FCC PART 15 Subpart C

EMI MEASUREMENT AND TEST REPORT

For

Lionda Technology Company Limited

Block 2 Laodong 2nd Industrial Area, Xixian, Baoan,
Shenzhen, Guangdong, China 518102

FCC ID: O63GH9702DLD02

July 29, 2002

This Report Concerns:	Equipment Type:
☒ Original Report	2.4GHz Digital Cordless Telephone System - Household Appliances

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Report Number:	R0206054
Test Date:	June 20, 2002
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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Lionda Technology Company Limited's product, FCC ID: O63GH9702DLD02, Model No.: *GH9702, GH9703, HCB702, HCB703* or the "EUT" as referred to in this report is a 2.4GHz CDSS Cordless Telephone system. The EUT was composed of two parts, one is the base which measures approximately 5.50" L x 3.45"W x 3.30" H, and the other is the handset which measures 6.125"L x 2.0" W x 1.55" H.

1.2 Objective

This type approval report is prepared on behalf of. *Lionda Technology Company Limited* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC rules for Output Power, Antenna Requirements, 6 dB Bandwidth, power density, 100 kHz Bandwidth of Band Edges Measurement, Conducted and Spurious Radiated Emission, and processing gain.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 –2000, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2000.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1998, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8568B	2610A02165	12/6/02
HP	Spectrum Analyzer	8593B	2919A00242	12/20/02
HP	Amplifier	8349B	2644A02662	12/20/02
HP	Quasi-Peak Adapter	85650A	917059	12/6/02
HP	Amplifier	8447E	1937A01046	12/6/02
A.H. System	Horn Antenna	SAS0200/571	261	12/27/02
Com-Power	Log Periodic Antenna	AL-100	16005	11/2/02
Com-Power	Biconical Antenna	AB-100	14012	11/2/02
Solar Electronics	LISN	8012-50-R-24-BNC	968447	12/28/02
Com-Power	LISN	LI-200	12208	12/20/02
Com-Power	LISN	LI-200	12005	12/20/02
BACL	Data Entry Software	DES1	0001	12/20/02

*** Statement of Traceability: Bay Area Compliance Laboratory Corp.** certifies that all calibration has been performed using suitable standards traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY (NIST).

1.7 Local Support Equipment

Manufacturer	Description	Model	Serial Number	FCC ID
Teltone Corp.	Simulator	TLS-3B-01	80071	DOC
Panasonic	Telephone	KX-T3175	6IBTB142741	ACJMLA-75986-MT-E

1.8 Power Supply and Line Filters of EUT

Manufacturer	Description	Model	Serial Number	FCC ID
Bell South	AC/DC Adapter	U090030D	None	None

1.9 External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Unshielded Telephone Cable	20	RJ11 Port/Simulator	EUT
Unshielded Telephone Cable	20	RJ11 Port/Simulator	Telephone

2 - SYSTEM TEST CONFIGURATION

2.1 Description of Test Configuration

The EUT was configured for testing in a typical fashion (as normally used by a typical user).

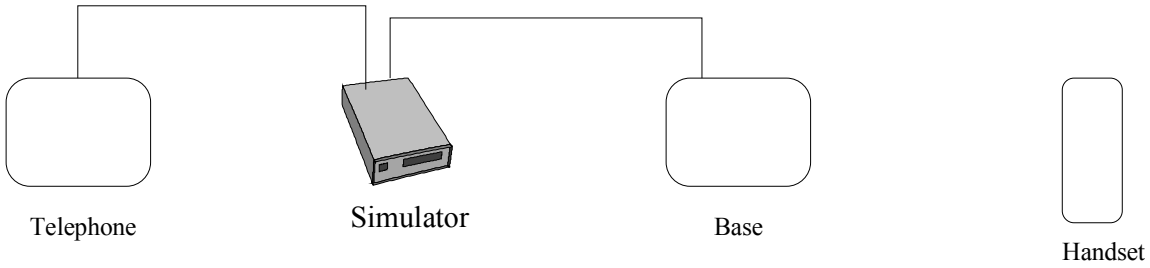
Handset being tested: The Cordless Telephone - Handset, Model GH9702, GH9703, HCB702, HCB703 was placed on the wooden table and tested in three orthogonal axis. The handset was connected to the headset via its headset port. The Low, middle, and high channels were tested. The handset was transmitting to and receiving from the base unit. The EUT was investigated for emissions while off hook. The radiated data was taken in this mode of operation. All initial and final investigations were performed with the EMI receiver in manual mode scanning the frequency range continuously. The cables were bundled and routed as shown in the 2.3.

Base being tested: The Cordless Telephone – Base, Model GH9702, GH9703, HCB702, HCB703 was placed on the wooden table. The Low, middle, and high channels were tested. The base was connected to the line simulator and an AC adapter via its Tel Line and power ports, respectively. The base was transmitting and receiving from the handset. The conducted as well as radiated data was taken in this mode of operation. All initial and final investigations were performed with the EMI receiver in manual mode scanning the frequency range continuously. The cables were bundled and routed as shown in the 2.3.

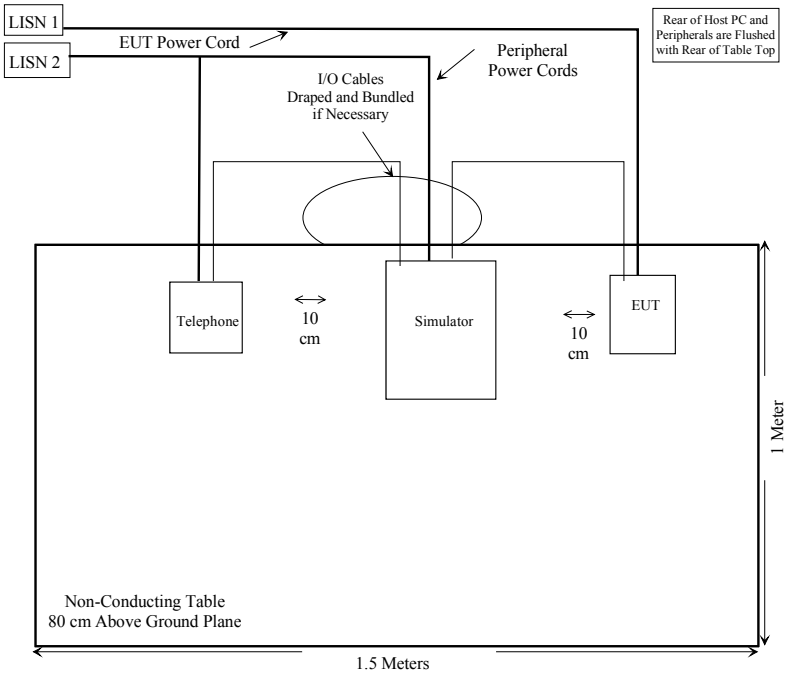
2.2 Equipment Modifications

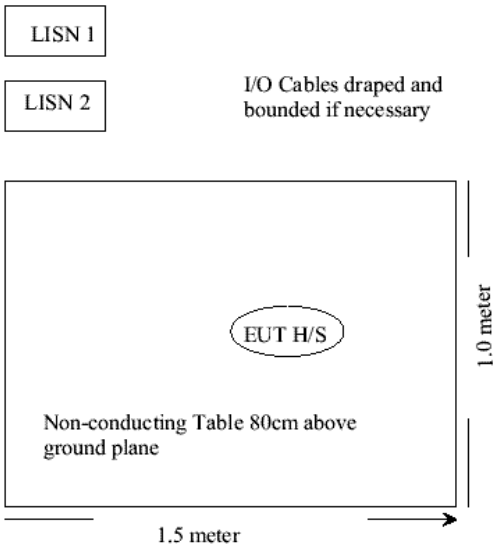
No modification(s) was made by BACL Corp. to ensure the EUT complies with the applicable limits and standards.

