



1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

FCC Rules and Regulations / Intentional Radiators

Part 90, Subpart J

Non-Voice and Other Specialized Operations

Part 90, Subpart J, Section 90.241

Radio Call Box Operations

THE FOLLOWING **MEETS** THE ABOVE TEST SPECIFICATION

Formal Name: STAR-LB

Kind of Equipment: Callbox Transmitter

Frequency Range: 72 MHz - 76 MHz

Test Configuration: Wall Mounted NEMA-1 Enclosure, Wired to Fire Panels (Tested at 120 vac, 60 Hz)

Model Number(s): 99952-LB

Model(s) Tested: 99952-LB

Serial Number(s): L0001

Emission Designator: A2D

Date of Tests: May 19 & 21, 2009

Test Conducted For: King-Fisher Company, inc  
2350 Foster Ave  
Wheeling, IL 60090

**NOTICE:** "This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government". Please see the "Additional Description of Equipment Under Test" page listed inside of this report.

© Copyright 1983-2009 D.L.S. Electronic Systems, Inc

**COPYRIGHT NOTICE**

This report must not be reproduced (except in full), without the approval of D.L.S. Electronic Systems, Inc.



Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## SIGNATURE PAGE

Report By:

Arnom C. Rowe  
Test Engineer  
EMC-001375-NE

Reviewed By:

William Stumpf  
OATS Manager

Approved By:

Brian Mattson  
General Manager



Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## TABLE OF CONTENTS

i.	Cover Page .....	1
ii.	Signature Page .....	2
iii.	Table of Contents .....	3
iv.	NVLAP Certificate of Accreditation .....	4
1.0	Summary of Test Report .....	5
2.0	Introduction .....	5
3.0	Object .....	5
4.0	Test Set-Up .....	6
5.0	Test Equipment .....	6
6.0	Ambient Measurements .....	7
7.0	AC Power Line Conducted Emission Measurements .....	7
8.0	Description of Test Sample .....	8
9.0	Additional Description of Test Sample .....	9
10.0	Photo Information and Test Set-Up .....	9
11.0	ID Photos Taken During Testing .....	10
11.0	AC Power Line Conducted Photos Taken During Testing .....	12
12.0	Results of Tests .....	13
13.0	Conclusion .....	13
	TABLE 1 – EQUIPMENT LIST .....	14
	Appendix A – Electric Field Radiated Emissions Test .....	15
1.0	Test Set-Up .....	16
2.0	DC Voltages and Current into final Amplifying Stage .....	16
3.0	RF Power Output .....	16
3.0	Data and Charts taken of the RF Power Output .....	17
4.0	Transmission Times and Duration .....	20
4.0	Graph(s) taken of the Transmission Times and Duration .....	21
5.0	Occupied Bandwidth .....	25
5.0	Data and Graph(s) taken of the 99% Occupied Bandwidth .....	26
5.0	Data and Graph(s) taken of the Emission Mask .....	29
6.0	Spurious Emissions At Antenna Terminals .....	34
6.0	Conducted Emission Data and Charts made at the Antenna Terminals .....	35
7.0	Field Strength of Fundamental & Spurious Emission Measurements .....	38
7.0	Radiated Data and Graph(s) Taken for Spurious Emissions .....	39
8.0	Frequency Stability (Temperature) .....	42
9.0	Frequency Stability (Voltage Variation) .....	42
8.0 & 9.0	Data taken for Frequency Stability Temperature & Voltage Variation .....	43
10.0	Frequency Stability Photos Taken During Testing .....	45



1250 Peterson Dr., Wheeling, IL 60090

Company:  
Model Tested:  
Report Number:

King-Fisher Company, inc  
99952-LB  
15407

United States Department of Commerce  
National Institute of Standards and Technology



## Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 100276-0

**D.L.S. Electronic Systems, Inc.**  
Wheeling, IL

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:*

### **ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS**

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communiqué dated 18 June 2005).*



2008-10-01 through 2009-09-30

Effective dates

*Sally D. Bruce*  
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2006-09-13)



Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## 1.0 SUMMARY OF TEST REPORT

It was found that the STAR-LB, Model Number(s) 99952-LB **meets** the radio interference conducted and radiated emissions requirements of the FCC "Rules and Regulations", Part 90, Subpart J, Section 90.241, for Radio Call Box Operations.

## 2.0 INTRODUCTION

On May 19 & 21, 2009, a series of radio frequency interference measurements were performed on STAR-LB, Model Number(s) 99952-LB, Serial Number: L0001. The tests were performed according to the procedures of the FCC as stated in Part 2 - Frequency Allocations and Radio Treaty Matters: General Rules and Regulations, Subpart J, Equipment Authorization Procedures of the Code of Federal Regulations 47. Tests were performed by personnel of D.L.S. Electronic Systems, Inc. who are responsible to Donald L. Sweeney, Senior EMC Engineer.

D.L.S. Electronic Systems, Inc. is a full service EMC/Safety Testing Laboratory accredited to ISO Guide 17025. NVLAP Certificate and Scope can be viewed at <http://www.dlsemc.com/certificate>. Our facilities are registered with the FCC, Industry Canada, and VCCI. All immunity tests were performed by personnel of D.L.S. Electronic Systems, Inc. at the following location(s):

### Main Test Facility:

D.L.S. Electronic Systems, Inc.

1250 Peterson Drive.....

Wheeling, Illinois 60090.....

### O.A.T.S. Test Facility:

D.L.S. Electronic Systems, Inc.

166 S. Carter Street

Genoa City, Wisconsin 53128

FCC Registration Number: 334127

## 3.0 OBJECT

The purpose of this series of tests was to determine if the test sample could meet the radio frequency interference requirements of the FCC "Rules and Regulations", Part 90, Subpart J, Section 90.241, for Radio Call Box Operations.



Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

#### 4.0 TEST SET-UP

All tests were performed at D.L.S. Electronic Systems, Inc. and set up according to the FCC and TIA-603C regulations. The conducted tests if required were performed with the test item placed on a non-conductive table (table top equipment), located in the test room. Equipment normally operated on the floor was tested by placing it on the metal ground plane. The ground plane has an electrical isolation layer over its surface approximately 7mm thick. The power line supplied was connected to a dual line impedance stabilization network electrically bonded to the ground plane, located on the floor. The networks were constructed per the requirements of the American National Standards Institute, ANSI C63.4-2003.

All radiated emissions tests were performed with the test item placed on a 80 cm high rotating non-conductive table, located in the test room. Equipment normally operated on the floor was placed on a metal covered turntable, which is flush with the surrounding conducting ground plane. The ground plane has an electrical isolation layer over its surface approximately 7 mm thick. The EUT is separated from the turntable ground plane by a non-conductive layer. The equipment under test was set up according to TIA Standard, TIA-603-C:2004, Section 2.2.12.

#### 5.0 TEST EQUIPMENT (Bandwidths and Detector Function)

All preliminary data below 1000 MHz was automatically plotted using the ESI 26/ESI 40 Fixed Tuned Receiver. The data was taken using Peak, Quasi-Peak or the Average Detector Functions as required. This information was then used to determine the frequencies of maximum emissions. Above 1000 MHz, final data was taken using the Average Detector.

Below 1000 MHz, final data was taken using the ESI 26/ESI 40 fixed tuned receiver. These plots were made using the Peak or Quasi-Peak Detector functions, with manual measurements performed on the questionable frequencies using the Quasi-Peak or the Average Detector Function of the Analyzer or ESI 26/ESI 40 Receiver as required. Above 1000 MHz, final data was taken using the Average Detector on the ESI 26/ESI 40 Fixed Tuned Receiver.

The bandwidths shown below are specified by ANSI C63.4-2003.

Frequency Range	Bandwidth (-6 dB)
10 to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz
Above 1 GHz	1 MHz

A list of the equipment used can be found in Table 1. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.



Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## 6.0 AMBIENT MEASUREMENTS

For emissions measurements, broadband antennas and an EMI Test Receiver with a panoramic spectrum display are used. First the frequency range is scanned and displayed on the test receiver display. Next the scanned frequency range is divided into smaller ranges, and then it is manually tuned through to determine the emissions from the EUT. A headset or loudspeaker is connected to the test receiver's AM/FM demodulated output as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT. If there is any doubt as to the source of the emission, it is further investigated by rotating the EUT, or by disconnecting the power from the EUT.

The EUT is set up in its typical configuration and operated in its various modes. For tabletop systems, cables are manipulated within the range of likely configurations. For floor-standing equipment, the cables are located in the same manner as the user would install them and no further manipulation is made. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions. For each mode of operation, the frequency spectrum is monitored. Variations in antenna height, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) are explored to produce the emission that has the highest amplitude relative to the limit.

## 7.0 AC POWER LINE CONDUCTED EMISSION MEASUREMENTS – Part 15.207

As stated in FCC Part 90, Subpart J, Sections 90.231 to 90.250, AC power line conducted emissions are not required for non-voice and other specialized operations.



1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## 8.0 DESCRIPTION OF TEST SAMPLE:

### 8.1 Description:

This device transmits coded fire alarm messages to a central monitoring receiver. The messages consist of 5-10 amplitude modulated tones that identify the location of the transmitter and the type of message, i.e. fire, test, supervisory, trouble. Messages are either triggered by an external fire monitoring device, such as the dry contact outputs from a fire alarm panel, or they are generated internally for required periodic tests or to inform about trouble conditions such as loss of power, low battery, ground faults, or loss of connection to the monitoring device.

### 8.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

Depth: 3 in x Width: 12 in x Height: 18 in

### 8.3 LINE FILTER USED:

No commercial AC Line filters. Voltages: 120 VAC @ 50/60 Hz  
and can be run from battery: 12.6 VDC

### 8.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

52 kHz

Clock Frequencies:

25 & 0.032 MHz

### 8.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. STAR Transmitter

PN: 66950-0-LB, Rev 0

2. STAR Interface

PN: 66951-0, Rev 0





Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

9.0 ADDITIONAL DESCRIPTION OF TEST SAMPLE:  
(See also Paragraph 8.0)

1: There were no additional descriptions noted at the time of test.

NOTE:

FCC Part 90.241: Continuous transmit on Low and High channels.  
FCC Part 15.109: Transmitter in Standby mode.

