Maximum Permissible Exposure Report

1. Product Information

FCC ID	:	2AJ6DTODAAIRAC
EUT	:	Wireless AP/CPE/Access Point/Bridge
Model Number	:	DIP9526K-H, DIP4530-H, DIP645-H, DIP695-H, DIP4526-H, DIP9526-H, DIP1095-H, TX23-9516K, TX23-9525K, TX23-120KYW, IN1235KYW-H, IN1212YW-H, IN7531YW, IN1240YW, IN3231YW, IN3240YW, IN3212YW-H
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, Only model name and shell color is different for these models.
Test Model	:	DIP9526K-H
Power Supply	:	DC 24V/1A
Hardware Version	:	TD-9344/9563/31/57
Software Version	:	TD63-H
WIFI(2.4G Band)	:	
Frequency Range	:	2412MHz-2462MHz
Channel Spacing	:	5MHz
Channel Number	:	11 channels for 20MHz bandwidth(2412MHz~2462MHz) 7 channels for 40MHz bandwidth(2422MHz~2452MHz)
Modulation Type	:	802.11b: DSSS(CCK,DQPSK,DBPSK); 802.11g/n: OFDM(64QAM, 16QAM, QPSK, BPSK)
WIFI(5.2G Band)	:	
Frequency Range	:	5180MHz-5240MHz
Channel Number	:	4 channels for 20MHz bandwidth(5180MHz-5240MHz) 2 channels for 40MHz bandwidth(5190MHz~5230MHz) 1 channels for 80MHz bandwidth(5210MHz)
Modulation Type	:	802.11a/n/ac: OFDM(64QAM, 16QAM, QPSK, BPSK)
WIFI(5.8G Band)	:	
Frequency Range	:	5745MHz-5825MHz
Channel Number	:	5 channels for 20MHz bandwidth(5745MHz-5825MHz) 2 channels for 40MHz bandwidth(5755MHz~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)
Modulation Type	:	802.11a/n/ac: OFDM(64QAM, 16QAM, QPSK, BPSK)
Antenna Description	:	
		Dipole Antenna(CH0), 12.0dBi(max.) Dipole Antenna(CH1), 12.0dBi(max.)
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 KDB447498 D01 General RF Exposure Guidance v06 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 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/cm^2)	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/cm^2)	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

DIP9526K-H can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna Identification in Internal photos	Antenna type and antenna number	Operate frequency band	Maximum antenna gain
Ant0	2.4G Wifi / 5G Wifi	Dipole Antenna	2.4GHz – 2.4835 GHz 5GHz – 6 GHz	12.0dBi(Max.)
Ant1	2.4G Wifi / 5G Wifi	Dipole Antenna	2.4GHz – 2.4835 GHz 5GHz – 6 GHz	12.0dBi(Max.)

6. Measurement Results

6.1 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.

2.4GHz WLAN

Ant0

Modulation Type	Max. Tune Up Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW					
IEEE 802.11b	2.00	1.5849	12.0000	15.8489	100%	0.0050	1.0000
IEEE 802.11g	5.00	3.1623	12.0000	15.8489	100%	0.0100	1.0000
IEEE 802.11n HT20	5.00	3.1623	12.0000	15.8489	100%	0.0100	1.0000
IEEE 802.11n HT40	5.00	3.1623	12.0000	15.8489	100%	0.0100	1.0000

Ant1

Modulation Type	Max. Tune Up Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW					
IEEE 802.11b	2.00	1.5849	12.0000	15.8489	100%	0.0050	1.0000
IEEE 802.11g	5.00	3.1623	12.0000	15.8489	100%	0.0100	1.0000
IEEE 802.11n HT20	5.00	3.1623	12.0000	15.8489	100%	0.0100	1.0000
IEEE 802.11n HT40	5.00	3.1623	12.0000	15.8489	100%	0.0100	1.0000

5GHz WLAN Band 1

Ant0

Modulation Type	Max. Tune Up Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW					
IEEE 802.11a	3.00	1.9953	12.0000	15.8489	100%	0.0063	1.0000
IEEE 802.11n HT20	3.00	1.9953	12.0000	15.8489	100%	0.0063	1.0000
IEEE 802.11ac VHT20	3.00	1.9953	12.0000	15.8489	100%	0.0063	1.0000
IEEE 802.11n HT40	2.00	1.5849	12.0000	15.8489	100%	0.0050	1.0000
IEEE 802.11ac VHT40	3.00	1.9953	12.0000	15.8489	100%	0.0063	1.0000
IEEE 802.11ac VHT80	1.00	1.2589	12.0000	15.8489	100%	0.0040	1.0000

