TEST REPORT

Test Report No. 00431-4529-C6027

EQUIPMENT UNDER TEST

Equipment :	PCS CDMA WLL(Wireless Local Loop) Terminal
Type/Model :	LSP-4000
Manufacturer :	LG Electronics Inc.
Applicant :	LG Electronics Inc.
Address :	19-1,Cheongho-Ri, Jinwuy-Myun, Pyungtaik-City, Kyunggi-Do, 451-713 Korea
FCC ID:	BEJLSP4000
FCC Rule Part(s)	§24(E), §2
Test procedure:	ANSI C63.4-2003, TIA/EIA603
Equipment Class:	Intentional Radiators
Date of Receipt of EUT :	Apr. 24, 2006
Date of Test :	June. 12, 2006 ~ June 14, 2006
Date of issue :	June 22, 2006
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 C63.4-2003, 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:

Dongkwon Kim / Research Engineer
Standards Group
Quality and Reliability Center

Reviewed by:

Y. S. 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 (PCS CDMA)

1.1.3 Model No.: LSP-4000

1.1.4 Serial No.: N/A

1.1.5 System characteristic and descriptions

1) Output power: 25.5 dBm (EIRP)
2) Antenna type: Half wavelength antenna
3) Emission Designator: 1M25F9W
4) Transmitting of frequency range: 1851.25 ~ 1908.75 MHz.
5) Receiving of frequency range : 1931.25 ~ 1988.75 MHz.

1.2 Regulations applied to EUT

FCC Part 24(E), Part2

1.3 Measurement procedure

ANSI C63.4-2003, 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 Fully Anechoic chamber

Measurement of radiated emissions from EUT was made at fully anechoic chamber that has been in compliance with Federal Communications Commissions (FCC) according to ANSI C63.4-2003.

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 C63.4-2003. 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 Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by "SAR Measurement Procedures for 3G Devices", May 2006.

1) If the Mobile station (MS) supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC = 1/1) with 9600 bps data rate only.
2) Under RC 1, C.S0011 Table 4.4.5.2-1, Table 1 parameters were applied.
3) If the MS supports the RC 3 Reverse FCH, RC 3 Reverse SCH0 and demodulation of RC 3, 4 or 5 setup a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600 bps Fundamental Channel and 9600 bps SCH0 data rate.
4) Under RC3, C.S0011 Table 4.4.5.2-2, Table 2 was applied.
5) FCHs were configured at full rate for maximum SAR with "All Up" power control bits.

parameter	Units	Value
I_{or}	dBm/1.23 MHz	-104
Pilot E_{c}/ I_{or}	dB	-7
Traffic E_{c}/ I_{or}	dB	-7.4

Table 1
Parameters for Max. Power for RC1

parameter	Units	Value
I_{or}	dBm/1.23 MHz	-86
Pilot E_{c}/ I_{or}	dB	-7
Traffic E_{c}/ I_{or}	dB	-7.4

Table 2
Parameters for Max. Power for RC3

4.2 RF Power Output (ERP/EIRP)

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, if necessary, to ensure that the maximum signal is still being received.
6) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

