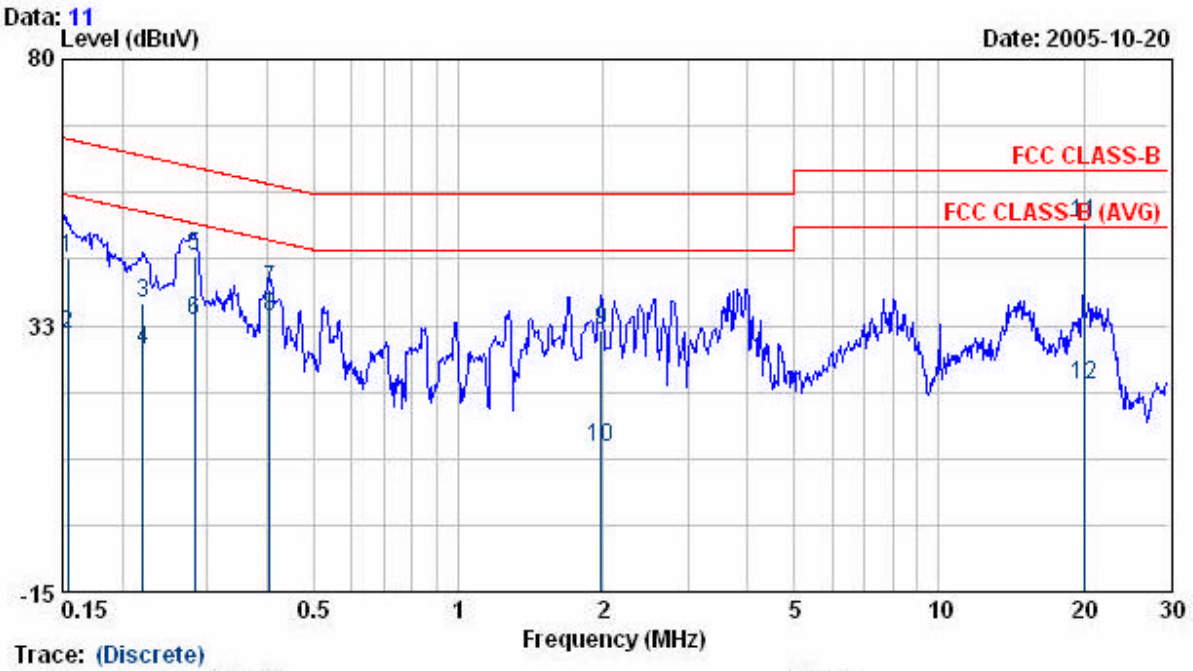
EUT : WAG102
Power : AC 120V
Test Mode : 802.11g CH6
Memo : DSA-0131F-12

Pol/Phase : LINE
Temperature : 25 ℃
Humidity : 57 %



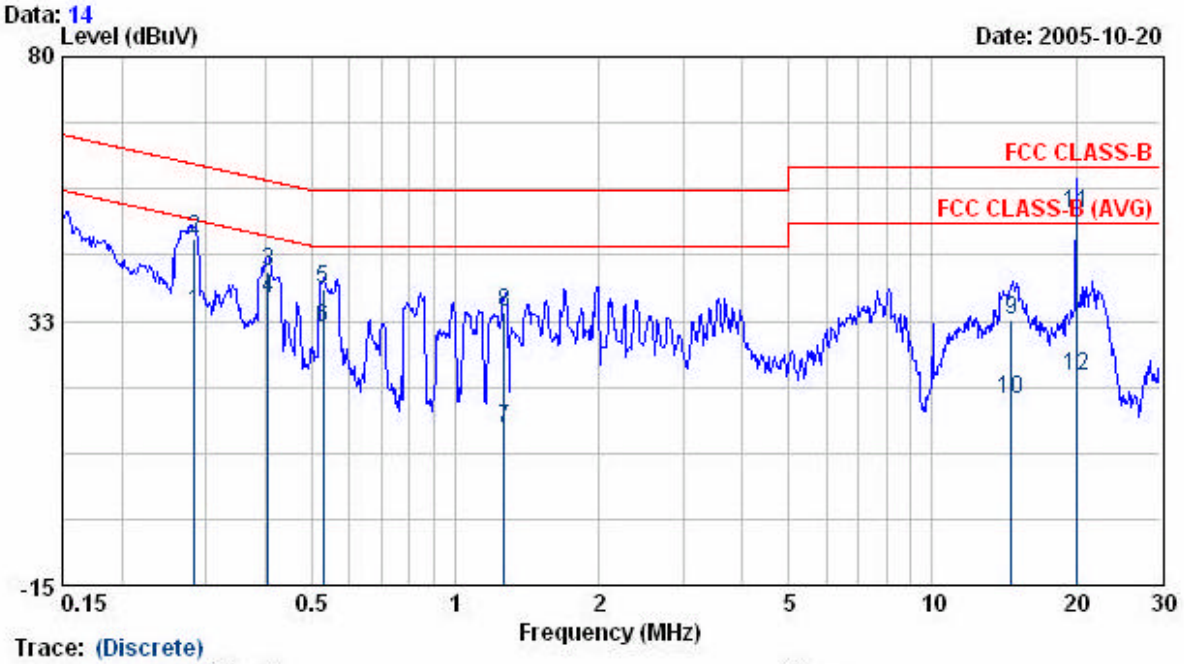
Trace: (Discrete)

Freq	Read Level	Factor	Level	Limit	Over Limit	Remark
MHz	dBuV	dB	dBuV	dBuV	dBuV	
0.15	44.24	0.38	44.62	65.78	-21.17	QP
0.15	30.63	0.38	31.01	55.78	-24.78	AVERAGE
0.22	36.19	0.34	36.53	62.79	-26.26	QP
0.22	27.87	0.34	28.21	52.79	-24.58	AVERAGE
0.28	44.56	0.45	45.01	60.74	-15.74	QP
0.28	32.99	0.45	33.44	50.74	-17.31	AVERAGE
0.41	38.23	0.60	38.83	57.75	-18.92	QP
0.41	33.48	0.60	34.08	47.75	-13.67	AVERAGE
1.98	30.77	0.70	31.47	56.00	-24.53	QP
1.98	10.11	0.70	10.81	46.00	-35.19	AVERAGE
20.00	50.31	0.60	50.91	60.00	-9.09	QP
20.00	21.22	0.60	21.82	50.00	-28.18	AVERAGE

Remarks: 1. Level = Read Level + Factor
2. Factor = LISN(ISN) Factor + Cable Loss

