Emissions Testing
Performed
on the
Ketec Inc.
Transceiver
Model: K2000

To

FCC Part 15 Subpart B and Subpart C, Section 15.223

Date of Test: June 21, 2001

Report Number: J20051699

Contact: Mr. Rich Frohberg

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I – Introduction and Summary

TO: Mr. Rick Frohberg
FROM: Nicholas Abbondante, Engineer
DATE: June 22, 2001
JOB #: J20051699
RE: Emissions Testing Performed on the Transceiver, Model: K2000

On June 21, 2001, we tested the Transceiver, Model: K2000 to determine if it was in compliance with the FCC Part 15, Subpart B and Subpart C, Section 15.223. We found that the unit met the Part 15 requirements when tested as received. A prototype version of the sample was received on Thursday, June 21, 2001 in good condition.

The following Table summarizes the results of testing.

Test	Frequency (MHz)	Measurement	Requirement	Pass/Fail	Section of FCC Rules	Section of Test Report
Fundamental Field Strength	7.87	15.4 dBµV/m	40.0 dBµV/m	Pass Pass	15.223	15.223
Transmitter Spurious Emissions	113.6	36.6 dBµV/m	43.5 dBµV/m	Pass	15.209	Table 1
Transmitter Line-conducted	8.64	39.4 dBµV	48.0 dBµV	Pass	15.207	Table 2
Duty Cycle	N/A	.0022%	N/A	N/A	15.31	X
0 dB Bandwidth	7.873	1.247 MHz	N/A	N/A	N/A	XI
6 dB Bandwidth	7.873	1.552 MHz	N/A	N/A	15.223	XI
% Occupancy of Restricted Band	8.291-8.294	0.2%	<1%	Pass	15.205 (d)(1)	15.205
% Occupancy of Restricted Band	8.362-8.366	0.3%	<1%	Pass	15.205 (d)(1)	15.205
% Occupancy of Restricted Band	8.37625-8.38675	0.8%	<1%	Pass	15.205 (d)(1)	15.205
% Occupancy of Restricted Band	8.41425-8.41475	0.0004%	<1%	Pass	15.205 (d)(1)	15.205
Receiver Radiated Emissions	113.6	36.6 dBµV	43.5 dBµV	Pass	15.109	Table 1
Receiver Conducted Emissions	8.64	39.4 dBµV	48.0 dBµV	Pass	15.107	Table 2

In summary, this report confirms that the Model: K2000 is compliant with the FCC Part 15, Subpart B and Subpart C Section 15.223 requirements when production units conform to the initial sample. Please address all questions and comments concerning this report to Michael Murphy, EMC Staff Engineer.

