



TEST REPORT FROM RADIO FREQUENCY INVESTIGATION LTD.

Test Of: Sendo Ltd.
SND251 Dual Band Mobile Telephone,
Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001
and FCC Part 24: 2001

Test Report Serial No:
RFI/MPTB1/RP43652JD04A

This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director: 	Checked By: 
Tested By: 	Release Version No: PDF01
Issue Date: 08 October 2002	Test Dates: 02 September to 12 September 2002

This report is issued in Adobe Acrobat portable document format (PDF). It is only a valid copy of the report if it is being viewed in PDF format with the following security options not allowed: Changing the document, Selecting text and graphics, Adding or changing notes and form fields. Furthermore, the date of creation must match the issue date stated above.
This report may be copied in full. The results in this report apply only to the sample(s) tested.

Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, ENGLAND. Tel: +44 (0) 1256 851193 Fax: +44 (0) 1256 851192	Registered in England, No. 211 7901. Registered Office: Ewhurst Park, Ramsdell, Basingstoke, Hampshire RG26 5RQ	
---	---	---

RADIO FREQUENCY INVESTIGATION LTD.

TEST REPORT

Conformance Testing Department

S.No: RFI/MPTB1/RP43652JD04A

Page 2 of 83

Issue Date: 08 October 2002

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

This page has been left intentionally blank.

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

Table of Contents

1. Client Information.....	4
2. Equipment Under Test (EUT).....	5
3. Test Specification, Methods And Procedures	9
4. Deviations From The Test Specification.....	12
5. Operation Of The EUT During Testing	13
6. Summary Of Test Results	15
7. Measurements, Examinations And Derived Results.....	17
8. Measurement Uncertainty	49
Appendix 1. Test Equipment Used.....	50
Appendix 2. Measurement Methods.....	53
Appendix 3. Test Configuration Drawings.....	63
Appendix 4. Graphical Test Results.....	67

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

1. Client Information

Company Name:	Sendo Ltd
Address:	Sendo Base Station Hatchford Way Birmingham B26 3RZ
Contact Name:	Mr M Roper

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

2. Equipment Under Test (EUT)

The following information has been supplied by the client:

2.1. Identification Of Equipment Under Test (EUT)

Brand Name:	Sendo
Model Name or Number:	S251
Unique Type Identification:	SND251
Serial Number:	As IMEI on samples IMEI: 001031010010076 IMEI: 0010310100100500
Country of Manufacture:	Czech Republic
FCC ID Number:	P6PSND251
Date of Receipt:	02 September 2002

Brand Name:	Sendo (refer to note 1)
Model Name or Number:	US Linear Charger 8D09-02302-20000
Unique Type Identification:	8D09-02302-20000
Serial Number:	As above, including 6 digit date code DD/MM/YY on product
Country of Manufacture:	China
FCC ID Number:	None stated by client
Date of Receipt:	02 September 2002

Brand Name:	Sendo (refer to note 1)
Model Name or Number:	Personal Hands Free Kit 8P02-02000-21000
Unique Type Identification:	8P02-02000-21000 (Sales Pack Part Number: 8M14-02000-20000)
Serial Number:	As above, including 6 digit date code DD/MM/YY on plastic bag
Country of Manufacture:	China
FCC ID Number:	None stated by client
Date of Receipt:	02 September 2002

2.2. Description Of EUT

The equipment under test is a SND251, a dual band GSM 850/1900 MHz mobile telephone. The phone supports speech and WAP and has a personal hands free head set. The product is supplied with a linear 115 V US charger.

2.3. Modifications Incorporated In EUT

The EUT has not been modified from what is described by the Model Name/Number and Unique Type Identification stated above.

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

2.4. Additional Information Related To Testing

Power Supply Requirement: (non-removable lithium ion battery)	3.5 V to 4.2 V (3.8 V nominal)
Power Supply Requirement: (AC Battery Charger)	115 V, 60 Hz AC Mains Charger
Intended Operating Environment:	Within GSM Network Coverage
Equipment Category:	PCE/TNE
Type of Unit:	Cordless Telephone (GSM System Mobile Phone)
Weight:	98g
Dimensions:	104 mm (L) x 48 mm (W) x 25 mm (D)
Interface Ports:	Headset (audio) DC In (Charger)
Transmit Frequency	Variable 1850 to 1910 MHz (PCS 1900 Band) 824 to 849 MHz (GSM 850 Band)
Receive Frequency	Variable 1930 to 1990 MHz (PCS 1900 Band) 869 to 894 MHz (GSM 850 Band)
Maximum Power Output	2 Watts Max

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

2.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	GSM Communication Test Set
Brand Name:	Will'Tek
Model Name or Number:	4202S
Serial Number:	0513018
FCC ID Number:	None Stated by Client
Cable Length And Type:	2m Mains Cable
Connected to Port:	AC Input

Description:	PSU
Brand Name:	Farnell
Model Name or Number:	E30-2BT
Serial Number:	000263
FCC ID Number:	None Stated by Client
Cable Length And Type:	1.5m 2 Core
Connected to Port:	Output Power Terminals

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

3. Test Specification, Methods And Procedures

3.1. Test Specifications

Reference:	FCC Part 24: 2001 Sections 24.232, 24.235, 24.238
Title:	Code of Federal Regulations, Part 24 (47CFR) Personal Communication Services.
Comments:	None.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

Reference:	FCC Part 22: 2001 Sections 22.355, 22.913, 22.197
Title:	Code of Federal Regulations, Part 22 (47CFR) Public Mobile Services.
Comments:	None.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

Reference:	FCC Part 15: 2001 Class B, Sections: 15.107 and 15.109
Title:	Code of Federal Regulations, Part 15 (47CFR) Radio Frequency Devices: Digital Devices.
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

Test Specifications (continued)

Reference:	FCC Part 2: 2001 Sections 2.1046 2.1049 2.1051 2.1055
Title:	Code of Federal Regulations, Part 2 (47CFR) Frequency allocations and radio treaty matters; General Rules and Regulations
Comments:	None.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

3.2. Methods And Procedures

The methods and procedures used were as detailed in:

47CFR: Part 24 (2001)

Title: Federal Communications Commission: Code of Federal Regulations 47:
Personal Communication Services.

47CFR: Part 22 (2001)

Title: Federal Communications Commission: Code of Federal Regulations 47:
Public Mobile Services.

47CFR: Part 15 (2001)

Title: Federal Communications Commission: Code of Federal Regulations 47:
Telecommunication

47CFR: Part 2 (2001)

Title: Federal Communications Commission: Code of Federal Regulations 47:
Telecommunication

ANSI C63.2 (1996)

Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2001)

Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1998)

Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)

Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1 (1999)

Title: Specification for radio disturbance and immunity measuring apparatus and methods. Part 1. Radio disturbance and immunity measuring apparatus.

3.3. Definition Of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the Methods & Procedures section above. Appendix 1 contains a list of the test equipment used.

RADIO FREQUENCY INVESTIGATION LTD.

TEST REPORT

Conformance Testing Department

S.No: RFI/MPTB1/RP43652JD04A

Page 12 of 83

Issue Date: 08 October 2002

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

4. Deviations From The Test Specification

None.

5. Operation Of The EUT During Testing

5.1. Operating Conditions

The EUT was tested in a normal laboratory environment.

5.2. Operating Modes

The EUT was tested in the following operating modes:

PCS 1900 and GSM 850 Transmitter Modes:

For carrier output power, occupied bandwidth, final transmitter radiated measurements, testing was performed at full power on top, middle and bottom channels of the assigned frequency block.

For frequency stability testing, measurements were performed at full power on the top and bottom channels of the assigned frequency block at -30 through +50 deg.C in 10 degree increments.

All transmitter radiated and conducted spurious pre-scan tests were performed at full power on the middle channel of the assigned frequency block. Final measurements were then performed on the Top, Middle and Bottom channels if an emission was identified.

This mode was tested in its worse case configuration, see note.

PCS 1900 and GSM 850 Receiver Modes:

Testing was performed with the call terminated and the phone was left in its receive mode.

This mode was tested in its worse case configuration, see note.

Note.

The EUT only had one interface port that serviced both the AC charger and the Hands Free kit making it impossible to operate both simultaneously. In light of this fact, Pre-scans were performed with the Hands Free kit fitted and then repeated with the 115 V AC battery charger fitted. The worse case configuration was deduced and final measurements were performed on this configuration in both modes of operation.

5.3. Configuration and Peripherals

The EUT was tested in the following configuration:

For all tests the EUT was connected to a GSM test set either by direct connection or via an air link.

The EUT was configured with the AC charger supplied by a 115 V 60Hz AC supply and also configured with the personal hands free kit for both the transmitter and receiver testing.

NB Section 2 of this report contains a full list of support equipment used and Appendix 3 contains a schematic diagram of the test configuration.

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

6. Summary Of Test Results

6.1. Transmit Mode

Range Of Measurements	Specification Reference	Mode of Operation	Port Type	Compliance Status
Conducted RF Output Power (PCS 1900 Mode)	Part 24 of CFR 47: 2001, Section 2.1046(a)	Transmit	Antenna Terminals	Complied
Conducted RF Output Power (GSM 850 Mode)	Part 22 of CFR 47: 2001, Section 2.1046(a)	Transmit	Antenna Terminals	Complied
Carrier Output Power (EIRP)	Part 24 of CFR 47: 2001, Section 24.232(b)	Transmit	Antenna	Complied
Carrier Output Power (ERP)	Part 22 of CFR 47: 2001, Section 22.913(a)	Transmit	Antenna	Complied
Frequency Stability (Temperature Variation)	Part 24 of CFR 47: 2001, Section 2.1055/24.235	Transmit	Antenna Terminals	Complied
Frequency Stability (Voltage Variation)	Part 24 of CFR 47: 2001, Section 2.1055/24.235	Transmit	Antenna Terminals	Complied
Frequency Stability (Temperature Variation)	Part 22 of CFR 47: 2001, Section 2.1055/22.355	Transmit	Antenna Terminals	Complied
Frequency Stability (Voltage Variation)	Part 22 of CFR 47: 2001, Section 2.1055/22.355	Transmit	Antenna Terminals	Complied
Occupied Bandwidth	Part 24 of CFR 47: 2001, Section 2.1049 (i)	Transmit	Antenna Terminals	Complied
Occupied Bandwidth	Part 22 of CFR 47: 2001, Section 2.1049 (i)	Transmit	Antenna Terminals	Complied
Emissions at Band Edges	Part 24 of CFR 47: 2001, Section 24.238	Transmit	Antenna Terminals	Complied
Emissions at Band Edges	Part 22 of CFR 47: 2001, Section 22.917	Transmit	Antenna Terminals	Complied
Emissions at Band Edges (PCS 1900 Mode)	Part 2 of CFR 47: 2001, Section 2.1053	Transmit	Antenna	Complied
Emissions at Band Edges (GSM 850 Mode)	Part 2 of CFR 47: 2001, Section 2.1053	Transmit	Antenna	Complied
Emissions at Base Frequency Range	Part 22 of CFR 47: 2001, Section 22.917 (e)	Transmit	Antenna	Complied
Emissions Outside of Authorised Frequency Block	Part 24 of CFR 47: 2001, Section 2.1051/24.238	Transmit	Antenna Terminals	Complied

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

Transmit Mode (continued)

Range Of Measurements	Specification Reference	Mode of Operation	Port Type	Compliance Status
Out of Band Emissions	Part 22 of CFR 47: 2001, Section 2.1051/22.917	Transmit	Antenna Terminals	Complied
Electric Field Strength, Spurious Emissions (30 MHz to 1000 MHz)	Part 2 of CFR 47: 2001, Section 2.1053/22.917/24.238	Transmit	Antenna	Complied
Electric Field Strength, Spurious Emissions (1 GHz to 20.0 GHz)	Part 2 of CFR 47: 2001, Section 2.1053/22.917/24.238	Transmit	Antenna	Complied
Conducted Emissions (450 kHz to 30 MHz)	Part 15 of CFR 47: 2001, Section 15.107	Transmit	AC Mains Input	Complied

6.2. Receive Mode

Range Of Measurements	Specification Reference	Mode of Operation	Port Type	Compliance Status
Electric Field Strength, Radiated Emissions (30 MHz to 1000 MHz)	Part 15 of CFR 47: 2001, Section 15.109	Receive	Enclosure	Complied
Electric Field Strength, Spurious Emissions (1 GHz to 10.0 GHz)	Part 15 of CFR 47: 2001, Section 15.109	Receive	Enclosure	Complied

6.3. Location Of Tests

All the measurements described in this report were performed at the premises of Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

7. Measurements, Examinations And Derived Results

7.1. General Comments

7.1.1. This section contains test results only.

7.1.2. Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 8 for details of measurement uncertainties.

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

**7.2. Conducted RF Output Power: PCS 1900 Mode – Hands Free Kit
Section 2.1046(a)**

7.2.1. The EUT, spectrum analyser and GSM test set were configured as for conducted port measurements.

7.2.2. Tests were performed to identify the maximum transmit power in accordance with FCC Part 2.1046(a) for conducted power.

7.2.3. The applicant provided a temporary antenna port to allow a direct connection to be made for conducted power measurements.

7.2.4. Results are shown for the EUT set to Bottom, Middle and Top channels using a fully charged battery. The battery nominally charged voltage is declared at 3.8 Volts:

Results:

Channel	Frequency (MHz)	Level (Watts)	Limit (Watts)	Margin	Result
Bottom	1850.2	0.843	2.0	1.157	Complied
Middle	1879.8	0.979	2.0	1.021	Complied
Top	1909.8	0.925	2.0	1.075	Complied

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

7.3. Conducted RF Output Power: GSM 850 Mode – Hands Free Kit
Section 2.1046(a)

7.3.1. The EUT, spectrum analyser and GSM test set were configured as for conducted port measurements.

7.3.2. Tests were performed to identify the maximum transmit power in accordance with FCC Part 2.1046(a) for conducted power.

7.3.3. The applicant provided a temporary antenna port to allow a direct connection to be made for conducted power measurements.

7.3.4. Results are shown for the EUT set to Bottom, Middle and Top channels using a fully charged battery. The battery nominally charged voltage is declared at 3.8 Volts:

Results:

Channel	Frequency (MHz)	Level (Watts)	Limit (Watts)	Margin	Result
Bottom	824.2	1.660	7.0	5.340	Complied
Middle	836.4	1.660	7.0	5.340	Complied
Top	848.8	1.738	7.0	5.262	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

7.4. Carrier Output Power (EIRP): PCS 1900 Mode – Hands Free Kit
Section 24.232(b)

7.4.1. Tests were performed to identify the maximum transmit power in accordance with FCC Part 24.232(b) for EIRP.

7.4.2. Results are shown for the EUT set to Bottom, Middle and Top channels using a fully charged battery. The battery nominally charged voltage is declared at 3.8 Volts:

Results

Channel	Frequency (MHz)	Antenna Polarity (H/V)	Level EIRP (dBm)	Limit EIRP (dBm)	Margin	Result
Bottom	1850.2	Vert	28.56	33	4.44	Complied
Middle	1879.8	Vert	29.08	33	3.92	Complied
Top	1909.8	Vert	27.42	33	5.58	Complied

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

**7.5. Carrier Output Power (ERP): GSM 850 Mode – Hands Free Kit
Section 22.913(a)**

7.5.1. Tests were performed to identify the maximum transmit power in accordance with FCC Part 22.913(a) for ERP.

7.5.2. Results are shown for the EUT set to Bottom, Middle and Top channels using a fully charged battery. The battery nominally charged voltage is declared at 3.8 Volts:

Results

Channel	Frequency (MHz)	Antenna Polarity (H/V)	Level ERP (dBm)	Limit ERP (dBm)	Margin	Result
Bottom	824.2	Vert	21.24	38.45	17.21	Complied
Middle	836.4	Vert	21.04	38.45	17.41	Complied
Top	848.8	Vert	23.40	38.45	15.05	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

**7.6. Frequency Stability Measurements: PCS 1900 Mode – Hands Free Kit:
(Temperature and Voltage Variation): Sections 2.1055/24.235**

7.6.1. The EUT and Will'Tek communication test set were configured for conducted antenna port measurements.

7.6.2. A temporary antenna port was provided by the applicant to allow for conducted measurements.

7.6.3. Measurements were performed to determine the frequency stability of the fundamental emission from the EUT, when subjected to variation of ambient temperature and variation of supply voltage.

