EMC
TEST REPORT

Report No. : EME-031084
Model No. : WLC-101M
Issued Date : Oct. 24, 2003

Applicant : Cellvision Systems Inc.
18F-7, No. 79 Sec. 1, Hsin Taiwu Road Hsichih,
Taipei, Taiwan

Test By : Intertek Testing Services Taiwan Ltd.
No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,
Shiang-Shan District, Hsinchu City, Taiwan

Project Engineer

Jerry Liu

Reviewed By

Elton Chen

Table of Contents

Summary of Tests

Wireless mini ISA module-Model: WLC-101M
FCC ID: QTRWLC10002

Test	Reference	Results
Minimum 6dB Bandwidth test	15.247(a)(2)	Complies
Maximum Output Power test	15.247(b)	Complies
Radiated Spurious Emission test	15.205, 15.209	Complies
Power Spectrum Density test	15.247(d)	Complies
Power Line Conducted Emission test	15.207	Complies

1. General information

1.1 Identification of the EUT

Applicant	: Cellvision Systems Inc.
Product	: Wireless mini ISA module
Model No.	: WLC-101M
FCC ID.	: QTRWLC10002
Frequency Range	: 2412~2462 MHz
Channel Number	: 11 Channels
Frequency of Each Channel	: 2412MHz, 2417MHz, 2422MHz, 2427MHz, 2432MHz, 2437MHz, 2442MHz, 2447MHz, 2452MHz, 2457MHz, 2462MHz
Type of Modulation	: CCK (11Mps, 5.5Mbps), DQPSK (2Mbps), DBPSK (1Mbps)
Rated Power	: 3.3Vdc
Power Cord	: N/A
Sample Received	: Sep. 23, 2003
Test Date(s)	: Sep. 23, 2003 ~ Oct. 21, 2003

A FCC DoC report has been generated for the client.

1.2 Additional information about the EUT

The WLC-101M Wireless mini ISA module is the perfect solution for your wireless network applications based on the IEEE 802.11b standard offering a data tare of 11Mbps in a wireless LAN environment.

For more detail features, please refer to User's manual as file name “Installation guide.pdf”

1.3 Antenna description

For Dipole antenna (with connector):

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain : 2.15dBi (max)
Antenna Type : Dipole
Connector Type : SMA, Female, Reverse

For Dipole antenna (without connector):

The EUT uses a permanently connected antenna.

Antenna Gain : 2.15dBi (max)
Antenna Type : Dipole
Connector Type : N/A

For PIFA antenna:

The EUT uses a permanently connected antenna.

Antenna Gain : -2dBi (peak)
Antenna Type : PIFA
Connector Type : N/A

1.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
PC	N/A	N/A	N/A	FCC DoC Approved
Printer	HP	C2642A	TH86K1N2ZB	FCC DoC Approved
Modem	Dynalink	V1456VQE	00V230A00051494	FCC DoC Approved
Access Point	Z-COM	XI-1450	AF16001-00242	FCC DoC Approved

Remark: The PC was provided by client.

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section § 15.205、§15.207、§15.209、§15.247 and ANSI C63.4/2001.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

The EUT can be equipped with three kinds of antenna. The tests are based on the module with antenna separated. And the combinations are listed as below:

Item	Type of EUT	Definition in this report
1	Module with Dipole antenna (with connector)	antenna 1
2	Module with Dipole antenna (without connector)	antenna 2
3	Module with PIFA antenna	antenna 3

(please refer to External photo)

Plug the EUT into the PC via mini ISA to PCMCIA interface extended card.

We conducted the Radiated Emission test for three kinds of antennas individually, and for Conducted Emission test, we measured antenna 1 and recorded in this report.

During conducted emission test, the EUT was operated in normal mode with AP.
While in other tests, it worked in the status of continuously transmitting.

After verifying the maximum output power, we found the maximum output power was occurred at 11Mbps data rate. The final test was executed under this condition and recorded in this report individually.

2.3 Test equipment

Equipment	Brand	Frequency range	Model No.	Series No.	Last Cal.Date
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	825788/014	Feb. 18, 2003
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	825428/005	June 10, 2003
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	100137	July 10, 2003
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	100186	Oct. 9, 2003
Horn Antenna	EMCO	1GHz~18GHz	3115	9906-5890	Sep. 19, 2003
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	159	June 21, 2003
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	3133	Feb. 21, 2003
Turn Table	HDGmbH	N/A	DS 420S	420/669/01	N/A
Antenna Tower	HDGmbH	N/A	MA 240	240/573	N/A
Microwave Amplifier	Agilent	2GHz~26.5GHz	8348A	3111A00567	Dec. 20, 2002
Crystal Detector	Agilent	10MHz~18GHz	8472B	MY42240243	N/A
Signal Generator	Rohde & Schwarz	20MHz~27GHz	SMR27	100036	Aug. 15, 2003
Two Channel Digital Storage Oscilloscope	Tektronix	N/A	TDS1012	C031679	Aug. 16, 2003

Note:
1. The calibration interval of the above instruments is 12 months.

3. Minimum 6dB Bandwidth test

3.1 Operating environment

Temperature:	24	℃
Relative Humidity:	42	%
Atmospheric Pressure	1023	hPa

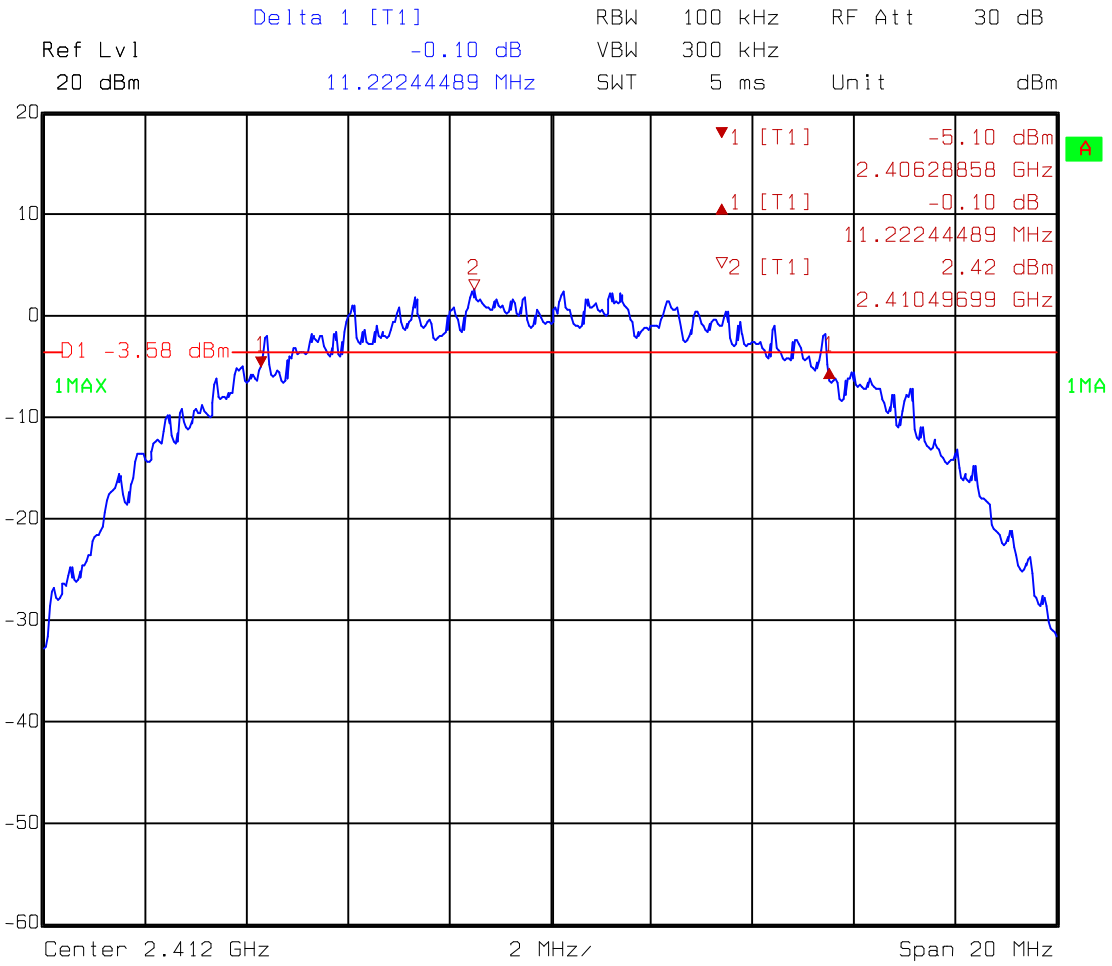
3.2 Test setup & procedure

The minimum 6dB bandwidth per FCC §15.247(a)(2) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 100kHz, the video bandwidth set at 300kHz, and the SPAN>>RBW. The test was performed at 3 channels (lowest, middle and highest channel). The minimum 6-dB modulation bandwidth is in the following Table.

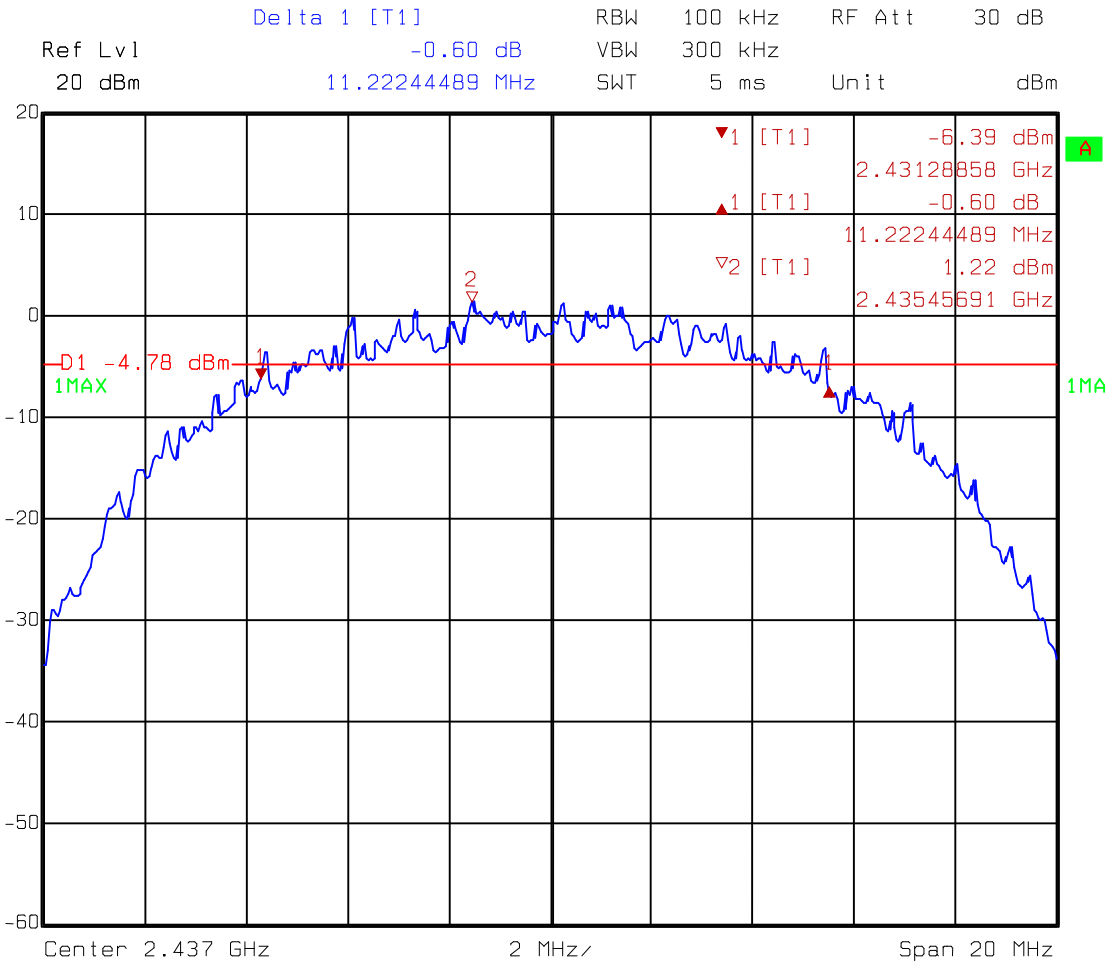
3.3 Measured data of Minimum 6dB Bandwidth test results

