

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT
OF**

2.4GHz Digital Frequency Hopping Cordless Phone

MODEL No.: EP-236

BRAND NAME: SENAO

FCC ID: NI3-EP-236

REPORT NO: 020033-RF-ID

ISSUE DATE: September 20, 2002

Prepared for
**SENAO INTERNATIONAL CO., LTD.
2F, NO. 531, CHUNG CHENG RD.,
HSIN-TIEN City, Taipei Hsien, 231 Taiwan, R. O. C.**



Prepared by
**C&C LABORATORY, CO., LTD.
#B1, 1st Fl., Universal Center,
No. 183, Sec. 1, Tatung Rd., Hsi Chih,
Taipei Hsien, Taiwan, R.O.C.
TEL: (02)8642-2071~3
FAX: (02) 8642-2256**



VERIFICATION OF COMPLIANCE

Applicant: **SENAO INTERNATIONAL CO., LTD.**
2F, NO. 531, CHUNG CHENG RD.,
HSIN-TIEN City, Taipei Hsien, 231 Taiwan, R. O. C.

Equipment Under Test: 2.4GHz Digital Frequency Hopping Cordless Phone

BRAND NAME: SENAO

MODEL No.: EP-236

Serial Number: N/A

File Number: 020033-RF-ID

Date of test: July 22 ~ Sep. 18, 2002

We hereby certify that:

The above equipment was tested by C&C Laboratory Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (1992) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.

The test results of this report relate only to the tested sample identified in this report.

Approved By

A handwritten signature in black ink that reads 'Steven Wang'.

Steven Wang / RF Dept. Manager
C&C Laboratory Co., Ltd



Table of Contents

1. GENERAL INFORMATION5
1.1 Product Description5
1.2 Related Submittal(s) / Grant (s)5
1.3 Test Methodology5
1.4 Test Facility5
1.5 Special Accessories6
1.6 Equipment Modifications6
2. SYSTEM TEST CONFIGURATION7
2.1 EUT Configuration7
2.2 EUT Exercise7
2.3 Test Procedure7
2.4 Configuration of Tested System8
3. SUMMARY OF TEST RESULTS10
4. DESCRIPTION OF TEST MODES10
5. CONDUCTED EMISSION TEST11
5.1 Standard Applicable11
5.2 EUT Setup11
5.3 Measurement Procedure11
5.4 Measurement Equipment Used:11
5.5 Measurement Result11
6. OUTPUT POWER MEASUREMENT24
6.1 Standard Applicable24
6.2 Measurement Procedure24
6.3 Measurement Result25
6.4 Measurement Equipment Used:26
7. 20dB BAND WIDTH27
7.1 Standard Applicable27
7.2 Measurement Procedure27
7.3 Measurement Result27
7.4 Measurement Equipment Used:27
8. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT34
8.1 Standard Applicable34
8.2 Measurement Procedure34
8.3 Measurement Result34
8.4 Measurement Equipment Used:34



9. SPURIOUS RADIATED EMISSION TEST39

9.1 Standard Applicable 39

9.2 EUT Setup..... 39

9.3 Measurement Procedure..... 39

9.4 Test SET-UP (Block Diagram of Configuration) 40

9.5 Measurement Equipment Used: 41

9.6 Field Strength Calculation 41

9.7 Measurement Result (below 1GHz)..... 41

10 FREQUENCY SEPARATION260

10.1 Standard Applicable260

10.2 Measurement Procedure.....260

10.3 Measurement Result.....260

10.4 Measurement Equipment Used:260

11 NUMBER OF HOPPING FREQUENCY263

11.1 Standard Applicable263

11.2 Measurement Procedure.....263

11.3 Measurement Result.....263

11.4 Measurement Equipment Used:263

12 TIME OF OCCUPANCY (DWELL TIME)266

12.1 Standard Applicable266

12.2 Measurement Procedure.....266

12.3 Measurement Result.....266

12.4 Measurement Equipment Used:266

13 ANTENNA REQUIREMENT273

13.1 Standard Applicable273

13.2 Antenna Connected Construction273

14 SAR Measurement274

14.1 Standard Applicable274



1. GENERAL INFORMATION

1.1 Product Description

The SENA INTERNATIONAL CO., LTD. Model: EP-236 (referred to as the EUT in this report) is a 2.4GHz Digital Frequency Hopping Cordless Phone System which including handset and base .

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 2401 – 2480MHz; 92 channels
- B). Modulation type: GFSK
- C) Spread Spectrum :Frequency Hopping Spread Spectrum (FHSS)
- D). Antenna Designation:
 - Handset: Non-User Replaceable (Fixed)
 - Base: One integral Antenna and 5 external Antenna.
 - Antenna Gain see Page 295
- E) Rated Output Power:
 - Handset, BASE: Peak Power 28 dBm (8% duty cycle)
 - Average Power 18 dBm
- E). Power Supply:
 - Handset: 3.6Vdc by battery, an AC/DC Power Adaptor provided.
 - Base: An AC/DC Power Adapter rated 120Vac, 60Hz, 0.18A, 12Vdc 800mA
- F). Receiver type : Super heterodyne

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: NI3-EP-236 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (1992). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of C&C Laboratory, Co., Ltd. No. 81-1, 210 Lane, Pa-de 2nd Road, Lu-Chu Hsiang, Taoyuan, Taiwan, R.O.C.. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 1992 and CISPR 22/EN 55022 requirements.



1.5 Special Accessories

Not available for this EUT intended for grant.

1.6 Equipment Modifications

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter and Receiver) was operated in the engineering mode to fix the Tx and Rx frequency which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on a table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-1992. Conducted emissions from the EUT measured in the **frequency range between 0.15 MHz and 30MHz** using **CISPR Quasi-Peak and Average detector mode**.

2.3.2 Radiated Emissions

The EUT is a placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-1992.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

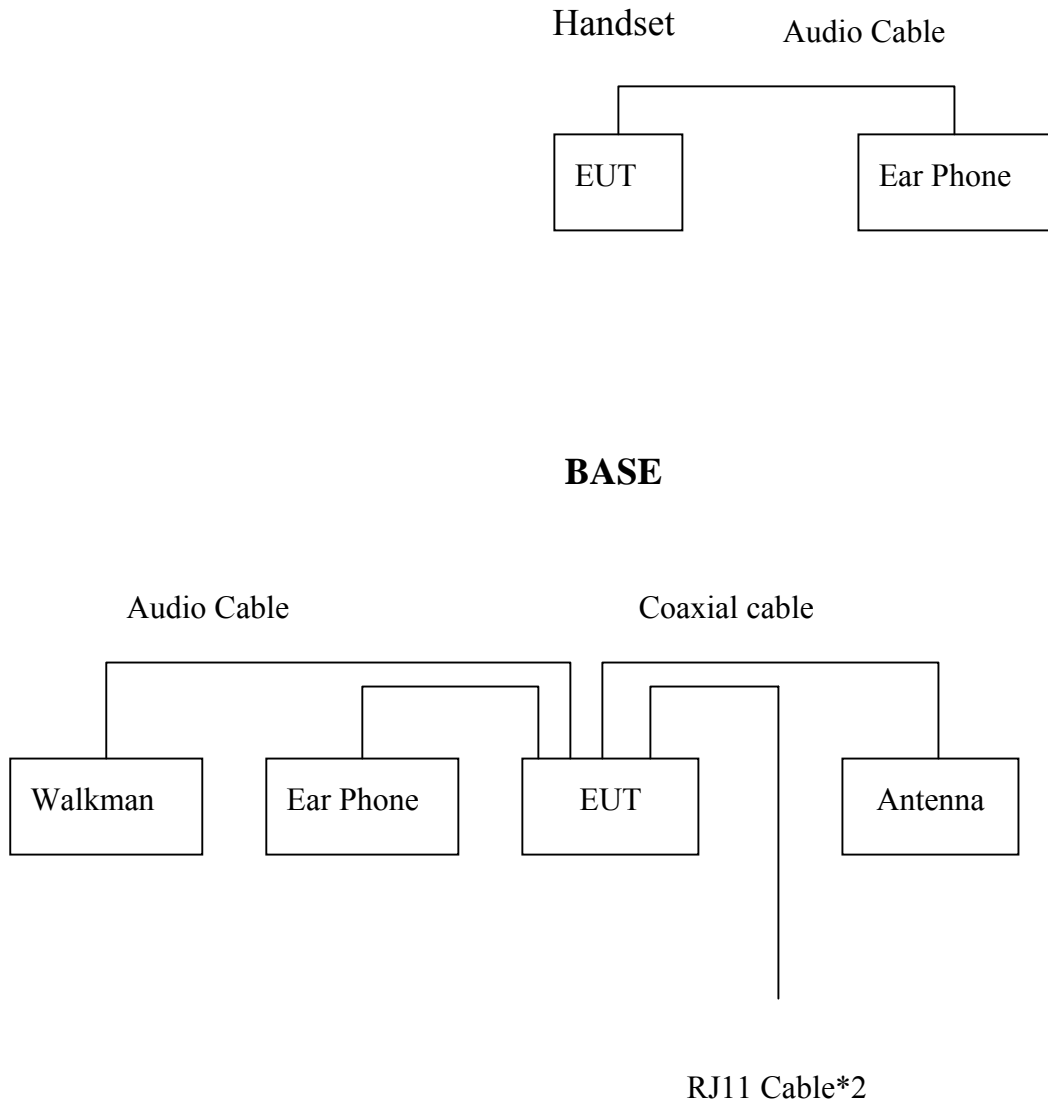


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1	Handset	SENAO	EP-236	NI3-EP-236	N/A	EUT
2	Base	SENAO	EP-236	NI3-EP-236	N/A	EUT
3	Walkman	Panasonic	RQ-L10	FCC DoC	HB004469	
4	Ear phone	GITON	GT-2004V	N/A	N/A	
5	Antenna	See page 336	See page 336	N/A	N/A	EUT

Table 2-2 Information of Interface Cable

Item	I/O Cable	Device Connected	Shielded Type	Ferrite Core	Detachable/ Permanently	Length	Note
C-1	Audio Cable	Handset-Ear Phone	No	No	Detachable	180cm	
C-2	Coaxial cable	BASE-Antenna	Yes	No	Part of Printer, Detachable	150cm	
C-3	RJ11 Cable	BASE	No	No	Detachable	200cm	

Note:

- (1) Unless otherwise marked as in 「Remark」 column, Neutron consigns the support equipment to the tested system.
- (2) For detachable type I/O cable should be specified the length in cm in 「Length」 column.

