

MEASUREMENT AND TECHNICAL REPORT

HM ELECTRONICS INCORPORATED
 14110 Stowe Drive
 Poway, CA 92064

DATE: 18 February 2003

This Report Concerns:	Original Grant: <input checked="" type="checkbox"/>	Class II Change: <input type="checkbox"/>
Equipment Type:	BS500 Base Station, Model BS500	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes: <input type="checkbox"/> Defer until: <input type="text"/>	No: <input checked="" type="checkbox"/>
Company Name agrees to notify the Commission by: of the intended date of announcement of the product so that the grant can be issued on that date.	<input type="text" value="N/A"/>	
Transition Rules Request per 15.37?	Yes: <input type="checkbox"/>	No: <input checked="" type="checkbox"/>
(*) FCC Part 15, Paragraph(s) 15.207(a), 15.209(b), 15.249(a)		
Report Prepared by:	TÜV AMERICA, INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 546 3999 Fax: 858 546 0364	

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1.0 GENERAL INFORMATION

1.1 Product Description

General Equipment Description -- NOTE: This information will be input into your test report as shown below.

EUT Description Wireless Intercom Base Station

EUT Name BS500 Base Station

Model No.: BS500 Serial No.: --

Product Options: Ceiling Speaker, Remote Display

Configurations to be tested: Vehicle Present, Transmit & Receive

Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 120 (If battery powered, make sure battery life is sufficient to complete testing.)

of Phases: 1

Current (Amps/phase(max)): 0.5A Current (Amps/phase(nominal)): 0.2A

Other --

Other Special Requirements

--

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)

Industrial - Wall Mount inside a Quick Service Restaurant

EUT Power Cable

Permanent OR Removable Length (in meters): 3

Shielded OR Unshielded

Not Applicable

EUT Interface Ports and Cables												
Interface				Shielding								
Type	Analog	Digital	Qty	Yes	No	Type	Termination	Connector Type	Port Termination	Length (in meters)	Removable	Permanent
EXAMPLE: RS232	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Foil over braid	Coaxial	Metallized 9-pin D-Sub	Characteristic Impedance	6	<input checked="" type="checkbox"/>	<input type="checkbox"/>
RS485	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Foil over Drain Wire	Multi-conductor	Terminal Block	Characteristic Impedance	16	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Outside Microphone	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Foil over Drain Wire	Multi-conductor	Terminal Block	200 ohms	39	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Outside Speaker	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	--	Multi-conductor	Terminal Block	8 ohms	39	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Ceiling Speaker	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	--	Multi-conductor	Terminal Block	8 ohms	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>

EUT Software.

Revision Level: Audio - U33 Ver 2.0, U25 Ver 1.0, U31 Ver 1.10, XCVR - U11 Ver 1.00, U10 Ver 1.00

Description: Audio - U33 is the Automatic Noise Reduction, U25 is operation/control, U31 is the Automatic Volume Control.

XCVR - U11 is the operation/control, U10 is the voice prompts.

EUT Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1. No Vehicle Present, Receive & Transmit

2. Vehicle Present, Receive & Transmit

EUT System Components -- List and describe all components which are part of the EUT. For FCC testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc.)

Description	Model #	Serial #	FCC ID #
Base Station	BS500	--	BYMBS500

Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)

Description	Model #	Serial #	FCC ID #
Outside Microphone	DM3	--	--
Outside Speaker	SP2500LP	--	--
Ceiling Speaker	MM100	--	--
Remote Display	R30	--	--
Power Adapter	760117	--	--
Power Adapter	760119	--	--

Oscillator Frequencies

Frequency	Derived Frequency	Component # / Location	Description of Use
4.000MHz	--	Y3, Audio Board	Clock for micro U25
16.257MHz	--	Y2, Audio Board	Clock for DSP U32
24.576MHz	--	Y1, Audio Board	Clock for CODEC U19
7.160MHz	--	Y2, XCVR Board U11	Clock for micro U11
--	3.58MHz	Y2/U11 XCVR Board	Clock for Audio Processor U14
8.000MHz	4.000MHz	Y1, XCVR Board Y1/U8 XCVR Board	Oscillator for Audio IC U4 Oscillator for Sub-tones U9

Power Supply

Manufacturer	Model #	Serial #	Type
--			<input type="checkbox"/> Switched-mode: (Frequency) <input type="checkbox"/> Linear <input type="checkbox"/> Other:

Power Line Filters

Manufacturer	Model #	Location in EUT
--		

Critical EMI Components (Capacitors, ferrites, etc.)

