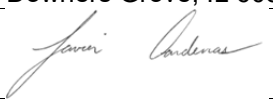
Engineering Test Report No. 2000553-02	
Report Date	March 18, 2020
Manufacturer Name	Springs Window Fashions
Manufacturer Address	7549 Graber Road Middleton, WI 53562
Product Name Brand/Model No.	CSZ2
Date Received	March 12, 2020
Test Dates	March 12-13,2020
Specifications	FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.207 and 15.249 FCC "Code of Federal Regulations" Title 47 Part 15, Subpart B, Section 15.107 and 15.109 Innovation, Science, and Economic Development Canada, RSS-210 and RSS-GEN Innovation, Science, and Economic Development Canada, ICES-003
Test Facility	Elite Electronic Engineering, Inc. 1516 Centre Circle, Downers Grove, IL 60515
Signature	
Tested by	Javier Cardenas
Signature	
Approved by	Raymond J. Klouda, Registered Professional Engineer of Illinois – 44894

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.207 and 15.249 and Innovation, Science, and Economic Development Canada, RSS-210 and RSS-GEN test specification(s). The data presented in this test report pertains to the EUT on the test date(s) specified. Any electrical or mechanical modifications made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification. This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the Federal Government.

Table of Contents

1. Report Revision History

Revision	Date	Description
–	18 March 2020	Initial Release of Engineering Test Report No. 2000553-02

2. Introduction

This document presents the results of a series of electromagnetic compatibility (EMC) tests that were performed on Automated Cellular Window Shades (hereinafter referred to as the Equipment Under Test (EUT)). The EUT was identified as follows:

EUT Identification	
Description	Automated Cellular Window Shades
Model/Part No.	CSZ2
S/N	N/A
Number of Interconnection Wires	N/A
Type of Interconnection Wires	N/A
Highest Internal Frequency of the EUT:	916MHz
Occupied Bandwidth	141.86kHz
Output Power	-10dBm

The EUT listed above was/were used throughout the test series.

The EUT was submitted for testing along with the following support equipment:

Description	Model #	S/N
AC/DC Switching Power Supply	GT-41130-2016-1.0-W2	

3. Test Specification(s)

The tests were performed to selected portions of, and in accordance with the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.207 and 15.249 test specification(s). It was also performed to the selected portions of, and in accordance with the Innovation, Science, and Economic Development Canada RSS-210 specifications

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 15, Subpart C
- ANSI C63.4-2014, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
- ANSI C63.10-2013, “American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices”
- ICES-003, Issue 6, January 2016, “Spectrum Management and Telecommunications, Interference-Causing Equipment Standard, Information Technology Equipment (Including Digital Apparatus) – Limits and methods of measurement”
-
- RSS-Gen Issue 5, March 2019, Amendment 1, Innovation, Science, and Economic Development Canada, “Spectrum Management and Telecommunications, Radio Standards Specification, General Requirements for Compliance of Radio Apparatus”
- RSS-210 Issue 10, December 2019, Innovation, Science, and Economic Development Canada, “License-Exempt Radio Apparatus: Category 1 Equipment”

4. Laboratory Conditions

The temperature at the time of the test was 21°C and the relative humidity was 16%.

5. Summary

The following EMC tests were performed and the results are shown below:

Test Description	Test Methods	Equipment Class	Results
RF Conducted Emissions Test (AC Mains)	FCC 15B FCC15C ISED RSS-GEN ISED ICES-003 ANSI C63.4-2014	B	Conforms
RF Radiated Emissions Test	FCC 15B ISED ICES-003 ANSI C63.4-2014	B	Conforms
Occupied Bandwidth	ISED RSS-210 ANSI C63.10-2013	-	Conforms
Field Strength and Radiated Spurious Emissions	FCC15C ISED RSS-210 ANSI C63.10-2013	-	Conforms
Band-Edge Compliance	FCC15C ISED RSS-GEN	-	Conforms

6. Test Plan

No test plan was provided. Instructions were provided by personnel from Springs Window Fashions and used in conjunction with the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.207 and 15.249 and Innovation, Science, and Economic Development Canada, RSS-210 and RSS-GEN, and ANSI C63.4-2014 specification(s).

7. Grounding

The EUT was not grounded.

8. Modifications Made to EUT

No modifications were made to the EUT during the testing.

9. Deviations from Specification(s)

No deviations from the specification(s) were made during the testing.

10. Modes of Operation

The EMC tests were performed with the EUTs operating in one or more of the test modes described below. See the specific test section for the applicable test modes.

10.1. Transmitting

This mode was achieved by applying power to the device. The EUT was configured to transmit at the following frequencies:

- 908.4MHz
- 916MHz

10.2. Receiving and Motor Running

This mode was achieved by applying power to the EUT. The EUT was configured to receive and have the window shades' motor running.

11. Test Method

The tests were performed using the referenced methods described in the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.207 and 15.249 and Innovation, Science, and Economic Development Canada, RSS-210 and RSS-GEN test specifications. The specific test sections and specification references are called out in the individual test sections.

12. Sample Calculations

For Powerline Conducted Emissions:

The resultant voltage level (VL) is a summation in decibels (dB) of the receiver meter reading (MTR) and the cable loss factor (CF).

Formula 1: VL (dBuV) = MTR (dBuV) + CF (dB).

For Radiated Emissions:

The resultant field strength (FS) is a summation in decibels (dB) of the receiver meter reading (MTR), the antenna correction factor (AF), and the cable loss factor (CF). If an external preamplifier is used, the total is reduced by its gain (-PA). If a distance correction (DC) is required, it is added to the total.

Formula 1: FS (dBuV/m) = MTR (dBuV) + AF (dB/m) + CF (dB) + (- PA (dB)) + DC (dB)

To convert the Field Strength dBuV/m term to uV/m, the dBuV/m is first divided by 20. The Base 10 AntiLog is taken of this quotient. The result is the Field Strength value in uV/m terms.

Formula 2: FS (uV/m) = AntiLog [(FS (dBuV/m))/20]

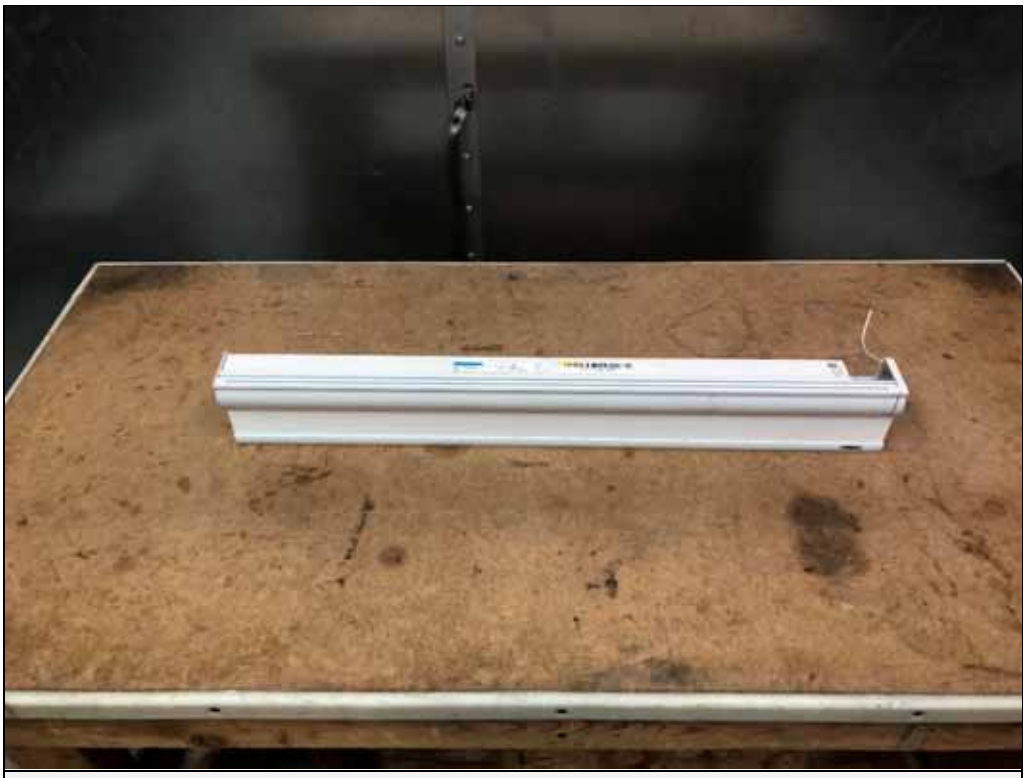
13. Statement of Conformity

The Springs Window Fashions Automated Cellular Window Shades, Model No. CSZ2 did fully conform to the selected requirements of FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.207 and 15.249 and Innovation, Science, and Economic Development Canada, RSS-210 and RSS-GEN.

14. Certification

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.207 and 15.249 and Innovation, Science, and Economic Development Canada, RSS-210 and RSS-GEN test specifications. The data presented in this test report pertains to the EUT on the test date specified. Any electrical or mechanical modifications made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification.

15. Photographs of EUT



16. Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW11	PREAMPLIFIER	PMI	PE2-35-120-5R0-10-12-SFF	PL11685/1241	1GHZ-20GHZ	4/8/2019	4/8/2020
CDX8	COMPUTER	ELITE	WORKSTATION			N/A	
GRB0	1MHZ, LISN SIGNAL CHECKER	ELITE	LISNCHKR1M	1	1MHZ	1/9/2019	1/9/2021
MEA0	MICRO-OHM METER	KEITHLEY	580	674866	10UOHM-200KOHM	7/13/2019	7/13/2020
NTA4	BILOG ANTENNA	TESEQ	6112D	46660	20-2000GHZ	9/23/2019	9/23/2020
NWQ1	DOUBLE RIDGED WAVEGUIDE ANTENNA	ETS-LINDGREN	3117	66655	1GHZ-18GHZ	4/10/2018	4/10/2020
PLF2	CISPR16 50UH LISN	ELITE	CISPR16/70A	002	.15-30MHz	4/23/2019	4/23/2020
PLF4	CISPR16 50UH LISN	ELITE	CISPR16/70A	003	.15-30MHz	4/23/2019	4/23/2020
RBG2	EMI ANALYZER	ROHDE & SCHWARZ	ESW44	101591	2HZ-44GHZ	2/21/2019	3/21/2020
SES0	24VDC POWER SUPPLY	P-TRANS	FS-32024-1M	001	18-27VDC	NOTE 1	
T1N6	10DB 20W ATTENUATOR	NARDA	766-10	---	DC-4GHZ	5/14/2018	5/14/2020
VBV2	CISPR EN FCC ICES RE.EXE	ELITE	CISPR EN FCC ICES RE.EXE	---	---	N/A	
WKA1	SOFTWARE, UNIVERSAL RCV EMI	ELITE	UNIV_RCV_EMI	1	---	I/O	
XLQ5	5W, 50 OHM TERMINATION	JFW INDUSTRIES	50T-052	---	DC-2GHZ	1/10/2020	1/10/2022
XPQ2	HIGH PASS FILTER	K&L MICROWAVE	4IH30-1804/T10000-0	3	1.8-10GHZ	9/6/2019	9/6/2021

N/A: Not Applicable I/O: Initial Only CNR: Calibration Not Required
NOTE 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

17. RF Conducted Emissions Test (AC Mains)

Manufacturer	Springs Window Fashions
Product	Automated Cellular Window Shades
Model	CSZ2
Serial No	N/A
Mode	Transmitting

Information	
Setup Format	Tabletop
Height of Support	N/A
Type of Test Site	Reverberation Chamber
Note	

Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Conducted disturbance (mains port) (150 kHz – 30 MHz)	2.7

Procedures

The interference on each power lead of the EUT was measured by connecting the measuring equipment to the appropriate meter terminal of the Line Impedance Stabilization Network (LISN). The meter terminal of the LISN not under test was terminated with 50 ohms.