7.6.4. The device is battery operated. The applicant has stated that the nominal voltage of the battery is 3.8 volts with a range from 3.5 V to 4.2 V. Extreme measurements were performed at these two voltage limits as requested in FCC Part 2.1055 (d) (2)

7.6.5. The ambient temperature was varied from -30°C to +50°C in 10°C steps. During the test the fundamental frequency of the EUT shall stay within the declared frequency block.

7.6.6. The ppm frequency error is calculated using the following formulae taken from the TIA_EIA_603A document.

$$\text{ppm error} = \left(\frac{MCF_{MHz}}{ACF_{MHz}} - 1 \right) * 10^6$$

where MCF_{MHz} is the measured carrier frequency in MHz
 ACF_{MHz} is the assigned carrier frequency in MHz

7.6.7. The limit to the lower band edge from the bottom channel and the limit to the upper band edge from the top channel was calculated in ppm. The actual error in ppm is then calculated and subtracted from the calculated limit. If the margin was less than 0 the frequency would be outside of the authorised frequency block.

7.6.8. The client has stated that the authorised frequency block is:-

Lower Block Edge	1850 MHz
Upper Block Edge	1910 MHz

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

**Frequency Stability Measurements: PCS 1900 Mode – Hands Free Kit
(continued)****Results: Bottom Channel (1850.2 MHz)**

Temperature (°C)	DC Input Voltage (Volts)	Absolute Peak Frequency Error (Hz)	Frequency Error (ppm)	Limit to band Edge (ppm)	Margin (ppm)	Result
-30	3.5	101.0	0.550	108.108	108.054	Complied
	4.2	99.0	0.048	108.108	108.061	Complied
-20	3.5	98.0	0.053	108.108	108.055	Complied
	4.2	109.0	0.059	108.108	108.049	Complied
-10	3.5	97.0	0.052	108.108	108.056	Complied
	4.2	96.0	0.052	108.108	108.056	Complied
+0	3.5	90.0	0.049	108.108	108.059	Complied
	4.2	94.0	0.051	108.108	108.057	Complied
+10	3.5	85.0	0.046	108.108	108.062	Complied
	4.2	81.0	0.044	108.108	108.064	Complied
+20	3.5	66.0	0.036	108.108	108.072	Complied
	4.2	63.0	0.034	108.108	108.074	Complied
+30	3.5	71.0	0.038	108.108	108.070	Complied
	4.2	64.0	0.035	108.108	108.074	Complied
+40	3.5	49.0	0.026	108.108	108.082	Complied
	4.2	48.0	0.026	108.108	108.082	Complied
+50	3.5	41.0	0.022	108.108	108.086	Complied
	4.2	41.0	0.022	108.108	108.086	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

**Frequency Stability Measurements: PCS 1900 Mode – Hands Free Kit
(continued)****Results: Top Channel (1909.8 MHz)**

Temperature (°C)	DC Input Voltage (Volts)	Absolute Peak Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	3.5	90.0	0.047	104.712	104.665	Complied
	4.2	140.0	0.054	104.712	104.658	Complied
-20	3.5	87.0	0.046	104.712	104.666	Complied
	4.2	88.0	0.046	104.712	104.666	Complied
-10	3.5	86.0	0.045	104.712	104.667	Complied
	4.2	87.0	0.046	104.712	104.666	Complied
+0	3.5	85.0	0.045	104.712	104.668	Complied
	4.2	82.0	0.043	104.712	104.669	Complied
+10	3.5	75.0	0.039	104.712	104.673	Complied
	4.2	77.0	0.040	104.712	104.672	Complied
+20	3.5	75.0	0.039	104.712	104.673	Complied
	4.2	84.0	0.044	104.712	104.668	Complied
+30	3.5	64.0	0.034	104.712	104.679	Complied
	4.2	68.0	0.036	104.712	104.676	Complied
+40	3.5	60.0	0.031	104.712	104.681	Complied
	4.2	60.0	0.031	104.712	104.681	Complied
+50	3.5	50.0	0.026	104.712	104.686	Complied
	4.2	51.0	0.027	104.712	104.685	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

7.7. Frequency Stability Measurements: Transmit 850 Mode – Hands Free Kit (Temperature and Voltage Variation): Sections 2.1055/22.355

7.7.1. The EUT and spectrum analyser were configured for conducted antenna port measurements.

7.7.2. A temporary antenna port was provided by the applicant to allow for conducted measurements.

7.7.3. Measurements were performed to determine the frequency stability of the fundamental emission from the EUT, when subjected to variation of ambient temperature and variation of supply voltage.

7.7.4. The device is battery operated. The applicant has stated that the nominal voltage of the battery is 3.8 volts with a range from 3.5 V to 4.2 V. Extreme measurements were performed at these two voltage limits as requested in FCC Part 2.1055 (d) (2)

7.7.5. The ambient temperature was varied from -30°C to +50°C in 10°C steps. During the test the fundamental frequency of the EUT shall stay within 2.5 ppm.

7.7.6. The ppm frequency error is calculated using the following formula taken from the TIA_EIA_603A document.

$$\text{ppm error} = \left(\frac{MCF_{\text{MHz}}}{ACF_{\text{MHz}}} - 1 \right) * 10^6$$

where MCF_{MHz} is the measured carrier frequency in MHz
 ACF_{MHz} is the assigned carrier frequency in MHz

7.7.7. The client has stated that the authorised frequency block is:-

Lower Block Edge	824 MHz
Upper Block Edge	849 MHz

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

Frequency Stability Measurements: GSM 850 Mode – Hands Free Kit
(continued)

Results: Bottom Channel (824.2 MHz)

Temperature (°C)	DC Input Voltage (Volts)	Peak Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	3.5	-46.0	-0.056	2.5	2.444	Complied
	4.2	-39.0	-0.047	2.5	2.453	Complied
-20	3.5	-43.0	-0.052	2.5	2.448	Complied
	4.2	-42.0	-0.051	2.5	2.449	Complied
-10	3.5	-37.0	-0.045	2.5	2.455	Complied
	4.2	-37.0	-0.045	2.5	2.455	Complied
+0	3.5	-38.0	-0.046	2.5	2.454	Complied
	4.2	-38.0	-0.046	2.5	2.454	Complied
+10	3.5	-32.0	-0.039	2.5	2.461	Complied
	4.2	-30.0	-0.036	2.5	2.464	Complied
+20	3.5	-39.0	-0.047	2.5	2.453	Complied
	4.2	-47.0	-0.057	2.5	2.443	Complied
+30	3.5	-41.0	-0.050	2.5	2.450	Complied
	4.2	-43.0	-0.052	2.5	2.448	Complied
+40	3.5	-39.0	-0.047	2.5	2.453	Complied
	4.2	-44.0	-0.053	2.5	2.447	Complied
+50	3.5	-41.0	-0.050	2.5	2.450	Complied
	4.2	-43.0	-0.052	2.5	2.448	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

**Frequency Stability Measurements: GSM 850 Mode – Hands Free Kit
(continued)****Results: Middle Channel (836.2 MHz)**

Temperature (°C)	DC Input Voltage (Volts)	Peak Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	3.5	-45.0	-0.054	2.5	2.446	Complied
	4.2	-44.0	-0.053	2.5	2.447	Complied
-20	3.5	-51.0	-0.061	2.5	2.439	Complied
	4.2	-49.0	-0.059	2.5	2.441	Complied
-10	3.5	-40.0	-0.048	2.5	2.452	Complied
	4.2	-36.0	-0.043	2.5	2.457	Complied
+0	3.5	-30.0	-0.036	2.5	2.464	Complied
	4.2	-40.0	-0.048	2.5	2.452	Complied
+10	3.5	-32.0	-0.038	2.5	2.462	Complied
	4.2	-32.0	-0.038	2.5	2.462	Complied
+20	3.5	-50.0	-0.060	2.5	2.440	Complied
	4.2	-47.0	-0.056	2.5	2.444	Complied
+30	3.5	-41.0	-0.049	2.5	2.451	Complied
	4.2	-45.0	-0.054	2.5	2.446	Complied
+40	3.5	-37.0	-0.044	2.5	2.456	Complied
	4.2	-38.0	-0.045	2.5	2.455	Complied
+50	3.5	-42.0	-0.050	2.5	2.450	Complied
	4.2	-43.0	-0.051	2.5	2.449	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

**Frequency Stability Measurements: GSM 850 Mode – Hands Free Kit
(continued)****Results: Top Channel (848.8 MHz)**

Temperature (°C)	DC Input Voltage (Volts)	Absolute Peak Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	3.5	-35.0	-0.041	2.5	2.459	Complied
	4.2	-41.0	-0.048	2.5	2.452	Complied
-20	3.5	-45.0	-0.053	2.5	2.447	Complied
	4.2	-44.0	-0.052	2.5	2.480	Complied
-10	3.5	-34.0	-0.048	2.5	2.460	Complied
	4.2	-25.0	-0.029	2.5	2.471	Complied
+0	3.5	-39.0	-0.046	2.5	2.454	Complied
	4.2	-42.0	-0.049	2.5	2.451	Complied
+10	3.5	-34.0	-0.040	2.5	2.460	Complied
	4.2	-33.0	-0.039	2.5	2.461	Complied
+20	3.5	-45.0	-0.053	2.5	2.447	Complied
	4.2	-46.0	-0.054	2.5	2.446	Complied
+30	3.5	-41.0	-0.048	2.5	2.452	Complied
	4.2	-43.0	-0.051	2.5	2.449	Complied
+40	3.5	-42.0	-0.049	2.5	2.451	Complied
	4.2	-39.0	-0.046	2.5	2.454	Complied
+50	3.5	-40.0	-0.047	2.5	2.453	Complied
	4.2	-40.0	-0.047	2.5	2.453	Complied

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

7.8. Transmitter Conducted Measurements: PCS 1900 Mode – Hands Free Kit (Occupied Bandwidth): Sections 2.1049 (i)

7.8.1. The EUT and spectrum analyser were configured for conducted antenna port measurements.

7.8.2. A temporary antenna port was provided by the applicant to allow for conducted measurements.

7.8.3. The device was operating in its normal mode of operation.

7.8.4. Measurements were performed to determine the Occupied Bandwidth in accordance with FCC Part 2.1049. The Occupied Bandwidth was measured from the fundamental emission at the bottom, middle and top channels. The EUT is a PCS phone therefore no modulation input port was available. A call was setup using the PCS/GSM simulator using normal modulation and the Occupied Bandwidth was measured.

7.8.5. The Occupied Bandwidth was measured using the built in occupied bandwidth function of the Rohde and Schwarz FSEB spectrum analyser. It was set to measure the bandwidth where 99% of the signal power was contained. The analyser settings were set as per those outlined in the FSEB user manual for this measurement, i.e., RBW $\leq 1/20$ of occupied bandwidth.

Results:

Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (kHz)
Bottom (512)	1850.2	3	10	246.4929
Middle (660)	1879.8	3	10	250.1002
Top (810)	1909.8	3	10	246.4929

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

7.9. Transmitter Conducted Measurements: GSM 850 Mode – Hands Free Kit (Occupied Bandwidth): Sections 2.1049 (i)

7.9.1. The EUT and spectrum analyser were configured for conducted antenna port measurements.

7.9.2. A temporary antenna port was provided by the applicant to allow for conducted measurements.

7.9.3. The device was operating in its normal mode of operation.

7.9.4. Measurements were performed to determine the Occupied Bandwidth in accordance with FCC Part 2.1049. The Occupied Bandwidth was measured from the fundamental emission at the bottom, middle and top channels. The EUT is a PCS phone therefore no modulation input port was available. A call was setup using the PCS/GSM simulator using normal modulation and the Occupied Bandwidth was measured.

7.9.5. The Occupied Bandwidth was measured using the built in occupied bandwidth function of the Rohde and Schwarz FSEB spectrum analyser. It was set to measure the bandwidth where 99% of the signal power was contained. The analyser settings were set as per those outlined in the FSEB user manual for this measurement, i.e., RBW $\leq$ 1/20 of occupied bandwidth.

Results:

Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (kHz)
Bottom (128)	824.2	3	10	252.5050
Middle (189)	836.4	3	10	250.5010
Top (251)	848.8	3	10	248.4969

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

7.10. Transmitter Conducted Measurements: PCS 1900 Mode – Hands Free Kit (Emissions at Band Edges): Section 24.238

7.10.1. The EUT and spectrum analyser were configured as for conducted antenna port measurements.

7.10.2. A temporary antenna port was provided by the applicant to allow for conducted measurements.

7.10.3. FCC Part 24.238 states that emissions shall be attenuated by at least $43 + 10 \log(P)$ dB below the transmitter power (P), where (P) is the power measured at the EUT antenna terminals.

7.10.4. FCC Part 24.238 also states that the 1st MHz band immediately adjacent to the applicants declared frequency block may be measured using a resolution bandwidth of at least 1% of the emission bandwidth. This bandwidth was found to be 3 kHz.

7.10.5. The highest level within these 1 MHz bands was thus measured and recorded in the tables below.

Results:**Bottom Band Edge**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850.000	-60.58	-13	47.6	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1910.000	-56.180	-13	43.2	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

7.11. Transmitter Conducted Measurements: GSM 850 Mode – Hands Free Kit (Emissions at Band Edges): Section 22.917 (e)

7.11.1.The EUT and spectrum analyser were configured as for conducted antenna port measurements.

7.11.2.A temporary antenna port was provided by the applicant to allow for conducted measurements.

7.11.3.FCC Part 22.917 states that emissions shall be attenuated by at least $43+10 \log(P)$ dB below the transmitter power (P), where (P) is the power measured at the EUT antenna terminals.

Results:**Bottom Band Edge**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
823.997	-60.220	-13	47.2	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
849.024	-61.310	-13	48.3	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

7.12. Transmitter Radiated Measurements: PCS 1900 Mode – Hands Free Kit (Emissions at Band Edges): Section 2.1053

7.12.1.FCC Part 24.238 states that emissions shall be attenuated by at least $43+10 \log(P)$ dB below the transmitter power (P). It also states that the 1st MHz band immediately adjacent to the applicants declared frequency block may be measured using a resolution bandwidth of at least 1% of the emission bandwidth. This bandwidth was found to be 3 kHz.

7.12.2. The highest level within these 1 MHz bands was thus measured and recorded.

7.12.3. The limit is specified as $43+10 \log(P)$ dB below the transmitter power (P), where (P) is the power measured at the EUT antenna terminals.

7.12.4. The limit line was determined by radiating -13dBm from a dipole located in place of the EUT and measuring the equivalent field strength at the 3 meters.

Results:**Bottom Band Edge**

Frequency (MHz)	Antenna Polarity (H/V)	Peak Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	Result
1850	Vert.	58.23	22.0	2.6	82.83	84.0	1.17	Complied

Top Band Edge

Frequency (MHz)	Antenna Polarity (H/V)	Peak Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	Result
1910	Vert.	58.28	22.0	2.6	82.88	84.0	1.12	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

**7.13. Transmitter Radiated Measurements: GSM 850 Mode – Hands Free:
(Emissions at Band Edges): Section 2.1053**

7.13.1.FCC Part 22.917 (e) states that emissions shall be attenuated by at least $43+10 \log(P)$ dB below the transmitter power (P).

7.13.2. The limit is specified as $43+10 \log(P)$ dB below the transmitter power (P), where (P) is the power measured at the EUT antenna terminals.

7.13.3. The limit line was determined by radiating -13dBm from a dipole located in place of the EUT and measuring the equivalent field strength at the 3 meters.

Bottom Band Edge

Frequency (MHz)	Antenna Polarity (H/V)	Peak Detector level (dB μ V)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Peak Margin (dB)	Result
823.999	Vert.	49.51	23.0	2.6	75.11	84.0	8.89	Complied

Top Band Edge

Frequency (MHz)	Antenna Polarity (H/V)	Peak Detector level (dB μ V)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Peak Margin (dB)	Result
849.023	Vert.	46.26	23.0	2.6	71.86	84.0	12.4	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

7.14. Transmitter Conducted Measurements: GSM 850 Mode – Hands Free Kit (Emissions in Base Frequency Range): Section 22.917 (f)

7.14.1. The EUT and spectrum analyser were configured as for conducted antenna port measurements.

7.14.2. A temporary antenna port was provided by the applicant to allow for conducted measurements.

7.14.3. The device was operating in its normal mode of operation.

7.14.4. FCC Part 22.917(f) states that the mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated, must be attenuated to a level not to exceed –80 dBm at the transmit antenna connector.

