

Certification Test Report

In Accordance With: FCC Part 15 Subpart C, 15.231

Applicant: SMK Manufacturing
1055 Tierra del Rey
Chula Vista, CA 91910

Equipment Under Test (EUT): Settop Box Remote Control
Model: LC 2way

FCC ID: QVEFSK2LC

Tested By: Nemko USA Inc.
2210 Faraday Avenue, Suite 150
Carlsbad, CA 92008

Authorized By: 
Alan Laudani, EMC/RF Test Engineer

Test Report Number: 2012 11218099 FCCTR
Date: October 22, 2012
Project Number 1029704
NEX Number 218099

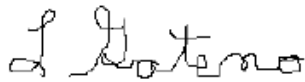
Total Number of Pages: 27

Applicant Affirmation

Leon Gateno representing SMK Manufacturing hereby affirms:

- a) That he/she has reviewed and concurs that the test shown in this report are reflective of the operational characteristics of the device for which certification is sought;
- b) That the device in this test report will be representative of production units;
- c) That all changes (in hardware and software/firmware) to the subject device will be reviewed.
- d) That any changes impacting the attributes, functionality or operational characteristics documented in this report will be communicated to the body responsible for approving (certifying) the subject equipment.

Leon Gateno
Printed name of official



Signature of official

1055 Tierra del Rey
Address

August 28, 2012
Date

619-216-6400
Telephone number

lgateno@smkusa.com
Email address of official

NOTE—This affirmation must be signed by the responsible party before it is submitted to a regulatory body for approval.

Section 1. Summary of Test Results

1.1 General

All measurements are traceable to national standards

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15; Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed:	Settop Box Remote Control
Model:	LC 2way
Specification:	FCC Part 15 Subpart C, 15.231
Date Received in Laboratory:	August 23, 2012
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None

1.2 Report Release History

REVISION	DATE	COMMENTS
-	November 2, 2012	Prepared By: Andreas Gillmeier
-	November 2, 2012	Initial Release: Alan Laudani

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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Andreas Gillmeier, Sr. EMC/Wireless Engineer



Alan Laudani, RF/EMC Test Engineer

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Section 2: Equipment Under Test

2.1 Theory of Operation

The LC 2way is a Settop Box Remote Control. This set up box is similar to a cable box. This unit is operated from 4 AAA batteries. The IC's have an internal regulator. The Remote works on four channels only. There is an external regulator that supplies 3.3 Volts to all the circuits.

2.2 Technical Specifications of the EUT

Manufacturer:	SMK Manufacturing
Operating Frequency:	369.5, 375.3, 388.3, 394.3 MHz
Measured Power:	69.4 dBuV/m @ 3m
Modulation:	FSK
Antenna Data:	Integrated loop printed on PWB
Antenna Connector:	NONE
Power Source:	6V battery (4 x 1.5V AAA)

Section 3: Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.231

Periodic operation in the band 40.66–40.70 MHz and above 70 MHz.

3.2 Deviations From Laboratory Test Procedures

No deviations from Laboratory Test Procedure

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	23 °C
Humidity range	:	53-74 %
Pressure range	:	100.4-100.6 kPa

3.4 Test Equipment

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
E1017	9kHz to 7GHz Spectrum Analyzer	Rohde & Schwarz	FSP7	839337/0022	3/8/2012	3/8/2013
110	Antenna, LPA	Electrometrics	LPA-25	1217	4/1/2011	4/1/2013
128	Antenna, Bicon	EMCO	3104	2882	3/21/2011	3/21/2013
E1029	Preamplifier (20MHz to 18GHz)	A.H. Systems, Inc.	PAM-0118	343	2/21/2012	2/21/2013
317	Preamplifier	HP	8449A	2749A00167	6/11/2012	6/11/2013
752	Antenna, DRG Horn, .7-18GHz	EMCO	3115	4943	12/2/2010	12/2/2012
901	pre amp	Sonoma	310 N	130607	10/27/2011	10/27/2012
911	Spectrum Analyzer	Agilent	E4440A	US41421266	10/27/2011	10/27/2012

Section 4: Observations

4.1 Modifications Performed During Assessment

No modifications were performed during assessment.

4.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

4.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

4.4 Tests Deleted

No Tests were deleted from this assessment.

4.5 Additional Observations

There were no additional observations made during this assessment.

Section 5: Results Summary

This section contains the following:

FCC Part 15 Subpart C: Test Results.

The column headed "Required" indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No: not applicable / not relevant
Y Yes: Mandatory i.e. the apparatus shall conform to these tests.
N/T Not Tested, mandatory but not assessed. (See section 4.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

5.1 Test Results

Part 15	Test Description	Required	Result
15.207 (a)	Power line Conducted Emissions	Battery Powered	NA
15.215 (c)	Occupied Bandwidth 20%	Y	Pass
15.231(c)			
15.231 (a)	Permissible Field Strength Limits for Momentarily Operated Devices	Y	Pass
15.205 (a)			
15.231 (a)	Types of Momentary Signals	Y	Pass
15.231 (d)	Frequency Stability	N*	NA
15.107 (a)	Receiver Spurious Conducted Emissions	Battery Powered	NA
15.109 (a)	Receiver Spurious Radiated Emissions	N**	Pass

* Battery Powered

** Not transmitting in the band requiring Frequency Stability

*** Only transmitter, standby test was done in infrared TX mode

Appendix A: Test Results

Conducted Emissions

Not applicable as EUT is battery powered.

Occupied Bandwidth

15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Conditions:

Client	SMK Manufacturing	Temperature	23	°C
NEX #	218099	Relative Humidity	70	%
EUT Name	Settop Box Remote Control			
EUT Model	LC 2way	Test Location	Hallway	
Governing Doc	CFR 47, Part 15C	Test Engineer	Andreas Gillmeier	
Basic Standard	Sec. 15.231 Transmit	Date of test	10/19/2012	

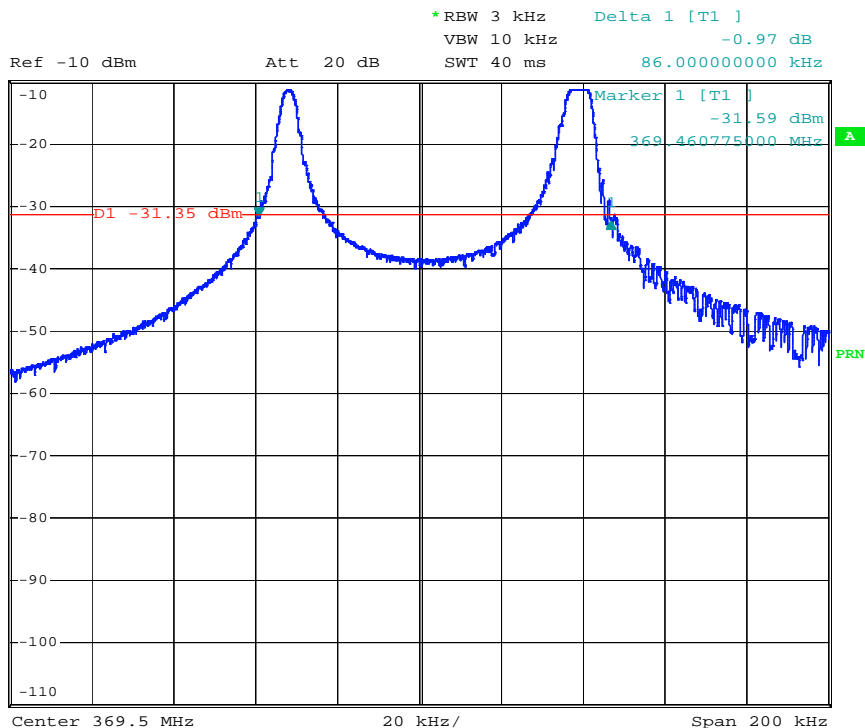
Test Results: Plot, next page

.25% of the carrier frequency is 923 kHz.

