Intertek Testing Services

FCC Part 15.239 Test Report
for
Innovative Wireless Products
on the
Low Power Transmitter
Model: N-10
FCC ID: NWH-0700N15F

Test Report #: 20155381 Date of Report: July 30, 2000

Job #: J2015538 Date of Test: July 27, 2000

Total No. of Pages Contained in this Report: 13

This report shall not be reproduced except in full, without written approval of Intertek Testing Services.

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

The results contained in this report were derived from measurements performed on the identified test samples. Any implied performance of other samples on this report is dependent on the representative of the samples tested.

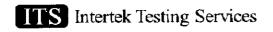


FCC Part 15.239 Tx Cert, Ver 3/00

Date of Test: July 27, 2000

Table of Contents

1,0	Sumn	nary of Test Results
2.0	Gene	ral Description
	2.1	Product Description
	2.2	Related Submittal(s) Grants
	2.3	Test Methodology
	2.4	Test Facility
3.0	Syste	m Test Configuration
- • -	3.1	Justification
	3.2	EUT Exercising Software
	3.4	System Test Configuration
		3.4.1 Support Equipment
		3.4.2 Block Diagram of Test Sctup
	3.5	Equipment Modification.
	3.6	Additions, deviations and exclusions from standards
4.0	Emis	sion Results
	4 .1	Field Strength Calculation
	4.2	Radiated Emission Data
	4.3	Conducted Emission Data
5.0	Ante	nna Requirement1
6.0	Misc	ellaneous Information or Other Comments1



Date of Test: July 27, 2000

1.0 Summary of Test Results

Model: N-10 FCC ID: NWH-0700N15F

TEST	REFERENCE	RESULTS
Bandwi dth	15.239(a)	Pass
Radiated Emission	15.239(b)	Pass
Out of Band Radiated Emission	15.239(c)	Pass
AC Conducted Emission	15.207	N/A
Radiated Emission from Digital Part	15.109	Pass
Antenna Requirement	15.203	Pass

Based on the test results, the tested sample was found to be in compliance with the FCC Part 15 requirements.

We attest to the accuracy of this report.

Test Engineer:	Jo Som	Date: $9 \gamma e^{-\gamma}$	
	Xi-Ming Yang		

Engineering Mgr. Collision Chemomordik

David Chemomordik

Date: 8/4/60

Date of Test: July 27, 2000

2.0 General Description

2.1 Product Description

The Innovative Wireless Products Model N-10 is a low power transmitter device use for cellular devices.

A pre-production version of the sample was received on July 27, 2000 in good condition.

	Overview of the EUT
Manufacturer, Model & FCC ID of transmitter module	N/A
Type of Equipment	[x] Transmitter only [] Transceiver
Type of Transmission	[x] FM
Actual Frequency Range, MHz	88.1 MHz – 107.9 MHz
Number of Channels	
Antenna Requirement	 [X] The EUT uses a permanently connected antenna. [] The antenna is affixed to the EUT using a unique connector which allows for a replacement of a broken antenna, but does not use a standard antenna jack or electrical connector. [] The EUT requires professional installation (attach supporting documentation if using this option).

File: 15239 Version 1.0 Page 3 of 13

Date of Test: July 27, 2000

3.0 System Test Configuration

3.1 Justification

For emission testing, the equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). During testing, all cables were manipulated to produce worst case emissions.

For the measurements, the EUT is attached to a cardboard box (if necessary) and placed on the wooden turntable. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). The EUT is wired to transmit full power without modulation.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Detector function is in peak mode. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. All readings are extrapolated back to the equivalent three meters reading using inverse scaling with distance.

Small loop antenna was used at close distance measurement of bandwidth and band edge plots.

Maximum sensitivity frequency 1 kHz audio was input to the other cellular phone which was wirelessly connected to the cellular phone connected conductively to the EUT. The value was adjusted until the saturation period.

3.2 EUT Exercising Software

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

For emissions testing, the units were setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing.

3.3 Mode of Operation During Test

The EUT was continuously transmitting.

