

# Electromagnetic Compatibility (EMC) ITE Equipment For AMX Corporation, MIO R2 Remote Control Device FCC I/D Number: CWU-MIOR2 FCC PART 15, SUB-PART B, CLASS B FCC PART 15.231

Prepared For: AMX Corporation 3000 Research Drive Richardson, TX 75082

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Issued: May 9, 2006

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# **TEST SUMMARY**

This test record demonstrates compliance with the following EMC requirements for the MIO R2 Remote Control Device

#### EMISSIONS

North America Regions:

- CFR 47, Part 15, Subpart B, Class B, FCC Emissions
- CFR 47, Part 15.231 Intentional Radiator 418MHz and 433Mhz

Service For:

AMX Corporation 3000 Research Drive Richardson, TX 75082

66277

Purchase Order No.:

This is to certify that the following report is true and correct to the best of my knowledge.

Sugurny

Dieu Vo EMI Operations Supervisor FCC, CE, Telecommunication

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# REVISIONS

Revision	Reason for Revision	Date
0	Original	April 24, 2006
1	Add additional product information and data per TCB requested	May 12, 2006

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# **1.0 GENERAL INFORMATION**

# 1.1 <u>Product Description</u>

## **1.1.1 RF Module Technical Description**

## DESCRIPTION

The Mio R-2 remote provides custom control features. The Mio R-2 controls 6 different device modes, supports 3 macro functions and is capable of executing 219 functions. The Mio R-2 can transmit in 418 RF (1-way) (**FG147-418**), 433 RF (1-way) (**FG147-433**) one of the RF frequencies.

Selecting a source device sends a command to the master and runs predetermined events associated with that source. Selecting a macro will run predefined events, which might not be associated with sources listed, then return the device to its previous mode.

# **APPLICATIONS INCLUDE**

• Remote Control

# THEORY OF OPERATION

The MIO-R2 is a handheld remote control that uses one-way RF to send control commands to an RF receiver. It uses a or TXM-433-LR (433 MHz) / or TXM-418-LR (418MHz) module from Linx Technologies and a spiral PCB trace antenna. Data is sent at a rate of 250 Hz using on-off keying (OOK).

When a button is pressed, the unit begins transmitting frames that are 64 ms in duration. The unit will transmit a minimum of 4 frames if the button is held for less that 256 ms. If the button is held for longer than 256 ms then released, the R2 will finish its current frame before it stops transmitting, so the device should stop transmitting with 64 ms."



## **1.1.2 EUT Operational Description**

Batlery	4 AAA Alkaline Batteries (5 hours battery life)						
Transmission Frequencies	<ul> <li>AMX 28 KHz/455 KHz IR</li> <li>418 RF (1-way) (FG147-418)</li> <li>433 RF (1-way) (FG147-433)</li> </ul>						
Transmission Range (distance) with Mio IR Receiver	<ul> <li>100 feet at 38KHz (IR)</li> <li>50 feet at 455KHz (IR)</li> <li>300 feet at 418 (RF)</li> <li>200 feet at 433 (RF)</li> </ul>						
Transmission Range (angle)	<ul> <li>140 degrees (+/-70° from perpendicular) horizontally from an axis extending from the end of the remote. (IR)</li> <li>40 degrees (+/-20° from perpendicular) vertically from an axis extending from the end of the remote. (IR)</li> </ul>						
Top Components	<ul> <li>LED - blue backlit buttons indicate device is awake</li> <li>Display (OLED) - 128 x 32 pixels, active area is 29.42mm x 7.99mm</li> <li>Pushbuttons - the power button is red backlit; the rest are blue backlit buttons. 45 buttons; 9 custom buttons (3 macro and 6 device).</li> </ul>						
Rear Component	<ul> <li>Programming Port - 2.5 mm stereo female conductor jack</li> <li>Battery Door</li> <li>Rechargeable Battery Connection</li> </ul>						

Dimensions (HWD)	9.50 x 2.00 x .74 (241.3 mm x 50.8 mm x 18.80 mm)					
Supported Languages:	Arabic     English     French     German     Greek     Hebrew     Hindi     Italian	<ul> <li>Japanese</li> <li>Korean</li> <li>Mandarin Chinese</li> <li>Portuguese</li> <li>Russian</li> <li>Spanish</li> <li>Thai</li> </ul>				
Weight	.45 lbs (20 g) without batteries     .55 lbs (25 g) with batteries					
Operating Environment:	Operating Temperature:     Storage Temperature:	0° to 50° C (32° to 122° F) 10° to 70° C (14° to 158° F)				
Other AMX Equipment	DB-9 extension cable (F Programming Cable - a Custom engraving (FG1 Mio-RCC Kit (FG147-03 Mio-RCC Charging Bas Mio-RBP Rechargeable AXR-RF 418 MHZ RF F AXR-RF 433 MHZ RF F	G10-727) 3 wire, 2.5 mm stereo jack (FG10-817) 47-01) KK) e (FG147-02) Lithium Ion Battery (FG147-10) lecenver (FG782-418) lecenver (FG782-433)				

#### 1.2 Instrument Calibration

All test instrumentation requiring calibration will be calibrated in accordance with ANSI Standard NCSL Z540-1. There will be a current calibration sticker attached to the item and traceability documentation will be provided at the customer's request.

