

**FCC ID: L82-228870**

Prepared for:

**SIEMENS BUSINESS COMMUNICATIONS**  
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By:

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Submitted to:

**Federal Communications Commission**  
**Equipment Authorization Division,**  
**Application Processing Branch**  
7435 Oakland Mills Road  
Columbia, MD 21048

August 1998

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**FCC Type Certification Test Report**  
**of an Intentional Radiator**

**SIEMENS BUSINESS COMMUNICATION SYSTEMS**  
**GigaSet 2400HS Spread Spectrum**  
**Cordless Phone System Desk Station**  
**(Transmitter Portion)**

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## Certificate of Compliance

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Manufacturer: Siemens Business Communications

Model: Gigaset 2400HS Handset

Serial #: 03

FCC ID: L82-228870

Test Dates: June through August 1998

I, Jeffrey A. Lenk, for Professional Testing (EMI), Inc., being familiar with the FCC rules and test procedures have reviewed the test setup, measurement data and this report. I believe them to be true and accurate. The **Siemens Gigaset 2400DS Desk Station** was tested and found to be in compliance with FCC Part 15 for Intentional Radiators.

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Jeffrey A. Lenk  
President

## 1.0 Equipment Under Test (EUT) Description

The **Siemens Gigaset 2400DS Desk Station** is a two way mobile unit used as part of the Siemens Gigaset 2420 Small Office/Home Office (SOHO) Cordless Phone System. The system is intended for use in a home or small office environment. The system is comprised of a base unit (**Siemens Gigaset 2420DS Desk Station**) and up to eight cordless handsets. The system can use some of the standard higher end telephone features (speed dial, station ID, hold, etc.)

Unlike most other cordless phone systems, this system is a frequency hopping spread spectrum technique for the wireless link. For this reason, the system is being qualified under spread spectrum (frequency hopping methods) of Section 15.247 rather than the standard cordless telephone parts. Since the system is comprised of two types of transmitters, the system is being qualified under two FCC ID numbers. The identifiers for the system are:

<b><u>System Component</u></b>	<b><u>FCC ID Number</u></b>
Gigaset 2400HS Handset	L82-228869
Gigaset 2400DS Desk Station	L82-228870

In addition to the frequency hopping portions of §15.247, The document FCC 97-111 was used for guidance in the procedures used for testing of the **Siemens Gigaset 2400DS Desk Station**. Specific test requirements include the following:

47 CFR 15.247(a)(1)(ii)	Occupied Bandwidth
47 CFR 15.247(a)(1)(ii)	Number of Hop Frequencies
47 CFR 15.247(a)(1)(ii)	Average Time of Occupancy
47 CFR 15.247(b)	Peak Output Power
47 CFR 15.247(c)	Out-of-Band Emissions
& 47CFR 15.205	Restricted Bands of Operation
47 CFR 15.203	Antenna Requirement
47 CFR 15.207	Conducted Emissions
47 CFR 15.31(e)	Frequency Stability
and 15.215(c).	

**The system tested consisted of the following components:**

<b><u>EUT</u></b>	<b><u>Manufacturer &amp; Model</u></b>	<b><u>Serial #</u></b>	<b><u>FCC ID #</u></b>	<b><u>Description</u></b>
Siemens Business Communications, Inc., Gigaset 2400DS	505		N/P	Desk Station
Ault Inc. P41120400A010G	N/P		N/P	Desk Station Power Supply

## Support Equipment

<u>Manufacturer &amp; Model</u>	<u>Serial #</u>	<u>FCC ID #</u>	<u>Description</u>
Siemens Business Communications, Inc., Gigaset 2400HS	6-057	N/P	Mobile Phone
Siemens Business Communications, Inc., Gigaset 2400HS	6-070	N/P	Mobile Phone

**System Peripherals:**

Radio Shack 43-858	047766	AAOCHIN-22523-TE-E	Standard Phone
Siemens Business Communications, Inc., Headset Load Cable	N/P	N/P	Headset Load Emulator

**Cables and Cords:**

8 Wire Phone Patch Cable (6 Ft.) (1 ea.)  
 Radio Shack Clear 4 Wire Phone Cable (6 Ft.) (1 ea.)

The equipment within this report was tested to verify its compliance with FCC Rule Part 15, for Intentional Radiators.

### **1.1 Equipment Under Test (EUT) Operation**

For all tests except those involving §15.247(c), §15.205 and §15.247(a)(1)(ii), the **Siemens Gigaset 2400DS Desk Station** was put into an intercom mode with the Desk Station unit. This mode exercised the transmit functions of the EUT in a normal fashion. For the remainder of the tests, the EUT was placed in a special mode which transmitted the signal on a single channel. For tests using this mode, either three channels were used for testing or the channel producing the worst case emissions was tested.

### **2.0 Occupied Bandwidth Measurements**

Measurements were made on the **Siemens Gigaset 2400DS Desk Station** to verify compliance with the bandwidth requirements of § 15.247(a)(1)(ii).

#### **2.1 Test Procedure**

Radiated Emissions measurements were made at the Professional Testing "Open Field" Site 3, located in Marble Falls, Texas to determine the radio noise radiated from the EUT. A "Description of Measurement Facilities" has been submitted to the FCC and approved pursuant to Section 2.948 of CFR 47 of the FCC rules.

## 2.2 Test Criteria

Section 15.247(a)(1)(ii) states that each channel of a frequency hopping spread spectrum system shall have a maximum bandwidth of 1 MHz. In accordance with this section, this is based on a 20 db criteria.

## 2.3 Test Results

The **Siemens Gigaset 2400DS Desk Station** operates over the frequency range 2401.056 to 2483.136 MHz. The frequency hopping algorithm was disabled, resulting in emission at discrete channels. Testing was performed on three separate channels, centered at 2401.056 (Channel 00), 2440.800 MHz (Channel 46) and 2483.136 MHz (Channel 95). Measurements were performed utilizing a spectrum analyzer IF/video bandwidth of 100 kHz/300 kHz.

The measured bandwidths were as follows:

	MAXIMUM BANDWIDTH (kHz)		
	<u>Measured</u>	<u>Specified</u>	<u>Margin</u>
Channel 00	801	1000	-199
Channel 46	827	1000	-173
Channel 95	903	1000	-97

Plots for occupied bandwidth are contained in Appendix A of this report. The **Siemens Gigaset 2400DS Desk Station** met the §15.247(a)(1)(ii) maximum bandwidth requirements.

## 3.0 Hop Frequency Quantity

An analysis of the **Siemens Gigaset 2400DS Desk Station** was performed to verify compliance with the hop frequency quantity requirement of §15.247(a)(1)(ii).

### 3.1 Evaluation Procedure

The channel listing provided by the Siemens Business Communication Systems was studied to determine the number of channels assigned for the **Siemens Gigaset 2400DS Desk Station**. The number of the channels used was determined based on spectral analysis of the EUT in normal operating mode. The basic evaluation procedure was to determine that the number of hopping channels was equal to or greater than 75 (based on the list comparison) and that all channels in available band were used by the device. The second part of the evaluation involved plotting the spectral response of the EUT over the transmit band over time in a peak hold mode. If all channels are used, the transmit band should be filled with little or no dropouts.

