

Appendix G:**MPE Calculation**

MPE calculation for the GEN 2 RF board (Product ID XRFMODULE-GEN2-915A1) only

2.1091 Radio frequency radiation exposure evaluation: mobile devices.

For purposes of these requirements mobile devices are defined by the FCC as transmitters designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimetres is normally maintained between radiating structures and the body of the user or nearby persons. These devices are normally evaluated for exposure potential with relation to the MPE limits. As the 20cm separation specified under FCC rules may not be achievable under normal operation of the EUT, an RF exposure calculation is needed to show the minimum distance required to be less than 1mW/cm² power density limit, as required under FCC rules.

Prediction of MPE limit at a given distance

Equation from page 19 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2} \text{ or } \frac{EIRP}{4\pi R^2} \text{ re-arranged} \quad R = \sqrt{\frac{PG}{S4\pi}} \text{ or } \sqrt{\frac{EIRP}{S4\pi}}$$

where:

S = power density (Limit) (in appropriate units, e.g. mW/cm²)

EIRP = equivalent (or effective) isotropically radiated power (mW)

R = distance to the center of radiation of the antenna (cm)

P = power input to the antenna (mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

(numeric gain. = $G = 10^{\frac{dB}{10}}$)

Sample No.	S01, S02 and S07	
Maximum peak output power at the antenna terminal:	14.56	dBm
Maximum peak output power at the antenna terminal:	28.57590543	mW
Antenna gain (typical):	2.78	dBi
Maximum antenna gain:	1.896705921	numeric
Prediction distance:	20	cm
Prediction frequency:	905.2	MHz

Result

Prediction Frequency (MHz)	Maximum EIRP (mW)	Power density limit f/1500 (S) (mW/cm ²)	Distance (R) cm required to be less than 0.603467 mW/cm ²
905.2	54.2	0.603467	2.673427585

Combined transmitter MPE calculation for the TRA-011281-W-US-01, GEN 2 RF board (Product ID XRFMODULE-GEN2-915A1) and FCC ID R17UC864G report number NK08R101 (Attachment MPE 2)

The RF exposure distance has been determined based on the most stringent of requirements of the power density limit. The power density limit has been calculated based on the operating frequency used by the GEN 2 RF board (Product ID XRFMODULE-GEN2-915A1) or the Telit UC864-G (FCC ID R17UC864G.).

RF Exposure Distance Report number TRA-011281-W-US-01 FCC ID YRUWMLN-915 and report number NK08R101 FCC ID R17UC864G														
TRA-011281-W-US-01 FCC ID YRUWMLN-915: GEN 2 RF board (Product ID XRFMODULE-GEN2-915A1)						FCC ID R17UC864G: GSM 850						Combined power (mW)	Power density limit 61500 (S) (mW/cm ²)	RF Exposure Distance (cm)
Channel	Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain (Numeric)	EIRP (mW)	Channel	Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain (Numeric)	EIRP (mW)			
0	905.2	14.56	28.58	1.896705921	54.20008903	128	824.2	32.13	1633.05	0.52	849.1670129			
						190	836.6	32.11	1625.55	0.52	845.295353			
						251	848.8	32.01	1588.55	0.52	826.0443093			
											903.3871019	0.549467	11.44	
											899.485442	0.557733	11.33	
											880.2443963	0.565867	11.13	
TRA-011281-W-US-01 FCC ID YRUWMLN-915: GEN 2 RF board (Product ID XRFMODULE-GEN2-915A1)						FCC ID R17UC864G: PCS 1900						Combined power (mW)	Power density limit 61500 (S) (mW/cm ²)	RF Exposure Distance (cm)
Channel	Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain (Numeric)	EIRP (mW)	Channel	Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain (Numeric)	EIRP (mW)			
0	905.2	14.56	28.58	1.896705921	54.20008903	512	1850.2	29.07	807.24	0.69	556.9921709			
						661	1880	29.13	818.46	0.69	564.7407038			
						810	1909.8	28.98	790.68	0.69	545.5682533			
											611.1922599	0.603467	8.98	
											618.9407928	0.603467	9.03	
											599.7683424	0.603467	8.89	
TRA-011281-W-US-01 FCC ID YRUWMLN-915: GEN 2 RF board (Product ID XRFMODULE-GEN2-915A1)						FCC ID R17UC864G: WCDMA Band V						Combined power (mW)	Power density limit 61500 (S) (mW/cm ²)	RF Exposure Distance (cm)
Channel	Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain (Numeric)	EIRP (mW)	Channel	Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain (Numeric)	EIRP (mW)			
0	905.2	14.56	28.58	1.896705921	54.20008903	4357	826.4	23.25	211.35	0.52	109.9014301			
						4408	836.6	22.98	198.61	0.52	103.2769357			
						4458	846.6	23.24	210.86	0.52	109.6486638			
											184.1015191	0.550933	4.87	
											157.4770247	0.557733	4.74	
											163.8487528	0.564400	4.81	
TRA-011281-W-US-01 FCC ID YRUWMLN-915: GEN 2 RF board (Product ID XRFMODULE-GEN2-915A1)						FCC ID R17UC864G: WCDMA Band II						Combined power (mW)	Power density limit 61500 (S) (mW/cm ²)	RF Exposure Distance (cm)
Channel	Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain (Numeric)	EIRP (mW)	Channel	Frequency (MHz)	Output power (dBm)	Output power (mW)	Antenna Gain (Numeric)	EIRP (mW)			
0	905.2	14.56	28.58	1.896705921	54.20008903	9262	1852.4	23.43	220.29	0.69	152.001926			
						9400	1880	23.14	206.06	0.69	142.183464			
						9538	1907.6	23	199.53	0.69	137.6730997			
											206.202015	0.603467	5.21	
											196.383553	0.603467	5.09	
											191.8731888	0.603467	5.03	