#### 1.2.1 Accuracy of Measurement

The expected accuracy of measurement shall be:

Frequency Accuracy:  $\pm 2\%$ Amplitude Accuracy:  $\pm 2 dB$ Distance:  $\pm 5\%$ Amplitude, Measurement System (includes measurement receivers, transducers, cables, etc):



# $\frac{\pm 3 \text{ dB}}{\pm 5\%}$ Time (waveforms): $\frac{\pm 5\%}{\pm 5\%}$ Radiated Emission Measurement Uncertainty: 5.49dB (Using PMAT method with K = 2).

## 1.3 <u>Ambient Tests</u>

In the event that an out-of-tolerance interference condition arises, ambient measurements shall be made in the frequency range where out-of-tolerance condition is present. Ambient measurements shall be made with power applied to all equipment, with the exception of the system under test. This level shall be at least 6 dB below the specification limits of FCC Part 15.

#### 1.4 Failure Reporting

In the event of a test item failure or a test anomaly, the following procedure will be followed:

- 1. The testing will be stopped.
- 2. The AMX Corporation Program Manager or his designate will immediately be notified.
- 3. A Notice of Deviation (NOD) will be prepared.
- 4. The test item will be retained in the setup or in storage, as applicable, pending disposition from AMX Corporation.
- 5. Testing will be resumed only on instructions (written, if practicable) of AMX Corporation to the project engineer or test engineer.

#### 1.5 <u>Threshold of Susceptibility</u>

When susceptibility indications are noted in test sample operation, the threshold level shall be determined where the susceptible condition is no longer present. The threshold level shall be determined as follows:

- 1. When a susceptibility condition is detected, reduce the signal level until the test sample recovers.
- 2. Gradually increase the signal level until the susceptibility condition reoccurs. The resulting level is the threshold of susceptibility, and that level shall be recorded.



#### 1.6 <u>Test Program Deviation</u>

Unless otherwise directed by the responsible test witness, the tests described in the table summary page of this document may be performed in any sequence.

In the event that test plan deviations are required during the normal qualification test program, they shall be made only upon approval of the cognizant representative and that approval shall be noted in the test log with a complete description and justification for such deviations.

#### 1.7 <u>Inspection</u>

All tests described herein may have been witnessed by the authorized representative(s) of AMX Corporation. All testing will be performed by qualified test engineers/personnel.

#### 1.8 Disposition of Test Items

The test sample was returned to AMX Corporation upon completion of the test program.



# 1.9 <u>Test Facility</u>

Measurements for this report were taken at Nemco Dallas, EMC Test Facility, 802 N. Kealy, Dallas, Texas, USA. At the time of testing, the EMC facility had the following accreditations, registrations, etc.:

- Compliance with the requirements of ISO/IEC 17025;2005
- Compliance with the radiated and AC line conducted test site criteria in ANSI C63.4-2005 as required by the Federal Communications Commission (FCC).

# 2.0 GENERAL TEST METHODOLOGY

#### 2.1 <u>Emissions</u>

Required emissions testing is performed in accordance with the respective measurement procedures listed on page 1. Specifics such as test locations will be listed in the appropriate data sections of this report.

Radiated measurements are performed in either a semi-anechoic chamber meeting the normalized site attenuation of ANSI C63.4 and listed with the FCC with an antenna to EUT distance of 3m or an OATS Site with an antenna to EUT distance of 10m. The applicable frequency spectrum is scanned with a calibrated RF measuring system using an antenna and a spectrum analyzer and compared to the appropriate limits. "Maximization" of each suspect frequency is accomplished by a combination of a 360° azimuth search and varying the antenna to ground plane height from 1m to 4m. Also, both the vertical and horizontal polarization are scanned in the frequency range of 30 MHz to 1 GHz per ANSI C63.4. Final data is collected in the worst case configurations of the EUT with the highest emission levels.

Other emissions tests will be performed in accordance with the appropriate measurement procedures listed in this report.