### 3.2 Evaluation Criteria

Section 15.247(a)(1)(ii) requires that frequency hopping spread spectrum systems shall utilize a minimum of 75 frequencies (Channels). Data for the channel assignments for the system was obtained from the manufacturer and the number of channels compared to the limit.

### 3.3 Evaluation Results

The **Siemens Gigaset 2400DS Desk Station** operates over the 96 channels over the frequency range of 2401.056 to 2483.136 MHz. The spectral response of the EUT showed no significant omissions in the transmit channel band.

Data for this evaluation is contained in Appendix B. The **Siemens Gigaset 2400DS Desk Station** met the §15.247(a)(1)(ii) hop frequency quantity requirement.

## 4.0 Average Time of Occupancy

Measurements were made on the **Siemens Gigaset 2400DS Desk Station** to verify compliance with the average time of occupancy requirements of §15.247(a)(1)(ii).

### 4.1 Test Procedure

Testing was performed in a controlled laboratory environment. The EUT was placed into a standard operating mode (intercom with the desk station). A spectrum analyzer was set with a center frequency of 2440.7 MHz (Channel 46) and the bandwidth set to view only the primary emissions of this channel. The individual transmission period and worst case duty cycle of the transmission on this channel was measured. The total period of occupancy of the channel over a 30 second period was then calculated and compared to the limit. This criteria is more stringent than that quoted by the rule.

### 4.2 Test Criteria

Section 15.247(a)(1)(ii) states that the average time of occupancy one a single frequency shall not be greater than 0.4 seconds over a 30 second period.

### 4.3 Test Results

Data plots for these measurements are contained in Appendix C of this document. The maximum signal duration on the channel was 0.68 ms. The worst case period (shortest) for repetition of signals on this channel was 790 ms. This period equates to approximately 38 pulses over a 30 second period. Based on this rate and a signal duration of 0.68 ms, the highest signal duration for this channel would be  $30 \times 0.68 \text{ ms} = 25.84 \text{ ms}$ . Based on this criteria, the **Siemens Gigaset 2400DS Desk Station** meets the average time of occupancy requirement of §15.247(a)(1)(ii).

## 5.0 Peak Output Power

Measurement of the peak output power for the **Siemens Gigaset 2400DS Desk Station** to verify compliance with requirements of §15.247(b).

## 5.1 Measurement Procedure

The tests were performed in a 12' X 16' RayProof anechoic lined modular shielded room. A Hewlett Packard 8566B Spectrum Analyzer was used to record the output profile of the transmitter. The EUT was operated in a normal intercom mode with the spread spectrum transmitter in standard communication with a remote unit.

The orientation of the EUT and the measurement antenna were varied to find the worst case (highest emission level) for this test. The final orientation was with the measurement antenna vertical. The spectrum of the transmit signal from the EUT was recorded on an HP 8566 Spectrum Analyzer with an EMCO 3115 horn as the measurement antenna. The plot of this spectrum is shown in Appendix D. The peak of this plot was measured and compared to the limit. Final measurement of the peak was made with a 1 MHz/1 MHz bandwidth combination.

## 5.2 Evaluation Criteria

Section 15.247(b) states that the maximum peak output power from the transmitter shall not exceed 1 watt.

## 5.3 Evaluation Results

Datasheets containing this information is contained in Appendix D. The highest ERP for the **Siemens Gigaset 2400DS Desk Station** occurred at a frequency of 2440.1 MHz with a maximum recorded level of 0.497 watts. The **Siemens Gigaset 2400DS Desk Station** meets the §15.247(b) maximum transmitted power criteria.

## 6.0 Out-of-Band Emission Measurements

Measurements were made on the **Siemens Gigaset 2400DS Desk Station** to verify compliance with the out-of-band emission requirements of §15.247(c). Measurements were performed for the radiated out-of-band emissions. The antenna of the **Siemens Gigaset 2400DS Desk Station** is soldered to the main board of the device with no conductor exposed and no add-on port is available, so conducted out of band emissions were not performed for the antenna.

## 6.1 Test Procedure

Radiated Emissions measurements were made at the Professional Testing "Open Field" Site 3, located in Marble Falls, Texas to determine the radio noise radiated from the EUT. A "Description of Measurement Facilities" has been submitted to the FCC and approved pursuant to Section 2.948 of CFR 47 of the FCC rules.

The EUT was placed in single channel transmit mode at Channel 95 (Center Frequency = 2483 MHz). This method (single channel operation) provided the most effective method for detecting emissions from the EUT by disabling the hopping function. Prior to formal testing, the spectrum of the intended emissions from the EUT in this mode were compared to those for normal operation mode. The emissions in single channel mode were higher, thereby making this a worst case configuration for this test.

## 6.2 Test Criteria

Section 15.247(c) requires that all out-of-band emissions from the EUT be 20 dB below the intended signal level. In addition, the emissions from the EUT must meet the restricted band criteria of 15.205.

## 6.3 Test Results

A Hewlett Packard 8566B Spectrum Analyzer utilizing an IF/video bandwidth of 100 kHz/300 kHz was used to record the output signals. Testing was performed over the frequency range 30 MHz to 18 GHz. While this test range covers emissions through the seventh harmonic, analysis of the emissions from the EUT was made to determine if the detected signals were from the EUT. If a significant number of the signals were emissions from the EUT, additional testing would be performed.

The data sheets for out-of-band emissions is contained in Appendix E of this report. All measured emissions outside the 2401 to 2483 MHz band were greater than 20 dB below the carrier; therefore, the **Siemens Gigaset 2400HS Handset** met the §15.247(c) radiated emission requirements. In addition, in the restricted bands defined by §15.205, the emissions detected during this test were also below this limit.

## 7.0 Conducted Emissions Measurements

Conducted emissions measurements were made to determine the line-to-ground radio noise from the **Siemens Gigaset 2400DS Desk Station** external power supply power-input terminals which connect to the public utility lines.

### 7.1 Test Procedure

The tests were performed in a 12' X 16' RayProof modular shielded room. The measurements were taken using Schwarbeck 8127 Line Impedance Stabilization Network (LISN). A Hewlett Packard Spectrum Analyzer in association with a Quasi-Peak Adapter were used to record the conducted emissions. The Quasi-Peak Adapter utilizes a measurement bandwidth of 9 kHz.

The power cord length in excess of the distance between the EUT and LISN was wrapped in a "figure eight" pattern using tie wraps to establish the correct power cable length.

### 7.2 Test Criteria

The §15.207 conducted emission limits are given below:

Frequency <u>(MHz)</u>	Maximum RF Line Voltage <u>(<math>\mu</math>V)</u> <u>(dB<math>\mu</math>V)</u>	
0.45 to 30.0	250	48

### 7.3 Test Results

The **Siemens Gigaset 2400DS Desk Station** operates over the frequency range 2401.056 to 2483.136 MHz. Testing was performed with the device in intercom mode with 2 handsets. This exercise the transmitter of the EUT in a standard mode

Conducted test data is contained in Appendix F of this report. The **Siemens Gigaset 2400DS Desk Station** met the §15.207 conducted emission requirements.

