

KTL Test Report: 0L0178RUS1

Applicant: The Purchasing Department, Inc.
160 E. Poplar, Suite C
Fayetteville, AR 72703

**Equipment Under Test:
(E.U.T.)** TX-3312N

FCC ID: O4TTX3312N

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: KTL Dallas, Inc.
802 N. Kealy
Lewisville, TX 75057-3136

Authorized By: 

Tom Tidwell, Wireless Group Manager

Date: 7/26/00

Total Number of Pages: 25

EQUIPMENT: **TX-3312N**
FCC ID.: **O4TTX3312N**

PROJECT NO.: **0L0178RUS**

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EQUIPMENT: **TX-3312N**FCC ID.: **O4TTX3312N**PROJECT NO.: **OL0178RUS**

Section 1. Summary of Test Results

Model No.: TX-3312N

Serial No.: A52447

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 15.231. 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.

See " Summary of Test Data".

**NVLAP LAB CODE: 100426-0**

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This report applies only to the items tested.

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Summary Of Test Data

Name of Test	Paragraph No.	Results
Transmission Requirements	15.231(a)	Complies
Radiated Emissions	15.231(b)	Complies
Occupied Bandwidth	15.231(c)	Complies
Frequency Tolerance ⁽¹⁾	15.231(d)	N/A
Periodic Alternate Field Strength Requirements ⁽²⁾	15.231(e)	N/A
Powerline Conducted Emissions ⁽³⁾	15.207	N/A

Footnotes For N/A's:

- (1) The unit does not operate in the designated band for this requirement.
- (2) The device meets the requirements of 15,231(a).
- (3) The device is DC (battery) powered

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

General Equipment Information

Frequency Range:	434 - 434 (Fixed)
Operating Frequency(ies) of Sample:	434 MHz
Type of Emission:	Pulse Code Modulation
Emission Designator:	48K5L1D
Supply Power Requirement:	12 Volt Alkaline battery
Duty Cycle Correction Factor:	-3.2 dB

KTL Dallas, Inc.

FCC PART 15, SUBPART C
FOR LOW POWER TRANSMITTERS

EQUIPMENT: TX-3312N

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Description of E.U.T.

Key fob type RF transmitter used for remote actuation.

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.

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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. (Worst case)
- (2) Upright, Horizontal
- (3) Upright, Vertical

Exercise Program

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

Exercise mode:

- (1) Continuous transmit

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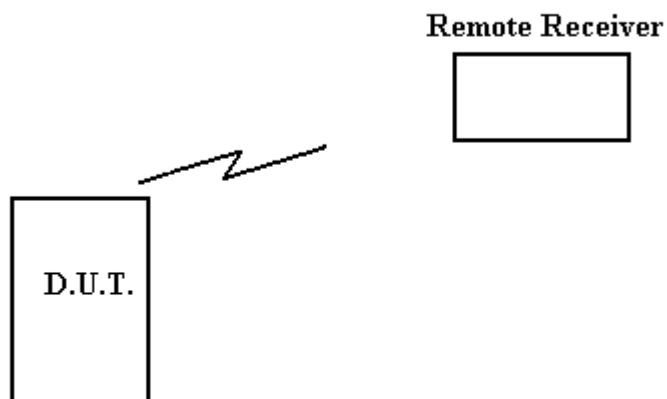
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Section 3. Equipment Configuration**Equipment Configuration List:**

Item	Description	Model No.	Serial.	Rev.
(A)	Transmitter	TX-3312N	A52447	

Inter-connection Cables:

There are no interconnecting cables. The unit is self-contained.

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

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Section 4. Transmission Requirements

NAME OF TEST: Transmission Requirements	PARA. NO.: 15.231(a)
TESTED BY: David Light	DATE: 6/5/00

- 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.

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Rationale for Compliance with Transmission Requirements

The EUT transmits a unique code but does not transmit any data information.

- 15.231(a)(1) : The transmission is de-activated within 6.16 μ sec. after the user releases the tx button. See graph on page 14.
- 15.231(a)(2) : The transmitter is not activated automatically.
- 15.231(a)(3) : The transmitter only transmits when the TX button is pressed. There are no automatic transmissions at pre-determined intervals.
- 15.231(a)(4) : The transmitter is for remote actuation and thus transmits a short burst when activated by the user.

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Test Plot: Duty Cycle Correction Factor

