KTL Test Report:	9L0684RUS
Applicant:	Internet Telemetry 3131 S. Sheridan Road Tulsa, OK 74145
Equipment Under Test: **(E.U.T.)**	TIM 200 Telemetry Interface Module Transmitter
FCC ID:	O2N1005
In Accordance With:	**FCC Part 15, Subpart C, 15.247** Frequency Hopping Transmitters
Tested By:	KTL Dallas Inc. 802 N. Kealy Lewisville, Texas 75057-3136
Authorized By:	 Tom Tidwell, RF Group Manager
Date:	5/19/00
Total Number of Pages:	38

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Section 1. Summary of Test Results

Manufacturer: Internet Telemetry

Model No.: TIM 200

Serial No.: 4

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 is 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

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
Powerline Conducted Emissions	15.207(a)	48 dBµV	Not Applicable	N/A
Channel Separation	15.247(a)(1)	Greater of 25 kHz or 20 dB Bandwidth	601.5 kHz	Complies
Pseudo-random Hopping Algorithm	15.247(a)(1)			Complies
Time of Occupancy	15.247(a)(1)(ii)	≤ 0.4 sec in 10 sec	.2 sec. in 10 sec.	Complies
20 dB Occupied Bandwidth	15.247(a)(1)	≤ 500 kHz	368 kHz	Complies
Peak Power Output	15.247(b)	1 Watt	41.4 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)	50.7 dBuV/m @ 3m	Complies

Footnotes:

1. The E.U.T. operates on battery supply or a separate DC power source.
2. All emissions were measured as radiated emissions since the antenna is integral.

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

General Equipment Information

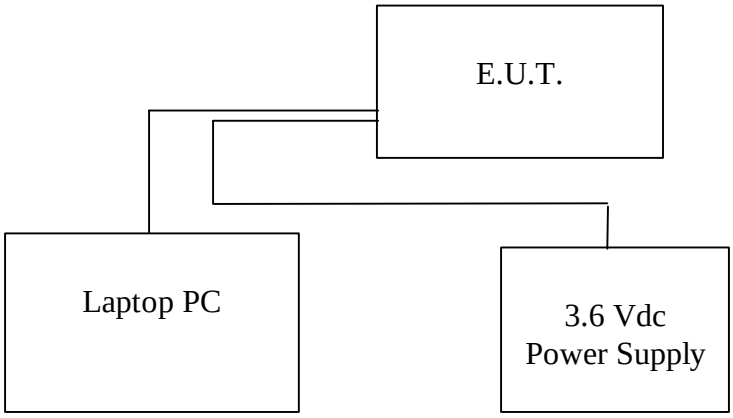
Frequency Band:	☒ 902 – 928 MHz ☐ 2400 – 2483.5 MHz
Operating Frequency Range:	905.5 MHz – 924.2 MHz
Number of Channels:	25
Channel Spacing:	600 kHz
Emission Designator:	368KF1D
User Frequency Adjustment:	None
User RF Power Adjustment:	None

Description of Equipment

The E.U.T. is a frequency-hopping transmitter that operates in the 902 – 928 MHz ISM band. Utility companies would typically use the equipment to transmit telemetry data to a remote receiver.

The transmitting antenna is integral to the PWB and is therefore non-detachable.

Test Setup Diagram



Section 3. Powerline Conducted Emissions

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

Test Results: Not Applicable

Measurement Data: See attached plots.

Equipment Used:

Measurement Uncertainty: +/- ___ dB

Temperature: °C

Relative Humidity: %

Section 4. Channel Separation

NAME OF TEST: Channel Separation	PARA. NO.: 15.247(a)(1)
TESTED BY: Kevin Rose	DATE: 4/24/00

Test Results: Complies. The measured 20 dB bandwidth is less than 500 kHz.

Measurement Data:

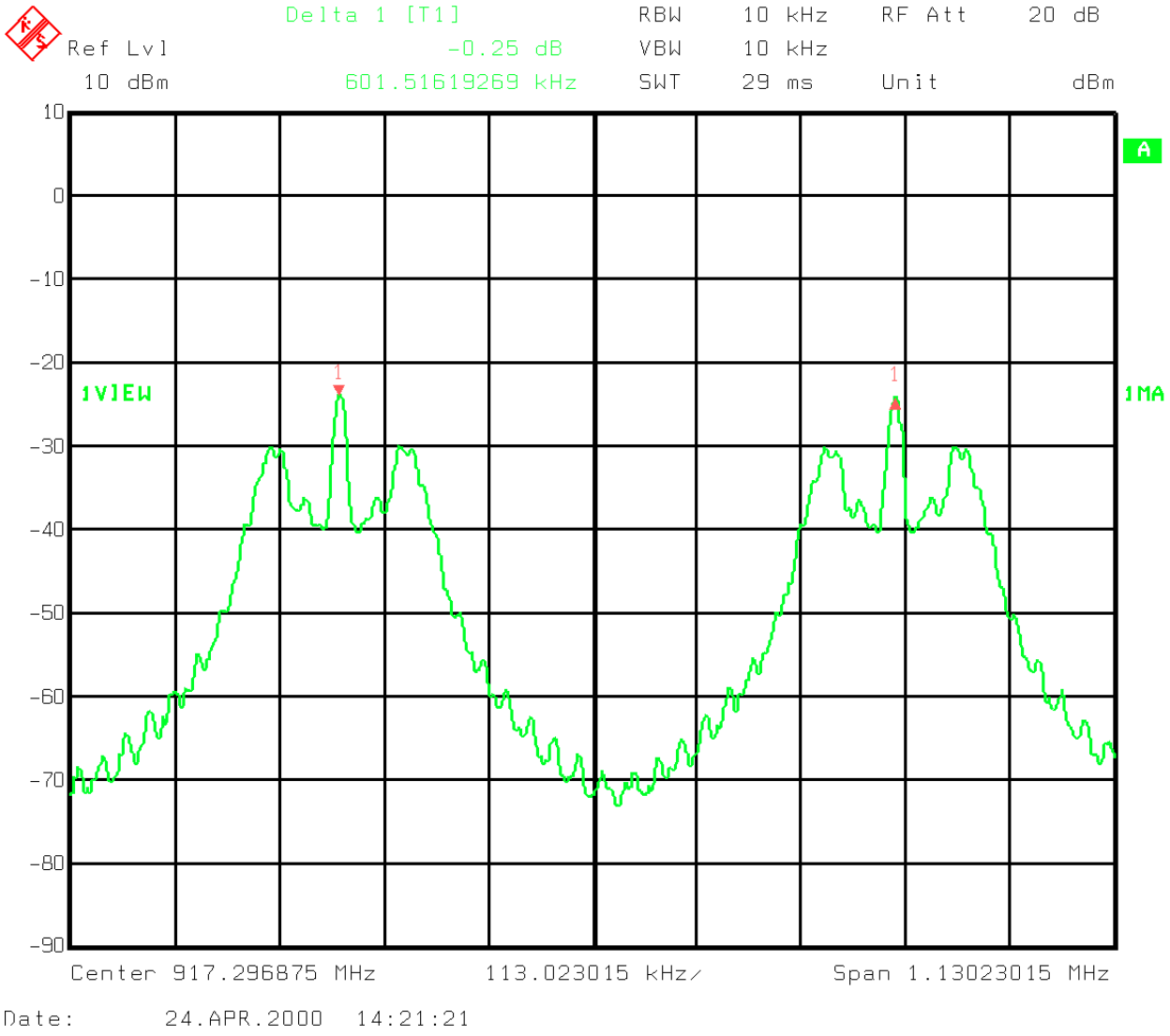
Measured 20 dB bandwidth: 368 kHz
Channel Separation: 601.5 kHz