Description	Manufacturer	Part # or Value	Qty	Component # / Location
--				

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.
--

--

1.2 Related Submittal Grant

None

1.3 Tested System Details

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system are:

None

1.4 Test Methodology

Purpose of Test: To demonstrate compliance with the following tests.

TEST	FCC CFR 47#	PASS/FAIL
Conducted Emissions	15.207(a)	Pass
Radiated Emissions	15.209(b)	Pass
Radiated Emissions	15.249(a)	Pass

Both Conducted and Radiated testing were performed according to the procedures in FCC/ANSI C63.4 and CSA 108.8-M1983. Radiated testing was performed at an antenna-to-EUT distance of 3 meters to the 10th harmonic.

1.5 Test Facility

The open area test site and conducted measurement data were tested by:

TÜV AMERICA, INC
 10040 Mesa Rim Road
 San Diego, CA 92121-2912
 Phone: 858 546 3999
 Fax: 858 546 0364

The Test Site Data and performance comply with ANSI C63.4 and are registered with the FCC, 7435 Oakland Mills Road, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was initially tested for FCC emissions in the following configuration:

See Block Diagram

2.2 EUT Exercise Software

None

2.3 Special Accessories

None

2.4 Equipment Modifications

None

2.5 Configuration of Test System

See Block Diagram

Report No. SC300557-03

3.0 CONDUCTED EMISSIONS EQUIPMENT/DATA

See following page(s).

Report No. SC300557-03

Test Conditions: CONDUCTED EMISSIONS: FCC Part 15.207(a)

The CONDUCTED EMISSIONS measurements were performed at the San Diego Testing Facility:

- Test not applicable

■ - SR-3, Shielded Room, 12' x 20' x 8', Metal Chamber

Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Date
9252-50-R-24-BNC	458	LISN, 50 μ H /250 μ H/50 Ω / 0.25 μ F	Solar Electronics Co.	941719	04/02
ESHS 20	428	EMI Test Receiver	Rohde & Schwarz	837055/001	12/02
CAT-20	606	20 dB Attenuator	Mini-Circuits	--	09/02

Remarks: One year calibration cycle for all test equipment and sites.

