LG Electronics

TEST REPORT(RF)

Certification Of Compliance

Test Report No. : 00431-4529-C4047

EQUIPMENT UNDER TEST

Equipment :	Wireless Local Loop Telephone (CDMA)
Type/Model :	LSP-350
Manufacturer :	LG Electronics Inc.
Applicant :	LG Electronics Inc.
Address :	19-1,Cheongho-Ri, Jinwuy-Myun, Pyungtaik-City, Kyunggi-Do, 451-713 Korea
FCC ID:	BEJLSP350
Regulation:	FCC Part 22, Part 2
Test procedure:	ANSI C63.4-2001, TIA/EIA603
Equipment Class:	Intentional Radiators
Date of Receipt of EUT :	November 1, 2004
Date of Test :	November 1~4, 2004
Date of issue :	November 8, 2004
Test Result :	PASS

SUMMARY

This device has been verified to comply with the applicable requirements in the FCC Part 22 & Part2 and was tested in accordance with the measurement procedures specified in ANSI C63.4-2001, TIA/EIA 603

※ The test results in this test report apply only to sample(s) tested.

Approved by

Kyeom-Soon Kim / General Manager
Standards Group
Quality and Reliability Center

Tested by:

Y. S. Lee / Chief Research Engineer
Standards Group
Quality and Reliability Center

Reviewed by:

J. C. Lee / Chief Research Engineer
Standards Group
Quality and Reliability Center

Address : LG Electronics Inc. Q & R Center, 36, Munlae-dong, 6-ga, Youngdungpo-gu, Seoul, Korea Tel:+82-2-2630-3090~4, Fax:+82-2-2630-3504

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1. GENERAL INFORMATION

1.1 Descriptions of equipment under test (EUT)

1.1.1 Manufacturer: LG Electronics Inc.
19-1,Cheongho-Ri, Jinwuy-Myun, Pyungtaik-City, Kyunggi-Do,
451-713 Korea

1.1.2 EUT Type: Wireless Local Loop Telephone (CDMA)

1.1.3 Model No.: LSP-350

1.1.4 Serial No.: N/A

1.1.5 System characteristic and descriptions

1) Output power: 26.4 dBm (ERP) - with Battery
26.3 dBm (ERP) - with Charger
2) Antenna type: Half wavelength antenna
3) Emission Designator: 1M25F9W
4) Transmitting of frequency range: 824.70 ~ 848.31 MHz.
5) Receiving of frequency range : 869.70 ~ 893.31 MHz.

1.2 Regulations applied to EUT

FCC Part 22 ; 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

2.1 Anechoic chamber

Measurement of radiated emissions from EUT was made at anechoic chamber that has been in compliance with Federal Communications Commissions (FCC) requirements of clause 2.948 according to ANSI C63.4-1992 on Jan. 29, 2001.

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

1) On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.
2) The test antenna shall be oriented initially for vertical polarization located 3m 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 quasi-peak 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.
4) The transmitter shall be switched on, if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
5) 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.
6) The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7) 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.
8) The maximum signal level detected by the measuring receiver shall be noted.

