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Report No.: GLEMR080100223RFT
Page: 1 of 20
FCC ID: VX5270NC

TEST REPORT

Application No. : GLEMR080100223RF

Applicant: Thermor Ltd.

FCC ID: VX5270NC

**Fundamental
Frequency :** 433.842MHz

Equipment Under Test (EUT):

Name: 433MHz Wireless In/Outdoor Thermometer

Model No.: 270NC, 270NU, 270BC, 270BU, 275NC, 275NU, 275BC, 275BU, 276NC, 276NU, 276BC, 276BU ♣

Serial No.: Not supplied by client.

♣

Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.

Standards: FCC PART 15, SUBPART C : 2007
Section 15.231(e)

Date of Receipt: 21 January 2008

Authorized Signature:

Stephen Guo
Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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Report No.: GLEMR070601768RFT
Page: 2 of 20
FCC ID: VX5270NC

Date of Test: 21 January to 01 February 2008

Date of Issue: 02 February 2008

Test Result :	PASS *
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* In the configuration tested, the EUT complied with the standards specified above.



2 Test Summary

The customer requested FCC tests for a 433MHz Wireless In/Outdoor Thermometer.			
Test	Test Requirement	Standard Paragraph	Result
Radiated Emission (30MHz to 1000MHz)	FCC PART 15 :2007	Section 15.231(e)	PASS
Occupied Bandwidth	FCC PART 15 :2007	Section 15.231(c)	PASS
Dwell Time	FCC PART 15 :2007	Section 15.231(e)	PASS

Remark:

♣Item No.: 270NC,270NU,270BC, 270BU, 275NC, 275NU, 275BC, 275BU, 276NC, 276NU, 276BC, 276BU ♣

Only the Item 270NC was tested, since the electrical circuit design, PCB layout, components used and internal wiring were identical for the above items, only the logo imprinted on the plastic casing ,the color of the plastic casing and item numbers were different according to the conformation from the applicant (manufacturer).



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4 General Information

4.1 Client Information

Applicant Name: Thermor Ltd.

Applicant Address: 16975 Leslie Street, Newmarket, Ontario, L3Y 9A1, Canada.

4.2 Details of E.U.T.

Name: 433MHz Wireless In/Outdoor Thermometer

Model No.: 270NC, 270NU, 270BC, 270BU, 275NC, 275NU, 275BC, 275BU, 276NC, 276NU, 276BC, 276BU

Power Supply: DC3V (2×1.5V “AAA” size battery)

Power Cord: N/A-

4.3 Description of Support Units

The EUT was tested as an independent unit: a 433.842MHz radio transmitter.

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory, No.198 Kezhu Road, Science Town Economic & Technology Development District Guangzhou, China 510663

Tel: +86 20 82155555

Fax: +86 20 82075059

No tests were sub-contracted.

4.5 Other Information Requested by the Customer

None.



4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

- **FCC (Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002. With the above and NVLAP's accreditation, SGS-CSTC is an authorized test laboratory for the DoC process.



5 Test Results

5.1 Test Instruments

RE in Chamber/OATS						
No:	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	06-03-2007	06-03-2008
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100249	05-12-2007	05-12-2008
N/A	EMI Test Software	Audix	E3	N/A	N/A	N/A
EMC0514	Coaxial cable	SGS	N/A	N/A	04-12-2007	04-12-2008
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	12-08-2007	12-08-2008
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	12-08-2007	12-08-2008
EMC0517	Horn Antenna	Rohde & Schwarz	HF906	100095	12-08-2007	12-08-2008
EMC0040	Spectrum Analyzer	Rohde & Schwarz	FSP30	100324	05-12-2007	05-12-2008
EMC0520	0.1-1300 MHz Pre-Amplifier	HP	8447D OPT 010	2944A06252	28-03-2007	28-03-2008
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	28-03-2007	28-03-2008
EMC0523	Active Loop Antenna	EMCO	6502	00042963	09-08-2006	09-08-2008
EMC0530	10m Semi- Anechoic Chamber	ETS	N/A	N/A	10-08-2007	10-08-2008

General used equipment						
No:	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
EMC0050-EMC0053	Temperature, & Humidity	ZHENGZHOU BO YANG	WSB	N/A	05-12-2007	05-12-2008
EMC0006	DMM	Fluke	73	70681569	27-09-2007	27-09-2008
EMC0007	DMM	Fluke	73	70671122	27-09-2007	27-09-2008



5.2 E.U.T. Operation

Input voltage: DC3V (2×1.5V“AAA”size battery)
Operating Environment:
Temperature: 25.0 °C
Humidity: 56 % RH
Atmospheric Pressure: 1011 mbar
EUT Operation: Test the EUT in transmitting mode.

