

Nemko Test Report:

0L0528RUS2

Applicant:

L.R. Nelson Corp.
One Sprinkler Lane
Peoria, IL 61615-9544

**Equipment Under Test:
(E.U.T.)**

EZ Pro Controller

FCC ID:

NYD86XX

In Accordance With:

FCC Part 15, Subpart C, 15.247
Frequency Hopping Transmitters

Tested By:

Nemko Dallas Inc.
802 N. Kealy
Lewisville, Texas 75057-3136

Authorized By:

A handwritten signature in black ink, appearing to read "Tom Tidwell", is shown within a rectangular border.

Tom Tidwell, RF Group Manager

Date:

Total Number of Pages:

56

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EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

OL0528RUS2

Section 1. Summary of Test Results

Manufacturer: L.R. Nelson Corp.

Model No.: EZ Pro Controller

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.247 for Frequency Hopping Spread Spectrum devices. Radiated tests were conducted in accordance with ANSI C63.4-1992. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit



Family Listing

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See " Summary of Test Data".

**NVLAP LAB CODE: 100426-0**

TESTED BY: _____ DATE: _____

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Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
Powerline Conducted Emissions	15.207(a)	48 dB μ V	23.05 dB μ V	Complies
Channel Separation	15.247(a)(1)	Greater of 25 kHz or 20 dB Bandwidth	85 kHz	Complies
Pseudorandom Hopping Algorithm	15.247(a)(1)	Customer Supplied	Customer Supplied	Customer Supplied
Time of Occupancy	15.247(a)(1)(ii)	$\leq$ 0.4 sec in 30 sec	0.3 sec in 30 sec.	Complies
20 dB Occupied Bandwidth	15.247(a)(1)	$\leq$ 1 MHz		Complies
Peak Power Output	15.247(b)	4 Watts EIRP	88 mW	Complies
Spurious Emissions (Antenna Conducted)	15.247(c)	-20 dBc	N/A	N/A
Spurious Emissions (Radiated)	15.247(c)	Table 15.209(a)	See Data	Complies

Footnotes:

The device does not have a detachable antenna.

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Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Frequency Band:

☐

902 – 928 MHz

☒

2400 – 2483.5 MHz

Number of Channels:

75

Channel Spacing:

85 kHz

User Frequency Adjustment:

Software controlled

Description of Modification for Modification Filing

Not Applicable

Family List Rational

Not Applicable

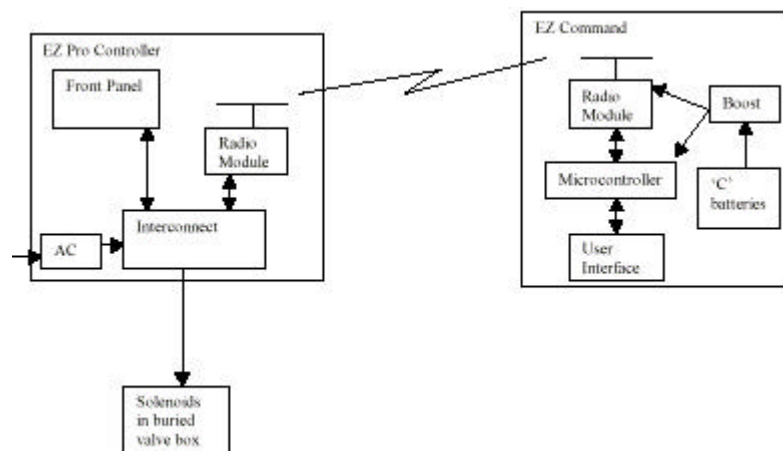
Theory of Operation

The EZ Pro is an AC Powered Irrigation Controller. The Primary input voltage is stepped down from line voltage (120VAC 60Hz Domestic, 230VAC 50Hz Export) to 24VAC (nominal), which then energizes the DC power supply and supplies power for the zones. The secondary is protected by a 1A Raychem® polyswitch (self-resetting current limiter). A microcontroller aboard the Front Panel Module controls a user interface which consists of 3 knobs and a 4 button keypad. The microcontroller keeps time using a 32kHz quartz oscillator and schedules when to turn on the appropriate zones according to what was programmed in on the user interface. The microcontroller also supplies limited diagnostic information as to the presence or absence of a fault on a zone and discontinues operation of a faulty zone. The outputs consist of 4 through 24 zones which can only be turned on one at a time, along with a secondary output (called the Pump/Master Valve) which may or may not be turned on based upon user programming.

86xxR models incorporate a radio module, which allows for extension of the user interface to a handheld device. The radio consists of a Zinc encased 2.4GHz Spread Spectrum Radio.

All of the Models use an identical enclosure, transformer, and control electronics. The only major differences between models is the number of available zones, the type of enclosure lock, inclusion of radio module, and physical size of interconnect. Instructions will be supplied appropriate to the language of the country in which the unit is sold.

System Diagram



EQUIPMENT: EZ Pro Controller*FCC ID:*

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Section 3. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions

PARA. NO.: 15.207(a)

TESTED BY: David Light

DATE: 3/16/01

Test Results: Complies.**Measurement Data:** See attached plots.**Measurement Uncertainty:** +/- .7 dB

EQUIPMENT: EZ Pro Controller

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Test Data - Powerline Conducted Emissions

Data Plot		Powerline Conducted Emissions	
Page 1 of 2		Complete ☒ Preliminary ☐	
Job No.:	OL0528R	Date:	3/16/01
Specification:	15.247	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%):	50
E.U.T.:	EZ PRO		
Configuration:	TX		
Sample Number:			
Location:	Lab 2	RBW:	10 kHz
Detector Type:	Peak	VBW:	10 kHz
Test Equipment Used			
Antenna:		Limiter:	674
Pre-Amp:		Cable #1:	1328
Filter:	968	Cable #2:	1534
Receiver:	1036	L.I.S.N.:	969
Attenuator #1:		Load:	1578
Attenuator #2:		Mixer:	
Additional equipment used:			
Measurement Uncertainty: +/-3.6 dB			

Ref		Marker 1 [T1]		RBW		RF Att	
Lvl	1	20.37 dBμV		10 kHz		10 dB	
85 dBμV		17.68256513 MHz		VBW	10 kHz	Mixer	-20 dBm
				SWT	740 ms	Unit	dBμV

Start 450 kHz 2.955 MHz Stop 30 MHz

Title: CONDUCTED EMISSIONS - L1
Date: 16.MAR.2001 8:56:05

Notes:

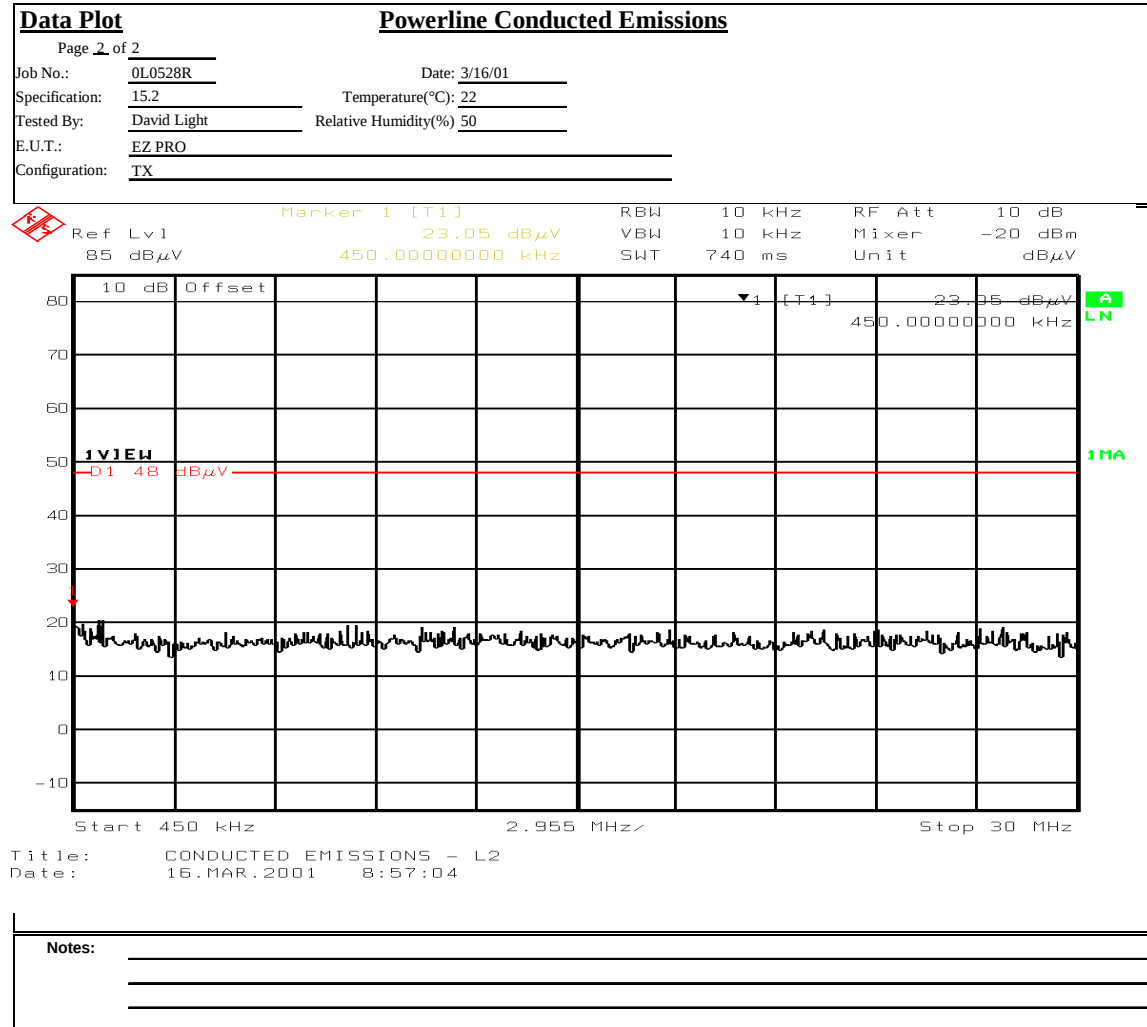
EQUIPMENT: EZ Pro Controller

FCC ID:

