



Maximum Permissible Exposure (MPE) & Exposure evaluation

Report identification number: 1-1241/16-01-17

Certification numbers and labeling requirements	
FCC ID	O6QPMT8X XPYLISAU200(GSM/UMTS module) PI4BL600T (Bluetooth Module)
IC number	3892A-PMT8X 8595A-LISAU200N (GSM/UMTS module) 1931B-BL600T
HVIN (Hardware Version Identification Number)	PMT81R, PMT81D, PMT81W
PMN (Product Marketing Name)	PLICSMOBILE T81
FVIN (Firmware Version Identification Number)	-/-
HMN (Host Marketing Name)	-/-

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Document authorized:

Thomas Vogler
Testing Manager
Radio Communications & EMC

EUT technologies:

Case 1

Technologies:	Max. power: (AVG)	Timebased AVG-Power:	Max. gain:	Min. pathloss:
GSM 850 GPRS	35 dBm	26 dBm (1 TS)	3 dBi	-/-
Bluetooth LE (2450 MHz)	-5 dBm	100% Duty Cycle	5 dBi	-/-

Case 2

Technologies:	Max. power: (AVG)	Timebased AVG-Power:	Max. gain:	Min. pathloss:
PCS 1900 GPRS	32 dBm	23 dBm (1 TS)	4 dBi	-/-
Bluetooth LE (2450 MHz)	-5 dBm	100% Duty Cycle	5 dBi	-/-

Case 3

Technologies:	Max. power: (AVG)	Timebased AVG-Power:	Max. gain:	Min. pathloss:
WCDMA 850	25 dBm	100% Duty Cycle	3 dBi	-/-
Bluetooth LE (2450 MHz)	-5 dBm	100% Duty Cycle	5 dBi	-/-

Case 4

Technologies:	Max. power: (AVG)	Timebased AVG-Power:	Max. gain:	Min. pathloss:
WCDMA 1900	25 dBm	100% Duty Cycle	4 dBi	-/-
Bluetooth LE (2450 MHz)	-5 dBm	100% Duty Cycle	5 dBi	-/-

Case 5

Technologies:	Max. power: (AVG)	Timebased AVG-Power:	Max. gain:	Min. pathloss:
WCDMA 1700	25 dBm	100% Duty Cycle	4 dBi	-/-
Bluetooth LE (2450 MHz)	-5 dBm	100% Duty Cycle	5 dBi	-/-

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

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 ²)	Averaging Time (minutes)
300 -1500	f/1500	30
1500 - 100000	1.0	30

where f = Frequency (MHz)

Case 1 GSM850 and BTLE active simultaneously

	> 1500 MHz	< 1500 MHz
Technology	BTLE (2450 MHz)	GSM 850
P Maximum power	-5 dBm	26.0 dBm
R Distance	20 cm	20 cm
G Antenna gain	5 dBi	3.0 dBi
S MPE limit for uncontrolled exposure	1 mW/cm ²	0.56 mW/cm ²
Calculated Power density:	0.0002 mW/cm²	0.158 mW/cm²
Colocation:	0.02%	28.28 %
Sum (worst case/all transmitters active):	28.30 %	

Case 2 PCS 1900 and BTLE active simultaneously

	> 1500 MHz	> 1500 MHz
Technology	BTLE (2450 MHz)	PCS 1900
P Maximum power	-5 dBm	23.0 dBm
R Distance	20 cm	20 cm
G Antenna gain	5 dBi	4.0 dBi
S MPE limit for uncontrolled exposure	1 mW/cm ²	1.0 mW/cm ²
Calculated Power density:	0.0002 mW/cm²	0.100 mW/cm²
Colocation:	0.02%	10.0 %
Sum (worst case/all transmitters active):	10.02 %	

Case 3 WCDMA 850 and BTLE active simultaneously

		> 1500 MHz		< 1500 MHz
	Technology	BTLE (2450 MHz)		WCDMA 850
P	Maximum power	-5 dBm		25.0 dBm
R	Distance	20 cm		20 cm
G	Antenna gain	5 dBi		3.0 dBi
S	MPE limit for uncontrolled exposure	1 mW/cm ²		0.56 mW/cm ²
	Calculated Power density:	0.0002 mW/cm²		0.126 mW/cm²
	Colocation:	0.02%		22.46 %
	Sum (worst case/all transmitters active):	22.48 %		