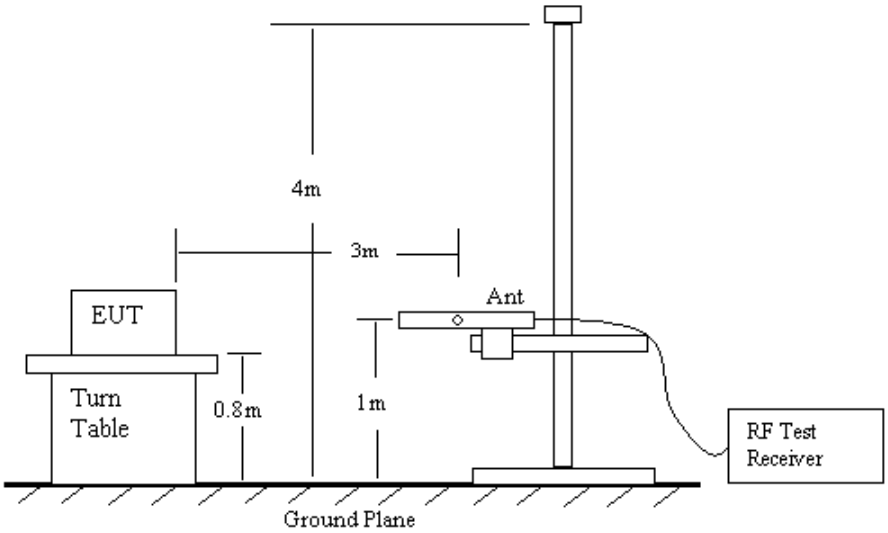


Figure1. Radiated Emission Measurement 30 to 1000 MHz

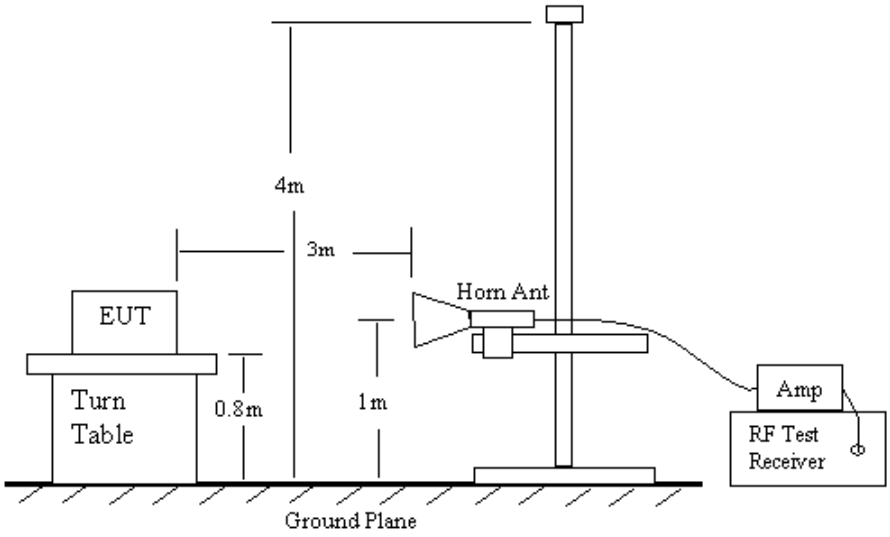


Figure2. Radiated Emission Above 1000 MHz

9) The transmitter shall be replaced by a tuned dipole (substitution antenna).

10) The substitution antenna shall be oriented for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.

11) The substitution antenna shall be connected to a calibrated signal generator.

12) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

13) The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

14) 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.