Equipment Used: G2632, CF41

Measurement Uncertainty: +/- 0.7 dB
+/- 1×10^{-6} ppm

Temperature: 21 °C

Relative Humidity: 48 %


Delta 1 [T1]
RBW 10 kHz
RF Att 20 dB
Ref Lvl
-0.25 dB
VBW 10 kHz
10 dBm
601.51619269 kHz
SWT 29 ms
Unit dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
A
1VIEW
1MA
Center 917.296875 MHz
113.023015 kHz/
Span 1.13023015 MHz
Date: 24.APR.2000 14:21:21

Section 5. Pseudorandom Hopping Algorithm

NAME OF TEST: Pseudorandom Hopping Algorithm	PARA. NO.: 15.247(a)(1)

Test Results: Complies. A pseudo-random hop table is used to determine the frequency hop sequence. The receiver is programmed with the same hop table as the transmitter. The receiver's input bandwidth is nominally 600 kHz. The transmitter initiates the conversation with a synch pulse that is recognized by the receiver. The receiver then synchronizes and begins hopping in sequence with the transmitter. After the information packets are transmitted, the transmitter ceases transmission. The next time the transmitter begins transmitting it will begin transmitting at the next frequency in the hop table. Each frequency in the hop table is therefore used before the transmitter will hop to an already used frequency. Multiple transmitters in a system will not synchronize transmissions since each transmitter will have a different transmit duration depending on the amount of data transmitted.

Measurement Data: See sample hop table.

Number of Hopping Frequencies: 25

Section 6. Time of Occupancy

NAME OF TEST: Time of Occupancy	PARA. NO.: 15.247(a)(1)

Test Results: Complies. The shortest delay that the firmware will allow between transmissions is .057 seconds. Accounting for switch debounce time of 10 msec., a wakeup time of 1 msec., 9 msec. PLL setup time, and .037 transmit time: It takes 1.425 seconds to visit all 25 channels (.057 x 25 = 1.425). Any one channel could be visited 7.02 times in 10 seconds. (10/1.425 = 7.02). Thus the total transmit time for any 10 second period is 7.02 x .037 = .260 seconds.

Measurement Data:

Maximum Dwell Time On Any Channel: 0.260 sec. in any 10 sec. period.

Section 7. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(1)(i)
TESTED BY: Kevin Rose	DATE: 4/17/00

Test Results: Complies. The maximum 20 dB bandwidth is 368 kHz. This is less than the 500 kHz allowed for systems using 25 channels.

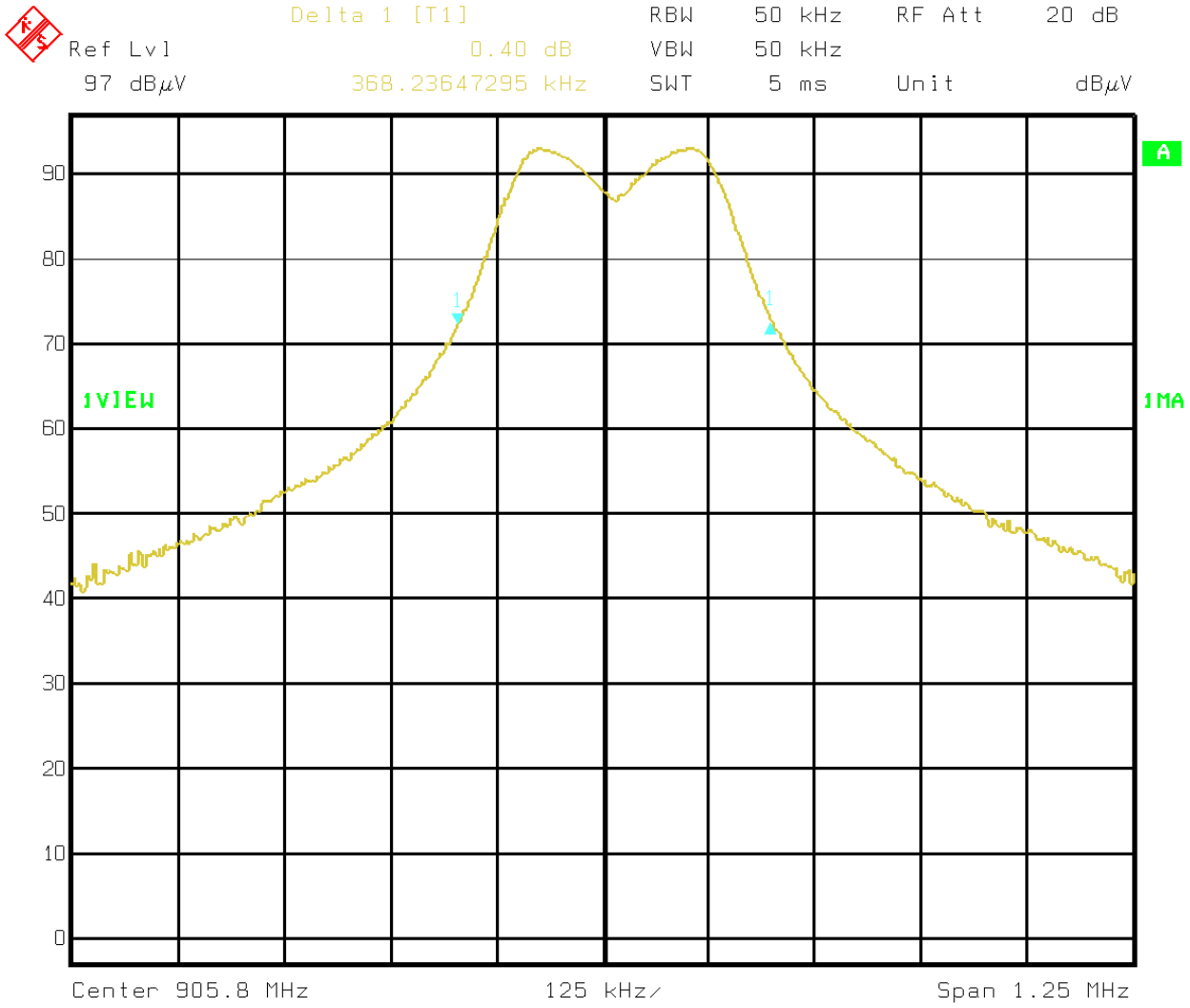
Measurement Data: See attached plots.