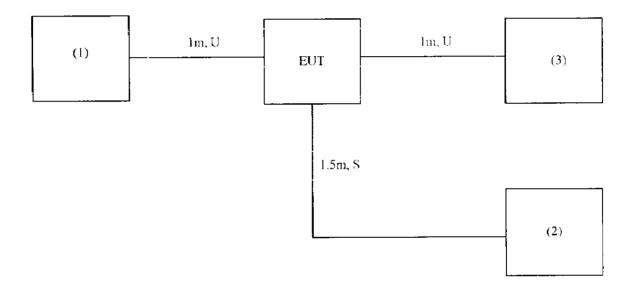
Date of Test: July 27, 2000

3.4 System Test Configuration

3.4.1 Support Equipment

Item#	Description	Model No.	Serial No.	FCC ID
1	Cellular Phone	Nokia 6160	23508400083	LJPNSW-3AX
2	Microphone	N/A	N/A	N/A
3	12VDC Battery	N/A	N/A	N/A

3.4.2 Block Diagram of Test Setup



		n Ferrite
	Shielded F = Witt	
** = No ferrites on video cable	l Inshielded	

File: 15239 Version 1.0 Page 6 of 13



Date of Test: July 27, 2000

3.5 Equipment Modification

Any modifications installed previous to testing by Innovative Wireless Products will be incorporated in each production model sold/leased in the United States.

3.6 Additions, deviations and exclusions from standards

None

File: 15239 Version 1.0 Page 7 of 13



Date of Test: July 27, 2000

4.0 Emission Results

AC line conducted emission measurements were performed from 0.45 MH to 30 MHz. Analyzer resolution is 10 kHz or greater.

Radiated emission measurements were performed from 30 MHz to 5000 MHz. Analyzer resolution is 100 kHz or greater for 30 MHz to 1000 MHz, 1 MHz for >1000 MHz.

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

File: 15239 Version 1.0 Page 8 of 13

Date of Test: July 27, 2000

4.1 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:

$$FS = RA + AF + CF - AG$$

where FS = Field Strength in $dB(\mu V/m)$

RA = Receiver Amplitude (including preamplifier) in $dB(\mu V)$

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB/m

AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:-

$$FS = RR + LF$$

where FS = Field Strength in $dB(\mu V/m)$ RR = RA - AG in $dB(\mu V)$ LF = CF + AF in dB

Assume a receiver reading of 52.0 dB(μ V) is obtained. The antenna factor of 7.4 dB/m and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB(μ V/m). This value in dB \Box V/m was converted to its corresponding level in μ V/m.

$$\begin{array}{ll} RA = 52.0 \; dB(\mu V) & AF = 7.4 \; dB/m \\ RR = 23.0 \; dB(\mu V) & CF = 1.6 \; dB \\ LF = 9.0 \; dB & AG = 29.0 \; dB \end{array}$$

FS = RR + LF
FS = 23 + 9 = 32 dB(
$$\mu$$
V/m)

Level in $\mu V/m = Common Antilogarithm {[32 dB(<math>\mu V/m$)]/20} = 39.8 $\mu V/m$



Date of Test: July 27, 2000

4.2 Radiated Emission Data

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

120000000000000000000000000000000000000	TO 11 00 1D 1	OF A LATE		
	Passed by 0.8dB at 19	07 9 MH2		
I/Courte	I Assett by 0.000 at 1	07,2 1413 864	 	

Note: a) All emissions not reported are at least 20 dB below the limits

Radiated Emissions Test Data

Company: EUT: Project #: Test Mode:
Innovative Wireless Products Tx @ 98.0MHz
Model #: S/N #: Test Date: Engineer:
N-10 July 27, 2000 Xi-Ming Y
Standard FC Limits FC Test Distance Duty Relaxation
0 3 2
SB meters dB