10.0 PHOTO INFORMATION AND TEST SET-UP

Item 0 STAR-LB

Model Number: 99952-LB, Serial Number: L0001

Item 1 Non-shielded AC power cord. 1.5 meter,

Item 2 Shielded Serial Cable with Metal Connectors (for setting transmitter test modes only; not normally connected). 10 meters



Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

#### 11.0 ID PHOTOS TAKEN DURING TESTING

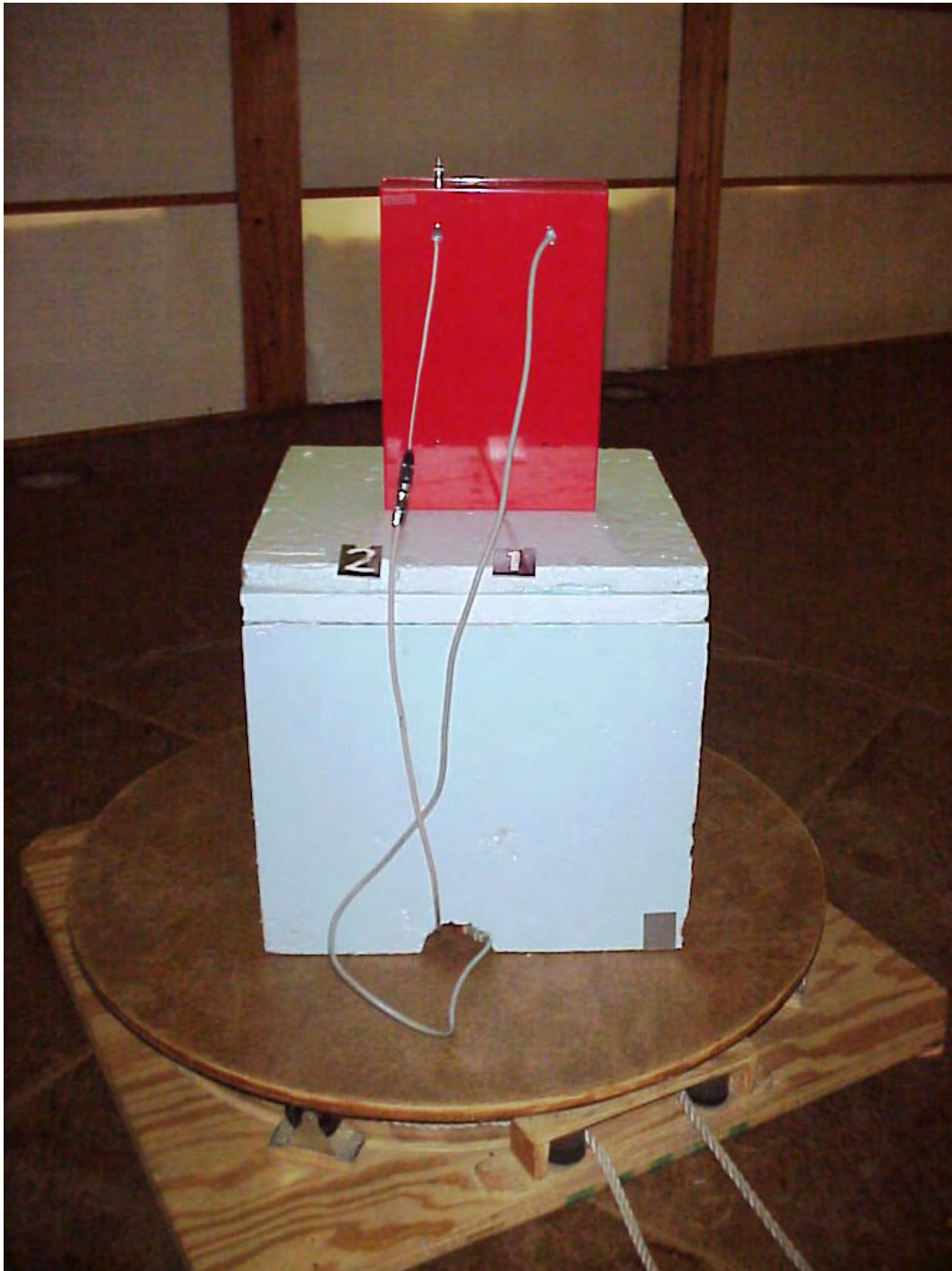




Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## 11.0 RADIATED PHOTOS TAKEN DURING TESTING







1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## 11.0 AC POWER LINE CONDUCTED PHOTOS TAKEN DURING TESTING





1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## 12.0 RESULTS OF TESTS

The radio interference emission charts can be seen on the pages at the end of this report. Data sheets indicating the test measurements taken during testing can also be found at the end of this report.

## 13.0 CONCLUSION

It was found that the STAR-LB Model Number(s) 99952-LB **meets** the radio interference conducted and radiated emission requirements of the FCC "Rules and Regulations", Part 90, Subpart J, Section 90.241, for Radio Call Box Operations.



1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

TABLE 1 – EQUIPMENT LIST

<b>Test Equipment</b>	<b>Manufacturer</b>	<b>Model Number</b>	<b>Serial Number</b>	<b>Frequency Range</b>	<b>Cal Due Dates</b>
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	7/09
Preamplifier	Rohde & Schwarz	TS-PR10	032001/005	9 kHz – 1 GHz	3/10
Antenna	EMCO	3104C	97014785	20 MHz – 200 MHz	5/10
Antenna	EMCO	3146	97024895	200 MHz – 1 GHz	5/10
Signal Generator	Marconi	2022C	119062-013	9 kHz – 1 GHz	8/09
Dipole Antenna Set	Com-Power	AD-100	DLS#558	30 MHz – 1 GHz	---
Receiver	Rohde & Schwarz	ESI 26	837491/010	20 Hz – 26 GHz	12/09
LISN	Solar	9252-50-R-24-BNC	961019	10 kHz – 30 MHz	7/09
Filter- High-Pass	SOLAR	7930	090702	120 kHz	2/10
Limiter	Electro-Metrics	EM-7600	706	10 kHz – 30 MHz	1/10

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.



1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

# APPENDIX A

## TEST PROCEDURE

### PART 90 PRIVATE LAND MOBILE RADIO SERVICES

#### SUBPART J

#### NON-VOICE AND OTHER SPECIALIZED OPERATIONS



1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## APPENDIX A

### 1.0 TEST SET-UP

All radiated emission tests were performed at D.L.S. Electronic Systems, Inc. The radiated tests were made with the test item placed on a non-conductive turntable located in the Test Room with the receive antenna placed three or one meter from the device under test.

### 2.0 DC VOLTAGES AND CURRENTS APPLIED INTO FINAL AMPLIFYING STAGE – PART 2.1033(c-8)

12 Volts at 525 mA

### 3.0 RF-POWER OUTPUT – PART 2.1046 and EIA /TIA-603-C:2004, SECTION 2.2.17

As stated in Part 90.1215, the RF output power should not exceed 1 watt(s). The RF output of the STAR-LB was connected to a Spectrum Analyzer or a Power Meter through suitable attenuation. All cables, connectors, and attenuators were calibrated prior to testing. The RF output power was measured using the following test method:

#### **Actual Measurements Taken:**

29.5 dBm Measured output of the transmitter

29.5 dBm equals 0.891 watt(s)

#### **LIMIT:**

Manufacturer's rated output power = 29.5 dBm

#### **MARGIN:**

$1 - 0.891 = 0.109$  watt(s)





1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## APPENDIX A

# DATA & CHARTS TAKEN OF THE RF POWER OUTPUT MEASUREMENT

EIA /TIA-603-C:2004, SECTION 2.2.17

90.241 & PART 2.1046



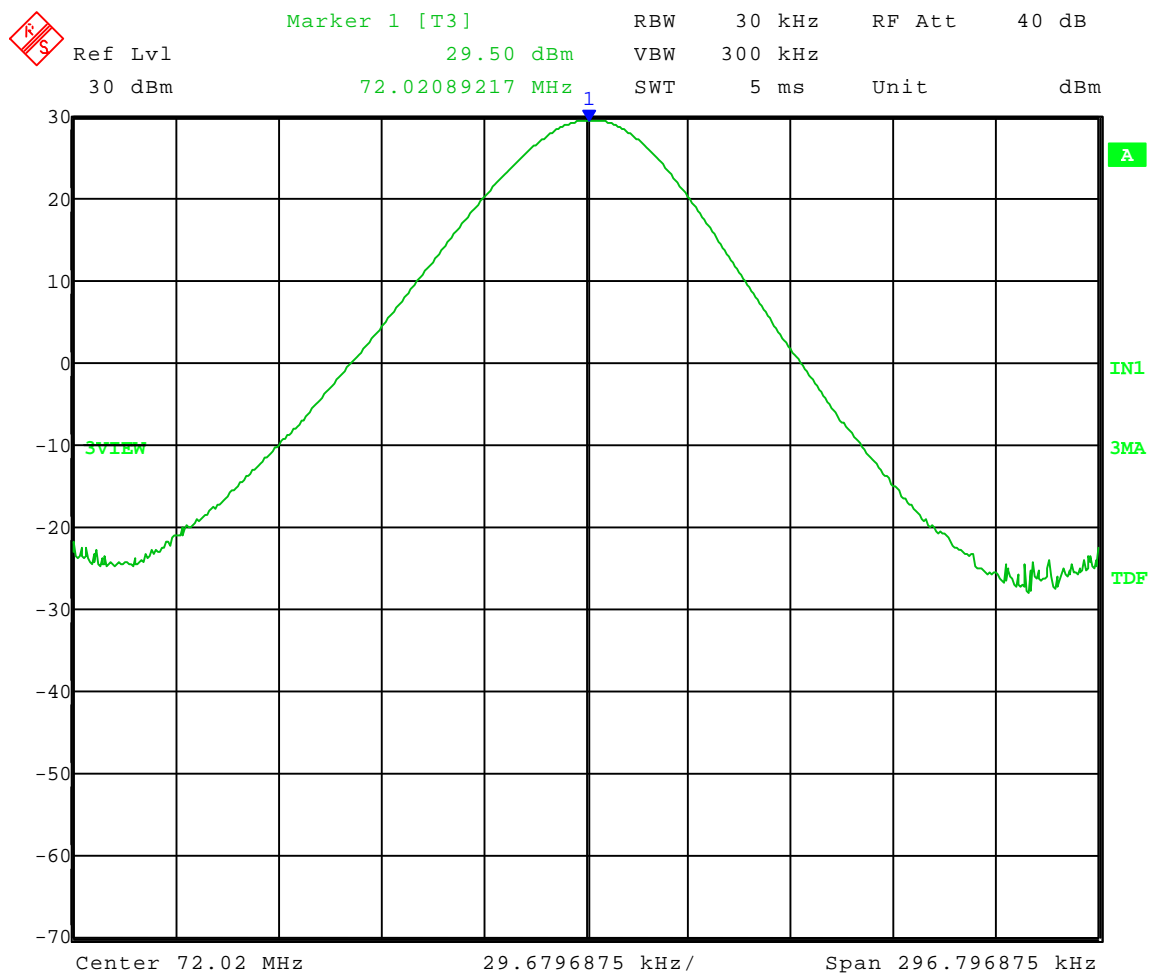
Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 05-19-2009  
Company: King-Fisher Company, inc.  
EUT: STAR LB  
Test: Peak Power Output - Conducted  
Rule part: FCC Part 90.241; FCC Part 2.1046  
Operator: Craig B  
Comment: Channel: 72.02 MHz  
Unmodulated