**TUV Product Service
Conducted Emissions**

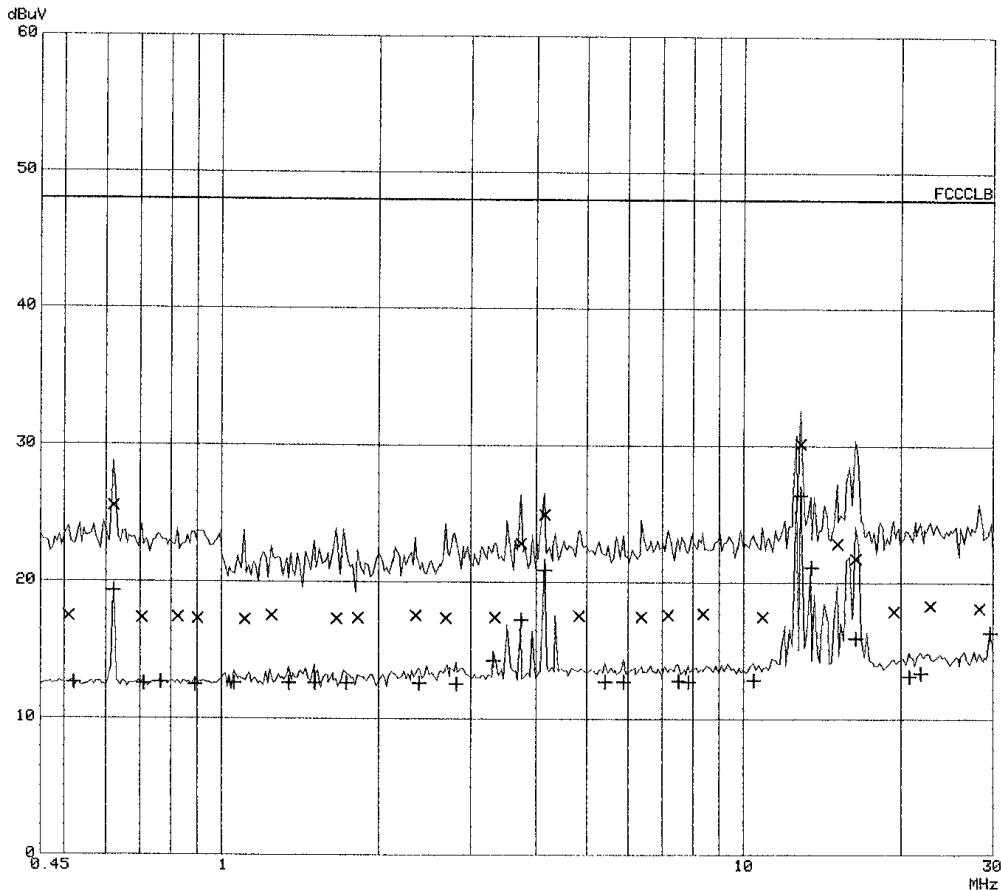
EUT: System 500 Base Station
 Manuf: HM Electronics INC
 Op Cond: Transmit/Receive duplex
 Operator: A. Laudani
 Test Spec: FCC 15.107(a)
 Comment: 110 Vac 60Hz Line 1
 SC300557
 Date: 05. Feb 03 08:44

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	1M	5k	10k	PK+AV	100ms	AUTO	LN OFF	60dB
1M	30M	5k	10k	PK+AV	2ms	AUTO	LN OFF	60dB

Transducer No.	Start	Stop	Name
1	100k	30M	20dB LISN

Final Measurement: x QP / + AV
 Meas Time: 1 s
 Subranges: 25
 Acc Margin: 35dB



**TUV Product Service
Conducted Emissions**

EUT: System 500 Base Station
 Manuf: HM Electronics INC
 Op Cond: Transmit/Receive duplex
 Operator: A. Laudani
 Test Spec: FCC 15.107(a)
 Comment: 110 Vac 60Hz Line 1
 SC300557
 Date: 05. Feb 03 08:44

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.51000	17.5	48.0
0.62000	25.6	48.0
0.70500	17.4	48.0
0.82500	17.4	48.0
0.90000	17.3	48.0
1.10500	17.3	48.0
1.24500	17.6	48.0
1.66000	17.3	48.0
1.82500	17.3	48.0
2.35500	17.5	48.0
2.69000	17.4	48.0
3.33000	17.4	48.0
3.73500	22.9	48.0
4.14500	25.0	48.0
4.82500	17.5	48.0
6.36000	17.5	48.0
7.17500	17.6	48.0
8.35000	17.7	48.0
10.87000	17.5	48.0
12.86000	30.1	48.0
15.13500	22.9	48.0
16.37000	21.8	48.0
19.36000	17.9	48.0
22.81000	18.3	48.0
28.32000	18.1	48.0

Frequency MHz	AV Level dBuV	AV Limit dBuV
0.52000	12.6	
0.62000	19.3	
0.71000	12.5	
0.76500	12.6	
0.89000	12.5	
1.05500	12.6	
1.34500	12.6	
1.50500	12.6	
1.73500	12.6	
2.38500	12.6	
2.81500	12.5	
3.31500	14.3	
3.73500	17.2	

Date: 05. Feb 03 08:44

4.14500	20.9
5.42000	12.7
5.87500	12.7
7.50500	12.8
7.83500	12.7
10.46500	12.8
12.86000	26.4
13.48000	21.1
16.37500	15.9
20.76500	13.1
21.85000	13.4
29.64500	16.3

