

# RAE Systems, Inc

## SAR COMPLIANCE REPORT

**Report Type:**

FCC Part §2.1091, §2.1093 and §1.1307(b) assessment report

**Model:**

PGM-2602

**REPORT NUMBER:**

180600757SHA-003

**ISSUE DATE:**

July 20, 2018

**DOCUMENT CONTROL NUMBER:**

TTRFFCSAR-01\_V1 © 2018 Intertek



**Applicant:** RAE Systems, Inc  
3775 N. 1st St. San Jose, California USA 95134


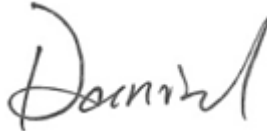
**Manufacturer:** RAE Systems, Inc  
3775 N. 1st St. San Jose, California USA 95134

**Manufacturing site:** RAE Systems (Shanghai) Inc.  
No. 990, East Huiwang Road, Jiading District, Shanghai, China, 201815

**FCC ID:** SU3-2602A

**SUMMARY:**

The equipment complies with the requirements according to the following standard(s) or Specification:
KDB 447498 D01 General RF Exposure Guidance v06 KDB 248227 D01 SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS FCC Part2.1091, FCC Part2.1093 FCC Part1.1307(b)

<b>PREPARED BY:</b>	<b>REVIEWED BY:</b>
	
Project Engineer Nemo Li	Reviewer Daniel Zhao

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

## Revision History

Report No.	Version	Description	Issued Date
180600757SHA-003	Rev. 01	Initial issue of report	July 20, 2018

## 1 GENERAL INFORMATION

### 1.1 Description of Equipment Under Test (EUT)

Product name:	MICRORAE
Type/Model:	PGM-2602
Description of EUT:	EUT is a product with Bluetooth and WiFi function. It has only one model.
Rating:	Internal battery: 3.7V Switch-mode power supply: Model: 6A-061WP12 Input: 100-240V~ Output: 12VDC 0.5A
EUT type:	<input checked="" type="checkbox"/> Table top <input type="checkbox"/> Floor standing
Software Version:	/
Hardware Version:	/
Sample received date:	June 8, 2018
Date of test:	June 8, 2018 ~ July 10, 2018

### 1.2 Technical Specification

Frequency Range:	2400MHz ~ 2483.5MHz
Support Standards:	Bluetooth LE
Type of Modulation:	GFSK
Channel Number:	40
Data Rate:	1Mbps
Channel Separation:	2 MHz
Antenna Information:	PCB antenna, -5.3dBi Peak gain

Frequency Range:	2400MHz ~ 2483.5MHz
Support Standards:	802.11b, 802.11g, 802.11n(HT20)
Type of Modulation:	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11n(HT20): OFDM (64QAM, 16QAM, QPSK, BPSK)
Channel Number:	11 Channels for 802.11b, 802.11g and 802.11n(HT20)
Data Rate:	802.11b: Up to 11Mbps 802.11g: Up to 54Mbps 802.11n(HT20): Up to MCS7
Channel Separation:	5 MHz

### 1.3 Description of Test Facility

Name:	Intertek Testing Services Shanghai
Address:	Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
Telephone:	86 21 61278200
Telefax:	86 21 54262353

The test facility is recognized, certified, or accredited by these organizations:	CNAS Accreditation Lab Registration No. CNAS L0139
	FCC Accredited Lab Designation Number: CN1175
	IC Registration Lab Registration code No.: 2042B-1
	VCCI Registration Lab Registration No.: R-4243, G-845, C-4723, T-2252
	NVLAP Accreditation Lab NVLAP LAB CODE: 200849-0
	A2LA Accreditation Lab Certificate Number: 3309.02

**TEST REPORT**

## 2 SAR Assessment

Test result: Pass

### 2.1 SAR Test Exclusion Limit

100 MHz – 6 GHz and  $\leq 50$  mm

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	<i>SAR Test Exclusion Threshold (mW)</i>
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	
MHz	30	35	40	45	50	
150	232	271	310	349	387	<i>SAR Test Exclusion Threshold (mW)</i>
300	164	192	219	246	274	
450	134	157	179	201	224	
835	98	115	131	148	164	
900	95	111	126	142	158	
1500	73	86	98	110	122	
1900	65	76	87	98	109	
2450	57	67	77	86	96	
3600	47	55	63	71	79	
5200	39	46	53	59	66	
5400	39	45	52	58	65	
5800	37	44	50	56	62	

**TEST REPORT**

**100 MHz – 6 GHz and > 50 mm**

MHz	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	mm
100	474	481	487	494	501	507	514	521	527	534	541	547	554	561	567	mW
150	387	397	407	417	427	437	447	457	467	477	487	497	507	517	527	
300	274	294	314	334	354	374	394	414	434	454	474	494	514	534	554	
450	224	254	284	314	344	374	404	434	464	494	524	554	584	614	644	
835	164	220	275	331	387	442	498	554	609	665	721	776	832	888	943	
900	158	218	278	338	398	458	518	578	638	698	758	818	878	938	998	
1500	122	222	322	422	522	622	722	822	922	1022	1122	1222	1322	1422	1522	
1900	109	209	309	409	509	609	709	809	909	1009	1109	1209	1309	1409	1509	
2450	96	196	296	396	496	596	696	796	896	996	1096	1196	1296	1396	1496	
3600	79	179	279	379	479	579	679	779	879	979	1079	1179	1279	1379	1479	
5200	66	166	266	366	466	566	666	766	866	966	1066	1166	1266	1366	1466	
5400	65	165	265	365	465	565	665	765	865	965	1065	1165	1265	1365	1465	
5800	62	162	262	362	462	562	662	762	862	962	1062	1162	1262	1362	1462	

**< 100 MHz and < 200 mm**

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	

## 2.2 Assessment Results

According to report 180600757SHA-001 and 180600757SHA-002, the max conducted output power for wifi is 13.77dBm, the max conducted output power for BLE is -10.1dBm.