Peak Output Power = 29.50 dBm = 891 mW



Date: 19.MAY.2009 11:40:52



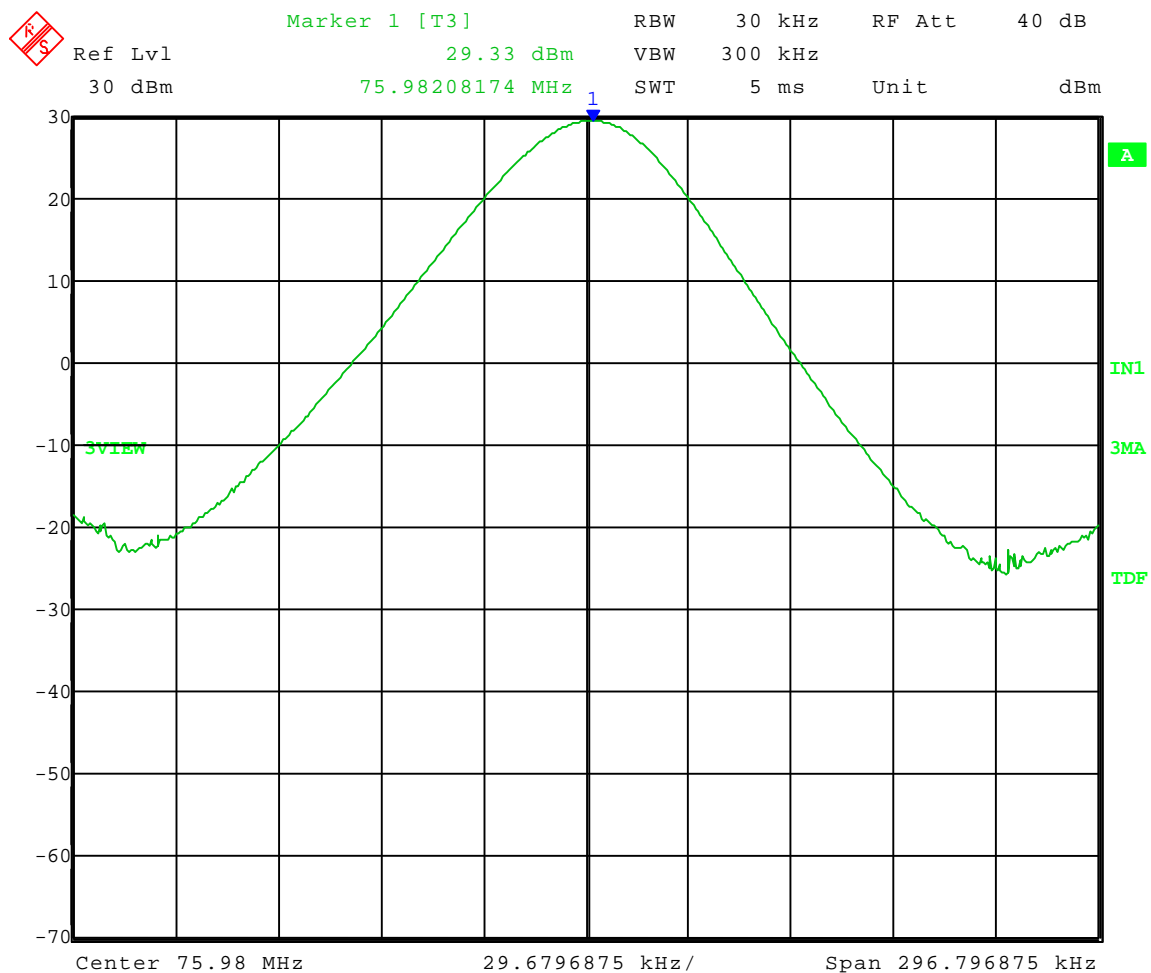
Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 05-19-2009  
Company: King-Fisher Company, inc.  
EUT: STAR LB  
Test: Peak Power Output - Conducted  
Rule part: FCC Part 90.241; FCC Part 2.1046  
Operator: Craig B  
Comment: Channel: 75.98 MHz  
Unmodulated

Peak Output Power = 29.33 dBm = 857 mW



Date: 19.MAY.2009 11:38:22



1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## APPENDIX A

### 4.0 TRANSMISSION TIMES AND DURATION – PART 90.241a-7

Each transmission must be limited to a maximum of two seconds and shall not be automatically repeated more than two times at spaced intervals within the following 30 seconds. Thereafter, the authorized cycle may not be reactivated for one minute



1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## APPENDIX A

# GRAPH(S) TAKEN SHOWING THE TRANSMISSION TIMES AND DURATION

PART 90.241a-7



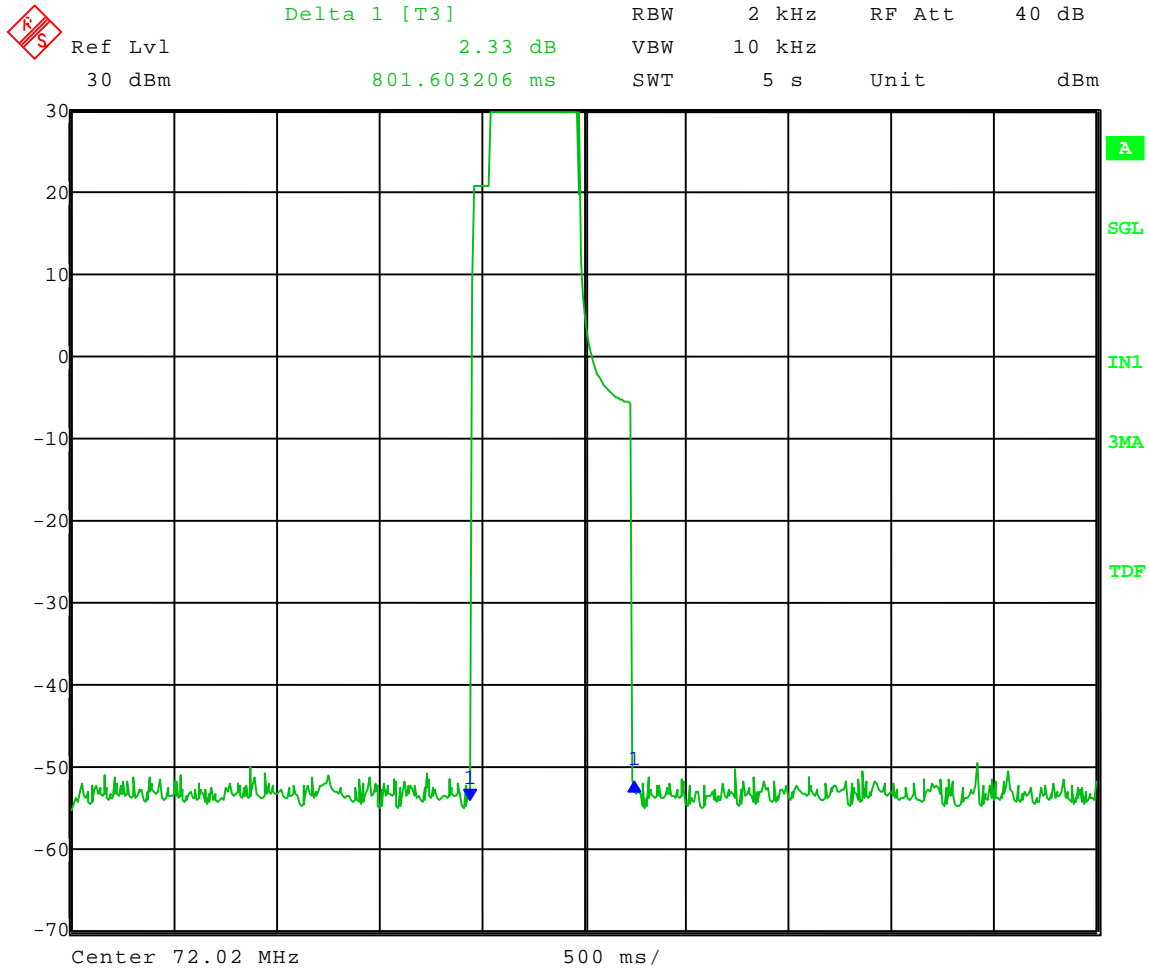
Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 05-19-2009  
Company: King-Fisher Company, inc.  
EUT: STAR LB  
Test: ON time of one transmission  
Rule Part: FCC Part 90.241(a)(7)  
Operator: Craig B  
Comment: Low Channel Transmit = 72.02 MHz

