

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

for

**LIFE SHIELD KEYPAD
Model: SKP2**

Prepared for

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

Prepared by: _____

MATT HARRISON

Approved by: _____

JEFF KLINGER

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DATE: MAY 22, 2014

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
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FIGURE	TITLE
1	Plot Map And Layout of Test Site Below 1GHz
2	Plot Map And Layout of Test Site Above 1GHz
3	Conducted Emissions Test Setup



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 Keypad
Model: SKP2
S/N: N/A

Product Description: The Life Shield Keypad is a Keypad for arming, disarming, and programming 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 1st, 2nd, 14th, and 22nd, 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.	Complies with the limits of CFR Title 47 Part 15 Subpart B Section 15.107 and Part 15 Subpart C Section 15.207
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 (dBµV/m)	Limit (dBµV/m)	Delta (dB)	Test Distance
1	AV	V	345.00	70.46	77.26	-6.80	3-Meters
2	AV	H	345.00	63.21	77.26	-14.05	3-Meters
3	QP	V	37.70	25.01	40.00	-14.99	3-Meters
4	QP	V	38.20	24.77	40.00	-15.23	3-Meters
5	QP	V	39.90	24.34	40.00	-15.66	3-Meters
6	QP	V	39.40	24.30	40.00	-15.70	3-Meters

SIX HIGHEST CONDUCTED EMISSIONS READINGS

	Reading Type (PK / QP / AV)	Line / Neutral (L or N)	Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Delta (dB)
1	QP	L	0.44	45.34	57.10	-11.76
2	QP	N	0.43	41.88	57.18	-15.30
3	QP	L	0.70	34.59	56.00	-21.41
4	QP	L	0.35	37.44	59.06	-21.61
5	QP	L	0.37	36.60	58.41	-21.81
6	QP	L	1.16	32.19	56.00	-23.81



1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Life Shield Keypad Model: SKP2. 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 1st, 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 Keypad Model: SKP2 (EUT) was setup in a tabletop configuration. The EUT was powered by a power supply with a battery backup. The EUT was continuously transmitting a control signal and continuously receiving during tests. The EUT was checked in battery only mode, PSU with battery backup, wall mount and table mount configurations. The mode with wall mount and the power supply connected was found to be worst case.

The power supply voltage was varied from 85% to 115%; 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

This is a 1.8 meter, braid shielded round cable connecting the EUT to the Power Supply. There is a barrel connector at the EUT end and it is hardwired into the Power Supply.



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 KEYPAD (EUT)	LINEAR, LLC.	SKP2	N/A	EF400122
2	POWER SUPPLY	GLOBTEK, INC.	GT-41134-0606-1.0	NONE	N/A
3	BATTERY	PANASONIC	AA	NONE	N/A



5.2 EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
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
LISN	Com-Power	LI-150	191937	4/18/2014	4/18/2015
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 a wire antenna which is connected to 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

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 complies with the limits of CFR Title 47 Part 15 Subpart B sections 15.107 and CFR Title 47 Part 15 Subpart C section 15.207.



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 = -15.22dB

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

where

n is the number of pulses of duration t_1

m is the number of pulses of duration t_2

ξ 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: $150.8317 \mu\text{s} * 83 = 12.52 \text{ mS}$; Pulse Type 2: $283.5671 \mu\text{s} * 17 = 4.82 \text{ mS}$

$12.52 \text{ mS} + 4.82 \text{ mS} = 17.34 \text{ mS} / 100 \text{ ms} = 0.1734$

$20 \log (0.1734) = -15.22 \text{ dB}$



9. TEST PROCEDURE DEVIATIONS

The test procedures were not deviated from throughout all tests.

10. CONCLUSIONS

The Life Shield Keypad Model: SKP2 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***



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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



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>



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APPENDIX B

MODIFICATIONS TO THE EUT



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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
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20621 Pascal Way
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(949) 587-0400

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Life Shield Keypad
Model: SKP2
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**

