



849 NW State Road 45
Newberry, FL 32669 USA
Ph: 888.472.2424 or 352.472.5500
Fax: 352.472.2030
Email: info@timcoengr.com
Website: www.timcoengr.com

**FCC PART 15.249 AND IC RSS-210 (i8) TEST REPORT
UNLICENSED INTENTIONAL RADIATOR**

Applicant	ELK PRODUCTS, INC.
Address	3266 HIGHWAY 70 WEST HILDEBRAN NC 28637 USA
FCC ID	TMAELK-6050
IC	4353A-6050
Model Number	ELK-6050
Product Description	SMOKE DETECTOR
Date Sample Received	6/14/2013
Date Tested	6/26/2013
Tested By	JOE SCOGLIO
Approved By	JOE SCOGLIO
Report Number	1055AUT13TestReport.docx
Test Results	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

**THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.**



Testing Certificate #0955-01



TABLE OF CONTENT

GENERAL REMARKS	3
GENERAL INFORMATION	4
EMC EQUIPMENT LIST.....	5
TEST PROCEDURES.....	6
RADIATION INTERFERENCE	7
OCCUPIED BANDWIDTH	9
BAND EDGE COMPLIANCE	10
DUTY CYCLE.....	12
POWER LINE CONDUCTED INTERFERENCE	14

APPLICANT: ELK PRODUCTS, INC.
FCC ID: TMAELK-6050
IC: 4353A-6050
REPORT #: E\ELK_TMA\1055AUT13\1055AUT13TestReport.docx

GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

Summary

The device under test does:

- fulfill the general approval requirements as identified in this test report
- not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.



Certificate # 0955-01

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, Fl 32669



Authorized Signatory Name:

Joe Scoglio
Project Manager/ Test technician

Date: 6/26/2013

APPLICANT: ELK PRODUCTS, INC.
FCC ID: TMAELK-6050
IC: 4353A-6050
REPORT #: E\ELK_TMA\1055AUT13\1055AUT13TestReport.docx



GENERAL INFORMATION

DUT Specification

The test results relate only to the items tested.			
Applicable Standard	Part 15.249, RSS-210		
DUT Description	SMOKE DETECTOR		
FCC ID	TMAELK-6050		
IC	4353A-6050		
Model Number	ELK-6050		
Operating Frequency	TX: 902MHz to 928MHz	RX: Same	
No. of Channels	25		
Modulations	GFSK		
DUT Power Source	<input type="checkbox"/> 110-120Vac/50- 60Hz		
	<input type="checkbox"/> DC Power		
	<input checked="" type="checkbox"/> Battery Operated Exclusively		
Test Item	<input type="checkbox"/> Prototype	<input checked="" type="checkbox"/> Pre-Production	<input type="checkbox"/> Production
Type of Equipment	<input checked="" type="checkbox"/> Fixed	<input type="checkbox"/> Mobile	<input type="checkbox"/> Portable
Antenna Connector	FCC Rules require that the antenna connector be unique.		
Test Facility	Timco Engineering Inc. located at 849 NW State Road 45 Newberry, FL 32669 USA.		
Test Conditions	Temperature: 26°C Relative humidity: 50%		
Test Exercise	The DUT was placed in continuous transmit mode of operation.		
Modifications			

Test Supporting Equipment

Supporting Device	Manufacturer	Model / FCC ID	Serial Number
N/A			

APPLICANT: ELK PRODUCTS, INC.
 FCC ID: TMAELK-6050
 IC: 4353A-6050
 REPORT #: E\ELK_TMA\1055AUT13\1055AUT13TestReport.docx



EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	12/31/11	12/31/13
3-Meter OATS	TEI	N/A	N/A	12/31/11	12/31/13
Antenna: Passive Loop	EMC Test Systems	EMCO 6512	9706-1211	06/14/12	06/14/14
Frequency Counter	HP	5385A	2730A03025	08/17/11	08/17/13
Digital Multimeter	Fluke	77	43850817	02/22/12	02/22/14
Antenna: Active Loop	ETS-Lindgren	6502	00062529	09/23/10	09/23/13
Analyzer Open-Frame Tower Preamplifier	HP	8449B	3008A01075	07/22/09	09/15/13
Antenna: Double-Ridged Horn	Electro-Metrics	RGA-180	2319	06/19/12	06/19/14
LISN	Electro-Metrics	ANS-25/2	2604	10/28/11	10/28/13
LISN	Electro-Metrics	EM-7820	2682	02/26/13	02/26/15
DC Power Supply	HP	6264B		05/06/13	05/06/15
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/11	12/31/13
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	06/13/12	06/13/14
Temperature Chamber	Thermotron Corp.	S1.2 Mini Max	25-1420-09	07/03/12	07/03/14
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	05/09/13	05/09/15
Digital Multimeter	Fluke	77	35053830	09/09/11	09/09/13
Antenna: Biconnical	Eaton	94455-1	1096	05/10/13	05/10/15
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	10/28/11	10/28/13
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	10/28/11	10/28/13
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	10/28/11	10/28/13
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	10/28/11	10/28/13
Antenna: Log-Periodic	Eaton	96005	1243	05/31/13	05/31/15

APPLICANT: ELK PRODUCTS, INC.

FCC ID: TMAELK-6050

IC: 4353A-6050

REPORT #: E\ELK_TMA\1055AUT13\1055AUT13TestReport.docx



TEST PROCEDURES

Radiation Interference: ANSI C63.4-2003 using a spectrum analyzer, a preselector, a quasi-peak adapter, and an appropriate antenna. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz with an appropriate sweep speed and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3 MHz above 1 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The spectrum was searched to at least the tenth (10) harmonic of the fundamental.

Formula Of Conversion Factors: The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBμV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the preselector was accounted for in the spectrum analyzer meter reading.

Example:

Freq (MHz)	Meter Reading	+ ACF	+ CL = FS
33	20 dBμV	+ 10.36 dB	+ 0.5 = 30.86 dBμV/m @ 3m

Power Line Conducted Interference: The procedure used was ANSI C63.4-2003 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed. The spectrum was scanned from 0.15 to 30 MHz.

Occupied Bandwidth: A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was printed. The vertical scale is set to -10 dBm per division.

ANSI C63.4-2003 10.1 Measurement Procedures: The DUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The DUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes. Emissions attenuated more than 20 dB below the permissible value are not reported.



RADIATION INTERFERENCE

Rules Part No.: 15.249, 15.209, RSS-210

Requirements:

Frequency	Limits
Part 15.209	
9 to 490 kHz	2400/F (kHz) μ V/m @ 300 meters
490 to 1705 kHz	24000/F (kHz) μ V/m @ 30 meters
1705 kHz to 30 MHz	29.54 dB μ V/m @ 30 meters
30 – 88	40.0 dB μ V/m @ 3 meters
80 – 216	43.5 dB μ V/m @ 3 meters
216 – 960	46.0 dB μ V/m @ 3 meters
Above 960	54.0 dB μ V/m @ 3 meters
Part 15.249	
Fundamental 902 – 928 MHz	94.0 dB μ V/m @ 3 meters
Fundamental 2.4 – 2.4835 MHz	94.0 dB μ V/m @ 3 meters
Harmonics	54.0 dB μ V/m @ 3 meters

Test Data: Radiated emissions were measured from the lowest frequency generated or 9 kHz to the 10th harmonic intentional emission. Measurements in the table are peak unless noted otherwise.

