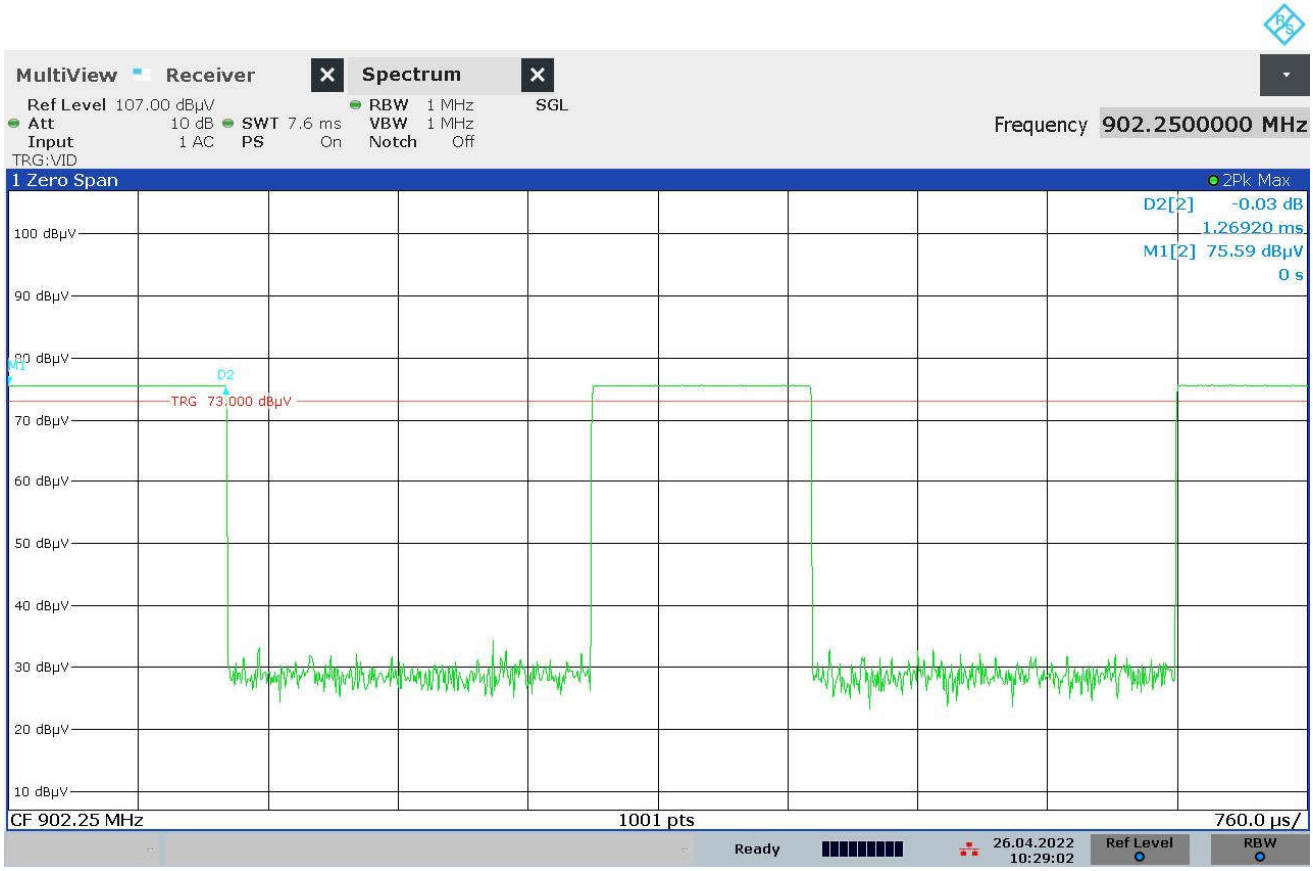
Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx Low @ 902.25MHz
Frequency Tested	902.25MHz
Result	On Time = 1.27ms
Notes	29 Pulses



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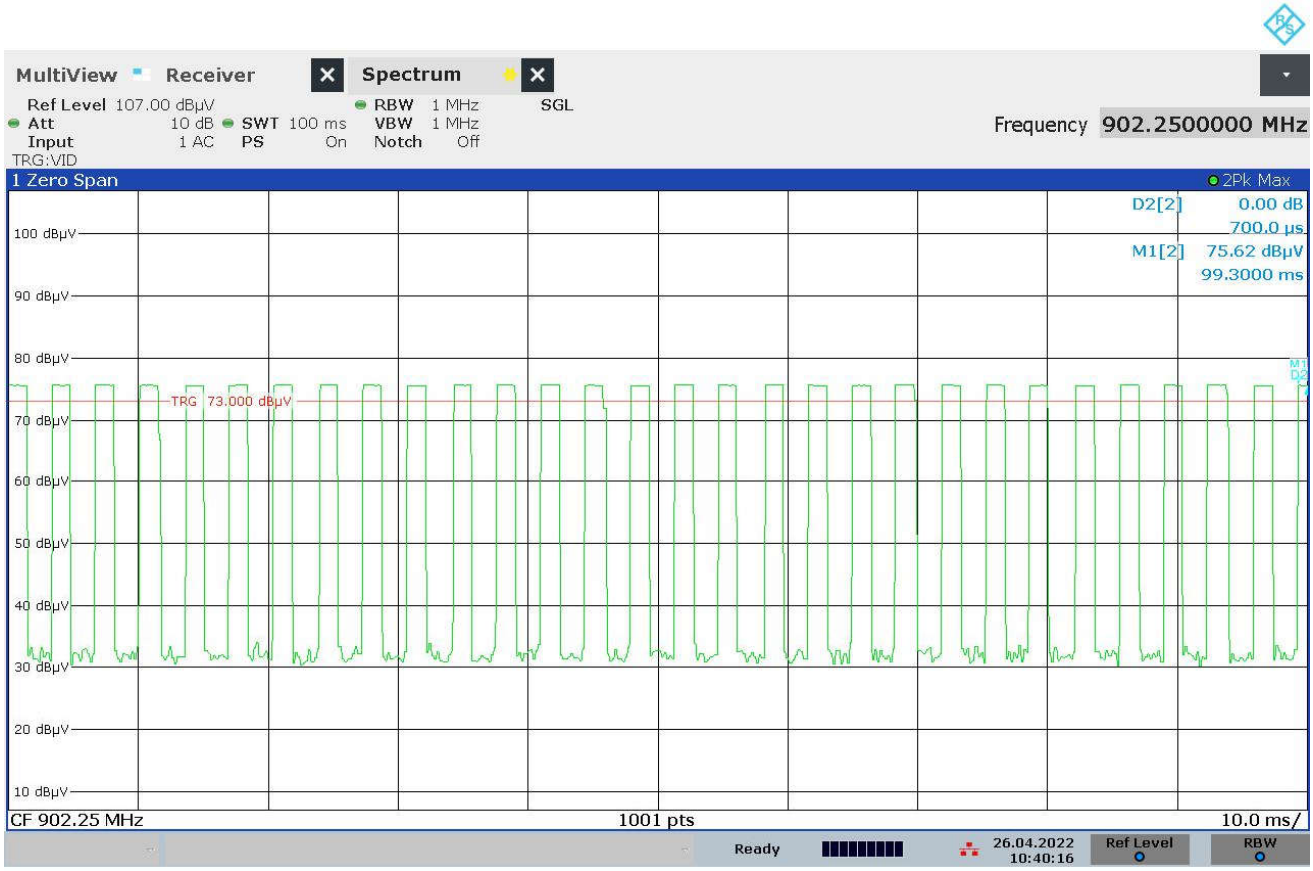
Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx Low @ 902.25MHz
Frequency Tested	902.25MHz
Result	On Time = 0.7ms
Notes	1 Pulse