Measured 20 dB Occupied Bandwidth at 369.5 MHz: **86.00 kHz**



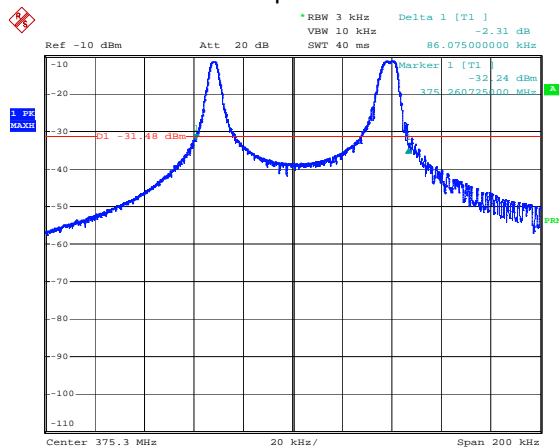
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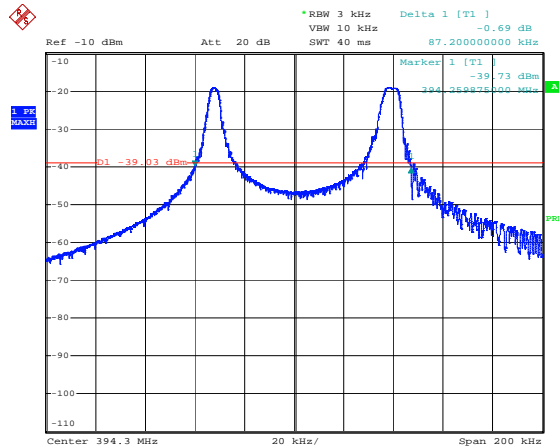
Date: 1.JAN.1997 01:47:21

Max peak hold.

Measured 20 dB Occupied Bandwidth at 375.3 MHz: **86.08 kHz**



Date: 1.JAN.1997 01:36:36



Date: 1.JAN.1997 01:23:25

Measured 20 dB Occupied Bandwidth at 394.3 MHz: **87.20 kHz**

Frequency Stability

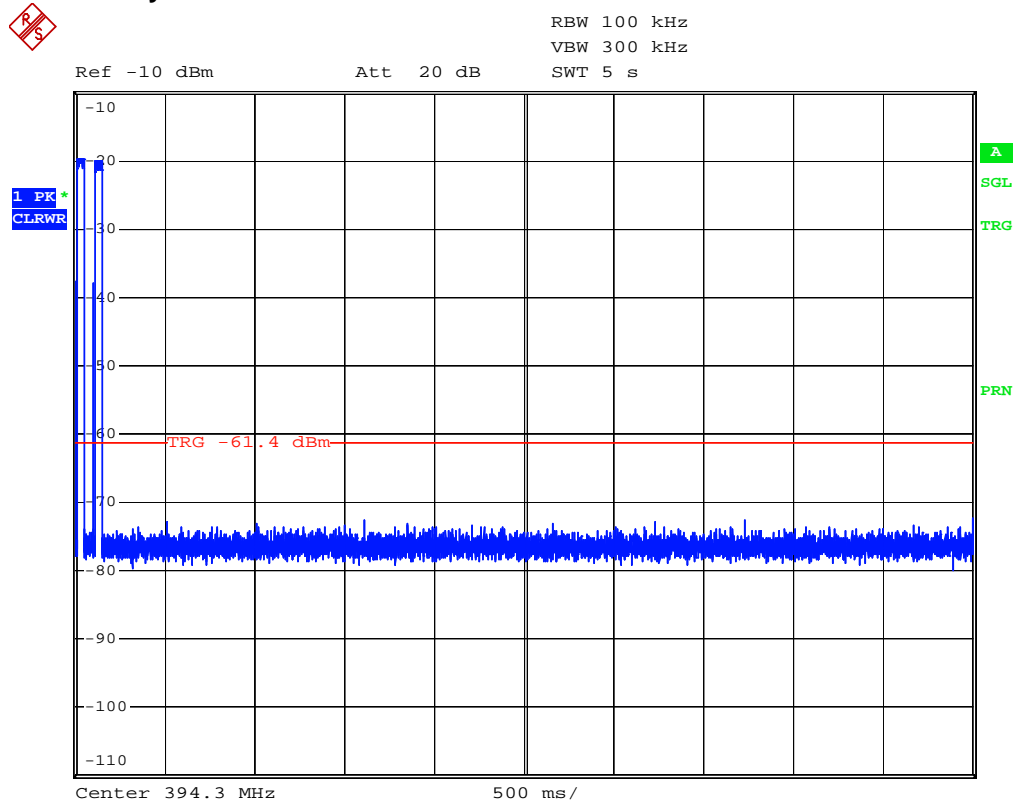
The EUT does not transmit within the 40.66—40.70 MHz band, therefore this test is not applicable.

Types of Momentary Signals

15.231(a) (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Client	SMK Manufacturing	Temperature	23	°C
NEX #	218099	Relative Humidity	70	%
EUT Name	Settop Box Remote Control			
EUT Model	LC 2way	Test Location	Hallway	
Governing Doc	CFR 47, Part 15C	Test Engineer	Andreas Gillmeier	
Basic Standard	Sec. 15.231 Transmit	Date of test	10/19/2012	

Transmitter stops TX after 2 transmissions when button is pressed one time and released immediately:



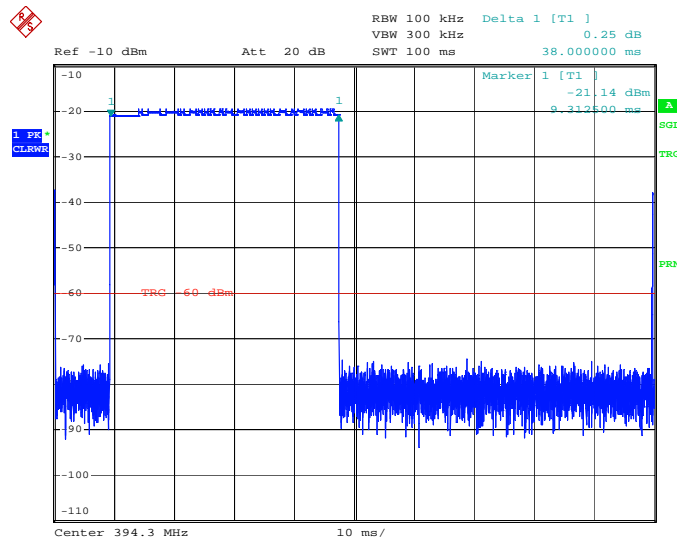
Date: 1.JAN.1997 01:13:41

Duty Cycle Factor

Duty cycle factor = $20 \times \log(\text{on} / 100 \text{ ms})$
on: $2 \times 0.11 \text{ ms} + 38.00 \text{ ms} = 38.22 \text{ ms}$