86 565 42661	***	(CerMer
\$	ڃ	F. 100
• •	⊆:	
	3	10000
Model.	lumber:	
10.000 00000	ō	
111111111111111111111111111111111111111		0888
10000000	90	
1,000,000,000		100000
1885 St. N.		(80) 850 (80) 850
		16908
Moreove.	100	
\$4.0×64		
(4) (E-12)		
	_	: 3 ≥
- C		3 3 3
* Q		
MOTOR		35
0.0000		: 33€
8832		D
担保を		<u> </u>
EM		Antenna Used
70 TO	\sim	33.00
		20:00:0
招頭 養子		566665
18 8 CT		58888
1393,635		2000
1020303		50000
Model EMCO EM LPA-25 None	Number: 1 7 0	
HSS		\$89\$i
1100		88888
11 S		10000
11 To 1		\$800 B
Model EMCO EMILPA-25 Nohe CDI_P950 Nohe		
100 Metre		2000
Name Carlo		2000000 2000000
11000		\$650.00
COLF950		Pře-
Q		2000000 5000000
		2000
	Ü	್ಷರ
92		- 7
concentra-		
3000000		3
500000000		
\$5000000		-
53035000		1000000
	_	
	0	
01_P950 None None NPS66		Used
\$000000 \$0000000		
50000000		161161
		\$31.31
B10000000		200
#1196.00.000 #1108000000 #1090000000		80.000
2		## B
Q	0	\$3033
3 (C)	_	\$33.33
None		\$3535 33535
		\$3333
		\$ \$ 1 \$ 1 E
NESSIE		
-		33
75		्ष
6.0	(Tr	₹D.
ග	0.	-

None NPS665		: :::
		Ω.
\$ 500 500 500 m		
2 9		\$6361
0	\circ	\$ 65 A
7		24443
\$ 75.00		\$ 63,65
		\$ 65,62
\$100 H		\$ 33 33
		\$886
Z		\$888
\$ ♀	0	\$8988 -
5 To		\$608°
		\$00,000 \$00,000
10		
\$ 13.50		300000E
對發鐵		MARKET .
€ 38 38 38 38 1		
; 2		CO.
· · · · · · ·	$\overline{}$	anşç
\$ 100 pm		27.
	_	
•	_	ă
1		æ
	_	OHO.
•	_	ducer
	_	Transducer C
C	_	ducer Us
G	_	Ø.
G		Ø.
P		Ø.
ve None None		Transquer Used

MHZ ,	dB(μV)	P/A/O	*	*.	Ę	dB(1/m)	dB .	a	e dB	dB(μV/m)	dΒ(μV/m)	G.
98.00E+0	37.8	Peak	_	0	ı	7.6	0.0	0.9	0.0	46.3	48.0	-1.7
38.40€+0	11.0	Peak		0	I	10.8	0.0	0.5	0.0	22.3	40,0	-17
57.66E+0	13.2	Peak		0	I	5.0	0.0	0.7	0.0	18.9	40.0	21
196.00E+0	21.0	Peak	_	0	Ι.	11.0	0.0	1.5	0.0	33.5	43.5	-10
294 00E+0	11.0	Peak		0	Į.	13.5	0.0	1.8	0.0	26.3	46,0	-19
392,00€+0	11.5	Peak		0	I	15.7	0.0	2.2	0.0	29.4	46.0	16
490.00E+0	11.0	Peak	 	O.	I:	17.9	0.0	2.3	0.0	31.2	46.0	-14
588 00E+0	10.0	Peak	<u> </u>	0	I	19.4	0.0	2.9	0.0	32.3	46,0	<u>-1</u> 3
686.00E+0	11.0	Peak	<u> </u>	0	エ	20.7	0.0	3.0	0.0	34.7	46.0	<u>-1</u>
784.00E+0	11.5	Peak	<u> </u>	0	I.	22.5	0.0	3.0	0.0	37.0	46.0	-9
882.00E+0	12.3	Peak		0	I	23.7	0.0	3 4	0.0	39.4	46.0	-6
980.00E+0	10.0	Peak		က ်		23.6	9,4	ပ	0.0	27.7	54.0	-26

D	Control of the contro	Notes: a
b) insert. Loss (dB)		0
9 0 1		D.C.F.:Distance
_		mi.
880		S.
â) (E
<u></u>	į	è
U.		S_{i}
= Cable A	•	Correction
e F		tion
+		'n
Cable	:	actor

ble B + Cable C

c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert, Loss. - Transducer Loss - Duty Relaxation (transmitter only).

d) Negative signs (-) in Margin column signify levels below the limits.

e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.

