

**FCC PART 15 SUBPART B & C  
TEST REPORT**

*for*

**LIFE SHIELD 4 BUTTON KEY FOB  
Model: SKF2**

Prepared for

**LINEAR, LLC.**  
1950 CAMINO VIDA ROBLE, SUITE 150  
CARLSBAD, CA 92008

Prepared by: \_\_\_\_\_

**MATT HARRISON**

Approved by: \_\_\_\_\_

**JEFF KLINGER**

**COMPATIBLE ELECTRONICS INC.**  
20621 PASCAL WAY  
LAKE FOREST, CALIFORNIA 92630  
(949) 587-0400

DATE: MAY 14, 2014

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
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1	Plot Map And Layout of Test Site Below 1GHz
2	Plot Map And Layout of Test Site Above 1GHz



## GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form unless done so in full with the written permission of Compatible Electronics.

This report must not be used to claim product endorsement by NVLAP, NIST, or any other agency of the U.S. Government or other governments.

Device Tested: Life Shield 4 Button Key Fob  
Model: SKF2  
S/N: N/A

Product Description: The Life Shield Key Fob is a 4 button key fob for arming and disarming a home security system.

Modifications: The EUT was not modified during testing.

Manufacturer: Linear, LLC.  
1950 Camino Vida Roble, Suite 150  
Carlsbad, CA 92008

Test Date: May 1<sup>st</sup>, 2<sup>nd</sup>, and 14<sup>th</sup>, 2014

Test Specifications: EMI requirements  
CFR Title 47, Part 15 Subpart B Sections 15.109  
CFR Title 47, Part 15 Subpart C Sections 15.205, 15.209 and 15.231

Test Procedure: ANSI C63.4  
ANSI C63.10



**SUMMARY OF TEST RESULTS**

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz - 30 MHz.	The EUT is battery powered; therefore this test was not performed.
2	Radiated RF Emissions & Harmonics, 9 kHz – 4 GHz.	Complies with the limits of CFR Title 47 Part 15 Subpart B Section 15.109 and Part 15 Subpart C Section 15.205, 15.209, and 15.231.

**SIX HIGHEST RADIATED EMISSIONS READINGS**

	Reading Type (PK / QP / AV)	Polarization (Vert / Horz)	Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Delta (dB)	Test Distance
1	AV	V	2415.00	52.84	57.26	-4.42	3-Meters
2	AV	H	345.00	72.31	77.26	-4.95	3-Meters
3	AV	H	2070.00	47.68	57.26	-9.58	3-Meters
4	AV	H	2415.00	47.54	57.26	-9.72	3-Meters
5	AV	V	2070.00	45.75	57.26	-11.51	3-Meters
6	AV	V	3105.00	41.08	57.26	-13.54	3-Meters



**1. PURPOSE**

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Life Shield 4 Button Key Fob Model: SKF2. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 and ANSI C63.10. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT (equipment under test) hereafter, are within the specification limits defined by the Code of Federal Regulations Title 47, Part 15 Subpart B sections 15.109 and Part 15 Subpart C sections 15.205, 15.209 and 15.231.



## 2. ADMINISTRATIVE DATA

### 2.1 Location of Testing

The tests described herein were performed at the test facility of Compatible Electronics, 20621 Pascal Way Lake Forest, California 92630.

### 2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

### 2.3 Cognizant Personnel

Linear, LLC.

Josh Hansen Regulatory Engineer

Compatible Electronics, Inc.

Matt Harrison Test Technician

Jeff Klinger Director of Engineering

### 2.4 Date Test Sample was Received

The test sample was received on May 1<sup>st</sup>, 2014.

### 2.5 Disposition of the Test Sample

The test sample remains at Compatible Electronics, Inc. as of the date of this test report.

### 2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network
NVLAP	National Voluntary Laboratory Accreditation Program
CFR	Code of Federal Regulations
PCB	Printed Circuit Board
TX	Transmit
RX	Receive



**3. APPLICABLE DOCUMENTS**

The following documents are referenced or used in the preparation of this Test Report.

SPEC	TITLE
CFR Title 47, Part 15	FCC Rules – Radio frequency devices (including digital devices)
ANSI C63.4 2009	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.
ANSI C63.10: 2009	American National Standard for Testing Unlicensed Wireless Devices





## 4. DESCRIPTION OF TEST CONFIGURATION

### 4.1 Description of Test Configuration

The Life Shield 4 Button Key Fob Model: SKF2 (EUT) was setup in a tabletop configuration. The EUT was powered by 1-CR2450 battery. The EUT was continuously transmitting a control signal during transmitter tests and continuously receiving during receiver tests. The EUT was checked in the X, Y, and Z axis, X axis was found to be worst case.

The CR2450 battery was replaced with a new CR2450 battery; the transmitting signal amplitude and frequency did not vary.

It was determined that the emissions were at their highest level when the EUT was transmitting in the configuration described above for Radiated Emissions. The final radiated data was taken in the above configuration. Please see Appendix E for the test data.

#### 4.1.1 Photograph Test Configuration



#### 4.1.2 Cable Construction and Termination

##### Cable 1

There were no interconnecting cables.



**5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT****5.1 EUT and Accessory List**

#	EQUIPMENT TYPE	MANU-FACTURER	MODEL	SERIAL NUMBER	FCC ID
1	Life Shield 4 Button Key Fob (EUT)	LINEAR, LLC.	SKF2	N/A	EF400119
2	BATTERY	PANASONIC	CR2450	N/A	N/A



**5.2 EMI Test Equipment**

<b>EQUIPMENT TYPE</b>	<b>MANUFACTURER</b>	<b>MODEL NUMBER</b>	<b>SERIAL NUMBER</b>	<b>CAL. DATE</b>	<b>CAL. DUE DATE</b>
Computer	Compatible Electronics	NONE	NONE	N/A	N/A
EMI Receiver	Rohde & Schwarz	ESIB40	100219	9/19/2013	9/19/2014
Antenna, Loop	Com Power	AL-130	121049	12/6/2013	12/6/2015
Antenna, CombiLog	Com Power	AC-220	25857	5/25/2013	5/25/2014
Antenna, Horn 1-18GHz	Com Power	AH-118	071250	7/3/2012	7/3/2014
Pre-Amp, 1-18GHz	Com Power	PAM-118A	551034	2/6/2014	2/6/2015
Pre-Amp, 1-18GHz	Com Power	PAM-118	443011	4/16/2014	4/16/2015
Notch Filter	Microwave Circuits	N0309153	3709-01 DC0415	5/9/2013	5/9/2014
Mast, Antenna Positioner	Sunol Science Corporation	TWR 95-4	081309-3	N/A	N/A
Antenna Mast	Sunol Science Corporation	TWR 95-4	081309-3	N/A	N/A
Turntable	Sunol Science Corporation	FM2011VS	N/A	N/A	N/A
Mast and Turntable Controller	Sunol Science Corporation	SC104V	020808-1	N/A	N/A



## 6. TEST SITE DESCRIPTION

### 6.1 Test Facility Description

Please refer to section 2.1 and the figures in Appendix D of this report for test location.

### 6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 by 0.8 meter high non-conductive table, which was placed on the ground plane.

The EUT was not grounded.

### 6.3 Facility Environmental Characteristics

When applicable refer to the data sheets in Appendix E for the relative humidity, air temperature, and barometric pressure.



## 7. CHARACTERISTICS OF THE TRANSMITTER

### 7.1 Channel Number and Frequencies

There is 1 operating channel.

1 == 345 MHz

### 7.2 Antenna

The antenna is made up of an integrated PCB antenna which is located on the PCB.



## 8. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

### 8.1 RF Emissions

#### 8.1.1 Conducted Emissions Test

*(This test was not performed)*

The EMI receiver was used as a measuring meter. A quasi-peak and/or average reading was taken only where indicated in the data sheets. The LISN output was measured using the EMI receiver. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for this test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding, and grounding of the EUT. The EUT received its power through the LISN, which was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI 63.4. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The conducted emissions from the EUT were maximized for operating mode as well as cable placement. The final data was collected under program control by the computer software. The final qualification data is located in Appendix E.

#### Test Results:

The EUT is battery powered; therefore this test was not performed.



### 8.1.2 Radiated Emissions (Spurious and Harmonics) Test

The EMI receiver was used as a measuring meter. The receiver was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the receiver records the highest measured reading over all the sweeps. Amplifiers were used to increase the sensitivity of the instrument. There was one Microwave Preamplifier used for frequencies above 1 GHz.

For spurious emissions the quasi-peak detector was used for frequencies below 1GHz and the average detector was used for frequencies above 1 GHz.

For the Fundamental and Harmonic emissions a duty cycle correction factor was used.

The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE (MHz)	TRANSDUCER	EFFECTIVE MEASUREMENT BANDWIDTH
.009 to .150	Active Loop Antenna	200 Hz
.150 to 30	Active Loop Antenna	9 kHz
30 to 1000	Combilog Antenna	100 kHz
1000 to 10000	Horn Antenna	1 MHz

The TDK FAC-3 shielded test chamber of Compatible Electronics, Inc. was used for radiated emissions testing. This test site is in full compliance with ANSI C63.4, EN 50147-2, and CISPR 22. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters in both vertical and horizontal polarizations (for E field radiated field strength).

