

TEST REPORT

of

Part 15 Subpart C § 15.231

Equipment Under Test : Universal Remote Control
Model Name : IR / RF 600
Serial No. : N/A
Applicant : Contec, LLC
Manufacturer : Contec, LLC
Date of Test(s) : 2009-11-16 ~ 2009-11-25
Date of Issue : 2009-11-26

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Date

2009-11-26

Feel Jeong

Approved By



Date

2009-11-26

Charles Kim

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1. General information

1.1. Testing laboratory

SGS Testing Korea Co., Ltd.

Wireless Div. 2FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040

www.electrolab.kr.sgs.com

Telephone : +82 +31 428 5700

FAX : +82 +31 427 2371

1.2.Details of applicant

Applicant : Contec, LLC

Address : 1011 State St. Schenectady, NY 12307, USA

Contact Person : Gene. W. Griesau

Phone No. : 518-382-8000

Fax No. : 518-382-8453

1.3. Description of EUT

Kind of Product	Contec, LLC
Model Name	IR / RF 600
Serial Number	N/A
Power Supply	DC 3.0 V(AA Alkaline battery *2 EA)
Frequency Range	433.92 MHz
Modulation Technique	ASK/OOK
Number of Channels	1
Operating Conditions	0 ~ 60
Antenna Type	Fixed type (PCB ANT)

1.4. Details of modification

-N/A

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1.5. Test equipment list

Equipment	Manufacturer	Model	Cal due.
Signal Generator	Agilent	E4438C	Apr. 01, 2010
Spectrum Analyzer	Agilent	E4440A	Apr. 01, 2010
High Pass Filter	MINI-CIRCUITS	NHP-800+	Apr. 01, 2010
High Pass Filter	WAINWRIGHT INSTRUMENTGmbH	WHK3.0/18G-10SS	Sep. 29, 2010
DC Power Supply	Agilent	E3631A	Apr. 01, 2010
Test Receiver	R & S	ESU26	Apr. 21, 2010
Preamplifier	H.P.	8447F	Jul. 02, 2010
Preamplifier	Agilent	8449B	Apr. 01, 2010
Bilog Antenna	SCHWARZBECK MESSELEKTRONIK	VULB9163	Jul. 22, 2010
Horn Antenna	R & S	HF 906	Oct. 09, 2010
Anechoic Chamber	SY Corporation	L W H (9.6 m 3.5 m 3.5 m)	Jan. 31, 2010

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1.6. Summary of test results

The EUT has been tested according to the following specifications:

Applied standard : FCC Part15 Subpart C		
Standard section	Test item	Result
15.231(b)	Field strength of the fundamental, spurious emission	Complied
15.231(a)	Transmission time	Complied
15.231(c)	Bandwidth of operation frequency	Complied

1.7. Test report revision

Revision	Report number	Description
0	F690501/RF-RTL003465	Initial

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2. Field strength of the fundamental & spurious emission