## 8.0 Frequency Stability Measurements

Measurements were made on the **Siemens Gigaset 2400DS Desk Station** to verify compliance with the frequency stability requirements of §15.31(e) and 15.215(c). Under these specifications, the EUT is tested to verify satisfactory frequency stability versus changes in the amplitude of the primary power for operation from the AC mains

### 8.1 Test Procedure

The EUT was placed on a non-conductive turntable with the the headset simulator attached and a standard handset plugged into the auxiliary port. The **Siemens Gigaset 2400DS Desk Station** operates over the frequency range 2401.056 to 2483.136 MHz. Testing was performed with the EUT set to transmit on Channel 46.

Power to the input terminals of the AC to DC power adapter was varied from 100 to 140VAC at a nominal frequency of 60 Hz. The nominal AC mains power for this system is 120 VAC which is listed on the label for the AC to DC converter. The center frequency and center frequency power level was recorded at 5 volt intervals over this range.

### 8.2 Test Criteria

When combined, Sections 15.31(e) and 15.215(c) indicate that the output frequency of the transmitter shall remain within the central 80% appropriate channel band with AC mains power varied from 85% to 115% of the nominal value. For battery powered units, the EUT shall meet this criteria when tested with a fully charged battery supply. Based on this criteria, no significant drift of the frequency shall occur under these conditions. While 15.215(c) is a recommendation, for the purposes of this test it is viewed as a requirement.

### 8.3 Test Results

Data for this test is located in the Appendix of this report. No significant movement of the center frequency was detected over the AC input variation range. The **Siemens Gigaset 2400DS Desk Station** meets the frequency stability requirements for frequency stability versus AC mains input variation based on the criteria listed above.

## 9.0 Antenna Requirement

An analysis of the **Siemens Gigaset 2400DS Desk Station** was performed to determine compliance with Section 15.203 of the Rules. This section requires specific handling and control of antennas used for devices subject to regulation under the Intentional Radiator portions of Part 15.

### 9.1 Evaluation Procedure

The structure and application of the **Siemens Gigaset 2400DS Desk Station** were analyzed with respect to the rules. The antenna for this unit is a one inch rubber whip on top of the unit. The antenna is soldered onto the main board and is not accessible by the user and an auxiliary antenna port is not present.

### 9.2 Evaluation Criteria

Section 15.203 of the rules states that the subject device must meet at least one of the following criteria:

- (a) Antenna be permanently attached to the unit.
- (b) Antenna must use a unique type of connector to attach to the EUT.
- (c) Unit must be professional installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

### 9.3 Evaluation Results

The **Siemens Gigaset 2400HS Handset** meets the criteria of this rule by virtue of having an antenna permanently attached to the unit. The EUT is therefore compliant with §15.203.

## 10.0 Privacy Label Requirement

An analysis of the **Siemens Gigaset 2400DS Desk Station** was performed to determine compliance with Section 15.214 of the Rules. This section addresses labelling of cordless phone with respect to possible eavesdropping.

### 10.1 Evaluation Procedure

The coding and modulation of the RF signal for the **Siemens Gigaset 2400DS Desk Station** were analyzed with respect to the rules. This analysis was then presented to the FCC with a request for a labelling waiver for this part.

## 10.2 Evaluation Criteria

The **Siemens Gigaset 2400DS Desk Station** is based on spread spectrum technology rather than the standard FM, AM or simple digital modulation techniques used in most cordless phones. This system is a frequency hopping spread spectrum system which uses a fairly long pseudo-random sequence of hopping frequencies. It uses time-division channelization, i.e., time division duplex (TDD) with time division multiple access (TDMA) in a spread spectrum scheme, to communicate with each of the eight mobile units, and the modulation is gaussian frequency shift keying (GFSK).

Each mobile unit (**Siemens Gigaset 2400HS Handset**) must be registered with the desk (base) unit with which it is to be used. No mobiles can talk to each other except through the base to which they are registered, and no mobiles can talk to bases to which they are not registered. All analogue signals are converted to digital for communications between the base and mobiles, so that the "on-the-air" signal is entirely digitally modulated onto a pseudo-random sequence of hopping frequencies.

We developed this complex modulation scheme with the long pseudo-random hopping sequence to provide as much privacy of communications that it is possible to provide without going to an encryption scheme. We believe that this is sufficient to ensure the privacy of communications required by §15.214."

## 10.3 Evaluation Results

The scope of this Special Consideration was discussed by Mr. Ed Bronaugh of Siemens Business Communications and Mr. Art Wall and Mr. Joe Dichoso of the FCC. Based on a reply from Mr. Dichoso (e-mail dated August 24, 1998), The **Gigaset 2400DS Desk Station** does not require labelling in accordance with §15.214 due to the use of spread spectrum technology (not normally used in cordless phones) and the encoding algorithms and registration employed by this system.

## 11.0 List of Test Equipment

A list of the test equipment utilized to perform the conducted and radiated emission measurements is given below. The date of calibration is given for each.

<u>Device</u>	<u>Description</u>	<u>Date Last Calibrated</u>	<u>Calibration Due</u>
HP 8566B	Spectrum Analyzer	09/22/97	09/22/98
HP 85650A	Quasi Peak Adapter	09/22/97	09/22/98
MITEQ AFS4-00101800-40-10P-N	Broadband Pre-Amp	05/22/98	05/22/99
Schwarzbeck 8127 LISN	LISN	03/05/98	03/05/99
EMCO 3115	Double Ridged Horn Antenna	05/22/98	05/22/99



