FCC 47 CFR MPE REPORT

DEI Sales Inc. dba Definitive Technology

JMDD Module

Model Number: JMDD

FCC ID: IPUJMDD

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Maximum Permissible Exposure

1、Applicable Standard

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

(a)、Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm2)	Averaging Times｜E｜2 , ｜H｜2 or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-10000			5	6

(b)、Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm2)	Averaging Times｜E｜2 , ｜H｜2 or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-10000			1.o	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

2、MPE Calculation Method

E (V/m) = (30*P*G) 0.5/d Power Density: Pd (W/m2) = E2/377

E = Electric Field (V/m)

P = Peak RF output Power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

Pd = (30*P*G) / (377*d2)

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

3、Conducted Power Result

3.1 Antenna 0

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
GFSK	2402	3.63	2.31	3±2	4.03	2.53
	2441	4.98	3.15	4±2	4.03	2.53
	2480	5.74	3.75	5±2	4.03	2.53
8-DPSK	2402	6.47	4.44	6±2	4.03	2.53
	2441	7.77	5.98	7±2	4.03	2.53
	2480	8.50	7.08	8±2	4.03	2.53
BLE GFSK 1M	2402	3.49	2.23	3±2	4.03	2.53
	2440	4.40	2.75	4±2	4.03	2.53
	2480	4.69	2.94	4±2	4.03	2.53
BLE GFSK 2M	2402	3.59	2.29	3±2	4.03	2.53
	2440	4.53	2.84	4±2	4.03	2.53
	2480	4.81	3.03	4±2	4.03	2.53

3.2 Antenna 1

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11b	2412	16.01	39.90	16±2	4.10	2.57
	2437	16.05	40.27	16±2	4.10	2.57
	2462	15.41	34.75	15±2	4.10	2.57
IEEE 802.11g	2412	11.54	14.26	11±2	4.10	2.57
	2437	11.72	14.86	11±2	4.10	2.57
	2462	11.54	14.26	11±2	4.10	2.57
IEEE 802.11n HT20	2412	8.09	6.44	8±2	4.10	2.57
	2437	8.32	6.79	8±2	4.10	2.57
	2462	8.81	7.60	8±2	4.10	2.57
IEEE 802.11n HT40	2422	5.47	3.52	5±2	4.10	2.57
	2437	5.22	3.33	5±2	4.10	2.57
	2452	5.34	3.42	5±2	4.10	2.57
IEEE 802.11a	5180	14.78	30.06	14±2	2.39	1.73
	5200	14.53	28.38	14±2	2.39	1.73
	5240	14.42	27.67	14±2	2.39	1.73
	5260	14.43	27.73	14±2	1.65	1.42
	5300	14.62	28.97	14±2	1.65	1.42
	5320	14.49	28.12	14±2	1.65	1.42
	5500	13.73	23.60	13±2	2.97	1.95
	5580	14.84	30.48	14±2	2.97	1.95
	5700	14.49	28.12	14±2	2.97	1.95
	5745	14.26	26.67	14±2	3.90	2.45
	5785	14.15	26.00	14±2	3.90	2.45
	5825	14.24	26.55	14±2	3.90	2.45

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT20	5180	12.79	19.01	12±2	2.39	1.73
	5200	12.61	18.24	12±2	2.39	1.73
	5240	12.56	18.03	12±2	2.39	1.73
	5260	11.45	13.96	11±2	1.65	1.42
	5300	11.91	15.52	11±2	1.65	1.42
	5320	11.97	15.74	11±2	1.65	1.42
	5500	11.64	14.59	11±2	2.97	1.95
	5580	12.00	15.85	12±2	2.97	1.95
	5700	11.83	15.24	11±2	2.97	1.95
	5745	12.87	19.36	12±2	3.90	2.45
	5785	12.91	19.54	12±2	3.90	2.45
	5825	12.85	19.28	12±2	3.90	2.45
IEEE 802.11ac VHT20	5180	12.95	19.72	12±2	2.39	1.73
	5200	12.68	18.54	12±2	2.39	1.73
	5240	12.63	18.32	12±2	2.39	1.73
	5260	11.72	14.86	11±2	1.65	1.42
	5300	11.50	14.13	11±2	1.65	1.42
	5320	11.59	14.42	11±2	1.65	1.42
	5500	11.99	15.81	11±2	2.97	1.95
	5580	11.48	14.06	11±2	2.97	1.95
	5700	11.71	14.83	11±2	2.97	1.95
	5745	12.99	19.91	12±2	3.90	2.45
	5785	12.52	17.86	12±2	3.90	2.45
	5825	12.86	19.32	12±2	3.90	2.45

