

RF Exposure Evaluation

FCC ID: SJ8VS2070M

1. Client Information

Applicant	:	RDI Technology (Shenzhen) Co., Ltd
Address	:	101 to 401, Building 1, and Building 2, No. 7 Yongyue Road, East Baishixia, Fuyong, Baoan, Shenzhen. PRC
Manufacturer	:	RDI Technology (Shenzhen) Co., Ltd
Address	:	101 to 401, Building 1, and Building 2, No. 7 Yongyue Road, East Baishixia, Fuyong, Baoan, Shenzhen. PRC

2. General Description of EUT

EUT Name	:	Network Video Recorder	
Model(s) No.	:	VS2070M	
Model Different	:	N/A	
Sample ID	:	20201217-17_1-03& 20201217-17_1-04	
Product Description	:	Operation Frequency:	802.11b/g/n(HT20): 2412MHz~2462MHz 802.11n(HT40): 2422MHz~2452MHz
		RF Output Power:	Bluetooth: -1.020dBm(GFSK)
		Antenna Gain:	5dBi Dipole Antenna
		Modulation Type:	802.11b: DSSS(CCK, DQPSK, DBPSK) 802.11g/n: OFDM(BPSK, QPSK, 16QAM, 64QAM)
Power Supply	:	DC 5V from Adapter(CS18J050250FUF): Input: AC 100-240V, 50/60Hz 500mA Max. Output: DC 5.0V, 2.5A DC 3.7V by 18650 Li-ion Battery.	
Software Version	:	N/A	
Hardware Version	:	N/A	

Remark: The antenna gain and the adapter provided by the applicant, the verified for the RF conduction test and adapter provided by TOBY test lab.

Note: More test information about the EUT please refer the RF Test Report.

SAR Test Exclusion Calculations

1. FCC: According to KDB 447498 D01 Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies v06.

According to KDB447498 D01 General RF Exposure Guidance v06 Section 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 Test Exclusion Threshold condition, listed below, is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.²² The minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander (see 5) of section 4.1). To qualify for SAR test exclusion, the test separation distances applied must be fully explained and justified by the operating configurations and exposure conditions of the transmitter and applicable host platform requirements, typically in the SAR measurement or SAR analysis report, according to the required published RF exposure KDB procedures. When no other RF exposure testing or reporting is required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for the SAR test exclusion. When required, the device specific conditions described in the other published RF exposure KDB procedures must be satisfied before applying these SAR test exclusion provisions; for example, handheld PTT two-way radios, handsets, laptops & tablets etc.²³ “

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

- f (GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

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 according to f) in section 4.1 is applied to determine SAR test exclusion.

When one of the following test exclusion conditions is satisfied for all combinations of simultaneous transmission configurations, further equipment approval is not required to incorporate transmitter modules in host devices that operate in the mixed mobile and portable host platform exposure conditions. The grantee is responsible for documenting this according to Class I permissive change requirements. Antennas that qualify for standalone SAR test exclusion must apply the estimated standalone SAR to determine simultaneous transmission test exclusion.

- a) The $\left[\sum \text{of (the highest measured or estimated SAR for each standalone antenna configuration, adjusted for maximum tune-up tolerance)} / 1.6 \text{ W/kg} \right] + \left[\sum \text{of MPE ratios} \right]$ is ≤ 1.0 .
- b) The SAR to peak location separation ratios of all simultaneously transmitting antenna pairs operating in portable device exposure conditions are all ≤ 0.04 , and the $\left[\sum \text{of MPE ratios} \right]$ is ≤ 1.0 .

2. Calculation:

Test separation: 5mm						
2.4G WiFi Module 6032						
802.11b						
Frequency (GHz)	Conducted Power (dBm)	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (dBm)	Max power of tune up tolerance (mw)	Calculation Value	Threshold Value
2.412	9.24	8.5±1.0	9.5	8.913	2.768	3.0
2.437	9.18	8.5±1.0	9.5	8.913	2.783	3.0
2.462	9.16	8.5±1.0	9.5	8.913	2.797	3.0
802.11g						
Frequency (GHz)	Conducted Power (dBm)	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (dBm)	Max power of tune up tolerance (mw)	Calculation Value	Threshold Value
2.412	9.09	8.5±1.0	9.5	8.913	2.768	3.0
2.437	9.13	8.5±1.0	9.5	8.913	2.783	3.0
2.462	9.09	8.5±1.0	9.5	8.913	2.797	3.0
802.11n(HT20)						
Frequency (GHz)	Conducted Power (dBm)	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (dBm)	Max power of tune up tolerance (mw)	Calculation Value	Threshold Value
2.412	9.13	8.5±1.0	9.5	8.913	2.768	3.0
2.437	9.15	8.5±1.0	9.5	8.913	2.783	3.0
2.462	9.26	8.5±1.0	9.5	8.913	2.797	3.0
802.11n(HT40)						
Frequency (GHz)	Conducted Power (dBm)	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (dBm)	Max power of tune up tolerance (mw)	Calculation Value	Threshold Value
2.422	9.14	8.5±1.0	9.5	8.913	2.774	3.0
2.437	9.07	8.5±1.0	9.5	8.913	2.783	3.0
2.452	9.15	8.5±1.0	9.5	8.913	2.791	3.0

Test separation: 5mm						
2.4G WiFi Module EUS_v143						
802.11b						
Frequency (GHz)	Conducted Power (dBm)	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (dBm)	Max power of tune up tolerance (mw)	Calculation Value	Threshold Value
2.412	9.35	8.5±1.0	9.5	8.913	2.768	3.0
2.437	9.46	8.5±1.0	9.5	8.913	2.783	3.0
2.462	9.47	8.5±1.0	9.5	8.913	2.797	3.0
802.11g						
Frequency (GHz)	Conducted Power (dBm)	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (dBm)	Max power of tune up tolerance (mw)	Calculation Value	Threshold Value
2.412	9.32	8.5±1.0	9.5	8.913	2.768	3.0
2.437	9.38	8.5±1.0	9.5	8.913	2.783	3.0
2.462	9.27	8.5±1.0	9.5	8.913	2.797	3.0
802.11n(HT20)						
Frequency (GHz)	Conducted Power (dBm)	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (dBm)	Max power of tune up tolerance (mw)	Calculation Value	Threshold Value
2.412	9.19	8.5±1.0	9.5	8.913	2.768	3.0
2.437	9.18	8.5±1.0	9.5	8.913	2.783	3.0
2.462	9.20	8.5±1.0	9.5	8.913	2.797	3.0
802.11n(HT40)						
Frequency (GHz)	Conducted Power (dBm)	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (dBm)	Max power of tune up tolerance (mw)	Calculation Value	Threshold Value
2.422	9.15	8.5±1.0	9.5	8.913	2.774	3.0
2.437	9.17	8.5±1.0	9.5	8.913	2.783	3.0
2.452	9.24	8.5±1.0	9.5	8.913	2.791	3.0

3. Simultaneous Transmission for SAR Exclusion

The sample support one BT modular and one WLAN modular, they supports difference antenna, need consider simultaneous transmission;

$$\sum \text{of (the highest measured or estimated SAR}_{6032} + \text{SAR}_{\text{EUS_v143}}) / 1.6 = (0.3729 + 0.3729) / 1.6 = 0.47 < 1.0;$$

Conclusion:

The measurement results comply with the FCC Limit per 47 CFR 2.1093 for the uncontrolled RF Exposure and SAR Exclusion Threshold per KDB 447498 v06.

-----END OF REPORT-----