



Product Name	WiFi Combo VPN Router	Test Date	2010/10/4
Model	BDW463AM	Test By	John Chen
Test Mode	IEEE 802.11n HT40 TX (CH Low)	TEMP& Humidity	26.8°C, 57%

Horizontal

TX / IEEE 802.11n HT40 mode / CH Low					Measurement Distance at 3m			Horizontal polarity	
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
* 4844.18	51.69	33.23	3.74	42.40	0.70	46.96	74.00	-27.04	P
* 4844.18	41.85	33.23	3.74	42.40	0.70	37.12	54.00	-16.88	A
* 7265.34	50.16	38.70	4.69	41.80	1.50	53.25	74.00	-20.75	P
* 7265.34	40.73	38.70	4.69	41.80	1.50	43.82	54.00	-10.18	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.



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Vertical

TX / IEEE 802.11n HT40 mode / CH Low					Measurement Distance at 3m				Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4844.20	53.04	33.23	3.74	42.40	0.70	48.31	74.00	-25.69	P
*	4844.20	42.36	33.23	3.74	42.40	0.70	37.63	54.00	-16.37	A
*	7265.56	51.56	38.70	4.69	41.80	1.50	54.65	74.00	-19.35	P
*	7265.56	41.37	38.70	4.69	41.80	1.50	44.46	54.00	-9.54	A
	N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
	N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.



Product Name	WiFi Combo VPN Router	Test Date	2010/10/4
Model	BDW463AM	Test By	John Chen
Test Mode	IEEE 802.11n HT40 TX (CH Middle)	TEMP& Humidity	26.8°C, 57%

Horizontal

TX / IEEE 802.11n HT40 mode / CH Middle					Measurement Distance at 3m			Horizontal polarity	
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
* 4874.16	51.96	33.32	3.74	42.43	0.71	47.31	74.00	-26.69	P
* 4874.16	41.63	33.32	3.74	42.43	0.71	36.98	54.00	-17.02	A
* 7311.34	50.69	38.83	4.71	41.72	1.60	54.11	74.00	-19.89	P
* 7311.34	40.03	38.83	4.71	41.72	1.60	43.45	54.00	-10.55	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.



Product Name	WiFi Combo VPN Router	Test Date	2010/10/4
Model	BDW463AM	Test By	John Chen
Test Mode	IEEE 802.11n HT40 TX (CH Middle)	TEMP& Humidity	26.8°C, 57%

Vertical

TX / IEEE 802.11n HT40 mode / CH Middle					Measurement Distance at 3m				Vertical	polarity
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark	
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)	
* 4873.86	53.06	33.32	3.74	42.43	0.71	48.40	74.00	-25.60	P	
* 4873.86	42.25	33.32	3.74	42.43	0.71	37.59	54.00	-16.41	A	
* 7311.16	51.85	38.83	4.71	41.72	1.60	55.26	74.00	-18.74	P	
* 7311.16	41.36	38.83	4.71	41.72	1.60	44.77	54.00	-9.23	A	
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P	
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A	

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.



Product Name	WiFi Combo VPN Router	Test Date	2010/10/4
Model	BDW463AM	Test By	John Chen
Test Mode	IEEE 802.11n HT40 TX (CH High)	TEMP& Humidity	26.8°C, 57%

Horizontal

TX / IEEE 802.11n HT40 mode / CH High					Measurement Distance at 3m				Horizontal polarity	
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark	
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)	
* 4903.86	51.36	33.41	3.75	42.46	0.72	46.78	74.00	-27.22	P	
* 4903.86	41.69	33.41	3.75	42.46	0.72	37.11	54.00	-16.89	A	
* 7355.95	50.84	38.97	4.73	41.65	1.69	54.58	74.00	-19.42	P	
* 7355.95	40.62	38.97	4.73	41.65	1.69	44.36	54.00	-9.64	A	
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P	
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A	

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.



Product Name	WiFi Combo VPN Router	Test Date	2010/10/4
Model	BDW463AM	Test By	John Chen
Test Mode	IEEE 802.11n HT40 TX (CH High)	TEMP& Humidity	26.8°C , 57%

Vertical

TX / IEEE 802.11n HT40 mode / CH High					Measurement Distance at 3m				Vertical	polarity
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark	
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)	
* 4904.16	53.21	33.41	3.75	42.46	0.72	48.64	74.00	-25.36	P	
* 4904.16	41.85	33.41	3.75	42.46	0.72	37.28	54.00	-16.72	A	
* 7355.98	51.39	38.97	4.73	41.65	1.69	55.13	74.00	-18.87	P	
* 7355.98	41.08	38.97	4.73	41.65	1.69	44.82	54.00	-9.18	A	
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P	
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A	

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:
Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.



8.6.4 RESTRICTED BAND EDGES

802.11b Mode

Channel	Polarity	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
LOW	H	2390.00	57.26	74	-16.74	Peak
	H	2390.00	45.17	54	-8.83	Average
	V	2390.00	62.46	74	-11.54	Peak
	V	2390.00	52.38	54	-1.62	Average
HIGH	H	2483.50	57.19	74	-16.81	Peak
	H	2483.50	45.61	54	-8.39	Average
	V	2483.50	62.97	74	-11.03	Peak
	V	2483.50	52.74	54	-1.26	Average

802.11g Mode

Channel	Polarity	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
LOW	H	2390.00	58.79	74	-15.21	Peak
	H	2390.00	45.96	54	-8.04	Average
	V	2390.00	69.69	74	-4.31	Peak
	V	2390.00	52.48	54	-1.52	Average
HIGH	H	2483.50	61.51	74	-12.49	Peak
	H	2483.50	46.55	54	-7.45	Average
	V	2483.50	69.36	74	-4.64	Peak
	V	2483.50	51.46	54	-2.54	Average

802.11n HT-20 Mode

Channel	Polarity	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
LOW	H	2390.00	60.35	74	-13.65	Peak
	H	2390.00	46.63	54	-7.37	Average
	V	2390.00	70.95	74	-3.05	Peak
	V	2390.00	52.27	54	-1.73	Average
HIGH	H	2483.50	57.79	74	-16.21	Peak
	H	2483.50	45.75	54	-8.25	Average
	V	2483.50	68.45	74	-5.55	Peak
	V	2483.50	51.78	54	-2.22	Average

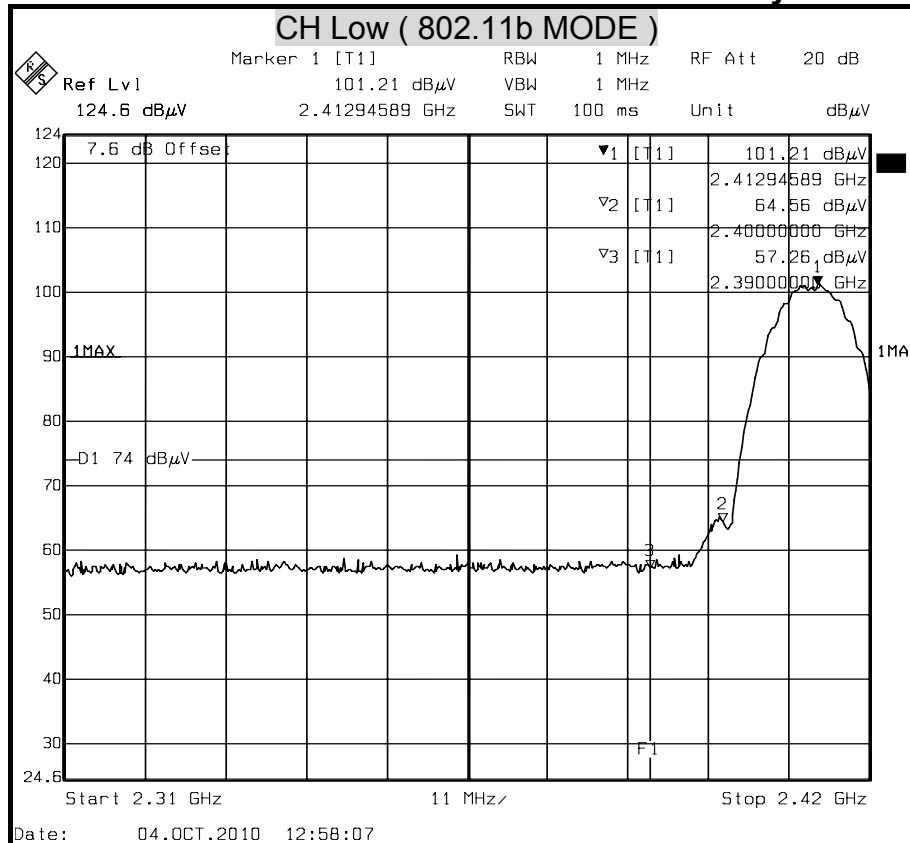
802.11n HT-40 Mode

Channel	Polarity	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
LOW	H	2390.00	58.25	74	-15.75	Peak
	H	2390.00	46.58	54	-7.42	Average
	V	2390.00	68.62	74	-5.38	Peak
	V	2390.00	52.44	54	-1.56	Average
HIGH	H	2483.50	58.8	74	-15.20	Peak
	H	2483.50	45.73	54	-8.27	Average
	V	2483.50	69.69	74	-4.31	Peak
	V	2483.50	52.19	54	-1.81	Average