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Test Data - Powerline Conducted Emissions

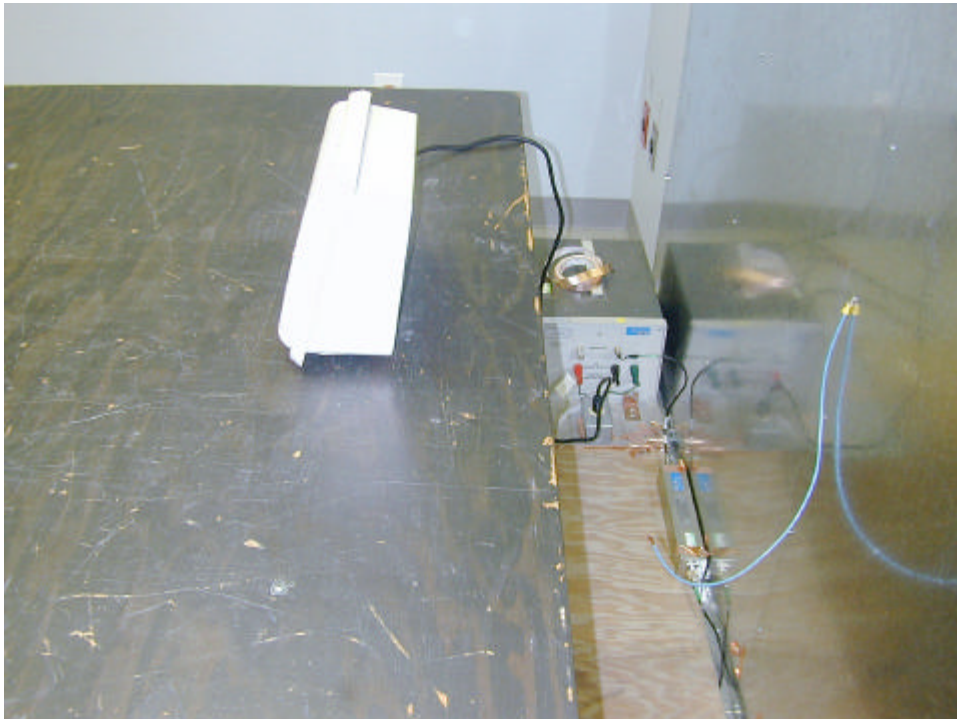


Photographs - Powerline Conducted Emissions

Front



Side



EQUIPMENT: EZ Pro Controller

FCC ID:

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Section 4. Channel Separation

NAME OF TEST: Channel Separation	PARA. NO.: 15.247(a)(1)
TESTED BY: David Light	DATE:3/16/01

Test Results: Complies.

Measurement Data: See 20 dB BW plot 81.8 kHz
Measured 20 dB bandwidth:
Channel Separation: 85 kHz

Measurement Uncertainty: +/- .7 dB

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

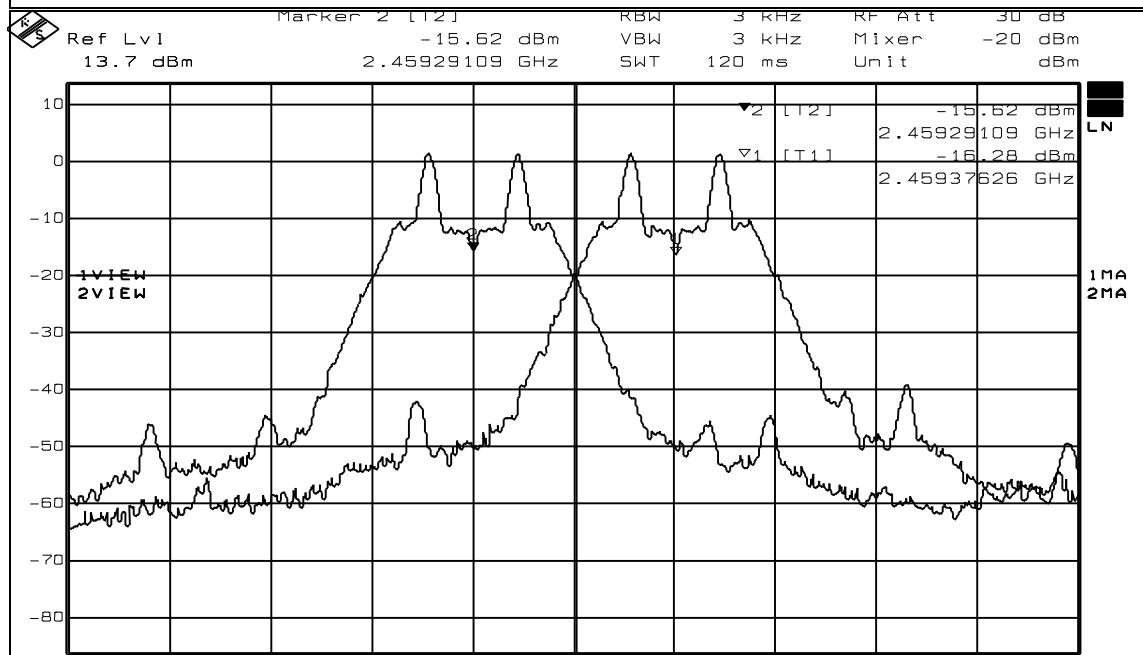
EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

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Test Data - Channel Separation

Data Plot		CHANNEL SEPERATION	
Page 1 of 1		Complete ☒ Preliminary ☐	
Job No.:	0L0528R	Date:	3/16/01
Specification:	15.247	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%):	50
E.U.T.:	EZ Pro		
Configuration:	Transmit modulated data		
Sample Number:	S08		
Location:	Lab 1	RBW:	3 kHz
Detector Type:	Peak	VBW:	3 kHz
Test Equipment Used			
Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1:		Cable #4:	
Attenuator #2:		Mixer:	
Additional equipment used: #802 Near Field Probe Set			
Measurement			
Uncertainty:	+/-3.6 dB		
			
Title: CONDUCTED EMISSIONS - L2			
Date: 16.MAR.2001 11:49:08			
Notes: HOP GROUP 1 - CHANNELS 39 & 40			
CHANNEL SEPERATION = 85 kHz			

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Section 5. Pseudorandom Hopping Algorithm

NAME OF TEST: Pseudorandom Hopping Algorithm	PARA. NO.: 15.247(a)(1)
TESTED BY: Supplied by Customer	DATE:

Test Results: Complies.

Measurement Data: See sample hopping sequence.
Number of Hopping Frequencies: 75
Number of Hopping Patterns: 8

Proposal for modification of the Nelson EZ-Pro radio system firmware to comply with pseudo-random hopping requirements of the FCC.

The Nelson EZ-Pro radio system is installed into two different types of host units: The Pro Controller (fixed, AC powered) and the EZ Programmer (mobile, battery powered). The radios are strapped by the connector wiring of the host unit into either a Master or Slave configuration. The Pro Controller contains the Master radio, and the EZ Programmer contains the Slave.

Prior to a connection attempt, a unique four-byte ID is loaded into each by the operator through the front panel user interface. This ID is used for radio addressing and connection authentication.

The Master radio is placed into a listen-only state in which it slowly hops through all available channels listening for a valid packet from a Slave radio. If one is received but does not match the stored ID, it is ignored and the radio remains in a listen-only state. The radio does not transmit during this time.

When a connection is desired, the operator activates the Slave radio, which causes it to start a transmit/receive sequence attempting to contact a Master radio. Each short transmit burst is followed immediately by a longer listen window, then the radio hops to the next channel and repeats this sequence.

When the Master radio hears a valid packet from the Slave, it validates the received ID against its own. If they match, the Master replies immediately to the Slave and is placed into "connected" mode. Upon receipt of a valid message from the Master, the Slave is now also in "connected" mode. The two radios hop in sync and continue to exchange data for the duration of the connection. This connection can be continuous, but in the interest of power savings, the Slave may terminate the connection at any time. In this case, the Master radio reverts to listen-only mode and slowly hops through all available channels listening for a valid packet from a Slave radio.