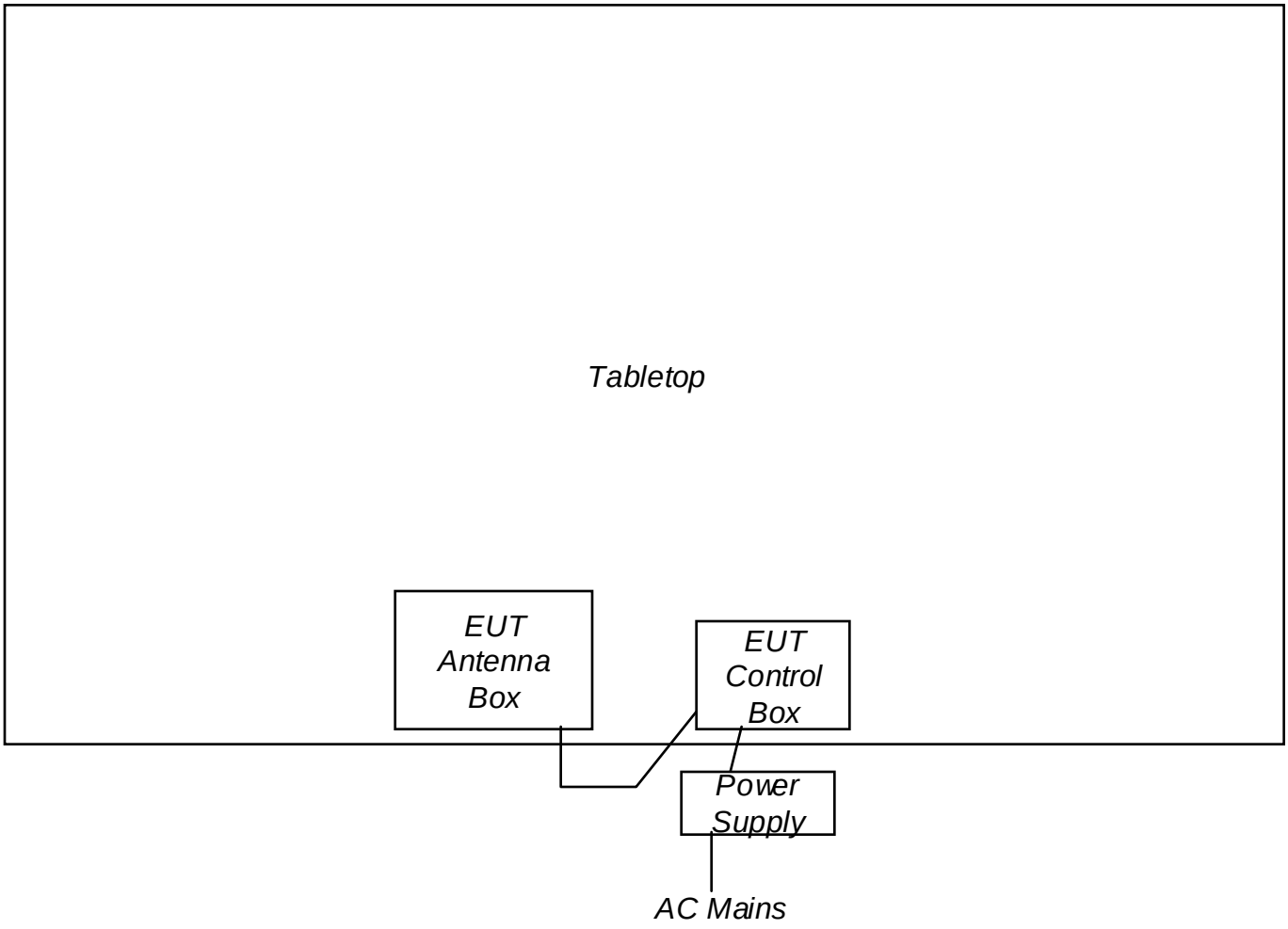
II – Technical Requirements

15.1 Scope

The K2000 Deactivator is a transceiver. The complete device functions as an EAS tag deactivator, which disables the security tags used in retail environments when an item is purchased. The device is an intentional radiator intended to operate in accordance with 15.223 "Operation within the bands 1.705- 10 MHz.".

The EUT was received on June 21, 2001 in good condition.

The following block diagram shows the equipment setup during testing.



15.27 Special Accessories

No special accessories are necessary for the K2000 to meet the compliance requirements.

15.31 Measurement Standards

The measurement procedures as specified by ANSI C63.4:1992 were used to test this device. See Section IV of the test report for a detailed description of the test site and the measurement equipment. Please note also that procedures specified by Rich Fabina of the FCC were used. A copy of the FCC correspondence regarding this can be found in Appendix A, FCC Correspondence.

15.33 Frequency range of measurement

The device was scanned for spurious and harmonic emissions from 6 MHz to the 10^{th} harmonic of the fundamental emission.

15.35 Measurement detector functions and bandwidth

The following table illustrates the detector functions and bandwidth used to test the device.

Frequency Range	Measurement Detector	Measurement Bandwidth
450 kHz to 30 MHz	Quasi-Peak	9 kHz
30 MHz to 1000 MHz	Quasi-Peak	120 kHz
1000 MHz to 10^{th} harmonic	Average	1 MHz

The quasi-peak detector meets the requirements of CISPR 16.
An averaging factor was used because the device operates with a .0022% duty cycle.

15.36 Transition Provisions

Transition provisions were not applied to the device. The receiver is not being certified with the device. The receiver is integral to the device and is not separately authorized. The device does not operate in the band 902-905 MHz.

15.105 Information to the user.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.

15.107 Conducted limits.

(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line shall not exceed the following. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

Frequency of Emission Conducted Limit – Class B

Frequency (MHz)	Limit (μV)	Limit (dBμV)
0.45 to 30	250	48

(b) For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 450 kHz to 30 MHz shall not exceed the limits in the

following table. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals. The lower limit applies at the band edges.

Frequency of Emission Conducted Limit – Class A

Frequency (MHz)	Limit (μV)	Limit (dBμV)
0.45 to 1.705	1000	60
1.705 to 30	3000	69.5

The following option may be employed if the conducted emissions exceed the limits in paragraph (a) or (b) of this Section, as appropriate, when measured using instrumentation employing a quasi-peak detector function: if the level of the emission measured using the quasi-peak instrumentation is 6 dB, or more, higher than the level of the same emission measured with instrumentation having an average detector and a 9 kHz minimum bandwidth, that emission is considered broadband and the level obtained with the quasi-peak detector may be reduced by 13 dB for comparison to the limits. When employing this option, the following conditions shall be observed:

(1) The measuring instrumentation with the average detector shall employ a linear IF amplifier.

(2) Care must be taken not to exceed the dynamic range of the measuring instrument when measuring an emission with a low duty cycle.

(3) The test report required for verification or for an application for a grant of equipment authorization shall contain all details supporting the use of this option.

Summary of Test Results

Configuration	Frequency (MHz)	Measurement (dBμV)	Measurement (μV)	Limit (μV)	Pass/Fail
Receiving	8.64	39.4	93.3	250	Pass

Data can be found in Table 2.

15.109 Radiated emission limits.

Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission Radiated Limit – Class B

Frequency (MHz)	Limit (μV/m)	Limit (dBμV/m)
30 to 88	100	40.0
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

Frequency of Emission Radiated Limit – Class A

Frequency (MHz)	Limit (μV/m)	Limit (dBμV/m)
30 to 88	90	39.1
88 to 216	150	43.5
216 to 960	210	46.4
Above 960	300	49.5

In the emission tables above, the tighter limit applies at the band edges. Sections 15.33 and 15.35 which specify the frequency range over which radiated emissions are to be measured and the detector functions and other measurement standards apply.

For a receiver which employs terminals for the connection of an external receiving antenna, the receiver shall be tested to demonstrate compliance with the provisions of this Section with an antenna connected to the antenna terminals unless the antenna conducted power is measured as specified in Section 15.111(a). If a permanently attached receiving antenna is used, the receiver shall be tested to demonstrate compliance with the provisions of this Section.

