

EMC Test Report

Project Number: 4266230

Report Number: 4266230EMC01

Revision Level: 0

Client: Attenti

Equipment Under Test: 2-Piece Electronic Monitor

Model Name: RTCVZ

Model Number (HVIN): 24014VL

FCC ID: NC3-24014VL

IC ID: 23669-24014VL

Applicable Standards: FCC Part 15 Subpart C, § 15.231

RSS-210, Issue 9

ANSI C63.10: 2013

RSS-GEN, Issue 4

Report issued on: 21 February 2018

Test Result: Compliant

Tested by:



Jeremy Pickens, Senior EMC Engineer

Reviewed by:



David Schramm, Operations Manager

Remarks: This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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1 Summary of Test Results

Test Description	Test Specification		Test Result
	FCC	ISED	
Antenna Requirement	15.203	RSS-GEN S8.3	Compliant (1)
Occupied Bandwidth	15.231(c)	RSS-210 A.1.3 RSS-GEN S6.6	Compliant
Radiated Emissions	15.209 and 15.231(b)	RSS-210 A.1.2 RSS-GEN S6.13 RSS-GEN S8.10	Compliant
Transmitter De-activation Time	15.231(a)	RSS-210 A.1.1	Compliant
Duty Cycle Correction Factor	ANSI C63.10:2013	ANSI C63.10:2013	Reported
AC Power Line Conducted Emission	15.107, 15.207	RSS-GEN 7.2.4	Compliant

(1) Internal, PCB Antenna

1.1 Modifications Required to Compliance

None

2 General Information

2.1 Client Information

Name: Attenti
Address: 1838 Gunn Highway
City, State, Zip, Country: Odessa, FL 33556

2.2 Test Laboratory

Name: SGS Consumer Testing and Retail Services
Address: 620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country: Suwanee, GA 30024, USA

2.3 General Information of EUT

Type of Product: 2-Piece Electronic Monitor
Model Name: RTCVZ
Model Number: 24014VL
Serial Number: Unit P23

Frequency Range: 433.92MHz

Antenna: Internal, PCB Trace Antenna

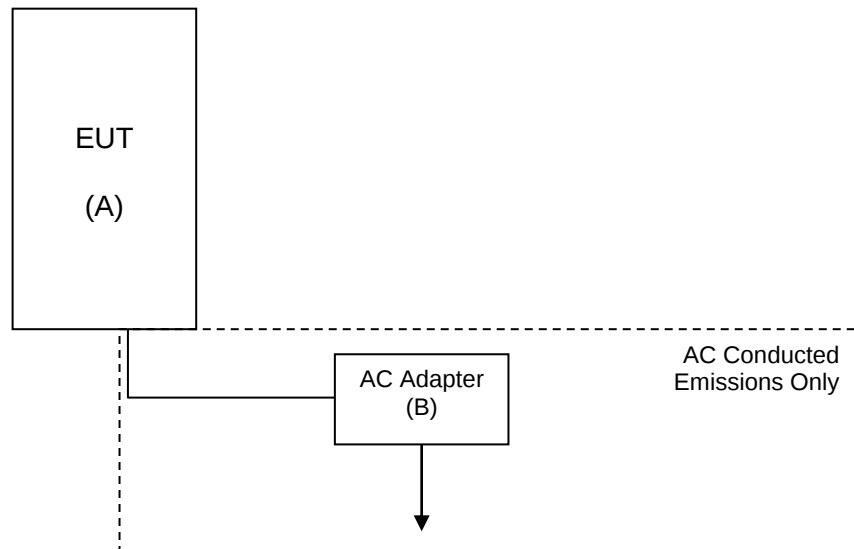
Rated Voltage: Internal, 3.7Vdc Li-Ion

Sample Received Date: 29 January 2018
Dates of testing: 31 January – 01 February 2018

2.4 Operating Modes and Conditions

During spurious emissions testing, software was used to configure the device for continuous transmission.

2.5 EUT Connection Block Diagram



2.6 System Configurations

Device reference	Manufacturer	Description	Model Number	Serial Number
A	Attenti	2-Piece Electronic Monitor	24014VL	Unit P23
B	JFEC	AC Adapter	JF024WR-1200200UH	Not Labeled

2.7 Cable List

Cable reference	Port Name	Start	End	Cable Length (m)	Ferrite installed?	Shielded?
1	Charging	EUT	AC Adapter	2.8	No	No

3 Occupied Bandwidth

3.1 Test Result

Test Description	Basic Standards	Test Result
Occupied Bandwidth / 20dB Bandwidth	15.231(c)(1) ANSI C63.10: 2013	Reported

3.2 Test Method

Measurements were recorded using the methods defined in ANSI C63.10, Clause 6.9.2. The 20dB bandwidth (ndB down) measurement function of the spectrum analyzer was employed along with the 99%OBW function.

3.2.1 Limit

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For a device operating at 433.92MHz, the limit is 1.08MHz.