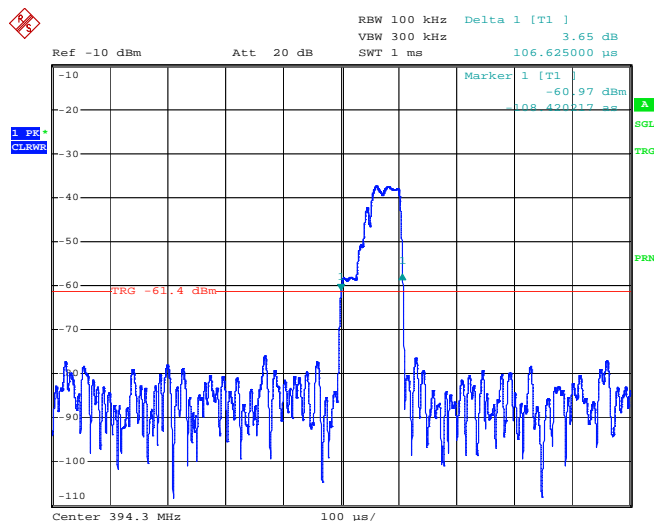
= $20 \times \log(38.22 \text{ ms} / 100 \text{ ms}) = -8.35 \text{ dB}$

Full 100 ms:



Date: 1.JAN.1997 00:58:55

Start burst:



Date: 1.JAN.1997 01:08:56

Field Strength and Radiated Spurious Emissions

15.231 (b) In addition to the provisions of § 15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	¹ 1,250 to 3,750	¹ 125 to 375
174-260	3,750	375
260-470	¹ 3,750 to 12,500	¹ 375 to 1,250
Above 470	12,500	1,250

¹ Linear interpolations.

(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in § 15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of § 15.205 shall be demonstrated using the measurement instrumentation specified in that section.

(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in § 15.209, whichever limit permits a higher field strength.

Limit for fundamental and spurious emissions at 3m:

Frequency	Limit for fundamental in dBuV/m	Limit for fundamental in uV/m	Limit for spurious emissions in dBuV/m (*)	Limit for spurious emissions in uV/m (*)
369.5 MHz	78.4	8312.5	58.4	831.3
375.3 MHz	78.6	8554.2	58.6	855.4
394.3 MHz	79.4	9345.8	59.4	934.6

(*) or 15.209 in the restricted bands

Client	SMK Manufacturing	Temperature	23	°C
NEX #	218099	Relative Humidity	53-74	%
EUT Name	Settop Box Remote Control			
EUT Model	LC 2way	Test Location	10 m Chamber	
Governing Doc	CFR 47, Part 15C	Test Engineer	Andreas Gillmeier	
Basic Standard	Sec. 15.231 Transmit	Date of test	9/10/2012 – 10/19/2012	

Test Results:

See Table. EUT complies for fundamental power and spurious emissions.

Additional Observations:

The Spectrum was searched from 30MHz to the 10th Harmonic (3943 MHz).

The EUT was investigated with a fresh battery. The emissions were measured with a test mode to repeat the emission so measurements could be maximized for the rotation of the sample and height and polarity of the measurement antenna.

All Measurements below 1GHz were performed at 3m employing a CISPR quasi-peak detector, except for the radio's fundamental. Fundamental power was measured at 1 MHz RBW, 3 MHz VBW to ensure capture of entire emissions envelope.

Peak measurements above 1GHz were done utilizing RBW of 1MHz and VBW of 3MHz.

Average measurements were calculated: average = peak + duty cycle factor.

Measurements made at the 3 meter distance of the 10m Semi-anechoic chamber, all measurements max hold after peaking for EUT rotation and antenna height from 1 to 4 meters.

No other emissions found within 20 dB of the limits. Harmonic emissions measured in same EUT configuration of highest fundamental transmission orientation—proven worst case.

Emissions were measured on a 80cm (height) table.

Since the EUT has no defined use position: emissions were measured at x, y and z EUT configurations.

Note: Corrected Reading Computations

Average = Peak Maximum Meter Reading + Antenna Factor + Path Loss + DUTY CYCLE FACTOR

69.4 = 57.9 + 16.1 + 3.8 - 8.4

EUT passes

Limit paragraph 231(e) = 9345.8 uV/m

Corrected Average Reading = 69.4 dBuV/m

$10^{(69.4/20)} = 2951.2 \text{ uV/m}$

Radiated Power:

Radiated Emissions Data																							
Job # :	10229704		Date :	9/10/12		Page	1		of		1												
NEX#:	218099		Time :	8:30 am																			
			Staff :	AG																			
Client Name :	SMK					EUT Voltage :	6V DC																
EUT Name :	Remote Control					EUT Frequency :																	
EUT Model # :	LC 2way					Phase:																	
EUT Serial # :	Unit #3																						
EUT Config. :	Continuous Xmit																						
						Distance < 1000 MHz:	3 m																
						Distance > 1000 MHz:	3 m																
Specification :	CFR47 Part 15, Subpart B, Class B 15.231																						
Loop Ant. #:	NA		Temp. (°C) :	23		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Quasi-Peak</td> <td>RBW: 120 kHz</td> </tr> <tr> <td colspan="2">Video Bandwidth 300 kHz</td> </tr> <tr> <td>Peak</td> <td>RBW: 1 MHz</td> </tr> <tr> <td colspan="2">Video Bandwidth 3 MHz</td> </tr> <tr> <td colspan="2">Average = Peak + Duty Cycle Factor</td> </tr> <tr> <td colspan="2">DCF = 20 x log(duty cycle)</td> </tr> </table>						Quasi-Peak	RBW: 120 kHz	Video Bandwidth 300 kHz		Peak	RBW: 1 MHz	Video Bandwidth 3 MHz		Average = Peak + Duty Cycle Factor		DCF = 20 x log(duty cycle)	
Quasi-Peak	RBW: 120 kHz																						
Video Bandwidth 300 kHz																							
Peak	RBW: 1 MHz																						
Video Bandwidth 3 MHz																							
Average = Peak + Duty Cycle Factor																							
DCF = 20 x log(duty cycle)																							
Bicon Ant. #:	NA		Humidity (%) :	74																			
Log Ant. #:	110_3m		Spec Analyzer #:	911																			
DRG Ant. #:	N/A		Analyzer Display #:	911																			
Cable LF#:	SAC_10m		Quasi-Peak Detector #:	911																			
Cable HF#:	N/A		Duty Cycle (%) :	38.22																			
Preamp LF#:	N/A																						
Preamp HF#:	N/A																						
Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated. Measurements above 1 GHz are Average values, unless otherwise stated.																							
Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side DEG	Ant. Height cm	Max. Reading (dBµV)	Corrected Reading (dBµV)	Spec. limit (dBµV)	CR/SL Diff. (dB)	Pass Fail	Comment												
369.500	41.7	57.6	P	304.0	100.0	57.6	76.5	98.4	-21.9	Pass	Unit 3 side left point left, ch 1												
369.500	41.7	57.6	A	304.0	100.0	57.6	68.2	78.4	-10.2	Pass	Unit 3 side left point left, ch 1												
369.500	54.3	45.0	P	255.0	131.0	54.3	73.2	98.4	-25.2	Pass	Unit 3 long side down n, ch1												
369.500	54.3	45.0	A	255.0	131.0	54.3	64.9	78.4	-13.5	Pass	Unit 3 long side down n, ch1												
369.500	53.8	48.6	P	289.0	116.0	53.8	72.7	98.4	-25.7	Pass	Unit 3 point up, ch 1												
369.500	53.8	48.6	A	289.0	116.0	53.8	64.4	78.4	-14.0	Pass	Unit 3 point up, ch 1												
375.300	43.4	57.8	P	303.0	100.0	57.8	76.8	98.6	-21.8	Pass	Unit 3 side left point left, ch3												
375.300	43.4	57.8	A	303.0	100.0	57.8	68.4	78.6	-10.2	Pass	Unit 3 side left point left, ch3												
375.300	55.0	45.8	P	245.0	123.0	55.0	74.0	98.6	-24.6	Pass	Unit 3 long side down n, ch 3												
375.300	55.0	45.8	A	245.0	123.0	55.0	65.6	78.6	-13.0	Pass	Unit 3 long side down n, ch 3												
375.300	54.1	48.9	P	286.0	110.0	54.1	73.1	98.6	-25.5	Pass	Unit 3 point up, ch 3												
375.300	54.1	48.9	A	286.0	110.0	54.1	64.7	78.6	-13.9	Pass	Unit 3 point up, ch 3												
394.300	42.8	57.9	P	332.0	100.0	57.9	77.8	99.4	-21.6	Pass	Unit 3 side left point left, ch 7												
394.3	42.8	57.9	A	332.0	100.0	57.9	69.4	79.4	-10.0	Pass	Unit 3 side left point left, ch 7												
394.3	55.7	53.1	P	289.0	121.0	55.7	75.6	99.4	-23.8	Pass	Unit 3 long side down n, ch 7												
394.3	55.7	53.1	A	289.0	121.0	55.7	67.2	79.4	-12.2	Pass	Unit 3 long side down n, ch 7												
394.3	55.3	49.5	P	279.0	109.0	55.3	75.2	99.4	-24.2	Pass	Unit 3 point up, ch 7												
394.3	55.3	49.5	A	279.0	109.0	55.3	66.8	79.4	-12.6	Pass	Unit 3 point up, ch 7												

