Vista Labs
TEST • CERTIFY • COMPLY

Phone: +1 (949) 393-1123
Web: www.vista-compliance.com
Email: info@vista-compliance.com

RF Test Report

Test Report Number	HID-24112231-LC-FCC-IC-RF
FCC ID	JQ6-TT2
ISED ID	2236B-TT2
Applicant	HID Global Corporation
Applicant Address	611 Center Ridge Drive, Austin, TX, 78753, USA
Product Name	Tot Tag 2
Model (s)	TT2
Date of Receipt	12/09/2024
Date of Test	12/17/2024- 01/15/2025
Report Issue Date	01/22/2025
Test Standards	47 CFR Part 15.231 RSS-210 Issue 11, June 2024
Test Result	**PASS**

Issued by:

Vista Compliance Laboratories
1261 Puerta Del Sol, San Clemente, CA 92673 USA
www.vista-compliance.com

Minoush Niknam (Test Engineer)

David Zhang (Technical Manager)

REVISION HISTORY

Report Number	Version	Description	Issued Date
HID-24112231-LC-FCC-IC-RF	01	Initial report	01/22/2025

TABLE OF CONTENTS

1 Test Summary

Test Item	Test Requirement	Test Method	Result
Antenna Requirement	47 CFR Part 15.203	N/A	Pass
Fundamental Field Strength	47 CFR Part 15.231 RSS-210 Issue 11, June 2024	ANSI C63.10-2013 RSS-Gen Issue 5, February 2021	Pass
Radiated Emissions	47 CFR Part 15.231 RSS-210 Issue 11, June 2024	ANSI C63.10-2013 RSS-Gen Issue 5, February 2021	Pass
Occupied Bandwidth	47 CFR Part 15.231 RSS-210 Issue 11, June 2024	ANSI C63.10-2013 RSS-Gen Issue 5, February 2021	Pass
Duty Cycle	47 CFR Part 15.231 RSS-210 Issue 11, June 2024	ANSI C63.10-2013 RSS-Gen Issue 5, February 2021	Pass
AC Power Line Conducted Emissions	47 CFR Part 15.207 RSS-Gen Issue 5, Feb 2021	ANSI C63.10-2013 RSS-Gen Issue 5, February 2021	N/A

Note: N/A. The EUT is battery-operated and has no power ports, so AC power line conducted emission does not apply.

2 General Information

2.1 Applicant

Applicant	HID Global Corporation
Applicant address	611 Center Ridge Drive, Austin, TX, 78753, USA
Manufacturer	HID Global Corporation
Manufacturer Address	611 Center Ridge Drive, Austin, TX, 78753, USA

2.2 Product information

Product Name	Tot Tag 2
Product Description	TotTag 2 Infant Monitoring Tag
Model Number	TT2
Family Models	N/A
Serial Number	000059 (Continuous TX) 000057 (Normal operation)
Frequency Band	433.92 MHz
Type of modulation	ASK
Equipment Class	DSC
Antenna Information	Internal Antenna
Clock Frequencies	N/A
Input Power	DC3V
Power Adapter Manufacturer/Model	N/A
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
Additional Info	TotTag is an active monitoring device specifically designed for newborn infants. It has a battery life of up to 12 months. This tag transmits a periodic location beacon and includes a low-frequency receiver that detects signals from GuardRFID® Tag Exciters. TotTags are compatible with the GuardRFID AllGuard® software, which includes support from TotGuard® to offer real-time location services.

2.3 Test standard and method

Test standard	47 CFR Part 15.231 RSS-210 Issue 11, June 2024
Test method	ANSI C63.10-2013 RSS-Gen Issue 5, February 2021

3 Test Site Information

Lab performing tests	Vista Laboratories, Inc.
Lab Address	1261 Puerta Del Sol, San Clemente, CA 92673 USA
Phone Number	+1 (949) 393-1123
Website	www.vista-compliance.com

Test Condition	Temperature	Humidity	Atmospheric Pressure
RF Testing	23.2°C	57.5%	996 mbar
Radiated Emission Testing	23.2°C	57.5%	996 mbar

4 Modification of EUT / Deviations from Standards

The normal operation sample is unmodified; the continuous TX sample is modified with external jumper to power on and off for testing purpose. No deviation from standards.

