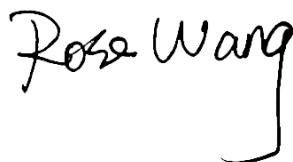


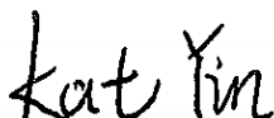
# RF Exposure Evaluation Report

APPLICANT : Motorola Solutions Inc.  
EQUIPMENT : WAVE Two-Way Mobile Radio  
BRAND NAME : Motorola Solutions  
MODEL NAME : TLK150  
MODEL NUMBER : HK2131A  
FCC ID : AZ492FT7127  
STANDARD : 47 CFR Part 2.1091  
FCC KDB 447498 D01 v06

We, Sporton International (Kunshan) Inc., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.



Reviewed by: Rose Wang / Supervisor



Approved by: Kat Yin / Manager



**Sporton International (Kunshan) Inc.**

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300  
People's Republic of China**



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**Revision History**

| REPORT NO. | VERSION | DESCRIPTION                | ISSUED DATE   |
|------------|---------|----------------------------|---------------|
| FA9N0421   | Rev. 01 | Initial issue of report.   | Jan. 21, 2020 |
| FA9N0421   | Rev. 02 | Update the equipment name. | Mar. 10, 2020 |
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## **1. Administration Data**

### **1.1. Testing Laboratory**

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

| Testing Laboratory |                                                                                                                                                                          |                                |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Test Firm          | Sporton International (Kunshan) Inc.                                                                                                                                     |                                |
| Test Site Location | No. 1098, Pengxi North Road, Kunshan Economic Development Zone<br>Jiangsu Province 215300 People's Republic of China<br>TEL : +86-512-57900158<br>FAX : +86-512-57900958 |                                |
| Test Site No.      | FCC Designation No.                                                                                                                                                      | FCC Test Firm Registration No. |
|                    | CN1257                                                                                                                                                                   | 314309                         |

| Applicant    |                                                       |
|--------------|-------------------------------------------------------|
| Company Name | Motorola Solutions Inc.                               |
| Address      | 8000 West Sunrise Boulevard, Fort Lauderdale, Florida |

| Manufacturer |                                                                                   |
|--------------|-----------------------------------------------------------------------------------|
| Company Name | Motorola Solutions Malaysia Sdn. Bhd.                                             |
| Address      | Plot 2A, Medan Bayan Lepas, Mukim 12, S.W.D. 11900 Bayan Lepas, Penang, Malaysia. |

## 2. Description of Equipment Under Test (EUT)

| Product Feature & Specification                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT Type                                                                                                                               | WAVE Two-Way Mobile Radio                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Brand Name                                                                                                                             | Motorola Solutions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Model Name                                                                                                                             | TLK150                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Model Number                                                                                                                           | HK2131A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| FCC ID                                                                                                                                 | AZ492FT7127                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Wireless Technology and Frequency Range                                                                                                | WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz<br>WCDMA Band V: 826.4 MHz ~ 846.6 MHz<br>LTE Band 2: 1850.7 MHz ~ 1909.3 MHz<br>LTE Band 4: 1710.7 MHz ~ 1754.3 MHz<br>LTE Band 5: 824.7 MHz ~ 848.3 MHz<br>LTE Band 7: 2502.5 MHz ~ 2567.5 MHz<br>LTE Band 13: 779.5 MHz ~ 784.5 MHz<br>LTE Band 17: 706.5 MHz ~ 713.5 MHz<br>WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz<br>WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz<br>WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz<br>WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz<br>WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz                                                                                                                                 |
| Mode                                                                                                                                   | RMC/AMR 12.2Kbps<br>HSDPA<br>HSUPA<br>LTE: QPSK, 16QAM<br>WLAN 2.4GHz 802.11b/g/n HT20/ HT40<br>WLAN 5GHz 802.11a/n HT20/ HT40<br>Bluetooth BR/EDR/LE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| HW Version                                                                                                                             | P2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| SW Version                                                                                                                             | TLK150_BASE_ENG_D03.00.32_APPS_D03.00.36                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Antenna Type/ Gain                                                                                                                     | For WWAN antenna: External Antenna<br>WCDMA Band V: 1.70 dBi<br>WCDMA Band II: 2.80 dBi<br>LTE Band 2 : 2.80 dBi<br>LTE Band 4 : 2.50 dBi<br>LTE Band 5 : 1.70 dBi<br>LTE Band 7 : 1.10 dBi<br>LTE Band 13 : 0.30 dBi<br>LTE Band 17 : 0.90 dBi<br><br>WLAN2.4GHz antenna:<br><2412 MHz ~ 2462 MHz ><br>Chip Antenna with gain -0.1 dBi<br>Bluetooth antenna:<br><2402 MHz ~ 2480 MHz ><br>Chip Antenna with gain -0.1 dBi<br><br>WLAN5GHz antenna:<br><5180 MHz ~ 5240 MHz ><br>Chip Antenna with gain 1.9 dBi<br><5260 MHz ~ 5320 MHz ><br>Chip Antenna with gain 1.8 dBi<br><5500 MHz ~ 5720 MHz ><br>Chip Antenna with gain 0.9 dBi<br><5745 MHz ~ 5825 MHz><br>Chip Antenna with gain 0.1 dBi |
| EUT Stage                                                                                                                              | Identical Prototype                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Remark:</b><br>1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