2.1. Test setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 40 GHz Emissions.

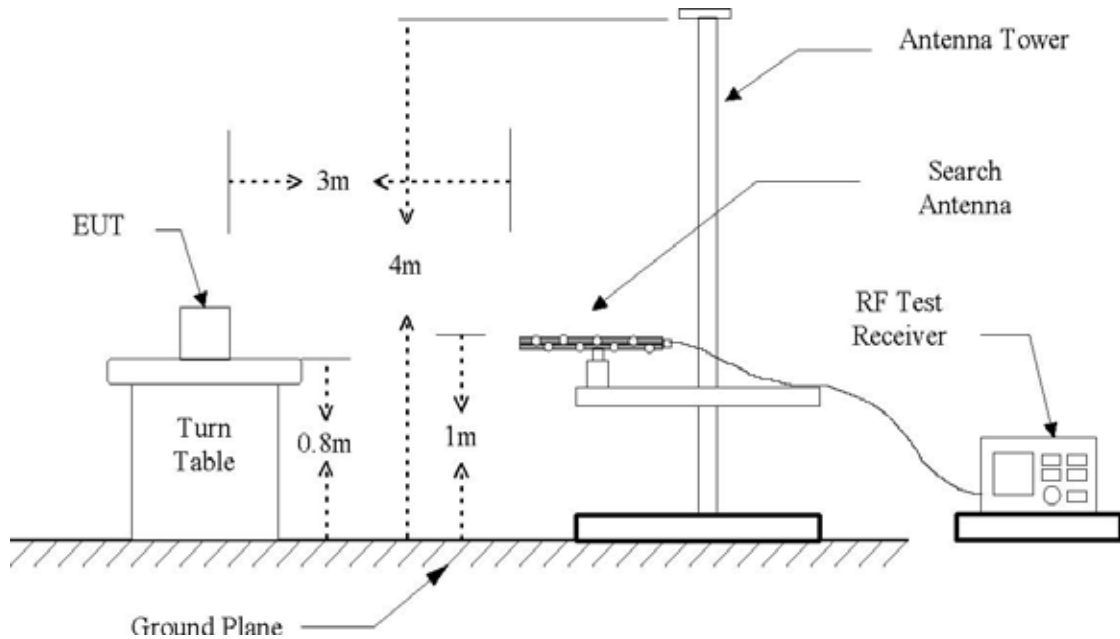


Figure 1 : Frequencies measured below 1 GHz configuration

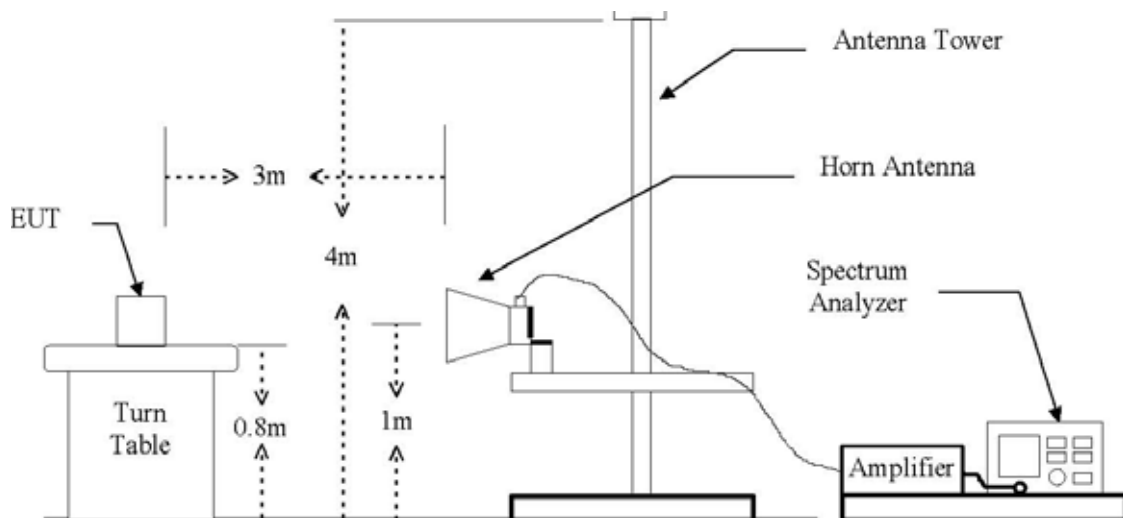


Figure 2 : Frequencies measured above 1 GHz configuration

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2.2. Limit

In addition to the provisions of Section 15.205, the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66 – 47.70	2,250	225
70 - 130	1,250	125
130 – 174	1,250 to 3,750 **	125 to 375 **
174 – 260	3,750	375
260 – 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

** linear interpolations

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows : for the band 130-174 MHz, $\mu\text{V/m}$ at 3 meters = $56.81818(F)-6136.3636$; for the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters = $41.6667(F)-7083.333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

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2.3. Test procedures for emission from 30 MHz to 1000 MHz

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 1 meter away from the interference-receiving antenna.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Note :

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz for Peak detection and frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1 GHz.