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## 2.1.1 <u>Radiated Emissions Field Strength Calculations</u>

FS = RA + AF + CF - AG where: FS = field strength CF = cable attenuation factor<math>RA = receiver amplitude AG = amplifier gainAF = Antenna Factor

The receiver used for radiated emissions measurements performed the field strength calculations automatically. The program has resident AF and CF figures for individual antennas and cables.

#### 2.2 Order of Testing

Testing normally proceeds from the least volatile to the most. As an example for "global" requirements the sequence typically would begin with conducted emissions, then radiated prescans in the semi-anechoic chamber, then Final radiated emissions measurements inside the FCC Certified Chamber. The actual order may vary due to tests conducted, scheduling and facility availability.

2.3 Special Test Justification

None



# 3.0 TEST CONFIGURATION

## 3.1 <u>Selection of EUT Configuration and Modes of Operation</u>

As per measurement procedures, **the worst-case test configuration and mode of operation was used for all testing**. Unless otherwise noted elsewhere in this report, this selection will apply to all testing. The selection process was based on previous investigative testing of the EUT system. Worst case operating mode is described as "Operate." Other modes used will be listed in the respective data measurement sections when appropriate. Operating modes considered were all those available to the operator, including Standby.

#### 3.1 Equipment Modifications

None.



# 4.0 TEST INSTRUMENTATION

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due	
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	08/26/06	08/26/07	
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	08/26/06	08/26/07	
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/14/05	01/15/07	
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	04/20/06	04/20/07	
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/01/05	08/02/07	
1284	Spectrum analyzer display	Hewlett Packard 8566B	1811A00223	02/16/06	02/16/07	
1514	CABLE ASSY, LAB 2- B OATS	Nemko USA, Inc. SITE B OATS	N/A	04/21/06	04/21/07	
762	27dB GAIN PREAMP	Nemko USA, Inc. 27dB LNA	946	09/07/05	09/07/06	
1508	ANTENNA, LP	Nemko USA, Inc. 3146	1349	02/13/06	02/13/07	



#### 5.0 EMISSIONS

The test procedures of Paragraph 2.1 were followed for these measurements. Radiated final measurements were made Semi-anechoic chamber at three meters distance from antenna described in Paragraph 2.0. All readings are quasi-peak unless otherwise stated and are listed in order of ascending delta. The original test data is contained in Master Job Folder B6082, located at the National Technical Systems EMC Facility. Mode of operation is that listed under Paragraph 3.1, unless otherwise stated.

#### 5.1 <u>Radiated Emissions</u>

# 5.1.2 Radiated Measurement CFR 47 FCC part 15.231 Subpart C

#### Mode of Operation during emissions test:

Mode of operations during emissions test: The diagnostic mode of the MIO-R2/MIO-R2 Remote Control Device was set to continuously transmit random data. Note that this mode represents the worst case where data transmissions can last for periods greater than 100mS. This diagnostic mode was added specifically to simplify FCC Subpart C compliance testing.

The nominal power output of the transmitter is 0.25 mW.

# Test Result for FCC 15.231

The field strength was measured at 3 meters distance between Equipment under test and measurement antenna.

Radiated outside specific frequency band were met FCC part 15 subpart B class B and Spurious frequency per FCC part 15 subpart C requirement.

The maximum Radiated emission was scanned from 30Mhz to 9.2Ghz.

#### **Test requirement Field Strength of Emissions from Intentional Radiator**

EUT name: AMX Corporation MIO-R2/MIO-R2 Remote Control Device. Reference to FCC part 15 subpart C, 15.231. The fundamental frequency tuned at 418MHz and 433.93MHz 8 MHz.



# Duty Cycle: 50 % (due to modulation method per manufacture information) Fundamental frequency 433Mhz

Data Plot			Duty Cycle	10		
Page <u>1</u> of	13		U. NA VIRALE MARKE			Complete X
Job No.:	6L00256R	Date:	5/12/2006		I	Preliminary:
Specification:	15.231 K i D	Temperature(°C):	21			
Tested By:	A33 Mbz remote	Relative Humidity(%)	33			
Configuration:	Full transmit					
Sample Number:	1					
Location:	Lab 1		RBW: Refer t	o plots		
Detector Type:	Peak		VBW: Refer t	o plots		
Test Fauinma	ant Used					
Antenna:	903	Direct	ional Coupler:			
Pre-Amp:			Cable #1:			
Filter:			Cable #2:	12		
Receiver:	1464		Cable #3:			
Attenuator #1			Cable #4:			
Attenuator #2:			Mixer:	2		
Additional equipr	nent used: none		2			
Measurement Uno	certainty: +/-1.7 dB					
r	ATTEN 101D		. MIZE	<b>E</b> 0	15	
	HITEN TUGE	10407	ΔMKR -	500	38	
		100.87	0.0/MS	5	8	1
						100ms duty cycle
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	RBW 30KHZ	АВМ ЗАК	HZ #	SWP	IOQWS	
Notes:						
Hotes.	(27/100)log*20=11.4					



