

NEMKO Test Report: 2L0355RUS1

Applicant: Indyme
9085 Aero Avenue
San Diego, CA 92123

**Equipment Under Test:
(E.U.T.)** CB511, CB514, CB440, CB475 Family

In Accordance With: **FCC Part 15, Subpart C**
For Low Power Transmitters Operating Periodically
In The Band 40.66 - 40.77 MHz And Above 70 MHz

Tested By: NEMKO Dallas, Inc.
802 N. Kealy
Lewisville, TX 75057-3136

Authorized By:



Tom Tidwell, RF Group Manager

Date: 8/28/02

Total No. of Pages: 25

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Section 1. Summary of Test Results

Manufacturer: Indyme

Model Nos.: CB511
CB514
CB440
CB475General: **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 15.231. All tests were conducted using measurement procedure 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

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. **None**

See " Summary of Test Data".

**NVLAP LAB CODE: 100426-0**

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This report applies only to the items tested.

Summary Of Test Data

Transmission Requirements	15.231(a)	Complies
Radiated Emissions	15.231(b)	Complies
Occupied Bandwidth	15.231(c)	Complies
Frequency Tolerance	15.231(d)	N/A
Alternate Field Strength Requirements	15.231(e)	N/A
Powerline Conducted Emissions	15.207	N/A

Footnotes:

The device does not operate in this band.

The device does not transmit at periodic pre-determined intervals.

The device is battery powered.

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

General Equipment Information

	303.8 MHz Nominal
	303.8 MHz
	Pulsed
	Lifetime integral battery
	-15.7 dB

Description of E.U.T.

The unit is a microprocessor controlled callbox that is a self contained low transmit power unit with an integral lifetime battery (estimated lifetime is 7-10 years under normal use). It is installed in a nonconductive plastic enclosure with customer specific graphic overlays.

Modifications Incorporated in E.U.T.

The EUT has not been modified from what is described by the brand name and unique type identification stated above.

Family List Rational

All the devices listed in this family utilize the same radio and printed circuit board layout. The only difference being the plastic enclosure.

Justification

The E.U.T. was configured for testing as per typical installation.

The following combinations were investigated to establish worst case configuration:

- (1) Lying flat
- (2) Upright
- (3) Lying on edge

Exercise Mode

The E.U.T. exercise mode used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

Exercise mode:

- (1) Transmit all wide pulses at full power

Section 3. Equipment Configuration

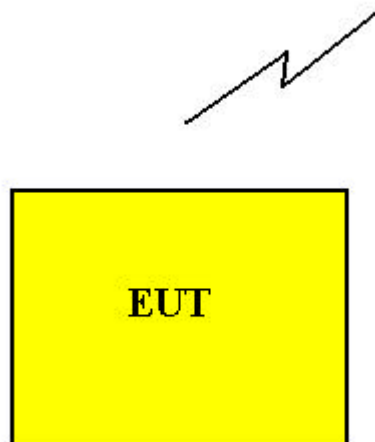
Equipment Configuration List:

(A)	Callbox	CB511	None
(B)	Callbox	CB540	None
(C)	Callbox	CB440	None
(D)	Callbox	CB475	None

Inter-connection Cables:

(1)	The device has no detachable cables	

Configuration of the Equipment Under Test (E.U.T)



Section 4. Transmission Requirements

NAME OF TEST: Transmission Requirements	PARA. NO.: 15.231(a)
TESTED BY: David Light	DATE: 8/24/2002

Minimum Standard:

15.231(a) Continuous transmissions such as voice, video or data transmissions are not permitted.

15.231(a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds after being released.

15.231(a)(2) A transmitter activated automatically shall cease transmission within 5 seconds of activation.

15.231(a)(3) Periodic transmissions at regular pre-determined intervals are not permitted. However polling or supervisory transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.

15.231(a)(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm.

Test Results:

Complies.

Test Data:

Compliance was determined by verification of technical specifications and a functional test on the equipment.