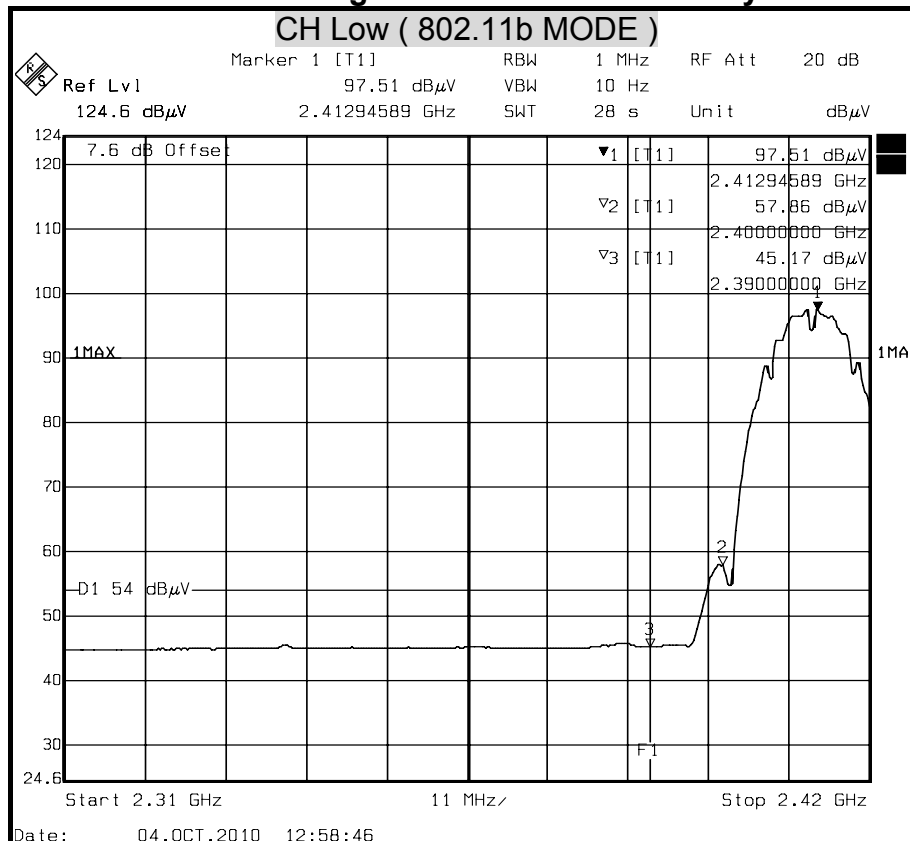
Detector mode : Peak

Polarity : Horizontal



Detector mode : Average

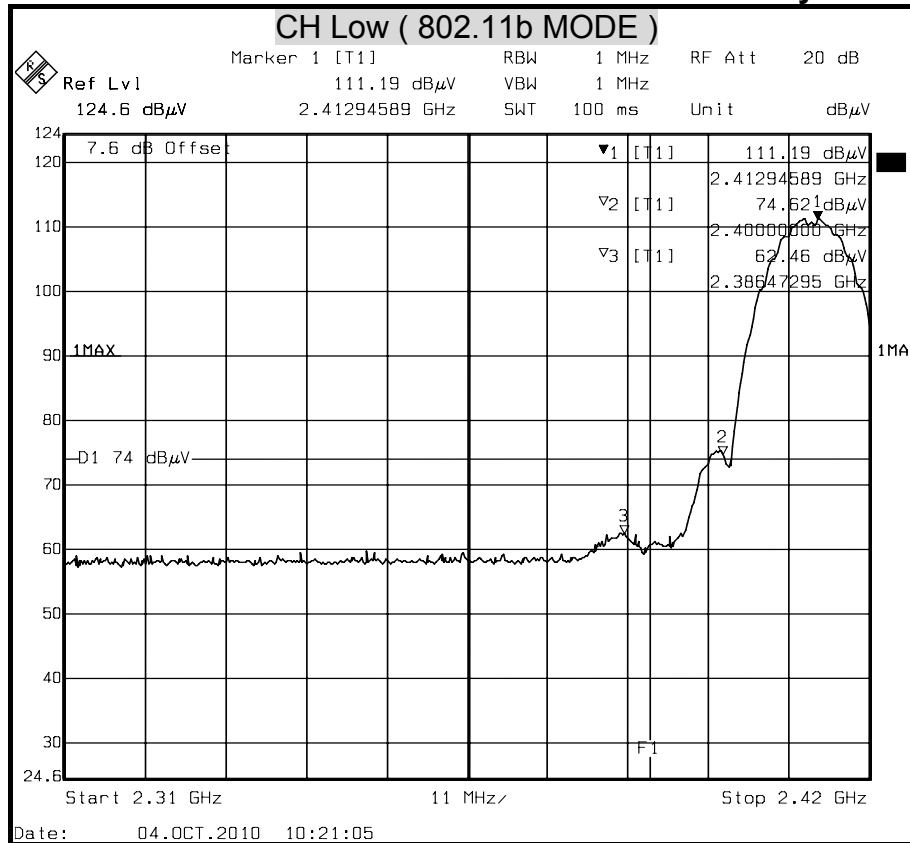
Polarity : Horizontal





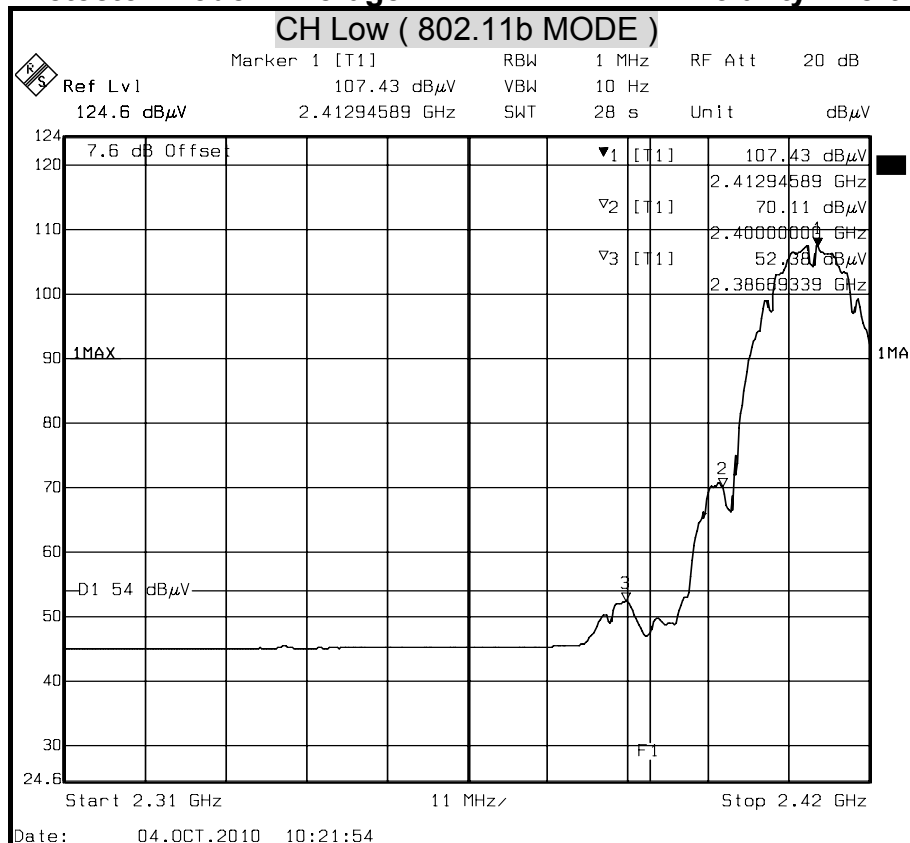
Detector mode : Peak

Polarity : Vertical



Detector mode : Average

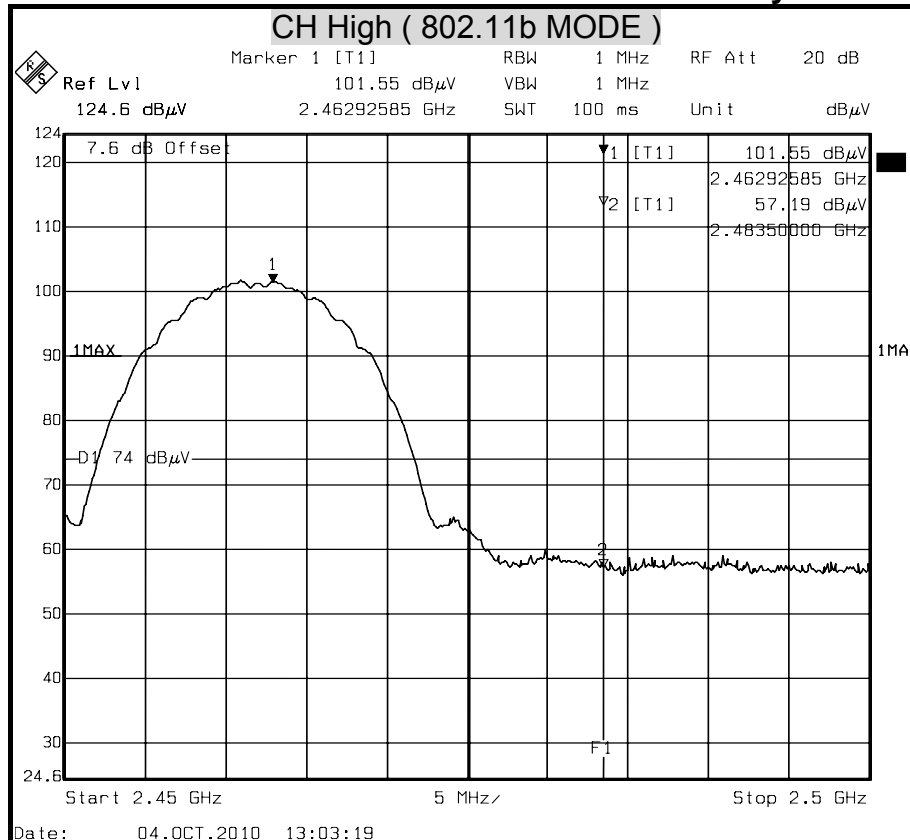
Polarity : Vertical





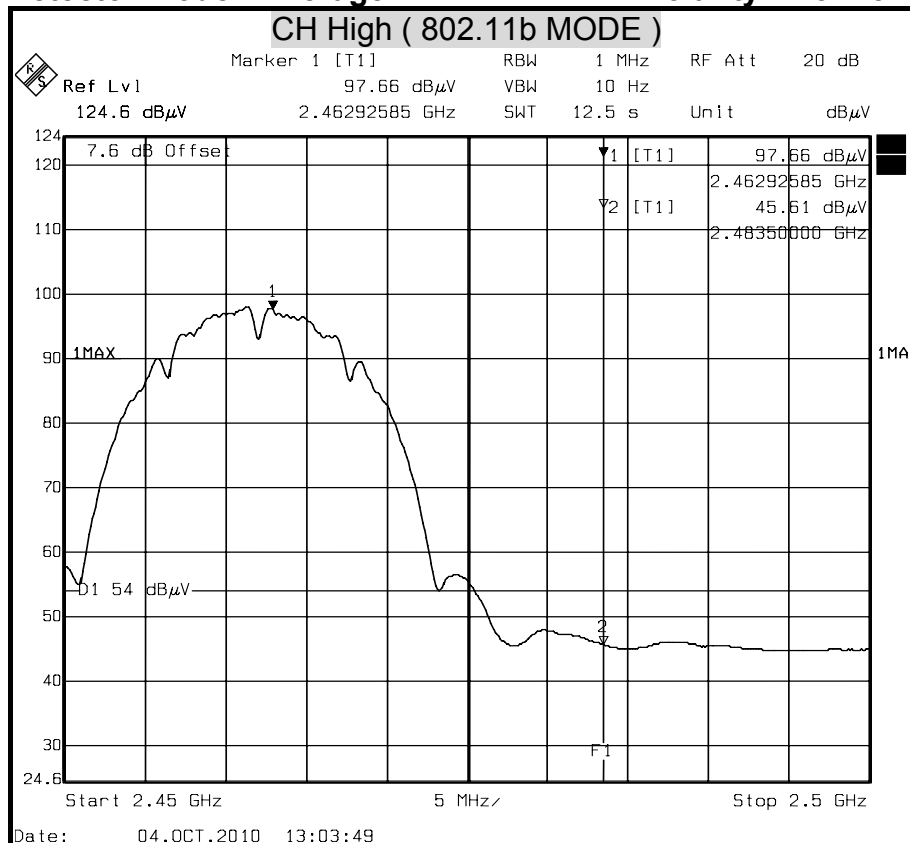
Detector mode : Peak

Polarity : Horizontal



Detector mode : Average

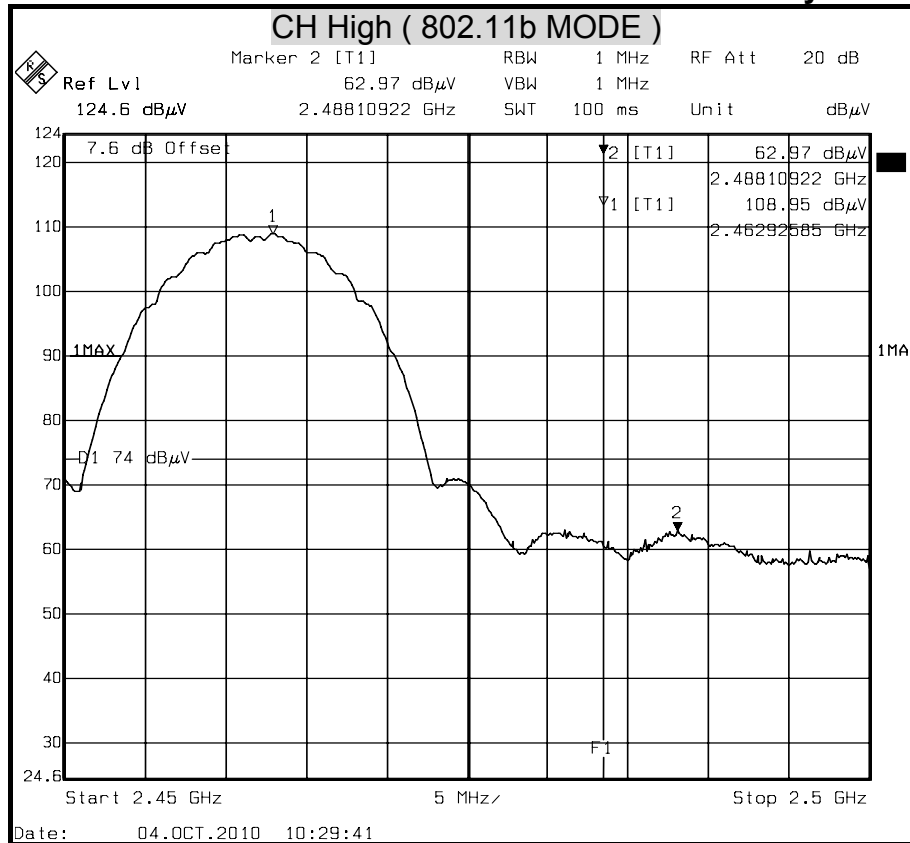
Polarity : Horizontal





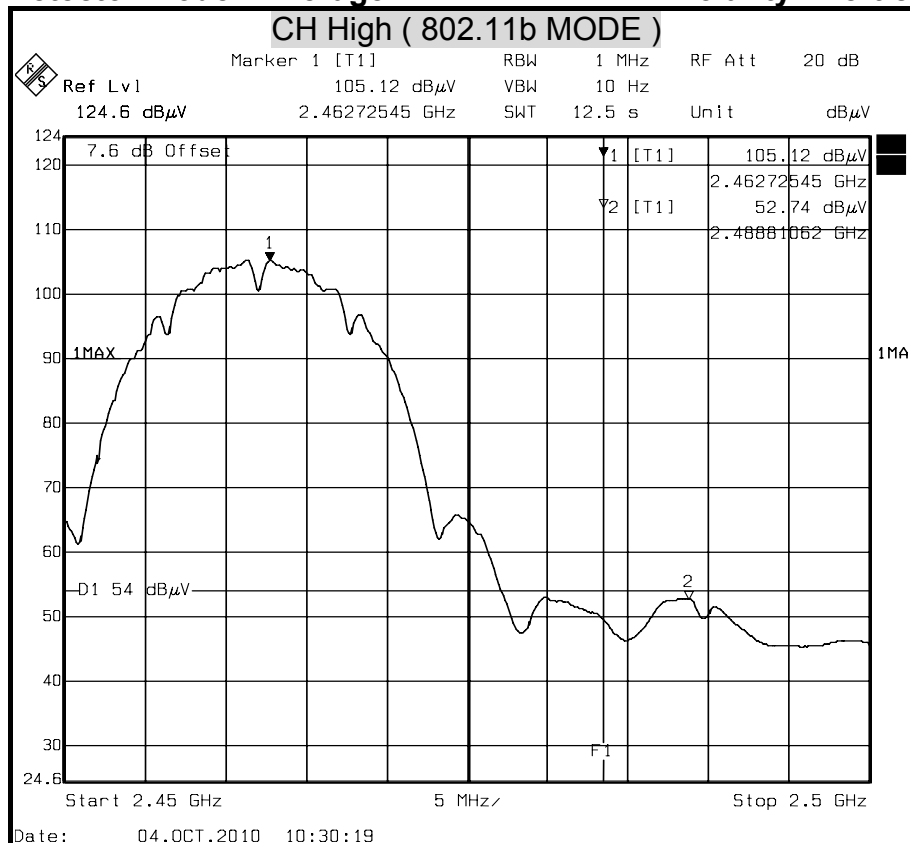
Detector mode : Peak

Polarity : Vertical



Detector mode : Average

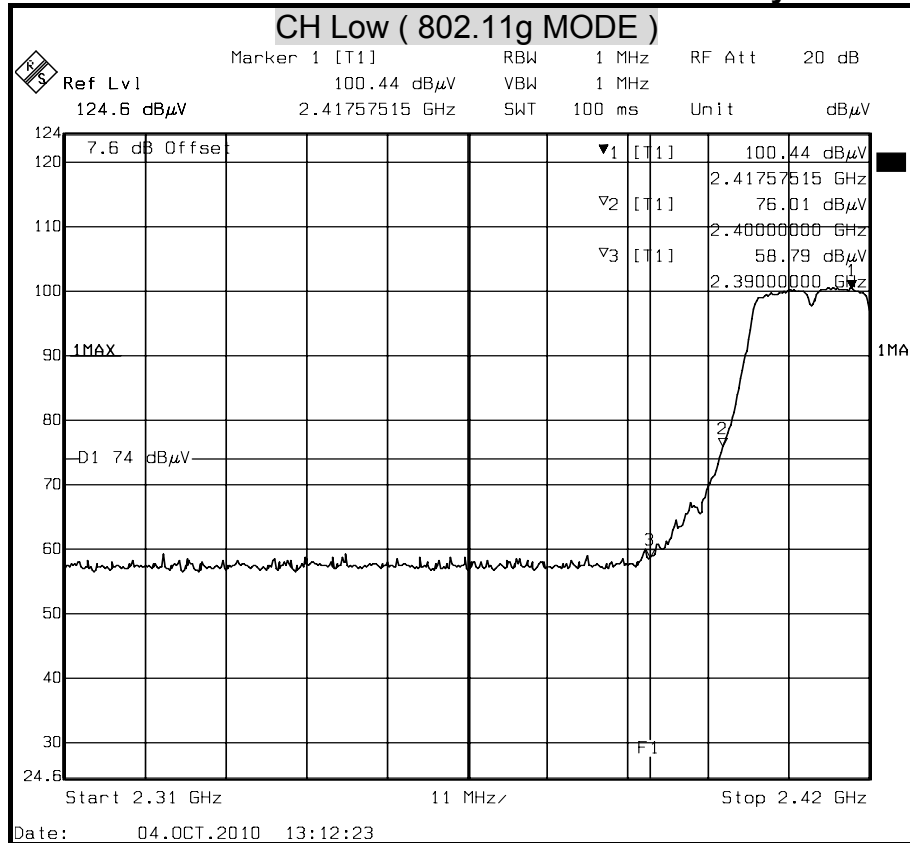
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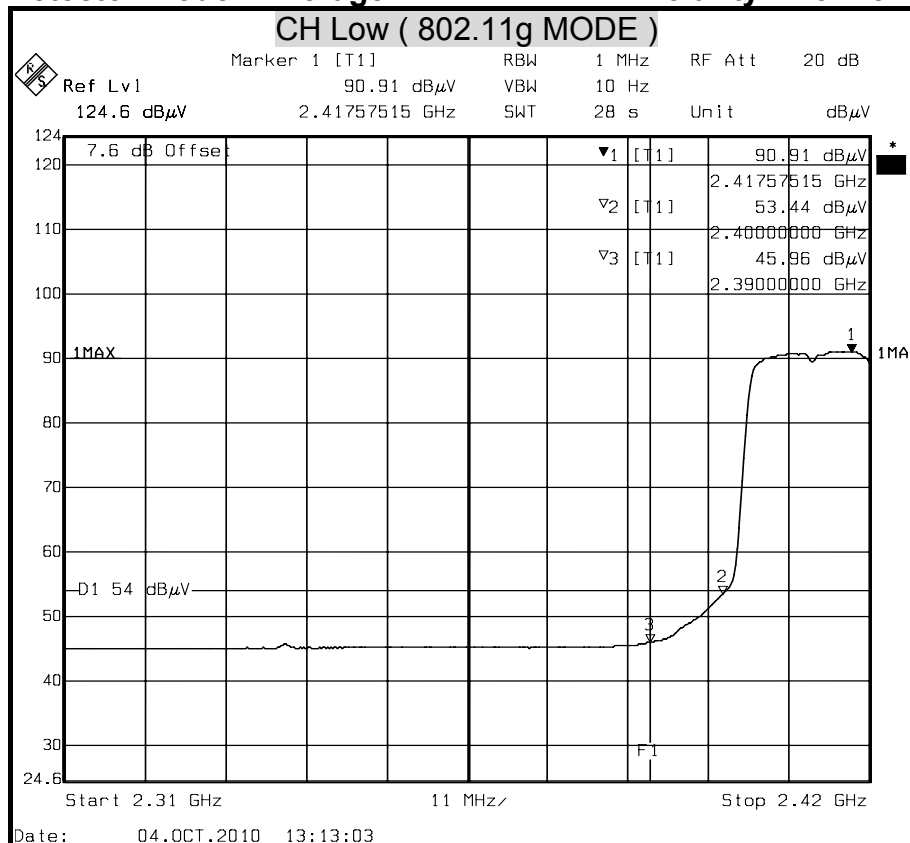
Detector mode : Peak