#### Test Results:

The EUT complies with the limits of CFR Title 47 Part 15 Subpart B sections 15.109 and CFR Title 47 Part 15 Subpart C sections 15.205, 15.209 and 15.231.





### 8.1.3 Fundamental Field Strength

The Peak Transmit Radiated Field Strength was measured at a 3-meter test distance using the EMI Receiver to obtain the final test data. The final qualification data sheets are located in Appendix E.

#### Test Results:

The EUT complies with Part 15 Subpart C, Section 15.231.

### 8.1.4 Occupied Bandwidth

The Occupied Bandwidth measurement was made using the EMI Receiver to obtain the final test data. The final qualification data sheets are located in Appendix E.

#### Test Results:

The EUT complies with Part 15 Subpart C, Section 15.231.

### 8.1.5 Transmit Time Out

The Transmit Time Out measurement was made using the EMI Receiver to obtain the final test data. The final qualification data sheets are located in Appendix E.

#### Test Results:

The EUT complies with Part 15 Subpart C, Section 15.231.

### 8.1.6 Duty Cycle

Duty Cycle Correction Factor = -15.66dB

$$\delta(\text{dB}) = 20 \log \left[ \frac{\sum (nt_1 + mt_2 + \dots + \xi t_x)}{T} \right]$$

where

$n$  is the number of pulses of duration  $t_1$

$m$  is the number of pulses of duration  $t_2$

$\xi$  is the number of pulses of duration  $t_x$

$T$  is the period of the pulse train or 100 ms if the pulse train length is greater than 100 ms

Pulse Type 1:  $150.301 \mu\text{s} * 68 = 10.22 \text{ mS}$ ; Pulse Type 2:  $284.369 \mu\text{s} * 22 = 6.256 \text{ mS}$

$10.22 \text{ mS} + 6.256 \text{ mS} = 16.476 \text{ mS} / 100 \text{ ms} = 0.16476$

$20 \log (0.16476) = -15.66 \text{ dB}$



**9. TEST PROCEDURE DEVIATIONS**

The test procedures were not deviated from throughout all tests.

**10. CONCLUSIONS**

The Life Shield 4 Button Key Fob Model: SKF2 meets all of the relevant specification requirements defined in the Code of Federal Regulations Title 47, Part 15 Subpart B sections 15.109 and Code of Federal Regulations Title 47, Part 15 Subpart C sections 15.205, 15.209 and 15.231.



**APPENDIX A**

***LABORATORY ACCREDITATIONS AND  
RECOGNITIONS***



---

**Brea Division**  
114 Olinda Drive  
Brea, CA 92823  
(714) 579-0500

**Agoura Division**  
2337 Troutdale Drive  
Agoura, CA 91301  
(818) 597-0600

**Silverado Division**  
19121 El Toro Road  
Silverado, CA 92676  
(949) 589-0700

**Lake Forest Division**  
20621 Pascal Way  
Lake Forest, CA 92630  
(949) 587-0400

## LABORATORY ACCREDITATIONS AND RECOGNITIONS



NVLAP LAB CODES 200063-0,  
200528-0, 200527-0

For US, Canada, Australia/New Zealand, Taiwan and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025 an ISO 9002 equivalent. Please follow the link to the NIST site for each of our facilities NVLAP certificate and scope of accreditation.

### NVLAP listing links

Agoura Division - <http://ts.nist.gov/Standards/scopes/2000630.htm>

Brea Division - <http://ts.nist.gov/Standards/scopes/2005280.htm>

Silverado/Lake Forest Division - <http://ts.nist.gov/Standards/scopes/2005270.htm>



### ANSI listing

[CETCB](#)

<https://www.ansica.org/wwwversion2/outside/ALLdirectoryDetails.asp?menuID=1&prgID=3&orgID=123&status=4>



Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for EMC under the US/EU Mutual Recognition Agreement (MRA).



Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for Taiwan/BSMI under the US/APEC (Asia-Pacific Economic Cooperation) Mutual Recognition Agreement (MRA).

We are also certified/listed for IT products by the following country/agency:



### VCCI Listing, from VCCI site

[Enter "Compatible" in search form](http://www.vcci.or.jp/vcci_e/activity/registration/setsubi.html) [http://www.vcci.or.jp/vcci\\_e/activity/registration/setsubi.html](http://www.vcci.or.jp/vcci_e/activity/registration/setsubi.html)



### FCC Listing, from FCC OET site

[FCC test lab search](https://fjallfoss.fcc.gov/oetcf/eas/reports/TestFirmSearch.cfm) <https://fjallfoss.fcc.gov/oetcf/eas/reports/TestFirmSearch.cfm>



Compatible Electronics IC listing can be found at:

<http://www.ic.gc.ca/eic/site/ic1.nsf/eng/home>



**Brea Division**  
114 Olinda Drive  
Brea, CA 92823  
(714) 579-0500

**Agoura Division**  
2337 Troutdale Drive  
Agoura, CA 91301  
(818) 597-0600

**Silverado Division**  
19121 El Toro Road  
Silverado, CA 92676  
(949) 589-0700

**Lake Forest Division**  
20621 Pascal Way  
Lake Forest, CA 92630  
(949) 587-0400

**APPENDIX B**

***MODIFICATIONS TO THE EUT***



---

**Brea Division**  
114 Olinda Drive  
Brea, CA 92823  
(714) 579-0500

**Agoura Division**  
2337 Troutdale Drive  
Agoura, CA 91301  
(818) 597-0600

**Silverado Division**  
19121 El Toro Road  
Silverado, CA 92676  
(949) 589-0700

**Lake Forest Division**  
20621 Pascal Way  
Lake Forest, CA 92630  
(949) 587-0400

## MODIFICATIONS TO THE EUT

There were no modifications made to the EUT during testing.



**APPENDIX C**

***ADDITIONAL MODELS COVERED  
UNDER THIS REPORT***



---

**Brea Division**  
114 Olinda Drive  
Brea, CA 92823  
(714) 579-0500

**Agoura Division**  
2337 Troutdale Drive  
Agoura, CA 91301  
(818) 597-0600

**Silverado Division**  
19121 El Toro Road  
Silverado, CA 92676  
(949) 589-0700

**Lake Forest Division**  
20621 Pascal Way  
Lake Forest, CA 92630  
(949) 587-0400

## ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Life Shield 4 Button Key Fob  
Model: SKF2  
S/N: None

No additional models were tested.



