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RF MPE EXPOSURE

October 30, 2020
FCC ID: PWO460065

The MPE calculations for **EUT model 460065** signal booster were done for frequency bands:

- 700 MHz (Band 12)
- 700 MHz (Band 13)

Antennas recommended for the EUT:

Port	Frequency Range (MHz)	Antenna Product Number	Coax Product Number	Maximum Antenna Gain (dBi)	Minimum Coax Loss (dB)	Gain – Coax Loss (dB)	Gain - Coax Loss (unitless)
Donor	698-716	314475	950630	7.5	2.6	4.9	3.1
Donor	777-787	314475	950630	7.5	2.6	4.9	3.1
Server	728-746	311236	N/A	2.0	0.0	2.0	1.6
Server	746-756	311236	N/A	2.2	0.0	2.2	1.7

*Maximum antenna gain and minimum cable losses were selected to compute “worst case” limit and are indicated in the antenna kitting specification for model 460065

EUT Operating Limits

Limits for Uncontrolled Exposure
47 CFR 1.1310 Table 1(B)

Frequency Range (MHz)	Limit (mw/cm^2)
0.3-1.234	100
1.24-30	180/f^2
30-300	0.2
300-1500	f/1500
1500-100,000	1

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EUT Operating Limits Evaluation

Port	Frequency Range (MHz)	EUT Maximum Output power (dBm)	EUT Maximum Output power (mw)	Gain - Coax Loss (unitless)	Power density limit (mw/cm^2)	Power density evaluation (mw/cm^2)	Minimum safe distance (cm)
Donor	698-716	24.3	269.15	3.1	0.47	0.165	20
Donor	777-787	23.0	199.53	3.1	0.52	0.123	20
Server	728-746	11.7	14.79	1.6	0.49	0.005	20
Server	746-756	12.9	19.50	1.7	0.50	0.006	20

*The lowest frequency in each band was used to compute the "worst case" limit.

NOTE: Simultaneous transmission does not apply to consumer boosters as the output power is capped at 30 dBm EIRP regardless of how many signals are present.

EUT Power Density Evaluation

Calculated power density - Uplink:

Band 12 (698-716 MHz)
Power density is calculated using maximum uplink transmitted power of 269.15 mw and unitless antenna gain less coax loss of 3.1

$$S = \frac{P_t G}{4\pi r^2} = \frac{(269.15)(3.1)}{4\pi 20^2} = 0.165\ (mw/cm^2)$$

$S = Power\ Density\ (mw/cm^2)$
$P_t = Transmitter\ Power\ (mw)$
$G = Antenna\ Gain\ (nonlog) * Coax\ Loss\ (nonlog) * duty\ cycle\ (\%)$
$r = Distance\ to\ center\ of\ radiation\ of\ antenna\ (cm)$

At the minimum safe distance of 20 cm, the power density of the EUT is $0.165\ (mw/cm^2)$, which is less than the operational limit of 0.47 (mw/cm^2). Therefore, no minimum safe distance calculation is required.

Band 13 (777-787 MHz)
Power density is calculated using maximum uplink transmitted power of 199.53 mw and unitless antenna gain less coax loss of 3.1

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$$S = \frac{P_t G}{4\pi r^2} = \frac{(199.53)(3.1)}{4\pi 20^2} = 0.123\ (mw/cm^2)$$

$S = Power\ Density\ (mw/cm^2)$
$P_t = Transmitter\ Power\ (mw)$
$G = Antenna\ Gain\ (nonlog) * Coax\ Loss\ (nonlog) * duty\ cycle\ (\%)$
$r = Distance\ to\ center\ of\ radiation\ of\ antenna\ (cm)$

At the minimum safe distance of 20 cm, the power density of the EUT is $0.123\ (mw/cm^2)$, which is less than the operational limit of 0.52 (mw/cm^2). Therefore, no minimum safe distance calculation is required.

Calculated power density - Downlink:

Band 12 (728-746 MHz)
Power density is calculated using maximum downlink transmitted power of 14.79 mw and unitless antenna gain less coax loss of 1.6

$$S = \frac{P_t G}{4\pi r^2} = \frac{(14.79)(1.6)}{4\pi 20^2} = 0.005(mw/cm^2)$$

$S = Power\ Density\ (mw/cm^2)$
$P_t = Transmitter\ Power\ (mw)$
$G = Antenna\ Gain\ (nonlog) * Coax\ Loss\ (nonlog) * duty\ cycle\ (\%)$
$r = Distance\ to\ center\ of\ radiation\ of\ antenna\ (cm)$

At the minimum safe distance of 20 cm, the power density of the EUT is $0.005\ (mw/cm^2)$, which is less than the operational limit of 0.49 (mw/cm^2). Therefore, no minimum safe distance calculation is required.

Band 13 (746-756 MHz)
Power density is calculated using maximum downlink transmitted power of 19.50 mw and unitless antenna gain less coax loss of 1.7

$$S = \frac{P_t G}{4\pi r^2} = \frac{(19.50)(1.7)}{4\pi 20^2} = 0.006\ (mw/cm^2)$$

$S = Power\ Density\ (mw/cm^2)$

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$$P_t = Transmitter\ Power\ (mw)$$
$$G = Antenna\ Gain\ (nonlog) * Coax\ Loss\ (nonlog) * duty\ cycle\ (\%)$$
$$r = Distance\ to\ center\ of\ radiation\ of\ antenna\ (cm)$$

At the minimum safe distance of 20 cm, the power density of the EUT is $0.006\ (mw/cm^2)$, which is less than the operational limit of 0.50 (mw/cm^2). Therefore, no minimum safe distance calculation is required.

END OF REPORT