

TEST REPORT

Report Number: 3125508MPK-001

Project Number: 3125508

July 23, 2007

Testing performed on the
CO/Smoke Alarm with RF Transceiver
Model: 900-0225
FCC ID: SAK9000225
IC ID: 7145A-HHCOSMBRFCA
to

FCC Part 15.231
RSS-210 Issue 7, Annex 1

for
Kidde Residential and Commercial



A2LA Certificate Number: 1755.01

Test Performed by:

Intertek
1365 Adams Court
Menlo Park, CA 94025

Test Authorized by:

Kidde Residential and Commercial
1016 Corporate Park Drive
Mebane, NC 27302

Prepared by:

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Date: July 23, 2007

Reviewed by:

Ollie Moyrong
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Date: July 23, 2007

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1.0 Summary of Test Results

Table 1

DESCRIPTION OF TEST	FCC Rule	RSS Rule	RESULT
Field Strength of fundamental (transmitting mode)	15.231(b)	RSS-210, A1.1.2	Complies
Field Strength of spurious emissions (transmitting mode)	15.231(b)	RSS-210, A1.1.2	Complies
Bandwidth of the emission	15.231(c)	RSS-210, A1.1.3	Complies
Antenna requirement	15.203	RSS-Gen	Complies *
Line Conducted Emissions	15.207	RSS-Gen	Not Applicable **
Radiated Emission (receive mode)	15.109	RSS-Gen	Complies

* A integrated permanently connected antenna is used in the device

** This device is solely battery operated

We have carried out all required tests according to the specifications listed in Table 1. We have found that the Kidde Safety, model 900-0225, complies with the requirements of the above-mentioned specifications.

EMC Department

Date of issue: July 23, 2007

Test Engineer:

David Chernomordik

Date: July 23, 2007

David Chernomordik

Reviewing Engineer:

Date: July 23, 2007

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2.0 General Description

2.1 Product Description

EQUIPMENT UNDER TEST

<i>Type of equipment</i>	CO/Smoke Alarm with RF Transceiver		
<i>Type/Model</i>	900-0225		
<i>EUT description</i>	<p>Frequency: 433.3 MHz Modulation: FSK Duty Cycle: 10% Supply voltage: Alkaline battery, 3.6 V Antenna: Integral, permanently attached</p>		
<i>Manufacturer</i>	Kidde Residential and Commercial 1016 Corporate Park Drive Mebane, NC 27302		
<i>Tested by request of</i>	Mr. Matt Buchholz Phone: 719-533-2337 Fax: 719-533-2310		
<i>Standards:</i>	FCC Part 15.231 RSS-210 Annex 1		
<i>Test Report No.</i>	3125508MPK-001		
<i>FCC ID:</i>	SAK9000225		
<i>Industry Canada ID:</i>	7145A-HHCOSMBRFCA		

2.2 Related Submittal(s) Grants

This report is for use with an application for certification of a low power transmitter. One transmitter is included in the application. This specific report details the emission characteristics of transmitter.

2.3 Test Methodology

Emission measurements were performed according to the procedures in ANSI C63.4 (2003). Radiated emission measurements were performed in Semi-anechoic 10 m Chamber. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Justification Section"** of this Application.

2.4 Test Facility

The 10 m Semi Anechoic Chamber and conducted measurement facility used to collect the radiated data is Site 1. This test facility and site measurement data have been fully placed on file with the FCC, Industry of Canada and A2LA accredited.

Test Facility: Intertek ETL Semko
1365 Adams Court
Menlo Park, CA 94025

Accreditations: FCC Registration Number 90708
A2LA Certificate Number 1755.01
Canada Registration Number 2055B-1

3.0 System Test Configuration

3.1 Justification

For emission testing, the equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). During testing, all cables were manipulated to produce worst-case emissions.

During the radiated emission test, EUT was wired to operate at continuous transmitting mode (CW).

3.2 EUT Exercising Software

No software is required to exercise the EUT.

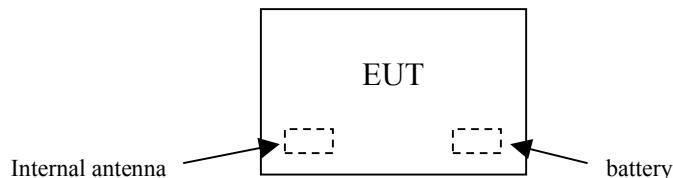
3.3 System Test Configuration

3.3.1 Support Equipment

No support equipment is required to operate the EUT.

3.3.2 Block Diagram of Test Setup

No cable is required to be connected to the EUT



3.4 Equipment Modification

No modification was made during the evaluation.

3.5 Mode(s) of operation

The EUT was powered from a fresh battery. The EUT utilizes Frequency Shift Keyed (FSK) modulation in normal operation. During the radiated emission test, EUT was wired to operate at continuous transmitting mode (CW). For emission bandwidth, duty cycle and shut off time measurements the EUT was setup in normal operation mode.

4.0 Field Strength of Emissions in transmitting mode

4.1 Test Description

Requirement:	FCC 15.231(b), RSS-210 A1.1.2
Fundamental:	Field Strength Limit at 3 m: 80.8 dB(μ V/m) - average
Spurious (except emissions in the restricted bands):	Field Strength Limit at 3 m: 60.8 dB(μ V/m) - average
Spurious emissions in the restricted bands:	Field Strength Limit at 3 m: FCC 15.209, RSS-210 Table 2

Note: peak Field Strength must not exceed the average Field Strength by more than 20 dB

4.2 Test Procedure

For the measurements, the EUT is attached to a cardboard box (if necessary) and placed on the non-conductive turntable which is 0.8 m above the ground plane. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). The EUT is wired to transmit full power in CW mode. Average Factor was calculated and added to the peak emission obtained in CW mode

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance.