For the hopping scheme, we propose to implement a two-table lookup system. The end result is that the overall hopping pattern is much longer than the number of channels in the system.

One table, the "synthesizer table", contains the synthesizer register values for each of the 75 channels, numbered 0-74, and the other table, the "pr pattern table" contains a long list pseudo-randomly arranged pointers to entries in the synthesizer table. This table's length is a multiple of 75, guaranteeing that each channel is occupied an equal amount of time.

The Slave radio data header contains a pointer indicating the current index into the pr pattern table. The Master then uses this information to determine where it should hop next. The following diagram illustrates the new lookup scheme.

Synthesizer Table

```
;Hop group 0 :
    retlw 12h    ; LO= 2084
;Hop group 1 :
    retlw 16h    ; LO= 2085
;Hop group 2 :
    retlw 1ah    ; LO= 2086
;Hop group 3:
    retlw 1eh    ; LO= 2087
;Hop group 4 :
    retlw 12h    ; LO= 2084
;Hop group 5 :
    retlw 16h    ; LO= 2085
;Hop group 6 :
    retlw 1ah    ; LO= 2086
;Hop group 7:
    retlw 1eh    ; LO= 2087

;TX channel 0 :
    retlw 012h
    retlw 08Ch
    retlw 033h  ; Freq= 370.9775 MHz
;TX channel 1 :
    retlw 012h
    retlw 08Dh
    retlw 04Ah  ; Freq= 371.0625 MHz
;TX channel 2 :
    retlw 012h
    retlw 08Eh
    retlw 060h  ; Freq= 371.1475 MHz
;TX channel 3 :
    retlw 012h
    retlw 08Fh
    retlw 077h  ; Freq= 371.2325 MHz
;TX channel 4 :
    retlw 012h
    retlw 090h
    retlw 08Dh  ; Freq= 371.3175 MHz
;TX channel 5 :
    retlw 012h
    retlw 091h
```

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```
    retlw    0A4h ; Freq= 371.4025 MHz
;TX channel 6 :
    retlw    012h
    retlw    092h
    retlw    0BAh ; Freq= 371.4875 MHz
;TX channel 7 :
    retlw    012h
    retlw    093h
    retlw    0D1h ; Freq= 371.5725 MHz
;TX channel 8 :
    retlw    012h
    retlw    094h
    retlw    0E7h ; Freq= 371.6575 MHz
;TX channel 9 :
    retlw    012h
    retlw    095h
    retlw    0FEh ; Freq= 371.7425 MHz
;TX channel 10 :
    retlw    012h
    retlw    097h
    retlw    014h ; Freq= 371.8275 MHz
;TX channel 11 :
    retlw    012h
    retlw    098h
    retlw    02Bh ; Freq= 371.9125 MHz
;TX channel 12 :
    retlw    012h
    retlw    099h
    retlw    041h ; Freq= 371.9975 MHz
;TX channel 13 :
    retlw    012h
    retlw    09Ah
    retlw    058h ; Freq= 372.0825 MHz
;TX channel 14 :
    retlw    012h
    retlw    09Bh
    retlw    06Eh ; Freq= 372.1675 MHz
;TX channel 15 :
    retlw    012h
    retlw    09Ch
    retlw    085h ; Freq= 372.2525 MHz
;TX channel 16 :
    retlw    012h
```

EQUIPMENT: EZ Pro Controller*FCC ID:*

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```
    retlw    09Dh
    retlw    09Ch ; Freq= 372.3375 MHz
;TX channel 17 :
    retlw    012h
    retlw    09Eh
    retlw    0B2h ; Freq= 372.4225 MHz
;TX channel 18 :
    retlw    012h
    retlw    09Fh
    retlw    0C8h ; Freq= 372.5075 MHz
;TX channel 19 :
    retlw    012h
    retlw    0A0h
    retlw    0DFh ; Freq= 372.5925 MHz
;TX channel 20 :
    retlw    012h
    retlw    0A1h
    retlw    0F6h ; Freq= 372.6775 MHz
;TX channel 21 :
    retlw    012h
    retlw    0A3h
    retlw    00Ch ; Freq= 372.7625 MHz
;TX channel 22 :
    retlw    012h
    retlw    0A4h
    retlw    023h ; Freq= 372.8475 MHz
;TX channel 23 :
    retlw    012h
    retlw    0A5h
    retlw    039h ; Freq= 372.9325 MHz
;TX channel 24 :
    retlw    012h
    retlw    0A6h
    retlw    050h ; Freq= 373.0175 MHz
;TX channel 25 :
    retlw    012h
    retlw    0A7h
    retlw    066h ; Freq= 373.1025 MHz
;TX channel 26 :
    retlw    012h
    retlw    0A8h
    retlw    07Dh ; Freq= 373.1875 MHz
;TX channel 27 :
```

EQUIPMENT: EZ Pro Controller*FCC ID:*

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```
retlw 012h
retlw 0A9h
retlw 093h ; Freq= 373.2725 MHz
;TX channel 28 :
retlw 012h
retlw 0AAh
retlw 0AAh ; Freq= 373.3575 MHz
;TX channel 29 :
retlw 012h
retlw 0ABh
retlw 0C0h ; Freq= 373.4425 MHz
;TX channel 30 :
retlw 012h
retlw 0ACh
retlw 0D7h ; Freq= 373.5275 MHz
;TX channel 31 :
retlw 012h
retlw 0ADh
retlw 0EEh ; Freq= 373.6125 MHz
;TX channel 32 :
retlw 012h
retlw 0AFh
retlw 004h ; Freq= 373.6975 MHz
;TX channel 33 :
retlw 012h
retlw 0B0h
retlw 01Ah ; Freq= 373.7825 MHz
;TX channel 34 :
retlw 012h
retlw 0B1h
retlw 031h ; Freq= 373.8675 MHz
;TX channel 35 :
retlw 012h
retlw 0B2h
retlw 048h ; Freq= 373.9525 MHz
;TX channel 36 :
retlw 012h
retlw 0B3h
retlw 05Eh ; Freq= 374.0375 MHz
;TX channel 37 :
retlw 012h
retlw 0B4h
retlw 075h ; Freq= 374.1225 MHz
```

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```
;TX channel 38 :  
    retlw    012h  
    retlw    0B5h  
    retlw    08Bh ; Freq= 374.2075 MHz  
;TX channel 39 :  
    retlw    012h  
    retlw    0B6h  
    retlw    0A2h ; Freq= 374.2925 MHz  
;TX channel 40 :  
    retlw    012h  
    retlw    0B7h  
    retlw    0B8h ; Freq= 374.3775 MHz  
;TX channel 41 :  
    retlw    012h  
    retlw    0B8h  
    retlw    0CFh ; Freq= 374.4625 MHz  
;TX channel 42 :  
    retlw    012h  
    retlw    0B9h  
    retlw    0E5h ; Freq= 374.5475 MHz  
;TX channel 43 :  
    retlw    012h  
    retlw    0BAh  
    retlw    0FCh ; Freq= 374.6325 MHz  
;TX channel 44 :  
    retlw    012h  
    retlw    0BCh  
    retlw    012h ; Freq= 374.7175 MHz  
;TX channel 45 :  
    retlw    012h  
    retlw    0E3h  
    retlw    03Dh ; Freq= 377.7775 MHz  
;TX channel 46 :  
    retlw    012h  
    retlw    0E4h  
    retlw    054h ; Freq= 377.8625 MHz  
;TX channel 47 :  
    retlw    012h  
    retlw    0E5h  
    retlw    06Ah ; Freq= 377.9475 MHz  
;TX channel 48 :  
    retlw    012h  
    retlw    0E6h
```

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```
    retlw    081h    ; Freq= 378.0325 MHz
;TX channel 49 :
    retlw    012h
    retlw    0E7h
    retlw    097h    ; Freq= 378.1175 MHz
;TX channel 50 :
    retlw    012h
    retlw    0E8h
    retlw    0AEh    ; Freq= 378.2025 MHz
;TX channel 51 :
    retlw    012h
    retlw    0E9h
    retlw    0C4h    ; Freq= 378.2875 MHz
;TX channel 52 :
    retlw    012h
    retlw    0EAh
    retlw    0DBh    ; Freq= 378.3725 MHz
;TX channel 53 :
    retlw    012h
    retlw    0EBh
    retlw    0F2h    ; Freq= 378.4575 MHz
;TX channel 54 :
    retlw    012h
    retlw    0EDh
    retlw    008h    ; Freq= 378.5425 MHz
;TX channel 55 :
    retlw    012h
    retlw    0EEh
    retlw    01Eh    ; Freq= 378.6275 MHz
;TX channel 56 :
    retlw    012h
    retlw    0EFh
    retlw    035h    ; Freq= 378.7125 MHz
;TX channel 57 :
    retlw    012h
    retlw    0F0h
    retlw    04Ch    ; Freq= 378.7975 MHz
;TX channel 58 :
    retlw    012h
    retlw    0F1h
    retlw    062h    ; Freq= 378.8825 MHz
;TX channel 59 :
    retlw    012h
```

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```
    retlw    0F2h
    retlw    079h  ; Freq= 378.9675 MHz
;TX channel 60 :
    retlw    012h
    retlw    0F3h
    retlw    08Fh  ; Freq= 379.0525 MHz
;TX channel 61 :
    retlw    012h
    retlw    0F4h
    retlw    0A6h  ; Freq= 379.1375 MHz
;TX channel 62 :
    retlw    012h
    retlw    0F5h
    retlw    0BCh  ; Freq= 379.2225 MHz
;TX channel 63 :
    retlw    012h
    retlw    0F6h
    retlw    0D3h  ; Freq= 379.3075 MHz
;TX channel 64 :
    retlw    012h
    retlw    0F7h
    retlw    0E9h  ; Freq= 379.3925 MHz
;TX channel 65 :
    retlw    012h
    retlw    0F9h
    retlw    000h  ; Freq= 379.4775 MHz
;TX channel 66 :
    retlw    012h
    retlw    0FAh
    retlw    016h  ; Freq= 379.5625 MHz
;TX channel 67 :
    retlw    012h
    retlw    0FBh
    retlw    02Dh  ; Freq= 379.6475 MHz
;TX channel 68 :
    retlw    012h
    retlw    0FCh
    retlw    044h  ; Freq= 379.7325 MHz
;TX channel 69 :
    retlw    012h
    retlw    0FDh
    retlw    05Ah  ; Freq= 379.8175 MHz
;TX channel 70 :
```