3.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.7 °C

Relative Humidity: 52.0 %

3.4 Test Equipment

Test End Date: 21-Feb-2018

Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079823	26-Jul-2018

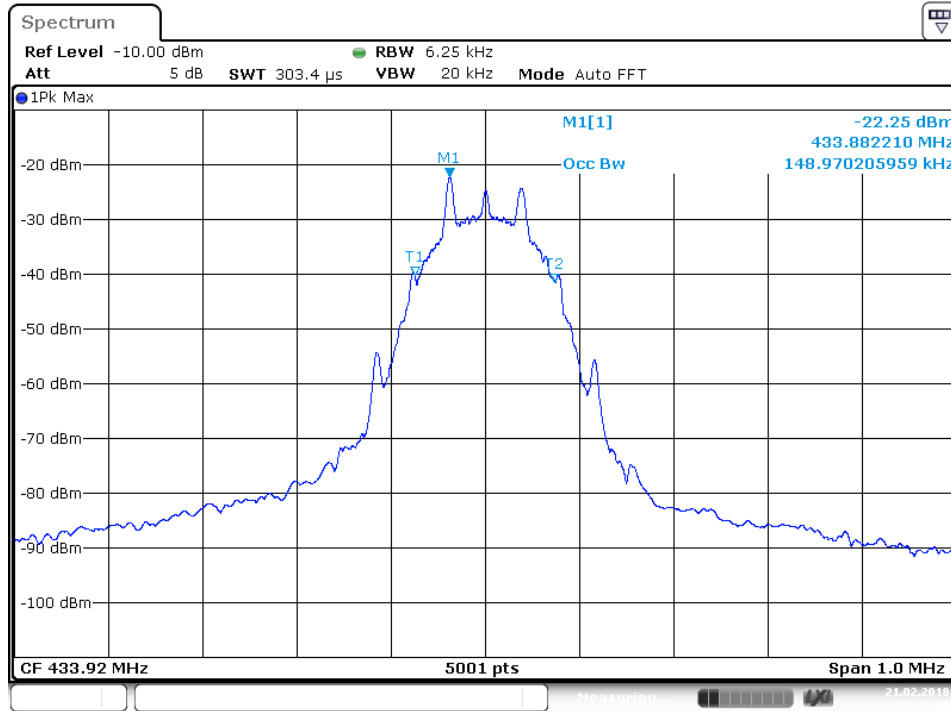
Note: The equipment calibration period is 1 year except for the FSV which is on a 2-year calibration cycle.

3.5 Test Data

Frequency (MHz)	20 dB bandwidth (MHz)	99% OBW (MHz)
433.92	0.149	0.160

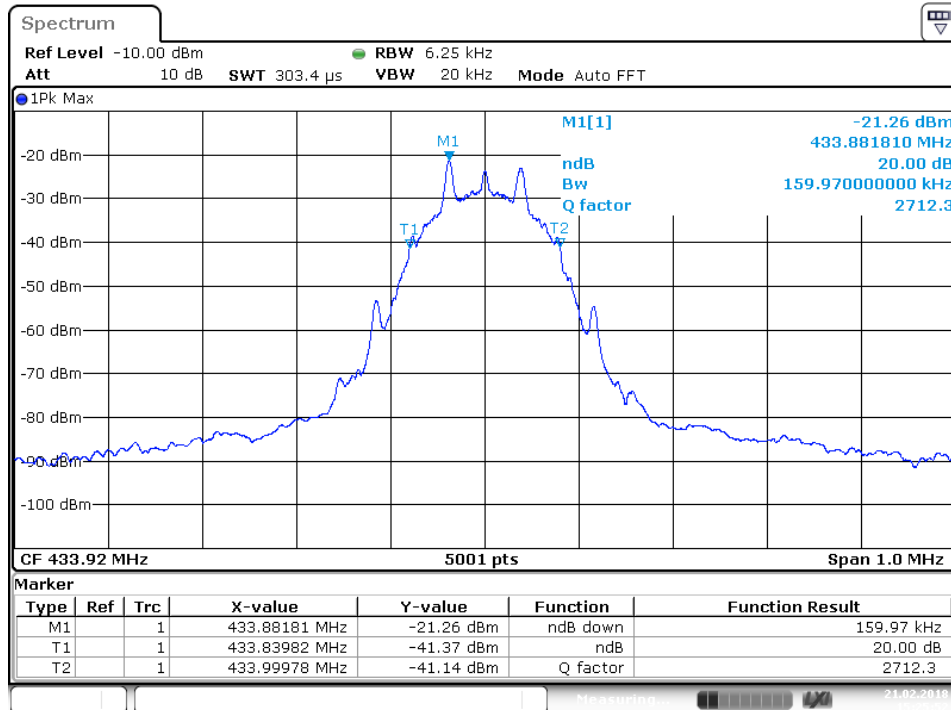
Sample Plots

Occupied Bandwidth = 148.9kHz



Date: 21.FEB.2018 15:13:25

20dB Bandwidth = 159.97kHz



Date: 21.FEB.2018 15:25:52

4 Radiated Emissions

4.1 Test Result

Test Description	Basic Standards	Test Result
Radiated Emissions	15.231(b) 15.209 ANSI C63.10:2013	Compliant

4.2 Test Method

Radiated emissions were measured using the methods defined in ANSI C63.10, Clauses 6.5 and 6.6. Because the fundamental transmission frequency was 433.92MHz, measurements were limited to 5GHz.

4.2.1 Limits

Fundamental Frequency (MHz)	Field strength of fundamental (μV/m)	Field strength of spurious emission (μV/m)
40.66-40.70	1000	100
70-130	500	50
130-174	500 to 1500 ⁽¹⁾	50 to 150 ⁽¹⁾
174-260	1500	150
260-470	1500 to 5000 ⁽¹⁾	150 to 500 ⁽¹⁾
Above 470	5000	500

(1) Linear interpolations

At 433.92, the average limits for the fundamental and spurious emissions are 10996.7μV/m (80.8dBμV/m) and 1099.7μV/m (60.8dBμV/m) respectively when measured at a distance of 3 meters.

