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RF exposure analysis for the equipment FCC ID: PD97260H and PD97260HU; IC: 1000M-7260H

The device (FCC ID: FCC ID: PD97260H and PD97260HU; IC: 1000M-7260H) is designed as module to be installed in and used in a mixed mobile and portable exposure host platform. Portable exposure conditions are evaluated in a separate exhibit. The analysis provided in this document only covers mobile exposure conditions and for that the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all the persons and must not be co-located or operating in conjunction with any other antenna or transmitter except in the conditions described in this document.

MPE exposure limits

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	Power density (mW/cm ²)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100.000	1,0	30

The table below is excerpted from RSS-102, Issue 4, 4.2, titled “RF Limits for Devices used by the General Public”:

Frequency Range (MHz)	Power density (W/m ²)	Averaging time (minutes)
300 – 1500	f (MHz) /150	6
1500 – 100.000	10	6

As all the operating frequencies of this device are higher than 1500 MHz, the applicable maximum permissive exposure is: 1 mW/cm².

Using the equation $S = \frac{PG}{4\pi R^2}$ to calculate the exposure to electromagnetic fields

- where: S = power density (in appropriate units, e.g. mW/cm²)
- P = power input to the antenna (in appropriate units, e.g., mW)
- 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 (appropriate units, e.g., cm)

Compliance with FCC and IC maximum permissive exposure limits is demonstrated based on the following calculations.



