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TEST REPORT

Revision History

Report No.	Version	Description	Issued Date
230401890SHA-001 Rev. 01		Initial issue of report	November 10, 2023



Measurement result summary

TEST ITEM	FCC REFERANCE	RESULT
Minimum 6dB Bandwidth	15.247(a)(2)	Pass
Maximum conducted output power and e.i.r.p.	15.247(b)(3)	Pass
Power spectrum density	15.247(e)	Pass
Emission outside the frequency band	15.247(d)	Pass
Radiated Emissions in restricted frequency bands	15.247(d), 15.205&15.209	Pass
Power line conducted emission	15.207(a)	Pass
Occupied bandwidth	_	Tested
Antenna requirement	15.203	Pass

Notes: 1: NA =Not Applicable

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TEST REPORT

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	Smart cordless floor washer		
	FW110300US, FW110500US, FW11xxyyzz, XX could be 00-99 or AA-ZZ,		
	indicate for different accessories; yy could be 00-99 indicate for different		
Type/Model:	sales channels; zz could be AA-ZZ indicate for different countries.		
	The EUT is a Smart cordless floor washer, it supports WIFI function, all		
	models are identical except the display, there are LCD display and LED		
	display. In model name, the suffix of the first two digits or two letters		
	indicate for different accessories, the followed two digits indicate for		
	different sales channels, and the last two letters indicate for different		
Description of FUT	countries, they do not matter with the testing requirements. we test the		
Description of EUT:	EUT with LED and LCD display and list the worst results in this report.		
	DC 21.6V, 230W Adapter S030-1B260100HU:		
	Input:100-240V~, 50-60Hz, 0.8A		
	output: 26V dc, 1.0A.		
	Adapter KL-WA260100-A3:		
	Input:100-240V~, 50-60Hz, 1.2A		
Rating:	output: 26V dc, 1.0A.		
EUT type:	Table top 🛛 Floor standing		
Software Version:	/		
Hardware Version:	/		
Sample Identification No.:	0230608-02-001		
Sample received date:	2023.6.8		
Date of test:	2023.6.10-2023.6.23		

1.2 Technical Specification

Frequency Band:	2400MHz ~ 2483.5MHz	
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20	
	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)	
	IEEE 802.11g: OFDM (64-QAM, 16-QAM, QPSK, BPSK)	
Type of Modulation:	IEEE 802.11n-HT20: OFDM (64-QAM, 16-QAM, QPSK, BPSK)	
Channel Number: 11 Channels for 802.11b, 802.11g and 802.11n(HT20)		
Channel Separation:	5 MHz	
Antenna:	PCB Antenna, 2.0dBi	



1.3 Description of Test Facility

Name:	Intertek Testing Services Shanghai
Address:	Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
Telephone:	86 21 61278200
Telefax:	86 21 54262353

The test facility is recognized,	CNAS Accreditation Lab Registration No. CNAS L0139
certified, or accredited by these organizations:	FCC Accredited Lab Designation Number: CN0175
organizations.	IC Registration Lab CAB identifier.: CN0014
	VCCI Registration Lab Registration No.: R-14243, G-10845, C-14723, T-12252
	A2LA Accreditation Lab Certificate Number: 3309.02

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2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2021) ANSI C63.10 (2013) KDB 558074 (v05r02)

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied.

Software name	Manufacturer	Version	Supplied by
EspRFTestTool	-	V2.8	Client

The lowest, middle and highest channel were tested as representatives.

Frequency Band (MHz)	Mode	Lowest (MHz)	Middle (MHz)	Highest (MHz)
	802.11b	2412	2437	2462
2400-2483.5	802.11g	2412	2437	2462
	802.11n(HT20)	2412	2437	2462

Data rate and Power setting:

The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases. After this pre-scan, we choose the following table of the data rata as the worst case.

