ONE WORLD ○ OUR APPROVAL

Test report

445128-1TRFWL

Date of issue: July 14, 2021

Applicant:

The Genie Company (Overhead Door Corporation)

Product:

Universal 4 Button Transmitter (U4Tx2)

Model:	Variant(s):
OU4TR2	GU4TG2, GU4TR2
FCC ID:	IC ID:
B8QUNI4B2	2133A-UNI4B2

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.

Table of Contents

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
445128-1TRFWL	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: 445128

3.2 EUT information

Product name	Universal 4 Button Transmitter (U4Tx2)
Model	OU4TR2
Variant(s)	GU4TR2 (Variant is identical to OU4TR2 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: (see table below)
Power requirements	$3V_{DC}$ battery
Antenna information	The EUT uses a unique antenna coupling/ non-detachable antenna to the intentional radiator.

Various operating modes are supported as follows:

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

3.4 Product description and theory of operation

The EUT is a programmable hand-held 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 in testing: CW: UT4B-v2.100.2_CW.hex, Modulated: UT4B-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 28, 2021 – June 30, 2021	Temperature	24 °C
Test engineer	James Cunningham, EMC/MIL/WL Supervisor	Air pressure	1007 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 19 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	35	490	18	987	N/A	N/A	-9.14
Sommer	Rolling code	310	42	190	35	391	N/A	N/A	-13.28
Stanley	10 switch / 2 position DIP switch	310	30	1486	0	0	N/A	N/A	-7.02
Genie	Intellicode®, 1995-current	315	44	191	33	391	N/A	N/A	-13.43
Genie	Intellicode® II, 2010-2010	315	19	489	13	1485	9	987	-8.52
Chamberlain	Purple learn button, security+, 2006-2014	315	49	191	29	392	N/A	N/A	-13.67
Marantec	Fixed learn code	315	12	757	12	1522	N/A	N/A	-11.26
Linear	Mega Code®	318	17	988			N/A	N/A	-15.50
Wayne Dalton	Rolling code, 1999-current	372.5	41	192	38	390	N/A	N/A	-12.88
Ryobi	Rolling code	372.5	51	191	28	391	N/A	N/A	-13.69
Genie	Intellicode I	390	46	191	31	390	N/A	N/A	-13.61
Chamberlain	Orange Red	390	17	491	16	987	7	1485	-9.24
Chamberlain	Yellow	390	131	242	27	490	N/A	N/A	-6.95
Chamberlain	Green	390	5	987	6	1982	4	2977	-10.83
Chamberlain	Intellicode II	390	57	191	27	391	N/A	N/A	-13.37
Chamberlain	9 switch 3 position	390	3	987	11	2975	N/A	N/A	-8.95
Chamberlain	12 switch 2 position	390	Note 2	47.13	Note 2	21.926	N/A	N/A	-5.81
Chamberlain	9 switch 2 position	390	Note 2	45.61	Note 2	20.38	N/A	N/A	-6.13
Chamberlain	9 switch 3 position 1993-1995	390	2	940	15	2834	N/A	N/A	-7.05

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:

$$\delta(dB) = 20\log_{10}[(nt_1 + mt_2)/100]$$
$$\delta(dB) = 20\log_{10}[(35 \times 0.490 + 18 \times 0.987)/100] = -9.14\ dB$$

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.

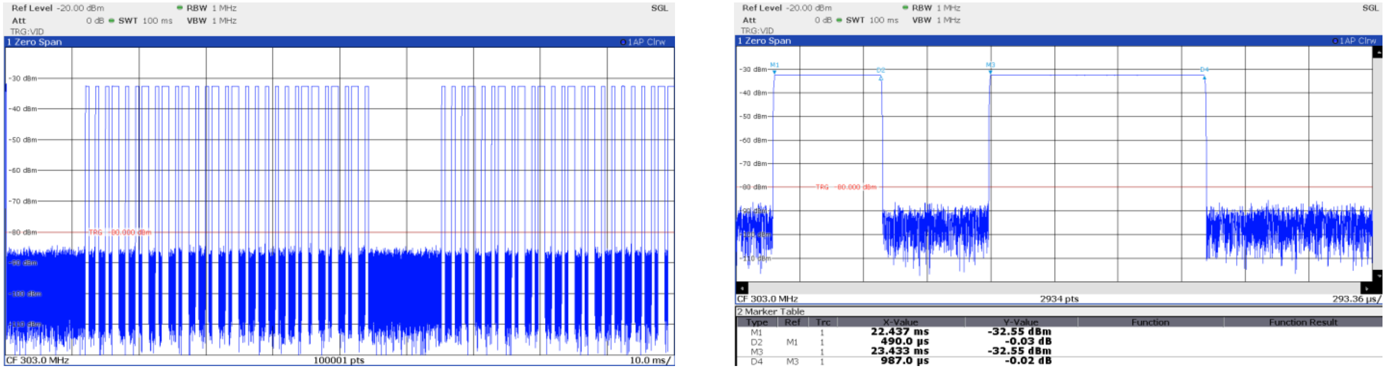


Figure 8.1-1: *Duty cycle, Guardian, fixed learn code, 303 MHz: 100 ms burst and pulse width measurements respectively*

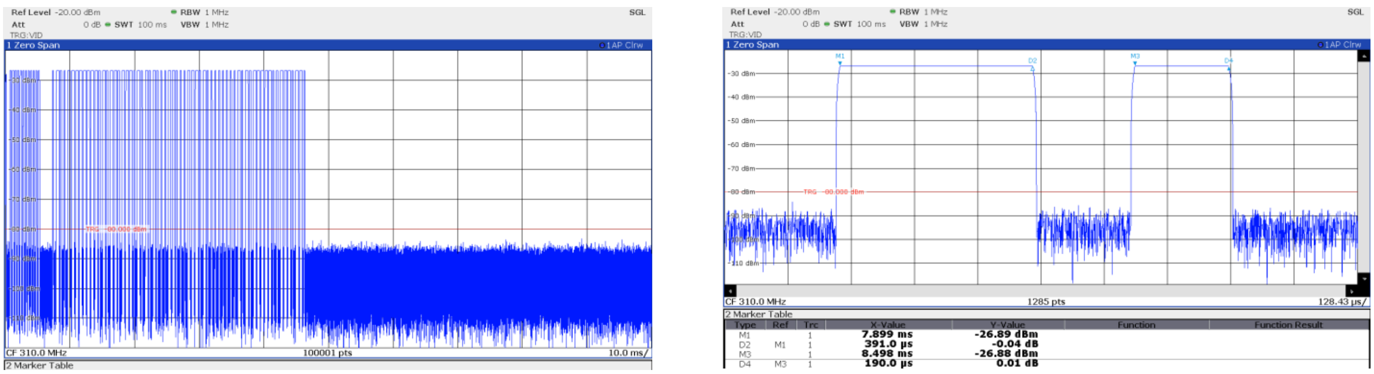


Figure 8.1-2: *Duty cycle, Sommer, rolling code, 310 MHz: 100 ms burst and pulse width measurements respectively*

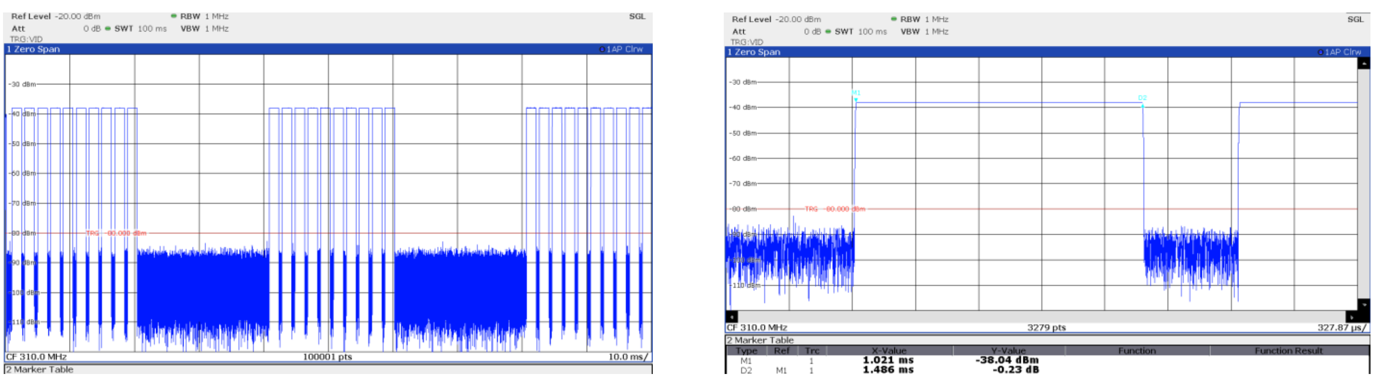


Figure 8.1-3: *Duty cycle, Stanley, 10 switch / 2 position DIP switch, 310 MHz: 100 ms burst and pulse width measurements respectively*

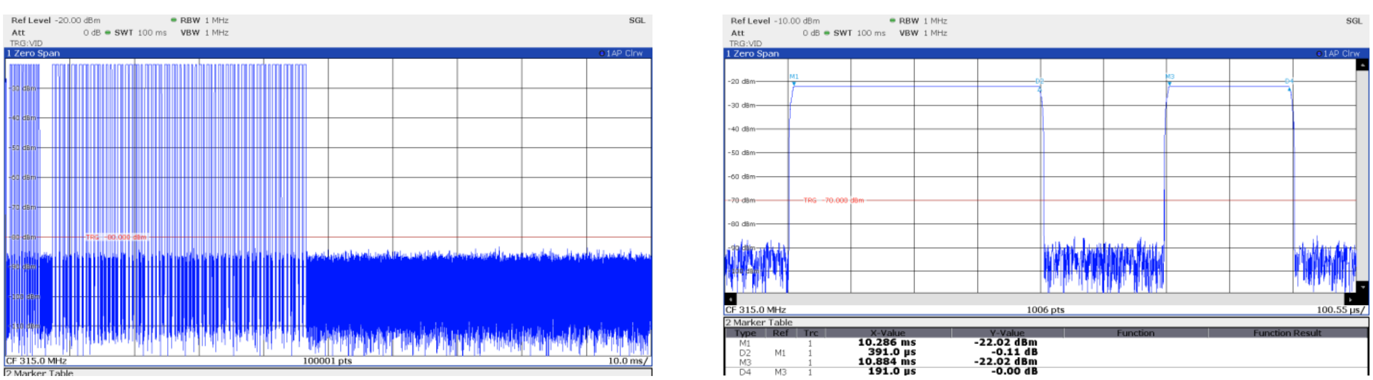


Figure 8.1-4: *Duty cycle, Genie, Intellicode®, 1995-current, 315 MHz: 100 ms burst and pulse width measurements respectively*

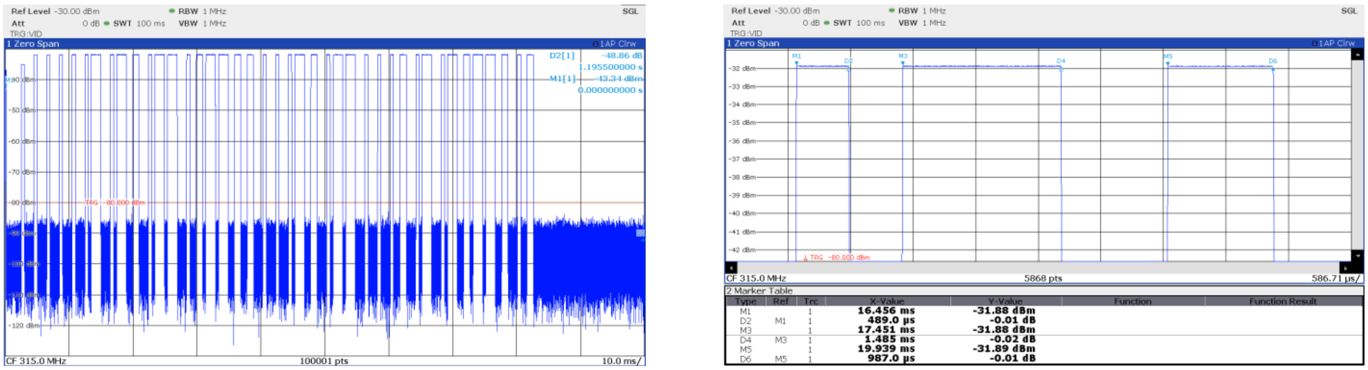


Figure 8.1-5: *Duty cycle, Chamberlain, Purple learn button, Security+®, 2006-2014, 315 MHz: 100 ms burst and pulse width measurements respectively*

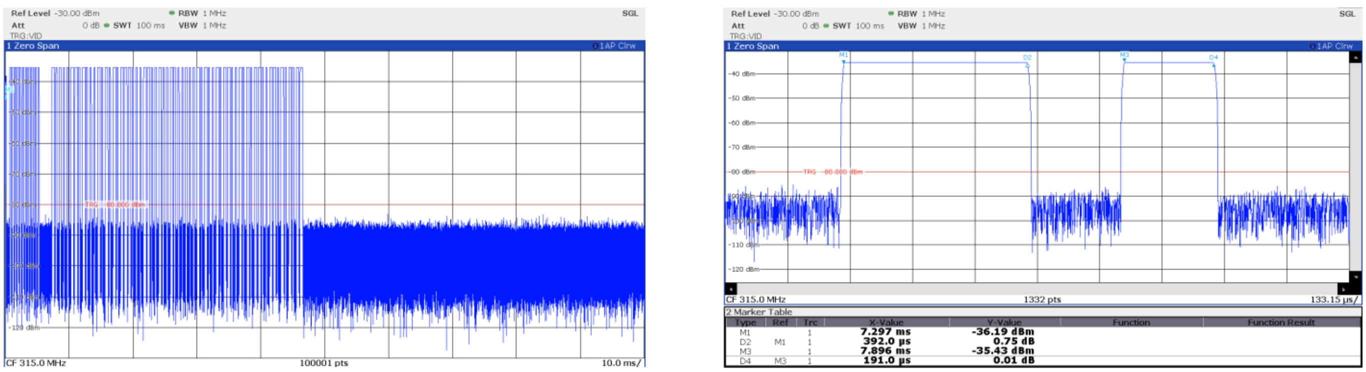


Figure 8.1-6: *Duty cycle, Genie, Intellicode® II, 2010-2010, 315 MHz: 100 ms burst and pulse width measurements respectively*

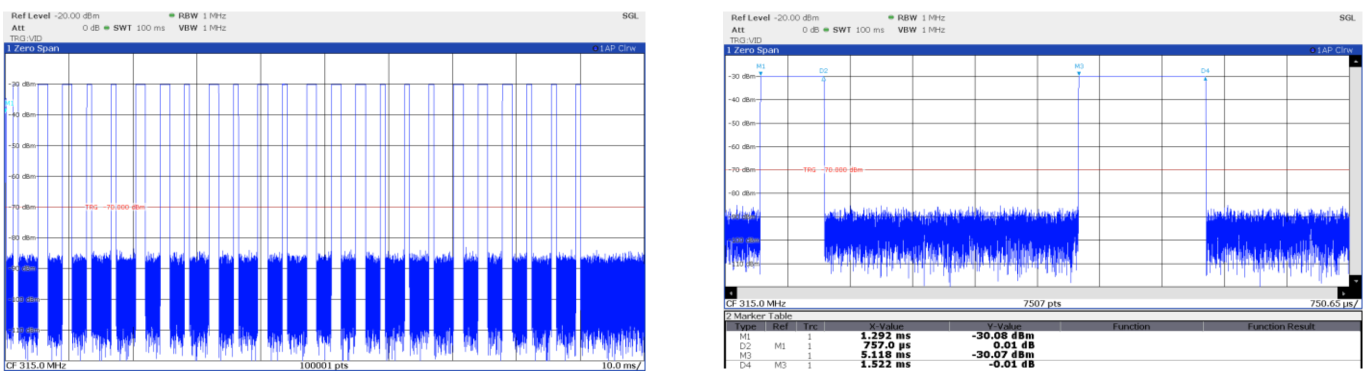


Figure 8.1-7: *Duty cycle, Marantec, Fixed learn code, 315 MHz: 100 ms burst and pulse width measurements respectively*

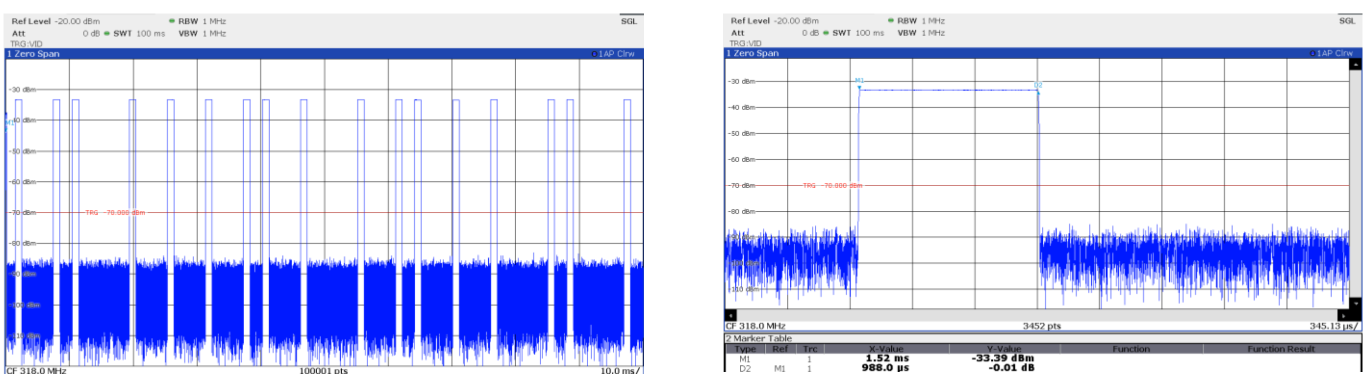


Figure 8.1-8: *Duty cycle, Linear, Mega Code®, 318 MHz: 100 ms burst and pulse width measurements respectively*