Equipment Used: G2632, CF41

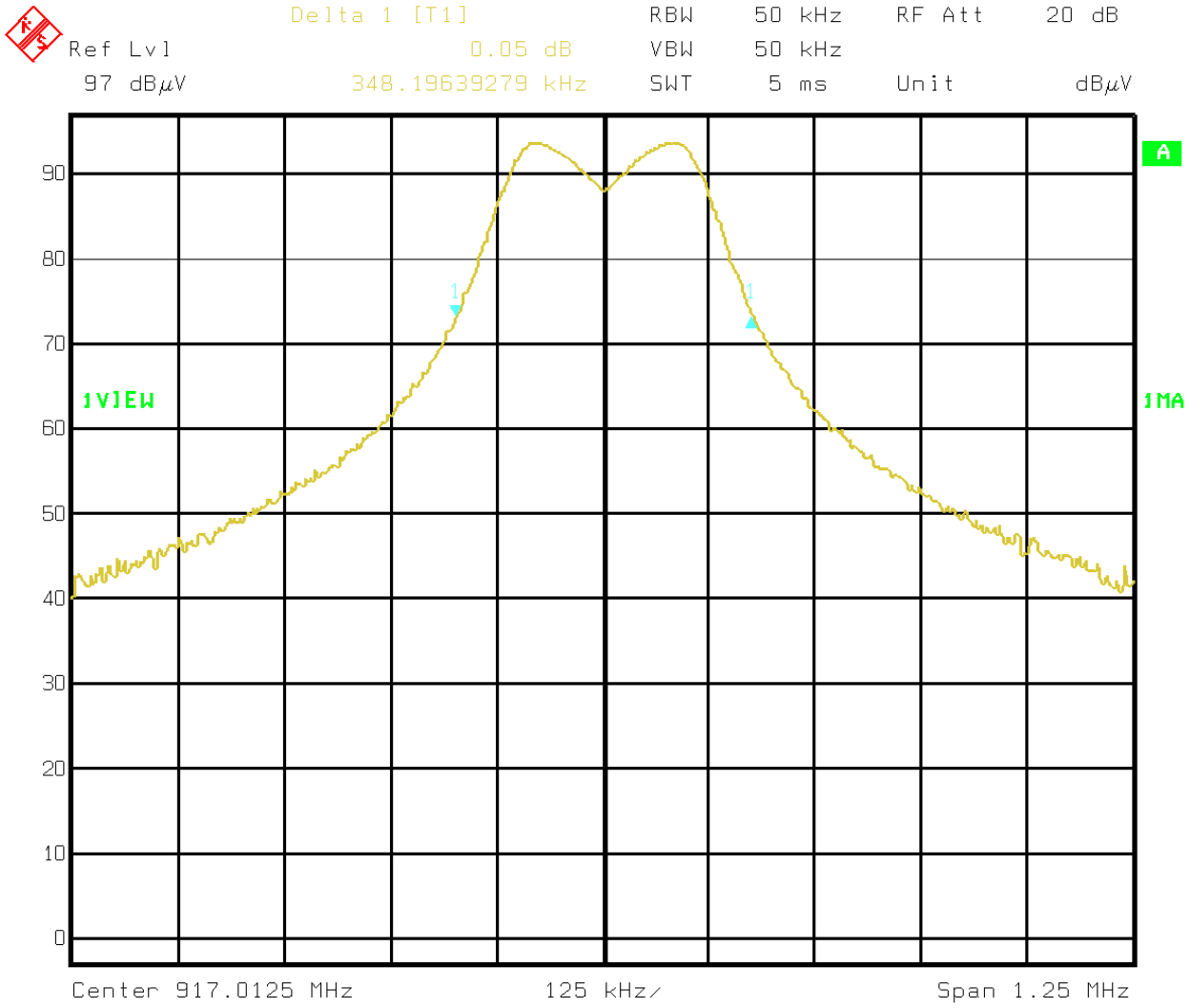
Measurement Uncertainty: +/- 0.7 dB
+/- 1×10^{-6} ppm