According to client's information, the product transmits less than 1s in every 60s period on normal working mode, and transmits less than 1s in every 10s period on alarm mode.

The max average conducted output power for wifi is  $13.77\text{dBm} + 10\log(1/10) = 3.77\text{dBm}$ , the turn-up tolerance is 2dB, so the max average conducted output power with turn-up tolerance is  $3.77\text{dBm} + 2\text{dB} = 5.77\text{dBm} = 3.776\text{mW}$

The max conducted output power for BLE is -10.1dBm, the turn-up tolerance is 2dB, so the max conducted power with turn-up tolerance is  $-10.1\text{dBm} + 2\text{dB} = -8.1\text{dBm} = 0.155\text{mW}$

According to KDB 447498 Clause 4.3.1, the standalone 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 WiFi, the threshold is calculated as below:

$$3.776(\text{mW})/5(\text{mm}) * [\sqrt{2.4(\text{GHz})}] = 1.170 < 3.0$$

For Bluetooth, the threshold is calculated as below:

$$0.155(\text{mW})/5(\text{mm}) * [\sqrt{2.4(\text{GHz})}] = 0.048 < 3.0$$

The product can support simultaneous transmitting of wifi and Bluetooth, according to KDB 447498 Clause 4.3.2, the standalone SAR value must be estimated according to the following to determine the simultaneous transmission SAR test exclusion criteria:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}/x] \text{ W/kg}$ , for test separation distances  $\leq 50 \text{ mm}$ ; where  $x = 7.5$  for 1-g SAR.

For WiFi and Bluetooth, the simultaneous transmission SAR test exclusion criteria is calculated as below:

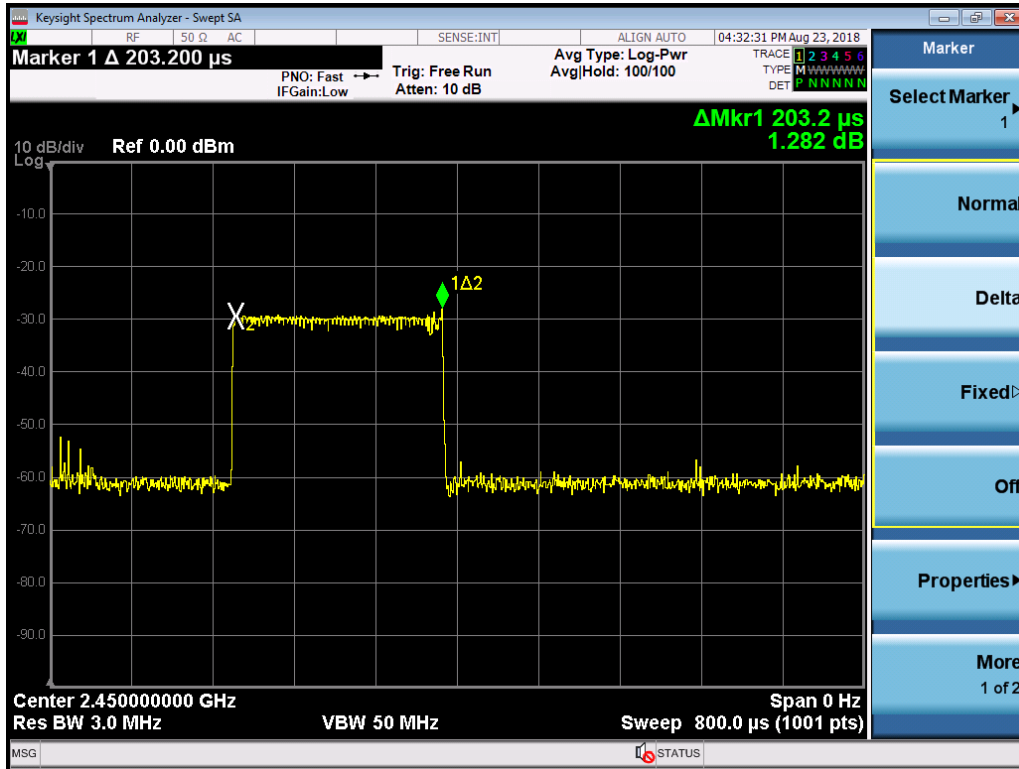
$$3.776(\text{mW})/5(\text{mm}) * [\sqrt{2.4(\text{GHz})}/7.5] + 0.155(\text{mW})/5(\text{mm}) * [\sqrt{2.4(\text{GHz})}/7.5] = 0.156 \text{ W/kg} + 0.006 \text{ W/kg} = 0.162 \text{ W/kg} < 1.6 \text{ W/kg}$$

Therefore, the SAR requirement for the product is deemed to be satisfied without test.





### Duration of wifi



\*\*\*\*\* END \*\*\*\*\*