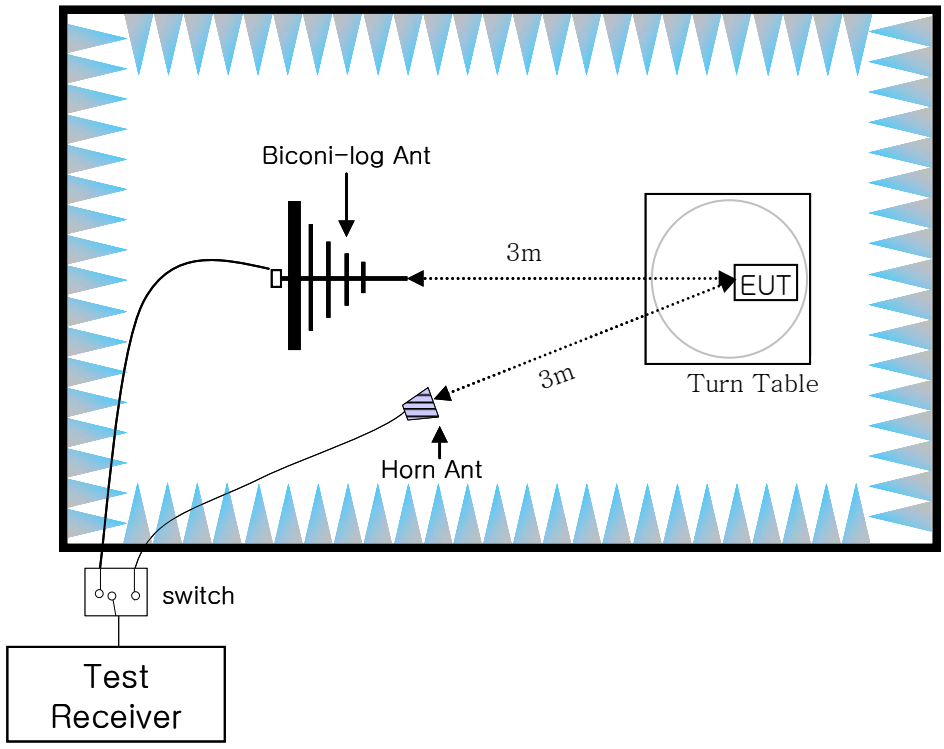


Figure1. Radiated Emission Measurement.

7) The test antenna shall be raised and lowered, if necessary, to ensure that the maximum signal is still being received.

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

9) The transmitter shall be replaced by a tuned 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, if necessary, to ensure that the maximum signal is still being 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.

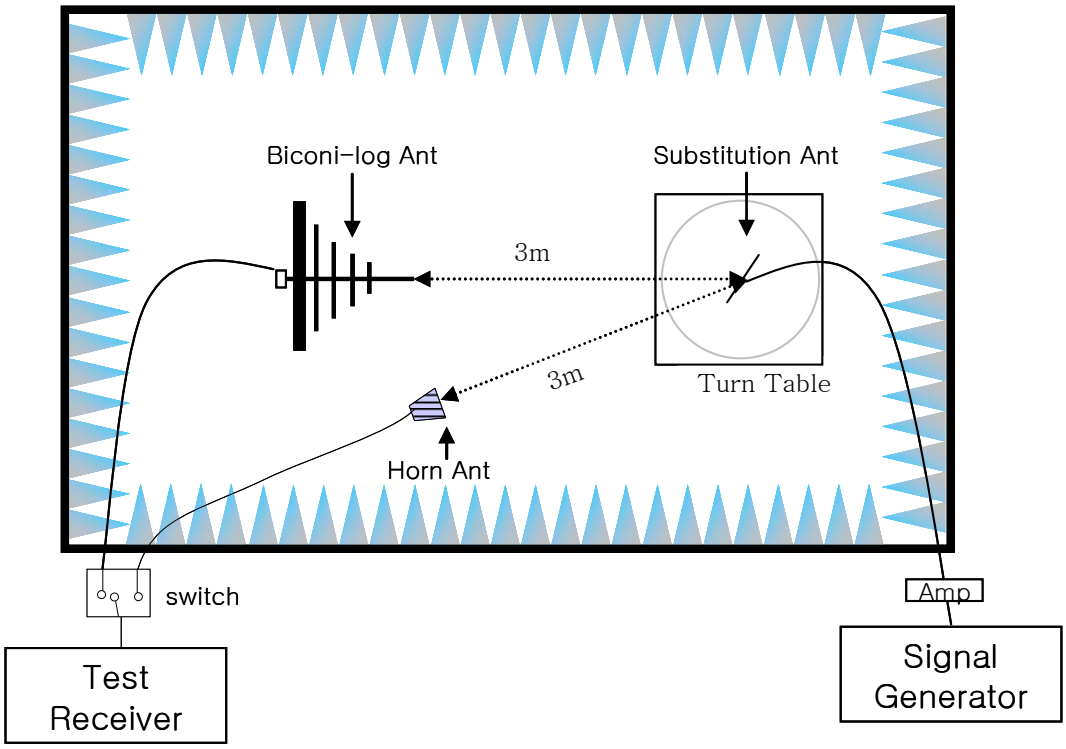
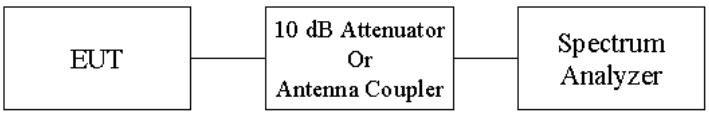