Summary of Test Results

Configuration	Frequency (MHz)	Measurement (dBµV)	Measurement (µV)	Limit (µV)	Pass/Fail
Receiving	113.6	36.6	67.6	150	Pass

15.111 Antenna power conduction limits for receivers.

In addition to the radiated emission limits, receivers that operate (tune) in the frequency range 30 to 960 MHz and CB receivers that provide terminals for the connection of an external receiving antenna may be tested to demonstrate compliance with the provisions of Section 15.109 with the antenna terminals shielded and terminated with a resistive termination equal to the impedance specified for the antenna, provided these receivers also comply with the following: with the receiver antenna terminal connected to a resistive termination equal to the impedance specified or employed for the antenna, the power at the antenna terminal at any frequency within the range of measurements specified in Section 15.33 shall not exceed 2.0 nanowatts.

Summary of Test Results

Configuration	Frequency (MHz)	Measurement (dBµV)	Measurement (µV)	Limit (µV)	Pass/Fail
The device does not have the ability to connect to an external antenna measurements were not performed.					

15.201 Certification

The device is required to be certified in accordance with Part 2 of the FCC rules, Subpart J.

15.203 Antenna Requirements

The antenna connects to the device using a unique connector not available in the commercial market. Additionally, it is specified in the user's manual that users are not permitted to modify the device in any way.

15.204 External Radio Amplifier

The device is not an amplifier.

15.205 Restricted bands of operation

The maximum measured field strength allowable by 15.223 is higher than that allowed by 15.209. All unwanted emissions from the transmitter were compared to the general limits in 15.209 that are the requirement for restricted band emissions. Below 1000 MHz a quasi-peak detector was employed to measure emissions except as noted in this report.

The K2000 transceiver sweeps over several restricted bands. According to paragraph (d)(1), swept frequency field disturbance sensors operating between 1.705 and 37 MHz are allowed to do this if the device never stops in a restricted band and if the fundamental emission is outside of these restricted bands for 99% of the time the device is transmitting, without compensation for duty cycle.

The device does not stop in any of the restricted bands, as it is always cycling freqencies. To demonstrate that the 4 restricted bands within the fundamental sweep range were not occupied for more than 1% of the transmission time, the bandwidth from the lowest to highest sweep frequency was measured 0 dB down from the peak. This data can be found in section XI. The percent occupany was determined by dividing the bandwidth of the restricted band by the bandwidth of the fundamental emission.

The 0 dB bandwidth was measured to be 1.247 MHz. For the bands 8.291-8.294, 8.362-8.366, 8.37625-8.38675, 8.41425-8.41475, this gives a percent occupancy of 0.2%, 0.3%, 0.8% and 0.0004%, respectively.

15.207 Conducted limits

The device was tested for line-conducted emissions both in transmit and receive modes. However, transmit and receive are the same mode for this device, therefore only one test was performed. See Table 2 for the summary of line-conducted emissions measured. Note that the limits are identical for a Class B Digital Device as defined in 15.107. Refer to 15.107 for a summary of the limits and to Table 2 for testing results.

15.209 Radiated emission limits; general requirements

All unwanted emissions from the transmitter were compared to the general requirements of 15.209. These limits are the same as those of 15.109. An explanation of the limits can be found in 15.109, and test results are located in Table 1.

Test Method Justifications

For maximizing emissions, the system was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed.

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in C63.4 (1992).

The arrangement of the cables dangling from the rear of the table was varied to the extent possible to produce the maximum emissions.

15.223 Operation within the band 1.705-10 MHz

The field strength limit for the device was based on the operating frequency of 7.873 MHz:

Frequency (MHz)	Emission Limit (mV/m)	Emission Limit (dBμV/m)	Test Distance (meters)
7.873	0.1	40	30

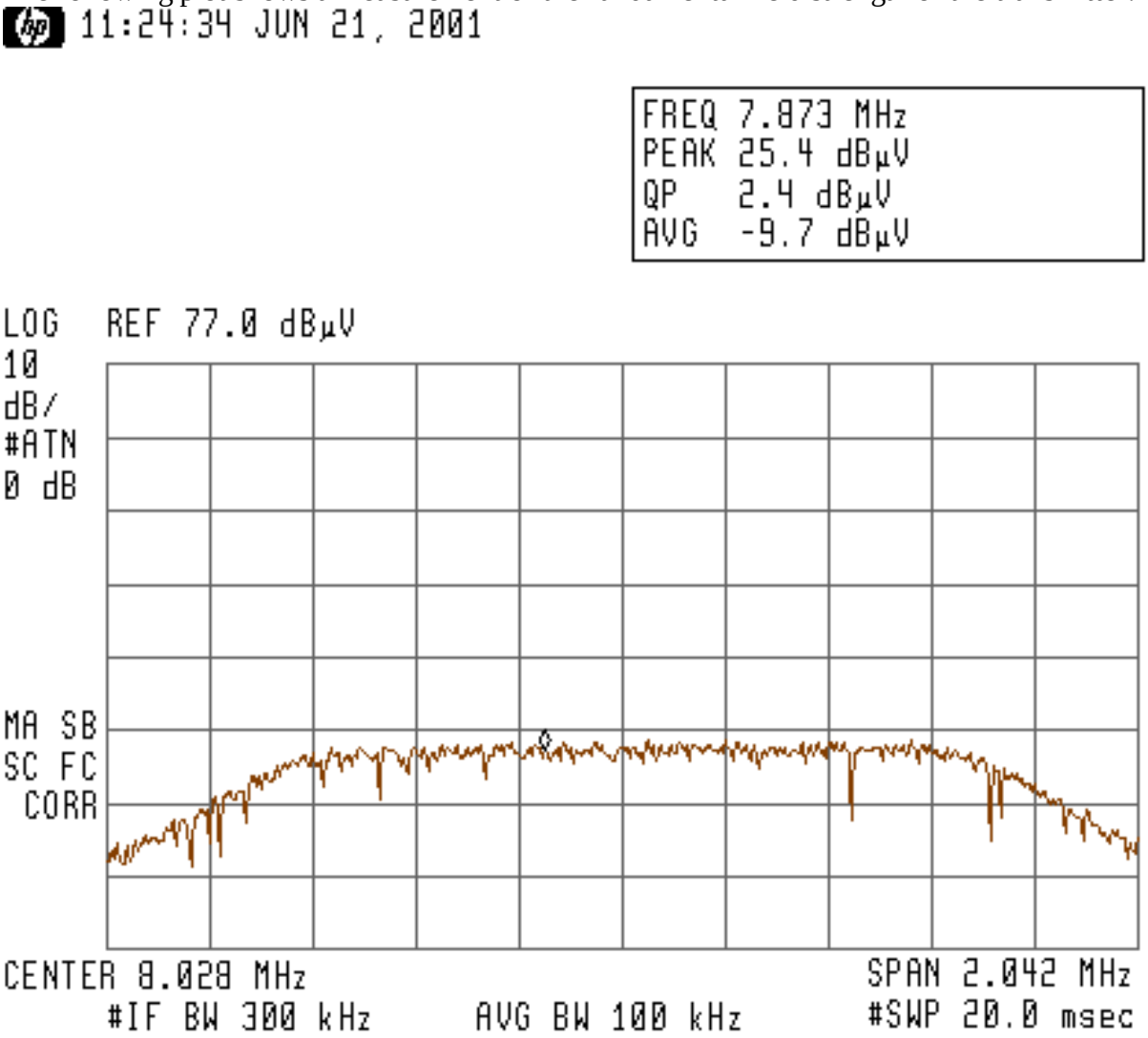
The emission requirement for harmonic emission is identical to the general requirement of 15.209. Spurious emission measurements were compared to the general requirement of 15.209.