Results:**Bottom Channel**

Frequency (MHz)	Spurious Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
882.806	-85.0	-80.0	5.0	Complied

Middle Channel

Frequency (MHz)	Spurious Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
874.000	-84.44	-80.0	4.44	Complied

Top Channel

Frequency (MHz)	Spurious Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
893.861	-84.42	-80.0	4.42	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

**7.15. Transmitter Conducted Measurements: PCS 1900 Mode – Hands Free Kit
(Emissions Outside of Authorised Frequency Block): Section 2.1051/24.238**

7.15.1.The EUT and spectrum analyser were configured as for conducted antenna port measurements.

7.15.2.A temporary antenna port was provided by the applicant to allow for conducted measurements.

7.15.3.FCC Part 24.238 states that emissions shall be attenuated by at least $43+10 \log(P)$ dB below the transmitter power (P), where (P) is the power measured at the EUT antenna terminals in each channel.

Results:

Channel	Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	4991.00	-33.86	-13	20.9	Complied
Middle	4917.60	-34.12	-13	21.1	Complied
Top	4986.73	-33.15	-13	20.2	Complied

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

7.16. Transmitter Conducted Measurements: GSM 850 Mode – Hands Free Kit (Out of Band Emissions): Section 2.1051/22.917(e)

7.16.1.The EUT and spectrum analyser were configured as for conducted antenna port measurements.

7.16.2.A temporary antenna port was provided by the applicant to allow for conducted measurements.

7.16.3.FCC Part 22.917(e) states that emissions shall be attenuated by at least 43+10 Log (P) dB below the transmitter power, where (P) is the power measured at the EUT antenna terminals in each channel.

Results:

Channel	Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	4990.56	-35.64	-13	22.6	Complied
Middle	4981.04	-34.80	-13	21.8	Complied
Top	4986.50	-35.82	-13	22.8	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

7.17. Transmitter Radiated Emissions:**GSM 850 Mode – AC Adapter/Hands Free Kit: Section 2.1053/22.917 (e)****7.17.1. Electric Field Strength Measurements: 30 to 1000 MHz**

7.17.1.1. Preliminary Radiated spurious scans were performed with the EUT set to the Middle channel. Any visible spurious was then measured with the device set to top, bottom and middle channels.

7.17.1.2. The following table lists frequencies at which emissions were measured using a Quasi-Peak detector at a test distance of 3m (results incorporate antenna factors and cable losses):

7.17.1.3. The limit is specified as $43+10 \log(P)$ dB below the transmitter power (P), where (P) is the power measured at the EUT antenna terminals.

7.17.1.4. The limit line was determined by radiating -13dBm from a dipole located in place of the EUT and measuring the equivalent field strength at the 3 meters.

Results:

Channel	Frequency (MHz)	Ant. Pol.	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
Bottom	948.7333	Vert	22.2	84.0	61.8	Complied
Middle	948.7333	Hori	21.5	84.0	62.5	Complied
Top	948.7333	Hori	22.1	84.0	61.9	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

7.18. Transmitter Radiated Emissions:**PCS 1900 Mode – AC Adapter/Hands Free Kit : Section 2.1053/24.238****7.18.1. Electric Field Strength Measurements: 30 to 1000 MHz**

7.18.1.1. Preliminary Radiated spurious scans were performed with the EUT set to the Middle channel. Any visible spurious was then measured with the device set to top, bottom and middle channels.

7.18.1.2. The following table lists frequencies at which emissions were measured using a Quasi-Peak detector at a test distance of 3m (results incorporate antenna factors and cable losses):

7.18.1.3. The limit is specified as $43+10 \log(P)$ dB below the transmitter power (P), where (P) is the power measured at the EUT antenna terminals.

7.18.1.4. The limit line was determined by radiating -13dBm from a dipole located in place of the EUT and measuring the equivalent field strength at the 3 meters.

Results:

Channel	Frequency (MHz)	Ant. Pol.	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
Bottom	945.1885	Vert	25.6	84.0	58.4	Complied
Middle	945.1885	Hori	18.7	84.0	65.3	Complied
Top	945.1885	Hori	25.4	84.0	58.6	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

7.19. Transmitter Radiated Emissions:**Transmit 850 Mode – AC Adapter/Hands Free Kit: Section 2.1053/22.917 (e)****7.19.1. Electric Field Strength Measurements: 1.0 to 20.0 GHz**

7.19.1.1. The client has stated that the highest clock frequency for the EUT was 1.9101 GHz. Therefore tests were performed up to 20 GHz.

7.19.1.2. Preliminary radiated spurious scans were performed with the EUT set to Bottom, Middle and Top channels as stated in section (Operation of EUT).

7.19.1.3. The following table lists frequencies at which emissions were measured using an Peak detector, a measurement test distance of 3 meters was used for the indicated results.

7.19.1.4. The limit is specified as $43+10 \log(P)$ dB below the transmitter power (P), where (P) is the power measured at the EUT antenna terminals.

7.19.1.5. The limit line was determined by radiating -13dBm from a dipole located in place of the EUT and measuring the equivalent field strength at the 3 meters.

Highest Peak Level:- Bottom Channel

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	Result
5.55071	Vert	41.07	22.6	1.5	65.17	84.0	18.83	Complied
11.10141	Vert	41.22	28.5	2	71.92	84.0	12.08	Complied

Highest Peak Level: - Middle Channel

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	Result
5.63922	Vert	43.41	22.6	1.5	67.51	84.0	16.49	Complied
9.39943	Vert	41.73	28.5	2	72.23	84.0	11.77	Complied

Highest Peak Level: - Top Channel

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	Result
5.72953	Horiz.	41.78	22.6	1.5	65.88	84.0	18.12	Complied
9.54934	Vert	39.39	28.5	2	69.89	84.0	14.11	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

**7.20. Transmitter Radiated Emissions: PCS 1900 Mode – AC Adapter/Hands Free Kit
Section 2.1053/24.238****7.20.1. Electric Field Strength Measurements: 1.0 to 20.0 GHz**

7.20.1.1. The client has stated that the highest clock frequency for the EUT was 1.9101 GHz. Therefore tests were performed up to 20 GHz.

7.20.1.2. Preliminary radiated spurious scans were performed with the EUT set to Bottom, Middle and Top channels as stated in section (Operation of EUT).

7.20.1.3. The following table lists frequencies at which emissions were measured using an Peak detector, a measurement test distance of 3 meters was used for the indicated results.

7.20.1.4. The limit is specified as $43+10 \log(P)$ dB below the transmitter power (P), where (P) is the power measured at the EUT antenna terminals.

7.20.1.5. The limit line was determined by radiating -13dBm from a dipole located in place of the EUT and measuring the equivalent field strength at the 3 meters.

Highest Peak Level:- Bottom Channel

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	Result
5.7963	Vert	39.77	22.6	1.5	63.87	84.0	20.13	Complied
8.24248	Vert	33.09	28.3	2	63.39	84.0	20.61	Complied

Highest Peak Level: - Middle Channel

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	Result
5.01852	Vert	41.68	22.6	1.5	65.78	84.0	18.22	Complied
8.36425	Vert	33.42	28.3	2	63.72	84.0	20.28	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

**Transmitter Radiated Emissions: PCS 1900 Mode – AC Adapter/Hands Free Kit
Section 2.1053/24.238 (continued)****Highest Peak Level: - Top Channel**

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dB μ V)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Peak Margin (dB)	Result
5.09233	Horiz.	40.26	22.6	1.5	64.36	84.0	19.64	Complied
9.33751	Vert	30.89	28.3	2	61.639	84.0	22.61	Complied

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

7.21. Receiver Radiated Emissions:**GSM 850 Mode – AC Adapter/Hands Free Kit: Section 15.109****7.21.1. Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)**

7.21.1.1. The following table indicates measured results with the EUT operated in receive mode to the limits specified in Part 15.109.

7.21.1.2. The following table lists frequencies at which emissions were measured using a Quasi-Peak detector at a test distance of 3m (results incorporate antenna factors and cable losses):

Results – Middle Channel (189):

Frequency (MHz)	Ant. Pol.	Q-P Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
948.7332	Horiz.	22.7	46	23.3	Complied

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

7.22. Receiver Radiated Emissions:**PCS 1900 Mode – Adapter/Hands Free Kit: Section 15.109****7.22.1. Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)**

7.22.1.1. The following table indicates measured results with the EUT operated in receive mode to the limits specified in Part 15.109.

7.22.1.2. The following table lists frequencies at which emissions were measured using a Quasi-Peak detector at a test distance of 3m (results incorporate antenna factors and cable losses):

Results – Middle Channel (660):

Frequency (MHz)	Ant. Pol.	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
927.2371	Vert.	16.3	46.0	29.7	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

7.23. Receiver Radiated Emissions:**GSM 850 Mode – AC Adapter/Hands Free Kit: Section 15.109****7.23.1. Electric Field Strength Measurements: 1.0 to 10.0 GHz**

7.23.1.1. The following table indicates measured results with the EUT operated in receive mode to the limits specified in Part 15.109.

7.23.1.2. The following table lists frequencies at which emissions were measured using both a Peak and Average detector at a test distance of 3m

Highest Peak Level:- Middle Channel

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dB μ V)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Peak Margin (dB)	Result
9.5488	Horiz.	22.41	28.4	2.2	53.01	74.0	20.99	Complied

Highest Average Level:- Middle Channel

Frequency (GHz)	Antenna Polarity (H/V)	Average Detector level (dB μ V)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dB μ V/m)	Average Limit (dB μ V/m)	Average Margin (dB)	Result
9.5488	Horiz.	11.97	28.4	2.2	42.57	54.0	11.43	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

7.24. Receiver Radiated Emissions:**PCS 1900 Mode – AC Adapter/Hands Free Kit : Section 15.109****7.24.1. Electric Field Strength Measurements: 1.0 to 10.0 GHz**

7.24.1.1. The following table indicates measured results with the EUT operated in receive mode to the limits specified in Part 15.109.

7.24.1.2. The following table lists frequencies at which emissions were measured using both a Peak and Average detector at a test distance of 3m

Highest Peak Level:- Middle Channel

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dB μ V)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Peak Margin (dB)	Result
9.48	Horiz.	22.23	28.4	2.2	52.83	74.0	21.17	Complied

Highest Average Level:- Middle Channel

Frequency (GHz)	Antenna Polarity (H/V)	Average Detector level (dB μ V)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dB μ V/m)	Average Limit (dB μ V/m)	Average Margin (dB)	Result
9.48	Horiz.	11.49	28.4	2.2	42.09	54.0	11.91	Complied

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

7.25. AC Mains Conducted Emissions: GSM 850 Mode: Section 15.107

7.25.1. Quasi-Peak Detector Measurements On Live And Neutral Lines

7.25.1.1. Preliminary conducted spurious scans were performed with the EUT set to Middle channel. Any visible spurious was then measured with the device set to top, bottom and middle channels.

7.25.1.2. All emissions were >20 dB below the relevant limit therefore no result were recorded.

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

7.26. AC Mains Conducted Emissions: PCS 1900 Mode: Section 15.107

7.26.1. Quasi-Peak Detector Measurements On Live And Neutral Lines

7.26.1.1. Preliminary conducted spurious scans were performed with the EUT set to Middle channel. Any visible spurious was then measured with the device set to top, bottom and middle channels.

7.26.1.2. All emissions were >20 dB below the relevant limit therefore no result were recorded.

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

8. Measurement Uncertainty

8.1. No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

8.2. The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

8.3. The uncertainty of the result may need to be taken into account when interpreting the measurement results.

8.4. The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

Measurement Type	Range	Confidence Level	Calculated Uncertainty
Carrier Output Power (EIRP)	Not applicable	95%	+/- 1.78 dB
Carrier Output Power (ERP)	Not applicable	95%	+/- 1.78 dB
Conducted Emissions (AC)	0.15 MHz to 30 MHz	95%	+/- 3.25 dB
Conducted Emissions Antenna Port	0.009 kHz to 26 GHz	95%	+/- 2.9 dB
Radiated Emissions at 3.0 metres	30 MHz to 1000 MHz	95%	+/- 5.26 dB
Radiated Emissions at 3.0 metres	1 GHz to 26 GHz	95%	+/- 1.78 dB
Frequency Stability	Not applicable	95%	+/- 20 Hz
Occupied Bandwidth	824 to 849 MHz 1850 to 1910 MHz	95%	+/- 0.12 %
Emissions at Band Edges	824 to 849 MHz 1850 to 1910 MHz	95%	+/- 2.9 dB

8.5. The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A027	Horn Antenna	Eaton	9188-2	301
A030	Step Attenuator	Narda	745-69	01544
A031	2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	557
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002
A072	Adjustable Dipole Antenna Set	EMCO	3121C	9004-552
A1018	WG22 to K-Type Coaxial Adapter	FLANN Microwave	22094-KF20	1703
A1023	MED POW Attenuator	NARDA	MOD 768-3	SI0539
A1077	3020A	Narda	3020A	40140
A197	Site 2 Controller SC144	Unknown	SC144	150720
A244	20 dB Attenuator	Schaffner	6820-17-B	None
A246	30 dB Attenuator	Schaffner	6830-17-B	None
A253	WG 12 Microwave Horn	Flann Microwave	12240-20	128
A259	Bilog Antenna	Chase	CBL6111	1513
A276	OATS Positioning Controller	Rohde & Schwarz	HCC	-
A392	3 dB attenuator (9)	Suhner	6803.17.B	None
A427	WG 14 horn	Flann	14240-20	150
A429	WG 16 horn	Flann	16240-20	561
A430	WG 18 horn	Flann	18240-20	425
A512	Wave Guide Antenna	EMCO	3115	3993
C202	Rosenberger cable	Rosenberger	UFA 210A-1-1180-70X70	1543
C321	Cable	Rosenberger	UFA 210A-1-0788-50x50	96A0122
C346	Coaxial Cable	Rosenberger	UFA210A-1-1181-70x70	1932

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

Test Equipment Used (continued)

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
C362	Cable	Rosenberger	UFA210A-1-1181-70x70	1925
C364	BNC Cable	Rosenberger	RG142	None
C468	N-Type Coaxial Cable	Rosenberger	UFA210A-1-3937-504504	98L0440
E013	PCN Environmental Chamber	Sanyo	ATMOS chamber	None
G011	SMGU Signal Generator	Rohde & Schwarz	SMGU	894 054/004
G013	SMHU Signal Generator	Rohde & Schwarz	SMHU	894 055/003
G085	Generator	Hewlett Packard	83650L	3614A00104
M003	Spectrum Monitor	Rohde & Schwarz	EZM	883 580/008
M023	ESVP Receiver	Rohde & Schwarz	ESVP	872 991/027
M069	ESMI Spectrum Analyser / Receiver	Rohde & Schwarz	ESMI	829 808/007 (DU) / 827 063/008 (RU)
M090	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:838494/005 RU:836833/001
M105	Fluke 77 DVM	Fluke	77	963580770
M1093	Will tek	Will tek	4202S	0513018
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016
M133	Temperature/Humidity/Pressure Meter	RS Components	None	None
M150	Power Sensor	Boonton	51072	28473
M151	Power Meter	Boonton	4220	D207602BL

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

Test Equipment Used (continued)

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
M173	Turntable Controller	R.H.Electrical Services	RH351	3510020
M191	Thermo-Hygro	RS Components	RS212-124	M191-212-124
M210	Thermo/hygro meter	RS Components Ltd	RS212-124	M210-RS212-124
M245	Thermo/hygrometer	Oregon Scientific	M245	M245
S202	Site 2	RFI	2	-
S207	Site 7	RFI	7	-
S209	Site 9	RFI	9	-

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. Measurement Methods

A2.1 FCC Part 24.232: Effective Isotropic Radiated Power (EIRP)

A2.1.1 EIRP measurements were performed in accordance with the standard, against appropriate limits.

A2.1.2 The EIRP was measured with the EUT arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2001 Clause 5.4. The transmitter was fitted with an integral antenna, as such tests were run with the unit operating into the integral antenna.

A2.1.3 The level of the EIRP was measured using a spectrum analyser. Its amplitude was maximised by first raising and lowering the test antenna in the horizontal plane. The turntable was then rotated through 360 degrees to determine the maximum reading. The maximum reading was then recorded. This procedure was then repeated for the Vertical polarity.

