

# **Exhibit Q: Spurious Radiated Emissions**

**FCC ID: HN2MPCI3A-20**

**Justification**

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

**Channels in Specified Band Investigated:**

Low

Mid

High

**Operating Modes Investigated:**

Typical

**Antennas Investigated:****Dipole** (lowest gain of all the antennas to be used with the EUT)Highest Gain **Yagi** to be used with the EUTHighest Gain **Omni** to be used with the EUTHighest Gain **Flat Panel** to be used with the EUT**Data Rates Investigated:**

Maximum

**Output Power Setting(s) Investigated:**

Maximum

**Power Input Settings Investigated:**

DC from E-net

**Frequency Range Investigated**

Start Frequency

30 MHz

Stop Frequency

26 GHz

**Software\Firmware Applied During Test**

Exercise software

AP Monitor

Version

V5.97

**Description**

A notebook PC controls the radio through a serial port connection on the WA22 access point. Hyper Terminal running in Windows 98 address the AP monitor commands for setting the transmit channel and data rate.

**Equipment Modifications**

No EMI suppression devices were added or modified. The EUT was tested as delivered.

**EUT and Peripherals**

Description	Manufacturer	Model/Part Number	Serial Number
EUT – 802.11(b) radio module installed in WA22 Access Point	Intermec	MPCI3A-20	022-026
EUT – 802.11(b) radio module installed in WA21 Access Point	Intermec	MPCI3A-20	022-075
Laptop PC	Panasonic	CF-35	7KHSA02247
Remote Power Bridge	Intermec	071579	U01156281006901
063365 Yagi antenna	Cushcraft	PC2415	N/A
065349 9dB Omni antenna	Intermec	065349	N/A
063366 flat panel antenna	Larsen	063366	N/A
066147 dipole antenna	Intermec	066147	N/A

**Cables**

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Ethernet cable	No	7.5	No	Remote Power Bridge	WA22 Access Point
Ethernet cable	No	2	No	Laptop	WA21 Access Point
AC power	No	1.9	No	Remote Power Bridge	AC mains
AC power	No	2.0	No	WA21 Access Point	AC mains
Serial cable	Yes	1.5	No	Access Point	Laptop (for setup)
Antenna adapter cable	Yes	.75	No	Access Point	Antennas

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

**Measurement Equipment**

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	03/19/2002	12 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	12/03/2001	12 mo
Antenna, Biconilog	EMCO	3141	AXE	12/31/2001	12 mo
Pre-Amplifier	Miteq	AMF-4D-010120-30-10P	AOP	07/09/2002	12 mo
Antenna, Horn	EMCO	3115	AHC	08/24/2001	12 mo
Spectrum Analyzer	Tektronix	2784	AAO	03/08/2001	24 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	07/09/2002	12 mo
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	01/17/2000	36 mo
Antenna, Horn	EMCO	3160-09	AHG	01/15/2000	36 mo
DC Power Supply	Topward	TPS-2000	TPD	NCR	0 mo
High Pass Filter	RLC Electronics	F-100-4000-5-R (HPF>	HFF	02/04/2002	12 mo

## Test Description

**Requirement:** The field strength of any spurious emissions or modulation products that fall in a restricted band, as defined in 47 CFR 15.205, is measured. The peak level must comply with the limits specified in 47 CFR 15.35(b). The average level (taken with a 10Hz VBW) must comply with the limits specified in 15.209.

**Configuration:** The highest gain of each type of antenna to be used with the EUT was tested. In addition, the lowest gain of all the antennas to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height and polarization (per ANSI C63.4:1992). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

The EUT can be used in either the applicant's WA22 access point or the WA21 access point. Since the WA22 access point uses a plastic enclosure and is powered by a DC over Ethernet interface, it was determined to be the worst-case host system. All the scans were performed with the radio configured in the WA22 access point. The radio was also scanned in the WA21 access point configured with the worst case antenna configuration.