The fundamental emission was measured with a peak detector using 300 KHz resolution bandwidth, as specified in correspondence with Rich Fabina of the FCC. This correspondence can be seen in Appendix A.

The 6 dB bandwidth of the EUT was measured to be 19.7% of the fundamental frequency. This allows the

limits specified above to be used. The data for this measurement can be found in section XI.

The following plot shows a measurement of the fundamental field strength of the transmitter.



The peak measurement is 25.4 dBuV, with cable loss of 0.6 dB, and an antenna factor of 9.4 dB. Additionally, a duty cycle factor of 20 dB can be applied. The duty cycle calculation can be found in Section X.

Summary of Test Results

Configuration	Frequency (MHz)	Measurement (dBµV)	Measurement (µV)	Limit (µV)	Pass/Fail
Transmitting	7.873	15.4	5.89	100	Pass

III - Attestation

LABORATORY MEASUREMENTS

Pursuant To
Part 15, Subpart C
For
Intentional Radiators

Company Name:	Ketec Inc.
Address:	1256 N. Church Street Moorestown, NJ 08057
Model:	K2000
Date of Test(s):	June 21, 2001
Test Site Location:	INTERTEK TESTING SERVICES NA INC. 70 Codman Hill Road Boxborough, MA 01719
Site:	3

I attest to the accuracy of this report:

Signature	Signature
Nicholas Abbondante	Michael S. Ogunleye
Test Engineer	Reviewer
Engineer	Senior Project Engineer
Title	Title

IV - Site Description and Measurement Equipment

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C, General Requirements.

A. **Test Set-Up**:

1. The test site is a Plastic/Fiberglass structure with a groundplane. The site has attenuation characteristics which meet the requirements of ANSI C63.4 (1992). Information on the site has been filed with the FCC as required by Rule 2.948. The address of the site is 70 Codman Hill Road, Boxborough, MA 01719.

2. Power to the site is nominal line voltage of 117 V_{AC} and 230 V_{AC}, 60 Hz.

3. The equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the groundplane. During the radiated emissions test, the turntable is rotated 360 degrees and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The antenna height and polarization are also varied during the search for maximum signal levels. The height of the antenna is varied from one meter to four meters. Body-worn, hand-held and small portable devices are mounted on a non-conductive box and emissions are investigated on three orthogonal axis.

4. Detector function for radiated emissions is in peak or quasi-peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings according to the following formula:

   Averaging Factor in dB = 20 LOG (duty cycle)

   The time period over which the duty cycle is measured is 100 msec. The worst-case (highest percentage on) duty cycle is used and described specifically in the data section. The duty cycle is measured by placing the spectrum analyzer in zero scan (receiver mode) and linear mode at maximum bandwidth (3 MHz at 3 dB down) and viewing the resulting time domain signal output from the analyzer on a Tektronix 465 Oscilloscope. The oscilloscope is used because of its superior time base and triggering facilities.

5. Antennas used below 1000 MHz were EMCO Model 3142 Biconolog Antennas and Compliance Design Inc. Model A100 tuned Dipole Antennas. For measurements between 1000 MHz and 18000 MHz above 1 GHz, an EMCO Model: 3115 Horn Antenna is used. The Antennas used are listed in the Test Equipment Summary in Section 6.
6. The field strength measuring equipment used included:

The following equipment was used to make measurements for emissions testing:

Description	Manufacturer	Model	Serial #	Cal Due
Antenna, Loop, .15-30 MHz	Empire	LP-105	127	04/29/2002
Cable, BNC/BNC	Alpha	RG58B/U	CBL310E	09/24/2001
Antenna	EMCO	3142	9711-1224	11/17/2001
Plotter, Digital Pen	Hewlett Packard	7470A	2308A23938	No Cal
EMI Receiver W/RF Filter	Hewlett Packard	85422E	3625A00188	01/22/2002
LISN 50uH .01-50MHz 24A	Solar Electronics	9252-50-R-24-BNC	955107	03/26/2002
Attenuator, 20dB	Mini	20dB, 50 ohm	DS21A	07/14/2001

7. The frequency range to be scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency, or 40 GHz, whichever is lower. For line-conducted emissions, the range scanned is 450 kHz to 30 MHz.

