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FCC PART 15.231(a) & RSS-210 (i9) ANNEX 1
MOMENTARILY OPERATED TRANSMITTER
COMBO TEST REPORT

Applicant	ADEMCO INC.
Address	2 CORPORATE CENTER DRIVE SUITE 1009040 MELVILLE NY 11747
Product Model Number	5816
Product Description	WIRELESS DOOR/WINDOW TRANSMITTER
FCC ID	CFS8DL5816V
IC	573F-5816V
Date Sample Received	08/01/2019
Date Tested	08/06/2019
Tested By	Tim Royer
Approved By	Franklin Rose

Report Number	Version Number	Description	Issue Date
1988UT19TestReport	Rev1	Initial Issue	08/06/2019
	Rev2	Updated duty cycle on page 9 and setup pictures	09/20/2019
	Rev3	Updated Model#, FCC & IC ID, Plot	10/3/2019

**THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.**

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GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

Summary

The device under test does:

- ☒ Fulfill the general approval requirements as identified in this test report and was selected by the customer.
- ☐ Not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669

Tested by:



Sr. EMC Engineer
EMC-003838-NE



Name and Title: Tim Royer, Project Manager/Testing Engineer

Date: 09/08/2019



Reviewed and approved by:

Name and Title: Franklin Rose, Project Manager/EMC Specialist

Date: 09/13/2019

Applicant: ADEMCO INC.
FCC ID: CFS8DL5816V
IC: 573F-5816V
Report: 1988UT19TestReport_Rev3

GENERAL INFORMATION

EUT Description	WIRELESS DOOR/WINDOW TRANSMITTER
FCC ID	CFS8DL5816V
Model Number	5816
IC Certification	573F-5816V
Operating Frequency	344.94 MHz
Test Frequencies	344.94 MHz
EUT Power Source	☐ 110-120Vac/50- 60Hz
	☐ DC Power 12V
	☒ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☐ Fixed
	☒ Mobile
	☐ Portable
Test Conditions	Temperature: 24-26°C Relative humidity: 50-65% Barometric Pressure: 1024mb
Test Facility	Timco Engineering Inc. located at 849 NW State Road 45 Newberry, FL 32669 USA. Designation #: US1070, ISED 2056-A
Modification to the EUT	NONE
Test Exercise	For radiated emissions testing a continuously transmitting modulated carrier was used, for verification of duty cycle and compliance with periodic operation a normally operating transmitter was used
Regulatory Standards	FCC CFR Title 47 Part 15C
Measurement Standards	ANSI C63.10: 2013 FCC CFR Title 47 Part 15.31, 15.33, 15.35 RSS-GEN (i4)

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TEST RESULTS SUMMARY

Requirement	FCC Rules Part No.	IC RSS §	RESULTS Pass/Fail/NA
Spurious Emissions and Harmonics	15.231(b) 15.209(a) 15.205(a)(b)	210 A1.1.2 GEN 8.9 GEN 8.10	Pass
Occupied Bandwidth	15.231(c) 15.215(c)	210 A1.1.3 GEN 6.6	Pass

TEST SETUP

Supporting Peripheral Equipment	N/A
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RADIATED SPURIOUS EMISSIONS

FCC Rules Part No.: 15.231(b), 15.209 (a), 15.205(a) (b)

IC RSS: 210 § A1.1 Table A, RSS-Gen § 8.9, & 8.10

Requirements:

Fundamental and Harmonics not in Restricted Bands		
Fundamental Frequency (MHz)	Field Strength of Fundamental (dB μ V/m)	Field Strength of Harmonics and Spurious Emissions (dB μ V/m @ 3m)
40.66 to 40.70	67.04	47.04
70 to 130	61.94	41.94
130 to 174	61.94 to 71.48	41.94 to 51.48
174 to 260	71.48	51.48
260 to 470	71.48 to 81.94	51.48 to 61.94
470 and above	81.94(12500)	61.94

Restricted Band Emissions	
Frequency (MHz)	Limits
9 – 490 kHz	2400/F (kHz) μ V/m @ 300 meters
490 – 1705 kHz	24000/F (kHz) μ V/m @ 30 meters
1705 – 30 MHz	29.54 dB μ V/m measured @ 30 meters
30 – 88	40.0 dB μ V/m measured @ 3 meters
88 – 216	43.5 dB μ V/m measured @ 3 meters
216 – 960	46.0 dB μ V/m measured @ 3 meters
Above 960	54.0 dB μ V/m measured @ 3 meters

No fundamental frequency is allowed in the restricted bands.

