

## Just Play (HK) Limited

# **TEST REPORT**

SCOPE OF WORK FCC TESTING- MODEL:41103

**REPORTNUMBER** SZHH01910182-001

**ISSUE DATE** APR 19, 2024

## PAGES

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### Just Play (HK) Limited

Application for Certification

#### FCC ID: 2AAIB4110300

#### Wednesday Animated Thing

#### Model: 41103

2.4GHz Transmitter

#### Report No.: SZHH01910182-001

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-22]

Prepared and Checked by:

Approved by:

Sign on file

Terry Tang Assistant Supervisor Ryan Chen Project Engineer Date: Apr 19, 2024

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#### Intertek Testing Service Shenzhen Ltd. Longhua Branch

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#### **MEASUREMENT/TECHNICAL REPORT**

This report concerns (chec	k one:)	Original Grant <u>≯</u>	<u>(</u> CI	ass II Chan	ige _						
Equipment Type: <u>DXX - Pa</u>	art 15 Low Po	ower Communicat	ion Device T	ransmitter							
Deferred grant requested p	ber 47 CFR 0	.457(d)(1)(ii)?	Yes	1	No _	X					
		lf yes, de	efer until:	date	;						
Company Name agrees to notify the Commission by:											
of the intended date of ann date.	nouncement o	of the product so	that the gran	t can be iss	sued	on that					
Transition Rules Request p	per 15.37?		Yes	1	No _	X					
If no, assumed Part 15, Su provision.	bpart C for in	tentional radiator	– the new 47	′ CFR [10-1	-22	Edition]					
Report prepared by:											
	101, 201, B Community People's Rep	ing Services Sher Building B, No. 3 GuanHu Subdist Dublic of China -755-86016288/8	08 Wuhe A trict, LongHu	venue, Zha ua District,	angk						



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#### 1.0 <u>Summary of Test Result</u>

Applicant: Just Play (HK) Limited Applicant Address: 10/F, Mirror Tower, 61 Mody Road, Tsim Sha Tsui East Kowloon HongKong

Manufacturer: Just Play (HK) Limited Manufacturer Address: 10/F, Mirror Tower, 61 Mody Road, Tsim Sha Tsui East Kowloon HongKong

MODEL:41103

FCC ID: 2AAIB4110300

Test Specification	Reference	Results
Transmitter Radiated Emission	15.249 &15.209 &15.205	Pass
Bandedge		
20dB Bandwidth	15.215(c)	Pass

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.



#### 2.0 General Description

2.1 Product Description

The equipment under test (EUT) is a Wednesday Animated Thing operating at 2.4G Band. The EUT can be powered by DC 4.5V (3 x 1.5V LR44 batteries).For more detail information pls. refer to the user manual.

Antenna Type: Integral antenna Modulation Type: GFSK Antenna Gain: 0dBi

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

2.2 Related Submittal(s) Grants

This is an application for certification of controller unit for the Wednesday Animated Thing, there has a receiver which associated with this EUT has been subjected to the FCC SDOC.

2.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Radiated emission measurement was performed in Semi-anechoic chamber. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The Semi-anechoic chamber used to collect the radiated data is **Intertek Testing Services Shenzhen Ltd. Longhua Branch**and located at101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community GuanHu Subdistrict, LongHua District, Shenzhen, People's Republic of China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: CN1188).



#### 3.0 System Test Configuration

#### 3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.10 (2013).

The EUT was powered by DC 4.5V (3 x 1.5V LR44 batteries) during the test, only the worst data was reported in this report.

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the bottom of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Section4.

The EUT was operated standalone and placed in the central of the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on a turn table, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

3.2 EUT Exercising Software

There was no special software to exercise the device.

3.3 Special Accessories

No special accessories used.

3.4 Equipment Modification

Any modifications installed previous to testing by Just Play (HK) Limited will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd Longhua Branch.

- 3.5 Measurement Uncertainty When determining the test conclusion, the Measurement Uncertainty of test has been considered.
- 3.6 Support Equipment List and Description

Description	Manufacturer	Model No.
//	//	//



#### 4.0Emission Results

Data is included worst-case configuration (the configuration which resulted in the highest emission levels).

4.1 Radiated Test Results

A sample calculation, configuration photographs and data tables of the emissions are included.

