

# SAR EVALUATION REPORT

For

## Inrico Technologies Co., Ltd

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China

**FCC ID: 2AIV6-2-S200**

<b>Report Type:</b> Amended Report	<b>Product Type:</b> Intelligent Two Way Radio
<b>Report Number:</b>	SZGMA210719-29698E-20BA1
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Attestation of Test Results			
<b>EUT Information</b>	<b>EUT Description</b>	Intelligent Two Way Radio	
	<b>Tested Model</b>	S200	
	<b>FCC ID</b>	2AIV6-2-S200	
	<b>MODE</b>	<b>Max. SAR Level(s) Reported(W/kg)</b>	<b>Limit (W/kg)</b>
<b>GSM 850</b>	1g Head SAR(Face Up)	<b>0.56</b>	<b>1.6</b>
	1g Body SAR(Body Back)	<b>0.98</b>	
<b>PCS 1900</b>	1g Head SAR(Face Up)	0.17	
	1g Body SAR(Body Back)	0.53	
<b>WCDMA Band 2</b>	1g Head SAR(Face Up)	0.29	
	1g Body SAR(Body Back)	0.45	
<b>WCDMA Band 5</b>	1g Head SAR(Face Up)	0.30	
	1g Body SAR(Body Back)	0.41	
<b>LTE Band 2</b>	1g Head SAR(Face Up)	0.45	
	1g Body SAR(Body Back)	0.59	
<b>LTE Band 4</b>	1g Head SAR(Face Up)	0.56	
	1g Body SAR(Body Back)	0.36	
<b>LTE Band 5</b>	1g Head SAR(Face Up)	0.42	
	1g Body SAR(Body Back)	0.57	
<b>LTE Band 12&amp;17</b>	1g Head SAR(Face Up)	0.22	
	1g Body SAR(Body Back)	0.37	
<b>LTE Band 13</b>	1g Head SAR(Face Up)	0.18	
	1g Body SAR(Body Back)	0.41	
<b>Simultaneous</b>	1g Head SAR(Face Up)	<b>0.70</b>	
	1g Body SAR(Body Back)	<b>1.25</b>	
<b>Applicable Standards</b>	<b>FCC 47 CFR part 2.1093</b> Radiofrequency radiation exposure evaluation: portable devices		
	<b>RF Exposure Procedures: TCB Workshop April 2019</b>		
	<b>IEEE1528:2013</b> IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques		
	<b>IEC 62209-1:2016</b> Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Part 1: Devices used next to the ear (Frequency range of 300 MHz to 6 GHz)		
	<b>KDB procedures</b> KDB 447498 D01 General RF Exposure Guidance v06 KDB 648474 D04 Handset SAR v01r03 KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04 KDB 865664 D02 RF Exposure Reporting v01r02 KDB 941225 D01 3G SAR Procedures v03r01 KDB 941225 D05 SAR for LTE Devices v02r05		
<b>Note:</b> This wireless device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in <b>FCC 47 CFR part 2.1093</b> and has been tested in accordance with the measurement procedures specified in IEEE 1528-2013 and RF exposure KDB procedures. <b>The results and statements contained in this report pertain only to the device(s) evaluated.</b>			

*Note: The test data of 2G/3G/4G, please refer to FCC ID: 2AIV6-S200, SAR report of RDG200511002-20, issued by Bay Area Compliance Laboratories Corp. (Dongguan) on 2020-06-18.*

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## DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	RDG200511002-20	Original Report	2020-06-18
2.0	SZGMA210719-29698E-20BA1	Amended Report	2021-09-09

Note: This is an amended SAR report based on the original filing of a similar device. The differences between them are listed below:

1. The applicant stated that the current device is fully identical to a certified device (FCC ID: 2AIV6-S200) except for additional Wi-Fi & BT functions are activated by software.
2. Updated FCC ID, applicant name and address.

Based on the modifications and products' similarities, standalone SAR evaluations of Wi-Fi and BT were presented and simultaneous transmissions of WLAN & WWAN are evaluated in this report. The SAR results of WWAN can be referred to the original filing of FCC ID: 2AIV6-S200, granted on 07/13/2020.

## EUT DESCRIPTION

This report has been prepared on behalf of **Inrico Technologies Co., Ltd.** and their product **LTE Intelligent Two Way Radio**, Model: **S200**, FCC ID: **2AIV6-2-S200** or the EUT (Equipment under Test) as referred to in the rest of this report.