## Appendix A

## Occupied Bandwidth Test Data

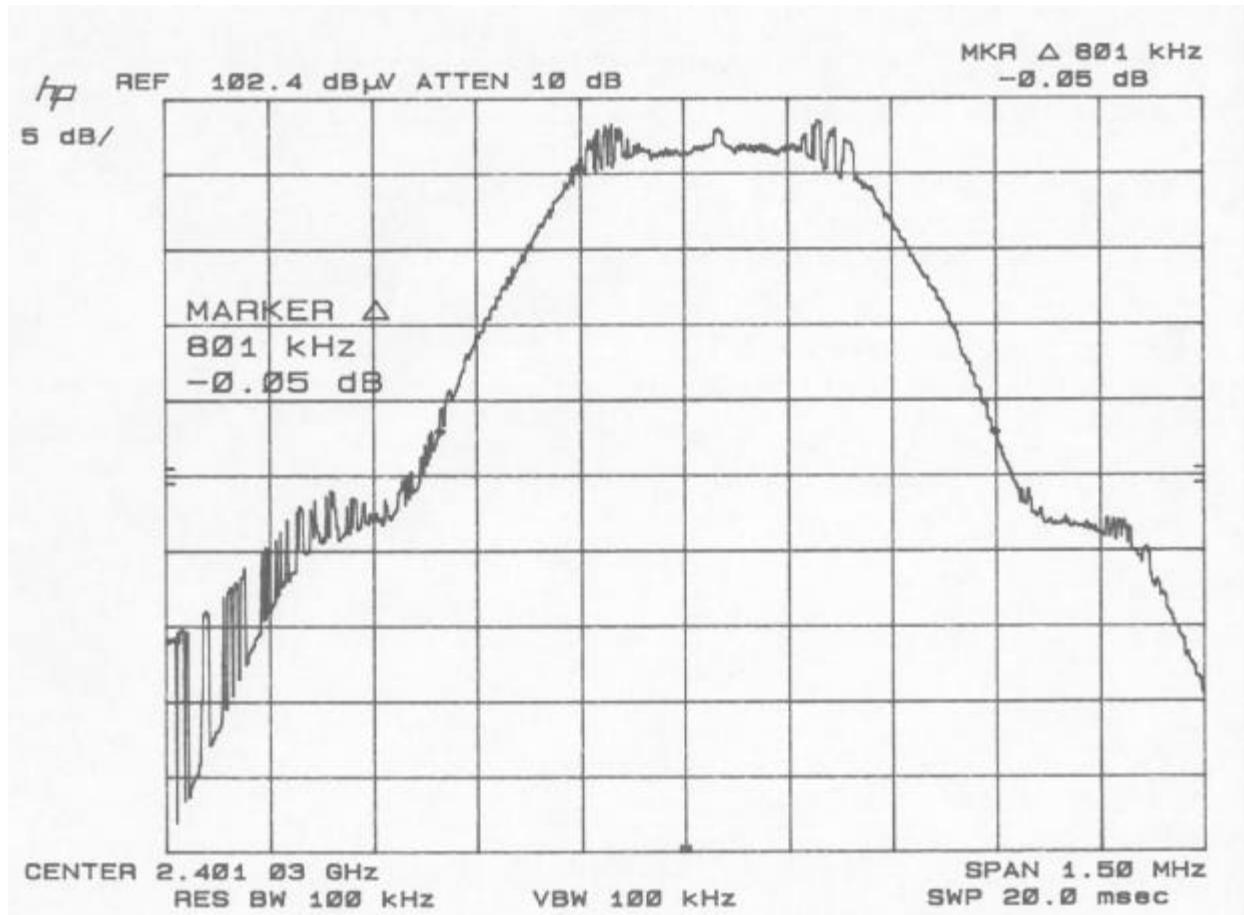
## Occupied Bandwidth Data Sheet

Siemens Business Communication Systems  
Siemens Gigaset 2400DS Desk Station

SERIAL #: 14

PROJECT #: 99-016

DATE: August 8, 1998



COMMENT #1: Channel Setting = 00 (Center Frequency = 2400.93 MHz)

COMMENT #2: 20dB Bandwidth = 801 kHz

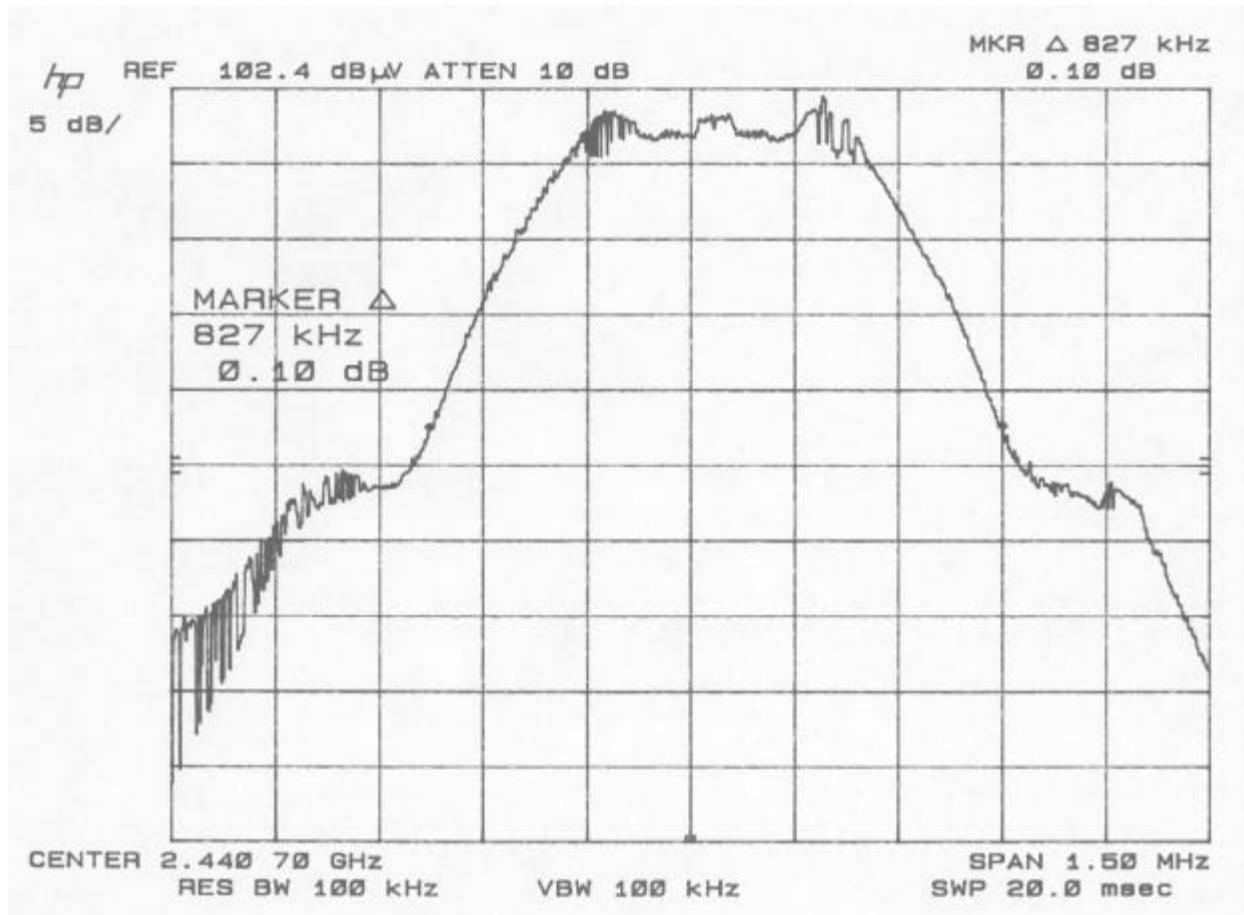
TEST ENGINEER: \_\_\_\_\_ APPROVED BY: \_\_\_\_\_

John O'Brien Jeffery Lenk

## Occupied Bandwidth Data Sheet

Siemens Business Communication Systems  
Siemens Gigaset 2400DS Desk StationSERIAL #: 505  
DATE: August 8, 1998

PROJECT #: 99-016



COMMENT #1: Channel Setting = 46 (Center Frequency = 2440.96 MHz)

