FCC Part 15
EMI TEST REPORT

of

E.U.T. : SST Cordless Phone

MODEL : SN-920 ULTRA
FCC ID. : NI3-SN-920U

for

APPLICANT : SENAO INTERNATIONAL CO., LTD.

ADDRESS : 2FL, NO. 531 CHUNG CHENG RD., HSIN-TIEN CITY, TAIPEI HSIEN, TAIWAN, R.O.C.

Test Performed by

ELECTRONICS TESTING CENTER, TAIWAN
NO. 8 LANE 29, WENMIMG ROAD,
LOSHAN TSUN, KWEISHAN HSIANG,
TAOYUAN, TAIWAN, R.O.C.

Tel:(03)3280026-32
Fax:(03)3280034

Report Number : ET88R12-069-01

TEST REPORT CERTIFICATION

Applicant	: SENAO INTERNATIONAL CO., LTD. 2FL, NO. 531 CHUNG CHENG RD., HSIN-TIEN CITY, TAIPEI HSIEN, TAIWAN, R.O.C.
Manufacturer	: SENAO INTERNATIONAL CO., LTD. 2FL, NO. 531 CHUNG CHENG RD., HSIN-TIEN CITY, TAIPEI HSIEN, TAIWAN, R.O.C.
Description of EUT	:
a) Type of EUT	: SST Cordless Phone
b) Trade Name	: EnGenius
c) Model No.	: SN-920 ULTRA
d) Power Supply	: Handset Unit (750 mAh NiMH), Base Unit (AC Adapter I/P:120V/60Hz, O/P:8Vdc/600mA)
Regulation Applied	: FCC Rules and Regulations Part 15 Subpart C (1998)

I HEREBY CERTIFY THAT: The data shown in this report were made in accordance with the procedures given in ANSI C63.4, and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Note: 1. The result of the testing report relates only to the item tested.
2. The testing report shall not be reproduced expect in full, without the written approval of ETC.

Issued Date : Jan. 21, 2000

Test Engineer : Tien Lu Liau
(Tien Lu Liau)

Approve & Authorized Signer : Will Yauo
Will Yauo, Supervisor
EMI Test Site of ELECTRONICS TESTING CENTER, TAIWAN

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1 GENERAL INFORMATION

1.1 Product Description

a) Type of EUT : SST Cordless Phone
b) Trade Name : EnGenius
c) Model No. : SN-920 ULTRA
d) Power Supply : Handset Unit (750 mAh NiMH), Base Unit (AC Adapter I/P:120V/60Hz, O/P:8Vdc/600mA)

1.2 Characteristics of Device

The SST Cordless Phone using the frquency hopping spread spectrum technology. The base unit plugs into a standard analogue telephone jack and provides a digital wireless communication link with the handset using the 920 to 928 MHz ISM band. It automatically hops to different frequencies over 200 times per second. And the modulation is the binary FSK type.

1.3 Test Methodology

For SST Cordless Phone, both conducted and radiated emissions were performed according to the procedures illustrated in ANSI C63.4(1992) and for processing gain measurement is according to FCC Public Notice. Other required measurements were illustrated in separate sections of this test report for details.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the roof top of Building at No.34, 5 Lirn, Din Fu Tsun, Lin Kou, Taipei, Taiwan, R.O.C.
This site has been fully described in a report submitted to your office, and accepted in a letter dated Feb. 10 , 1997.

2 PROVISIONS APPLICABLE

2.1 Definition

Unintentional radiator:
A device that intentionally generates and radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

Class A Digital Device:
A digital device which is marketed for use in commercial or business environment; exclusive of a device which is market for use by the general public, or which is intended to be used in the home.

Class B Digital Device :
A digital device which is marketed for use in a residential environment notwithstanding use in a commercial, business of industrial environment. Example of such devices that are marketed for the general public.

Note : A manufacturer may also qualify a device intended to be marketed in a commercial, business, or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, Regardless of its intended use.

Intentional radiator:
A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Requirement for Compliance

(1) Conducted Emission Requirement

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following:

Frequency MHz	Emissions μV	Emissions dBμV
0.45 - 30.0	250	48.0

For intentional device, according to § 15.207(a) Line Conducted Emission Limits is same as above table.

(2) Radiated Emission Requirement

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency MHz	Distance Meters	Radiated dBμV/m	Radiated μV/m
30 - 88	3	40.0	100
88 - 216	3	43.5	150
216 - 960	3	46.0	200
above 960	3	54.0	500

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

Per 15.247 (c), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frquency power that produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in 15.209(a) is not required. 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).

(3) Antenna Requirement

For intentional device, according to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

(4) Hopping Channel Separation

According to 15.247(a)(1), frequency hopping system shall have , hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

(5) Number of Hopping frequencies used

According to 15.247(a)(1)(i), for frequency hopping system operating in the 902-928 MHz bands: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies

According to 15.247(a)(1)(ii), for frequency hopping system operating in the 2400-2483.5 MHz and 5725-5850 MHz bands shall use at least 75 hopping frequencies.

(6) Hopping Channel Bandwidth

According to 15.247(a)(1)(i), for frequency hopping system operating in the 902-928 MHz bands, the maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

According to 15.247(a)(1)(ii), for frequency hopping system operating in the 2400-2483.5 MHz and 5725-5850 MHz bands, the maximum 20 dB bandwidth of the hopping channel is 1MHz.

(7) Dwell Time of each hopping frequency

According to 15.247(a)(1)(i), for frequency hopping system operating in the 902-928 MHz band, if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20-second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of cccupancy on any frequency shall not be greater than 0.4 seconds within a 10-second period.

According to 15.247(a)(1)(ii), for frequency hopping system operating in the 2400-2483.5 MHz and 5725-5850 MHz bands, the average time of occupancy on any frequency shall not be greater than 0.4 second within a 30-second period.

(8) Output Power Requirement

For frequency hopping systems operating in the 2400-2483.5 MHz or 5725-5850 MHz band and for all direct sequence systems, according to 15.247(b)(1), the maximum peak output power of the transmitter shall not exceed 1 Watt.

For frequency hopping systems operating in the 902-928 MHz band, according to 15.247(b)(2), 1 Watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 channels.

If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(9) 100 kHz Bandwidth of Frequency Band Edges Requirement

According to 15.247(c), if any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz 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).

2.3 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.25
0.495 - 0.505 **	16.69475 - 16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425 - 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475 - 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3360-4400	Above 38.6
13.36-13.41			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2.4 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions : (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual.

The Federal Communications Commission Radio Frequency Interference Statement includes the following paragraph.