Limit = 2 seconds



Date: 19.MAY.2009 13:22:40



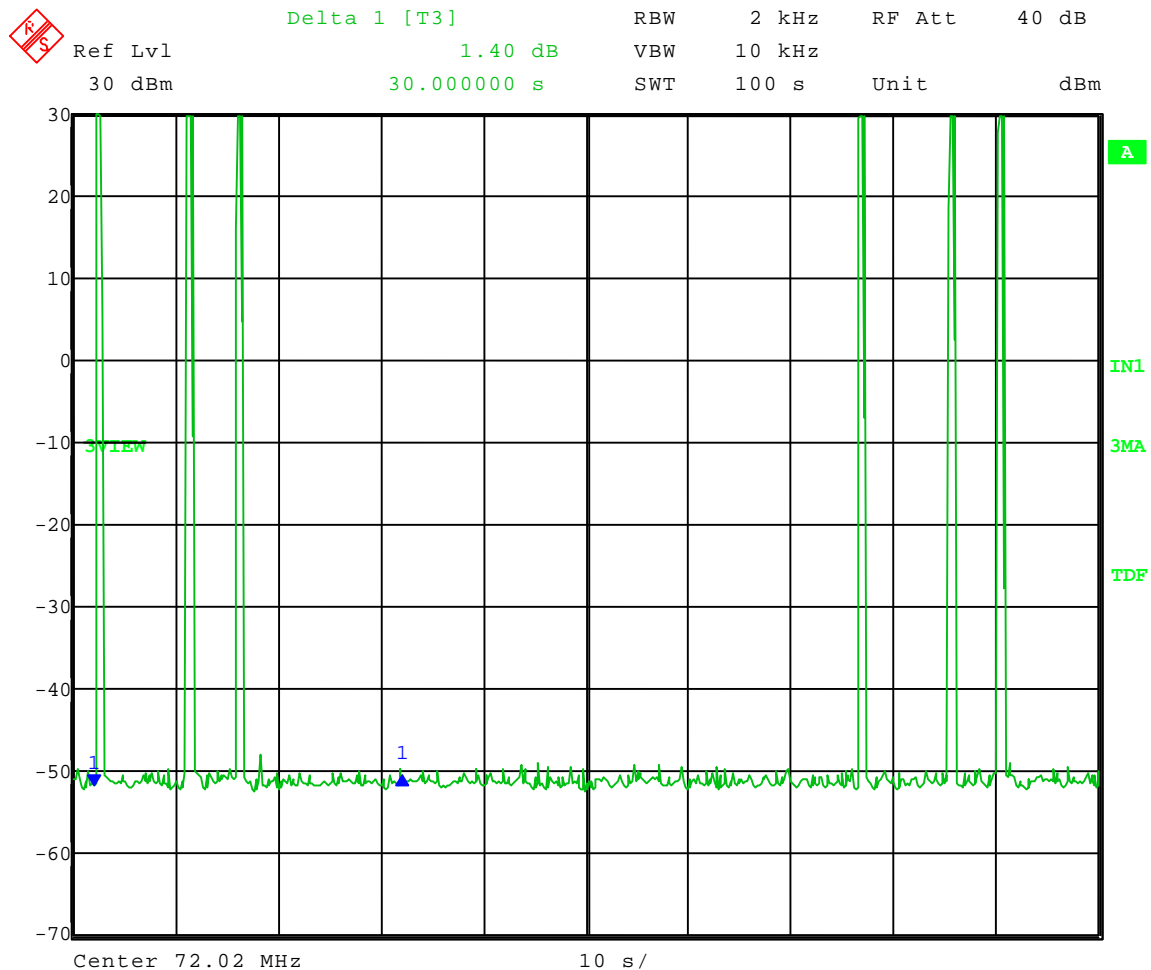
Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 05-19-2009  
Company: King-Fisher Company, inc.  
EUT: STAR LB  
Test: Repetitions within 30 second period  
Rule Part: FCC Part 90.241(a)(7)  
Operator: Craig B  
Comment: Low Channel Transmit = 72.02 MHz

Limit = 3 transmissions in 30 second period.



Date: 19.MAY.2009 13:08:09



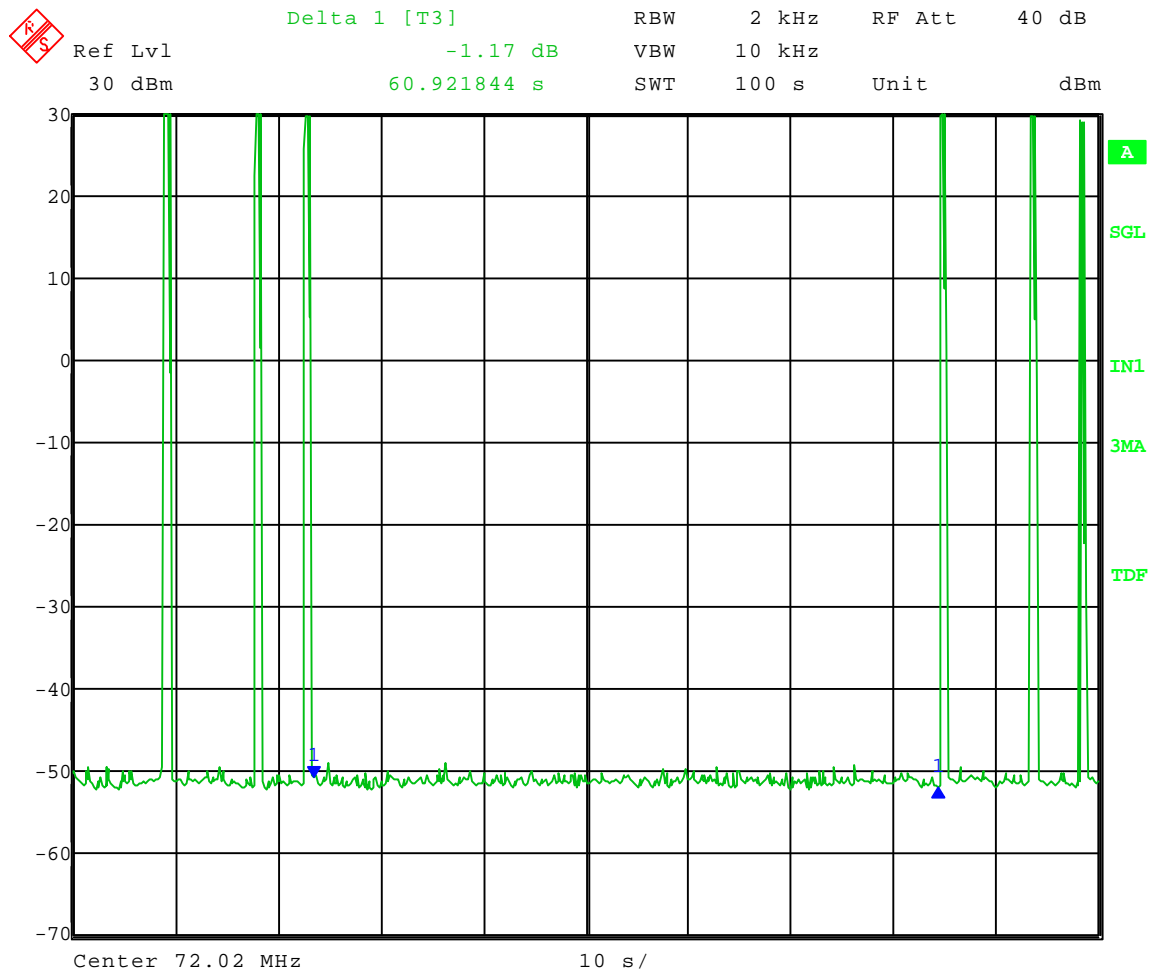
Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 05-19-2009  
Company: King-Fisher Company, inc.  
EUT: STAR LB  
Test: Minimum reactivation time  
Rule Part: FCC Part 90.241(a)(7)  
Operator: Craig B  
Comment: Low Channel Transmit = 72.02 MHz

Limit = Cycle may not be reactivated for one minute.



Date: 19.MAY.2009 13:19:41





1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## APPENDIX A

### 5.0 OCCUPIED BANDWIDTH - PART 2.1049

The occupied bandwidth is that between the lower and upper limits of the signal where the mean power is 99.0% of the total mean power and measured under the following conditions:

For radio call box operations stations operating in the bands other than those allocated for TV broadcasting, the occupied bandwidth shall not be greater than that necessary for satisfactory transmission and emissions appearing on any discrete frequency outside the authorize band shall be attenuated  $43+10 \log^{10}$  (mean output power, in watts) dB below the mean output power of the transmitting unit (device under test).



1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## APPENDIX A

DATA AND GRAPH(S) TAKEN OF THE

99% OCCUPIED BANDWIDTH

PART 2.1049



Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

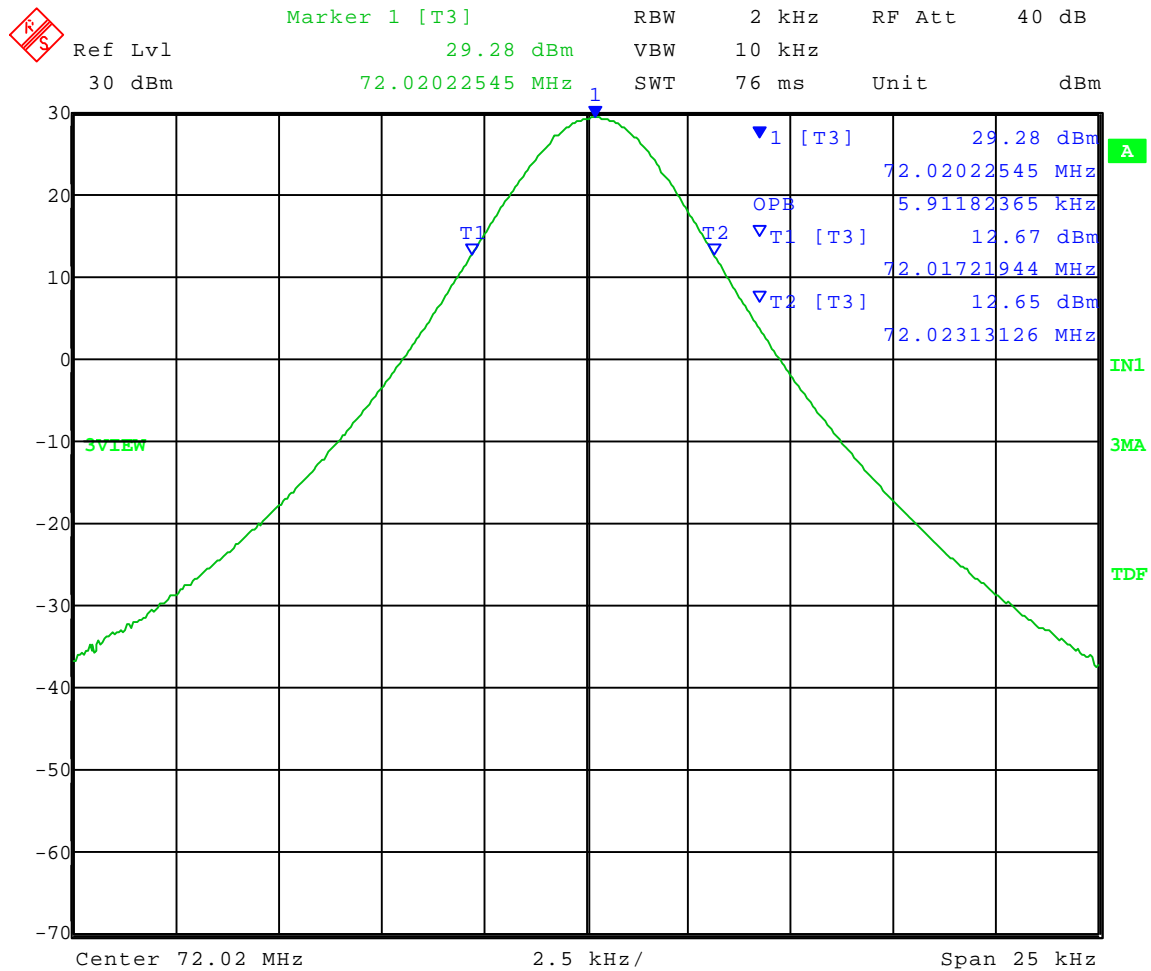
1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 05-19-2009  
Company: King-Fisher Company, inc.  
EUT: STAR LB  
Test: Occupied Bandwidth, 99% bandwidth  
Rule part: FCC Part 90.241; FCC Part 2.1049  
Operator: Craig B

