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Test Report

Company: Telex Communications
8601 East Cornhusker Highway
Lincoln, NE 68505
Contact: Paul Hoffmeyer
Product: 2472AA
FCC ID: B5D-CPE50MW

Test Report No: R040404-01A1

APPROVED BY: Steve Cass
General Manager

A handwritten signature in black ink, appearing to read "Steve Cass", is written over a horizontal line.

Doug Kramer
Test Engineer

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1.0 Summary of test results

1.1 Test Results

Test	Test Specification	Results
CFR 47, FCC Part 15.203	Part 15.203	Complies
CFR 47, FCC Part 15.207	Part 15.207, Class B	Complies
CFR 47, FCC Part 15.209	Part 15.109, Class B	Complies
CFR 47, FCC Part 15.247	Parts 15.209 and 15.247	Complies

1.2 Test Methods

1.2.1 Conducted Emissions

Measurements of conducted emissions to the limits set in CFR 47 Part 15.207 were conducted using the methods shown in ANSI/IEEE C63.4, 2001. Several configurations were examined the results presented represent a worst-case scenario. The EUT was placed on a wooden table approximately 80 centimeters high, positioned 40 centimeters from the vertical ground plane and 80 centimeters or more away from any other conductive surface.

1.2.2 Radiated Emissions

Compliance to CFR 47 Parts 15.109/209 and 15.247 was tested in accordance with the methods of ANSI/IEEE C63.4, 2001. Several configurations were examined the results presented represent a worst-case scenario. The EUT was mounted on a wooden table 80 centimeters high and centered on a 4 meter diameter turntable. The table was rotated to maximize emissions. All measurements below 18GHz were taken at a distance of 3 meters from the EUT. Measurements above 18GHz were made at a distance of 1 meter.

2.0 Description

2.1 Equipment under test

The DSSS transmitter and receiver of the EUT is powered via a PCMCIA interface to the LAN interface PCB. The transmitter and receiver of the EUT are connected to an 18 dBi patch antenna array within the CPE radome enclosure via a coaxial cable. The LAN interface PCB is connected to an outdoor-rated Ethernet cable (CAT-5) from which it receives both data and DC power. The DC power is injected onto wires 4,5,7 and 8 from a Power-over-Ethernet (PoE) box, which is located near the client s computer equipment. The EUT is powered by an 12V DC Globtek power supply through a Power over Ethernet (PoE) adapter box. The DSSS transmitter and receiver consists of a PCMCIA radio card, SparkLan model WL-316C (FCC ID: MXF-C00924).

2.1.1 Identification: 2472AA

2.1.2 EUT received date: 1 March 2004

2.1.3 EUT tested dates: 1st March 2004 – 15th April 2004

2.1.4 Manufacturer: Telex Communications

2.1.5 Serial number: MAC 00904B25002E

2.2 Laboratory description

All testing was performed at the NCEE Lincoln facility, which is a FCC registered lab. This site has been fully described in a report submitted to the FCC office, and accepted in a letter dated May 4, 2001.

2.3 Special equipment or setup

The transmit mode was a continuous RF on setting at 11Mbps and power setting of 04.

3.0 Test equipment used

<i>Serial #</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Description</i>	<i>Last cal.</i>
1654	EMCO	3142B	Biconilog antenna	03-May-03
6415	EMCO	3115	DRG Horn	29-Apr-03
2576	EMCO	3116	DRG Horn	29-Apr-03
100037	Rohde & Schwarz	ESIB26	EMI Test Receiver	02-Jul-03
100007	Rohde & Schwarz	ESIB7	EMI Test Receiver	26-May-03
082001/003	Rohde & Schwarz	TS-PR18	Preamplifier	N/A
2575	Rohde & Schwarz	ES-K1	Software v1.60	N/A
836679/010	Rohde & Schwarz	ESH3-Z5	Artificial Mains	29-Apr-03
200332488	Trilithic	23042	High pass filter	N/A

4.0 Detailed Results

Radiated emissions measurements were made by first using a spectrum analyzer getting a rough signal spectrum, any points were then measured using a CISPR 16 compliant receiver with the following bandwidth setting:

30MHz - 1GHz: 120kHz IF bandwidth, 60kHz steps

Above 1GHz: 1MHz IF bandwidth, 500kHz steps

Conducted measurements were made using a CISPR 16 compliant receiver with the IF bandwidth set to 9kHz taking 5kHz steps through the range 150kHz to 30MHz.

All results shown are corrected to incorporate cables losses, antenna factors, and any amplification.

4.1 FCC Part 15.203 Antenna Requirement

The RF connector is an MMCX jack connector integrated into the PCMCIA card (FCC ID: MXF-C00924). A coaxial cable with an MMCX plug connector connects the PCMCIA card to the 18dBi antenna. This PCMCIA card and coaxial cable are internal to the 2472AA (FCC ID: B5D-CPE50MW). The 2472AA does not have any accessible external antenna connectors.

4.2 FCC Part 15.207 Conducted Emissions

The EUT was tested with the transmitter operating with a continuous RF signal. The setup can be seen in Figures 1 and 2. The results can be seen in Figure 5. The worst case emission was at 160kHz on the Neutral conductor. The quasi-peak value at 160kHz was 47.5dBuV, which is 17.9dB under the limit. The plot shown in Figure 5 is a composite worst-case of the Line and Neutral conductors.

4.3 FCC Part 15.109 Radiated Emissions, Receive only

The EUT was found to not produce any emissions in excess of the Class 'B' limits. The test setup can be seen in Figures 3 and 4. More information on the radiated emissions can be found in Section 4.4. The transmitter was not active for these measurements. Appendix C shows the measured values denoted by a red '+' or blue '+' in Figures 6 and 7. The red '+' is the quasi-peak or average

measurement while the blue '+' in Figures 6 and 7 show the peak values. No values were found to be in excess of the limits. A table of the values can be seen in Appendix C. All measurements were made at a distance of 3 meters.

4.4 FCC Parts 15.209 and 15.247 Radiated Emissions, Transmit only

The EUT was tested with the transmitter operating with a continuous RF signal at three frequencies in the lower, middle and upper portions of the band. The frequencies chosen were Channel 1 (2.412GHz), Channel 5 (2.432GHz), and Channel 11 (2.462GHz). No spurious emissions were noted above 18GHz. Appendix B shows the worst-case emissions for each channel in the ranges of 30MHz – 1GHz, 1GHz – 3GHz, and 3GHz – 18GHz while the EUT was transmitting. Figures 8 through 16 show the emissions. The peak and quasi-peak measurements below 1GHz were found not to exceed the limits. The peak and average measurements between 1GHz and 3GHz did not exceed limits outside of the transmitters operating band. The peak and average measurement between 3GHz and 18GHz did not exceed the limits. The test setup can be seen in Figures 2 and 3. The EUT was mounted on a table 80 centimeters above a ground plane. Appendix D contains the results of testing the 3 transmitter frequencies. Appendix B shows the measured values denoted by a red '+' or a blue '+' in Figures 8 through 16. The red '+' is the quasi-peak or average measurement while the blue '+' in Figures 8 through 16 show the peak values.

4.5 Bandedge and Conducted Power Measurements

The EUT was tested at Channel 1 and Channel 11 for the bandedge measurements. The EUT was tested on Channels 1, 5 and 11 for the conducted power measurements. Appendix F shows the results and the plots of bandedge and conducted power measurements. The radiated peak and average values were tested with the antenna centered on the turntable. The maximum calculated emission in the 2.31GHz – 2.39GHz restricted band is 61.39dBuV/m for peak and 53.76dBuV/m for average. The maximum calculated emission in the 2.4835GHz – 2.5GHz restricted band is 59.97dBuV/m for peak and 48.23dBuV/m for average. The maximum emission in the lower restricted band fell within 2MHz of 2.39GHz as shown in Figures 19 and 20. The maximum emission in the upper restricted band fell within 2MHz of 2.4835GHz as shown in Figures 25 and 26.

The following table shows the values measured in Figures 29 through 37.

	Channel		
	1	5	11
6dB Bandwidth	11.2 MHz	11.3 MHz	11.2 MHz
Maximum Power	17.2 dBm	16.9 dBm	16.7 dBm
Maximum PSD	-10.81 dBm	-11.40 dBm	-11.20 dBm

EIRP for this product is then between 34.7 and 35.2, below the 36dB limit.