1. Standalone operations analysis

DSS GRANT (Bluetooth Basic and EDR)																								
Frequency band (MHz)	Mode	BW (MHz)	Channel / Freq.	Data Rate	CONDUCTED OUTPUT POWER										ANTENNA GAIN									
					SISO Chain A Measured Value (dBm)	SISO Chain A Measured Value (mW)	SISO Chain B Measured Value (dBm)	SISO Chain B Measured Value (mW)	MIMO Chain A Measured Value (dBm)	MIMO Chain A Measured Value (mW)	MIMO Chain B Measured Value (dBm)	MIMO Chain B Measured Value (mW)	MIMO Chain A+B Measured Value (mW)	Worst Case Conducted Output Power (mW)	Antenna gain (dBi)	Antenna gain (numerical)	Duty cycle (%)	Evaluation distance (cm)	Power density (mW/cm ²)	FCC/IC MPE limit (mW/cm ²)	MPE RATIO			
2400-2483,5	Bluetooth BR (Modulation: GFSK)	1	0 / 2402	1 Mbps	n/a	n/a	2.94	1.968	n/a	n/a	n/a	n/a	n/a	1.968	3.24	2.11	100%	20	0.001	1.000	0.001			
			40 / 2441		n/a	n/a	3.64	2.382	n/a	n/a	n/a	n/a	2.382	3.24	2.11	100%	20	0.001	1.000	0.001				
			79 / 2480		n/a	n/a	4.66	2.924	n/a	n/a	n/a	n/a	2.924	3.24	2.11	100%	20	0.002	1.000	0.002				
		0 / 2402	2 Mbps		n/a	n/a	3.02	2.004	n/a	n/a	n/a	n/a	2.004	3.24	2.11	100%	20	0.001	1.000	0.001				
		40 / 2441			n/a	n/a	3.74	2.366	n/a	n/a	n/a	n/a	2.366	3.24	2.11	100%	20	0.001	1.000	0.001				
		79 / 2480			n/a	n/a	4.69	2.944	n/a	n/a	n/a	n/a	2.944	3.24	2.11	100%	20	0.002	1.000	0.002				
	0 / 2402	3 Mbps	n/a	n/a	3.27	2.123	n/a	n/a	n/a	n/a	2.123	3.24	2.11	100%	20	0.001	1.000	0.001						
	40 / 2441		n/a	n/a	4.09	2.564	n/a	n/a	n/a	n/a	2.564	3.24	2.11	100%	20	0.002	1.000	0.002						
	79 / 2480		n/a	n/a	4.87	3.069	n/a	n/a	n/a	n/a	3.069	3.24	2.11	100%	20	0.002	1.000	0.002						
	DTS GRANT (Bluetooth Low Energy operation + WLAN operation in 2400-2483,5 MHz and 5725-5850 MHz frequency bands)																							
	Frequency band (MHz)	Mode	BW (MHz)	Channel / Freq.	Data Rate	CONDUCTED OUTPUT POWER										ANTENNA GAIN								
						SISO Chain A Measured Value (dBm)	SISO Chain A Measured Value (mW)	SISO Chain B Measured Value (dBm)	SISO Chain B Measured Value (mW)	MIMO Chain A Measured Value (dBm)	MIMO Chain A Measured Value (mW)	MIMO Chain B Measured Value (dBm)	MIMO Chain B Measured Value (mW)	MIMO Chain A+B Measured Value (mW)	Worst Case Conducted Output Power (mW)	Antenna gain (dBi)	Antenna gain (numerical)	Duty cycle (%)	Evaluation distance (cm)	Power density (mW/cm ²)	FCC/IC MPE limit (mW/cm ²)	MPE RATIO		
2400-2483,5	Bluetooth Low Energy (Modulation: GFSK)	1	0 / 2402	200 kbps	n/a	n/a	2.83	1.919	n/a	n/a	n/a	n/a	n/a	1.919	3.24	2.11	100%	20	0.001	1.000	0.001			
			40 / 2441		n/a	n/a	3.64	2.312	n/a	n/a	n/a	n/a	2.312	3.24	2.11	100%	20	0.001	1.000	0.001				
			79 / 2480		n/a	n/a	4.54	2.844	n/a	n/a	n/a	n/a	2.844	3.24	2.11	100%	20	0.002	1.000	0.002				
2400-2483,5	802.11b	20	1 / 2412	1 Mbps	18.61	0.073	17.64	58.076	n/a	n/a	n/a	n/a	n/a	58.076	3.24	2.11	100%	20	0.025	1.000	0.025			
			6 / 2437		19.17	0.083	17.62	57.810	n/a	n/a	n/a	n/a	57.810	3.24	2.11	100%	20	0.025	1.000	0.025				
			11 / 2462		18.95	0.079	17.84	60.814	n/a	n/a	n/a	n/a	60.814	3.24	2.11	100%	20	0.026	1.000	0.026				
		1 / 2412	6 Mbps		22.09	0.162	21.34	136.144	n/a	n/a	n/a	n/a	136.144	3.24	2.11	100%	20	0.058	1.000	0.058				
		6 / 2437			25.66	0.368	24.59	287.740	n/a	n/a	n/a	n/a	287.740	3.24	2.11	100%	20	0.121	1.000	0.121				
		11 / 2462			23.24	0.211	23.47	222.331	n/a	n/a	n/a	n/a	222.331	3.24	2.11	100%	20	0.094	1.000	0.094				
	1 / 2412	HT4	23.29	0.213	21.59	144.212	22.50	177.828	21.67	146.893	324.721	3.24	2.11	100%	20	0.137	1.000	0.137						
	6 / 2437		26.01	0.399	24.83	304.089	23.14	206.063	22.80	190.546	396.609	3.24	2.11	100%	20	0.167	1.000	0.167						
	11 / 2462		23.36	0.217	23.45	221.308	22.95	187.242	22.62	182.810	380.052	3.24	2.11	100%	20	0.16	1.000	0.16						
	5725-5850	802.11g	20	3 / 2422	6 Mbps	22.70	0.186	23.59	113.937	18.87	71.090	18.78	75.508	152.600	152.600	3.24	2.11	100%	20	0.065	1.000	0.065		
				6 / 2437		23.24	0.211	23.47	222.331	n/a	n/a	n/a	n/a	222.331	3.24	2.11	100%	20	0.094	1.000	0.094			
				11 / 2462		23.29	0.213	21.59	144.212	22.50	177.828	21.67	146.893	324.721	3.24	2.11	100%	20	0.137	1.000	0.137			
6 / 2437			HT4	26.01		0.399	24.83	304.089	23.14	206.063	22.80	190.546	396.609	3.24	2.11	100%	20	0.167	1.000	0.167				
11 / 2462				23.36		0.217	23.45	221.308	22.95	187.242	22.62	182.810	380.052	3.24	2.11	100%	20	0.16	1.000	0.16				