Frequency Band (MHz)	Mode	Worst case data rate	Power Setting
	802.11b	1Mbps	Default
2400-2483.5	802.11g	6Mbps	Default
	802.11n(HT20)	MCS0	Default



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2.3 Test software list

Test Items	ms Software Manufacturer		Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission ES-K1		R&S	V1.71

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
1	Laptop computer	DELL 5480	-

2.5 Test environment condition:

Test items	Temperature	Humidity		
Minimum 6dB Bandwidth				
Maximum conducted output power and e.i.r.p.				
Power spectrum density	24°C	52%RH		
Emission outside the frequency band				
Occupied bandwidth				
Radiated Emissions in restricted frequency bands	25°C	51%RH		
Power line conducted emission	24°C	52%RH		

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2.6 Instrument list

Report No.: 230401890SHA-001

Conducted Emission							
Used	Equipment	Manufacturer	Туре	Internal no.	Due date		
\square	Test Receiver	R&S	ESCS 30	EC 2107	2023-07-09		
\square	A.M.N.	R&S	ESH2-Z5	EC 3119	2023-11-09		
	A.M.N.	R&S	ENV 216	EC 3393	2023-07-09		
	A.M.N.	R&S	ENV4200	EC 3558	2024-06-09		
Radiated E	mission						
Used	Equipment	Manufacturer	Туре	Internal no.	Due date		
\square	Test Receiver	R&S	ESIB 26	EC 3045	2023-10-19		
\square	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2023-08-06		
\square	Pre-amplifier	R&S	AFS42- 00101800-25-S- 42	EC5262	2024-06-09		
\square	Horn antenna	ETS	3117	EC 4792-1	2024-03-26		
\square	Horn antenna	ΤΟΥΟ	HAP18-26W	EC 4792-3	2023-07-08		
	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2024-04-23		
RF test	-						
Used	Equipment	Manufacturer	Туре	Internal no.	Due date		
\square	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2024-03-13		
	Power sensor	Agilent	U2021XA	EC 5338-1	2024-03-13		
	Vector Signal Generator	Agilent	N5182B	EC 5175	2024-03-13		
	Universal Radio Communication Tester	R&S	CMW500	EC5944	2024-01-20		
	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2024-03-05		
	Mobile Test System	Litepoint	lqxel	EC 5176	2024-01-11		
	Test Receiver	R&S	ESCI 7	EC 4501	2023-12-09		
	Climate chamber	GWS	MT3065	EC 6021	2024-03-05		
\square	Spectrum Analyzer	Keysight	N9030B	EC 6078	2024-06-08		
Tet Site							
Used	Equipment	Manufacturer	Туре	Internal no.	Due date		
\square	Shielded room	Zhongyu	-	EC 2838	2024-01-24		
	Shielded room	Zhongyu	-	EC 2839	2024-01-24		
\square	Semi-anechoic chamber	Albatross project	-	EC 3048	2023-08-22		

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Fully-anechoic Albatross EC 3047 2023-08-22 chamber project Additional instrument Manufacturer Used Equipment Туре Internal no. Due date Therom- \square ZJ1-2A S.M.I.F. EC 3783 2024-03-23 Hygrograph Therom- \square S.M.I.F. EC 5844 2024-03-08 ZJ1-2A Hygrograph Therom- \boxtimes ZJ1-2A S.M.I.F. EC 3442 2024-01-04 Hygrograph Therom- \boxtimes ZJ1-2A S.M.I.F. EC 5198 2024-03-08 Hygrograph Shanghai Pressure meter YM3 EC 3320 2023-07-22 Mengde



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2.7 Measurement uncertainty

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Measurement uncertainty
Maximum peak output power	± 0.74 dB
Radiated Emissions in restricted frequency bands below 1GHz	\pm 4.90dB
Radiated Emissions in restricted frequency bands above 1GHz	± 5.02dB
Emission outside the frequency band	± 2.89dB
Power line conducted emission	± 3.19dB

TEST REPORT

3 Minimum 6dB bandwidth

Test result: Pass

3.1 Limit

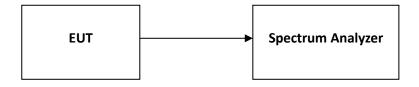
For systems using digital modulation techniques that may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 kHz.

