THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

Test Report

Product Name: Pilot Servercall Transmitter

FCC ID: QBTLTK-PSC

Applicant:
LEE TECHNOLOGY KOREA CO., LTD

3FL #499-2, Sang 3-Dong, Wonmi-Gu
Bucheon-City, Kyungki-Do
KOREA

Date Receipt:04/21/2005

Date Tested: 05/06/2005

THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

TABLE OF CONTENTS LIST FOR PART 90 UHF DEVICE

APPLICANT: LEE TECHNOLOGY KOREA CO., LTD

FCC ID: QBTLTK-PSC

TEST REPORT CONTAINING:

EXHIBITS CONTAINING:

THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

GENERAL INFORMATION REQUIRED
FOR TYPE ACCEPTANCE

2.1033 (c)(1)(2) LEE TECHNOLOGY KOREA CO., LTD. will sell the FCC ID: QBTLTK-PSC VHF transceiver in quantity, for use under FCC RULES PART 90

2.1033 (C) TECHNICAL DESCRIPTION
2.1033 (3) User Manual See Exhibit 6

2.1033 (4) Type of Emission: 10K2F2D
FOR 25kHz

Bn = 2M + 2DK
M = 1,200 Bits per second
D = 4.5 kHz (Peak Deviation)
K = 1
Bn = 2(1,200bps/2) + 2(4500)(1) = 10.2k

ALLOWED AUTHORIZED BANDWIDTH = 10.2 kHz.

90.209(b) (5)

2.1033 (5) Frequency Range: 26.995 MHz
2.1034

(6) Power Range and Controls: There are NO user Power controls.

(7) Maximum Output Power Rating:
see Next Page.

(8) DC Voltages and Current into Final Amplifier:

POWER INPUT
FIANL AMPLIFIER ONLY
Vce = 12 Volts
IC = 1.2A

(9) Tune-up procedure. The tune-up procedure is given in EXHIBIT 9.

2.1033 (10) Complete Circuit Diagrams: The circuit diagram is included as EXHIBIT 2. The block diagram is included as EXHIBIT 3.

(11) Function of each electron tube or semiconductor device or other active circuit device:
- SEE EXHIBIT 8.

(8) Instruction book. The instruction manual is included as EXHIBIT 6.

(10) Description of all circuitry and devices provided for determining and stabilizing frequency is included in the circuit description in Exhibit #7.

2.1033(c)(11) A photograph or drawing of the equipment identification label is shown in Exhibit 1.

2.1033(c)(12) Photographs of the equipment of sufficient clarity to reveal equipment construction and layout and label location are shown in Exhibit 4-5.

2.1033(c)(13) For equipment employing digital modulation, a detail description of the modulation technique. This UUT uses FSK to modulate the transmitter.

2.1033(c)(14) Data required for 2.1046 to 2.1057 See Below

2.1046(a) & 90.205 RF power output.

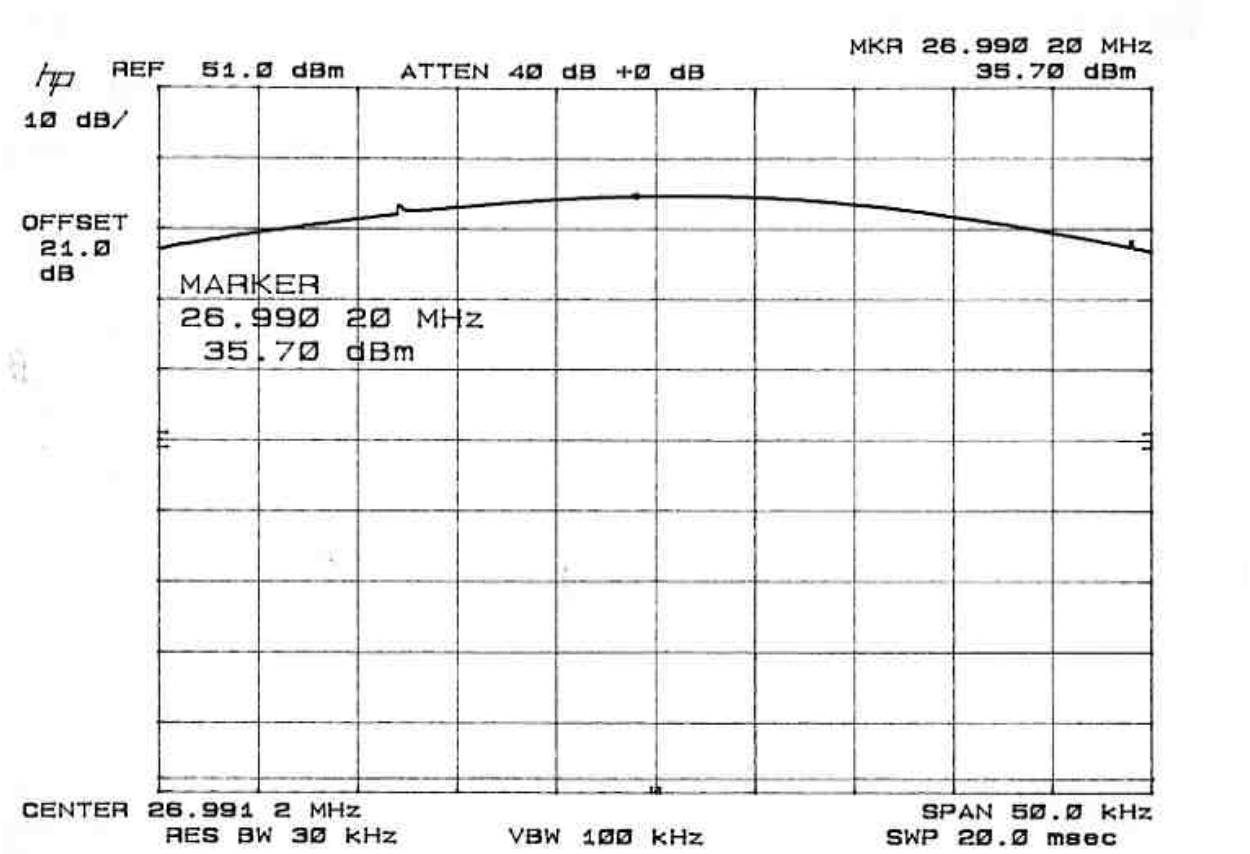
MAXIMUM PEAK OUTPUT POWER(conducted)

