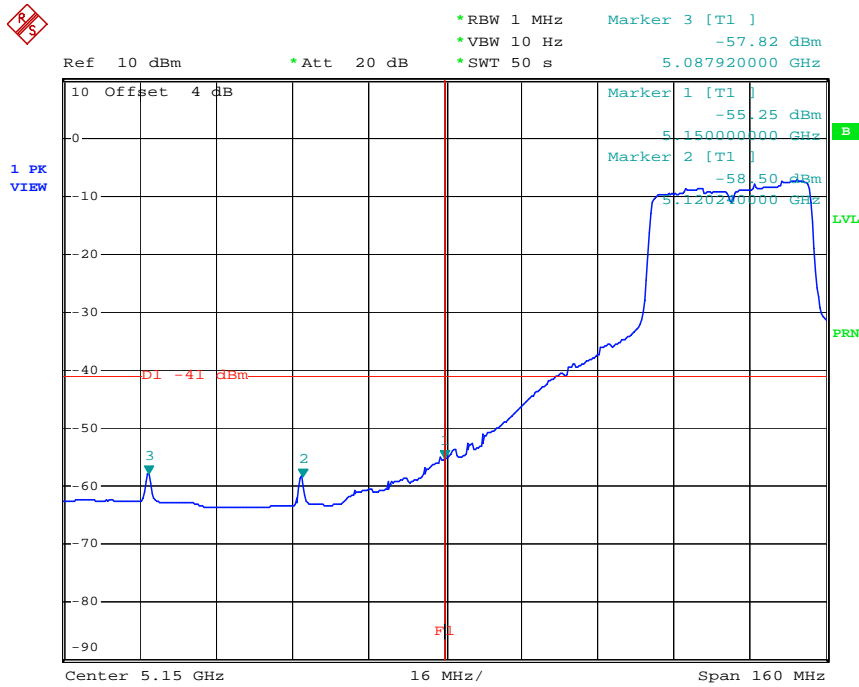
Conducted Band Edge Measurement Result

Turbo Mode CH Lowest (Peak Mode)



Date:

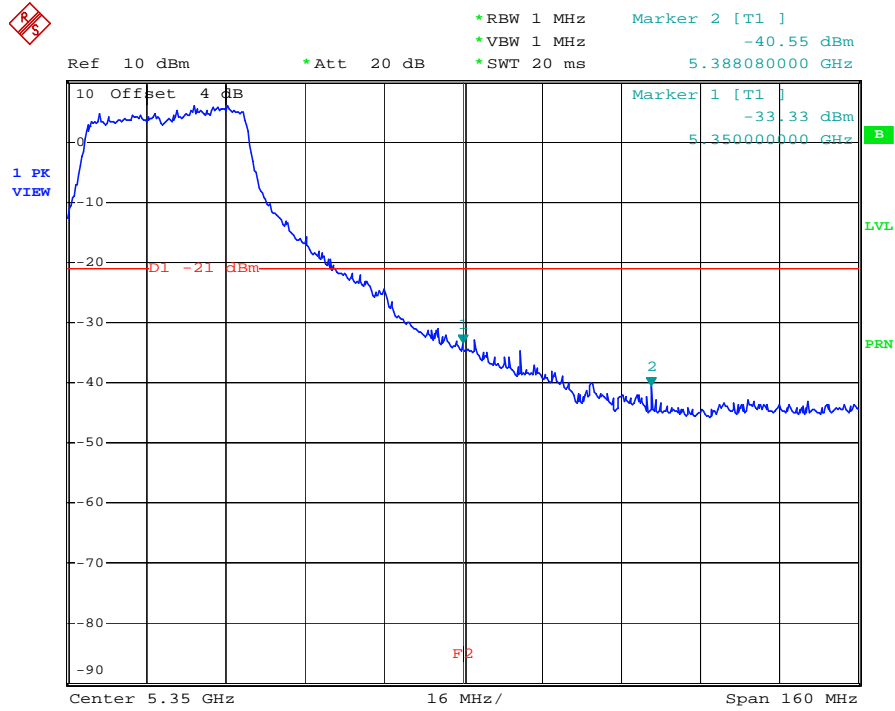
Turbo Mode CH Lowest (Average Mode)



Date: 3.APR.2003 21:25:11

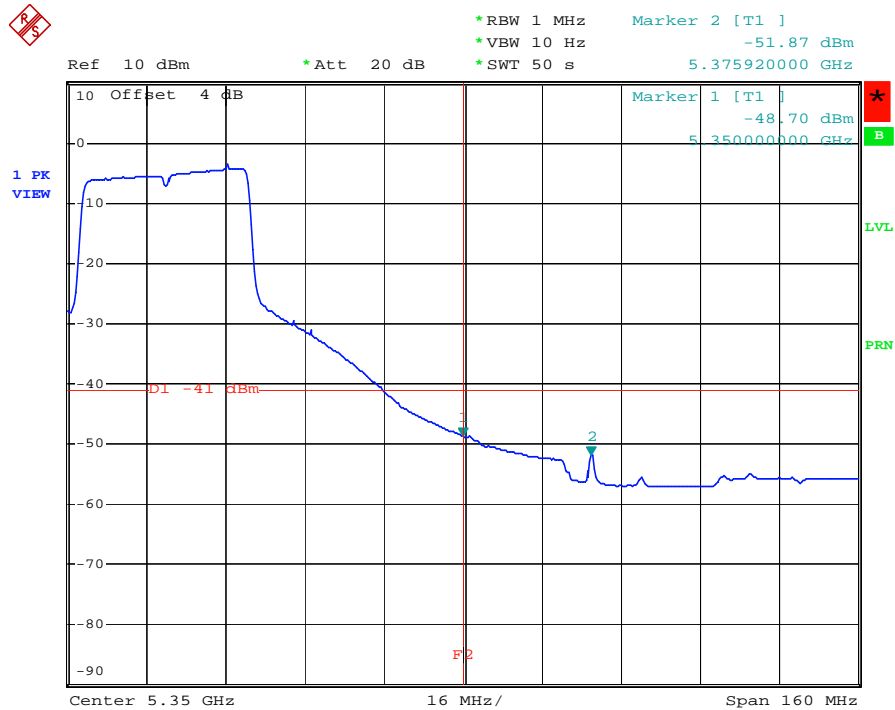


Turbo Mode CH Highest (Peak Mode)



Date: 3.APR.2003 21:28:55

Turbo Mode CH Highest (Average Mode)



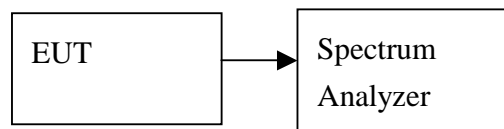
Date: 3.APR.2003 21:27:51

11. UNDESIRABLE EMISSION - CONDUCTED MEASUREMENT

Conducted RF measurements of the transmitter output were made at the band edges and the adjacent restricted bands.

Also, conducted RF measurements of the transmitter output over the 30 MHz to 40 GHz band were made in order to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

11.1 Test setup



The EUT was connected to a power meter through a 50 Ω RF cable.

11.2 Measurement Procedure

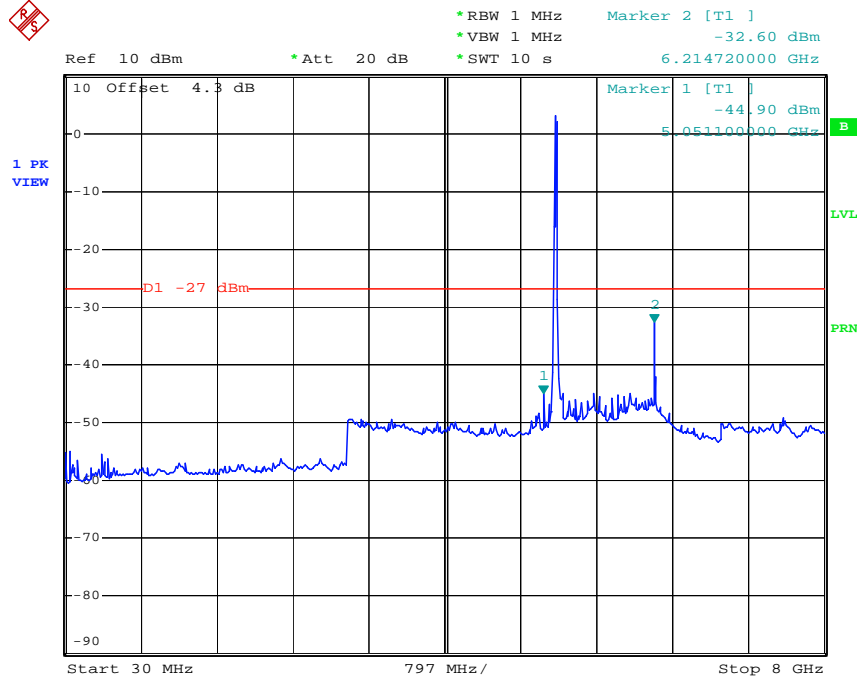
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum.
3. Set Spectrum RBW=1MHz, VBW = 1MHz for peak measurement.
4. Set Spectrum over the 30MHz to 40GHz range with the transmitter set to the lowest, middle, and highest channels.

11.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	Advantest	R3182	110600647	11/16/2002	11/15/2003
Spectrum Analyzer	R&S	FSP30	1093.4495.30	07/23/2002	07/22/2003

