CKC LABORATORIES, INC. Testing the Future


# RT TECHNOLOGIES TEST REPORT

## FOR THE

## REMOTE CONTROL TRANSMITTER, REMINGTON SIDEKICK TRANSMITTER

## FCC PART 15 SUBPART C SECTIONS 15.209 & 15.249 AND RSS-210 ISSUE 7

## TESTING

**DATE OF ISSUE: AUGUST 21, 2008**

**PREPARED FOR:**

RT Technologies
921 E. Dupont Rd.
Fort Wayne, IN 46825

W.O. No.: 87989

**PREPARED BY:**

Mary Ellen Clayton
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Date of test: July 18, 2008

**Report No.: FC08-084**

## TABLE OF CONTENTS

## ADMINISTRATIVE INFORMATION

**DATE OF TEST:** July 18, 2008

**DATE OF RECEIPT:** July 18, 2008

**REPRESENTATIVE:** Gregory Stillwell

**MANUFACTURER:**
RT Technologies
921 E. Dupont Rd.
Fort Wayne, IN 46825

**TEST LOCATION:**
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

**TEST METHOD:** ANSI C63.4 (2003), RSS-210 Issue 7 and RSS-GEN

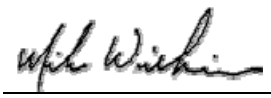
**PURPOSE OF TEST:** To perform the testing of the Remote Control Transmitter, Remington Sidekick Transmitter with the requirements for FCC Part 15 Subpart C Sections 15.209 & 15.249 and RSS-210 devices.

**APPROVALS**

**QUALITY ASSURANCE:**

Steve Behm, Director of Engineering Services

**TEST PERSONNEL:**



Mike Wilkinson, Senior EMC Engineer/Lab Manager

## SUMMARY OF RESULTS

| Test | Specification/Method | Results |
|---|---|---|
| | | |
| Field Strength of Spurious Emissions | FCC Part 15.209 | Pass |
| | | |
| Field Strength of Fundamental | FCC Part 15.249 | Pass |
| | | |
| Band Edge | FCC Part 15.249 | Pass |
| | | |
| 99% Bandwidth | RSS-210 | Pass |
| | | |
| Site Filing Nos. | FCC Site No. 784962<br>Industry of Canada File No. IC 3082A-1 | |

## CONDITIONS DURING TESTING

No modifications to the EUT were necessary during testing.

**FCC 15.31(e) Voltage Variations**
Not applicable to this device because it is battery powered.

**FCC 15.31(m) Number Of Channels**
This device operates on a single channel.

**FCC 15.33(a) Frequency Ranges Tested**
15.209 Radiated Emissions: 9 kHz – 10000 MHz
15.249 Radiated Emissions: Carrier

**FCC 15.203 Antenna Requirements**
The antenna is an integral part of the EUT and is non-removable; therefore the EUT complies with Section 15.203 of the FCC rules.

**EUT Operating Frequency**
The EUT was operating at 916.25 MHz.

**Temperature And Humidity During Testing**
The temperature during testing was within +15°C and + 35°C.
The relative humidity was between 20% and 75%.

## EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The customer declares the EUT tested by CKC Laboratories was representative of a production unit.

## EQUIPMENT UNDER TEST

**Remote Control Transmitter**

| | |
|---|---|
| Manuf: | RT Technologies |
| Model: | Remington Sidekick Transmitter |
| Serial: | 001 |
| FCC ID: | pending |

## PERIPHERAL DEVICES

The EUT was not tested with peripheral devices.

# REPORT OF EMISSIONS MEASUREMENTS

## TESTING PARAMETERS

The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

## CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula. This reading was then compared to the applicable specification limit.

| SAMPLE CALCULATIONS | | |
|---|---|---|
| | Meter reading | (dBµV) |
| + | Antenna Factor | (dB) |
| + | Cable Loss | (dB) |
| - | Distance Correction | (dB) |
| - | Preamplifier Gain | (dB) |
| = | Corrected Reading | (dBµV/m) |

## TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. The following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

| MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE | | | |
|---|---|---|---|
| TEST | BEGINNING FREQUENCY | ENDING FREQUENCY | BANDWIDTH SETTING |
| RADIATED EMISSIONS | 30 MHz | 1000 MHz | 120 kHz |
| RADIATED EMISSIONS | 1000 MHz | >1 GHz | 1 MHz |

## SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the highest readings, this is indicated as a "QP" or an "Ave" on the appropriate rows of the data sheets. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

**Peak**

In this mode, the spectrum analyzer/receiver readings were recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the measuring device called "peak hold," the measuring device had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

**Quasi-Peak**

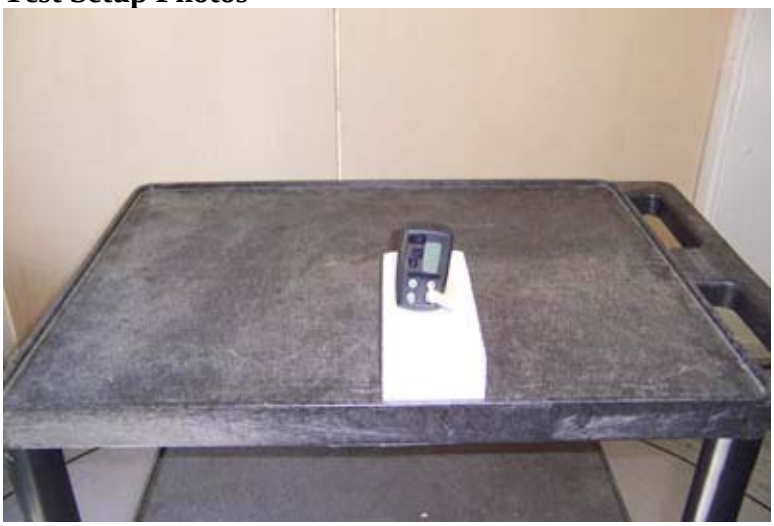
When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the quasi-peak detector.

**Average**

For certain frequencies, average measurements may be made using the spectrum analyzer/receiver. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.

## FCC 15.209 FIELD STRENGTH OF SPURIOUS EMISSIONS

### Test Setup Photos



## Test Data Sheets

Test Location: CKC Laboratories, Inc. •4933 Sierra Pines Dr. • Mariposa CA, 95338 • 1-800-500-4EMC (4362)

Customer: **RT Technologies**
Specification: **FCC 15.209**
Work Order #: **88020** Date: 8/18/2008
Test Type: **Maximized Emissions** Time: 15:09:42
Equipment: **Remote Control Transmitter** Sequence#: 3
Manufacturer: RT Technologies Tested By: Mike Wilkinson
Model: Remington Sidekick Transmitter
S/N: 001

***Test Equipment*:**

| Function | S/N | Calibration Date | Cal Due Date | Asset # |
|---|---|---|---|---|
| Agilent E4446A SA | US44300407 | 01/03/2007 | 01/03/2009 | 02660 |
| Chase CBL6111C Bilog | 2456 | 12/30/2006 | 12/30/2008 | 01991 |
| HP 8447D Preamp | 1937A02604 | 03/14/2007 | 03/14/2009 | 00099 |
| 3M SITE CABLE 20GHZ | NA | 03/06/2008 | 03/06/2010 | SITED3M1 |
| Cable 2' 40 GHz Astrolab | NA | 01/15/2008 | 01/15/2010 | AN03011 |
| Cable 2' 40 GHz Astrolab | NA | 01/15/2008 | 01/15/2010 | AN03008 |
| Andrews Hardline (25') | CKC 1012 | 04/23/2007 | 04/23/2009 | P01012 |
| Agilent E4446A SA | US44300407 | 01/03/2007 | 01/03/2009 | 02660 |
| EMCO 3115 Horn Antenna | 9307-4085 | 03/17/2007 | 03/17/2009 | 00656 |
| EMCO Loop Antenna | 1074 | 05/01/2007 | 05/01/2009 | 00226 |
| HP 8449B Preamp | 3008A00301 | 12/13/2006 | 12/13/2008 | 2010 |

***Equipment Under Test* (* = EUT):**

| Function | Manufacturer | Model # | S/N |
|---|---|---|---|
| Remote Control Transmitter* | RT Technologies | Remington Sidekick Transmitter | 001 |