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dB μ V	Ant. Polarity	Coax Loss dB	Correction Factor dB/m	Duty Cycle Factor dB	Field Strength dB μ V/m	Margin dB
903.0	903.00	72.0	V	1.95	21.88	17.4	78.43	15.57
903.0	903.00	74.3	H	1.95	21.88	17.4	80.73	13.27
903.0	1,806.00	20.4	V	2.74	30.47	17.4	36.21	17.79
903.0	1,806.00	21.9	H	2.74	30.47	17.4	37.71	16.29
903.0	2,709.00	18.2	V	3.40	32.77	17.4	36.97	17.03
903.0	2,709.00	19.8	H	3.40	32.77	17.4	38.57	15.43
903.0	3,612.00	23.2	V	4.15	33.21	17.4	43.16	10.84
903.0	3,612.00	27.7	H	4.15	33.21	17.4	47.66	6.34
903.0	4,515.00	17.5	V	4.76	34.21	17.4	39.07	14.93
903.0	4,515.00	17.6	H	4.76	34.21	17.4	39.17	14.83
903.0	5,418.00	8.8	V	5.13	34.75	17.4	31.28	22.72
903.0	5,418.00	10.9	H	5.13	34.75	17.4	33.38	20.62
903.0	6,321.00	8.3	V	5.40	35.79	17.4	32.09	21.91
903.0	6,321.00	10.3	H	5.40	35.79	17.4	34.09	19.91
903.0	8,127.00	9.2	V	6.25	36.10	17.4	34.15	19.85
903.0	8,127.00	11.3	H	6.25	36.10	17.4	36.25	17.75

APPLICANT: ELK PRODUCTS, INC.
 FCC ID: TMAELK-6050
 IC: 4353A-6050
 REPORT #: E\ELK_TMA\1055AUT13\1055AUT13TestReport.docx



Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBμV	Ant. Polarity	Coax Loss dB	Correction Factor dB/m	Duty Cycle dB	Field Strength dBμV/m	Margin dB
915.0	915.00	72.4	V	1.97	22.45	17.4	79.42	14.58
915.0	915.00	73.7	H	1.97	22.45	17.4	80.72	13.28
915.0	1,830.00	20.9	V	2.76	30.61	17.4	36.87	17.13
915.0	1,830.00	22.7	H	2.76	30.61	17.4	38.67	15.33
915.0	2,745.00	20.1	H	3.42	32.80	17.4	38.92	15.08
915.0	2,745.00	20.4	V	3.42	32.80	17.4	39.22	14.78
915.0	3,660.00	24.5	V	4.19	33.26	17.4	44.55	9.45
915.0	3,660.00	26.2	H	4.19	33.26	17.4	46.25	7.75
915.0	4,575.00	16.5	V	4.79	34.25	17.4	38.14	15.86
915.0	4,575.00	19.2	H	4.79	34.25	17.4	40.84	13.16
915.0	5,490.00	8.6	V	5.15	34.79	17.4	31.14	22.86
915.0	5,490.00	9.3	H	5.15	34.79	17.4	31.84	22.16
915.0	6,405.00	9.8	V	5.42	35.84	17.4	33.66	20.34
915.0	6,405.00	10.1	H	5.42	35.84	17.4	33.96	20.04
915.0	8,235.00	8.6	V	6.29	36.10	17.4	33.59	20.41
915.0	8,235.00	9.6	H	6.29	36.10	17.4	34.59	19.41
927.0	927.00	71.4	V	1.99	23.09	17.4	79.08	14.92
927.0	927.00	73.2	H	1.99	23.09	17.4	80.88	13.12
927.0	1,854.00	23.3	V	2.78	30.75	17.4	39.43	14.57
927.0	1,854.00	27.7	H	2.78	30.75	17.4	43.83	10.17
927.0	2,781.00	20.8	V	3.45	32.82	17.4	39.67	14.33
927.0	2,781.00	22.4	H	3.45	32.82	17.4	41.27	12.73
927.0	3,708.00	23.2	V	4.24	33.31	17.4	43.35	10.65
927.0	3,708.00	26.6	H	4.24	33.31	17.4	46.75	7.25
927.0	4,635.00	16.7	H	4.82	34.28	17.4	38.4	15.6
927.0	4,635.00	17.2	V	4.82	34.28	17.4	38.9	15.1
927.0	5,562.00	10.5	H	5.17	34.90	17.4	33.17	20.83
927.0	5,562.00	10.6	V	5.17	34.90	17.4	33.27	20.73
927.0	6,489.00	11.0	V	5.45	35.89	17.4	34.94	19.06
927.0	6,489.00	13.1	H	5.45	35.89	17.4	37.04	16.96
927.0	8,343.00	10.4	H	6.34	36.10	17.4	35.44	18.56
927.0	8,343.00	11.0	V	6.34	36.10	17.4	36.04	17.96

