EMT ELECTRO MAGNETIC TEST, INC.
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MPE Exclusion Statement

Per FCC §1.1310

MPE Evaluation Formula: $P_d = (P_r) / (4\pi r^2)$

Where,

P_d = Power Density (mW/cm^2)

P_r = Output Power in EIRP (mW) = $1*10^{((P_{out}+G)/10)}$

P_{out} = Conducted output power (dBm)

G = gain of antenna (dBi)

π = 3.141592654

r = distance between observation point and center of the radiator (cm)

FCC 47 CFR 1.1310 MPE Exclusion Calculation										
Antenna	Antenna Type	Tx	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	EIRP (mW)	Separation Distance (cm)	Worst Case (mW/cm^2)	Threshold (mW/cm^2)	Result
1	Dipole	2.4GHz	2462	13.26	6.70	99.08	20	0.02	1.0	Pass by Exclusion; Threshold Value is less than 1.0
2	Dipole	2.4GHz	2462	13.27	6.70	99.31	20	0.02	1.0	Pass by Exclusion; Threshold Value is less than 1.0
1	Dipole	U-NII 1	5230	13.88	6.70	114.29	20	0.03	1.0	Pass by Exclusion; Threshold Value is less than 1.0
2	Dipole	U-NII 1	5230	13.88	6.70	114.29	20	0.03	1.0	Pass by Exclusion; Threshold Value is less than 1.0
1	Dipole	U-NII 3	5745	18.93	7.80	470.98	20	0.10	1.0	Pass by Exclusion; Threshold Value is less than 1.0
2	Dipole	U-NII 3	5745	18.94	7.80	472.06	20	0.10	1.0	Pass by Exclusion; Threshold Value is less than 1.0

*Results are rounded to nearest 0.01

RSS-102 SAR exemption calculation

Summary:

Minimum typical separation distance between the antenna and the user = 3 Meters = 300 centimeters

Exemption limit from RSS-102 for routine evaluation based on frequency and separation distance for ≥ 300MHz ≤ 6GHz = **2.7219W** @ 2.462GHz, **4.5551W** @ 5.23GHz & **4.857W** @ 5.745GHz (see Appendix A)

EUT's EIRP with Dipole Antenna @ 2.462GHz= 0.0991 W (see EIRP calculation below)

EUT's EIRP with Dipole Antenna @ 5.23GHz= 0.1143 W (see EIRP calculation below)

EUT's EIRP with Dipole Antenna @ 5.745GHz= 0.4721 W (see EIRP calculation below)

0.0993W <2.7219W, 0.1143W < 4.5491W, and 0.4721W < 4.857W, therefore the EUT is exempt from routine SAR evaluation.

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EIRP Limit calculation:

@2.426GHz = $1.31*10^{-2}(2462^{0.6834})$ = 2.7219 W

@5.23GHz = $1.31*10^{-2}(5230^{0.6834})$ = 4.5551 W

@5.745GHz = $1.31*10^{-2}(5745^{0.6834})$ =4.857 W

EIRP calculation:

Dipole Antenna @2.462GHz

13.27 dBm peak conducted RF output power as measured using a method compliant with RSS-210

6.70 dBi peak antenna gain

EIRP = peak conducted RF power + peak antenna gain = 13.27 dBm + 6.70 dBi = 19.97dBm = 0.0993W

Dipole Antenna @5.23GHz

13.88 dBm peak conducted RF output power as measured using a method compliant with RSS-210

6.70 dBi peak antenna gain

EIRP = peak conducted RF power + peak antenna gain = 13.88 dBm + 6.70 dBi = 20.58dBm = 0.1143W

Dipole Antenna @5.745GHz

18.94dBm peak conducted RF output power as measured using a method compliant with RSS-210

7.80dBi peak antenna gain

EIRP = peak conducted RF power + peak antenna gain = 18.94dBm + 7.80 dBi = 26.74dBm = 0.4721W

Conclusion:

For our EUT transmitting at 5230 MHz with the dipole antenna, if we evaluate the EUT against the exemption limits at a distance of 3m (typical use case), the power at this distance must be below 4.5551W. 4.5551W – 0.1143W = 4.4408W of margin (pass).

For our EUT transmitting at 5745 MHz with the dipole antenna, if we evaluate the EUT against the exemption limits at a distance of 3m (typical use case), the power at this distance must be below 4.857W. 4.857W – 0.4721W = 4.3849W of margin (pass).

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Appendix A:

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310 and RSS-102: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b).

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits For Occupational / Control Exposures (f = frequency)				
30-300	61.4	0.163	1.0	6
300-1500	…	…	f/300	6
1500-100,000	…	…	5.0	6
(B) Limits For General Population / Uncontrolled Exposure (f = frequency)				
30-300	27.5	0.073	0.2	30
300-1500	…	…	f/1500	30
1500-100,000	…	…	1.0	30

Table 1-1. Limits for Maximum Permissible Exposure (MPE)

From RSS-102

2.5.2 Exemption Limits for Routine Evaluation — RF Exposure Evaluation

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[6] 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 $22.48/f^{0.5}$ 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 $1.31 \times 10^{-2}\ f^{0.6834}$ 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).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.