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit
Low	2412	11.22244	＞500kHz
Middle	2437	11.22244	＞500kHz
High	2462	11.22244	＞500kHz

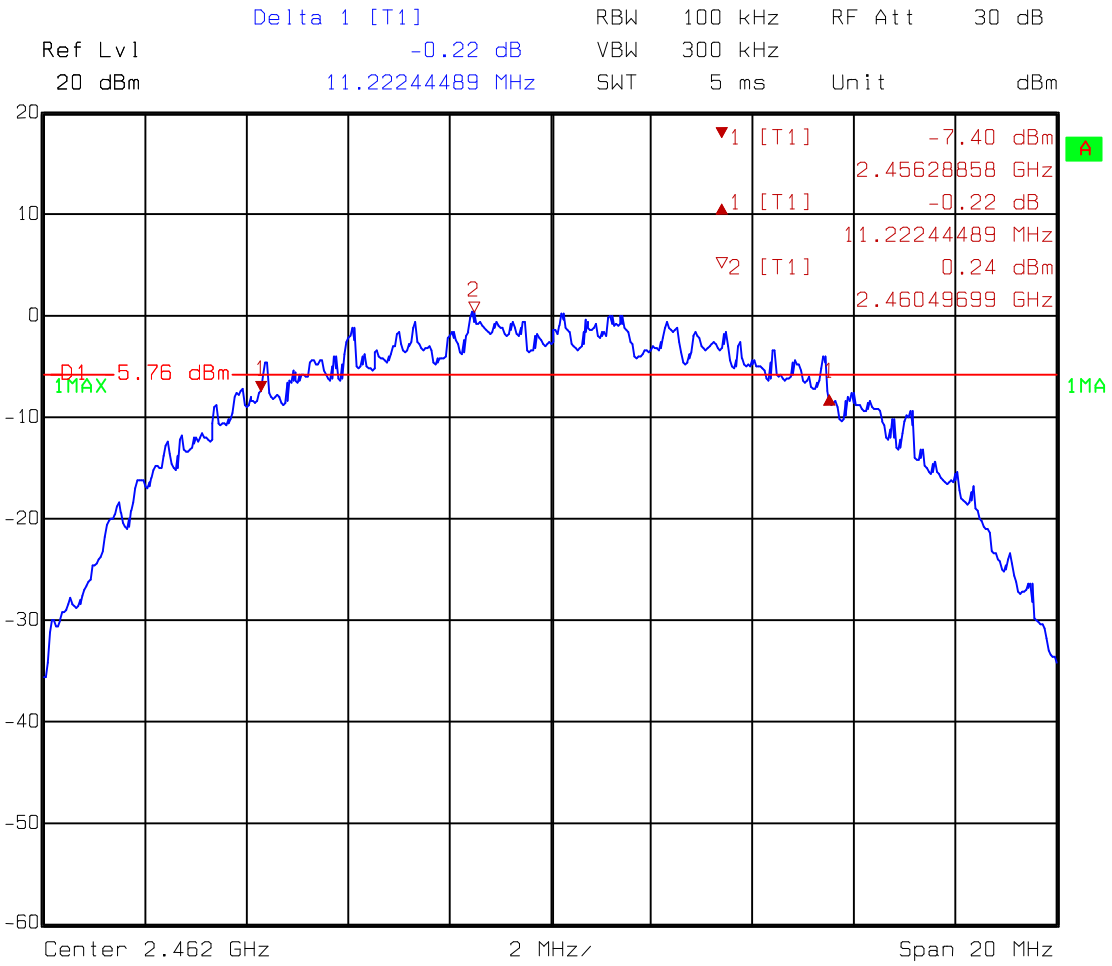
Please see the plot below.



Comment A: 6dB bandwidth at low channel (EC365)
Date: 02.OCT.2003 14:34:27



Comment A: 6dB bandwidth at middle channel (EC365)
Date: 02.OCT.2003 14:37:22



Comment A: 6dB bandwidth at high channel (EC365)
Date: 02.OCT.2003 14:39:49

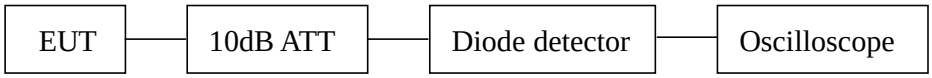
4. Maximum Output Power test

4.1 Operating environment

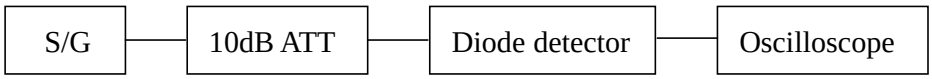
Temperature:	24	℃
Relative Humidity:	42	%
Atmospheric Pressure	1023	hPa

4.2 Test setup & procedure

A:



B:



1. The output of the transmitter via a 10 dB attenuator and coupled to a diode detector.
2. The output of the diode detector connected to the vertical channel of and oscilloscope. The observed trace of the oscilloscope shall be recorded as “A”.
3. The transmitter replaced by a signal generator. The output frequency of the signal made equal to the center of the frequency range occupied by the transmitter and unmodulated.
4. The output of the signal generator raised to reach the peak of trace “A” named X.
5. The signal generator output level X (dBm) is the transmitter peak output power.

4.3 Measured data of Maximum Output Power test results

Channel	Frequency (MHz)	Reading (dBm)	Output Power		Limit (dBm)
			(dBm)	(mW)	
Lowest	2412	16.83	16.83	48.195	30
Middle	2437	16.83	16.83	48.195	30
Highest	2462	16.23	16.23	41.976	30

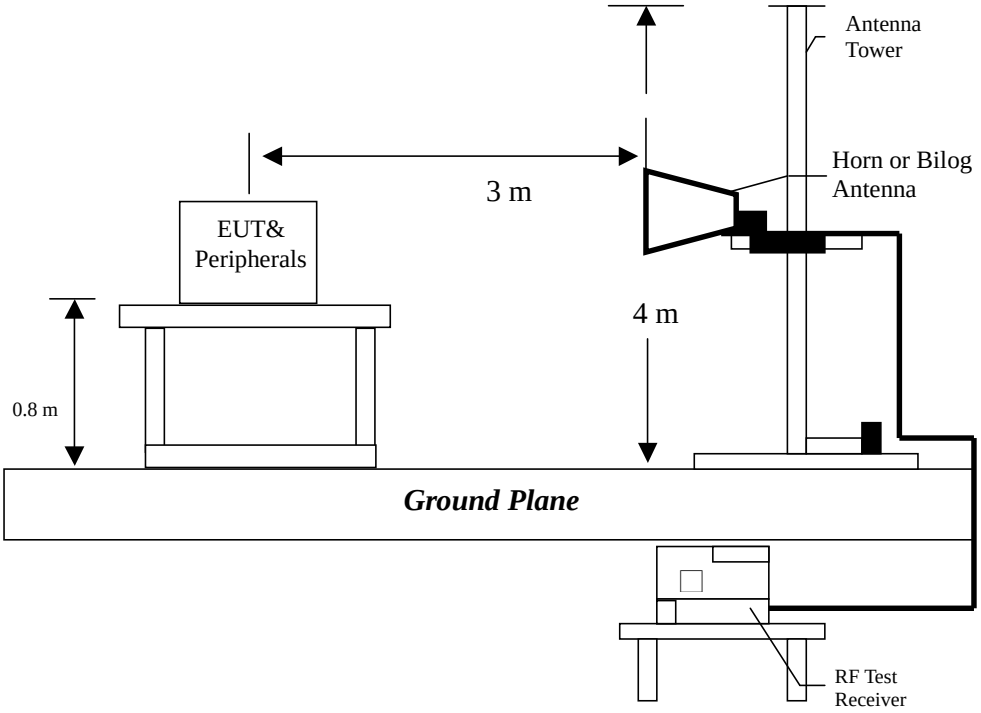
5. Radiated Emission test

5.1 Operating environment

Temperature:	24	℃	(10-40℃)
Relative Humidity:	42	%	(10-90%)
Atmospheric Pressure	1023	hPa	(860-1060hPa)

5.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emissions were invested cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz RBW/VBW) recorded also on the report.
The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

The EUT configuration please refer to the "Spurious set-up photo.pdf".

5.3 Emission limits

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency (MHz)	Limits (dB μ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:
1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81.
Expanded uncertainty (k=2) of radiated emission measurement is ±4.98 dB.
Expanded uncertainty (k=2) of conducted emission measurement is ±2.02 dB.

5.4 Radiated spurious emission test data

5.4.1 Measurement results: frequencies equal to or less than 1 GHz

The radiated spurious emissions at

Frequency(MHz)	Margin
501.86000	-3.28
200.42000	-1.42
263.98000	-3.05

are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.

EUT : WLC-101M

Worst Case Condition : Tx at low channel with antenna 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
263.98000	QP	V	13.38	19.67	33.05	46.00	-12.95	265.00	186.00
307.98000	QP	V	14.45	21.45	35.90	46.00	-10.10	263.00	169.00
400.17000	QP	V	16.94	8.80	25.74	46.00	-20.26	214.00	288.00
433.50000	QP	V	17.37	8.09	25.46	46.00	-20.54	182.00	287.00
501.86000	QP	V	18.58	24.14	42.72	46.00	-3.28	111.00	108.00
736.32000	QP	V	22.60	5.09	27.69	46.00	-18.31	246.00	0.00
161.98000	QP	H	14.92	18.07	32.99	43.50	-10.51	180.00	249.00
200.42000	QP	H	11.52	30.56	42.08	43.50	-1.42	100.00	105.00
219.99000	QP	H	11.52	28.30	39.82	46.00	-6.18	100.00	117.00
263.98000	QP	H	13.38	29.57	42.95	46.00	-3.05	100.00	233.00
307.98000	QP	H	14.45	26.07	40.52	46.00	-5.48	100.00	133.00
501.88000	QP	H	18.58	18.88	37.46	46.00	-8.54	191.00	357.00

Remark:

1.Corrected Level = Reading Level + Correction Factor

2.Correction Factor = Antenna Factor + Cable Loss

EUT : WLC-101M
Worst Case Condition : Tx at low channel with antenna 2

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
263.98000	QP	V	13.38	19.88	33.26	46.00	-12.74	286.00	187.00
301.11000	QP	V	14.45	15.28	29.73	46.00	-16.27	265.00	172.00
307.98000	QP	V	14.45	21.99	36.44	46.00	-9.56	331.00	174.00
433.52000	QP	V	17.37	12.36	29.73	46.00	-16.27	117.00	341.00
501.88000	QP	V	18.58	20.26	38.84	46.00	-7.16	136.00	69.00
733.78000	QP	V	22.60	11.98	34.58	46.00	-11.42	177.00	3.00
200.42000	QP	H	11.52	30.21	41.73	43.50	-1.77	132.00	249.00
263.98000	QP	H	13.38	29.43	42.81	46.00	-3.19	100.00	121.00
300.15000	QP	H	14.45	23.21	37.66	46.00	-8.34	100.00	237.00
307.98000	QP	H	14.45	28.49	42.94	46.00	-3.06	100.00	229.00
433.53000	QP	H	17.37	12.52	29.89	46.00	-16.11	148.00	203.00
501.97000	QP	H	18.58	17.52	36.10	46.00	-9.90	295.00	148.00

Remark:
1.Corrected Level = Reading Level + Correction Factor
2.Correction Factor = Antenna Factor + Cable Loss

EUT : WLC-101M
Worst Case Condition : Tx at low channel with antenna 3

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
307.99000	QP	V	14.45	17.46	31.91	46.00	-14.09	251.00	182.00
395.99000	QP	V	16.40	14.71	31.11	46.00	-14.89	211.00	174.00
433.58000	QP	V	17.37	4.43	21.80	46.00	-24.20	245.00	111.00
484.00000	QP	V	18.61	12.63	31.24	46.00	-14.76	176.00	182.00
501.93000	QP	V	18.58	13.85	32.43	46.00	-13.57	221.00	93.00
566.84000	QP	V	19.99	0.93	20.92	46.00	-25.08	228.00	86.00
263.98000	QP	H	13.38	22.58	35.96	46.00	-10.04	100.00	133.00
301.11000	QP	H	14.45	15.83	30.28	46.00	-15.72	100.00	121.00
307.99000	QP	H	14.45	23.91	38.36	46.00	-7.64	100.00	128.00
352.01000	QP	H	15.56	14.92	30.48	46.00	-15.52	100.00	134.00
433.52000	QP	H	17.37	8.98	26.35	46.00	-19.65	100.00	150.00
500.22000	QP	H	18.58	20.03	38.61	46.00	-7.39	133.00	136.00

Remark:
1.Corrected Level = Reading Level + Correction Factor
2.Correction Factor = Antenna Factor + Cable Loss

5.4.2 Measurement results: frequency above 1GHz

The radiated spurious emissions at

Frequency(MHz)	Margin	Frequency(MHz)	Margin
7233.00	-2.45	7307.80	-2.09
7233.00	-1.47	7307.90	-3.49
9648.06	-3.69	7382.80	-4.95

are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.