No harmonic or spurious emissions may exceed the level of the fundamental carrier frequency.

RADIATED SPURIOUS EMISSIONS

Fundamental Emission Limit Formula:

- 1) For the band 130-174 MHz, $\mu\text{V/m}$ at 3 meters = $56.81818(F)-6136.3636$;
- 2) For the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters = $41.6667(F)-7083.3333$.

Where F is the fundamental emission frequency in MHz

Example Calculation of limit @ 433.92 MHz:

$$41.6667 (433.9)-7083.3333 = 10,995.85 \text{ } \mu\text{V/m}$$

$$20\log (10,995.85) = 80.82 \text{ dB}\mu\text{V/m}$$

Harmonics and Spurious Emissions Limit:

- 1) 20 dBc for all emissions outside of restricted bands
- 2) General limits of 15.209(a) & RSS-Gen for emissions inside restricted bands

3 Meter Field Strength Limit for this EUT:

Fund Freq (MHz)	Fund Limit (dBuV/m)	Harm & Spur (dBuV/m)	Restricted Bands
344.94	77.25	57.25	Limit of 15.209

RADIATED SPURIOUS EMISSIONS

Test Method: ANSI C63.10 § 6.3 – 6.6 Radiated Emissions Unlicensed Devices

The EUT was placed on a table with dimensions of 1m by 1.5m, 80 cm high below 1 GHz and 150 cm high above 1 GHz. The EUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 9 KHz or the lowest frequency generated to the 10th harmonic of the fundamental.

Peak readings were taken in three (3) orthogonal planes when necessary and the highest readings were converted to average readings based on the duty cycle.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

Formula of Conversion Factors:

The field strength at 3m was established by adding the meter reading of the spectrum analyzer to the antenna correction factor supplied by the antenna manufacturer plus the coax loss. The antenna correction factors are stated in terms of dB/m. The gain of the preselector was accounted for in the spectrum analyzer reading.

Example:

Freq. MHz	Meter Reading dBμV	ACF dB/m	Cable Loss dB	Duty Cycle dB	Field Strength dBμV/m @ 3 m
334	20	+10	+1	-20	= +12

Note: -20dB Duty cycle correction factor is derived from a 10% duty cycle provided by the manufacturer.

RADIATED SPURIOUS EMISSIONS

Test Data: Emissions from 9 KHz to the 10th harmonic of the Fundamental Table

Tuned Frequency (MHz)	Detector	Meter Reading (dBμV)	Antenna Polarity	Coax Loss (dB)	Duty Cycle Correction (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBμV/m)	15.231 Fundamental Limit	Margin (dBm)
345.00	PK	75.82	H	2.12	-20.00	13.70	3.00	71.64	77.26	5.62
345.00	PK	72.69	V	2.12	-20.00	13.70	3.00	68.51	77.26	8.75