Test Plot – Transmitter Release Time



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Data Plot		Transmitter Release Time		Complete <u>X</u>	
Page <u>1</u> of <u>1</u>		Date: <u>8/24/02</u>		Preliminary: _____	
Job No.: <u>2L0355</u>		Temperature(°C): <u>22</u>			
Specification: <u>15.231</u>		Relative Humidity(%): <u>40</u>			
Tested By: <u>David Light</u>					
E.U.T.: <u>CALL BOX</u>					
Configuration: <u>TX</u>					
Location: <u>Lab 2</u>		RBW: <u>30 kHz</u>		Measurement	
Detector Type: <u>Peak</u>		VBW: <u>30 kHz</u>		Distance: <u>NA</u> m	
Test Equipment Used					
Antenna: <u>802</u>		Directional Coupler: _____			
Pre-Amp: _____		Cable #1: <u>1045</u>			
Filter: _____		Cable #2: _____			
Receiver: <u>1036</u>		Cable #3: _____			
Attenuator #1: _____		Cable #4: _____			
Attenuator #2: _____		Mixer: _____			
Additional equipment used: _____					
Measurement Uncertainty: <u>+/-1.7 dB</u>					
<div style="display: flex; justify-content: space-between;"> <div> <p>Ref Lvl 1 -10 dBm</p> <p>Delta 1 [T1] -32.27 dB 1.162325 s</p> </div> <div> <p>RBW 30 kHz VBW 30 kHz SWT 2 s</p> </div> <div> <p>RF Att 20 dB</p> </div> <div> <p>Unit dBm</p> </div> </div> <p>Center 303.8034076 MHz 200 ms/</p> <p>Date: 24.AUG.2002 14:32:55</p>					
Notes: TRANSMITTER RELEASE TIME = 1.162325 SECONDS					

Rationale for Compliance with Transmission Requirements

15.231(a)(1)	<input checked="" type="checkbox"/> Manual activation	TX deactivation time:
15.231(a)(2) :	<input type="checkbox"/> Automatic activation	
15.231(a)(3) :	<input type="checkbox"/> Regular, predetermined transmissions <input type="checkbox"/> Polling or supervisory transmissions	TX rate and duration:
15.231(a)(4) :	<input type="checkbox"/> Alarm device operating during the pendancy of alarm condition	
	<input type="checkbox"/> Non-alarm device	

Section 5. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.231(b)
TESTED BY: David Light	DATE: 8/24/202

Minimum Standard:

Permissible Field Strength Limits (Momentarily Operated Devices)

Fundamental Frequency (MHz)	Field Strength of Fundamental Microvolts/Meter at 3 meters; (watts)	Field Strength of Unwanted Emissions Microvolts/Meter at 3 meters; (watts)
40.66 - 40.70	2,250	225
70-130	1, 250	125
130-174	1,250 to 3,750*	125 to 375
174-260 (note 1)	3,750	375
260-470 (note 1)	3,750 to 12,500*	375 to 1,250
Above 470	12,500	1,250

Notes:

# Use quasi-peak or averaging meter.	For 130 - 174 MHz: $FS \text{ (microvolts/m)} = (56.82 \times F) - 6136$
* Linear interpolation with frequency F in MHz	For 260 - 470 MHz: $FS \text{ (microvolts/m)} = (41.67 \times F) - 7083$

Any emissions that fall within the restricted bands of 15.205 shall not exceed the following 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

Test Results: Complies

Test Data: See attached table.

Above 1 GHz a spectrum analyzer and low noise amplifier are used to measure emission levels. The spectrum analyzer resolution bandwidth was set to 1 MHz and video bandwidth was 1 MHz.

The E.U.T. is rotated in three planes to obtain worst-case results.

Note – The device was tested with a fully charged battery.

Note – All units were prescanned in an anechoic chamber to verify differences in radiated emissions. It was determined that there are no noticable differences in the output power levels or spurious emissions.

Test Data - Radiated Emissions



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Radiated Emissions Data

Complete	<u> X </u>	Job # :	<u>2L0355R</u>	Test # :	<u>RE-1</u>
Preliminary	<u> </u>		Page <u> 1 </u>	of	<u> 1 </u>
Client Name : <u>Indyme</u>					
EUT Name : <u>Callbox</u>					
EUT Config. : <u>Tabletop - Upright (worst case) - Tx continuous</u>					
Specification : <u>15.231</u>					
Reference :					
Rod. Ant. #:	<u> </u>	Temp. (deg. C) :	<u> </u>	Date :	<u>8/24/02</u>
Bicon Ant. #:	<u> </u>	Humidity (%) :	<u> </u>	Time :	<u>16:00</u>
Log Ant. #:	<u> 759 </u>	EUT Voltage :	<u> </u>	Staff :	<u>Light</u>
Bilog Ant. #:	<u> </u>	EUT Frequency :	<u> </u>	Photo ID:	<u>None</u>
Dipole Ant. #:	<u> </u>	Phase:	<u> </u>	Peak Bandwidth:	<u>100 kHz below 1 GHz</u>
Cable#:	<u> 1983 </u>	Location:	<u> </u>	Video Bandwidth	<u>100 kHz below 1 GHz</u>
Preamp#:	<u> 1025 </u>	Distance:	<u> </u>	Peak Bandwidth:	<u>1 MHz above 1 GHz</u>
Limiter#:	<u> NA </u>			Video Bandwidth	<u>1 MHz above 1 GHz</u>
Atten #:	<u> NA </u>				
Detector#:	<u> 1036 </u>	Additional equipment 1464-1484-1485-1016-1304			