EUT : WAG102
Power : AC 120V
Test Mode : 802.11g CH11
Memo : DSA-0131F-12

Pol/Phase : NEUTRAL
Temperature : 25 ℃
Humidity : 57 %



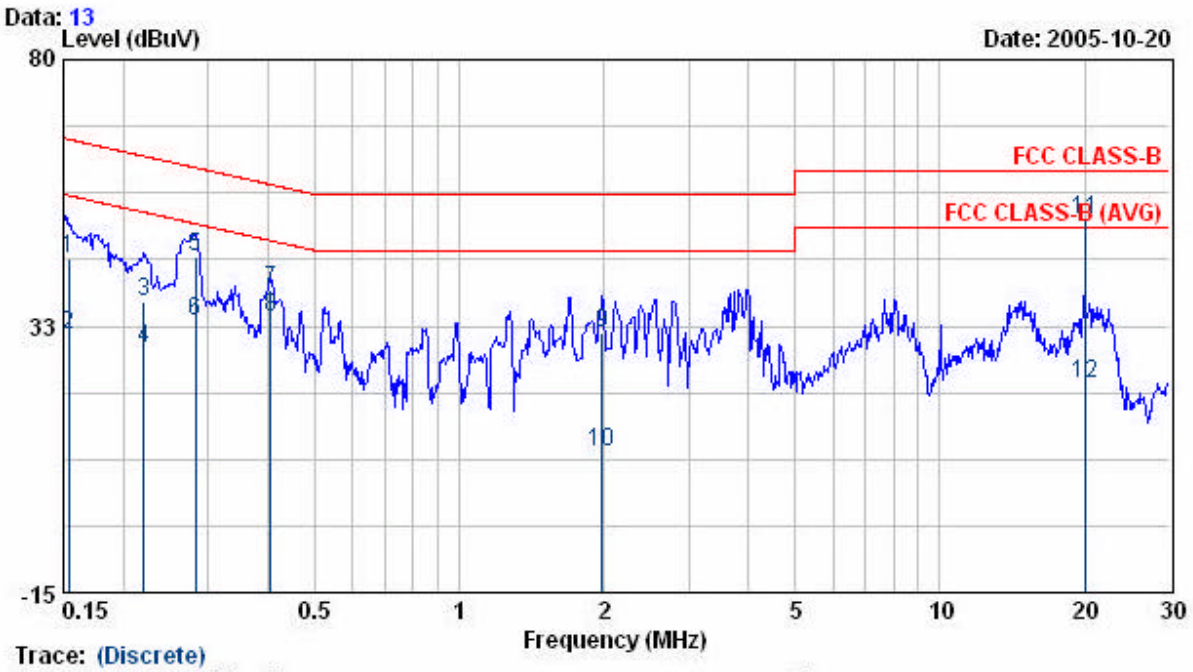
Trace: (Discrete)

Freq	Read Level	Factor	Level	Limit	Over Limit	Remark
MHz	dBuV	dB	dBuV	dBuV	dBuV	
0.28	33.67	0.35	34.02	50.70	-16.68	AVERAGE
0.28	46.79	0.35	47.14	60.70	-13.56	QP
0.41	41.02	0.50	41.52	57.74	-16.22	QP
0.41	35.99	0.50	36.49	47.74	-11.25	AVERAGE
0.53	37.77	0.50	38.27	56.00	-17.73	QP
0.53	30.79	0.50	31.29	46.00	-14.71	AVERAGE
1.27	12.63	0.53	13.16	46.00	-32.84	AVERAGE
1.27	33.61	0.53	34.14	56.00	-21.86	QP
14.63	31.64	0.88	32.52	60.00	-27.48	QP
14.63	17.64	0.88	18.52	50.00	-31.48	AVERAGE
20.00	51.06	0.80	51.86	60.00	-8.14	QP
20.00	21.67	0.80	22.47	50.00	-27.53	AVERAGE

Remarks: 1. Level = Read Level + Factor
2. Factor = LISN(ISN) Factor + Cable Loss

EUT : WAG102
Power : AC 120V
Test Mode : 802.11g CH11
Memo : DSA-0131F-12

Pol/Phase : LINE
Temperature : 25 ℃
Humidity : 57 %



Trace: (Discrete)

Freq	Read Level	Factor	Level	Limit	Over Limit	Remark
MHz	dBuV	dB	dBuV	dBuV	dBuV	
0.15	44.03	0.38	44.41	65.78	-21.38	QP
0.15	30.66	0.38	31.04	55.78	-24.75	AVERAGE
0.22	36.41	0.34	36.75	62.79	-26.04	QP
0.22	28.08	0.34	28.42	52.79	-24.37	AVERAGE
0.28	44.56	0.45	45.01	60.74	-15.74	QP
0.28	32.99	0.45	33.44	50.74	-17.31	AVERAGE
0.41	38.23	0.60	38.83	57.75	-18.92	QP
0.41	33.48	0.60	34.08	47.75	-13.67	AVERAGE
1.98	30.67	0.70	31.37	56.00	-24.63	QP
1.98	9.39	0.70	10.09	46.00	-35.91	AVERAGE
20.00	50.80	0.60	51.40	60.00	-8.60	QP
20.00	21.50	0.60	22.10	50.00	-27.90	AVERAGE

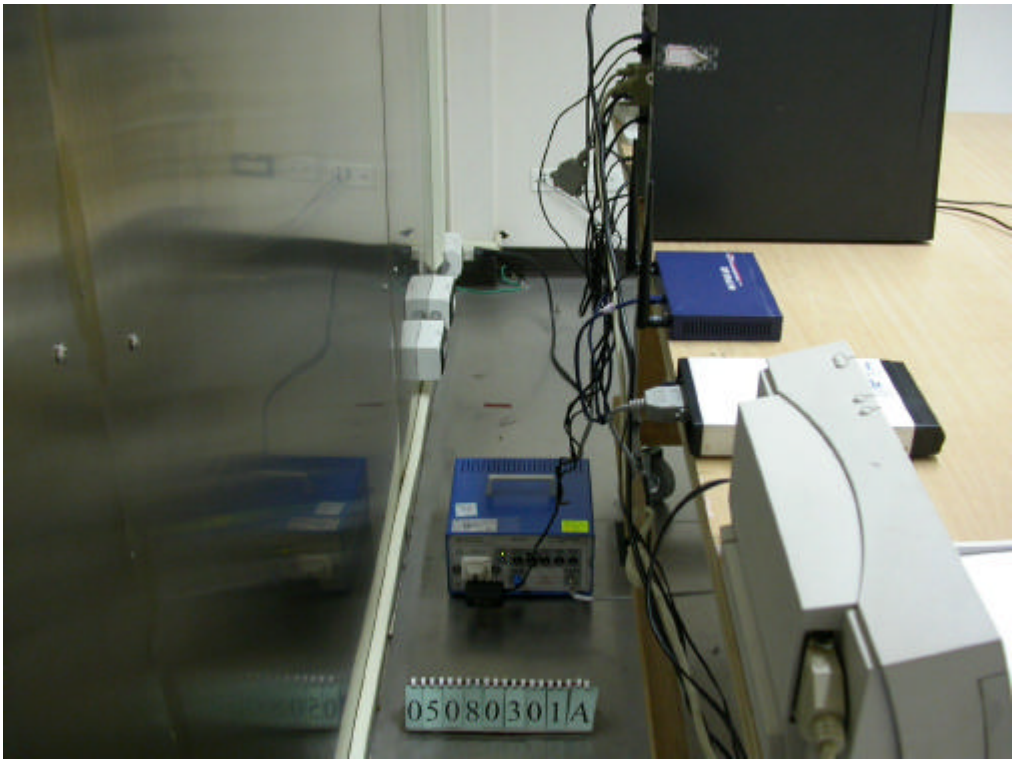
Remarks: 1. Level = Read Level + Factor
2. Factor = LISN(ISN) Factor + Cable Loss

