

# FCC ID : 2AN9R-S15ULTRA

## 1. RF EXPOSURE EVALUATION

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 <sup>2</sup> )	Average Time
<b>(A) Limits for Occupational/Control Exposures</b>				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
<b>(B) Limits for General Population/Uncontrol Exposures</b>				
300-1500	--	--	F/1500	6
1500-100000	--	--	1	30

**Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$**

Where

$P_d$  = Power density in mW/cm<sup>2</sup>.

$P_{out}$  = output power to antenna in mW.

$G$  = Numeric gain of the antenna relative to isotropic antenna.

$\pi$  = 3.1416.

$R$  = distance between observation point and center of the radiator in 20cm.

$P_d$  the limit of MPE, 1mW/cm<sup>2</sup>. If we know the maximum gain of the antenna, power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

## 2. EUT TECHNICAL DESCRIPTION

<b>Product Name:</b>	MINI PC
<b>Model Number:</b>	S15 Ultra, S15, F650, S**, S*****, F***, F****, S15*****, C*****, F***** (“*” may be alphanumeric characters, blank or other characters, which represent operating system or user serial number. But such changes do not concern those factors (such as hardware and the external structure) which might impact the security or electromagnetic compatibility of the device.) (Note: Pre testing all models, and find the S15 Ultra is the worst, so only the worst data of S15 Ultra is shown in the report.)
<b>Power Supply:</b>	AC 120V/60Hz by Adapter Adapter 1: Model: GM39-120300-1A Input: 100-240V~50/60Hz, 1.2A Output: 12V, 3A Adapter 2: Model: GQ36-120300-BU Input: 100-240V~50/60Hz, 1.5A Output: 12V, 3A (Note: The EUT has two adapters, all the adapters are tested, and find the adapter 2 is worst, so only the worst data is shown in the report.)
<b>Temperature Range:</b>	0°C ~ 40°C

<b>Device Type:</b>	Bluetooth V5.2
<b>Data Rate:</b>	1Mbps for GFSK modulation 2Mbps for $\pi/4$ -DQPSK modulation 3Mbps for 8DPSK modulation
<b>Modulation:</b>	GFSK, $\pi/4$ -DQPSK, 8DPSK
<b>Operating Frequency Range(s):</b>	2402-2480MHz
<b>Number of Channels:</b>	79 channels
<b>Antenna Type:</b>	Integrated Antenna
<b>Antenna Gain:</b>	3.89dBi (Note: The antenna information is provided by the customers, which will have a certain impact on the test results.)

<b>Device Type:</b>	BLE V5.2
<b>Data Rate:</b>	1Mbps/2Mbps for GFSK modulation
<b>Modulation:</b>	GFSK
<b>Operating Frequency Range:</b>	2402-2480MHz
<b>Number of Channels:</b>	40 Channels

<b>Antenna Type:</b>	Integrated Antenna
<b>Antenna Gain:</b>	3.89dBi (Note: The antenna information is provided by the customers, which will have a certain impact on the test results.)

<b>IEEE 802.11 WLAN Mode Supported:</b>	IEEE 802.11b IEEE 802.11g IEEE 802.11n(20MHz channel bandwidth) IEEE 802.11n(40MHz channel bandwidth) IEEE 802.11ax(20MHz channel bandwidth) IEEE 802.11ax(40MHz channel bandwidth)
<b>Modulation:</b>	DSSS with DBPSK/DQPSK/CCK for 802.11b OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n OFDMA with BPSK/QPSK/16QAM/64QAM/256QAM/1024QAM for 802.11ax
<b>Operating Frequency Range:</b>	2412-2462MHz
<b>Channels Step:</b>	5MHz
<b>Number of Channels:</b>	11 channels
<b>Antenna Type:</b>	Integrated Antenna
<b>Antenna Gain:</b>	Ant1: 3.89dBi, Ant2: 3.59dBi (NOTE: The antenna information is provided by the customers, which will have a certain impact on the test results.)

