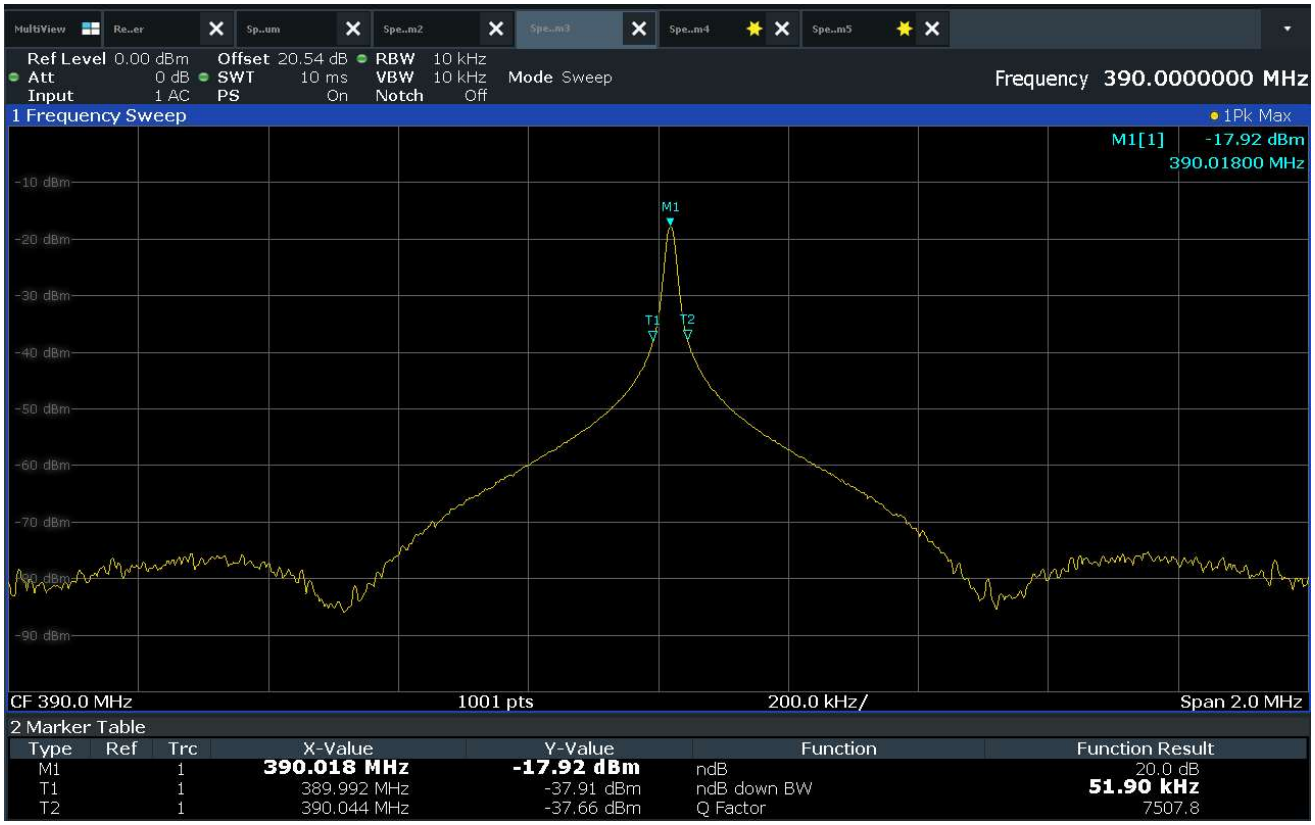
Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 8
Mode	Genie Code
Frequency Tested	315MHz
Result	20dB BW = 53.9kHz
Notes	

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 9
Mode	Genie Code
Frequency Tested	390MHz
Result	20dB BW = 51.9kHz
Notes	



23. Occupied Bandwidth – 99%

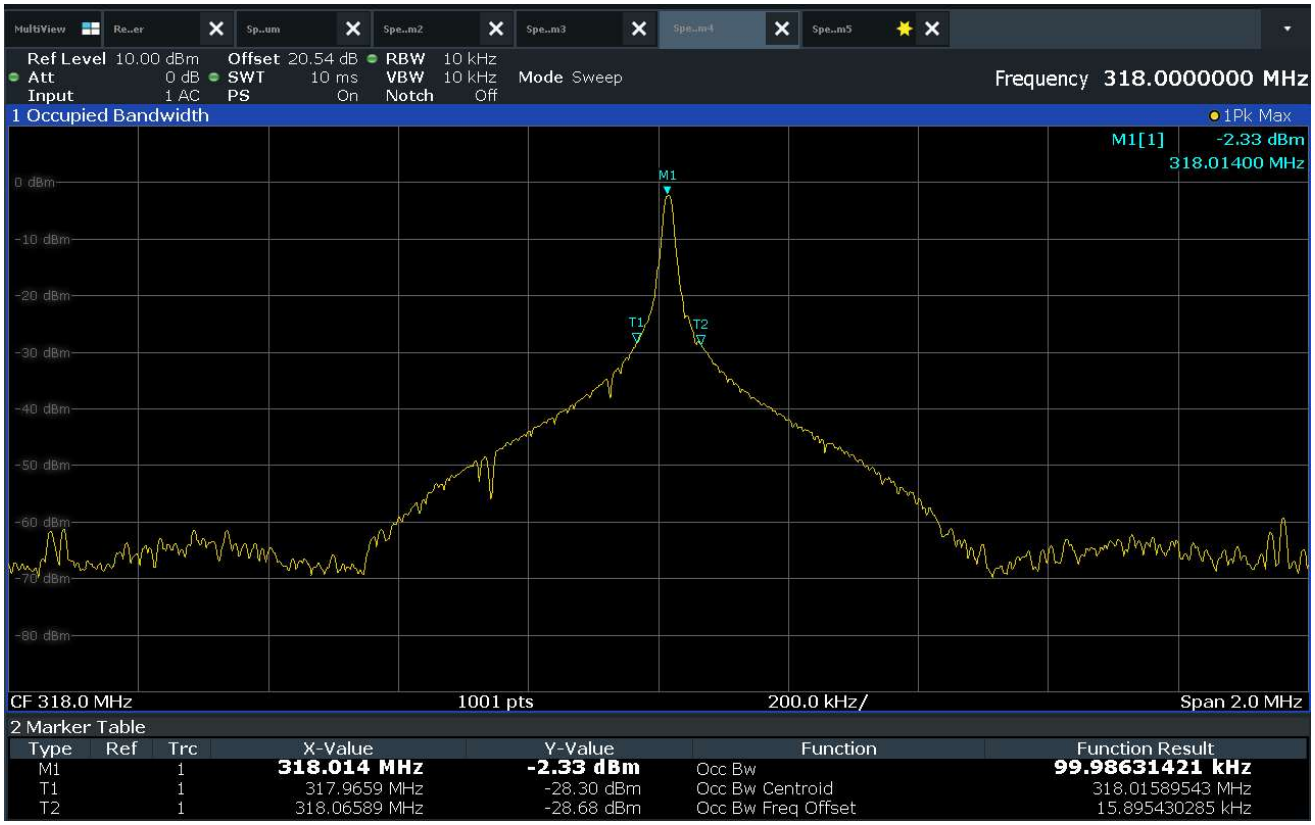
EUT Information	
Manufacturer	The Chamberlain Group LLC
Product	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 1, OOK 2, OOK 3, OOK 4, OOK 5, OOK 6, OOK 7, OOK 8, OOK 9
Mode	Billion A Code, D Code, E Code, Linear Mega Code, Genie Code, Stanley Code, Wayne-Dalton Code, Ryobi Code, Guardian Code, Sommer Code

Test Setup Details	
Setup Format	Tabletop
Measurement Method	Antenna Conducted
Type of Test Site	Tabletop
Notes	

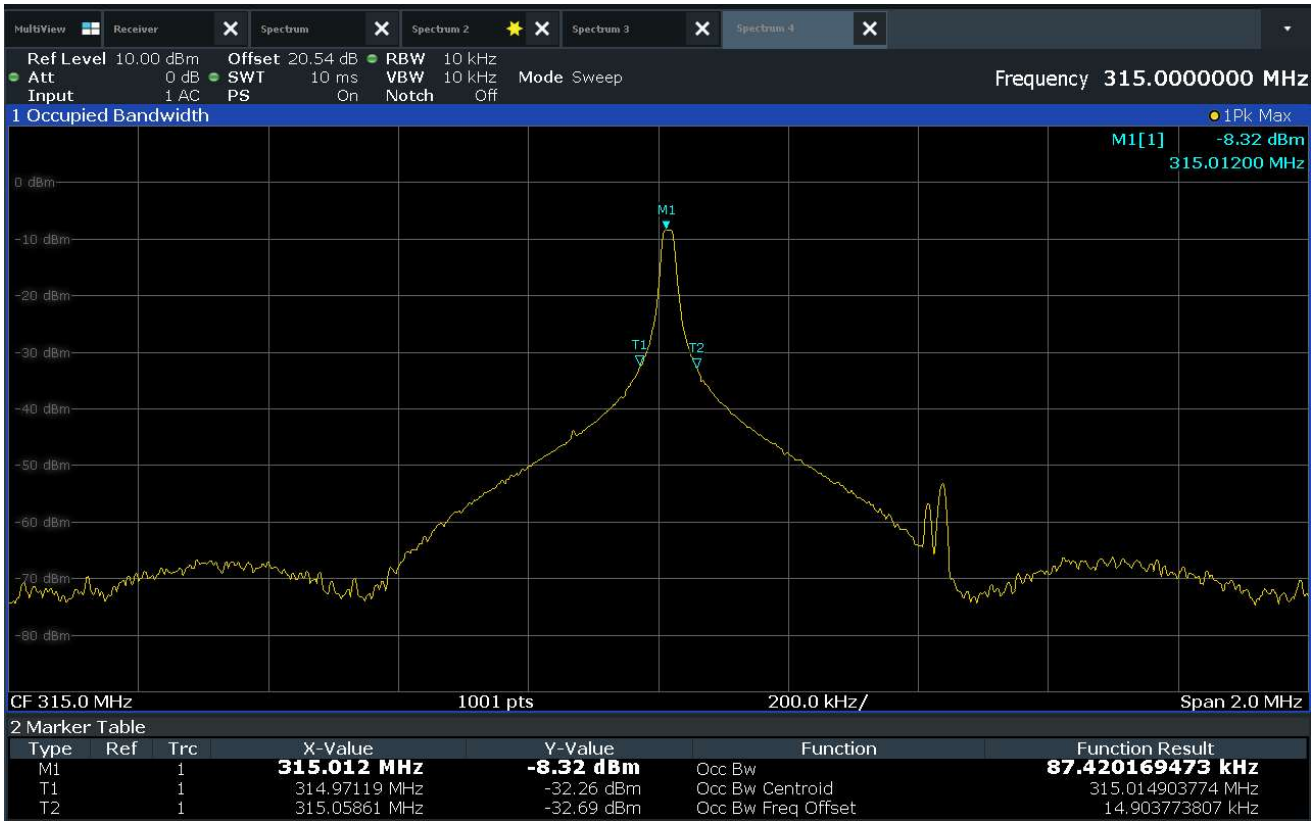
Requirement
Per RSS-210, Annex A, Section A.1.3, the occupied bandwidth (99% Bandwidth) of momentarily operated devices shall be less than or equal to 0.25% of the center frequency for devices operating between 70MHz and 900MHz. For devices operating above 900MHz, the occupied bandwidth shall be less than or equal to 0.5% of the center frequency.