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```
    retlw    012h
    retlw    0FEh
    retlw    070h ; Freq= 379.9025 MHz
;TX channel 71 :
    retlw    012h
    retlw    0FFh
    retlw    087h ; Freq= 379.9875 MHz
;TX channel 72 :
    retlw    013h
    retlw    000h
    retlw    09Eh ; Freq= 380.0725 MHz
;TX channel 73 :
    retlw    013h
    retlw    001h
    retlw    0B4h ; Freq= 380.1575 MHz
;TX channel 74 :
    retlw    013h
    retlw    002h
    retlw    0CBh ; Freq= 380.2425 MHz
```

Pseudo-random Table

prtable

```

    movlw    prtbl2<
    movwf    pclath
    movf     tall,w
    addwf    2,1

```

prtbl2

;seed = 6826

```

    retlw    25      ;0
    retlw    64      ;1
    retlw    29      ;2
    retlw    12      ;3
    retlw    45      ;4
    retlw    16      ;5
    retlw    5 ;6
    retlw    26      ;7
    retlw    59      ;8
    retlw    7 ;9
    retlw    0 ;a
    retlw    60      ;b
    retlw    2 ;c
    retlw    70      ;d
    retlw    9 ;e
    retlw    54      ;f
    retlw    46      ;10
    retlw    23      ;11
    retlw    65      ;12
    retlw    11      ;13
    retlw    44      ;14
    retlw    69      ;15
    retlw    48      ;16
    retlw    14      ;17
    retlw    47      ;18
    retlw    40      ;19
    retlw    57      ;1a
    retlw    51      ;1b
    retlw    15      ;1c
    retlw    21      ;1d
    retlw    53      ;1e
    retlw    20      ;1f
    retlw    50      ;20
    retlw    63      ;21

```

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

EQUIPMENT: EZ Pro Controller

FCC ID:

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```

retlw    71      ;22
retlw    66      ;23
retlw    52      ;24
retlw    13      ;25
retlw    67      ;26
retlw    24      ;27
retlw    73      ;28
retlw    19      ;29
retlw    30      ;2a
retlw    3 ;2b
retlw    35      ;2c
retlw    38      ;2d
retlw    74      ;2e
retlw    41      ;2f
retlw    27      ;30
retlw    1 ;31
retlw    68      ;32
retlw    72      ;33
retlw    28      ;34
retlw    36      ;35
retlw    49      ;36
retlw    18      ;37
retlw    43      ;38
retlw    31      ;39
retlw    58      ;3a
retlw    42      ;3b
retlw    8 ;3c
retlw    34      ;3d
retlw    32      ;3e
retlw    4 ;3f
retlw    62      ;40
retlw    6 ;41
retlw    37      ;42
retlw    17      ;43
retlw    10      ;44
retlw    55      ;45
retlw    61      ;46
retlw    56      ;47
retlw    22      ;48
retlw    39      ;49
retlw    33      ;4a
;seed = 8866
retlw    39      ;4b

```

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

0L0528RUS2

retlw	60	;4c
retlw	32	;4d
retlw	68	;4e
retlw	26	;4f
retlw	45	;50
retlw	42	;51
retlw	15	;52
retlw	46	;53
retlw	29	;54
retlw	25	;55
retlw	63	;56
retlw	54	;57
retlw	40	;58
retlw	9	;59
retlw	66	;5a
retlw	50	;5b
retlw	65	;5c
retlw	20	;5d
retlw	30	;5e
retlw	11	;5f
retlw	72	;60
retlw	7	;61
retlw	18	;62
retlw	34	;63
retlw	38	;64
retlw	19	;65
retlw	49	;66
retlw	10	;67
retlw	74	;68
retlw	52	;69
retlw	12	;6a
retlw	53	;6b
retlw	13	;6c
retlw	44	;6d
retlw	14	;6e
retlw	43	;6f
retlw	48	;70
retlw	70	;71
retlw	57	;72
retlw	21	;73
retlw	62	;74
retlw	28	;75
retlw	69	;76

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

0L0528RUS2

```

retlw    37      ;77
retlw    47      ;78
retlw    56      ;79
retlw    5 ;7a
retlw    73      ;7b
retlw    6 ;7c
retlw    41      ;7d
retlw    59      ;7e
retlw    67      ;7f
retlw    33      ;80
retlw    24      ;81
retlw    61      ;82
retlw    17      ;83
retlw    3 ;84
retlw    27      ;85
retlw    23      ;86
retlw    58      ;87
retlw    71      ;88
retlw    51      ;89
retlw    1 ;8a
retlw    4 ;8b
retlw    22      ;8c
retlw    36      ;8d
retlw    16      ;8e
retlw    35      ;8f
retlw    2 ;90
retlw    8 ;91
retlw    64      ;92
retlw    0 ;93
retlw    31      ;94
retlw    55      ;95
;seed = 4596
retlw    17      ;96
retlw    26      ;97
retlw    23      ;98
retlw    13      ;99
retlw    19      ;9a
retlw    16      ;9b
retlw    10      ;9c
retlw    51      ;9d
retlw    9 ;9e
retlw    56      ;9f
retlw    34      ;a0

```

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

0L0528RUS2

```
retlw 2 ;a1
retlw 61 ;a2
retlw 64 ;a3
retlw 31 ;a4
retlw 46 ;a5
retlw 63 ;a6
retlw 41 ;a7
retlw 36 ;a8
retlw 68 ;a9
retlw 47 ;aa
retlw 32 ;ab
retlw 28 ;ac
retlw 54 ;ad
retlw 70 ;ae
retlw 52 ;af
retlw 48 ;b0
retlw 18 ;b1
retlw 20 ;b2
retlw 25 ;b3
retlw 71 ;b4
retlw 6 ;b5
retlw 24 ;b6
retlw 53 ;b7
retlw 58 ;b8
retlw 4 ;b9
retlw 74 ;ba
retlw 38 ;bb
retlw 69 ;bc
retlw 66 ;bd
retlw 15 ;be
retlw 44 ;bf
retlw 5 ;c0
retlw 1 ;c1
retlw 8 ;c2
retlw 33 ;c3
retlw 60 ;c4
retlw 30 ;c5
retlw 7 ;c6
retlw 73 ;c7
retlw 29 ;c8
retlw 11 ;c9
retlw 27 ;ca
retlw 3 ;cb
```

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

0L0528RUS2

retlw	42	;cc
retlw	45	;cd
retlw	22	;ce
retlw	40	;cf
retlw	43	;d0
retlw	14	;d1
retlw	0	;d2
retlw	37	;d3
retlw	49	;d4
retlw	55	;d5
retlw	21	;d6
retlw	62	;d7
retlw	65	;d8
retlw	57	;d9
retlw	12	;da
retlw	72	;db
retlw	35	;dc
retlw	59	;dd
retlw	67	;de
retlw	39	;df
retlw	50	;e0

EQUIPMENT: EZ Pro Controller*FCC ID:*

PROJECT NO.:

0L0528RUS2

Section 6. Time of Occupancy

NAME OF TEST: Time of Occupancy

PARA. NO.: 15.247(a)(1)

TESTED BY: David Light

DATE:3/19/01

Test Results: Complies.**Measurement Data:**

Maximum Dwell Time On Any Channel:

300 mS in 30 seconds
See Plot

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

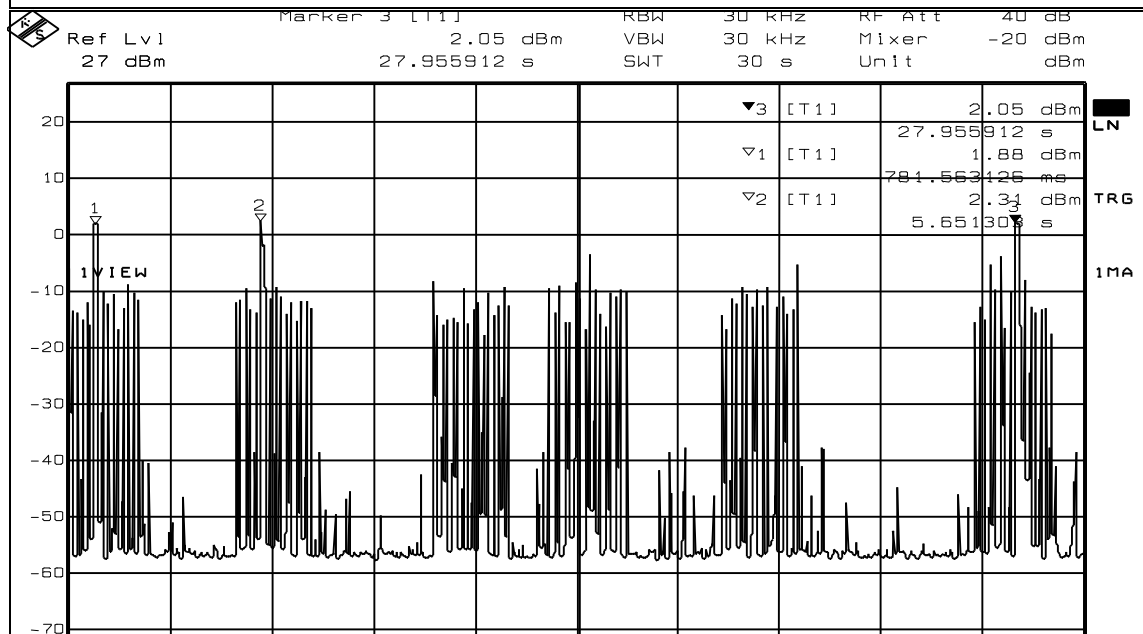
EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

OL0528RUS2

Test Data-Time of Occupancy

Data Plot		Time of Occupancy	
Page 1 of 2		Complete ☒ Preliminary ☐	
Job No.:	OL0528R	Date:	3/19/01
Specification:	15.247	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%)	50
E.U.T.:	EZ Pro		
Configuration:	Transmit modulated data		
Sample Number:	S08		
Location:	Lab 1	RBW:	Refer to Plots
Detector Type:	Peak	VBW:	Refer to Plots
Test Equipment Used			
Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1:		Cable #4:	
Attenuator #2:		Mixer:	
Additional equipment used: #802 Near Field Probe Set			
Measurement			
Uncertainty:	+/-3.6 dB		
			
Center 2.459405354 GHz 3 s/			
Title: CONDUCTED EMISSIONS - L2			
Date: 19.MAR.2001 13:36:36			
Notes: 3 PULSES IN 30 SECOND PERIOD			
100 mS / pulse			

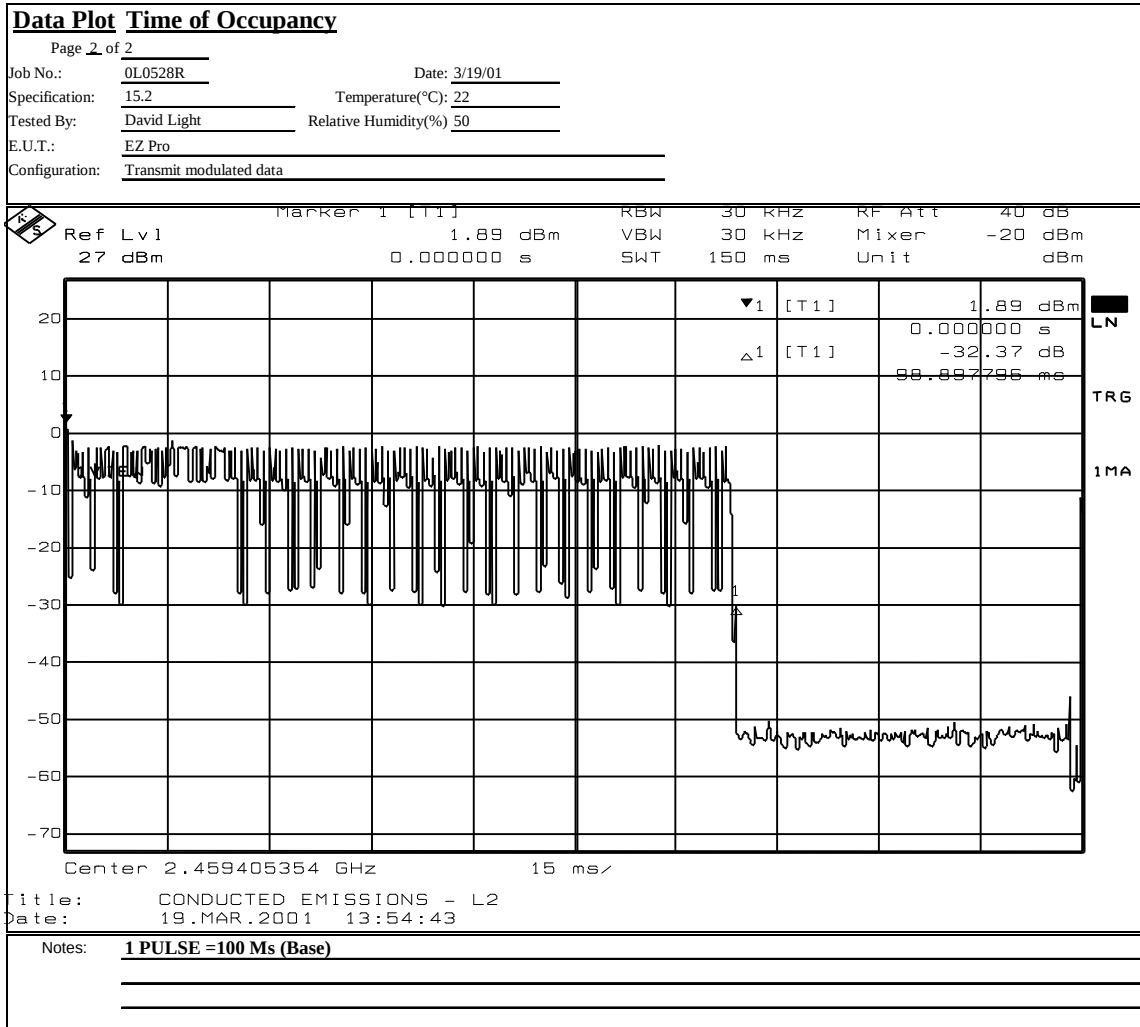
EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

0L0528RUS2

Test Data-Time of Occupancy



EQUIPMENT: EZ Pro Controller*FCC ID:*

PROJECT NO.:

0L0528RUS2

Section 7. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(1)(i)
TESTED BY: David Light	DATE:3/16/01

Test Results: Complies.**Measurement Data:** See attached plots.**Measurement Uncertainty:** +/-).7 dB

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

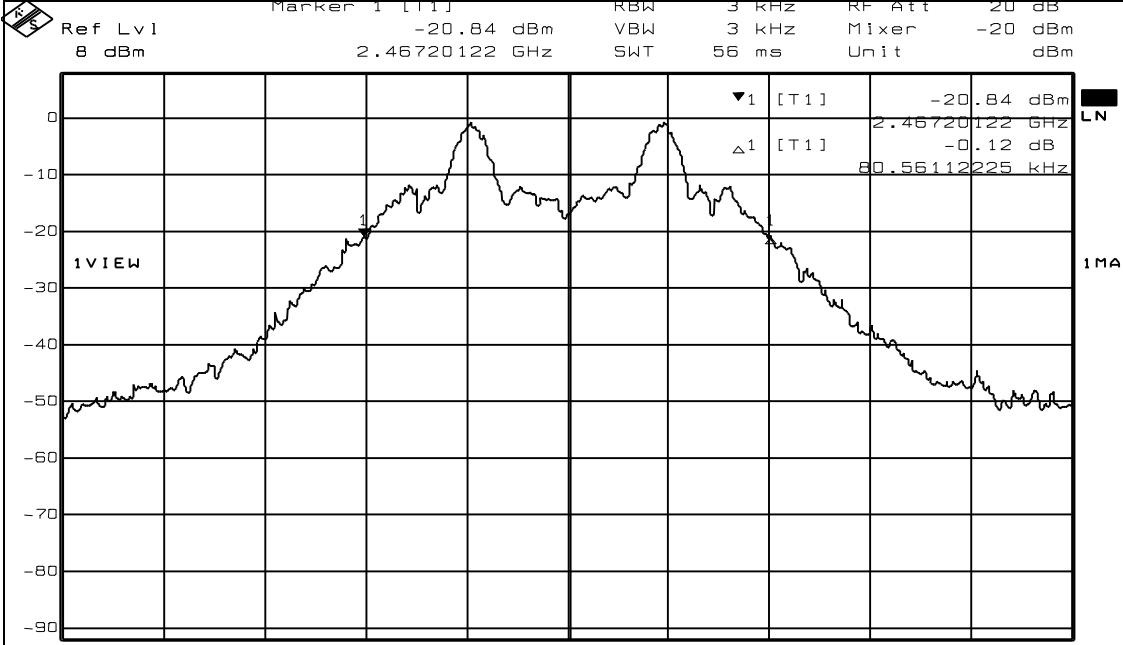
EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

