

LG Electronics Inc.

Quality & Reliability Center

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CERTIFICATION OF COMPLIANCE

Date of Issue: May 27, 2004

Test Report No: 00431-4529-C4024

Applicant:	LG Electronics Inc.
Regulation:	FCC Part 24 , Part2
Test procedure:	ANSI C63.4-2001, TIA/EIA603
Equipment Class:	Intentional Radiators
EUT Type:	RF Repeater(CDMA)
FCC ID:	BEJREAP10WHE
<u>Trade Name(s):</u>	<u>Model No.:</u>
LG	LGNR 1900CE-10S

This device has been verified to comply with the applicable requirements in the FCC Part 24 & Part2 and was tested in accordance with the measurement procedures specified in ANSI C63.4-2001, TIA/EIA 603.

I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.



Kyeom-Soon Kim / General Manager
Quality and Reliability Center
LG Electronics Inc.

REPORT FOR AN INTENTIONAL RADIATORS

U.S. Responsible Party: LG Electronics USA Inc.
Address: 6133 North River Road, Suite 1100 (Riverway Plaza)
Rosemont, IL 60018, USA

Contact Person: P. H. Byun, General Manager
Telephone No.: (847) 692-4630 EXT.329
Manufacturer: LG Electronics Inc.
Address: Information & Communications Plant, 19-1, Cheongho-Ri,
Jinwuy-Myun, Pyungtaek-City, kyunggi-do, Korea
FCC ID No.: BEJREAP10WHE
EUT Class: Intentional Radiators
EUT Type: RF Repeater
Trade Name: LG
Model No.: LGNR 1900CE-10S
Rule Part: FCC Part 24, Part2
Test Procedure: ANSI C63.4-2001, TIA/EIA603
Date of Test: February 16 ~ May 10, 2004
Date of Receipt of EUT: February 12, 2004
Date of Issue: May 27, 2004
Test Report No.: 00431-4529-C4024
Test Result: **Positive**

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Quality and Reliability Center reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production unit of this model are manufactured with identical electrical and mechanical components.

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Tested by:



Y. S. Lee / Senior Research Engineer
Quality and Reliability Center
LG Electronics Inc.

Reviewed by:



J. C. Lee / Senior Research Engineer
Quality and Reliability Center
LG Electronics Inc.

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1. GENERAL INFORMATION

1.1 Descriptions of equipment under test (EUT)

- 1.1.1 Manufacturer: LG Electronics Inc.
299, Kongdan-Dong, Kumi-city, Kyongsangbuk-Do Korea
- 1.1.2 EUT Type: RF Repeater(CDMA)
- 1.1.3 Model No.: LGNR 1900CE-10S(1900MHz PCS Block E)
- 1.1.4 Serial No.: N/A
- 1.1.5 Trade Name: LG
- 1.1.6 FCC ID No.: BEJREAP10WHE
- 1.1.7 System characteristic and descriptions
 - 1) Output power: 39.4dBm (Conducted)
 - 2) Antenna type: Dipole Type 50 ohms
 - 3) Transmitting of frequency range:
 - Downlink : 1965 ~ 1970 MHz.
 - Uplink : 1885 ~ 1890 MHz

1.2 Regulations applied to EUT

FCC Part 24 ; Part2

1.3 Measurement procedure

ANSI C63.4-2001, TIA/EIA603

Both conducted and radiated testing were performed according to the procedures documented on chapter 13 of ANSI C63.4 and TIA/EIA603

1.4 Measurement place

LG Electronics Inc. Quality and Reliability Center
36, Munlae-dong, 6-ga, Youngdungpo-gu, Seoul 150-096, Korea

2. TEST SITE

Anechoic chamber

The test facilities used to perform radiated and conducted emissions tests are accredited by Nation Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200040-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.

2.2 A shielded enclosure

The measurement of conducted spurious emissions was made in a shielded enclosure providing sufficient shielding effectiveness.

3. CALIBRATIONS OF MEASURING INSTRUMENTS

All measurements were made with instruments calibrated according to the recommendation by manufacturer. Measurement of radiated emissions and conducted emissions were made with instruments conforming to American National Standards Institute, ANSI C63.4-2001. The calibration of measuring instrument, including any accessories that may affect test results, were performed according to the recommendation by manufacturer.