Procedure
The antenna port of the EUT was connected to the spectrum analyzer through attenuation. The EUT was allowed to transmit continuously. The transmit channel was set separately to low, middle, and high channels. The resolution bandwidth (RBW) was set to 1% to 5% of the actual occupied / x dB bandwidth, the video bandwidth (VBW) was set 3 times greater than the RBW, and the span was set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer's display was plotted using a 'screen dump' utility.

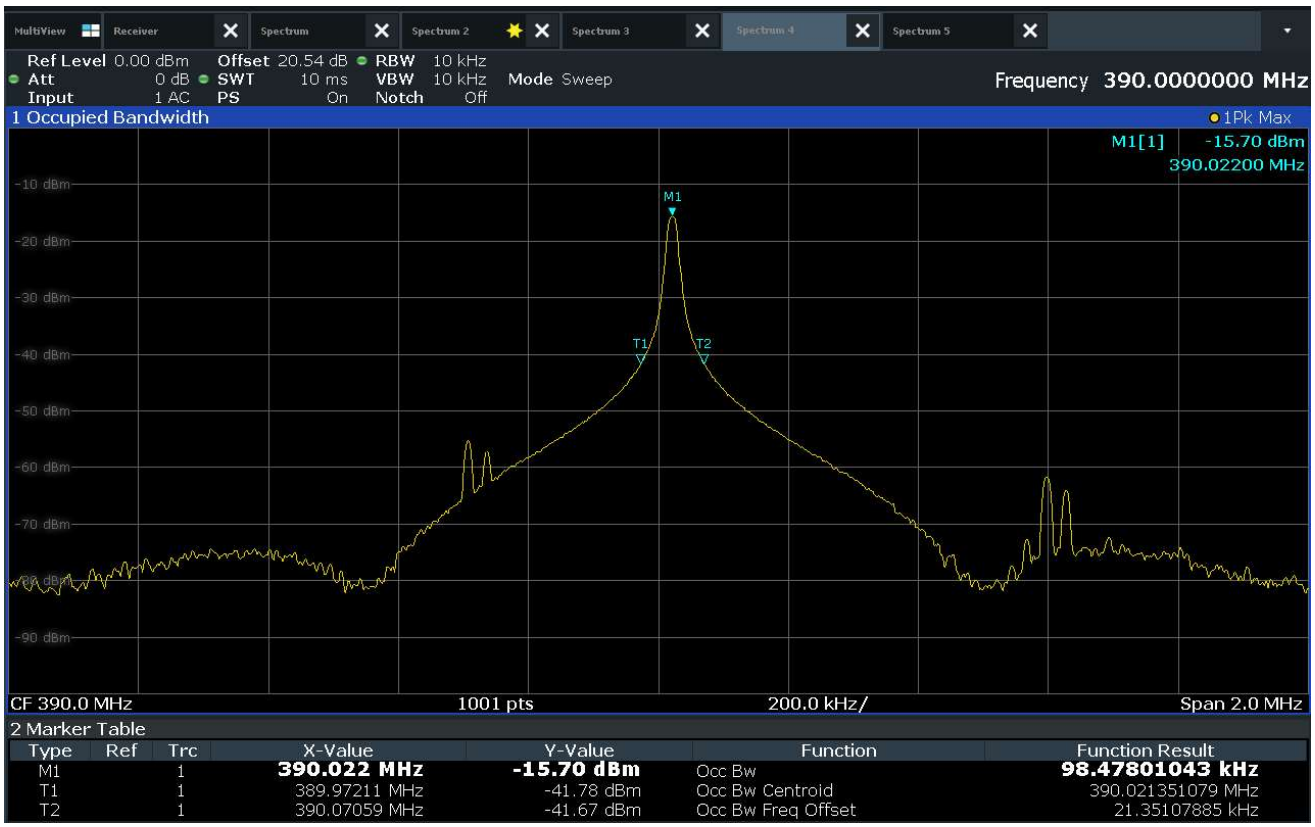
Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 3
Mode	Linear Mega Code
Frequency Tested	318MHz
Result	99% BW = 99.98kHz
Notes	



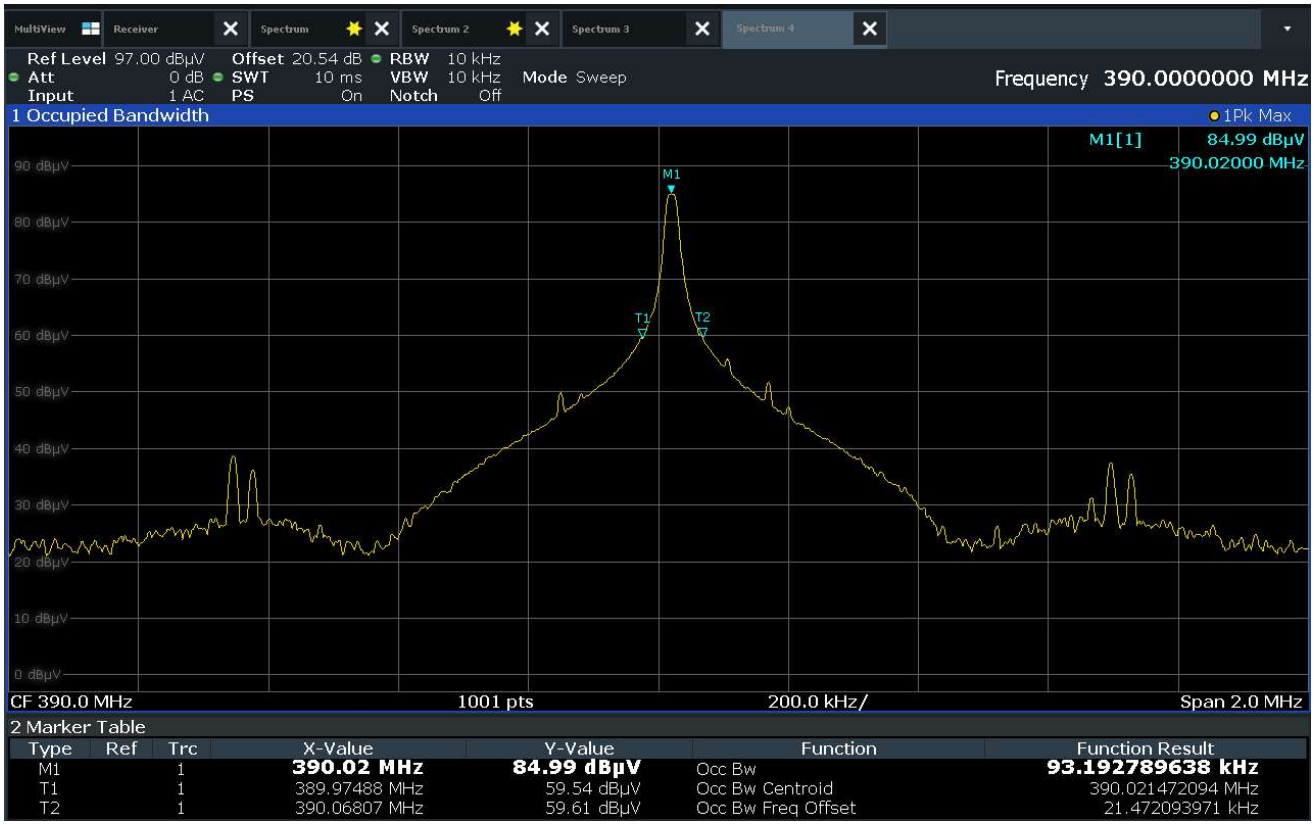
Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 1
Mode	D Code
Frequency Tested	315MHz
Result	99% BW = 87.42kHz
Notes	



Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 1
Mode	D Code
Frequency Tested	390MHz
Result	99% BW = 98.47kHz
Notes	

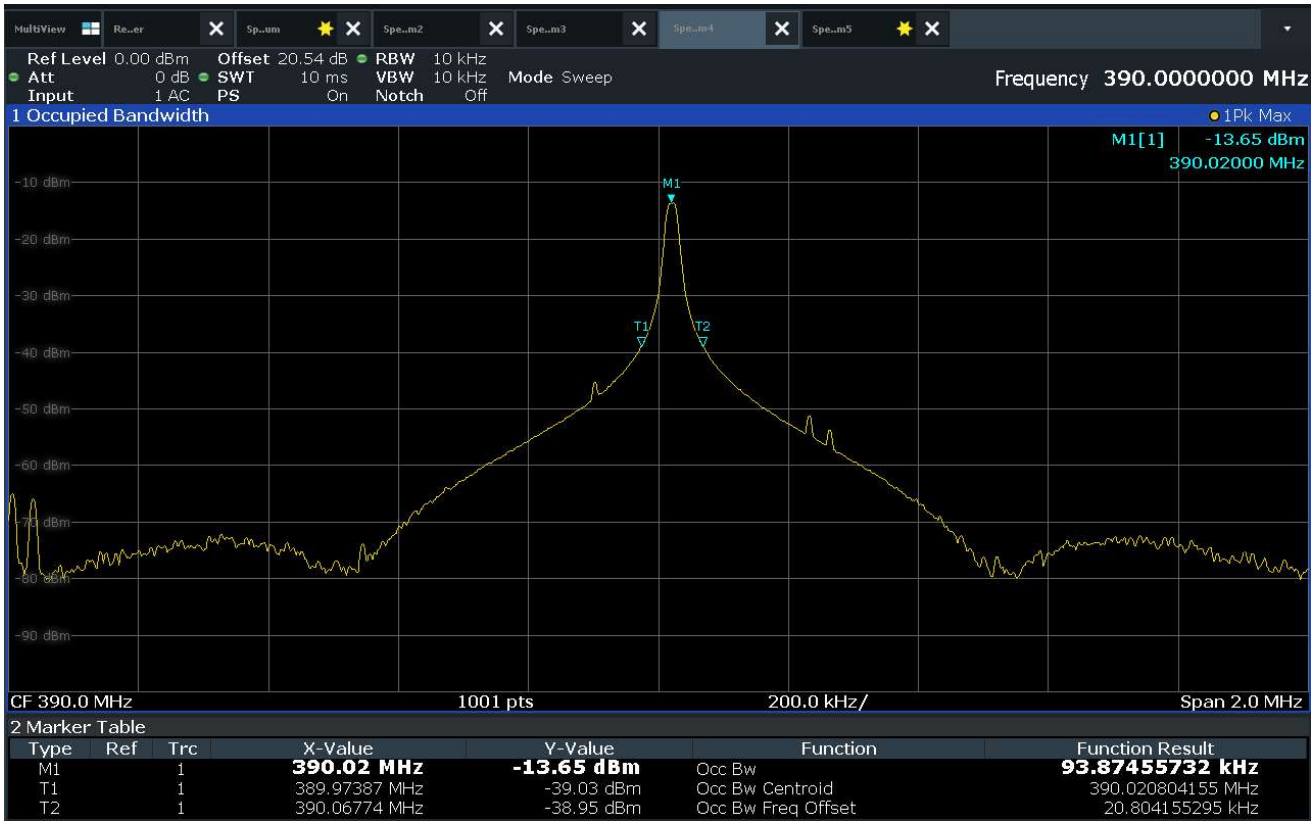


Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 1
Mode	Billion A Code
Frequency Tested	390MHz
Result	99% BW = 93.19kHz
Notes	