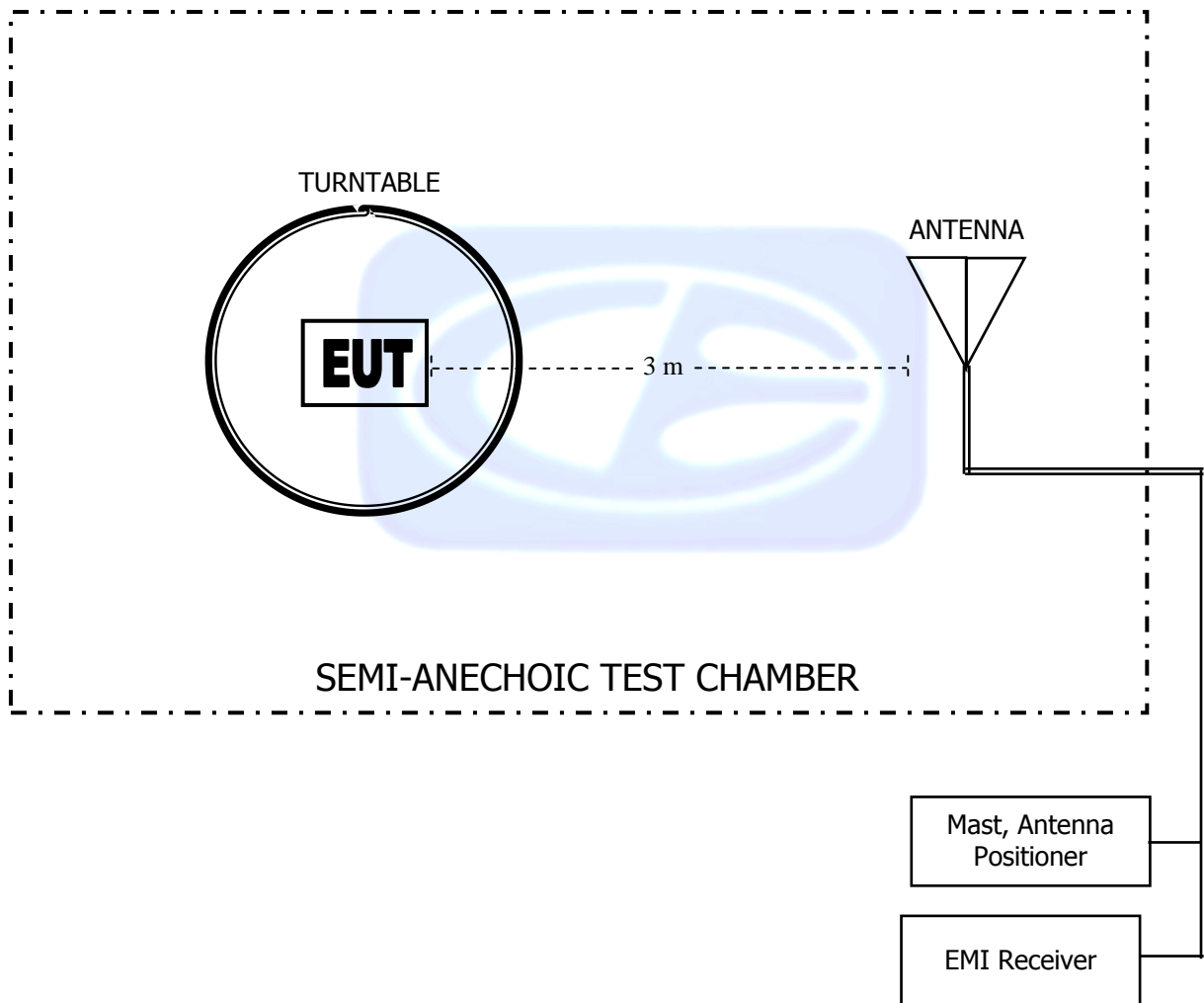


**APPENDIX D**

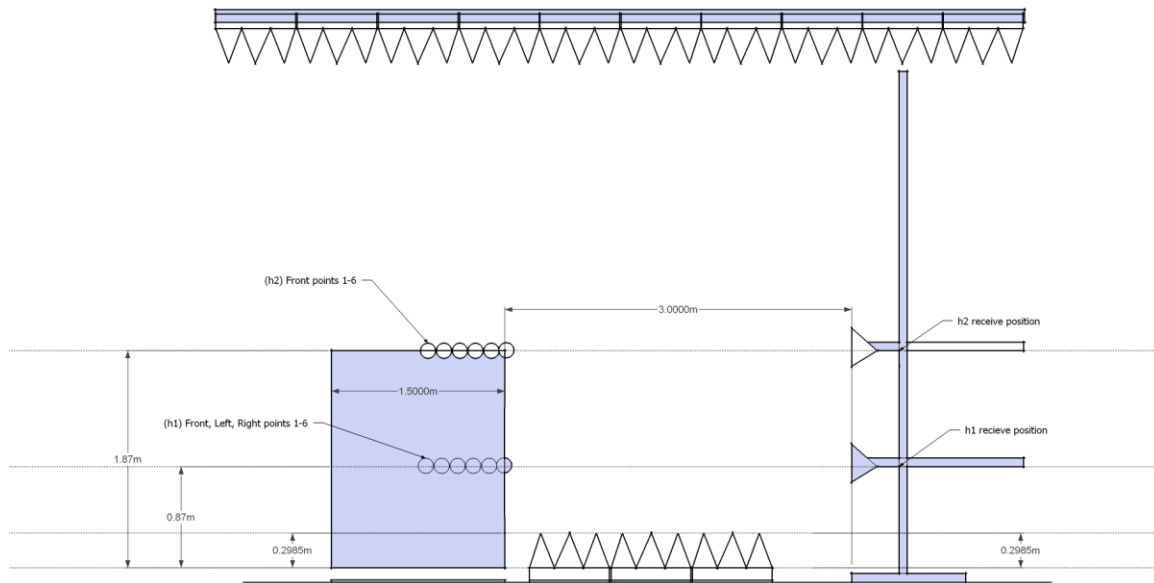
***DIAGRAMS, CHARTS, AND PHOTOS***



**FIGURE 1: PLOT MAP AND LAYOUT OF TEST SITE  
BELOW 1GHZ**



**FIGURE 2: PLOT MAP AND LAYOUT OF TEST SITE  
ABOVE 1GHZ**



**COM-POWER AL-130****LOOP ANTENNA**

S/N: 121049

**CALIBRATION DUE: DECEMBER 6, 2015**

<b>FREQUENCY (MHz)</b>	<b>MAGNETIC (dB/m)</b>	<b>ELECTRIC (dB/m)</b>	<b>FREQUENCY (MHz)</b>	<b>MAGNETIC (dB/m)</b>	<b>ELECTRIC (dB/m)</b>
<b>0.009</b>	-34.64	16.86	<b>0.8</b>	-36.32	15.18
<b>0.01</b>	-34.78	16.72	<b>0.9</b>	-36.22	15.28
<b>0.02</b>	-35.91	15.59	<b>1.0</b>	-36.22	15.28
<b>0.03</b>	-35.48	16.02	<b>2.0</b>	-35.91	15.59
<b>0.04</b>	-35.82	15.68	<b>3.0</b>	-35.91	15.59
<b>0.05</b>	-36.49	15.01	<b>4.0</b>	-36.01	15.49
<b>0.06</b>	-36.30	15.20	<b>5.0</b>	-35.80	15.70
<b>0.07</b>	-36.43	15.07	<b>6.0</b>	-36.00	15.50
<b>0.08</b>	-36.30	15.20	<b>7.0</b>	-35.90	15.60
<b>0.09</b>	-36.39	15.11	<b>8.0</b>	-35.70	15.80
<b>0.1</b>	-36.41	15.09	<b>9.0</b>	-35.70	15.80
<b>0.2</b>	-36.61	14.89	<b>10.0</b>	-35.60	15.90
<b>0.3</b>	-36.63	14.87	<b>15.0</b>	-36.52	14.98
<b>0.4</b>	-36.52	14.99	<b>20.0</b>	-35.75	15.75
<b>0.5</b>	-36.63	14.87	<b>25.0</b>	-37.78	13.72
<b>0.6</b>	-36.62	14.88	<b>30.0</b>	-38.62	12.88
<b>0.7</b>	-36.53	14.97			



**COM-POWER AC-220****LAB R - COMBILOG ANTENNA**

S/N: 25857

CALIBRATION DUE: MAY 25, 2014

<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>	<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>
<b>30</b>	17.8	<b>160</b>	8.3
<b>35</b>	18.4	<b>180</b>	9.4
<b>40</b>	19.2	<b>200</b>	9.0
<b>45</b>	17.2	<b>250</b>	12.0
<b>50</b>	17.2	<b>300</b>	13.4
<b>60</b>	13.5	<b>400</b>	15.0
<b>70</b>	8.9	<b>500</b>	17.3
<b>80</b>	6.0	<b>600</b>	17.8
<b>90</b>	7.1	<b>700</b>	20.0
<b>100</b>	8.0	<b>800</b>	20.5
<b>120</b>	9.2	<b>900</b>	20.8
<b>140</b>	7.5	<b>1000</b>	22.4



**COM-POWER AH-118****HORN ANTENNA**

S/N: 071250

**CALIBRATION DUE: JULY 3, 2014**

<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>	<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>
1000	26.5	9500	40.4
1500	27.2	10000	40.3
2000	31.5	10500	41.7
2500	31.9	11000	42.1
3000	32.7	11500	42.3
3500	34.0	12000	42.6
4000	33.5	12500	41.4
4500	34.9	13000	42.7
5000	36.2	13500	43.6
5500	36.6	14000	42.4
6000	36.8	14500	42.7
6500	37.4	15000	45.4
7000	39.4	15500	45.1
7500	39.6	16000	42.9
8000	42.4	16500	44.0
8500	40.3	17000	46.8
9000	39.6	17500	47.5
		18000	46.6



**COM-POWER PAM-118A****1-18GHz - PREAMPLIFIER**

S/N: 551034

**CALIBRATION DUE: FEBRUARY 6, 2015**

<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>	<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>
500	36.77	5500	39.82
1000	38.63	6000	38.74
1100	38.72	6500	39.60
1200	38.97	7000	35.52
1300	38.59	7500	36.61
1400	39.18	8000	36.92
1500	38.71	8500	37.13
1600	39.28	9000	36.50
1700	39.25	9500	38.92
1800	39.06	10000	38.74
1900	40.34	11000	35.23
2000	40.07	12000	35.64
2500	39.69	13000	36.73
3000	40.94	14000	36.48
3500	40.41	15000	37.57
4000	40.44	16000	38.10
4500	41.20	17000	37.34
5000	39.35	18000	36.80



**COM-POWER PAM-118****1-18GHz - PREAMPLIFIER**

S/N: 443011

CALIBRATION DUE: APRIL 16, 2015

<b>FREQUENCY (GHz)</b>	<b>FACTOR (dB)</b>	<b>FREQUENCY (GHz)</b>	<b>FACTOR (dB)</b>
0.500	27.01	7.000	23.96
1.000	25.68	7.500	24.28
1.500	26.55	8.000	24.33
2.000	26.16	8.500	24.42
2.500	27.21	9.500	25.89
3.000	26.46	10.000	27.73
3.500	26.52	11.000	28.36
4.000	27.67	12.000	27.21
4.500	26.32	13.000	27.69
5.000	26.90	14.000	25.94
5.500	26.72	15.000	24.27
6.000	26.48	16.000	27.22
6.500	27.12	17.000	26.12
		18.000	25.96







**FRONT VIEW**

LINEAR, LLC.