Appendix A: Photos

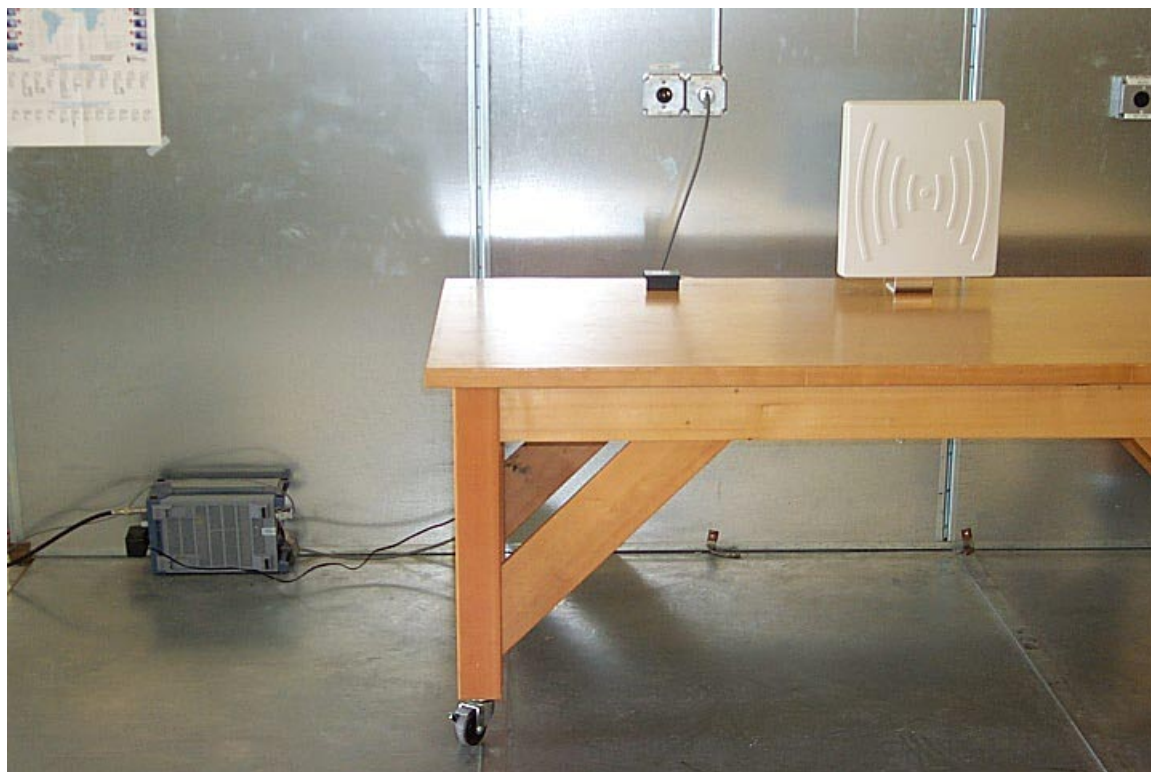


Figure 1 Conducted Emissions Test Setup

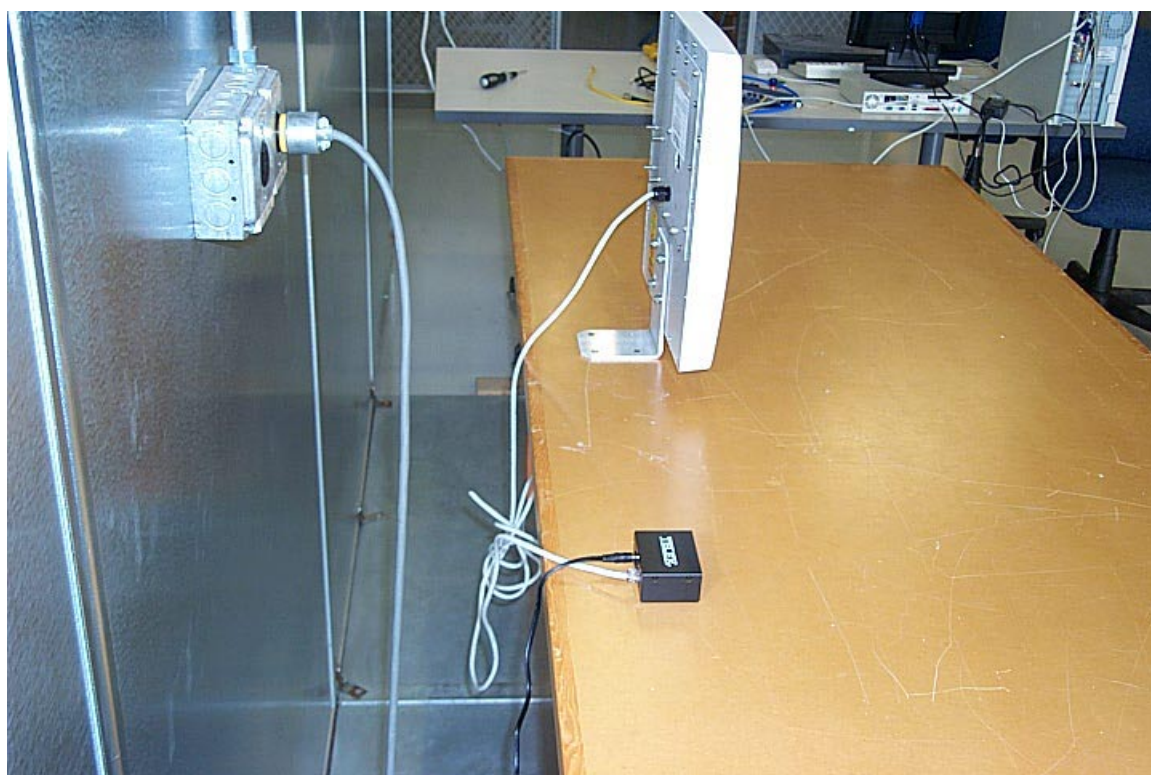


Figure 2 Conducted Emissions Test Setup



Figure 3 Radiated Emissions Test Setup

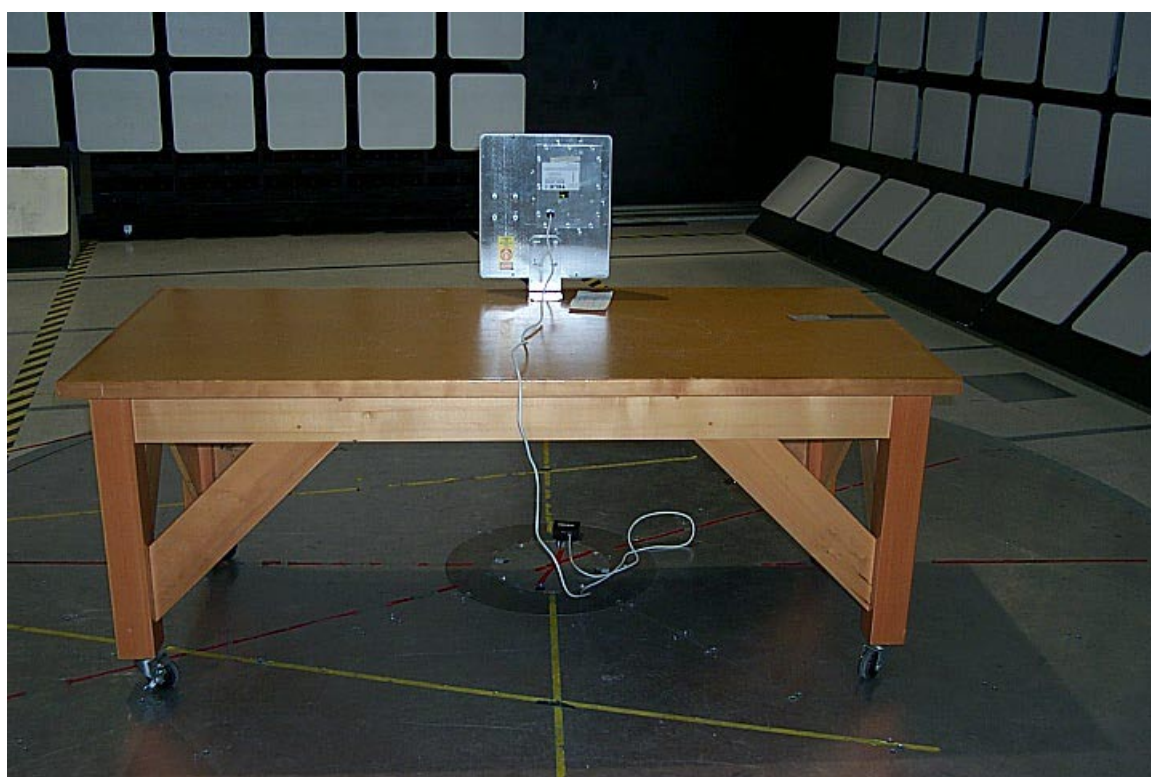


Figure 4 Radiated Emissions Test Setup

Appendix B: Emissions Plots

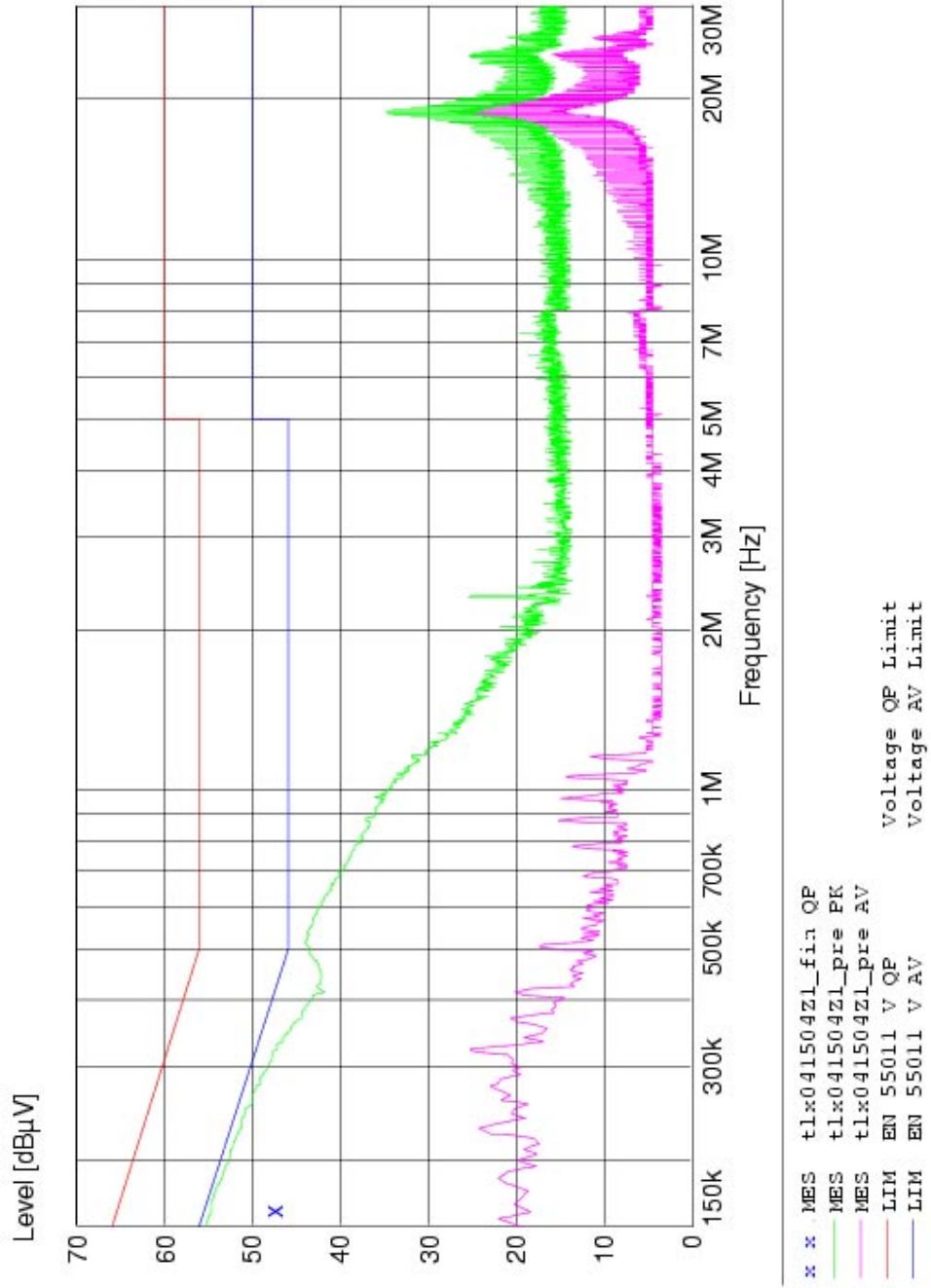


Figure 5 Conducted Emissions Plot

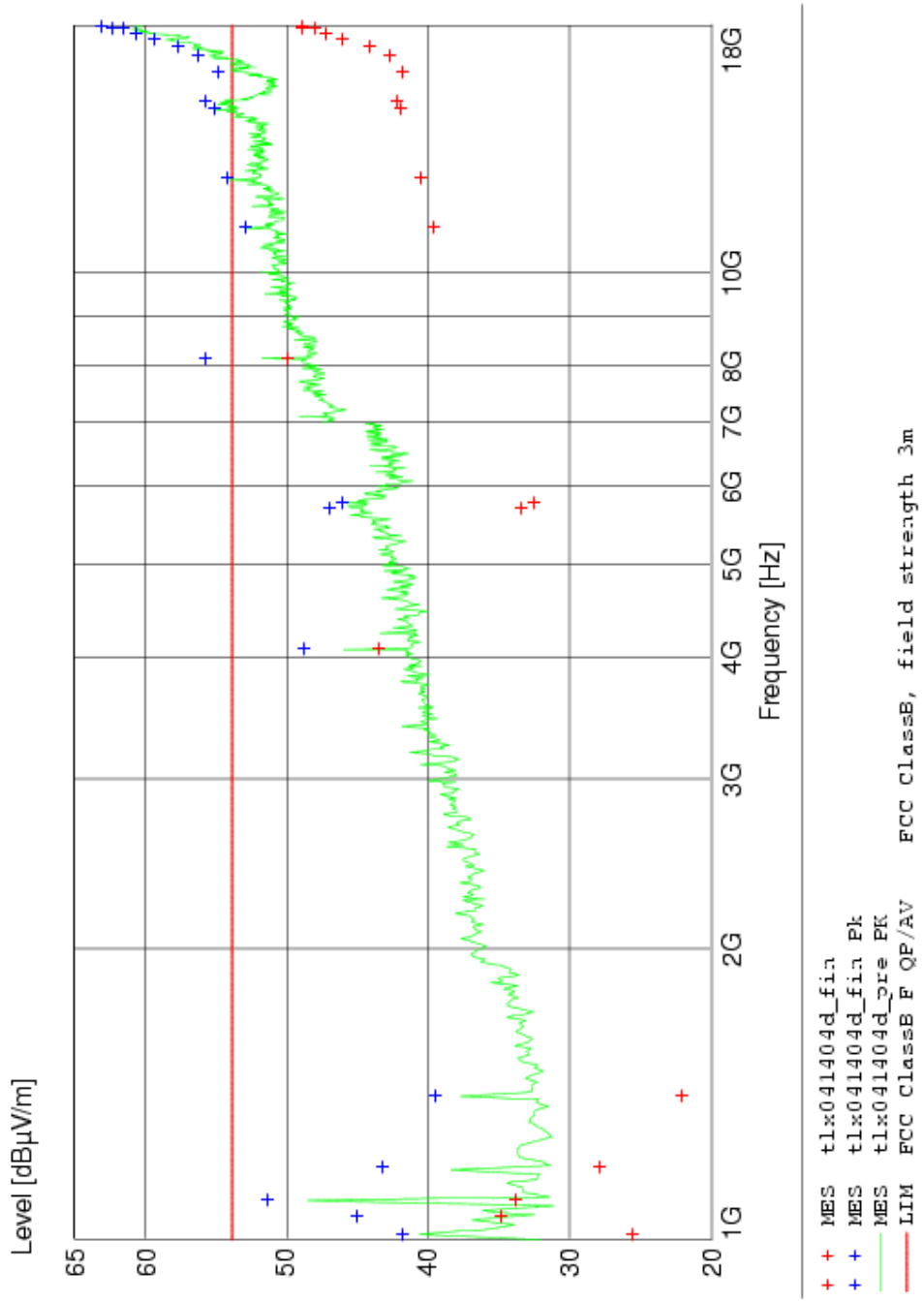


Figure 6 Radiated Emissions Plot, Receive Only

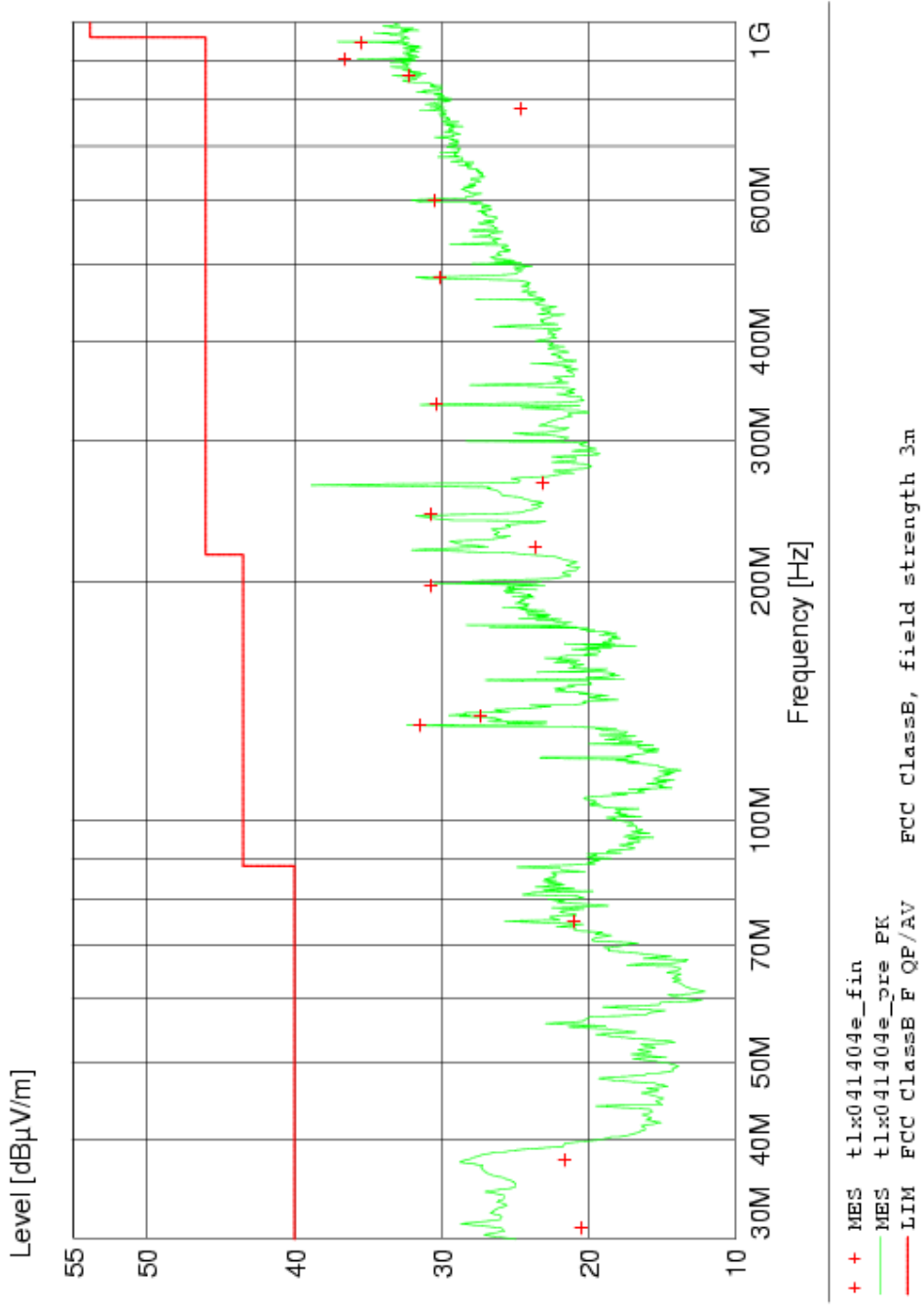


Figure 7 Radiated Emissions Plot, Receive Only

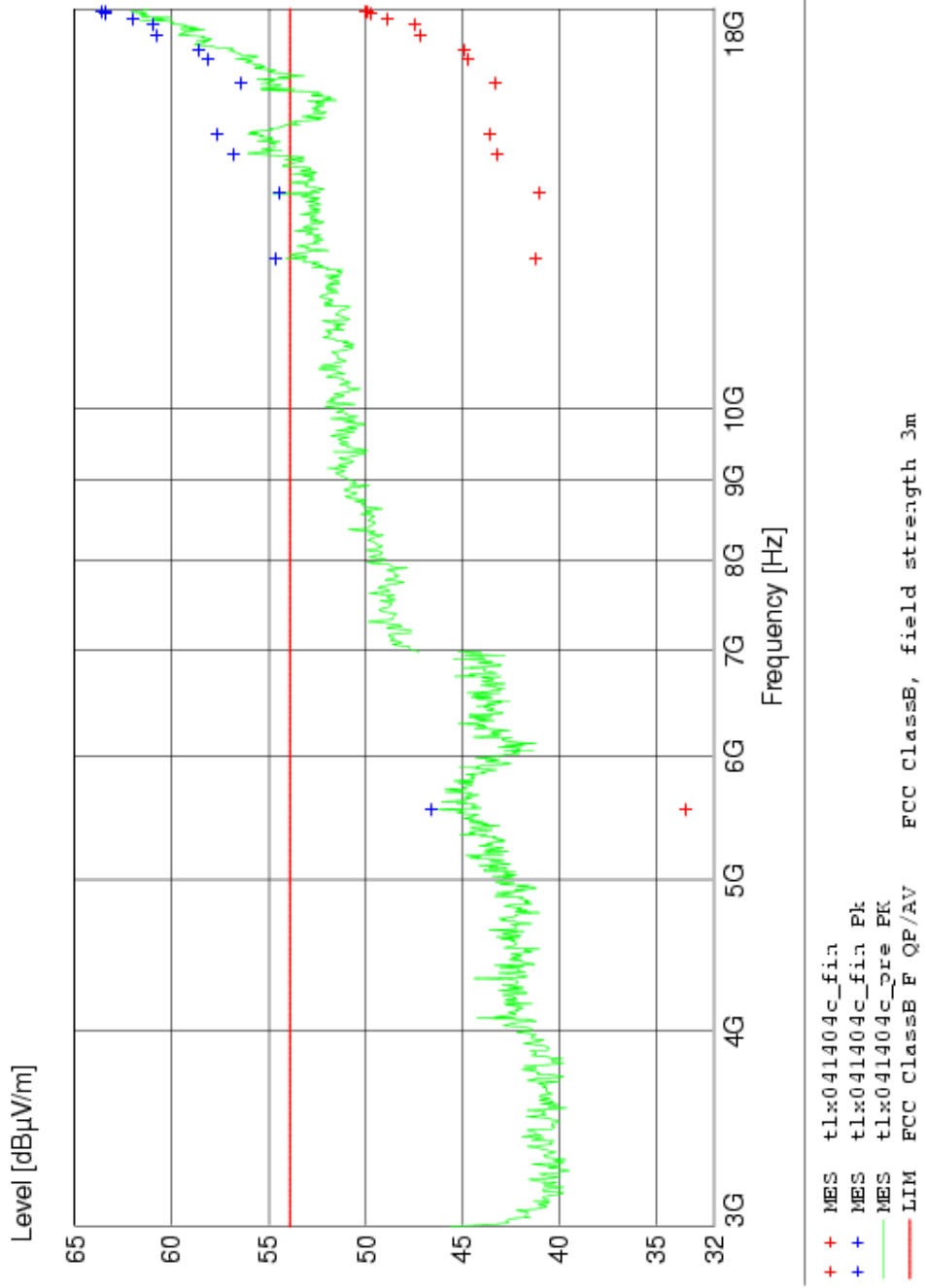


Figure 8 Radiated Emissions Plot, Channel 1

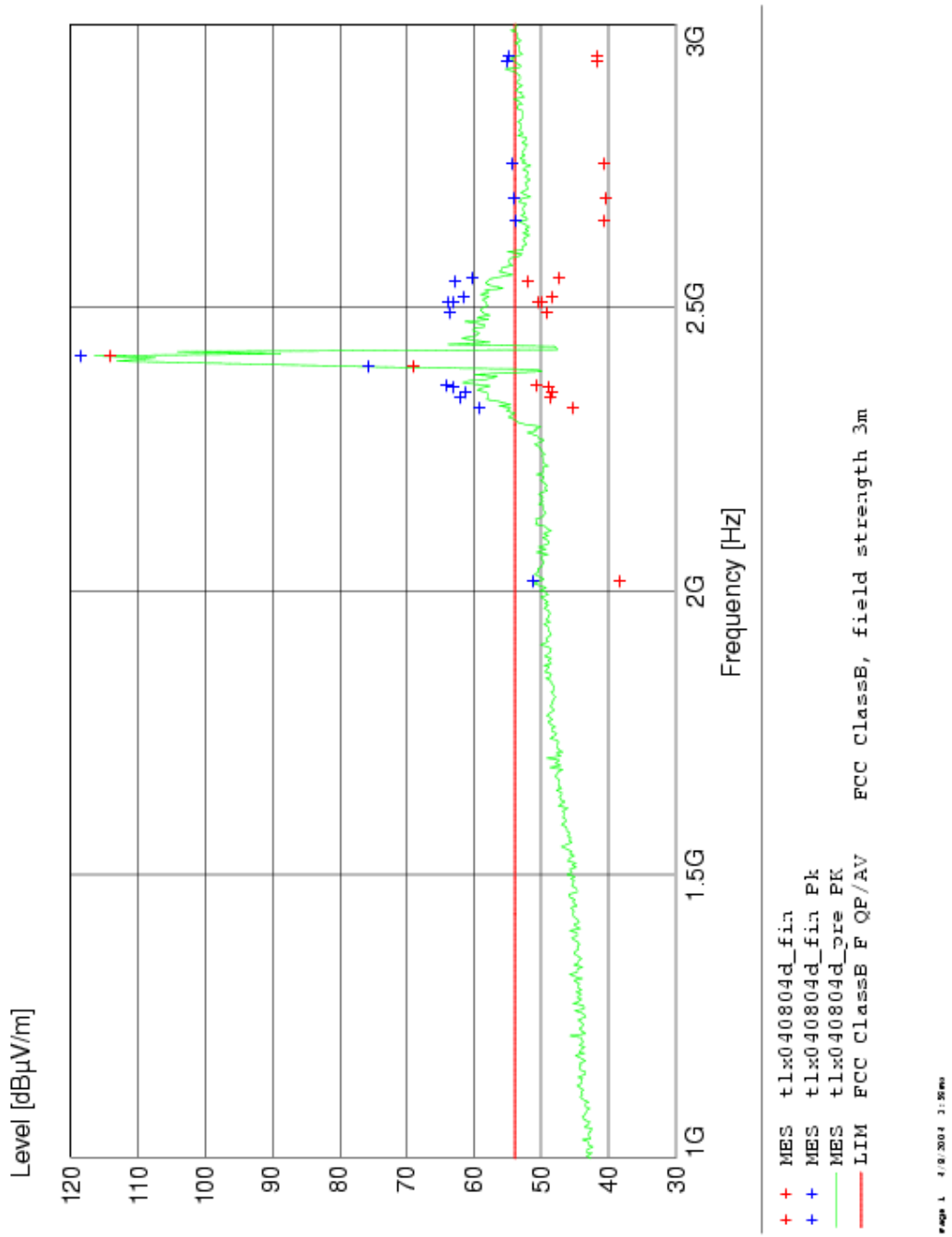


Figure 9 Radiated Emissions Plot, Channel 1

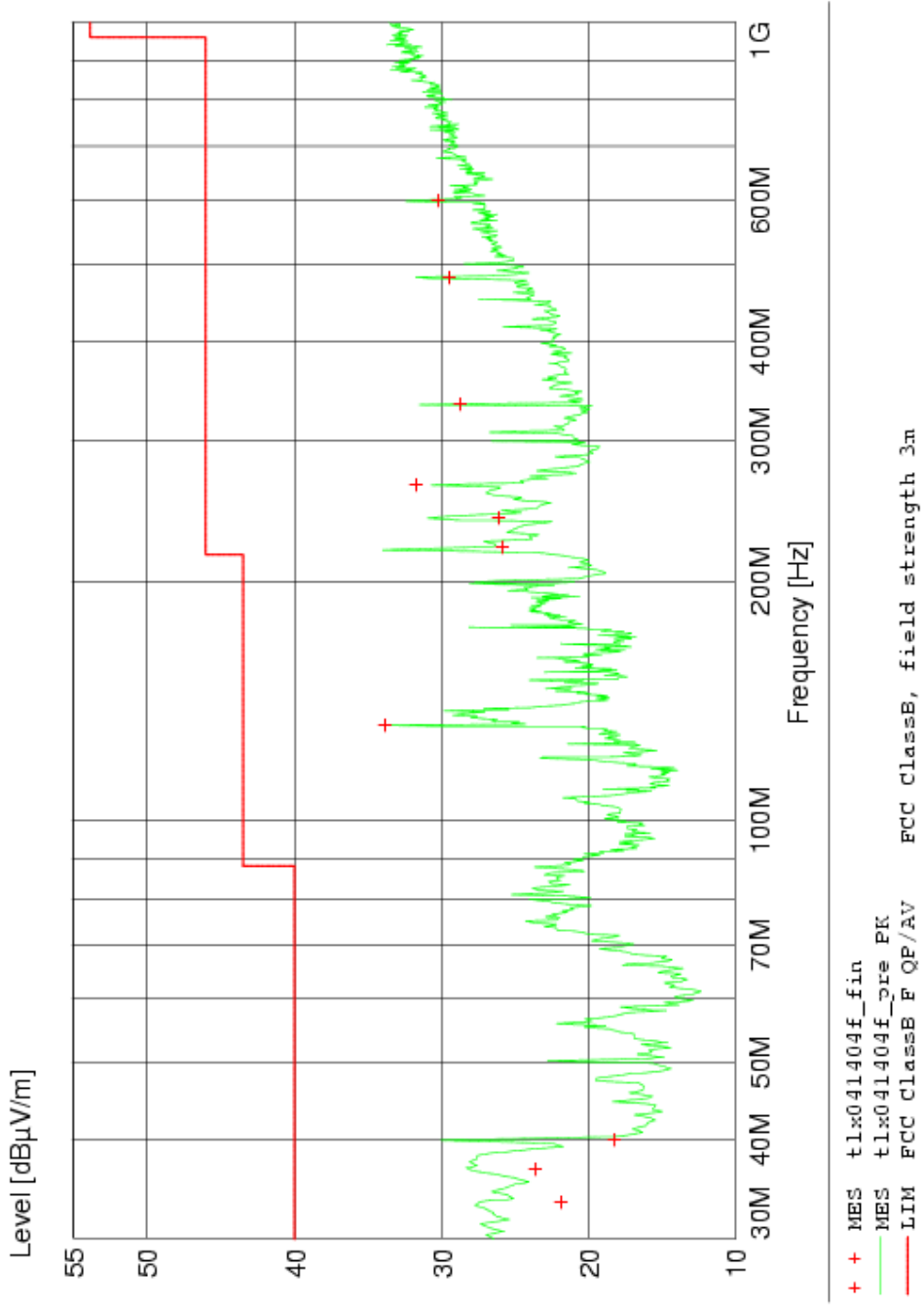


Figure 10 Radiated Emissions Plot, Channel 1

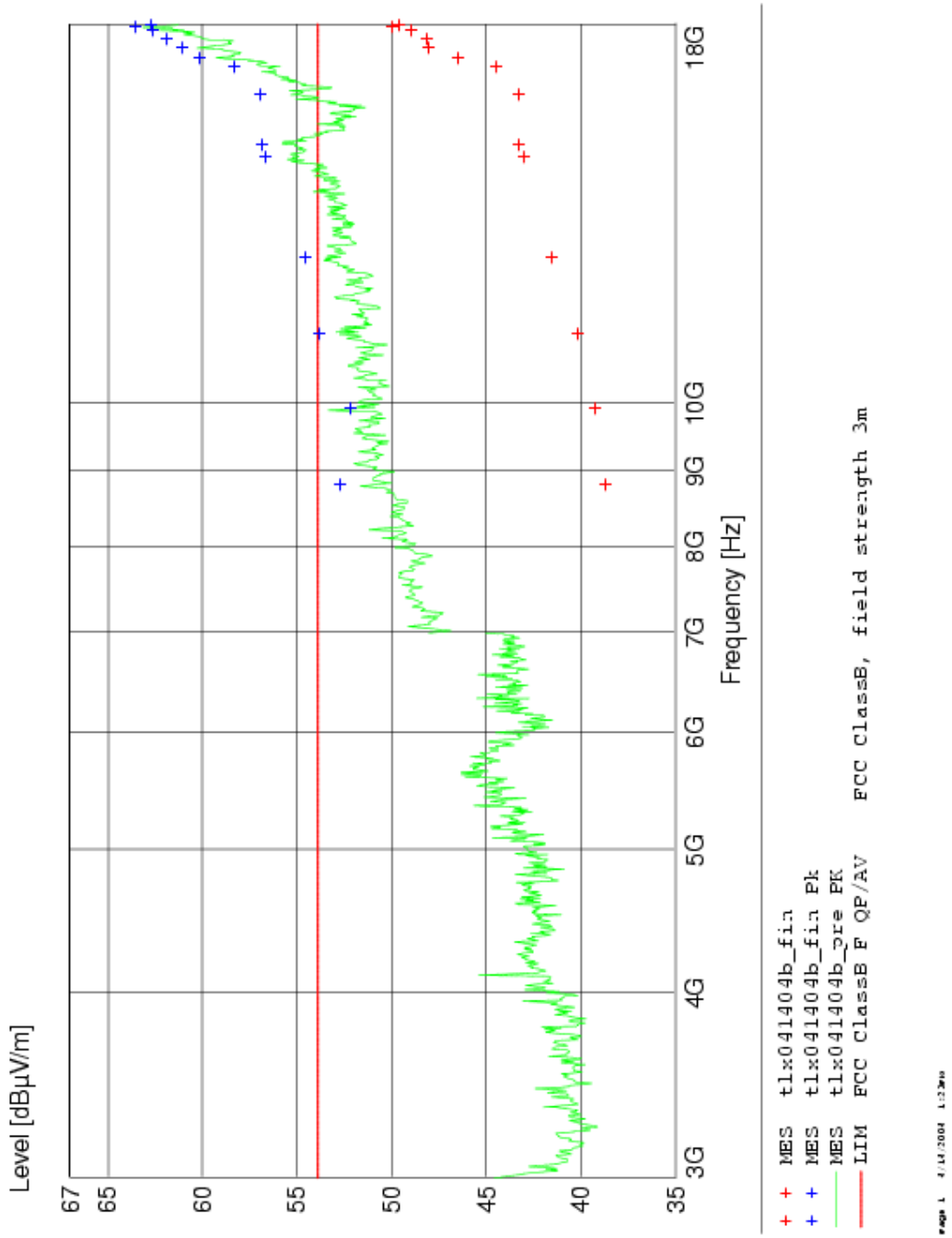


Figure 11 Radiated Emissions Plot, Channel 5

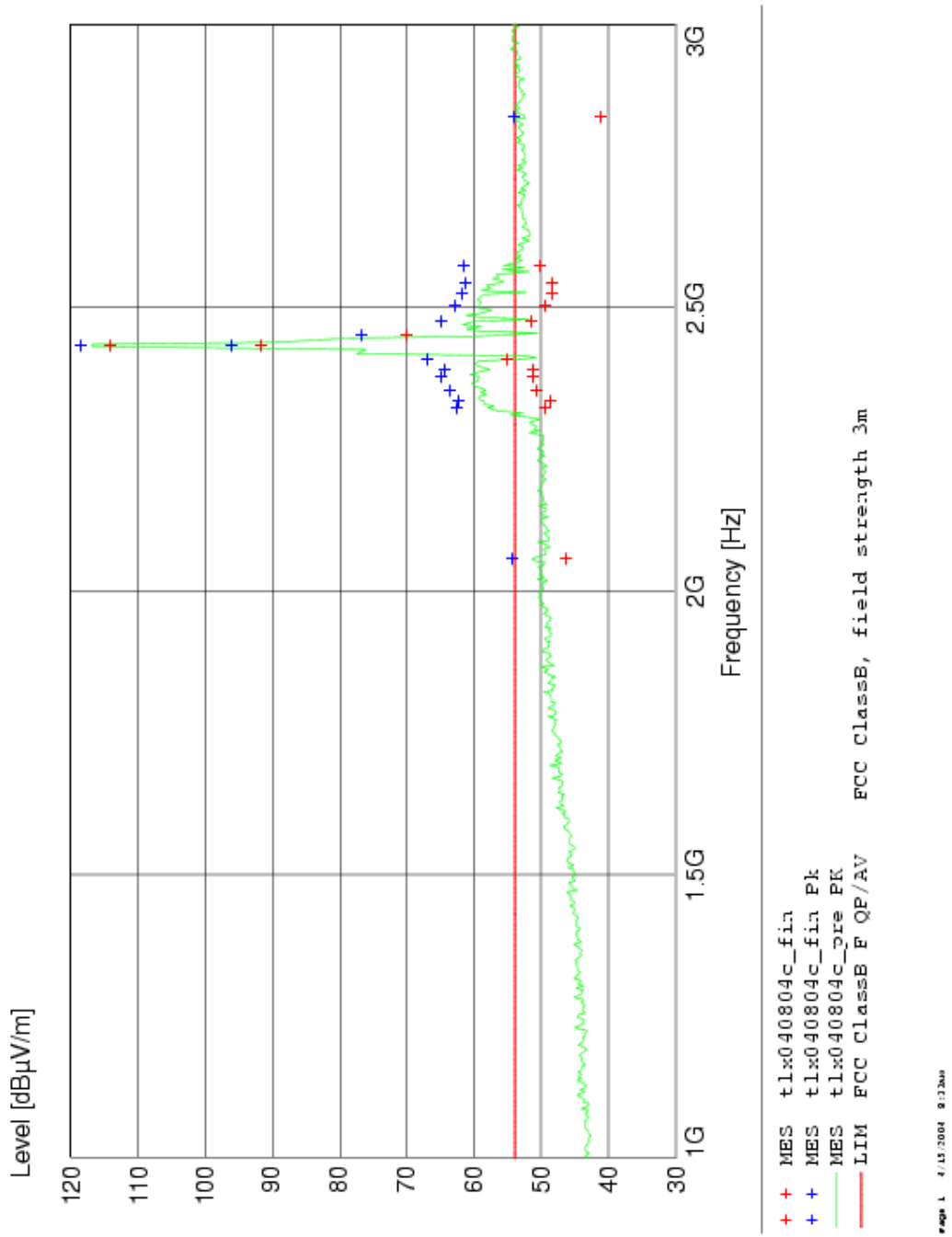


Figure 12 Radiated Emissions Plot, Channel 5

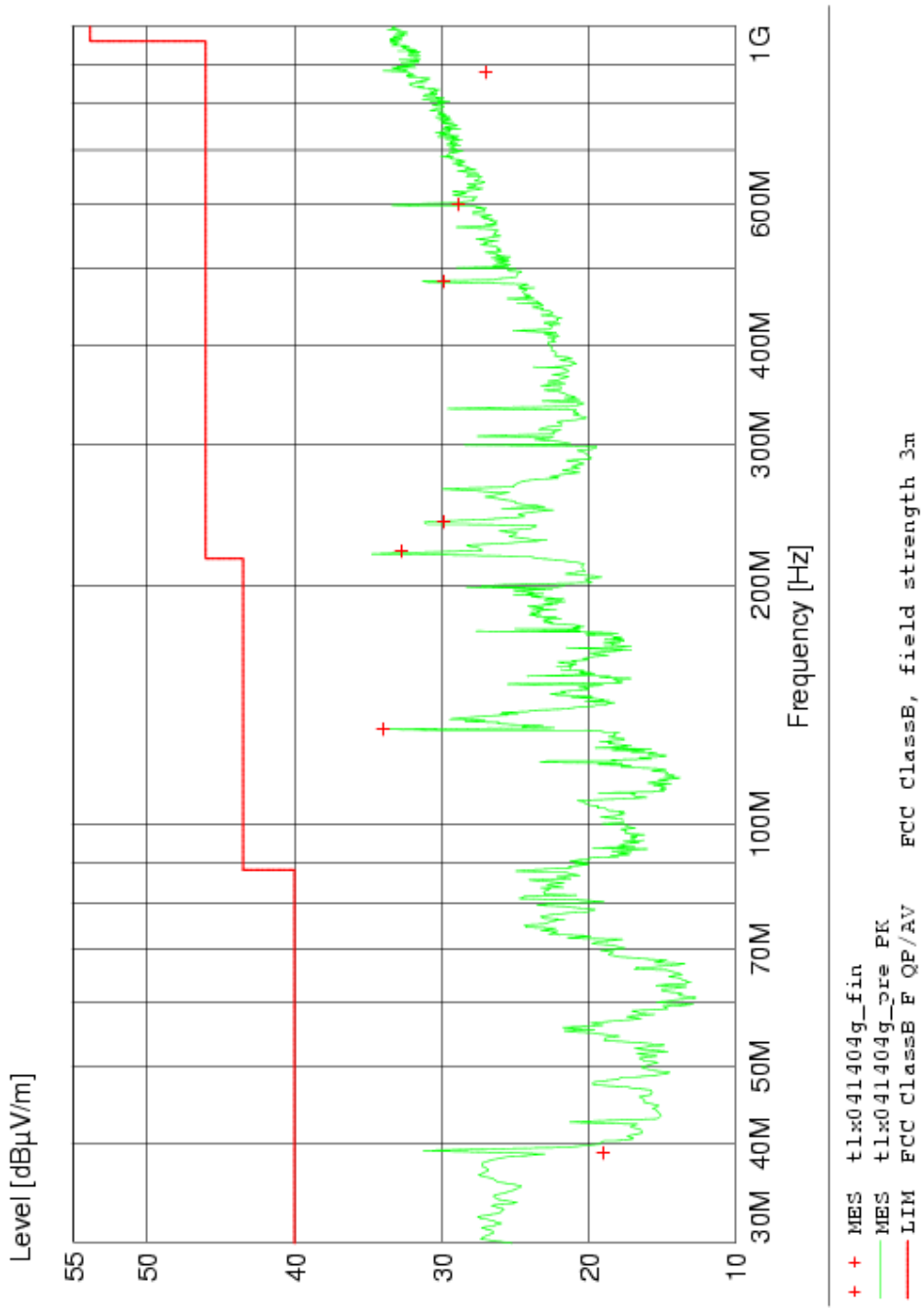


Figure 13 Radiated Emissions Plot, Channel 5

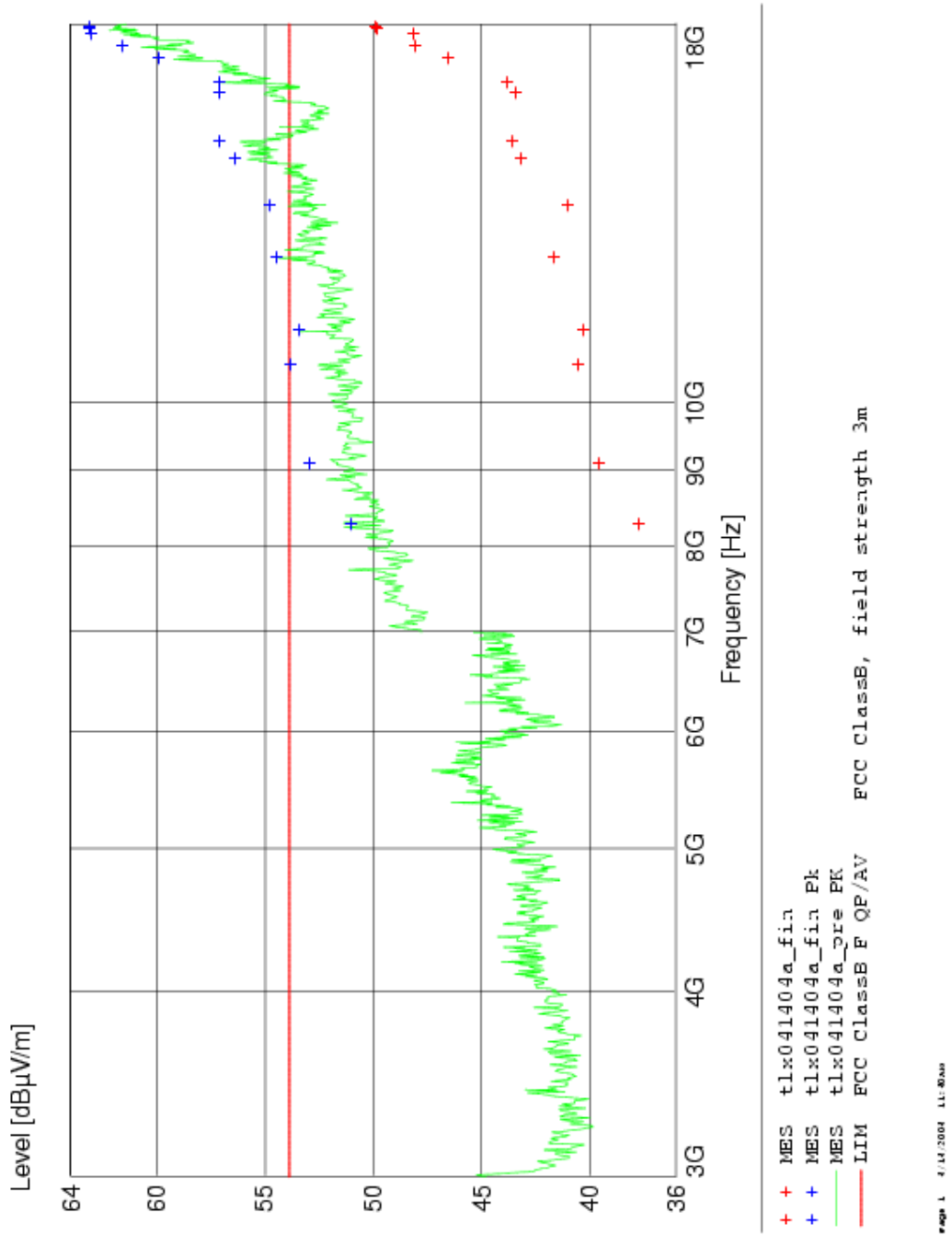


Figure 14 Radiated Emissions Plot, Channel 11

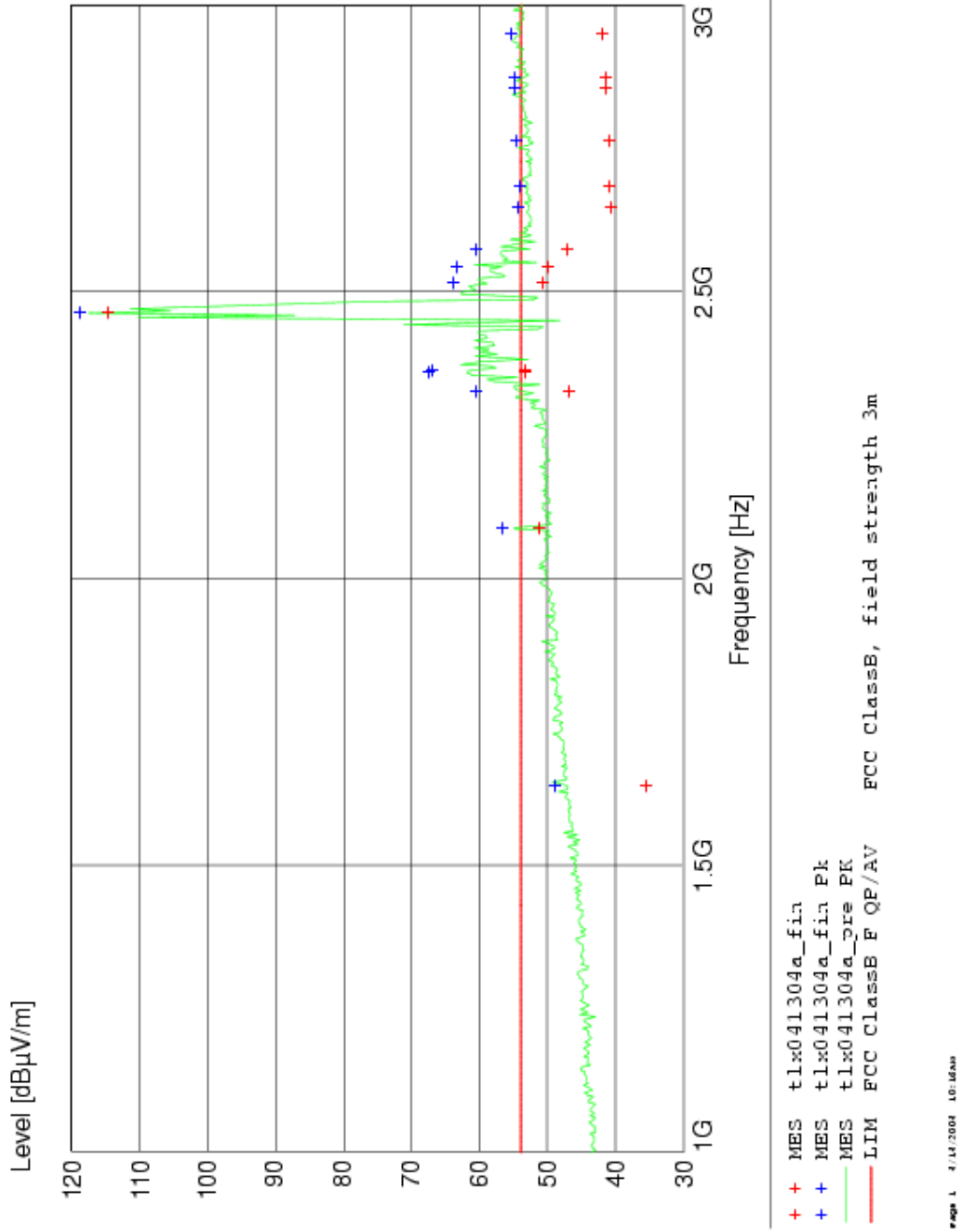


Figure 15 Radiated Emissions Plot, Channel 11

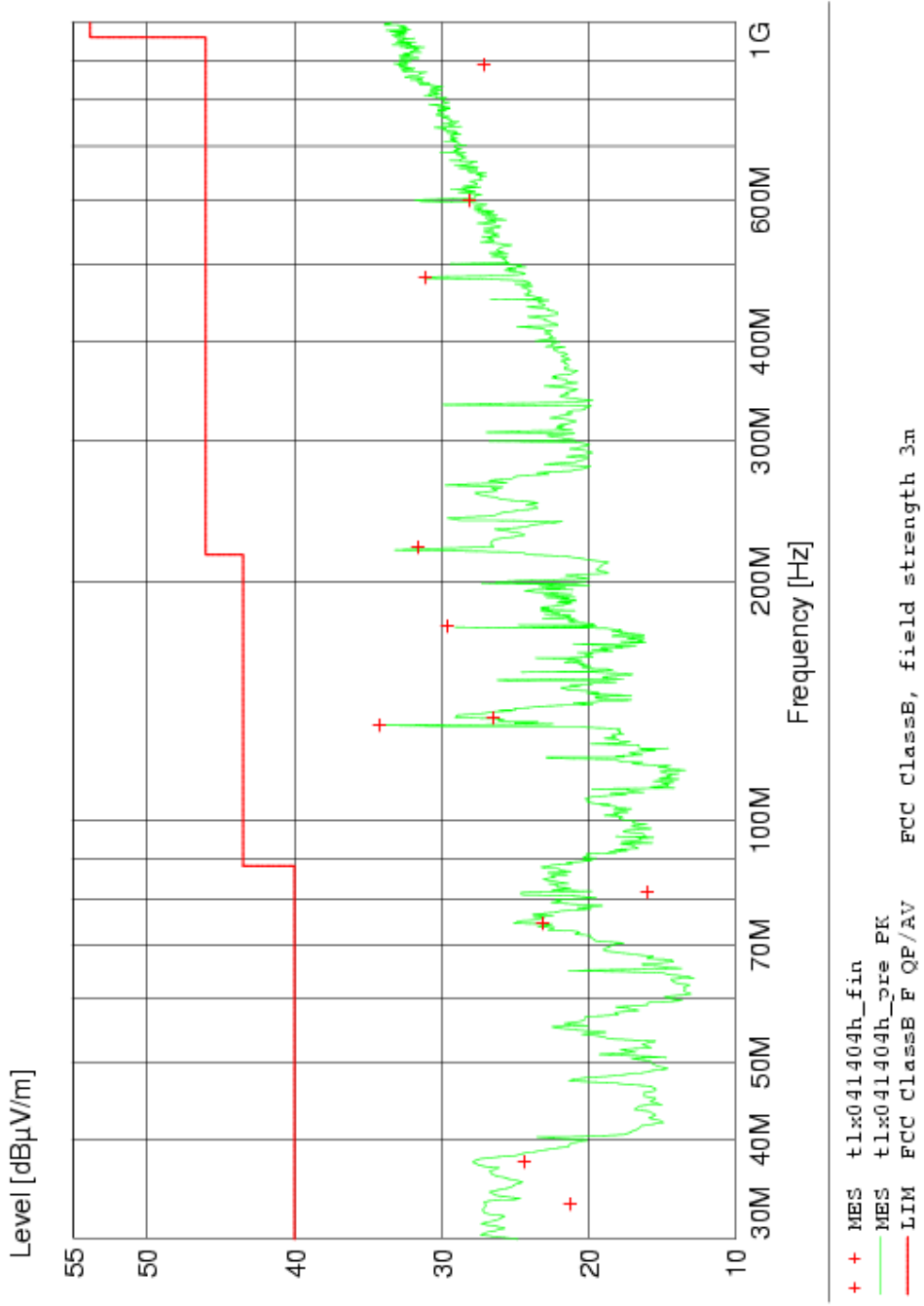


Figure 16 Radiated Emissions Plot, Channel 11

Appendix C: Emissions Results, Receive, 3-Meter Measurement Distance

Receive Only QuasiPeak Results 30M-1GHz

Frequency	Level	Measured	Transd	Cables	Limit	Margin	Height	Angle	Pol.
MHz	dB μ V/m	dB μ V	dB	dB	dB μ V/m	dB	cm	deg	
31.02	20.75	2.57	17.6	-0.6	40	19.3	98	64	VERT
37.8	21.88	7.4	13.8	-0.7	40	18.1	135	99	VERT
75	21.25	13.4	6.8	-1.1	40	18.7	351	5	HORI
132	31.76	22.82	7.4	-1.5	43.5	11.7	99	66	VERT
135.78	27.58	18.48	7.6	-1.5	43.5	15.9	101	73	VERT
198	30.99	18.51	10.7	-1.8	43.5	12.5	101	35	HORI
220.14	23.92	10.52	11.5	-1.9	46	22.1	99	127	HORI
241.98	30.9	16.68	12.2	-2	46	15.1	104	31	HORI
265.02	23.35	8.5	12.8	-2.1	46	22.6	105	40	HORI
333.36	30.57	13.36	14.9	-2.3	46	15.4	115	54	VERT
479.58	30.34	9.15	18.4	-2.8	46	15.7	99	126	VERT
599.58	30.7	7.3	20.2	-3.2	46	15.3	100	38	VERT
780.36	24.89	-1.01	22.4	-3.5	46	21.1	333	15	VERT
858	32.51	5.41	23.2	-3.9	46	13.5	122	108	HORI
901.98	36.85	8.95	23.9	-4	46	9.1	112	55	VERT
945.96	35.67	7.58	24	-4.1	46	10.3	112	83	VERT

Receive Only Average Results 1GHz - 18GHz

Frequency	Level	Measured	Transd	Cables	Limit	Margin	Height	Angle	Pol.
MHz	dB μ V/m	dB μ V	dB	dB	dB μ V/m	dB	cm	deg	
1012	25.82	26.97	26.2	27.4	53.9	28.1	100	329	HORI
1056	35.01	35.89	26.3	27.2	53.9	18.9	100	78	VERT
1100	33.92	34.69	26.4	27.2	53.9	20	99	97	VERT
1188	28.08	28.5	26.6	27.1	53.9	25.8	99	54	HORI
1408	22.21	21.98	27	26.8	53.9	31.7	120	359	HORI
4075.5	43.64	31.35	34.2	22	53.9	10.3	101	85	VERT
5702	33.66	14.66	36.5	17.5	53.9	20.2	101	87	HORI
5767.5	32.69	13.38	36.6	17.3	53.9	21.2	149	121	VERT
8151	50.03	29.73	39.2	18.9	53.9	3.9	99	129	HORI