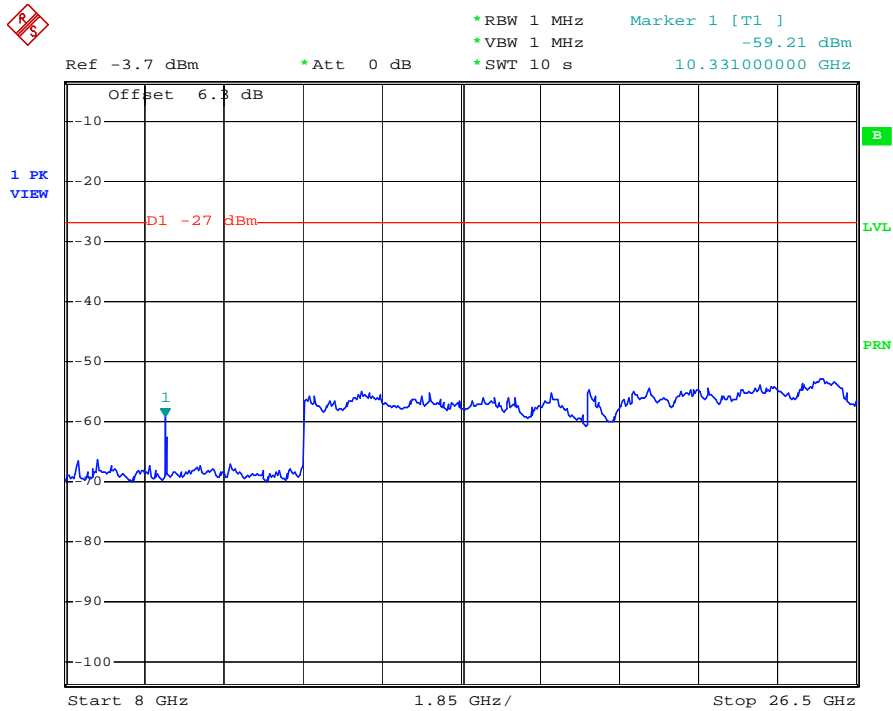


SMT(A-antenna) Base Mode CH Low 30MHz – 8GHz



Date: 3.APR.2003 20:11:10

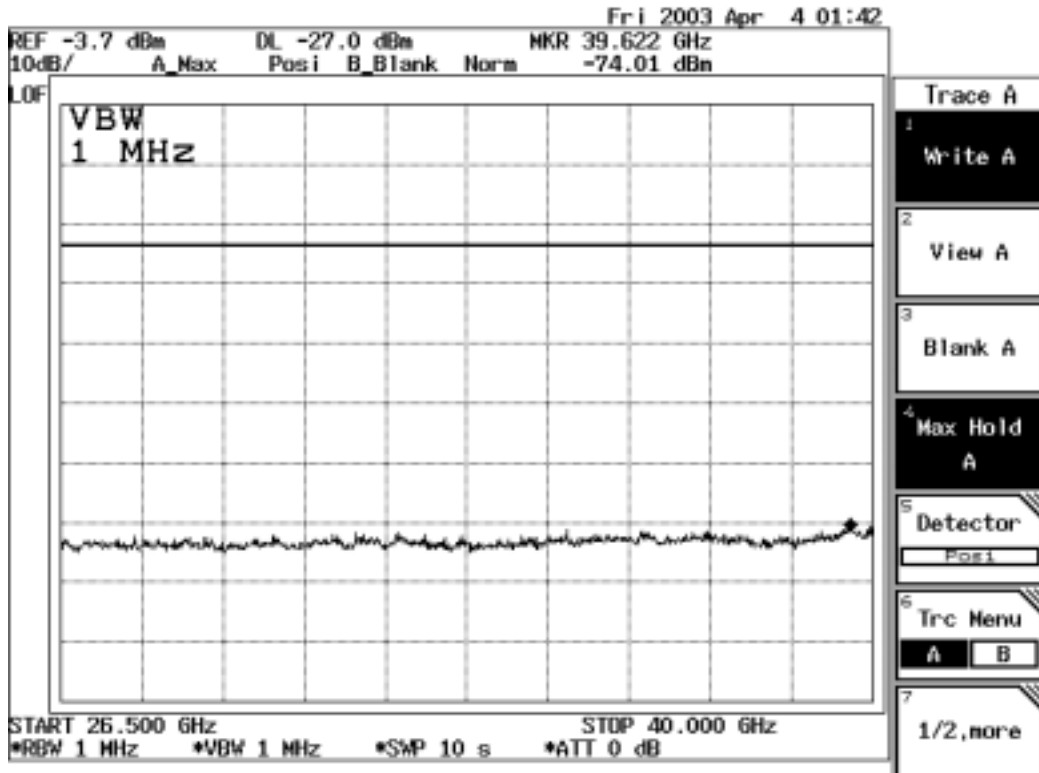
Base Mode CH Low 8GHz –26.5GHz



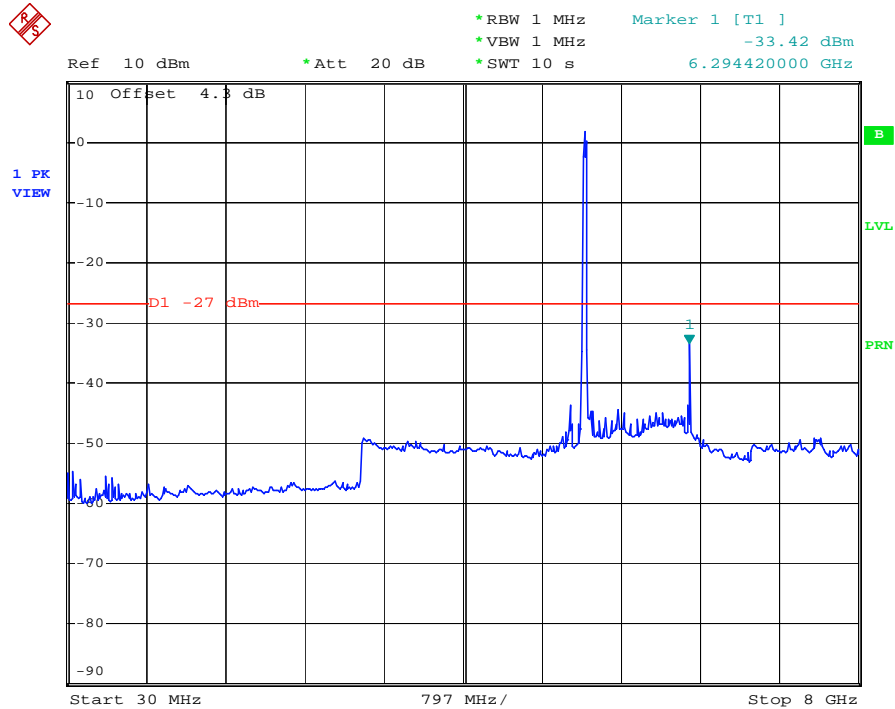
Date: 3.APR.2003 20:20:06



Base Mode CH Low 26.5GHz –40GHz



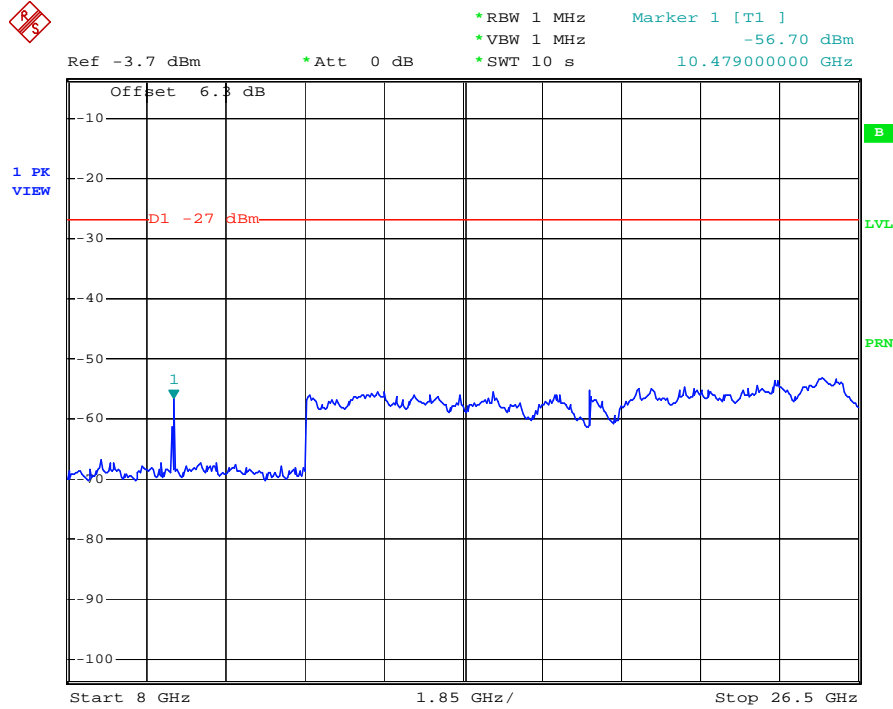
Base Mode CH Middle 30MHz –8GHz



Date: 3.APR.2003 20:16:25

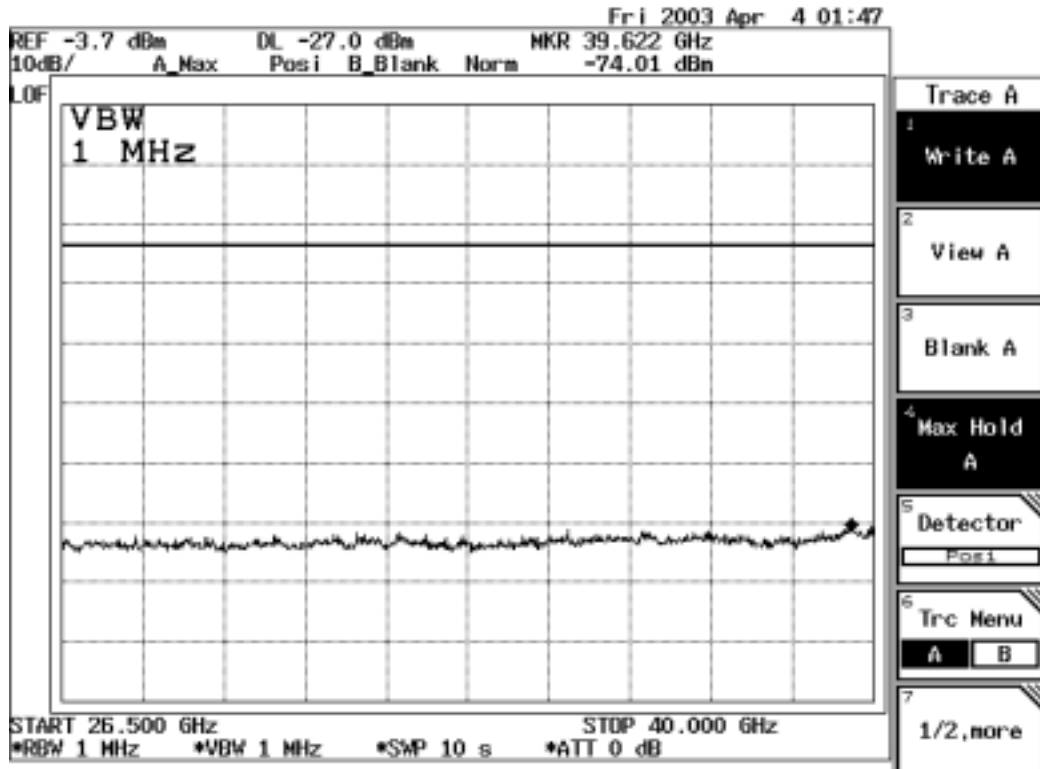


Base Mode CH Middle 8GHz -26.5GHz



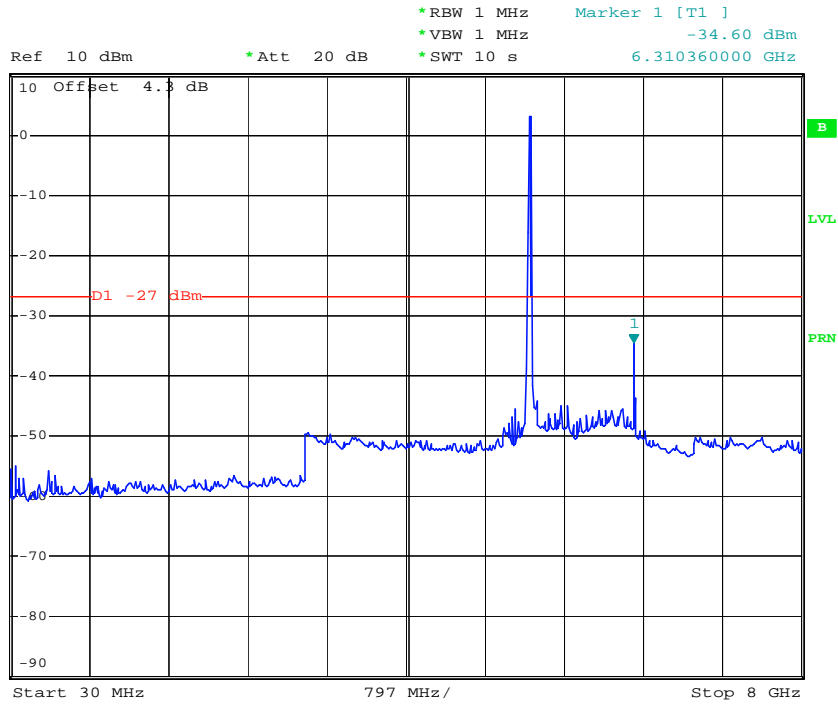
Date: 3.APR.2003 20:18:06

Base Mode CH Middle 26.5GHz -40GHz



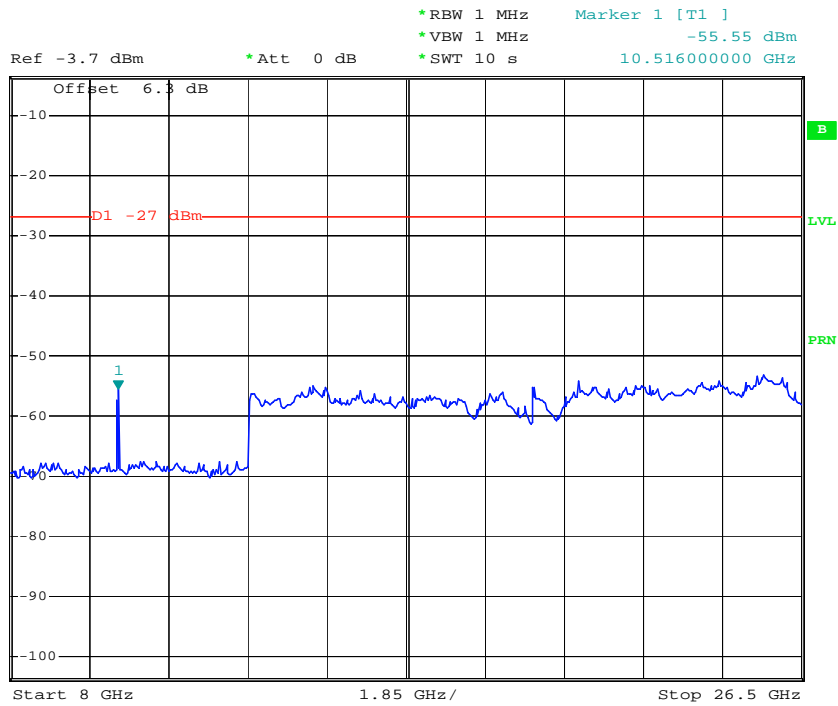


Base Mode CH Middle 30MHz -8GHz



Date: 3.APR.2003 20:22:53

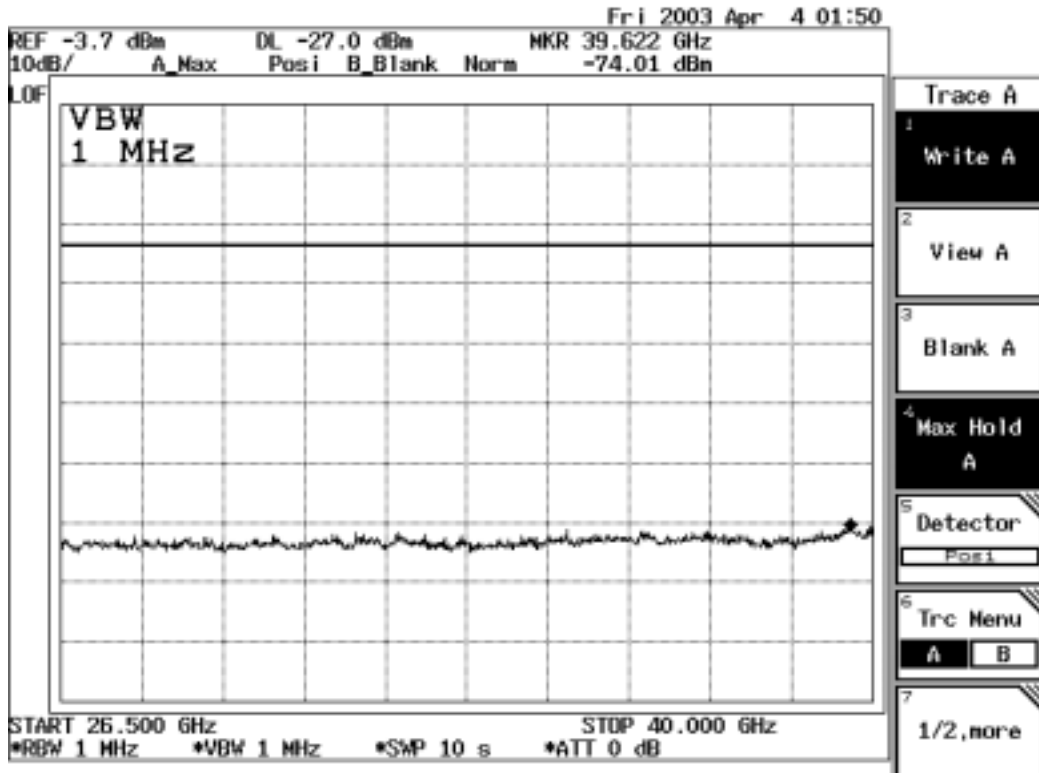
Base Mode CH Middle 8GHz -26.5GHz



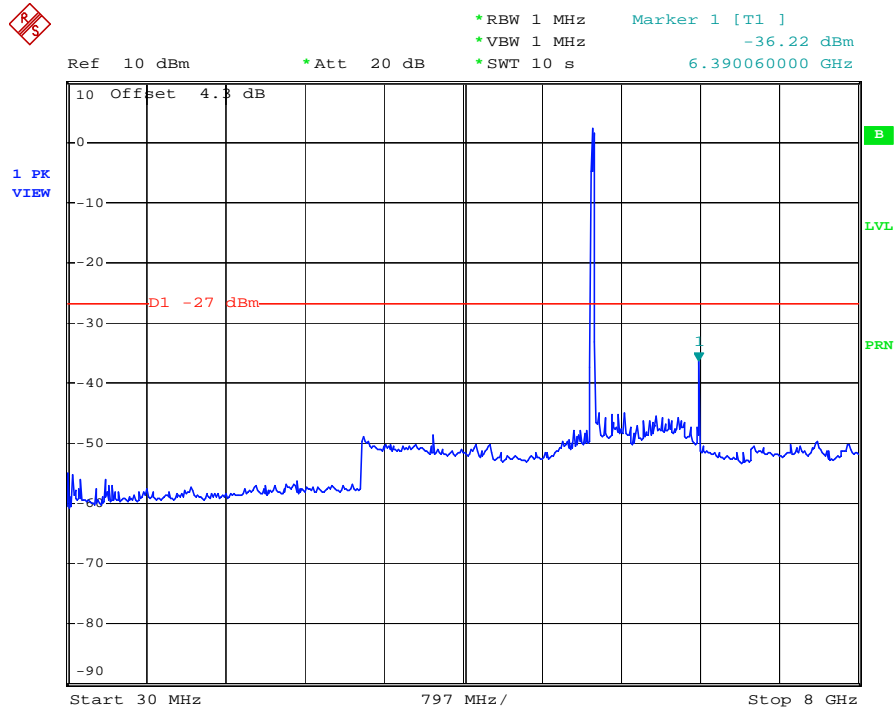
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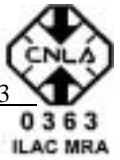
Base Mode CH Middle 26.5GHz –40GHz



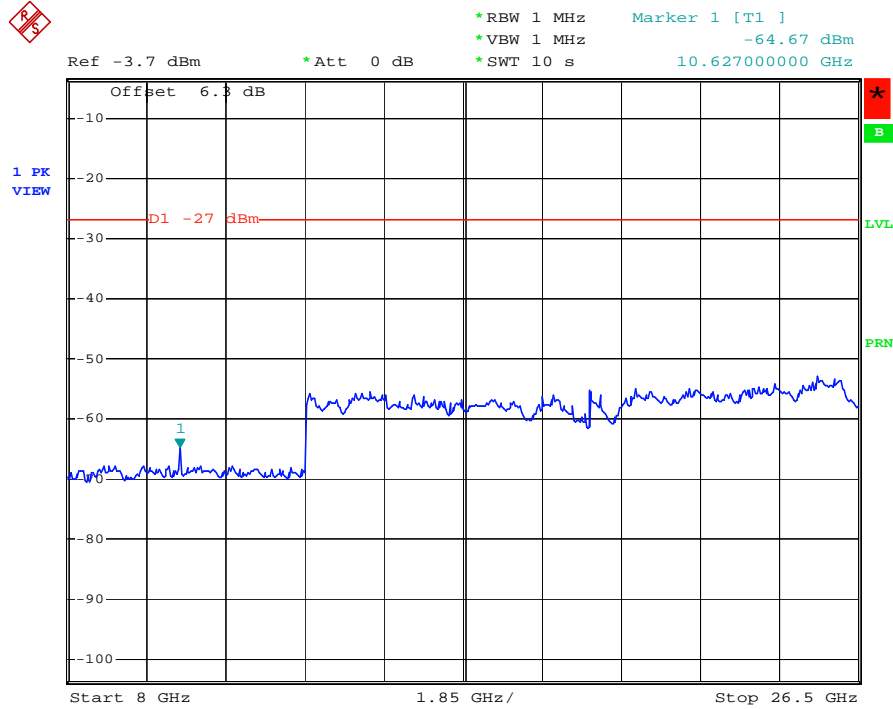
Base Mode CH High 30MHz – 8GHz



Date: 3.APR.2003 20:24:02

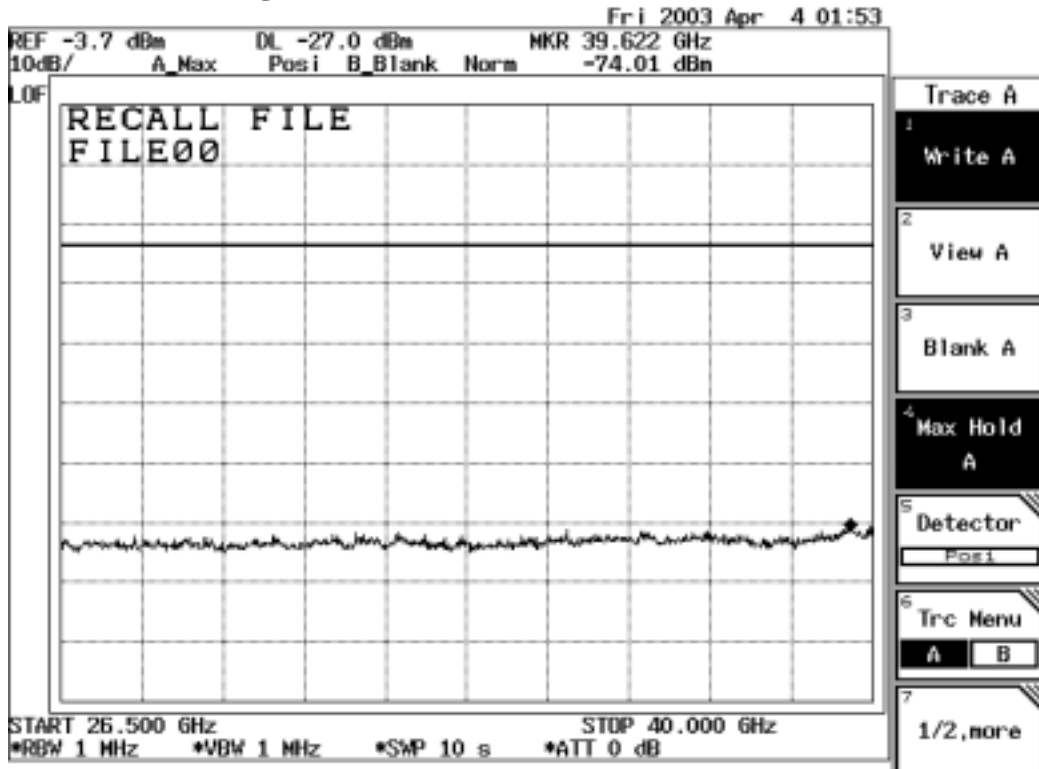


Base Mode CH High 8GHz – 26.5GHz



Date: 3.APR.2003 20:30:07

Base Mode CH High 26.5GHz – 40GHz

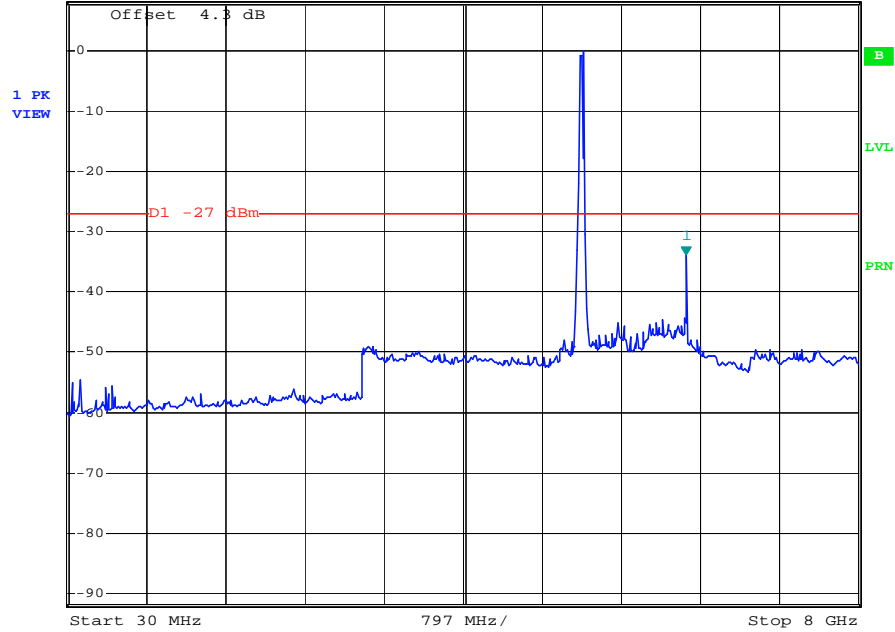




Turbo Mode CH Low 30MHz – 8GHz



Ref 8 dBm *Att 20 dB *RBW 1 MHz Marker 1 [T1]
*VBW 1 MHz -33.79 dBm
*SWT 10 s 6.262540000 GHz

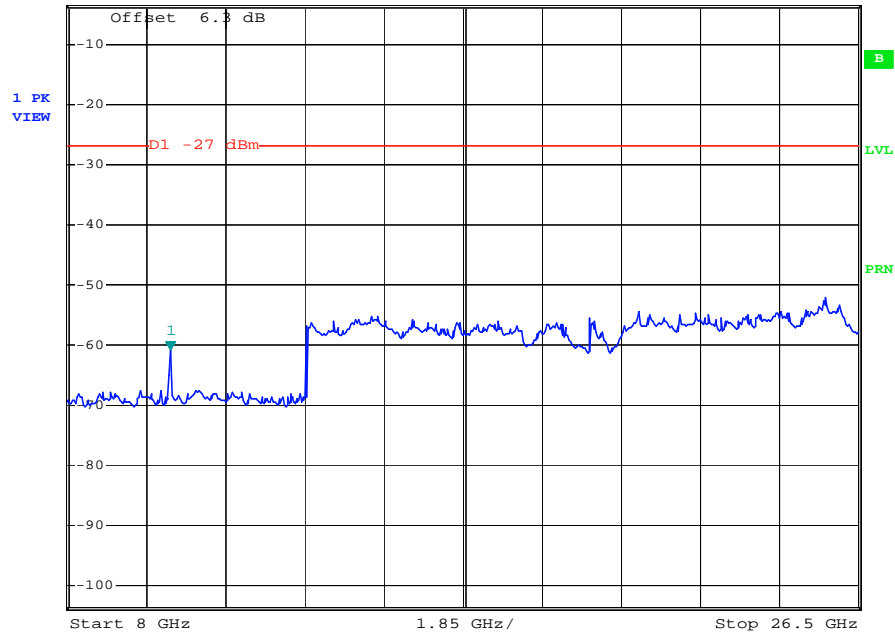


Date: 3.APR.2003 20:38:59

Turbo Mode CH Low 8GHz – 26.5GHz



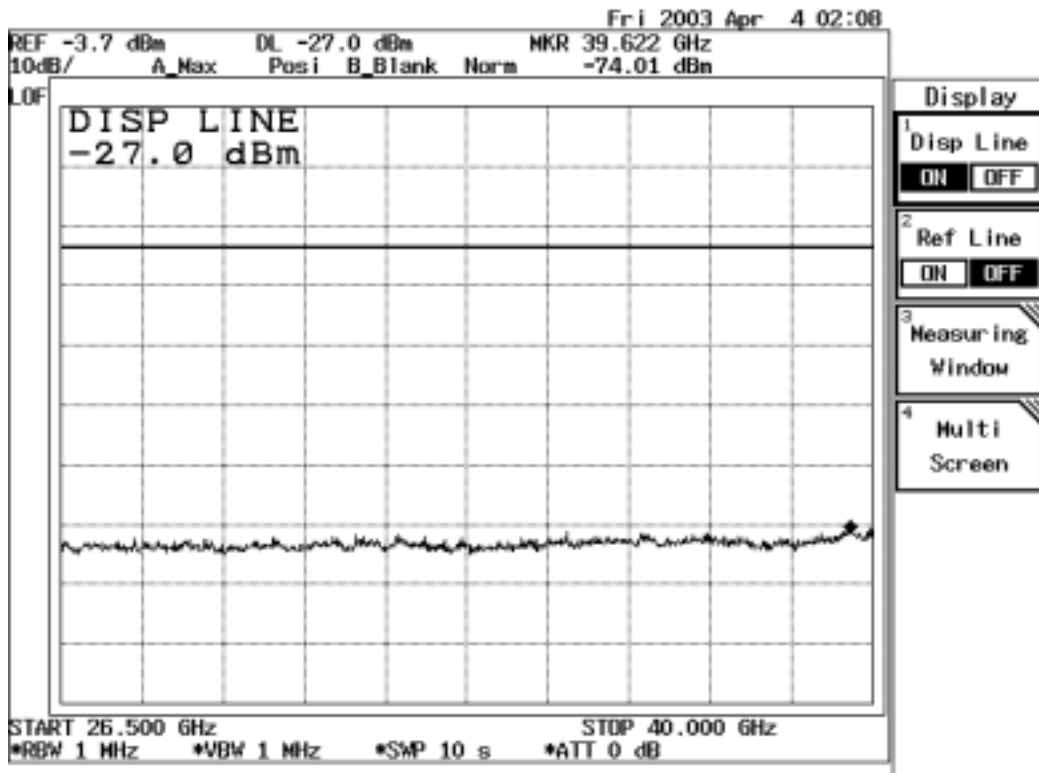
Ref -3.7 dBm *Att 0 dB *RBW 1 MHz Marker 1 [T1]
*VBW 1 MHz -60.71 dBm
*SWT 10 s 10.405000000 GHz