3 / 2422				22.70		0.186	23.59	113.937	18.87	71.090	18.78	75.508	152.600	152.600	3.24	2.11	100%	20	0.065	1.000	0.065			
5725-5850		802.11n	20	6 / 2437	HT4	26.78	0.476	23.95	248.313	23.53	192.424	22.79	190.108	415.532	415.532	3.24	2.11	100%	20	0.175	1.000	0.175		
				9 / 2452		23.87	0.244	23.28	212.814	22.30	169.824	21.98	157.761	327.585	3.24	2.11	100%	20	0.138	1.000	0.138			
				149 / 5745		25.33	0.341	25.07	321.366	n/a	n/a	n/a	n/a	321.366	4.97	3.14	100%	20	0.201	1.000	0.201			
			157 / 5785	24.58		0.287	24.93	311.172	n/a	n/a	n/a	n/a	311.172	4.97	3.14	100%	20	0.195	1.000	0.195				
			165 / 5825	26.13		0.410	25.65	367.282	n/a	n/a	n/a	n/a	367.282	4.97	3.14	100%	20	0.23	1.000	0.23				
			149 / 5745	25.55		0.359	25.44	349.945	24.36	272.898	23.18	207.970	480.867	4.97	3.14	100%	20	0.301	1.000	0.301				
	802.11n	20	157 / 5785	HT4	25.73	0.374	25.67	368.978	24.35	272.270	23.29	213.304	485.575	4.97	3.14	100%	20	0.304	1.000	0.304				
			165 / 5825		25.66	0.368	25.96	394.457	23.72	235.505	23.31	214.289	449.794	4.97	3.14	100%	20	0.282	1.000	0.282				
			151 / 5755		25.54	0.358	25.94	392.645	24.88	307.610	23.33	215.278	522.888	4.97	3.14	100%	20	0.327	1.000	0.327				
		159 / 5795	25.55		0.359	26.06	403.845	23.56	226.986	23.41	219.280	446.267	4.97	3.14	100%	20	0.279	1.000	0.279					
		802.11ac	80		165 / 5775	VHT6	23.25	0.211	23.34	215.774	24.51	282.488	23.47	222.331	504.819	504.819	4.97	3.14	100%	20	0.316	1.000	0.316	
		U-NII GRANT (WLAN operation in 5150-5250 MHz, 5250-5350 MHz, 5470-5725 and 5725-5825 MHz frequency bands)																						
Frequency band (MHz)	Mode	BW (MHz)	Channel / Freq.	Data Rate	CONDUCTED OUTPUT POWER										ANTENNA GAIN									
					SISO Chain A Measured Value (dBm)	SISO Chain A Measured Value (mW)	SISO Chain B Measured Value (dBm)	SISO Chain B Measured Value (mW)	MIMO Chain A Measured Value (dBm)	MIMO Chain A Measured Value (mW)	MIMO Chain B Measured Value (dBm)	MIMO Chain B Measured Value (mW)	MIMO Chain A+B Measured Value (mW)	Worst Case Conducted Output Power (mW)	Antenna gain (dBi)	Antenna gain (numerical)	Duty cycle (%)	Evaluation distance (cm)	Power density (mW/cm ²)	FCC/IC MPE limit (mW/cm ²)	MPE RATIO			
5150-5250	802.11a	20	36 / 5180	6 Mbps	14.24	0.027	11.69	14.757	n/a	n/a	n/a	n/a	n/a	14.757	3.64	2.31	100%	20	0.007	1.000	0.007			
			40 / 5200		14.84	0.030	15.07	32.137	n/a	n/a	n/a	n/a	32.137	3.64	2.31	100%	20	0.015	1.000	0.015				
			48 / 5240		14.91	0.031	14.92	31.046	n/a	n/a	n/a	n/a	31.046	3.64	2.31	100%	20	0.015	1.000	0.015				
		36 / 5180	HT4		13.59	0.023	12.24	16.749	11.73	14.894	10.23	10.544	25.437	3.64	2.31	100%	20	0.012	1.000	0.012				
		40 / 5200			14.99	0.032	15.05	31.989	11.91	15.524	11.82	15.205	30.729	3.64	2.31	100%	20	0.015	1.000	0.015				
		48 / 5240			15.10	0.032	15.08	32.063	12.09	16.181	12.16	16.444	32.625	3.64	2.31	100%	20	0.016	1.000	0.016				
	802.11n	40	38 / 5190	HT4	8.21	0.007	8.79	7.568	7.40	5.495	7.12	5.152	10.648	10.648	3.64	2.31	100%	20	0.005	1.000	0.005			
			46 / 5230		15.65	0.037	15.01	31.696	11.74	14.928	12.13	16.331	31.258	3.64	2.31	100%	20	0.015	1.000	0.015				
			802.11ac		80	42 / 5210	VHT6	6.89	0.005	7.79	6.012	5.47	3.524	5.64	3.664	7.188	7.188	3.64	2.31	100%	20	0.004	1.000	0.004
		5250-5350	802.11a		20	52 / 5260	6 Mbps	12.96	0.020	13.07	20.277	n/a	n/a	n/a	n/a	n/a	20.277	3.73	2.36	100%	20	0.01	1.000	0.01
						60 / 5300		14.71	0.030	16.18	41.495	n/a	n/a	n/a	n/a	41.495	3.73	2.36	100%	20	0.02	1.000	0.02	
						64 / 5320		11.93	0.016	11.93	15.596	n/a	n/a	n/a	n/a	15.596	3.73	2.36	100%	20	0.008	1.000	0.008	
52 / 5260	HT4			12.96	0.020	12.97		19.815	10.47	11.143	10.93	12.388	23.531	3.73	2.36	100%	20	0.012	1.000	0.012				
60 / 5300				14.70	0.030	15.01		31.696	11.74	14.928	12.13	16.331	31.258	3.73	2.36	100%	20	0.015	1.000	0.015				
64 / 5320				11.89	0.015	12.36		17.219	9.90	9.772	10.27	10.641	20.414	3.73	2.36	100%	20	0.01	1.000	0.01				
802.11n	40		54 / 5270	HT4	8.85	0.008	9.62	9.162	7.69	5.875	7.46	5.572	11.447	11.447	3.73	2.36	100%	20	0.006	1.000	0.006			
			62 / 5310		9.97	0.010	10.19	10.447	7.90	6.166	7.76	5.970	12.136	12.136	3.73	2.36	100%	20	0.006	1.000	0.006			
			802.11ac		80	58 / 5290	VHT6	9.87	0.010	10.28	10.666	7.11	5.140	6.97	4.977	10.118	10.666	3.73	2.36	100%	20	0.006		