3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	Conducted Emission	Compliant
§15.247(b)	Peak Output Power	Compliant
§15.247(a)(1)(ii)	20dB Bandwidth	Compliant
§15.247(c)	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.209(a) (f)	Spurious Emission	Compliant
§15.247(a)(1)	Frequency Separation	Compliant
§15.247(a)(1)(ii)	Number of hopping frequency	Compliant
§15.247(a)(1)(ii)	Time of Occupancy	Compliant
§15.203	Antenna Requirement	Compliant
§2.1093	SAR Testing	

4. DESCRIPTION OF TEST MODES

The EUT (Handset and Base) has been tested under Engineering test mode to control the EUT for staying in continuous transmitting and receiving mode is programmed.

There are 92 channels in total, Channel low (2401MHz), mid (2442MHz) and high (2480MHz) were chosen for testing.

5. CONDUCTED EMISSION TEST

5.1 Standard Applicable

According to §15.207 frequency within 150KHz to 30MHz shall not exceed 250microvolts(48dBuV).

5.2 EUT Setup

1. Fix the EUT on Channel Low, Mid, or High. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-1992.
2. External I/O cables were draped along the edge of the test table and bundle when necessary.
3. The EUT (Base) was connected with 110Vac/60Hz power source.

5.3 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

5.4 Measurement Equipment Used:

Conducted Emission Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NO.	SERIAL NO.	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCS30	847793/012	12/19/2001	12/18/2002
LISN	R&S	ESH2-Z5	843285/010	12/10/2001	12/09/2002
LISN	EMCO	3825/2	9003-1628	07/26/2002	07/25/2003
Spectrum Analyzer	ADVANTEST	R3261C	71720533	08/06/2002	08/05/2003
2X2 WIRE ISN	R&S	ENY22	100020	06/20/2002	06/19/2003
FOUR WIRE ISN	R&S	ENY41	100006	06/20/2002	06/19/2003

5.5 Measurement Result

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.



LINE CONDUCTED TEST (BASE)

Model Number: EP-236

Tested by: Joe Zhong

Test Mode: TX CH-Low

Detector Function: Quasi-Peak

Temperature: 25⁰C

Humidity: 65%RH

(The chart below shows the highest readings taken from the final data)

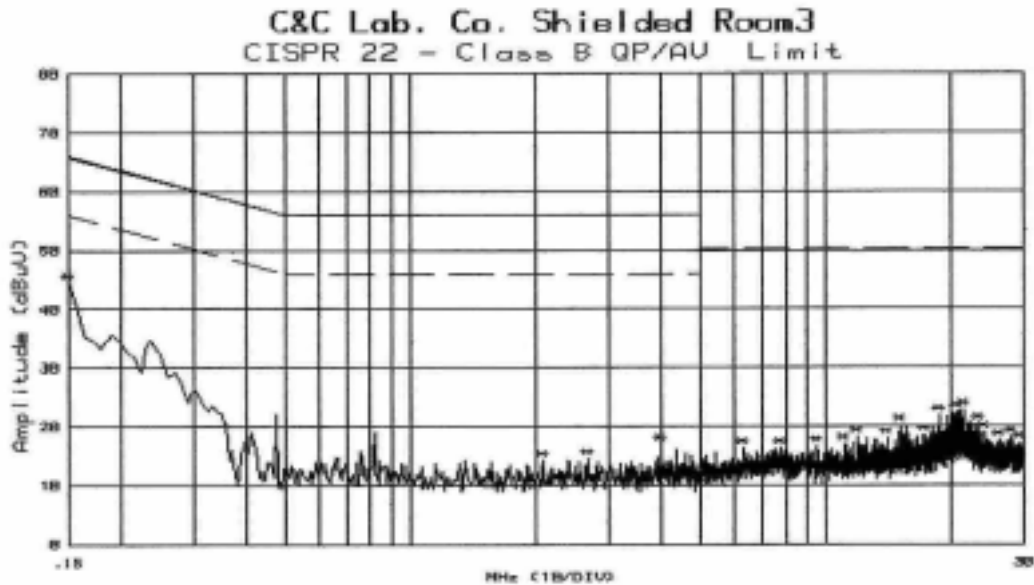
FREQ MHz	Q.P. Raw dBuV	AVG Raw dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.150	44.50	---	66.00	---	-21.50	---	L1
4.020	16.90	---	56.00	---	-39.10	---	L1
18.790	21.80	---	60.00	---	-38.20	---	L1
20.580	22.30	---	60.00	---	-37.70	---	L1
21.470	22.70	---	60.00	---	-37.30	---	L1
23.390	20.40	---	60.00	---	-39.60	---	L1
0.150	46.60	---	66.00	---	-19.40	---	L2
17.650	23.40	---	60.00	---	-36.60	---	L2
18.780	24.70	---	60.00	---	-35.30	---	L2
20.500	26.00	---	60.00	---	-34.00	---	L2
20.810	24.60	---	60.00	---	-35.40	---	L2
23.700	21.40	---	60.00	---	-38.60	---	L2

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

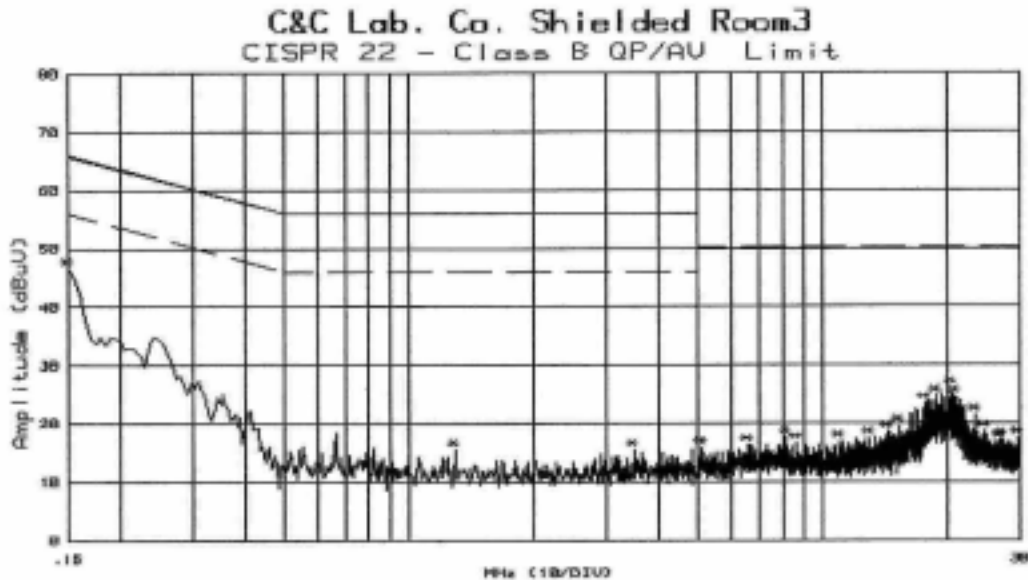
****NOTE: “---” denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.**



Conducted Emission Test Plot (BASE TX Low)



Customer:SENAO File#: 172 Date :23 Jul 2002 09:52:37
Model :EP-236 Humd.:55 (%) Temp. :27 (C)
Mode :BASE TX LOW Port :L1 Tested by:JOE
Reading :Peak(R&S Receiver)
Remark :FIELD SYSTEM



Customer:SENAO File#: 173 Date :23 Jul 2002 10:03:58
Model :EP-236 Humd.:55 (%) Temp. :27 (C)
Mode :BASE TX LOW Port :L2 Tested by:JOE
Reading :Peak(R&S Receiver)
Remark :FIELD SYSTEM

LINE CONDUCTED TEST (BASE)

Model Number: EP-236

Tested by: Joe Zhong

Test Mode: TX CH-Mid

Detector Function: Quasi-Peak

Temperature: 25⁰C

Humidity: 65%RH

(The chart below shows the highest readings taken from the final data)

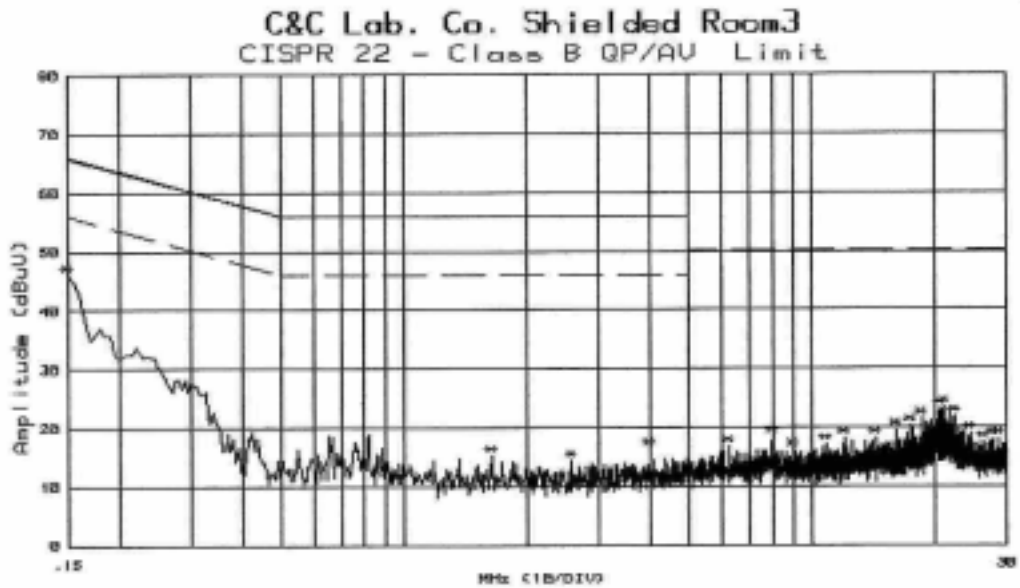
FREQ	Q.P.	AVG	Q.P.	AVG	Q.P.	AVG	NOTE
MHz	Raw dBuV	Raw dBuV	Limit dBuV	Limit dBuV	Margin dB	Margin dB	
0.150	46.40	---	66.00	---	-19.60	---	L1
17.700	22.50	---	60.00	---	-37.50	---	L1
19.150	25.10	---	60.00	---	-34.90	---	L1
19.270	25.50	---	60.00	---	-34.50	---	L1
21.460	24.80	---	60.00	---	-35.20	---	L1
22.410	20.70	---	60.00	---	-39.30	---	L1
0.150	46.00	---	66.00	---	-20.00	---	L2
4.000	16.50	---	56.00	---	-39.50	---	L2
18.600	21.50	---	60.00	---	-38.50	---	L2
20.540	23.10	---	60.00	---	-36.90	---	L2
21.170	23.40	---	60.00	---	-36.60	---	L2
22.460	21.80	---	60.00	---	-38.20	---	L2