Spurious emissions 30-1000 MHz:

Radiated Emissions Data											
Job # :	10229704		Date :	9/10/12		Page	1		of		1
NEX#:	218099		Time :	8:30 am							
			Staff :	AG							
Client Name :	SMK					EUT Voltage :	6V DC				
EUT Name :	Remote Control					EUT Frequency :					
EUT Model # :	LC 2way					Phase:					
EUT Serial # :	Unit #3										
EUT Config. :	Continuous Xmit										
						Distance < 1000 MHz:	3 m				
						Distance > 1000 MHz:	3 m				
Specification :	CFR47 Part 15, Subpart B, Class B 15.231										
Loop Ant. #:	NA		Temp. (°C) :	23							
Bicon Ant. #:	NA		Humidity (%) :	74							
Log Ant. #:	110_3m		Spec Analyzer #:	911							
DRG Ant. #:	N/A		Analyzer Display #:	911							
Cable LF#:	SAC_10m		Quasi-Peak Detector #:	911							
Cable HF#:	N/A		Duty Cycle (%) :	38.22							
Preamp LF#:	N/A										
Preamp HF#:	N/A										
						<div> <div>Quasi-Peak</div> <div>RBW: 120 kHz</div> <div>Video Bandwidth 300 kHz</div> </div> <div> <div>Peak</div> <div>RBW: 1 MHz</div> <div>Video Bandwidth 3 MHz</div> </div> <div> <div>Average = Peak + Duty Cycle Factor</div> <div>DCF = 20 x log(duty cycle)</div> </div>					
Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.											
Measurements above 1 GHz are Average values, unless otherwise stated.											
Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side DEG	Ant. Height cm	Max. Reading (dBµV)	Corrected Reading (dBµV)	Spec. limit (dBµV)	CR/SL Diff. (dB)	Pass Fail	Comment
739.0	28.1	31.0	P	348.0	100.0	31.0	57.7	78.4	-20.7	Pass	Unit 3 side left point left, ch 1
739.0	28.1	31.0	A	348.0	100.0	31.0	49.4	58.4	-9.0	Pass	Unit 3 side left point left, ch 1
739.0	20.1	26.4	Q	348.0	100.0	26.4	53.1	58.4	-5.3	Pass	Unit 3 side left point left, ch 1
739.0	27.9	33.2	P	220.0	110.0	33.2	59.9	78.4	-18.5	Pass	Unit 3 long side down n, ch1
739.0	27.9	33.2	A	220.0	110.0	33.2	51.6	58.4	-6.8	Pass	Unit 3 long side down n, ch1
739.0	16.5	26.5	Q	220.0	110.0	26.5	53.2	58.4	-5.2	Pass	Unit 3 long side down n, ch1
739.0	30.3	28.1	P	219.0	107.0	30.3	57.0	78.4	-21.4	Pass	Unit 3 point up, ch 1
739.0	30.3	28.1	A	219.0	107.0	30.3	48.7	58.4	-9.7	Pass	Unit 3 point up, ch 1
739.0	22.4	18.0	Q	219.0	107.0	22.4	49.1	58.4	-9.3	Pass	Unit 3 point up, ch 1
750.6	27.4	30.7	P	350.0	107.0	30.7	57.6	78.6	-21.0	Pass	Unit 3 side left point left, ch3
750.6	27.4	30.7	A	350.0	107.0	30.7	49.2	58.6	-9.4	Pass	Unit 3 side left point left, ch3
750.6	20.5	26.0	Q	350.0	107.0	26.0	52.9	58.6	-5.7	Pass	Unit 3 side left point left, ch3
750.6	26.8	32.4	P	220.0	100.0	32.4	59.3	78.6	-19.3	Pass	Unit 3 long side down n, ch 3
750.6	26.8	32.4	A	220.0	100.0	32.4	50.9	58.6	-7.7	Pass	Unit 3 long side down n, ch 3
750.6	16.6	26.1	Q	220.0	100.0	26.1	53.0	58.6	-5.6	Pass	Unit 3 long side down n, ch 3
750.6	30.4	27.6	P	218.0	100.0	30.4	57.3	78.6	-21.3	Pass	Unit 3 point up, ch 3
750.6	30.4	27.6	A	218.0	100.0	30.4	48.9	58.6	-9.7	Pass	Unit 3 point up, ch 3
750.6	23.5	18.0	Q	218.0	100.0	23.5	50.4	58.6	-8.2	Pass	Unit 3 point up, ch 3
788.6	30.0	29.7	P	180.0	110.0	30.0	57.3	79.4	-22.1	Pass	Unit 3 side left point left, ch 7
788.6	30.0	29.7	A	180.0	110.0	30.0	49.0	59.4	-10.4	Pass	Unit 3 side left point left, ch 7
788.6	24.7	24.2	Q	180.0	110.0	24.7	52.0	59.4	-7.4	Pass	Unit 3 side left point left, ch 7
788.6	29.1	34.8	P	181.0	101.0	34.8	62.1	79.4	-17.3	Pass	Unit 3 long side down n, ch 7
788.6	29.1	34.8	A	181.0	101.0	34.8	53.8	59.4	-5.6	Pass	Unit 3 long side down n, ch 7
788.6	22.9	31.8	Q	181.0	101.0	31.8	59.1	59.4	-0.3	Pass	Unit 3 long side down n, ch 7
788.6	32.4	28.4	P	219.0	100.0	32.4	59.7	79.4	-19.7	Pass	Unit 3 point up, ch 7
788.6	32.4	28.4	A	219.0	100.0	32.4	51.4	59.4	-8.0	Pass	Unit 3 point up, ch 7
788.6	27.5	20.4	Q	219.0	100.0	27.5	54.8	59.4	-4.6	Pass	Unit 3 point up, ch 7

