

Maximum Permissible Exposure Evaluation

FCC ID: 2AWNK-TR100 & IC: 25047-TR100

1. Client Information

Applicant	:	Shenzhen Apeman Innovations Technology Co.,Ltd.
Address	:	1808, Heng Lu E Times Building, No. 159, North Pingji Road, Hehua Community, Pinghu Street, Longgang District, Shenzhen, Guangdong, CHINA
Manufacturer	:	Shenzhen Apeman Innovations Technology Co.,Ltd.
Address	:	1808, Heng Lu E Times Building, No. 159, North Pingji Road, Hehua Community, Pinghu Street, Longgang District, Shenzhen, Guangdong, CHINA

2. General Description of EUT

EUT Name	:	Teckin Roll
HVIN/Models No.	:	TR100, TR200, TR300, TR400, TR500
Model Different	:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is appearance.
Sample ID	:	20201216-10-1#& 20201216-10-2#
Product Description	Operation Frequency:	802.11b/g/n(HT20): 2412MHz~2462MHz 802.11n(HT40): 2422MHz~2452MHz
	Antenna Gain:	4.53dBi FPC Antenna
	Modulation Type:	802.11b: DSSS(CCK, DQPSK, DBPSK) 802.11g/n:OFDM(BPSK,QPSK,16QAM,64QAM)
Power Rating	:	DC 5V from Adapter(TPA-46050100UU): Input: AC 100-240V, 50/60Hz 0.15A Output: DC 5V, 1000mA
Software Version	:	20201208_V1.0.4
Hardware Version	:	TI01_MB_V1.1
Remark	:	The adapter and antenna gain provided by the applicant, the verified for the RF conduction test provided by TOBY test lab.

TB-RF-075-1.0

Method Of Measurement for FCC

1. Antenna Gain:

FPC Antenna: 4.53dBi.

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								
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]
802.11b	1	2412	13.48	14±1	15	4.53	20	0.0179
		2437	13.95	14±1	15	4.53	20	0.0179
		2462	13.68	14±1	15	4.53	20	0.0179
802.11g	1	2412	13.78	14±1	15	4.53	20	0.0179
		2437	14.15	14±1	15	4.53	20	0.0179
		2462	14.13	14±1	15	4.53	20	0.0179
802.11n (HT20)	1	2412	13.81	14±1	15	4.53	20	0.0179
		2437	14.12	14±1	15	4.53	20	0.0179
		2462	14.02	14±1	15	4.53	20	0.0179
802.11n (HT40)	1	2422	13.64	14±1	15	4.53	20	0.0179
		2437	13.53	14±1	15	4.53	20	0.0179
		2452	13.39	14±1	15	4.53	20	0.0179

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:2412~2462 MHz

MPE limit S: 1mW/ cm²

The MPE is calculated as $0.0179\text{mW} / \text{cm}^2 < \text{limit } 1\text{mW} / \text{cm}^2$. 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.

Method Of Measurement for IC

1. Applicable Standard

[Radio Standards Specification 102](#), Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands), sets out the requirements and measurement techniques used to evaluate radio frequency (RF) exposure compliance of radio communication apparatus designed to be used within the vicinity of the human body.

[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.

2. Evaluation Method and Limit

Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

Frequency Band	f (MHz)	E.I.R.P. (W)
2.4G WLAN	2412	2.684
Note: Limit= $1.31 \times 10^{-2} f^{0.6834}$ (where f is in MHz). The f in the limit is the frequency of the lowest Channel.		

3. Evaluation Results

Standalone MPE Evaluation:

[2.4GHz WLAN]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)	Tolerance \pm (dB)	Turn-up Power Tolerance (dB)
IEEE 802.11b	1	2412	13.48	1.0	14 \pm 1
	6	2437	13.95	1.0	14 \pm 1
	11	2462	13.68	1.0	14 \pm 1
IEEE 802.11g	1	2412	13.78	1.0	14 \pm 1
	6	2437	14.15	1.0	14 \pm 1
	11	2462	14.13	1.0	14 \pm 1
IEEE 802.11n HT20	1	2412	13.81	1.0	14 \pm 1
	6	2437	14.12	1.0	14 \pm 1
	11	2462	14.02	1.0	14 \pm 1
IEEE 802.11n HT40	3	2422	13.64	1.0	14 \pm 1
	6	24	13.53	1.0	14 \pm 1
	9	2452	13.39	1.0	14 \pm 1

2.4GHz WLAN

Modulation Type	Output power (Turn-up Procedure)	Antenna Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)	E.I.R.P. Limit (W)
	dBm				
IEEE 802.11b	15	4.53	19.53	0.090	2.684
IEEE 802.11g	15	4.53	19.53	0.090	2.684
IEEE 802.11n HT20	15	4.53	19.53	0.090	2.684
IEEE 802.11n HT40	15	4.53	19.53	0.090	2.684

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.

Note

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

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