## Bandwidths Used for Measurements

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 – 0.15	1.0	0.2	0.2
0.15 – 30.0	10.0	9.0	9.0
30.0 – 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

*Measurements were made using the bandwidths and detectors specified. No video filter was used.*

Completed by:



# OATS DATA SHEET

EUT: MPC13A-20	Work Order: INMC0023
Serial Number: 002-026	Date: 08/09/02
Customer: Intermec Corporation	Temperature: 77
Attendees: None	Humidity: 38%
Cust. Ref. No.:	Barometric Pressure: 30.26
Tested by: Rod Peloquin	Power: DC from E-net
	Job Site: EV01

<b>TEST SPECIFICATIONS</b>	
Specification: FCC 15.247(c)	Year: Current 47CFR
Method: ANSI C63.4	Year: 2000

**SAMPLE CALCULATIONS**  
 Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation  
 Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

**COMMENTS**  
 Tested in WA22 Access Point, maximum data rate

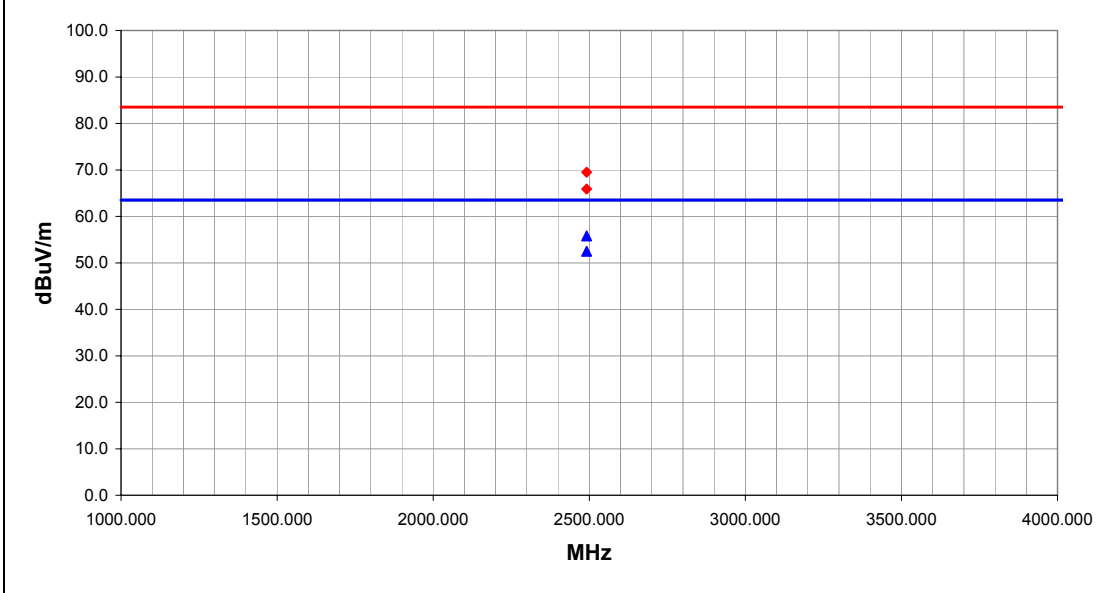
**EUT OPERATING MODES**

**DEVIATIONS FROM TEST STANDARD**  
 No deviations.

<b>RESULTS</b>	Test Distance (m)	Run #
Pass	1	4

Other

  
 Tested By: \_\_\_\_\_



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
2491.750	22.5	33.3	310.0	1.3	1.0	0.0	V-Horn	AV	0.0	55.8	63.5	-7.7	"high channel, Flat Panel "
2491.750	19.2	33.3	295.0	1.0	1.0	0.0	H-Horn	AV	0.0	52.5	63.5	-11.0	"high channel, flat panel antenna"
2491.750	36.2	33.3	310.0	1.3	1.0	0.0	V-Horn	PK	0.0	69.5	83.5	-14.0	"high channel, flat panel antenna"
2491.750	32.6	33.3	295.0	1.0	1.0	0.0	H-Horn	PK	0.0	65.9	83.5	-17.6	"high channel, flat panel antenna"

NORTHWEST **EMC** **OATS DATA SHEET** REV d2.05 07/31/2002

EUT: MPC13A-20	Work Order: INMC0023
Serial Number: 002-026	Date: 8/9/02
Customer: Intermec Corporation	Temperature: 77
Attendees: None	Humidity: 38%
Cust. Ref. No.:	Barometric Pressure: 30.26
Tested by: Rod Peloquin	Power: DC from E-net
	Job Site: EV01