Frequency: 72.02 MHz

99% power bandwidth = 5.9 kHz



Date: 19.MAY.2009 12:55:18



Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

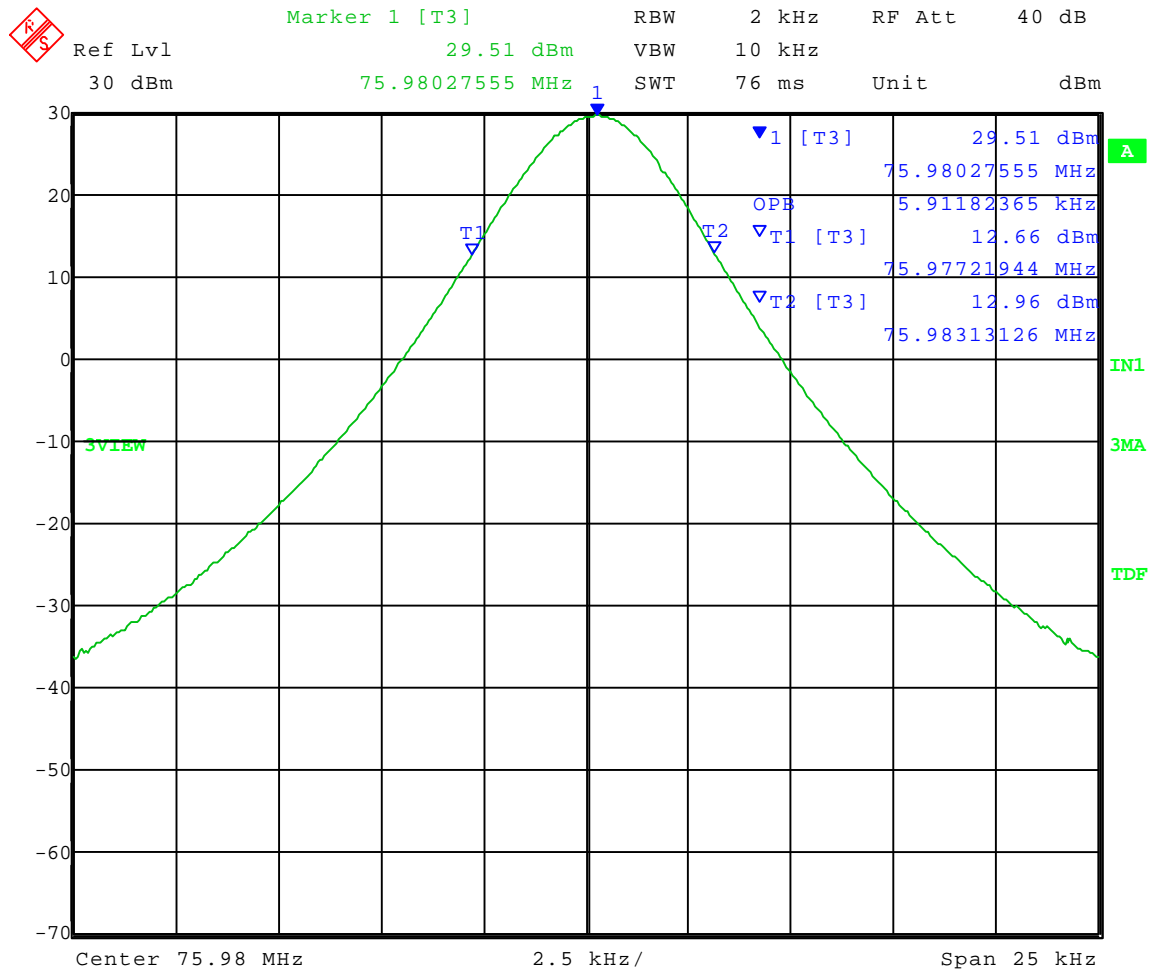
1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 05-19-2009  
Company: King-Fisher Company, inc.  
EUT: STAR LB  
Test: Occupied Bandwidth; 99% bandwidth  
Rule part: FCC Part 90.241; FCC Part 2.1049  
Operator: Craig B

Frequency: 75.98 MHz

99% power bandwidth = 5.9 kHz



Date: 19.MAY.2009 12:57:07



1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## APPENDIX A

# DATA AND GRAPH(S) TAKEN OF THE EMISSION MASK



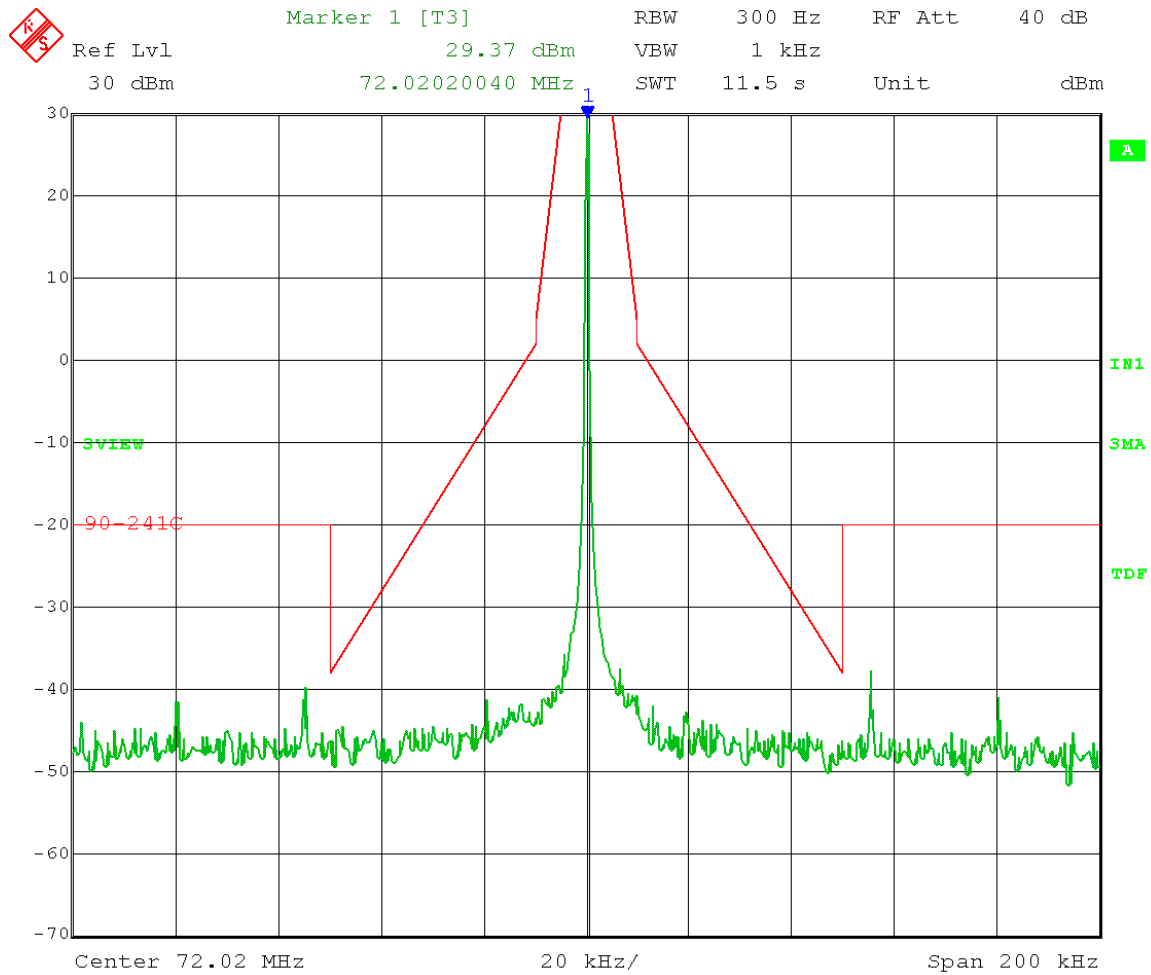
Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 05-19-2009  
Company: King-Fisher Company, inc.  
EUT: STAR LB  
Test: Emission Mask  
Rule Part: FCC Part 90.210(c)  
Operator: Craig B

