

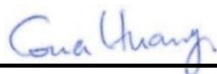
# RF EXPOSURE EVALUATION REPORT

FCC ID : ZAT-2651R3SIPA  
Equipment : CC2651R3SIPA SimpleLink™ Multiprotocol  
2.4-GHz Wireless System-in-Package Module  
with Integrated Antenna & 352-KB Memory  
Brand Name : Texas Instruments  
Model Name : CC2651R3SIPAT0MOUR  
Marketing Name : CC2651R3SIPA SimpleLink™ Multiprotocol  
2.4-GHz Wireless System-in-Package Module  
with Integrated Antenna & 352-KB Memory  
Applicant : Texas Instruments Incorporated  
12500 TI BLVD., Dallas, Texas, 75243  
Manufacturer : Texas Instruments Incorporated  
12500 TI BLVD., Dallas, Texas, 75243  
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated this product in accordance with 47 CFR Part 2.1091 and it complies with applicable limit.

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC evaluation.

The results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Laboratory, the test report shall not be reproduced except in full.



Approved by: Cona Huang / Deputy Manager



**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**  
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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**1. Description of Equipment Under Test (EUT)**

| <b>Product Feature &amp; Specification</b>     |  |
|--|--|
| <b>EUT Type</b>                                | CC2651R3SIPA SimpleLink™ Multiprotocol 2.4-GHz Wireless System-in-Package Module with Integrated Antenna & 352-KB Memory |
| <b>Brand Name</b>                              | Texas Instruments  |
| <b>Model Name</b>                              | CC2651R3SIPAT0MOUR   |
| <b>Marketing Name</b>                          | CC2651R3SIPA SimpleLink™ Multiprotocol 2.4-GHz Wireless System-in-Package Module with Integrated Antenna & 352-KB Memory |
| <b>FCC ID</b>                                  | ZAT-2651R3SIPA   |
| <b>Wireless Technology and Frequency Range</b> | Bluetooth: 2402 MHz ~ 2480 MHz<br>Zigbee: 2405 MHz ~ 2480 MHz  |
| <b>Mode</b>                                    | Bluetooth LE (125 kbps, 500 kbps, 1Mbps, 2Mbps)<br>Zigbee (OQPSK DSSS1:8, 250 kbps)                                      |

**Reviewed by: Jason Wang**

**Report Producer: Paula Chen**

Bluetooth LE (125 kbps, 500 kbps, 1Mbps, 2Mbps) and Zigbee (OQPSK DSSS1:8, 250 kbps)