Radiated emission measurements were performed from 30 MHz to the 10th harmonic of transmitting frequency. Analyzer resolution is 120 KHz for 30 to 1000 MHz, 1 MHz - for frequencies above 1000 MHz.

This test was performed per test procedure specified in ANSI C63.4 (2003).

4.2.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with antennas, cables, preamplifiers (if any) and average factors (when specified limits is in average and measurements are made with peak detectors) The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG + AV$$

where FS = Field Strength in dB(μ V/m)

RA = Receiver Amplitude in dB(μ V)

AG = Amplifier Gain in dB

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB(1/m)

AV = Average Factor in (dB)

Assume a receiver reading (RA) of 52.0 dB(μ V) is obtained. The antenna factor (AF) of 7.4 dB(1/m),

cable factor(CF) of 4.6 dB and average factor of -5.1 dB are added. The amplifier gain of 27 dB is subtracted, giving a field strength of 32 dB(μ V/m).

$$\begin{array}{lll} RA = 52 \text{ dB}(\mu\text{V}) & CF = 1.6 \text{ dB} & AV = -5.1 \text{ dB} \\ AF = 7.4 \text{ dB}(1/\text{m}) & AG = 29 \text{ dB} & FS = 52 + 7.4 + 4.7 - 27 - 5.1 = 32 \text{ dB}(\mu\text{V}/\text{m}) \end{array}$$

This value in dB(μ V/m) was converted to its corresponding level in μ V/m.
Level in μ V/m = Common Antilogarithm $\{[32 \text{ dB}(\mu\text{V}/\text{m})]/20\} = 39.8 \mu\text{V}/\text{m}$

4.2.2 Average Factor calculation

The EUT utilizes Frequency Shift Keyed (FSK) modulation in normal operation. During the radiated emission test EUT was wired to operate in continuous transmitting mode (CW). For the average level of the field strength, a Duty Cycle Correction Factor (DCCF) was calculated and added to the peak emission obtained in CW mode and compared to the specified average limit.

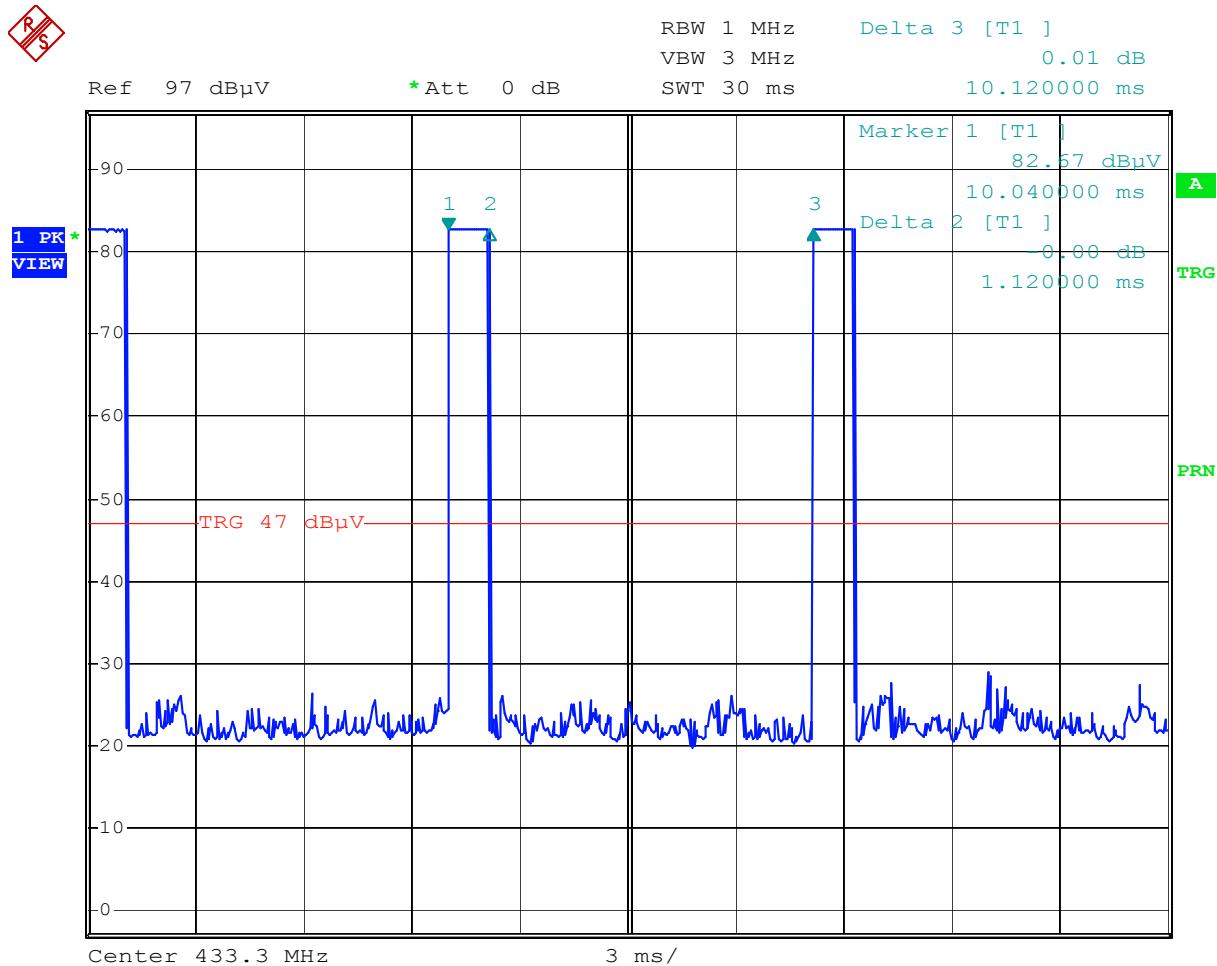
The time period for the duty cycle correction is 100 milliseconds, therefore the DCCF is calculated as:

DCCF = $20 \times \log (T \text{ ms}/100 \text{ ms})$, where "T" is the total transmitting "Time ON" in 100 ms interval.