* limit exceeded

**TUV Product Service
Conducted Emissions**

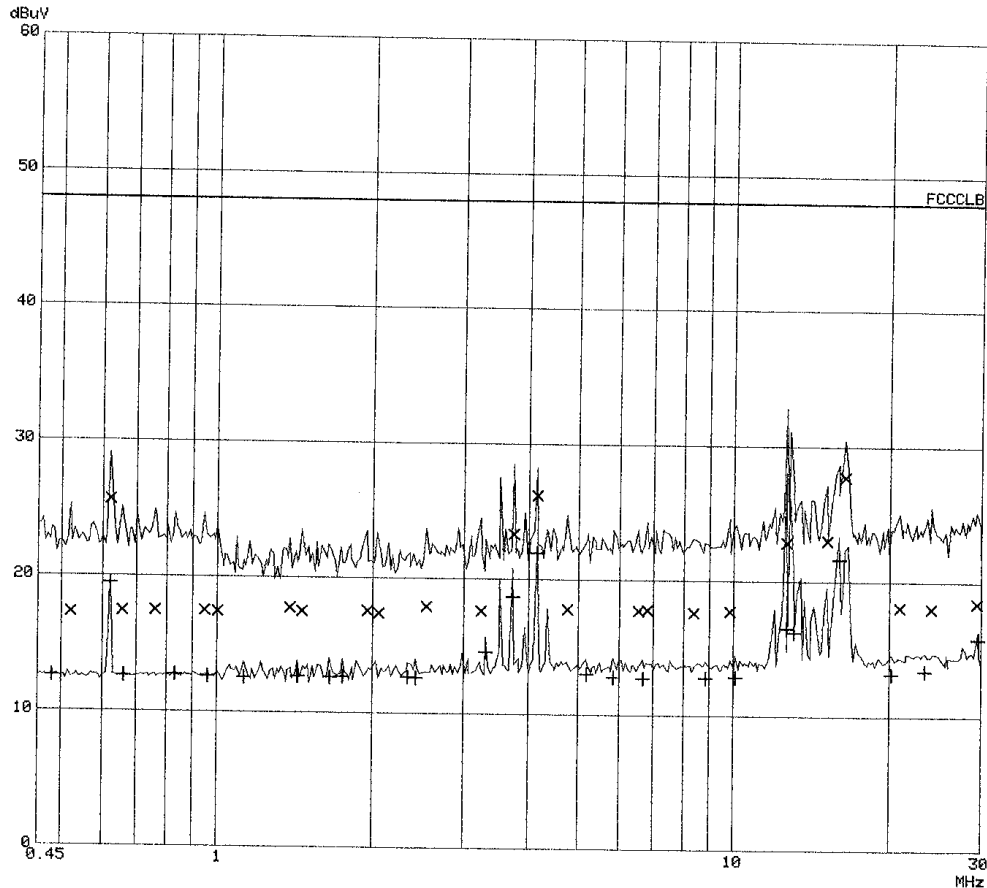
EUT: System 500 Base Station
 Manuf: HM Electronics INC
 Op Cond: Transmit/Receive duplex
 Operator: A. Laudani
 Test Spec: FCC 15.107(a)
 Comment: 110 Vac 60Hz Line 2
 SC300557
 Date: 05. Feb 03 08:58

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	1M	5k	10k	PK+AV	100ms	AUTO	LN OFF	60dB
1M	30M	5k	10k	PK+AV	2ms	AUTO	LN OFF	60dB

Transducer No.	Start	Stop	Name
1	100k	30M	20dBLISN

Final Measurement: x QP / + AV
 Meas Time: 1 s
 Subranges: 25
 Acc Margin: 35dB



**TUV Product Service
Conducted Emissions**

EUT: System 500 Base Station
 Manuf: HM Electronics INC
 Op Cond: Transmit/Receive duplex
 Operator: A. Laudani
 Test Spec: FCC 15.107(a)
 Comment: 110 Vac 60Hz Line 2
 SC300557
 Date: 05. Feb 03 08:58