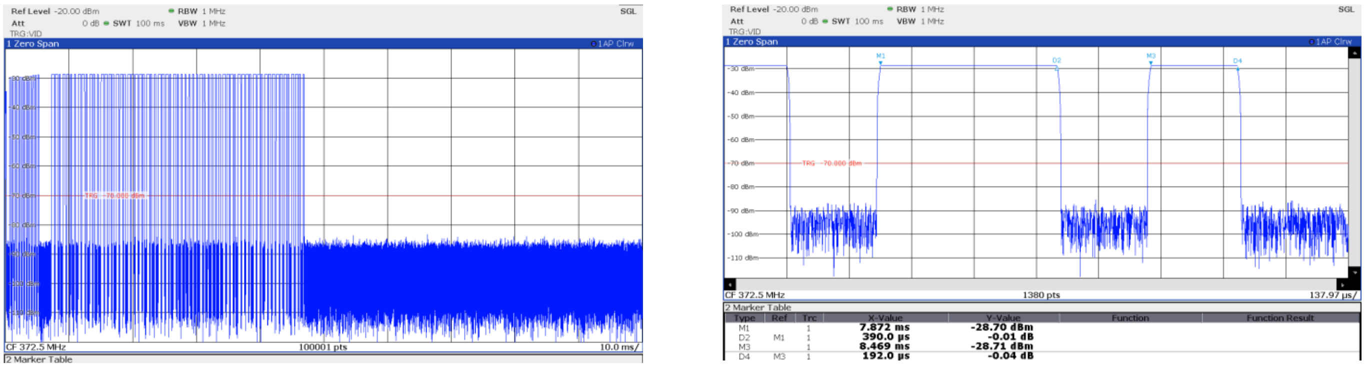


Figure 8.1-9: *Duty cycle, Wayne Dalton, Rolling code, 1999-current, 372.5 MHz: 100 ms burst and pulse width measurements respectively*

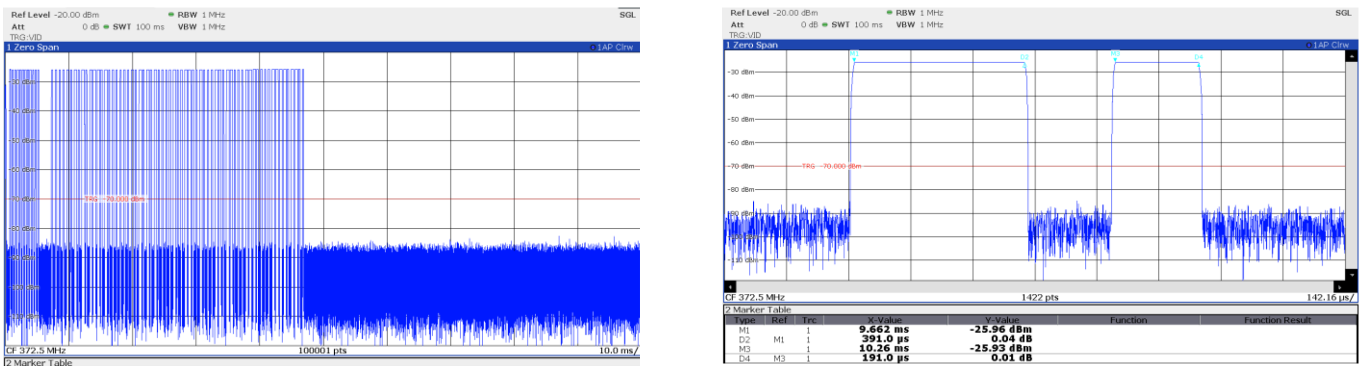


Figure 8.1-10: *Duty cycle, Ryobi, Rolling code, 372.5 MHz: 100 ms burst and pulse width measurements respectively*

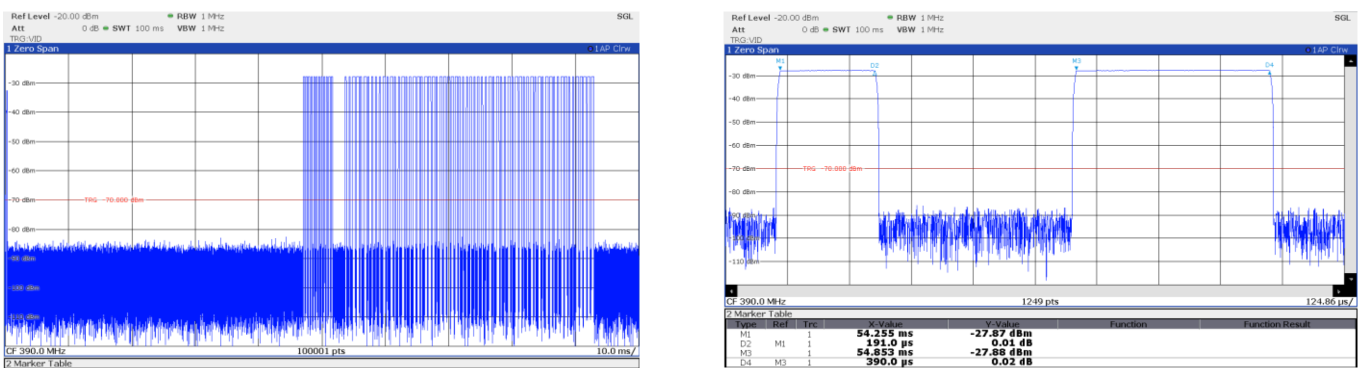


Figure 8.1-11: *Duty cycle, Genie, Intellicode® I, 1995-current, 390 MHz: 100 ms burst and pulse width measurements respectively*

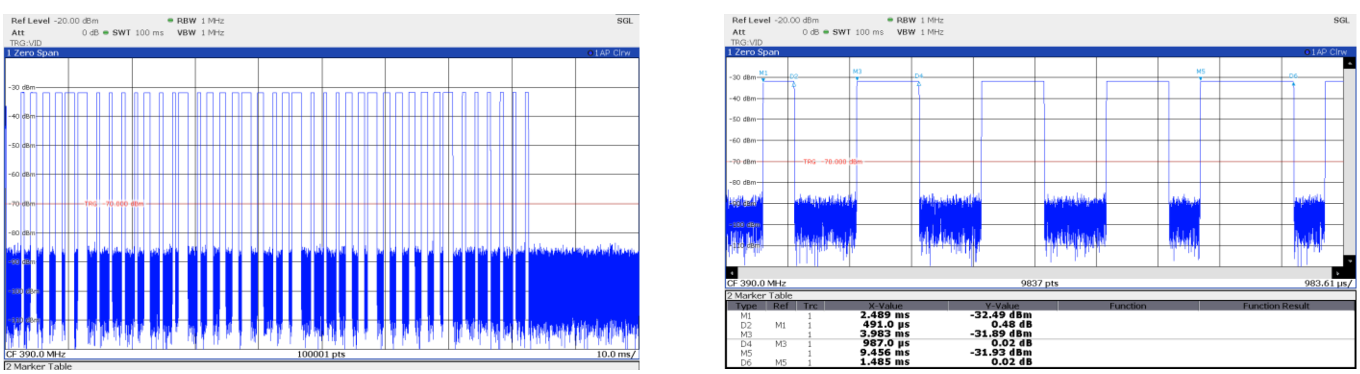


Figure 8.1-12: *Duty cycle, Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz: 100 ms burst and pulse width measurements respectively*

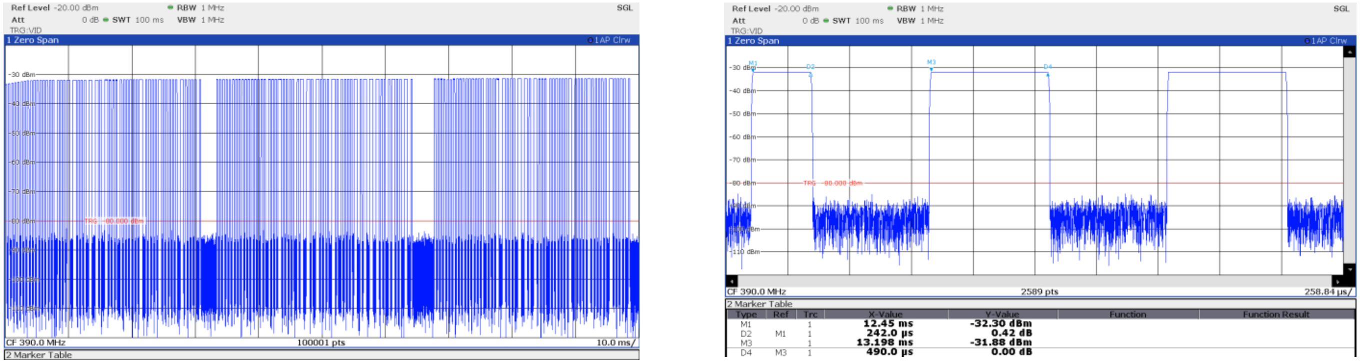


Figure 8.1-13: *Duty cycle, Chamberlain, Yellow learn button, Security+2.0®, 2011-current, 390 MHz: 100 ms burst and pulse width measurements respectively*

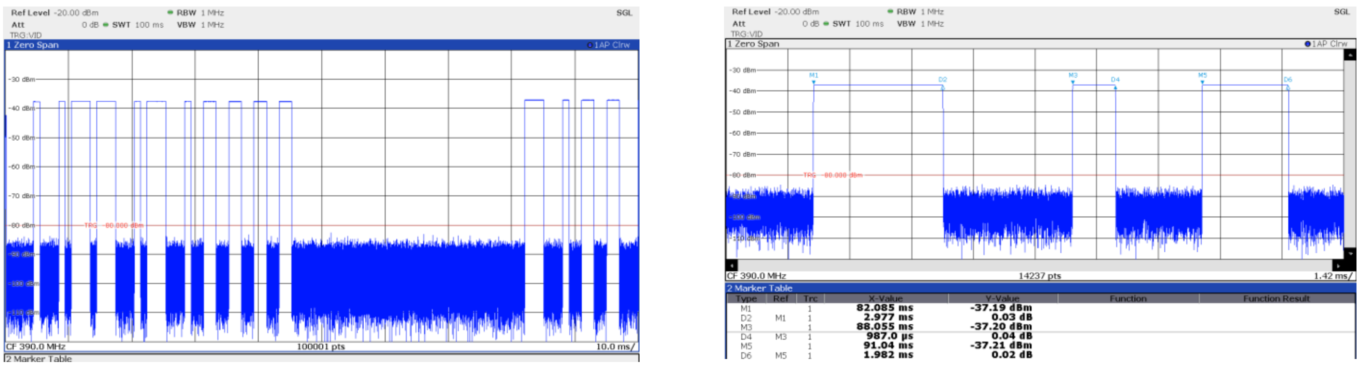


Figure 8.1-14: *Duty cycle, Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz: 100 ms burst and pulse width measurements respectively*

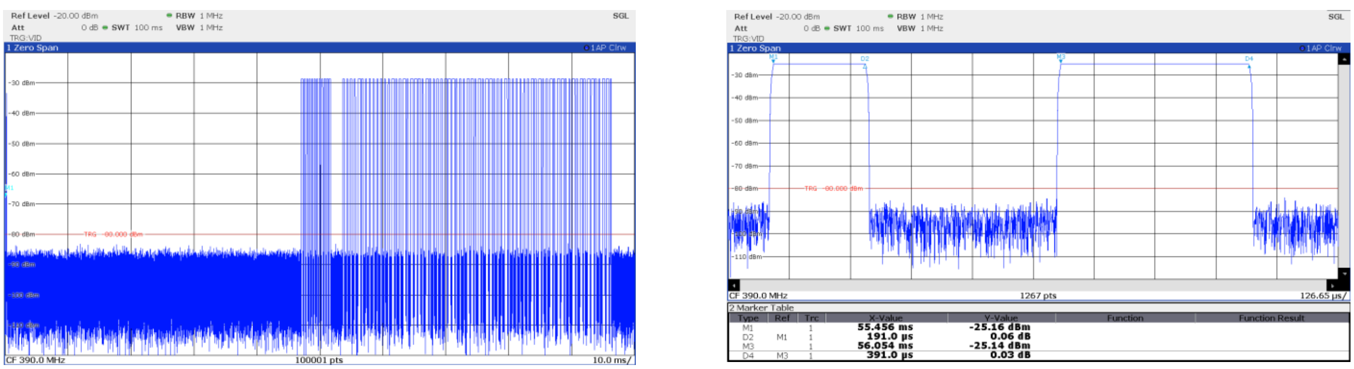


Figure 8.1-15: *Duty cycle, Genie, Intellicode ® II, 2010-2011, 390 MHz: 100 ms burst and pulse width measurements respectively*

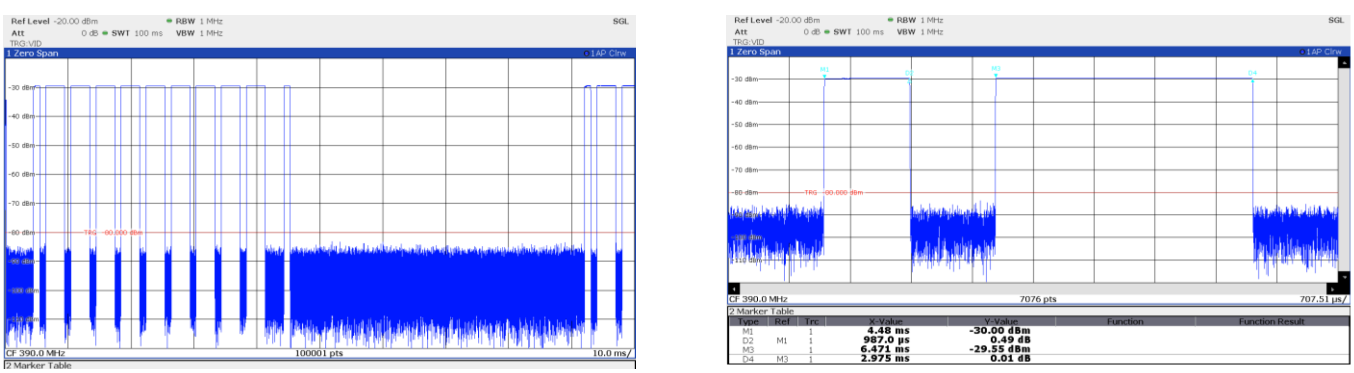


Figure 8.1-16: *Duty cycle, Chamberlain, 9 switch / 3 position DIP switch, 390 MHz: 100 ms burst and pulse width measurements respectively*

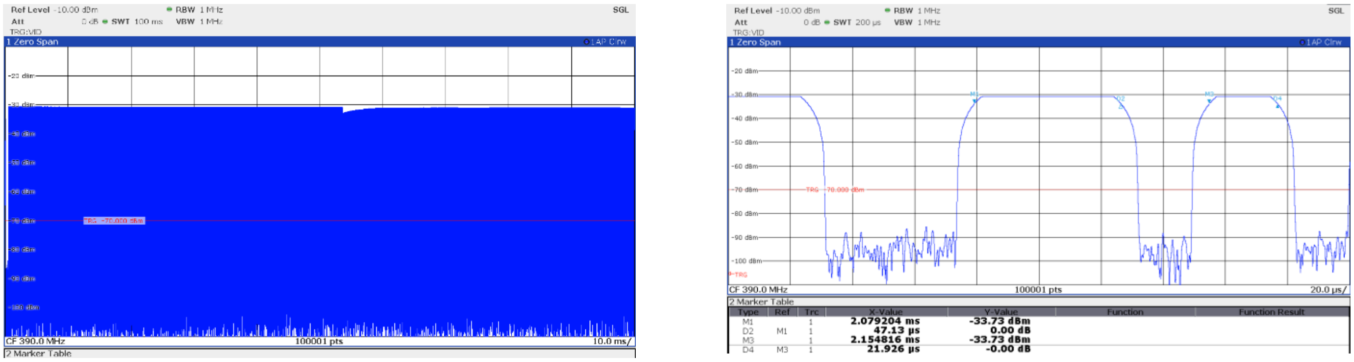


Figure 8.1-17: *Duty cycle, Genie, 12 switch / 2 position DIP switch, 1993-1995, 390 MHz: 100 ms burst and pulse width measurements respectively*

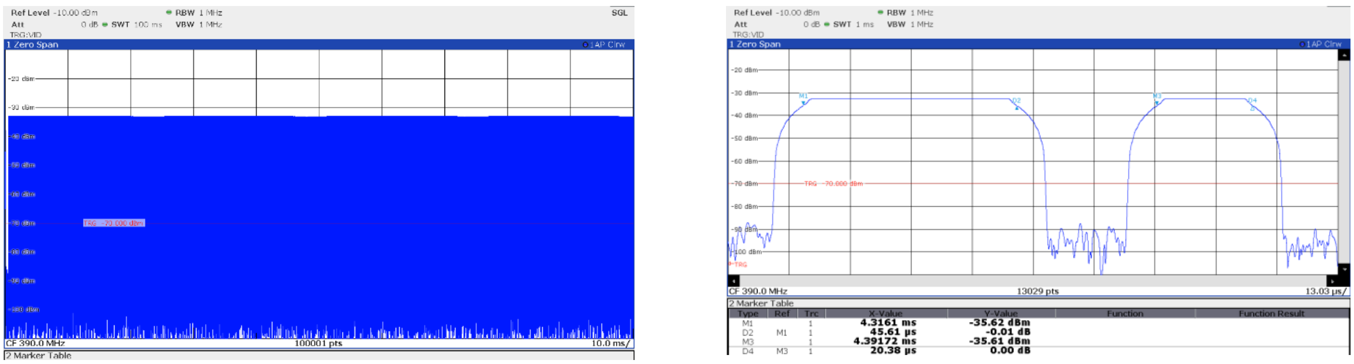


Figure 8.1-18: *Duty cycle, Genie, 9 switch / 2 position DIP switch, 1993-1995, 390 MHz: 100 ms burst and pulse width measurements respectively*