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio / TV technician for help.

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The tested unit is a Spread Spectrum Technology designed cordless telephone. Both handset and base units have a RF power detection function to maintain the good communication between the handset unit and base unit, that is, if the distance between these two units is getting fare, then the output power of each unit will be automaticly increased to maintain the linking. For this reason, all testings are performed under the condition of maximum output power by the way of firmware control, and using a spectrum analyzer to make double checks.

And due to the frequency hopping transmission type, to measure the RF radiation and other relative test items will become unreliable, therefore these test items are performed under the condition of fixed frequency by means of firmware control. For this cordless system uses the frequency band of 902-928 MHz, there are three frequencies to be tested, that is, on lower, middle, and higher frequency. Hance, the test result is definitely sure to comply with the requirements of FCC rules.

3.2 Devices for Tested System

Device	Manufacture	Model / FCC ID.	Cable Description
SST Cordless Phone *	SENAO INTERNATIONAL CO., LTD.	SN-920 ULTRA NI3-SN-920U	3m telephone line x 2 1.8m AC adaptor Power Cord

Remark “*” means equipment under test.

4 RADIATED EMISSION MEASUREMENT

4.1 Applicable Standard

Per 15.247 (c), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frquency power that produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in 15.209(a) is not required. 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).

4.2 Measurement Procedure

1. Setup the configuration per figure 5 and 6 for frequencies measured below and above 1 GHz respectively.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 ° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.

   Note : A band pass filter was used to avoid pre-amplifier saturated when measure TX operation mode in frequency band above 1 GHz.
5. Repeat step 4 until all frequencies need to be measured were complete.
6. Repeat step 5 with search antenna in vertical polarized orientations.
7. Check the three frequencies of highest emission with varying the placement of cables associated with EUT to obtain the worse case and record the result.

Figure 1 : Frequencies measured below 1 GHz configuration

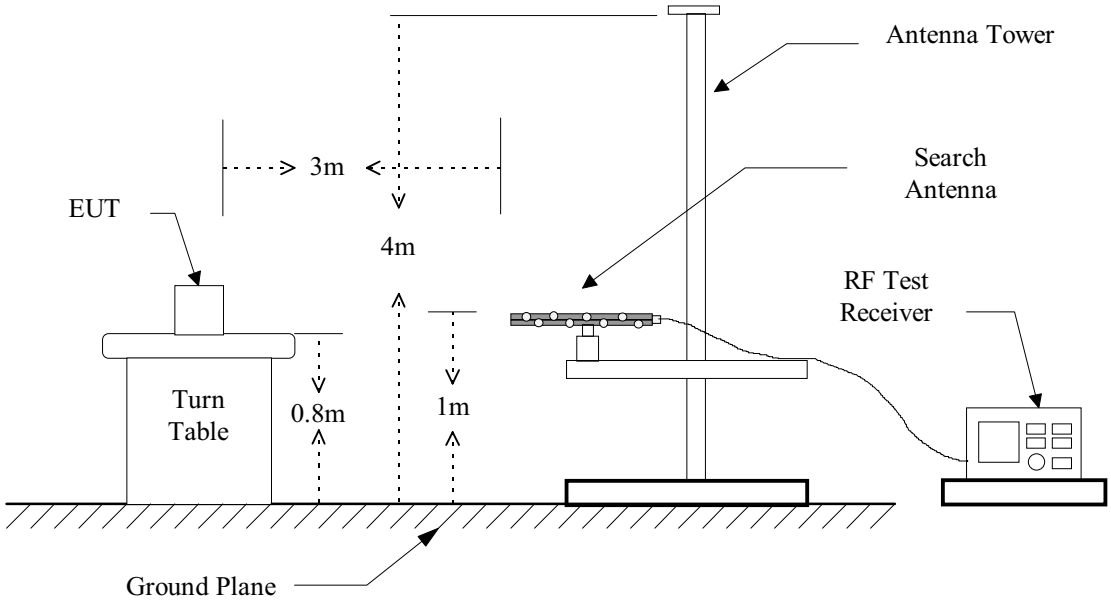
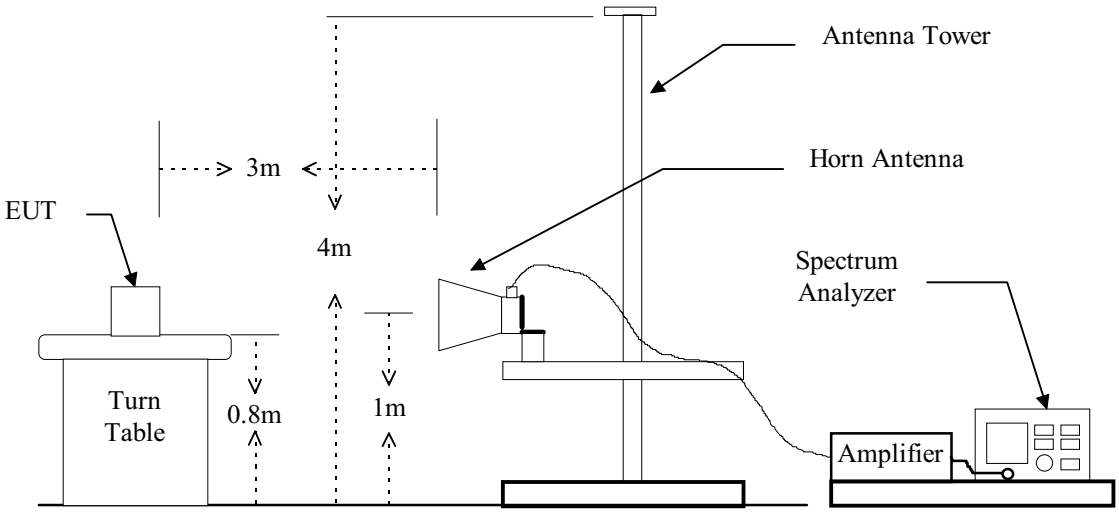


Figure 2 : Frequencies measured above 1 GHz configuration



4.3 Measuring Instrument

The following instrument are used for radiated emissions measurement :

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Hewlett-Packard	8568B	JAN. 10, 2001
Pre-selector	Hewlett-Packard	85685A	JAN. 10, 2001
Quasi Peak Detector	Hewlett-Packard	85650A	JAN. 10, 2001
Spectrum Analyzer	Hewlett-Packard	8564E	JUL. 09, 2000
RF Test Receiver	Rohde & Schwarz	ESVS 30	JAN. 18, 2001
Horn Antenna	EMCO	3115	MAY 12, 2000
Horn Antenna	EMCO	3116	JUN. 22, 2000
Log periodic Antenna	EMCO	3146	NOV. 03, 2000
Biconical Antenna	EMCO	3110	SEP. 22, 2000
Preamplifier	Hewlett-Packard	8449B	JUN. 21, 2000
Preamplifier	Hewlett-Packard	8447D	SEP. 19, 2000

