



**Nemko Test Report No.:**

5L0427RUS1

**Applicant:**

Samsung Telecommunications  
America1301 E. Lookout Drive  
Richardson, TX 75081

**Equipment Under Test:**

SCBS-519L V.5 Indoor Base Station

**In Accordance With:**

**FCC Part 24, Subpart E**  
Broadband PCS Base Station Transmitter

**Tested By:**

Nemko U.S.A., Inc.  
802 N. Kealy  
Lewisville, Texas 75057-3136

A handwritten signature in blue ink, appearing to read 'Tom Tidwell', is written over the printed name.

**Authorized By:**

Tom Tidwell, Frontline Group Manager

**Date:**

30 August, 2005

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**Section 1. Summary of Test Results**

Manufacturer: Samsung

Model No.: SCBS-519L V.5

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 24, Subpart E.

New Submission

Production Unit

Class II Permissive Change

Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE. NONE

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This report applies only to the items tested.

**Summary Of Test Data**

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	24.232	300W	Complies
Occupied Bandwidth (CDMA)	24.238	-	Complies
Spurious Emissions at Antenna Terminals	24.238(a)	-13 dBm	Complies
Field Strength of Spurious Emissions	24.238(a)	-13 dBm E.I.R.P.	Complies
Frequency Stability	24.235	$\pm 0.05$ ppm	Complies

**Footnotes:**

**Measurement uncertainty is expressed to a confidence level of 95%.**

**Section 2. General Equipment Specification**

<b>Supply Voltage Input:</b>	120 Vac, 60 Hz		
<b>Frequency Bands: TX</b>	<input checked="" type="checkbox"/> Block A : 1930 – 1945 MHz <input checked="" type="checkbox"/> Block D : 1945 – 1950 MHz <input checked="" type="checkbox"/> Block B : 1950 – 1965 MHz <input checked="" type="checkbox"/> Block E : 1965 – 1970 MHz <input checked="" type="checkbox"/> Block F : 1970 – 1975 MHz <input checked="" type="checkbox"/> Block C : 1975 – 1990 MHz		
<b>Frequency Bands: RX</b>	<input checked="" type="checkbox"/> Block A : 1850 – 1865 MHz <input checked="" type="checkbox"/> Block B : 1865 – 1870 MHz <input checked="" type="checkbox"/> Block C : 1870 – 1885 MHz <input checked="" type="checkbox"/> Block D : 1885 – 1890 MHz <input checked="" type="checkbox"/> Block E : 1890 – 1895 MHz <input checked="" type="checkbox"/> Block F : 1895 – 1910 MHz		
<b>Type of Modulation and Designator:</b>	<b>CDMA</b> (1M25G7W) <input checked="" type="checkbox"/>	<b>GSM</b> (200KGXW) <input type="checkbox"/>	<b>NADC</b> (40K0DXW) <input type="checkbox"/>
<b>Output Impedance:</b>	50 ohms		
<b>RF Output (Rated):</b>	Per channel: 20W – 160 Watts composite		
<b>Band Selection:</b>	<b>Software</b> <input type="checkbox"/>	<b>Duplexer</b> <input type="checkbox"/>	<b>Fullband</b> <input checked="" type="checkbox"/>

### **System Description**

The SCBS-519L V.5 Indoor Base Station is a 20 Watt per channel CDMA PCS band base station able to combine up to 8 carriers out at out diplexer output.

### **System Diagram**

Refer to separate exhibit.

**Section 3. RF Power Output**

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: David Light	DATE: 6/7/2005

**Test Results:** Complies.

**Measurement Data:**

Modulation Type	Measured Output Power (dBm)	Measured Output Power (W)
CDMA	43.5	22.4

**Equipment Used:** 1066-1472-1036

**Measurement Uncertainty:** +/- 1.6 dB

**Temperature:** 22 °C

**Relative Humidity:** 40 %

**Section 4. Occupied Bandwidth**

NAME OF TEST: Occupied Bandwidth (CDMA)	PARA. NO.: 2.1049
TESTED BY: David Light	DATE: 6/7/2005

