

## RF Exposure Report

**Report No.:** SABFBE-WTW-P21070951

**FCC ID:** YAW529027

**Test Model:** PVS6

**Received Date:** 2021/7/27

**Test Date:** 2021/8/25

**Issued Date:** 2021/12/8

**Applicant:** SunPower Corporation

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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
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**Test Location:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
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**FCC Registration /  
Designation Number:** 723255 / TW2022



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## Table of Contents

<b>Release Control Record .....</b>	<b>3</b>
<b>1     Certificate of Conformity .....</b>	<b>4</b>
<b>2     RF Exposure .....</b>	<b>5</b>
2.1   Limits for Maximum Permissible Exposure (MPE) .....	5
2.2   MPE Calculation Formula .....	5
2.3   Classification .....	5
2.4   Antenna Gain .....	6
2.5   Calculation Result .....	7
<b>Appendix .....</b>	<b>8</b>

### Release Control Record

Issue No.	Description	Date Issued
SABFBE-WTW-P21070951	Original release.	2021/12/8

## 1 Certificate of Conformity

**Product:** SunPower Monitoring System with PVS6

**Brand:** SUNPOWER

**Test Model:** PVS6

**Sample Status:** Engineering sample

**Applicant:** SunPower Corporation

**Test Date:** 2021/8/25

**Standards:** FCC Part 2 (Section 2.1091)

KDB 447498 D01 General RF Exposure Guidance v06

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :** Vivian Huang , **Date:** 2021/12/8  
Vivian Huang / Specialist

**Approved by :** Clark Lin , **Date:** 2021/12/8  
Clark Lin / Technical Manager

## 2 RF Exposure

### 2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	...	...	f/1500	30
1500-100,000	...	...	1.0	30

f = Frequency in MHz ; \*Plane-wave equivalent power density

### 2.2 MPE Calculation Formula

$$P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$$

where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

$R$  = distance between observation point and center of the radiator in cm

### 2.3 Classification

The antenna of this product, under normal use condition, is at least 25 cm away from the body of the user. So, this device is classified as **Mobile Device**.

## 2.4 Antenna Gain

WLAN							
Ant No.	Chain No.	Brand	Model	Antenna Net Gain (dBi)	Frequency rang (GHz)	Antenna type	Connector type
1	Chain 0 (Including BT)	airgain	65-031-212002B	2.2	2.4~2.4835	PCB	I-PEX
				3.8	5.15~5.25		
				4.2	5.725~5.85		
2	Chain 1 (WLAN use only)	airgain	65-031-212003B	4.2	2.4~2.4835	PCB	I-PEX
				4.1	5.15~5.25		
				4.8	5.725~5.85		
Zigbee							
Ant No.	Brand	Model	Antenna Gain (dBi)	Frequency rang (GHz)	Antenna type	Connector type	
3	airgain	65-031-212004B	4.8	2.4~2.4835	PCB	I-PEX	
LTE							
Ant No.	Brand	Model	Antenna Gain (dBi)	Frequency rang (MHz)	Antenna type	Connector type	
4	airgain	65-031-212001B	2.7	1920~1980	PCB	I-PEX	
				1850~1910			
				1710~1785			
				1710~1755			
				824 ~ 849			
				880~915			
				698~716			
				777~787			
				815 ~ 830			
				830 ~ 845			
				832 ~ 862			
				814 ~ 849			
				703 ~ 748			
				1880 ~ 1920			

\*The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

## 2.5 Calculation Result

All data except LTE data, was copied from the original test report (Report No.: SA180803E05A).

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
WLAN 2.4GHz	2437	762.15	6.27	25	0.41110	1
WLAN 5GHz (U-NII-1)	5240	199.38	6.96	25	0.12606	1
WLAN 5GHz (U-NII-3)	5745	268.355	7.52	25	0.19303	1
Bluetooth	2440	5.26	2.20	25	0.00111	1
Zigbee	2405	42.17	4.80	25	0.01621	1
LTE <Worst band>	699.7	110	2.70	25	0.02608	0.46647

### NOTE:

WLAN 2.4GHz: Directional gain =  $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 6.27\text{dBi}$

WLAN 5GHz (U-NII-1): Directional gain =  $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 6.96$

WLAN 5GHz (U-NII-3): Directional gain =  $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 7.52$

LTE: Limit of Power Density = F/1500

### Conclusion:

The formula of calculated the MPE is:

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4GHz + Bluetooth + Zigbee + LTE =  $0.41110 / 1 + 0.00111 / 1 + 0.01621 / 1 + 0.02608 / 0.46647 = 0.48433$

WLAN 5GHz + Bluetooth + Zigbee + LTE =  $0.19303 / 1 + 0.00111 / 1 + 0.01621 / 1 + 0.02608 / 0.46647 = 0.26626$

**Therefore the maximum calculations of above situations are less than the “1” limit.**

## Appendix

LTE module

MPE Evaluation for FCC ID: XMR2020BG95M1

Operation Mode	Evaluation Frequency (MHz)	The Worst Case		Max Avg. Power		Directional Gain	Power Density (mW/cm <sup>2</sup> )		Ratio
		Channel Number	Freq. (MHz)	mW	dBm		Value	Limit	
LTE (Band 2)	1850.7-1909.3	18607	1850.7	123	20.90	2.70	0.02916	1	0.02916
LTE (Band 4)	1710.7-1754.3	19957	1710.7	120	20.79	2.70	0.02845	1	0.02845
LTE (Band 12)	699.7-715.3	23017	699.7	110	20.41	2.70	0.02608	0.46647	0.05591

\*Distance = 25 cm

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