KTL Test Report:	8R01318
Applicant:	GN Netcom Inc. 77 North Eastern Blvd. Nashua, New Hampshire 03062 USA
Equipment Under Test: **(E.U.T.)**	2.4 GHz Frequency Hopping Wireless Telephone Headset
FCC ID:	BCE-ELLIPSE24
In Accordance With:	**FCC Part 15, Subpart B** Radio Receivers
Tested By:	KTL Ottawa Inc. 3325 River Road, R.R. 5 Ottawa, Ontario K1V 1H2
Authorized By:	T. Tidwell, Laboratory Manager
Date:	
Total Number of Pages:	37

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Section 1. Summary of Test Results

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 15, Subpart B. Measurement procedure ANSI C63.4-1992 was used for all tests. Radiated Emissions were measured on an open area test site.

☒	New Submission	☒	Production Unit
☐	Class II Permissive Change	☐	Pre-Production Unit

C	Y	Y	Equipment Code

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.
See " Summary of Test Data".

NVLAP LAB CODE: 100351-0

TESTED BY: _____ DATE: _____
Kevin Carr, Technologist

Summary Of Test Data

Name Of Test	Para. No.	Results	
		Base	**Headset**
Antenna Conducted Emissions	15.111	Not Applicable	Not Applicable
Radiated Emissions	15.109	Complies	Complies
Powerline Conducted Emissions	15.107	Complies	Complies

Footnotes For N/A's:

Test Conditions:

Indoor	Temperature:	22 °C
	Humidity:	23 %
Outdoor	Temperature:	10 °C
	Humidity:	23 %

Section 2. Equipment Under Test (E.U.T.)

Manufacturer: KIRK Telecom A/S

Model No.: ELLIPSE

Serial No.: None

Equipment Details

Frequency Range:	2400 – 2483.5
Number of Channels:	79
Operating Frequency(ies) of Sample:	Channel 0, Channel 40, Channel 78
Crystal Frequency(ies):	9.302131 MHz
Primary Power Requirement:	120 VAC
Bandwidth and Emission Designator:	Not Applicable
Intermediate Frequency(ies):	Not Applicable

Description of E.U.T.

The E.U.T. is a wireless headset for an existing hard-wired telephone set.

Modifications Incorporated in E.U.T.

The EUT has not been modified from what is described by the brand name and unique type identification stated above.

Theory of Operation

The MARS system is a frequency hopping cordless headset, operating in the 2.4 GHz to 2.4835 GHz band. The system works in conjunction with a hardwired telephone set. The system allows the operator to be in wireless communications with an already existing telephone set. The headset does not have any dial out capabilities of it's own and does not connect to a telephone line in.

Justification

The E.U.T. was configured for testing as per typical installation. Position and bundling of cables were investigated to establish maximum amplitude of emissions.

The following combinations were investigated to establish worst case configuration:

(1) Headset – 3 orthogonal positions, vert. (worst case).

Exercise Program

The E.U.T. exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

Exercise Mode:

(1) Normal operation.

(2) Hopping sequence set to test channel only.