Maximum peak output power(W)
26.995MHz
35.7 dbm(3.7w)

THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

PLOT



THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

SPURIOUS EMISSIONS (conducted)

2.1057 SPECTRUM RANGE TO BE INVESTIGATED

Lowest radio frequency signal generated in the equipment, without going below 9kHz, up to at least the frequency shown below:

(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

(2) If the equipment operates at or above 10GHz and below 30GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

(3) If the equipment operates at or above 30GHz: to the fifth harmonic of the highest fundamental frequency or to 200GHz, whichever is lower.

(b) Particular attention should be paid to harmonics and sub-harmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.

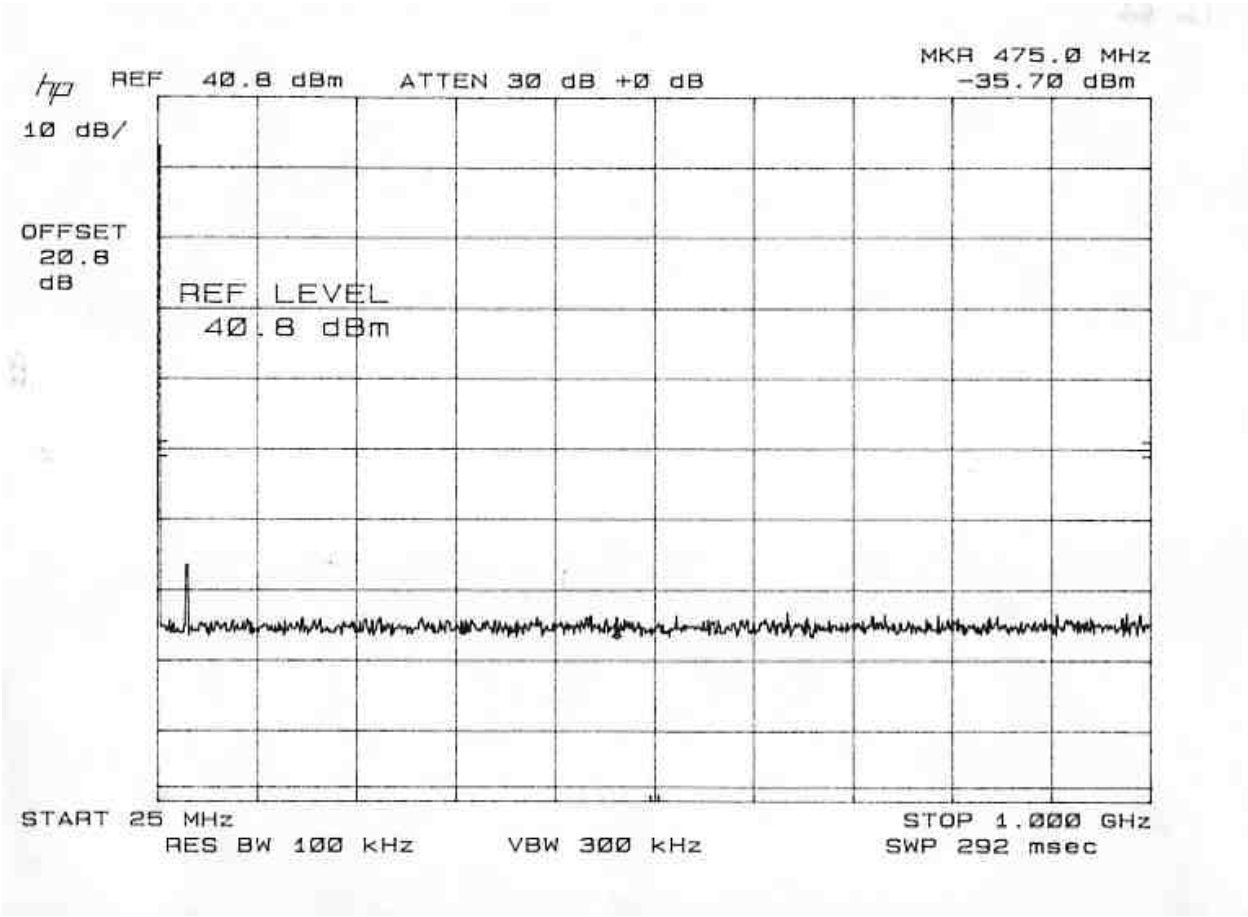
(c) The amplitude of spurious emissions, which are attenuated more than 20dB below the permissible value, need not be reported.

