KTL Test Report:	9R02231
Applicant:	Heath Company PO Box 90004 2701 Industrial Drive Bowling Green, KY 42102
Equipment Under Test: **(E.U.T.)**	W-32A-TX
FCC ID:	BJ4-61WRC32ATX
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 Ottawa Inc. 3325 River Road, R.R. 5 Ottawa, Ontario K1V 1H2
Authorized By:	
	R. Grant, Wireless Group Manager
Date:	
Total Number of Pages:	24

Table of Contents

Section 1. Summary of Test Results

Manufacturer: Heath Company

Model No.: W-32A-TX

Serial No.: None

Date Received In Laboratory: February 17, 2000

KTL Identification No.: Item #3

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

D	S	C

Equipment Code

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

NVLAP LAB CODE: 100351-0

TESTED BY: _____ DATE: _____
Glen Westwell, Technologist

Summary Of Test Data

Name of Test	Paragraph Number	Results
Transmission Requirements	15.231(a)	Complies
Radiated Emissions	15.231(b)	Complies
Occupied Bandwidth	15.231(c)	Complies

Footnotes For N/A's:

Test Conditions:

Indoor	Temperature:	24 °C
	Humidity:	20 %
Outdoor	Temperature:	-4 °C
	Humidity:	16 %

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

General Equipment Information

Frequency Range: 315 MHz (Fixed)

Operating Frequency(ies) of Sample: 315 MHz

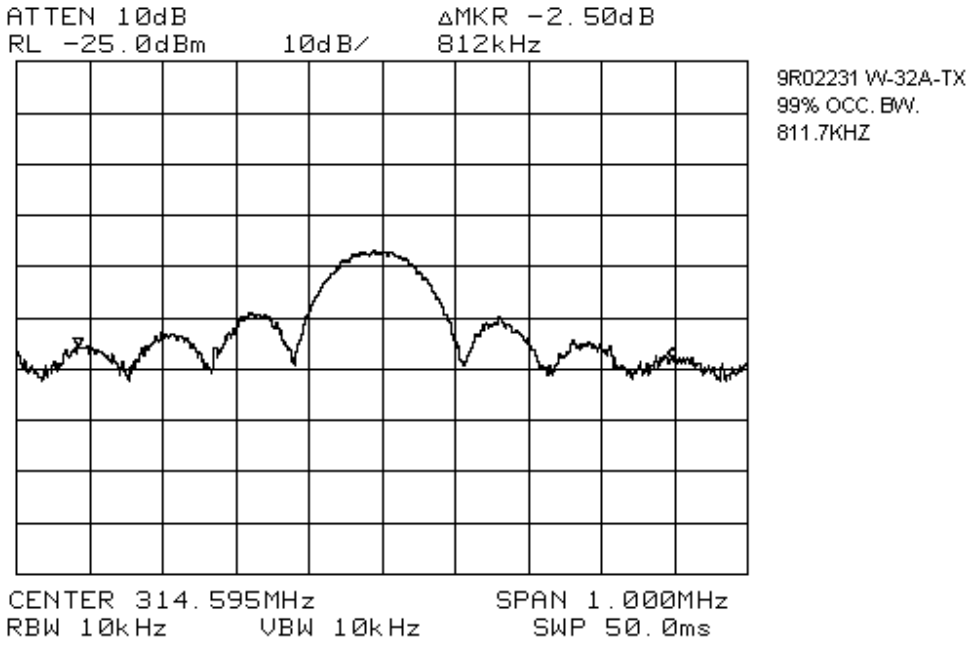
Type of Emission: Pulse Code Modulation

Emission Designator: 811KL1D

Supply Power Requirement: 9 Vdc Battery

Duty Cycle Calculation:

1. Pulse Period = 100 mS ÷ 35.6 μS = 2809 pulses in 100 mSec period.
2. One Time Pulse Width = 14.25 μSec
   2809 x 14.28 μSec
3. 20 Log $\frac{40mSec}{100mSec}$ = -7.96 dB (8.0 dB)


ATTEN 10dB
RL -25.0dBm
10dB/
ΔMKR -2.50dB
812kHz
9R02231 W-32A-TX
99% OCC. BW.
811.7KHZ
CENTER 314.595MHz
SPAN 1.000MHz
RBW 10kHz
VBW 10kHz
SWP 50.0ms

Section 3. Transmission Requirements

NAME OF TEST: Transmission Requirements	PARA. NO.: 15.231(a)
TESTED BY: Glen Westwell	DATE: February 18, 2000

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.