15.209 Radiated emissions limits (Restricted Bands of Operation)

Frequency Range (MHz)	Limits (uV/m) Quasi-Peak or Average	Measurement Distance (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note: Limits were converted to dBuV/m using the equation $20 \cdot \text{LOG}(x)$. Additionally, for measurements below 30MHz, the limits were adjusted to a distance of 3m using a 40dB/decade correction per §15.31(f)(2)

Example: at 20MHz, the limit is expressed as 30uV/m at 30m

$$20 \cdot \log(30) = 29.5 \text{ dBuV/m}$$

30 to 3 meters is a single decade, so $29.5 + 40 = 69.5 \text{ dBuV/m}$

4.3 Test Site

3m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions

Temperature: 24.1 °C

Relative Humidity: 32.4 %

Atmospheric Pressure: 97.9 kPa

4.4 Test Equipment

Test End Date: 31-Jan-2018

Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	25-Jul-2018
ANTENNA, BILOG	JB6	SUNOL	B079690	29-Nov-2018
RF CABLE	SF106	HUBER & SUHNER	B079661	25-Jul-2018
RF CABLE	SF106	HUBER & SUHNER	B079713	24-Jul-2018
RF CABLE	UC-N-MM-78	MAURY MICROWAVE	17017	25-Jul-2018
RF CABLE	SUCOFLEX 100	HUBER & SUHNER	B108523	24-Jul-2018
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	22-Feb-2018
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079699	16-May-2018
RF CABLE	UC-N-MM-275	MAURY MICROWAVE	17015	25-Jul-2018
RF CABLE	SF106	HUBER & SUHNER	B079713	24-Jul-2018

Note: The equipment calibration period is 1 year.

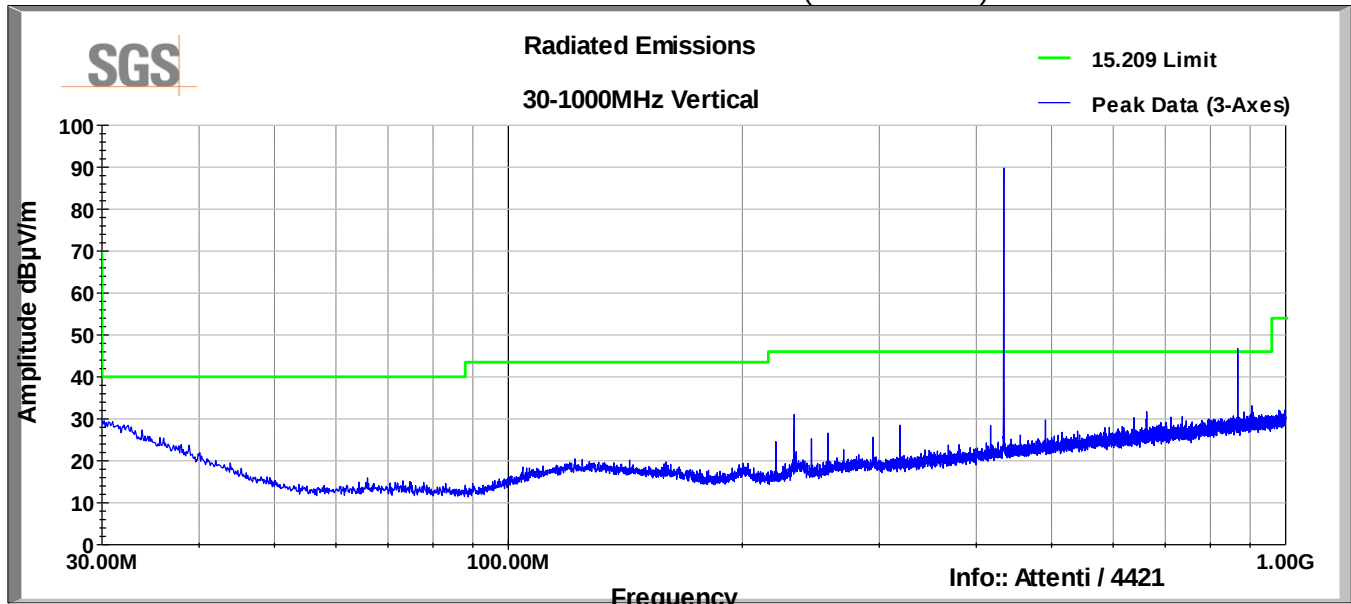
Software:

“Radiated Emissions” TILE! profile dated Dec 2015

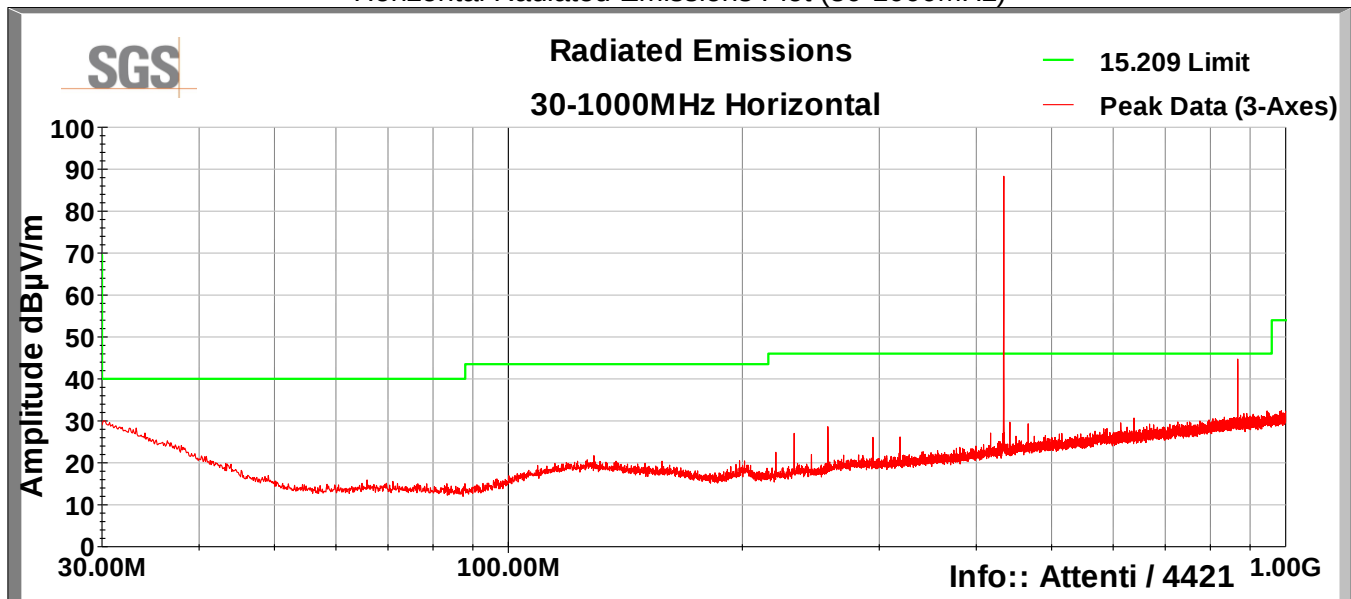
4.5 Test Data – Peak Plots

There were no emissions detected below 30MHz.