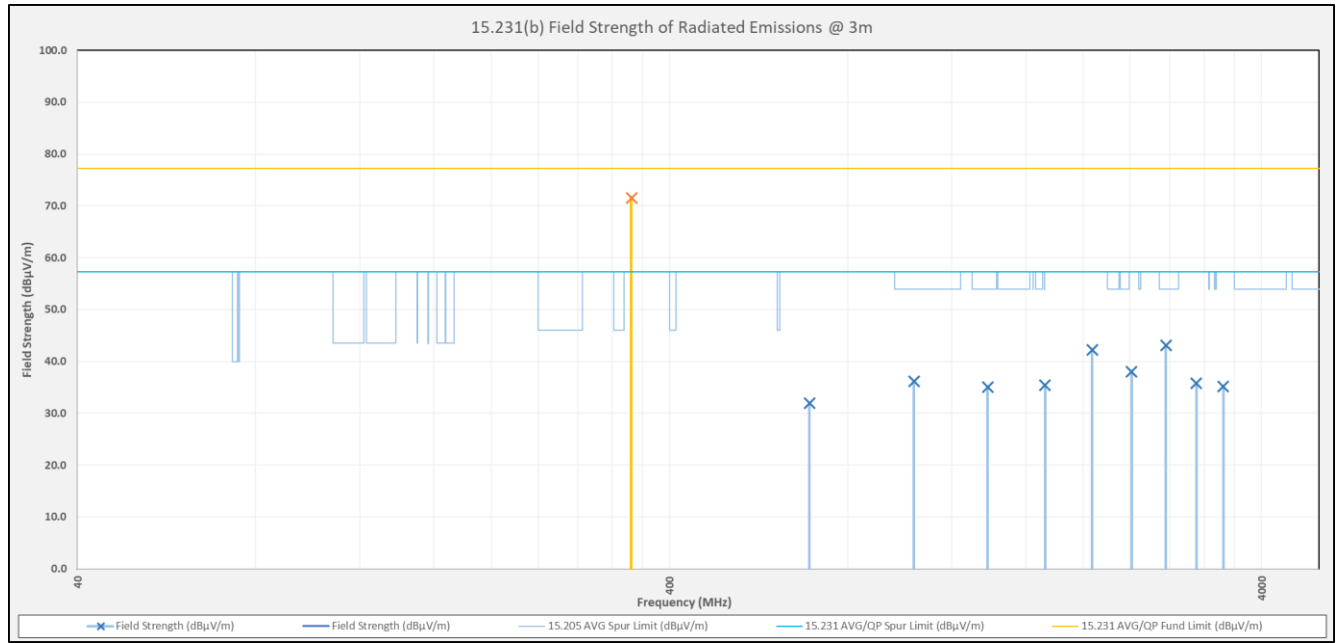
Tuned Frequency (MHz)	Emission Frequency (MHz)	15.205 Restricted Band	15.205, 15.35, 15.247(d) Detector	Meter Reading (dBμV)	Antenna Polarity	Coax Loss (dB)	Duty Cycle Correction (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBμV/m)	15.231 Spurious Limit	Margin (dBm)
345.00	690.00		PK	27.84	V	3.07	-20.00	20.40	3.00	31.31	57.26	25.95
345.00	690.00		PK	28.50	H	3.07	-20.00	20.40	3.00	31.97	57.26	25.29
345.00	1035.00	X	PK	18.74	V	3.76	-20.00	26.86	3.00	29.36	57.26	27.90
345.00	1035.00	X	PK	25.59	H	3.76	-20.00	26.86	3.00	36.21	57.26	21.05
345.00	1380.00	X	PK	18.37	V	4.30	-20.00	28.58	3.00	31.25	57.26	26.00
345.00	1380.00	X	PK	22.18	H	4.30	-20.00	28.58	3.00	35.06	57.26	22.19
345.00	1725.00		PK	19.01	V	4.81	-20.00	29.40	3.00	33.22	57.26	24.03
345.00	1725.00		PK	21.16	H	4.81	-20.00	29.40	3.00	35.37	57.26	21.88
345.00	2070.00		PK	23.97	V	5.31	-20.00	31.00	3.00	40.28	57.26	16.97
345.00	2070.00		PK	25.95	H	5.31	-20.00	31.00	3.00	42.26	57.26	14.99
345.00	2415.00		PK	16.51	V	5.61	-20.00	31.87	3.00	33.99	57.26	23.27
345.00	2415.00		PK	20.50	H	5.61	-20.00	31.87	3.00	37.98	57.26	19.28
345.00	2760.00	X	PK	19.23	V	6.11	-20.00	32.41	3.00	37.75	57.26	19.50
345.00	2760.00	X	PK	24.55	H	6.11	-20.00	32.41	3.00	43.07	57.26	14.18
345.00	3105.00		PK	15.70	V	6.45	-20.00	32.77	3.00	34.92	57.26	22.34
345.00	3105.00		PK	16.58	H	6.45	-20.00	32.77	3.00	35.80	57.26	21.46
345.00	3450.00		PK	14.11	V	6.88	-20.00	32.59	3.00	33.59	57.26	23.67
345.00	3450.00		PK	15.76	H	6.88	-20.00	32.59	3.00	35.24	57.26	22.02

* -Denotes restricted bands which must comply with limits 15.209

Note: Emissions that are 20 dB below the limit are not required to be reported.