Life Shield 4 Button Key Fob

Model: SKF2

FCC SUBPART B & C - RADIATED EMISSIONS < 1GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**





**REAR VIEW**

LINEAR, LLC.

Life Shield 4 Button Key Fob

Model: SKF2

FCC SUBPART B & C - RADIATED EMISSIONS < 1GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**







**FRONT VIEW**

LINEAR, LLC.

Life Shield 4 Button Key Fob

Model: SKF2

FCC SUBPART B & C - RADIATED EMISSIONS > 1GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**





**REAR VIEW**

LINEAR, LLC.

Life Shield 4 Button Key Fob

Model: SKF2

FCC SUBPART B & C - RADIATED EMISSIONS > 1GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**



**APPENDIX E**

***RADIATED EMISSIONS DATA SHEETS***



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**Brea Division**  
114 Olinda Drive  
Brea, CA 92823  
(714) 579-0500

**Agoura Division**  
2337 Troutdale Drive  
Agoura, CA 91301  
(818) 597-0600

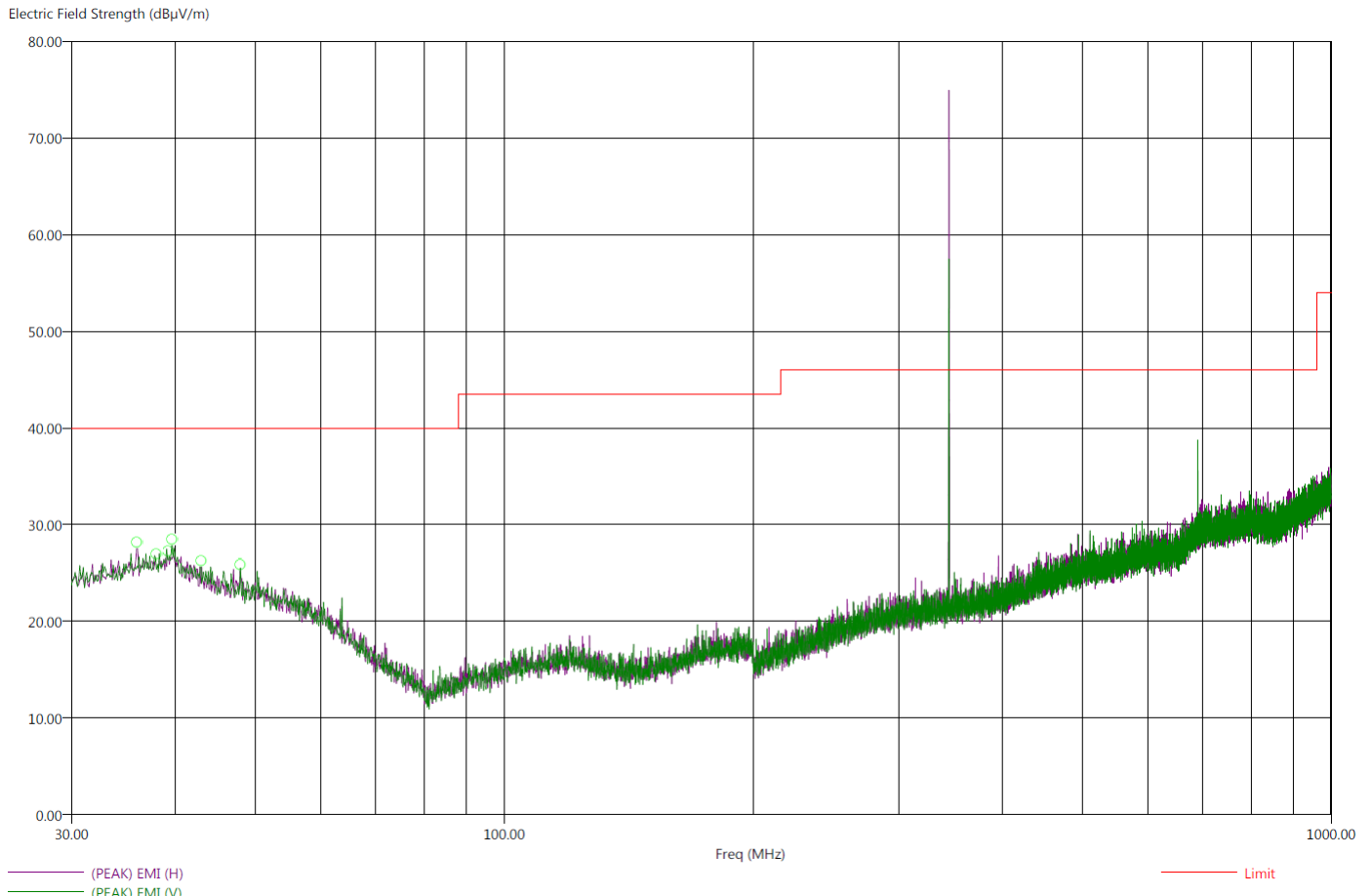
**Silverado Division**  
19121 El Toro Road  
Silverado, CA 92676  
(949) 589-0700

**Lake Forest Division**  
20621 Pascal Way  
Lake Forest, CA 92630  
(949) 587-0400

Title: FCC 15.209  
File: Radiated Pre-Scan 30-1000Mhz.set  
Operator: Matt Harrison  
EUT Type: Key Fob: SKF2.  
EUT Condition: Constantly Transmitting.  
Comments:  
Temp: 72f  
Hum: 30%  
Battery Powered

5/1/2014 9:55:07 AM  
Sequence: Preliminary Scan

Compatible Electronics, Inc. FAC-3 (Lab R)



**There were no radiated emissions other than harmonics found below 30 MHz or above 1000MHz  
There were no radiated emissions found in Receive Mode.**



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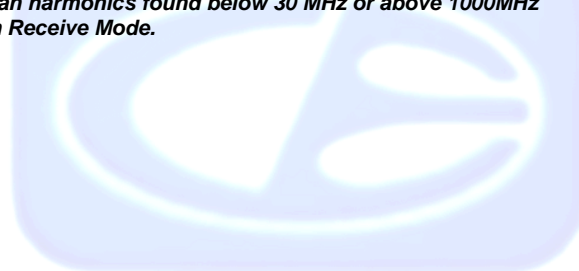
Title: FCC 15.209  
File: Radiated Final 30-1000Mhz.set  
Operator: Matt Harrison  
EUT Type: Key Fob: SKF2.  
EUT Condition: Constantly Transmitting.  
Comments:  
Temp: 72f  
Hum: 30%  
Battery Powered

5/1/2014 10:06:36 AM  
Sequence: Final Measurements

## Compatible Electronics, Inc. FAC-3 (Lab R)

Freq (MHz)	(QP) Margin (dB)	(QP) EMI (dB $\mu$ V/m)	(PEAK) EMI (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Pol	Ttbl Agl (deg)	Twr Ht (cm)	Transducer (dB)	Cable(dB)
36.00	-18.68	21.32	26.52	40.00	H	153.00	133.43	18.58	1.09
38.00	-18.19	21.81	27.19	40.00	H	87.50	224.95	18.90	1.19
39.20	-17.93	22.07	27.84	40.00	H	345.25	204.35	19.09	1.26
39.70	-17.77	22.23	28.29	40.00	V	258.00	399.94	19.15	1.28
43.00	-19.13	20.87	26.08	40.00	V	0.00	251.28	18.01	0.92
48.00	-16.07	23.93	28.08	40.00	H	39.00	399.94	17.20	0.32

*There were no radiated emissions other than harmonics found below 30 MHz or above 1000MHz  
There were no radiated emissions found in Receive Mode.*



***FUNDAMENTAL & HARMONICS  
DATA SHEETS***



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**FCC 15.231**

Linear, LLC.

