RF Exposure / MPE Calculation

No.	:	13973200H
Applicant	:	SHIMANO INC.
Type of Equipment	:	Rear Derailleur
Model No.	:	3HY1
FCC ID	:	WY7-3HY1

SHIMANO INC. declares that Model: 3HY1 complies with FCC radiation exposure requirement specified in the FCC Rule 2.1091 (for mobile).

RF Exposure Calculations:

The following information provides the minimum separation distance for the highest gain antenna provided with the "3HY1" as calculated from (B) Limits for General Population / Uncontrolled Exposure of TABLE 1- LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE) of §1.1310 Radiofrequency radiation exposure limits.

[SHIMANO ORIGINAL]

This calculation is based on the highest EIRP possible from the system, considering maximum power and antenna gain, and considering a 1mW/cm^2 uncontrolled exposure limit. The Friis formula used was:

$$S = \frac{P \times G}{4 \times \pi \times r^2}$$

Where

$P =$ 5.48 mW (Maximum average output power)

☐ Time average was used for the above value in consideration of 6-minutes time-averaging

☑ Burst power average was used for the above value in consideration of worst condition.

$G =$ 0.537 Numerical Antenna gain; equal to -2.7dBi

$r =$ 20 cm (Separation distance)

Power Density Result $S =$ 0.00059 mW/cm^2

[Bluetooth Low Energy]

This calculation is based on the highest EIRP possible from the system,
considering maximum power and antenna gain, and considering a 1mW/cm^2 uncontrolled
exposure limit. The Friis formula used was:

$$S = \frac{P \times G}{4 \times \pi \times r^2}$$

Where

P = 2.12 mW (Maximum average output power)

☐ Time average was used for the above value in consideration of 6-minutes time-averaging

☑ Burst power average was used for the above value in consideration of worst condition.

G = 0.427 Numerical Antenna gain; equal to -3.7dBi

r = 20 cm (Separation distance)

Power Density Result S = 0.00018 mW/cm^2

[ANT+]

This calculation is based on the highest EIRP possible from the system,
considering maximum power and antenna gain, and considering a 1mW/cm^2 uncontrolled
exposure limit. The Friis formula used was:

$$S = \frac{P \times G}{4 \times \pi \times r^2}$$

Where

P = 2.12 mW (Maximum average output power)

☐ Time average was used for the above value in consideration of 6-minutes time-averaging

☑ Burst power average was used for the above value in consideration of worst condition.

G = 0.427 Numerical Antenna gain; equal to -3.7dBi

r = 20 cm (Separation distance)

Power Density Result S = 0.00018 mW/cm^2

Therefore, if SHIMANO ORIGINAL and Bluetooth Low Energy transmit simultaneously,

S= **0.00059 mW/cm^2** + **0.00018 mW/cm^2**

= **0.00077 mW/cm^2**

Therefore, if SHIMANO ORIGINAL and ANT+ transmit simultaneously,

S= **0.00059 mW/cm^2** + **0.00018 mW/cm^2**

= **0.00077 mW/cm^2**

Even taking into account the tolerance, this device can be satisfied with the limits.