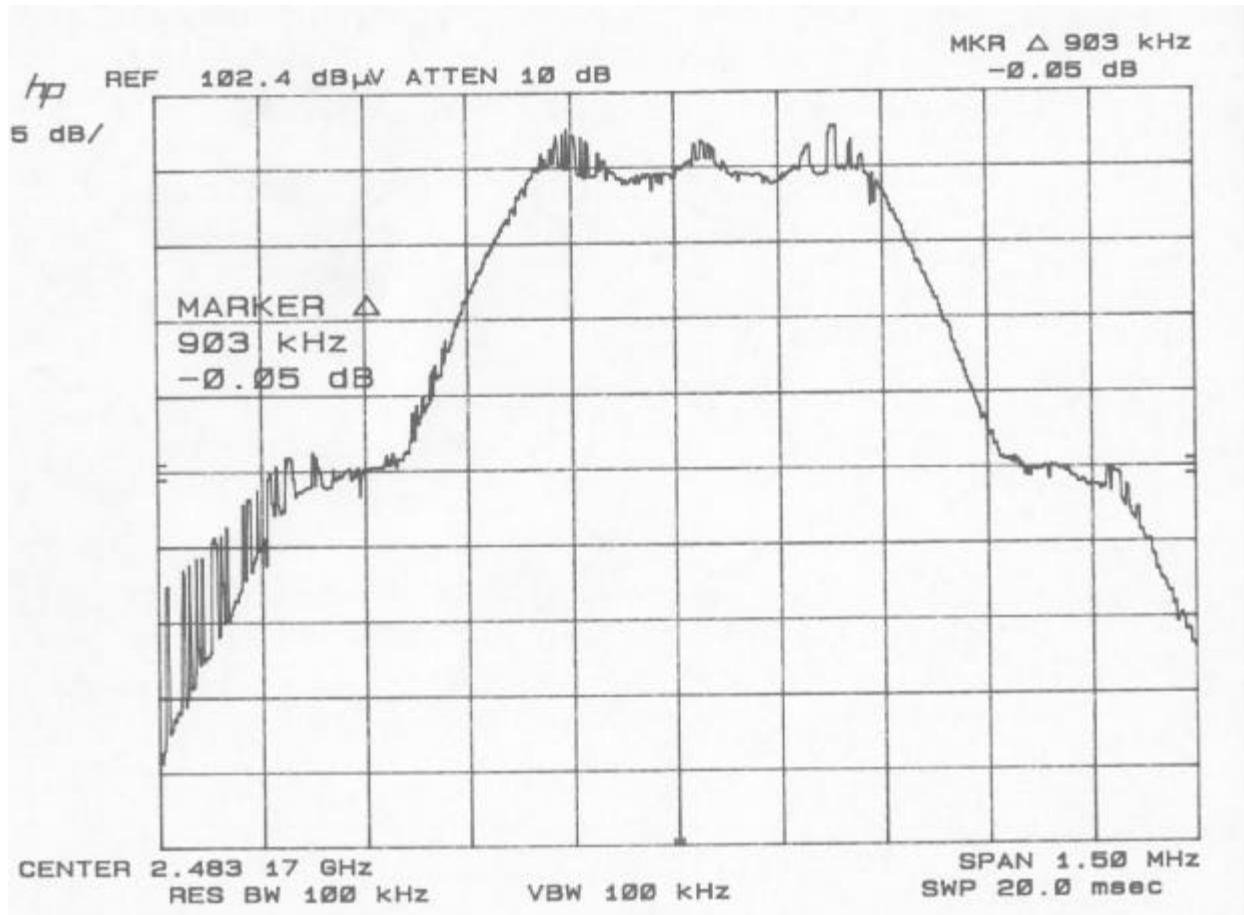
COMMENT #2: 20dB Bandwidth = 827 kHz

TEST ENGINEER: \_\_\_\_\_ APPROVED BY: \_\_\_\_\_  
John O'Brien Jeffery Lenk

## Occupied Bandwidth Data Sheet

Siemens Business Communication Systems  
Siemens Gigaset 2400DS Desk StationSERIAL #: 505  
DATE: August 8, 1998

PROJECT #: 99-016



COMMENT #1: Channel Setting = 95 (Center Frequency = 2482.83 MHz)

COMMENT #2: 20dB Bandwidth = 903 kHz

TEST ENGINEER: \_\_\_\_\_ APPROVED BY: \_\_\_\_\_  
John O'Brien Jeffery Lenk

## **Appendix B**

## **Hop Frequency Quantity Evaluation Data**

## Hop Frequency Quantity Data Sheet #1

## Siemens Business Communication Systems

### Siemens Gigaset 2400DS Desk Station

SERIAL #: 505  
DATE: August 3, 1998

PROJECT #: 99-016

Table 3.2.3. SOHOC Hopping Channels

Channel	Freq.	Channel	Freq.	Channel	Freq.	Channel	Freq.
##	MHz	##	MHz	##	MHz	##	MHz
00	2401.056	24	2421.792	48	2442.528	72	2463.264
01	2401.920	25	2422.656	49	2443.392	73	2464.128
02	2402.784	26	2423.520	50	2444.256	74	2464.992
03	2403.648	27	2424.384	51	2445.120	75	2465.856
04	2404.512	28	2425.248	52	2445.984	76	2466.720
05	2405.376	29	2426.112	53	2446.848	77	2467.548
06	2406.240	30	2426.976	54	2447.712	78	2464.448
07	2407.104	31	2427.840	55	2448.576	79	2469.312
08	2407.968	32	2428.704	56	2449.440	80	2470.176
09	2408.832	33	2429.568	57	2450.304	81	2471.040
10	2409.696	34	2430.432	58	2451.168	82	2471.904
11	2410.560	35	2431.296	59	2452.032	83	2472.768
12	2411.424	36	2432.160	60	2452.896	84	2473.632
13	2412.288	37	2433.024	61	2453.760	85	2474.496
14	2413.152	38	2433.888	62	2454.624	86	2475.360
15	2414.016	39	2434.752	63	2455.488	87	2476.224
16	2414.880	40	2435.616	64	2456.352	88	2477.088
17	2415.744	41	2436.480	65	2457.216	89	2477.952
18	2416.608	42	2437.344	66	2458.080	90	2478.816
19	2417.472	43	2438.208	67	2458.944	91	2479.680
20	2418.336	44	2439.072	68	2459.808	92	2480.544
21	2419.200	45	2439.936	69	2460.672	93	2481.408
22	2420.064	46	2440.800	70	2461.536	94	2482.272
23	2420.928	47	2441.664	71	2462.400	95	2483.136