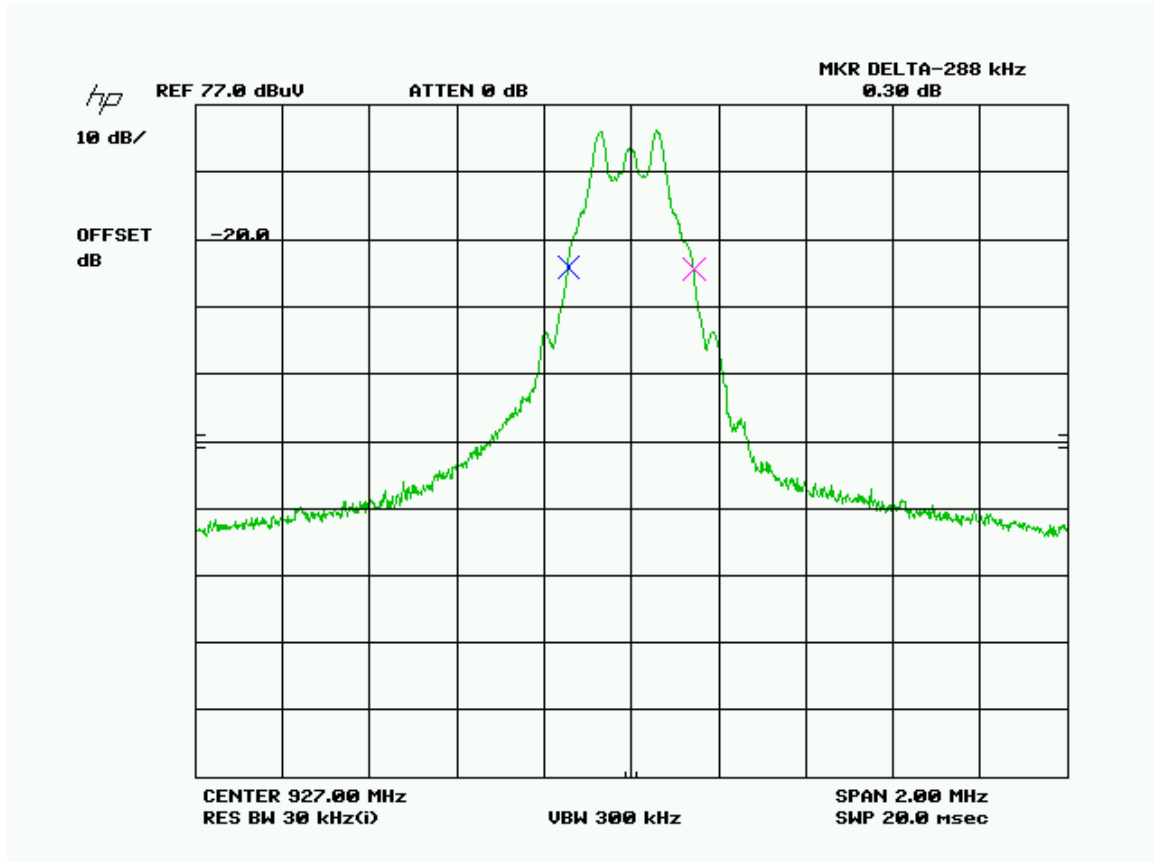
APPLICANT: ELK PRODUCTS, INC.
 FCC ID: TMAELK-6050
 IC: 4353A-6050
 REPORT #: E\ELK_TMA\1055AUT13\1055AUT13TestReport.docx

OCCUPIED BANDWIDTH

Rules Part No.: 15.249 (d), RSS-GEN

Requirements: The field strength of any emissions appearing outside the specified frequency bands, except harmonics shall be attenuated at least 50 dB below the level of the carrier or to the general limits of 15.209 whichever is the lesser.