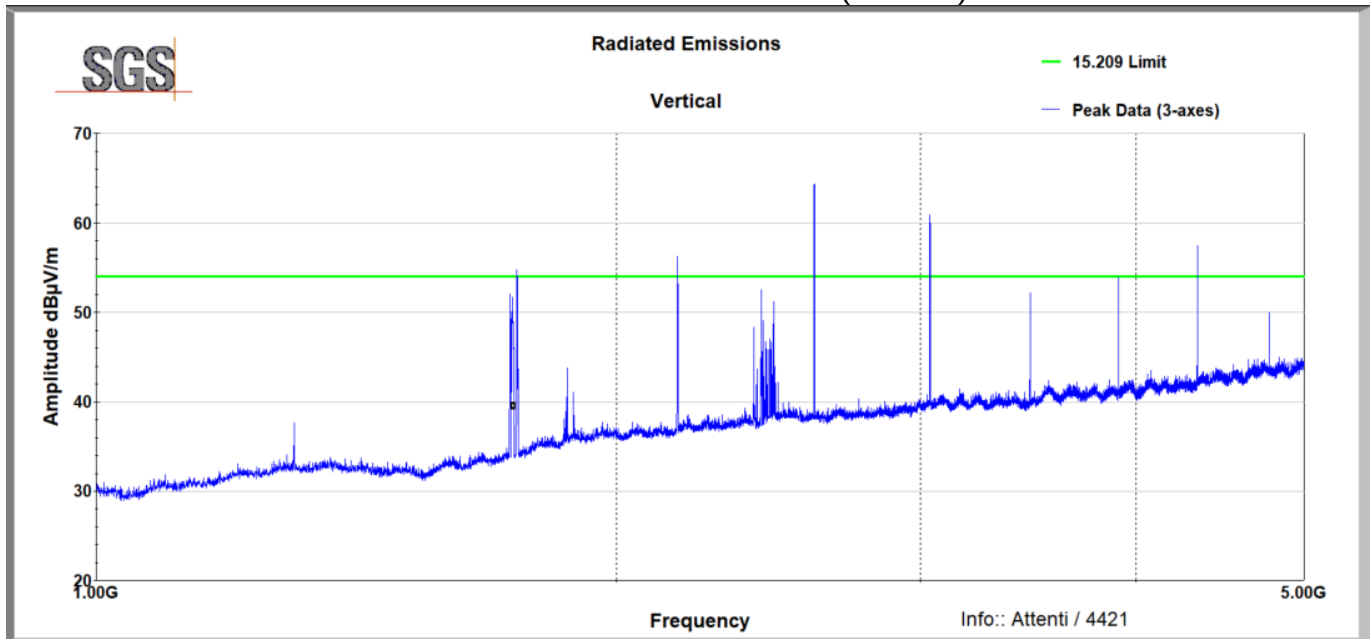
Vertical Radiated Emissions Plot (30-1000MHz)



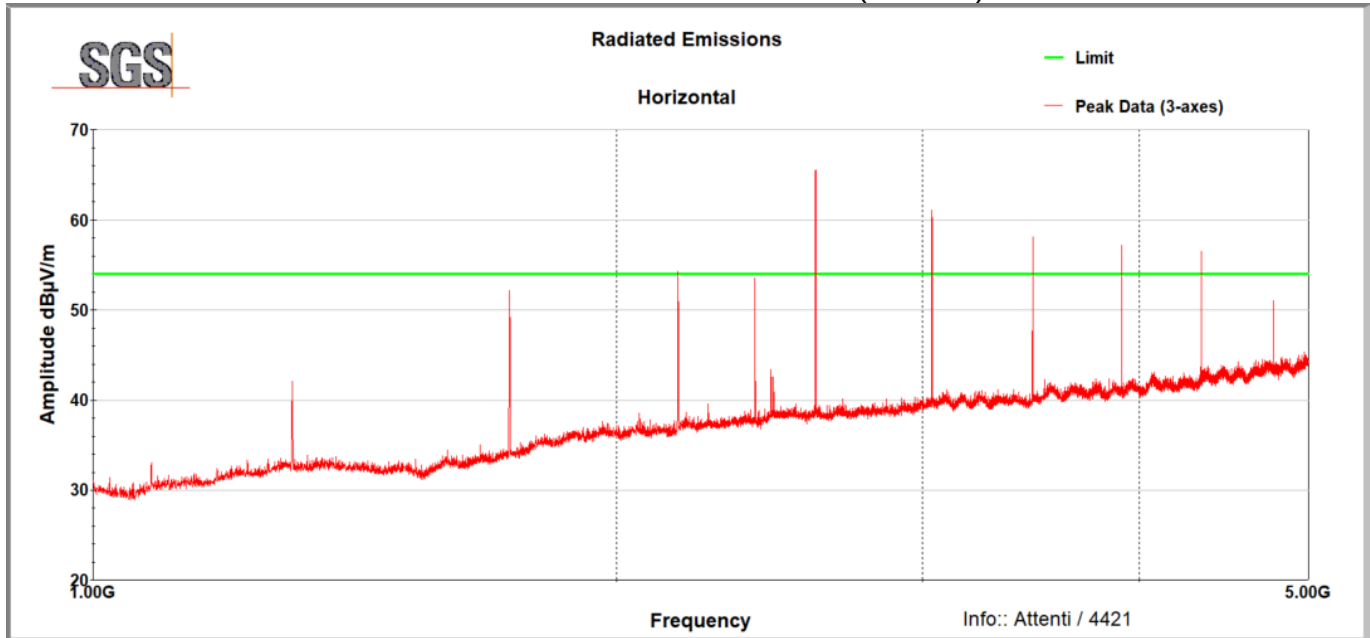
Horizontal Radiated Emissions Plot (30-1000MHz)



