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Report Template Version: V04

Report Template Revision Date: 2018-07-06

RF Exposure Evaluation Report

Report No.: CQASZ20210400531E-02
Applicant: Medeli Electronics Co., Ltd.
Address of Applicant: 120/F., Cheung Lee Industrial Building, 9 Cheung Lee Street, Chai Wan, Hongkong
Equipment Under Test (EUT):
EUT Name: Electronic Keyboard
Model No.: AKX10, AK1000, DX1749
Test Model No.: AKX10
Brand Name: MEDELI
FCC ID: 2AZ6J-GC321493
Standards: 47 CFR Part 1.1307
47 CFR Part 2.1093
KDB447498D01 General RF Exposure Guidance v06
Date of Test: 2021-4-23 to 2021-5-20
Date of Issue: 2021-5-20
Test Result: PASS*

*In the configuration tested, the EUT complied with the standards specified above

Tested By:

Lewis Zhou

(Lewis Zhou)

Reviewed By:

Jun Li

(Jun Li)

Approved By:

Sheek Luo

(Sheek Luo)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210400531E-02	Rev.01	Initial report	2021-5-20

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3 General Information

3.1 Client Information

Applicant:	Medeli Electronics Co., Ltd.
Address of Applicant:	120/F., Cheung Lee Industrial Building, 9 Cheung Lee Street, Chai Wan, Hongkong
Manufacturer:	Medeli Musical Instrument (Zhu Hai) Co.,Ltd
Address of Manufacturer:	Medeli Industrial Park,2 Shuang Lin East Road,Dalinshan Area, Liangang Industrial Zone, Jinwan District, Zhuhai, China.
Factory	MEDELI MUSICAL INSTRUMENT (ZHUHAI)CO.,LTD.
Factory of Manufacturer:	Medeli Industrial Park,2 Shuang Lin East Road,Dalinshan Area, Liangang Industrial Zone, Jinwan District, Zhuhai, China.

3.2 General Description of EUT

Product Name:	Electronic Keyboard
Model No.:	AKX10, AK1000, DX1749
Test Model No.:	AKX10
Trade Mark:	MEDELI
Hardware Version:	V02
Software Version:	V01.01.03
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V5.0
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Transfer Rate:	1Mbps/2Mbps/3Mbps
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Product Type:	☐ Mobile ☐ Portable ☐ Fix Location ☒ Fix Location and Portable
Antenna Type:	Ceramic antenna
Antenna Gain:	2.5dBi
EUT Power Supply:	SWITCHING ADAPTER: ModeGQ48-150250-E2 INPUT: 100-240V~ 50/60Hz 1.5A MAX OUT PUT: 15V 2.5A 37.5W

Note:

All model:AKX10, AKX1000, DX1749

Only the model AKX10 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

4 SAR Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limitst

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.1.3 EUT RF Exposure

1) For BT Classic

Antenna Gain: 2.5 dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.78 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	0.170	-0.5±1	0.5	1.122
Middle(2441MHz)	1.460	0.5±1	1.5	1.413
Highest(2480MHz)	1.930	1±1	2	1.585
π/4DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	0.990	0±1	1	1.259
Middle(2441MHz)	2.420	1.5±1	2.5	1.778
Highest(2480MHz)	3.020	2.5±1	3.5	2.239
8DPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	1.170	0.5±1	1.5	1.413
Middle(2441MHz)	2.560	2±1	3	1.995
Highest(2480MHz)	3.210	2.5±1	3.5	2.239

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm²)	Limit	Result
2.239	0	0.00079	1.0	PASS

Note: 1) Refer to report No. CQASZ20210400531E-01 for EUT test Max Conducted Peak Output Power value.

2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (2.239 * 1.78) / (4 * 3.1416 * 20^2) = 0.00079$

The RF exposure report also includes SAR exclusions.