

APPLICANT X-10 (USA), Inc. 400 Forge Way, Suite 412 Rockaway, NJ 07866-2033	MANUFACTURER X-10 Electronics Shenzhen Co. Ltd. X-10 Building Labour Industrial District Shenzhen, Xixiang, Bao An Guang Dong, China, 518102
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TEST SPECIFICATION: FCC Rules and Regulations Part 15, Subpart C, Para. 15.231

TEST PROCEDURE: ANSI C63.4:2000

TEST SAMPLE DESCRIPTION

BRANDNAME: X-10 USA MODEL: CR15A

TYPE: Pulsed Transmitter

POWER REQUIREMENTS: 6 VDC derived from 4 New "AAA" Batteries

FREQUENCY OF OPERATION: 310 MHz

TESTS PERFORMED

Para. 15.231(a), Radiated Emissions, Fundamental and Harmonics

Para. 15.231(b), Radiated Emissions, Spurious Case

Para. 15.231(b), Duty Cycle Determination

Para. 15.231(c), Occupied Bandwidth

REPORT OF MEASUREMENTS

Applicant: X-10 (USA), Inc.
Device: Pulsed Transmitter
FCC ID: B4SCR15A
Power Requirements: 6 VDC derived from 4 New "AAA" Batteries
Applicable Rule Section: Part 15, Subpart C, Section 15.231

	Retlif Testing Laboratories
	Test Report No. R-9422-1 FCC ID: B4SCR15A

REPORT OF MEASUREMENTS (continued)

TEST RESULTS

- 15.231 (a): This device is used as a remote control transmitter.
- 15.231 (a)(1) & 15.231(a)(2): The transmitter is manually operated and ceases transmission within 5 seconds after deactivation.
- 15.231 (a)(3): The transmitter does not perform periodic transmissions.
- 15.231 (b): The fundamental field strength did not exceed 5830 $\mu\text{V/M}$ (Average) at a test distance of 3 meters. In addition, the requirements of section 15.35 for averaging pulsed emissions and for limiting peak emissions were met.
- The field strength of harmonic and spurious emissions did not exceed 583.0 $\mu\text{V/M}$ (AVERAGE).

DETERMINATION OF FIELD STRENGTH LIMITS

The field strength limits shown below are found in Section 15.231.

Frequency			Limit		
F1	=	260	3750	=	L1
Fo	=	310			Lo
F2	=	470	12500	=	L2

The formula below was utilized to determine the limits:

$$\text{Limit} = L1 + [(Fo-F1)(L2-L1)/(F2-F1)]$$

Solving yields:

Fundamental Limit = 5830 $\mu\text{V/M}$ (AVERAGE) @ 3 Meters

Harmonic Limit = 583.0 $\mu\text{V/M}$ (AVERAGE) @ 3 Meters



Retlif Testing Laboratories

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REPORT OF MEASUREMENTS (continued)

DUTY CYCLE DETERMINATION

The unit's RF output was directly coupled to the input of the spectrum analyzer. The analyzer was set for a frequency span of 0Hz. The sweep time was then adjusted in order to display one full pulse train. The transmitter on time was then summed and compared to the time for one full cycle in order to obtain the duty cycle.(See plots for additional information)

Transmitter On Time = 17.65 milliseconds (maximum)

Transmitter Cycle Time = 42.6 milliseconds

Transmitter Duty Cycle = 41.4 %

CALCULATION:

1 Large Pulse	=	4 milliseconds
21 x 650 μ s (small pulse)	=	13.65 milliseconds
4 + 13.65	=	17.65 milliseconds
Duty Cycle (17.65/42.6)	=	41.4 %
Correction Factor = 20 log(0.414)	=	-7.7 dB

SPECTRUM ANALYZER DESENSITIZATION CONSIDERATIONS

Due to the nature of the emissions being measured, care was taken to ensure that the resolution bandwidth of the spectrum analyzer was adequate to provide accurate measurements. The following formula was utilized:

Setting pulse desensitization equal to zero and utilizing the minimum observed pulse width of 650 μ s yields a minimum required bandwidth of 1,025 Hz. FCC specified bandwidths of 100kHz and 1MHz were utilized below and above 1GHz, respectively.



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GENERAL NOTES

1. All readings were taken utilizing a peak detector function at a test distance of 3 meters.
2. The duty cycle was applied to the peak readings in order to determine the average value of the emissions.
3. The frequency range was scanned from 30 MHz to 3.1 GHz. All emissions not reported were more than 20 dB below the specified limit.