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

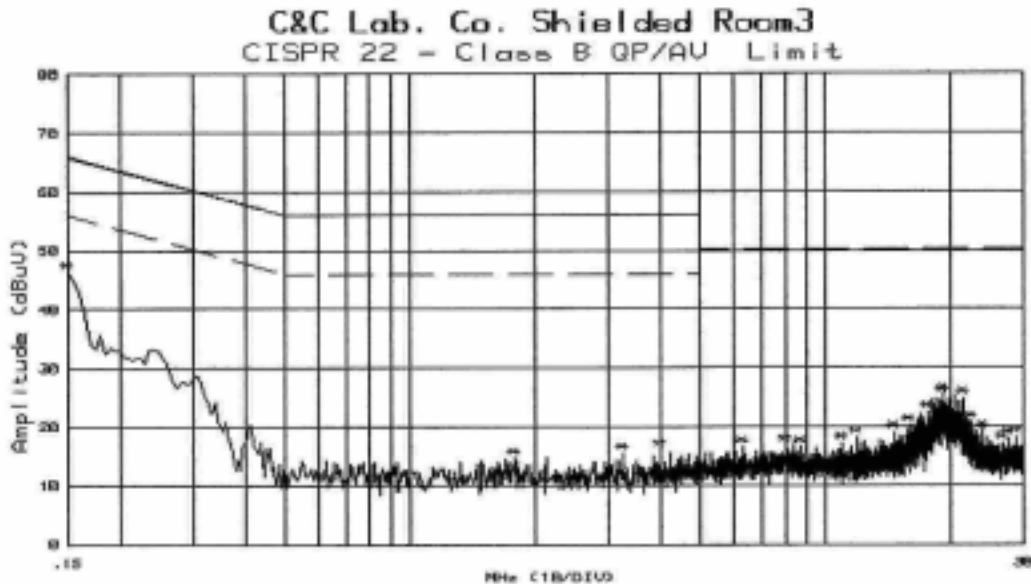
**NOTE: "---" denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.



Conducted Emission Test Plot (BASE TX Mid)



Customer: SENAO	File#: 175	Date :23 Jul 2002 10:27:37
Model :EP-236	Humd.:55 (%)	Temp.:27 (C)
Mode :BASE TX MIDDLE	Port :L1	Tested by:JOB
Reading :Peak(R&S Receiver)		
Remark :WIRE SYSTEM		



Customer: SENAO	File#: 174	Date :23 Jul 2002 10:15:31
Model :EP-236	Humd.:55 (%)	Temp.:27 (C)
Mode :BASE TX MIDDLE	Port :L2	Tested by:JOB
Reading :Peak(R&S Receiver)		
Remark :WIRE SYSTEM		

LINE CONDUCTED TEST (BASE)

Model Number: EP-236**Tested by:** Joe Zhong**Test Mode:** TX CH-High**Detector Function:** Quasi-Peak**Temperature:** 25⁰C**Humidity:** 65%RH

(The chart below shows the highest readings taken from the final data)

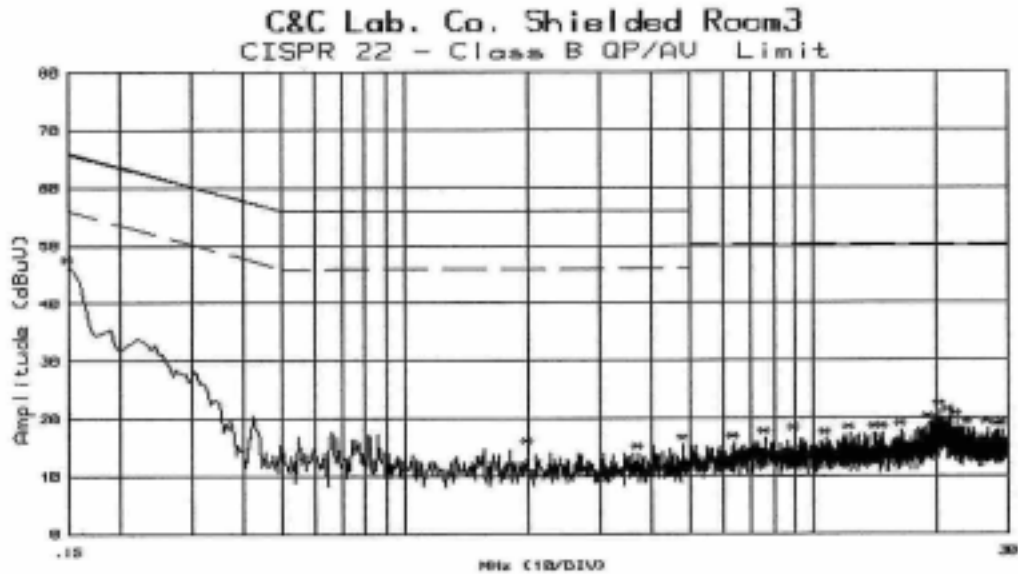
FREQ MHz	Q.P. Raw dBuV	AVG Raw dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.150	46.40	---	66.00	---	-19.60	---	L1
4.810	15.50	---	56.00	---	-40.50	---	L1
19.230	19.10	---	60.00	---	-40.90	---	L1
20.400	21.30	---	60.00	---	-38.70	---	L1
21.490	20.30	---	60.00	---	-39.70	---	L1
22.480	19.60	---	60.00	---	-40.40	---	L1
0.150	47.40	---	66.00	---	-18.60	---	L2
4.000	16.20	---	56.00	---	-39.80	---	L2
17.100	21.10	---	60.00	---	-38.90	---	L2
19.200	23.70	---	60.00	---	-36.30	---	L2
19.830	23.10	---	60.00	---	-36.90	---	L2
21.620	25.10	---	60.00	---	-34.90	---	L2

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

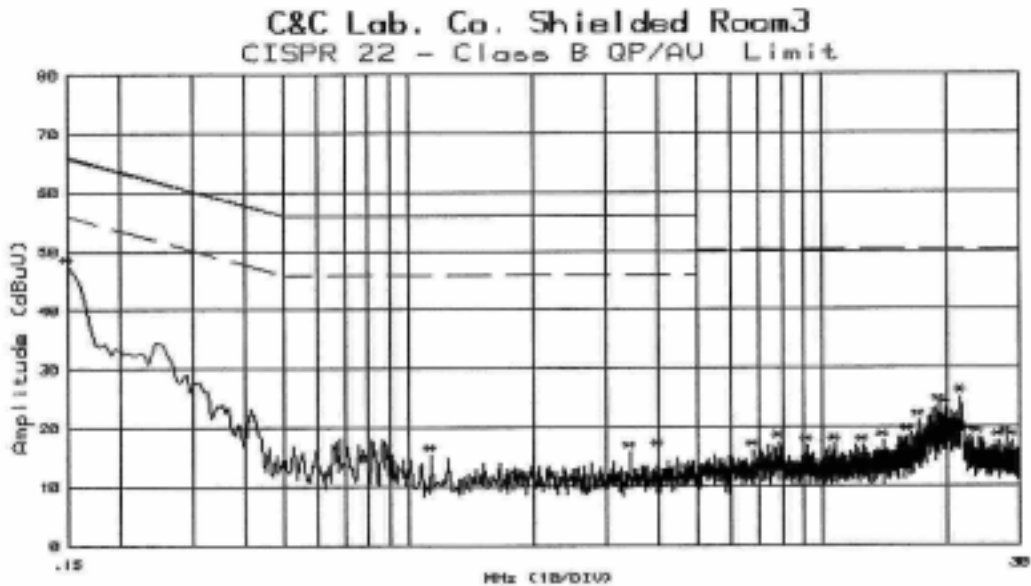
**NOTE: "---" denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.



Conducted Emission Test Plot(BASE TX High)



Customer:SENAO File#: 176 Date :23 Jul 2002 10:39:17
Model :EP-236 Humd.:55 (%) Temp. :27 (C)
Mode :BASE TX HIGH Port :L1 Tested by:JOE
Reading :Peak(R&S Receiver)
Remark :FULL SYSTEM



Customer:SENAO File#: 177 Date :23 Jul 2002 10:59:51
Model :EP-236 Humd.:55 (%) Temp. :27 (C)
Mode :BASE TX HIGH Port :L2 Tested by:JOE
Reading :Peak(R&S Receiver)
Remark :FULL SYSTEM

LINE CONDUCTED TEST (Handset)

Model Number: EP-236

Tested by: Joe Zhong

Test Mode: TX CH-Low

Detector Function: Quasi-Peak

Temperature: 25⁰C

Humidity: 65%RH

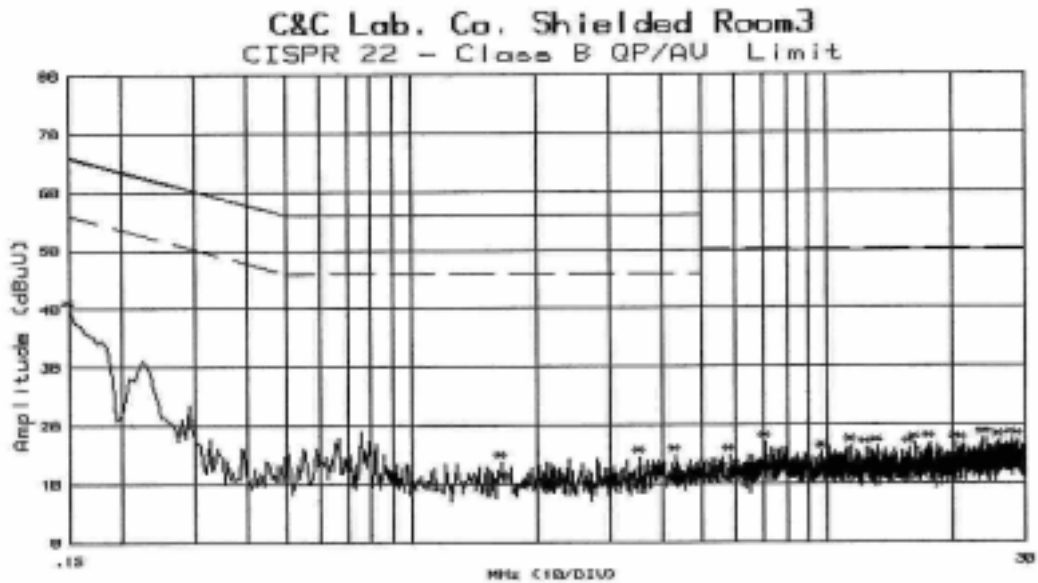
(The chart below shows the highest readings taken from the final data)

