

ENGINEERING AND TEST DIVISION CHURCH STREET, BOHEMIA, LONG ISLAND, NEW YORK 11716 (631) 589-6300

**TEST REPORT NO.:** 

DTB01R04-0960

**DAYTON T. BROWN, INC. JOB NO.:** 401219-01-000

CRESTRON ELECTRONICS, INC. **CUSTOMER: 15 VOLVO DRIVE** ROCKLEIGH, NJ 07647

FCC CODE OF FEDERAL REGULATIONS, 47 CFR, PART 15, SUBJECT: SUB-PART C TESTING PERFORMED ON TWO WATERPROOF REMOTES, MODEL NO. WPR-48, SERIAL NOS. X100419 AND 1468551 AND ONE WATERPROOF REMOTE DOCKING STATION, MODEL NO. WPR-DS, SERIAL NO. X100385

PURCHASE ORDER NO.: 17519

**ATTENTION:** 

MR. SAM YOGASUNTHARAM

THIS REPORT CONTAINS: FOUR PAGES AND FOUR ENCLOSURES

TEST ENGINEER	R. Matheille R. MONTICELLO	0
DEPARTMENT SUPERVISOR	T. ARCATI	
QUALITY DEPARTMENT	of And	
DATE	22 DECEMBER 2004	

INFORMATION CONTAINED HEREIN MAY BE SUBJECT TO EXPORT CONTROL LAWS. REFER TO INTERNATIONAL TRAFFIC IN ARMS REGULATION (ITAR) OR THE EXPORT ADMINISTRATION REGULATION (EAR) OF 1979

> THE DATA CONTAINED IN THIS REPORT WAS OBTAINED BY TESTING IN COMPLIANCE WITH THE APPLICABLE TEST SPECIFICATION AS NOTED



# TABLE OF CONTENTS

<u>Subject</u>	Paragraph	Page No.
Abstract	1.0	2
References	2.0	2
Administrative Information	3.0	3
Test Program Outline	4.0	3
General Test Information	5.0	3

Enclos	sures	Number of Pages	Number of Photos
(1)	Physical Inspection Forms	6	-
(2)	Conducted Emission, 150 kHz to 30 MHz	7	1
(3)	Radiated Emission, Intentional Radiator, 30 MHz to 5 GHz	12	3
(4)	Occupied Bandwidth	4	-



#### 1.0 ABSTRACT

This report details the results of the FCC Code of Federal Regulations, 47 CFR, Part 15, Sub-Part C testing on two Waterproof Remotes, Model No. WPR-48, Serial Nos. X100419 and 1468551 and one Waterproof Remote Docking Station, Model No. WPR-DS, Serial No. X100385, manufactured by Crestron Electronics, Incorporated.

The conducted emission test was performed using two separate Waterproof Remotes, Serial No. X100419 (programmed for 418 MHz operation) and Serial No. 1468551 (programmed for 433 MHz operation).

The radiated emission and occupied bandwidth tests were performed using one Waterproof Remote, Serial No. X100419. When using only one Waterproof Remote, Serial No. X100419, the Remote was programmed for 418 MHz operation and then reprogrammed for 433 MHz operation.

The Waterproof Remote and the Waterproof Remote Docking Station were found to be in compliance with the Conducted Emission, Radiated Emission, and Occupied Bandwidth portions of the FCC Code of Federal Regulations, 47 CFR, Part 15, Sub-Part C, specification limits.

Detailed test results can be observed in Enclosures 2, 3, and 4 of this report.

The test results recorded in this report relate only to those items tested.

This report shall not be reproduced, except in full, without the written approval of Dayton T. Brown, Inc.

#### 2.0 REFERENCES

(a)	Customer Purchase Order No.:	17519
(b)	Dayton T. Brown, Inc. Job No.:	401219-01-000
(c)	Test Specification:	Code of Federal Regulations, 47 CFR, Part 15, Sub-Part C
(d)	Test Procedure:	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low- Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz, ANSI C63.4-2003



# 3.0 ADMINISTRATIVE INFORMATION

Customer		15 Volv	n Electroni vo Drive igh, NJ 076	,	
Test Item Description	Qua	ntity Rec	ceived	Model No.	Serial No.
Waterproof Remote	On	e		WPR-48	X100419
	On	e		WPR-48	1468551
Waterproof Remote Docking	On	e		WPR-DS	X100385
Station					
Date Received		1 Decen	mber 2004		
Dates Tested 1 an		1 and 2	1 2 December 2004		
Date Shipped 2 Dec		2 Decen	ember 2004		
Customer Representative Present During Testing					
Name			Affiliation	1	
Mr. Sam Yogasuntharam			Crestron I	Electronics, Inc.	

## 4.0 TEST PROGRAM OUTLINE

Test Description	Results
Conducted Emission, 150 kHz to 30 MHz	Met the specification requirements.
Radiated Emission, Intentional Radiator,	Met the specification requirements.
30 MHz to 5 GHz	
Occupied Bandwidth	Met the specification requirements.

# 5.0 GENERAL TEST INFORMATION

#### <u>Setup</u>

For the conducted emission test in the frequency range of 150 kHz to 30 MHz, the test samples were set up in a GTEM Cell. The Waterproof Remotes were mounted in the Waterproof Remote Docking Station and were operated in the Charge/Transmit mode.

For the radiated emission test in the frequency range of 30 MHz to 1 GHz, the test samples were set up in a climate controlled open field site that measures 44 feet long by 24 feet wide by 24 feet high. The Waterproof Remote was mounted in the Waterproof Remote Docking Station and was operated in the Charge/Transmit mode at 418.0 MHz and then at 433.95 MHz.



For the radiated emission test in the frequency range of 1 to 5 GHz, the test samples were set up in an anechoic chamber that measures 20 feet wide by 20 feet long by 10 feet high. The Waterproof Remote was mounted in the Waterproof Remote Docking Station and was operated in the Charge/Transmit mode at 418.0 MHz and then at 433.95 MHz.