4. DESCRIPTION OF TEST CONDITION

4.1 RF Power Output : § 24.232(a)

Equipment is a bi-directional amplifier repeater on E-band frequency for broadband PCS. The downlink input is connected to a signal generator through a power divider. The input to the amplifier is set such that the maximum power output is achieved at the customer supplied antenna connectors.

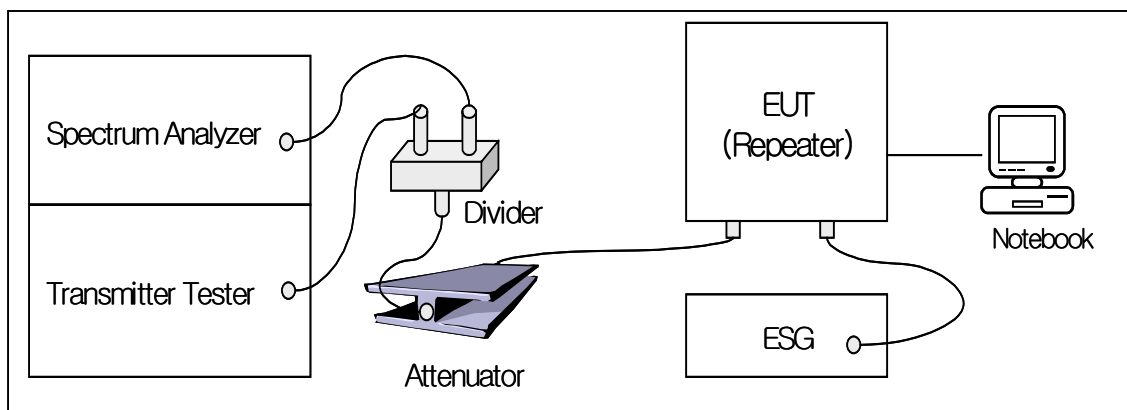


Figure1. RF Power Output (conducted) measurement

4.2 Occupied Bandwidth : § 2.1049

As required by §2.1033(c)(14) and §2.1049 of CFR47, occupied bandwidth measurements were made on the Repeater. Equipment is a bi-directional amplifier repeater for broadband PCS. The signal input is connected to the signal generators through a power divider. The input to the amplifier is set such that the maximum power output is achieved at the customer supplied antenna connectors. Maximum Allowable Downlink Power Output is 40dBm and Maximum Allowable Uplink Power Output is 25dBm. Using a bandwidth of 30kHz, we determined the occupied bandwidth of the emission at the center of the selectable channel range.