***Support Devices:***

| Function | Manufacturer | Model # | S/N |
|---|---|---|---|

***Test Conditions / Notes:***

EUT is a remote control transmitter operating at 916.25 MHz. EUT is battery powered: a fresh battery is installed prior to testing. EUT is operated manually using a plastic clamp to depress a button. Orientations: X - EUT lying on its long side with the buttons and screen facing horizontally. Y - EUT lying on its short side with the buttons and screen facing horizontally. Z - EUT lying on its back with the buttons and screen facing vertically. Y was found to be worst case. EUT tested in worst case orientation. Frequency Range Investigated: 9 kHz to 10000 MHz RBW = 9 kHz 9KHz to 30 MHz,120 kHz 30 to 1000 MHz, 1 MHz 1-10 GHz & VBW = 3xRBW. Temperature: 29ºC, Relative Humidity: 29%. The readings in this datasheet also satisfies FCC 15.109 and 15.205

***Transducer Legend:***

| | |
|---|---|
| T1=AMP AN00099 | T2=Amp HF - AN02010 |
| T3=ANT AN01991 25-1000MHz | T4=CAB-AN03011-40GHZ-2FT |
| T5=Cable P01012 | T6=CAB-SITED3M1 9k - 20G |
| T7=CAB-AN03008-40GHZ-2FT | T8=ANT AN00656 900MHz-18.5GHz |

***Measurement Data:*** Reading listed by margin. Test Distance: 3 Meters

| # | Freq | Rdng | T1 | T2 | T3 | T4 | Dist | Corr | Spec | Margin | Polar |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | T5 | T6 | T7 | T8 | | | | | |
| | MHz | dBµV | dB | dB | dB | dB | Table | dBµV/m | dBµV/m | dB | Ant |
| 1 | 1832.564M | 49.3 | +0.0 | -35.0 | +0.0 | +0.4 | +0.0 | 47.5 | 54.0 | -6.5 | Vert |
| | | | +2.0 | +3.6 | +0.4 | +26.8 | | | | | |
| 2 | 1832.699M | 47.6 | +0.0 | -35.0 | +0.0 | +0.4 | +0.0 | 45.8 | 54.0 | -8.2 | Horiz |
| | | | +2.0 | +3.6 | +0.4 | +26.8 | | | | | |
| 3 | 3665.208M | 27.5 | +0.0 | -34.4 | +0.0 | +0.5 | +0.0 | 35.9 | 54.0 | -18.1 | Vert |
| | | | +2.9 | +6.4 | +0.5 | +32.5 | | | | | |
| 4 | 4581.462M | 25.5 | +0.0 | -33.9 | +0.0 | +0.5 | +0.0 | 35.6 | 54.0 | -18.4 | Vert |
| | | | +3.3 | +7.5 | +0.5 | +32.2 | | | | | |
| 5 | 3665.053M | 26.8 | +0.0 | -34.4 | +0.0 | +0.5 | +0.0 | 35.2 | 54.0 | -18.8 | Horiz |
| | | | +2.9 | +6.4 | +0.5 | +32.5 | | | | | |
| 6 | 2748.799M | 30.5 | +0.0 | -34.8 | +0.0 | +0.4 | +0.0 | 34.2 | 54.0 | -19.8 | Horiz |
| | | | +2.5 | +5.2 | +0.4 | +30.0 | | | | | |
| 7 | 5497.562M | 20.8 | +0.0 | -34.2 | +0.0 | +0.6 | +0.0 | 33.3 | 54.0 | -20.7 | Horiz |
| | | | +3.7 | +8.3 | +0.6 | +33.5 | | | | | |
| 8 | 2748.954M | 28.1 | +0.0 | -34.8 | +0.0 | +0.4 | +0.0 | 31.8 | 54.0 | -22.2 | Vert |
| | | | +2.5 | +5.2 | +0.4 | +30.0 | | | | | |
| 9 | 429.060M | 28.5 | -27.4 | +0.0 | +16.6 | +0.2 | +0.0 | 20.8 | 46.0 | -25.2 | Vert |
| | | | +0.9 | +1.8 | +0.2 | | | | | | |
| 10 | 429.060M | 23.5 | -27.4 | +0.0 | +16.6 | +0.2 | +0.0 | 15.8 | 46.0 | -30.2 | Horiz |
| | | | +0.9 | +1.8 | +0.2 | | | | | | |