5.3 Test Procedure & Measurement Data

5.3.1 Radiated Emissions

Test Requirement: FCC Part15 C 15.231(e)
Test Method: ANSI C63.4 section 8 & 13
Test Date: January 31 2008
Measurement Distance: 3m (Semi-Anechoic Chamber)
Requirements: the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:

Fundamental Frequency MHz	Field Strength of Fundamental (dBμV/m @ 3m)	Field Strength of Harmonics and Spurious Emissions (dBμV/m @ 3m)
40.66 to 40.70	60.0	40.0
70 to 130	54.0	34.0
130 to 174	54.0 to 63.5	34.0 to 43.5
174 to 260	63.5	43.5
260 to 470	63.5 to 74.0	43.5 to 54.0
470 and above	74.0	54.0

Detector: Peak for pre-scan
Peak and Average:
30-1000MHz:120kHz resolution bandwidth
1GHz-5GHz: 1MHz resolution bandwidth

** 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 = $22.72727(F) - 2454.545$; for the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters = $16.6667(F) - 2833.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

Since the device is a pulsed transmission with a periodic rate less than 20 pulses per second (20Hz).

The fundamental frequency of the EUT is 433.842MHz.

The limit for average field strength dBuV/m for the fundamental emission= 72.9 dBuV/m

No fundamental is allowed in the restricted bands.

The limit for average field strength dBuV/m for the spurious emission=52.9 dBuV/m. Spurious in the restricted bands must be less than 52.9dBuV/m or 15.209. Whichever limit permits a higher field strength.



And according 15.35(a)

15.35(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. The specifications for the measuring instrument using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. As an alternative to CISPR quasi-peak measurements, the responsible party, at its option, may demonstrate compliance with the emission limits using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, as long as the same bandwidths as indicated for CISPR quasi-peak measurements are employed.

Note: For pulse modulated devices with a pulse-repetition frequency of 20 Hz or less and for which CISPR quasi-peak measurements are specified, compliance with the regulations shall be demonstrated using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, using the same measurement bandwidths that are indicated for CISPR quasi-peak measurements.

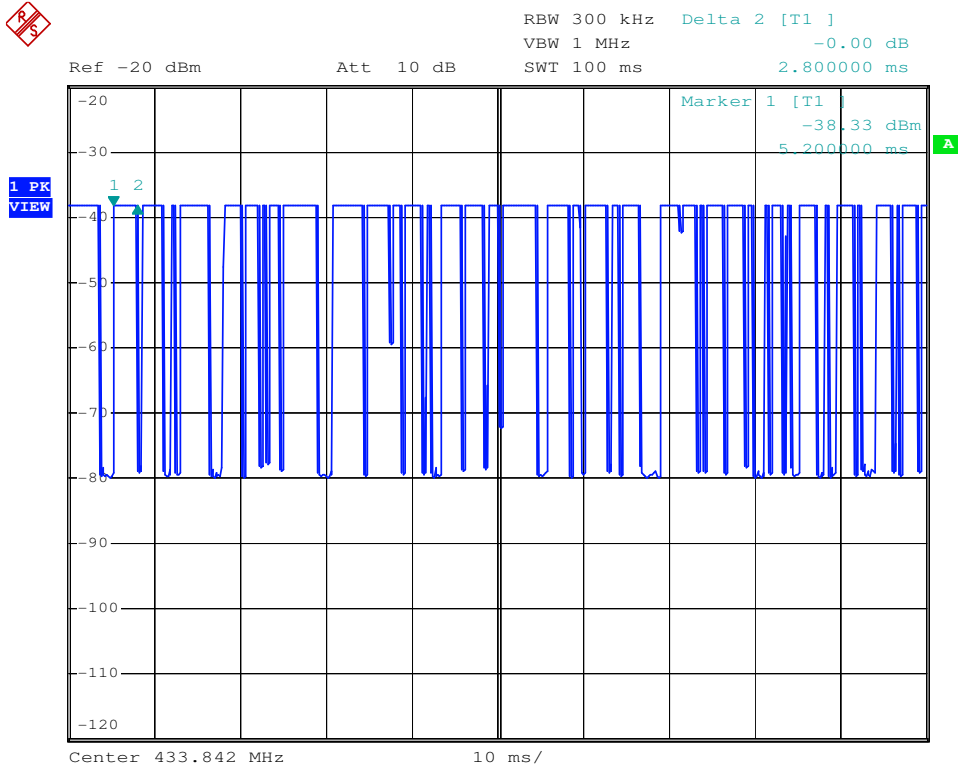
According to 15.35 (b) Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, *e.g.*, see §§ 15.250, 15.252, 15.255, and 15.509-15.519 of this part, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device, *e.g.*, the total peak power level. Note that the use of a pulse desensitization correction factor may be needed to determine the total peak emission level. The instruction manual or application note for the measurement instrument should be consulted for determining pulse desensitization factors, as necessary.