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Test Report No. R-9422-1
FCC ID: B4SCR15A

EQUIPMENT LIST

FCC 15.231 Compliance Testing

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
067	Open Area Test Site	Retlif	3 Meter	RNY	09/20/2000	09/20/2003
128	Double Ridged Guide	Electro-Mechanics	1 GHz - 18 GHz	3105	05/31/2001	05/31/2002
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dB	BPA-1000	06/13/2001	06/13/2002
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	01/16/2002	07/16/2002
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	03/05/2002	03/05/2003
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	01/15/2002	07/15/2002
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	06/13/2001	06/13/2002
543	Preamplifier	Hewlett Packard	1.0 GHz - 26.5 GHz	8449B	06/27/2001	06/27/2002
767	Biconilog	EMCO	26 - 2000 MHz	3142B	08/28/2001	08/28/2002



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Test Report No. R-9422-1
FCC ID: B4SCR15A

FCC 15.231(b)
RADIATED EMISSIONS, FUNDAMENTAL & SPURIOUS CASE



Retlif Testing Laboratories

Test Report No. R-9132-1
FCC ID: B4SCR15A

Test Method:		FCC Part 15 Subpart C Radiated Emissions, Fundamental & Harmonic Emissions					
Customer:		X-10 (USA)			Job No.		R-9422-1
Test Sample:		RF remote			Paragraph:		15.231
Model No.:		CR15A			FCC ID:		B4SCR15A
Operating Mode:		Continuously Transmitting a 310 MHz Signal					
Technician:		Peter Lananna			Date:		April 23, 2002
Notes:		Test Distance: 3 Meters Detector: Peak, Unless otherwise specified					
Test Freq.	Antenna Pol./Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Peak Limit
MHz	(V/H)/Meters	X / Y / Z	dBuV	dB	dBuV/m	uV/m	uV/m
310	H / 1.0	X	48.9	16.8	65.7	1927.5	58300
	H / 1.0	Y	51.9	16.8	68.7	2722.7	
	H / 1.0	Z	51.7	16.8	68.5	2660.7	
	V / 1.8	X	48.9	16.8	65.7	1927.5	
	V / 2.0	Y	47.1	16.8	63.9	1566.8	
310	V / 2.0	Z	47.9	16.8	64.7	1717.9	58300
620	H / 1.0	X	43.8	3.9	47.7	242.7	5830
	H / 1.0	Y	50.4	3.9	54.3	518.8	
	H / 1.3	Z	52.4	3.9	56.3	653.1	
	V / 2.0	X	50.3	3.9	54.2	512.9	
	V / 1.0	Y	49.0	3.9	52.9	441.6	
620	V / 2.8	Z	44.6	3.9	48.5	266.1	5830
930	H / 1.0	X	21.3	8.5	29.8	30.9*	5830
	H / 1.0	Y	21.3	8.5	29.8	30.9*	
	H / 1.0	Z	21.3	8.5	29.8	30.9*	
	V / 1.0	X	21.3	8.5	29.8	30.9*	
	V / 1.0	Y	21.3	8.5	29.8	30.9*	
930	V / 1.0	Z	21.3	8.5	29.8	30.9*	5830
1240	H / 1.0	X	38.8	-3.0	35.8	61.7*	5000
	H / 1.0	Y	38.8	-3.0	35.8	61.7*	
	H / 1.0	Z	38.8	-3.0	35.8	61.7*	
	V / 1.0	X	38.8	-3.0	35.8	61.7*	
	V / 1.0	Y	38.8	-3.0	35.8	61.7*	
1240	V / 1.0	Z	38.8	-3.0	35.8	61.7*	5000
1550	H / 1.0	X	41.7	1.0	42.7	136.5*	5000
	H / 1.0	Y	41.7	1.0	42.7	136.5*	
	H / 1.0	Z	41.7	1.0	42.7	136.5*	
	V / 1.0	X	41.7	1.0	42.7	136.5*	
	V / 1.0	Y	41.7	1.0	42.7	136.5*	
1550	V / 1.0	Z	41.7	1.0	42.7	136.5*	5000
	The frequency range was scanned from 30 MHz to 3.1 GHz. All emissions not recorded were more						
	Than 10 dB below the specified limit. Emissions from the EUT do not exceed the specified limits.						
	*=Noise Floor Measurements (Minimum system sensitivity)						