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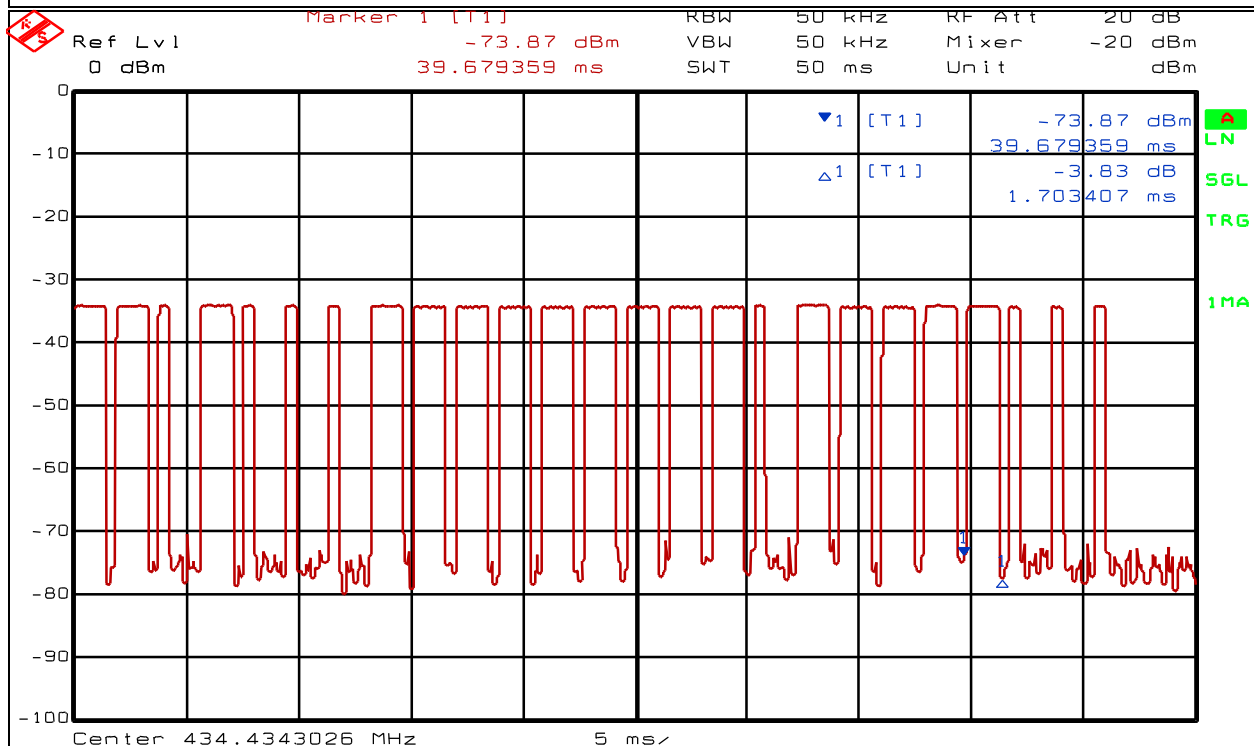
Job No.:	0L0178R	Date:	06/05/00
Specification:	CFR 15.231	Temperature(°C):	24
Tested By:	David Light	Relative Humidity(%)	50
E.U.T.:	Transmitter		
Configuration:	Continuous Transmit		
Serial Number:	A52447		
Location:	Lab 1	RBW:	50 kHz
Detector Type:	Peak	VBW:	50 kHz

Test Equipment Used

Antenna:	802	Directional Coupler:	#N/A
Pre-Amp:	#N/A	Cable #1:	1045
Filter:	#N/A	Cable #2:	#N/A
Receiver:	1036	Cable #3:	#N/A
Attenuator #1	#N/A	Cable #4:	#N/A
Attenuator #2:	#N/A	Mixer:	#N/A