Radiated Emissions Test Data

Test Mode:	Project #:	EUT:	Company:
Tx @ 88.1MHz			Innovative Wireless Products
• ;			
Engineer:	Test Date:	# N/S	Model #: N-10
XI-Ming Y	July 27, 2000		N-10
0	Distance3	s_ 2	Standard_ FCC § 15B

Model: Number:

Antenna Used
1 7 0

Pre-Amp Used Cable Used 5 0 0 5 0 0

Transducer Used

Frequency	3143 Reading	Defector	A 7	Amp.	Ant. Pol	Ant. Factor	Pro-Amp	Insert, Loss	D, C, F.	Net	Limit @3m	Margin
WH.	dΒ(μV)	D/A/Q	32	*	- Z	dB(1/m)	дβ	GB I	æ	dB(µV/m)	dΒ(μ/V/m)	æ
88.10E+0	37.5	Peak	1	0	I	8.1	0.0	0.9	0.0	46.5	48.0	-1.5
38.40E+0	11.5	Peak	_	0	エ	10.8	0.0	0.5	0.0	22.8	40.0	-17.2
57.66E+0	13.0	Peak	_	0	I	5 O	0.0	0.7	0.0	18.7	40.0	-21.3
176.20E+0	14.0	Peak	<u>~</u>	0	ェ	9.2	0.0	1.4	0.0	24.6	43.5	-18.9
264.30E+0	11.0	Peak	_	0	Ι.	12.5	0.0	1.8	0.0	25.3	46.0	-20.7
352.40E+0	11.0	Peak		0	I	15.4	0.0	22	0.0	28.6	46.0	-17.4
440,50E+0	11 3	Peak	_	0	I	17.0	0.0	N:	0.0	30.6	46.0	-15.4
528.60€+0	10.0	Peak	<u> </u>	0	= :	18.7	0.0	2.5	0.0	31.2	46.0	-14.8
616.70E+0	11.0	Peak		0	I	19.5	0.0	2.7	0.0	33.2	46.0	-12.8
704.80E+0	11.6	Peak	<u> </u>	0	I	21.1	0.0	3.0	0.0	35.7	46.0	-10.3
792.90€+0	94	Peak		0	I.	22.1	0.0	3.0	0.0	34.5	46.0	-11.5
04 000 100	0	Dank	٠.	n	Ξ) 1	ر ا ا	ر م	>	ر د د	200	317

e) All other	d) Negative	c) Net (dB)	b) Insert L	Woles: a) D.C.F. Distance Correction Factor
emissions not reported are below the e	d) Negative signs (-) in Margin column signify levels below the limits	= Reading + Antenna Factor - Pre-amp +	b) Insert Loss (dB) = Cable A + Cable B + Cable C	stance Correction Factor
e) All other emissions not reported are below the equipment noise floor which is at least 20 dB b	is below the limits	c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert Loss Transducer Loss - Duty Rek		
0 dB below the limits.		ity Relaxation (transmitter only).		