**Test Results:** Complies.

**Test Data:** See attached plot(s).

**Equipment Used:** 1066-1472-1036

**Measurement Uncertainty:** +/- 1.6 dB

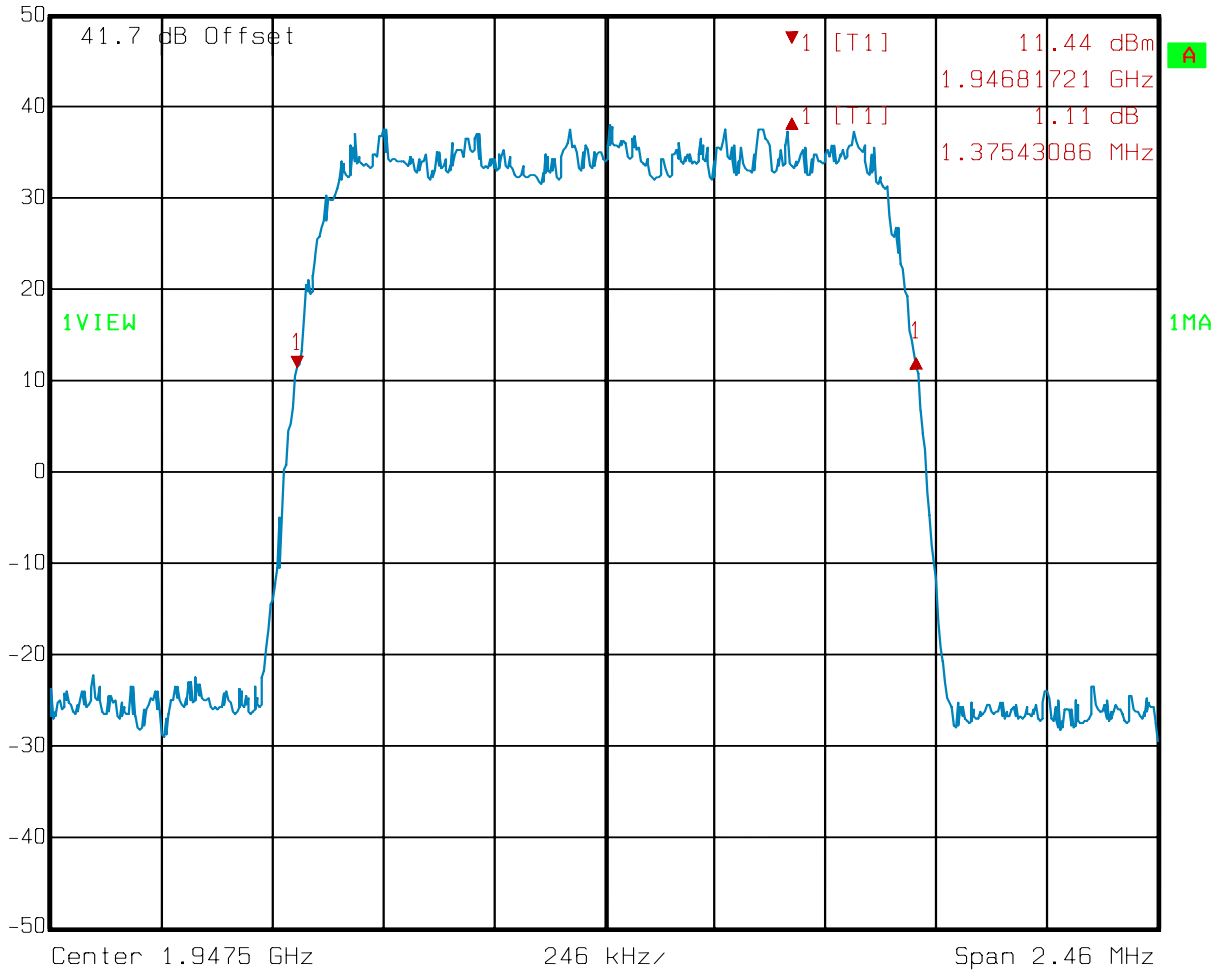
**Temperature:** 22 °C

**Relative Humidity:** 40 %



Test Data – 26 dB Bandwidth

	Delta 1 [T1]	RBW	30 kHz	RF Att	20 dB	
	Ref Lvl	1.11 dB	VBW	30 kHz	Mixer	-10 dBm
	50 dBm	1.37543086 MHz	SWT	7 ms	Unit	dBm



Date: 07.JUN.2005 10:23:48

**Section 5. Spurious Emissions at Antenna Terminals**

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: David Light	DATE: 6/7/2005 & 8/16/2005