Test engineer: Jerry

4.5.1 Test Photographs

Front View

Rear View



5. Test of Radiated Emission (For 802.11b/g device)

5.1 Test Limit

Radiated emissions from 30 MHz to 25 GHz were measured according to the methods defines in ANSI C63.4-2003. The EUT was placed, 0.8 meter above the ground plane, as shown in section 5.6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance Meters	Radiated (μ V / M)	Radiated (dB μ V/ M)
30-88	3	100	40.0
88-216	3	150	43.5
216-960	3	200	46.0
Above 960	3	500	54.0

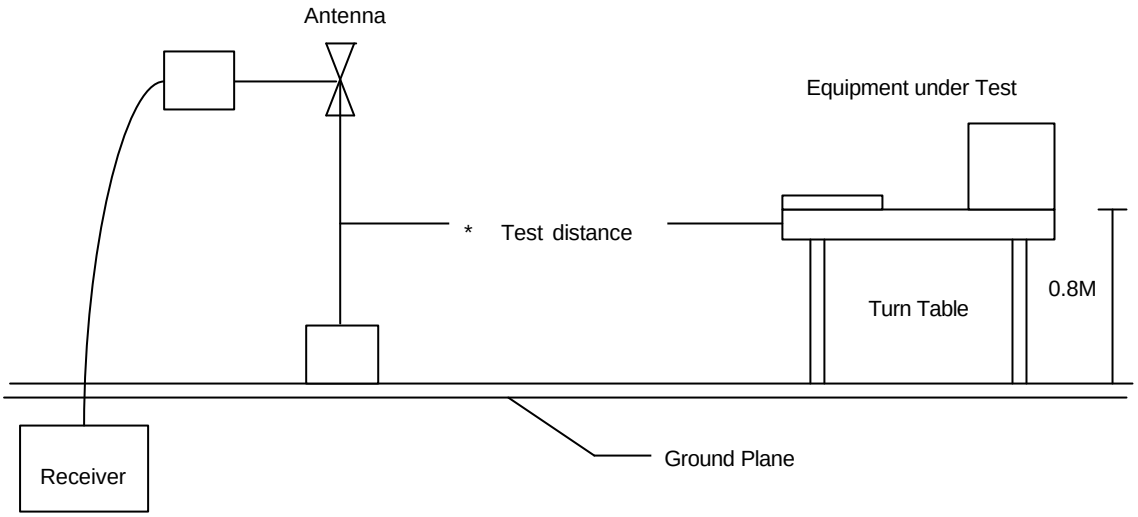
For unintentional device, according to CISPR PUB.22, for Class B digital devices, the general requirement of field strength of radiated emissions from intentional radiators at a distance of 10 meters shall not exceed the above table.

Frequency (MHz)	Distance Meters	Radiated (dB μ V/ M)
30-230	10	30
230-1000	10	37

5.2 Test Procedures

1. The EUT was placed on a rotatable table top 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
5. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
8. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

5.3 Typical Test Setup



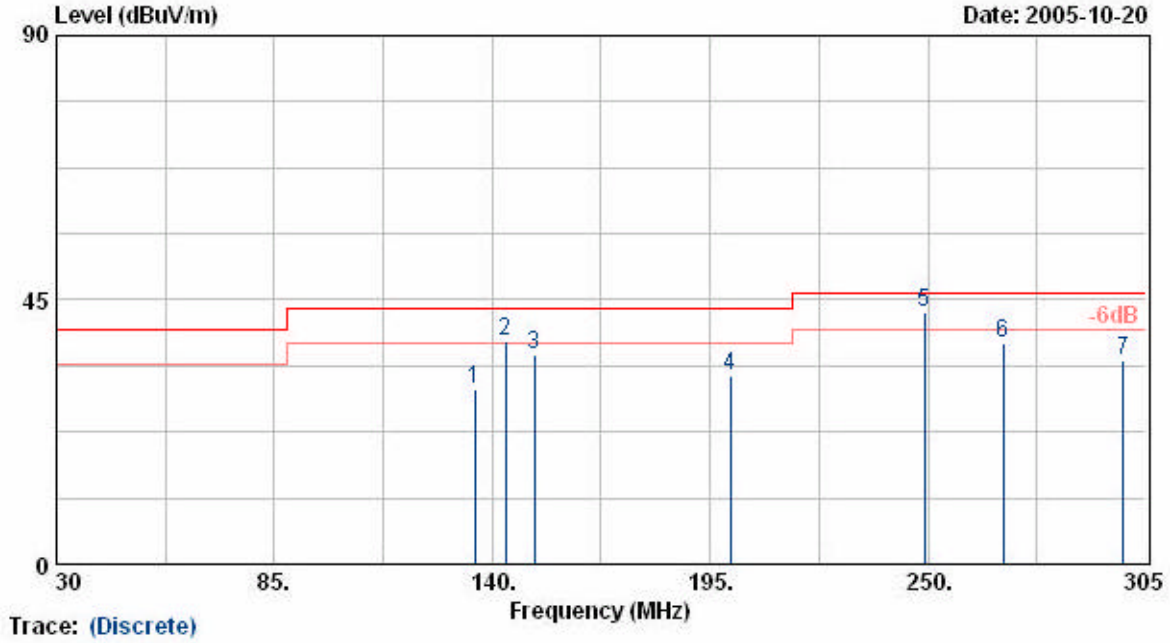
5.4 Measurement equipment

Instrument/Ancillary	Type	Manufacturer	Valid Date
EMI Receiver	8546A	HP	2006/04/13
Spectrum Analyzer	FSP40	R&S	2005/12/28
Horn Antenna	3115	EMCO	2006/02/21
Horn Antenna	3116	EMCO	2006/02/21
Bilog Antenna	CBL6112B	Schaffner	2006/04/12
Amplifier	8447D	Agilent	2006/02/14
Amplifier	8447D	Agilent	2006/02/22

5.5 Test Result and Data

Test model 1: (Test antenna 1)

EUT	: WAG102		
Power	: AC 120V	Pol/Phase	: HORIZONTAL
Test Mode	: Transmit/Receive	Temperature	: 22 ℃
Operation Channel	: 1	Humidity	: 70 %
Modulation Type	: 802.11b/g	Atmospheric Pressure	: 1020 mmHg
Rate	: 11/54 Mbps		
Memo	: DSA-0131F-12 Dipole (5dBi)		