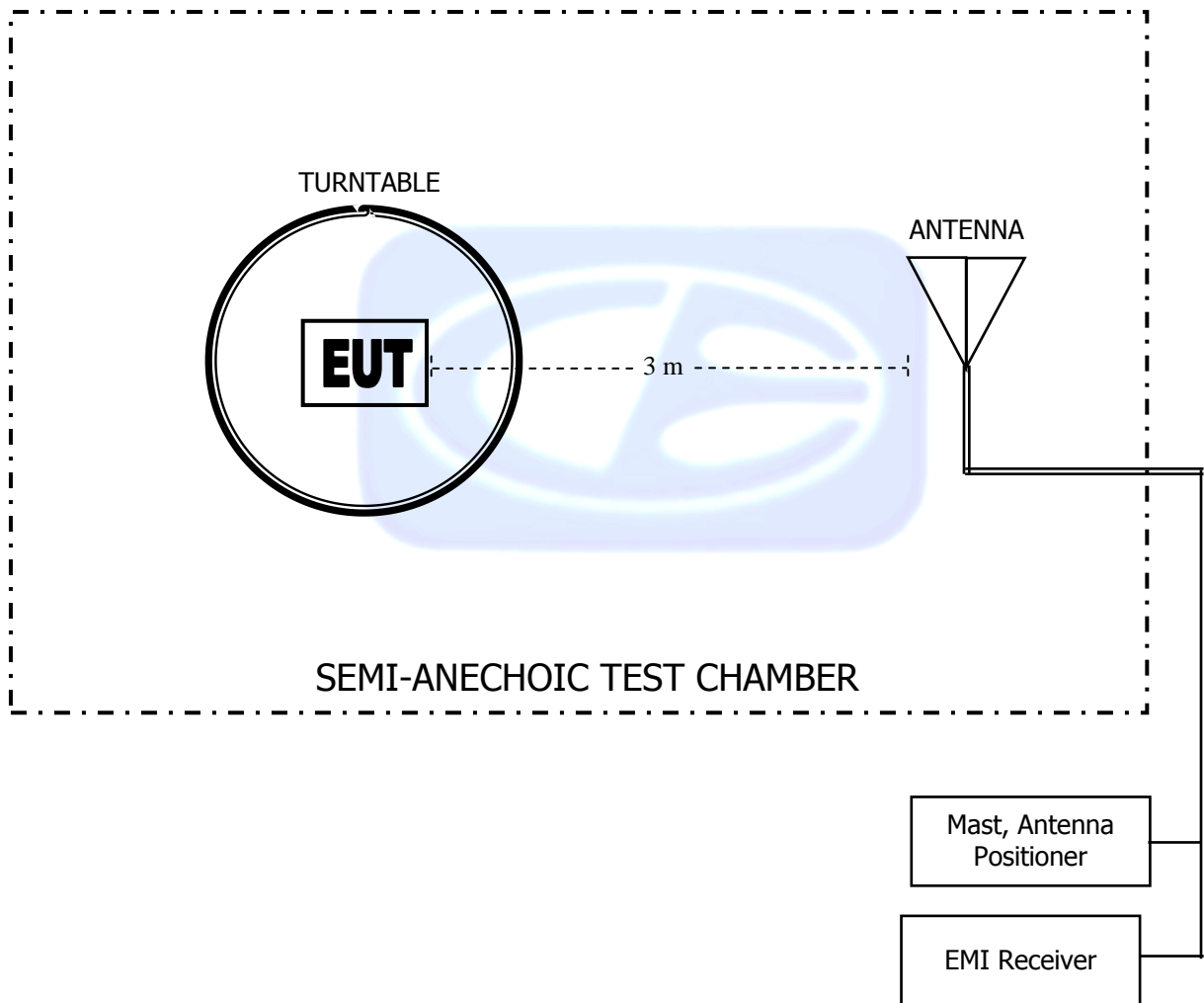


FIGURE 2: PLOT MAP AND LAYOUT OF TEST SITE ABOVE 1GHZ

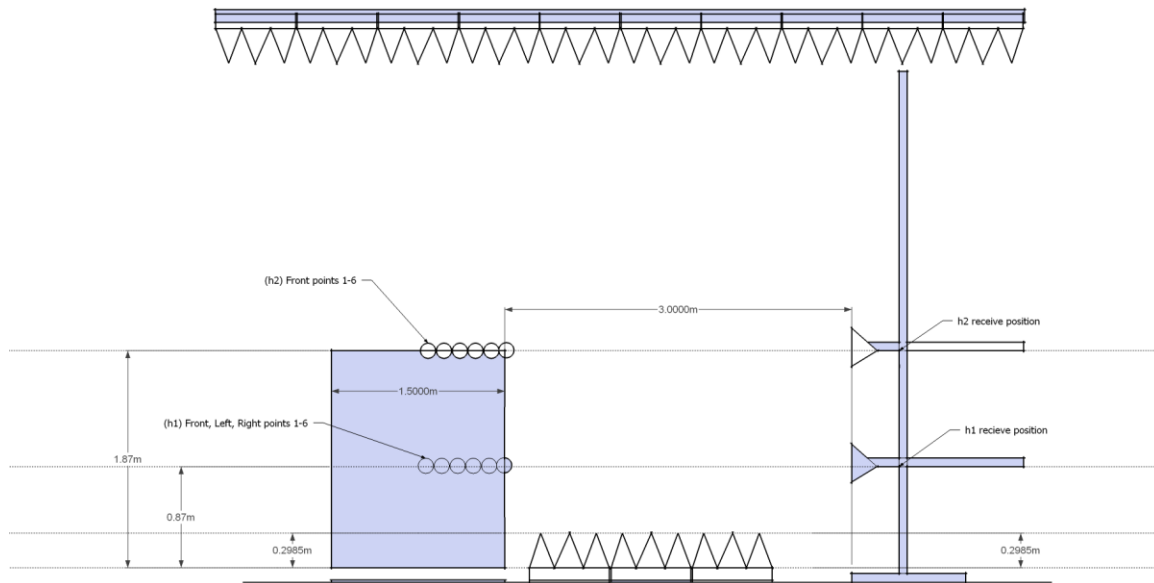
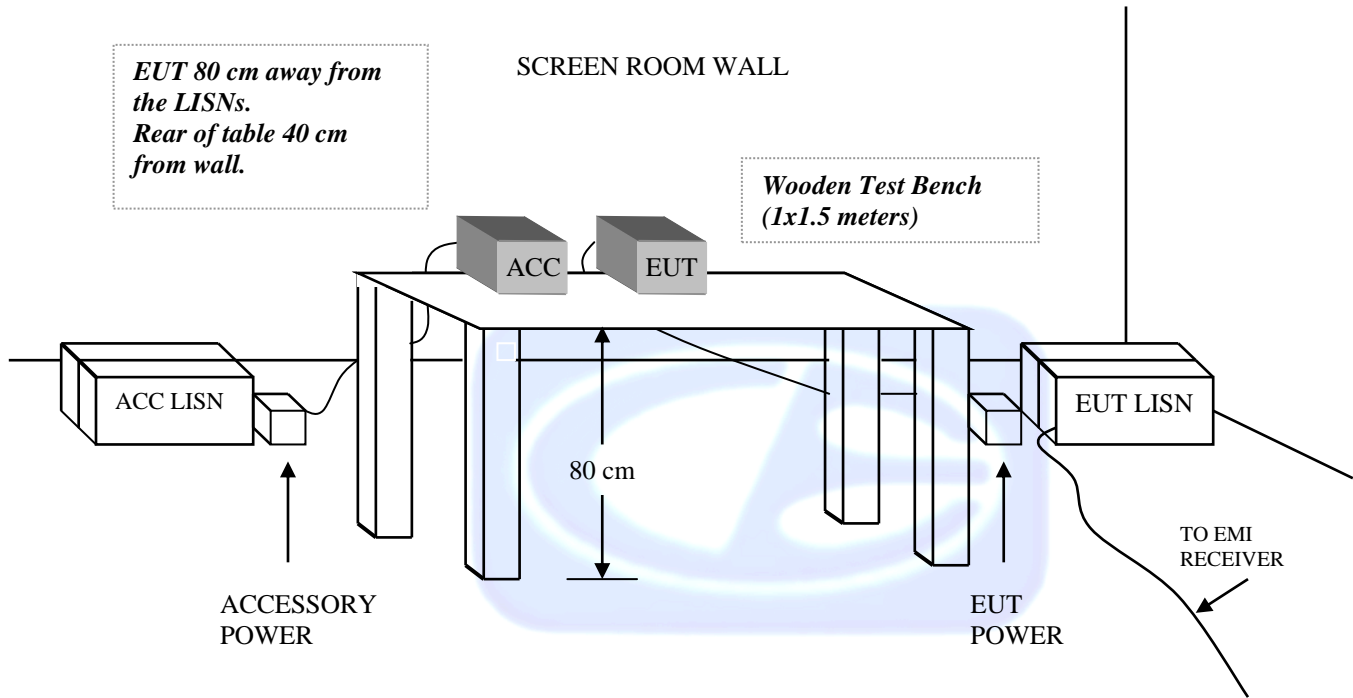


FIGURE 3: CONDUCTED EMISSIONS TEST SETUP



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

S/N: 121049

CALIBRATION DUE: DECEMBER 6, 2015

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



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

S/N: 25857

CALIBRATION DUE: MAY 25, 2014

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



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

S/N: 071250

CALIBRATION DUE: JULY 3, 2014

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
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

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
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

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
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 KEYPAD
MODEL: SKP2

FCC SUBPART B & C - RADIATED EMISSIONS < 1GHz

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





REAR VIEW

LINEAR, LLC.
LIFE SHIELD KEYPAD
MODEL: SKP2

FCC SUBPART B & C - RADIATED EMISSIONS < 1GHz

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





FRONT VIEW

LINEAR, LLC.
LIFE SHIELD KEYPAD
MODEL: SKP2

FCC SUBPART B & C - RADIATED EMISSIONS > 1GHz

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





REAR VIEW

LINEAR, LLC.
LIFE SHIELD KEYPAD
MODEL: SKP2

FCC SUBPART B & C - RADIATED EMISSIONS > 1GHz

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





FRONT VIEW

LINEAR, LLC.

LIFE SHIELD KEYPAD

MODEL: SKP2

FCC SUBPART B & C - CONDUCTED EMISSIONS

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



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



REAR VIEW

LINEAR, LLC.

LIFE SHIELD KEYPAD

MODEL: SKP2

FCC SUBPART B & C - CONDUCTED EMISSIONS

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



APPENDIX E

RADIATED EMISSIONS DATA SHEETS



Brea Division
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Agoura Division
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Silverado Division
19121 El Toro Road
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(949) 589-0700

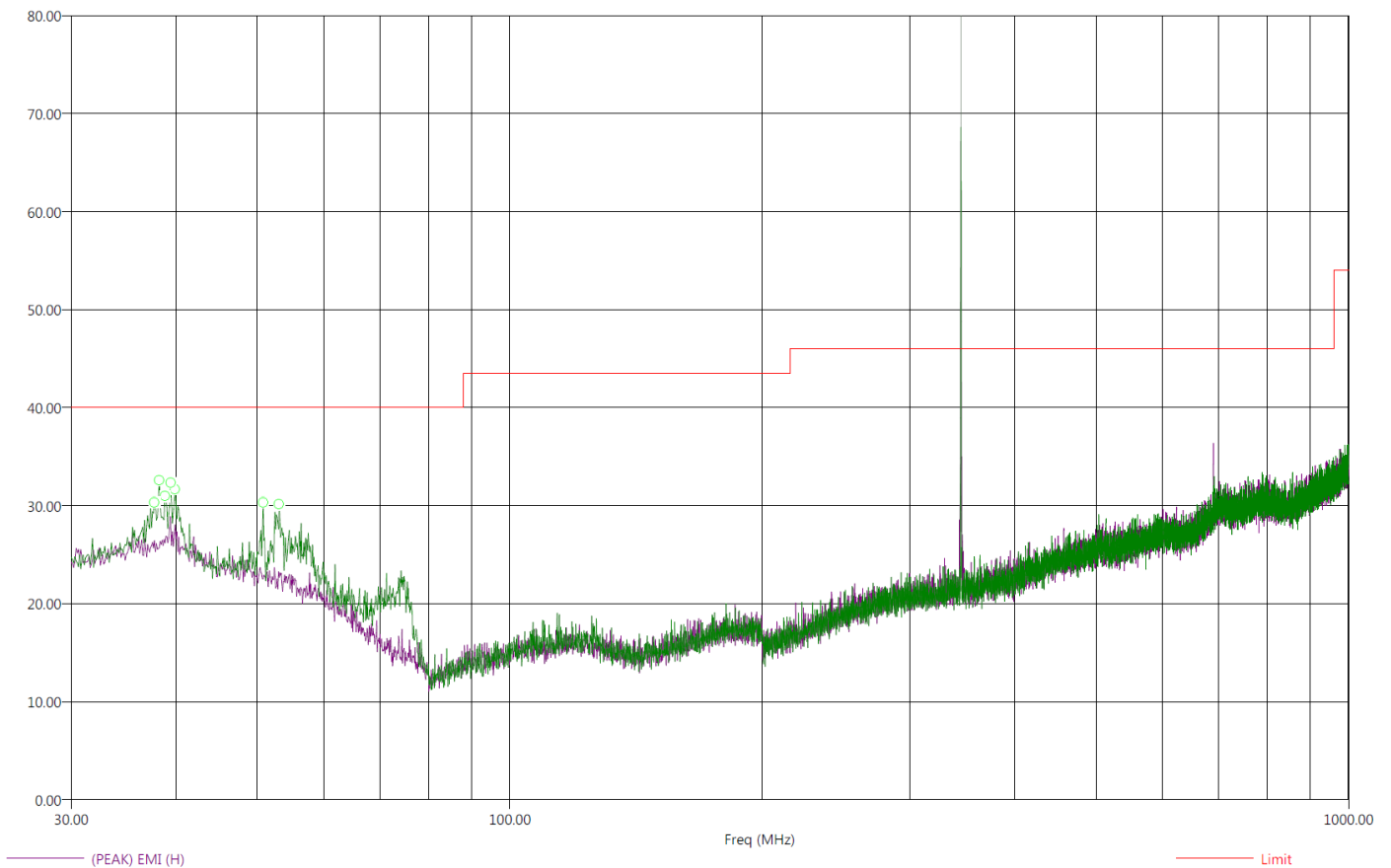
Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