**Test Results:** Complies.

**Test Data:**

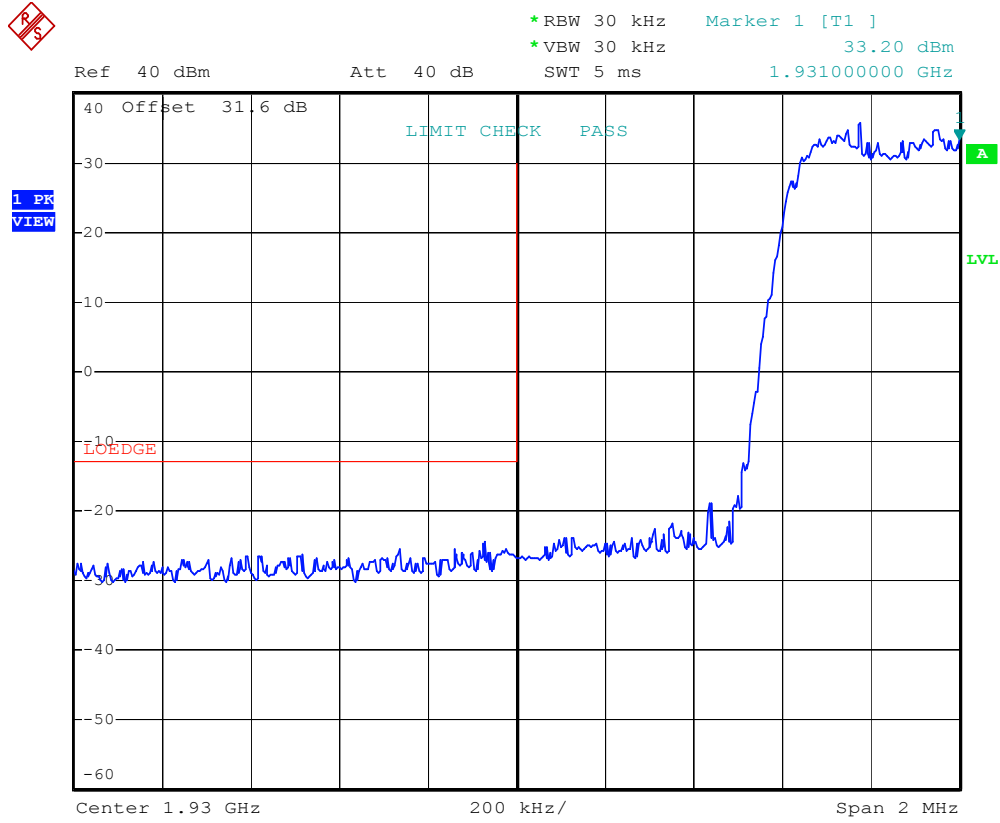
**Equipment Used:** 1066-1472-1036-1659

**Measurement Uncertainty:** +/- 1.6 dB

**Temperature:** 22 °C

**Relative Humidity:** 40 %

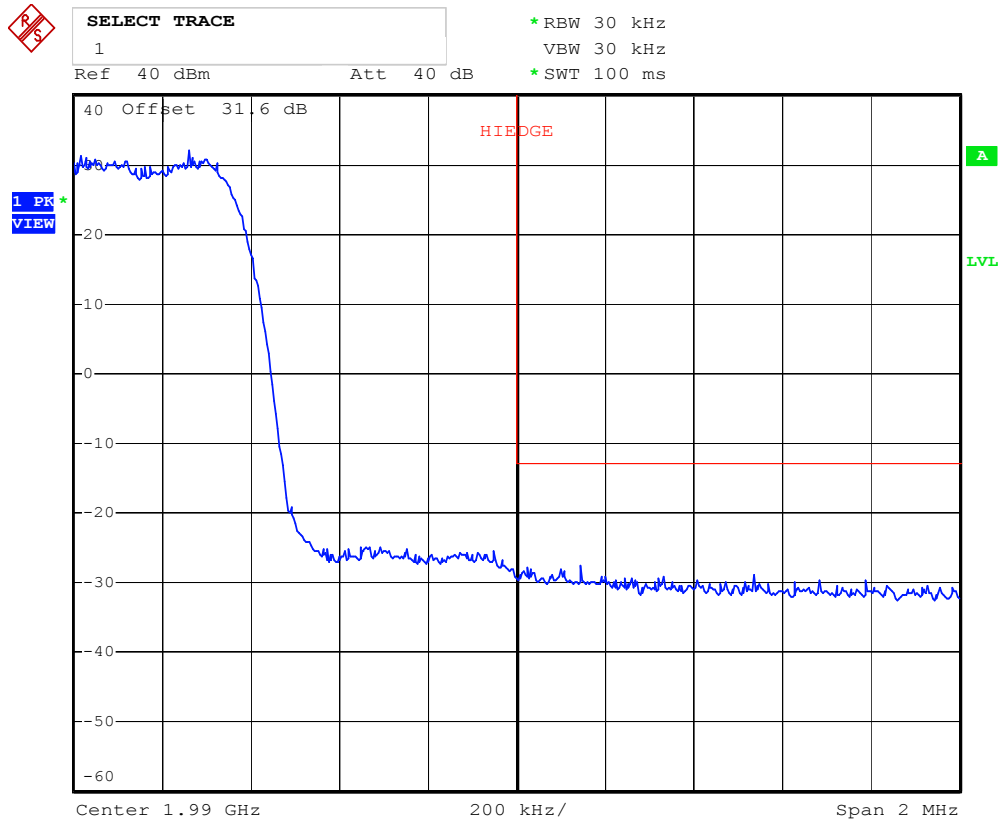
Test Data – Spurious Emissions at Antenna Terminal