8. Conducted measurements were made as described in ANSI C63.4 (1992). An IF bandwidth of 9 kHz is used, and peak or quasi-peak detection is employed.

9. The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application No. 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report. Above 1000 MHz, a bandwidth of 1 MHz is generally used.

10. For measurements made in the 9 kHz to 30 MHz range, a distance of 30 meters was used unless a good signal-to-noise ratio could not be obtained. In that case, a closer distance was used and that distance is so marked in the data table.

V – Summary of Equipment Under Test

1	**Manufacturer**:	Ketec Inc., LLC 1256 N. Church Street Unit A Moorestown, NJ 08057 (856) 778-4343 TIN 22-2937055 Contact: Rich Frohberg
2	**Grantee**:	Ketec Inc., LLC 1256 N. Church Street Unit A Moorestown, NJ 08057 (856) 778-4343 TIN 22-2937055 Contact: Rich Frohberg
3	**Model No.**:	K2000
4	**Trade Name**:	K2000 EAS Tag Deactivator
5	**Serial No.**:	ENG01 (assigned by ITS for tracking purposes)
6	**Date of Test**:	6/21/00
7	**Frequencies to which device can be tuned**:	7.5, 7.648077, 7.799078, 7.953059, 8.110081, 8.270204, 8.433487, and 8.6 MHz
8	**Can customer tune device?**	No
9	**Detailed description of operation pursuant to 15.209**:	See 15.209
10	**Applicable emissions limits**:	15.107, 15.109, 15.205, 15.207,15.209 and 15.223

VI - Configuration Information

Equipment Under Test: Transceiver

Model: K2000

Serial No.: ENG01 (assigned by ITS for tracking purposes)

FCC Identifier: H47-K2000

Support Equipment:

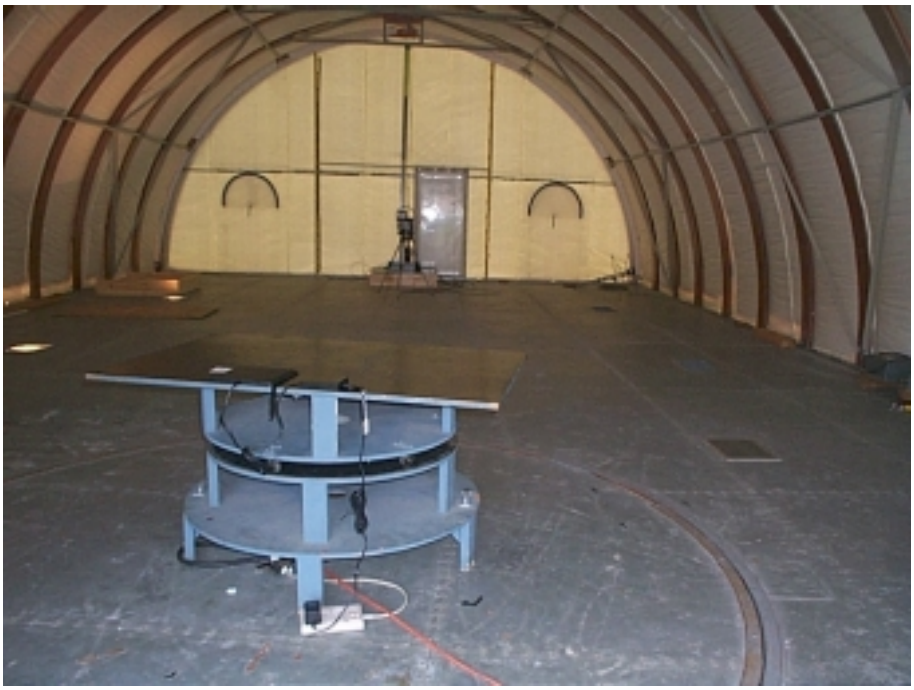
Power Supply	Manufacturer: APX Technologies AC Adapter Model: AP2287C Serial Number: 0112 FCC ID: Not Labeled

Cables:

QTY	Description	Shield Description	Hood Description	Length (m)
1	AC Mains	None	Plastic	1.5

VII - Configuration Photographs

Worst-Case Radiated Emissions



Worst-Case Line-Conducted Emissions

VIII - Sample Calculation

The following is how net field strength readings were determined:

NF = RF + AF + CF + PF + DF

Where,

NF = Net Reading in dBµV/m
RF = Reading from receiver in dBµV
AF = Antenna Correction Factor in dB(1/m)
CF = Cable Correction Factor in dB
PF = Preamplifier Correction Factor in dB
DF = Distance Factor in dB (using 20 dB/decade), from 3 to 1 meters 10.5 dB was added for measurements performed at 1 meter

To convert from dBµV/m to µV/m or mV/m the following was used:

$UF = 10^{(NF / 20)}$

Where,

UF = Net Reading in µV/m

Example:

For the fundamental field strength measurement at 8.4 (distance = 3 meters) see table [1].