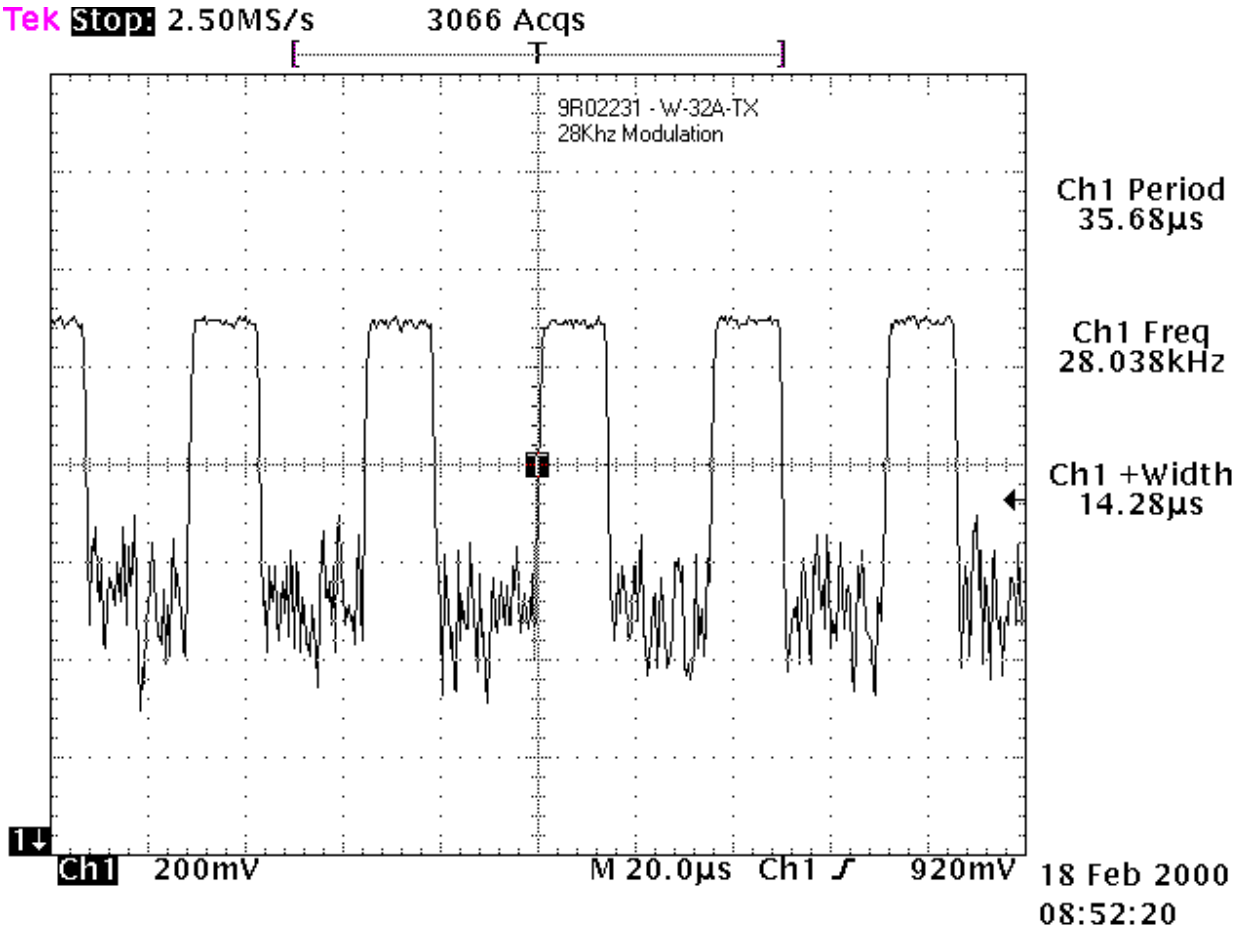
Rationale for Compliance with Transmission Requirements