Date: 16.AUG.2005 12:11:11

Lowest operating channel  
1931.25 MHz  
20 Watts

Test Data – Spurious Emissions at Antenna Terminal

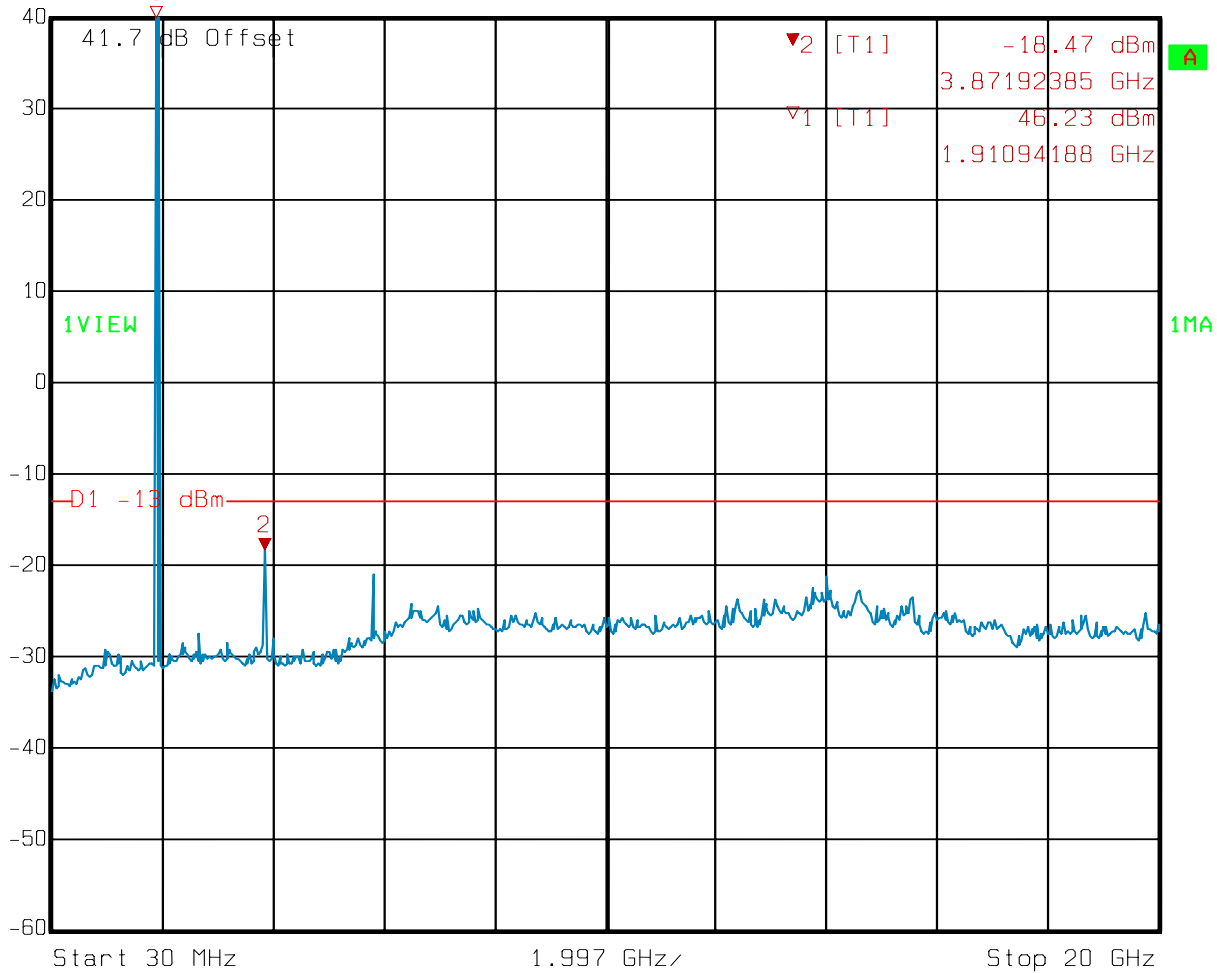


Date: 16.AUG.2005 13:32:03

Highest operating channel  
1988.75 MHz  
20 Watts

Test Data – Spurious Emissions at Antenna Terminal