0L0528RUS2

Test Data – Occupied Bandwidth

Data Plot		20 dB Bandwidth	
Page 1 of 3		Complete <u>X</u>	
Job No.:	0L0528R	Date:	3/16/01
Specification:	15.247	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%):	50
E.U.T.:	EZ Pro		
Configuration:	Transmit modulated data		
Sample Number:	S08		
Location:	Lab 1	RBW:	3 kHz
Detector Type:	Peak	VBW:	3 kHz
Test Equipment Used			
Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1:		Cable #4:	
Attenuator #2:		Mixer:	
Additional equipment used: #802 Near Field Probe Set			
Measurement Uncertainty: +/-3.6 dB			
			
Title: CONDUCTED EMISSIONS - L2			
Date: 16.MAR.2001 11:33:05			
Notes: <u>Highest channel</u>			
<u>HOP GROUP 7 - CHANNEL 74</u>			

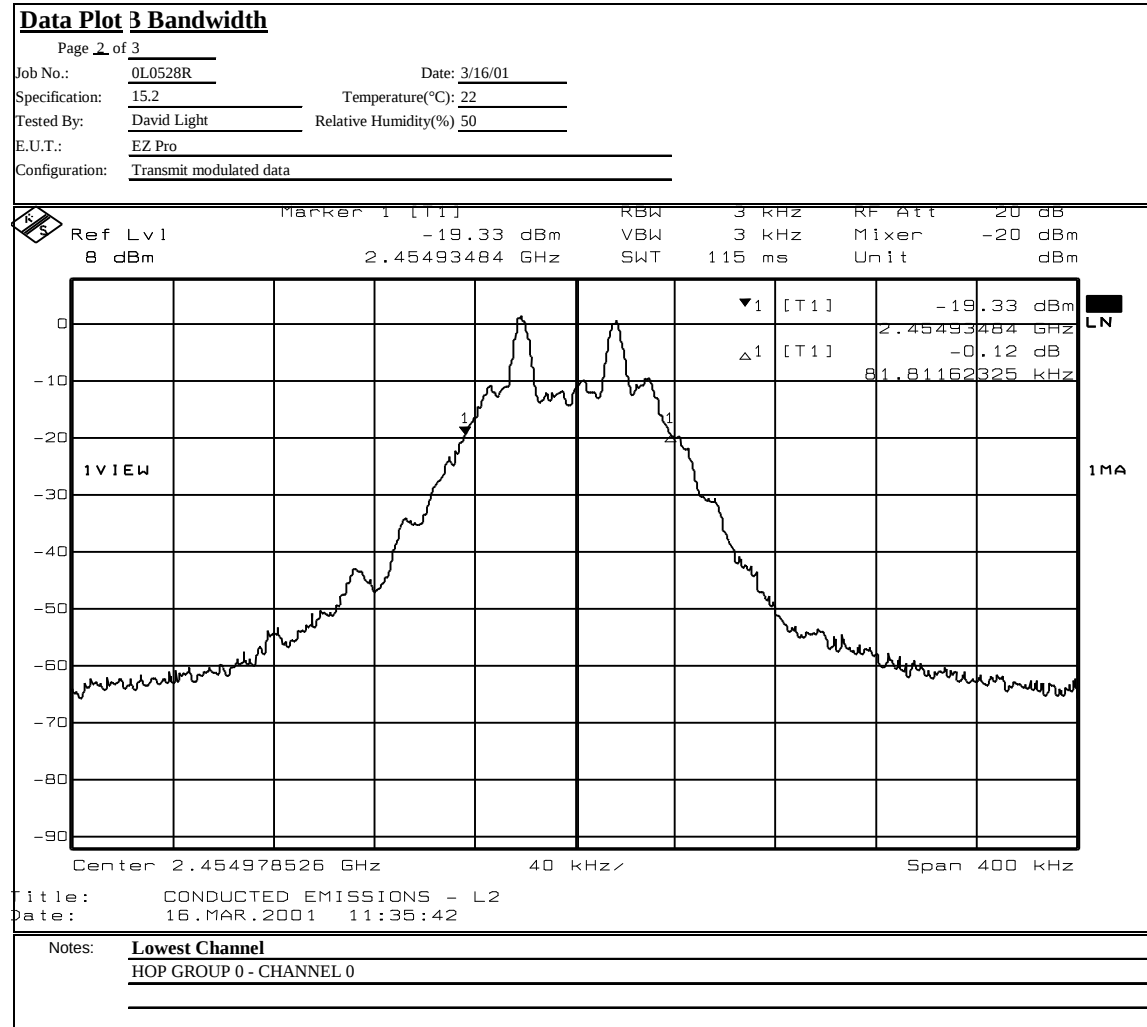
EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

0L0528RUS2

Test Data – Occupied Bandwidth



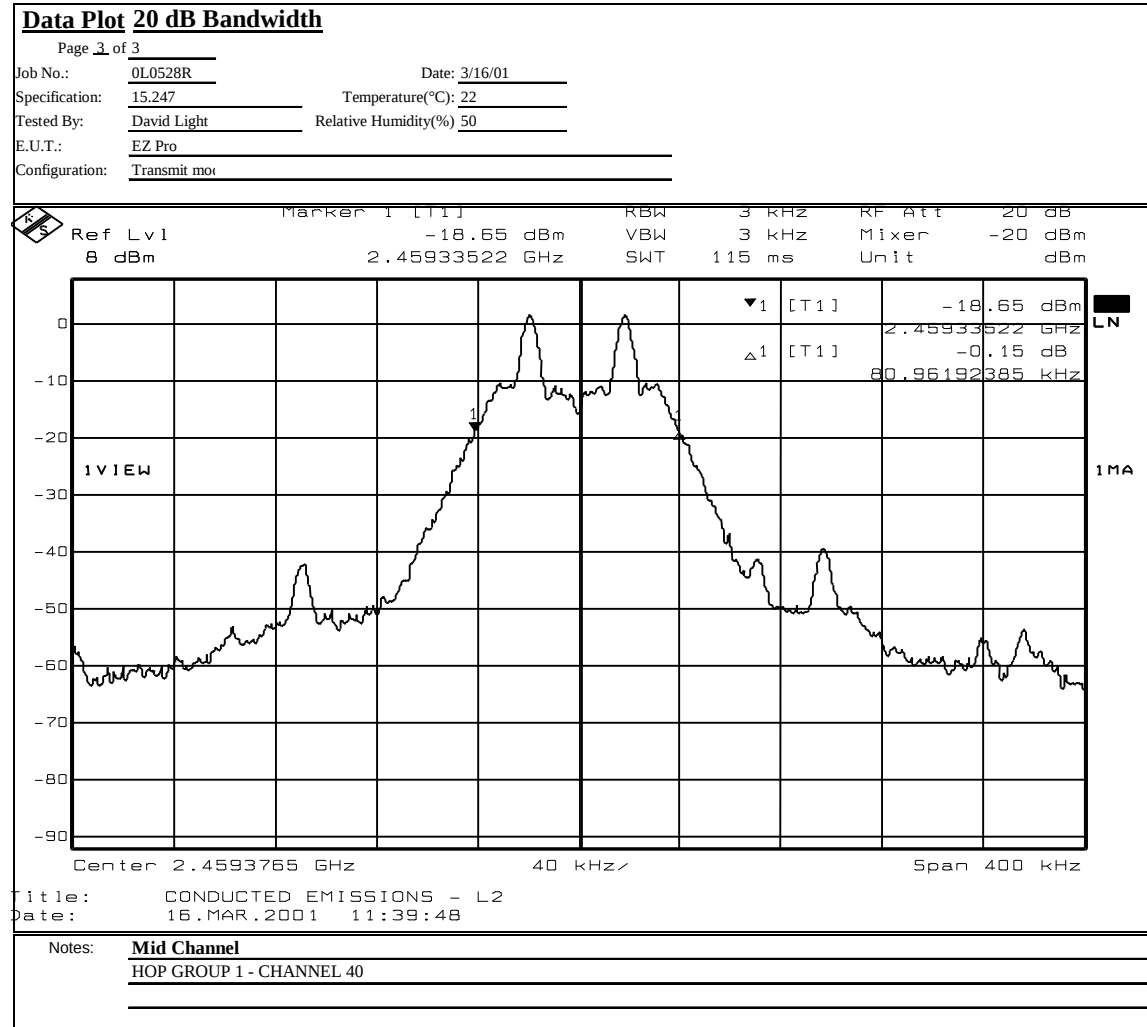
EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

0L0528RUS2

Test Data – Occupied Bandwidth



EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

0L0528RUS2

Section 8. Peak Power Output

NAME OF TEST: Peak Power Output

PARA. NO.: 15.247 (b)

TESTED BY: David Light

DATE: 3/14/01

Test Results: Complies.**Measurement Data:** See attached plots.

Detachable antenna?