A2.1.4 Once the final amplitude (maximised) had been obtained, the EIRP was measured by using a substitution method.

A2.1.5 The substitution method involved replacing the EUT with a substitution antenna. For EIRP measurements a Horn antenna whose gain was based on an isotropic antenna was used. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was then connected to and fed by a signal generator tuned to the EUT's operating frequency. The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the previously recorded maximum level for this set of conditions was obtained. This procedure was repeated with both antennas vertically polarised. The EIRP was then taken as:-

$$\text{EIRP} = \text{Signal Generator Level} - \text{Cable Loss} + \text{Antenna Gain}$$

A2.1.6 All measurements were performed using broadband Horn antennas.

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

A2.1.7 The test equipment settings for EIRP measurements were as follows:

Receiver Function	Final Measurements
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	1 MHz
Amplitude Range:	20 dB
Measurement Time:	> 1 s
Observation Time:	> 15 s
Sweep Time:	Coupled

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

A2.2 FCC Part 22.913: Effective Radiated Power (ERP)

A2.2.1 ERP measurements were performed in accordance with the standard, against appropriate limits.

A2.2.2 The ERP was measured with the EUT arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2001 Clause 5.4. The transmitter was fitted with an integral antenna, as such tests were run with the unit operating into the integral antenna.

A2.2.3 The level of the ERP was measured using a spectrum analyser. Its amplitude was maximised by first raising and lowering the test antenna in the horizontal plane. The turntable was then rotated through 360 degrees to determine the maximum reading. The maximum reading was then recorded. This procedure was then repeated for the Vertical polarity.

A2.2.4 Once the final amplitude (maximised) had been obtained, the ERP was measured by using a substitution method.

A2.2.5 The substitution method involved replacing the EUT with a substitution antenna. The substitution antenna used was a half-wavelength dipole with its elements set to the correct length for the test frequencies involved. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was then connected to and fed by a signal generator tuned to the EUT's operating frequency. The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the previously recorded maximum level for this set of conditions was obtained. This procedure was repeated with both antennas vertically polarised. The ERP was then taken as:-

$$\text{ERP} = \text{Signal Generator Level} - \text{Cable Loss} + \text{Antenna Gain}$$

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

A2.2.6 The test equipment settings for ERP measurements were as follows:

Receiver Function	Final Measurements
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	1 MHz
Amplitude Range:	20 dB
Measurement Time:	> 1 s
Observation Time:	> 15 s
Sweep Time:	Coupled

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

A2.3 FCC Part 2.1055: Frequency Stability

A2.3.1 The EUT was situated within an environmental test chamber and connected to test equipment via and access port.

A2.3.1 Measurements were performed with the EUT operating under extremes of temperature in 10 degree increments within the range –30 to 50 Deg C.

A2.3.1 Measurements were also performed at voltage extremes between the declared nominal supply voltage and at the declared endpoint voltage.

A2.3.1 The requirement was to determine the frequency stability of the device under specified environmental operating conditions.

A2.3.2 Measurements were made on the top, middle and bottom channels.

A2.3.3 The EUT was switched off for a minimum of 30 minutes between each stage of testing while the environmental chamber stabilised at the next temperature within the stated temperature range.

A2.3.4 The frequency error measured was converted to an error in ppm using the following formula as defined by TIA_EIA_603A :-

$$\text{ppm error} = \left(\frac{MCF_{\text{MHz}}}{ACF_{\text{MHz}}} - 1 \right) * 10^6$$

where MCF_{MHz} is the measured carrier frequency in MHz
 ACF_{MHz} is the assigned carrier frequency in MHz

A2.3.5 The measured ppm had to be less then the relevant limits in order to comply.

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

A2.4 Conducted Antenna Port Measurements: FCC Part 2.1051:

A2.4.1 Spurious measurements at the Antenna port were performed from the lower frequency of the allocated frequency block and from the top frequency of the allocated frequency block to 10 times the highest EUT generated frequency.

A2.4.2 A measuring receiver was connected to the antenna port of the EUT via a suitable cable and RF Attenuator. The total loss of both the cable and the attenuator were measured and entered as a reference level offset into the measuring receiver to correct for the losses.

A2.4.3 The specified frequency band was investigated with the transmitter operating at full power on the middle channel. Any spurious noted was then measured with the transmitter set to top, bottom and middle channels.

A2.4.1 The EUT was then replaced with a signal generator who's frequency was set to the indicated spurious frequency and who's level was adjusted to equal that recorded in section from the EUT. The level final recorded level was that reported by the signal generated.

A2.4.2 The test equipment settings for conducted antenna port measurements were as follows:

Receiver Function	Initial Scan	Final Measurements Below 1GHz	Final Measurements Above 1 GHz
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak/Average
Mode:	Max Hold	Not applicable	Not applicable
Bandwidth:	100 kHz	120 kHz	1 MHz
Amplitude Range:	60 dB	20 dB	20 dB (typical)
Measurement Time:	Not applicable	> 1 s	> 1 s
Observation Time:	Not applicable	> 15 s	> 15 s
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

* The resolution bandwidth used for measurements in the 1 MHz blocks either side of the declared operating frequency block was set to 3 kHz.

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

A2.5 FCC Part 2.1049 (i): Occupied Bandwidth

A2.5.1 The EUT was connected to a spectrum analyser via its temporary antenna port.

A2.5.1 Measurements were performed to determine the Occupied Bandwidth in accordance with FCC Part 2.1049. The Occupied Bandwidth was measured from the fundamental emission at the bottom middle and top channels. The EUT is a PCS phone therefore no modulation input port was available. A call was thus setup using the PCS/GSM simulator and using normal modulation. The Occupied Bandwidth was measured in this configuration.

A2.5.2 The Occupied Bandwidth was measured using the built in occupied bandwidth function of the Rohde and Schwarz FSEB spectrum analyser. It was set to measure the bandwidth where 99% of the signal power was contained. The analyser settings were set as per those outlined in the FSEB user manual for this measurement, i.e., RBW $\leq 1/20$ of occupied bandwidth. A value of 3kHz was used.

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

A2.6 FCC Part 15: AC Mains Conducted Emissions

A2.6.1 AC mains conducted emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

A2.6.2 The test was performed in a shielded enclosure with the equipment arranged as detailed in the standard on a wooden bench using the floor of the screened enclosure as the ground reference plane.

A2.6.3 Initial measurements in the form of swept scans covering the entire measurement band were performed in order to identify frequencies on which the EUT was generating interference. In order to minimise the time taken for these swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidths (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

A2.6.4 During the swept measurements (and also during subsequent final measurements on single frequencies) any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT.

A2.6.5 Following the initial scans, a graph was produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested (at individual frequencies) using the appropriate detector function.

A2.6.6 The test equipment settings for conducted emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements
Detector Type:	Peak	Quasi-Peak (CISPR)/Average
Mode:	Max Hold	Not applicable
Bandwidth:	10 kHz*	9 kHz*
Amplitude Range:	60 dB	20 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

* Where measurements were made below 150 kHz a 200 Hz bandwidth was used.

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

A2.7 Radiated Emissions: FCC Part 15,22 and 24

A2.7.1 Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

A2.7.2 Initial pre-scans covering the entire measurement band from the lowest generated frequency up to the highest specified frequency were performed within a screened chamber in order to identify frequencies on which the EUT was generating interference. This determined the frequencies from the EUT with required further attention. In order to minimise the time taken for the swept measurements, a peak detector was used in conjunction with the appropriate detector measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

A2.7.3 The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested on the open area test site, at the appropriate distance, using a measuring receivers with a Quasi-Peak detector (below 1000 MHz), where applicable, for measurements above 1000 MHz average and peak detectors were used.

A2.7.4 For the main (final) measurements the EUT arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2001 Clause 5.4.

A2.7.5 On the open area test site, at each frequency where a signal was found, the levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the horizontal polarisation. At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT. The procedure was repeated for the vertical polarisation.

A2.7.6 The final field strength was determined as the indicated level in dBuV plus cable loss and antenna factor.

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

A2.7.7 The test equipment settings for radiated emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements Below 1GHz	Final Measurements Above 1 GHz
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak/Average
Mode:	Max Hold	Not applicable	Not applicable
Bandwidth:	(120 kHz < 1GHz) (1MHz > 1GHz)	120 kHz	1 MHz (If Applicable)
Amplitude Range:	60 dB	20 dB	20 dB (typical)
Measurement Time:	Not applicable	> 1 s	> 1 s
Observation Time:	Not applicable	> 15 s	> 15 s
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

Appendix 3. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\43652JD04\EMICON	Test configuration for measurement of conducted emissions
DRG\43652JD04\EMIRAD	Test configuration for measurement of radiated emissions
DRG\43652JD04\001	Schematic diagram of the EUT, support equipment and interconnecting cables used for the test

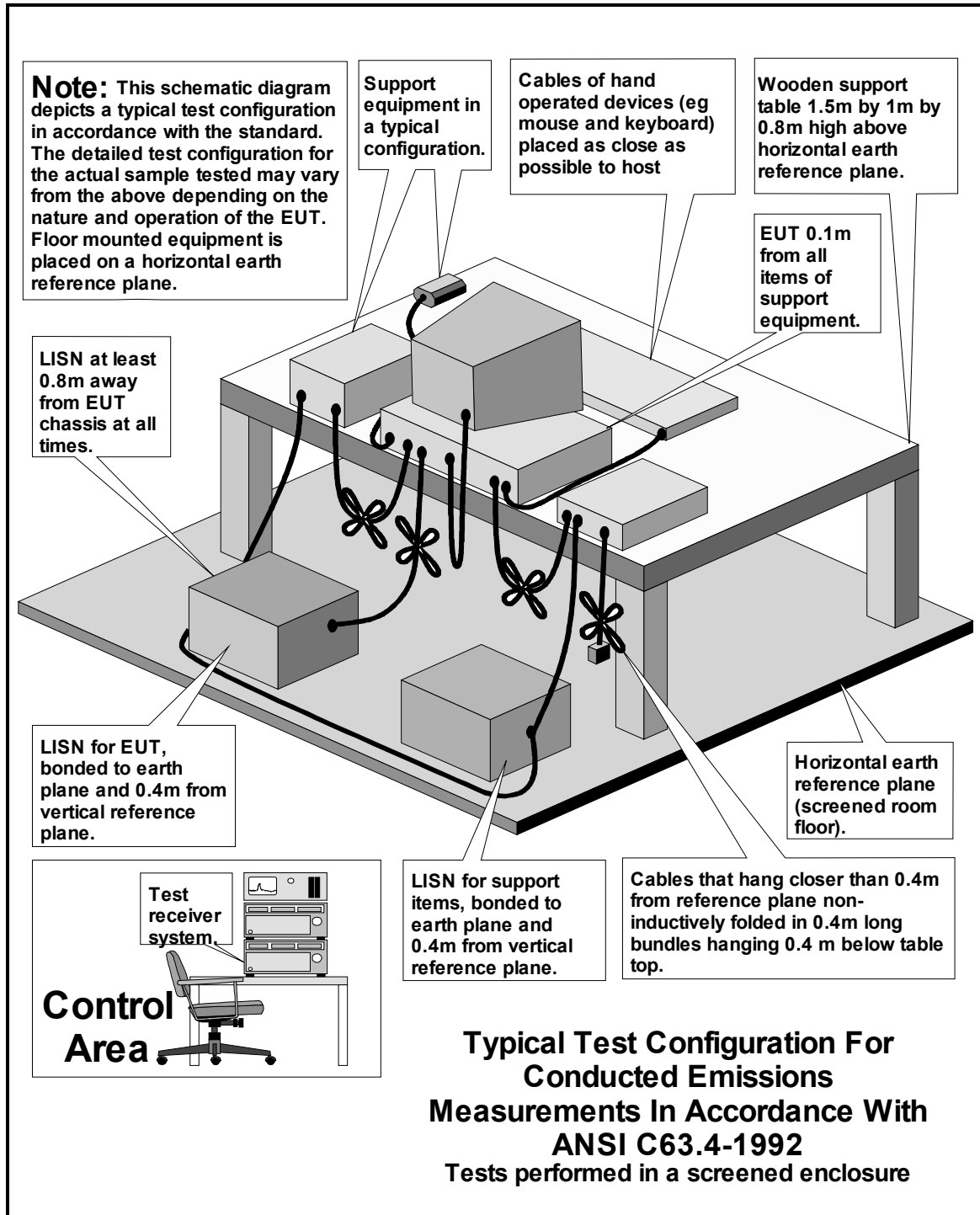
Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

DRG\43652JD04\EMICON



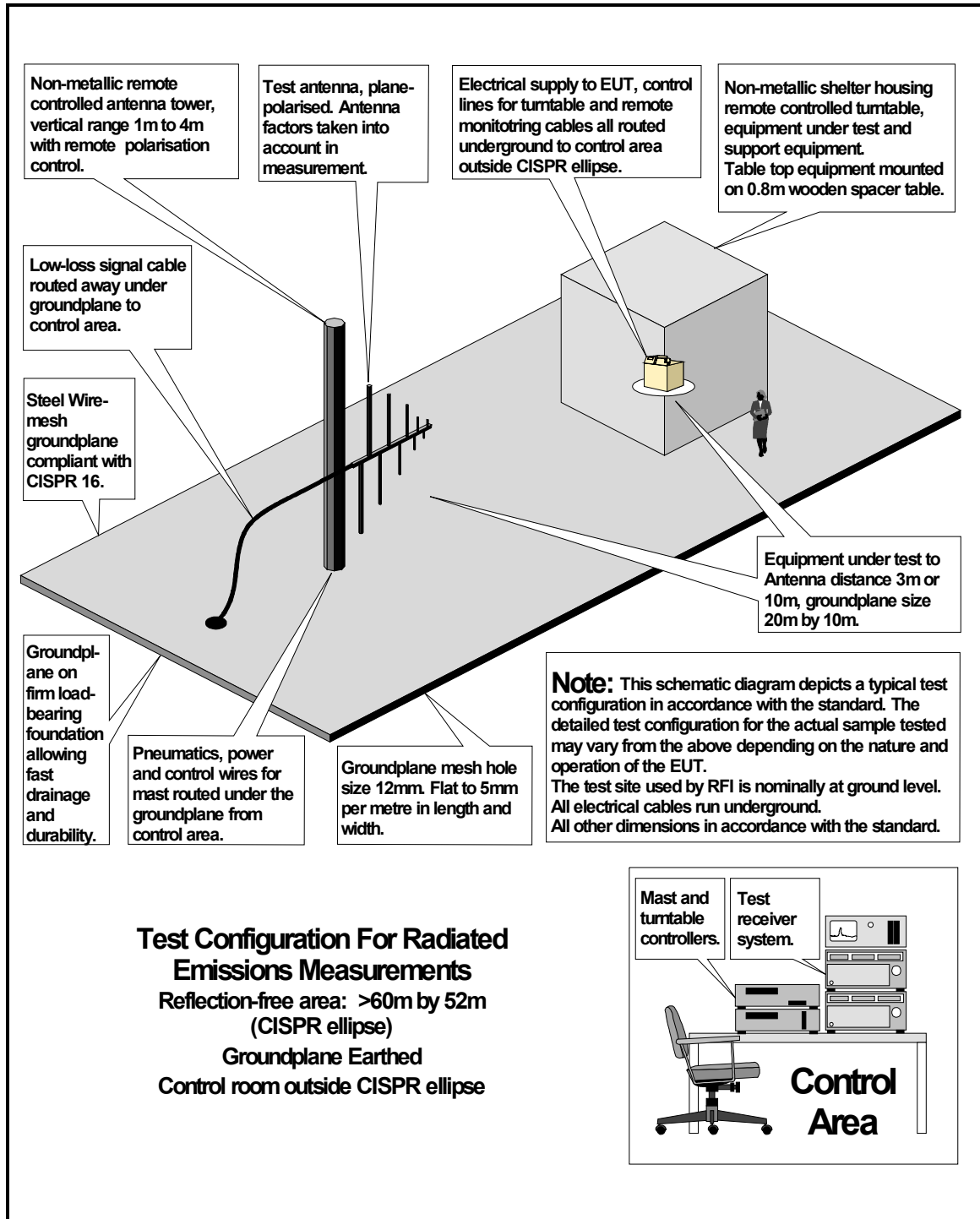
Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

DRG\43652JD04\EMIRAD



Test Of: Sendo Ltd.