<b>TEST SPECIFICATIONS</b>	
Specification: FCC 15.247(c)	Year: 2000
Method: ANSI C63.4	Year: 1992

**SAMPLE CALCULATIONS**  
 Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation  
 Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

**COMMENTS**  
 Tested in WA22 Access Point, maximum data rate

**EUT OPERATING MODES**

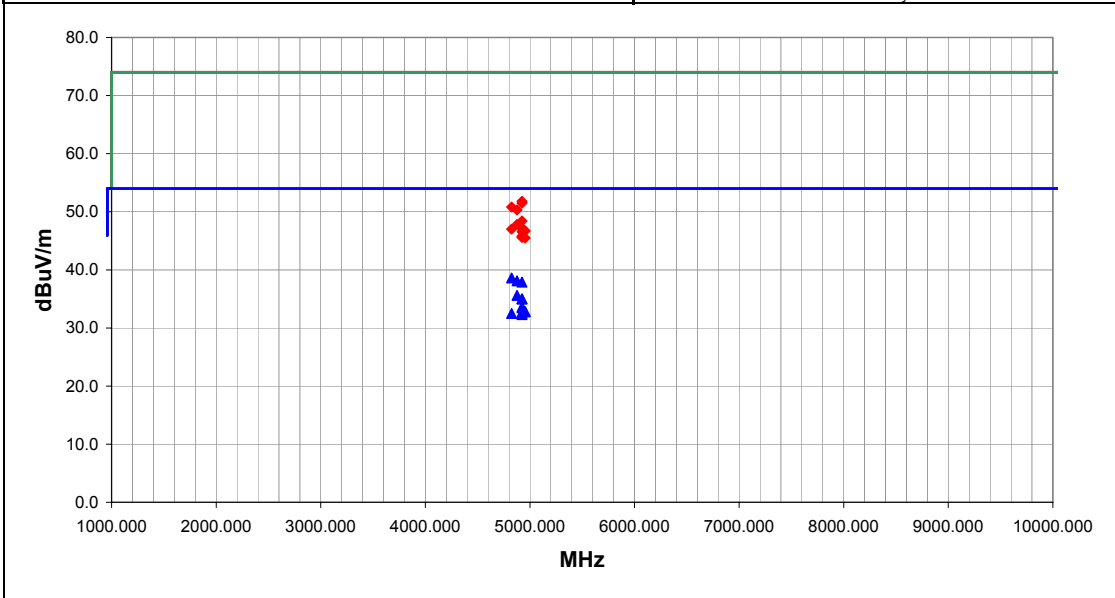
**DEVIATIONS FROM TEST STANDARD**

No deviations.