Figure2. Radiated Emission – Substitution Method

4.3 Occupied Bandwidth

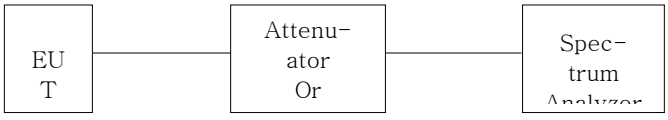
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% of the Emission bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.



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.



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

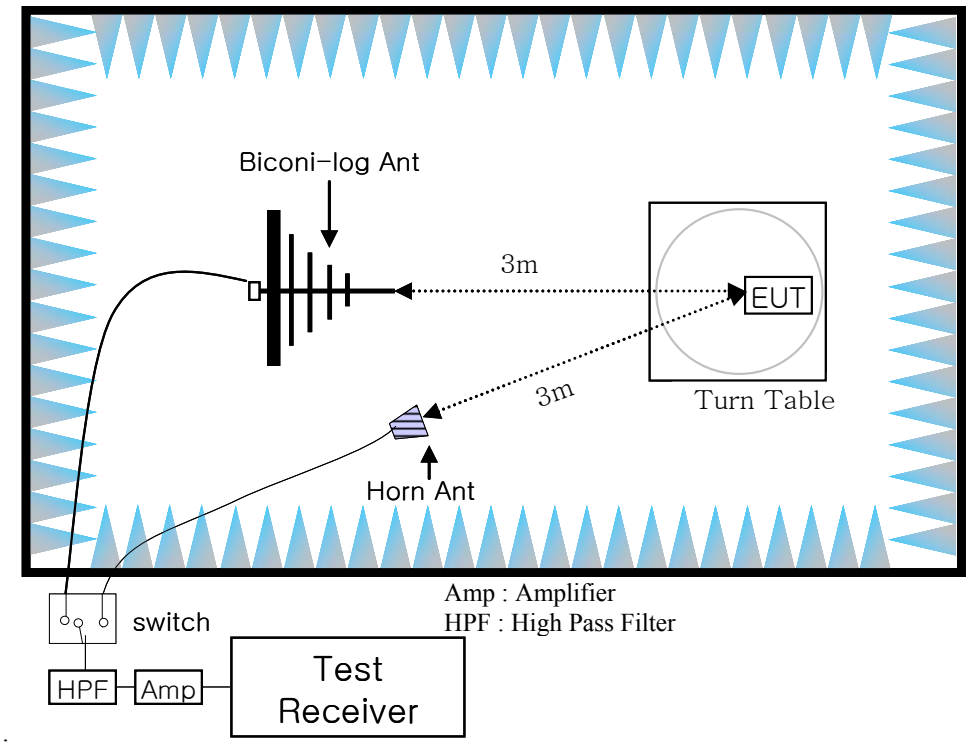


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Figure3. Radiated Emission Measurement

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, if necessary, to ensure that the maximum signal is still being received.

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, if necessary, to ensure that the maximum signal is still being received.

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

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 , if necessary, to ensure that the maximum signal is still being 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.