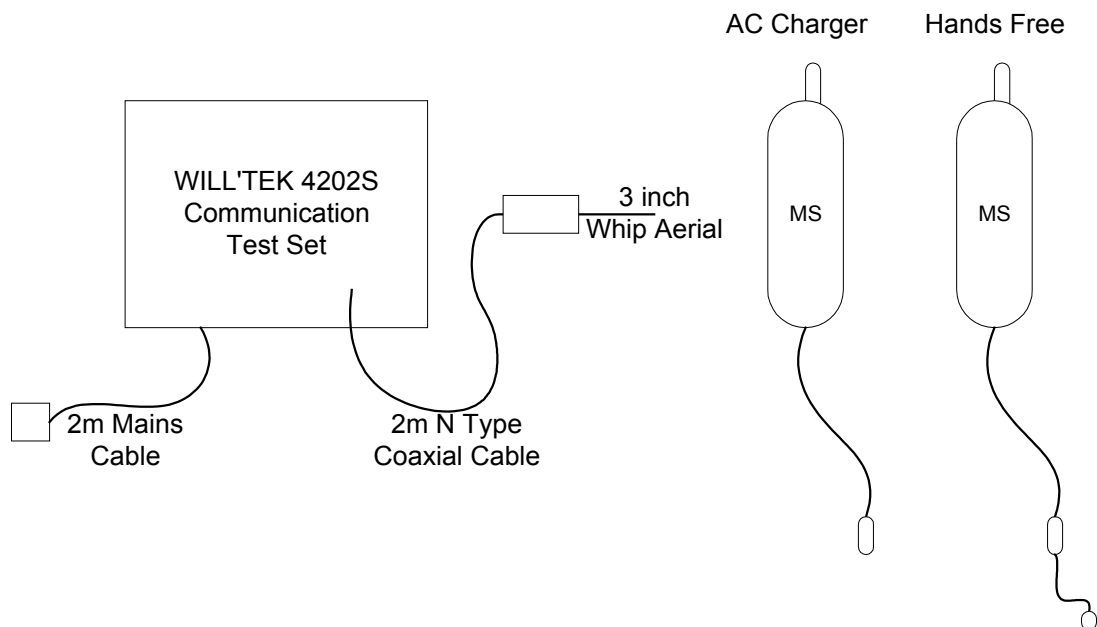
SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

DRG\43652JD04\001

Configuration of EUT and Support Equipment



Test Of: Sendo Ltd.**SND251 Dual Band Mobile Telephone,****Personal Hands Free Headset and US Linear Charger****To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001**

Appendix 4. Graphical Test Results

This appendix contains the following graphs:

Graph Reference Number	Title
GPH\43652JD04\001a	Occupied Bandwidth, Bottom Channel, 1900 Mode
GPH\43652JD04\002a	Occupied Bandwidth, Middle Channel, 1900 Mode
GPH\43652JD04\003a	Occupied Bandwidth, Top Channel, 1900 Mode
GPH\43652JD04\004a	Occupied Bandwidth, Bottom Channel, 850 Mode
GPH\43652JD04\005a	Occupied Bandwidth, Middle Channel, 850 Mode
GPH\43652JD04\006a	Occupied Bandwidth, Top Channel, 850 Mode
GPH\43652JD04\052	Radiated Emissions, Band Edges Transmit 1900 Mode (Bottom Ch): AC Charger.
GPH\43652JD04\053	Radiated Emissions, Band Edges Transmit 1900 Mode (Top Ch): AC Charger
GPH\43652JD04\099	Conducted Emissions, Band Edges Transmit 1900 Mode (Top Channel): HandsFree. FCC Part 2.1051 Class Bottom.
GPH\43652JD04\100	Conducted Emissions, Band Edges Transmit 1900 Mode (Bottom Channel): HandsFree. FCC Part 2.1051 Class Bottom.
GPH\43652JD04\101	Conducted Emissions, Band Edges Transmit 850 Mode (Bottom Channel): HandsFree. FCC Part 2.1051 Class Bottom.
GPH\43652JD04\102	Conducted Emissions, Band Edges Transmit 850 Mode (Top Channel): HandsFree. FCC Part 2.1051 Class Bottom.
GPH\43652JD04\106	Radiated Emissions, Band Edges Transmit 850 Mode (Bottom Ch): AC Charger. FCC Part 2.1053 Class Bottom.
GPH\43652JD04\107	Radiated Emissions, Band Edges Transmit 850 Mode (Top Ch): AC Charger. FCC Part 2.1053 Class Bottom.
GPH\43652JD04\401	Conducted Emissions AC Power Lines Receive 1900
GPH\43652JD04\402	Conducted Emissions AC Power Lines Receive 850

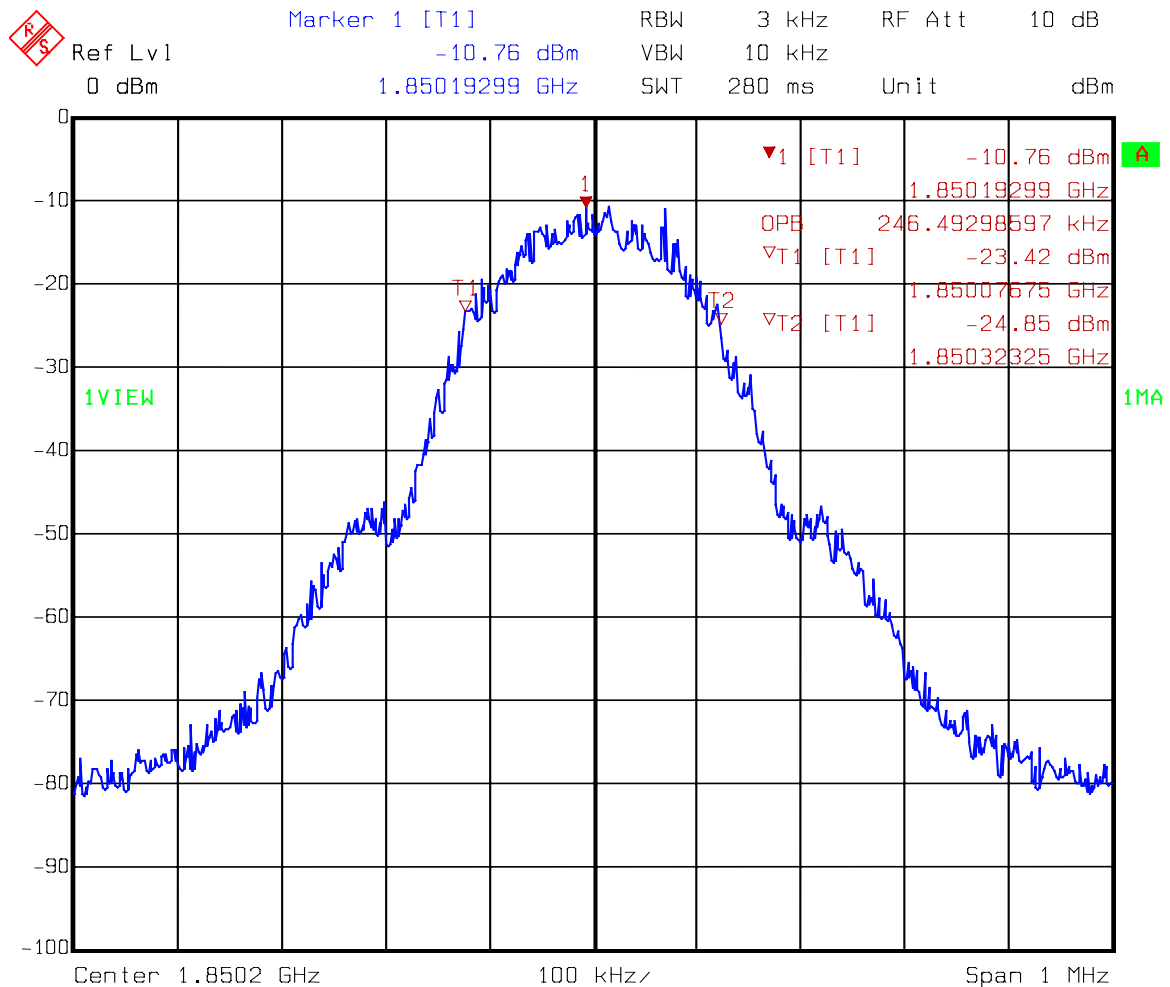
Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

GPH\43652JD04\001a



Date: 8.SEP.2002 16:03:20

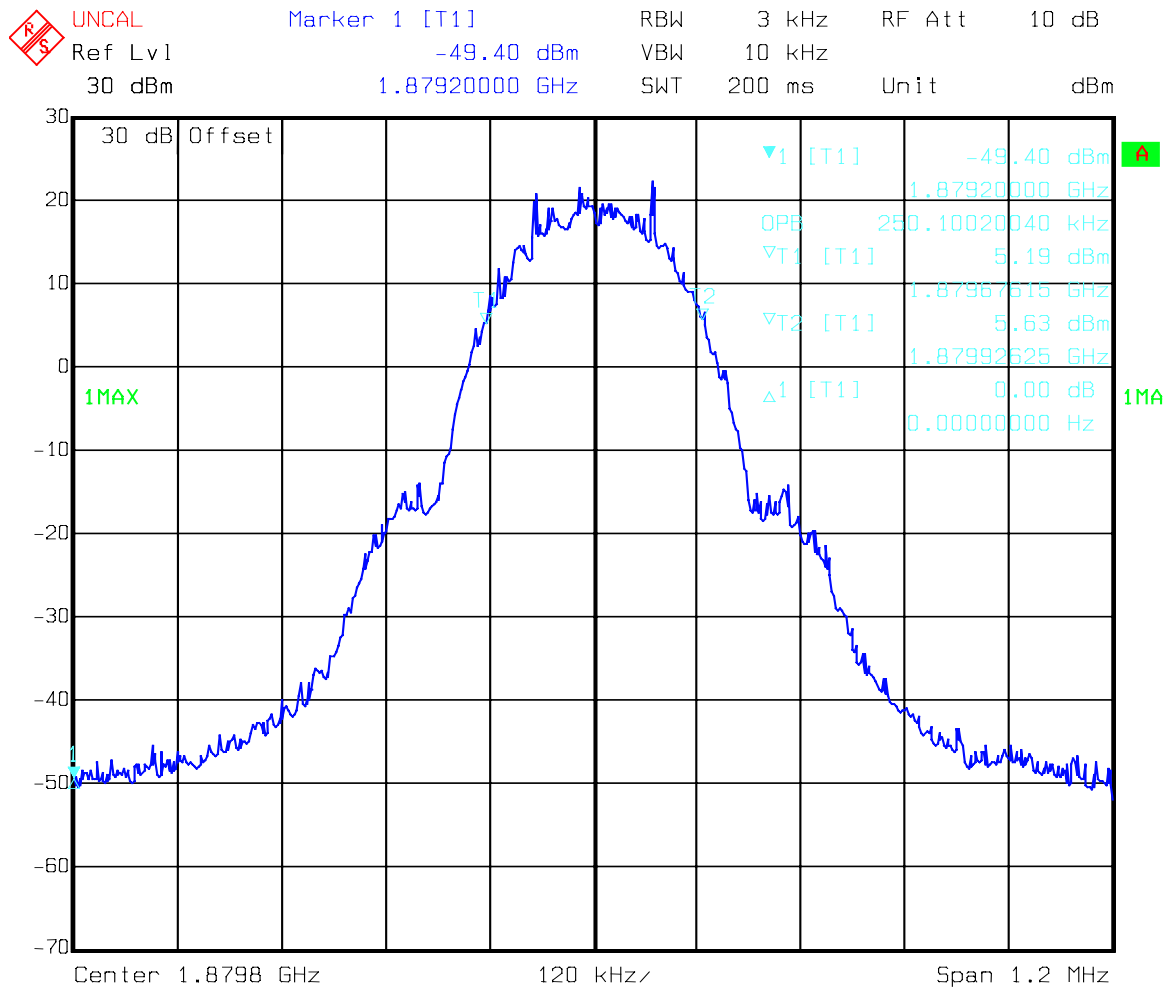
Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

GPH\43652JD04\002a



Date: 8.SEP.2002 15:30:57

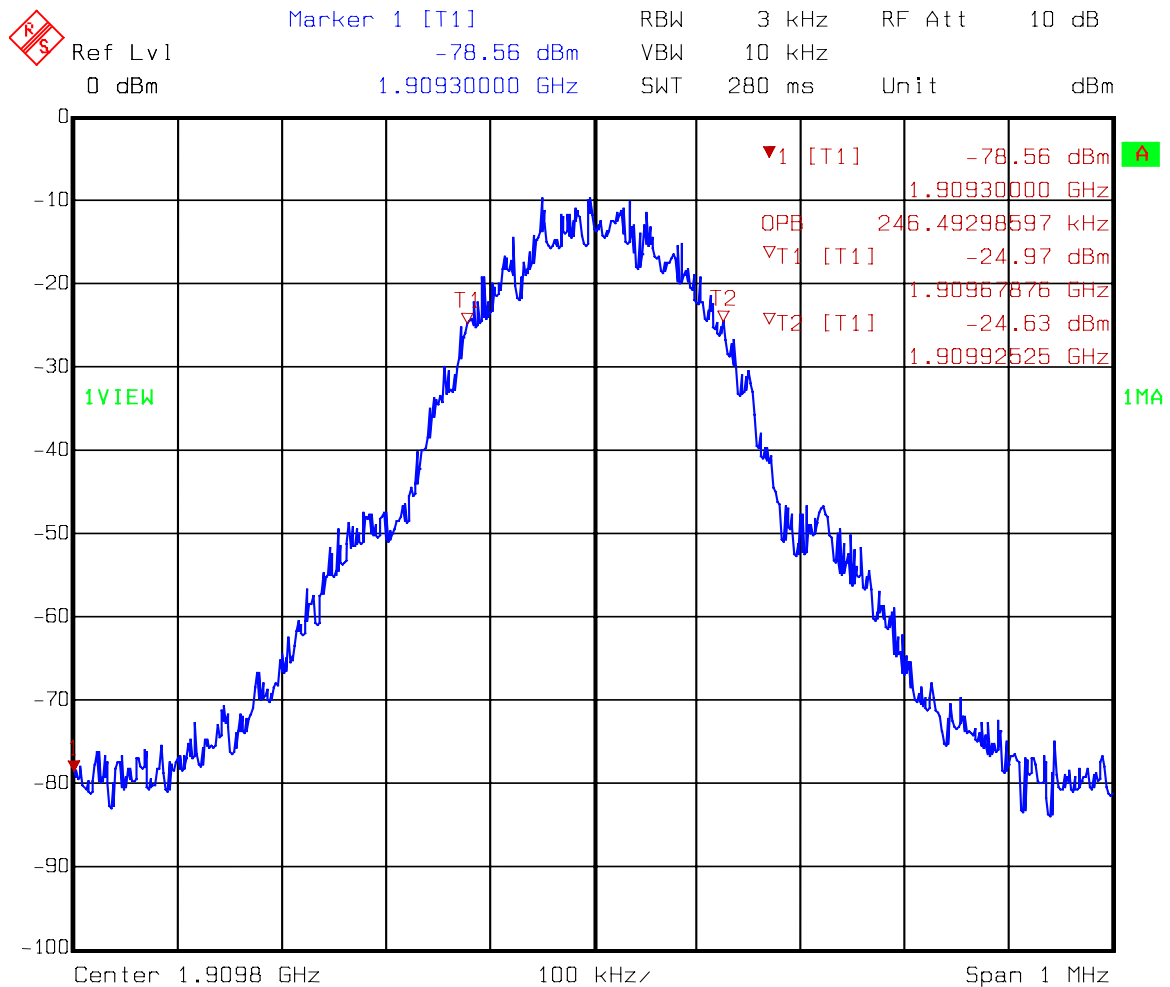
Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