<b>RESULTS</b>	Test Distance (m)	Run #
Pass	3	5

Other

*Rod Peloquin*  
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 Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4824.000	31.3	7.3	14.0	1.3	3.0	0.0	H-Horn	AV	0.0	38.6	54.0	-15.4	"low channel, flat panel antenna"
4876.000	30.6	7.5	13.0	1.4	3.0	0.0	H-Horn	AV	0.0	38.1	54.0	-15.9	"mid channel, flat panel"
4924.000	30.2	7.7	11.0	1.3	3.0	0.0	H-Horn	AV	0.0	37.9	54.0	-16.1	"high channel, flat panel antenna"
4876.000	28.1	7.5	312.0	1.2	3.0	0.0	V-Horn	AV	0.0	35.6	54.0	-18.4	"mid channel, flat panel"
4924.000	27.3	7.7	272.0	1.4	3.0	0.0	V-Horn	AV	0.0	35.0	54.0	-19.0	"high channel, flat panel antenna"
4924.000	27.3	7.7	257.0	1.2	3.0	0.0	V-Horn	AV	0.0	35.0	54.0	-19.0	"high channel, dipole antenna"
4924.000	25.9	7.7	45.0	2.7	3.0	0.0	V-Horn	AV	0.0	33.6	54.0	-20.4	"high channel, omni antenna"
4924.000	25.8	7.7	119.0	1.3	3.0	0.0	H-Horn	AV	0.0	33.5	54.0	-20.5	"high channel, dipole antenna"
4954.000	25.0	7.8	190.0	1.3	3.0	0.0	H-Horn	AV	0.0	32.8	54.0	-21.2	"mid channel, omni antenna"
4954.000	25.0	7.8	222.0	1.2	3.0	0.0	V-Horn	AV	0.0	32.8	54.0	-21.2	"mid channel, omni antenna"
4924.000	25.0	7.7	89.0	2.1	3.0	0.0	V-Horn	AV	0.0	32.7	54.0	-21.3	"high channel, yagi antenna"
4824.000	25.2	7.3	282.0	1.2	3.0	0.0	V-Horn	AV	0.0	32.5	54.0	-21.5	"low channel, flat panel antenna"
4924.000	24.7	7.7	233.0	1.3	3.0	0.0	H-Horn	AV	0.0	32.4	54.0	-21.6	"high channel, yagi antenna"
4924.000	24.6	7.7	263.0	1.3	3.0	0.0	H-Horn	AV	0.0	32.3	54.0	-21.7	"high channel, omni antenna"
4924.000	44.1	7.7	11.0	1.3	3.0	0.0	H-Horn	PK	0.0	51.8	74.0	-22.2	"high channel, flat panel"
4924.000	43.8	7.7	257.0	1.2	3.0	0.0	V-Horn	PK	0.0	51.5	74.0	-22.5	"high channel, dipole antenna"
4824.000	43.5	7.3	14.0	1.3	3.0	0.0	H-Horn	PK	0.0	50.8	74.0	-23.2	"low channel, flat panel antenna"
4876.000	42.8	7.5	13.0	1.4	3.0	0.0	H-Horn	PK	0.0	50.3	74.0	-23.7	"mid channel, flat panel"
4924.000	40.7	7.7	272.0	1.4	3.0	0.0	V-Horn	PK	0.0	48.4	74.0	-25.6	"high channel, flat panel antenna"
4876.000	40.3	7.5	312.0	1.2	3.0	0.0	V-Horn	PK	0.0	47.8	74.0	-26.2	"mid channel, flat panel"
4924.000	39.5	7.7	119.0	1.3	3.0	0.0	H-Horn	PK	0.0	47.2	74.0	-26.8	"high channel, dipole antenna"
4824.000	39.7	7.3	282.0	1.2	3.0	0.0	V-Horn	PK	0.0	47.0	74.0	-27.0	"low channel, flat panel antenna"
4954.000	38.9	7.8	222.0	1.2	3.0	0.0	V-Horn	PK	0.0	46.7	74.0	-27.3	"mid channel, omni antenna"
4924.000	38.9	7.7	45.0	2.7	3.0	0.0	V-Horn	PK	0.0	46.6	74.0	-27.4	"high channel, omni antenna"
4924.000	38.1	7.7	89.0	2.1	3.0	0.0	V-Horn	PK	0.0	45.8	74.0	-28.2	"high channel, yagi antenna"
4924.000	38.0	7.7	263.0	1.3	3.0	0.0	H-Horn	PK	0.0	45.7	74.0	-28.3	"high channel, omni antenna"
4924.000	37.9	7.7	233.0	1.3	3.0	0.0	H-Horn	PK	0.0	45.6	74.0	-28.4	"high channel, yagi antenna"
4954.000	37.7	7.8	190.0	1.3	3.0	0.0	H-Horn	PK	0.0	45.5	74.0	-28.5	"mid channel, omni antenna"

EUT:	MPCI3A-20	Work Order:	INMC0023
Serial Number:	002-075	Date:	8/11/02
Customer:	Intermec Corporation	Temperature:	77
Attendees:	None	Humidity:	38%
Cust. Ref. No.:		Barometric Pressure:	30.26
Tested by:	Greg Kiemel	Power:	120 V, 60 Hz
		Job Site:	EV01

<b>TEST SPECIFICATIONS</b>	
Specification:	FCC Part 15.247(c)
Method:	ANSI C63.4
Year:	2001
Year:	1992

**SAMPLE CALCULATIONS**  
 Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation  
 Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator


**COMMENTS**  
 Tested in WA21 Access Point, maximum data rate, worst case antenna configuration: Flat Panel on TX b, 3 dipole antennas.