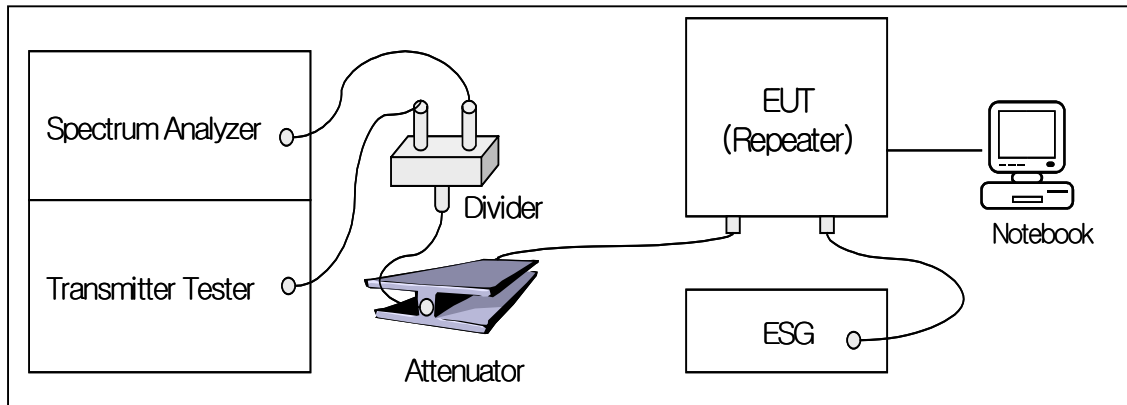
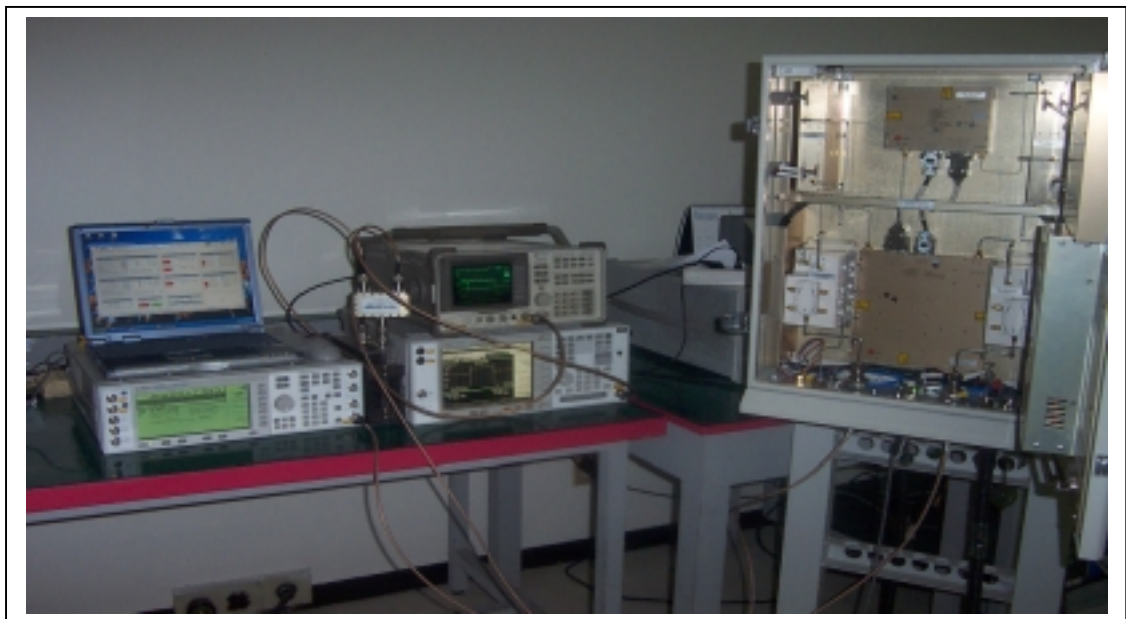


Figure2. Occupied Bandwidth measurement



Photograph of Test Configuration

4.3 Spurious Emission at Antenna Terminal: § 2.1051;24.238(a)(b)

- 1) EUT's RF output connector (made solely for the purpose of the test) is connected to the spectrum analyzer, and set as close as possible to the bottom of the block edge and one set as close as possible to the top of the block edge. Set the RES BW to 1% of the emission bandwidth to show compliance with the -13dBm limit, in the 2 MHz bands immediately outside and adjacent to the top and bottom edges of the frequency block.

