

RF Exposure / MPE Calculation

No.	14911698S
Customer	ALPS ALPINE CO., LTD.
Description of EUT	Head unit
Model Number of EUT	AH00ICB
FCC ID	A269ZUA165

ALPS ALPINE CO., LTD. declares that Model: AH00ICB 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 "AH00ICB" 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.

[Bluetooth part]

This calculation is based on the highest EIRP possible from the system, considering maximum power and antenna gain, and considering a 1mW/cm² uncontrolled exposure limit. The Friis formula used was:

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

Where

$P =$ 0.82 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.

$G =$ 0.955 Numerical Antenna gain; equal to -0.2 dBi

$r =$ 20 cm (Separation distance)

Power Density Result $S =$ **0.00016 mW/cm²**

[Bluetooth low energy part]

This calculation is based on the highest EIRP possible from the system, considering maximum power and antenna gain, and considering a 1 mW/cm² uncontrolled exposure limit. The Friis formula used was:

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

Where

$P =$ 2.40 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.

$G =$ 0.955 Numerical Antenna gain; equal to -0.2 dBi

$r =$ 20 cm (Separation distance)

Power Density Result $S = 0.00046 \text{ mW/cm}^2$

[Wireless LAN 2.4 GHz band]

This calculation is based on the highest EIRP possible from the system, considering maximum power and antenna gain, and considering a 1 mW/cm² uncontrolled exposure limit. The Friis formula used was:

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

Where

$P =$ 25.06 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.

$G =$ 0.955 Numerical Antenna gain; equal to -0.2 dBi

$r =$ 20 cm (Separation distance)

Power Density Result $S = 0.00476 \text{ mW/cm}^2$

[WLAN 5 GHz band part]

This calculation is based on the highest EIRP possible from the system, considering maximum power and antenna gain, and considering a 1mW/cm² uncontrolled exposure limit. The Friis formula used was:

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

Where

$P =$ 11.46 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.

$G =$ 1.866 Numerical Antenna gain; equal to 2.71 dBi

$r =$ 20 cm (Separation distance)

$$\text{Power Density Result } S = 0.00426 \text{ mW/cm}^2$$

This calculation was made to show that the EUT complies with the limit in simultaneous transmitting of Wireless LAN (5 GHz band) and Wireless LAN (2.4 GHz band) and Bluetooth and Bluetooth Low Energy.

$$S1 = (P1 \times G1) + (P2 \times G2) + (P4 \times G4) / (4 \times \pi \times r^2)$$
$$S2 = (P1 \times G1) + (P3 \times G3) + (P4 \times G4) / (4 \times \pi \times r^2)$$

Where

$P1 =$ 11.46 mW (Maximum average output power) *1)
 $P2 =$ 0.82 mW (Maximum average output power) *2)
 $P3 =$ 2.40 mW (Maximum average output power) *3)
 $P4 =$ 25.06 mW (Maximum average output power) *4)

$G1 =$ 1.87 Numerical Antenna gain; equal to 2.71 dBi *1)
 $G2 =$ 0.95 Numerical Antenna gain; equal to -0.20 dBi *2)
 $G3 =$ 0.95 Numerical Antenna gain; equal to -0.20 dBi *3)
 $G4 =$ 0.95 Numerical Antenna gain; equal to -0.20 dBi *4)

$r =$ 20.0 cm

For: AH001CB (Wireless LAN (5 GHz band and 2.4 GHz band) and Bluetooth)

$$S1 = 0.00917 \text{ mW/cm}^2$$

For: AH001CB (Wireless LAN (5 GHz band and 2.4 GHz band) and Bluetooth LE

$$S2 = 0.00947 \text{ mW/cm}^2$$

*1) Wireless LAN (5 GHz band) value

*2) Bluetooth value

*3) Bluetooth LE value

*4) Wireless LAN (2.4 GHz band) value