SK TECH CO., LTD.

FCC-Certificate of Compliance

Test Report No.:	**SKTFCE-060118-007**		
NVLAP CODE :	**200220-0**		
Applicant:	**Hitachi Cable, Ltd.**		
Applicant Address:	Takasago Works, 880 Lsagozawa-cho, Hitachi-shi, Ibaraki-ken, 319-1418 Japan		
Manufacturer :	**UniData Communication Systems, Inc.**		
Manufacturer Address:	2F, OhSung-Bldg, 82-15, NonHyun-Dong GangNam-Gu, Seoul, 135-010 Korea		
Product:	**WLAN IP Phone**		
FCC ID:	**S99WIP-3000**	**Model No.:**	**WirelessIP3000**
Receipt No.:	SKTEU05-0799	**Date of receipt:**	Dec. 29, 2005
Date of Issue:	Jan. 18, 2006		
Testing location:	**SK TECH CO., LTD.** 820-2, Wolmoon-Ri, Wabu-Up, Namyangju-Si, Kyunggi-Do, Korea		
Test Standards:	**ANSI C63.4 / 2003**		
Rule Parts:	**FCC part 15 Subpart B**		
Equipment Class :	**Class B Digital Device Peripheral**		
Other Aspects :	**This Class B Digital apparatus complies with Canadian IECS-003**		
Test Result:	The above mentioned product has been tested and passed.		

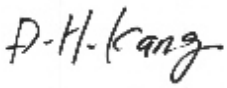
Prepared by: S.Y.Ye

Signature *Date*

Tested by:*S.H.Yoon/Engineer*

Signature *Date*

Approved by: *D.H.Kang*
/Manager& Chief Engineer



Signature *Date*

Other Aspects :	
Abbreviations :	**· OK, Pass = passed · Fail = failed · N/A = not applicable**

☞ **•This test report is not permitted to copy partly without our permission.**
•This test result is dependent on only equipment to be used.
•This test result is based on a single evaluation of one sample of the above mentioned.
•This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S Government.
• We certify that this test report has been based on the measurement standards that is traceable to the national or International standards.

NVLAP®

NVLAP Lab. Code: 200220-0

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1. General

This equipment has been shown to be capable of compliance with the applicable technical standards and was tested in accordance with the measurement procedures as indicated in this report.

We attest to the accuracy of data. All measurements reported herein were performed by SK TECH Co., Ltd. and were made under Chief Engineer's supervision.
We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

2. Test Site

SK TECH Co., Ltd.

2.1 Location

820-2, Wolmoon Ri, Wabu-Up, Namyangju-Si, Kyunggi-Do, Korea

The test site is in compliance with ISO/IEC 17025 for general requirements for the competence of testing and calibration laboratories.
This laboratory is recognized as a Conformity Assessment Body(CAB) for CAB's Designation Number: **KR0007** by FCC, is accredited by NVLAP for NVLAP Lab. Code : **200220-0** and DATech for DAR-Registration No.:**DAT-P-076/97-0**

2.2 List of Test and Measurement Instruments

Table 1 : List of Test and Measurement Equipment

- **Conducted Disturbance**

Kind of Equipment	Type	S/N	Calibrated until
EMI Receiver	ESHS10	862970/019	09.2006
Artificial Mains Network	ESH2-Z5	834549/011	08.2006
EMI Receiver	ESHS10	835871/002	09.2006
Artificial Mains Network	ESH3-Z5	836679/018	08.2006

- **Radiated Disturbance**

Kind of Equipment	Type	S/N	Calibrated until
EMI Receiver	ESVS 10	825120/013	09.2006
EMI Receiver	ESVS 10	834468/008	09.2006
Spectrum Analyzer	R3361A	11730187	09.2006
Amplifier	8447F	3113A05153	08.2006
Log Periodic Antenna	UHALP9107	1819	11.2006
Biconical Antenna	BBA9106	91031626	11.2006
Horn Antenna	SAS-200/571	304	04.2006
Open Site Cable	N/A	N/A	N/A
Antenna Turntable Driver	5907	N/A	N/A
Antenna Turntable controller	5906	N/A	N/A
Amp & Receiver connection cable	N/A	N/A	N/A
Amp & Spectrum connection cable	N/A	N/A	N/A
50Ω Switcher	MP59B	6100214538	N/A

2.3 Test Date

Date of Application : Dec. 29, 2005

Date of Test : Jan. 10, 2006 ~ Jan. 14, 2006

2.4 Test Environment

See each test item's description.