NF = RF + AF + CF + PF + DF = 61.6 + 27.7 + 3.9 + 0.0 + 0.0 = 89.8 dBµV/m

$UF = 10^{(89.8\ dB\mu V / 20)}$ = 30,902 µV/m

IX – Data Tables

Intertek Testing Services

Radiated Emissions / Interference

Table: 1

Company: Ketec Incorporated
Model: K2000
Job No.: J20051699
Date: 06/21/01
Standard: FCC15C
Class: B Group: 1
Notes:

Tested by: Nicholas Abbondante
Location: Site 3C
Detector: HP 8542E
Antenna: LOG3
PreAmp: 0
Cable(s): 3C,10m PRIMARY
Distance: 3 or 10 meters

	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB
10m	V	16.950	-2.3	10.6	0.6	0.0	9.5	-0.6	29.5	-30.1
10m	V	24.330	1.1	11.3	0.8	0.0	9.5	3.7	29.5	-25.8
3m	V	32.440	7.1	16.7	0.9	0.0	0.0	24.7	40.0	-15.3
3m	V	40.550	12.1	12.1	1.0	0.0	0.0	25.2	40.0	-14.8
3m	V	48.670	11.4	9.2	1.1	0.0	0.0	21.6	40.0	-18.4
3m	V	48.880	11.5	9.1	1.1	0.0	0.0	21.7	40.0	-18.3
3m	V	56.770	20.6	7.8	1.1	0.0	0.0	29.5	40.0	-10.5
3m	V	109.500	8.7	7.4	1.7	0.0	0.0	17.8	43.5	-25.7
3m	V	113.600	27.7	7.2	1.7	0.0	0.0	36.6	43.5	-6.9

Intertek Testing Services

Conducted Emissions / Interference

Table: 2

Company: Ketec Incorporated
Model: K2000
Job No.: J20051699
Date: 06/21/01
Standard: FCC15C
Class: B Group: 1
Notes:
System Loss: Includes the Cable and LISN loss.

Tested by: Nicholas Abbondante
Location: Site 3C
Detector: HP 8542E
Cable(s): 3C,10m
Limiter: no

Frequency MHz	Reading Side A dB	Reading Side B dB	Attenuator Factor dB	System Loss dB	Quasi-Peak Net dB(uV)	Quasi-Peak Limit dB(uV)	Quasi-Peak Margin dB
0.804	-3.9	-0.8	20.0	0.9	20.1	48.0	-27.9
2.038	0.5	-0.5	20.0	0.9	21.4	48.0	-26.6
4.017	5.1	4.6	20.0	0.9	26.0	48.0	-22.0
8.640	18.7	15.5	20.0	0.7	39.4	48.0	-8.6
15.235	0.7	-4.6	20.0	0.4	21.1	48.0	-26.9
23.020	18.2	17.8	20.0	0.1	38.3	48.0	-9.7

X - Duty Cycle (Average Factor)

Average factor is subtracted from peak readings to compare emissions readings to average limits. The average factor is calculated from duty cycle measurements from the following plots.

The average factor is 20 Log (ON-TIME/PERIOD) of the emission. If the period is longer than 100 milliseconds then 100 milliseconds is used for the period. Average factor is determined using the worst-case duty cycle.

K2000 Duty Cycle Derivation

The K2000 system generates a pulse of fixed duration and period. The transmit pulse waveform is demonstrated below.

4µs 1800µs (556 Hz)

The frequency of the pulse is 556Hz, giving a period of ~1.8 milliseconds. The on time is 4µs, so then the averaging factor is

20 Log(4µs /1800µs) = -53.1 dB

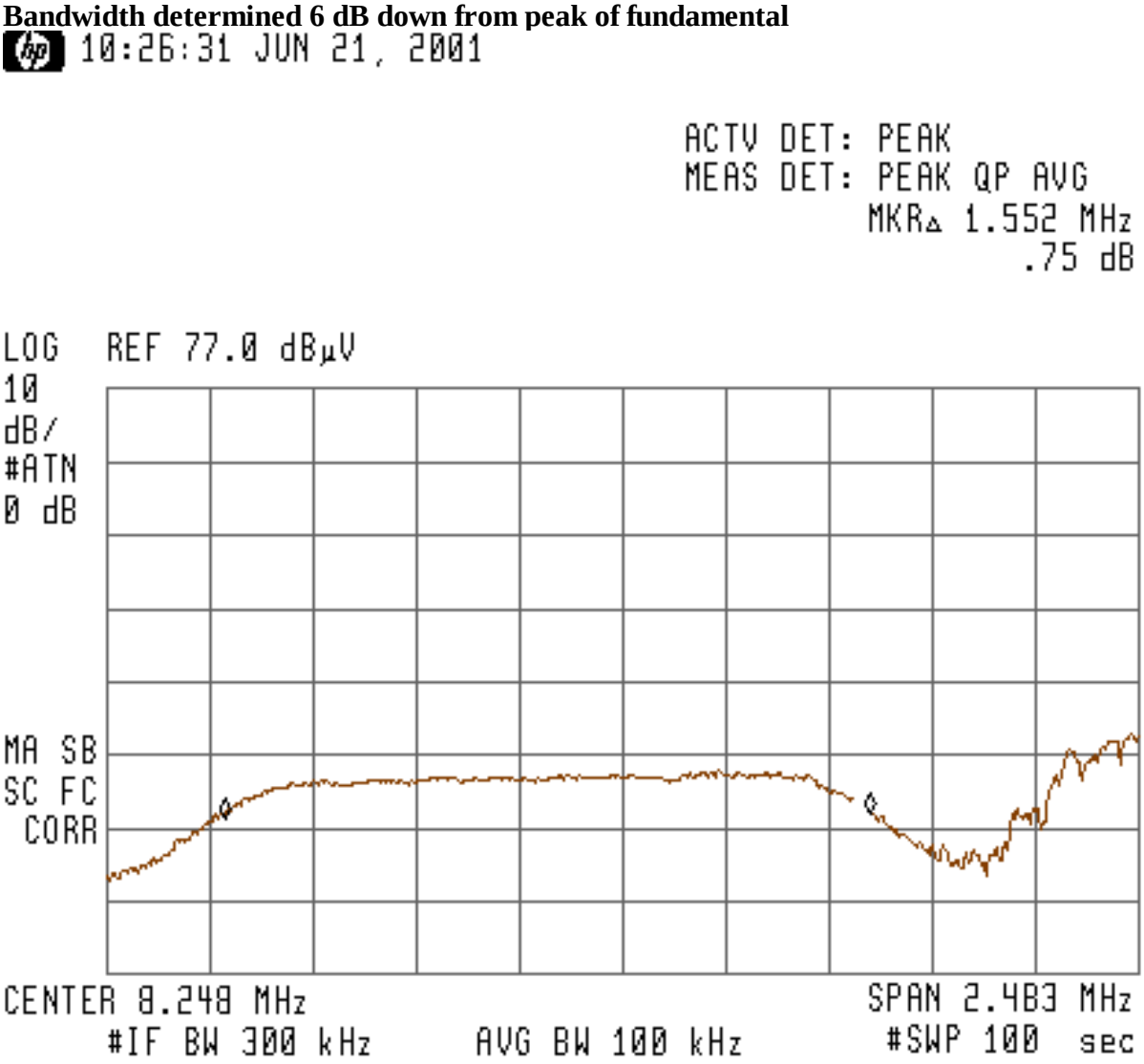
Maximum duty cycle over a 100ms period is .00222% resulting in an averaging factor of 53.1 dB.

