

Maximum Permissible Exposure Evaluation

FCC ID: M82-PCMUR02

1. Client Information

Applicant	:	Advantech Co., LTD.
Address	:	No. 1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114 Taiwan
Manufacturer	:	RYD Electronic Technology Co., Ltd
Address	:	16/F, building 18, No.68, Taidong Road, Siming District, Xiamen City, Fujian Province.China.

2. General Description of EUT

EUT Name	:	PCM-UR02
Model(s) No.	:	PCM-UR02, PCM-UR03
Model Difference	:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is model name.
Product Description	:	Operation Frequency: Bluetooth V5.0: 2402MHz~2480MHz 802.11b/g/n(HT20): 2412MHz~2462MHz 802.11n(HT40): 2422MHz~2452MHz U-NII-1: 5180MHz~5240MHz U-NII-2A: 5260MHz~5320MHz U-NII-2C: 5500MHz~5700MHz U-NII-3: 5745MHz~5825MHz
	:	RF Output Power: BT: 6.75dBm (Max) BLE: 5.16dBm (Max) 2.4G WiFi: 17.79dBm (Max) 5G WiFi: 17.89dBm (Max)
	:	Antenna Gain: 1.26dBi PIFA Antenna For 2.4GWIFI&BT 0.74dBi PIFA Antenna For 5GWIFI
Power Supply	:	For adapter: Input: AC 100V-240V, 1A 50/60Hz Output: DC 12V, 3A
Software Version	:	usc_130_160_R1_20210707
Hardware Version	:	PCM-UR02 01-2
Remark: The antenna gain provided by the applicant, the adapter and verified for the RF conduction test and adapter provided by TOBY test lab.		

Note: More test information about the EUT please refer the RF Test Report.

MPE Calculations for WIFI

1. Antenna Gain:

2.4GWIFI&BT PIFA Antenna:1.26dBi.

5GWIFI PIFA Antenna:1.26dBi

2. EUT Operation Condition:

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

3. Exposure Evaluation:

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 the 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

4. Test Result:

Worst Maximum MPE Result								
Bluetooth								
Mode	N _{TX}	Freq. (MHz)	Conducted Power(max) (dBm)	Turn-up Power (dB)	Max tune up power (dBm) [P]	ANT Gain (dBi) [G]	Distance (cm) [R]	Power Density (mW/ cm ²) [S]
GFSK	1	2402	5.79	6±1	7	1.26	20	0.0013
		2441	6.31	6±1	7	1.26	20	0.0013
		2480	6.75	7±1	8	1.26	20	0.0017
π/4-DQPSK	1	2402	4.75	5±1	6	1.26	20	0.0011
		2441	5.11	5±1	6	1.26	20	0.0011
		2480	5.42	5±1	6	1.26	20	0.0011
8-DPSK	1	2402	5.27	5±1	6	1.26	20	0.0011
		2441	5.4	5±1	6	1.26	20	0.0011
		2480	5.58	6±1	7	1.26	20	0.0013

BLE								
1Mbps	1	2402	4.71	5 ± 1	6	1.26	20	0.0011
	1	2440	5.01	5 ± 1	6	1.26	20	0.0011
	1	2480	5.14	5 ± 1	6	1.26	20	0.0011
2Mbps	1	2402	4.8	5 ± 1	6	1.26	20	0.0011
	1	2440	5.01	5 ± 1	6	1.26	20	0.0011
	1	2480	5.16	5 ± 1	6	1.26	20	0.0011
2.4G WiFi								
802.11b	1	2412	17.60	18 ± 1	19	1.26	20	0.0211
	1	2437	17.81	18 ± 1	19	1.26	20	0.0211
	1	2462	17.96	18 ± 1	19	1.26	20	0.0211
802.11g	1	2412	17.04	17 ± 1	18	1.26	20	0.0168
	1	2437	17.40	17 ± 1	18	1.26	20	0.0168
	1	2462	17.54	18 ± 1	19	1.26	20	0.0211
802.11n20	1	2412	17.92	18 ± 1	19	1.26	20	0.0211
	1	2437	17.00	17 ± 1	18	1.26	20	0.0168
	1	2462	17.15	17 ± 1	18	1.26	20	0.0168
802.11n40	1	2422	17.21	17 ± 1	18	1.26	20	0.0168
	1	2437	17.26	17 ± 1	18	1.26	20	0.0168
	1	2452	17.41	17 ± 1	18	1.26	20	0.0168
5G WiFi								
11A	1	5180	17.08	17 ± 1	18	0.74	20	0.0149
	1	5200	17.15	17 ± 1	18	0.74	20	0.0149
	1	5240	17.06	17 ± 1	18	0.74	20	0.0149
	1	5260	17.11	17 ± 1	18	0.74	20	0.0149
	1	5280	16.73	17 ± 1	18	0.74	20	0.0149
	1	5320	16.24	16 ± 1	17	0.74	20	0.0118
	1	5500	16.15	16 ± 1	17	0.74	20	0.0118
	1	5580	16.31	16 ± 1	17	0.74	20	0.0118
	1	5700	16.59	17 ± 1	18	0.74	20	0.0149