2.3 Configuration of Test System



2.4 Test Setup Block Diagram





3 - SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT	Section Reference
§ 15.205	Restricted Bands	Compliant	Section 12
§ 2.1091	RF Safety Requirements	Compliant	Section 10
§15.203	Antenna Requirement	Compliant	Section 9
§15.207 (a)	Conducted Emission	Compliant	Section 12
§15.209 (a)	Radiated Emission	Compliant	Section 11
§15.209 (f)	Spurious Emission	Compliant	Section 6
§15.247 (a) (2)	6 dB Bandwidth	Compliant	Section 5
§15.247 (b) (2)	Peak Output Power	Compliant	Section 4
§15.247 (b) (4)	RF Exposure	Compliant	Section 10
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edges	Compliant	Section 7
§15.247 (d)	Peak Power Spectral Density	Compliant	Section 8
§15.247 (e)	Processing Gain	Compliant	Section 13

4 - CONDUCTED OUTPUT POWER MEASUREMENT

4.1 Standard Applicable

According to §15.247(b) (2), for all direct sequence systems, the maximum peak output power of the intentional radiator shall not exceed 1 Watt.

4.2 Measurement Procedure

1. Place the EUT on the turntable and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.

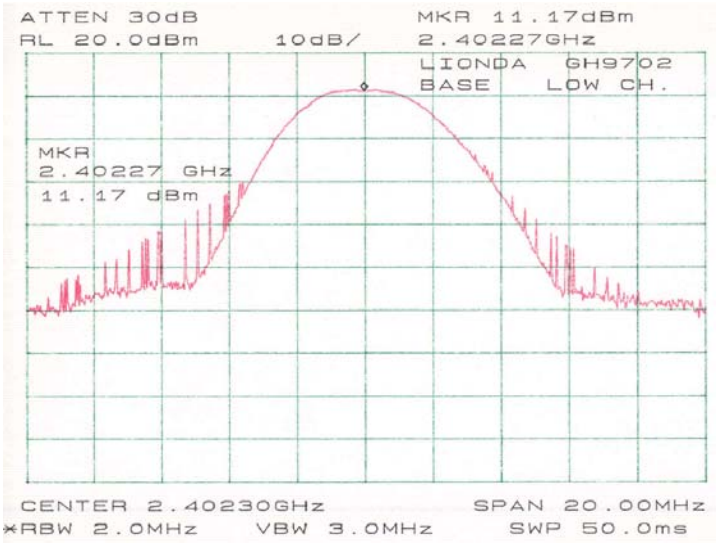
4.3 Measurement Result

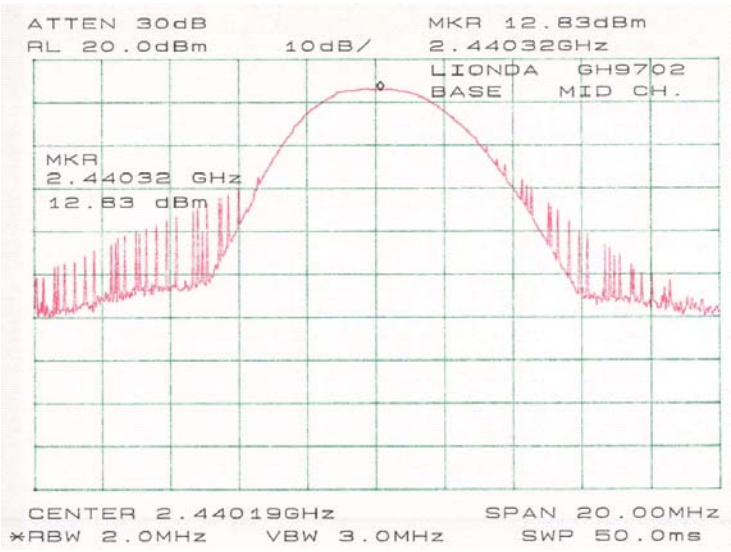
Please refer to the attached pictures for more information.

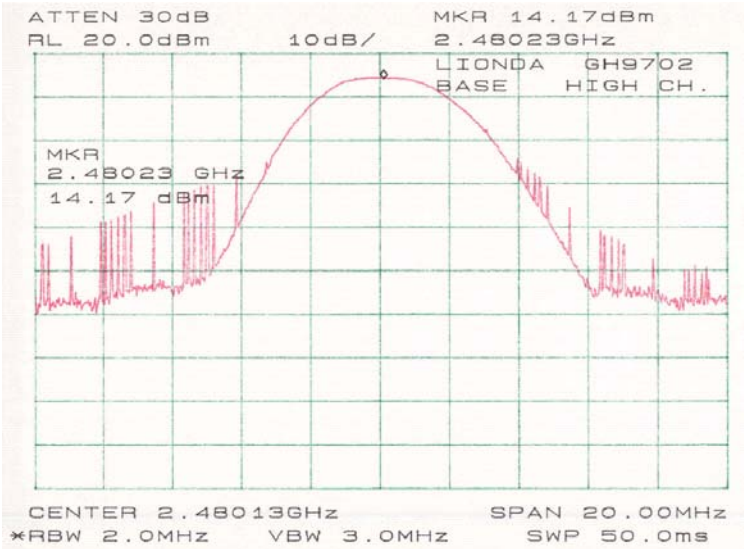
Unit	Frequency (MHz)	Output Power (dBm)	Output Power (mW)	Standard (W)	Result	Page Reference
Base	2402.27	11.17	13.09	≤ 1W	Compliant	Page 11
Base	2440.32	12.83	19.19	≤ 1W	Compliant	Page 11
Base	2480.23	14.17	26.12	≤ 1W	Compliant	Page 11
Handset	2402.30	11.00	12.59	≤ 1W	Compliant	Page 12
Handset	2440.19	12.50	17.78	≤ 1W	Compliant	Page 12
Handset	2480.23	14.00	25.12	≤ 1W	Compliant	Page 12

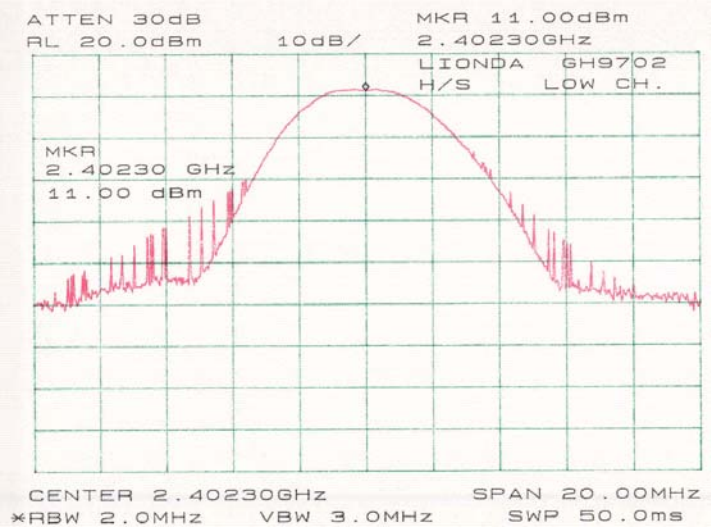
4.4 Test Equipment

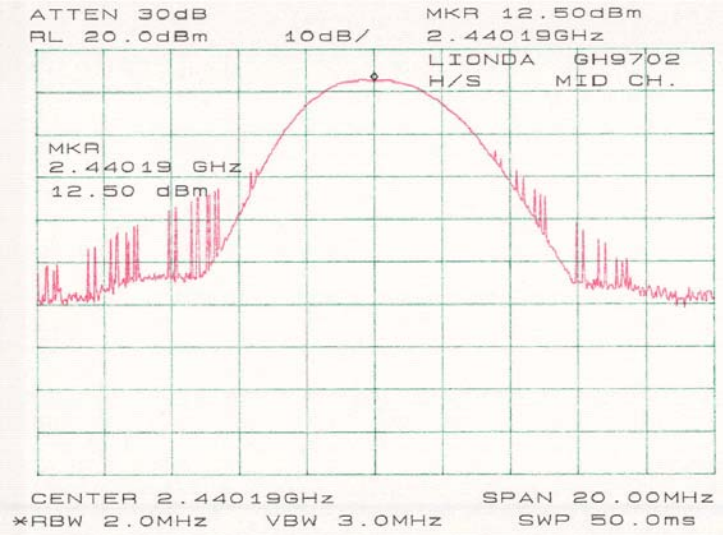
Manufacturer	Model No.	Serial No.	Calibration Due Date
Agilent	E4419b	GB40202891	4/8/03
Agilent	E4412a	US38486529	4/8/03


ATTEN 30dB
RL 20.0dBm
10dB/
MKR 11.17dBm
2.40227GHz
LIONDA GH9702
BASE LOW CH.
MKR
2.40227 GHz
11.17 dBm
CENTER 2.40230GHz
SPAN 20.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms


ATTEN 30dB
RL 20.0dBm
10dB/
MKR 12.83dBm
2.44032GHz
LIONDA GH9702
BASE MID CH.
MKR
2.44032 GHz
12.83 dBm
CENTER 2.44019GHz
SPAN 20.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms


ATTEN 30dB
RL 20.0dBm
10dB/
MKR 14.17dBm
2.48023GHz
LIONDA GH9702
BASE HIGH CH.
MKR
2.48023 GHz
14.17 dBm
CENTER 2.48013GHz
SPAN 20.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms


ATTEN 30dB
RL 20.0dBm
10dB/
MKR 11.00dBm
2.40230GHz
LIONDA GH9702
H/S LOW CH.
MKR
2.40230 GHz
11.00 dBm
CENTER 2.40230GHz
SPAN 20.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms


ATTEN 30dB
RL 20.0dBm
10dB/
MKR 12.50dBm
2.44019GHz
LIONDA GH9702
H/S MID CH.
MKR
2.44019 GHz
12.50 dBm
CENTER 2.44019GHz
SPAN 20.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms


ATTEN 30dB
RL 20.0dBm
10dB/
MKR 14.00dBm
2.48023GHz
LIONDA GH9702
H/S HIGH CH.
MKR
2.48023 GHz
14.00 dBm
CENTER 2.48013GHz
SPAN 20.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms

5 - 6 DB BANDWIDTH

5.1 Standard Applicable

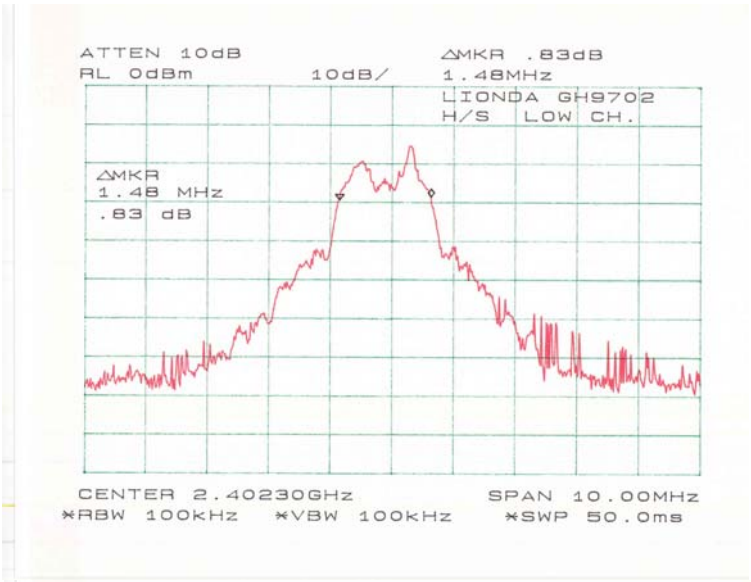
According to §15.247(a)(2), for direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

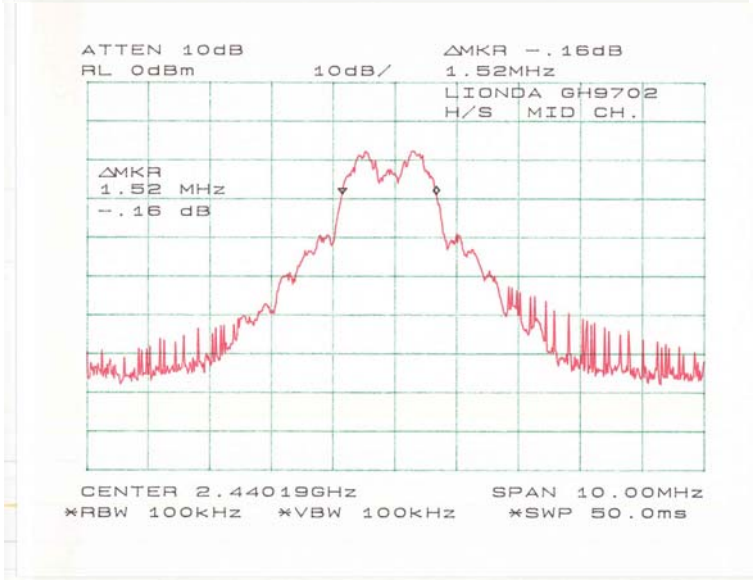
5.2 Measurement Procedure

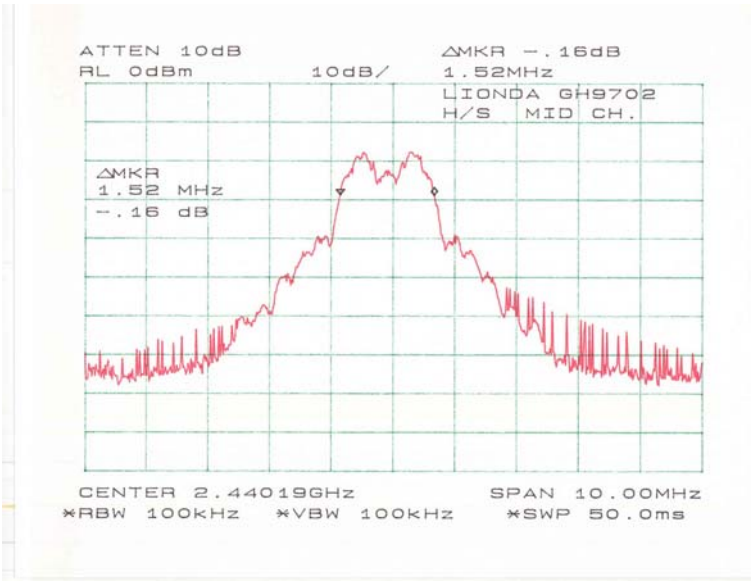
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

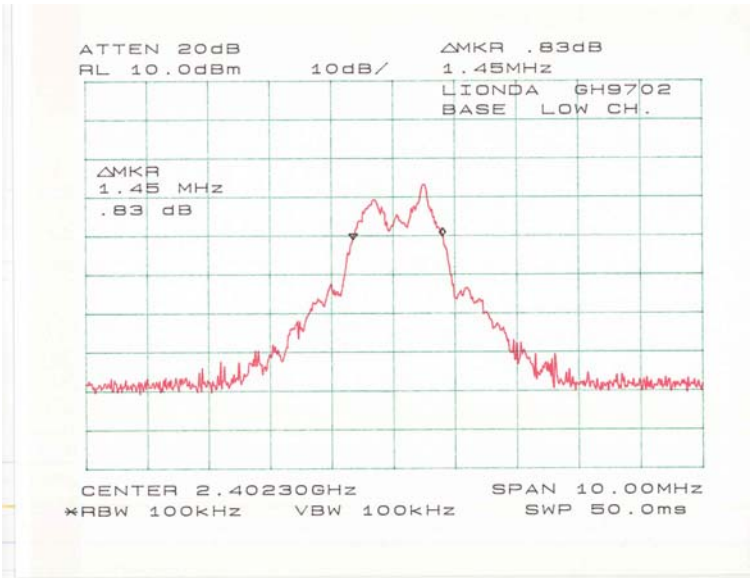
5.3 Measurement Data

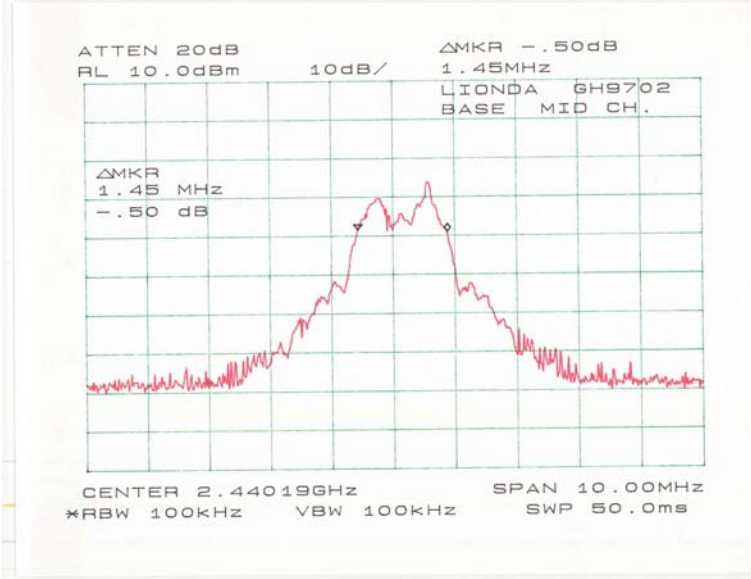
Channel Bandwidth	Page Reference		Test Result
	Base	Handset	
Low Channel	Page 15	Page 14	Compliant
Middle Channel	Page 15	Page 14	Compliant
High Channel	Page 15	Page 14	Compliant