Title: FCC 15.209
File: Radiated Pre-Scan 30-1000Mhz.set
Operator: Matt Harrison
EUT Type: Key Pad: KP2.
EUT Condition: Constantly Transceiving.
Comments: Connected to PSU.
Temp: 71f
Hum: 30%
120V 60Hz

5/2/2014 2:23:45 PM
Sequence: Preliminary Scan

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

Electric Field Strength (dBµV/m)



There were no radiated emissions other than harmonics found below 30 MHz or above 1000MHz



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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 Final 30-1000Mhz.set
Operator: Matt Harrison
EUT Type: Life Shield Keypad: SKP2.
EUT Condition: Constantly Transceiving.
Comments: Connected to PSU.
Temp: 71f
Hum: 30%
120V 60Hz

5/2/2014 2:42:23 PM
Sequence: Final Measurements

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

Freq (MHz)	(QP) Margin (dB)	(QP) EMI (dB μ V/m)	(PEAK) EMI (dB μ V/m)	Limit (dB μ V/m)	Pol	Ttbl Agl (deg)	Twr Ht (cm)	Transducer (dB)	Cable(dB)
37.70	-14.99	25.01	31.88	40.00	V	352.75	117.19	18.84	1.18
38.20	-15.23	24.77	32.55	40.00	V	303.00	110.20	18.93	1.21
38.80	-15.17	24.83	32.76	40.00	V	360.00	110.86	19.02	1.24
39.40	-15.70	24.30	31.09	40.00	V	340.50	177.61	19.13	1.27
39.90	-15.66	24.34	32.09	40.00	V	181.50	152.47	19.20	1.30
50.80	-18.08	21.92	30.85	40.00	V	316.25	104.17	16.85	0.19
53.10	-16.89	23.11	31.10	40.00	V	191.25	108.05	16.01	0.39

There were no radiated emissions other than harmonics found below 30 MHz or above 1000MHz



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CONDUCTED EMISSIONS
DATA SHEETS



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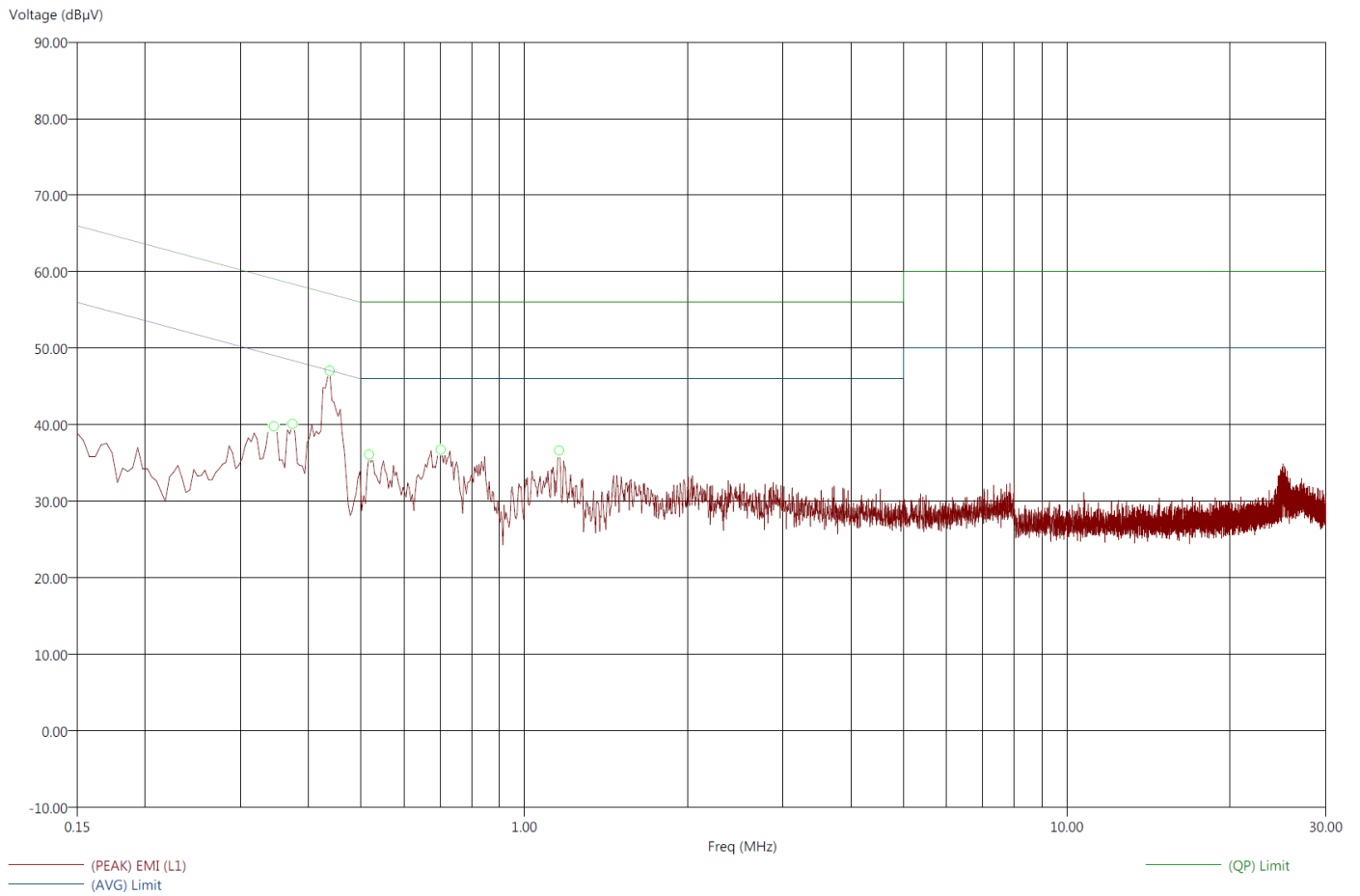
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19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

Title: FCC 15.207
File: Conducted Pre-Line.set
Operator: Matt Harrison
EUT Type: SKP2.
EUT Condition: Transceiving @ 345MHz
Comments: Connected to PSU.
Temp: 70f
Hum: 38%
120V 60Hz

5/22/2014 3:05:43 PM
Sequence: Preliminary Scan

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



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Title: FCC 15.207
File: Conducted Final-Line.set
Operator: Matt Harrison
EUT Type: SKP2.
EUT Condition: Transceiving @ 345MHz
Comments: Connected to PSU.
Temp: 70f
Hum: 38%
120V 60Hz

5/22/2014 3:20:00 PM
Sequence: Final Measurements

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

Freq (MHz)	(AVG) Margin AVL (dB)	(QP) Margin QPL (dB)	(AVG) EMI (dB V)	(QP) EMI (dB V)	(PEAK) EMI (dB V)	(AVG) Limit (dB V)	(QP) Limit (dB V)	Transducer (dB)	Cable (dB)
0.35	-22.63	-21.61	26.43	37.44	40.49	49.06	59.06	0.04	0.12
0.37	-23.03	-21.81	25.38	36.60	39.97	48.41	58.41	0.03	0.10
0.44	-12.88	-11.76	34.22	45.34	48.13	47.10	57.10	0.04	0.04
0.52	-25.85	-24.80	20.15	31.20	34.37	46.00	56.00	0.03	0.00
0.70	-21.92	-21.41	24.08	34.59	37.52	46.00	56.00	0.03	0.00
1.16	-25.14	-23.81	20.86	32.19	35.18	46.00	56.00	0.03	0.06