Temperature: 21 °C

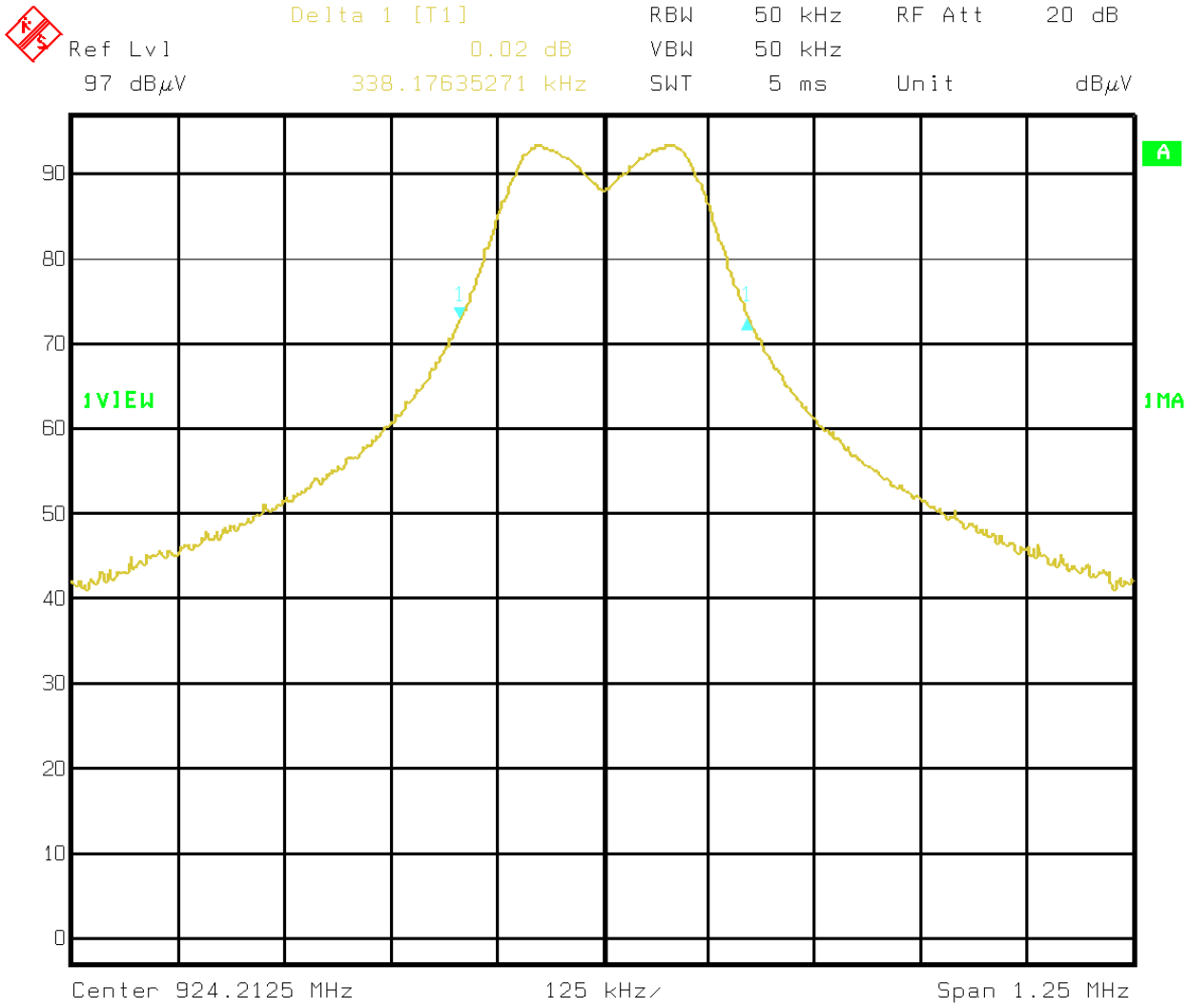
Relative Humidity: 48 %



Title: 20db low ch.
Comment A: internet telmetry
Date: 17.APR.2000 11:02:32



Title: 20db mid ch.
Comment A: internet telmetry
Date: 17.APR.2000 11:00:24



Title: 20db upper ch.
Comment A: internet telmetry
Date: 17.APR.2000 10:57:49

Section 8. Peak Power Output

NAME OF TEST: Peak Power Output	PARA. NO.: 15.247 (b)
TESTED BY: David Light	DATE: 5/17/00

Test Results: Complies. The worst-case radiated power output was 111.4 dBuV/m @ 3 m at 906 MHz. This is equivalent to 41.4 mW e.i.r.p.

Measurement Data: See radiated emissions data.
Detachable antenna? ☐ Yes ☒ No
If yes, state the type of non-standard connector used:

Antennas: The antenna is integral to the PCB. The antenna gain is 0 dBi.

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

Field Strength: 111.4 dBµV/m @ 3m or .371535 V/m @ 3m.

Section 9. Spurious Emissions (Antenna Conducted)

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

Test Results:

Measurement Data:

Not Applicable

Equipment Used:

Measurement Uncertainty: +/- ___ dB

Temperature: °C

Relative Humidity: %

Section 10. Spurious Emissions (Radiated)

NAME OF TEST: Spurious Emissions (Radiated)	PARA. NO.: 15.247(c)
TESTED BY: David Light	DATE: 5/17/00

Test Results: Complies. The worst-case spurious emission level was 50.7 dBuV/m @ 3m at 8316 MHz. This is 3.3 dB below the specification limit.