4.1.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

Where  $FS = Field Strength in dB\mu V/m$   $RA = Receiver Amplitude (including preamplifier) in dB\mu V$  CF = Cable Attenuation Factor in dB AF = Antenna Factor in dB/m AG = Amplifier Gain in dB PD = Pulse Desensitization in dBAV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD + AV

Assume a receiver reading of 62.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

RA =  $62.0 \text{ dB}\mu\text{V}$ AF = 7.4 dB/m CF = 1.6 dB AG = 29.0 dB PD = 0 dB AV = -10 dB FS =  $62 + 7.4 + 1.6 - 29 + 0 = 42 \text{ dB}\mu\text{V/m}$ 

Level in  $\mu$ V/m = Common Antilogarithm [(42 dB $\mu$ V/m)/20] = 125.9  $\mu$ V/m



#### 4.1.2 Radiated Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos. pdf.

#### 4.1.3 Radiated Emissions

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Worst Case Radiated Emission at 710.746000 MHz

Judgement: Passed by 14.6 dB

#### TEST PERSONNEL:

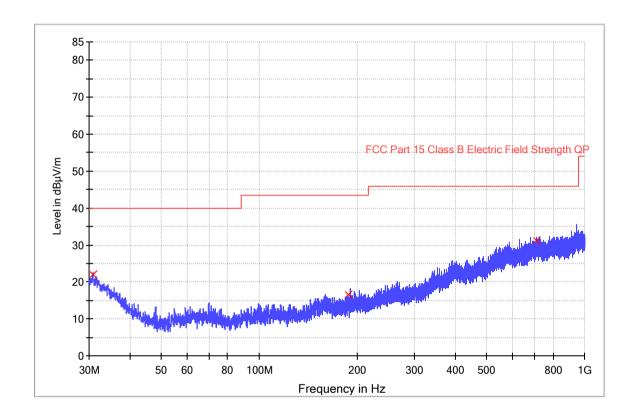
Sign on file

Terry Tang, Assistant Supervisor Typed/Printed Name

<u>Apr 18, 2024</u> Date



Model:41103 Transmitting(2420.000MHz)



#### ANT Polarity: Horizontal

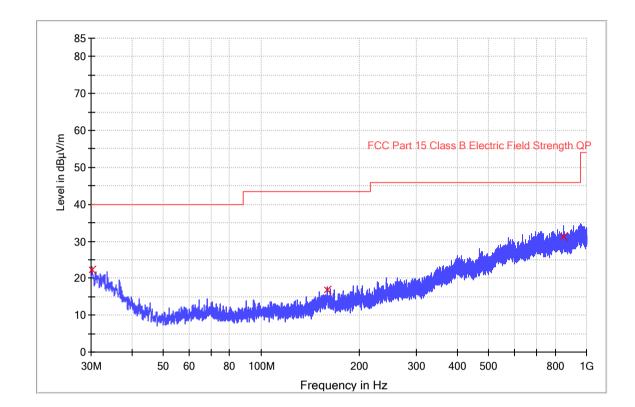
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
30.808333	22.0	1000.0	120.000	Н	22.9	18.0	40.0
188.530333	16.6	1000.0	120.000	Н	16.7	26.9	43.5
710.746000	31.4	1000.0	120.000	Н	30.9	14.6	46.0

Remark:

- 1. Corr.(dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. QuasiPeak (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Limit Line(dB $\mu$ V/m) Level (dB $\mu$ V/m)



Model:41103 Transmitting(2420.000MHz)



#### ANT Polarity: Vertical

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
30.240000	22.4	1000.0	120.000	V	23.3	17.6	40.0
159.656667	16.7	1000.0	120.000	V	17.2	26.8	43.5
851.978000	31.3	1000.0	120.000	V	31.7	14.7	46.0

Remark:

- 1. Corr.(dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. QuasiPeak (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Limit Line(dB $\mu$ V/m) Level (dB $\mu$ V/m)



#### 4.1.4 Transmitter Spurious Emissions (Radiated)

#### Worst Case Radiated Emission at 7380.000 MHz

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos. pdf.

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 0.3 dB

#### TEST PERSONNEL:

Sign on file

Terry Tang, Assistant Supervisor Typed/Printed Name

Apr 18, 2024 Date



Model:41103 Transmitting

#### Table 1

Contraction Radiated Emissions (2420 MHz)												
Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)					
Horizontal	2420.000	97.3	36.7	28.1	88.7	114.0	-25.3					
Horizontal	4840.000	57.8	36.7	35.5	56.6	74.0	-17.4					
Horizontal	7260.000	55.3	36.7	35.9	54.5	74.0	-19.5					
Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Netat 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)				
Horizontal	2420.000	97.3	36.7	28.1	5.9	82.8	94.0	-11.2				
Horizontal	4840.000	57.8	36.7	35.5	5.9	50.7	54.0	-3.3				
Horizontal	7260.000	55.3	36.7	35.9	5.9	48.6	54.0	-5.4				

Notes: 1. Peak Detector Data unless otherwise stated.