## FCC 15.249 FIELD STRENGTH OF FUNDAMENTAL

### Test Setup Photos

## Test Data Sheets

Test Location: CKC Laboratories, Inc. •4933 Sierra Pines Dr. • Mariposa CA, 95338 • 1-800-500-4EMC (4362)

Customer: **RT Technologies**
Specification: **FCC 15.249-209 (902-928MHz)**
Work Order #: **88020** Date: 8/18/2008
Test Type: **Maximized Emissions** Time: 14:26:31
Equipment: **Remote Control Transmitter** Sequence#: 2
Manufacturer: RT Technologies Tested By: Mike Wilkinson
Model: Remington Sidekick Transmitter
S/N: 001

***Test Equipment*:**

| Function | S/N | Calibration Date | Cal Due Date | Asset # |
|---|---|---|---|---|
| Agilent E4446A SA | US44300407 | 08/07/2008 | 08/07/2010 | 02660 |
| Chase CBL6111C Bilog | 2456 | 12/30/2006 | 12/30/2008 | 01991 |
| HP 8447D Preamp | 1937A02604 | 03/14/2007 | 03/14/2009 | 00099 |
| 3M SITE CABLE 20GHZ | NA | 03/06/2008 | 03/06/2010 | SITED3M1 |
| Cable 2' 40 GHz Astrolab | NA | 01/15/2008 | 01/15/2010 | AN03011 |
| Cable 2' 40 GHz Astrolab | NA | 01/15/2008 | 01/15/2010 | AN03008 |
| Andrews Hardline (25') | CKC 1012 | 04/23/2007 | 04/23/2009 | P01012 |

***Equipment Under Test* (* = EUT):**

| Function | Manufacturer | Model # | S/N |
|---|---|---|---|
| Remote Control Transmitter* | RT Technologies | Remington Sidekick Transmitter | 001 |

***Support Devices:***

| Function | Manufacturer | Model # | S/N |
|---|---|---|---|

***Test Conditions / Notes:***

EUT is a remote control transmitter operating at 916.25 MHz. EUT is battery powered: a fresh battery is installed prior to testing. EUT is operated manually using a plastic clamp to depress a button. Orientations: X - EUT lying on its long side with the buttons and screen facing horizontally. Y - EUT lying on its short side with the buttons and screen facing horizontally. Z - EUT lying on its back with the buttons and screen facing vertically. Y was found to be worst case. EUT tested in worst case orientation. Frequency Range Investigated: Carrier RBW = 9 kHz 9KHz to 30 MHz,120 kHz 30 to 1000 MHz, 1 MHz 1-10 GHz & VBW = 3xRBW Temperature: 29ºC, Relative Humidity: 29%.

***Transducer Legend:***

| | |
|---|---|
| T1=AMP AN00099 | T2=ANT AN01991 25-1000MHz |
| T3=CAB-AN03011-40GHZ-2FT | T4=Cable P01012 |
| T5=CAB-SITED3M1 9k - 20G | T6=CAB-AN03008-40GHZ-2FT |

***Measurement Data:*** Reading listed by margin. Test Distance: 3 Meters

| # | Freq | Rdng | T1<br>T5 | T2<br>T6 | T3 | T4 | Dist | Corr | Spec | Margin | Polar |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBµV | dB | dB | dB | dB | Table | dBµV/m | dBµV/m | dB | Ant |
| 1 | 916.241M | 64.9 | -27.3<br>+2.7 | +23.0<br>+0.3 | +0.3 | +1.4 | +0.0 | 65.3 | 94.0 | -28.7 | Vert |
| 2 | 916.238M | 62.6 | -27.3<br>+2.7 | +23.0<br>+0.3 | +0.3 | +1.4 | +0.0 | 63.0 | 94.0 | -31.0 | Horiz |

## FCC 15.249 BAND EDGE

### Test Conditions

Test Location: CKC Laboratories, Inc. •4933 Sierra Pines Dr. • Mariposa CA, 95338 • 1-800-500-4EMC (4362)

