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Test report

445126-1TRFWL

Date of issue: July 14, 2021

Applicant:

The Genie Company (Overhead Door Corporation)

Product:

Universal Wireless Wall Console

Model:	Variant(s):
GUWWC2	OUWWC2
FCC ID:	IC ID:
B8QUWWC2	2133A-UWWC2

Specifications:

- FCC 47 CFR Part 15, Subpart C – §15.231
- Industry Canada RSS-210 Issue 10 – Annex A

Lab and test locations

Company name	Nemko USA Inc.
Address	2210 Faraday Ave, Suite 150
City	Carlsbad
State	California
Postal code	92008
Country	USA
Telephone	+1 760 444 3500
Website	www.nemko.com
FCC Site Number	Test Firm Registration Number: 392943 Designation Number: US5058
ISED Test Site	2040B-3

Tested by	David Hewitt, EMC Specialist
	Mark Phillips, Senior EMC Engineer
	James Cunningham, EMC/MIL/WL Supervisor
Reviewed by	Juan M Gonzalez, EMC & Wireless Divisions Manager
Review date	July 14, 2021
Reviewer signature	

Limits of responsibility

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. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.
This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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Section 1 Report summary

1.1 Applicant

Company name	Genie Company
Address	One Door Drive, PO Box 67
City	Mount Hope
Province/State	OH
Postal/Zip code	44660
Country	United States of America

1.2 Manufacturer

Company name	Genie Company
Address	One Door Drive, PO Box 67
City	Mount Hope
Province/State	OH
Postal/Zip code	44660
Country	United States of America

1.3 Test specifications

FCC 47 CFR Part 15, Subpart C – §15.231	Periodic operation in the band 40.66-40.70 MHz and above 70 MHz
IC RSS-210, Issue 10; Annex A	Licence-Exempt Radio Apparatus: Category I Equipment: Momentarily operated and remote-control devices

1.4 Test methods

ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

1.5 Exclusions

None.

1.6 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

1.7 Test report revision history

Table 1.7-1: *Test report revision history*

Revision #	Details of changes made to test report
445126-1TRFWL	Original report issued

Notes:

Section 2 Summary of test results

2.1 FCC Part 15 Subpart C, general requirements test results

Part	Test description	Verdict
§15.207(a)	Conducted limits	Not applicable [1]
§15.31(e)	Variation of power source	Pass
§15.203	Antenna requirement	Pass [2]

Notes: [1] The EUT is battery operated. Charging via AC adaptor is not possible.
[2] The EUT uses a trace antenna on PCB.

2.2 FCC Part 15 Subpart C, intentional radiators test results

Part	Test description	Verdict
§15.231(a)(1)	Manually operated transmitter	Pass
§15.231(a)(2)	Cessation of transmission	Not applicable [1]
§15.231(a)(3)	Periodic transmissions	Pass [2]
§15.231(a)(4)	Setup information for security systems	Not applicable [3]
§15.231(b)	Field strength of emissions	Pass
§15.231(c)	Bandwidth of emissions	Pass
§15.231(d)	Band edge and frequency tolerance	Not applicable [4]
§15.231(e)	Periodic operation	Not applicable [5]

Notes: [1] The EUT does not support automatic activation.
[2] The EUT does not support periodic, polling or supervision transmissions.
[3] The EUT is not a security system and does not transmit set-up information.
[4] The EUT does not operate in the 40.66 – 40.70 MHz band to which these requirements apply.
[5] The EUT complies with the requirements of section 15.231(a) therefore these requirements do not apply.

2.4 IC RSS-GEN, Issue 5 test results

Part	Test description	Verdict
6.7	Occupied bandwidth	Pass
7.3	Receiver radiated emission limits	Not applicable [1]
7.4	Receiver conducted emission limits	Not applicable
8.8	Power Line Conducted Emissions Limits for License-Exempt Radio Apparatus	Not applicable

Notes: [1] The EUT is neither a scanning receiver nor a stand-alone receiver.
[2] The EUT is battery operated. Charging via AC adaptor is not possible.

2.4 IC RSS-231, Issue 10, Annex A test results

Part	Test description	Verdict
A.1.1(a)	Manually operated transmitter	Pass
A.1.1(b)	Cessation of transmission	Not applicable [1]
A.1.1(c)	Periodic transmissions	Pass [2]
A.1.1(d)	Setup information for security systems	Not applicable [3]
A.1.2	Field strength of emissions	Pass
A.1.3	Bandwidth of momentary signals	Pass
A.1.4	Reduced field strengths	Not applicable [4]

Notes: [1] The EUT does not support automatic activation.
[2] The EUT does not support periodic, polling or supervision transmissions.
[3] The EUT is not a security system and does not transmit set-up information.
[4] The EUT complies with the requirements of section 15.247(a) therefore these requirements do not apply.

Section 3 Equipment under test (EUT) details

3.1 Sample information

Receipt date	June 28, 2021
Nemko sample ID number	NEx: 445126

3.2 EUT information

Product name	Universal Wireless Wall Console
Model	GUWWC2
Variant(s)	OUWWC2 (Variant is identical to GUWWC2 with respect to PCB and electronic components. Labelling and color are the only differences).
Serial number	None
Part number	N/A

3.3 EUT technical information

Operating frequency(-ies)	Various operating modes are supported as follows:
Power requirements	3V$_{DC}$ battery
Antenna information	The EUT uses a unique antenna coupling/ non-detachable antenna to the intentional radiator.

Brand Name	**Coding**	**Operating Frequency (MHz)**
Guardian	Fixed learn code	303
Sommer	Rolling code	310
Stanley	10 switch / 2 position DIP switch	310
Genie	Intellicode®, 1995-current	315
Chamberlain	Purple learn button, security+, 2006-2014	315
Genie	Intellicode® II, 2010-2010	315
Marantec	Fixed learn code	315
Linear	Mega Code®	318
Wayne Dalton	Rolling code, 1999-current	372.5
Ryobi	Rolling code	372.5
Genie	Intellicode® I, 1995-current	390
Chamberlain	Orange/Red learn button, Security+, 1996-2005	390
Chamberlain	Yellow learn button, Security+2.0 ®, 2011-current	390
Chamberlain	Green learn button, Billion Code®, 1993-1995	390
Genie	Intellicode® II, 2010-2011	390
Chamberlain	9 switch/3 position DIP switch	390
Genie	12 switch/2 position DIP switch, 1993-1995	390
Genie	9 switch/2 position DIP switch, 1993-1995	390
OHD	9 switch/3 position DIP switch, 1993-1995	390
FAAC	Rolling code	433.92

3.4 Product description and theory of operation

The EUT is a programmable wall mounted remote garage door opener activated via manual push-button.

3.5 EUT exercise and monitoring details

For radiated emissions, the EUT was programmed to operate in a given mode (brand, coding, and operating frequency) with continuous transmission. For bench testing, samples were programmed to operate in a given mode in the normal operating state. That is, the transmitter is manually activated by pushing the appropriate button on the sample. For radiated testing, a bench-top DC power supply was used in place of the battery.
Firmware/Software used during testing: a) CW: UWWC-v2.100.2_CW.hex , b) Modulated: UWWC-v2.100.2.hex

Table 3.5-1: *EUT sub-assemblies*

Description	Brand name	Model/Part number	Serial number	Rev.
The EUT has no sub-assemblies	--	--	--	--

Table 3.5-2: *EUT interface ports*

Description	Qty.
None	--

Table 3.5-3: *Support equipment*

Description	Brand name	Model/Part number	Serial number	Rev.
None				

Table 3.5-4: *Inter-connection cables*

Cable description	From	To	Length (ft)
None	--	--	--

3.6 EUT setup diagram

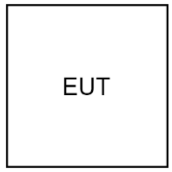


Figure 3.6-1: *Test setup*

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures

Section 5 Test conditions

5.1 Atmospheric conditions

Temperature	15-30 °C
Relative humidity	20-75 %
Air pressure	86–106 kPa

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 6 Measurement uncertainty

6.1 Uncertainty of measurement

Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of K = 2 with 95% certainty.

Test name	Measurement uncertainty, dB
Radiated spurious emissions	3.78
Powerline conducted emissions	1.38
All antenna port measurements	0.55
Conducted spurious emissions	1.13

Section 7 Test equipment

Table 6.1-1: *Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI Test Receiver	Rohde & Schwarz	ESU40	E1121	1 year	19 May 2022
System Controller	Sunol Sciences	SC104V	E1191	NCR	NCR
Bilog Antenna (30-1000MHz)	Schaffner	CBL6111D	1763	1 year	18 Feb 2022
DRG Horn (1-18GHz)	ETS-Lindgren	3117-PA	E1160	1 year	2 Dec 2021
Signal & Spectrum Analyzer	Rohde & Schwarz	FSW43	E1302	2 years	18 Sep 2022
Close Field Probe (30 MHz – 1 GHz)	Agilent	11940A	920	NCR	NCR

Notes: NCR – no calibration required

Section 8 Testing data

8.1 Duty cycle

8.1.1 Definitions and limits

To correctly report average values of the fundamental and spurious harmonic emissions, it is necessary to measure the duty cycle of the transmitter.

8.1.2 Test summary

Test date	June 30, 2021 – July 1, 2021	Temperature	22 °C
Test engineer	James Cunningham, EMC/MIL/WL Supervisor	Air pressure	1004 mbar
Test location	Wireless bench	Relative humidity	39 %

8.1.3 Observations, settings, and special notes

Measurements were performed in accordance with Section 7.5 of ANSI C63.10 using a spectrum analyzer tuned to the transmitter fundamental frequency in a zero-span mode.

Duty cycle was measured for each of the 20 supported brand/coding/transmitter frequency combinations supported by the EUT.

8.1.4 Test data

Table 8.1-1: *Duty cycle test data*

Brand Name	Coding	Carrier Frequency (MHz)	Number of pulses t1 in 100 ms	t1 pulse width (µs)	Number of pulses t2 in 100 ms	t2 pulse width	Number of pulses t3 in 100 ms	t3 pulse width (µs)	Duty Cycle Correction (dB) Note 1
Guardian	Fixed learn code	303	25	490	28	986	N/A	N/A	-7.99
Sommer	Rolling code	310	45	192	34	390	N/A	N/A	-13.19
Stanley	10 switch / 2 position DIP switch	310	30	1486	N/A	N/A	N/A	N/A	-7.02
Genie	Intellicode®, 1995-current	315	47	191	31	391	N/A	N/A	-13.52
Genie	Intellicode® II, 2010-2010	315	17	988	15	1487	9	987	-6.38
Chamberlain	Purple learn button, security+, 2006-2014	315	48	192	36	391	N/A	N/A	-12.66
Marantec	Fixed learn code	315	14	757	10	1520	N/A	N/A	-11.77
Linear	Mega Code®	318	17	986	N/A	N/A	N/A	N/A	-15.51
Wayne Dalton	Rolling code, 1999-current	372.5	43	191	36	389	N/A	N/A	-13.07
Ryobi	Rolling code	372.5	37	191	42	389	N/A	N/A	-12.61
Genie	Intellicode I	390	46	190	32	390	N/A	N/A	-13.47
Chamberlain	Orange Red	390	6	489	21	984	14	1483	-7.06
Chamberlain	Yellow	390	116	241	35	490	N/A	N/A	-6.92
Chamberlain	Green	390	5	988	8	2975	3	1982	-9.20
Chamberlain	Intellicode II	390	54	191	30	391	N/A	N/A	-13.13
Chamberlain	9 switch 3 position	390	3	987	11	2974	N/A	N/A	-8.95
Chamberlain	12 switch 2 position	390	Note 2	22	Note 2	47	N/A	N/A	-5.92
Chamberlain	9 switch 2 position	390	Note 2	22	Note 2	47	N/A	N/A	-5.88
Chamberlain	9 switch 3 position 1993-1995	390	2	939	14	2828	N/A	N/A	-7.65
FAAC	Rolling code	433.92	40	444	34	896	N/A	N/A	-6.33

Note 1:
Duty cycle correction factor calculated using the following equation (from ANSI C63.10 Section 7.5):

$$\delta(dB) = 20\log_{10}\left[\sum(nt_1 + mt_2 + \cdots + \varepsilon t_x)/T\right]$$

Sample calculation: For Guardian, fixed learning code, 303 MHz:

$$\delta(dB) = 20\log_{10}[(nt_1 + mt_2)/100]$$
$$\delta(dB) = 20\log_{10}[(25 \times 0.490 + 28 \times 0.986)/100] = -7.99\ dB$$

Note 2:
For Chamberlain modes “12 switch 2 position” and “9 switch 2 position”, there were over 1000 discrete pulses observed over a 100 ms interval which was impractical to count manually. For these modes, the spectrum analyzer trace was exported to a spreadsheet and the duty cycle was calculated from the raw data. The duty cycle correction factor was calculated using the following equation (from ANSI C63.10 Section 7.5):

$$\delta(dB) = 20\log_{10}\langle\Delta\rangle$$

Where: Δ is the duty cycle calculated as (transmit on time during 100 ms interval) / 100 ms.

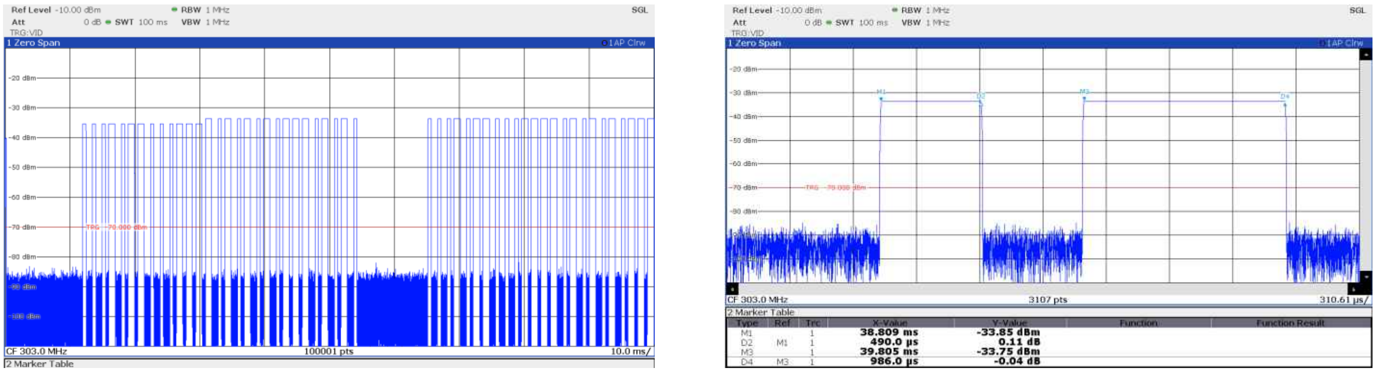


Figure 8.1-1: *Duty cycle, Guardian, fixed learn code, 303 MHz: 100 ms burst and pulse width measurements respectively*

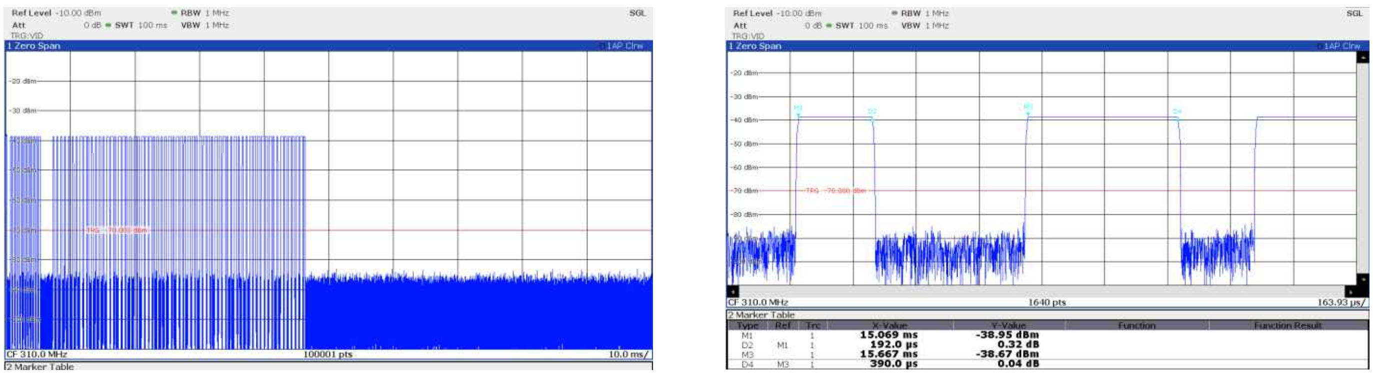


Figure 8.1-2: *Duty cycle, Sommer, rolling code, 310 MHz: 100 ms burst and pulse width measurements respectively*

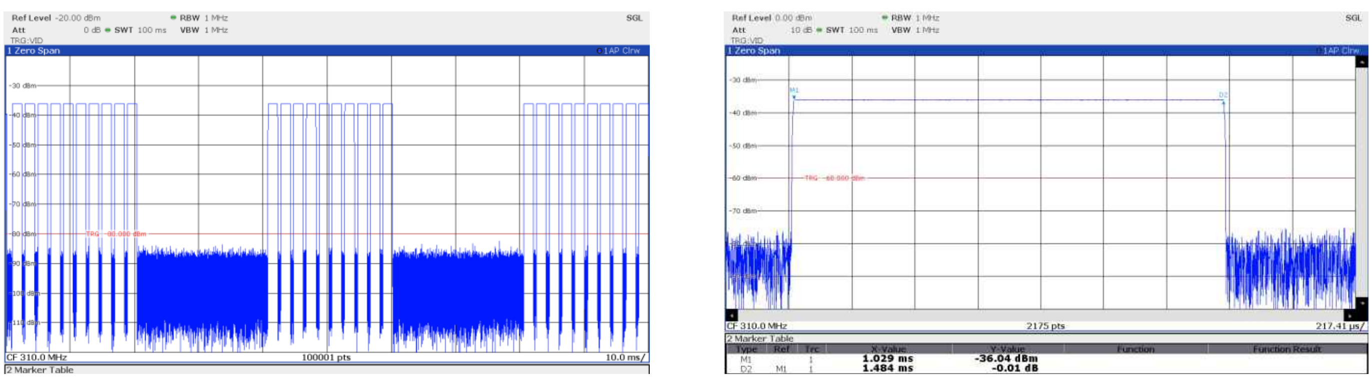


Figure 8.1-3: *Duty cycle, Stanley, 10 switch / 2 position DIP switch, 310 MHz: 100 ms burst and pulse width measurements respectively*

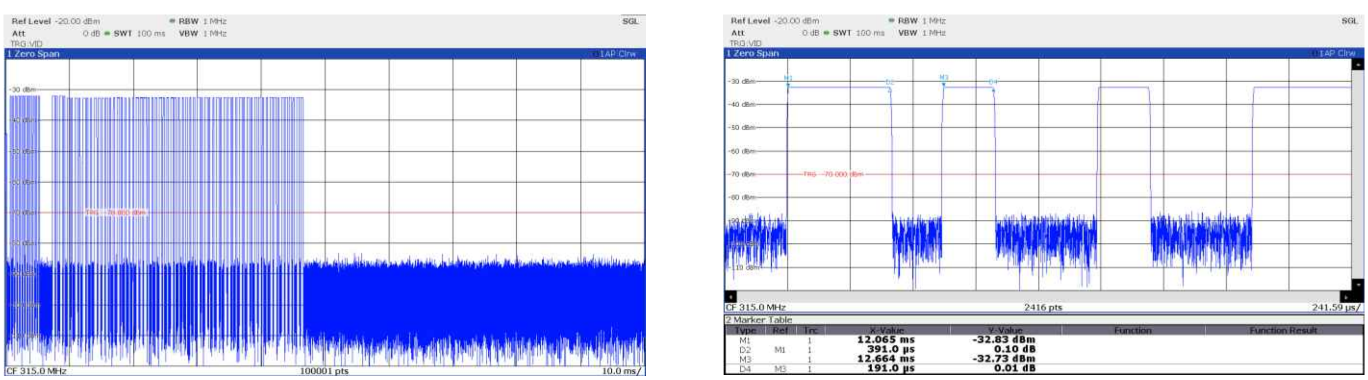


Figure 8.1-4: *Duty cycle, Genie, Intellicode®, 1995-current, 315 MHz: 100 ms burst and pulse width measurements respectively*