more detailed description.

**3. Maximum RF average output power among production units****<WCDMA/LTE >**

| Mode  |         | Maximum Average power(dBm) |
|-------|---------|----------------------------|
| WCDMA | Band II | 25.00                      |
|       | Band V  | 25.00                      |
| LTE   | Band 2  | 25.00                      |
|       | Band 4  | 25.00                      |
|       | Band 5  | 25.00                      |
|       | Band 7  | 25.00                      |
|       | Band 13 | 25.00                      |
|       | Band 17 | 25.00                      |

**<WLAN 2.4GHz>**

| Mode   |              | Maximum Average Power (dBm) |
|--------|--------------|-----------------------------|
| 2.4GHz | 802.11b      | 19.00                       |
|        | 802.11g      | 15.50                       |
|        | 802.11n-HT20 | 14.00                       |
|        | 802.11n-HT40 | 12.00                       |

**<Bluetooth > For Bluetooth Module**

| Band / Mode | Average Power (dBm) |      |      |      |
|-------------|---------------------|------|------|------|
|             | BR / EDR            |      |      | LE   |
|             | 1M                  | 2M   | 3M   | GFSK |
| Bluetooth   | 9.50                | 6.50 | 6.50 | 0.00 |



**<WLAN 5GHz>**

| Mode   |              | Maximum Average Power (dBm) |
|--------|--------------|-----------------------------|
| 5.2GHz | 802.11a      | 15.00                       |
|        | 802.11n-HT20 | 13.00                       |
|        | 802.11n-HT40 | 12.00                       |
| 5.3GHz | 802.11a      | 15.00                       |
|        | 802.11n-HT20 | 13.00                       |
|        | 802.11n-HT40 | 12.00                       |
| 5.5GHz | 802.11a      | 15.00                       |
|        | 802.11n-HT20 | 13.00                       |
|        | 802.11n-HT40 | 12.00                       |
| 5.8GHz | 802.11a      | 15.00                       |
|        | 802.11n-HT20 | 13.00                       |
|        | 802.11n-HT40 | 12.00                       |

#### **4. RF Exposure Limit Introduction**

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

| Frequency range (MHz)                                          | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                               |                               |                                     |                          |
| 0.3-3.0                                                        | 614                           | 1.63                          | *(100)                              | 6                        |
| 3.0-30                                                         | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              | 6                        |
| 30-300                                                         | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300-1500                                                       |                               |                               | f/300                               | 6                        |
| 1500-100,000                                                   |                               |                               | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3-1.34                                                       | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34-30                                                        | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 30                       |
| 30-300                                                         | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300-1500                                                       |                               |                               | f/1500                              | 30                       |
| 1500-100,000                                                   |                               |                               | 1.0                                 | 30                       |