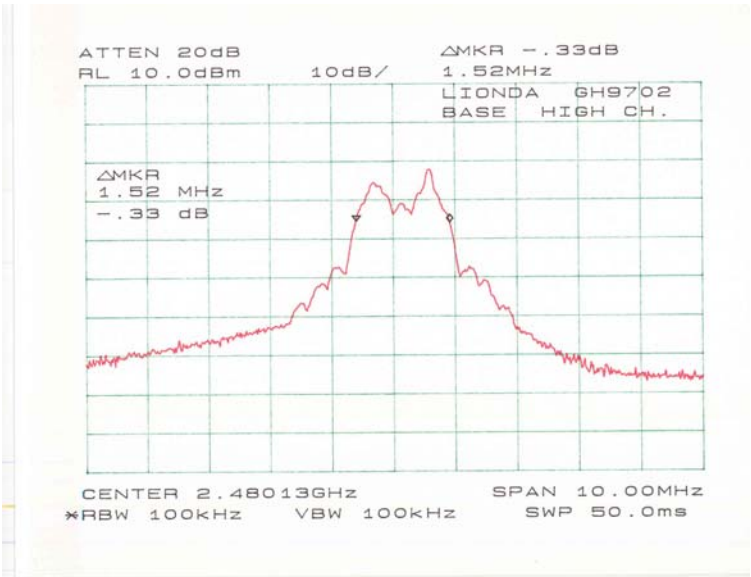

ATTEN 10dB
RL 0dBm
10dB/
ΔMKR .83dB
1.48MHz
LIONDA GH9702
H/S LOW CH.
ΔMKR
1.48 MHz
.83 dB
CENTER 2.40230GHz
SPAN 10.00MHz
*RBW 100kHz
*VBW 100kHz
*SWP 50.0ms


ATTEN 10dB
RL 0dBm
10dB/
ΔMKR -.16dB
1.52MHz
LIONDA GH9702
H/S MID CH.
ΔMKR
1.52 MHz
-.16 dB
CENTER 2.44019GHz
SPAN 10.00MHz
*RBW 100kHz
*VBW 100kHz
*SWP 50.0ms


ATTEN 10dB
RL 0dBm
10dB/
ΔMKR -.16dB
1.52MHz
LIONDA GH9702
H/S MID CH.
ΔMKR
1.52 MHz
-.16 dB
CENTER 2.44019GHz
SPAN 10.00MHz
*RBW 100kHz
*VBW 100kHz
*SWP 50.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR .83dB
1.45MHz
LIONDA GH9702
BASE LOW CH.
ΔMKR
1.45 MHz
.83 dB
CENTER 2.40230GHz
SPAN 10.00MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -.50dB
1.45MHz
LIONDA GH9702
BASE MID CH.
ΔMKR
1.45 MHz
-.50 dB
CENTER 2.44019GHz
SPAN 10.00MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -.33dB
1.52MHz
LIONDA GH9702
BASE HIGH CH.
ΔMKR
1.52 MHz
-.33 dB
CENTER 2.48013GHz
SPAN 10.00MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

6 - SPURIOUS EMISSION

6.1 Standard Applicable

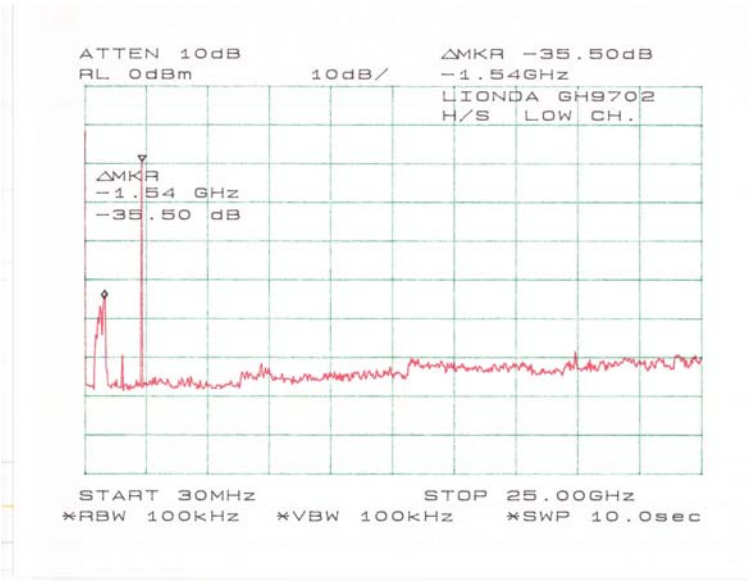
According to §15.209 (f) and §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation f a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit.

6.2 Measurement Procedure

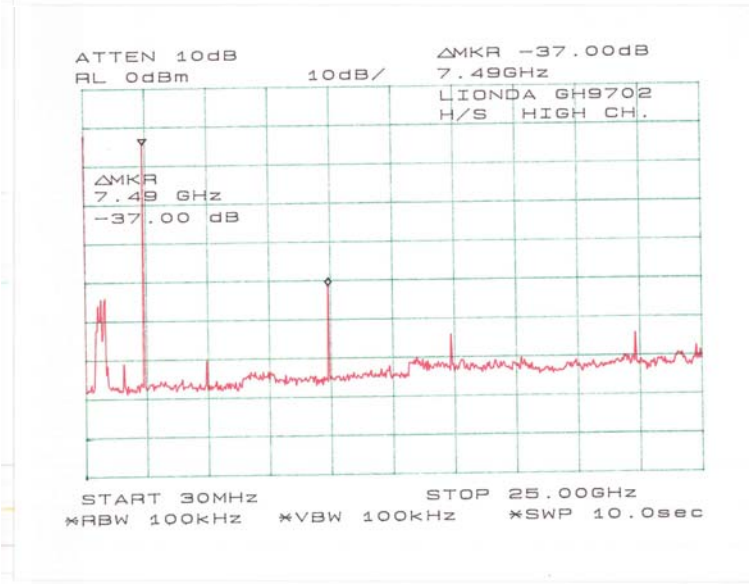
1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

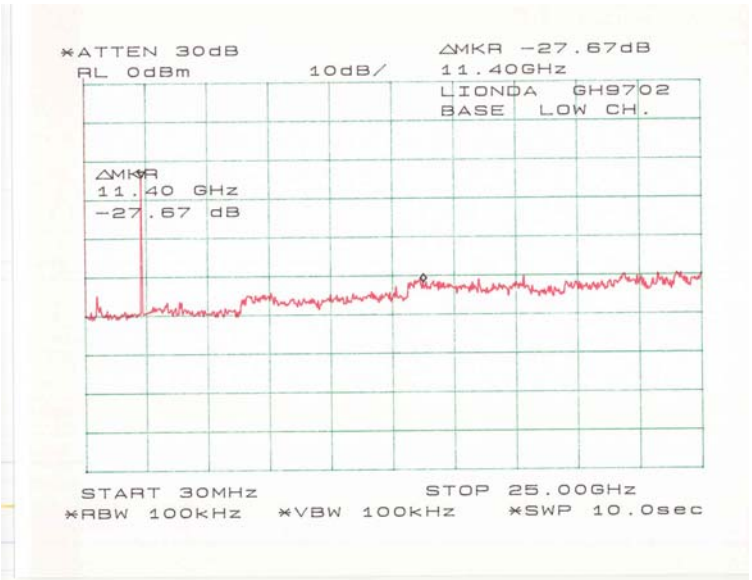
6.3 Measurement Data

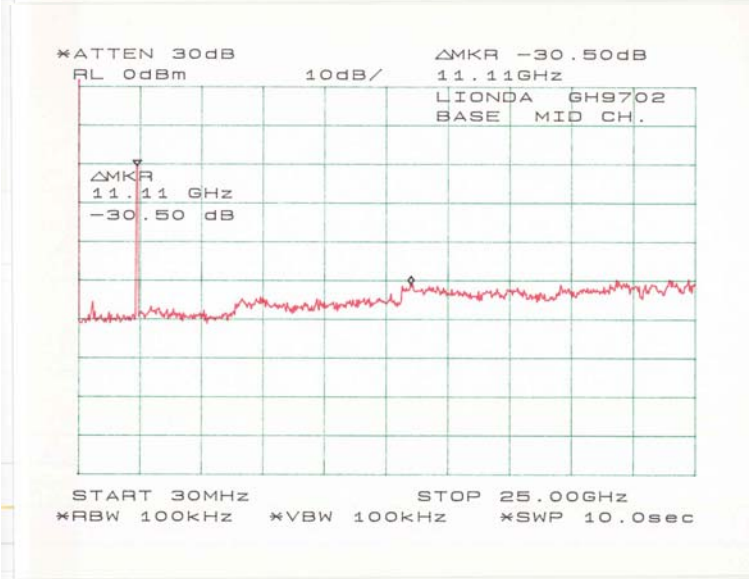
Page Reference		Test Results
Base	Handset	
Page 18	Page 17	Compliant