1) The EUT was operated in the Transmitting mode.
2) Measurements were first made on the Voltage high line.
3) The frequency range from 150 kHz to 30 MHz was broken up into smaller frequency sub-bands.
4) Conducted emissions measurements were taken on the first frequency sub-band using a peak detector.
5) The data thus obtained was then searched by the computer for the highest levels. Any emissions levels that were within 10dB of the average limit were then measured again using both a quasi-peak detector and an average detector. (If no peak readings were within 10dB of the average limit, quasi-peak and average readings were taken on the highest emissions levels measured during the peak detector scan.)
6) Steps (4) and (5) were repeated for the remainder of the frequency sub-bands until the entire frequency range from 150kHz to 30MHz was investigated. The peak trace was automatically plotted. The plot also shows quasi-peak and average readings that were taken on discrete frequencies. A table showing the quasi-peak and average readings was also generated. This tabular data compares the quasi-peak and average conducted emissions to the applicable conducted emissions limits.
7) Steps (3) through (6) were repeated on the Voltage neutral line.
8) Steps (2) through (7) were repeated with the EUT operated in the Receiving and Motor Running mode.

Test Setup for RF Conducted Emissions (AC Mains)

Test Setup for RF Conducted Emissions (AC Mains)

FCC Part 15 Subpart C Conducted Emissions Test

Significant Emissions Data

VBR8 01/08/2020

Manufacturer	:	Springs Window Fashions
Model	:	CSZ2
DUT Mode	:	Transmitting
Line Tested	:	High
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-1
Notes	:	N/A
Test Engineer	:	J. Cardenas
Limit	:	FCC 15.207
Test Date	:	Mar 13, 2020 02:56:09 PM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 1 dB margin below limit

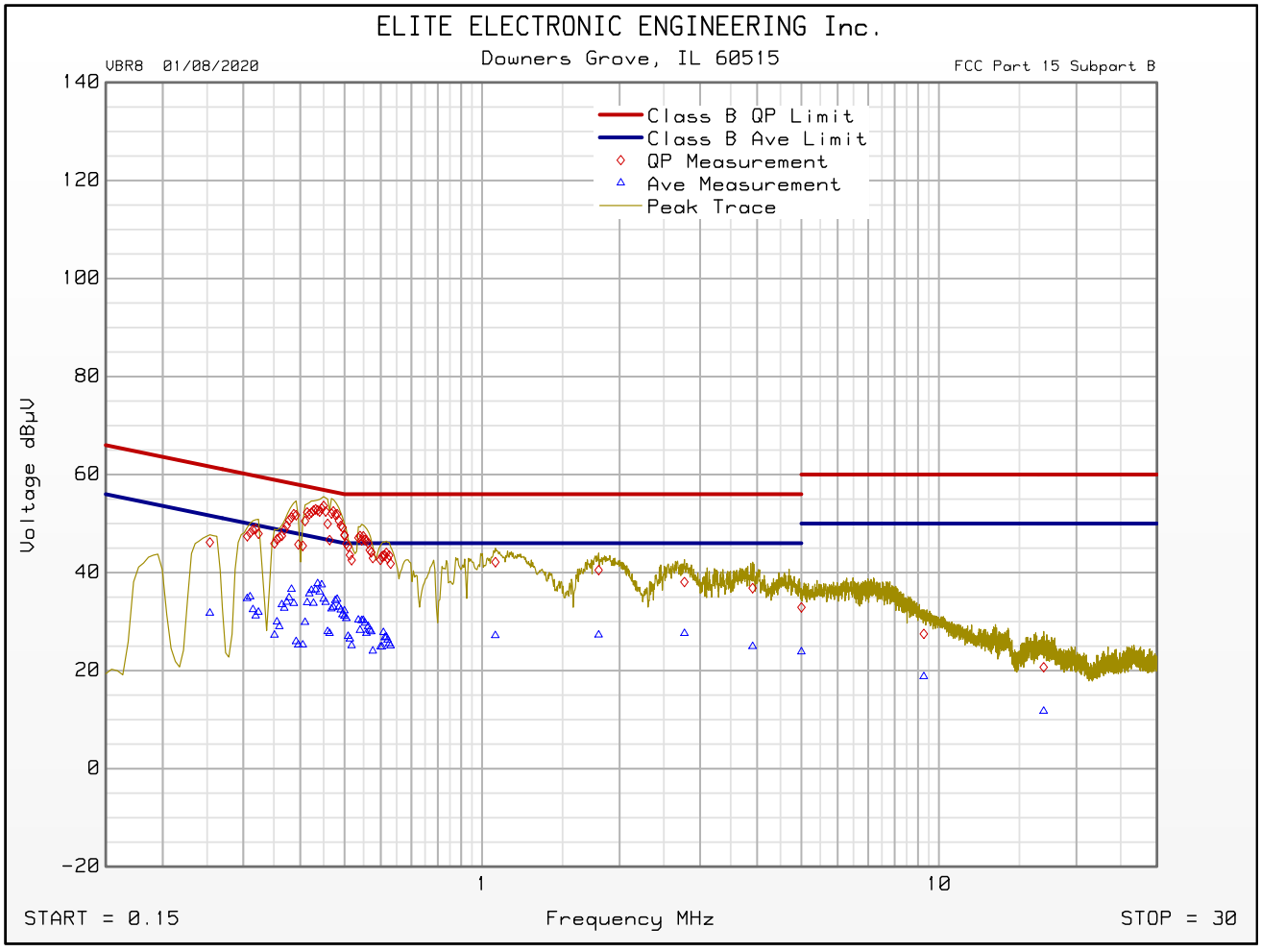
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.254	46.2	61.6		31.8	51.6	
0.450	53.6	56.9		34.6	46.9	
0.500	47.6	56.0		31.1	46.0	
1.069	42.1	56.0		27.2	46.0	
1.799	40.5	56.0		27.3	46.0	
2.772	38.1	56.0		27.6	46.0	
3.910	36.8	56.0		24.9	46.0	
5.000	32.9	56.0		23.9	46.0	
9.266	27.5	60.0		18.8	50.0	
16.952	20.7	60.0		11.8	50.0	

FCC Part 15 Subpart C Conducted Emissions Test

Significant Emissions Data

VBR8 01/08/2020

Manufacturer	:	Springs Window Fashions
Model	:	CSZ2
DUT Mode	:	Transmitting
Line Tested	:	High
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-1
Notes	:	N/A
Test Engineer	:	J. Cardenas
Limit	:	FCC 15.207
Test Date	:	Mar 13, 2020 02:56:09 PM



Emissions Meet QP Limit
Emissions Meet Ave Limit

FCC Part 15 Subpart C Conducted Emissions Test

Significant Emissions Data

VBR8 01/08/2020

Manufacturer	:	Springs Window Fashions
Model	:	CSZ2
DUT Mode	:	Transmitting
Line Tested	:	Neutral
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-1
Notes	:	N/A
Test Engineer	:	J. Cardenas
Limit	:	FCC 15.207
Test Date	:	Mar 13, 2020 02:47:44 PM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 1 dB margin below limit

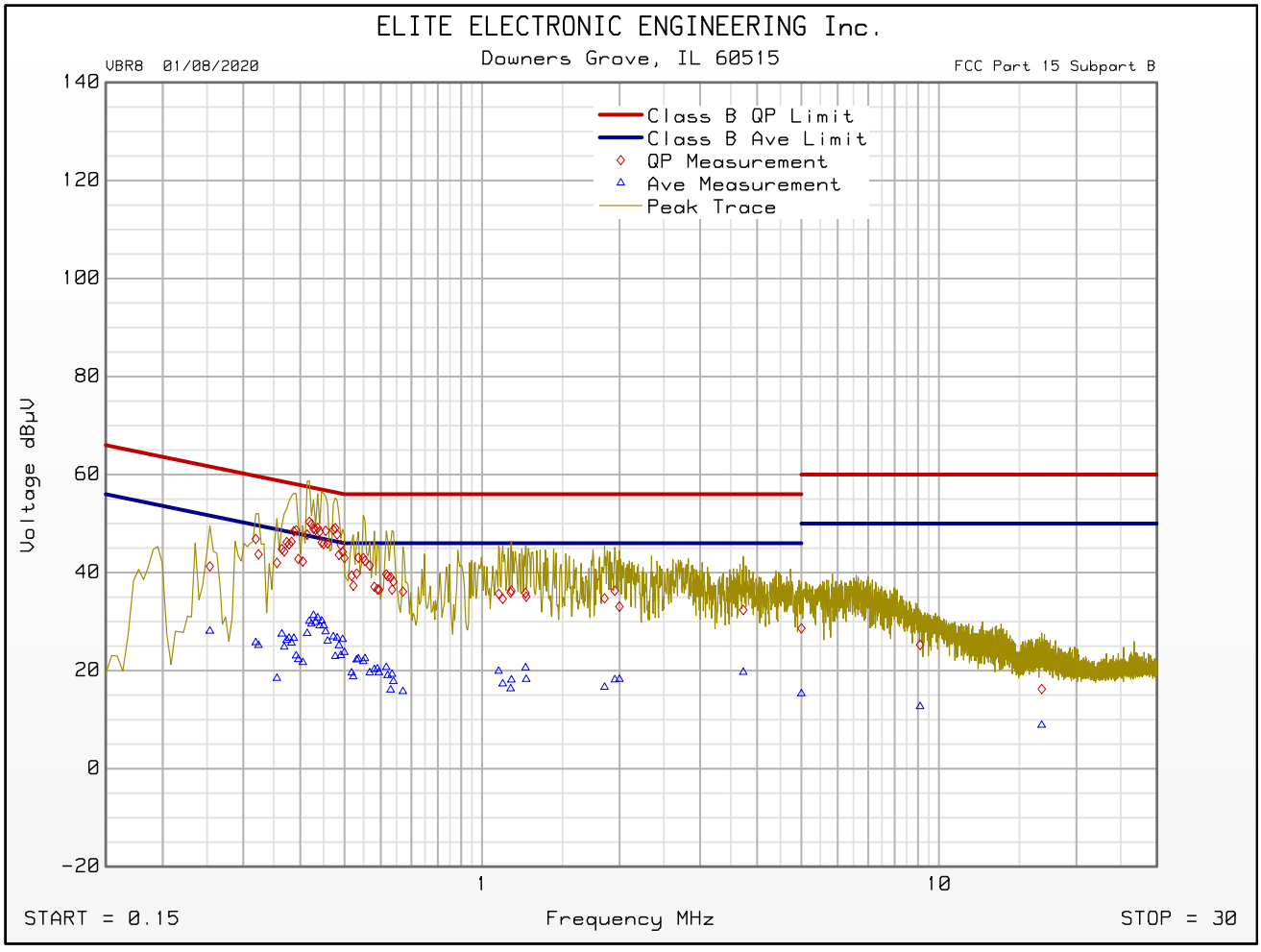
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.254	41.3	61.6		28.1	51.6	
0.419	50.4	57.5		30.1	47.5	
0.536	43.0	56.0		22.4	46.0	
1.159	36.3	56.0		18.1	46.0	
1.952	36.3	56.0		18.2	46.0	
1.998	33.1	56.0		18.2	46.0	
3.730	32.4	56.0		19.7	46.0	
5.000	28.6	56.0		15.3	46.0	
9.095	25.3	60.0		12.7	50.0	
16.790	16.2	60.0		8.9	50.0	

