APPLICATION FOR PART 24, SUBPART E CERTIFICATION

Samsung Telecommunications America
1130 East Arapaho Road
Richardson, TX 75081
972-761-7987

MODEL: Pico-BTS 10W PRU
FCC ID: NP8-1900-10-PRU

January 13, 2000

This report concerns (check one): Original Grant: X **Class II Change:** **Equipment Type**: **Transmitter**
Deferred grant requested per 47 CFR 0.457 (d) (1) (ii)? Yes: No: X **If yes, defer until:** _____ ***Date*** **Company name agrees to notify the Commission by: _____(date) of the intended date of announcement of the product so that the grant can be issued on that date.**
Transition Rules Request per 15.37? Yes: No: X **If no, assumed Part 15, subpart B for unintentional radiators - the new 47 CFR**

NAME OF TEST	PARA. NO.	SPEC.	MEASUREMENT	RESULTS
RF Power Output				Complies
Occupied Bandwidth (CDMA)				Complies
Occupied Bandwidth (GSM)				Complies
Occupied Bandwidth (NADC)				Complies
Spurious Emissions at Antenna Terminals				Complies
Field Strength of Spurious Emissions				Complies
Frequency Stability				Complies

REPORT PREPARED BY:

EMI Technician: J. Mayle
Administrative Writer: Melissa Fleming

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1.0 INTRODUCTION

The or Certification of an FCC Part 24 is prepared on behalf of Samsung Telecommunications America in accordance with Part 2, and Part 24, of the Federal Communications Commissions rules and regulations. The Equipment Under Test (EUT) was the Pico-BTS 10W PRU, FCC ID: NP8-1900-10-PRU. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with CFR 47, Part 22, ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instruments. These are explained in the appendix of this report. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

All radiated and conducted emission measurements were performed at National Technical Systems (NTS). The radiated emission measurements required by the rules were performed on the three and ten meter, open field, test range maintained by National Technical Systems (NTS) 1701 East Plano Parkway, Suite 150, Plano, TX 75074. Complete description and site attenuation measurement data have been placed on file with the Federal Communications Commission. National Technical Systems (NTS) is on the FCC accepted lab list as a facility available to do measurement work for others on a contract basis.

1.1 RELATED SUBMITTAL(S)/GRANT(S)

This is an original submission for Certification.

1.2 EMISSIONS EQUIPMENT LIST

TABLE 1: EMISSIONS EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	LAST CAL. DATE	NEXT CAL. DATE
POWER METER	HEWLETT PACKARD	438A	3513U05937	3/9/99	3/9/00

1.3 TEST SYSTEM DETAILS

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

TABLE 2: TEST SYSTEM DETAILS

EXTERNAL COMPONENTS

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION
PICO-BTS 10W PRU (EUT)	SAMSUNG ELECTRONICS	PICO-BTS 10W PRU		NP8-1900-10-PRU	

1.4 TEST METHODOLOGY

All tests were performed according to the procedures in FCC Part 22 and FCC Part 2. Field strength of spurious radiation testing was performed at an antenna to EUT distance of 3 and 10 meters. Additionally, spectrum efficiency standard, RF power output, spurious emissions at antenna terminal, occupied bandwidth, frequency stability versus temperature and voltage, transient frequency behavior were measured per FCC Rules and Regulations: CFR 47, part 22, October 1, 1997 and Part 2, October 1, 1997.

1.5 TEST FACILITY

The open aria test site and conducted measurement facility used to collect the radiated data is located at National Technical Systems (NTS), 1701 East Plano Parkway, Suite 150, Plano TX 75074. This site has been fully described in a report dated March 3, 1994, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

2.0 SYSTEM TEST CONFIGURATION

2.1 JUSTIFICATION

To complete the test configuration required by the FCC, the transmitter was connected to PMU to operate the transmitter. ET channels, available within the range 1931.25-1988.75 MHz, were investigated and tested from 9 kHz to 20 GHz. Only worst case emissions are used for final measurement.

2.2 EUT EXERCISE SOFTWARE

The EUT was enabled to continuously transmit data.

2.3 CONFORMANCE STATEMENT

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made during testing to the equipment in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the FCC Part 22 Type Certification Transmitter and Part 2 test methodology.

Signature: _____ Date: January 19, 2000

Typed/Printed Name: Michael Cantwell Position: General Manager
(NVLAP Signatory)

Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 20061-0.