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2.4. Test result

Ambient temperature : 25
Relative humidity : 49 % R.H.

2.4.1. Below 1 GHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Pk Red (dBuV)	Av Rdg (dBuV)	Pol.	AF (dB/m)	CL (dB)	Av Actual (dBuV/m)	Av Limit (dBuV/m)	Margin (dB)
433.92	62.89	48.00	H	16.17	2.14	66.31	80.83	14.52
433.92	51.62	36.73	V	16.17	2.14	55.04	80.83	25.79
Frequency (MHz)	Pk Red (dBuV)	Av Rdg (dBuV)	Pol.	AF (dB/m)	Amp Gain+ CL (dB)	Actual (dBuV/m)	Av Limit (dBuV/m)	Margin (dB)
867.918	68.40	53.51	H	21.94	-25.52	49.93	60.83	10.90
867.918	56.50	41.61	V	21.94	-25.52	38.03	60.83	22.80

Remark:

- To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.
- Average reading = Peak reading (dBuV) + 20 log (Duty cycle)
= Peak reading (dBuV) + 20 log (0.18)
= Peak reading (dBuV)-14.89

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2.4.2. Above 1 GHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Pk Red (dBuV)	Av Rdg (dBuV)	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Av Limit (dBuV/m)	Margin (dB)
1301.667	66.60	51.71	H	24.66	-31.37	45.00	54.00	9.00
1735.750	62.80	47.91	V	26.23	-30.62	43.52	60.83	17.31
2169.834	54.70	39.81	H	27.74	-30.57	36.98	60.83	23.85
2603.500	49.90	35.01	V	28.53	-30.05	33.49	60.83	27.34
3471.375	51.30	36.41	H	31.12	-29.34	38.19	60.83	22.64
3905.125	48.00	33.11	H	32.17	-28.58	36.70	60.83	24.13
>4000	Not detected	-	-	-	-	-	-	-

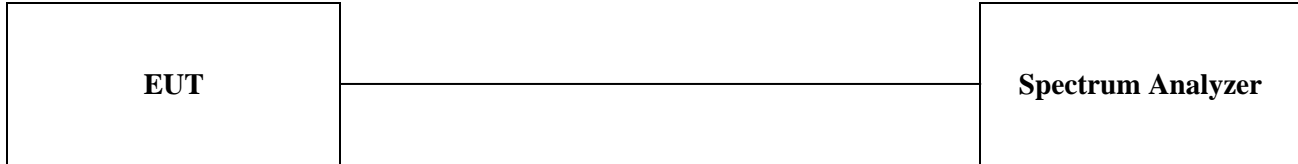
Remark:

1. To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.

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3. Duty cycle & transmission time

3.1. Test setup



3.2. Limit

According to §15.35 (c), The measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

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

3.3. Test procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. The duty cycle was measured with the spectrum analyzer using RBW=1 MHz, VBW=1 MHz and span=0 Hz.
3. The transmission time was measured with the spectrum analyzer using RBW=1 MHz, VBW=1 MHz and span=0 Hz.

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3.4. Test result

Ambient temperature : 25
Relative humidity : 49 % R.H.