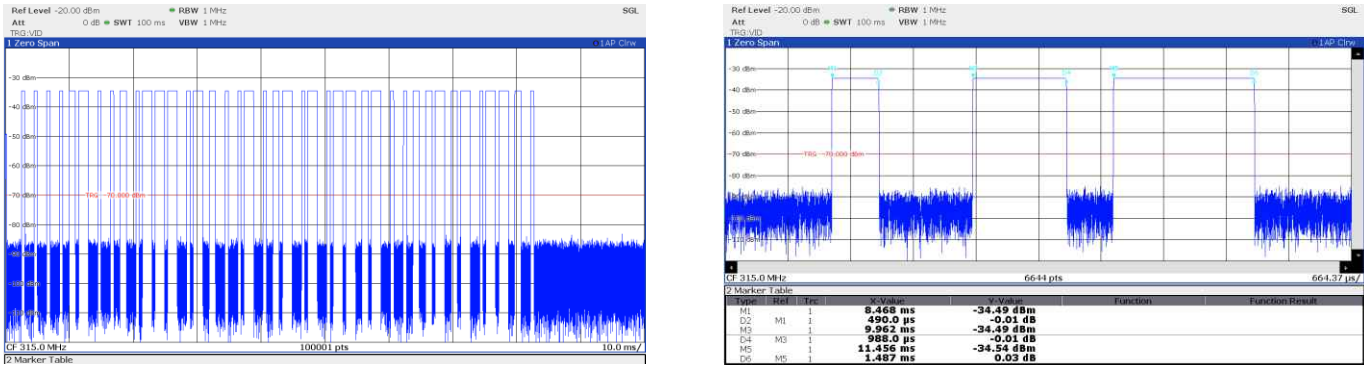


Figure 8.1-5: *Duty cycle, Chamberlain, Purple learn button, Security+®, 2006-2014, 315 MHz: 100 ms burst and pulse width measurements respectively*

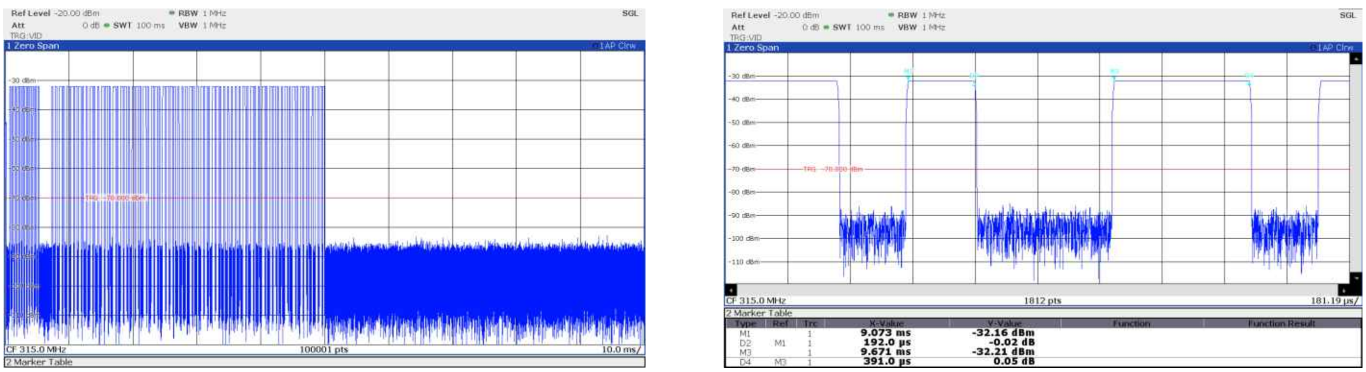


Figure 8.1-6: *Duty cycle, Genie, Intellicode® II, 2010-2010, 315 MHz: 100 ms burst and pulse width measurements respectively*

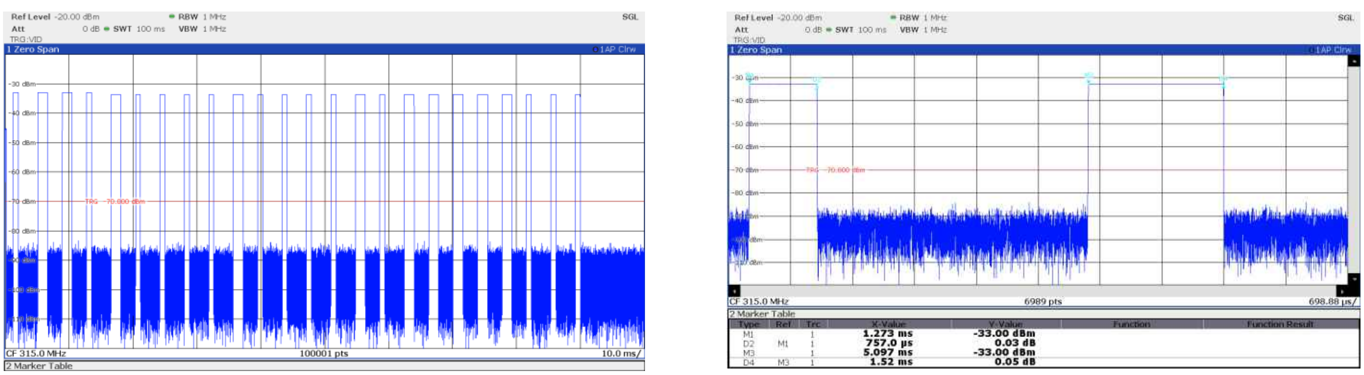


Figure 8.1-7: *Duty cycle, Marantec, Fixed learn code, 315 MHz: 100 ms burst and pulse width measurements respectively*

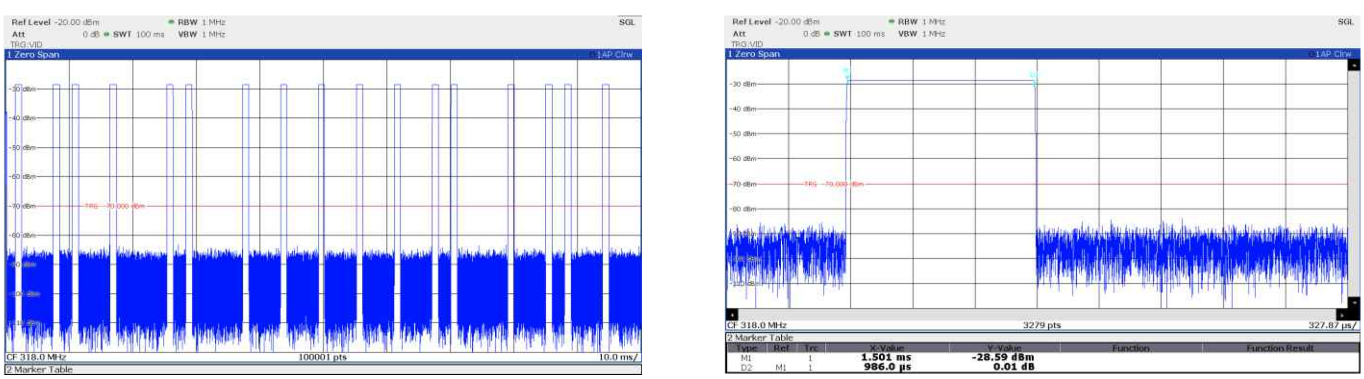


Figure 8.1-8: *Duty cycle, Linear, Mega Code®, 318 MHz: 100 ms burst and pulse width measurements respectively*

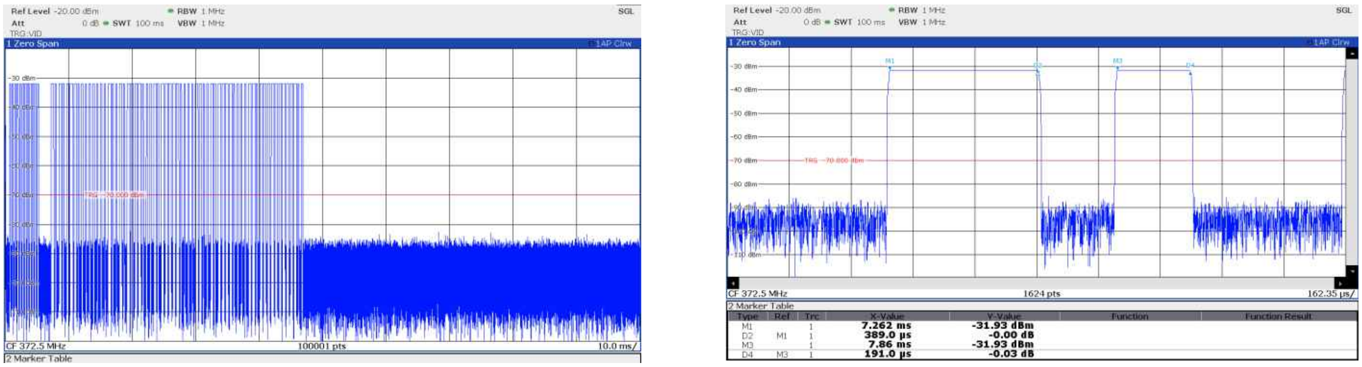


Figure 8.1-9: *Duty cycle, Wayne Dalton, Rolling code, 1999-current, 372.5 MHz: 100 ms burst and pulse width measurements respectively*

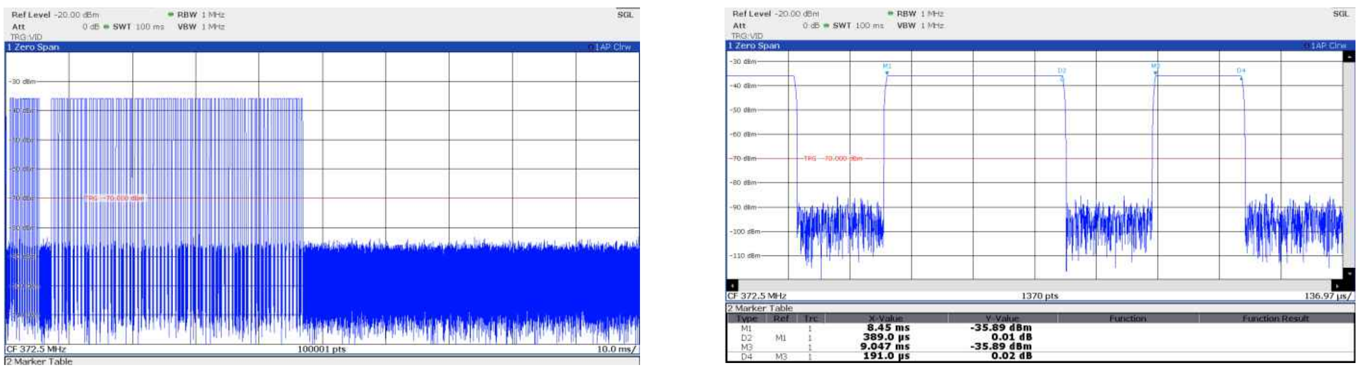


Figure 8.1-10: *Duty cycle, Ryobi, Rolling code, 372.5 MHz: 100 ms burst and pulse width measurements respectively*

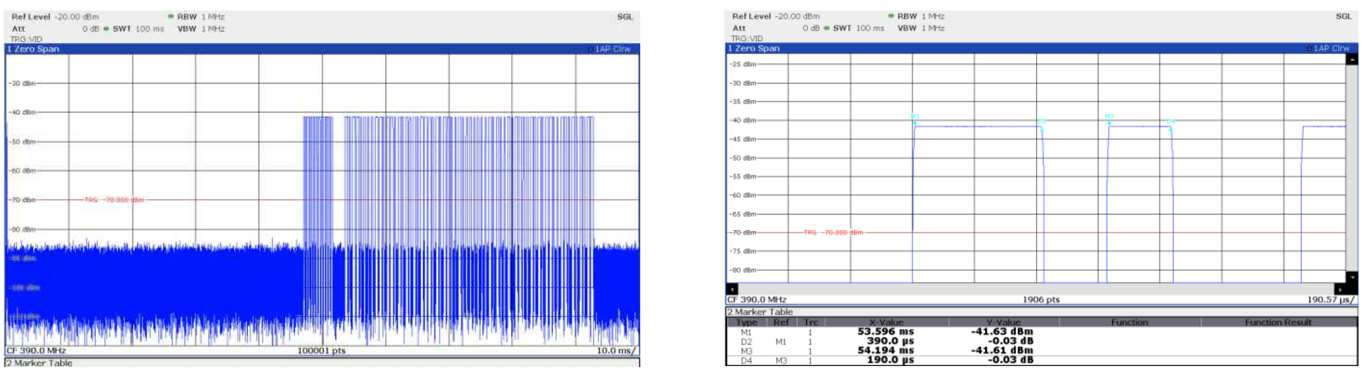


Figure 8.1-11: *Duty cycle, Genie, Intellicode® I, 1995-current, 390 MHz: 100 ms burst and pulse width measurements respectively*

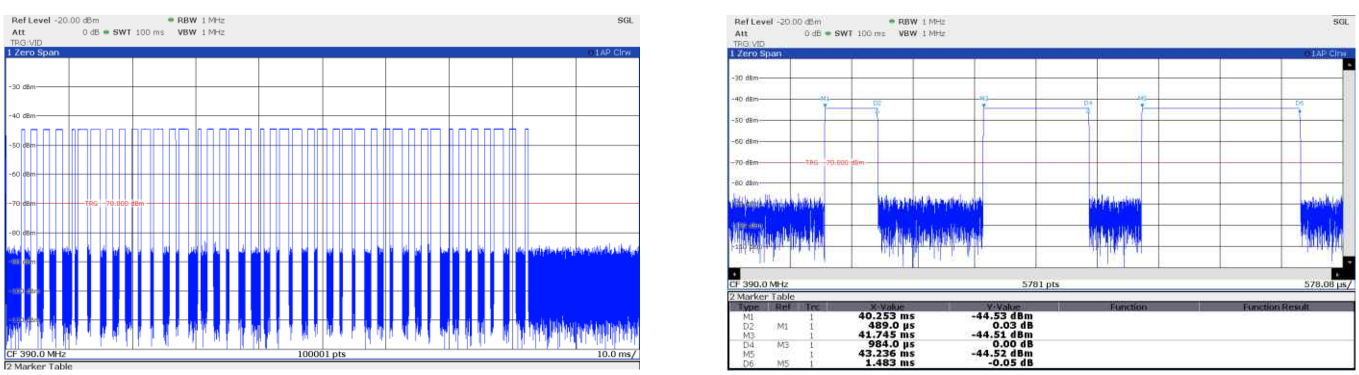


Figure 8.1-12: *Duty cycle, Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz: 100 ms burst and pulse width measurements respectively*

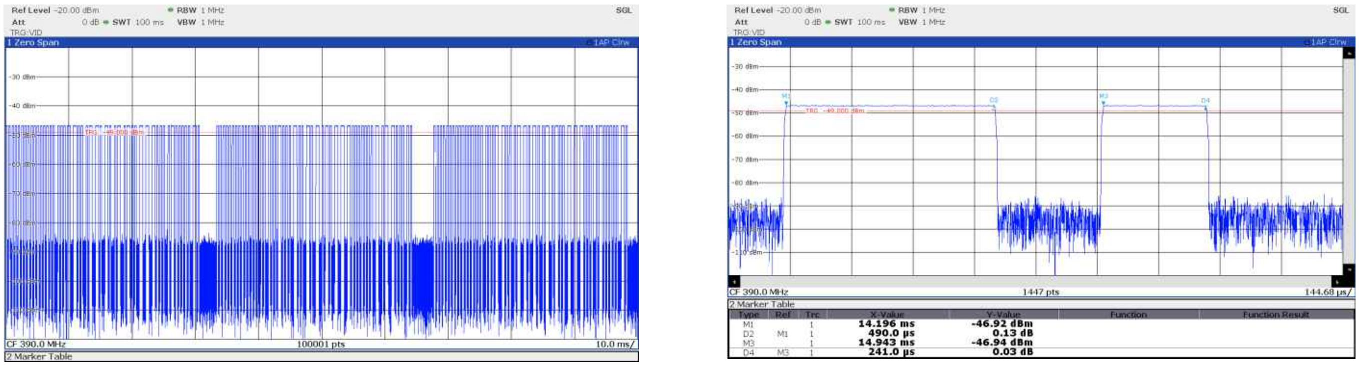


Figure 8.1-13: *Duty cycle, Chamberlain, Yellow learn button, Security+2.0®, 2011-current, 390 MHz: 100 ms burst and pulse width measurements respectively*

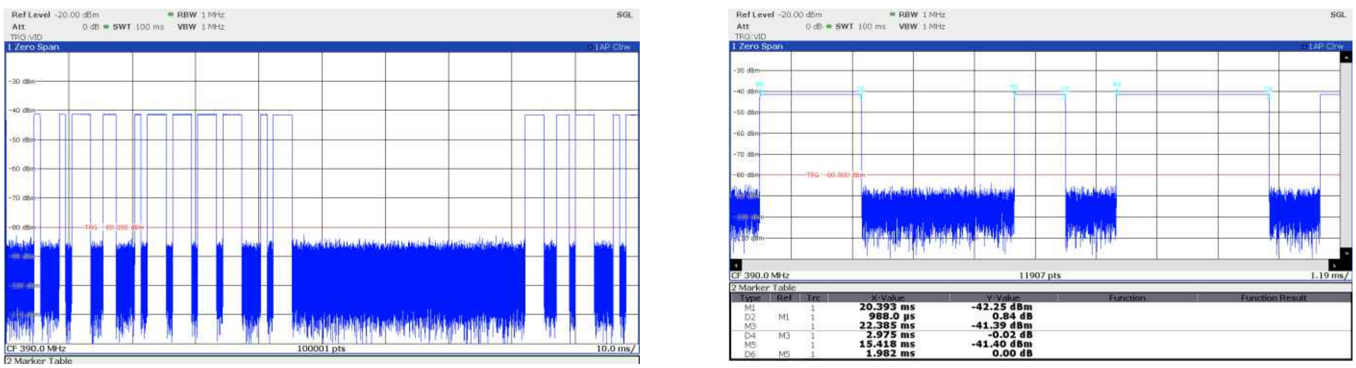


Figure 8.1-14: *Duty cycle, Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz: 100 ms burst and pulse width measurements respectively*