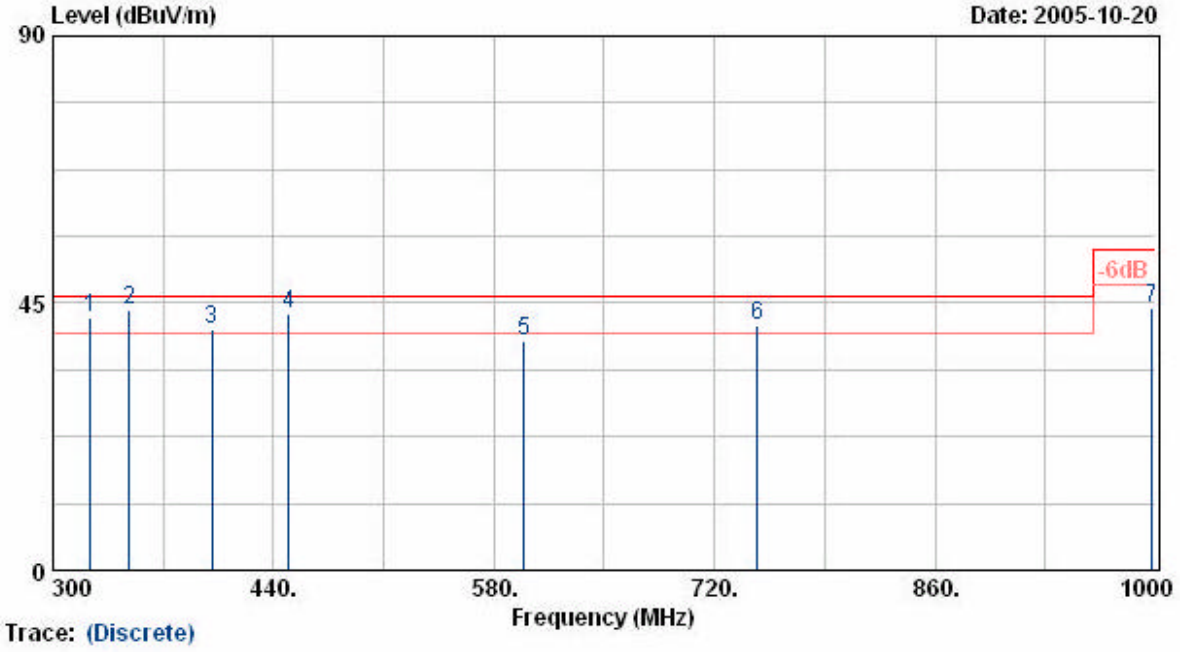


Frequency (MHz)	Meter Reading (dBuV)	Corrected Factor (dBuV/m)	Result (dBuV/m)	Limit (dB)	Margin (dB)	Remark	Table Deg.	Ant High (cm)
135.60	44.54	-14.79	29.75	43.50	-13.75	Peak	0	100
143.30	52.41	-14.44	37.97	43.50	-5.53	QP	0	100
150.73	50.25	-14.53	35.72	43.50	-7.78	Peak	0	100
200.23	49.16	-17.09	32.08	43.50	-11.42	Peak	100	100
249.18	56.41	-13.47	42.94	46.00	-3.06	QP	100	100
268.98	49.68	-12.02	37.66	46.00	-8.34	Peak	0	100
299.23	45.97	-11.32	34.65	46.00	-11.35	Peak	0	100

Notes:

1. Result = Meter Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too below to be measured.

EUT	: WAG102	Pol/Phase	: HORIZONTAL
Power	: AC 120V	Temperature	: 22 ℃
Test Mode	: Transmit/Receive	Humidity	: 70 %
Operation Channel	: 1	Atmospheric Pressure	: 1020 mmHg
Modulation Type	: 802.11b/g		
Rate	: 11/54 Mbps		
Memo	: DSA-0131F-12 Dipole (5dBi)		

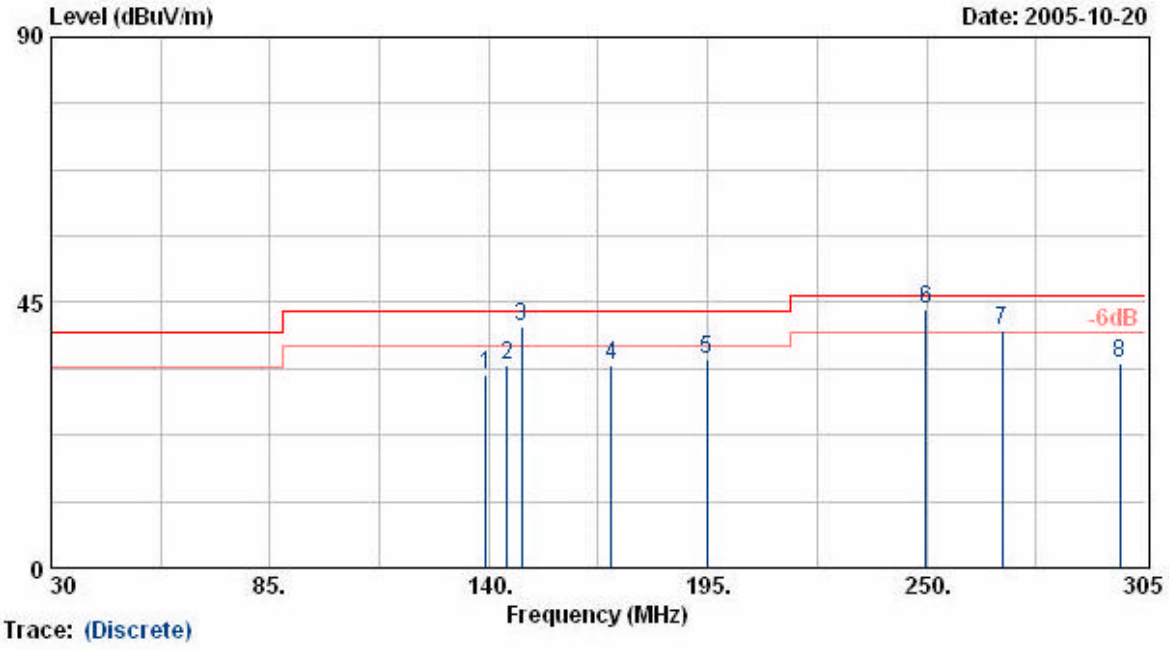


Frequency (MHz)	Meter Reading (dBuV)	Corrected Factor (dBuV/m)	Result (dBuV/m)	Limit (dB)	Margin (dB)	Remark	Table Deg.	Ant High (cm)
323.80	53.39	-10.89	42.50	46.00	-3.50	QP	0	100
348.30	54.28	-10.47	43.81	46.00	-2.19	QP	0	100
400.80	49.40	-8.87	40.53	46.00	-5.47	QP	50	100
449.80	52.04	-8.81	43.23	46.00	-2.77	QP	80	100
598.90	43.05	-4.55	38.50	46.00	-7.50	Peak	50	100
747.30	42.91	-1.52	41.39	46.00	-4.61	QP	80	100
997.90	41.44	2.78	44.22	54.00	-9.78	Peak	0	100

Notes:

1. Result = Meter Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too below to be measured.

EUT	: WAG102	Pol/Phase	: VERTICAL
Power	: AC 120V	Temperature	: 22 ℃
Test Mode	: Transmit/Receive	Humidity	: 70 %
Operation Channel	: 1	Atmospheric Pressure	: 1020 mmHg
Modulation Type	: 802.11b/g		
Rate	: 11/54 Mbps		
Memo	: DSA-0131F-12 Dipole (5dBi)		

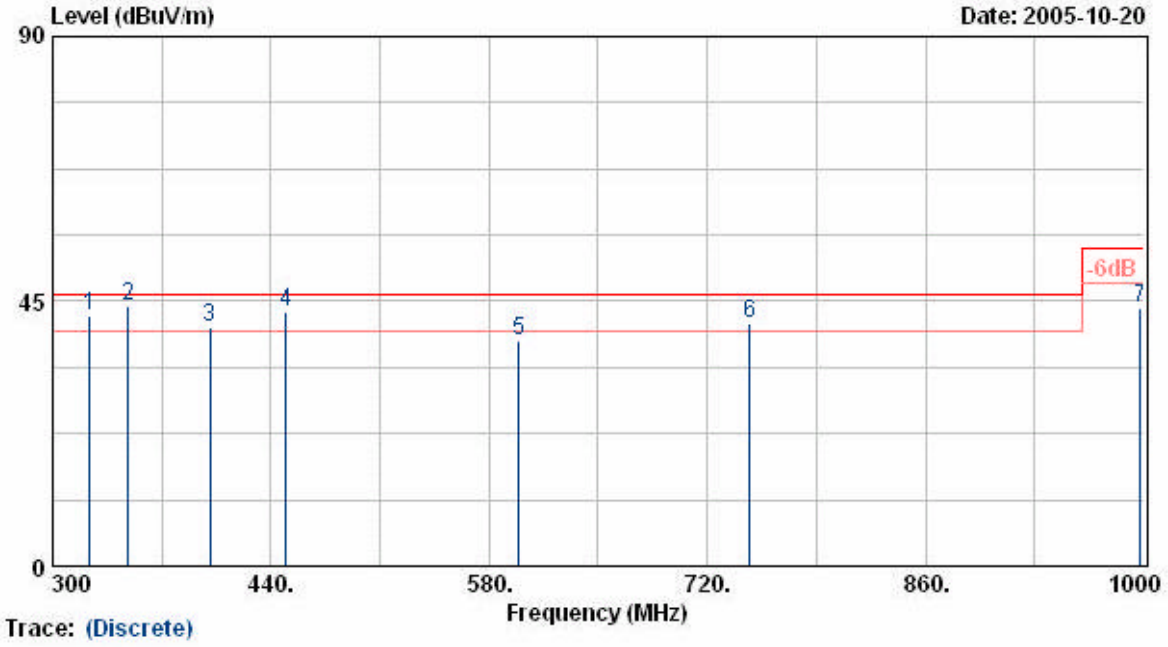


Frequency (MHz)	Meter Reading (dBuV)	Corrected Factor (dBuV/m)	Result (dBuV/m)	Limit (dB)	Margin (dB)	Remark	Table Deg.	Ant High (cm)
139.20	47.32	-14.53	32.79	43.50	-10.71	Peak	0	100
144.60	48.68	-14.43	34.25	43.50	-9.25	Peak	0	100
148.11	55.47	-14.43	41.04	43.50	-2.46	QP	60	100
170.80	51.23	-16.83	34.40	43.50	-9.10	Peak	60	100
194.73	52.26	-17.06	35.20	43.50	-8.30	Peak	60	100
249.73	57.18	-13.36	43.82	46.00	-2.18	QP	60	100
268.98	52.31	-12.02	40.29	46.00	-5.71	QP	0	100
298.68	46.12	-11.32	34.80	46.00	-11.20	Peak	0	100

Notes:

1. Result = Meter Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too below to be measured.

EUT	: WAG102	Pol/Phase	: VERTICAL
Power	: AC 120V	Temperature	: 22 ℃
Test Mode	: Transmit/Receive	Humidity	: 70 %
Operation Channel	: 1	Atmospheric Pressure	: 1020 mmHg
Modulation Type	: 802.11b/g		
Rate	: 11/54 Mbps		
Memo	: DSA-0131F-12 Dipole (5dBi)		

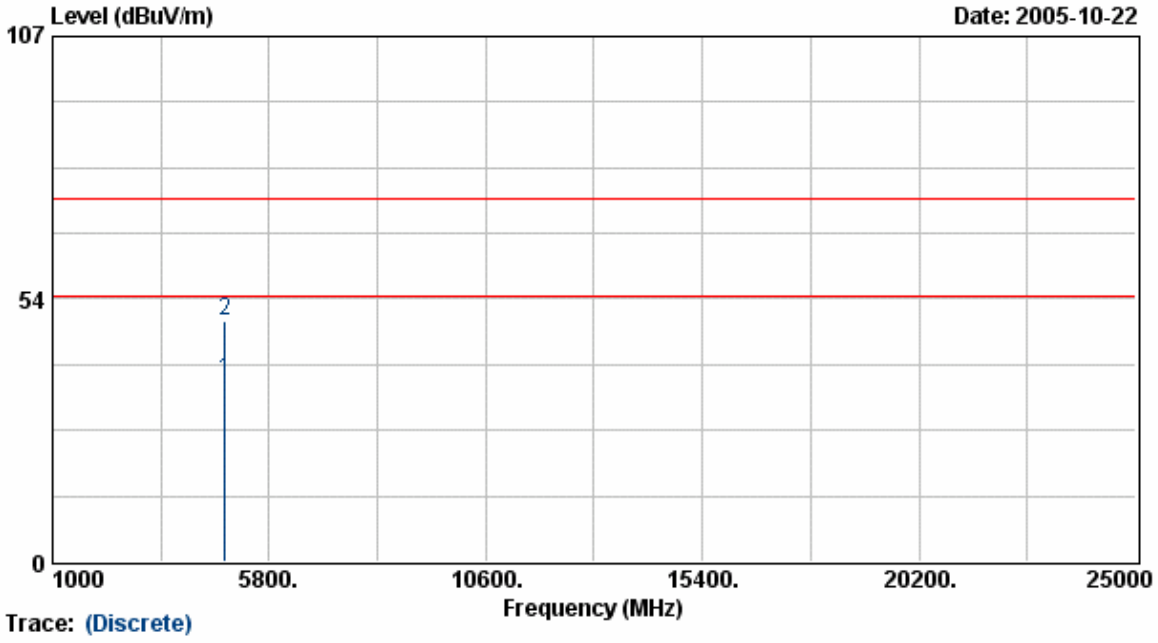


Frequency (MHz)	Meter Reading (dBuV)	Corrected Factor (dBuV/m)	Result (dBuV/m)	Limit (dB)	Margin (dB)	Remark	Table Deg.	Ant High (cm)
323.80	53.30	-10.89	42.42	46.00	-3.58	QP	0	100
348.30	54.62	-10.47	44.15	46.00	-1.85	QP	0	100
400.80	49.30	-8.87	40.43	46.00	-5.57	QP	80	100
449.80	51.92	-8.81	43.11	46.00	-2.89	QP	80	100
598.90	42.96	-4.55	38.40	46.00	-7.60	Peak	80	100
747.30	42.74	-1.52	41.22	46.00	-4.78	QP	80	100
997.90	41.22	2.78	44.00	54.00	-10.00	Peak	0	100