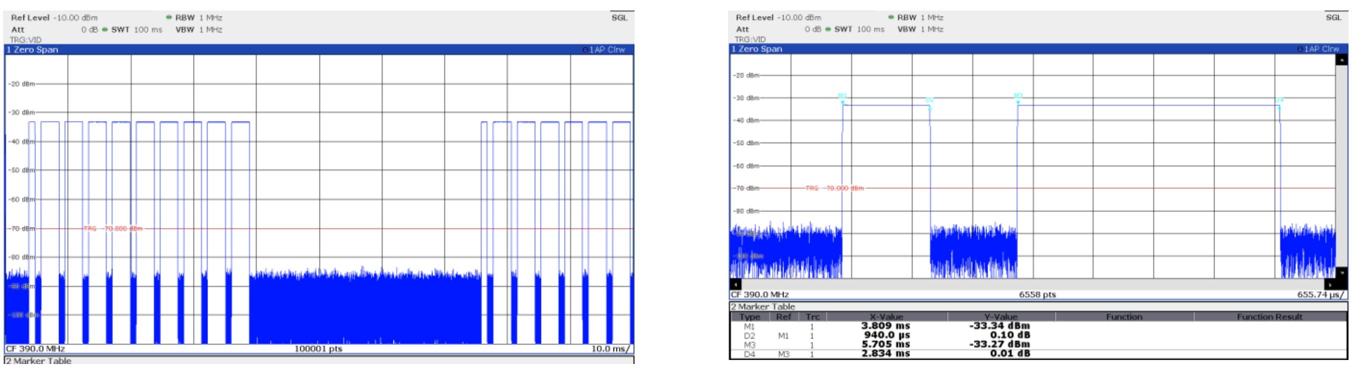


Figure 8.1-19: *Duty cycle, OHD, 9 switch / 3 position DIP switch, 1993-1995, 390 MHz: 100 ms burst and pulse width measurements respectively*

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 28, 2021 – June 30, 2021	Temperature	24 °C
Test engineer	James Cunningham, EMC/MIL/WL Supervisor	Air pressure	1007 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	1.13
Sommer	Rolling code	310	1.34
Stanley	10 switch / 2 position DIP switch	310	1.30
Genie	Intellicode®, 1995-current	315	1.38
Chamberlain	Purple learn button, security+, 2006-2014	315	1.19
Genie	Intellicode® II, 2010-2010	315	1.37
Marantec	Fixed learn code	315	1.15
Linear	Mega Code®	318	1.14
Wayne Dalton	Rolling code, 1999-current	372.5	1.35
Ryobi	Rolling code	372.5	1.35
Genie	Intellicode® I, 1995-current	390	0.50
Chamberlain	Orange/Red learn button, Security+®, 1996-2005	390	1.11
Chamberlain	Yellow learn button, Security+2.0 ®, 2011-current	390	3.46
Chamberlain	Green learn button, Billion Code®, 1993-1995	390	1.14
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	1.28
Genie	9 switch/2 position DIP switch, 1993-1995	390	1.33
OHD	9 switch/3 position DIP switch, 1993-1995	390	1.18

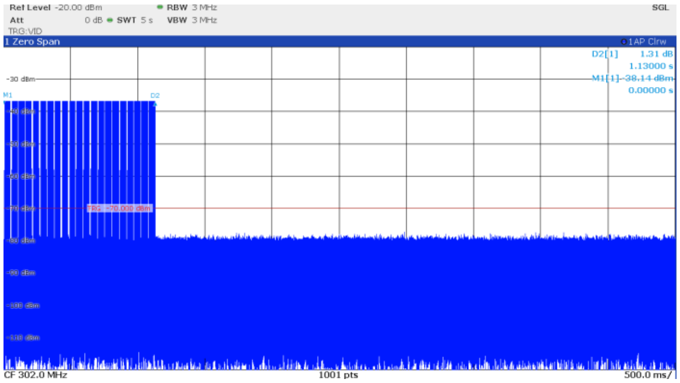


Figure 8.2-1: Deactivation time, Guardian, fixed learn code, 303 MHz

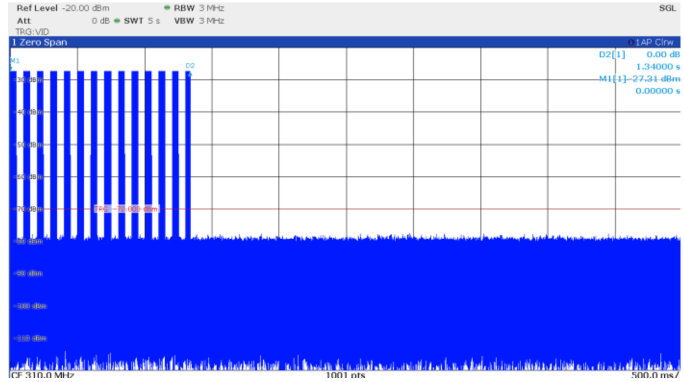


Figure 8.2-2: Deactivation time, Sommer, rolling code, 310 MHz

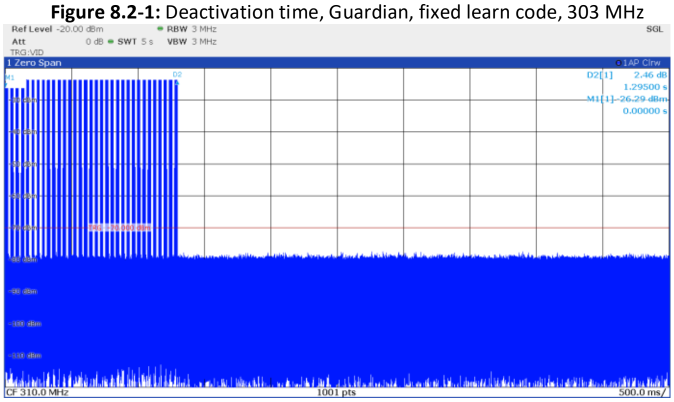


Figure 8.2-3: Stanley, 10 switch / 2 position DIP switch, 310 MHz

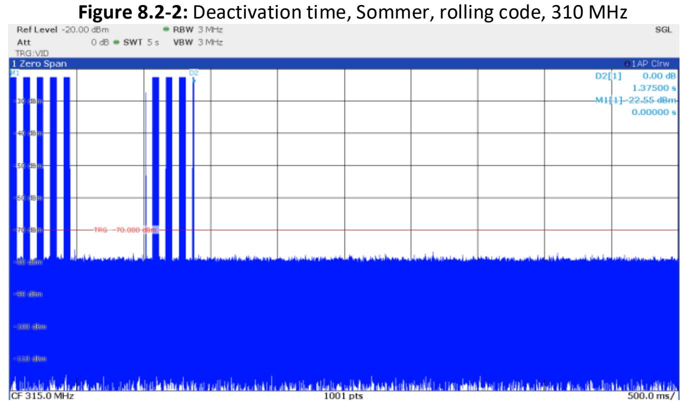


Figure 8.2-4: Deactivation time, Genie, Intellicode®, 1995-current, 315 MHz

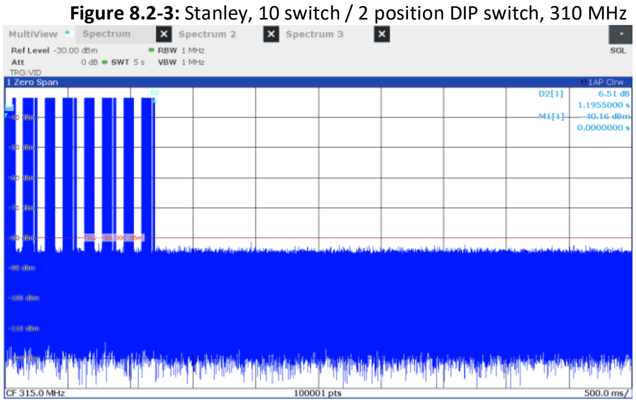


Figure 8.2-5: Deactivation time, Chamberlain, purple learn button, security+, 2006-2014, 315 MHz

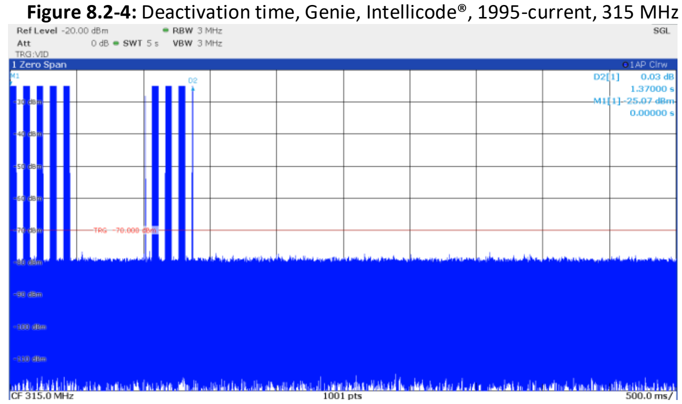


Figure 8.2-6: Deactivation time, Genie, Intellicode® II, 2010-2010, 315 MHz

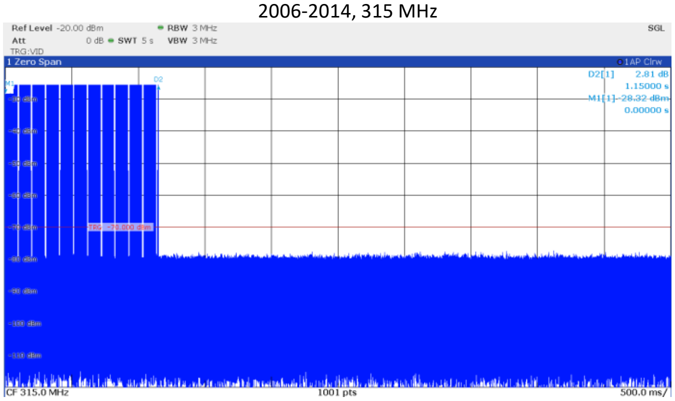


Figure 8.2-7: Deactivation time, Marantec, fixed learn code, 315 MHz

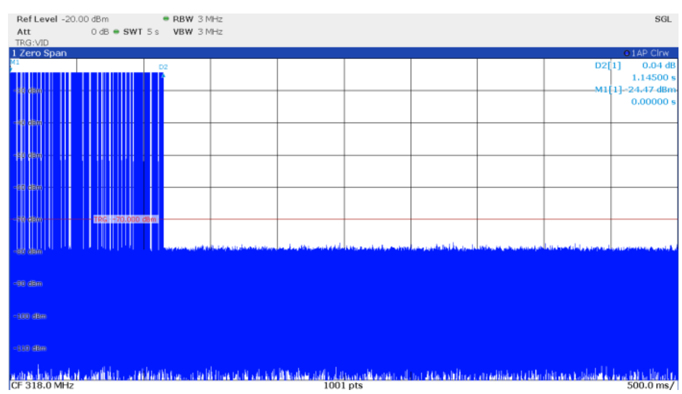


Figure 8.2-8: Deactivation time, Linear, Mega Code®, 318 MHz

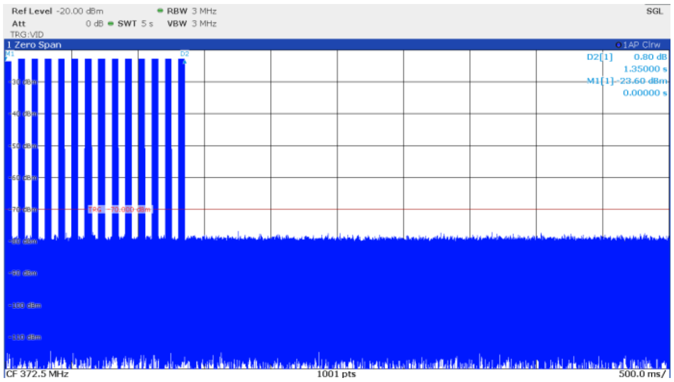


Figure 8.2-9: Deactivation time, Wayne Dalton, rolling code, 1999-current, 372.5 MHz

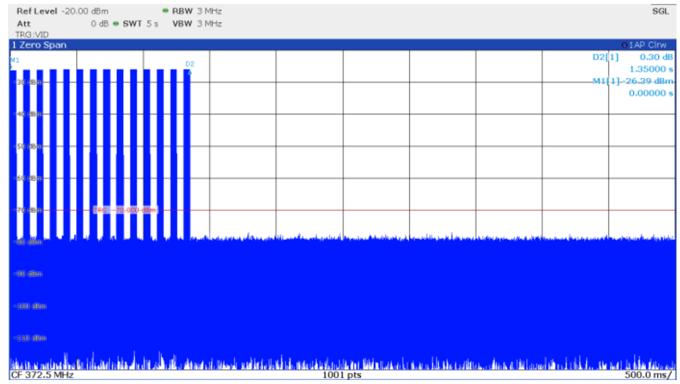


Figure 8.2-10: Deactivation time, Ryobi, rolling code, 372.5 MHz

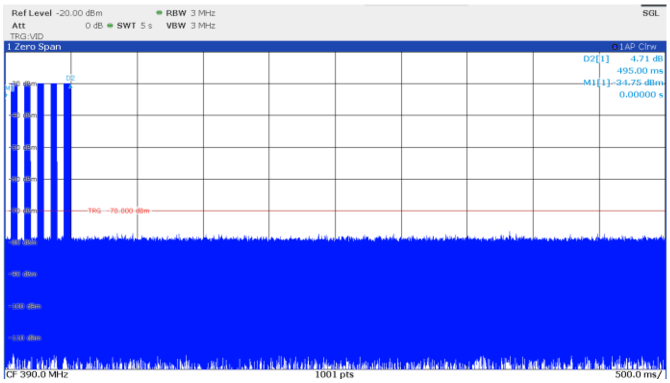


Figure 8.2-11: Deactivation time, Genie, Intellicode® I, 1995-current, 390 MHz

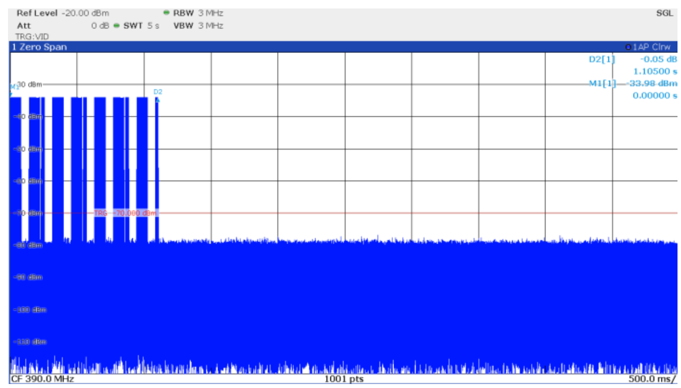


Figure 8.2-12: Deactivation time, Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz

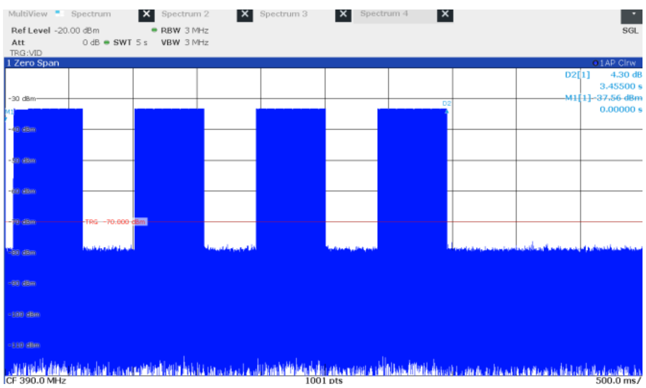


Figure 8.2-13: Deactivation time, Chamberlain, Yellow learn button, Security+2.0®, 2011-current, 390 MHz

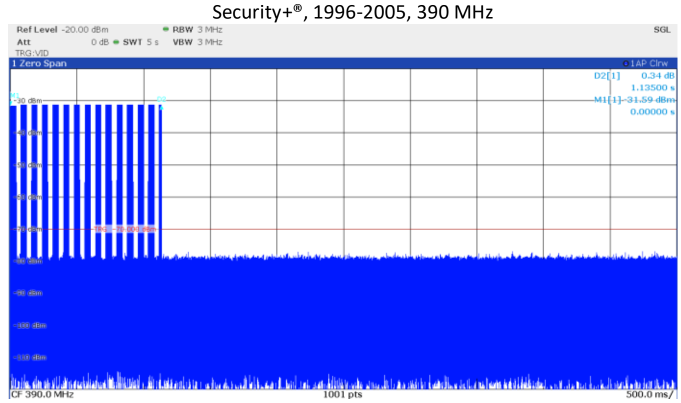


Figure 8.2-14: Deactivation time, Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz

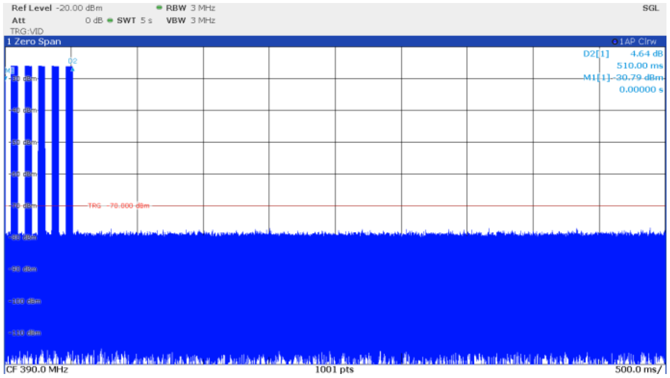


Figure 8.2-15: Deactivation time, Genie, Intellicode® II, 2010-2011, 390 MHz

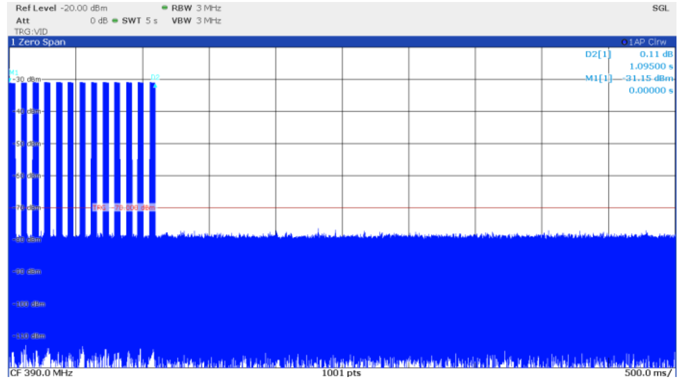


Figure 8.2-16: Deactivation time, Chamberlain, 9 switch / 3 position DIP switch, 390 MHz