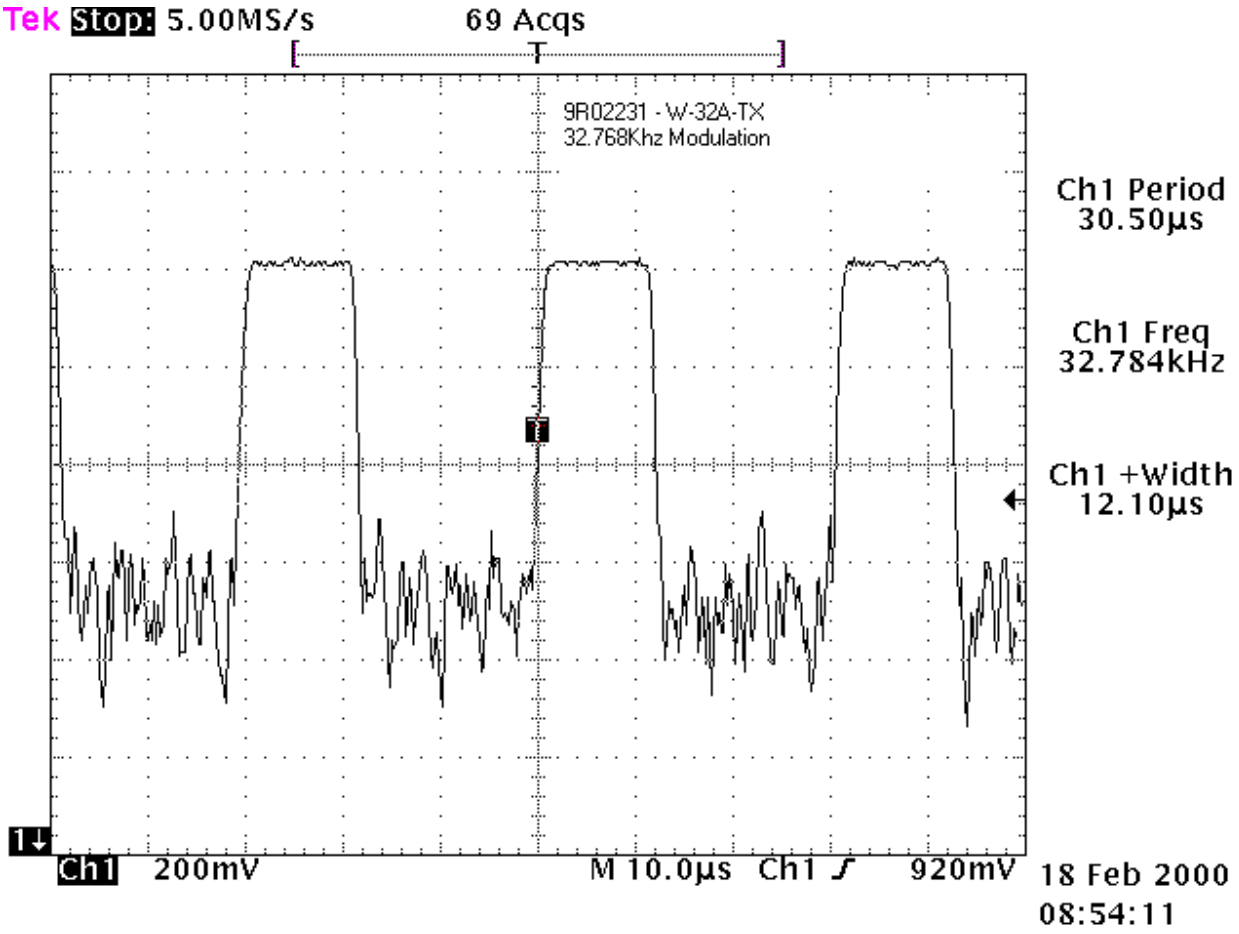
15.231(a)(1) : The transmitter is deactivated immediately upon release of the transmit button.

15.231(a)(2) : Not Applicable

15.231(a)(3) : The transmitter does not transmit at regular intervals.

15.231(a)(4) : Not Applicable


Tek Stop: 2.50MS/s
3066 Acqs
9R02231 - W-32A-TX
28Khz Modulation
Ch1 Period
35.68µs
Ch1 Freq
28.038kHz
Ch1 +Width
14.28µs
Ch1 200mV
M 20.0µs Ch1 ƒ 920mV
18 Feb 2000
08:52:20


