



# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CLASS B CERTIFICATION

**Test report file number** : E018R-045

**Applicant** : SONUS TELECOM INC.  
**Address** : #605, Banpo Plaza, 1313, Banpo-Dong, Seocho-Gu, Seoul, 137-040, Korea

**Manufacturer** : SONUS TELECOM INC.  
**Address** : 456, Geum-Gok, Iryu-Myun, Chungju, Choongbuk, Korea

**Type of Equipment** : VOIP Phone (Class B Computing Device Peripheral)

**FCC ID.** : OU3IP-2000

**Model / Type No.** : IP-2000,

**Multiple Model/ Type No.** : N/A

**Serial number** : N/A

**Total page of Report** : 13 pages (including this page)

**Date of Incoming** : August 16, 2001

**Date of Issuing** : August 27, 2001

## SUMMARY

The equipment complies with the requirements of **FCC CFR 47 PART 15 SUBPART B, Class B.**

This test report contains only the results of a single test of the sample supplied for the examination.

It is not a general valid assessment of the features of the respective products of the mass-production.

Prepared by: G. W. Lee  
G. W. Lee/ Assist. Chief Engineer

Reviewed by: Y. K. Kwon  
Y. K. Kwon/ Chief Engineer

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FCC-003 (Rev.0)

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## 1. VERIFICATION OF COMPLIANCE

- APPLICANT : SONUS TELECOM INC.  
 - ADDRESS : #605, Banpo Plaza, 1313, Banpo-Dong, Seocho-Gu, Seoul, 137-040, Korea  
 - CONTACT PERSON : Mr. Kuen-Chul, Cho / General Manager  
 - TELEPHONE NO : +82-2-6300-6719  
 - MODEL NO/NAME : IP-2000  
 - SERIAL NUMBER : N/A  
 - DATE : August 27, 2001

DEVICE TYPE	Peripheral Device for Class B Computing Device - Unintentional Radiator
E.U.T. DESCRIPTION	VOIP Phone
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4/1992
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15, SECTION 15.101
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

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## 2. GENERAL INFORMATION

### 2.1 Product Description

The SONUS TELECOM INC., Model IP-2000 (referred to as the EUT in this report) is a VOIP Phone that is connected the LAN port (RJ-45) of a computer by access port. Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	24.576 MHz, 25 MHz
NUMBER OF LAYERS	6 Layers (Base Main B'D), 2 Layers (Base Key B'D), 1 Layer (Others B'D)
POWER REQUIREMENT	DC 48V from AD/DC adapter
EXTERNAL CONNECTOR	Headset port, Access port, Network port, DC in port

#### Model Differences:

The difference(s) compared to the EUT is as follows: none

### 2.2 Related Submittal(s) / Grant(s)

Original submittal only

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### 2.3 Test System Details

The model numbers for all the equipments which were used in the tested system is:

Model	Manufacturer	FCC ID	Description	Connected to
IP-2000	SONUS TELECOM INC.	OU3IP-2000	VOIP Phone (EUT)	PC
HKD-01299	HON-KWANG	N/A	AC/DC ADAPTER	EUT
Catalyst 3500 Series XL	CISCO SYSTEMS INC.	N/A	HUB	EUT
DCM	DELL COMPUTER	DoC	PC	-
SEM-DT35	SAMSUNG ELECTRO	DoC	KEYBOARD	PC
OK-720	A4 TECH	DOC	MOUSE	PC
6650-23N	SONY	DOC	MONITOR	PC
2225C	HP	DSI6XU2225	PRINTER	PC
020-0470	CARDINAL	GDE0196	MODEM	PC

### 2.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4/1992. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

### 2.5 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-080 Korea. Description details of test facilities were submitted to the Commission on January 12, 1999. (Registration Number: 92819)

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### 3. SYSTEM TEST CONFIGURATION

#### 3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
BASE-MAIN B'D	SONUS TELECOM INC.	IP-2000 MAIN PCB	N/A
BASE-KEY B'D	SONUS TELECOM INC.	IP-2000 KEY BOARD	N/A
BASE-HOOK B'D	SONUS TELECOM INC.	IP-2000 HOOKSW PCB	N/A
BASE-SUB B'D	SONUS TELECOM INC.	N/A	N/A

#### 3.2 EUT exercise Software

The network port of the EUT was connected to the HUB as a simulator, which was installed in the test room, and the access port of the EUT was connected to the Personal Computer. The data from HUB and/or EUT were transmitted and received using "ping" program during the testing.

