FCC APPLICATION INQUIRY RESPONSE
L82-228869: SIEMENS GIGASET 2400 HANDSET
Correspondence Number: None
September 29, 1998

1.0 Overview

This package was compiled to reply to inquiries made by Mr. Joe Dichoso of the FCC regarding the Type Certification Application for the Siemens Gigaset 2400 Desk Station. Each Inquiry item is listed below followed by the response. The text of this is based on information obtained from a set of phone discussions on September 28, 1998.

2.0 Investigation of Restricted Band Issue

Original Inquiry from the Comission was:

(1) Resolve possible non-compliance issue regarding the 2500 MHz restricted emission band.

Answer:

The Siemens SOHO Handset is subject to the following limits regarding emissions in the 2500 MHz Restricted Emission Band:

Maximum Average Limit (1 meter): 64 dBµV/m

Maximum Peak Limit (1 meter): 64 dBµV/m + 20 dB = 84 dBµV/m

When operating on Channel 95, the Siemens SOHO Handset is compliant with the average limit at the band edge (band edge = 2483.5 MHz) but is not compliant with the peak emission limit.

(2) EUT Modification

The Siemens SOHO Handset will be modified via a programming change (firmware) to limit operation to Channels 00 through 94. The nominal center frequency of Channel 94 is 2482.272 MHz. This change will result in the reduction of spectral regrowth into the restricted band (which is the source of the restricted band non-compliance issue). No hardware changes will be made to the EUT. This programming change will not affect the pseudo-random spread spectrum hopping algorithms and will still utilize a sufficient number of channels to meet the minimum hop channel requirement. This modification was discussed with Mr. Joe Dichoso of the FCC on Sept. 28, 1998 as a possible remedy for this situation.

3.0 Re-evaluation of Affected Areas

Based on this modification, the following areas of the application are affected:

(a) ERP at the Upper Transmit Channel
(b) Occupied Bandwidth at the Upper Transmit Channel
(c) Re-specification of the transmit band based on a change of the Upper Transmit Channel
(d) Compliance with the 20 dB down requirement at the Upper Transmit Channel
(e) Compliance with the 2500 MHz Restricted Band

Tests of the Siemens SOHO Handset operating on Channel 94 (simulating the final software modification) were made to determine compliance with these specifications. All measurements discussed in this report were made with the following test configuration:

Test Distance:	1 meter
Antenna Height:	1 meter
Worst Case Direction:	0 Degrees

All tests were made with the EUT in a fixed transmit mode (not hopping) at Channel 94.

(1) ERP of the Upper Transmit Channel

The peak emission of Channel 94 was 124.3 dBμV/m. The EIRP for this channel is calculated as:

$$P(EIRP) = \{(E * d)^2 \} / 30$$

with:

E = 127.3 dBμV/m = 1.640 V/m

r = 1 meter

Therefore, P = {(1.640 * 1)^2}/30 = 0.089 watts. For RF Safety purposes, this figure is below the 0.2 watt figure referenced as the limit in OET-65C for requiring a complete RF Safety evaluation. This figure will be further reduced when weighted by the duty cycle of the transmission (1/12).

(2) Occupied Bandwidth of the Upper Transmit Channel

A plot of the Occupied Bandwidth of Channel 94 is included in the Appendix. The measured occupied bandwidth of this channel is 704 kHz, which is in keeping the results for Channels 00 and 46.

(3) Re-specification of the transmit band based on a change of the Upper Transmit Band.

Siemens/PTI requests that the upper allowed transmit frequency of the device be modified based on the following equation:

Upper Edge of Transmission = Center of Channel 94 + ½ Occupied BW + nominal frequency (drift) error of the system

For the values for these figures are:

Center of Channel 94 = 2482.272 MHz

½ Occupied Bandwidth = ½ * 700 kHz = 350 kHz

nominal frequency error (drift) of the system = 100 kHz

This results in a revised upper transmit frequency of 2482.7 MHz. We request that the Comission revise the upper frequency listed on the Form 731 for this application to reflect this change. The lower transmit frequency is not affected by this change.

(4) Compliance with the 20 dB down requirement of §15.247(c).

A plot of the emission of Channel 94 is included showing a marker at the bandedge based on Item (3). This level is 25.65 dB down at this point.

(5) Compliance with the 2500 MHz Restricted Band.

Compliance with the 2500 MHz Restricted Band was performed in two parts:

(a) Compliance to the Peak Emission Level
(b) Compliance with the Average Emission Level

Compliance with the Peak level was based on the following method, as provided by Mr. Joe Dichoso on Sept. 28, 1998:

(1) Measure the peak emission at the highest intended transmit channel using 1MHz/1 MHz bandwidth settings.