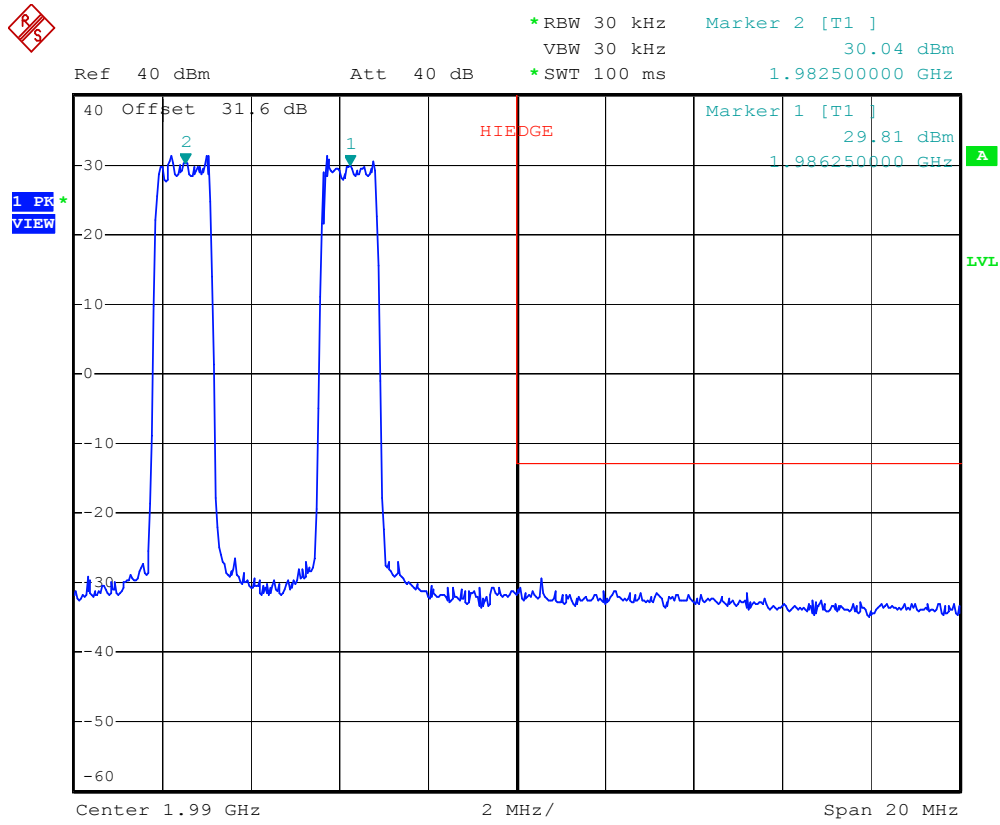
RS	Ref Lvl	Marker 2 [T1]	RBW	1 MHz	RF Att	10 dB
	40 dBm	-18.47 dBm	VBW	1 MHz	Mixer	-10 dBm
		3.87192385 GHz	SWT	200 ms	Unit	dBm



Date: 07.JUN.2005 10:52:42

Center channel

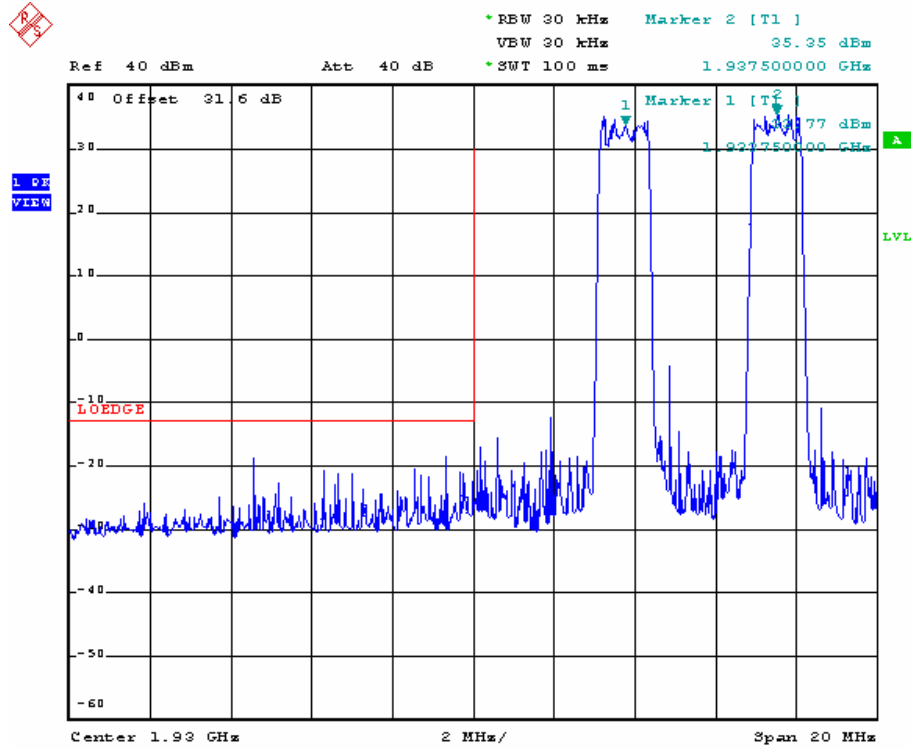
Test Data – Spurious Emissions at Antenna Terminal