Retlif Testing Laboratories

Retlif Job Number R-9422-1

Test Method:	FCC Part 15 Subpart C Radiated Emissions, Fundamental & Harmonic Emissions						
Customer:	X-10 (USA)				Job No.	R-9422-1	
Test Sample:	RF remote				Paragraph:	15.231	
Model No.:	CR15A				FCC ID:	B4SCR15A	
Operating Mode:	Continuously Transmitting a 310 MHz Signal						
Technician:	Peter Lananna				Date:	April 23, 2002	
Notes:	Test Distance: 3 Meters Detector: Peak, unless otherwise specified						
Test Freq.	Antenna Pol./Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Peak Limit
MHz	(V/H)-Meters	X / Y / Z	dBuV	dB	dBuV/m	uV/m	uV/m
1860	H / 1.0	X	42.7	3.6	46.3	206.5*	5830
	H / 1.0	Y	42.7	3.6	46.3	206.5*	
	H / 1.0	Z	42.7	3.6	46.3	206.5*	
	V / 1.0	X	42.7	3.6	46.3	206.5*	
	V / 1.0	Y	42.7	3.6	46.3	206.5*	
1860	V / 1.0	Z	42.7	3.6	46.3	206.5*	5830
2170	H / 1.0	X	42.7	1.2	43.9	156.7*	5830
	H / 1.0	Y	42.7	1.2	43.9	156.7*	
	H / 1.0	Z	42.7	1.2	43.9	156.7*	
	V / 1.0	X	42.7	1.2	43.9	156.7*	
	V / 1.0	Y	42.7	1.2	43.9	156.7*	
2170	V / 1.0	Z	42.7	1.2	43.9	156.7*	5830
2480	H / 1.0	X	41.5	3.8	45.3	184.1*	5830
	H / 1.0	Y	41.5	3.8	45.3	184.1*	
	H / 1.0	Z	41.5	3.8	45.3	184.1*	
	V / 1.0	X	41.5	3.8	45.3	184.1*	
	V / 1.0	Y	41.5	3.8	45.3	184.1*	
2480	V / 1.0	Z	41.5	3.8	45.3	184.1*	5830
2790	H / 1.0	X	40.6	6.2	46.8	218.8*	5000
	H / 1.0	Y	40.6	6.2	46.8	218.8*	
	H / 1.0	Z	40.6	6.2	46.8	218.8*	
	V / 1.0	X	40.6	6.2	46.8	218.8*	
	V / 1.0	Y	40.6	6.2	46.8	218.8*	
2790	V / 1.0	Z	40.6	6.2	46.8	218.8*	5000
3100	H / 1.0	X	42.0	6.8	48.8	275.4*	5830
	H / 1.0	Y	42.0	6.8	48.8	275.4*	
	H / 1.0	Z	42.0	6.8	48.8	275.4*	
	V / 1.0	X	42.0	6.8	48.8	275.4*	
	V / 1.0	Y	42.0	6.8	48.8	275.4*	
3100	V / 1.0	Z	42.0	6.8	48.8	275.4*	5830
The frequency range was scanned from 30 MHz to 3.1 GHz. All emissions not recorded were more							
Than 10 dB below the specified limit. Emissions from the EUT do not exceed the specified limits.							
*=Noise Floor Measurements (Minimum system sensitivity)							



Retlif Testing Laboratories

Retlif Job Number R-9422-1

Test Method:	FCC Part 15 Subpart C Radiated Emissions, Fundamental & Harmonic Emissions						
Customer:	X-10 (USA)				Job No.	R-9422-1	
Test Sample:	RF remote				Paragraph:	15.231	
Model No.:	CR15A				FCC ID:	B4SCR15A	
Operating Mode:	Continuously Transmitting a 310 MHz Signal						
Technician:	Peter Lananna				Date:	April 23, 2002	
Notes:	Test Distance: 3 Meters				Duty Cycle: 41.4%		
	Detector: Peak, unless otherwise specified				Duty Cycle Correction: -7.7dB		
Test Freq.	Antenna Pol./Height	EUT Orientation	Peak Reading	Correction Factor	Corrected Reading	Converted Reading	Avg. Limit
MHz	(V/H)-Meters	X / Y / Z	dBuV	dB	dBuV/m	uV/m	uV/m
310	H / 1.0	X	65.7	-7.7	58.0	794.3	5830
	H / 1.0	Y	68.7	-7.7	61.0	1122.0	
	H / 1.0	Z	68.5	-7.7	60.8	1096.5	
	V / 1.8	X	65.7	-7.7	58.0	794.3	
	V / 2.0	Y	63.9	-7.7	56.2	645.7	
310	V / 2.0	Z	64.7	-7.7	57.0	707.9	5830
620	H / 1.0	X	47.7	-7.7	40.0	100.0	583
	H / 1.0	Y	54.3	-7.7	46.6	213.8	
	H / 1.3	Z	56.3	-7.7	48.6	269.2	
	V / 2.0	X	54.2	-7.7	46.5	211.3	
	V / 1.0	Y	52.9	-7.7	45.2	182.0	
620	V / 2.8	Z	48.5	-7.7	40.8	109.6	583
930	H / 1.0	X	29.8	-7.7	22.1	12.7*	583
	H / 1.0	Y	29.8	-7.7	22.1	12.7*	
	H / 1.0	Z	29.8	-7.7	22.1	12.7*	
	V / 1.0	X	29.8	-7.7	22.1	12.7*	
	V / 1.0	Y	29.8	-7.7	22.1	12.7*	
930	V / 1.0	Z	29.8	-7.7	22.1	12.7*	583
1240	H / 1.0	X	35.8	-7.7	28.1	25.4*	500
	H / 1.0	Y	35.8	-7.7	28.1	25.4*	
	H / 1.0	Z	35.8	-7.7	28.1	25.4*	
	V / 1.0	X	35.8	-7.7	28.1	25.4*	
	V / 1.0	Y	35.8	-7.7	28.1	25.4*	
1240	V / 1.0	Z	35.8	-7.7	28.1	25.4*	500
1550	H / 1.0	X	42.7	-7.7	35.0	56.2*	500
	H / 1.0	Y	42.7	-7.7	35.0	56.2*	
	H / 1.0	Z	42.7	-7.7	35.0	56.2*	
	V / 1.0	X	42.7	-7.7	35.0	56.2*	
	V / 1.0	Y	42.7	-7.7	35.0	56.2*	
1550	V / 1.0	Z	42.7	-7.7	35.0	56.2*	500
The frequency range was scanned from 30 MHz to 3.1 GHz. All emissions not recorded were more Than 10 dB below the specified limit. Emissions from the EUT do not exceed the specified limits.							
*=Noise Floor Measurements (Minimum system sensitivity)							