Customer: **RT Technologies**
Specification: Band Edge and 99% OBW plots
Work Order #: **88020** Date: 8/18/2008
Test Type: **Maximized Emissions**
Equipment: **Remote Control Transmitter**
Manufacturer: RT Technologies Tested By: Mike Wilkinson
Model: Remington Sidekick Transmitter
S/N: 001

***Test Equipment*:**

| Function | S/N | Calibration Date | Cal Due Date | Asset # |
|---|---|---|---|---|
| Agilent E4446A SA | US44300407 | 08/07/2008 | 08/07/2010 | 02660 |
| Chase CBL6111C Bilog | 2456 | 12/30/2006 | 12/30/2008 | 01991 |
| HP 8447D Preamp | 1937A02604 | 03/14/2007 | 03/14/2009 | 00099 |
| 3M SITE CABLE 20GHZ | NA | 03/06/2008 | 03/06/2010 | SITED3M1 |
| Cable 2' 40 GHz Astrolab | NA | 01/15/2008 | 01/15/2010 | AN03011 |
| Cable 2' 40 GHz Astrolab | NA | 01/15/2008 | 01/15/2010 | AN03008 |
| Andrews Hardline (25') | CKC 1012 | 04/23/2007 | 04/23/2009 | P01012 |

***Equipment Under Test* (* = EUT):**

| Function | Manufacturer | Model # | S/N |
|---|---|---|---|
| Remote Control Transmitter* | RT Technologies | Remington Sidekick Transmitter | 001 |