15) The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

16) The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

17) The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

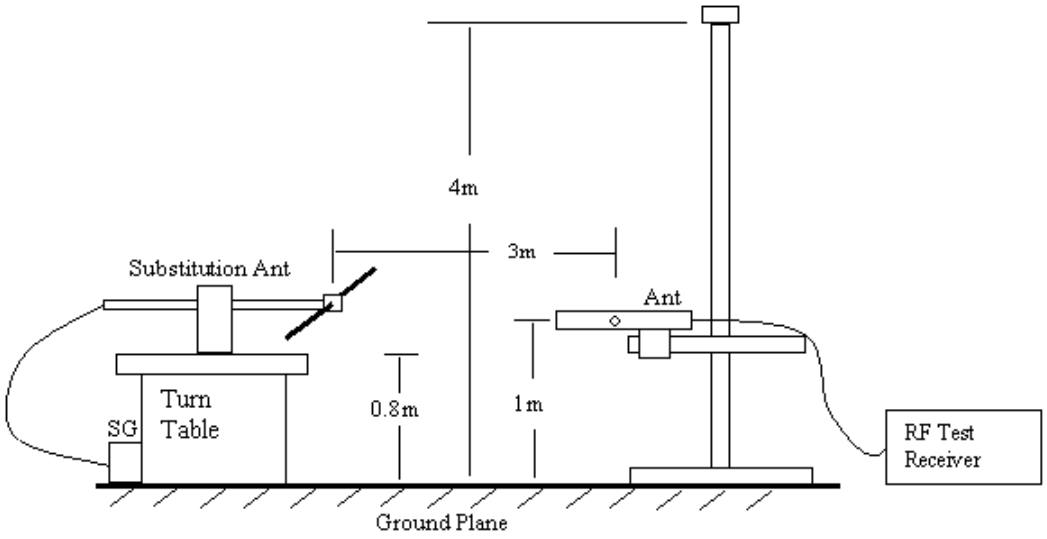


Figure3. Radiated Emission – Substitution Method

4.2 Modulation Characteristics

According to CFR 47 section 2.1047 (a), for Voice Modulated Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000 Hz shall be measured.

According to CFR 47 section 22.915: A unit that transmits emission type F3E must not exceed a peak frequency deviation of ±5 kHz, and the audio frequency response shall not exceed 3.125 kHz.

According to CFR 47 section 22.915: Audio Frequency Low Pass Filter between the modulation limiter & the modulation stage of the transmitter. At any frequency (f in kHz) between 3 and 20 kHz, the filter must have an attenuation of at least 60 $\log_{10}(f/3)$dB greater than the attenuation at 1 kHz. Above 20 kHz, it must have an attenuation of at least 50 dB greater than the attenuation at 1 kHz.

4.2.1 Modulation Limit

1) Configure the EUT as shown below, adjust the audio input for 60% of rated system deviation at 1 kHz using this level as a reference (0 dB) and vary the input level from –20 to + 20 dB. Record the frequency deviation obtained as a function of the input level.

2) Repeat step 1 with input frequency changing to 300, 1004 and 2500 Hz in sequence.

4.2.2. Audio Frequency Response

1) Configure the EUT as shown below.

2) Adjust the audio input for 20% of rated system deviation at 1 kHz using this level as a reference (0 dB).

3) Vary the audio frequency from 100 Hz to 10 kHz and record the frequency deviation.

4) Audio frequency response = 20 $\log_{10}$(Deviation of test frequency / Deviation of 1 kHz reference).

4.2.3 Audio Low Pass Filter Response

1) Configure The EUT as shown below.

2) Connect the audio frequency generator as close as possible the input of the post limiter low pass filter within the transmitter under test.

3) Connect the audio spectrum analyzer to the output of the post limiter low pass filter within the transmitter under test.

4) Apply 1000 Hz tone from the audio frequency generator and adjust the level per manufacturer's specifications.

5) Record the dB level of the 1000 Hz spectral line on the audio spectrum analyzer as LEV_{REF}.

6) Set the audio frequency generator to the desired test frequency between 3000 Hz and the upper low pass filter limit.

7) Record audio spectrum analyzer levels, at the frequency in step 6).

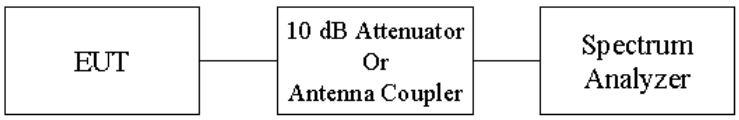
8) Record the dB level on the audio spectrum analyzer as LEV_{FREQ}.

9) Calculate the audio frequency response at the test frequency as:
Low pass filter response = LEV_{FREQ} - $LEV_{REF.}$

10) Repeat the 6) through 9) for all the desired test frequencies.

4.3 Occupied Bandwidth

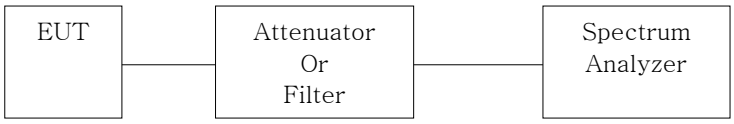
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% of the Emission bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.