For the occupied bandwidth test, the test samples were set up in a GTEM Cell. The Waterproof Remote was mounted in the Waterproof Remote Docking Station and was operated in the Charge/Transmit mode at 418.0 MHz and then at 433.95 MHz.



Enclosure 1

Physical Inspection Forms

/	
	DAYTON T. BROWN
	R
	Founded 1950

PHYSICAL INSPECTION FORM					
JOB NUMBER 401219-01-000	DATE 1 Dece	mber 2004			
CUSTOMER Crestron Electronics, Inc.	TECHNICIAN	M, Sheehy			
TEST <u>EMI</u>	SPECIFICATION	FCC Rules and Regulations, Part 15			
ITEM Waterproof Remote	SERIAL NO.	X100419			
	D: ANOMALIES ANOMALIES DUE TO FOLLOWING	TESTING			
Photograph Taken? No I	f Yes, Photo Numbe	er N/A			
LAB FORM NO. 40 REV 11/03					



PHYSICAL INSPECTION FORM						
JOB NUMBER 401219-0	)1-000	DATE <u>1 Dece</u>	mber 2004			
CUSTOMER Crestron Electr	onics, Inc.	TECHNICIAN	M, Sheehy			
TEST EMI		SPECIFICATION	FCC Rules and Regulations, Part 15			
ITEM Waterproof Remote		SERIAL NO.	1468551			
A PRE-TEST INSPECTIO	X NO AN	OMALIES OMALIES DUE TO ' OLLOWING	TESTING			
Photograph Taken? <u>No</u>	If Y	Yes, Photo Numbe	er <u>N/A</u>			
LAB FORM NO. 40 REV 11/03						



PHYSICAL INSPECTION FORM					
JOB NUMBER 401219-01-000	DATE 1 December 2004				
CUSTOMER Crestron Electronics, Inc.	TECHNICIAN M, Sheehy				
TEST EMI	SPECIFICATION FCC Rules and Regulations, Part 15				
Waterproof Remote Docking ITEM Station	SERIAL NO. X100385				
A PRE-TEST INSPECTION REVEALED	D:				
X NO A	NOMALIES				
NO A	NOMALIES DUE TO TESTING				
THE	FOLLOWING				
Photograph Taken? <u>No</u> If	f Yes, Photo Number <u>N/A</u>				

LAB FORM NO. 40 REV 11/03



	PHYSICAI	L INSPECTION FO	ORM
JOB NUMBER 401	219-01-000	DATE 2 Dece	mber 2004
CUSTOMER Crestron	Electronics, Inc.	TECHNICIAN	M, Sheehy
TEST EMI		SPECIFICATION	FCC Rules and Regulations, Part 15
ITEM Waterproof Remo	te	SERIAL NO.	X100419
A POST-TEST INSP	X NO AN	D: NOMALIES NOMALIES DUE TO TO OLLOWING	TESTING
Photograph Taken?	<u>No</u> If	Yes, Photo Numbe	er <u>N/A</u>
LAB FORM NO. 40 REV 11/03			



JOB NUMBER         401219-01-000         DATE         2 December 2004	
CUSTOMER Crestron Electronics, Inc. TECHNICIAN M, Sheehy	
TEST     EMI     SPECIFICATION     FCC Rules and Regulations, Part 15	
ITEM Waterproof Remote SERIAL NO. 1468551	
A POST-TEST INSPECTION REVEALED:	
Photograph Taken?     No     If Yes, Photo Number     N/A	
LAB FORM NO. 40 REV 11/03	



PHYSICA	L INSPECTION F	ORM
JOB NUMBER 401219-01-000	DATE 2 Dece	ember 2004
CUSTOMER Crestron Electronics, Inc.	TECHNICIAN	M, Sheehy
TEST EMI	SPECIFICATION	FCC Rules and Regulations, Part 15
Waterproof Remote Docking     ITEM   Station	SERIAL NO.	X100385
A POST-TEST INSPECTION REVEALE	ED:	
X NO A	NOMALIES	
NO A	NOMALIES DUE TO	TESTING
THE	FOLLOWING	
Photograph Taken? <u>No</u> If	Yes, Photo Numb	er <u>N/A</u>

LAB FORM NO. 40 REV 11/03



Enclosure 2

Conducted Emission, 150 kHz to 30 MHz



### CONDUCTED EMISSION, 150 kHz to 30 MHz

#### Test Procedure

A conducted emission test, in the frequency range of 150 kHz to 30 MHz, was performed on the Waterproof Remote and Waterproof Remote Docking Station, while mounted on a non-conductive table.

Power was supplied to the Waterproof Remote and Waterproof Remote Docking Station, via LISNs which were bonded to the ground plane below and to the side of the nonconductive table. The unused  $50\Omega$  connector on the LISN was terminated in  $50\Omega$ .

Measurements were made utilizing the following bandwidth and detector function:

Frequency Range	CISPR Bandwidth	Detector Function
150 kHz to 30 MHz	9 kHz	Quasi-Peak

The test setup employed is depicted in the photograph contained in this enclosure.

#### Test Results

No emission levels above the conducted emission specification limits were observed.

Detailed test results for the conducted emission test can be observed on pages 2 through 5 of this enclosure.