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT40	5190	12.56	18.03	12±2	2.39	1.73
	5230	12.03	15.96	12±2	2.39	1.73
	5270	11.67	14.69	11±2	1.65	1.42
	5310	11.70	14.79	11±2	1.65	1.42
	5510	11.24	13.30	11±2	2.97	1.95
	5670	11.75	14.96	11±2	2.97	1.95
	5755	11.97	15.74	11±2	3.90	2.45
	5795	12.18	16.52	12±2	3.90	2.45
IEEE 802.11ac VHT40	5190	12.57	18.07	12±2	2.39	1.73
	5230	11.98	15.78	11±2	2.39	1.73
	5270	11.52	14.19	11±2	1.65	1.42
	5310	11.62	14.52	11±2	1.65	1.42
	5510	11.03	12.68	11±2	2.97	1.95
	5670	11.64	14.59	11±2	2.97	1.95
	5755	12.46	17.62	12±2	3.90	2.45
	5795	12.09	16.18	12±2	3.90	2.45
IEEE 802.11ac VHT80	5210	11.62	14.52	11±2	2.39	1.73
	5290	10.43	11.04	10±2	1.65	1.42
	5530	11.56	14.32	11±2	2.97	1.95
	5775	11.66	14.66	11±2	3.90	2.45

3.3 Antenna 2

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11b	2412	16.52	44.87	16±2	3.17	2.07
	2437	16.58	45.50	16±2	3.17	2.07
	2462	16.19	41.59	16±2	3.17	2.07
IEEE 802.11g	2412	11.98	15.78	11±2	3.17	2.07
	2437	12.15	16.41	12±2	3.17	2.07
	2462	12.41	17.42	12±2	3.17	2.07
IEEE 802.11n HT20	2412	8.58	7.21	8±2	3.17	2.07
	2437	9.34	8.59	9±2	3.17	2.07
	2462	9.59	9.10	9±2	3.17	2.07
IEEE 802.11n HT40	2422	5.74	3.75	5±2	3.17	2.07
	2437	5.93	3.92	5±2	3.17	2.07
	2452	5.98	3.96	5±2	3.17	2.07
IEEE 802.11a	5180	15.03	31.84	15±2	2.91	1.95
	5200	14.42	27.67	14±2	2.91	1.95
	5240	14.39	27.48	14±2	2.91	1.95
	5260	14.01	25.18	14±2	3.12	2.05
	5300	13.59	22.86	13±2	3.12	2.05
	5320	13.60	22.91	13±2	3.12	2.05
	5500	14.79	30.13	14±2	4.50	2.82
	5580	14.36	27.29	14±2	4.50	2.82
	5700	14.54	28.44	14±2	4.50	2.82
	5745	13.47	22.23	13±2	3.56	2.27
	5785	13.41	21.93	13±2	3.56	2.27
	5825	13.33	21.53	13±2	3.56	2.27

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT20	5180	13.15	20.65	13±2	2.91	1.95
	5200	12.71	18.66	12±2	2.91	1.95
	5240	12.73	18.75	12±2	2.91	1.95
	5260	12.17	16.48	12±2	3.12	2.05
	5300	12.21	16.63	12±2	3.12	2.05
	5320	12.03	15.96	12±2	3.12	2.05
	5500	12.12	16.29	12±2	4.50	2.82
	5580	11.45	13.96	11±2	4.50	2.82
	5700	11.46	14.00	11±2	4.50	2.82
	5745	12.43	17.50	12±2	3.56	2.27
	5785	12.34	17.14	12±2	3.56	2.27
	5825	12.42	17.46	12±2	3.56	2.27
IEEE 802.11ac VHT20	5180	13.22	20.99	13±2	2.91	1.95
	5200	12.80	19.05	12±2	2.91	1.95
	5240	12.89	19.45	12±2	2.91	1.95
	5260	12.25	16.79	12±2	3.12	2.05
	5300	11.97	15.74	11±2	3.12	2.05
	5320	12.04	16.00	12±2	3.12	2.05
	5500	11.71	14.83	11±2	4.50	2.82
	5580	12.05	16.03	12±2	4.50	2.82
	5700	11.97	15.74	11±2	4.50	2.82
	5745	12.45	17.58	12±2	3.56	2.27
	5785	12.40	17.38	12±2	3.56	2.27
	5825	12.43	17.50	12±2	3.56	2.27

