RF Exposure Evaluation Declaration

FCC ID:	2ATZUSOIMTZS11HA8SA
APPLICANT:	SAIC MOTOR Overseas Intelligent Mobility Technology Co., Ltd.
Product:	Color Radio
Model No.:	10682313/01
FCC Classification:	FCC Part 15 Spread Spectrum Transmitter (DSS) Digital Transmission System (DTS) Unlicensed National Information Infrastructure (NII) PCS Licensed Transmitter (PCB)
Test Procedure(s):	KDB 447498 D01v06
Test Date:	December 06, 2019

Reviewed By: (Kevin Guo)

Approved By: (Robin Wu)

Revision History

Report No.	Version	Description	Issue Date	Note
1907WSU008-U6	Rev. 01	Initial report	02-02-2020	Valid

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name:	Color Radio
Model No.:	10682313/01
Wi-Fi Specification:	802.11a/b/g/n
Bluetooth Version	v4.1 single mode
GSM Operation Band (s):	GSM 850 / 1900
WCDMA Operation Band (s):	Band II / IV / V
LTE Operation Band (s):	FDD Band 2 / 4 / 5 / 12 / 13 / 17
GNSS:	GPS, GLODNASS, BDS
Working Voltage:	DC 12V

1.2. Product Specification Subjective to this Report

Bluetooth	
Operating Frequency:	2402 ~ 2480MHz
Type of modulation:	FHSS
Data Rate:	1Mbps(GFSK), 2Mbps(Pi/4 DQPSK), 3Mbps (8DPSK)
Antenna Type:	Chip Antenna
Antenna Gain:	4dBi
Wi-Fi 2.4G	
Frequency Range:	802.11b/g/n-HT20: 2412 ~ 2462 MHz 802.11n-HT40: 2422 ~ 2452 MHz
Channel Number:	802.11b/g/n-HT20: 11 802.11n-HT40: 7
Type of Modulation:	802.11b: DSSS 802.11g/n: OFDM
Data Rate:	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps
Antenna Type:	Chip Antenna
Antenna Gain:	4dBi

Wi-Fi 5G	
Frequency Range:	For 802.11a/n-HT20: 5180~5240MHz, 5745~5825MHz For 802.11n-HT40: 5190~5230MHz, 5755~5795MHz
Type of Modulation:	802.11a/n: OFDM
Data Rate:	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps
Antenna Type:	Chip Antenna
Antenna Gain:	4.13dBi
GSM/WCDMA	
T_X Frequency Range:	GSM850: 824.2 ~ 848.8MHz, PCS1900: 1850.2 ~ 1909.8MHz WCDMA Band II: 1852.4 ~ 1907.6MHz WCDMA Band IV: 1712.4 ~ 1752.6MHz WCDMA Band V: 826.4 ~ 846.6MHz
R_X Frequency Range:	GSM850: 869.2 ~ 893.8MHz PCS1900: 1930.2 ~ 1989.8MHz WCDMA Band II: 1852.4 ~ 1907.6MHz WCDMA Band IV: 1712.4 ~ 1752.6MHz WCDMA Band V: 826.4 ~ 846.6MHz
Type of Modulation:	GSM / GPRS: GMSK EDGE: 8PSK WCDMA: QPSK
Antenna Type:	PIFA Antenna
Antenna Gain:	-3.37dBi

LTE	
Tx Frequency Range:	LTE Band 2: 1850.7MHz ~ 1909.3MHz LTE Band 4: 1710.7MHz ~ 1754.3MHz LTE Band 5: 824.7MHz ~ 848.3MHz LTE Band 12: 699.7MHz ~ 715.3MHz LTE Band 13: 779.5MHz ~ 784.5MHz LTE Band 17: 706.5MHz ~ 713.5MHz
Rx Frequency Range:	LTE Band 2: 1930.7MHz ~ 1989.3MHz LTE Band 4: 2110.7MHz ~ 2154.3MHz LTE Band 5: 869.7MHz ~ 893.3MHz LTE Band 12: 729.7 ~ 745.3MHz LTE Band 13: 748.5 ~ 753.5MHz LTE Band 17: 736.5 ~ 743.5MHz
Bandwidth:	LTE Band 2: 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 4: 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 5: 1.4MHz / 3MHz / 5MHz / 10MHz LTE Band 12: 1.4MHz / 3MHz / 5MHz / 10MHz LTE Band 13: 5MHz / 10MHz LTE Band 17: 5MHz / 10MHz
Type of Modulation	QPSK / 16-QAM
Antenna Type:	PIFA antenna
Antenna Gain:	-3.37dBi

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	f/1500	6
1500-100,000	--	--	1	30

f= Frequency in MHz

Calculation Formula: $Pd = (Pout*G)/(4*pi*r^2)$

Where
Pd = power density in mW/cm^2
Pout = output power to antenna in mW
G = gain of antenna in linear scale
Pi = 3.1416
r = distance between observation point and center of the radiator in cm

Pd is the limit of MPE, $1mW/cm^2$. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2.2. Test Result of RF Exposure Evaluation

Product	Color Radio
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Maximum tune-up power (dBm)	Maximum EIRP (dBm)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)	CPD/LPD
Bluetooth	2402 ~ 2480	12	16	0.00792	1	0.0079
Wi-Fi 2.4G	2412 ~ 2462	20	24	0.05000	1	0.0500
Wi-Fi 5G	5180 ~ 5240 5745 ~ 5825	16	20.13	0.02051	1	0.0205
GSM 850	824.2 ~ 848.8	31	27.63	0.11533	0.5495	0.2099
PCS 1900	1850.2 ~ 1909.8	26	22.63	0.03647	1	0.0365
WCDMA Band II	1852.4 ~ 1907.6	23	19.63	0.01828	1	0.0183
WCDMA Band IV	1712.4 ~ 1752.6	23	19.63	0.01828	1	0.0183
WCDMA Band V	826.4 ~ 846.6	23	19.63	0.01828	0.5576	0.0333
LTE Band 2	1850.7 ~ 1909.3	23	19.63	0.01828	1	0.0183
LTE Band 4	1710.7 ~ 1754.3	23	19.63	0.01828	1	0.0183
LTE Band 5	824.7 ~ 848.3	23.5	20.13	0.02051	0.5498	0.0373
LTE Band 12	699.7 ~ 715.3	23.5	20.13	0.02051	0.4665	0.0440
LTE Band 13	779.5 ~ 784.5	23.5	20.13	0.02051	0.5197	0.0396
LTE Band 17	706.5 ~ 713.5	23.5	20.13	0.02051	0.471	0.0437

Note 1: Bluetooth with GSM or WCDMA or LTE, Wi-Fi with GSM or WCDMA or LTE can transmit simultaneously.

Note 2: CPD = Calculation Power Density, LPD = Limit of Power Density

CONCLUSION:

Due to the description in note 1 as above, device will generate the max value of CPD/LPD+ when Wi-Fi 2.4G with GSM 850 is on transmitting simultaneously.

Max value of CPD/LPD = 0.0500 + 0.2099 = 0.2599 < 1

So the safety distance is 20cm for this device installed without any other radio equipment.

The End

Appendix A – Test Setup Photograph

Refer to “1907WSU008-UT” file.

Appendix B – EUT Photograph

Refer to “1907WSU008-UE” file.