The average correction factor is computed by analyzing the "worst case" on time in any 100 msec time period. Analysis of the remote transmitter worst case on time in any 100 msec time period is an on time of 100 msec, therefore the average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle), where the duty factor is calculated from following formula:

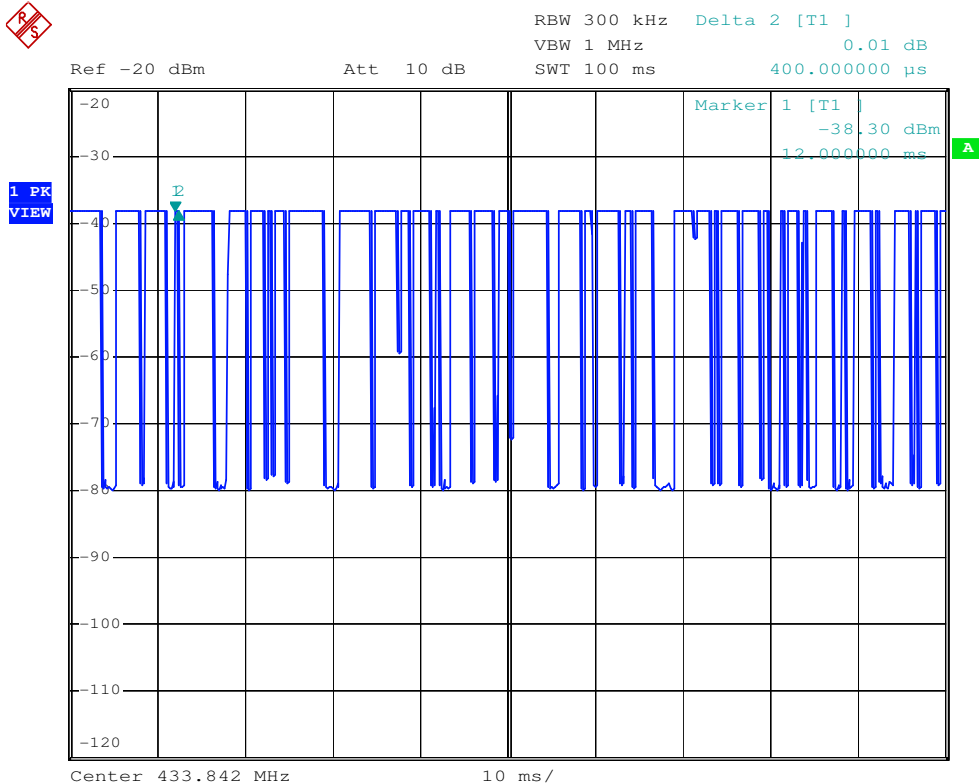
$$20\log (\text{Duty cycle}) = 20\log (T_{\text{pulse}}/100\text{ms}) = 20\log (66.2/100) = -3.6$$