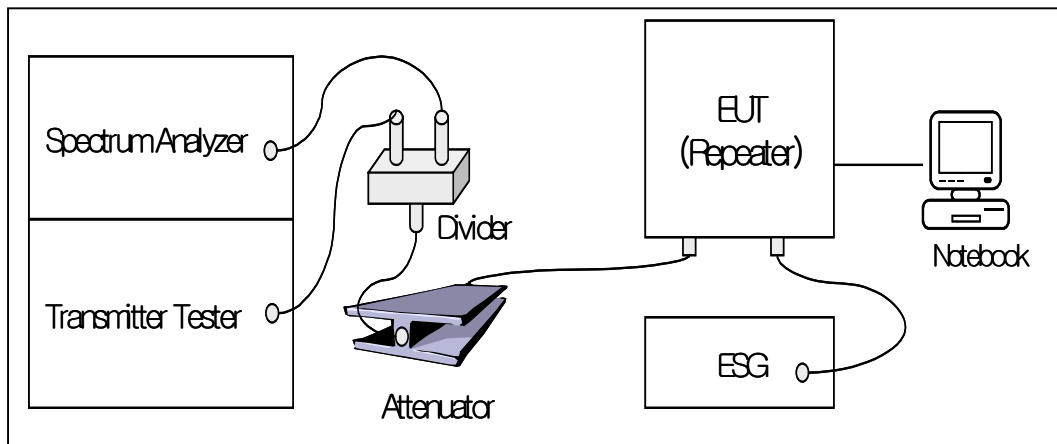
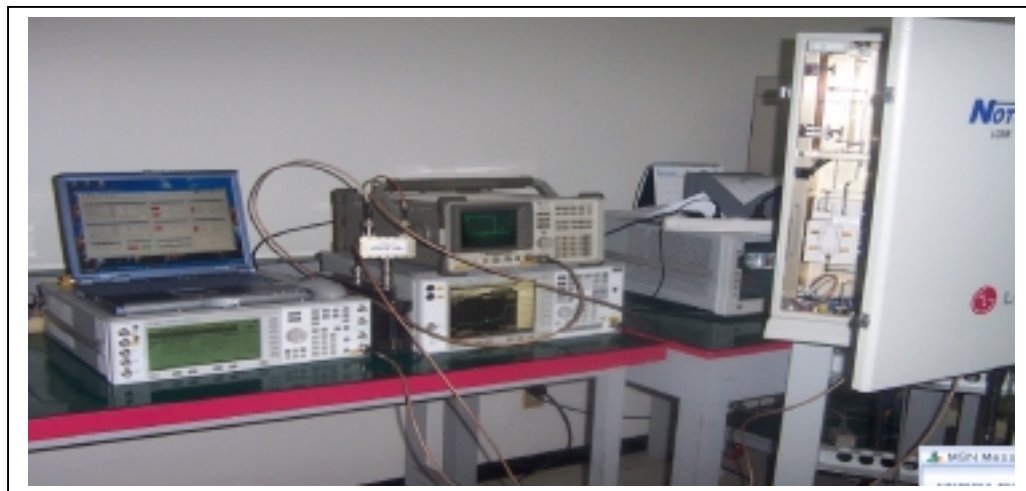


Figure3. Block edge measurement



Photograph of Test Configuration

- 2) Equipment is a bi-directional amplifier repeater for broadband PCS. The signal input is connected to the signal generators through a power divider. The input to the amplifier is set such that the maximum power output is achieved at the customer supplied antenna connectors. Maximum Allowable Downlink Power Output is 40dBm and Maximum Allowable Uplink Power Output is 25dBm.

Inter-modulation Attenuation Test (3 Signal Method) Blocks Tested: A-F Downlink Modulation Tested: CDMA.RBW=1MHz and VBW=1MHz except in the 1MHz bandwidth outside of the assigned block where RBW=100kHz and VBW=300kHz. Three input signals are chosen such that in the 15 MHz channel blocks the lowest and highest channels are selected in addition to the third lowest channel. In the 5 MHz channel blocks the lowest and highest channels are selected in addition to the second lowest channel. Frequency Range tested: 30 MHz to 20 GHz.

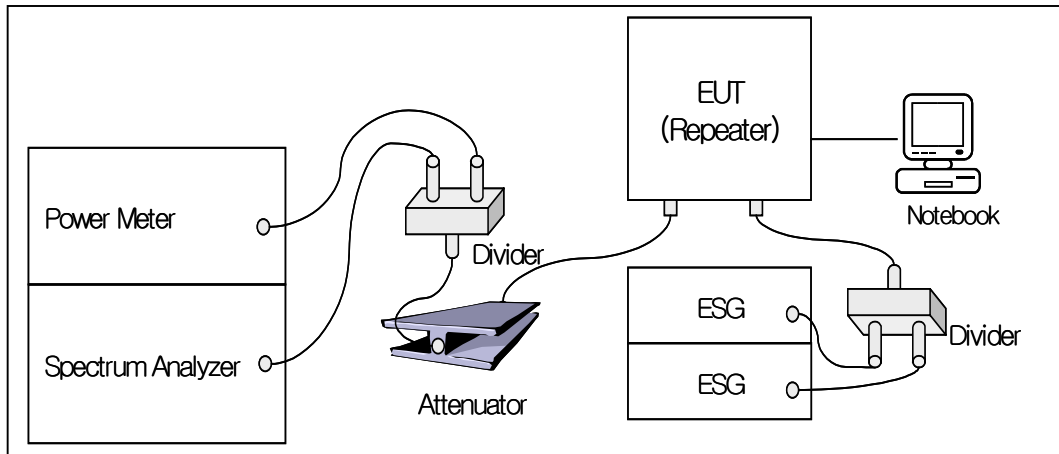


Figure4. Conducted Spurious Emission(under Inter-modulation) measurement



4.4 Field Strength of Spurious Radiation : § 2.1053

- 1) On a test site, the service Antenna of EUT shall be placed on a turntable, and in the closest position to the normal use as declared by the user.
- 2) The test antenna shall be oriented for vertical polarization located 3 m from the EUT to correspond to the frequency of the transmitter.
- 3) The output of the test antenna shall be connected to the measuring receiver and either a peak or average detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.