3.4.1. Transmission time

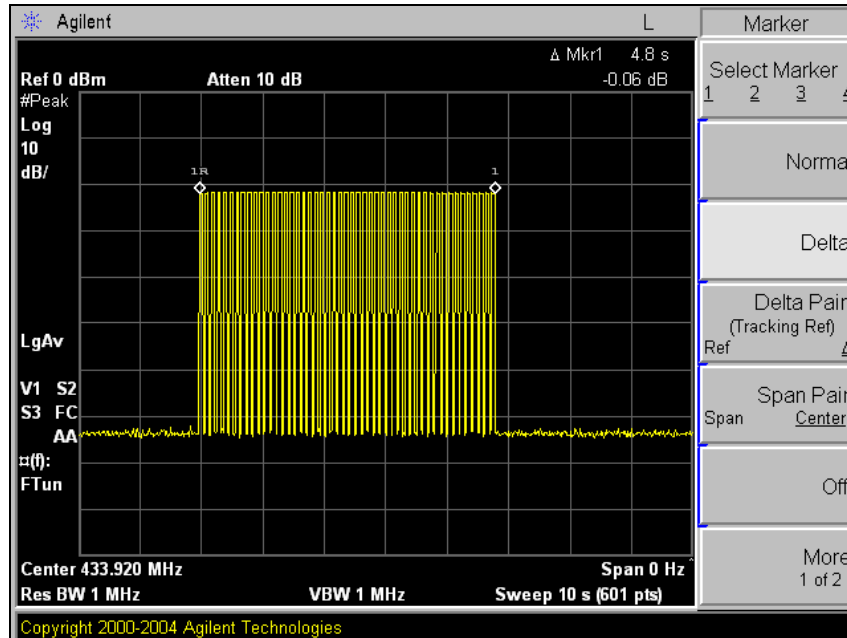
Transmission time(s)	Limit (sec)
4.8	5

3.4.2. Duty cycle

One period (ms)	Long Pulse (ms)	# of long pulses	Short Pulse(ms)	# of short pulses	Duty cycle (D)	20log(D) (dB)
99	4.8	1	1.0	13	0.18	-14.89

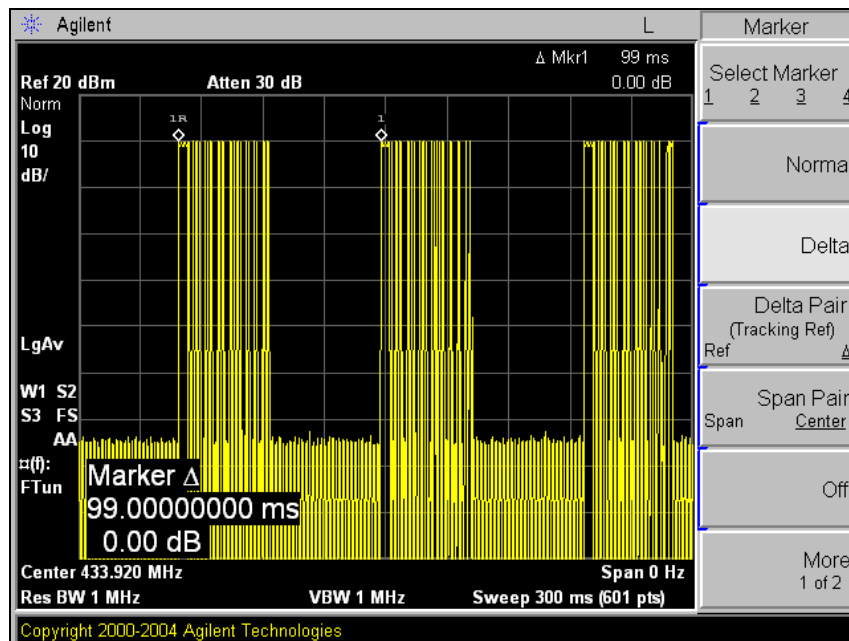
Tp>100ms. Use 100 ms for calculation.