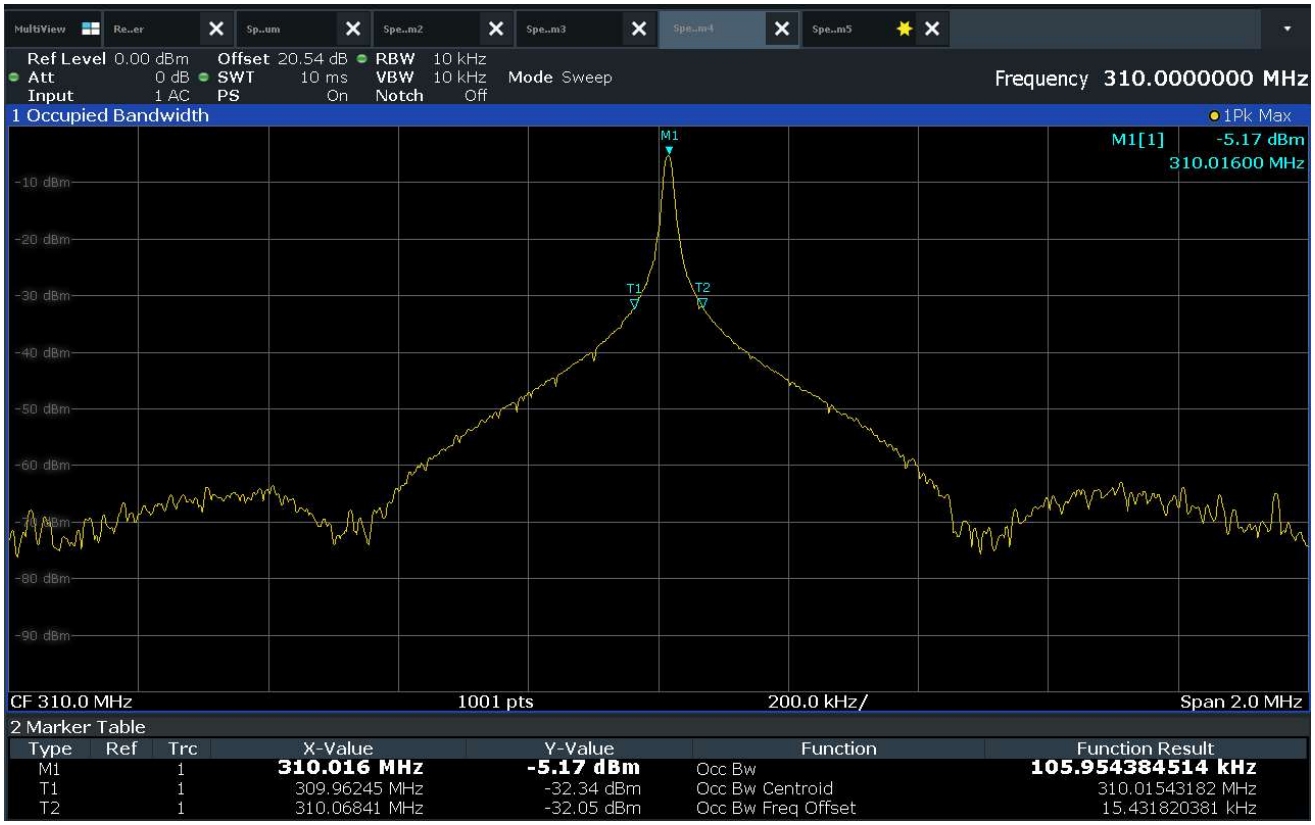


Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 1
Mode	E Code
Frequency Tested	315MHz
Result	99% BW = 103.48kHz
Notes	

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 1
Mode	E Code
Frequency Tested	390MHz
Result	99% BW = 93.87kHz
Notes	

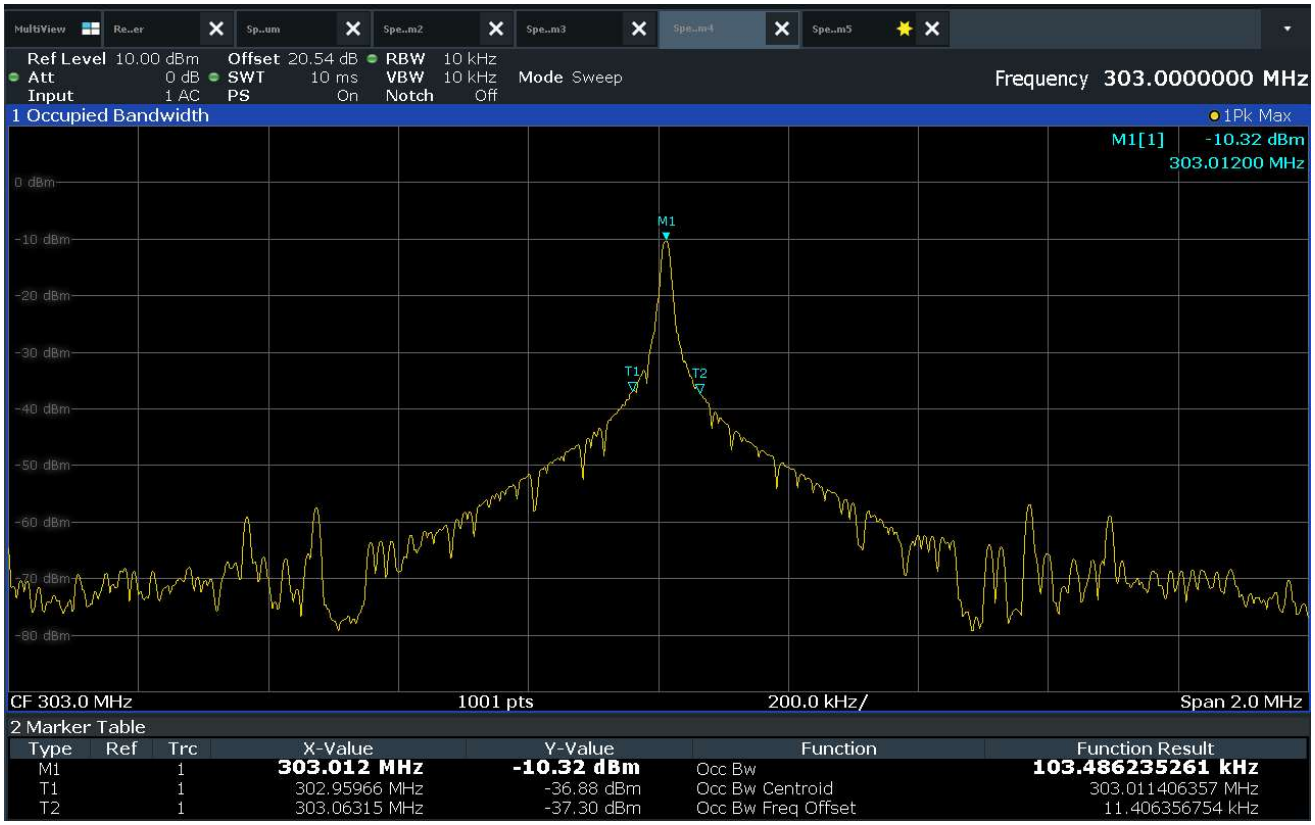


Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 2
Mode	Sommer Code
Frequency Tested	310MHz
Result	99% BW = 105.95kHz
Notes	



Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 4
Mode	Wayne-Dalton Code
Frequency Tested	372.5MHz
Result	99% BW = 107.31kHz
Notes	

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 5
Mode	Guardian Code
Frequency Tested	303MHz
Result	99% BW = 103.48kHz
Notes	



Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 6
Mode	Ryobi Code
Frequency Tested	372.5MHz
Result	99% BW = 106.82kHz
Notes	

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 7
Mode	Stanley Code
Frequency Tested	310MHz
Result	99% BW = 101.5kHz
Notes	

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 8
Mode	Genie Code
Frequency Tested	315MHz
Result	99% BW = 106.76kHz
Notes	

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK 9
Mode	Genie Code
Frequency Tested	390MHz
Result	99% BW = 106.48kHz
Notes	

24. Spurious Radiated Emissions

EUT Information	
Manufacturer	The Chamberlain Group LLC
Product	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK2
Mode	Billion A Code, D Code, E Code, Linear Mega Code, Genie Code, Stanley Code, Wayne-Dalton Code, Ryobi Code, Guardian Code, Sommer Code

Test Setup Details	
Setup Format	Tabletop
Type of Test Site	Semi-Anechoic Chamber
Test Site Used	R29F
Antenna Types Used	Below 1GHz: Bilog (or equivalent) Above 1GHz: Double-Ridged Waveguide (or equivalent)
Notes	N/A

Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz)	4.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz)	3.1

Requirement
The EUT must comply with the requirements of §15.231(b) and FCC §15.205. The EUT must also comply with the requirements of RSS-210 Annex A.1 and RSS-Gen Section 8.10.

FCC §15.231(b) Field Strength Emissions		
Fundamental Frequency (MHZ)	Field Strength of Fundamental (µV/m)	Field Strength of Spurious Emissions (µV/m)
40.66 – 40.70	2250	225
70 – 130	1250	125
130 – 174	1250 to 3750[1]	125 to 375[1]
174 – 260	3750	375
260 – 470	3750 to 12500[1]	375 to 1250[1]
Above 470	12500	1250
Note 1: Linear interpolations		

RSS-210 Field Strength Emissions		
Fundamental Frequency (MHZ)	Field Strength of Fundamental (µV/m at 3m)	Field Strength of Spurious Emissions (µV/m at 3m)
70 – 130	1250	125
130 – 174	1250 to 3750[1]	125 to 375[1]
174 – 260 [2]	3750	375
260 – 470 [2]	3750 to 12500[1]	375 to 1250[1]
Above 470	12500	1250

[1] Linear interpolation with frequency (f) in MHZ:
- For 130 – 174MHz: Field Strength (µV/m) = (56.82 × f) – 6136
- For 260 – 470MHz: Field Strength (µV/m) = (41.67 × f) – 7083

[2] Frequency bands 225 – 328.6MHz and 335.4 – 399.9MHz are designated for the exclusive use of the Government of Canada. Manufacturers should be aware of possible harmful interference and degradation of their license-exempt radio equipment in these frequency bands.