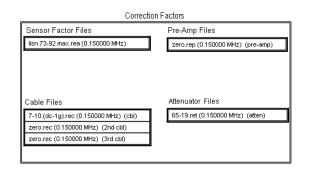


Test Procedure: FCC R & R Part 15 Sub. Part C, Conducted Emissions

Test Item: Model Nui Part Num	del Num.: WPR-48 and WPR-DS							Job Num.: Project Eng.: Tested By: Sensor Loc.: Sensor Pol.:			401219-01-000 R. Monticello M. Sheehy LISN						
Mode of C										sor Pol.: Num.:		ghline		04			
	<b>p</b> Charg	ie/Transm	it ivioae						Tes			1219-					
											lame: 40	01219-0	11-004.	red			
											E Data				Conducted Er		· · · · · · ·
Da	ate: 12/1/20	04 <b>Tim</b>	ne: 4:1	5 PM		Ana	alyzer:	HP85	42E	2. FC	υπαπ	Fantio	OUD. F	an C,	Conducted Er	nissions.rei	(spec 1#
70.0-							-										
65.0-	<b>.</b>																
	· · · · ·																
	· · · · ·																
60.0-																	
		1									j						
55.0-														-			
50.0-														_			
15.0																	
45.0-																	
40.0-	Miller advances of																
	and the second second	Nu.															
35.0-		and the state of t	man 1														
30.0-		_	- 1		$\sim$							_	+	_			
				\ [/	'	N											
25.0-				Y													
						\											
20.0						\.											
20.0-						1	7										
							Ъ										
15.0-							<u>_</u>						+	-			
							્યુ	N.									
10.0-							77										
								""W	MALL.								
								ויי		<b>.</b>	ц.	11		1 1	. الد ، ال. 1	. ا. ساه	
5.0-									1 🖷		الأبر ا		JU.U	I, I			111
										L		l. and a little		זייי	يليس ليسترين	an lle <b>the flat</b>	1.04.9.a
0.0-						.000000								10.00	l		30

Comment: 418 MHZ Remote Control

BW Table									
Frequency	BW								
0.150000 MHz	9000 Hz								
30.000000 MHz									



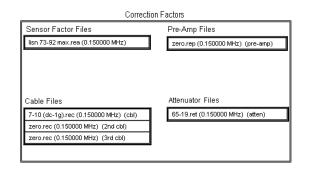


Test Procedure: FCC R & R Part 15 Sub. Part C, Conducted Emissions

Test Item Model Nu Part Num Serial Nu Mode of (	Num.:         WPR-48 and WPR-DS           lum.:         -           Num.:         X100419 & X100385							Tes Ser Ser	ject Eng. Ited By: Isor Loc. Isor Pol.: It Num.:	:	401219-01-000 R. Monticello M. Sheehy LISN Neutral 401219-01-005							
	)ate:	12/1/2004	Tim	ne: 4:	31 PM		An	alyzer:	HP85	42E	1. F	RE Data					icted Emiss	ء • ions.rel (spec
70.0	•.																	
65.0-		•••••••••																
55.0-			*****	••••														
50.0																		
45.0																		
40.0-	h Wala																	
35.0	<b>ب</b> ر	May and Markedow	<u>.</u>															
30.0			*****															
25.0-					w -								_	_				
20.0-						L X	+						-					
15.0							ł						_	_		-		
10.0-							W	havl <sub>d</sub> Mat		<b>.</b>								
5.0-									-" <b>)</b>		₩₩₩₽₽₽₽₽				Жļч			
0.0-	00						.000000									.000000		30

Comment: 418 MHZ Remote Control

BW Table									
Frequency	BW								
0.150000 MHz	9000 Hz								
30.000000 MHz									



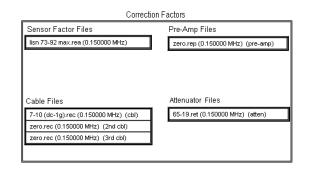


Test Procedure: FCC R & R Part 15 Sub. Part C, Conducted Emissions

Customer: Test Item: Model Num Part Num.: Serial Num	-		Job Num.: Project Eng.: Tested By: Sensor Loc.: Sensor Pol.:	401219-01-000 R. Monticello M. Sheehy LISN Highline								
Mode of Op	.: Charge/I	ransmit M	ode				Test Num.:	40121		01		
							File Na	me: 401219				
							1. RE [	Data				
<b>D</b> -4		_			0		2. FCC	R & R Part	15 Sub. F	Part C, C	Conducted Emission	s.rel (spec l 🖊
70.0-r	e: 12/1/2004	Time:	3:51 PM		Analyzer:	HP8542E						
65.0	••••											
60.0-		****						·	•=•=• =	••+•+		
			.									
55.0-												
50.0-												
	Way want											
45.0-	- The second											
40.0-												
			$\mathbf{X}$									
40.0-				$ \prec $								
				$  \rangle$								
35.0-			- ¥-		$\setminus$							
30.0-					_\							_
					$  \rangle$							
25.0-					\							
20.0												
					\							
20.0-					\ \	N.						
						Wenner ladit						
15.0-					+					++		
						I IV	NL I					
10.0-												_
5.0-								. h h		.    .	الملالمة الم	
5.0-									والبارار	U III		
									11° 13° 141		Alexandre Researces	dates 1.
0.0-				10	00000					10.000		30

Comment: 433 MHZ Remote Control

BW Table									
Frequency	BW								
0.150000 MHz	9000 Hz								
30.000000 MHz									



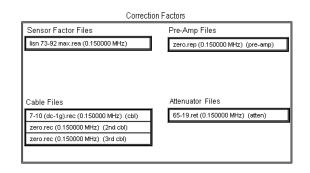


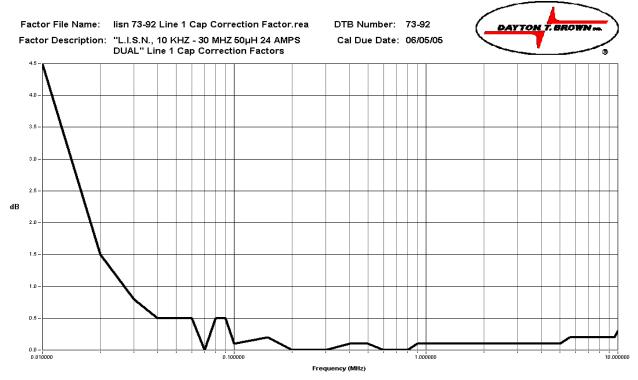
Test Procedure: FCC R & R Part 15 Sub. Part C, Conducted Emissions