GPH\43652JD04\003a



Date: 8.SEP.2002 16:00:33

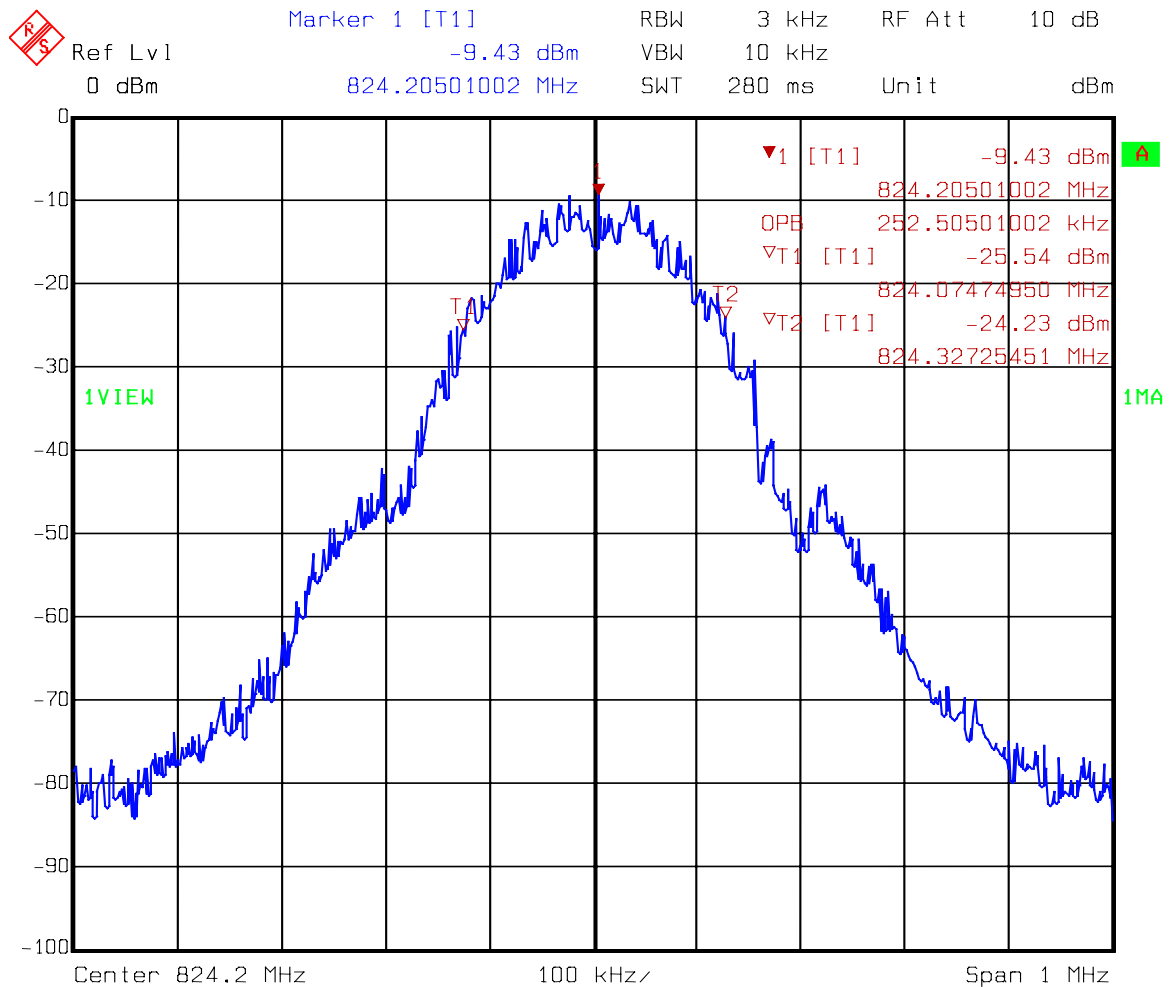
Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

GPH\43652JD04\004a



Date: 8.SEP.2002 16:12:18

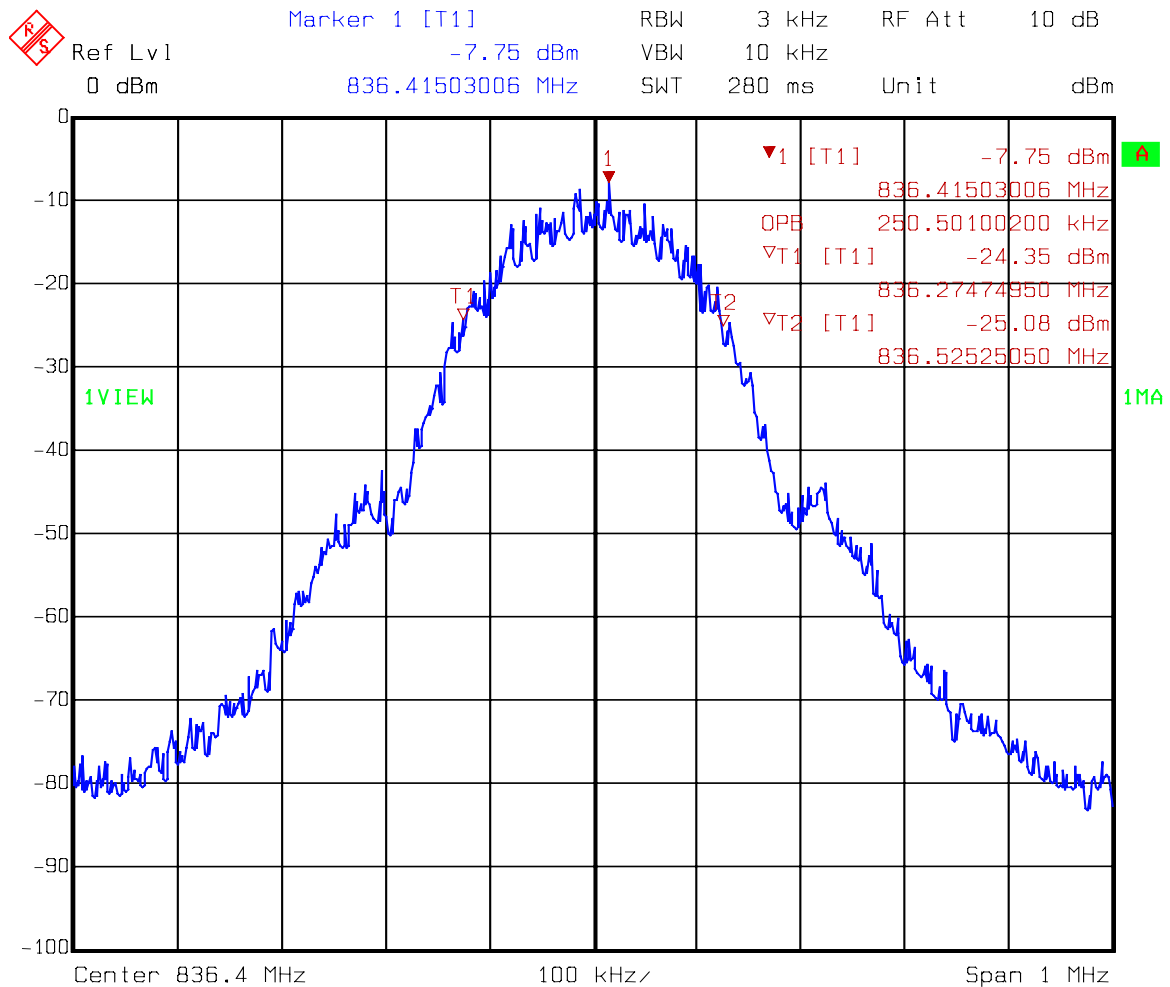
Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

GPH\43652JD04\005a



Date: 8.SEP.2002 16:09:32

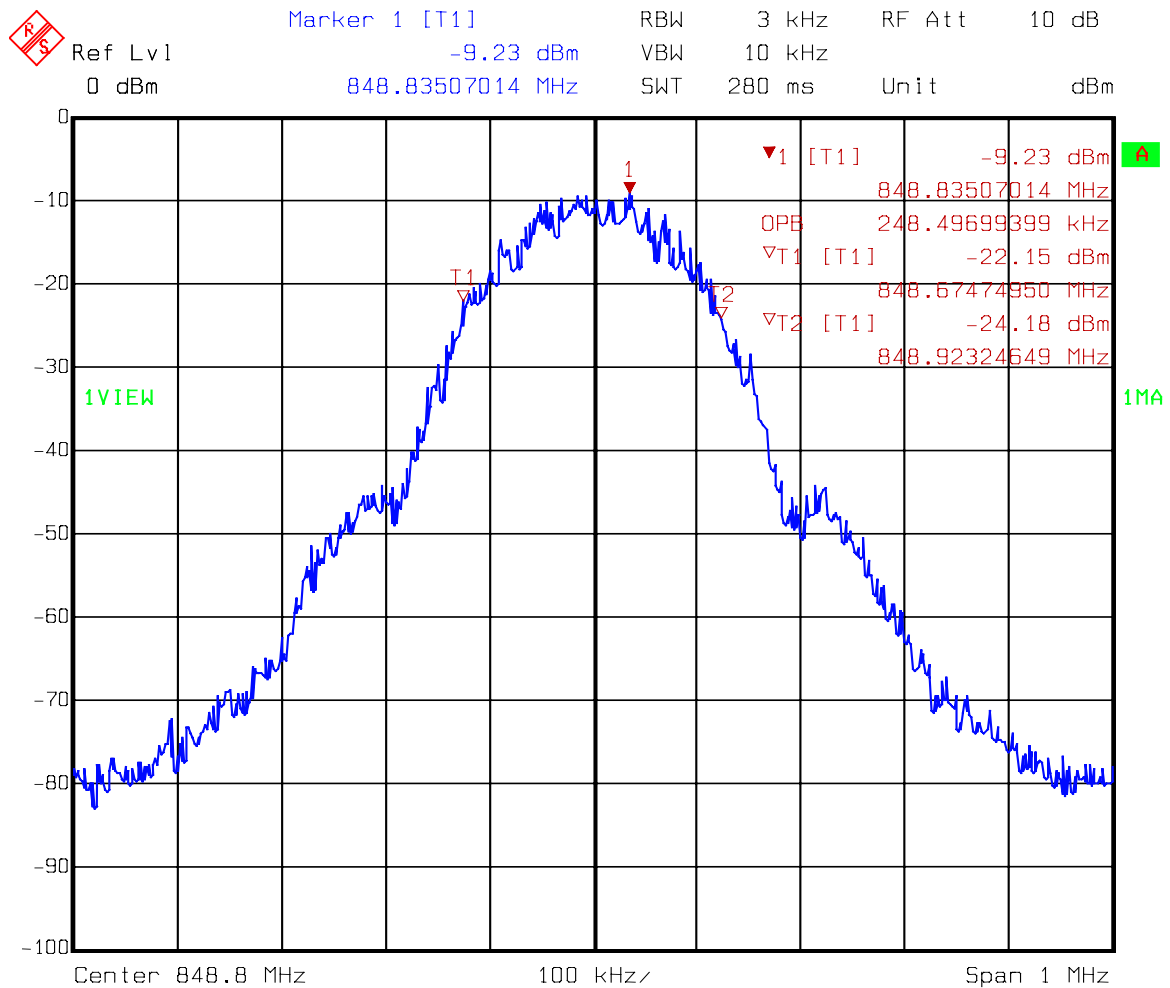
Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

GPH\43652JD04\006a



Date: 8.SEP.2002 16:06:29

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

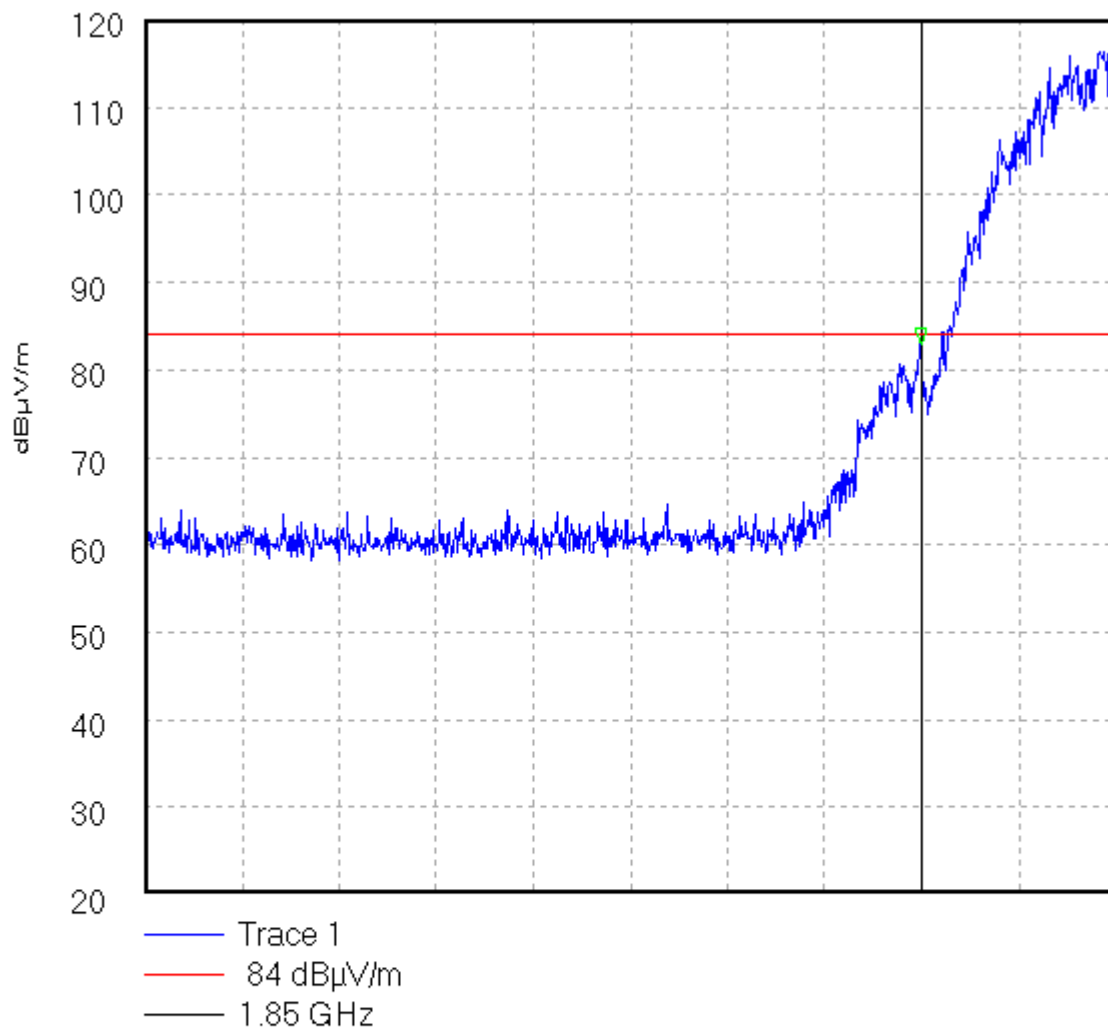
GPH\43652JD04\052

Radiated Emissions testing for SENDO

EUT: SND 251. Band Edges TX 1900 Mode (B CH): AC Charger.