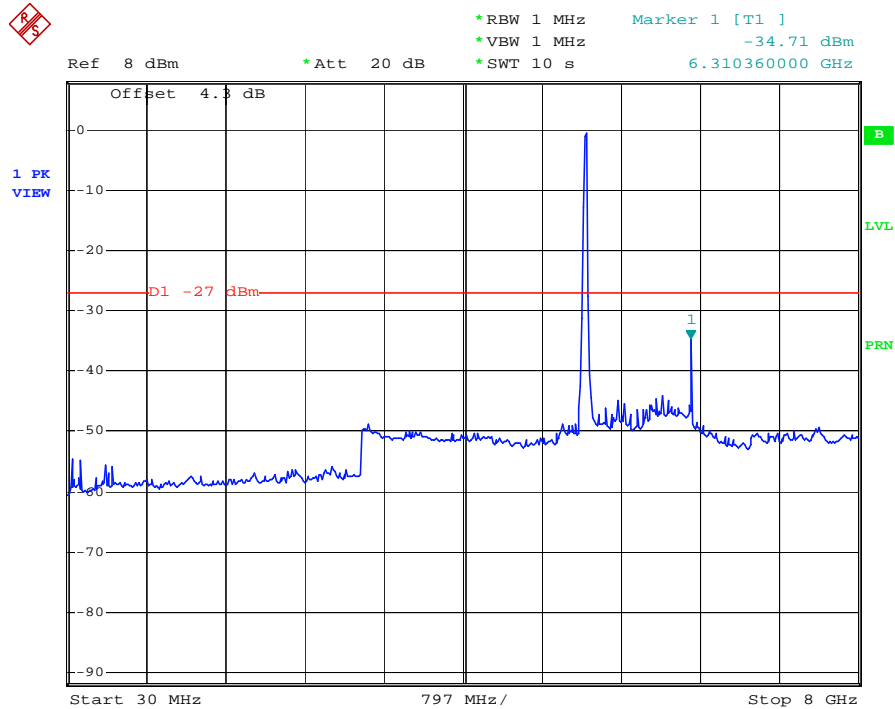
Date: 3.APR.2003 20:40:21



Turbo Mode CH Low 26.5GHz – 40GHz



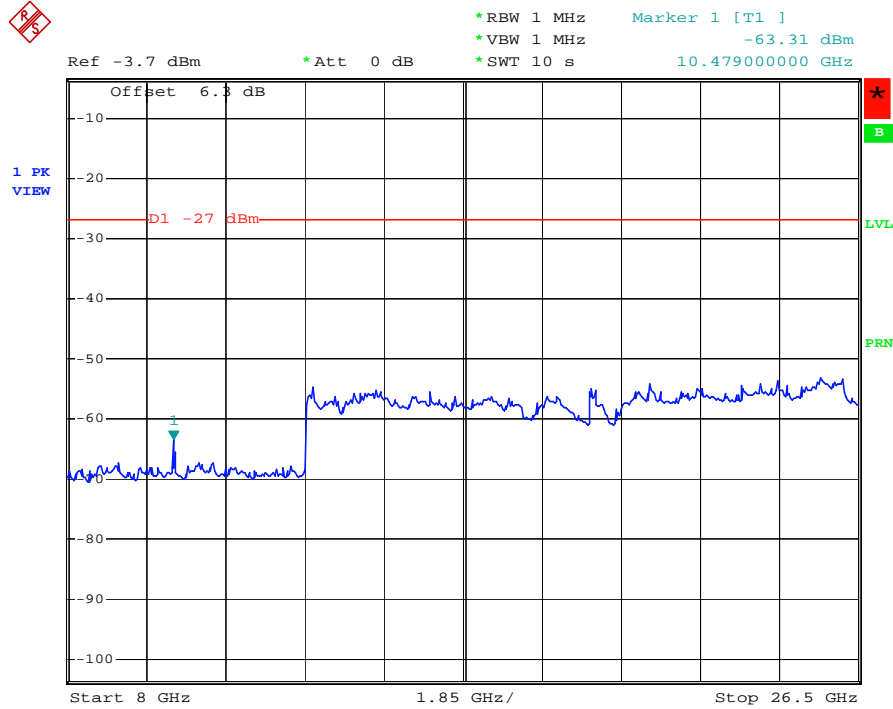
Turbo Mode CH Middle 30MHz – 8GHz



Date: 3.APR.2003 20:37:26

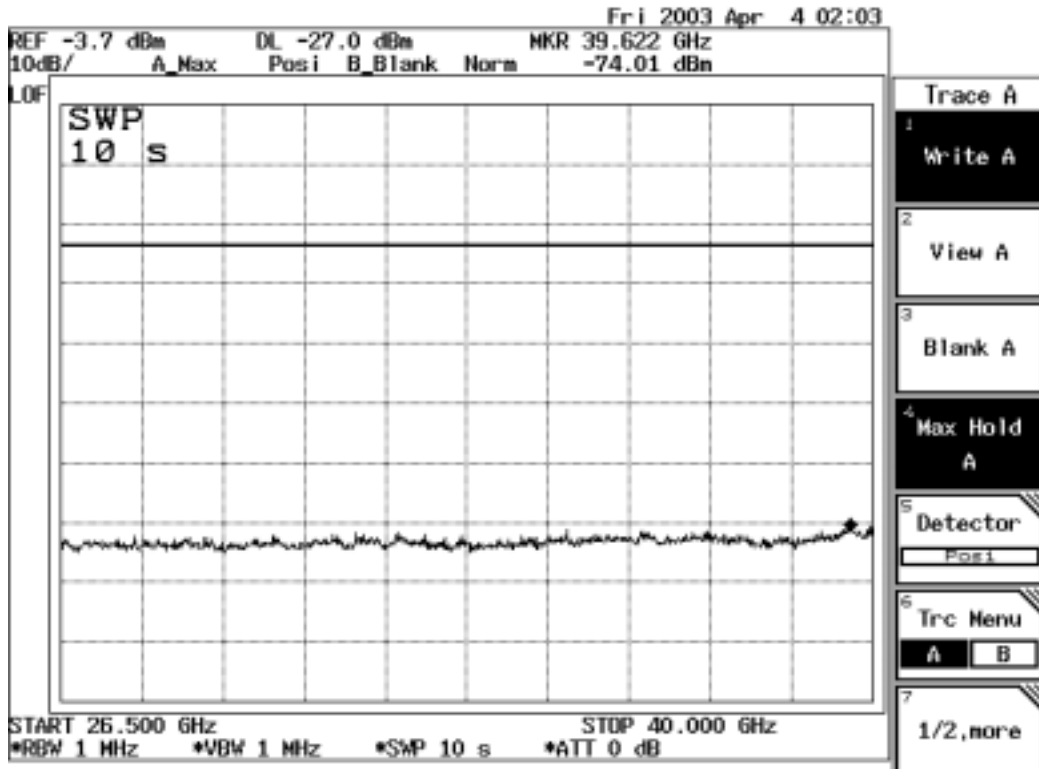


Turbo Mode CH Middle 8GHz – 26.5GHz



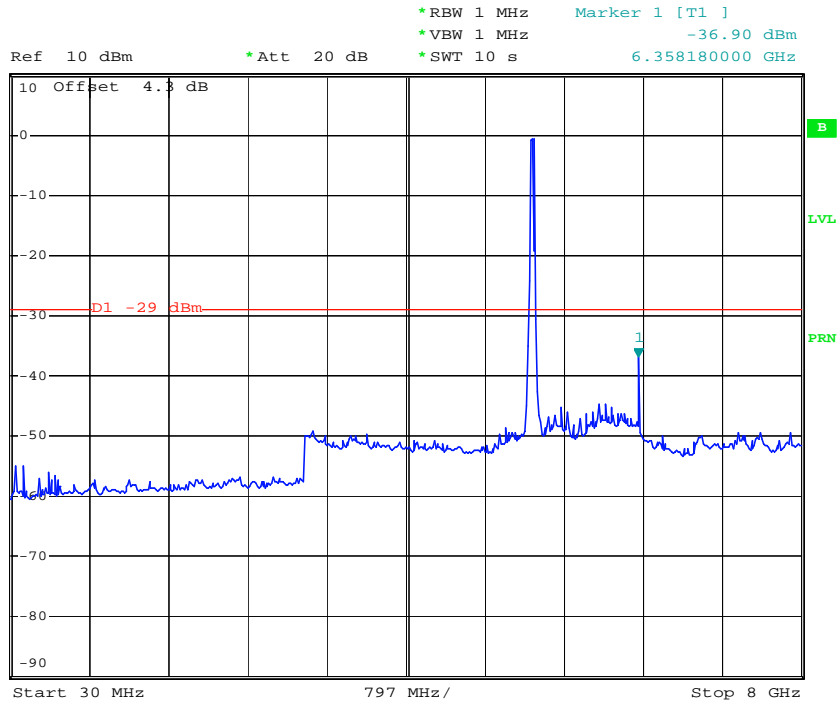
Date: 3.APR.2003 20:35:15

Turbo Mode CH Middle 26.5GHz – 40GHz



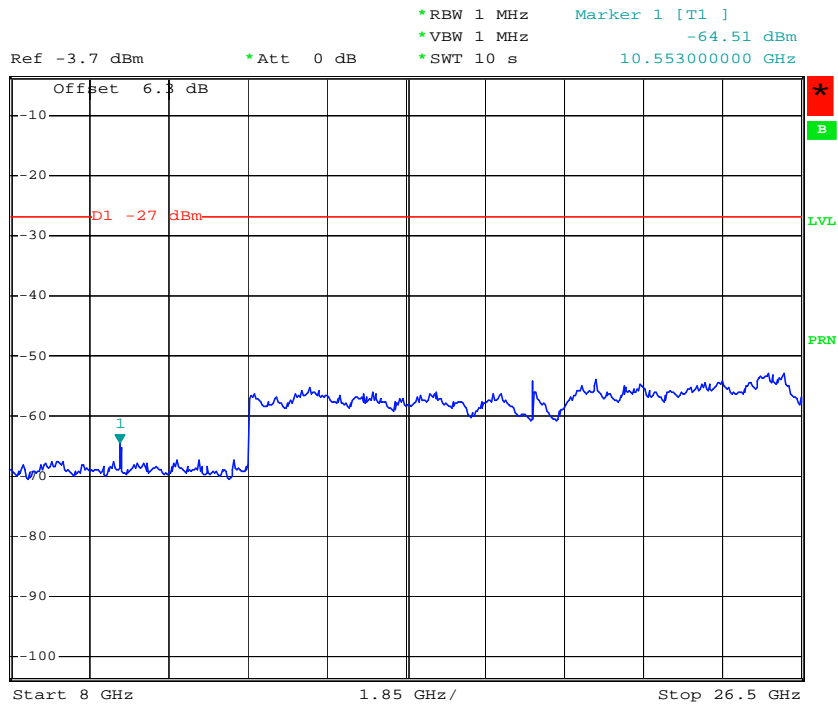


Turbo Mode CH High 30MHz – 8GHz



Date: 3.APR.2003 20:32:33

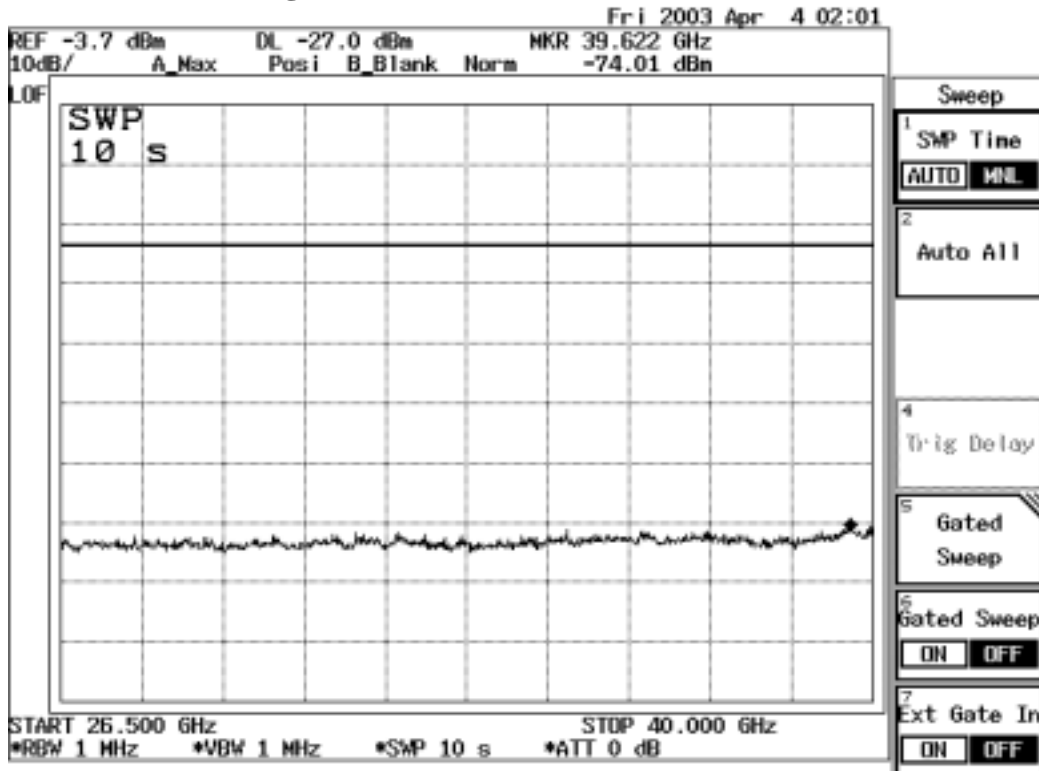
Turbo Mode CH High 8GHz – 26.5GHz



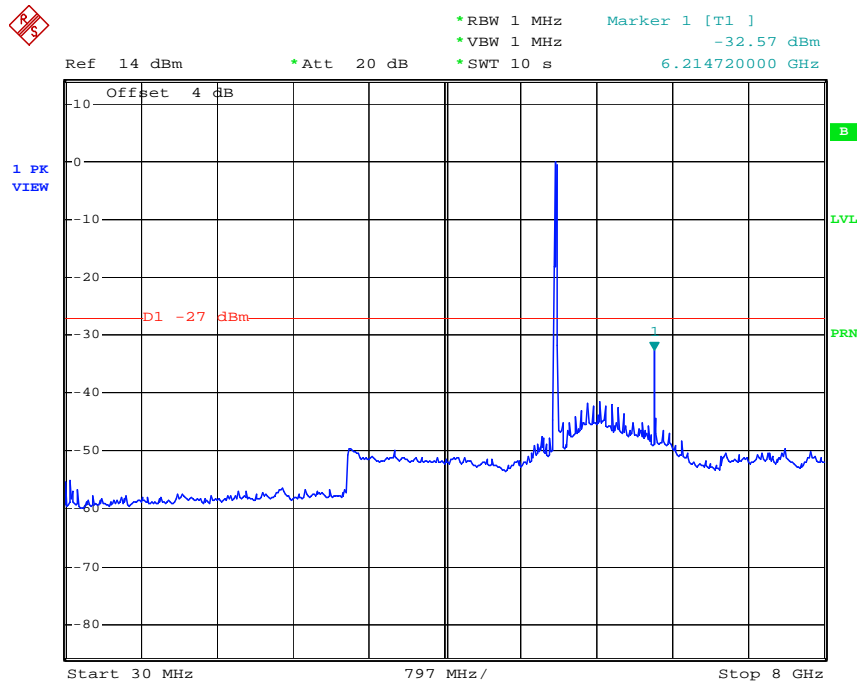
Date: 3.APR.2003 20:31:02



Turbo Mode CH High 26.5GHz – 40GHz



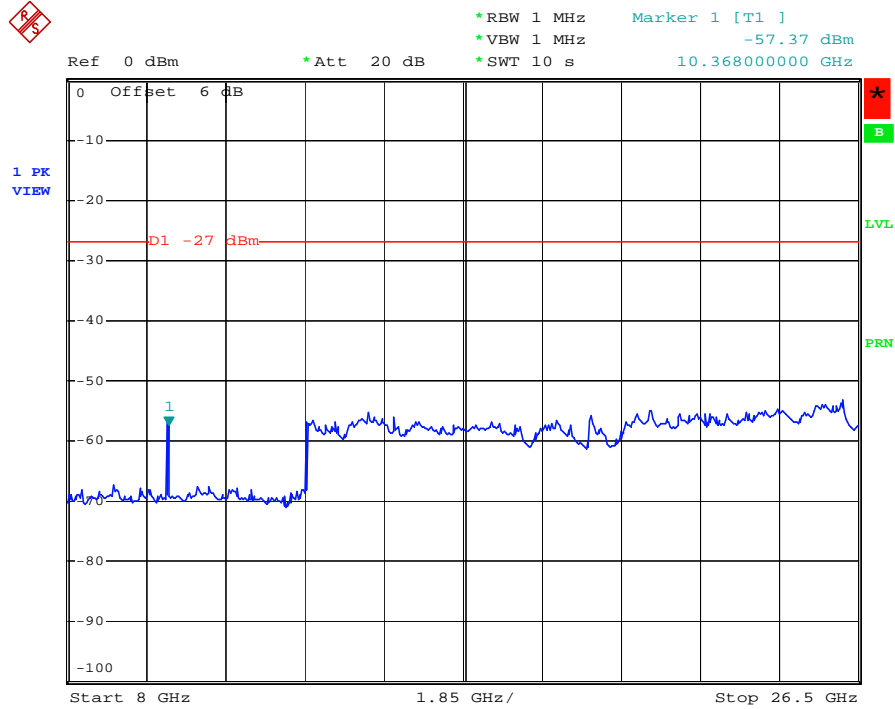
Joymax(B-antenna) Base Mode CH Low 30MHz – 8GHz