FCC Part 15 Subpart C Conducted Emissions Test

Significant Emissions Data

VBR8 01/08/2020

Manufacturer	:	Springs Window Fashions
Model	:	CSZ2
DUT Mode	:	Transmitting
Line Tested	:	Neutral
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-1
Notes	:	N/A
Test Engineer	:	J. Cardenas
Limit	:	FCC 15.207
Test Date	:	Mar 13, 2020 02:47:44 PM



Emissions Meet QP Limit
Emissions Meet Ave Limit

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 01/08/2020

Manufacturer	:	Springs Window Fashions
Model	:	CSZ2
DUT Mode	:	Receiving and Motor Running
Line Tested	:	High
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-1
Notes	:	N/A
Test Engineer	:	J. Cardenas
Limit	:	Class B
Test Date	:	Mar 13, 2020 03:07:25 PM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 1 dB margin below limit

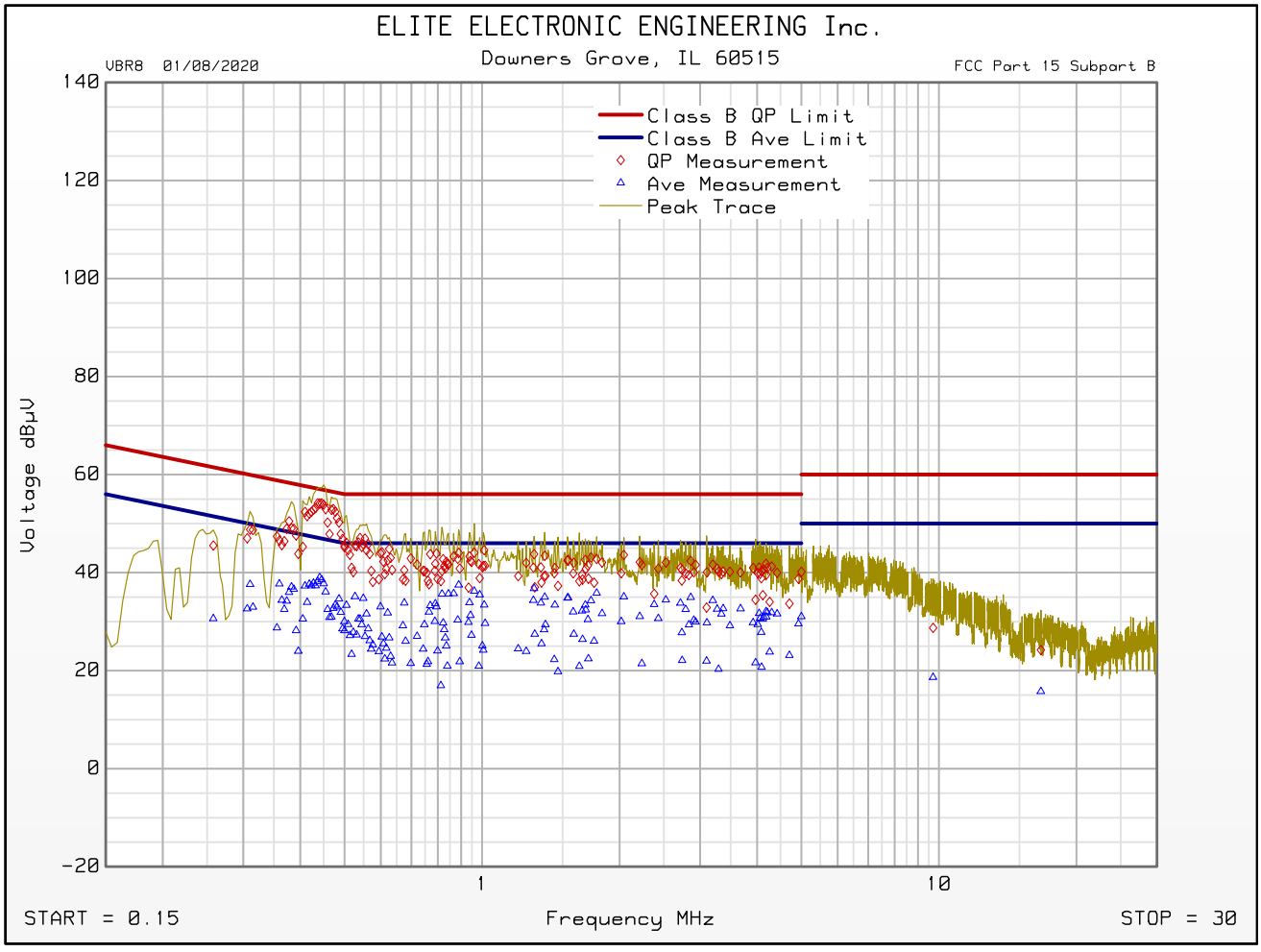
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.258	45.5	61.5		30.6	51.5	
0.446	54.1	57.0		38.6	47.0	
0.541	47.1	56.0		30.5	46.0	
1.011	44.6	56.0		33.4	46.0	
1.300	43.8	56.0		36.8	46.0	
2.043	43.6	56.0		35.1	46.0	
4.184	41.8	56.0		32.1	46.0	
5.000	40.2	56.0		31.0	46.0	
9.711	28.7	60.0		18.7	50.0	
16.718	24.2	60.0		15.8	50.0	

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 01/08/2020

Manufacturer	:	Springs Window Fashions
Model	:	CSZ2
DUT Mode	:	Receiving and Motor Running
Line Tested	:	High
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-1
Notes	:	N/A
Test Engineer	:	J. Cardenas
Limit	:	Class B
Test Date	:	Mar 13, 2020 03:07:25 PM



Emissions Meet QP Limit
Emissions Meet Ave Limit

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 01/08/2020

Manufacturer	:	Springs Window Fashions
Model	:	CSZ2
DUT Mode	:	Receiving and Motor Running
Line Tested	:	Neutral
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-1
Notes	:	N/A
Test Engineer	:	J. Cardenas
Limit	:	Class B
Test Date	:	Mar 13, 2020 03:13:47 PM
Data Filter	:	Up to 80 maximum levels detected with 6 dB level excursion threshold over 1 dB margin below limit

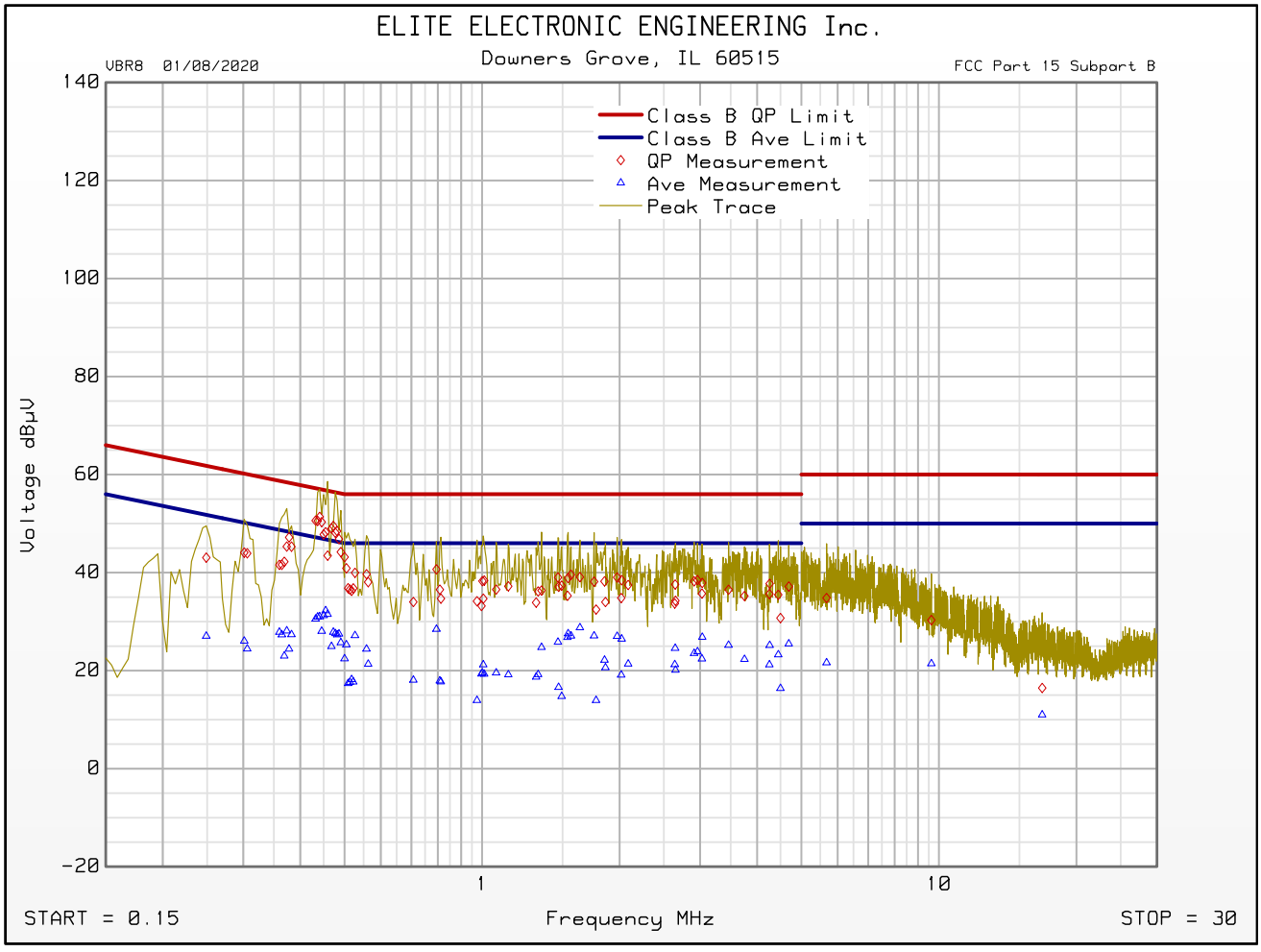
Freq MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Excessive Quasi-peak Emissions	Average Level dBµV	Average Limit dBµV	Excessive Average Emissions
0.249	43.1	61.8		27.1	51.8	
0.441	51.4	57.0		31.0	47.0	
0.500	43.2	56.0		22.4	46.0	
0.795	40.7	56.0		28.5	46.0	
1.565	39.6	56.0		27.1	46.0	
2.961	38.5	56.0		23.9	46.0	
4.261	37.7	56.0		25.2	46.0	
5.675	34.8	60.0		21.6	50.0	
9.626	30.3	60.0		21.4	50.0	
16.831	16.5	60.0		11.0	50.0	

FCC Part 15 Subpart B Conducted Emissions Test

Significant Emissions Data

VBR8 01/08/2020

Manufacturer	:	Springs Window Fashions
Model	:	CSZ2
DUT Mode	:	Receiving and Motor Running
Line Tested	:	Neutral
Scan Step Time [ms]	:	30
Meas. Threshold [dB]	:	-1
Notes	:	N/A
Test Engineer	:	J. Cardenas
Limit	:	Class B
Test Date	:	Mar 13, 2020 03:13:47 PM



Emissions Meet QP Limit
Emissions Meet Ave Limit

18. RF Radiated Emissions Test

Manufacturer	Springs Window Fashions
Product	Automated Cellular Window Shades
Model	CSZ2
Serial No	N/A
Mode	Receiving and Motor Running

Information	
Setup Format	Tabletop
Height of Support	N/A
Type of Test Site	Semi-Anechoic Chamber
Type of Antennas Used	Below 1GHz: Bilog (or equivalent) Above 1GHz: Double-ridged waveguide (or equivalent)
Highest Internal Frequency of the EUT:	916MHz
Highest Measurement Frequency:	10GHz
Notes	The cables were manually maximized during the preliminary emissions sweeps. The cable arrangement which resulted in the worst-case emissions was utilized.