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi-Peak	120 kHz	N/A
	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz
	Spectrum Analyzer	Average	1 MHz	300 Hz

4.4 Radiated Emission Data

4.4.1 Handset Unit

a) Lower Frequncy (Channel 01)

Antenna Type : Fixed Antenna
Operation Mode : Full Power Transmitting
Fundamental Frequency : 902.12 MHz (Tx)
Test Date : May 15, 2000 Temperature : 28 ℃ Humidity : 65%

Frequency	Reading (dBuV) @3m				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)		(dB)	Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave.		(Deg.)	(m)
902.111	117.0	---	125.9	---	2.1	128.0	---	Ref	Ref	Ref	0	1.1
1804.222	66.2	63.5	66.4	63.8	-5.7	60.7	58.1	108.0	88.0	-29.9	180	1.4
Δ2706.333	55.3	52.1	---	---	-2.1	53.2	50.0	74.0	54.0	-4.0	180	1.5
Δ3608.444	50.8	---	51.3	---	0.4	51.7	---	74.0	54.0	-2.3	45	1.1
Δ4510.555	47.6	---	47.3	---	2.0	49.6	---	74.0	54.0	-4.4	0	1.3
Δ5412.666	---	---	---	---	4.1	---	---	74.0	54.0	---	---	---
6314.777	45.8	---	44.8	---	4.5	50.3	---	74.0	54.0	-3.7	180	1.4
7216.888	49.8	42.8	50.2	46.3	5.7	55.9	52.0	74.0	54.0	-2.0	180	1.5
Δ8118.999	45.2	---	51.8	45.6	6.5	58.3	52.1	74.0	54.0	-1.9	180	1.5
Δ9021.110	---	---	---	---	7.0	---	---	74.0	54.0	---	---	---

Note :

1. Remark "Δ" means that the emission frequency is whitin restricted band.
2. Remark "*" means that the emission frequency is produced from local oscillator.
3. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
4. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

Antenna Type : Retractable Antenna

Operation Mode : Full Power Transmitting

Fundamental Frequency : 902.12 MHz (Tx)

Test Date : May 16, 2000 Temperature : 28 ℃ Humidity : 65%

Frequency	Reading (dBuV) @3m				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)		(dB)	Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave.		(Deg.)	(m)
902.111	117.5	---	127.1	---	2.1	129.2	---	Ref	Ref	Ref	0	1.1
1804.222	71.2	69.4	84.0	81.8	-5.7	78.3	76.1	109.2	89.2	-13.1	180	1.4
Δ2706.333	53.8	50.3	51.6	46.4	-2.1	51.7	48.2	74.0	54.0	-5.8	180	1.5
Δ3608.444	52.8	48.1	55.1	51.8	0.4	55.5	52.2	74.0	54.0	-1.8	45	1.1
Δ4510.555	49.2	45.4	50.3	46.3	2.0	52.3	48.3	74.0	54.0	-5.7	0	1.3
Δ5412.666	43.3	---	44.6	---	4.1	48.7	---	74.0	54.0	-5.3	180	1.3
6314.777	48.9	44.8	49.1	44.5	4.5	53.6	49.3	74.0	54.0	-4.7	180	1.4
7216.888	50.2	45.0	51.0	46.9	5.7	56.7	52.6	74.0	54.0	-1.4	180	1.5
Δ8118.999	48.4	42.6	50.8	45.8	6.5	57.3	52.3	74.0	54.0	-1.7	180	1.5
Δ9021.110	46.2	37.8	---	---	7.0	53.2	44.8	74.0	54.0	-9.2	---	---

Note :

1. Remark "Δ" means that the emission frequency is whitin restricted band.
2. Remark "*" means that the emission frequency is produced from local oscillator.
3. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
4. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

b) Middle Frequency (Channel 72)

Antenna Type : Fixed Antenna
Operation Mode : Full Power Transmitting
Fundamental Frequency : Tx 915.046 MHz
Test Date : May 16, 2000 Temperature : 28 ℃ Humidity : 65%

Frequency	Reading (dBuV) @3m				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)		(dB)	Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave.		(Deg.)	(m)
914.863	117.2	---	126.7	---	2.3	129.0	---	Ref	Ref	Ref	0	1.9
1829.726	63.3	60.1	68.6	66.3	-5.6	63.0	60.7	109.0	89.0	-28.3	180	1.4
Δ2744.589	47.1	43.8	52.4	48.8	-2.0	50.4	46.8	74.0	54.0	-7.2	180	1.5
Δ3659.452	45.1	33.6	52.3	42.6	0.6	52.9	43.2	74.0	54.0	-10.8	45	1.1
Δ4574.315	48.8	43.9	51.3	47.6	2.1	53.4	49.7	74.0	54.0	-4.3	0	1.3
5489.178	---	---	---	---	4.4	---	---	74.0	54.0	---	---	---
6404.041	46.9	40.8	49.9	43.5	4.5	54.4	48.0	74.0	54.0	-6.0	180	1.4
Δ7318.904	50.6	45.1	51.6	46.5	5.9	57.5	52.4	74.0	54.0	-1.6	180	1.5
Δ8233.767	45.7	38.2	50.2	42.0	6.6	56.8	48.6	74.0	54.0	-5.4	180	1.5
Δ9148.630	---	---	---	---	7.1	---	---	74.0	54.0	---	---	---

Note :

1. Remark "Δ" means that the emission frequency is whitin restricted band.
2. Remark "*" means that the emission frequency is produced from local oscillator.
3. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
4. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

