Maximum Permissible Exposure Report

1. Product Information

FCC ID:	ZDED4Z
Product name	QHD Wireless IP Camera
Test Model	D4Z
Additional Model No.	D4Z VX, MDS2040, MDS2040 VX, MDS2041, MDS2041VX, MDS2042 VX, MDS2043 VX, MDS2044VX, MDS2045 VX, Genie 3 VX, Foscam Genie 3 VX, D2*, D2* VX, D4* , D4* VX, PS4X** MDS4010, MDS4010VX, MDS4011 VX, MDS4012 VX, MDS4013VX, MDS4014 VX, MDS4015VX (Notes: V indicates the software version, x = 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. When x = 0, V0 is blank by default, and * indicates the small version is identified by letters.)
Model Declaration	PCB board, structure and internal of these model(s) are the same, So no additional models were tested.
Power supply	For AC Adapter Input:100-240V~, 50/60Hz , 0.8A Max Output: 12V⎓2A
Operation frequency	IEEE 802.11b:2412-2462MHz IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz IEEE 802.11n HT40:2422-2452MHz 5.2GHz Band:5180~5240MHz 5.8GHz Band:5745~5825MHz
Modulation Type	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11a/n/ac: OFDM(64QAM, 16QAM, QPSK, BPSK)
Channel Number	11 Channels for 20MHz bandwidth(2412~2462MHz) 7 Channels for 40MHz bandwidth(2422~2452MHz) 4 channels for 20MHz bandwidth(5180MHz-5240MHz) 2 channels for 40MHz bandwidth(5190MHz~5230MHz) 1 channels for 80MHz bandwidth(5210MHz) 5 channels for 20MHz bandwidth(5745MHz-5825MHz) 2 channels for 40MHz bandwidth(5755MHz~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)
Antenna Type	External Antenna
Antenna Gain	2.0dBi (Max.)
Hardware version	/
Software version	/
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Fixed 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: Fixed 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

ES-D4 can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Notes
Antenna	External Antenna	2400~5850MHz	2.0 dBi	WiFi Antenna

6. Conducted Power

Mode	Channel	Frequency(MHz)	Average Conducted Output Power (dBm)
IEEE 802.11b	1	2412	10.89
	6	2437	10.73
	11	2462	10.13
IEEE 802.11g	1	2412	11.74
	6	2437	11.28
	11	2462	10.75
IEEE 802.11n HT20	1	2412	11.43
	6	2437	11.20
	11	2462	10.65
IEEE 802.11n HT40	3	2422	11.77
	6	2437	11.63
	9	2452	10.83
IEEE 802.11a (5.2G)	36	5180	11.02
	40	5200	10.94
	48	5240	10.28
IEEE 802.11n20 (5.2G)	36	5180	11.34
	40	5200	12.56
	48	5240	11.15
IEEE 802.11n40 (5.2G)	38	5190	11.43
	46	5230	10.83
IEEE 802.11ac20 (5.2G)	36	5180	11.23
	40	5200	11.37
	48	5240	10.12
IEEE 802.11ac40 (5.2G)	38	5190	11.39
	46	5230	10.56
IEEE 802.11ac80 (5.2G)	42	5210	11.33
IEEE 802.11a (5.8G)	149	5745	10.22
	157	5785	10.23
	165	5825	10.53
IEEE 802.11n20 (5.8G)	149	5745	11.68
	157	5785	11.45
	165	5825	10.82
IEEE 802.11n40 (5.8G)	151	5755	10.58
	159	5795	11.00
IEEE 802.11ac20 (5.8G)	149	5745	11.23
	157	5785	11.37
	165	5825	10.12
IEEE 802.11ac40 (5.8G)	151	5755	11.39
	159	5795	10.56
IEEE 802.11ac80 (5.8G)	155	5775	10.56