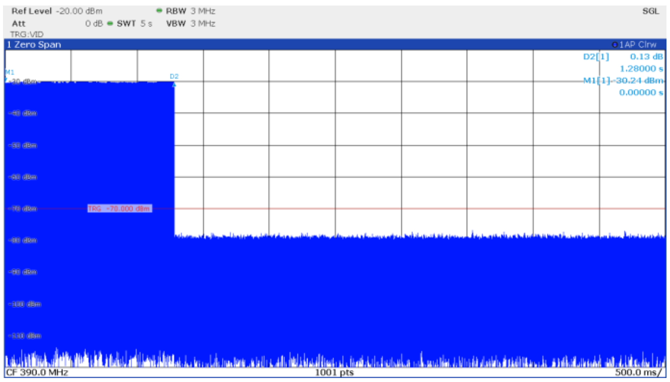


Figure 8.2-17: Deactivation time, Genie, 12 switch/2 position DIP switch, 1993-1995, 390 MHz

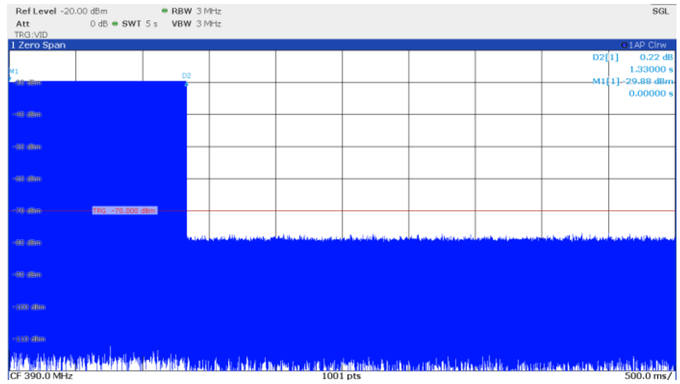


Figure 8.2-18: Deactivation time, Genie, 9 switch/2 position DIP switch, 1993-1995, 390 MHz

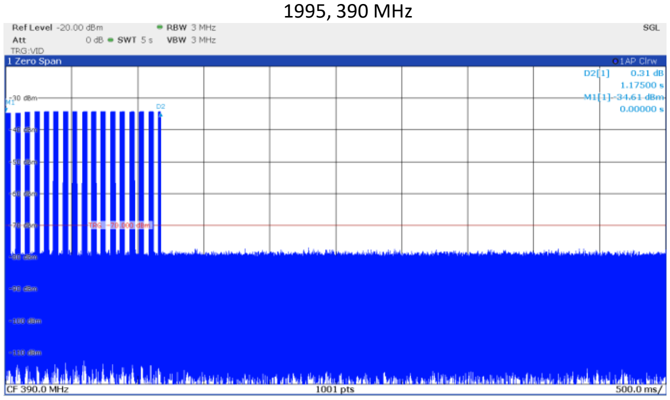


Figure 8.2-19: Deactivation time, OHD, 9 switch/3 position DIP switch, 1993-1995, 390 MHz

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 28, 2021 – June 29, 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.
EUT was verified in 3 axis (X/Y/Z) to determine the maximum emissions. The worst-case scenario was identified to be having the EUT flat on the turntable and was used during all testing.

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

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 and Genie Intellicode® II 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	79.82	-9.14	70.68	74.17
Sommer	Rolling code	310	84.64	-13.28	71.36	74.58
Stanley	10 switch / 2 position DIP switch	310	77.63	-7.02	70.61	74.58
Genie	Intellicode®, 1995-current	315	86.24	-13.43	72.81	74.86
Chamberlain	Purple learn button, security+, 2006-2014	315	78.71	-8.52	70.19	74.86
Genie	Intellicode® II, 2010-2010	315	86.24	-13.67	72.57	74.86
Marantec	Fixed learn code	315	82.70	-11.26	71.44	74.86
Linear	Mega Code®	318	88.19	-15.50	72.69	75.02
Wayne Dalton	Rolling code, 1999-current	372.5	83.78	-12.88	70.90	77.81
Ryobi	Rolling code	372.5	83.78	-13.69	70.09	77.81
Genie	Intellicode® I, 1995-current	390	81.41	-13.61	67.80	78.62
Chamberlain	Orange/Red learn button, Security+®, 1996-2005	390	77.16	-9.24	67.92	78.62
Chamberlain	Yellow learn button, Security+2.0 ®, 2011-current	390	77.16	-6.95	70.21	78.62
Chamberlain	Green learn button, Billion Code®, 1993-1995	390	78.45	-10.83	67.62	78.62
Genie	Intellicode® II, 2010-2011	390	81.41	-13.37	68.04	78.62
Chamberlain	9 switch/3 position DIP switch	390	77.16	-8.95	68.21	78.62
Genie	12 switch/2 position DIP switch, 1993-1995	390	77.16	-5.81	71.35	78.62
Genie	9 switch/2 position DIP switch, 1993-1995	390	77.16	-6.13	71.03	78.62
OHD	9 switch/3 position DIP switch, 1993-1995	390	77.16	-7.05	70.11	78.62

Average Emission = Peak Emission + Duty Cycle Correction Factor. Example: Guardian 79.82 dBµV/m + (-9.14) dB = 70.68 dBµV/m average emission.

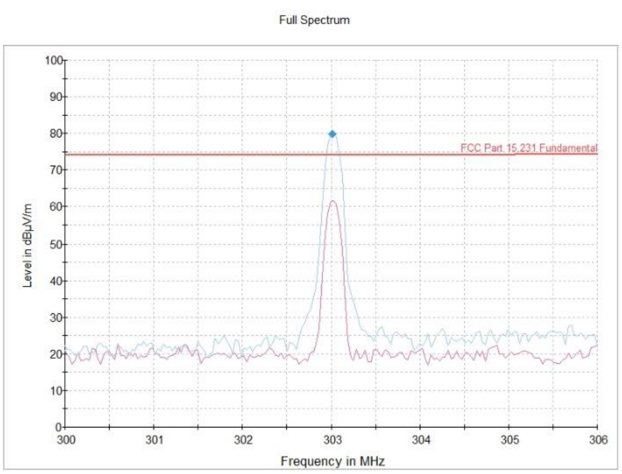


Figure 8.3-1: Fundamental emission, Guardian, fixed learn code, 303 MHz

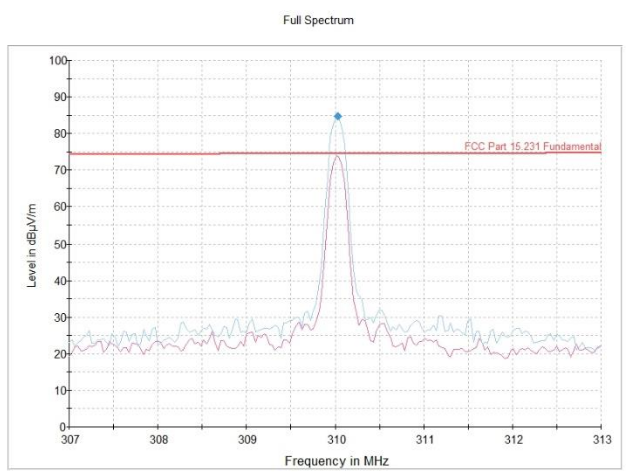


Figure 8.3-2: Fundamental emission, Sommer, rolling code, 310 MHz

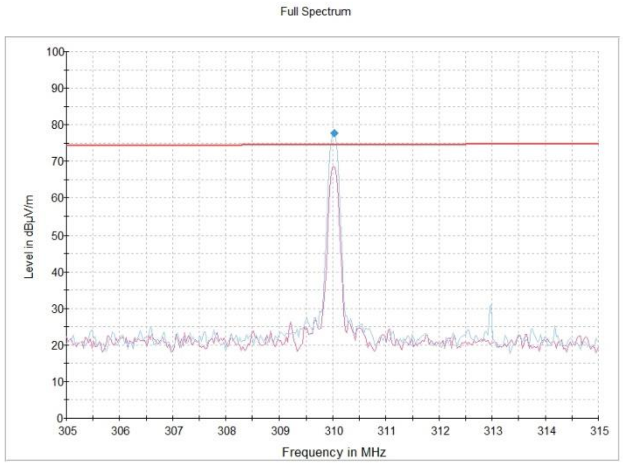


Figure 8.3-3: Fundamental emission, Stanley, 10 switch / 2 position DIP switch, 310 MHz

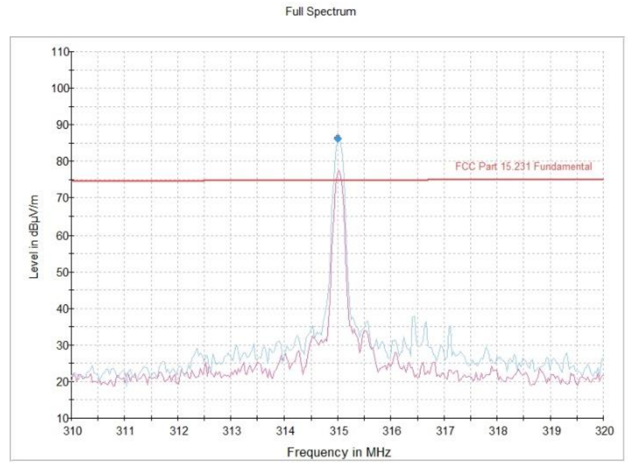


Figure 8.3-4: Fundamental emission, Genie, Intellicode®, 1995-current, 315 MHz

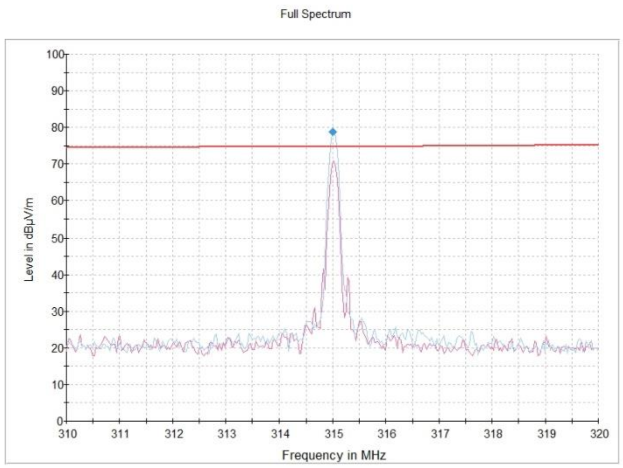


Figure 8.3-5: Fundamental emission, Chamberlain, purple learn button, security+, 2006-2014, 315 MHz

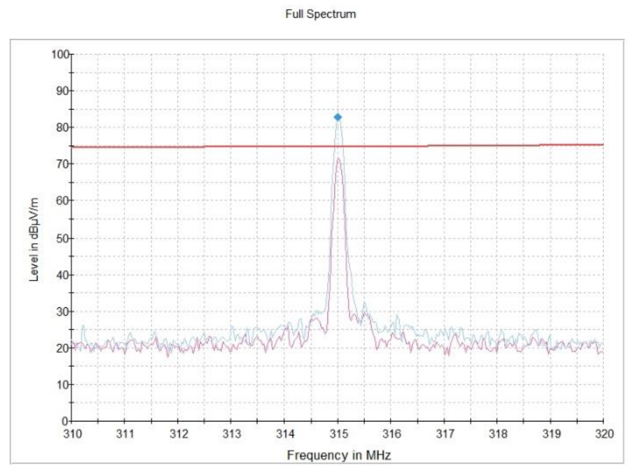


Figure 8.3-6: Fundamental emission, Marantec, fixed learn code, 315 MHz

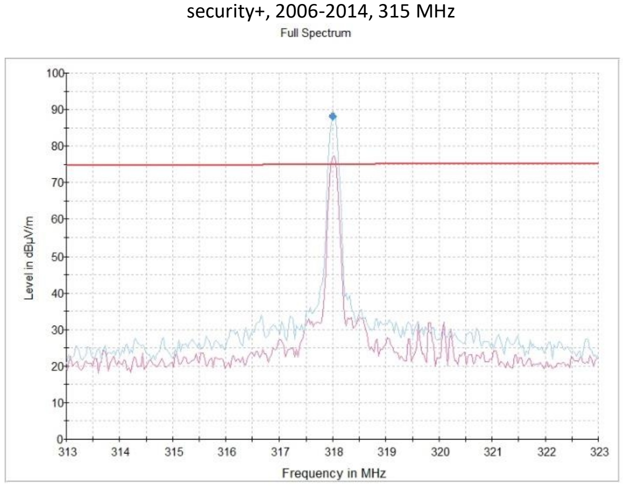


Figure 8.3-7: Fundamental emission, Linear, Mega Code®, 318 MHz

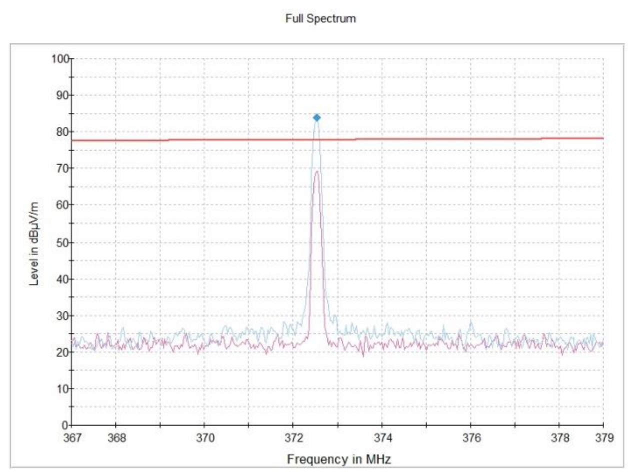


Figure 8.3-8: Fundamental emission, Wayne Dalton, rolling code, 1999-current, 372.5 MHz

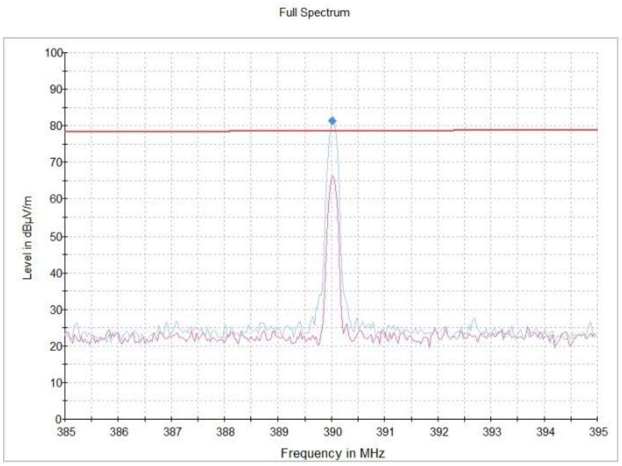


Figure 8.3-9: Fundamental emission, Genie, Intellicode® I, 1995-current, 390 MHz

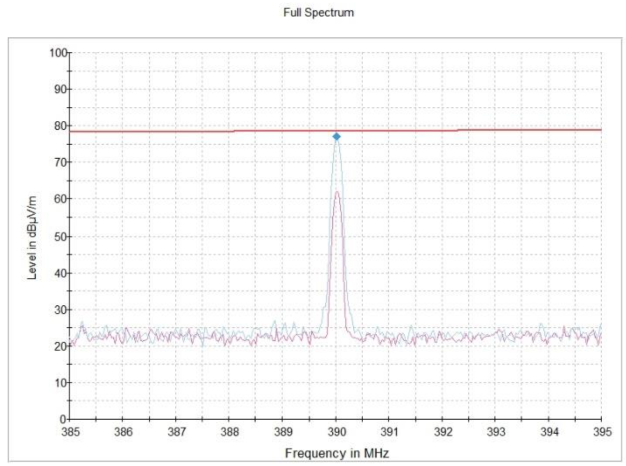


Figure 8.3-10: Fundamental emission, Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz

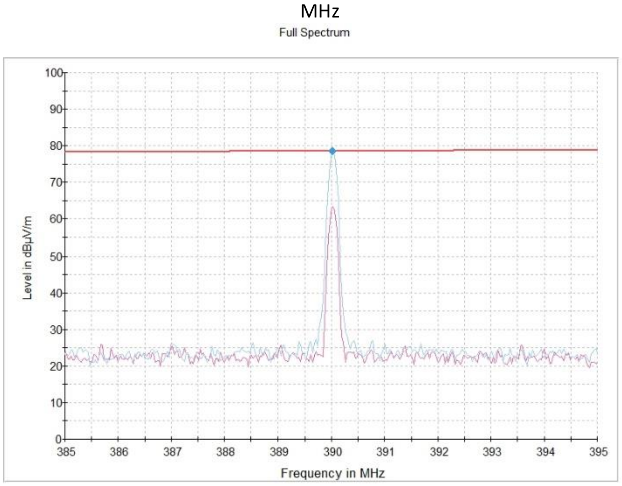


Figure 8.3-11: Fundamental emission, Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz

Harmonic and spurious emissions:

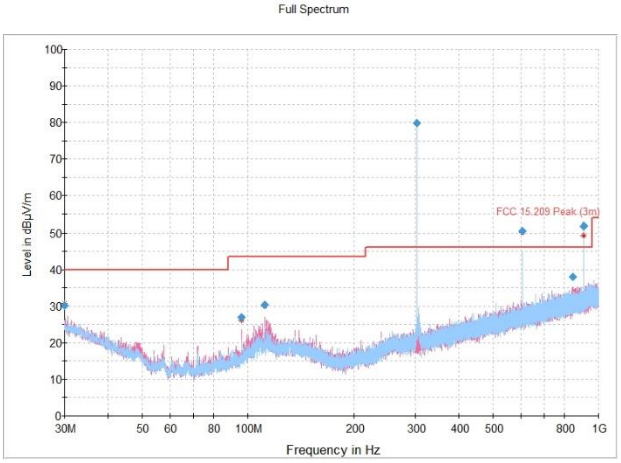


Figure 8.3-12: Harmonic and spurious emissions, 30 – 1000 MHz, Guardian, Fixed learn code, 303 MHz

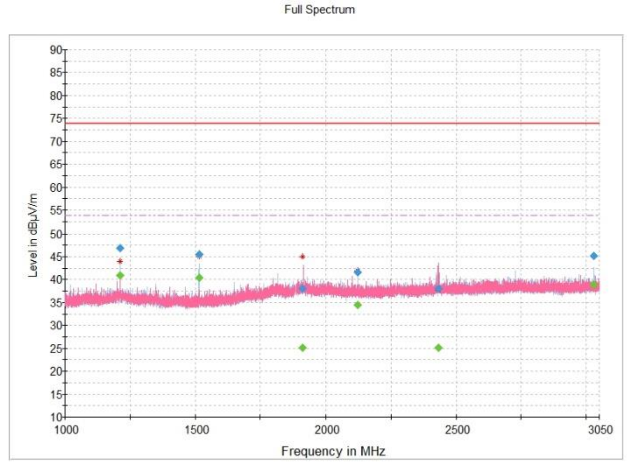


Figure 8.3-13: Harmonic and spurious emissions, 1 – 3.05 GHz, Guardian, Fixed learn code, 303 MHz

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)
30.060000	30.05			54.17	24.12	5000.0	120.000	327.0	V	70.0	26.5
96.004667	26.99			54.17	27.18	5000.0	120.000	390.0	V	205.0	17.1
112.049667	30.26			54.17	23.91	5000.0	120.000	402.0	V	316.0	18.9
606.038333	50.58	-9.14	41.44	54.17	12.73	5000.0	120.000	126.0	H	254.0	29.0
843.736000	37.93			54.17	16.24	5000.0	120.000	402.0	V	152.0	32.8
909.058667	51.78	-9.14	42.64	54.17	11.53	5000.0	120.000	137.0	H	52.0	33.2
1212.100000	46.94	-9.14	37.80	54.17	16.37	5000.0	1000.000	246.0	H	268.0	-13.1
1515.100000	45.54	-9.14	36.40	54.17	17.77	5000.0	1000.000	182.0	H	30.0	-13.6
1910.850000	38.10			54.17	16.07	5000.0	1000.000	116.0	V	67.0	-10.0
2121.350000	41.60	-9.14	32.46	54.17	21.71	5000.0	1000.000	140.0	H	43.0	-10.1
2433.800000	38.06	-9.14	28.92	54.17	25.25	5000.0	1000.000	319.0	V	283.0	-8.8
3030.250000	45.16	-9.14	36.02	54.17	18.15	5000.0	1000.000	130.0	H	221.0	-7.1

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.

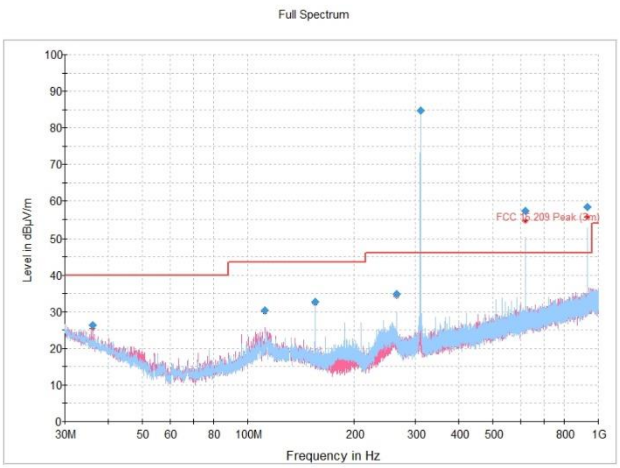


Figure 8.3-14: Harmonic and spurious emissions, 30 – 1000 MHz, Sommer, Rolling code, 310 MHz

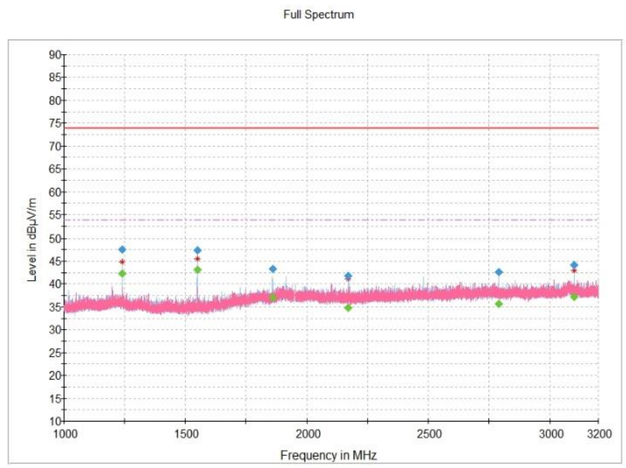


Figure 8.3-15: Harmonic and spurious emissions, 1 – 3.20 GHz, Sommer, Rolling code, 310 MHz

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)
36.078333	26.37			54.58	28.21	5000	120	366	V	229	23.2
112.042	30.38			54.58	24.2	5000	120	402	V	67	18.9
155.02067	32.66			54.58	21.92	5000	120	125	H	132	19.0
265.43133	34.79			54.58	19.79	5000	120	100	H	253	21.6
620.031	57.37	-13.28	44.09	54.58	10.49	5000	120	136	H	117	29.3
930.043	58.35	-13.28	45.07	54.58	9.51	5000	120	147	H	88	33.7
1240.15	47.59	-13.28	34.31	54.58	20.27	5000	1000	138	H	226	-12.9
1549.9	47.43	-13.28	34.15	54.58	20.43	5000	1000	203	H	31	-13.5
1860.2	43.23	-13.28	29.95	54.58	24.63	5000	1000	138	H	11	-10.4
2170	41.74	-13.28	28.46	54.58	26.12	5000	1000	145	H	88	-10.0
2790.1	42.61	-13.28	29.33	54.58	25.25	5000	1000	104	H	31	-7.6
3100.15	44.20	-13.28	30.92	54.58	23.66	5000	1000	128	H	215	-6.6

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.

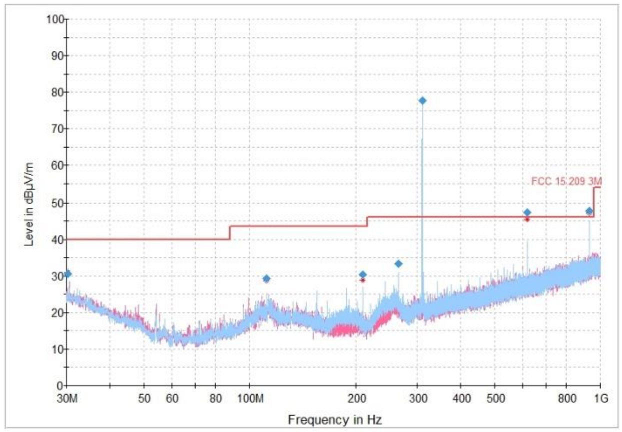
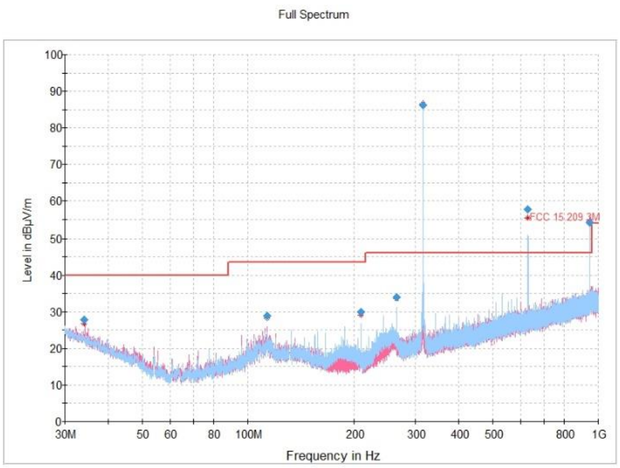


Figure 8.3-16: Harmonic and spurious emissions, 30 – 1000 MHz, Stanley, 10 switch / 2 position DIP switch, 310 MHz

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)
30.346667	30.47			54.58	24.11	5000	120	303	V	65	26.4
112.08967	29.37			54.58	25.21	5000	120	402	V	323	18.9
210.149	30.32			54.58	24.26	5000	120	110	H	316	18.1
265.439	33.23			54.58	21.35	5000	120	100	H	240	21.6
620.031	47.30	-7.02	40.28	54.58	14.30	5000	120	126	H	114	29.3
930.043	47.74	-7.02	40.72	54.58	13.86	5000	120	147	H	257	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.



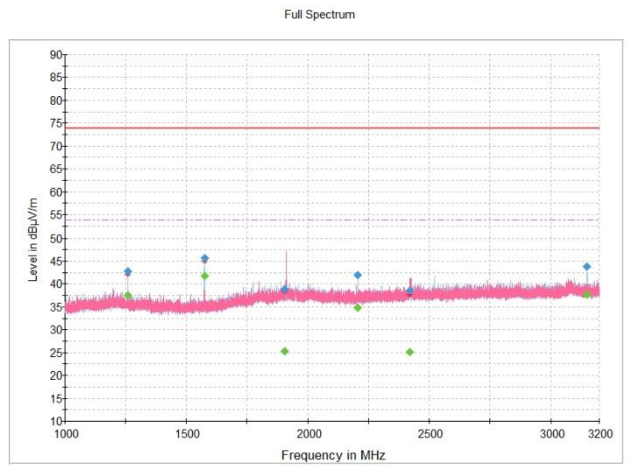


Figure 8.3-17: Harmonic and spurious emissions, 30 – 1000 MHz, Genie, Intellicode® I, 1995-current, 315 MHz

Figure 8.3-18: Harmonic and spurious emissions, 1 – 3.20 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)
34.143333	27.75			54.86	27.11	5000.0	120.000	234.0	V	192.0	24.2
113.706333	28.95			54.86	25.91	5000.0	120.000	402.0	V	214.0	19.1
210.109000	29.99			54.86	24.87	5000.0	120.000	100.0	H	156.0	18.1
265.439000	33.96			54.86	20.90	5000.0	120.000	100.0	H	236.0	21.6
630.022000	57.7	-13.43	44.27	54.86	10.59	5000.0	120.000	135.0	H	115.0	29.6
945.045667	54.11	-13.43	40.68	54.86	14.18	5000.0	120.000	137.0	H	86.0	34.4
1260.350000	42.75	-13.43	29.32	54.86	25.54	5000.0	1000.000	132.0	H	219.0	-13.0
1575.100000	45.64	-13.43	32.21	54.86	22.65	5000.0	1000.000	166.0	H	32.0	-13.4
1905.200000	38.86	-13.43	25.43	54.86	29.43	5000.0	1000.000	213.0	V	-1.0	-9.9
2205.250000	41.86	-13.43	28.43	54.86	26.43	5000.0	1000.000	101.0	H	42.0	-9.9
2418.700000	38.55	-13.43	25.12	54.86	29.74	5000.0	1000.000	109.0	V	184.0	-8.9
3150.250000	43.78	-13.43	30.35	54.86	24.51	5000.0	1000.000	127.0	H	32.0	-6.6

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.

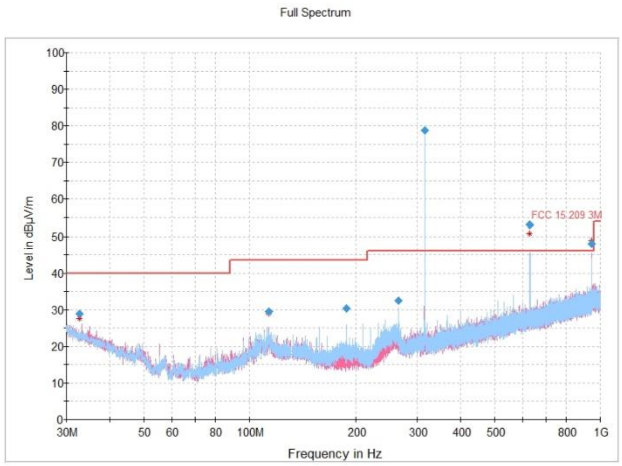


Figure 8.3-19: Harmonic and spurious emissions, 30 – 1000 MHz, Chamberlain, Purple learn button, security+, 2006-2014, 315 MHz

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)
32.661000	28.81			54.86	26.05	5000.0	120.000	355.0	V	232.0	25.0
113.634000	29.43			54.86	25.43	5000.0	120.000	375.0	V	0.0	19.1
188.033000	30.33			54.86	24.53	5000.0	120.000	174.0	H	299.0	17.2
265.439000	32.51			54.86	22.35	5000.0	120.000	118.0	H	258.0	21.6
630.022000	53.11	-8.52	44.59	54.86	10.27	5000.0	120.000	126.0	H	100.0	29.6
945.045667	47.91	-8.52	39.39	54.86	15.47	5000.0	120.000	157.0	V	192.0	34.4

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 8.3-7: 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)
34.143333	27.75			54.86	27.11	5000.0	120.000	234.0	V	192.0	24.2
113.706333	28.95			54.86	25.91	5000.0	120.000	402.0	V	214.0	19.1
210.109000	29.99			54.86	24.87	5000.0	120.000	100.0	H	156.0	18.1
265.439000	33.96			54.86	20.90	5000.0	120.000	100.0	H	236.0	21.6
630.022000	57.70	-13.67	25.19	54.86	29.67	5000.0	120.000	135.0	H	115.0	29.6
945.045667	54.11	-13.67	28.19	54.86	26.67	5000.0	120.000	137.0	H	86.0	34.4
1260.350000	42.75	-13.67	24.88	54.86	29.98	5000.0	1000.000	132.0	H	219.0	-13.0
1575.100000	45.64	-13.67	30.11	54.86	24.75	5000.0	1000.000	166.0	H	32.0	-13.4
1905.200000	38.86	-13.67	44.03	54.86	10.83	5000.0	1000.000	213.0	V	-1.0	-9.9
2205.250000	41.86	-13.67	40.44	54.86	14.42	5000.0	1000.000	101.0	H	42.0	-9.9
2418.700000	38.55	-13.67	29.08	54.86	25.78	5000.0	1000.000	109.0	V	184.0	-8.9
3150.250000	43.78	-13.67	31.97	54.86	22.89	5000.0	1000.000	127.0	H	32.0	-6.6

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.

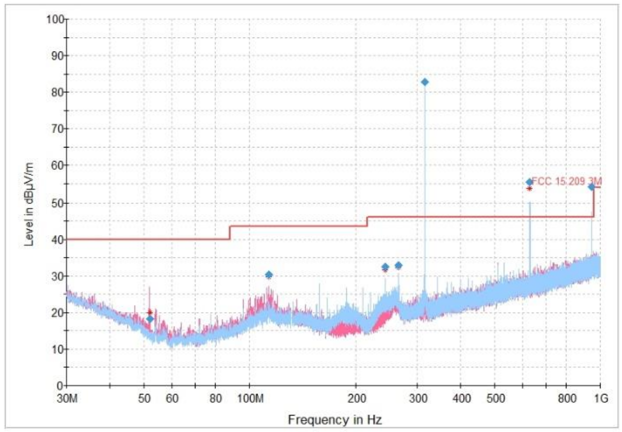


Figure 8.3-20: Harmonic and spurious emissions, 30 – 1000 MHz, Marantec, Fixed learn code, 315 MHz

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)
52.035667	18.31			54.86	36.55	5000.0	120.000	242.0	V	161.0	15.0
113.634000	30.45			54.86	24.41	5000.0	120.000	402.0	V	349.0	19.1
243.283000	32.54			54.86	22.32	5000.0	120.000	100.0	H	274.0	20.2
265.399000	32.89			54.86	21.97	5000.0	120.000	100.0	H	256.0	21.6
630.022000	55.48	-11.26	44.27	54.86	10.59	5000.0	120.000	116.0	H	83.0	29.6
945.045667	54.16	-11.26	40.68	54.86	14.18	5000.0	120.000	100.0	H	226.0	34.4

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.

