RF Exposure Evaluation Declaration

FCC ID: DD4GLXD1Z3

APPLICANT: Shure Incorporated

Application Type: Certification

Product: Wireless Bodypack Transmitter

Model No.: GLXD1+ Z3

Brand Name: SHURE, SHURE

FCC Rule Part(s): FCC Part 2 (Section 2.1091)

Test Date: November 22, 2020 ~ April 07, 2021

Reviewed By: Jame Yuan

Approved By: Robin Wu

Revision History

Report No.	Version	Description	Issue Date	Note
2103RSU004-U3	Rev. 01	Initial Report	04-13-2021	Valid

1. Product Information

1.1. Equipment Description

Product Name	Wireless Bodypack Transmitter
Model No.	GLXD1+ Z3
Radio Specification	2.4GHz & 5.8GHz
Operating Temperature	0 ~ 45 °C
Power Type	AC/DC Adapter or Rechargeable Li-ion Battery Input
Accessories	
USB Adapter	Model No.: SBC10-USB15WSUSTWJ Input Power: 100 - 240V ~ 50/60Hz, 0.6A Output Power: 5VDC 3A
Rechargeable Li-ion Battery	Model No.: SB904 Capacitance: 2420mAh/8.71Wh Rated Voltage: 3.6V

1.2. RF Specification

Frequency Range	2404 ~ 2478MHz, 5729 ~ 5846MHz
Declared Channel Bandwidth	Full Bandwidth Mode: 2 MHz Half Bandwidth Mode: 1 MHz
Channel Spacing	1MHz
Type of Modulation	2-level CPM with Gaussian shaping (basically GFSK)

1.3. Antenna Details

Antenna Type	Frequency Band (MHz)	Max Peak Gain (dBi)	Frequency Band (MHz)	Max Peak Gain (dBi)
PIFA Antenna	2404	2.72	5729	-0.20
	2442	3.45	5788	-0.32
	2478	2.33	5846	1.07

1.4. Applied Standards

KDB 447498 D01v06

2. Duty Cycle Factor Measurement

2.1. Test Requirement

Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 s (100 ms). In cases where the pulse train exceeds 0.1 s, the measured field strength shall be determined during a 0.1 s interval.

The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retrained in the measurement data file for equipment subject to notification or verification.

2.2. Test Procedures

a. The EUT was set to communicate with GLXD4+ continuously.

b. A horn antenna was positioned at a 3 meter distance from the EUT. The output of the antenna was connected to the input of a spectrum analyzer.

c. The center frequency of the spectrum analyzer was set to the transmit frequency of the EUT.

d. The frequency span of the spectrum analyzer was set to 0Hz so that the time domain trace of the

transmitted pulse of the EUT was displayed on the spectrum analyzer.

e. The sweep time of the spectrum analyzer was adjusted so that the beginning and end of a single pulse could be seen on the display of the spectrum analyzer.

f. The single sweep function of the spectrum analyzer was used multiple times to determine the maximum pulse width of the EUT.

g. The maximum pulse width display of the spectrum analyzer was recorded and then plotted using a 'screen dump' utility.

h. The sweep time of the spectrum analyzer was then adjusted to 100msec.

i. The single sweep function of the spectrum analyzer was used multiple times to determine the maximum number of transmitted pulses that occurred in a 100msec time period.

j. The maximum number of pulses transmitted in a 100msec time period was recorded and then plotted using a ‘screen dump’ utility.

k. The duty cycle correction was calculated using the following equation:

Duty Cycle Correction Factor (dB) = D.C. (dB)

D.C. (dB) = 20 x log (((pulse width (msec))x(#pulses in a 100msecperiod)/100msec)

2.3. Test Result

Test Site	SIP-SR5	Test Engineer	Alisa Deng
Test Date	2021/04/19		

Test Mode	Frequency (MHz)	Single Pulse Width (us)	Number of Packet In 100ms	Duty Cycle Factor (dB)
Full BW	2453	264.8	86	-12.85
Half BW	2453	831.0	37	-10.24

Note: Duty Cycle Correction Factor (dB) = 20 x log (((pulse width (msec)) x (#pulses in a 100msecperiod) / 100msec).