5 Test Configuration and Operation

5.1 EUT Test Configuration

For radio testing, EUT is set to radio test mode with continuous transmission; for duty cycle measurement, EUT is in normal operation mode.

The following software was used for testing and monitoring EUT performance:

Software	Description
EMISoft Vasona	EMC/RF Spurious emission test software used during testing

5.2 Supporting Equipment

Description	Manufacturer	Model #	Serial #	Remark
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

6 Uncertainty of Measurement

Test item	Measurement Uncertainty (dB)
RF Output Power (Conducted)	±1.2 dB
Power Spectral Density	±0.9 dB
Unwanted Emission (conducted)	±2.6 dB
Occupied Channel Bandwidth	±5 %
Radiated Emission (9KHz-30MHz)	±3.5 dB
Radiated Emission (30MHz-1GHz)	±4.6 dB
Radiated Emission (1-18GHz)	±4.9 dB
Radiated Emission (18-40GHz)	±3.5 dB

7 Test Results

7.1 Antenna Requirement

7.1.1 Requirement

Per § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

7.1.2 Result

Analysis:

- EUT has an internal antenna permanently attached to the main board, fulfilling the requirement for permanent attachment.

Conclusion:

- EUT complies with antenna requirement in § 15.203.

7.2 Field strength and Radiated Emissions Measurement

7.2.1 Requirement

§ 15.231 (b), RSS-210 Annex A

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66 – 40.70 MHz	2250	225
70 – 130 MHz	1250	125
130 – 174 MHz	1,250 to 3,750	125 to 375
174 – 260 MHz	3,750	3,75
260 – 470 MHz	3,750 to 12,500	3,75 to 12,50
Above 470	12,500	1,250

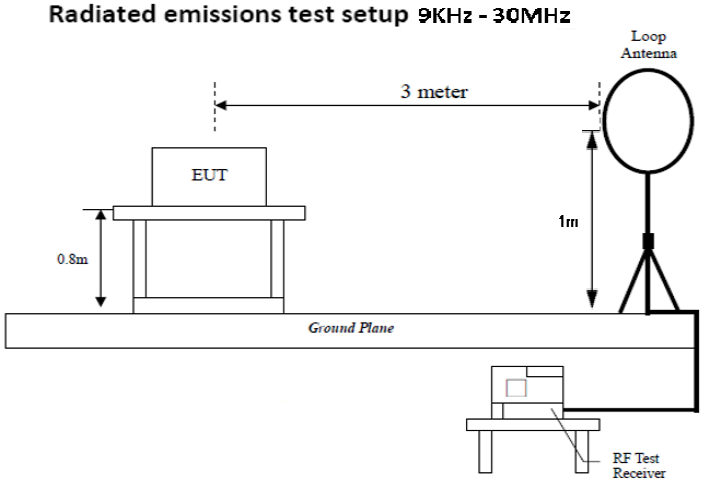
If the emission falls within the restricted band specified in 15.205(a), then the limit in 15.209(a) from the table below must be followed.

Frequency Range	Field strength of fundamental (microvolts/meter)	Measurement Distance (meters)
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