Meas. Freq. (MHz)	Ant. Pol. (H/V)	Duty Cycle (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. limit (dBuV/m)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
303.8	V	-15.7	82.6	19.2	4.8	27.3	63.6	75.0	-11.4	Pass	
607.6	V	-15.7	42.3	19.1	7.3	27.6	25.4	55.0	-29.6	Pass	
911.4	V	0	31.4	23.2	9.1	27.0	36.7	55.0	-18.3	Pass	noise floor
303.8	H	-15.7	89.4	19.2	4.8	27.3	70.4	75.0	-4.6	Pass	
607.6	H	-15.7	39.5	19.1	7.3	27.6	22.6	55.0	-32.4	Pass	
911.4	H	-15.7	37.8	23.2	9.1	27.0	27.4	55.0	-27.6	Pass	
1215.2	H	0	37.7	23.7	1.6	30.0	33.0	55.0	-22.0	Pass	noise floor
3038	H	0	34.5	30	3.4	32.8	35.1	54.0	-18.9	Pass	noise floor
1215.2	V	0	37.7	23.7	1.6	30.0	33.0	54.0	-21.0	Pass	noise floor
3038	V	0	34.5	30	3.4	32.8	35.1	54.0	-18.9	Pass	noise floor
											Duty cycle correction
											was applied to all meas-
											ured signals excluding
											noise floor
											Scanned to the 10th
											harmonic of carrier

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Test Plot – Duty Cycle



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Data Plot		Duty Cycle	
Page 1 of 4			
Job No.:	2L0355	Date:	8/24/02
Specification:	15.231	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%)	40
E.U.T.:	CALL BOX		
Configuration:	TX ALL NARROW PULSE OR ALL WIDE PULSES		
Location:	Lab 2	RBW:	Refer to plots
Detector Type:	Peak	VBW:	Refer to plots
		Measurement Distance:	NA m
Test Equipment Used			
Antenna:	802	Directional Coupler:	
Pre-Amp:		Cable #1:	1629
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1:		Cable #4:	
Attenuator #2:		Mixer:	
Additional equipment used:			
Measurement Uncertainty:	+/-1.7 dB		

Ref	Lvl	Marker 1 [11]	RBW	50 kHz	RF Att	20 dB
-10	-10 dBm	-76.55 dBm	VBW	50 kHz		
		10.350701 ms	SWT	25 ms	Unit	dBm