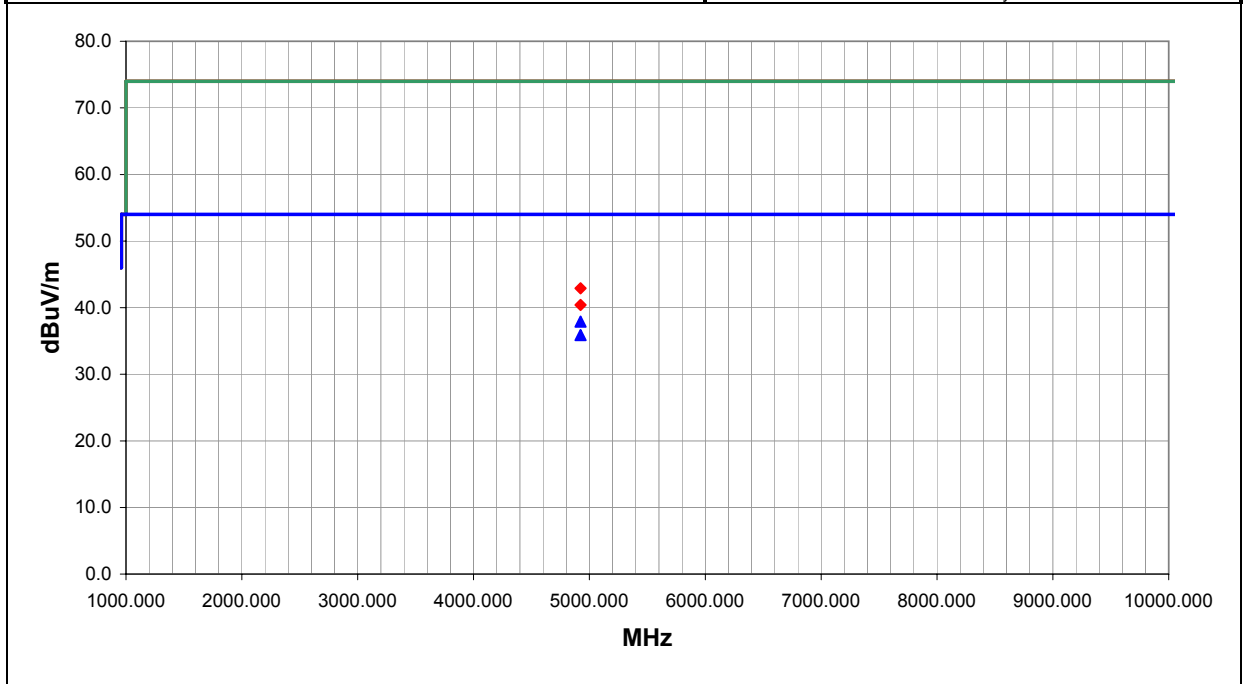
**EUT OPERATING MODES**

**DEVIATIONS FROM TEST STANDARD**  
 No deviations.

<b>RESULTS</b>	Test Distance (m)	Run #
Pass	3	7

Other

  
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 Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4924.000	30.2	7.7	46.0	1.2	3.0	0.0	H-Horn	AV	0.0	37.9	54.0	-16.1	"high channel"
4924.000	28.2	7.7	24.0	1.3	3.0	0.0	V-Horn	AV	0.0	35.9	54.0	-18.1	"high channel"
4924.000	35.2	7.7	46.0	1.2	3.0	0.0	H-Horn	PK	0.0	42.9	74.0	-31.1	"high channel"
4924.000	32.7	7.7	24.0	1.3	3.0	0.0	V-Horn	PK	0.0	40.4	74.0	-33.6	"high channel"

# OATS DATA SHEET

EUT:	MPC13A-20	Work Order:	INMC0023
Serial Number:	002-075	Date:	8/11/02
Customer:	Intermec Corporation	Temperature:	77
Attendees:	None	Humidity:	38%
Cust. Ref. No.:		Barometric Pressure:	30.26
Tested by:	Greg Kiemel	Power:	120 V, 60 Hz
		Job Site:	EV01

<b>TEST SPECIFICATIONS</b>	
Specification:	FCC 15.247(c)
Method:	ANSI C63.4
Year:	Current 47CFR
Year:	2000

**SAMPLE CALCULATIONS**  
 Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation  
 Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

**COMMENTS**  
 Tested in WA21 Access Point, maximum data rate, worst case antenna configuration: Flat Panel on TX b, 3 dipole antennas.