Tek Stop: 5.00MS/s
69 Acqs
9R02231 - W-32A-TX
32.768Khz Modulation
Ch1 Period
30.50µs
Ch1 Freq
32.784kHz
Ch1 +Width
12.10µs
Ch1 200mV
M 10.0µs Ch1 ƒ 920mV
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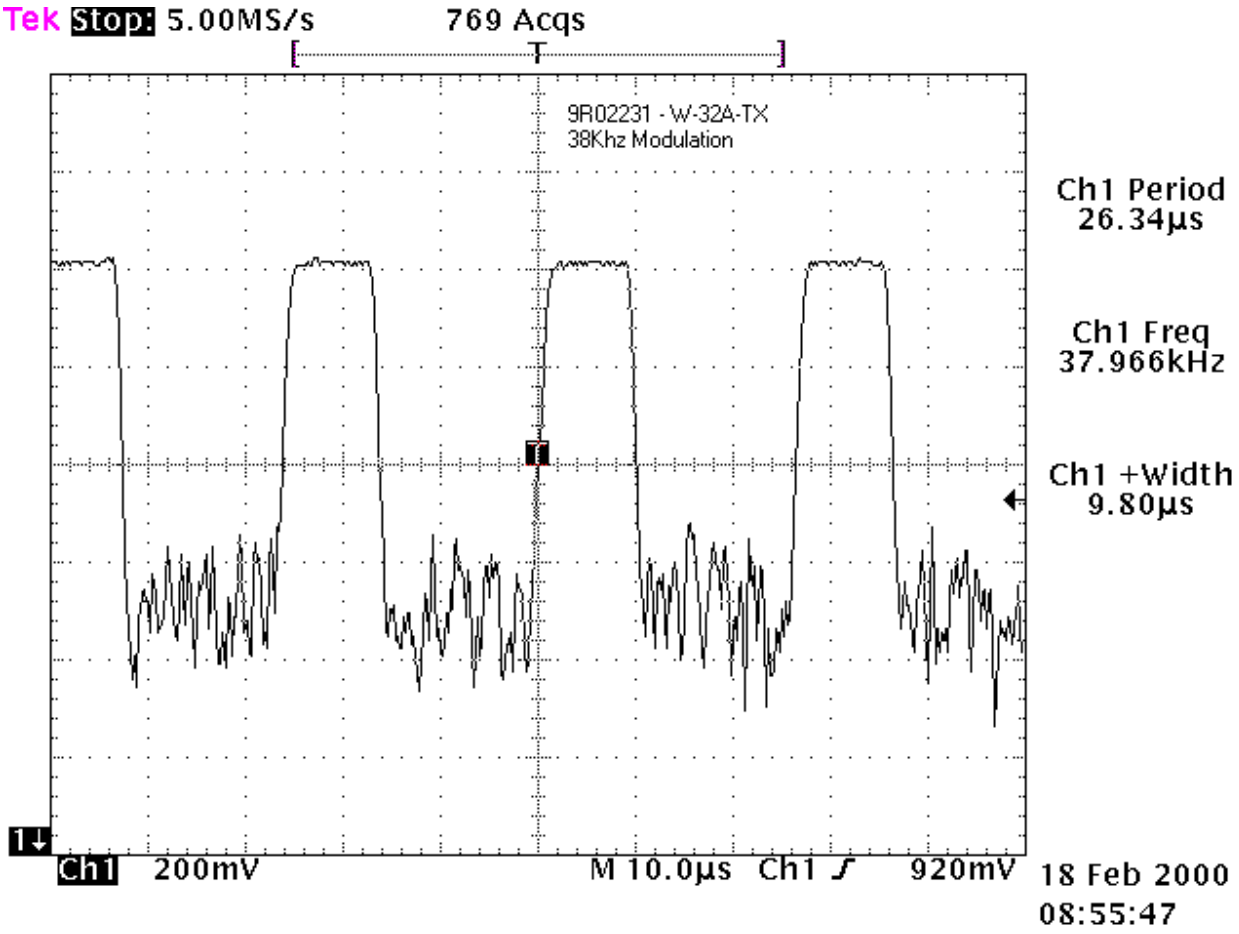
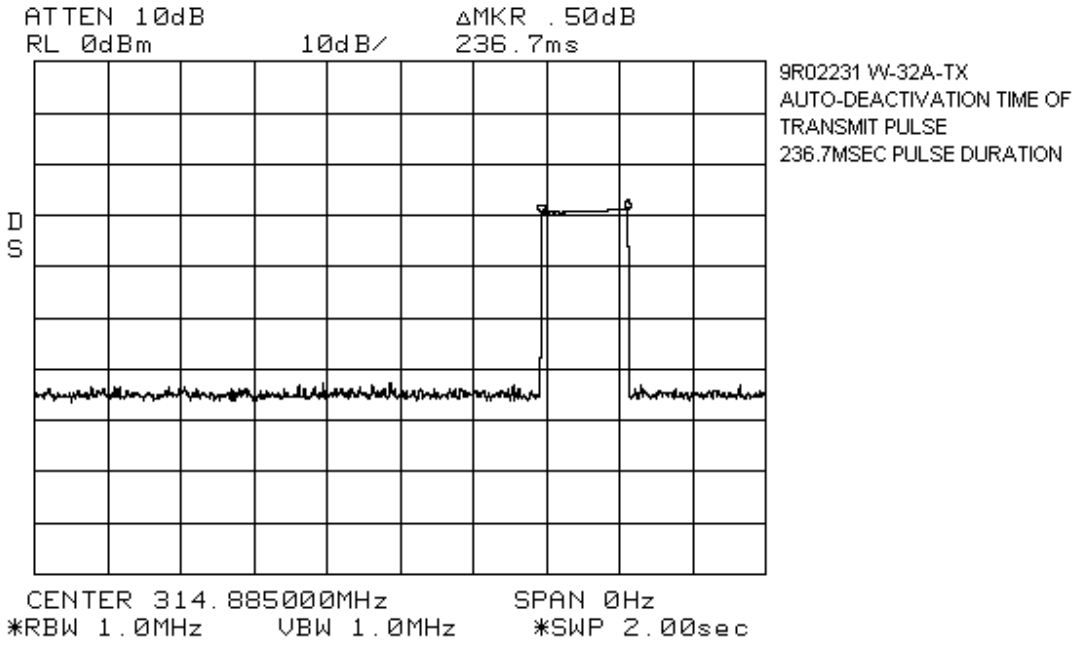
08:54:11