by the second se	Data Plot	1					Duty	Cycle					
ATTEN 10dB RL 0dBm 10dB/ 2.000ms wide pulse T AMKR 2.000 ms -8.33 dB -8.33 dB -8.35 dB -	Page <u>c</u> o No.: ecification: sted By: J.T.: n figuration:	6L0025 6L0025 15.2 Kevin I 433 Mb Full tra	6R Rose 12 remote nsmit	Rd	Temperat ative Hum	Date: <u>5/</u> ure(°C): <u>21</u> adity(%) <u>37</u>	12/2006 1 3		_				
MKR       wide pulse         AMKR       a         -8.33 dB       -8.33 dB         -8.33 dB       -9.44         -9.44       -9.44         -9.44       -9.44         -9.44       -9.44         -9.44       -9.44         -9.44       -9.44         -9.44       -9.44         -9.45       -9.44         -9.45       -9.44         -9.45       -9.44         -9.45       -9.44         -9.45       -9.44         -9.45       -9.44		AT 1 RL	EN 1 ØdBm	ØdB	1(	Ød B∕	۵۲ 2	IKR - 000r	-8.33 NS	3d B			
T AMKR 2.000 ms -8.33 dB -8.33			1.0			-						wide pulse	
-8.33 d3       -8.33 d3         -8.33 d3       -9.000000000000000000000000000000000000		т 🐴	1KR 000		<b>7</b>								
CENTER 433.933000MHz RBW 30kHz VBW 30kHz SPAN 0Hz *SWP 30.0ms		-8	33	dB									
CENTER 433. 933000MHz RBW 30kHz VBW 30kHz SPAN 0Hz *SWP 30. 0ms								+					
CENTER 433.933000MHz SPAN 0Hz RBW 30kHz VBW 30kHz *SWP 30.0ms									$\square$				
CENTER 433.933000MHz SPAN 0Hz RBW 30kHz VBW 30kHz *SWP 30.0ms													
CENTER 433.933000MHz SPAN 0Hz RBW 30kHz VBW 30kHz *SWP 30.0ms			1 h	Hu Hut	ľ		111	_ <b>h</b> th		<b>F</b> ()	1		
Notes:		CEN RBI	ITER I 30k	433.93 Hz	33000 VBV	∂MHz √ 30k	(Hz	SPA *	IN ØH SWP	Hz 30.0	ðms		
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Data Plot Page <u>3</u> c ob No. : ipecification: letted By: 20.T.: lon figuration:	of 3 6L00256R 15.2 Kevin Rose 433 Mhz remote Full transmit	Date: <u>5/12/</u> Temperature(*C): <u>21</u> Relative Humichty(%) <u>33</u>			
Allig	ATTEN 10dB RL 0dBm	10dB/	 ΔMKR 58.34 500μs	4dB	
	т <u>АМК</u> 50 <u>0 µ</u> s <b>,</b> 58.34 dB				
Natari	CENTER 433. RBW 30kHz	933000MHz VBW 30kH	SPAN ØF z *SWP 3	Hz 30. Øms	



# Per FCC part 15.231 para. C; 20dB down from carrier **Fundamental frequency 433Mhz** EUT was complies with the limits of CFR title 47, part 15, Subpart C, section 15.231





## Duty Cycle: 50 % (due to modulation method per manufacture information) Fundamental frequency 418Mhz





Data Plot Page 2 o	f3		i.	<u>Spur</u>	ious Em	issions	at Ant	enna	Tern	ninals	
5 No. : ecification: sted By: U.T.: nfiguration:	61.002 15.2 Kevin 418 M Full tn	S6R Rose Inz remo	ate	Temp Relative F	Date: <u>8</u> erature(°C): <u>2</u> lumidity(%) <u>3</u>	12/2006 13			_		
	AT RL	TEN Ød1	10dB Bm		10dB/	۵۱ 2.	1KR 5 .000r	50.1 ns	17d B		wide nulse
ŝ	T 2	MK 8.	2 ms 7 d3								
Notes:		אדבו א 31	R 41B ØkHz	- 1 1. 0033 VI	33MHz BW 30k	Hz	SP(	AN ( SWP	2Hz 30.	0ms	fn