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.52000	17.3	48.0
0.62000	25.7	48.0
0.65500	17.4	48.0
0.76000	17.5	48.0
0.94500	17.5	48.0
1.00000	17.4	48.0
1.38500	17.7	48.0
1.46000	17.5	48.0
1.95000	17.6	48.0
2.05500	17.4	48.0
2.54000	17.9	48.0
3.23500	17.6	48.0
3.73500	23.3	48.0
4.14500	26.2	48.0
4.76500	17.8	48.0
6.54000	17.7	48.0
6.78000	17.8	48.0
8.37500	17.6	48.0
9.84000	17.7	48.0
12.64000	22.9	48.0
15.13500	23.0	48.0
16.37000	27.7	48.0
20.93000	18.1	48.0
24.08500	18.0	48.0
29.46000	18.5	48.0

Frequency MHz	AV Level dBuV	AV Limit dBuV
0.48000	12.6	
0.62000	19.5	
0.66000	12.6	
0.83000	12.7	
0.96000	12.6	
1.12500	12.5	
1.43500	12.7	
1.65500	12.6	
1.75500	12.6	
2.34000	12.6	
2.42000	12.6	
3.31500	14.6	
3.73000	18.6	

Date: 05. Feb 03 08:58

4.14500	22.0
5.18500	13.0
5.83500	12.7
6.68000	12.7
8.84000	12.8
10.09000	12.8
12.64000	16.5
13.06500	16.2
15.96500	21.7
20.17500	13.1
23.37500	13.4
29.64500	15.8

* limit exceeded

Report No. SC300557-03

4.0 RADIATED EMISSIONS EQUIPMENT/DATA

See following page(s).

Test Conditions: RADIATED EMISSIONS: FCC Part 15.209(b) and Part 15.249(a)

The RADIATED EMISSIONS measurements were performed at the San Diego Testing Facility:

- Test not applicable

- - SR-3, Shielded Room, 12' x 20' x 8', Metal Chamber
- - Roof (Small Open Area Test Site)
- - Canyon #2 (3- and 10-Meter Open Area Test Site), Carroll Canyon, San Diego

Test Equipment Used:

SR-3, Shielded Room, 12' x 20' x 8', Metal Chamber

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Date
CBL6111	461	Bilog Antenna	Chase Electronics	1291	NCR*
HP8566B	721	Spectrum Analyzer	Hewlett Packard	2542A12099	07/02
3115	453	Double Ridge Horn Antenna	EMCO	3564	01/03

Roof (Small Open Area Test Site)

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Date
HP8566B	743	Spectrum Analyzer	Hewlett Packard	2618A02913	09/02
Cable 1	731	30' cable	United Microwave Pro	--	NCR*
Cable 2	756	10' Cable	United Microwave Pro	--	NCR*
Cable 3	6788	3' Cable	United Microwave Pro	--	NCR*
3146	243	Log Periodic Antenna	EMCO	106X	04/02
3115	251	Double Ridge Horn Antenna	EMCO	2495	12/02
FF6548-2	777	900 MHz High Pass Filter	Sage	006	NCR*
AMF-5D-010180-35-10P	719	PreAmplifier	Miteq	549460	NCR*
8445B	6677	Preselector	Hewlett Packard	1442A01127	NCR*

Canyon #2 (3- and 10-Meter Open Area Test Site)

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Date
ESVS30	6723	EMC Receiver	Rohde & Schwarz	830350/006	12/02
LBP25020/A	739	Bilog Antenna	Antenna Research	1170	05/02