Tek Stop: 5.00MS/s
769 Acqs
9R02231 - W-32A-TX
38Khz Modulation
Ch1 Period
26.34µs
Ch1 Freq
37.966kHz
Ch1 +Width
9.80µs
Ch1 200mV
M 10.0µs Ch1 ƒ 920mV
18 Feb 2000
08:55:47


ATTEN 10dB
RL 0dBm
10dB/
ΔMKR .50dB
236.7ms
9R02231 W-32A-TX
AUTO-DEACTIVATION TIME OF
TRANSMIT PULSE
236.7MSEC PULSE DURATION
D
S
CENTER 314.885000MHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 2.00sec

Section 4. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.231(b)
TESTED BY: Glen Westwell	DATE: February 22, 2000

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 (µV/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 71.2 dBµV/m @ 3m at 315 MHz. This is 4.4 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.

Test Data - Radiated Emissions

Test Distance (meters) : 3		Range: A Tower		Receiver: ESVP / 8565E		RBW(kHz): 1 MHz		Detector: PEAK			
Freq. (MHz)	**Ant. ***	**Pol. (V/H)**	**Ant. HGT. (m)**	**Table (deg.)**	**RCVD Signal (dBµV/m)**	**Ant. Factor (dB)****	**Amp. Gain (dB)*****	**Duty Cycle (dB)**	**Field Strength (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
315.0	L/P	V			42.1	21.9		-8.0	56.0	75.6	19.6
315.0	E/D3	H			57.3	21.9		-8.0	71.2	75.6	4.4
360.0	L/P	V			21.2	24.9		-8.0	38.1	55.6	17.5
360.0	L/P	H			24.7	24.9		-8.0	41.6	55.6	14.0
945.0	L/P	V			16.6	30.4		-8.0	39.0	55.6	16.6
945.0	L/P	H			16.8	30.4		-8.0	39.2	55.6	16.4
1260.0	Hrn2	V			15.5	29.2		-8.0	36.7	55.6	18.9
1260.0	Hrn2	H			15.8	29.2		-8.0	37.0	55.6	18.6
1575.0	Hrn2	V			52.0	31.2	-44.5	-8.0	30.7	54.0	23.3
1575.0	Hrn2	H			53.2	31.2	-44.5	-8.0	31.9	54.0	22.1
1890.0	Hrn2	V			56.0	33.1	-47.2	-8.0	33.9	55.6	21.7
1890.0	Hrn2	H			59.8	33.1	-47.2	-8.0	37.7	55.6	17.9
2205.0	Hrn2	V			56.3	34.5	-47.5	-8.0	35.3	55.6	20.3
2205.0	Hrn2	H			49.0	34.5	-47.5	-8.0	28.0	55.6	27.6

Notes:

B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole
* Re-measured using dipole antenna.
** Includes cable loss when amplifier is not used.
*** Includes cable loss.
( ) Denotes failing emission level.
All Harmonics up to the 10th were searched.
Any non-reported harmonics were not detected.
The noise floor was 20 dBµV below the limit.