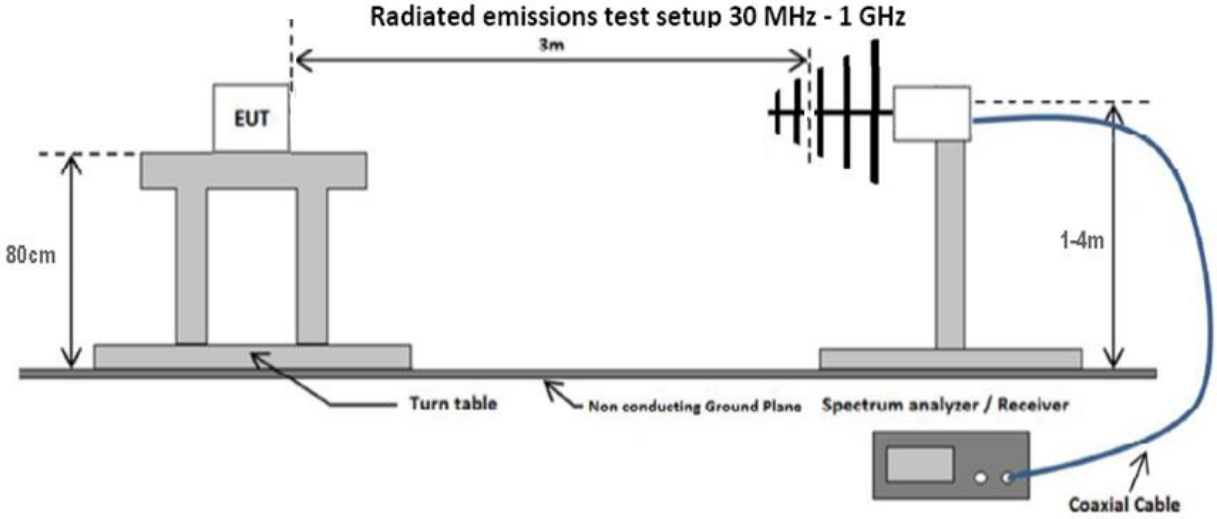
Note: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

7.2.2 Test Setup

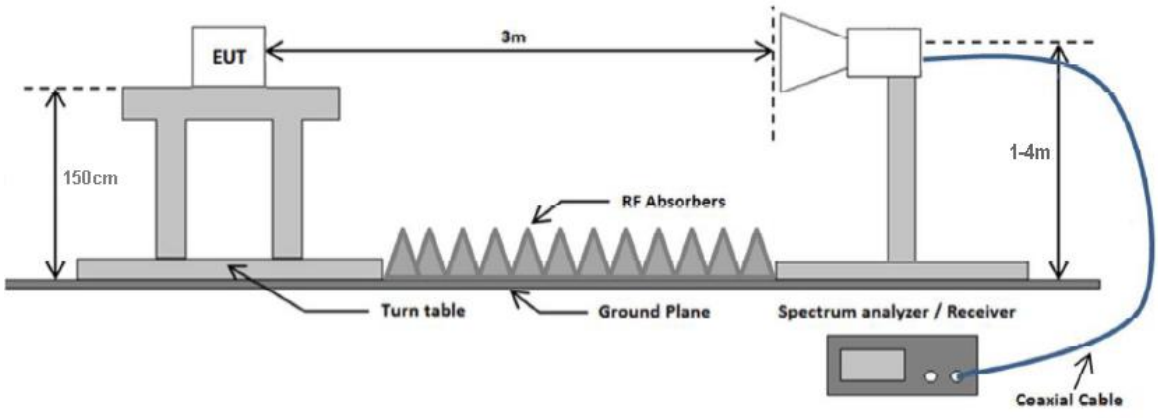
Radiated emissions test setup 9KHz - 30MHz



Radiated emissions test setup 30 MHz - 1 GHz



Radiated emissions test setup above 1 GHz



7.2.3 Test Procedure

According to section 6 radiated spurious emission measurements in ANSI C63.10-2013, Boresight antenna mast was used during the scanning to point to EUT to maximize the emission. The process will be repeated in 3 EUT orientations.

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
   a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
   b. The EUT was then rotated to the direction that gave the maximum emission.
   c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 300 Hz for frequency below 150KHz.
4. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10 kHz for frequency between 150KHz – 30MHz.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-Peak detection at frequency between 30MHz - 1GHz.
6. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak and average measurement at frequency above 1GHz.
7. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