Additional equipment used: _____

Measurement Uncertainty: _____



Date: 5 JUL 2000 12:27:16

Notes: Wide pulse = 1.703 ms each X 17 per train = 28.951 ms

EQUIPMENT: TX-3312N

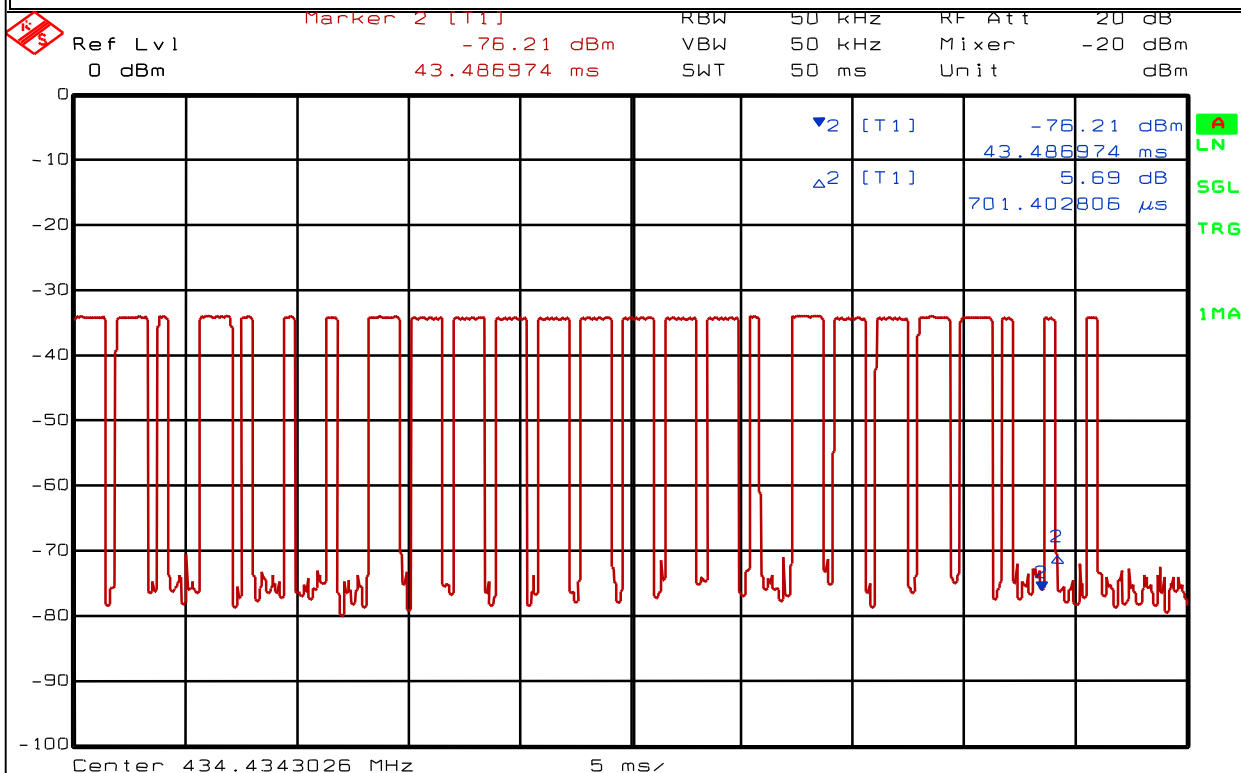
FCC ID.: O4TTX3312N

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Test Plot: Duty Cycle Correction Factor

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Job No.: OL0178R Date: 6/5/00
Specification: CFR 15.231 Temperature(°C): 1/24/00
Tested By: David Light Relative Humidity(%): 1/19/00
E.U.T.: Transmitter
Configuration: Continuous Transmit



Date: 5.JUL.2000 12:33:17

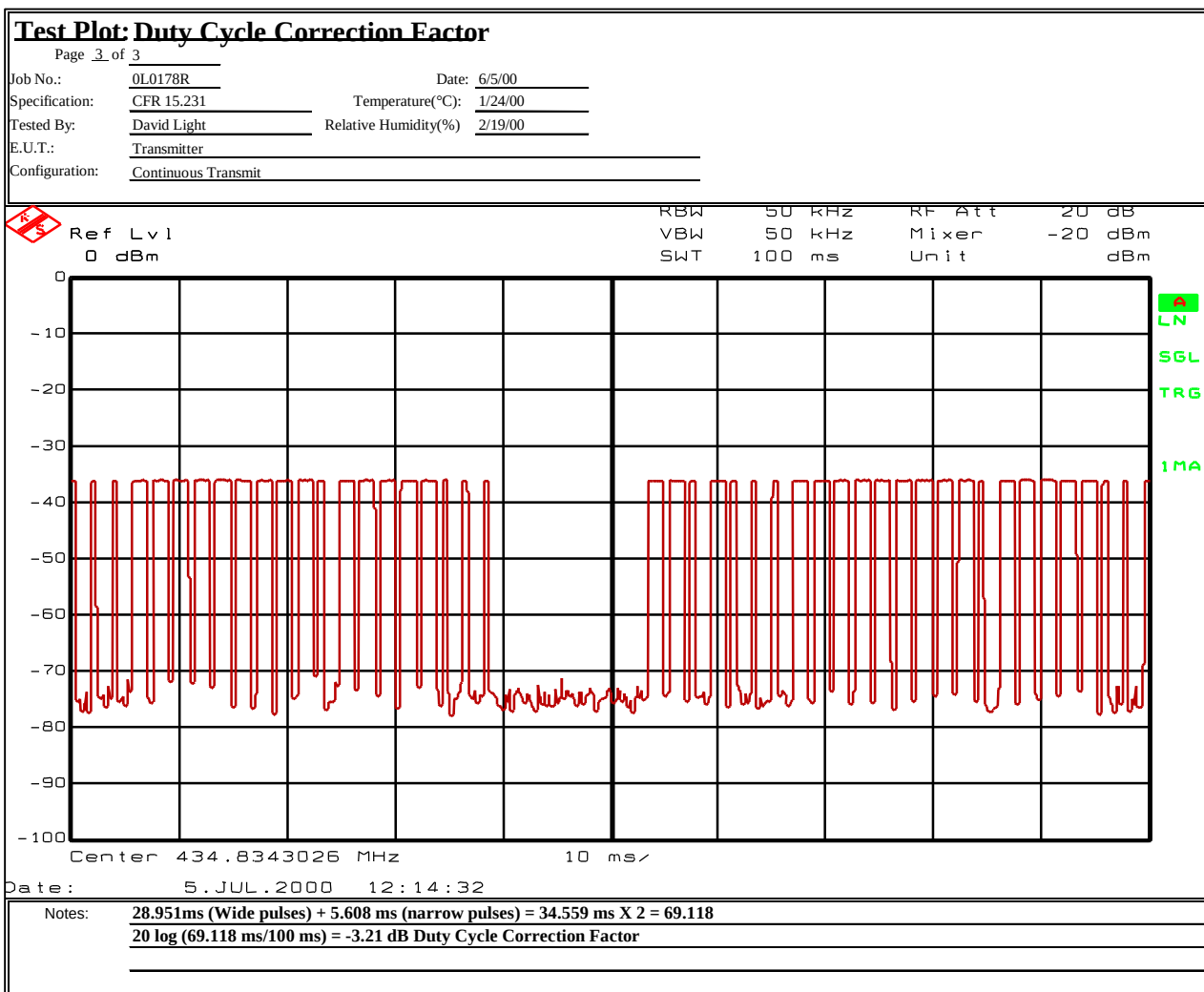
Notes: Narrow pulse = 701 us X 8 per train = 5.608 ms