Radiated Photographs (Worst Case Configuration)

Front View

Rear View

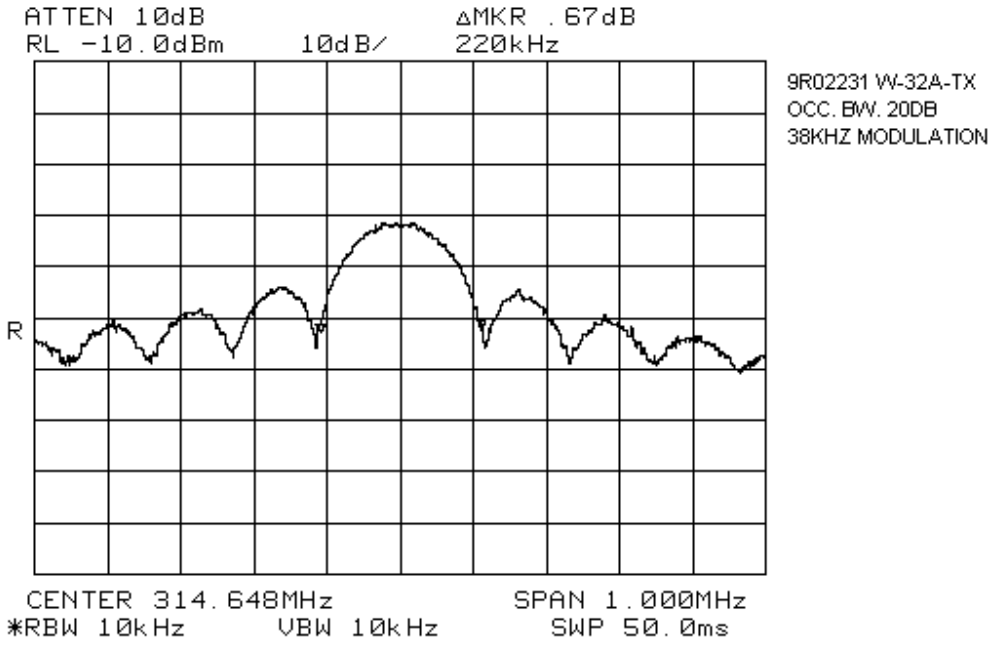
Section 5. Occupied Bandwidth

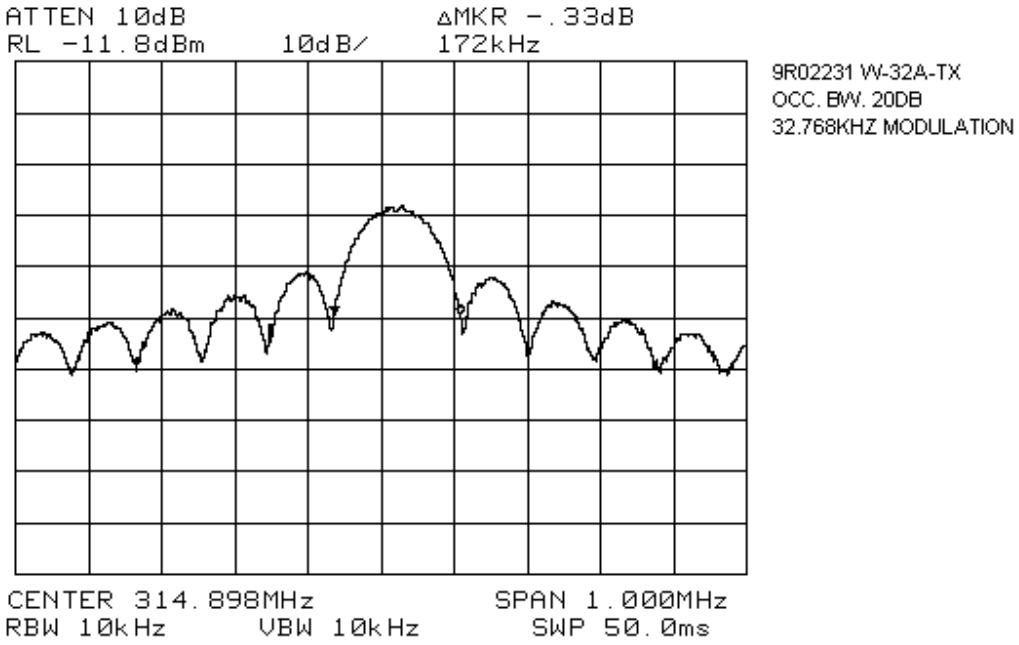
NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.231(c)
TESTED BY: Glen Westwell	DATE: February 18, 2000