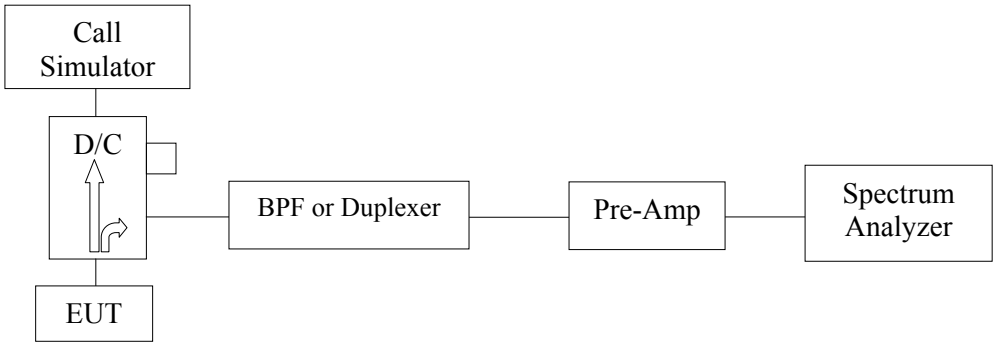
4.4 Spurious Emission at Antenna Terminal

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 1 MHz bands immediately outside and adjacent to the top and bottom edges of the frequency block.

2) For the Out-of-Band measurements a 1 MHz RES BW was used to scan from 30 MHz to 5xfo of the fundamental carrier for all frequency block. A display line was placed at –13dBm to show compliance for spurious, and harmonics.



3) 22.917(f): Mobile emissions in base frequency range. The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitter operated must be attenuated to a level not to exceed –80dBm at the transmit antenna connector.



4.5 Field Strength of Spurious Radiation

1) On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.

2) The test antenna shall be oriented initially 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.

4) The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

5) 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.

6) The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

7) 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.

8) The maximum signal level detected by the measuring receiver shall be noted.

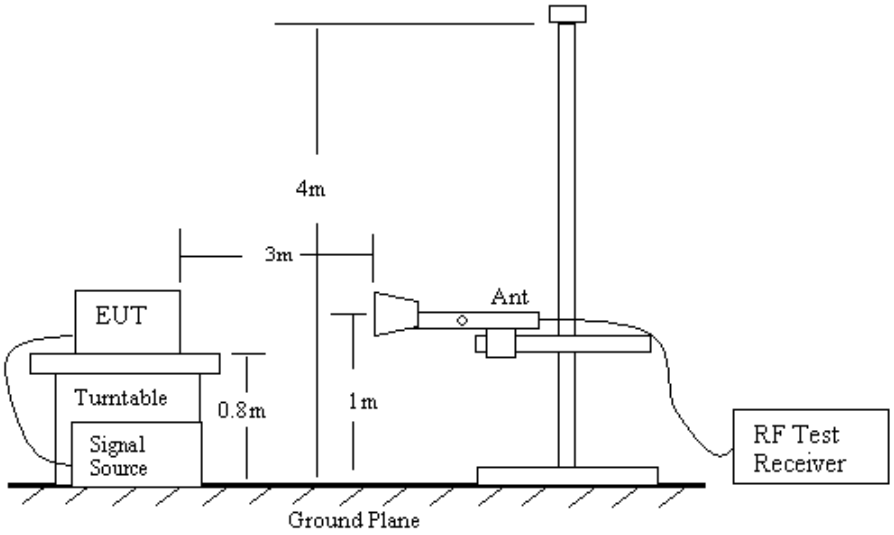


Figure4. Radiated Emission Measurement

9) The transmitter shall be replaced by a substitution antenna.

10) The substitution antenna shall be oriented for vertical polarization.

11) The substitution antenna shall be connected to a calibrated signal generator.

12) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

13) The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

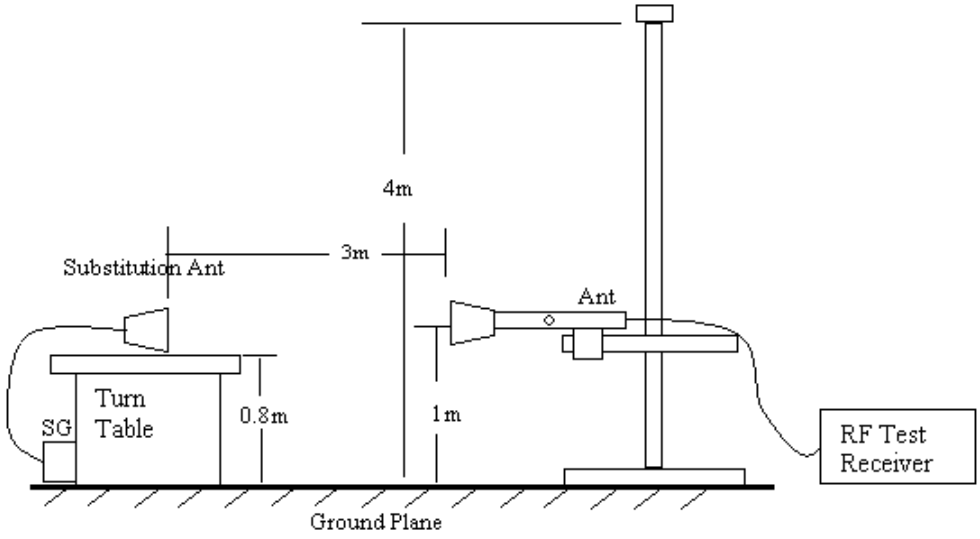


Figure5. Radiated Emission – Substitution Method set-up

14) 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.

15) The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

16) The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

17) The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

4.6 Frequency Stability

4.6.1 Frequency stability versus environmental temperature

1) Setup the configuration per figure 6 for frequencies measurement inside the environmental chamber. Set the temperature of the chamber to 20°C. Set SA Resolution Bandwidth low enough to obtain the desired frequency resolution and 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 20 to 30 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 6 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 (±15%) and record the maximum frequency change.

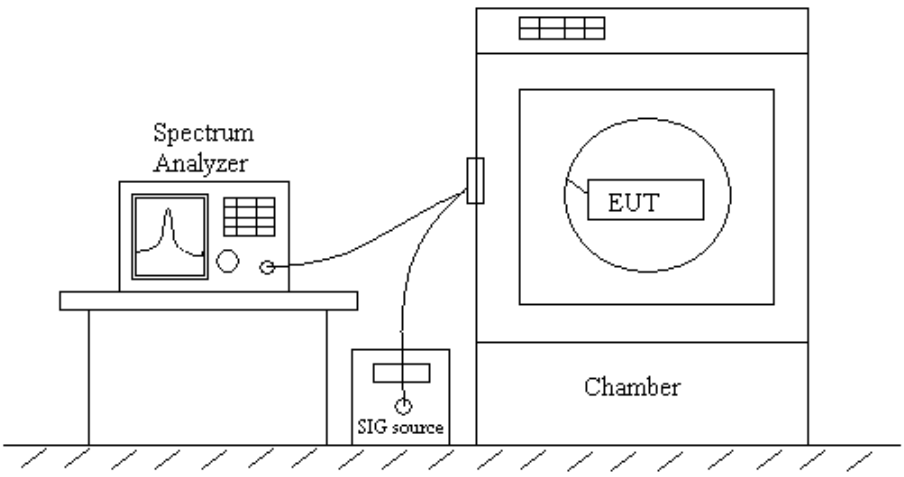


Figure6. Frequency Stability

5. TEST DATA

5.1. RF Power Output (§ 2.1046)

Product: Wireless Local Loop Telephone (CDMA) Serial No.: N/A
Model: LSP-350 Test Date: November 4, 2004