- 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
- 3. Negative value in the margin column shows emission below limit.
- 4. Horn antenna is used for the emission over 1000MHz.



Model:41103 Transmitting

#### Table 2

	Radiated Emissions (2445 MHz)											
Polarization Frequency (MHz) Reading (dBµV) Amp Gain (dB) Antenna Factor (dBµV/m) (dBµV/m) (dBµV/m) (dBµV/m) (dBµV/m) (dB)												
Horizontal	2445.000	95.2	36.7	28.1	86.6	114.0	-27.4					
Horizontal	4890.000	59.4	36.7	35.5	58.2	74.0	-15.8					
Horizontal	7335.000	56.1	36.7	36.0	55.4	74.0	-18.6					
Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Netat 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)				
Horizontal	2445.000	95.2	36.7	28.1	5.9	80.7	94.0	-13.3				
Horizontal	4890.000	59.4	36.7	35.5	5.9	52.3	54.0	-1.7				
Horizontal	7335.000	56.1	36.7	36.0	5.9	49.5	54.0	-4.5				

Notes: 1. Peak Detector Data unless otherwise stated.

- 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
- 3. Negative value in the margin column shows emission below limit.
- 4. Horn antenna is used for the emission over 1000MHz.



Model:41103 Transmitting

#### Table 3

	Radiated Emissions (2460 MHz)												
Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)						
Horizontal	2460.000	96.6	36.7	28.1	88.0	114.0	-26.0						
Horizontal	4920.000	55.3	36.7	35.5	54.1	74.0	-19.9						
Horizontal	7380.000	60.1	36.7	36.2	59.6	74.0	-14.4						
Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Netat 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)					
Horizontal	2460.000	96.6	36.7	28.1	5.9	82.1	94.0	-11.9					
Horizontal	4920.000	55.3	36.7	35.5	5.9	48.2	54.0	-5.8					
Horizontal	7380.000	60.1	36.7	36.2	5.9	53.7	54.0	-0.3					

Notes: 1. Peak Detector Data unless otherwise stated.

- 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
- 3. Negative value in the margin column shows emission below limit.
- 4. Horn antenna is used for the emission over 1000MHz.



#### 5.0 Equipment Photographs

For electronic filing, the photographs of the tested EUT are saved with filename: external photos.pdf& internal photos.pdf.

#### 6.0 **Product Labelling**

For electronic filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

#### 7.0 <u>Technical Specifications</u>

For electronic filing, the block diagram and schematics of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

#### 8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.



#### 9.0 Miscellaneous Information

This miscellaneous information includes details of the measured bandedge, 20dB Bandwidth, the test procedure and calculation of factor such as pulse desensitization.

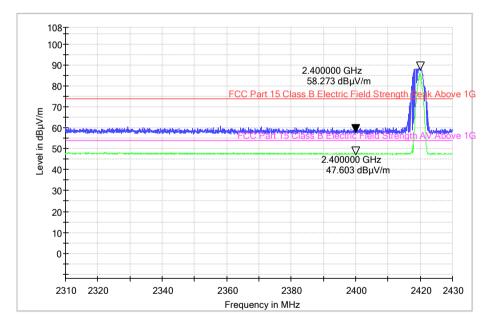
#### 9.1Bandedge Plot

The test plots are attached as below. From the plot, the field strength of any emissions outside of the specified frequency band are attenuated to the general radiated emission limits in section 15.209. It fulfils the requirement of 15.249(d).

#### Peak Measurement

Restricted-band band-edge tests shall be performed as radiated measurements, i.e(Band-edge Plot).