#### 3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
VOIP Phone (EUT)	N	N	1.2(P), 1.5(D)
AC/DC ADAPTER	N	N/A	1.2(P)
HUB	N	N	1.5(P), 15(D)
PC	N	-	1.5 (P)
KEYBOARD	N/A	N	1.2(D)
MOUSE	N/A	N	1.2(D)
MONITOR	N	Y	1.5 (P), 1.2(D)
PRINTER	N	Y	1.5(P), 1.5(D)
MODEM	N	Y	1.5(P), 1.5(D)

\* The marked "(P)" means the Power Cable.

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### 3.4 Noise Suppression Parts on Cable

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
VOIP Phone (EUT)	N	N/A	N	N/A
AC/DC ADAPTER	N	N/A	Y	EUT END
HUB	N	N/A	N	N/A
PC	N	N/A	-	-
KEYBOARD	N	N/A	Y	PC END
MOUSE	N	N/A	Y	PC END
MONITOR	Y	PC END	Y	PC END
PRINTER	N	N/A	Y	BOTH END
MODEM	N	N/A	Y	BOTH END

### 3.5 Equipment Modifications

To achieve compliance to CLASS B levels, the following change(s) was made by ONETECH Corp. during compliance testing:

“There was no Modified items during EMI test”

### 3.6 Configuration of Test System

**Line Conducted Test** : The EUT was connected to AC/DC adapter and the adapter was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4/1992 7.2.3 to determine the worse operating conditions.

**Radiated Emission Test** : Preliminary radiated emission test was conducted using the procedure in ANSI C63.4/1992 8.3.1.1 to determine the worse operating conditions. Final radiated emission test was conducted at 3 meters open area test site.





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## 4. PRELIMINARY TEST

### 4.1 AC Power line Conducted Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Standby Mode	
Continuously transferring data between HUB and EUT	X

### 4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Standby Mode	
Continuously transferring data between HUB and EUT	X



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## 5. FINAL RESULT OF MEASUREMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level

### 5.1 Conducted Emission Test

Humidity Level : 55 % Temperature : 21°C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.107  
 Type of Test : CLASS B  
 Result : PASSED BY -4.50 dB at 6.02 MHz

EUT : VOIP Phone Date: August 16, 2001  
 Operating Condition : Continuously transferring data between HUB and EUT  
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