Date: 3.APR.2003 22:54:37

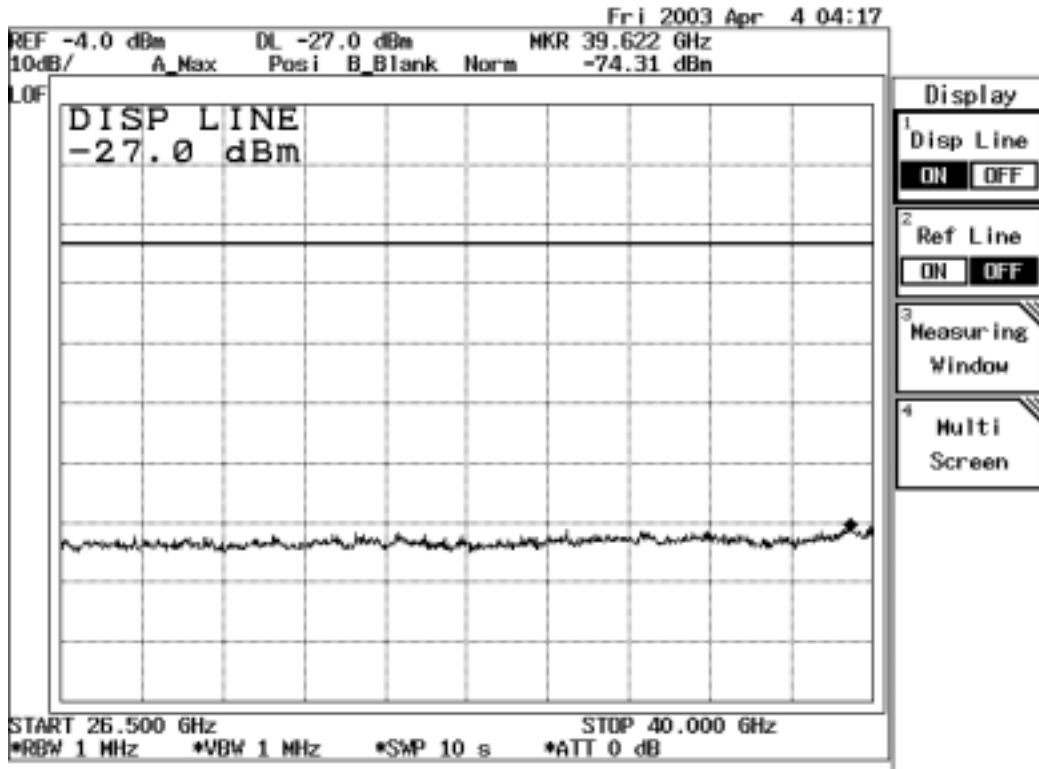


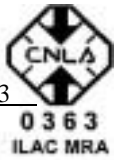
Base Mode CH Low 8GHz -26.5GHz



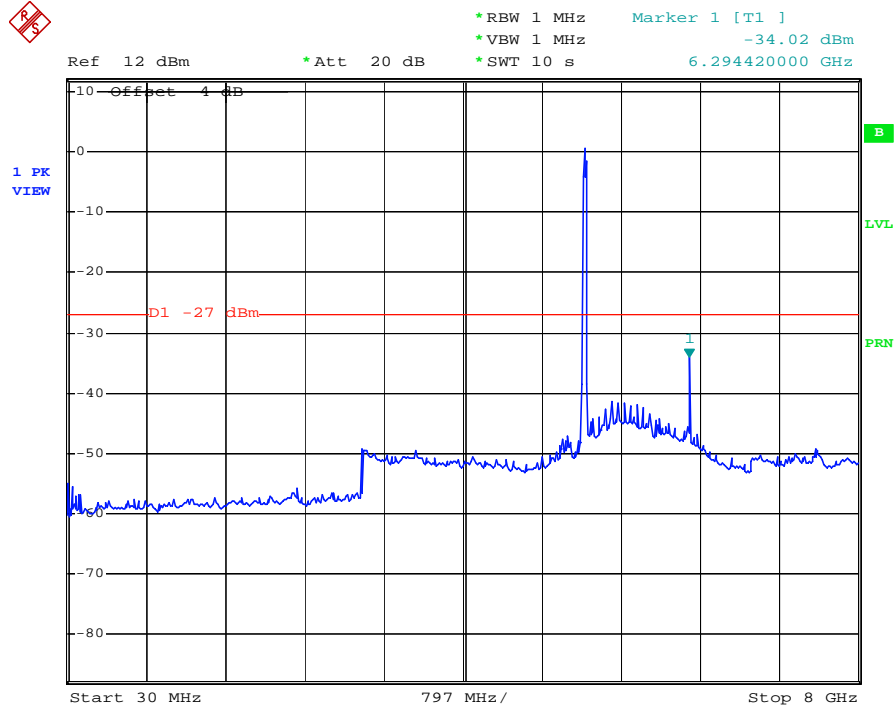
Date: 3.APR.2003 22:50:10

Base Mode CH Low 26.5GHz -40GHz



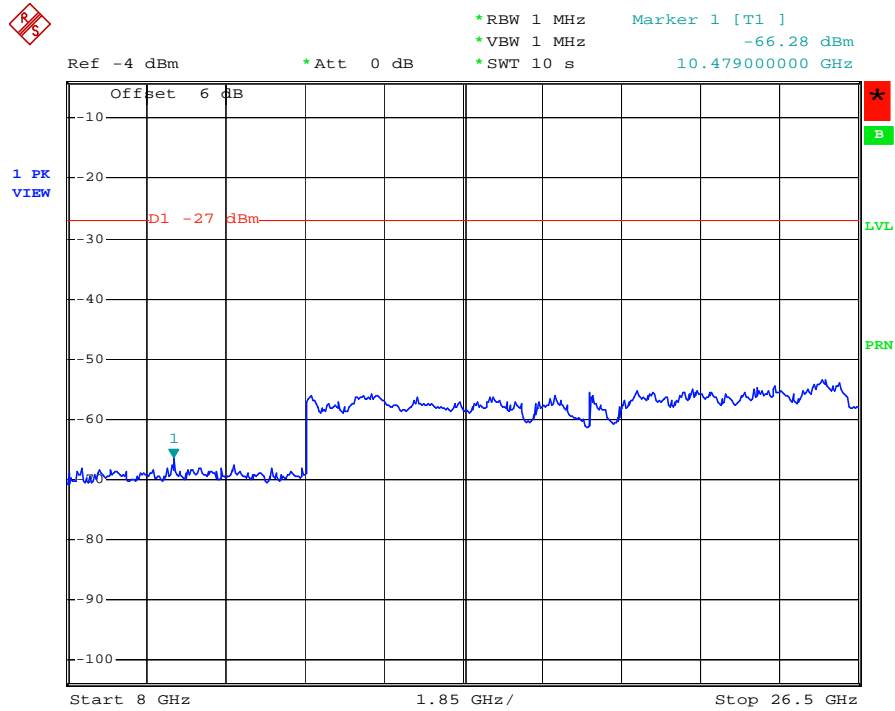


Base Mode CH Middle 30MHz -8GHz



Date: 3.APR.2003 22:45:00

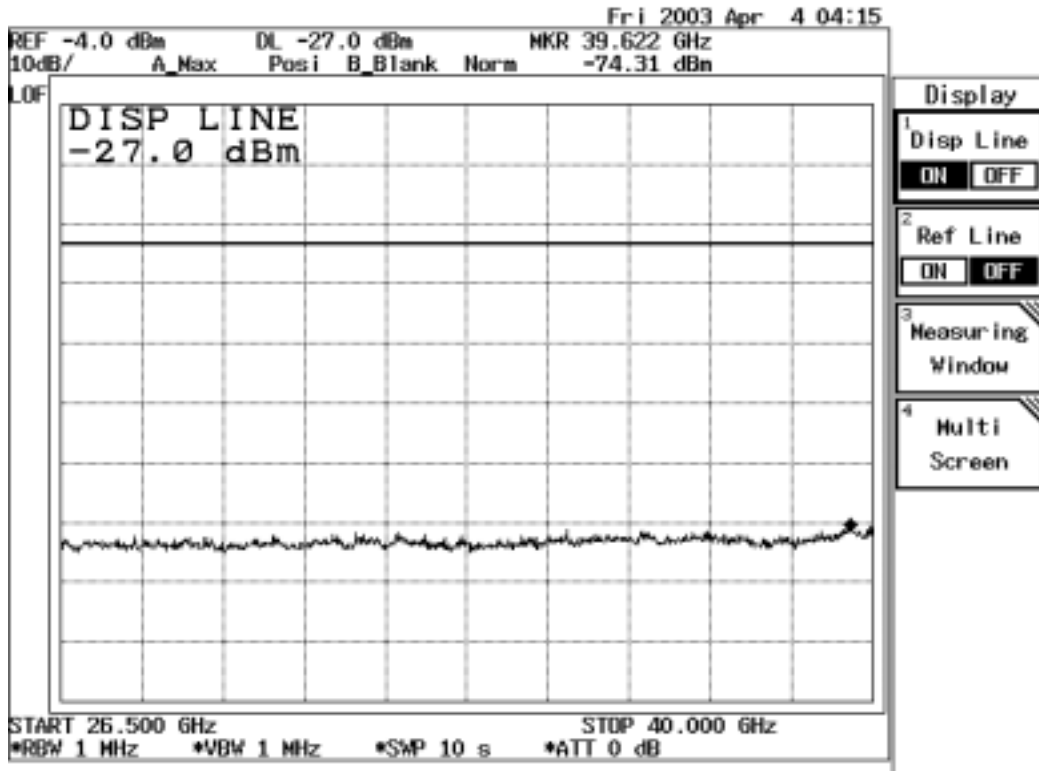
Base Mode CH Middle 8GHz -26.5GHz



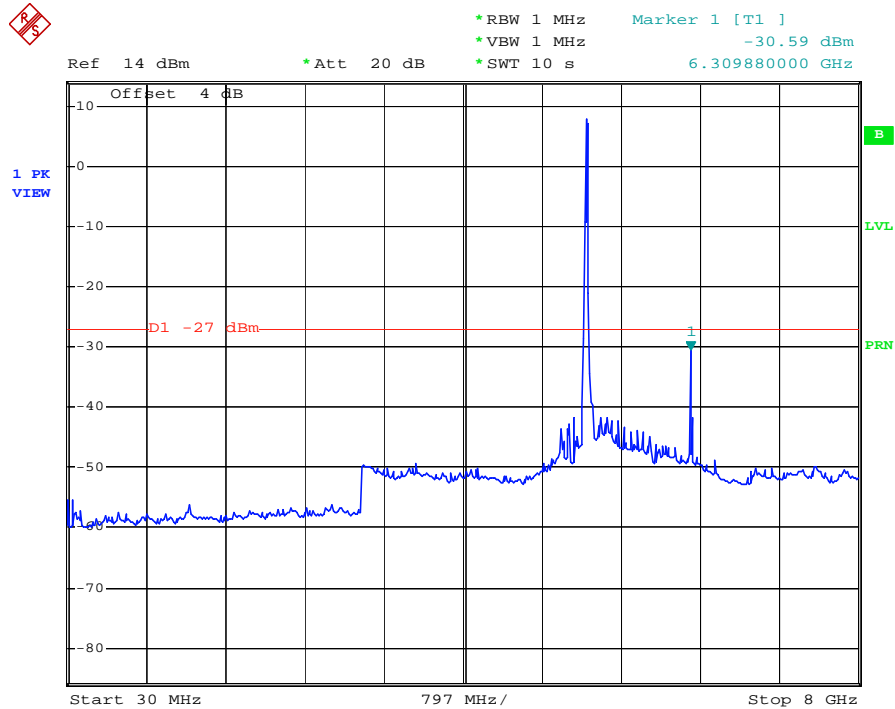
Date: 3.APR.2003 22:51:52



Base Mode CH Middle 26.5GHz –40GHz



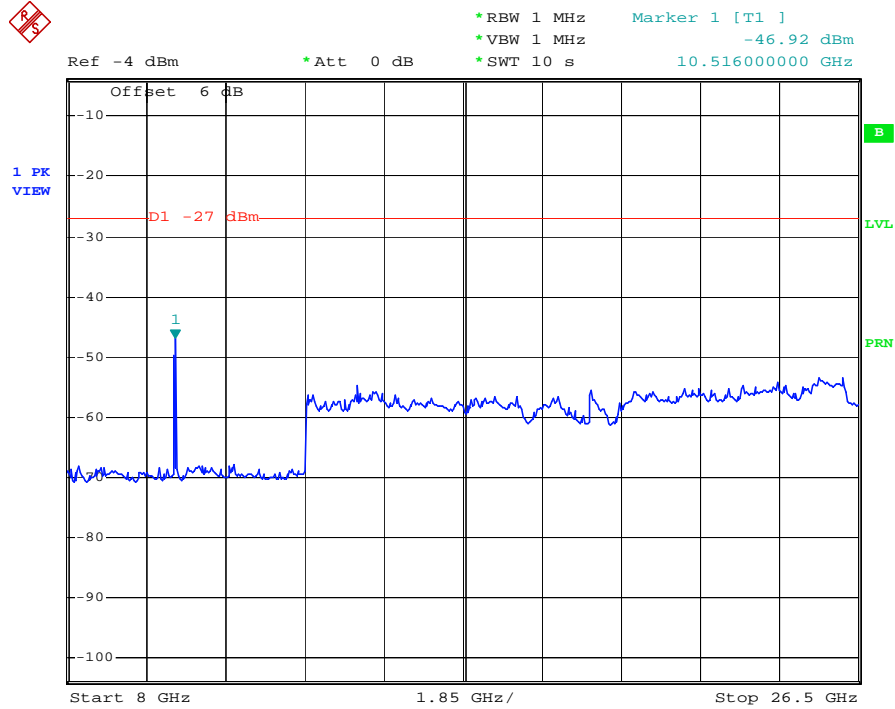
Base Mode CH Middle 30MHz –8GHz



Date: 3.APR.2003 22:35:26

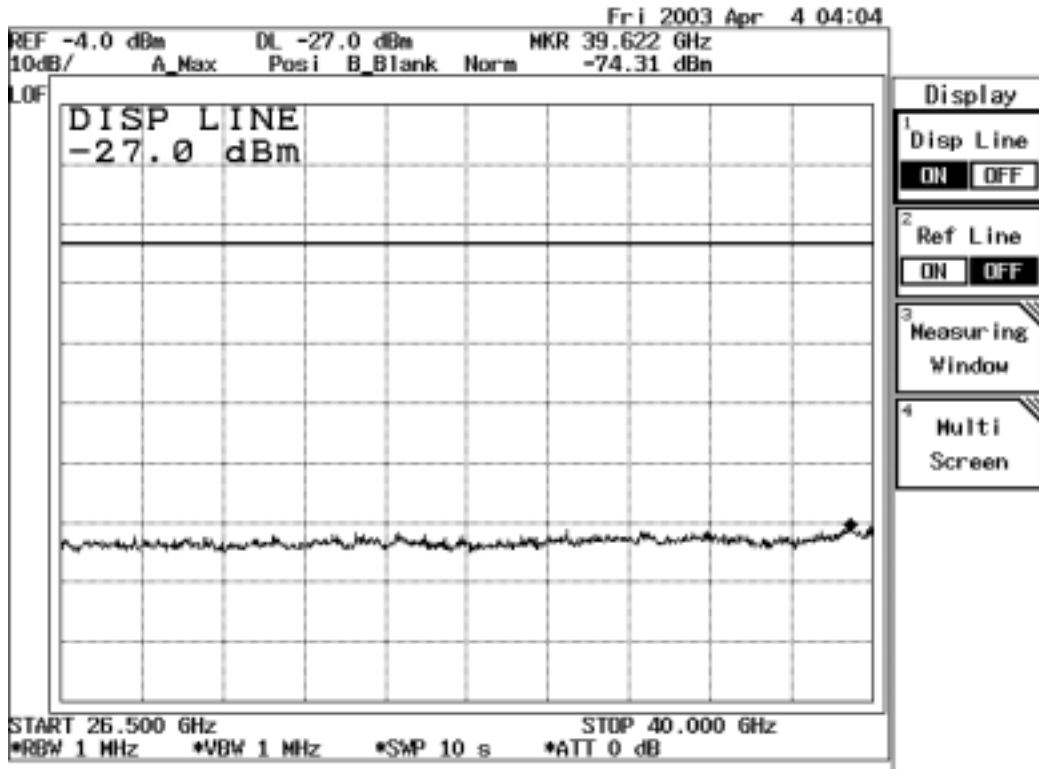


Base Mode CH Middle 8GHz -26.5GHz



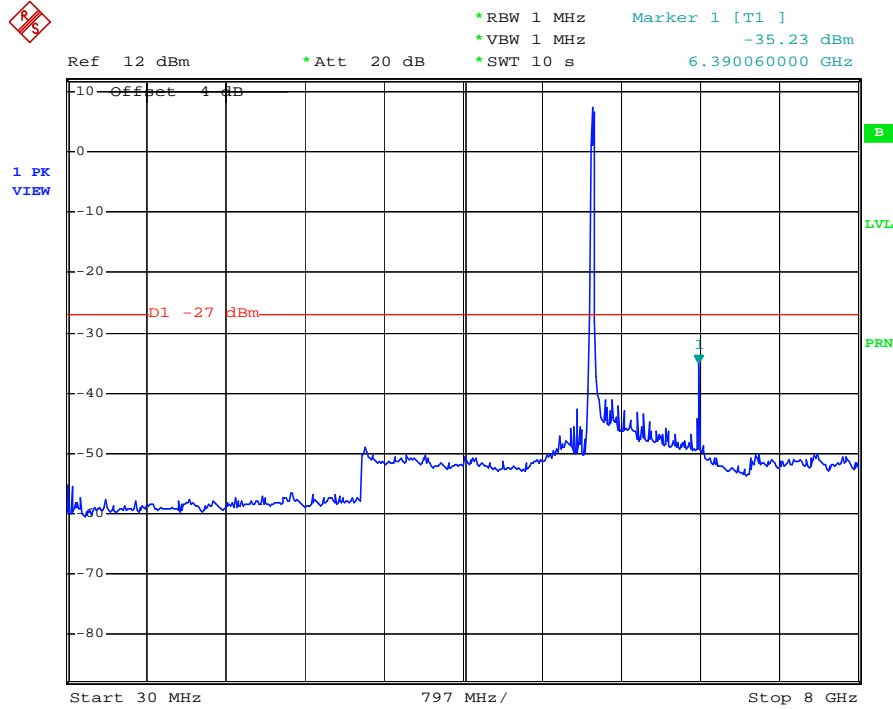
Date: 3.APR.2003 22:41:11

Base Mode CH Middle 26.5GHz -40GHz



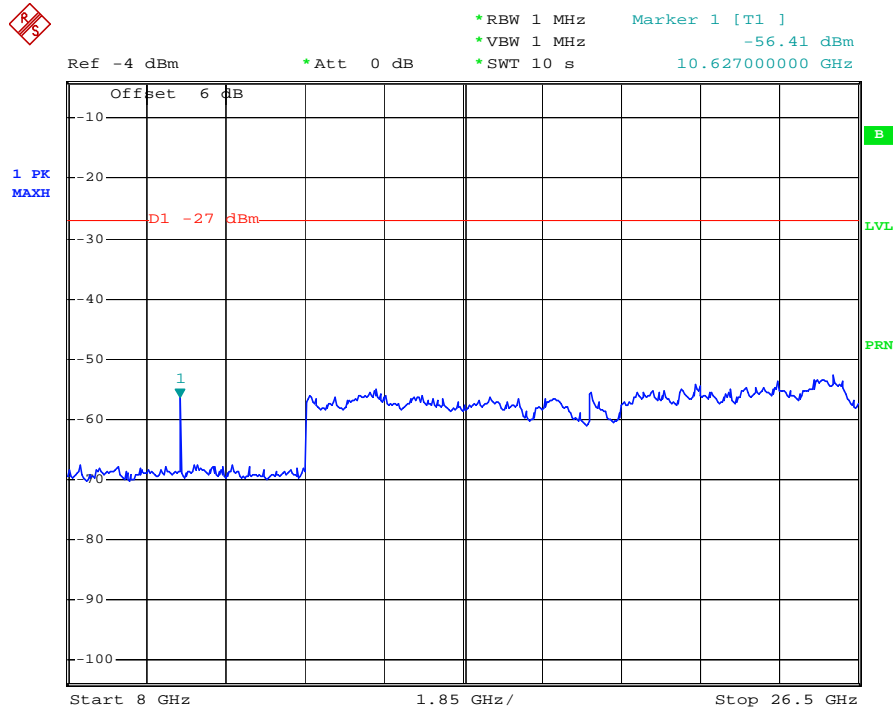


Base Mode CH High 30MHz – 8GHz



Date: 3.APR.2003 22:43:30

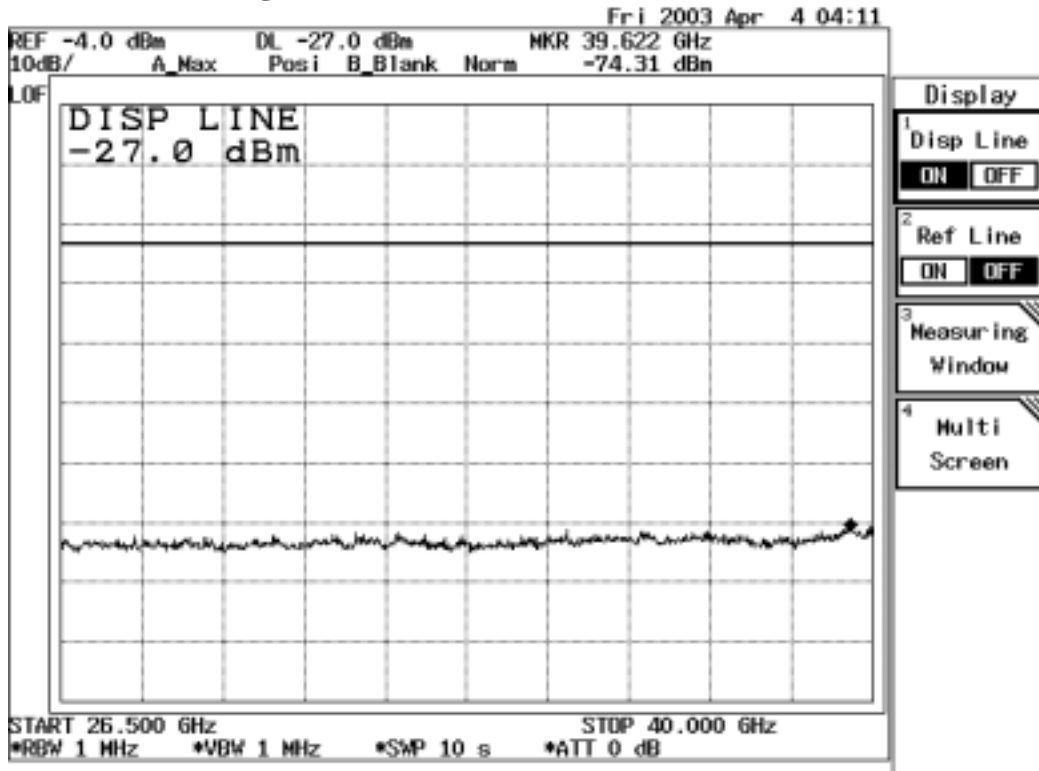
Base Mode CH High 8GHz – 26.5GHz



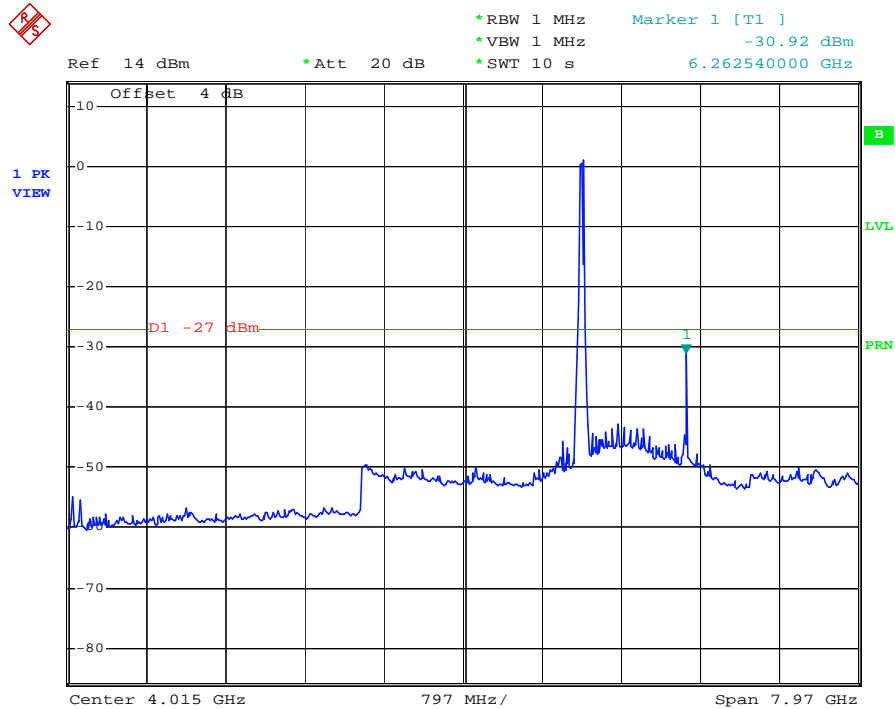
Date: 3.APR.2003 22:42:03



Base Mode CH High 26.5GHz – 40GHz



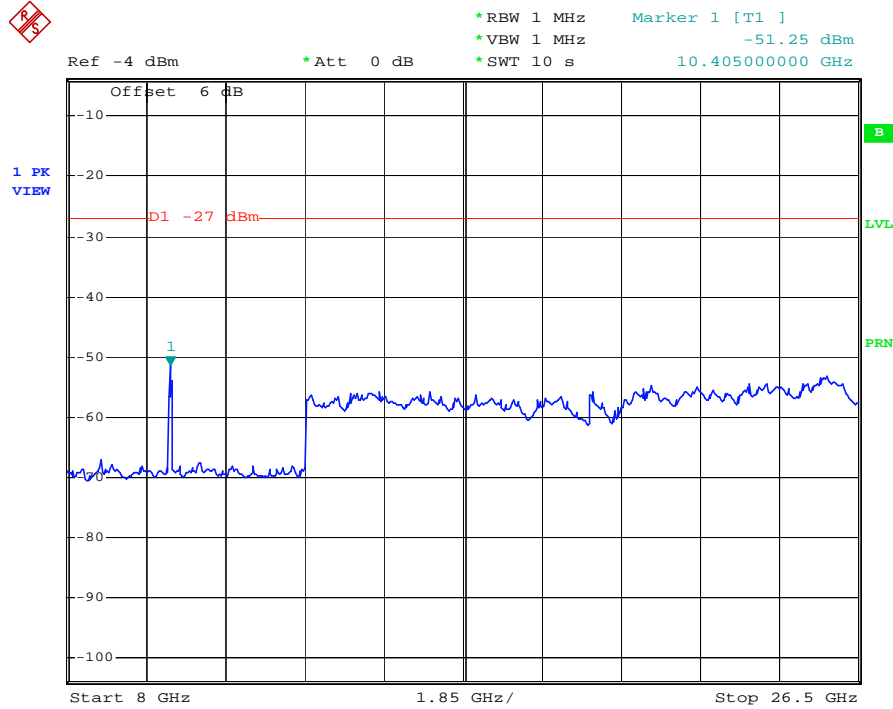
Turbo Mode CH Low 30MHz – 8GHz



Date: 3.APR.2003 22:55:39

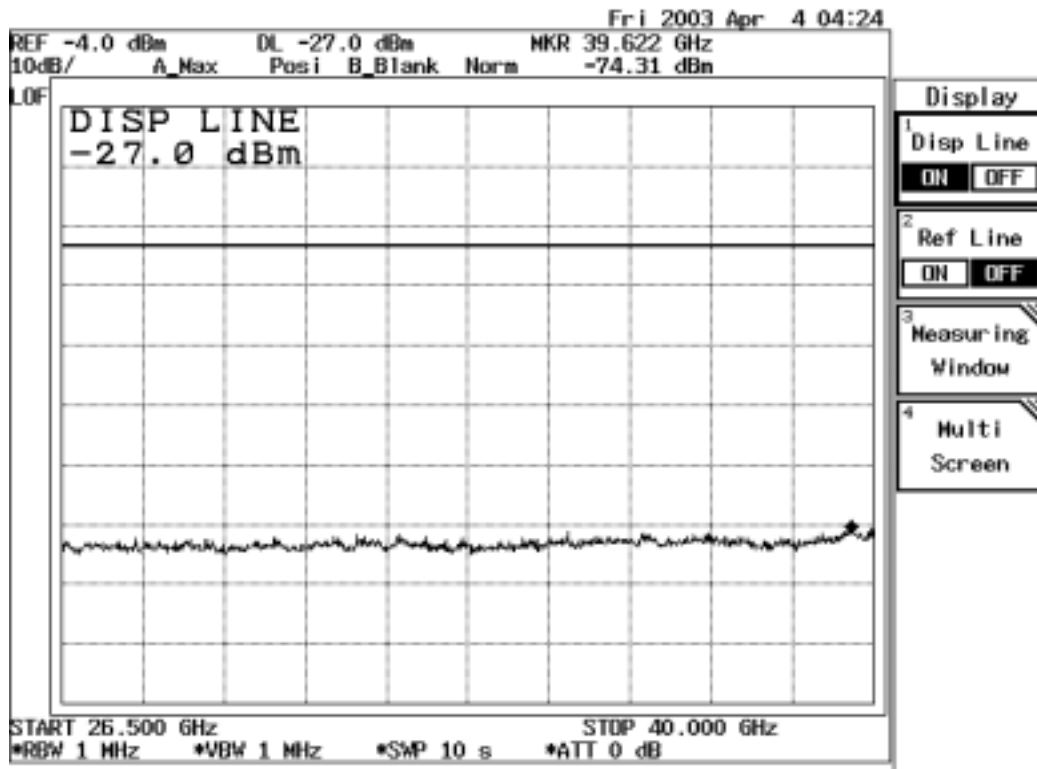


Turbo Mode CH Low 8GHz – 26.5GHz



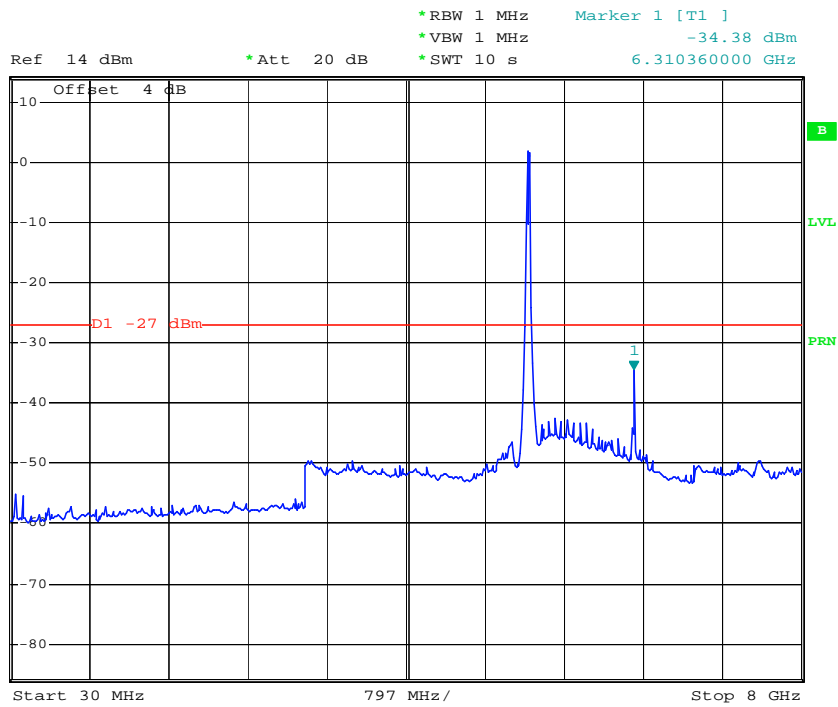
Date: 3.APR.2003 22:57:06

Turbo Mode CH Low 26.5GHz – 40GHz



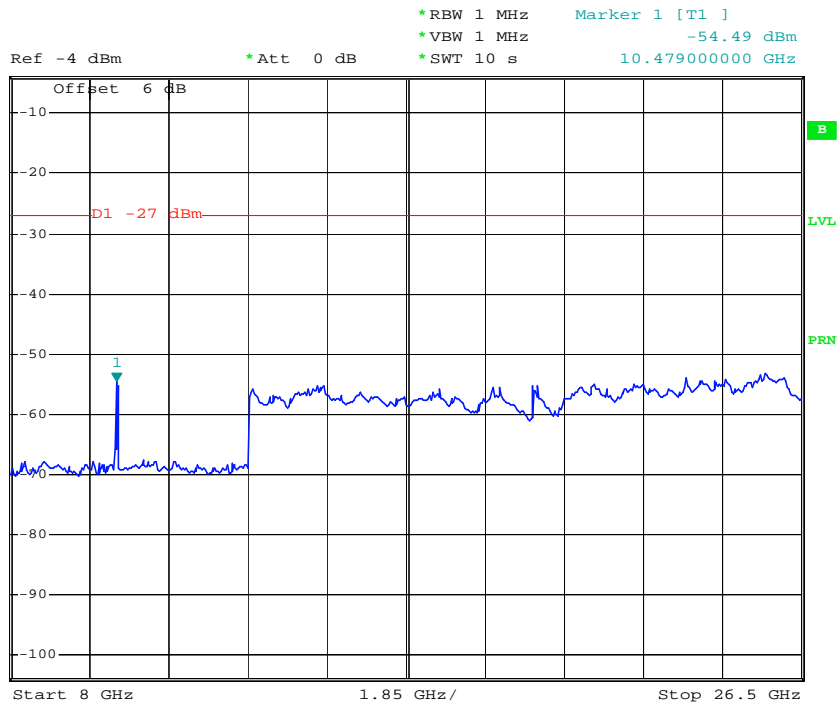


Turbo Mode CH Middle 30MHz – 8GHz



Date: 3.APR.2003 22:59:59

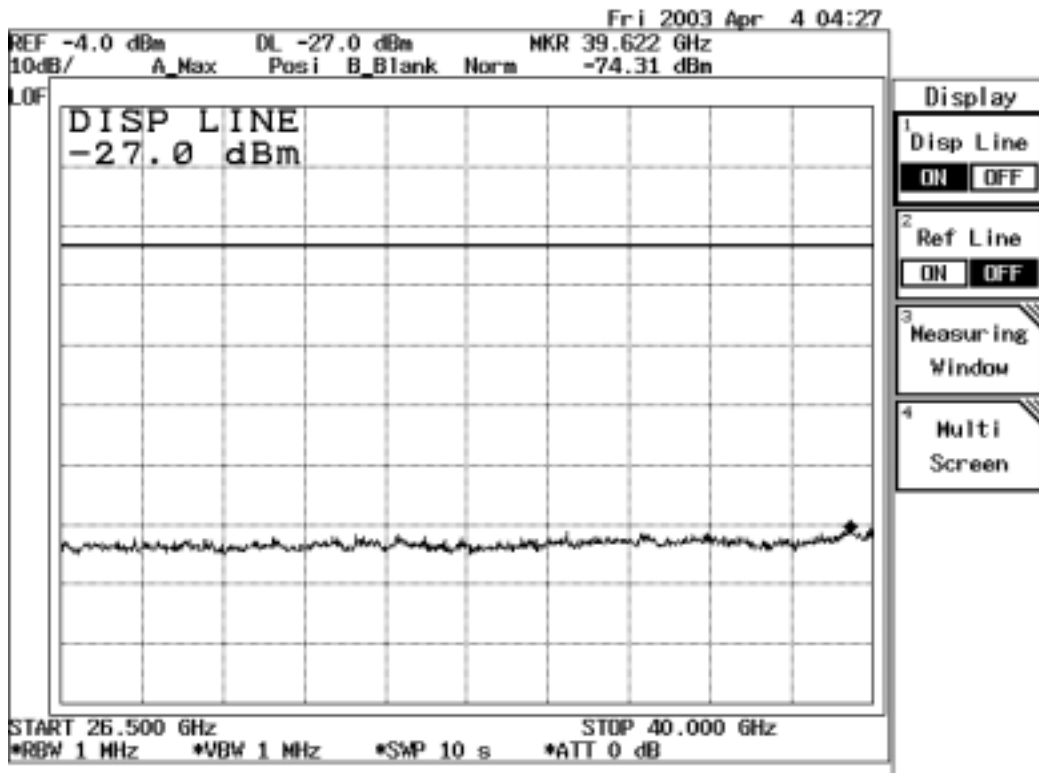
Turbo Mode CH Middle 8GHz – 26.5GHz



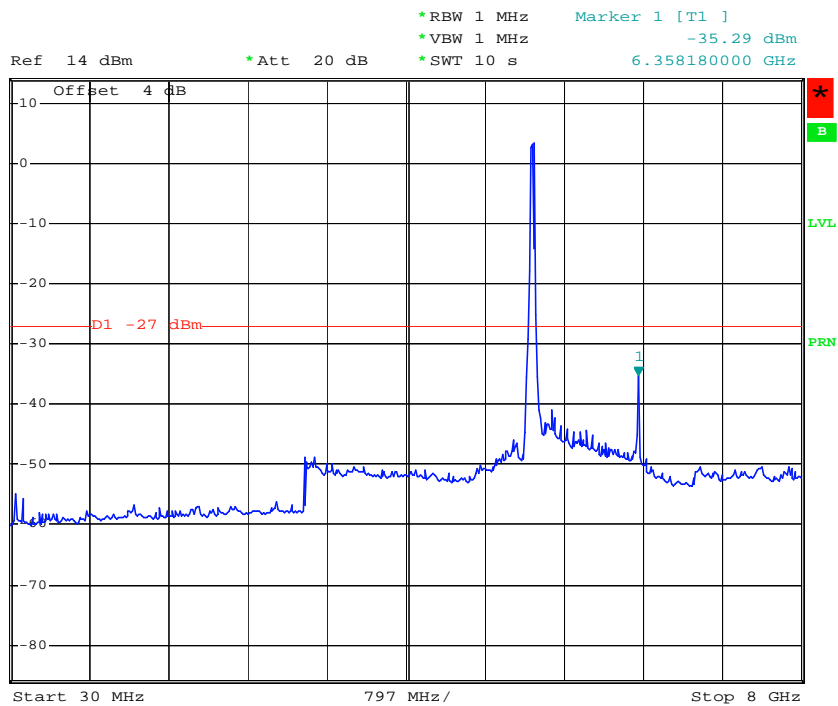
Date: 3.APR.2003 22:58:10



Turbo Mode CH Middle 26.5GHz – 40GHz



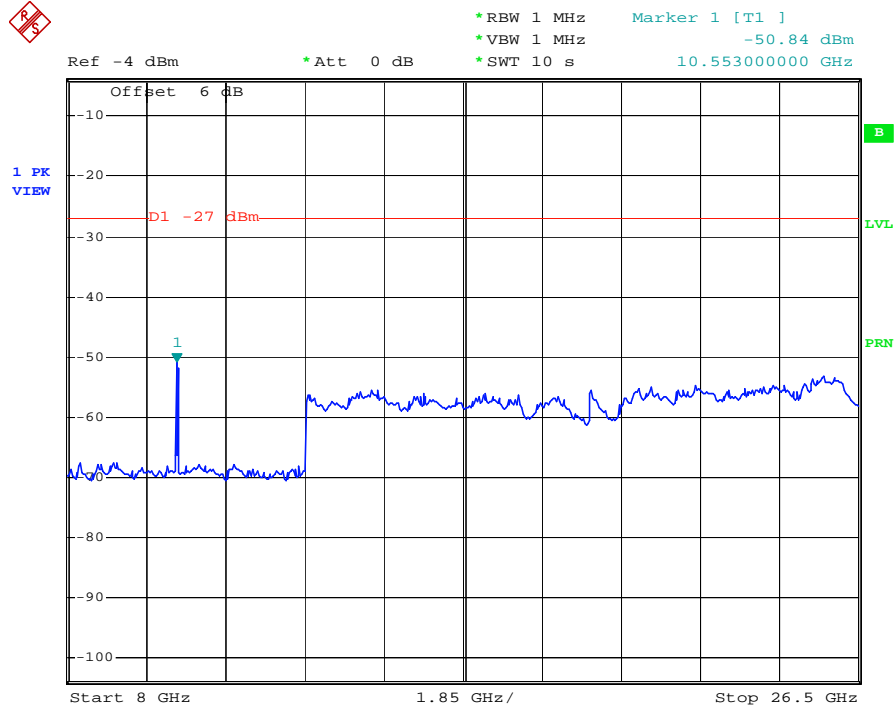
Turbo Mode CH High 30MHz – 8GHz



Date: 3.APR.2003 23:01:21

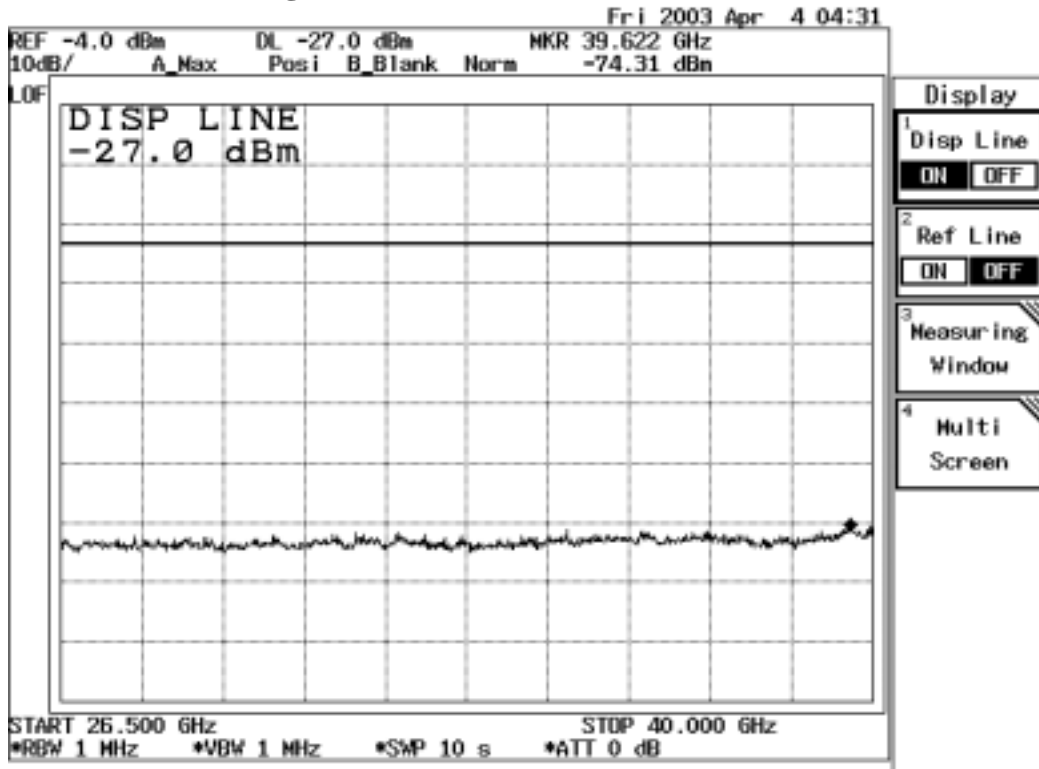