3. Description of the tested samples

The EUT is WLAN IP Phone.

3.1 Rating and Physical Characteristics

Items	Specifications
RF rated output power (dBm)	16dBm
Weight	103g
Operating Temperature	0~45℃
Standard	130.05(L) X 43(W) x 17.13(H)
Weight	103g
Adaptor	
Input voltage	AC100~240V, 50~60Hz
Rated Output Voltage	DC 5.0 V ±0.2 V
Max. Output Current	1A
Battery	
Battery Type	3.7V Li-ion
Battery Capacity	1,320mAh
Time(Estimate)	Standby time 55 hour
	Talk time 4 hour
	Charting time 3 hour

3.2 Submitted Documents

N/A

4. Measurement Conditions

Operating voltage of the EUT is AC120V, 60Hz.

(Adaptor : AC input:100~240V, 50~60Hz, 0.15A / DC output : 5V,1A

/ Adaptor M/N : YFAR22073001, Manufacturer : Wang Huei Company Limited.)

4.1 Modes of Operation

The EUT was in the following operation mode during all testing;

During all tests, the EUT was in PC download mode.

4.2 List of Peripherals

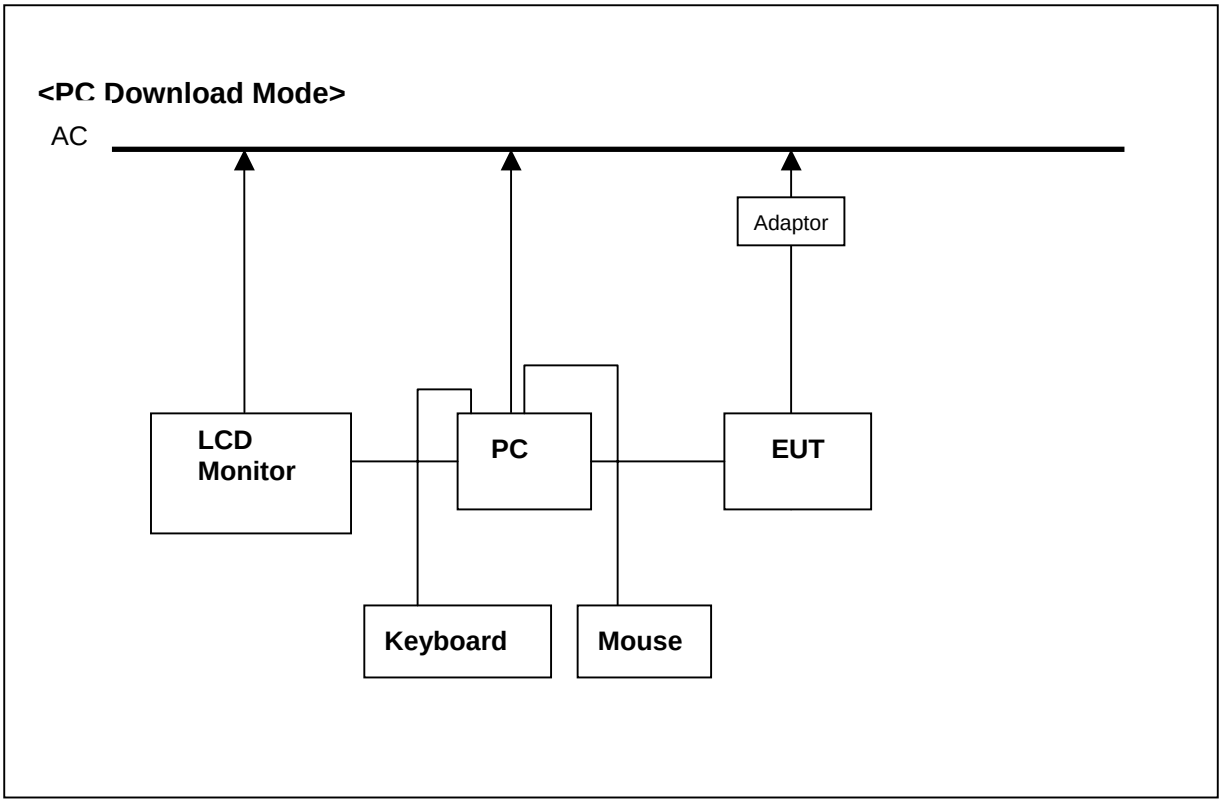
Equipment	Manufacturer	Model Name	Serial No.
Wireless LAN AP	Supplied by the applicant	2454NM	N/A
Adaptor (for Wireless LAN AP)	FA IRWAY ELECTRONIC CO., LTD	WN05-050	N/A
Keyboard(PS2)	Jing Mold Enterprise Co., Ltd.	LKB-0107	20103814
Mouse(USB)	LG	LMULBGS01I	04CU000259
LCD Monitor	LG	1510TFT Rev B	304KG04896
Personal Computer	LG	W8S	203KI12463