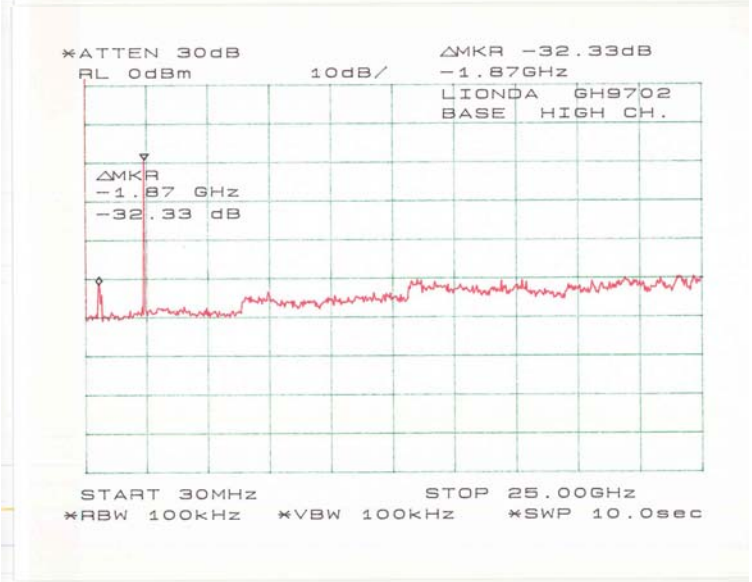

ATTEN 10dB
RL 0dBm
10dB/
ΔMKR -35.50dB
-1.54GHz
LIONDA GH9702
H/S LOW CH.
ΔMKR
-1.54 GHz
-35.50 dB
START 30MHz
STOP 25.00GHz
*RBW 100kHz
*VBW 100kHz
*SWP 10.0sec


ATTEN 10dB
RL 0dBm
10dB/
ΔMKR -38.00dB
-1.75GHz
LIONDA GH9702
H/S MID CH.
ΔMKR
-1.75 GHz
-38.00 dB
START 30MHz
STOP 25.00GHz
*RBW 100kHz
*VBW 100kHz
*SWP 10.0sec


ATTEN 10dB
RL 0dBm
10dB/
ΔMKR -37.00dB
7.49GHz
LIONDA GH9702
H/S HIGH CH.
ΔMKR
7.49 GHz
-37.00 dB
START 30MHz
STOP 25.00GHz
*RBW 100kHz
*VBW 100kHz
*SWP 10.0sec


*ATTEN 30dB
RL 0dBm
10dB/
ΔMKR -27.67dB
11.40GHz
LIONDA GH9702
BASE LOW CH.
ΔMKR
11.40 GHz
-27.67 dB
START 30MHz
STOP 25.00GHz
*RBW 100kHz
*VBW 100kHz
*SWP 10.0sec


*ATTEN 30dB
RL 0dBm
10dB/
ΔMKR -30.50dB
11.11GHz
LIONDA GH9702
BASE MID CH.
ΔMKR
11.11 GHz
-30.50 dB
START 30MHz
STOP 25.00GHz
*RBW 100kHz
*VBW 100kHz
*SWP 10.0sec


*ATTEN 30dB
RL 0dBm
10dB/
ΔMKR -32.33dB
-1.87GHz
LIONDA GH9702
BASE HIGH CH.
ΔMKR
-1.87 GHz
-32.33 dB
START 30MHz
STOP 25.00GHz
*RBW 100kHz
*VBW 100kHz
*SWP 10.0sec

7 - 100 KHZ BANDWIDTH OF BAND EDGES MEASUREMENT

7.1 Standard Applicable

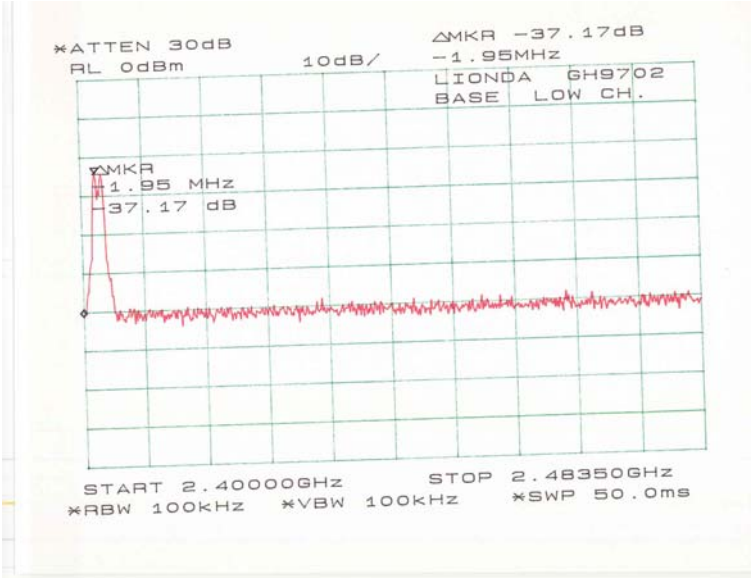
According to §15.247(c), if *any* 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in § 15.209(a), whichever results in the lesser attenuation.

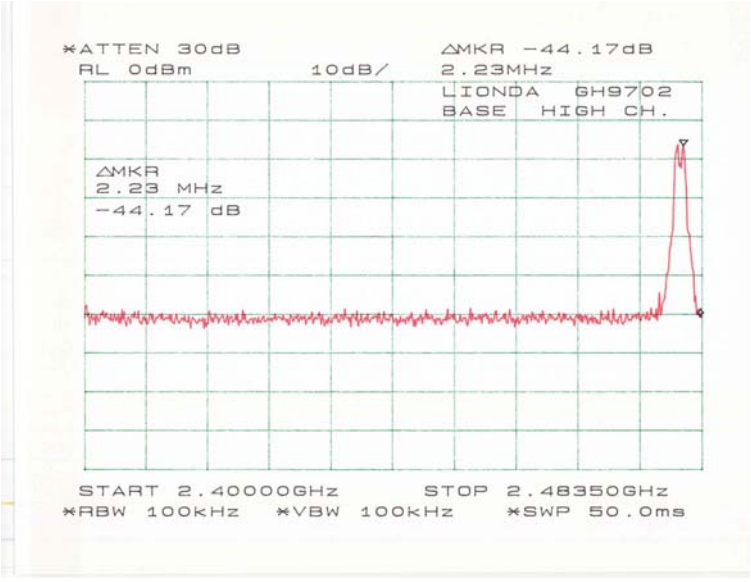
7.2 Measurement Procedure

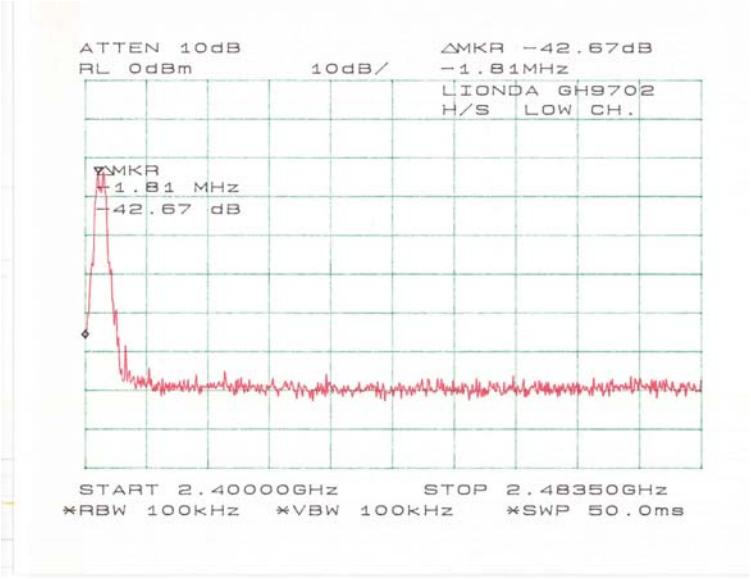
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