Life Shield 4 Button Key Fob

Model: SKF2

Duty Cycle Correction Factor: -15.66

Date: 5/2/2014

Lab: R

Tested By: Matt Harrison

**Fundamental Field Strength**

Freq. (MHz)	Level (dB $\mu$ V)	Pol (v/h)	Limit (dB $\mu$ V)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Tower Height (m)	Comments
345	87.97	H	97.26	-9.29	Peak	100	234	X-Axis
345	72.31	H	77.26	-4.95	AVG	100	234	X-Axis
345	70.67	V	97.26	-26.59	Peak	131	326	X-Axis
345	55.01	V	77.26	-22.25	AVG	131	326	X-Axis

Test distance

3 meter



## HARMONIC EMISSIONS HORIZONTAL

**FCC 15.231**

Company: Linear, LLC

EUT: Key Fob

Model: SKF2

Duty Cycle Correction Factor: -15.66

Date: 5/1/2014

Lab: R

Test ENG: M. Harrison

### Compatible Electronics, Inc. FAC-3

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
690.00	47.52	H	77.26	-29.74	Peak	1.06	65	
690.00	31.86	H	57.26	-25.40	Avg	1.06	65	
1035.00	45.66	H	73.98	-28.32	Peak	1.00	65	
1035.00	30.00	H	53.98	-23.98	Avg	1.00	65	
1380.00	56.10	H	73.98	-17.88	Peak	1.00	285	
1380.00	40.44	H	53.98	-13.54	Avg	1.00	285	
1725.00	51.83	H	77.26	-25.43	Peak	1.25	240	
1725.00	36.17	H	57.26	-21.09	Avg	1.25	240	
2070.00	63.34	H	77.26	-13.92	Peak	1.00	185	
2070.00	47.68	H	57.26	-9.58	Avg	1.00	185	
2415.00	63.20	H	77.26	-14.06	Peak	1.00	340	
2415.00	47.54	H	57.26	-9.72	Avg	1.00	340	
2760.00	50.99	H	73.98	-22.99	Peak	1.00	210	
2760.00	35.33	H	53.98	-18.65	Avg	1.00	210	
3105.00	51.33	H	77.26	-25.93	Peak	1.00	172	
3105.00	35.67	H	57.26	-21.59	Avg	1.00	172	
3450.00	49.53	H	77.26	-27.73	Peak	1.00	205	
3450.00	33.87	H	57.26	-23.39	Avg	1.00	205	

 Test distance  
3 meter


## HARMONIC EMISSIONS VERTICAL

**FCC 15.231**

Company: Linear, LLC

EUT: Key Fob

Model: SKF2

Duty Cycle Correction Factor: -15.66

Date: 5/1/2014

Lab: R

Test ENG: M. Harrison

### Compatible Electronics, Inc. FAC-3

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
690.00	44.02	V	77.26	-33.24	Peak	1.00	166	
690.00	28.36	V	57.26	-28.90	Avg	1.00	166	
1035.00	45.84	V	73.98	-28.14	Peak	1.20	163	
1035.00	30.18	V	53.98	-23.80	Avg	1.20	163	
1380.00	51.34	V	73.98	-22.64	Peak	1.65	190	
1380.00	35.68	V	53.98	-18.30	Avg	1.65	190	
1725.00	54.25	V	77.26	-23.01	Peak	1.00	360	
1725.00	38.59	V	57.26	-18.67	Avg	1.00	360	
2070.00	61.41	V	77.26	-15.85	Peak	1.00	275	
2070.00	45.75	V	57.26	-11.51	Avg	1.00	275	
2415.00	68.50	V	77.26	-8.76	Peak	1.00	165	
2415.00	52.84	V	57.26	-4.42	Avg	1.00	165	
2760.00	54.02	V	73.98	-19.96	Peak	1.00	285	
2760.00	38.36	V	53.98	-15.62	Avg	1.00	285	
3105.00	56.74	V	77.26	-20.52	Peak	1.00	272	
3105.00	41.08	V	57.26	-16.18	Avg	1.00	272	
3450.00	54.81	V	77.26	-22.45	Peak	1.00	330	
3450.00	39.15	V	57.26	-18.11	Avg	1.00	330	

 Test distance  
3 meter


***OCCUPIED BANDWIDTH***

***DATA SHEETS***



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**Brea Division**  
114 Olinda Drive  
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(818) 597-0600

**Silverado Division**  
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(949) 589-0700

**Lake Forest Division**  
20621 Pascal Way  
Lake Forest, CA 92630  
(949) 587-0400

# OCCUPIED BANDWIDTH

FCC 15.231

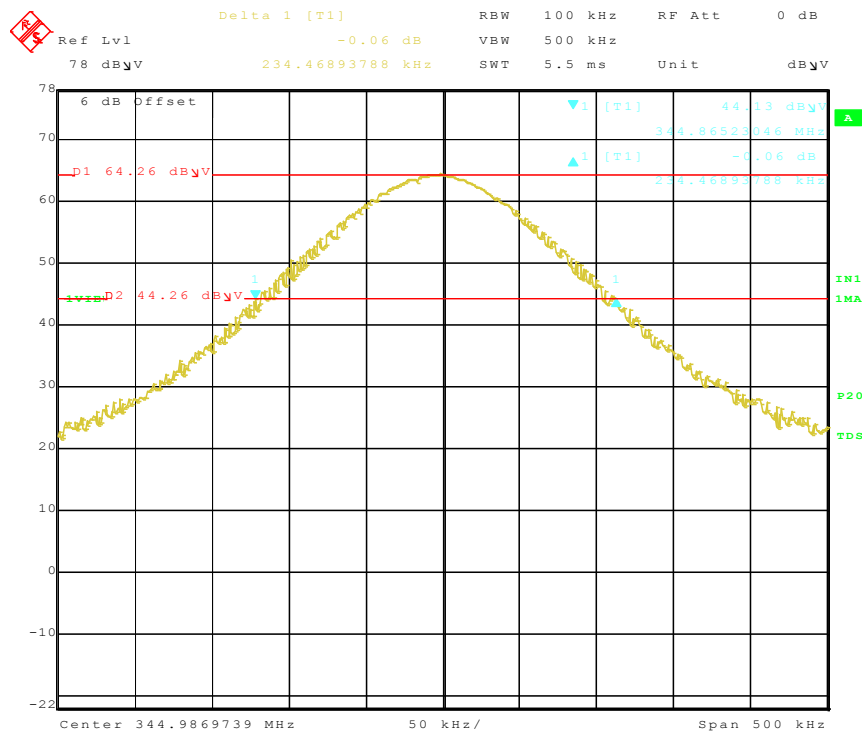
Company: Linear, LLC  
 EUT: Key Fob  
 Model: SKF2

Date: 5/2/2014  
 Lab: R  
 Test ENG: M. Harrison

## Compatible Electronics, Inc. FAC-3

FCC 20dB Occupied Bandwidth

Freq. (MHz)	Measured BW (kHz)	Limit (kHz)	Margin (kHz)	Comments
345.00	234.47	862.50	-628.03	



Title: Key Fob: KF2.  
 Comment A: 20dB Bandwidth.  
 Date: 1.MAY.2014 10:30:51



***TRANSMITTER TIME OUT***

***DATA SHEETS***



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114 Olinda Drive  
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(949) 587-0400

# TRANSMIT TIME OUT

**FCC 15.231**

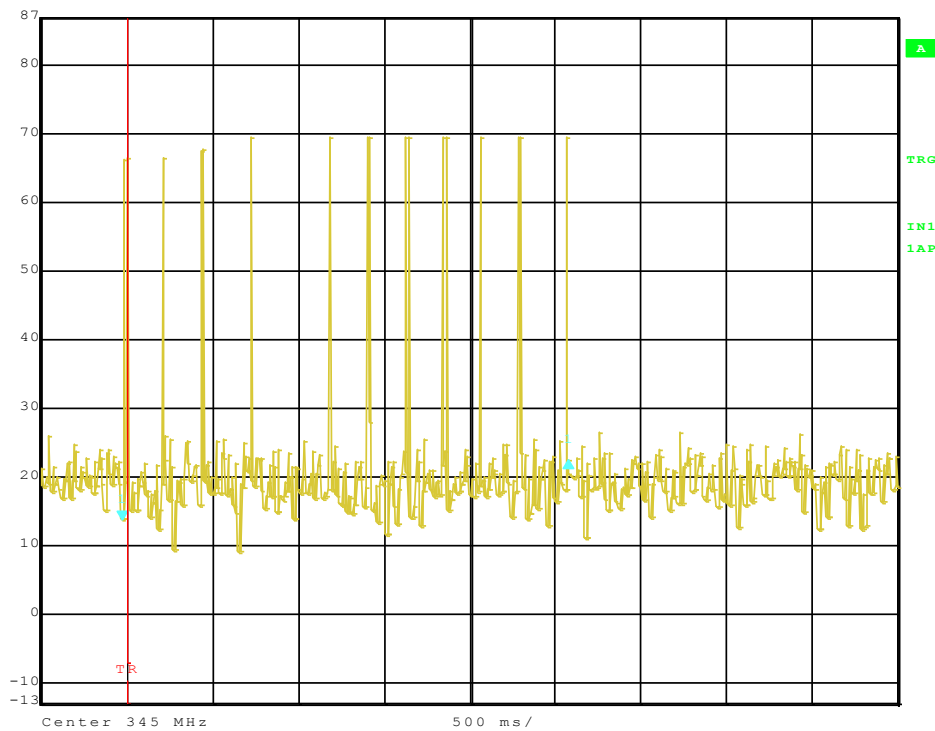
Company: Linear, LLC  
 EUT: Key Fob  
 Model: SKF2

Date: 5/14/2014  
 Lab: R  
 Test ENG: M. Harrison

**Compatible Electronics, Inc. FAC-3**

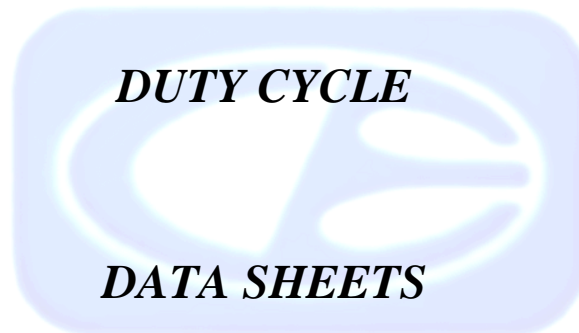
Freq. (MHz)	Measured Time (S)	Limit (S)	Margin (S)	Comments
345	2.61	5.00	-2.39	