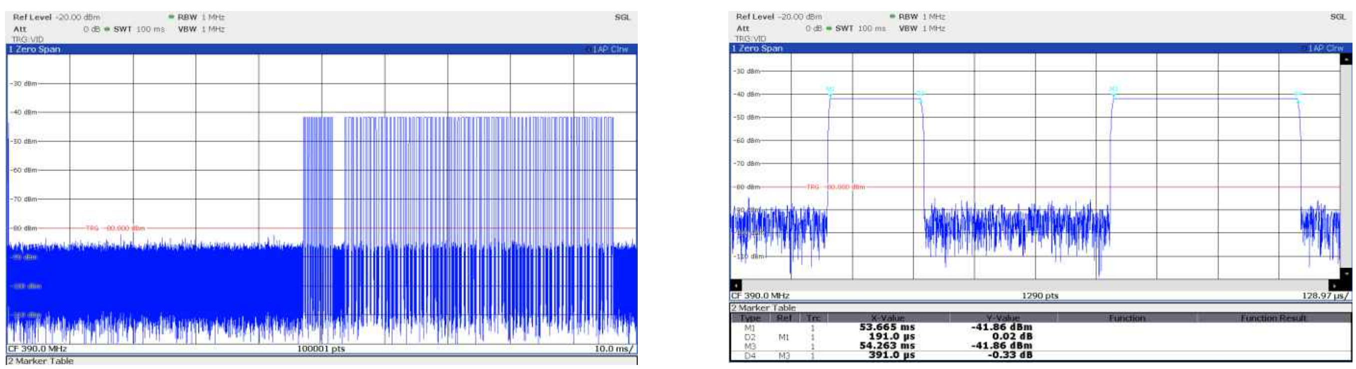


Figure 8.1-15: *Duty cycle, Genie, Intellicode ® II, 2010-2011, 390 MHz: 100 ms burst and pulse width measurements respectively*

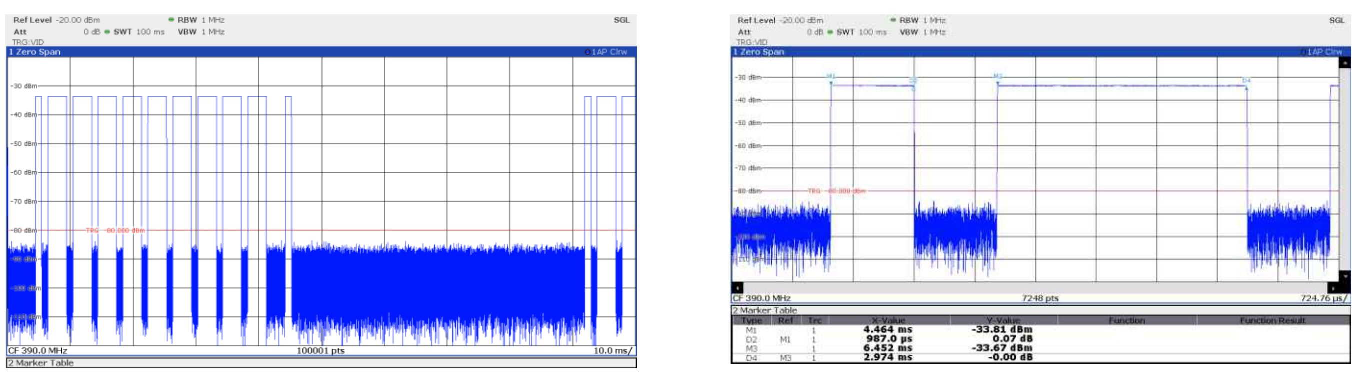


Figure 8.1-16: *Duty cycle, Chamberlain, 9 switch / 3 position DIP switch, 390 MHz: 100 ms burst and pulse width measurements respectively*

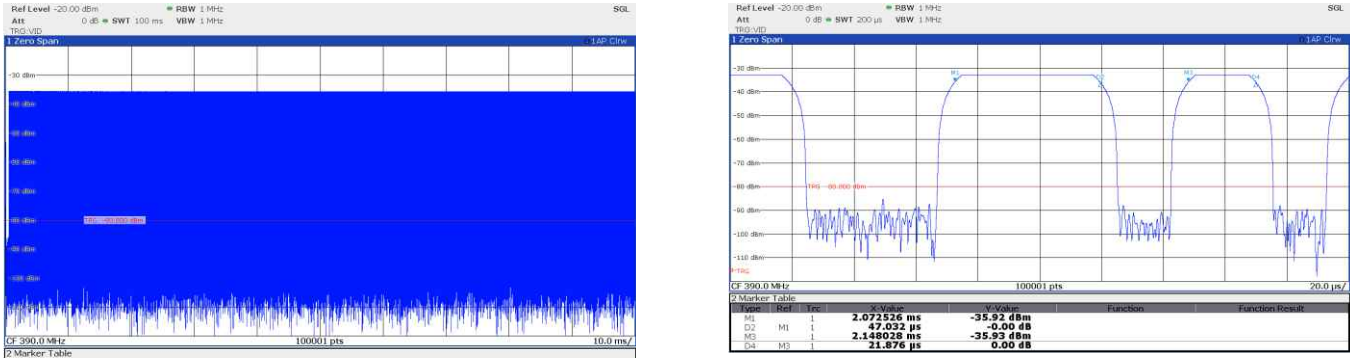


Figure 8.1-17: *Duty cycle, Genie, 12 switch / 2 position DIP switch, 1993-1995, 390 MHz: 100 ms burst and pulse width measurements respectively*

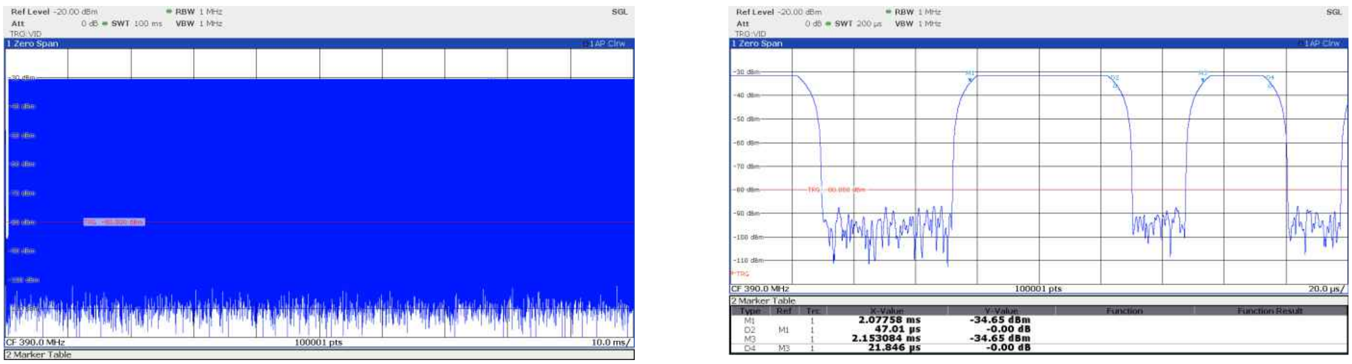


Figure 8.1-18: *Duty cycle, Genie, 9 switch / 2 position DIP switch, 1993-1995, 390 MHz: 100 ms burst and pulse width measurements respectively*

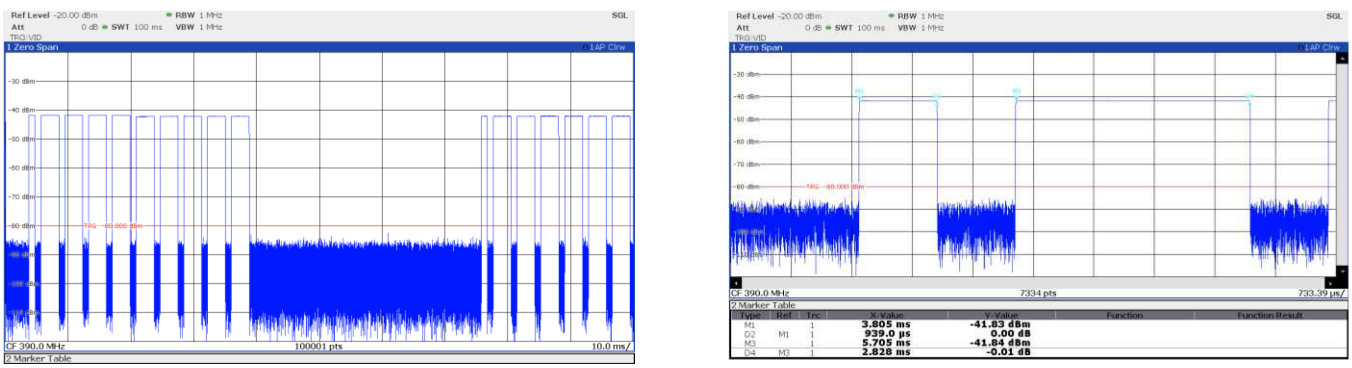


Figure 8.1-19: *Duty cycle, OHD, 9 switch / 3 position DIP switch, 1993-1995, 390 MHz: 100 ms burst and pulse width measurements respectively*

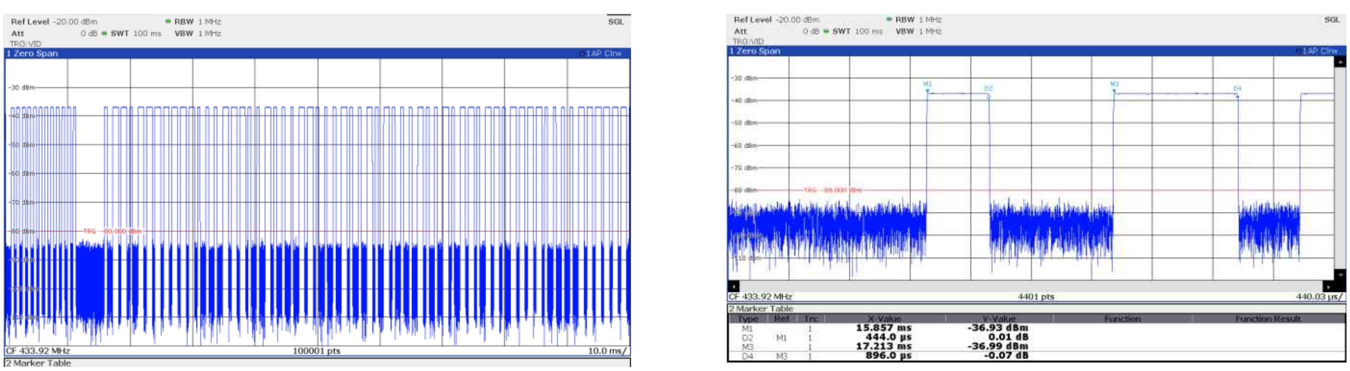


Figure 8.1-20: *Duty cycle, FAAC, Rolling code, 433.92 MHz: 100 ms burst and pulse width measurements respectively*

8.2 FCC 15.231(a)(1) / RSS-210 A.1.1(a) Manually operated transmitter

8.2.1 Definitions and limits

FCC 15.231(a)(1) and RSS-210 A.1.1(a):
A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

8.2.2 Test summary

Verdict	Pass		
Test date	June 29, 2021 – July 1, 2021	Temperature	22 °C
Test engineer	James Cunningham, EMC/MIL/WL Supervisor	Air pressure	1004 mbar
Test location	Wireless bench	Relative humidity	39 %

8.2.3 Observations, settings, and special notes

Tests were performed based on the methodology of Section 7.4 of ANSI C63.10.

The spectrum analyzer was tuned to the operating frequency of the EUT in zero span mode. A 5 second sweep time was used with video triggering to capture the transmission from the EUT when the transmitter activation button was pressed. Markers were used to measure the transmission deactivation time.

8.2.4 Test data

Table 8.2-1: *Test data – deactivation time*

Brand	Coding	Operating Frequency (MHz)	Deactivation Time (s)
Guardian	Fixed learn code	303	1.15
Sommer	Rolling code	310	1.32
Stanley	10 switch / 2 position DIP switch	310	1.18
Genie	Intellicode®, 1995-current	315	1.31
Chamberlain	Purple learn button, security+, 2006-2014	315	1.12
Genie	Intellicode® II, 2010-2010	315	1.32
Marantec	Fixed learn code	315	1.12
Linear	Mega Code®	318	1.13
Wayne Dalton	Rolling code, 1999-current	372.5	1.32
Ryobi	Rolling code	372.5	1.33
Genie	Intellicode® I, 1995-current	390	0.49
Chamberlain	Orange/Red learn button, Security+®, 1996-2005	390	1.12
Chamberlain	Yellow learn button, Security+2.0 ®, 2011-current	390	3.79
Chamberlain	Green learn button, Billion Code®, 1993-1995	390	1.08
Genie	Intellicode® II, 2010-2011	390	0.51
Chamberlain	9 switch/3 position DIP switch	390	1.10
Genie	12 switch/2 position DIP switch, 1993-1995	390	1.29
Genie	9 switch/2 position DIP switch, 1993-1995	390	1.29
OHD	9 switch/3 position DIP switch, 1993-1995	390	1.05
FAAC	Rolling code	433.92	1.15

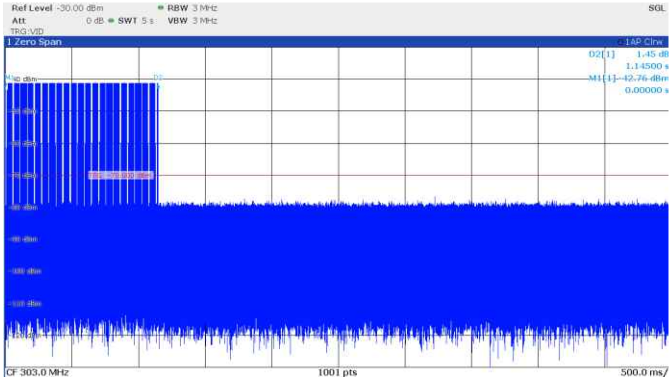


Figure 8.2-1: Deactivation time, Guardian, fixed learn code, 303 MHz

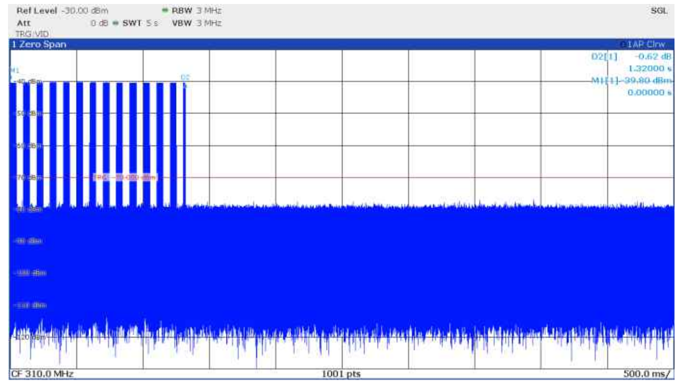


Figure 8.2-2: Deactivation time, Sommer, rolling code, 310 MHz

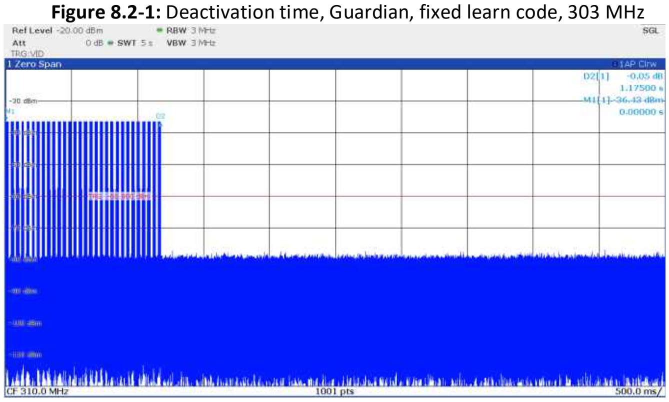


Figure 8.2-3: Stanley, 10 switch / 2 position DIP switch, 310 MHz

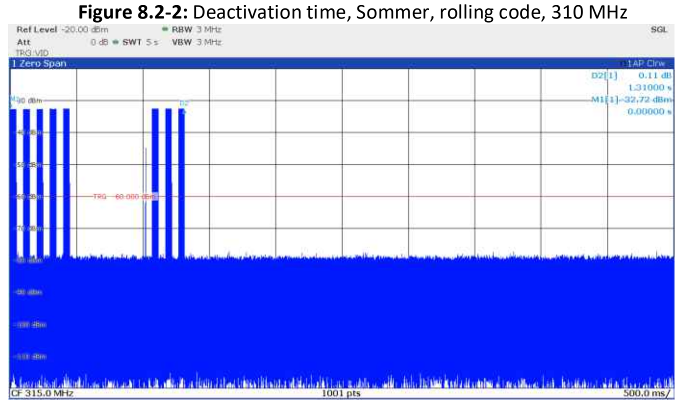


Figure 8.2-4: Deactivation time, Genie, Intellicode®, 1995-current, 315 MHz

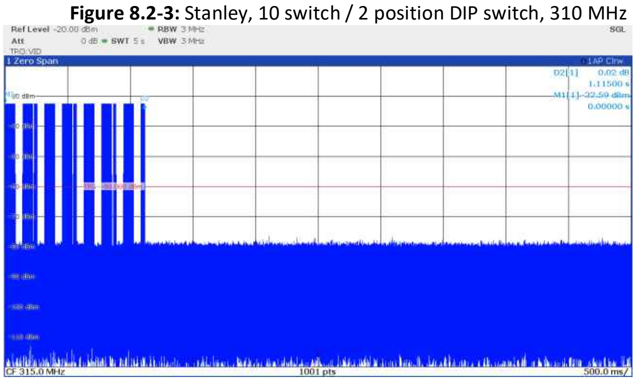


Figure 8.2-5: Deactivation time, Chamberlain, purple learn button, security+, 2006-2014, 315 MHz

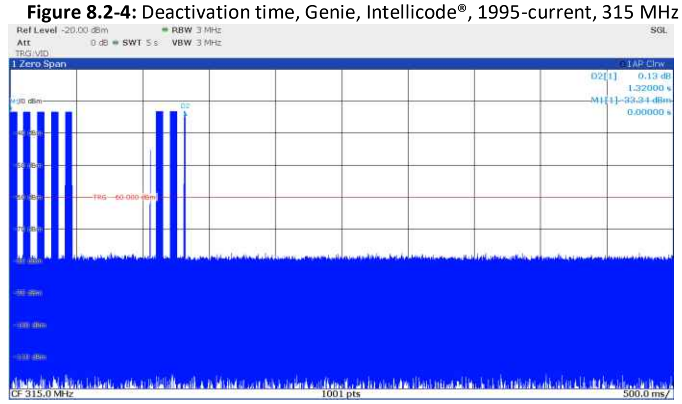


Figure 8.2-6: Deactivation time, Genie, Intellicode® II, 2010-2010, 315 MHz

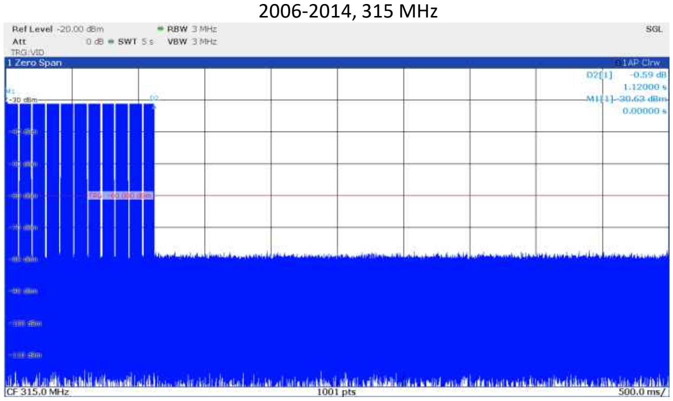


Figure 8.2-7: Deactivation time, Marantec, fixed learn code, 315 MHz

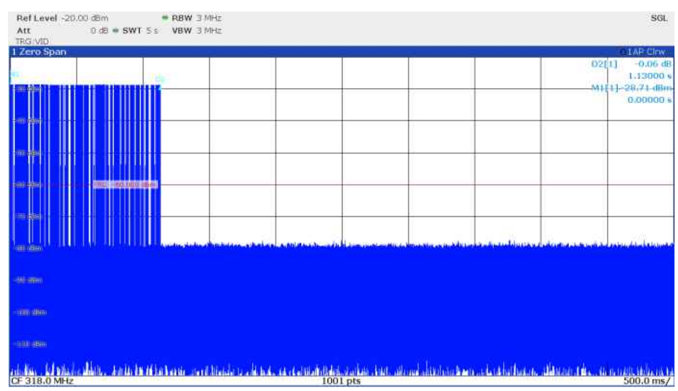


Figure 8.2-8: Deactivation time, Linear, Mega Code®, 318 MHz

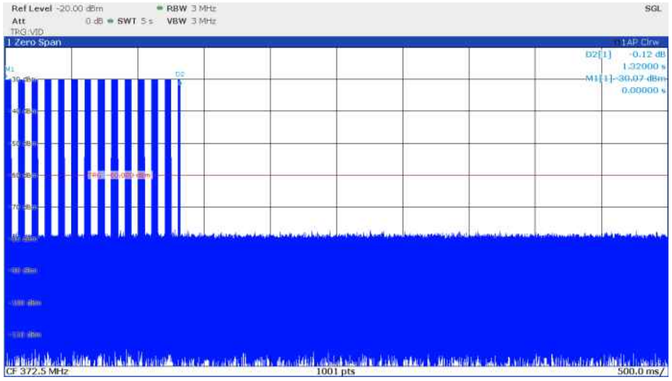


Figure 8.2-9: Deactivation time, Wayne Dalton, rolling code, 1999-current, 372.5 MHz