Vertical Radiated Emissions Plot (1–5GHz)



Horizontal Radiated Emissions Plot (1–5GHz)



4.6 Test Data – Tabular Data

Frequency MHz	Raw Peak Meas (dBuV)	Polarity (V/H)	Correction (dB/m)	DCCF (dB)	Corr Value dBuV/m	Limit (dBuV/m)	Margin (dB)
433.92	75.4	V	-14.5	0.0	89.9	100.8	-10.9
433.92	75.4	V	-14.5	29.0	60.9	80.8	-19.9
433.92	73.8	H	-14.5	0.0	88.3	100.8	-12.5
433.92	73.8	H	-14.5	29.0	59.3	80.8	-21.5
867.84	40.8	V	-7.8	0.0	48.6	80.8	-32.2
867.84	40.8	V	-7.8	29.0	19.6	60.8	-41.2
867.84	36.9	H	-7.8	0.0	44.7	80.8	-36.1
867.84	36.9	H	-7.8	29.0	15.7	60.8	-45.1
1735.68	56.6	V	1.8	0.0	54.8	80.8	-26.0
1735.68	56.6	V	1.8	29.0	25.8	60.8	-35.0
1735.68	53.9	H	1.8	0.0	52.1	80.8	-28.7
1735.68	53.9	H	1.8	29.0	23.1	60.8	-37.7
2169.60	61.2	V	4.9	0.0	56.3	80.8	-24.5
2169.60	61.2	V	4.9	29.0	27.3	60.8	-33.5
2169.60	59.2	H	4.9	0.0	54.3	80.8	-26.5
2169.60	59.2	H	4.9	29.0	25.3	60.8	-35.5
2603.52	71.2	V	6.8	0.0	64.4	80.8	-16.4
2603.52	71.2	V	6.8	29.0	35.4	60.8	-25.4
2603.52	72.4	H	6.8	0.0	65.6	80.8	-15.2
2603.52	72.4	H	6.8	29.0	36.6	60.8	-24.2
3037.44	68.9	V	8.0	0.0	60.9	80.8	-19.9
3037.44	68.9	V	8.0	29.0	31.9	60.8	-28.9
3037.44	69.1	H	8.0	0.0	61.1	80.8	-19.7
3037.44	69.1	H	8.0	29.0	32.1	60.8	-28.7
3471.36	60.6	V	8.4	0.0	52.2	80.8	-28.6
3471.36	60.6	V	8.4	29.0	23.2	60.8	-37.6
3471.36	66.5	H	8.4	0.0	58.1	80.8	-22.7
3471.36	66.5	H	8.4	29.0	29.1	60.8	-31.7
3905.28	63.4	V	9.5	0.0	53.9	74.0	-20.1
3905.28	63.4	V	9.5	29.0	24.9	54.0	-29.1
3905.28	66.7	H	9.5	0.0	57.2	74.0	-16.8
3905.28	66.7	H	9.5	29.0	28.2	54.0	-25.8
4339.20	68.3	V	10.8	0.0	57.5	74.0	-16.5
4339.20	68.3	V	10.8	29.0	28.5	54.0	-25.5
4339.20	67.3	H	10.8	0.0	56.5	74.0	-17.5
4339.20	67.3	H	10.8	29.0	27.5	54.0	-26.5

* These emissions fall within restricted frequency bands of operation.

5 Transmitter De-activation Time

5.1 Test Result

Test Description	Basic Standards	Test Result
Transmitter De-activation Time	15.231(a)	Compliant

5.2 Test Method

Tests were performed using the methods defined in ANSI C63.10, Clause 7.4.

5.2.1 Limit

- (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
- (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
- (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.
- (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition
- (5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

5.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.4 °C

Relative Humidity: 29.5 %

5.4 Test Equipment

Test End Date: 1-Feb-2018

Tester: JOP

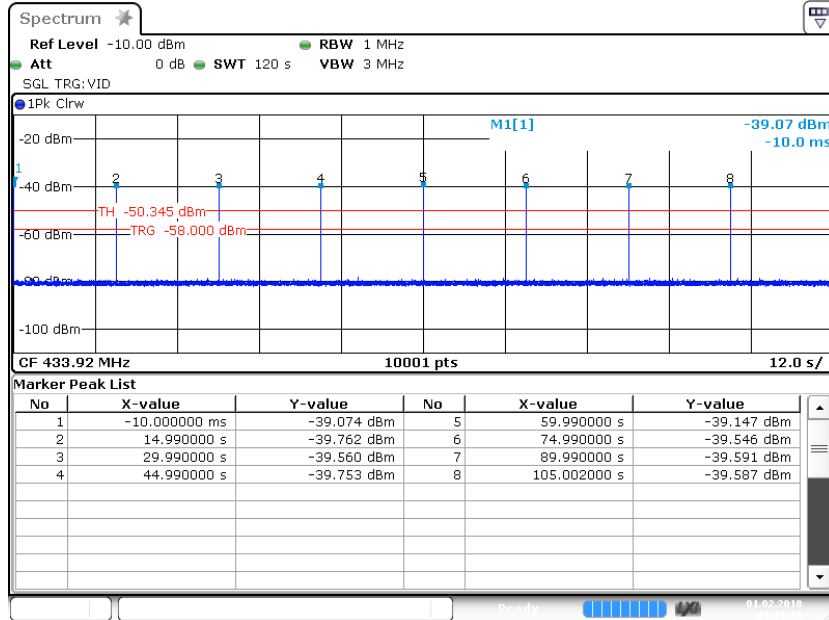
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	141	HUBER & SUHNER	B095588	26-Jul-2018

Note: The equipment calibration period is 1 year except for the FSV which is on a 2-year calibration cycle.