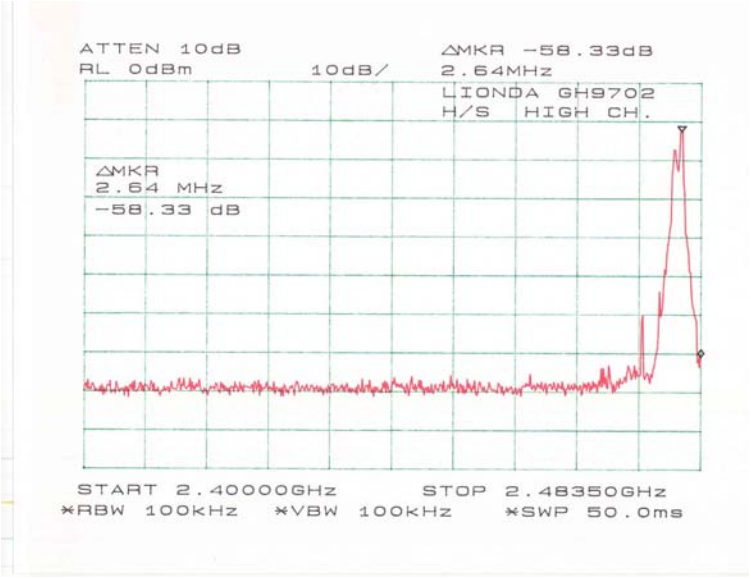
7.3 Test Results

Band Edge Bandwidth	Page Reference		Test Result
	Base	Handset	
Low Channel	Page 20	Page 21	Compliant
Middle Channel	Page 20	Page 21	Compliant
High Channel	Page 20	Page 21	Compliant


*ATTEN 30dB
RL 0dBm
10dB/
ΔMKR -37.17dB
-1.95MHz
LIONDA GH9702
BASE LOW CH.
ΔMKR
1.95 MHz
-37.17 dB
START 2.40000GHz
STOP 2.48350GHz
*RBW 100kHz
*VBW 100kHz
*SWP 50.0ms


*ATTEN 30dB
RL 0dBm
10dB/
ΔMKR -44.17dB
2.23MHz
LIONDA GH9702
BASE HIGH CH.
ΔMKR
2.23 MHz
-44.17 dB
START 2.40000GHz
STOP 2.48350GHz
*RBW 100kHz
*VBW 100kHz
*SWP 50.0ms


ATTEN 10dB
RL 0dBm
10dB/
ΔMKR -42.67dB
-1.81MHz
LIONDA GH9702
H/S LOW CH.
ΔMKR
-1.81 MHz
-42.67 dB
START 2.40000GHz
STOP 2.48350GHz
*RBW 100kHz
*VBW 100kHz
*SWP 50.0ms


ATTEN 10dB
RL 0dBm
10dB/
ΔMKR -58.33dB
2.64MHz
LIONDA GH9702
H/S HIGH CH.
ΔMKR
2.64 MHz
-58.33 dB
START 2.40000GHz
STOP 2.48350GHz
*RBW 100kHz
*VBW 100kHz
*SWP 50.0ms

8 - POWER DENSITY

8.1 Standard Applicable

According to §15.247 (d), for direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

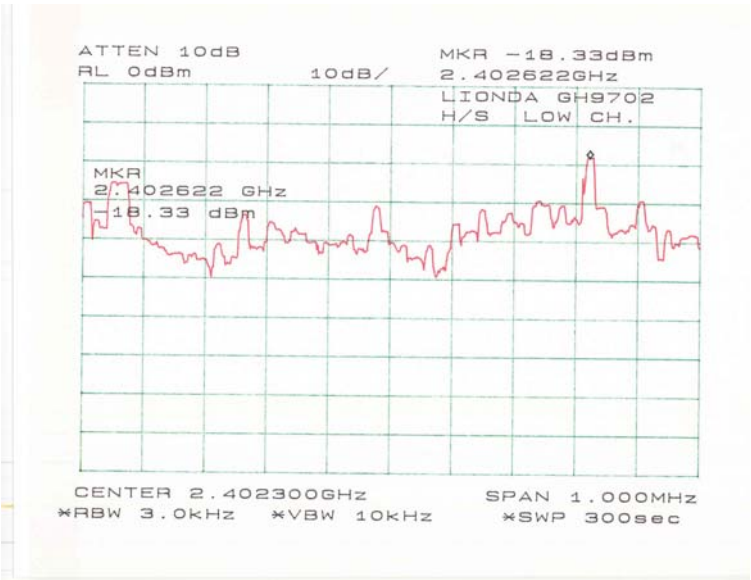
8.2 Measurement Procedure

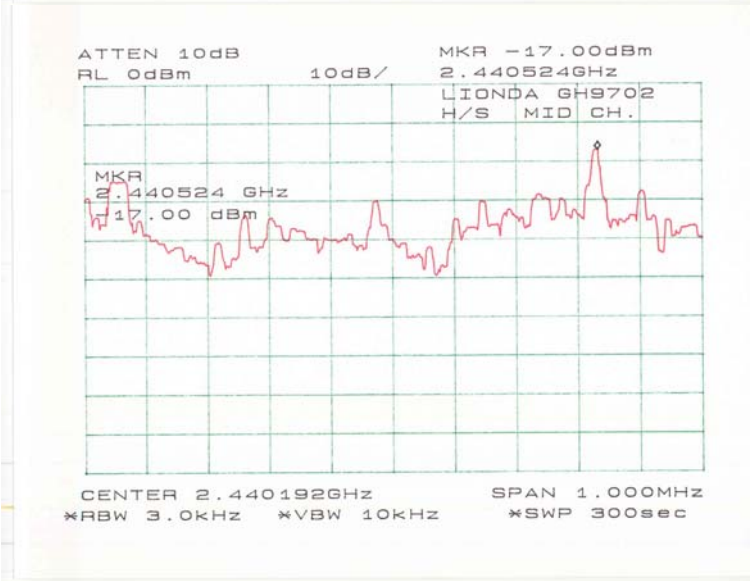
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Repeat above procedures until all frequencies measured were complete.

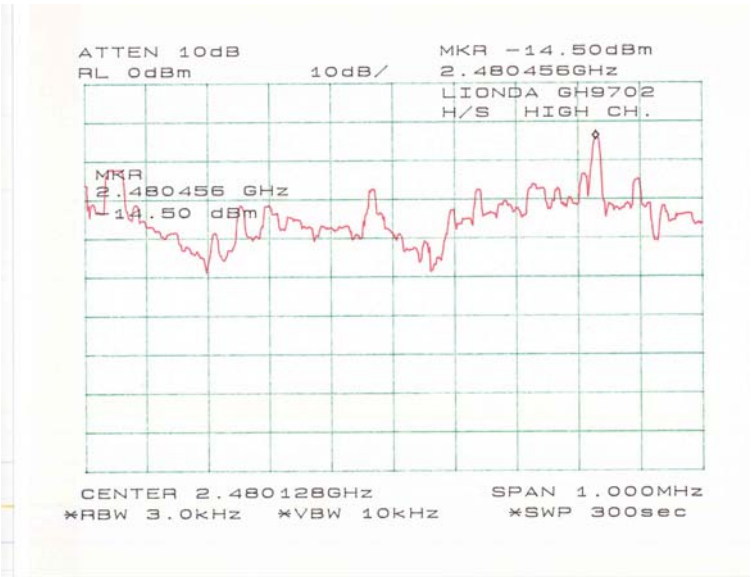
8.3 Test Results

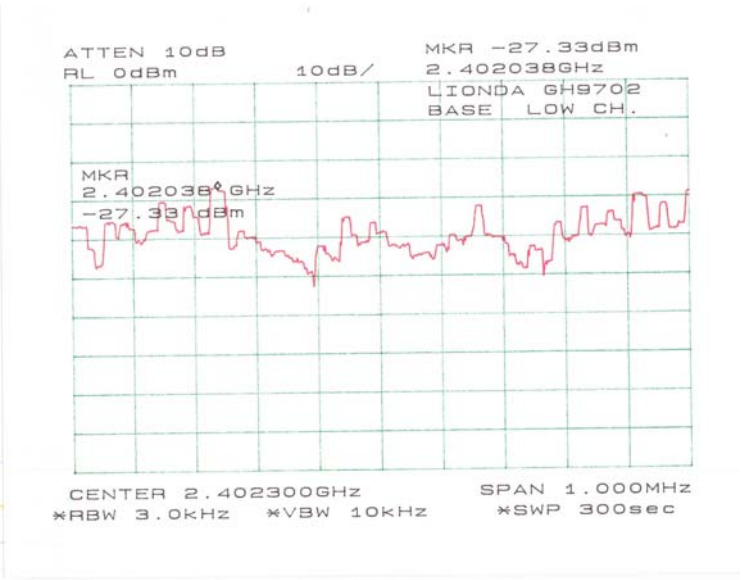
Please refer to the following plot(s).