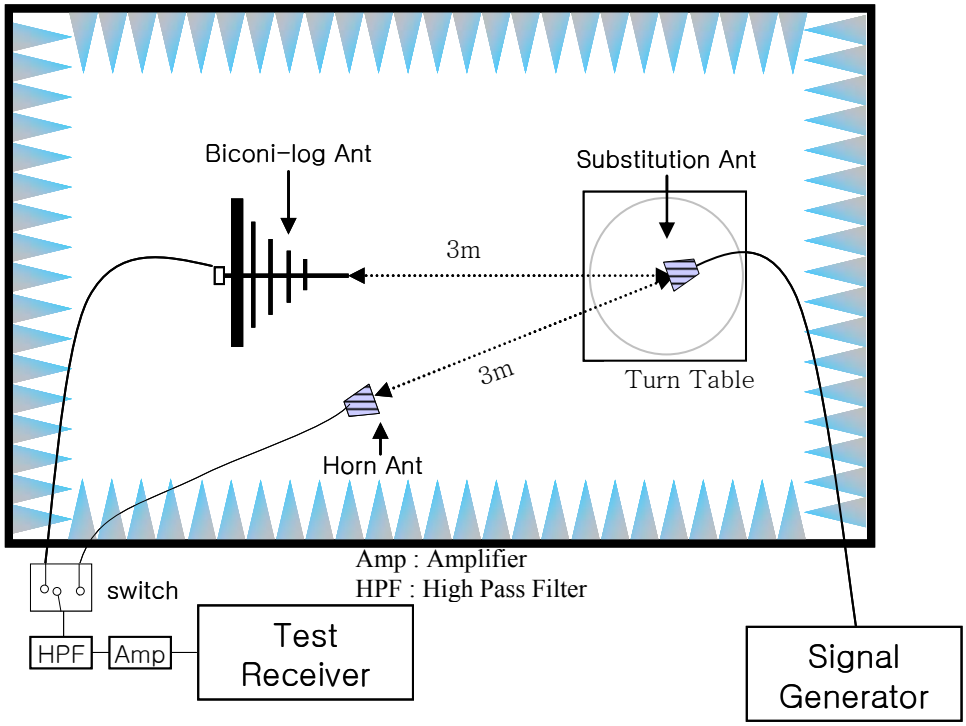

Figure4. Radiated Emission – Substitution Method set-up

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

4.5.1 Frequency stability versus environmental temperature

1) Setup the configuration per figure5 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 minutes 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.

4.5.2 Frequency stability versus environment temperature & input voltage

1) Setup the configuration per figure5 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.

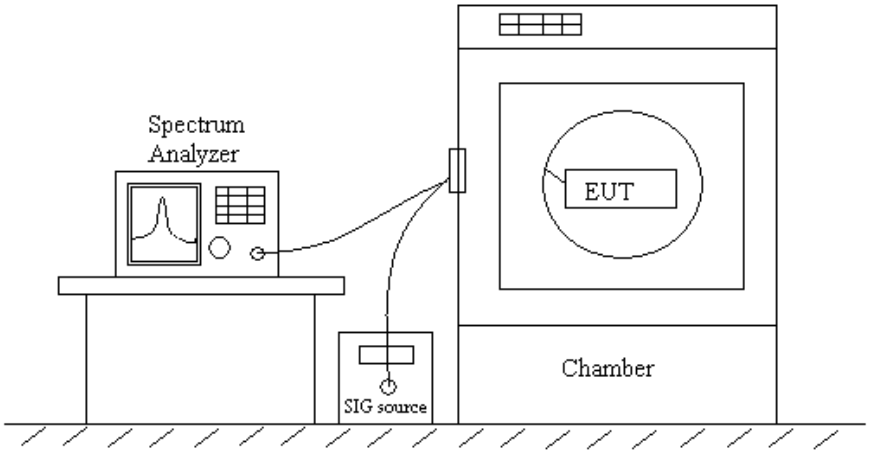

Figure5. Frequency Stability

5. TEST DATA

5.1. RF Output Power Verification

Product: PCS CDMA WLL Terminal
Model: LSP-4000
Serial No.: N/A
Test Date: June 12, 2006