11099.5	39.85	16.47	40.8	17.4	53.9	14.1	100	282	VERT
12487	40.7	15.99	41.3	16.6	53.9	13.2	400	21	VERT
14738	42.11	16.46	42.9	17.3	53.9	11.8	250	324	HORI
15004	42.44	16.32	43	16.9	53.9	11.5	119	0	HORI
16139.5	41.94	18.24	40.4	16.7	53.9	12	256	359	VERT
16737	42.84	16.34	42.4	15.9	53.9	11.1	349	178	VERT
17049	44.35	16.15	43.6	15.4	53.9	9.6	149	235	VERT
17407	46.14	15.57	45	14.5	53.9	7.8	358	285	HORI
17649	47.43	16.07	46.1	14.7	53.9	6.5	400	284	HORI
17821.5	48.17	15.31	46.8	14	53.9	5.7	191	358	VERT
17883	49.04	15.99	47.1	14	53.9	4.9	101	228	HORI
17892.5	49.05	15.97	47.1	14.1	53.9	4.9	350	3	VERT

Receive Only Peak Results 1GHz - 18GHz

Frequency	Level	Measured	Transd	Cables	Limit	Margin	Height	Angle	Pol.
MHz	dB μ V/m	dB μ V	dB	dB	dB μ V/m	dB	cm	deg	
1012	41.9	43.04	26.2	27.4	74	32.1	100	329	HORI
1056	45.17	46.05	26.3	27.2	74	28.8	100	78	VERT
1100	51.51	52.28	26.4	27.2	74	22.5	99	97	VERT
1188	43.41	43.83	26.6	27.1	74	30.6	99	54	HORI
1408	39.62	39.38	27	26.8	74	34.4	120	359	HORI
4075.5	48.96	36.67	34.2	22	74	25.0	101	85	VERT
5702	47.1	28.1	36.5	17.5	74	26.9	101	87	HORI
5767.5	46.26	26.95	36.6	17.3	74	27.7	149	121	VERT
8151	55.79	35.49	39.2	18.9	74	18.2	99	129	HORI
11099.5	53.09	29.71	40.8	17.4	74	20.9	100	282	VERT
12487	54.29	29.59	41.3	16.6	74	19.7	400	21	VERT
14738	55.36	29.71	42.9	17.3	74	18.6	250	324	HORI
15004	55.96	29.84	43	16.9	74	18.0	119	0	HORI
16139.5	54.96	31.28	40.4	16.7	74	19.0	256	359	VERT
16737	56.34	29.84	42.4	15.9	74	17.7	349	178	VERT
17049	57.76	29.59	43.6	15.4	74	16.2	149	235	VERT
17407	59.52	28.96	45	14.5	74	14.5	358	285	HORI
17649	60.82	29.46	46.1	14.7	74	13.2	400	284	HORI
17821.5	61.68	28.82	46.8	14	74	12.3	191	358	VERT
17883	62.5	29.46	47.1	14	74	11.5	101	228	HORI
17892.5	63.3	30.22	47.1	14.1	74	10.7	350	3	VERT

Appendix D: Emissions Results, Transmit, 3-Meter Measurement Distance

Channel 1 QuasiPeak Results 30M-1GHz

Frequency	Level	Measured	Transd	Cables	Limit	Margin	Height	Angle	Pol.
MHz	dB μ V/m	dB μ V	dB	dB	dB μ V/m	dB	cm	deg	
33.42	22.07	5.27	16.2	-0.6	40	17.9	107	328	VERT
36.66	23.77	8.7	14.4	-0.7	40	16.2	100	89	VERT
40.02	18.53	5.14	12.7	-0.7	40	21.5	249	216	VERT
132	34.07	25.13	7.4	-1.5	43.5	9.4	99	80	VERT
220.08	26.09	12.69	11.5	-1.9	46	19.9	150	136	HORI
240.06	26.28	12.18	12.1	-2	46	19.7	101	0	HORI
264	32	17.18	12.8	-2	46	14	98	31	HORI
333.36	28.89	11.69	14.9	-2.3	46	17.1	122	48	VERT
479.64	29.74	8.55	18.4	-2.8	46	16.3	102	121	VERT
600.18	30.37	6.96	20.2	-3.2	46	15.6	100	36	VERT

Channel 1 Average Results 1GHz - 18GHz

Frequency	Level	Measured	Transd	Cables	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV	dB	dB	dBµV/m	dB	cm	deg	
2017.5	38.62	3.24	29.4	-5.9	53.9	15.3	149	32	VERT
2319	45.59	9.06	30.1	-6.4	53.9	8.3	128	358	VERT
2339	48.91	12.34	30.2	-6.4	53.9	5	118	358	VERT
2349.5	48.57	11.98	30.2	-6.4	53.9	5.3	106	359	VERT
2358	49.21	12.6	30.2	-6.4	53.9	4.7	106	358	VERT
2362.5	51.18	14.56	30.2	-6.4	53.9	2.7	119	359	VERT
2394	69.22	32.53	30.3	-6.4	94.59	25.4	113	359	VERT
2413	114.59	77.81	30.3	-6.5	114.59	0.0	119	3	VERT
