



EMC TEST REPORT

Report No. : EME-030766
Model No. : HTKWLAN02
Issued Date : July 4, 2003

Applicant : HIGH-TEK HARNESS ENTERPRISE CO., LTD.
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Test By : Intertek Testing Services Taiwan Ltd.
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Project Engineer

Jerry Liu

Reviewed By

Elton Chen



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Summary of Tests

802.11b Mini PCI WLAN Card-Model: HTKWLAN02
FCC ID: Q2EWLAN02

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	: HIGH-TEK HARNESS ENTERPRISE CO., LTD.
Product	: 802.11b Mini PCI WLAN Card
Model No.	: HTKWLAN02
FCC ID.	: Q2EWLAN02
Frequency Range	: 2412MHz to 2462MHz
Channel Number	: 11
Frequency of Each Channel	: 2412MHz, 2417MHz, 2422MHz, 2427MHz, 2432MHz, 2437MHz, 2442MHz, 2447MHz, 2452MHz, 2457MHz, 2462MHz
Type of Modulation	: CCK (11Mbps, 5.5Mbps), DQPSK (2Mbps), DBPSK (1Mbps)
Rated Power	: DC 3.3V
Power Cord	: N/A
Sample Received	: April 23, 2003
Test Date(s)	: April 23, 2003 to June 30, 2003

A FCC DoC report has been generated for the client.

1.2 Additional information about the EUT

This WLAN card uses the IEEE 802.11b protocol to enable communications between the host and the other computers, using the 2.4GHz ISM Radio Band for the communications medium. It supports the IEEE 802.11b network specification for Direct Sequence Spread Spectrum (DSSS) signaling, providing data rates of 1, 2, 5.5, 11Mbps.

The EUT meets special requirements for full modular approval on FCC Public Notice DA 00-1407 and the device is only for OEM integrator, please refer the test result in this report.

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



1.3 Antenna description

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 : 0dBi

Antenna Type : PIFA antenna

Connector Type : Male

1.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
PC	Acer	N/A	N/A	N/A
Key Board	IBM	37L2548	0095996	FCC DoC Approved
Monitor	IBM	6331-0LN	23-NW855	ARSCM560S
Mouse	Logitech	850693-0001	LAZ82706831	FCC DoC Approved
Printer	HP	C2642A	TH86K1N2ZB	FCC DoC Approved
Modem	Dynalink	V1456VQE	00V230A00051494	FCC DoC Approved

Remark: The PC 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 C63.4/1992.

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

Settle the EUT into PC via a Mini PCI to PCI interface extended Card. Run the test Program “INPROCOMM RF Test Utility” provided by manufacturer. This setup manner only for test purpose.

The EUT was transmitted continuously during all the test.

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
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	100137	July 10, 2002
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	100186	Oct. 9, 2002
Horn Antenna	EMCO	1GHz~18GHz	3115	9906-5890	Sep. 19, 2002
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
4GHz Source RF	HP	9KHz~4GHz	8648D	3847U00403	Sep. 7, 2002
RF Power Meter	Boonton	10kHz~100GHz	4231A	79401	Mar. 25, 2003
Power Sensor	Boonton	30MHz~8GHz	51011-EMC	32482	Mar. 25, 2003

Note:

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



3. Minimum 6dB Bandwidth test

3.1 Operating environment

Temperature: 22 °C
Relative Humidity: 53 %
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 100kHz, 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.

See Minimum 6dB Bandwidth plot as file name “Minimum 6dB Bandwidth plot.pdf”

3.3 Measured data of Minimum 6dB Bandwidth test results

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit
Low	2412	9.86	> 500kHz
Middle	2437	9.86	> 500kHz
High	2462	9.86	> 500kHz



4. Maximum Output Power test

4.1 Operating environment

Temperature: 22 °C
Relative Humidity: 60 %
Atmospheric Pressure 1023 hPa

4.2 Test setup & procedure

The power output per FCC §15.247(b) was measured on the EUT using a 50 ohm SMA cable connected to spectrum analyzer. The RBW of spectrum analyzer was set to 1MHz, VBW $\geq$ RBW. The channel power function would be enable. Power was read directly and cable loss correction (2.83dB) 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).

