



RF Exposure Evaluation

FCC ID: 2A9VY-PILOTXPODIUM1

1. Client Information

Applicant	:	Pathway Innovations Inc.
Address	:	6780 Paradise Road Las Vegas, Nevada 89119
Manufacturer	:	ShenZhen KerunVisual Technology Co., LTD.
Address	:	Unit A, F/11, Bldg.1, Senyang Electronic Technology Park, Tianliao Community, Guangming High Tech Zone, Guangming New District, Shenzhen, China 518132

2. General Description of EUT

EUT Name	:	Pilot X
Models No.	:	Pilot X, Pilot S, KR2102X(Pilot X Tablet), KR2102Q(Pilot S Tablet)
Model Different	:	All PCB boards and circuit diagrams are the same, the only difference is that model names.
Product Description	:	Operation Frequency: Bluetooth LE5.2: 2402MHz~2480MHz 802.11b/g/n(HT20/40): 2412MHz~2462MHz U-NII-1: 5180MHz~5240MHz
		Antenna Gain: 3dBi FPC Antenna 1 for Bluetooth 3dBi FPC Antenna 1&2for 2.4GWiFi&5GWiFi
		Modulation Type: Bluetooth LE: GFSK1/2Mbps 802.11b: DSSS (DQPSK, DBPSK, CCK) 802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11a: OFDM (QPSK, BPSK, 16QAM) 802.11ac: OFDM (QPSK, BPSK, 16QAM, 64QAM, 256QAM)
Power Supply	:	Input: DC 15V, 6A Output: DC 5V, 1A DC 7.6V by 10000mAh Rechargeable Li-ion battery
Software Version	:	EC:V0.7
Hardware Version	:	V0.1
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) $[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f_{\text{(GHz)}}/x}] \text{ W/kg, for test separation distances } \leq 50 \text{ mm;}$

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 $> 50 \text{ mm}$.³⁷

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

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



3. Calculation:

Bluetooth LE Mode(1Mbps)						
Frequency (GHz)	Conducted Power (dBm)	Antenna	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (mw)	Calculation Value	Threshold Value
2.402	5.433	Ant1	5±1	3.162	0.980	3.0
2.440	5.616	Ant1	6±1	5.012	1.566	3.0
2.480	5.601	Ant1	6±1	5.012	1.579	3.0
Bluetooth LE Mode(2Mbps)						
Frequency (GHz)	Conducted Power (dBm)	Antenna	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (mw)	Calculation Value	Threshold Value
2.402	5.573	Ant1	6±1	5.012	1.554	3.0
2.440	5.873	Ant1	6±1	5.012	1.566	3.0
2.480	5.916	Ant1	6±1	5.012	1.579	3.0

2.4G WiFi							
TestMode	Antenna	Channel	Conducted Power (dBm)	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (mw)	Calculation Value	Threshold Value
11B-CDD	Ant1	2412	4.67	5+1	3.981	1.237	3
	Ant2	2412	3.82	4+1	3.162	0.982	3
	Ant1	2437	4.96	5+1	3.981	1.243	3
	Ant2	2437	4.03	4+1	3.162	0.987	3
	Ant1	2462	4.60	5+1	3.981	1.249	3
	Ant2	2462	3.98	4+1	3.162	0.992	3
11G-CDD	Ant1	2412	4.22	4+1	3.162	0.982	3
	Ant2	2412	3.71	4+1	3.162	0.982	3
	Ant1	2437	4.34	4+1	3.162	0.987	3
	Ant2	2437	3.59	4+1	3.162	0.987	3
	Ant1	2462	4.24	4+1	3.162	0.992	3
	Ant2	2462	3.54	4+1	3.162	0.992	3
11N20MIMO	Ant1	2412	4.16	4+1	3.162	0.982	3
	Ant2	2412	3.62	4+1	3.162	0.982	3
	Ant1	2437	4.16	4+1	3.162	0.987	3
	Ant2	2437	3.44	3+1	2.512	0.784	3
	Ant1	2462	4.02	4+1	3.162	0.992	3
	Ant2	2462	3.63	4+1	3.162	0.992	3
11N40MIMO	Ant1	2422	5.13	5+1	3.981	1.239	3
	Ant2	2422	4.23	4+1	3.162	0.984	3
	Ant1	2437	4.98	5+1	3.981	1.243	3
	Ant2	2437	4.29	4+1	3.162	0.987	3
	Ant1	2452	4.99	5+1	3.981	1.247	3
	Ant2	2452	4.18	4+1	3.162	0.990	3



U-NII-1: 5180MHz~5240MHz							
TestMode	Antenna	Channel	Conducted Power (dBm)	Turn-up Power Tolerance (dB)	Max power of tune up tolerance (mw)	Calculation Value	Threshold Value
11A-CDD	Ant1	5180	4.87	5+1	3.981	1.812	3
	Ant2	5180	3.88	4+1	3.162	1.439	3
	Ant1	5200	4.90	5+1	3.981	1.816	3
	Ant2	5200	3.87	4+1	3.162	1.442	3
	Ant1	5240	4.70	5+1	3.981	1.823	3
	Ant2	5240	3.68	4+1	3.162	1.448	3
11N20MIMO	Ant1	5180	4.87	5+1	3.981	1.812	3
	Ant2	5180	3.66	4+1	3.162	1.439	3
	Ant1	5200	4.72	5+1	3.981	1.816	3
	Ant2	5200	3.81	4+1	3.162	1.442	3
	Ant1	5240	4.56	5+1	3.981	1.823	3
	Ant2	5240	3.78	4+1	3.162	1.448	3
11N40MIMO	Ant1	5190	5.51	6+1	5.012	2.284	3
	Ant2	5190	4.56	5+1	3.981	1.814	3
	Ant1	5230	5.34	5+1	3.981	1.821	3
	Ant2	5230	4.47	4+1	3.162	1.446	3
11AC20MIMO	Ant1	5180	4.86	5+1	3.981	1.812	3
	Ant2	5180	3.70	4+1	3.162	1.439	3
	Ant1	5200	4.80	5+1	3.981	1.816	3
	Ant2	5200	3.78	4+1	3.162	1.442	3
	Ant1	5240	4.58	5+1	3.981	1.823	3
	Ant2	5240	3.67	4+1	3.162	1.448	3
11AC40MIMO	Ant1	5190	5.61	6+1	5.012	2.284	3
	Ant2	5190	4.44	4+1	3.162	1.441	3
	Ant1	5230	5.42	6+1	5.012	2.292	3
	Ant2	5230	4.55	5+1	3.981	1.821	3
11AC80MIMO	Ant1	5210	5.49	5+1	3.981	1.817	3
	Ant2	5210	4.60	5+1	3.981	1.817	3

Simultaneous Transmission for SAR Exclusion			
Simultaneous Transmission for SAR Exclusion		Total Calculation Value	Limit
Ant 1	Ant 2		
0.211	0.168	0.237	1.0
Note: The sample support one BT modular and WiFi modular, they supports difference antenna, need consider $\sum$ of (the highest measured or estimated $SAR_{Ant1}+SAR_{Ant2}$)/1.6 = (0.211+0.168)/1.6 = 0.237 < 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-----