2490.5	49.56	12.56	30.5	-6.5	94.59	45.0	99	359	VERT
2507.5	50.65	13.6	30.5	-6.5	53.9	3.2	115	359	VERT
2508	50.33	13.27	30.5	-6.5	53.9	3.6	119	358	VERT
2519	48.74	11.6	30.6	-6.6	53.9	5.2	119	358	VERT
2547	52.28	14.93	30.7	-6.7	53.9	1.6	101	3	VERT
2552	47.68	10.3	30.7	-6.7	53.9	6.2	119	359	VERT
2651.5	40.86	3.04	31	-6.8	53.9	13	149	284	HORI
2692.5	40.76	2.72	31.2	-6.9	53.9	13.1	381	274	VERT
2753	40.84	2.4	31.3	-7.1	53.9	13.1	400	212	VERT
2932	42.01	2.89	31.9	-7.2	53.9	11.9	150	153	VERT
2942	41.97	2.77	31.9	-7.3	53.9	11.9	201	335	HORI
5531	33.59	15.39	36.4	18.2	53.9	20.3	400	30	VERT
12454	41.37	16.33	41.2	16.2	53.9	12.5	249	83	HORI
13718.5	41.18	15.78	42.2	16.8	53.9	12.7	149	113	HORI
14535.5	43.23	16.27	42.9	15.9	53.9	10.7	100	289	HORI
14952.5	43.63	16.25	43	15.6	53.9	10.3	399	164	HORI
16143.5	43.43	18.28	40.4	15.3	53.9	10.5	291	106	HORI
16708.5	44.82	16.68	42.2	14.1	53.9	9.1	237	236	HORI
16932	45.02	15.91	43.1	14	53.9	8.9	400	33	VERT
17282	47.26	15.4	44.5	12.7	53.9	6.6	249	30	VERT
17559	47.56	15.58	45.7	13.7	53.9	6.3	278	234	VERT
17703.5	48.92	16.02	46.3	13.4	53.9	5	150	4	HORI
17871.5	49.76	15.82	47	13.1	53.9	4.1	349	342	HORI
17911.5	50.07	16.01	47.2	13.2	53.9	3.8	400	202	HORI
17916.5	50.01	15.91	47.2	13.1	53.9	3.9	291	341	HORI

Channel 1 Peak Results 1GHz -
18GHz

Frequency	Level	Measured	Transd	Cables	Limit	Margin	Height	Angle	Pol.
MHz	dB μ V/m	dB μ V	dB	dB	dB μ V/m	dB	cm	deg	
2017.5	51.68	16.3	29.4	-5.9	74	22.3	149	32	VERT
2319	59.7	23.17	30.1	-6.4	74	14.3	128	358	VERT
2339	62.49	25.92	30.2	-6.4	74	11.5	118	358	VERT
2349.5	61.64	25.05	30.2	-6.4	74	12.4	106	359	VERT
2358	63.3	26.69	30.2	-6.4	74	10.7	106	358	VERT
2362.5	64.46	27.84	30.2	-6.4	74	9.5	119	359	VERT
2394	76.07	39.38	30.3	-6.4	98.8	22.7	113	359	VERT
2413	118.8	82.02	30.3	-6.5	118.8	0.0	119	3	VERT
2490.5	63.95	26.95	30.5	-6.5	98.8	34.9	99	359	VERT
2507.5	64.13	27.07	30.5	-6.5	74	9.9	115	359	VERT
2508	63.49	26.43	30.5	-6.5	74	10.5	119	358	VERT
2519	61.93	24.78	30.6	-6.6	74	12.1	119	358	VERT
2547	63.14	25.79	30.7	-6.7	74	10.9	101	3	VERT
2552	60.55	23.17	30.7	-6.7	74	13.5	119	359	VERT
2651.5	54.24	16.42	31	-6.8	74	19.8	149	284	HORI
2692.5	54.46	16.42	31.2	-6.9	74	19.5	381	274	VERT
2753	54.49	16.05	31.3	-7.1	74	19.5	400	212	VERT
2932	55.43	16.3	31.9	-7.2	74	18.6	150	153	VERT
2942	55.11	15.91	31.9	-7.3	74	18.9	201	335	HORI
5531	46.68	28.48	36.4	18.2	74	27.3	400	30	VERT
12454	54.75	29.71	41.2	16.2	74	19.3	249	83	HORI
13718.5	54.57	29.21	42.2	16.8	74	19.4	149	113	HORI
14535.5	56.93	29.96	42.9	15.9	74	17.1	100	289	HORI
14952.5	57.73	30.36	43	15.6	74	16.3	399	164	HORI
3/12/1944	56.56	31.41	40.4	15.3	74	17.4	291	106	HORI
16708.5	58.23	30.09	42.2	14.1	74	15.8	237	236	HORI
16932	58.7	29.59	43.1	14	74	15.3	400	33	VERT
17282	60.94	29.08	44.5	12.7	74	13.1	249	30	VERT
17559	61.07	29.08	45.7	13.7	74	12.9	278	234	VERT
17703.5	62.14	29.21	46.3	13.4	74	11.9	150	4	HORI
17871.5	63.52	29.59	47	13.1	74	10.5	349	342	HORI
17911.5	63.78	29.71	47.2	13.2	74	10.2	400	202	HORI
17916.5	63.55	29.46	47.2	13.1	74	10.5	291	341	HORI