### Technical Specification

<b>Device Type:</b>	Portable
<b>Exposure Category:</b>	Population/Uncontrolled
<b>Antenna Type(s):</b>	Internal Antenna
<b>DTM Type:</b>	Class B
<b>Multi-slot Class:</b>	GPRS(Class 12); EGPRS(Class 12)
<b>Body-Worn Accessories:</b>	None
<b>Face-Head Accessories:</b>	None
<b>Operation Mode :</b>	GSM Voice, GPRS/EDGE Data, WCDMA( R99 (Voice+Data), HSDPA/HSUPA/DC-HSDPA/HSPA+), FDD-LTE, Wi-Fi and Bluetooth
<b>Frequency Band:</b>	GSM 850: 824-849 MHz(TX); 869-894 MHz(RX) PCS 1900: 1850-1910 MHz(TX); 1930-1990 MHz(RX) WCDMA Band 2: 1850-1910 MHz(TX); 1930-1990 MHz(RX) WCDMA Band 5: 824-849 MHz(TX); 869-894 MHz(RX) LTE Band 2: 1850-1910 MHz(TX); 1930-1990 MHz(RX) LTE Band 4: 1710-1755 MHz(TX) ; 2110-2155 MHz(RX) LTE Band 5: 824-849 MHz(TX); 869-894 MHz(RX) LTE Band 12: 699-716 MHz(TX); 729-746 MHz(RX) LTE Band 13: 777-787 MHz(TX); 746-756 MHz(RX) LTE Band 17: 704-716 MHz(TX); 734-746 MHz(RX) Wi-Fi 2.4G: 2412 -2472 MHz/2422 -2462 MHz Bluetooth: 2402 -2480 MHz
<b>Conducted RF Power:</b>	GSM 850: 31.40 dBm* PCS 1900: 28.64 dBm* WCDMA Band 2: 23.91 dBm* WCDMA Band 5: 22.26 dBm* LTE Band 2: 22.66 dBm* LTE Band 4: 24.26 dBm* LTE Band 5: 23.35 dBm* LTE Band 12: 23.49 dBm* LTE Band 13: 22.57 dBm* LTE Band 17: 24.28 dBm* Wi-Fi 2.4G: 7.93 dBm Bluetooth(BDR/EDR): 5.96 dBm BLE: 6.57 dBm
<b>Power Source:</b>	3.8 VDC Rechargeable Battery
<b>Normal Operation:</b>	Head, Face Up and Body-worn

**Note:**\* The test data of WWAN, please refer to original SAR report of RDG200511002-20, issued by Bay Area Compliance Laboratories Corp. (Dongguan) on 2020-06-18.

## CONDUCTED OUTPUT POWER MEASUREMENT

### Maximum Target Output Power

Max Target Power(dBm)			
Mode/Band	Channel		
	Low	Middle	High
WLAN 2.4G(802.11b)	8	8	8
WLAN 2.4G(802.11g)	8	8	8
WLAN 2.4G(802.11n20)	8	8	8
WLAN 2.4G(802.11n40)	8	8	8
Bluetooth BDR/EDR	6.5	6.5	6.5
BLE_1M	7	7	7

### Test Results:

#### Wi-Fi 2.4 GHz:

Mode	Channel frequency (MHz)	Data Rate	Conducted Average Output Power(dBm)
802.11b	2412	1Mbps	7.29
	2442		7.77
	2472		7.54
802.11g	2412	6Mbps	7.87
	2442		7.76
	2472		7.54
802.11n HT20	2412	MCS0	<b>7.93</b>
	2442		7.86
	2472		7.49
802.11n HT40	2422	MCS0	7.51
	2442		7.83
	2462		7.85

**Bluetooth:**

Mode	Channel frequency (MHz)	RF Output Power (dBm)
BDR(GFSK)	2402	5.13
	2441	<b>5.96</b>
	2480	4.24
EDR( $\pi/4$ -DQPSK)	2402	3.94
	2441	5.01
	2480	3.30
EDR(8DPSK)	2402	3.98
	2441	5.10
	2480	3.21
BLE_1M	2402	4.94
	2440	<b>6.57</b>
	2480	4.04

*Note: The test data of WWAN, please refer to original SAR report of RDG200511002-20, issued by Bay Area Compliance Laboratories Corp. (Dongguan) on 2020-06-18.*

### Standalone SAR test exclusion considerations

**Antennas Location:**



**Antenna Distance To Edge**

Antenna Distance To Edge(mm)						
Antenna	Back	Front	Left	Right	Top	Bottom
WWAN Antenna(GSM/WCDMA/LTE)	< 5	< 5	< 5	< 40	125	< 5
Wi-Fi&BT Antenna	< 5	< 5	< 5	< 5	< 5	120

**Standalone SAR test exclusion considerations**

Mode	Frequency (MHz)	Pavg (dBm)	Pavg (mW)	Distance (mm)	Calculated value	Threshold (1-g)	SAR Test Exclusion
2.4G WLAN	2472	8.1	6.46	0	2.0	3	Yes
BT	2480	7	5.01	0	1.6	3	Yes

*Note: The bluetooth based peak power for calculation, and Wi-Fi based average power for calculation.*

**NOTE:**

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

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

1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.