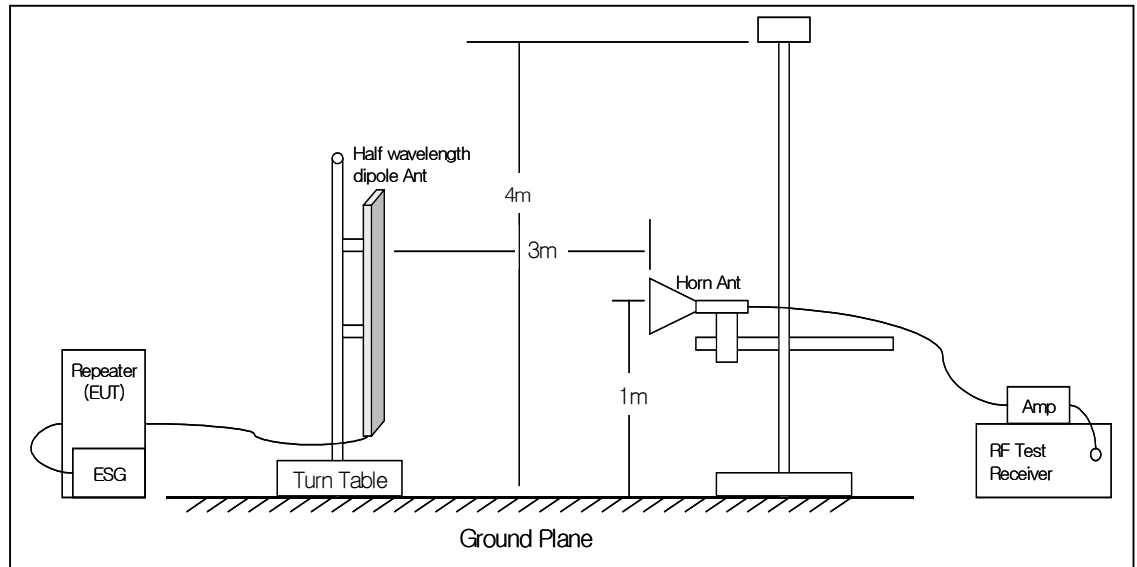


Figure5. Radiated Emission Measurement



Photograph of Test Configuration

- 4) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.

- 5) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- 6) The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- 7) The maximum signal level detected by the measuring receiver shall be noted.

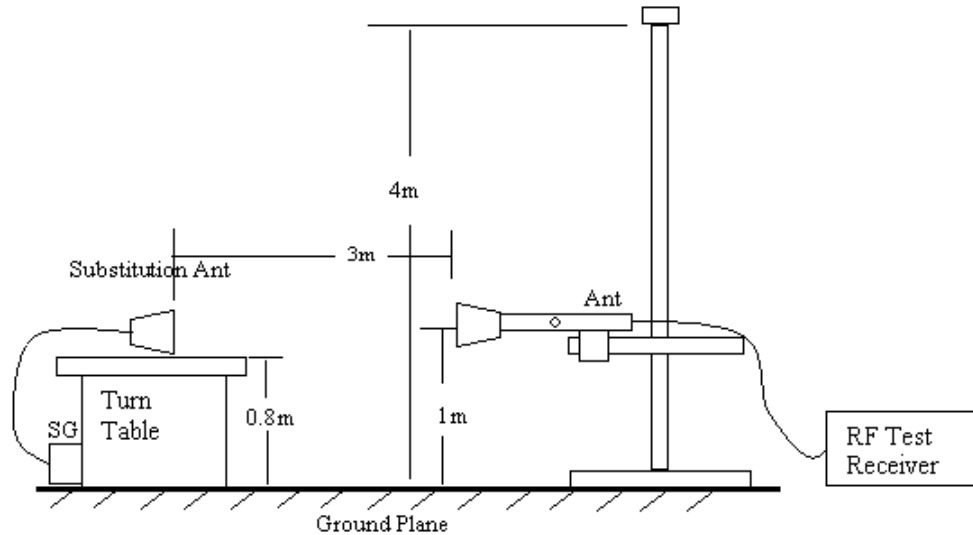


Figure6. Radiated Emission – Substitution Method set-up

- 8) The transmitter shall be replaced by a substitution antenna.
- 9) The substitution antenna shall be oriented for vertical polarization.
- 10) The substitution antenna shall be connected to a calibrated signal generator.
- 11) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- 12) The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- 13) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.