Channel 5 QuasiPeak Results 30M-1GHz

Frequency	Level	Measured	Transd	Cables	Limit	Margin	Height	Angle	Pol.
MHz	dB μ V/m	dB μ V	dB	dB	dB μ V/m	dB	cm	deg	
39	19.27	5.39	13.2	-0.7	40	20.7	100	160	VERT
132	34.16	25.22	7.4	-1.5	43.5	9.3	100	83	VERT
220.02	32.91	19.51	11.5	-1.9	46	13.1	115	6	HORI
240.06	30.12	16.02	12.1	-2	46	15.9	99	30	HORI
479.64	30.11	8.92	18.4	-2.8	46	15.9	128	129	VERT
599.88	29.08	5.68	20.2	-3.2	46	16.9	119	40	VERT
880.44	27.31	-0.91	24.3	-3.9	46	18.7	358	110	VERT

Channel 5 Average Results 1GHz - 18GHz

Frequency	Level	Measured	Transd	Cables	Limit	Margin	Height	Angle	Pol.
MHz	dB μ V/m	dB μ V	dB	dB	dB μ V/m	dB	cm	deg	
2057.5	46.63	11.09	29.5	-6	53.9	7.3	191	359	VERT
2322	49.68	13.14	30.1	-6.4	53.9	4.2	115	359	VERT
2335.5	48.94	12.38	30.2	-6.4	53.9	5	100	0	VERT
2354	50.98	14.37	30.2	-6.4	53.9	2.9	115	359	VERT
2377	51.37	14.72	30.3	-6.4	53.9	2.5	119	359	VERT
2388.5	51.44	14.77	30.3	-6.4	53.9	2.5	118	359	VERT
2410	55.31	18.55	30.3	-6.4	94.42	39.1	119	3	VERT
2433	114.42	77.52	30.4	-6.5	114.42	0.0	119	359	VERT
2434	91.95	55.05	30.4	-6.5	114.42	22.5	128	110	VERT
2450	70.35	33.35	30.4	-6.6	94.42	24.1	119	358	VERT
2474.5	51.71	14.71	30.4	-6.6	94.42	42.7	115	359	VERT
2503	49.85	12.83	30.5	-6.5	53.9	4.1	119	3	VERT
2524.5	48.87	11.69	30.6	-6.6	53.9	5	119	2	VERT
2540	48.59	11.29	30.6	-6.7	53.9	5.3	119	0	VERT
2572	50.51	13.07	30.7	-6.7	53.9	3.4	106	3	VERT
2836	41.39	2.71	31.6	-7.1	53.9	12.5	400	158	VERT
8799.5	38.82	15.88	40	17.1	53.9	15.1	314	106	VERT
9900	39.39	16.02	40.7	17.3	53.9	14.5	214	232	VERT
11130	40.33	16.47	40.7	16.9	53.9	13.6	119	208	HORI
12522	41.62	16.29	41.3	16	53.9	12.3	150	73	VERT
14616.5	43.11	16.08	42.9	15.9	53.9	10.8	394	19	VERT
14905.5	43.42	16.04	43	15.6	53.9	10.5	106	260	HORI
16134	43.38	18.26	40.4	15.3	53.9	10.5	399	183	VERT
16834	44.62	16.12	42.7	14.2	53.9	9.3	250	28	VERT
17079	46.66	15.93	43.7	13	53.9	7.2	105	46	HORI
17346	48.1	16.01	44.8	12.7	53.9	5.8	250	238	HORI
17595.5	48.25	16.05	45.8	13.6	53.9	5.7	250	228	VERT
17810.5	49.13	15.32	46.8	13	53.9	4.8	169	319	HORI
17895	50.03	16.05	47.1	13.2	53.9	3.9	349	87	VERT
17953	49.74	15.43	47.4	13.1	53.9	4.2	349	218	VERT

Channel 5 Peak Results 1GHz - 18GHz

Frequency	Level	Measured	Transd	Cables	Limit	Margin	Height	Angle	Pol.
MHz	dB μ V/m	dB μ V	dB	dB	dB μ V/m	dB	cm	deg	
2057.5	54.73	19.19	29.5	-6	74	19.3	191	359	VERT
2322	62.84	26.3	30.1	-6.4	74	11.2	115	359	VERT
2335.5	62.74	26.17	30.2	-6.4	74	11.3	100	0	VERT
2354	63.93	27.33	30.2	-6.4	74	10.1	115	359	VERT
2377	65.26	28.61	30.3	-6.4	74	8.7	119	359	VERT
2388.5	64.77	28.1	30.3	-6.4	74	9.2	118	359	VERT
2410	67.33	30.57	30.3	-6.4	98.63	31.3	119	3	VERT
2433	118.63	81.73	30.4	-6.5	118.63	0.0	119	359	VERT
2434	96.29	59.38	30.4	-6.5	118.63	22.3	128	110	VERT
2450	77.12	40.12	30.4	-6.6	98.63	21.5	119	358	VERT
2474.5	65.1	28.1	30.4	-6.6	98.63	33.5	115	359	VERT
2503	63.07	26.04	30.5	-6.5	74	10.9	119	3	VERT
2524.5	62.1	24.92	30.6	-6.6	74	11.9	119	2	VERT
2540	61.54	24.24	30.6	-6.7	74	12.5	119	0	VERT
2572	61.96	24.52	30.7	-6.7	74	12	106	3	VERT
2836	54.45	15.77	31.6	-7.1	74	19.6	400	158	VERT
8799.5	52.77	29.84	40	17.1	74	21.2	314	106	VERT
9900	52.33	28.96	40.7	17.3	74	21.7	214	232	VERT
11130	53.95	30.09	40.7	16.9	74	20.1	119	208	HORI
12522	54.67	29.34	41.3	16	74	19.3	150	73	VERT
14616.5	56.74	29.71	42.9	15.9	74	17.3	394	19	VERT
14905.5	56.97	29.59	43	15.6	74	17	106	260	HORI
16134	57.05	31.93	40.4	15.3	74	17	399	183	VERT
16834	58.39	29.84	42.7	14.2	74	15.6	250	28	VERT
17079	60.19	29.46	43.7	13	74	13.8	105	46	HORI
17346	61.17	29.08	44.8	12.7	74	12.8	250	238	HORI
17595.5	62.05	29.84	45.8	13.6	74	12	250	228	VERT
17810.5	62.76	28.96	46.8	13	74	11.2	169	319	HORI
17895	63.7	29.71	47.1	13.2	74	10.3	349	87	VERT
17953	62.87	28.56	47.4	13.1	74	11.1	349	218	VERT

Channel 11 QuasiPeak Results 30M-1GHz

Frequency	Level	Measured	Transd	Cables	Limit	Margin	Height	Angle	Pol.
MHz	dB μ V/m	dB μ V	dB	dB	dB μ V/m	dB	cm	deg	
33.24	21.52	4.62	16.3	-0.6	40	18.5	101	274	VERT
37.5	24.68	10.04	14	-0.7	40	15.3	99	132	VERT
74.58	23.33	15.47	6.8	-1	40	16.7	250	157	HORI
81.6	16.2	8.22	6.9	-1.1	40	23.8	343	356	HORI
132	34.43	25.49	7.4	-1.5	43.5	9.1	100	85	VERT
135.24	26.77	17.74	7.5	-1.5	43.5	16.7	100	75	VERT
175.02	29.79	19.09	9	-1.7	43.5	13.7	172	0	HORI
220.02	31.86	18.46	11.5	-1.9	46	14.1	100	24	HORI
479.94	31.35	10.16	18.4	-2.8	46	14.6	165	80	VERT
600.06	28.31	4.91	20.2	-3.2	46	17.7	100	131	VERT
884.46	27.37	-1.01	24.5	-3.9	46	18.6	249	0	HORI

Channel 11 Average Results 1GHz - 18GHz

Frequency	Level	Measured	Transd	Cables	Limit	Margin	Height	Angle	Pol.
MHz	dB μ V/m	dB μ V	dB	dB	dB μ V/m	dB	cm	deg	
1638.5	35.74	2.59	27.9	-5.3	53.9	18.2	106	75	VERT
2087.5	51.47	15.86	29.6	-6	53.9	2.4	169	269	VERT
2327	47.22	10.68	30.1	-6.4	53.9	6.7	143	272	VERT
2356.5	53.57	16.96	30.2	-6.4	53.9	0.3	118	276	VERT
2362	53.56	16.94	30.2	-6.4	53.9	0.3	119	272	VERT
2463	114.95	77.95	30.4	-6.6	114.95	0.0	115	276	VERT
2512	50.98	13.89	30.5	-6.5	53.9	2.9	106	282	VERT
2539.5	50.34	13.04	30.6	-6.7	53.9	3.6	106	276	VERT
2572	47.41	9.96	30.7	-6.7	53.9	6.5	100	275	VERT
2646.5	41.03	3.23	31	-6.8	53.9	12.9	249	92	HORI
2683.5	41.19	3.2	31.1	-6.9	53.9	12.7	150	68	HORI
2761	41.26	2.81	31.4	-7.1	53.9	12.6	349	46	VERT
2854	41.79	2.99	31.7	-7.1	53.9	12.1	149	69	VERT
2871	41.73	2.91	31.7	-7.1	53.9	12.2	99	110	VERT
2948.5	42.23	2.99	31.9	-7.3	53.9	11.7	179	70	HORI
3003.5	42.31	2.8	32.1	-7.4	53.9	11.6	347	3	VERT
8267.5	37.8	16.51	39.3	18	53.9	16.1	178	30	VERT
9101.5	39.66	16.06	40.4	16.8	53.9	14.2	250	167	VERT
10599.5	40.58	16.25	40.6	16.3	53.9	13.3	256	224	VERT
11162.5	40.39	16.55	40.7	16.9	53.9	13.5	301	141	VERT
12516.5	41.7	16.31	41.3	15.9	53.9	12.2	100	348	VERT
13553.5	41.11	15.55	42.2	16.6	53.9	12.8	227	154	HORI
14572	43.29	16.26	42.9	15.9	53.9	10.6	155	14	HORI
14984.5	43.63	16.26	43	15.6	53.9	10.3	99	129	HORI
16162.5	43.55	18.35	40.5	15.3	53.9	10.4	99	30	VERT
16439	43.86	17.85	41.2	15.2	53.9	10	130	315	VERT
17068	46.59	16.04	43.7	13.1	53.9	7.3	350	41	VERT
17371.5	48.17	16.03	44.9	12.8	53.9	5.7	249	106	VERT
17696.5	48.25	15.35	46.3	13.4	53.9	5.7	249	336	HORI
17867.5	49.86	15.93	47	13.1	53.9	4	400	124	VERT
17924.5	50.03	15.89	47.3	13.1	53.9	3.9	337	224	VERT

Channel 11 Peak Results 1GHz - 18GHz

Frequency	Level	Measured	Transd	Cables	Limit	Margin	Height	Angle	Pol.
MHz	dB μ V/m	dB μ V	dB	dB	dB μ V/m	dB	cm	deg	
1638.5	49.2	16.05	27.9	-5.3	74	24.8	106	75	VERT
2087.5	57.01	21.4	29.6	-6	74	17	169	269	VERT
2327	60.65	24.11	30.1	-6.4	74	13.4	143	272	VERT
2356.5	67.69	31.09	30.2	-6.4	74	6.3	118	276	VERT
2362	67.19	30.57	30.2	-6.4	74	6.8	119	272	VERT
2463	119.16	82.16	30.4	-6.6	119.16	0.0	115	276	VERT
2512	64.29	27.2	30.5	-6.5	74	9.7	106	282	VERT
2539.5	63.73	26.43	30.6	-6.7	74	10.3	106	276	VERT
2572	60.75	23.3	30.7	-6.7	74	13.3	100	275	VERT
2646.5	54.72	16.93	31	-6.8	74	19.3	249	92	HORI
2683.5	54.41	16.42	31.1	-6.9	74	19.6	150	68	HORI
2761	54.87	16.42	31.4	-7.1	74	19.1	349	46	VERT
2854	55.19	16.42	31.7	-7.1	74	18.8	149	69	VERT
2871	55.11	16.3	31.7	-7.1	74	18.9	99	110	VERT
2948.5	55.8	16.55	31.9	-7.3	74	18.2	179	70	HORI
3003.5	56.06	16.55	32.1	-7.4	74	17.9	347	3	VERT
8267.5	51.12	29.84	39.3	18	74	22.9	178	30	VERT
9101.5	53.07	29.46	40.4	16.8	74	20.9	250	167	VERT
10599.5	53.92	29.59	40.6	16.3	74	20.1	256	224	VERT
11162.5	53.55	29.71	40.7	16.9	74	20.5	301	141	VERT
12516.5	54.6	29.21	41.3	15.9	74	19.4	100	348	VERT
13553.5	54.89	29.34	42.2	16.6	74	19.1	227	154	HORI
14572	56.49	29.46	42.9	15.9	74	17.5	155	14	HORI
14984.5	57.21	29.84	43	15.6	74	16.8	99	129	HORI
16162.5	57.25	32.06	40.5	15.3	74	16.8	99	30	VERT
16439	57.29	31.28	41.2	15.2	74	16.7	130	315	VERT
17068	60.01	29.46	43.7	13.1	74	14	350	41	VERT
17371.5	61.72	29.59	44.9	12.8	74	12.3	249	106	VERT
17696.5	63.1	30.22	46.3	13.4	74	10.9	249	336	HORI
17867.5	63.26	29.34	47	13.1	74	10.7	400	124	VERT
17924.5	63.22	29.08	47.3	13.1	74	10.8	337	224	VERT

Appendix E: Sample Calculation

Field Strength Calculation

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

$$FS = RA + AF - (-CF + AG) + AV$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

AV = Averaging Factor (if applicable)

Assume a receiver reading of 55 dB μ V is obtained. The Antenna Factor of 12 and a Cable Factor of 1.1 is added. The Amplifier Gain of 20 dB is subtracted, giving a field strength of 48.1 dB μ V/m.

$$FS = 55 + 12 - (-1.1 + 20) + 0 = 48.1 \text{ dB}\mu\text{V/m}$$

The 48.1 dB μ V/m value can be mathematically converted to its corresponding level in μ V/m.

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm} [(48.1 \text{ dB}\mu\text{V/m})/20] = 254.1 \mu\text{V/m}$$

Appendix F: Bandedge and Conducted Power Measurements

This appendix contains information about the signal of interest in relation to the restricted bands of 2.31GHz to 2.39GHz and 2.4835GHz to 2.5GHz. The following tables show the calculated restricted band values based on the measured radiated and conducted values from the EUT. Calculated values are denoted by an ‘*’. The figures referenced in the table below denote the plot from which the measured value is taken.

Radiated		Radiated		
Channel	Peak (dBuV/m)	Fig.	Average (dBuV/m)	Fig.
1	122.56	17	117.67	18
11	121.96	23	117.47	24
Conducted Peak				
Channel	100kHz RBW (dBm)	Fig.	RestBand (dBm)	Fig.
1	1.4	19	-54.88	19
11	0.54	25	-56.6	25
Conducted Average				
Channel	100kHz RBW (dBm)	Fig.	RestBand (dBm)	Fig.
1	-7.41	20	-62.38	20
11	-7.83	26	-68.19	26
Delta dB*				
Channel	Peak (dB)	Average (dB)		
1	56.28	54.97		
11	57.14	60.36		
Mhz from BandEdge				
Channel	Peak (Mhz)	Average (Mhz)		
1	0.10	0.30		
11	0.70	0.09		
BW Delta dB (1MHz vs 100kHz)*				
Channel	Peak (dB)	Average (dB)		
1	4.89	8.94		
11	4.85	8.88		
Restricted Band Calculated Values (dBuV/m)*				
Channel	Peak	Average		
1	61.39	53.76		
11	59.97	48.23		

Channel	100kHz RBW (dBm)	Fig.	RestBand (dBm)	Fig.	Freq (Ghz)	1MHz RBW(dBm)
1	1.4	19	-54.88	19	2.3899	6.29
11	0.54	25	-56.6	25	2.4842	5.39
Conducted Average						
Channel	100kHz RBW (dBm)	Fig.	RestBand (dBm)	Fig.	Freq (Ghz)	1MHz RBW (dBm)
1	-7.41	20	-62.38	20	2.3897	1.53
11	-7.83	26	-68.19	26	2.4836	1.05

Restricted Bands		
Freq (Ghz)		
	Minimum	Maximum
Lower	2.3100	2.3900
Upper	2.4835	2.5000