Delta 1 [T1] RBW 1 MHz RF Att 10 dB  
 Ref Lvl 8.75 dB VBW 300 kHz  
 87 dBµV 2.605210 s SWT 5 s Unit dBµV



Title: SKF2.  
 Comment A: Max Transmit Time.  
 Date: 14.MAY.2014 16:00:20





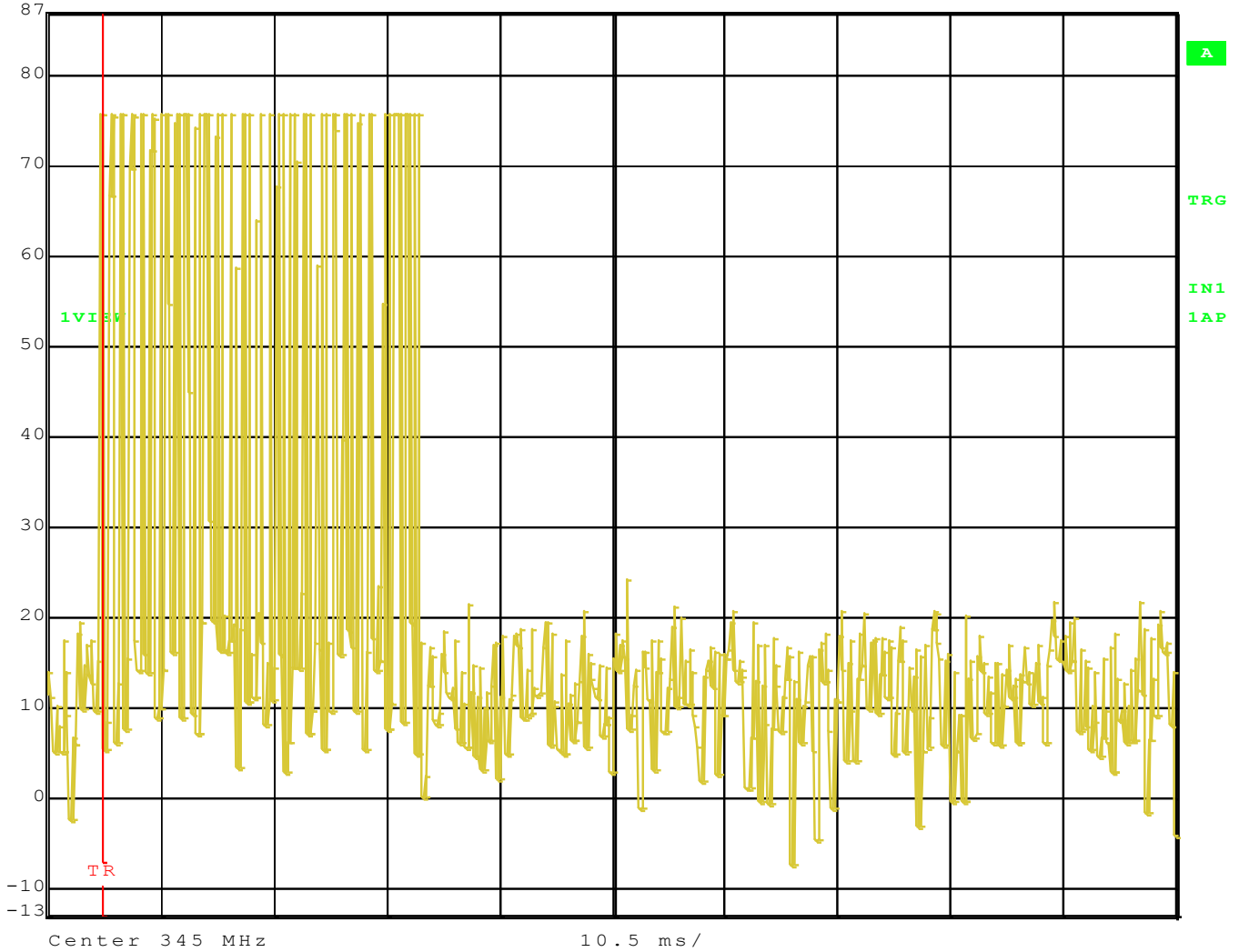


# DUTY CYCLE TRAIN



Ref Lvl  
87 dBμV

RBW 100 kHz RF Att 10 dB  
VBW 300 kHz  
SWT 105 ms Unit dBμV



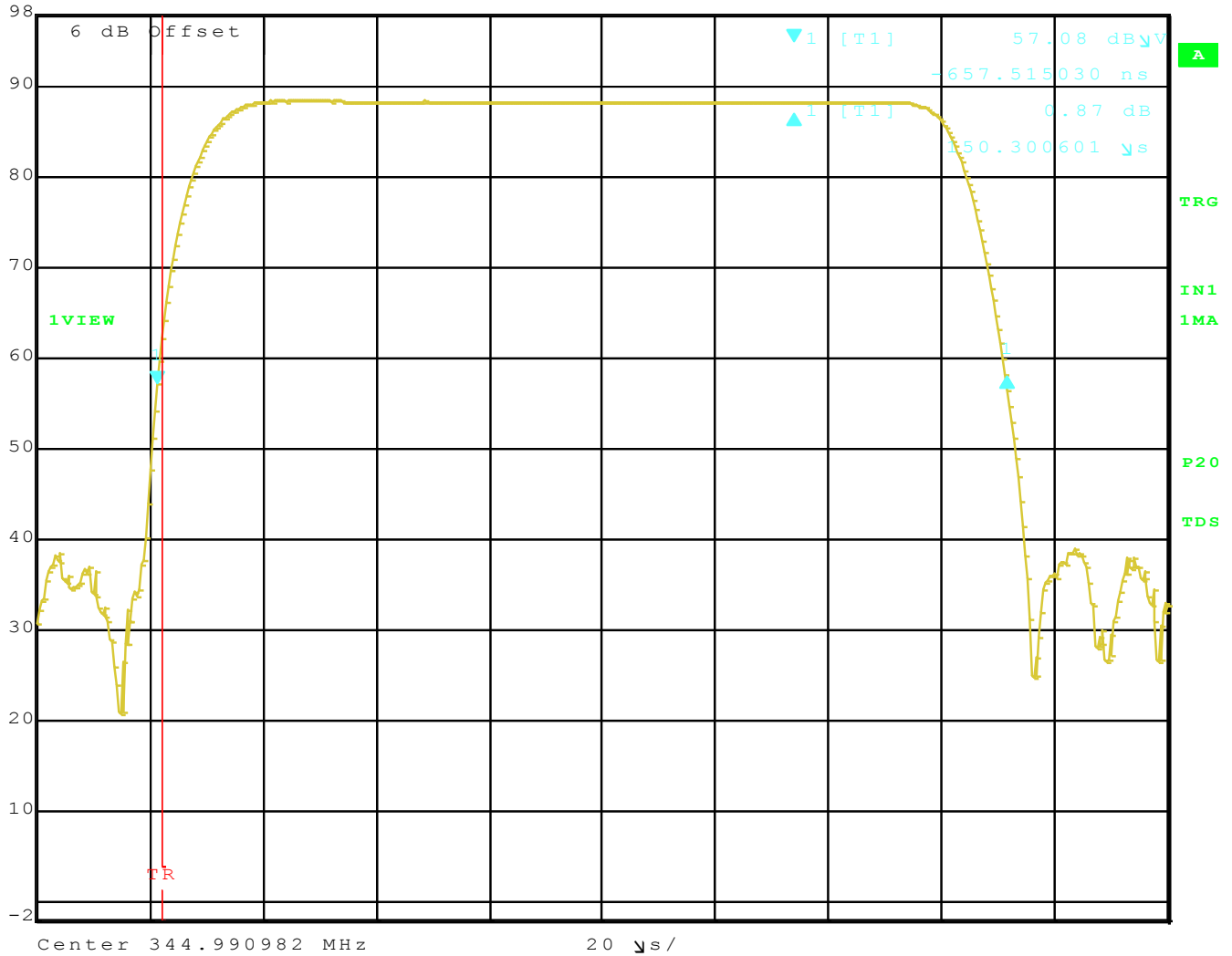
Title: SKF2.  
Comment A: Duty Cycle  
Date: 19.MAY.2014 13:01:23



## DUTY CYCLE PULSE TYPE 1 WIDTH



	Delta 1 [T1]	RBW	100 kHz	RF Att	20 dB
Ref Lvl	0.87 dB	VBW	3 MHz		
98 dB $\mu$ V	150.300601 $\mu$ s	SWT	200 $\mu$ s	Unit	dB $\mu$ V