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Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx Low @ 902.25MHz
Frequency Tested	902.25MHz
Result	Duty Cycle = 41.3%
Notes	Duty Cycle Factor Calculation: 29 × 1.4ms = 40.6ms 1 × 0.7ms = 0.7ms 40.6ms + 0.7ms = 41.3ms $\text{Duty Cycle Factor} = 20\log\left(\frac{41.3\text{ms}}{100\text{ms}}\right) = -8.512dB$

30. Case Spurious Radiated Emissions

EUT Information	
Manufacturer	Chamberlain
Product	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx Low @ 902.25MHz Tx Mid @ 914.75MHz Tx High @ 926.75MHz

Test Setup Details	
Setup Format	Tabletop
Height of Support	N/a
Type of Test Site	Semi-Anechoic Chamber
Test Site Used	Room 21
Type of Antennas 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
Radiated disturbance (electric field strength on an open area test site or alternative test site) (6 GHz – 18 GHz)	3.2
Radiated disturbance (electric field strength on an open area test site or alternative test site) (18 GHz – 26.5 GHz)	3.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (26.5 GHz – 40 GHz)	3.4

Procedure

Radiated measurements were performed in a 32ft. x 20ft. x 14ft. high shielded enclosure. The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All powerlines 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.

Preliminary radiated emissions tests were 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 10.0GHz was investigated using a peak detector function.

The final open field emission tests were then manually performed over the frequency range of 30MHz to 10.0GHz.

1) For all harmonics not in the restricted bands, the following procedure was used:

   a) The field strength of the fundamental was measured using a bilog antenna. The bilog antenna was positioned at a 3-meter distance from the EUT. The EUT was placed on a 80 cm high non-conductive stand. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.

   b) The field strengths of all of the harmonics not in the restricted band were then measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3-meter distance from the EUT. The EUT was placed on a 1.5-meter-high non-conductive stand. A peak detector with a resolution bandwidth of 100kHz was used on the spectrum analyzer.

   c) To ensure that maximum or worst-case emission levels at the fundamental and harmonics were measured, the following steps were taken when measuring the fundamental emissions and the spurious emissions:

      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.

      iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead, the EUT was rotated through all axis to ensure the maximum readings were recorded for the EUT.

   d) All harmonics not in the restricted bands must be at least 20dB below levels measured at the fundamental. However, attenuation below the general limits specified in §15.209(a) is not required.

2) For all emissions in the restricted bands, the following procedure was used:

   a) The field strengths of all emissions below 1GHz were measured using a bi-log antenna. The bi-log antenna was positioned at a 3-meter distance from the EUT. The EUT was placed on an 80cm high non-conductive stand. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.

   b) The field strengths of all emissions above 1GHz were measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3-meter distance from the EUT. The EUT was placed on a 1.5-meter-high non-conductive stand. A peak detector with a resolution bandwidth of 1MHz was used on the spectrum analyzer.

   c) To ensure that maximum or worst-case emission levels were measured, the following steps were taken when taking all measurements:

      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.

iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead, the EUT was rotated through all axis to ensure the maximum readings were recorded for the EUT.