Retlif Testing Laboratories

Retlif Job Number R-9422-1

Test Method:	FCC Part 15 Subpart C Radiated Emissions, Fundamental & Harmonic Emissions						
Customer:	X-10 (USA)				Job No.	R-9422-1	
Test Sample:	RF remote				Paragraph:	15.231	
Model No.:	CR15A				FCC ID:	B4SCR15A	
Operating Mode:	Continuously Transmitting a 310 MHz Signal						
Technician:	Peter Lananna				Date:	April 23, 2002	
Notes:	Test Distance: 3 Meters				Duty Cycle: 41.4%		
	Detector: Peak, unless otherwise specified				Duty Cycle Correction: -7.7dB		
Test Freq.	Antenna Pol./Height	EUT Orientation	Peak Reading	Correction Factor	Corrected Reading	Converted Reading	Avg. Limit
MHz	(V/H)-Meters	X / Y / Z	dBuV	dB	dBuV/m	uV/m	uV/m
1860	H / 1.0	X	46.3	-7.7	38.6	85.1*	583
	H / 1.0	Y	46.3	-7.7	38.6	85.1*	
	H / 1.0	Z	46.3	-7.7	38.6	85.1*	
	V / 1.0	X	46.3	-7.7	38.6	85.1*	
	V / 1.0	Y	46.3	-7.7	38.6	85.1*	
1860	V / 1.0	Z	46.3	-7.7	38.6	85.1*	583
2170	H / 1.0	X	43.9	-7.7	36.2	64.6*	583
	H / 1.0	Y	43.9	-7.7	36.2	64.6*	
	H / 1.0	Z	43.9	-7.7	36.2	64.6*	
	V / 1.0	X	43.9	-7.7	36.2	64.6*	
	V / 1.0	Y	43.9	-7.7	36.2	64.6*	
2170	V / 1.0	Z	43.9	-7.7	36.2	64.6*	583
2480	H / 1.0	X	45.3	-7.7	37.6	75.9*	583
	H / 1.0	Y	45.3	-7.7	37.6	75.9*	
	H / 1.0	Z	45.3	-7.7	37.6	75.9*	
	V / 1.0	X	45.3	-7.7	37.6	75.9*	
	V / 1.0	Y	45.3	-7.7	37.6	75.9*	
2480	V / 1.0	Z	45.3	-7.7	37.6	75.9*	583
2790	H / 1.0	X	46.8	-7.7	39.1	90.2*	500
	H / 1.0	Y	46.8	-7.7	39.1	90.2*	
	H / 1.0	Z	46.8	-7.7	39.1	90.2*	
	V / 1.0	X	46.8	-7.7	39.1	90.2*	
	V / 1.0	Y	46.8	-7.7	39.1	90.2*	
2790	V / 1.0	Z	46.8	-7.7	39.1	90.2*	500
3100	H / 1.0	X	48.8	-7.7	41.1	113.5*	583
	H / 1.0	Y	48.8	-7.7	41.1	113.5*	
	H / 1.0	Z	48.8	-7.7	41.1	113.5*	
	V / 1.0	X	48.8	-7.7	41.1	113.5*	
	V / 1.0	Y	48.8	-7.7	41.1	113.5*	
3100	V / 1.0	Z	48.8	-7.7	41.1	113.5*	583
	The frequency range was scanned from 30 MHz to 3.1 GHz. All emissions not recorded were more						
	Than 10 dB below the specified limit. Emissions from the EUT do not exceed the specified limits.						
	*=Noise Floor Measurements (Minimum system sensitivity)						



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FCC 15.231(c)
OCCUPIED BANDWIDTH