Procedure

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. The walls and ceiling of the shielded chamber are lined with ferrite tiles. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2014 for site attenuation.

The shielded enclosure prevents emissions from other sources, such as radio and TV stations, from interfering with the measurements. All power lines and signal lines entering the enclosure pass through filters on the enclosure wall. The powerline filters prevent extraneous signals from entering the enclosure on these leads.

A preliminary radiated emissions test was performed to determine the emission characteristics of the EUT. For the preliminary test, a broadband measuring antenna was positioned at a 3 meter distance from the EUT. The entire frequency range from 30MHz to 4GHz was investigated using a peak detector function.

The final emission tests were then manually performed over the frequency range of 30MHz to 4GHz.

1) Between 30MHz and 1GHz, a bi-log antenna was used as the pick-up device. The EUT was placed on an 80cm high non-conductive stand.
2) A peak detector with a resolution bandwidth of 100kHz was used on the spectrum analyzer.
3) Above 1GHz, a broadband double ridged waveguide antenna was used as the pick-up device. The EUT was placed on a 1.5m high non-conductive stand.
4) A peak detector with a resolution bandwidth of 1MHz was used on the spectrum analyzer.
5) The peak detected levels were converted to average levels using a duty cycle factor which was computed from the pulse train
6) To ensure that maximum or worst case, emission levels were measured, the following steps were taken:
    i) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
    ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
    iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.

Removed for short term confidentiality
Test Setup for Spurious Radiated Emissions, 30MHz – 1GHz – Antenna Polarization Horizontal
Removed for short term confidentiality
Test Setup for Spurious Radiated Emissions, 30MHz – 1GHz – Antenna Polarization Vertical

Removed for short term confidentiality

Test Setup for Spurious Radiated Emissions, Above 1GHz – Antenna Polarization Horizontal

Removed for short term confidentiality

Test Setup for Spurious Radiated Emissions, Above 1GHz – Antenna Polarization Vertical

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK2
Mode	Linear Mega Code
Frequency Tested	318MHz
Notes	Field Strength of the Fundamental Limit = 6166.7µV/m

Freq. (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Total (dBµV/m)	Total (µV/m)	Limit (µV/m)	Margin (dB)
318.000	H	54.1		0.9	19.7	0.0	-15.9	58.8	873.4	6166.7	-17.0
318.000	V	62.6		0.9	19.7	0.0	-15.9	67.3	2313.3	6166.7	-8.5
636.000	H	16.4	*	1.3	25.3	0.0	-15.9	27.1	22.7	616.7	-28.7
636.000	V	29.9		1.3	25.3	0.0	-15.9	40.6	107.1	616.7	-15.2
954.000	H	22.5		1.6	27.0	0.0	-15.9	35.2	57.4	616.7	-20.6
954.000	V	25.3		1.6	27.0	0.0	-15.9	38.0	79.2	616.7	-17.8
1272.000	H	26.9	*	1.9	29.7	0.0	-15.9	42.6	134.1	616.7	-13.2
1272.000	V	30.0	*	1.9	29.7	0.0	-15.9	45.7	191.7	616.7	-10.1
1590.000	H	27.5	*	2.1	27.9	0.0	-15.9	41.6	120.0	500.0	-12.4
1590.000	V	28.2		2.1	27.9	0.0	-15.9	42.2	128.7	500.0	-11.8
1908.000	H	26.0	*	2.3	30.1	0.0	-15.9	42.4	132.5	616.7	-13.4
1908.000	V	24.6	*	2.3	30.1	0.0	-15.9	41.1	113.8	616.7	-14.7
2226.000	H	31.0		2.5	31.6	0.0	-15.9	49.2	287.6	500.0	-4.8
2226.000	V	32.6		2.5	31.6	0.0	-15.9	50.7	342.5	500.0	-3.3
2544.000	H	27.7	*	2.7	33.1	0.0	-15.9	47.6	238.5	616.7	-8.2
2544.000	V	28.4	*	2.7	33.1	0.0	-15.9	48.3	259.8	616.7	-7.5
2862.000	H	28.0	*	2.9	32.8	0.0	-15.9	47.8	245.9	500.0	-6.2
2862.000	V	28.4	*	2.9	32.8	0.0	-15.9	48.2	256.0	500.0	-5.8
3180.000	H	27.8	*	3.0	33.1	0.0	-15.9	48.0	251.4	616.7	-7.8
3180.000	V	27.1	*	3.0	33.1	0.0	-15.9	47.3	232.2	616.7	-8.5

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK2
Mode	D Code
Frequency Tested	390MHz
Notes	Field Strength of the Fundamental Limit = 9166.7µV/m

Freq. (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Total (dBµV/m)	Total (µV/m)	Limit (µV/m)	Margin (dB)
390.000	H	49.0		1.0	21.4	0.0	-14.9	56.5	671.5	9166.7	-22.7
390.000	V	65.3		1.0	21.4	0.0	-14.9	72.8	4386.1	9166.7	-6.4
780.000	H	27.9		1.4	25.9	0.0	-14.9	40.4	104.2	916.7	-18.9
780.000	V	42.9		1.4	25.9	0.0	-14.9	55.4	586.0	916.7	-3.9
1170.000	H	28.1	*	1.8	29.2	0.0	-14.9	44.2	161.3	500.0	-9.8
1170.000	V	29.7	*	1.8	29.2	0.0	-14.9	45.8	194.4	500.0	-8.2
1560.000	H	27.7		2.1	27.9	0.0	-14.9	42.8	137.6	500.0	-11.2
1560.000	V	33.2		2.1	27.9	0.0	-14.9	48.3	260.3	500.0	-5.7
1950.000	H	28.1		2.3	30.3	0.0	-14.9	45.8	195.0	916.7	-13.4
1950.000	V	29.8		2.3	30.3	0.0	-14.9	47.6	239.6	916.7	-11.7
2340.000	H	29.0		2.6	32.2	0.0	-14.9	48.8	276.7	500.0	-5.1
2340.000	V	30.0		2.6	32.2	0.0	-14.9	49.9	313.3	500.0	-4.1
2730.000	H	28.8	*	2.8	33.0	0.0	-14.9	49.7	306.2	500.0	-4.3
2730.000	V	27.8	*	2.8	33.0	0.0	-14.9	48.7	272.3	500.0	-5.3
3120.000	H	27.8	*	3.0	33.0	0.0	-14.9	48.9	279.5	916.7	-10.3
3120.000	V	27.6	*	3.0	33.0	0.0	-14.9	48.7	273.5	916.7	-10.5
3510.000	H	26.6	*	3.2	33.2	0.0	-14.9	48.0	252.0	916.7	-11.2
3510.000	V	26.8	*	3.2	33.2	0.0	-14.9	48.3	259.1	916.7	-11.0
3900.000	H	27.2		3.4	33.5	0.0	-14.9	49.1	285.6	500.0	-4.9
3900.000	V	27.1	*	3.4	33.5	0.0	-14.9	49.0	283.0	500.0	-4.9

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK2
Mode	D Code
Frequency Tested	315MHz
Notes	Field Strength of the Fundamental Limit = 6041.7µV/m

Freq. (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Total (dBµV/m)	Total (µV/m)	Limit (µV/m)	Margin (dB)
315.000	H	57.8		0.9	19.7	0.0	-14.4	64.0	1590.4	6041.7	-11.6
315.000	V	66.0		0.9	19.7	0.0	-14.4	72.2	4059.8	6041.7	-3.5
630.000	H	18.5		1.3	25.3	0.0	-14.4	30.7	34.3	604.2	-24.9
630.000	V	29.1		1.3	25.3	0.0	-14.4	41.2	115.2	604.2	-14.4
945.000	H	22.9		1.6	26.9	0.0	-14.4	37.0	70.8	604.2	-18.6
945.000	V	26.3		1.6	26.9	0.0	-14.4	40.3	103.8	604.2	-15.3
1260.000	H	26.6	*	1.9	29.7	0.0	-14.4	43.7	153.0	604.2	-11.9
1260.000	V	26.2	*	1.9	29.7	0.0	-14.4	43.3	145.6	604.2	-12.4
1575.000	H	26.5	*	2.1	27.9	0.0	-14.4	42.0	126.3	500.0	-11.9
1575.000	V	29.0		2.1	27.9	0.0	-14.4	44.6	169.1	500.0	-9.4
1890.000	H	26.6	*	2.3	30.0	0.0	-14.4	44.4	166.8	604.2	-11.2
1890.000	V	28.1		2.3	30.0	0.0	-14.4	46.0	198.5	604.2	-9.7
2205.000	H	32.0		2.5	31.4	0.0	-14.4	51.5	375.3	500.0	-2.5
2205.000	V	34.2		2.5	31.4	0.0	-14.4	53.7	484.1	500.0	-0.3
2520.000	H	27.4	*	2.7	33.1	0.0	-14.4	48.7	271.4	604.2	-6.9
2520.000	V	28.0	*	2.7	33.1	0.0	-14.4	49.4	293.6	604.2	-6.3
2835.000	H	27.6	*	2.9	32.8	0.0	-14.4	48.9	279.5	500.0	-5.1
2835.000	V	27.8	*	2.9	32.8	0.0	-14.4	49.1	284.4	500.0	-4.9
3150.000	H	27.7	*	3.0	33.0	0.0	-14.4	49.4	293.7	604.2	-6.3
3150.000	V	28.1	*	3.0	33.0	0.0	-14.4	49.7	307.2	604.2	-5.9

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK2
Mode	Billion A Code
Frequency Tested	390MHz
Notes	Field Strength of the Fundamental Limit = 9166.7µV/m

