Maximum Permissible Exposure Report

Product Information

FCC ID	2ADAC-NEON42C-4
Product name	Intel mini PC
Model number	NEO N42C-4
Power supply	DC12V$\overline{}$, 3.0A
WLAN Modulation Type	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)
BT Modulation Type	GFSK, π/4-DQPSK, 8DPSK for BT 4.0 DSS GFSK for BT 4.0 DTS
Antenna Type	WLAN: Two Internal antenna BT: Internal Antenna
Antenna Gain	WLAN: Chain 0: 2.0dBi (Max.) 　　　　 Chain 1: 2.0dBi (Max.) BT: 2.00dBi (maximum)
Hardware version	JXAPLA
Software version	Windows 10 Pro 64bit 1703
WLAN FCC Operation frequency	IEEE 802.11b:2412-2462MHz IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz IEEE 802.11n HT40:2422-2452MHz
BT Operation frequency	2402-2480MHz
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Mobile Device

2. Evaluation Method

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.
In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0. The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3. Limit

3. 1 Refer evaluation method

ANSI C95.1–1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.
FCC CFR 47 part1 1.1310: Radiofrequency radiation exposure limits.
FCC CFR 47 part2 2.1091: Radiofrequency radiation exposure evaluation: mobile devices

3. 2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm²)	Averaging Time (minute)
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 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	$(180/f^2)$*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz
*=Plane-wave equivalent power density

4. MPE Calculation Method

Predication of MPE limit at a given distance
Equation from page 18 of OET Bulletin 65, Edition 97-01

$S=PG/4\pi R^2$
Where: S=power density
    P=power input to antenna
    G=power gain of the antenna in the direction of interest relative to an isotropic radiator
    R=distance to the center of radiation of the antenna

5. Antenna Information

The EUT can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain
Antenna 0	Internal Antenna	2000 MHz – 2500 MHz	2.00dBi
Antenna 1	Internal Antenna	2000 MHz – 2500 MHz	2.00dBi
Antenna 2	Internal Antenna	2000 MHz – 2500 MHz	2.00dBi

6. Conducted Power

2.4GWLAN

Test Mode		Channel	Frequency (MHz)	Measured Peak Output Power (dBm)
Antenna 0	IEEE 802.11b	1	2412	15.68
		6	2437	16.09
		11	2462	15.57
	IEEE 802.11g	1	2412	16.38
		6	2437	15.51
		11	2462	15.43
	IEEE 802.11n HT20	1	2412	16.42
		6	2437	15.94
		11	2462	15.84
	IEEE 802.11n HT40	3	2422	15.27
		6	2437	15.72
		9	2452	15.73

2.4GWLAN

Test Mode		Channel	Frequency (MHz)	Measured Peak Output Power (dBm)
Antenna 1	IEEE 802.11b	1	2412	15.11
		6	2437	15.77
		11	2462	16.17
	IEEE 802.11g	1	2412	15.39
		6	2437	15.4
		11	2462	16.09
	IEEE 802.11n HT20	1	2412	15.07
		6	2437	15.99
		11	2462	15.73
	IEEE 802.11n HT40	3	2422	15.69
		6	2437	15.69
		9	2452	16.11

Test Mode		Channel	Frequency (MHz)	Measured Peak Output Power (dBm)
Antenna0+ Antenna 1	IEEE 802.11n HT20	1	2412	18.81
		6	2437	18.98
		11	2462	18.80
	IEEE 802.11n HT40	3	2422	18.50
		6	2437	18.72
		9	2452	18.93

Bluetooth

Test Mode		Channel	Frequency (MHz)	Measured Peak Output Power (dBm)
Antenna 2	GFSK	0	2402	2.899
		39	2441	3.137
		78	2480	3.083
	π/4DQPSK	0	2402	2.548
		39	2441	2.445
		78	2480	2.855
	8DPSK	0	2402	2.775
		39	2441	3.042
		78	2480	3.037
	GFSK (BLE)	0	2402	1.610
		19	2440	1.618
		39	2480	2.141

7. Manufacturing Tolerance

2.4GWLAN-Antenna 0

IEEE 802.11b (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	15.5	16.0	15.5
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	16.0	15.5	15.5
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	16.5	16.0	16.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Peak)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	15.0	15.5	15.5
Tolerance ±(dB)	1.0	1.0	1.0

2.4GWLAN-Antenna 1

IEEE 802.11b (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	15.0	15.5	16.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	15.0	15.0	16.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	15.0	16.0	15.5
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Peak)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	15.5	15.5	16
Tolerance ±(dB)	1.0	1.0	1.0

2.4G Antenna 0 & Antenna 1

IEEE 802.11n HT20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	18.0	18.5	18.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Peak)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	18.0	18.0	18.5
Tolerance ±(dB)	1.0	1.0	1.0

Bluetooth-Antenna 2

GFSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	3.0	3.0	3.0
Tolerance ±(dB)	1.0	1.0	1.0
π/4DQPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	2.5	2.5	2.5
Tolerance ±(dB)	1.0	1.0	1.0
8DPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	2.5	3.0	3.0
Tolerance ±(dB)	1.0	1.0	1.0
GFSK (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	1.5	1.5	2.0
Tolerance ±(dB)	1.0	1.0	1.0

8. Measurement Results

8.1 Standalone MPE

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, r =20cm, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

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2.4G WLAN Antenna 0

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW					
IEEE 802.11b	17.00	50.1187	2.0000	1.5849	100%	0.0158	1.0000
IEEE 802.11g	17.00	50.1187	2.0000	1.5849	100%	0.0158	1.0000
IEEE 802.11n HT20	17.50	56.2341	2.0000	1.5849	100%	0.0177	1.0000
IEEE 802.11n HT40	16.50	44.6684	2.0000	1.5849	100%	0.0141	1.0000

2.4G WLAN Antenna 1

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW					
IEEE 802.11b	17.00	50.1187	2.0000	1.5849	100%	0.0158	1.0000
IEEE 802.11g	16.50	44.6683	2.0000	1.5849	100%	0.0141	1.0000
IEEE 802.11n HT20	16.50	44.6683	2.0000	1.5849	100%	0.0141	1.0000
IEEE 802.11n HT40	17.00	50.1187	2.0000	1.5849	100%	0.0100	1.0000

2.4G Antenna 0 & Antenna 1

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW					
	Ant0+Ant1	Ant0+Ant1	Ant0+Ant1	Ant0+Ant1			
IEEE 802.11n HT20	19.5	89.12509	5.01	3.1696	100%	0.0562	1.0000
IEEE 802.11n HT40	19.5	89.12509	5.01	3.1696	100%	0.0562	1.0000

Bluetooth Antenna 2

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW					
GFSK	4.00	2.5119	2.0000	1.5849	100%	0.0008	1.0000
π/4DQPSK	3.50	2.2387	2.0000	1.5849	100%	0.0007	1.0000
8DPSK	4.00	2.5119	2.0000	1.5849	100%	0.0008	1.0000
GFSK (BLE)	3.00	1.9953	2.0000	1.5849	100%	0.0006	1.0000

Remark:
1. Output power including tune-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer;

8.2 Simultaneous Transmission MPE

The sample support one WLAN modular and Bluetooth modular, they supports difference antenna, but WLAN and BT not support Simultaneous technology. *The WLAN support MIMO technology.*

Remark:
1. Output power including tune-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer;

9. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

----------------THE END OF REPORT---------------