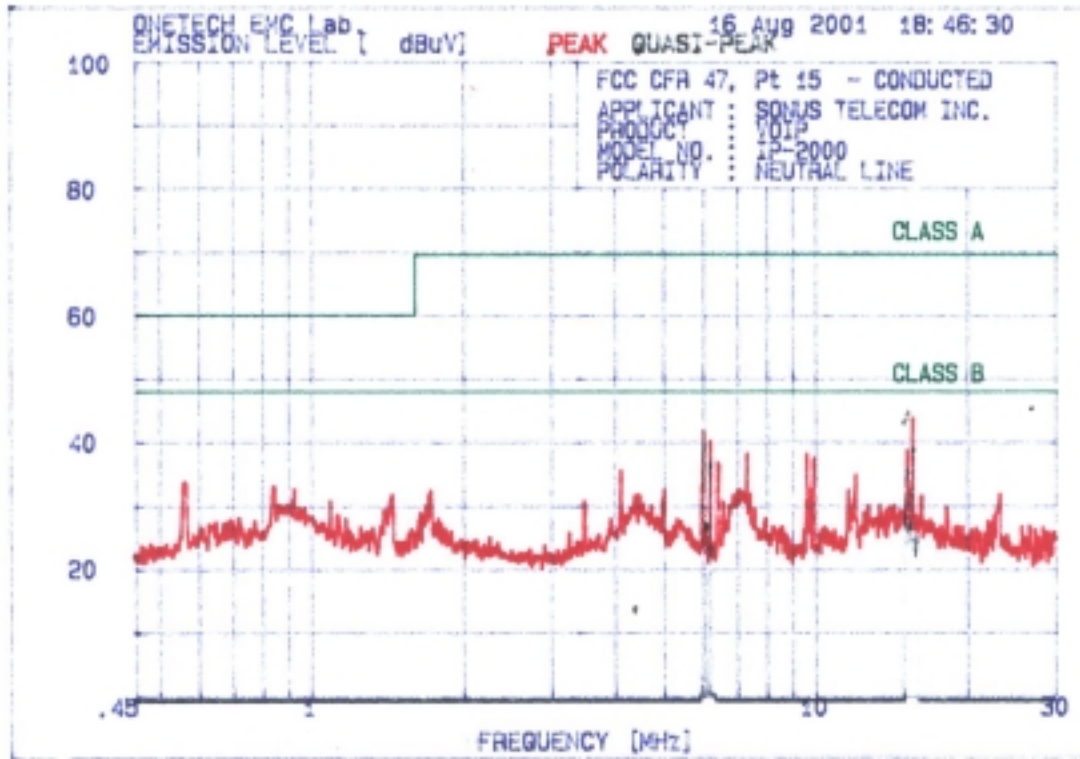
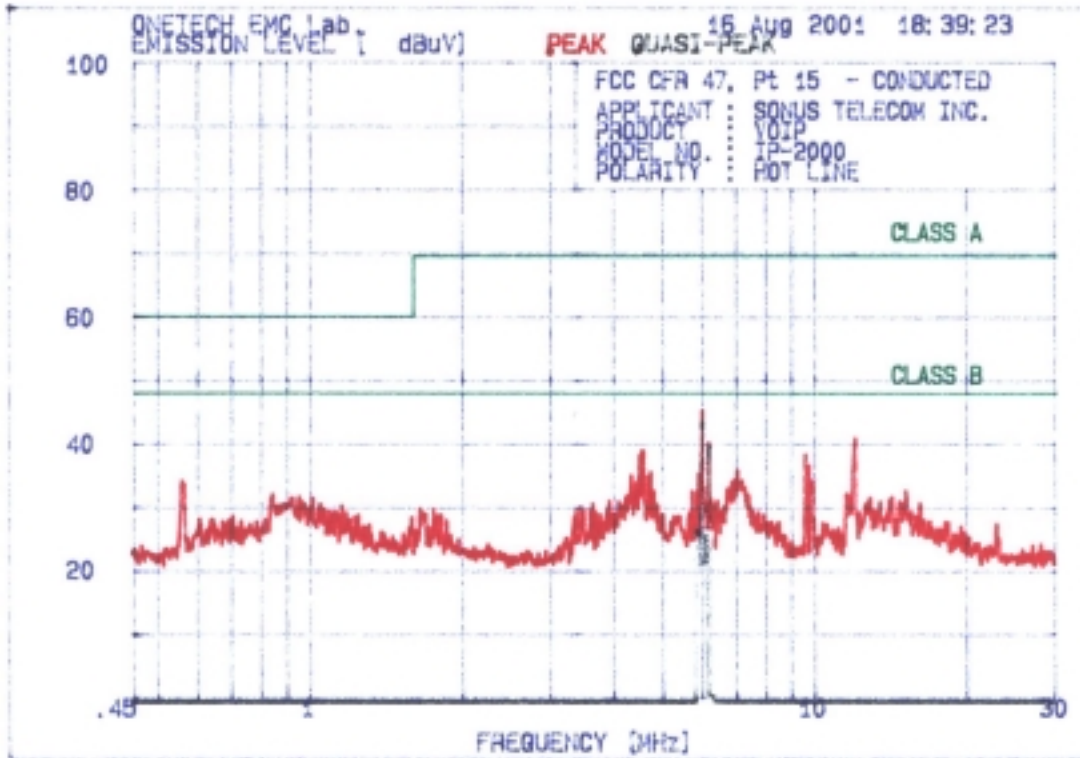
Power Line Conducted Emission			FCC CLASS B	
Frequency (MHz)	Amplitude (dBuV)	Conductor	Limit (dBuV)	Margin (dB)
4.56	39.00	HOT	48.00	-9.00
6.02	43.50	HOT	48.00	-4.50
6.19	39.70	HOT	48.00	-8.30
9.62	38.40	HOT	48.00	-9.60
12.07	40.90	HOT	48.00	-7.10
15.59	39.00	NEUTRAL	48.00	-9.00