EUT : WLC-101M
Test Condition : Tx at low channel with antenna 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
7233.00	PK	V	34.17	39.966	57.424	63.22	74	-10.78	172.00	19.00
7233.00	AV	V	34.17	39.966	45.754	51.55	54	-2.45	172.00	19.00
9648.07	PK	V	35.7525	43.384	51.5185	59.15	74	-14.85	206.00	296.00
9648.07	AV	V	35.7525	43.384	41.1385	48.77	54	-5.23	206.00	296.00
4825.92	PK	H	32.265	35.742	52.013	55.49	74	-18.51	223.00	63.00
4825.92	AV	H	32.265	35.742	35.063	38.54	54	-15.46	223.00	63.00
7233.00	PK	H	34.17	39.966	58.794	64.59	74	-9.41	168.00	61.00
7233.00	AV	H	34.17	39.966	46.734	52.53	54	-1.47	168.00	61.00
9648.06	PK	H	35.7525	43.384	51.4185	59.05	74	-14.95	174.00	301.00
9648.06	AV	H	35.7525	43.384	42.6785	50.31	54	-3.69	174.00	301.00

Remark:
1. Corrected Level = Reading Level + Correction Factor－Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

For PK:
1GHz-3GHz: 50dBuV
3GHz-14GHz: 54dBuV
14GHz-26.5GHz: 60dBuV

For AV:
1GHz-3GHz: 41.5dBuV
3GHz-14GHz: 46dBuV
14GHz-26.5GHz: 46.5dBuV

EUT : WLC-101M
Test Condition : Tx at middle channel with antenna 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
7307.80	PK	V	34.17	39.966	58.284	64.08	74	-9.92	180.00	18.00
7307.80	AV	V	34.17	39.966	46.114	51.91	54	-2.09	180.00	18.00
7307.90	PK	H	34.17	39.966	57.474	63.27	74	-10.73	150.00	60.00
7307.90	AV	H	34.17	39.966	44.714	50.51	54	-3.49	150.00	60.00

Remark:
1. Corrected Level = Reading Level + Correction Factor－Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

For PK:
1GHz-3GHz: 50dBuV
3GHz-14GHz: 54dBuV
14GHz-26.5GHz: 60dBuV

For AV:
1GHz-3GHz: 41.5dBuV
3GHz-14GHz: 46dBuV
14GHz-26.5GHz: 46.5dBuV

EUT : WLC-101M
Test Condition : Tx at high channel with antenna 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
7383.00	PK	V	34.17	39.966	53.244	59.04	74	-14.96	204.00	332.00
7383.00	AV	V	34.17	39.966	42.134	47.93	54	-6.07	204.00	332.00
7382.80	PK	H	34.17	39.966	54.884	60.68	74	-13.32	165.00	58.00
7382.80	AV	H	34.17	39.966	43.254	49.05	54	-4.95	165.00	58.00

Remark:
1. Corrected Level = Reading Level + Correction Factor－Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

For PK:
1GHz-3GHz: 50dBuV
3GHz-14GHz: 54dBuV
14GHz-26.5GHz: 60dBuV

For AV:
1GHz-3GHz: 41.5dBuV
3GHz-14GHz: 46dBuV
14GHz-26.5GHz: 46.5dBuV

The radiated spurious emissions at

Frequency(MHz)	Margin
7238.74	-1.06
7237.18	-3.25

are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.

EUT : WLC-101M
Test Condition : Tx at low channel with antenna 2

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
7238.74	PK	V	34.17	39.966	58.694	64.49	74	-9.51	161.00	278.00
7238.74	AV	V	34.17	39.966	47.144	52.94	54	-1.06	161.00	278.00
7237.18	PK	H	34.17	39.966	57.294	63.09	74	-10.91	164.00	63.00
7237.18	AV	H	34.17	39.966	44.954	50.75	54	-3.25	164.00	63.00

Remark:
1. Corrected Level = Reading Level + Correction Factor－Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

For PK:
1GHz-3GHz: 50dBuV
3GHz-14GHz: 54dBuV
14GHz-26.5GHz: 60dBuV

For AV:
1GHz-3GHz: 41.5dBuV
3GHz-14GHz: 46dBuV
14GHz-26.5GHz: 46.5dBuV

EUT : WLC-101M
Test Condition : Tx at middle channel with antenna 2

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
7310.7	PK	V	34.17	39.966	54.084	59.88	74	-14.12	173.00	289.00
7310.7	AV	V	34.17	39.966	41.364	47.16	54	-6.84	173.00	289.00
7308	PK	H	34.17	39.966	54.384	60.18	74	-13.82	121.00	32.00
7308	AV	H	34.17	39.966	41.624	47.42	54	-6.58	121.00	32.00

Remark:
1. Corrected Level = Reading Level + Correction Factor－Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

For PK:
1GHz-3GHz: 50dBuV
3GHz-14GHz: 54dBuV
14GHz-26.5GHz: 60dBuV

For AV:
1GHz-3GHz: 41.5dBuV
3GHz-14GHz: 46dBuV
14GHz-26.5GHz: 46.5dBuV

EUT : WLC-101M
Test Condition : Tx at high channel with antenna 2

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
7388.7	PK	V	34.17	39.966	52.634	58.43	74	-15.57	135.00	291.00
7388.7	AV	V	34.17	39.966	39.664	45.46	54	-8.54	135.00	291.00
7382.9	PK	H	34.17	39.966	51.384	57.18	74	-16.82	104.00	35.00
7382.9	AV	H	34.17	39.966	38.964	44.76	54	-9.24	104.00	35.00

Remark:
1. Corrected Level = Reading Level + Correction Factor－Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

For PK:
1GHz-3GHz: 50dBuV
3GHz-14GHz: 54dBuV
14GHz-26.5GHz: 60dBuV

For AV:
1GHz-3GHz: 41.5dBuV
3GHz-14GHz: 46dBuV
14GHz-26.5GHz: 46.5dBuV

EUT : WLC-101M
Test Condition : Tx at low channel with antenna 3

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
7235.467	PK	V	34.17	39.966	46.014	51.81	74	-22.19	195.00	73.00
7235.467	AV	V	34.17	39.966	34.494	40.29	54	-13.71	195.00	73.00
4824.890	PK	H	32.265	35.742	50.973	54.45	74	-19.55	194.00	29.00
4824.089	AV	H	32.265	35.742	40.413	43.89	54	-10.11	194.00	29.00

Remark:
1. Corrected Level = Reading Level + Correction Factor－Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.
4. No spurious was found at middle and high channel.

For PK:
1GHz-3GHz: 50dBuV
3GHz-14GHz: 54dBuV
14GHz-26.5GHz: 60dBuV

For AV:
1GHz-3GHz: 41.5dBuV
3GHz-14GHz: 46dBuV
14GHz-26.5GHz: 46.5dBuV

EUT : WLC-101M
Test Condition : Tx at middle and high channel with antenna 3

Test Result:
No spurious emission was found above the spectrum analyzer's noise floor.
The noise floor are listed as below:

For PK:
1GHz-3GHz: 50dBuV
3GHz-14GHz: 54dBuV
14GHz-26.5GHz: 60dBuV

For AV:
1GHz-3GHz: 41.5dBuV
3GHz-14GHz: 46dBuV
14GHz-26.5GHz: 46.5dBuV

6. Power Spectrum Density test

6.1 Operating environment

Temperature:	24	℃
Relative Humidity:	42	%
Atmospheric Pressure	1023	hPa

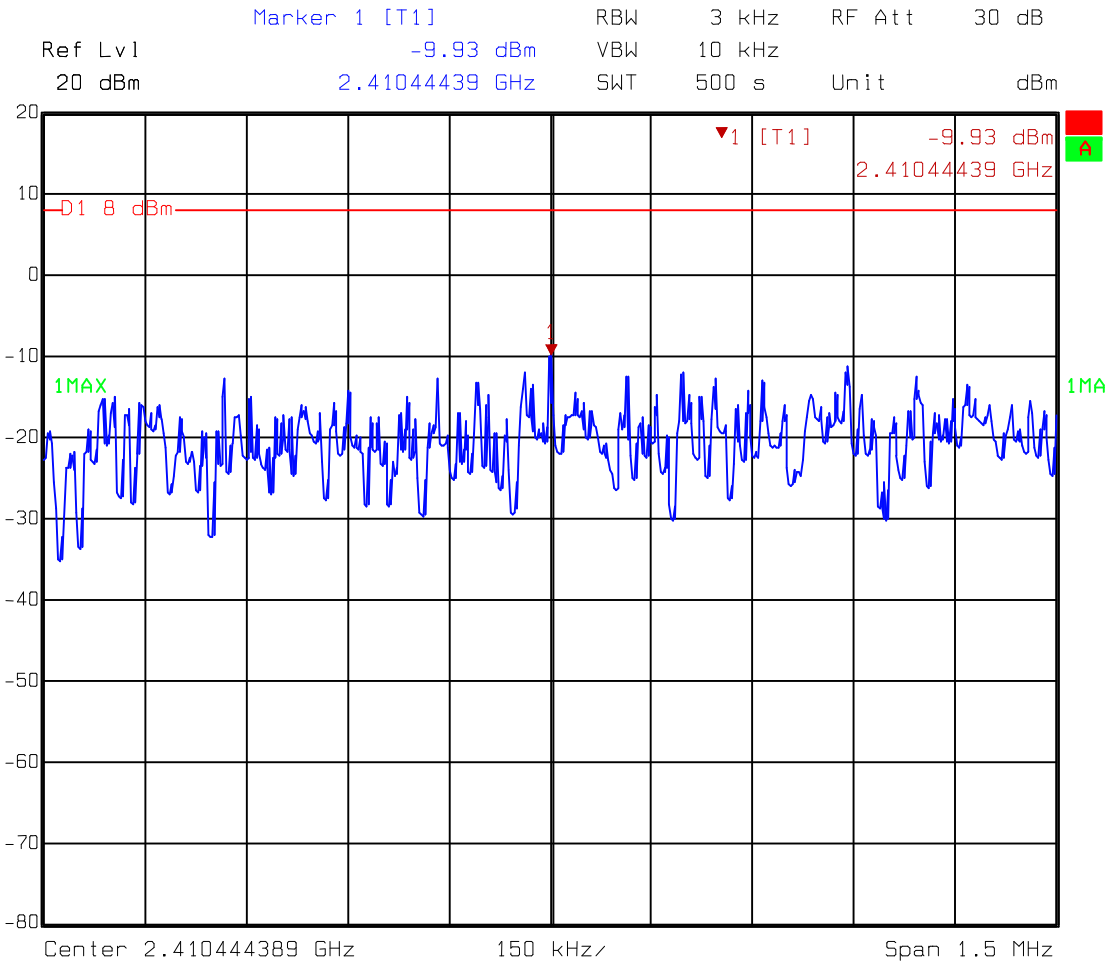
6.2 Test setup & procedure

The power spectrum density per FCC §15.247(d) was measured from the antenna port of the EUT using a 50ohm spectrum analyzer with the resolution bandwidth set at 3kHz, the video bandwidth set at 10kHz, a span of 1.5 MHz, and the sweep time set at 500 seconds. Power Density was read directly and cable loss (2.13dB) correction was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel). The Power Spectral Density measured result is in the following table.

