

RF EXPOSURE

Report Number		ESTRGC2304-003(1)		
Applicant	Company name	ID Secure LLC		
	Address	10 Crooked Hill Oakland New Jersey United States 07436		
	Telephone	+82-031-607-7537		
	Contact person	Darren Reid		
Product	Product name	Portable Data Collection Terminal		
	Model No.	RP1600X	Manufacturer	Gen2wave
	Serial No.	NONE	Country of origin	KOREA
Test date	20-Mar-23 ~ 22-Mar-23		Date of issue	15-Jun-23
Testing location	140-16, Eongmalli-ro, Majang-myeon, Icheon-si, Gyeonggi-do, Rep. of Korea			
FCC ID	2BA25-RP1600X			
ISED ID	30760-RP1600X			
Standard	KDB 447498 D01 General RF Exposure Guidance v06			
Measurement facility registration number		659627		
Tested by	Engineer H.G. Lee		(Signature)	
Reviewed by	Engineering Manager I.K Hong		(Signature)	
Abbreviation	OK, Pass = Passed, Fail = Failed, N/A = not applicable			
* Note - This test report is not permitted to copy partly without our permission - This test result is dependent on only equipment to be used - This test result based on a single evaluation of one sample of the above mentioned - This test report is not related to KOLAS accreditation				

1.0 INTRODUCTION

These calculations are based on the highest EIRP possible from the EUT, measured in the radiated mode for the RFID portion and conducted mode for the Bluetooth and WIFI 2.4GHz, 5GHz.

EIRP was calculated using the following.

EIRP = $(E \times d)^2/30$, where:

- **E** = electric field strength in V/m,
- **d** = measurement distance in meters (m).

It was measured to be 55.52 dBuV/m at 13.56 MHz at 3 meters or -39.71 dBm (0.000 07 mW) EIRP.

The field strength is calculated without distance correction factors.

1.0 SAR EXCLUSION RESULT BLUETOOTH and WIFI

In accordance with FCC KDB Publication 447498 D01 V06 Clause 4.3.1 a), the 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$[(\text{max. power, mW})/(\text{min. separation distance, mm})] \times [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g extremity}$$

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

2.4GHz Bluetooth&WIFI antenna has a 0.32 dB gain.

5.2GHz WIFI antenna has a 0.771 dB gain.

5.8GHz WIFI antenna has a -0.145 dB gain.

BAND	Mode	Freq. (MHz)	max (dBm)	Tune up Tolerance (dBm)	Max Tune up Power (dBm)	Max Ant Gain dBi	Max Tune up Power (mW)	Distance (mm)	Results	Limit
BLUETOOTH	BDR	2 402.0	-2.84	± 1.0	-2.00	0.32	0.68	5	0.211	3
		2 440.0	-1.36	± 1.0	-1.00	0.32	0.86	5	0.267	3
		2 480.0	-2.85	± 1.0	-2.00	0.32	0.68	5	0.214	3
	EDR	2 402.0	-6.38	± 1.0	-6.00	0.32	0.27	5	0.084	3
		2 440.0	-4.67	± 1.0	-4.00	0.32	0.43	5	0.134	3
		2 480.0	-5.76	± 1.0	-5.00	0.32	0.34	5	0.107	3
	LE	2 402.0	1.27	± 1.0	2.00	0.32	1.71	5	0.529	3
		2 440.0	3.32	± 1.0	4.00	0.32	2.70	5	0.845	3
		2 480.0	1.24	± 1.0	2.00	0.32	1.71	5	0.537	3
WIFI 2.4GHz	802.11b	2 412.0	0.09	± 1.0	1.00	0.32	1.36	5	0.421	3
		2 437.0	1.03	± 1.0	1.50	0.32	1.52	5	0.475	3
		2 462.0	1.78	± 1.0	1.50	0.32	1.52	5	0.477	3
	802.11g	2 412.0	-4.01	± 1.0	-4.00	0.32	0.43	5	0.133	3
		2 437.0	-2.47	± 1.0	-2.00	0.32	0.68	5	0.212	3
		2 462.0	-1.56	± 1.0	-1.00	0.32	0.86	5	0.268	3
	802.11n HT20	2 412.0	-5.92	± 1.0	-5.00	0.32	0.34	5	0.106	3
		2 437.0	-3.89	± 1.0	-3.00	0.32	0.54	5	0.168	3
		2 462.0	-2.88	± 1.0	-2.00	0.32	0.68	5	0.213	3