3.2 Measurement Procedure

The EUT was tested according to Subclause 11.8 of ANSI C63.10.

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) \ge 3 × RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

3.3 Test Configuration



3.4 Test Results of Minimum 6dB bandwidth

Please refer to Appendix A



4 Maximum conducted output power and e.i.r.p.

Test result: Pass

4.1 Limit

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 W. (The e.i.r.p. shall not exceed 4 W)

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 30dBm and 30+ (6 –antenna gain-beam forming gain).

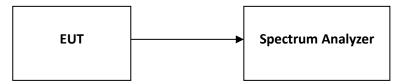
4.2 Measurement Procedure

The EUT was tested according to Subclause 11.9.2.2 of ANSI C63.10.

- a) Measure the duty cycle, x, of the transmitter output signal as described in Section 6.0.
- b) Set span to at least 1.5 x OBW.
- c) Set RBW = 1 % to 5 % of the OBW, not to exceed 1 MHz.
- d) Set VBW \geq 3 x RBW.
- e) Number of points in sweep $\ge 2 \times \text{span} / \text{RBW}$. (This gives bin-to-bin spacing $\le \text{RBW}/2$, so that narrowband signals are not lost between frequency bins.)
- f) Sweep time = auto.
- g) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- h) Do not use sweep triggering. Allow the sweep to "free run".
- i) Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the on and off periods of the transmitter.
- j) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
- k) Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on- and off-times of the transmission). For example, add 10 log (1/0.25) = 6 dB if the duty cycle is 25 %.



4.3 Test Configuration



4.4 Test Results of Maximum conducted output power

Please refer to Appendix A

TEST REPORT

5 Power spectrum density

Test result: Pass

5.1 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

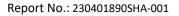
If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 8dBm/MHz and 8+ (6 –antenna gain-beam forming gain).

5.2 Measurement Procedure

The EUT was tested according to Subclause 11.10 of ANSI C63.10.

This procedure is applicable when the EUT cannot be configured to transmit continuously (i.e., duty cycle < 98 %), and when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty cycle is constant (i.e., duty cycle variations are less than ± 2 %):

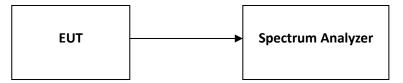
- a) Measure the duty cycle (x) of the transmitter output signal as described in Section 6.0.
- b) Set instrument center frequency to DTS channel center frequency.
- c) Set span to at least 1.5 x OBW.
- d) Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- e) Set VBW ≥3 x RBW.
- f) Detector = power averaging (RMS) or sample detector (when RMS not available).
- g) Ensure that the number of measurement points in the sweep $\ge 2 \times \text{span/RBW}$.
- h) Sweep time = auto couple.
- i) Do not use sweep triggering. Allow sweep to "free run".
- j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
- k) Use the peak marker function to determine the maximum amplitude level.
- I) Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.
- m) If resultant value exceeds the limit, then reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).





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5.3 Test Configuration



5.4 Test Results of Power spectrum density

Please refer to Appendix A

TEST REPORT

6 Emission outside the frequency band

Test result: Pass

6.1 Limit

In any 100 kHz 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 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

6.2 Measurement Procedure

The EUT was tested according to Subclause 11.11 of ANSI C63.10.

Reference level measurement

Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set the span to \geq 1.5 times the DTS bandwidth.
- c) Set the RBW = 100 kHz.
- d) Set the VBW \geq 3 x RBW.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum PSD level.

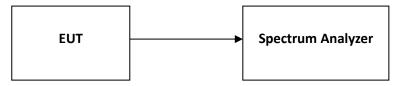
Emission level measurement

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW \geq 3 x RBW.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.