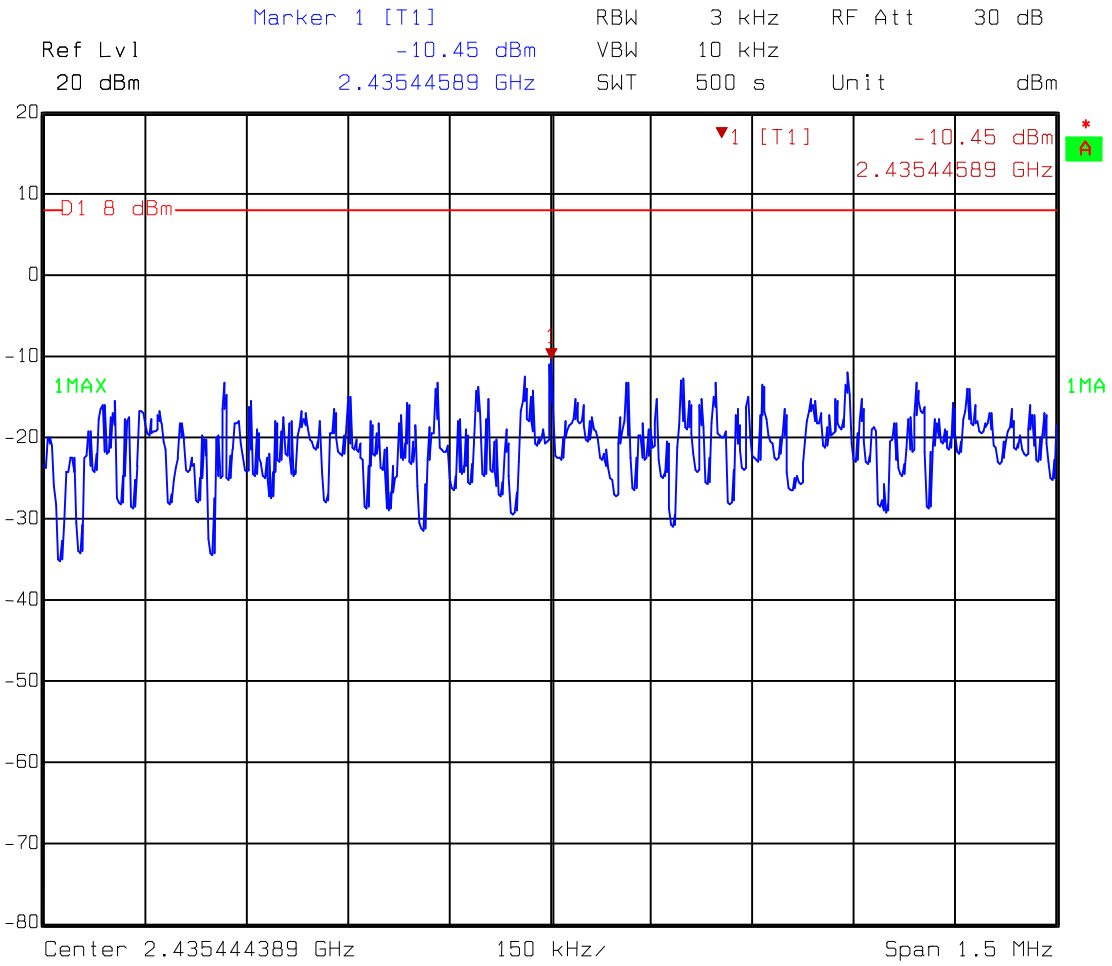
6.3 Measured data of Power Spectrum Density test results

Channel	Frequency (MHz)	Measured level (dBm)	Limit (dBm)
Low	2412	-7.80	8
Middle	2437	-8.32	8
High	2462	-9.25	8

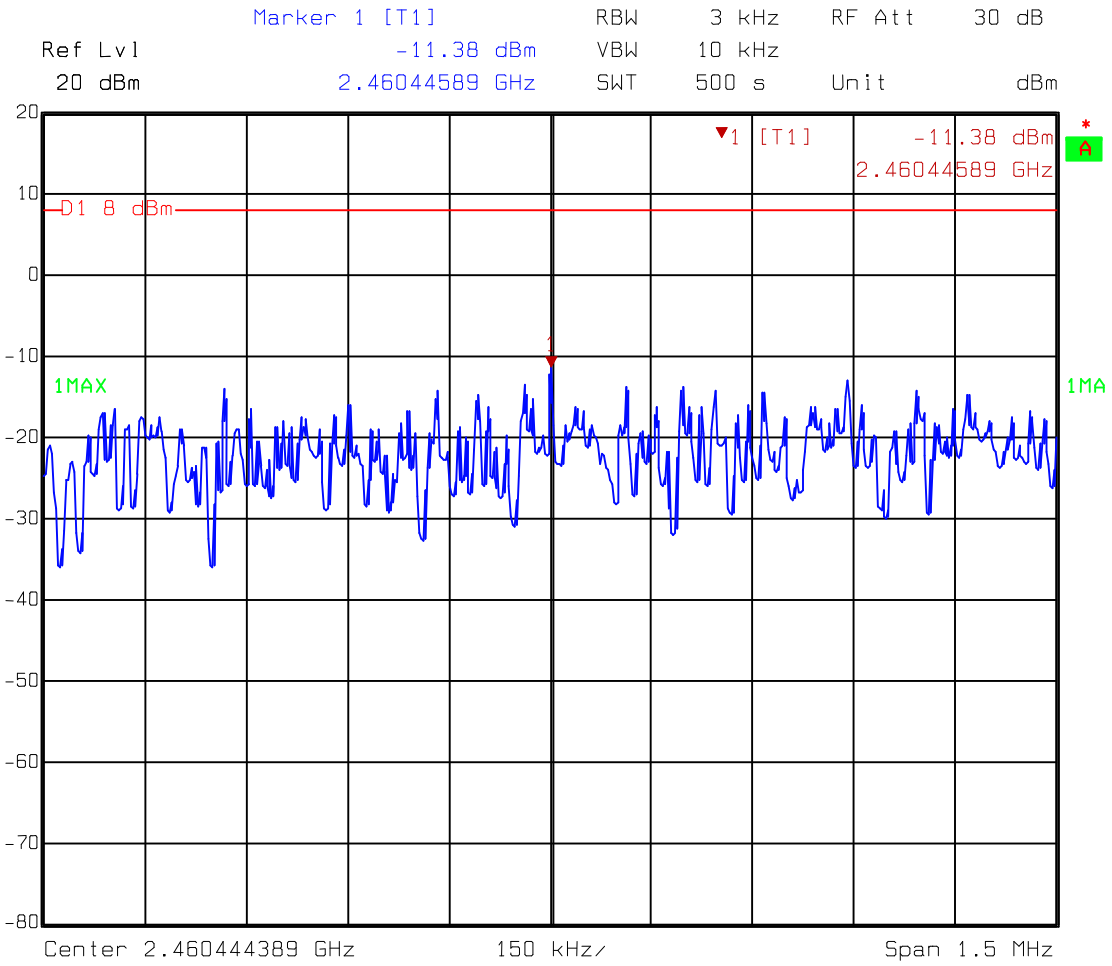
Please see the plot below.



Comment A: Power spectrum density at low channel
CL=2.13dB
Date: 26.SEP.2003 18:21:03



Comment A: Power spectrum density at middle channel
CL=2.13dB
Date: 26.SEP.2003 18:22:50



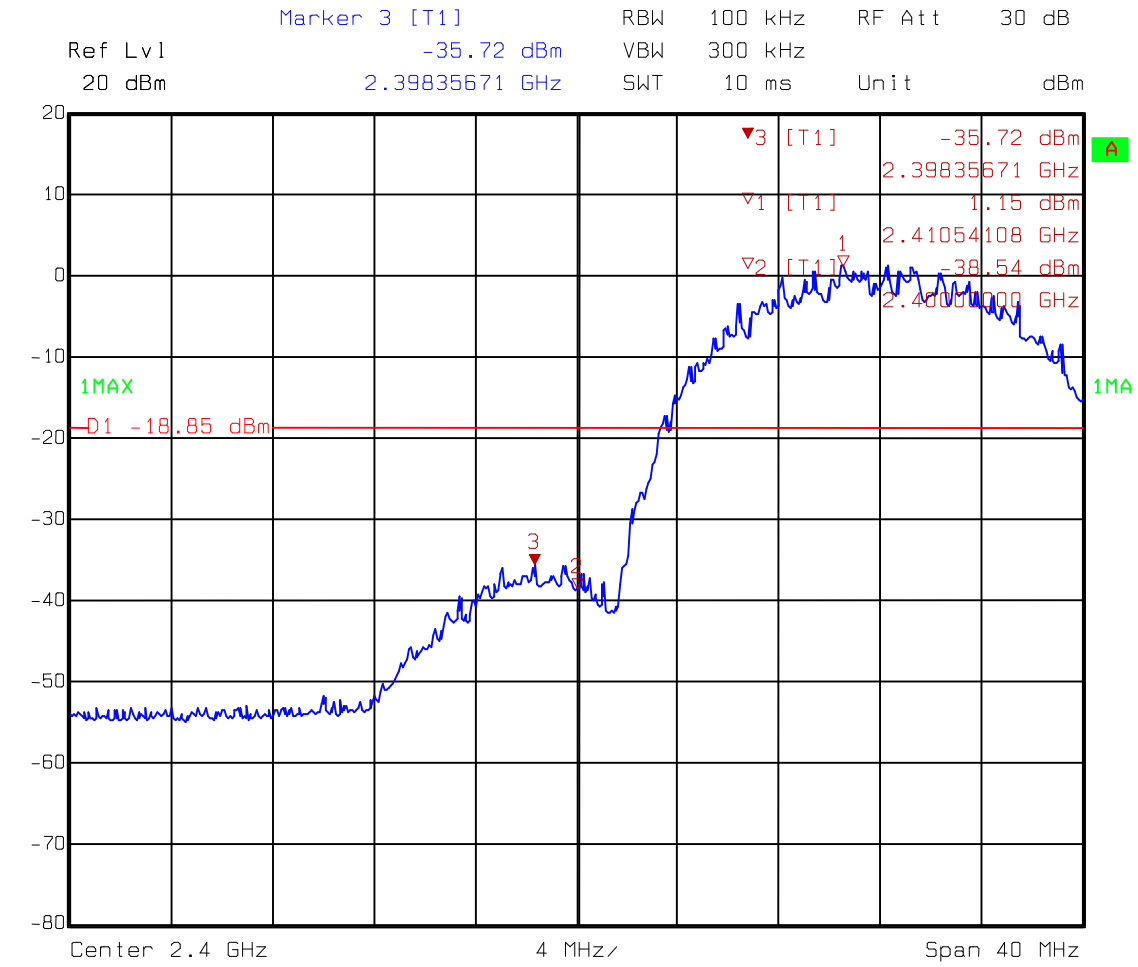
Comment A: Power spectrum density at high channel
CL=2.13dB
Date: 26.SEP.2003 18:24:23

7. Emission on the band edge §FCC 15.247(C)

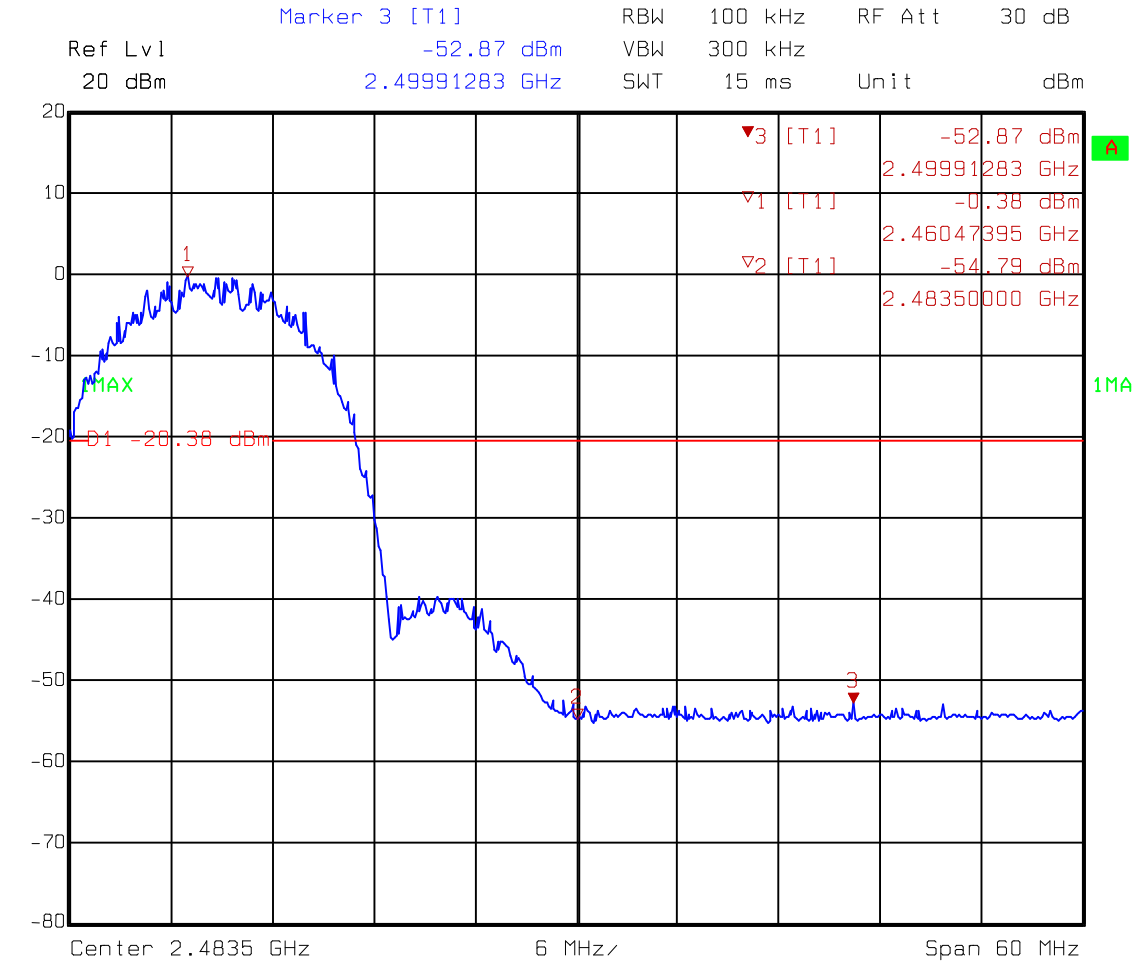
In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

Please see the plot below.