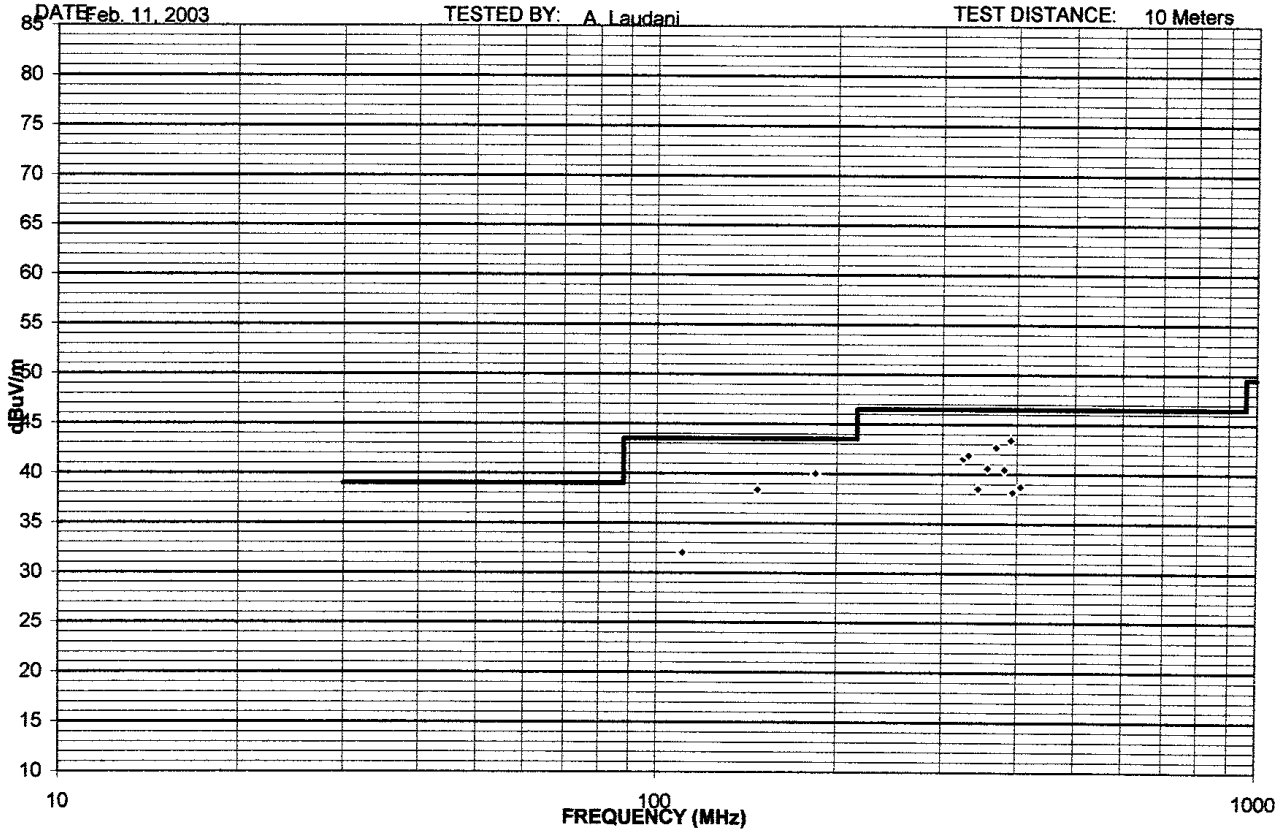
Remarks: One year calibration cycle for all test equipment and sites. (*) No Calibration Required.

REPORT NO. SC300557
COMPANY: HM Electronics INC
EUT System: HS500 Base Station
EUT MODE: Receive
DATE: Feb. 11, 2003

SPEC: FCC Part 15 para 15.109(b)