EQUIPMENT: TX-3312N

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MAXIMUM RF ON TIME IN 100 MSEC GRAPH(S)

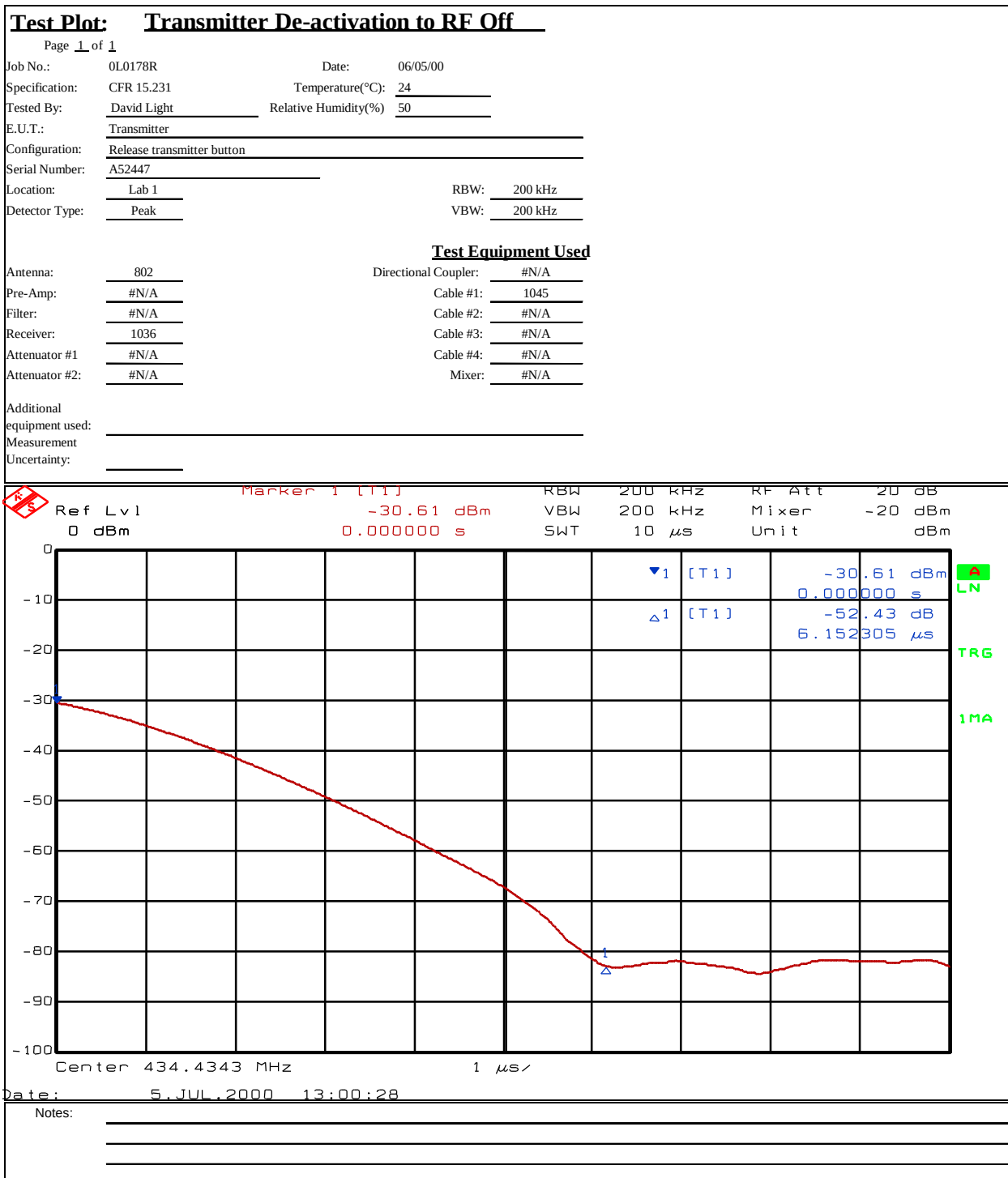


EQUIPMENT: TX-3312N

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TIME FROM BUTTON RELEASE DE-ACTIVATION TO RF OFF GRAPH(S)



EQUIPMENT: TX-3312N

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Section 5. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.231(b)
TESTED BY: David Light	DATE: 6/5/00

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 (microvolts/m) = (56.82 x F) - 6136
* Linear interpolation with frequency F in MHz	For 260 - 470 MHz: FS (microvolts/m) = (41.67 x 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. The worst-case emission level is 52.6 dBμV/m @ 3m at 1.302 GHz. This is 1.4 dB below the specification limit.