Where $T_{\text{pulse}} = (\text{Pulse 1}) \times 8 + (\text{Pulse 2}) \times 12 + (\text{Pulse 3}) \times 5 + (\text{Pulse 4}) \times 11 = 66.2$

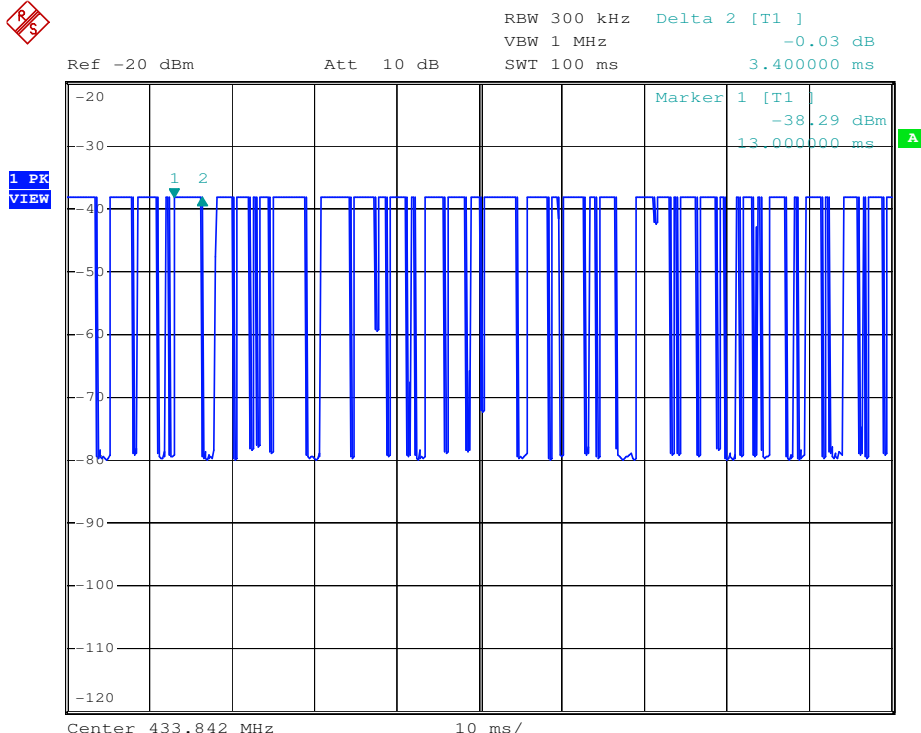
Please refer to below pictures for more details.