FCC Part 2.1053 Class B. IMEI : 0010310100100500

43652JD04 052



Start 1.849 GHz; Stop 1.85 GHz

Ref 120 dB μ V/m; Ref Offset 0.0 dB; 10 dB/div

RBW 3.0 kHz; VBW 30.0 kHz; Att 30 dB; Swp 340.0 mS

Marker 1.85 GHz, 82.83 dB μ V/mDisplay Line: 84 dB μ V/m;

9/6/02 4:33:33 PM

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

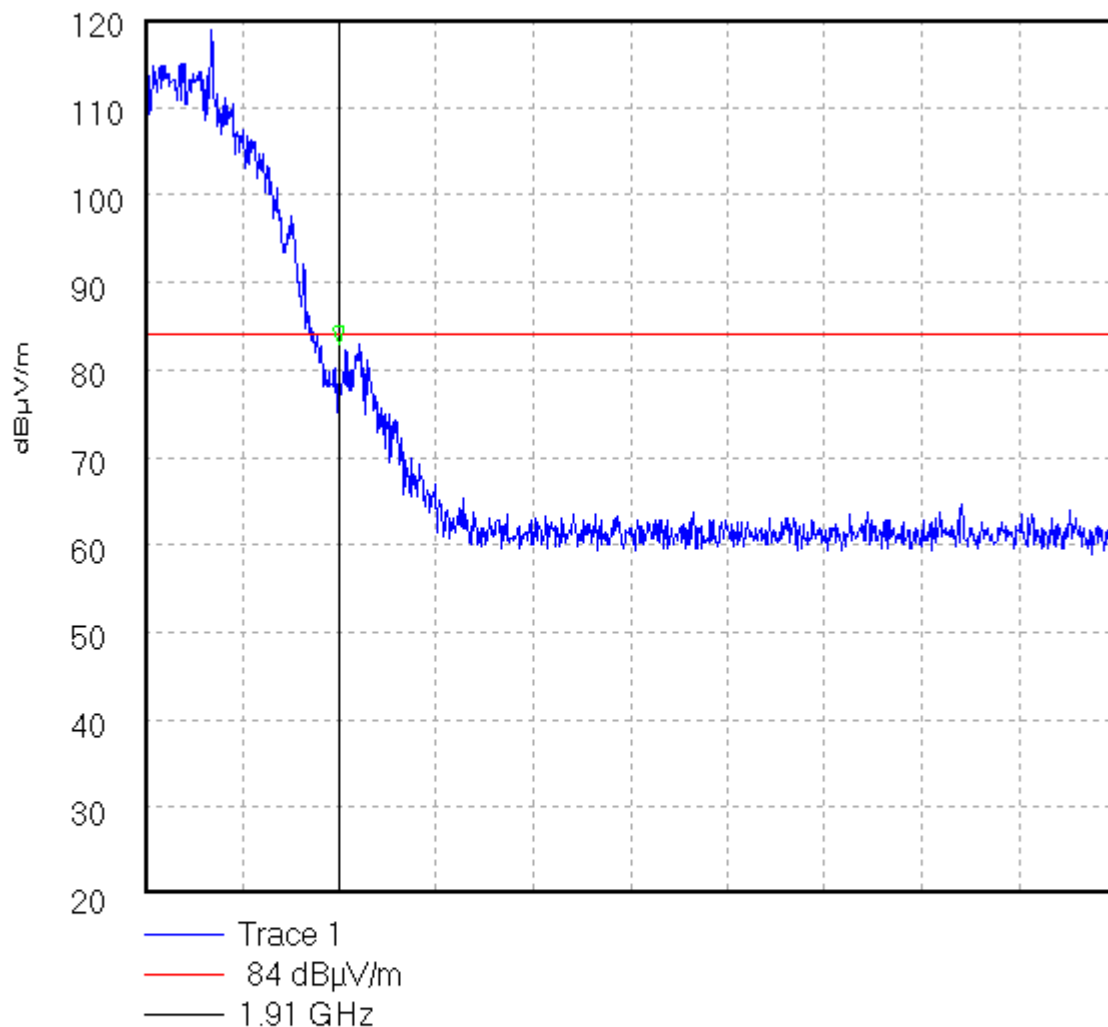
GPH\43652JD04\053

Radiated Emissions testing for SENDO

EUT: SND 251. Band Edges TX 1900 Mode (T CH): AC Charger

FCC Part 2.1053 Class B. IMEI: 0010310100100500

43652JD04 053



Start 1.91 GHz; Stop 1.911 GHz

Ref 120 dB μ V/m; Ref Offset 0.0 dB; 10 dB/div

RBW 3.0 kHz; VBW 30.0 kHz; Att 30 dB; Swp 340.0 mS

Marker 1.91 GHz, 82.88 dB μ V/mDisplay Line: 84 dB μ V/m;

9/6/02 4:36:56 PM

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

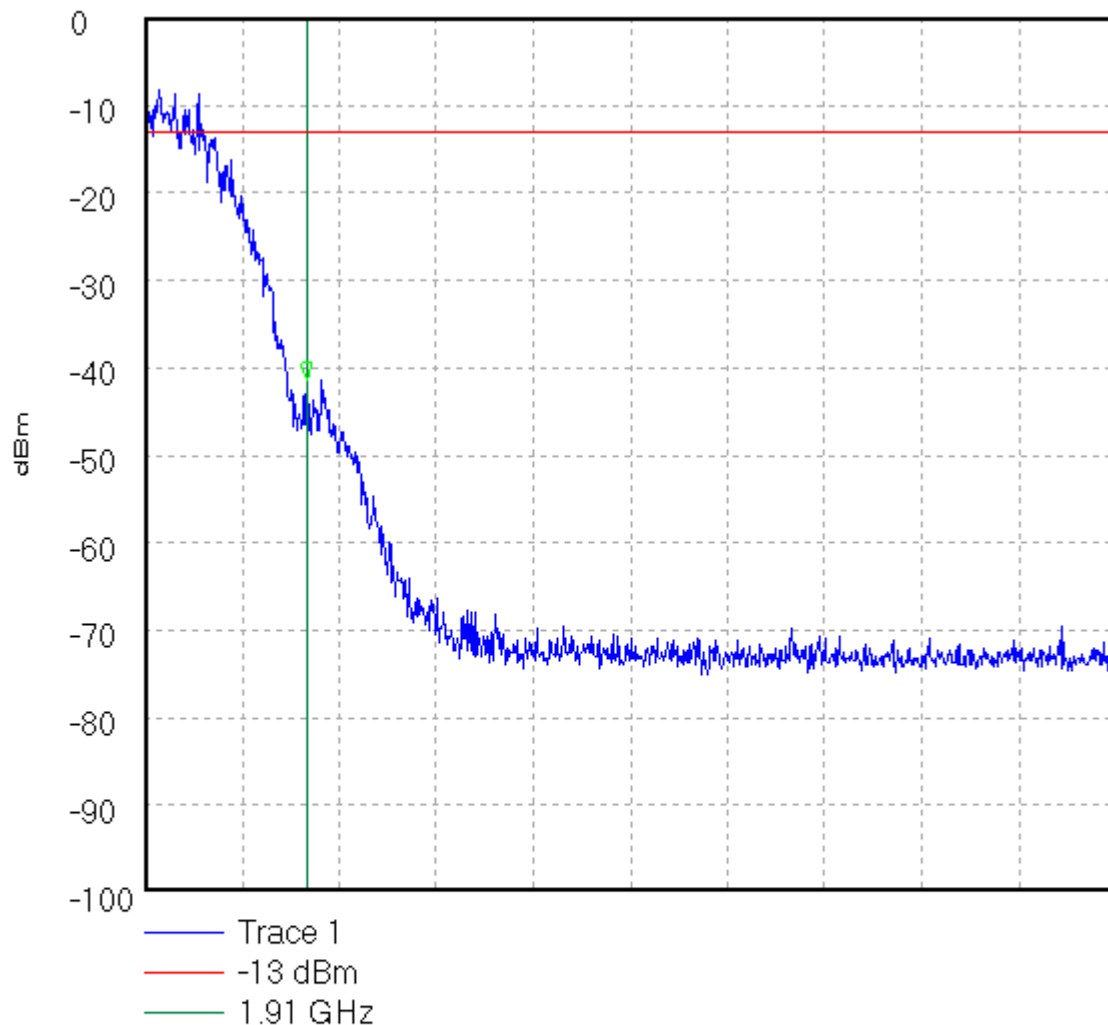
GPH\43652JD04\099

Conducted Emissions testing for SENDO

EUT: SND 251. Band Edges TX 1900 Mode (Top Channel): HandsFree

FCC Part 2.1051 Class B. IMEI: 001031010010076

43652JD04 099



Start 1.91 GHz; Stop 1.911 GHz

Ref 0 dBm; Ref Offset 28.8 dB; 10 dB/div

RBW 3.0 kHz; VBW 30.0 kHz; Att 5 dB; Swp 400.0 mS

Marker 1.91 GHz, -41.41 dBm

Display Line: -13 dBm;

9/10/02 6:10:59 PM

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

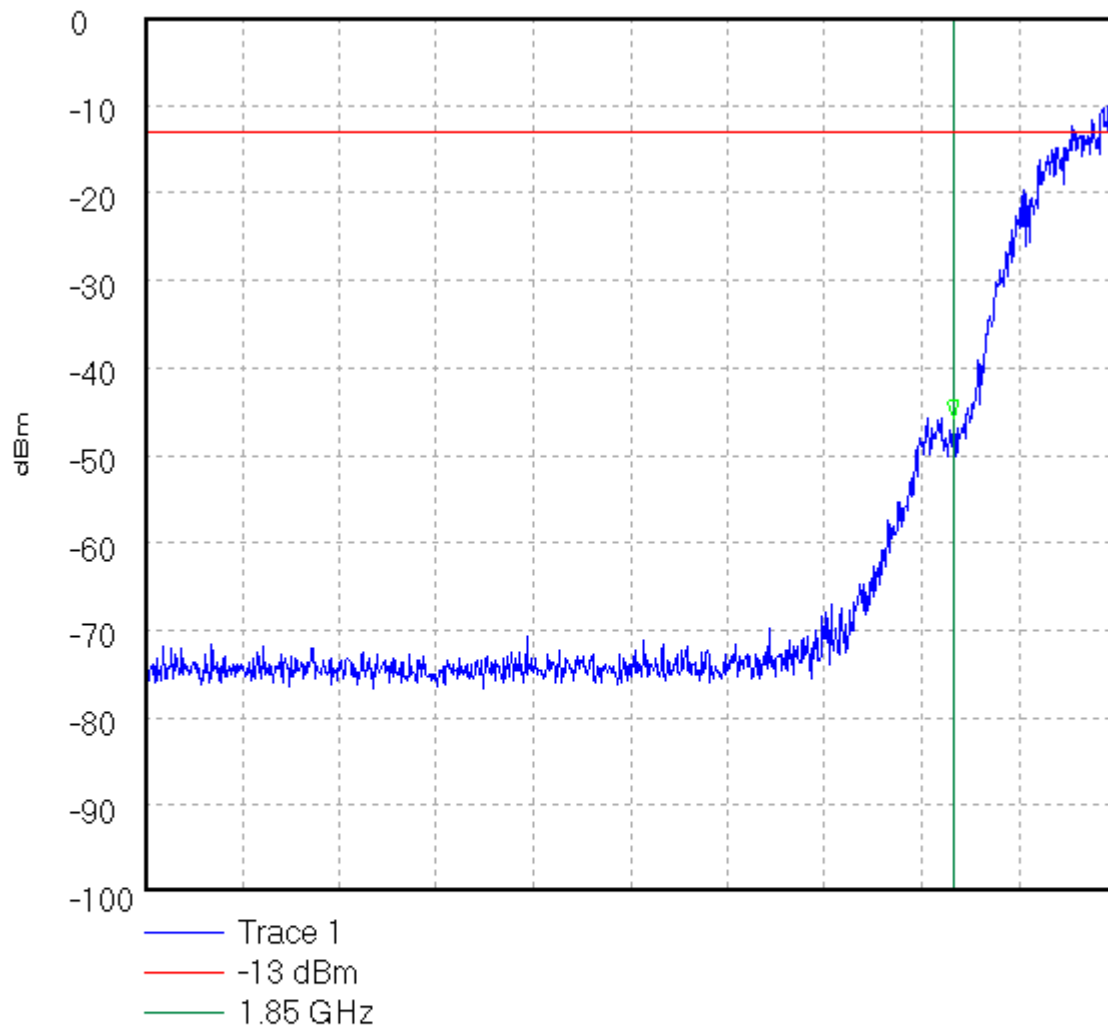
GPH\43652JD04\100

Conducted Emissions testing for SENDO

EUT: SND 251. Band Edges TX 1900 Mode (Bottom Channel): HandsFree.

FCC Part 2.1051 Class B. IMEI: 001031010010076

43652JD04 100



Start 1.849 GHz; Stop 1.85 GHz

Ref 0 dBm; Ref Offset 28.8 dB; 10 dB/div

RBW 3.0 kHz; VBW 30.0 kHz; Att 5 dB; Swp 400.0 mS

Marker 1.85 GHz, -45.81 dBm

Display Line: -13 dBm;

9/10/02 6:19:09 PM

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

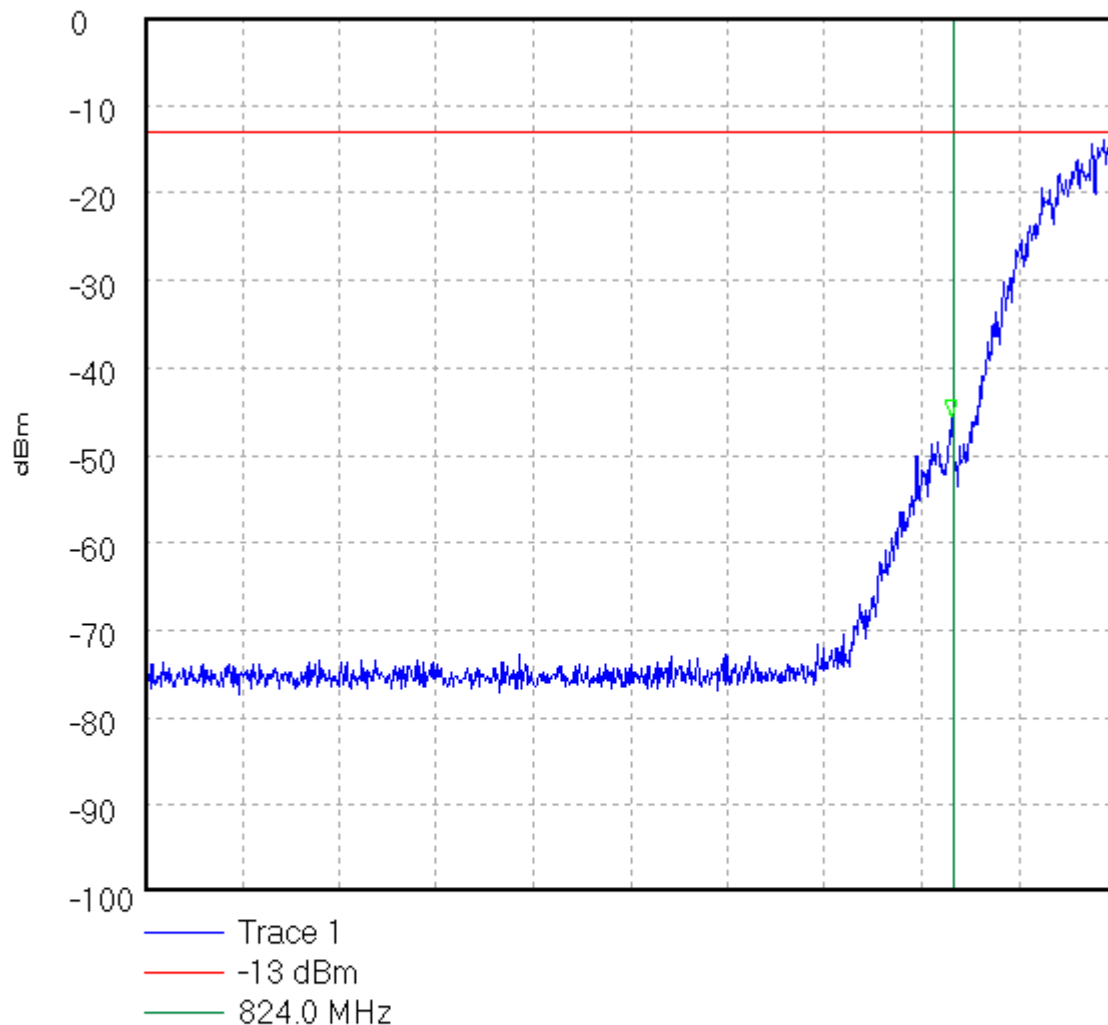
GPH\43652JD04\101

Conducted Emissions testing for SENDO

EUT: SND 251. Band Edges TX 850 Mode (Bottom Channel): HandsFree

FCC Part 2.1051 Class B. IMEI: 001031010010076

43652JD04 101



Start 823.0 MHz; Stop 824.2 MHz

Ref 0 dBm; Ref Offset 28.9 dB; 10 dB/div

RBW 3.0 kHz; VBW 30.0 kHz; Att 5 dB; Swp 400.0 mS

Marker 823.997 MHz, -45.6 dBm

Display Line: -13 dBm;