7.2.4 Test Result

Field strength of Fundamental Test result

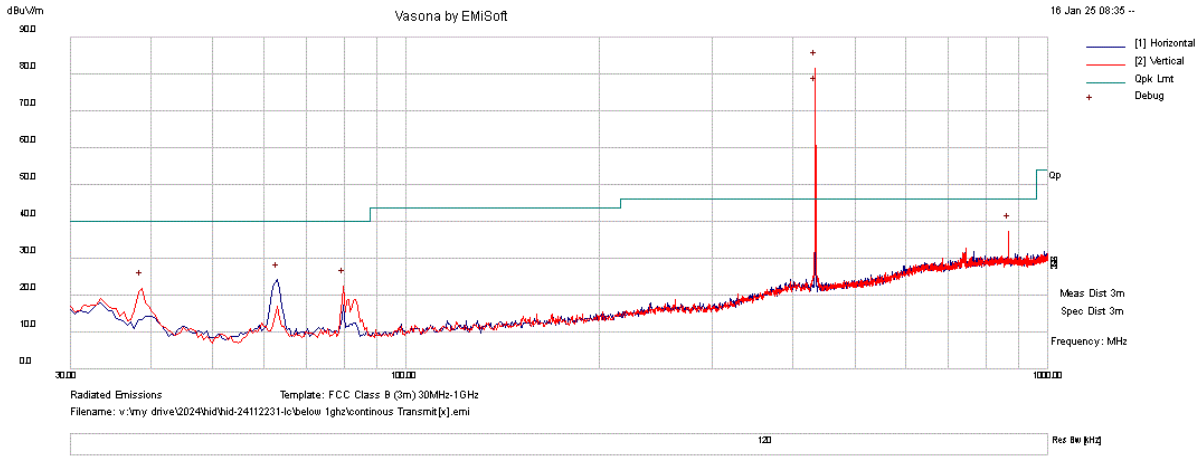
No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	433.92	70.6	6.3	-2.4	74.40	Peak Max	H	100	0	100.8	-23.40	Pass
2	433.92	-	-	-	59.34	Average Max	-	-	-	80.8	-21.46	Pass
3	433.92	77.7	6.3	-2.4	81.50	Peak Max	V	100	0	100.8	-19.30	Pass
4	433.92	-	-	-	66.44	Average Max	-	-	-	80.8	-14.36	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF (dB/m) = Antenna Factor (dB/m)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. Average= Peak level +Duty cycle factor

RADIATED EMISSIONS BELOW 1 GHZ

Test Standard:	FCC Part 15.231 RSS-210 Issue 11	Mode:	Continuous Transmit Mode
Frequency Range:	30 MHz - 1 GHz	Test Date:	01/15/2025
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Engineer:	Minoush Niknam
Remark:	EUT is on the X-axis	Test Result:	Pass



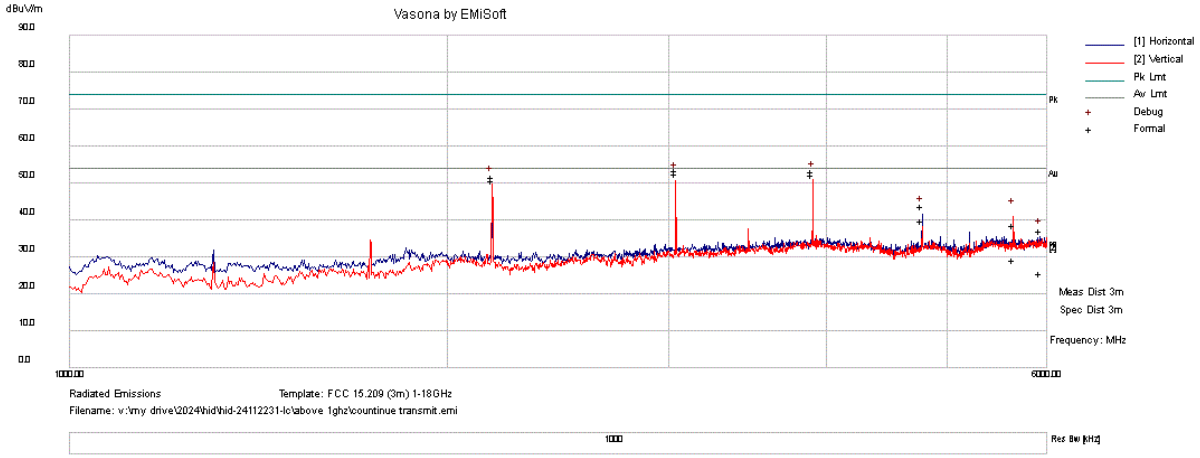
No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
3	62.98	34.4	3.0	-13.4	24.1	Peak	H	400	0	40	-15.9	Pass
4	79.955	32.3	3.3	-13.3	22.4	Peak	V	100	0	40	-17.6	Pass
5	38.73	28.2	2.5	-9.0	21.7	Peak	V	300	0	40	-18.3	Pass
6	868.08	25.9	7.5	3.8	37.2	Peak	V	100	0	43.5	-6.3	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF (dB/m) = Antenna Factor (dB/m) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. EUT was tested in three orientations: X, Y, and Z. The worst-case scenario is based on the emissions level recorded along the X-axis, and the report includes only the worst-case data.
5. The detector type used is peak, which is more stringent than the Quasi-Peak detector and is permitted to be used per section 11.12.2.3 of ANSI C63.10 and FCC KDB 720338.
6. A more stringent limit from section 15.209 is applied to demonstrate compliance.