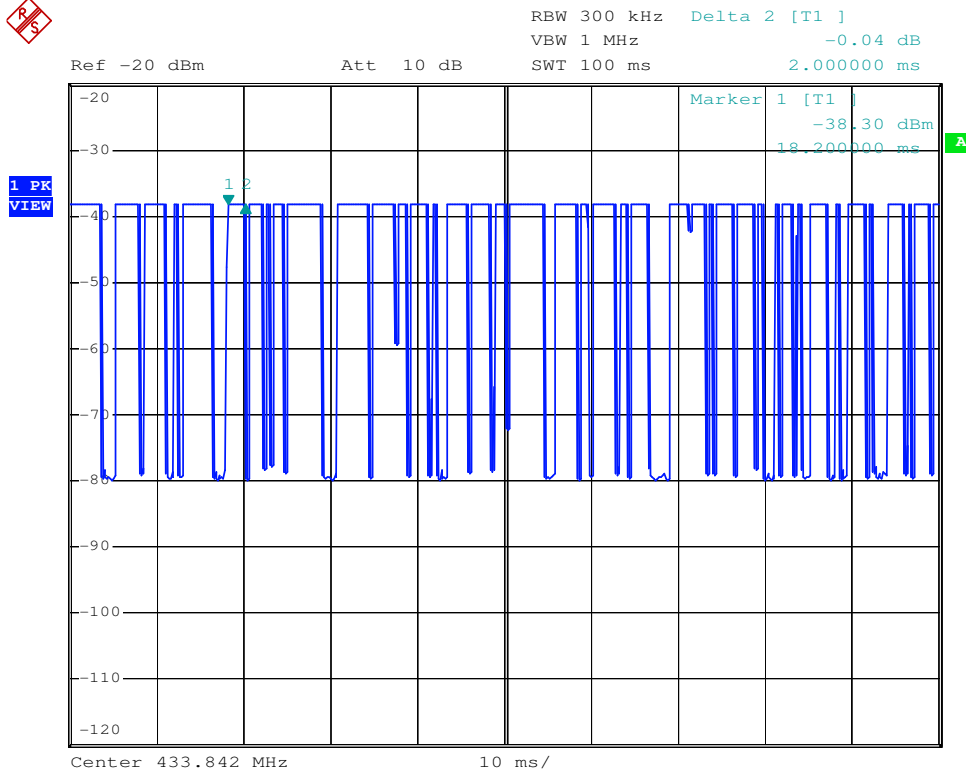
Pulse 1=2.8ms



Pulse 2=0.4ms



Pulse 3=3.4ms



Pulse 4=2ms



Test Procedure: The procedure used was ANSI Standard C63.4-2003. The receiver was scanned from 30MHz to 5.0GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes with two new batteries.

The field strength is calculated by adding the Antenna Factor, Cable Factor & Peramplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Peramplifier Factor

An initial pre-scan was performed in the 3m chamber using the spectrum analyser in peak detection mode. Peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bilog antenna with 2 orthogonal polarities and Horn antenna.

The following test results were performed on the EUT on 31 January 2008.

**1. Fundamental emission & Spurious Emissions****(a) Antenna polarization: Horizontal**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
433.831	79.3	16.5	2.5	25.3	72.9	92.9	-20.0	PEAK
433.831	75.7	16.5	2.5	25.3	69.3	72.9	-3.6	AVERAG
866.140	45.7	20.4	3.8	25.2	44.8	72.9	-28.1	PEAK
866.140	42.1	20.4	3.8	25.2	41.2	52.9	-11.7	AVERAG
1296.000	62.5	24.7	3.3	35.6	55.0	72.9	-17.9	PEAK
1296.000	58.9	24.7	3.3	35.6	51.4	52.9	-1.5	AVERAG
2092.000	50.1	27.7	4.4	35.0	47.3	72.9	-25.6	PEAK
2092.000	46.5	27.7	4.4	35.0	43.7	52.9	-9.2	AVERAG

(b) Antenna polarization: Vertical

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
433.839	76.2	22.9	0.7	25.3	69.9	92.9	-23.0	PEAK
433.839	72.6	22.9	0.7	25.3	66.3	72.9	-6.6	AVERAG
867.658	39.9	16.5	2.5	25.3	39.4	72.9	-33.5	PEAK
867.658	36.3	16.5	2.5	25.3	35.8	52.9	-17.1	AVERAG
1296.000	62.5	20.4	3.8	25.2	55.0	72.9	-17.9	PEAK
1296.000	58.9	20.4	3.8	25.2	51.4	52.9	-1.5	AVERAG
2092.000	40.9	24.7	3.3	35.6	38.1	72.9	-34.8	PEAK
2092.000	37.3	24.7	3.3	35.6	34.5	52.9	-18.4	AVERAG

Remark:

According to 15.35 (b) When average radiated emission measurements are specified in the regulations, including emission measurements below 1000 MHz, there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules, e.g., see Section 15.255.

TEST RESULTS: The unit does meet the FCC Part 15 C Section 15.231 requirements.



5.3.2 Occupied Bandwidth

Test Requirement: FCC Part 15 C Section 15.231(c)

Test Method: ANSI C63.4 section 13.