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 3 MHz.

In the case of handheld equipment, the E.U.T. is rotated in three planes to obtain worst-case results.

EQUIPMENT: TX-3312N

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Test Data - Radiated Emissions

Client Name:	The Purchasing Department, Inc.			Job #:	0L0178R			Date:	6/6/00		
EUT Model:	Transmitter			Serial #:	A52447			Time:	8:00 AM		
EUT Config.:	Continuous Transmit - Unit laying flat on table (Worst case)							Staff:	D. Light		
Test Specification:	CFR47 Part 15.231							Test #:	1		
Rod Ant. #:		Cable #:	C1A	Detect. Type:	Peak			Location:	A-OATS		
Bicon Ant. #:		Preamp #:	2207	Res. BW (kHz):	100			Distance (m):	3		
Log Ant. #:	2017	Limiter #:	NA	Video BW (kHz):	100			EUT Voltage (V):			
Bilog Ant. #:		Atten. #:	NA	Temp. (deg. C):	27			EUT Freq. (Hz):	DC		
Dipole Ant. #:		Detector #:	1036	Humidity (%):	60			Photo ID:	0L0178R 1		

Emission Frequency (MHz)	Ant. Pol. (H/V)	Det. Atten. (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 Marginal	Notes
434.0	V	0.0	57.6	17.2	6.0	24.0	53.6	80.8	-27.2	Pass	Fundamental
868.0	V	0.0	36.5	21.4	8.2	23.9	39.0	60.8	-21.8	Pass	2nd Harmonic
434.0	H	0.0	72.0	17.2	6.0	24.0	68.0	80.8	-12.8	Pass	Fundamental
868.0	H	0.0	49.1	21.4	8.2	23.9	51.6	60.8	-9.2	Pass	2nd Harmonic

Note: 3.2 dB was subtracted from meter reading for Duty Cycle Correction. See appropriate section of report.

Job No.:	0L0178R			Date:	7/5/00		
Specification:	CFR 47, Part 15.231			Temperature(°C):	24		
Tested By:	David Light			Relative Humidity(%):	50		
E.U.T.:	Transmitter						
Configuration:	Continuous transmit - Laying flat on table (Worst case)						
Serial Number:	A52447						
Location:	AC 3			RBW:	1 MHz		
Detector Type:	Peak			VBW:	1 MHz		

Test Equipment Used

Antenna:	993	Directional Coupler:	#N/A
Pre-Amp:	1016	Cable #1:	1043
Filter:	#N/A	Cable #2:	1484
Receiver:	1464	Cable #3:	1485
Attenuator #1:	#N/A	Cable #4:	#N/A
Attenuator #2:	#N/A	Mixer:	#N/A

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
1.302	61.3	24	2.5	32	52.6	54.0	-1.4	Horizontal
1.736	60.5	26.5	3.3	32.8	54.3	60.8	-6.5	Horizontal
2.17	39.5	30	3.7	33.2	36.8	60.8	-24.0	Horizontal - Noise Floor (NF)
2.604	39.5	30.4	4.1	33.5	37.3	60.8	-23.5	Horizontal - (NF)
3.039	40	30.9	4.5	33.3	38.9	60.8	-21.9	Horizontal - (NF)
3.473	38	31	4.6	33.5	36.9	60.8	-23.9	Horizontal - (NF)
3.907	38.5	32	5.2	33.3	39.2	54.0	-14.8	Horizontal - (NF)
4.341	38.5	33	5.2	33.3	40.2	54.0	-13.8	Horizontal - (NF)
1.302	44.5	24	2.5	32	35.8	54.0	-18.2	Vertical
1.736	48	26.5	3.3	32.8	41.8	60.8	-19.0	Vertical
2.17	39.5	30	3.7	33.2	36.8	60.8	-24.0	Vertical - (NF)
2.604	39.5	30.4	4.1	33.5	37.3	60.8	-23.5	Vertical - (NF)
3.039	40	30.9	4.5	33.3	38.9	60.8	-21.9	Vertical - (NF)
3.473	38	31	4.6	33.5	36.9	60.8	-23.9	Vertical - (NF)
3.907	38.5	32	5.2	33.3	39.2	54.0	-14.8	Vertical - (NF)
4.341	38.5	33	5.2	33.3	40.2	54.0	-13.8	Vertical - (NF)

Notes: 3.2 dB was subtracted from meter reading for Duty Cycle Correction. See appropriate section of report

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Radiated Photographs (Worst Case Configuration)

FRONT VIEW



REAR VIEW



EQUIPMENT: TX-3312N

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Section 6. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth

PARA. NO.: 15.231(c)

TESTED BY: David Light

DATE: 6/6/00

Minimum Standard:

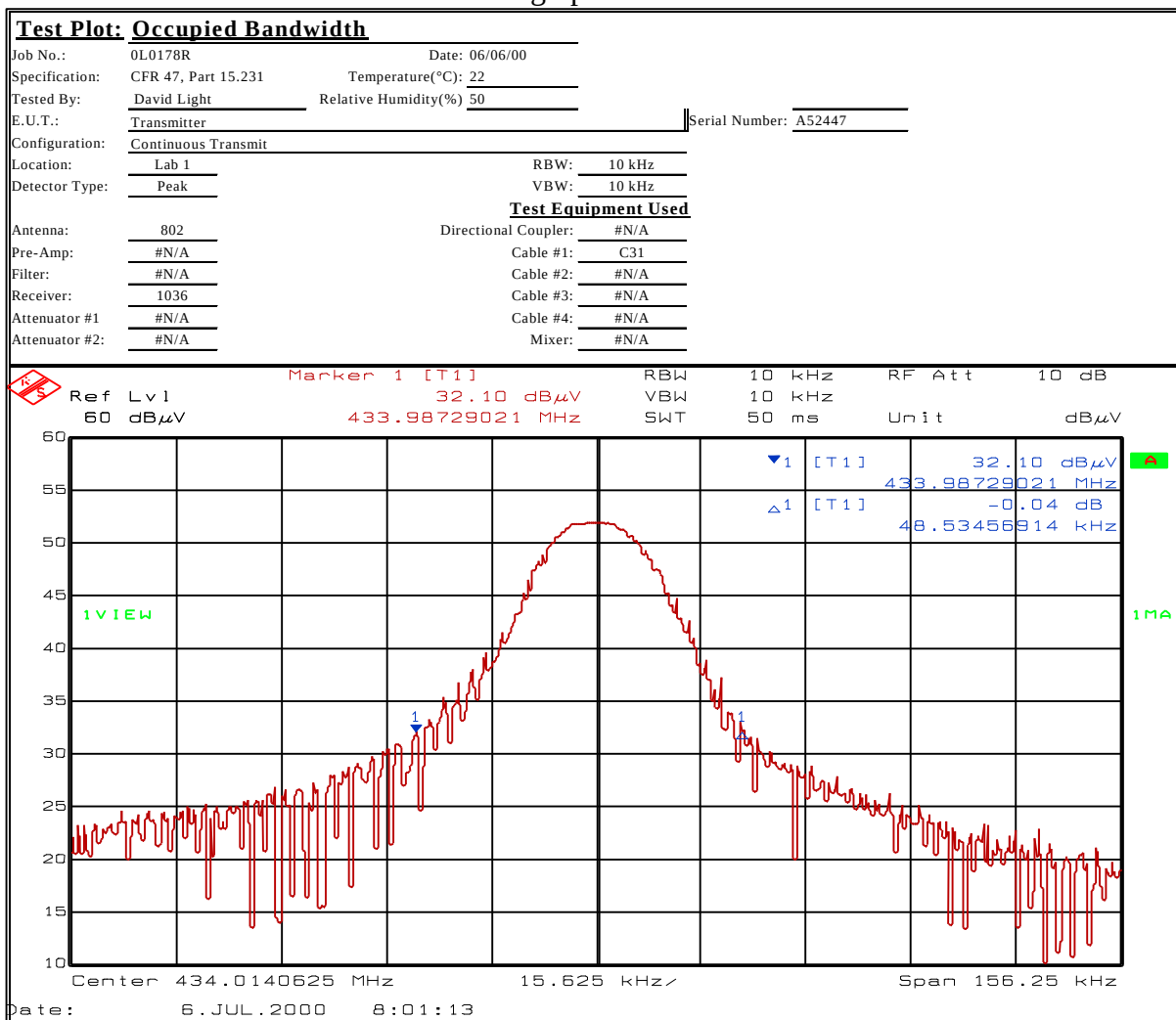
15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from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

Test Results:

Complies. The measured 20 dB bandwidth is 48.5 kHz. The specification limit is $434 \text{ MHz} \times .25\% = 1.085 \text{ MHz}$.

Test Data:

See attached graph.



EQUIPMENT: TX-3312N

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Section 7. Frequency Tolerance
Devices in the Frequency Band 40.66 - 40.77 MHz

NAME OF TEST: Frequency Tolerance	PARA. NO.: 15.231(d)
TESTED BY:	DATE:

Minimum Standard: 15.231(d) For devices operating within the frequency band 40.66 - 40.70 MHz, the bandwidth of the emission shall be confined within the band edges and the frequency tolerance of the carrier shall be $\pm 0.01\%$. This frequency tolerance shall be maintained for a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary power supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Results: Complies/Does Not Comply. See attached graph and data.

Test Data: See attached graph.

EQUIPMENT: TX-3312N

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Section 8. Periodic Alternate Field Strength Requirements

NAME OF TEST: Periodic Alternate Field Strength Requirements PARA. NO.: 15.231(e)

TESTED BY:

DATE:

Minimum Standard:

15.231(e) Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following.

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40 - 50	5,000	100
50 - 74	500	50
74 - 136	500 to 1,500	50 to 150
136 - 174	1,500	150
174 - 260	1,500 to 5,000	150 to 500
260 - 470	5,000	500
Above 470		

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

Test Results:

Complies/Does Not Comply.

Test Data:

See attached table.