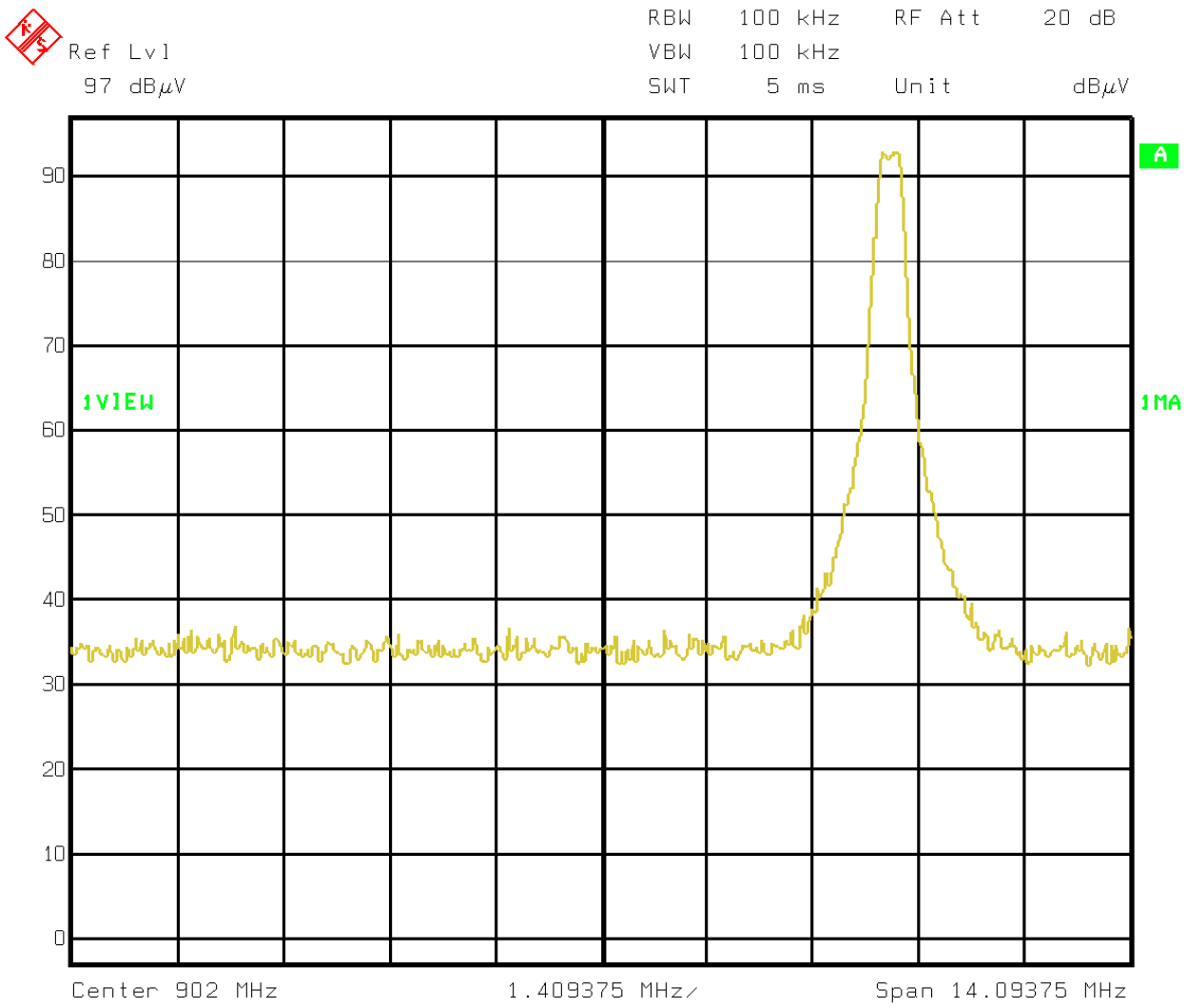
Measurement Data: See attached tables.

Duty Cycle Calculation:

Duty Cycle correction factor(dB) = 20 log (rf_{ON} in ms/100ms)
Maximum rf_{ON} = 57 msec. in 100 msec.
Duty cycle correction factor = -4.9 dB

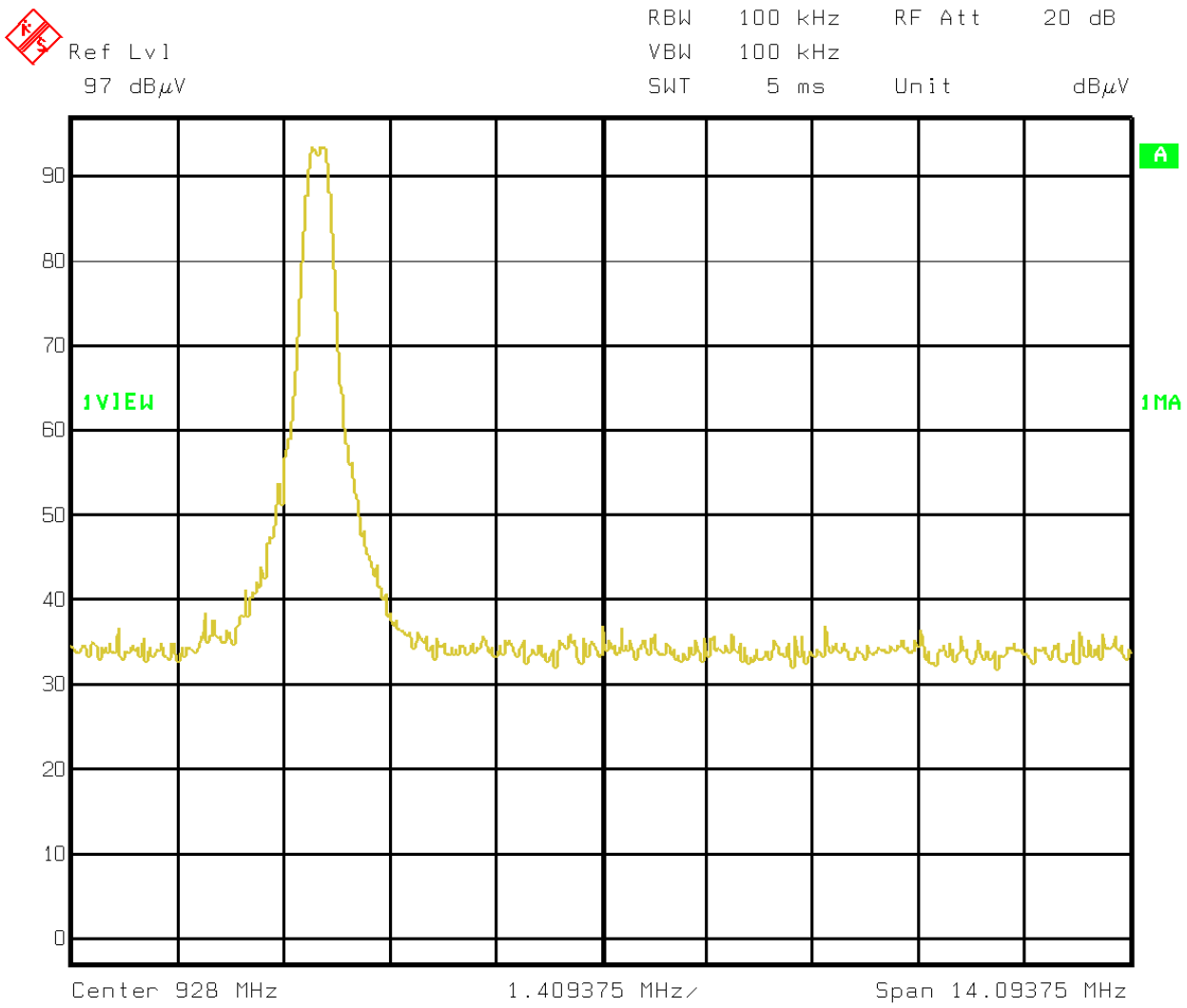
The E.U.T. was tested in three orthogonal axis to determine the worst-case orientation.