PCS CDMA Output Power Verification

Channel Freq.(MHz)	CDMA2000 RC	SO2 LoopBack	SO55 LoopBack
Low(25) 1851.25MHz	RC1	22.68dBm	22.88dBm
	RC3	22.77dBm	22.59dBm
Mid(600) 1880.00MHz	RC1	23.68dBm	23.78dBm
	RC3	23.52dBm	23.44dBm
High(1175) 1908.75MHz	RC1	22.96dBm	22.94dBm
	RC3	23.00dBm	22.43dBm

NOTES: RBW = VBW = 3 MHz

5.2. RF Power Output (§ 2.1046)

Product: PCS CDMA WLL Terminal
Model: LSP-4000
Serial No.: N/A
Test Date: June 13, 2006

PCS CDMA Output Power

Freq. (MHz)	SG Reading (dBm)	Amp. Gain(dB)	CL (dB)	Pol. (H/V)	Ant. Gain(dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel(CH#: 25)								
1851.25	-5.2	33.4	11.0	H	8.5	**25.7**	33.0	-7.3
Middle Channel(CH#: 600)								
1880.00	-5.4	33.4	11.0	H	8.5	**25.5**	33.0	-7.5
High Channel(CH#: 1175)								
1908.75	-5.6	33.4	11.1	H	8.6	**25.3**	33.0	-7.7

NOTES: RBW = VBW = 3 MHz

Result: Pass

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

Product: PCS CDMA WLL Terminal
Model: LSP-4000
Serial No.: N/A
Test Date: June 12, 2006

Channel	Frequency (MHz)	Occupied BW (MHz)	-26 dB Emission BW (MHz)
25	1851.25	1.253	1.405
600	1880.00	1.244	1.377
1175	1908.75	1.275	1.379

Result: Pass

5.4. Spurious Emission at Antenna Terminal (§ 2.1051)

Product: PCS CDMA WLL Terminal
Model: LSP-4000
Serial No.: N/A
Test Date: June 12, 2005

Band Edge

Channel	Measured frequency(MHz)	Measured value (dBm)	Limit (dBm)	Margin (dB)
25	1850.00	**-29.4**	-13.0	-16.4
1175	1910.00	**-34.4**	-13.0	-21.4

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

Out-of-Band

Channel	Frequency (GHz)	Measured value (dBm)	Limit (dBm)	Margin (dB)
25	13.828	**-30.7**	-13.0	-17.7
600	13.414	**-31.0**	-13.0	-18.0
1175	14.195	**-30.7**	-13.0	-17.7

NOTES: RBW = VBW = 1 MHz

Result: Pass

5.5. Field Strength of Spurious Radiation (§ 2.1053)

Product: PCS CDMA WLL Terminal
Model: LSP-4000
Serial No.: N/A
Test Date: June 14, 2006

Frequency (MHz)	SG Reading (dBm)	CL (dB)	Pol. (H/V)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel(CH#:25)								
3702.50	-38.4	14.8	V	9.9	0.0	**-43.3**	-13.0	-30.3
3702.50	-37.1	14.8	H	9.9	0.0	**-42.0**	-13.0	-29.0
5553.75	-31.3	17.1	V	11.3	0.0	**-37.2**	-13.0	-24.2
5553.75	-33.8	17.1	H	11.3	0.0	**-39.7**	-13.0	-26.7
7405.00	-29.1	17.8	V	11.5	0.0	**-35.4**	-13.0	-22.4
7405.00	-32.7	17.8	H	11.5	0.0	**-39.0**	-13.0	-26.0
Middle Channel(CH#:600)								
3760.00	-36.4	14.8	V	9.9	0.0	**-41.3**	-13.0	-28.3
3760.00	-35.7	14.8	H	9.9	0.0	**-40.6**	-13.0	-27.6
5640.00	-30.1	17.1	V	12.3	0.0	**-34.9**	-13.0	-21.9
5640.00	-36.3	17.1	H	12.3	0.0	**-41.1**	-13.0	-28.1
7520.00	-30.8	17.8	V	11.5	0.0	**-37.1**	-13.0	-24.1
7520.00	-34.7	17.8	H	11.5	0.0	**-41.0**	-13.0	-28.0
High Channel(CH#:1175)								
3817.50	-32.2	15.1	V	9.9	0.0	**-37.5**	-13.0	-24.5
3817.50	-36.4	15.1	H	9.9	0.0	**-41.7**	-13.0	-28.7
5726.25	-32.8	17.3	V	12.3	0.0	**-37.8**	-13.0	-24.8
5726.25	-34.9	17.3	H	12.3	0.0	**-39.9**	-13.0	-26.9
7635.00	-29.3	18.0	V	11.5	0.0	**-35.8**	-13.0	-22.8
7635.00	-33.6	18.0	H	11.5	0.0	**-40.1**	-13.0	-27.1