Nominal Frequency: 72.02 MHz  
Unmodulated



Date: 19.MAY.2009 12:33:09



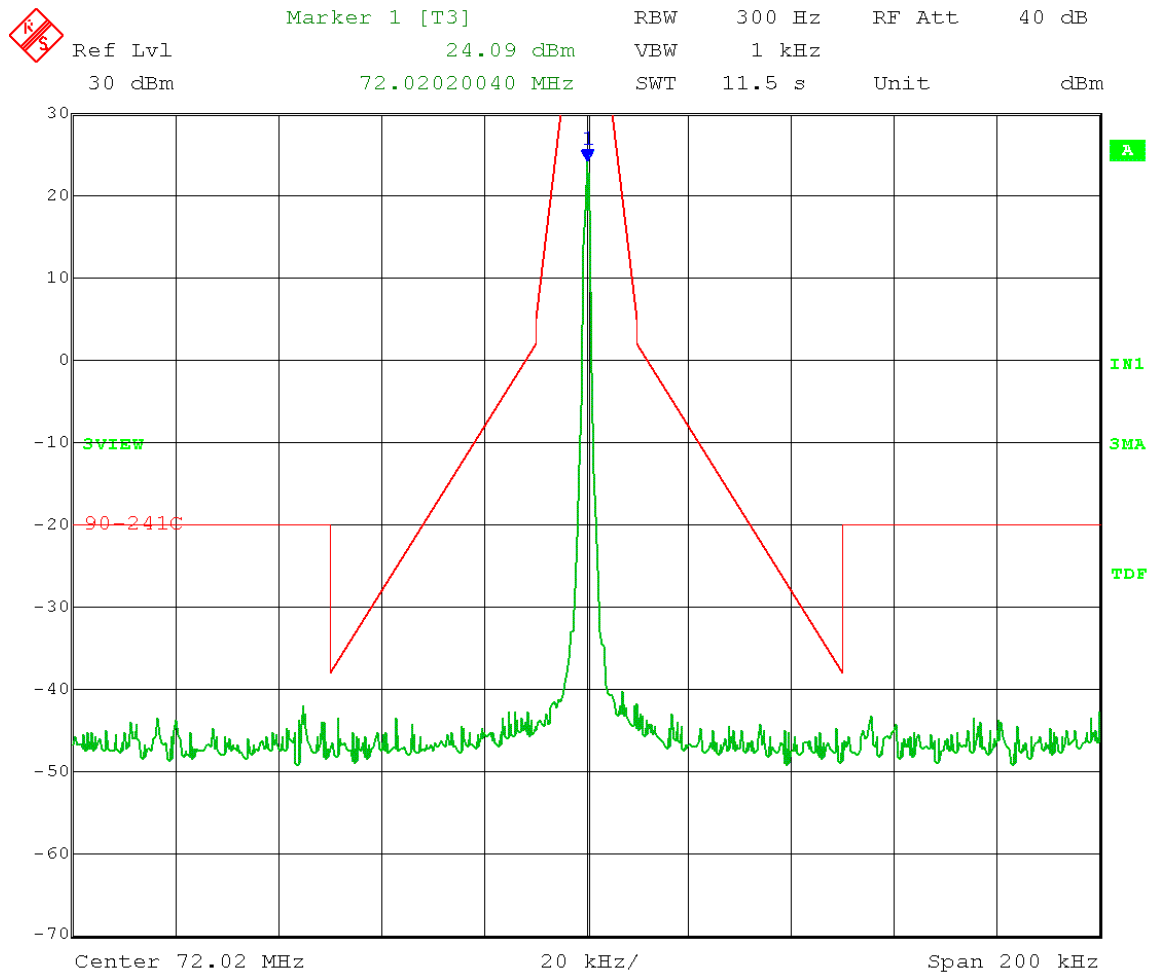
Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 05-19-2009  
Company: King-Fisher Company, inc.  
EUT: STAR LB  
Test: Emission Mask  
Rule Part: FCC Part 90.210(c)  
Operator: Craig B

Nominal Frequency: 72.02 MHz  
Modulation ON



Date: 19.MAY.2009 12:37:56



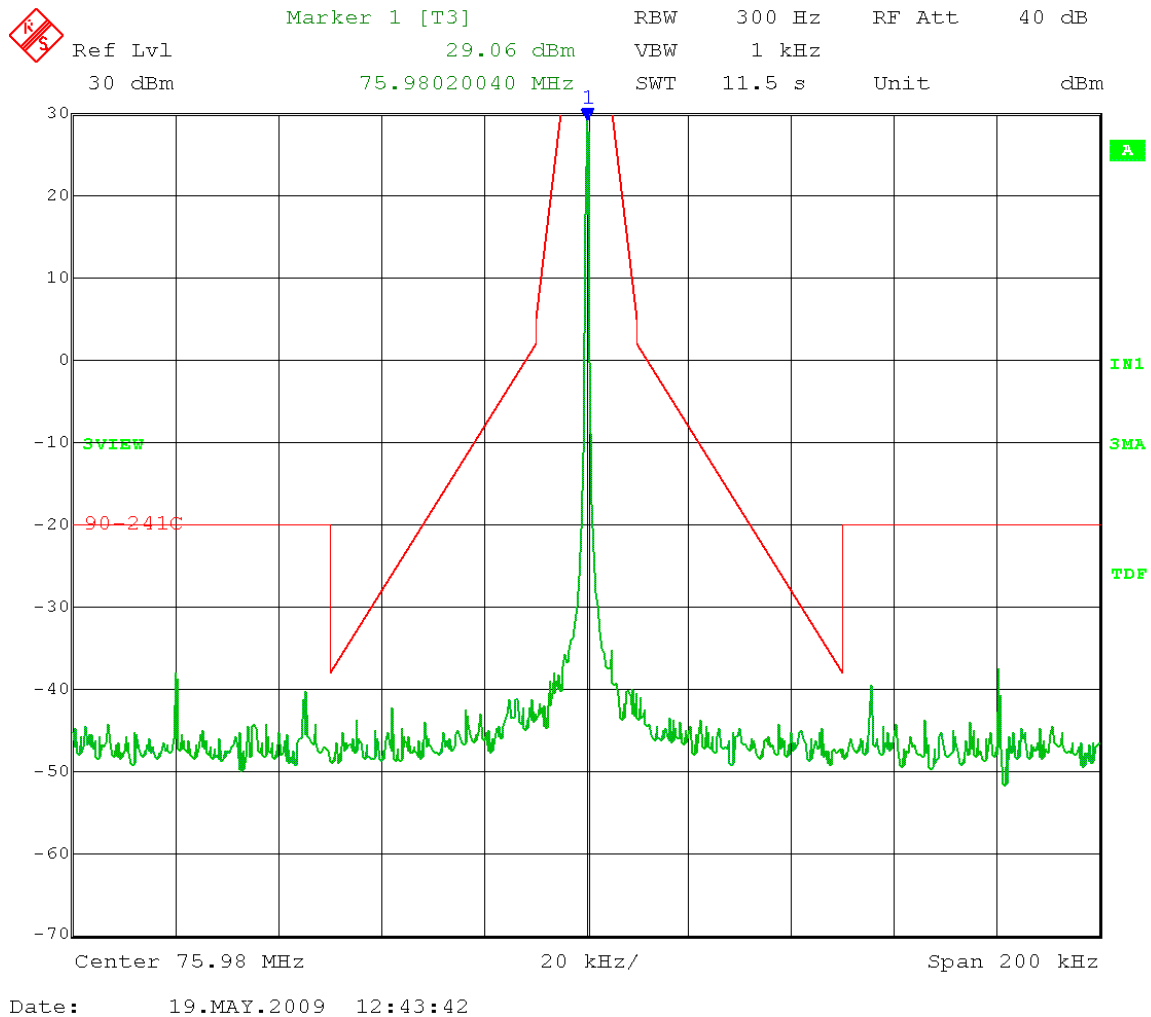
Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 05-19-2009  
Company: King-Fisher Company, inc.  
EUT: STAR LB  
Test: Emission Mask  
Rule Part: FCC Part 90.210(c)  
Operator: Craig B

Nominal Frequency: 75.98 MHz  
Unmodulated







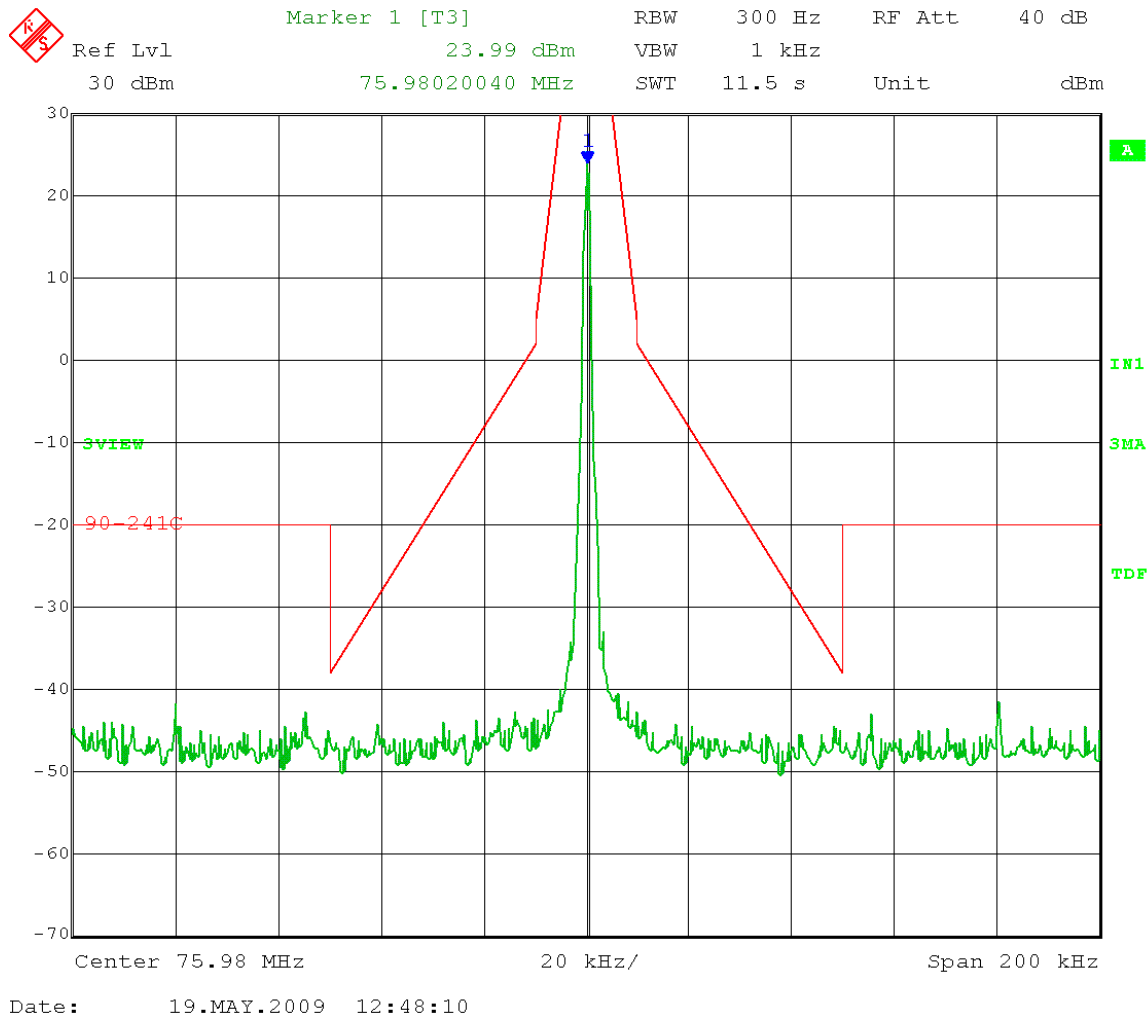
Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 05-19-2009  
Company: King-Fisher Company, inc.  
EUT: STAR LB  
Test: Emission Mask  
Rule Part: FCC Part 90.210(c)  
Operator: Craig B