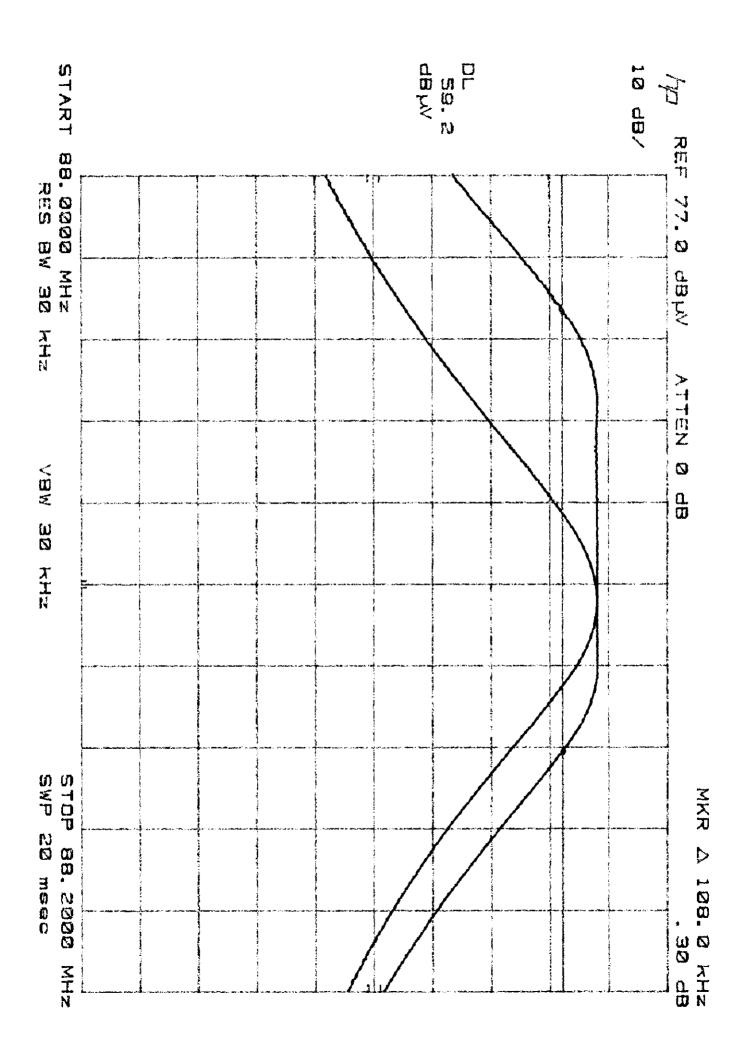
Radiated Emissions Test Data

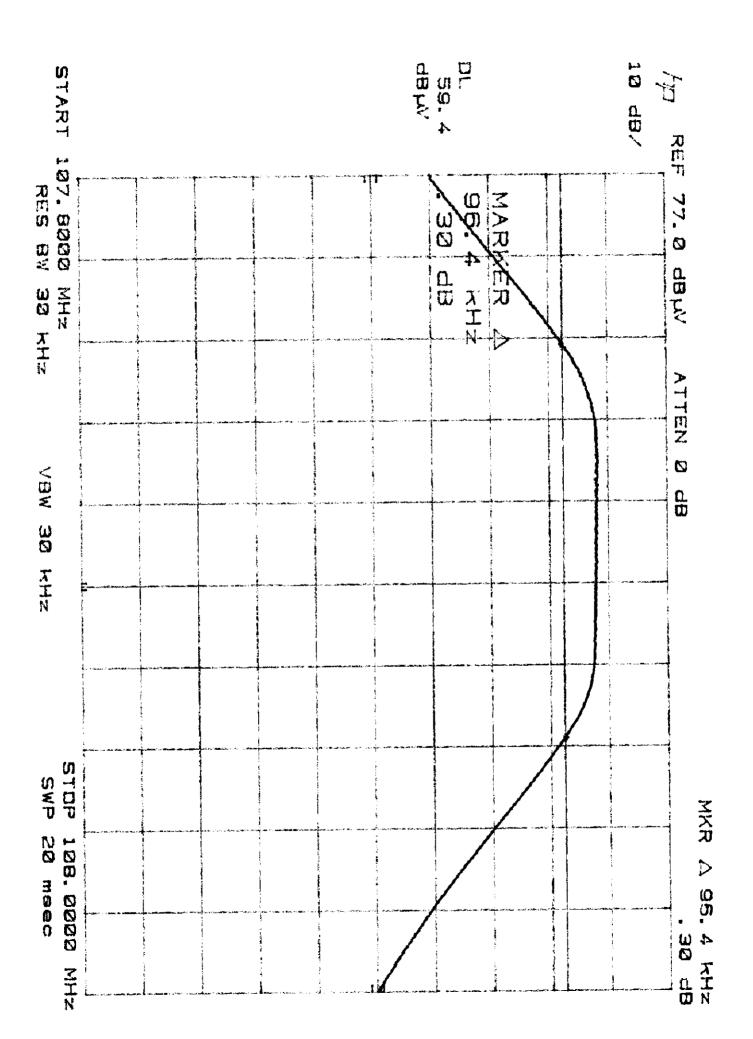
Innovative Wireless Products SIN #: Test Date: July 27, 2000 Tx @107.9MHz Model #: N-10 SIN #: Test Date: July 27, 2000	ireless Products Model #: N-10 Stand: S/N #: Test Date: July 27, 2000 Test D Hz Engineer: Xi-Ming Y. Duty #	ireless Products Model #: N-10 Standard S/N #: Test Date: July 27, 2000 Test Dist Engineer: Xi-Ming Y: Duty Refa
00	Stand: Limits 00 Test D	Standard_ FCC: Limits_ OO Test Distance_ Duty Refaxation
00	Stand: Limits 00 Test D	Standard_ FCC: Limits_ OO Test Distance_ Duty Refaxation
	T O 6	dardFCC;