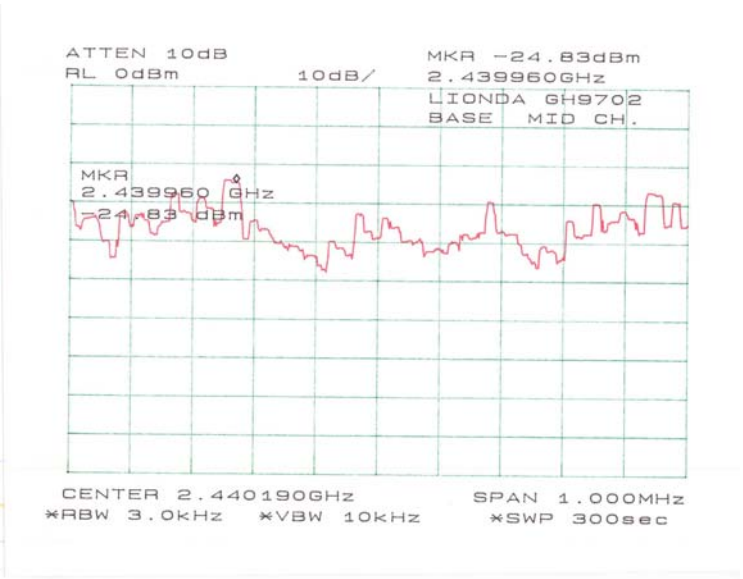
Power Density	Page Reference		Test Result
	Base	Handset	
Low Channel	Page 24	Page 23	Compliant
Middle Channel	Page 24	Page 23	Compliant
High Channel	Page 24	Page 23	Compliant


ATTEN 10dB
RL 0dBm
10dB/
MKR -18.33dBm
2.402622GHz
LIONDA GH9702
H/S LOW CH.
MKR
2.402622 GHz
-18.33 dBm
CENTER 2.402300GHz
SPAN 1.000MHz
*RBW 3.0kHz
*VBW 10kHz
*SWP 300sec


ATTEN 10dB
RL 0dBm
10dB/
MKR -17.00dBm
2.440524GHz
LIONDA GH9702
H/S MID CH.
MKR
2.440524 GHz
-17.00 dBm
CENTER 2.440192GHz
SPAN 1.000MHz
*RBW 3.0kHz
*VBW 10kHz
*SWP 300sec


ATTEN 10dB
RL 0dBm
10dB/
MKR -14.50dBm
2.480456GHz
LIONDA GH9702
H/S HIGH CH.
MKR
2.480456 GHz
-14.50 dBm
CENTER 2.480128GHz
SPAN 1.000MHz
*RBW 3.0kHz
*VBW 10kHz
*SWP 300sec


ATTEN 10dB
RL 0dBm
10dB/
MKR -27.33dBm
2.402038GHz
LIONDA GH9702
BASE LOW CH.
MKR
2.402038 GHz
-27.33 dBm
CENTER 2.402300GHz
SPAN 1.000MHz
*RBW 3.0kHz
*VBW 10kHz
*SWP 300sec


ATTEN 10dB
RL 0dBm
10dB/
MKR -24.83dBm
2.439960GHz
LIONDA GH9702
BASE MID CH.
MKR
2.439960 GHz
-24.83 dBm
CENTER 2.440190GHz
SPAN 1.000MHz
*RBW 3.0kHz
*VBW 10kHz
*SWP 300sec


ATTEN 10dB
RL 0dBm
10dB/
MKR -22.83dBm
2.479900GHz
LIONDA GH9702
BASE HIGH CH.
MKR
2.479900 GHz
-22.83 dBm
CENTER 2.480130GHz
SPAN 1.000MHz
*RBW 3.0kHz
*VBW 10kHz
*SWP 300sec

9 - ANTENNA REQUIREMENT

9.1 Standard Applicable

For intentional device, according to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to § 15.247 (1), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

9.2 Antenna Connected Construction

The directional gain of antenna used for transmitting is 0 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

10 - RF SAFETY REQUIREMENTS TO 2.1091

According to section 3 of Supplement C to OET Bulleting 65, Part 15 Transmitters are categorically excluded from Routine Environmental Evaluation by measurement or precise computations unless otherwise required by the Commissions.

According to §15.247(b)(4) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-15000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

MPE Prediction

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal: -12.67 (dBm)
Maximum peak output power at antenna input terminal: 0.06 (mW)
Antenna Gain (typical): 2 (dBi)
Maximum antenna gain: 1.58 (numeric)
Prediction distance: 3 (cm)
Predication frequency: 2400 (MHz)
MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm^2)
Power density at predication frequency: 1.9×10^{-5} (mW/cm^2)

Test Result

The predicted power density level at 3 cm is 1.9 x 10^{-5}mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2400 MHz.

This base unit is intended to be used at least 20cm away from users and is thus classed as mobile equipment.

This handset unit is intended to be used at least 2.5cm away from users and is thus classed as portable equipment.

IMPORTANT NOTE

To comply with FCC RF exposure compliance requirements, the antenna installation and device operating configurations must be satisfied. The Spread Spectrum Portable Transmitter operating with the device and its antenna at a separation distance less than 2.5 cm from all persons.

11 - SPURIOUS RADIATED EMISSION DATA

11.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is $\pm$4.0 dB.

11.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4 - 2000. The specification used was the FCC 15 Subpart C limits.

The EUT was connected to a 110 VAC / 60 Hz power source and it was placed on the back edge of the test table. The simulator was placed on one side of the EUT, and the telephone was placed on the other side of the EUT. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.

The spacing between the peripherals was 10 centimeters.

Input / Output cables were draped along the edge of the test table and bundle when necessary.

11.3 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR §15.33 (a) (1), the system was tested to 25000 MHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Start Frequency	30 MHz
Stop Frequency	25000 MHz
Sweep Speed	Auto
IF Bandwidth	1 MHz
Video Bandwidth	1 MHz
Quasi-Peak Adapter Bandwidth	120 kHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	1MHz

11.4 Test Procedure

For the radiated emissions test, both the EUT and all support equipment power cords were connected to the AC floor outlet since the power supply used in the EUT did not provide an accessory power outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dBμV of specification limits), and are distinguished with a "**Qp**" in the data table.