Spurious emissions 1-4 GHz:

Radiated Emissions Data

Job # :	10229704	Date :	9/10/12	Page	1	of	1
NEX#:	218099	Time :	8:30 am				
		Staff :	AG				
Client Name :	SMK			EUT Voltage :	6V DC		
EUT Name :	Remote Control			EUT Frequency :			
EUT Model # :	LC 2way			Phase:			
EUT Serial # :	Unit #3						
EUT Config. :	Continuous Xmit Ch 1 (369.5 MHz)						
				Distance < 1000 MHz:	3 m		
				Distance > 1000 MHz:	3 m		
Specification :	CFR47 Part 15, Subpart B, Class B 15.231						
Loop Ant. #:	NA		Temp. (°C) :	23			
Bicon Ant. #:	NA		Humidity (%) :	74			
Log Ant. #:	110_3m		Spec Analyzer #:	911			
DRG Ant. #:	752		Analyzer Display #:	911			
Cable LF#:	SAC_10m		Quasi-Peak Detector #:	911			
Cable HF#:	WCC		Duty Cycle (%) :	38.22			
Preamp LF#:							
Preamp HF#:	1029						

Quasi-Peak	RBW: 120 kHz
Video Bandwidth	300 kHz
Peak	RBW: 1 MHz
Video Bandwidth	3 MHz
Average = Peak + Duty Cycle Factor	
DCF = 20 x log(duty cycle)	

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.

Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side DEG	Ant. Height cm	Max. Reading (dBμV)	Corrected Reading (dBμV)	Spec. limit (dBμV)	CR/SL Diff. (dB)	Pass Fail	Comment
1108.500	52.9	57.9	P	134.0	100.0	57.9	44.9	74.0	-29.1	Pass	Unit 3 side left point left
1108.500	52.9	57.9	A	134.0	100.0	57.9	36.6	54.0	-17.4	Pass	Unit 3 side left point left
1478.000	61.7	62.5	P	36.0	100.0	62.5	51.5	74.0	-22.5	Pass	Unit 3 side left point left
1478.000	61.7	62.5	A	36.0	100.0	62.5	43.1	54.0	-10.9	Pass	Unit 3 side left point left
1847.500	60.0	60.5	P	104.0	157.0	60.5	52.1	78.4	-26.3	Pass	Unit 3 side left point left
1847.500	60.0	60.5	A	104.0	157.0	60.5	43.7	58.4	-14.7	Pass	Unit 3 side left point left
2217.000	46.0	52.0	P	62.0	140.0	52.0	44.6	74.0	-29.4	Pass	Unit 3 side left point left
2217.000	46.0	52.0	A	62.0	140.0	52.0	36.2	54.0	-17.8	Pass	Unit 3 side left point left
2586.500	47.8	52.5	P	70.0	102.0	52.5	46.4	78.4	-32.0	Pass	Unit 3 side left point left
2586.500	47.8	52.5	A	70.0	102.0	52.5	38.1	58.4	-20.3	Pass	Unit 3 side left point left
3325.5	48.0	48.5	P	71.0	114.0	48.5	46.1	78.4	-32.3	Pass	Unit 3 side left point left
3325.5	48.0	48.5	A	71.0	114.0	48.5	37.8	58.4	-20.6	Pass	Unit 3 side left point left

Radiated Emissions Data

Job #: 10229704 Date: 10/1/12
NEX #: 218099 Time: 10 am
Staff: AG

Client Name: SMK
EUT Name: Remote Control
EUT Model #: LC 2way
EUT Serial #: Unit #3
EUT Config.: Continuous Xmit Ch 1 (369.5 MHz)

Specification: CFR47 Part 15, Subpart B, Class B 15.231

Loop Ant. #: NA
Bicon Ant. #: NA Temp. (°C): 23
Log Ant. #: 110_3m Humidity (%): 53
DRG Ant. #: 752 Spec Analyzer #: 911
Cable LF#: SAC_10m Analyzer Display #: 911
Cable HF#: WCC Quasi-Peak Detector #: 911
Preamp LF#: NA Duty Cycle (%): 38.22
Preamp HF#: 317

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EUT Voltage: 6V DC
EUT Frequency:
Phase:
Distance < 1000 MHz: 3 m
Distance > 1000 MHz: 3 m

Quasi-Peak	RBW: 120 kHz
Video Bandwidth	300 kHz
Peak	RBW: 1 MHz
Video Bandwidth	3 MHz
Average = Peak + Duty Cycle Factor	
DCF = 20 x log(duty cycle)	