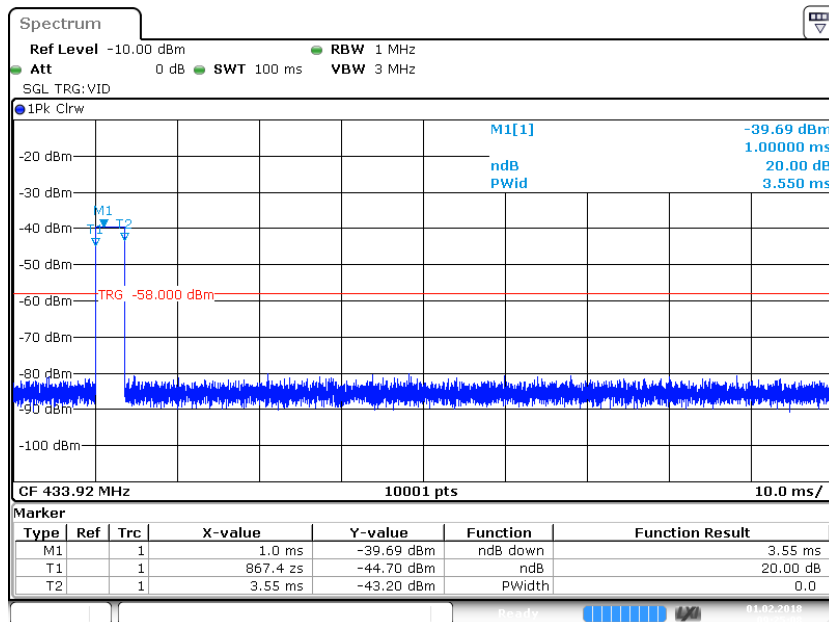
5.5 Test Data

15.231(a)(1) – The device is not a manually operated transmitter.

15.231(a)(2) / 15.231(a)(3) – The device is used in security applications and polls periodically – roughly every 15 seconds. Never twice within a 5 second period. Within a 1 hour period, the transmit on time is: $3.55\text{ms} \times 241 \text{ pulses} = 0.86 \text{ seconds}$ which is less the 2 second limit.



Date: 1 FEB 2018 09:29:11



Date: 1 FEB 2018 09:25:08

15.231(a)(4) – Not applicable, the device is not employed for radio control purposes during emergencies.

15.231(a)(5) – The security device does not exceed the transmission duration limits.

6 Duty Cycle

6.1 Test Result

Test Description	Basic Standards	Test Result
Duty Cycle	ANSI C63.10: 2013	Compliant

6.2 Test Method

Tests were performed using the methods defined in 15.231(a) and ANSI C63.10, Clause 7.5.

6.2.1 Limit

No limit is defined for the duty cycle. The resulting correction factor was used to compensate the measured peak fundamental and harmonic emissions for comparison to the average limits.

6.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.4 °C

Relative Humidity: 29.5 %

6.4 Test Equipment

Test End Date: 1-Feb-2018

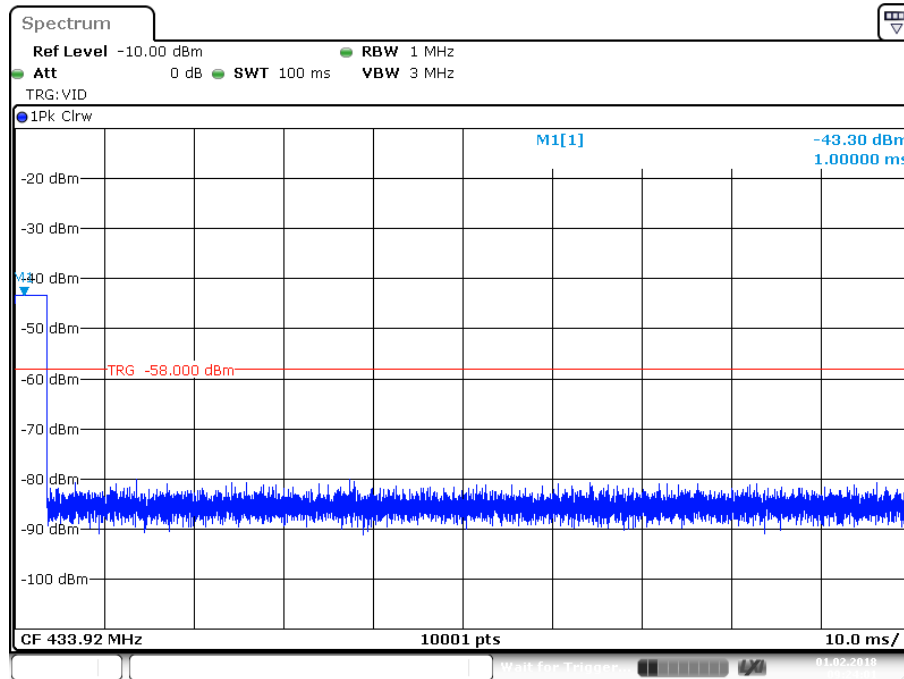
Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	141	HUBER & SUHNER	B095588	26-Jul-2018

Note: The equipment calibration period is 1 year except for the FSV which is on a 2-year calibration cycle.