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Test Report No. R-9422-1
FCC ID: B4SCR15A

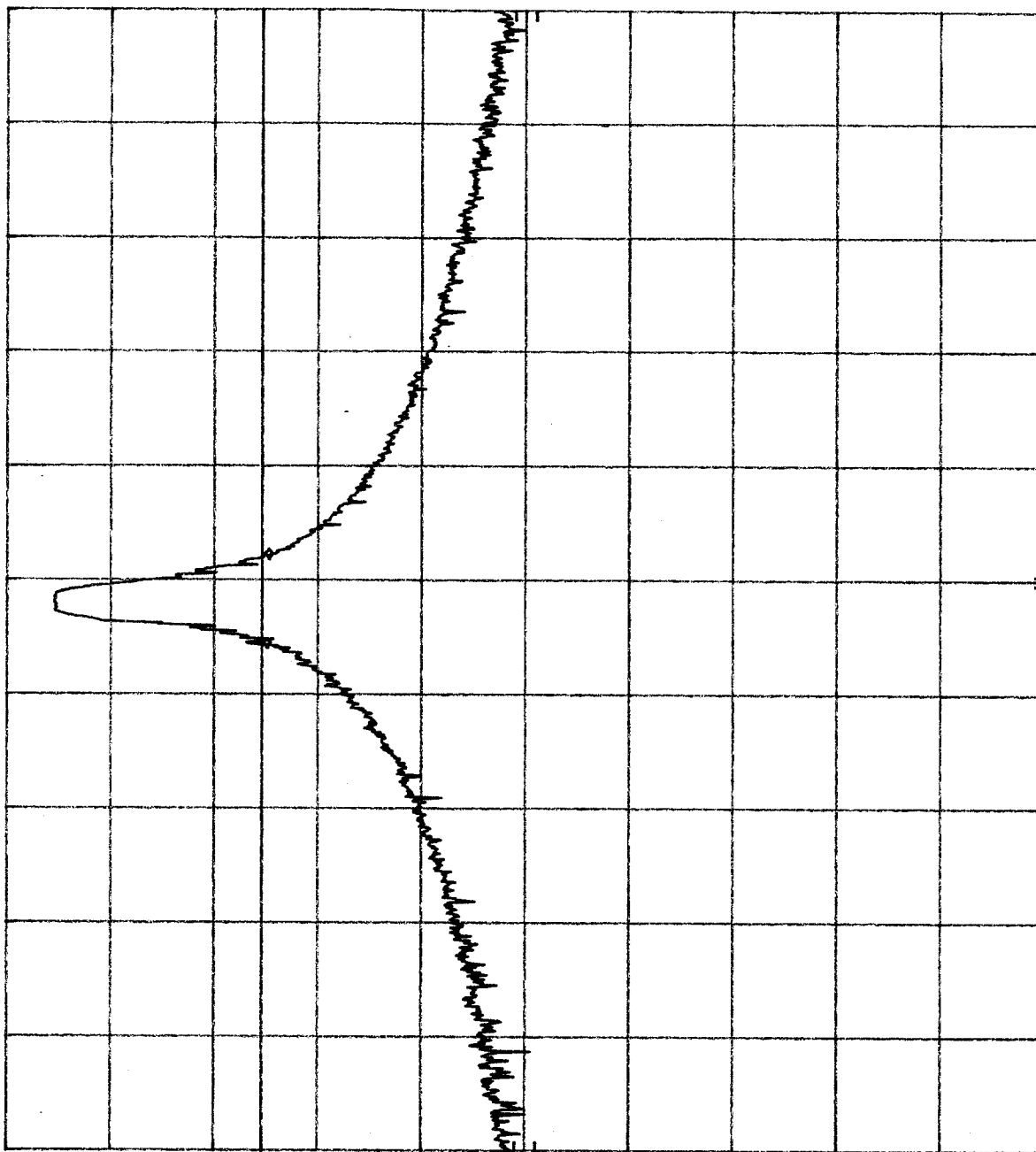
MKR Δ 60.4 kHz
-0.20 dB

R-9422 X-10 CR15A 4/22/01 PL
REF 75.0 dB μ V ATTEN 10 dB

hp

10 dB/

DL
50.4
dB μ V



SPAN 775 kHz
SWP 30.0 msec

VBW 30 kHz

CENTER 309.958 MHz
RES BW 10 kHz

Customer:	X-10 (USA)
Test Sample:	310MHz Pulsed Transmitter
Model No.:	CR15A FCC ID: B45CR15A
Test Method:	FCC 15.231(c) Occupied Bandwidth
Notes:	Bandwidth of the PK Emission is less than 0.25% of center frequency, measured 20dB(c) from the modulated carrier.
Date:	April 22, 2002
Tech:	Peter Lananna
Sheet:	1 of 1