7.1 Band-edge (Conducted method)



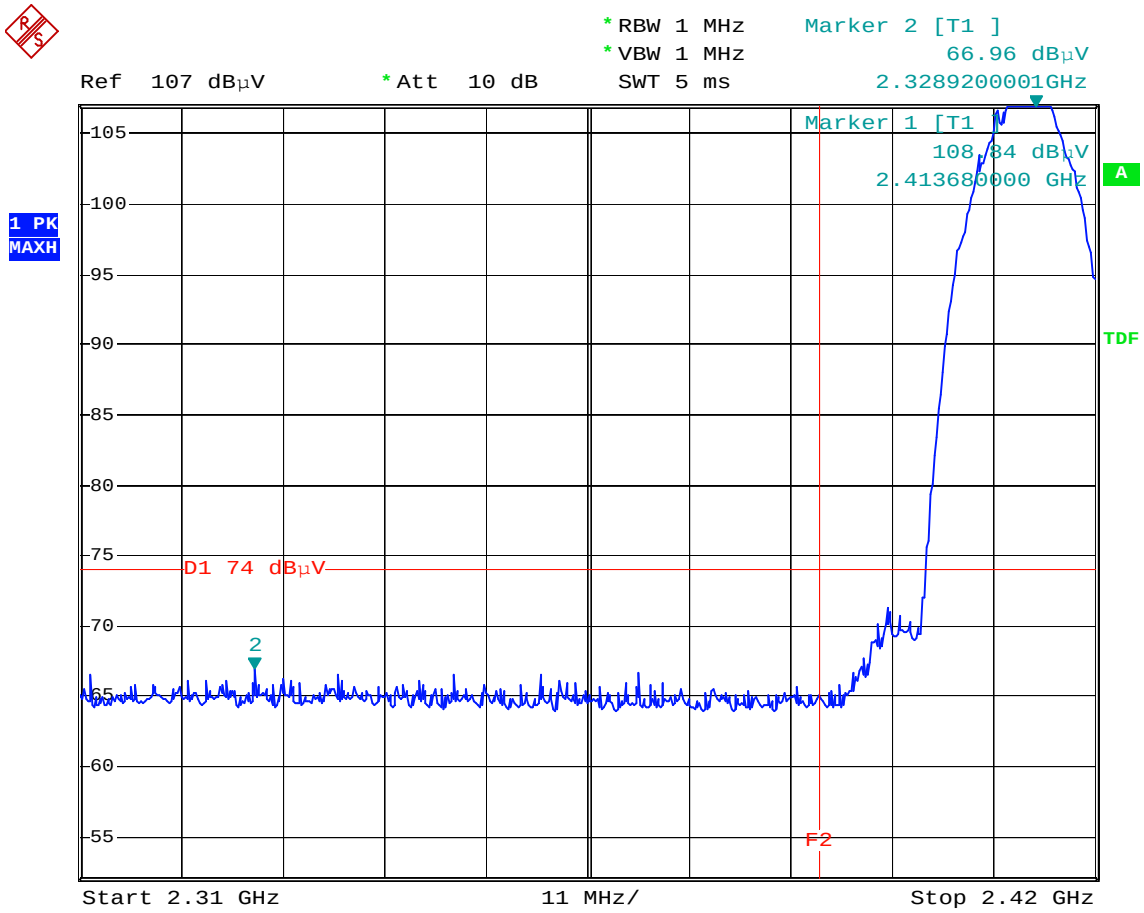
Comment A: Band-edge at low channel
Date: 26.SEP.2003 15:26:27



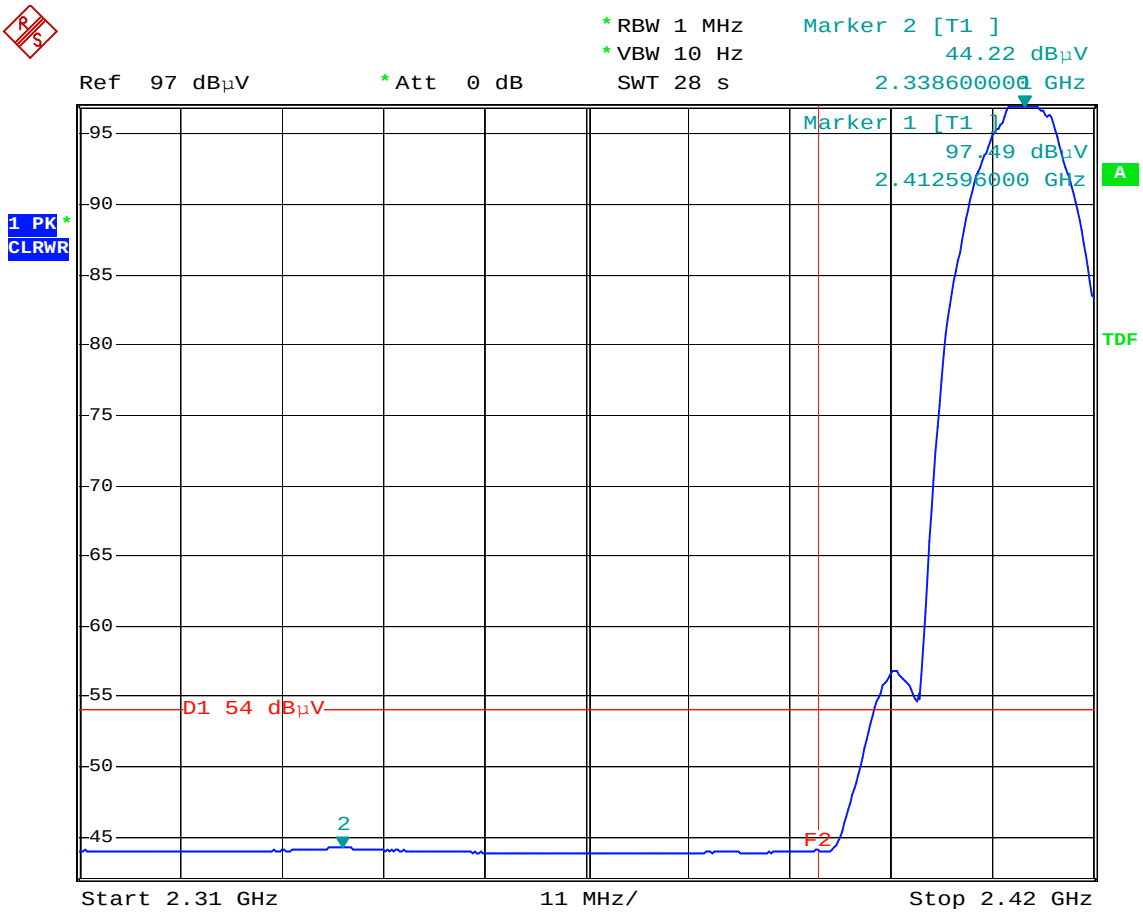
Comment A: Band-edge at high channel
Date: 26.SEP.2003 15:23:23