(2) Calculate the attenuation required to meet the Restricted Band limit at the lower edge of the restricted band by determining the difference between the peak emission level and the Restricted Band limit.

(3) Using the instrument settings from the occupied bandwidth measurement, measure the attenuation from the center of the highest emission channel to the bottom edge of the Restricted Band. If this attenuation level is greater than that calculated in Step 2, then the EUT is compliant with the Peak Restricted Band Emission Requirement.

Normally, evaluation of the peak emissions for the restricted band would be performed using standard peak emission measurement techniques. Mr. Dichoso indicated that this technique was an accepted method for situations involving an intended emission being in close proximity to the edge of the restricted band.

The peak emission was measured as 124.3 dBµV/m. The restricted band peak emission limit at 1 meter for this band is 84 dBµV/m. The resulting attenuation required at the edge of the restricted band is:

$$124.3\ \text{dB}\mu\text{V/m} - 84\ \text{dB}\mu\text{V/m} = 40.3\ \text{dB}$$

Plots of the peak emission level versus the edge of the restricted band were performed for both vertical & horizontal polarizations. These plots are included in the Appendix. The Restricted Band Attenuation for the Vertical Polarization 52.1 dB (11.8 dB below the limit) and 52.6 dB for the Horizontal Polarization (12.3 dB below the limit).

For the measurement of the average emissions at the bandedge was performed using standard average measurement procedures. Data for these measurements is also included in the Appendix. The Siemens SOHO Handset met both the average and peak restricted band emission requirements.

APPENDIX

DATASHEETS

Radiated Data Sheet

Siemens Business Communication Systems
Gigaset 2400HS Handset

SERIAL #: Pilot Run 1, SN 02
DATE: Septmber 29, 1998
PROJECT #: 99-016

MEASUREMENT DISTANCE: 1 meter
MEASUREMENT HEIGHT: 1 meter
EUT Orientation: 0

EIRP

Freq. (MHz)	Polarization	Recorded Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBuV/m)	EIRP (Watts)
2482.3	Vertical	95.9	26.8	1.6	124.3	0.0897
2482.3	Horizontal	89.9	26.8	1.6	118.3	0.0225

Corrected Level = Recorded Level + Antenna Factor + Cable Loss

COMMENT #1: All measurements for this test based on peak measurement methods

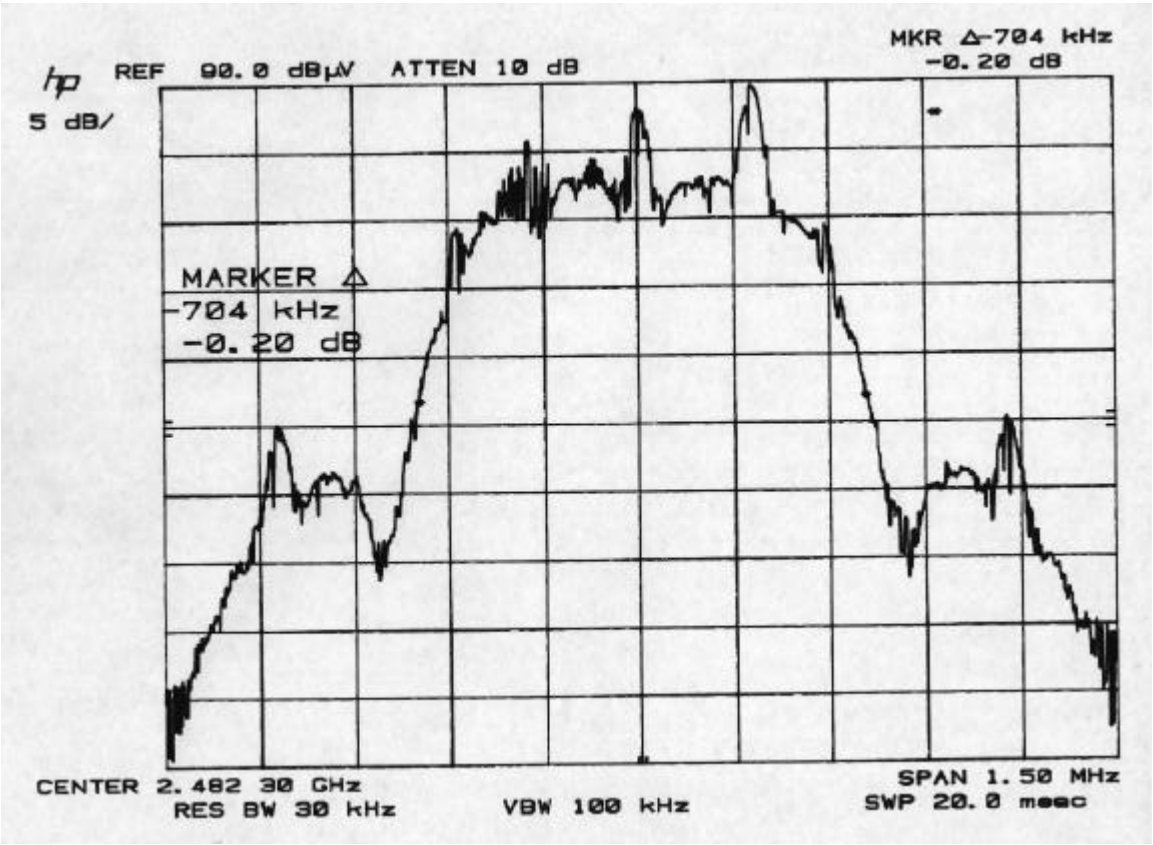
COMMENT #2:

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

Occupied Bandwidth Data Sheet

Siemens Business Communication Systems
Gigaset 2400HS Handset

SERIAL #: Pilot Run 1, SN 02 PROJECT #: 99-016
DATE: September 29, 1998



COMMENT #1: Channel Setting = 94

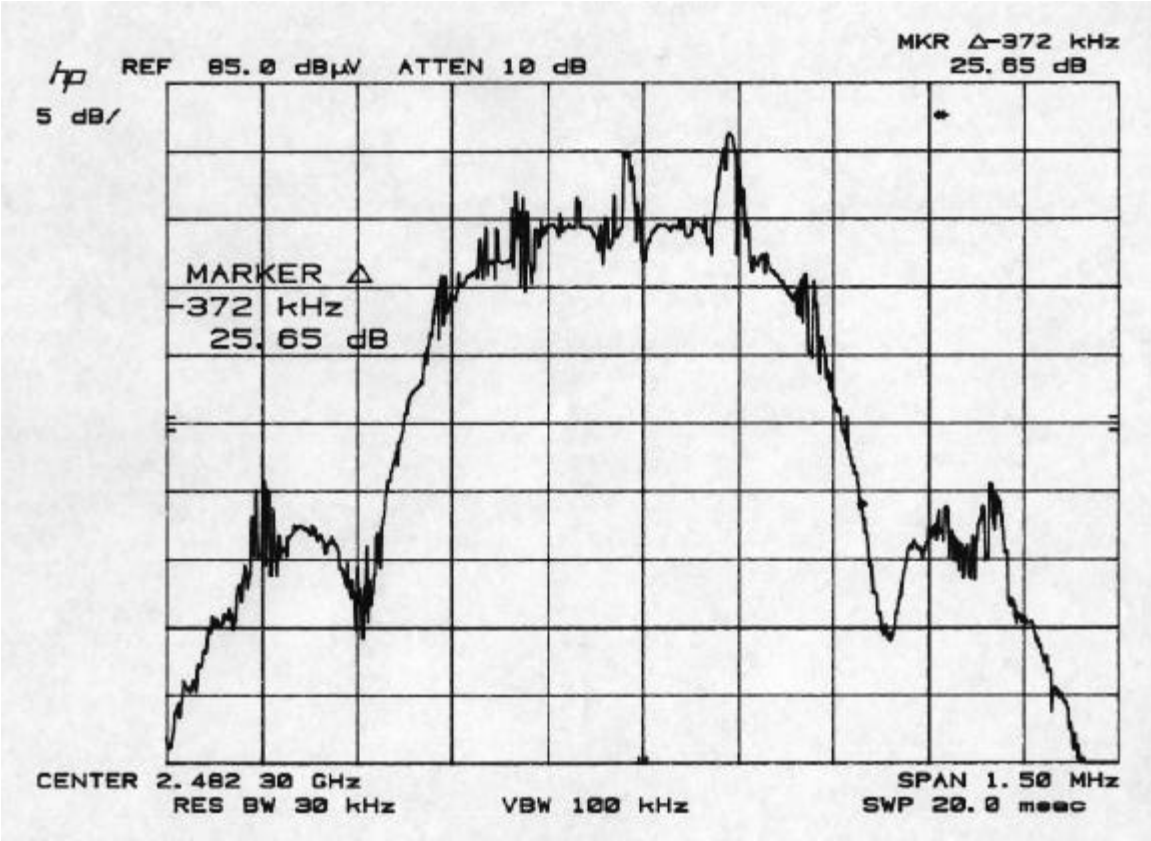
COMMENT #2: 20dB Bandwidth = 704 kHz

TEST ENGINEER:_____ **APPROVED BY**: _____
John O'Brien Jeffrey Lenk

20 dB Bandedge Data Sheet

Siemens Business Communication Systems