Center 303.8034076 MHz 2.5 ms/

Date: 24.AUG.2002 14:12:14

Notes: All narrow pulses 571.14 uS each

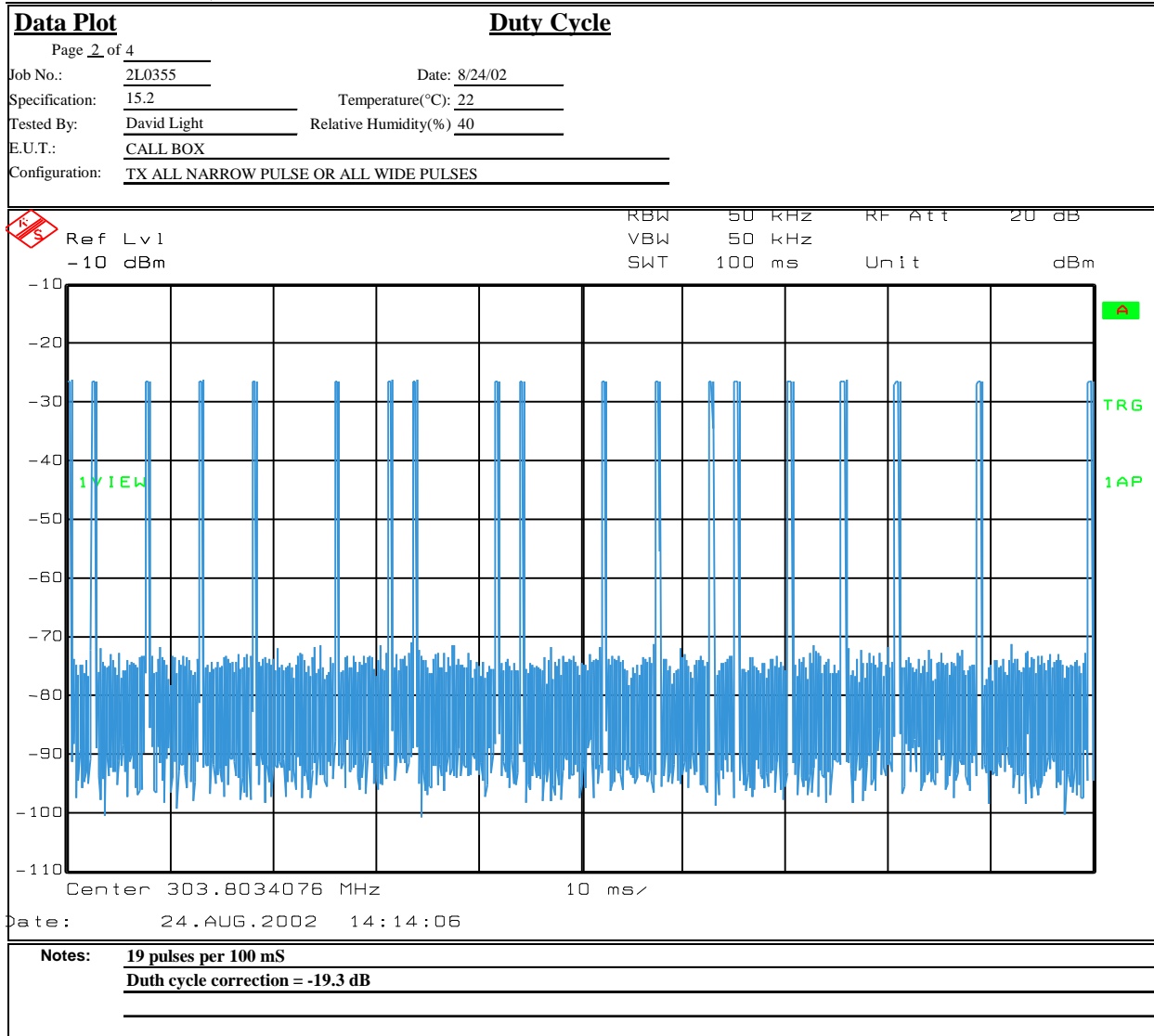
Test Plot – Duty Cycle



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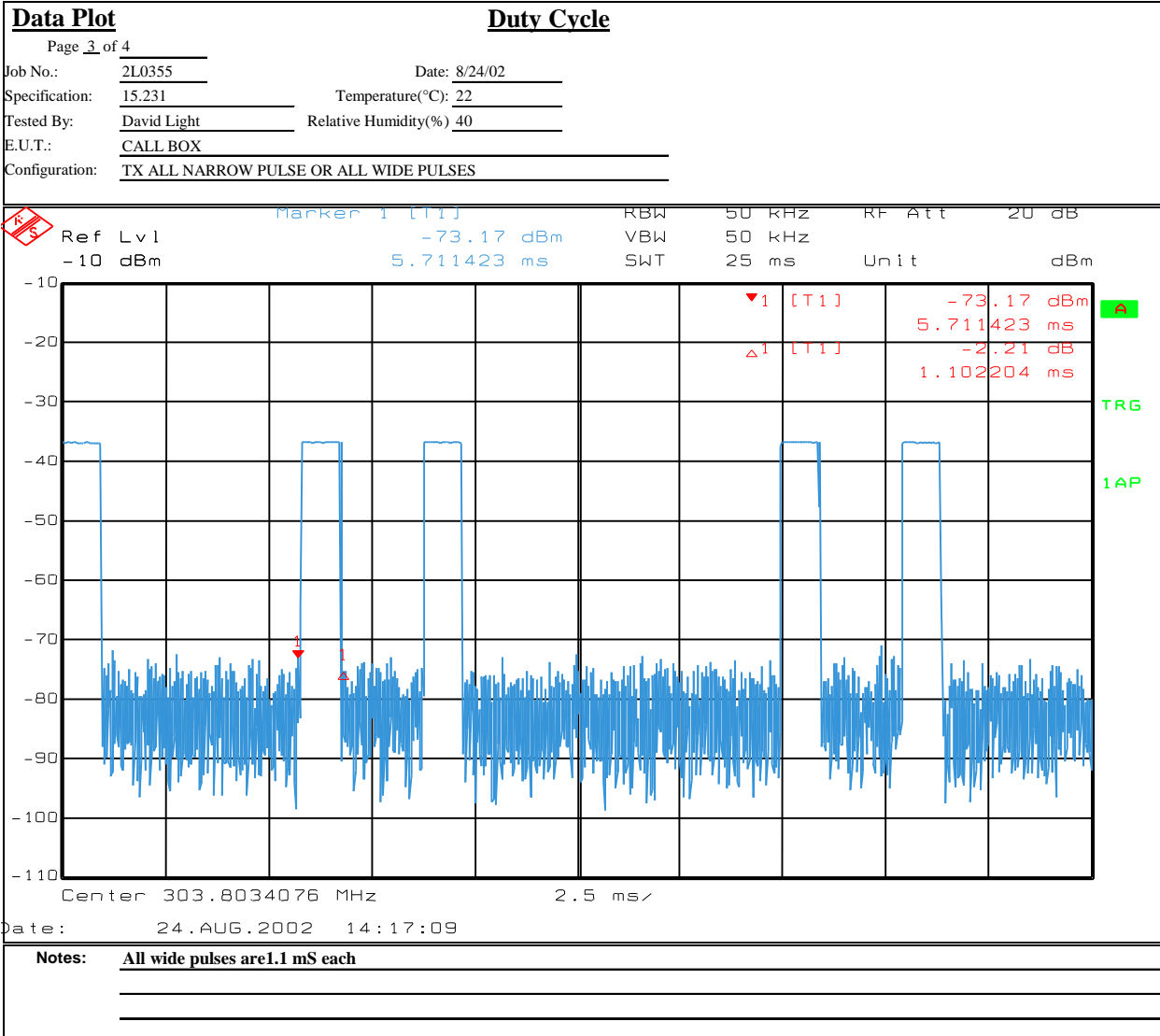
Test Plot – Duty Cycle



