FCC RF Exposure Evaluation

1. Product Information

FCC ID	2ADXC18WMN388
Product name	Wireless Extender
Model number	LKV388mini, LKV388Typec-s, LKV388miniDP, LKV388mini-N
Model Declaration	PCB board, structure and internal of these model(s) are the same, Only model name is different for these models.
Test Model	LKV388mini
Power supply	Input: DC 5V/1A
Modulation Type	IEEE 802.11a/n/ac: OFDM(64QAM, 16QAM, QPSK, BPSK)
Antenna Type	PIFA Antenna
Antenna Gain	2.00 dBi
Hardware version	V1.0
Software version	V1.0
Frequency Range	5180 – 5240 MHz / 5745 – 5825 MHz
Channel Number	4 channels for 20MHz bandwidth (5180 – 5240 MHz) 2 channels for 40MHz bandwidth (5190 – 5230 MHz) 1 channels for 80MHz bandwidth (5210MHz) 5 channels for 20MHz bandwidth (5745 – 5825 MHz) 2 channels for 40MHz bandwidth (5755 – 5795 MHz) 1 channels for 80MHz bandwidth (5775MHz)
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Portable Device

2. Evaluation Method and Limit

According to KDB447498 D01 General RF Exposure Guidance v06 Section 4.3.1 Standalone SAR test exclusion considerations: “Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition, listed below, is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.22 The minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander (see 5) of section 4.1). To qualify for SAR test exclusion, the test separation distances applied must be fully explained and justified by the operating configurations and exposure conditions of the transmitter and applicable host platform requirements, typically in the SAR measurement or SAR analysis report, according to the required published RF exposure KDB procedures. When no other RF exposure testing or reporting is required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for the SAR test exclusion. When required, the device specific conditions described in the other published RF exposure KDB procedures must be satisfied before applying these SAR test exclusion provisions; for example, handheld PTT two-way radios, handsets, laptops & tablets etc. “

[(max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm)] · [√f (GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where:

- f (GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and

for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to f) in section 4.1 is applied to determine SAR test exclusion.

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.

a) The [∑ of (the highest measured or estimated SAR for each standalone antenna configuration, adjusted for maximum tune-up tolerance) / 1.6 W/kg] + [∑ of MPE ratios] is ≤ 1.0.

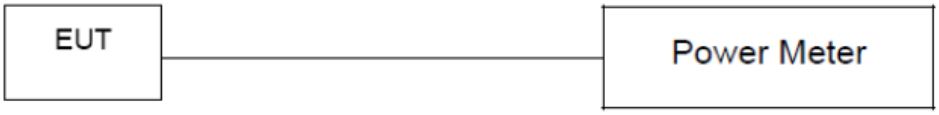
b) The SAR to peak location separation ratios of all simultaneously transmitting antenna pairs operating in portable device exposure conditions are all ≤ 0.04, and the [∑ of MPE ratios] is ≤ 1.0.

3. Refer Evaluation Method

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.
FCC CFR 47 part1 1.1310: Radiofrequency radiation exposure limits.
FCC CFR 47 part2 2.1093: Radiofrequency radiation exposure evaluation: portable devices

4. Conducted Power Results

4.1 Test Setup Block Diagram



4.2 Test Equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	R&S	NRVS	100444	2019-06-15
2	Power Sensor	R&S	NRV-Z32	10057	2019-06-15

Remark: all calibration period of equipment list is one year.