Data Plot Page 3 o	F3			<u>Spu</u>	rious En	nissions	at Ant	tenn	a Terr	ninals	
o No.: ecification: sted By: U.T.: n figuration:	61.0025 15.2 Kevin I 418 Mb Full tra	SGR Rose 12 remot nsmit	le	Ten Relative	Date: nperature(°C): Humidity(%)	5/12/2006 21 33	=		_		
	ATT RL	EN Ød E	10d∃ 3m	}	10dB/	∕	MKR 100µs	66.	00d E		
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						Ĭ					
	11			1		. III	1	ľ			
	CEN RBM	TER	₹41E ðkHz	3. 0033 L	333MHz /ВИ 30	z 3k Hz	SP ¥	AN SWF	0Hz 9 30.	Øms	
Notes:	545556		Serie Street	6.0	Second			84.000	0. 2002.0		



# Per FCC part 15.231 para. C; 20dB down from carrier **Fundamental frequency 418Mhz** EUT was complies with the limits of CFR title 47, part 15, Subpart C, section 15.231





# Test Data for 433Mhz Remote control

# Per CFR47 part 15.231

Specification :		CFR47 P	art 15.231				Reference :					
Specification : Rod. Ant. #: Bicon Ant.#: Log Ant.#: Bilog Ant.#: Dipole Ant.#: Cable#: Preamp#: Limiter#: Atten #: Detector#:		1508 1514 762 na na	-	Temp. (d Humidity EUT Volt EUT Free Phase: Location: Distance	eg.C): (%): age: quency:	21 43 5VDC NA NA B OATS 3		Date : Time : Staff : Photo ID: andwidth: andwidth	05/12/06 10:30 Kevin Rose 100 KHz 100 KHz			
Meas.	Ant.	Atten.	Meter	Antenna	Path	RF	Corrected	Spec.	CR/SL	Pass		
Freq. (MHz)	Pol. (H/V)	(dB)	Reading (dBuV)	Factor (dB)	Loss (dB)	Gain (dB)	Reading (dBuV/m)	limit (dBuV/m)	Diff. (dB)	Fail Unc.	QP readings Comment	
433.93	V	0	43.5	15.2	6.0	0.0	64.7	80.8	-16.1	Pass	11.4DB DUTY CYCLE	
434.93	H	0	51.5	15.2	6.0	0.0	72.7	80.8	-8.1	Pass	11.4DB DUTY CYCLE	
367.83	V	0	45.7	22.2	9.0	27.8	49.1	60.8	-11.7	Pass	<ul> <li></li></ul>	
967.83	H	0	49.7	22.2	9.0	27.8	53.1	60.8	-1.1	Pass		
VEMCS1	nare\AUT	OMATE\D	ATASHT:	SIRADEM	EV Rev (	C.xls	Document	Control #	EMCDS	S EM RAD	L L HFE	