| Antenna Information |                       |                                       |                     |              |
|---------------------|-----------------------|---------------------------------------|---------------------|--------------|
|                     | Brand                 | Antenna Type                          | Model               | 2.4 GHz Gain |
| 1                   | Texas Instruments     | Inverted F - PCB                      | Custom Antenna      | 3.3 dBi      |
| 2                   |                       | CC2651R3SIPA integrated antenna – PCB | Custom Antenna      | 1.5 dBi      |
| 3                   | Ethertronics          | Dipole                                | 1000423             | -0.6dBi      |
| 4                   | LSR                   | Rubber Whip / Dipole                  | 001-0012            | 2dBi         |
| 5                   |                       |                                       | 080-0013            | 2dBi         |
| 6                   |                       |                                       | 080-0014            | 2dBi         |
| 7                   |                       | PIFA                                  | 001-0016            | 2.5dBi       |
| 8                   |                       |                                       | 001-0021            | 2.5dBi       |
| 9                   |                       | Laird                                 | PCB                 | CAF94504     |
| 10                  |                       |                                       | CAF9405             | 2dBi         |
| 11                  | Pulse                 | Ceramic Chip                          | W3006               | 3.2dBi       |
| 12                  | ACX                   | Multilayer Chip                       | AT3216-BR2R7HAA     | 0.5dBi       |
| 13                  |                       |                                       | AT312-T2R4PAA       | 1.5dBi       |
| 14                  | TDK                   | Multilayer Ceramic Chip Antenna       | ANT016008LCD2442MA1 | 1.6dBi       |
| 15                  |                       |                                       | ANT016008LCD2442MA2 | 2.5dBi       |
| 16                  | Mitsubishi Material   | Chip Antenna                          | AM03DP-ST01         | 1.6dBi       |
| 17                  |                       | Antenna Unit                          | UB18CP-100ST01      | -1.0dBi      |
| 18                  | Taiyo Yuden           | Chip Antenna / Helical Monopole       | AF216M245001        | 1.5dBi       |
| 19                  |                       |                                       | AH212M245001        | 1.3dBi       |
| 20                  |                       | Chip Antenna / Monopole Type          | AH316M245001        | 1.9dBi       |
| 21                  | Antenna Technology    | Dipole                                | AA2402SPU           | 2.0dBi       |
| 22                  |                       |                                       | AA2402RSPU          | 2.0dBi       |
| 23                  |                       |                                       | AA2402A-UFLLP       | 2.0dBi       |
| 24                  |                       |                                       | AA2402AU-UFLLP      | 2.0dBi       |
| 25                  | Staf                  | Mono-pole                             | 1019-016            | 2.14dBi      |
| 26                  |                       |                                       | 1019-017            | 2.14dBi      |
| 27                  |                       |                                       | 1019-018            | 2.14dBi      |
| 28                  |                       |                                       | 1019-019            | 2.14dBi      |
| 29                  | Map Electronics       | Rubber Whip                           | MEIWX-2411SAXX-2400 | 2.0dBi       |
| 30                  |                       |                                       | MEIWX-2411RSXX-2400 | 2.0dBi       |
| 31                  |                       |                                       | MEIWX-282XSAXX-2400 | 2.0dBi       |
| 32                  |                       |                                       | MEIWX-282XRSXX-2400 | 2.0dBi       |
| 33                  |                       |                                       | MEIWF-HP01RS2X-2400 | 2.0dBi       |
| 34                  | Yageo                 | Chip                                  | ANT3216A063R2400A   | 1.69dBi      |
| 35                  | Mag Layers Scientific | Chip                                  | LTA-3216-2G4S3-A1   | 1dBi         |
| 36                  |                       |                                       | LTA-3216-2G4S3-A3   | 2dBi         |
| 37                  | Advantech             | Rubber Whip / Dipole                  | AN2450-5706RS       | 2.38dBi      |
| 38                  |                       |                                       | R-AN2400-5701RS     | 3.3dBi       |

Note: Antenna 2 is the default antenna used on the test HW (the Launchpad)

## 2. Maximum RF average output power among production units

| Band         | Maximum Average Power (dBm) |
|--------------|-----------------------------|
| Bluetooth LE | 6.3                         |
| Zigbee       | 6.2                         |



### 3. RF Exposure Limit Introduction

According to Part1.1307b, Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold Pth (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by:

$$P_{th} \text{ (mW)} = ERP_{20cm} (d / 20)^x \text{ for distance } d \leq 20cm$$

$$P_{th} \text{ (mW)} = ERP_{20cm} \text{ for distance } 20cm < d \leq 40cm$$

$$x = -\log_{10} \left( \frac{60}{ERP_{20cm} \sqrt{f}} \right)$$

|                          |                        |        |
|--------------------------|------------------------|--------|
| ERP <sub>20cm</sub> (mW) | 0.3 GHz ≤ f < 1.5 GHz: | 2040 f |
|                          | 1.5 GHz ≤ f ≤ 6 GHz:   | 3060   |

### 4. RF Exposure Evaluation

#### 4.1. Standalone assessment

| Band      | Antenna Gain (dBi) | Maximum Conducted Power (dBm) | Maximum EIRP (dBm) | Maximum ERP (dBm) | Maximum EIRP (mW) | Maximum ERP (mW) | P <sub>th</sub> | P <sub>th</sub> (mW) | Part1.1307 option(b) Threshold (mW) |
|-----------|--------------------|-------------------------------|--------------------|-------------------|-------------------|------------------|-----------------|----------------------|-------------------------------------|
| Bluetooth | 3.30               | 6.3                           | 0.6                | -1.55             | 1.15              | 0.70             | -2.70           | 0.54                 | 3060.000                            |
| Zigbee    | 3.30               | 6.2                           | 3.5                | 1.35              | 2.24              | 1.36             | 0.20            | 1.05                 | 3060.000                            |

### Conclusion:

According to 47 CFR §1.1307, the RF exposure analysis concludes that the RF Exposure is FCC compliant.