5.1.1 CDMA Output Power - with Battery (Standard)

Freq. (MHz)	SG Reading (dBm)	Amp. Gain(dB)	CL (dB)	Pol. (H/V)	Ant. Impedance Matching(dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
Low Channel(CH#: 1013)								
824.70	15.2	24.0	2.8	H	10.0	**26.4**	38.5	-12.1
Middle Channel(CH#: 363)								
835.89	15.1	24.0	2.8	H	10.0	**26.3**	38.5	-12.2
High Channel(CH#: 777)								
848.31	15.0	24.0	2.8	H	10.0	**26.2**	38.5	-12.3

NOTES: RBW = VBW = 3 MHz

Result: Pass

5.1.2 CDMA Output Power - with Charger

Freq. (MHz)	SG Reading (dBm)	Amp. Gain(dB)	CL (dB)	Pol. (H/V)	Ant. Impedance Matching(dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
Low Channel(CH#: 1013)								
824.70	15.1	24.0	2.8	H	10.0	**26.3**	38.5	-12.2
Middle Channel(CH#: 363)								
835.89	14.9	24.0	2.8	H	10.0	**26.1**	38.5	-12.4
High Channel(CH#: 777)								
848.31	14.9	24.0	2.8	H	10.0	**26.1**	38.5	-12.4

NOTES: RBW = VBW = 3 MHz

Result: Pass

5.2. Modulation Characteristics (§ 2.1047)

The EUT is single mode CDMA only.

Result: Not Applicable

5.3. Occupied Bandwidth / 26dB Emission Bandwidth(§ 2.1049)

Product: Wireless Local Loop Telephone (CDMA) Serial No.: N/A
Model: LSP-350 Test Date: November 1, 2004

Channel	Frequency (MHz)	Occupied BW (MHz)	-26 dB Emission BW (MHz)
1013	824.70	1.224	1.404
363	835.89	1.236	1.365
777	848.31	1.238	1.404

5.4. Spurious Emission at Antenna Terminal (§ 2.1051)

Product: Wireless Local Loop Telephone (CDMA) Serial No.: N/A
Model: LSP-350 Test Date: November 1~2, 2004

Band Edge

Channel	Frequency (MHz)	SA Reading (dBm)	CL (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1013	824.00	-20.0	0.4	**-19.6**	-13.0	-6.6
777	849.00	-15.3	0.4	**-14.9**	-13.0	-1.9

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

Out-of-Band

Channel	Frequency (GHz)	SA Reading (dBm)	CL (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1013	1.645	-37.0	0.7	**-36.3**	-13.0	-23.3
363	1.670	-41.6	0.7	**-40.9**	-13.0	-27.9
777	1.695	-41.6	0.7	**-40.9**	-13.0	-27.9

NOTES: RBW = VBW = 1 MHz

CDMA Mobile Emission in Base Frequency Range

Channel	Frequency (MHz)	SA Reading (dBm)	CL (dB)	Amp Gain(dB)	Level (dBm)	Limit (dBm)	Margin (dB)
1013	873.04	-106.1	1.5	28.0	**-104.6**	-80.0	-24.6
363	880.92	-104.5	1.5	28.0	**-103.0**	-80.0	-23.0
777	879.88	-105.5	1.5	28.0	**-104.0**	-80.0	-24.0

NOTES: RBW = 100 kHz, VBW=300 kHz

Result: Pass

5.5. Field Strength of Spurious Radiation (§ 2.1053)

Product: Wireless Local Loop Telephone (CDMA) Serial No.: N/A
Model: LSP-350 Test Date: November 4, 2004