Test Data:



APPLICANT: ELK PRODUCTS, INC.
 FCC ID: TMAELK-6050
 IC: 4353A-6050
 REPORT #: E\ELK_TMA\1055AUT13\1055AUT13TestReport.docx

BAND EDGE COMPLIANCE

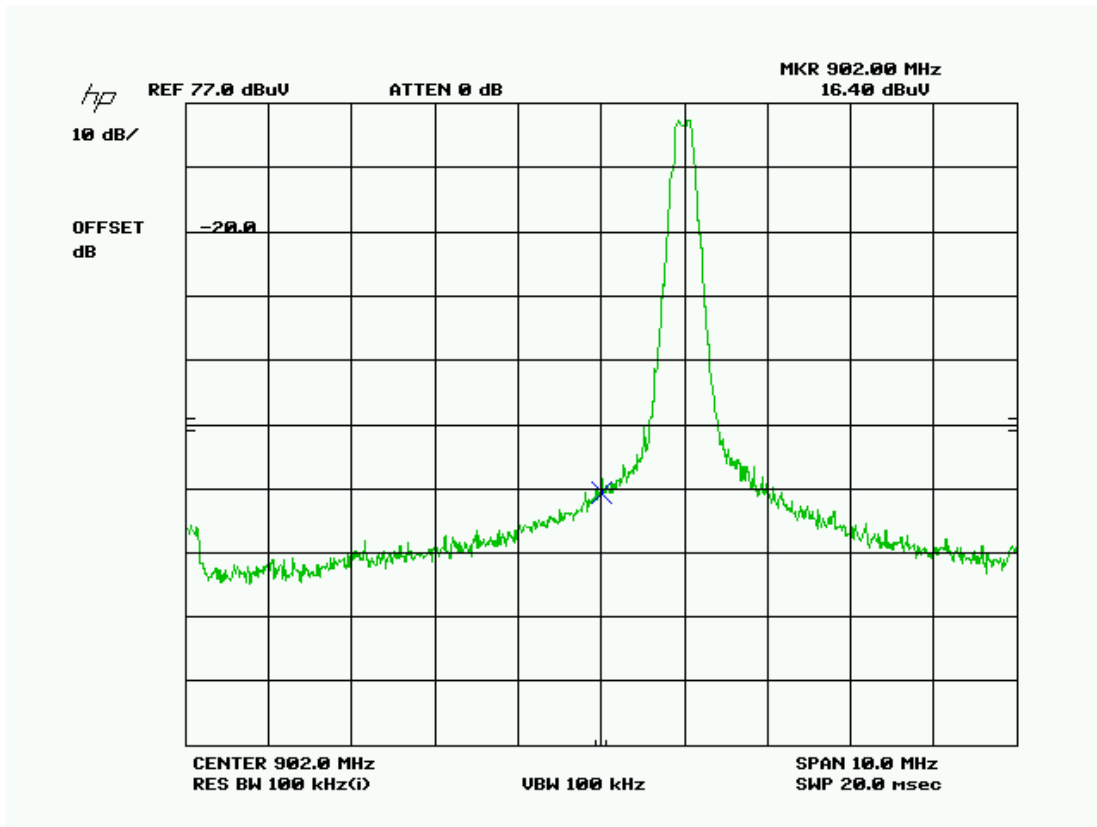
Rules Part No.: 15.249 (d), RSS-210, RSS-GEN

Requirements: 40 dBc or in the case of restricted bands 54 dB μ V/m.

Test Data:

Lower bandedge

Peak Plot



Peak Plot

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dB μ V	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Field Strength dB μ V/m
903.0	902.00	16.4	H	1.95	21.82	40.17

APPLICANT: ELK PRODUCTS, INC.