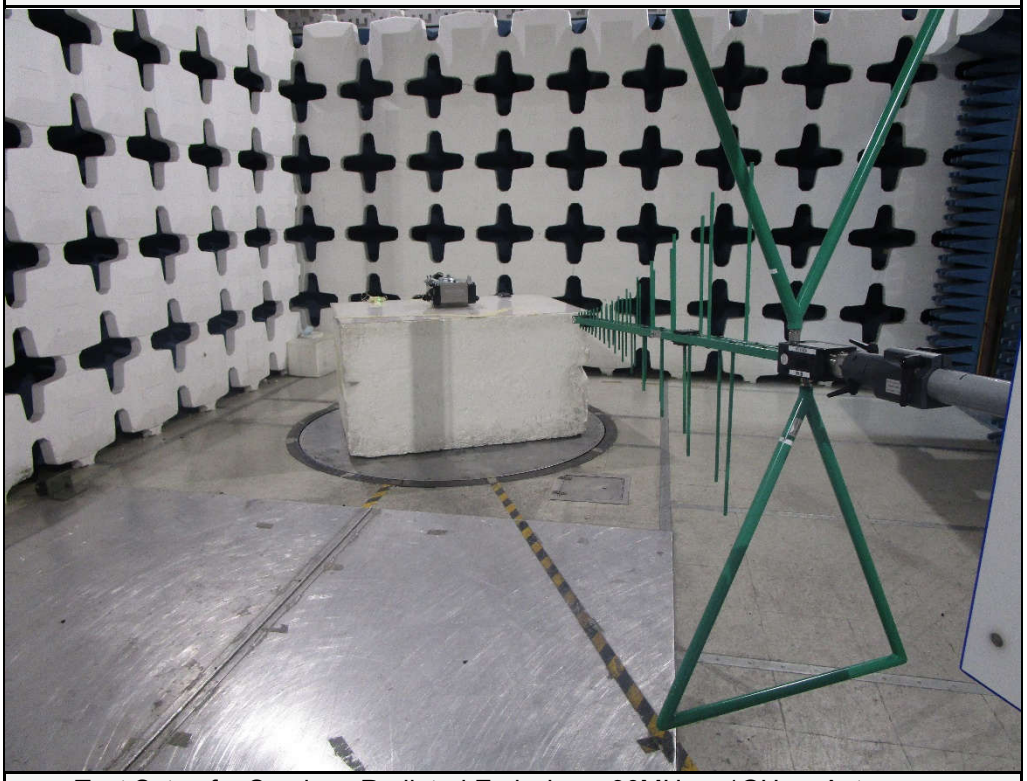
d) For all radiated emissions measurements below 1GHz, if the peak reading is below the limits listed in §15.209(a), no further measurements are required. If, however, the peak readings exceed the limits listed in §15.209(a), then the emissions are remeasured using a quasi-peak detector.

e) For all radiated emissions measurements above 1GHz, the peak readings must comply with the §15.35(b) limits. §15.35(b) states that when average radiated emissions measurements are specified, there also is a limit on the peak level of the radiated emissions. The limit on the peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, all peak readings above 1GHz must be no greater than 20dB above the limits specified in §15.209(a).

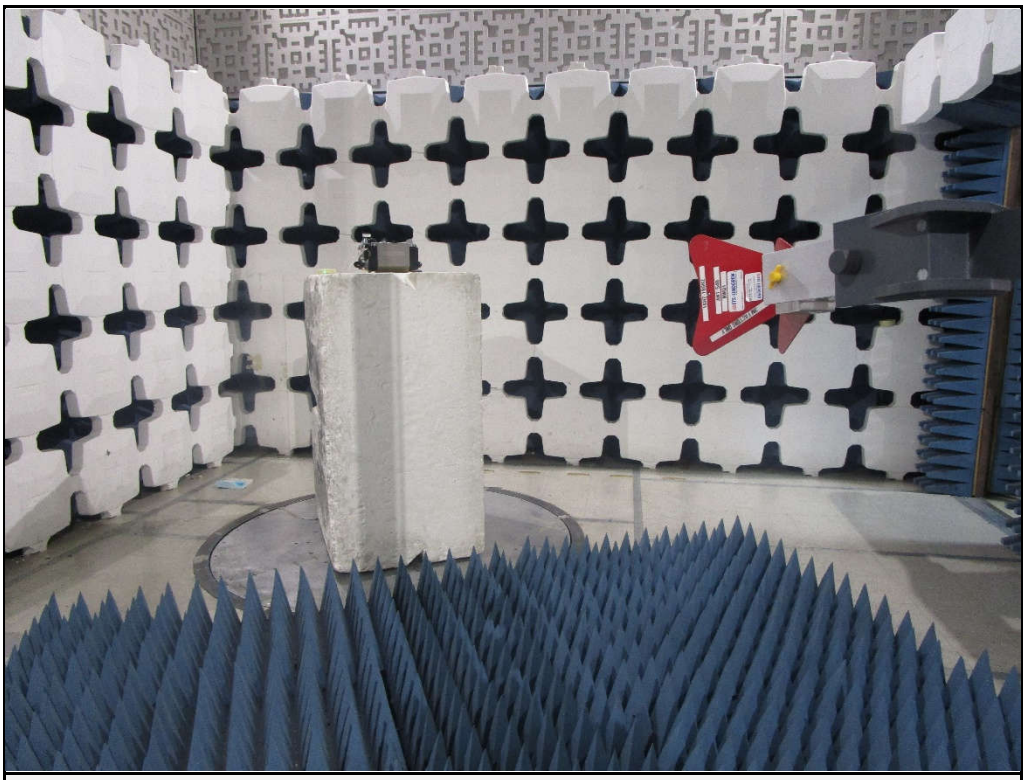
f) Next, for all radiated emissions measurements above 1GHz, the resolution bandwidth was set to 1MHz. The analyzer was set to linear mode with a 10Hz video bandwidth in order to simulate an average detector. An average reading was taken.

If the dwell time per channel of the hopping signal is less than 100msec, then the reading obtained with the 10Hz video bandwidth may be further adjusted by a duty cycle correction factor derived from 20*log(dwell time/100msec). These readings must be no greater than the limits specified in §15.209(a).