See Maximum Output Power plot as file name “Maximum Output Power plot CH1, CH6 and CH11.pdf”

4.3 Measured data of Maximum Output Power test results

Channel	Frequency (MHz)	C.B.L. (dB)	Reading (dBm)	Power Output		Limit (W)
				(dBm)	(mW)	
Lowest	2412	2.83	14.21	17.04	50.58	1
Middle	2437	2.83	13.94	16.77	47.53	1
Highest	2462	2.83	13.67	16.50	44.67	1



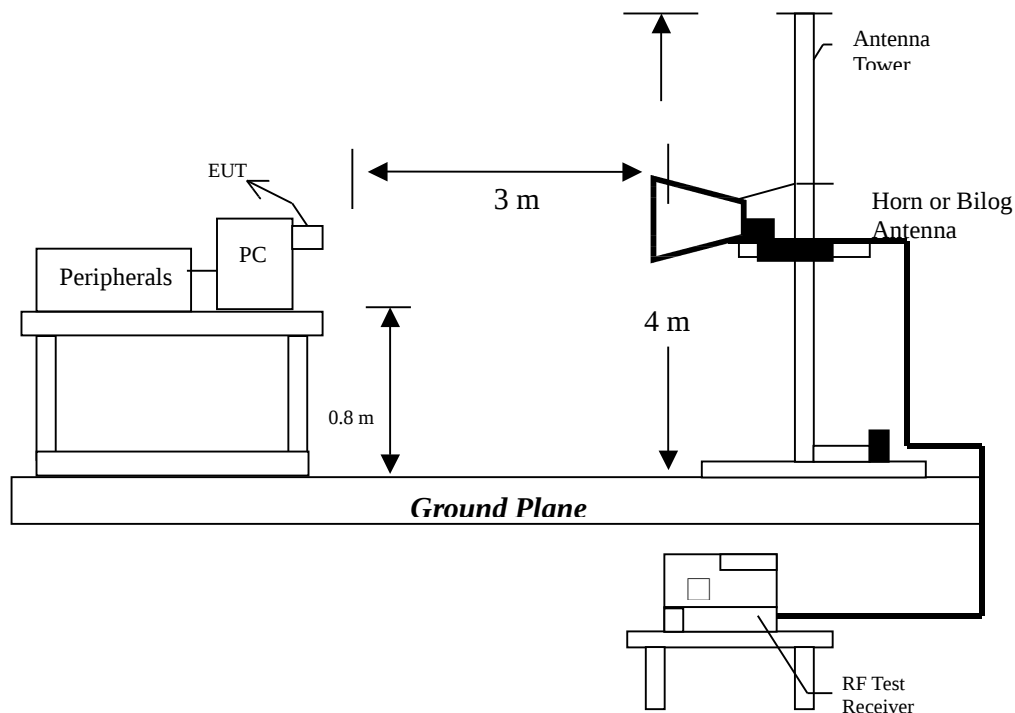
5. Radiated Emission test

5.1 Operating environment

Temperature:	25	°C	(10-40°C)
Relative Humidity:	55	%	(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 investigated 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

EUT : HTKWLAN02

Test Condition : Tx at low channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
165.8000	QP	V	14.55	20.40	34.95	43.50	-8.55
239.5000	QP	V	12.82	24.70	37.52	46.00	-8.48
251.2000	QP	V	13.21	21.90	35.11	46.00	-10.89
266.7000	QP	V	13.55	19.30	32.85	46.00	-13.15
400.5000	QP	V	16.94	21.90	38.84	46.00	-7.16
501.4000	QP	V	18.62	19.30	37.92	46.00	-8.08
99.8000	QP	H	10.90	20.90	31.80	43.50	-11.70
165.8000	QP	H	14.55	21.10	35.65	43.50	-7.85
239.5000	QP	H	12.82	22.00	34.82	46.00	-11.18
400.5000	QP	H	16.94	15.30	32.24	46.00	-13.76
501.4000	QP	H	18.62	13.40	32.02	46.00	-13.98
751.7000	QP	H	23.45	8.60	32.05	46.00	-13.95

Remark:

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



EUT : HTKWLAN02

Test Condition : Tx at middle channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
99.8000	QP	V	10.90	20.40	31.30	43.50	-12.20
165.8000	QP	V	14.55	21.20	35.75	43.50	-7.75
239.5000	QP	V	12.82	24.80	37.62	46.00	-8.38
251.2000	QP	V	13.21	22.80	36.01	46.00	-9.99
400.5000	QP	V	16.94	22.80	39.74	46.00	-6.26
501.4000	QP	V	18.62	19.70	38.32	46.00	-7.68
165.8000	QP	H	14.55	21.60	36.15	43.50	-7.35
239.5000	QP	H	12.82	24.10	36.92	46.00	-9.08
251.2000	QP	H	13.21	21.60	34.81	46.00	-11.19
375.3000	QP	H	16.32	20.10	36.42	46.00	-9.58
400.5000	QP	H	16.94	20.90	37.84	46.00	-8.16
501.4000	QP	H	18.62	18.00	36.62	46.00	-9.38

Remark:

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



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EUT : HTKWLAN02

Test Condition : Tx at high channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
165.8000	QP	V	14.55	21.60	36.15	43.50	-7.35
239.5000	QP	V	12.82	24.10	36.92	46.00	-9.08
251.2000	QP	V	13.21	21.60	34.81	46.00	-11.19
385.3000	QP	V	16.55	20.10	36.65	46.00	-9.35
400.5000	QP	V	16.94	20.90	37.84	46.00	-8.16
501.4000	QP	V	18.62	18.00	36.62	46.00	-9.38
99.8000	QP	H	10.90	23.00	33.90	43.50	-9.60
165.8000	QP	H	14.55	22.20	36.75	43.50	-6.75
239.5000	QP	H	12.82	20.80	33.62	46.00	-12.38
400.5000	QP	H	16.94	13.90	30.84	46.00	-15.16
501.4000	QP	H	18.62	13.80	32.42	46.00	-13.58
668.3000	QP	H	21.82	9.20	31.02	46.00	-14.98

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
3215.98	-4.16

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

EUT : HTKWLAN02

Test Condition : Tx at low channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamplifier (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
3215.98	PK	V	32.624	32.16	55.014	54.55	74	-19.45
3215.98	AV	V	32.624	32.16	50.304	49.84	54	-4.16
4824	PK	V	32.496	35.47	-	-	74	-
4824	AV	V	32.496	35.47	-	-	54	-
7236	PK	V	34.32	38.42	-	-	74	-
7236	AV	V	34.32	38.42	-	-	54	-
9648	PK	V	35.808	41.35	-	-	74	-
9648	AV	V	35.808	41.35	-	-	54	-
12060	PK	V	35.4	43.38	-	-	74	-
12060	AV	V	35.4	43.38	-	-	54	-
14472	PK	V	34.754	44.99	-	-	74	-
14472	AV	V	34.754	44.99	-	-	54	-
16884	PK	V	35.346	42.8	-	-	74	-
16884	AV	V	35.346	42.8	-	-	54	-
19296	PK	V	34.488	34.488	-	-	74	-
19296	AV	V	34.488	34.488	-	-	54	-



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21708	PK	V	34.588	34.588	-	-	74	-
21708	AV	V	34.588	34.588	-	-	54	-
24120	PK	V	35.52	35.52	-	-	74	-
24120	AV	V	35.52	35.52	-	-	54	-

Remark:

1. Corrected Level = Reading Level + Correction Factor — Preamp

2. Correction Factor = Antenna Factor + Cable Loss

3. “-“ means the emission is below the noise floor, and the noise floor listed below:

For PK:

1GHz-10GHz: 50dBuV

10GHz-26.5GHz: 60dBuV

For AV:

1GHz-10GHz: 40dBuV

10GHz-26.5GHz: 45dBuV



EUT : HTKWLAN02
Test Condition : Tx at low channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamplifier (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
3215.98	PK	H	32.624	32.16	56.334	55.87	74	-18.13
3215.98	AV	H	32.624	32.16	49.314	48.85	54	-5.15
4824	PK	H	32.496	35.47	-	-	74	-
4824	AV	H	32.496	35.47	-	-	54	-
7236	PK	H	34.32	38.42	-	-	74	-
7236	AV	H	34.32	38.42	-	-	54	-
9648	PK	H	35.808	41.35	-	-	74	-
9648	AV	H	35.808	41.35	-	-	54	-
12060	PK	H	35.4	43.38	-	-	74	-
12060	AV	H	35.4	43.38	-	-	54	-
14472	PK	H	34.754	44.99	-	-	74	-
14472	AV	H	34.754	44.99	-	-	54	-
16884	PK	H	35.346	42.8	-	-	74	-
16884	AV	H	35.346	42.8	-	-	54	-
19296	PK	H	34.488	34.488	-	-	74	-
19296	AV	H	34.488	34.488	-	-	54	-
21708	PK	H	34.588	34.588	-	-	74	-
21708	AV	H	34.588	34.588	-	-	54	-
24120	PK	H	35.52	35.52	-	-	74	-
24120	AV	H	35.52	35.52	-	-	54	-