7.2 Band-edge (Radiated method)

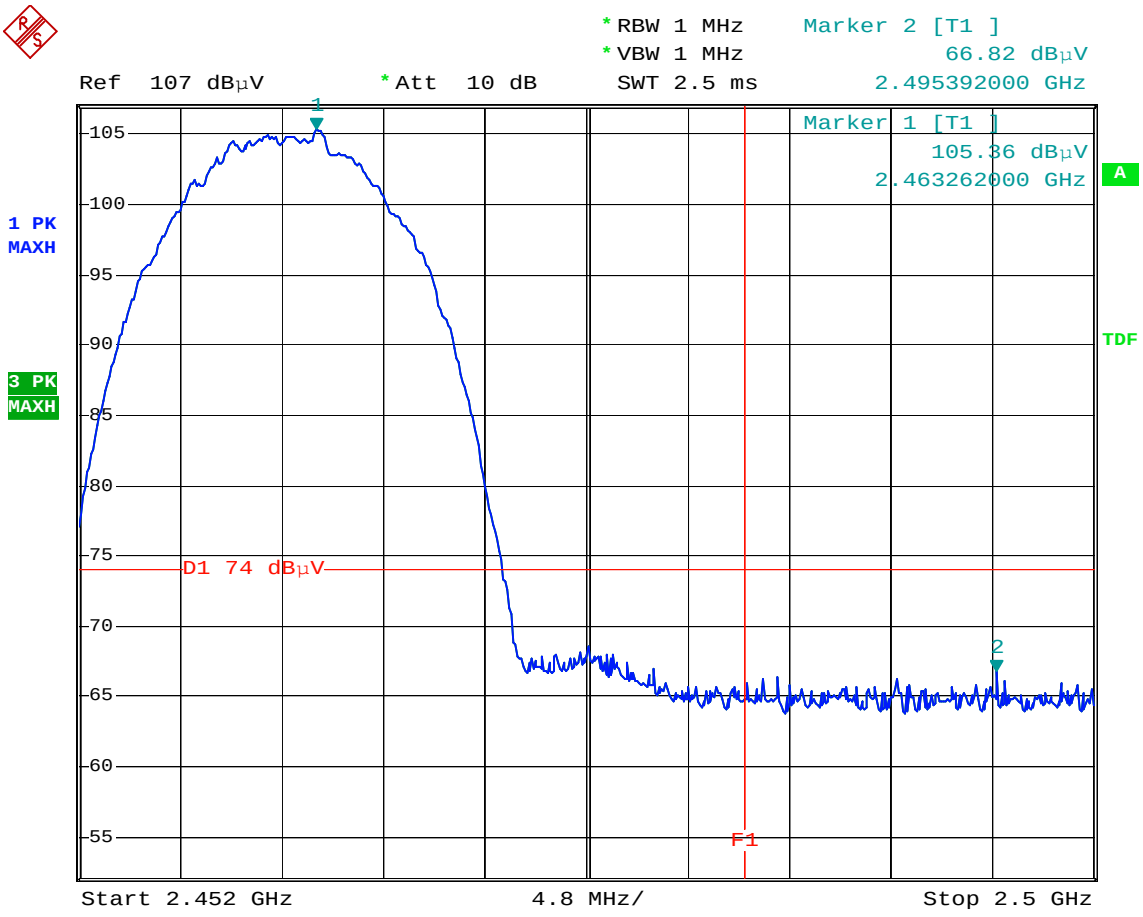
Test Condition: Antenna 1



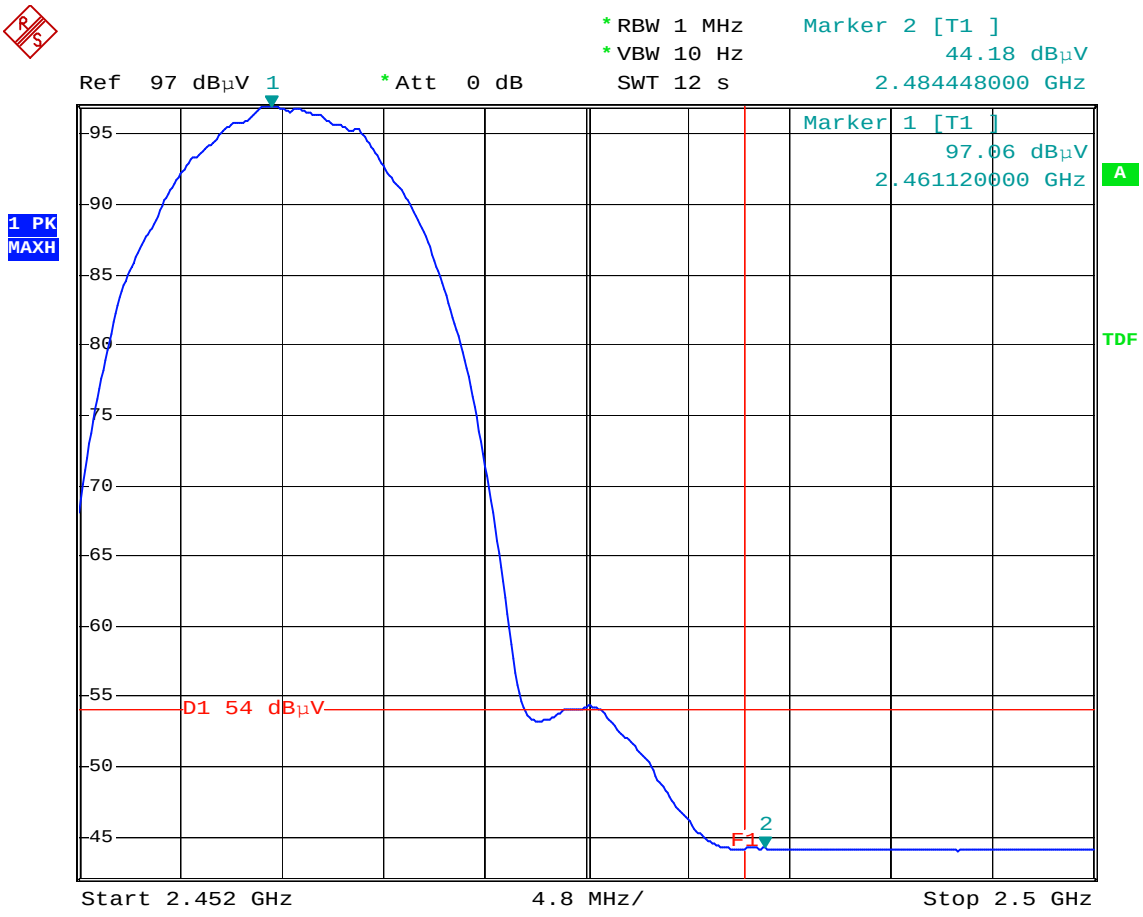
Comment A: Band-edge test at low channelEN B
Peak detector F2=2390MHz
Date: 29.OCT.2003 16:33:21



Comment A: Band-edge test at low channelEN B
Average detector F2=2390MHz
Date: 29.OCT.2003 16:36:08

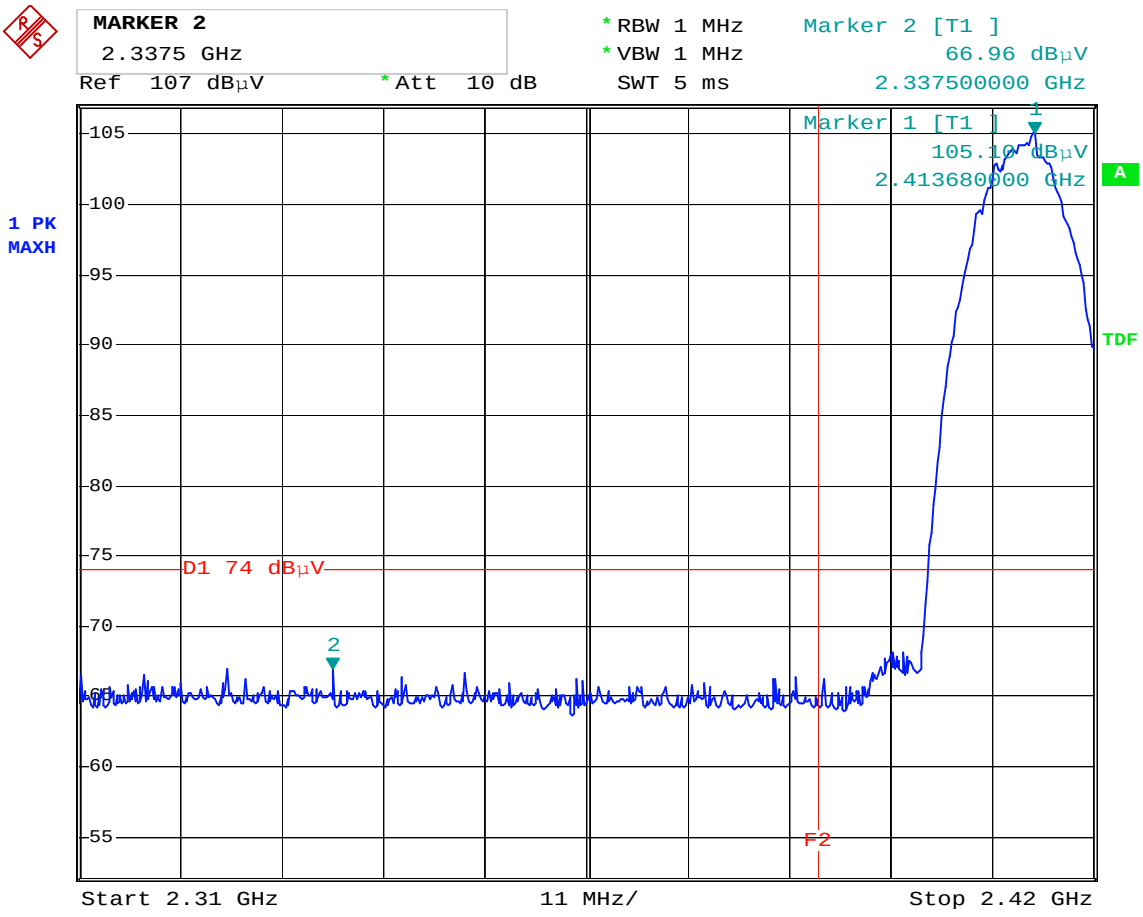


Comment A: Band-edge test at high channelN B
Peak detector F1=2483.5MHz
Date: 29.OCT.2003 16:30:08

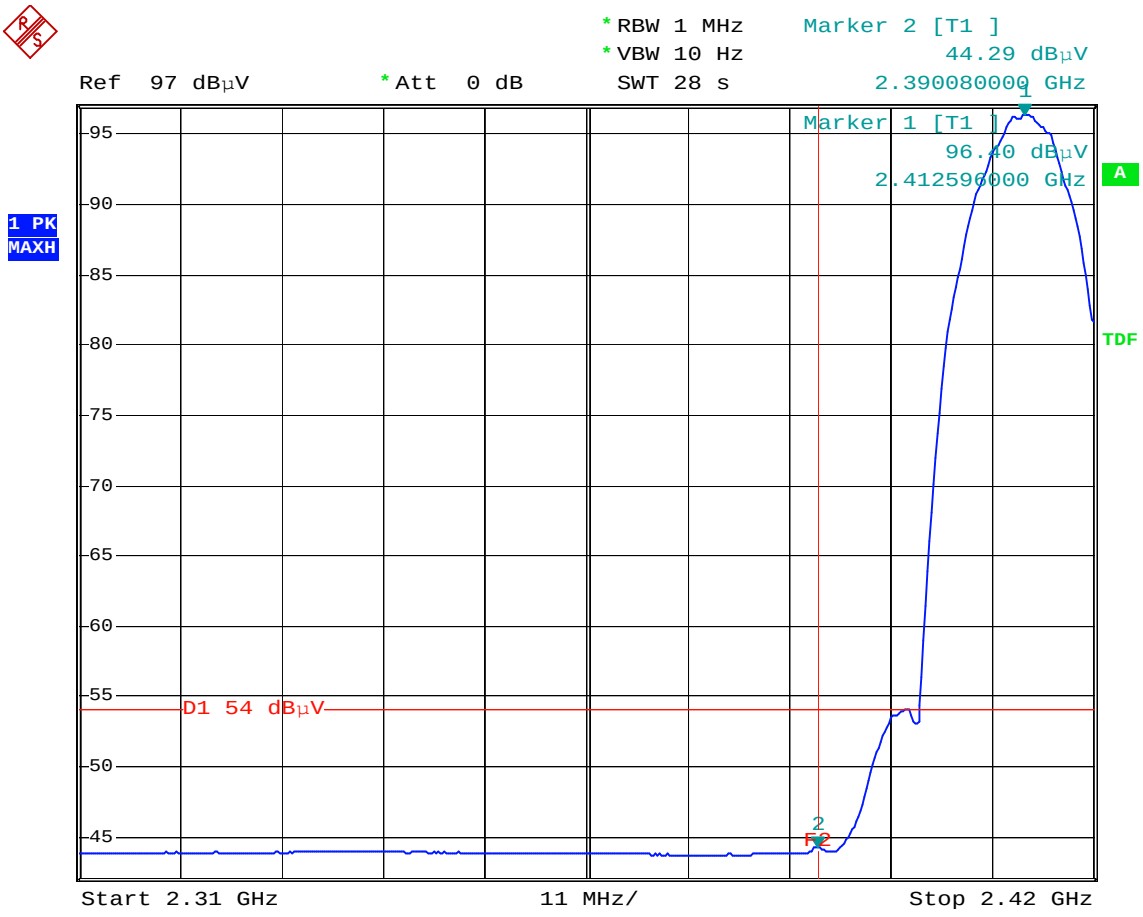


Comment A: Band-edge test at high channelN B
Average detector F1=2483.5MHz
Date: 29.OCT.2003 16:31:37