Gigaset 2400HS Handset

SERIAL #: Pilot Run 1, SN 02 PROJECT #: 99-016
DATE: September 29, 1998



COMMENT #1: Channel Setting = 94

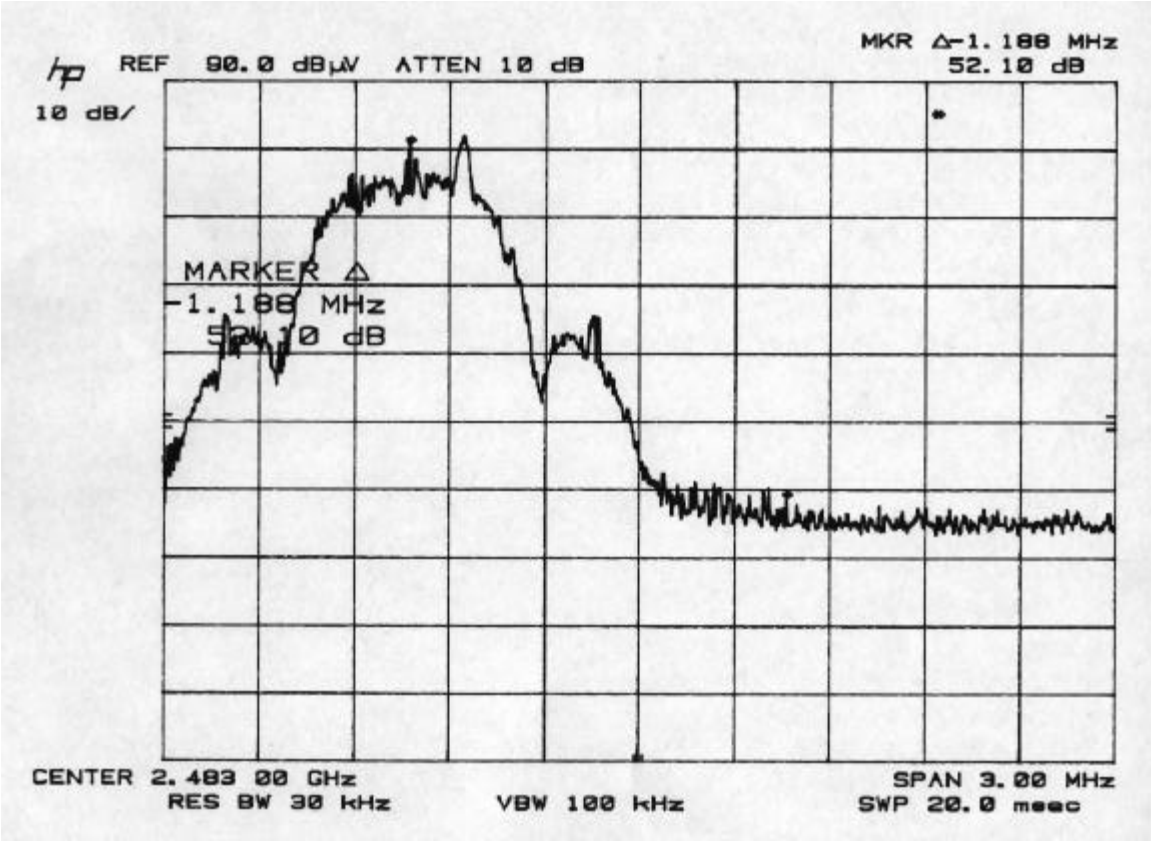
COMMENT #2: Bandedge Attenuation = 25.6 dB

TEST ENGINEER:_____ **APPROVED BY**: _____
John O'Brien Jeffrey Lenk

Restricted Band (Peak) Data Sheet

Siemens Business Communication Systems
Gigaset 2400HS Handset

SERIAL #: Pilot Run 1, SN 02 PROJECT #: 99-016
DATE: September 29, 1998 POLARIZATION: Vertical