Plots 4.1 and 4.2 on the next page show the transmission timing over 100 ms time frame.

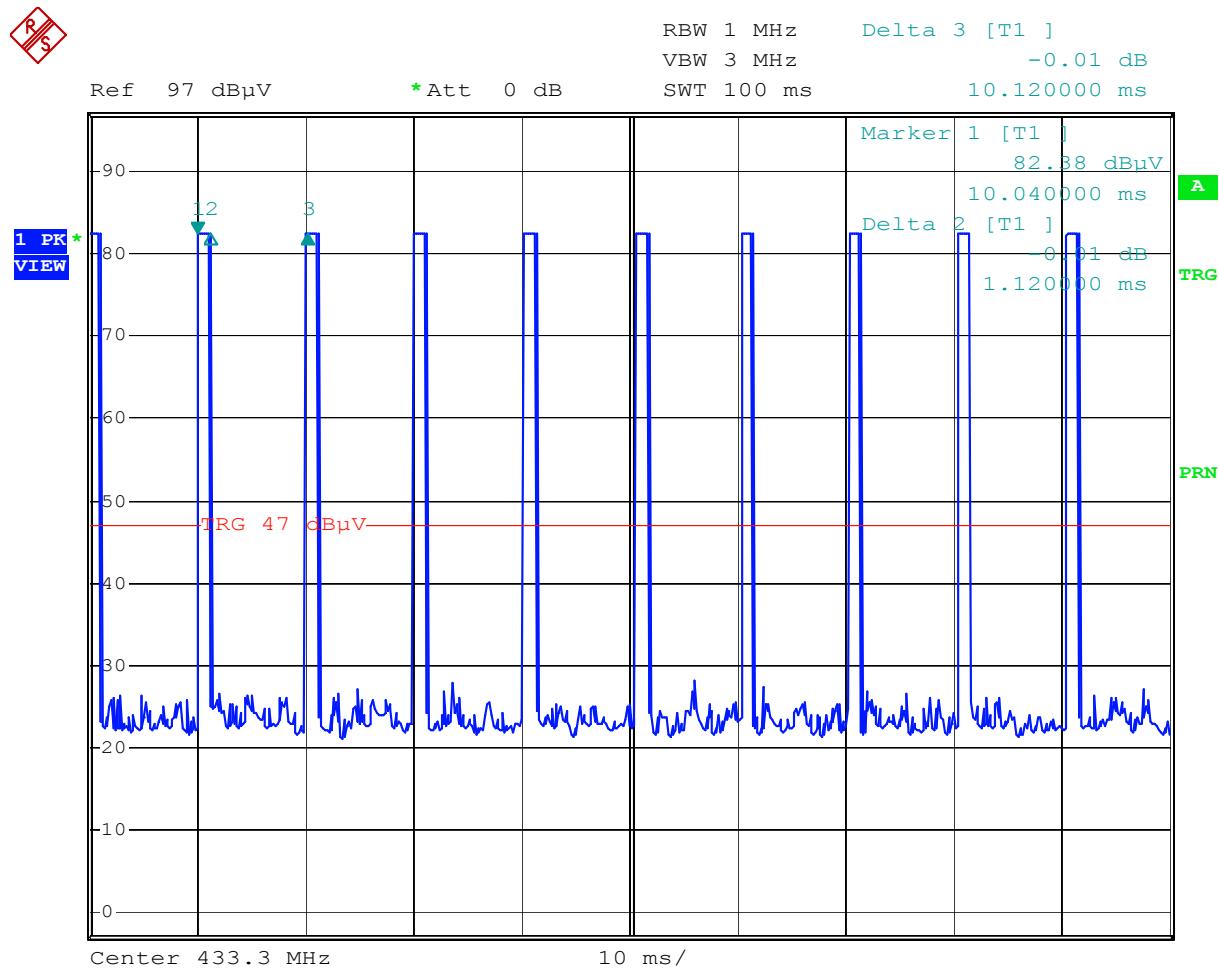
$$DCCF = 20 \times \log (1.12/10.12) = -19.1 \text{ dB}$$