Freq. (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Total (dBµV/m)	Total (µV/m)	Limit (µV/m)	Margin (dB)
390.000	H	42.9		1.0	21.4	0.0	-9.6	55.8	613.2	9166.7	-23.5
390.000	V	58.5		1.0	21.4	0.0	-9.6	71.4	3720.3	9166.7	-7.8
780.000	H	23.5		1.4	25.9	0.0	-9.6	41.3	116.0	916.7	-18.0
780.000	V	36.5		1.4	25.9	0.0	-9.6	54.3	520.5	916.7	-4.9
1170.000	H	27.5	*	1.8	29.2	0.0	-9.6	49.0	281.3	500.0	-5.0
1170.000	V	27.4	*	1.8	29.2	0.0	-9.6	48.8	275.2	500.0	-5.2
1560.000	H	27.4	*	2.1	27.9	0.0	-9.6	47.9	248.3	500.0	-6.1
1560.000	V	30.3		2.1	27.9	0.0	-9.6	50.8	345.2	500.0	-3.2
1950.000	H	28.9	*	2.3	30.3	0.0	-9.6	52.0	396.8	916.7	-7.3
1950.000	V	27.2	*	2.3	30.3	0.0	-9.6	50.3	326.2	916.7	-9.0
2340.000	H	57.8		2.6	32.2	-39.9	-9.6	43.2	143.8	500.0	-10.8
2340.000	V	55.9		2.6	32.2	-39.9	-9.6	41.2	114.8	500.0	-12.8
2730.000	H	52.8	*	2.8	33.0	-39.8	-9.6	39.3	92.1	500.0	-14.7
2730.000	V	50.3	*	2.8	33.0	-39.8	-9.6	36.8	69.6	500.0	-17.1
3120.000	H	51.7	*	3.0	33.0	-39.5	-9.6	38.7	86.0	916.7	-20.6
3120.000	V	56.3		3.0	33.0	-39.5	-9.6	43.2	145.3	916.7	-16.0
3510.000	H	49.5	*	3.2	33.2	-39.2	-9.6	37.1	71.5	916.7	-22.2
3510.000	V	49.5	*	3.2	33.2	-39.2	-9.6	37.1	71.7	916.7	-22.1
3900.000	H	51.9		3.4	33.5	-39.2	-9.6	39.9	99.2	500.0	-14.0
3900.000	V	52.5		3.4	33.5	-39.2	-9.6	40.5	106.4	500.0	-13.4

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK2
Mode	E Code
Frequency Tested	315MHz
Notes	Field Strength of the Fundamental Limit = 6041.7µV/m

Freq. (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Total (dBµV/m)	Total (µV/m)	Limit (µV/m)	Margin (dB)
315.000	H	59.7		0.9	19.7	0.0	-13.6	66.8	2176.2	6041.7	-8.9
315.000	V	67.3		0.9	19.7	0.0	-13.6	74.3	5196.4	6041.7	-1.3
630.000	H	18.8		1.3	25.3	0.0	-13.6	31.9	39.3	604.2	-23.7
630.000	V	28.6		1.3	25.3	0.0	-13.6	41.6	120.5	604.2	-14.0
945.000	H	22.7		1.6	26.9	0.0	-13.6	37.6	76.0	604.2	-18.0
945.000	V	25.8		1.6	26.9	0.0	-13.6	40.7	108.5	604.2	-14.9
1260.000	H	26.7	*	1.9	29.7	0.0	-13.6	44.7	171.3	604.2	-10.9
1260.000	V	26.2	*	1.9	29.7	0.0	-13.6	44.1	161.2	604.2	-11.5
1575.000	H	26.4	*	2.1	27.9	0.0	-13.6	42.8	137.6	500.0	-11.2
1575.000	V	28.3		2.1	27.9	0.0	-13.6	44.7	172.1	500.0	-9.3
1890.000	H	27.0	*	2.3	30.0	0.0	-13.6	45.7	192.9	604.2	-9.9
1890.000	V	27.8		2.3	30.0	0.0	-13.6	46.5	211.8	604.2	-9.1
2205.000	H	66.3		2.5	31.4	-39.9	-13.6	46.8	217.9	500.0	-7.2
2205.000	V	66.9		2.5	31.4	-39.9	-13.6	47.4	234.6	500.0	-6.6
2520.000	H	52.5		2.7	33.1	-39.9	-13.6	34.8	55.2	604.2	-20.8
2520.000	V	54.4		2.7	33.1	-39.9	-13.6	36.8	68.8	604.2	-18.9
2835.000	H	51.3	*	2.9	32.8	-39.7	-13.6	33.7	48.6	500.0	-20.3
2835.000	V	52.1		2.9	32.8	-39.7	-13.6	34.5	53.1	500.0	-19.5
3150.000	H	53.0		3.0	33.0	-39.5	-13.6	36.0	63.4	604.2	-19.6
3150.000	V	57.9		3.0	33.0	-39.5	-13.6	41.0	111.9	604.2	-14.6

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK2
Mode	E Code
Frequency Tested	390MHz
Notes	Field Strength of the Fundamental Limit = 9166.7µV/m

Freq. (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Total (dBµV/m)	Total (µV/m)	Limit (µV/m)	Margin (dB)
390.000	H	49.3		1.0	21.4	0.0	-13.7	58.1	804.6	9166.7	-21.1
390.000	V	67.5		1.0	21.4	0.0	-13.7	76.3	6540.0	9166.7	-2.9
780.000	H	28.9		1.4	25.9	0.0	-13.7	42.6	135.0	916.7	-16.6
780.000	V	44.0		1.4	25.9	0.0	-13.7	57.7	765.5	916.7	-1.6
1170.000	H	28.7		1.8	29.2	0.0	-13.7	46.1	201.5	500.0	-7.9
1170.000	V	30.0		1.8	29.2	0.0	-13.7	47.4	233.2	500.0	-6.6
1560.000	H	27.0		2.1	27.9	0.0	-13.7	43.4	147.1	500.0	-10.6
1560.000	V	35.3		2.1	27.9	0.0	-13.7	51.6	382.0	500.0	-2.3
1950.000	H	27.3		2.3	30.3	0.0	-13.7	46.3	205.4	916.7	-13.0
1950.000	V	27.4		2.3	30.3	0.0	-13.7	46.4	209.4	916.7	-12.8
2340.000	H	64.5		2.6	32.2	-39.9	-13.7	45.8	194.0	500.0	-8.2
2340.000	V	65.7		2.6	32.2	-39.9	-13.7	47.0	223.6	500.0	-7.0
2730.000	H	52.0		2.8	33.0	-39.8	-13.7	34.4	52.8	500.0	-19.5
2730.000	V	54.4		2.8	33.0	-39.8	-13.7	36.8	69.2	500.0	-17.2
3120.000	H	55.1		3.0	33.0	-39.5	-13.7	38.0	79.6	916.7	-21.2
3120.000	V	62.1		3.0	33.0	-39.5	-13.7	45.0	178.4	916.7	-14.2
3510.000	H	49.5	*	3.2	33.2	-39.2	-13.7	33.0	44.8	916.7	-26.2
3510.000	V	48.3	*	3.2	33.2	-39.2	-13.7	31.8	38.9	916.7	-27.4
3900.000	H	51.7		3.4	33.5	-39.2	-13.7	35.7	60.8	500.0	-18.3
3900.000	V	53.0		3.4	33.5	-39.2	-13.7	36.9	70.1	500.0	-17.1

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK2
Mode	Sommer Code
Frequency Tested	310MHz
Notes	Field Strength of the Fundamental Limit = 5833.3µV/m

Freq. (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Total (dBµV/m)	Total (µV/m)	Limit (µV/m)	Margin (dB)
310.000	H	54.5		0.9	19.6	0.0	-20.2	54.8	549.1	5833.3	-20.5
310.000	V	62.3		0.9	19.6	0.0	-20.2	62.7	1358.7	5833.3	-12.7
620.000	H	15.4	*	1.3	25.2	0.0	-20.2	21.7	12.2	583.3	-33.6
620.000	V	26.0		1.3	25.2	0.0	-20.2	32.3	41.1	583.3	-23.0
930.000	H	18.8		1.6	26.9	0.0	-20.2	27.1	22.6	583.3	-28.2
930.000	V	19.5		1.6	26.9	0.0	-20.2	27.8	24.6	583.3	-27.5
1240.000	H	26.2	*	1.8	29.6	0.0	-20.2	37.5	75.3	500.0	-16.4
1240.000	V	26.6	*	1.8	29.6	0.0	-20.2	37.9	78.2	500.0	-16.1
1550.000	H	26.6	*	2.1	28.0	0.0	-20.2	36.5	66.6	500.0	-17.5
1550.000	V	26.3	*	2.1	28.0	0.0	-20.2	36.1	63.9	500.0	-17.9
1860.000	H	26.6	*	2.3	29.8	0.0	-20.2	38.4	83.2	583.3	-16.9
1860.000	V	25.4	*	2.3	29.8	0.0	-20.2	37.3	73.2	583.3	-18.0
2170.000	H	51.6	*	2.5	31.3	-39.9	-20.2	25.3	18.5	583.3	-30.0
2170.000	V	53.8		2.5	31.3	-39.9	-20.2	27.5	23.7	583.3	-27.8
2480.000	H	48.2	*	2.7	32.9	-39.9	-20.2	23.8	15.4	583.3	-31.6
2480.000	V	50.8	*	2.7	32.9	-39.9	-20.2	26.3	20.7	583.3	-29.0
2790.000	H	50.0	*	2.8	32.9	-39.7	-20.2	25.8	19.5	500.0	-28.2
2790.000	V	51.0	*	2.8	32.9	-39.7	-20.2	26.9	22.1	500.0	-27.1
3100.000	H	51.2	*	3.0	33.0	-39.5	-20.2	27.5	23.8	583.3	-27.8
3100.000	V	53.0		3.0	33.0	-39.5	-20.2	29.3	29.1	583.3	-26.0

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK2
Mode	Wayne-Dalton Code
Frequency Tested	372.5MHz
Notes	Field Strength of the Fundamental Limit = 8437.5µV/m

Freq. (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Total (dBµV/m)	Total (µV/m)	Limit (µV/m)	Margin (dB)
372.500	H	54.1		1.0	21.0	0.0	-12.6	63.5	1491.1	8437.5	-15.1
372.500	V	68.9		1.0	21.0	0.0	-12.6	78.3	8194.0	8437.5	-0.3
745.000	H	22.9		1.4	25.8	0.0	-12.6	37.4	74.5	843.7	-21.1
745.000	V	37.1		1.4	25.8	0.0	-12.6	51.7	385.0	843.7	-6.8
1117.500	H	27.2		1.7	28.6	0.0	-12.6	45.0	178.0	500.0	-9.0
1117.500	V	29.1		1.7	28.6	0.0	-12.6	46.9	220.7	500.0	-7.1
1490.000	H	26.9	*	2.0	28.2	0.0	-12.6	44.5	167.3	500.0	-9.5
1490.000	V	26.5	*	2.0	28.2	0.0	-12.6	44.1	160.7	500.0	-9.9
1862.500	H	27.8		2.3	29.8	0.0	-12.6	47.2	228.5	843.7	-11.3
1862.500	V	26.1	*	2.3	29.8	0.0	-12.6	45.5	188.7	843.7	-13.0
2235.000	H	51.5	*	2.5	31.6	-39.9	-12.6	33.1	45.2	500.0	-20.9
2235.000	V	54.0		2.5	31.6	-39.9	-12.6	35.6	60.0	500.0	-18.4
2607.500	H	50.2	*	2.7	33.2	-39.8	-12.6	33.7	48.5	843.7	-24.8
2607.500	V	50.3	*	2.7	33.2	-39.8	-12.6	33.8	49.2	843.7	-24.7
2980.000	H	51.9		2.9	32.8	-39.6	-12.6	35.5	59.3	843.7	-23.1
2980.000	V	54.4		2.9	32.8	-39.6	-12.6	37.9	78.4	843.7	-20.6
3352.500	H	50.4	*	3.1	33.1	-39.3	-12.6	34.6	54.0	500.0	-19.3
3352.500	V	50.2	*	3.1	33.1	-39.3	-12.6	34.5	53.0	500.0	-19.5
3725.000	H	50.0	*	3.3	33.3	-39.2	-12.6	34.7	54.6	500.0	-19.2
3725.000	V	49.3	*	3.3	33.3	-39.2	-12.6	34.1	50.6	500.0	-19.9

