

Prediction of MPE Limit
47 CFR § 2.1091

$$S_{20} = \frac{P_A G_N}{4\pi R_{20}^2}$$

$$S_C = \frac{P_A G_N}{4\pi R_C^2}$$

$$R_C = \sqrt{\frac{P_A G_N}{4\pi S_L}}$$

$$S_L = \frac{f}{1500} \text{ (mW/cm}^2\text{)}$$

S₂₀ = Power Density of the Device at 20cm

S_L = Power Density Limit

S_C = Power Density of the Device at the Compliance Distance R_C

R₂₀ = 20cm

R_C = Minimum Distance to the Radiating Element to Meet Compliance

P_T = Power Input to Antenna

P_A = Adjust Power

G_N = Numeric Gain of the Antenna

f = Transmit Frequency

Transmit Duty Cycle = 100%

Use Group = General Population

FCC ID:

2AC7Z-ESP32WROOM32E

S₂₀ at 20cm = 0.1730 (mW/cm²)

See Page 2

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QOQMGM12P0

S₂₀ at 20cm = 0.0030 (mW/cm²)

See Page 3

2AHQR-11500A

S₂₀ at 20cm = 0.1760 (mW/cm²)

S_L = 1.0000 (mW/cm²)

Power Density of Host = Sum of all simultaneous Power Densities

Power Density Limit = Lowest Limit Based on Frequency

FCC ID: 2AHQR-11500A

RESULT: PASS

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$$S_{20} = \frac{P_A G_N}{4\pi R_{20}^2}$$

$$S_C = \frac{P_A G_N}{4\pi R_C^2}$$

$$R_C = \sqrt{\frac{P_A G_N}{4\pi S_L}}$$

$$S_L = \frac{1}{} \text{ (mW/cm}^2\text{)}$$

S_{20} = Power Density of the Device at 20cm

S_L = Power Density Limit

S_C = Power Density of the Device at the Compliance Distance R_C

R_{20} = 20cm

R_C = Minimum Distance to the Radiating Element to Meet Compliance

P_T = Power Input to Antenna

P_A = Adjust Power

G_N = Numeric Gain of the Antenna

f = Transmit Frequency

Transmit Duty Cycle = 100%

Use Group = General Population

Transmit Duty Cycle:	100.00	(%)
Tx Frequency (f):	2412.00	(MHz)
RF Power at Antenna Input Port (P_T):	398.00	(mW)
Antenna Gain:	3.40	(dBi)
Numeric Antenna Gain (G_N):	2.19	(numeric)
Cable or Other Loss:	0.00	(dB)
Duty Cycle/Loss Adjusted Power (P_A):	398.00	(mW)

S_L =	1.000	(mW/cm ²)
S_{20} at 20cm =	0.173	(mW/cm ²)
R_C =	8.3	(cm)
S_C =	1.00	(mW/cm ²)

FCC ID: 2AC7Z-ESP32WROOM32E

RESULT: PASS

Prediction of MPE Limit
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$$S_{20} = \frac{P_A G_N}{4\pi R_{20}^2}$$

$$S_C = \frac{P_A G_N}{4\pi R_C^2}$$

$$R_C = \sqrt{\frac{P_A G_N}{4\pi S_L}}$$

$$S_L = \frac{1}{} \text{ (mW/cm}^2\text{)}$$

S_{20} = Power Density of the Device at 20cm

S_L = Power Density Limit

S_C = Power Density of the Device at the Compliance Distance R_C

R_{20} = 20cm

R_C = Minimum Distance to the Radiating Element to Meet Compliance

P_T = Power Input to Antenna

P_A = Adjust Power

G_N = Numeric Gain of the Antenna

f = Transmit Frequency

Transmit Duty Cycle = 100%

Use Group = General Population

Transmit Duty Cycle:	100.00	(%)
Tx Frequency (f):	2402.00	(MHz)
RF Power at Antenna Input Port (P_T):	9.14	(mW)
Antenna Gain:	2.14	(dBi)
Numeric Antenna Gain (G_N):	1.64	(numeric)
Cable or Other Loss:	0.00	(dB)
Duty Cycle/Loss Adjusted Power (P_A):	9.14	(mW)

S_L =	1.000	(mW/cm ²)
S_{20} at 20cm =	0.003	(mW/cm ²)
R_C =	1.1	(cm)
S_C =	1.00	(mW/cm ²)

FCC ID: QOQMGM12P0

RESULT: PASS