Test Date: 02 February 2008

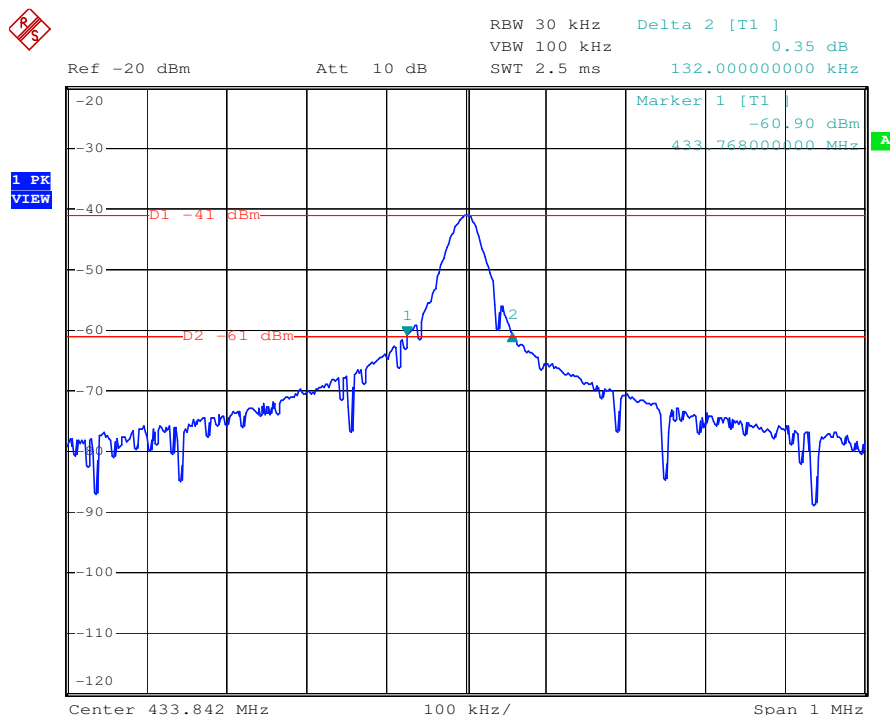
Requirements: 15.231 (c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points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

The fundamental frequency is 433.842MHz,so the limit for 20dB bandwidth is 1.08MHz.

Method of measurement: The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector. The vertical Scale is set to 10dB per division. The horizontal scale is set to 100KHz per division.

20dB Bandwidth: 132KHz

The graph as below, represents the emissions take for this device.



Date: 2.FEB.2008 12:12:34

The results: The unit does meet the FCC Part 15 C Section 15.231 requirements.



5.3.3 Dwell Time

Test Requirement: FCC Part 15 C Section 15.231(e)

Test Method: FCC Part 15 C Section 15.231(e)

Test Date: 02 February 2008

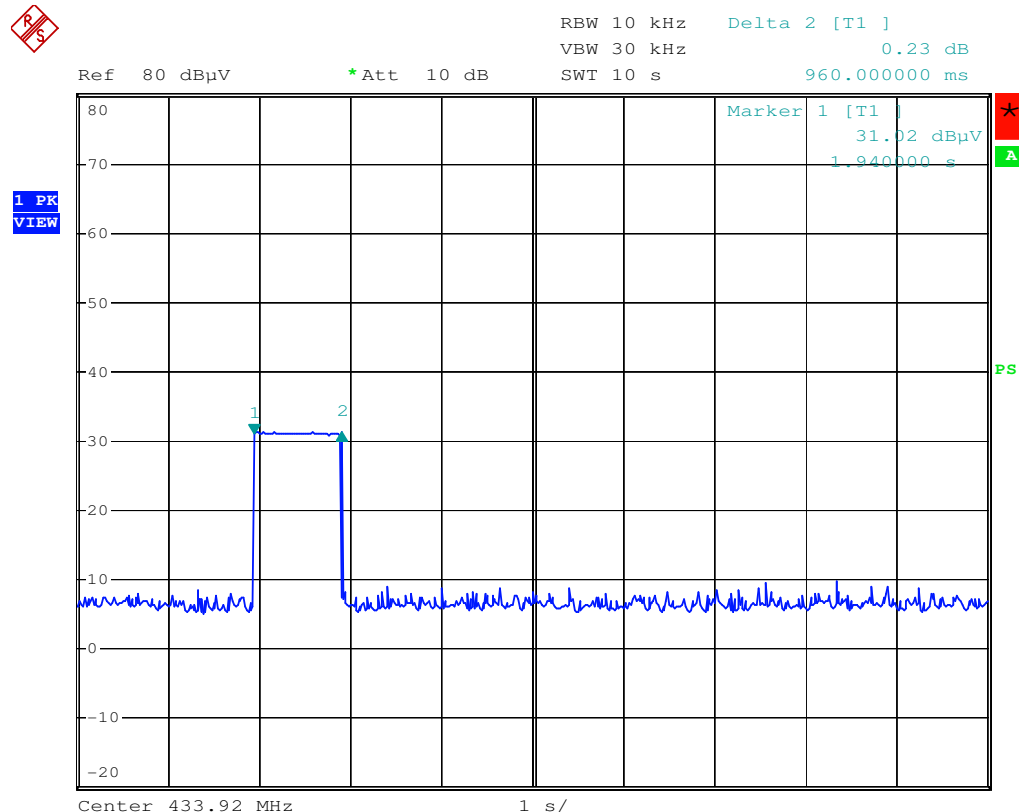
Requirements:

1. Regulation 15.231 (e) 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.

Result:

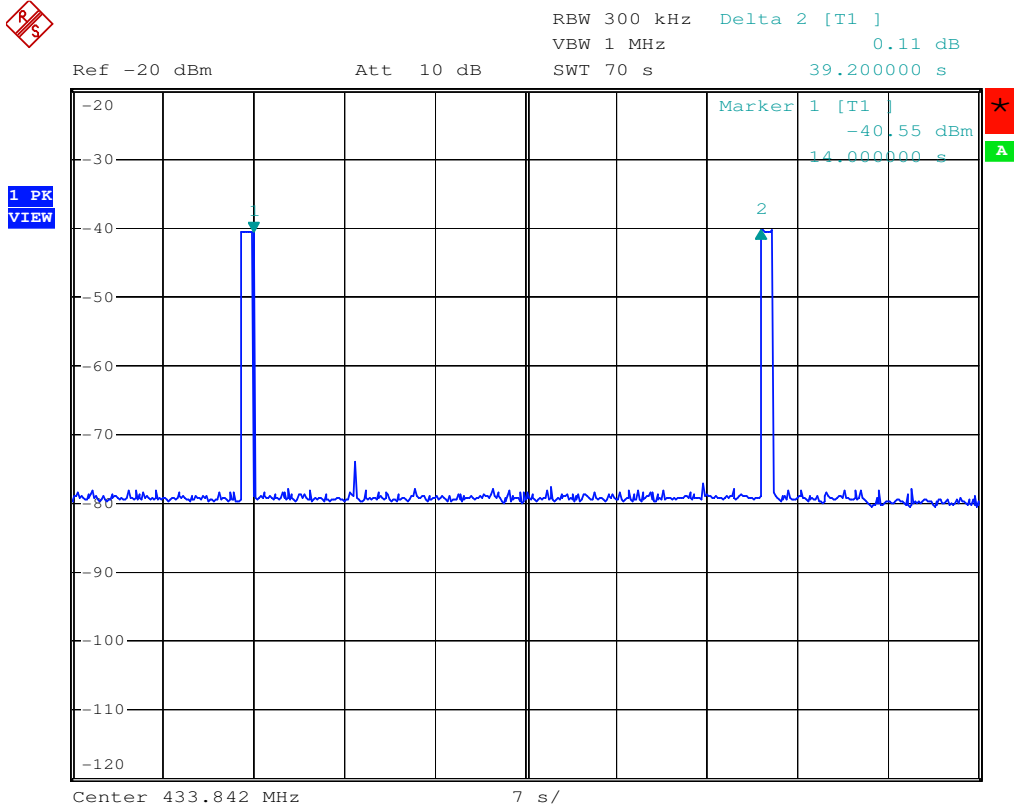
The duration of the EUT transmission is 960ms, and the silent period between transmissions is about 39.2s greater than 30 times the duration of the transmission and greater than 10 seconds.

Duration time of transmissions



Date: 18.FEB.2008 12:08:03

Silent period between transmissions



Date: 2.FEB.2008 12:04:31

The results: The unit does meet the FCC Part 15 C Section 15.231 requirements.

6 Photographs - Test Setup

Radiated Emission



7 Photographs - EUT Constructional Details





