

## RF EXPOSURE TEST

**FCC ID: 2ABNA-TRM100**

**IC : 11648A-TRM100**

### Applied procedures / limit

These devices are not exempted from compliance does not exceed the Commission's RF exposure guidelines. Unless a device operates at substantially low power levels, with a low gain antenna(s), supporting information is generally needed to establish the various potential operating configurations and exposure conditions of a transmitter and its antenna(s) in order to determine compliance with the RF exposure guidelines.

In order to demonstrate compliance with MPE requirement (see Section 2.1091), the following information is typically needed:

Calculation that estimates the minimum separation distance (20 cm or more) between an antenna and persons required to satisfy power density limits defined for free space.

Antenna installation and device operating instructions for installers (professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement

Any caution statements and/or warning labels that are necessary in order to comply with the exposure limits Any other RF exposure related issues that may affect MPE compliance.

FCC 1.1310: 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).

### (A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

### (B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; \*Plane-wave equivalent power density

## MPE CALCULATION METHOD

Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi r^2} = \frac{EIRP}{4\pi r^2}$$

P :power input to the antenna in Mw

EIRP :Equivalent(effective) isotropic radiated power.

S :power density mW/ cm<sup>2</sup>

G ;numeric gain of antenna relative to isotropic radiator

R :distance to centre of radiation in cm

FCC radio frequency exposure limits may be exceeded at distances closer than r cm from the antenna of this device

$$r = \sqrt{\frac{PG}{4\pi S}} = \sqrt{\frac{EIRP}{4\pi S}}$$

EIRP=10<sup>(Antenna Gain+Peak Output Power/10)</sup>

Note:

1. s=1.0 mW /cm<sup>2</sup> for limits for General Population/Uncontrolled Exposures.
2. The time averaged power over 30 minutes will be equaled Output Power.
3. The Power Density at a distance of 20cm calculated from the formula is far below the limit of 1MW/ cm<sup>2</sup>

Tune-up power:

**410.5 MHz: 29.1~30.1dBm**

**469.5MHz: 29.1~30.1dBm**

### MPE calculate

Frequency bands	The maximum sourced based time-averaged transmit power(dBm)	Antenna Gain	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Power Density Limit (mW/cm <sup>2</sup> )	PASS/Fail
410.5 MHz	30.1(1023mW)	4dBi(2.512)	30	0.227	0.273	PASS
469.5MHz	30.1(1023mW)	4dBi(2.512)	30	0.227	0.313	PASS

**For Max allowed antenna calculate:**

### MPE calculate

Frequency bands	The maximum sourced based time-averaged transmit power(dBm)	Distance (cm)	Power Density Limit (mW/cm <sup>2</sup> )	Max allow antenna gain (dBi)
410.5 MHz	30.1(1023mW)	30	0.273	4.79
469.5MHz	30.1(1023mW)	30	0.313	5.39

The antenna under test with gain 4 dBi .

Output power is conducted. This device is to be used in mobile or fixed applications only. Antenna gain including cable loss must not exceed **4.79** dBi for the purpose of satisfying the requirements of 2.1043 and 2.1091. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least **30cm** from all persons and must not be co-located or operated in conjunction with any antenna or transmitter not described under this FCC id. The final product operating with this transmitter must include operating instructions and antenna installation instructions, for end-users and installers to satisfy RF exposure compliance requirements.