



RF EXPOSURE Test Report

Report No.: MTi230418006-02E6

Date of issue: 2023-09-06

Applicant: Shenzhen Binary Technology Co., Ltd.

Product: Car Multimedia Player

Model(s): 12-22ES,13-21IS/RC, 15-21NX

FCC ID: 2BCC5-22ES

Shenzhen Microtest Co., Ltd.

<http://www.mtitest.com>



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Test Result Certification	
Applicant:	Shenzhen Binary Technology Co., Ltd.
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Manufacturer:	Longhua Branch of Shenzhen Binary Technology Co., Ltd.
Address:	Room 401, Floor 4, No.1 building, Guanghui Technology Park, Mingqing Road, Fukang Community, Longhua District, Shenzhen City
Product description	
Product name:	Car Multimedia Player
Trademark:	BINARYTEK
Model name:	12-22ES
Serial Model:	13-21IS/RC, 15-21NX
Standards:	N/A
Test procedure:	KDB 447498 D01 v06
Date of Test	
Date of test:	2023-07-19 to 2023-09-05
Test result:	Pass

Test Engineer :

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(David Lee)

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Approved By :

Tom Xue

(Tom Xue)



RF EXPOSURE EVALUATION

According to FCC 1.1310: 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 §1.1307(b)

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 Exposure				
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
300-1,500			f/300	6
1,500-100,000			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
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

MPE Calculation Method

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

Where

P_d = Power density in mW/cm²

P_{out} = output power to antenna in mW

G = Numeric gain of the antenna relative to isotropic antenna

π = 3.1415926

R = distance between observation point and center of the radiator in cm(20cm)

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



Measurement Result

BT/BLE:

Operation Frequency: 2402-2480MHz

ANT Gain: 3.15 dBi

Power density limited: 1mW/ cm²

BR+EDR:

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain		(mW/cm2)	(mW/cm ²)
				(dBm)	(mW)	(dBi)	Numeric		
2402	GFSK	3.30	3±1	4	2.512	3.15	2.07	0.0010	1
2441		3.11	3±1	4	2.512	3.15	2.07	0.0010	1
2480		-1.09	(-1)±1	0	1.000	3.15	2.07	0.0004	1
2402	π/4-DQPSK	0.27	0±1	1	1.259	3.15	2.07	0.0005	1
2441		-0.09	0±1	1	1.259	3.15	2.07	0.0005	1
2480		0.88	0±1	1	1.259	3.15	2.07	0.0005	1
2402	8DPSK	0.56	0±1	1	1.259	3.15	2.07	0.0005	1
2441		0.66	0±1	1	1.259	3.15	2.07	0.0005	1
2480		1.25	1±1	2	1.585	3.15	2.07	0.0007	1

BLE:

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain		(mW/cm2)	(mW/cm 2)
				(dBm)	(mW)	(dBi)	Numeric		
2402	GFSK-1M	1.76	1±1	2	1.585	3.15	2.07	0.0007	1
2441		1.73	1±1	2	1.585	3.15	2.07	0.0007	1
2480		2.18	2±1	3	1.995	3.15	2.07	0.0008	1
2402	GFSK-2M	1.74	1±1	2	1.585	3.15	2.07	0.0007	1
2441		1.72	1±1	2	1.585	3.15	2.07	0.0007	1
2480		2.2	2±1	3	1.995	3.15	2.07	0.0008	1

2.4G WIFI:

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,

802.11n HT40: 2422-2452MHz,

ANT Gain: 3.15 dBi

 Power density limited: 1mW/ cm²

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna	Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	Numeric		
2412	802.11b	14.72	14±1	15	31.623	2.07	0.01299	1
2437		14.81	14±1	15	31.623	2.07	0.01299	1
2462		14.68	14±1	15	31.623	2.07	0.01299	1
2412	802.11g	16.14	16±1	17	50.119	2.07	0.02059	1
2437		16.15	16±1	17	50.119	2.07	0.02059	1
2462		15.99	16±1	17	50.119	2.07	0.02059	1
2412	802.11n H20	15.98	16±1	17	50.119	2.07	0.02059	1
2437		16.12	16±1	17	50.119	2.07	0.02059	1
2462		16.01	16±1	17	50.119	2.07	0.02059	1
2422	802.11n H40	16.93	17±1	18	63.096	2.07	0.02593	1
2437		17.12	17±1	18	63.096	2.07	0.02593	1
2452		17.26	17±1	18	63.096	2.07	0.02593	1

5G WIFI:

Operation Frequency:

U-NII-1: 5150 MHz to 5250 MHz, U-NII-3: 5725 MHz to 5850 MHz

ANT Gain:

U-NII-1 Gain: 3.45 dBi, U-NII-3 Gain: 3.31 dBi

UNII-1

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna	Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	Numeric		
5180	11a	14.71	14±1	15	31.623	2.21	0.01392	1
5200	11a	14.41	14±1	15	31.623	2.21	0.01392	1
5240	11a	14.30	14±1	15	31.623	2.21	0.01392	1
5180	11n (HT20)	14.40	14±1	15	31.623	2.21	0.01392	1
5200	11n (HT20)	14.27	14±1	15	31.623	2.21	0.01392	1
5240	11n (HT20)	14.13	14±1	15	31.623	2.21	0.01392	1
5190	11n (HT40)	15.02	15±1	16	31.623	2.21	0.01753	1
5230	11n (HT40)	14.85	14±1	15	31.623	2.21	0.01392	1
5180	11ac (HT20)	14.18	14±1	15	31.623	2.21	0.01392	1
5200	11ac (HT20)	14.06	14±1	15	31.623	2.21	0.01392	1
5240	11ac (HT20)	13.96	14±1	15	31.623	2.21	0.01392	1
5190	11ac (HT40)	14.98	14±1	15	31.623	2.21	0.01392	1
5230	11ac (HT40)	14.83	14±1	15	31.623	2.21	0.01392	1
5210	11ac (HT80)	12.63	12±1	13	19.953	2.21	0.00878	1



UNII-3

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna	Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	Numeric		
5745	11a	14.36	14±1	15	31.623	2.14	0.01348	1
5785	11a	14.07	14±1	15	31.623	2.14	0.01348	1
5825	11a	13.82	14±1	15	31.623	2.14	0.01348	1
5745	11n (HT20)	13.98	14±1	15	31.623	2.14	0.01348	1
5785	11n (HT20)	13.65	14±1	15	31.623	2.14	0.01348	1
5825	11n (HT20)	13.20	14±1	15	31.623	2.14	0.01348	1
5755	11n (HT40)	14.44	14±1	15	31.623	2.14	0.01348	1
5795	11n (HT40)	14.32	14±1	15	31.623	2.14	0.01348	1
5745	11ac (HT20)	13.96	14±1	15	31.623	2.14	0.01348	1
5785	11ac (HT20)	13.67	14±1	15	31.623	2.14	0.01348	1
5825	11ac (HT20)	13.24	14±1	15	31.623	2.14	0.01348	1
5755	11ac (HT40)	12.61	12±1	13	19.593	2.14	0.00851	1
5795	11ac (HT40)	12.59	12±1	13	19.953	2.14	0.00851	1
5775	11ac (HT80)	12.82	12±1	13	19.953	2.14	0.00851	1

LTE:

Operation frequency:

LTE FDD Band 2: 1850.7 – 1909.3MHz

LTE FDD Band 4: 1710.7 – 1754.3MHz

LTE FDD Band 5: 824.7 – 848.3MHz

LTE FDD Band 7: 2502.5 – 2567.5MHz

LTE FDD Band 13: 779.5 – 784.5MHz

LTE FDD Band 17: 706.5 - 713.5 MHz

LTE TDD Band 41: 2498.5 – 2687.5MHz

ANT Gain:

LTE FDD Band 2 Gain: 1.60dBi

LTE FDD Band 4 Gain: 3.60dBi

LTE FDD Band 5 Gain: 1.24dBi

LTE FDD Band 7 Gain: 0.53dBi

LTE FDD Band 13 Gain: 0.51dBi

LTE FDD Band 17 Gain: 1.59dBi

LTE TDD Band 41 Gain: 0.77dBi

Channel Freq. (MHz)	modulation	conducted power	Max Tune- up power	Max		Antenna	Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	Numeric		
1907.5	LTE Band 2	24.34	24±1	25	316.228	1.45	0.09093	1
1752.5	LTE Band 4	22.98	22±1	23	199.526	2.29	0.09093	1
847.5	LTE Band 5	23.24	23±1	24	251.189	1.33	0.06649	1
2562.5	LTE Band 7	23.66	23±1	24	251.189	1.13	0.05646	1
779.5	LTE Band 13	22.37	22±1	23	199.526	1.12	0.04464	1
710	LTE Band 17	22.93	22±1	23	199.526	1.44	0.05724	1
2682.5	LTE Band 41	23.55	23±1	24	251.189	1.19	0.05967	1

Conclusion:

SIMULTANEOUS TRANSMISSIONS

When a number of sources at different frequencies, and/or broadband sources, contribute to the total exposure, it becomes necessary to weigh each contribution relative to the MPE. To comply with the MPE, the fraction of the MPE in terms of E2, H2 (or power density) incurred within each frequency interval should be determined and the sum of all such fractions should not exceed unity. In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is

$$\sum_{i=1}^n \frac{S_i}{MPE_i} \leq 1$$

Simultaneous transmit:

Operating Band	The MPE ratio
BR&EDR	0.0010
BLE	0.0008
2.4G WIFI	0.02593
5G WIFI	0.01753
LTE	0.09093

So the simultaneous transmitting antenna pairs as below:

BR&EDR+BLE +2.4G WIFI +LTE=0.0010+0.0008+0.02593+0.09093=0.11866

BR&EDR+BLE +5G WIFI +LTE=0.0010+0.0008+0.01753+0.09093=0.11026

For the max result: $0.11866 \leq 1.0$ SAR, No SAR is required.

----END OF REPORT----