Polarity : Horizontal



Detector mode : Average

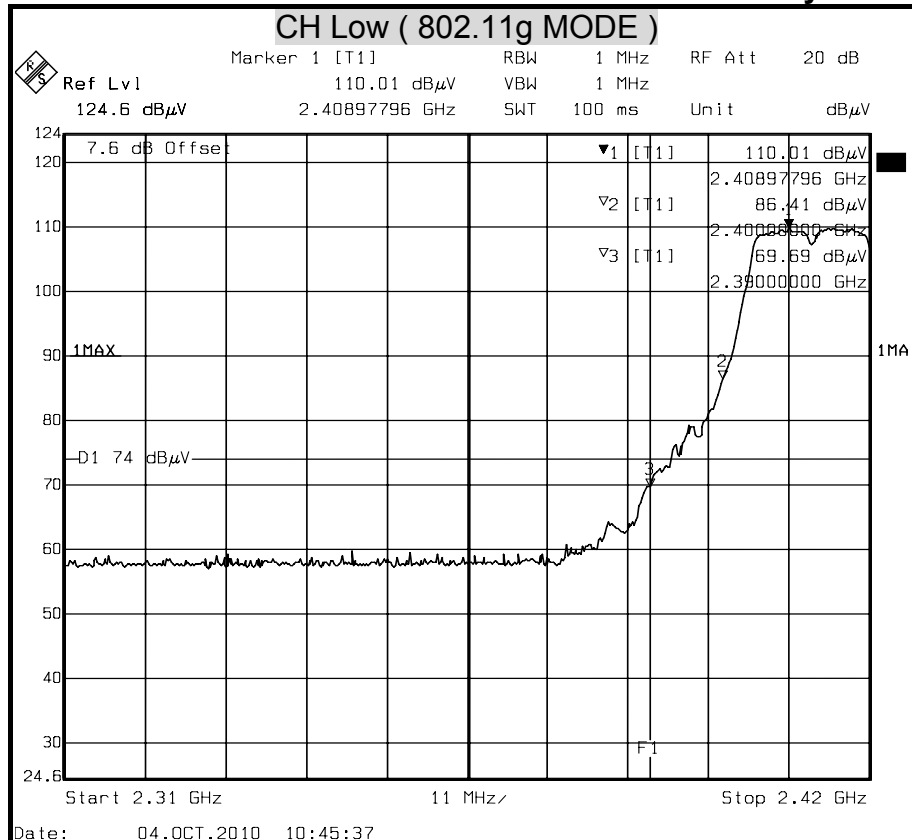
Polarity : Horizontal





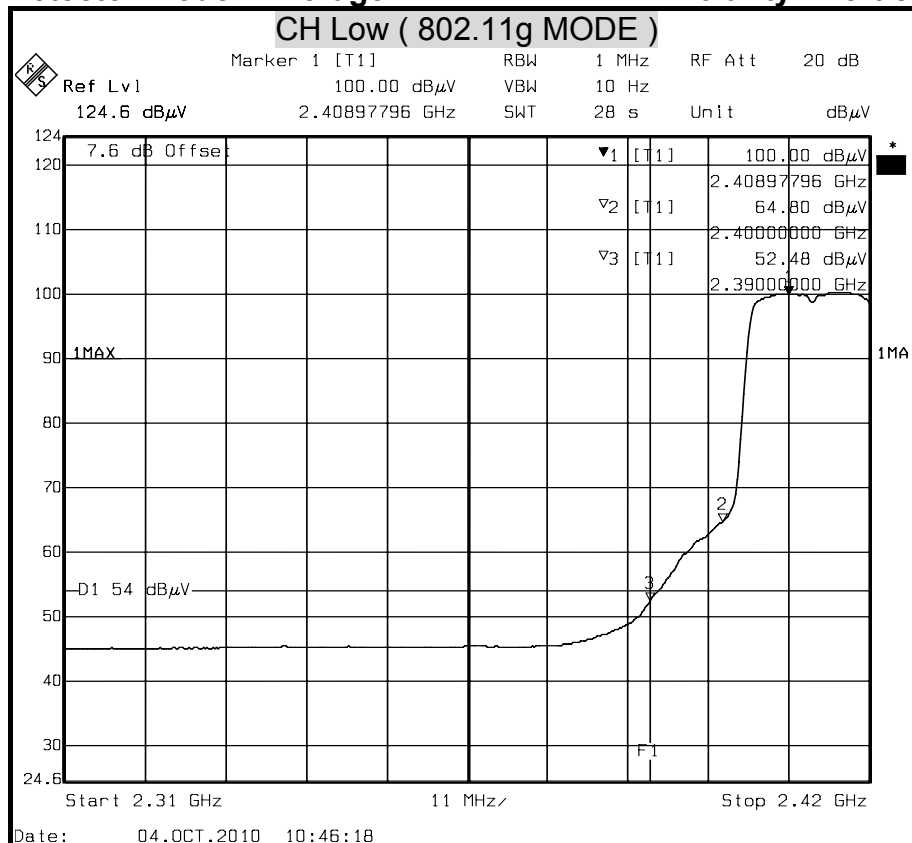
Detector mode : Peak

Polarity : Vertical



Detector mode : Average

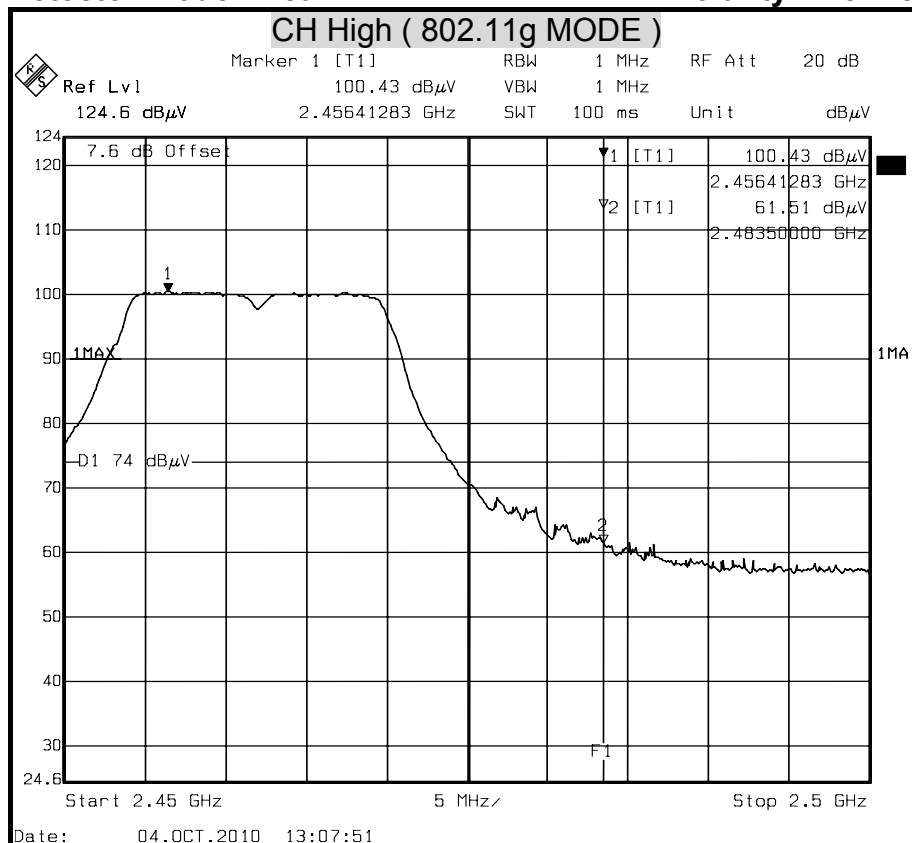
Polarity : Vertical





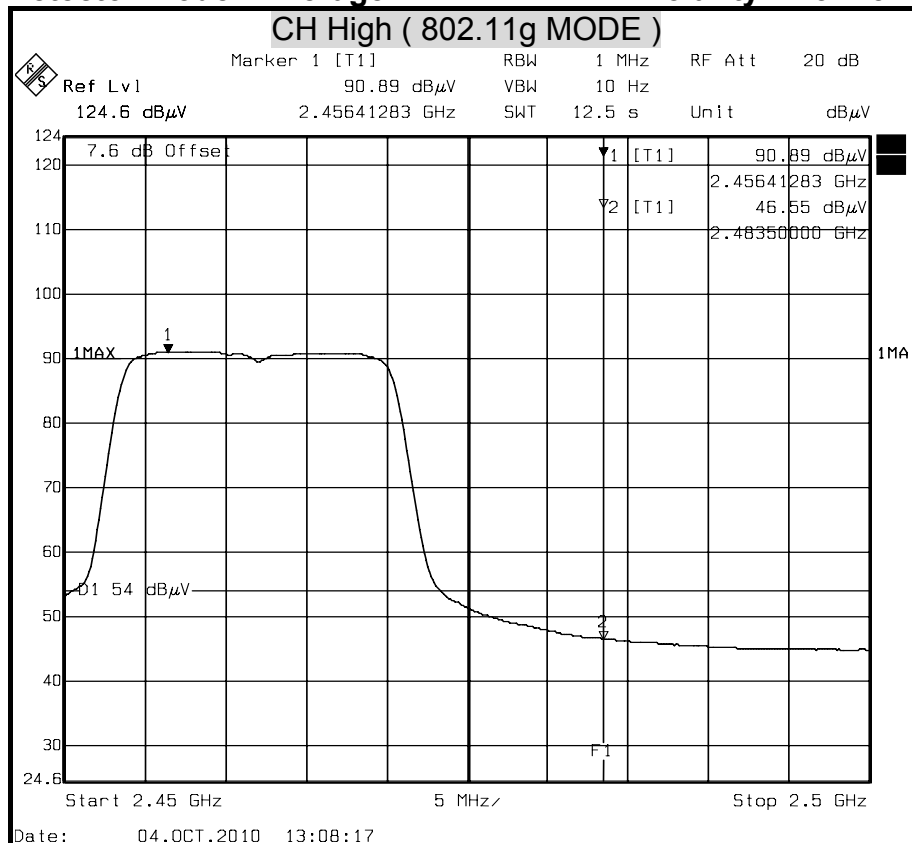
Detector mode : Peak

Polarity : Horizontal



Detector mode : Average

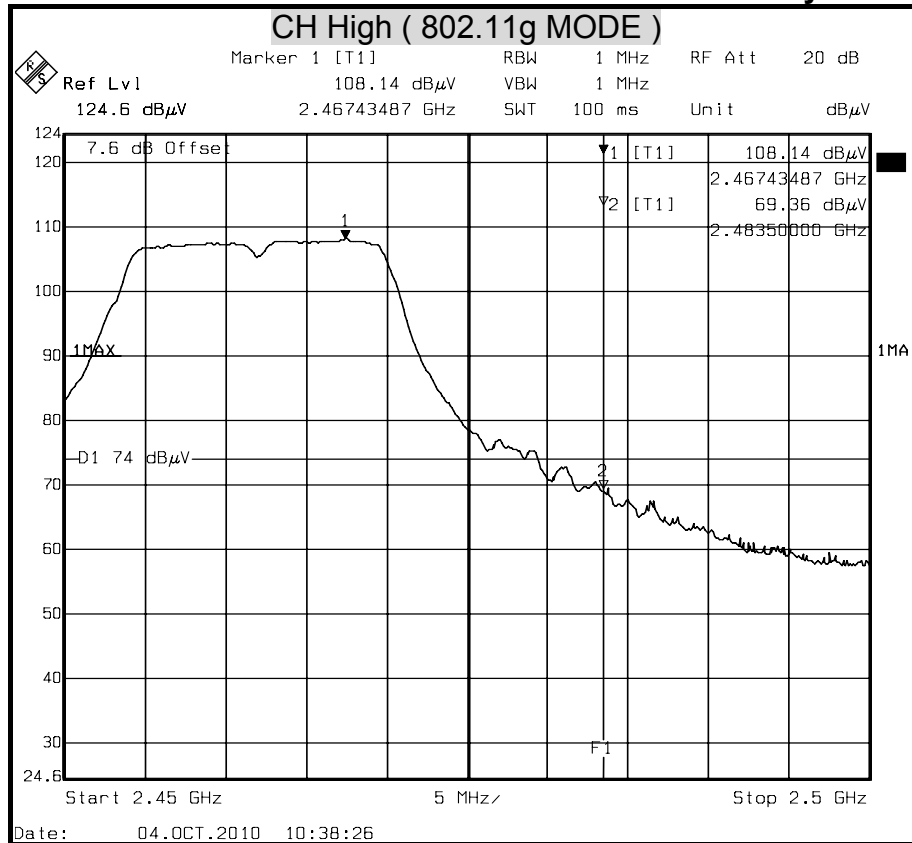
Polarity : Horizontal





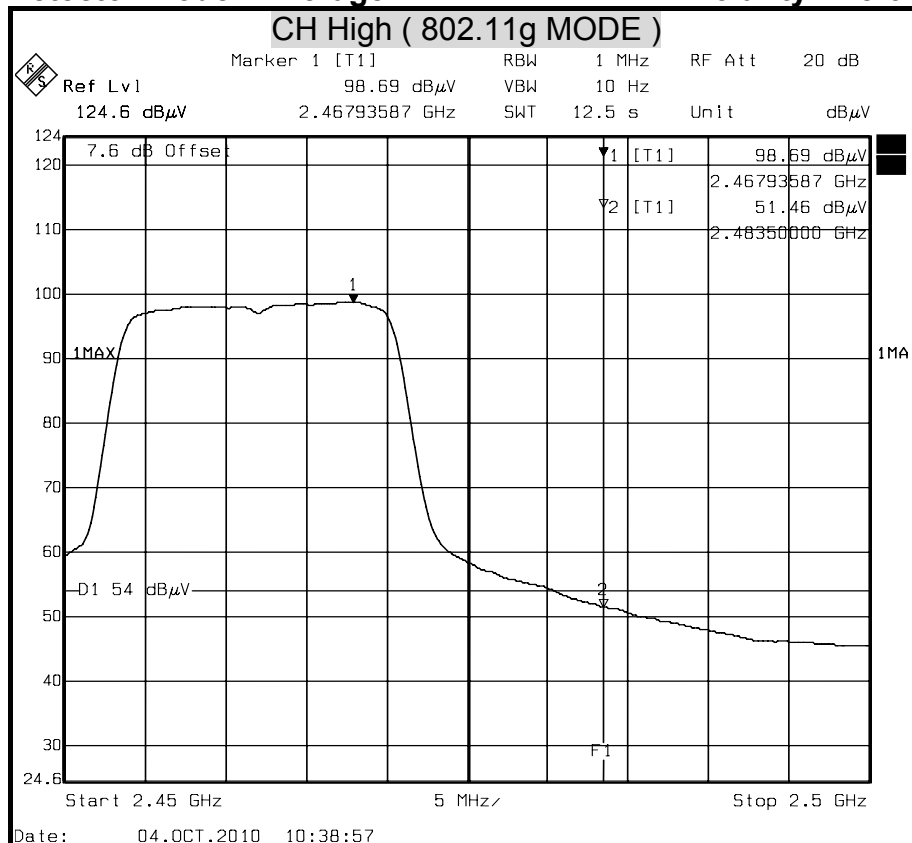
Detector mode : Peak

Polarity : Vertical



Detector mode : Average

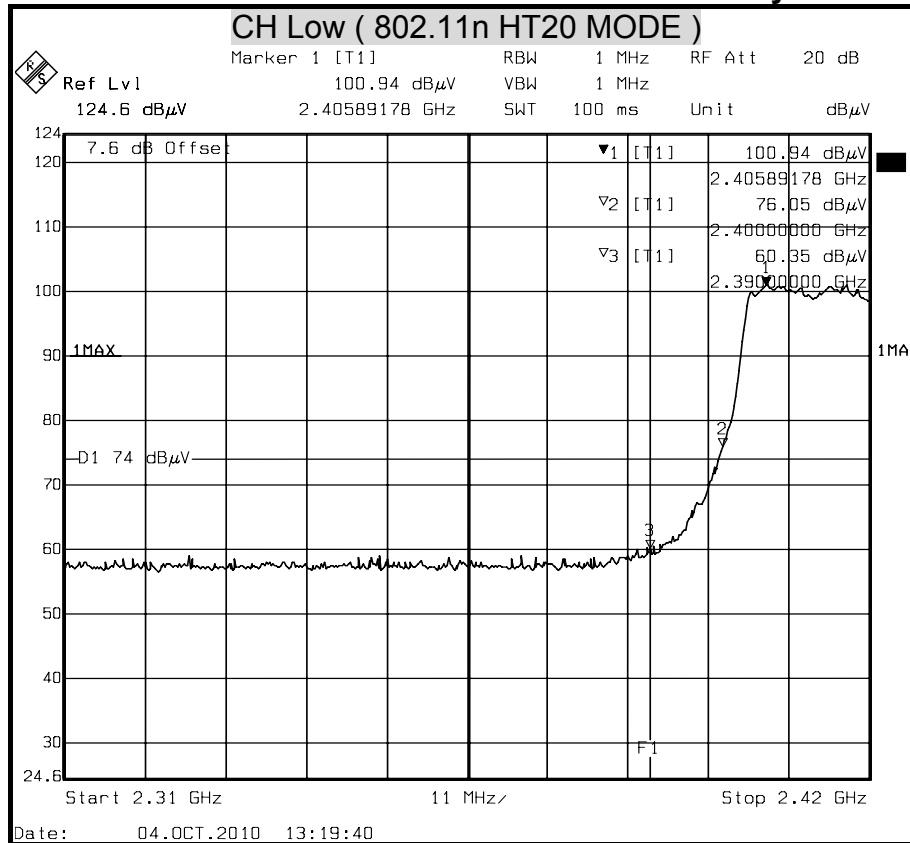