Antenna Type : Retractable Antenna

Operation Mode : Full Power Transmitting

Fundamental Frequency : Tx 915.046 MHz

Test Date : May 16, 2000 Temperature : 28 ℃ Humidity : 65%

Frequency	Reading (dBuV) @3m				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)		(dB)	Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave.		(Deg.)	(m)
914.863	118.4	---	127.2	---	2.3	129.5	---	Ref	Ref	Ref	0	1.2
1829.726	69.4	66.6	80.1	78.1	-5.6	74.5	72.5	109.5	89.5	-17.0	180	1.4
Δ2744.589	55.9	52.2	48.6	43.7	-2.0	53.9	50.2	74.0	54.0	-3.8	180	1.5
Δ3659.452	50.6	45.1	56.5	51.8	0.6	57.1	52.4	74.0	54.0	-1.6	45	1.1
Δ4574.315	49.0	44.3	49.0	43.6	2.1	51.1	46.4	74.0	54.0	-7.6	0	1.3
5489.178	---	---	---	---	4.4	---	---	74.0	54.0	---	---	---
6404.041	48.3	42.6	47.2	40.5	4.5	52.8	47.1	74.0	54.0	-6.9	180	1.4
Δ7318.904	51.3	45.3	51.9	46.0	5.9	57.8	51.9	74.0	54.0	-2.1	180	1.5
Δ8233.767	45.4	38.3	47.4	40.9	6.6	54.0	47.5	74.0	54.0	-6.5	180	1.5
Δ9148.630	---	---	---	---	7.1	---	---	74.0	54.0	---	---	---

Note :

1. Remark "Δ" means that the emission frequency is whitin restricted band.
2. Remark "*" means that the emission frequency is produced from local oscillator.
3. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
4. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

c) Higher Frequency (Channel 142)

Antenna Type : Fixed Antenna

Operation Mode : Full PowerTransmitting

Fundamental Frequency : Tx 927.790 MHz

Test Date : May 16, 2000 Temperature : 28 ℃ Humidity : 65%

Frequency	Reading (dBuV) @3m				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)		(dB)	Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave.		(Deg.)	(m)
927.607	114.4	---	125.4	---	2.6	128.0	---	Ref	Ref	Ref	220	1.5
1855.214	69.7	---	65.1	---	-5.4	64.3	---	108.0	88.0	-23.7	180	1.4
Δ2782.821	48.7	---	46.1	---	-1.9	46.8	---	74.0	54.0	-7.2	180	1.5
Δ3710.428	47.3	---	48.3	---	0.8	49.1	---	74.0	54.0	-4.9	45	1.1
Δ4638.035	45.5	---	45.3	---	2.2	47.7	---	74.0	54.0	-6.3	0	1.3
5565.642	---	---	---	---	4.4	---	---	74.0	54.0	---	---	---
6493.249	---	---	---	---	4.5	---	---	74.0	54.0	---	---	---
Δ7420.856	46.6	---	47.3	40.6	6.1	53.4	46.7	74.0	54.0	-7.3	180	1.5
Δ8348.463	45.9	---	49.3	42.3	6.7	56.0	49.0	74.0	54.0	-5.0	180	1.5
9276.070	---	---	---	---	7.1	---	---	74.0	54.0	---	---	---

Note :

1. Remark "Δ" means that the emission frequency is whitin restricted band.
2. Remark "*" means that the emission frequency is produced from local oscillator.
3. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
4. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

Antenna Type : Rectractable Antenna

Operation Mode : Full Power Transmitting

Fundamental Frequency : Tx 927.7895 MHz

Test Date : May 16, 2000 Temperature : 28 ℃ Humidity : 65%

Frequency	Reading (dBuV) @3m				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)		(dB)	Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave.		(Deg.)	(m)
927.607	115.8	---	125.4	---	2.6	128.0	---	Ref	Ref	Ref	0	1.2
1855.214	76.4	---	86.7	---	-5.4	81.3	---	108.0	88.0	-6.7	180	1.1
Δ2782.821	58.2	53.9	56.9	52.6	-1.9	56.3	52.0	74.0	54.0	-2.0	0	1.5
Δ3710.428	51.4	---	52.1	---	0.8	52.9	---	74.0	54.0	-1.1	180	1.5
Δ4638.035	49.6	43.6	51.2	44.3	2.2	53.4	46.5	74.0	54.0	-7.5	0	1.1
5565.642	---	---	---	---	4.4	---	---	74.0	54.0	---	---	---
6493.249	46.0	---	46.0	---	4.5	50.5	---	74.0	54.0	-3.5	180	1.3
Δ7420.856	47.8	41.9	46.3	41.1	6.1	53.9	48.0	74.0	54.0	-6.0	180	1.5
Δ8348.463	45.8	40.0	50.7	43.8	6.7	57.4	50.5	74.0	54.0	-3.5	180	1.5
9276.070	---	---	---	---	7.1	---	---	74.0	54.0	---	---	---

Note :

1. Remark "Δ" means that the emission frequency is whitin restricted band.
2. Remark "*" means that the emission frequency is produced from local oscillator.
3. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
4. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

d) Other Emissions

Antenna Type : Fixed Antenna & Retractable Antenna

Operation Mode : Full Power Transmitting

Fundamental Frequency : Normal Hopping

Test Date : Dec. 15, 1999 Temperature : 20℃ Humidity : 80%

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
30-1000	H	---	---	---	---	---	---	---
30-1000	V	---	---	---	---	---	---	---

1. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of 25 dB gain is used).

4.4.2 Base Unit

a) Lower Frequency (Channel 01)

Antenna Type : Indoor Antenna
Operation Mode : Full Power Transmitting
Fundamental Frequency : 902.12 MHz (Tx)
Test Date : May 12, 2000 Temperature : 28 ℃ Humidity : 65%

Frequency	Reading (dBuV) @3m				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)		(dB)	Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave.		(Deg.)	(m)
902.104	114.4	---	125.5	---	2.1	127.6	---	Ref	Ref	Ref	337	1.3
1804.208	77.3	72.3	92.3	87.5	-5.7	86.6	81.8	107.6	87.6	-5.8	90	1.5
Δ2706.312	49.0	---	54.4	52.1	-2.1	52.3	50.0	74.0	54.0	-4.0	180	1.5
Δ3608.416	54.4	50.2	53.4	46.9	0.4	54.8	50.6	74.0	54.0	-3.4	270	1.0
Δ4510.520	---	---	47.2	---	2.0	49.2	---	74.0	54.0	-4.8	0	1.0
Δ5412.624	---	---	47.3	---	4.1	51.4	---	74.0	54.0	-2.6	90	1.2
6314.728	---	---	53.8	46.3	4.5	58.3	50.8	74.0	54.0	-3.2	270	1.5
7216.832	---	---	46.3	---	5.7	52.0	---	74.0	54.0	-2.0	180	1.5
Δ8118.936	---	---	46.4	---	6.5	52.9	---	74.0	54.0	-1.1	---	---
Δ9021.040	---	---	---	---	7.0	---	---	74.0	54.0	---	90	1.5

Note :

1. Remark "Δ" means that the emission frequency is whitin restricted band.
2. Remark "*" means that the emission frequency is produced from local oscillator.
3. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
4. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