Test Data – Band Edges



Title: lower band edge
Comment A: internet telmetry
Date: 17.APR.2000 11:06:48

Test Data – Band Edges



Title: upper band edge
Comment A: internet telmetry
Date: 17.APR.2000 11:07:49

Test Data - Radiated Emissions (Low Channel)

Radiated Emissions

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Job No.:	9L0684R	Date:	5/17/00
Specification:	CFR 47, Part 15.247	Temperature(°F):	72
Tested By:	David Light	Relative Humidity(%)	50
E.U.T.:	T.I.M.		
Configuration:	Transmit at 905.8 MHz		
Sample Number:	4		
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:	#N/A
Filter:	1481	Cable #2:	1043
Receiver:	1464	Cable #3:	1081
Attenuator #1	#N/A	Cable #4:	#N/A
Attenuator #2:	#N/A	Mixer:	#N/A

Additional equipment used: CF-47 1480
Measurement Distance: 3 Meters
Measurement Uncertainty: 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)	Polarity	Comment
0.906	74.67	23.8	1.4	0	99.9	N/A		V	Fundamental
1.812	47.5	28.5	6.16	32	45.3	79.9	-34.6	V	
2.717	43	29	6.27	32.5	40.9	54.0	-13.1	V	Restricted Band
3.623	48.5	29.9	6.97	31.8	48.7	54.0	-5.3	V	Restricted Band
4.529	41	32	7.95	30.8	45.3	54.0	-8.7	V	Restricted Band
5.435	40	33.6	7.95	28.9	47.8	54.0	-6.3	V	Restricted Band
6.341	36	35.2	8.9	31.6	43.6	79.9	-36.3	V	Noise floor
7.246	36	35.9	9.33	34.2	42.1	54.0	-11.9	V	Restricted Band
8.152	36	37.8	10	33.2	45.7	54.0	-8.3	V	Restricted Band
9.058	36	37	11.3	33.3	46.1	54.0	-7.9	V	Restricted Band - Noise floor
0.9058	86.17	23.8	1.4	0	111.4	N/A		H	Fundamental
1.8116	46.6	28.5	6.16	32	44.4	91.4	-47.0	H	
2.7174	40	29	6.27	32.5	37.9	54.0	-16.1	H	Restricted Band
3.6232	40	29.9	6.97	31.8	40.2	54.0	-13.8	H	Restricted Band
4.529	37	32	7.95	30.8	41.3	54.0	-12.8	H	Restricted Band
5.4348	37	33.6	7.95	28.9	44.8	54.0	-9.3	H	Restricted Band
6.3406	36	35.2	8.9	31.6	43.6	91.4	-47.8	H	Noise floor
7.2464	36	35.9	9.33	34.2	42.1	54.0	-11.9	H	Restricted Band - Noise floor
8.1522	36	37.8	10	33.2	45.7	54.0	-8.3	H	Restricted Band - Noise floor
9.058	36	37	11.3	33.3	46.1	54.0	-7.9	H	Restricted Band - Noise floor

Notes: **Duty cycle correction of 4.9 dB was included in corrected reading**

Test Data - Radiated Emissions (Mid Channel)

Radiated Emissions

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Job No.: 9L0684R Date: 5/17/00
Specification: CFR 47, Part 15 Temperature(°F): 72
Tested By: David Light Relative Humidity(%) 50
E.U.T.: T.I.M.
Configuration: Transmit at 917 MHz
Sample Number: 4
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: #N/A
Filter: 1481 Cable #2: 1043
Receiver: 1464 Cable #3: 1081
Attenuator #1 #N/A Cable #4: #N/A
Attenuator #2: #N/A Mixer: #N/A

Additional equipment used: CF-47 1480
Measurement Distance: 3 Meters

Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Polarity	Comment
0.917	77	23.8	1.4	0	102.2	N/A		V	Fundamental
1.834	50	28.5	6.16	32	47.8	82.2	-34.4	V	
2.751	45.3	29	6.27	32.5	43.2	54.0	-10.8	V	Restricted Band
3.668	48.3	29.9	6.97	31.8	48.5	54.0	-5.5	V	Restricted Band
4.585	44	32	7.95	30.8	48.3	54.0	-5.7	V	Restricted Band
5.502	42	33.6	7.95	28.9	49.8	54.0	-4.3	V	Restricted Band
6.419	36	35.2	8.9	31.6	43.6	82.2	-38.6	V	Noise floor
7.336	37	35.9	9.33	34.2	43.1	54.0	-10.9	V	Restricted Band
8.253	37.5	37.8	10	33.2	47.2	54.0	-6.8	V	Restricted Band
9.170	36	37	11.3	33.3	46.1	54.0	-7.9	V	Restricted Band - Noise floor
0.917	84.5	23.8	1.4	0	109.7	N/A		H	Fundamental
1.834	47.5	28.5	6.16	32	45.3	89.7	-44.4	H	
2.751	39.5	29	6.27	32.5	37.4	54.0	-16.6	H	Restricted Band
3.668	39	29.9	6.97	31.8	39.2	54.0	-14.8	H	Restricted Band
4.585	39	32	7.95	30.8	43.3	54.0	-10.8	H	Restricted Band
5.502	36	33.6	7.95	28.9	43.8	54.0	-10.3	H	Restricted Band - Noise floor
6.419	36	35.2	8.9	31.6	43.6	89.7	-46.1	H	Noise floor
7.336	36	35.9	9.33	34.2	42.1	54.0	-11.9	H	Restricted Band - Noise floor
8.253	36	37.8	10	33.2	45.7	54.0	-8.3	H	Restricted Band - Noise floor
9.17	36	37	11.3	33.3	46.1	54.0	-7.9	H	Restricted Band - Noise floor