(d) Unless otherwise specified,measurements above 40GHz shall be performed using a minimum resolution bandwidth of 1MHz.

THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

PLOT



THRUlab & Engineering.

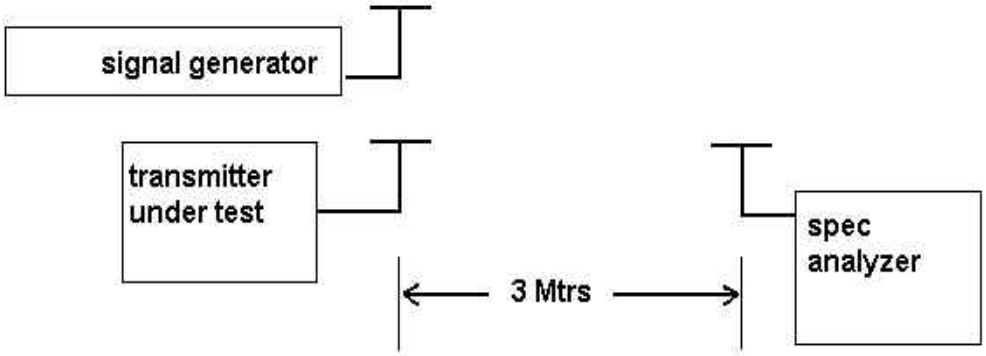
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

2.1053
95.635 (b) (7)
90.210 (c) (3)

UNWANTED RADIATION

The tabulated Data shows the results of the radiated Field strength emissions test. The spectrum was Scanned from 30 MHz to at least the 10th harmonic of The fundamental. This test was conducted per ANSI C63.4 – 1992

Method of Measuring Radiated Spurious Emissions



THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

REQUIREMENTS: **43 + 10log(3.7) = 48.682dB**

DATA

Horizontal				Vertical		
Test Data :				Test Data :		
Emission Frequency	ATTN dBc	Margin dB		Emission Frequency	ATTN dBc	Margin dB
26.9950	0.00	0.00		27.00	0.00	0.00
53.9900	64.63	15.91		53.99	58.63	9.91
80.9850	79.83	31.11		80.99	70.53	21.81
107.9800	65.95	17.23		107.98	62.15	13.43
134.9750	70.15	21.43		134.98	70.05	21.33
161.9700	79.16	30.44		161.97	78.86	30.14
188.9650	86.15	37.43		188.97	82.65	33.93
215.9600	88.46	39.74		215.96	86.36	37.64
242.9550	85.84	37.12		242.96	88.44	39.72
269.9500	82.52	33.80		269.95	86.52	37.80

METHOD OF MEASUREMENT : The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA STANDARD 603 using the substitution method. Measurements were made at the open field test site of ThruLab & ENGINEERING. located at 389 JeAm-Rhi HyangNam-Myun,HwaSung-Shi,KyoungKi-Do Korea.

THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

APPLICANT: LEE TECHNOLOGY KOREA CO., LTD
FCC ID: QBTLTK-PSC
NAME OF TEST: RADIATION INTERFERENCE
RULES PART NO.: 90.210(c)(3)
REQUIREMENTS: 30 to 88 MHz: 40.0 dBuV/M @ 3 METERS
88 to 216 MHz: 43.5 dBuV/M
216 to 960 MHz: 46.0 dBuV/M
ABOVE 960 MHz: 54.0 dBuV/M

TEST RESULTS: A search was made of the spectrum from 30 to 1000MHz and the measurements indicate that the unit DOES meet the FCC requirements. Radiated and antenna conducted spurious emissions testing is required. For Antenna Conducted spurious, the limit is 20dBc.

On any frequency removed from the center of the authorized bandwidth by more than 250percent of the authorized bandwidth: At least 43+10log(p) dB.