Anterina Used Pre-Amp Used Cable Used Transducer Used Number: 1 7 0 5 0
Antenna Used 1 7 0 EMCO EM LPA:25 None 3143
Antenna Used 1 7 0 EMCO EM LPA:25 None 3143
Antenna Used 1 7 0 EMCO EM LPA:25 None 3143
Antenna Used 1 7 0 EMCO EM LPA:25 None 3143
Antenna Used 1 7 0 EMCO EM LPA:25 None 3143
Antenna Used 1 7 0 EMCO EM LPA:25 None 3143
Antenna Used 1 7 0 EMCO EM LPA:25 None 3143
Antenna Used 1 7 0 EMCO EM LPA:25 None 3143
Antenna Used 1 7 0 EMCO EM LPA:25 None 3143
Antenna Used 1 7 0 EMCO EM LPA:25 None 3143
Antenna Used 1 7 0 EMCO EM LPA:25 None 3143
Antenna Used 1 7 0 EMCO EM LPA:25 None 3143
Antenna Used 1 7 0 EMCO EM LPA:25 None 3143
Anterina Used 1 7 0 EMCO EM LPA: 25 None 3143
Anterina Used 1 7 0 EMCO EM LPA: 25 None 3143
Anterina Used 1 7 0 EMCO EM LPA: 25 None 3143
a Used 7 0 EM LPA-25 None
a Used 7 0 EM LPA-25 None
a Used 7 0 EM LPA-25 None
a Used 7 0 EM LPA-25 None
a Used 7 0 EM LPA-25 None
ia Used 7 0 EM LPA-25 None
ia Used 7 0 EM LPA-25 None
- (2022/2:lauas
Pre-Amp Used Cable Used Transd 5 0 0 5 0 0 0 CDI_P950 None None NPS665 None None None
Pre-Amp Used Cable Used Transd 5 0 0 0 0 0 5D_P950 None None NPS665 None None None
Pre-Amp Used Cable Used Transd 5 0 0 5 0 0 0 DI_P950 None None NPS665 None None None
Pre-Amp Used Cable Used Transd 5 0 0 0 0 0 1-P950 None None NPS665 None None None
Pre-Amp Used Cable Used Transd 5 0 0 5 0 0 0 P950 None None NPS665 None None None
Pre-Amp Used Cable Used Transd 0 </td
#-Amp Used Transd 0 0 5 0 0 0 850 None None NPS665 None None None
Amp Used Cable Used Transd 0 0 0 0 0 0 None None NPS665 None None None
Amp Used Cable Used Transd 0 0 5 0 0 0 None None MPS665 None None None
mp Used Cable Used Transd 0 0 0 0 0 0 None None NPS665 None None None
np.Used Cable Used Transd 0 0 5 0 0 0 None None NPS665 None None
3-U3ed Cable Used Transd 0 0 5 0 0 0 None NPS665 None None None
Used Cable Used Transd 0 0 0 0 0 None None
Jsed Cable Used Transd 0 0 0 0 0 None None
ted Cable Used Transd 0 0 5 0 0 0 tone None None None
id Cable Used Transd 0 5 0 0 0 ne None NPS665 None None None
Cable Used
Cable Used Transd 0 5 0 0 0 None NPS665 None None None
Cable Used Transd 0 5 0 0 0 None NPS665 None None None
Cable Used Transd 0 5 0 0 0 None NPS665 None None None
Cable Used Transd 0 5 0 0 0 None NPS665 None None None
Cable Used Transd 0 5 0 0 0 None NPS665 None None None
Cable Used Transd 0 5 0 0 0 None NPS665 None None None
Cable Used Transd 0 5 0 0 0 None NPS665 None None None
Cable Used Transd 0 5 0 0 0 None NPS665 None None None
Cable Used Transd 0 5 0 0 0 one NPS665 None None None
Cable Used Transd 0 0 0 0 ne NPS665 None None None
Cable Used Transd 5 0 0 0 NPS665 None None None
Cable Used Transd 5 0 0 0 NPS665 None None None
Cable Used Transd 5 0 0 0 NPS665 None None None
Cable Used Transd 5 0 0 0 NPS665 None None None
Cable Used Transd 5 0 0 0 NPS665 None None None
Cable Used Transd 5 0 0 0 NPS665 None None None
able Used Transd 5 0 0 0 NPS665 None None None
ble Used Transd 5 0 0 0 4PS665 None None None
ile Used Transd 5 0 0 0 93665 None None None
s Used Transd 5 0 0 0 \$665 None None None
Used Transd 0 0 0 365 None None
sed Transd 0 0 0 55 None None None
sed Transd 0 0 0 0 None None
id Transd 0 0 0 None None None
Transd 0 0 0 None None
Transd 0 0 0 None None None
Transd 0 0 0 None None
Transd 0 0 0 None None
Transd 0 0 0 one None None
Transd
Transd 0 0 a None None
Transd 0 0
Transd 0 0
Transd 0 0 None None
Transd 0 0 None None
Transd 0 0 None None
Transd 0 0 one None
Transd 0 None
Transd 0 None
O None
ansd One
F
100° 🛣
2001000100 250 550
\$50,000,000 \$50,000 P. C.
fucer
parasita isiMit
\$355555 B
(CONT.)
10000000 100 100 100
100000
gossor w y t
promise 1990
ducer Used
Kuntata MANA