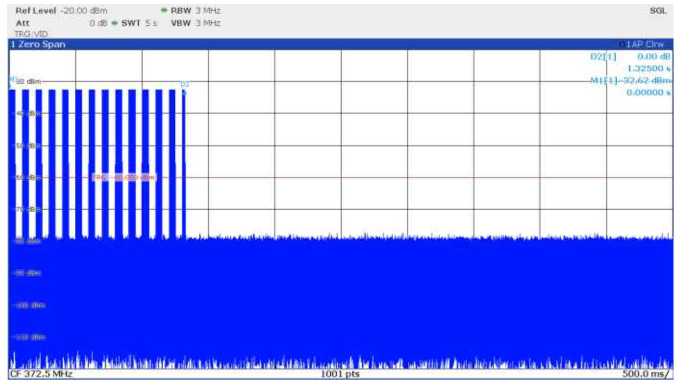


Figure 8.2-10: Deactivation time, Ryobi, rolling code, 372.5 MHz

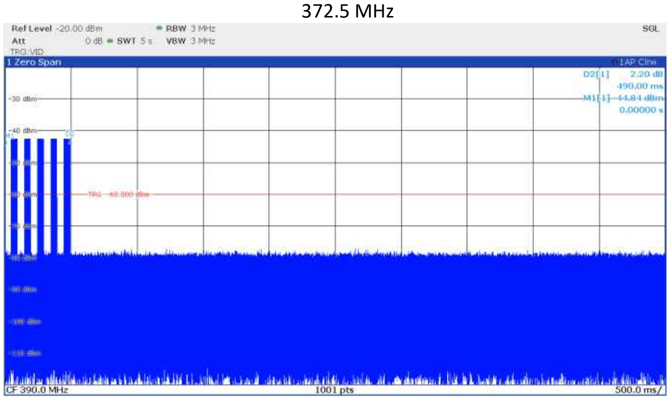


Figure 8.2-11: Deactivation time, Genie, Intellicode® I, 1995-current, 390 MHz

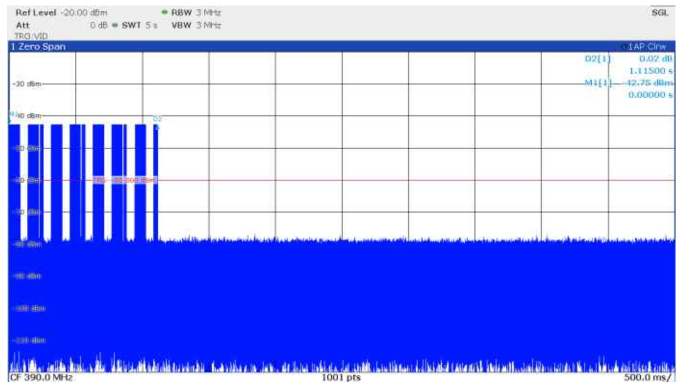


Figure 8.2-12: Deactivation time, Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz

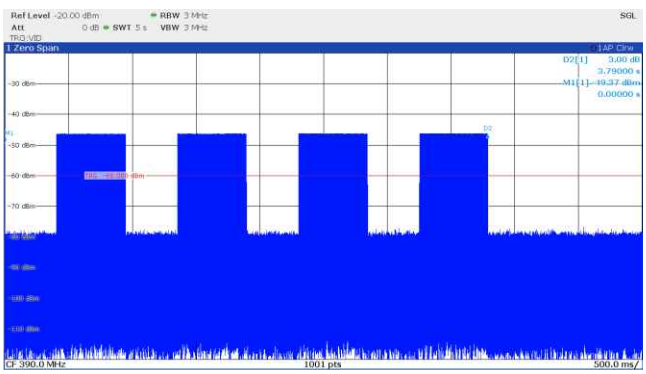


Figure 8.2-13: Deactivation time, Chamberlain, Yellow learn button, Security+2.0®, 2011-current, 390 MHz

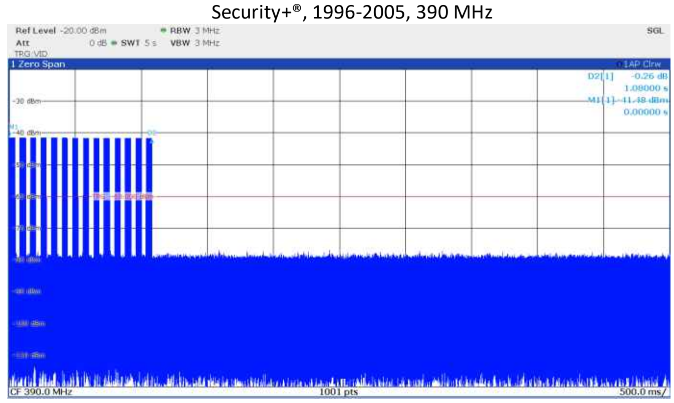


Figure 8.2-14: Deactivation time, Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz

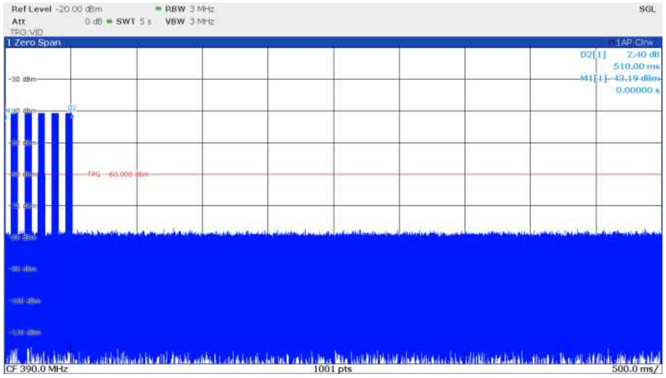


Figure 8.2-15: Deactivation time, Genie, Intellicode® II, 2010-2011, 390 MHz

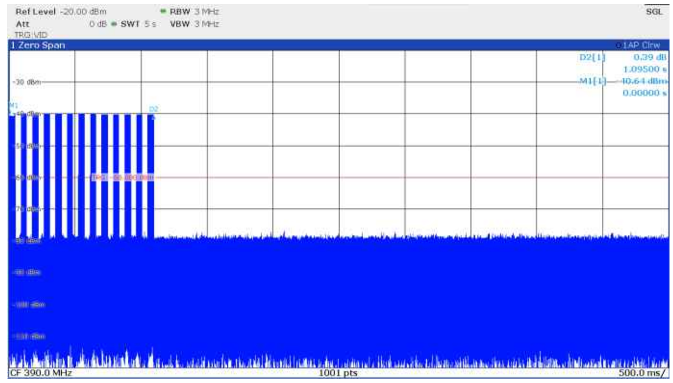


Figure 8.2-16: Deactivation time, Chamberlain, 9 switch / 3 position DIP switch, 390 MHz

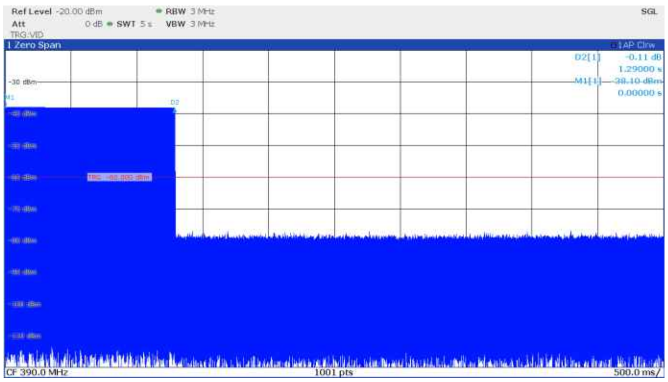


Figure 8.2-17: Deactivation time, Genie, 12 switch/2 position DIP switch, 1993-1995, 390 MHz

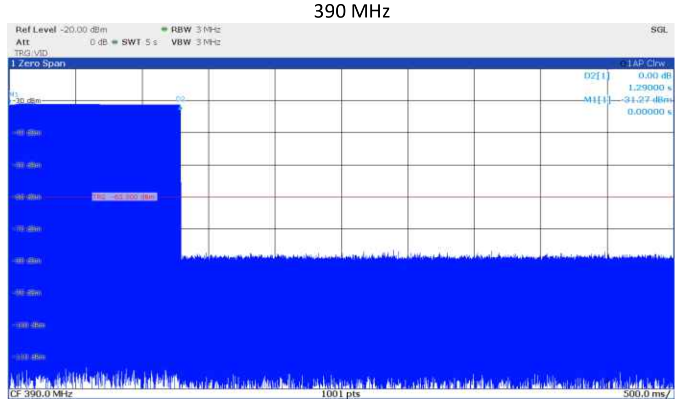


Figure 8.2-18: Deactivation time, Genie, 9 switch/2 position DIP switch, 1993-1995, 390 MHz

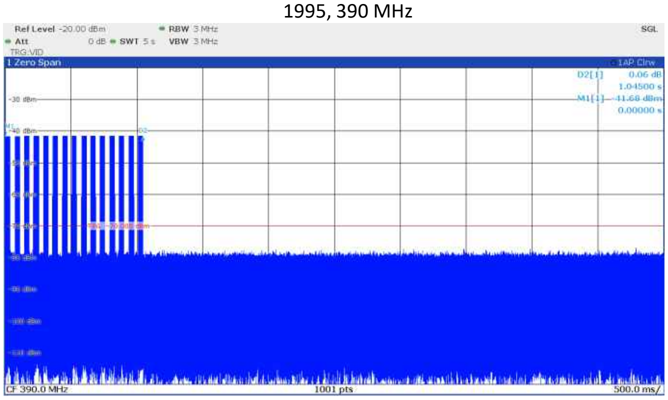


Figure 8.2-19: Deactivation time, OHD, 9 switch/3 position DIP switch, 1993-1995, 390 MHz

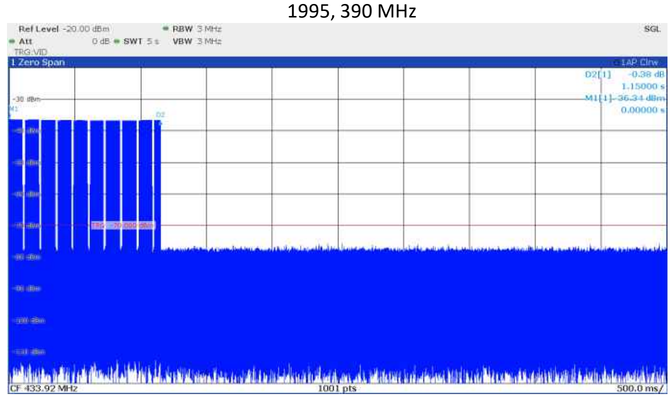


Figure 8.2-20: Deactivation time, FAAC, Rolling code, 433.92 MHz

8.3 FCC 15.231(b) / RSS-210 A.1.2 Field strength of emissions

8.3.1 Definitions and limits

FCC 15.231(b)):
In addition to 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	2250	225
70 – 130	1250	125
130 – 174	1250 to 3750 [1]	125 – 375 [1]
174 – 260	3750	375
260 – 470	3750 – 12500 [1]	375 – 1250 [1]
Above 470	12500	1250

Notes: [1] Linear interpolation.

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

(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits of 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.

RSS-210 A.1.2:
Following are the requirements for field strength of emissions:

a. The field strength of emissions from momentarily operated intentional radiators shall not exceed the limits in the table below, based on the average value of the measured emissions. The requirements of the “Pulsed operation” section of RSS-Gen apply for averaging pulsed emissions and limiting peak emissions.
Alternatively, compliance with the limits in the table below may be demonstrated using an International Special Committee on Radio Interference (CISPR) quasi-peak detector.

b. Unwanted emissions shall be 10 times below the fundamental emissions field strength limits in table below or comply with the limits specified in RSS-GEN, whichever is less stringent.

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)
40.66 – 40.70	2250
70 – 130	1250
130 – 174	1250 to 3750 *
174 – 260	3750
260 – 470	3750 – 12500 *
Above 470	12500

*Linear interpolation with frequency, f, in MHz:
For 130-174 MHz: Field Strength (µV/m) = (56.82 x f)-6136
For 260-470 MHz: Field Strength (µV/m) = (41.67 x f)-7083
** Frequency bands 225-328.6 MHz and 335.4-399.9 MHz are designated for the exclusive use of the Government of Canada. Manufacturers should be aware of possible harmful interference and degradation of their licence-exempt radio equipment in these frequency bands.

8.3.2 Test summary

Verdict	Pass		
Test date	June 29, 2021 – June 30, 2021	Temperature	22 °C
Test engineer	David Hewitt, EMC Specialist Mark Philips, Sr. EMC Engineer	Air pressure	1002 mbar
Test location	3m semi anechoic chamber 10m semi anechoic chamber	Relative humidity	64 %

8.3.3 Observations, settings, and special notes

Tests were performed using the methodology of Sections 6.3, 7.5 and 7.6 of ANSI C63.10.

The frequency range from 30 MHz to > 10 x the fundamental frequency was examined. The EUT was configured to continuously transmit at the desired mode (brand, coding, and operating frequency). Measurements were made with a peak detector. Fundamental and harmonic emissions were adjusted using the appropriate duty cycle correction factor for comparison against the average emission limits. All measurements were performed at a 3 m measurement distance simulating its intended configuration “Wall Mounted Axis”.

The table below outlines the operating modes tested:

Brand Name	Coding	Operating Frequency (MHz)	Comments
Guardian	Fixed learn code	303	Fully tested
Sommer	Rolling code	310	Fully tested
Stanley	10 switch / 2 position DIP switch	310	Fully tested (scans only above 1 GHz)
Genie	Intellicode®, 1995-current	315	Fully tested
Chamberlain	Purple learn button, security+, 2006-2014	315	Fully tested (scan only above 1 GHz)
Genie	Intellicode® II, 2010-2010	315	Calculated
Marantec	Fixed learn code	315	Fully tested (scan only above 1 GHz)
Linear	Mega Code®	318	Fully tested
Wayne Dalton	Rolling code, 1999-current	372.5	Fully tested
Ryobi	Rolling code	372.5	Calculated
Genie	Intellicode® I, 1995-current	390	Fully tested
Chamberlain	Orange/Red learn button, Security+, 1996-2005	390	Fully tested (scan only above 1 GHz)
Chamberlain	Yellow learn button, Security+2.0 ®, 2011-current	390	Calculated
Chamberlain	Green learn button, Billion Code®, 1993-1995	390	Fully tested (scan only above 1 GHz)
Genie	Intellicode® II, 2010-2011	390	Calculated
Chamberlain	9 switch/3 position DIP switch	390	Calculated
Genie	12 switch/2 position DIP switch, 1993-1995	390	Calculated
Genie	9 switch/2 position DIP switch, 1993-1995	390	Calculated
OHD	9 switch/3 position DIP switch, 1993-1995	390	Calculated
FAAC	Rolling code	433.92	Fully tested

For the operating modes not fully tested: samples operating in these modes have identical CW performance to another fully tested mode. Therefore, the measured peak emissions from the identical mode are used and the duty cycle correction for the not tested mode is applied to yield data that is compared against the average limits. In particular:

1. At 315 MHz, Genie Intellicode® I, Genie Intellicode® II and Marantec have identical CW performance.
2. At 372.5 MHz, Wayne Dalton and Ryobi have identical CW performance.
3. At 390 MHz, Genie Intellicode® I and Genie Intellicode® II have identical CW performance.
4. At 390 MHz, Chamberlain Orange/Red learn button, Chamberlain Yellow learn button, Chamberlain 9 switch / 3 position, Genie 12 switch / 2 position, Genie 9 switch / 2 position and OHD 9 switch / 3 position have identical CW performance.

For modes marked “scans only above 1 GHz”: Prescans were performed. Final measurements were only performed above 1 GHz on the worst case operating mode for each carrier frequency.

8.3.4 Test data

Field strength of fundamental:

Table 8.3-1: *Test data – field strength of fundamental*

Brand	Coding	Operating Frequency (MHz)	Peak Emission (dBµV/m)	Duty Cycle Correction Factor (dB)	Average Emission (dBµV/m)	Limit (dBµV/m)
Guardian	Fixed learn code	303	74.18	-7.99	66.19	74.17
Sommer	Rolling code	310	85.54	-13.19	72.35	74.58
Stanley	10 switch / 2 position DIP switch	310	79.36	-7.02	72.34	74.58
Genie	Intellicode®, 1995-current	315	85.96	-13.52	72.44	74.86
Chamberlain	Purple learn button, security+, 2006-2014	315	80.74	-6.38	74.36	74.86
Genie	Intellicode® II, 2010-2010	315	85.96	-12.66	73.30	74.86
Marantec	Fixed learn code	315	85.96	-11.77	74.19	74.86
Linear	Mega Code®	318	89.37	-15.51	73.86	75.02
Wayne Dalton	Rolling code, 1999-current	372.5	85.33	-13.07	72.26	77.81
Ryobi	Rolling code	372.5	85.33	-12.61	72.72	77.81
Genie	Intellicode® I, 1995-current	390	83.8	-13.47	70.33	78.62
Chamberlain	Orange/Red learn button, Security+®, 1996-2005	390	82.73	-7.06	75.67	78.62
Chamberlain	Yellow learn button, Security+2.0 ®, 2011-current	390	82.73	-6.92	75.81	78.62
Chamberlain	Green learn button, Billion Code®, 1993-1995	390	83.38	-9.20	74.18	78.62
Genie	Intellicode® II, 2010-2011	390	83.38	-13.13	70.25	78.62
Chamberlain	9 switch/3 position DIP switch	390	82.73	-8.95	73.78	78.62
Genie	12 switch/2 position DIP switch, 1993-1995	390	82.73	-5.92	76.81	78.62
Genie	9 switch/2 position DIP switch, 1993-1995	390	82.73	-5.88	76.85	78.62
OHD	9 switch/3 position DIP switch, 1993-1995	390	82.73	-7.65	75.08	78.62
FAAC	Rolling code	433.92	74.10	-6.33	67.77	80.50

Average Emission = Peak Emission + Duty Cycle Correction Factor. Example: Guardian 74.18 dBµV/m + (-7.99) dB = 66.19 dBµV/m average emission.