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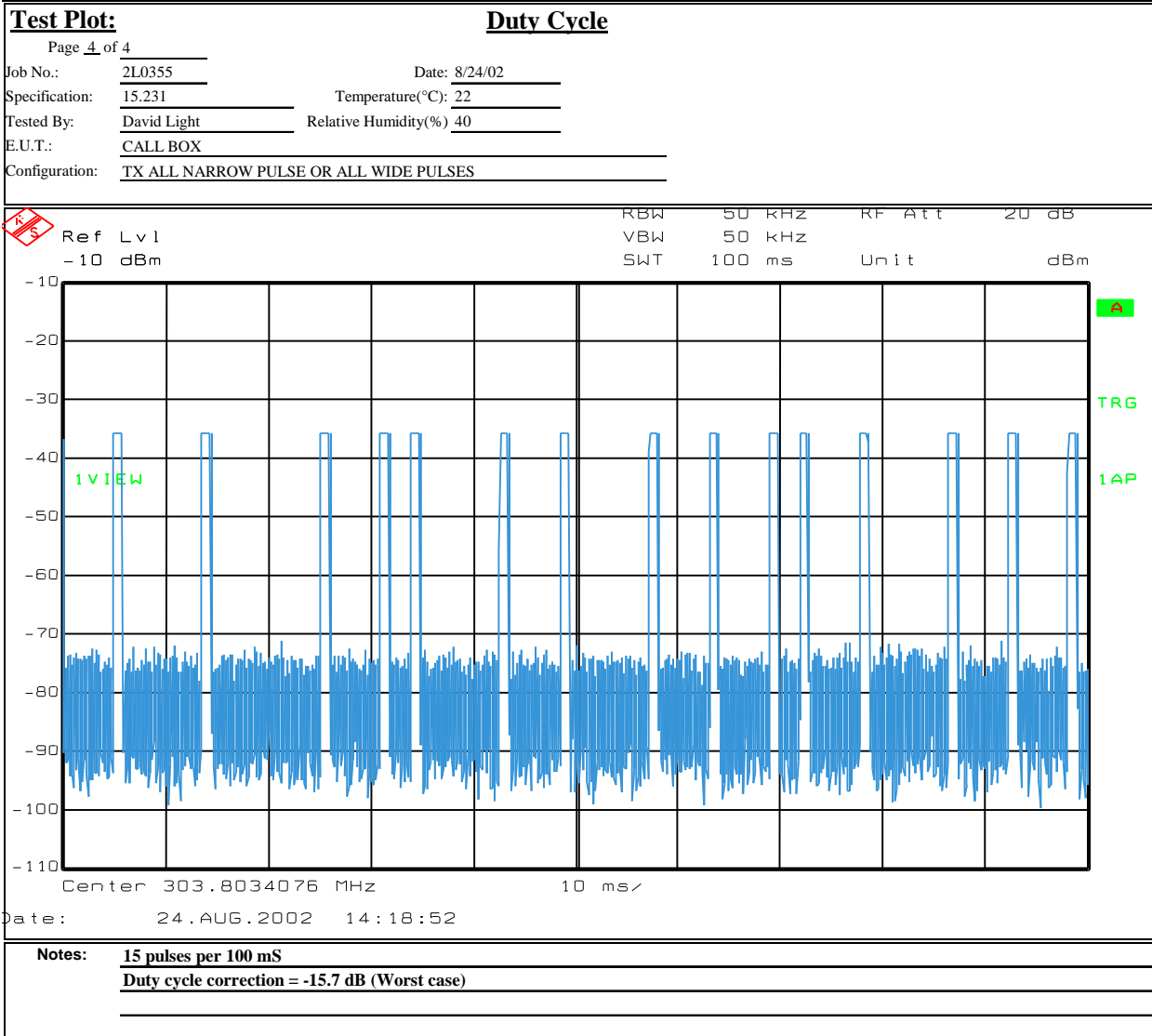
Test Plot – Duty Cycle



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Radiated Photographs (Worst Case Configuration)

FRONT VIEW



REAR VIEW



Section 6. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.231(c)
TESTED BY: David Light	DATE: 8/24/2002

Minimum Standard: 15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Results: [Complies See attached graph.](#)

Test Data: See attached graph.