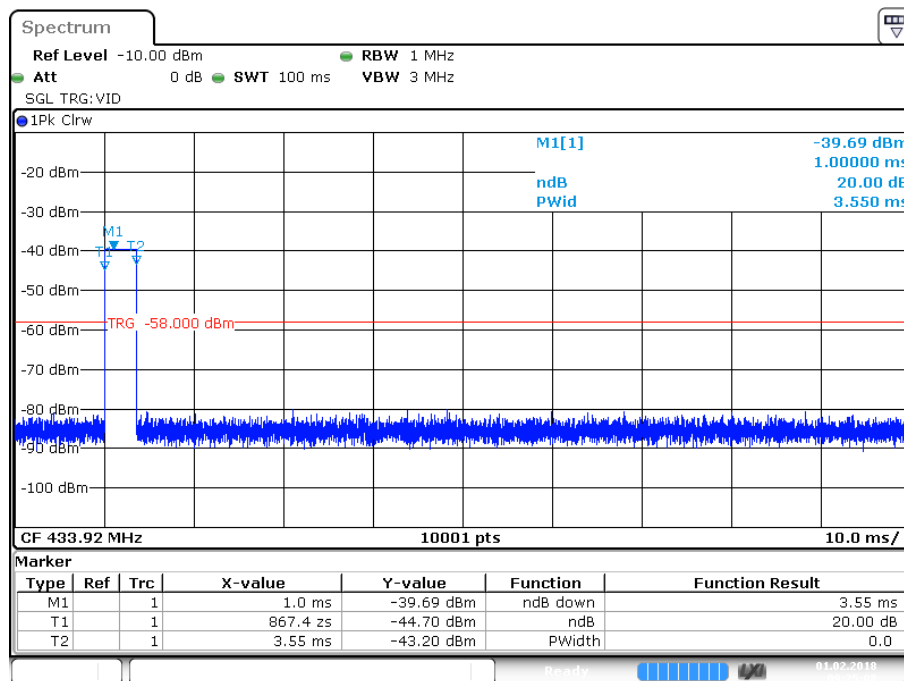
6.5 Test Data

100ms pulse train



Date: 1.FEB.2018 09:24:02

Pulse width



Date: 1.FEB.2018 09:25:08

On time over 100ms = 3.550ms

Duty Cycle = 3.55%

DCCF = $20 \cdot \log(\text{DC}) = -29.0\text{dB}$

7 Conducted Emissions

7.1 Test Result

Test Description	Basic Standards	Test Result
Conducted Emissions, Class B	RSS-GEN, Issue 4 ANSI C63.4:2014	Compliant

7.2 Test Method

With the receiver's resolution bandwidth was set to 9 kHz the exploratory scans were performed over the measuring frequency range (0.15MHz to 30MHz) using a max hold mode incorporating a Peak detector and Average detector and using the TILE! software. The final test data was measured using a Quasi-Peak detector and Average detector and compared against the limits indicated in the table below.

Frequency Range	Class A Limits (dBuV)	Class B Limits (dBuV) CISPR
0.15 to 0.5 MHz	Avg 66 QP 79	Avg 56 to 46 QP 66 to 56
0.5 to 5 MHz	Avg 60 QP 73	Avg 46 Pk 56
5 to 30 MHz	Avg 60 QP 73	Avg 50 Pk 60

7.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.8°C

Relative Humidity: 51.5%

7.4 Test Equipment

Test End Date: 21-Feb-2018

Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	25-Jul-2018
LINE IMPEDANCE STABILIZATION NETWORK	NNB 51	TESEQ	B085882	8-Nov-2018
RF CABLE	CBL-25FT-NMNM	MINI-CIRCUITS	B094941	25-Jul-2018

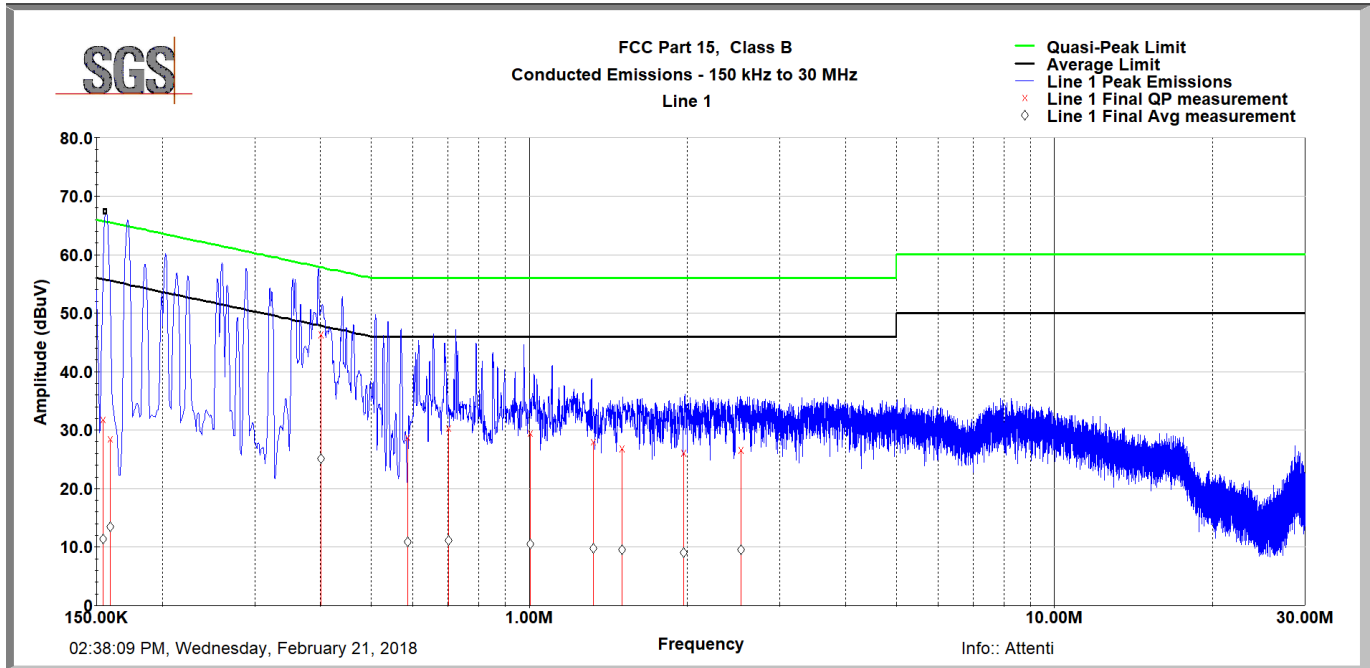
Note: The equipment calibration period is 1 year.