Test Setup for Spurious Radiated Emissions, 30MHz – 1GHz – Antenna Polarization Horizontal



Test Setup for Spurious Radiated Emissions, 30MHz – 1GHz – Antenna Polarization Vertical



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

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

Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx Low @ 902.25MHz
Frequency Tested	902.25MHz
Notes	Peak Measurements in the Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBµV/m)	Peak Total at 3m (µV/m)	Peak Limit at 3m (µV/m)	Margin (dBm)
2706.75	H	51.4		3.7	32.6	-40.4	47.3	231.0	5000.0	-26.7
	V	55.6		3.7	32.6	-40.4	51.4	372.4	5000.0	-22.6
3609.00	H	57.2		4.3	33.2	-40.3	54.4	523.9	5000.0	-19.6
	V	57.7		4.3	33.2	-40.3	54.8	551.1	5000.0	-19.2
4511.25	H	52.2		4.7	34.2	-40.1	50.9	352.5	5000.0	-23.0
	V	49.3	*	4.7	34.2	-40.1	48.0	252.5	5000.0	-25.9
5413.50	H	59.2		5.1	35.0	-40.2	59.1	902.5	5000.0	-14.9
	V	58.4		5.1	35.0	-40.2	58.3	825.0	5000.0	-15.7
8120.25	H	48.6	*	6.5	35.8	-40.0	50.9	351.7	5000.0	-23.1
	V	48.8	*	6.5	35.8	-40.0	51.1	360.7	5000.0	-22.8
9022.50	H	49.7	*	6.5	36.3	-39.7	52.8	435.6	5000.0	-21.2
	V	49.6	*	6.5	36.3	-39.7	52.7	429.1	5000.0	-21.3

Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx Low @ 902.25MHz
Frequency Tested	902.25MHz
Notes	Average Measurements in the Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBµV/m)	Average Total at 3m (µV/m)	Average Limit at 3m (µV/m)	Margin (dB)
2706.75	H	43.00		3.7	32.6	-40.4	-8.5	30.3	32.8	500.0	-23.7
	V	43.90		3.7	32.6	-40.4	-8.5	31.2	36.4	500.0	-22.8
3609.00	H	46.30		4.3	33.2	-40.3	-8.5	35.0	55.9	500.0	-19.0
	V	46.60		4.3	33.2	-40.3	-8.5	35.3	57.9	500.0	-18.7
4511.25	H	38.30		4.7	34.2	-40.1	-8.5	28.6	26.8	500.0	-25.4
	V	34.30	*	4.7	34.2	-40.1	-8.5	24.6	16.9	500.0	-29.4
5413.50	H	48.10		5.1	35.0	-40.2	-8.5	39.5	94.2	500.0	-14.5
	V	47.00		5.1	35.0	-40.2	-8.5	38.4	83.0	500.0	-15.6
8120.25	H	34.40	*	6.5	35.8	-40.0	-8.5	28.2	25.7	500.0	-25.8
	V	34.20	*	6.5	35.8	-40.0	-8.5	28.0	25.2	500.0	-26.0
9022.50	H	35.30	*	6.5	36.3	-39.7	-8.5	29.8	31.1	500.0	-24.1
	V	34.90	*	6.5	36.3	-39.7	-8.5	29.4	29.7	500.0	-24.5

Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx Low @ 902.25MHz
Frequency Tested	902.25MHz
Notes	Peak Measurements in Non-Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBµV/m)	Peak Total at 3m (µV/m)	Peak Limit at 3m (µV/m)	Margin (dBm)
902.25	H	89.51		2.0	26.5	0.0	118.0	796248.6	NA	NA
	V	84.59		2.0	26.5	0.0	113.1	451906.6	NA	NA
1804.50	H	72.91		2.9	30.9	-40.9	65.9	1964.8	79624.9	-32.2
	V	71.97		2.9	30.9	-40.9	64.9	1763.3	79624.9	-33.1
6315.75	H	43.35		5.6	35.5	-40.2	44.3	164.2	79624.9	-53.7
	V	47.68		5.6	35.5	-40.2	48.6	270.3	79624.9	-49.4
7218.00	H	43.48		6.1	35.7	-40.1	45.2	182.0	79624.9	-52.8
	V	39.83		6.1	35.7	-40.1	41.6	119.6	79624.9	-56.5

Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx Mid @ 914.75MHz
Frequency Tested	914.75MHz
Notes	Peak Measurements in the Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBµV/m)	Peak Total at 3m (µV/m)	Peak Limit at 3m (µV/m)	Margin (dBm)
2744.25	H	56.4		3.7	32.6	-40.4	52.3	412.8	5000.0	-21.7
	V	56.0		3.7	32.6	-40.4	51.9	391.5	5000.0	-22.1
3659.00	H	58.1		4.3	33.2	-40.3	55.3	583.9	5000.0	-18.7
	V	56.8		4.3	33.2	-40.3	54.0	503.3	5000.0	-19.9
4573.75	H	50.5		4.7	34.3	-40.1	49.4	295.1	5000.0	-24.6
	V	49.3	*	4.7	34.3	-40.1	48.2	258.5	5000.0	-25.7
7318.00	H	50.3		6.2	35.7	-40.1	52.1	400.9	5000.0	-21.9
	V	49.5		6.2	35.7	-40.1	51.3	365.2	5000.0	-22.7
8232.75	H	49.0		6.5	35.9	-39.9	51.4	371.2	5000.0	-22.6
	V	48.1	*	6.5	35.9	-39.9	50.6	337.7	5000.0	-23.4
9147.50	H	50.2		6.6	36.3	-39.7	53.4	468.1	5000.0	-20.6
	V	49.3		6.6	36.3	-39.7	52.5	420.1	5000.0	-21.5

Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx Mid @ 914.75MHz
Frequency Tested	914.75MHz
Notes	Average Measurements in the Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBµV/m)	Average Total at 3m (µV/m)	Average Limit at 3m (µV/m)	Margin (dB)
2744.25	H	45.40		3.7	32.6	-40.4	-8.5	32.8	43.6	500.0	-21.2
	V	44.70		3.7	32.6	-40.4	-8.5	32.1	40.2	500.0	-21.9
3659.00	H	47.20		4.3	33.2	-40.3	-8.5	35.9	62.4	500.0	-18.1
	V	45.60		4.3	33.2	-40.3	-8.5	34.3	51.9	500.0	-19.7
4573.75	H	36.80		4.7	34.3	-40.1	-8.5	27.2	23.0	500.0	-26.8
	V	34.80	*	4.7	34.3	-40.1	-8.5	25.2	18.2	500.0	-28.8
7318.00	H	35.10		6.2	35.7	-40.1	-8.5	28.4	26.3	500.0	-25.6
	V	35.60		6.2	35.7	-40.1	-8.5	28.9	27.8	500.0	-25.1
8232.75	H	33.60		6.5	35.9	-39.9	-8.5	27.5	23.8	500.0	-26.5
	V	33.50	*	6.5	35.9	-39.9	-8.5	27.4	23.5	500.0	-26.6
9147.50	H	35.70		6.6	36.3	-39.7	-8.5	30.4	33.1	500.0	-23.6
	V	35.00		6.6	36.3	-39.7	-8.5	29.7	30.5	500.0	-24.3

Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx Mid @ 914.75MHz
Frequency Tested	914.75MHz
Notes	Peak Measurements in Non-Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBµV/m)	Peak Total at 3m (µV/m)	Peak Limit at 3m (µV/m)	Margin (dBm)
914.75	H	87.40		2.1	26.4	0.0	115.8	618396.6	NA	NA
	V	87.79		2.1	26.4	0.0	116.2	646795.6	NA	NA
1829.50	H	69.05		2.9	30.9	-40.8	62.1	1272.0	64679.6	-34.1
	V	71.17		2.9	30.9	-40.8	64.2	1623.6	64679.6	-32.0
5488.50	H	61.12		5.2	35.0	-40.2	61.1	1129.3	64679.6	-35.2
	V	57.22		5.2	35.0	-40.2	57.2	720.8	64679.6	-39.1

Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx High @ 926.75MHz
Frequency Tested	926.75MHz
Notes	Peak Measurements in the Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBµV/m)	Peak Total at 3m (µV/m)	Peak Limit at 3m (µV/m)	Margin (dBm)
2780.25	H	54.2		3.7	32.5	-40.4	50.0	317.5	5000.0	-23.9
	V	54.8		3.7	32.5	-40.4	50.6	340.2	5000.0	-23.3
3707.00	H	58.4		4.3	33.2	-40.2	55.7	608.8	5000.0	-18.3
	V	54.4		4.3	33.2	-40.2	51.6	382.4	5000.0	-22.3
4633.75	H	50.0	*	4.8	34.5	-40.2	49.1	285.3	5000.0	-24.9
	V	50.2	*	4.8	34.5	-40.2	49.3	290.2	5000.0	-24.7
7414.00	H	49.5		6.2	35.6	-40.0	51.3	367.8	5000.0	-22.7
	V	48.5	*	6.2	35.6	-40.0	50.3	326.7	5000.0	-23.7
8340.75	H	48.4	*	6.5	35.9	-39.9	50.9	352.7	5000.0	-23.0
	V	48.0	*	6.5	35.9	-39.9	50.5	335.3	5000.0	-23.5

Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx High @ 926.75MHz
Frequency Tested	926.75MHz
Notes	Average Measurements in the Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBµV/m)	Average Total at 3m (µV/m)	Average Limit at 3m (µV/m)	Margin (dB)
2780.25	H	42.40		3.7	32.5	-40.4	-8.5	29.8	30.8	500.0	-24.2
	V	42.70		3.7	32.5	-40.4	-8.5	30.1	31.9	500.0	-23.9
3707.00	H	47.80		4.3	33.2	-40.2	-8.5	36.6	67.4	500.0	-17.4
	V	42.40		4.3	33.2	-40.2	-8.5	31.2	36.2	500.0	-22.8
4633.75	H	35.70	*	4.8	34.5	-40.2	-8.5	26.3	20.6	500.0	-27.7
	V	34.60	*	4.8	34.5	-40.2	-8.5	25.2	18.1	500.0	-28.8
7414.00	H	34.70		6.2	35.6	-40.0	-8.5	28.0	25.1	500.0	-26.0
	V	34.30	*	6.2	35.6	-40.0	-8.5	27.6	24.0	500.0	-26.4
8340.75	H	33.40	*	6.5	35.9	-39.9	-8.5	27.4	23.4	500.0	-26.6
	V	33.20	*	6.5	35.9	-39.9	-8.5	27.2	22.9	500.0	-26.8

Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx High @ 926.75MHz
Frequency Tested	926.75MHz
Notes	Peak Measurements in Non-Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBµV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBµV/m)	Peak Total at 3m (µV/m)	Peak Limit at 3m (µV/m)	Margin (dBm)
926.75	H	88.35		2.1	26.8	0.0	117.2	722570.7	NA	NA
	V	86.26		2.1	26.8	0.0	115.1	568041.9	NA	NA
1853.50	H	69.55		3.0	31.0	-40.8	62.7	1365.6	72257.1	-34.5
	V	69.38		3.0	31.0	-40.8	62.5	1339.1	72257.1	-34.6
5560.50	H	61.81		5.2	35.0	-40.2	61.8	1223.9	72257.1	-35.4
	V	61.55		5.2	35.0	-40.2	61.5	1187.9	72257.1	-35.7
6487.25	H	40.85		5.7	35.6	-40.1	42.0	125.9	72257.1	-55.2
	V	45.28		5.7	35.6	-40.1	46.4	209.7	72257.1	-50.7
9267.50	H	42.49		6.6	36.3	-39.7	45.8	194.9	72257.1	-51.4
	V	41.03		6.6	36.3	-39.7	44.3	164.7	72257.1	-52.8

31. Band Edge Compliance

EUT Information	
Manufacturer	Chamberlain
Product	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx Low @ 902.25MHz Tx High @ 926.75MHz Tx Hopping

Test Setup Details	
Setup Format	Tabletop
Height of Support	N/a
Measurement Method	Antenna Conducted
Type of Test Site	Tabletop
Type of Antennas Used	N/a
Notes	Bench

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

Procedure

1) Low Band Edge:
   a) The antenna port of the EUT was connected to the spectrum analyzer through 30dB of attenuation.
   b) The EUT was set to transmit continuously at the channel closest to the low band-edge hopping function disabled.
   c) To determine the band edge compliance, the following spectrum analyzer settings were used:
      - Center Frequency = 902MHz (low band-edge frequency).
      - Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
      - Resolution Bandwidth (RBW) = ≥ 1% of the span.
      - 'Max-Hold' function was engaged.
   d) The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
   e) The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the left of the center frequency (band-edge) must be below the display line.)
   f) The analyzer's display was then screenshot and saved.
   g) Steps (d) through (f) were repeated with the frequency hopping function enabled.
2) High Band Edge:

a) The antenna port of the EUT was connected to the spectrum analyzer through 30dB of attenuation.

b) The EUT was set to transmit continuously at the channel closest to the high band-edge hopping function disabled.

c) To determine the band edge compliance, the following spectrum analyzer settings were used:

- Center Frequency = 928MHz (high band-edge frequency).
- Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
- Resolution Bandwidth (RBW) = ≥ 1% of the span.
- 'Max-Hold' function was engaged.