Test Item: Model Num.: Part Num.: Serial Num.: Mode of Op.:	Num.: WPR-48 and WPR-DS um.: - Num.: 1468551 & X100385							Project Eng.: Tested By: Sensor Loc.: Sensor Pol.: Test Num.:			401219-01-000 R. Monticello M. Sheehy LISN Neutral 401219-01-002				
Date:	12/1/2004	Time:	3:57 PM		Analyze	<b>r:</b> HP854:	2E	1. RE				, Conducted Emis	sions.rel (spec l 🗸		
70.0															
65.0-	· · · · · · · · · · · · · · · · · · ·														
60.0-		•••••••••	、 <u> </u>												
55.0-															
50.0-															
45.0-															
40.0-															
35.0-															
30.0-				$\mathbf{h}$											
25.0-				1	\										
20.0-					hore										
15.0-						William Maria									
10.0-						۳ <b>h</b>	<b>\</b>								
5.0-															
0.0-					.000000			الينا بالاستاريل.	жh., <i>њ</i> . (	1 - 11 <b>11 -</b>		00000 11	30		

Comment: 433 MHZ Remote Control

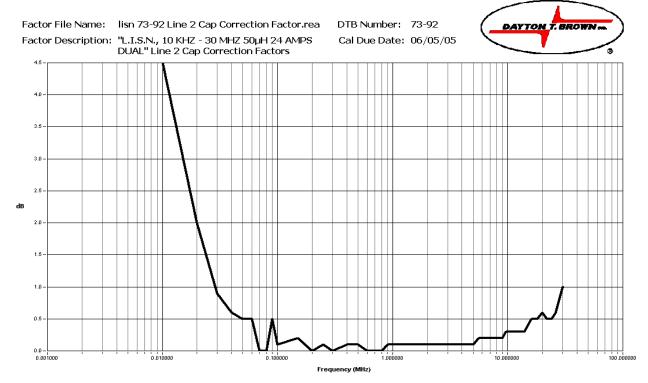
BW Table									
Frequency	BW								
0.150000 MHz	9000 Hz								
30.000000 MHz									





#### CORRECTION FACTOR

#### **CORRECTION FACTOR**





Job Sub : 401219-01	TEST: Conducted Emissions			
ITEM	MANUFACTURER	MODEL	DTB NO.	CAL DUE DATE
GTEM CELL, 1.75 METERS	MESSELECTRONIK BERLIN	MEB G TEM 1750	27-368	10/23/2005
RECEIVER, EMI	HEWLETT-PACKARD	8542E	65-177	04/10/2005
LIMITER, TRANSIENT	HEWLETT-PACKARD	11947A	65-19	04/24/2005
ANALYZER, SPECTRUM	HEWLETT-PACKARD	8562A	65-219	12/19/2004
ANALYZER, SPECTRUM 10 KHz - 26.5 GHz	HEWLETT-PACKARD	8563A	65-247	05/01/2005
CABLE, TYPE "N" MALE TO MALE	PASTERNACK	PE3062	7-43	10/23/2005
CABLE,18" TYPE N MALE TO MALE TEST	E DAYTON T. BROWN	RG 393	7-66	05/15/2005
CABLE, RF SMA 36" 18 GHz	GORE	PHASEFLEX EJRO1RO1036.	7-67	10/16/2005
CABLE, RF SMA 36" 18GHZ	GORE	PHASEFLEX EJRO1RO1036.	7-68	10/16/2005
CABLE, RF SMA 36" 18GHz	GORE	PHASEFLEX EJRO1RO1036.	7-68	10/16/2005
PREAMPLIFIER, 1-26.5 GHz	HEWLETT-PACKARD	8449B	71-11	10/22/2006
AMPLIFIER, 10.0 KHz – 1.0 GHz APPROX. 50 DB	MITEQ	AM-1309	71-22	03/06/2005
AMPLIFIER, 10.0 KHz – 1.0 GHz APPROX. 50 DB	MITEQ	AM-1309	71-22	03/06/2005
L.I.S.N., 10 KHz - 30 MHz 50µH 24 AMPS DUAL	SOLAR	9252-50-R-24BNC	73-92	06/05/2005



TESTED FOR: CRESTRON ELECTRONICS, INC. E AND DOCKING STATION M/N: WPR-48 AND WPR-DS CONDUCTED EMISSION, 150 kHz TO 30 MHz ITEM: WATERPROOF REMOTE AND DOCKING STATION

S/N: X100419, 1468551, AND X100385

JOB NO.: 401219-01-000 DTB01R04-0960

FILE NO.: DSC02194 ENCLOSURE 2

2 DECEMBER 2004 PHOTO 1





Enclosure 3

Radiated Emission, Intentional Radiator, 30 MHz to 5 GHz



#### RADIATED EMISSION, INTENTIONAL RADIATOR, 30 MHz to 5 GHz

#### Test Procedure

A radiated emission test, in the frequency range of 30 to 1000 MHz, was performed on the Waterproof Remote and Waterproof Remote Docking Station, while they were mounted on a wooden table that was standing on a conductive turntable.

For the frequency range of 30 to 1000 MHz, measurements were made utilizing a manually tuned interference measurement receiver, which was located in the instrumentation room below the ground plane.

The receiver was connected to the measurement antenna, which was located 3 meters from the turntable for the frequency range of 30 to 1000 MHz.

A linear polarized antenna was utilized for the measurements. The antenna height was varied between 1 and 4 meters and the test sample was rotated  $360^{\circ}$  to ensure maximum pickup from the test sample.

A radiated emission test, in the frequency range of 1 to 5 GHz, was performed on the Waterproof Remote and Waterproof Remote Docking Station, while they were mounted on a non-conductive table in an anechoic chamber.

For the frequency range of 1 to 5 GHz, measurements were made utilizing a spectrum analyzer located in a shielded enclosure, which was attached to the anechoic enclosure.

The receiver was connected to the measurement antenna, which was located 3 meters from the table for the frequency range of 1 to 5 GHz, with a length of  $50\Omega$  coaxial cable.

The Waterproof Remote utilizes pulse modulation with a 50% duty cycle.

Any emissions not reported were at least 20 dB below the specification limits.

Measurements were made utilizing the following bandwidth and detector function:

Frequency_Range	CISPR Bandwidth	Detector Function				
30 to 1000 MHz	120 kHz	Quasi-Peak				
1 to 5 GHz	100 kHz	Peak				

The antenna per meter factors of the antennas utilized are depicted in the figures contained in this enclosure.