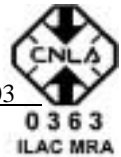
Turbo Mode CH High 8GHz – 26.5GHz



Date: 3.APR.2003 23:03:05

Turbo Mode CH High 26.5GHz – 40GHz





12. UNDESIRABLE EMISSION - RADIATED MEASUREMENT

12.1 Standard Applicable

(1) For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm / MHz.

(2) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(3) The provisions of §15.205 apply to intentional radiators operating under this section.

§15.205- RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 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
6.215 - 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 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.



² Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209- RADIATED EMISSION LIMITS: GENERAL REQUIREMENTS

FCC PART 15.209

MEASURING DISTANCE OF 3 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

12.2 EUT Setup

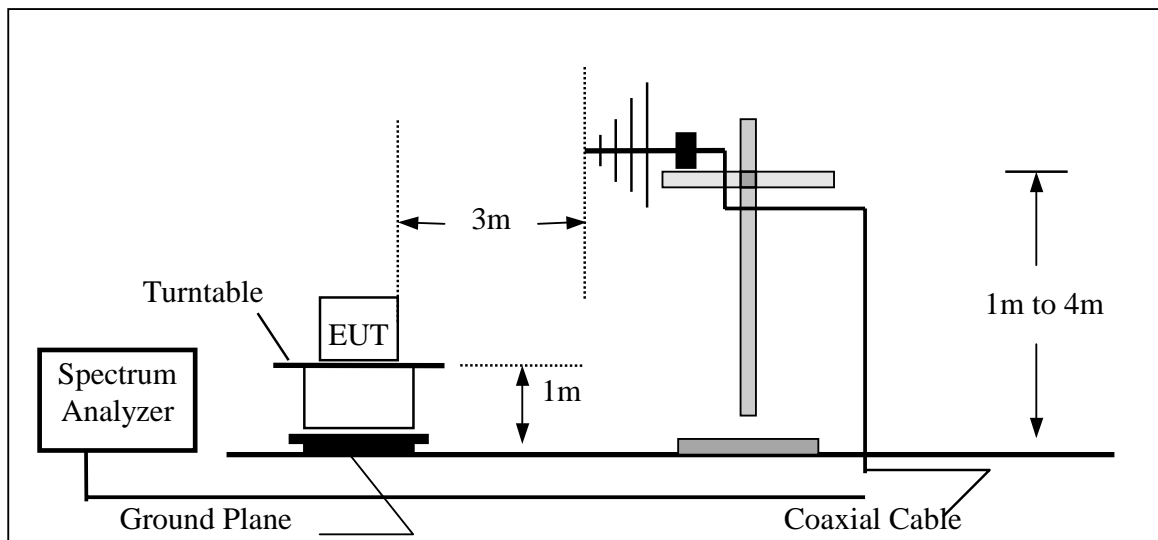
1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.4-2000.
2. The EUT was plug-in the host Notebook via PCMCIA port. The host Notebook system was placed on the center of the back edge on the test table. The peripherals like printer, K/B, and mouse were placed on the side of the host Notebook system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The keyboard was placed directly in the front of the Notebook, flushed with the front tabletop. The mouse was placed next to the Keyboard, flushed with the back of keyboard.
4. The spacing between the peripherals was 10 centimeters.
5. External I/O cables were draped along the edge of the test table and bundle when necessary.
6. The host Notebook system was connected with 110Vac/60Hz power source.

12.3 Measurement Procedure

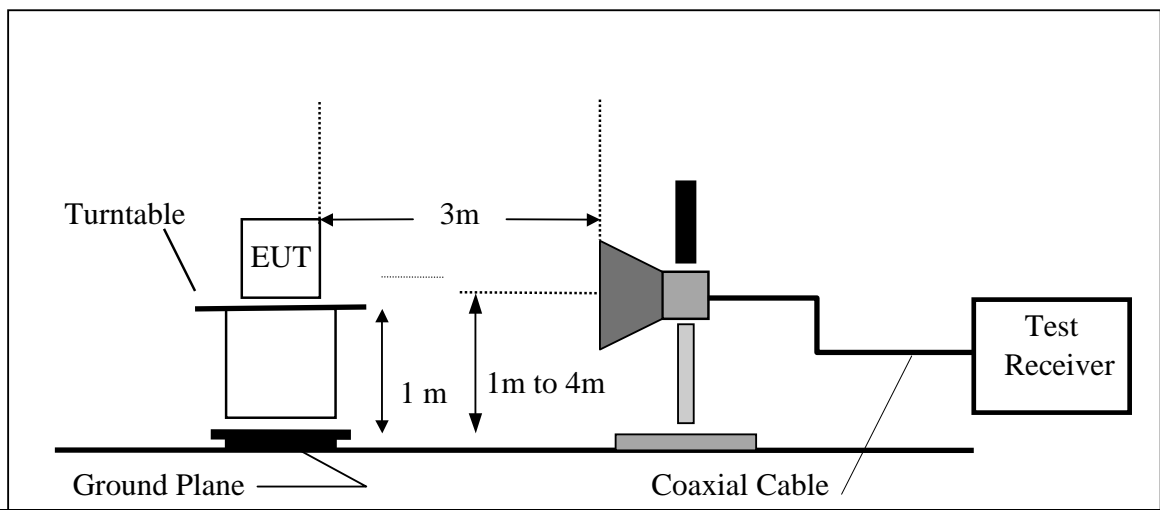
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until all frequency measured were complete.

