



Maximum Permissible Exposure (MPE) & Exposure evaluation

Report identification number: 1-2337/21-01-13 MPE (FCC_ISED)

Certification numbers and labeling requirements	
FCC ID	2AGFACOMHAWKXT04
ISED number	20746-COMHAWKXT04
HVIN (Hardware Version Identification Number)	Verona GEN4
PMN (Product Marketing Name)	Verona Gen 4 / COMhawk xt
FVIN (Firmware Version Identification Number)	-/-
HMN (Host Marketing Name)	-/-

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EUT technologies:

Technologies:	Power Average Conducted [dBm]			Power ERP/EIRP ² [dBm]	Tune-Up Correction + ERP Correction ³ + GSM Correction ⁴ [dBm]	Max. Power for RF Exposure [dBm]
	Measured Value	Max. declared (Tune-Up)	Difference ¹ (Tune-Up Correction)			
E GPRS 850 MHz	31.5	33.0	1.5	29.0	-5.4	23.7
E GPRS 1900 MHz	28.8	30.0	1.2	28.7	-7.8	20.9
LTE FDD 2 1900 MHz	23.2	25.0	1.8	25.5	1.8	27.3
LTE FDD 4 1750 MHz	23.7	25.0	1.3	24.9	1.3	26.2
LTE FDD 5 850 MHz	23.3	25.0	1.7	24.5	3.9	28.4
LTE FDD 12 700 MHz	24.4	25.0	0.6	21.4	2.8	24.2
LTE FDD 13 700 MHz	21.9	23.0	1.2	22.5	3.3	25.8
LTE FDD 25 1900 MHz	23.5	25.0	1.5	25.4	1.5	26.9
LTE FDD 26 850 MHz	23.9	25.0	1.1	19.9	3.2	23.1
LTE TDD 41 2600 MHz	22.5	24.0	1.5	22.5	1.5	24.0
LTE FDD 66 2150 MHz	23.0	25.0	2.0	23.8	2.0	25.8
WLAN 2450 MHz	21.3	N/A	N/A	23.8*	N/A	23.8

¹Difference (Tune-Up Correction) = Max. declared conducted power (Tune-Up) – measured conducted Power

²Output power listed is ERP below 1 GHz and EIRP above 1 GHz

³ERP Correction: EIRP = 2.15 dB + ERP

⁴GSM Correction: 1/8 Time Slots → 10 log (1/8) = - 9.03 dB

*2.5 dBi antenna gain declared by customer

Test results in CTC advanced GmbH report:

1-2337_21-01-09 (WLAN)

1-2337_21-01-11 (LTE, conducted)

1-2337_21-01-11 (GSM)

1-2337_21-01-11 (WCDMA)

And Shenzhen STS Test Services Co., Ltd report:

STS2111044W01 (FCC, LTE)

STS2006043W02 (ISED, LTE)

Collocation overview:

Active scenario: Technology	1	2	3	4
E GPRS / LTE	x		x	
WLAN	x	x		

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
 R = Distance to the center of radiation of the antenna
 PG = Output Power including antenna gain

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)

Prediction: worst case

Technologies:		LTE	LTE	LTE	WLAN	
	Frequency (MHz)	700	850	1900	2450	
PG	Declared max power (EIRP)	25.8	28.4	27.3	23.8	dBm
R	Distance	20.0	20.0	20.0	20.0	cm
S	MPE limit for uncontrolled exposure	0.4667	0.5667	1.2667	1.0000	mW/cm ²
	Calculated Power density:	0.0757	0.1377	0.1069	0.0477	mW/cm ²
	Calculated percentage of Limit:	16.22%	24.30%	8.44%	4.77%	
Collocation:						
	Scenario 1: GSM / LTE + WLAN					
	Calculated percentage of Limit:	29.08%				

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 - ISED

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 $4.49/f^{0.5} \text{ W}$ (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 $1.31 \times 10^{-2} f^{0.6834} \text{ W}$ (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).

Prediction: worst case

		LTE FDD 5	LTE FDD 2	WLAN	
	Frequency	850	1900	2450	MHz
R	Distance	20	20	20	cm
PG	Maximum EIRP	28.4	27.3	23.8	dBm
PG	Maximum EIRP	691.8	537.0	239.9	mW
	Exclusion Limit from above:	1.32	2.28	2.71	W
	Calculated percentage of Limit:	52.57%	23.55%	8.84%	
	Collocation:				
	Scenario 1: LTE + WLAN 2.4 MHz	61.42%			
	Calculated percentage of Limit:				

Conclusion: RF exposure evaluation is not required.