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

Procedures
Since a quasi-peak detector and an average detector requires a long integration times, it is not practical to automatically sweep through the quasi-peak and average levels. Therefore, radiated emissions from the EUT were first scanned using a peak detector and automatically plotted. The frequencies where significant emission levels were noted were then remeasured using the quasi-peak detector or average detector. The EUT and all peripheral equipment were placed on an 80cm high non-conductive stand. The broadband measuring antenna was positioned at a 3 meter distance from the EUT. The frequency range from 30MHz to 1GHz was investigated using a peak detector function with the bilog antenna at several heights, horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The frequency range from 1GHz to 10GHz was investigated using a peak detector function with the double ridged waveguide antenna at several heights, horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The maximum levels for each antenna polarization were plotted. Final radiated emissions were performed on all significant broadband and narrowband emissions found in the exploratory sweeps using the following methods: 1) Measurements from 30MHz to 1GHz were made using a quasi-peak detector and a broadband bilog antenna. Measurements above 1GHz were made using an average detector and a broadband double ridged waveguide antenna. 2) To ensure that maximum or worst case, emission levels were measured, the following steps were taken: a) The EUT was rotated so that all sides were exposed to the receiving antenna. b) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured. c) The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings. d) For hand-held or body-worn devices, the EUT was rotated through three orthogonal axes to determine which orientation produces the highest emission relative to the limit.

Test Setup for Radiated Emissions: 30MHz to 1GHz, Horizontal Polarization

Test Setup for Radiated Emissions: 30MHz to 1GHz, Vertical Polarization

Test Setup for Radiated Emissions: Above 1GHz, Horizontal Polarization

Test Setup for Radiated Emissions: Above 1GHz, Vertical Polarization

FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

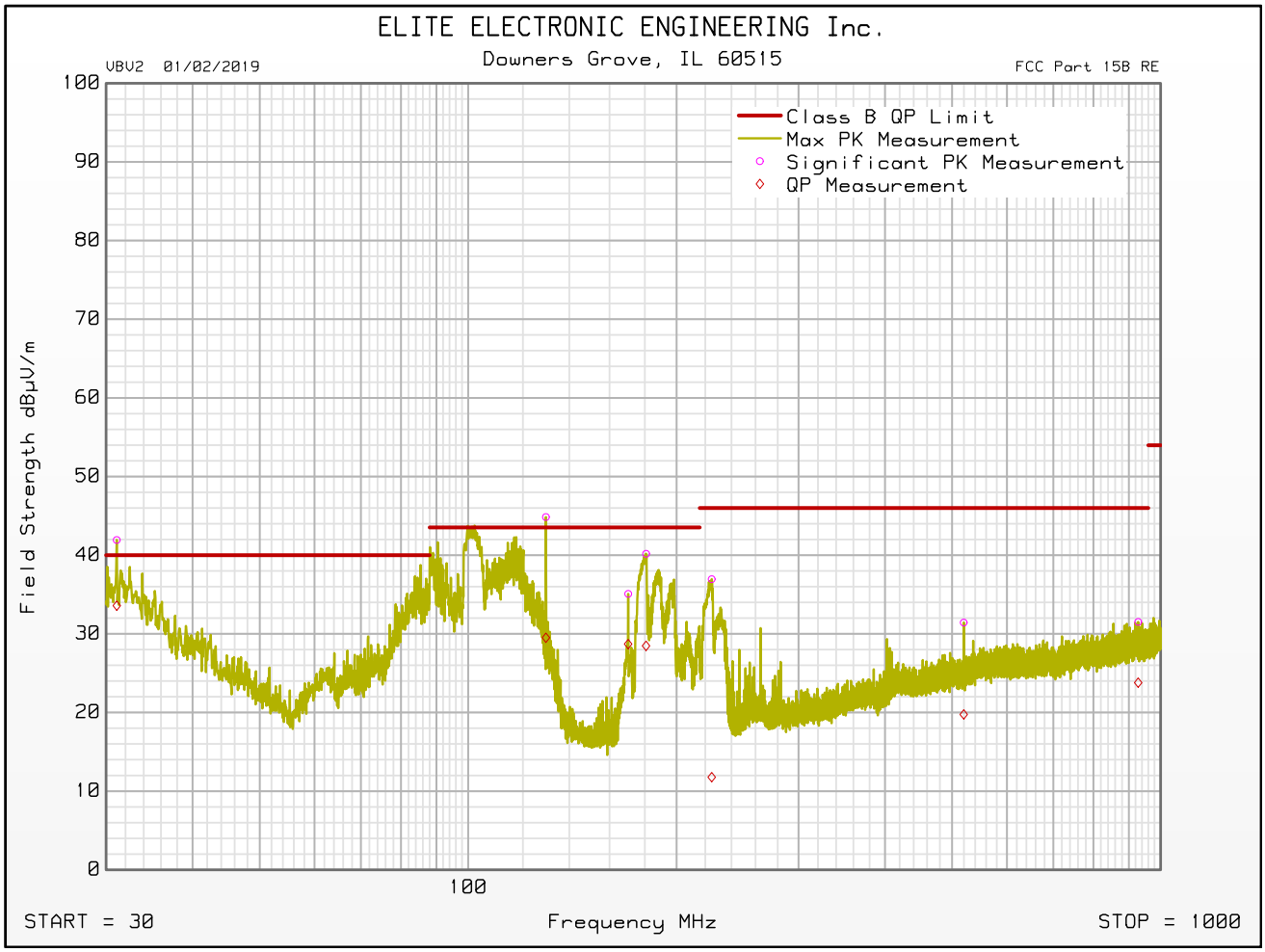
Manufacturer	:	Springs Window Fashions
Model	:	CSZ2
DUT Mode	:	Receiving and Motor Running
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Scan Type	:	Stepped Scan
Test RBW	:	120 kHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	N/A
Test Engineer	:	J. Cardenas
Test Date	:	Mar 13, 2020 11:22:17 AM

Freq MHz	Peak Mtr Rdg dBuV	QP Mtr Rdg dBuV	Ant Fac dB	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBµV/m	QP Total dBµV/m	QP Limit dBµV/m	QP Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °
31.080	17.6	9.3	23.9	0.0	0.4	0.0	41.9	33.6	40.0	-6.4	V	120	90
82.680	30.1	24.4	13.7	0.0	0.4	0.0	44.2	38.5	40.0	-1.5	H	340	180
83.640	28.4	20.6	13.9	0.0	0.4	0.0	42.7	34.9	40.0	-5.1	H	340	180
87.900	32.0	15.6	14.7	0.0	0.4	0.0	47.1	30.7	40.0	-9.3	H	340	0
110.140	26.5	-3.0	17.7	0.0	0.4	0.0	44.6	15.1	43.5	-28.4	H	120	135
129.520	26.1	10.8	18.2	0.0	0.5	0.0	44.8	29.5	43.5	-14.0	V	120	270
170.260	18.7	12.4	15.7	0.0	0.7	0.0	35.1	28.7	43.5	-14.8	V	200	180
180.700	24.2	12.5	15.3	0.0	0.7	0.0	40.2	28.5	43.5	-15.0	V	340	180
190.900	34.4	24.3	15.0	0.0	0.7	0.0	50.1	40.1	43.5	-3.4	H	120	180
224.760	20.4	-4.8	15.8	0.0	0.8	0.0	37.0	11.8	46.0	-34.2	V	340	90
433.620	10.7	-4.5	22.4	0.0	1.1	0.0	34.3	19.1	46.0	-26.9	H	340	270
497.820	5.6	-4.9	23.7	0.0	1.1	0.0	30.4	19.9	46.0	-26.1	H	200	45
519.660	6.9	-4.8	23.4	0.0	1.1	0.0	31.4	19.8	46.0	-26.2	V	340	0
928.320	3.3	-4.4	26.7	0.0	1.5	0.0	31.5	23.8	46.0	-22.2	V	340	135

FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

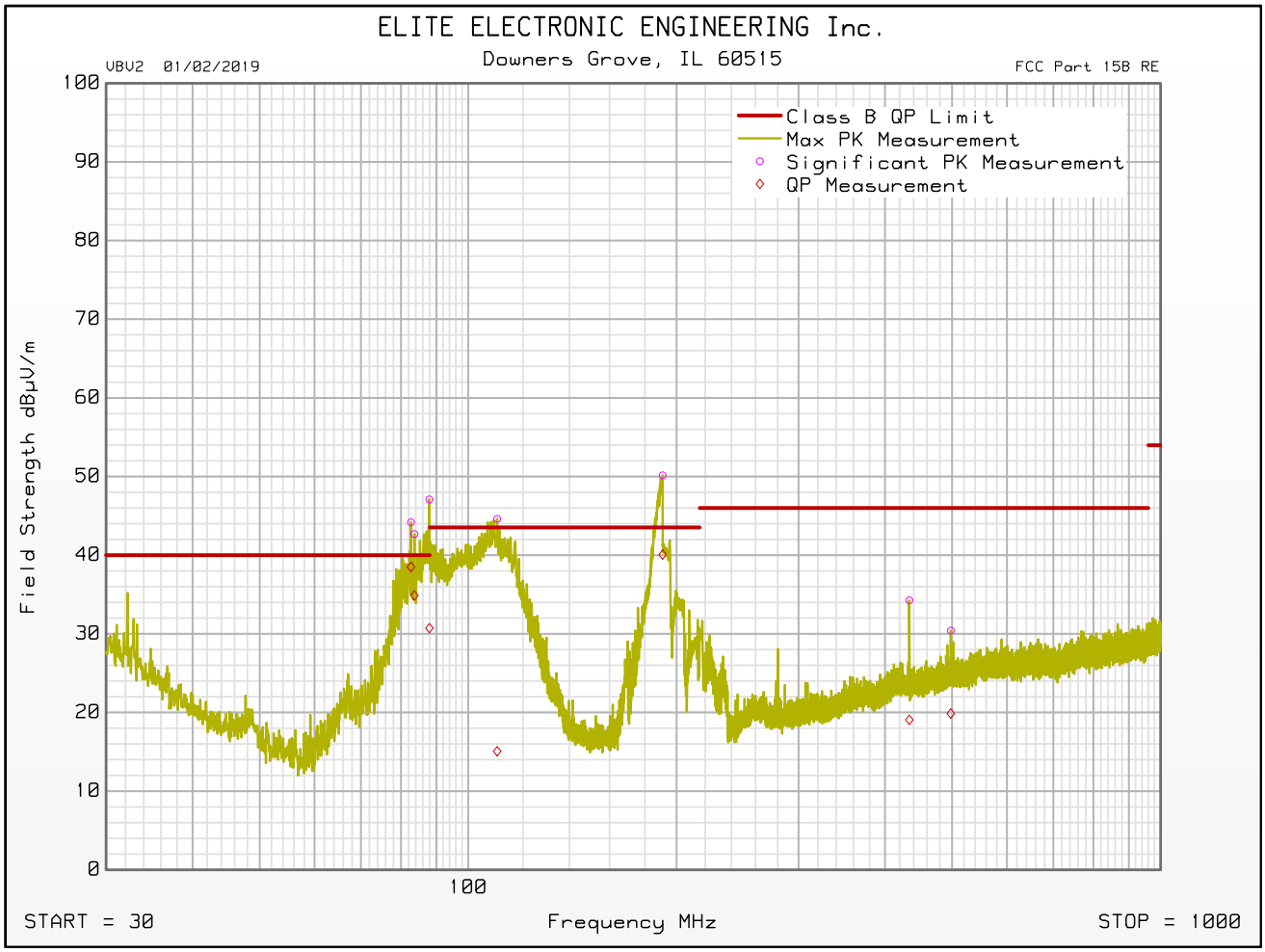
Manufacturer	:	Springs Window Fashions
Model	:	CSZ2
DUT Mode	:	Receiving and Motor Running
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	V
Scan Type	:	Stepped Scan
Test RBW	:	120 kHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	N/A
Test Engineer	:	J. Cardenas
Test Date	:	Mar 13, 2020 11:22:17 AM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer	:	Springs Window Fashions
Model	:	CSZ2
DUT Mode	:	Receiving and Motor Running
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	H
Scan Type	:	Stepped Scan
Test RBW	:	120 kHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	N/A
Test Engineer	:	J. Cardenas
Test Date	:	Mar 13, 2020 11:22:17 AM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

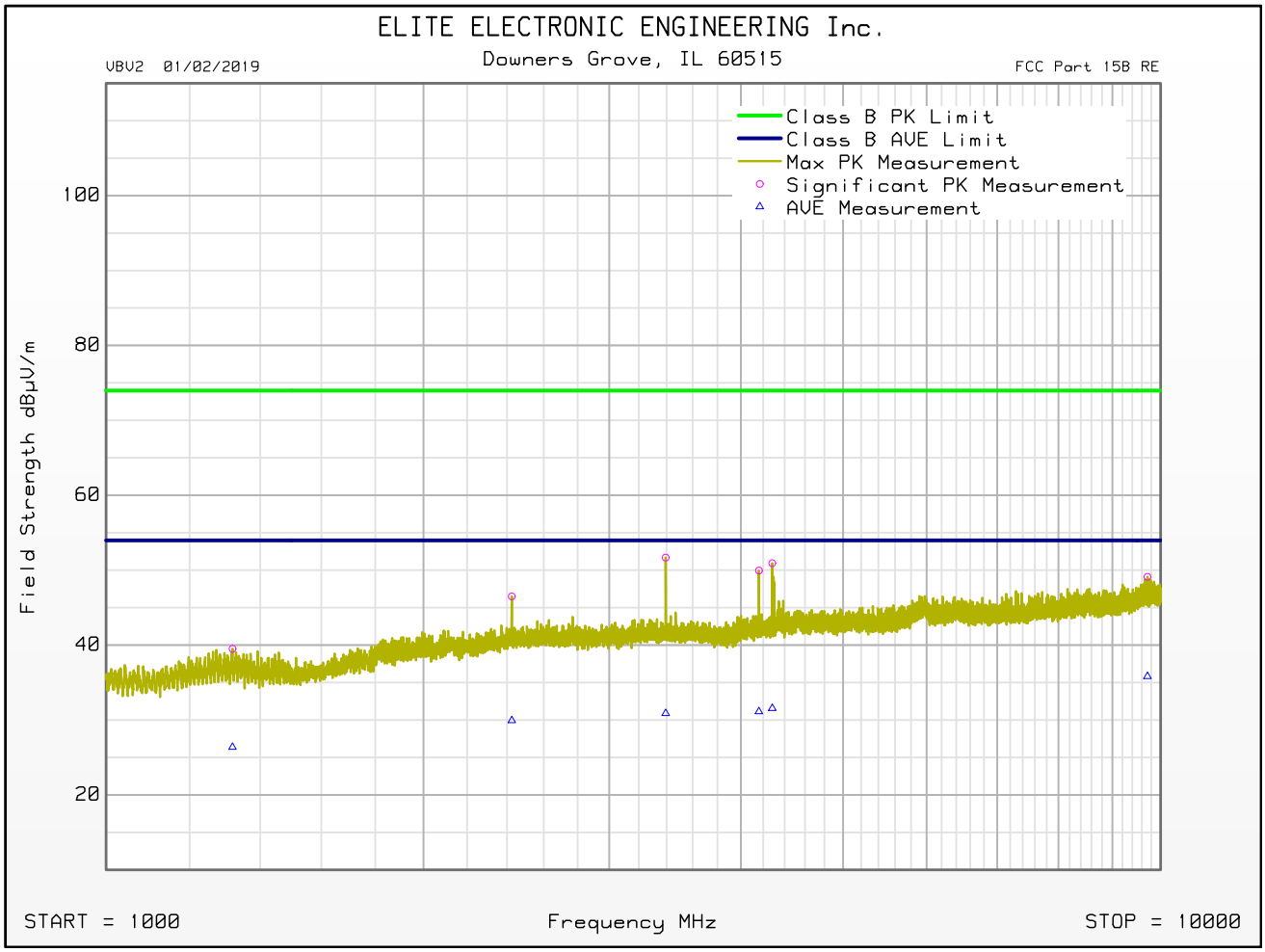
Manufacturer	:	Springs Window Fashions
Model	:	CSZ2
DUT Mode	:	Receiving and Motor Running
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Scan Type	:	Stepped Scan
Test RBW	:	1 MHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	N/A
Test Engineer	:	J. Cardenas
Test Date	:	Mar 13, 2020 10:52:19 AM

Freq MHz	Peak Mtr Rdg dBuV	Average Mtr Rdg dBuV	Ant Fac dB	Amp Fac dB	Cbl Fac dB	Dist Corr dB	Peak Total dBµV/m	Peak Limit dBµV/m	Peak Lim Mrg dB	Average Total dBµV/m	Average Limit dBµV/m	Average Lim Mrg dB	Ant Pol	Mast Ht cm	Azim °
1318.000	49.5	36.4	29.0	-40.9	1.8	0.0	39.5	74.0	-34.5	26.4	54.0	-27.6	V	200	45
2006.000	49.4	36.6	31.6	-40.8	2.3	0.0	42.4	74.0	-31.6	29.6	54.0	-24.4	H	340	90
2425.000	52.1	35.5	32.3	-40.5	2.6	0.0	46.5	74.0	-27.5	29.9	54.0	-24.0	V	200	0
2439.000	51.8	35.3	32.4	-40.5	2.6	0.0	46.3	74.0	-27.7	29.8	54.0	-24.2	H	340	225
3394.000	56.1	35.2	32.9	-40.4	3.2	0.0	51.7	74.0	-22.3	30.9	54.0	-23.1	V	120	225
4160.500	53.3	34.4	33.5	-40.3	3.5	0.0	50.0	74.0	-24.0	31.1	54.0	-22.9	V	340	180
4283.000	54.2	34.8	33.6	-40.4	3.5	0.0	50.9	74.0	-23.0	31.6	54.0	-22.4	V	340	45
5996.500	48.2	34.2	35.1	-40.4	4.2	0.0	47.0	74.0	-27.0	33.1	54.0	-20.9	H	200	0
9718.000	47.4	34.1	36.7	-40.2	5.2	0.0	49.1	74.0	-24.9	35.8	54.0	-18.2	V	200	270

FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

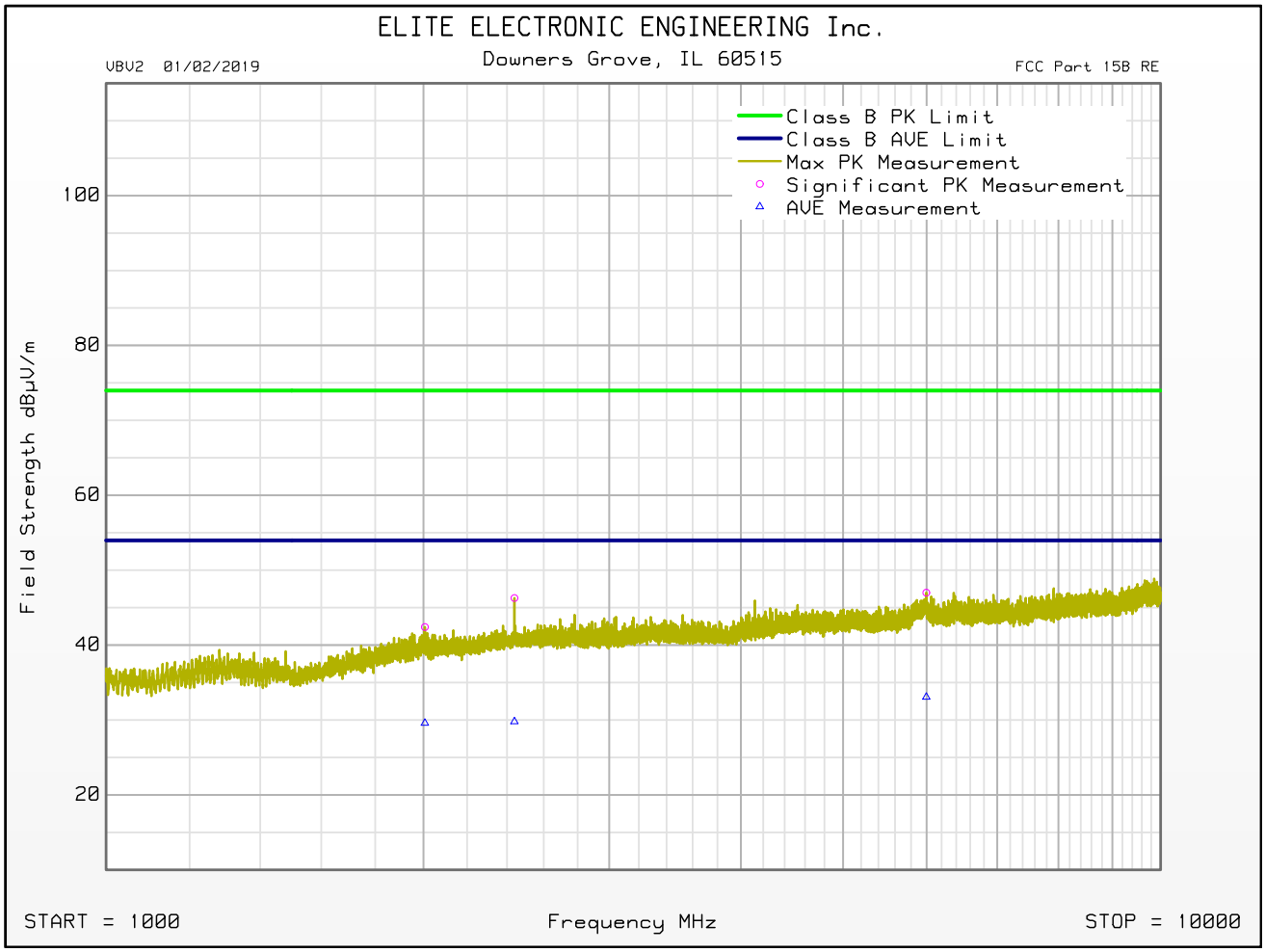
Manufacturer	:	Springs Window Fashions
Model	:	CSZ2
DUT Mode	:	Receiving and Motor Running
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	V
Scan Type	:	Stepped Scan
Test RBW	:	1 MHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	N/A
Test Engineer	:	J. Cardenas
Test Date	:	Mar 13, 2020 10:52:19 AM