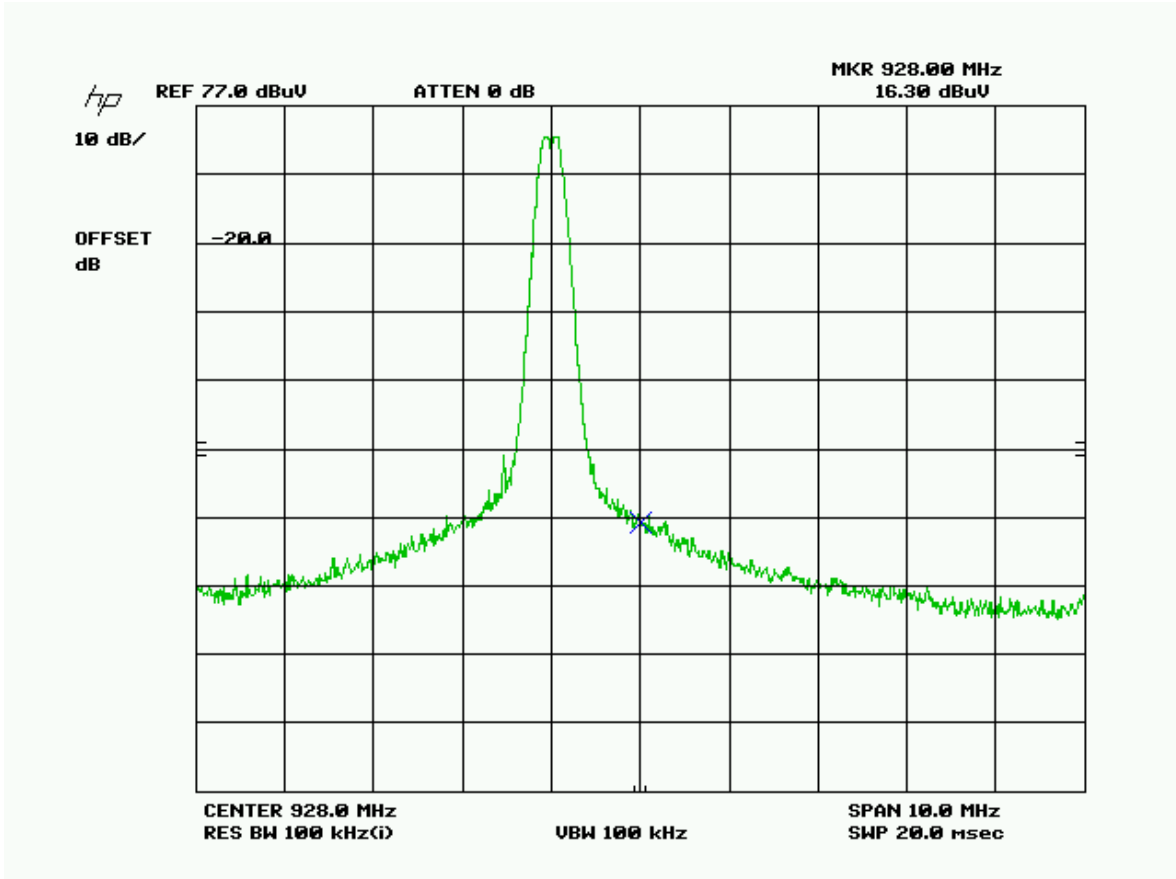
FCC ID: TMAELK-6050

IC: 4353A-6050

REPORT #: E\ELK_TMA\1055AUT13\1055AUT13TestReport.docx

Upper bandedge

Peak Plot



Peak Plot

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBμV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Field Strength dBμV/m
927.0	928.00	16.3	H	1.99	23.16	41.45