RADIATED SPURIOUS EMISSIONS

Test Data: Emissions from 9 KHz to the 10th harmonic of the Fundamental Plot



OCCUPIED BANDWIDTH

FCC Rules Part No.: 15.231(C), & 15.215(c)

IC RSS: 210 § A1.1.3, & GEN § 6.6

Requirements:

The bandwidth of the emission shall fall completely inside the band of operation, and be no wider than .25% of the center frequency for devices operating between 70 and 900 MHz.

For FCC compliance the Bandwidth is determined at the points 20 dB down from the modulated carrier.

For IC compliance the Bandwidth is determined as the 99% power bandwidth.

Test Method: ANSI C63.10 § 6.9.2 Occupied bandwidth Relative procedure
ANSI C63.10 § 6.9.3 Occupied bandwidth 99% Power

Test Data: **Occupied Bandwidth Measurement Table**

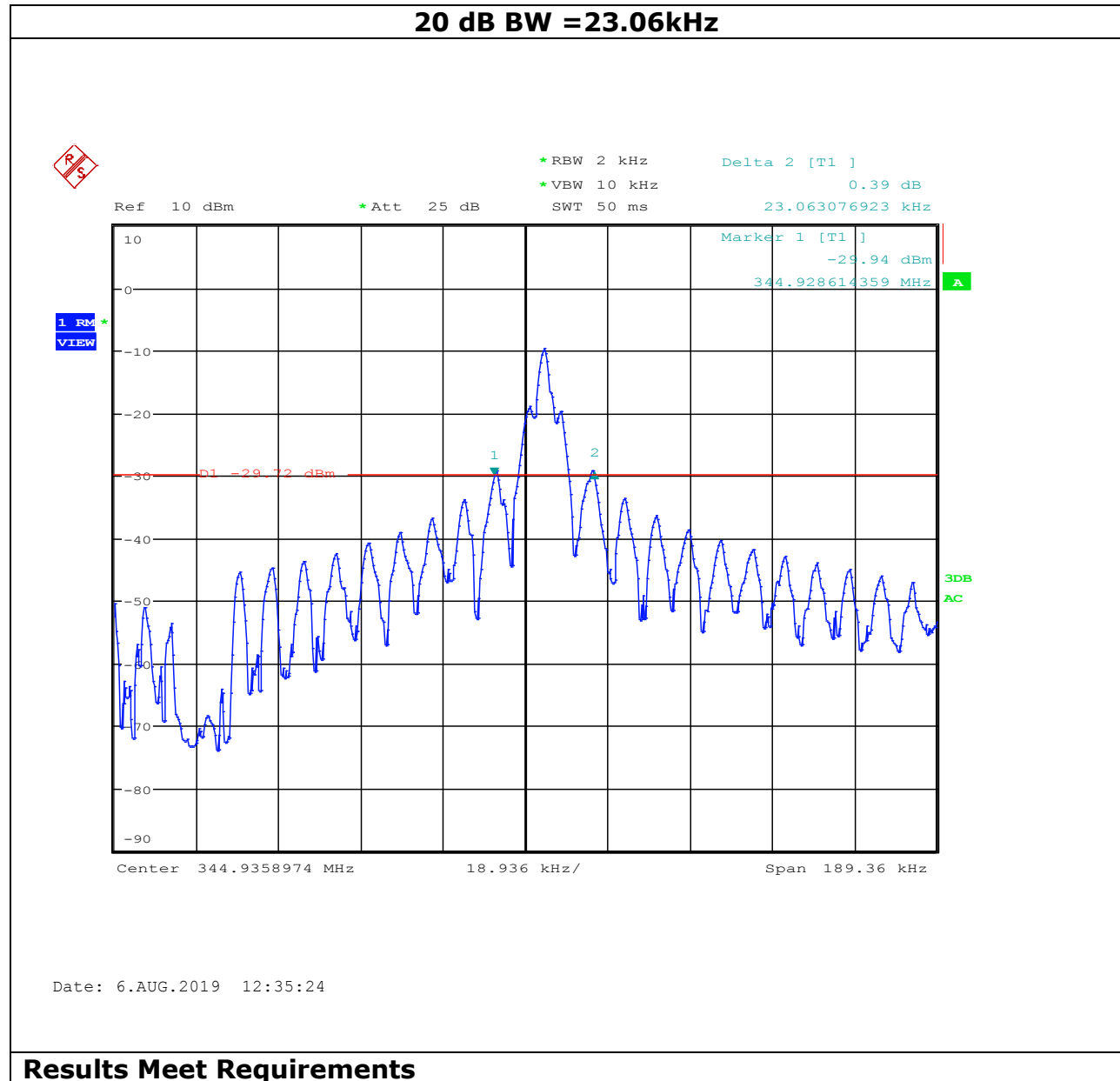
Tuned Frequency (MHz)	Limit (KHz)	Measured 20 dB BW (KHz)	Measured 99% BW (KHz)
344.94	862.35	23.06	50.07
Margin (KHz)		839.29	812.28