FCC Part 15B Class B Radiated RF Emissions Test

SW ID/Rev: VBV2 01/02/2019

Manufacturer	:	Springs Window Fashions
Model	:	CSZ2
DUT Mode	:	Receiving and Motor Running
Turntable Step Angle (°)	:	45
Mast Positions (cm)	:	120, 200, 340
Ant. Polarization(s)	:	H
Scan Type	:	Stepped Scan
Test RBW	:	1 MHz
Prelim Dwell Time (s)	:	0.0001
Notes	:	N/A
Test Engineer	:	J. Cardenas
Test Date	:	Mar 13, 2020 10:52:19 AM



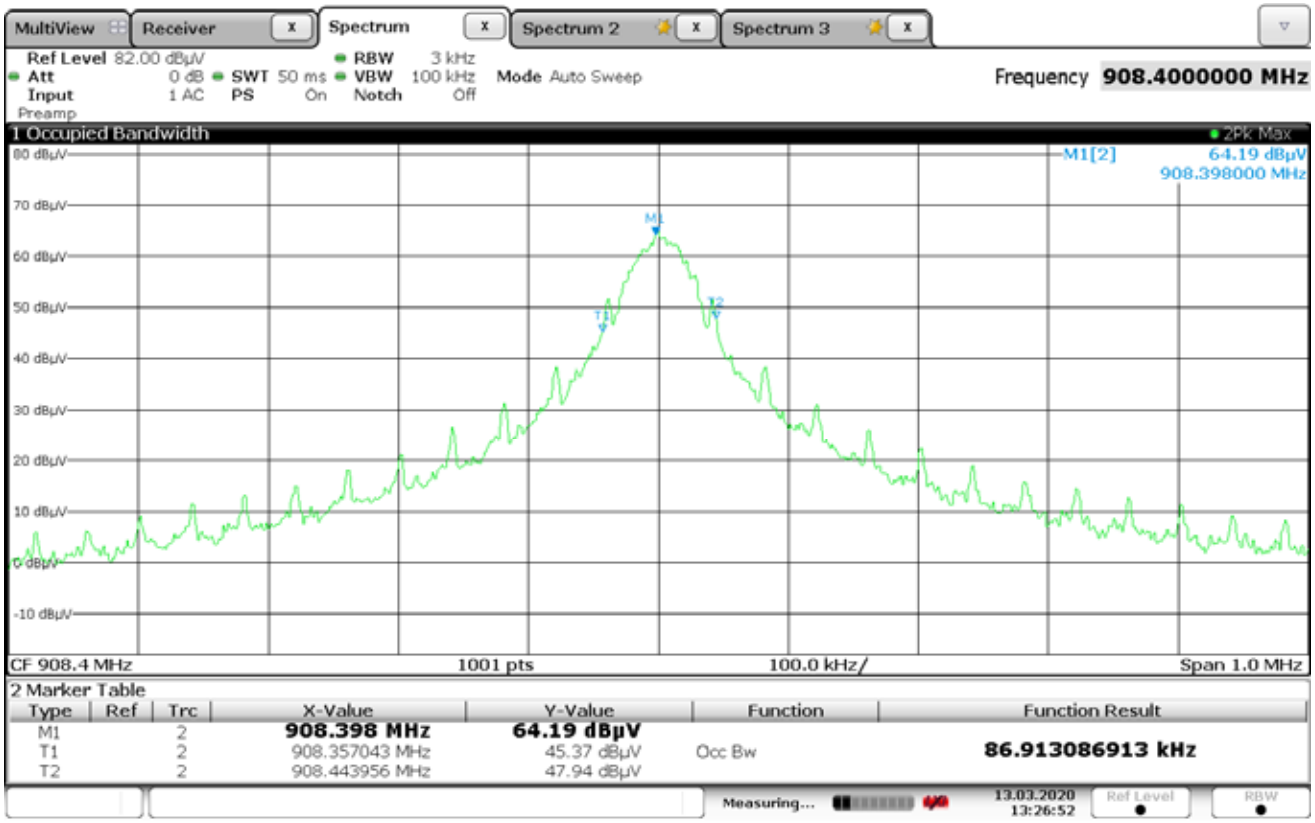
19. Occupied Bandwidth

Manufacturer	Springs Window Fashions
Product	Automated Cellular Window Shades
Model	CSZ2
Serial No	N/A
Mode	Transmitting

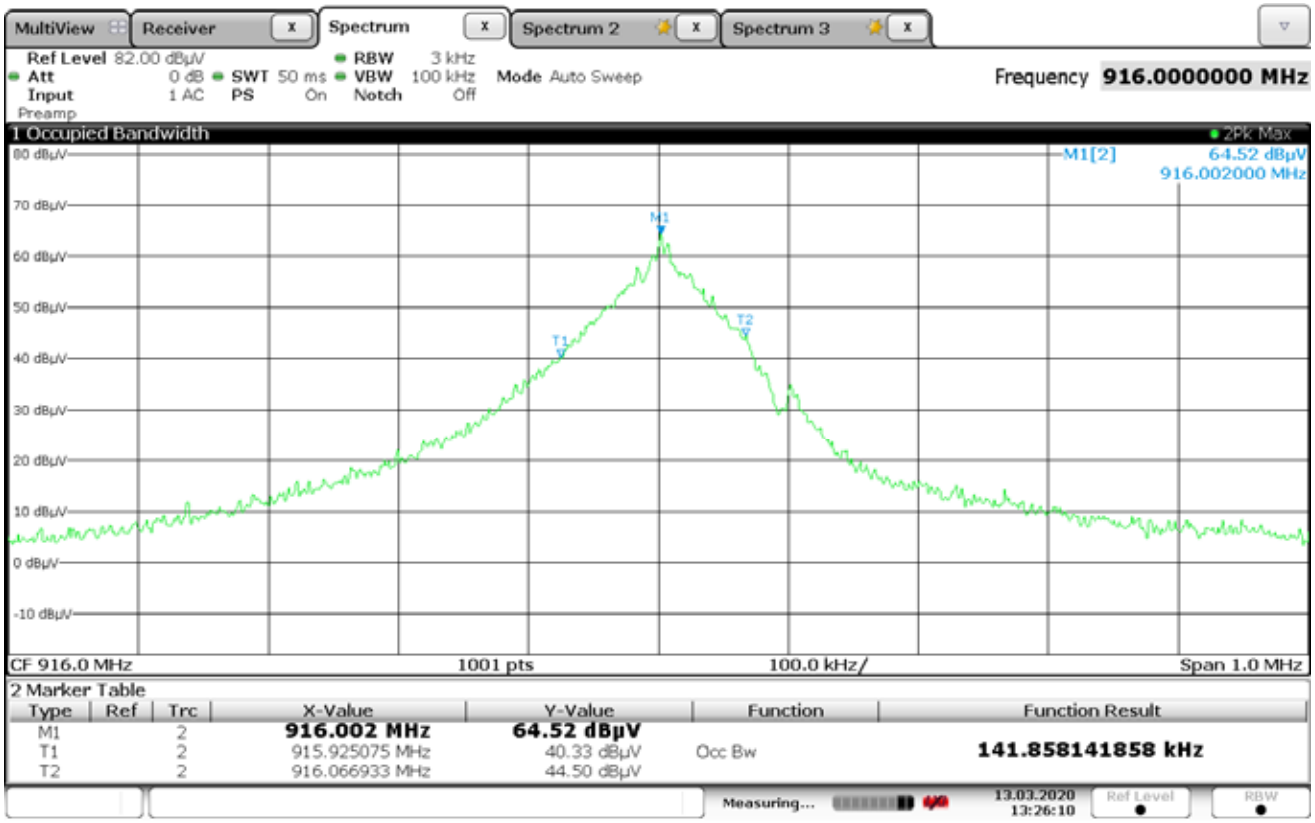
Information	
Setup Format	Tabletop
Height of Support	N/A
Type of Test Site	Semi-Anechoic Chamber
Notes	

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

Procedures
The EUT was allowed to transmit continuously. The transmit channel was set separately to 908.4MHz and 916MHz. The resolution bandwidth (RBW) was set to 1% to 5% of the OCC and the span was set to greater than the RBW and wide enough to show the whole transmitter envelope. 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



Date: 13.MAR.2020 13:26:53



Date: 13.MAR.2020 13:26:09

20. Field Strength and Radiated Spurious Emissions

Manufacturer	Springs Window Fashions
Product	Automated Cellular Window Shades
Model	CSZ2
Serial No	N/A
Mode	Receiving and Motor Running

Information	
Setup Format	Tabletop
Height of Support	N/A
Type of Test Site	Semi-Anechoic Chamber
Type of Antennas Used	Below 1GHz: Bilog (or equivalent) Above 1GHz: Double-ridged waveguide (or equivalent)
Highest Internal Frequency of the EUT:	916MHz
Highest Measurement Frequency:	10GHz
Notes	The cables were manually maximized during the preliminary emissions sweeps. The cable arrangement which resulted in the worst-case emissions was utilized.

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

Procedures
The EUT and all peripheral equipment were placed on an 80cm high non-conductive stand. The broadband measuring antenna was positioned at a 3 meter distance from the EUT. The frequency range from 30MHz to 1GHz was investigated using a peak detector function with the bilog antenna at several heights, horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The EUT and all peripheral equipment were then placed on a 150cm high non-conductive stand. The frequency range from 1GHz to 10GHz was investigated using a peak and average detector function with the double ridged waveguide antenna at several heights, horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The maximum levels for each antenna polarization were recorded.