#### (i) Lower channel 2420.000MHz:

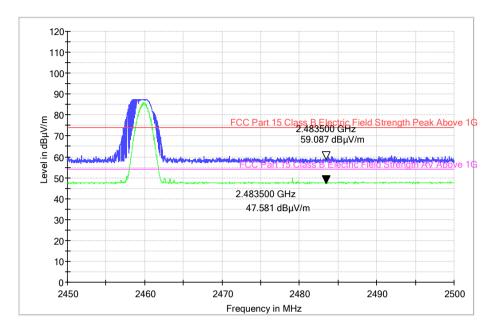


Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2400.000	66.9	36.7	28.1	58.3	74.0	-15.7

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m	Margin (dB)
Horizontal	2400.000	56.2	36.7	28.1	47.6	54.0	-6.4

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed  $74dB\mu\nu/m$  (Peak Limit) and  $54dB\mu\nu/m$  (Average Limit).



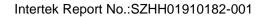


#### (ii) Upper channel 2460.000MHz:

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2483.500	66.8	36.8	29.1	59.1	74.0	-14.9

Pola	rization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m	Margin (dB)
Hor	izontal	2483.500	55.3	36.8	29.1	47.6	54.0	-6.4

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74dB $\mu$ v/m (Peak Limit) and 54dB $\mu$ v/m (Average Limit).





#### 9.2 20dB Bandwidth

Pursuant to FCC part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered. The test plots are reported as below.