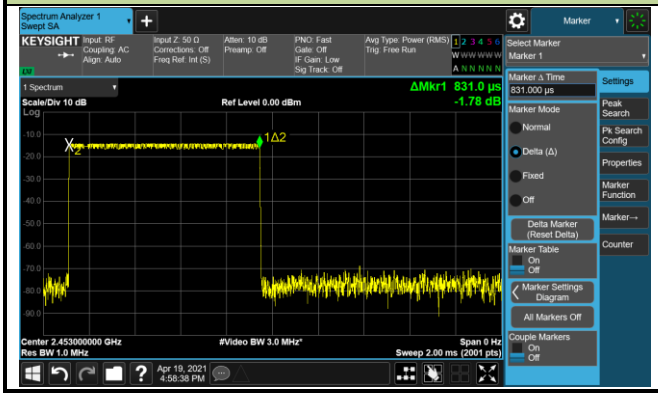
Full BW, Channel 2453MHz

Pulse Width

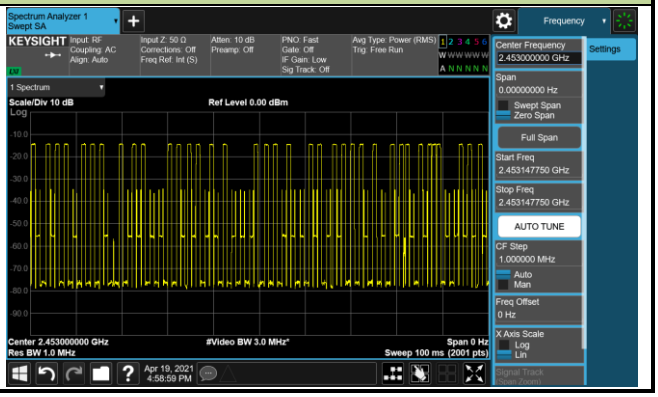
100ms Period

Half BW, Channel 2453MHz

Pulse Width



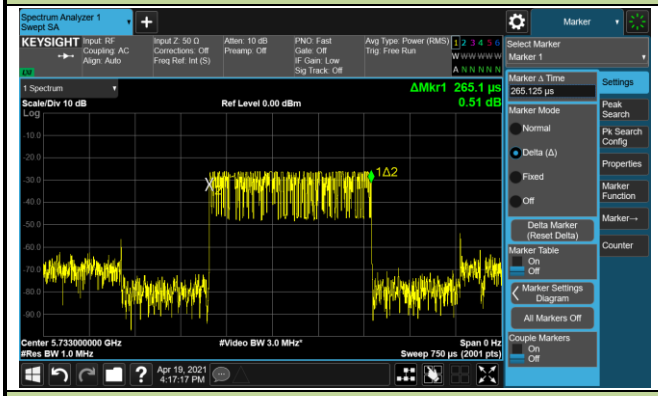
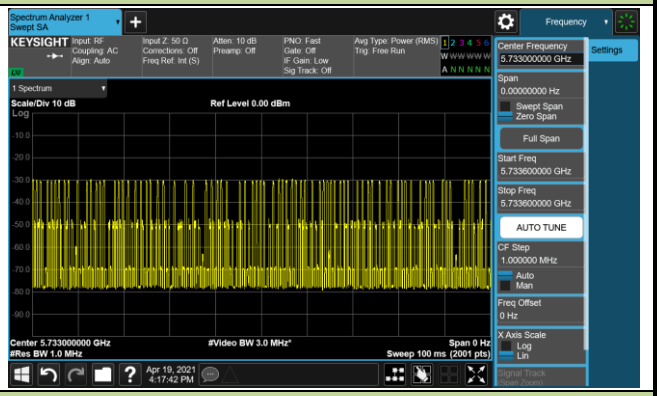
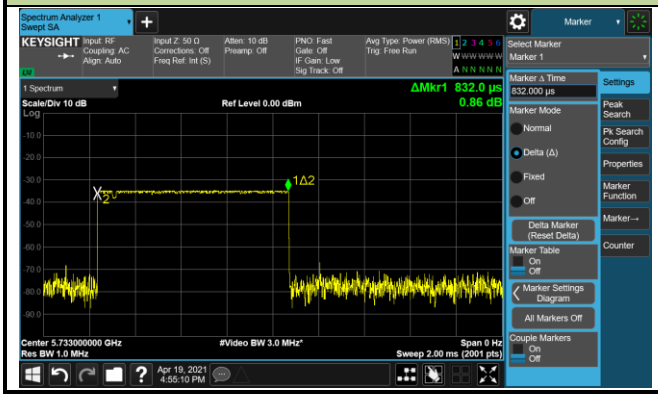
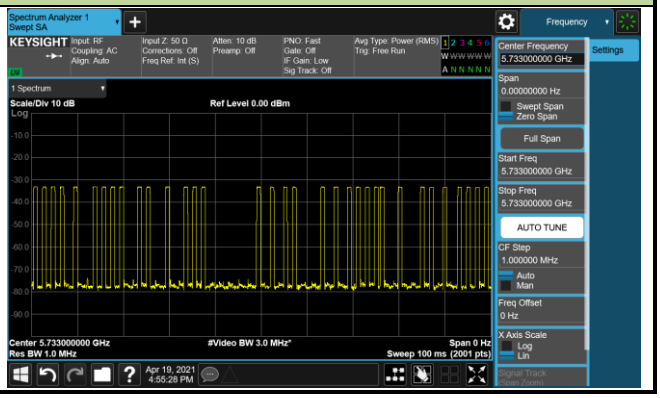
100ms Period