4.5 Frequency Stability : § 2.1055(a)(d);24.135

4.6.1 Frequency stability versus environmental temperature

- 1) Setup the configuration per figure 7 for frequencies measurement inside the environmental chamber. Set the temperature of the chamber to 20°C. Measure the EUT 20°C operating frequency as reference frequency.
- 2) Turn EUT off and set Chamber temperature to -30°C.
- 3) Allow sufficient time (approximately 30 to 40 minus after chamber reach the assigned temperature) for EUT to stabilize. Turn on EUT and measure the EUT operating frequency. Turn off EUT after the measurement.
- 4) Repeat step 3 with a 10°C increased per stage until the highest temperature of +50°C reached, record all measured frequencies on each temperature step.

4.6.2 Frequency stability versus input voltage

- 1) Setup the configuration per figure 3 and set chamber temperature to 20°C. Use a variable power supply to power the EUT and set output voltage to EUT nominal input voltage. Set SA Resolution Bandwidth low enough to obtain the desired frequency resolution and measure the EUT 20°C operating frequency as reference frequency.
- 2) Slowly reduce the EUT input voltage to specified extreme voltage variation ($\pm 15\%$) and record the maximum frequency change.

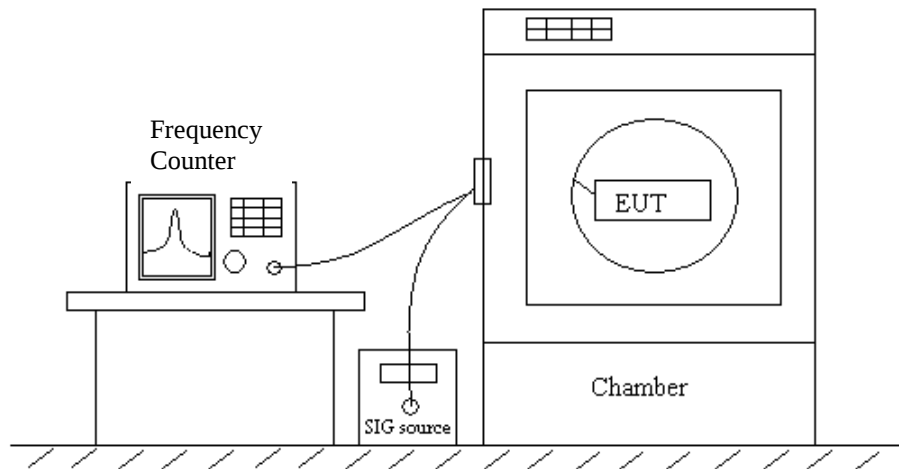


Figure7. Frequency Stability

5. TEST DATA

5.1. RF Power Output : § 24.232(a)

Product: Repeater(1900MHz PCS Block E)
Model: LGNR 1900CE-10S

Serial No.: N/A
Test Date: February 16, 2004

Downlink

Channel No.	Nominal Frequency (MHz)	Power Output (dBm)
725	1966.25	39.4
750	1967.50	39.0
775	1968.75	39.3

Uplink

Channel No.	Nominal Frequency (MHz)	Power Output (dBm)
725	1886.25	25.0
750	1887.50	25.0
775	1888.75	25.0

NOTES: RBW = VBW = 3 MHz

Result: Positive

Equipment complies with FCC 2.1046 and 24.232(a). The repeater does not exceed 100W (or 50dBm) at the carrier frequency.