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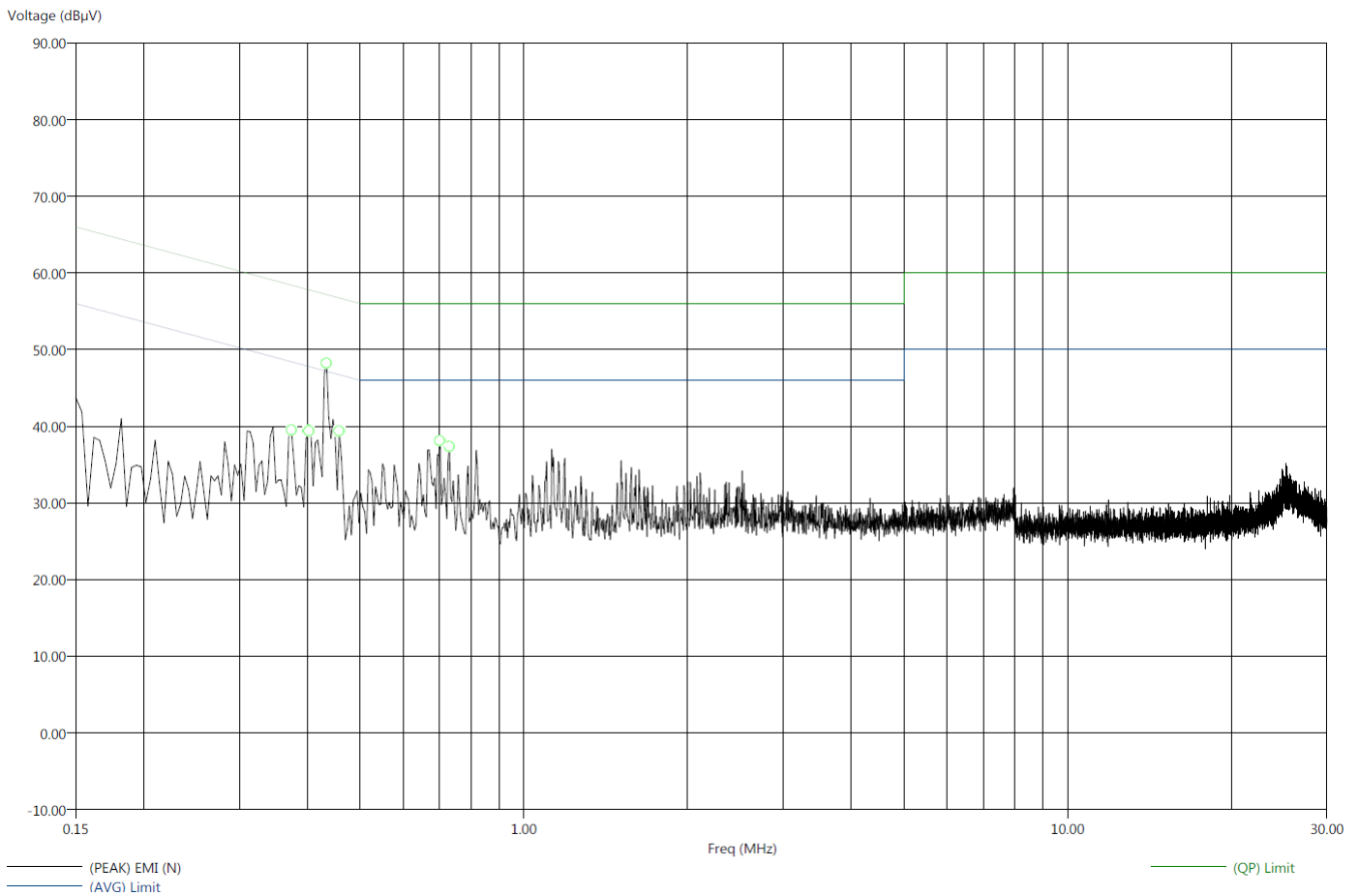
Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

Title: FCC 15.207
File: Conducted Pre-Neutral.set
Operator: Matt Harrison
EUT Type: SKP2
EUT Condition: Transceiving @ 345MHz
Comments: Connected to PSU.
Temp: 70f
Hum: 38%
120V 60Hz

5/22/2014 3:23:23 PM
Sequence: Preliminary Scan

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



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Lake Forest Division
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Title: FCC 15.207
File: Conducted Final-Neutral.set
Operator: Matt Harrison
EUT Type: SKP2
EUT Condition: Transceiving @ 345MHz
Comments: Connected to PSU.
Temp: 70f
Hum: 38%
120V 60Hz

5/22/2014 3:27:02 PM
Sequence: Final Measurements

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

Freq (MHz)	(AVG) Margin AVL (dB)	(QP) Margin QPL (dB)	(AVG) EMI (dB V)	(QP) EMI (dB V)	(PEAK) EMI (dB V)	(AVG) Limit (dB V)	(QP) Limit (dB V)	Transducer (dB)	Cable (dB)
0.37	-26.03	-25.52	22.39	32.89	40.39	48.41	58.41	0.03	0.10
0.40	-24.37	-23.94	23.44	33.87	40.37	47.81	57.81	0.03	0.07
0.43	-15.74	-15.30	31.43	41.88	48.79	47.18	57.18	0.04	0.05
0.46	-24.31	-23.96	22.41	32.77	40.55	46.73	56.73	0.04	0.03
0.70	-25.01	-24.30	20.99	31.70	39.10	46.00	56.00	0.03	0.00
0.73	-26.85	-25.96	19.15	30.04	38.90	46.00	56.00	0.03	0.00



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***FUNDAMENTAL & HARMONICS
DATA SHEETS***



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FCC 15.231

Linear, LLC.

Life Shield Keypad

Model: SKP2

Duty Cycle Correction Factor: -15.22

Date: 5/2/2014

Lab: R

Tested By: Matt Harrison

Fundamental Field Strength

Freq. (MHz)	Level (dB μ V)	Poi (v/h)	Limit (dB μ V)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Tower Height (m)	Comments
345	78.43	H	97.26	-18.83	Peak	100	120	
345	63.21	H	77.26	-14.05	AVG	100	120	
345	85.68	V	97.26	-11.58	Peak	148	187	
345	70.46	V	77.26	-6.80	AVG	148	187	

Test distance

3 meter



HARMONIC EMISSIONS HORIZONTAL

FCC 15.231

Company: Linear, LLC

EUT: Keypad

Model: SKP2

Duty Cycle Correction Factor: -15.22

Date: 5/2/2014

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	42.71	H	77.26	-34.55	Peak	1.00	170	
690.00	27.49	H	57.26	-29.77	Avg	1.00	170	
1035.00	44.69	H	73.98	-29.29	Peak	1.00	165	
1035.00	29.47	H	53.98	-24.51	Avg	1.00	165	
1380.00	41.69	H	73.98	-32.29	Peak	1.00	175	
1380.00	26.47	H	53.98	-27.51	Avg	1.00	175	
1725.00	39.29	H	77.26	-37.97	Peak	1.00	300	
1725.00	24.07	H	57.26	-33.19	Avg	1.00	300	
2070.00	51.08	H	77.26	-26.18	Peak	1.00	160	
2070.00	35.86	H	57.26	-21.40	Avg	1.00	160	
2415.00	51.21	H	77.26	-26.05	Peak	1.00	155	
2415.00	35.99	H	57.26	-21.27	Avg	1.00	155	
2760.00	49.92	H	73.98	-24.06	Peak	1.00	150	
2760.00	34.70	H	53.98	-19.28	Avg	1.00	150	
3105.00	49.44	H	77.26	-27.82	Peak	1.00	160	
3105.00	34.22	H	57.26	-23.04	Avg	1.00	160	
3450.00	55.39	H	77.26	-21.87	Peak	1.00	140	
3450.00	40.17	H	57.26	-17.09	Avg	1.00	140	

 Test distance
 3 meter


HARMONIC EMISSIONS VERTICAL

FCC 15.231

Company: Linear, LLC

EUT: Keypad

Model: SKP2

Duty Cycle Correction Factor: -15.22

Date: 5/2/2014

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	40.94	V	77.26	-36.32	Peak	1.70	190	
690.00	25.72	V	57.26	-31.54	Avg	1.70	190	
1035.00	46.36	V	73.98	-27.62	Peak	1.00	160	
1035.00	31.14	V	53.98	-22.84	Avg	1.00	160	
1380.00	42.55	V	73.98	-31.43	Peak	1.00	180	
1380.00	27.33	V	53.98	-26.65	Avg	1.00	180	
1725.00	39.47	V	77.26	-37.79	Peak	1.00	20	
1725.00	24.25	V	57.26	-33.01	Avg	1.00	20	
2070.00	48.51	V	77.26	-28.75	Peak	1.00	145	
2070.00	33.29	V	57.26	-23.97	Avg	1.00	145	
2415.00	48.50	V	77.26	-28.76	Peak	1.00	140	
2415.00	33.28	V	57.26	-23.98	Avg	1.00	140	
2760.00	47.29	V	73.98	-26.69	Peak	1.00	95	
2760.00	32.07	V	53.98	-21.91	Avg	1.00	95	
3105.00	47.28	V	77.26	-29.98	Peak	1.00	190	
3105.00	32.06	V	57.26	-25.20	Avg	1.00	190	
3450.00	51.33	V	77.26	-25.93	Peak	1.00	140	
3450.00	36.11	V	57.26	-21.15	Avg	1.00	140	