COMMENT #1: Number of Hop Channels = 96

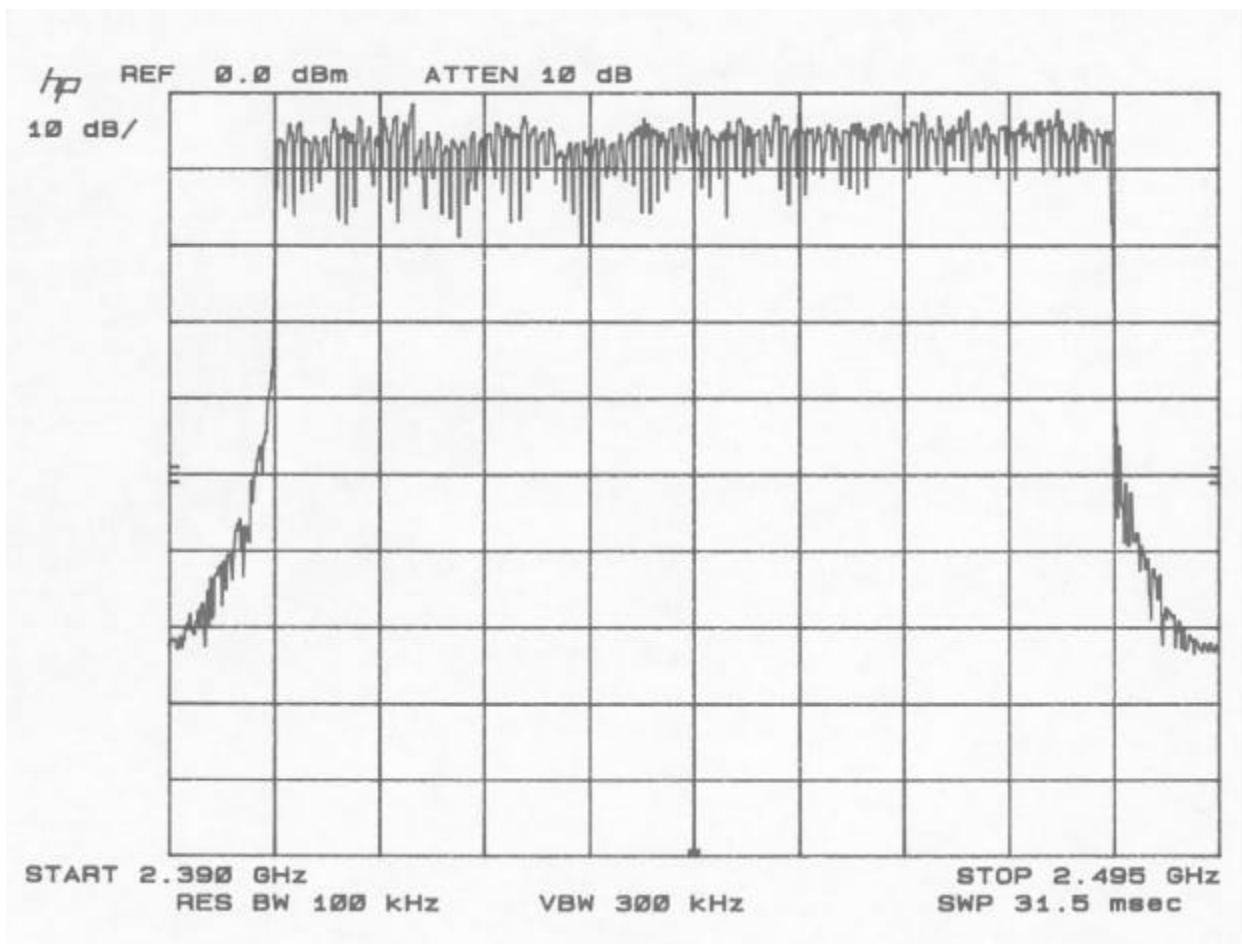
## COMMENT #2:

**Hop Frequency Quantity Data Sheet #2****Siemens Business Communication Systems  
Siemens Gigaset 2400DS Desk Station**

SERIAL #: 505

PROJECT #: 99-016

DATE: August 3, 1998



COMMENT #1: No significant channel omissions detected

COMMENT #2:

**TEST ENGINEER:** \_\_\_\_\_ **APPROVED BY:** \_\_\_\_\_  
John O'Brien Jeffery Lenk

## **Appendix C**

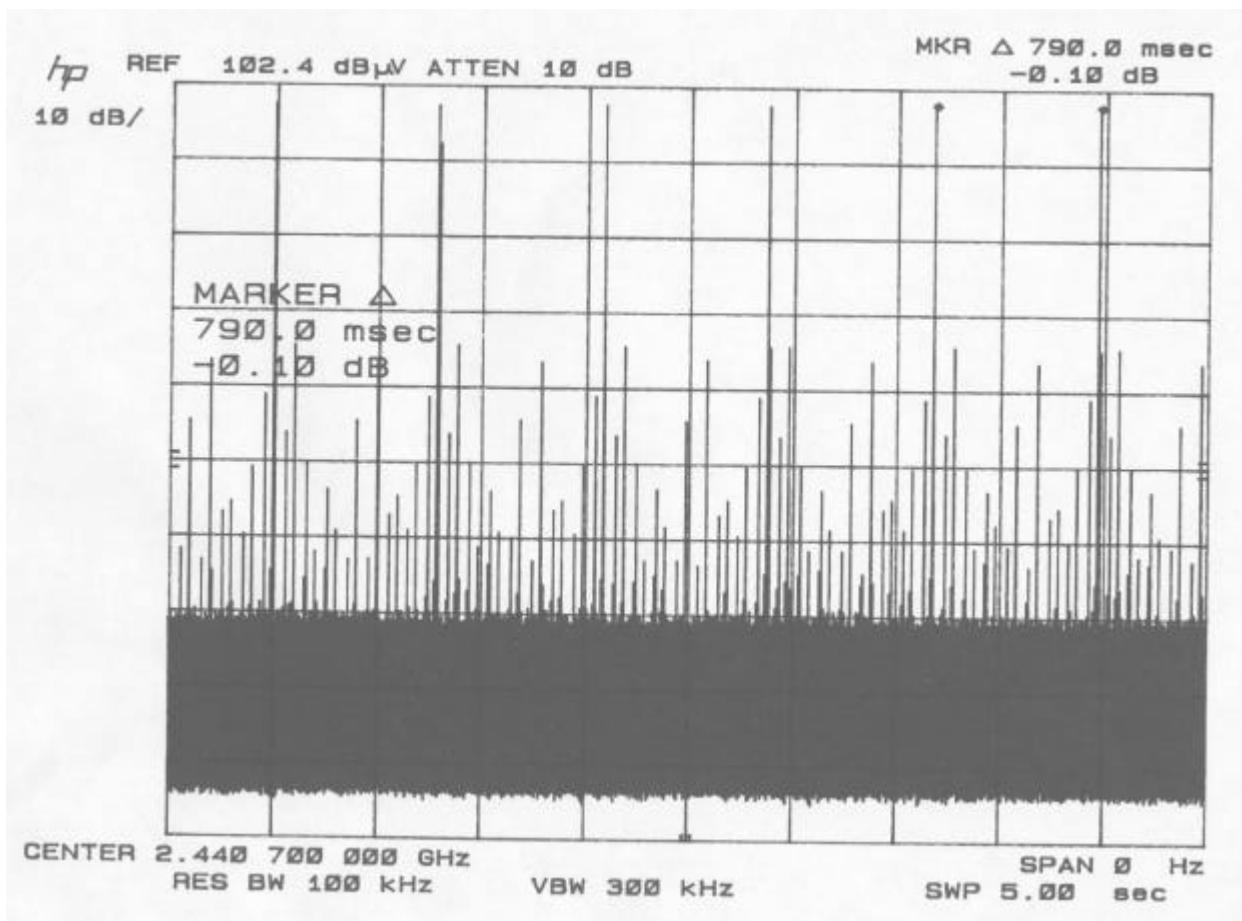
## **Average Time of Occupancy Test Data**

