

# 1. RF Exposure Requirements

---

## 1.1 General Information

### Client Information

Applicant: Tianhe Intelligent Control Technology(Chongqing) Co., Ltd  
Address of applicant: 8-3, No. 9 Fuxing Street, Nan'an District, Chongqing, China

Manufacturer: Tianhe Intelligent Control Technology(Chongqing) Co., Ltd  
Address of manufacturer: 8-3, No. 9 Fuxing Street, Nan'an District, Chongqing, China

### General Description of EUT:

Product Name: Center Console Part  
Trade Name: /  
Model No.: HS550UTV-11S  
Adding Model(s): /  
Rated Voltage: DC12V  
Power Adapter: /  
FCC ID: 2BD8S-HS550UTV11S  
Equipment Type: Mobile device

### Technical Characteristics of EUT:

#### Bluetooth(BLE mode)

Bluetooth Version: V5.0 (BLE mode)  
Frequency Range: 2402-2480MHz  
RF Output Power: 11.06dBm (Conducted)  
Data Rate: 1Mbps  
Modulation: GFSK  
Quantity of Channels: 40  
Channel Separation: 2MHz  
Type of Antenna: Copper tube antenna  
Antenna Gain: 0.44dBi

#### Bluetooth(BR/EDR mode)

Bluetooth Version: V5.0 (BR/EDR mode)  
Frequency Range: 2402-2480MHz  
RF Output Power: 3.81dBm (Conducted)  
Data Rate: 1Mbps, 2Mbps, 3Mbps  
Modulation: GFSK, π/4 DQPSK, 8DPSK  
Quantity of Channels: 79  
Channel Separation: 1MHz  
Type of Antenna: Copper tube antenna  
Antenna Gain: 0.44dBi

#### Wi-Fi(5G)

Support Standards: 802.11n-HT40, 802.11ac-VHT40

Frequency Range: 5745-5825MHz  
 Max. RF Output Power: 11.79dBm (Conducted)  
 Type of Modulation: QPSK, 16QAM, 64QAM  
 Type of Antenna: Copper tube antenna  
 Antenna Gain: 2.35dBi

## 1.2 RF Exposure Exemption

According to §1.1307(b)(3) and KDB 447498 D04 Interim General RF Exposure Guidance v01, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

**Option A:** FCC Rule Part 1.1307 (b)(3)(i)(A): The available maximum time-averaged power is no more than 1mW, regardless of separation distance.

**Option B:** FCC Rule Part 1.1307 (b)(3)(i)(B): The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold  $P_{th}$  (mW) described in the following formula.  $P_{th}$  is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}}(d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left( \frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

$d$  = the separation distance (cm);

**Option C:** FCC Rule Part 1.1307 (b)(3)(i)(C): The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. R must be at least  $\lambda/2\pi$ , where  $\lambda$  is the free-space operating wavelength in meters.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$
1.34-30	$3,450 R^2/f^2$

30-300	3.83 R <sup>2</sup>
300-1,500	0.0128 R <sup>2f</sup>
1,500-100,000	19.2R <sup>2</sup>

**For Multiple RF sources:** FCC Rule Part 1.1307(b)(3)(ii):

- (A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required).
- (B) In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

### 1.3 Calculated Result

Radio Access Technology	Prediction Frequency	Output Power	Antenna Gain	Duty Cycle	Tune-Up Time-Averaged Power	ERP
	(MHz)	(dBm)	(dBi)	(%)	(dBm)	(dBm)
Bluetooth	2402	11.06	0.44	100	12.00	10.29
Wi-Fi	5745	11.79	2.35	100	12.00	12.20

Frequency (MHz)	Option	Min. Distance	Max. Power		Exposure Limit	Ratio	Result
		(cm)	(dBm)	(mW)	(mW)		Pass/Fail
2402	C	20.00	10.29	10.69	768.00	0.01	Pass
5745	C	20.00	12.20	16.60	768.00	0.02	Pass

*Note: 1. Time-Averaged Power=Output Power \* Duty Cycle; ERP= Time-Averaged Power+ Antenna gain-2.15dB*

2. Option A, B and C refers as clause 1.2.
3. For option B, Max (time-averaged power, effective radiated power (ERP)) converts to Max. Power. For option C, ERP converts to Max. Power;
4. For option B,  $P_{th}$  (mW) converts to Exposure Limit (mW); For option C, ERP (W) converts to Exposure Limit (mW).
5. Ratio= Tune-Up ERP (mW)/ Exposure Limit (mW)

#### Mode for Simultaneous Multi-band Transmission:

Radio Access Technology	Ratio 1	Ratio 2	Simultaneous Ratio	Limit	Result
					Pass/Fail
--	--	--	--	--	--

*Note: BT and Wi-Fi can't transmit at the same time.*

Result: Pass