Date: 16.AUG.2005 13:35:18

Intermodulation Characteristics  
20 Watts per carrier / 40 Watts composite

Test Data – Spurious Emissions at Antenna Terminal



Date: 16.AUG.2005 13:11:50

Intermodulation Characteristics  
20 Watts per carrier / 40 Watts composite

**Section 6. Field Strength of Spurious**

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1051
TESTED BY: David Light	DATE: 6/7/2005

**Test Results:** Complies.

**Test Data:** There were no emissions detected above the noise floor which was at least 30 dB below the specification limit of -13 dBm. The spectrum was searched from 30 MHz to 20 Ghz..

**Equipment Used:** 1036-1016-1484-1485-1304-791-1982-760-759

**Measurement Uncertainty:** +/- 1.6 dB

**Temperature:** 22 °C

**Relative Humidity:** 40 %



**Photographs of Test Setup**



## Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
TESTED BY: David Light	DATE: 6/9/2005

**Test Results:** Complies

**Measurement Data:** Standard Test Frequency: 1946.25 MHz  
Standard Test Voltage: 27 Vdc

**Test Data – Frequency Stability**

<b>Frequency Stability</b>							
Page <u>1</u> of <u>1</u>							
Job No.:	5L0262R			Date: 6/9/2005			
Specification:	Part 24		Temperature(°C): <u>20</u>				
Tested By:	<u>David Light</u>		Relative Humidity(%) <u>50</u>				
E.U.T.:	<u>Indoor base station</u>						
Configuration:	<u>Tx CDMA signal at mid band</u>						
Sample Number:	<u>1</u>						
<b>Test Equipment Used</b>							
Antenna:	_____			Directional Coupler: _____			
Pre-Amp:	_____			Cable #1: <u>1484</u>			
Filter:	_____			Cable #2: _____			
Receiver:	<u>1036</u>						
Attenuator #1	<u>1472</u>						
Attenuator #2:	_____						
Measurement Uncertainty:	<u>1x10<sup>-17</sup> ppm</u>		Standard Test Frequency <u>1946.250000</u> MHz				
Temp (°C)	Measured Frequency (MHz)	Rho	Test Voltage	Frequency Error (Hz)	Limit (+/-Hz)	Error (ppm)	Comment
20	1946.250055	0.9980	27	55	973.1	0.028	
20	1946.250053	0.9982	23.0	53	973.1	0.027	
20	1946.250047	0.9981	31.0	47	973.1	0.024	
50	1946.250057	0.9978	27	57	973.1	0.029	
40	1946.250034	0.9983	27	34	973.1	0.017	
30	1946.250031	0.9981	27	31	973.1	0.016	
10	1946.250049	0.9982	27.0	49	973.1	0.025	
0	1946.250032	0.9982	27.0	32	973.1	0.016	
-10	1946.250065	0.9980	27.0	65	973.1	0.033	
-20	1946.250031	0.9980	27	31	973.1	0.016	
-30	1946.250036	0.9981	27	36	973.1	0.018	
Notes:							

**Section 8. Test Equipment List**

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	03/22/04	03/23/06
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	08/26/04	08/26/05
1472	20db Attenuator DC 18 Ghz	Omni Spectra 20600-20db	NONE	CBU	N/A
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	03/22/04	03/23/06
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	08/02/04	08/02/05
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	11/12/04	11/12/05
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03	09/22/05
759	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	556	07/23/04	07/23/05
760	Antenna biconical	Electro Metrics MFC-25	477	06/22/04	06/22/05
791	PREAMP, 25dB	ICC LNA25	398	11/12/04	11/12/05
1982	CABLE, 7m	KTL RG223	N/A	10/25/00	N/A
1066	CABLE, 4M	STORM PR90-010-144	N/A	08/26/04	08/26/05
	Chart recorder ETL Asset 1244	Unk Unk		03/04/05	03/04/06
	Temp controller ETL asset 1154	Unk Unk		11/19/04	11/19/05
1659	Spectrum Analyzer	Rhode & Schwarz FSP	973353	10/02/03	10/02/05