***Support Devices:***

| Function | Manufacturer | Model # | S/N |
|---|---|---|---|

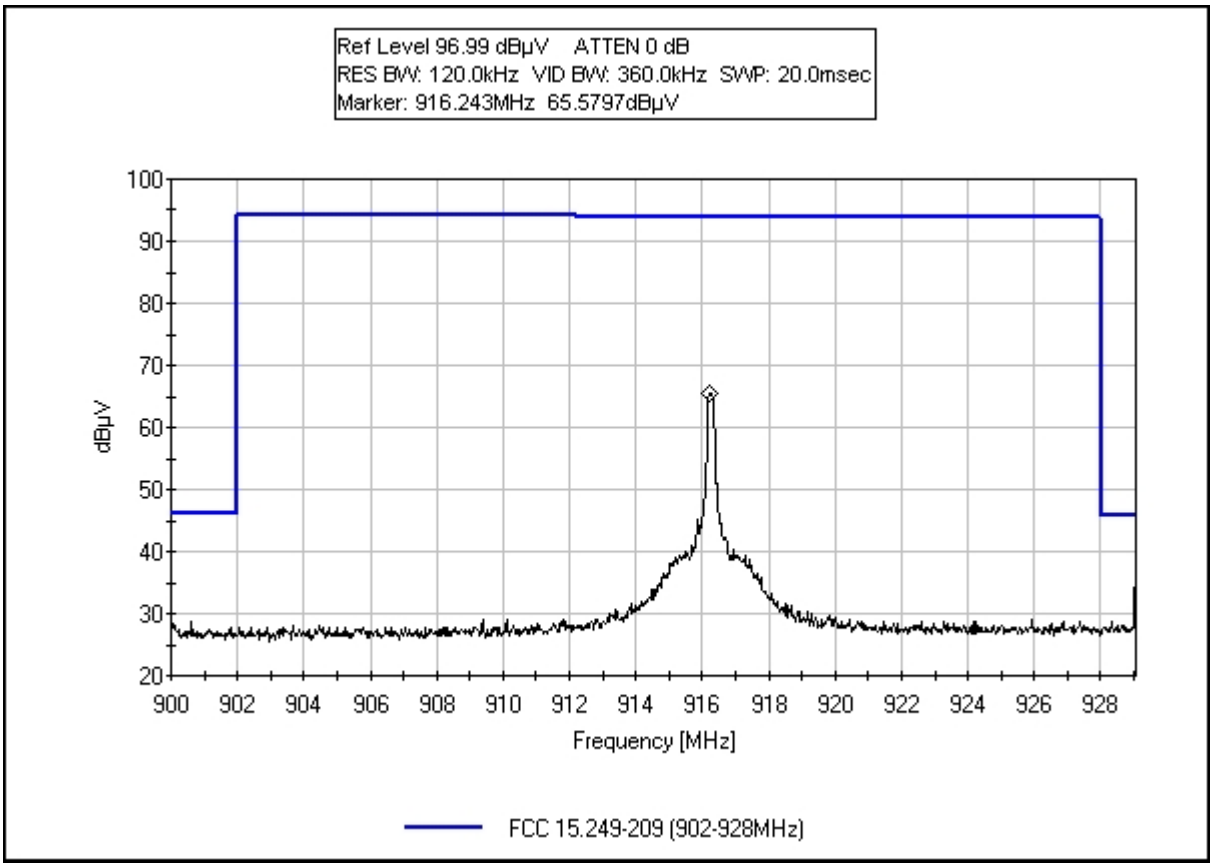
***Test Conditions / Notes:***

EUT is a remote control transmitter operating at 916.25 MHz. EUT is battery powered: a fresh battery is installed prior to testing. EUT is operated manually using a plastic clamp to depress a button. Orientations: X - EUT lying on its long side with the buttons and screen facing horizontally. Y - EUT lying on its short side with the buttons and screen facing horizontally. Z - EUT lying on its back with the buttons and screen facing vertically. Y was found to be worst case. EUT tested in worst case orientation. Frequency Range Investigated: Carrier RBW = 9 kHz 9KHz to 30 MHz,120 kHz 30 to 1000 MHz, 1 MHz 1-10 GHz & VBW = 3xRBW Temperature: 29ºC, Relative Humidity: 29%.

**Test Setup Photos**

**Test Plots**

**FCC 15.249 BAND EDGE**



## RSS-210 99% BANDWIDTH

### Test Conditions

Test Location: CKC Laboratories, Inc. •4933 Sierra Pines Dr. • Mariposa CA, 95338 • 1-800-500-4EMC (4362)

Customer: **RT Technologies**
Specification: Band Edge and 99% OBW plots
Work Order #: **88020** Date: 8/18/2008
Test Type: **Maximized Emissions**
Equipment: **Remote Control Transmitter**
Manufacturer: RT Technologies Tested By: Mike Wilkinson
Model: Remington Sidekick Transmitter
S/N: 001

***Test Equipment*:**

| Function | S/N | Calibration Date | Cal Due Date | Asset # |
|---|---|---|---|---|
| Agilent E4446A SA | US44300407 | 08/07/2008 | 08/07/2010 | 02660 |
| Chase CBL6111C Bilog | 2456 | 12/30/2006 | 12/30/2008 | 01991 |
| HP 8447D Preamp | 1937A02604 | 03/14/2007 | 03/14/2009 | 00099 |
| 3M SITE CABLE 20GHZ | NA | 03/06/2008 | 03/06/2010 | SITED3M1 |
| Cable 2' 40 GHz Astrolab | NA | 01/15/2008 | 01/15/2010 | AN03011 |
| Cable 2' 40 GHz Astrolab | NA | 01/15/2008 | 01/15/2010 | AN03008 |
| Andrews Hardline (25') | CKC 1012 | 04/23/2007 | 04/23/2009 | P01012 |

***Equipment Under Test* (* = EUT):**

| Function | Manufacturer | Model # | S/N |
|---|---|---|---|
| Remote Control Transmitter* | RT Technologies | Remington Sidekick Transmitter | 001 |