TEST DATA:

No	Emission Frequency (MHz)	Meter Reading dBuV/m	Ant. Polaritry	Correction Factor dB	Cable Loss dB	Field Strength (dBuv/m)	Margin (dBuv)	Limit (dBuv/m)
1	296.96	26.1	V	16.7	3.4	46.2	-47.8	94.0
2	323.94	23.6	H	16.1	3.6	43.3	-50.7	94.0
3	350.92	27.2	V	14.8	3.8	45.8	-48.2	94.0
4	377.89	35.5	H	15.0	4.0	54.6	-39.4	94.0
5	404.87	36.8	H	15.5	4.2	56.6	-37.4	94.0
6	431.85	29.1	V	15.9	4.4	49.5	-44.5	94.0
7	458.83	24.3	H	17.9	4.6	46.8	-47.2	94.0
8	485.81	20.5	V	18.8	4.8	44.1	-49.9	94.0
9	512.91	20.8	H	17.9	5.0	43.7	-50.3	94.0
10	539.77	16.7	V	18.0	5.2	39.9	-54.1	94.0
11	566.75	10.1	H	18.4	5.3	33.9	-60.1	94.0
12	593.73	12.1	V	18.9	5.5	36.5	-57.5	94.0
13	620.71	13.7	V	20.4	5.7	39.8	-54.2	94.0
14	647.68	9.8	H	20.2	5.9	35.9	-58.1	94.0
15	674.61	8.3	V	21.1	6.0	35.4	-58.6	94.0

SAMPLE CALCULATION: FSdBuV/m = MR (dBuV) + ACFdB.
TEST PROCEDURE: ANSI STANDARD C63.4-1992 using a Hewlett Packard Model 8566B spectrum analyzer, a Hewlett Packard Model 85685A Preselector, a Hewlett Packard Model 85650A Quasi-Peak adapter, and an appropriate antenna – see the test equipment list. The bandwidth of spectrum analyzer was 100 kHz with an appropriate sweep speed. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported.

PERFORMED BY: K.M.Choi **DATE: 05/06/2005**

THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

BANDWIDTH LIMITATION

90.209 According to 90.203(3) For all other types of emissions, the maximum authorized bandwidth shall not be more than that normally authorized for voice operations.
According to 90.200(5), Unless specified elsewhere, channel spacing and bandwidths that will be authorized in the following frequency bands are given in the following"STANDARD CHANNEL SPACING/BANDWIDTH" table.

Standard Channel Spacing/Bandwidth

Frequency band (MHz)	Channel spacing (KHz)	Authorized Bandwidth(kHz)
Below 25 ……		
25-50.	20	20
72-76	20	20
150-174	1)7.5	1,3)20/11.25/6
220-222	5	4
421-512	1)6.25	1,3)20/11.25/6
806-821/851-866	25	20
821-824/866-869	12.5	20
896-901/935-940	12.5	13.6
902-928……		
929-930	25	20
1427-1435……		
2450-2483.52……		
Above 2500……		

1) For stations authorized on or after August 18,1995.
3) Operations using equipment designed to operate with a 25kHz channel bandwidth will be authorized a 20kHz bandwidth. Operations using equipment designed to operate with a 12.5kHz channel bandwidth will be authorized an 11.25kHz bandwidth. Operations using equipment designed to operate with a 6.25kHz channel bandwidth will be authorized a 6kHz bandwidth.

