



RF Exposure Evaluation Report

Equipment : SunPower Monitoring System with PVS5x
Brand Name : SUNPOWER
Model No. : PVS5x
FCC ID : YAW522350L
Standard : 47 CFR Part 2.1091
Applicant : SunPower Corporation
1414 Harbour Way South Suite 1901, Richmond, CA
94804, USA
Manufacturer (1) : Zyxel Communications Corporation
No.2 Industry East RD. IX, Hsinchu Science Park,
Hsinchu 30075, Taiwan
Manufacturer (2) : MitraStar Technology Corporation
No. 6, Innovation Rd II, Science-Based Industrial,
Hsin-Chu, Taiwan
Manufacturer (3) : Wuxi MitraStar Technology Co. Ltd
1-1# Minshan Road, Wuxi New Wu District, Jiangsu,
China

The product sample received on Jun. 26. 2015 and completely tested on Feb. 01, 2018. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with 47 CFR Part 2.1091 and pass the limit.

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Sam Chen
SPORTON INTERNATIONAL INC.





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PHOTOGRAPHS OF EUT V01

REVISION HISTORY

[illegible]

1 General Description

1.1 EUT General Information

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Zigbee	2400-2483.5	2405-2475	DSSS (O-QPSK)

Note: The device contains transmitter module (FCC ID: XMR201605EC25A)

1.2 Testing Location

Testing Location			
☐	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973	
☒	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085	

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086D with Industry Canada.

2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Method

The MPE was calculated at 25 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

2.3 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

<For WLAN>

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;D1D	4.20	27.96	32.16	0.5	32.66	1.84502	25	0.23503	1
2.4G Zigbee	2.30	21.29	23.59	0.5	24.09	0.25645	25	0.03266	1

<For WWAN>

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
WCDMA Band V 826.4-846.6	10.92	23.50	34.42	0.5	34.92	3.10456	25	0.39548	0.551
WCDMA Band II 1852.4-1907.6	13.51	23.50	37.01	0.5	37.51	5.63638	25	0.71800	1
WCDMA IV 1712.4-1752.6	13.51	23.50	37.01	0.5	37.51	5.63638	25	0.71800	1
LTE Band II 1850.7-1909.3	13.01	24.00	37.01	0.5	37.51	5.63638	25	0.71800	1
LTE Band IV 1710.7-1754.3	13.01	24.00	37.01	0.5	37.51	5.63638	25	0.71800	1
LTE Band XII 699.7-715.3	9.69	24.00	33.69	0.5	34.19	2.62422	25	0.33429	0.466

Simultaneous Transmission Analysis Mode: WLAN + Zigbee + WWAN (FCC ID:XMR201605EC25A)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
2.4G;D1D	4.20	27.96	32.16	0.5	32.66	1.84502	25	0.23503	1	0.23503
2.4G Zigbee	2.30	21.29	23.59	0.5	24.09	0.25645	25	0.03266	1	0.03266
WCDMA Band II 1852.4-1907.6	13.51	23.50	37.01	0.5	37.51	5.63638	25	0.71800	1	0.71800
									Sum Ratio	0.98569
									Ratio Limit	1