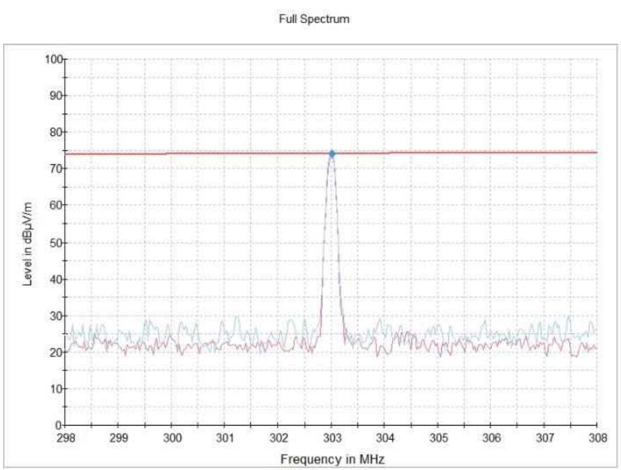


Figure 8.3-1: Fundamental emission, Guardian, fixed learn code, 303 MHz

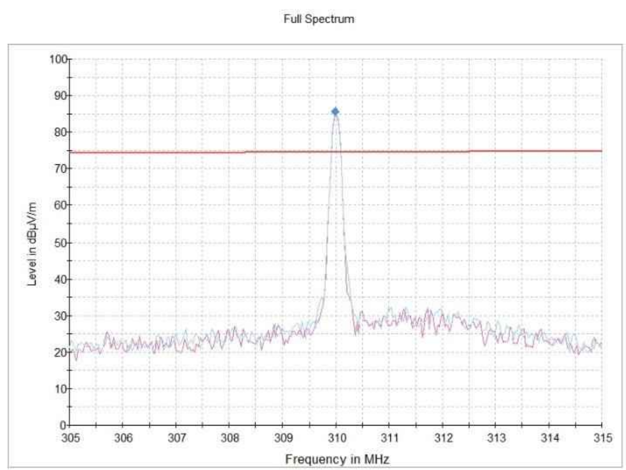


Figure 8.3-2: Fundamental emission, Sommer, rolling code, 310 MHz

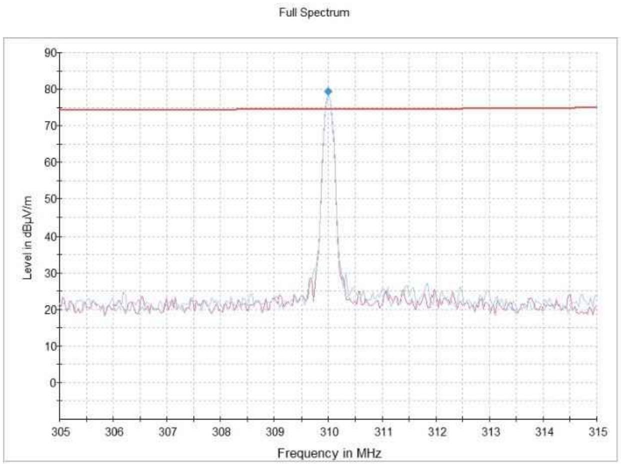


Figure 8.3-3: Fundamental emission, Stanley, 10 switch / 2 position DIP switch, 310 MHz

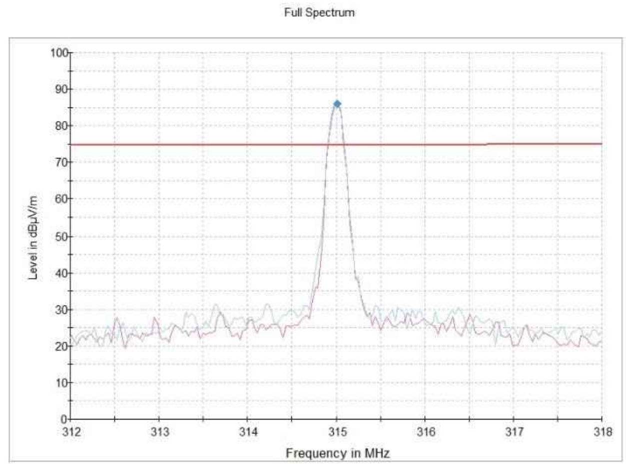


Figure 8.3-4: Fundamental emission, Genie, Intellicode®, 1995-current, 315 MHz

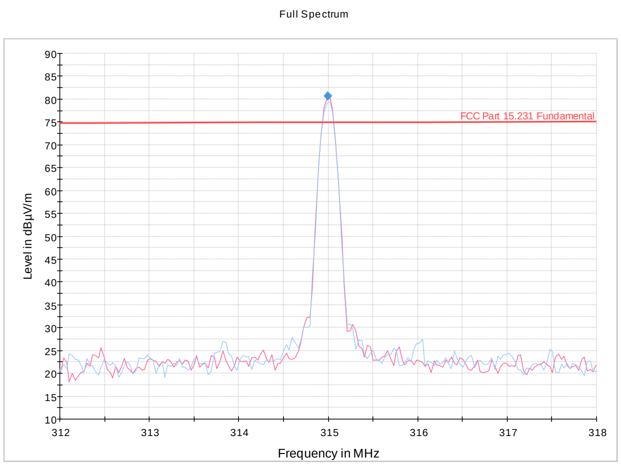


Figure 8.3-5: Fundamental emission, Chamberlain, purple learn button, security+, 2006-2014, 315 MHz

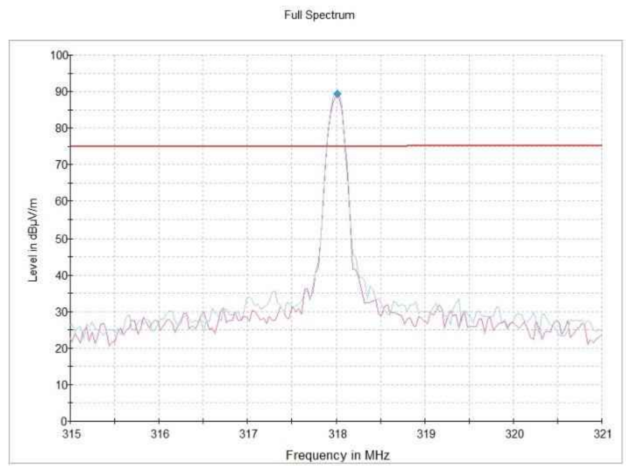


Figure 8.3-6: Fundamental emission, Linear, Mega Code®, 318 MHz

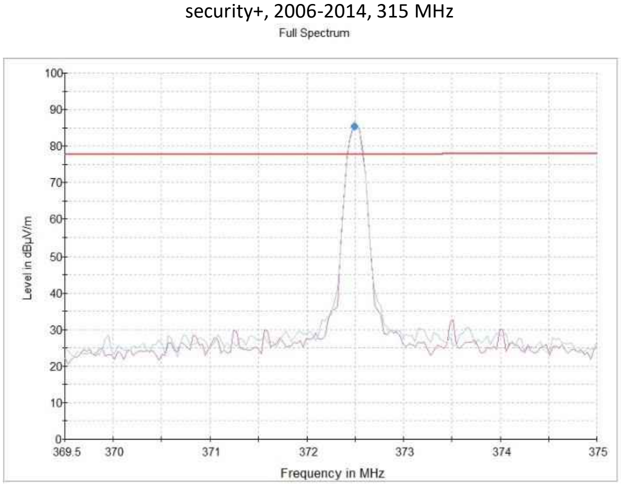


Figure 8.3-7: Fundamental emission, Wayne Dalton, rolling code, 1999-current, 372.5 MHz

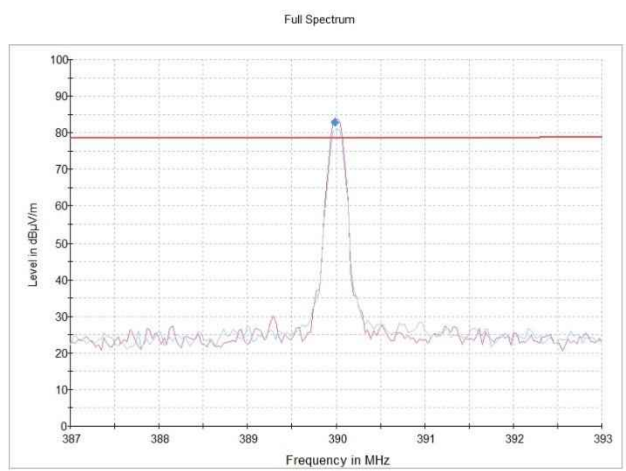


Figure 8.3-8: Fundamental emission, Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz

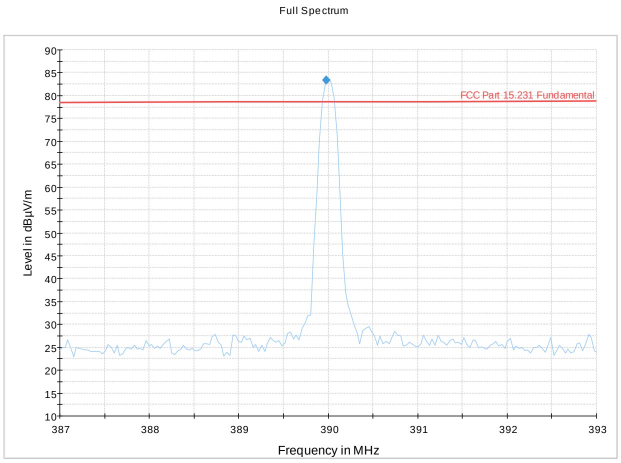


Figure 8.3-9: Fundamental emission, Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz

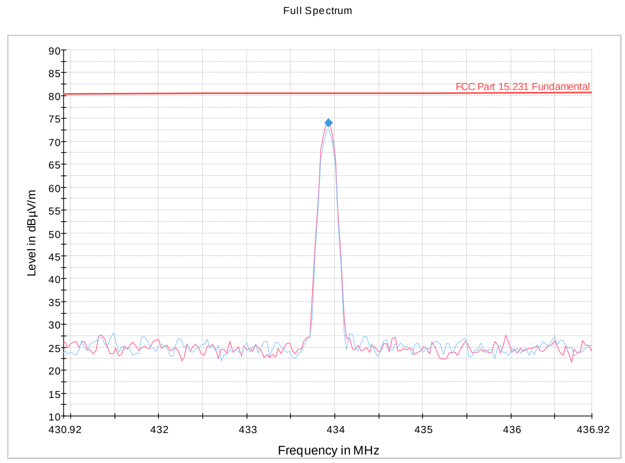
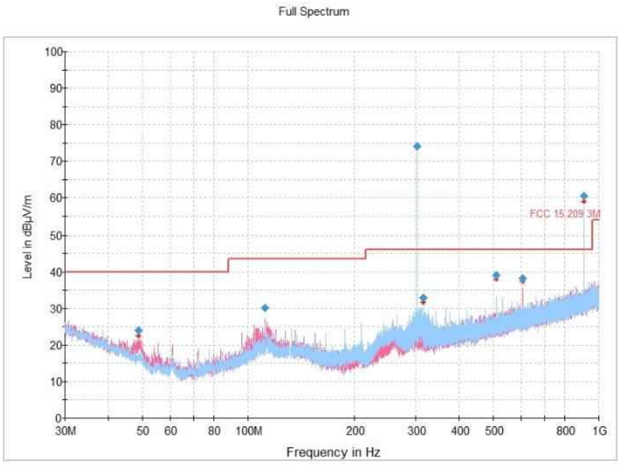


Figure 8.3-10: Fundamental emission, FAAC, Rolling code, 433 MHz

Harmonic and spurious emissions:



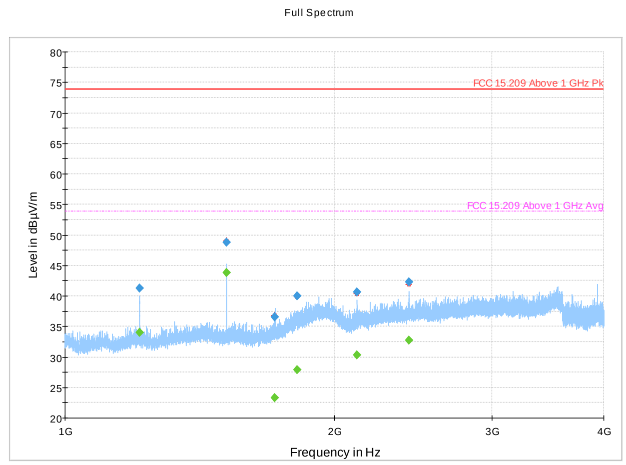


Figure 8.3-11: Harmonic and spurious emissions, 30 – 1000 MHz, Guardian, Fixed learn code, 303 MHz

Figure 8.3-12: Harmonic and spurious emissions, 1 – 4 GHz, Guardian, Fixed learn code, 303 MHz

Table 8.3-2: Harmonic and spurious emissions test data, Guardian, Fixed learn code, 303 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
48.815	23.94			54.17	30.23	5000	120	110	V	350	16.5
112.04967	30.15			54.17	24.02	5000	120	356	V	0	18.9
314.88167	32.99			54.17	21.18	5000	120	100	H	0	22.3
508.74733	39.10			54.17	15.07	5000	120	137	H	152	27.3
605.966	38.31	-7.99	30.32	54.17	23.85	5000	120	147	V	53	29
908.994	60.46	-7.99	52.47	54.17	1.70	5000	120	127	H	36	33.2
1212.15	41.33	-7.99	33.34	54.17	20.83	5000	1000	171	V	212	-14.7
1515.15	48.79	-7.99	40.80	54.17	13.37	5000	1000	98	V	116	-13.8
1716.4	36.56			54.17	17.61	5000	1000	401	V	50	-12.8
1818.2	39.97	-7.99	31.98	54.17	22.19	5000	1000	201	H	117	-10.6
2120.75	40.62	-7.99	32.63	54.17	21.54	5000	1000	102	V	170	-10
2424.2	42.29	-7.99	34.30	54.17	19.87	5000	1000	168	V	0	-8

Notes:

[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (dB)
[3] The maximum measured value observed over a period of 5 seconds was recorded.
[4] Peak emissions at harmonic frequencies are adjusted by the duty cycle correction factor and compared against the average limit. For non-harmonic emissions, the peak is compared directly against the average limit.
[5] The limit is calculated based on the nominal carrier frequency.

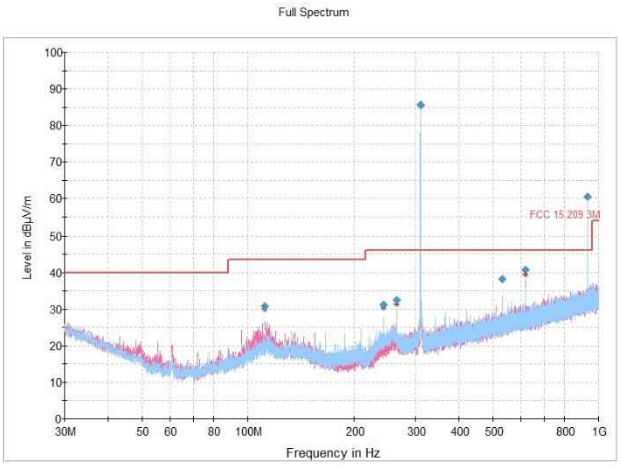


Figure 8.3-13: Harmonic and spurious emissions, 30 – 1000 MHz, Sommer, Rolling code, 310 MHz

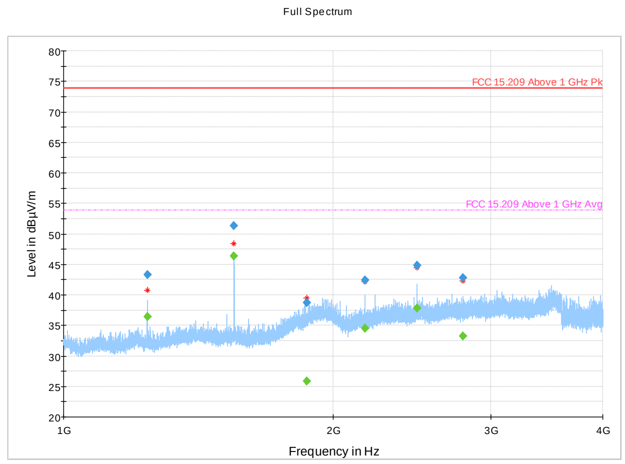


Figure 8.3-14: Harmonic and spurious emissions, 1 – 4 GHz, Sommer, Rolling code, 310 MHz

Table 8.3-3: Harmonic and spurious emissions test data, Sommer, Rolling code, 310 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
112.04967	30.72			54.58	23.86	5000	120	402	V	0	18.9
243.323	31.11			54.58	23.47	5000	120	100	H	180	20.2
265.439	32.41			54.58	22.17	5000	120	100	H	164	21.6
530.86333	38.28			54.58	16.30	5000	120	116	H	130	27.7
620.00633	40.67	-13.19	27.48	54.58	27.10	5000	120	98	V	210	29.3
929.97833	60.57	-13.19	47.38	54.58	7.20	5000	120	361	H	11	33.7
1240.05	43.35	-13.19	30.16	54.58	24.42	5000	1000	102	V	206	-14.8
1550.1	51.38	-13.19	38.19	54.58	16.39	5000	1000	115	V	116	-13.6
1869.5	38.73	-13.19	25.54	54.58	29.04	5000	1000	115	H	223	-9.7
2170.2	42.39	-13.19	29.20	54.58	25.38	5000	1000	122	V	142	-9.6
2479.85	44.88	-13.19	31.69	54.58	22.89	5000	1000	182	H	0	-7.7
2790	42.84	-13.19	29.65	54.58	24.93	5000	1000	122	V	320	-6.8

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) − amplifier gain (dB)
[3] The maximum measured value observed over a period of 5 seconds was recorded.
[4] Peak emissions at harmonic frequencies are adjusted by the duty cycle correction factor and compared against the average limit. For non-harmonic emissions, the peak is compared directly against the average limit.
[5] The limit is calculated based on the nominal carrier frequency.

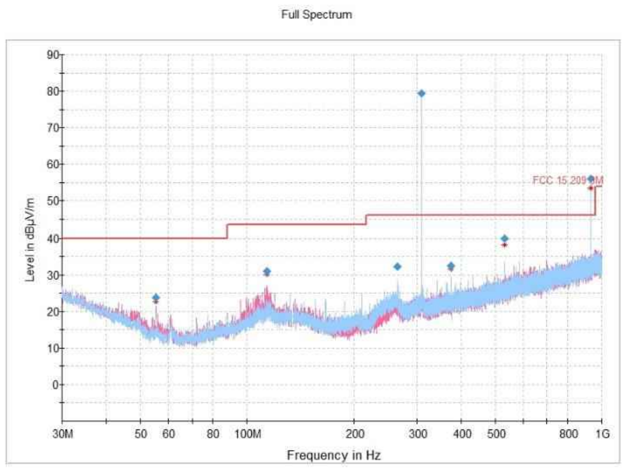


Figure 8.3-15: Harmonic and spurious emissions, 30 – 1000 MHz, Stanley, 10 switch / 2 position DIP switch, 310 MHz

Table 8.3-4: Harmonic and spurious emissions test data, Stanley, 10 switch / 2 position DIP switch, 310 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
55.304667	23.81			54.58	30.77	5000	120	110	V	85	13.7
113.634	30.89			54.58	23.69	5000	120	402	V	319	19.1
265.439	32.35			54.58	22.23	5000	120	100	H	166	21.6
376.019	32.37			54.58	22.21	5000	120	167	H	148	24.3
530.82333	39.84			54.58	14.74	5000	120	136	H	147	27.7
929.97833	55.94	-7.02	48.92	54.58	5.66	5000	120	117	H	0	33.7

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (dB)
[3] The maximum measured value observed over a period of 5 seconds was recorded.
[4] Peak emissions at harmonic frequencies are adjusted by the duty cycle correction factor and compared against the average limit. For non-harmonic emissions, the peak is compared directly against the average limit.
[5] The limit is calculated based on the nominal carrier frequency.