Section 3. Equipment Configuration

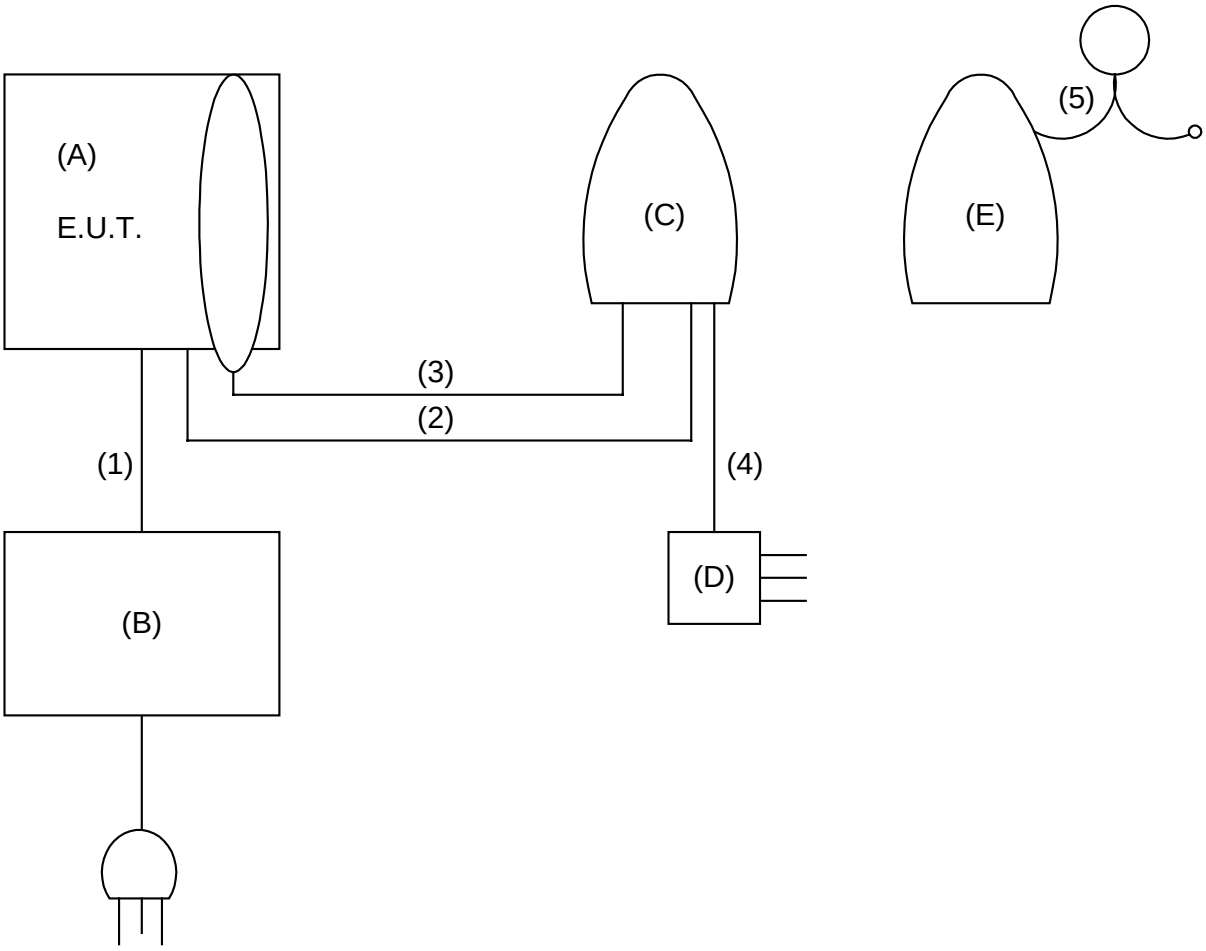
Equipment Configuration List:

Item	Description	Model No.	Serial.	Rev.
(A)	KIRK Delta Feature Phone	0217 180Q	None	
(B)	DC Feed and Ring-Up Unit	CLI-043	02	
(C)	ELLIPSE Base Unit	ELLIPSE	None	
(D)	Power Cube – 120 VAC to 11.3 Vdc Nominal	None	None	
(E)	ELLIPSE Headset Unit	ELLIPSE	None	

Inter-connection Cables:

Item	Description	Length (m)
(1)	Telco Cable	3.0
(2)	Telco Cable	1.0
(3)	Telco Cable	1.0
(4)	Power cord	2.0
(5)	Headset – Mic / Speaker Cable	1.0

Configuration of the Equipment Under Test (E.U.T)



Section 4. Receiver Antenna Conducted Emissions

NAME OF TEST: Receiver Antenna Conducted Emissions	PARA. NO.: 15.111
TESTED BY:	DATE:

Test Results: Complies. See attached graphs and data.

Measurement Data: See attached graphs and data.

NOT APPLICABLE

Section 5(A). Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.109(a)
TESTED BY:	DATE:

NOT APPLICABLE

Minimum Standard:

Frequency(MHz)	Field Strength (dBμV/m @ 3m)
30 - [illegible]	40.0
8[illegible] 2[illegible]	43.5
21[illegible]96	46.0
Above 960	54.0

Test Results: [illegible]omplies / Does Not Comply. The worst-case emission level is _____ dBμV/m @ 3m at _____ MHz. This is _____ dB above/below the specification limit.

Measurement Data: See attached table.

For super-regenerative receivers the receiver is cohered using a signal generator and dipole antenna.