4.3 Test Procedure

a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram Test Setup;

b. Setup EUT work at duty cycle more than 98%;

c. Read power sensor values in RMS detector;

[5GWLAN Band 1 and Band 3]

Mode	Channel	Frequency (MHz)	Average Conducted Output Power (dBm)
IEEE 802.11a	36	5180	7.61
	40	5200	7.95
	48	5240	7.73
	149	5745	6.69
	157	5785	6.73
	165	5825	6.76
IEEE 802.11n HT20	36	5180	7.53
	40	5200	7.19
	48	5240	7.05
	149	5745	6.71
	157	5785	6.42
	165	5825	6.55
IEEE 802.11ac VHT20	36	5180	7.03
	40	5200	6.89
	48	5240	6.71
	149	5745	6.96
	157	5785	6.77
	165	5825	6.84
IEEE 802.11n HT40	38	5190	7.37
	46	5230	7.11
	151	5755	6.89
	159	5795	6.84
IEEE 802.11ac VHT40	38	5190	7.32
	46	5230	7.08
	151	5755	6.81
	159	5795	6.97
IEEE 802.11ac VHT80	42	5210	5.89
	155	5775	6.24

5. Manufacturing Tolerance

<5GWLAN Band 1>

IEEE 802.11a (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	7.0	7.0	7.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	7.0	7.0	7.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11ac VHT20 (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	7.0	7.0	7.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Average)			
Channel	Channel 38	-/-	Channel 46
Target (dBm)	7.0	-/-	7.0
Tolerance ±(dB)	1.0	-/-	1.0
IEEE 802.11ac VHT40 (Average)			
Channel	Channel 38	-/-	Channel 46
Target (dBm)	7.0	-/-	7.0
Tolerance ±(dB)	1.0	-/-	1.0
IEEE 802.11ac VHT80 (Average)			
Channel	-/-	Channel 42	-/-
Target (dBm)	-/-	6.0	-/-
Tolerance ±(dB)	-/-	1.0	-/-

<5GWLAN Band 3>

IEEE 802.11a (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	6.8	6.8	6.8
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	6.8	6.8	6.8
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11ac VHT20 (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	6.8	6.8	6.8
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Average)			
Channel	Channel 151	-/-	Channel 159
Target (dBm)	6.8	-/-	6.8
Tolerance ±(dB)	1.0	-/-	1.0
IEEE 802.11ac VHT40 (Average)			
Channel	Channel 151	-/-	Channel 159
Target (dBm)	6.8	-/-	6.8
Tolerance ±(dB)	1.0	-/-	1.0
IEEE 802.11ac VHT80 (Average)			
Channel	-/-	Channel 155	-/-
Target (dBm)	-/-	6.8	-/-
Tolerance ±(dB)	-/-	1.0	-/-

6. Evaluation Results

6.1 Standalone Evaluation

Band/Mode	f (GHz)	Antenna Distance (mm)	RF output power		SAR Test Exclusion Threshold	SAR Test Exclusion
			dBm	mW		
IEEE 802.11a	5.25	5	8.00	6.3096	2.9 < 3.0	Yes
	5.85	5	7.80	6.0256	2.9 < 3.0	Yes
IEEE 802.11n HT20	5.25	5	8.00	6.3096	2.9 < 3.0	Yes
	5.85	5	7.80	6.0256	2.9 < 3.0	Yes
IEEE 802.11ac VHT20	5.25	5	8.00	6.3096	2.9 < 3.0	Yes
	5.85	5	7.80	6.0256	2.9 < 3.0	Yes
IEEE 802.11n HT40	5.25	5	8.00	6.3096	2.9 < 3.0	Yes
	5.85	5	7.80	6.0256	2.9 < 3.0	Yes
IEEE 802.11ac VHT40	5.25	5	8.00	6.3096	2.9 < 3.0	Yes
	5.85	5	7.80	6.0256	2.9 < 3.0	Yes
IEEE 802.11ac VHT80	5.25	5	7.00	5.0119	2.3 < 3.0	Yes
	5.85	5	7.80	6.0256	2.9 < 3.0	Yes

Remark:

1. Output power including tune up tolerance;

2. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to f) in section 4.1 is applied to determine SAR test exclusion.

6.2 Simultaneous Transmission for SAR Exclusion

The sample support one WLAN modular and one antenna, No need consider simultaneous transmission;

7. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1093 for the uncontrolled RF Exposure and SAR Exclusion Threshold per KDB 447498 v06.

.....THE END OF REPORT.....