



Global Product Certification
EMC-EMF Safety Approvals

RF Exposure FCC MPE Report

Test Sample: HAND-HELD READER
Model Number: BLU-668
Tested For: BLUECHIIP LIMITED

Report Number: M181213-6
Date of Issue: 10 August 2022

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SAR EXEMPTION CERTIFICATE

Device under Test:	HAND-HELD READER
Model Number:	BLU-668
Manufacturer:	BLUECHIIP LIMITED
FCC ID:	FCC ID: 2ATNO-BRHRBB001
Tested for:	BLUECHIIP LIMITED
Address:	1 Dalmore Drive, Scoresby, Vic, 3179
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Contact:	Scott Turner
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Standards:	FCC KDB 447498 D01 General RF Exposure Guidance v6 Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.
Result:	SAR evaluation is not required in accordance with FCC KDB 447498 D01 clause 4.3.1
Test Dates:	18 th June 2019
Test Engineers:	 Emad Mansour EMR Lead Engineer EMC Technologies Pty Ltd
Authorised Signatory:	 Chris Zombolas Technical Director EMC Technologies Pty Ltd

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1 INTRODUCTION

This report shows the SAR exclusion on the HAND-HELD READER, Model No. BLU-668, in accordance with FCC KDB 447498 D01 clause 4.3.1,

The test sample was provided by the Client. The conclusion herein is based on the information provided by the client.

2 GENERAL INFORMATION

(Information supplied by the Client)

2.1 EUT Details

Radio #1:	WiFi Module*
Radio Module:	Texas Instruments WL18MODGB
Operating Band:	2.4 GHz
Radio Module FCC ID:	Z64-WL18SBMOD
Output power:	13 dBm
Antenna:	2.4 GHz FlexPIFA Antenna
Antenna Gain:	2.5 dBi
Radio#2:	
Radio Module:	RFID module
Operating Band:	1.2 – 4.1 MHz
Output power:	20 dBm
Antenna:	
Front Antenna:	SVR coil
Rear Antenna:	Wand tip coil

*Note1: The Texas Instruments WL18MODGB is a combo device (Wi-Fi/BT), the Bluetooth disabled from the firmware

3 UNCERTAINTY

EMC Technologies has evaluated the tools and methods used to perform Radiated Electromagnetic Field predictions.

The estimated measurement uncertainties for the calculation shown within this report are as follows:

Electromagnetic Modelling

30 MHz to 100GHz ± 2.8 dB

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

4 ASSUMPTIONS IN THIS ASSESSMENT

This assessment does not include accumulated RF fields from nearby sites/antennas or possible radio signal reflections or attenuation due to buildings or the general environment.

Antenna Parameters and power settings were supplied by the customer.

The aperture of the radiating element assumed to be a point source in free space and far field conditions.

100% duty cycle and time averaging assumed for calculation

The RFID use only one antenna at a time

The separation distance is assumed to be less than 5mm

5 SAR TEST EXCLUSION THRESHOLD FOR < 100 MHz and < 200 mm

Table1: SAR test exclusion threshold for <100 MHz and <200mm

MHz	< 50	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	mm
100	237	474	481	487	494	501	507	514	521	527	534	541	547	554	561	567	mW
50	308	617	625	634	643	651	660	669	677	686	695	703	712	721	729	738	
10	474	948	961	975	988	1001	1015	1028	1041	1055	1068	1081	1095	1108	1121	1135	
1	711	1422	1442	1462	1482	1502	1522	1542	1562	1582	1602	1622	1642	1662	1682	1702	
0.1	948	1896	1923	1949	1976	2003	2029	2056	2083	2109	2136	2163	2189	2216	2243	2269	
0.05	1019	2039	2067	2096	2125	2153	2182	2211	2239	2268	2297	2325	2354	2383	2411	2440	
0.01	1185	2370	2403	2437	2470	2503	2537	2570	2603	2637	2670	2703	2737	2770	2803	2837	

6 SAR TEST EXCLUSION THRESHOLD FOR 100 MHz – 6 GHz and \leq 50 mm

Table 2: SAR test exclusion threshold for 100 MHz – 6 GHz and \leq 50 mm

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	SAR Test Exclusion Threshold (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances \leq 50 mm are determined by:

For 1-g

$$\frac{\text{max. power of channel, including tune-up tolerance (mW)}}{\text{min. test separation distance (mm)}} * \sqrt{f(\text{GHz})} \leq 3.0$$

For 10-g

$$\frac{\text{max. power of channel, including tune - up tolerance (mW)}}{\text{min. test separation distance (mm)}} * \sqrt{f(\text{GHz})} \leq 7.5$$

Where

- $f(\text{GHz})$ 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
- 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.
- The minimum test separation distance is 5 mm,

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7 EVALUATION RESULT

Wi-Fi Module

The standalone transmitter is exempted from SAR if the below condition satisfied in conjunction with threshold power condition in table 1

$$\frac{\text{max. power of channel, including tune - up tolerance (mW)}}{\text{min. test separation distance (mm)}} * \sqrt{f(\text{GHz})} \leq 7.5$$

Where

Minimum test separation distance (5mm):

The minimum test separation distance is determined by the smallest distance from the antenna (radiating structures) to the outer surface of the device

Maximum power of channel (mW):

Time-averaged maximum conducted output power

As the device is handheld 10-g extremity SAR values were evaluated

$$\frac{\text{max. power of channel, including tune - up tolerance (mW)}}{\text{min. test separation distance (mm)}} * \sqrt{f(\text{GHz})} \\ = \frac{20\text{mW}}{5\text{mm}} * \sqrt{2.4\text{ GHz}} = 6.2 \leq 7.5$$

As the transmitted power is 20 mW less than 25 mW indicated in table 2 (the 25mW is 10 mW from table 2 multiplied by 2.5 for extremity), and the result of the above condition is 6.2 (less than 7.5), hence this transmitter excepted from SAR evaluation

RFID Module

As the transmitted power is 100 mW less than 711 mW indicated in table 1, hence this transmitter excepted from SAR evaluation

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8 CONCLUSION

The EUT is exempted from SAR evaluation based on the test exclusion guidance in FCC KDB 447498 D01 clause 4.3.1

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