Handheld equipment and equipment not designed to be mounted in any fixed orientation, the E.U.T. is tested in three orthogonal axis to obtain worst case results.

Test Data - Radiated Emissions

Test Distance (meters) :		Range:		Receiver:		RBW(kHz):		Detector:			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Table (deg.)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)

NOT APPLICABLE

Notes:
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole
* Re-measured using dipole antenna. ( ) Denotes failing emission level.
(1) 120 kHz, Q-Peak, (2) 10 kHz, Peak, (3) 100 kHz RGW, 300 kHz VBW, Peak,
(4) 300 kHz RBW, 1 MHz VBW, Peak, (5) 1 MHz RBW, 3 MHz VBW, Peak, (6) 1 MHz RBW, 10 Hz VBW, Peak

Radiated Photographs (Worst Case Configuration)

FRONT VIEW

REAR VIEW

Section 5(B). Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.109(b)
TESTED BY: Kevin Carr	DATE: March 1, 1999

Minimum Standard: Equipment manufactured or imported before June 23, 1999 is permitted the following limits.

Frequency(MHz)	**Field Strength (dBµV/m @ 3m)**
30-70	320 (50.1 dBµV/m)
70-130	500 (54.0 dBµV/m)
130-174	500 - 1500 dBµV/m)
174-260	1500 (63.5 dBµV/m)
260-470	1500 - 5000 (linear interpolation)
Above 470	5000 (74.0 dBµV/m)

Test Results: Complies. No emissions were detected below 1 GHz.

Measurement Data: See attached table.

Test Data - Radiated Emissions

Test Distance (meters) :		Range:		Receiver:		RBW(kHz):		Detector:			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Table (deg.)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)

NO EMISSIONS DETECTED

Notes:
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole
* Re-measured using dipole antenna. ( ) Denotes failing emission level.
(1) 120 kHz, Q-Peak, (2) 10 kHz, Peak, (3) 100 kHz RBW, 300 kHz VBW, Peak,
(4) 300 kHz RBW, 1 MHz VBW, Peak, (5) 1 MHz RBW, 3 MHz VBW, Peak, (6) 1 MHz RBW, 10 Hz VBW, Peak

Radiated Photographs: Base (Worst Case Configuration)

FRONT VIEW

NOT APPLICABLE

REAR VIEW

Radiated Photographs: Headset (Worst Case Configuration)

FRONT VIEW

NOT APPLICABLE

REAR VIEW

Prescan Data: Base

Prescan Data

Project Number : 8r01318
Project Filename : 8R1318.LST
Date : March 1, 1999
Start Frequency : 30 MHz
Stop Frequency : 1000 MHz
Display Line Value: 24 (30-300 MHz), 16 (300-1000MHz) dBuV

Vertical Prescan

Top Emissions below 300 MHz from the vertical prescan list:

Full Emission List below 300 MHz:

Top Emissions above 300 MHz from the vertical prescan list:

Full Emission List above 300 MHz:

Horizontal Prescan

Top Emissions below 300 MHz from the horizontal prescan list:

Full Emission List below 300 MHz:

Top Emissions above 300 MHz from the horizontal prescan list:

Full Emission List above 300 MHz:

Prescan Data: Headset

Prescan Data

Project Number : 8r01318
Project Filename : 8R1318H.LST
Date : March 1, 1999
Start Frequency : 30 MHz
Stop Frequency : 1000 MHz
Display Line Value: 24 (30-300 MHz), 16 (300-1000MHz) dBuV

Vertical Prescan

Top Emissions below 300 MHz from the vertical prescan list:

Full Emission List below 300 MHz:

Top Emissions above 300 MHz from the vertical prescan list:

Full Emission List above 300 MHz:

Horizontal Prescan

Top Emissions below 300 MHz from the horizontal prescan list:

Full Emission List below 300 MHz:

Top Emissions above 300 MHz from the horizontal prescan list:

Full Emission List above 300 MHz:

Section 6. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.107
TESTED BY: Kevin Carr	DATE: March 1, 1999

Minimum Standard: The RF energy feed back into the power lines shall not exceed 48 dBµV on any frequency between 0.45 MHz and 30 MHz inclusive.

Test Results: Complies. See attached graphs.

Measurement Data: See attached graphs.