Title: Key Fob, KF2.  
 Comment A: Pulse Type 1.  
 Date: 1.MAY.2014 08:26:07

*Pulse width = 150.301 $\mu$ s*



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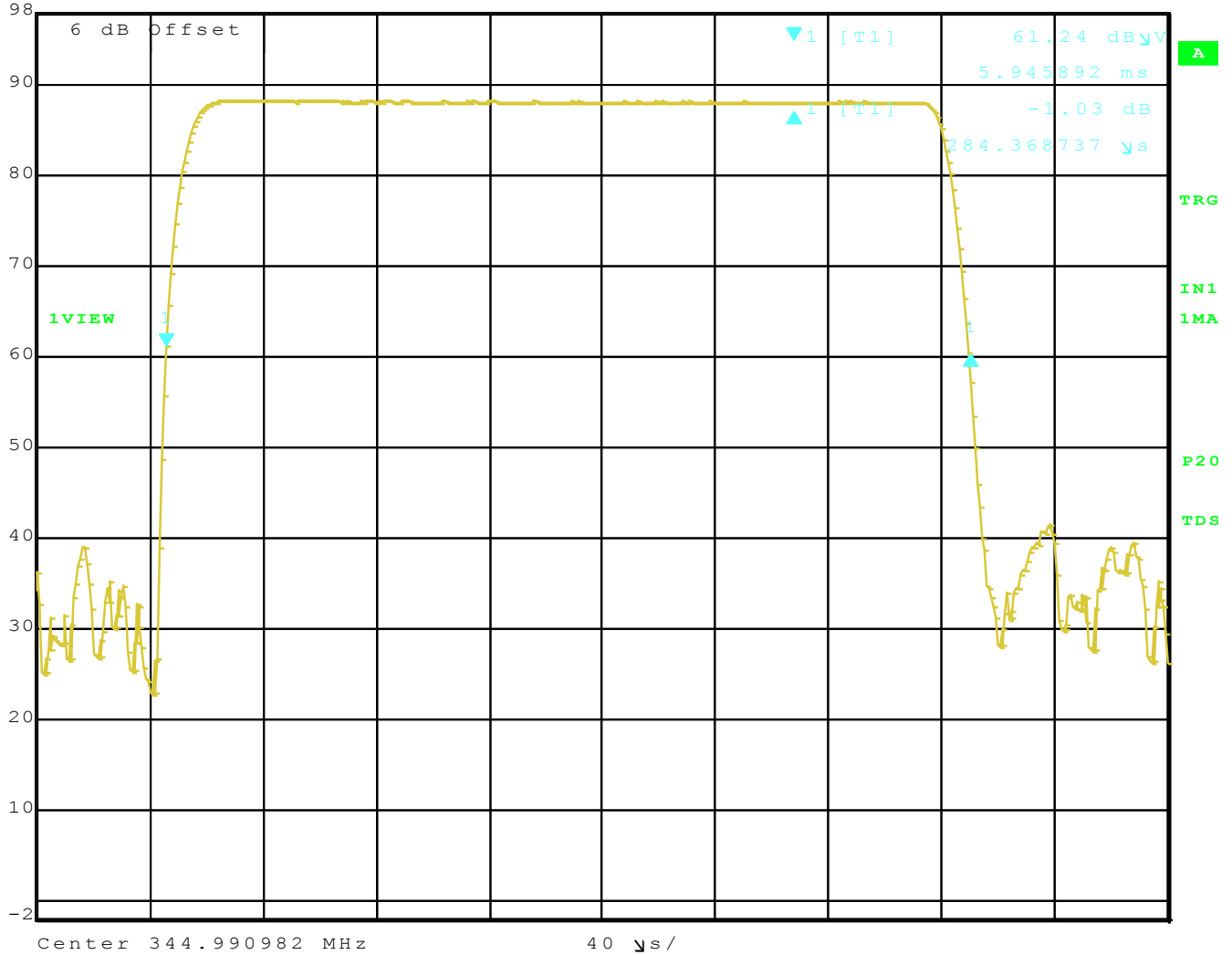
**Silverado Division**  
 19121 El Toro Road  
 Silverado, CA 92676  
 (949) 589-0700

**Lake Forest Division**  
 20621 Pascal Way  
 Lake Forest, CA 92630  
 (949) 587-0400

## DUTY CYCLE PULSE TYPE 2 WIDTH



	Delta 1 [T1]	RBW	100 kHz	RF Att	20 dB
Ref Lvl	-1.03 dB	VBW	3 MHz		
98 dB $\mu$ V	284.368737 $\mu$ s	SWT	400 $\mu$ s	Unit	dB $\mu$ V



Title:            Key Fob, KF2.  
 Comment A:    Pulse Type 2.  
 Date:           1.MAY.2014 08:28:09

*Pulse width = 284.369 $\mu$ s*



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**Lake Forest Division**  
 20621 Pascal Way  
 Lake Forest, CA 92630  
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## DUTY CYCLE PULSE TRAIN (1<sup>st</sup> 10mS of Train)



Marker 1 [T1]

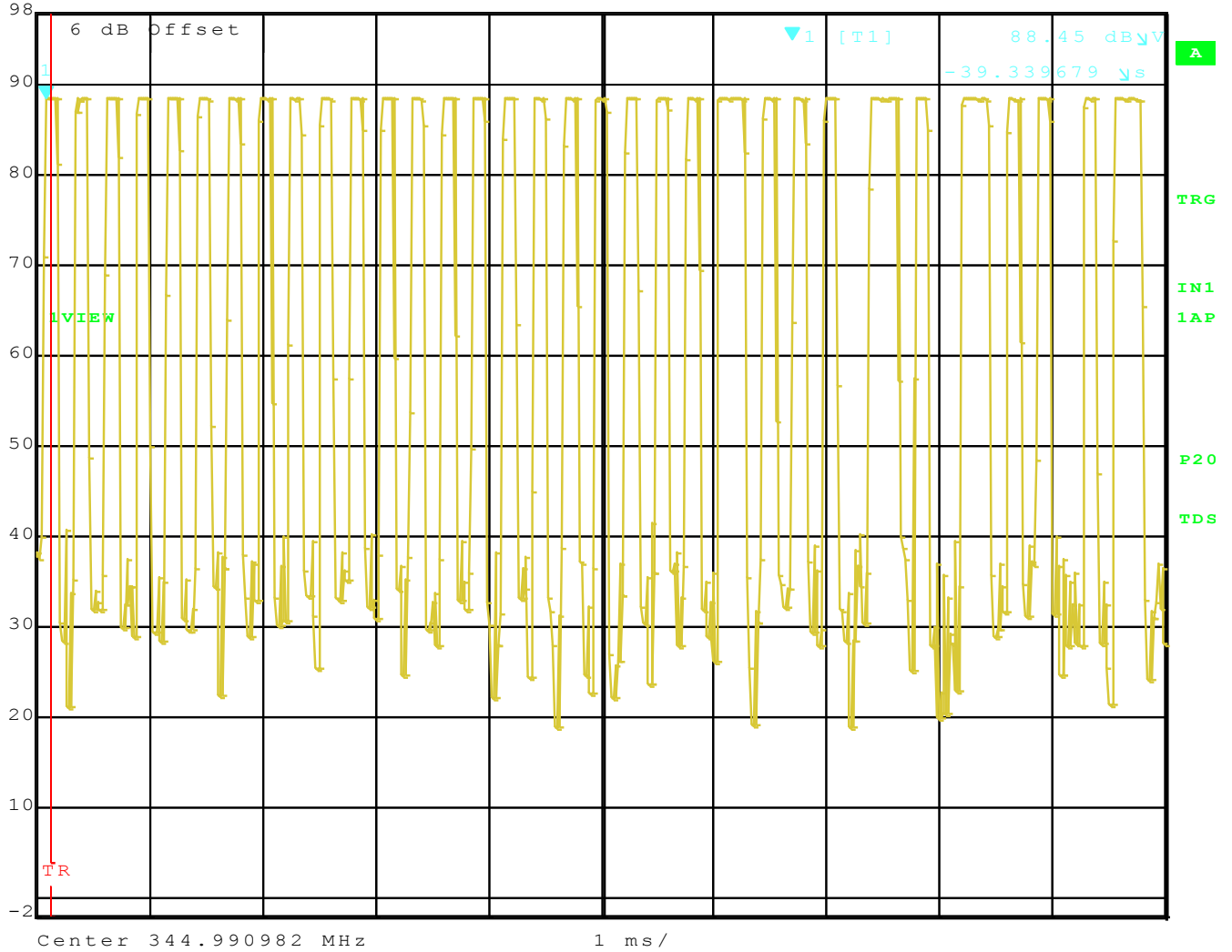
RBW 100 kHz RF Att 20 dB

Ref Lvl 88.45 dB $\mu$ V

VBW 3 MHz

98 dB $\mu$ V -39.339679  $\mu$ s

SWT 10 ms Unit dB $\mu$ V



Title: Key Fob, KF2.  
 Comment A: Duty Cycle 1st 10uS of Train.  
 Date: 1.MAY.2014 08:15:36