4.3 Type of Used Cables

Equipment	Manufacturer	M/N	S/N	Cables &connectors
Wireless LAN AP	Supplied by the applicant	2454NM	N/A	1.2m unshielded USB cable
Adaptor (for Wireless LAN AP)	FAIRWAY ELECTRONIC CO., LTD	WN05-050	N/A	1.2m unshielded power cable
Keyboard(PS2)	Jing Mold Enterprise Co., Ltd.	LKB-0107	20103814	1.0m unshielded ps/2 cable
Mouse(USB)	LG	LMULBGS01I	04CU000259	1.2m unshielded USB cable
LCD Monitor	LG	1510TFT Rev B	304KG04896	1.6m unshielded power cable 1.2m shielded VGA cable
Personal Computer	LG	W8S	203KI12463	1.2m unshielded power cable 1.2m unshielded LAN cable

4.4 Test Setup

The test setup photographs showed the external supply connections and interfaces.



4.5 Uncertainty

1) Radiated disturbance

⊙Radiated disturbances from 30 MHz to 1000 MHz at a distance of 3m and 10 m

Input quantity	Xi	Probability distribution function
Receiver reading	Vr	Rectangular √ 3
Attenuation: antenna-receiver	Lc	k=1
Amplifier Error	Ae	k=2
antenna factor	Lac	k=2
Receiver corrections:		
Sine wave voltage	dVsw	Rectangular √ 3
Pulse amplitude response	dVpa	Rectangular √ 3
Pulse repetition rete response	dVpr	Rectangular √ 3
Mismatch: antenna-receiver	dM	k=1
antenna corrections:		
AF frequency interpolation	dAFf	Rectangular √ 3
AF height deviations	dAFh	Rectangular √ 3
Directivity difference at 3 m	dAdir	Rectangular √ 3
Directivity difference at 10 m	dAdir	Rectangular √ 3
Phase centre location at 3 m	dAph	Rectangular √ 3
Phase centre location at 10 m	dAph	Rectangular √ 3
Cross-polarisation	dAcp	Rectangular √ 3
Balance	dAbal	Rectangular √ 3
Site corrections:		
Site imperfections	dSA	Rectangular √ 6
Separation distance at 3 m	dd	Rectangular √ 3
Separation distance at 10 m	dd	Rectangular √ 3
Table height at 3 m	dh	k=2
Table height at 10m	dh	k=2
Combined Standard Uncertainty		
Expanded Uncertainty		4.60(Vertical)/4.59(Horizontal) k=2 (Level of confidance)

Expanded Uncertainty

U= k*Uc(xi) = 2 * 2.3= 4.60dB (The coverage factor k =2 yields approximately a 95% level of confidence)

2) Conducted disturbance

⊙ **Conducted disturbance from 150 KHz to 30 MHz using a 50 Ω/50 uH AMN**

Input quantity	Xi	Probability distribution function
Receiver reading	Vr	Rectangular √ 3
Attenuation: AMN-receiver	Lc	k=1
AMN voltage division factor	Lamn	k=2
Receiver corrections		
Sine wave voltage	dVsw	Rectangular √ 3
Pulse amplitude response	dVpa	Rectangular √ 3
Pulse repetition rete response	dVpr	Rectangular √ 3
Mismatch: AMN-receiver	dM	U-shape √ 2
AMN impedance	dZ	Triangular √ 6
Combined Standard Uncertainty		
Expanded Uncertainty		3.99 k=2 (Level of confidance)