Notes: **Duty cycle correction of 4.9 dB was included in corrected reading**

Test Data - Radiated Emissions (High Channel)

Radiated Emissions

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Job No.:	9L0684R	Date:	5/17/00
Specification:	CFR 47, Part 15.247	Temperature(°F):	72
Tested By:	David Light	Relative Humidity(%)	50
E.U.T.:	T.I.M.		
Configuration:	Transmit at 924 MHz		
Sample Number:	4		
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:	#N/A
Filter:	1481	Cable #2:	1043
Receiver:	1464	Cable #3:	1081
Attenuator #1	#N/A	Cable #4:	#N/A
Attenuator #2:	#N/A	Mixer:	#N/A

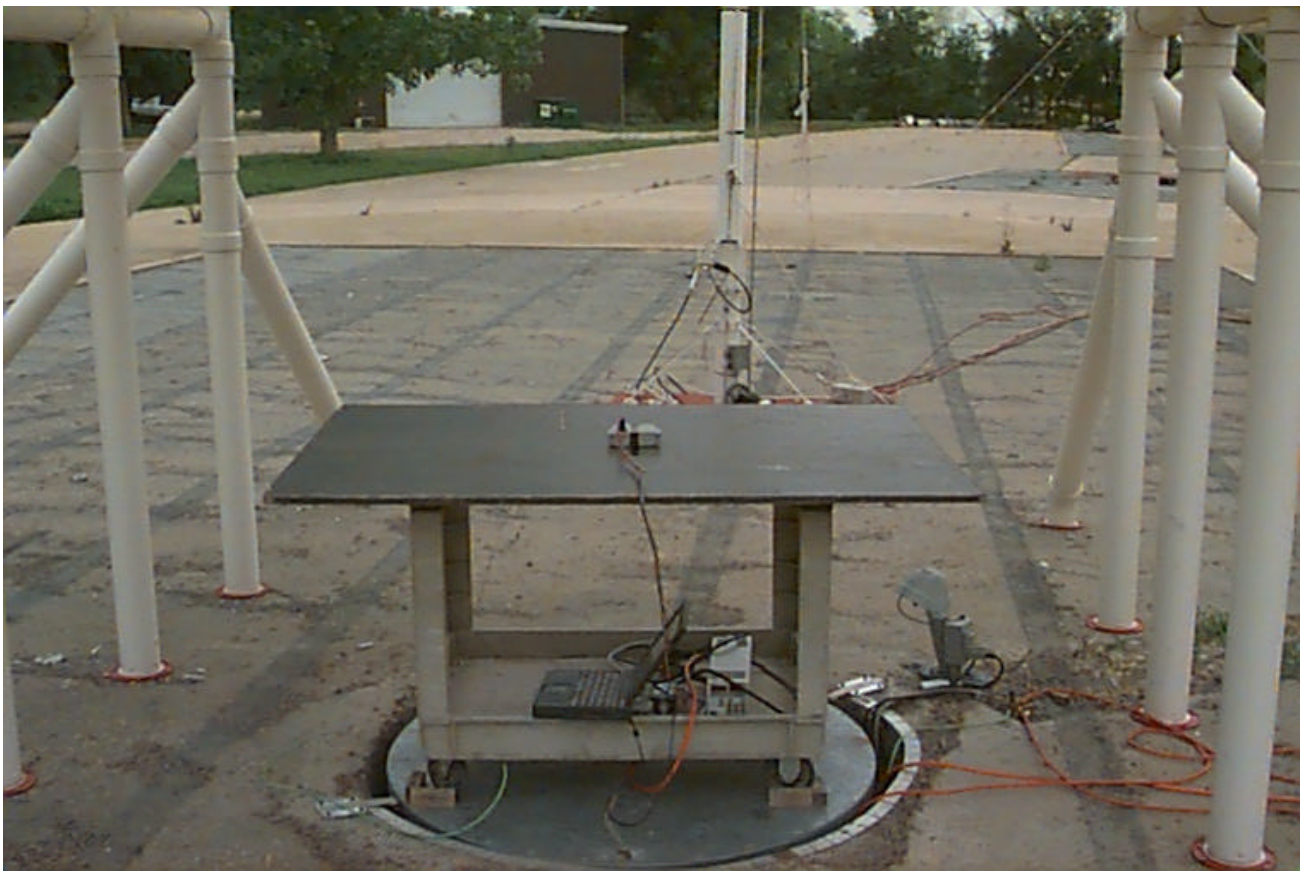
Additional equipment used: CF-47 1480

Measurement Distance: 3 Meters

Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Polarity	Comment
0.924	77.2	23.8	1.4	0	102.4	N/A		V	Fundamental
1.848	52.3	28.5	6.16	32	50.1	82.4	-32.3	V	
2.772	45	29	6.27	32.5	42.9	54.0	-11.1	V	Restricted Band
3.696	49.3	29.9	6.97	31.8	49.5	54.0	-4.5	V	Restricted Band
4.620	46	32	7.95	30.8	50.3	54.0	-3.7	V	Restricted Band
5.544	42.5	33.6	7.95	28.9	50.3	54.0	-3.8	V	Restricted Band
6.468	36	35.2	8.9	31.6	43.6	82.4	-38.8	V	Noise floor
7.392	36	35.9	9.33	34.2	42.1	54.0	-11.9	V	Restricted Band - Noise floor
8.316	41	37.8	10	33.2	50.7	54.0	-3.3	V	Restricted Band
9.240	40.3	37	11.3	33.3	50.4	54.0	-3.6	V	Restricted Band
0.924	83.7	23.8	1.4	0	108.9	N/A		H	Fundamental
1.848	46	28.5	6.16	32	43.8	88.9	-45.1	H	
2.772	38.3	29	6.27	32.5	36.2	54.0	-17.8	H	Restricted Band
3.696	37	29.9	6.97	31.8	37.2	54.0	-16.8	H	Restricted Band
4.62	39	32	7.95	30.8	43.3	54.0	-10.8	H	Restricted Band
5.544	36	33.6	7.95	28.9	43.8	54.0	-10.3	H	Restricted Band - Noise floor
6.468	36	35.2	8.9	31.6	43.6	88.9	-45.3	H	Noise floor
7.392	36	35.9	9.33	34.2	42.1	54.0	-11.9	H	Restricted Band - Noise floor
8.316	36	37.8	10	33.2	45.7	54.0	-8.3	H	Restricted Band - Noise floor
9.24	36	37	11.3	33.3	46.1	54.0	-7.9	H	Restricted Band - Noise floor