Test Setup for Radiated Emissions: 30MHz to 1GHz, Horizontal Polarization

Test Setup for Radiated Emissions: 30MHz to 1GHz, Vertical Polarization

Test Setup for Radiated Emissions: Above 1GHz, Horizontal Polarization

Test Setup for Radiated Emissions: Above 1GHz, Vertical Polarization

Test Details	
Mode	Transmitting – 908.4MHz
Notes	N/A

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	QP/Peak Total dBuV/m at 3m	QP/Peak Total uV/m at 3 m	QP/Peak Limit uV/m at 3 m	Margin (dB)
908.400	H	64.9		1.6	26.7	0.0	93.1	45383.4	50000.0	-0.8
908.400	V	62.8		1.6	26.7	0.0	91.1	35718.8	50000.0	-2.9
1816.800	H	52.8	*	2.2	30.6	-40.0	45.7	192.2	5000.0	-28.3
1816.800	V	53.3	*	2.2	30.6	-40.0	46.2	203.9	5000.0	-27.8
2725.200	H	53.8	*	2.8	32.5	-39.8	49.4	295.5	5000.0	-24.6
2725.200	V	53.3	*	2.8	32.5	-39.8	48.9	277.1	5000.0	-25.1
3633.600	H	47.3	*	3.2	33.0	-39.2	44.3	164.9	5000.0	-29.6
3633.600	V	47.3	*	3.2	33.0	-39.2	44.3	164.0	5000.0	-29.7
4542.000	H	50.0	*	3.6	34.1	-39.2	48.5	265.1	5000.0	-25.5
4542.000	V	50.0	*	3.6	34.1	-39.2	48.5	266.6	5000.0	-25.5
5450.400	H	50.2	*	3.9	34.6	-39.4	49.4	295.4	5000.0	-24.6
5450.400	V	49.5	*	3.9	34.6	-39.4	48.7	272.9	5000.0	-25.3
6358.800	H	49.5	*	4.3	35.4	-39.4	49.9	311.3	5000.0	-24.1
6358.800	V	50.4	*	4.3	35.4	-39.4	50.7	344.5	5000.0	-23.2
7267.200	H	49.2	*	4.7	35.6	-39.4	50.1	318.8	5000.0	-23.9
7267.200	V	48.9	*	4.7	35.6	-39.4	49.8	307.3	5000.0	-24.2
8175.600	H	50.1	*	4.9	35.7	-39.4	51.3	366.7	5000.0	-22.7
8175.600	V	50.0	*	4.9	35.7	-39.4	51.2	363.0	5000.0	-22.8
9084.000	H	50.2	*	5.0	36.0	-39.3	51.9	391.9	5000.0	-22.1
9084.000	V	50.7	*	5.0	36.0	-39.3	52.3	414.2	5000.0	-21.6

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
1816.80	H	37.83	*	2.2	30.6	-40.0	0.0	30.7	34.2	500.0	-23.3
1816.80	V	37.81	*	2.2	30.6	-40.0	0.0	30.7	34.1	500.0	-23.3
2725.20	H	37.85	*	2.8	32.5	-39.8	0.0	33.4	46.9	500.0	-20.6
2725.20	V	37.82	*	2.8	32.5	-39.8	0.0	33.4	46.7	500.0	-20.6
3633.60	H	31.98	*	3.2	33.0	-39.2	0.0	29.0	28.2	500.0	-25.0
3633.60	V	31.95	*	3.2	33.0	-39.2	0.0	29.0	28.1	500.0	-25.0
4542.00	H	34.92	*	3.6	34.1	-39.2	0.0	33.4	46.8	500.0	-20.6
4542.00	V	34.85	*	3.6	34.1	-39.2	0.0	33.3	46.4	500.0	-20.7
5450.40	H	34.43	*	3.9	34.6	-39.4	0.0	33.6	47.9	500.0	-20.4
5450.40	V	34.44	*	3.9	34.6	-39.4	0.0	33.6	48.0	500.0	-20.4
6358.80	H	34.6	*	4.3	35.4	-39.4	0.0	34.9	55.8	500.0	-19.0
6358.80	V	34.12	*	4.3	35.4	-39.4	0.0	34.5	52.8	500.0	-19.5
7267.20	H	33.97	*	4.7	35.6	-39.4	0.0	34.8	55.1	500.0	-19.1
7267.20	V	33.92	*	4.7	35.6	-39.4	0.0	34.8	54.8	500.0	-19.2
8175.60	H	34.79	*	4.9	35.7	-39.4	0.0	36.0	62.9	500.0	-18.0
8175.60	V	34.66	*	4.9	35.7	-39.4	0.0	35.8	62.0	500.0	-18.1
9084.00	H	34.69	*	5.0	36.0	-39.3	0.0	36.4	65.8	500.0	-17.6
9084.00	V	34.49	*	5.0	36.0	-39.3	0.0	36.2	64.3	500.0	-17.8

Test Details	
Mode	Transmitting – 916MHz
Notes	N/A

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	QP/Peak Total dBuV/m at 3m	QP/Peak Total uV/m at 3 m	QP/Peak Limit uV/m at 3 m	Margin (dB)
916.000	H	61.4		1.6	26.7	0.0	89.6	30255.8	50000.0	-4.4
916.000	V	58.5		1.6	26.7	0.0	86.8	21842.8	50000.0	-7.2
1832.000	H	54.1	*	2.2	30.7	-40.0	47.0	223.3	5000.0	-27.0
1832.000	V	53.4	*	2.2	30.7	-40.0	46.3	206.3	5000.0	-27.7
2748.000	H	51.7		2.8	32.6	-39.7	47.3	231.4	5000.0	-26.7
2748.000	V	54.2		2.8	32.6	-39.7	49.8	310.7	5000.0	-24.1
3664.000	H	49.9	*	3.3	33.0	-39.2	46.9	221.2	5000.0	-27.1
3664.000	V	50.0	*	3.3	33.0	-39.2	47.1	225.3	5000.0	-26.9
4580.000	H	50.3	*	3.6	34.2	-39.2	48.8	276.8	5000.0	-25.1
4580.000	V	50.3	*	3.6	34.2	-39.2	48.9	278.4	5000.0	-25.1
5496.000	H	50.1	*	3.9	34.6	-39.4	49.2	287.9	5000.0	-24.8
5496.000	V	50.0	*	3.9	34.6	-39.4	49.2	287.2	5000.0	-24.8
6412.000	H	49.4		4.3	35.5	-39.4	49.9	311.0	5000.0	-24.1
6412.000	V	49.0		4.3	35.5	-39.4	49.4	295.0	5000.0	-24.6
7328.000	H	48.4	*	4.7	35.7	-39.4	49.3	292.7	5000.0	-24.7
7328.000	V	49.5	*	4.7	35.7	-39.4	50.4	330.3	5000.0	-23.6
8244.000	H	50.0	*	4.9	35.7	-39.4	51.3	366.4	5000.0	-22.7
8244.000	V	49.9	*	4.9	35.7	-39.4	51.1	359.3	5000.0	-22.9
9160.000	H	49.4	*	5.0	36.1	-39.3	51.2	361.2	5000.0	-22.8
9160.000	V	49.1	*	5.0	36.1	-39.3	50.8	348.5	5000.0	-23.1

Freq. MHz	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBuV/m at 3m	Average Total uV/m at 3 m	Average Limit uV/m at 3 m	Margin (dB)
1832.00	H	38.41	*	2.2	30.7	-40.0	0.0	31.3	36.7	500.0	-22.7
1832.00	V	37.58	*	2.2	30.7	-40.0	0.0	30.5	33.4	500.0	-23.5
2748.00	H	39.75		2.8	32.6	-39.7	0.0	35.4	58.8	500.0	-18.6
2748.00	V	44.75		2.8	32.6	-39.7	0.0	40.4	104.6	500.0	-13.6
3664.00	H	34.55	*	3.3	33.0	-39.2	0.0	31.6	37.9	500.0	-22.4
3664.00	V	34.73	*	3.3	33.0	-39.2	0.0	31.8	38.7	500.0	-22.2
4580.00	H	34.54	*	3.6	34.2	-39.2	0.0	33.1	45.3	500.0	-20.9
4580.00	V	35.24	*	3.6	34.2	-39.2	0.0	33.8	49.1	500.0	-20.2
5496.00	H	34.51	*	3.9	34.6	-39.4	0.0	33.6	48.1	500.0	-20.3
5496.00	V	34.48	*	3.9	34.6	-39.4	0.0	33.6	47.9	500.0	-20.4
6412.00	H	37.13		4.3	35.5	-39.4	0.0	37.5	75.4	500.0	-16.4
6412.00	V	36.84		4.3	35.5	-39.4	0.0	37.3	72.9	500.0	-16.7
7328.00	H	35.05	*	4.7	35.7	-39.4	0.0	36.0	62.9	500.0	-18.0
7328.00	V	35.68	*	4.7	35.7	-39.4	0.0	36.6	67.6	500.0	-17.4
8244.00	H	34.62	*	4.9	35.7	-39.4	0.0	35.9	62.1	500.0	-18.1
8244.00	V	34.45	*	4.9	35.7	-39.4	0.0	35.7	60.9	500.0	-18.3
9160.00	H	34.45	*	5.0	36.1	-39.3	0.0	36.2	64.5	500.0	-17.8
9160.00	V	34.27	*	5.0	36.1	-39.3	0.0	36.0	63.2	500.0	-18.0

21. Band-Edge Compliance

Manufacturer	Springs Window Fashions
Product	Automated Cellular Window Shades
Model	CSZ2
Serial No	N/A
Mode	Transmitting

Information	
Setup Format	Tabletop
Height of Support	N/A
Type of Antennas Used	Below 1GHz: Bilog (or equivalent) Above 1GHz: Double-ridged waveguide (or equivalent)
Notes	