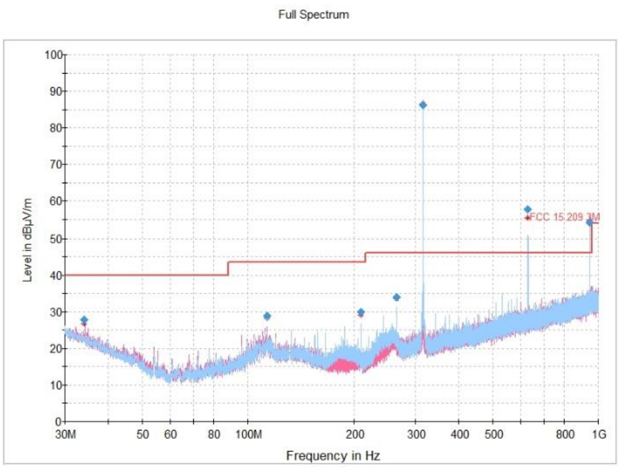


Figure 8.3-21: Harmonic and spurious emissions, 30 – 1000 MHz, Linear, Mega Code®, 318 MHz

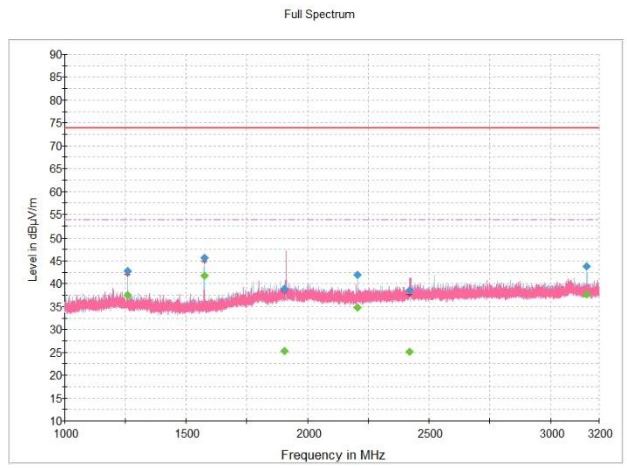


Figure 8.3-22: Harmonic and spurious emissions, 1 – 3.20 GHz, Linear, Mega Code®, 318 MHz

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)
113.626333	30.37			55.02	24.65	5000.0	120.000	399.0	V	346.0	19.1
188.000667	30.45			55.02	24.57	5000.0	120.000	100.0	H	270.0	17.2
243.283000	31.43			55.02	23.59	5000.0	120.000	100.0	H	259.0	20.2
265.911333	30.91			55.02	24.11	5000.0	120.000	100.0	H	113.0	21.5
636.043667	68.29	-15.5	52.79	55.02	2.23	5000.0	120.000	127.0	H	85.0	29.7
954.034333	54.32	-15.5	38.82	55.02	16.2	5000.0	120.000	137.0	H	197.0	34.7
1271.950000	47.54	-15.5	32.04	55.02	22.98	5000.0	1000.000	181.0	H	218.0	-13.1
1590.100000	47.84	-15.5	32.34	55.02	22.68	5000.0	1000.000	161.0	H	30.0	-13.2
1907.850000	50.41	-15.5	34.91	55.02	20.11	5000.0	1000.000	359.0	H	0.0	-9.9
2226.350000	42.86	-15.5	27.36	55.02	27.66	5000.0	1000.000	111.0	H	55.0	-9.9
2862.250000	44.93	-15.5	29.43	55.02	25.59	5000.0	1000.000	128.0	H	32.0	-7.4
3180.000000	45.73	-15.5	30.23	55.02	24.79	5000.0	1000.000	130.0	H	217.0	-6.4

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.

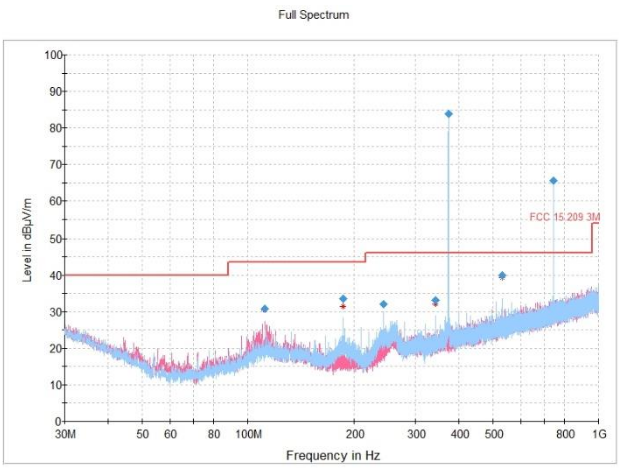


Figure 8.3-23: Harmonic and spurious emissions, 30 – 1000 MHz, Wayne Dalton, Rolling code, 1999-current, 372.5 MHz

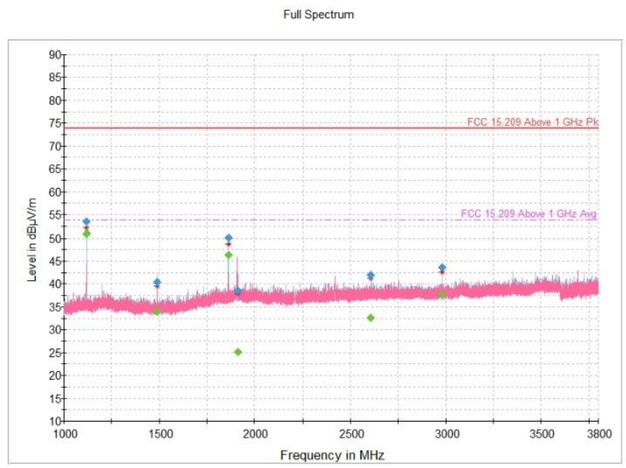


Figure 8.3-24: Harmonic and spurious emissions, 1 – 3.80 GHz, Wayne Dalton, Rolling code, 1999-current, 372.5 MHz

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)
112.049667	30.70			57.81	27.11	5000.0	120.000	402.0	V	0.0	18.9
186.254667	33.47			57.81	24.34	5000.0	120.000	138.0	H	133.0	17.1
243.323000	32.09			57.81	25.72	5000.0	120.000	110.0	H	260.0	20.2
342.845000	33.23			57.81	24.58	5000.0	120.000	100.0	H	270.0	23.4
530.863333	39.90	-15.50	24.40	57.81	33.41	5000.0	120.000	119.0	H	228.0	27.7
745.031667	65.67	-15.50	50.17	57.81	7.64	5000.0	120.000	100.0	H	101.0	31.4
1117.450000	53.47	-15.50	37.97	57.81	19.84	5000.0	1000.000	155.0	H	221.0	-13.8
1490.050000	40.36	-15.50	24.86	57.81	32.95	5000.0	1000.000	144.0	H	114.0	-13.7
1862.500000	50.08	-15.50	34.58	57.81	23.23	5000.0	1000.000	146.0	H	204.0	-10.3
1913.700000	38.50	-15.50	23.00	57.81	34.81	5000.0	1000.000	325.0	V	280.0	-10.0
2607.700000	41.88	-15.50	26.38	57.81	31.43	5000.0	1000.000	135.0	H	22.0	-8.4
2980.150000	43.67	-15.50	28.17	57.81	29.64	5000.0	1000.000	163.0	H	211.0	-7.2

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.

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)
112.049667	30.70			57.81	27.11	5000.0	120.000	402.0	V	0.0	18.9
186.254667	33.47			57.81	24.34	5000.0	120.000	138.0	H	133.0	17.1
243.323000	32.09			57.81	25.72	5000.0	120.000	110.0	H	260.0	20.2
342.845000	33.23			57.81	24.58	5000.0	120.000	100.0	H	270.0	23.4
530.863333	39.90	-13.69	26.21	57.81	31.6	5000.0	120.000	119.0	H	228.0	27.7
745.031667	65.67	-13.69	51.98	57.81	5.83	5000.0	120.000	100.0	H	101.0	31.4
1117.450000	53.47	-13.69	39.78	57.81	18.03	5000.0	1000.000	155.0	H	221.0	-13.8
1490.050000	40.36	-13.69	26.67	57.81	31.14	5000.0	1000.000	144.0	H	114.0	-13.7
1862.500000	50.08	-13.69	36.39	57.81	21.42	5000.0	1000.000	146.0	H	204.0	-10.3
1913.700000	38.50	-13.69	24.81	57.81	33.00	5000.0	1000.000	325.0	V	280.0	-10.0
2607.700000	41.88	-13.69	28.19	57.81	29.62	5000.0	1000.000	135.0	H	22.0	-8.4
2980.150000	43.67	-13.69	29.98	57.81	27.83	5000.0	1000.000	163.0	H	211.0	-7.2

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.

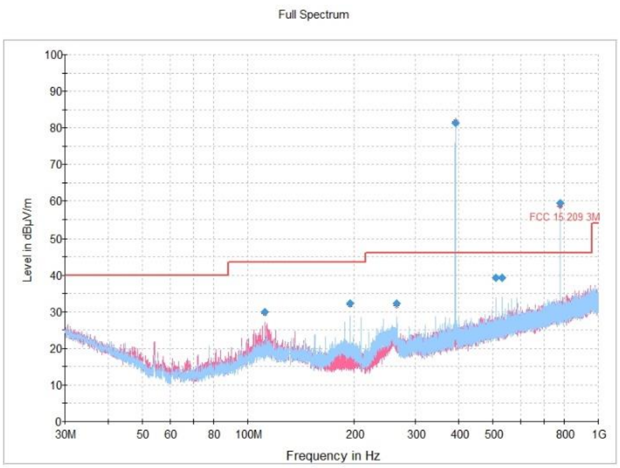


Figure 8.3-25: Harmonic and spurious emissions, 30 – 1000 MHz, Genie, Intellicode® I, 1995-current, 390 MHz

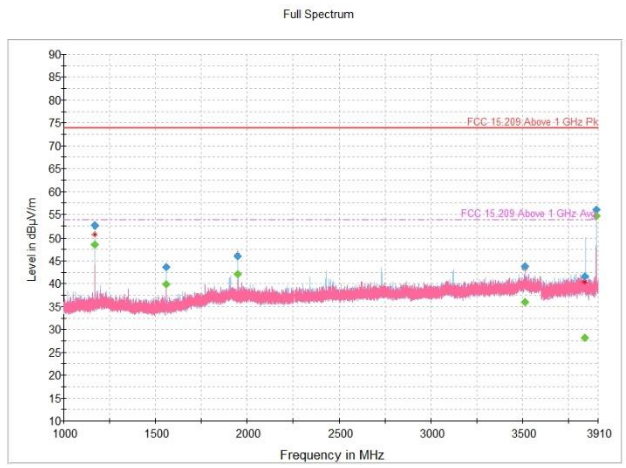


Figure 8.3-26: Harmonic and spurious emissions, 1 – 3.91 GHz, Genie, Intellicode® I, 1995-current, 390 MHz

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)
112.009667	29.94			58.62	28.68	5000.0	120.000	360.0	V	11.0	18.9
195.009333	32.31			58.62	26.31	5000.0	120.000	155.0	H	144.0	17.5
265.446667	32.24			58.62	26.38	5000.0	120.000	127.0	H	253.0	21.6
508.739667	39.34			58.62	19.28	5000.0	120.000	137.0	H	221.0	27.3
530.863333	39.38	-13.61	25.77	58.62	32.85	5000.0	120.000	137.0	H	228.0	27.7
780.048667	59.48	-13.61	45.87	58.62	12.75	5000.0	120.000	100.0	H	101.0	31.6
1170.100000	52.63	-13.61	39.02	58.62	19.6	5000.0	1000.000	128.0	H	219.0	-13.2
1560.200000	43.67	-13.61	30.06	58.62	28.56	5000.0	1000.000	153.0	H	336.0	-13.4
1949.950000	46.08	-13.61	32.47	58.62	26.15	5000.0	1000.000	108.0	H	12.0	-10.1
3510.100000	43.86	-13.61	30.25	58.62	28.37	5000.0	1000.000	146.0	H	114.0	-5.2
3838.100000	41.64	-13.61	28.03	58.62	30.59	5000.0	1000.000	378.0	H	207.0	-3.7
3900.000000	56.05	-13.61	42.44	58.62	16.18	5000.0	1000.000	145.0	H	54.0	-3.4

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.

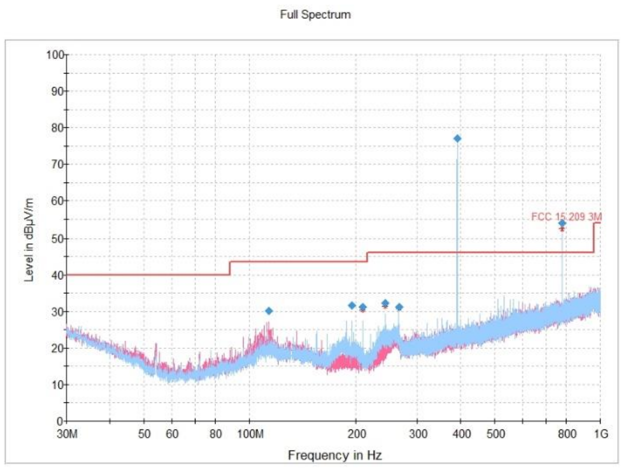


Figure 8.3-27: Harmonic and spurious emissions, 30 – 1000 MHz, Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz

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)
113.626333	30.25			58.62	28.37	5000.0	120.000	402.0	V	212.0	19.1
195.017000	31.61			58.62	27.01	5000.0	120.000	147.0	H	118.0	17.5
210.109000	31.11			58.62	27.51	5000.0	120.000	140.0	H	164.0	18.1
243.290667	32.35			58.62	26.27	5000.0	120.000	100.0	H	271.0	20.2
265.999000	31.12			58.62	27.50	5000.0	120.000	109.0	H	84.0	21.5
780.048667	54.03	-9.24	44.79	58.62	13.83	5000.0	120.000	100.0	H	100.0	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)
113.626333	30.25			58.62	28.37	5000.0	120.000	402.0	V	212.0	19.1
195.017000	31.61			58.62	27.01	5000.0	120.000	147.0	H	118.0	17.5
210.109000	31.11			58.62	27.51	5000.0	120.000	140.0	H	164.0	18.1
243.290667	32.35			58.62	26.27	5000.0	120.000	100.0	H	271.0	20.2
265.999000	31.12			58.62	27.50	5000.0	120.000	109.0	H	84.0	21.5
780.048667	54.03	-6.95	47.08	58.62	11.54	5000.0	120.000	100.0	H	100.0	31.6

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

Full Spectrum

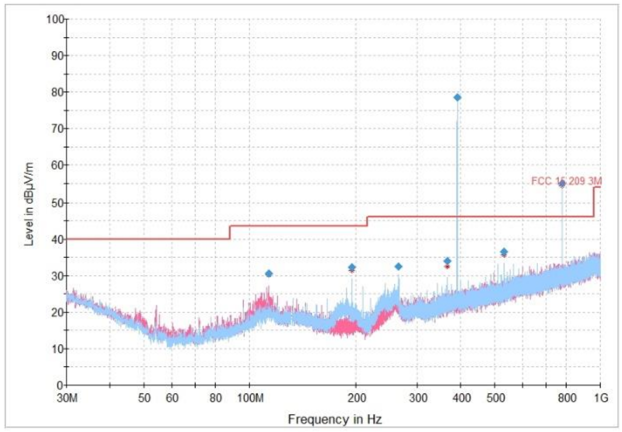


Figure 8.3-28: Harmonic and spurious emissions, 30 – 1000 MHz, Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz

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)
113.626333	30.54			58.62	28.08	5000.0	120.000	399.0	V	308.0	19.1
195.017000	32.29			58.62	26.33	5000.0	120.000	100.0	H	146.0	17.5
265.439000	32.51			58.62	26.11	5000.0	120.000	110.0	H	248.0	21.6
364.961000	34.03			58.62	24.59	5000.0	120.000	204.0	H	258.0	24.2
530.855667	36.58	-10.83	25.75	58.62	32.87	5000.0	120.000	110.0	V	0.0	27.7
780.048667	54.88	-10.83	44.05	58.62	14.57	5000.0	120.000	100.0	H	102.0	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 8.3-16: 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)
113.626333	30.54			58.62	28.08	5000.0	120.000	399.0	V	308.0	19.1
195.017000	32.29			58.62	26.33	5000.0	120.000	100.0	H	146.0	17.5
265.439000	32.51			58.62	26.11	5000.0	120.000	110.0	H	248.0	21.6
364.961000	34.03			58.62	24.59	5000.0	120.000	204.0	H	258.0	24.2
530.855667	36.58	-13.37	23.21	58.62	35.41	5000.0	120.000	110.0	V	0.0	27.7
780.048667	54.88	-13.37	41.51	58.62	17.11	5000.0	120.000	100.0	H	102.0	31.6

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)
113.626333	30.54			58.62	28.08	5000.0	120.000	399.0	V	308.0	19.1
195.017000	32.29			58.62	26.33	5000.0	120.000	100.0	H	146.0	17.5
265.439000	32.51			58.62	26.11	5000.0	120.000	110.0	H	248.0	21.6
364.961000	34.03			58.62	24.59	5000.0	120.000	204.0	H	258.0	24.2
530.855667	36.58	-8.95	27.63	58.62	30.99	5000.0	120.000	110.0	V	0.0	27.7
780.048667	54.88	-8.95	45.93	58.62	12.69	5000.0	120.000	100.0	H	102.0	31.6

Note: Measurement result taken from Chamberlain, Green learn button, Billion Code®, 1993-1995, 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)
113.626333	30.54			58.62	28.08	5000.0	120.000	399.0	V	308.0	19.1
195.017000	32.29			58.62	26.33	5000.0	120.000	100.0	H	146.0	17.5
265.439000	32.51			58.62	26.11	5000.0	120.000	110.0	H	248.0	21.6
364.961000	34.03			58.62	24.59	5000.0	120.000	204.0	H	258.0	24.2
530.855667	36.58	-5.81	30.77	58.62	27.85	5000.0	120.000	110.0	V	0.0	27.7
780.048667	54.88	-5.81	49.07	58.62	9.55	5000.0	120.000	100.0	H	102.0	31.6

Note: Measurement result taken from Chamberlain, Green learn button, Billion Code®, 1993-1995, 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)
113.626333	30.54			58.62	28.08	5000.0	120.000	399.0	V	308.0	19.1
195.017000	32.29			58.62	26.33	5000.0	120.000	100.0	H	146.0	17.5
265.439000	32.51			58.62	26.11	5000.0	120.000	110.0	H	248.0	21.6
364.961000	34.03			58.62	24.59	5000.0	120.000	204.0	H	258.0	24.2
530.855667	36.58	-6.13	30.45	58.62	28.17	5000.0	120.000	110.0	V	0.0	27.7
780.048667	54.88	-6.13	48.75	58.62	9.87	5000.0	120.000	100.0	H	102.0	31.6

Note: Measurement result taken from Chamberlain, Green learn button, Billion Code®, 1993-1995, 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)
113.626333	30.54			58.62	28.08	5000.0	120.000	399.0	V	308.0	19.1
195.017000	32.29			58.62	26.33	5000.0	120.000	100.0	H	146.0	17.5
265.439000	32.51			58.62	26.11	5000.0	120.000	110.0	H	248.0	21.6
364.961000	34.03			58.62	24.59	5000.0	120.000	204.0	H	258.0	24.2
530.855667	36.58	-7.05	29.53	58.62	29.09	5000.0	120.000	110.0	V	0.0	27.7
780.048667	54.88	-7.05	47.83	58.62	10.79	5000.0	120.000	100.0	H	102.0	31.6

Note: Measurement result taken from Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz. Duty cycle correction factor for OHD, 9 switch/3 position DIP switch, 1993-1995 applied to harmonic emissions.