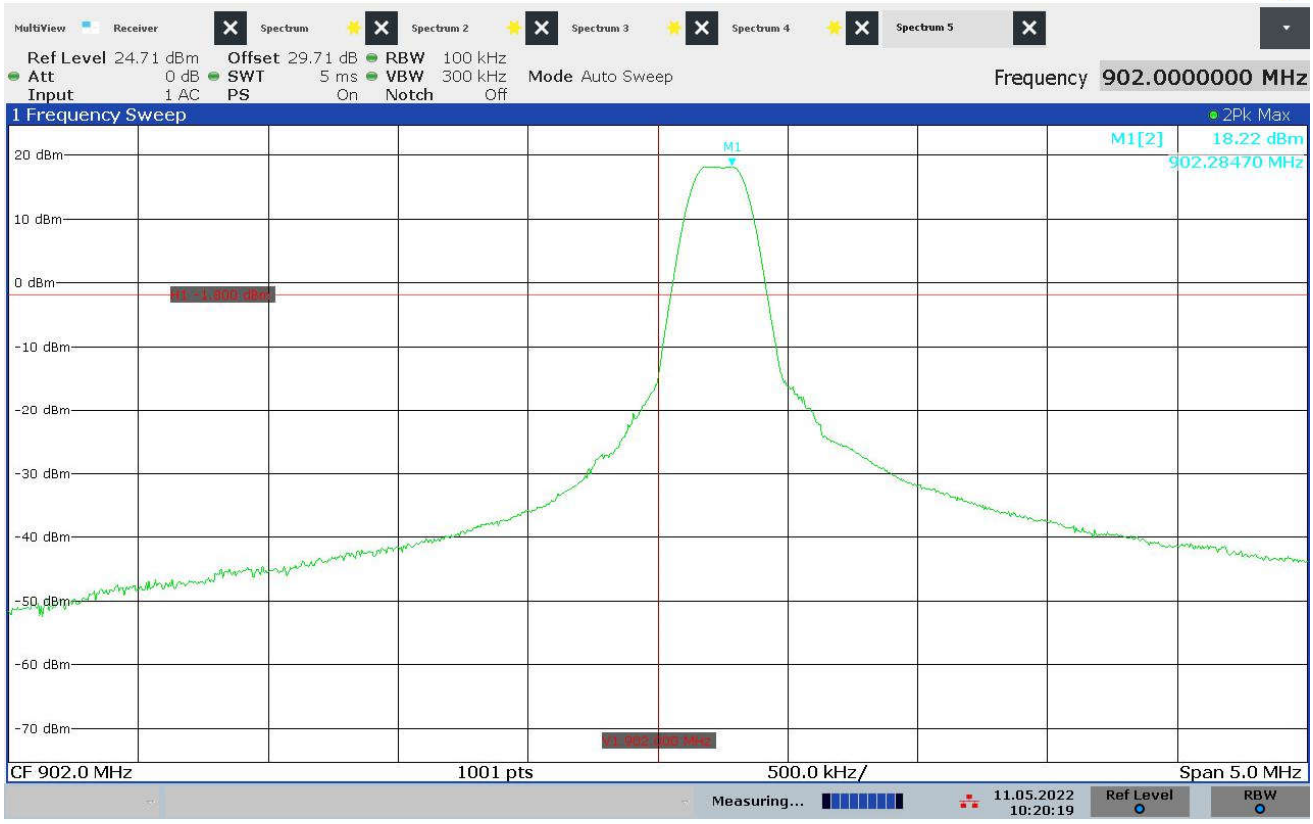
d) The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.

e) The marker was set on the peak of the in-band emissions. A display line was placed 20dB (30dB for DTS systems where average power was used) down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB (30dB for DTS systems where average power was used) down display line. (All emissions to the left of the center frequency (band-edge) must be below the display line.)

f) The analyzer's display was then screenshot and saved.

g) Steps (d) through (f) were repeated with the frequency hopping function enabled.

Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx Low @ 902.25MHz
Frequency Tested	902.25MHz
Notes	Low Band Edge (Antenna Conducted)