12.4 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz





12.5 Measurement Equipment Used:

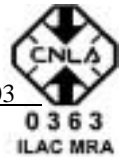
Open Area Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3261A	N/A	03/18/2003	03/17/2004
Spectrum Analyzer	Advantest	R3182	110600647	11/16/2002	11/15/2003
Spectrum Analyzer	ROHDE & SCHWARZ	FSP30	100112	06/29/2002	06/28/2003
EMI Test Receiver	R&S	ESVS20	838804/004	01/04/2003	01/03/2004
Pre-Amplifier	HP	8447D	2944A09173	03/03/2003	03/02/2004
Bi-log Antenna	SCHWAZBECK	VULB9163	145	07/06/2002	07/05/2003
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R	N.C.R
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R	N.C.R
Controller	EMCO	2090	9709-1256	N.C.R	N.C.R
RF Switch	ANRITSU	MP59B	M53867	N.C.R	N.C.R
Site NSA	C&C	N/A	N/A	11/17/2002	11/16/2003
Horn antenna	Schwarzbeck	BBHA 9120	D210	2/23/2003	2/22/2004
Horn antenna	EMCO	3116	2487	11/11/2002	11/10/2003
Pre-Amplifier	HP	8449B	3008B00965	10/01/2002	10/02/2003

Factor Calculation

The Factor is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$F = AF + CL - AG$$

Where F = Factor	CL = Cable Attenuation Factor (Cable Loss)
AF = Antenna Factor	AG = Amplifier Gain



EIRP CALCULATIONS

Given

$$E = \sqrt{(30 * P * G) / d}$$

where

E = Field Strength in Volts / meter P = Power in watts

G = Numeric antenna gain d = distance in meters

Rearranging terms yields:

$$P * G = (d * E)^2 / 30$$

Converting to the logarithmic form and changing to units of mW and uV/m, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$E \text{ (uV/m)} = E \text{ (V/m)} / 1000000$$

yields

$$\begin{aligned} 10 \log (P * G) &= 10 \log (d^2) + 10 \log (E^2) - 10 \log (30) - 10 \log (10^9) \\ &= 20 \log (d) + 20 \log (E) - 104.77 \end{aligned}$$

In this logarithmic form

10 log (P * G) is PG in dBm and

20 log (E) is E in dBuV/m

Since EIRP = P * G, then at a specification distance of 3 meters, the EIRP in terms of field strength is:

$$\text{EIRP (dBm)} = P * G \text{ (dBm)} = E \text{ (dBuV/m)} - 95.2$$

$$E \text{ (dBuV/m)} \text{ (Average limit)} = \text{EIRP} + 95.2 = -27 + 95.2 = 68.2 \text{ dBuV/m}$$

$$E \text{ (dBuV/m)} \text{ (Peak limit)} = 68.2 + 20 = 88.2 \text{ dBuV/m}$$

12.6 Measurement Result

Refer to attach tabular data sheets.

NOTE:

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 100kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode: TX Mode Test Date : Mar. 07 2003
 Temperature : 26 Test By: Robin
 Humidity : 60 % Pol: Ver./Hor

Frequency (MHz)	Ant. Pol. (H/V)	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV)	Limit(3m) (dBuV/m)	Margin (dB)
32.70	H	PK	35.26	-1.18	34.08	40.0	-5.92
40.26	H	PK	37.45	-4.08	33.37	40.0	-6.63
48.36	H	PK	36.54	-7.73	28.81	40.0	-11.19
78.06	H	PK	42.07	-17.84	24.23	40.0	-15.77
159.60	H	PK	41.28	-17.59	23.69	43.5	-19.81
273.54	H	PK	43.84	-13.29	30.55	46.0	-15.45
280.02	H	PK	44.91	-13.34	31.57	46.0	-14.43
311.20	H	PK	46.04	-12.33	33.71	46.0	-12.29
337.80	H	PK	45.22	-11.49	33.73	46.0	-12.27
370.00	H	PK	47.25	-10.88	36.37	46.0	-9.63
377.00	H	PK	47.61	-10.64	36.97	46.0	-9.03
553.40	H	PK	44.05	-7.64	36.41	46.0	-9.59
931.40	H	PK	40.95	-3.28	37.67	46.0	-8.33
32.70	V	PK	32.65	-1.18	31.47	40.0	-8.53
54.30	V	PK	36.93	-5.52	31.41	40.0	-8.59
78.06	V	PK	44.54	-18.00	26.54	40.0	-13.46
84.54	V	PK	41.15	-18.82	22.33	40.0	-17.67
120.18	V	PK	40.97	-17.88	23.09	43.5	-20.41
280.02	V	PK	44.07	-13.34	30.73	46.0	-15.27
311.20	V	PK	43.90	-12.33	31.57	46.0	-14.43
344.80	V	PK	46.80	-11.18	35.62	46.0	-10.38
370.00	V	PK	49.82	-10.88	38.94	46.0	-7.06
377.00	V	PK	49.88	-10.64	39.24	46.0	-6.76
697.60	V	PK	41.58	-5.78	35.80	46.0	-10.20
930.00	V	PK	36.87	-3.31	33.56	46.0	-12.44

Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz.
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.
- (5) Emission level = Reading value + Factor

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode: TX Low Mode Test Date : April 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: SMT (A-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5150.00	2.15	33.90	35.53	60.14	42.98	H	60.66	43.50	74.0	54.0	-13.34	-10.50
5185.40	2.15	33.90	35.53	101.19	93.05	H	101.71	93.57				
5376.80	2.15	33.90	35.53	55.40	46.08	H	55.92	46.60	74.0	54.0	-18.08	-7.40
10359.60	3.21	38.40	35.87	46.56	36.39	H	52.30	42.13	88.2	68.2	-35.90	-26.07
15540.20	3.79	38.40	35.36	48.51	37.63	H	55.34	44.46	74.0	54.0	-18.66	-9.54
5150.00	2.15	33.90	35.53	50.99	40.21	V	51.51	40.73	74.0	54.0	-22.49	-13.27
5187.20	2.15	33.90	35.53	90.22	82.25	V	90.74	82.77				
10359.60	3.21	38.40	35.87	46.74	36.50	V	52.48	42.24	88.2	68.2	-35.72	-25.96
15540.60	3.79	38.40	35.36	49.19	37.48	V	56.02	44.31	74.0	54.0	-17.98	-9.69

Remark :

- (1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Emission.
- (4) Spectrum Peak Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.
- (5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)



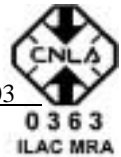
Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode: TX Mid Mode Test Date : Mar. 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: SMT (A-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5243.60	2.15	33.90	35.53	101.34	92.93	H	101.86	93.45				
5308.40	2.15	33.90	35.53	55.22	45.87	H	55.74	46.39	74.0	54.0	-18.26	-7.61
10481.00	3.21	38.40	35.87	47.38	36.18	H	53.12	41.92	88.2	68.2	-35.08	-26.28
15720.00	3.79	38.40	35.36	47.93	37.29	H	54.76	44.12	74.0	54.0	-19.24	-9.88
5234.60	2.15	33.90	35.53	88.30	80.08	V	88.82	80.60				
10486.00	3.21	38.40	35.87	46.49	35.81	V	52.23	41.55	88.2	68.2	-35.97	-26.65
15720.00	3.79	38.40	35.36	48.28	37.33	V	55.11	44.16	74.0	54.0	-18.89	-9.84

Remark :

- (1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Emission.
- (4) Spectrum Peak Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.
- (5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)



Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode: TX Mid (5260MHz) Mode Test Date : Mar. 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: SMT (A-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5265.40	2.15	33.90	35.53	104.24	95.98	H	104.76	96.50				
5328.40	2.15	33.90	35.53	56.66	48.10	H	57.18	48.62	74.0	54.0	-16.82	-5.38
10522.40	3.04	38.40	35.67	47.19	37.08	H	52.96	42.85	88.2	68.2	-35.24	-25.35
15780.00	3.79	38.40	35.36	49.71	37.78	H	56.54	44.61	74.0	54.0	-17.46	-9.39
5256.40	2.15	33.90	35.53	90.69	82.18	V	91.21	82.70				
10518.80	3.04	38.40	35.67	49.85	37.41	V	55.62	43.18	88.2	68.2	-32.58	-25.02
15780.00	3.79	38.40	35.36	48.19	37.64	V	55.02	44.47	74.0	54.0	-18.98	-9.53

Remark :

- (1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Emission.
- (4) Spectrum Peak Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.
- (5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)



Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode: TX High Mode Test Date : Mar. 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: SMT (A-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5235.60	2.15	33.90	35.53	105.65	97.15	H	106.17	97.67				
5350.00	2.15	33.90	35.53	64.56	48.72	H	65.08	49.24	74.0	54.0	-8.92	-4.76
10639.60	3.04	38.40	35.67	47.30	36.97	H	53.07	42.74	74.0	54.0	-20.93	-11.26
15960.20	3.79	38.40	35.36	48.24	37.54	H	55.07	44.37	74.0	54.0	-18.93	-9.63
5323.60	2.15	33.90	35.53	88.42	80.45	V	88.94	80.97				
5350.00	2.15	33.90	35.53	48.68	36.97	V	49.20	37.49	74.0	54.0	-24.80	-16.51
10640.20	3.04	38.40	35.67	46.43	36.19	V	52.20	41.96	74.0	54.0	-21.80	-12.04
15960.20	3.79	38.40	35.36	48.35	37.57	V	55.18	44.40	74.0	54.0	-18.82	-9.60

Remark :

- (1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Emission.
- (4) Spectrum Peak Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.
- (5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode: TX Low Mode(Turbo Mode) Test Date : Mar. 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: SMT (A-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5150.00	2.15	33.90	35.53	59.10	45.50	H	59.62	46.02	74.0	54.0	-14.38	-7.98
5244.20	2.15	33.90	35.53	100.56	92.01	H	101.08	92.53				
10429.60	3.21	38.40	35.87	46.57	35.85	H	52.31	41.59	74.0	54.0	-21.69	-12.41
15630.00	3.79	38.40	35.36	47.98	37.82	H	54.81	44.65	88.2	68.2	-33.39	-23.55
5150.00	2.15	33.90	35.53	51.40	40.44	V	51.92	40.96	74.0	54.0	-22.08	-13.04
5199.20	2.15	33.90	35.53	89.44	81.41	V	89.96	81.93				
10422.40	3.21	38.40	35.87	46.34	35.77	V	52.08	41.51	74.0	54.0	-21.92	-12.49
15630.00	3.79	38.40	35.36	47.70	37.73	V	54.53	44.56	88.2	68.2	-33.67	-23.64

Remark :

- (1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Emission.
- (4) Spectrum Peak Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.
- (5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

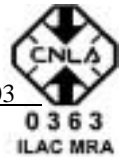
Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode: TX Mid Mode(Turbo Mode) Test Date : Mar. 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: SMT (A-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5255.00	2.15	33.90	35.53	104.71	95.92	H	105.23	96.44				
5316.20	2.15	33.90	35.53	57.32	48.07	H	57.84	48.59	74.0	54.0	-16.16	-5.41
5373.80	2.15	33.90	35.53	56.62	45.92	H	57.14	46.44	74.0	54.0	-16.86	-7.56
10502.00	3.04	38.40	35.67	45.40	34.96	H	51.17	40.73	88.2	68.2	-37.03	-27.47
15750.00	3.79	38.40	35.36	47.85	37.39	H	54.68	44.22	74.0	54.0	-19.32	-9.78
5253.20	2.15	33.90	35.53	90.63	82.47	V	91.15	82.99				
10502.00	3.04	38.40	35.67	44.40	33.96	V	50.17	39.73	88.2	68.2	-38.03	-28.47
15750.00	3.79	38.40	35.36	46.85	36.39	V	53.68	43.22	74.0	54.0	-20.32	-10.78

Remark :

- (1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Emission.
- (4) Spectrum Peak Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.
- (5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)



Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode: TX High Mode(Turbo Mode) Test Date : Mar. 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: SMT (A-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5297.20	2.15	33.90	35.53	101.19	93.92	H	101.71	94.44				
5350.00	2.15	33.90	35.53	60.12	47.59	H	60.64	48.11	74.0	54.0	-13.36	-5.89
10582.00	3.04	38.40	35.67	46.70	35.84	H	52.47	41.61	88.2	68.2	-35.73	-26.59
15870.00	3.79	38.40	35.36	47.39	37.47	H	54.22	44.30	74.0	54.0	-19.78	-9.70
5288.20	2.15	33.90	35.53	88.12	80.64	V	88.64	81.16				
5350.00	2.15	33.90	35.53	50.00	40.00	V	50.52	40.52	74.0	54.0	-23.48	-13.48
10580.80	3.04	38.40	35.67	47.34	36.55	V	53.11	42.32	88.2	68.2	-35.09	-25.88
15870.40	3.79	38.40	35.36	48.64	37.46	V	55.47	44.29	74.0	54.0	-18.53	-9.71

Remark :

- (1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Emission.
- (4) Spectrum Peak Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.
- (5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode: TX Low Mode Test Date : April 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: Joymax (B-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5087.60	2.15	33.90	35.53	48.25	39.15	H	48.77	39.67	74.0	54.0	-25.23	-14.33
5150.00	2.15	33.90	35.53	54.86	41.79	H	55.38	42.31	74.0	54.0	-18.62	-11.69
5184.80	2.15	33.90	35.53	93.71	85.52	H	94.23	86.04				
5409.00	2.15	33.90	35.53	48.63	40.43	H	49.15	40.95	74.0	54.0	-24.85	-13.05
10359.60	3.21	38.40	35.87	46.56	36.39	H	52.30	42.13	88.2	68.2	-35.90	-26.07
15540.20	3.79	38.40	35.36	48.51	37.63	H	55.34	44.46	74.0	54.0	-18.66	-9.54
5088.00	2.15	33.90	35.53	50.22	43.69	V	50.74	44.21	74.0	54.0	-23.26	-9.79
5150.00	2.15	33.90	35.53	62.15	48.63	V	62.67	49.15	74.0	54.0	-11.33	-4.85
5184.40	2.15	33.90	35.53	101.09	93.05	V	101.61	93.57				
5249.60	2.15	33.90	35.53	54.45	44.95	V	54.97	45.47	74.0	54.0	-19.03	-8.53
5471.20	2.15	33.90	35.53	55.96	45.50	V	56.48	46.02	74.0	54.0	-17.52	-7.98
5537.60	2.25	34.60	35.54	54.86	45.09	V	56.17	46.40	74.0	54.0	-17.83	-7.60
10359.60	3.21	38.40	35.87	46.74	36.50	V	52.48	42.24	88.2	68.2	-35.72	-25.96
15540.60	3.79	38.40	35.36	49.19	37.48	V	56.02	44.31	74.0	54.0	-17.98	-9.69

Remark :

- (1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Emission.
- (4) Spectrum Peak Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.
- (5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)



Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode: TX Mid Mode Test Date : Mar. 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: Joymax (B-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5151.80	2.15	33.90	35.53	46.56	38.42	H	47.08	38.94	74.0	54.0	-26.92	-15.06
5245.20	2.15	33.90	35.53	93.75	84.75	H	94.27	85.27				
5303.20	2.15	33.90	35.53	47.41	37.67	H	47.93	38.19	74.0	54.0	-26.07	-15.81
5498.80	2.15	33.90	35.53	48.32	40.33	H	48.84	40.85	74.0	54.0	-25.16	-13.15
10481.00	3.21	38.40	35.87	47.38	36.18	H	53.12	41.92	88.2	68.2	-35.08	-26.28
15720.00	3.79	38.40	35.36	47.93	37.29	H	54.76	44.12	74.0	54.0	-19.24	-9.88
5024.40	2.15	33.90	35.53	51.59	42.65	V	52.11	43.17	74.0	54.0	-21.89	-10.83
5242.64	2.15	33.90	35.53	101.20	93.30	V	101.72	93.82				
5408.08	2.15	33.90	35.53	55.87	48.44	V	56.39	48.96	74.0	54.0	-17.61	-5.04
5473.20	2.15	33.90	35.53	56.85	47.06	V	57.37	47.58	74.0	54.0	-16.63	-6.42
10486.00	3.21	38.40	35.87	46.49	35.81	V	52.23	41.55	88.2	68.2	-35.97	-26.65
15720.00	3.79	38.40	35.36	48.28	37.33	V	55.11	44.16	74.0	54.0	-18.89	-9.84

Remark :

- (1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Emission.
- (4) Spectrum Peak Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.
- (5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

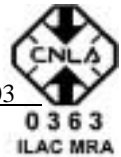
Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode: TX Mid (5260MHz)Mode Test Date : Mar. 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: Joymax (B-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5024.00	2.15	33.90	35.53	46.69	36.25	H	47.21	36.77	74.0	54.0	-26.79	-17.23
5088.00	2.15	33.90	35.53	45.72	36.86	H	46.24	37.38	74.0	54.0	-27.76	-16.62
5268.00	2.15	33.90	35.53	93.37	86.12	H	93.89	86.64				
5330.00	2.15	33.90	35.53	47.70	37.90	H	48.22	38.42	74.0	54.0	-25.78	-15.58
5408.00	2.15	33.90	35.53	47.53	39.34	H	48.05	39.86	74.0	54.0	-25.95	-14.14
5472.00	2.15	33.90	35.53	47.60	39.81	H	48.12	40.33	74.0	54.0	-25.88	-13.67
10522.40	3.04	38.40	35.67	47.19	37.08	H	52.96	42.85	88.2	68.2	-35.24	-25.35
15780.00	3.79	38.40	35.36	49.71	37.78	H	56.54	44.61	74.0	54.0	-17.46	-9.39
5024.16	2.15	33.90	35.53	51.76	44.70	V	52.28	45.22	74.0	54.0	-21.72	-8.78
5263.52	2.15	33.90	35.53	104.50	96.00	V	105.02	96.52				
5330.40	2.15	33.90	35.53	55.25	46.43	V	55.77	46.95	74.0	54.0	-18.23	-7.05
5472.96	2.15	33.90	35.53	57.02	49.95	V	57.54	50.47	74.0	54.0	-16.46	-3.53
10518.80	3.04	38.40	35.67	49.85	37.41	V	55.62	43.18	88.2	68.2	-32.58	-25.02
15780.00	3.79	38.40	35.36	48.19	37.64	V	55.02	44.47	74.0	54.0	-18.98	-9.53

Remark :

- (1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Emission.
- (4) Spectrum Peak Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.
- (5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)



Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode: TX High Mode Test Date : Mar. 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: Joymax (B-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5152.00	2.15	33.90	35.53	44.67	36.08	H	45.19	36.60	74.0	54.0	-28.81	-17.40
5324.00	2.15	33.90	35.53	92.90	84.89	H	93.42	85.41				
5350.00	2.15	33.90	35.53	54.45	39.58	H	54.97	40.10	74.0	54.0	-19.03	-13.90
5388.00	2.15	33.90	35.53	46.63	38.07	H	47.15	38.59	74.0	54.0	-26.85	-15.41
5472.00	2.15	33.90	35.53	48.16	39.28	H	48.68	39.80	74.0	54.0	-25.32	-14.20
5536.00	2.25	34.60	35.54	48.24	40.15	H	49.55	41.46	74.0	54.0	-24.45	-12.54
5600.00	2.25	34.60	35.54	48.69	39.61	H	50.00	40.92	74.0	54.0	-24.00	-13.08
10639.60	3.04	38.40	35.67	47.30	36.97	H	53.07	42.74	74.0	54.0	-20.93	-11.26
15960.20	3.79	38.40	35.36	48.24	37.54	H	55.07	44.37	74.0	54.0	-18.93	-9.63
5152.00	2.15	33.90	35.53	49.83	42.55	V	50.35	43.07	74.0	54.0	-23.65	-10.93
5325.80	2.15	33.90	35.53	101.85	93.82	V	102.37	94.34				
5350.00	2.15	33.90	35.53	62.34	49.07	V	62.86	49.59	74.0	54.0	-11.14	-4.41
5536.00	2.25	34.60	35.54	58.13	48.36	V	59.44	49.67	74.0	54.0	-14.56	-4.33
10640.20	3.04	38.40	35.67	46.43	36.19	V	52.20	41.96	74.0	54.0	-21.80	-12.04
15960.20	3.79	38.40	35.36	48.35	37.57	V	55.18	44.40	74.0	54.0	-18.82	-9.60

Remark :