Spectrur	<u></u>							₩
Ref Level		BUA		RBW 30 kHz				UV.
Att					Mode Auto FFT			
●1Pk View								
- 60 dBµA					M2[1]		36.53	dBuA
							2.42016930	
50 dBµA					M1[1]		16.98	
							2.41893630	) GHz
40 dBµA					M2			
то авря					X			
30 dBµA								
30 UBHA			$\sqrt{\sqrt{2}}$		· ~ .			
20 dBµA	M1	- $1$	V ·		~~~~			
20 UBHA-	D1 16.	530 dBµA				701		
10 dBµA						3		
то авря—	1							
	¥ in					1 miles	41	
-10 dBµA—							1 m	
-10 UBHA-							- N-A	<u> </u>
20. dpA								_~
-20 dBµA—								
-30 dBµA—								
-30 UBHA-								
CF 2.42 G	Hz			691 pt	s		Span 3.0	MHz
darker				001 PC	2		opunoio	
Type   Re	of   Tro	X-val	ue (	Y-value	Function	L Eu	nction Result	1
M1	1		9363 GHz	16.98 dBµA	, i unotion			
	41 1	1	589 MHz	-0.52 dB				
M2								
Spectrur	L		1693 GHz	36.53 dBµA				
Spectrur Ref Level Att	n	dBµA	•	36.53 dBµA <b>RBW</b> 30 kHz	Mode Auto FFT			
Spectrur Ref Level Att	n	dBµA	•	36.53 dBµA <b>RBW</b> 30 kHz	Mode Auto FFT			
Spectrur Ref Level Att 1Pk View	n	dBµA	•	36.53 dBµA <b>RBW</b> 30 kHz	Mode Auto FFT		39.82	dBµA
Spectrur Ref Level Att 1Pk View	n	dBµA	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366	dBµA 5 GHz
Spectrur Ref Level Att 1Pk View 60 dBµA-	n	dBµA	•	36.53 dBµA <b>RBW</b> 30 kHz			2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att 1Pk View 60 dBµA-	n	dBµA	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366	dBµA 5 GHz dBµA
Spectrur Ref Level Att 1Pk View 60 dBµA	n	dBµA	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att 1Pk View 60 dBµA	n	dBµA	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att 1Pk View 60 dBµA	n	dBµA	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att 1Pk View 60 dBµA	n 1 63.00 c	JBµA 0 dB SWT (	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
<b>Spectrur</b> <b>Att</b> <b>)</b> IPk View 60 dBµA— 50 dBµA— 40 dBµA— 30 dBµA—	n 1 63.00 c	dBµA	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att ) IPk View 60 dBµA— 50 dBµA— 40 dBµA— 30 dBµA—	n 1 63.00 c	JBµA 0 dB SWT (	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att ) IPk View 60 dBµA— 50 dBµA— 40 dBµA— 30 dBµA—	n 1 63.00 c	JBµA 0 dB SWT (	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att ) IPk View 60 dBµA— 40 dBµA— 30 dBµA— 20 dBµA— 10 dBµA—	n 1 63.00 c	JBµA 0 dB SWT (	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att ■ 1Pk View 60 dBµA— 50 dBµA— 40 dBµA— 30 dBµA— 10 dBµA— 10 dBµA—	n 1 63.00 c	JBµA 0 dB SWT (	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att ) IPk View 60 dBµA— 50 dBµA— 30 dBµA— 20 dBµA— 10 dBµA— 0 dBµA—	n 1 63.00 c	JBµA 0 dB SWT (	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att ) IPk View 60 dBµA— 40 dBµA— 30 dBµA— 20 dBµA— 10 dBµA—	n 1 63.00 c	JBµA 0 dB SWT (	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att 1Pk View 60 dBµA— 50 dBµA— 40 dBµA— 30 dBµA— 10 dBµA— 0 dBµA—	n 1 63.00 c	JBµA 0 dB SWT (	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att ) IPk View 60 dBµA— 50 dBµA— 30 dBµA— 20 dBµA— 10 dBµA— 0 dBµA—	n 1 63.00 c	JBµA 0 dB SWT (	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att ) IPk View 60 dBµA— 50 dBµA— 30 dBµA— 30 dBµA— 10 dBµA— 0 dBµA— -10 dBµA— -20 dBµA—	n 1 63.00 c	JBµA 0 dB SWT (	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att ) IPk View 60 dBµA— 50 dBµA— 40 dBµA— 30 dBµA— 10 dBµA— 10 dBµA—	n 1 63.00 c	JBµA 0 dB SWT (	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA
Spectrur Ref Level Att ) IPk View 60 dBµA— 50 dBµA— 40 dBµA— 30 dBµA— 10 dBµA— -10 dBµA— -20 dBµA— -20 dBµA—	D1 19.	JBµA 0 dB SWT (	•	36.53 dBµA	M2[1]		2.46017366 19.92 2.46052970	dBµA 5 GHz dBµA J GHz
Spectrur Ref Level Att 1Pk View 60 dBµA— 50 dBµA— 40 dBµA— 30 dBµA— 10 dBµA— 0 dBµA— -10 dBµA— -20 dBµA— -20 dBµA— -20 dBµA— -20 dBµA—	D1 19.	JBµA 0 dB SWT (	•	36.53 dBµA <b>RBW</b> 30 kHz	M2[1]		2.46017366 19.92	dBµA 5 GHz dBµA J GHz
Spectrur Ref Level Att ) IPk View 60 dBµA— 50 dBµA— 30 dBµA— 30 dBµA— 10 dBµA— 0 dBµA— -10 dBµA— -20 dBµA— -20 dBµA— -30 dBµA— -30 dBµA—	n 1 63.00 c 1 D1 19.4		53.2 µs •	36.53 dBµA	M2[1] M1[1] M2 		2.46017366 19.92 2.4605297( 	dBµA 5 GHz dBµA J GHz
Spectrur Ref Level Att ● 1Pk View 60 dBµA	n 1 63.00 c 1 D1 19.0 Hz		53.2 µs •	36.53 dBµA	M2[1]		2.46017366 19.92 2.46052970	dBµA 5 GHz dBµA J GHz
Spectrur Ref Level Att 1Pk View 60 dBµA— 50 dBµA— 40 dBµA— 30 dBµA— 10 dBµA— 0 dBµA— -10 dBµA— -20 dBµA— -20 dBµA— -20 dBµA— -20 dBµA— -20 dBµA— -20 dBµA— -30 dBµA— -20 dBµA= -20 d	n 1 63.00 c 1 D1 19.0 Hz ef Trc 1	ЗВµА 0 dB SWT ( 820 dBµA 820 dBµA	53.2 µs	36.53 dBµA RBW 30 kH2 VBW 100 kH2	M2[1] M1[1] M2 		2.46017366 19.92 2.4605297( 	dBµA 5 GHz dBµA J GHz
Spectrur Ref Level Att 1Pk View 60 dBµA— 50 dBµA— 40 dBµA— 30 dBµA— 10 dBµA— 10 dBµA— -10 dBµA— -20 dBµA= -20	n 1 63.00 c 1 D1 19.0 Hz	IBµA 0 dB SWT ( 820 деµА 820 деµА 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	53.2 µs •	36.53 dBµA	M2[1] M1[1] M2 		2.46017366 19.92 2.4605297( 	dBµA 5 GHz dBµA J GHz



#### 9.3 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period ( $T_{eff}$ ) is approximately 1.0087ms for a digital "1" bit, as shown in the plots of Section9.4 With a resolution bandwidth (3 dB) of 100 kHz, the pulse desensitivity factor was 0 dB

9.4 Calculation of Average Factor

Averaging factor in  $dB = 20 \log (duty cycle)$ 

The specification for output field strengths in accordance with the FCC rules specify measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation. The duty cycle is measured by placing the spectrum analyzer in zero scan (receiver mode) and linear mode at maximum bandwidth (3 MHz at 3 dB down) and viewing the resulting time domain signal output from the analyzer on a Tektronix oscilloscope. The oscilloscope is used because of its superior time base and triggering facilities.

