



RF Exposure Evaluation

FCC ID: 2A9PI-L2120V1

1. Client Information

Applicant	:	SHENZHEN XGRIDS-INNOVATION CO., LTD
Address	:	2207, SHENZHEN OVERSEAS STUDENTS INCUBATOR PARK, BUILDING 1, SHENZHEN, CHINA
Manufacturer	:	SHENZHEN XGRIDS-INNOVATION CO., LTD
Address	:	2207, HENZHEN OVERSEAS STUDENTS INCUBATOR PARK, BUILDING 1, SHENZHEN, CHINA

2. General Description of EUT

EUT Name	:	Lixel L2 120 V1
Model(s) No.	:	Lixel, L2 120 V1
Model Difference	:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is the model names.
Product Description	Operation Frequency:	Bluetooth&LE:2402MHz~2480MHz 2.4GWiFi:2412MHz~2462MHz U-NII-1: 5180MHz~5240MHz U-NII-3: 5745MHz~5825MHz
	Antenna Gain:	-0.69dBi FPC Antenna for 2400~2500MHz 0.75dBi FPC Antenna for U-NII-1 5180MHz~5240MHz 2.74dBi FPC Antenna for U-NII-3 5745MHz~5825MHz
	Modulation Type:	GFSK, Pi/4-DQPSK, 8-DPSK(3Mbps) 802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/n: OFDM (QPSK, BPSK, 16QAM, 64QAM) 802.11a: OFDM (QPSK, BPSK, 16QAM) 802.11ac: OFDM (QPSK, BPSK, 16QAM, 64QAM, 256QAM)
	Bit Rate of Transmitter:	Bluetooth:1/2/3Mbps 802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6 Mbps 802.11a: 6/9/12/18/24/36/48/54 Mbps 802.11n: up to 150Mbps 802.11ac: at most 433.3 Mbps
Power Rating	:	For Adapter (Model: FY1682000) Input: 100-240V~ 50/60Hz 1.5A 80VA Output: 16.8V=2.0A, 33.6W
Li-ion Polymer Battery	:	DC 14.4V by 3.25Ah/46.8Wh Rechargeable Li-ion battery
Software Version	:	1.3.1
Hardware Version	:	P2

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.



SAR Test Exclusion Calculations

1. FCC: According to KDB 447498 D01 Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies v06.

(1) Clause 4.3: General SAR test reduction and exclusion guidance

Sub clause 4.31: Standalone SAR test exclusion considerations

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6GHz at test separation distance ≤ 5 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation, mm})] \cdot [\sqrt{f_{\text{GHz}}}] \leq 3.0$ for 1-g SAR

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation, mm})] \cdot [\sqrt{f_{\text{GHz}}}] \leq 7.5.0$ for 10-g SAR

2. Summary simultaneous transmission for SAR Exclusion

The SAR exemption limits outlined in clause 4.3.2(b) of KDB 447498 have been derived based on an approximate SAR value of 0.4 W/kg using half-wave dipole antennas Footnote 1. As such, when simultaneous transmitter SAR evaluations include transmitters that have been exempt from routine SAR evaluation, the SAR must be estimating based on the ratio between the maximum tune-up tolerance limit of the transmitter that has been exempt and the exemption limit at the specific distance and frequency for that transmitter. This ratio must be multiplied by 0.4 W/kg (2.0 W/kg for controlled use and 1.0 W/kg for limb worn devices) in order to calculate the estimated SAR level.

The estimate SAR value is calculated based the following equation:

(maximum power level including tune-up tolerance for transmitter A / maximum power level of exemption at the same frequency and distance) * 0.4W/kg

1) $[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f_{\text{GHz}}/x}]$ W/kg, for test separation distances ≤ 50 mm;

where $x = 7.5$ for 1-g SAR and $x = 18.75$ for 10-g SAR.

2) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distance is > 50 mm.³⁷

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

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 $[\Sigma \text{ of MPE ratios}]$ is ≤ 1.0 .



3. Calculation:

Test separation: 5mm								
Worst MPE Result								
Test Mode	Antenna	Frequency (MHz)	Conducted Power (dBm)	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (dBm)	Max power of tune up tolerance (mw)	Calculation Value	Threshold Value
Bluetooth	Ant2	2402	7.875	7±1	8	6.310	1.956	3.0
2.4G b	Ant1	2412	8.985	8±1	9	7.943	2.467	3.0
	Ant2	2437	8.708	8±1	9	7.943	2.480	3.0
2.4G g	Ant1	2412	7.850	7±1	8	6.310	1.960	3.0
	Ant2	2412	6.492	6±1	7	5.012	1.557	3.0
2.4G n20	Ant1	2437	6.876	6±1	7	5.012	1.565	3.0
	Ant2	2437	4.405	4±1	5	3.162	0.987	3.0
2.4G n40	Ant1	2452	6.880	6±1	7	5.02	1.570	3.0
	Ant2	2422	4.198	4±1	5	3.162	0.984	3.0
5G a	Ant1	5200	6.71	6±1	7	5.012	2.286	3.0
	Ant2	5745	6.98	6±1	7	5.012	2.403	3.0
5G n20	Ant1	5240	5.21	5±1	6	3.981	1.823	3.0
	Ant2	5745	6.76	6±1	7	5.012	2.411	3.0
5G n40	Ant1	5190	4.25	4±1	5	3.162	1.441	3.0
	Ant2	5795	6.68	6±1	7	5.012	2.413	3.0
5G ac20	Ant1	5200	4.95	4±1	5	3.162	1.442	3.0
	Ant2	5785	7.11	6±1	7	5.012	2.403	3.0
5G ac40	Ant1	5230	5.03	5±1	6	3.981	1.821	3.0
	Ant2	5795	6.60	6±1	7	5.012	2.413	3.0
5G ac80	Ant1	5775	4.38	4±1	5	3.162	1.520	3.0
	Ant2	5210	4.89	4±1	5	3.162	1.444	3.0

Simultaneous Transmission for SAR Exclusion			
Simultaneous Transmission for SAR Exclusion		Total Calculation Value	Limit
Ant1	Ant2		
0.335	0.335	0.418	1.0
Σ of (the highest measured or estimated SAR _{Ant1} +SAR _{Ant2})/1.6 = (0.335 +0.335)/1.6 = 0.418 < 1.0;			

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.

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