	1	5745	17.01	17±1	18	0.74	20	0.0149
	1	5785	17.34	17±1	18	0.74	20	0.0149
	1	5825	17.56	18±1	19	0.74	20	0.0187
11N20	1	5180	17.16	17±1	18	0.74	20	0.0149
	1	5200	17.30	17±1	18	0.74	20	0.0149
	1	5240	17.17	17±1	18	0.74	20	0.0149
	1	5260	17.16	17±1	18	0.74	20	0.0149
	1	5280	16.88	17±1	18	0.74	20	0.0149
	1	5320	16.47	16±1	17	0.74	20	0.0118
	1	5500	17.48	17±1	18	0.74	20	0.0149
	1	5580	17.63	18±1	19	0.74	20	0.0187
	1	5700	16.48	16±1	17	0.74	20	0.0118
	1	5745	16.99	17±1	18	0.74	20	0.0149
	1	5785	17.13	17±1	18	0.74	20	0.0149
	1	5825	17.38	17±1	18	0.74	20	0.0149
11N40	1	5190	17.84	18±1	19	0.74	20	0.0187
	1	5230	17.82	18±1	19	0.74	20	0.0187
	1	5270	17.67	18±1	19	0.74	20	0.0187
	1	5310	17.22	17±1	18	0.74	20	0.0149
	1	5510	16.79	17±1	18	0.74	20	0.0149
	1	5550	17.69	18±1	19	0.74	20	0.0187
	1	5670	16.44	16±1	17	0.74	20	0.0133
	1	5755	16.99	17±1	18	0.74	20	0.0168
	1	5795	17.22	17±1	18	0.74	20	0.0118
11AC20	1	5180	16.26	16±1	17	0.74	20	0.0118
	1	5200	16.42	16±1	17	0.74	20	0.0118
	1	5240	16.50	17±1	18	0.74	20	0.0149
	1	5260	16.43	16±1	17	0.74	20	0.0118
	1	5280	17.89	18±1	19	0.74	20	0.0187

	1	5320	17.32	17±1	18	0.74	20	0.0149
	1	5500	17.07	17±1	18	0.74	20	0.0149
	1	5580	17.18	17±1	18	0.74	20	0.0149
	1	5700	17.85	18±1	19	0.74	20	0.0187
	1	5745	16.59	17±1	18	0.74	20	0.0149
	1	5785	17.42	17±1	18	0.74	20	0.0149
	1	5825	17.52	18±1	19	0.74	20	0.0187
11AC40	1	5190	17.69	18±1	19	0.74	20	0.0187
	1	5230	17.73	18±1	19	0.74	20	0.0187
	1	5270	17.47	17±1	18	0.74	20	0.0149
	1	5310	17.06	17±1	18	0.74	20	0.0149
	1	5510	17.54	18±1	19	0.74	20	0.0187
	1	5550	17.58	18±1	19	0.74	20	0.0187
	1	5670	17.00	17±1	18	0.74	20	0.0149
	1	5755	17.44	17±1	18	0.74	20	0.0149
	1	5795	17.76	18±1	19	0.74	20	0.0187
	1	5210	17.86	18±1	19	0.74	20	0.0187
11AC80	1	5290	17.51	18±1	19	0.74	20	0.0187
	1	5530	17.38	17±1	18	0.74	20	0.0149
	1	5610	16.70	17±1	18	0.74	20	0.0149
	1	5775	16.95	17±1	18	0.74	20	0.01498
	1	5775	16.95	17±1	18	0.74	20	0.01498

Note:

(1) N_{TX}= Number of Transmit Antennas

(2) RF Output power specifies that Maximum Conducted Peak Output Power.

5. Conclusion:

As specified in Table 1B of 47 CFR 1.1310- Limits for Maximum Permissible Exposure (MPE),

Limits for General Population/ Uncontrolled Exposure

Frequency Range (MHz)	Power density (mW/ cm ²)
300-1,500	F/1500
1,500-100,000	1.0

For BT&BLE&2.4GWIFI&5GWIFI

MPE limit S: 1mW/ cm²

The MPE is calculated as $0.0211 \text{ mW} / \text{cm}^2 < \text{limit } 1 \text{mW} / \text{cm}^2$. So, RF exposure limit warning or SAR test are not required.

The EUT will only be used with a separation of 20cm or greater between the antenna and nearby persons and can therefore be considered a mobile transmitter per 47 CFR2.1091 (b).

The RF Exposure Information page from the manual is included here for reference.

Note

For a more detailed features description, please refer to the RF Test Report.

6. Conclusion:

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

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