Test Site	SIP-SR5	Test Engineer	Alisa Deng
Test Date	2021/04/19		

Test Mode	Frequency (MHz)	Single Pulse Width (us)	Number of Packet In 100ms	Duty Cycle Factor (dB)
Full BW	5733	265.1	79	-13.58
Half BW	5733	832.0	34	-10.97

Note: Duty Cycle Correction Factor (dB) = 20 x log (((pulse width (msec)) x (#pulses in a 100msecperiod) / 100msec).

Full BW, Channel 5733MHz	
Pulse Width	100ms Period
	
Half BW, Channel 5733MHz	
Pulse Width	100ms Period
	

3. RF Exposure Evaluation

3.1. Test Limit

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table. The equation and threshold in Note 1 must be applied to determine SAR test exclusion.

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	SAR Test Exclusion Threshold (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	
MHz	30	35	40	45	50	mm
150	232	271	310	349	387	SAR Test Exclusion Threshold (mW)
300	164	192	219	246	274	
450	134	157	179	201	224	
835	98	115	131	148	164	
900	95	111	126	142	158	
1500	73	86	98	110	122	
1900	65	76	87	98	109	
2450	57	67	77	86	96	
3600	47	55	63	71	79	
5200	39	46	53	59	66	
5400	39	45	52	58	65	
5800	37	44	50	56	62	

Note: The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

3.2. Test Result

Product	Wireless Bodypack Transmitter
Test Item	RF Exposure Evaluation

Frequency Band (MHz)	Maximum Turn-up Power (dBm)	Duty Cycle Factor (dB)	Time Average Power (dBm)	SAR Test Exclusion Threshold (mW)
2404 ~ 2478	10.0	-10.24	-0.24	10
5729 ~ 5846	10.0	-10.97	-0.97	6

Note 1: The time average power = Maximum turn-up power + DC factor.

Note 2: Per FCC KDB 447498 D01v06, the SAR exclusion threshold for distances < 50mm is defined by the following equation:

$$\frac{Max\ Power\ of\ Channel\ (mW)}{Test\ Separation\ Dist\ (mm)} * \sqrt{Frequency(GHz)} \leq 3.0$$

Based on the maximum conducted power and the antenna to use separation distance, SAR was not required;

For 2.4GHz band, (0.95mW / 5mm) * (2.478GHz^0.5) = 0.2991 << 3.0;

For 5.8GHz band, (0.80mW / 5mm) * (5.846GHz^0.5) = 0.3869 << 3.0;

Note 3: When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

The End

Appendix - EUT Photograph

Refer to “2103RSU004-UE” file.