Nominal Frequency: **75.98 MHz**  
Modulation ON





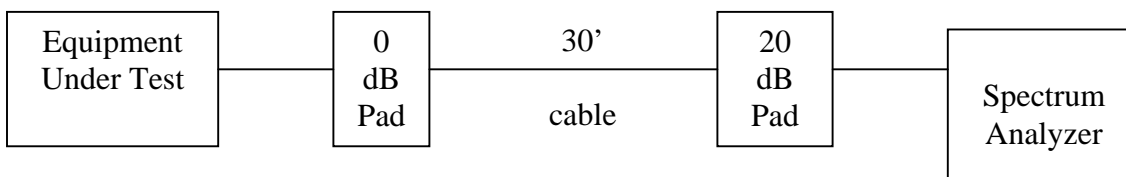
1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## APPENDIX A

### 6.0 SPURIOUS EMISSIONS AT ANTENNA TERMINALS – PART 90.210, PART 2.1051 and EIA /TIA-603-C:2004, SECTION 2.2.13

Spurious conducted emissions were measured at the antenna terminals using an artificial load. Plots were made showing the amplitude of each harmonic emission with the equipment operated as specified in 2.989. Measurements were made up to the 10<sup>th</sup> harmonic of the fundamental. The following setup was used showing placement of the attenuators:



The allowed emissions for transmitters operating in the 72 MHz - 76 MHz bands for STAR-LB equipment are found under Part 90, Section 90.210, Paragraph c for Regulations Governing Licensing in the 72 - 76 MHz Band. This paragraph states the mean power of the emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

#### Emission Mask C

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5 kHz, but not more than 10 kHz: At least  $83 \log(f_d/5)$  dB;
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least  $29 \log(f_d^2/11)$  dB or 50 dB, whichever is the lesser attenuation;
- (3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log(P)$  dB.

#### NOTE:

The STAR-LB uses the **Vertical Halfwave Dipole**. See the following pages for the data and graphs of the actual measurements made:



1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## APPENDIX A

# CONDUCTED EMISSION DATA & CHARTS TAKEN FOR SPURIOUS EMISSION MEASUREMENTS MADE AT THE ANTENNA TERMINALS EIA /TIA-603-C:2004, SECTION 2.2.13 90.241 & PART 2.1051

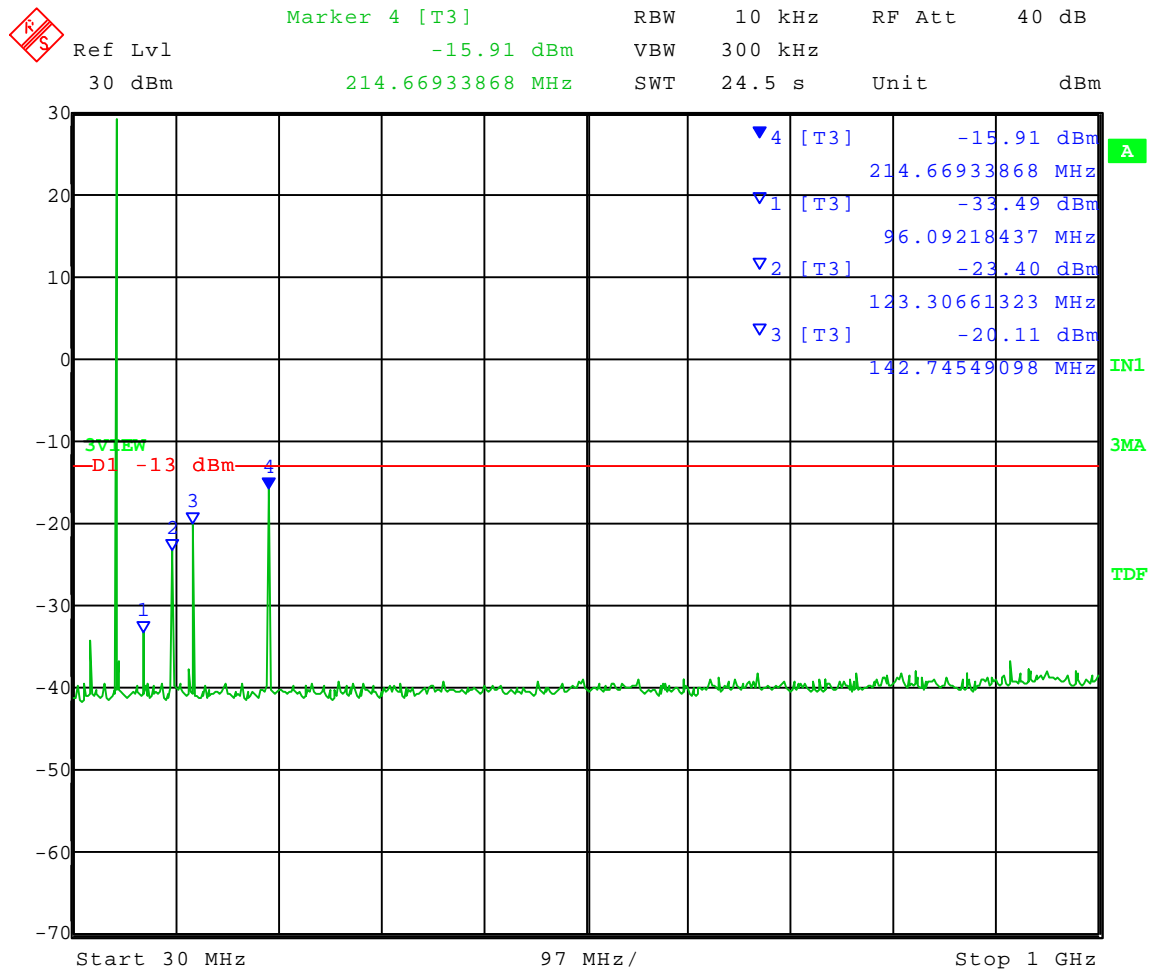


Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 05-19-2009  
Company: King-Fisher Company, inc.  
EUT: STAR LB  
Test: Spurious Emissions - Conducted  
Rule Part: FCC Part 90.210; FCC Part 2.1051  
Operator: Craig B  
Comment: Low Channel Transmit = 72.02 MHz  
Frequency Range: 30 to 1000 MHz  
Limit = -13 dBm