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT40	5190	12.33	17.10	12±2	2.91	1.95
	5230	11.80	15.14	11±2	2.91	1.95
	5270	12.51	17.82	12±2	3.12	2.05
	5310	12.95	19.72	12±2	3.12	2.05
	5510	11.88	15.42	11±2	4.50	2.82
	5670	12.34	17.14	12±2	4.50	2.82
	5755	11.72	14.86	11±2	3.56	2.27
	5795	12.73	18.75	12±2	3.56	2.27
IEEE 802.11ac VHT40	5190	12.35	17.18	12±2	2.91	1.95
	5230	11.70	14.79	11±2	2.91	1.95
	5270	12.77	18.92	12±2	3.12	2.05
	5310	12.54	17.95	12±2	3.12	2.05
	5510	12.21	16.63	12±2	4.50	2.82
	5670	12.10	16.22	12±2	4.50	2.82
	5755	12.01	15.89	12±2	3.56	2.27
	5795	12.57	18.07	12±2	3.56	2.27
IEEE 802.11ac VHT80	5210	11.45	13.96	11±2	2.91	1.95
	5290	12.44	17.54	12±2	3.12	2.05
	5530	12.04	16.00	12±2	4.50	2.82
	5775	11.24	13.30	11±2	3.56	2.27

4、Calculated Worst Result and Limit

4.1 Antenna 0

Mode	Target power（dBm）	Antenna gain		Power Density (S) (mW /cm2)	Limited of Power Density (S) (mW /cm2)	Test Result
		(dBi)	(Linear)			
2.4G Band						
GFSK	7	4.03	2.53	**0.00252**	1	Compiles
8-DPSK	10	4.03	2.53	**0.00503**	1	Compiles
BLE(GFSK 1M)	6	4.03	2.53	**0.00200**	1	Compiles
BLE(GFSK 2M)	6	4.03	2.53	**0.00200**	1	Compiles

4.2 Antenna 1

Mode	Target power（dBm）	Antenna gain		Power Density (S) (mW /cm2)	Limited of Power Density (S) (mW /cm2)	Test Result
		(dBi)	(Linear)			
2.4G Band						
IEEE 802.11b	18	4.10	2.57	**0.03226**	1	Compiles
IEEE 802.11g	13	4.10	2.57	**0.01020**	1	Compiles
IEEE 802.11n HT20	10	4.10	2.57	**0.00511**	1	Compiles
IEEE 802.11n HT40	7	4.10	2.57	**0.00256**	1	Compiles
5G Band						
IEEE 802.11a	16	3.90	2.45	**0.01944**	1	Compiles
IEEE 802.11n HT20	14	3.90	2.45	**0.01227**	1	Compiles
IEEE 802.11ac VHT20	14	3.90	2.45	**0.01227**	1	Compiles
IEEE 802.11n HT40	14	3.90	2.45	**0.01227**	1	Compiles
IEEE 802.11ac VHT40	14	3.90	2.45	**0.01227**	1	Compiles
IEEE 802.11ac VHT80	13	3.90	2.45	**0.00974**	1	Compiles

4.3 Antenna 2

Mode	Target power（dBm）	Antenna gain		Power Density (S) (mW /cm2)	Limited of Power Density (S) (mW /cm2)	Test Result
		(dBi)	(Linear)			
2.4G Band						
IEEE 802.11b	18	3.17	2.07	**0.02605**	1	Compiles
IEEE 802.11g	14	3.17	2.07	**0.01037**	1	Compiles
IEEE 802.11n HT20	11	3.17	2.07	**0.00520**	1	Compiles
IEEE 802.11n HT40	7	3.17	2.07	**0.00207**	1	Compiles
5G Band						
IEEE 802.11a	16	4.50	2.82	**0.02232**	1	Compiles
IEEE 802.11n HT20	14	4.50	2.82	**0.01408**	1	Compiles
IEEE 802.11ac VHT20	14	4.50	2.82	**0.01408**	1	Compiles
IEEE 802.11n HT40	14	4.50	2.82	**0.01408**	1	Compiles
IEEE 802.11ac VHT40	14	4.50	2.82	**0.01408**	1	Compiles
IEEE 802.11ac VHT80	14	4.50	2.82	**0.01408**	1	Compiles

4.4 Antenna 1+2

Mode	Power Density (S) (mW /cm2) Antenna 1	Power Density (S) (mW /cm2) Antenna 2	Power Density (S) (mW /cm2) Total	Limited of Power Density (S) (mW /cm2)	Test Result
2.4G Band					
IEEE 802.11n HT20	0.00511	0.00520	**0.01031**	1	Compiles
IEEE 802.11n HT40	0.00256	0.00207	**0.00463**	1	Compiles
5G Band					
IEEE 802.11n HT20	0.01227	0.01408	**0.02635**	1	Compiles
IEEE 802.11ac VHT20	0.01227	0.01408	**0.02635**	1	Compiles
IEEE 802.11n HT40	0.01227	0.01408	**0.02635**	1	Compiles
IEEE 802.11ac VHT40	0.01227	0.01408	**0.02635**	1	Compiles
IEEE 802.11ac VHT80	0.00974	0.01408	**0.02382**	1	Compiles

Note: 2.4 and 5GHz bands are share an antenna, Cann't both the 2.4 and 5 GHz bands operate simultaneously.