The test setups employed are depicted in the photographs contained in this enclosure.



### Test Results

No emission levels above the FCC Code of Federal Regulations, 47 CFR, Part 15, Sub-Part C, specification limits were observed.

Detailed test results for the radiated emission test for Intentional Radiators can be observed on pages 3 through 10 of this enclosure.



Waterpro	of Remote and	Waterproof	Docking Station	Date:	2 Dece	2 December 2004		
Crestron	Electronics,	Inc.		Serial N	<b>o.:</b> X10041	9 and X100385		
418 MHz	Radiator wit	h active cha	arge base	Job No.	401219	-01-000		
n: <u>FCC R 8</u>	R, Part 15, S	Sub-Part C		Distance	e: 3 Mete	ers		
nction: Qu	asi Peak	Units:	DBµV/m	Antenna	Antenna Polarization: Vertical			
120 kHz	(CISPR)			Technic	ian: M. She	eehy		
d Strength	Measuremen	nts		Me	t Requireme	nt Yes X No		
Meter Indicated	Antenna Factor	Cable Loss	Total Emission	Spec. Limit	Level Above	Notes		
(DbµV)	(Db)	(Db)	(DbµV/m)	(DbµV/m)	Limit			
17	17.9	0.3	35.2	40.0		Ambient		
20	17.1	1.4	38.5	46.0		Ambient		
50	17.2	1.4	68.6	80.6 *		Fundamental		
19	17.2	1.4	37.6	46.0		Ambient		
19	20.9	2.2	42.1	46.0		Second harmonic		
12	21.7	3.6	37.3	54.0		Ambient		
	Crestron 418 MHz FCC R 8 nction: Qu 120 kHz eld Strength Meter Indicated (DbµV) 17 20 50 19	Crestron Electronics,         418 MHz Radiator wit         FCC R & R, Part 15, S         Inction:       Quasi Peak         120 kHz (CISPR)         Eld Strength Measuremen         Meter       Antenna         Indicated       Factor         (DbµV)       (Db)         17       17.9         20       17.1         50       17.2         19       17.2         19       20.9	Crestron Electronics, Inc.         418 MHz Radiator with active cha         FCC R & R, Part 15, Sub-Part C         Inction:       Quasi Peak       Units:         120 kHz (CISPR)       Units:         Iteld Strength Measurements       Cable         Indicated       Antenna       Cable         Indicated       Factor       Loss         (DbµV)       (Db)       (Db)         17       17.9       0.3         20       17.1       1.4         50       17.2       1.4         19       17.2       1.4         19       20.9       2.2	Crestron Electronics, Inc.418 MHz Radiator with active charge basen:FCC R & R, Part 15, Sub-Part CInction:Quasi PeakUnits:120 kHz (CISPR)Units:DB $\mu$ V/m120 kHz (CISPR)EmissionMeterAntennaCableIndicatedFactorLoss(Db $\mu$ V)(Db)(Db)(Db $\mu$ V)(Db)(Db)1717.90.32017.11.438.55017.21.41917.21.41920.92.242.11920.92.242.1	Crestron Electronics, Inc.Serial N418 MHz Radiator with active charge baseJob No.n:FCC R & R, Part 15, Sub-Part CDistancenction:Quasi PeakUnits:DBµV/m120 kHz (CISPR)Techniceld Strength MeasurementsMeterIndicatedAntennaFactorLossTotal(DbµV)(Db)(Db)(DbµV)(Db)(DbµV/m)1717.90.32017.11.438.546.05017.21.41917.21.41920.92.242.146.01920.92.242.146.0	Crestron Electronics, Inc.Serial No.:X10041418 MHz Radiator with active charge baseJob No.:401219n:FCC R & R, Part 15, Sub-Part CDistance:3 MeteInction:Quasi PeakUnits:DBµV/mAntenna Polarization120 kHz (CISPR)TotalMet RequirementMeterAntennaCableTotalLevelIndicatedFactorLossEmissionLimitAbove Spec.(DbµV)(Db)(Db)(DbµV/m)(DbµV/m)Limit1717.90.335.240.0Image: Spec.2017.11.438.546.0Image: Spec.5017.21.468.680.6 *Image: Spec.1917.21.437.646.0Image: Spec.1920.92.242.146.0Image: Spec.1920.92.242.146.0Image: Spec.1920.92.242.146.0		

Remarks: \* The specification limit from para. 15.231 was used for the fundamental frequency of 418 MHz.



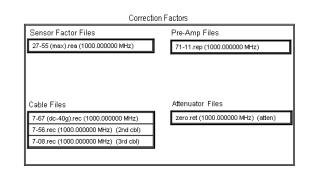
#### Test Title: Radiated Emissions

Test Procedure: FCC R & R Part 15 Sub. Part C Radiated Emissions

Customer: Test Item: Model Num.: Part Num.:		Waterpr	e Electroni oof Remot and WPF	e and Dock	ing Stat	ion		Job Num.: Project Eng.: Tested By: Sensor Loc.:	401219-01-000 R. Monticello M. Sheehy	
Seria	al Num. le of Op			9 & X1003 Fransmit M					Sensor Loc.: Sensor Pol.: Test Num.:	Three meters from UUT Vertical 401219-01-017
									1. RE [	me: 401219-01-017.red Data
6:	Dat	e:	12/2/04	Time:	5:06 PM		Analyzer:	HP8562A	2.401.	
61	0.0									
51	8.0-									
51	6.0-									
54	4.0-									
5: //m	2.0-					+		1		
51	0.0-					+				
41	8.0-					-				
41	6.0-					+				
4	4.0-					-				
43	2.0-					+				
41	0.0-				1					
31	8.0-				TUP AND M	MALL.				
31		ᢔᠰ	M	Mit						
	4.0-									5000.0

Comment: 418 Remote Control and Charger





Frequency (MHz)