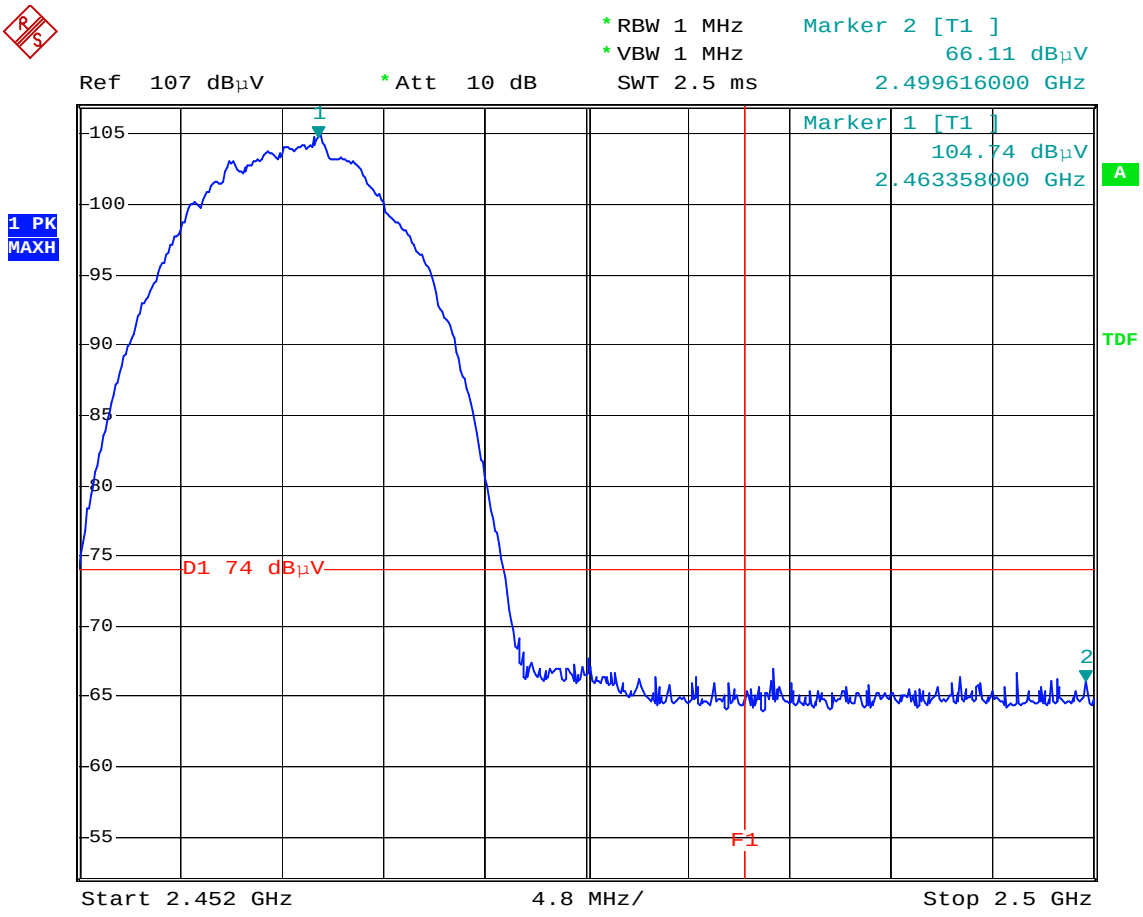
Test Condition: Antenna 2



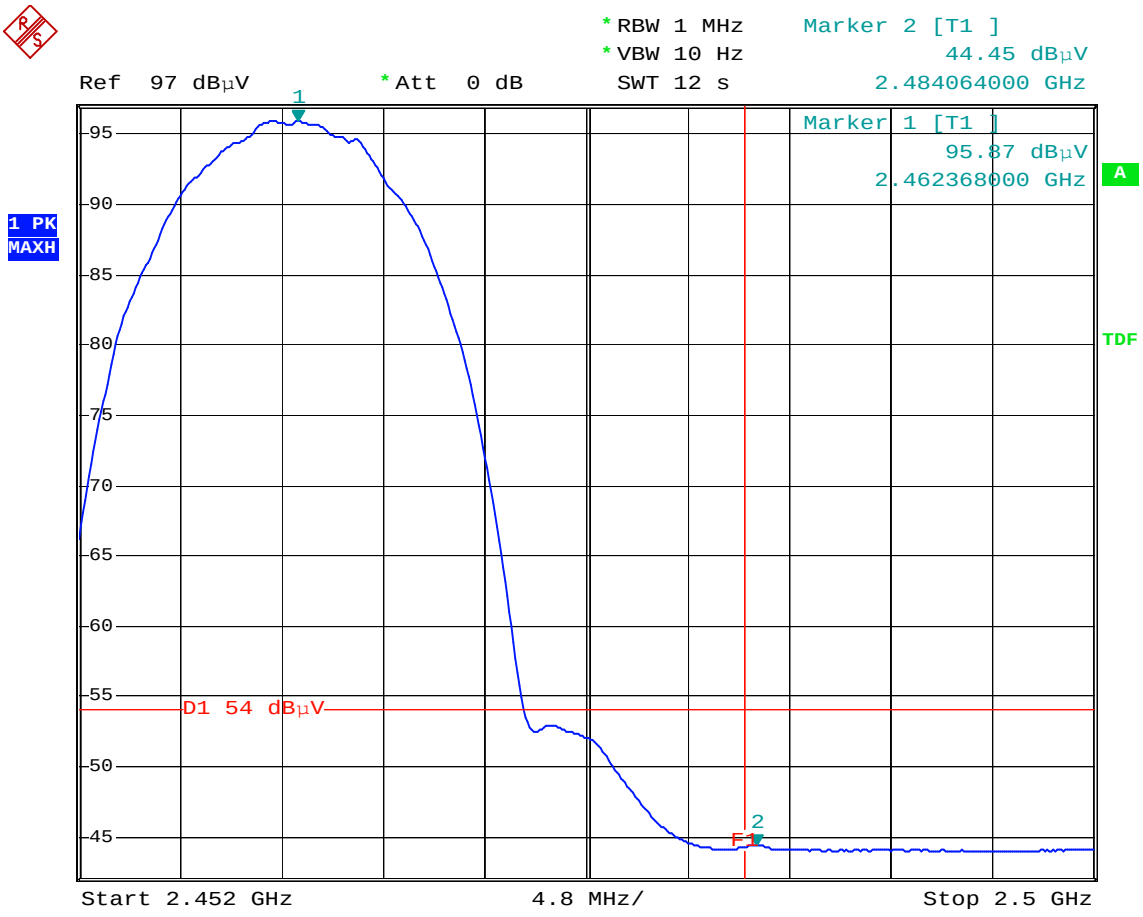
Comment A: Band-edge test at low channelEN B
Peak detector F2=2390MHz
Date: 29.OCT.2003 17:05:28



Comment A: Band-edge test at low channelEN B
Average detector F2=2390MHz
Date: 29.OCT.2003 17:07:07

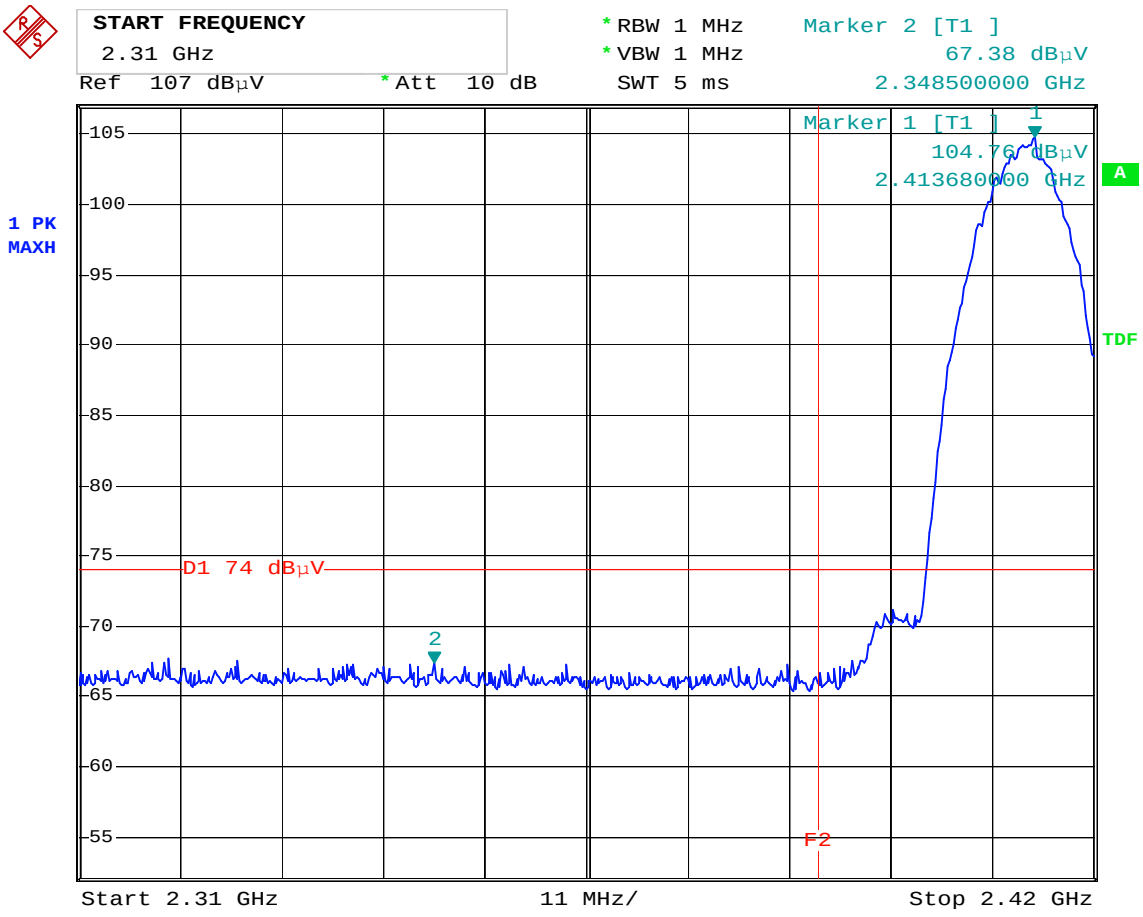


Comment A: Band-edge test at high channelN B
Peak detector F1=2483.5MHz
Date: 29.OCT.2003 17:08:58

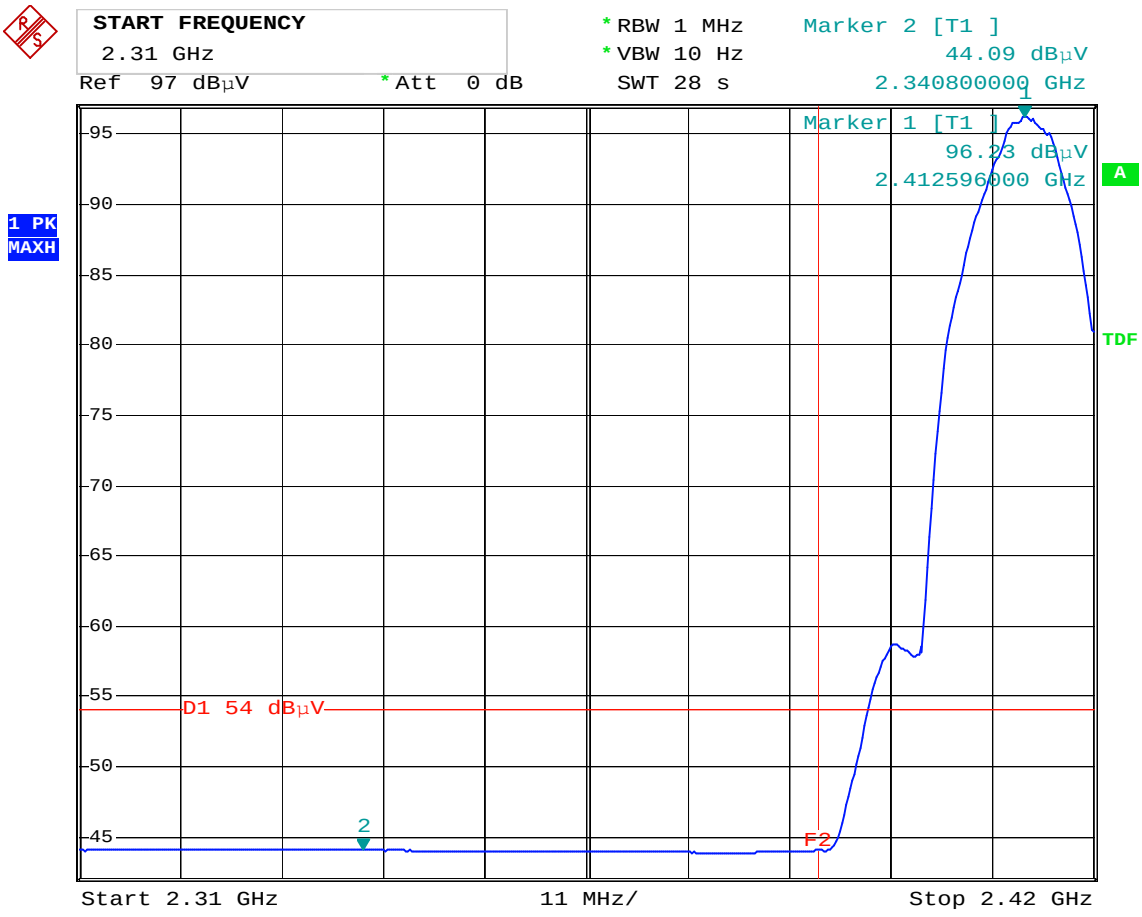


Comment A: Band-edge test at high channelN B
Average detector F1=2483.5MHz
Date: 29.OCT.2003 17:10:32