# Test Data for 433Mhz Remote control

)ata Plo	t			RADL	ATED S	PURIOU	JS				
Page 1	of <u>1</u>							Co	mplete X	- 52	
b No. :	6L00256R			Date:	5/12/2006			Prelim	inary:	-	
ecification:	13.231 Kavin Bora		D eletive Llur	dure (*C.):	13						
TIT -	434 Mhz ner	note	Realiverin	many( 78)	33						
on figuration:	Full transmi	t					_				
ample Numb	r: I										
ocation:	Lab 2	-			RBW: I	100 kHz	_				
etector Type	Peak	2			VBW:1	100 kHz	_				
est Equip	nent Used										
intenna :	993	-		Directio	nal Coupler:		_				
re-Amp:	1016	i i i i i i i i i i i i i i i i i i i			Cable #1:	1484	_				
ilter:	140	-			Cable #2:	1485	_				
thermator #1	1404	-			Cable #4:		-				
iteruator #2:	12	2			Mixer:		-				
Additional equ	pment used:	none			- 1997 <del>-</del>		_				
Measurement U	Incertainty:	+/-1.7 dB	~				_				
	53. 5	8 2	2								
leasuren	ient Data:	Rea	ding lister	1 by orde	r taken.		Те	st Distance	2: 3 Meters		
#	Freq	Rdng	Cable	Cable	Pre-A	Hom	Dist	Corr	Spec	Margin	Polar
1 17	MHz 35.720M	dBuV 58.2	dB +0.7	dB +2.0	+31.7	dB +26.4	+0.0	dBuV/m 55.6	dBµV/m 60.8	-5.2	Ant Vert
2 13	01.790M	56.0	+0.2	+1.6	+31.0	+23.7	+0.0	50.5	54.0	-3.5	Vert
3 21	69.650M	56.5	+0.6	+2.2	+31.8	+28.7	+0.0	56.2	60.8	-4.6	Vert
4 26	03.580M	56.0	+0.8	+2.6	+32.5	+29.2	+0.0	56.1	60.8	-4.7	Vert
5 30	37.510M	49.3	+0.8	+2.6	+32.4	+29.7	+0.0	50.0	60.8	-10.8	Vert
6 34	71.44 OM	48.7	+0.7	+2.8	+32.1	+29.9	+0.0	50.0	60.8	- 10.8	Vert
7 39	05.370M	48.2	+0.9	+2.9	+31.3	+31.3	+0.0	52.0	54.0	-2.0	Vert
8 39	05.370M	34.4	+0.9	+2.9	+31.3	+31.3	+0.0	38.2	54.0	-15.8	Vert
9 43	39.300M	46.3	+1.0	+3.0	+31.5	+31.9	+0.0	50.7	54.0	-3.3	Vert
10 43	39.300M	36.3	+1.0	+3.0	+31.5	+31.9	+0.0	40.7	54.0	-13.3	Vert
AVC			+0.2	+1.6	+31.0	+23.7	+0.0	51.3	54.0	-2.7	Hortz
11 13	01.790M	56.8	+0.2								Linels
11 13	01.790M 35.720M	56.8 56.8	+0.2	+2.0	+31.7	+26.4	+0.0	54.2	60.8	-6.6	HOLE
11 13 12 17 13 21	01.790M 35.720M 69.650M	56.8 56.8 53.5	+0.7	+2.0	+31.7 +31.8	+26.4 +28.7	+0.0	54.2 53.2	60.8 60.8	-6.6 -7.6	Horiz
11 13 12 17 13 21 14 26	01.790M 35.720M 69.650M 03.580M	56.8 56.8 53.5 49.3	+0.2 +0.7 +0.6 +0.8	+2.0 +2.2 +2.6	+31.7 +31.8 +32.5	+26.4 +28.7 +29.2	+0.0 +0.0 +0.0	54.2 53.2 49.4	60.8 60.8 60.8	-6.6 -7.6 -11.4	Horiz
11 13 12 17 13 21 14 26 15 30	01.790M 35.720M 69.650M 03.580M 37.510M	56.8 56.8 53.5 49.3 43.0	+0.7 +0.6 +0.8 +0.8	+2.0 +2.2 +2.6 +2.6	+31.7 +31.8 +32.5 +32.4	+26.4 +28.7 +29.2 +29.7	+0.0 +0.0 +0.0 +0.0	54.2 53.2 49.4 43.7	60.8 60.8 60.8 60.8	-6.6 -7.6 -11.4 -17.1	Horiz
11 13 12 17 13 21 14 26 15 30 16 34	01.790M 35.720M 69.650M 03.580M 37.510M 71.440M	56.8 56.8 53.5 49.3 43.0 44.2	+0.2 +0.7 +0.6 +0.8 +0.8 +0.7	+2.0 +2.2 +2.6 +2.6 +2.8	+31.7 +31.8 +32.5 +32.4 +32.1	+26.4 +28.7 +29.2 +29.7 +29.9	+0.0 +0.0 +0.0 +0.0 +0.0	54.2 53.2 49.4 43.7 45.5	60.8 60.8 60.8 60.8 60.8	-6.6 -7.6 -11.4 -17.1 -15.3	Hortz
11 13 12 17 13 21 14 26 15 30 16 34 17 39	01.790M 35.720M 69.650M 03.580M 37.510M 71.440M 05.370M	56.8 56.8 53.5 49.3 43.0 44.2 44.0	+0.2 +0.7 +0.6 +0.8 +0.8 +0.7 +0.7	+2.0 +2.2 +2.6 +2.6 +2.8 +2.9	+31.7 +31.8 +32.5 +32.4 +32.1 +32.1	+26.4 +28.7 +29.2 +29.7 +29.9 +31.3	+0.0 +0.0 +0.0 +0.0 +0.0 +0.0	54.2 53.2 49.4 43.7 45.5 47.8	60.8 60.8 60.8 60.8 60.8 60.8	-6.6 -7.6 -11.4 -17.1 -15.3 -6.2	Horiz Horiz Horiz Horiz Horiz
11 13 12 17 13 21 14 26 15 30 16 34 17 39 18 43	01.790M 35.720M 69.650M 03.580M 37.510M 71.440M 05.370M 39.300M	56.8 56.8 53.5 49.3 43.0 44.2 44.0 42.7	+0.2 +0.7 +0.6 +0.8 +0.8 +0.7 +0.7 +0.9 +1.0	+2.0 +2.2 +2.6 +2.6 +2.8 +2.9 +2.9 +3.0	+31.7 +31.8 +32.5 +32.4 +32.1 +31.3 +31.5	+26.4 +28.7 +29.2 +29.7 +29.9 +31.3 +31.9	+0.0 +0.0 +0.0 +0.0 +0.0 +0.0 +0.0	54.2 53.2 49.4 43.7 45.5 47.8 47.1	60.8 60.8 60.8 60.8 60.8 54.0 54.0	-6.6 -7.6 -11.4 -17.1 -15.3 -6.2 -6.9	Horiz Horiz Horiz Horiz Horiz Horiz
11 13 12 17 13 21 14 26 15 30 16 34 17 39 18 43 19 43	01.790M 35.720M 69.650M 03.580M 37.510M 71.440M 05.370M 39.300M 01.790M	56.8 56.8 53.5 49.3 43.0 44.2 44.0 42.7 45.4	+0.2 +0.7 +0.6 +0.8 +0.8 +0.7 +0.9 +1.0 +0.2	+2.0 +2.2 +2.6 +2.6 +2.8 +2.8 +2.9 +3.0 +1.6	+31.7 +31.8 +32.5 +32.4 +32.1 +31.3 +31.5 +31.0	+26.4 +28.7 +29.2 +29.7 +29.9 +31.3 +31.9 +23.7	+0.0 +0.0 +0.0 +0.0 +0.0 +0.0 +0.0 +0.0	51.5 54.2 53.2 49.4 43.7 45.5 47.8 47.1 39.9	60.8 60.8 60.8 60.8 60.8 54.0 54.0 54.0	-6.6 -7.6 -11.4 -17.1 -15.3 -6.2 -6.9 -14.1	Hortz Hortz Hortz Hortz Hortz Hortz Hortz
11 13 12 17 13 21 14 26 15 30 16 34 17 39 18 43 19 13 Ave	01.790M 35.720M 69.650M 03.580M 37.510M 71.440M 05.370M 39.300M 01.790M	56.8 56.8 53.5 49.3 43.0 44.2 44.0 42.7 45.4	+0.2 +0.7 +0.6 +0.8 +0.8 +0.7 +0.9 +1.0 +0.2	+2.0 +2.2 +2.6 +2.6 +2.8 +2.9 +3.0 +1.6	+31.7 +31.8 +32.5 +32.4 +32.1 +31.3 +31.5 +31.0	+26.4 +28.7 +29.2 +29.7 +29.9 +31.3 +31.9 +23.7	+0.0 +0.0 +0.0 +0.0 +0.0 +0.0 +0.0 +0.0	51.5 54.2 53.2 49.4 43.7 45.5 47.8 47.1 39.9	60.8 60.8 60.8 60.8 60.8 54.0 54.0 54.0	-6.6 -7.6 -11.4 -17.1 -15.3 -6.2 -6.9 -14.1	Hortz Hortz Hortz Hortz Hortz Hortz Hortz