Plot 4.1



Comment: Duty Cycle
Date: 16.JUL.2007 19:01:56

Plot 4.2

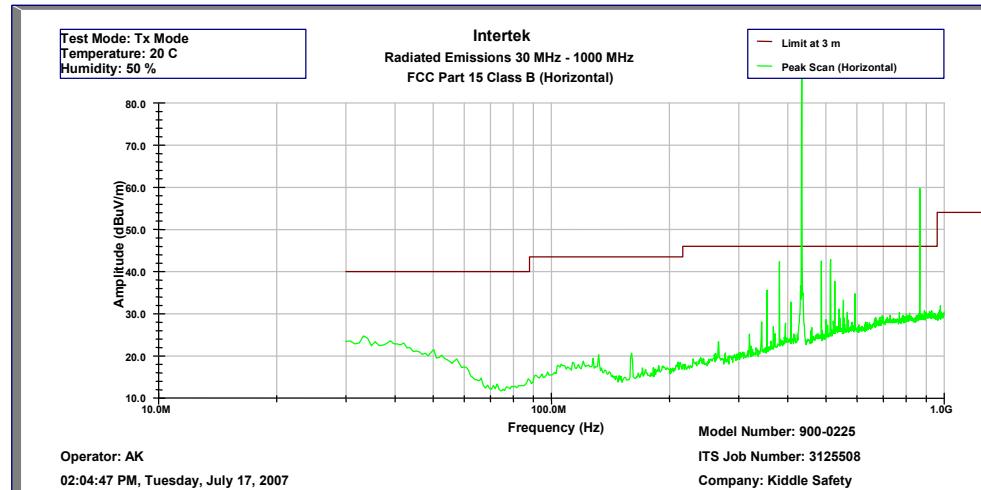
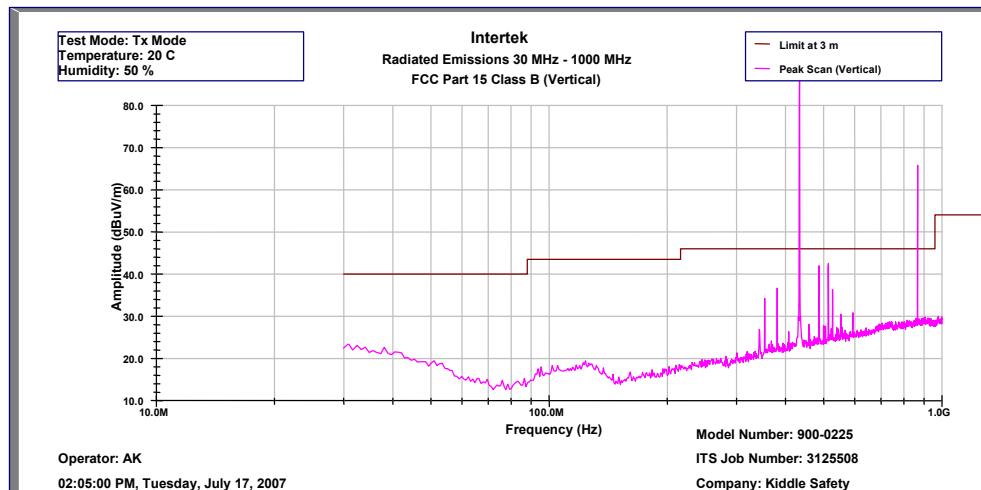


Comment: Duty Cycle
Date: 16.JUL.2007 19:03:40

4.3 Test Results

Standard: FCC Part 15.231(b)**Model Number:** 900-0225**Tested by:** Arkadi Kaplan**Mode:** Transmitting**Distance:** 3 m

Radiated emissions below 1 GHz



Note: The limits shown on the graphs above are for emissions in the restricted bands only. All these emissions are at least 10 dB below the limit. Limits for emissions outside the restricted bands are not shown on the graph but are presented in the Data Table on the next page.

Radiated emissions at fundamental frequency and harmonics

Frequency	Peak RA	AF	CF	AV	Average FS	Peak FS	Limit	Margin
MHz	dB((μV/m)	dB(1/m)	dB	dB	dB((μV/m)	dB((μV/m)	dB((μV/m)	dB
433.3	79.2	16.5	1.4	-	-	97.1	100.8	-3.7
433.3	79.2	16.5	1.4	-19.1	78.0	-	80.8	-2.8
866.6	38.2	23.1	2.0	-	-	63.3	80.8	-17.5
866.6	38.2	23.1	2.0	-19.1	44.2	-	60.8	-16.6
1300.0	37.0	25.0	2.5	-	-	64.5	74.0	-9.5
1300.0	37.0	25.0	2.5	-19.1	45.4	-	54.0	-8.6
1733.2	19.3	26.4	3.2	-	-	48.9	80.8	-31.9
1733.2	19.3	26.4	3.2	-19.1	29.8	-	60.8	-31.0
2166.5	37.6	28.1	3.6	-	-	69.3	80.8	-11.5
2166.5	37.6	28.1	3.6	-19.1	50.2	-	60.8	-10.6
2599.8	21.3	30.0	4.0	-	-	55.3	80.8	-25.5
2599.8	21.3	30.0	4.0	-19.1	36.2	-	60.8	-24.6
3033.1	40.2	30.2	4.3	-	-	74.7	80.8	-6.1
3033.1	40.2	30.2	4.3	-19.1	55.6	-	60.8	-5.2
3466.4	13.3	31.6	5.1	-	-	50.0	80.8	-30.8
3466.4	13.3	31.6	5.1	-19.1	30.9	-	60.8	-29.9
3899.7*	33.6	32.5	5.9	-	-	72.0	74.0	-2.0
3899.7*	33.6	32.5	5.9	-19.1	52.9	-	54.0	-1.1
4333.0*	22.6	32.7	6.5	-	-	61.8	74.0	-12.2
4333.0*	22.6	32.7	6.5	-19.1	42.7	-	54.0	-11.3

Notes:

- a) The field strength shown in the table for Average Field Strength is obtained through the calculation by adding Average Factor (DCCF) to the Peak measurements.
- b) Negative signs (-) in Margin column signify levels below the limits.
- c) Spectrum Analyzer setting:
below 1 GHz - RBW = 120 KHz, VBW = 300 KHz; above 1 GHz - RBW = 1 MHz, VBW = 1 MHz
- d) All other emissions not reported are below the equipment noise floor which is at least 6 dB below the limit
- e) * Restricted Frequency Band per FCC 15.205 and RSS-210 Table 1

Result **Complies by 1.1 dB**

The measurement result is below the specification limit by a margin less than the measurement uncertainty; it is not therefore possible to determine compliance at a level of confidence of 95%. However, the measured result indicates a high probability that the product tested complies with the specification limit

5.0 Emission Bandwidth**5.1 Test description**

Requirement:	FCC 15.231(c), RSS-210 A1.1.3
Emission Bandwidth:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency (i.e. 1.083 MHz)

5.2 Test Procedure

The measurement antenna was positioned in a close proximity to the transmitter.