Powerline Conducted Emissions Photographs

Front View

Side View

Section 7. Sample Calculations

Conducted Emissions:

If the Quasi-Peak to Average ratio is greater than 6 dB, then the emission is classified as broadband and its Quasi-Peak level is reduced by 13 dB for comparison to the limit.

i.e. Quasi-Peak level = 40 dBµV
Average level = 34 dBµV
Corrected level = 40 - 13 = 27 dBµV

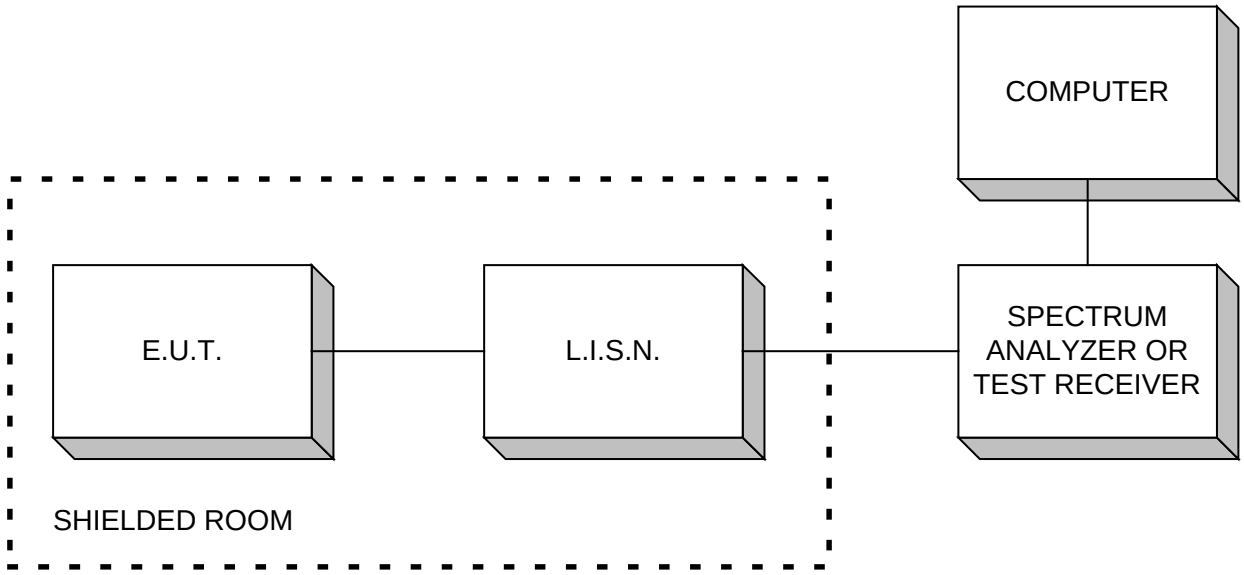
Radiated Emissions

Emissions are measured at a distance of 3 meters and corrected for antenna factor and cable loss.

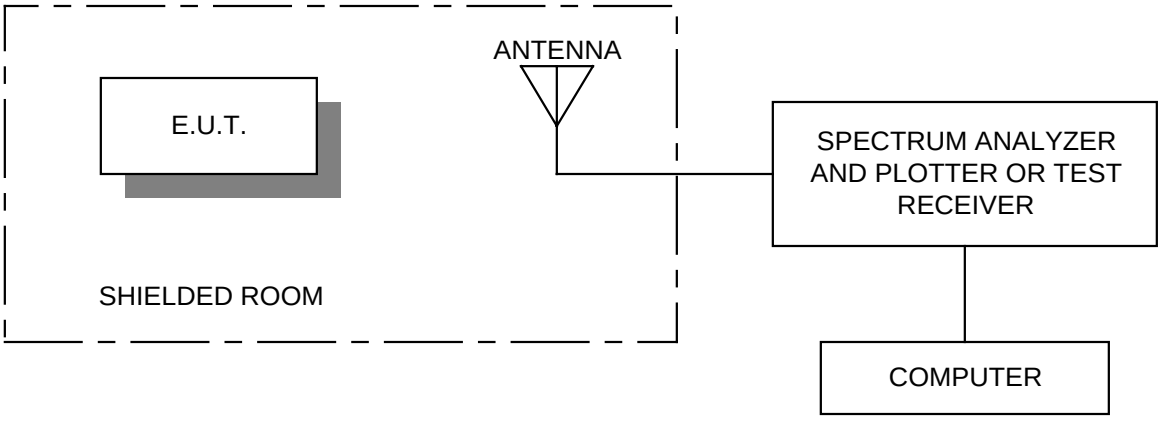
i.e. Received Signal = 25 dBµV @ 100 MHz
Antenna Factor & Cable Loss = 9.8 dB
Field Intensity = 25 + 9.8 = 34.8 dBµV/m @ 3 m