6.3 Test Configuration



6.4 The results of Emission outside the frequency band

Please refer to Appendix A

TEST REPORT

7 Radiated Emissions in restricted frequency bands

Test result: Pass

7.1 Limit

The radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified showed as below:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88~216	150	3
216 ~ 960	200	3
Above 960	500	3

7.2 Measurement Procedure

The EUT was tested according to Subclause 11.12 of ANSI C63.10.

For Radiated emission below 30MHz:

- a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. For the floor-standing devices, the EUT was placed on the top of a rotating table 0.1 meters above the ground at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c) Both X and Y axes of the antenna are set to make the measurement.
- d) For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e) The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.



For Radiated emission above 30MHz:

- a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. For the floor-standing devices, the EUT was placed on the top of a rotating table 0.1 meters above the ground at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c) The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f) The test-receiver system was set to peak and average detector function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

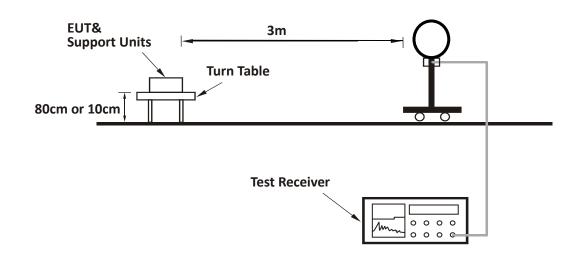
Note:

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 3 x RBW (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
- 4. All modes of operation were investigated and the worst-case emissions were reported.

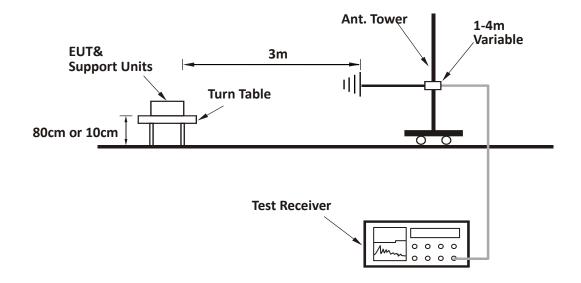


7.3 Test Configuration

For Radiated emission below 30MHz:



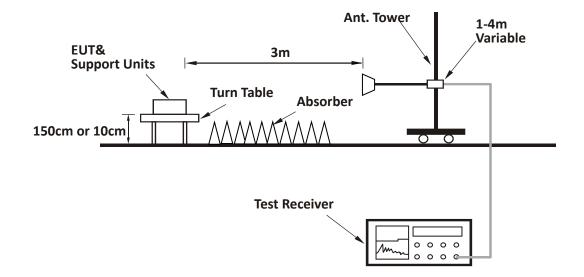
For Radiated emission 30MHz to 1GHz:





Total Quality. Assured.
TEST REPORT

For Radiated emission above 1GHz:

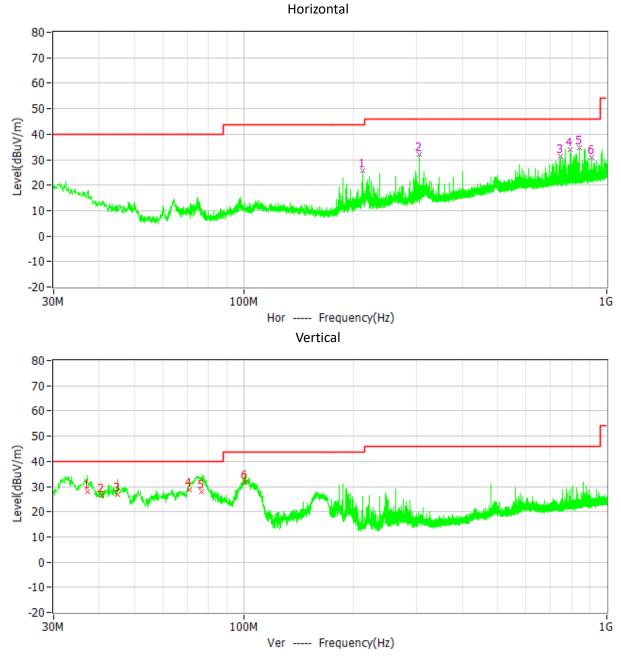


Total Quality. Assured.