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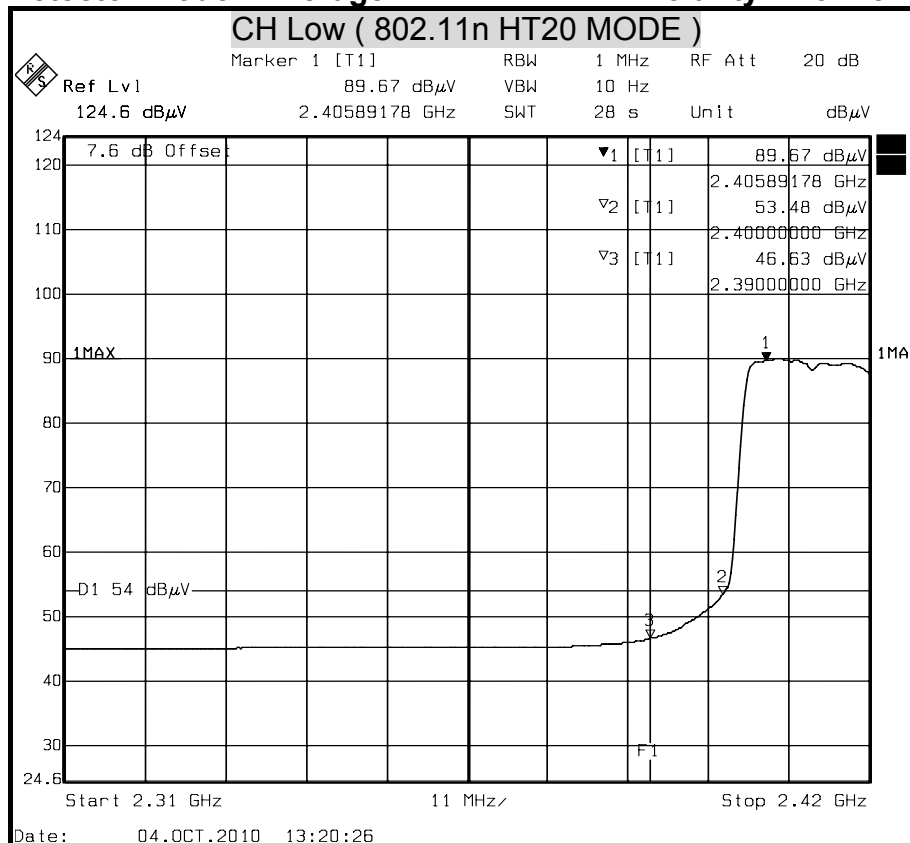
Detector mode : Peak

Polarity : Horizontal



Detector mode : Average

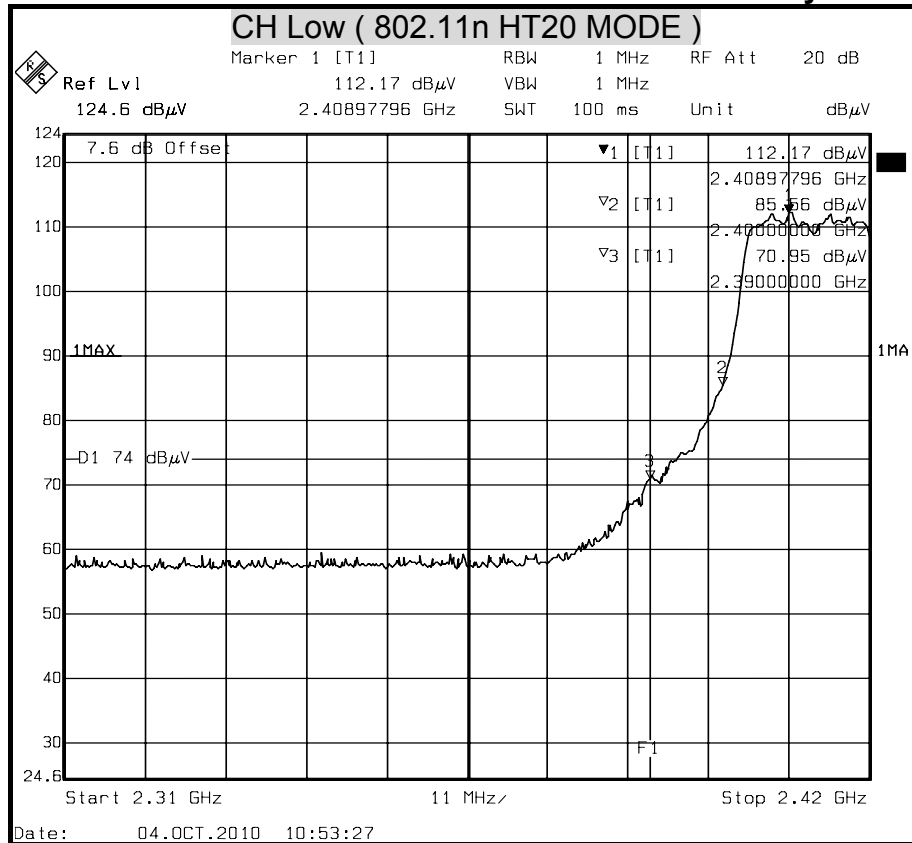
Polarity : Horizontal





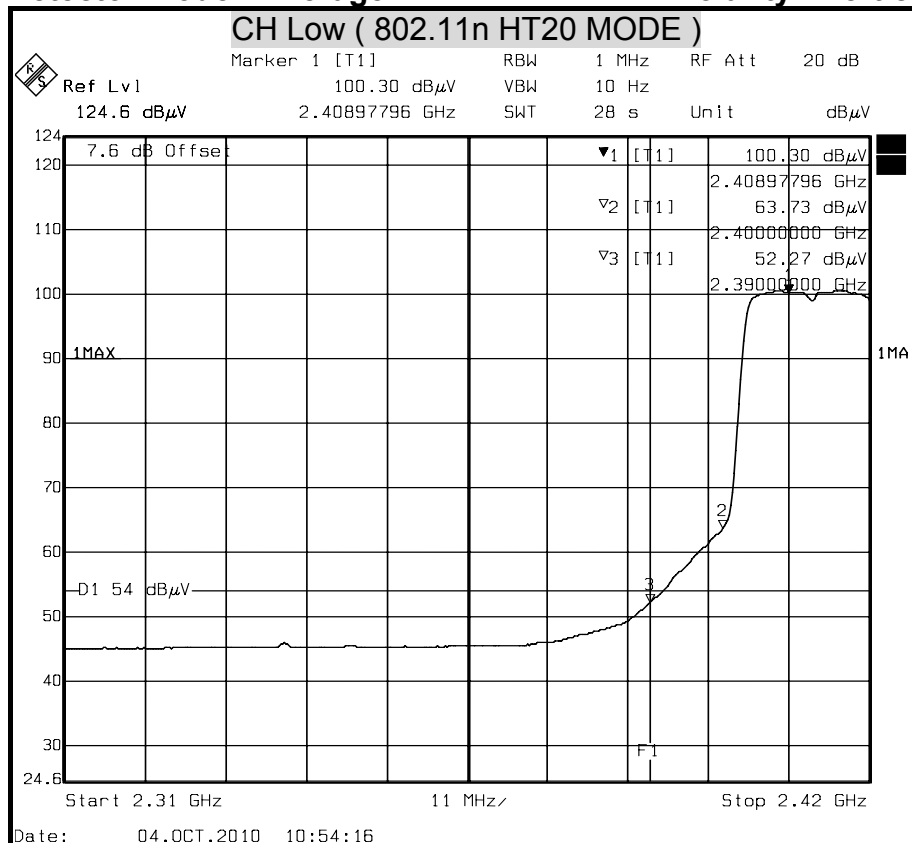
Detector mode : Peak

Polarity : Vertical



Detector mode : Average

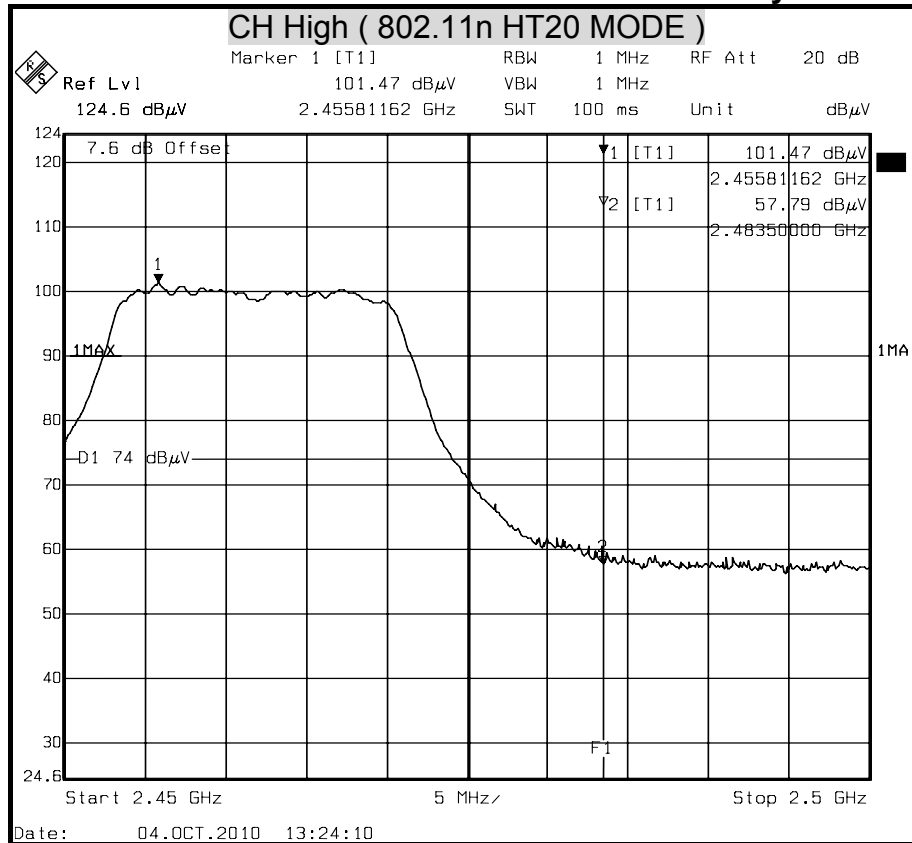
Polarity : Vertical





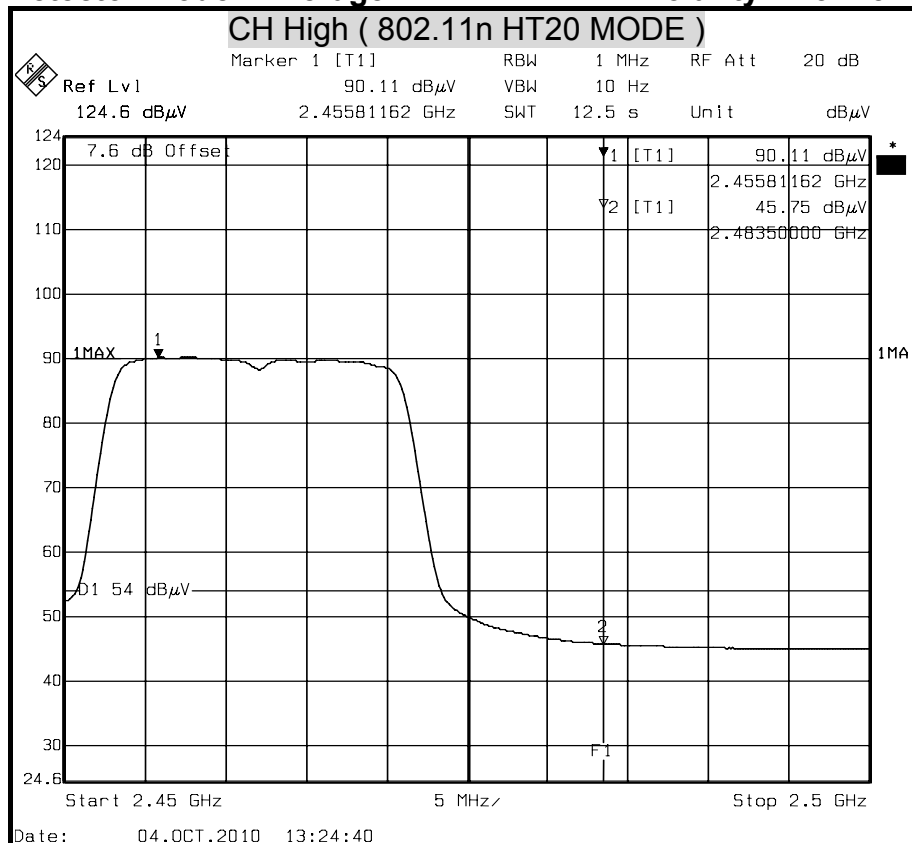
Detector mode : Peak

Polarity : Horizontal



Detector mode : Average

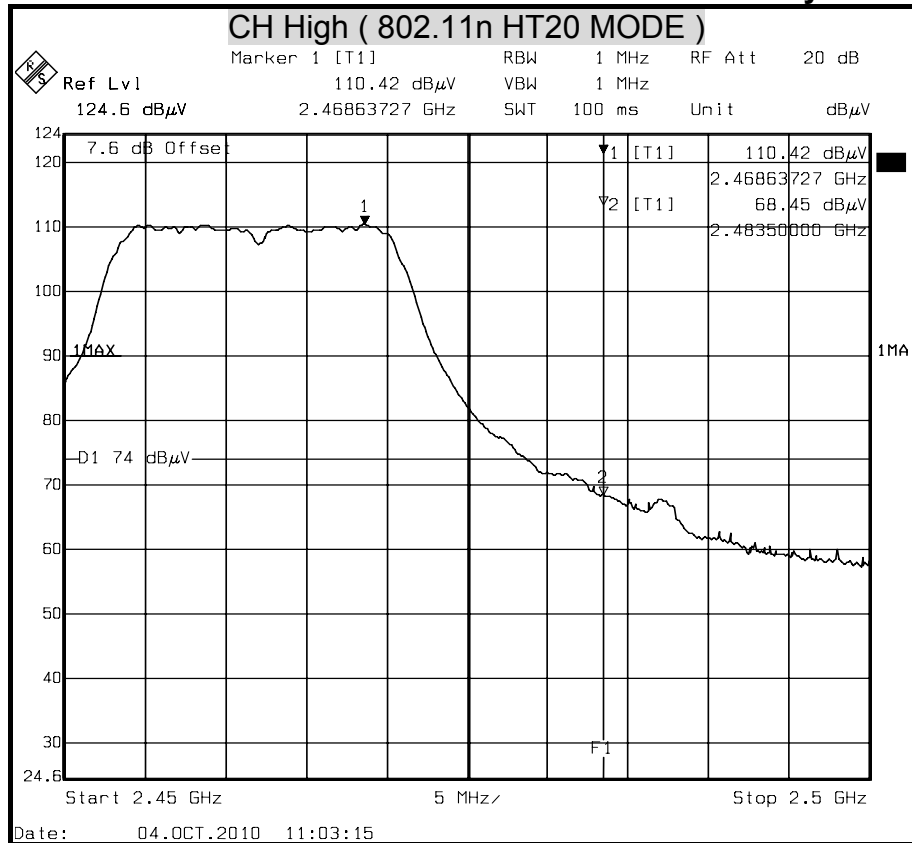
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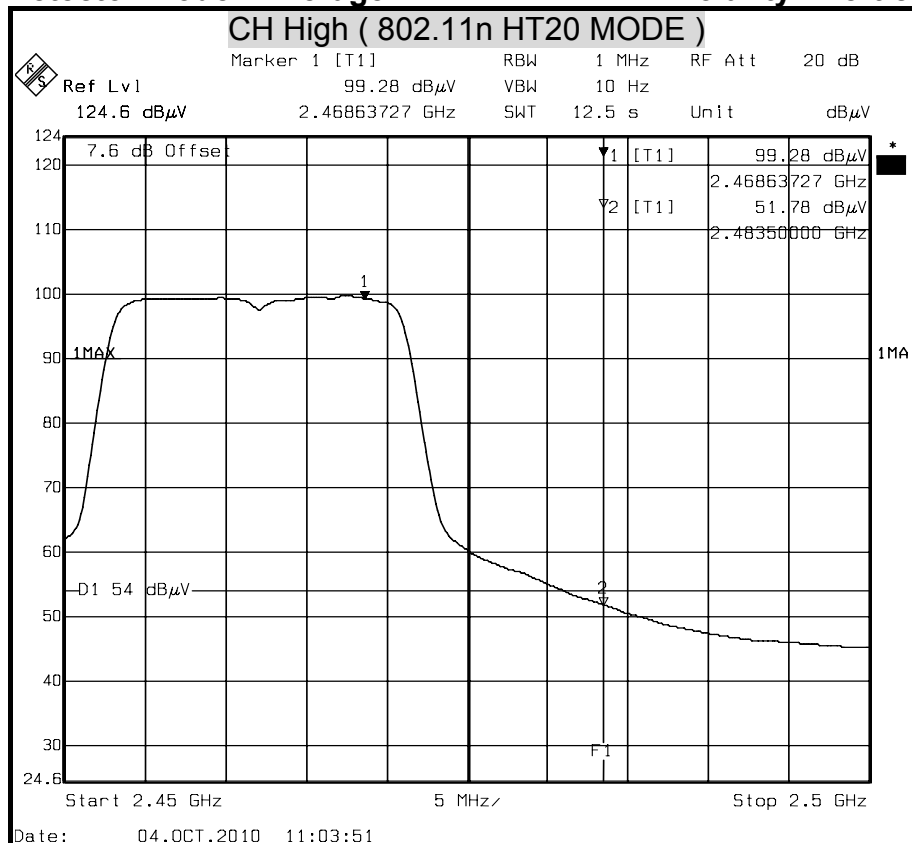
Detector mode : Peak