COMMENT #1: Channel Setting = 94

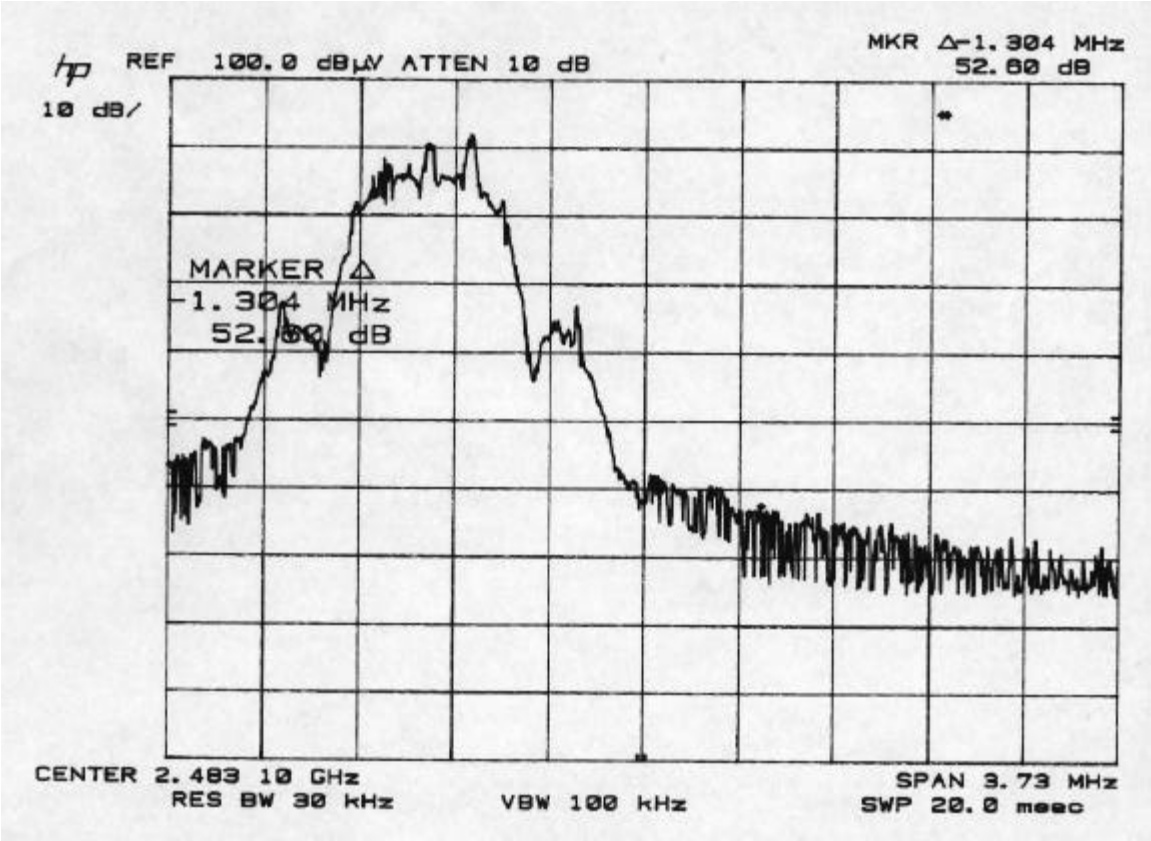
COMMENT #2: Peak to Restricted Bandedge Attenuation = 52.1 dB

TEST ENGINEER:_____ **APPROVED BY**: _____
John O'Brien Jeffrey Lenk

Restricted Band (Peak) Data Sheet

Siemens Business Communication Systems
Gigaset 2400HS Handset

SERIAL #: Pilot Run 1, SN 02 PROJECT #: 99-016
DATE: September 29, 1998 POLARIZATION: Horizontal



COMMENT #1: Channel Setting = 94

COMMENT #2: Peak to Restricted Bandedge Attenuation = 52.6 dB

TEST ENGINEER:_____ **APPROVED BY**: _____
John O'Brien Jeffrey Lenk

Radiated Data Sheet

Siemens Business Communication Systems
Gigaset 2400HS Handset

SERIAL #: Pilot Run 1, SN 02
DATE: Septmber 29, 1998
PROJECT #: 99-016

MEASUREMENT DISTANCE (m): 1
MEASUREMENT HEIGHT: 1 meter

RESTRICTED BAND TEST (Average)

Freq. (MHz)	Notes and Polarization	Recorded Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.5	(1) Vertical	33.6	26.8	1.6	62.0	64.0	-2.0
2483.5	(1) Horizontal	34.7	26.8	1.6	63.1	64.0	-0.9

Corrected Level = Recorded Level + Antenna Factor + Cable Loss

RESTRICTED BAND TEST (Peak)

(1) Attenuation Required:

124.3 dBµV/m - 84dBµV/m = 40.3 dB

(2) Attenuation Measured:

Vertical = 52.1 dB = 12.1dB under the limit

Horizontal = 52.6 dB = 12.3 dB under the limit

COMMENT (1): Average measurements

COMMENT (2):

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