## Average Time of Occupancy Sheet #1

## Siemens Business Communication Systems Siemens Gigaset 2400DS Desk Station

SERIAL #: 505  
DATE: August 3, 1998

PROJECT #: 99-016



COMMENT #1: Pulse Interval = 790 mS

## COMMENT #2:

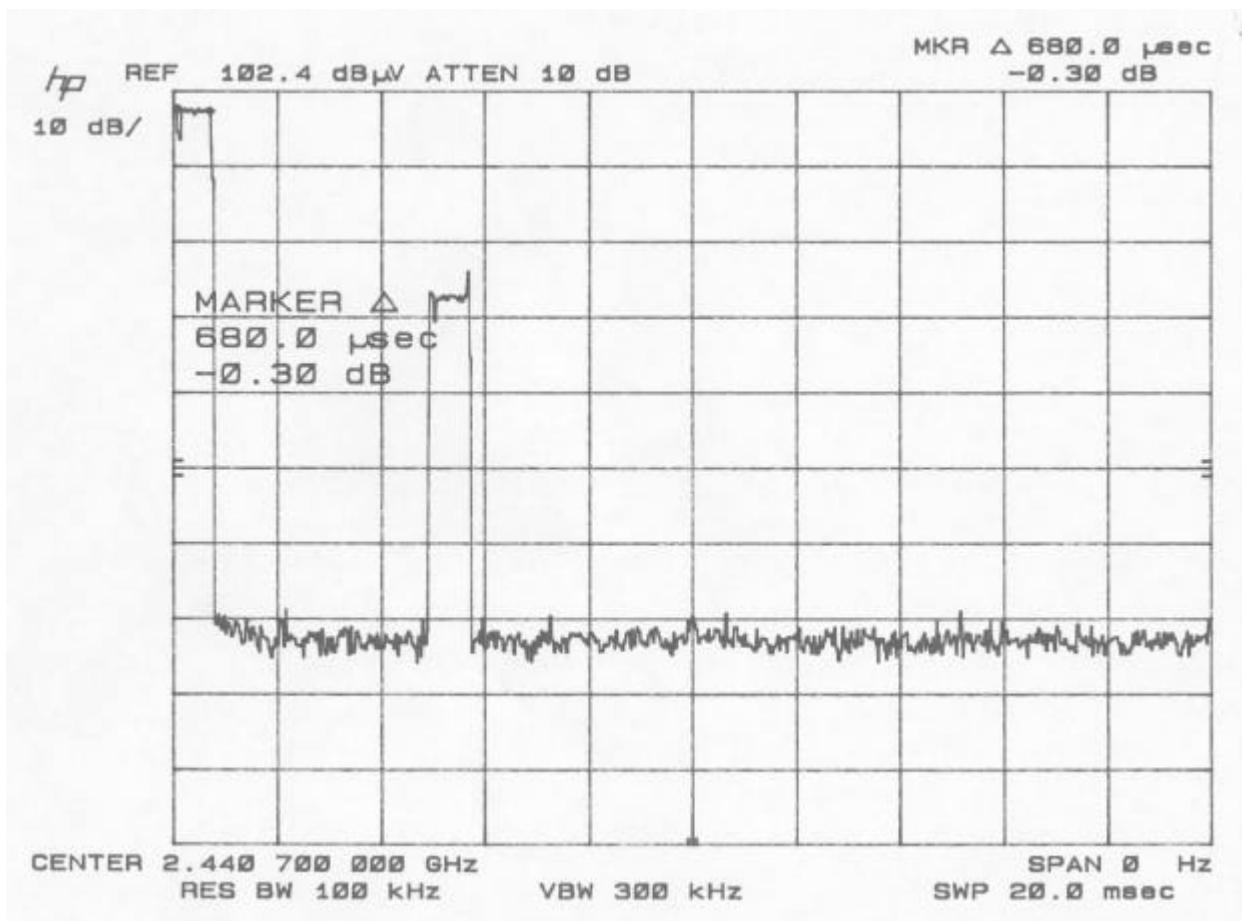
## Average Time of Occupancy Sheet #2

Siemens Business Communication Systems  
Siemens Gigaset 2400DS Desk Station

SERIAL #: 505

PROJECT #: 99-016

DATE: August 3, 1998



COMMENT #1: Pulse Interval = 0.680 mS

COMMENT #2:

TEST ENGINEER: \_\_\_\_\_ APPROVED BY: \_\_\_\_\_

John O'Brien Jeffery Lenk

## **Appendix D**

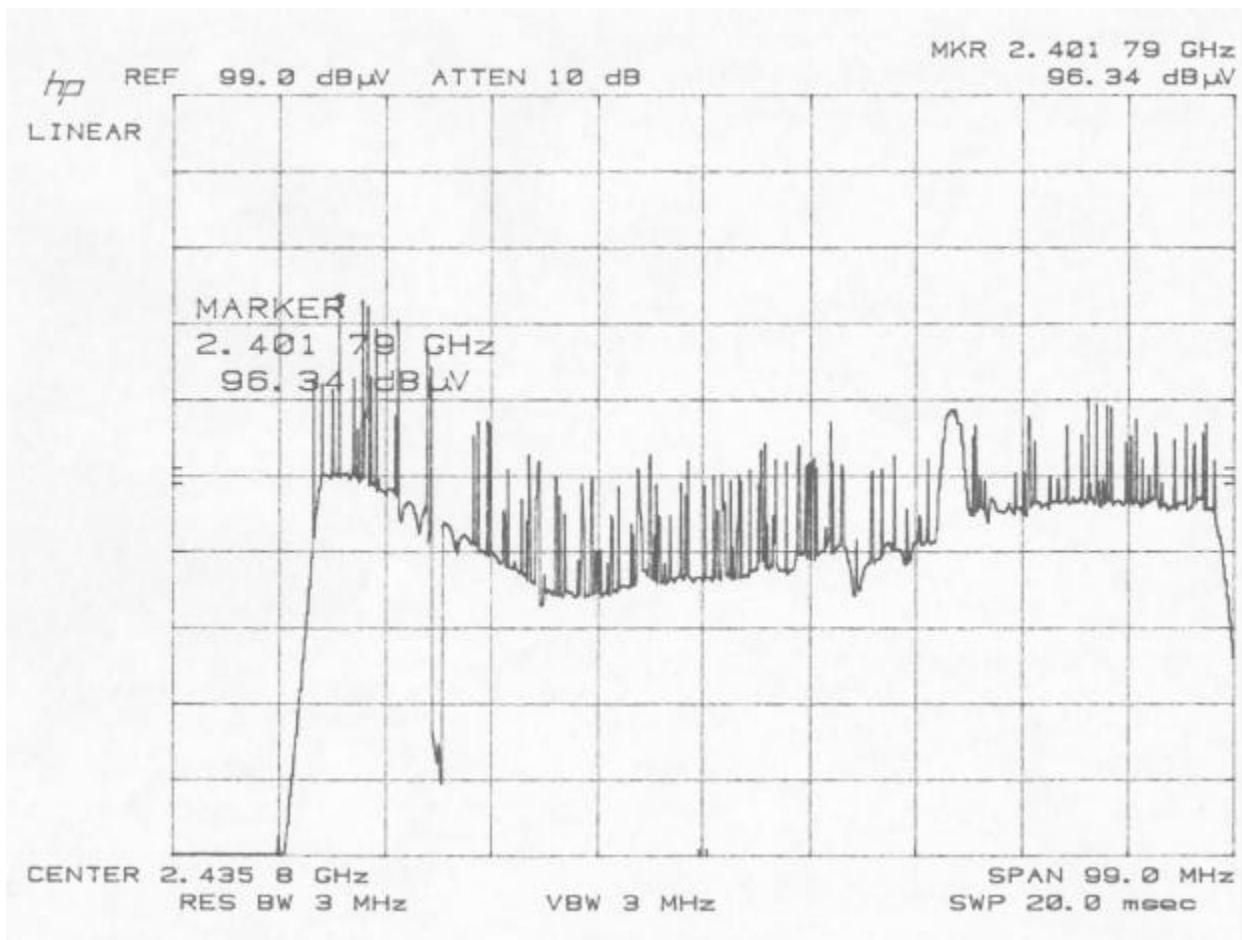
## **Peak Output Power Test Data**

**Peak Output Power (Section 15.247)**

**Siemens Business Communication Systems**  
**Siemens Gigaset 2400DS Desk Station**

SERIAL #: 505  
 DATE: July 26, 1998

PROJECT #: 99-016



COMMENT #1: Peak Radiated Signal Level = Signal + Cable Loss + Antenna Factor  
 $= 98.8 \text{ dBuV} + 1.6 \text{ dB} + 26.2 = 128.7 \text{ dBuV/m}$