Polarity : Vertical



Detector mode : Average

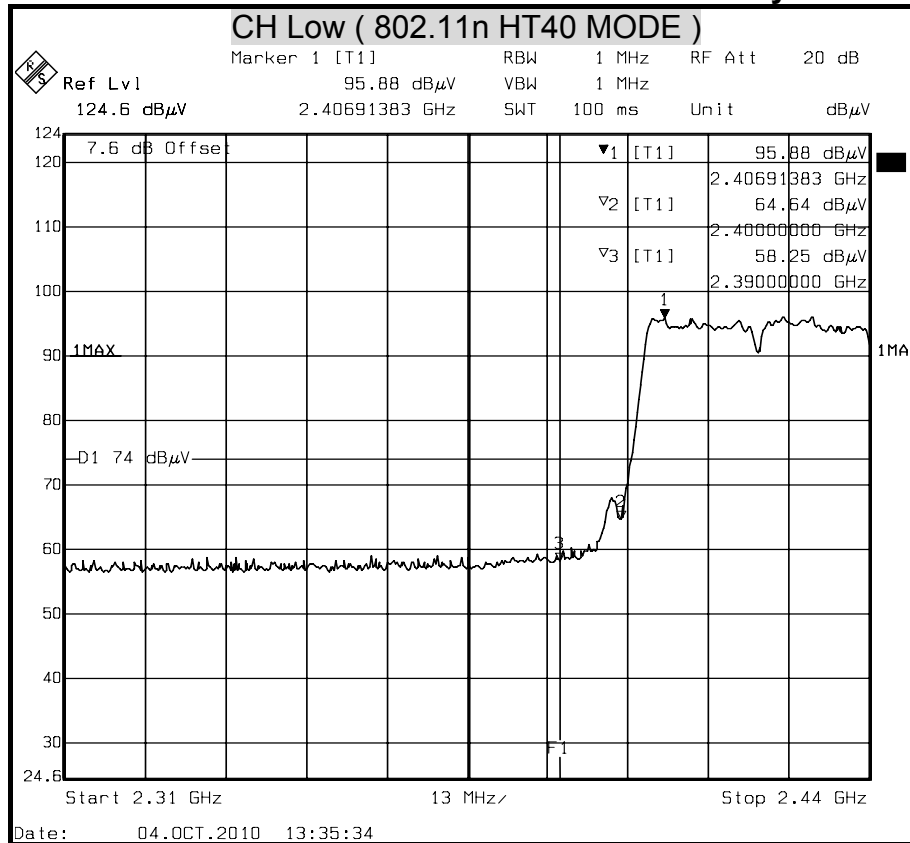
Polarity : Vertical





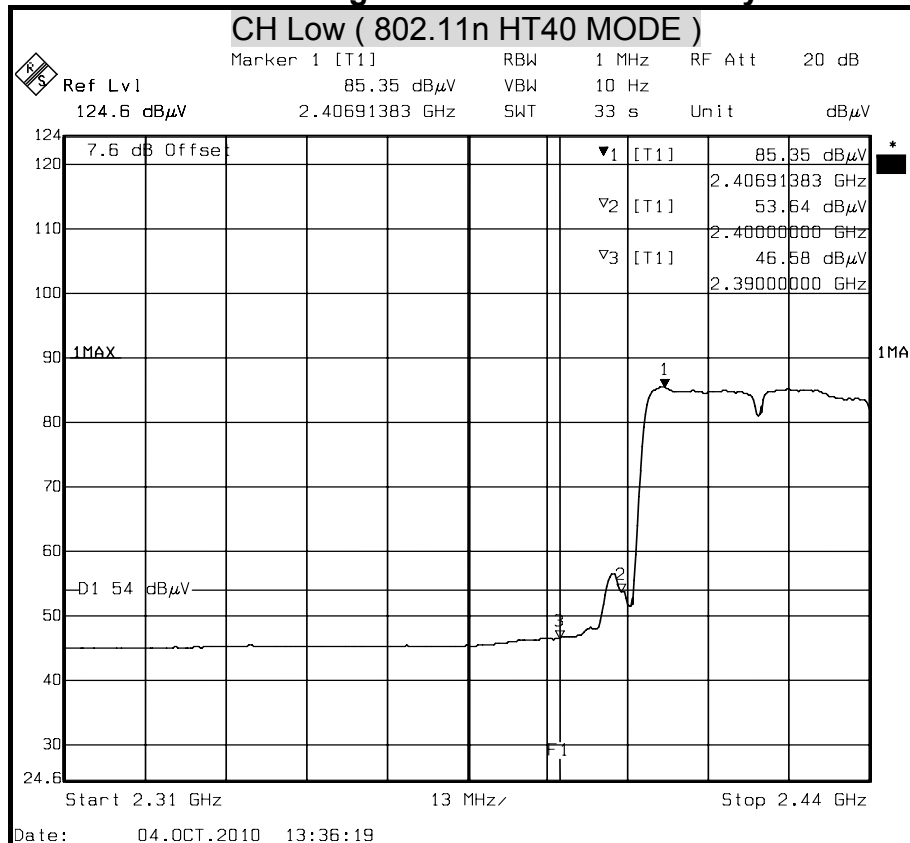
Detector mode : Peak

Polarity : Horizontal



Detector mode : Average

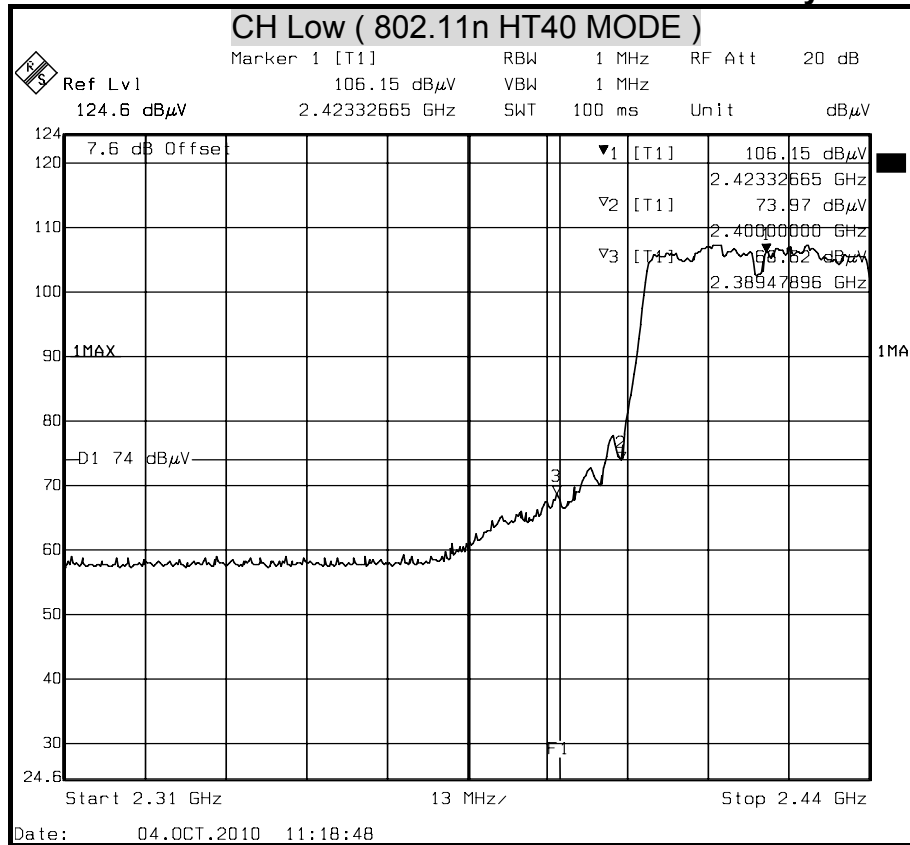
Polarity : Horizontal





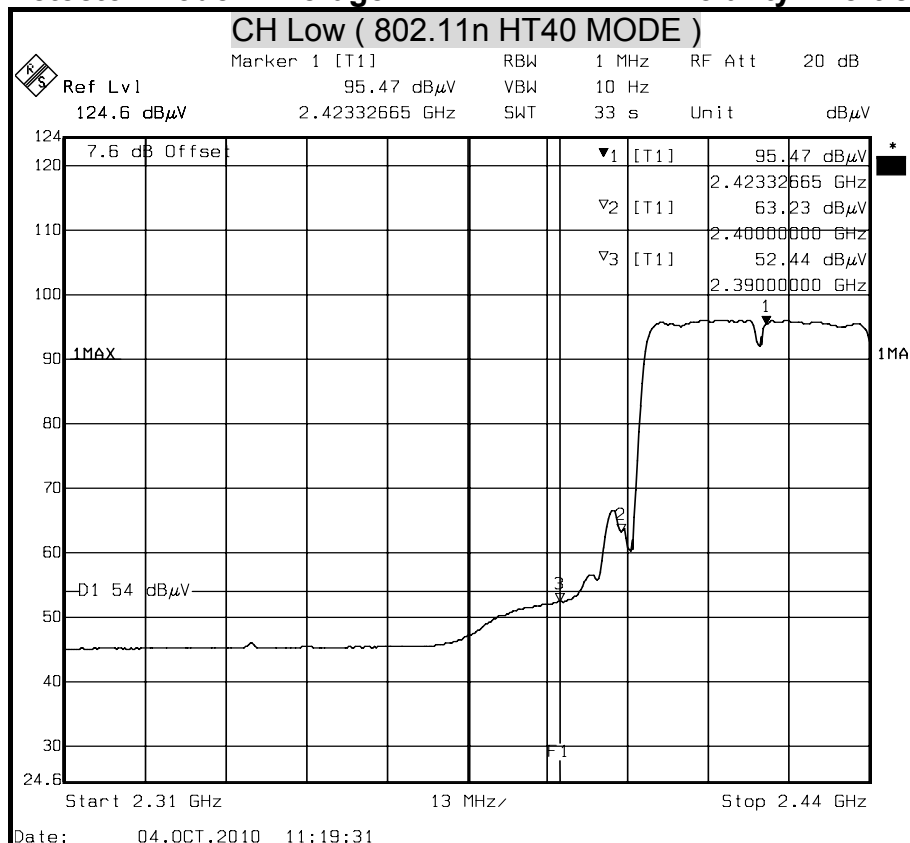
Detector mode : Peak

Polarity : Vertical



Detector mode : Average

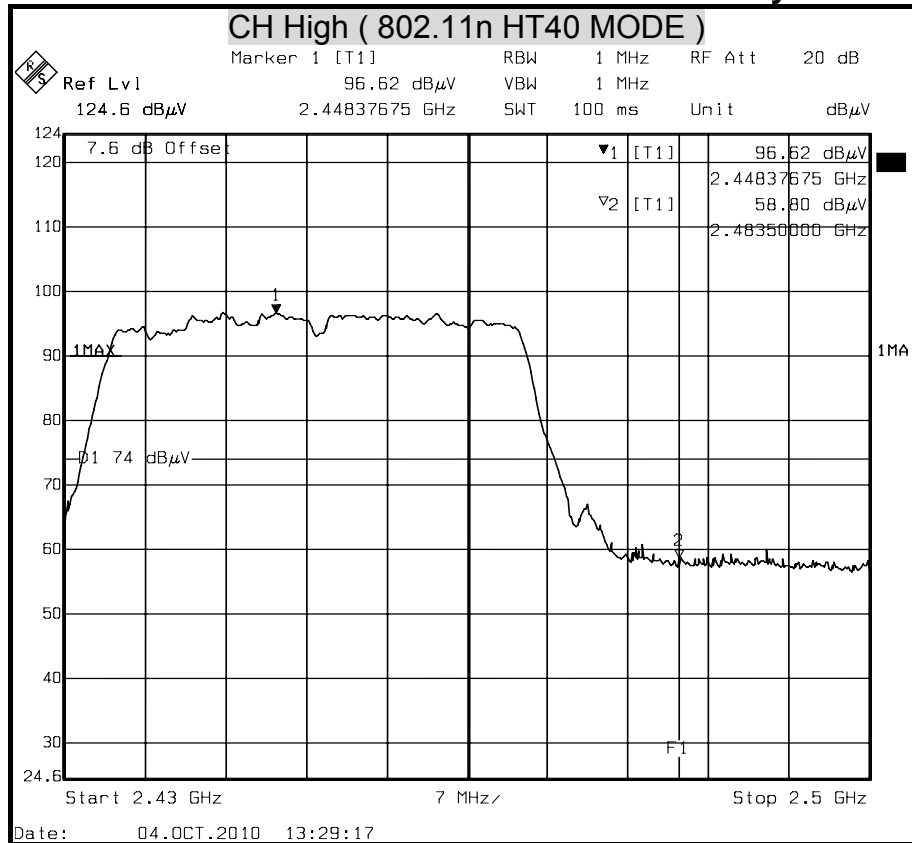
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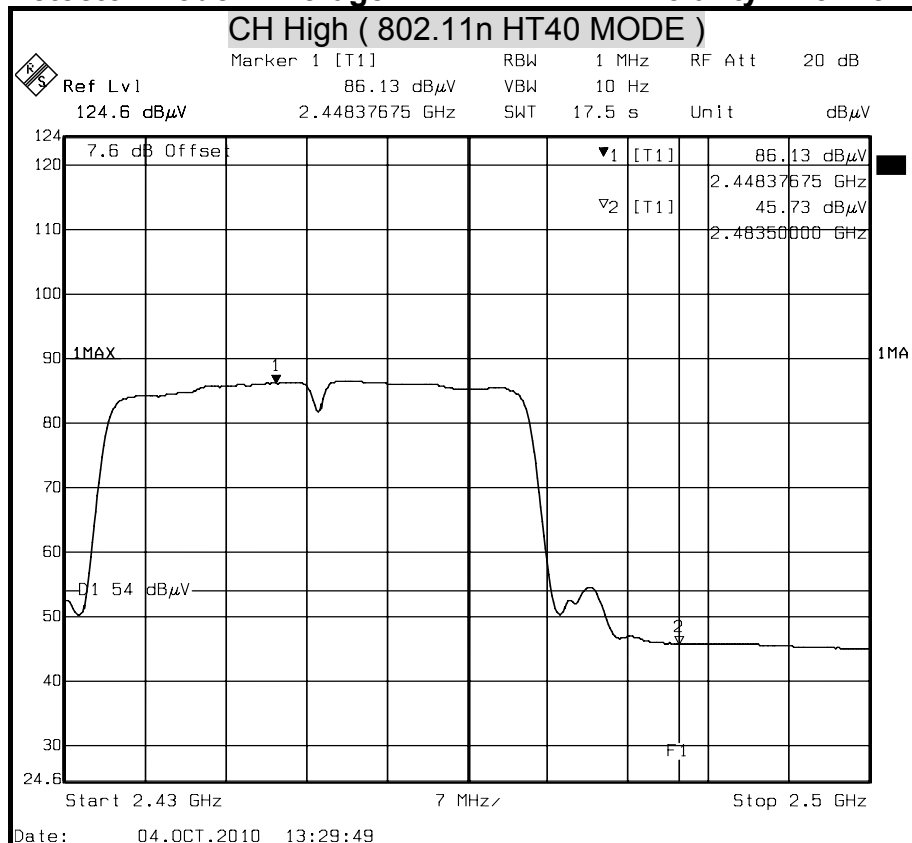
Detector mode : Peak