Notes:

1. Result = Meter Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too below to be measured.

EUT	: WAG102		
Power	: AC 120V	Pol/Phase	: HORIZONTAL
Test Mode	: Transmit/Receive	Temperature	: 22 ℃
Operation Channel	: 1	Humidity	: 70 %
Modulation Type	: 802.11b	Atmospheric Pressure	: 1020 mmHg
Rate	: 11 Mbps		
Memo	: DSA-0130F-12 Dipole (5dBi)		

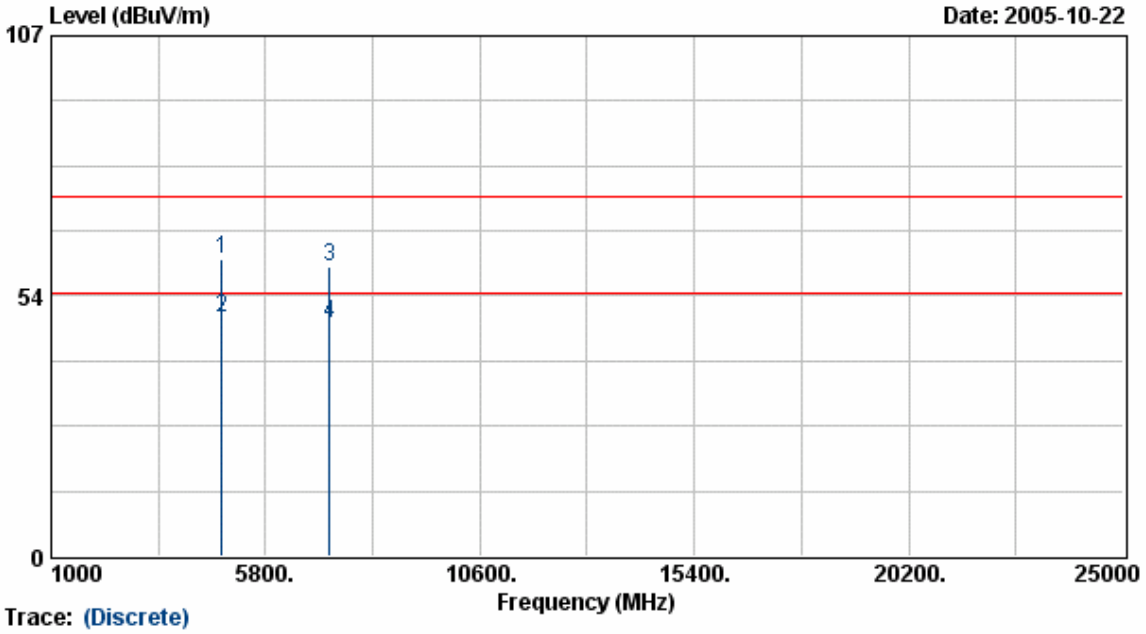


Frequency (MHz)	Meter Reading (dBuV)	Corrected Factor (dBuV/m)	Result (dBuV/m)	Limit (dB)	Margin (dB)	Remark	Table Deg.	Ant High (cm)
4823.93	28.94	8.12	37.06	54.00	-16.94	Average	81	100
4823.93	40.84	8.12	48.96	74.00	-25.04	Peak	81	100

Notes:

1. Result = Meter Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too below to be measured.

EUT	: WAG102	Pol/Phase	: VERTICAL
Power	: AC 120V	Temperature	: 22 ℃
Test Mode	: Transmit/Receive	Humidity	: 70 %
Operation Channel	: 1	Atmospheric Pressure	: 1020 mmHg
Modulation Type	: 802.11b		
Rate	: 11 Mbps		
Memo	: DSA-0130F-12 Dipole (5dBi)		

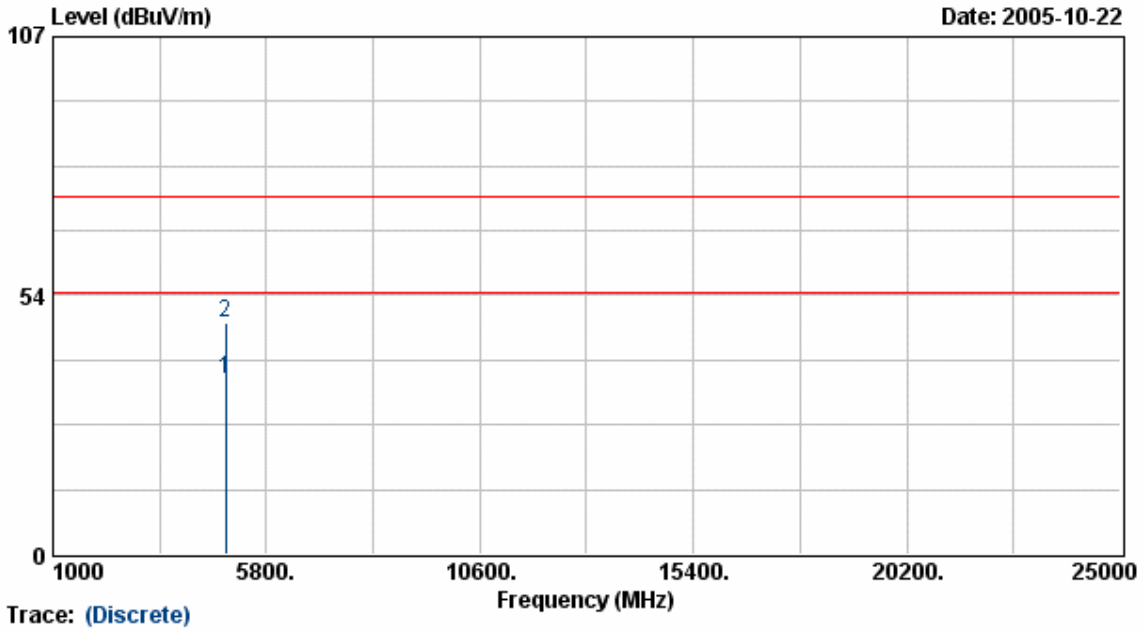


Frequency (MHz)	Meter Reading (dBuV)	Corrected Factor (dBuV/m)	Result (dBuV/m)	Limit (dB)	Margin (dB)	Remark	Table Deg.	Ant High (cm)
4823.41	53.56	7.36	60.91	74.00	-13.09	Peak	231	100
4823.41	41.77	7.36	49.13	54.00	-4.87	Average	231	100
7237.69	48.64	11.06	59.70	74.00	-14.30	Peak	231	100
7237.69	36.72	11.06	47.78	54.00	-6.22	Average	231	100

Notes:

1. Result = Meter Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too below to be measured.

EUT	: WAG102	Pol/Phase	: HORIZONTAL
Power	: AC 120V	Temperature	: 22 ℃
Test Mode	: Transmit/Receive	Humidity	: 70 %
Operation Channel	: 6	Atmospheric Pressure	: 1020 mmHg
Modulation Type	: 802.11b		
Rate	: 11 Mbps		
Memo	: DSA-0130F-12 Dipole (5dBi)		

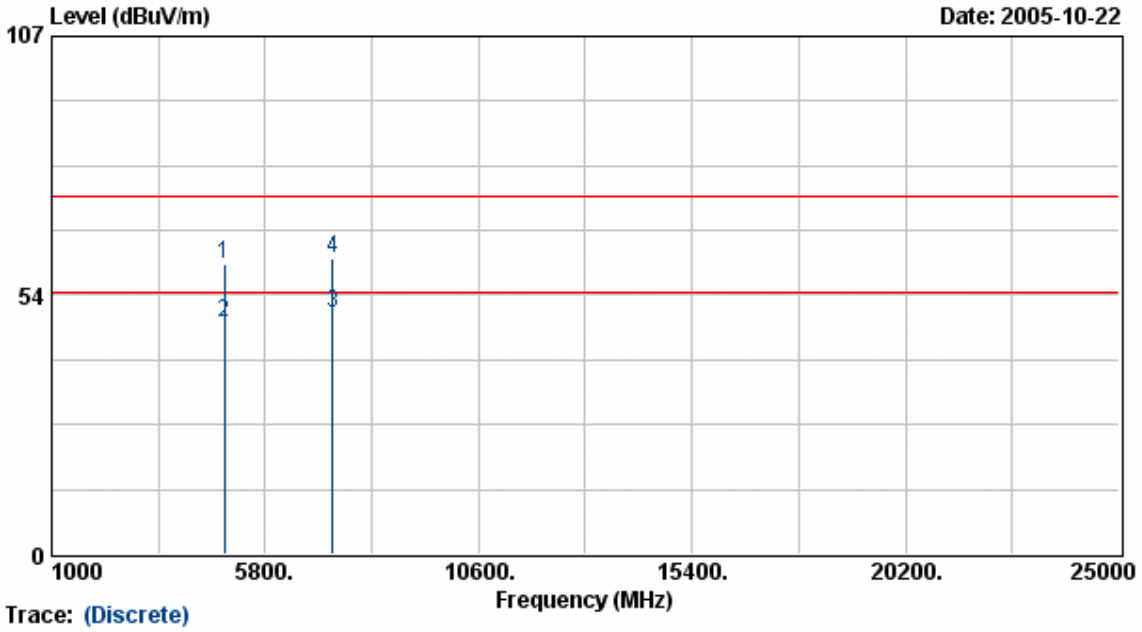


Frequency (MHz)	Meter Reading (dBuV)	Corrected Factor (dBuV/m)	Result (dBuV/m)	Limit (dB)	Margin (dB)	Remark	Table Deg.	Ant High (cm)
4873.99	27.83	8.32	36.14	54.00	-17.86	Average	81	100
4873.99	39.67	8.32	47.99	74.00	-26.01	Peak	81	100

Notes:

1. Result = Meter Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too below to be measured.

EUT	: WAG102		
Power	: AC 120V	Pol/Phase	: VERTICAL
Test Mode	: Transmit/Receive	Temperature	: 22 ℃
Operation Channel	: 6	Humidity	: 70 %
Modulation Type	: 802.11b	Atmospheric Pressure	: 1020 mmHg
Rate	: 11 Mbps		
Memo	: DSA-0130F-12 Dipole (5dBi)		

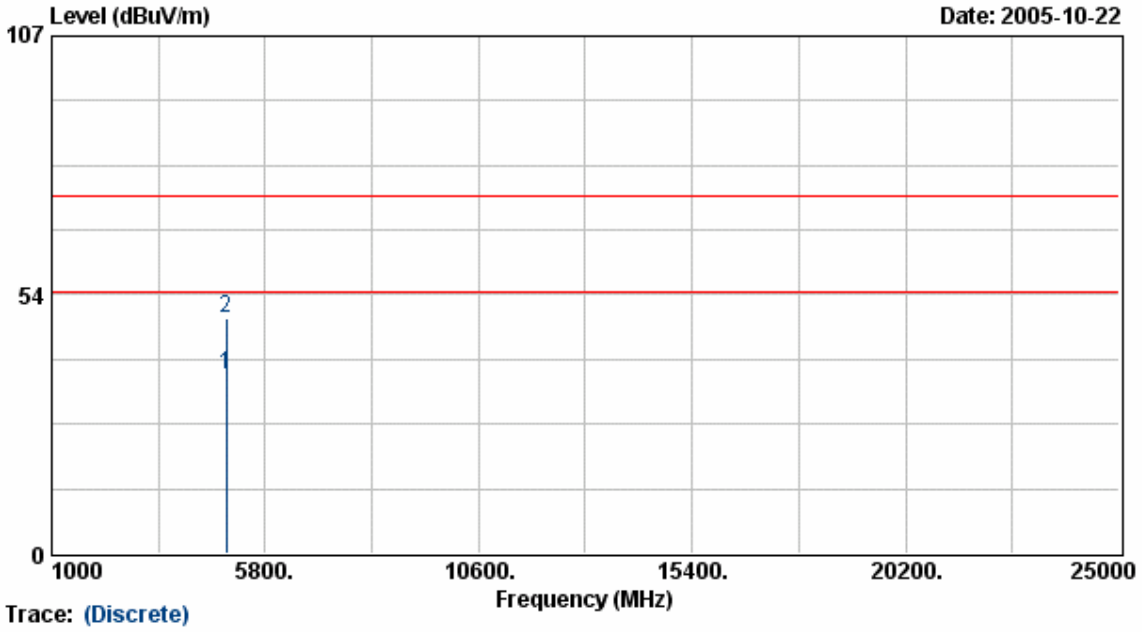


Frequency (MHz)	Meter Reading (dBuV)	Corrected Factor (dBuV/m)	Result (dBuV/m)	Limit (dB)	Margin (dB)	Remark	Table Deg.	Ant High (cm)
4874.76	52.36	7.54	59.90	74.00	-14.10	Peak	231	100
4874.76	40.31	7.54	47.85	54.00	-6.15	Average	231	100
7309.79	38.76	11.14	49.89	54.00	-4.11	Average	231	100
7309.79	50.02	11.14	61.16	74.00	-12.84	Peak	231	100

Notes:

1. Result = Meter Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too below to be measured.

EUT	: WAG102	Pol/Phase	: HORIZONTAL
Power	: AC 120V	Temperature	: 22 ℃
Test Mode	: Transmit/Receive	Humidity	: 70 %
Operation Channel	: 11	Atmospheric Pressure	: 1020 mmHg
Modulation Type	: 802.11b		
Rate	: 11 Mbps		
Memo	: DSA-0130F-12 Dipole (5dBi)		

