



## RF Exposure evaluation

Report Reference No.....: HTT202505429F05

FCC ID.....: 2BLU9-QA24R5SU

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Date of issue .....: May. 23, 2025

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Applicant's name.....: M&M Electronics, S.A.

Address.....: Cocosolito, Colon Free Zone, Main Entrance Warehouse10D and  
11D, Panama,03050.

Standard .....: 47CFR §1.1310  
47CFR §2.1093  
KDB447498 D01 General RF Exposure Guidance v06

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Test item description .....: **ALL IN ONE**

Manufacturer .....: M&M Electronics, S.A.

Trade Mark .....: N/A

Model/Type reference .....: QA24R5SU16512

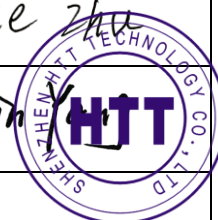
Rating .....: DC 19V

Result .....: **PASS**

Heber He

Bruce Zhu

Kevin



## TEST REPORT

Equipment under Test : ALL IN ONE

Model /Type : QA24R5SU16512

Listed Models : N/A

**Applicant** : **M&M Electronics, S.A.**

Address : Cocosolito, Colon Free Zone, Main Entrance Warehouse10D and 11D, Panama,03050.

**Manufacturer** : **M&M Electronics, S.A.**

Address : Cocosolito, Colon Free Zone, Main Entrance Warehouse10D and 11D, Panama,03050.

<b>Test Result:</b>	<b>PASS</b>
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The test report merely corresponds to the test sample.  
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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# **1 TEST STANDARDS**

The tests were performed according to following standards:

[ANSI C95.1-1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB 447498 D01 General RF Exposure Guidance v06](#): Mobile and Portable Device, RF Exposure, Equipment Authorization Procedures.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1093](#): Radiofrequency radiation exposure evaluation: portable devices

## 2 SUMMARY

### 2.1 General Remarks

Date of receipt of test sample	:	May. 14, 2025
Testing commenced on	:	May. 14, 2025
Testing concluded on	:	May. 23, 2025

### 2.2 Product Description

Product Name:	ALL IN ONE
Model No.:	QA24R5SU16512
Series model:	N/A
Test sample(s) ID:	HTT202505429-1(Engineer sample) HTT202505429-2(Normal sample)
BT	
Operation Frequency:	2402MHz~2480MHz
Channel numbers:	79
Channel separation:	1MHz
Modulation type:	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Antenna Type:	Internal antenna
Antenna Gain:	2.92 dBi
Power Supply:	DC 19V
BLE	
Operation frequency	2402~2480 MHz
Number of Channels	40
Modulation Type	GFSK
Channel separation	2MHz
Antenna Type:	Internal antenna
Antenna Gain:	2.92 dBi
Power Supply:	DC 19V
2.4GWIFI:	
Channel numbers:	802.11b /802.11g /802.11n(HT20): 11 802.11n(HT40): 7
Channel separation:	5MHz
Modulation technology:	802.11b: Direct Sequence Spread Spectrum (DSSS) 802.11g/802.11n(H20)/802.11n(HT40): Orthogonal Frequency Division Multiplexing (OFDM)
Antenna Type:	Internal antenna
Antenna gain:	3.86 dBi for ANT 1 and 2.92 dBi for ANT 2

Power Supply:		DC 19V		
5GWIFI				
Supported type:	20MHz system	40MHz system	80MHz system	160MHz system
	802.11a 802.11n 802.11ac	802.11n 802.11ac	802.11ac	N/A
Operation frequency:	5180MHz-5240MHz 5745MHz-5825MHz	5190MHz-5230MHz 5755MHz-5795MHz	5210MHz 5775MHz	N/A
Modulation:	802.11a/802.11n/ 802.11ac:OFDM	802.11n/802.11ac: OFDM	802.11ac:OFDM	N/A
Channel number:	9	4	2	N/A
Channel separation:	20MHz	40MHz	80MHz	N/A
Antenna Type:	Internal antenna			
Antenna gain:	4.58dBi for 5180-5240MHz for ANT 1, 5.13dBi for 5745-5825MHz for ANT 1, 6.34dBi for 5180-5240MHz for ANT 2, 7.15dBi for 5745-5825MHz for ANT 2			

### 2.3 Special Accessories

The following is the EUT test of the auxiliary equipment provided by the laboratory:

Description	Manufacturer	Model	Technical Parameters	Certificate	Provided by
/	/	/	/	/	/

### 2.4 Modifications

No modifications were implemented to meet testing criteria.