Polarity : Horizontal



Detector mode : Average

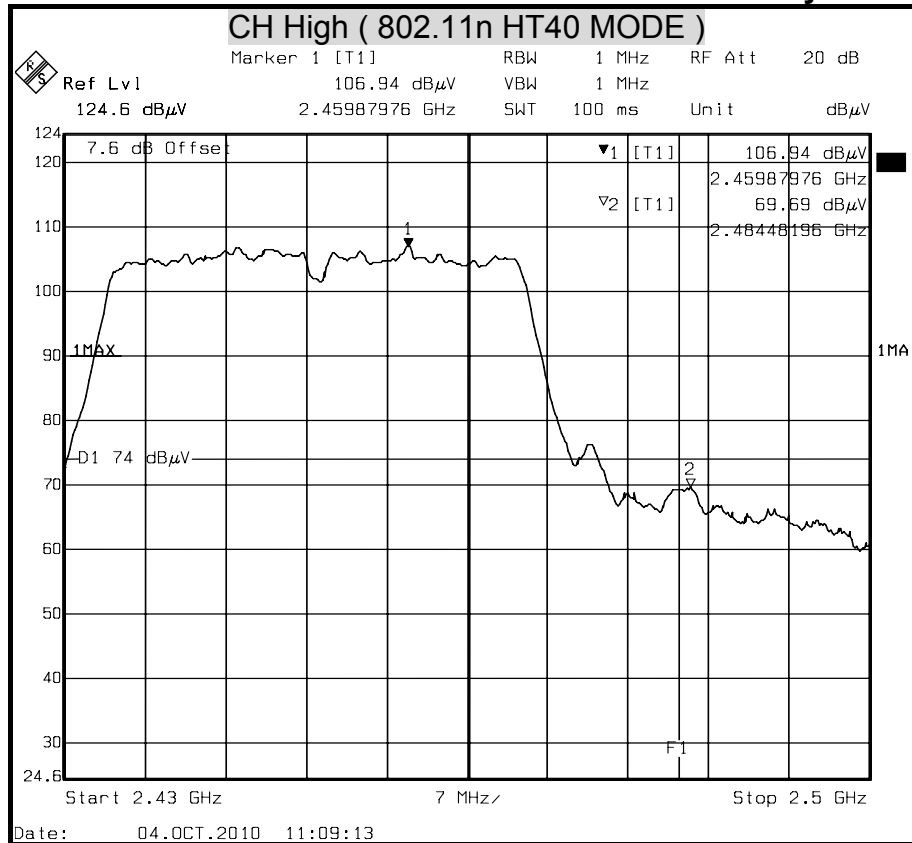
Polarity : Horizontal





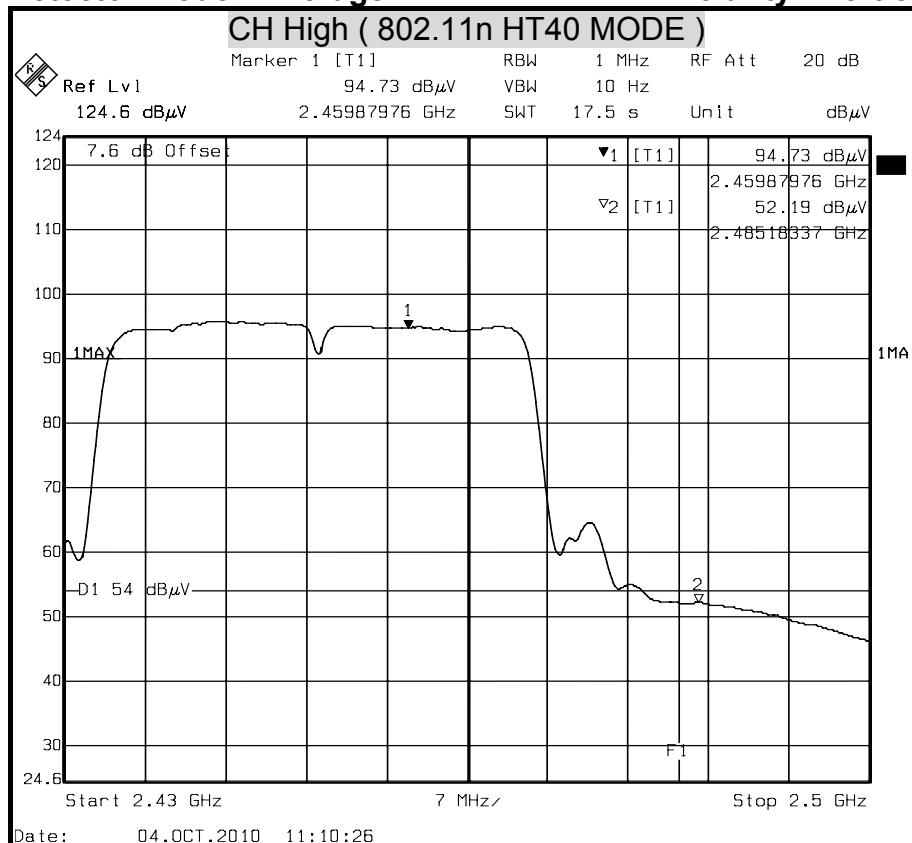
Detector mode : Peak

Polarity : Vertical



Detector mode : Average

Polarity : Vertical





8.7 POWERLINE CONDUCTED EMISSIONS

LIMITS

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

The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted limit (dB μ v)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 - 30	60	50

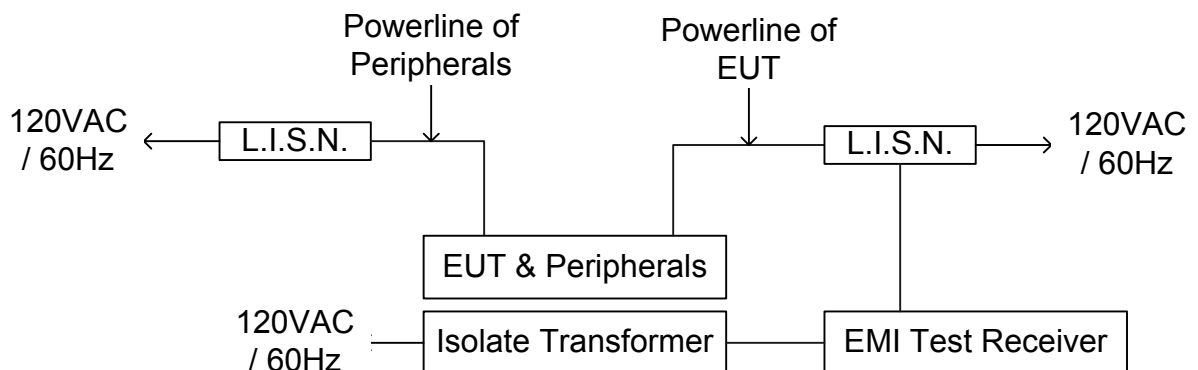
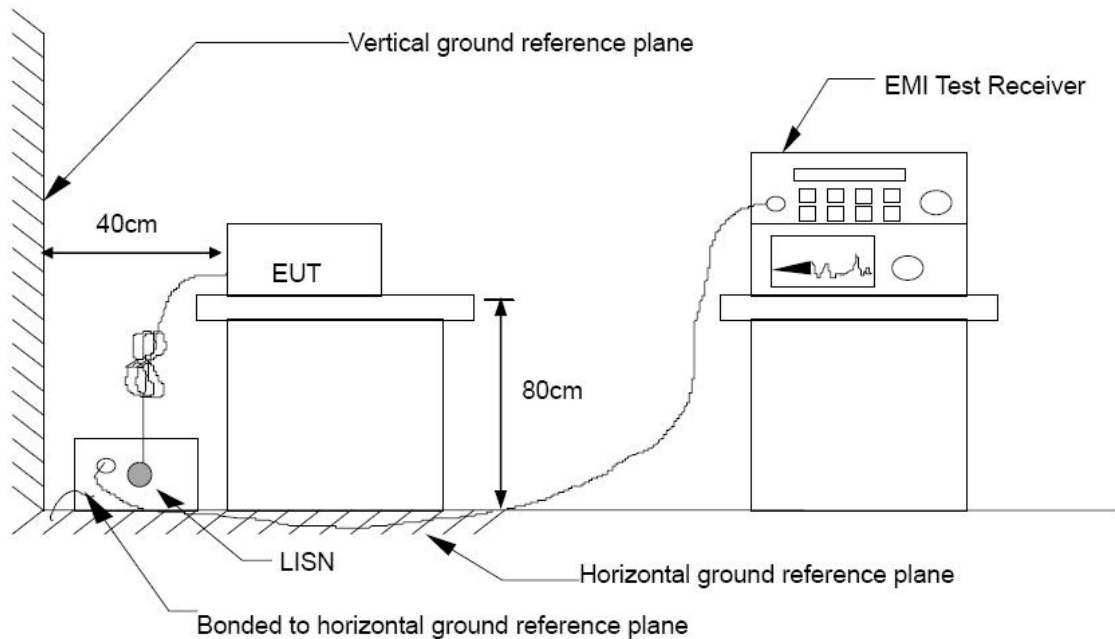
TEST EQUIPMENTS

The following test equipments are used during the conducted power line tests:

Conducted Emission room #1				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
L.I.S.N.	SCHWARZBECK	NNLK 8121	8121-308	MAR. 09, 2011
TEST RECEIVER	Rohde & Schwarz	ESCS 30	100348	JUL. 13, 2011
TYPE N COAXIAL CABLE	CCS	BNC50	11	OCT. 04, 2010
Test S/W	e-3 (5.04211c) R&S (2.27)			



TEST SETUP



TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80cm above the horizontal ground plane. The EUT IS CONFIGURED IN ACCORDANCE WITH ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both quasi-peak detection and average detection measurements.

Line conducted data is recorded for both NEUTRAL and LINE.

TEST RESULTS

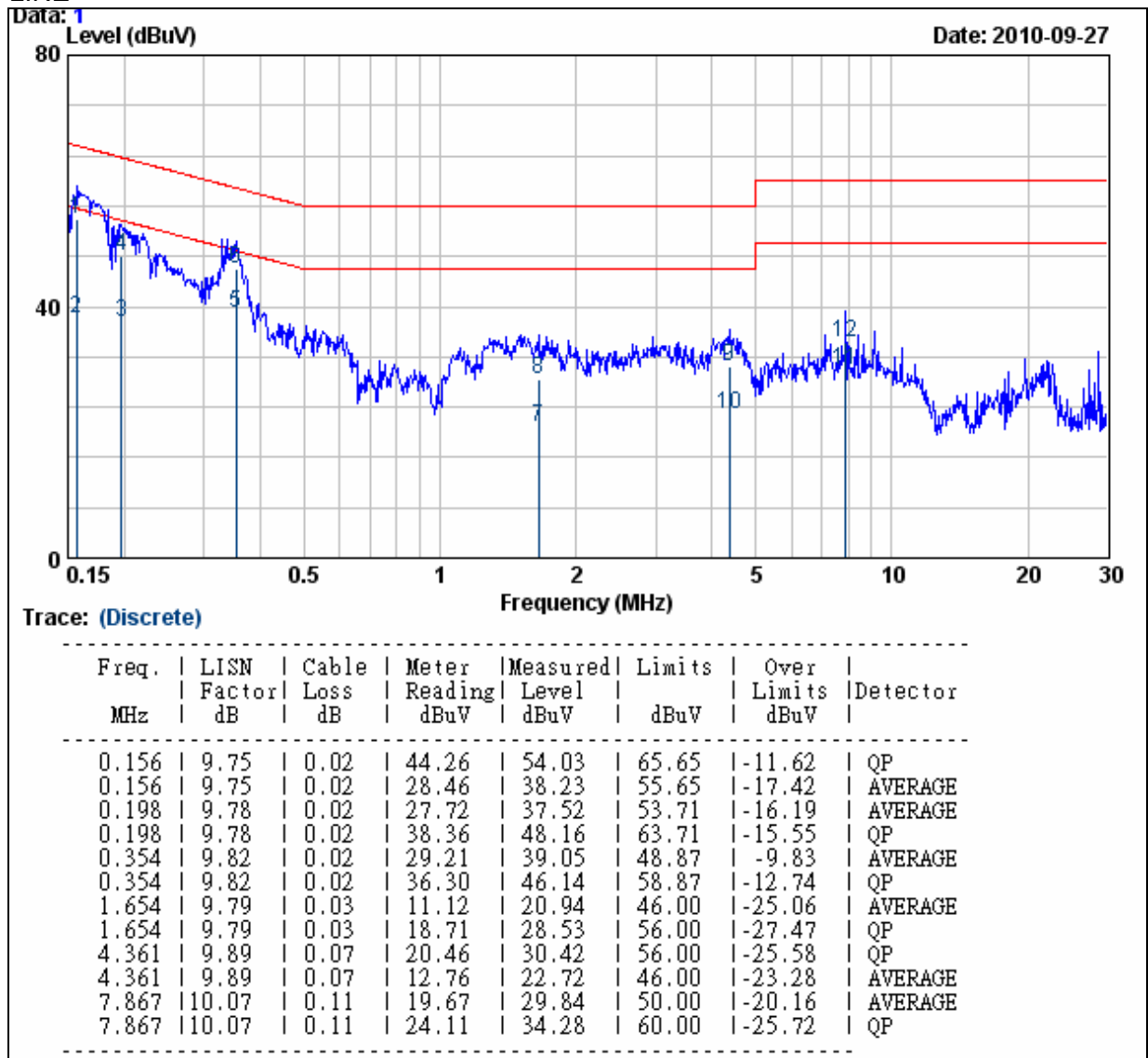
No non-compliance noted.



