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RF Exposure Evaluation Report

Report No.: CQASZ20201201480E-03
Applicant: Ocean Digital Technology Ltd.
Address of Applicant: Flat 12B, Yeung Yiu Chung (No.8) Ind. Bldg., 20 Wang Hoi Road, Kowloon Bay
Equipment Under Test (EUT):
EUT Name: Internet Radio
Model No.: MA-336D, MA-336N, WR-336N, WR-336D, WR-336
Test Model No.: MA-336D
Brand Name: N/A
FCC ID: 2ABD3-MA336N
Standards: 47 CFR Part 1.1307
47 CFR Part 2.1093
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2020-12-15
Date of Test: 2020-12-15 to 2020-12-22
Date of Issue: 2020-12-22
Test Result: **PASS***

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

Tested By:

Martin Lee

(Martin Lee)

Reviewed By:

Ares Liu

(Ares Liu)

Approved By:

Sheek Luo

(Sheek Luo)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20201201480E-03	Rev.01	Initial report	2020-12-22

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3 General Information

3.1 Client Information

Applicant:	Ocean Digital Technology Ltd.
Address of Applicant:	Flat 12B, Yeung Yiu Chung (No.8) Ind. Bldg., 20 Wang Hoi Road, Kowloon Bay
Manufacturer:	Ocean Digital Technology Ltd.
Address of Manufacturer:	Flat 12B, Yeung Yiu Chung (No.8) Ind. Bldg., 20 Wang Hoi Road, Kowloon Bay
Factory:	Ocean Digital Technology Ltd.
Address of Factory:	Flat 12B, Yeung Yiu Chung (No.8) Ind. Bldg., 20 Wang Hoi Road, Kowloon Bay

3.2 General Description of EUT

Product Name:	Internet Radio
Model No.:	MA-336D, MA-336N, WR-336N, WR-336D, WR-336
Test Model No.:	MA-336D
Trade Mark:	N/A
Hardware version:	V2.0
Software version:	(APP:20200304.1159)
Test sample No:	CQASZ20201201480E#1
EUT Supports Radios application:	Bluetooth: 2402-2480MHz 2.4G Wi-Fi: 802.11b/g/n(HT20): 2412MHz~2462 MHz
Power Supply:	lithium battery: DC3.7V, 2000mAh, Charge by DC5V

3.3 General Description of BT Classic

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V4.2
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channel:	79
Transfer Rate:	1Mbps/2Mbps/3Mbps
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	☐ Mobile ☒ Portable ☐ Fix Location
Test Software of EUT:	EspRFtestTool (manufacturer declare)
Antenna Type:	PCB antenna
Antenna Gain:	0dBi

3.4 General Description of 2.4G WIFI

Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE for 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20): OFDM (64QAM, 16QAM, QPSK, BPSK)
Transfer Rate:	IEEE for 802.11b: 1Mbps/2Mbps/5.5Mbps/11Mbps IEEE for 802.11g: 6Mbps/9Mbps/12Mbps/18Mbps/24Mbps/36Mbps/48Mbps/54Mbps IEEE for 802.11n(HT20): 6.5Mbps/13Mbps/19.5Mbps/26Mbps/39Mbps/52Mbps/58.5Mbps/65Mbps
Product Type:	☐ Mobile ☒ Portable ☐ Fix Location
Test Software of EUT:	EspRFtestTool (manufacturer declare)
Antenna Type:	PCB antenna
Antenna Gain:	0dBi

Note:

Model No.: MA-336D, MA-336N, WR-336N, WR-336D, WR-336

Only the model MA-336D 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 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.

4.1.2 Limits

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:

$$\left[\frac{\text{(max. power of channel, including tune-up tolerance, mW)}}{\text{(min. test separation distance, mm)}} \right] \cdot \sqrt{f(\text{GHz})} \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR, where}$$

$f(\text{GHz})$ is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation¹⁷

The result is rounded to one decimal place for comparison

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 is applied to determine SAR test exclusion

4.1.3 EUT RF Exposure

Measurement Data

1) For BT Classic:

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-2.520	-3.5±1	-2.5	0.562
Middle(2441MHz)	-1.230	-2.0±1	-1.0	0.794
Highest(2480MHz)	-1.320	-2.0±1	-1.0	0.794
$\pi/4$ DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	0.130	-0.5±1	0.5	1.122
Middle(2441MHz)	0.370	-0.5±1	0.5	1.122
Highest(2480MHz)	1.160	0.5±1	1.5	1.413
8DPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	1.490	0.5±1	1.5	1.413
Middle(2441MHz)	2.010	1.5±1	2.5	1.778
Highest(2480MHz)	2.580	2.0±1	3.0	1.995

Worst case: 8DPSK mode						
Channel	Maximum Peak Conducted Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune- up Power		Calculated value	Exclusion threshold
			(dBm)	(mW)		
Lowest (2402MHz)	1.490	0.5±1	1.5	1.413	0.438	3.0
Middle (2441MHz)	2.010	1.5±1	2.5	1.778	0.556	
Highest (2480MHz)	2.580	2.0±1	3.0	1.995	0.628	
Conclusion: the calculated value ≤3.0, SAR is exempted.						

Remark: The Max Conducted Peak Output Power data refer to report Report No.:CQASZ20201201480E-01

2) For 2.4G WIFI:

802.11b mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	8.34	7.5±1	8.5	7.079
Middle(2437MHz)	8.53	8.0±1	9.0	7.943
Highest(2462MHz)	8.26	7.5±1	8.5	7.079
802.11g mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	7.88	7.0±1	8.0	6.310
Middle(2437MHz)	7.67	7.0±1	8.0	6.310
Highest(2462MHz)	7.73	7.0±1	8.0	6.310
802.11n(HT20)mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	7.26	6.5±1	7.5	5.623
Middle(2437MHz)	7.20	6.5±1	7.5	5.623
Highest(2462MHz)	7.28	6.5±1	7.5	5.623

Worst case: 802.11b mode						
Channel	Maximum Peak Conducted Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune- up Power		Calculated value	Exclusion threshold
			(dBm)	(mW)		
Lowest (2412MHz)	8.34	7.5±1	8.5	7.079	2.194	3.0
Middle (2437MHz)	8.53	8.0±1	9.0	7.943	2.480	
Highest (2462MHz)	8.26	7.5±1	8.5	7.079	2.222	
Conclusion: the calculated value ≤3.0, SAR is exempted.						

Remark: The Max Conducted Average Output Power data refer to report Report No.:CQASZ20201201480E-02
BDR, EDR and WIFI can not simultaneous transmitting at same time.