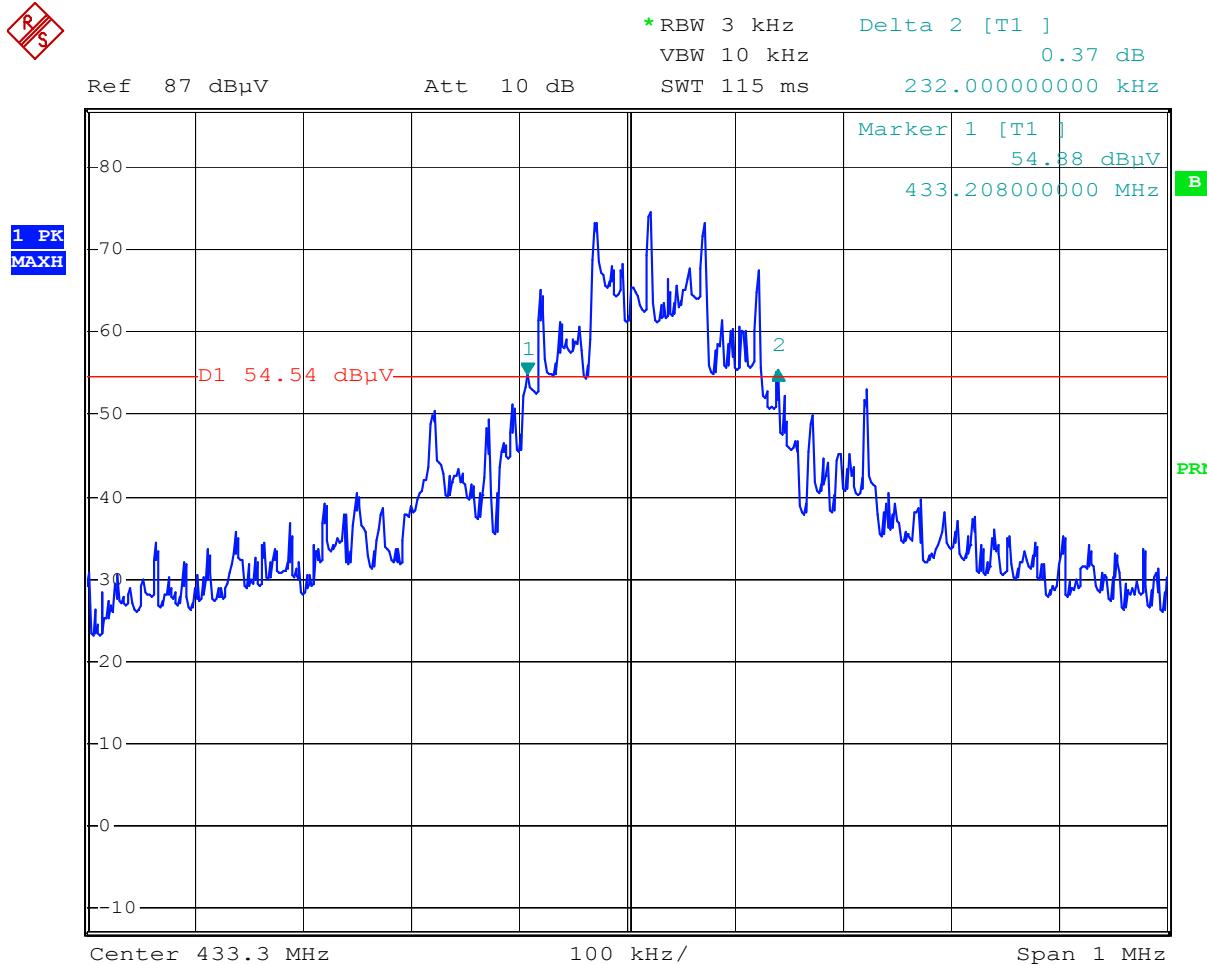
The resolution bandwidth of the spectrum analyzer was set approximately 1 – 2 % of the emission bandwidth of the transmitter.

The 20-dB bandwidth and Occupied bandwidth (99% Power bandwidth) were measured.

5.3 Test Results

Please see next page for the occupied bandwidth plot:

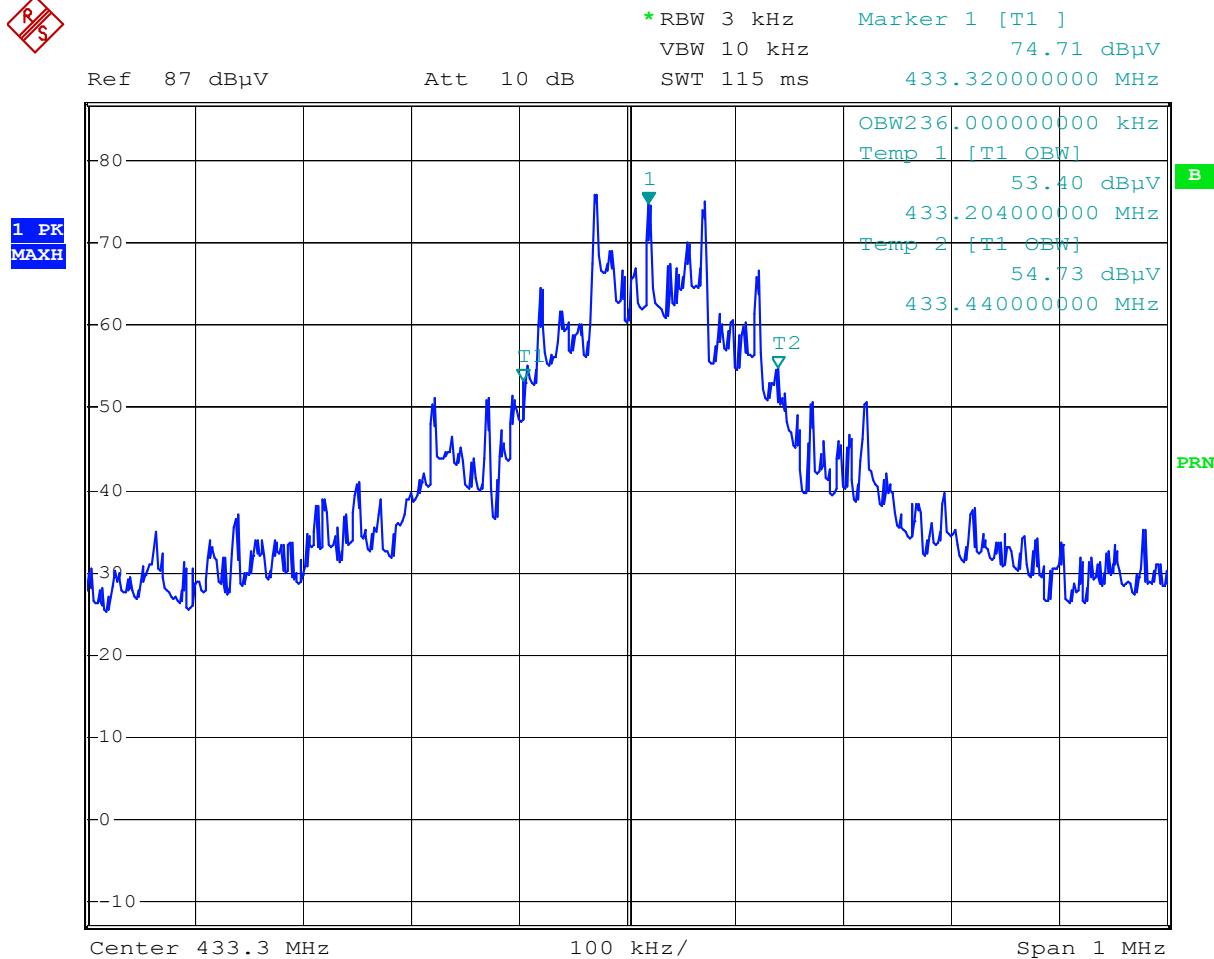
Test Result:	The 20-dB Bandwidth is 232 kHz The Occupied Bandwidth is 236 kHz
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Comment: 20-dB bandwidth

Date: 17.JUL.2007 16:19:21

RS



Comment: Occupied bandwidth
Date: 17.JUL.2007 16:17:10

6.0 Time of transmission

6.1 Test description

Requirement:	FCC 15.231(a)(1)(2), RSS-210 A1.1.1(a)(b)
	<p>(1) a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.</p> <p>(2) a transmitter activated automatically shall cease transmission within 5 seconds after activation.</p>

6.2 Test Procedure

The measuring antenna, connected to the spectrum analyzed, was positioned in a close proximity to the transmitter.

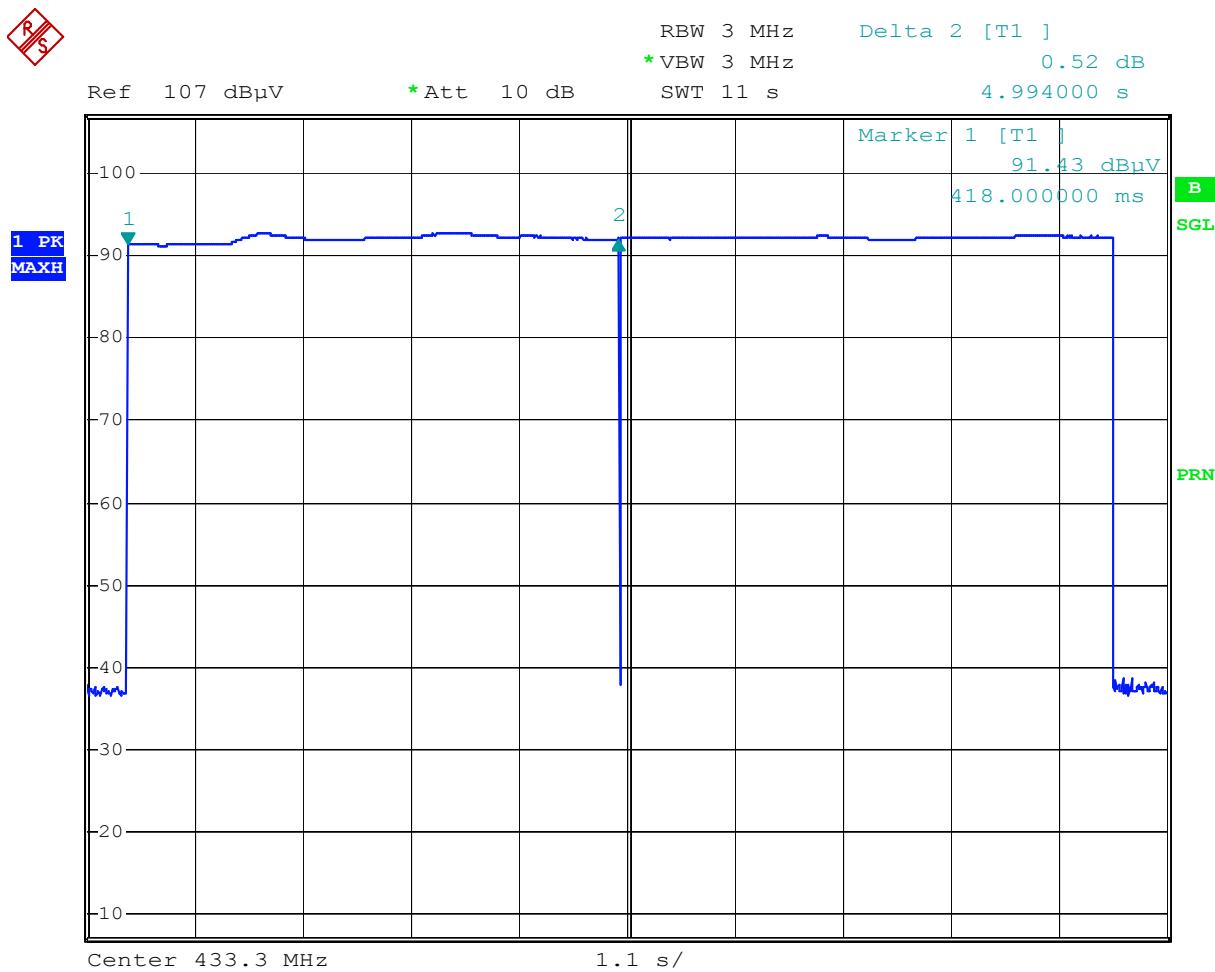
The switch on the device was pressed and released. The transmitting signal was observed on the spectrum analyzer.