2. Co-location analysis

2.1. Co-location with other transmitter in mobile exposure conditions

According to KDB 447498 D01 General RF Exposure Guidance v05, 7.2:

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 calculated or measured field strengths or power density, is ≤ 1.0 .

As the maximum calculated MPE ratio for the device is 0,327, the product can be co-located with other antennas providing that the sum of the MPE ratios for all the other simultaneous transmitting antennas incorporated in a host device, based on calculated or measured field strengths or power density is $\leq 1.0 - 0,327 = 0,673$.

2.2. Co-location with other transmitter in mixed mobile and portable host platform exposure conditions

According to KDB 447498 D01 General RF Exposure Guidance v05, 7.2:

When one of the following test exclusion conditions is satisfied for all combinations of simultaneous transmission configurations, further equipment approval is not required to incorporate transmitter modules in host devices that operate in the mixed mobile and portable host platform exposure conditions. The grantee is responsible for documenting this according to Class I permissive change requirements. Antennas that qualify for standalone SAR test exclusion must apply the estimated standalone SAR to determine simultaneous transmission test exclusion.

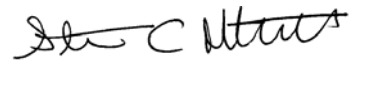
- *The $[\sum$ of (the highest measured or estimated SAR for each standalone antenna configuration, adjusted for maximum tune-up tolerance) / 1.6 W/kg] + $[\sum$ of MPE ratios] is ≤ 1.0 .*
- *The SAR to peak location separation ratios of all simultaneous transmitting antenna pairs operating in portable exposure conditions are all ≤ 0.04 and the $[\sum$ of MPE ratios] is ≤ 1.0 .*

As the maximum calculated MPE ratio for the device is 0,327, the equipment can be co-located with other transmitters in a mixed mobile and portable conditions providing that the exposure of the co-located transmitter complies with:

- The $[\sum$ of (the highest measured or estimated SAR for each standalone antenna configuration, adjusted for maximum tune-up tolerance) / 1.6 W/kg] + $[\sum$ of MPE ratios] is $\leq 1.0 - 0,327 = 0,673$
- OR**
- The SAR to peak location separation ratios of all simultaneous transmitting antenna pairs operating in portable exposure conditions are all ≤ 0.04 and the $[\sum$ of MPE ratios] is $\leq 1.0 - 0,327 = 0,673$

Sincerely,

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 (Signature)