Less than 5 seconds

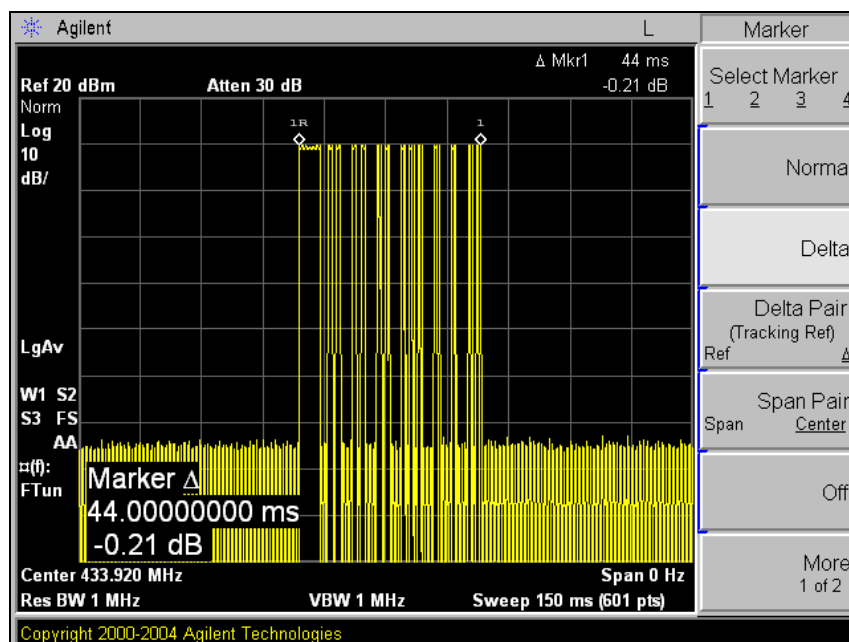


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One period

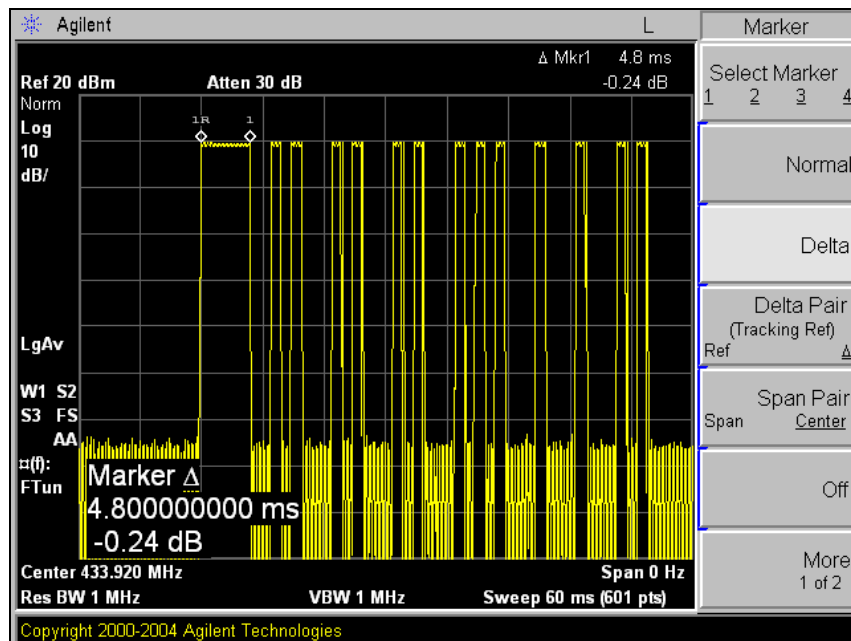


Transmission time

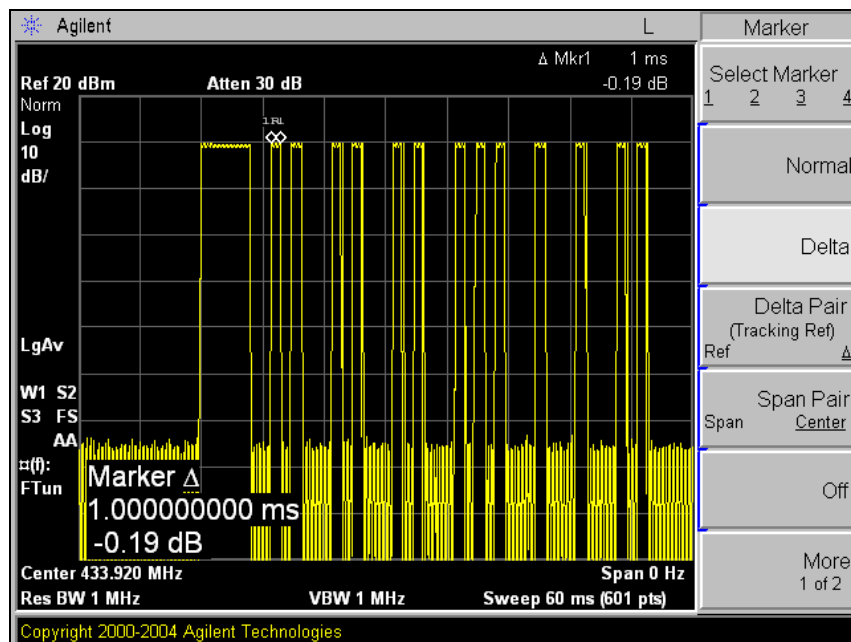


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Long pulse



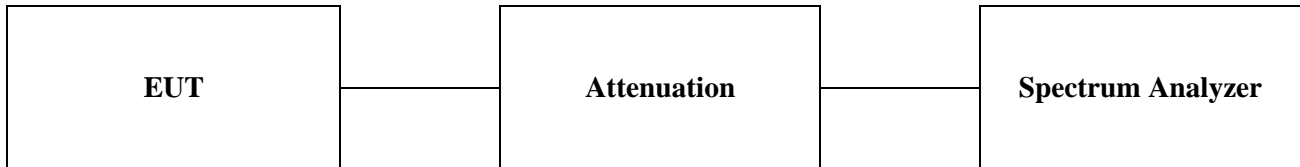
Short pulse



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4. Bandwidth of operation frequency

4.1. Test setup



4.2. Limit

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. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Limit of 20 dB bandwidth