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

3.0 STANDARD REQUIREMENTS

TYPE CERTIFICATION FCC PART 24: PERSONAL COMMUNICATIONS SERVICES SUBPART E: BROADBAND PCS

3.1 FCC PART 24.232: POWER AND ANTENNA HEIGHT LIMITS

(a) Base stations are limited to 1640 watts peak equibalent isotropically radiated power (E.I.R.P.) with an antenna height up to 300 meters HAAT. See §24.53 for HAAT calculation method. Base station antenna heights may exceed 300 meters with a corresponding reduction in power. In no case may the peak output power of a base station transmitter exceed 100 watts. The service area boundary limit and microwave protection criteria specified in §24.236 and §24.237 apply.

TABLE 3: REDUCED POWER FOR BASE STATION ANTENNA HEIGHTS OVER 300 METERS

HAAT in meters	Maximum E.I.R.P. (watts)
≤300	1640
≤500	1070
≤1000	490
≤1500	270
≤2000	160

(b) Mobile/portable stations are limited to 2 watts (E.I.R.P.) peak power and the equipment must employ means to limit the power to the minimum necessary for seccessful communications.

(c) Peak transmit power must be measured over any interval of continuous transmission using instrumentaion calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitaions, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

3.2 FCC PART 24.235: FREQUENCY STABILITY

The frequency stability shall be sufficient to ensure that the findamental emission stays within the authorized frequency block.

3.3 FCC PART 24.238: EMISSION LIMITS

(a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB.

(b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. 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 below the transmitter power.

(c) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(d) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

(e) When an emission outside of the authorized bandwidth causes harmful interference the Commission may, at its discretion, require greater attenuation than specified in this section.

4.0 TEST RESULTS

TABLE 4: RADIATED EMISSIONS AT 10 METERS (TRANSMITTING AT FULL POWER ON CHANNEL 825 @ 39.8dBm)

(Temperature: 70°F, Humidity: 60%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	FCC Limit (dBuV/m)	FCC Margin (dB)
172.114	Qp	H	200	3.0	34.6	-8.8	25.8	43.5	-17.7
172.119	Qp	V	0	1.0	35.2	-9.2	26.0	43.5	-17.5
177.037	Qp	V	145	1.0	33.0	-9.4	23.6	43.5	-19.9
177.039	Qp	H	5	4.0	29.4	-9.1	20.3	43.5	-23.2
196.680	Qp	H	160	4.0	39.7	-9.8	29.9	43.5	-13.6
196.689	Qp	V	45	1.0	38.1	-9.4	28.7	43.5	-14.8
206.521	Qp	H	20	4.0	37.0	-9.9	27.1	43.5	-16.4
221.264	Qp	H	320	4.0	31.7	-10.7	21.0	46.4	-25.4
221.271	Qp	V	15	1.0	34.3	-9.8	24.5	46.4	-21.9
231.106	Qp	H	205	3.0	35.0	-10.1	24.9	46.4	-21.5
231.112	Qp	V	5	1.0	38.9	-9.4	29.5	46.4	-16.9
245.837	Qp	H	340	3.0	38.0	-9.2	28.8	46.4	-17.6
245.842	Qp	V	83	1.0	35.7	-9.0	26.7	46.4	-19.7
250.757	Qp	H	335	3.0	35.6	-8.8	26.8	46.4	-19.6
250.761	Qp	V	350	1.0	39.4	-8.7	30.7	46.4	-15.7
270.414	Qp	H	5	2.0	33.6	-7.3	26.3	46.4	-20.1
270.430	Qp	V	80	1.0	33.4	-6.6	26.8	46.4	-19.6
304.829	Qp	V	35	1.0	36.3	-6.4	29.9	46.4	-16.5
304.831	Qp	H	100	2.0	35.5	-6.4	29.1	46.4	-17.3
344.157	Qp	H	5	2.0	29.2	-5.0	24.2	46.4	-22.2
344.158	Qp	V	70	1.0	32.1	-5.1	27.0	46.4	-19.4
393.293	Qp	V	95	1.0	35.8	-3.3	32.5	46.4	-13.9
393.298	Qp	H	210	1.5	36.5	-3.9	32.6	46.4	-13.8
398.211	Qp	H	35	3.0	32.0	-3.6	28.4	46.4	-18.0
398.213	Qp	V	95	1.0	31.3	-3.1	28.2	46.4	-18.2
432.622	Qp	H	235	3.0	31.4	-2.5	28.9	46.4	-17.5
668.545	Qp	H	275	3.5	35.1	1.0	36.1	46.4	-10.3
668.559	Qp	V	5	2.0	31.4	1.0	32.4	46.4	-14.0
688.211	Qp	V	5	2.0	28.6	1.6	30.2	46.4	-16.2
688.214	Qp	H	70	1.0	29.7	1.2	30.9	46.4	-15.5
707.860	Qp	V	0	2.0	32.1	2.0	34.1	46.4	-12.3
707.863	Qp	H	75	3.0	31.3	1.1	32.4	46.4	-14.0
1179.746	Av	V	340	2.5	15.0	7.1	22.1	49.5	-27.4
1179.747	Av	H	130	2.0	14.2	6.1	20.3	49.5	-29.2
1199.397	Av	H	345	2.5	17.0	6.5	23.5	49.5	-26.0
1199.405	Av	V	35	2.5	19.1	7.0	26.1	49.5	-23.4