 Test distance
3 meter


OCCUPIED BANDWIDTH

DATA SHEETS



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OCCUPIED BANDWIDTH

FCC 15.231

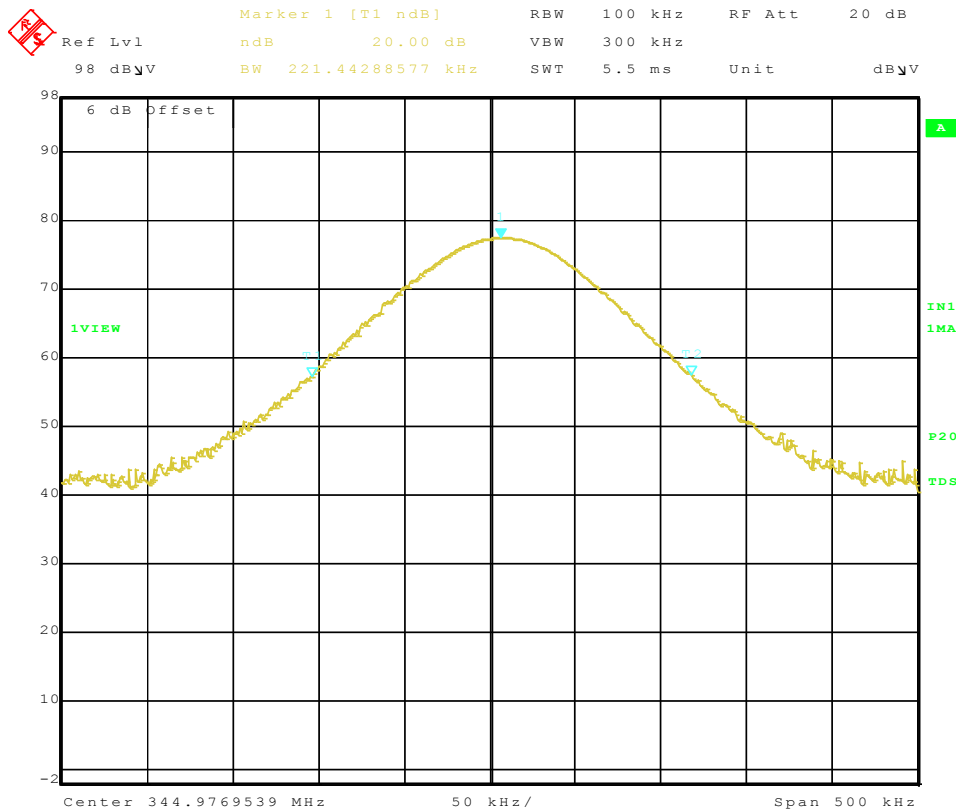
 Company: Linear, LLC
 EUT: Life Shield Keypad
 Model: SKP2

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

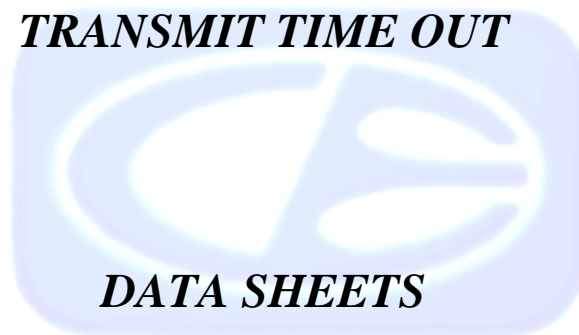
Compatible Electronics, Inc. FAC-3

FCC 20dB Occupied Bandwidth

Freq. (MHz)	Measured BW (kHz)	Limit (kHz)	Margin (kHz)	Comments
345.00	221.44	862.50	-641.06	


 Title: Key Pad: KP2.
 Comment A: 20dB Bandwidth.
 Date: 2.MAY.2014 13:47:05


TRANSMIT TIME OUT



DATA SHEETS



TRANSMIT TIME OUT

FCC 15.231

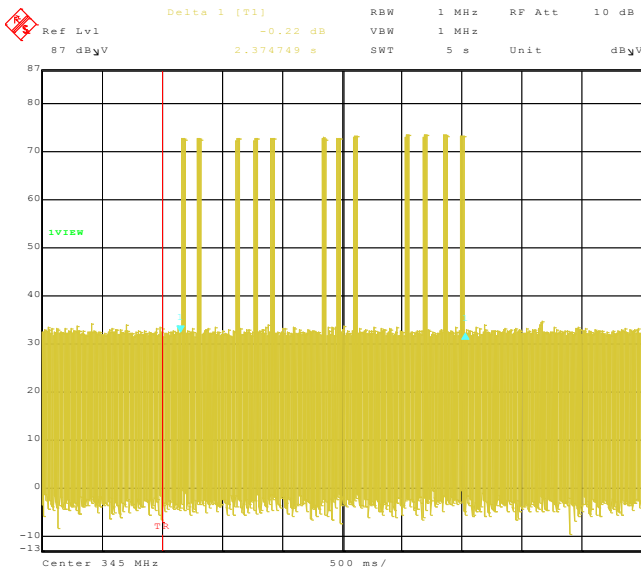
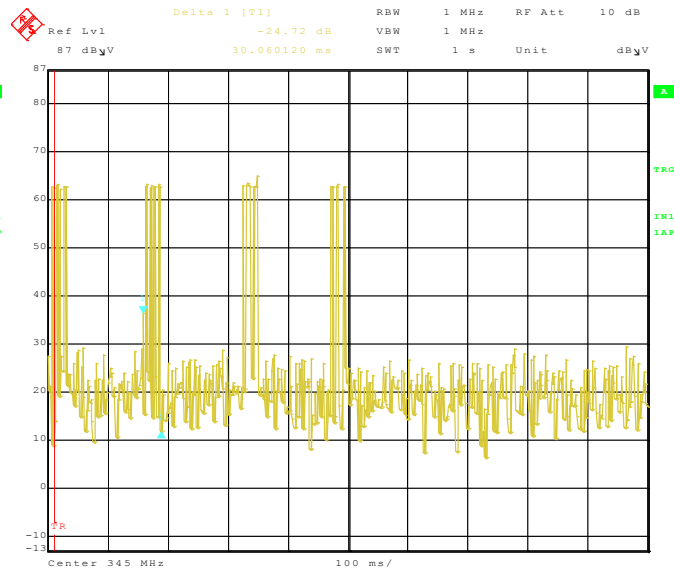
 Company: Linear, LLC
 EUT: Life Shield Keypad
 Model: SKP2

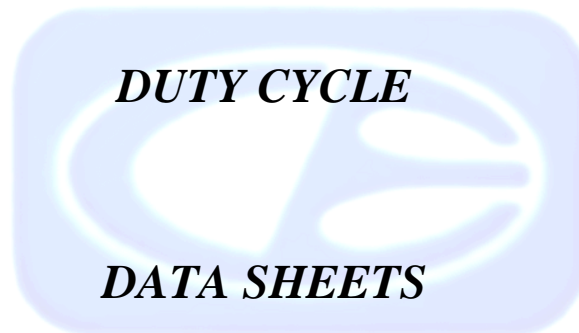
 Date: 5/22/2014
 Lab: R
 Test ENG: M. Harrison

Compatible Electronics, Inc. FAC-3

Transmit Time Out

Freq. (MHz)	Measured Time (S)	Limit (S/Hr)	Margin (S)	Comments
345	0.36	2.00	-1.64	


 Title: SKP2.
 Comment A: Tx Time Out.
 Date: 22.MAY.2014 15:44:05

 Title: SKP2.
 Comment A: Tx Time Out.
 Date: 22.MAY.2014 15:52:46

DUTY CYCLE TRAIN



Delta 1 [T1]