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor, and the noise floor listed below:

For PK:

1GHz-10GHz: 50dBuV
10GHz-26.5GHz: 60dBuV

For AV:

1GHz-10GHz: 40dBuV
10GHz-26.5GHz: 45dBuV



EUT : HTKWLAN02

Test Condition : Tx at middle channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamplifier (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
3249.3	PK	V	32.624	32.16	54.154	53.69	74	-20.31
3249.3	AV	V	32.624	32.16	49.144	48.68	54	-5.32
4874	PK	V	32.496	35.47	-	-	74	-
4874	AV	V	32.496	35.47	-	-	54	-
7311	PK	V	34.32	38.42	-	-	74	-
7311	AV	V	34.32	38.42	-	-	54	-
9748	PK	V	35.808	41.35	-	-	74	-
9748	AV	V	35.808	41.35	-	-	54	-
12185	PK	V	35.4	43.38	-	-	74	-
12185	AV	V	35.4	43.38	-	-	54	-
14622	PK	V	34.856	45.75	-	-	74	-
14462	AV	V	34.754	44.99	-	-	54	-
17059	PK	V	35.29	34.488	-	-	74	-
17059	AV	V	35.29	34.488	-	-	54	-
19496	PK	V	34.401	34.488	-	-	74	-
19496	AV	V	34.401	34.488	-	-	54	-
21933	PK	V	34.644	34.588	-	-	74	-
21933	AV	V	34.644	34.588	-	-	54	-
24370	PK	V	35.636	35.52	-	-	74	-
24370	AV	V	35.636	35.52	-	-	54	-

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor, and the noise floor listed below:

For PK:

1GHz-10GHz: 50dBuV

10GHz-26.5GHz: 60dBuV

For AV:

1GHz-10GHz: 40dBuV

10GHz-26.5GHz: 45dBuV



The radiated spurious emissions at

Frequency(MHz)	Margin
3249.3	-1.12

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

EUT : HTKWLAN02

Test Condition : Tx at middle channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamplifier (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
3249.3	PK	H	32.624	32.16	57.804	57.34	74	-16.66
3249.3	AV	H	32.624	32.16	53.344	52.88	54	-1.12
4874	PK	H	32.496	35.47	-	-	74	-
4874	AV	H	32.496	35.47	-	-	54	-
7311	PK	H	34.32	38.42	-	-	74	-
7311	AV	H	34.32	38.42	-	-	54	-
9748	PK	H	35.808	41.35	-	-	74	-
9748	AV	H	35.808	41.35	-	-	54	-
12185	PK	H	35.4	43.38	-	-	74	-
12185	AV	H	35.4	43.38	-	-	54	-
14622	PK	H	34.856	45.75	-	-	74	-
14462	AV	H	34.754	44.99	-	-	54	-
17059	PK	H	35.29	34.488	-	-	74	-
17059	AV	H	35.29	34.488	-	-	54	-
19496	PK	H	34.401	34.488	-	-	74	-
19496	AV	H	34.401	34.488	-	-	54	-



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21933	PK	H	34.644	34.588	-	-	74	-
21933	AV	H	34.644	34.588	-	-	54	-
24370	PK	H	35.636	35.52	-	-	74	-
24370	AV	H	35.636	35.52	-	-	54	-

Remark:

1. Corrected Level = Reading Level + Correction Factor — Preamp

2. Correction Factor = Antenna Factor + Cable Loss

3. “-“ means the emission is below the noise floor, and the noise floor listed below:

For PK:

1GHz-10GHz: 50dBuV

10GHz-26.5GHz: 60dBuV

For AV:

1GHz-10GHz: 40dBuV

10GHz-26.5GHz: 45dBuV



The radiated spurious emissions at

Frequency(MHz)	Margin
3249.3	-4.82

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

EUT : HTKWLAN02

Test Condition : Tx at high channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamplifier (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
3249.3	PK	V	32.624	32.16	54.414	53.95	74	-20.05
3249.3	AV	V	32.624	32.16	49.644	49.18	54	-4.82
4924	PK	V	32.496	35.47	-	-	74	-
4924	AV	V	32.496	35.47	-	-	54	-
7386	PK	V	34.32	38.42	-	-	74	-
7386	AV	V	34.32	38.42	-	-	54	-
9848	PK	V	35.919	41.55	-	-	74	-
9848	AV	V	35.919	41.55	-	-	54	-
12310	PK	V	35.315	43.75	-	-	74	-
12310	AV	V	35.315	43.75	-	-	54	-
14772	PK	V	34.856	45.75	-	-	74	-
14772	AV	V	34.856	45.75	-	-	54	-
17234	PK	V	35.234	44.75	-	-	74	-
17234	AV	V	35.234	44.75	-	-	54	-
19696	PK	V	34.314	34.488	-	-	74	-
19696	AV	V	34.314	34.488	-	-	54	-



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22158	PK	V	34.7	34.588	-	-	74	-
22158	AV	V	34.7	34.588	-	-	54	-
24620	PK	V	35.868	35.52	-	-	74	-
24620	AV	V	35.868	35.52	-	-	54	-

Remark:

1. Corrected Level = Reading Level + Correction Factor — Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor, and the noise floor listed below:

For PK:

1GHz-10GHz: 50dBuV

10GHz-26.5GHz: 60dBuV

For AV:

1GHz-10GHz: 40dBuV

10GHz-26.5GHz: 45dBuV



The radiated spurious emissions at

Frequency(MHz)	Margin
3249.3	-1.19

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

EUT : HTKWLAN02

Test Condition : Tx at high channel

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamplifier (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)
3249.3	PK	H	32.624	32.16	57.564	57.1	74	-16.9
3249.3	AV	H	32.624	32.16	53.274	52.81	54	-1.19
4924	PK	H	32.496	35.47	-	-	74	-
4924	AV	H	32.496	35.47	-	-	54	-
7386	PK	H	34.32	38.42	-	-	74	-
7386	AV	H	34.32	38.42	-	-	54	-
9848	PK	H	35.919	41.55	-	-	74	-
9848	AV	H	35.919	41.55	-	-	54	-
12310	PK	H	35.315	43.75	-	-	74	-
12310	AV	H	35.315	43.75	-	-	54	-
14772	PK	H	34.856	45.75	-	-	74	-
14772	AV	H	34.856	45.75	-	-	54	-
17234	PK	H	35.234	44.75	-	-	74	-
17234	AV	H	35.234	44.75	-	-	54	-
19696	PK	H	34.314	34.488	-	-	74	-
19696	AV	H	34.314	34.488	-	-	54	-



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22158	PK	H	34.7	34.588	-	-	74	-
22158	AV	H	34.7	34.588	-	-	54	-
24620	PK	H	35.868	35.52	-	-	74	-
24620	AV	H	35.868	35.52	-	-	54	-

Remark:

1. Corrected Level = Reading Level + Correction Factor — Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor, and the noise floor listed below:

For PK:

1GHz-10GHz: 50dBuV

10GHz-26.5GHz: 60dBuV

For AV:

1GHz-10GHz: 40dBuV

10GHz-26.5GHz: 45dBuV



6. Power Spectrum Density test

6.1 Operating environment

Temperature: 22 °C
Relative Humidity: 53 %
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 (2.83dB)/external attenuator (3dB) 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.

See Power Spectrum Density plot as file name “Power Spectrum Density plot.pdf”

6.3 Measured data of Power Spectrum Density test results

Channel	Frequency (MHz)	Measured level (dBm)	Limit (dBm)
Low	2412.691	-8.89	8
Middle	2437.690	-9.84	8
High	2462.692	-9.76	8



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.

See band-edge plot as file name “Band-edge plot.pdf”.