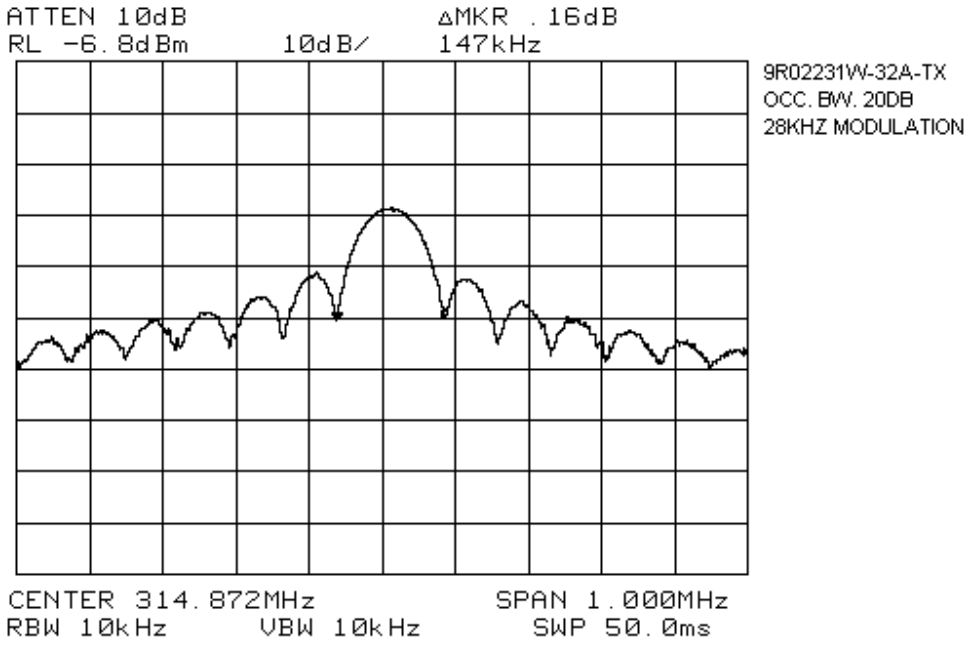
Minimum Standard: 15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points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

Test Results: Complies. See attached graph. The maximum 20 dB bandwidth is 700 kHz. This is 0.2% of the center frequency.

Test Data: See attached graph.

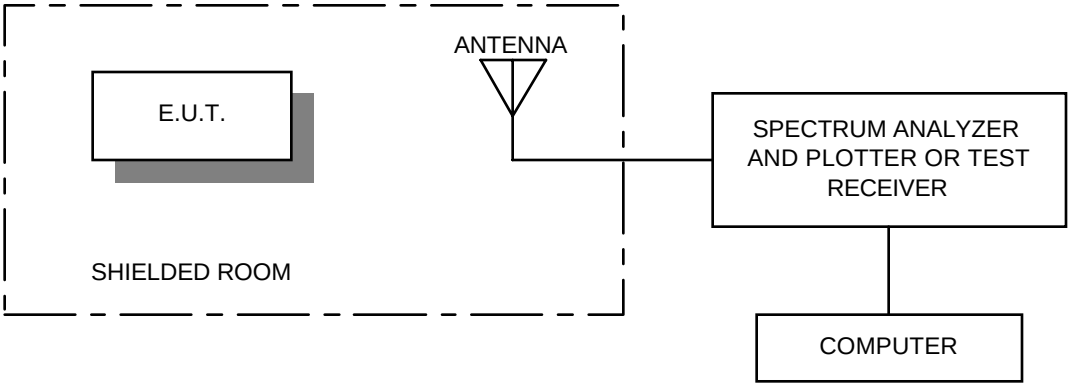

ATTEN 10dB
RL -10.0dBm
10dB/
ΔMKR .67dB
220kHz
9R02231 W-32A-TX
OCC. BW. 20DB
38KHZ MODULATION
R
CENTER 314.648MHz
SPAN 1.000MHz
*RBW 10kHz
VBW 10kHz
SWP 50.0ms


ATTEN 10dB
RL -11.8dBm
10dB/
ΔMKR -.33dB
172kHz
9R02231 W-32A-TX
OCC. BW. 20DB
32.768KHZ MODULATION
CENTER 314.898MHz
SPAN 1.000MHz
RBW 10kHz
VBW 10kHz
SWP 50.0ms