Results Meet Requirement

Applicant: ADEMCO INC.
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OCCUPIED BANDWIDTH

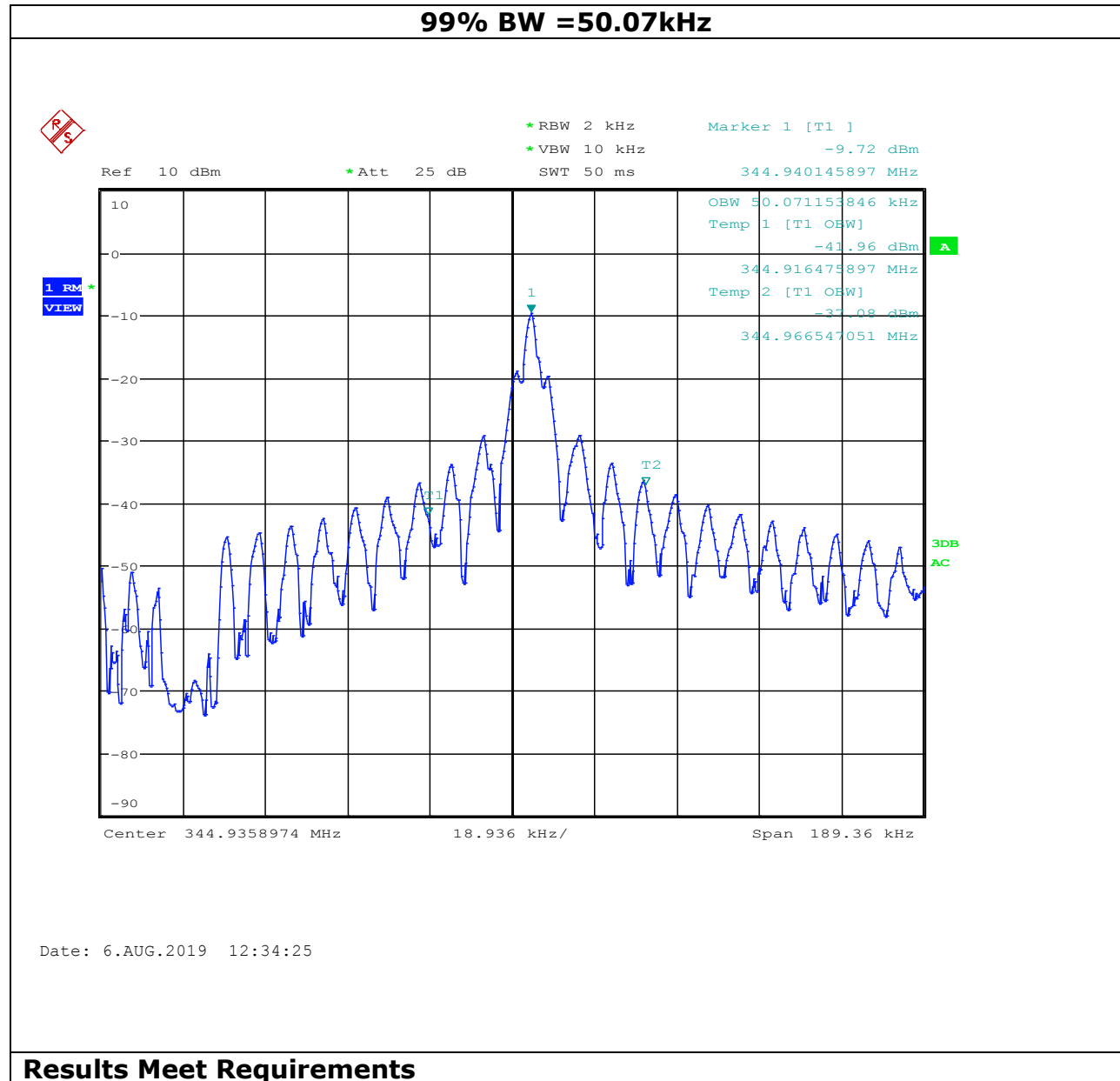
Test Data: **20 dB Occupied Bandwidth Plot**