Limits (dBuV/m)	
Average	54
Peak	74

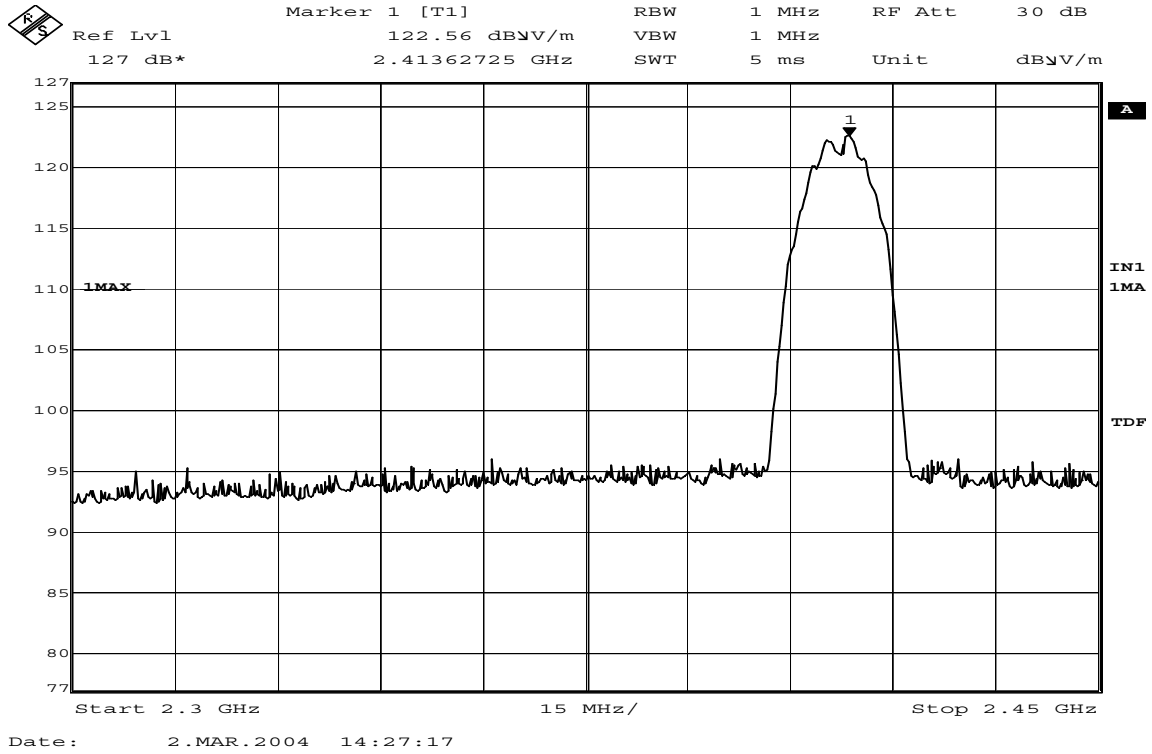


Figure 17 Radiated Peak Plot, Channel 1

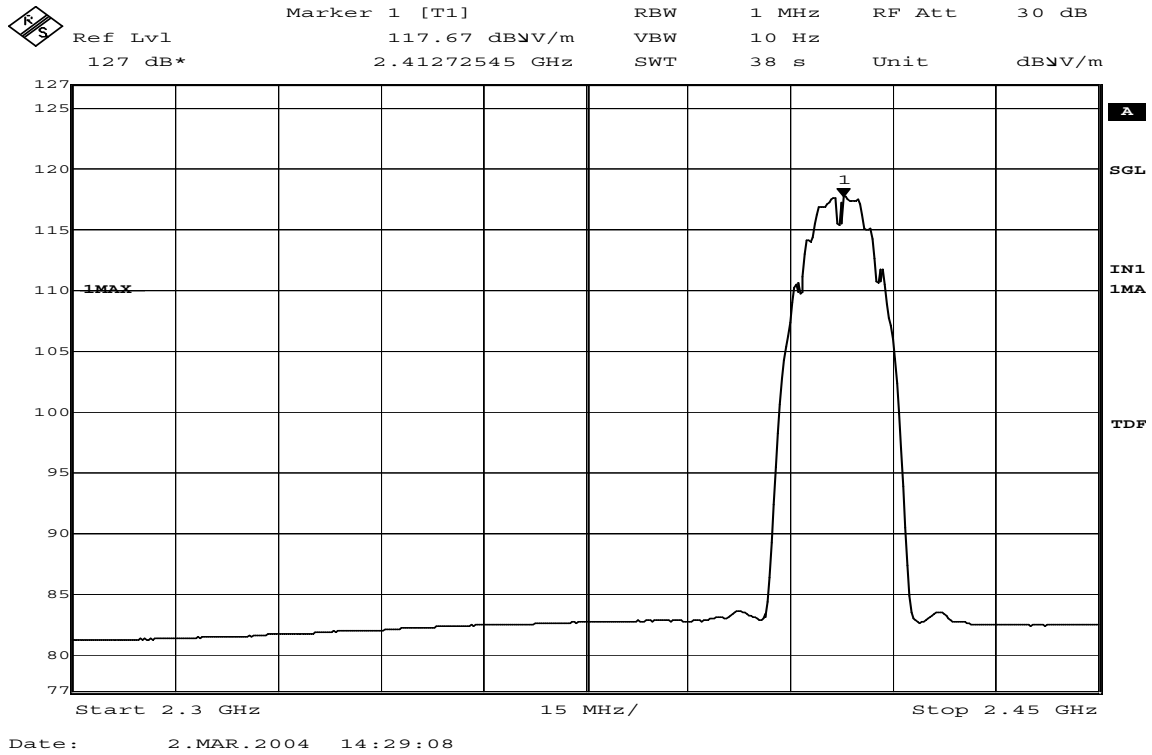


Figure 18 Radiated Average Plot, Channel 1

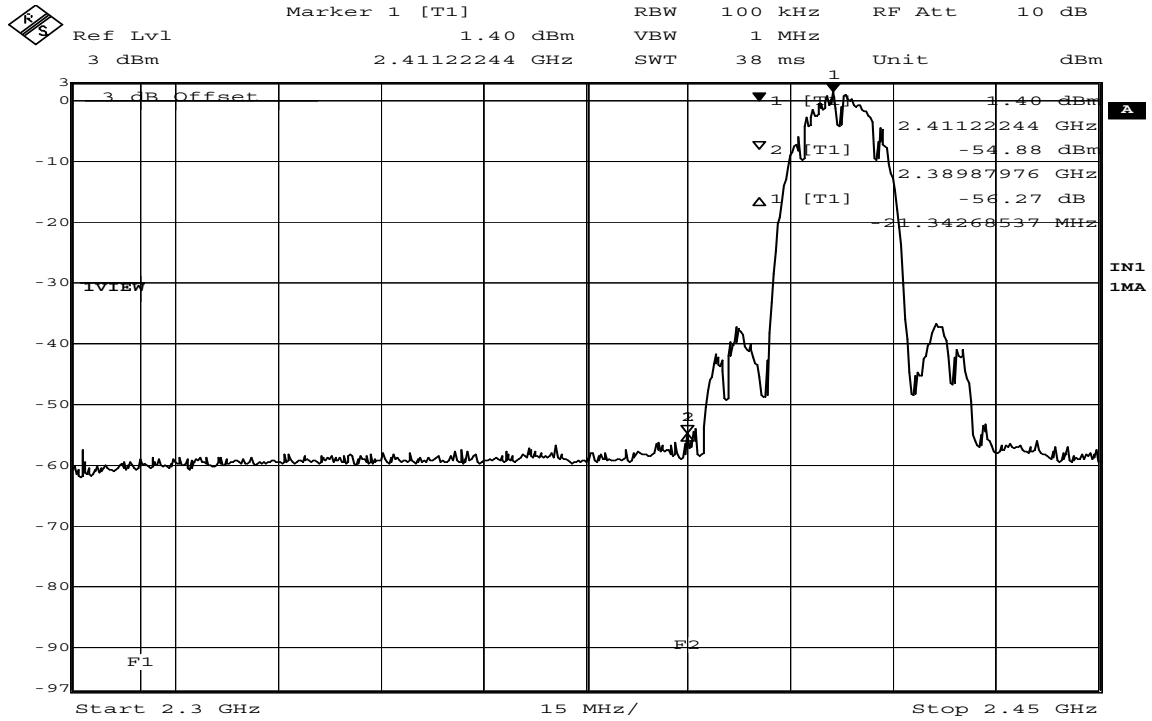


Figure 19 Conducted Peak Plot, Channel 1, RBW=100kHz

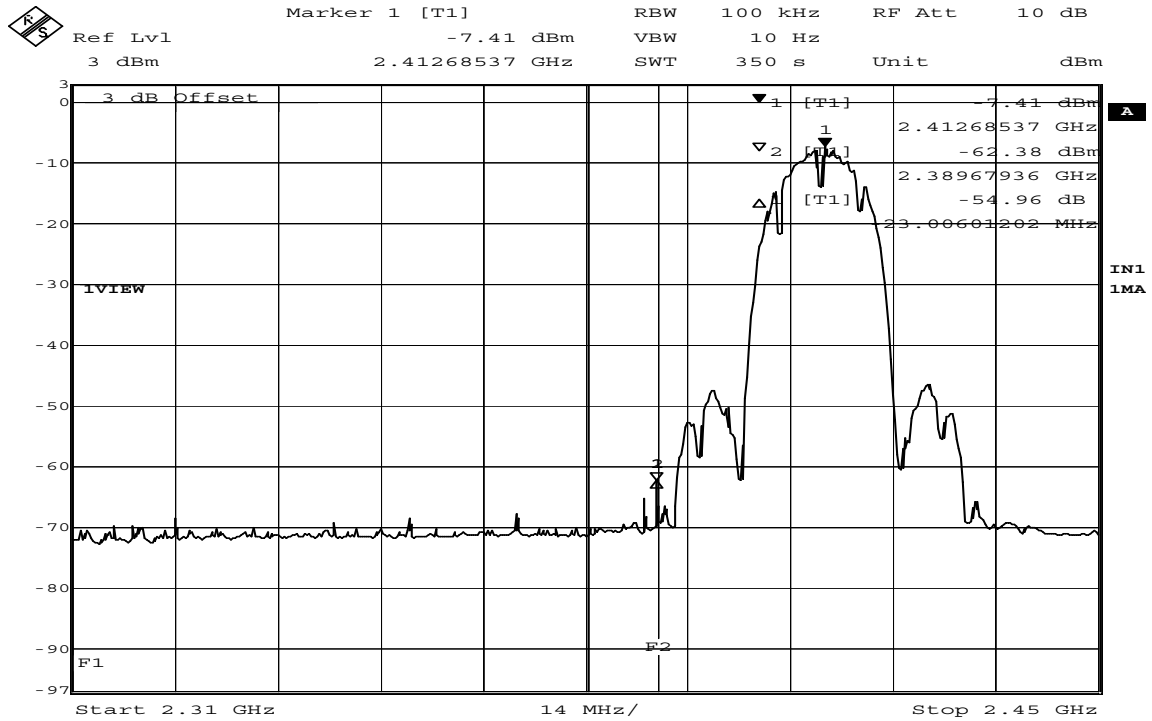


Figure 20 Conducted Average Plot, Channel 1, RBW=100kHz

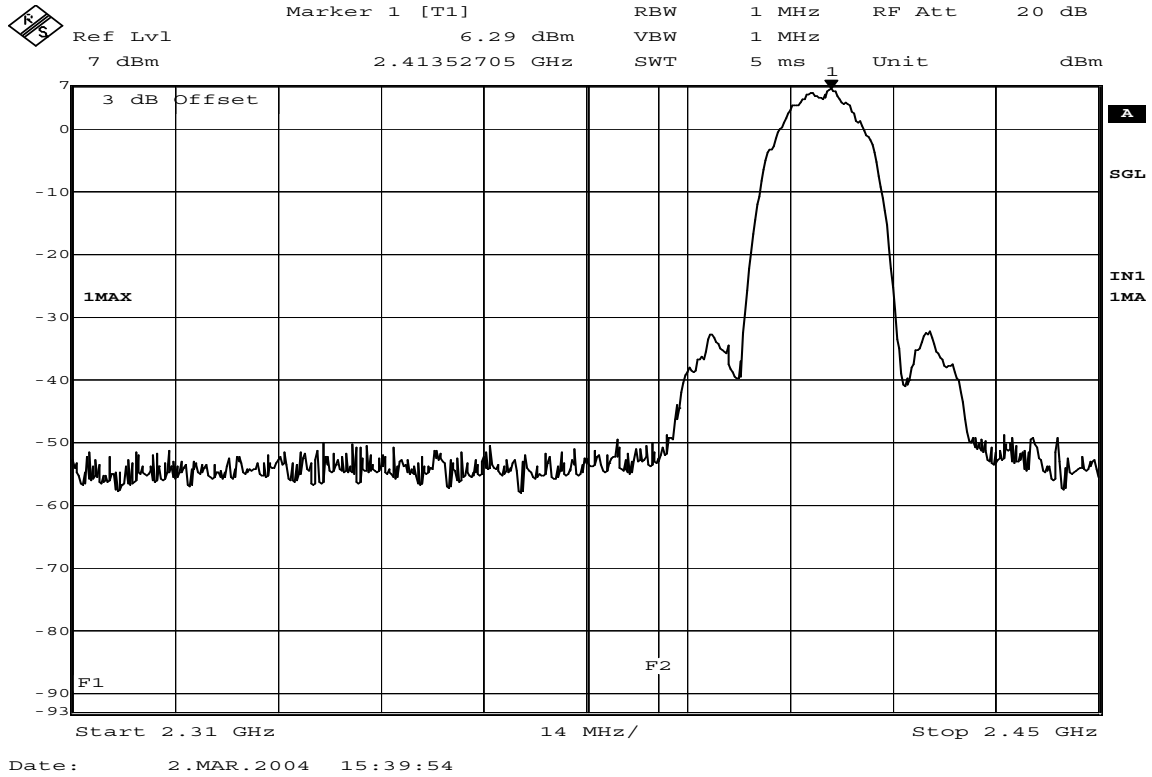


Figure 21 Conducted Peak Plot, Channel 1, RBW=1MHz

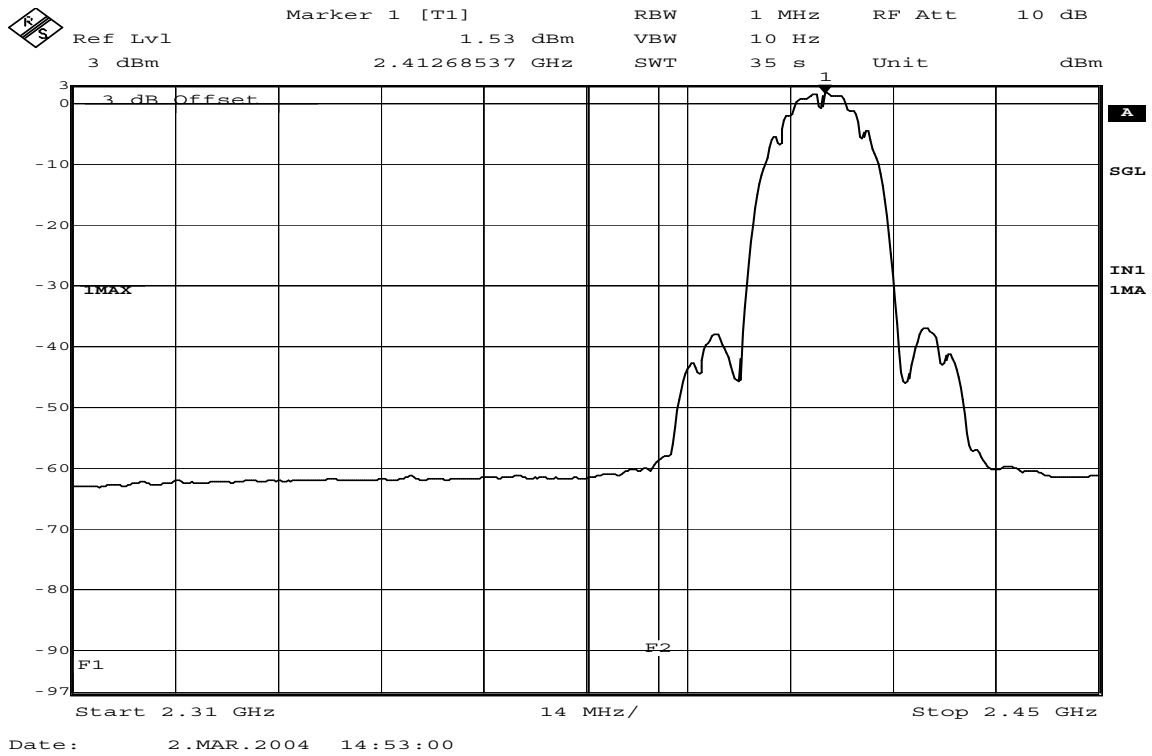


Figure 22 Conducted Average Plot, Channel 1, RBW=1MHz

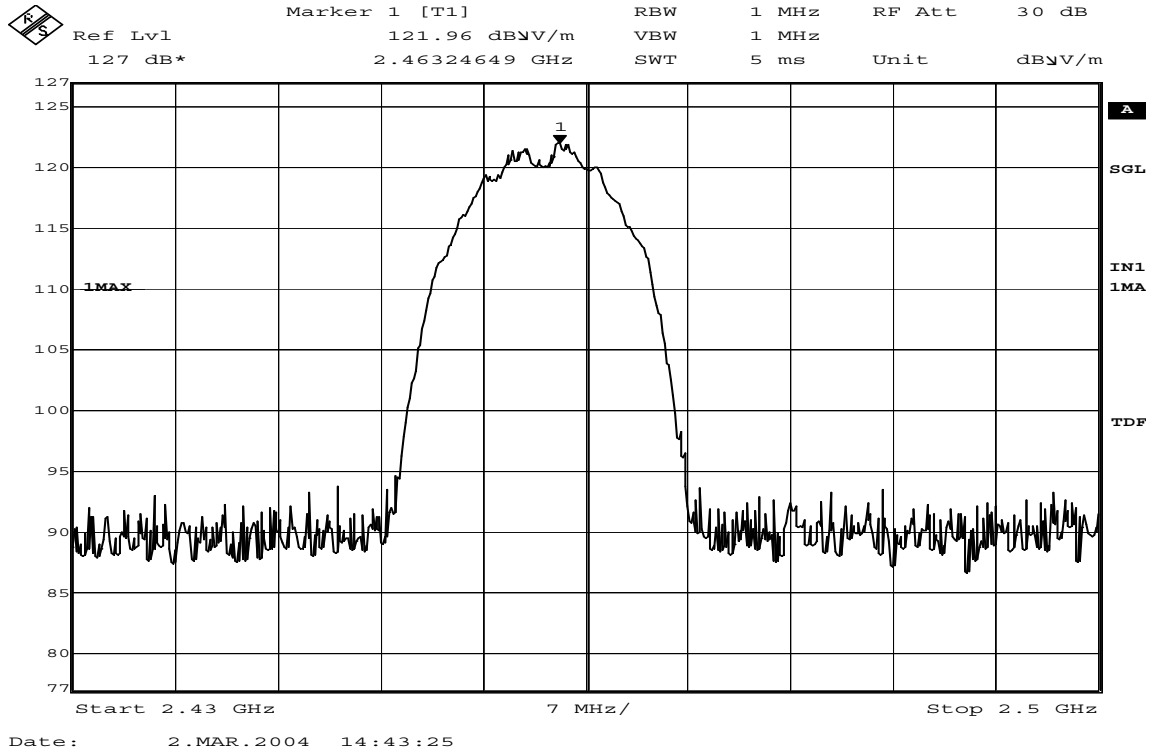


Figure 23 Radiated Peak Plot, Channel 11