FREQ MHz	Q.P. Raw dBuV	AVG Raw dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.150	39.80	---	66.00	---	-26.20	---	L1
1.650	13.80	---	56.00	---	-42.20	---	L1
3.550	14.50	---	56.00	---	-41.50	---	L1
4.310	14.80	---	56.00	---	-41.20	---	L1
23.700	17.60	---	60.00	---	-42.40	---	L1
24.070	17.60	---	60.00	---	-42.40	---	L1
0.513	43.60	---	56.00	---	-12.40	---	L2
0.655	42.80	---	56.00	---	-13.20	---	L2
0.726	43.60	---	56.00	---	-12.40	---	L2
0.860	43.40	---	56.00	---	-12.60	---	L2
0.926	43.80	---	56.00	---	-12.20	---	L2
1.039	43.60	---	56.00	---	-12.40	---	L2

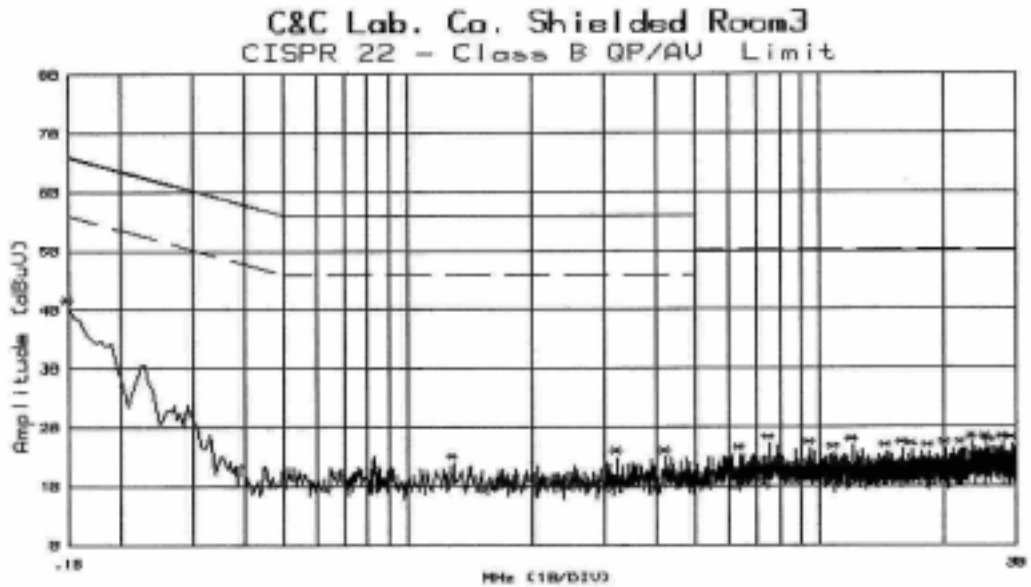
L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

****NOTE: “---” denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.**

Conducted Emission Test Plot (Handset TX Low)



Customer: SENAO File#: 185 Date :23 Jul 2002 13:48:30
Model : EP-236 Humd.:55 (%) Temp. :27 (C)
Mode : HAND TX LOW Port :L1 Tested by:JOE
Reading : Peak(R&S Receiver)
Remark : FULL SYSTEM



Customer: SENAO File#: 186 Date :23 Jul 2002 14:00:08
Model : EP-236 Humd.:55 (%) Temp. :27 (C)
Mode : HAND TX LOW Port :L2 Tested by:JOE
Reading : Peak(R&S Receiver)
Remark : FULL SYSTEM

LINE CONDUCTED TEST (Handset)

Model Number: EP-236

Tested by: Joe Zhong

Test Mode: TX CH-Mid

Detector Function: Quasi-Peak

Temperature: 25⁰C

Humidity: 65%RH

(The chart below shows the highest readings taken from the final data)

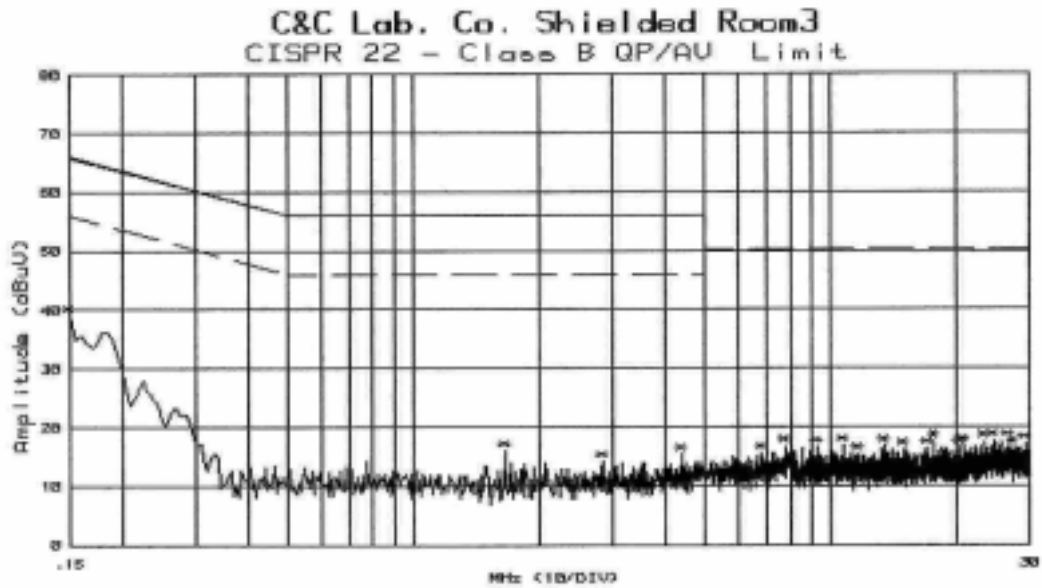
FREQ	Q.P.	AVG	Q.P.	AVG	Q.P.	AVG	NOTE
MHz	Raw dBuV	Raw dBuV	Limit dBuV	Limit dBuV	Margin dB	Margin dB	
0.150	39.00	---	66.00	---	-27.00	---	L1
1.660	16.00	---	56.00	---	-40.00	---	L1
2.850	14.10	---	56.00	---	-41.90	---	L1
4.420	15.40	---	56.00	---	-40.60	---	L1
24.500	17.60	---	60.00	---	-42.40	---	L1
26.780	17.70	---	60.00	---	-42.30	---	L1
0.150	37.90	---	66.00	---	-28.10	---	L2
2.050	14.30	---	56.00	---	-41.70	---	L2
3.500	13.90	---	56.00	---	-42.10	---	L2
9.040	18.40	---	60.00	---	-41.60	---	L2
24.180	18.10	---	60.00	---	-41.90	---	L2
27.690	18.20	---	60.00	---	-41.80	---	L2

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

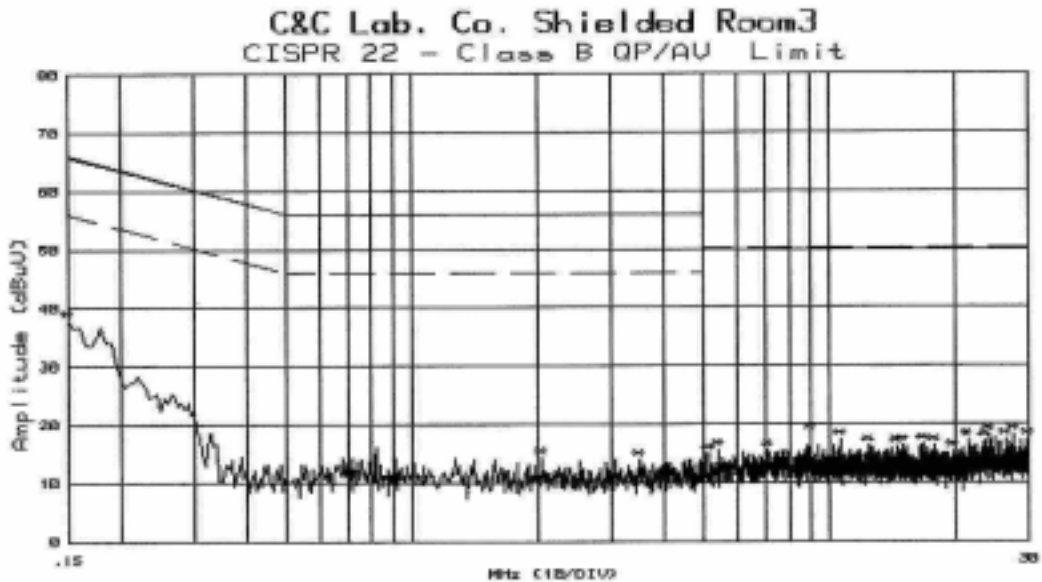
**NOTE: "---" denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.