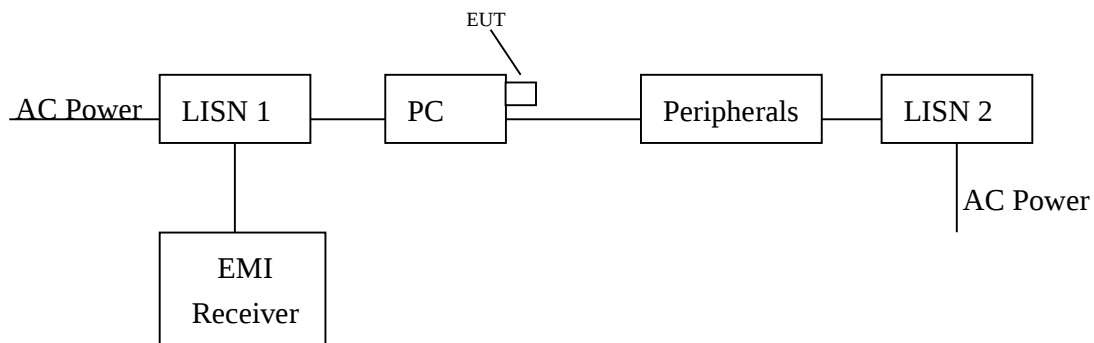


8. Power Line Conducted Emission test §FCC 15.207

8.1 Operating environment

Temperature:	25	°C	(10-40°C)
Relative Humidity:	55	%	(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 investigated 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”.

See Power Line Conducted Emission plot as file name “Power Line Conducted Emission plot.pdf”.



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 : HTKWLAN02
Test Condition : Tx at low channel

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
0.19800	45.30	63.69	45.20	53.69	-18.39	-8.49
0.30200	39.90	60.19	39.50	50.19	-20.29	-10.69
0.60600	36.90	56.00	34.90	46.00	-19.10	-11.10
0.71000	29.40	56.00	27.40	46.00	-26.60	-18.60
6.79800	40.40	60.00	39.00	50.00	-19.60	-11.00
7.12600	39.10	60.00	38.00	50.00	-20.90	-12.00

(2) Neutral

EUT : HTKWLAN02
Test Condition : Tx at low channel

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
0.20600	43.50	63.37	43.40	53.37	-19.87	-9.97
0.30200	33.10	60.19	32.70	50.19	-27.09	-17.49
0.60600	34.80	56.00	32.10	46.00	-21.20	-13.90
0.71000	31.40	56.00	29.30	46.00	-24.60	-16.70
4.12600	29.60	56.00	27.50	46.00	-26.40	-18.50
6.79800	39.90	60.00	38.20	50.00	-20.10	-11.80

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.



(1) Line

EUT : HTKWLAN02
Test Condition : Tx at middle channel

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
0.20600	49.50	63.37	49.40	53.37	-13.87	-3.97
0.30200	36.50	60.19	36.10	50.19	-23.69	-14.09
0.61400	37.10	56.00	35.10	46.00	-18.90	-10.90
6.79800	39.70	60.00	38.20	50.00	-20.30	-11.80
10.59800	31.50	60.00	27.70	50.00	-28.50	-22.30
20.75000	25.80	60.00	17.90	50.00	-34.20	-32.10

(2) Neutral

EUT : HTKWLAN02
Test Condition : Tx at middle channel

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
0.20600	44.60	63.37	44.40	53.37	-18.77	-8.97
0.30200	32.40	60.19	31.90	50.19	-27.79	-18.29
0.61400	37.00	56.00	34.60	46.00	-19.00	-11.40
0.71000	29.30	56.00	27.20	46.00	-26.70	-18.80
4.17400	29.80	56.00	27.60	46.00	-26.20	-18.40
7.03000	37.50	60.00	35.00	50.00	-22.50	-15.00

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.



(1) Line

EUT : HTKWLAN02

Test Condition : Tx at high channel

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
0.20600	50.10	63.37	50.10	53.37	-13.27	-3.27
0.31000	37.40	59.97	37.10	49.97	-22.57	-12.87
0.61400	37.80	56.00	35.70	46.00	-18.20	-10.30
0.71800	28.10	56.00	26.70	46.00	-27.90	-19.30
7.08175	41.10	60.00	40.30	50.00	-18.90	-9.70
11.91000	31.30	60.00	26.90	50.00	-28.70	-23.10

(2) Neutral

EUT : HTKWLAN02

Test Condition : Tx at high channel

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
0.20600	46.80	63.37	46.80	53.37	-16.57	-6.57
0.31000	34.10	59.97	33.50	49.97	-25.87	-16.47
0.61400	39.40	56.00	37.10	46.00	-16.60	-8.90
0.71800	31.90	56.00	29.90	46.00	-24.10	-16.10
4.50200	31.40	56.00	29.50	46.00	-24.60	-16.50
7.12600	39.50	60.00	38.60	50.00	-20.50	-11.40

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.