Expanded uncertainty

U= k*Uc(xi) = 2 * 1.96 = 3.99dB

The coverage factor k =2 yields approximately a 95% level of confidence

5. EMISSION Test

5.1 Conducted Emissions

Result: **PASS**

The line-conducted facility is located inside a 2.6M x 3.6M x 7.0M shielded enclosure.
The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 604-05.
A 1 m x 1.5 m wooden table 80 cm high is placed 40 cm. away from the vertical wall and 1.5 m away from the side wall of the shielded room. ROHDE & SCHWARZ Model ESH3-Z5 (10 kHz-30 MHz) 50 ohm/50 uH Line-Impedance Stabilization Networks(LISNs) are bonded to the shielded room.
The EUT is powered from the ROHDE & SCHWARZ LISN and the support equipment is powered from the ROHDE & SCHWARZ LISN. Power to the LISNs are filtered by a high-current high-insertion loss Lindgren enclosures power line filters (100dB 14 kHz-10 GHz).
The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure.
All electrical cables are shielded by braided tinned copper zipper tubing with inner diameter of 1/2".
If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the ROHDE & SCHWARZ LISN.
All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length.
Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.
The spectrum was scanned from 150 kHz to 30 MHz with 100msec. sweep time.
The frequency producing the maximum level was reexamined using EMI/field Intensity Meter (ESHS 10) and Quasi-Peak adapter. The detector function was set to CISPR quasi-peak mode.
The bandwidth of the receiver was set to 10 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.
Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; if applicable; whichever determined the worst-case emission.
Photographs of the worst-case emission can be seen in photograph of conducted test.
Each EME reported was calibrated using self-calibrating mode.

Table 2: Test Data, Conducted Disturbance(PC Download Mode)

<Quasi-Peak>

Frequency (MHz)	Reading (dBuV)	Line	C/F (dB)	C/L (dB)	Actual (dBuV)	Limit (dBuV)	Margin (dB)
0.350	47.85	N	0.12	0.04	48.01	58.96	10.95
0.950	43.95	N	0.13	0.06	44.14	56.00	11.86
1.010	45.02	N	0.14	0.07	45.23	56.00	10.77
1.710	43.05	N	0.14	0.07	43.26	56.00	12.74
2.910	43.83	N	0.15	0.11	44.09	56.00	11.91
2.970	43.32	N	0.15	0.11	43.58	56.00	12.42

<Average>

Frequency (MHz)	Reading (dBuV)	Line	C/F (dB)	C/L (dB)	Actual (dBuV)	Limit (dBuV)	Margin (dB)
0.350	43.63	N	0.12	0.04	43.79	48.96	5.17
0.380	39.09	N	0.12	0.04	39.25	48.28	9.03
1.010	38.10	N	0.14	0.07	38.31	46.00	7.69
2.270	36.78	N	0.15	0.11	37.04	46.00	8.96
2.910	37.92	N	0.15	0.11	38.18	46.00	7.82
2.970	38.07	N	0.15	0.11	38.33	46.00	7.67

▶ NOTE

*** C/F = Correction Factor**

*** C/L = Cable Loss**

*** LINE : L = Line PE, N = Neutral PE**

*** Margin Calculation**
Margin(Q.P) = Limit - Actual
[Actual(Q.P) = Reading(Q.P) + C/F + C/L]

Figure 1: Spectral Diagram, LINE – PE (PC Download Mode/Quasi Peak)

11 Jan 2006 13:48

CONDUCTED DISTURBANCE

EUT: WirelessIP3000
Manuf:
Op Cond:
Operator:
Test Spec:
Comment: LINE-PE

Result File: d20_l.dat : WirelessIP3000

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	10kHz	10kHz	PK	100msec	Auto	OFF	60dB