Conducted Emission Test Plot (Handset TX Mid)



Customer: SENAO File#: 188 Date :23 Jul 2002 14:23:29
Model :EP-236 Humd.:55 (%) Temp. :27 (C)
Mode :HAND TX MIDDLE Port :L1 Tested by:JOE
Reading :Peak(R&S Receiver)
Remark :PHIL STSTRM



Customer: SENAO File#: 187 Date :23 Jul 2002 14:12:11
Model :EP-236 Humd.:55 (%) Temp. :27 (C)
Mode :HAND TX MIDDLE Port :L2 Tested by:JOE
Reading :Peak(R&S Receiver)
Remark :PHIL STSTRM

LINE CONDUCTED TEST(Handset)

Model Number: EP-236

Tested by: Joe Zhong

Test Mode: TX CH-High

Detector Function: Quasi-Peak

Temperature: 25⁰C

Humidity: 65%RH

(The chart below shows the highest readings taken from the final data)

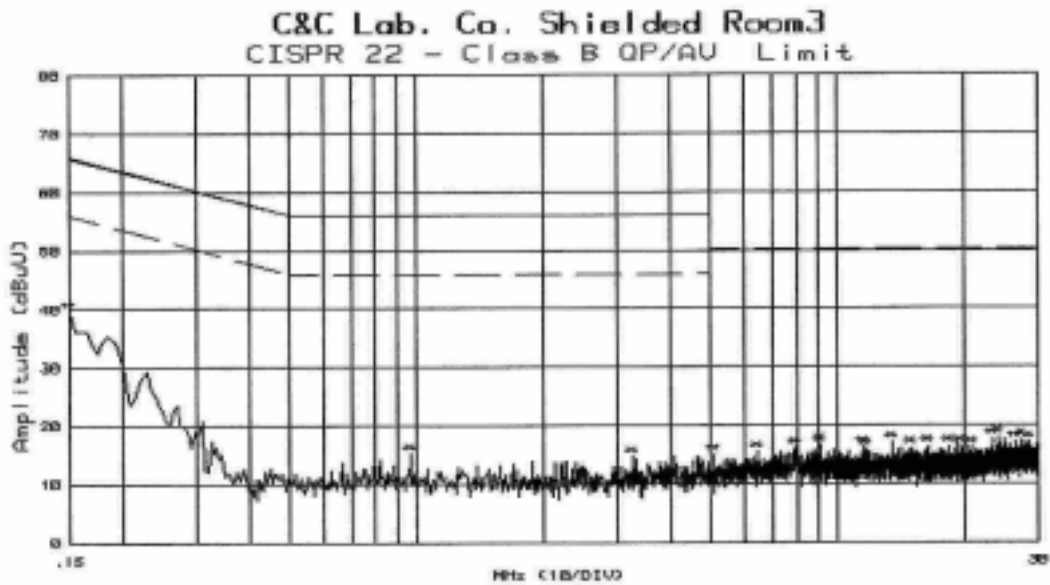
FREQ MHz	Q.P. Raw dBuV	AVG Raw dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.150	39.60	---	66.00	---	-26.40	---	L1
0.970	15.20	---	56.00	---	-40.80	---	L1
3.270	14.70	---	56.00	---	-41.30	---	L1
23.290	17.60	---	60.00	---	-42.40	---	L1
24.060	18.00	---	60.00	---	-42.00	---	L1
27.440	17.40	---	60.00	---	-42.60	---	L1
0.150	39.50	---	66.00	---	-26.50	---	L2
1.600	14.30	---	56.00	---	-41.70	---	L2
3.390	15.90	---	56.00	---	-40.10	---	L2
4.370	14.30	---	56.00	---	-41.70	---	L2
24.480	18.20	---	60.00	---	-41.80	---	L2
29.380	17.60	---	60.00	---	-42.40	---	L2

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

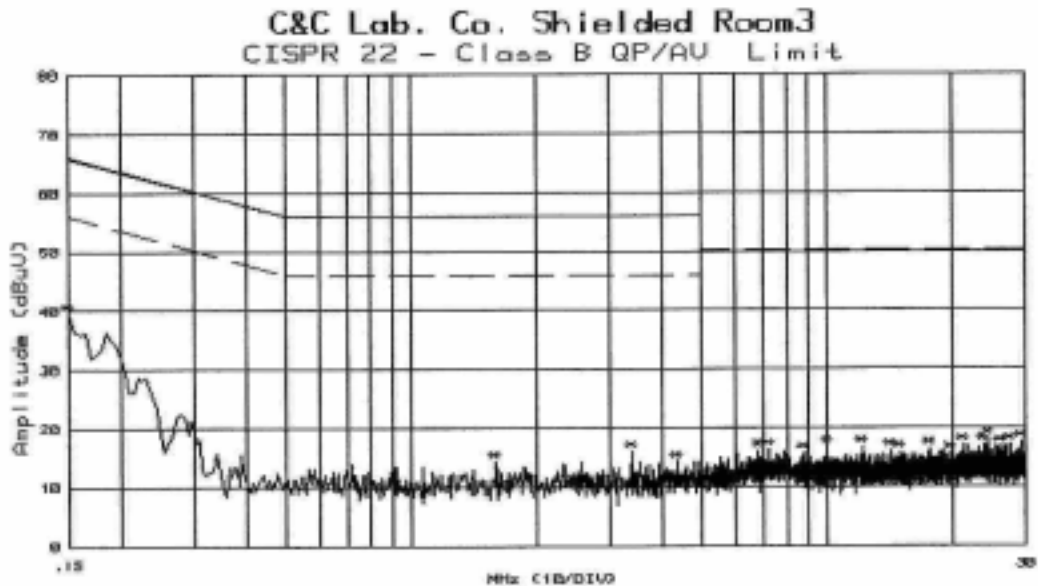
**NOTE: "---" denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.



Conducted Emission Test Plot (Handset TX High)



Customer:SENAO File#: 189 Date :23 Jul 2002 14:35:48
Model :EP-236 Humd.:55 (%) Temp. :27 (C)
Mode :HAND TX HIGH Port :L1 Tested by:JOE
Reading :Peak(R&S Receiver)
Remark :FULL SYSTEM



Customer:SENAO File#: 190 Date :23 Jul 2002 14:47:32
Model :EP-236 Humd.:55 (%) Temp. :27 (C)
Mode :HAND TX HIGH Port :L2 Tested by:JOE
Reading :Peak(R&S Receiver)
Remark :FULL SYSTEM



6. OUTPUT POWER MEASUREMENT

6.1 Standard Applicable

According to §15.247(b)(2), the maximum peak output power of the intentional radiator shall not exceed 1 Watt.

6.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum.
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

6.3 Measurement Result

Peak Output Power

	CH	Reading Power dBm	Cable Loss	Output Power dBm	Output Power W	Limit (W)	Result
BASE (Internal Antenna Port)	LOWER	27.50	0.00	27.50	0.56234	1	PASS
	MID	27.30	0.00	27.30	0.53703	1	PASS
	Upper	26.60	0.00	26.60	0.45709	1	PASS
BASE (External Antenna Port)	LOWER	27.80	0.00	27.80	0.60256	1	PASS
	MID	26.61	0.00	26.61	0.45814	1	PASS
	Upper	24.83	0.00	24.83	0.30409	1	PASS
HANDSET	LOWER	26.15	1.00	27.15	0.51880	1	PASS
	MID	26.7	1.00	27.70	0.58884	1	PASS
	HIGHER	26.74	1.00	27.74	0.59429	1	PASS

Average Output Power

	CH	Reading Power dBm	Cable Loss	Output Power dBm	Output Power W	Limit (W)	Result
BASE (Internal Antenna Port)	LOWER	17.90	0.00	17.90	0.06166	1	PASS
	MID	17.27	0.00	17.27	0.05333	1	PASS
	Upper	15.16	0.00	15.16	0.03281	1	PASS
BASE (External Antenna Port)	LOWER	16.66	0.00	16.66	0.04634	1	PASS
	MID	16.00	0.00	16.00	0.03981	1	PASS
	Upper	13.71	0.00	13.71	0.02350	1	PASS
HANDSET	LOWER	15.19	1.00	16.19	0.04159	1	PASS
	MID	15.9	1.00	16.90	0.04898	1	PASS
	HIGHER	16	1.00	17.00	0.05012	1	PASS

6.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Power Meter	HP	436A	2709A29027	03/16/2002	03/15/2003
Power Sensor	HP	8481A	2702A61366	03/16/2002	03/15/2003
low loss cable	Huber + Suhner	Sucoflex 104	N/A	N/A	N/A

7. 20dB BAND WIDTH

7.1 Standard Applicable

According to §15.247(a)(1)(ii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz and 5725MHz – 5850MHz bands. The Maximum 20dB bandwidth of the hopping channel is 1MHz.

7.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=30KHz(1 % of Bandwidth.), Span= 2MHz, Sweep=auto
4. Mark the peak frequency and –20dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

7.3 Measurement Result

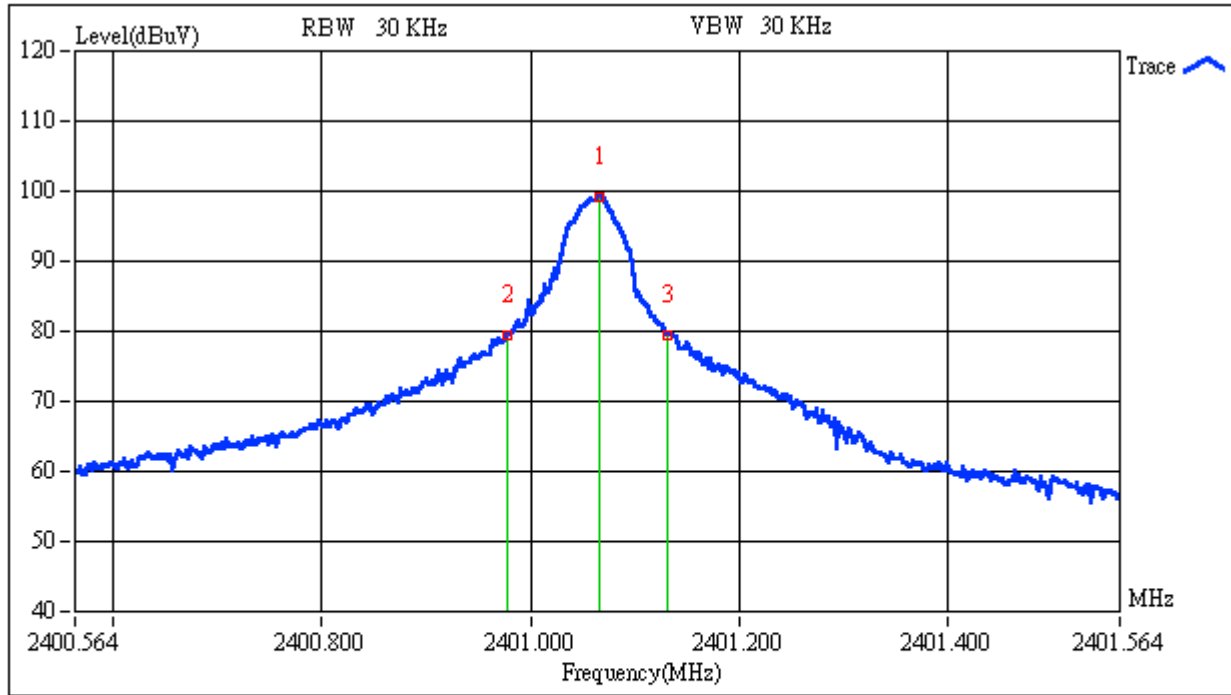
	CH	Bandwidth	Bandwidth Limit	Result
		(MHz)	(MHz)	
Headset	Lower	0.392	1	PASS
	Mid	0.404	1	PASS
	Higher	0.232	1	PASS
Base	Lower	0.154	1	PASS
	Mid	0.198	1	PASS
	Higher	0.159	1	PASS