Ant1

Modulation Type	Max. Tune Up Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW					
IEEE 802.11a	3.00	1.9953	12.0000	15.8489	100%	0.0063	1.0000
IEEE 802.11n HT20	3.00	1.9953	12.0000	15.8489	100%	0.0063	1.0000
IEEE 802.11ac VHT20	3.00	1.9953	12.0000	15.8489	100%	0.0063	1.0000
IEEE 802.11n HT40	2.00	1.5849	12.0000	15.8489	100%	0.0050	1.0000
IEEE 802.11ac VHT40	3.00	1.9953	12.0000	15.8489	100%	0.0063	1.0000
IEEE 802.11ac VHT80	1.00	1.2589	12.0000	15.8489	100%	0.0040	1.0000

5GHz WLAN Band 3

Ant0

Modulation Type	Max. Tune Up Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW					
IEEE 802.11a	2.00	1.5849	12.0000	15.8489	100%	0.0050	1.0000
IEEE 802.11n HT20	3.00	1.9953	12.0000	15.8489	100%	0.0063	1.0000
IEEE 802.11ac VHT20	3.00	1.9953	12.0000	15.8489	100%	0.0063	1.0000
IEEE 802.11n HT40	3.00	1.9953	12.0000	15.8489	100%	0.0063	1.0000
IEEE 802.11ac VHT40	2.00	1.5849	12.0000	15.8489	100%	0.0050	1.0000
IEEE 802.11ac VHT80	2.00	1.5849	12.0000	15.8489	100%	0.0050	1.0000

Ant1

Modulation Type	Max. Tune Up Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW					
IEEE 802.11a	2.00	1.5849	12.0000	15.8489	100%	0.0050	1.0000
IEEE 802.11n HT20	3.00	1.9953	12.0000	15.8489	100%	0.0063	1.0000
IEEE 802.11ac VHT20	3.00	1.9953	12.0000	15.8489	100%	0.0063	1.0000
IEEE 802.11n HT40	3.00	1.9953	12.0000	15.8489	100%	0.0063	1.0000
IEEE 802.11ac VHT40	2.00	1.5849	12.0000	15.8489	100%	0.0050	1.0000
IEEE 802.11ac VHT80	2.00	1.5849	12.0000	15.8489	100%	0.0050	1.0000

Remark:
1. Output power including turn-up tolerance;
2. Output power was adjust to duty cycle at 100% if measured duty cycle less than 98%;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer.

6.2 Simultaneous Transmission MPE

The sample supports 2 antennas for 2.4GHz WLAN and 5G WLAN. The 2.4G WLAN and 5G WLAN can transmit simultaneous.
According to KDB447498 D01 General RF Exposure Guidance v06 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;
$\sum$ of MPE ratios ≤ 1.0

Ant0 and Ant1 for 2.4G WLAN

Modulation Type	MPE $_{Ant0}$ (mW/cm^2)	MPE $_{Ant1}$ (mW/cm^2)	∑MPE ratios	Limit	Results
IEEE 802.11n HT20	0.0100	0.0100	0.0200	1.0	PASS
IEEE 802.11n HT40	0.0100	0.0100	0.0200	1.0	PASS

Ant0 and Ant1 for 5G WLAN Band 1

Modulation Type	MPE $_{Ant0}$ (mW/cm^2)	MPE $_{Ant1}$ (mW/cm^2)	∑MPE ratios	Limit	Results
IEEE 802.11n HT20	0.0063	0.0063	0.0126	1.0	PASS
IEEE 802.11ac VHT20	0.0063	0.0063	0.0126	1.0	PASS
IEEE 802.11n HT40	0.0050	0.0050	0.0100	1.0	PASS
IEEE 802.11ac VHT40	0.0063	0.0063	0.0126	1.0	PASS
IEEE 802.11ac VHT80	0.0040	0.0040	0.0080	1.0	PASS

Ant0 and Ant1 for 5G WLAN Band 3

Modulation Type	MPE $_{Ant0}$ (mW/cm^2)	MPE $_{Ant1}$ (mW/cm^2)	∑MPE ratios	Limit	Results
IEEE 802.11n HT20	0.0063	0.0063	0.0126	1.0	PASS
IEEE 802.11ac VHT20	0.0063	0.0063	0.0126	1.0	PASS
IEEE 802.11n HT40	0.0063	0.0063	0.0126	1.0	PASS
IEEE 802.11ac VHT40	0.0050	0.0050	0.0100	1.0	PASS
IEEE 802.11ac VHT80	0.0050	0.0050	0.0100	1.0	PASS

Simultaneous Transmission Analysis Mode: 2.4G WLAN + 5G WLAN

Modulation Type	MPE $_{2.4G\ WLAN}$ (mW/cm^2)	MPE $_{5G\ WLAN}$ (mW/cm^2)	∑MPE ratios	Limit	Results
2.4G WLAN+5G WLAN	0.0200	0.0126	0.0326	1.0	PASS

7. Conclusion

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

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