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 KDB 447498 D01 V06 and §1.1307(b) CFR Title 47 §2.1091(b): (b) For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

FCC ID: 2A6GTGLCSNTN1101

EUT	IP Camera N11						
Frequency band (Operating)	WLAN: 2.412GHz ~ 2.462GHz						
	⊠WLAN: 5.18GHz ~ 5.24GHz						
	⊠WLAN: 5.745GHz ~ 5.825GHz						
	⊠Others: 2.402GHz~2.480GHz BT						
	NFC: 13.56MHz						
	RFID: 125kHz						
Device category	Portable (<20cm separation)						
	⊠Mobile (>20cm separation)						
	Others						
Exposure classification	Occupational/Controlled exposure (S = 5mW/cm2)						
	General Population/Uncontrolled exposure (S=1mW/cm2)						
Antenna diversity	☐Single antenna						
	⊠Multiple antennas						
	Tx diversity						
	Rx diversity						
	Tx/Rx diversity						
Evaluation applied	MPE Evaluation						
	SAR Evaluation						

EUT Specification

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)					
(I) 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					
	(II) LIMITS FOR GENERA	L POPULATION/UNCONTROLLED E	XPOSURE						
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					

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f = frequency in MHz. * = Plane-wave equivalent power density.

Note: Emissions between 100 kHz to 300 kHz should be assessed versus the limits at 300 kHz in Table 1 of Section 1.1310: 614 V/m and 1.63 A/m.AKDB inquiry is required to determine the applicable exposure limits below 100 kHz.

Friis transmission formula: Pd=(Pout*G)\(4*pi*R2)

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Where
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Pd= Power density in mW/cm²

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 the limit of MPE, 1mW/cm2. If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

Measurement Result

BDR&EDR worst case:

Operating Mode	Channel Frequen cy	Measured Power	Tune up tolerance	Max. Tune up Power	Antenna Gain	Power density at 20cm	Power density Limits (mW/cm²)
	(MHz)	(dBm)	(dBm)	(dBm)	(dBi)	(mW/ cm ²)	
π/4-DQPSK	2402	-1.52	-1.52±1	-0.52	0.03	0.0002	1

BLE worst case:

Onesting	Channel	Measured	Tune up	Max. Tune	Antenna	Power density	Devue deveitu
Operating	Frequency	Power	tolerance	up Power	Gain	at 20cm	Power density $(m) M(m^2)$
Mode	(MHz)	(dBm)	(dBm)	(dBm)	(dBi)	(mW/ cm ²)	
GFSK	2402	-1.76	-1.76±1	-0.76	0.03	0.0002	1

2.4GHz WiFi worst case:

	Channel	Measured	Tune up	Max. Tune	Antenna	Power density	Davien dan situ
Operating	Frequency	Power	tolerance	up Power	Gain	at 20cm	Power density $(m) M/(cm^2)$
wode	(MHz)	(dBm)	(dBm)	(dBm)	(dBi)	(mW/ cm ²)	
802.11n (HT40)	2422	16.09	14.57±1	17.09	2.93	0.0200	1

5.1GHz WiFi worst case:

Operating	Channel Frequency	Measured Power	Tune up tolerance	Max. Tune up Power	Antenna Gain	Power density at 20cm	Power density
Mode	(MHz)	(dBm)	(dBm)	(dBm)	(dBi)	(mW/ cm ²)	LIMITS (MVV/CM ²)
802.11n (HT40)	5230	12.25	12.25±1	13.25	3.35	0.0091	1

5.8GHz WiFi worst case:

Operating	Channel	Measured	Tune up	Max. Tune	Antenna	Power density	Power density
Mada	Frequency	FOWEI	luerance	up Fower	Gain	at 20011	L_{imito} (m) $\Lambda//om^2$)
Mode	(MHz)	(dBm)	(dBm)	(dBm)	(dBi)	(mW/ cm ²)	
802.11n (HT40)	5755	13.12	13.12±1	14.12	2.13	0.0084	1

Evaluate the condition of different modules work simultaneously

The requirement of Simultaneous Transmission evaluation has also been considered and has complied with the following conditions of the worst case:

 $MPE1/Limit1 + MPE2/Limit2 + \dots \leq 1$

Thus,

- 1. 2.4G WiFi and 5 WiFi cannot support simultaneous transmission.
- 2. The BT and 2.4G WiFi can support simultaneous transmission: 0.0002/1+0.0200/1=0.0002+0.0200=0.0202
- 3. The BT and 5G WiFi can support simultaneous transmission: 0.0002/1+0.0091/1=0.0002+0.0091=0.0093

It is concluded that no Simultaneous Transmission evaluation is required.

Test Result: Pass