TESTED BY: A. Laudani

TEST DISTANCE: 10 Meters



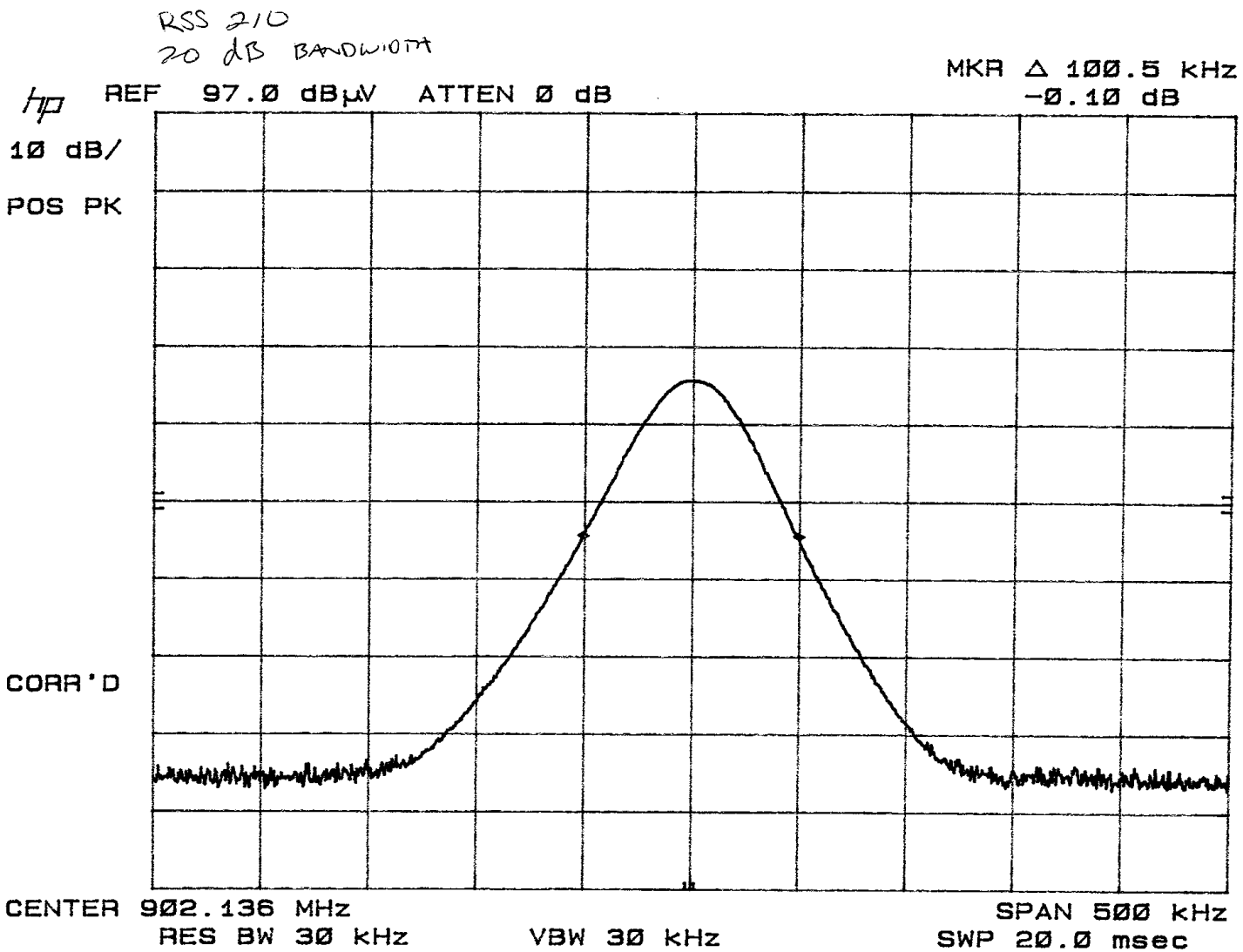
REPORT No: SC300557 TESTER: Alan Laudani *AL* SPEC: FCC Part 15 para 15.209(a)
 FCC Part 15 para 15.249(a)
 CUSTOMER: HM Electronics INC TEST DIST: 3 Meters
 E U T: System 500 Base Station TEST SITE: Roof
 EUT MODE: Transmit/Receive Duplex BICONICAL: N/A
 DATE: Feb. 5, 2003 LOG: 243

NOTES: OTHER: 251

above 1GHz: RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG
 below 1GHz: RBW & VBW 100 kHz for Pk; RBW 100kHz and VBW 10Hz for AVG
 CF = Antenna Factor + Cable Loss - Preamplifier Gain + Preselector Loss

NO OTHER EMISSIONS DETECTED FROM 30 MHz TO 10 GHz (RELATED TO XMTR MODE)