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FCC 15.231(c)
DUTY CYCLE



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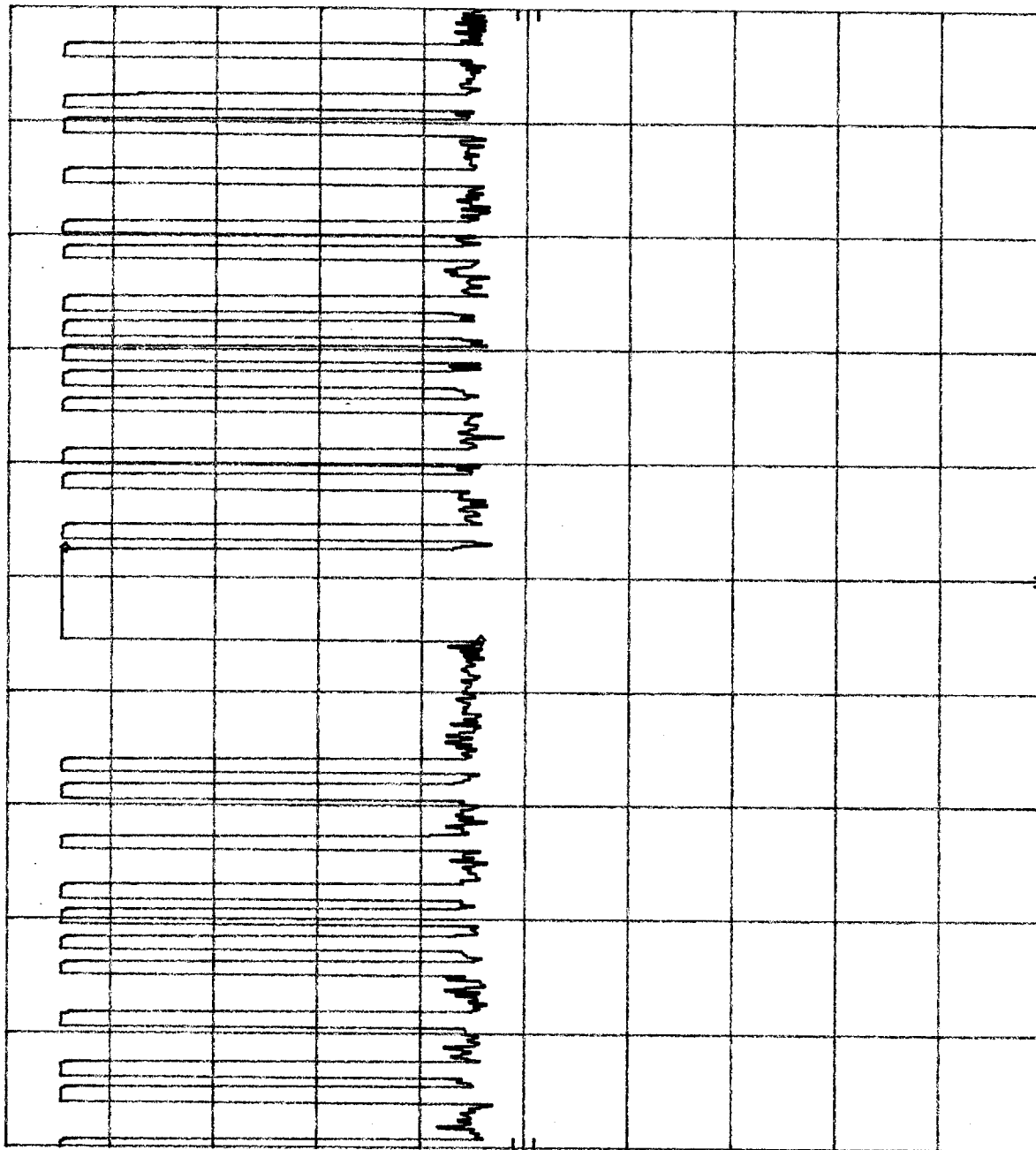
Test Report No. R-9422-1
FCC ID: B4SCR15A

MKR Δ 4.000 msec
 40.20 dB

R-9422 X-10 CR15A 4/22/01 PL
 REF 75.0 dB μ V ATTEN 10 dB

hp

10 dB/



SPAN 0 Hz
 SWP 50.0 msec

VBW 1 MHz

CENTER 309.938 113 MHz
 RES BW 300 kHz

Customer:	X-10 (USA)		
Test Sample:	310MHz Pulsed Transmitter		
Model No.:	CR15A	FCC ID:	B4SCR15A
Test Method:	FCC15.35 Duty Cycle Determination		
Notes:	Large Pulkse= 4.0miliseconds		
Date:	April 22, 2002	Tech:	Peter Lananna
Sheet	1	of	3