TEST REPORT

7.4 Test Results of Radiated Emissions

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



Total Quality. Assured.

TEST REPORT

Test data below 1GHz

Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
н	212.36	25.80	43.50	17.70	РК
Н	304.80	32.10	46.00	13.90	РК
Н	745.76	31.30	46.00	14.70	РК
Н	792.03	34.00	46.00	12.00	РК
Н	842.96	34.80	46.00	11.20	РК
Н	911.34	31.00	46.00	15.00	РК
V	37.26	27.80	40.00	12.20	РК
V	40.61	26.40	40.00	13.60	РК
V	44.95	26.80	40.00	13.20	РК
V	70.77	28.60	40.00	11.40	РК
V	76.81	28.10	40.00	11.90	РК
V	100.99	31.70	43.50	11.80	РК

Test result above 1GHz:

The emission was conducted from 1GHz to 25GHz

802.11b

СН	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
	V	2390	51.40	74.00	22.60	РК
	V	4824	55.80	74.00	18.20	РК
L	V	4824	46.10	54.00	7.90	AV
	V	9648	58.40	74.00	15.60	РК
	V	9648	46.40	54.00	7.60	AV
	V	4874	57.90	74.00	16.10	РК
N /	V	4874	48.50	54.00	5.50	AV
Μ	V	9748	58.20	74.00	15.80	РК
	V	9748	49.10	54.00	4.90	AV
	V	2483.5	50.40	74.00	23.60	РК
	V	4924	57.30	74.00	16.70	РК
н	V	4924	47.10	54.00	6.90	AV
	V	9848	59.70	74.00	14.30	РК
	V	9848	49.30	54.00	4.70	AV

intertek Total Quality. Assured.

TEST REPORT

802.11g

СН	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
	V	2390	58.10	74.00	15.90	РК
	V	2390	47.40	54.00	6.60	AV
	V	4824	56.60	74.00	17.40	РК
L	V	4824	47.80	54.00	6.20	AV
	V	9648	56.40	74.00	17.60	РК
	V	9648	47.30	54.00	6.70	AV
	V	4874	56.80	74.00	17.20	РК
5.4	V	4874	47.50	54.00	6.50	AV
Μ	V	9748	57.30	74.00	16.70	РК
	V	9748	48.40	54.00	5.60	AV
	V	2483.5	58.70	74.00	15.30	РК
	V	2483.5	45.30	54.00	8.70	AV
	V	4924	57.40	74.00	16.60	РК
Н	V	4924	48.10	54.00	5.90	AV
	V	9848	57.60	74.00	16.40	РК
	V	9848	47.80	54.00	6.20	AV

802.11n(HT20)

СН	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
	V	2390	60.10	74.00	13.90	РК
	V	2390	48.40	54.00	5.60	AV
	V	4824	55.90	74.00	18.10	РК
L	V	4824	46.30	54.00	7.70	AV
	V	9648	56.10	74.00	17.90	РК
	V	9648	47.60	54.00	6.40	AV
	V	4874	56.30	74.00	17.70	РК
N 4	V	4874	47.20	54.00	6.80	AV
М	V	9748	57.70	74.00	16.30	РК
	V	9748	48.50	54.00	5.50	AV
	V	2483.5	59.70	74.00	14.30	РК
	V	2483.5	48.20	54.00	5.80	AV
	V	4924	57.20	74.00	16.80	РК
Н	V	4924	48.80	54.00	5.20	AV
	V	9848	57.40	74.00	16.60	РК
	V	9848	48.20	54.00	5.80	AV