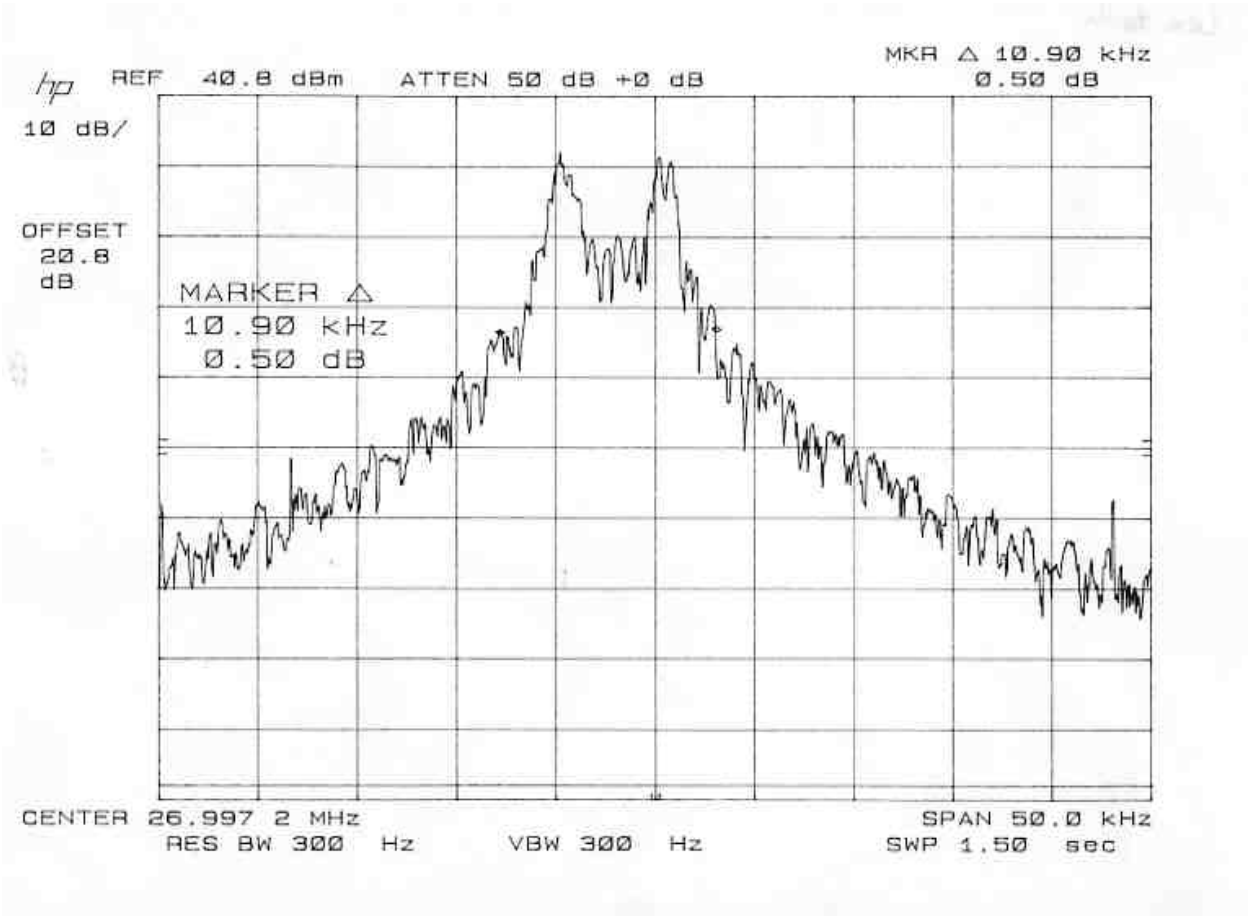
Specification Limit: 20kHz

THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

90.209- 26 dB BANDWIDTH LIMITATION

PLOT



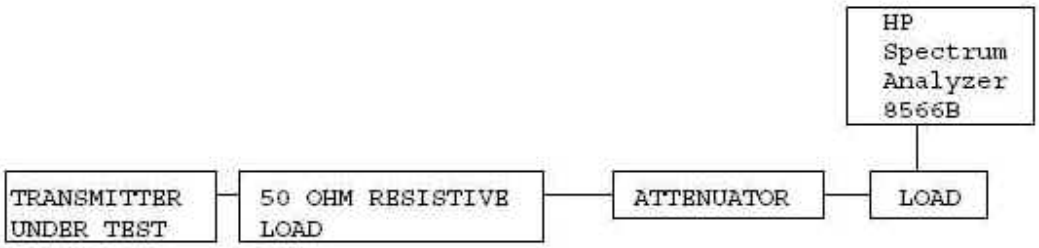
THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

2.1049 Audio Low Pass Filter
This UUT does not have a low pass filter

2.1049 Occupied bandwidth:
90.210(c,)
For transmitters that are not equipped with an audio low pass filter pursuant to S90.211(b), the power of any emission must be attenuated below the unmodulated carrier output power as follows; (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency(fd in kHz) of more than 5 kHz but not more than 10kHz: At least 83log(fd/5)dB; (2) ON any frequency removed from the center of the authorized bandwidth by a displacement frequency(fd in kHz) of more than 10 kHz, but not more than 250% of the authorized bandwidth: At least 29log(fd2/11)dB or 50 dB, whichever is the lesser attenuation; (3) On any frequency removed from the center of the auth -orized bandwidth by more than 250% of the authorized bandwidth: At least 43+10log(Po)dB.