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna



## **5. Radio Frequency Radiation Exposure Evaluation**

### **5.1. Standalone Power Density Calculation**

| Band         | Frequency (MHz) | Antenna Gain (dBi) | Maximum Power (dBm) | Maximum EIRP (dBm) | Maximum EIRP (W) | Average EIRP (mW) | Power Density at 20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Power Density / Limit |
|--------------|-----------------|--------------------|---------------------|--------------------|------------------|-------------------|---------------------------------------------|-----------------------------|-----------------------|
| WCDMA Band 2 | 1852.4          | 2.80               | 25.00               | 27.80              | 0.60             | 602.56            | 0.120                                       | 1.000                       | 0.120                 |
| WCDMA Band 5 | 826.4           | 1.70               | 25.00               | 26.70              | 0.47             | 467.74            | 0.093                                       | 0.551                       | 0.169                 |
| LTE Band 2   | 1850.7          | 2.80               | 25.00               | 27.80              | 0.60             | 602.56            | 0.120                                       | 1.000                       | 0.120                 |
| LTE Band 4   | 1710.7          | 2.50               | 25.00               | 27.50              | 0.56             | 562.34            | 0.112                                       | 1.000                       | 0.112                 |
| LTE Band 5   | 824.7           | 1.70               | 25.00               | 26.70              | 0.47             | 467.74            | 0.093                                       | 0.550                       | 0.169                 |
| LTE Band 7   | 2502.5          | 1.10               | 25.00               | 26.10              | 0.41             | 407.38            | 0.081                                       | 1.000                       | 0.081                 |
| LTE Band 13  | 779.5           | 0.30               | 25.00               | 25.30              | 0.34             | 338.84            | 0.067                                       | 0.520                       | 0.130                 |
| LTE Band 17  | 706.5           | 0.90               | 25.00               | 25.90              | 0.39             | 389.05            | 0.077                                       | 0.471                       | 0.164                 |
| Bluetooth    | 2402.0          | -0.10              | 9.50                | 9.40               | 0.01             | 8.71              | 0.002                                       | 1.000                       | 0.002                 |
| 2.4GHz WLAN  | 2412.0          | -0.10              | 19.00               | 18.90              | 0.08             | 77.62             | 0.015                                       | 1.000                       | 0.015                 |
| 5.2GHz WLAN  | 5180.0          | 1.90               | 15.00               | 16.90              | 0.05             | 48.98             | 0.010                                       | 1.000                       | 0.010                 |
| 5.3GHz WLAN  | 5260.0          | 1.80               | 15.00               | 16.80              | 0.05             | 47.86             | 0.010                                       | 1.000                       | 0.010                 |
| 5.5GHz WLAN  | 5500.0          | 0.90               | 15.00               | 15.90              | 0.04             | 38.90             | 0.008                                       | 1.000                       | 0.008                 |
| 5.8GHz WLAN  | 5745.0          | 0.10               | 15.00               | 15.10              | 0.03             | 32.36             | 0.006                                       | 1.000                       | 0.006                 |

**Note:**

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band
2. Chose the maximum power density to do MPE analysis.

## 5.2. Collocated Power Density Calculation

| WWAN Power Density / Limit | WLAN 2.4GHz Power Density / Limit | WLAN 5GHz Power Density / Limit | Bluetooth Power Density / Limit | $\Sigma$ (Power Density / Limit) of WWAN+ WLAN 2.4GHz | $\Sigma$ (Power Density / Limit) of WWAN+ WLAN 5GHz | $\Sigma$ (Power Density / Limit) of WWAN+ Bluetooth | $\Sigma$ (Power Density / Limit) of WWAN+Bluetooth+ WLAN 5GHz |
|----------------------------|-----------------------------------|---------------------------------|---------------------------------|-------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------|
| 0.169                      | 0.015                             | 0.010                           | 0.002                           | 0.184                                                 | 0.179                                               | 0.171                                               | 0.181                                                         |

**Note:**

1.  $\Sigma$  (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WWAN + WLAN 2.4GHz, WWAN + WLAN 5GHz, WWAN + Bluetooth and WWAN + Bluetooth + WLAN 5GHz.
2. Considering the WWAN collocation with the Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1.
3. EUT will choose either WLAN 2.4GHz or WLAN 5GHz according to the network signal condition; therefore, 2.4GHz WLAN and 5GHz WLAN will not operate simultaneously at any moment.
4. According to the EUT character, WLAN 5GHz and Bluetooth can transmit simultaneously.
5. WLAN 2.4GHz and Bluetooth share the same antenna, and they cannot transmit simultaneously each other.

## Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.