Section 8. Block Diagrams

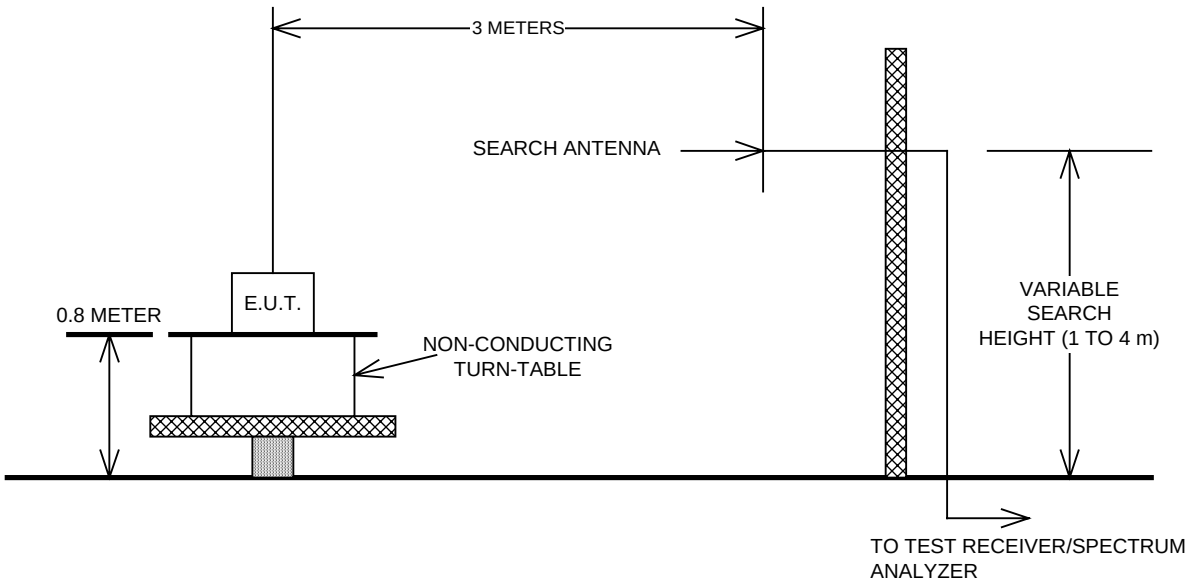
Conducted Emissions



Radiated Prescan



Outdoor Test Site For Radiated Emissions



The spectrum was searched up to the 10th harmonic of the fundamental frequency of operation.

Section 9. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.	
1 Year	Spectrum Analyzer-**1**	Hewlett Packard	8566B	2311A02238	Oct. 22/98	Oct. 22/99	
1 Year	Spectrum Analyzer Display-**1**	Hewlett Packard	8566B	2314A04759	Oct. 22/98	Oct. 22/99	
1 Year	Quasi-peak adapter-**1**	Hewlett-Packard	85650A	2043A00302	Oct. 22/98	Oct. 22/99	
1 Year	Attenuator	Narda	765-20	9510	July 24/98	July 24/99	
1 Year	Attenuator	Narda	768-10	9704	July 24/98	July 24/99	
1 Year	LISN	Tegam	95300-50	T-12855/56	July 24/98	July 24/99	
2 Year	Horn Antenna	EMCO #2	3115	4336	Oct. 30/97	Oct. 30/99	
1 Year	Digital Storage Oscilloscope	Tektronix	TDS544A	B012005	July 23/98	July 23/99	
1 Year	Low Noise Amplifier	Avantek	AWT-8035	1005	Aug. 4/98	Aug. 4/99	
3 Year	Standard Gain Horn	Electro-Metrics	SH-50/60-1	FA000479	July 29/97	July 29/00	
3 Year	Highpass Filter	K&L Microwave Inc.	11SH10-4000	FA1340	Feb. 26/99	Feb. 26/02	

NA: Not Applicable
NCR: No Cal Required