## Test Data for 418Mhz Remote control

# Per CFR47 part 15.231

Specification :		CFR47 F	art 15.2	31				EUT		418 remote control transmitter			
Rod. Ant #: Bicon Ant.#: Log Ant.#: Dipole Ant.#: Cable#: Preamp#: Limiter#: Atten #: Detector#:		1508 1514 762 na na		Temp. (d Humidity EUT Vol EUT Fre Phase: Location Distance	Ieg. C) : / (%) : tage : iquency : i: i: i:	21 43 5VDC NA NA B OATS 3	: : : -	Eon D Ti S Ph Peak Ban Video Bar			05/12/06 10:30 Kevin Rose 100 KHz 100 KHz		
Meas.	Ant.	Atten	Meter	Antenna	Path	RF	Corrected	Spec.	CR/SL	Pass			
Freq. (MHz)	Pol. (HAV)	(dB)	Reading (dBuV)	Factor (dB)	Loss (dB)	Gain (dB)	Reading (dBuV/m)	imit (dBuV/m)	Diff. (dB)	Fall Unc.	GP readings Comment		
417.99	V	0	49.8	15.6	6.0	0.0	71.4	80.3	-8.9	Pass	11.4DB DUTY CYCLE		
417.99	Н	0	57.2	15.6	6.0	0.0	78.8	80.3	-1.5	Unc.	11.4DB DUTY CYCLE		
867.83	V	0	43.2	22.2	9.0	27.8	46.6	60.3	-13.7	Pass			
867.83	н	0	47.8	22.2	9.0	27.8	51.2	60.3	-9.1	Pass			
		ŧ											
		$\models$	$\models$	$\square$									
									( 				
		$\vdash$											
\EMCS	hare\Al	JTOMATE	DATAS		EMEV F	lev C.xls	Documer	t Control	#EMC [	DS EM R	AD HFE		