Since the average factor exceeds the 20dB maximum allowed in 15.35 (b), the applied averaging factor is 20dB.

XI - Bandwidth

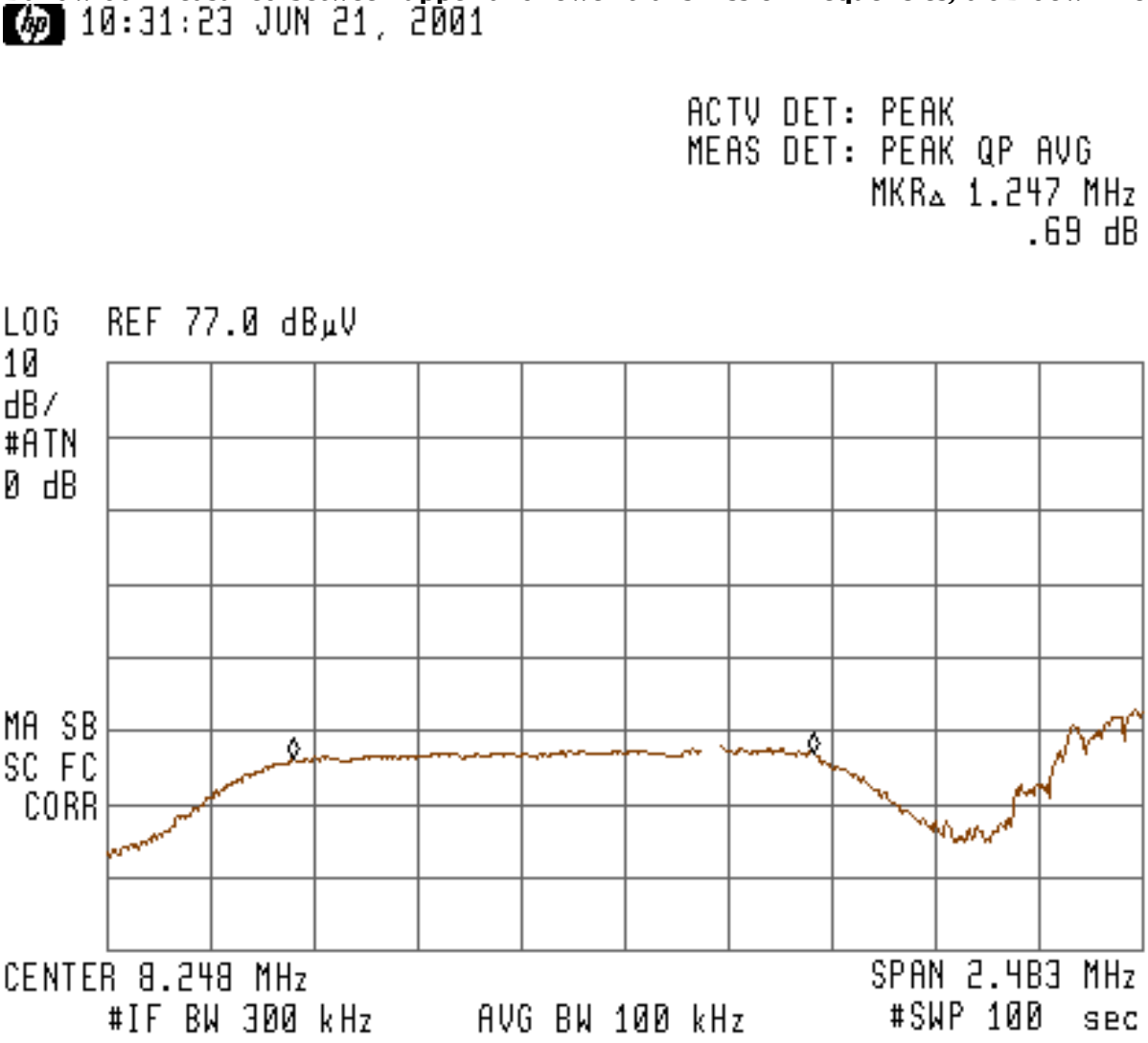
The following plot(s) show bandwidth measurements made. The Bandwidth is the 99% power.