RADIATED EMISSIONS ABOVE 1 GHZ

Test Standard:	FCC Part 15.231 RSS-210 Issue 11	Mode:	Continuous Transmit Mode
Frequency Range:	1 GHz – 6 GHz	Test Date:	01/14/2025
Antenna Type/Polarity:	Horn/Hor & Ver	Test Engineer:	Minoush Niknam
Remark:	EUT is on the X-axis	Test Result:	Pass



No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	3905.300	38.6	9.5	5.1	53.2	Peak Max	V	109	181	74.0	-20.8	Pass
2	3037.425	43.1	7.6	2.7	53.4	Peak Max	V	100	181	74.0	-20.6	Pass
3	2169.563	45.1	6.5	0.0	51.5	Peak Max	V	136	158	74.0	-22.5	Pass
4	4773.155	28.9	9.1	5.8	43.8	Peak Max	H	112	160	74.0	-30.2	Pass
5	5641.640	22.0	11.2	5.5	38.7	Peak Max	V	177	68	74.0	-35.3	Pass
6	5922.348	20.0	11.7	5.5	37.2	Peak Max	H	161	70	74.0	-36.8	Pass
7	3905.300	37.6	9.5	5.1	52.2	Average Max	V	109	181	54.0	-1.8	Pass
8	3037.425	42.2	7.6	2.7	52.5	Average Max	V	100	181	54.0	-1.5	Pass
9	2169.563	44.2	6.5	0.0	50.7	Average Max	V	136	158	54.0	-3.3	Pass
10	4773.155	24.9	9.1	5.8	39.8	Average Max	H	112	160	54.0	-14.2	Pass
11	5641.640	12.4	11.2	5.5	29.1	Average Max	V	177	68	54.0	-24.9	Pass
12	5922.348	8.3	11.7	5.5	25.5	Average Max	H	161	70	54.0	-28.5	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF (dB/m) = Antenna Factor (dB/m) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. High pass filter was used during the testing to eliminate low-frequency noise and interference.
5 A more stringent limit from section 15.209 is applied to demonstrate compliance.

Radiated Emission Between 9KHz and 30 MHz Test Result

Note: No substantial emission is found other than the noise floor. Different modes have been verified.

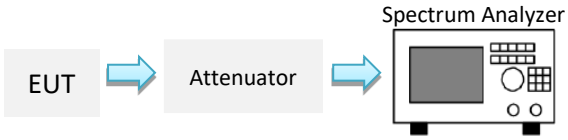
7.3 Occupied Bandwidth

7.3.1 Requirement

Per § 15.215 (c), RSS Gen-210, Annex A 1.4,

The occupied bandwidth of momentarily operated devices shall be less than or equal to 0.25% of the centre frequency for devices operating between 70 MHz and 900 MHz

