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# RF Exposure Evaluation Report

**Report No.:** CQASZ20210701158E-03  
**Applicant:** Portable Multimedia Limited  
**Address of Applicant:** Unit 2, Caerphilly Business Park, Van Road, Caerphilly. Mid Glamorgan, CE83 3ED. United Kingdom  
**Equipment Under Test (EUT):**  
**EUT Name:** Dash Cam  
**Model No.:** NBDVR323GW, FE-NBDVR323GW, NBDVR323GW-WHT, FE-NBDVR323GW-WHT, VYDVR323GW, FE-VYDVR323GW, NBDVR323GWL, FE-NBDVR323GWL  
**Test Model No.:** NBDVR323GW  
**Brand Name:** N/A  
**FCC ID:** 2AOT9 - NBDVR323GW  
**Standards:** 47 CFR Part 1.1307  
47 CFR Part 1.1310  
KDB447498D01 General RF Exposure Guidance v06  
**Date of Receipt:** 2021-07-26  
**Date of Test:** 2021-07-26 to 2021-07-29  
**Date of Issue:** 2021-08-13  
**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:**

*Jack ai*

( Jack ai )



## 1 Version

### Revision History Of Report

| Report No.           | Version | Description    | Issue Date |
|----------------------|---------|----------------|------------|
| CQASZ20210701158E-03 | Rev.01  | Initial report | 2021-08-13 |

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### 3 General Information

#### 3.1 Client Information

|                          |  |
|--------------------------|--|
| Applicant:               | Portable Multimedia Limited  |
| Address of Applicant:    | Unit 2, Caerphilly Business Park, Van Road, Caerphilly. Mid Glamorgan, CE83 3ED. United Kingdom                                    |
| Manufacturer:            | Shenzhen Samoon Technology Co.,Ltd   |
| Address of Manufacturer: | Floor5-6&9, Building 7, Zhongyuntai Ind. Park, Yingrenshi Road Crossing, Shiyan Town, Bao'an District, Shenzhen, Guangdong, China. |

#### 3.2 General Description of EUT

|                   |  |
|-------------------|--|
| Product Name:     | Dash Cam   |
| Model No.:        | NBDVR323GW, FE-NBDVR323GW, NBDVR323GW-WHT, FE-NBDVR323GW-WHT, VYDVR323GW, FE-VYDVR323GW, NBDVR323GWL, FE-NBDVR323GWL |
| Test Model No.:   | NBDVR323GW   |
| Trade Mark:       | N/A  |
| Hardware Version: | A6   |
| Software Version: | R20.5  |
| EUT Power Supply: | DC 3.7V from battery   |

#### 3.3 General Description of BT Classic

|                       |  |
|-----------------------|--|
| Operation Frequency:  | 2402MHz~2480MHz  |
| Bluetooth Version:    | V5.0   |
| 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:          | <input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable <input type="checkbox"/> Fix Location |
| Antenna Type:         | Ceramic antenna  |
| Antenna Gain:         | 0dBi   |
| EUT Power Supply:     | Lithium battery: DC3.7V, 280mAh, Charge by DC 12V  |

### 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)<br>IEEE for 802.11 g/n(HT20 : OFDM  |
| Product Type:         | <input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> Fix Location |
| Test Software of EUT: | RF test (manufacturer declare )   |
| Antenna Type:         | Ceramic antenna   |
| Antenna Gain:         | 0 dBi   |
| EUT Power Supply:     | Lithium battery: DC3.7V, 280mAh, Charge by DC 12V   |

Note:

All model: NBDVR323GW, FE-NBDVR323GW, NBDVR323GW-WHT, FE-NBDVR323GW-WHT, VYDVR323GW, FE-VYDVR323GW, NBDVR323GWL, FE-NBDVR323GWL

Only the model NBDVR323GW was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being model name.

## 4 MPE 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 <sup>2</sup> ) | Averaging time (minutes) |
|--|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                               |                               |                                     |                          |
| 0.3–3.0 .....  | 614                           | 1.63                          | *(100)                              | 6                        |
| 3.0–30 .....   | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              | 6                        |
| 30–300 .....   | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300–1500 .....   | .....                         | .....                         | f/300                               | 6                        |
| 1500–100,000 .....   | .....                         | .....                         | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3–1.34 .....   | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34–30 .....  | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 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/cm<sup>2</sup>

$P_{out}$  = 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

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. 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: 0 dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