Line Conducted Emission Tabulated Data

**Tested by: Young-Min Choi / Project Engineer**



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## 5.2 Radiated Emission Test

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 56 % Temperature : 23 °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.109  
 Type of Test : CLASS B  
 Result : PASSED BY -2.96 dB at 40.00 MHz

EUT : VOIP Phone Date: August 16, 2001  
 Operating Condition : Continuously transferring data between HUB and EUT  
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)  
 Distance : 3 Meter

Radiated Emissions		Ant	Correction Factors		Total	FCC CLASS B	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
40.00	24.50	V	11.72	0.82	37.04	40.00	-2.96
50.00	21.00	V	11.09	0.93	33.02	40.00	-6.98
52.00	23.30	H	10.97	0.95	35.22	40.00	-4.78
60.89	22.70	V	9.44	0.98	33.12	40.00	-6.88
75.00	24.70	V	6.30	1.00	32.00	40.00	-8.00
78.86	21.40	V	6.32	1.00	28.72	40.00	-11.28
80.25	22.60	V	6.38	1.01	29.99	40.00	-10.01
125.00	20.50	V	13.17	1.25	34.92	43.50	-8.58
150.10	18.10	V	13.41	1.35	32.86	43.50	-10.64
175.00	16.40	V	15.61	1.44	33.45	43.50	-10.05
218.80	19.40	H	11.85	1.67	32.92	46.00	-13.08
249.80	25.20	H	12.37	1.83	39.40	46.00	-6.60
262.40	21.30	V	13.24	1.86	36.40	46.00	-9.60
289.00	25.50	V	14.74	1.95	42.19	46.00	-3.81
316.00	21.10	H	15.21	2.10	38.41	46.00	-7.59
325.00	20.40	H	15.21	2.15	37.76	46.00	-8.24
350.40	16.50	H	15.20	2.28	33.98	46.00	-12.02
375.40	21.40	H	15.51	2.39	39.30	46.00	-6.70
394.20	17.40	H	15.75	2.42	35.57	46.00	-10.43
437.20	17.80	H	16.65	2.51	36.96	46.00	-9.04
449.80	12.50	V	16.93	2.55	31.98	46.00	-14.02
649.20	12.30	V	20.16	3.08	35.54	46.00	-10.46
699.60	13.80	V	20.99	3.31	38.10	46.00	-7.90
749.60	11.50	V	20.70	3.51	35.71	46.00	-10.29

Radiated Emissions Tabulated Data



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Tested by: Young-Min Choi / Project Engineer



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## 6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+ Meter reading (dBuV)

+ Cable Loss (dB)

+ Antenna Factor (Loss) (dB/meter)

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= Corrected Reading (dBuV/meter)

- Specification Limit (dBuV/meter)

= dB Relative to Spec (+/- dB)

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## 7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS 10	827864/005	OCT/00	12MONTH	■
2.	Test receiver	R/S	ESHS 10	834467/007	APR/01	12MONTH	
3.	Spectrum analyzer	HP	8568B	3109A05456	APR/01	12MONTH	■
4.	RF preselector	HP	85685A	3107A01264	APR/01	12MONTH	■
5.	Quasi-Peak Adapter	HP	85650A	3107A01542	APR/01	12MONTH	■
6.	Loop Antenna	EMCO	6502	9108-2668	DEC/00	12MONTH	
7.	Dipole Antenna	EMCO	3121C	9107-745	JUN/01	12MONTH	
8.	Biconical antenna	EMCO	3104C	9109-4441 9109-4443 9109-4444	APR/01	12MONTH	■
9.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	APR/01	12MONTH	■
10.	LISN	EMCO	3825/2	9109-1867 9109-1869	JUN/01	12MONTH	■
11.	Computer System	HP	98581C	98543A	N/A	N/A	■
	Hard disk drive		9153C	CMC762Z9153	N/A	N/A	■
12.	Plotter	HP	7475A	30052 22986	N/A	N/A	■
13.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	■
14.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	■
15.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	■