7. Measurement Results

IEEE 802.11b (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	11.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	11.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	11.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Peak)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	11.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11a(5.2G) (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	11.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11 N20 (5.2G) (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	11.0	12.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11 N40 (5.2G) (Average)			
Channel	Channel 38	Channel 46	/
Target (dBm)	11.0	11.0	/
Tolerance ±(dB)	1.0	1.0	/
IEEE 802.11 ac20 (5.2G) (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	11.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11ac40 (5.2G) (Average)			
Channel	Channel 38	Channel 46	/
Target (dBm)	11.0	11.0	/
Tolerance ±(dB)	1.0	1.0	/
IEEE 802.11ac80 (5.2G) (Average)			
Channel	Channel 42	/	/
Target (dBm)	11.0	/	/
Tolerance ±(dB)	1.0	/	/
IEEE 802.11a(5.8G) (Average)			
Channel	Channel 149	Channel 157	Channel 165

Target (dBm)	11.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11 N20 (5.8G) (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	11.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11 N40 (5.8G) (Average)			
Channel	Channel 151	Channel 59	/
Target (dBm)	11.0	11.0	/
Tolerance ±(dB)	1.0	1.0	/
IEEE 802.11 ac20 (5.8G) (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	11.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11ac40 (5.8G) (Average)			
Channel	Channel 151	Channel 59	/
Target (dBm)	11.0	11.0	/
Tolerance ±(dB)	1.0	1.0	/
IEEE 802.11ac80 (5.8G) (Average)			
Channel	Channel 155	/	/
Target (dBm)	11.0	/	/
Tolerance ±(dB)	1.0	/	/

8. Evaluation Results

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.

2.4GWIFI

Band/Mode	f (GHz)	RF output power		Antenna Gain (dBi)	Duty Cycle	MPE (mW/cm2)	MPE Limits (mW/cm2)
		dBm	mW				
IEEE 802.11b	2.462	12	15.8489	2.0	100%	0.0050	1.0000
IEEE 802.11g	2.412	12	15.8489	2.0	100%	0.0050	1.0000
IEEE 802.11n HT20	2.437	12	15.8489	2.0	100%	0.0050	1.0000
IEEE 802.11n HT40	2.422	12	15.8489	2.0	100%	0.0050	1.0000

5.2GWIFI

Band/Mode	f (GHz)	RF output power		Antenna Gain (dBi)	Duty Cycle	MPE (mW/cm2)	MPE Limits (mW/cm2)
		dBm	mW				
IEEE 802.11a (5.2G)	5.180	12	15.8489	2.0	100%	0.0020	1.0000
IEEE 802.11n20 (5.2G)	5.180	13	19.9526	2.0	100%	0.0063	1.0000
IEEE 802.11n40 (5.2G)	5.190	12	15.8489	2.0	100%	0.0050	1.0000
IEEE 802.11ac20 (5.2G)	5.240	12	15.8489	2.0	100%	0.0050	1.0000
IEEE 802.11ac40 (5.2G)	5.190	12	15.8489	2.0	100%	0.0050	1.0000
IEEE 802.11ac80 (5.2G)	5.210	12	15.8489	2.0	100%	0.0050	1.0000

5.8GWIFI

Band/Mode	f (GHz)	RF output power		Antenna Gain (dBi)	Duty Cycle	MPE (mW/cm2)	MPE Limits (mW/cm2)
		dBm	mW				
IEEE 802.11a (5.8G)	5.825	12	15.8489	2.0	100%	0.0050	1.0000
IEEE 802.11n20 (5.8G)	5.825	12	15.8489	2.0	100%	0.0050	1.0000
IEEE 802.11n40 (5.8G)	5.795	12	15.8489	2.0	100%	0.0050	1.0000
IEEE 802.11ac20 (5.8G)	5.745	12	15.8489	2.0	100%	0.0050	1.0000
IEEE 802.11ac40 (5.8G)	5.755	12	15.8489	2.0	100%	0.0050	1.0000
IEEE 802.11ac80 (5.8G)	5.775	12	15.8489	2.0	100%	0.0050	1.0000

Remark:
1. Output power including turn-up tolerance;
2. Output power is burst average power;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer;
4. MPE values = $PG/4\pi R^2$

9. 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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