Antenna Type : Out Door Antenna
Operation Mode : Full Power Transmitting
Fundamental Frequency : 902.12 MHz (Tx), 1012.713 MHz (Rx)
Test Date : Dec. 21, 1999 Temperature : 19 ℃ Humidity : 80%

Frequency	Reading (dBuV) @3m				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)		(dB)	Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave.		(Deg.)	(m)
902.120	85.0	---	95.9	---	28.7	124.6	---	Ref	Ref	Ref	337	1.3
1804.240	62.1	60.1	76.3	74.4	-5.7	70.6	68.7	104.6	84.6	-15.9	90	1.5
Δ2706.360	47.3	---	51.6	---	-2.1	49.5	---	74.0	54.0	-4.5	180	1.5
Δ3608.480	46.3	---	46.3	---	0.4	46.7	---	74.0	54.0	-7.3	270	1.0
Δ4510.600	45.9	---	---	---	2.0	47.9	---	74.0	54.0	-6.1	0	1.0
Δ5412.720	---	---	52.4	48.5	4.1	56.5	52.6	74.0	54.0	-1.4	90	1.2
6314.840	---	---	48.4	42.7	4.5	52.9	47.2	74.0	54.0	-6.8	270	1.5
7216.960	---	---	47.9	38.5	5.7	53.6	44.2	74.0	54.0	-9.8	180	1.5
Δ8119.080	---	---	---	---	6.5	---	---	74.0	54.0	---	---	---
Δ9021.209	---	---	49.8	44.1	7.0	56.8	51.1	74.0	54.0	-2.9	90	1.5
*1012.713	50.8	---	52.8	---	-9.6	43.2	---	74.0	54.0	-10.8	270	1.3
*2025.460	---	---	44.8	---	-4.5	40.3	---	74.0	54.0	-13.7	180	1.2
*3038.190	---	---	---	---	-1.1	---	---	74.0	54.0	---	---	---
*4050.920	---	---	---	---	2.0	---	---	74.0	54.0	---	---	---
*5063.650	---	---	---	---	3.1	---	---	74.0	54.0	---	---	---

Note :

1. Remark "Δ" means that the emission frequency is whitin restricted band.
2. Remark "*" means that the emission frequency is produced from local oscillator.
3. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
4. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

b) Middle Frequency (Channel 72)

Antenna Type : Indoor Antenna
Operation Mode : Full Power Transmitting
Fundamental Frequency : Tx 915.046 MHz
Test Date : May 12, 2000 Temperature : 28 ℃ Humidity : 65%

Frequency	Reading (dBuV) @3m				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)		(dB)	Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave.		(Deg.)	(m)
914.863	114.9	---	126.2	---	2.3	128.5	---	Ref	Ref	Ref	337	1.3
1829.726	72.8	67.7	85.1	80.3	-5.6	79.5	74.7	107.6	87.6	-12.9	90	1.5
Δ2744.589	48.8	---	52.8	50.5	-2.0	50.8	48.5	74.0	54.0	-5.5	180	1.5
Δ3659.452	---	---	46.2	---	0.6	46.8	---	74.0	54.0	-7.2	270	1.0
Δ4574.315	---	---	---	---	2.1	---	---	74.0	54.0	---	270	1.3
5489.178	---	---	---	---	4.4	---	---	74.0	54.0	---	90	1.2
6404.041	47.0	---	55.5	48.0	4.5	60.0	52.5	74.0	54.0	-1.5	270	1.3
Δ7318.904	---	---	---	---	5.9	---	---	74.0	54.0	---	180	1.5
Δ8233.767	---	---	---	---	6.6	---	---	74.0	54.0	---	180	1.5
Δ9148.630	---	---	---	---	7.1	---	---	74.0	54.0	---	90	1.5

Note :

1. Remark "Δ" means that the emission frequency is whitin restricted band.
2. Remark "*" means that the emission frequency is produced from local oscillator.
3. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
4. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

Antenna Type : Outdoor Antenna

Operation Mode : Full Power Transmitting

Fundamental Frequency: Tx 915.046 MHz, Rx 1025.638 MHz

Test Date : Dec. 21, 1999 Temperature : 19 ℃ Humidity : 80%

Frequency	Reading (dBuV) @3m				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)		(dB)	Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave.		(Deg.)	(m)
915.047	84.9	---	95.9	---	28.8	124.7	---	Ref	Ref	Ref	337	1.3
1830.094	58.1	56.2	64.3	62.8	-5.6	58.7	57.2	104.7	84.7	-27.5	90	1.5
Δ2745.141	53.6	---	53.9	---	-2.0	51.9	---	74.0	54.0	-2.1	180	1.5
Δ3660.188	46.9	---	50.1	---	0.6	50.7	---	74.0	54.0	-3.3	270	1.0
Δ4575.235	46.8	---	49.4	---	2.1	51.5	---	74.0	54.0	-2.5	270	1.3
5490.282	---	---	52.3	48.4	4.4	56.7	52.8	74.0	54.0	-1.2	90	1.2
6405.329	---	---	53.7	47.4	4.5	58.2	51.9	74.0	54.0	-2.1	270	1.3
Δ7320.376	---	---	50.4	41.4	5.9	56.3	47.3	74.0	54.0	-6.7	180	1.5
Δ8235.423	---	---	49.1	39.9	6.6	55.7	46.5	74.0	54.0	-7.5	180	1.5
Δ9150.470	---	---	50.1	45.1	7.1	57.2	52.2	74.0	54.0	-1.8	90	1.5
*1025.638	50.1	---	53.0	---	-9.6	43.4	---	74.0	54.0	-10.6	270	1.3
*2051.276	---	---	45.6	---	-4.4	41.2	---	74.0	54.0	-12.8	180	1.2
*3076.914	---	---	---	---	-1.0	---	---	74.0	54.0	---	---	---
*4102.552	---	---	---	---	2.0	---	---	74.0	54.0	---	---	---
*5128.190	---	---	---	---	3.3	---	---	74.0	54.0	---	---	---

Note :

1. Remark "Δ" means that the emission frequency is whitin restricted band.
2. Remark "*" means that the emission frequency is produced from local oscillator.
3. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
4. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

c) Higher Frequency (Channel 142)

Antenna Type : Indoor Antenna
Operation Mode : Full PowerTransmitting
Fundamental Frequency : Tx 927.789 MHz
Test Date : May 12, 2000 Temperature : 28 ℃ Humidity : 65%