Software:

"Conducted Emissions" TILE! profile dated Dec 2015

7.5 Test Data

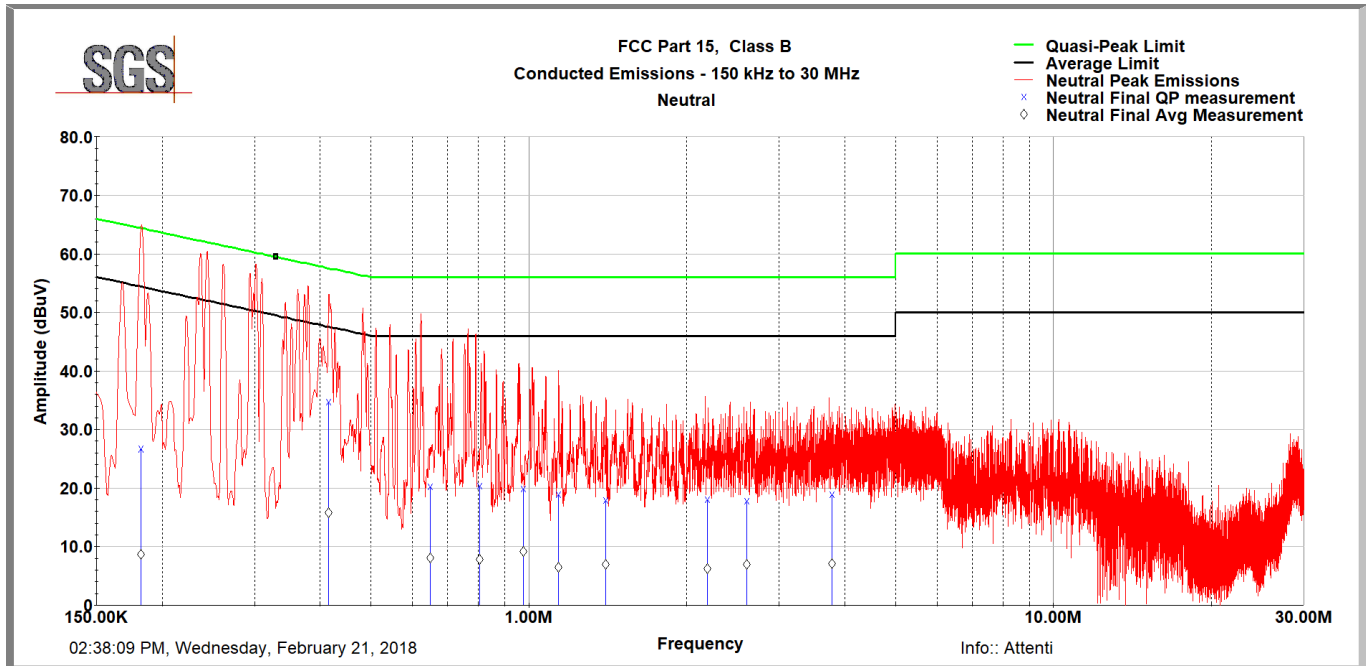
Line 1 Conducted Emissions Plot 150-30MHz



Line 1 Conducted Emissions Data 150-30MHz

Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
0.155	31.7	65.7	-34.0	11.4	55.7	-44.4
0.159	28.4	65.5	-37.1	13.5	55.5	-42.1
0.401	46.2	57.9	-11.6	25.1	47.9	-22.8
0.587	28.7	56.0	-27.3	10.9	46.0	-35.1
0.701	30.3	56.0	-25.7	11.1	46.0	-34.9
1.003	29.3	56.0	-26.7	10.5	46.0	-35.5
1.322	27.9	56.0	-28.1	9.8	46.0	-36.2
1.500	26.8	56.0	-29.2	9.5	46.0	-36.5
1.967	26.0	56.0	-30.0	9.0	46.0	-37.0
2.532	26.6	56.0	-29.4	9.6	46.0	-36.4

Neutral Conducted Emissions Plot 150-30MHz



Neutral Conducted Emissions Data 150-30MHz

Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
0.182	26.7	64.4	-37.7	8.6	54.4	-45.8
0.415	34.6	57.5	-22.9	15.8	47.5	-31.7
0.649	20.3	56.0	-35.7	8.1	46.0	-37.9
0.805	20.4	56.0	-35.6	7.8	46.0	-38.2
0.976	19.8	56.0	-36.2	9.2	46.0	-36.8
1.139	18.8	56.0	-37.2	6.4	46.0	-39.6
1.402	17.8	56.0	-38.2	6.9	46.0	-39.1
2.191	18.0	56.0	-38.0	6.2	46.0	-39.8
2.601	17.7	56.0	-38.3	7.0	46.0	-39.0
3.777	18.8	56.0	-37.2	7.1	46.0	-38.9

8 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	21 February 2018