<b>WIFI Type:</b>	UNII-1: 5150MHz-5250MHz Band UNII-2A: 5250MHz-5350MHz Band UNII-2C: 5470MHz-5725MHz Band UNII-3: 5725MHz-5850MHz Band
<b>WLAN Supported:</b>	IEEE 802.11a IEEE 802.11n(20MHz channel bandwidth) IEEE 802.11n(40MHz channel bandwidth) IEEE 802.11ac(20MHz channel bandwidth) IEEE 802.11ac(40MHz channel bandwidth) IEEE 802.11ac(80MHz channel bandwidth) IEEE 802.11ax(20MHz channel bandwidth) IEEE 802.11ax(40MHz channel bandwidth) IEEE 802.11ax(80MHz channel bandwidth)
<b>Modulation:</b>	IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) IEEE 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) IEEE 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
<b>Frequency Range:</b>	5150MHz-5250MHz Band: 5180-5240MHz for 802.11a 5180-5240MHz for 802.11n(HT20) 5190-5230MHz for 802.11n(HT40) 5180-5240MHz for 802.11ac(HT20) 5190-5230MHz for 802.11ac(HT40) 5210MHz for 802.11ac(HT80) 5180-5240MHz for 802.11ax(HT20) 5190-5230MHz for 802.11ax(HT40)

	5210MHz for 802.11ax(HT80)
	5250MHz-5350MHz Band: 5260-5320MHz for 802.11a 5260-5320MHz for 802.11n(HT20) 5270-5310MHz for 802.11n(HT40) 5260-5320MHz for 802.11ac(HT20) 5270-5310MHz for 802.11ac(HT40) 5290MHz for 802.11ac(HT80) 5260-5320MHz for 802.11ax(HT20) 5270-5310MHz for 802.11ax(HT40) 5290MHz for 802.11ax(HT80)
	5470MHz-5725MHz Band: 5500-5700MHz for 802.11a 5500-5700MHz for 802.11n(HT20) 5510-5670MHz for 802.11n(HT40) 5500-5700MHz for 802.11ac(HT20) 5510-5670MHz for 802.11ac(HT40) 5530-5610MHz for 802.11ac(HT80) 5500-5700MHz for 802.11ax(HT20) 5510-5670MHz for 802.11ax(HT40) 5530-5610MHz for 802.11ax(HT80)
	5725MHz-5850MHz Band: 5745-5825MHz for 802.11a 5745-5825MHz for 802.11n(HT20) 5755-5795MHz for 802.11n(HT40) 5745-5825MHz for 802.11ac(HT20) 5755-5795MHz for 802.11ac(HT40) 5775MHz for 802.11ac(HT80) 5745-5825MHz for 802.11ax(HT20) 5755-5795MHz for 802.11ax(HT40) 5775MHz for 802.11ax(HT80)
<b>TPC Function:</b>	Support
<b>Beamforming:</b>	Not Support
<b>Antenna Type:</b>	Integrated Antenna
<b>Antenna Gain:</b>	Ant1: 4.95dBi, Ant2: 5.19dBi

### 3. Measurement Result

NOTE: All the modulation modes are tested, the data of the worst mode are described in the table.

Mode	Frequency (MHz)	Max Power (dBm)	Antenna gain (dBi)	Antenna Gain Numeric	R (cm)	Evaluation result (mW/cm <sup>2</sup> )	Power density Limits (mW/cm <sup>2</sup> )	Verdict
BT	2402	12.56	3.89	2.45	20	0.009	1.0000	PASS
2.4G WIFI	2412	24.88	3.89	2.45	20	0.150	1.0000	PASS
5G WIFI	5180	25.42	5.19	3.30	20	0.229	1.0000	PASS

#### Conclusion of simultaneous transmitter:

All modes can transmit simultaneously, the formula of calculated the MPE is:

$CPD1/LPD1 + CPD2/LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

Therefore the worst-case situation is  $0.009/1 + 0.150/1 + 0.229/1 = 0.388$ , which is less than 1, this confirmed that the device comply with FCC 1.1310 MPE limit.

----- The End -----