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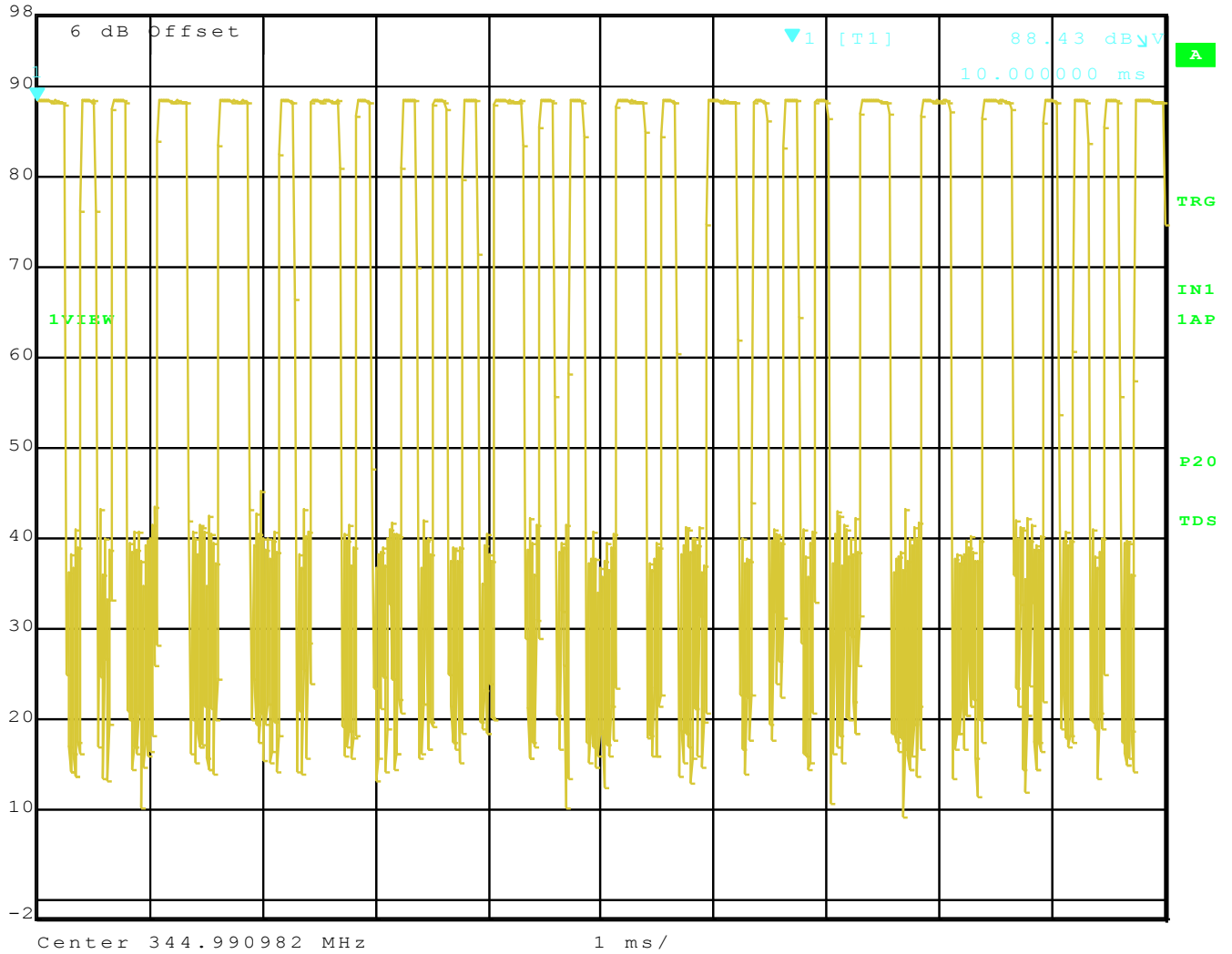
**Silverado Division**  
 19121 El Toro Road  
 Silverado, CA 92676  
 (949) 589-0700

**Lake Forest Division**  
 20621 Pascal Way  
 Lake Forest, CA 92630  
 (949) 587-0400

## DUTY CYCLE PULSE TRAIN (2<sup>nd</sup> 10mS of Train)



	Marker 1 [T1]	RBW	100 kHz	RF Att	20 dB
Ref Lvl	88.43 dB $\mu$ V	VBW	3 MHz		
98 dB $\mu$ V	10.000000 ms	SWT	10 ms	Unit	dB $\mu$ V



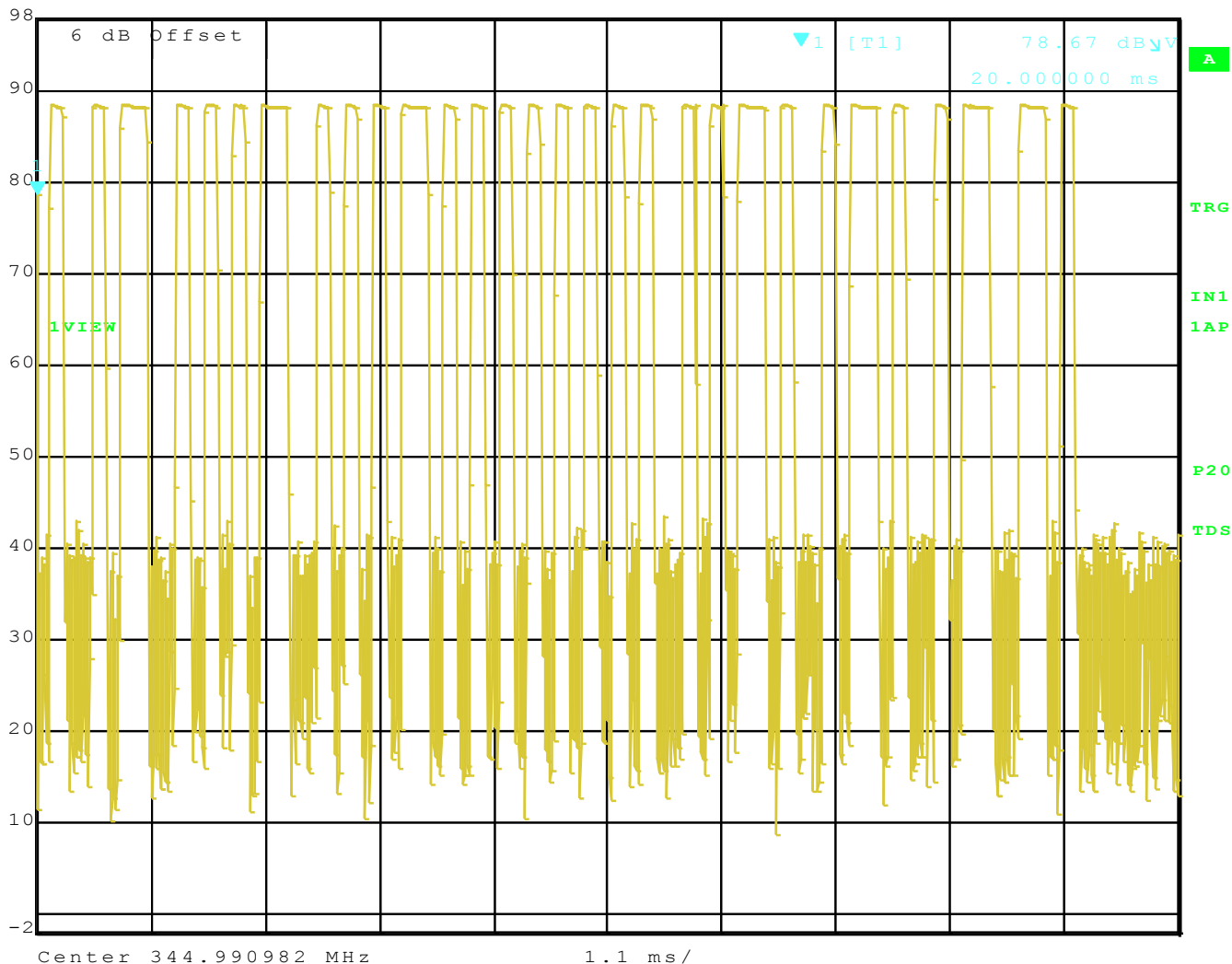
Title:            Key Fob, KF2.  
 Comment A:    Duty Cycle 2nd 10uS of Train.  
 Date:           1.MAY.2014 08:18:59



## DUTY CYCLE PULSE TRAIN (Last 10ms of Train)



Marker 1 [T1] RBW 100 kHz RF Att 20 dB  
 Ref Lvl 78.67 dB $\mu$ V VBW 3 MHz  
 98 dB $\mu$ V 20.000000 ms SWT 11 ms Unit dB $\mu$ V



Title: Key Fob, KF2.  
 Comment A: Duty Cycle 3rd 10uS of Train.  
 Date: 1.MAY.2014 08:19:58

*Number of Pulses in 100ms = Pulse Type 1: 68; Pulse Type 2: 22*  
*Total Pulse On-Time Within 100ms period = 16.476ms*  
*Duty Cycle = 16.476ms / 100ms = 0.16476*  
*Correction Factor = 20 \* log 0.16476 = -15.66 dB*



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