6.3 Test Results

As can be seen on the plots 6.1 and 6.2, the device initially transmitted the first signal and stopped transmitting, then automatically transmitted the second signal and stopped again. The duration of the first and second signals are less than 5 second.

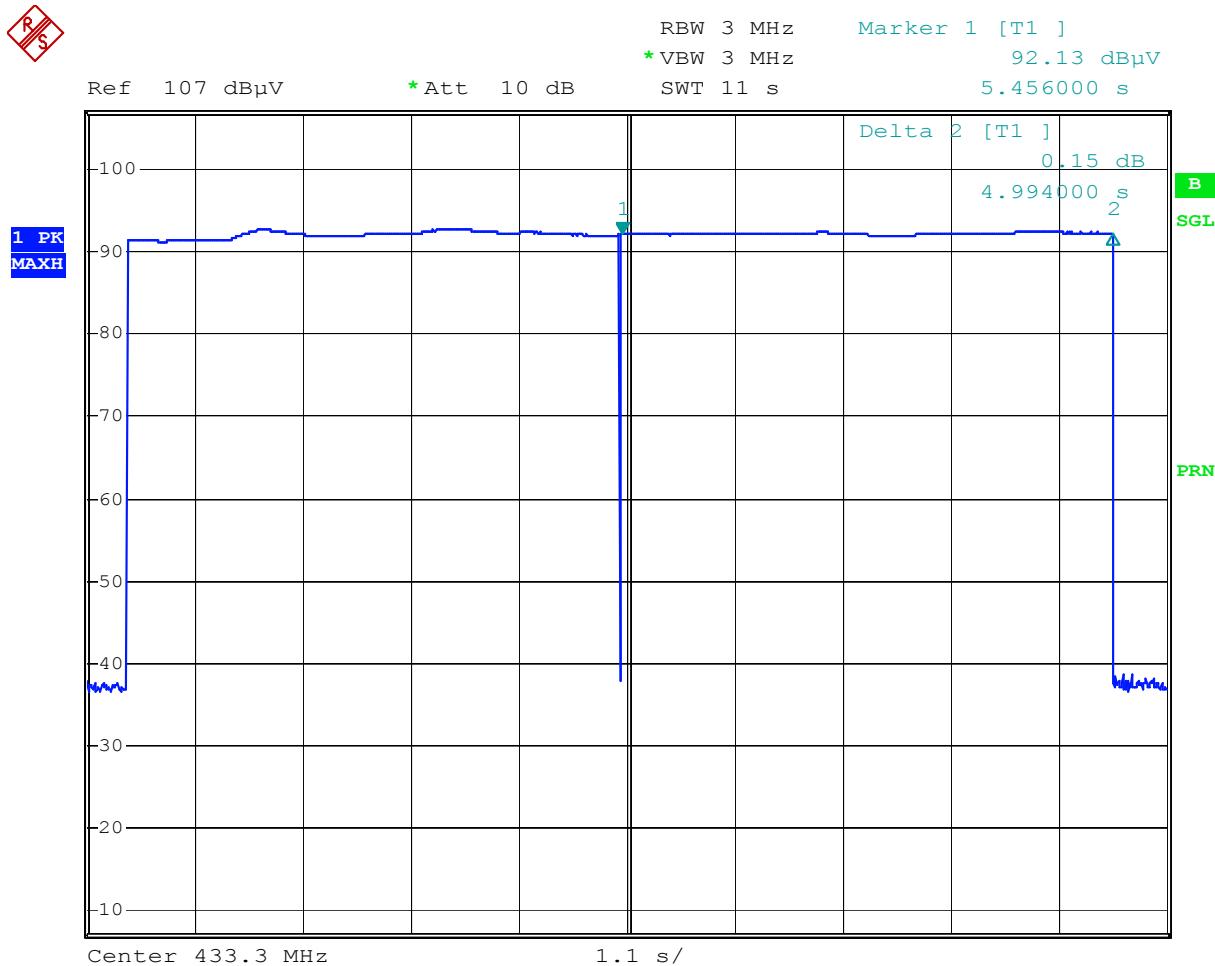
Test Result:	Complies
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Plot 6.1



Comment: Time of deactivating, manually operating Tx
Date: 17.JUL.2007 19:29:23

Plot 6.2



Comment: Time of deactivating, automatically operating Tx
Date: 17.JUL.2007 19:31:01

7.0 Field Strength of Emissions in receiving mode

7.1 Test Description

Requirement:	FCC 15.109, RSS-210 Table 2, Class B	
	Frequency	Field Strength at 3 m
	30-88 MHz	40.0 dB(μ V/m)
	88-216 MHz	43.5 dB(μ V/m)
	216-960 MHz	46.0 dB(μ V/m)
	Above 960 MHz	54.0 dB(μ V/m)

7.2 Test Procedure

See section 4.2

7.3 Test Results

Standard: FCC Part 15.231(b)