Frequency (MHz)	SG Reading (dBm)	CL (dB)	Pol. (H/V)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
Low Channel(CH#:1013)								
1649.40	-46.7	4.1	V	8.1	6.0	**-44.9**	-13.0	-31.9
1649.40	-46.4	4.1	H	8.1	6.0	**-44.6**	-13.0	-31.6
2474.10	-34.5	5.2	V	9.4	7.3	**-32.5**	-13.0	-19.5
2474.10	-38.5	5.2	H	9.4	7.3	**-36.5**	-13.0	-23.5
3298.80	-31.8	6.1	V	10.3	8.2	**-29.8**	-13.0	-16.8
3298.80	-41.0	6.1	H	10.3	8.2	**-39.0**	-13.0	-26.0
Middle Channel(CH#:363)								
1671.78	-44.5	4.2	V	8.1	6.0	**-42.8**	-13.0	-29.8
1671.78	-45.7	4.2	H	8.1	6.0	**-44.0**	-13.0	-31.0
2507.67	-33.0	5.3	V	9.5	7.4	**-31.0**	-13.0	-18.0
2507.67	-36.7	5.3	H	9.5	7.4	**-34.7**	-13.0	-21.7
3343.56	-31.2	6.1	V	10.3	8.2	**-29.2**	-13.0	-16.2
3343.56	-39.2	6.1	H	10.3	8.2	**-37.2**	-13.0	-24.2
High Channel(CH#:777)								
1696.62	-42.2	4.2	V	8.2	6.1	**-40.4**	-13.0	-27.4
1696.62	-46.2	4.2	H	8.2	6.1	**-44.4**	-13.0	-31.4
2544.93	-32.8	5.3	V	9.5	7.4	**-30.8**	-13.0	-17.8
2544.93	-35.1	5.3	H	9.5	7.4	**-33.1**	-13.0	-20.1
3393.24	-31.8	6.2	V	10.4	8.3	**-29.8**	-13.0	-16.8
3393.24	-43.3	6.2	H	10.4	8.3	**-41.3**	-13.0	-28.3

Result: Pass

5.6. Frequency Stability (§ 2.1055)

Product: Wireless Local Loop Telephone (CDMA) Serial No.: N/A
Model: LSP-350 Test Date: November 3, 2004

Reference Frequency: CDMA Middle Channel 835.890016 MHz @ 20℃ limit: to stay ± 2.5 ppm = 2089.725 Hz				
Power Supply (Vdc)	Environment Temperature (℃)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.70	50	835.889994	0.03	±2.5
3.70	40	835.890007	0.01	±2.5
3.70	30	835.890010	0.01	±2.5
3.70	***20(Ref)***	***835.890016***	***0.00***	***±2.5***
3.70	20	835.889982	0.04	±2.5
3.70	0	835.890011	0.01	±2.5
3.70	-10	835.890029	-0.02	±2.5
3.70	-20	835.889969	0.06	±2.5
3.70	-30	835.889973	0.05	±2.5
2.69 (End point)	20	835.889929	0.10	±2.5
3.15(-15%)	20	835.890008	0.01	±2.5
4.25(+15%)	20	835.889992	0.03	±2.5

Result: Pass

6. LIST OF INSTRUMENTS USED

Type	Maker	Model	Serial Number	Cal. Due Date
Wireless Communication Test Set	Agilent	8960	GB43133078	21-Jul.-05
PSA	Agilent	E4440A	MY44022892	04-Jul.-05
Signal Generator	R&S	SMR40	100106	25-Aug.-05
Tuned dipole Antenna	S/B	UHAP	579	28-May-05
Biconical Antenna	S/B	VHA 9103	VHA91031341	28-May-05
Log-periodic Antenna	S/B	VHALP9107	1667	21-Nov.-05
Tx Horn Antenna	EMCO	3115	9202-3805	15-Jun.-05
Rx Horn Antenna	EMCO	3115	9202-3804	15-Jun.-05
HFP	ANDECHS	WHK1.2/15G	8	26-Oct.-05
Amplifier	MITQ	AMF-4D-001180-24-10P	832938	26-Oct.-05
Amplifier	HP	8447F	2805A03092	02-Apr.-05
DC Power Supply	TESTLINK	AK-1205D	00540903	14-Oct.-05
Temperature Chamber	ESPEC	SH-641	92001096	13-May-05
BPF	CELWAVE	CDMA	4000	10-Sep.-05
Step Attenuator	R&S	DPSP	892-561/Q25	26-Apr.-05

Note : R&S: Rohde & Schwarz S/B: Schwarzbeck HP: Hewlett-Packard
Cal Due Date: Next calibration due date