Test Item:	Waterpro	of Remote and	Waterproof	Docking Station	Date:	2 Decen	nber 2004
Customer:	Crestron	Electronics,	Inc.		Serial I	No.: X100419	9 and X100385
Test Mode:	418 MHz	z Radiator witl	h active cha	arge base	Job No	.: 401219-	01-000
Specification	n: FCC R 8	R, Part 15, S	Sub-Part C		Distan	3 Meter	rs
Detector Fur	nction: Qu	asi Peak	Units:	DBµV/m	Antenn	a Polarization	: Horizontal
Bandwidth:	120 kHz	(CISPR)			Techni	cian: <u>M. She</u>	ehy
Radiated Fie	d Strength	Measuremen	ts		Me	et Requiremen	t Yes X No
Frequency	Meter Indicated	Antenna Factor	Cable Loss	Total Emission	Spec. Limit	Level Above Spec.	Notes
(MHz)	(DbµV)	(Db)	(Db)	(DbµV/m)	(DbµV/m)	Limit	
30	9	19.5	0.3	28.8	40.0		Ambient
416	20	17.7	1.4	39.1	46.0		Ambient
418	49	17.8	1.4	68.2	80.6 *		Fundamental
419	19	17.8	1.4	38.2	46.0		Ambient
836	22	21.5	2.2	45.7	46.0		Second harmonic
1000	14	22.8	3.6	40.4	54.0		Ambient

Remarks: \* The specification limit from para. 15.231 was used for the fundamental frequency of 418 MHz.



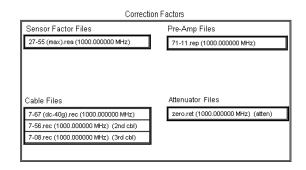
#### Test Title: Radiated Emissions

Test Procedure: FCC R & R Part 15 Sub. Part C Radiated Emissions

Custor Fest Ite Model I Part Ni	em: Num.:	- Sensor Loc.: Three meters from UUT					R. Monticello M. Sheehy	
Serial I Jode c	Num.: of Op.:		& X100385				Sensor Pol.: Test Num.:	Horizontal 401219-01-016
noue c		12/2/04	ransmit Moo Time: 5		Analyzer:	HP8562A	<b>File Na</b> 1. RE D	ne: 401219-01-016.red
62.0-					-			
60.0-								
58.0-								
56.0-								
54.0-								
52.0-								
50.0-							1	
48.0-	-					_		
46.0-	-						U	
44.0-	-							••••
42.0-	-					NULLINA		
40.0-				اير				
38.0-	M	hila Ja <sup>a</sup> yila	, All Way May		· •			
36.0-	W.	al Main II.						
34.0- 1000.0								50

Comment: 418 Remote Control and Charger

BW Table								
Frequency	BW							
1000.000000 MHz	1000000 Hz							
5000.000000 MHz								



Frequency (MHz)



Fundamental

Ambient

Test Item: Customer:		of Remote and Electronics,	•	Docking Station	_ Date: Serial	No.:		ber 2004 and X100385
Test Mode:		z Radiator wit		rge base	Job No		401219-0	
Specification	n: <u>FCC R 8</u>	R, Part 15, S	Sub-Part C		Distan	Distance: <u>3 Meters</u>		
<b>Detector Fur</b>	nction: Qu	iasi Peak	Units:	DBµV/m	Antenr	na Po	plarization:	Vertical
Bandwidth:	120 kHz	(CISPR)			Techni	ician	: M. Shee	ehy
Radiated Fie	eld Strength	Measuremer	nts		М	et Re	equirement	t Yes X No
Frequency	Meter Indicated	Antenna Factor	Cable Loss	Total Emission	Spec. Limit		Level Above Spec.	Notes
(MHz)	(DbµV)	(Db)	(Db)	(DbµV/m)	(DbµV/m)		Limit	
30	12	17.9	0.3	30.2	40.0			Ambient
416	17	17.1	1.4	35.5	46.0			Ambient
418	17	17.2	1.4	35.6	46.0			Ambient
419	17	17.2	1.4	35.6	46.0			Ambient

61.1

27.3

81.1 \*

54.0

**Remarks**: <u>\* The specification limit from para. 15.231 was used for the fundamental frequency of 433.95 MHz.</u>

433.95

1000

42

2

17.3

21.7

1.4

3.6



#### Test Title: Radiated Emissions

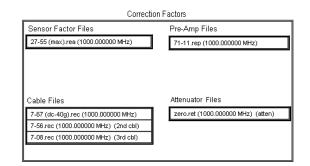
Test Procedure: FCC R & R Part 15 Sub. Part Radiated Emissions

Custon Test Ite Model I Part Ni	em: Num.:	Waterpr	I Electronics, Inc oof Remote and I and WPR-DS		ion		Job Num.: Project Eng.: Tested By: Sensor Loc.:	R. M.	01219-01-000 Monticello Sheehy ree meters from Ul	TL	
Serial I Mode c			) & X100385 Fransmit Mode				Sensor Pol.: Test Num.:	<b>°ol.:</b> Vertical			
							1. RE 2. 40	E Data	)1219-01-013.red - 1 to 5 GHz - 433 MHz Ra	idiator.rel (spec limit	, , , , , , , , , , , , , , , , , , ,
62.0-	Date:	12/2/04	Time: 4:321	PM	Analyzer:	HP85	52A				
60.0-											
58.0-											
56.0-											
54.0-											
52.0- 1									.1.1.1	in in a la la la na da	1
50.0-											
48.0-									<u>н</u> и — — — — — — — — — — — — — — — — — — —		
46.0-											
44.0-							լյոն				
42.0-					J.	11					
40.0-			<b>.</b>		MANN	MUMAN	47-14491-149-4494 47-1499-4494				
38.0-	. 16		Marything	, I Milita , Milita ,							
36.0-	M.	- WW	<del>P</del>								
34.0- 1000.0	000000								1		5000

Frequency (MHz)