- (1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Emission.
- (4) Spectrum Peak Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.
- (5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode: TX Low Mode(Turbo Mode) Test Date : Mar. 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: Joymax (B-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5087.60	2.15	33.90	35.53	46.99	38.34	H	47.51	38.86	74.0	54.0	-26.49	-15.14
5150.00	2.15	33.90	35.53	50.91	39.22	H	51.43	39.74	74.0	54.0	-22.57	-14.26
5204.00	2.15	33.90	35.53	91.23	83.63	H	91.75	84.15				
5409.20	2.15	33.90	35.53	48.69	40.06	H	49.21	40.58	74.0	54.0	-24.79	-13.42
10429.60	3.21	38.40	35.87	46.57	35.85	H	52.31	41.59	88.2	68.2	-35.89	-26.61
15630.00	3.79	38.40	35.36	47.98	37.82	H	54.81	44.65	74.0	54.0	-19.19	-9.35
5024.00	2.15	33.90	35.53	53.17	45.66	V	53.69	46.18	74.0	54.0	-20.31	-7.82
5150.00	2.15	33.90	35.53	57.98	45.03	V	58.50	45.55	74.0	54.0	-15.50	-8.45
5216.00	2.15	33.90	35.53	98.54	90.60	V	99.06	91.12				
5408.00	2.15	33.90	35.53	55.81	47.43	V	56.33	47.95	74.0	54.0	-17.67	-6.05
5472.80	2.15	33.90	35.53	56.09	49.71	V	56.61	50.23	74.0	54.0	-17.39	-3.77
10422.40	3.21	38.40	35.87	46.34	35.77	V	52.08	41.51	88.2	68.2	-36.12	-26.69
15630.00	3.79	38.40	35.36	47.70	37.73	V	54.53	44.56	74.0	54.0	-19.47	-9.44

Remark :

- (1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Emission.
- (4) Spectrum Peak Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.
- (5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)



Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode: TX Mid Mode(Turbo Mode) Test Date : Mar. 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: Joymax (B-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5087.00	2.15	33.90	35.53	47.25	39.88	H	47.77	40.40	74.0	54.0	-26.23	-13.60
5262.00	2.15	33.90	35.53	90.48	82.14	H	91.00	82.66				
5409.00	2.15	33.90	35.53	47.93	40.63	H	48.45	41.15	74.0	54.0	-25.55	-12.85
5473.00	2.15	33.90	35.53	48.87	41.52	H	49.39	42.04	74.0	54.0	-24.61	-11.96
10502.00	3.04	38.40	35.67	45.40	34.96	H	51.17	40.73	71.0	62.7	-19.83	-21.93
15750.00	3.79	38.40	35.36	47.85	37.39	H	54.68	44.22	88.2	68.2	-33.52	-23.98
5024.00	2.15	33.90	35.53	51.47	45.21	V	51.99	45.73	74.0	54.0	-22.01	-8.27
5088.00	2.15	33.90	35.53	50.08	43.64	V	50.60	44.16	74.0	54.0	-23.40	-9.84
5261.00	2.15	33.90	35.53	99.29	91.18	V	99.81	91.70				
5409.00	2.15	33.90	35.53	55.97	48.63	V	56.49	49.15	74.0	54.0	-17.51	-4.85
5473.00	2.15	33.90	35.53	57.05	50.29	V	57.57	50.81	74.0	54.0	-16.43	-3.19
10502.00	3.04	38.40	35.67	44.40	33.96	V	50.17	39.73	88.2	68.2	-38.03	-28.47
15750.00	3.79	38.40	35.36	46.85	36.39	V	53.68	43.22	74.0	54.0	-20.32	-10.78

Remark :

- (1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Emission.
- (4) Spectrum Peak Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.
- (5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

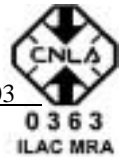
Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode: TX High Mode(Turbo Mode) Test Date : Mar. 07 2003
 Temperature : 26 Test By: James
 Humidity : 60 % Pol: Ver./Hor
 Test antenna: Joymax (B-antenna)

Frequency (MHz)	Cable loss (dB)	Ant. Fact (dB/m)	Pre-amp. (dB)	Reading (dBuV)		ANT. POL. (H/V)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
				PK	AV		PK	AV	PK	AV	PK	AV
5088.00	2.15	33.90	35.53	47.70	38.37	H	48.22	38.89	74.0	54.0	-25.78	-15.11
5280.00	2.15	33.90	35.53	91.08	83.14	H	91.60	83.66				
5472.00	2.15	33.90	35.53	49.19	40.72	H	49.71	41.24	74.0	54.0	-24.29	-12.76
10582.00	3.04	38.40	35.67	46.70	35.84	H	52.47	41.61	88.2	68.2	-35.73	-26.59
15870.00	3.79	38.40	35.36	47.39	37.47	H	54.22	44.30	74.0	54.0	-19.78	-9.70
5152.00	2.15	33.90	35.53	49.95	41.85	V	50.47	42.37	74.0	54.0	-23.53	-11.63
5304.00	2.15	33.90	35.53	99.34	91.67	V	99.86	92.19				
5350.00	2.15	33.90	35.53	59.05	47.39	V	59.57	47.91	74.0	54.0	-14.43	-6.09
5472.00	2.15	33.90	35.53	56.27	48.86	V	56.79	49.38	74.0	54.0	-17.21	-4.62
5536.00	2.25	34.60	35.54	55.20	47.94	V	56.51	49.25	74.0	54.0	-17.49	-4.75
10580.80	3.04	38.40	35.67	47.34	36.55	V	53.11	42.32	88.2	68.2	-35.09	-25.88
15870.40	3.79	38.40	35.36	48.64	37.46	V	55.47	44.29	74.0	54.0	-18.53	-9.71

Remark :

- (1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- (2) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Emission.
- (4) Spectrum Peak Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.



13. TRANSMISSION IN THE ABSENCE OF DATA

13.1 Standard Applicable

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

13.2 Result:

No non-compliance noted:

Refer to the theory of operation.



14. FREQUENCY STABILITY

14.1 Standard Applicable

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

14.2 Result:

No non-compliance noted:

Referring to the theory of operation, the crystal used to set the frequency has a temperature coefficient of +/- 20 ppm. For a transmitter fundamental frequency of 5.35 GHz, this corresponds to +/- 107 kHz.

During band edge testing, it is determined that the smallest margin (along the frequency axis) to the band edge occurred at the upper band edge in the Turbo mode, using average detection, with the antenna vertically polarized. In this configuration, with the transmitter set to the highest channel, the envelope of the modulation sideband intercepted the 54 dBuV/m limit at 5,347.3 MHz. Adding the maximum peak-to-peak deviation due to the crystal (0.214 MHz) yields 5,347.514 MHz, which remains within the authorized band of 5,150 to 5,350 MHz.

At the lower band edge, the smallest margin (along the frequency axis) occurred in the Base mode, using average detection, with the antenna vertically polarized. In this configuration, with the transmitter set to the lowest channel, the envelope of the modulation sideband intercepted the 54 dBuV/m limit at 5,154 MHz. Subtracting the maximum peak-to-peak deviation due to the crystal (0.214 MHz) yields 5,153.786 MHz, which remains within the authorized band of 5,150 to 5,350 MHz.



15. ANTENNA REQUIREMENT

15.1 Standard Applicable

According to §15.407(d), Any U-NII device that operates in the 5.15-5.25 GHz band shall use a transmitting antenna that is an integral part of the device.

15.2 Antenna Connected Construction

The directional gins of antenna used for transmitting as below:

A- antenna:

Manufacturer: Joymax,

Model : THF-6180-120-1

Antenna Gain: 5dBi for both 2.4GHz and 5GHz

B- antenna :

Manufacturer: SkyCross

Model : CBL-2450U-5250U-5800U-A

Antenna Gain: 3.0 dBi for 2.4GHz

3.25 dBi for 5.25GHz

2.0 dBi for 5.8GHz

the antenna connector is designed with unique connector no consideration of replacement by the user. Please see EUT photo for details.



16. RF Exposure

16.1 Standard Applicable

According to §15.247(b)(4) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

The device is class as a Mobile device.

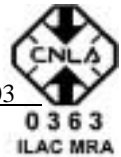
According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-15000	/	/	1.0	30

F = frequency in MHz

* = Plane-wave equipment power density



(A-antenna Port)

Maximum peak output power at antenna input terminal: 14.80 (dBm)

Maximum peak output power at antenna input terminal: 30.1995 (mW)

Antenna gain (typical): 5 (dBi)

Maximum antenna gain: 3.162 (numeric)

Prediction distance: 20 (cm)

MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm²)

Power density at predication frequency at 20 (cm) distance 0.0190086 (mW/cm²)

S	P	P	G	G	R
mW/cm ²	mW	dBm	dBi	(numeric)	cm
0.01900861	30.1995172	14.8	5	3.162278	20

Result

The predicted power density level at 20 cm is 0.0190086 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5180 MHz.



(B-antenna port)

Maximum peak output power at antenna input terminal: 20.12 (dBm)

Maximum peak output power at antenna input terminal: 102.80 (mW)

Antenna gain (typical): 3.25 (dBi)

Maximum antenna gain: 2.1134 (numeric)

Prediction distance: 20 (cm)

MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm²)

Power density at predication frequency at 20 (cm) distance 0.04324 (mW/cm²)

S	P	P	G	G	R
mW/cm ²	mW	dBm	dBi	(numeric)	cm
0.043246441	102.8016298	20.12	3.25	2.113489	20

Result

The predicted power density level at 20 cm is 0.04324 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5260 MHz.

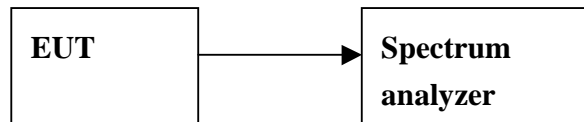
17 99% Bandwidth Measurement

17.1 Standard Applicable

17.2 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	R&S	FSP30	1093.4495.30	07/23/2002	07/22/2003

17.3 Test Set-up:



The EUT was connected to the spectrum analyzer through a 50 Ω RF cable.

17.4 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=1% of the approximate emission bandwidth, VBW = 3 times RBW, Span= approximately 20dB below the peak level. Sweep=auto
4. Turn on the 99% bandwidth function, max reading..
5. Repeat above procedures until all frequency measured were complete.

17.5 Measurement Result**SMT (A-antenna) Normal Mode**

CH	Bandwidth (MHz)	Result
Lower	21.6	PASS
Mid	20.96	PASS
Mid	21.68	PASS
Higher	22.08	PASS

SMT (A-antenna) Turbo Mode

CH	Bandwidth (MHz)	Result
Lower	39.64	PASS
Mid	39.2	PASS
Higher	39.2	PASS

Joymax(B-antenna) Normal Mode

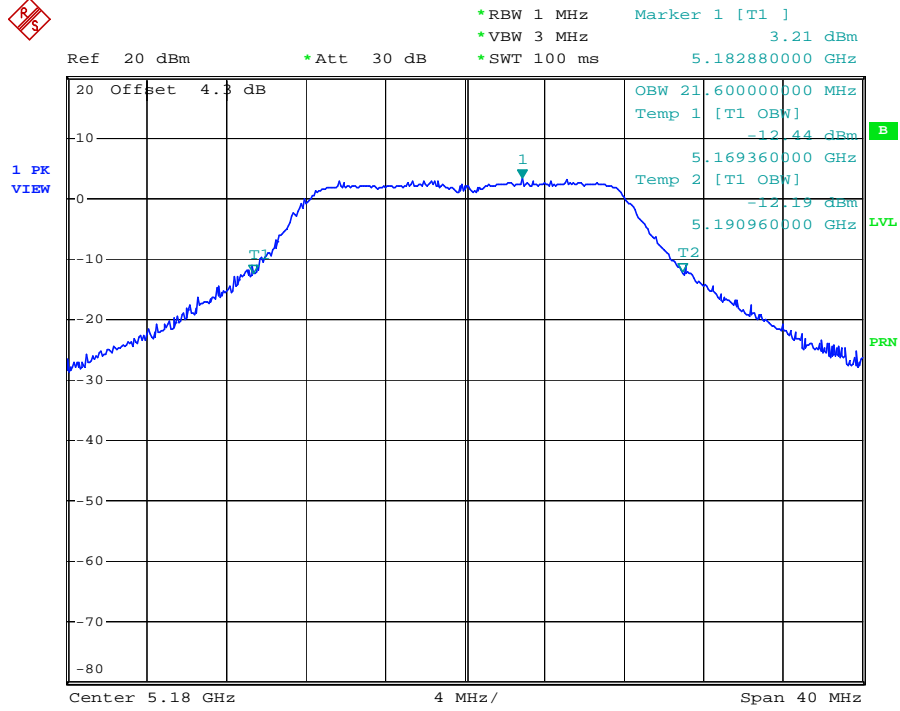
CH	Bandwidth (MHz)	Result
Lower	21.92	PASS
Mid	21.6	PASS
Mid	22.24	PASS
Higher	21.92	PASS

Joymax (B-antenna) Turbo Mode

CH	Bandwidth (MHz)	Result
Lower	40.8	PASS
Mid	38.72	PASS
Higher	41.28	PASS

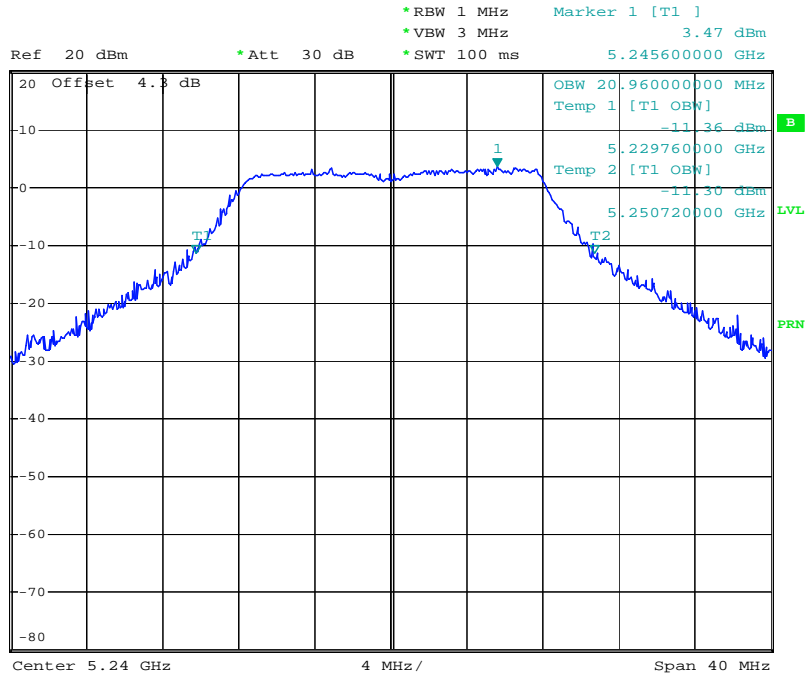


SMT (A-antenna) Normal Mode 99% Band Width Test Data CH-LOW



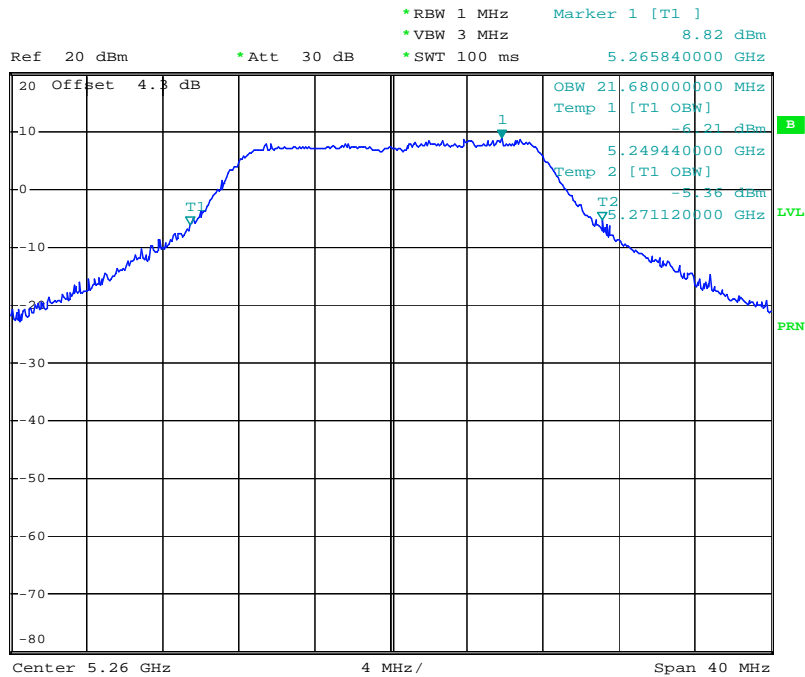
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99% Band Width Test Data CH-MID



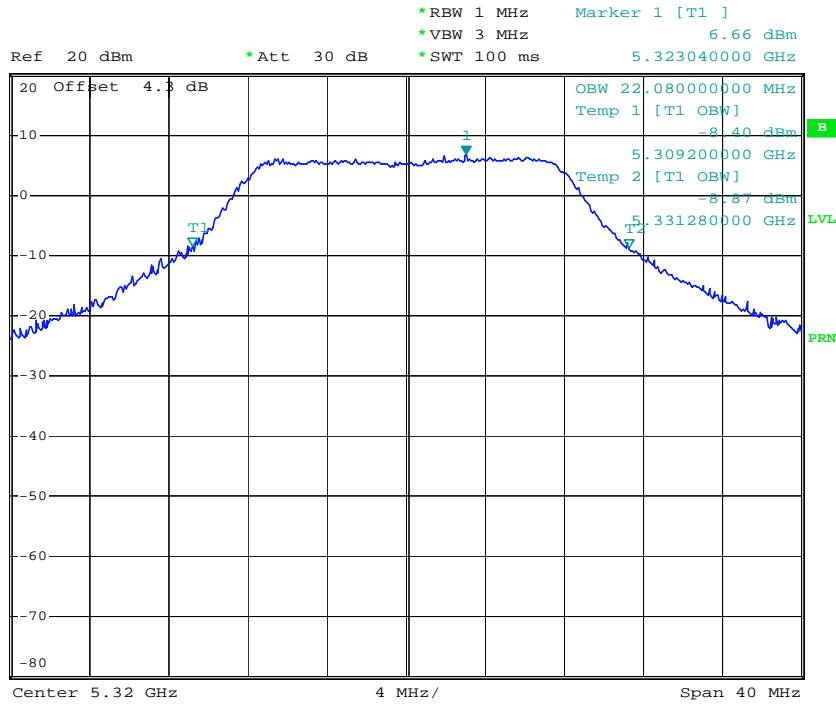
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99% Band Width Test Data CH-MID



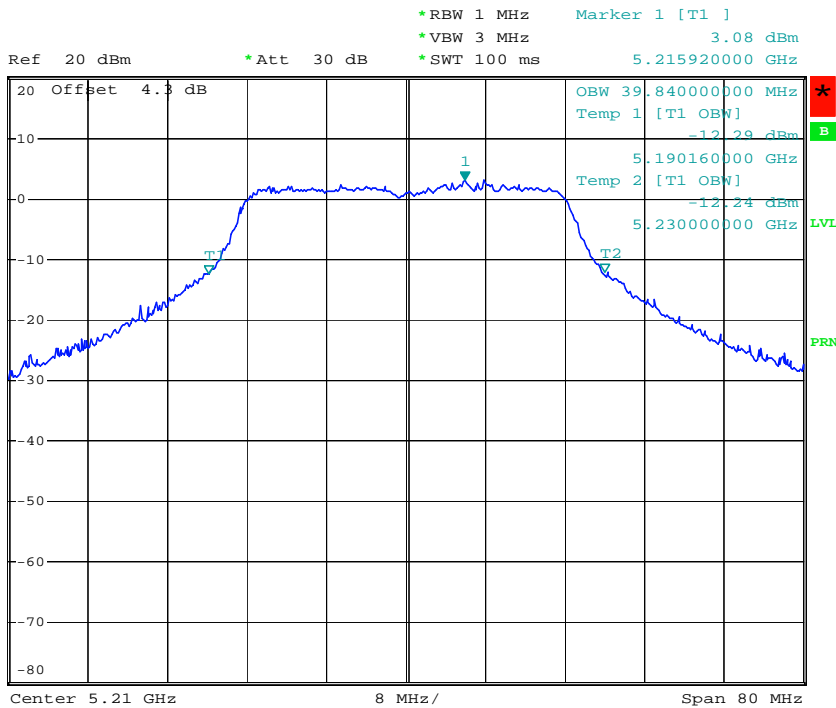
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99% Band Width Test Data CH-HIGH



Date: 3.APR.2003 21:54:34

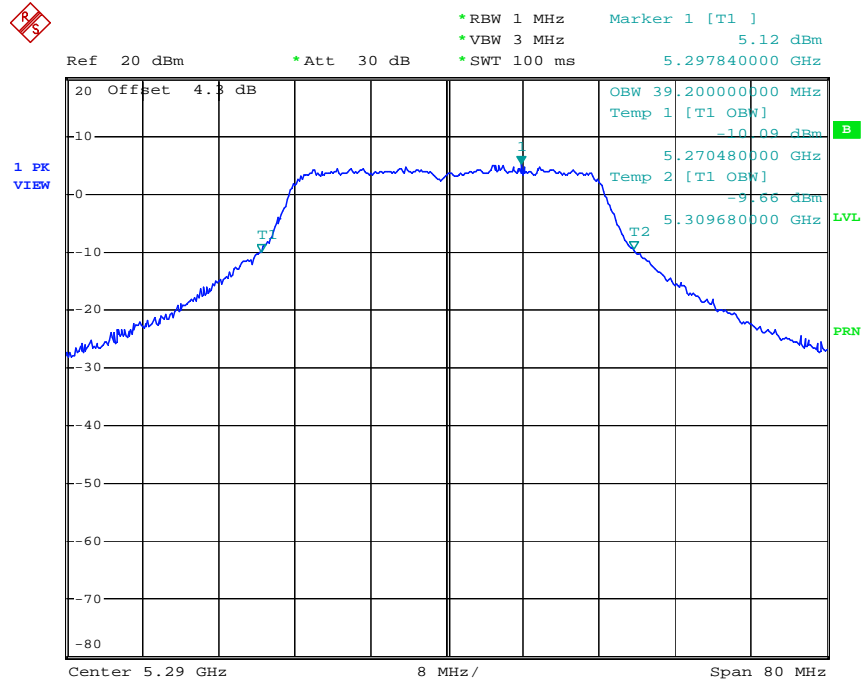
SMT (A-antenna) Turbo Mode 99% Band Width Test Data CH-LOW