Frequency	Reading (dBuV) @3m				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)		(dB)	Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave.		(Deg.)	(m)
927.607	112.7	---	124.2	---	2.6	126.8	---	Ref	Ref	Ref	337	1.3
1855.214	59.9	54.8	76.3	71.5	-5.4	70.9	66.1	107.6	87.6	-21.5	90	1.5
Δ2782.821	---	---	47.3	---	-1.9	45.4	---	74.0	54.0	-8.6	180	1.5
Δ3710.428	47.2	---	51.5	---	0.8	52.3	---	74.0	54.0	-1.7	270	1.0
Δ4638.035	---	---	---	---	2.2	---	---	74.0	54.0	---	270	1.3
5565.642	---	---	---	---	4.4	---	---	74.0	54.0	---	90	1.2
6493.249	---	---	---	---	4.5	---	---	74.0	54.0	---	270	1.3
Δ7420.856	---	---	---	---	6.1	---	---	74.0	54.0	---	180	1.5
Δ8348.463	---	---	---	---	6.7	---	---	74.0	54.0	---	180	1.5
9276.070	---	---	---	---	7.1	---	---	74.0	54.0	---	90	1.5

Note :

1. Remark "Δ" means that the emission frequency is whitin restricted band.
2. Remark "*" means that the emission frequency is produced from local oscillator.
3. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
4. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

Antenna Type : Outdoor Antenna

Operation Mode : Full PowerTransmitting

Fundamental Frequency: Tx 927.789 MHz, Rx 1038.381 MHz

Test Date : Dec. 21, 1999 Temperature : 19 ℃ Humidity : 80%

Frequency	Reading (dBuV) @3m				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)		(dB)	Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave.		(Deg.)	(m)
927.789	82.9	---	95.9	---	29.0	124.9	---	Ref	Ref	Ref	337	1.3
1855.578	55.7	53.5	70.4	68.7	-5.4	65.0	63.3	104.9	84.9	-21.6	90	1.5
Δ2783.367	47.7	---	46.2	---	-1.8	45.9	---	74.0	54.0	-8.1	180	1.5
Δ3711.156	45.3	---	47.6	---	0.8	48.4	---	74.0	54.0	-5.6	270	1.0
Δ4638.945	46.4	---	46.4	---	2.3	48.7	---	74.0	54.0	-5.3	270	1.3
5566.734	---	---	50.3	46.2	4.4	54.7	50.6	74.0	54.0	-3.4	90	1.2
6494.523	---	---	47.8	---	4.5	52.3	---	74.0	54.0	-1.7	270	1.3
Δ7422.312	---	---	48.1	41.5	6.1	54.2	47.6	74.0	54.0	-6.4	180	1.5
Δ8350.101	---	---	49.6	44.4	6.7	56.3	51.1	74.0	54.0	-2.9	180	1.5
9277.895	---	---	---	---	7.1	---	---	74.0	54.0	---	90	1.5
*1038.382	52.8	---	51.8	---	-9.5	43.3	---	74.0	54.0	-10.7	270	1.3
*2076.764	---	---	45.2	---	-4.3	40.9	---	74.0	54.0	-13.1	180	1.2
*3115.146	---	---	---	---	-0.9	---	---	74.0	54.0	---	---	---
*4153.528	---	---	---	---	2.0	---	---	74.0	54.0	---	---	---
*5191.910	---	---	---	---	3.5	---	---	74.0	54.0	---	---	---

Note :

1. Remark "Δ" means that the emission frequency is whitin restricted band.
2. Remark "*" means that the emission frequency is produced from local oscillator.
3. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
4. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

d) Other Emission

Operation Mode : Hopping
Test Date : Dec. 21, 1999 Temperature : 19 ℃ Humidity : 80%

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
147.432	H	19.6	15.4	35.0	43.5	-8.5	270	4.0
221.166	H	17.7	19.7	37.4	46.0	-8.6	90	4.0
229.366	H	19.3	20.1	39.4	46.0	- 6.6	10	4.0
237.559	H	18.0	20.6	38.6	46.0	-7.4	270	4.0
449.491	H	8.2	21.0	29.2	46.0	-16.8	10	2.0
599.344	H	9.9	22.7	32.6	46.0	-13.4	270	1.8
871.727	V	6.4	29.0	35.4	46.0	-10.6	180	2.0

e) Other Emission frequencies above 1 GHz

Radiated emission frequencies above 1 GHz to 5 GHz were too low to be measured with a pre-amplifier of 35 dB.

4.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, High Pass Filter Loss(if used) and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

where
Corrected Factor = Antenna FACTOR + Cable Loss + High Pass Filter Loss - Amplifier Gain

4.5 Photos of Radiation Measuring Setup

5 CONDUCTED EMISSION MEASUREMENT

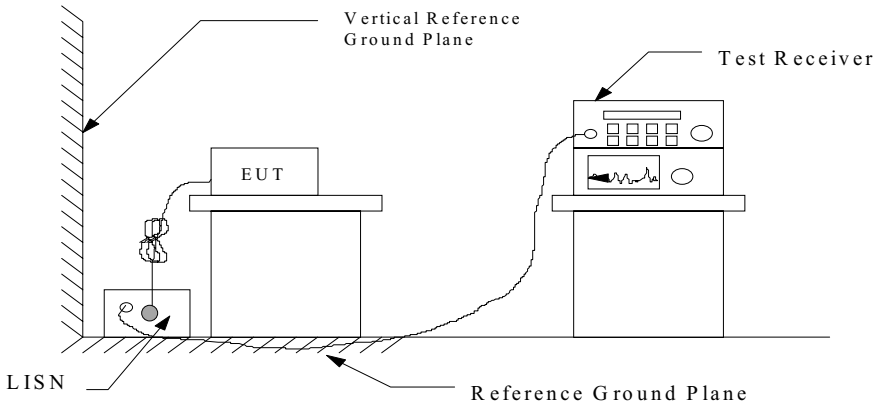
5.1 Standard Applicable

For unintentional and intentional device, Line Conducted Emission Limits are in accordance to § 15.107(a) and § 15.207(a) respectively. Both Limits are identical specification.

5.2 Measurement Procedure

1. Setup the configuration per figure 3.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 6 or 8 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then record the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest three emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

Figure 3 : Conducted emissions measurement configuration



5.3 Conducted Emission Data

5.3.1 Handset Unit

Operation Mode : Charging
Test Date : Dec. 24, 1999 Temperature : 15 ℃ Humidity: 68%

Frequency (MHz)	Reading (dBuV)		Factor (dB)	Result (dBuV)		Limit (dBuV)	Margin (dB)
	Va	Vb		Va	Vb		
0.4560	14.0	14.2	0.2	14.2	14.4	48.0	-33.6
0.7240	16.4	15.8	0.3	16.7	16.1	48.0	-31.3
11.6880	22.7	24.5	0.6	23.3	25.1	48.0	-22.9
15.9790	26.5	25.0	0.8	27.3	25.8	48.0	-20.7
17.7890	26.2	21.3	0.9	27.1	22.1	48.0	-20.9
18.9010	25.6	21.6	0.9	26.5	22.5	48.0	-21.5
26.9470	23.3	19.4	1.0	24.4	20.4	48.0	-23.6

Please see Appendix 1 for plotted data of whole investigated frequency band 0.45 – 30 MHz.