Final Measurement: Detector: X QP
Meas Time: 1sec
Peaks: 8
Acc Margin: 35 dB

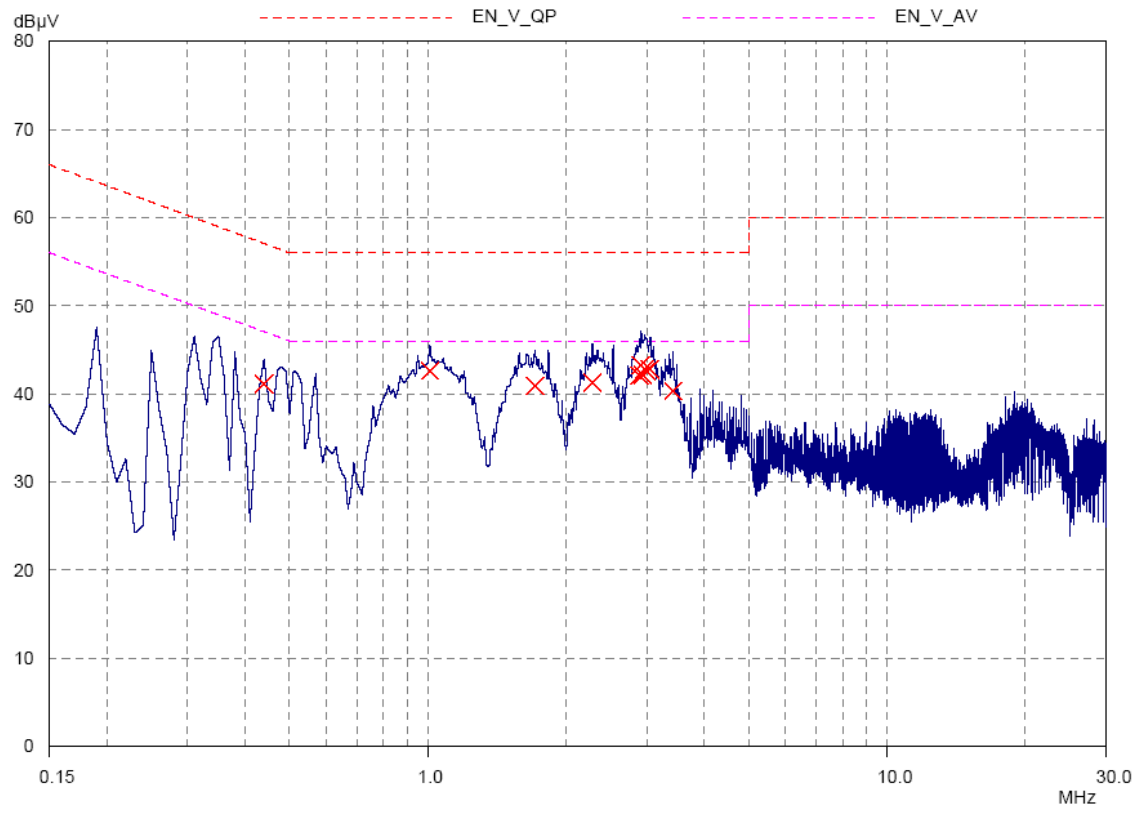


Figure 2: Spectral Diagram, NEUTRAL – PE (PC Download Mode/Quasi Peak)

11 Jan 2006 14:08

CONDUCTED DISTURBANCE

EUT: WirelessIP3000
Manuf:
Op Cond:
Operator:
Test Spec:
Comment: NEUTRAL-PE

Result File: d20_n.dat : WirelessIP3000

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	10kHz	10kHz	PK	100msec	Auto	OFF	60dB