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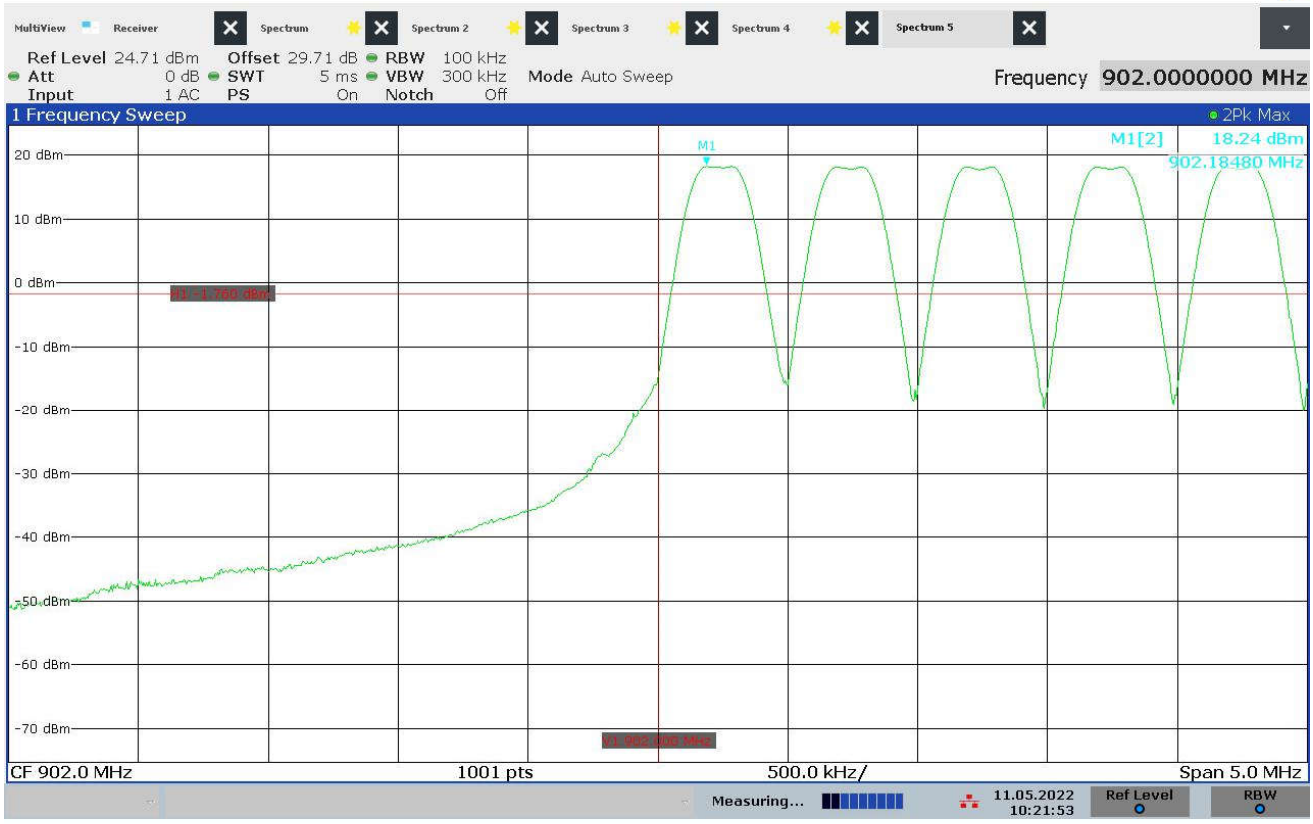
Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx Hopping
Frequency Tested	n/a
Notes	Low Band Edge (Antenna Conducted)



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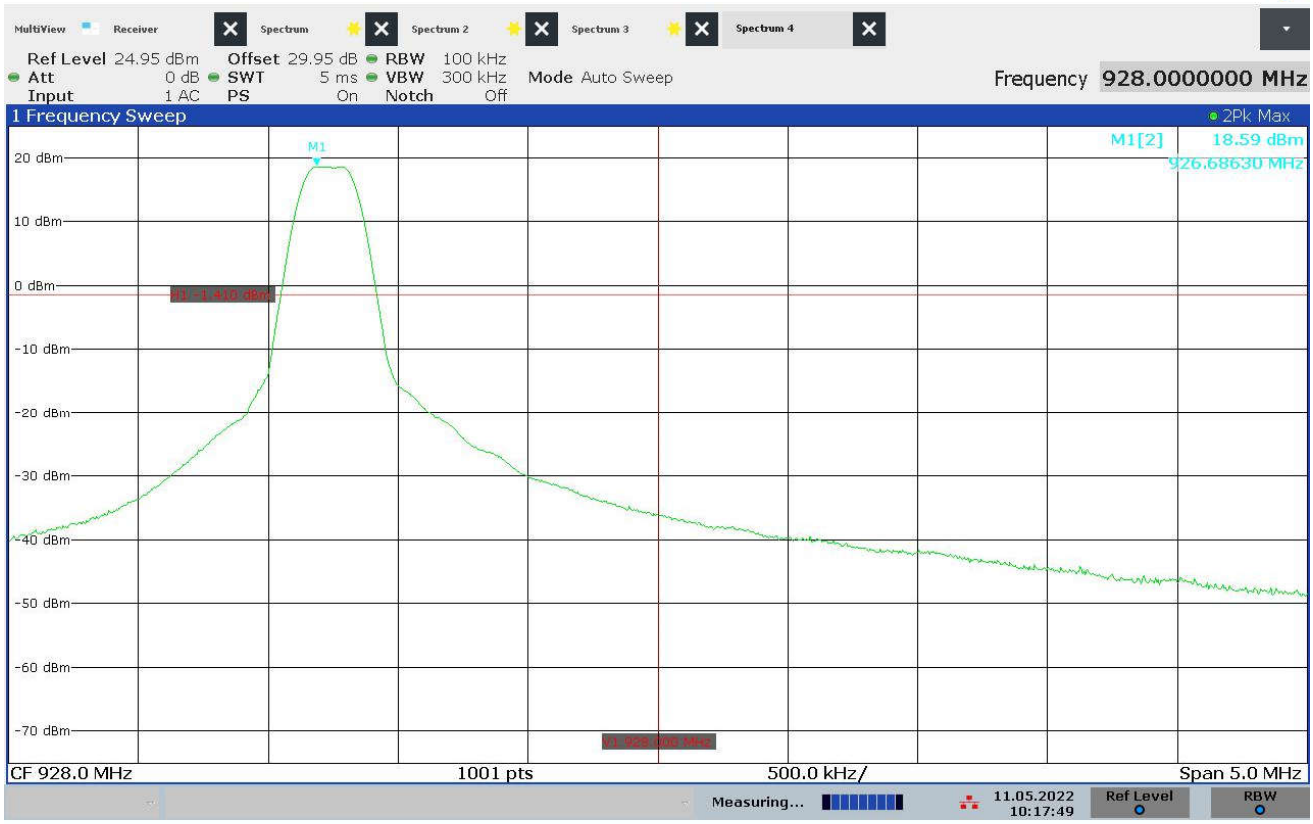
Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx High @ 926.75MHz
Frequency Tested	926.75MHz
Notes	High Band Edge (Antenna Conducted)