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Section 9. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207
TESTED BY:	DATE:

Minimum Standard:

Frequency(MHz)	Maximum Powerline Conducted RF Voltage	
	mV	dBmV
0.45 - 30.0	250	48

Test Results: Complies. See attached graphs and table.**Test Data:** See attached graphs and table.**Method Of Measurement:** (Procedure AN8-CA-4119)

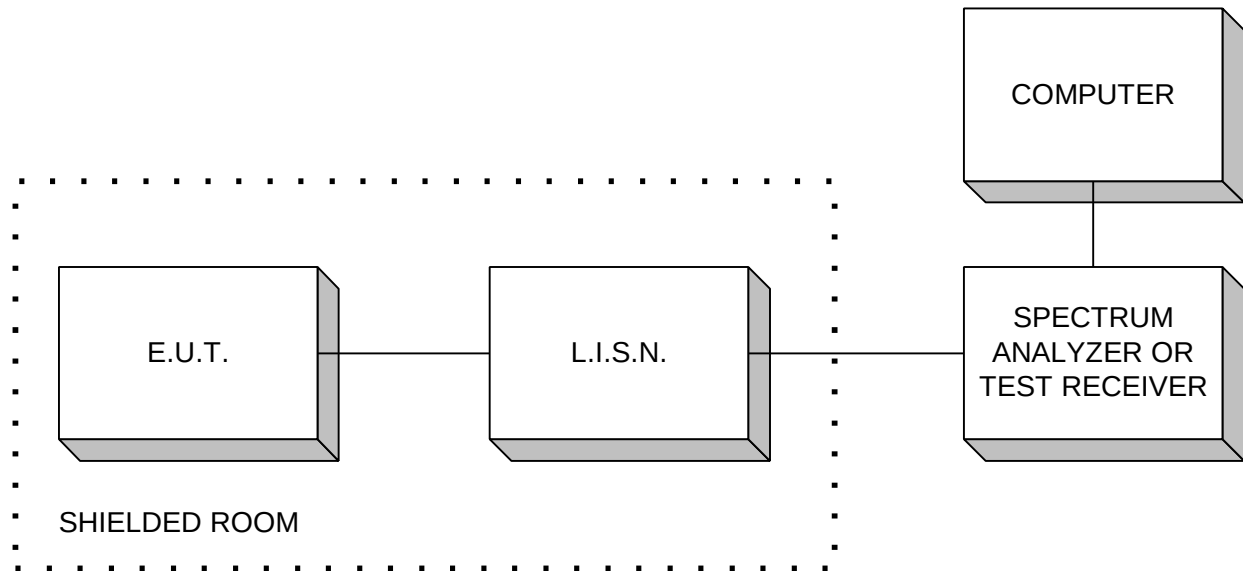
Measurements were made using a spectrum analyzer with 10 kHz RBW, Peak detector. Any emissions that are close to the limit are measured using a test receiver with 10 kHz bandwidth, CISPR Quasi-Peak detector.

Broadband emissions are identified by switching the receiver detector function from Quasi-Peak to Average. If the amplitude of the emission drops by 6 dB or more then the emission is classified as broadband and the Quasi-Peak level is reduced by a factor of 13 dB.

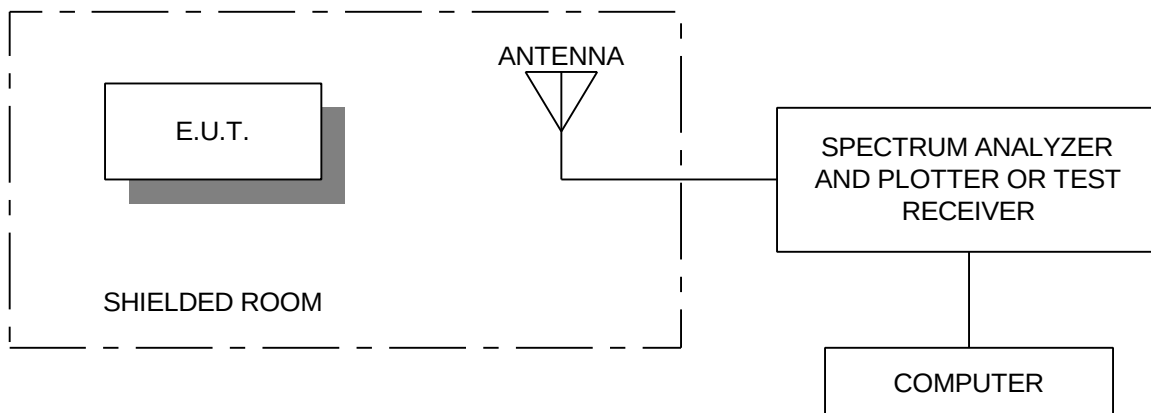
All emissions within 10 dB of limit have been recorded.