☐

Yes

☒

No

If yes, state the type of non-standard
connector used:**Antennas:**

///

Model	Type	Manufacturer	Gain (dBi)	E.I.R.P. (dBm)
Peak power output at antenna port(dBm):				

Note: [Refer to measurement data in Section 10-Spurious Emissions \(Radiated\)](#)**Measurement Uncertainty:** +/- .7 dB

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

0L0528RUS2

Section 9. Spurious Emissions (Antenna Conducted)

NAME OF TEST: Spurious Emissions (Antenna Conducted) PARA. NO.: 15.247(c)

TESTED BY:

DATE:

Test Results: Complies.

Measurement Data: See attached

Measurement Uncertainty: ± 0.7 dB

Not Applicable

EQUIPMENT: EZ Pro Controller*FCC ID:*

PROJECT NO.:

0L0528RUS2

Section 10. Spurious Emissions (Radiated)

NAME OF TEST: Spurious Emissions (Radiated)

PARA. NO.: 15.247(c)

TESTED BY: David Light

DATE:3/14/01

Test Results: Complies.**Measurement Data:** See attached table.**Duty Cycle Calculation:** None**Measurement Uncertainty:** +/- .7 dB

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

OL0528RUS2

Test Data - Radiated Emissions (Restricted Bands)

Radiated Emissions								
Page 1 of 1								
Job No.: 0L0528R		Date: 3/13/01						
Specification: 15.247		Temperature(°C): 22						
Tested By: David Light		Relative Humidity(%) 50						
E.U.T.: EZ PRO BASE								
Configuration: TX AT LO, MID & HI CHANNELS								
Sample Number:								
Location: AC 3		RBW: 1 MHz						
Detector Type: Average		VBW: 3 kHz						
Test Equipment Used								
Antenna: 993		Directional Coupler: #N/A						
Pre-Amp: 1016		Cable #1: 1484						
Filter: 1482		Cable #2: 1485						
Receiver: 1036		Cable #3: #N/A						
Attenuator #1: #N/A		Cable #4: #N/A						
Attenuator #2: #N/A		Mixer: #N/A						
Measurement Uncertainty: +/- .7 dB								
Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Comment
4.931	40.6	33.8	4.3	32.8	45.9	54	-8.1	Horizontal
7.397	39.7	35.9	5.3	33	47.9	54	-6.1	Horizontal
12.328	34.5	40.2	7.3	36.7	45.3	54	-8.7	Horizontal - Noise Floor
4.931	42.9	33.8	4.3	32.8	48.2	54	-5.8	Vertical
7.397	36.2	35.9	5.3	33	44.4	54	-9.6	Vertical
12.328	34.5	40.2	7.3	36.7	45.3	54	-8.7	Vertical - Noise Floor
4.91	40.1	33.8	4.3	32.8	45.4	54	-8.6	Horizontal
7.365	38.1	35.9	5.3	33	46.3	54	-7.7	Horizontal
12.274	34.5	40.2	7.3	36.7	45.3	54	-8.7	Horizontal - Noise Floor
4.91	41.3	33.8	4.3	32.8	46.6	54	-7.4	Vertical
7.365	39	35.9	5.3	33	47.2	54	-6.8	Vertical
12.274	34.5	40.2	7.3	36.7	45.3	54	-8.7	Vertical - Noise Floor
4.924	41.7	33.8	4.3	32.8	47.0	54	-7.0	Vertical
7.386	37.6	35.9	5.3	33	45.8	54	-8.2	Vertical
12.31	34.5	40.2	7.3	36.7	45.3	54	-8.7	Vertical - Noise Floor
4.924	39.8	33.8	4.3	32.8	45.1	54	-8.9	Horizontal
7.386	40.1	35.9	5.3	33	48.3	54	-5.7	Horizontal
12.31	34.5	40.2	7.3	36.7	45.3	54	-8.7	Horizontal - Noise Floor
Notes: Added ECCOSORB LS-26/SS-3 (1/8" thickness) to inside of radio case								

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

OL0528RUS2

Test Data - Radiated Emissions

Field Strength of Spurious Emissions										
Page 1 of 1		Complete ☒								
Job No.: OL0528R		Date: 3/15/01		Preliminary ☐						
Specification: 15.247		Temperature(°C): 22								
Tested By: Tom Tidwell		Relative Humidity(%): 50								
E.U.T.: EZ PRO BASE										
Configuration: TX FULL POWER - UPRIGHT -INTENDED INSTALLATION ORIENTATION										
Sample No:										
Location: AC 3		RBW: 1 MHz		Measurement						
Detector Type: Average		VBW: 30 kHz		Distance: 3 m						
Test Equipment Used										
Antenna: 993		Directional Coupler:								
Pre-Amp:		Cable #1: 1484								
Filter:		Cable #2: 1485								
Receiver: 1036		Cable #3:								
Attenuator #1:		Cable #4:								
Attenuator #2:		Mixer:								
Additional equipment used:										
Measurement Uncertainty: +/-3.6 dB										
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)	Limit (dBm)	ERP (dBm)	ERP (mW)	Polarity	Comments
2454.9	-40.0	34.1		0	6.9	36.0	0.9	1.230269	V	CARRIER - LO CH.
9819.6	-66.5	40.4		36.3	10.5	-20.5	-51.9	0.000007	V	
14729.4	-66.9	48.1		34.1	10.1	-20.5	-42.8	0.000053	V	NOISE FLOOR
17184.3	-65.8	47.0		34.5	11.7	-20.5	-41.5	0.000070	V	NOISE FLOOR
2454.9	-30.1	36.7		0	6.9	36.0	13.4	22.029265	H	CARRIER - LO CH.
9819.6	-65.7	42.6		36.3	10.5	-20.5	-48.9	0.000013	H	
14729.4	-66.9	48.7		34.1	10.1	-20.5	-42.2	0.000060	H	NOISE FLOOR
17184.3	-65.8	50.5		34.5	11.7	-20.5	-38.1	0.000156	H	NOISE FLOOR
2461.5	-30.5	36.7		0	6.9	36.0	13.0	20.090928	H	CARRIER - MID CH.
9846	-66.5	42.6		36.3	10.5	-20.5	-49.7	0.000011	H	
14769	-66.9	48.7		34.1	10.1	-20.5	-42.2	0.000060	H	NOISE FLOOR
17231	-65.8	50.5		34.5	11.7	-20.5	-38.1	0.000156	H	NOISE FLOOR
2461.5	-40.2	34.1		0	6.9	36.0	0.7	1.174898	V	CARRIER - MID CH.
9846	-66.0	40.4		36.3	10.5	-20.5	-51.4	0.000007	V	
14769	-66.9	48.1		34.1	10.1	-20.5	-42.8	0.000053	V	NOISE FLOOR
17231	-65.8	47.0		34.5	11.7	-20.5	-41.5	0.000070	V	NOISE FLOOR
2465.55	-41.4	34.1		0	6.9	36.0	-0.5	0.891251	V	CARRIER - HI CH.
9862.2	-67.5	40.4		36.3	10.5	-20.5	-52.9	0.000005	V	NOISE FLOOR
14793.3	-66.9	48.1		34.1	10.1	-20.5	-42.8	0.000053	V	NOISE FLOOR
17258.9	-65.8	47.0		34.5	11.7	-20.5	-41.5	0.000070	V	NOISE FLOOR
2465.55	-30.9	36.7		0	6.9	36.0	12.6	18.323144	H	CARRIER - HI CH.
9862.2	-65.1	42.6		36.3	10.5	-20.5	-48.3	0.000015	H	
14793.3	-66.9	48.7		34.1	10.1	-20.5	-42.2	0.000060	H	NOISE FLOOR
17258.9	-65.8	50.5		34.5	11.7	-20.5	-38.1	0.000156	H	NOISE FLOOR
Notes: SCANNED HARMONICS OF CARRIER TO THE 10TH HARMONIC EXCLUDING THOSE FREQUENCIES THAT FALL IN THE RESTRICTED BANDS OF OPERATION PER 15.205										

Limit of -20.5 dBm was derives from -20 dBc from lowest carrier power measured.

Radiated Photographs (Worst Case Configuration)

FRONT VIEW



REAR VIEW



FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

0L0528RUS2

Section 11. Test Equipment List

ASSET	Description	Manufacturer Model Number	Serial Number	Cal. Date	Cal. Due
993	Horn antenna	A.H. Systems SAS-200/571	XXX	07/16/99	07/16/01
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	06/14/99	06/14/01
1043	Flexible cable 1m	Astrolab Inc. 32027-2-29094K-1M	0	01/29/01	01/29/02
802	Near Field Probe Set	EMCO 7405	103	CNR	CNR
1482	Band Pass Filter	K & L 11SH10-4000/T12000-0/0	2	Cal B4 Use	N/A
1016	AMPLIFIER	HEWLETT PACKARD 8449A	2749A00159	05/24/00	05/24/01
968	Filter, High pass 5khz	Solartron 7930-5.0	933124	08/04/00	08/04/01
674	LIMITER	HP 11947A	3107A02200	11/04/00	11/04/01
1328	CABLE, .5m	KTL RG223	N/A	03/12/01	03/12/02
1534	CABLE, 9M	KTL RG223	NA	08/30/00	08/30/01
969	lisn	Schwarzbeck 8120	8120281	07/01/00	07/01/01
1578	50 Ohm Load	Mini-Circuits MCLBTRM-50	920513	01/12/01	01/12/02
1578	50 Ohm Load	Mini-Circuits MCLBTRM-50	920513	01/12/01	01/12/02
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	05/25/00	05/25/01
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	05/25/00	05/25/01

ANNEX A - TEST DETAILS

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

0L0528RUS2

NAME OF TEST: Powerline Conducted Emissions

PARA. NO.: 15.207(a)

Minimum Standard:

The R.F. that is conducted back onto the AC power line on any frequency within the band 0.45 to 30 MHz shall not exceed 250 μ V (48 dB μ V) across 50 ohms.