FREQ (MHz)	VERTICAL (dBuv)		HORIZONTAL (dBuv)		CF (dB/m)	MAX LEVEL (dBuV/m)		SPEC LIMIT (dBuV/m)		MARGIN (dB)		EUT Rotation	Antenna Height	Notes
	pk	av	pk	av		pk	av	pk	av	pk	av			
902.136	62.5	62.2	60	59.8	23.5893	86.09	85.8	93.7	93.7	-7.61	-7.9	200	2	Lane 1 channel 0 (low)
1804.3	52.9	47.6	48.6	40	-3.7226	49.18	43.9	74	54	-24.8	-10	180	1.1	Lane 1 channel 0 (low)
2706.4	47.3	35.4	47.6	38.2	2.432	50.03	40.6	74	54	-24	-13	219	1.2	
3608.5	45	32.9	44.8	32.8	5.4472	50.45	38.3	74	54	-23.6	-16			noise floor
4510.63	44.1		44.5		4.75102	49.25	4.75	74	54	-24.7	-49			noise floor
5412.76	44.6		43.3		11.145	55.75	11.1	74	54	-18.3	-43			noise floor
6314.89	32.8		34.1		12.7817	46.88	12.8	74	54	-27.1	-41			noise floor
7217.02	32		33.5		15.2511	48.75	15.3	74	54	-25.2	-39			noise floor
8119.15	33.4		31.2		17.5192	50.92	17.5	74	54	-23.1	-36			noise floor
9021.28	32.7		33.1		19.8234	52.92	19.8	74	54	-21.1	-34			noise floor
1202.9	56.4	54	55.4	53.9	-11.5768	44.82	42.4	74	54	-29.2	-12	220	1.4	
1503.5	55.1	52.3	51.6	46.3	-9.137	45.96	43.2	74	54	-28	-11	273	1.1	
1852.2	51.5	46.4	49.9	43.9	-2.8604	48.64	43.5	74	54	-25.4	-10	212	1.1	
903.936	58.4	57.6	55.2	54	23.5803	81.98	81.2	93.7	93.7	-11.7	-13	290	1.7	Lane 2 channel 7 (high)
1808	51.8	46.4	47	35.7	-3.656	48.14	42.7	74	54	-25.9	-11	70	1.2	Lane 2 channel 7 (high)
2711.7	50.8	42.5	48	38.4	2.4585	53.26	45	74	54	-20.7	-9	180	1.2	
3615.9	47.9	37	48	38.5	5.47088	53.47	44	74	54	-20.5	-10	144	1.4	
4520.6	47.1	35.2	46.6	35.2	4.79888	51.9	40	74	54	-22.1	-14			noise floor
5425.6	45.2	34	45.2	34.3	11.2709	56.47	45.6	74	54	-17.5	-8.4			noise floor
6330.6	34.7	23.2	34.9	23.2	12.8257	47.73	36	74	54	-26.3	-18			noise floor
7235.3	33.5	22.4	34.1	22.3	15.3059	49.41	37.7	74	54	-24.6	-16			noise floor
8140.5	33	21.7	33.2	21.6	17.5405	50.74	39.2	74	54	-23.3	-15			noise floor
9045.4	32.2	21.4	32.9	21.4	19.7366	52.64	41.1	74	54	-21.4	-13			noise floor
1205.3	61.3	60.2	58.5	56.3	-11.5576	49.74	48.6	74	54	-24.3	-5.4	333	1.2	
1506.7	55.7	52.8	51.4	43.7	-9.0794	46.62	43.7	74	54	-27.4	-10	28	1.7	
1855.7	49.9	42.7	49.6	42.7	-2.7974	47.1	39.9	74	54	-26.9	-14	220	1.1	



Report No. SC300557-03

5.0 ATTESTATION STATEMENT

GENERAL REMARKS:

SUMMARY:

All tests were performed per CFR 47, Part(s) 15.207(a), 15.209(b), 15.249(a)

■ - Performed

The Equipment Under Test

■ - **Fulfills** the requirements of CFR 47, Part(s) 15.207(a), 15.209(b), 15.249(a)

- TÜV AMERICA, INC. -

Responsible Engineer:



Jim Owen
(EMC Chief Engineer)

Responsible Engineer:



Alan Laudani
(EMC Engineer)