Comment: 433 Remote Control and Charger







\_

Test Item:	Waterproof Remote and Waterproof Docking Station	Date:	2 December 2004
Customer:	Crestron Electronics, Inc.	Serial No.:	X100419 and X100385
Test Mode:	433 MHz Radiator with active charge base	Job No.:	401219-01-000
Specification:	FCC R & R, Part 15, Sub-Part C	Distance:	3 Meters
Detector Funct	ion: Quasi Peak Units: DBµV/m	Antenna Po	larization: Horizontal
Bandwidth:	120 kHz (CISPR)	Technician:	M. Sheehy
Radiated Field	Strength Measurements	Met Re	quirement Yes X No

Radiated Fie	eld Strength	Measuremen	ts		Met Requirement Yes X No						
Frequency	Meter Indicated	Antenna Factor	Cable Loss	Total Emission	Spec. Limit	Level Above Spec.	Notes				
(MHz)	(DbµV)	(Db)	(Db)	(DbµV/m)	(DbµV/m)	Limit					
30	9	19.5	0.3	28.8	40.0		Ambient				
416	18	17.7	1.4	37.1	46.0		Ambient				
418	19	17.8	1.4	38.2	46.0		Ambient				
419	19	17.8	1.4	38.2	46.0		Ambient				
433.95	43	17.5	1.4	61.1	81.1 *		Fundamental				
1000	14	22.8	3.6	40.4	54.0		Ambient				

**Remarks**: \* The specification limit from para. 15.231 was used for the fundamental frequency of 433.95 MHz.



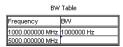
#### Test Title: Radiated Emissions

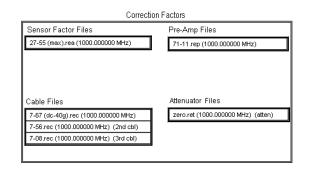
Test Procedure: FCC R & R Part 15 Sub. Part Radiated Emissions

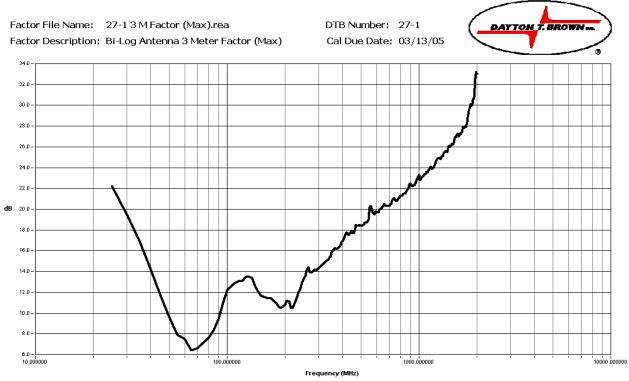
Custo Test li Model Part N	tem: I Num.:	Waterpr	Electronic oof Remote and WPR	e and Docking	g Station		Job Num.: Project Eng.: Tested By: Sensor Loc.:	401219-01-000 R. Monticello M. Sheehy Three meters from UUT
	Num.: of Op.:		) & X1003 Fransmit M			Horizontal 401219-01-012		
							1. RE D	ne: 401219-01-012.red Data ~ ~ 219-01-1 to 5 GHz - 433 MHz Radiator.rel (spec limit) ~ ~
62.0		12/2/04	Time:	4:23 PM	Analyzer:	HP8562A		
60.0	D-							
58.0	D							
56.0	D							
54.0	D							
52.0 m	D -							
50.0	D -							
48.0	D-							
46.0	0-							
44.0	D-							
42.0	D-					L.L.M.M.		
40.0	D-						• • • 1	
38.0	ار ا	NI ANN	M. M	u IIIInininininini N∏IInininini	<u>1.</u>			
36.0		WW W	<u>, , , , , , , , , , , , , , , , , , , </u>					
34.0 1000	D-							5000

Frequency (MHz)

Comment: 433 Remote Control and Charger

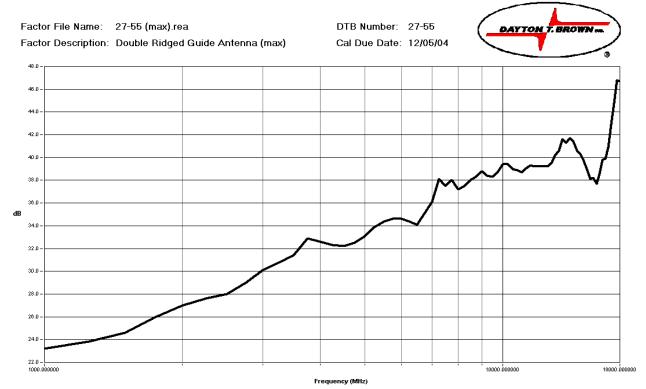






#### **CORRECTION FACTOR**

#### CORRECTION FACTOR



04-0960 Enc 3 Pg 11



Job Sub : 401219-01	TEST: Radiated Emission			
ITEM	MANUFACTURER	MODEL	<u>DTB NO.</u>	CAL DUE DATE
ANECHOIC CHAMBER, #4 20' X 20' X 10'	DAYTON T. BROWN	BEAM BLOCKER	01E-030	No Cal Required
FCC FACILITY	DAYTON T. BROWN	N/A	01E-032	No Cal Required
ANTENNA, BI-LOG	CHASE EMC	CBL6112	27-1	03/13/2005
ANTENNA, DOUBLE RIDGED GUIDE	ЕМСО	3115	27-55	12/05/2004
ANALYZER, INTERFERENCE	ELECTRO-METRICS	EMC-30	65-206	12/28/2004
ANALYZER, SPECTRUM	HEWLETT-PACKARD	8562A	65-219	12/19/2004
CABLE, TYPE N MALE ~20 FT.	DAYTON T. BROWN	NA	7-19	4/03/2005
CABLE, TYPE "N" MALE TO MALE DC – 10 GHz 24'	PASTERNACK	RG214/U	7-56	10/23/2005
CABLE, RF SMA 36" 18 GHz	GORE	PHASEFLEX EJRO1RO1036.	7-67	10/16/2005
CABLE, TYPE "N" MALE TO MALE TEST	PASTERNACK	RG214/U	7-8	4/17/2005
PREAMPLIFIER, 1-26.5 GHz	HEWLETT-PACKARD	8449B	71-11	10/22/2006





2 DECEMBER 2004 PHOTO 2

S/N: X100419, 1468551, AND X100385 M/N: WPR-48 AND WPR-DS







Enclosure 4

Occupied Bandwidth



### OCCUPIED BANDWIDTH

#### Test Procedure

The occupied bandwidth, of the Waterproof Remote, was measured using a spectrum analyzer with a bandwidth setting of 100 kHz. The spectrum analyzer was operated in the "Max Hold" mode.