5.3.2 Base Unit

a) Low frequency : Channel 1

Operation Mode : Transmitting
Test Date : Dec. 24, 1999 Temperature : 15 ℃ Humidity: 68%

Frequency (MHz)	Reading (dBuV)		Factor (dB)	Result (dBuV)		Limit (dBuV)	Margin (dB)
	Va	Vb		Va	Vb		
0.4560	17.4	16.2	0.2	17.6	16.4	48.0	-30.4
1.7580	18.2	14.4	0.3	18.5	14.7	48.0	-29.5
12.8920	22.6	24.4	0.7	23.3	25.1	48.0	-22.9
15.9790	27.0	32.8	0.8	27.8	33.6	48.0	-14.4
23.9800	25.8	32.0	1.0	26.8	33.0	48.0	-15.0
25.0080	24.6	28.4	1.0	25.6	29.4	48.0	-18.6

b) Middle frequency : Channel 72

Operation Mode : Transmitting
Test Date : Dec. 24, 1999 Temperature : 15 ℃ Humidity: 68%

Frequency (MHz)	Reading (dBuV)		Factor (dB)	Result (dBuV)		Limit (dBuV)	Margin (dB)
	Va	Vb		Va	Vb		
0.4560	17.3	16.0	0.2	17.5	16.2	48.0	-30.5
1.7580	18.0	14.3	0.3	18.3	14.6	48.0	-29.7
12.8920	22.5	24.2	0.7	23.2	24.9	48.0	-23.1
15.9790	26.8	32.7	0.8	27.6	33.5	48.0	-14.5
23.9800	25.7	31.8	1.0	26.7	32.8	48.0	-15.2
25.0080	24.4	28.3	1.0	25.4	29.3	48.0	-18.7

c) High frequency : Channel 142

Operation Mode : Transmitting
Test Date : Dec. 24, 1999 Temperature : 15 ℃ Humidity: 68%

Frequency (MHz)	Reading (dBuV)		Factor (dB)	Result (dBuV)		Limit (dBuV)	Margin (dB)
	Va	Vb		Va	Vb		
0.4560	17.2	16.1	0.2	17.4	16.3	48.0	-30.6
1.7580	18.1	14.2	0.3	18.4	14.5	48.0	-29.6
12.8920	22.4	24.3	0.7	23.1	25.0	48.0	-23.0
15.9790	26.9	32.6	0.8	27.7	33.4	48.0	-14.6
23.9800	25.6	31.9	1.0	26.6	32.9	48.0	-15.1
25.0080	24.5	28.2	1.0	25.5	29.2	48.0	-18.8

Note : Please see appendix 1 for Plotted Data

5.4 Result Data Calculation

The result data is calculated by adding the Factor (including LISN insertion loss and cable loss) to the measured reading. The basic equation with a sample calculation is as follows:

RESULT = READING + FACTOR

5.5 Conducted Measurement Equipment

The following test equipment are used during the conducted test .

Equipment	Manufacturer	Model No.	Next Cal. Due
RF Test Receiver	Rohde and Schwarz	ESH3	JAN. 10, 2001
Spectrum Monitor	Rohde and Schwarz	EZM	N.C.R.
Line Impedance Stabilization network	Kyoritsu	KNW-407	DEC. 01, 2000
Plotter	Hewlett-Packard	7440A	N/A
Shielded Room	Riken		N.C.R.

5.6 Photos of Conduction Measuring Setup

6 ANTENNA REQUIREMENT

6.1 Standard Applicable

For intentional device, according to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to § 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.2 Antenna Connected Construction and Directional Gain

Handset Unit:

There are two types of mono-pole antenna avalible for the handset unit. One is the fixed antenna and the other is retractable antenna, both of the two antennas are designed with a special manufactured connector and the directional gains are 0 dBi. Please see ***Appendix 2*** for details.

Base Unit:

There are two types of antenna avalible for the base unit. One is the indoor antenna (Dipole type) and the other is outdoor antenna, both of the two antennas employ a reversed TNC connector and the directional gains are 2 dBi and 5.4 dBi (maximum) respectively. Please see ***Appendix 2*** for details.

Note: The maximum ERP of the base unit is 33.0 dBm at 927.79 MHz relative to outdoor antenna and the maximum output power is 29.7 dBm, therefore the maximum directional gain of 5.4 dBi was derived from 33-29.7+2.1 dBi.

7 HOPPING CHANNEL SEPARATION

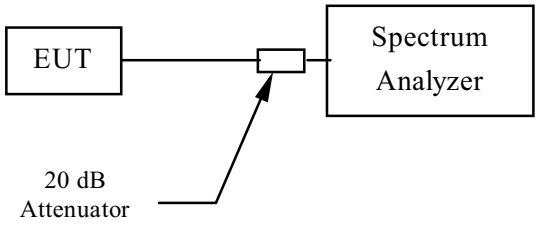
7.1 Standard Applicable

According to 15.247(a)(1), frequency hopping system shall have, hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

7.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Figure 4 : Emission bandwidth measurement configuration.



7.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Hewlett-Packard	8564E	JUL. 09, 2000
Plotter	Hewlett-Packard	7440A	N/A

7.4 Measurement Data

7.4.1 Handset unit

Test Date : Dec. 29, 1999 Temperature : 18 ℃ Humidity: 70%

a) Channel 01 : Adjacent Hopping Channel Separation is 182.5kHz
b) Channel 72 : Adjacent Hopping Channel Separation is 182.5kHz
c) Channel 142 : Adjacent Hopping Channel Separation is 182.5kHz

Note: Please see Appendix 3 for Plotted Data

7.4.2 Base Unit

Test Date : Dec. 29, 1999 Temperature : 18 ℃ Humidity: 70%

a) Channel 01 : Adjacent Hopping Channel Separation is 182.5kHz
b) Channel 72 : Adjacent Hopping Channel Separation is 182.5kHz
c) Channel 142 : Adjacent Hopping Channel Separation is 182.5kHz

8 NUMBER OF HOPPING FREQUENCY USED

8.1 Standard Applicable

According to 15.247(a)(1)(i), for frequency hopping system operating in the 902-928 MHz band, if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20-second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of cccupancy on any frequency shall not be greater than 0.4 seconds within a 10-second period. The maximum allowed 20 dB bandwidth of hopping channel is 500 kHz.