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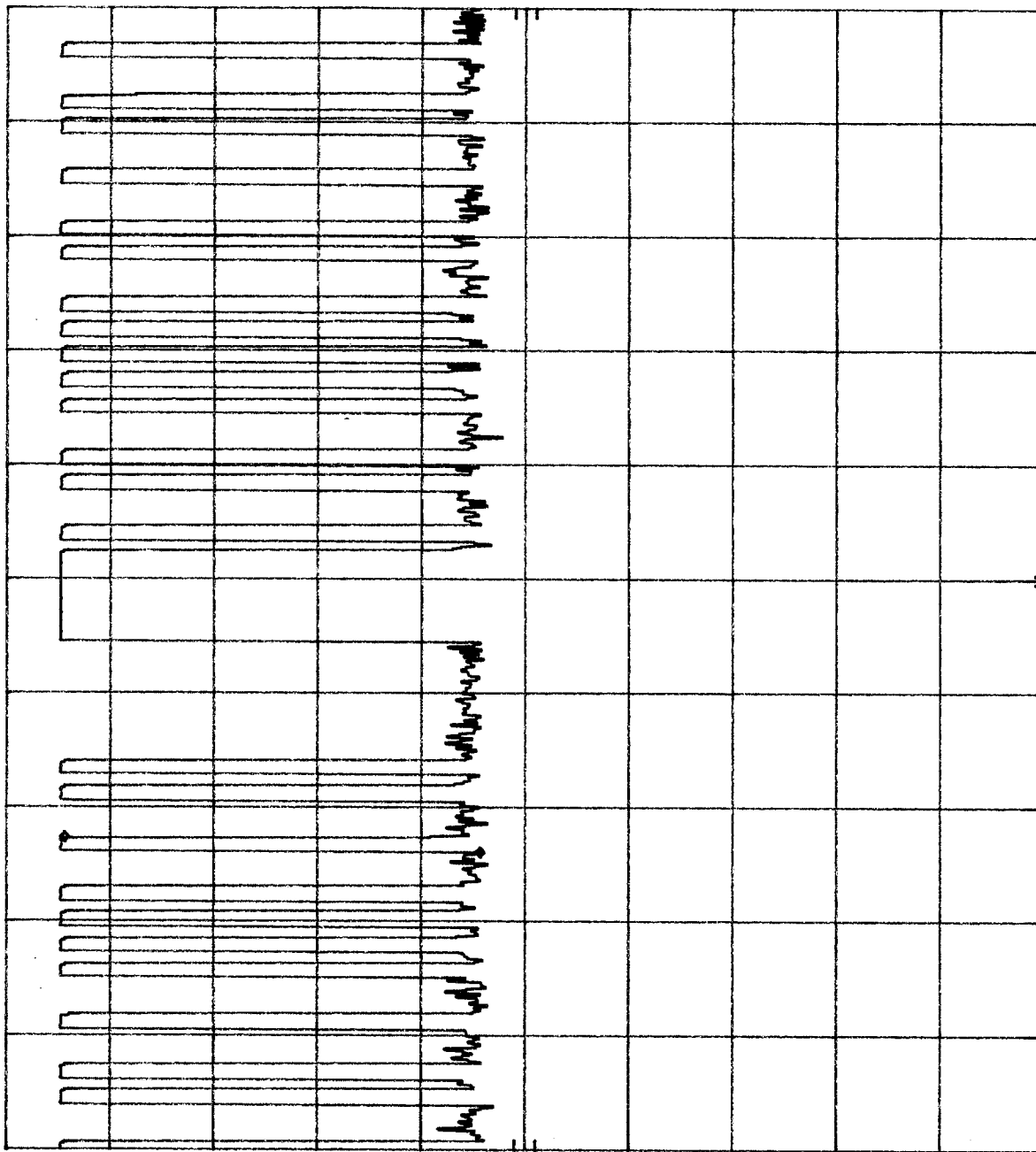
Report No. R-9422-1

h_p MKR Δ 650.0 μsec
40.10 dB

R-9422 X-10 CR15A 4/22/01 PL
REF 75.0 dBμV ATTEN 10 dB

hp

10 dB/



SPAN 0 Hz
SWP 50.0 msec

VBW 1 MHz

CENTER 309.938 113 MHz
RES BW 300 kHz

Customer: X-10 (USA)
Test Sample: 310MHz Pulsed Transmitter
Model No.: CR15A FCC ID: B4SCR15A
Test Method: FCC15.35 Duty Cycle Determination
Notes: Small Pulse=650microseconds
Number of Small Pulses=21
Small Pulse On Time=13.65milliseconds