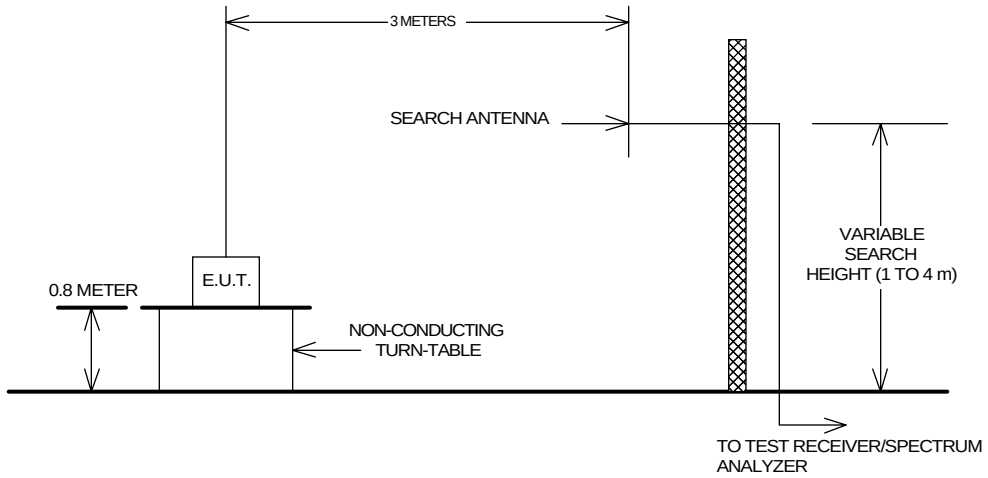

ATTEN 10dB
RL -6.8dBm
10dB/
ΔMKR .16dB
147kHz
9R02231W-32A-TX
OCC. BW. 20DB
28KHZ MODULATION
CENTER 314.872MHz
SPAN 1.000MHz
RBW 10kHz
VBW 10kHz
SWP 50.0ms

Section 6. Block Diagrams

Radiated Prescan

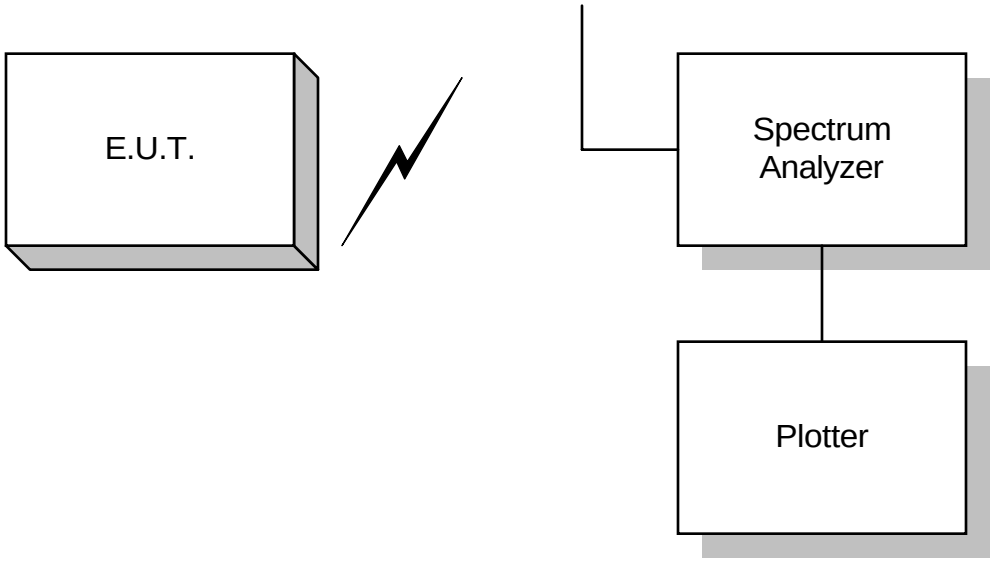


Outdoor Test Site For Radiated Emissions



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

Occupied Bandwidth



Section 7. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	June 16/99	June 16/00
1 Year	Receiver	Rohde & Schwarz	ESVP	892661/014	Mar. 29/99	Mar. 29/00
2 Year	Horn Antenna	EMCO #2	3115	4336	Nov. 11/99	Nov. 11/00
1 Year	Log Periodic Antenna 2	EMCO	3148	9904-1054	Apr. 30/99	Oct. 30/00
1 Year	Low Noise Amplifier	Avantek	AWT-8035	1005	Sept. 20/99	Sept. 20/00

NA: Not Applicable
NCR: No Cal Required
COU: CAL On Use

ANNEX A

RESTRICTED BANDS

Section 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			