7.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	ADVANTEST	R3271A	NA	10/15/2001	10/14/2002
low loss cable	Huber + Suhner	Sucoflex 104	N/A	N/A	N/A



20dB Band Width Test Data CH-Low (BASE)



Custom Name:

SENAO

Engineer:

JOE

Peak 2401.07 MHz

Band Width

99.28 dBuV

0.154 MHz

Model Name:

EP-236

Report No.:

020033-R

Delta1 2400.98 MHz

Delta2 2401.13 MHz

Test Mode:

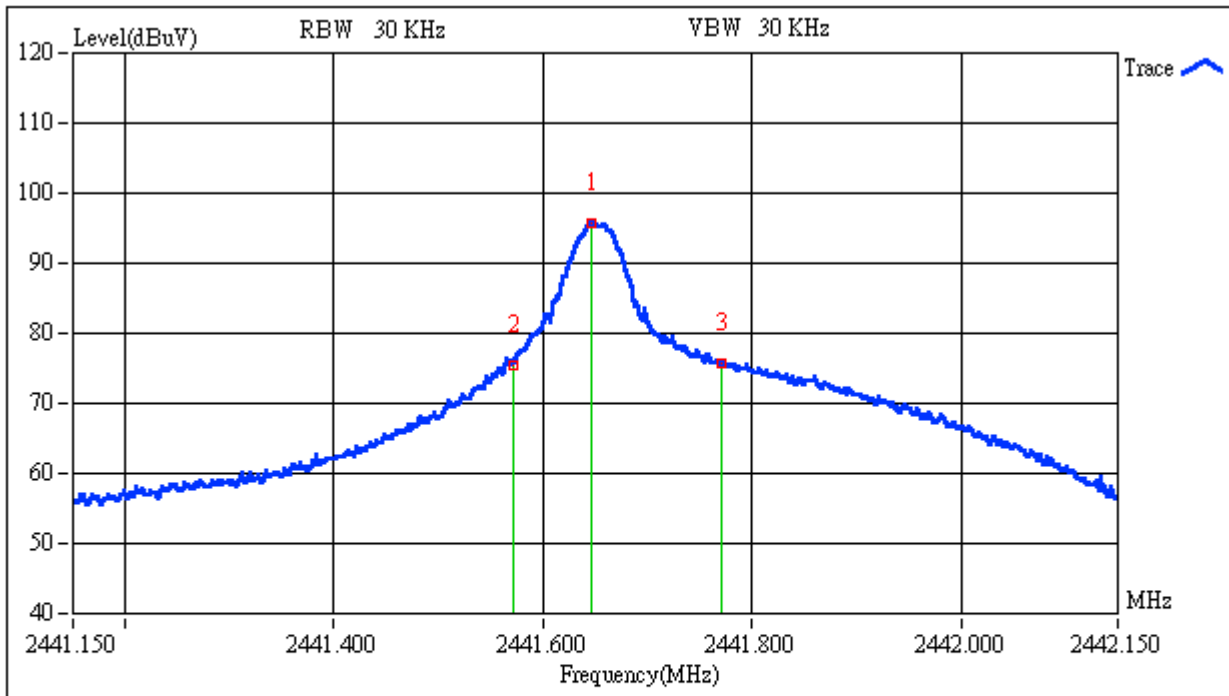
BASE LOW

79.42 dBuV

79.30 dBuV



20dB Band Width Test Data CH-Mid (BASE)

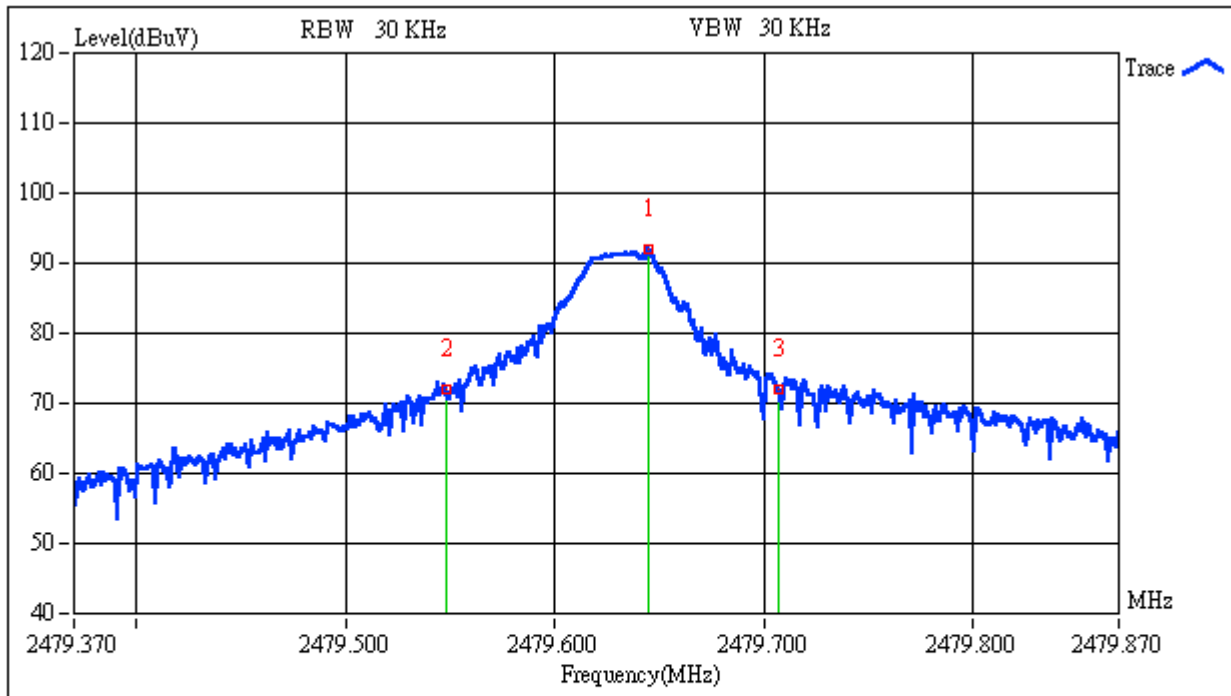


Custom Name:	Engineer:
<input type="text" value="SENAO"/>	<input type="text" value="JOE"/>
Model Name:	Report No.:
<input type="text" value="EP-236"/>	<input type="text" value="020033-R"/>
Test Mode:	
<input type="text" value="BASE MID"/>	

Peak	<input type="text" value="2441.65"/> MHz	Band Width	<input type="text" value="0.198"/> MHz
	<input type="text" value="95.71"/> dBuV		
Delta1	<input type="text" value="2441.57"/> MHz	Delta2	<input type="text" value="2441.77"/> MHz
	<input type="text" value="75.52"/> dBuV		<input type="text" value="75.66"/> dBuV



20dB Band Width Test Data CH-High (BASE)



Custom Name:

SENAO

Engineer:

JOE

Peak 2479.64 MHz

Band Width

91.86 dBuV

0.159 MHz

Model Name:

EP-236

Report No.:

020033-R

Delta1 2479.55 MHz

Delta2 2479.71 MHz

Test Mode:

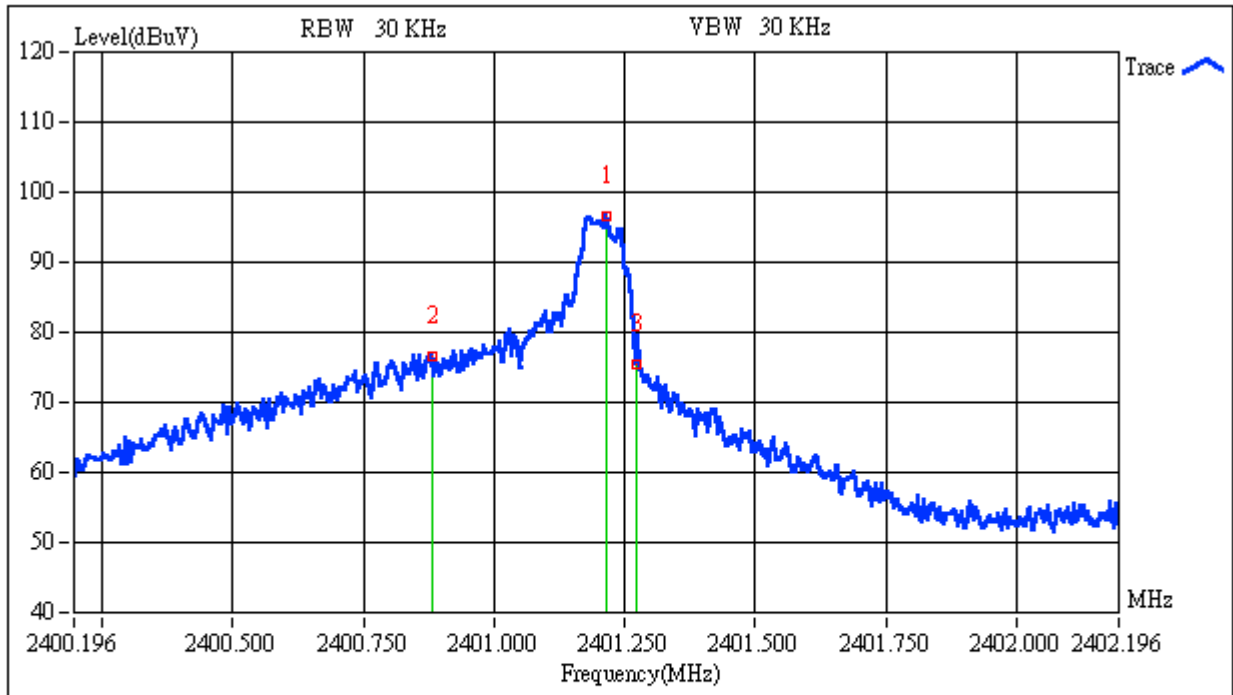
BASE HI

71.92 dBuV

71.89 dBuV



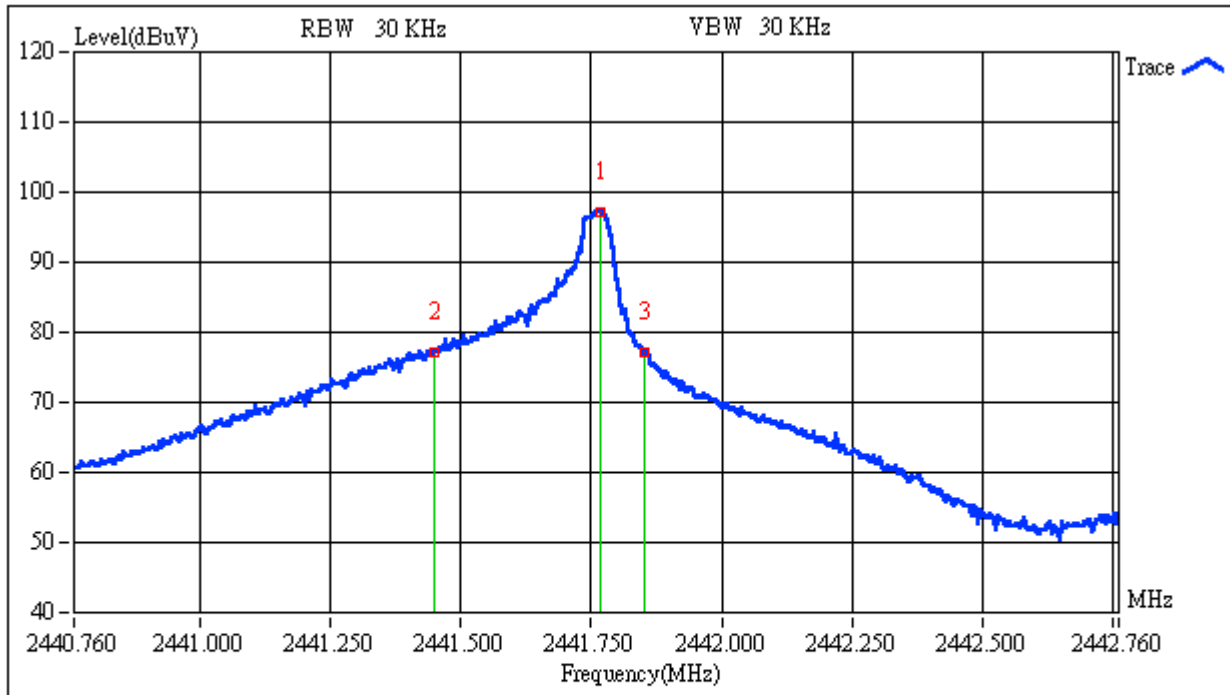
20dB Band Width Test Data CH-Low (HANDSET)



Custom Name:	Engineer:	Peak	Band Width
SENAO	JOE	2401.22 MHz	0.392 MHz
Model Name:	Report No.:	96.51 dBuV	
EP-236	020033-R	Delta1	Delta2
Test Mode:		2400.88 MHz	2401.27 MHz
HANDSET LO		76.51 dBuV	75.49 dBuV



20dB Band Width Test Data CH-Mid (HANDSET)



Custom Name:

SENAO

Engineer:

JOE

Peak 2441.77 MHz
97.28 dBuV

Band Width
0.404 MHz

Model Name:

EP-236

Report No.:

020033-R

Delta1 2441.45 MHz
77.28 dBuV

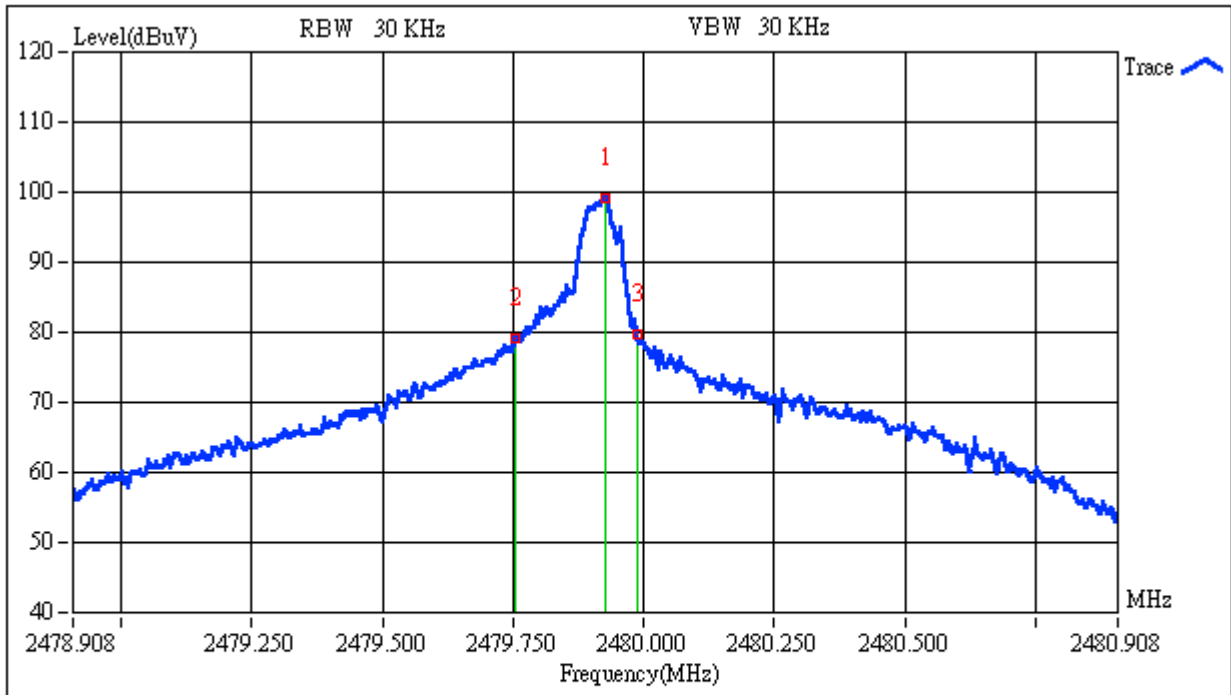
Delta2 2441.85 MHz
77.28 dBuV

Test Mode:

HANDSET MI



20dB Band Width Test Data CH-High (HANDSET)



Custom Name:	Engineer:	Peak	Band Width
SENAO	JOE	2479.93 MHz	0.232 MHz
Model Name:	Report No.:	99.18 dBuV	
EP-236	020033-R	Delta1	Delta2
Test Mode:		2479.76 MHz	2479.99 MHz
HANDSET HI		79.26 dBuV	79.58 dBuV

8. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

8.1 Standard Applicable

According to §15.247(c), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

8.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW,VBW=100KHz,Sweep = auto.
5. Mark Peak ,2.4GHz and 2.4835GHz and record the max. level.
6. Repeat above procedures until all frequency measured were complete.

8.3 Measurement Result

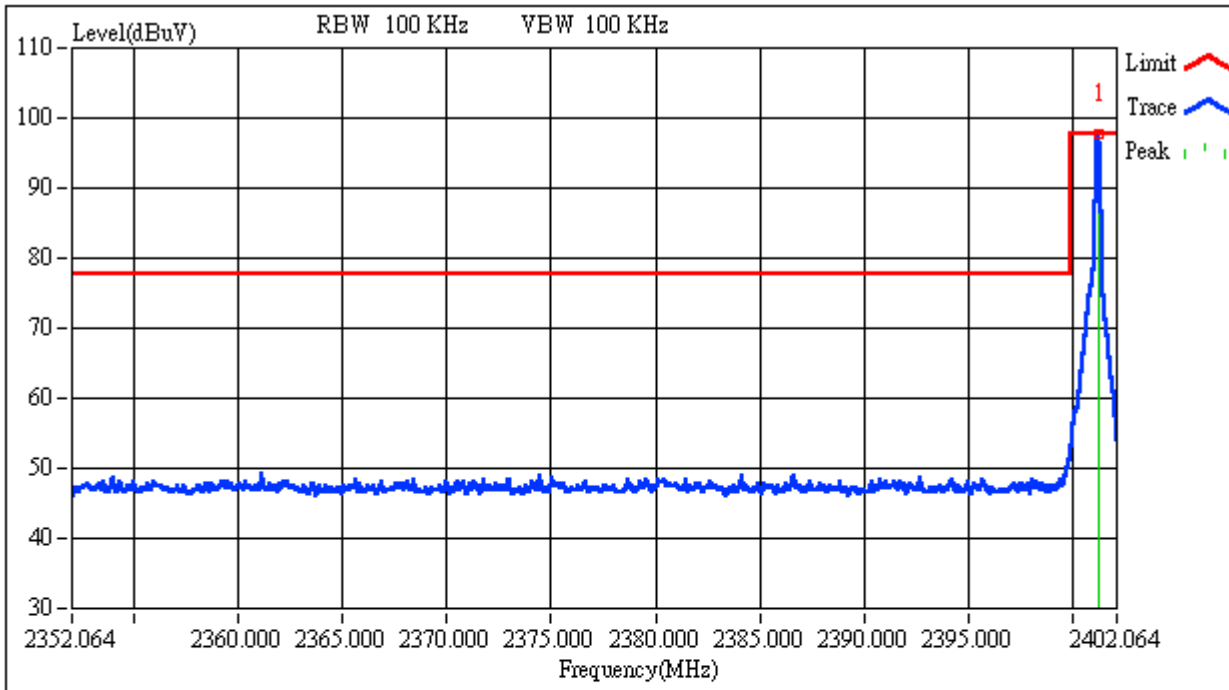
Refer to attach spectrum analyzer data chart.