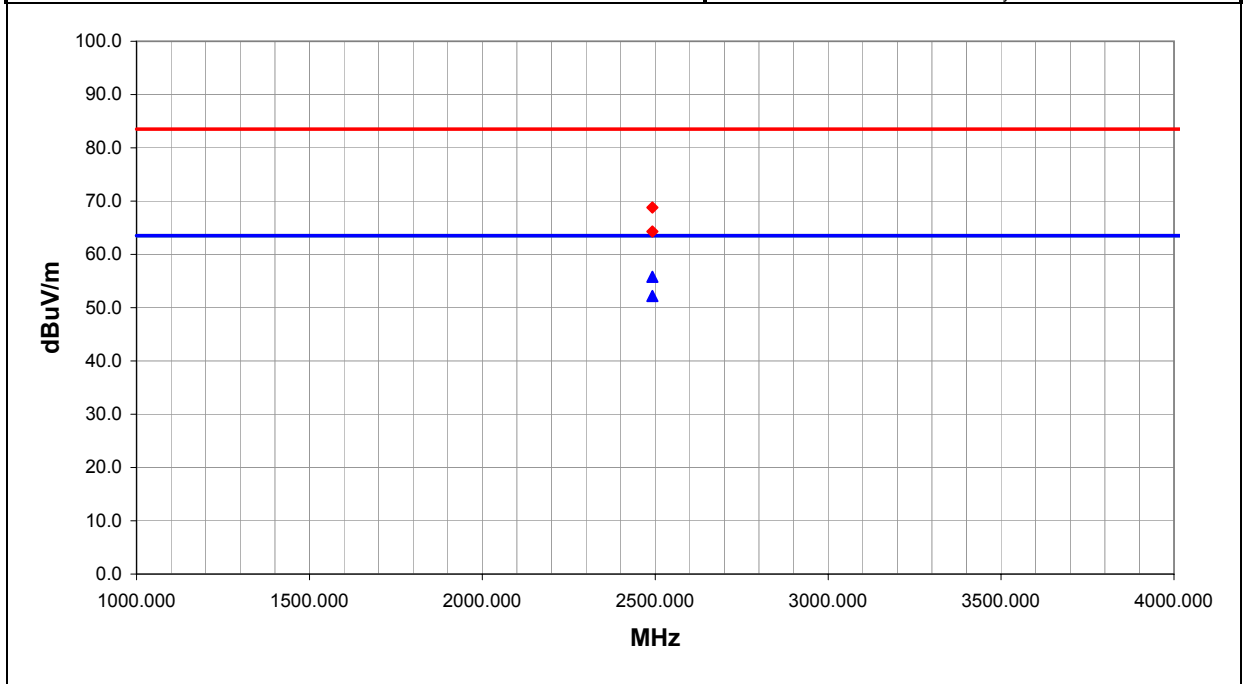
**EUT OPERATING MODES**

**DEVIATIONS FROM TEST STANDARD**  
 No deviations.

<b>RESULTS</b>	Test Distance (m)	Run #
Pass	1	9

Other

*Greg Kiemel*  
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 Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
2491.750	22.5	33.3	326.0	1.1	1.0	0.0	V-Horn	AV	0.0	55.8	63.5	-7.7	"high channel"
2491.750	18.9	33.3	120.0	1.3	1.0	0.0	H-Horn	AV	0.0	52.2	63.5	-11.3	"high channel"
2491.750	35.5	33.3	326.0	1.1	1.0	0.0	V-Horn	PK	0.0	68.8	83.5	-14.7	"high channel"
2491.750	31.0	33.3	120.0	1.3	1.0	0.0	H-Horn	PK	0.0	64.3	83.5	-19.2	"high channel"