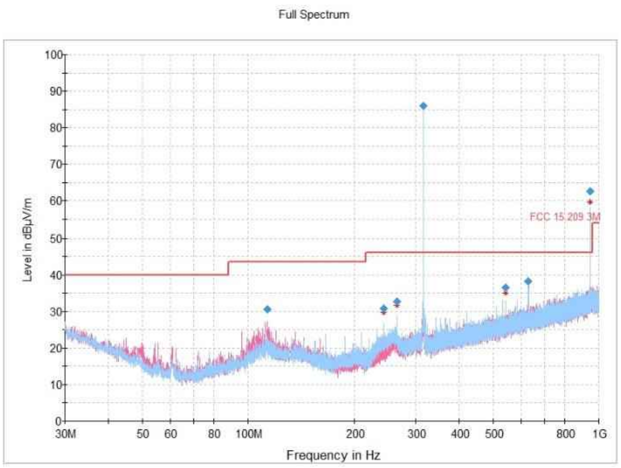


Figure 8.3-16: Harmonic and spurious emissions, 30 – 1000 MHz, Genie, Intellicode® I, 1995-current, 315 MHz

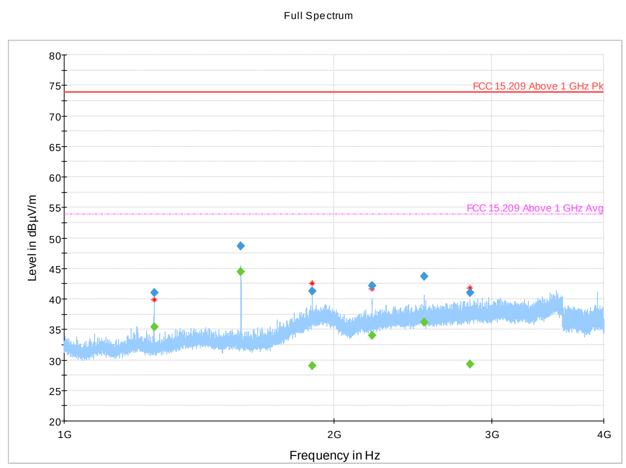


Figure 8.3-17: Harmonic and spurious emissions, 1 – 4 GHz, Genie, Intellicode® I, 1995-current, 315 MHz

Table 8.3-5: Harmonic and spurious emissions test data, Genie, Intellicode® I, 1995-current, 315 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
113.674	30.49			54.86	24.37	5000	120	402	V	224	19.1
243.283	30.81			54.86	24.05	5000	120	128	H	39	20.2
265.439	32.69			54.86	22.17	5000	120	100	H	180	21.6
541.91367	36.45			54.86	18.41	5000	120	128	H	149	27.7
629.99733	38.15	-13.52	24.63	54.86	30.23	5000	120	392	H	329	29.6
945.01333	62.61	-13.52	49.09	54.86	5.77	5000	120	126	H	0	34.4
1259.9	41.01	-13.52	27.49	54.86	27.37	5000	1000	98	V	227	-14.7
1575.15	48.63	-13.52	35.11	54.86	19.75	5000	1000	108	V	118	-13.7
1889.9	41.29	-13.52	27.77	54.86	27.09	5000	1000	150	V	0	-9.5
2204.75	42.2	-13.52	28.68	54.86	26.18	5000	1000	139	V	34	-9.3
2519.9	43.64	-13.52	30.12	54.86	24.74	5000	1000	161	H	22	-7.4
2835.3	41.05	-13.52	27.53	54.86	27.33	5000	1000	146	H	212	-6.5

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (dB)
[3] The maximum measured value observed over a period of 5 seconds was recorded.
[4] Peak emissions at harmonic frequencies are adjusted by the duty cycle correction factor and compared against the average limit. For non-harmonic emissions, the peak is compared directly against the average limit.
[5] The limit is calculated based on the nominal carrier frequency.

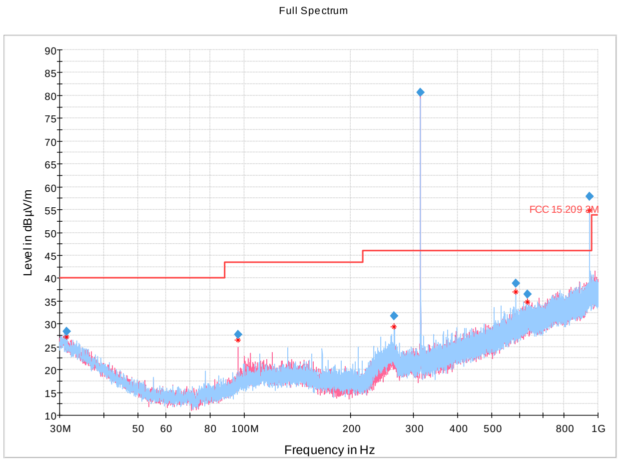


Figure 8.3-18: Harmonic and spurious emissions, 30 – 1000 MHz, Chamberlain, Purple learn button, security+, 2006-2014, 315 MHz

Table 8.3-6: Harmonic and spurious emissions test data, Chamberlain, Purple learn button, security+, 2006-2014, 315 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
31.427333	28.33			54.86	26.53	5000	120	266	H	163	24.1
96.012333	27.74			54.86	27.12	5000	120	271	V	353	15.9
265.43133	31.78			54.86	23.08	5000	120	98	H	345	21.4
586.14567	38.92			54.86	15.94	5000	120	98	H	313	28.8
630.05	36.49	-6.38	30.11	54.86	24.75	5000	120	192	H	0	29.5
945.01333	57.92	-6.38	51.54	54.86	3.32	5000	120	186	V	308	34.9

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (dB)
[3] The maximum measured value observed over a period of 5 seconds was recorded.
[4] Peak emissions at harmonic frequencies are adjusted by the duty cycle correction factor and compared against the average limit. For non-harmonic emissions, the peak is compared directly against the average limit.
[5] The limit is calculated based on the nominal carrier frequency.

Table 8.3-7: Harmonic and spurious emissions test data, Genie, Intellicode® II, 2010-2010, 315 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
113.674	30.49			54.86	24.37	5000	120	402	V	224	19.1
243.283	30.81			54.86	24.05	5000	120	128	H	39	20.2
265.439	32.69			54.86	22.17	5000	120	100	H	180	21.6
541.91367	36.45			54.86	18.41	5000	120	128	H	149	27.7
629.99733	38.15	-12.66	25.49	54.86	29.37	5000	120	392	H	329	29.6
945.01333	62.61	-12.66	49.95	54.86	4.91	5000	120	126	H	0	34.4
1259.9	41.01	-12.66	28.35	54.86	26.51	5000	1000	98	V	227	-14.7
1575.15	48.63	-12.66	35.97	54.86	18.89	5000	1000	108	V	118	-13.7
1889.9	41.29	-12.66	28.63	54.86	26.23	5000	1000	150	V	0	-9.5
2204.75	42.2	-12.66	29.54	54.86	25.32	5000	1000	139	V	34	-9.3
2519.9	43.64	-12.66	30.98	54.86	23.88	5000	1000	161	H	22	-7.4
2835.3	41.05	-12.66	28.39	54.86	26.47	5000	1000	146	H	212	-6.5

Note: Measurement result taken from Genie, Intellicode® I, 1995-current, 315 MHz. Duty cycle correction factor for Genie Intellicode® II, 2010-2010 applied to harmonic emissions.

Table 8.3-8: Harmonic and spurious emissions test data Marantec, Fixed learn code, 315 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
113.674	30.49			54.86	24.37	5000	120	402	V	224	19.1
243.283	30.81			54.86	24.05	5000	120	128	H	39	20.2
265.439	32.69			54.86	22.17	5000	120	100	H	180	21.6
541.91367	36.45			54.86	18.41	5000	120	128	H	149	27.7
629.99733	38.15	-11.77	26.38	54.86	28.48	5000	120	392	H	329	29.6
945.01333	62.61	-11.77	50.84	54.86	4.02	5000	120	126	H	0	34.4
1259.9	41.01	-11.77	29.24	54.86	25.62	5000	1000	98	V	227	-14.7
1575.15	48.63	-11.77	36.86	54.86	18.00	5000	1000	108	V	118	-13.7
1889.9	41.29	-11.77	29.52	54.86	25.34	5000	1000	150	V	0	-9.5
2204.75	42.20	-11.77	30.43	54.86	24.43	5000	1000	139	V	34	-9.3
2519.9	43.64	-11.77	31.87	54.86	22.99	5000	1000	161	H	22	-7.4
2835.3	41.05	-11.77	29.28	54.86	25.58	5000	1000	146	H	212	-6.5

Note: Measurement result taken from Genie, Intellicode® I, 1995-current, 315 MHz. Duty cycle correction factor for Marantec, Fixed learn code applied to harmonic emissions.

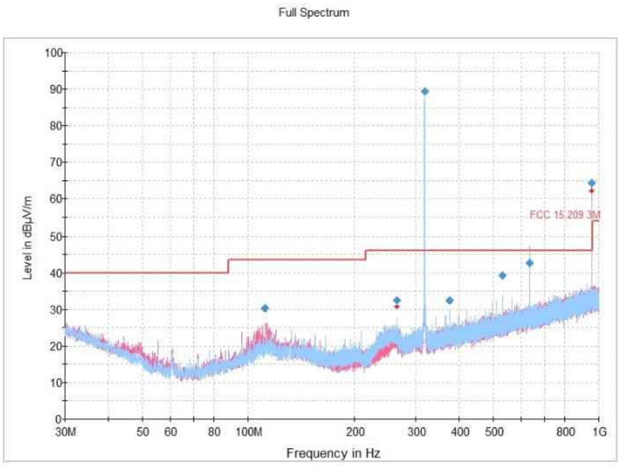


Figure 8.3-19: Harmonic and spurious emissions, 30 – 1000 MHz, Linear, Mega Code®, 318 MHz

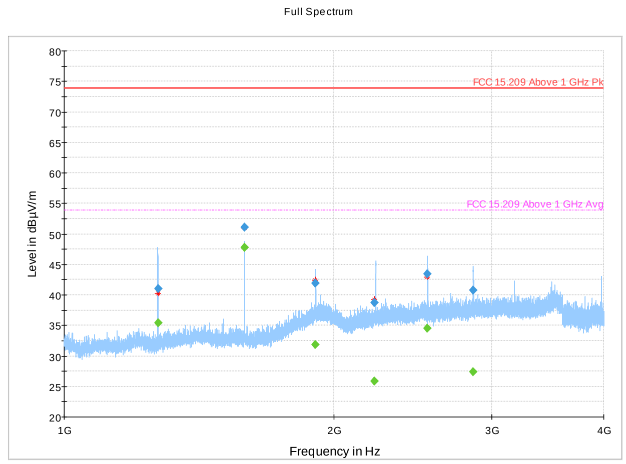


Figure 8.3-20: Harmonic and spurious emissions, 1 – 4 GHz, Linear, Mega Code®, 318 MHz

Table 8.3-9: Harmonic and spurious emissions test data, Linear, Mega Code®, 318 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
112.04967	30.28			55.02	24.74	5000	120	370	V	194	18.9
265.439	32.55			55.02	22.47	5000	120	128	H	194	21.6
376.019	32.4			55.02	22.62	5000	120	98	H	160	24.3
530.85567	39.26			55.02	15.76	5000	120	119	H	138	27.7
636.01133	42.70	-15.51	27.19	55.02	27.83	5000	120	136	V	240	29.7
954.00967	64.31	-15.51	48.80	55.02	6.22	5000	120	98	V	146	34.7
1272.15	40.96	-15.51	25.45	55.02	29.57	5000	1000	98	V	238	-14.5
1590.15	51.04	-15.51	35.53	55.02	19.49	5000	1000	105	V	131	-13.8
1907.75	41.95	-15.51	26.44	55.02	28.58	5000	1000	133	V	36	-9.4
2220.55	38.79	-15.51	23.28	55.02	31.74	5000	1000	129	V	51	-9.2
2544	43.44	-15.51	27.93	55.02	27.09	5000	1000	181	V	278	-7.6
2858.55	40.73	-15.51	25.22	55.02	29.80	5000	1000	401	V	0	-6.2

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) − amplifier gain (dB)
[3] The maximum measured value observed over a period of 5 seconds was recorded.
[4] Peak emissions at harmonic frequencies are adjusted by the duty cycle correction factor and compared against the average limit. For non-harmonic emissions, the peak is compared directly against the average limit.
[5] The limit is calculated based on the nominal carrier frequency.

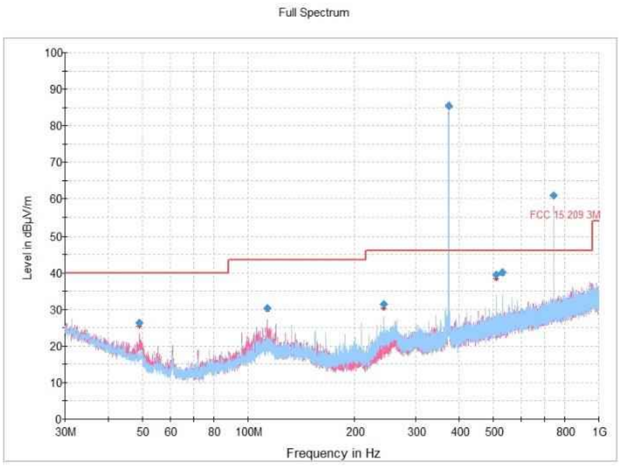


Figure 8.3-21: Harmonic and spurious emissions, 30 – 1000 MHz, Wayne Dalton, Rolling code, 1999-current, 372.5 MHz

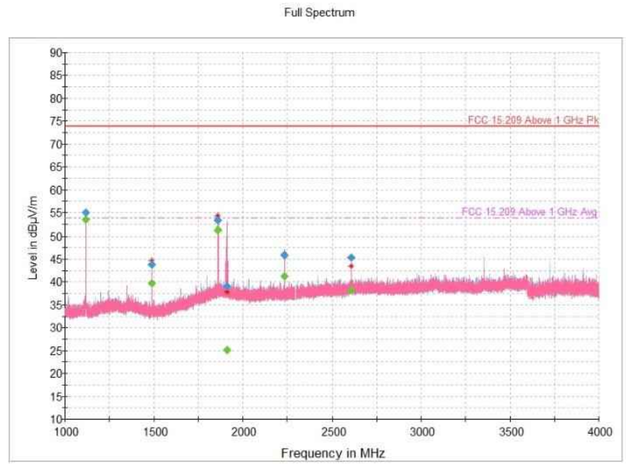


Figure 8.3-22: Harmonic and spurious emissions, 1 – 4 GHz, Wayne Dalton, Rolling code, 1999-current, 372.5 MHz

Table 8.3-10: Harmonic and spurious emissions test data, Wayne Dalton, Rolling code, 1999-current, 372.5 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
49.022667	26.36			57.81	31.45	5000	120	100	V	256	16.4
113.66633	30.41			57.81	27.40	5000	120	402	V	355	19.1
243.323	31.47			57.81	26.34	5000	120	110	H	176	20.2
508.74733	39.54			57.81	18.27	5000	120	110	H	145	27.3
530.85567	40.21	-13.07	27.14	57.81	30.67	5000	120	118	H	148	27.7
744.99933	60.85	-13.07	47.78	57.81	10.03	5000	120	116	V	271	31.4
1117.3	55.09	-13.07	42.02	57.81	18.81	5000	1000	108	V	153	-14.8
1489.9	43.86	-13.07	30.79	57.81	30.04	5000	1000	155	V	86	-15.2
1862.35	53.32	-13.07	40.25	57.81	20.58	5000	1000	110	V	294	-11
1911.95	38.97	-13.07	25.90	57.81	34.93	5000	1000	172	V	250	-10.8
2235.1	45.84	-13.07	32.77	57.81	28.06	5000	1000	116	V	44	-11
2607.4	45.28	-13.07	32.21	57.81	28.62	5000	1000	232	H	312	-9.4

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) − amplifier gain (dB)
[3] The maximum measured value observed over a period of 5 seconds was recorded.
[4] Peak emissions at harmonic frequencies are adjusted by the duty cycle correction factor and compared against the average limit. For non-harmonic emissions, the peak is compared directly against the average limit.
[5] The limit is calculated based on the nominal carrier frequency.

Table 8.3-11: Harmonic and spurious emissions test data, Ryobi, Rolling code, 372.5 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
49.022667	26.36			57.81	31.45	5000	120	100	V	256	16.4
113.66633	30.41			57.81	27.40	5000	120	402	V	355	19.1
243.323	31.47			57.81	26.34	5000	120	110	H	176	20.2
508.74733	39.54			57.81	18.27	5000	120	110	H	145	27.3
530.85567	40.21	-12.61	27.60	57.81	30.21	5000	120	118	H	148	27.7
744.99933	60.85	-12.61	48.24	57.81	9.57	5000	120	116	V	271	31.4
1117.3	55.09	-12.61	42.48	57.81	18.81	5000	1000	108	V	153	-14.8
1489.9	43.86	-12.61	31.25	57.81	30.04	5000	1000	155	V	86	-15.2
1862.35	53.32	-12.61	40.71	57.81	20.58	5000	1000	110	V	294	-11
1911.95	38.97	-12.61	26.36	57.81	34.93	5000	1000	172	V	250	-10.8
2235.1	45.84	-12.61	33.23	57.81	28.06	5000	1000	116	V	44	-11
2607.4	45.28	-12.61	32.67	57.81	28.62	5000	1000	232	H	312	-9.4

Note: Measurement result taken from Wayne Dalton, Rolling code, 1999-current, 372.5 MHz. Duty cycle correction factor for Ryobi, Rolling code applied to harmonic emissions.

Table 8.3-12: Harmonic and spurious emissions test data, Genie, Intellicode® I, 1995-current, 390 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
31.250333	28.67			58.62	29.95	5000	120	401	V	60	24.2
96.012333	27.52			58.62	31.1	5000	120	271	V	127	15.9
243.33067	30.52			58.62	28.1	5000	120	106	H	11	19
265.439	31.98			58.62	26.64	5000	120	98	H	0	21.4
563.99733	38.04			58.62	20.58	5000	120	111	H	318	28.2
779.984	60.4	-13.47	46.93	58.62	11.69	5000	120	111	V	251	31.5
1169.8	55.44	-13.47	41.97	58.62	16.65	5000	1000	116	V	321	-14.3
1902.85	38.77			58.62	19.85	5000	1000	220	H	193	-10.9
1919.45	38.78			58.62	19.84	5000	1000	402	V	9	-10.8
1949.95	46.23	-13.47	32.76	58.62	25.86	5000	1000	126	V	99	-10.8
2447.3	43.09			58.62	15.53	5000	1000	389	H	222	-9.9
2460.65	45.69			58.62	12.93	5000	1000	98	H	0	-9.8

Note: Measurement result taken from Chamberlain Green learn button, Billion Code®, 1993-1995, 390 MHz. Duty cycle correction factor for Genie, Intellicode® I, 1995-current, 390 MHz applied to harmonic emissions.