BAND	Mode	Freq. (MHz)	max (dBm)	Tune up Tolerance (dBm)	Max Tune up Power (dBm)	Max Ant Gain dBi	Max Tune up Power (mW)	Distance (mm)	Results	Limit
5.2GHz	802.11a	5 180.0	-16.40	± 1.0	-16.00	0.771	0.030	5	0.014	3
		5 200.0	-16.56	± 1.0	-16.00	0.771	0.030	5	0.014	3
		5 240.0	-16.41	± 1.0	-16.00	0.771	0.030	5	0.014	3
	802.11n HT20	5 180.0	-19.64	± 1.0	-19.00	0.771	0.015	5	0.007	3
		5 200.0	-18.98	± 1.0	-19.00	0.771	0.015	5	0.007	3
		5 240.0	-19.36	± 1.0	-19.00	0.771	0.015	5	0.007	3
	802.11n HT40	5 190.0	-23.58	± 1.0	-23.00	0.771	0.006	5	0.003	3
		5 230.0	-23.49	± 1.0	-23.00	0.771	0.006	5	0.003	3
	802.11ac VHT80	5 210.0	-23.48	± 1.0	-23.00	0.771	0.006	5	0.003	3
5.8GHz	802.11a	5 745.0	-17.20	± 1.0	-17.00	-0.145	0.019	5	0.009	3
		5 785.0	-18.60	± 1.0	-18.00	-0.145	0.015	5	0.007	3
		5 825.0	-20.08	± 1.0	-20.00	-0.145	0.010	5	0.005	3
	802.11n HT20	5 745.0	-19.39	± 1.0	-19.00	-0.145	0.012	5	0.006	3
		5 785.0	-21.03	± 1.0	-21.00	-0.145	0.008	5	0.004	3
		5 825.0	-22.23	± 1.0	-22.00	-0.145	0.006	5	0.003	3
	802.11n HT40	5 755.0	-24.70	± 1.0	-24.00	-0.145	0.004	5	0.002	3
		5 795.0	-26.05	± 1.0	-26.00	-0.145	0.002	5	0.001	3
	802.11ac VHT80	5 775.0	-24.91	± 1.0	-24.00	-0.145	0.004	5	0.002	3

FCC RF EXPOSURE COMPLIANCE RESULT:

In accordance with FCC KDB Publication 447498 D01 V06 Clause 4.3.1 a) for transmit frequencies below 100 MHz:

For 100 MHz to 6 GHz and *test separation distances* ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR, 30 where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation³¹
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as *numeric thresholds* in step b) 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 4.1 f) is applied to determine SAR test exclusion.

BAND	Mode	Freq. (MHz)	max (dBm)	Tune up Tolerance (dBm)	Max Tune up Power (dBm)	Max Ant Gain dBi	Max Tune up Power (mW)	Distance (mm)	1g (x=7.5)	Results
BLUETOOTH	BDR	2 402.0	-2.84	± 1.0	-2.00	0.32	0.68	5	7.5	0.028
		2 440.0	-1.36	± 1.0	-1.00	0.32	0.86	5	7.5	0.036
		2 480.0	-2.85	± 1.0	-2.00	0.32	0.68	5	7.5	0.029
	EDR	2 402.0	-6.38	± 1.0	-6.00	0.32	0.27	5	7.5	0.011
		2 440.0	-4.67	± 1.0	-4.00	0.32	0.43	5	7.5	0.018
		2 480.0	-5.76	± 1.0	-5.00	0.32	0.34	5	7.5	0.014
	LE	2 402.0	1.27	± 1.0	2.00	0.32	1.71	5	7.5	0.071
		2 440.0	3.32	± 1.0	4.00	0.32	2.70	5	7.5	0.113
		2 480.0	1.24	± 1.0	2.00	0.32	1.71	5	7.5	0.072
WIFI 2.4GHz	802.11b	2 412.0	0.09	± 1.0	1.00	0.32	1.36	5	7.5	0.056
		2 437.0	1.03	± 1.0	1.50	0.32	1.52	5	7.5	0.063
		2 462.0	1.78	± 1.0	1.50	0.32	1.52	5	7.5	0.064
	802.11g	2 412.0	-4.01	± 1.0	-4.00	0.32	0.43	5	7.5	0.018
		2 437.0	-2.47	± 1.0	-2.00	0.32	0.68	5	7.5	0.028
		2 462.0	-1.56	± 1.0	-1.00	0.32	0.86	5	7.5	0.036
	802.11n HT20	2 412.0	-5.92	± 1.0	-5.00	0.32	0.34	5	7.5	0.014
		2 437.0	-3.89	± 1.0	-3.00	0.32	0.54	5	7.5	0.022
		2 462.0	-2.88	± 1.0	-2.00	0.32	0.68	5	7.5	0.028