RBW 100 kHz RF Att 20 dB

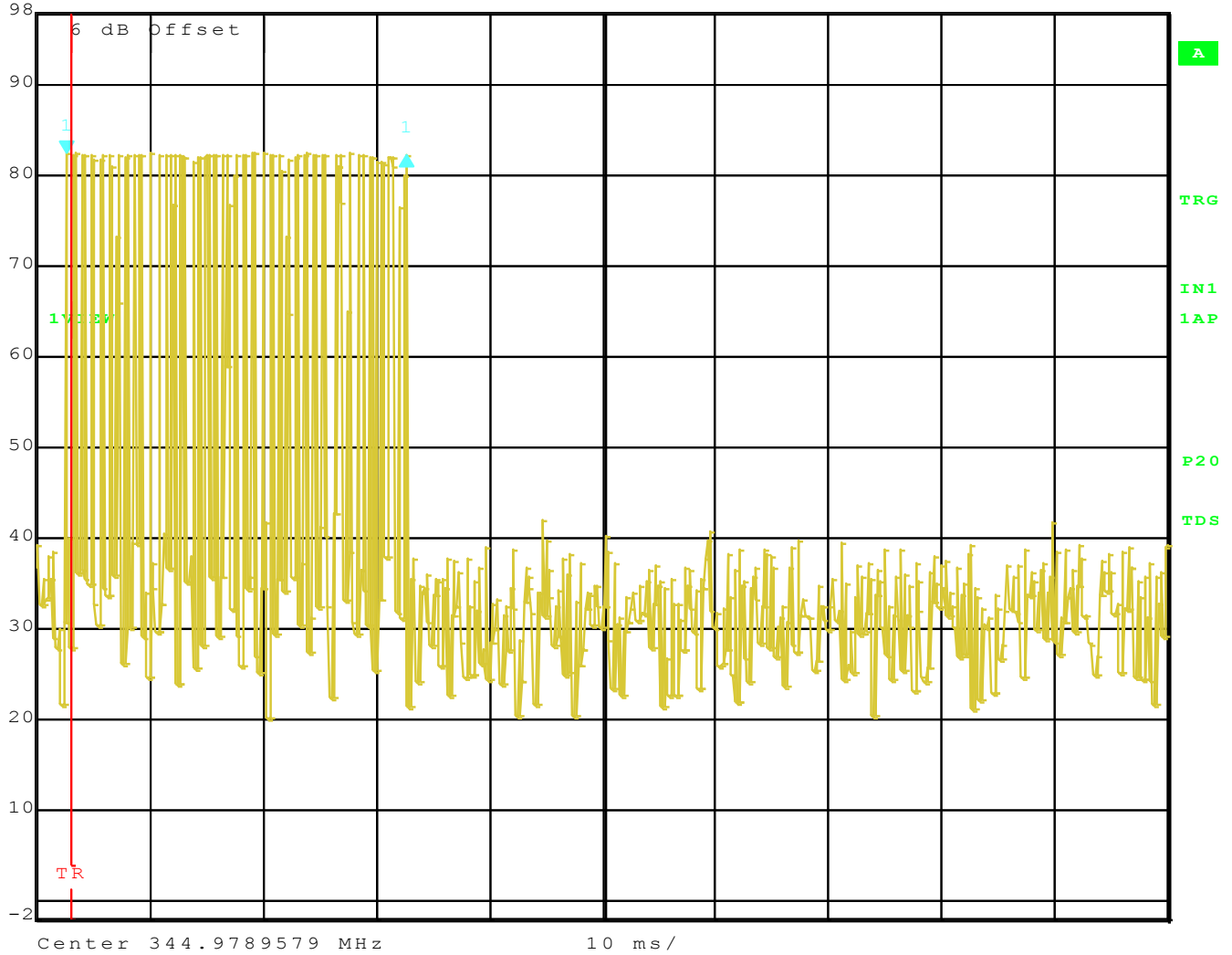
Ref Lvl -0.24 dB

VBW 500 kHz

98 dBμV 30.060120 ms

SWT 100 ms

Unit dBμV



Title: Key Pad: KP2.
 Comment A: Duty Cycle Train.
 Date: 1.MAY.2014 15:33:05



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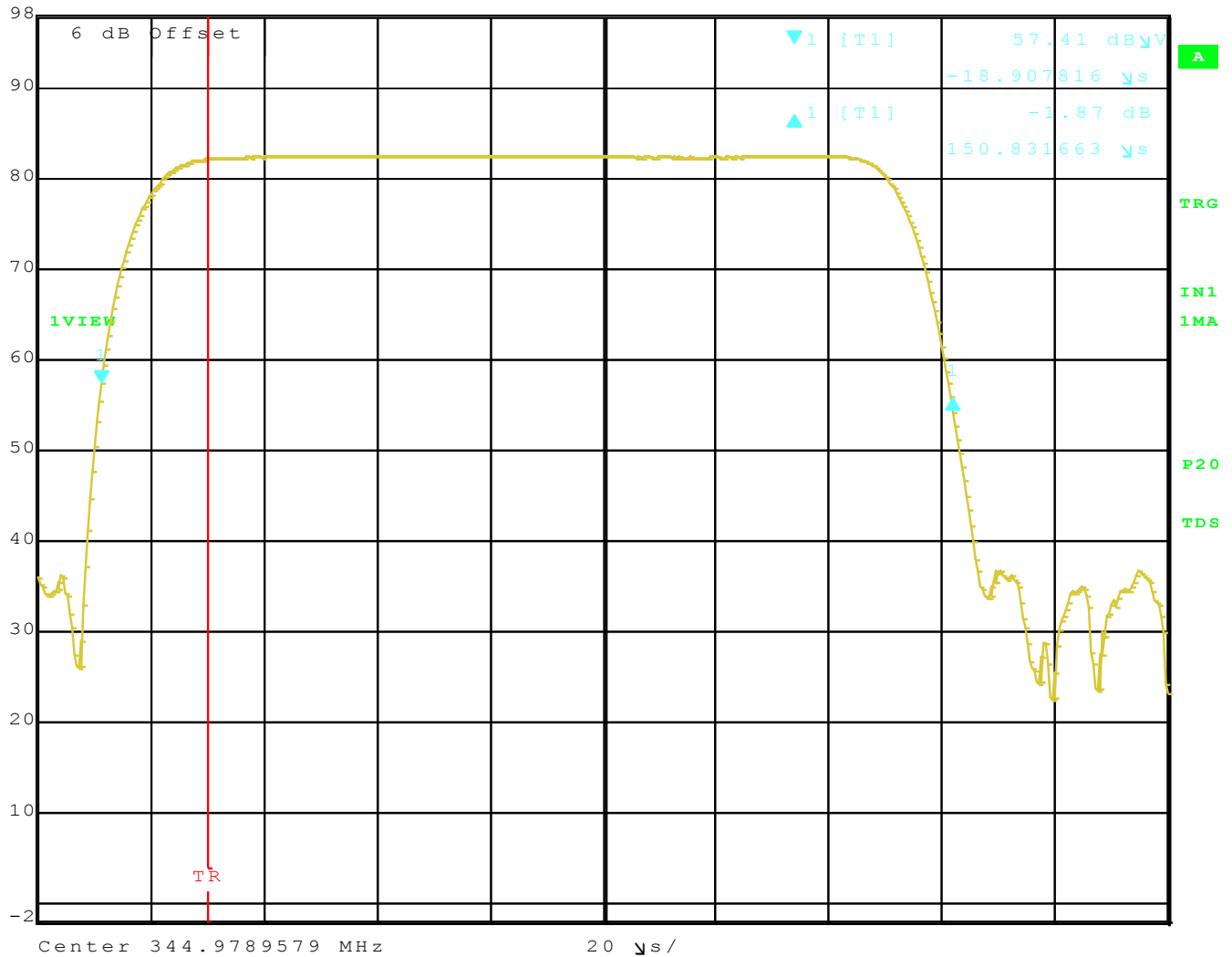
Silverado Division
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 Silverado, CA 92676
 (949) 589-0700

Lake Forest Division
 20621 Pascal Way
 Lake Forest, CA 92630
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DUTY CYCLE PULSE TYPE 1 WIDTH



	Delta 1 [T1]	RBW	100 kHz	RF Att	20 dB
Ref Lvl	-1.87 dB	VBW	500 kHz		
98 dB μ V	150.831663 μ s	SWT	200 μ s	Unit	dB μ V