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK2
Mode	Guardian Code
Frequency Tested	303MHz
Notes	Field Strength of the Fundamental Limit = 5541.7µV/m

Freq. (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Total (dBµV/m)	Total (µV/m)	Limit (µV/m)	Margin (dB)
303.000	H	48.6		0.9	19.4	0.0	-7.1	61.7	1216.4	5541.7	-13.2
303.000	V	56.3		0.9	19.4	0.0	-7.1	69.5	2975.7	5541.7	-5.4
606.000	H	15.9	*	1.3	24.9	0.0	-7.1	35.0	56.3	554.2	-19.9
606.000	V	20.4		1.3	24.9	0.0	-7.1	39.5	94.1	554.2	-15.4
909.000	H	17.3	*	1.6	26.7	0.0	-7.1	38.5	84.0	554.2	-16.4
909.000	V	17.1	*	1.6	26.7	0.0	-7.1	38.2	81.5	554.2	-16.6
1212.000	H	26.4	*	1.8	29.6	0.0	-7.1	50.6	339.4	500.0	-3.4
1212.000	V	26.5	*	1.8	29.6	0.0	-7.1	50.8	345.3	500.0	-3.2
1515.000	H	27.6	*	2.0	28.1	0.0	-7.1	50.6	337.0	500.0	-3.4
1515.000	V	26.2	*	2.0	28.1	0.0	-7.1	49.2	288.5	500.0	-4.8
1818.000	H	26.9	*	2.2	29.4	0.0	-7.1	51.4	372.3	554.2	-3.5
1818.000	V	25.0	*	2.2	29.4	0.0	-7.1	49.5	300.2	554.2	-5.3
2121.000	H	51.9	*	2.4	31.1	-39.9	-7.1	38.4	82.8	554.2	-16.5
2121.000	V	50.9	*	2.4	31.1	-39.9	-7.1	37.4	74.3	554.2	-17.5
2424.000	H	50.2	*	2.6	32.7	-39.9	-7.1	38.5	83.7	554.2	-16.4
2424.000	V	51.3	*	2.6	32.7	-39.9	-7.1	39.6	95.4	554.2	-15.3
2727.000	H	50.3	*	2.8	33.0	-39.8	-7.1	39.2	91.5	500.0	-14.7
2727.000	V	49.6	*	2.8	33.0	-39.8	-7.1	38.6	84.7	500.0	-15.4
3030.000	H	51.2	*	3.0	32.9	-39.6	-7.1	40.4	104.2	554.2	-14.5
3030.000	V	52.0	*	3.0	32.9	-39.6	-7.1	41.1	113.6	554.2	-13.8

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK2
Mode	Ryobi Code
Frequency Tested	372.5MHz
Notes	Field Strength of the Fundamental Limit = 8437.5µV/m

Freq. (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Total (dBµV/m)	Total (µV/m)	Limit (µV/m)	Margin (dB)
372.500	H	54.9		1.0	21.0	0.0	-12.5	64.3	1648.1	8437.5	-14.2
372.500	V	68.5		1.0	21.0	0.0	-12.5	77.9	7825.2	8437.5	-0.7
745.000	H	24.2		1.4	25.8	0.0	-12.5	38.9	88.0	843.7	-19.6
745.000	V	36.2		1.4	25.8	0.0	-12.5	50.9	349.1	843.7	-7.7
1117.500	H	27.5		1.7	28.6	0.0	-12.5	45.3	184.5	500.0	-8.7
1117.500	V	28.0	*	1.7	28.6	0.0	-12.5	45.8	195.8	500.0	-8.1
1490.000	H	26.3	*	2.0	28.2	0.0	-12.5	44.0	158.3	500.0	-10.0
1490.000	V	26.6	*	2.0	28.2	0.0	-12.5	44.3	163.5	500.0	-9.7
1862.500	H	26.8	*	2.3	29.8	0.0	-12.5	46.3	205.5	843.7	-12.3
1862.500	V	27.3	*	2.3	29.8	0.0	-12.5	46.8	219.4	843.7	-11.7
2235.000	H	51.6	*	2.5	31.6	-39.9	-12.5	33.3	46.1	500.0	-20.7
2235.000	V	52.5	*	2.5	31.6	-39.9	-12.5	34.2	51.3	500.0	-19.8
2607.500	H	50.5	*	2.7	33.2	-39.8	-12.5	34.1	50.5	843.7	-24.5
2607.500	V	50.0	*	2.7	33.2	-39.8	-12.5	33.6	47.8	843.7	-24.9
2980.000	H	51.6	*	2.9	32.8	-39.6	-12.5	35.2	57.8	843.7	-23.3
2980.000	V	54.1		2.9	32.8	-39.6	-12.5	37.7	77.0	843.7	-20.8
3352.500	H	50.4	*	3.1	33.1	-39.3	-12.5	34.7	54.4	500.0	-19.3
3352.500	V	49.1	*	3.1	33.1	-39.3	-12.5	33.4	46.7	500.0	-20.6
3725.000	H	49.8	*	3.3	33.3	-39.2	-12.5	34.6	53.6	500.0	-19.4
3725.000	V	50.1	*	3.3	33.3	-39.2	-12.5	34.9	55.6	500.0	-19.1

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK2
Mode	Stanley Code
Frequency Tested	310MHz
Notes	Field Strength of the Fundamental Limit = 5833.3µV/m

Freq. (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Total (dBµV/m)	Total (µV/m)	Limit (µV/m)	Margin (dB)
310.000	H	59.7		0.9	19.6	0.0	-12.7	67.5	2380.2	5833.3	-7.8
310.000	V	67.0		0.9	19.6	0.0	-12.7	74.8	5484.3	5833.3	-0.5
620.000	H	17.9		1.3	25.2	0.0	-12.7	31.7	38.5	583.3	-23.6
620.000	V	31.1		1.3	25.2	0.0	-12.7	44.9	175.5	583.3	-10.4
930.000	H	22.3		1.6	26.9	0.0	-12.7	38.0	79.8	583.3	-17.3
930.000	V	23.4		1.6	26.9	0.0	-12.7	39.2	90.7	583.3	-16.2
1240.000	H	30.0		1.8	29.6	0.0	-12.7	48.7	273.1	500.0	-5.3
1240.000	V	26.3	*	1.8	29.6	0.0	-12.7	45.1	179.4	500.0	-8.9
1550.000	H	27.6		2.1	28.0	0.0	-12.7	44.9	175.8	500.0	-9.1
1550.000	V	29.9		2.1	28.0	0.0	-12.7	47.2	229.9	500.0	-6.7
1860.000	H	27.0	*	2.3	29.8	0.0	-12.7	46.4	208.1	583.3	-9.0
1860.000	V	27.2	*	2.3	29.8	0.0	-12.7	46.5	212.4	583.3	-8.8
2170.000	H	56.4		2.5	31.3	-39.9	-12.7	37.5	75.3	583.3	-17.8
2170.000	V	59.6		2.5	31.3	-39.9	-12.7	40.7	108.7	583.3	-14.6
2480.000	H	49.8	*	2.7	32.9	-39.9	-12.7	32.8	43.8	583.3	-22.5
2480.000	V	51.4		2.7	32.9	-39.9	-12.7	34.4	52.7	583.3	-20.9
2790.000	H	50.3	*	2.8	32.9	-39.7	-12.7	33.6	48.0	500.0	-20.3
2790.000	V	50.9	*	2.8	32.9	-39.7	-12.7	34.2	51.5	500.0	-19.7
3100.000	H	52.2		3.0	33.0	-39.5	-12.7	36.0	63.2	583.3	-19.3
3100.000	V	55.8		3.0	33.0	-39.5	-12.7	39.6	95.0	583.3	-15.8

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK2
Mode	Genie Code
Frequency Tested	390MHz
Notes	Field Strength of the Fundamental Limit = 9166.7µV/m

Freq. (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Total (dBµV/m)	Total (µV/m)	Limit (µV/m)	Margin (dB)
390.000	H	45.6		1.0	21.4	0.0	-12.5	55.5	593.0	9166.7	-23.8
390.000	V	62.6		1.0	21.4	0.0	-12.5	72.5	4193.5	9166.7	-6.8
780.000	H	26.3		1.4	25.9	0.0	-12.5	41.1	113.5	916.7	-18.1
780.000	V	40.4		1.4	25.9	0.0	-12.5	55.2	574.0	916.7	-4.1
1170.000	H	28.2		1.8	29.2	0.0	-12.5	46.7	216.1	500.0	-7.3
1170.000	V	28.2		1.8	29.2	0.0	-12.5	46.7	216.1	500.0	-7.3
1560.000	H	27.4		2.1	27.9	0.0	-12.5	44.8	174.2	500.0	-9.2
1560.000	V	32.5		2.1	27.9	0.0	-12.5	50.0	316.2	500.0	-4.0
1950.000	H	26.1	*	2.3	30.3	0.0	-12.5	46.2	204.4	916.7	-13.0
1950.000	V	28.1		2.3	30.3	0.0	-12.5	48.2	256.8	916.7	-11.1
2340.000	H	60.9		2.6	32.2	-39.9	-12.5	43.2	144.8	500.0	-10.8
2340.000	V	62.1		2.6	32.2	-39.9	-12.5	44.4	166.7	500.0	-9.5
2730.000	H	49.8	*	2.8	33.0	-39.8	-12.5	33.3	46.3	500.0	-20.7
2730.000	V	51.8		2.8	33.0	-39.8	-12.5	35.3	58.5	500.0	-18.6
3120.000	H	53.4		3.0	33.0	-39.5	-12.5	37.3	73.7	916.7	-21.9
3120.000	V	51.6		3.0	33.0	-39.5	-12.5	35.6	60.3	916.7	-23.6
3510.000	H	49.7	*	3.2	33.2	-39.2	-12.5	34.3	51.9	916.7	-24.9
3510.000	V	48.3	*	3.2	33.2	-39.2	-12.5	32.9	44.1	916.7	-26.4
3900.000	H	52.6		3.4	33.5	-39.2	-12.5	37.6	76.0	500.0	-16.4
3900.000	V	52.5		3.4	33.5	-39.2	-12.5	37.6	75.4	500.0	-16.4

