



## Maximum Permissible Exposure (MPE) & Exposure evaluation

**Report identification number: 1-3065/16-01-04-A**

Certification numbers and labeling requirements	
FCC ID	X46WP02 UDV-1103022011008 (GSM/UMTS module) QQQ-WGM110 (WiFi module)
IC number	8816A-WP02 8460A-20110302008 (GSM/UMTS module) 5123A-WGM1110 (WiFi module)
HVIN (Hardware Version Identification Number)	WIP630-2
PMN (Product Marketing Name)	WIP630
FVIN (Firmware Version Identification Number)	-/-
HMN (Host Marketing Name)	-/-

Version –A: WiFi module added

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**Document authorized:**

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**EUT technologies:**

Case 1

Technologies:	Max. power: (AVG)	Timebased AVG-Power:	Max. gain:	Min. pathloss:
GSM 850 GPRS	35 dBm	29 dBm (2 or 4 TS)	0.0 dBi	-/-
ISM (915 MHz)	20 dBm	100% Duty Cycle	1.6 dBi	-/-
WLAN (2.4 GHz)	18 dBm	100% Duty Cycle	0.0 dBi	-/-

Case 2

Technologies:	Max. power: (AVG)	Timebased AVG-Power:	Max. gain:	Min. pathloss:
PCS 1900 GPRS	32 dBm	26 dBm (2 or 4 TS)	0.0 dBi	-/-
ISM (915 MHz)	20 dBm	100% Duty Cycle	1.6 dBi	-/-
WLAN (2.4 GHz)	18 dBm	100% Duty Cycle	0.0 dBi	-/-

Case 3

Technologies:	Max. power: (AVG)	Timebased AVG-Power:	Max. gain:	Min. pathloss:
WCDMA 850	25 dBm	100% Duty Cycle	0.0 dBi	-/-
ISM (915 MHz)	20 dBm	100% Duty Cycle	1.6 dBi	-/-
WLAN (2.4 GHz)	18 dBm	100% Duty Cycle	0.0 dBi	-/-

Case 4

Technologies:	Max. power: (AVG)	Timebased AVG-Power:	Max. gain:	Min. pathloss:
WCDMA 1900	25 dBm	100% Duty Cycle	0.0 dBi	-/-
ISM (915 MHz)	20 dBm	100% Duty Cycle	1.6 dBi	-/-
WLAN (2.4 GHz)	18 dBm	100% Duty Cycle	0.0 dBi	-/-

Note: Maximum Power includes maximum tune-up tolerance for GSM (2 dB), UMTS (1 dB)m, WLAN and ISM.

**Prediction of MPE limit at given distance - FCC**

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

where: S = Power density  
 P = Power input to the antenna  
 G = Antenna gain (declared by provider)  
 R = Distance to the center of radiation of the antenna

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled "Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure"

Frequency Range (MHz)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minutes)
300 -1500	f/1500	30
1500 - 100000	1.0	30

where f = Frequency (MHz)

**Case 1 GSM850 and S2View 915 MHz active simultaneously**

	< 1500 MHz	> 1500 MHz	< 1500 MHz
Technology	S2View (915 MHz)	WLAN (2400 MHz)	GSM 850
P Maximum power	20 dBm	18 dBm	29.0 dBm
R Distance	20 cm	20 cm	20 cm
G Antenna gain	1.6 dBi	0.0 dBi	0.0 dBi
S MPE limit for uncontrolled exposure	0.6 mW/cm <sup>2</sup>	1 mW/cm <sup>2</sup>	0.56 mW/cm <sup>2</sup>
<b>Calculated Power density:</b>	<b>0.029 mW/cm<sup>2</sup></b>	<b>0.013 mW/cm<sup>2</sup></b>	<b>0.158 mW/cm<sup>2</sup></b>
<b>Colocation:</b>	<b>4.79 %</b>	<b>1.29 %</b>	<b>28.28 %</b>
<b>Sum (worst case/all transmitters active):</b>	<b>34.36 %</b>		

**Case 2 PCS 1900 and S2View 915 MHz active simultaneously**

	< 1500 MHz	> 1500 MHz	> 1500 MHz
Technology	S2View (915 MHz)	WLAN (2400 MHz)	PCS 1900
P Maximum power	20 dBm	18 dBm	26.0 dBm
R Distance	20 cm	20 cm	20 cm
G Antenna gain	1.6 dBi	0.0 dBi	0.0 dBi
S MPE limit for uncontrolled exposure	0.6 mW/cm <sup>2</sup>	1 mW/cm <sup>2</sup>	1.0 mW/cm <sup>2</sup>
<b>Calculated Power density:</b>	<b>0.029 mW/cm<sup>2</sup></b>	<b>0.013 mW/cm<sup>2</sup></b>	<b>0.080 mW/cm<sup>2</sup></b>
<b>Colocation:</b>	<b>4.79 %</b>	<b>1.29 %</b>	<b>8.0 %</b>
<b>Sum (worst case/all transmitters active):</b>	<b>14.08 %</b>		

Case 3 WCDMA 850 and S2View 915 MHz active simultaneously

		< 1500 MHz	> 1500 MHz	> 1500 MHz
	Technology	S2View (915 MHz)	WLAN (2400 MHz)	WCDMA 850
P	Maximum power	20 dBm	18 dBm	25.0 dBm
R	Distance	20 cm	20 cm	20 cm
G	Antenna gain	1.6 dBi	0.0 dBi	0.0 dBi
S	MPE limit for uncontrolled exposure	0.6 mW/cm <sup>2</sup>	1 mW/cm <sup>2</sup>	0.56 mW/cm <sup>2</sup>
	<b>Calculated Power density:</b>	<b>0.029 mW/cm<sup>2</sup></b>	<b>0.013 mW/cm<sup>2</sup></b>	<b>0.063 mW/cm<sup>2</sup></b>
	<b>Colocation:</b>	<b>4.79 %</b>	<b>1.29 %</b>	<b>11.23 %</b>
	<b>Sum (worst case/all transmitters active):</b>	<b>16.49 %</b>		

