

FCC RF Exposure

FCC ID: 2ACRAHX-TS103

Applicant: HARXON CORPORATION

Exposure category: General population/uncontrolled environment

EUT Type: Smart Antenna

Refer Standard: FCC Part 2.1091: Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)

KDB 447498 D01

FCC MPE Limited:

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

Test Data

Predication of MPE limit at a given distance

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

Where: S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (30cm)

Antenna Gain information

Antenna Gain for 410MHz-470MHz: 4dBi

Antenna Gain for BT:1dBi

Maximum Conduct Power & Manufacturing tolerance

Test mode	Frequency (MHz)	Max. RF Power(dBm)	Tolerance \pm (dB)
GMSK	410.125	29.07	29 \pm 1
	440.125	28.21	29 \pm 1
	469.125	28.96	29 \pm 1
4FSK	410.125	29.24	29 \pm 1
	440.125	28.44	29 \pm 1
	469.125	29.13	29 \pm 1
GFSK (Bluetooth)	2441	2.6	2 \pm 1

Calculation results: pass

Mode	Frequency (MHz)	Maximum tune up power(dBm)	ANT Gain(dBi)	RF distance(cm)	Result (mW/cm ²)	Limit (mW/cm ²)	Ratio
GMSK	410.125	30	4	30	0.222	0.273	0.813
	440.125	30	4	30	0.222	0.293	0.758
	469.125	30	4	30	0.222	0.313	0.709
4FSK	410.125	30	4	30	0.222	0.273	0.813
	440.125	30	4	30	0.222	0.293	0.758
	469.125	30	4	30	0.222	0.313	0.709
GFSK (Bluetooth)	2441	3	1	30	0.0002	1	0.002

Simultaneous transmission MPE evaluation

For multiple collocated transmitters operating simultaneously in frequency bands where different limit apply

The power density at the specified separation distance is calculated for each transmitter according to the KDB447498 D01, the fraction of the exposure limit is calculated for each transmitter as (Power Density of transmitter)/(Limit applicable to that transmitter) ≤ 1

Max Simultaneous MPE calculation results:

No.	Simultaneous MPE Ratio	Results
1	0.815	0.815 < 1.0 (pass)