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TR-AP5A-N Test Report Appendix F – MFE Evaluation

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MFE Evaluation

FCC 1.1310 states the criteria listed in the table below shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter. Further information on evaluating compliance with these limits can be found in the FCC's OST/OET Bulletin Number 65, "Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radiofrequency Radiation."

Frequency Range (MHZ)	Electric Field Strength (V/m)	Magnetic Field Strength (A/M)	Power Density (mW/cm ²)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

9.1 Fries Formula

Fries transmission formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$ Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW.

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

R = the distance between the observation point and the center of the radiator in cm.

P_d is the limit of MPE, 1mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna we can calculate the distance r where the MPE limit is reached.

9.2 EUT Operating Condition

Software provided by the manufacturer enabled the EUT to transmit and receive data at the lowest, middle and highest channels individually.

The maximum antenna gain is 32.5 dBi for the TR-AP5A-N as stated by the manufacturer.

9.3 RF exposure evaluation distance calculation

TR-AP5A-N with 32 dBi antenna

Chan	Freq (MHz)	Output Power to Antenna (dBm)	Output Power to Antenna (mW)	Antenna Gain (dBi)	Antenna Gain	r (cm)
1	5745	15.65	37	33	1778.279	50.978
6	5785	16.61	46	33	1778.279	56.935
11	5825	16.89	49	33	1778.279	58.800

As shown above, the minimum distance where the MPE limit is reached is **59 cm** for the TR-AP5A-N.