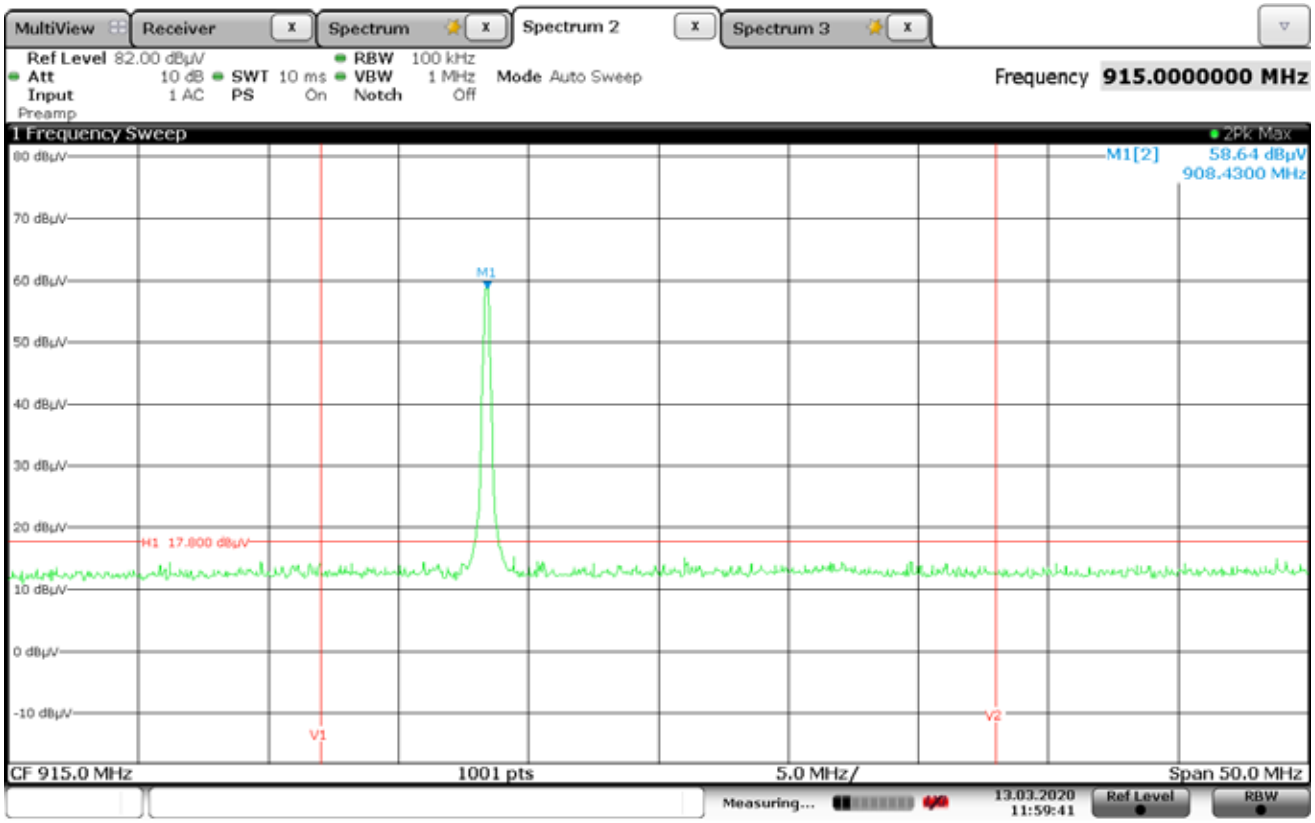
Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz)	4.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz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

Procedures

The EUT was set to transmit continuously at 908.4MHz and 916MHz separately. To determine the band edge compliance, the following spectrum analyzer settings were used:

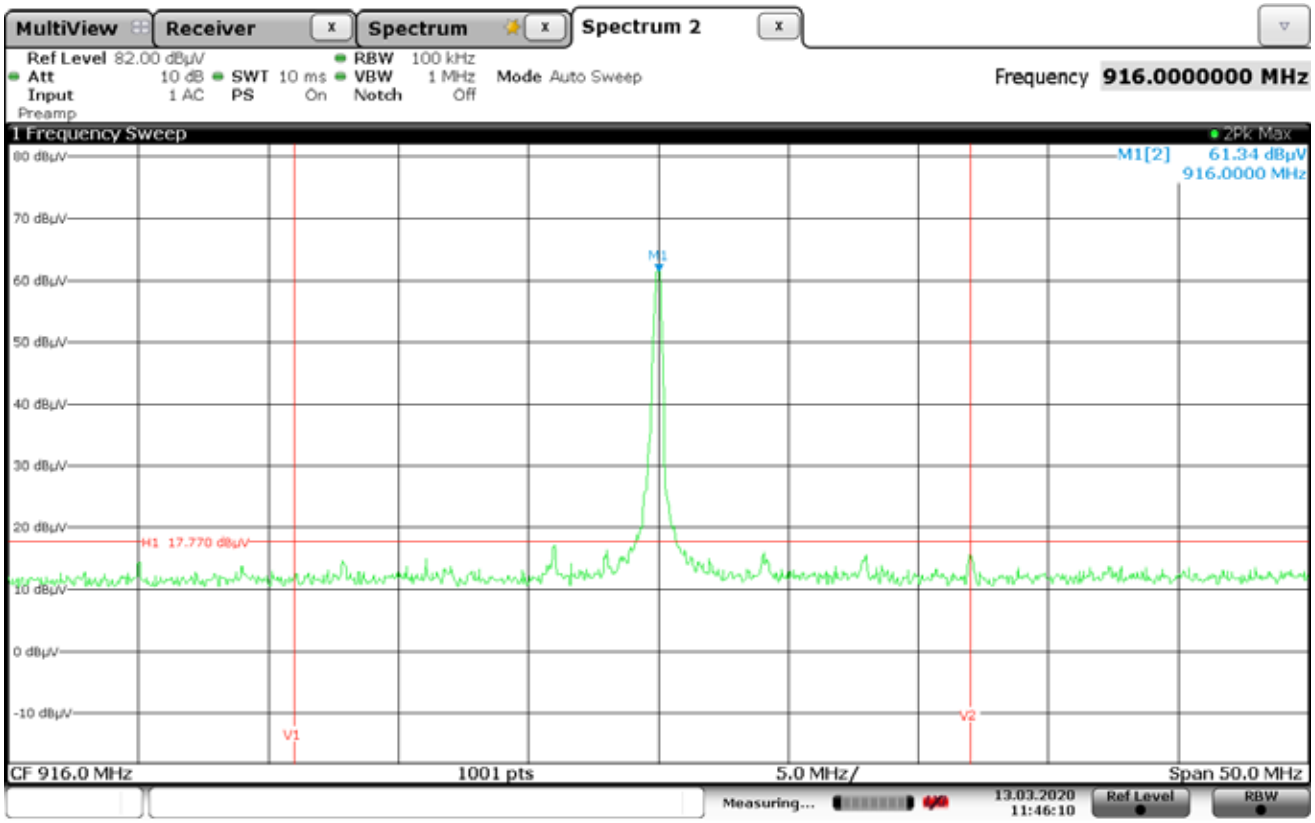
a) Center frequency = frequency at which the high and low band-edge can be seen.
b) Span = Wide enough to capture the peak level of the emission operating on the channel, as well as any modulation products which fall outside of the authorized band of operation.
c) Resolution bandwidth (RBW) ≥ 100kHz.
d) The 'Max-Hold' function was engaged. 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 horizontal display line was placed on where the general limit lies. Two vertical displays lines were placed at 902MHz and 928MHz, the band of operation. All emissions which fall outside of the authorized band of operation must be below the general limit display line.

The analyzer's display was plotted using a 'screen dump' utility.



Date: 13.MAR.2020 11:59:41

The maximum field strength reading at 908MHz = 93.1dBuV/m. The limit at the band edges must be 46dBuV/m (the general limit). Therefore the emissions at the band edges must be 47.1 dB down from the fundamental. The adjusted band edge limit is based on the maximum meter reading of 64.9dBuV/m. Therefore the band edge limit = 64.9dBuV – 47.1dBuV = 17.8dBuV.



Date: 13.MAR.2020 11:46:09

The maximum field strength reading at 916MHz = 89.6dBuV/m. The limit at the band edges must be 46dBuV/m (the general limit). Therefore the emissions at the band edges must be 43.6 dB down from the fundamental. The adjusted band edge limit is based on the maximum meter reading of 61.4dBuV/m. Therefore the band edge limit = 61.4dBuV – 43.6dBuV = 17.7dBuV.

22. Scope of Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ELITE ELECTRONIC ENGINEERING, INC.
1516 Centre Circle
Downers Grove, IL 60515
Robert Bugielski (QA Manager) Phone: 630 495 9770 ext. 168
Email: rbugielski@elitetest.com
Craig Fanning (EMC Lab Manager) Phone: 630 495 9770 ext. 112
Email: cfanning@elitetest.com
Stanley Dolecki (Automotive Team Leader) Phone: 630 495 9770 ext. 103
Email: sdolecki@elitetest.com
Website: www.elitetest.com

ELECTRICAL

Valid to: June 30, 2021 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
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)
Vehicle Radiated Emissions	CISPR 12; ICES-002

Test Technology:	Test Method(s)[1]:
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)
Bulk Current Injections (BCI) *(Closed Loop Method)*	ISO 11452-4; SAE J1113-4
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
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
Electrical Loads	ISO 16750-2, Sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.11, and 4.12
Dielectric Withstand Voltage	MIL-STD-202, Method 301; EIA-364-20D
Insulation Resistance	MIL-STD-202, Method 302; SAE/USCAR-2, Revision 6, Section 5.5.1; EIA-364-21D
Contact Resistance	MIL-STD-202, Method 307; SAE/USCAR-2, Revision 6, Section 5.3.1; EIA/ECA-364-23C; USCAR21-3 Section 4.5.3
DC Resistance	MIL-STD-202, Method 303
Contact Chatter	MIL-STD-202, Method 310; SAE/USCAR-2, Revision 6, Section 5.1.9
Voltage Drop	SAE/USCAR-2, Revision 6, Section 5.3.2; USCAR21-3 Section 4.5.6

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; KN 11; CNS 13803 (1997, 2003); CISPR 14-1; EN 55014-1; AS/NZS CISPR 14.1; 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; KN 32
Current Harmonics	IEC 61000-3-2; EN 61000-3-2; KN 61000-3-2
Flicker and Fluctuations	IEC 61000-3-3; EN 61000-3-3; KN 61000-3-3
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; 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; 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
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; IEEE C37.90.1 2012

Test Technology:	Test Method(s)[1]:
Immunity (cont'd)	
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
Power Frequency Magnetic Field Immunity	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
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
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
Generic and Product Specific EMC Standards	IEC/EN 61000-6-1; AS/NZS 61000-6-1; KN 61000-6-1; IEC/EN 61000-6-2; AS/NZS 61000-6-2; KN 61000-6-2; IEC/EN 61000-6-3; AS/NZS 61000-6-3; KN 61000-6-3; IEC/EN 61000-6-4; AS/NZS 61000-6-4; KN 61000-6-4; EN 50130-4; IEC 61326-1; IEC/CISPR 14-2; EN 55014-2; AS/NZS CISPR 14.2; KN 14-2; IEC/CISPR 24; AS/NZS CISPR 24; EN 55024; KN 24; 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 301 489-52;
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 300 330-1; 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 301 413; ETSI EN 302 502

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-246; RSS-247; RSS-251; RSS-252; RSS-287; RSS-288; RSS-310; RSS-GEN
Mexico Radio Tests	IFT-008; NOM-208-SCFI
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
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
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; 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/ac	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	FAA AC 150/5345-10H
(1mV to 5kV) 60 Hz	FAA AC 150/5345-43J
(0.1V to 250V) up to 500 MHz	FAA AC 150/5345-44K
(1µA to 150A) 60 Hz	FAA AC 150/5345-46E
DC Voltage / Current	FAA AC 150/5345-47C
(1mV to 15-kV) / (1µA to 10A)	FAA EB 67D
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, revision or edition of a test method standard is not identified on the scope of accreditation, the laboratory is expected to be using the current version within one year of the date of publication, per part C., Section 1 of A2LA *R101 - General Requirements - Accreditation of ISO-IEC 17025 Laboratories*.

Testing Activities Performed in Support of FCC Declaration of Conformity and 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
Unlicensed Personal Communication Systems Devices Part 15D	ANSI C63.17:2013	40000

Testing Activities Performed in Support of FCC Declaration of Conformity and 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)
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
Broadcast Radio Services Parts 73 and 74 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000

Testing Activities Performed in Support of FCC Declaration of Conformity and 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)
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 8th day of August 2019.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1786.01
Valid to June 30, 2021

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