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.
Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side DEG	Ant. Height cm	Max. Reading (dBµV)	Corrected Reading (dBµV)	Spec. limit (dBµV)	CR/SL Diff. (dB)	Pass Fail	Comment
1108.500	49.3	46.7	P	200.0	100.0	49.3	47.5	74.0	-26.5	Pass	Unit 3 long side down n
1108.500	49.3	46.7	A	200.0	100.0	49.3	39.1	54.0	-14.9	Pass	Unit 3 long side down n
1108.500	49.0	45.8	P	107.0	118.0	49.0	47.2	74.0	-26.8	Pass	Unit 3 point up
1108.500	49.0	45.8	A	107.0	118.0	49.0	38.8	54.0	-15.2	Pass	Unit 3 point up
1478.000	50.6	50.6	P	124.0	100.0	50.6	48.9	74.0	-25.1	Pass	Unit 3 long side down n
1478.000	50.6	50.6	A	124.0	100.0	50.6	40.5	54.0	-13.5	Pass	Unit 3 long side down n
1478.000	55.3	49.0	P	195.0	124.0	55.3	53.6	74.0	-20.4	Pass	Unit 3 point up
1478.000	55.3	49.0	A	195.0	124.0	55.3	45.2	54.0	-8.8	Pass	Unit 3 point up
1847.500	55.3	51.1	P	161.0	198.0	55.3	55.8	78.4	-22.6	Pass	Unit 3 long side down n
1847.500	55.3	51.1	A	161.0	198.0	55.3	47.5	58.4	-10.9	Pass	Unit 3 long side down n
1847.500	49.3	59.4	P	204.0	163.0	59.4	59.9	78.4	-18.5	Pass	Unit 3 point up
1847.500	49.3	59.4	A	204.0	163.0	59.4	51.6	58.4	-6.8	Pass	Unit 3 point up
2217.000	48.4	51.1	P	164.0	184.0	51.1	56.1	74.0	-17.9	Pass	Unit 3 long side down n
2217.000	48.4	51.1	A	164.0	184.0	51.1	47.8	54.0	-6.2	Pass	Unit 3 long side down n
2217.000	53.3	49.1	P	169.0	100.0	53.3	58.3	74.0	-15.7	Pass	Unit 3 point up
2217.000	53.3	49.1	A	169.0	100.0	53.3	50.0	54.0	-4.0	Pass	Unit 3 point up
2586.500	48.7	47.3	P	145.0	190.0	48.7	54.6	78.4	-23.8	Pass	Unit 3 long side down n
2586.500	48.7	47.3	A	145.0	190.0	48.7	46.3	58.4	-12.1	Pass	Unit 3 long side down n
2586.500	46.9	53.3	P	181.0	111.0	53.3	59.2	78.4	-19.2	Pass	Unit 3 point up
2586.500	46.9	53.3	A	181.0	111.0	53.3	50.9	58.4	-7.5	Pass	Unit 3 point up
2956.0		47.9	P	191.0	214.0	47.9	56.3	78.4	-22.1	Pass	Unit 3 long side down n
2956.0		47.9	A	191.0	214.0	47.9	47.9	58.4	-10.5	Pass	Unit 3 long side down n
2956.0	49.0	46.5	P	173.0	111.0	49.0	57.4	78.4	-21.0	Pass	Unit 3 point up
2956.0	49.0	46.5	A	173.0	111.0	49.0	49.0	58.4	-9.4	Pass	Unit 3 point up
3325.5	47.6	47.9	P	147.0	173.0	47.9	57.4	78.4	-21.0	Pass	Unit 3 long side down n
3325.5	47.6	47.9	A	147.0	173.0	47.9	49.0	58.4	-9.4	Pass	Unit 3 long side down n
3325.5	47.5	49.0	P	164.0	114.0	49.0	58.5	78.4	-19.9	Pass	Unit 3 point up
3325.5	47.5	49.0	A	164.0	114.0	49.0	50.1	58.4	-8.3	Pass	Unit 3 point up
3695.0		45.8	P	202.0	186.0	45.8	56.5	74.0	-17.5	Pass	Unit 3 long side down n
3695.0		45.8	A	202.0	186.0	45.8	48.1	54.0	-5.9	Pass	Unit 3 long side down n

Radiated Emissions Data

Job # :	10229704	Date :	10/1/12	Page	1	of	1
NEX #:	218099	Time :	10am				
		Staff :	AG				
Client Name :	SMK			EUT Voltage :	6V DC		
EUT Name :	Remote Control			EUT Frequency :			
EUT Model # :	LC 2way			Phase:			
EUT Serial # :	Unit #3						
EUT Config. :	Continuous Xmit ch 3 (375.3 MHz)						
				Distance < 1000 MHz:	3 m		
				Distance > 1000 MHz:	3 m		
Specification :	CFR47 Part 15, Subpart B, Class B 15.231						
Loop Ant. #:	NA						
Bicon Ant. #:	NA			Temp. (°C) :	23		
Log Ant. #:	110_3m			Humidity (%) :	53		
DRG Ant. #	752			Spec Analyzer #:	911		
Cable LF#:	SAC_10m			Analyzer Display #:	911		
Cable HF#:	WCC			Quasi-Peak Detector #:	911		
Preamp LF#:	NA			Duty Cycle (%) :	38.22		
Preamp HF#	317						

Quasi-Peak	RBW: 120 kHz
	Video Bandwidth 300 kHz
Peak	RBW: 1 MHz
	Video Bandwidth 3 MHz
Average = Peak + Duty Cycle Factor	
DCF = 20 x log(duty cycle)	

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.
Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side DEG	Ant. Height cm	Max. Reading (dBµV)	Corrected Reading (dBµV)	Spec. limit (dBµV)	CR/SL Diff. (dB)	Pass Fail	Comment
1501.200	55.0		P	185.0	164.0	55.0	54.9	74.0	-19.1	Pass	Unit 3 point up
1501.200	55.0		A	185.0	164.0	55.0	46.5	54.0	-7.5	Pass	Unit 3 point up
1876.500	57.0		P	181.0	150.0	57.0	59.7	78.6	-18.9	Pass	Unit 3 long side down
1876.500	57.0		A	181.0	150.0	57.0	51.4	58.6	-7.2	Pass	Unit 3 long side down
1876.500		60.3	P	173.0	154.0	60.3	63.0	78.6	-15.6	Pass	Unit 3 point up
1876.500		60.3	A	173.0	154.0	60.3	54.7	58.6	-3.9	Pass	Unit 3 point up
2251.800		48.7	P	152.0	181.0	48.7	53.6	74.0	-20.4	Pass	Unit 3 long side down
2251.800		48.7	A	152.0	181.0	48.7	45.2	54.0	-8.8	Pass	Unit 3 long side down
2251.800	53.3		P	207.0	129.0	53.3	58.2	74.0	-15.8	Pass	Unit 3 point up
2251.800	53.3		A	207.0	129.0	53.3	49.8	54.0	-4.2	Pass	Unit 3 point up
2627.100		53.7	P	180.0	108.0	53.7	60.3	78.6	-18.3	Pass	Unit 3 point up
2627.100		53.7	A	180.0	108.0	53.7	52.0	58.6	-6.6	Pass	Unit 3 point up

Radiated Emissions Data

Job # : 10229704 Date : 9/10/12
NEX # : 218099 Time : 8:30 am
Staff : AG

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Client Name : SMK
EUT Name : Remote Control
EUT Model # : LC 2way
EUT Serial # : Unit #3
EUT Config : Continuous Xmit CH 7 (394.3 MHz)

EUT Voltage : 6V DC
EUT Frequency :
Phase:

Distance < 1000 MHz: 3 m
Distance > 1000 MHz: 3 m

Specification : CFR47 Part 15, Subpart B, Class B 15.231
Loop Ant. #: NA
Bicon Ant. #: NA Temp. (°C) : 23
Log Ant. #: 110_3m Humidity (%) : 74
DRG Ant. # : 752 Spec Analyzer #: 911
Cable LF#: SAC_10m Analyzer Display #: 911
Cable HF#: WCC Quasi-Peak Detector #: 911
Preamp LF#: Duty Cycle (%): 38.22
Preamp HF# : 1029

Quasi-Peak	RBW: 120 kHz
Video Bandwidth	300 kHz
Peak	RBW: 1 MHz
Video Bandwidth	3 MHz
Average = Peak + Duty Cycle Factor	
DCF = 20 x log(duty cycle)	

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.

Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side DEG	Ant. Height cm	Max. Reading (dBμV)	Corrected Reading (dBμV)	Spec. limit (dBμV)	CR/SL Diff. (dB)	Pass Fail	Comment
1182.900	52.0	53.0	P	255.0	132.0	53.0	40.6	74.0	-33.4	Pass	Unit 3 side left point left
1182.900	52.0	53.0	A	255.0	132.0	53.0	32.3	54.0	-21.7	Pass	Unit 3 side left point left
1182.900	55.3	50.1	P	225.0	100.0	55.3	42.9	74.0	-31.1	Pass	Unit 3 long side down n
1182.900	55.3	50.1	A	225.0	100.0	55.3	34.6	54.0	-19.4	Pass	Unit 3 long side down n
1577.200	60.6	57.0	P	67.0	155.0	60.6	49.9	74.0	-24.1	Pass	Unit 3 side left point left
1577.200	60.6	57.0	A	67.0	155.0	60.6	41.5	54.0	-12.5	Pass	Unit 3 side left point left
1577.200	58.7	58.3	P	83.0	171.0	58.7	48.0	74.0	-26.0	Pass	Unit 3 long side down n
1577.200	58.7	58.3	A	83.0	171.0	58.7	39.6	54.0	-14.4	Pass	Unit 3 long side down n
1971.500	64.8	64.0	P	192.0	146.0	64.8	57.0	79.4	-22.4	Pass	Unit 3 side left point left
1971.500	64.8	64.0	A	192.0	146.0	64.8	48.7	59.4	-10.7	Pass	Unit 3 side left point left
1971.500	70.0	63.1	P	203.0	106.0	70.0	62.2	79.4	-17.2	Pass	Unit 3 long side down n
1971.500	70.0	63.1	A	203.0	106.0	70.0	53.9	59.4	-5.5	Pass	Unit 3 long side down n
2365.800	51.2	57.0	P	359.0	119.0	57.0	50.6	74.0	-23.4	Pass	Unit 3 side left point left
2365.800	51.2	57.0	A	359.0	119.0	57.0	42.2	54.0	-11.8	Pass	Unit 3 side left point left
2365.800	54.0	59.8	P	165.0	208.0	59.8	53.4	74.0	-20.6	Pass	Unit 3 long side down n
2365.800	54.0	59.8	A	165.0	208.0	59.8	45.0	54.0	-9.0	Pass	Unit 3 long side down n
2760.100		48.0	P	114.0	168.0	48.0	42.2	74.0	-31.8	Pass	Unit 3 side left point left
2760.100		48.0	A	114.0	168.0	48.0	33.9	54.0	-20.1	Pass	Unit 3 side left point left
2760.100	50.4	48.0	P	132.0	195.0	50.4	44.6	74.0	-29.4	Pass	Unit 3 long side down n
2760.100	50.4	48.0	A	132.0	195.0	50.4	36.3	54.0	-17.7	Pass	Unit 3 long side down n
3154.4	47.7		P	306.0	154.0	47.7	44.4	79.4	-35.0	Pass	Unit 3 side left point left
3154.4	47.7		A	306.0	154.0	47.7	36.0	59.4	-23.4	Pass	Unit 3 side left point left
3154.4	46.7	51.0	P	205.0	186.0	51.0	47.7	79.4	-31.7	Pass	Unit 3 long side down n
3154.4	46.7	51.0	A	205.0	186.0	51.0	39.3	59.4	-20.1	Pass	Unit 3 long side down n
3548.7	47.8		P	122.0	135.0	47.8	45.8	79.4	-33.6	Pass	Unit 3 long side down n
3548.7	47.8		A	122.0	135.0	47.8	37.5	59.4	-21.9	Pass	Unit 3 long side down n
3943.0	48.5	50.2	P	100.0	160.0	50.2	49.2	74.0	-24.7	Pass	Unit 3 long side down n
3943.0	48.5	50.2	A	100.0	160.0	50.2	40.9	54.0	-13.1	Pass	Unit 3 long side down n

Radiated Emissions Data

Job # :	10229704	Date :	10/10/12, 10/19/12	Page	1	of	1
NEX #:	218099	Time :	10am				
		Staff :	AG				
Client Name :	SMK	EUT Voltage :	6V DC				
EUT Name :	Remote Control	EUT Frequency :					
EUT Model # :	LC 2way	Phase:					
EUT Serial # :	Unit #3						
EUT Config. :	Continuous Xmit Ch 7 (394.3 MHz)						
		Distance < 1000 MHz:	3 m				
		Distance > 1000 MHz:	3 m				
Specification :	CFR47 Part 15, Subpart B, Class B 15.231						
Loop Ant. #:	NA						
Bicon Ant. #:	NA	Temp. (°C) :	23				
Log Ant. #:	110_3m	Humidity (%) :	53-70				
DRG Ant. #	752	Spec Analyzer #:	911				
Cable LF#:	SAC_10m	Analyzer Display #:	911				
Cable HF#:	WCC	Quasi-Peak Detector #:	911				
Preamp LF#:	NA	Duty Cycle (%) :	38.22				
Preamp HF#	317						

Quasi-Peak RBW: 120 kHz
 Video Bandwidth 300 kHz
 Peak RBW: 1 MHz
 Video Bandwidth 3 MHz
 Average = Peak + Duty Cycle Factor
 DCF = 20 x log(duty cycle)

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.

Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side DEG	Ant. Height cm	Max. Reading (dBµV)	Corrected Reading (dBµV)	Spec. limit (dBµV)	CR/SL Diff. (dB)	Pass Fail	Comment
1182.900	48.4	46.9	P	111.0	104.0	48.4	47.7	74.0	-26.3	Pass	Unit 3 point up
1182.900	48.4	46.9	A	111.0	104.0	48.4	39.3	54.0	-14.7	Pass	Unit 3 point up
1577.200	57.5	48.9	P	176.0	155.0	57.5	57.6	74.0	-16.4	Pass	Unit 3 point up
1577.200	57.5	48.9	A	176.0	155.0	57.5	49.3	54.0	-4.7	Pass	Unit 3 point up
1971.500	51.3	60.1	P	187.0	147.0	60.1	63.3	79.4	-16.1	Pass	Unit 3 point up
1971.500	51.3	60.1	A	187.0	147.0	60.1	55.0	59.4	-4.4	Pass	Unit 3 point up
2365.800	55.7	47.8	P	167.0	119.0	55.7	61.8	74.0	-12.2	Pass	Unit 3 point up
2365.800	55.7	47.8	A	167.0	119.0	55.7	53.4	54.0	-0.6	Pass	Unit 3 point up
2760.100	46.5	51.5	P	151.0	116.0	51.5	57.7	74.0	-16.3	Pass	Unit 3 point up
2760.100	46.5	51.5	A	151.0	116.0	51.5	49.4	54.0	-4.6	Pass	Unit 3 point up
3154.4	47.3	45.4	P	181.0	103.0	47.3	55.8	79.4	-23.6	Pass	Unit 3 point up
3154.4	47.3	45.4	A	181.0	103.0	47.3	47.5	59.4	-11.9	Pass	Unit 3 point up
3548.7	45.7	47.1	P	178.0	108.0	47.1	57.3	79.4	-22.1	Pass	Unit 3 point up
3548.7	45.7	47.1	A	178.0	108.0	47.1	48.9	59.4	-10.5	Pass	Unit 3 point up
3943.0	44.8		P	136.0	150.0	44.8	56.0	74.0	-18.0	Pass	Unit 3 point up
3943.0	44.8		A	136.0	150.0	44.8	47.6	54.0	-6.4	Pass	Unit 3 point up

Conducted Emissions Test Data—Receive Mode

EUT does not have need for AC power as it is battery powered.

Radiated Emissions Test Data—Receive Mode

The following receiver spurious emission limits shall be complied with:

(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Table 1 - Spurious Emission Limits for Receivers

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960	500

Client	SMK Manufacturing	Temperature	23	°C
NEX #	218099	Relative Humidity	53	%
EUT Name	Settop Box Remote Control			
EUT Model	LC 2way	Test Location	10 m Chamber	
Governing Doc	CFR 47, Part 15B	Test Engineer	Andreas Gillmeier	
Basic Standard	Sec. 15.109 Class "B"	Date of test	10/01/2012	

EUT does not have a receiver built-in.