Notes: **Duty cycle correction of 4.9 dB was included in corrected reading**

Radiated Photographs (Worst Case Configuration)



Section 11. Test Equipment List

KTL ID	Description	Manufacturer Model Number	Serial Number	Calibration Date
993	HORN ANTENNA	A.H. SYSTEMS SAS-200/571	0	CNR
1016	AMPLIFIER	HEWLETT PACKARD 8449A	2749A00159	06/11/99
1481	MICROWAVE HIGHPASS FILTER	K & L 3DH1-2000/T8000-0/0	4	12/16/99
1464	SPECTRUM ANALYZER	HEWLETT PACKARD 8563E	3551A04428	11/03/99
1043	FLEXIBLE CABLE 1M	ASTROLAB INC. 32027-2-29094K-1M	0	01/00/00
1081	CABLE 2M	ASTROLAB 32027-2-29094-72TC	N/A	08/31/99
1480	BILOG ANTENNA	SCHAFFNER-CHASE CBL6111C	2572	01/14/00
G2632	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	06/14/99

ANNEX A - TEST DETAILS

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 250µV (48 dBµV) across 50 ohms.

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.

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.

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 sec./.001 sec.)/75 chan. = 400 x 1 msec. = 400 msec. or 0.4 sec. in 30 sec.

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

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

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

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 (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

THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC

15.205 Restricted Bands

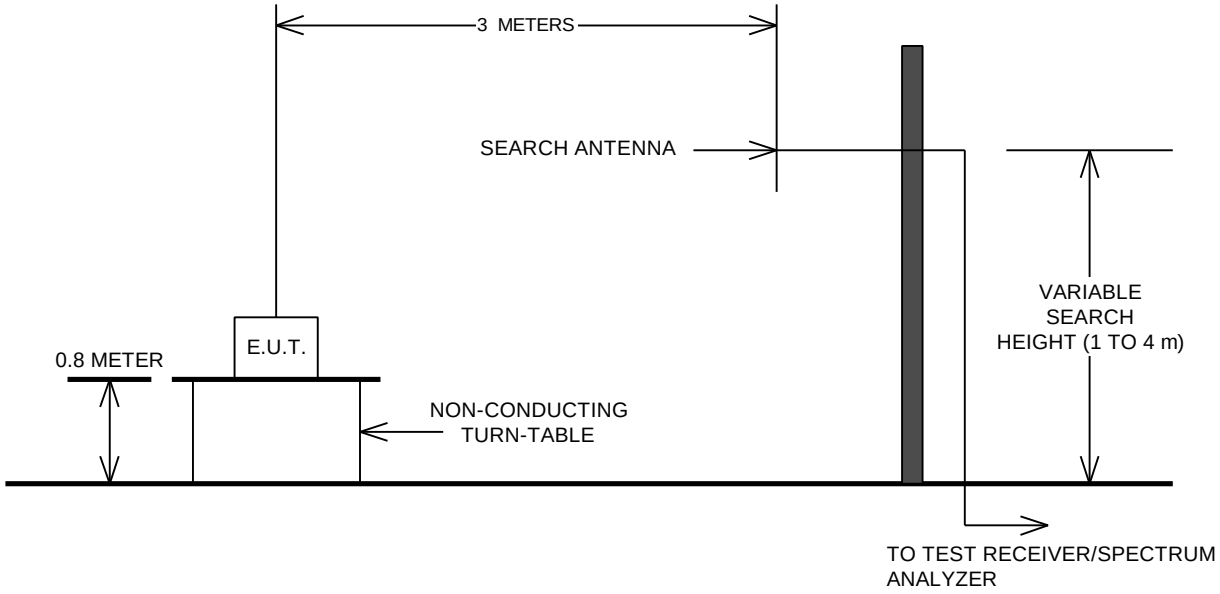
MHz	MHz	MHz	GHz
0.09-0.11	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.125-6.218	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:

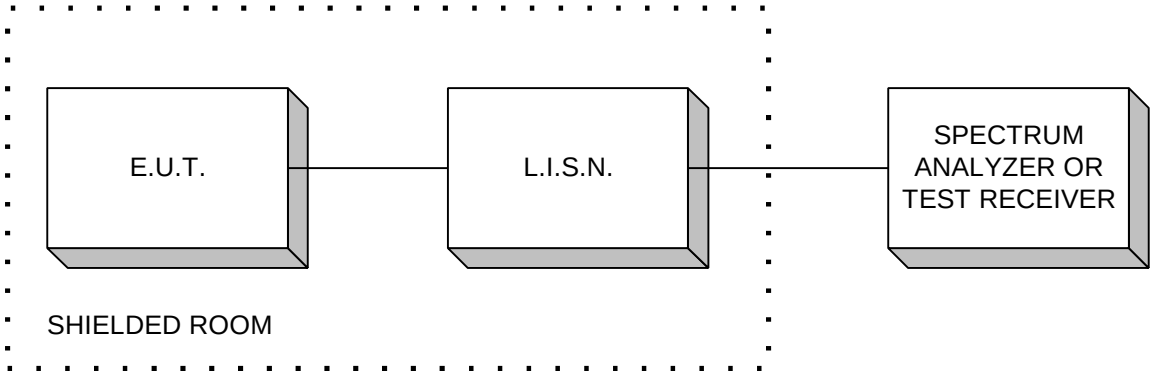
Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

ANNEX B - TEST DIAGRAMS

Test Site For Radiated Emissions



Conducted Emissions



Peak Power At Antenna Terminals