Final Measurement: Detector: X QP
Meas Time: 1sec
Peaks: 8
Acc Margin: 35 dB

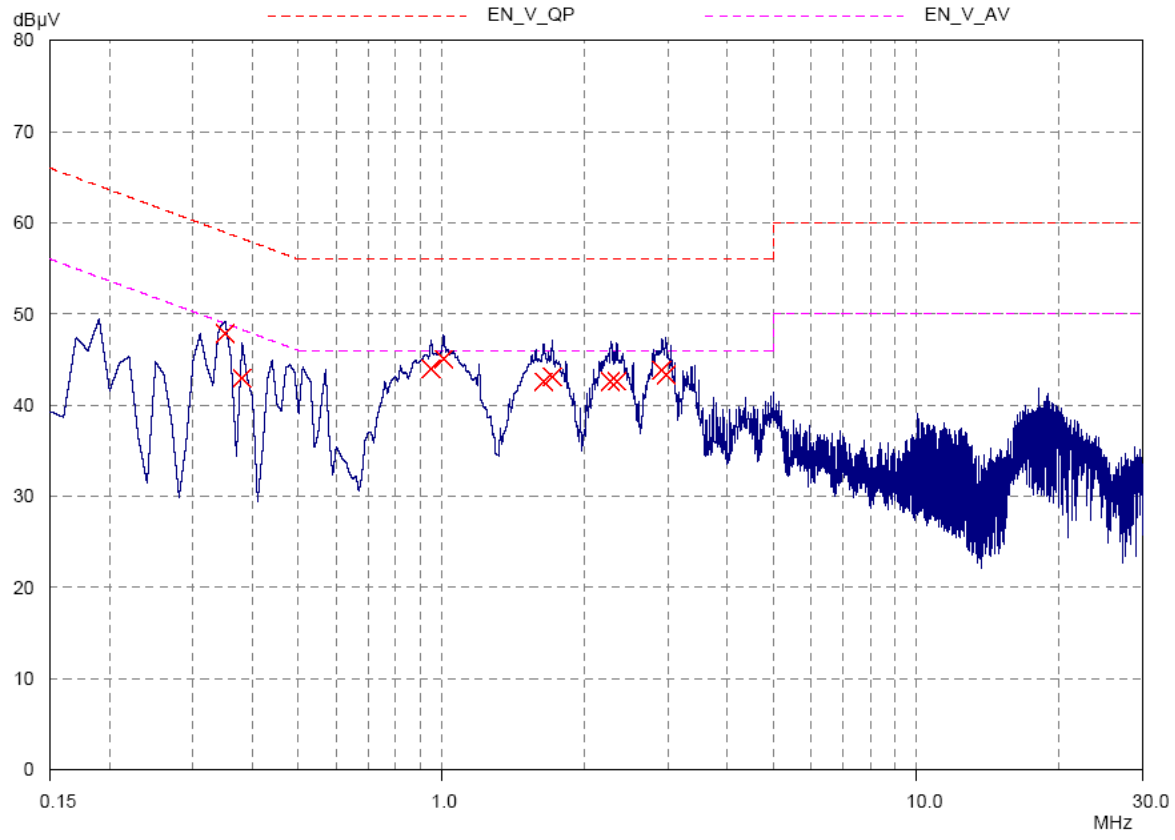


Figure 3: Spectral Diagram, NEUTRAL – PE (PC Download Mode/Average)