Method of Measuring Occupied Bandwidth

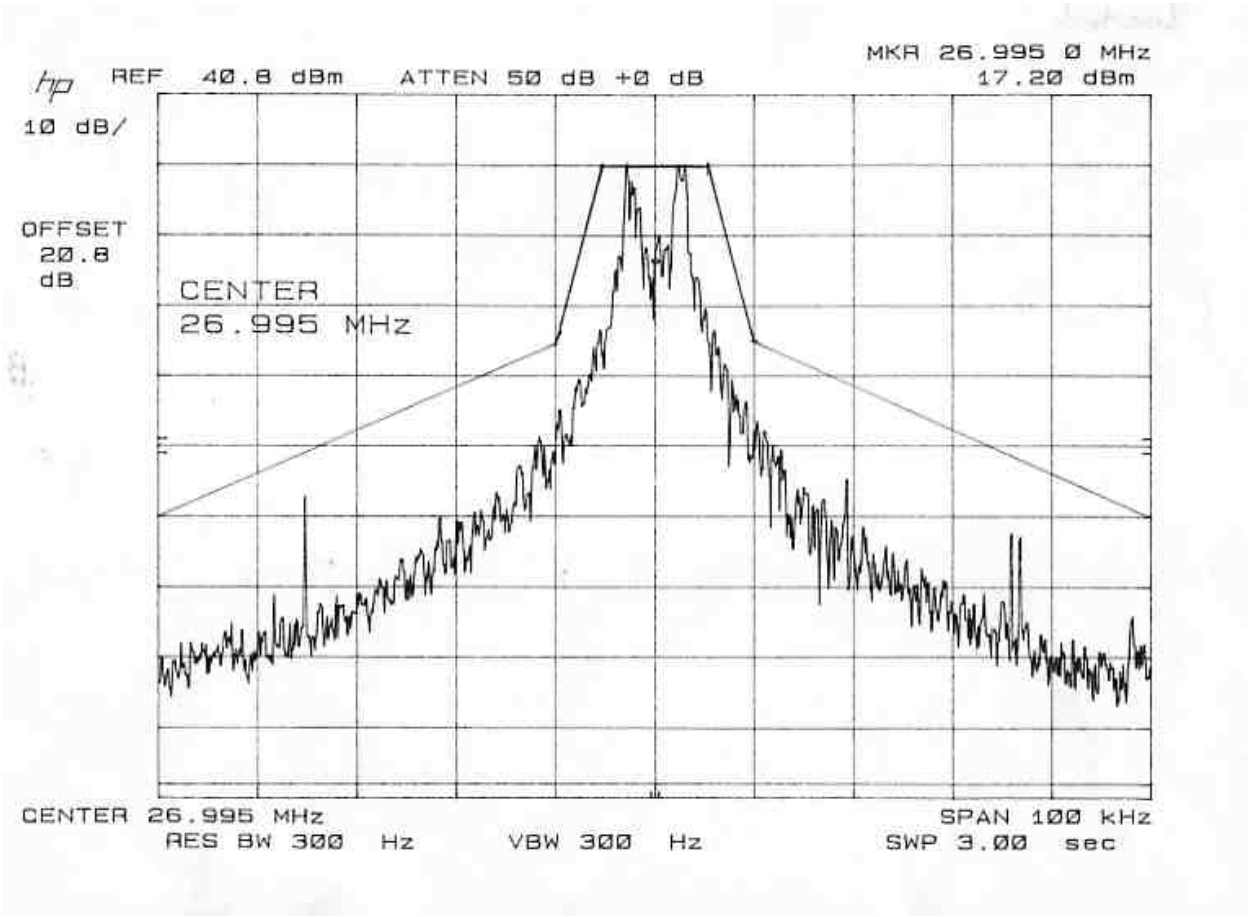


THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

EMISSIONS MASK PLOT

PLOT



THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

2.1055 Frequency stability:
90.213(a)(1)

Temperature and voltage tests were performed to verify that the frequency remains within the .0020%, 20 ppm specification limit, for 25 kHz spacing. The test was conducted as follows: The transmitter was placed in the temperature chamber at 25 degrees C and allowed to stabilize for one hour. The transmitter was keyed ON for one minute during which four frequency readings were recorded at 15 second intervals. The worse case number was taken for temperature plotting. The assigned channel frequency was considered to be the reference frequency. The temperature was then reduced to -30 degrees C after which the transmitter was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute, and again frequency readings were noted at 15 second intervals. The worst case number was recorded for temperature plotting. This procedure was repeated in 10 degree increments up to +50 degrees C.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency) :26.995 MHz

TEMPERATURE	FREQUENCY(MHz)	ppm	LIMIT(ppm)
REFERENCE	**26.99500**	**0**	
-30	26.99492	-2.96	20.0
-20	26.99507	2.59	20.0
-10	26.99511	4.07	20.0
0	26.99514	5.19	20.0
10	26.99515	5.56	20.0
20	26.99512	4.45	20.0
30	26.99507	2.59	20.0
40	26.99503	1.11	20.0
50	26.99502	0.74	20.0
END POINT OF BATTERY:4.7V	26.99533	12.22	20.0

THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

APPLICANT: LEE TECHNOLOGY KOREA CO., LTD

FCC ID: QBTLTK-PSC

NAME OF TEST: POWER LINE CONDUCTED INTERFERENCE

RULES PART NO.: 15.207

REQUIREMENTS:

	QUASI-PEAK	**AVERAGE**
.15 – 0.5 MHz	66-56 dBuV	56-46 dBuV
0.5 – 5.0	56	46
5.0 – 30.	60	50

TEST PROCEDURE: ANSI STANDARD C63.4-1992. The spectrum was scanned from .15 to 30 MHz.