BAND	Mode	Freq. (MHz)	max (dBm)	Tune up Tolerance (dBm)	Max Tune up Power (dBm)	Max Ant Gain dBi	Max Tune up Power (mW)	Distance (mm)	1g (x=7.5)	Results
WIFI 5.2GHz	802.11a	5 180.0	-16.40	± 1.0	-16.00	0.771	0.030	5	7.5	0.0018
		5 200.0	-16.56	± 1.0	-16.00	0.771	0.030	5	7.5	0.0018
		5 240.0	-16.41	± 1.0	-16.00	0.771	0.030	5	7.5	0.0018
	802.11n HT20	5 180.0	-19.64	± 1.0	-19.00	0.771	0.015	5	7.5	0.0009
		5 200.0	-18.98	± 1.0	-19.00	0.771	0.015	5	7.5	0.0009
		5 240.0	-19.36	± 1.0	-19.00	0.771	0.015	5	7.5	0.0009
	802.11n HT40	5 190.0	-23.58	± 1.0	-23.00	0.771	0.006	5	7.5	0.0004
		5 230.0	-23.49	± 1.0	-23.00	0.771	0.006	5	7.5	0.0004
	802.11ac VHT80	5 210.0	-23.48	± 1.0	-23.00	0.771	0.006	5	7.5	0.0004
WIFI 5.8GHz	802.11a	5 745.0	-17.20	± 1.0	-17.00	-0.145	0.019	5	7.5	0.0012
		5 785.0	-18.60	± 1.0	-18.00	-0.145	0.015	5	7.5	0.0010
		5 825.0	-20.08	± 1.0	-20.00	-0.145	0.010	5	7.5	0.0006
	802.11n HT20	5 745.0	-19.39	± 1.0	-19.00	-0.145	0.012	5	7.5	0.0008
		5 785.0	-21.03	± 1.0	-21.00	-0.145	0.008	5	7.5	0.0005
		5 825.0	-22.23	± 1.0	-22.00	-0.145	0.006	5	7.5	0.0004
	802.11n HT40	5 755.0	-24.70	± 1.0	-24.00	-0.145	0.004	5	7.5	0.0002
		5 795.0	-26.05	± 1.0	-26.00	-0.145	0.002	5	7.5	0.0002
	802.11ac VHT80	5 775.0	-24.91	± 1.0	-24.00	-0.145	0.004	5	7.5	0.0002

Mode	Freq. (MHz)	max (dBm)	Max Power (mW)	Distance (mm)	1g (x=7.5)	Results
RFID(HF)	13.56	-39.71	0.000 065	5	7.5	0.000 000 202

2.1 Calculations for Simultaneous Transmission.

In accordance with FCC KDB Publication 447498 D01 V06 Clause 7.2 (a)
 From Clause 4.3.2 (a) 2) For distances $\leq 50\text{mm}$, 0.4 W/kg limit is used for 1-g SAR limit

Mode	Avg Power (mW)	Distance (mm)	SAR Calculation as per 4.3.2 a)1 W/kg	SAR Exc Threshold per 7.2 & 4.3.2 a) 1 g limit (W/kg)
RFID(HF)	0.000 065	5	0.000 000 202	0.4
2.4GHz BLUETOOTH	2.704	5	0.112 632 480	0.4
2.4GH WIFI	1.521	5	0.063 622 797	0.4
5 GHz WIFI	0.030	5	0.001 831 194	0.4