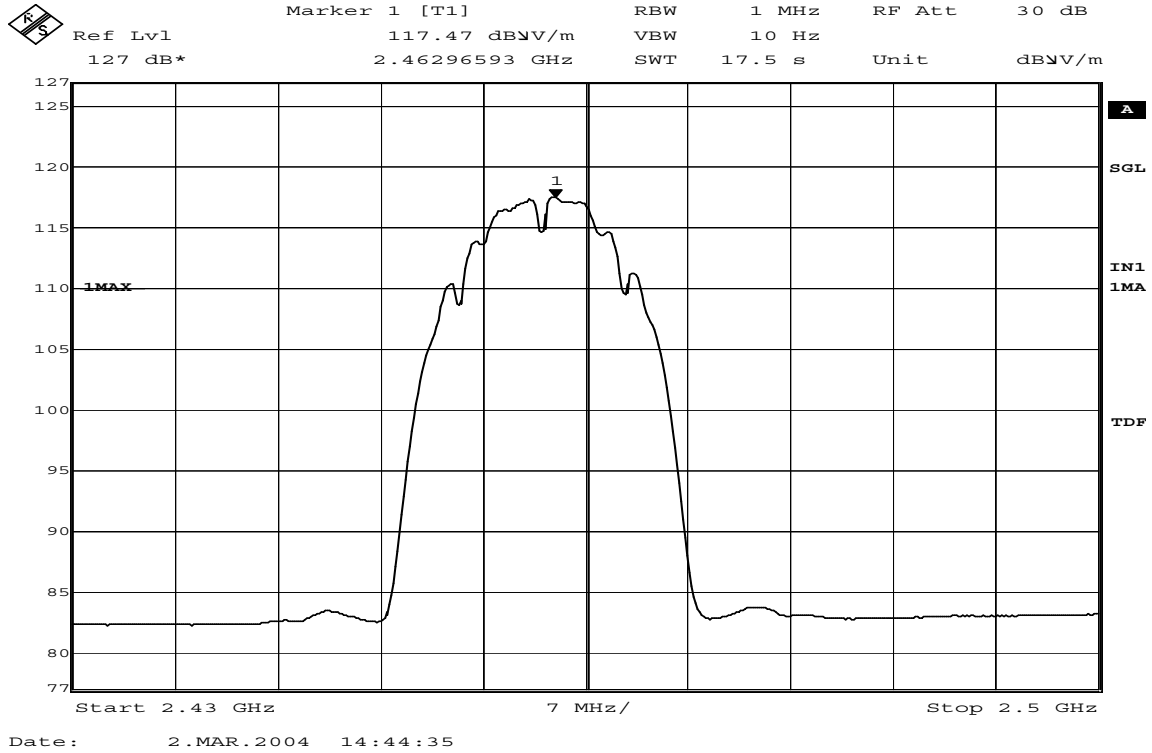


Figure 24 Radiated Average Plot, Channel 11

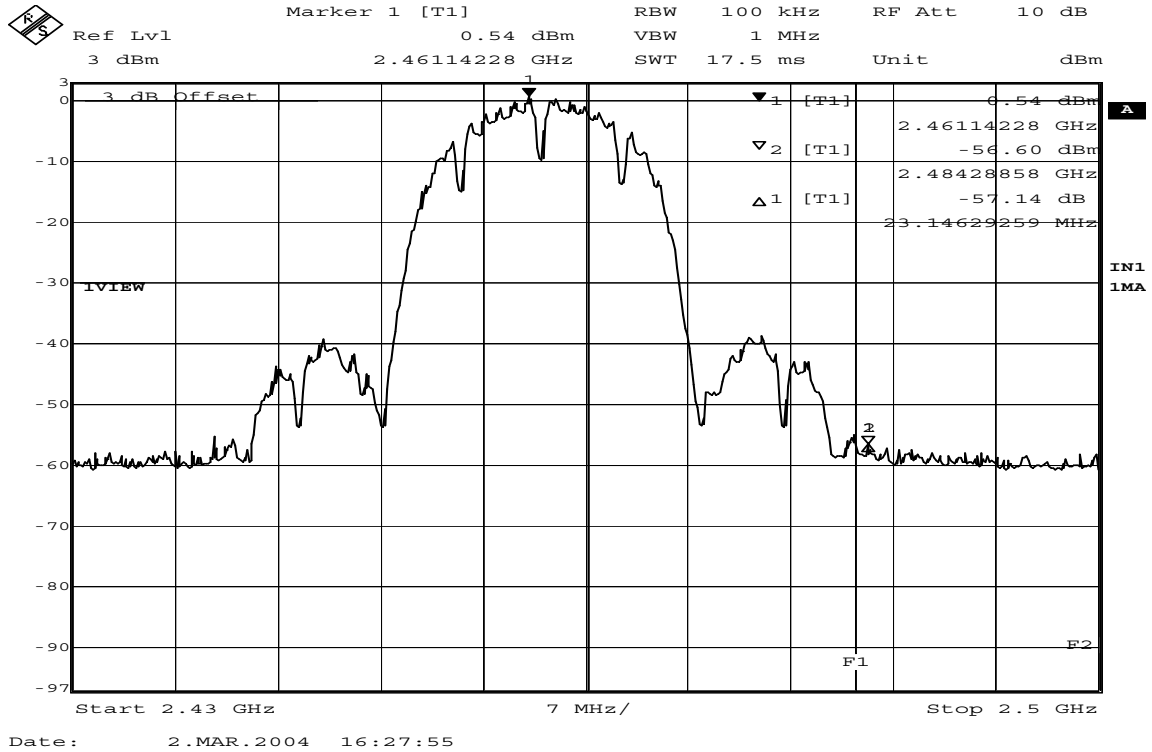


Figure 25 Conducted Peak Plot, Channel 11, RBW=100kHz

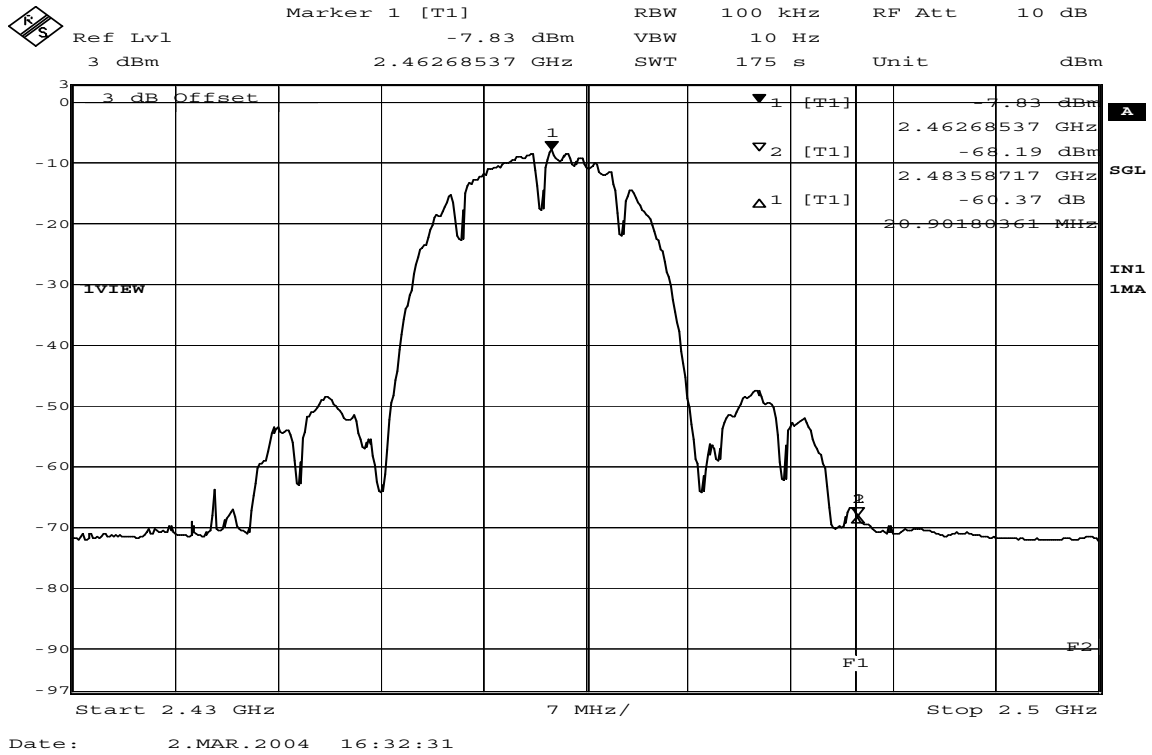


Figure 26 Conducted Average Plot, Channel 11, RBW=100kHz

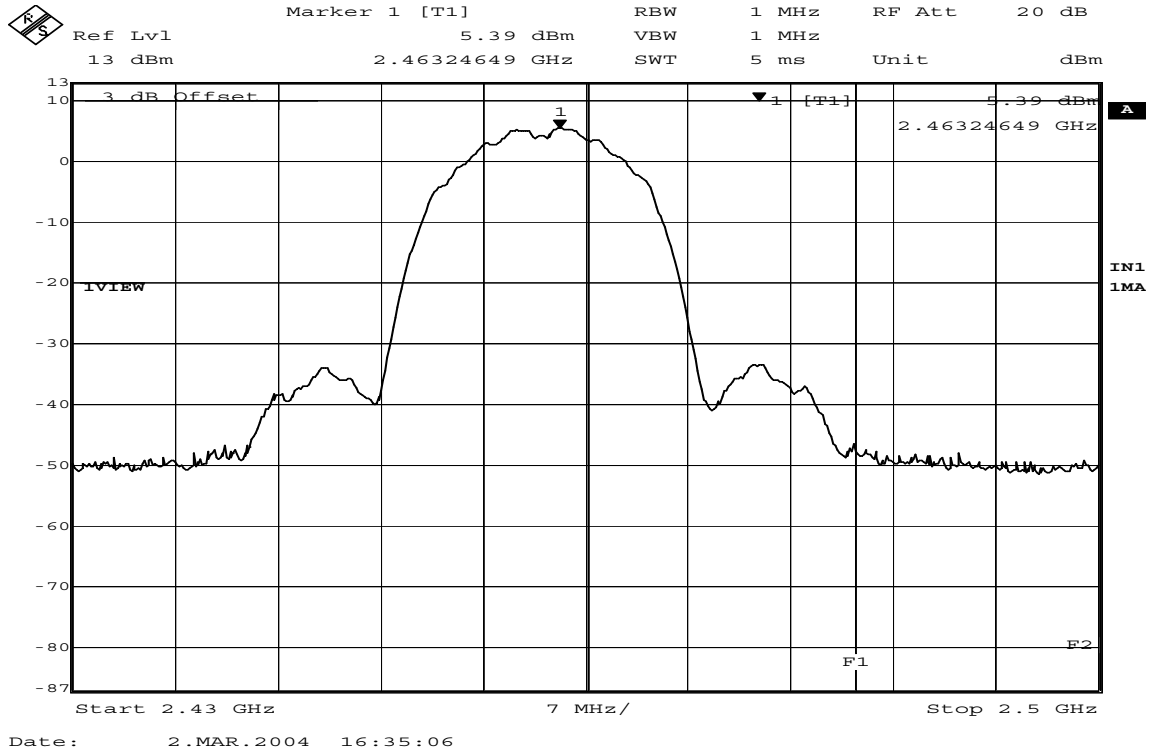


Figure 27 Conducted Peak Plot, Channel 11, RBW=1MHz

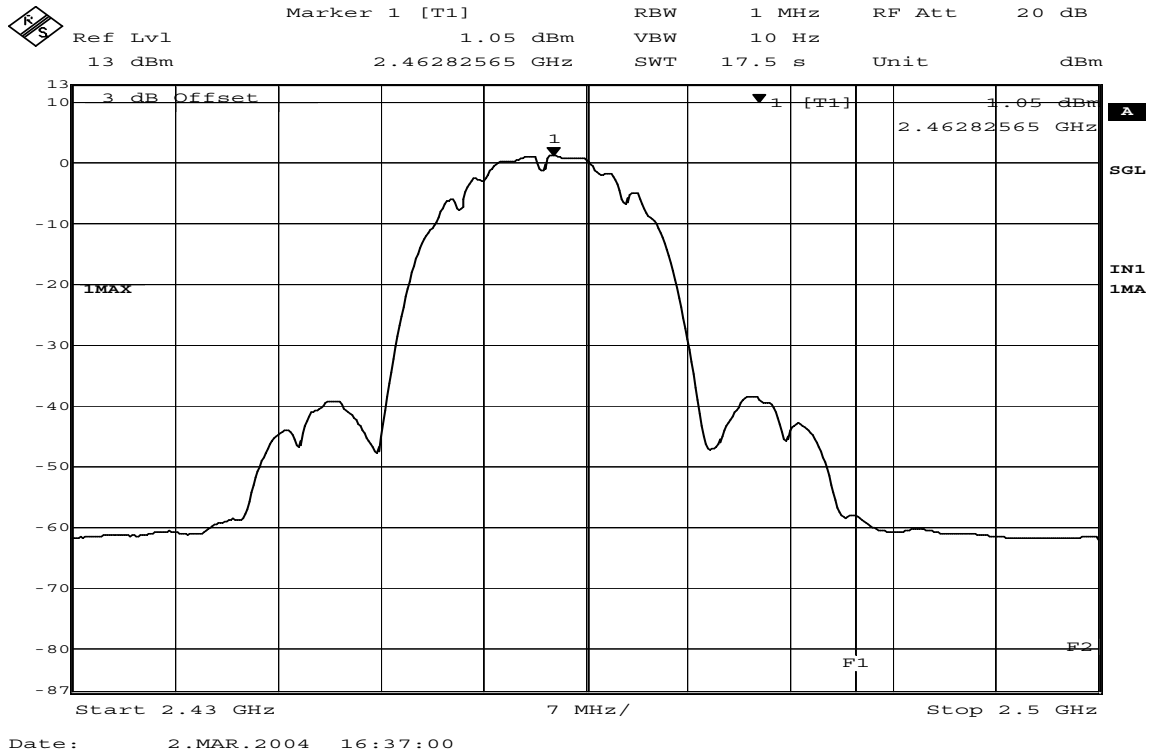


Figure 28 Conducted Average Plot, Channel 11, RBW=1MHz

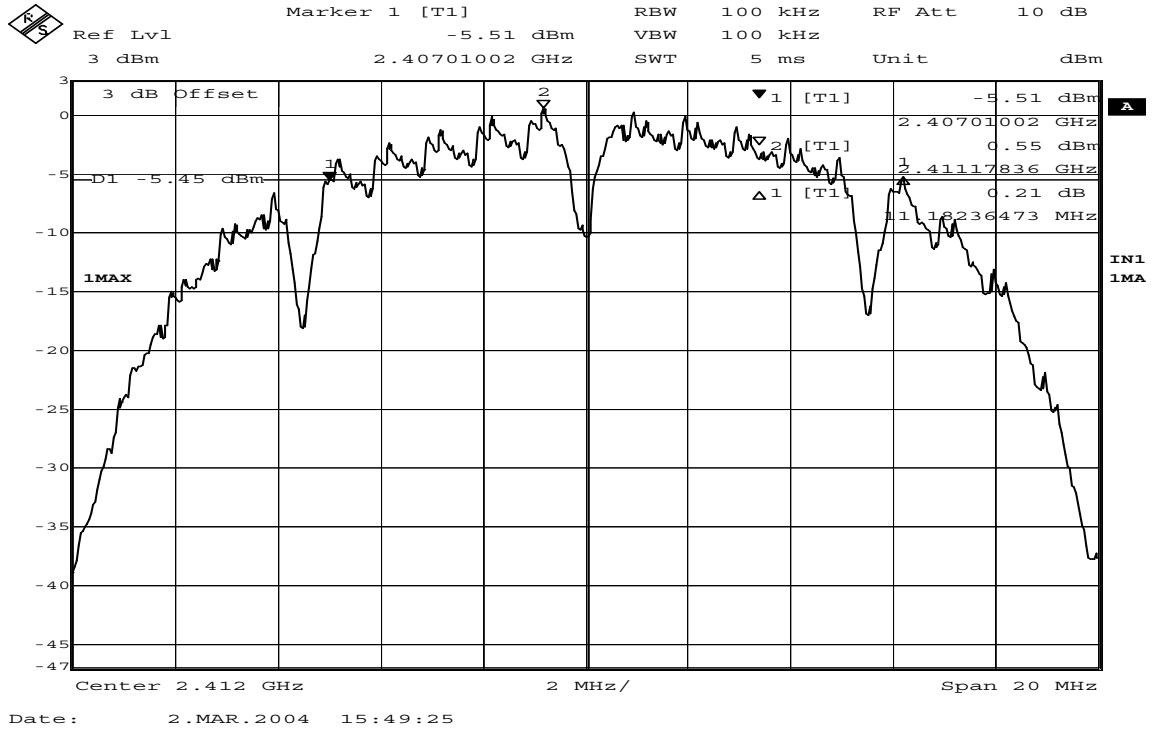
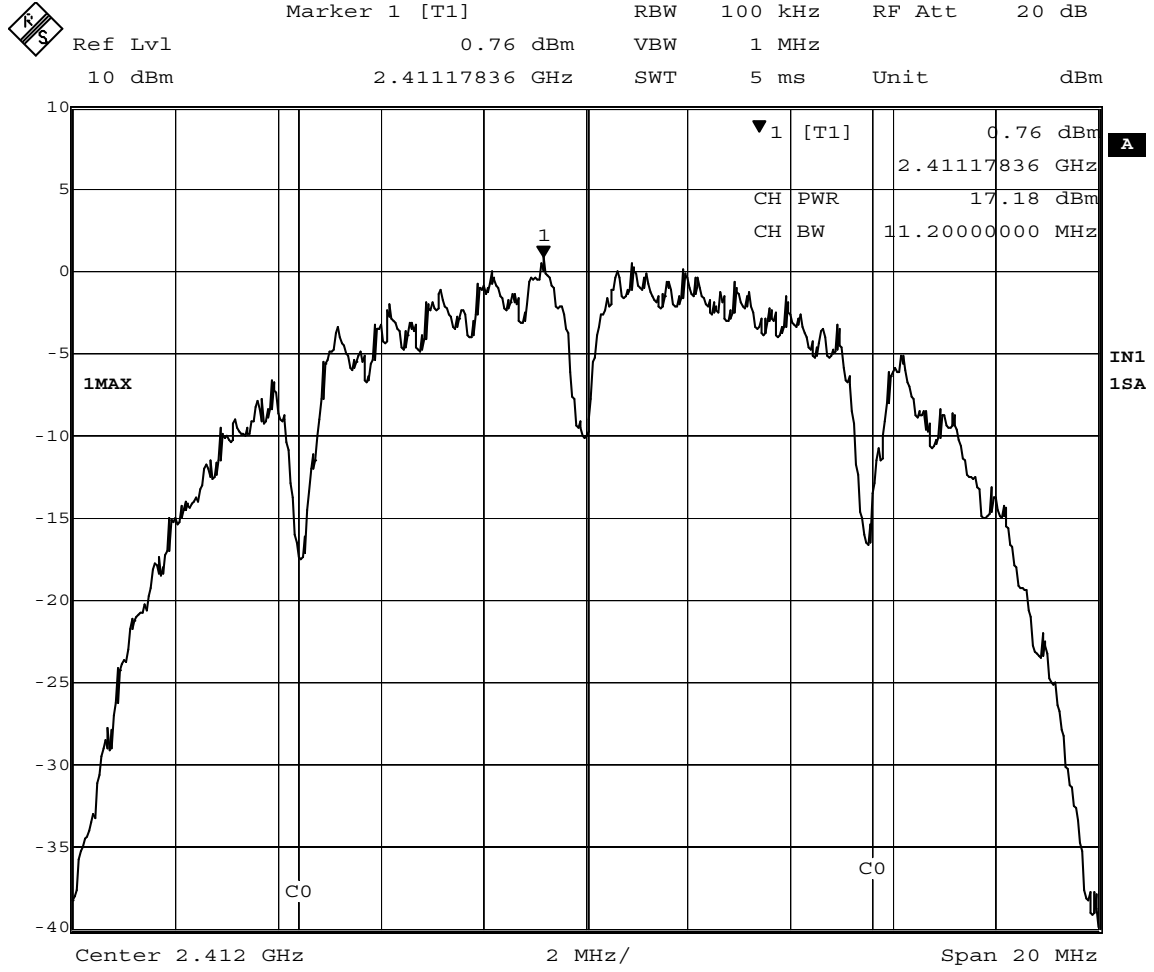


Figure 29 6dB Bandwidth, Channel 1



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Figure 30 Channel Power, Channel 1