Test Details	
Manufacturer	The Chamberlain Group LLC
EUT	Universal Keypad
Model No.	900-15649-1/014D15649 Rev C
Serial No.	OOK2
Mode	Genie Code
Frequency Tested	315MHz
Notes	Field Strength of the Fundamental Limit = 6041.7µV/m

Freq. (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Total (dBµV/m)	Total (µV/m)	Limit (µV/m)	Margin (dB)
315.000	H	57.4		0.9	19.7	0.0	-13.4	64.7	1710.0	6041.7	-11.0
315.000	V	65.6		0.9	19.7	0.0	-13.4	72.8	4375.2	6041.7	-2.8
630.000	H	18.0		1.3	25.3	0.0	-13.4	31.2	36.2	604.2	-24.4
630.000	V	29.1		1.3	25.3	0.0	-13.4	42.3	130.9	604.2	-13.3
945.000	H	22.7		1.6	26.9	0.0	-13.4	37.8	77.5	604.2	-17.8
945.000	V	25.7		1.6	26.9	0.0	-13.4	40.8	109.8	604.2	-14.8
1260.000	H	26.1	*	1.9	29.7	0.0	-13.4	44.3	163.7	604.2	-11.3
1260.000	V	27.6	*	1.9	29.7	0.0	-13.4	45.7	192.8	604.2	-9.9
1575.000	H	27.4	*	2.1	27.9	0.0	-13.4	44.0	159.0	500.0	-9.9
1575.000	V	27.8		2.1	27.9	0.0	-13.4	44.4	166.5	500.0	-9.5
1890.000	H	26.4	*	2.3	30.0	0.0	-13.4	45.2	182.7	604.2	-10.4
1890.000	V	28.1		2.3	30.0	0.0	-13.4	46.9	221.9	604.2	-8.7
2205.000	H	66.3		2.5	31.4	-39.9	-13.4	46.9	222.2	500.0	-7.0
2205.000	V	69.3		2.5	31.4	-39.9	-13.4	49.9	313.4	500.0	-4.1
2520.000	H	52.8		2.7	33.1	-39.9	-13.4	35.3	58.1	604.2	-20.3
2520.000	V	56.2		2.7	33.1	-39.9	-13.4	38.7	85.9	604.2	-16.9
2835.000	H	50.1	*	2.9	32.8	-39.7	-13.4	32.8	43.4	500.0	-21.2
2835.000	V	52.0		2.9	32.8	-39.7	-13.4	34.6	53.7	500.0	-19.4
3150.000	H	53.3		3.0	33.0	-39.5	-13.4	36.5	66.9	604.2	-19.1
3150.000	V	57.6		3.0	33.0	-39.5	-13.4	40.8	109.9	604.2	-14.8

25. Scope of Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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ELECTRICAL

Valid To: June 30, 2025 Certificate Number: 1786.01

In recognition of the successful completion of the A2LA Accreditation Program evaluation process, accreditation is granted to this laboratory to perform the following automotive electromagnetic compatibility and other electrical tests:

Test Technology:	Test Method(s)[1]:
Transient Immunity *(Max Voltage 60V/Max current 100A)*	ISO 7637-2 (including emissions); ISO 7637-3; ISO 16750-2:2012, Sections 4.6.3 and 4.6.4; CS-11979, Section 6.4; CS.00054, Section 5.9; EMC-CS-2009.1 (CI220); FMC1278 (CI220, CI221, CI222); GMW 3097, Section 3.5; SAE J1113-11; SAE J1113-12; ECE Regulation 10.06 Annex 10
Electrostatic Discharge (ESD) *(Up to +/-25kV)*	ISO 10605 (2001, 2008); CS-11979 Section 7.0; CS.00054, Section 5.10; EMC-CS-2009.1 (CI 280); FMC1278 (CI280); SAE J1113-13; GMW 3097 Section 3.6
Conducted Emissions	CISPR 25 (2002, 2008), Sections 6.2 and 6.3; CISPR 25 (2016), Sections 6.3 and 6.4; CS-11979, Section 5.1; CS.00054, Sections 5.6.1 and 5.6.2; GMW 3097, Section 3.3.2; EMC-CS-2009.1 (CE 420); FMC1278 (CE420, CE421, CE 430, CE440)

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Test Technology:	Test Method(s)[1]:
Radiated Emissions Anechoic *(Up to 6GHz)*	CISPR 25 (2002, 2008), Section 6.4; CISPR 25 (2016), Section 6.5; CS-11979, Section 5.3; CS.00054, Section 5.6.3; GMW 3097, Section 3.3.1; EMC-CS-2009.1 (RE 310); FMC1278 (RE310, RE320);
Vehicle Radiated Emissions	CISPR 12; CISPR 36; ICES-002; ECE Regulation 10.06 Annex 5
Bulk Current Injection (BCI) *(1 to 400MHz 500mA)*	ISO 11452-4; CS-11979, Section 6.1; CS.00054, Section 5.8.1; GMW 3097, Section 3.4.1; SAE J1113-4; EMC-CS-2009.1 (RI112); FMC1278 (RI112); ECE Regulation 10.06 Annex 9
Radiated Immunity Anechoic *(Up to 6GHz and 200V/m)* *(Including Radar Pulse 600V/m)*	ISO 11452-2; CS-11979, Section 6.2; CS.00054, Section 5.8.2; GMW 3097, Section 3.4.2; EMC-CS-2009.1 (RI114); FMC1278 (RI114); SAE J1113-21; ECE Regulation 10.06 Annex 9
Radiated Immunity Magnetic Field	ISO 11452-8; FMC 1278 (RI140)
Radiated Immunity Reverb *(360MHz to 6GHz and 100V/m)*	ISO/IEC 61000-4-21; GMW 3097, Section 3.4.3; EMC-CS-2009.1 (RI114); FMC1278 (RI114); ISO 11452-11
Radiated Immunity *(Portable Transmitters)* *(Up to 6GHz and 20W)*	ISO 11452-9; EMC-CS-2009.1 (RI115); FMC1278 (RI115); GMW 3097, Sec 3.4.4
Vehicle Radiated Immunity (ALSE)	ISO 11451-2; ECE Regulation 10.06 Annex 6
Vehicle Product Specific EMC Standards	EN 14982; EN ISO 13309; ISO 13766; EN 50498; EC Regulation No. 2015/208; EN 55012
Electrical Loads	ISO 16750-2
Stripline	ISO 11452-5
Transverse Electromagnetic (TEM) Cell	ISO 11452-3

Test Technology:	Test Method(s)[1]:
Emissions	
Radiated and Conducted (3m Semi-anechoic chamber, up to 40 GHz)	47 CFR, FCC Part 15 B (using ANSI C63.4:2014); 47 CFR, FCC Part 18 (using FCC MP-5:1986); ICES-001; ICES-003; ICES-005; IEC/CISPR 11, Ed. 4.1 (2004-06); AS/NZS CISPR 11 (2004); IEC/CISPR 11 Ed 5 (2009-05) + A1 (2010); KN 11 (2008-5) with RRL Notice No. 2008-3 (May 20, 2008); CISPR 11; EN 55011; KS C 9811; CNS 13803 (1997, 2003); CISPR 14-1; EN 55014-1; AS/NZS CISPR 14.1; CISPR 16-2-1 (2008); CISPR 16-2-1; KS C 9814-1; KN 14-1; IEC/CISPR 22 (1997); EN 55022 (1998) + A1(2000); EN 55022 (1998) + A1(2000) + A2(2003); EN 55022 (2006); IEC/CISPR 22 (2008-09); AS/NZS CISPR 22 (2004); AS/NZS CISPR 22, 3rd Edition (2006); KN 22 (up to 6 GHz); CNS 13438 (up to 6 GHz); VCCI V-3 (up to 6 GHz); CISPR 32; EN 55032; KS C 9832; KN 32; ECE Regulation 10.06 Annex 7 (Broadband); ECE Regulation 10.06 Annex 8 (Narrowband); ECE Regulation 10.06 Annex 14 (Conducted)
Cellular Radiated Spurious Emissions	ETSI TS 151 010-1 GSM; 3GPP TS 51.010-1, Sec 12; ETSI TS 134 124 UMTS; 3GPP TS 34.124; ETSI TS 136 124 LTE; E-UTRA; 3GPP TS 36.124
Current Harmonics	IEC 61000-3-2; IEC 61000-3-12; EN 61000-3-2; KN 61000-3-2; KS C 9610-3-2; ECE Regulation 10.06 Annex 11
Flicker and Fluctuations	IEC 61000-3-3; IEC 61000-3-11; EN 61000-3-3; KN 61000-3-3; KS C 9610-3-3; ECE Regulation 10.06 Annex 12
Immunity	
Electrostatic Discharge	IEC 61000-4-2, Ed. 1.2 (2001); IEC 61000-4-2 (1995) + A1(1998) + A2(2000); EN 61000-4-2 (1995); EN 61000-4-2 (2009-05); KN 61000-4-2 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-2; EN 61000-4-2; KN 61000-4-2; KS C 9610-4-2; IEEE C37.90.3 2001
Radiated Immunity	IEC 61000-4-3 (1995) + A1(1998) + A2(2000); IEC 61000-4-3, Ed. 3.0 (2006-02); IEC 61000-4-3, Ed. 3.2 (2010); KN 61000-4-3 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-3; EN 61000-4-3; KN 61000-4-3; KS C 9610-4-3; IEEE C37.90.2 2004

