Maximum Permissible Exposure Evaluation

FCC ID: 2BGCH-SMKG-1KNL-W

1. Client Information

Applicant	:	Yueqing Yizhao Tuohua Electric Technology Co., Ltd
Address	:	No. 41, 43 Jianshe East Road, Liushi Town, Yueqing City, Wenzhou City, Zhejiang Province, China
Manufacturer	:	Yueqing Yizhao Tuohua Electric Technology Co., Ltd
Address	:	No. 41, 43 Jianshe East Road, Liushi Town, Yueqing City, Wenzhou City, Zhejiang Province, China

2. General Description of EUT

EUT Name		smart circuit breaker	
Models No.		SMKG-1KNL-EU-W, SMKG-1KNL-EU-N, SMKG-1KNL-EU-Z, SMKG-1KNL-EU-M, SMKG-1KNL-K, SMKG-2KNL-K, SMKG-3KNL-K, SMKG-4KNL-K	
Model Different		All these models are identical in the same PCB, layout and electrical circuit, the only difference is appearance and model name.	
Product Description	:	Operation Frequency:	802.11b/g/n(HT20): 2412MHz~2462MHz 802.11n(HT40): 2422MHz-2452MHz
		Antenna Gain:	0.04dBi PCB Antenna
Power Rating	:	AC 120V/60Hz	
Software Version	:	V1.0	
Hardware Version	:	V3.0	
Connecting I/O Port(S)	:	Please refer to the User's Manual	
Remark	:	the evaluation report used the EUT(HC-C-202404-0111-01-01-2#).	

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Method of Measurement for FCC

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

2. **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

3. **Simultaneous transmission MPE Considerations**
   According to KDB447498: All transmitters and antennas in the host must be either evaluated for MPE compliance, by measurement or computational modeling, or qualify for the standalone MPE test exclusion in section 7.1. 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 modeled or measured field strengths or power density, is ≤ 1.0.
   This means that:
   ∑ of MPE ratios ≤ 1.0

4. Test Result:

2.4G WiFi 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	15.76	15±1	16	0.04	20	0.00799
		2437	15.56	15±1	16	0.04	20	0.00799
		2462	15.06	15±1	16	0.04	20	0.00799
802.11g	1	2412	14.47	14±1	15	0.04	20	0.00635
		2437	14.19	14±1	15	0.04	20	0.00635
		2462	13.65	13±1	14	0.04	20	0.00504
802.11n (HT20)	1	2412	14.27	14±1	15	0.04	20	0.00635
		2437	14.00	14±1	15	0.04	20	0.00635
		2462	14.08	14±1	15	0.04	20	0.00635
802.11n (HT40)	1	2422	12.02	12±1	13	0.04	20	0.00400
		2437	13.23	13±1	14	0.04	20	0.00504
		2452	11.90	11±1	12	0.04	20	0.00318

Note:
N_{TX}= Number of Transmit Antennas
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 2.4G WIFI: 2412~2462MHz
MPE limit S: $1mW/ cm^2$
The worst MPE is calculated as ***0.00799mW/cm2 < limit 1mW/cm²***. 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.

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

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

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