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 – June 30, 2021	Temperature	24 °C
Test engineer	James Cunningham, EMC/MIL/WL Supervisor	Air pressure	1007 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	9.08	757.5
Sommer	Rolling code	310	13.22	775.0
Stanley	10 switch / 2 position DIP switch	310	8.96	775.0
Genie	Intellicode®, 1995-current	315	14.88	787.5
Chamberlain	Purple learn button, security+, 2006-2014	315	9.32	787.5
Genie	Intellicode® II, 2010-2010	315	18.38	787.5
Marantec	Fixed learn code	315	9.20	787.5
Linear	Mega Code®	318	9.32	795.0
Wayne Dalton	Rolling code, 1999-current	372.5	14.49	931.3
Ryobi	Rolling code	372.5	12.64	931.3
Genie	Intellicode® I, 1995-current	390	14.39	975.0
Chamberlain	Orange/Red learn button, Security+®, 1996-2005	390	11.19	975.0
Chamberlain	Yellow learn button, Security+2.0 ®, 2011-current	390	18.88	975.0
Chamberlain	Green learn button, Billion Code®, 1993-1995	390	8.39	975.0
Genie	Intellicode® II, 2010-2011	390	18.48	975.0
Chamberlain	9 switch/3 position DIP switch	390	7.34	975.0
Genie	12 switch/2 position DIP switch, 1993-1995	390	75.12	975.0
Genie	9 switch/2 position DIP switch, 1993-1995	390	75.92	975.0
OHD	9 switch/3 position DIP switch, 1993-1995	390	9.94	975.0

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

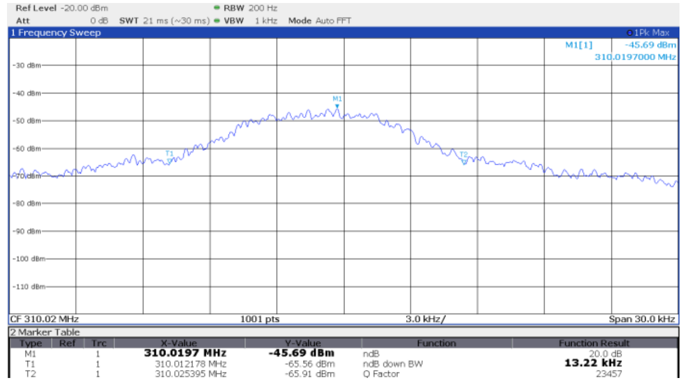


Figure 8.4-2: 20 dB bandwidth, Sommer, rolling code, 310 MHz

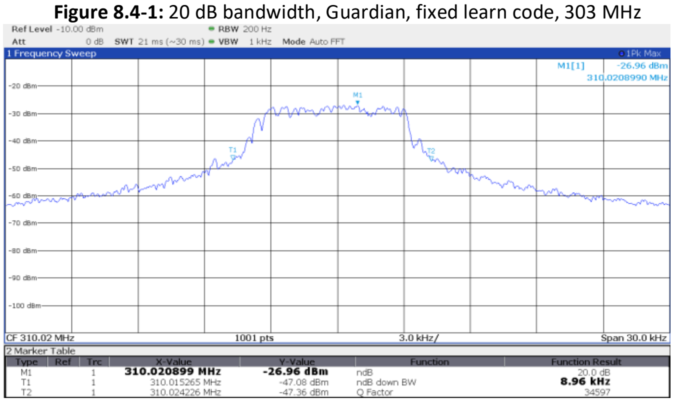


Figure 8.4-3: 20 dB bandwidth, Stanley, 10 switch / 2 position DIP switch, 310 MHz

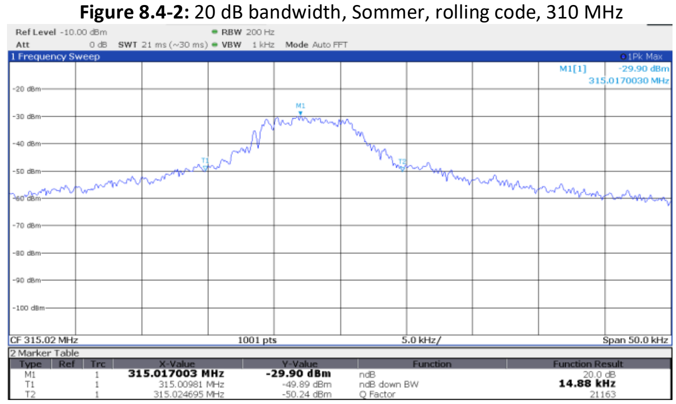


Figure 8.4-4: 20 dB bandwidth, Genie, Intellicode®, 1995-current, 315 MHz

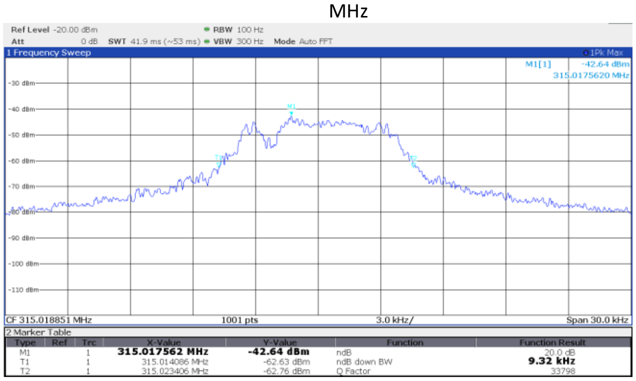


Figure 8.4-5: 20 dB bandwidth, Chamberlain, purple learn button, security+, 2006-2014, 315 MHz

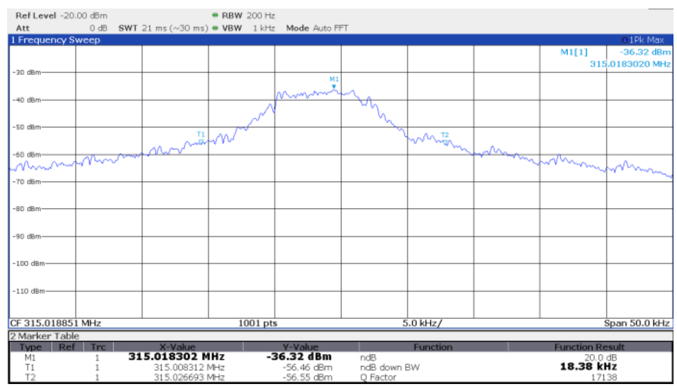


Figure 8.4-6: 20 dB bandwidth, Genie, Intellicode® II, 2010-2010, 315 MHz

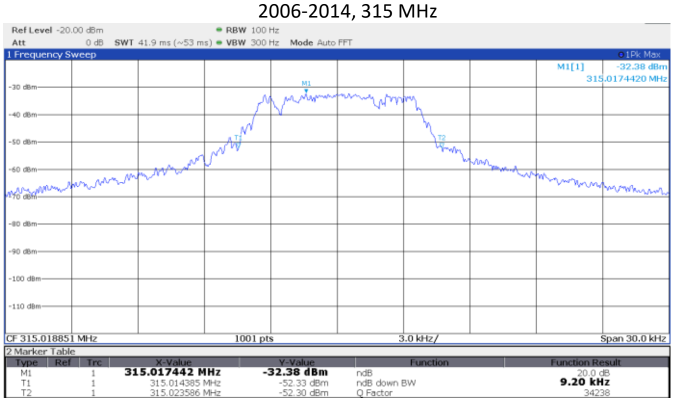


Figure 8.4-7: 20 dB bandwidth, Marantec, fixed learn code, 315 MHz

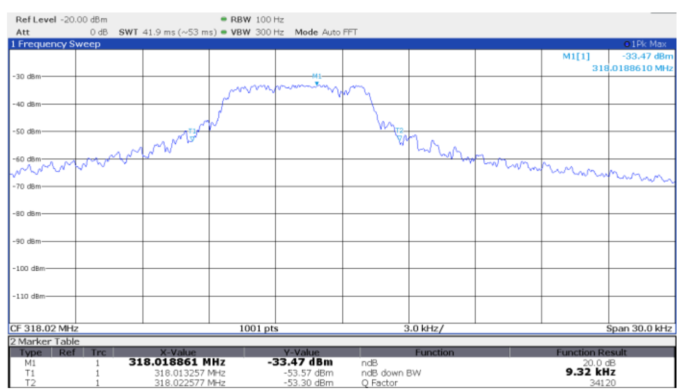


Figure 8.4-8: 20 dB bandwidth, Linear, Mega Code®, 318 MHz

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

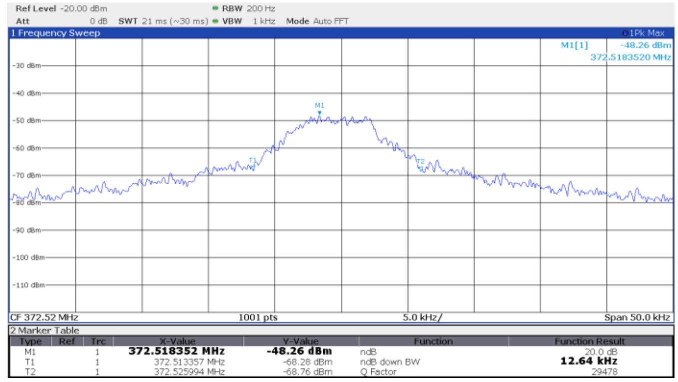


Figure 8.4-10: 20 dB bandwidth, Ryobi, rolling code, 372.5 MHz

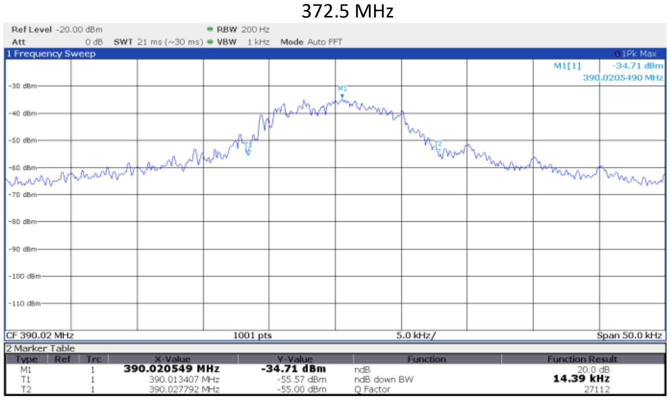


Figure 8.4-11: 20 dB bandwidth, Genie, Intellicode® I, 1995-current, 390 MHz

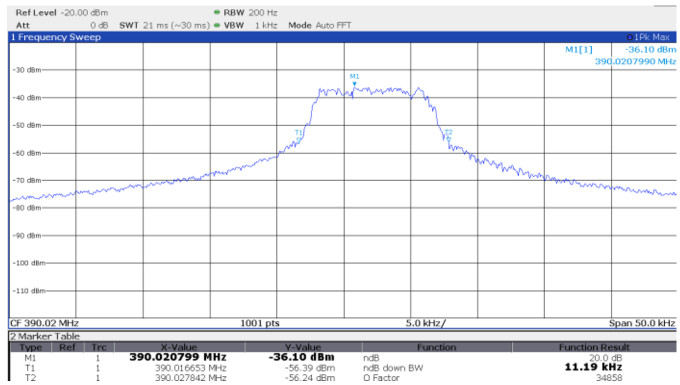


Figure 8.4-12: 20 dB bandwidth, Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz

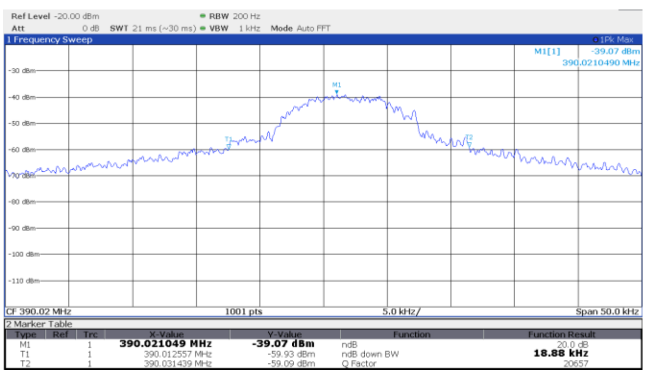


Figure 8.4-13: 20 dB bandwidth, Chamberlain, Yellow learn button, Security+2.0®, 2011-current, 390 MHz

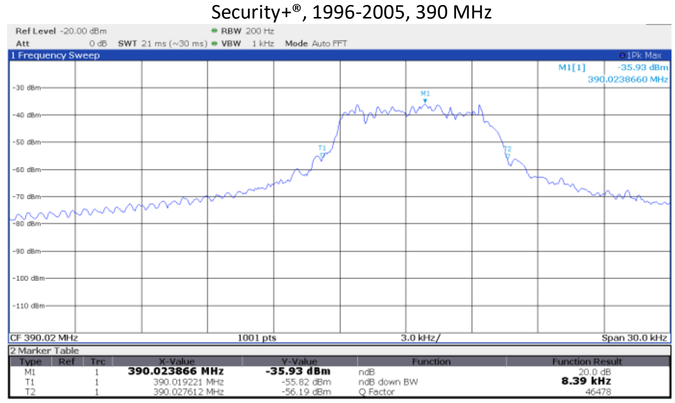


Figure 8.4-14: 20 dB bandwidth, Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz

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

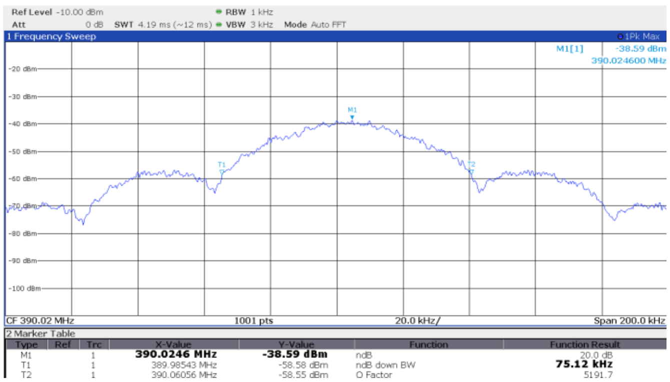


Figure 8.4-17: 20 dB bandwidth, Genie, 12 switch/2 position DIP switch, 1993-1995, 390 MHz

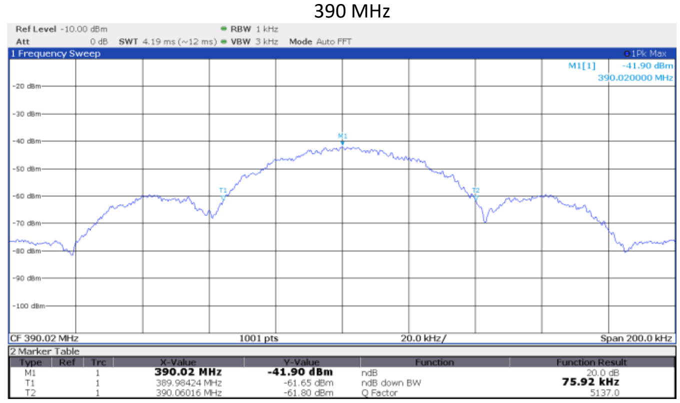


Figure 8.4-18: 20 dB bandwidth, Genie, 9 switch/2 position DIP switch, 1993-1995, 390 MHz

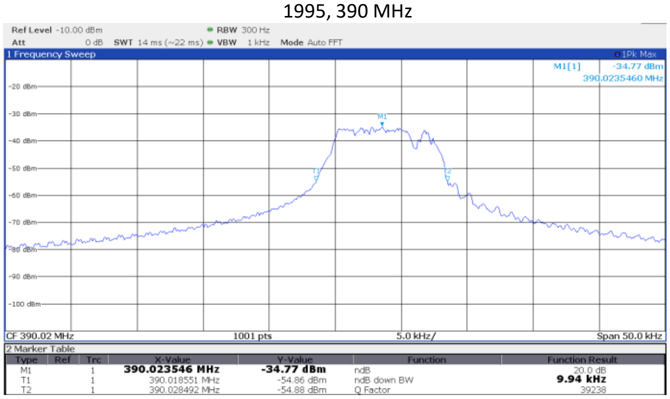


Figure 8.4-19: 20 dB bandwidth, OHD, 9 switch/3 position DIP switch, 1993-1995, 390 MHz

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 – June 30, 2021	Temperature	24 °C
Test engineer	James Cunningham, EMC/MIL/WL Supervisor	Air pressure	1007 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	11.92
Sommer	Rolling code	310	36.75
Stanley	10 switch / 2 position DIP switch	310	7.48
Genie	Intellicode®, 1995-current	315	32.45
Chamberlain	Purple learn button, security+, 2006-2014	315	9.00
Genie	Intellicode® II, 2010-2010	315	32.47
Marantec	Fixed learn code	315	8.16
Linear	Mega Code®	318	10.22
Wayne Dalton	Rolling code, 1999-current	372.5	29.32
Ryobi	Rolling code	372.5	31.37
Genie	Intellicode® I, 1995-current	390	31.11
Chamberlain	Orange/Red learn button, Security+®, 1996-2005	390	8.97
Chamberlain	Yellow learn button, Security+2.0 ®, 2011-current	390	30.66
Chamberlain	Green learn button, Billion Code®, 1993-1995	390	6.93
Genie	Intellicode® II, 2010-2011	390	32.85
Chamberlain	9 switch/3 position DIP switch	390	7.21
Genie	12 switch/2 position DIP switch, 1993-1995	390	117.87
Genie	9 switch/2 position DIP switch, 1993-1995	390	118.31
OHD	9 switch/3 position DIP switch, 1993-1995	390	6.06