CONDUCTED RF VOLTAGE MEASUREMENT

Model No.	BDW463AM	Resolution Bandwidth	9 kHz
Environmental Conditions	24.4°C, 59%	Test Mode 1	USB mode
Tested by	Hong Tsai	Adapter	12Vdc/2A

LINE



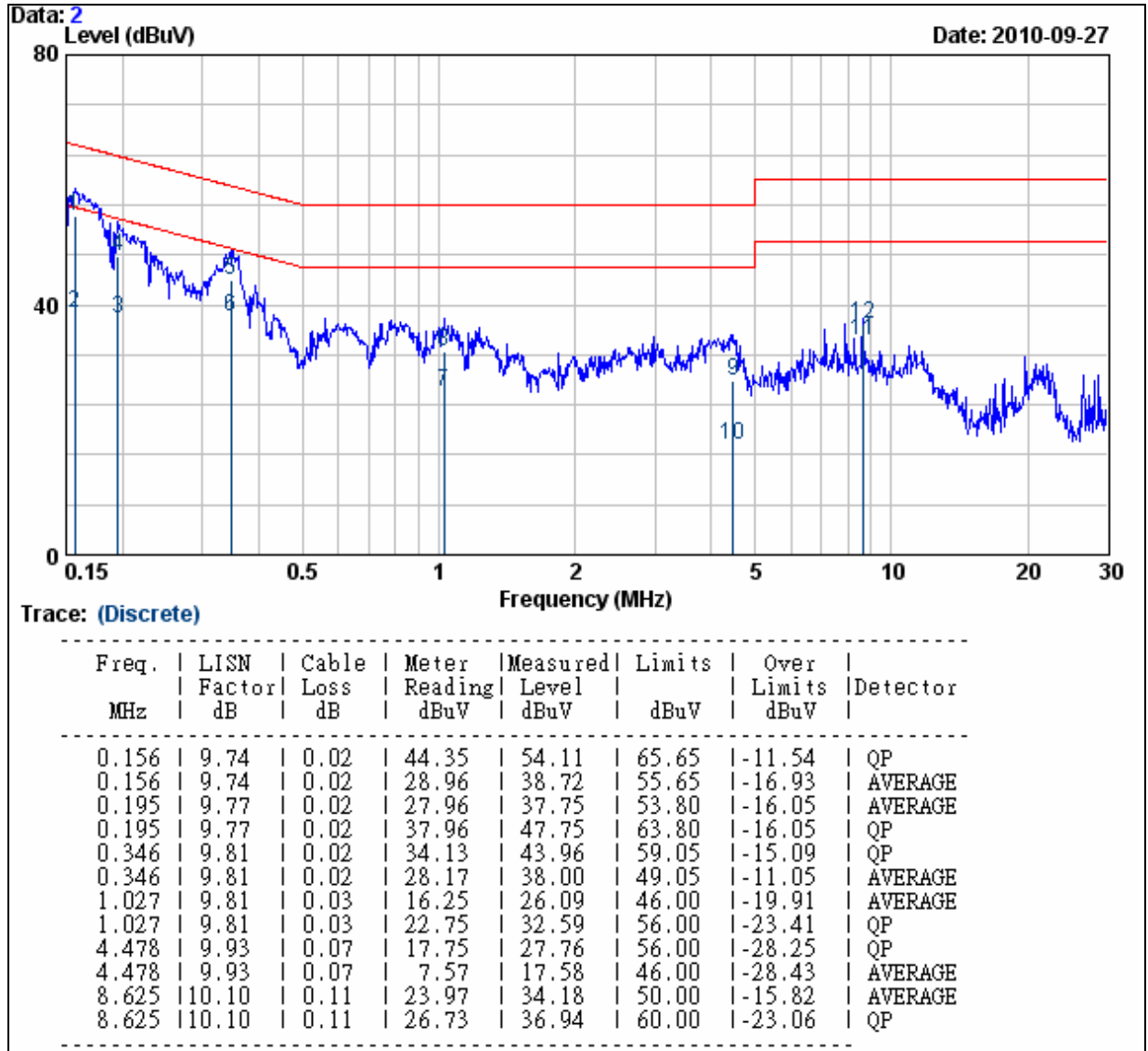
REMARKS :

1. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)
2. Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)



Model No.	BDW463AM	Resolution Bandwidth	9 kHz
Environmental Conditions	24.4°C, 59%	Test Mode 1	USB mode
Tested by	Hong Tsai	Adapter	12Vdc/2A

NEUTRAL

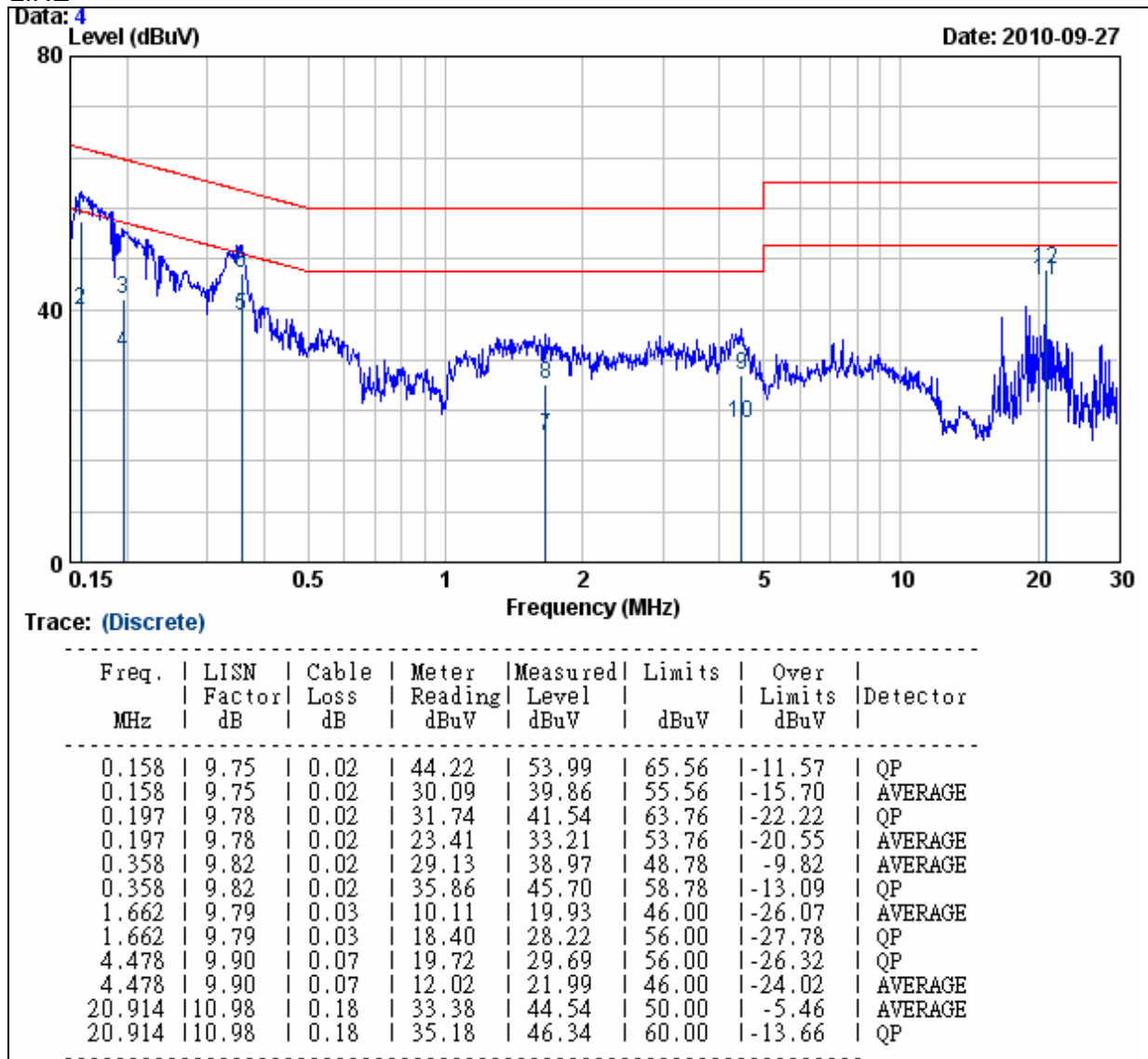


- REMARKS :**
1. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)
 2. Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)



Model No.	BDW462AM	Resolution Bandwidth	9 kHz
Environmental Conditions	24.4°C, 59%	Test Mode 2	USB mode
Tested by	Hong Tsai	Adapter	12Vdc/2A

LINE



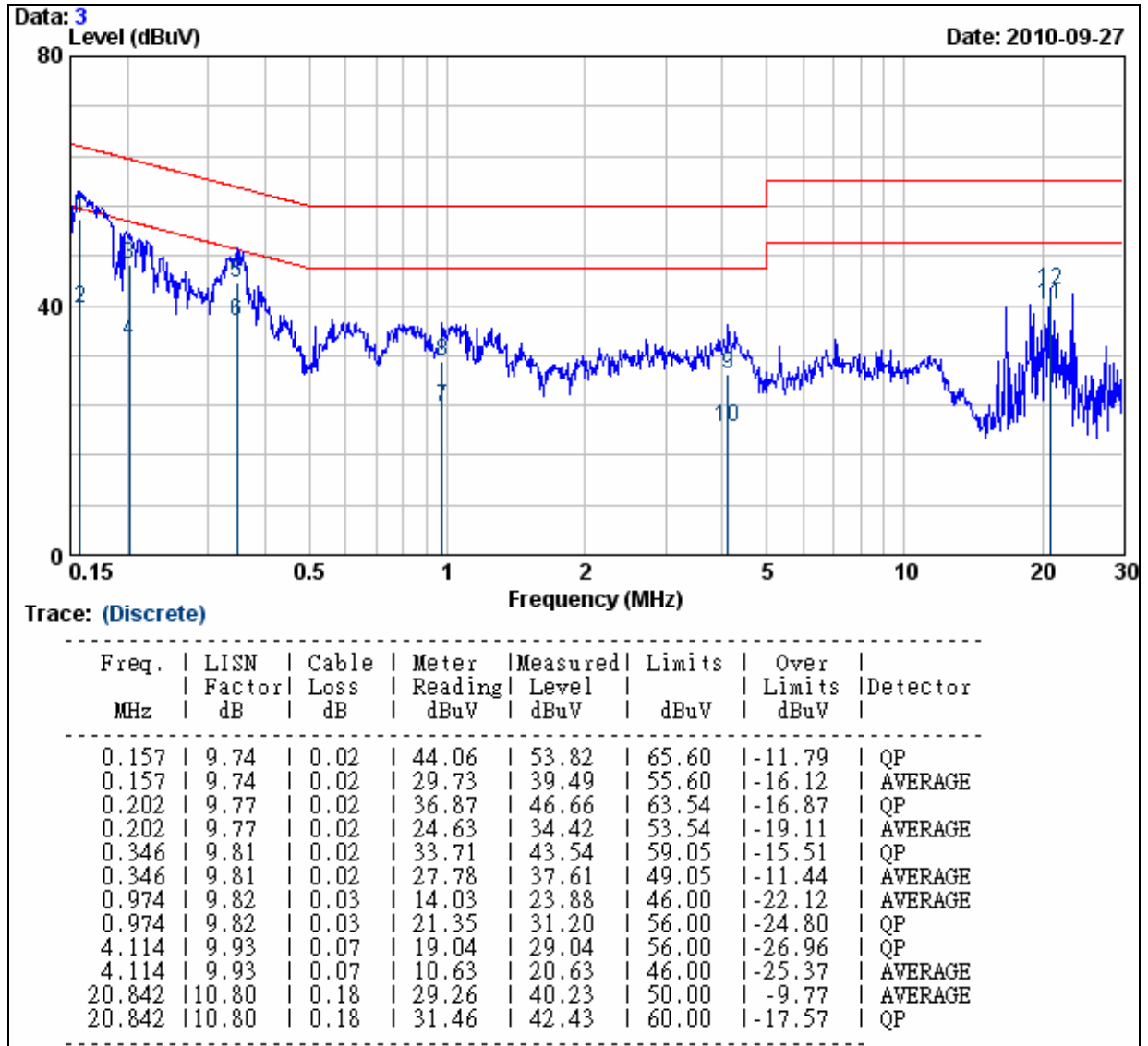
REMARKS :

1. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)
2. Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)



Model No.	BDW462AM	Resolution Bandwidth	9 kHz
Environmental Conditions	24.4°C, 59%	Test Mode 2	USB mode
Tested by	Hong Tsai	Adapter	12Vdc/2A

NEUTRAL

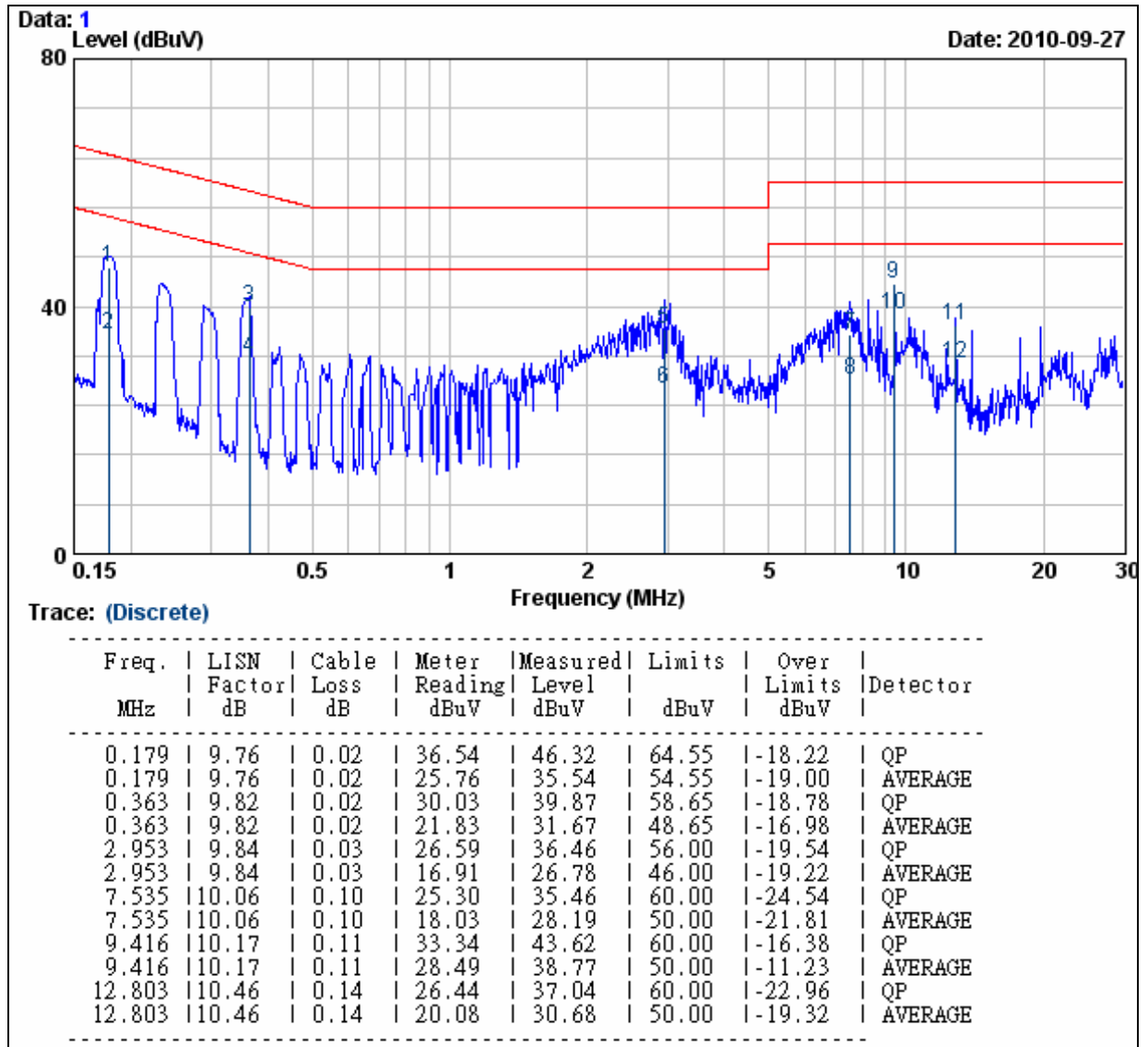


- REMARKS :**
1. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)
 2. Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)



Model No.	CDW463AM	Resolution Bandwidth	9 kHz
Environmental Conditions	24.4°C, 59%	Test Mode 3	USB mode
Tested by	Hong Tsai	Adapter	12Vdc/1A