channel : 433.92 MHz $\times 0.0025 =$ 1084.8 kHz

4.3. Test procedure

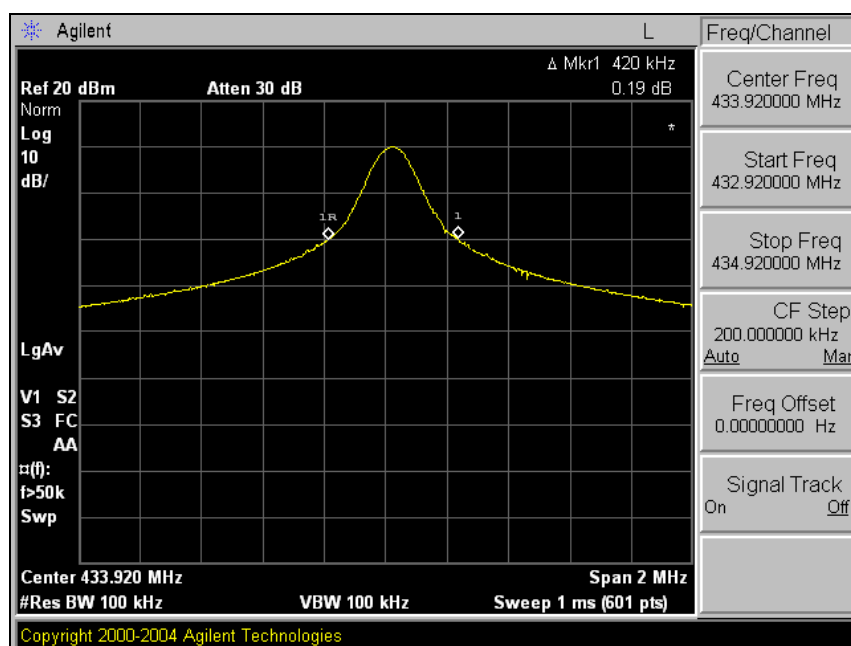
1. The transmitter output is connected to the spectrum analyzer.
2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW=100 kHz, VBW=100 kHz and Span=2 MHz.

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4.4. Test result

Ambient temperature : 25
Relative humidity : 49 % R.H.

Frequency (MHz)	20 dB Bandwidth (kHz)	Limit (kHz)
433.92	420	1082.63



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