## **ANNEX A - TEST DETAILS**

**NAME OF TEST: RF Power Output**

**PARA. NO.: 2.1046**

**Minimum Standard:** Para. No.24.232. Base stations are limited to 1640 watts peak E.I.R.P. with an antenna height up to 300 meters HAAT. In no case may the peak output power of a base station transmitter exceed 100 watts.

**Method Of Measurement:** CDMA Per ANSI/J-STD-014  
TDMA Per ANSI/J-STD-010

Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter or a spectrum analyzer.

**NAME OF TEST: Occupied Bandwidth**

**PARA. NO.: 2.1049**

**Minimum Standard:** Para. No. 24.238(b). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB.

**Method Of Measurement:**

CDMA Per ANSI/J-STD-014

Spectrum analyzer settings:

RBW: 30 kHz

VBW:  $\geq$  RBW

Span: 5 MHz

Sweep: Auto

GSM Per ANSI/J-STD-010

RBW: 3 kHz

VBW:  $\geq$  RBW

Span: 2 MHz

Sweep: Auto

NADC Per IS-136

RBW: 1 kHz

VBW:  $\geq$  RBW

Span: 1 MHz

Sweep: Auto

**NAME OF TEST: Spurious Emission at Antenna Terminals      PARA. NO.: 2.1051**

**Minimum Standard:**      Para. No.24.238(a). On any frequency outside a licensee’s frequency block, the power of any emission shall be attenuated below the transmitter power by at least 43 + 10 log (P) dB.

**Method Of Measurement:**

Spectrum analyzer settings:

CDMA Per ANSI/J-STD-014

GSM Per ANSI/J-STD-010

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 30 kHz (< 1MHz from Band Edge)  
VBW: ≥ RBW  
Sweep: Auto  
Video Avg: 6 Sweeps

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 3 kHz (< 1 MHz from Band Edge)  
VBW: ≥ RBW  
Sweep: Auto  
Video Avg: Disabled

NADC Per IS-136

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 1 kHz (< 1 MHz from Band Edge)  
VBW: ≥ RBW  
Sweep: Auto  
Video Avg: Disabled

To demonstrate compliance at band edges the frequency of the input signal is set to the lowest and highest assigned channel and the center frequency of the spectrum analyzer is set to the upper and lower edges of the appropriate frequency block.



<b>NAME OF TEST: Field Strength of Spurious Radiation</b>	<b>PARA. NO.: 2.1053</b>
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**Minimum Standard:** Para. No.24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least  $43 + 10 \log (P)$  dB.

**Test Method:**

The maximum field strength of the spurious emission is measured at a distance of 3 meters. The device under test is then replaced with a substitution antenna of known gain with respect to an isotropic radiator. A calibrated signal source is used to feed the substitution antenna. The rf level to the substitution antenna is adjusted to repeat the previously measured field strength. The rf input level to the substitution antenna is the effective isotropic power of the spurious emission.

**NAME OF TEST: Frequency Stability**

**PARA. NO.: 2.1055**

**Minimum Standard:** Para. No. 24.235. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

**Method Of Measurement:** CDMA Per ANSI/J-STD-014  
TDMA Per ANSI/J-STD-010  
NADC Per IS-136

Frequency Stability With Voltage Variation

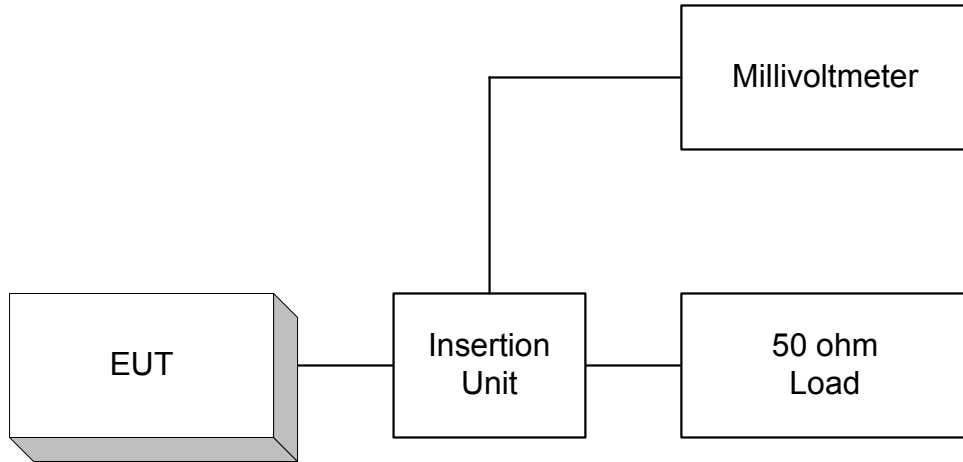
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation

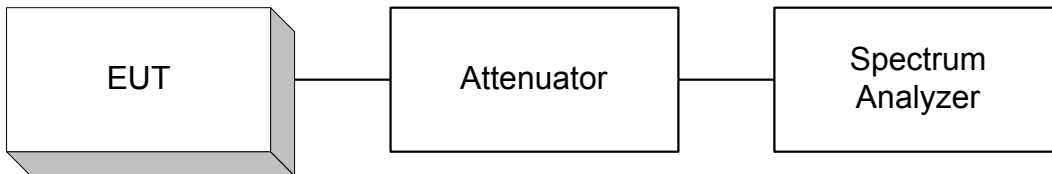
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

## **ANNEX B - TEST DIAGRAMS**

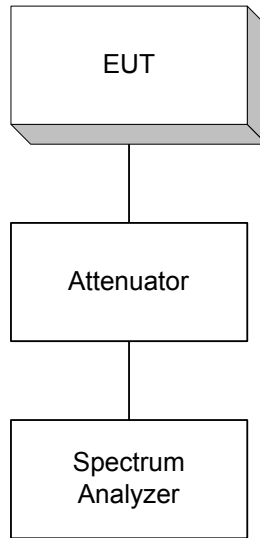
**Para. No. 2.985 - R.F. Power Output**



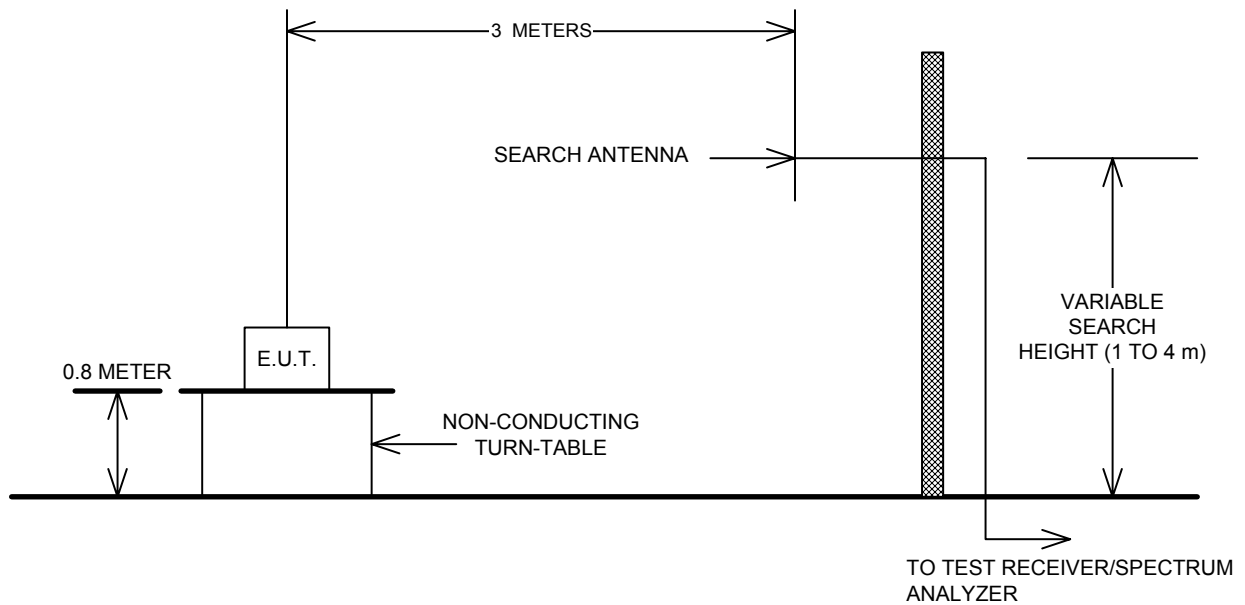
**Para. No. 2.989 - Occupied Bandwidth**



**Para. No. 2.991 Spurious Emissions at Antenna Terminals**



**Para. No. 2.993 - Field Strength of Spurious Radiation**



**Para. No. 2.995 - Frequency Stability**