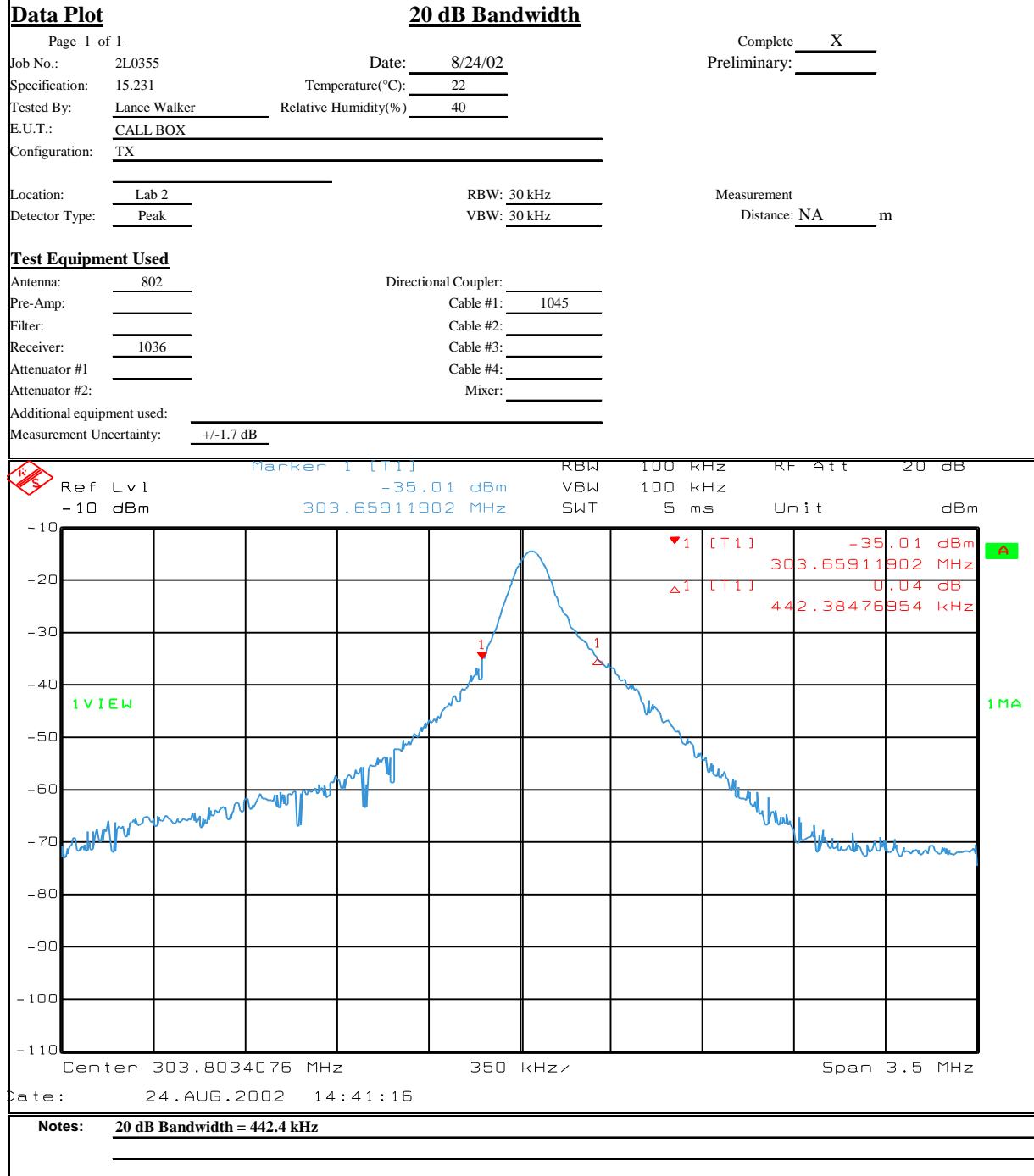
Test Plot – Occupied Bandwidth



Dallas Headquarters:

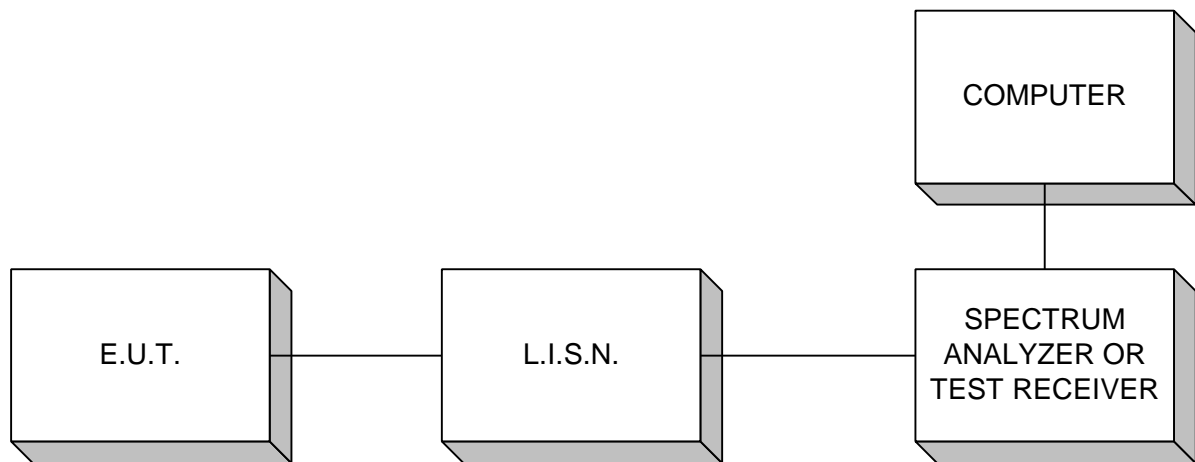
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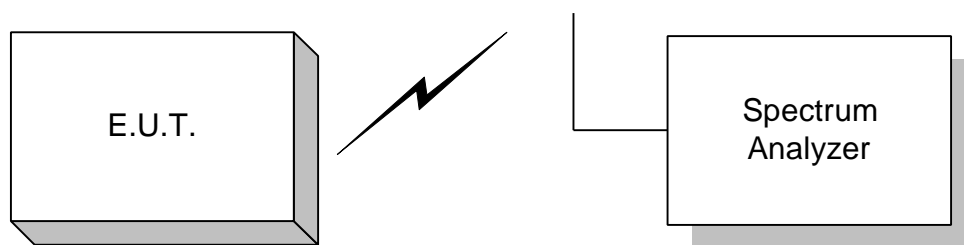