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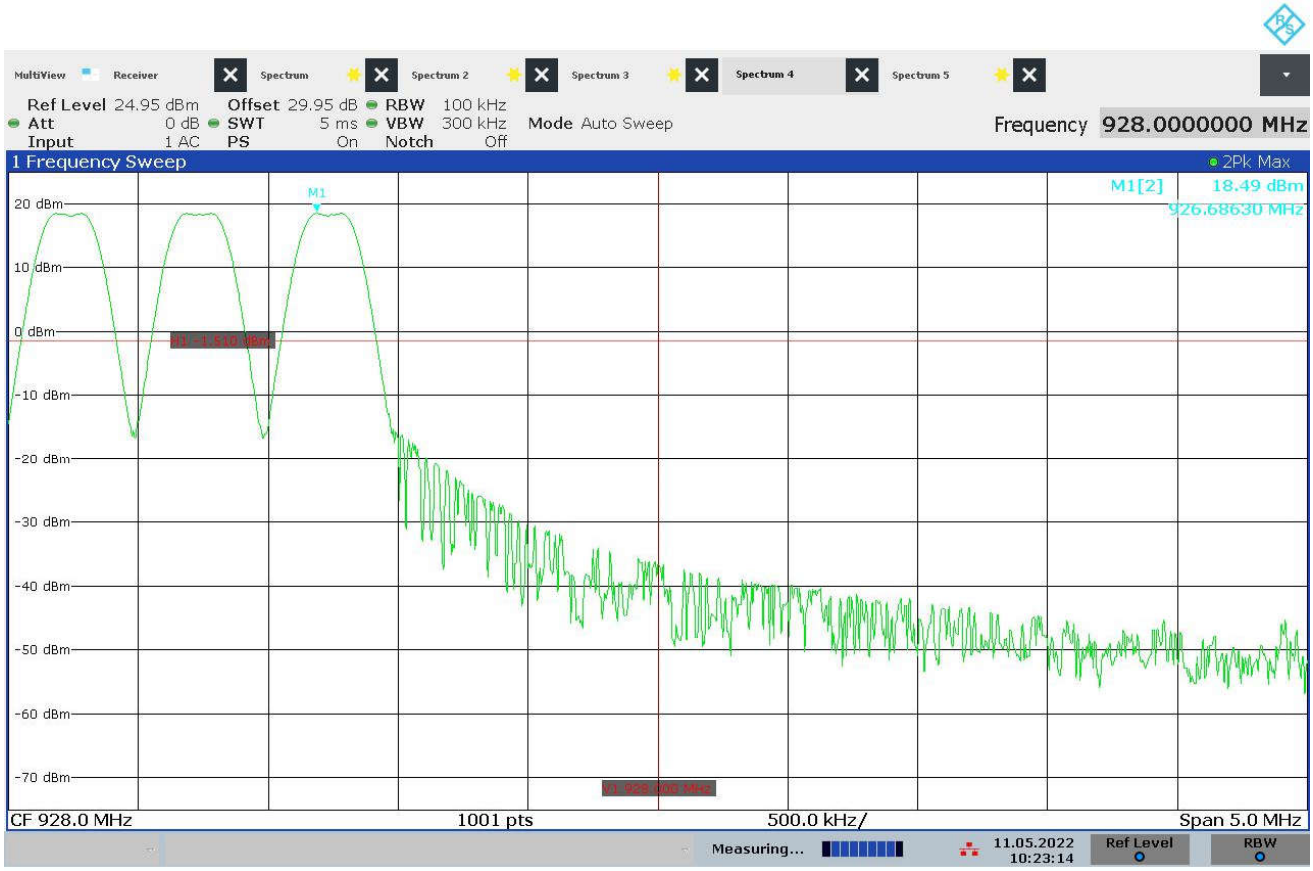
Test Details	
Manufacturer	Chamberlain
EUT	Phoenix AC GDO Logic Board
Model No.	003-0458-5
Serial No.	151220510865
Mode	Tx Hopping
Frequency Tested	n/a
Notes	High Band Edge (Antenna Conducted)



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32. Scope of Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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ELECTRICAL

Valid To: June 30, 2023 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	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)	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)
Radiated Emissions Anechoic	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); ECE Regulation 10.06 Annex 7 (Broadband) ECE Regulation 10.06 Annex 8 (Narrowband)

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Test Technology:	Test Method(s) [1]:
Vehicle Radiated Emissions	CISPR 12; CISPR 36; ICES-002; ECE Regulation 10.06 Annex 5
Bulk Current Injection (BCI)	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 *(Including Radar Pulse)*	ISO 11452-2; ISO 11452-5; 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
Radiated Immunity Reverb	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)*	ISO 11452-9; EMC-CS-2009.1 (RI115); FMC1278 (RI115)
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
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; 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 14
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

Test Technology:	Test Method(s) [1]:
Emissions (cont'd)	
Current Harmonics	IEC 61000-3-2; 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; 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
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

Test Technology:	Test Method(s) [1]:
Immunity (cont'd)	
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
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

Test Technology:	Test Method(s) [1]:
Canadian Radio Tests	RSS-102 (RF Exposure Evaluation only); 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)
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)

Test Technology:	Test Method(s) [1]:
OTA (Over the Air) Performance	
GSM, GPRS, EGPRS	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
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	
Electrical Measurements and Simulation	
AC Voltage / Current	
(1mV to 5kV) 60 Hz	FAA AC 150/5345-10H
(0.1V to 250V) up to 500 MHz	FAA AC 150/5345-43J
(1µA to 150A) 60 Hz	FAA AC 150/5345-44K
DC Voltage / Current	FAA AC 150/5345-46E
(1mV to 15-kV) / (1µA to 10A)	FAA AC 150/5345-47C
Power Factor / Efficiency / Crest Factor	FAA EB 67D
(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

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)
Industrial, Scientific, and Medical Equipment Part 18	FCC MP-5 (February 1986)	40000
Intentional Radiators Part 15C	ANSI C63.10:2013	40000
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

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)
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
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 19th day of May 2021.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1786.01
Valid to June 30, 2023

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