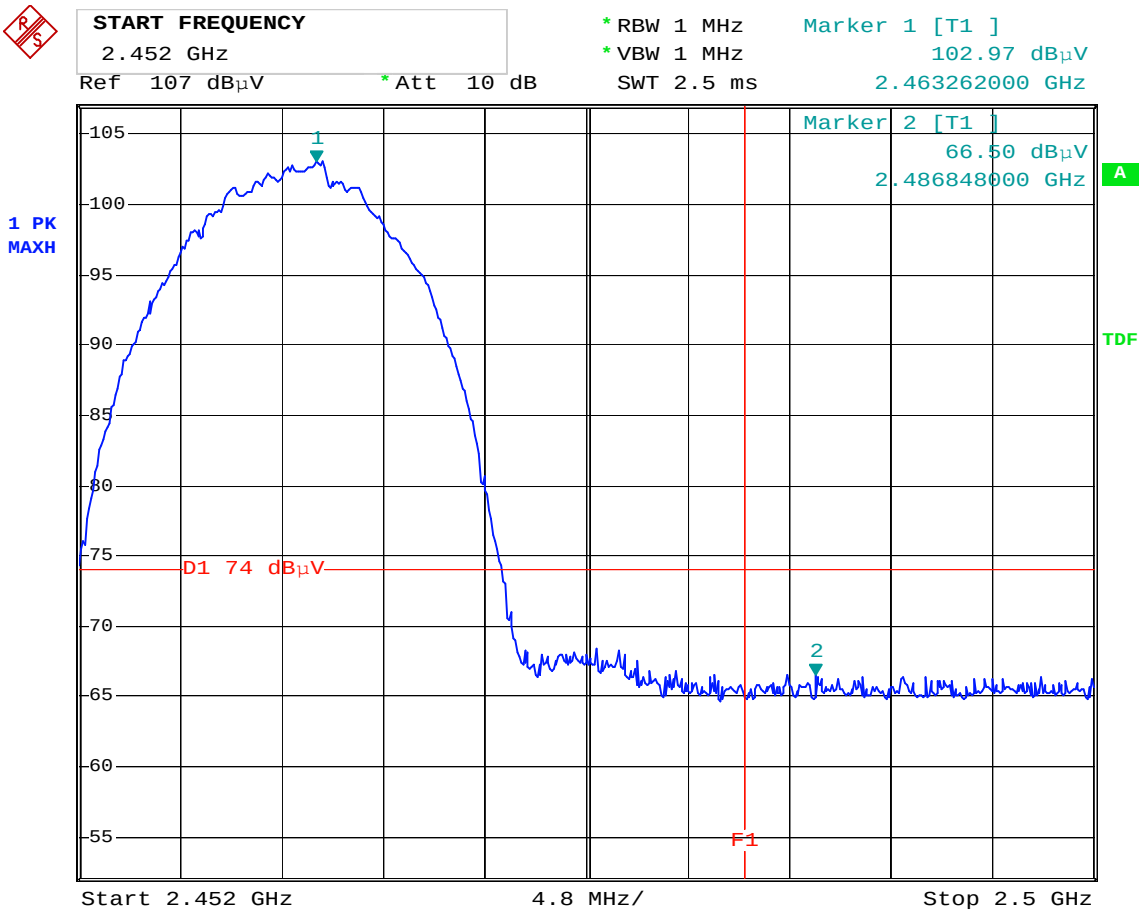
Test Condition: Antenna 3



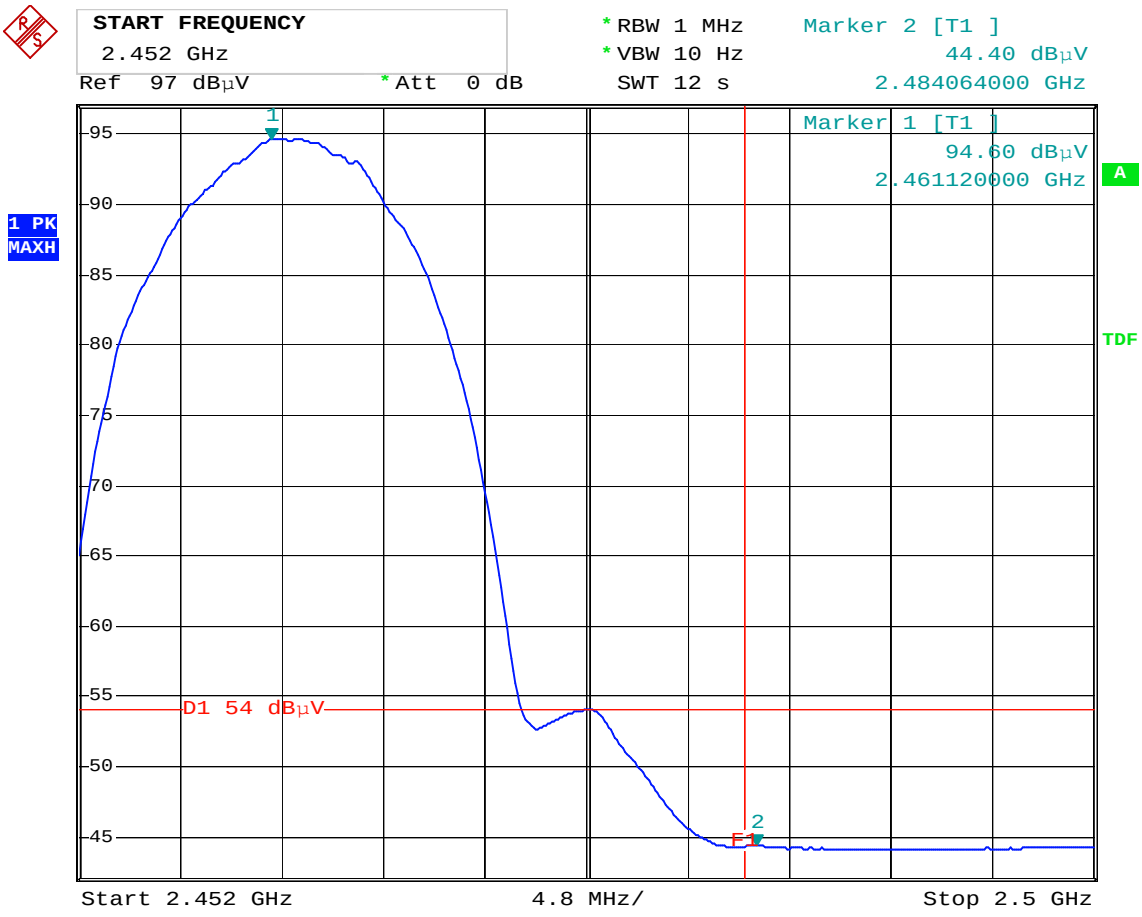
Comment A: Band-edge test at low channel1
Peak detector F2=2390MHz
Date: 21.OCT.2003 17:51:11



Comment A: Band-edge test at low channelEN B
Average detector F2=2390MHz
Date: 21.OCT.2003 17:54:04



Comment A: Band-edge test at high channelN B
Peak detector F1=2483.5MHz
Date: 21.OCT.2003 17:59:15



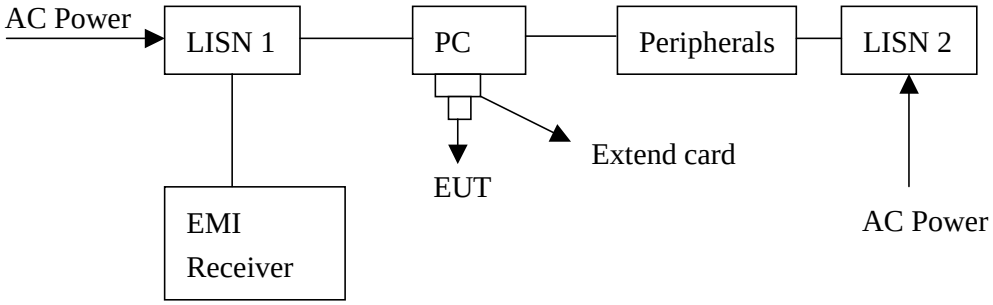
Comment A: Band-edge test at high channelN B
Average detector F1=2483.5MHz
Date: 21.OCT.2003 18:02:29

8. Power Line Conducted Emission test §FCC 15.207

8.1 Operating environment

Temperature:	22	℃	(10-40℃)
Relative Humidity:	52	%	(10-90%)
Atmospheric Pressure	1023	hPa	(860-1061hPa)

8.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/1992 on conducted measurement. The AC power conducted emissions was invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz. (15.207 paragraph)

The EUT configuration please refer to the "Conducted set-up photo.pdf".

Please see the plot below.

Emission Limit

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

8.3 Power Line Conducted Emission test data

(1) Line

EUT : WLC-101M

Test Condition : Normal operated mode

Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Reading (dB μ V) AV	Limit (dB μ V) AV	Margin (dB)	
					QP	AV
0.15800	47.9	65.57	43.4	55.57	-17.67	-12.17
0.19000	45.0	64.04	39.3	54.04	-19.04	-14.74
0.22200	40.8	62.75	37.5	52.75	-21.95	-15.25
0.70200	38.8	56.00	31.3	46.00	-17.20	-14.70
0.73400	39.5	56.00	30.3	46.00	-16.50	-15.70
0.76600	37.6	56.00	27.5	46.00	-18.40	-18.50

(2) Neutral

EUT : WLC-101M

Test Condition : Normal operated mode

Freq. (MHz)	Reading (dB μ V) QP	Limit (dB μ V) QP	Reading (dB μ V) AV	Limit (dB μ V) AV	Margin (dB)	
					QP	AV
0.15800	47.9	65.57	43.7	55.57	-17.67	-11.87
0.19000	45.0	64.04	39.3	54.04	-19.04	-14.74
0.22200	39.2	62.75	36.2	52.75	-23.55	-16.55
0.70200	38.4	56.00	30.2	46.00	-17.60	-15.80
0.73400	38.1	56.00	31.1	46.00	-17.90	-14.90
0.76600	36.9	56.00	26.7	46.00	-19.10	-19.30

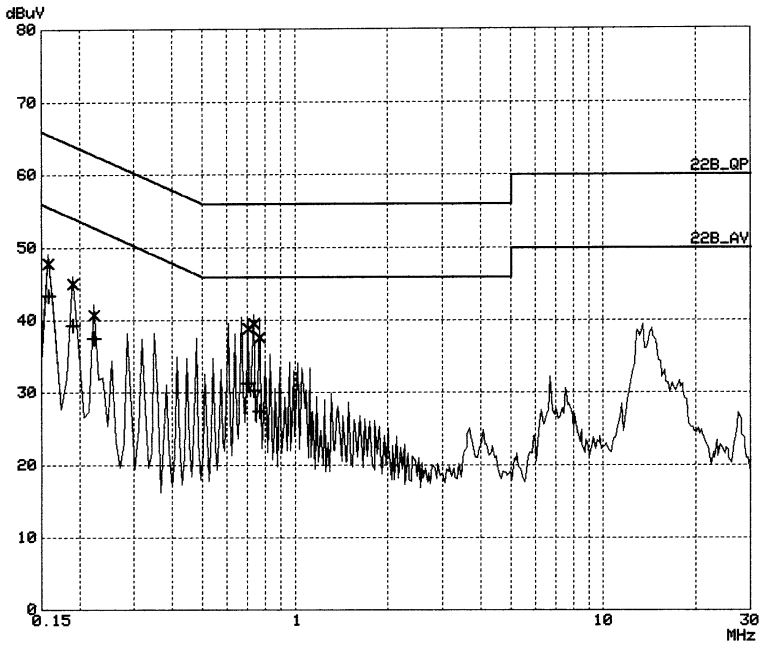
Remark:

1. The reading value included cable loss and LISN factor.
2. Uncertainty was calculated in accordance with NAMAS NIS 81.
   Expanded uncertainty (k=2) of conducted emission measurement is ±2.6 dB.

```
Intertek Testing Services
RF VOLTAGE
EUT:            WLC-101M
Manuf:          Cellvision
Op Cond:        LISN-L
Operator:       Clay
Test Spec:      FCC P15 Class_B
Comment:        EMI RCV:EC303        LISN:EC320
                120V 60Hz 26C 58%RH  normal operated mode
Date:           23. Sep 03  15:05

Scan Settings (1 Range)
|--------- Frequencies -----------||--------- Receiver Settings ---------|
   Start       Stop        Step     IF BW  Detector  M-Time  Atten Preamp
 150k         30M          8k         9k       PK      20ms AUTO LN   OFF

Final Measurement: x QP / + AV
                   Meas Time:    1 s
```



Intertek Testing Services
RF VOLTAGE

EUT:	WLC-101M
Manuf:	Cellvision
Op Cond:	LISN-N
Operator:	Clay
Test Spec:	FCC P15 Class_B
Comment:	EMI RCV:EC303 LISN:EC320
	120V 60Hz 26C 58%RH normal operated mode
Date:	23. Sep 03 15:11

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	30M	8k	9k	PK	20ms	AUTO LN	OFF

Final Measurement: x QP / + AV
Meas Time: 1 s