Case 4 WCDMA 1900 and S2View 915 MHz active simultaneously

		< 1500 MHz	> 1500 MHz	> 1500 MHz
	Technology	S2View (915 MHz)	WLAN (2400 MHz)	WCDMA 1900
P	Maximum power	20 dBm	18 dBm	25.0 dBm
R	Distance	20 cm	20 cm	20 cm
G	Antenna gain	1.6 dBi	0.0 dBi	0.0 dBi
S	MPE limit for uncontrolled exposure	0.6 mW/cm <sup>2</sup>	1 mW/cm <sup>2</sup>	1.0 mW/cm <sup>2</sup>
	<b>Calculated Power density:</b>	<b>0.029 mW/cm<sup>2</sup></b>	<b>0.013 mW/cm<sup>2</sup></b>	<b>0.063 mW/cm<sup>2</sup></b>
	<b>Colocation:</b>	<b>4.79 %</b>	<b>1.29 %</b>	<b>6.30 %</b>
	<b>Sum (worst case/all transmitters active):</b>	<b>12.37 %</b>		

**This prediction demonstrates the following:**

The power density levels for FCC at a distance of 20 cm are below the maximum levels allowed by regulations.

**Prediction of MPE limit at given distance - IC**

RSS-102, Issue 5, 2.5.2

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $4.49/f^{0.5}W$  (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834} W$  (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

**Case 1 GSM850 and ISM 915 MHz active simultaneously**

	Technology	GSM 850	WLAN 2400	Proprietary FHSS (915 MHz)	-/-
P	Max power	29.0 dBm	18 dBm	20 dBm	
G	Antenna gain	0.0 dBi	0.0 dBi	1.6 dBi	
S	MPE limit for uncontrolled exposure	1300 mW	2710 mW	1400 mW	
	Calculated output power:	794 mW	65 mW	144.5 mW	
	<b>Colocation GSM 850 + WLAN + FHSS 915</b>	<b>61.1 %</b>	---	---	<b>Sum</b>
	<b>Colocation GSM 850 + WLAN + FHSS 915</b>	---	<b>2.4 %</b>	---	
	<b>Colocation GSM 850 + WLAN + FHSS 915</b>	---	---	<b>10.3 %</b>	
					<b><u>73.8 %</u></b>

**Case 2 PCS 1900 and ISM 915 MHz active simultaneously**

	Technology	PCS 1900	WLAN 2400	Proprietary FHSS (915 MHz)	-/-
P	Max power	26.0 dBm	18 dBm	20 dBm	
G	Antenna gain	0.0 dBi	0.0 dBi	1.6 dBi	
S	MPE limit for uncontrolled exposure	2280 mW	2710 mW	1400 mW	
	Calculated output power:	399 mW	65 mW	144.5 mW	
	<b>Colocation PCS 1900 + WLAN + FHSS 915</b>	<b>17.50 %</b>	---	---	<b>Sum</b>
	<b>Colocation PCS 1900 + WLAN + FHSS 915</b>	---	<b>2.4 %</b>	---	
	<b>Colocation PCS 1900 + WLAN + FHSS 915</b>	---	---	<b>10.3 %</b>	
					<b><u>30.2 %</u></b>

Case 3 WCDMA 850 and ISM 915 MHz active simultaneously

	Technology	WCDMA 850	WLAN 2400	Proprietary FHSS (915 MHz)	-/-
P	Max power	25.0 dBm	18 dBm	20 dBm	<b>Sum</b>
G	Antenna gain	0.0 dBi	0.0 dBi	1.6 dBi	
S	MPE limit for uncontrolled exposure	1300 mW	2710 mW	1400 mW	
	Calculated output power:	316 mW	65 mW	144.5 mW	
	<b>Colocation WCDMA 850 + WLAN + FHSS 915</b>	<b>24.3 %</b>	---	---	<b><u>37 %</u></b>
	<b>Colocation WCDMA 850 + WLAN + FHSS 915</b>	---	<b>2.4 %</b>	---	
	<b>Colocation WCDMA 850 + WLAN + FHSS 915</b>	---	---	<b>10.3 %</b>	

Case 4 WCDMA 1900 and ISM 915 MHz active simultaneously

	Technology	WCDMA 1900	WLAN 2400	Proprietary FHSS (915 MHz)	-/-
P	Max power	25.0 dBm	18 dBm	20 dBm	<b>Sum</b>
G	Antenna gain	0.0 dBi	0.0 dBi	1.6 dBi	
S	MPE limit for uncontrolled exposure	2113 mW	2710 mW	1400 mW	
	Calculated output power:	316 mW	65 mW	144.5 mW	
	<b>Colocation WCDMA 1900 + WLAN + FHSS 915</b>	<b>15.0 %</b>	---	---	<b><u>27.7 %</u></b>
	<b>Colocation WCDMA 1900 + WLAN + FHSS 915</b>	---	<b>2.4 %</b>	---	
	<b>Colocation WCDMA 1900 + WLAN + FHSS 915</b>	---	---	<b>10.3 %</b>	

**Conclusion:** for applications where minimum distance to radiating element is 20cm Annex C of RSS-102 should be filled out.