11.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBμV means the emission is 7dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Class B Limit

11.6 Summary of Test Results

According to the data in section 11.7, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207, and 15.247, and had the worst margin of:

Base, 30MHz to 25000MHz, 3 meters

Low channel, -15.7 dBμV at 4804.60 MHz in the Vertical polarization
Middle channel, -15.4 dBμV at 4880.38 MHz in the Vertical polarization
High channel, -16.8 dBμV at 4960.26 MHz in the Vertical polarization

Handset, 30MHz to 25000MHz, 3 meters

Low channel, -15.0 dBμV at 4604.60 MHz in the Vertical polarization
Handset, middle channel, -15.7 dBμV at 4960.26 MHz in the Vertical polarization
Handset, high channel, -17.1 dBμV at 4880.38 MHz in the Vertical polarization

Base, 30MHz to 25000MHz, 3 meters

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART B	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
Low Channel											
4804.60	30.9	/	0	1.2	V	32.5	4.9	30.0	38.3	54	-15.7
4804.60	27.5	/	20	1.0	H	32.5	4.9	30.0	34.9	54	-19.1
Middle Channel											
4880.38	31.20	/	90	1.50	V	32.5	4.9	30.0	38.6	54	-15.4
4880.38	29.3	/	60	1.0	H	32.5	4.9	30.0	36.7	54	-17.3
High Channel											
4960.26	29.8	/	320	1.5	V	32.5	4.9	30.0	37.2	54	-16.8
4960.26	27.4	/	290	1.2	H	32.5	4.9	30.0	34.8	54	-19.2
Unintentional Emission, 30MHz to 1000MHz											
212.00	33.4	/	160	1.5	V	12.5	4.7	25.0	25.6	43.5	-17.9
212.00	27.5	/	140	1.2	H	12.5	4.7	25.0	19.7	43.5	-23.8
235.40	31.8	/	0	1.0	V	12.0	1.2	25.0	20.0	46	-26.0
235.40	26.2	/	30	1.2	H	12.0	1.2	25.0	14.4	46	-31.6
66.20	30.7	/	270	1.2	V	9.6	1.2	25.0	16.5	40	-23.5
66.20	28.4	/	210	1.2	H	9.6	1.2	25.0	14.2	40	-25.8

* There was no apparent emission after the 2nd harmonics.

Handset, 30MHz to 25000MHz, 3 meters

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART B	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
Low Channel											
4604.60	31.6	/	180	1.5	V	32.5	4.9	30.0	39.0	54	-15.0
4604.60	27.5	/	160	1.2	H	32.5	4.9	30.0	34.9	54	-19.1
Middle Channel											
4960.26	30.90	/	0	1.20	V	32.5	4.9	30.0	38.3	54	-15.7
4960.26	26.8	/	50	1.0	H	32.5	4.9	30.0	34.2	54	-19.8
High Channel											
4880.38	29.5	/	180	1.5	V	32.5	4.9	30.0	36.9	54	-17.1
4880.38	26.4	/	160	1.5	H	32.5	4.9	30.0	33.8	54	-20.2
Unintentional Emission, 30MHz to 1000MHz											
214.40	33.4	/	60	1.0	V	12.5	4.7	25.0	25.6	43.5	-17.9
214.40	31.7	/	90	1.2	H	12.5	4.7	25.0	23.9	43.5	-19.6
336.50	32.6	/	350	1.2	V	15.0	2.6	25.0	25.2	46	-20.8
336.50	33.4	/	310	1.0	H	15.0	2.6	25.0	26.0	46	-20.0
66.20	28.9	/	120	1.5	V	9.6	1.2	25.0	14.7	40	-25.3
66.20	26.1	/	180	1.5	H	9.6	1.2	25.0	11.9	40	-28.1

***** There was no apparent emission after the 2nd harmonics.

12 - CONDUCTED EMISSIONS

12.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ±2.4 dB.

12.2 EUT Setup

The measurement was performed at the **O**pen **A**rea **T**est **S**ite, using the same setup per ANSI C63.4 - 2000 measurement procedure. The specification used was FCC Class B limits.

The EUT was connected to a 110 VAC / 60 Hz power source and it was placed on the back edge of the test table. The simulator was placed on one side of the EUT, and the telephone was placed on the other side of the EUT. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.

The spacing between the peripherals was 10 centimeters.

Input / Output cables were draped along the edge of the test table and bundle when necessary.

12.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the conduction test:

Start Frequency	450 kHz
Stop Frequency	30 MHz
Sweep Speed	Auto
IF Bandwidth	10 kHz
Video Bandwidth	10 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode	Normal

12.4 Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within -4 dBμV of specification limits). Quasi-peak readings are distinguished with a "**Qp**".

12.5 Summary of Test Results

According to the data in section 12.6, the EUT complied with the FCC Conducted margin for a Class B device and these test results is deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations, with the *worst* margin reading of:

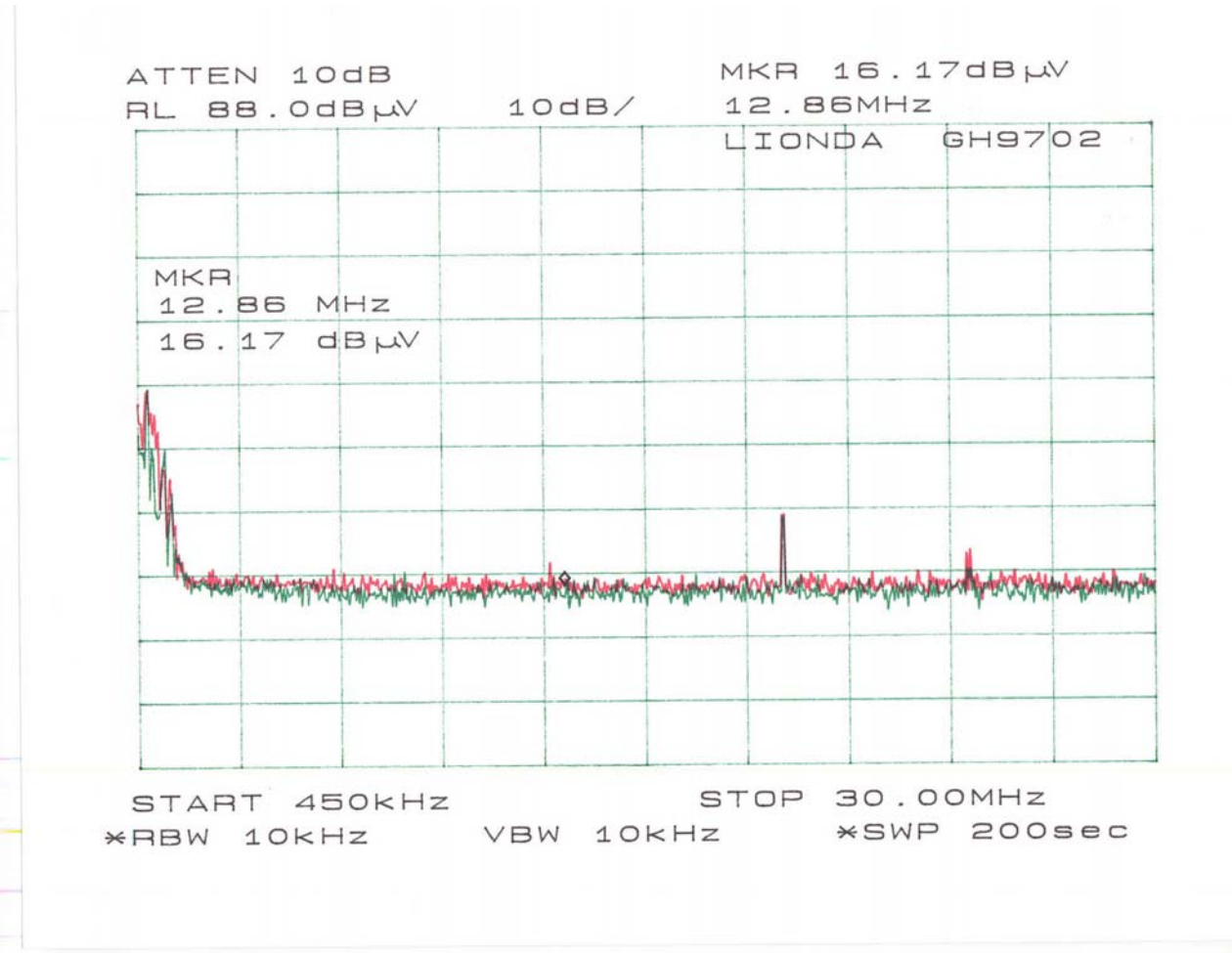
-1.2 dBμV at 0.710 MHz in the Neutral mode, 450kHz – 30 MHz

12.6 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
0.71	46.8	Qp	Neutral	48	-1.2
0.75	46.6	Qp	Line	48	-1.4
1.04	40.5	Qp	Neutral	48	-7.5
19.21	29.8	Qp	Neutral	48	-18.2
1.25	39.6	Qp	Line	48	-8.4
19.37	28.4	Qp	Line	48	-19.6

12.7 Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data is presented in the following page as reference.


ATTEN 10dB
RL 88.0dBµV
10dB/
MKR 16.17dBµV
12.86MHz
LIONDA GH9702
MKR
12.86 MHz
16.17 dBµV
START 450kHz
STOP 30.00MHz
*RBW 10kHz
VBW 10kHz
*SWP 200sec