Applicant: ADEMCO INC.
FCC ID: CFS8DL5816V
IC: 573F-5816V
Report: 1988UT19TestReport_Rev3

OCCUPIED BANDWIDTH

Test Data: 99% Occupied Bandwidth Plot



Applicant: ADEMCO INC.
 FCC ID: CFS8DL5816V
 IC: 573F-5816V
 Report: 1988UT19TestReport_Rev3

TEST EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Antenna: Biconical 1096	Eaton	94455-1	1096	08/01/17	08/01/20
Antenna: Log-Periodic 1243	Electro-Metrics	LPA-25	1243	03/29/18	03/29/20
CHAMBER	Panashield	3M	N/A	12/31/17	12/31/19
Antenna: Double- Ridged Horn/ETS Horn 2	ETS-Lindgren	3117	00041534	03/01/17	03/01/20
Software: Field Strength Program	Timco	N/A	Version 4.10.7.0	N/A	N/A
Antenna: Active Loop	ETS-Lindgren	6502	00062529	12/11/17	12/11/19
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	08/28/18	08/28/21
Coaxial Cable - Chamber 3 cable set (Primary)	Micro-Coax	Chamber 3 cable set (Primary)	KMKM-0244- 01; KMKM- 0670-00; KFKF-0198- 01	02/29/19	02/29/21
Bore-sight Antenna Positioning Tower	Sunol Sciences	TLT2	N/A	N/A	N/A

*EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

State of the measurement Uncertainty

The data and results referenced in this document are true and accurate. The measurement uncertainty was calculated for all measurements listed in this test report according To CISPR 16-4 or ENTR 100-028 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: “Uncertainty in EMC Measurements” and is documented in the Timco Engineering, Inc. quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Timco Engineering, Inc. is reported:

Test Items	Measurement Uncertainty	Notes
RF Frequency Accuracy	± 49.5 Hz	(1)
RF Conducted Power	± 0.93 dB	(1)
Conducted spurious emission of transmitter valid up to 40GHz	± 1.86 dB	
Occupied Bandwidth	$\pm 2.65\%$	
Radiated RF Power	± 1.4 dB	
Maximum frequency deviation: Within 300 Hz and 6kHz of audio freq.	$\pm 1.88\%$	
Within 6kHz and 25kHz of audio Freq.	$\pm 2.04\%$	
Adjacent channel power	± 1.47 dB	(1)
Transient Frequency Response	$\pm 1.88\%$	
Temperature	$\pm 1.0^{\circ}\text{C}$	(1)
Humidity	$\pm 5.0\%$	