Model Number: 900-0225

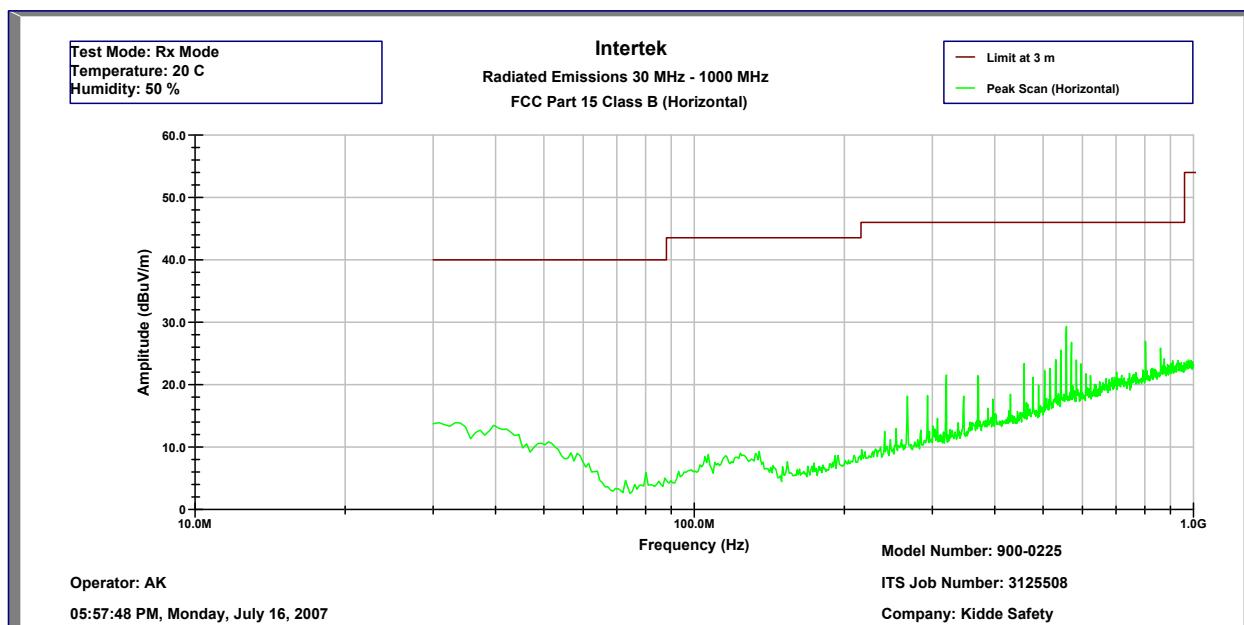
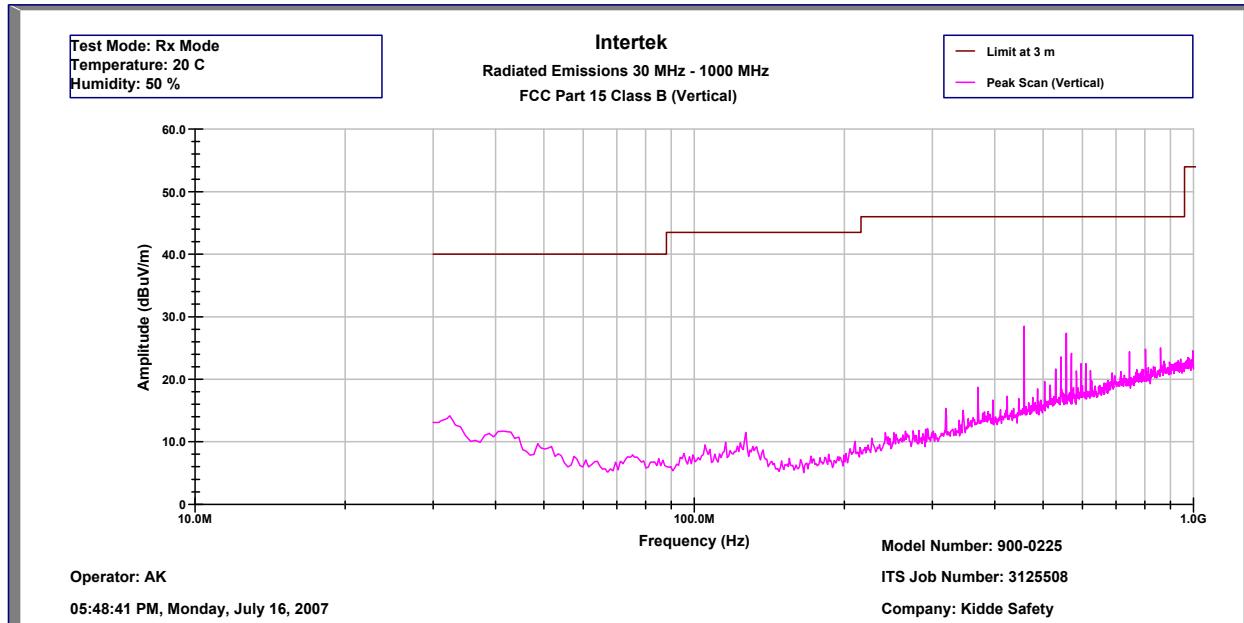
Tested by: Arkadi Kaplan

Mode: Transmitting

Distance: 3 m

The Test Results are presented on the following page.

Test Result:	Complies by 16.7 dB
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8.0 Test Equipment

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	9/11/07
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	9/11/07
EMI Receiver	Rhode-Schwarz	FSP-40	100030	12	9/12/07
BI-Log Antenna	Antenna Research	LPB-2513/A	1154	12	8/29/07
Horn Antenna	EMCO	3115	8812-3049	12	7/13/08
Pre-Amplifier	Sonoma Inst.	310	185634	12	8/11/07
Pre-Amplifier	Miteq	AMF-4D-001180-24-10P	799159	12	7/16/08