



CTK Co., Ltd.
The Power Leader of Global Regulatory Compliance

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RF EXPOSURE EVALUATION

Applicant : Samsung Electronics Co Ltd

Applicant Address : 19 Chapin Rd, Building D. Pine Brook, New Jersey,
United States

Kind of Product : Wi-Fi/BT Transceiver

**Equipment
model name** : WCA942M, WCA943M

FCC ID : A3LWCA942M

**Certification
Number IC** : 649E-WCA942M



Standard Requirement

The following RF exposure procedures are applicable :

- FCC Rules
Part 1.1310 Radiofrequency radiation exposure limits

Table 1 below sets forth limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields.

Table 1—Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f ²	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

- ISED Rules
RSS-102 Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

Table 4 : RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	0.73/ <i>f</i>	-	6**
1.1-10	87/ <i>f</i> ^{0.5}	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	58.07/ <i>f</i> ^{0.25}	0.1540/ <i>f</i> ^{0.25}	8.944/ <i>f</i> ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 <i>f</i> ^{0.3417}	0.008335 <i>f</i> ^{0.3417}	0.02619 <i>f</i>^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> ^{1.2}
150000-300000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616000/ <i>f</i> ^{1.2}

Note: *f* is frequency in MHz.

* Based on nerve stimulation (NS).

** Based on specific absorption rate (SAR).



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MPE Calculations

The EUT will only be used with a separation of 20 centimeters or greater between the antenna and the body of the user. The MPE calculation for this exposure is shown below.

The peak radiated output power (EIRP) is calculated as follows:

$EIRP = P + G$	Where, P = Power input to the antenna (mW) G = Power gain of the antenna (dBi)
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The numeric gain(G) of the antenna with a gain specified in dB is determined by:

$$G = \text{Log}^{-1} (\text{dB antenna gain} / 10)$$

Power density at the specific separation:

$S = PG / (4R^2\pi)$	Where, S = Maximum power density (mW/cm ²) P = Power input to the antenna (mW) G = Numeric power gain of the antenna R = Distance to the center of the radiation of the antenna (20cm = limit for MPE)
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Estimated safe separation:

$R = \sqrt{(PG / 4\pi)}$	Where, P = Power input to the antenna (mW) G = Numeric power gain of the antenna R = Distance to the center of the radiation of the antenna (20cm = limit for MPE)
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RF Exposure Results

<WCA942M>

Mode	P (dBm)	G (dBi)	EIRP (dBm)	EIRP (mW)	Power Density		R (cm)
					FCC (mW/cm ²)	ISED (W/m ²)	
BT	12.673	-1.04	11.63	14.56	0.0029	0.029	20
BLE	12.518	-1.04	11.48	14.05	0.0028	0.028	
WLAN 2.4 GHz	17.580	1.69	19.27	84.53	0.0168	0.168	
WLAN 5 GHz	21.510	3.88	25.39	345.94	0.0688	0.688	

Multiple chain transmitters

Mode	P (dBm)	G (dBi)	EIRP (dBm)	EIRP (mW)	Power Density		R (cm)
					FCC (mW/cm ²)	ISED (W/m ²)	
BT (Worst Case)	12.673	-1.04	11.63	14.56	/		20
WLAN 2.4 GHz	17.580	1.69	19.27	84.53			
WLAN 5 GHz	21.510	3.88	25.39	345.94			
Combined	/			445.03	0.0885	0.885	

<WCA943M>

Mode	P (dBm)	G (dBi)	EIRP (dBm)	EIRP (mW)	Power Density		R (cm)
					FCC (mW/cm ²)	ISED (W/m ²)	
BT	12.886	-1.38	11.51	14.14	0.0028	0.028	20
BLE	12.767	-1.61	11.16	13.05	0.0026	0.026	
WLAN 2.4 GHz	17.580	3.10	20.68	116.95	0.0233	0.233	
WLAN 5 GHz	21.510	2.95	24.46	279.25	0.0556	0.556	

Multiple chain transmitters

Mode	P (dBm)	G (dBi)	EIRP (dBm)	EIRP (mW)	Power Density		R (cm)
					FCC (mW/cm ²)	ISED (W/m ²)	
BT (Worst Case)	12.886	-1.38	11.51	14.14	/		20
WLAN 2.4 GHz	17.580	3.10	20.68	116.95			
WLAN 5 GHz	21.510	2.95	24.46	279.25			
Combined	/			410.34	0.0816	0.816	