Test was done in infrared transmit mode.

No emissions noted within 10 dB of the limit in the range of 30 to 2000 MHz.



APPENDIX B

B. Radiated Emissions Measurement Uncertainties

1. Introduction

ISO/IEC 17025:2005 and ANSI/NCSL Z540.3: 2006 require that all measurements contained in a test report be "traceable". "Traceability" is defined in the *International Vocabulary of Basic and General Terms in Metrology* (ISO: 1993) as: "the property of the result of a measurement... whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons, *all having stated uncertainties*".

The purposes of this Appendix are to "state the *Measurement Uncertainties*" of the conducted emissions and radiated emissions measurements contained in Section 5 of this Test Report, and to provide a practical explanation of the meaning of these measurement uncertainties.

2. Statement of the Worst-Case Measurement Uncertainties for the Conducted and Radiated Emissions Measurements Contained in This Test Report

Table 1: Worst-Case Expanded Uncertainty "U" of Measurement for a k=2 Coverage Factor

Radiated Emissions Measurement Detection Systems	Applicable Frequency Range	"U" for a k=2 Coverage Factor
Spectrum Analyzer with QPA & Preamplifier	30 MHz - 200 MHz	+3.9 dB, -4.0 dB
Spectrum Analyzer with QPA & Preamplifier	200 MHz-1000 MHz	+/- 3.5 dB
Spectrum Analyzer with Preamplifier	1 GHz - 18 GHz	+2.5 dB, -2.6 dB
Spectrum Analyzer with Preamplifier	18 GHz - 40 GHz	+/- 3.4 dB

NOTES:

1. Applies to 3 and 10 meter measurement distances
2. Applies to all valid combinations of Transducers (i.e. LISNs, Line Voltage Probes, and Antennas, as appropriate)
3. Excludes the Repeatability of the EUT

3. Practical Explanation of the Meaning of Radiated Emissions Measurement Uncertainties

In general, a "Statement of Measurement Uncertainty" means that with a certain (specified) confidence level, the "true" value of a measurand will be between a (stated) upper bound and a (stated) lower bound.

In the specific case of EMC Measurements in this test report, the measurement uncertainties of the conducted emissions measurements and the radiated emissions measurements have been calculated in accordance with the method detailed in the following documents:

- *ANSI Z540.2 (2002) Guide to the Expression of Uncertainty in Measurement*
- NIS 81:1994, *The Treatment of Uncertainty in EMC Measurements* (NAMAS, 1994)
- NIST Technical Note 1297(1994), *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results* (NIST, 1994)

The calculation method used in these documents requires that the stated uncertainty of the measurements be expressed as an "exNEXded uncertainty", U , with a $k=2$ coverage factor. The practical interpretation of this method of expressing measurement uncertainty is shown in the following example:

EXAMPLE: Assume that at 39.51 MHz, the (measured) radiated emissions level was equal to +26.5 dBuV/m, and that the +/- 2 standard deviations (i.e. 95% confidence level) measurement uncertainty was +/- 3.4 dB.

APPENDIX C

C. Nemko USA, Inc. Test Equipment & Facilities Calibration Program

Nemko USA, Inc. operates a comprehensive Periodic Calibration Program in order to ensure the validity of all test data. Nemko USA's Periodic Calibration Program is fully compliant to the requirements of NVLAP Policy Guide PG-1-1988, ANSI/NCSL Z540.3: 2006, ISO 10012:2003, ISO/IEC 17025:2005, and ISO-9000: 2000. Nemko USA, Inc.'s calibrations program therefore meets or exceeds the US national commercial and military requirements [N.B. ANSI/NCSL Z540.1-1994 replaced MIL-STD-45662A].

Specifically, all of Nemko USA's *primary reference standard devices* (e.g. vector voltmeters, multimeters, attenuators and terminations, RF power meters and their detector heads, oscilloscope mainframes and plug-ins, spectrum analyzers, RF preselectors, quasi-peak adapters, interference analyzers, impulse generators, signal generators and pulse/function generators, field-strength meters and their detector heads, etc.) and certain *secondary standard devices* (e.g. RF Preamplifiers used in CISPR 11/22 and FCC Part 15/18 tests) are periodically recalibrated by:

- A Nemko USA-approved independent (third party) metrology laboratory that uses NIST-traceable standards and that is ISO Guide 25-accredited as a calibration laboratories by NIST; or,
- A Nemko USA-approved independent (third party) metrology laboratory that uses NIST-traceable standards and that is ISO Guide 25-accredited as a calibration laboratory by another accreditation body (such as A2LA) that is mutually recognized by NIST; or,
- A manufacturer of Measurement and Test Equipment (M&TE), if the manufacturer uses NIST-traceable standards and is ISO Guide 25-accredited as calibration laboratory either by NIST or by another accreditation body (such as A2LA) that is mutually recognized by NIST; or
- A manufacturer of M&TE (or by a Nemko USA-approved independent third party metrology laboratory) that is not ISO Guide 25-accredited. (In these cases, Nemko USA conducts an annual audit of the manufacturer or metrology laboratory for the purposes of proving traceability to NIST, ensuring that adequate and repeatable calibration procedures are being applied, and verifying conformity with the other requirements of ISO Guide 25).

In all cases, the entity performing the Calibration is required to furnish Nemko USA with a calibration test report and/or certificate of calibration, and a "calibration sticker" on each item of M&TE that is successfully calibrated.

Calibration intervals are normally one year, except when the manufacture advises a shorter interval or if US Government directives or client requirements demand a shorter interval. Items of instrumentation/related equipment which fail during routine use, or which suffer visible mechanical damage (during use or while in transit), are sidelined pending repair and recalibration. (Repairs are carried out either in-house [if minor] or by a Nemko USA-approved independent [third party] metrology laboratory, or by the manufacturer of the item of M&TE).

Each antenna used for CISPR 11 and CISPR 22 and FCC Part 15 and Part 18 radiated emissions testing (and for testing to the equivalent European Norms) is calibrated annually by either a NIST (or A2LA) ISO Standard 17025-Accredited third-party Antenna Calibration Laboratory or by the antenna's OEM if the OEM is NIST or A2LA ISO Standard 17025-accredited as an antenna calibration laboratory. The antenna calibrations are performed using the methods specified in Annex G.5 of CISPR 16-1(2003) or ANSI C63.5-2004, including the "Three-Antenna Method". Certain other kinds of antennas (e.g. magnetic-shielded loop antennas) are calibrated annually by either a NIST (or A2LA) ISO Standard 17025-accredited third-party antenna calibration laboratory, or by the antenna's OEM if the OEM is NIST or A2LA ISO Standard 17025-accredited as an antenna calibration laboratory using the procedures specified in the latest version of SAE ARP-958.

In accordance with FCC and other regulations, Nemko USA recalibrates its suite of antennas used for radiated emissions tests on an annual basis. These calibrations are performed as a precursor to the FCC-required annual revalidation of the Normalized Site Attenuation properties of Nemko USA's Open Area Test Site. Nemko USA, Inc. uses the procedures given in both Sub clause 16.6 and Annex G.2 of CISPR 16-1 (2003), and, ANSI C63.4-2003 when performing the normalized site attenuation measurements.