Bandwidth determined 6 dB down from peak of fundamental



The 6 dB bandwidth of the fundamental emission is 1.552 MHz. This is 19.7% of the fundamental frequency, which is 7.873 MHz.

Bandwidth measured between upper and lower transmission frequencies, 0 dB down from peak



The bandwidth between the lowest and highest transmission frequency is 1.247 MHz.

Appendix A
FCC Correspondence

CORRESPONDENCE FROM RICH FABINA:

Rich,

Yes, the attached meets the conditions in our (Checkpoint) interpretation for frequecy hopping field disturbance sensors to meet the swept frequency field disturbance sensor requirements in Section 15.295(d)(1) of the FCC Rules.

Please attach a copy of this correspondence to the application filed for this modified device.

I trust that this has responded to this inquiry.

Rich Fabina

>>> "Rich F" <richfro@snip.net> 05/15/01 11:50AM >>>
Dear Mr. Fabina,

Thank you for your recent response to my inquiry. Although we do not agree with your assessment, we are proposing an alternate method that we believe will meet all of the requirements (1-5) that you indicated in Section I of your reply. We propose the following:

1. Our device will produce 8 randomly sequenced pulsed emissions at 8 discrete frequencies which will be treated as frequency hopping, where the bandwidth will be considered the spectrum between the lowest and highest carrier frequency that we pulse. Frequency hopping satisfies the swept frequency requirement of Section 15.205(d). This method was agreed to between Ed Gibbons and Checkpoint Systems.

2. The generation and transmission of these 8 discrete frequencies constitutes the fundamental, which is centered at 8.11MHz and has a 1.1MHz bandwidth. Although there are 8 individual frequencies used, together they constitute the fundamental operating frequency or frequency band of the device. They are not 8 individual fundamentals.

3. The transmitter will be microprocessor controlled and will not be capable of transmitting in or stopping in any restricted band as per Section 15.205 of the rules. The frequencies proposed are:
7.500000 MHz, 7.648077 MHz, 7.799078 MHz, 7.953059 MHz
8.110081 MHz, 8.270204 MHz, 8.433487 MHz, 8.600000 MHz.

4. A simple ratio of the maximum restricted band infringed upon divided by

the bandwidth of our fundamental emission (see item 1) must be less than 1% to satisfy Section 15.205 of the rules.

5. For the fundamental and harmonic emissions in the band between 1.7 MHz to 10 MHz, a 20db reduction from the true peak is to be compared to the limits of 100 uV/meter @ 30 meters. The unit will be modulated (pulsed) in its normal operating condition to produce the maximum emission level. True peak refers to the point at which the analyzer bandwidth is adjusted for minimum pulse desensitization.

6. For emissions outside the 1.705 MHz to 10 MHz band, CISPR quasi-peak measurements will be made with the device in the maximum emission level mode as described in item 5 above. Limits specified in Section 15.209 shall apply.

7. Conducted emissions remain as specified in Part 15 of the Rules.

Before we proceed with the expense and time required to redesign our product, please review this proposal and verify that it will meet the requirements of Section 15.205(d). Thank you.

Sincerely,

Rich Frohbergh
Ketec Inc.
richfro@snip.net

SUMMARY:

Testing the K2000 for FCC Part 15 Certification:

The K2000 has been redesigned in accordance with techniques allowed by the FCC that originally were applied to several similar devices manufactured by Checkpoint Systems. The basic criteria are noted and accepted in an e-mail from Rich Fabina, Chief, Equipment Authorization Branch, at the FCC, OET, Laboratory Division, of which a copy is included in the document package. This e-mail copy is to be included with the FCC submission documents. The following criteria shall apply:

1. The K2000 will produce 8 pulsed emissions at 8 different frequencies. These frequencies will be considered as a frequency hopping swept emission. The bandwidth is considered to be the spectrum between the lowest and highest pulse frequencies. This satisfies the swept frequency requirement

of Section 15.205(d).

2. The 8 frequencies will be considered as one fundamental frequency at 8.11 MHz with a bandwidth of 1.1 MHz. The lowest frequency is defined as 7.50 MHz and the highest frequency is defined as 8.60 MHz, producing the stated bandwidth.

3. The ratio of the restricted band divided by the fundamental emission bandwidth must be less than 1% to satisfy Section 15.205. The widest restricted band within the sweep is 8.37625-8.38675 MHz, or 10.5 KHz. Accordingly, 10.5 KHz / 1.1 MHz = 0.95%.

4. The transmitter is microprocessor controlled and is not capable of stopping in any restricted band. By its' inherent design, the transmitter is also incapable of stopping the sweep during measurements.

5. Fundamental and harmonic emissions up to 10 MHz will be measured at their true peak value according to the analyzer. To measure true peak, the analyzer is set to a frequency span of 6-10 MHz, peak detector, 300KHz Bandwidth, in the "max hold" condition. The peak reading of the displayed emission is then compared to the average limit of 15.223 (100uv/m @ 30m or 40dbuv/m) plus 20db. The corrected limit will be 60dbuv/m @ 30m. This is done due to the swept and pulsed nature of the transmission and in agreement with the FCC.

6. Emissions above 10 MHz will be made using CISPR quasi-peak measurements.

7. Conducted emissions remain as specified in Part 15 rules.