Date: 19.MAY.2009 11:30:17

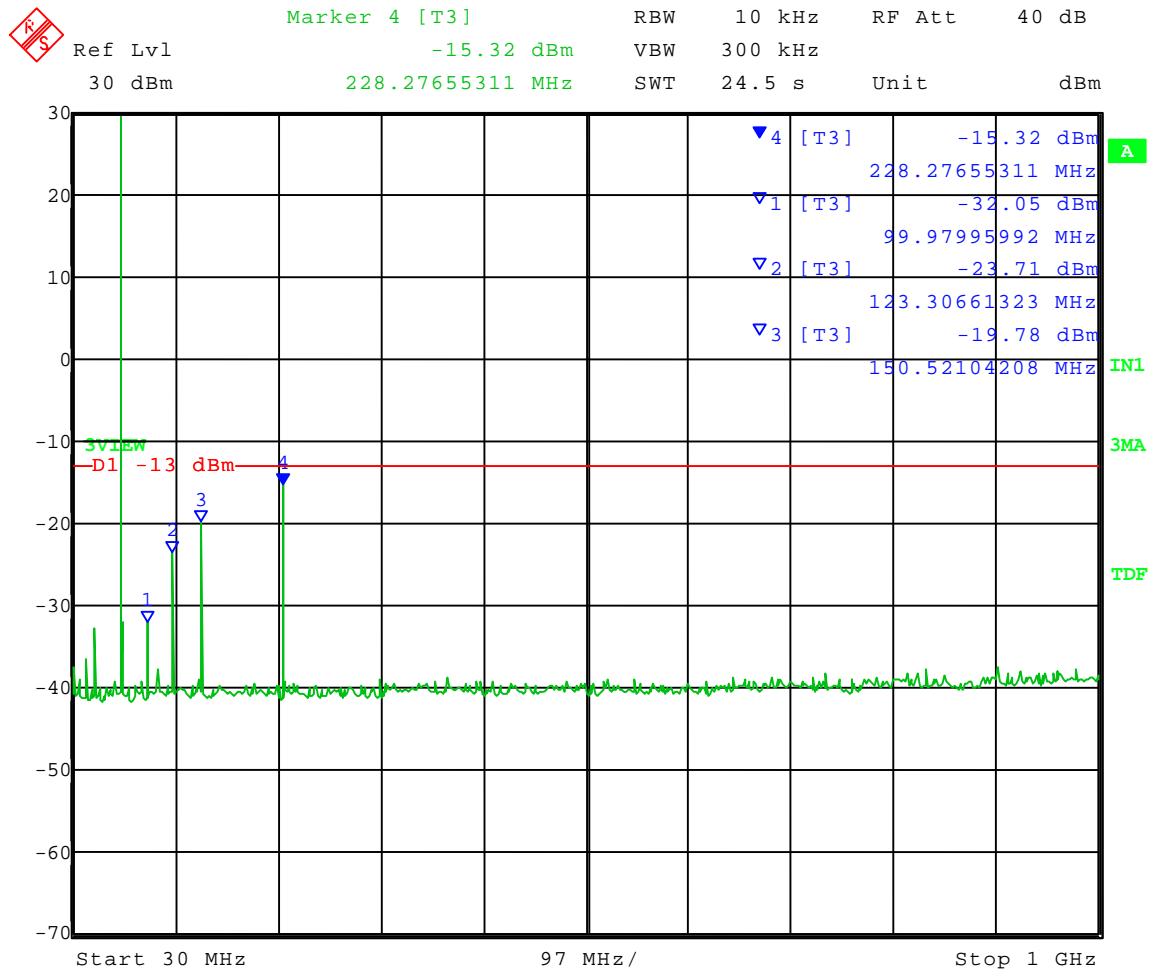


Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

Test Date: 05-19-2009  
Company: King-Fisher Company, inc.  
EUT: STAR LB  
Test: Spurious Emissions - Conducted  
Rule Part: FCC Part 90.210; FCC Part 2.1051  
Operator: Craig B  
Comment: High Channel Transmit = **75.98 MHz**  
Frequency Range: 30 to 1000 MHz  
Limit = -13 dBm



Date: 19.MAY.2009 11:35:04



1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## APPENDIX A

### 7.0 FIELD STRENGTH OF FUNDAMENTAL AND SPURIOUS EMISSION MEASUREMENTS – PART 2.1053 and EIA /TIA-603-C:2004, SECTION 2.2.12

Radiated measurements were performed scanning the frequency range from 30 MHz to at least the 10<sup>th</sup> harmonic of the fundamental frequency.

For the STAR-LB, the highest fundamental frequency is 75.98 so the scans were made up to 40 GHz, to cover the tenth harmonic.

All signals in the frequency range of 30 MHz to 200 MHz were measured with a Biconical Antenna and from 200 MHz to 1000 MHz a Log Periodic Antenna was used as the pickup devices. The cables and equipment were placed and moved within the range of positions likely to find their maximum emissions. Tests were made in both the horizontal and vertical planes of polarization.

The allowed emissions for transmitters operating in the 72 MHz - 76 MHz bands for STAR-LB equipment are found under Part 90, Section 90.210, Paragraph c for Regulations Governing Licensing in the 72 - 76 MHz Band. This paragraph states the mean power of the emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

#### Emission Mask C

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5 kHz, but not more than 10 kHz: At least  $83 \log(f_d/5)$  dB;
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least  $29 \log(f_d^2/11)$  dB or 50 dB, whichever is the lesser attenuation;
- (3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log(P)$  dB.



1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## APPENDIX A

# RADIATED EMISSION DATA AND GRAPH(S)

## TAKEN FOR SPURIOUS EMISSION

## MEASUREMENTS

## USING THE SUBSTITUTION METHOD

## EIA /TIA-603-C:2004, SECTION 2.2.12

## PART 2.1053



Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

DLS Electronic Systems, Inc.

Company: King Fisher Company Inc.  
Operator: Adam A  
Date of test: 5-21-2009  
Temperature: 68 deg. F  
Humidity: 45% R.H.  
Rule Part: FCC Part 90.241; Part 2.1053

Spurious Emissions - ERP - Substitution Method

Model: <b>King Fisher Company Inc. - Star LB</b>								
Mode: <b>Tx Frequency: 72.02 MHz</b>								
Frequency and Polarization (MHz)	Max. Field Strength of EUT @ 3 meters (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [ERP] (dBm)	Limit (dBm)	Margin (dB)	Strength of emission [ERP] (nW)
125.00 vertical	51.3	-44.20	3.65	2.15	-47.9	-13	34.9	16.406
125.00 horizontal	44.3	-51.00	3.65	2.15	-54.7	-13	41.7	3.428
144.02 vertical	59.9	-35.30	3.92	2.15	-39.2	-13	26.2	119.674
144.02 horizontal	55.2	-40.80	3.92	2.15	-44.7	-13	31.7	33.729
504.14 vertical	55.6	-37.10	8.11	2.15	-45.2	-13	32.2	30.130
504.14 horizontal	59.8	-31.40	8.11	2.15	-39.5	-13	26.5	111.944

EIRP = Signal generator output - cable loss + antenna gain

ERP<sub>(ref. to ½λ dipole)</sub> = Signal generator output - cable loss + antenna gain - 2.15





Company: King-Fisher Company, inc  
 Model Tested: 99952-LB  
 Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

DLS Electronic Systems, Inc.

Company: King Fisher Company Inc.  
 Operator: Adam A  
 Date of test: 5-21-2009  
 Temperature: 68 deg. F Humidity: 45% R.H.  
 Rule Part: FCC Part 90.241; Part 2.1053

Spurious Emissions - ERP - Substitution Method

Model: <b>King Fisher Company inc. - Star</b>								
Mode: <b>Tx Frequency: 75.98 MHz</b>								
Frequency and Polarization (MHz)	Max. Field Strength of EUT @ 3 meters (dBuV/m)	Output of Signal Generator when field strength equals that of EUT (dBm)	Correction factor for cable between Signal Gen. and subst. antenna (dB)	Gain of subst. antenna (dBi)	Strength of emission [ERP] (dBm)	Limit (dBm)	Margin (dB)	Strength of emission [ERP] (nW)
125.00 vertical	51.3	-44.20	3.65	2.15	-47.9	-13	34.9	16.406
125.00 horizontal	44.3	-51.00	3.65	2.15	-54.7	-13	41.7	3.428
151.92 vertical	55.2	-39.40	4.03	2.15	-43.4	-13	30.4	45.394
151.92 horizontal	55.4	-41.20	4.03	2.15	-45.2	-13	32.2	29.992
303.92 vertical	45.6	-43.20	5.99	2.15	-49.2	-13	36.2	12.050
303.92 horizontal	51.0	-43.90	5.99	2.15	-49.9	-13	36.9	10.257
531.86 vertical	55.6	-36.90	8.26	2.15	-45.2	-13	32.2	30.479
531.86 horizontal	59.4	-33.70	8.26	2.15	-42.0	-13	29.0	63.680

ERP = Signal generator output - cable loss + antenna gain

ERP<sub>(ref. to 1/2λ dipole)</sub> = Signal generator output - cable loss + antenna gain - 2.15

(Ref. ITU-R SM.329-8 Annex 1[1])



1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## APPENDIX A

### 8.0 FREQUENCY STABILITY (TEMPERATURE)– PART 2.1055(a1)

The frequency stability was measured from  $-40^{\circ}$  to  $+60^{\circ}$  centigrade at intervals of  $10^{\circ}$  centigrade throughout the range. Prior to each frequency measurement, the equipment was left alone for a sufficient period of time (approximately 30 minutes or more) to allow the components of the STAR-LB oscillator circuitry to stabilize.

See the following page for the data taken during testing.

### 9.0 FREQUENCY STABILITY (VOLTAGE VARIATION)– PART 2.1055(d2)

The frequency stability of STAR-LB was measured by reducing the primary supply voltage to the battery end point specified by the manufacturer.

See the following page for the data taken during testing.



1250 Peterson Dr., Wheeling, IL 60090

Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

## APPENDIX A

# DATA TAKEN FOR FREQUENCY STABILITY WHEN VARYING THE TEMPERATURE AND PRIMARY SUPPLY VOLTAGE VARIATION PART 2.1055a(1) & PART 2.1055d(d2)



Company: King-Fisher Company, inc  
Model Tested: 99952-LB  
Report Number: 15407

1250 Peterson Dr., Wheeling, IL 60090

DLS Electronic Systems, Inc.

Company: King-Fisher Company, inc.  
Operator: Craig B  
Date of test: 05-10-2009; 05-21-2009

Limit = 3.6 kHz (0.005% of 72 MHz)

Frequency Stability FCC Part 90.241; FCC Part 2.1055

Model	Nominal Frequency (MHz)	Measured Frequency									
		+60 deg. C	Error (kHz)	+50 deg. C	Error (kHz)	+40 deg. C	Error (kHz)	+30 deg. C	Error (kHz)	+20 deg. C	Error (kHz)
STAR LB	72.020	72.019970	-0.030	72.019985	-0.015	72.019990	-0.010	72.019955	-0.045	72.020000	0.000
STAR LB	75.980	75.979960	-0.040	75.980000	0.000	75.980000	0.000	75.979945	-0.055	75.980000	0.000

Frequency Stability FCC Part 90.241; FCC Part 2.1055

Model	Nominal Frequency (MHz)	Measured Frequency									
		+10 deg. C	Error (kHz)	0 deg. C	Error (kHz)	-10 deg. C	Error (kHz)	-20 deg. C	Error (kHz)	-30 deg. C	Error (kHz)
STAR LB	72.020	72.019925	-0.075	72.019930	-0.070	72.019915	-0.085	72.019890	-0.110	72.019880	-0.120
STAR LB	75.980	75.979925	-0.075	75.979935	-0.065	75.979915	-0.085	75.979885	-0.115	75.979875	-0.125

Frequency Stability FCC Part 90.241; FCC Part 2.1055

Model	Nominal Frequency (MHz)	Measured Frequency									
		-40 deg. C	Error (kHz)	102 V AC	Error (kHz)	138 V AC	Error (kHz)	13.8 V DC	Error (kHz)	10.2 V DC	Error (kHz)
STAR LB	72.020	72.019865	-0.135	72.020006	0.006	72.020006	0.006	72.020006	0.006	72.020006	0.006
STAR LB	75.980	75.979865	-0.135	75.980006	0.006	75.980006	0.006	75.980006	0.006	75.980006	0.006



1250 Peterson Dr., Wheeling, IL 60090

Company:	King-Fisher Company, inc
Model Tested:	99952-LB
Report Number:	15407

## 10.0 FREQUENCY STABILITY PHOTOS TAKEN DURING TESTING