##### Measurement Data

| GFSK mode        |                            |                            |                       |       |
|------------------|----------------------------|----------------------------|-----------------------|-------|
| Test channel     | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |       |
|                  |                            |                            | (dBm)                 | (mW)  |
| Lowest(2402MHz)  | -4.110                     | -5.0±1                     | -4.0                  | 0.398 |
| Middle(2441MHz)  | -3.410                     | -4.0±1                     | -3.0                  | 0.501 |
| Highest(2480MHz) | -2.870                     | -3.5±1                     | -2.5                  | 0.562 |
| π/4DQPSK mode    |                            |                            |                       |       |
| Test channel     | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |       |
|                  |                            |                            | (dBm)                 | (mW)  |
| Lowest(2402MHz)  | -3.400                     | -4.5±1                     | -3.0                  | 0.501 |
| Middle(2441MHz)  | -2.630                     | -3.5±1                     | -2.5                  | 0.562 |
| Highest(2480MHz) | -2.100                     | -3.0±1                     | -2.0                  | 0.631 |
| 8DPSK mode       |                            |                            |                       |       |
| Test channel     | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |       |
|                  |                            |                            | (dBm)                 | (mW)  |
| Lowest(2402MHz)  | -3.000                     | -4.0±1                     | -3.0                  | 0.501 |
| Middle(2441MHz)  | -2.250                     | -3.0±1                     | -2.0                  | 0.631 |
| Highest(2480MHz) | -1.680                     | -2.5±1                     | -1.5                  | 0.708 |

The worst case:

| Maximum tune-up Power<br>(mW) | Antenna Gain<br>(dBi) | Power Density<br>at R = 20 cm<br>(mW/cm <sup>2</sup> ) | Limit | Result |
|-------------------------------|-----------------------|--|-------|--------|
| 0.708                         | 0                     | 0.00014  | 1.0   | PASS   |

Note: 1) Refer to report No. CQASZ20210701158E-01 for EUT test Max Conducted Peak Output Power value.

2)  $P_d = (P_{out} * G) / (4 * \pi * R^2) = (0.708 * 1.0) / (4 * 3.1416 * 20^2) = 0.00014$

3) EUT's Bluetooth module is more than 20cm away from the human body.

2) For 2.4G WIFI

Antenna Gain: 0 dBi

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

| 802.11b mode      |                            |                            |                       |        |
|-------------------|----------------------------|----------------------------|-----------------------|--------|
| Test channel      | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |        |
|                   |                            |                            | (dBm)                 | (mW)   |
| Lowest(2402MHz)   | 7.29                       | 7.0±1                      | 8.0                   | 6.310  |
| Middle(2441MHz)   | 9.26                       | 9.0±1                      | 10.0                  | 10.000 |
| Highest(2480MHz)  | 8.87                       | 8.0±1                      | 9.0                   | 7.943  |
| 802.11g mode      |                            |                            |                       |        |
| Test channel      | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |        |
|                   |                            |                            | (dBm)                 | (mW)   |
| Lowest(2402MHz)   | 7.93                       | 7.0±1                      | 8.0                   | 6.310  |
| Middle(2441MHz)   | 9.71                       | 9.0±1                      | 10.0                  | 10     |
| Highest(2480MHz)  | 9.66                       | 9.0±1                      | 10.0                  | 10     |
| 802.11n(HT20)mode |                            |                            |                       |        |
| Test channel      | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |        |
|                   |                            |                            | (dBm)                 | (mW)   |
| Lowest(2402MHz)   | 8.19                       | 8.0±1                      | 9.0                   | 7.943  |
| Middle(2441MHz)   | 10.13                      | 10.0±1                     | 11.0                  | 12.589 |
| Highest(2480MHz)  | 9.78                       | 9.0±1                      | 10.0                  | 10     |

The worst case:

| Maximum tune-up Power<br>(mW) | Antenna Gain<br>(dBi) | Power Density<br>at R = 20 cm<br>(mW/cm <sup>2</sup> ) | Limit | Result |
|-------------------------------|-----------------------|--|-------|--------|
| 12.589                        | 0                     | 0.00250  | 1.0   | PASS   |

Note: 1) Refer to report No. CQASZ20210701158E-02 for EUT test Max Conducted average Output Power value.

2)  $Pd = (Pout * G) / (4 * \pi * R^2) = (12.589 * 1) / (4 * 3.14 * 20^2) = 0.00250$

According to 865664D02 2.2 d) 1):

The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits :

| Simultaneous transmission mode | The sum of the ratios | Result       |
|--------------------------------|-----------------------|--------------|
| 2.4G WIFI + BT                 | 0.0025/1 + 0.00014/1  | =0.00264 < 1 |