

1. RF Exposure Requirements

1.1 General Information

Client Information

Manufacturer: POLARIS INDUSTRIES INC
Address of manufacturer: 2100 Highway 55, Medina, MN 55340

General Description of EUT:

Product Name: Voyager Pro4
Trade Name: /
Model No.: Voyager Pro4
Adding Model(s): /
Rated Voltage: Charging Port:DC15V
Battery:DC3.7V
Battery Capacity: 3100mAh
Model No.:KT241150140US
Adapter Model: Input:AC100-240V 50/60Hz 0.8A
Output:DC15.0V,1.4A 21.0W
FCC ID: 2AOW7-9205VPRO
Equipment Type: Mobile device

Technical Characteristics of EUT:

Bluetooth

Bluetooth Version: V5.0 (BR/EDR mode)
Frequency Range: 2402-2480MHz
RF Output Power: 6.635dBm (Conducted)
Data Rate: 1Mbps, 2Mbps, 3Mbps
Modulation: GFSK, $\pi/4$ DQPSK, 8DPSK
Quantity of Channels: 79
Channel Separation: 1MHz
Type of Antenna: PCB Antenna
Antenna Gain: 3.3dBi

DSS-900MHz

Frequency Range: 902.5-927.5MHz
RF Output Power: 26.949dBm (Conducted)
Modulation: FSK
Quantity of Channels: 126
Channel Separation: 200kHz
Type of Antenna: External antenna
Antenna Gain: 5dBi

1.2 RF Exposure Exemption

According to §1.1307(b)(3) and KDB 447498 D04 Interim General RF Exposure Guidance v01, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

Option A: FCC Rule Part 1.1307 (b)(3)(i)(A): The available maximum time-averaged power is no more than 1mW, regardless of separation distance.

Option B: FCC Rule Part 1.1307 (b)(3)(i)(B): The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. P_{th} is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Option C: FCC Rule Part 1.1307 (b)(3)(i)(C): The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$
1.34-30	$3,450 R^2/f^2$
30-300	$3.83 R^2$
300-1,500	$0.0128 R^2 f$
1,500-100,000	$19.2 R^2$

For Multiple RF sources: FCC Rule Part 1.1307(b)(3)(ii):

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is

less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required).

- (B) In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

1.3 Calculated Result

Radio Access Technology	Prediction Frequency	Output Power	Antenna Gain	Duty Cycle	Tune-Up Time-Averaged Power	ERP
	(MHz)	(dBm)	(dBi)	(%)	(dBm)	(dBm)
DSS-Bluetooth	2402	6.635	3.3	100	7.00	8.15
DSS-900MHz	902.5	26.949	5.0	100	27.00	29.85
Bluetooth	2402	11.90	3.2	100	12.00	13.05
Wi-Fi	2412	20.58	3.2	100	21.00	22.05

Frequency (MHz)	Option	Min. Distance	Max. Power		Exposure Limit	Ratio	Result
		(cm)	(dBm)	(mW)	(mW)		Pass/Fail
2402	B	23	8.15	6.53	6573.71	0.01	Pass
902.5	B	23	29.85	966.05	2259.32	0.43	Pass
2402	B	23	13.05	20.18	6573.71	0.01	Pass
2412	B	23	22.05	160.32	6603.58	0.02	Pass

Note: 1. Time-Averaged Power=Output Power * Duty Cycle; ERP= Time-Averaged Power+ Antenna gain-2.15dB

2. Option A, B and C refers as clause 1.2.

3. For option B, Max (time-averaged power, effective radiated power (ERP)) converts to Max. Power. For option C, ERP converts to Max. Power;

4. For option B, P_{th} (mW) converts to Exposure Limit (mW); For option C, ERP (W) converts to Exposure Limit (mW).

5. Ratio= Tune-Up ERP (mW)/ Exposure Limit (mW)

Mode for Simultaneous Multi-band Transmission:

Radio Access Technology	Ratio 1	Ratio 2	Ratio 3	Simultaneous Ratio	Limit	Result
						Pass/Fail
Max(DSS-Bluetooth) + Max (DSS-900MHz) + Max (Bluetooth&Wi-Fi)	0.01	0.43	0.02	0.46	1	Pass

Note:

For Wi-Fi and Bluetooth Module (FCC ID: Z64-WL18SBMOD; the issue date: 02/21/2018)

Bluetooth: Maximum peak output power (dBm):11.90; Antenna Gain (dBi):3.2

Wi-Fi: Maximum peak output power (dBm): 20.58; Antenna Gain (dBi):3.2

Result: Pass