11 Jan 2006 14:10

CONDUCTED DISTURBANCE

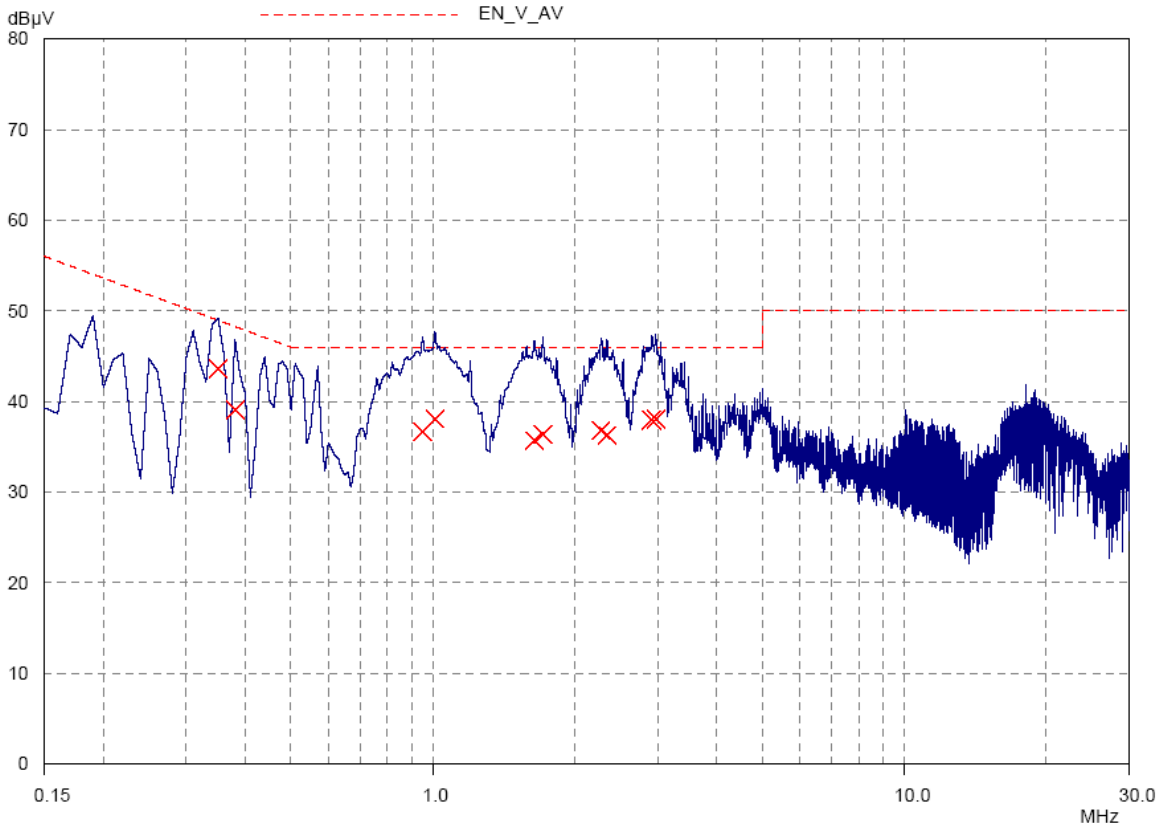
EUT: WirelessIP3000
Manuf:
Op Cond:
Operator:
Test Spec:
Comment: NEUTRAL-PE

Result File: d20_n.dat : WirelessIP3000

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	10kHz	10kHz	PK	100msec	Auto	OFF	60dB

Final Measurement: Detector: X AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 35 dB



5.2 Radiated Emissions

Result : **PASS**

Preliminary measurements were made indoors at 3 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found.
The spectrum was scanned from 30 to 300 MHz using biconical antenna and from 300 to 1000 MHz using log-periodic antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3-meter test range using SCHWARZBECK dipole antennas. The test equipment was placed on a wooden table situated on a 4x4 meter area adjacent to the measurement area. Turntable was to protect from weather in the dome that made with FRP. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using EMI/Field Intensity Meter(ESVS 10) and Quasi-Peak Adapter. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 100 kHz or 1 MHz depending on the frequency or type of signal.

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table.
The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed, and/or support equipment, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission.
Photographs of the worst-case emission can be seen in photograph of radiated emission test.
Each EME reported was calibrated using self-calibrating mode.

Table 3 : Test Data, Radiated Emissions

<PC Download Mode>

Frequency	Pol.	Height	Real	Correction Factor		T-Fact	Data	Limits	Margin
[MHz]		[m]	Reading	Antenna	Cable	[dB]	[dBuV/m]	[dBuV/m]	[dB]
160.02	H	4.0	6.2	15.3	1.3	16.6	22.8	30.0	7.2
233.91	H	3.5	9.7	17.2	1.3	18.5	28.2	37.0	8.8
250.22	H	4.0	9.1	17.5	1.3	18.8	27.9	37.0	9.1
273.35	V	1.0	6.0	18.1	1.5	19.6	25.6	37.0	11.4
377.33	H	2.0	7.9	17.7	1.7	19.4	27.3	37.0	9.7
706.98	V	1.0	5.2	22.3	2.4	24.7	29.9	37.0	7.1

Table. Radiated Measurements at 10-meters.

NOTES:

1. All modes of operation were investigated and the worst-case emission are reported.
2. All other emission are non-significant.
3. All readings are calibrated by self-mode in receiver.
4. Measurements using CISPR quasi-peak mode.
5. H = Horizontal, V = Vertical Polarization
6. DATA = Real Reading + T - Fact(Antenna+Cable)
7. Margin = Limits - Data