***Support Devices:***

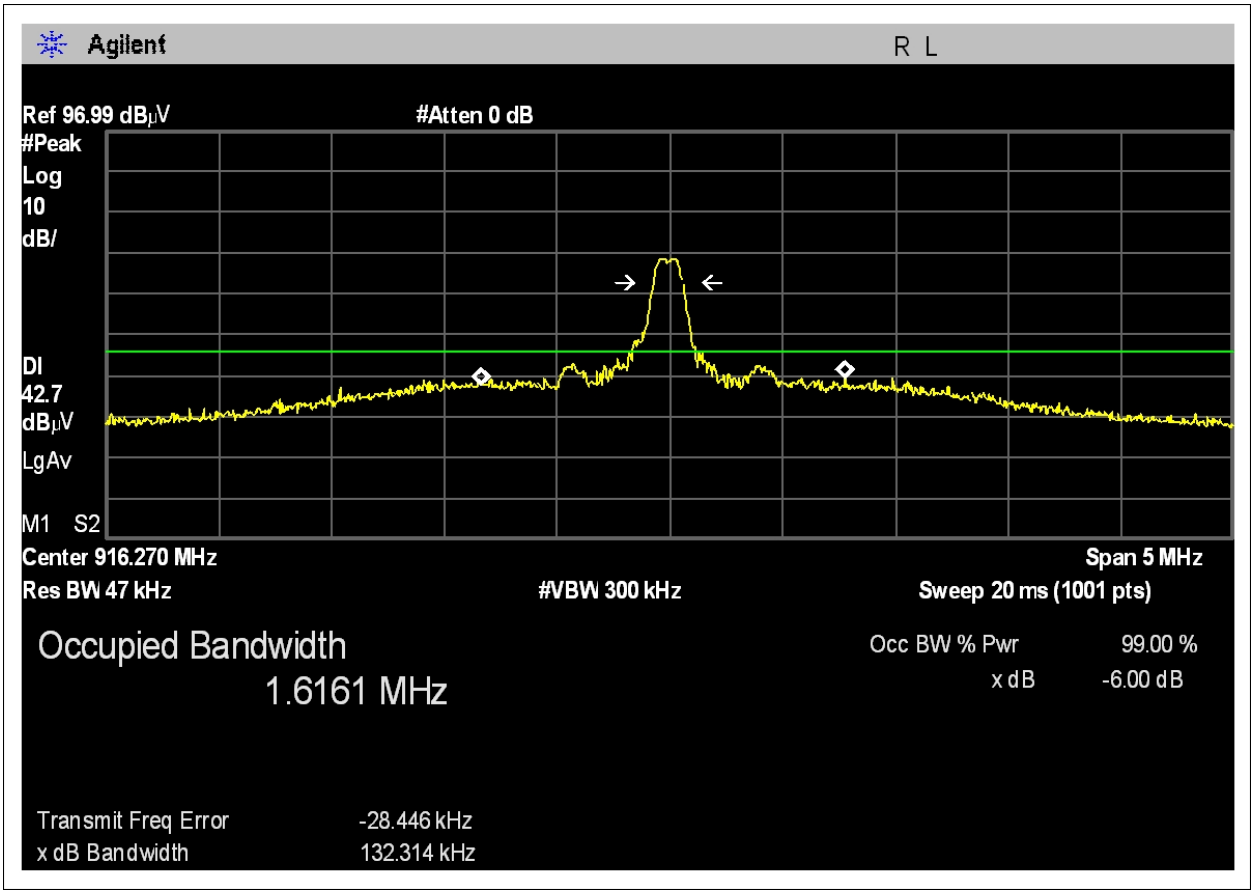
| Function | Manufacturer | Model # | S/N |
|---|---|---|---|

***Test Conditions / Notes:***

EUT is a remote control transmitter operating at 916.25 MHz. EUT is battery powered: a fresh battery is installed prior to testing. EUT is operated manually using a plastic clamp to depress a button. Orientations: X - EUT lying on its long side with the buttons and screen facing horizontally. Y - EUT lying on its short side with the buttons and screen facing horizontally. Z - EUT lying on its back with the buttons and screen facing vertically. Y was found to be worst case. EUT tested in worst case orientation. Frequency Range Investigated: Carrier RBW = 9 kHz 9KHz to 30 MHz,120 kHz 30 to 1000 MHz, 1 MHz 1-10 GHz & VBW = 3xRBW Temperature: 29ºC, Relative Humidity: 29%.

**Test Setup Photos**

## Test Plots


Agilent
R L
Ref 96.99 dBµV
#Atten 0 dB
#Peak
Log
10
dB/
Dl
42.7
dBµV
LgAv
M1 S2
Center 916.270 MHz
Span 5 MHz
Res BW 47 kHz
#VBW 300 kHz
Sweep 20 ms (1001 pts)
Occupied Bandwidth
1.6161 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -28.446 kHz
x dB Bandwidth 132.314 kHz