Date: April 22, 2002 Tech: Peter Lananna Sheet 2 of 3



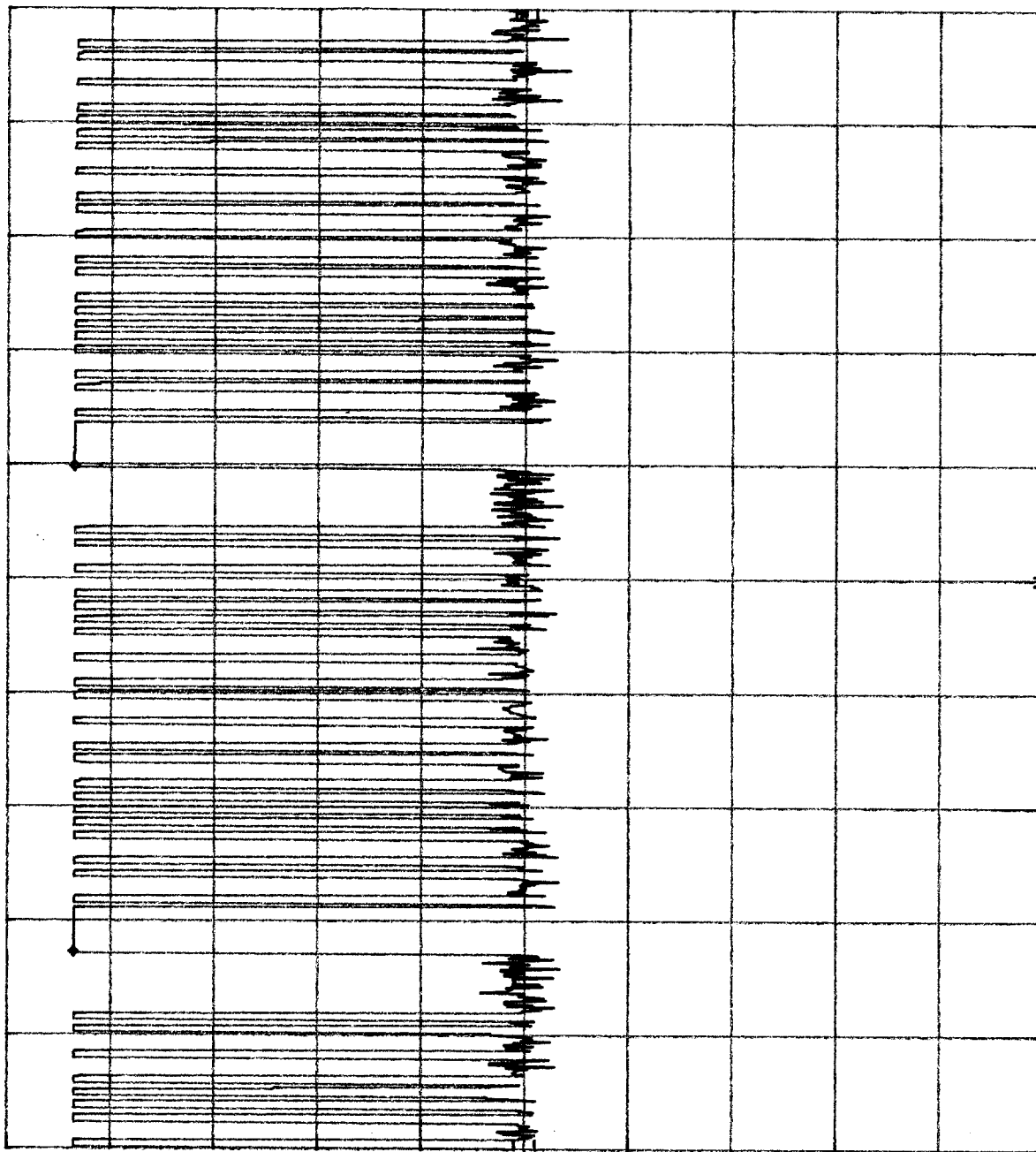
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Report No. R-9422-1

R-9422 X-10 CR15A 4/22/01 PL
 REF 75.0 dBμV ATTEN 10 dB
 MKR Δ 42.60 msec
 0.00 dB

hp

10 dB/



CENTER 309.938 113 MHz
 RES BW 100 kHz
 VBW 300 kHz
 SWP 100 msec
 SPAN 0 Hz

Customer:	X-10 (USA)
Test Sample:	310MHz Pulsed Transmitter
Model No.:	CR15A FCC ID: B4SCR15A
Test Method:	FCC15.35 Duty Cycle Determination
Notes:	Transmitter On Time = 4.0msec + 13.65msec = 17.65milliseconds Transmitter Cycle Time = 42.6milliseconds Duty Cycle = 17.65ms / 42.6ms = 0.414 = 41.4% = -7.7 dB
Date:	April 22, 2002
Tech:	Peter Lananna
Sheet:	3 of 3



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Test Setup Photograph



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Test Report No. R-9422-1
FCC ID: B4SCR15A