5.2. Occupied Bandwidth : § 2.1049

Product: Repeater(1900MHz PCS Block E)
Model: LGNR 1900CE-10S

Serial No.: N/A
Test Date: February 16, 2004

Downlink

Channel	Frequency (MHz)	Occupied BW (MHz)	26 dB Emission BW (MHz)
Low	1966.25	1.261	1.435
Middle	1967.50	1.262	1.430
High	1968.75	1.263	1.430

Uplink

Channel	Frequency (MHz)	Occupied BW (MHz)	26 dB Emission BW (MHz)
Low	1886.25	1.266	1.430
Middle	1887.50	1.276	1.425
High	1888.75	1.261	1.430

5.3. Spurious Emission at Antenna Terminal : § 2.1051;24.238(a)(b)

Product: Repeater(1900MHz PCS Block E)
Model: LGNR 1900CE-10S

Serial No.: N/A
Test Date: February 17, 2004
May 10, 2004

1) Block Edge

Downlink

Channel	Frequency (MHz)	SA Reading (dBm)	CL (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
Low	1965.00	-33.0	34.0	-33.0	-13.0	-20.0
High	1970.00	-30.5	34.0	-30.5	-13.0	-17.5

Uplink

Channel	Frequency (MHz)	SA Reading (dBm)	CL (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
Low	1885.00	-28.8	34.0	-28.8	-13.0	-15.8
High	1890.00	-32.9	34.0	-32.9	-13.0	-19.9

NOTES: RBW=15 kHz (above 1% of 26 dB Emission Bandwidth)

2) Out-of-Band

Downlink

Frequency (MHz)	SA Reading (dBm)	CL (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Pol (H/V)
959.0	-76.2	36.2	-40.0	-13.0	-27.0	None
1953.3	-63.8	37.8	-26.0	-13.0	-13.0	None
1981.8	-63.7	37.8	-25.9	-13.0	-12.9	None
3942.0	-64.9	38.5	-26.4	-13.0	-13.4	None
5900.0	-58.8	39.3	-19.5	-13.0	-6.5	None

Uplink

Frequency (MHz)	SA Reading (dBm)	CL (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Pol (H/V)
864.0	-72.2	36.2	-36.0	-13.0	-23.0	None
1874.7	-63.5	37.8	-25.7	-13.0	-12.7	None
1901.5	-62.9	37.8	-25.1	-13.0	-12.1	None
3777.0	-65.0	38.5	-26.5	-13.0	-13.5	None
5644.0	-64.7	39.3	-25.4	-13.0	-12.4	None

NOTES: 1) RBW = 100 kHz, VBW = 300 kHz (below 1GHz of Frequency Range)
RBW = VBW = 1 MHz (above 1GHz of Frequency Range)

2) The Input Signal of the Inter-modulation channel : 3 Signal Method simultaneously.
The channel numbers of the input signal simultaneously : CH 725, 750, 775

Result: Positive

5.4. Field Strength of Spurious Radiation : § 2.1053

Product: Repeater(1900MHz PCS Block E)

Serial No.: N/A

Model: LGNR 1900CE-10S

Test Date: February 18,2004

Limit $P-[43 + 10\log_{10}(P)] = -13\text{dBm}$

Distance 3 meters

Downlink

Frequency (GHz)	SG Reading (dBm)	CL (dB)	Pol. (H/V)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel(CH#:725)								
3.93250	-53.4	8.3	V	11.3	-	-50.4	-13.0	-37.4
5.89850	-51.7	9.0	V	12.7	-	-48.0	-13.0	-35.0
Middle Channel(CH#:750)								
3.93500	-54.9	8.3	V	11.3	-	-51.9	-13.0	-38.9
5.90250	-52.4	9.0	V	12.7	-	-48.7	-13.0	-35.7
High Channel(CH#:775)								
3.93750	-54.8	8.3	V	11.3	-	-51.8	-13.0	-38.8
5.90625	-52.4	9.0	V	12.7	-	-48.7	-13.0	-35.7

Uplink

Frequency (GHz)	SG Reading (dBm)	CL (dB)	Pol. (H/V)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel(CH#:725)								
3.77250	-43.4	8.3	V	11.2	-	-40.5	-13.0	-27.5
5.65875	-43.2	9.0	V	12.3	-	-39.9	-13.0	-26.9
Middle Channel(CH#:750)								
3.77500	-48.3	8.3	V	11.2	-	-45.4	-13.0	-32.4
5.66250	-42.8	9.0	V	12.3	-	-39.5	-13.0	-26.5
High Channel(CH#:775)								
3.77750	-47.0	8.3	V	11.2	-	-44.1	-13.0	-31.1
5.66625	-43.2	9.0	V	12.3	-	-39.9	-13.0	-26.9