Test Technology:	Test Method(s)[1]:
Immunity (cont'd)	
Electrical Fast Transient/Burst	IEC 61000-4-4, Ed. 2.0 (2004-07); IEC 61000-4-4, Ed. 2.1 (2011); IEC 61000-4-4 (1995) + A1(2000) + A2(2001); KN 61000-4-4 (2008-5); RRL Notice No. 2008-5 (May 20, 2008); IEC 61000-4-4; EN 61000-4-4; KN 61000-4-4; KS C 9610-4-4; ECE Regulation 10.06 Annex 15
Surge	IEC 61000-4-5 (1995) + A1(2000); IEC 61000-4-5, Ed 1.1 (2005-11); EN 61000-4-5 (1995) + A1(2001); KN 61000-4-5 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-5; EN 61000-4-5; KN 61000-4-5; KS C 9610-4-5; IEEE C37.90.1 2012; IEEE STD C62.41.2 2002; ECE Regulation 10.06 Annex 16
Conducted Immunity	IEC 61000-4-6 (1996) + A1(2000); IEC 61000-4-6, Ed 2.0 (2006-05); IEC 61000-4-6 Ed. 3.0 (2008); KN 61000-4-6 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); EN 61000-4-6 (1996) + A1(2001); IEC 61000-4-6; EN 61000-4-6; KN 61000-4-6; KS C 9610-4-6
Power Frequency Magnetic Field Immunity (*Down to 3 A/m*)	IEC 61000-4-8 (1993) + A1(2000); IEC 61000-4-8 (2009); EN 61000-4-8 (1994) + A1(2000); KN 61000-4-8 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-8; EN 61000-4-8; KN 61000-4-8; KS C 9610-4-8
Voltage Dips, Short Interrupts, and Line Voltage Variations	IEC 61000-4-11, Ed. 2 (2004-03); KN 61000-4-11 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-11; EN 61000-4-11; KN 61000-4-11; KS C 9610-4-11
Ring Wave	IEC 61000-4-12, Ed. 2 (2006-09); EN 61000-4-12:2006; IEC 61000-4-12; EN 61000-4-12; KN 61000-4-12; IEEE STD C62.41.2 2002

Test Technology:	**Test Method(s)[1]:**
Generic and Product Specific EMC Standards	IEC/EN 61000-6-1; AS/NZS 61000-6-1; KN 61000-6-1; KS C 9610-6-1; IEC/EN 61000-6-2; AS/NZS 61000-6-2; KN 61000-6-2; KS C 9610-6-2; IEC/EN 61000-6-3; AS/NZS 61000-6-3; KN 61000-6-3; KS C 9610-6-3; IEC/EN 61000-6-4; AS/NZS 61000-6-4; KN 61000-6-4; KS C 9610-6-4; EN 50130-4; EN 61326-1; EN 50121-3-2; EN 12895; EN 50270; EN 50491-1; EN 50491-2; EN 50491-3; EN 55015; EN 60730-1; EN 60945; IEC 60533; EN 61326-2-6; EN 61800-3; IEC/CISPR 14-2; EN 55014-2; AS/NZS CISPR 14.2; KN 14-2; KS C 9814-2; IEC/CISPR 24; AS/NZS CISPR 24; EN 55024; KN 24; IEC/CISPR 35; AS/NZS CISPR 35; EN 55035; KN 35; KS C 9835; IEC 60601-1-2; JIS T0601-1-2
TxRx EMC Requirements	EN 301 489-1; EN 301 489-3; EN 301 489-9; EN 301 489-17; EN 301 489-19; EN 301 489-20
European Radio Test Standards	ETSI EN 300 086-1; ETSI EN 300 086-2; ETSI EN 300 113-1; ETSI EN 300 113-2; ETSI EN 300 220-1; ETSI EN 300 220-2; ETSI EN 300 220-3-1; ETSI EN 300 220-3-2; ETSI EN 300 330-1; ETSI EN 300 330-2; ETSI EN 300 440-1; ETSI EN 300 440-2; ETSI EN 300 422-1; ETSI EN 300 422-2; ETSI EN 300 328; ETSI EN 301 893; ETSI EN 301 511; ETSI EN 301 908-1; ETSI EN 908-2; ETSI EN 908-13; ETSI EN 303 413; ETSI EN 302 502; EN 303 340; EN 303 345-2; EN 303 345-3; EN 303 345-4
Canadian Radio Tests	RSS-102 measurement (RF Exposure Evaluation); RSS-102 measurement (Nerve Stimulation); SPR-002; RSS-111; RSS-112; RSS-117; RSS-119; RSS-123; RSS-125; RSS-127; RSS-130; RSS-131; RSS-132; RSS-133; RSS-134; RSS-135; RSS-137; RSS-139; RSS-140; RSS-141; RSS-142; RSS-170; RSS-181; RSS-182; RSS-191; RSS-192; RSS-194; RSS-195; RSS-196; RSS-197; RSS-199; RSS-210; RSS-211; RSS-213; RSS-215; RSS-216; RSS-220; RSS-222; RSS-236; RSS-238; RSS-243; RSS-244; RSS-247; RSS-248; RSS-251; RSS-252; RSS-287; RSS-288; RSS-310; RSS-GEN
Mexico Radio Tests	IFT-008-2015; NOM-208-SCFI-2016
Japan Radio Tests	Radio Law No. 131, Ordinance of MPT No. 37, 1981, MIC Notification No. 88:2004, Table No. 22-11; ARIB STD-T66, Regulation 18
Taiwan Radio Tests	LP-0002 (July 15, 2020)

Test Technology:	Test Method(s)[1]:
Australia/New Zealand Radio Tests	AS/NZS 4268; Radiocommunications (Short Range Devices) Standard (2014)
Hong Kong Radio Tests	HKCA 1039 Issue 6; HKCA 1042; HKCA 1033 Issue 7; HKCA 1061; HKCA 1008; HKCA 1043; HKCA 1057; HKCA 1073
Korean Radio Test Standards	KN 301 489-1; KN 301 489-3; KN 301 489-9; KN 301 489-17; KN 301 489-52; KS X 3124; KS X 3125; KS X 3130; KS X 3126; KS X 3129
Vietnam Radio Test Standards	QCVN 47:2015/BTTTT; QCVN 54:2020/BTTTT; QCVN 55:2011/BTTTT; QCVN 65:2013/BTTTT; QCVN 73:2013/BTTTT; QCVN 74:2020/BTTTT; QCVN 112:2017/BTTTT; QCVN 117:2020//BTTTT
Vietnam EMC Test Standards	QCVN 18:2014/BTTTT; QCVN 86:2019/BTTTT; QCVN 96:2015/BTTTT; QCVN 118:2018/BTTTT
Unlicensed Radio Frequency Devices *(3 Meter Semi-Anechoic Room)*	47 CFR FCC Part 15C, 15D, 15E, 15F, 15G, 15H (using ANSI C63.10:2013, ANSI C63.17:2013 and FCC KDB 905462 D02 (v02))
Licensed Radio Service Equipment	47 CFR FCC Parts 20, 22, 24, 25, 27, 30, 73, 74, 80, 87, 90, 95, 96, 97, 101 (using ANSI/TIA-603-E, TIA-102.CAAA-E, ANSI C63.26:2015)
OTA (Over the Air) Performance GSM, GPRS, EGPRS UMTS (W-CDMA) LTE including CAT M1 A-GPS for UMTS/GSM LTS A-GPS, A-GLONASS, SIB8/SIB16 Large Device/Laptop/Tablet Testing Integrated Device Testing WiFi 802.11 a/b/g/n/a	CTIA Test Plan for Wireless Device Over-the-Air Performance (Method for Measurement for Radiated Power and Receiver Performance) V3.8.2; CTIA Test Plan for RF Performance Evaluation of WiFi Mobile Converged Devices V2.1.0

Test Technology:	Test Method(s)[1]:
Electrical Measurements and Simulation	
AC Voltage / Current (1mV to 5kV) 60 Hz (0.1V to 250V) up to 500 MHz (1μA to 150A) 60 Hz	FAA AC 150/5345-10H; FAA AC 150/5345-43J; FAA AC 150/5345-44K; FAA AC 150/5345-46E; FAA AC 150/5345-47C; FAA EB 67D
DC Voltage / Current (1mV to 15 kV) / (1μA to 10A)	
Power Factor / Efficiency / Crest Factor (Power to 30kW)	
Resistance (1mΩ to 4000MΩ)	
Surge (Up to 10 kV / 5 kA) (Combination Wave and Ring Wave)	

On the following products and materials:
Telecommunications Terminal Equipment (TTE), Radio Equipment, Network Equipment, Information Technology Equipment (ITE), Automotive Electronic Equipment, Automotive Hybrid Electronic Devices, Maritime Navigation and Radio Communication Equipment and Systems, Vehicles, Boats and Internal Combustion Engine Driven Devices, Automotive, Aviation, and General Lighting Products, Medical Electrical Equipment, Motors, Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment, Household Appliances, Electric Tools, Low-voltage Switchgear and Control gear, Programmable Controllers, Electrical Equipment for Measurement, Control and Laboratory Use, Base Materials, Power and Data Transmission Cables and Connectors

[1] When the date, edition, version, etc. is not identified in the scope of accreditation, laboratories may use the version that immediately precedes the current version for a period of one year from the date of publication of the standard measurement method, per part C., Section 1 of A2LA *R101 - General Requirements - Accreditation of ISO-IEC 17025 Laboratories*.

Testing Activities Performed in Support of FCC Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1[2]

Rule Subpart/Technology	Test Method	Maximum Frequency (MHz)
Unintentional Radiators Part 15B	ANSI C63.4:2014	40000
Industrial, Scientific, and Medical Equipment Part 18	FCC MP-5 (February 1986)	40000
Intentional Radiators Part 15C	ANSI C63.10:2013	40000

Testing Activities Performed in Support of FCC Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1[2]

Rule Subpart/Technology	Test Method	Maximum Frequency (MHz)
Unlicensed Personal Communication Systems Devices Part 15D	ANSI C63.17:2013	40000
U-NII without DFS Intentional Radiators Part 15E	ANSI C63.10:2013	40000
U-NII with DFS Intentional Radiators Part 15E	FCC KDB 905462 D02 (v02)	40000
UWB Intentional Radiators Part 15F	ANSI C63.10:2013	40000
BPL Intentional Radiators Part 15G	ANSI C63.10:2013	40000
White Space Device Intentional Radiators Part 15H	ANSI C63.10:2013	40000
Commercial Mobile Services (FCC Licensed Radio Service Equipment) Parts 22 (cellular), 24, 25 (below 3 GHz), and 27	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000
General Mobile Radio Services (FCC Licensed Radio Service Equipment) Parts 22 (non-cellular), 90 (below 3 GHz), 95, 97, and 101 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000
Citizens Broadband Radio Services (FCC Licensed Radio Service Equipment) Part 96	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000
Maritime and Aviation Radio Services Parts 80 and 87	ANSI/TIA-603-E; ANSI C63.26:2015	40000
Microwave and Millimeter Bands Radio Services Parts 25, 30, 74, 90 (above 3 GHz), 97 (above 3 GHz), and 101	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000

Testing Activities Performed in Support of FCC Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1[2]

Rule Subpart/Technology	Test Method	Maximum Frequency (MHz)
Broadcast Radio Services Parts 73 and 74 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000
Signal Boosters Part 20 (Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters) Section 90.219	ANSI C63.26:2015	40000

[2] Accreditation does not imply acceptance to the FCC equipment authorization program. Please see the FCC website (https://apps.fcc.gov/oetcf/eas/) for a listing of FCC approved laboratories.

Accredited Laboratory

A2LA has accredited

ELITE ELECTRONIC ENGINEERING INC.

Downers Grove, IL

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories.* This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 15th day of August 2023.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1786.01
Valid to June 30, 2025

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.