9/10/02 6:28:02 PM

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

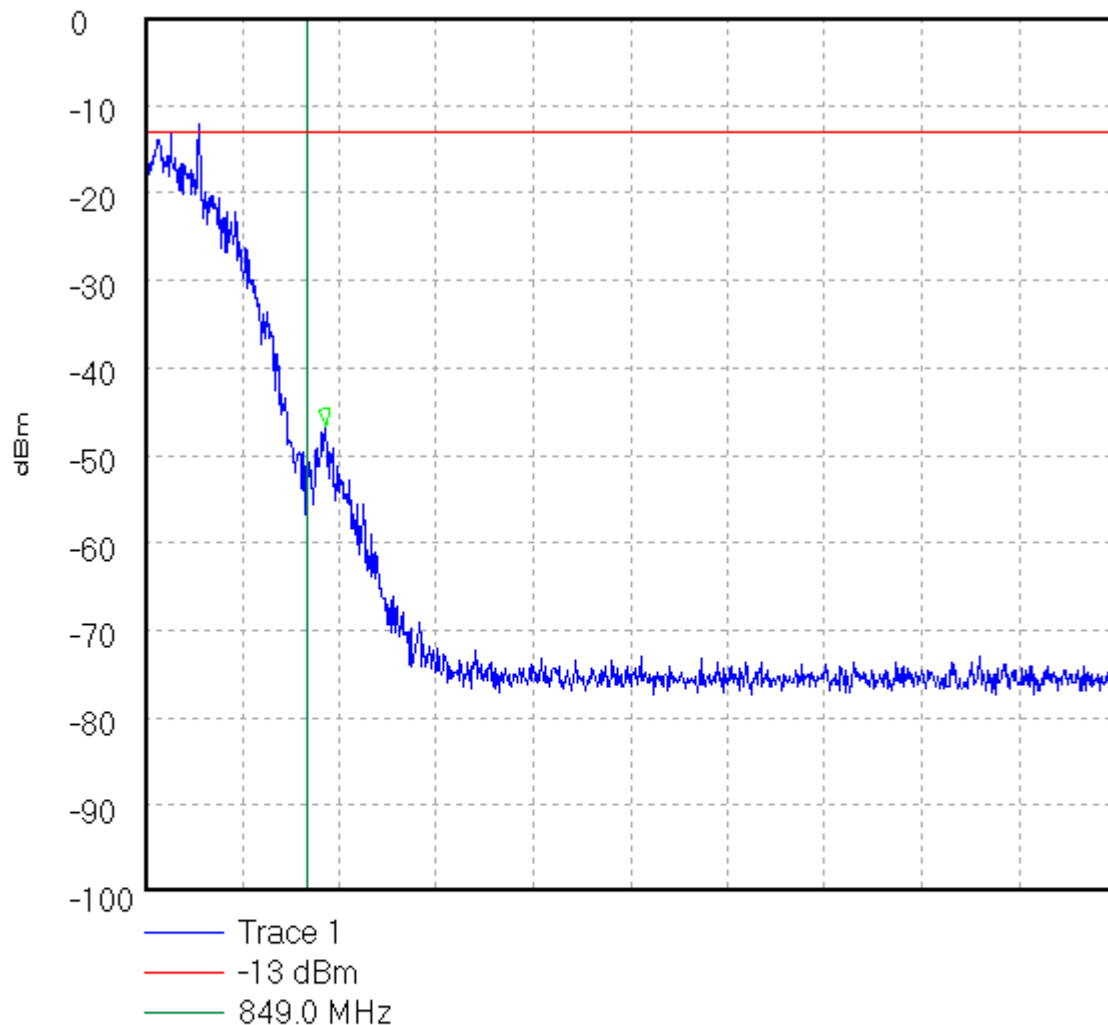
GPH\43652JD04\102

Conducted Emissions testing for SENDO

EUT: SND 251. Band Edges TX 850 Mode (Top Channel): HandsFree

FCC Part 2.1051 Class B. IMEI : 001031010010076

43652JD04 102



Start 848.8 MHz; Stop 850.0 MHz

Ref 0 dBm; Ref Offset 28.9 dB; 10 dB/div

RBW 3.0 kHz; VBW 30.0 kHz; Att 5 dB; Swp 400.0 mS

Marker 849.024 MHz, -46.69 dBm

Display Line: -13 dBm;

9/10/02 6:30:53 PM

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

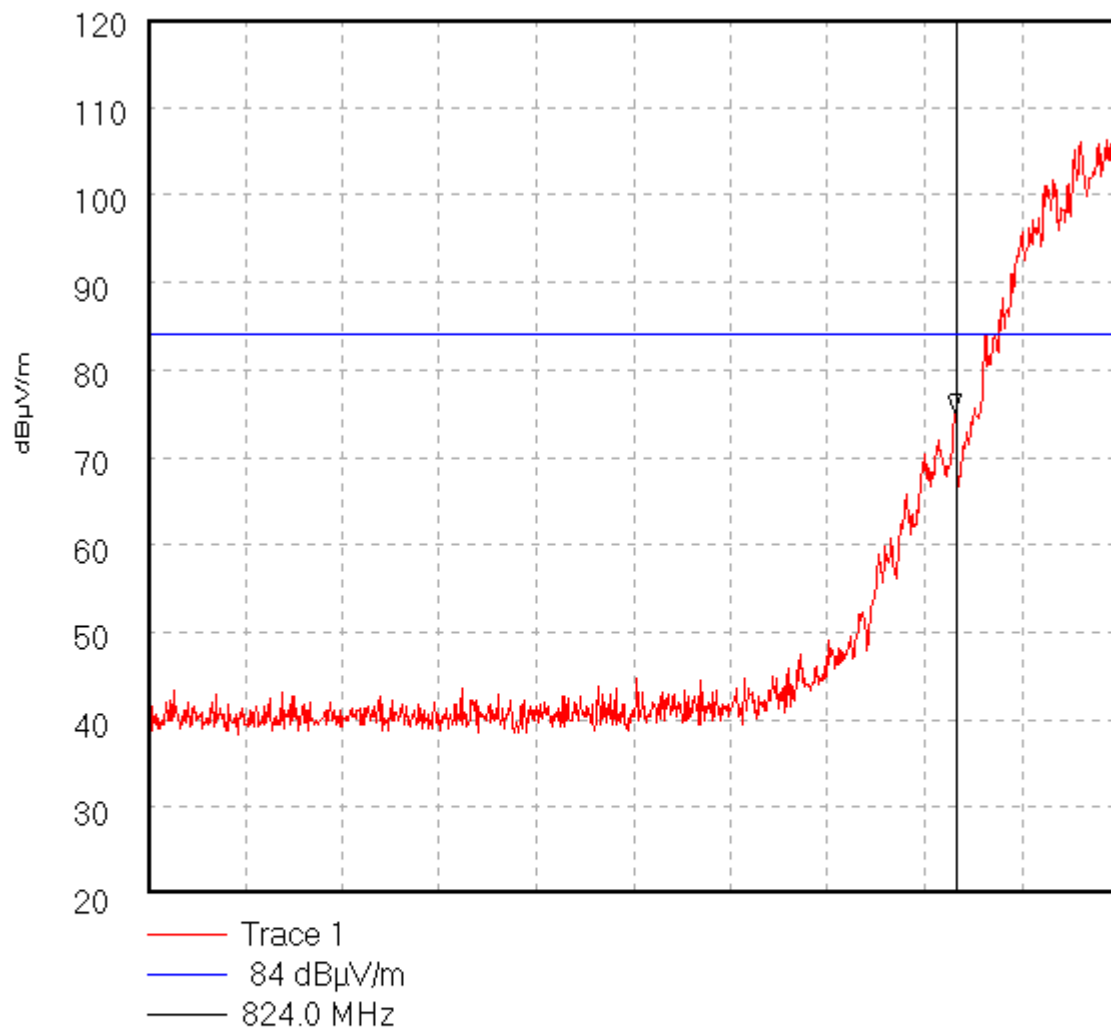
GPH\43652JD04\106

Radiated Emissions testing for SENDO

EUT: SND 251. Band Edges TX 850 Mode (B CH): AC Charger.

FCC Part 2.1053 Class B. IMEI: 0010310100100500

43652jd04 106



Start 823.0 MHz; Stop 824.2 MHz

Ref 120 dB μ V/m; Ref Offset 25.6 dB; 10 dB/div

RBW 3.0 kHz; VBW 30.0 kHz; Att 20 dB; Swp 400.0 mS

Marker 823.999 MHz, 75.11 dB μ V/mDisplay Line: 84 dB μ V/m;

04/01/80 23:19:01

Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

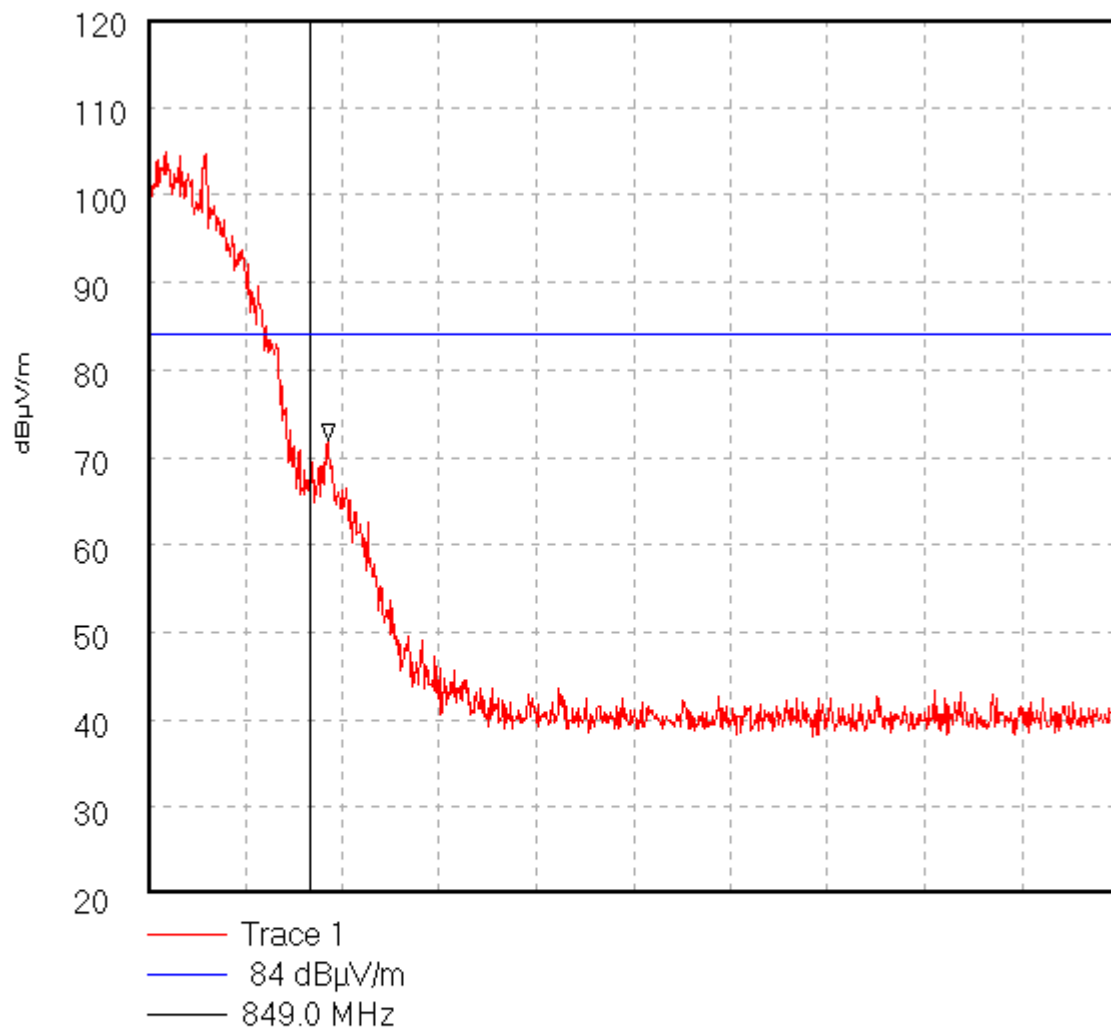
GPH\43652JD04\107

Radiated Emissions testing for SENDO

EUT: SND 251. Band Edges TX 850 Mode (T CH): AC Charger.

FCC Part 2.1053 Class B. IMEI: 0010310100100500

43652jd04 107



Start 848.8 MHz; Stop 850.0 MHz

Ref 120 dB μ V/m; Ref Offset 25.6 dB; 10 dB/div

RBW 3.0 kHz; VBW 30.0 kHz; Att 20 dB; Swp 400.0 mS

Marker 849.023 MHz, 71.86 dB μ V/mDisplay Line: 84 dB μ V/m;

04/01/80 23:34:18

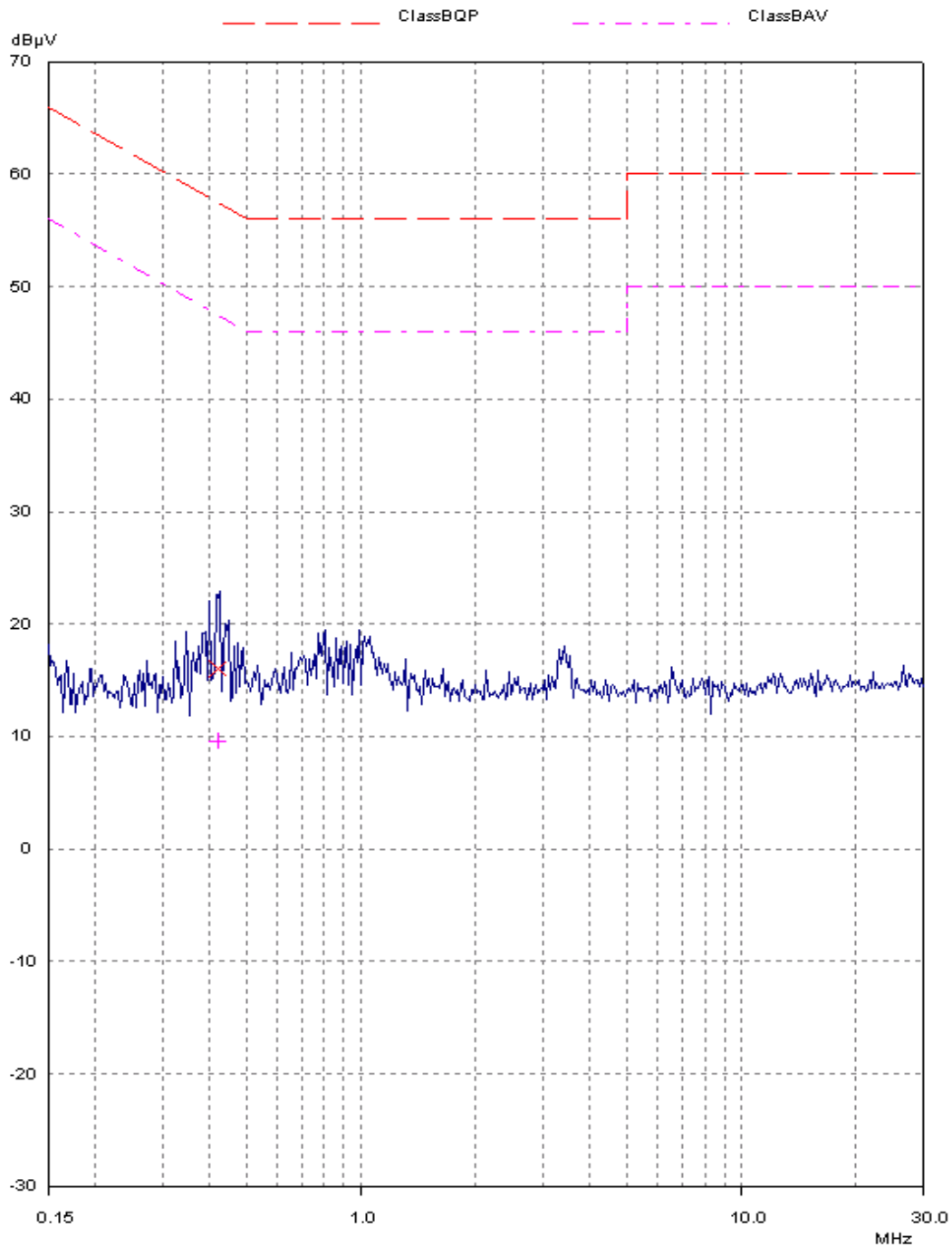
Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

GPH\43652JD04\401
Conducted Emissions AC Power Lines RX 1900



Test Of: Sendo Ltd.

SND251 Dual Band Mobile Telephone,

Personal Hands Free Headset and US Linear Charger

To: FCC Part 15: 2001, FCC Part 22: 2001 and FCC Part 24: 2001

GPH\43652JD04\402
Conducted Emissions AC Power Lines RX 850