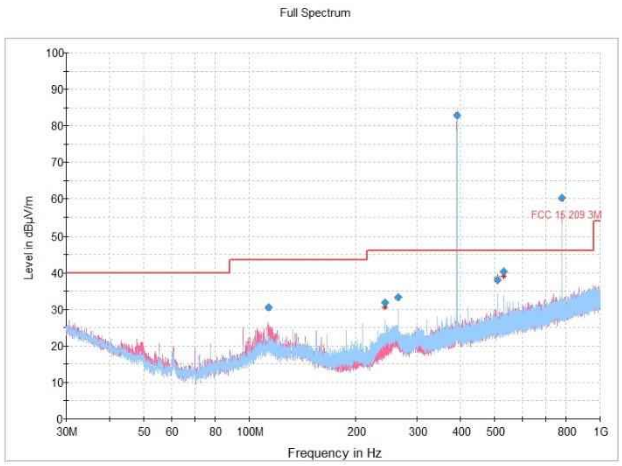


Figure 8.3-23: Harmonic and spurious emissions, 30 – 1000 MHz, Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz

Table 8.3-13: Harmonic and spurious emissions test data, Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
113.66133	30.49			58.62	28.13	5000	120	357	V	145	19.1
243.31533	31.92			58.62	26.70	5000	120	110	H	190	20.2
265.439	33.37			58.62	25.25	5000	120	100	H	192	21.6
508.74733	38.11			58.62	20.51	5000	120	128	H	129	27.3
530.86333	40.32			58.62	18.30	5000	120	119	H	147	27.7
779.984	60.37	-7.06	53.31	58.62	5.31	5000	120	108	V	270	31.6

Notes:

[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (dB)
[3] The maximum measured value observed over a period of 5 seconds was recorded.
[4] Peak emissions at harmonic frequencies are adjusted by the duty cycle correction factor and compared against the average limit. For non-harmonic emissions, the peak is compared directly against the average limit.
[5] The limit is calculated based on the nominal carrier frequency.

Table 8.3-14: Harmonic and spurious emissions test data, Chamberlain, Yellow learn button, Security+2.0 ®, 2011-current, 390 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
113.66133	30.49			58.62	28.13	5000	120	357	V	145	19.1
243.31533	31.92			58.62	26.7	5000	120	110	H	190	20.2
265.439	33.37			58.62	25.25	5000	120	100	H	192	21.6
508.74733	38.11			58.62	20.51	5000	120	128	H	129	27.3
530.86333	40.32			58.62	18.3	5000	120	119	H	147	27.7
779.984	60.37	-6.92	53.45	58.62	5.17	5000	120	108	V	270	31.6

Note: Measurement result taken from Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz. Duty cycle correction factor for Chamberlain, Yellow learn button learn button, Security+2.0®, 2011-current applied to harmonic emissions.

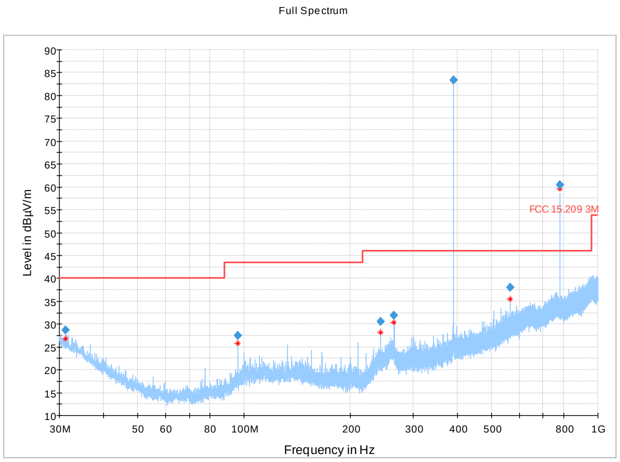


Figure 8.3-24: Harmonic and spurious emissions, 30 – 1000 MHz, Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz

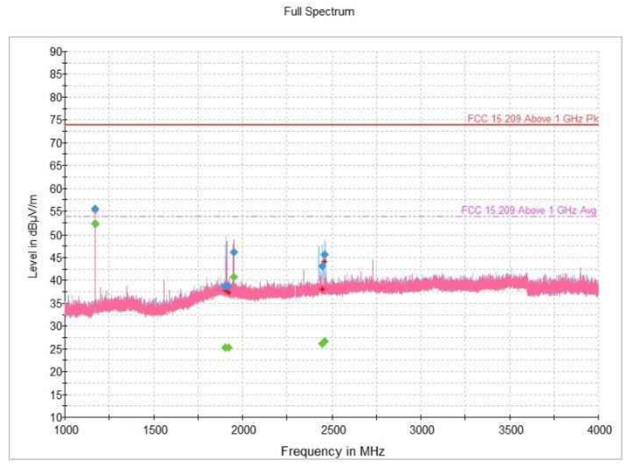


Figure 8.3-25: Harmonic and spurious emissions, 1 – 4 GHz, Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz

Table 8.3-15: Harmonic and spurious emissions test data, Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
31.250333	28.67			58.62	29.95	5000	120	401	V	60	24.2
96.012333	27.52			58.62	31.10	5000	120	271	V	127	15.9
243.33067	30.52			58.62	28.10	5000	120	106	H	11	19
265.439	31.98			58.62	26.64	5000	120	98	H	0	21.4
563.99733	38.04			58.62	20.58	5000	120	111	H	318	28.2
779.984	60.4	-9.20	51.20	58.62	7.42	5000	120	111	V	251	31.5
1169.8	55.44	-9.20	46.24	58.62	12.38	5000	1000	116	V	321	-14.3
1902.85	38.77			58.62	19.85	5000	1000	220	H	193	-10.9
1919.45	38.78			58.62	19.84	5000	1000	402	V	9	-10.8
1949.95	46.23	-9.20	37.03	58.62	21.59	5000	1000	126	V	99	-10.8
2447.3	43.09			58.62	15.53	5000	1000	389	H	222	-9.9
2460.65	45.69			58.62	12.93	5000	1000	98	H	0	-9.8

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (dB)
[3] The maximum measured value observed over a period of 5 seconds was recorded.
[4] Peak emissions at harmonic frequencies are adjusted by the duty cycle correction factor and compared against the average limit. For non-harmonic emissions, the peak is compared directly against the average limit.
[5] The limit is calculated based on the nominal carrier frequency.

Table 8.3-16: Harmonic and spurious emissions test data, Genie, Intellicode® II, 2010-2011, 390 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
31.250333	28.67			58.62	29.95	5000	120	401	V	60	24.2
96.012333	27.52			58.62	31.10	5000	120	271	V	127	15.9
243.33067	30.52			58.62	28.10	5000	120	106	H	11	19
265.439	31.98			58.62	26.64	5000	120	98	H	0	21.4
563.99733	38.04			58.62	20.58	5000	120	111	H	318	28.2
779.984	60.4	-13.13	47.27	58.62	11.35	5000	120	111	V	251	31.5
1169.8	55.44	-13.13	42.31	58.62	16.31	5000	1000	116	V	321	-14.3
1902.85	38.77			58.62	19.85	5000	1000	220	H	193	-10.9
1919.45	38.78			58.62	19.84	5000	1000	402	V	9	-10.8
1949.95	46.23	-13.13	33.10	58.62	25.52	5000	1000	126	V	99	-10.8
2447.3	43.09			58.62	15.53	5000	1000	389	H	222	-9.9
2460.65	45.69			58.62	12.93	5000	1000	98	H	0	-9.8

Note: Measurement result taken from Chamberlain, Green learn button, Billion Code®, 1993-1995**,** 390 MHz. Duty cycle correction factor for Genie, Intellicode® II, 2010-2011 applied to harmonic emissions.

Table 8.3-17: Harmonic and spurious emissions test data, Chamberlain, 9 switch/3 position DIP switch, 390 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
113.66133	30.49			58.62	28.13	5000	120	357	V	145	19.1
243.31533	31.92			58.62	26.7	5000	120	110	H	190	20.2
265.439	33.37			58.62	25.25	5000	120	100	H	192	21.6
508.74733	38.11			58.62	20.51	5000	120	128	H	129	27.3
530.86333	40.32			58.62	18.3	5000	120	119	H	147	27.7
779.984	60.37	-8.95	51.42	58.62	7.2	5000	120	108	V	270	31.6

Note: Measurement result taken from Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz. Duty cycle correction factor for Chamberlain, 9 switch/3 position DIP switch applied to harmonic emissions.

Table 8.3-18: Harmonic and spurious emissions test data, Genie, 12 switch/2 position DIP switch, 390 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
113.66133	30.49			58.62	28.13	5000	120	357	V	145	19.1
243.31533	31.92			58.62	26.7	5000	120	110	H	190	20.2
265.439	33.37			58.62	25.25	5000	120	100	H	192	21.6
508.74733	38.11			58.62	20.51	5000	120	128	H	129	27.3
530.86333	40.32			58.62	18.3	5000	120	119	H	147	27.7
779.984	60.37	-5.92	54.45	58.62	4.17	5000	120	108	V	270	31.6

Note: Measurement result taken from Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz. Duty cycle correction factor for Genie, 12 switch/2 position DIP switch applied to harmonic emissions.

Table 8.3-19: Harmonic and spurious emissions test data, Genie, 9 switch/2 position DIP switch, 1993-1995, 390 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
113.66133	30.49			58.62	28.13	5000	120	357	V	145	19.1
243.31533	31.92			58.62	26.7	5000	120	110	H	190	20.2
265.439	33.37			58.62	25.25	5000	120	100	H	192	21.6
508.74733	38.11			58.62	20.51	5000	120	128	H	129	27.3
530.86333	40.32			58.62	18.3	5000	120	119	H	147	27.7
779.984	60.37	-5.88	54.49	58.62	4.13	5000	120	108	V	270	31.6

Note: Measurement result taken from Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz. Duty cycle correction factor for Genie, 9 switch/2 position DIP switch, 1993-1995 applied to harmonic emissions.

Table 8.3-20: Harmonic and spurious emissions test data, OHD, 9 switch/3 position DIP switch, 1993-1995, 390 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
113.66133	30.49			58.62	28.13	5000	120	357	V	145	19.1
243.31533	31.92			58.62	26.7	5000	120	110	H	190	20.2
265.439	33.37			58.62	25.25	5000	120	100	H	192	21.6
508.74733	38.11			58.62	20.51	5000	120	128	H	129	27.3
530.86333	40.32			58.62	18.3	5000	120	119	H	147	27.7
779.984	60.37	-7.65	52.72	58.62	5.9	5000	120	108	V	270	31.6

Note: Measurement result taken from Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz. Duty cycle correction factor for OHD, 9 switch/3 position DIP switch, 1993-1995 applied to harmonic emissions.

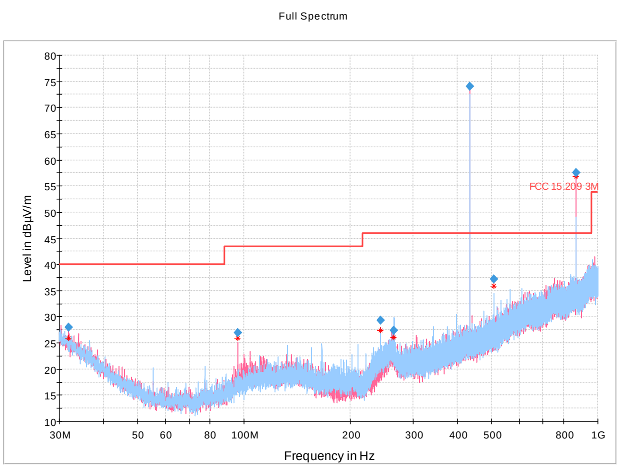


Figure 8.3-26: Harmonic and spurious emissions, 30 – 1000 MHz, FAAC rolling code, 433.92 MHz

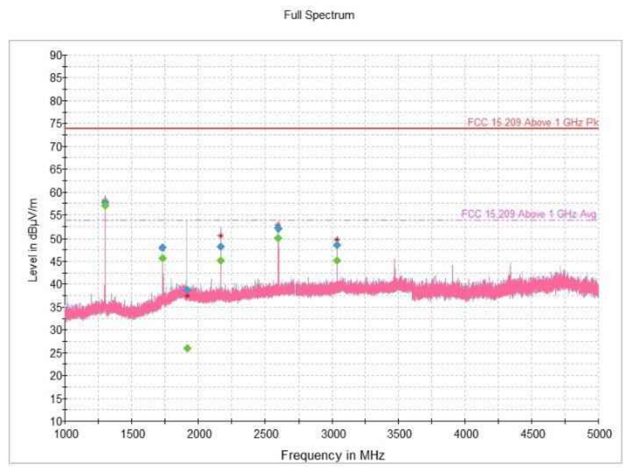


Figure 8.3-27: Harmonic and spurious emissions, 1 – 5 GHz, FAAC rolling code, 433.92 MHz

Table 8.3-21: Harmonic and spurious emissions test data, FAAC rolling code, 433.92 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Duty Cycle Correction (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
31.870667	27.97			60.50	32.53	5000	120	240	V	236	23.8
96.012333	26.9			60.50	33.60	5000	120	208	V	61	15.9
243.33067	29.35			60.50	31.15	5000	120	98	H	220	19
265.279	27.43			60.50	33.07	5000	120	167	H	355	21.5
508.73967	37.15			60.50	23.35	5000	120	98	H	292	26.4
867.83367	57.62	-6.33	51.29	60.50	9.21	5000	120	106	V	273	32.8
1301.6	57.7	-6.33	51.37	60.50	9.13	5000	1000	145	V	85	-14.5
1735.8	48.01	-6.33	41.68	60.50	18.82	5000	1000	410	H	357	-12.6
1920.2	38.66			60.50	21.84	5000	1000	296	H	0	-10.8
2169.4	48.14	-6.33	41.81	60.50	18.69	5000	1000	145	V	96	-11.1
2603.4	52.17	-6.33	45.84	60.50	14.66	5000	1000	251	H	0	-9.4
3037.4	48.54	-6.33	42.21	60.50	18.29	5000	1000	212	H	207	-8

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (dB)
[3] The maximum measured value observed over a period of 5 seconds was recorded.
[4] Peak emissions at harmonic frequencies are adjusted by the duty cycle correction factor and compared against the average limit. For non-harmonic emissions, the peak is compared directly against the average limit.
[5] The limit is calculated based on the nominal carrier frequency.

8.4 FCC 15.231(c) / RSS-210 A.1.3 Bandwidth of emissions

8.4.1 Definitions and limits

FCC 15.231(c) and RSS-210 A.1.1(a):
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.

8.4.2 Test summary

Verdict	Pass		
Test date	June 29, 2021 – July 1, 2021	Temperature	22 °C
Test engineer	James Cunningham, EMC/MIL/WL Supervisor	Air pressure	1004 mbar
Test location	Wireless bench	Relative humidity	39 %

8.4.3 Observations, settings, and special notes

Tests were performed based on the methodology of Section 6.9.2 of ANSI C63.10.

8.4.4 Test data

Table 8.4-1: *Test data – 20 dB bandwidth*

Brand	Coding	Operating Frequency (MHz)	20 dB Bandwidth (kHz)	Limit (kHz)
Guardian	Fixed learn code	303	5.25	757.5
Sommer	Rolling code	310	13.44	775.0
Stanley	10 switch / 2 position DIP switch	310	4.78	775.0
Genie	Intellicode®, 1995-current	315	9.71	787.5
Chamberlain	Purple learn button, security+, 2006-2014	315	4.06	787.5
Genie	Intellicode® II, 2010-2010	315	9.44	787.5
Marantec	Fixed learn code	315	5.24	787.5
Linear	Mega Code®	318	6.03	795.0
Wayne Dalton	Rolling code, 1999-current	372.5	10.01	931.3
Ryobi	Rolling code	372.5	11.34	931.3
Genie	Intellicode® I, 1995-current	390	9.44	975.0
Chamberlain	Orange/Red learn button, Security+®, 1996-2005	390	6.41	975.0
Chamberlain	Yellow learn button, Security+2.0 ®, 2011-current	390	15.68	975.0
Chamberlain	Green learn button, Billion Code®, 1993-1995	390	4.93	975.0
Genie	Intellicode® II, 2010-2011	390	9.56	975.0
Chamberlain	9 switch/3 position DIP switch	390	6.2	975.0
Genie	12 switch/2 position DIP switch, 1993-1995	390	75.92	975.0
Genie	9 switch/2 position DIP switch, 1993-1995	390	76.12	975.0
OHD	9 switch/3 position DIP switch, 1993-1995	390	6.01	975.0
FAAC	Rolling code	433.92	8.27	1084.8

Figure 8.4-1: 20 dB bandwidth, Guardian, fixed learn code, 303 MHz

Figure 8.4-2: 20 dB bandwidth, Sommer, rolling code, 310 MHz

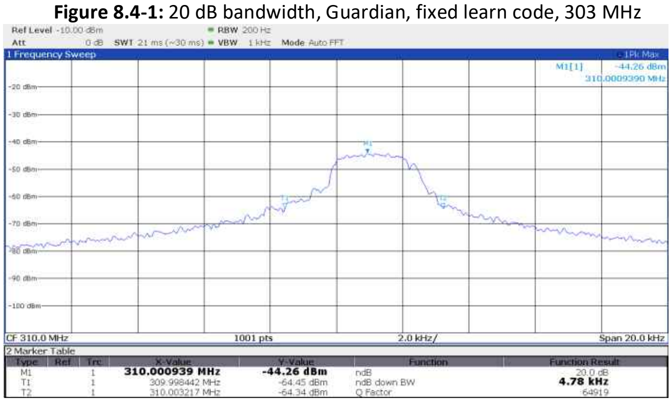


Figure 8.4-3: 20 dB bandwidth, Stanley, 10 switch / 2 position DIP switch, 310 MHz

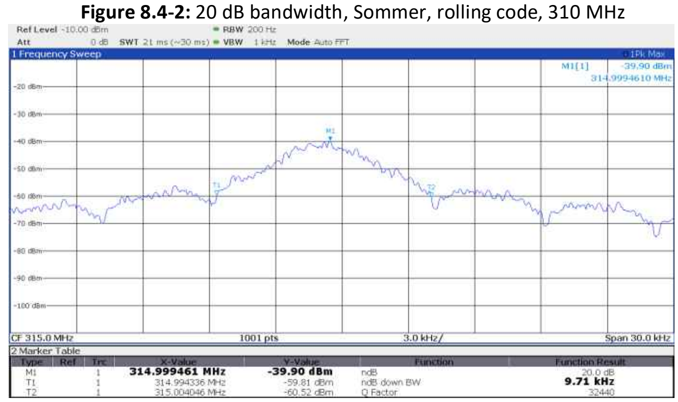


Figure 8.4-4: 20 dB bandwidth, Genie, Intellicode®, 1995-current, 315 MHz

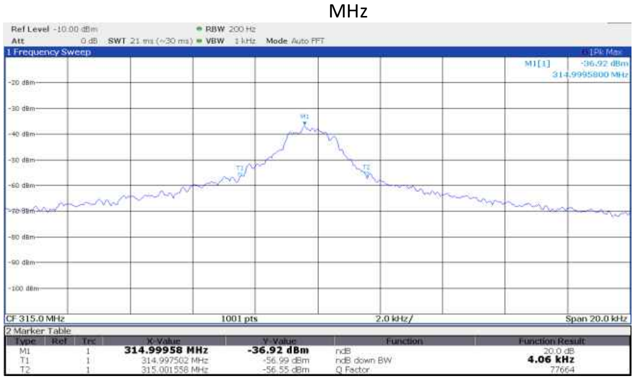


Figure 8.4-5: 20 dB bandwidth, Chamberlain, purple learn button, security+, 2006-2014, 315 MHz