COMMENT #2:  $124.1 \text{ dBuV/m} = 0.497 \text{ watts}$

**TEST ENGINEER:** \_\_\_\_\_ **APPROVED BY:** \_\_\_\_\_  
 John O'Brien Jeffery Lenk

## **Appendix E**

## **Out-of-Band Emissions Test Data**

## Radiated Out-of-Band Emissions Data Sheet

Siemens Business Communication Systems  
Siemens Gigaset 2400DS Desk Station

SERIAL #: 505  
DATE: July 8, 1998  
PROJECT #: 99-016

MEASUREMENT DISTANCE (m): 1  
ANTENNA POLARIZATION: Vertical  
DETECTOR FUNCTION: Peak

Freq. (MHz)	EUT Dir. (Deg.)	Antenna Elevation Meters	Recorded Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.0	232.0	1.0	97.8	26.9	3.6	128.3	Ref	Ref
4966.0	232.0	1.0	17.2	36.5	5.8	59.5	63.5	-4.0
7449.0	232.0	1.0	13.9	36.0	6.0	55.9	63.5	-7.6
9932.0	232.0	1.0	32.7	38.0	5.8	76.5	108.9	-32.4
12415.0	232.0	1.0	14.4	38.4	8.5	61.3	63.5	-2.2
14897.0	232.0	1.0	38.4	41.0	10.0	89.4	108.9	-19.5
17381.0	232.0	1.0	35.6	43.2	11.3	90.1	108.9	-18.8

**Corrected Level = Recorded Level + Antenna Factor + Cable Loss**

**COMMENT #1:** All measurements above the fundamental are detection system noise floor

## COMMENT #2:

## Radiated Out-of-Band Emissions Data Sheet

Siemens Business Communication Systems  
Siemens Gigaset 2400DS Desk Station

SERIAL #: 505  
DATE: July 8, 1998  
PROJECT #: 99-016

MEASUREMENT DISTANCE (m): 1  
ANTENNA POLARIZATION: Horizontal  
DETECTOR FUNCTION: Peak

Freq. (MHz)	EUT Dir. (Deg.)	Antenna Elevation Meters	Recorded Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.0	232.0	1.0	84.1	26.9	3.6	114.6	Ref	Ref
4966.0	232.0	1.0	13.5	36.5	5.8	55.8	63.5	-7.7
7449.0	232.0	1.0	14.7	36.0	6.0	56.7	63.5	-6.8
9932.0	232.0	1.0	31.4	38.0	5.8	75.2	108.9	-33.7
12415.0	232.0	1.0	14.1	38.4	8.5	61.0	63.5	-2.5
14897.0	232.0	1.0	35.7	41.0	10.0	86.7	108.9	-22.2
17381.0	232.0	1.0	39.8	43.2	11.3	94.3	108.9	-14.6

**Corrected Level = Recorded Level + Antenna Factor + Cable Loss**

COMMENT #1: All measurements above the fundamental are detection system noise floor

## COMMENT #2:

## **Appendix F**

## **Conducted Emissions Test Data**

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## FCC Part 15.207 Conducted Data Sheet

## Siemens Business Communication Systems

### Siemens Gigaset 2400DS Desk Station

SERIAL #: 505

DATE: July 16, 1998

DETECTOR FUNCTION: Quasi-Peak

LINE MEASURED: Neutral

PROJECT #: 99-016

Frequency Measured (MHz)	Recorded Level (dBuV)	Cable Loss (dB)	LISN Factor (dB)	Corrected Level (dBuV)	Limit Quasi-Peak (dBuV)	Margin (dB)
0.45	34.2	0.1	1.1	35.4	48.0	-12.6
0.502	32.8	0.1	1.1	34.0	48.0	-14.0
0.54	32.6	0.1	1.1	33.8	48.0	-14.2
0.94	26.2	0.2	1.1	27.5	48.0	-20.5
21.40	19.4	0.9	2.2	22.5	48.0	-25.5
30.00	19.4	1.0	3.2	23.6	48.0	-24.4

COMMENT #1: 120VAC/60Hz; Transmit mode

## COMMENT #2:

## FCC Part 15.207 Conducted Data Sheet

## Siemens Business Communication Systems

### Siemens Gigaset 2400DS Desk Station

SERIAL #: 505

DATE: July 16, 1998

## DETECTOR FUNCTION: Quasi-Peak

### LINE MEASURED: Phase

PROJECT #: 99-016

Frequency Measured (MHz)	Recorded Level (dBuV)	Cable Loss (dB)	LISN Factor (dB)	Corrected Level (dBuV)	Limit Quasi-Peak (dBuV)	Margin (dB)
0.46	32.5	0.1	1.1	33.7	48.0	-14.3
0.532	30.9	0.1	1.1	32.1	48.0	-15.9
0.60	26.9	0.1	1.1	28.1	48.0	-19.9
0.86	21.9	0.1	1.1	23.1	48.0	-24.9
4.89	19.4	0.4	1.3	21.1	48.0	-26.9
27.20	19.4	1.0	3.8	24.2	48.0	-23.8

COMMENT #1: 120VAC/60Hz; Transmit mode

## COMMENT #2:

## **Appendix G**

## **Frequency Stability Test Data**

**Frequency Stability vs. AC Power Supply Voltage Data Sheet****Siemens Business Communication Systems  
Siemens Gigaset 2400DS Desk Station**PROJECT #: 99-016  
DATE: August 3, 1998  
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SERIAL #: SN 505

AC Line Voltage (V)	Center Frequency (MHz)	Frequency Deviation (kHz)	Deviation vs Tolerance (kHz)
100	2440.760	-40.0	-11960.0
105	2440.758	-42.0	-11958.0
110	2440.764	-36.0	-11964.0
115	2440.746	-54.0	-11946.0
120	2440.748	-52.0	-11948.0
125	2440.756	-44.0	-11956.0
130	2440.752	-48.0	-11952.0
135	2440.758	-42.0	-11958.0
140	2440.758	-42.0	-11958.0

COMMENT #1: Nominal line voltage: 120 VAC per manufacturer

COMMENT #2: Tolerance used for reference is 12 kHz

TEST ENGINEER: \_\_\_\_\_ APPROVED BY: \_\_\_\_\_  
John O'Brien Jeffery Lenk