Title: Key Pad: KP2.
 Comment A: Pulse 1 Width.
 Date: 1.MAY.2014 15:44:02

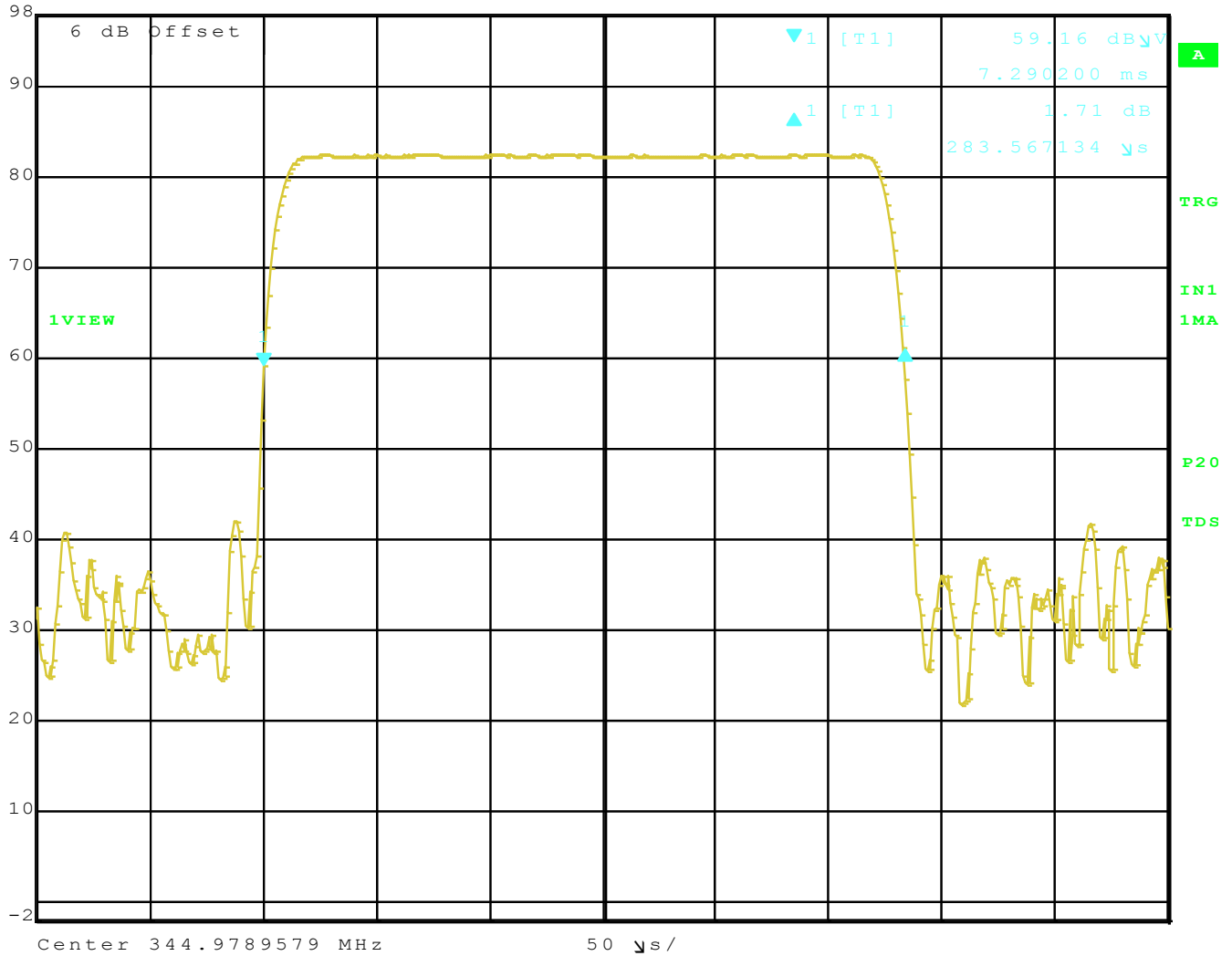
Pulse width = 150.831 μ s



DUTY CYCLE PULSE TYPE 2 WIDTH



	Delta 1 [T1]	RBW	100 kHz	RF Att	20 dB
Ref Lvl	1.71 dB	VBW	500 kHz		
98 dB μ V	283.567134 μ s	SWT	500 μ s	Unit	dB μ V



Title: Key Pad: KP2.
 Comment A: Pulse 2 Width.
 Date: 1.MAY.2014 15:47:51

Pulse width = 283.567 μ s



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DUTY CYCLE PULSE TRAIN (1st 10mS of Train)



Delta 1 [T1]