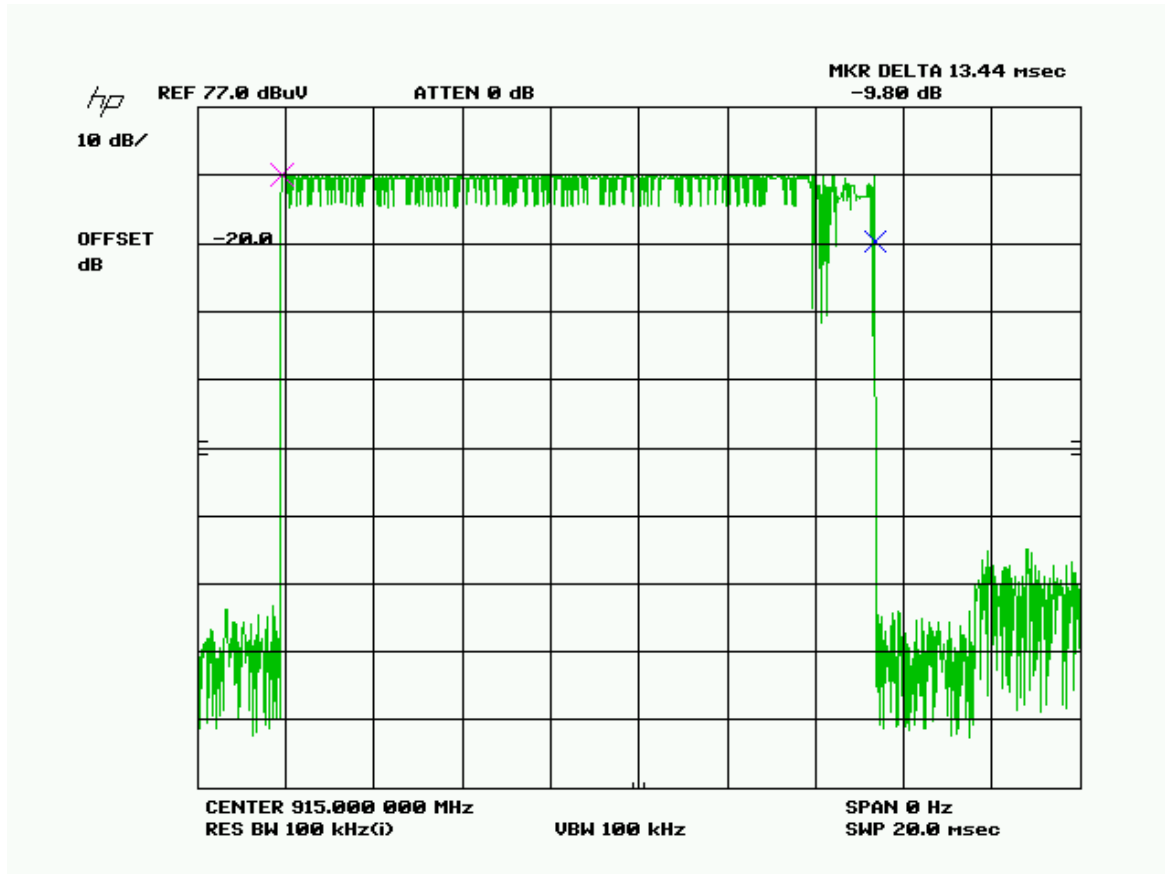
APPLICANT: ELK PRODUCTS, INC.
 FCC ID: TMAELK-6050
 IC: 4353A-6050
 REPORT #: E\ELK_TMA\1055AUT13\1055AUT13TestReport.docx

DUTY CYCLE

Total # of pulses: 1 in 100 ms

Duration of pulse: 13.44 ms maximum duration of pulse according to manufacturer.