Section 7. Block Diagrams

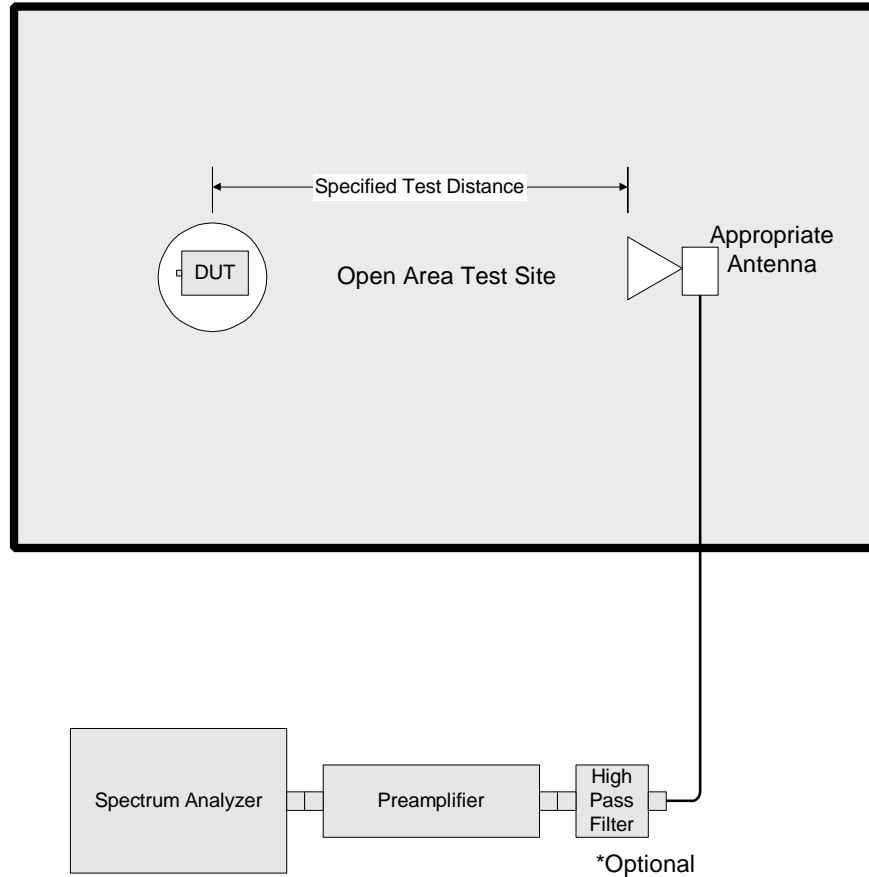
Conducted Emissions



Occupied Bandwidth, Duty Cycle

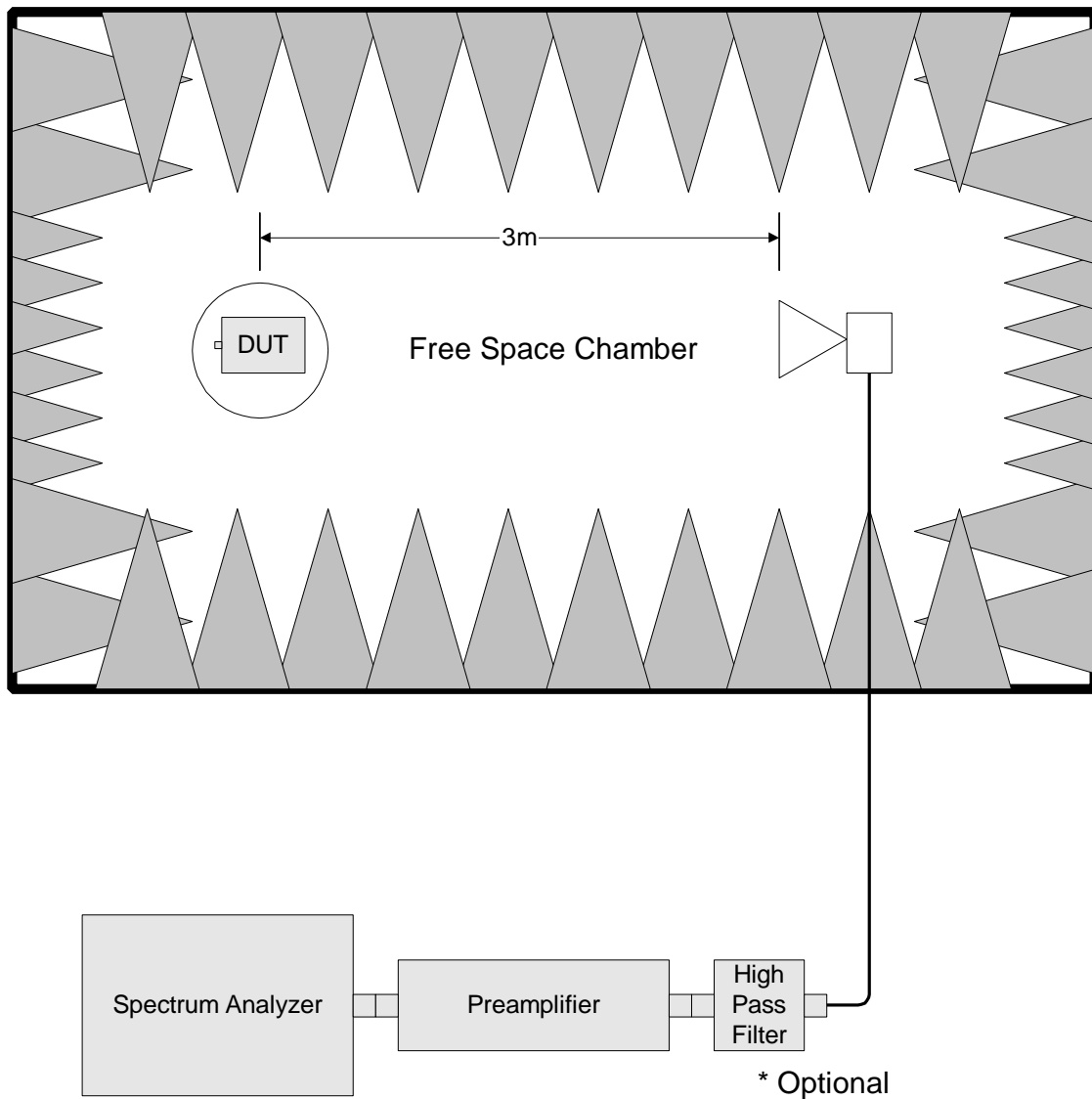


Outdoor Test Site For Radiated Emissions



Radiated Emissions 30 MHz - 1 GHz

The spectrum was searched up to the 10th harmonic of the fundamental frequency of operation.



Radiated Emissions above 1 GHz

Nemko Dallas, Inc.

FCC PART 15, SUBPART C

POWER TRANSMITTERS

EQUIPMENT: CB511, CB514, CB440, CB475 Family

PROJECT NO.: **2L0355RUS1**

Section 8. Test Equipment List

ANNEX A - RESTRICTED BANDS

Annex A Restricted Bands of Operation

(a) Except as shown in paragraph (d) of this section , only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.15
0.49 - 0.51	16.69475-16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425-16.80475	960-1240	7.25-7.75
3.020 - 3.026	25.5-25.67	1300-1427	8.025-8.5
4.125 - 4.128	37.5-38.25	1435-1626.6	9.0-9.2
4.17725 - 4.17775	73-74.6	1645.5-1646.5	9.3-9.5
4.20725 - 4.20775	74.8-75.2	1660-1710	10.6-12.7
6.215 - 6.218	108-121.94	1718.8-1722.2	13.25-13.4
6.31175 - 6.31225	123-138	2220-2300	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			