RBW 100 kHz RF Att 20 dB

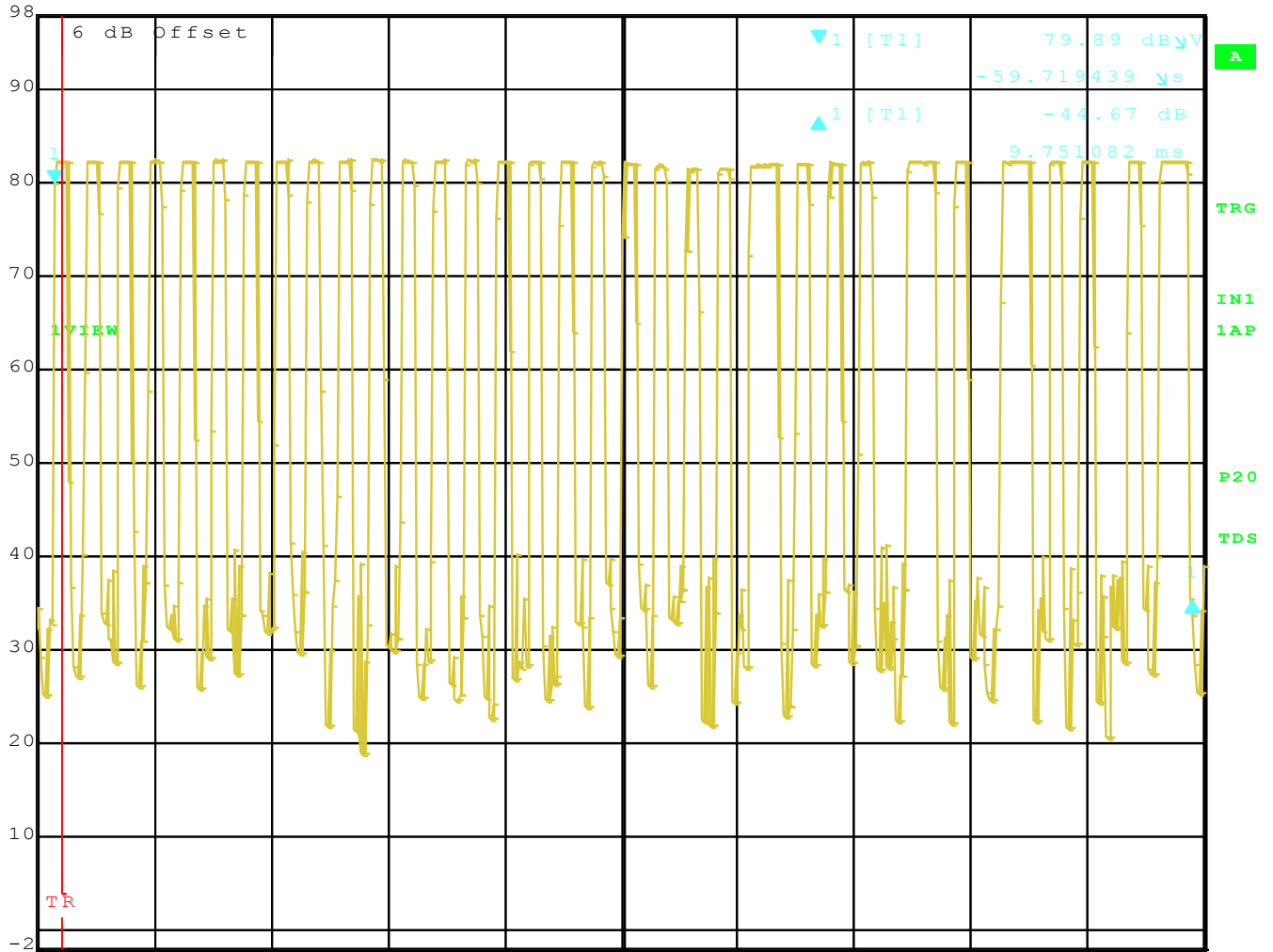
Ref Lvl -44.67 dB

VBW 500 kHz

98 dBμV 9.751082 ms

SWT 10 ms

Unit dBμV



Center 344.9789579 MHz 1 ms/

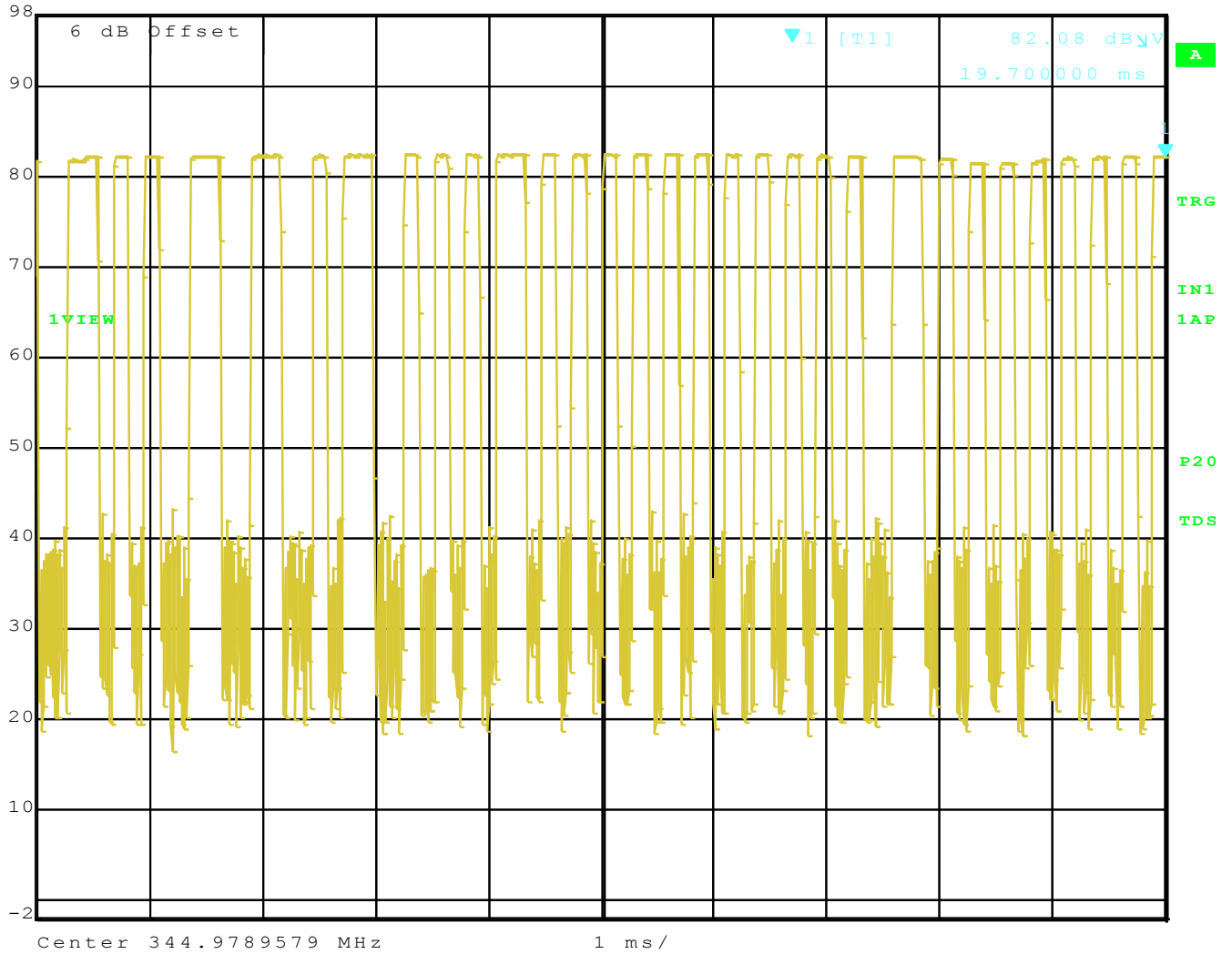
Title: Key Pad: KP2.
 Comment A: Duty Cycle 1st 10mS.
 Date: 1.MAY.2014 15:35:34



DUTY CYCLE PULSE TRAIN (2nd 10mS of Train)



	Marker 1 [T1]	RBW	100 kHz	RF Att	20 dB
Ref Lvl	82.08 dB μ V	VBW	500 kHz		
98 dB μ V	19.700000 ms	SWT	10 ms	Unit	dB μ V



Title: Key Pad: KP2.
 Comment A: Duty Cycle 1st 20mS.
 Date: 1.MAY.2014 15:37:37



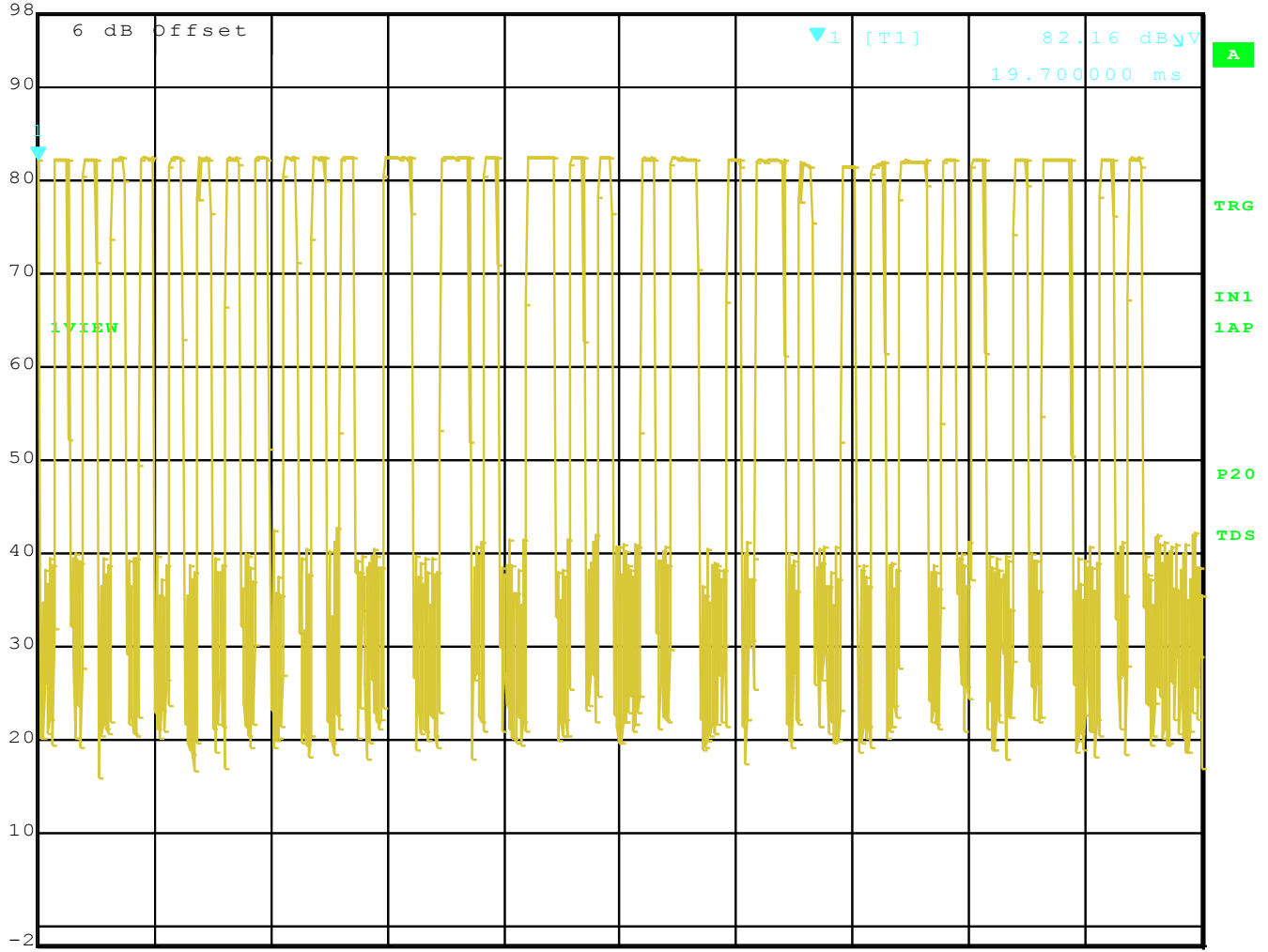
DUTY CYCLE PULSE TRAIN (Last 10ms of Train)



Marker 1 [T1] RBW 100 kHz RF Att 20 dB

Ref Lvl 82.16 dBμV VBW 500 kHz

98 dBμV 19.700000 ms SWT 11 ms Unit dBμV



Center 344.9789579 MHz 1.1 ms/

Title: Key Pad: KP2.
 Comment A: Duty Cycle 1st 30ms.
 Date: 1.MAY.2014 15:40:14

Number of Pulses in 100ms = Pulse Type 1: 83; Pulse Type 2: 17
 Total Pulse On-Time Within 100ms period = 17.34ms
 Duty Cycle = 17.34ms / 100ms = 0.1734
 Correction Factor = 20 * log 0.1734 = -15.22 dB