$20 \cdot \log \left(\frac{1 \cdot 13.44}{100} \right) = 20 \cdot \log (0.1344) = 17.4 \text{ dB}$

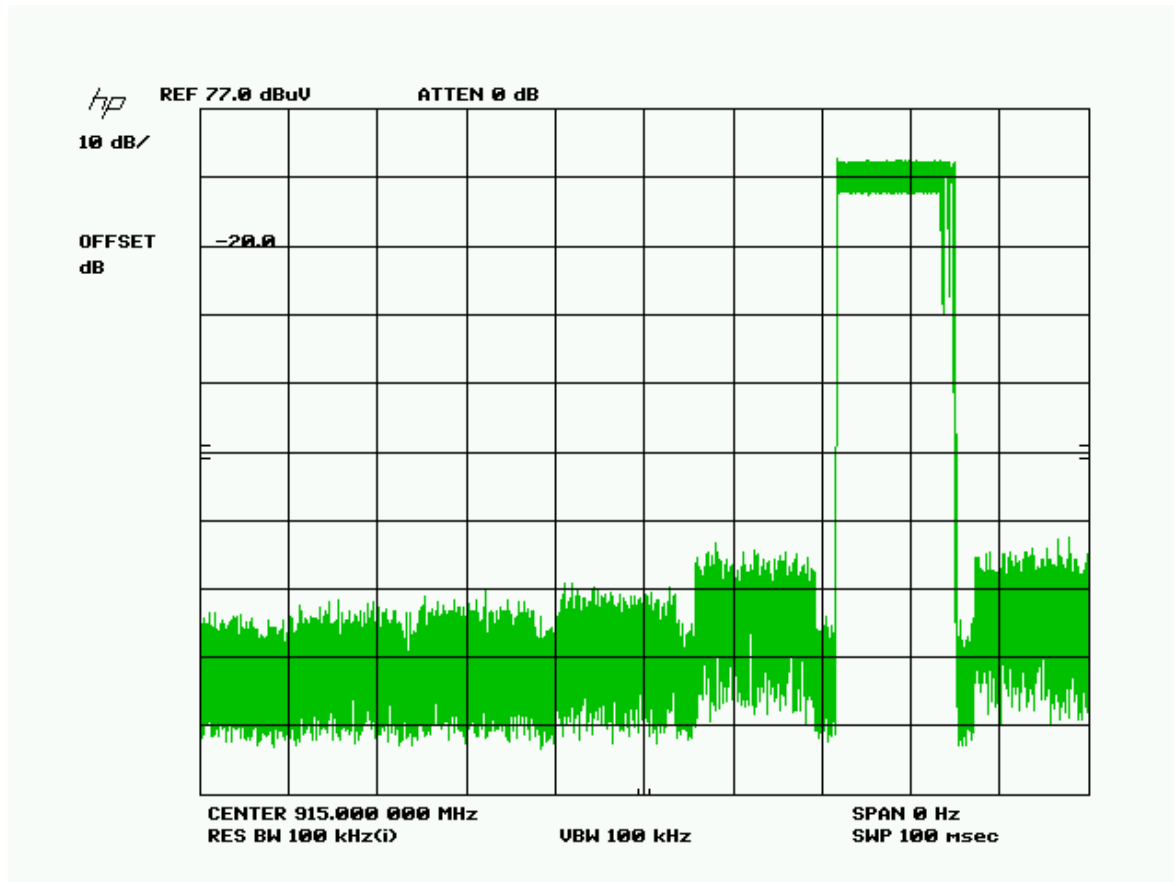


APPLICANT: ELK PRODUCTS, INC.

FCC ID: TMAELK-6050

IC: 4353A-6050

REPORT #: E\ELK_TMA\1055AUT13\1055AUT13TestReport.docx



APPLICANT: ELK PRODUCTS, INC.
 FCC ID: TMAELK-6050
 IC: 4353A-6050
 REPORT #: E\ELK_TMA\1055AUT13\1055AUT13TestReport.docx



POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: 15.207, RSS-GEN

Requirements:

Frequency (MHz)	Quasi Peak Limits (dB μ V)	Average Limits (dB μ V)
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5.0	56	46
5.0 – 30	60	50

Test Data: The attached graphs represent the emissions read for power line conducted for this device. Both lines were observed.

N/A
Battery or vehicle powered DUT.