7.3.2 Test setup



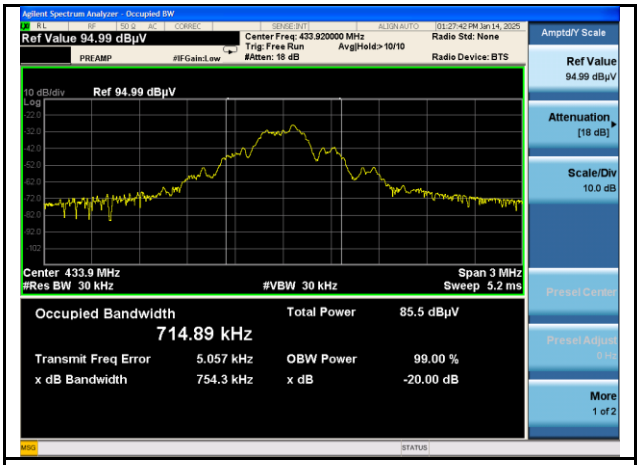
7.3.3 Test Procedure

1. Set RBW = 1% to 5% of the actual occupied BW.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Span = large enough to capture all products of the modulation process
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission; or OBW measurement function to determine the 99% occupied bandwidth.

7.3.4 Test Result

Mode	Frequency (MHz)	20dB Bandwidth (KHz)	99% Bandwidth (KHz)	Limit (KHz) ≤0.25% of the Center Frequency	Verdict
Periodic Transmit	433.9	754.3	714.89	1084.75	Pass

7.3.5 Test Plots



433.9 MHz

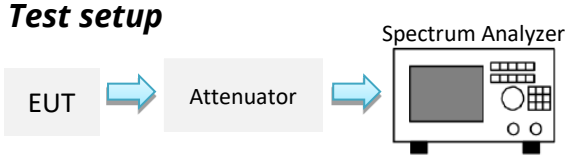
7.4 Duty Cycle

7.4.1 Requirement

Per § 15.231 (c), RSS Gen 6.7

According to FCC Part 15.231 (b)(2) and 15.35 (c), for pulse operation transmitter, the averaging pulsed emissions are calculated by peak value of measured emission plus duty cycle factor.

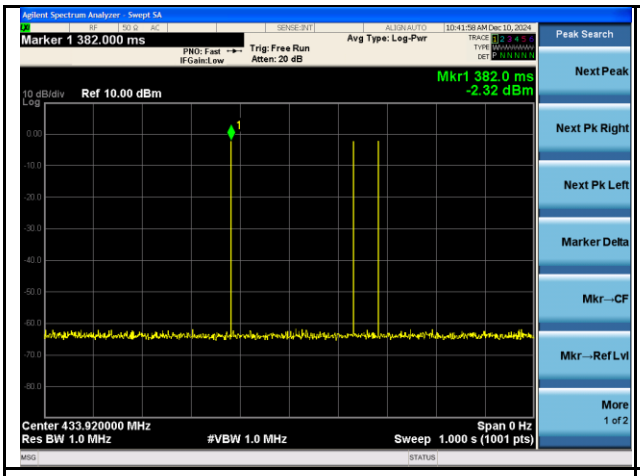
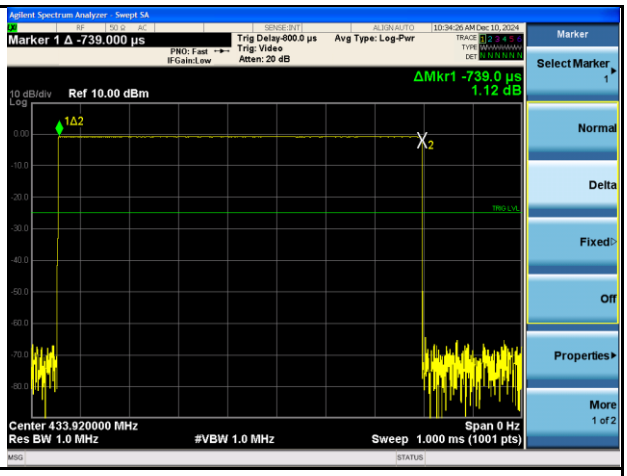
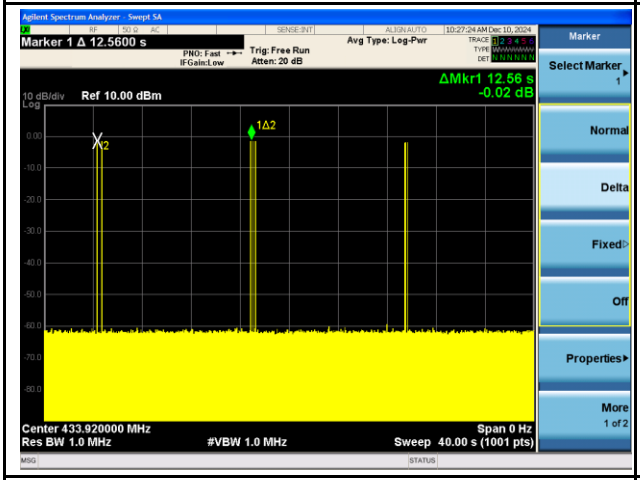
7.4.2 Test setup