Note : RBW=VBW=1MHz

Result: Positive

5.5. Frequency Stability : § 2.1055(a)(d);24.135

Product: Repeater(1900MHz PCS Block E)

Serial No.: N/A

Model: LGNR 1900CE-10S

Test Date: February 19, 2004

Downlink

Reference Frequency: Downlink Middle Channel(Mobile Station Rx=750CH) limit: to stay ± 0.0001 % or ± 1 ppm				
Power Supply (V _{AC})	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Deviation (Hz)	Limit (Hz)
110	50	1967.500245	0	± 1967.5
110	40	1967.500245	0	± 1967.5
110	30	1967.500245	0	± 1967.5
110	20	1967.500245	0	± 1967.5
110	10	1967.500244	1	± 1967.5
110	0	1967.500244	1	± 1967.5
110	-10	1967.500244	1	± 1967.5
110	-20	1967.500244	1	± 1967.5
110	-30	1967.500245	0	± 1967.5
68(End Point)	20	1967.500250	-5	± 1967.5
93.5(-15%)	20	1967.500252	-7	± 1967.5
126.5(+15%)	20	1967.500245	0	± 1967.5

Uplink

Reference Frequency: Uplink Middle Channel(Base station Rx=750CH) limit: to stay ± 0.0001 % or ± 1 ppm				
Power Supply (V _{AC})	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Deviation (Hz)	Limit (Hz)
110	50	1887.500235	0	± 1887.5
110	40	1887.500235	0	± 1887.5
110	30	1887.500235	0	± 1887.5
110	20	1887.500235	0	± 1887.5
110	10	1887.500234	1	± 1887.5
110	0	1887.500234	1	± 1887.5
110	-10	1887.500234	1	± 1887.5
110	-20	1887.500234	1	± 1887.5
110	-30	1887.500234	1	± 1887.5
68(End Point)	20	1887.500239	-4	± 1887.5
93.5(-15%)	20	1887.500238	-3	± 1887.5
126.5(+15%)	20	1887.500236	-1	± 1887.5

6. LIST OF INSTRUMENTS USED

Type	Maker	Model	Cal. Date	Cal. Due Date
Spectrum Analyzer	HP	8593A	02-Apr.-04	02-Apr.-05
Transmitter Tester	Agilent	E4406A	02-Apr.-04	02-Apr.-05
Signal Generator	R&S	SMR40	25-Aug.-03	25-Aug.-04
Tuned dipole Antenna	S/B	UHAP	21-Nov.-03	21-Nov.-04
Biconical Antenna	S/B	VHAP	21-Nov.-03	21-Nov.-05
Log-periodic Antenna	S/B	VHALP9107	21-Nov.-03	21-Nov.-05
Tx Horn Antenna	EMCO	3115	13-Oct.-03	13-Oct.-04
Rx Horn Antenna	EMCO	3115	13-Oct.-03	13-Oct.-04
HFP	ANDECHS	WHK1.2/15G	26-Oct.-03	26-Oct.-04
HFP	ANDECHS	WHK2.0/18G	26-Oct.-03	26-Oct.-04
HFP	ANDECHS	WHK2.8/18G	26-Oct.-03	26-Oct.-04
Amplifier	MITQ	AMF-4D-001180-24-10P	21-Oct.-03	21-Oct.-04
Amplifier	EIN	603L	02-Jun.-04	02-Jun.-05
Temperature Chamber	SUHAKTECH	LG-20WS	13-Feb.-04	13-Feb.-05
Step Attenuator	R&S	DPSP	26-Apr.-04	26-Apr.-05
Power Meter	HP	E4418B	08-Jan.-04	08-Jan.-05
Power Sensor	HP	E9301A	08-Jan.-04	08-Jan.-05
ESG-DP Signal Generator	Agilent	E4432B	30-Dec.-03	30-Dec.-04
ESG-DP Signal Generator	Agilent	E4432B	30-Dec.-03	30-Dec.-04

R&S: Rohde & Schwarz
Cal. Date: Calibration date

S/B: Schwarzbeck
Cal Due Date: Next calibration due date