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

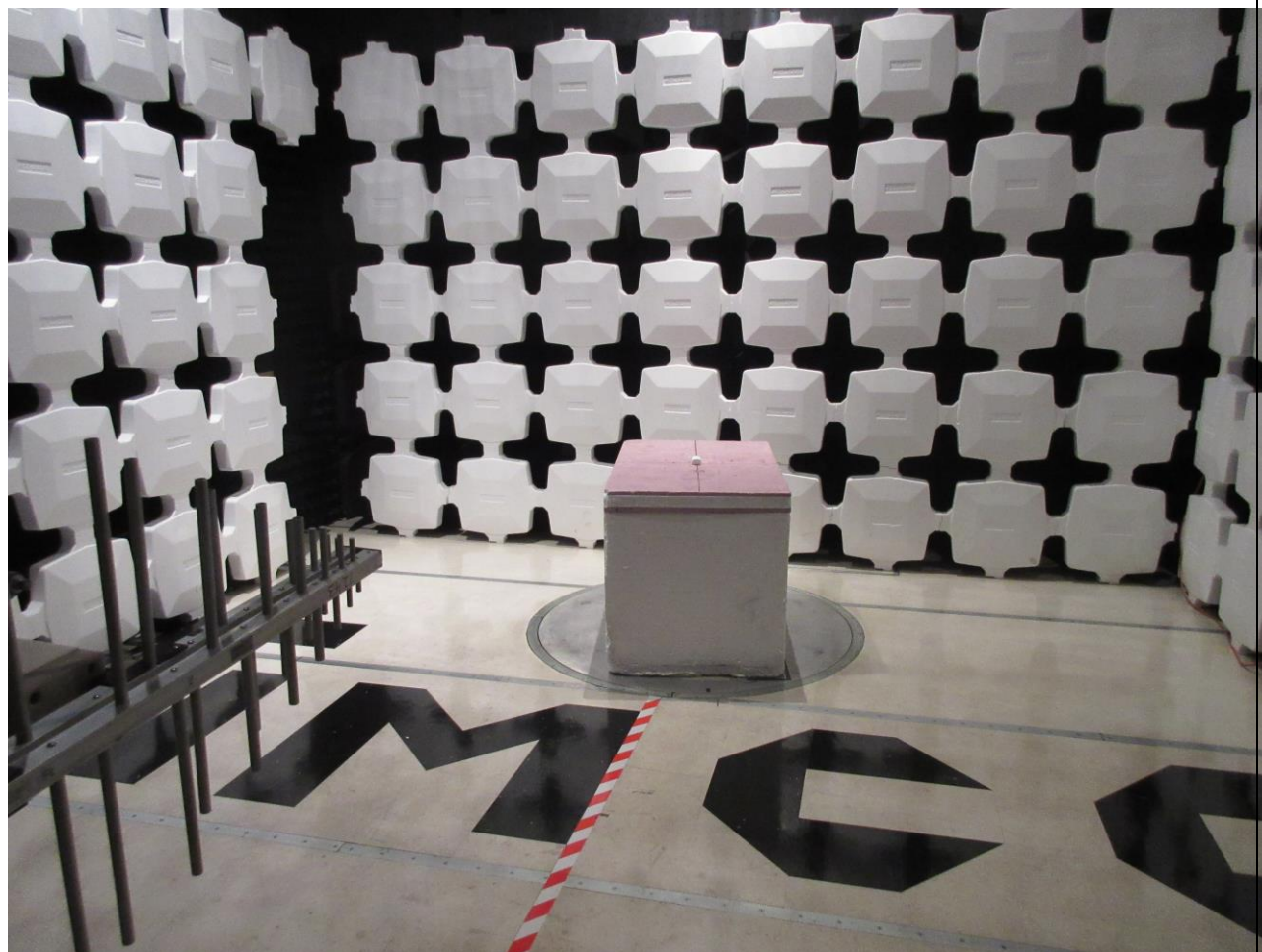
END OF TEST REPORT

Applicant: ADEMCO INC.
FCC ID: CFS8DL5816V
IC: 573F-5816V
Report: 1988UT19TestReport_Rev3

ADEMCO INC.
FCC ID: CFS8DL5816SVE
IC: 573F-5816SVE

TEST SET UP PHOTOS

Radiated Emissions Below 1 GHz



Report Template Revision History

Document Name	Description of Change	Revision Date	Approved By
PT 15231a RSS210 Combo TX Rpt	Initial Issue	160415	SS Sanders
	Added Document History to Template	160920	G Greene

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