TEST PERSONNEL:

Signature**:** _____ **D**ate**:** December 13, 1999

Typed/Printed Name: J. Mayle

TABLE 5: RADIATED EMISSIONS AT 3 METERS (TRANSMITTING AT FULL POWER ON CHANNEL 825 @ 39.8dBm)

(Temperature: 70°F, Humidity: 60%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	FCC Limit (dBuV/m)	FCC Margin (dB)
2187.994	Av	V	165	1.0	26.9	2.3	29.2	60.0	-30.8
2187.995	Av	H	265	2.0	32.1	2.3	34.4	60.0	-25.6
2310.312	Av	H	270	2.0	33.2	2.9	36.1	60.0	-23.9
2495.821	Av	H	220	2.0	23.8	3.8	27.6	60.0	-32.4
2676.957	Av	V	205	1.0	36.1	4.7	40.8	60.0	-19.2
5000.000	Av	H	5	1.0	22.4	6.7	29.1	60.0	-30.9
5000.000	Av	V	5	1.0	24.6	6.7	31.3	60.0	-28.7
7200.000	Av	H	5	1.0	20.8	11.7	32.5	60.0	-27.5
7200.000	Av	V	5	1.0	21.1	11.7	32.8	60.0	-27.2
10000.000	Av	H	5	1.0	21.5	11.7	33.2	60.0	-26.8
10000.000	Av	V	5	1.0	21.2	11.7	32.9	60.0	-27.1

TEST PERSONNEL:

Signature**:** _____ **D**ate**:** December 13, 1999

Typed/Printed Name: J. Mayle

4.1 FREQUENCY STABILITY FUNCTION OF TEMPERATURE

TABLE 6: FCC PART 24: FREQUENCY STABILITY FUNCTION OF TEMPERATURE

Channel 1175

Frequency stability function of temperature				
Channel	Voltage	Temperature (°C)	MCF(MHz)	PPM error $[(MCF/ACF)-1]10^6$
1175	115	-30	1988.75	0
1175	115	-20	1988.75	0
1175	115	-10	1988.75	0
1175	115	0	1988.75	0
1175	115	10	1988.75	0
1175	115	20	1988.75	0
1175	115	30	1988.75	0
1175	115	40	1988.75	0
1175	115	50	1988.75	0
1175	132.25	20	1988.75	0
1175	97.75	20	1988.75	0
25	115	-30	1931.25	0
25	115	-20	1931.25	0
25	115	-10	1931.25	0
25	115	0	1931.25	0
25	115	10	1931.25	0
25	115	20	1931.25	0
25	115	30	1931.25	0
25	115	40	1931.25	0
25	115	50	1931.25	0
25	132.25	20	1931.25	0
25	97.75	20	1931.25	0

where MCF is the Measured Carrier Frequency in MHz, ACF the Assigned Carrier Frequency in MHz. and ACF(MHz)=460.0000

5.0 Field Strength Calculation, and Radiated Test Methodology

5.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FI(dBuV/m) = SAR(dBuV) + SCF(dB/m)
FI = Field Intensity
SAR = Spectrum Analyzer Reading
SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

SCF(dB/m) = - PG(dB) + AF(dB/m) + CL(dB)

SCF = Site Correction Factor
PG = Pre-amplifier Gain
AF = Antenna Factor
CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(uV/m) = 10^{FI(dBuV/m)/20}$$

For example, assume a signal at a frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is -11.5 dB/m. The actual radiated field strength is calculated as follows:

49.3 dBuV - 11.5 dB/m = 37.8 dBuV/m

$$10^{37.8/20} = 10^{1.89} = 77.6 \text{ uV/m}$$

APPENDIX A:

TEST PHOTOS

APPENDIX B:

OCCUPIED BANDWIDTH PLOTS

APPENDIX C:

ANTENNA SPURIOUS PLOTS

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FREQUENCY STABILITY PLOTS

APPENDIX E:

PRODUCT DESCRIPTION

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APPENDIX I:

USER'S MANUAL