Case 4 WCDMA 1900 and BTLE active simultaneously

		> 1500 MHz		> 1500 MHz
	Technology	BTLE (2450 MHz)		WCDMA 1900
P	Maximum power	-5 dBm		25.0 dBm
R	Distance	20 cm		20 cm
G	Antenna gain	5 dBi		4.0 dBi
S	MPE limit for uncontrolled exposure	1 mW/cm ²		1.0 mW/cm ²
	Calculated Power density:	0.0002 mW/cm²		0.158 mW/cm²
	Colocation:	0.02%		15.80 %
	Sum (worst case/all transmitters active):	15.82 %		

Case 5 WCDMA 1700 and BTLE active simultaneously

		> 1500 MHz		> 1500 MHz
	Technology	BTLE (2450 MHz)		WCDMA 1700
P	Maximum power	-5 dBm		25.0 dBm
R	Distance	20 cm		20 cm
G	Antenna gain	5 dBi		4.0 dBi
S	MPE limit for uncontrolled exposure	1 mW/cm ²		1.0 mW/cm ²
	Calculated Power density:	0.0002 mW/cm²		0.158 mW/cm²
	Colocation:	0.02%		15.80 %
	Sum (worst case/all transmitters active):	15.82 %		

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 BTLE active simultaneously

	Technology	GSM 850		Bluetooth LE	-/-
P	Max power	26.0 dBm		-5 dBm	
G	Antenna gain	3.0 dBi		5 dBi	
S	MPE limit for uncontrolled exposure	1300 mW		2712 mW	
	Calculated output power:	794 mW		1 mW	
	Colocation GSM 850 + Bluetooth LE	61.1 %		---	Sum
	Colocation GSM 850 + Bluetooth LE	---		0.037 %	
					<u>61.14 %</u>

Case 2 PCS 1900 and BTLE active simultaneously

	Technology	PCS 1900		Bluetooth LE	-/-
P	Max power	23.0 dBm		-5 dBm	
G	Antenna gain	4.0 dBi		5 dBi	
S	MPE limit for uncontrolled exposure	2280 mW		2712 mW	
	Calculated output power:	500 mW		1 mW	
	Colocation PCS 1900 + Bluetooth LE	21.93 %		---	Sum
	Colocation PCS 1900 + Bluetooth LE	---		0.037 %	
					<u>21.97 %</u>

Case 3 WCDMA 850 and BTLE active simultaneously

	Technology	WCDMA 850		Bluetooth LE	-/-
P	Max power	25.0 dBm		-5 dBm	Sum
G	Antenna gain	3.0 dBi		5 dBi	
S	MPE limit for uncontrolled exposure	1300 mW		2712 mW	
	Calculated output power:	631 mW		1 mW	
	Colocation WCDMA 850 + Bluetooth LE	48.6 %		---	<u>48.64 %</u>
	Colocation WCDMA 850 + Bluetooth LE	---		0.037 %	

Case 4 WCDMA 1900 and BTLE active simultaneously

	Technology	WCDMA 1900		Bluetooth LE	-/-
P	Max power	25.0 dBm		-5 dBm	Sum
G	Antenna gain	4.0 dBi		5 dBi	
S	MPE limit for uncontrolled exposure	2280 mW		2712 mW	
	Calculated output power:	794 mW		1 mW	
	Colocation WCDMA 1900 + Bluetooth LE	34.82 %		---	<u>34.86 %</u>
	Colocation WCDMA 1900 + Bluetooth LE	---		0.037 %	

Case 5 WCDMA 1700 and BTLE active simultaneously

	Technology	WCDMA 1700		Bluetooth LE	-/-
P	Max power	25.0 dBm		-5 dBm	Sum
G	Antenna gain	4.0 dBi		5 dBi	
S	MPE limit for uncontrolled exposure	2155 mW		2712 mW	
	Calculated output power:	794 mW		1 mW	
	Colocation WCDMA 1900 + Bluetooth LE	36.83 %		---	<u>36.87 %</u>
	Colocation WCDMA 1900 + Bluetooth LE	---		0.037 %	

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