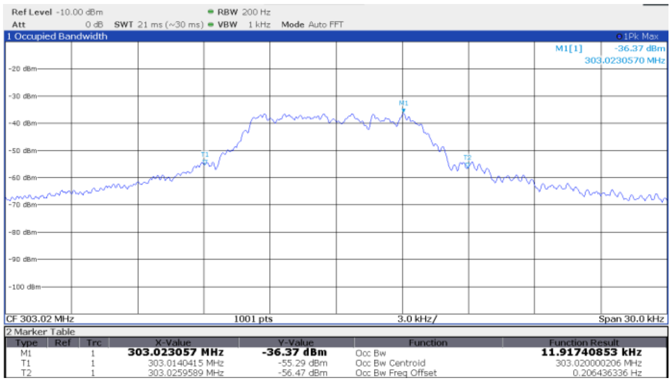


Figure 8.5-1: 99% occupied bandwidth, Guardian, fixed learn code, 303 MHz

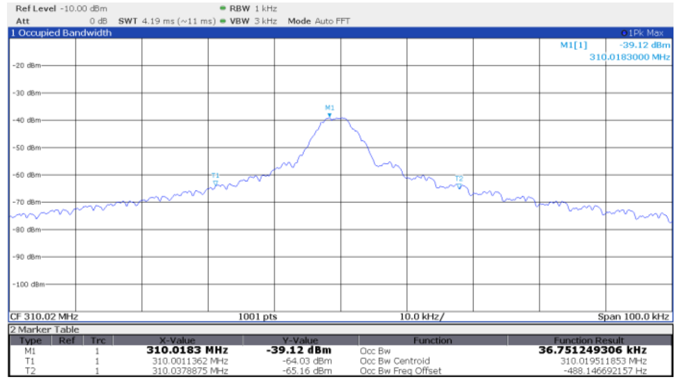


Figure 8.5-2: 99% occupied bandwidth, Sommer, rolling code, 310 MHz

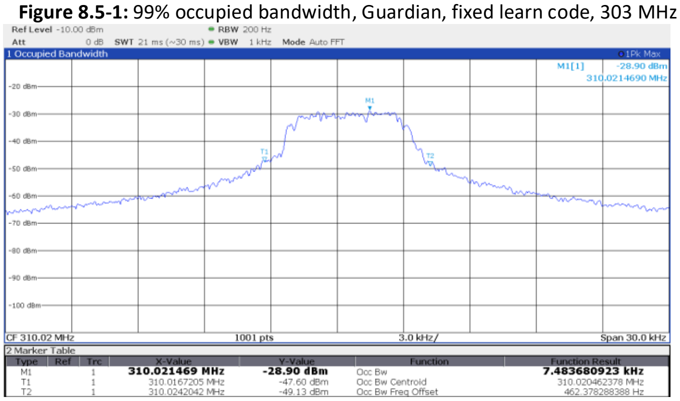


Figure 8.5-3: 99% occupied bandwidth, Stanley, 10 switch / 2 position DIP switch, 310 MHz

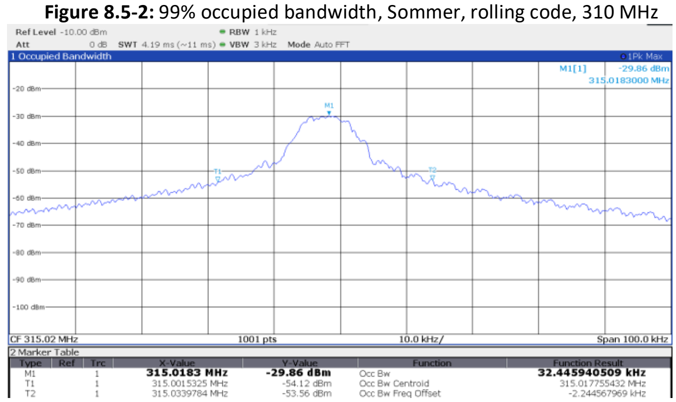


Figure 8.5-4: 99% occupied bandwidth, Genie, Intellicode®, 1995-current, 315 MHz

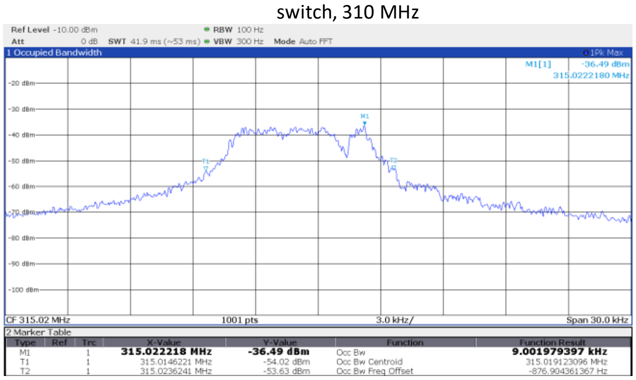


Figure 8.5-5: 99% occupied bandwidth, Chamberlain, purple learn button, security+, 2006-2014, 315 MHz

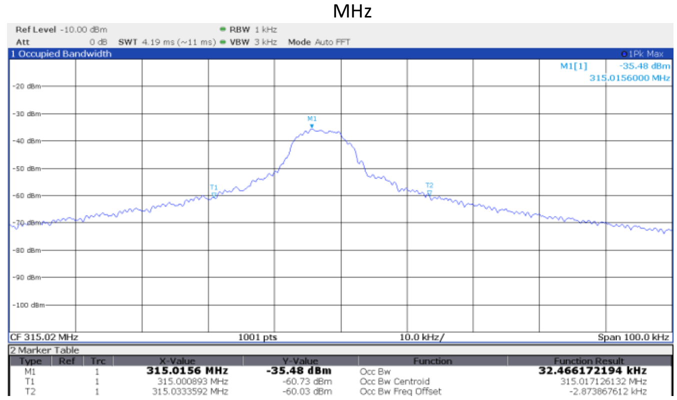


Figure 8.5-6: 99% occupied bandwidth, Genie, Intellicode® II, 2010-2010, 315 MHz

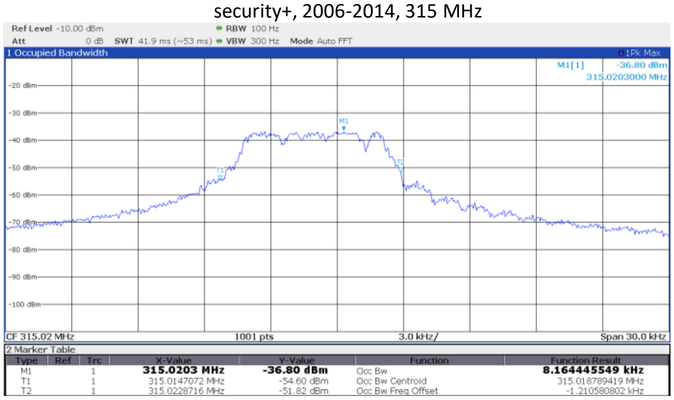


Figure 8.5-7: 99% occupied bandwidth, Marantec, fixed learn code, 315 MHz

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

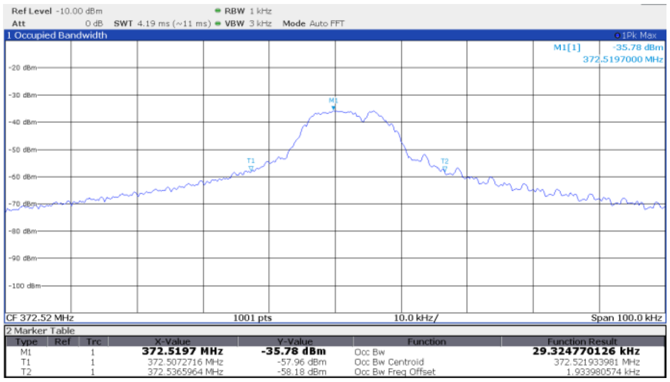


Figure 8.5-9: 99% occupied bandwidth, Wayne Dalton, rolling code, 1999-current, 372.5 MHz

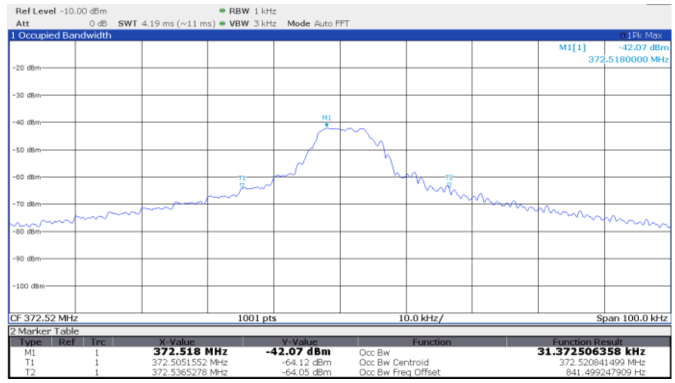


Figure 8.5-10: 99% occupied bandwidth, Ryobi, rolling code, 372.5 MHz

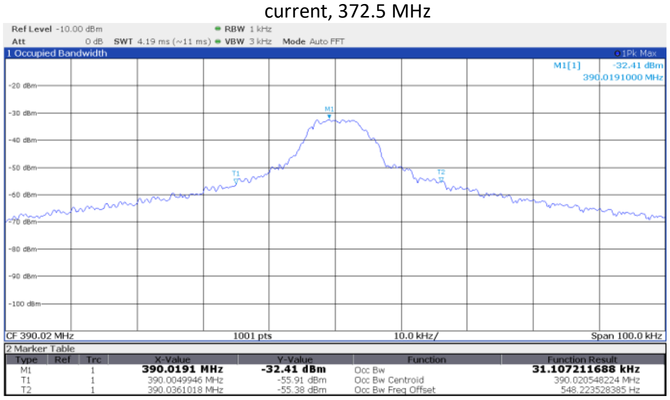


Figure 8.5-11: 99% occupied bandwidth, Genie, Intellicode® I, 1995-current, 390 MHz

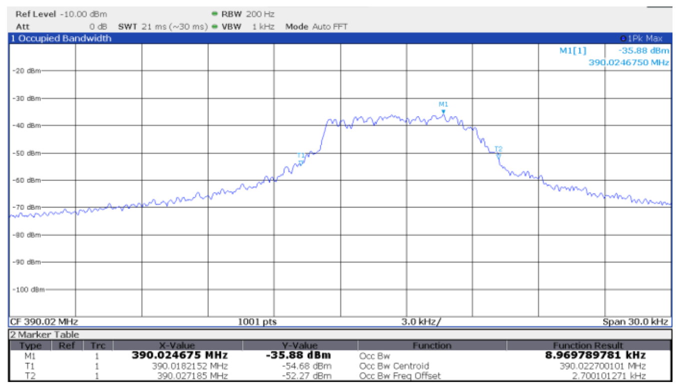


Figure 8.5-12: 99% occupied bandwidth, Chamberlain, Orange/Red learn button, Security+®, 1996-2005, 390 MHz

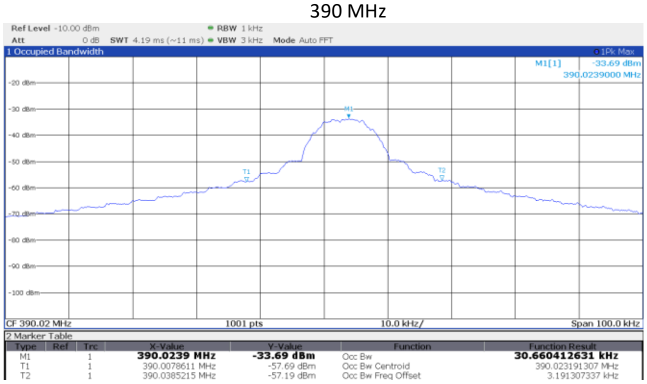


Figure 8.5-13: 99% occupied bandwidth, Chamberlain, Yellow learn button, Security+2.0®, 2011-current, 390 MHz

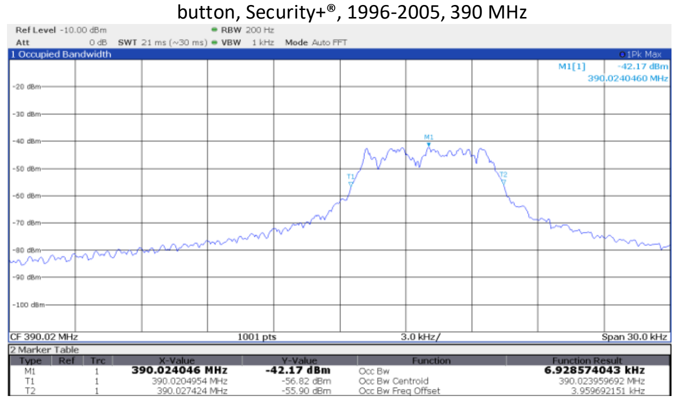


Figure 8.5-14: 99% occupied bandwidth, Chamberlain, Green learn button, Billion Code®, 1993-1995, 390 MHz

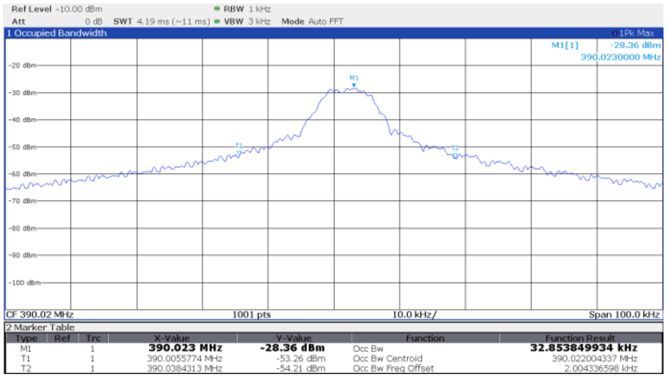


Figure 8.5-15: 99% occupied bandwidth, Genie, Intellicode® II, 2010-2011, 390 MHz

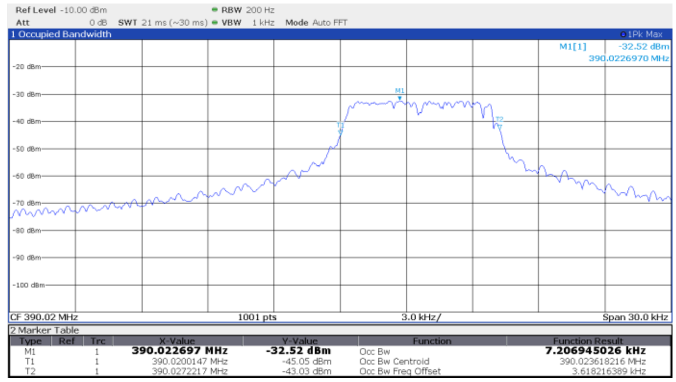


Figure 8.5-16: 99% occupied bandwidth, Chamberlain, 9 switch / 3 position DIP switch, 390 MHz

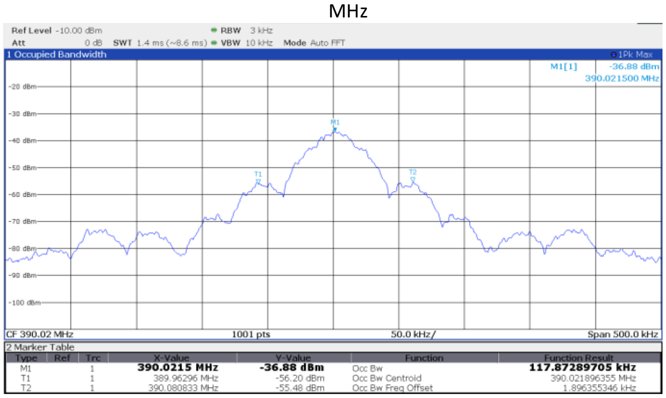


Figure 8.5-17: 99% occupied bandwidth, Genie, 12 switch/2 position DIP switch, 1993-1995, 390 MHz

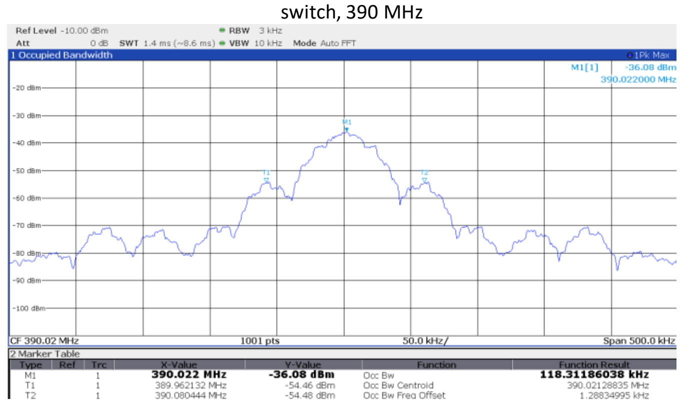


Figure 8.5-18: 99% occupied bandwidth, Genie, 9 switch/2 position DIP switch, 1993-1995, 390 MHz

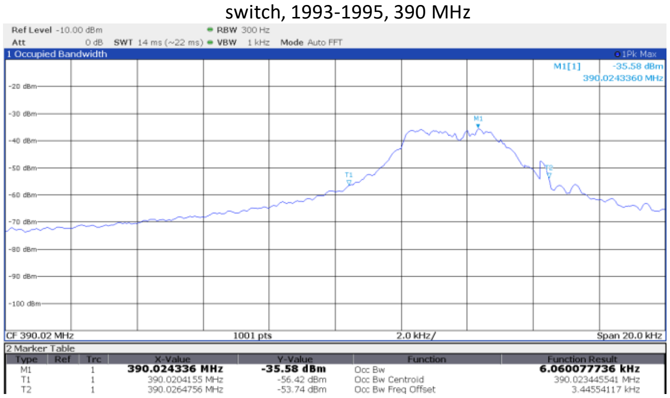


Figure 8.5-19: 99% occupied bandwidth, OHD, 9 switch/3 position DIP switch, 1993-1995, 390 MHz