Nemko Dallas

FCC PART 15, SUBPART C

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

0L0528RUS2

NAME OF TEST: Channel Separation

PARA. NO.: 15.247(a)(1)

Minimum Standard:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

EQUIPMENT: EZ Pro Controller*FCC ID:*

PROJECT NO.:

OL0528RUS2

NAME OF TEST: Pseudorandom Hopping Algorithm

PARA. NO.: 15.247(a)(1)

Minimum Standard:

The system shall hop to channel frequencies that are selected from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their transmitters and shall shift frequencies in synchronization with the transmitted signals.

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

OL0528RUS2

NAME OF TEST: Time of Occupancy

PARA. NO.: 15.247(a)(1)(ii)

Minimum Standard:

Frequency Band (MHz)	20 dB Bandwidth	No. of Hopping Channels	Average Time of Occupancy
902 - 928	<250 kHz	50	=<0.4 sec. in 20 sec.
902 - 928	=>250 kHz	25	=<0.4 sec. in 10 sec.
2400 - 2483.5	-----	75	=<0.4 sec. in 30 sec.
5725 - 5850	-----	75	=<0.4 sec. in 30 sec.

Method Of Measurement:

The spectrum analyzer is set as follows:

RBW: 1 MHz

VBW: = RBW

Span: 0 Hz

LOG dB/div.: 10 dB

Sweep: Sufficient to see one hop time sequence.

Trigger: Video

The occupancy time of one hop is measured as above. The average time of occupancy is calculated over the appropriate period of time from above table (10, 20, or 30 seconds).

Avg. time of occupancy = (period from table/duration of one hop)/no. of channels multiplied by the duration of one hop.

For instance:

If a 2.4 GHz system has a measured hop duration time of 1 msec. and uses 75 channels, then the average time of occupancy would be:

$(30 \text{ sec.} / .001 \text{ sec.}) / 75 \text{ chan.} = 400 \times 1 \text{ msec.} = 400 \text{ msec. or } 0.4 \text{ sec. in } 30 \text{ sec.}$

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

OL0528RUS2

NAME OF TEST: Occupied Bandwidth

PARA. NO.: 15.247(a)(2)

Minimum Standard:

Frequency Band (MHz)	Maximum 20 dB Bandwidth
902 - 928	500 kHz
2400 – 2483.5	1 MHz
5725 – 5850	1 MHz

Method Of Measurement:

The spectrum analyzer is set as follows:

RBW: At least 1% of span/div.

VBW: >RBW

Span: Sufficient to display 20 dB bandwidth

LOG dB/div.: 10 dB

Sweep: Auto

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

OL0528RUS2

NAME OF TEST: Peak Power Output

PARA. NO.: 15.247(b)

Minimum Standard:

Frequency Band (MHz)	No. of Hopping Channels	Maximum Peak Power Output at Antenna Port
902 - 928	at least 50	1 watt
902 – 928	25 - 49	0.25 watts
2400 – 2483.5	75	1 watt
5725 – 5850	75	1 watt

If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point to point operation may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceed 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operation may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Direct Measurement Method For Detachable Antennas:

If the antenna is detachable, a peak power meter is used to measure the power output with the transmitter operating into a 50 ohm load. The dBi gain of the antenna(s) employed shall be reported.

Calculation Of EIRP For Integral Antenna:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

The RBW of the spectrum analyzer shall be set to a value greater than the measured 20 dB occupied bandwidth of the E.U.T.

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

OL0528RUS2

NAME OF TEST: Spurious Emissions at Antenna Terminals PARA. NO.: 15.247(c)

Minimum Standard:

In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits. Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength (mV/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC**Method Of Measurement:**

30 MHz - 10th harmonic plot

RBW: 100 kHz

VBW: 300 kHz

Sweep: Auto

Display line: -20 dBc

Lower Band Edge

RBW: At least 1% of span/div.

VBW: >RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 902 MHz, 2400 MHz, or 5725 MHz

Marker: Peak of fundamental emission

Marker Δ: Peak of highest spurious level below center frequency.

Upper Band Edge

RBW: At least 1% of span/div.

VBW: >RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 928 MHz, 2483.5 MHz, or 5850 MHz

Marker: Peak of fundamental emission

Marker Δ: Peak of highest spurious level above center frequency.

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

EQUIPMENT: EZ Pro Controller

FCC ID:

PROJECT NO.:

OL0528RUS2

NAME OF TEST: Radiated Spurious Emissions

PARA. NO.: 15.247(c)

Minimum Standard: In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits:

Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength (mV/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC

15.205 Restricted Bands

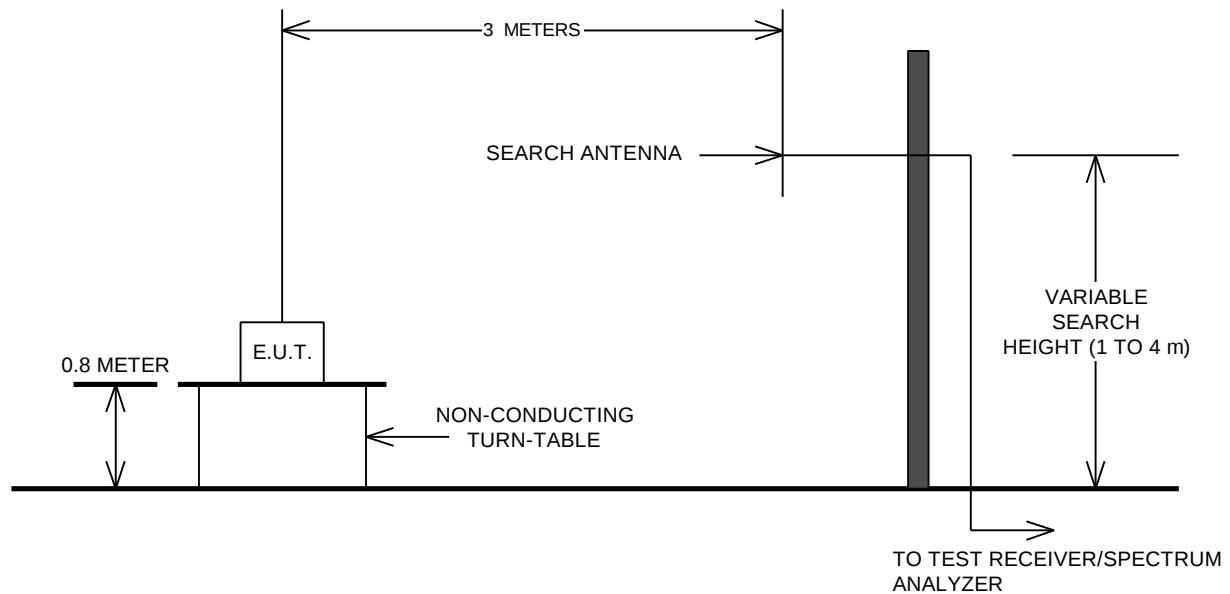
MHz	MHz	MHz	GHz
0.09-0.11	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.125-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41	1718		

Number of channels tested:

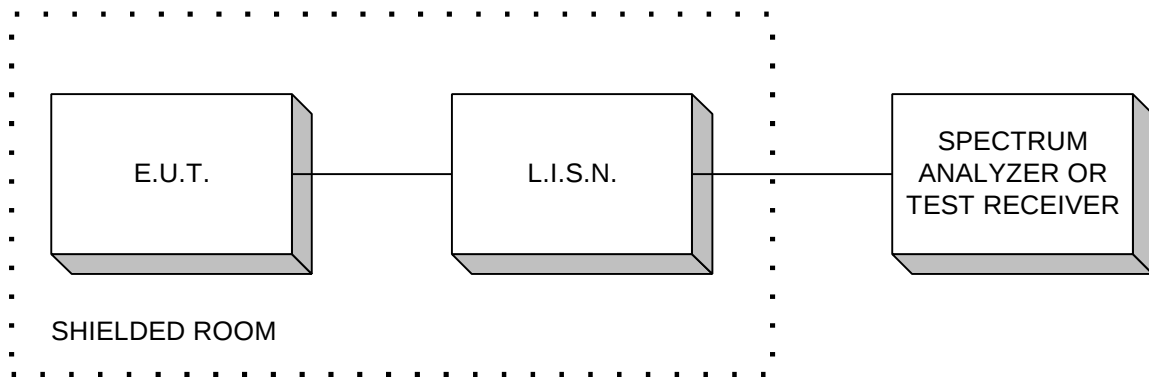
Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

ANNEX B - TEST DIAGRAMS

Test Site For Radiated Emissions



Conducted Emissions



Peak Power At Antenna Terminals