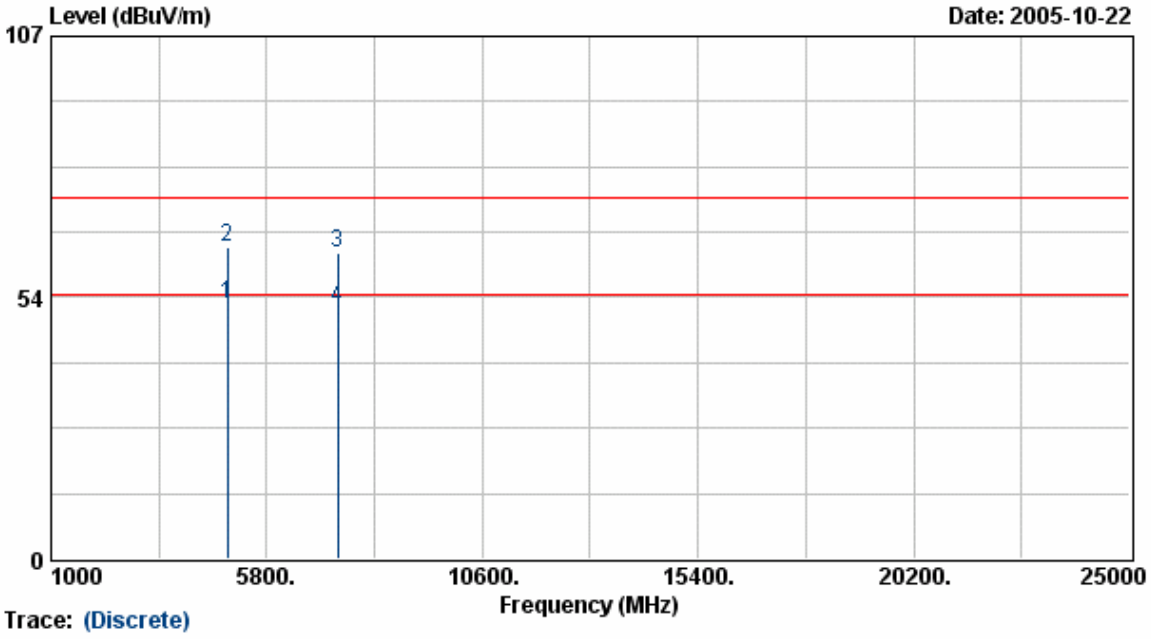


Frequency (MHz)	Meter Reading (dBuV)	Corrected Factor (dBuV/m)	Result (dBuV/m)	Limit (dB)	Margin (dB)	Remark	Table Deg.	Ant High (cm)
4923.96	28.29	8.51	36.80	54.00	-17.20	Average	81	100
4923.96	40.19	8.51	48.70	74.00	-25.30	Peak	81	100

Notes:

1. Result = Meter Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too below to be measured.

EUT	: WAG102		
Power	: AC 120V	Pol/Phase	: VERTICAL
Test Mode	: Transmit/Receive	Temperature	: 22 ℃
Operation Channel	: 11	Humidity	: 70 %
Modulation Type	: 802.11b	Atmospheric Pressure	: 1020 mmHg
Rate	: 11 Mbps		
Memo	: DSA-0130F-12 Dipole (5dBi)		

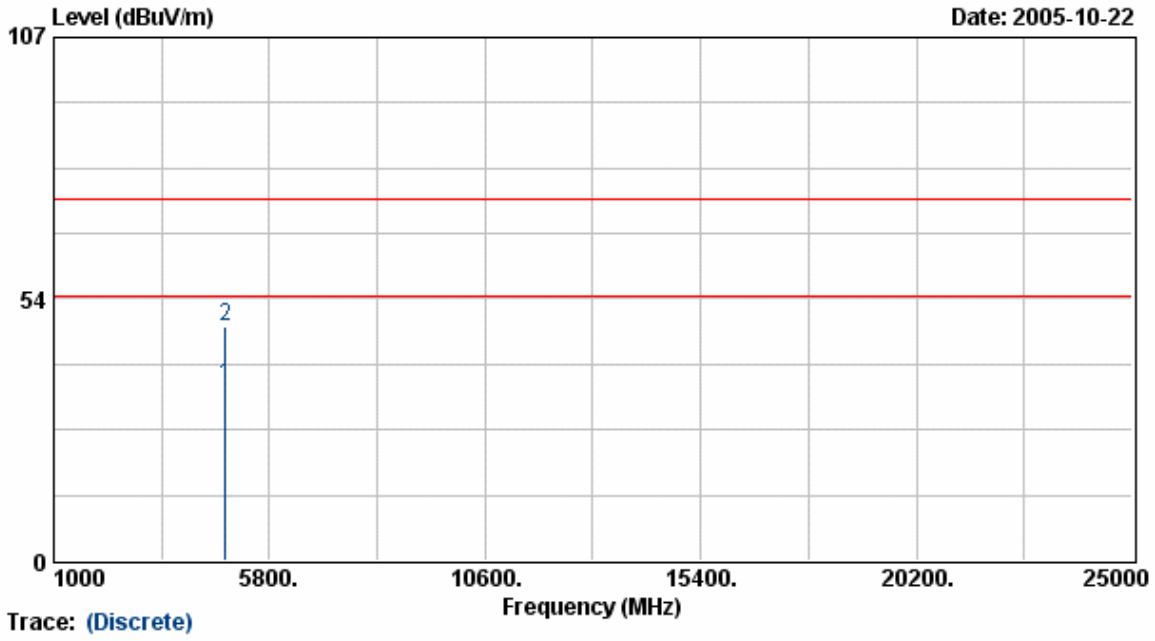


Frequency (MHz)	Meter Reading (dBuV)	Corrected Factor (dBuV/m)	Result (dBuV/m)	Limit (dB)	Margin (dB)	Remark	Table Deg.	Ant High (cm)
4923.23	44.23	7.72	51.95	54.00	-2.05	Average	231	100
4923.23	56.20	7.72	63.92	74.00	-10.08	Peak	231	100
7385.25	51.27	11.22	62.49	74.00	-11.51	Peak	231	100
7385.25	39.96	11.22	51.18	54.00	-2.82	Average	231	100

Notes:

1. Result = Meter Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too below to be measured.

EUT	: WAG102	Pol/Phase	: HORIZONTAL
Power	: AC 120V	Temperature	: 22 ℃
Test Mode	: Transmit/Receive	Humidity	: 70 %
Operation Channel	: 1	Atmospheric Pressure	: 1020 mmHg
Modulation Type	: 802.11g		
Rate	: 54 Mbps		
Memo	: DSA-0130F-12 Dipole (5dBi)		



Frequency (MHz)	Meter Reading (dBuV)	Corrected Factor (dBuV/m)	Result (dBuV/m)	Limit (dB)	Margin (dB)	Remark	Table Deg.	Ant High (cm)
4828.10	27.70	8.14	35.84	54.00	-18.16	Average	81	100
4828.10	39.67	8.14	47.81	74.00	-26.19	Peak	81	100

Notes:

1. Result = Meter Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300kHz for Peak detection and Quasi-peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
6. The other emissions is too below to be measured.