8.2 Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set the SA on MaxHold Mode, and then keep the EUT in hoppping mode. Record all the siganls from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

8.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Hewlett-Packard	8564E	JUL. 09, 2000
Attenuator	Weinschel Engineering	1	N/A

8.4 Measurement Data

8.4.1 Handset Unit

Test Date : Dec. 29, 1999 Temperature : 18 ℃ Humidity: 70%

There are 142 channels in tatol and 64 hopping frequencies are used in a hopping sequence.

8.4.2 Base Unit

Test Date : Dec. 29, 1999 Temperature : 18 ℃ Humidity: 70%

There are 142 channels in tatol and 64 hopping frequencies are used in a hopping sequence.

Note: Please see Appendix 4 for Plotted Data

9 CHANNEL BANDWIDTH

9.1 Standard Applicable

According to 15.247(a)(1)(i), for frequency hopping system operating in the 902-928 MHz band, if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20-second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of cccupancy on any frequency shall not be greater than 0.4 seconds within a 10-second period. The maximum allowed 20 dB bandwidth of hopping channel is 500 kHz.

9.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

9.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Hewlett-Packard	8564E	JUL. 09, 2000
Attenuator	Weinschel Engineering	1	N/A

9.4 Measurement Data

9.4.1 Handset Unit

Test Date : Dec. 29, 1999 Temperature : 18 ℃ Humidity: 70%

a) Channel 01 : Channel Bandwidth is 119.2kHz
b) Channel 72 : Channel Bandwidth is 119.2kHz
c) Channel 142 : Channel Bandwidth is 119.2kHz

9.4.2 Base Unit

Test Date : Dec. 29, 1999 Temperature : 18 ℃ Humidity: 70%

a) Channel 01 : Channel Bandwidth is 120kHz
b) Channel 72 : Channel Bandwidth is 120kHz
c) Channel 142 : Channel Bandwidth is 120kHz

Note: Please see Appendix 5 for Plotted Data

10 DWELL TIME ON EACH CHANNEL

10.1 Standard Applicable

According to 15.247(a)(1)(i), for frequency hopping system operating in the 902-928 MHz band, if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20-second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of cccupancy on any frequency shall not be greater than 0.4 seconds within a 10-second period.

10.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

10.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Hewlett-Packard	8564E	JUL. 09, 2000
Attenuator	Weinschel Engineering	1	N/A

10.4 Measurement Data

10.4.1 Handset Unit

Test Date : Dec. 29, 1999 Temperature : 18 ℃ Humidity: 70%

a) Channel 01 : the dwell time is 79x2=158 ms
b) Channel 72 : the dwell time is 79x2=158 ms
c) Channel 142 : the dwell time is 79x2=158 ms

10.4.2 Base Unit

Test Date : Dec. 29, 1999 Temperature : 18 ℃ Humidity: 70%

a) Channel 01 : the dwell time is 79x2=158 ms
b) Channel 72 : the dwell time is 79x2=158 ms
c) Channel 142 : the dwell time is 79x2=158 ms

Note: Please see Appendix 6 for plotted data

11 OUTPUT POWER MEASUREMENT

11.1 Standard Applicable

For direct sequence system, according to 15.247(b), the maximum peak output power of the transmitter shall not exceed 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

11.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 100 kHz and VBW to 100 kHz.
4. Measure the highest amplitude appearing on spectral display and record the level to calculate result data.
5. Repeat above procedures until all frequencies measured were complete.

11.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Hewlett-Packard	8564E	JUL. 09, 2000
Attenuator	Weinschel Engineering	1	N/A

11.4 Measurement Data

11.4.1 Handset Unit

Test Date : Dec. 29, 1999 Temperature : 18 ℃ Humidity: 70%

a) Channel 01 : Output Peak Power is 29.83 dBm or **961.61** mW
b) Channel 72 : Output Peak Power is 29.67 dBm or **926.83** mW
c) Channel 142 : Output Peak Power is 29.33 dBm or **857.04** mW

11.4.2 Base Unit

Test Date : Dec. 29, 1999 Temperature : 18 ℃ Humidity: 70%

a) Channel 01 : Output Peak Power is 29.67 dBm or **926.83** mW
b) Channel 72 : Output Peak Power is 29.50 dBm or **891.25** mW
c) Channel 142 : Output Peak Power is 29.67 dBm or **926.83** mW

Note: Please see Appendix 7 for Plotted Data

12 BAND EDGES MEASUREMENT

12.1 Standard Applicable

According to 15.247(c), if any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in § 15.209(a), whichever results in the lesser attenuation.

12.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 30 kHz and 100 kHz respectively with a convenient frequency span at least including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

12.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Hewlett-Packard	8564E	JUL. 09, 2000
Attenuator	Weinschel Engineering	1	N/A
Plotter	Hewlett-Packard	7440A	N/A

12.4 Measurement Data

12.4.1 Handset Unit

Test Date : Dec. 29, 1999 Temperature : 18 ℃ Humidity: 70%

a) Lower Band Edge : All emissions in this 100kHz bandwidth are attenuated more than 50dB from the carrier.
b) Upper Band Edge : All emissions in this 100kHz bandwidth are attenuated more than 50dB from the carrier.

12.4.2 Base Unit

Test Date : Dec. 29, 1999 Temperature : 18 ℃ Humidity: 70%

a) Lower Band Edge : All emissions in this 100kHz bandwidth are attenuated more than 50dB from the carrier.
b) Upper Band Edge : All emissions in this 100kHz bandwidth are attenuated more than 50dB from the carrier.

Note: Please see Appendix 8 for Plotted Data.

Appendix 1 : Plotted Data of Power Line Conducted Emissions

Total of 8 pages

Appendix 2 : Engineering Graph of Antenna Construction

Total of 4 pages.

Appendix 3 : Plotted Data for Separation of Adjacent Channel

Total of 6 pages

Appendix 4 : Plotted Data for Total Used Hopping Frequencies

Total of 2 pages

Appendix 5 : Plotted Data for Channel Bandwidth

Total of 6 pages

Appendix 6 : Plotted Data for Channel Dwell Time

Total of 6 pages

Appendix 7 : Plotted Data for Output Peak Power

Total of 6 pages

Appendix 8 : Plotted Data for 100 kHz Bandwidth from Band Edge

Total of 4 pages