**Standalone SAR estimation:**

Mode	Frequency (MHz)	Power (dBm)	Power (mW)	Distance (mm)	Estimated 1-g (W/kg)
WLAN Head	2472	8.1	6.46	10	0.14
WLAN Body	2472	8.1	6.46	0	0.27
BT Head	2480	7	5.01	10	0.11
BT Body	2480	7	5.01	0	0.21

*Note: The bluetooth based peak power for calculation, and Wi-Fi based average power for calculation.*

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})/x}]$$

W/kg for test separation distances  $\leq 50$  mm;

where  $x = 7.5$  for 1-g SAR.

When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm is applied to determine SAR test Exclusion

## SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

### Simultaneous Transmission:

Description of Simultaneous Transmit Capabilities		
Transmitter Combination	Simultaneous?	Hotspot?
WWAN(GSM/WCDMA/LTE) + Bluetooth	√	×
WWAN(GSM/WCDMA/LTE) + WLAN	√	×
WLAN + Bluetooth	×	×

### Simultaneous SAR test exclusion considerations:

Mode(SAR1+SAR2)	Position	Reported SAR(W/kg)		ΣSAR < 1.6W/kg
		SAR1	SAR2	
GSM 850+Bluetooth	Face Up	0.56	0.11	<b>0.67</b>
	Body Back	0.98	0.21	<b>1.19</b>
PCS 1900+ Bluetooth	Face Up	0.17	0.11	0.28
	Body Back	0.53	0.21	0.74
WCDMA Band 2+ Bluetooth	Face Up	0.29	0.11	0.4
	Body Back	0.45	0.21	0.66
WCDMA Band 5+ Bluetooth	Face Up	0.30	0.11	0.41
	Body Back	0.41	0.21	0.62
LTE Band 2+ Bluetooth	Face Up	0.45	0.11	0.56
	Body Back	0.59	0.21	0.8
LTE Band 4+ Bluetooth	Face Up	0.56	0.11	0.67
	Body Back	0.36	0.21	0.57
LTE Band 5+ Bluetooth	Face Up	0.42	0.11	0.53
	Body Back	0.57	0.21	0.78
LTE Band 12&17+ Bluetooth	Face Up	0.22	0.11	0.33
	Body Back	0.37	0.21	0.58
LTE Band 13+ Bluetooth	Face Up	0.18	0.11	0.29
	Body Back	0.41	0.21	0.62

Mode(SAR1+SAR2)	Position	Reported SAR(W/kg)		$\Sigma$ SAR < 1.6W/kg
		SAR1	SAR2	
GSM 850+Wi-Fi 2.4G	Face Up	0.56	0.14	<b>0.70</b>
	Body Back	0.98	0.27	<b>1.25</b>
PCS 1900+ Wi-Fi 2.4G	Face Up	0.17	0.14	0.31
	Body Back	0.53	0.27	0.8
WCDMA Band 2+ Wi-Fi 2.4G	Face Up	0.29	0.14	0.43
	Body Back	0.45	0.27	0.72
WCDMA Band 5+ Wi-Fi 2.4G	Face Up	0.30	0.14	0.44
	Body Back	0.41	0.27	0.68
LTE Band 2+ Wi-Fi 2.4G	Face Up	0.45	0.14	0.59
	Body Back	0.59	0.27	0.86
LTE Band 4+ Wi-Fi 2.4G	Face Up	0.56	0.14	0.7
	Body Back	0.36	0.27	0.63
LTE Band 5+ Wi-Fi 2.4G	Face Up	0.42	0.14	0.56
	Body Back	0.57	0.27	0.84
LTE Band 12&17+ Wi-Fi 2.4G	Face Up	0.22	0.14	0.36
	Body Back	0.37	0.27	0.64
LTE Band 13+ Wi-Fi 2.4G	Face Up	0.18	0.14	0.32
	Body Back	0.41	0.27	0.68

*Note: The results of WWAN, please refer to original SAR report of RDG200511002-20, issued by Bay Area Compliance Laboratories Corp. (Dongguan) on 2020-06-18.*

#### Conclusion:

Sum of SAR:  $\Sigma$ SAR  $\leq$  1.6 W/kg therefore simultaneous transmission SAR with Volume Scans is **not required**.

**\*\*\*\*\*GPF'QHREPORT**

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