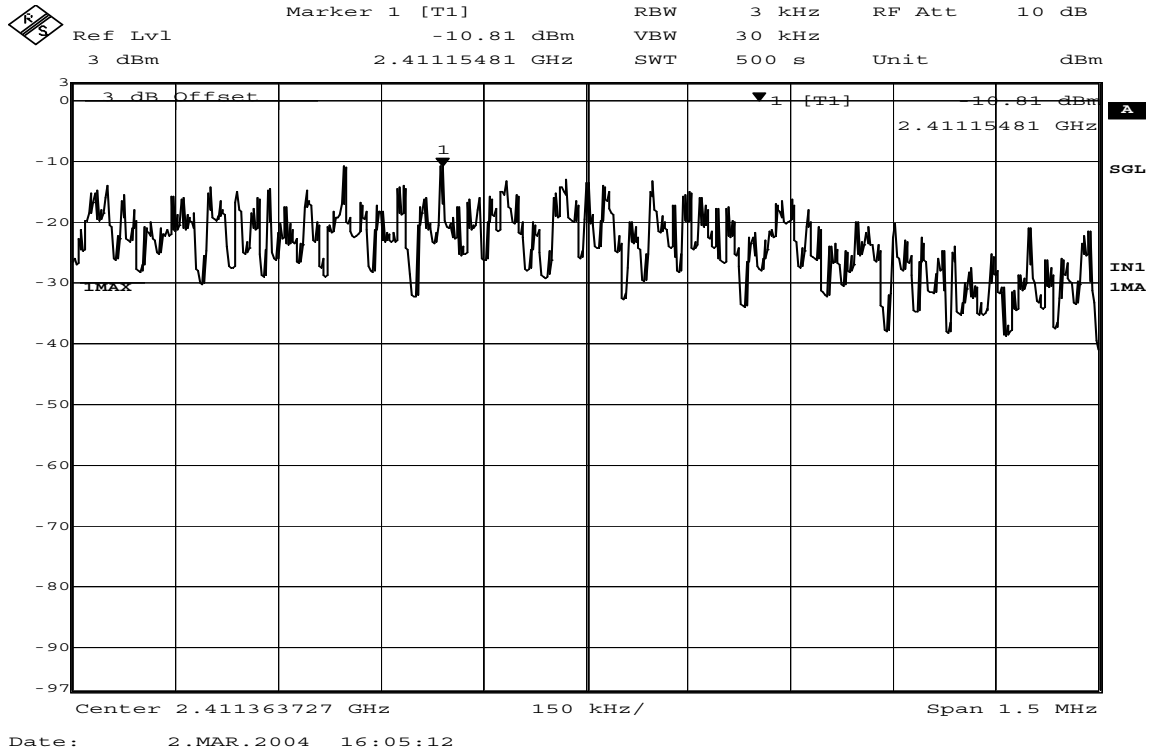


Figure 31 Power Spectral Density, Channel 1

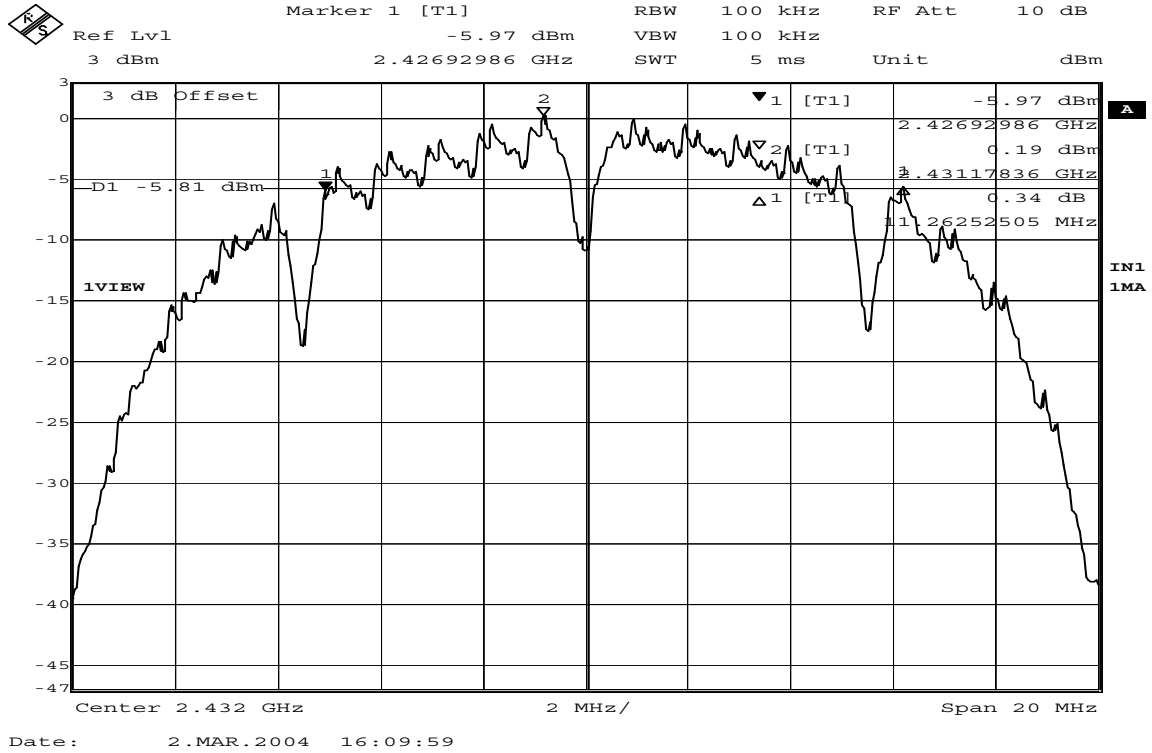


Figure 32 6dB Bandwidth, Channel 5

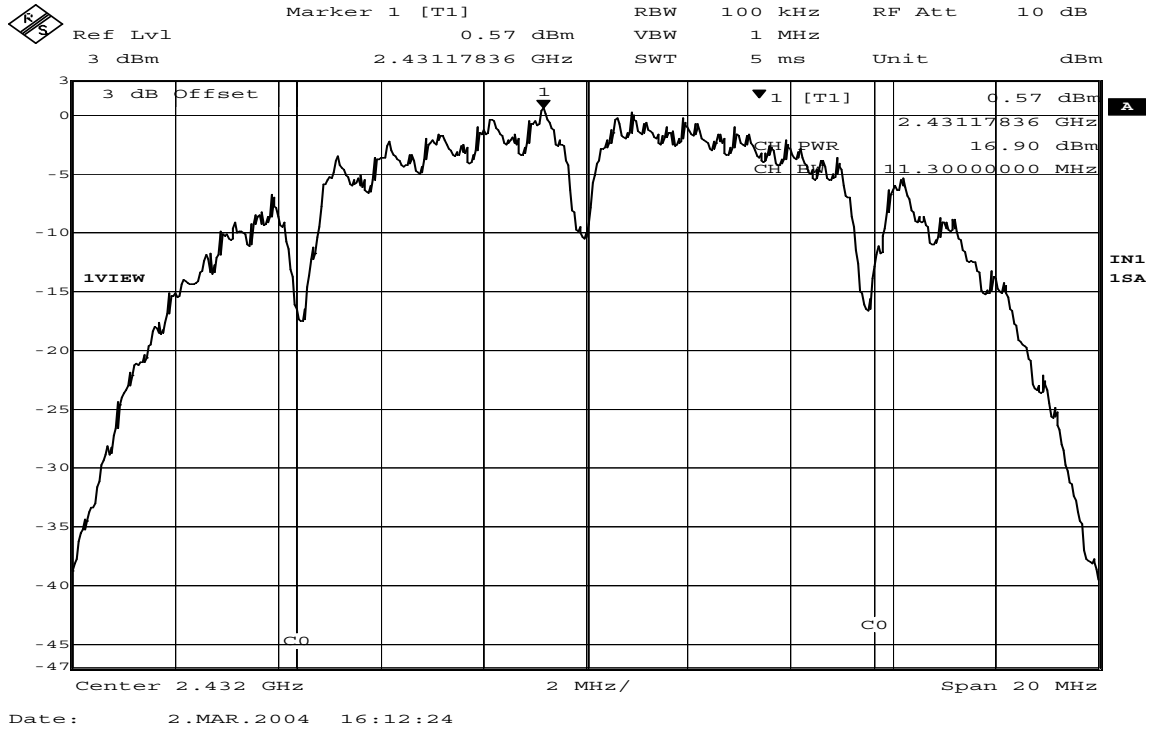


Figure 33 Channel Power, Channel 5

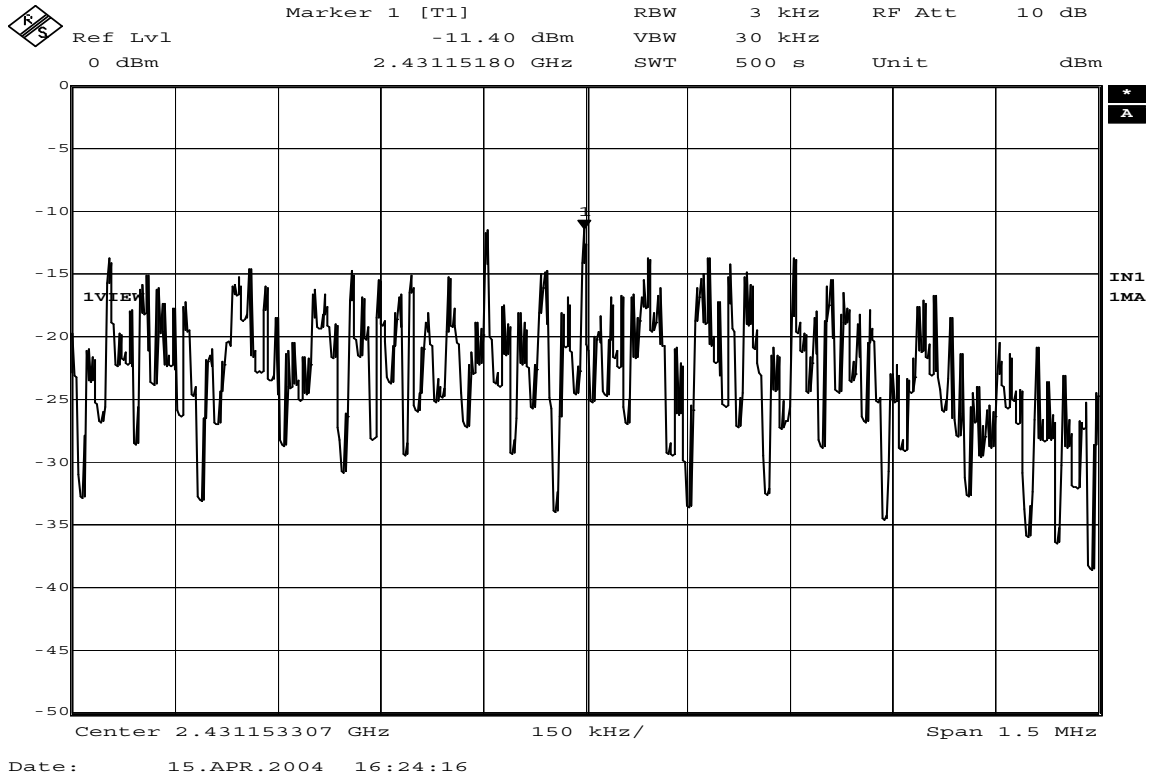


Figure 34 Power Spectral Density, Channel 5

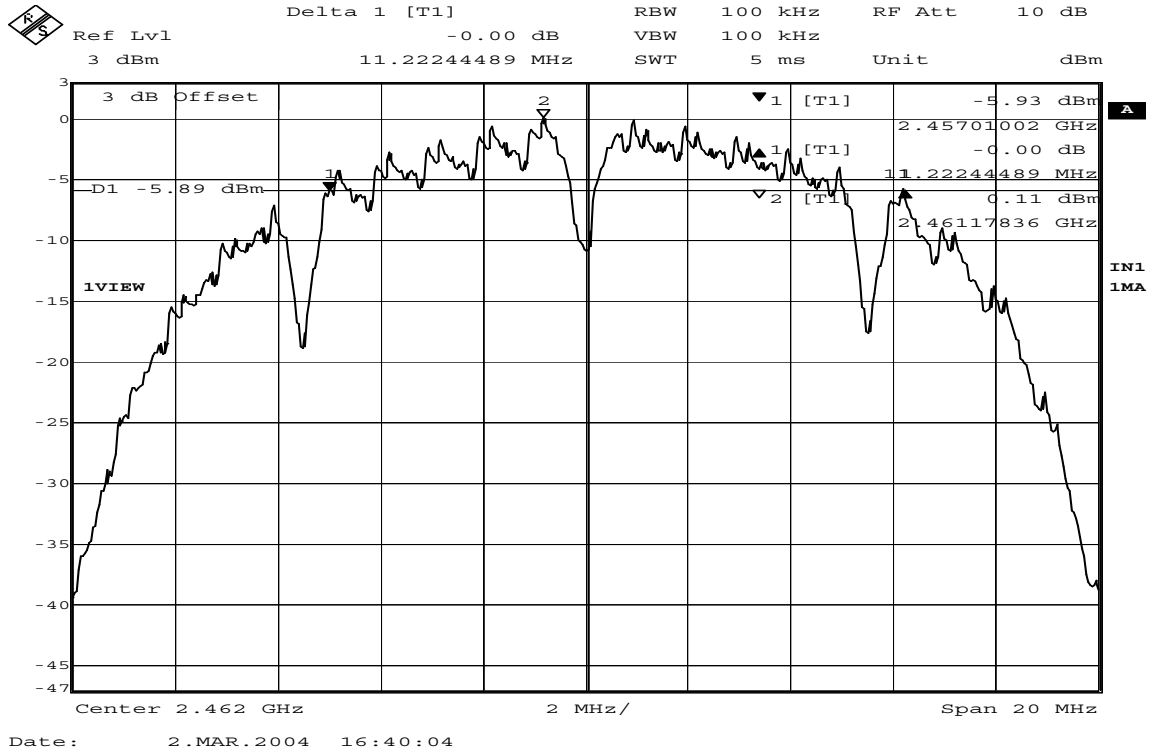


Figure 35 6dB Bandwidth, Channel 11

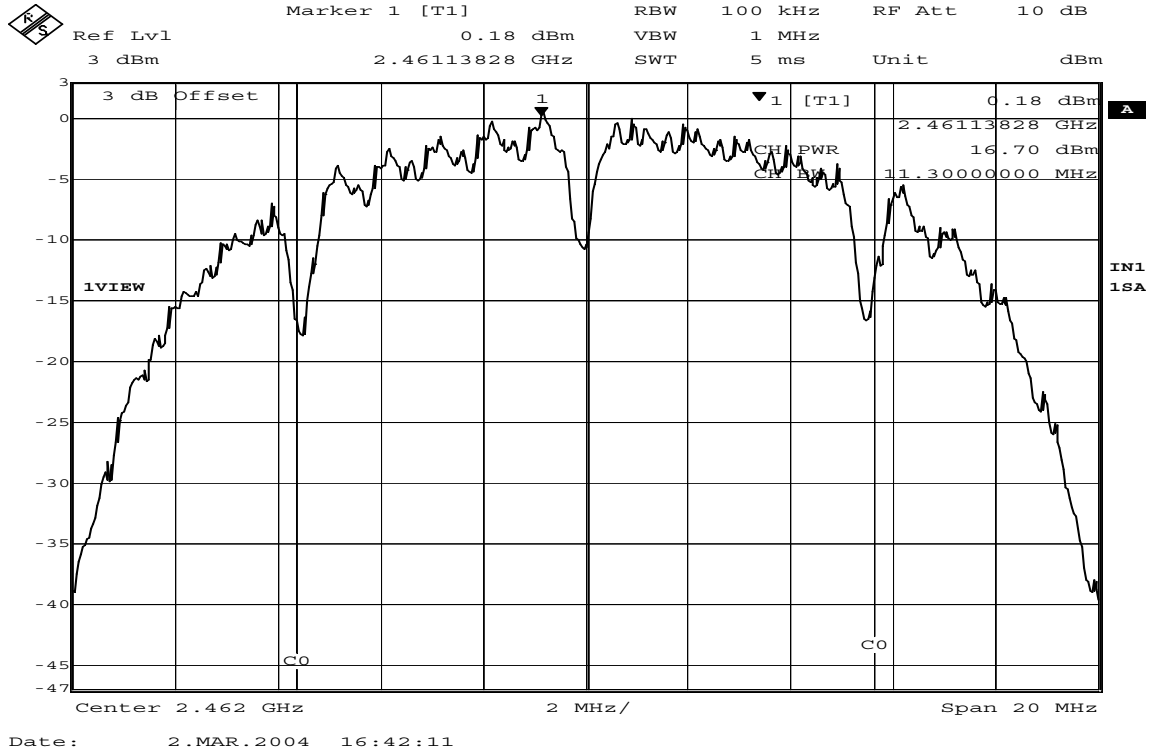


Figure 36 Channel Power, Channel 11

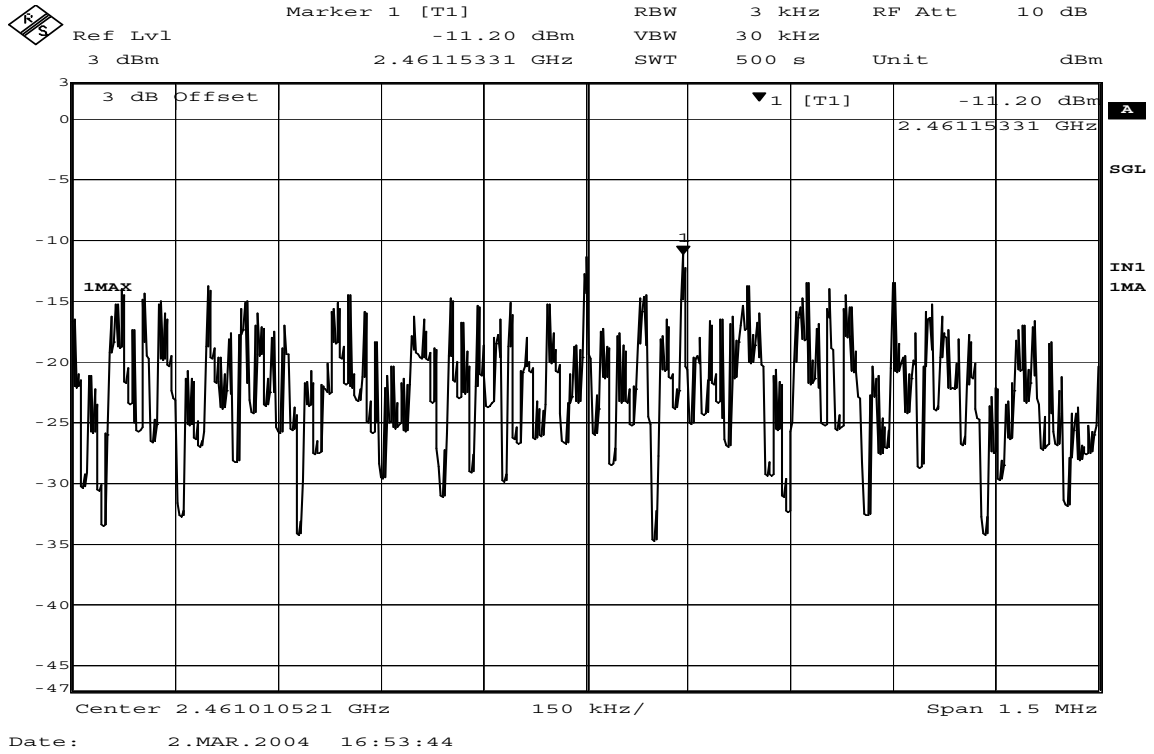


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