The highest emission read for Line 1 was 0.158MHz @ 38.2 dBuv/m

The highest emission read for Line 2 was 28.5MHz @ 35.2 dbuv/m

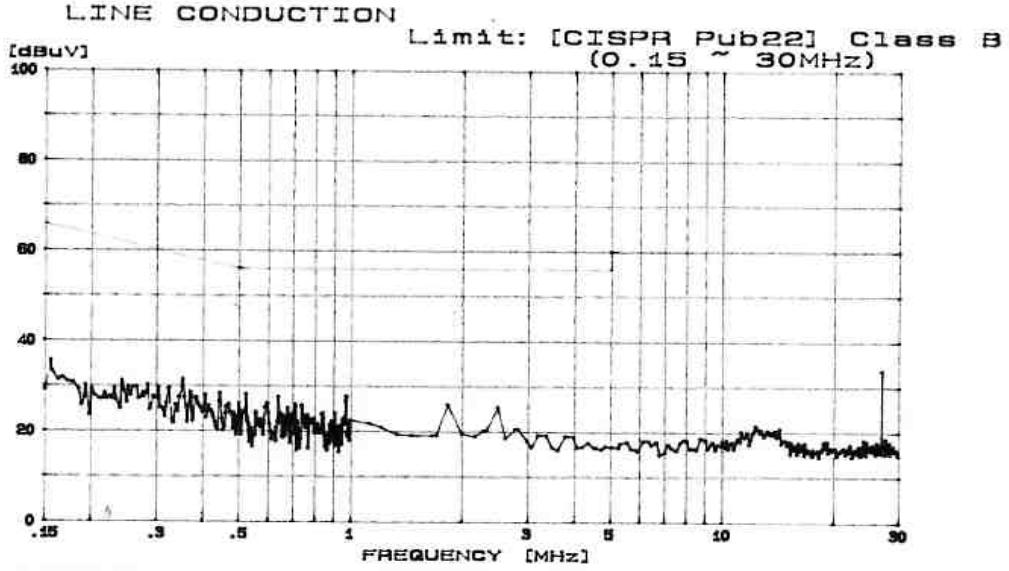
THE GRAPHS ON THE FOLLOWING PAGES REPRESENT THE EMISSIONS READ FOR POWER LINE CONDUCTED FOR THIS DEVICE.

TEST RESULTS: Both lines were observed. The measurements indicate that the unit DOES appear to meet the FCC requirements for this class of equipment.

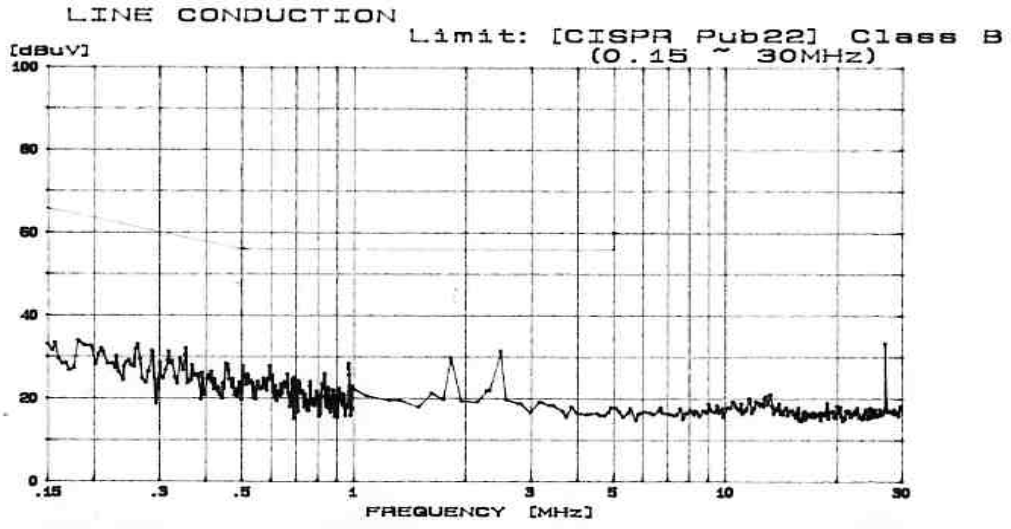
THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

Line 1



Line 2



THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

APPLICANT: LEE TECHNOLOGY KOREA CO., LTD

FCC ID: QBTLTK-PSC

NAME OF TEST: RADIATION INTERFERENCE

RULES PART NO.: 15.109

REQUIREMENTS: 30 to 88 MHz: 40.0 dBuV/M @ 3 METERS
88 to 216 MHz: 43.5 dBuV/M
216 to 960 MHz: 46.0 dBuV/M
ABOVE 960 MHz: 54.0 dBuV/M

TEST RESULTS: A search was made of the spectrum from 30 to 1000MHz and the measurements indicate that the unit DOES meet the FCC requirements.

TEST DATA:

No	Emission Frequency (MHz)	Meter Reading dBuV/m	Ant. Polaritry	Correction Factor dB	Cable Loss dB	Field Strength (dBuv/m)	Margin (dBuv)	Limit (dBuv/m)
1	30.89	13.1	V	13.1	0.7	26.8	-13.2	40.0
2	37.42	9.3	H	12.9	0.8	22.9	-17.1	40.0
3	50.18	15.8	V	10.9	1.0	27.7	-12.3	40.0
4	54.08	13.3	H	9.5	1.1	23.8	-16.2	40.0
5	60.23	7.6	H	7.3	1.1	16.1	-23.9	40.0
6	84.71	6.8	V	9.2	1.4	17.4	-22.6	40.0
7	143.07	4.1	H	15.6	2.0	21.7	-21.8	43.5
8	200.52	8.8	V	10.9	2.5	22.2	-21.3	43.5
9	263.32	3.3	H	13.4	3.2	19.9	-26.1	46.0
10	300.71	5.4	V	16.2	3.4	25.0	-21.0	46.0
11	345.23	3.2	H	15.2	3.8	22.2	-23.8	46.0
12	429.87	3.3	H	15.9	4.4	23.6	-22.4	46.0
13	526.21	2.7	V	17.8	5.1	25.6	-20.4	46.0
14	629.36	3.1	V	20.6	5.7	29.5	-16.5	46.0
15	701.23	4.5	V	21.4	6.2	32.1	-13.9	46.0
16	819.33	4.1	H	22.2	6.9	33.1	-12.9	46.0
17	933.45	3.6	V	23.1	7.4	34.1	-11.9	46.0