Figure 8.4-6: 20 dB bandwidth, Genie, Intellicode® II, 2010-2010, 315 MHz

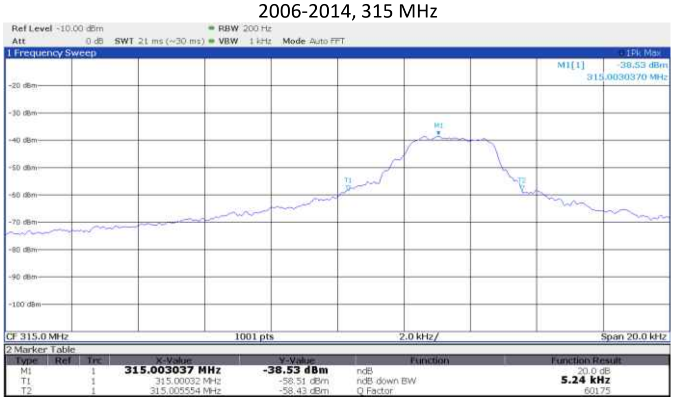


Figure 8.4-7: 20 dB bandwidth, Marantec, fixed learn code, 315 MHz

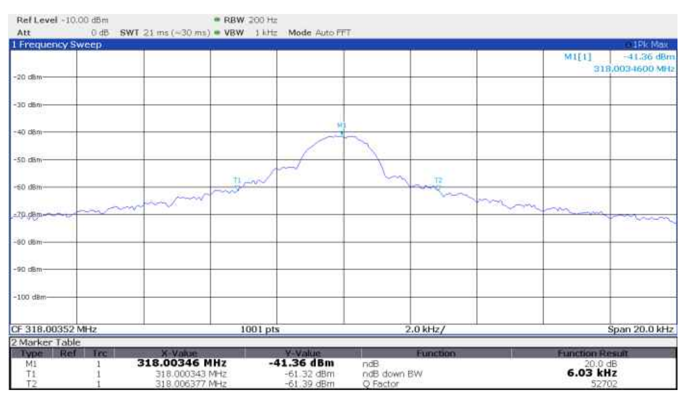


Figure 8.4-8: 20 dB bandwidth, Linear, Mega Code®, 318 MHz

Figure 8.4-9: 20 dB bandwidth, Wayne Dalton, rolling code, 1999-current, 372.5 MHz

Figure 8.4-10: 20 dB bandwidth, Ryobi, rolling code, 372.5 MHz

Figure 8.4-11: 20 dB bandwidth, Genie, Intellicode® I, 1995-current, 390 MHz

Figure 8.4-12: 20 dB bandwidth, Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz

Figure 8.4-13: 20 dB bandwidth, Chamberlain, Yellow learn button, Security+2.0®, 2011-current, 390 MHz

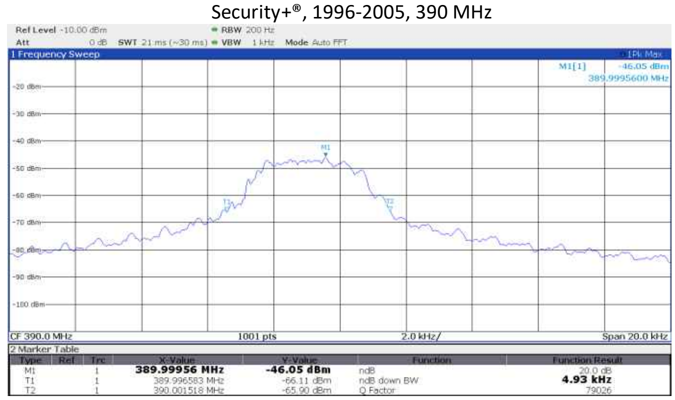


Figure 8.4-14: 20 dB bandwidth, Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz

Figure 8.4-15: 20 dB bandwidth, Genie, Intellicode® II, 2010-2011, 390 MHz

Figure 8.4-16: 20 dB bandwidth, Chamberlain, 9 switch / 3 position DIP switch, 390 MHz

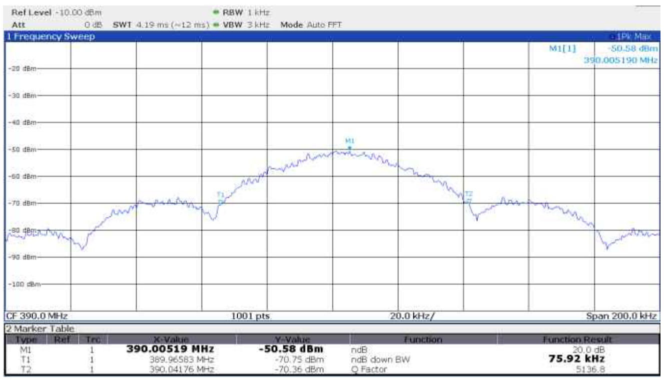


Figure 8.4-17: 20 dB bandwidth, Genie, 12 switch/2 position DIP switch, 1993-1995, 390 MHz

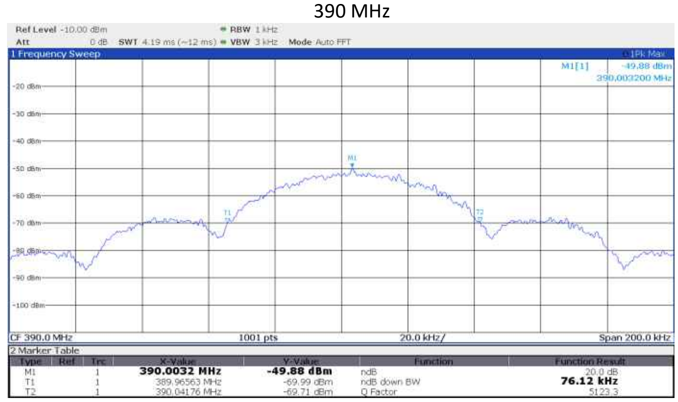


Figure 8.4-18: 20 dB bandwidth, Genie, 9 switch/2 position DIP switch, 1993-1995, 390 MHz

Figure 8.4-19: 20 dB bandwidth, OHD, 9 switch/3 position DIP switch, 1993-1995, 390 MHz

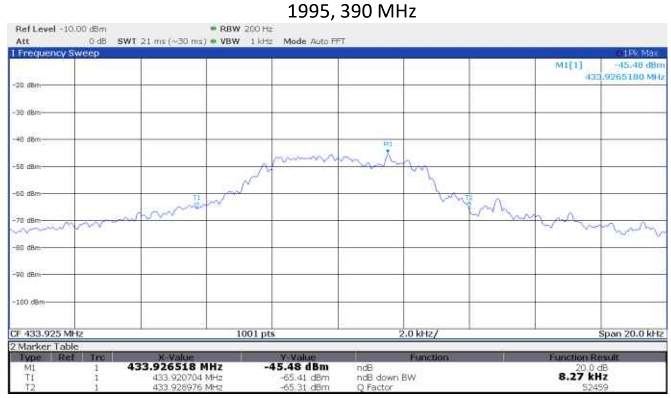


Figure 8.4-20: 20 dB bandwidth, FAAC, Rolling code, 433.92 MHz

8.5 RSS-GEN 6.7 – Occupied bandwidth

8.5.1 Definitions and limits

RSS-GEN 6.7:
The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

8.5.2 Test summary

Verdict	Pass		
Test date	June 29, 2021 – July 1, 2021	Temperature	22 °C
Test engineer	James Cunningham, EMC/MIL/WL Supervisor	Air pressure	1004 mbar
Test location	Wireless bench	Relative humidity	39 %

8.5.3 Observations, settings, and special notes

Tests were performed based on the methodology of Section 6.9.3 of ANSI C63.10.

8.5.4 Test data

Table 8.5-1: *Test data – 99% occupied bandwidth*

Brand	Coding	Operating Frequency (MHz)	99% Occupied Bandwidth (kHz)
Guardian	Fixed learn code	303	13.09
Sommer	Rolling code	310	38.45
Stanley	10 switch / 2 position DIP switch	310	7.47
Genie	Intellicode®, 1995-current	315	38.84
Chamberlain	Purple learn button, security+, 2006-2014	315	21.61
Genie	Intellicode® II, 2010-2010	315	39.24
Marantec	Fixed learn code	315	7.44
Linear	Mega Code®	318	11.86
Wayne Dalton	Rolling code, 1999-current	372.5	38.84
Ryobi	Rolling code	372.5	38.54
Genie	Intellicode® I, 1995-current	390	39.08
Chamberlain	Orange/Red learn button, Security+®, 1996-2005	390	8.19
Chamberlain	Yellow learn button, Security+2.0 ®, 2011-current	390	34.61
Chamberlain	Green learn button, Billion Code®, 1993-1995	390	4.73
Genie	Intellicode® II, 2010-2011	390	44.14
Chamberlain	9 switch/3 position DIP switch	390	5.27
Genie	12 switch/2 position DIP switch, 1993-1995	390	119.18
Genie	9 switch/2 position DIP switch, 1993-1995	390	120.91
OHD	9 switch/3 position DIP switch, 1993-1995	390	5.23
FAAC	Rolling code	433.92	14.52

Figure 8.5-1: 99% occupied bandwidth, Guardian, fixed learn code, 303 MHz

Figure 8.5-2: 99% occupied bandwidth, Sommer, rolling code, 310 MHz

Figure 8.5-3: 99% occupied bandwidth, Stanley, 10 switch / 2 position DIP switch, 310 MHz

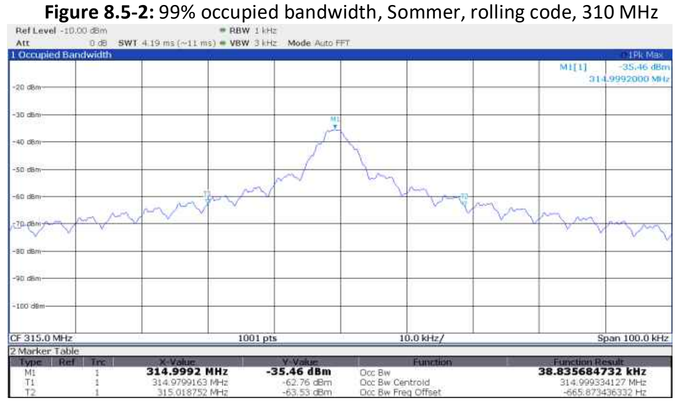


Figure 8.5-4: 99% occupied bandwidth, Genie, Intellicode®, 1995-current, 315 MHz

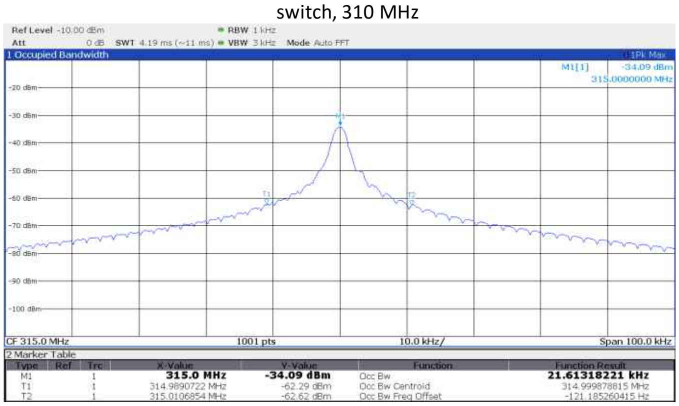


Figure 8.5-5: 99% occupied bandwidth, Chamberlain, purple learn button, security+, 2006-2014, 315 MHz

Figure 8.5-6: 99% occupied bandwidth, Genie, Intellicode® II, 2010-2010, 315 MHz

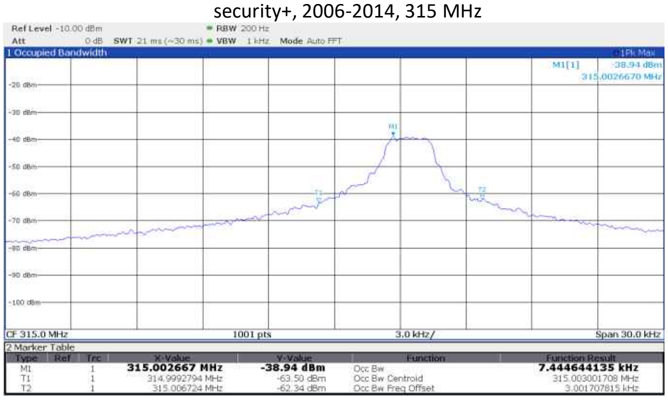


Figure 8.5-7: 99% occupied bandwidth, Marantec, fixed learn code, 315 MHz

Figure 8.5-8: 99% occupied bandwidth, Linear, Mega Code®, 318 MHz

Figure 8.5-9: 99% occupied bandwidth, Wayne Dalton, rolling code, 1999-current, 372.5 MHz

Figure 8.5-10: 99% occupied bandwidth, Ryobi, rolling code, 372.5 MHz

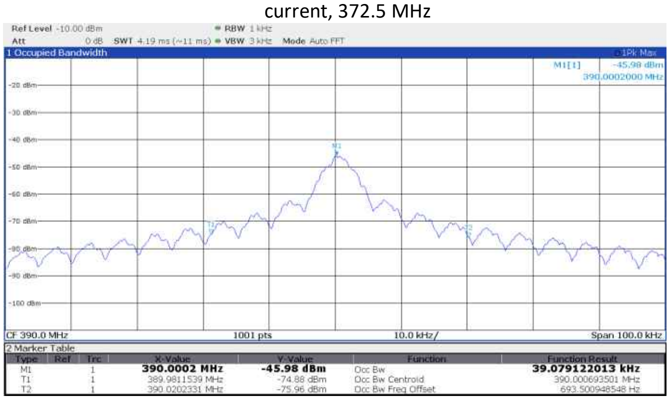


Figure 8.5-11: 99% occupied bandwidth, Genie, Intellicode® I, 1995-current, 390 MHz

Figure 8.5-12: 99% occupied bandwidth, Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz

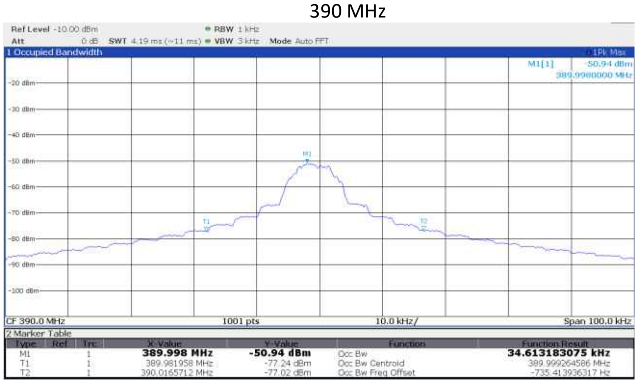


Figure 8.5-13: 99% occupied bandwidth, Chamberlain, Yellow learn button, Security+2.0®, 2011-current, 390 MHz

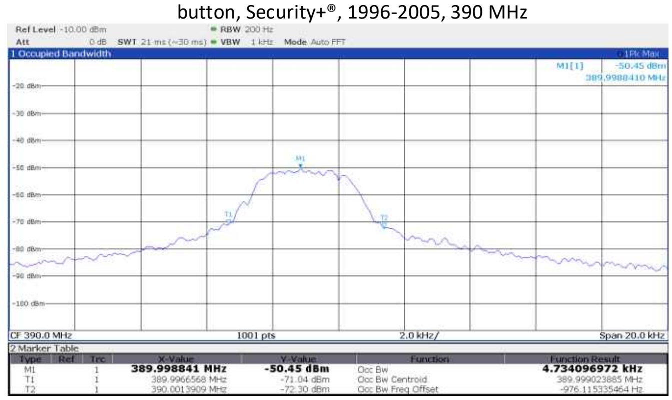


Figure 8.5-14: 99% occupied bandwidth, Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz

Figure 8.5-15: 99% occupied bandwidth, Genie, Intellicode® II, 2010-2011, 390 MHz

Figure 8.5-16: 99% occupied bandwidth, Chamberlain, 9 switch / 3 position DIP switch, 390 MHz

Figure 8.5-17: 99% occupied bandwidth, Genie, 12 switch/2 position DIP switch, 1993-1995, 390 MHz

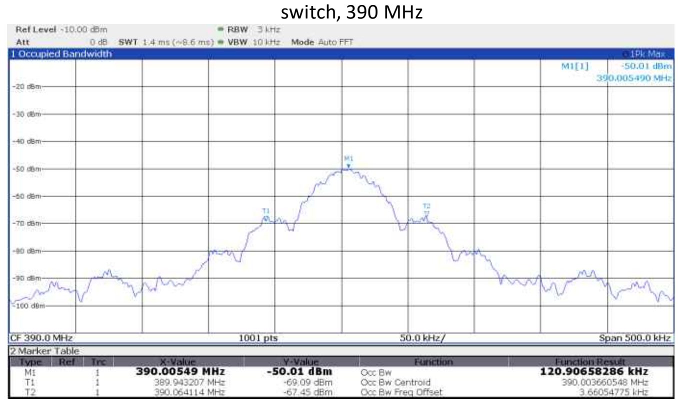


Figure 8.5-18: 99% occupied bandwidth, Genie, 9 switch/2 position DIP switch, 1993-1995, 390 MHz

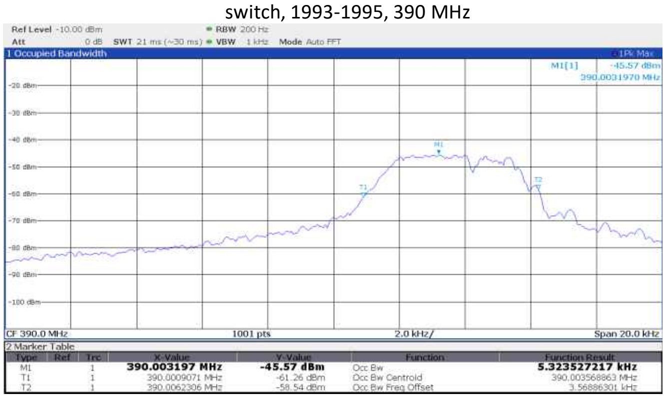


Figure 8.5-19: 99% occupied bandwidth, OHD, 9 switch/3 position DIP switch, 1993-1995, 390 MHz

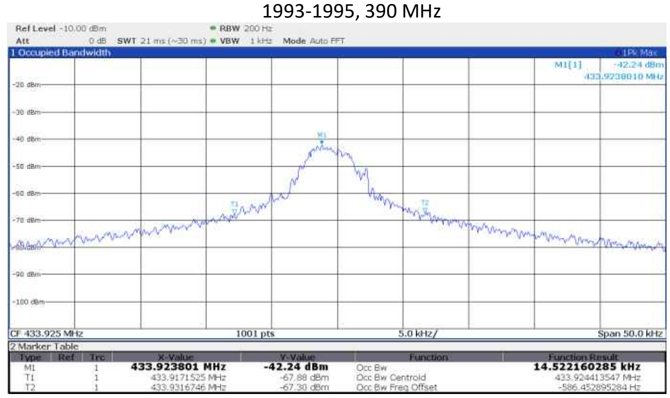


Figure 8.5-20: 99% occupied bandwidth, FAAC, Rolling code, 433.92 MHz