Result: Pass

5.6. Frequency Stability (§ 2.1055)

Product: PCS CDMA WLL Terminal
Model: LSP-4000
Serial No.: N/A
Test Date: June 13, 2006

Reference Frequency: PCS CDMA Middle Channel 1880.000020 MHz @ 20℃ limit: to stay±1.0 ppm = 1880 Hz				
Power Supply (VAC)	Temperature (℃)	Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
220	50	1880.000017	-0.02	±1.0
220	40	1880.000014	-0.01	±1.0
220	30	1880.000017	-0.02	±1.0
220	***20(Ref)***	***1879.999986***	***0.00***	***±1.0***
220	10	1880.000015	-0.02	±1.0
220	0	1880.000012	-0.01	±1.0
220	-10	1879.999990	0.00	±1.0
220	-20	1880.000013	-0.01	±1.0
220	-30	1879.999988	0.00	±1.0

Result: Pass

6. Prediction of MPE Limit

6.1. Friis Formula

Friis transmission formula : $S = (Pout \times G) / (4 \times \pi \times R^2)$

$$R = \sqrt{\frac{P_{out} \times G}{4\pi \times S}}$$

S = power density in mW/cm^2
P_{out} = output power to antenna in mW
G = gain of antenna in linear scale
$\pi = 3.1416$
R = distance between observation point and center of the radiator in cm

Power density(S) is limit of MPE, **1.0 mW/cm²**. If we know the maximum Gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

6.2. Test Results

6.2.1 Antenna Gain
The maximum Gain measured in Fully Anechoic Chamber is 2.5dBi or **1.778**(numeric).

6.2.2 Prediction for power density

Channel	Frequency (MHz)	Maximum Output Power at Antenna Terminal(mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)
600	1880	158.49	**0.056**	1.0

Note: Limit of Power Density(S)= **1.0** mW/cm^2

Calculation Power Density at 20 cm

S = $(P \times G) / (4 \times \pi \times R^2)$
= $(158.49 \times 1.778)/(4 \times 3.1416 \times 20^2)$
= **0.056** **(mW/cm^2)**

where : P = 158.49 mW (Maximum output power is 22dBm at antenna terminal)
G = 1.778(numeric gain)
π =3.1416
R = 20 cm

7. LIST OF INSTRUMENTS USED

Type	Maker	Model	Serial Number	Cal. Due Date
Wireless Communication Test Set	Agilent	8960	GB43133078	19-Jul.-06
Spectrum Analyzer(PSA)	Agilent	E4440A	MY44022892	30-Mar.-07
Test Receiver	R&S	ESI40	10072	15-Jun.-06
Signal Generator	R&S	SMP02	100186	15-Jun.-06
Amplifier	HP	8449B	3008A00263	01-Nov.-06
Tx Horn Antenna	EMCO	3115	9202-6390	08-Nov.-06
Tx Dipole Antenna	SCHWARZ-BECK	VUBA 9117	9117-156	30-Aug.-06
Rx Horn Antenna	EMCO	3115	9202-6393	08-Nov.-06
Rx Biconi-Log Antenna	SCHWARZ-BECK	VULB 9163	133	29-May.-07
HPF	WI	WHK1.2/15G	8	06-Apr.-07
HPF	WI	WHK2.0/18G	13	06-Apr.-07
HPF	WI	WHK2.8/18G	2	06-Apr.-07
Temperature Chamber	ESPEC	SH-641	92001096	11-May-07

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