SAMPLE CALCULATION: FSdBuV/m = MR (dBuV) + ACFdB.
TEST PROCEDURE: ANSI STANDARD C63.4-1992 using a Hewlett Packard Model 8566B spectrum analyzer, a Hewlett Packard Model 85685A Preselector, a Hewlett Packard Model 85650A Quasi-Peak adapter, and an appropriate antenna – see the test equipment list. The bandwidth of spectrum analyzer was 100 kHz with an appropriate sweep speed. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported.

PERFORMED BY: K.M.Choi **DATE: 05/06/2005**

THRUlab & Engineering.

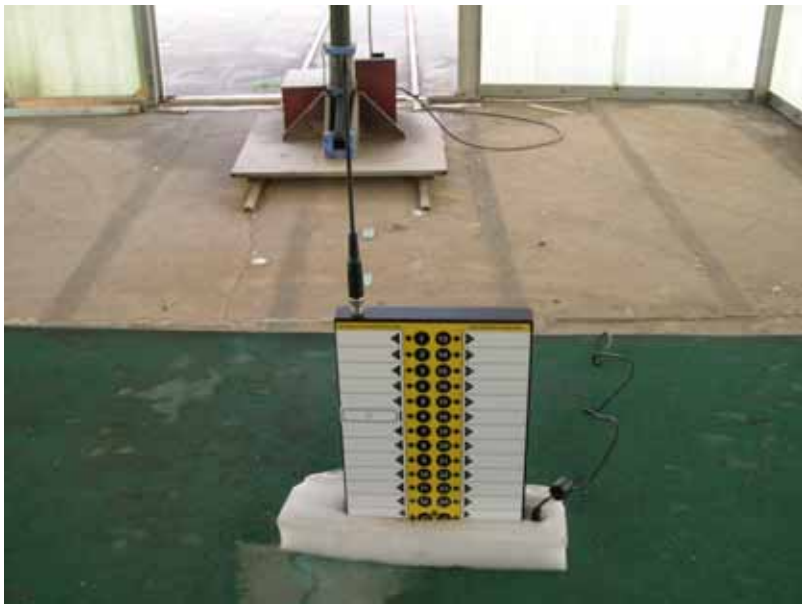
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

Test Equipment List

DEVICE	MODEL	MFGR	SERNO	DUE.CAL
EMI Test Receiver	ESVS 10	Rohde & Schwarz	830489/001	2006.04.23.
Spectrum Analyzer	8566B	Hewlett Packard	2311A02394	2006.04.23
Spectrum Display	85662A	Hewlett Packard	2542A12429	2006.04.23.
Quasi-Peak Adapter	85650A	Hewlett Packard	2521A00887	2006.04.23.
RF Preselector	85685A	Hewlett Packard	2648A00504	2006.04.23
Pre-Amplifier	8449B	Hewlett Packard	3008A00375	2006.04.23.
Pre-Amplifier	8447F	Hewlett Packard	3113A05367	2006.04.23.
Spectrum Monitor	EZM	Rohde & Schwarz	862304/007	2006.04.23.
Bico-Antenna	94455-1	Eaton	977	2007.04.01.
Log-Periodic Antenna	3146	EMCO	2051	2007.04.01.
Dipole Antenna	TDA25/1/2	Electro Metrics	176/200/200	2007.04.01.
Horn Antenna	SAS-571	A.H Systems	414	2007.04.01.
Spectrum Analyzer	R3261C	Advantest	71720189	2006.04.23
LISN	KNW-242	Kyoritsu	8-923-2	2007.04.25.
LISN	8012-50-R-24	Solar	8379121	2007.04.25..
Loop Ant	6507	EMCO	1435	2005.10.06.
Signal Generator	SMS	Rohde & Schwarz	872165/100	2006.04.23.
Modulation Analyzer	8901B	Hewlett Packard	3438A05094	2006.04.23.
Frequency Counter	CMC251	Tektronic	CMC-251TW52489	2006.04.23.

THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net



APPLICANT: LEE TECHNOLOGY KOREA CO., LTD
FCC ID: QBTLTK-PSC
REPORT #: THRU-505005

THRUlab & Engineering.
RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

APPLICANT: LEE TECHNOLOGY KOREA CO., LTD
FCC ID: QBTLTK-PSC
REPORT #: THRU-505005

THRUlab & Engineering.

RM302,BOKJO,29-15 , CHONGPA3-DONG
YONGSAN-GU, SEOUL, KOREA
81221095059F81221095056 email thrukang@kornet.net

APPLICANT: LEE TECHNOLOGY KOREA CO., LTD
FCC ID: QBTLTK-PSC
REPORT #: THRU-505005