

4. RF exposure statement

According to FCC Part1 Section 1.1307, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to FCC Part1 Section 1.1310 and 2.1091 RF exposure is calculated by Friis transmission formula.

Frequency Range [MHz]	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm ²]	Averaging Time [minute]
Limits for General Population/Uncontrolled Exposure				
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

Limits for General Population/Uncontrolled Exposure

Here, f = frequency in MHz

4.1 Friis transmission formula

$$P_d = (P_{out} \times G) / (4\pi r^2)$$

P_d = Power density

P_{out} = power input to antenna

G = power gain

r = distance to the center of radiation of the antenna

4.2 Information of Antenna

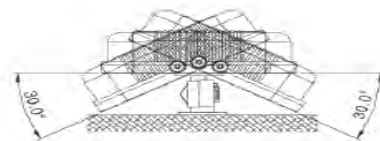
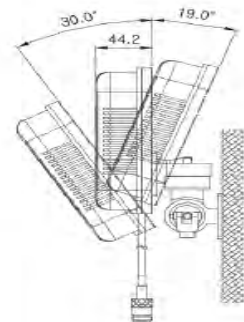
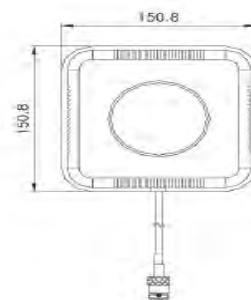
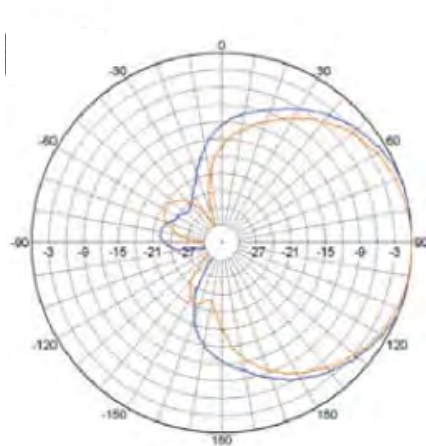
The Coaxial Cable is used for RF distribution to the Service Antenna (8 dBi gain) from USHR-700L and to the Donnor Antenna (9 dBi gain) from USHR-700L.

- **Model Name : PAT-CPWI-L (Service antenna)**



Antenna Gain;

- 698 MHz – 787 MHz : 4 dBi



- **Model Name : TS260771 (Service antenna)**



- **Antenna Gain**
- **698 MHz – 787 MHz : 8 dBi**

- **Model Name : TS250374 (Service antenna)**



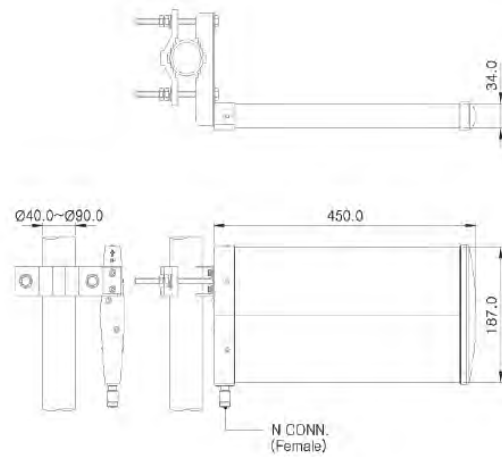
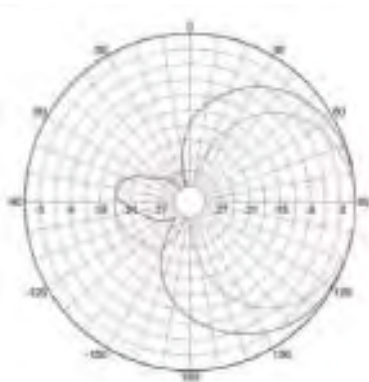
- **Antenna Gain**
- **698 MHz – 787 MHz : 5 dBi**

• **Model Name : ALP-17QD-L (Donor antenna)**



Antenna Gain;

- 698 MHz – 787 MHz : 6 dBi



- **Model Name : TS210471 (Donor antenna)**



Antenna Gain

- **698 MHz – 787 MHz : 4.5 dBi**

- **Model Name : TS220971 (Donor antenna)**



Antenna Gain

- **698 MHz – 787 MHz : 9 dBi**

4.3 Calculation of MPE at 20 cm

Band	Link	Frequency [MHz]	Output power [dBm]	Antenna gain [dBi]	Cable loss [dBi]	EIRP		Power density [mW/cm ²]	Limit [mW/cm ²]
						[dBm]	[mW]		
Band 12	Down	739.9	2.27	+8.00	-0.90	9.37	8.64	0.001 721 7	0.493 267
	Up	701.8	21.70	+9.00	-1.80	28.90	776.24	0.154 507 8	0.467 867
Band 13	Down	750.2	1.73	+8.00	-0.90	8.83	7.63	0.001 520 4	0.500 133
	Up	781.4	22.23	+9.00	-1.80	29.43	877.00	0.174 562 3	0.520 933

• Band 12

The maximum conducted power is 21.70 dBm; antenna is fix-mounted with a maximum gain and cable loss of 7.2 dBi gain.

Therefore, to comply with RF Exposure Requirement, the MPE is calculated.

The maximum Peak EIRP calculated is 28.90 dBm.

The Power Density can be calculated using the formula

It is considered that 20 cm is the minimum distance that a user can go closer to the EUT.

At 0.2 m, $S = 0.154 \text{ mW/cm}^2$, which is below the MPE Limit of 0.467 mW/cm^2

• Band 13

The maximum conducted power is 22.23 dBm; antenna is fix-mounted with a maximum gain and cable loss of 7.2 dBi gain.

Therefore, to comply with RF Exposure Requirement, the MPE is calculated.

The maximum Peak EIRP calculated is 29.43 dBm.

It is considered that 20 cm is the minimum distance that a user can go closer to the EUT.

At 0.2 m, $S = 0.174 \text{ mW/cm}^2$, which is below the MPE Limit of 0.520 mW/cm^2

• Band 12 + Band 13

Power density on up link side for Band 12 and Band 13 are 9.98 % and 10.38 % of the limit, so combined they are still well below 100 % of the limit.