LINE



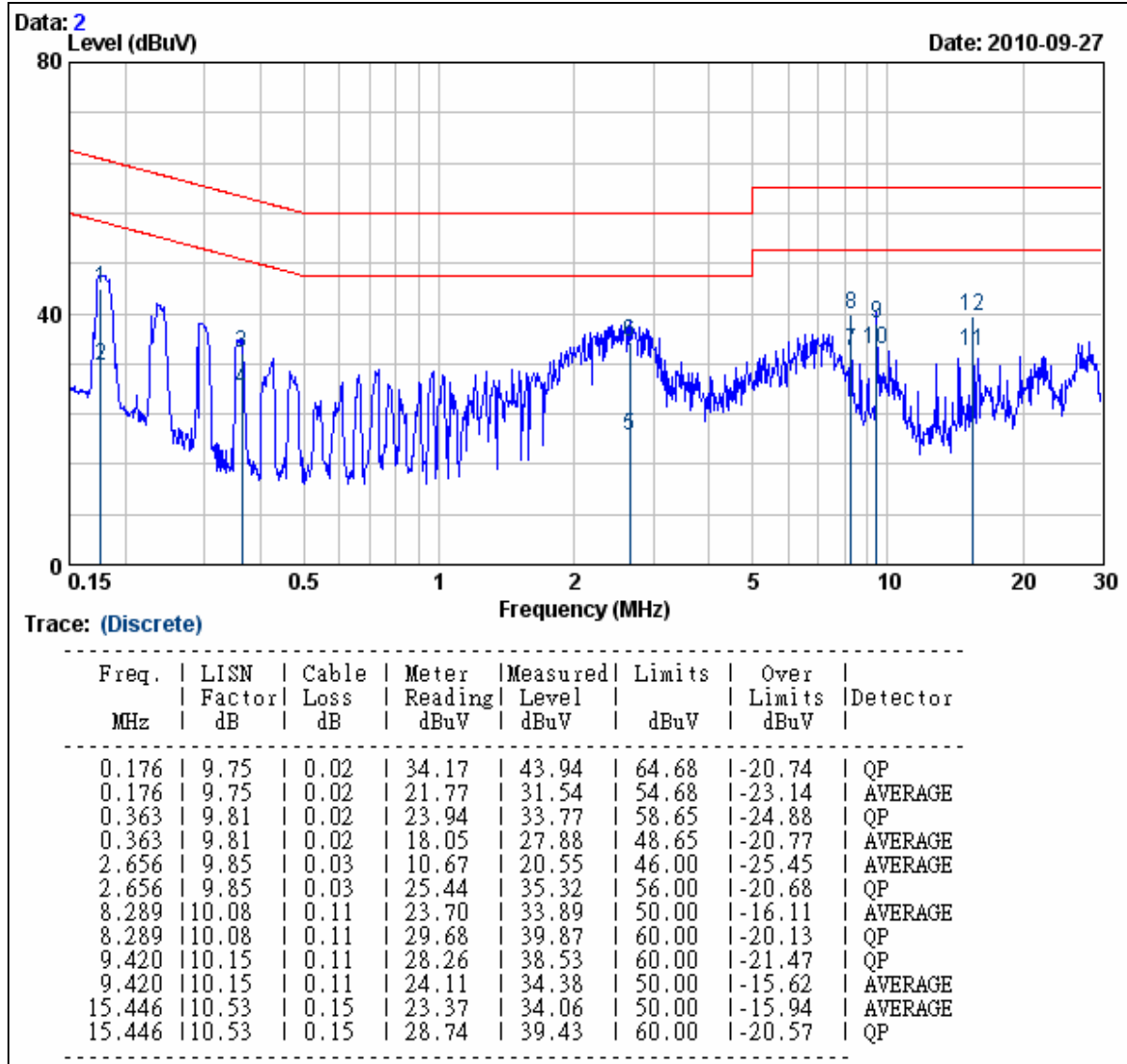
REMARKS :

1. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)
2. Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)



Model No.	CDW463AM	Resolution Bandwidth	9 kHz
Environmental Conditions	24.4°C, 59%	Test Mode 3	USB mode
Tested by	Hong Tsai	Adapter	12Vdc/1A

NEUTRAL

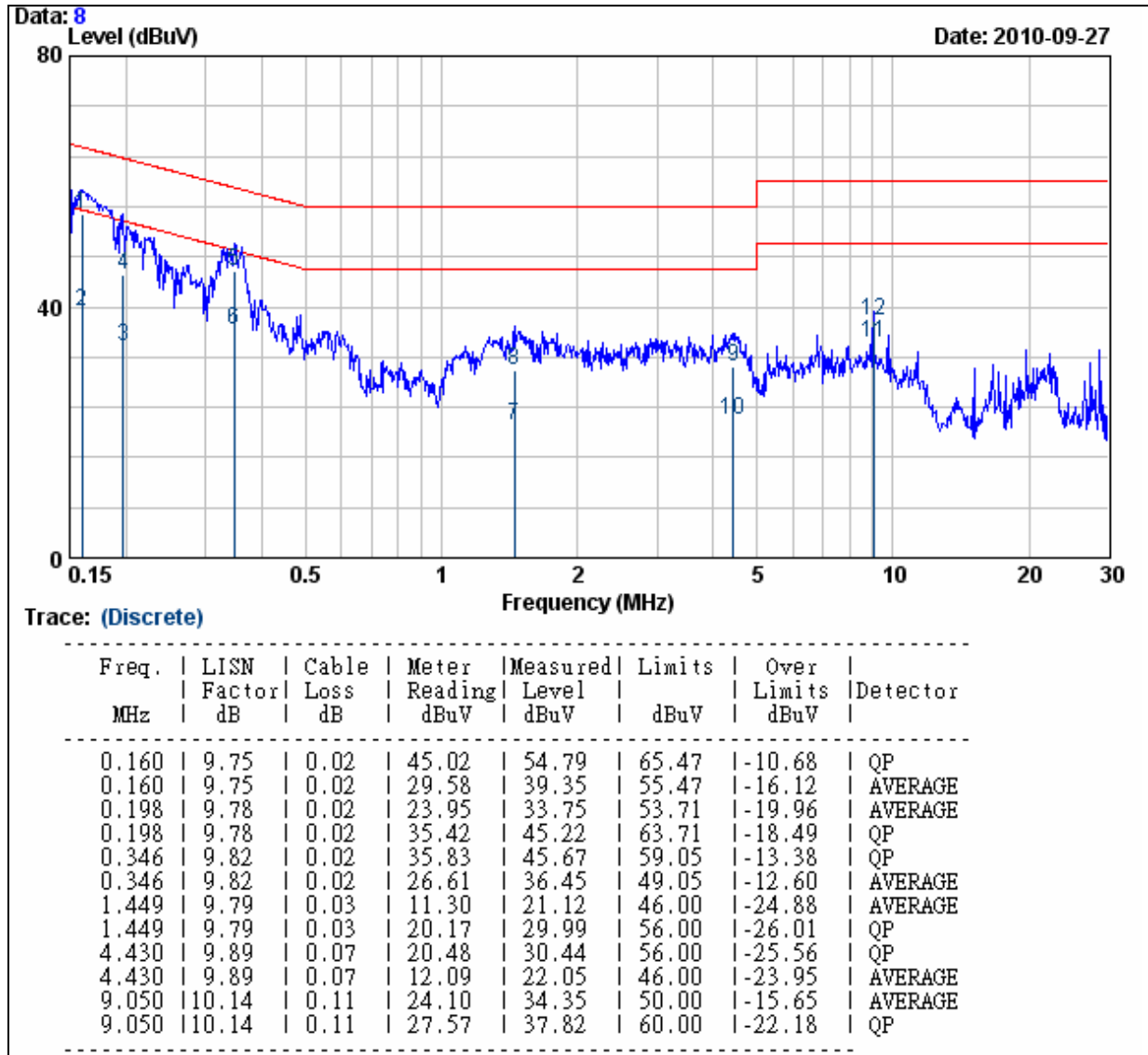


- REMARKS :**
1. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)
 2. Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)



Model No.	CDW463AM	Resolution Bandwidth	9 kHz
Environmental Conditions	24.4°C, 59%	Test Mode 4	PCIE mode
Tested by	Hong Tsai	Adapter	12Vdc/2A

LINE



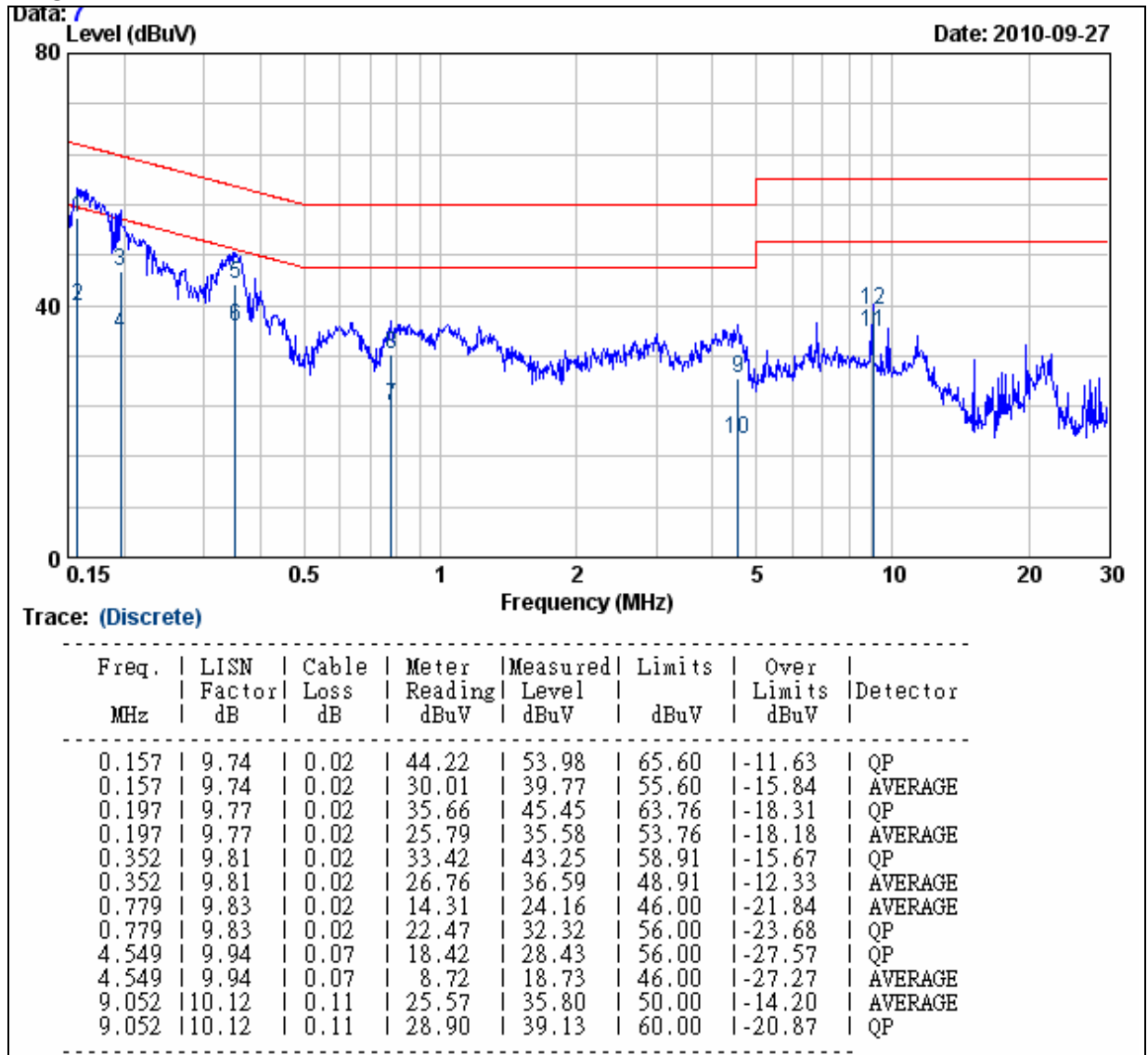
REMARKS :

1. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)
2. Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)



Model No.	CDW463AM	Resolution Bandwidth	9 kHz
Environmental Conditions	24.4°C, 59%	Test Mode 4	PCIE mode
Tested by	Hong Tsai	Adapter	12Vdc/2A

NEUTRAL



- REMARKS :**
1. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)
 2. Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)



9. ANTENNA REQUIREMENT

9.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

9.2 ANTENNA CONNECTED CONSTRUCTION

Two antennas 2Tx 2RX
RF Antenna Assembly
Manufacture: WHA YU GROUP
Model: C381-510150-A(SSR-91019)
Gain: 2 dBi
Connector: SMA Straight Plug Reverse
Type: Dipole



APPENDIX SETUP PHOTOS

CONDUCTED EMISSION TEST SETUP

Mode 1 BDW463AM





Mode 2 BDW462AM



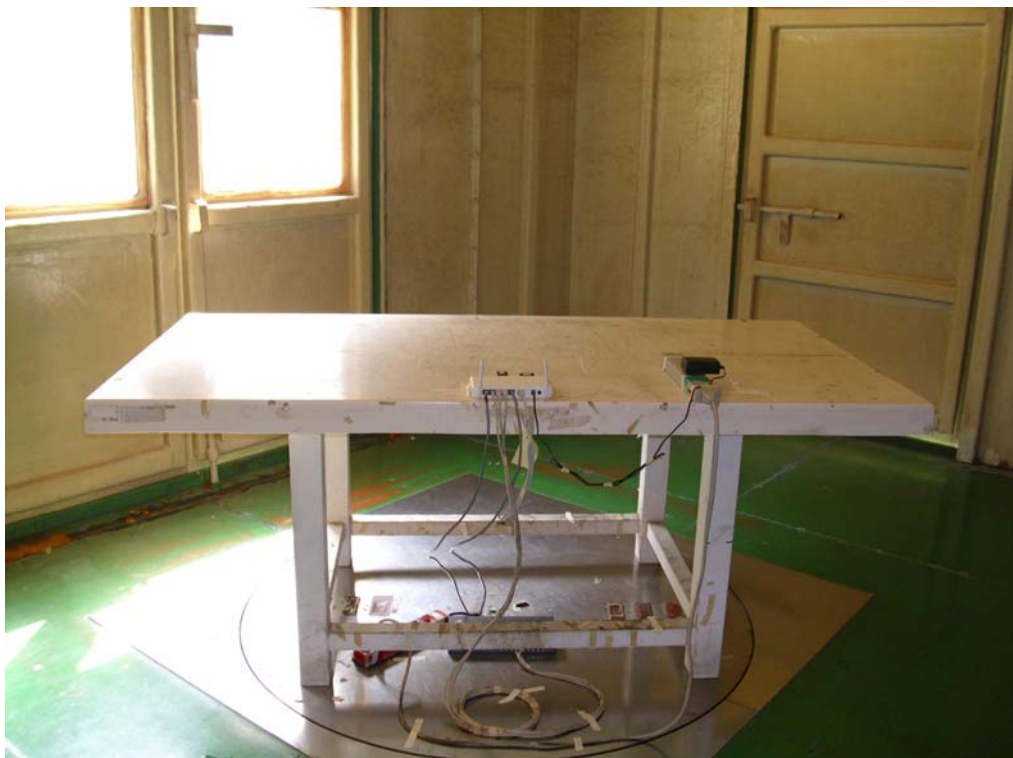


Mode 3 CDW463AM ; Mode 4 CDW463AM





RADIATED EMISSION MEASUREMENT SETUP
Mode 1 BDW463AM



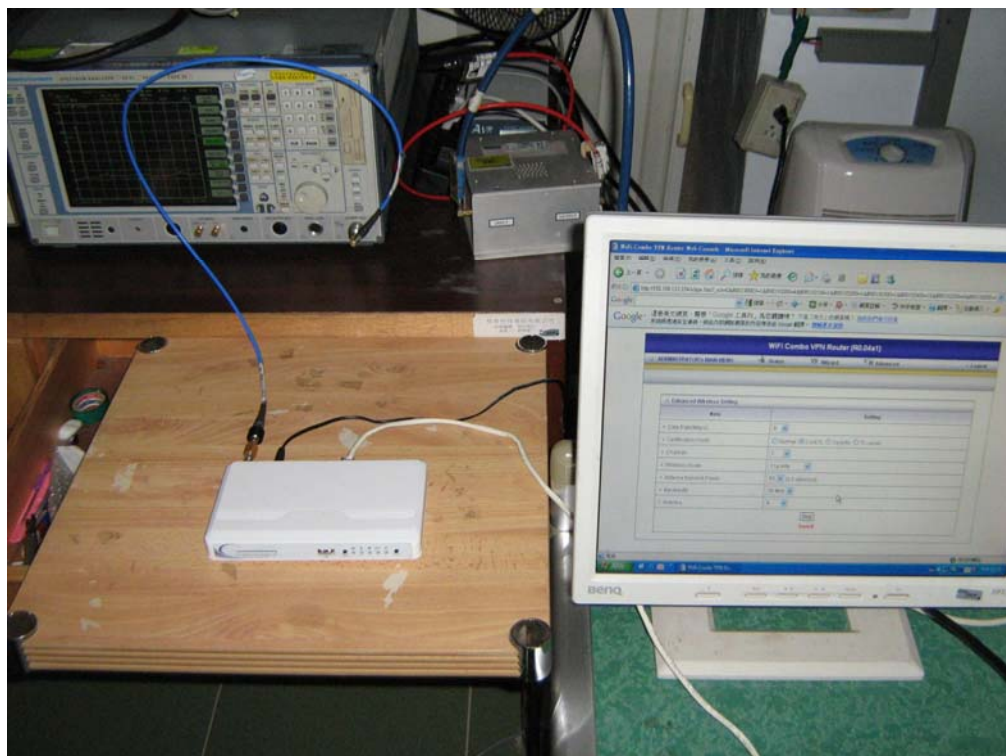


RADIATED RF MEASUREMENT SETUP





POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP



End of report