8.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	ADVANTEST	R3271A	NA	10/15/2001	10/14/2002
low loss cable	Huber + Suhner	Sucoflex 104	N/A	N/A	N/A



Out of Band Test Data CH-Low (Base)



Custom Name:

SENAO

Engineer:

JOE

Model Name:

EP-236

Report No.:

020033-R

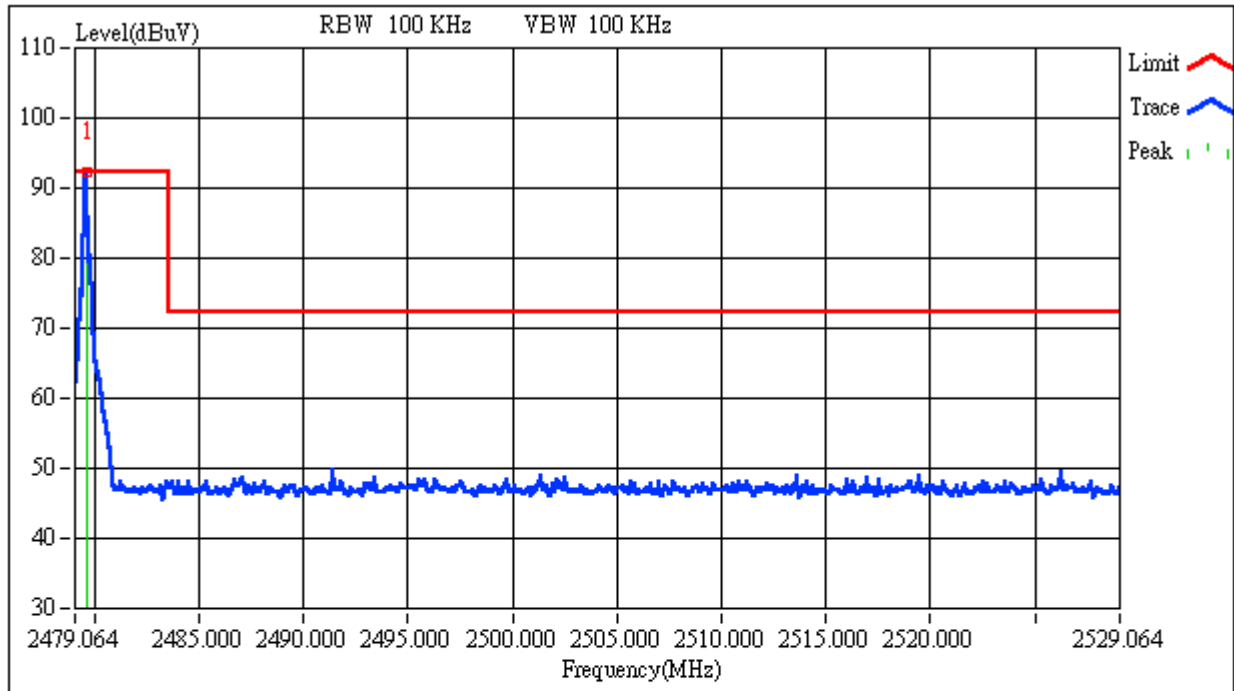
Test Mode:

BASE LOW

	Frequency(MHz)	Read Level (dBuV)	Probe (dB)	Cable Loss (dB)	Level(dBuV)
1	2401.1640	97.81	0.00	0.00	97.81



Out of Band Test Data CH-High (Base)

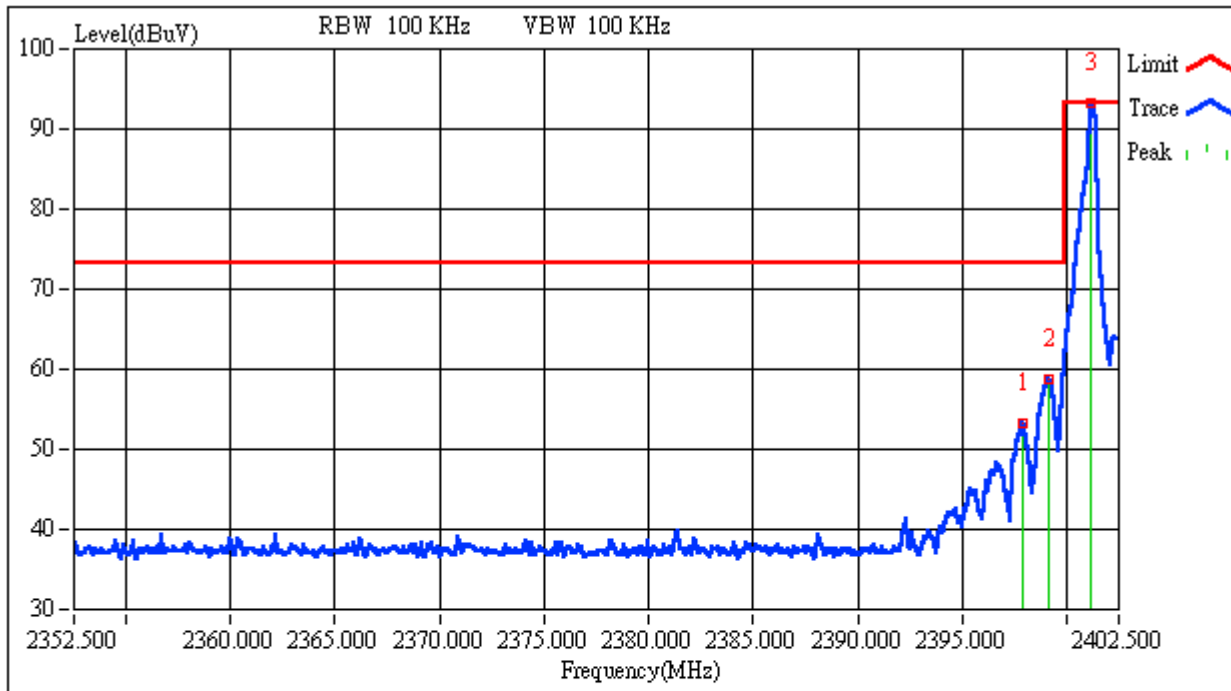


Custom Name:	Engineer:
<input type="text" value="SENAO"/>	<input type="text" value="JOE"/>
Model Name:	Report No.:
<input type="text" value="EP-236"/>	<input type="text" value="020033-R"/>
Test Mode:	
<input type="text" value="BASE HI"/>	

	Frequency(MHz)	Read Level (dBuV)	Probe (dB)	Cable Loss (dB)	Level(dBuV)
1	2479.6640	92.36	0.00	0.00	92.36



Out of Band Test Data CH-Low (Handset)

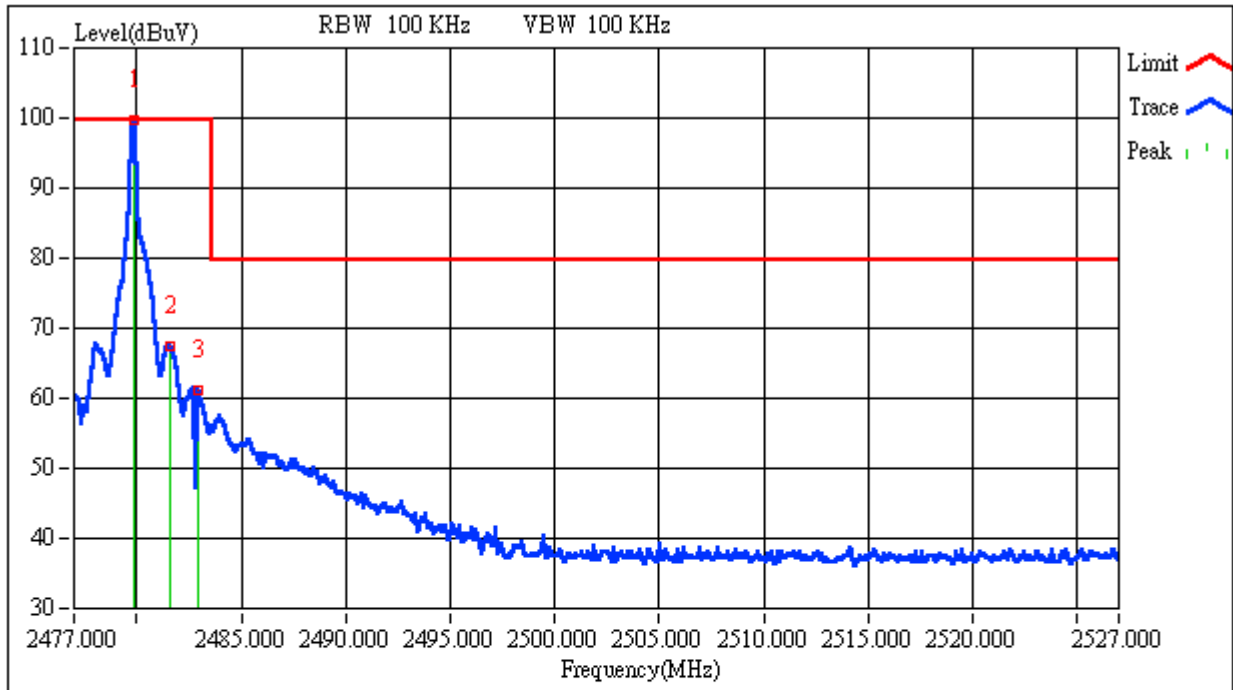


Custom Name:	Engineer:
<input type="text" value="SENAO"/>	<input type="text" value="JOE"/>
Model Name:	Report No.:
<input type="text" value="EP-236"/>	<input type="text" value="020033-R"/>
Test Mode:	
<input type="text" value="HANDSET CH-LO"/>	

	Frequency(MHz)	Read Level (dBuV)	Probe (dB)	Cable Loss (dB)	Level(dBuV)
1	2397.9000	53.30	0.00	0.00	53.30
2	2399.1000	58.73	0.00	0.00	58.73
3	2401.2000	93.26	0.00	0.00	93.26



Out of Band Test Data CH-High (Handset)



Custom Name:	Engineer:
<input type="text" value="SENAO"/>	<input type="text" value="JOE"/>
Model Name:	Report No.:
<input type="text" value="EP-236"/>	<input type="text" value="020033-R"/>
Test Mode:	
<input type="text" value="HANDSET CH-HI"/>	

	Frequency(MHz)	Read Level (dBuV)	Probe (dB)	Cable Loss (dB)	Level(dBuV)
1	2479.9000	99.85	0.00	0.00	99.85
2	2481.6000	67.32	0.00	0.00	67.32
3	2482.9000	61.16	0.00	0.00	61.16