Section 10. Block Diagrams

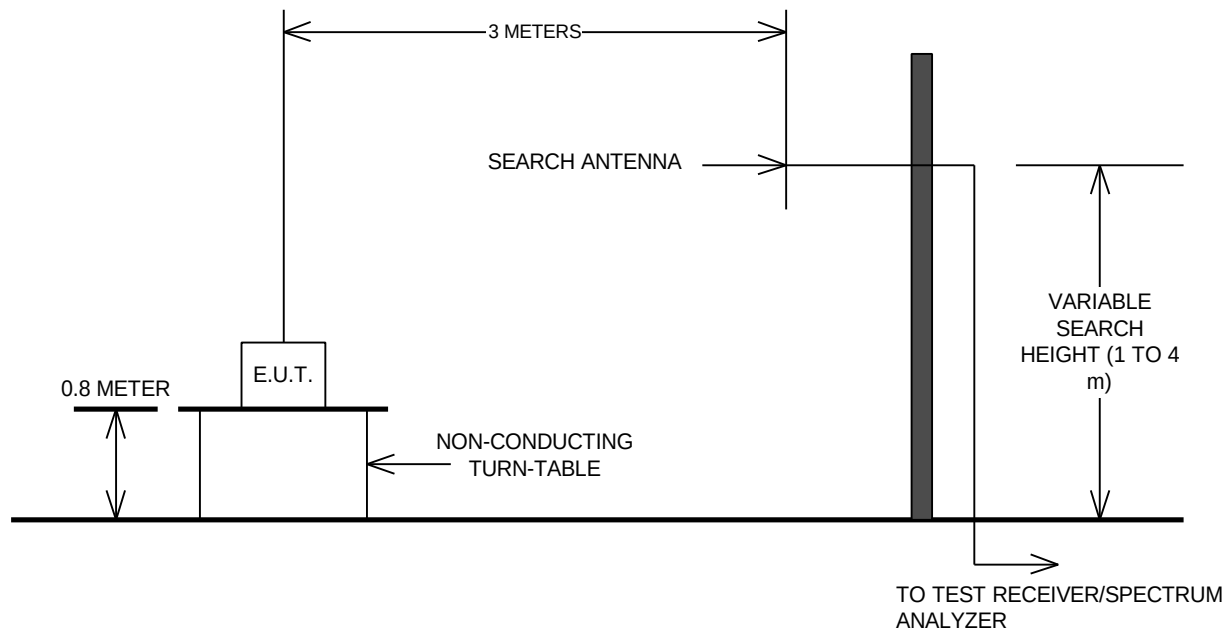
Conducted Emissions



Radiated Prescan

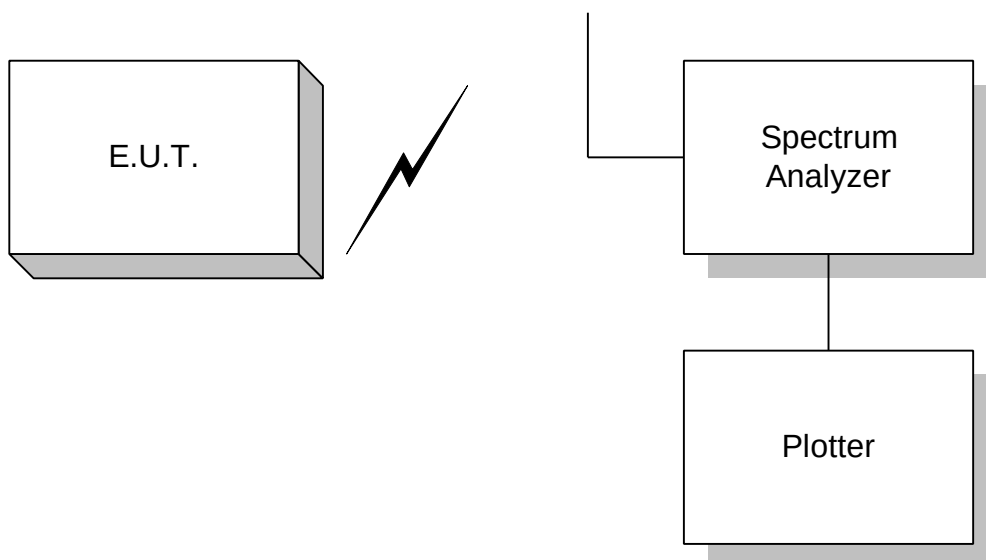


Outdoor Test Site For Radiated Emissions



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

Occupied Bandwidth



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Section 11. Test Equipment List

KTL ID	Description	Manufacturer Model Number	Serial Number	Calibration Date
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	06/14/99
G2017	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	556	01/25/99
G2207	PREAMP, 25dB	ICC LNA25	398	05/24/00
1045	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	05/23/00
993	Horn antenna	A.H. Systems SAS-200/571	XXX	07/16/99
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	05/25/00
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	05/25/00
1043	Flexible cable 1m	Astrolab Inc. 32027-2-29094K-1M	0	01/00/00
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	11/03/99
1016	AMPLIFIER	HEWLETT PACKARD 8449A	2749A00159	05/24/00
G2017	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	556	01/25/99
G2206	PREAMP, 15DB	ICC 30MHZ-1.4GHZ	408	08/27/99
1045	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	05/23/00
Lab1	Site A OATS			
AC3	Anechoic Chamber			

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ANNEX A - RESTRICTED BANDS

(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			