### 3 TEST ENVIRONMENT

#### 3.1 Address of the test laboratory

**Shenzhen HTT Technology Co.,Ltd.**

1F, Building B, Huafeng International Robotics Industrial Park, Hangcheng Road,Nanchang Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China

#### 3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

**FCC-Registration No.: 779513 Designation Number: CN1319**

Shenzhen HTT Technology Co.,Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

**A2LA-Lab Cert. No.: 6435.01**

Shenzhen HTT Technology Co.,Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

#### 3.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen HTT Technology Co.,Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen HTT Technology Co.,Ltd. :

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	9KHz~30MHz	3.12 dB	(1)
Radiated Emission	30~1000MHz	4.37 dB	(1)
Radiated Emission	1~18GHz	5.40 dB	(1)
Radiated Emission	18-40GHz	5.45 dB	(1)
Conducted Disturbance	0.15~30MHz	2.68 dB	(1)

## 4 Test limit

### 4.1 Requirement

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.<sup>22</sup> 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.<sup>23</sup> “

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

- f (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  $\leq 50$  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 5) in section 4.1 is applied to determine SAR test exclusion.

### 4.2 Conducted Power Results

Mode	TX Type	Frequency (MHz)	Packet Type	Maximum Peak Conducted Output Power (dBm)	
				ANT1	Limit
GFSK	SISO	2402	DH5	3.03	$\leq 30$
		2441	DH5	2.6	$\leq 30$
		2480	DH5	2.74	$\leq 30$
Pi/4DQPSK	SISO	2402	2DH5	6.65	$\leq 20.97$
		2441	2DH5	6.1	$\leq 20.97$
		2480	2DH5	6.65	$\leq 20.97$
8DPSK	SISO	2402	3DH5	7.11	$\leq 20.97$
		2441	3DH5	6.55	$\leq 20.97$
		2480	3DH5	7.17	$\leq 20.97$



Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)	
			ANT1	Limit
1M	SISO	2402	4.82	<=30
		2440	4.26	<=30
		2480	4.41	<=30
2M	SISO	2402	4.96	<=30
		2440	4.45	<=30
		2480	4.6	<=30

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)			
			ANT1	ANT2	MIMO	Limit
802.11b	SISO	2412	-0.30	-6.14	/	<=30
		2437	-1.06	-6.14	/	<=30
		2462	0.37	-6.06	/	<=30
802.11g	SISO	2412	6.71	2.90	/	<=30
		2437	6.56	2.76	/	<=30
		2462	7.14	2.80	/	<=30
802.11n (HT20)	MIMO	2412	6.49	2.32	7.90	<=29.6
		2437	6.30	2.11	7.70	<=29.6
		2462	7.07	2.12	8.28	<=29.6
802.11n (HT40)	MIMO	2422	6.91	2.67	8.30	<=29.6
		2437	6.77	2.52	8.16	<=29.6
		2452	7.07	2.61	8.40	<=29.6