1	c									C	c
Мнz	_d6(μV)	PING	# #	ΥM	dB(1/m)	dB	c B	C.		dB(μV/m)	
107.90E+0	39.0	Peak	1 0	I	7.2	0.0	1.0	0.0	47.2	48.0	-0.8
38.40E+0	11.3	Peak	1 0	I:	10.8	0.0	0.5	0.0		40.0	- 1
57.66E+0	12.5	Peak	1 0	Ι.	5,0	0.0	0.7	0.0		40,0	
215.80E+0	12.5	Peak	1 0	I		0.0	15	0.0	25.1	43.5	-184
431,60E+0	12.4	Peak	1 0	エ	17.2	0.0	2.3	0.0	31.9	46.0	-14.1
539.50E+0	10.4	Peak	1 0	ェ	0,0	0.0	2.5	0.0	31.9	46,0	-14.1
647.40E+0	10.0	Peak	1 .	I	20.7	0.0	27	0.0	33.4	46.0	-12 6
755.30E+0	11.0	Peak	1 0	エ	21.9	0.0	3.0	0.0	35.9	46.0	-10.1
863.20E+0	12.0	Peak	0	I	23.1	0.0	ω 4	0.0	38.5	46.0	-7.5
971 10E+0	11.5	Peak	1 0	I	23.4	0.0	3.5 5	0.0	38 4	54.0	-15 6
1079.00E+0	9.8	Peak	1 0	エ	24.0	0.0	3.6	0.0	37.4	54 .0	-16.6
980.00E+0	9.0	Peak	დ. 	I.	23.6	9.4	<u>ပ</u> (၁)	0	26.7	54.0	-27.3

e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.	d) Negative signs (-) in Margin column signify levels below the limits.	c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert Loss - Transducer Loss - Duty Relaxation (transmitter only)	+ Cable B + Cable C	Nates: a) D.C.F. Distance Correction Factor
			!	







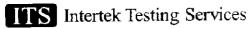
Date of Test: July 27, 2000

4.3 Conducted Emission Data

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Results:	N/A,	the unit is b	attery	powered device		

Note: a) A complete scan from 0.45 - 30 MHz was made.



Date of Test: July 27, 2000

Antenna Requirement 5.0

X	The transmitter uses a permanently connected antenna.
	The antenna is affixed to the EUT using a unique connector that allows for replacement of a broken antenna, but does NOT use a standard antenna jack or electrical connector.
	The EUT requires professional installation. Please refer to the attached documentation for details).



Date of Test: July 27, 2000

6.0 Miscellaneous Information or Other Comments

None

File: 15239 Version 1.0 Page 13 of 13