Shenzhen Most Technology Service Co., Ltd.
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RF Exposure Evaluation Report

Report Reference No.:	**MTEB23060046-H**
FCC ID:	**2BBL5-MA01**
Compiled by (position+printed name+signature)..:	File administrators Alisa Luo
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Approved by (position+printed name+signature)..:	Manager Yvette Zhou
Date of issue:	**Jun.06,2023**
Representative Laboratory Name:	**Shenzhen Most Technology Service Co., Ltd.**
Address:	No.5, 2nd Langshan Road, North District, Hi-tech Industrial Park, Nanshan, Shenzhen, Guangdong, China.
Applicant's name:	**Matrix Electronic Technology Co., LTD**
Address:	Room 801 Block B, #111 Fengcheng 5th Road Xi'an, Shaanxi, China
Test specification/ Standard:	**47 CFR Part 1.1307;47 CFR Part 1.1310** **KDB447498D01 General RF Exposure Guidance v06**
TRF Originator:	Shenzhen Most Technology Service Co., Ltd.

Test item description:	Music Streamer
Trade Mark:	Matrix Audio
Manufacturer:	**Matrix Electronic Technology Co., LTD**
Model/Type reference:	mini-i Pro 4
Listed Models:	element S, element S2, element X2 Pure, element X2, element X2S, element X3, element M2, element M2S, element M3, element i2, element i2S, element i3, mini-i 4
Modulation Type:	CCK/DSSS/ OFDM OFDM
Operation Frequency:	From 2412 - 2462MHz From 5180MHz-5240MHz
Hardware Version:	V1.5
Software Version:	1.0.1 build008
Rating:	100V-240V~ 50/60Hz, 100W
Result:	**PASS**

T E S T R E P O R T

Equipment under Test	:	Music Streamer
Model /Type	:	mini-i Pro 4
Listed Models		element S, element S2, element X2 Pure, element X2, element X2S, element X3, element M2, element M2S, element M3, element i2, element i2S, element i3, mini-i 4
Remark		Difference in model names
Applicant	:	Matrix Electronic Technology Co., LTD
Address	:	Room 801 Block B, #111 Fengcheng 5th Road Xi'an, Shaanxi, China
Manufacturer	:	Matrix Electronic Technology Co., LTD
Address	:	Room 801 Block B, #111 Fengcheng 5th Road Xi'an, Shaanxi, China

Test Result:	**PASS**

1. Revision History

Revision	Issue Date	Revisions	Revised By
00	2023-06-06	Initial Issue	Alisa Luo

2. SAR Evaluation

2.1 RF Exposure Compliance Requirement

2.1.1 Standard Requirement

According to KDB447498D01 General RF Exposure Guidance v06
4.3.1. Standalone SAR test exclusion considerations
Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

2.1.2 Limits

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: Pd = (Pout*G)/(4* Pi * R 2) Where
Pd = power density in mW/cm2
Pout = output power to antenna in mW
G = gain of antenna in linear scale
Pi = 3.1416

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

2.1.3 EUT RF Exposure

WIFI and BT do not support simultaneous transmission.
Antenna Gain: 3.14dBi
Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.4 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

WIFI 2.4G

802.11b			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
Lowest(2412MHz)	17.37	17.37±1	18.37
Middle(2437MHz)	18.42	18.42±1	19.42
Highest(2462MHz)	15.98	15.98±1	16.98

802.11g			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
Lowest(2412MHz)	19.51	19.51±1	20.51
Middle(2437MHz)	17.59	17.59±1	18.59
Highest(2462MHz)	16.90	16.90±1	17.9

802.11n(H20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
Lowest(2412MHz)	19.36	19.36±1	20.36
Middle(2437MHz)	19.89	19.89±1	20.89
Highest(2462MHz)	17.04	17.04±1	18.04

802.11n(H40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
Lowest(2422MHz)	17.80	17.80±1	18.8
Middle(2437MHz)	19.53	19.53±1	20.53
Highest(2452MHz)	17.70	17.70±1	18.7

WIFI 2.4G

Worst case: 802.11 n(H20)						
Channel	Maximum tune-up Power (dBm)	Maximum tune-up Power (MW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm2)	Limit	Result
Middle(2437MHz)	20.89	122.74	3.14	0.050	1.0	Pass

Note: 1) Refer to report MTEB23060046-R for EUT test Max Conducted average Output Power value.
Note: 2) Pd = (Pout*G)/(4* Pi * R2)=(122.74*2.06)/(4*3.1416*20^2)=0.050

Antenna Gain: 3.91dBi
Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.4 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

WIFI 5G

IEEE for 802.11a			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
36	11.171	11.171±1	12.171
40	11.507	11.507±1	12.507
44	11.418	11.418± 1	12.418

IEEE for 802.11n(HT20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
36	11.193	11.193±1	12.193
40	5.803	5.803 ±1	6.803
44	11.390	11.390±1	12.390

IEEE for 802.11n(HT40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
38	10.758	10.758±1	11.758
46	11.409	11.409±1	12.409

Worst case: IEEE for 802.11a						
Channel	Maximum Peak Conducted Output Power	Maximum Peak Conducted Output Power	Antenna Gain	Power Density at R = 20 cm	Limit	Result
	(dBm)	(MW)	(dBi)	(mW/cm2)		
Lowest (5200MHz)	12.507	17.81	3.91	0.009	1.0	Pass

Note: 1) Refer to report MTEB23060046-R1 for EUT test Max Conducted average Output Power value.
Note: 2) Pd = (Pout*G)/(4* Pi * R2)=(17.81*2.46)/(4*3.1416*20^2)=0.009

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