7.4.3 Test Procedure

1. Set RBW = 1% to 5% of the actual occupied BW.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Span = large enough to capture all products of the modulation process
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

7.4.4 Test Plots

<table>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Duty cycle_ multiple turned on beacon in 1 second period</td><td>Duty cycle_ Turned-on and off time for each beacon</td></tr>
<tr><td> 
</td><td>PW is the pulse width = (0.739) *(3)=2.217 ms
T is the total period

Duty Cycle= PW/T= (2.217)/ (12.56) = 0.1765

Duty Cycle Factor= 20*log (Duty Cycle)
Duty Cycle Factor = 20* log (0.1765) = -15.06 dB</td></tr>
<tr><td>Duty cycle-period for Turned-on time of each pulse</td><td>-</td></tr>
</table>

8 Test Instrument List

Equipment	Manufacturer	Model	Instrument Number	Cal. Date	Cal. Due
Semi-Anechoic Chamber	ETS-Lindgren	10M	VL001	10/18/2024	10/18/2025
Shielding Control Room	ETS-Lindgren	Series 81	VL006	N/A	N/A
Spectrum Analyzer	Keysight	N9020A	MY50110074	06/09/2024	06/09/2025
EMC Test Receiver	R&S	ESL6	100230	06/07/2024	06/07/2025
LISN (9KHz – 30MHz)	EMCO	3816/2	9705-1066	07/12/2024	07/12/2025
Bi-Log Antenna	ETS-Lindgren	3142E	217921	07/19/2024	07/19/2025
Horn Antenna (1-18GHz)	Electro-Metrics	EM-6961	6292	07/21/2024	07/21/2025
Horn Antenna (18-40GHz)	Com-Power	AH-840	101109	07/21/2024	07/21/2025
Preamplifier	RF Bay, Inc.	LPA-10-20	11180621	07/16/2024	07/16/2025
True RMS Multi-meter	UNI-T	UT181A	C173014829	06/07/2024	06/07/2025
Temp / Humidity / Pressure Meter	PCE Instruments	PCE-THB 40	R062028	06/07/2024	06/07/2025
RF Attenuator	Pasternack	PE7005-3	VL061	07/16/2024	07/16/2025
Preamplifier 100KHz - 40GHz	Aeroflex	33711-392-77150-11	064	07/16/2024	07/16/2025
EM Center Control	ETS-Lindgren	7006-001	160136	N/A	N/A
Turn Table	ETS-Lindgren	2181-3.03	VL002	N/A	N/A
Boresight Antenna Tower	ETS-Lindgren	2171B	VL003	N/A	N/A
Loop Antenna (9k-30MHz)	Com-Power	AL-130	121012	06/10/2024	06/10/2025
RE test cable(below 6GHz)	Vista	RE-6GHz-01	RE-6GHz-01	07/16/2024	07/16/2025
RE test cable (1-18GHz)	PhaseTrack	II-240	RE-18GHz-01	07/16/2024	07/16/2025
RE test cable (>18GHz)	Sucoflex	104	344903/4	07/16/2024	07/16/2025
Pulse limiter	Com-Power	LIT-930A	531727	07/16/2024	07/16/2025
CE test cable #1	FIRST RF	FRF-C-1002-001	CE-6GHz-01	07/16/2024	07/16/2025
CE test cable#2	FIRST RF	FRF-C-1002-001	CE-6GHz-02	07/16/2024	07/16/2025

Note:

1) This equipment is not for measurement purpose and only require functional verification. Calibration is not required.

---END---