The Waterproof Remote has an operating frequency of 418.0 MHz and 433.95 MHz. The maximum allowed bandwidth for devices operating above 70 MHz and below 900 MHz is 0.25% of the center frequency.

The maximum allowed bandwidth is calculated as follows:

418.0 MHz X 0.0025 = 1.0450 MHz

433.95 MHz X 0.0025 = 1.084875 MHz

The occupied bandwidth was determined at the points 20 dB down from the carrier.

#### Test Results

The test sample met the requirements of the occupied bandwidth test. The measured occupied bandwidth, from the Waterproof Remote at 418.0 MHz was 480.0 kHz and at 433.95 MHz was 790.0 kHz, at the 20 dB down point.

Detailed test results for the occupied bandwidth test can be observed on pages 2 and 3 of this enclosure.



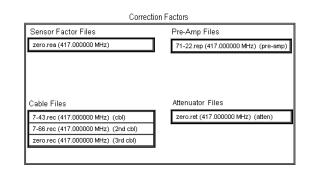
### Test Title: Occupied Bandwidth

Test Procedure: FCC R & R Part 15 Sub. Part C, Conducted Emissions

Customer: Test Item: Model Num.: Part Num.: Serial Num.:	Crestron Electronics, Inc. Waterproof Remote and Docking Station WPR-48 and WPR-DS - X100419 & X100385	Job Num.: Project Eng.: Tested By: Sensor Loc.: Sensor Pol.:	401219-01-000 R. Monticello M. Sheehy N/A
Mode of Op.:	Charge Mode	Test Num.:	- 401219-01-007
•		File Na	me: 401219-01-007.red
		1. RE [	
Deter	12/2/2004 Time: 9:38 AM Analyzer: HP85		.imit File Selected (spec limit)
42.0-	12/2/2004 Time: 9:38 AM Analyzer: HP85	002A	
40.0-		<u></u>	 ▲
38.0-	/		
36.0-			
34.0-	/	<u> </u>	
32.0-		<u>_</u>	
20.0	)	l l	20 dB
30.0-			
28.0-			
26.0-		\	
	1		
24.0-	· · · · · · · · · · · · · · · · · · ·	<b>∖</b> [	
22.0-	/	<u>}</u> ¦	
20.0-	¥	<u>\</u>	¥
18.0-	الاس	<b>^</b> \	
		i h	<b>λ</b>
16.0-			<u>M</u>
14.0-			*Mu.
40.0	480.	0 kHz —	<sup>ro</sup> un l
12.0-	A A and Williams	l l	Mul.
10.0-	Min Margher Marr		- ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
8.0-	417.77 MHz	i	Hz
	417.77 MHz	418.25 M	Hz
6.0-			-γ-η
4.0-			
417.000000			419.00000

Comment: 418 Remote Control and Charger

BW Table				
Frequency	BW			
417.000000 MHz	100000 Hz			
419.000000 MHz				





### Test Title: Occupied Bandwidth

Test Procedure: FCC R & R Part 15 Sub. Part C, Conducted Emissions

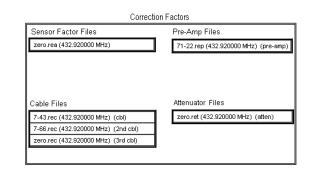
Customer: Test Item: Model Num.: Part Num.: Serial Num.: Mode of Op.:	Crestron Electronics, Inc. Waterproof Remote and Docking Station WPR-48 and WPR-DS - X100419 & X100385 Charge Mode	Job Num.:         401219-01-000           Project Eng.:         R. Monticello           Tested By:         M. Sheehy           Sensor Loc.:         N/A           Sensor Pol.:         -           Test Num.:         401219-01-009
		File Name: 401219-01-009.red 1. RE Data
		2. No Limit File Selected (spec limit)
54.0-	12/2/2004 Time: 10:27 AM Analyzer: HP8562	2A
62.0		*
52.0-	/	
50.0-		
48.0-		
46.0-	/	
44.0-		
42.0-		20 dB
40.0-	/	
38.0-	<i>}</i>	
36.0-		
34.0-		
		ų▼
32.0-		i h
30.0-	<u> </u>	
28.0-		
26.0-	/	<sup>5</sup> 74 <sub>6</sub>
	/	<b>A</b>
24.0-	790 (	0 kHz
22.0-		0 kHz
20.0-		
18.0-	433.56 MHz	434.35 MHz
16.0-		434.9200

Frequency (MHz)

000



BW Table				
Frequency	BW			
432.920000 MHz	100000 Hz			
434.920000 MHz				





Job Sub : 401219-01	TEST: Occupied Bandwidth			
ITEM	MANUFACTURER	<u>MODEL</u>	<u>DTB NO.</u>	CAL DUE DATE
GTEM CELL, 1.75 METERS	MESSELECTRONIK BERLIN	MEB G TEM 1750	27-368	10/23/2005
ANALYZER, SPECTRUM	HEWLETT-PACKARD	8562A	65-219	12/19/2004
CABLE, TYPE "N" MALE TO MALE	PASTERNACK	PE3062	7-43	10/23/2005
CABLE,18" TYPE N MALE TO MALE TEST	DAYTON T. BROWN	RG 393	7-66	05/15/2005
AMPLIFIER, 10.0 KHz – 1.0 GHz APPROX. 50 DB	MITEQ	AM-1309	71-22	03/06/2005
L.I.S.N., 10 KHz - 30 MHz 50µH 24 AMPS DUAL	SOLAR	9252-50-R-24BNC	73-92	06/05/2005