



MPE/RF EXPOSURE REPORT

FCC CFR 47 Part 1.1310

Report No; DIGI140-U7B Rev B

Company: Digi International Inc.

Model: XB3P9XR

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To: FCC CFR 47 Part 1.1310

Report Serial No.: DIGI140-U7B Rev B

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1. MAXIMUM PERMISSABLE EXPOSURE

Calculations for Maximum Permissible Exposure Levels

Power Density = P_d (mW/cm²) = $EIRP / (4 * \pi * d^2)$

$EIRP = P * G$

P = Peak output power (mW)

G = Antenna numeric gain (numeric)

d = Separation distance (cm)

Numeric Gain = $10^{(G \text{ (dBi)}/10)}$

The following assessment is made for the lowest gain antenna and for antennas with gain greater than 6 dBi. that are used with the Digi XBP9XR.

Freq. Band (MHz)	Transmit Frequency (MHz)	Ant Gain (dBi)	Numeric Gain (numeric)	Conducted Output Power (dBm)	Output Power (mW)	Power Density Limit (mW/cm ²)	Calculated Power Density (mW/cm ²) @ 20cm	Power Density Ratio	Min Calculated safe distance for Limit (cm)
902.0 – 928.0	902.5	0.80	1.20	29.98	995.41	0.60	0.238	0.396	12.58
902.0 – 928.0	902.5	8.00	6.31	28.00	630.96	0.60	0.792	1.316	22.95
902.0 – 928.0	902.5	15.00	31.62	21.00	125.89	0.60	0.792	1.316	22.95
2400.0 - 2483.5	2402.0	2.10	1.62	6.12	4.09	1.00	0.001	0.001	0.73
2400.0 - 2483.5	2402.0	19.00	79.43	6.12	4.09	1.00	0.065	0.065	5.09

Summary; Equipment does not meet the RF exposure requirements at a minimum separation distance of 20 cm when operating on 900 MHz band when antennas with gain greater than 6 dBi are used.

Calculation for 900 MHz radio operation using greater separation distance of 23 cm.

Freq. Band (MHz)	Transmit Frequency (MHz)	Ant Gain (dBi)	Numeric Gain (numeric)	Conducted Output Power (dBm)	Output Power (mW)	Power Density Limit (mW/cm ²)	Calculated Power Density (mW/cm ²) @ 23 cm	Power Density Ratio
902.0 – 928.0	902.5	8.00	6.31	28.00	630.96	0.60	0.599	0.995
902.0 – 928.0	902.5	15.00	31.62	21.00	125.89	0.60	0.599	0.995

Conclusion; A minimum separation distance of 23 cm is required to meet the RF exposure requirements as defined in Table 1 of FCC §1.1310 when using antennas over 6 dBi.

Assessment for simultaneous operation at distance of 23 cm; -

Freq. Band (MHz)	Transmit Frequency (MHz)	Ant Gain (dBi)	Numeric Gain (numeric)	Conducted Output Power (dBm)	Output Power (mW)	Power Density Limit (mW/cm ²)	Calculated Power Density (mW/cm ²) @ 23 cm	Power Density Ratio
902.0 – 928.0	902.5	8.00	6.31	28.00	630.96	0.60	0.599	0.995
2400.0 - 2483.5	2402.0	19.00	79.43	6.12	4.09	1.00	0.049	0.049
Summation of ratios								1.044

The Total Evaluation was calculated using the formula:

$$\sum_{i=1}^n E_i / E_{ref} \leq 1$$

Where

E_i: calculated E-field Strength for transmitter

E_{ref}: E-field strength related limit

Conclusion; Equipment does not meet the exposure limits limit for simultaneous transmission at separation distance of 23 cm when operating in the 900 MHz band usings antennas with over 6 dBi gain.

Assessment for simultaneous operation at distance of 24 cm; -

Freq. Band (MHz)	Transmit Frequency (MHz)	Ant Gain (dBi)	Numeric Gain (numeric)	Conducted Output Power (dBm)	Output Power (mW)	Power Density Limit (mW/cm ²)	Calculated Power Density (mW/cm ²) @ 23 cm	Power Density Ratio
902.0 – 928.0	902.5	8.00	6.31	28.00	630.96	0.60	0.550	0.914
2400.0 - 2483.5	2402.0	19.00	79.43	6.12	4.09	1.00	0.045	0.045
Summation of ratios								0.959

The Total Evaluation was calculated using the formula:

$$\sum_{i=1}^n E_i / E_{ref} \leq 1$$

Where

E_i: calculated E-field Strength for transmitter

E_{ref}: E-field strength related limit

Conclusion; Equipment meets the exposure limits for simultaneous transmission as defined in Table 1 of FCC §1.1310, at separation distance of **24 cm** when operating in the 900 MHz band using antennas with over 6 dBi gain.

Specification - Maximum Permissible Exposure Limits

The Limits are defined in Table 1 of FCC §1.1310.

The Limits for General Population/Uncontrolled Exposure apply.

Table 1 to [§ 1.1310\(e\)\(1\)](#)—Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(ii) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1,500			f/1500	<30
1,500-100,000			1.0	<30



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