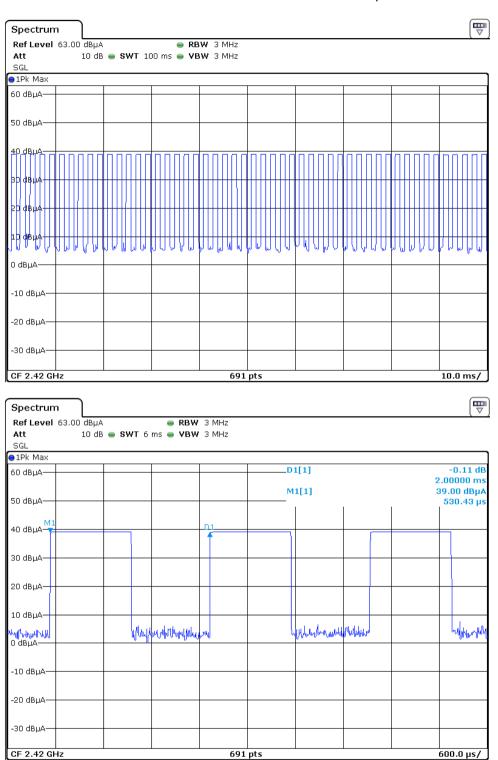
The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 2.000ms Effective period of the cycle = 1.0087ms DC =1.0087ms / 2.000ms =0.5044 or 50.44%

Therefore, the averaging factor is found by  $20 \log_{10}(0.5044) = -5.9 dB$ 

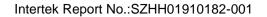
The test plots are attached as below.







Spectrum									
RefLevel 63 Att SGL	SWT 6 r	● RBW ms ● VBW							
●1Pk Max									
60 dBµA					1[1] 1[1]				0.09 dB 0870 ms .00 dBµA
50 dBµA									530.43 μs
40 dBµA									
30 dвµА									
20 dBµA									
10 dвµА									
Mythydrydhydd O dBµA	Ways	wahilimalika	,m)	1	Hubberlow	PWWWW	, 		halpharphly
-10 dBµA									
-20 dBµA									
-30 dвµА									
CF 2.42 GHz			691	pts	1			60	)0.0 µs/





#### 9.5 Emissions Test Procedures

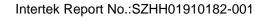
The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.10 - 2013.

The transmitting equipment under test (EUT) is placed on a styrene turntable which is four feet in diameter and approximately 0.8 meter up to 1GHz and 1.5 meter above 1GHz in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Section9.4.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.





#### 9.5 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Section9.2). Above 1000 MHz, a resolution bandwidth of 1 MHz is used, RBW 3 MHz used for fundamental emission.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.



#### 10.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-12	BiConiLog Antenna	ETS	3142E	00166158	4-Aug-2021	4-Aug-2024
SZ185-04	EMI Receiver	R & S	ESR7	102466	10-Nov-2023	10-Nov-2024
SZ061-08	Horn Antenna	ETS	3115	00092346	5-Sep-2021	5-Sep-2024
SZ061-06	Active Loop Antenna	Electro- Metrics	EM-6876	217	18-May-2021	18-May-2024
SZ061-15	Double- Ridged Waveguide Horn Antenna	ETS	3116C-PA	00224718	6-Jul-2021	6-Jul-2024
SZ056-06	Spectrum Analyzer	R&S	FSV40	101101	13-Dec-2023	13-Dec-2024
SZ181-04	Preamplifier	Agilent	8449B	3008A024 74	27-Apr-2023	27-Apr-2024
SZ188-01	Anechoic Chamber	ETS	RFD-F/A- 100	4102	12-Dec-2021	12-Dec-2024
SZ062-02	RF Cable	RADIALL	RG 213U		1-Nov-2023	1-May -2024
SZ062-05	RF Cable	RADIALL	0.04- 26.5GHz		1-Nov-2023	1-May -2024
SZ062-12	RF Cable	RADIALL	0.04- 26.5GHz		1-Nov-2023	1-May -2024
SZ067-04	Notch Filter	Micro-Tronics	BRM5070 2-02		27-Apr-2023	27-Apr-2024