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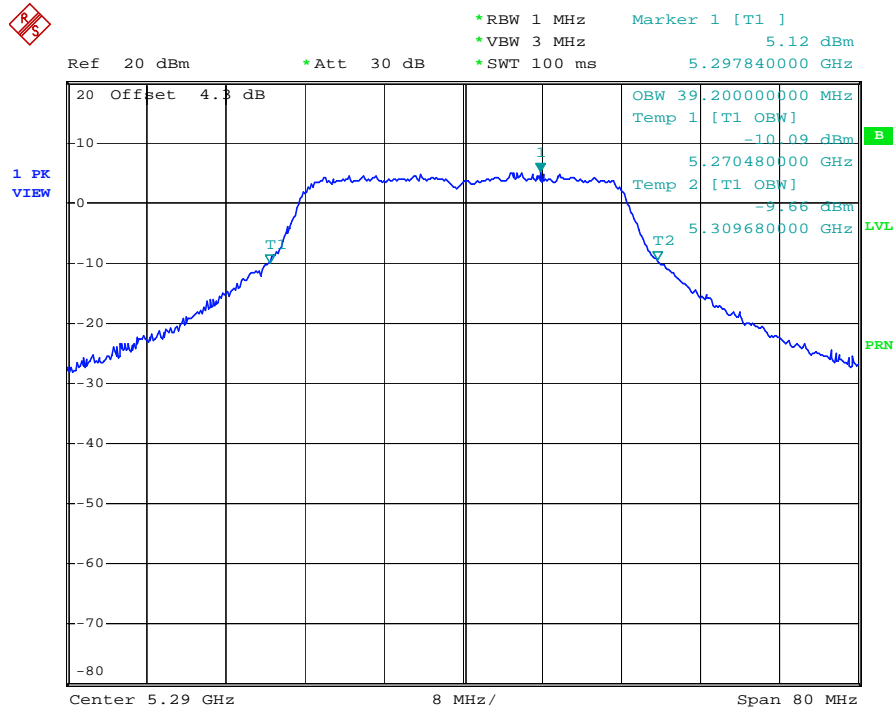


99% Band Width Test Data CH-MID



Date: 3.APR.2003 22:03:17

99% Band Width Test Data CH-HIGH

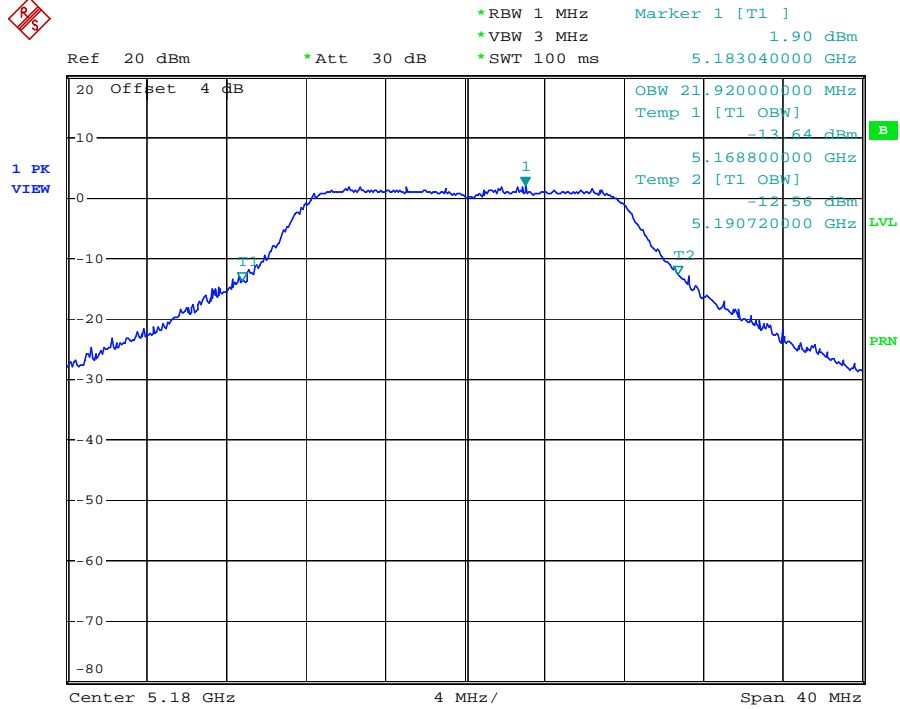


Date: 3.APR.2003 22:03:17

Joymax (B-antenna) Normal Mode

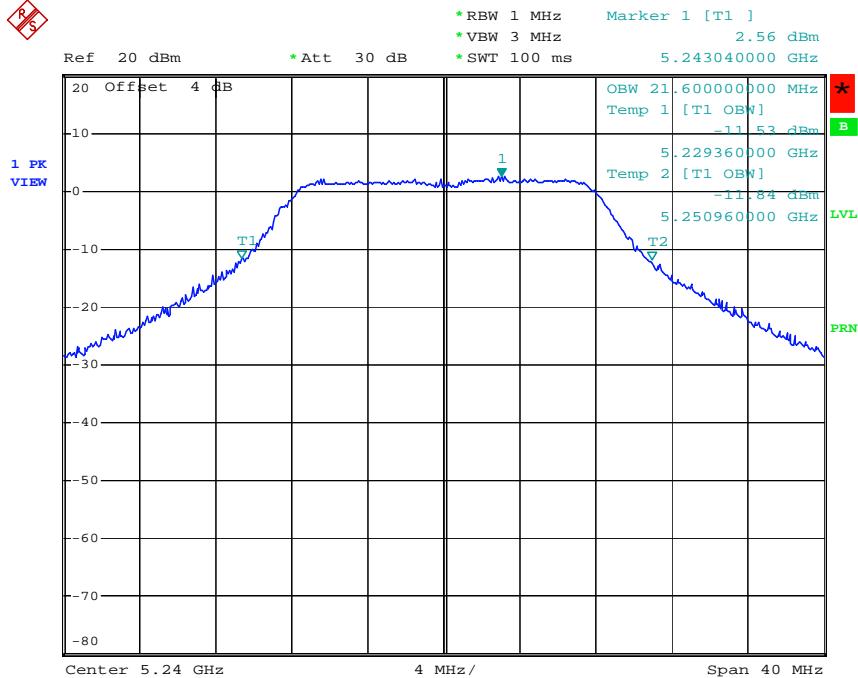


99% Band Width Test Data CH-LOW



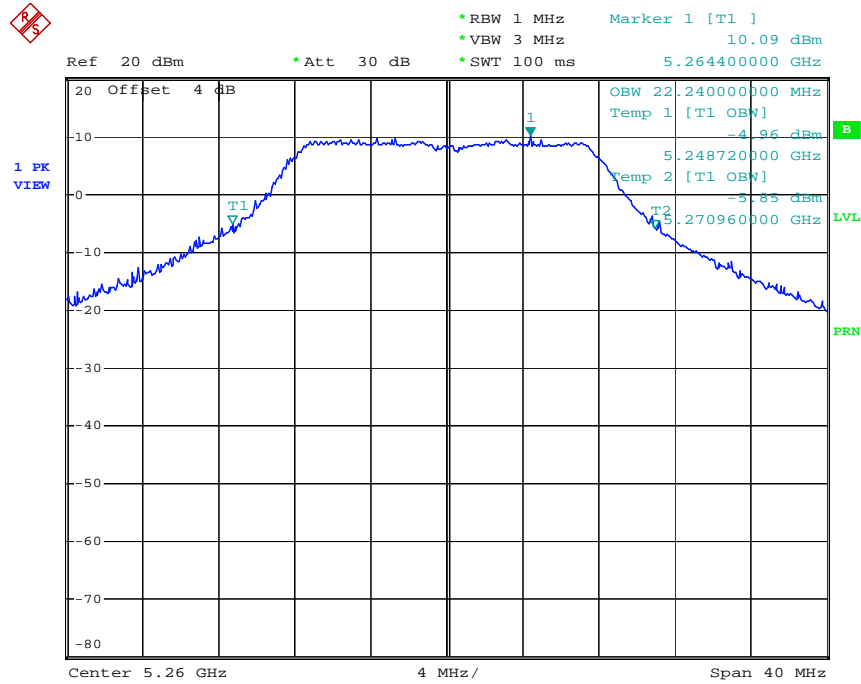
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99% Band Width Test Data CH-MID



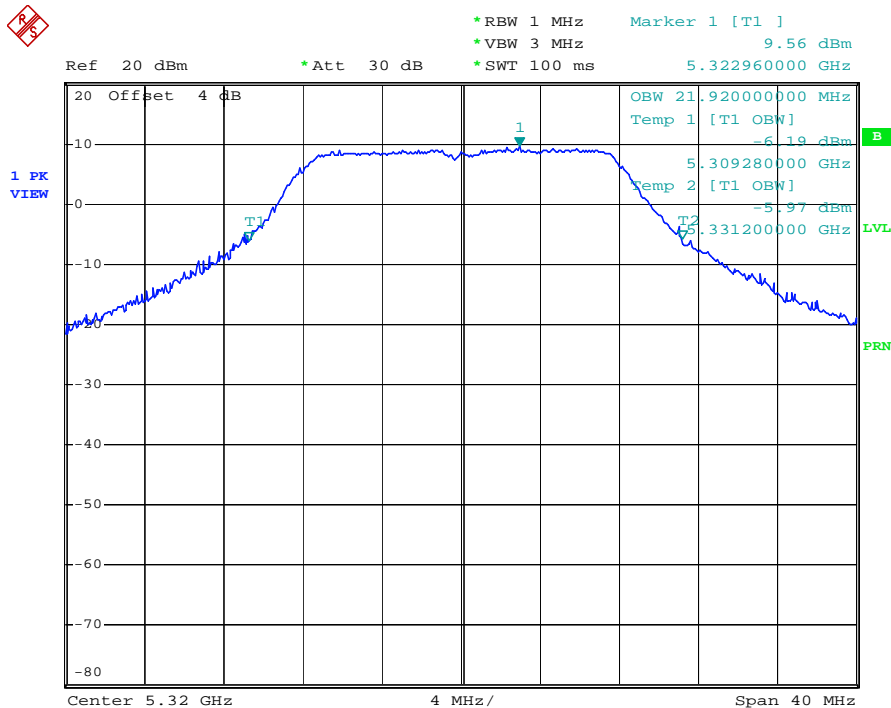
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99% Band Width Test Data CH-MID



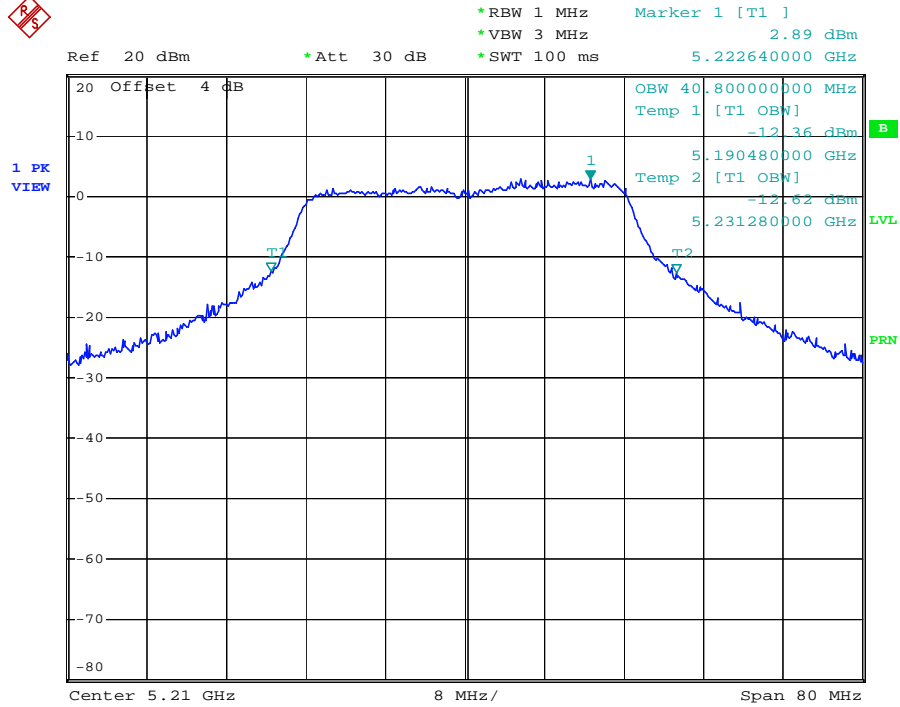
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99% Band Width Test Data CH-HIGH



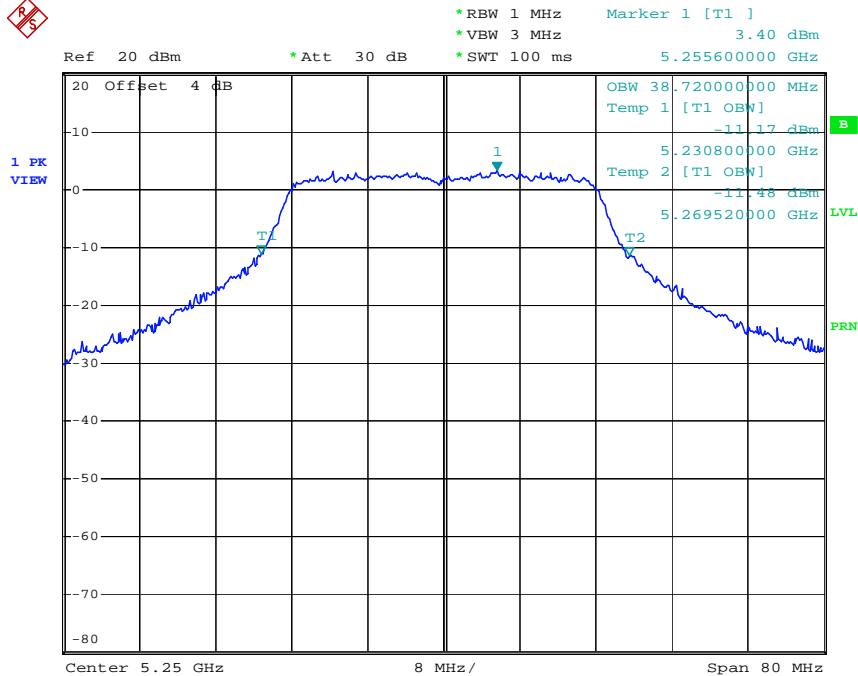
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**Joymax (B-antenna) Turbo Mode
 99% Band Width Test Data CH-LOW**



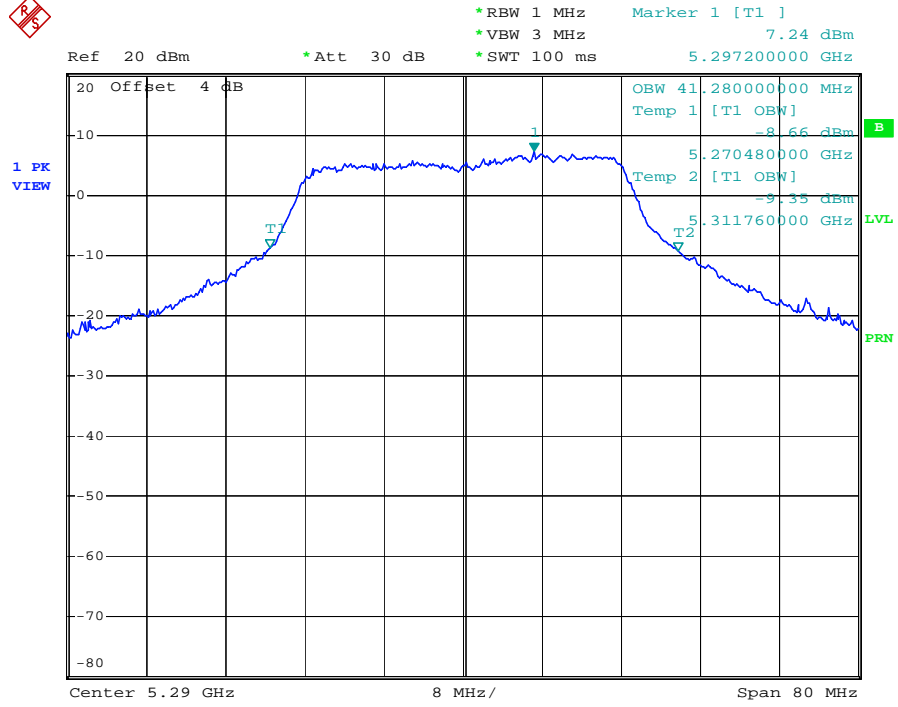
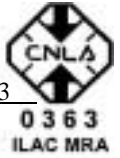
Date: 3.APR.2003 21:48:54

99% Band Width Test Data CH-MID



Date: 3.APR.2003 21:48:15

99% Band Width Test Data CH-HIGH



Date: 3.APR.2003 21:47:29

17. TERMS OF ABRIVATION TERMS OF ABRIVATION

ACP	Adjecent Channel Power
ANSI	Americal National Standard Institute
Ant.	Antenna
AV.	Average detection
B	26dB down emission bandwidth
CAL.	Calibration
Correct.	Correction
dBc	dB relative to fundamental frequency level
dBi	Gain in decibels relative to an isotropic antenna
EUT	Equipment Under Test
FREQ.	Frequency
Hor.	Horizontal direction
IEEE	Institute of Electral and Electronic Engineer
LISN	Line Impedance Stabilization Network
MFR	Manufacturer
NSA	Normalized Site Attenuation
OFDM	Orthogonal Frequency Division Multiplexing
PK	Peak detection
PIFA	Printed Invert-F Antenna
Pol.	Polarization
PPSD	Peak Power Spectral Density
Pre-amp.	Pre-amplifier
Q.P.	Quasi-peak detection
RBW	Resolution bandwidth
SAR	Specific Absorption Rate
SRA	Spectrum analyzer
U-NII	Unlicense National Information Infrastructure
VBW	Video bandwidth
Vert.	Vertical direction



APPENDIX 1

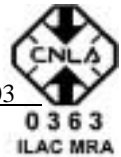
PHOTOGRPHS OF SET UP

Radiated Emission Set up Photos



Conducted Emission Set Up Photos





APPENDIX 2

PHOTOGRPHS OF EUT

Internal antenna with pc-1



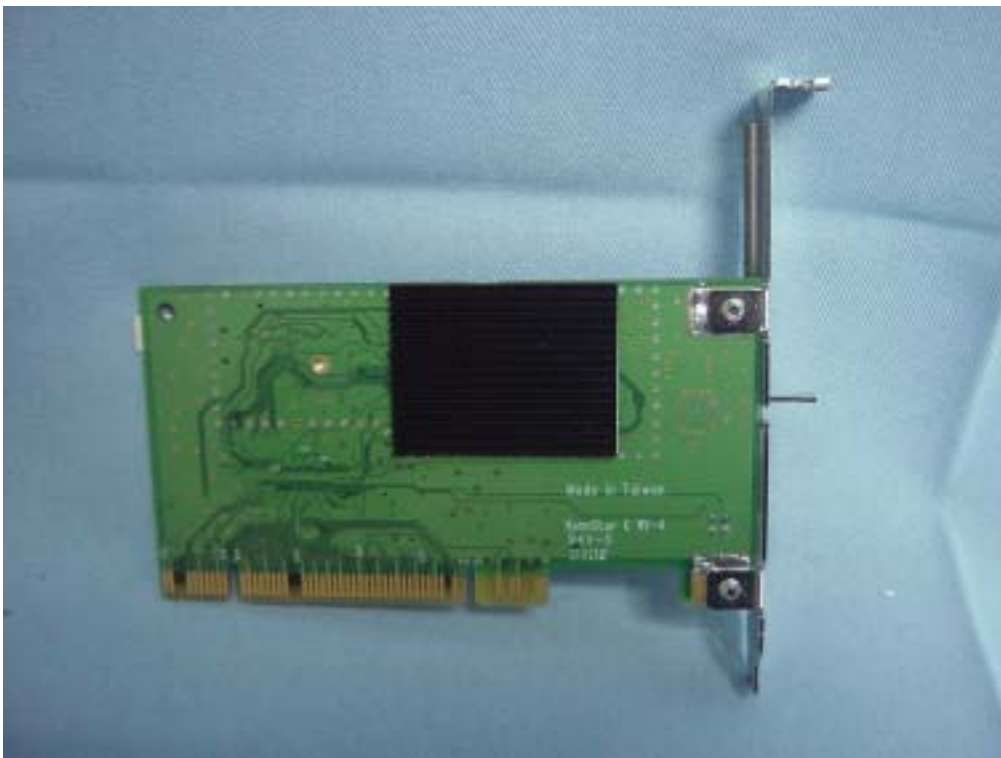
Internal antenna with pc-2



Front View of EUT



Back View of EUT



Dissolution View of EUT



Front View of EUT with Antenna



Back View of EUT with Antenna