# Test Data for 418Mhz Remote control

Data Plot			RAD	DIATED	SPURIC	US					
P	age 1 of 1			and the second s	800330-0	1	33	100000	Complete X	102	
ob No.	6L002561	8		Date:	5/12/2000	5		Preli	ninary:		
specific	ation: 15.231		Tern	perature(°C):	21						
fested I	sy: Kevin Ros	98	Relative	Humidity(%)	33	-					
LU.T.:	418 Mhz 1	emote	12	51		- 84					
Con figu	ration: Full transi	nit									
sample	Number: 1										
Location	1: Lab 2	_			RBW	(; 100 kHz					
Jetector	Type: Penk	-			VBW	(: 100 kHz					
Fest E	quipment Used										
Antenna	: 993	100		Dire	ctional Couple	r:	143				
re-Am	p: 1016				Cable #1	: 1484					
Filter:		100			Cable #2	1485	- 22				
Repeive	r: 1464	_			Cable #3	}:					
Attenua	lor #1				Cable #4	k	1.5				
Attenua	tor #2:				Mixe	r;	50				
Addition	in equipment used:	+/1.2.40					<u></u>				
Misisure	anen once anay.	+(+1.) up									
d easer	rement Daia	Reac	Cable	t by order Cable	Pre-A	Horn	Justance:	02	3 Meter	N	
6	Freq	Rdng	JD	112	JD	JD	Dist	Corr	Spec	Margin	Polar
1	1254.000M	63.5	+0.1	+1.5	+30.9	+23.6	+0.0	57.8	74.0	-16.2	Horiz
1	1254.000M	63.5	+0.1	+1.5	+30.9	+23.6	+0.0	46.4	54.0	-8.6	Horiz
2	Ave 1672.067M	59.5	+0.7	+1.9	+31.6	+25.9	+0.0	56.4	74.0	-17.6	Horiz
3	1672.067M	48.1	+0.7	+1.9	+31.6	+25.9	+0.0	45.0	54.0	-9.0	Horiz
4	Ave 2089.967M	48.0	+0.7	+2.2	+31.9	+28.6	+0.0	47.6	60.3	-12.7	Horiz
5	2507.567M	46.7	+0.8	+2.3	+32.2	+29.0	+0.0	46.6	60.3	-13.7	Horiz
6	2925.567M	44.3	+0.8	+2.7	+32.4	+29.6	+0.0	45.0	60.3	-15.3	Horiz
7	3343.567M	43.2	+0.7	+2.7	+32.3	+29.8	+0.0	44.1	60.3	-16.2	Horiz
8	3761.567M	43.7	+0.9	+2.9	+31.5	+30.8	+0.0	46.8	54.0	-7.2	Horiz
9	4179.566M	42.8	+1.0	+3.0	+31.4	+31.7	+0.0	47.1	54.0	-6.9	Horiz
10	1254.133M	65.8	+0.1	+1.5	+30.9	+23.6	+0.0	60.1	74	-13.9	Vert
	1254.133M	54.4	+0.1	+1.5	+30.9	+23.6	+0.0	48.7	54	-5.3	Vert
2	1672.133M	60.3	+0.7	+1.9	+31.6	+25.9	+0.0	57.2	74.0	-16.8	Vert
3	1672.133M	48.9	+0.7	+1.9	+31.6	+25.9	+0.0	45.8	54.0	-8.2	Vert
4	2090.133M	50.2	+0.7	+2.2	+31.9	+28.6	+0.0	49.8	60.3	-10.5	Vert
15	2508.133M	46.2	+0.8	+2.3	+32.2	+29.0	+0.0	46.1	60.3	-14.2	Vert
16	2926.133M	48.3	+0.8	+2.7	+32.4	+29.6	+0.0	49.0	60.3	-11.3	Vert
7	3344.133M	49.3	+0.7	+2.7	+32.3	+29.8	+0.0	50.2	60.3	-10.1	Vert
18	3761.733M	48.2	+0.9	+2.9	+31.5	+30.8	+0.0	51.3	74.0	-22.7	Vert
19	3761.733M	36.8	+0.9	+2.9	+31.5	+30.8	+0.0	39.9	54.0	-14.1	Vert
20	4179.733M	51.7	+1.0	+3.0	+31.4	+31.7	+0.0	56.0	74.0	-18.0	Vert
21	4179.733M	40.3	+1.0	+3.0	+31.4	+31.7	+0.0	44.6	54.0	-9.4	Vert

# 5.2 <u>Conducted Emissions</u>

Not required, it's a battery-operated unit