Mode	TX Type	Frequency (MHz)	Maximum Average Conducted Output Power (dBm)			
			ANT1	ANT2	MIMO	Limit
802.11a	SISO	5180	-0.6	-0.07	/	<=23.64
		5200	-0.6	0.32	/	<=23.64
		5240	-0.35	0.65	/	<=23.64
		5745	2.31	2.18	/	<=28.85
		5785	2.29	1.56	/	<=28.85
		5825	2.16	0.86	/	<=28.85
802.11n (HT20)	MIMO	5180	-0.84	-0.13	2.54	<=21.14
		5200	-0.57	0.27	2.88	<=21.14
		5240	-0.44	0.72	3.19	<=21.14
		5745	2.46	2.13	5.31	<=25.65
		5785	2.38	1.49	4.97	<=25.65
		5825	2.15	0.71	4.5	<=25.65
802.11n (HT40)	MIMO	5190	-0.72	0.11	2.73	<=21.14
		5230	-0.44	0.62	3.13	<=21.14
		5755	2.95	2.54	5.76	<=25.65
		5795	2.92	1.73	5.38	<=25.65
802.11ac (VHT20)	MIMO	5180	-0.68	-0.01	2.68	<=21.14
		5200	-0.4	0.3	2.97	<=21.14
		5240	-0.24	0.76	3.3	<=21.14
		5745	4.44	2.3	6.51	<=25.65
		5785	4.06	1.43	5.95	<=25.65

		5825	3.34	0.63	5.2	$\leq 25.65$
802.11ac (VHT40)	MIMO	5190	-0.75	-0.03	2.64	$\leq 21.14$
		5230	-0.47	0.44	3.02	$\leq 21.14$
		5755	4.57	2.56	6.69	$\leq 25.65$
		5795	4.23	1.44	6.07	$\leq 25.65$
802.11ac (VHT80)	MIMO	5210	1.44	0.5	4.01	$\leq 21.14$
		5775	4.94	2.16	6.78	$\leq 25.65$

### 4.3 Manufacturing tolerance

Mode	Max. Peak Conducted Output Power (dBm)	Max. tune-up
BT	7.17	$7.0 \pm 1$
BLE	4.96	$4.0 \pm 1$

Mode	Max. Peak Conducted Output Power (dBm)		Max. tune-up	
	Antenna1	Antenna2	Antenna1	Antenna2
2.4GWIFI	7.14	2.9	$7.0 \pm 1$	$3.0 \pm 1$
Mode	Max. Average Conducted Output Power (dBm)		Max. tune-up	
	Antenna1	Antenna2	Antenna1	Antenna2
5.2GWIFI	1.44	0.76	$2.0 \pm 1$	$1.0 \pm 1$
5.8GWIFI	4.94	2.56	$4.0 \pm 1$	$3.0 \pm 1$

### 4.4 Evaluation Result

#### Evaluation Results

Band/Mode	f (GHz)	Antenna Distance (mm)	RF output power (including tune-up tolerance)		SAR Test Exclusion Threshold	SAR Test Exclusion
			dBm	mW		
BT ANT2	2.450	5	8.0	6.3096	$1.9752 < 3.0$	Yes
BLE ANT2	2.450	5	5.0	3.1623	$0.9899 < 3.0$	Yes
2.4GWIFI ANT2	2.450	5	4.0	2.5119	$0.7863 < 3.0$	Yes
5.2GWIFI ANT2	5.25	5	2.0	1.5849	$0.7263 < 3.0$	Yes
5.8GWIFI ANT2	5.85	5	4.0	2.5119	$1.2151 < 3.0$	Yes
2.4GWIFI ANT1	2.450	5	8.0	6.3096	$1.9752 < 3.0$	Yes
5.2GWIFI ANT1	5.25	5	3.0	1.9953	$0.9143 < 3.0$	Yes
5.8GWIFI ANT1	5.85	5	5.0	3.1623	$1.5297 < 3.0$	Yes

#### 4.5 Simultaneous Transmission for SAR Exclusion

The sample BT/WIFI support two antennas, need consider simultaneous transmission;  
 $\Sigma$  of (the highest measured or estimated SAR<sub>BT</sub>+SAR<sub>2.4GWIFI</sub>)/1.6 = (0.2660+0.2660)/1.6 = 0.3  
< 1.0;

### 5 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 D01v06

\*\*\*\*\* End of Report \*\*\*\*\*