

Pawport- Smart Pet Tag Operation

Product Description

See website for a more visual description of the product <https://pawport.com/>.

The Smart Pet Tag is used with the Pawport Smart Pet Door and communicates presence and distance via Ultra-Wide Band Transceivers. The door is a smart, motorized pet door for homes that can either slide onto existing pet door frames on the inside or come as a complete system with inside and external doors. The complete system is for people without an existing pet door. It is available in a number of different colors and three different sizes (small, medium and large). All models use the same electronics. Figure 1 shows an installation of the full system. The version that slides onto existing pet doors would be minus the external door.

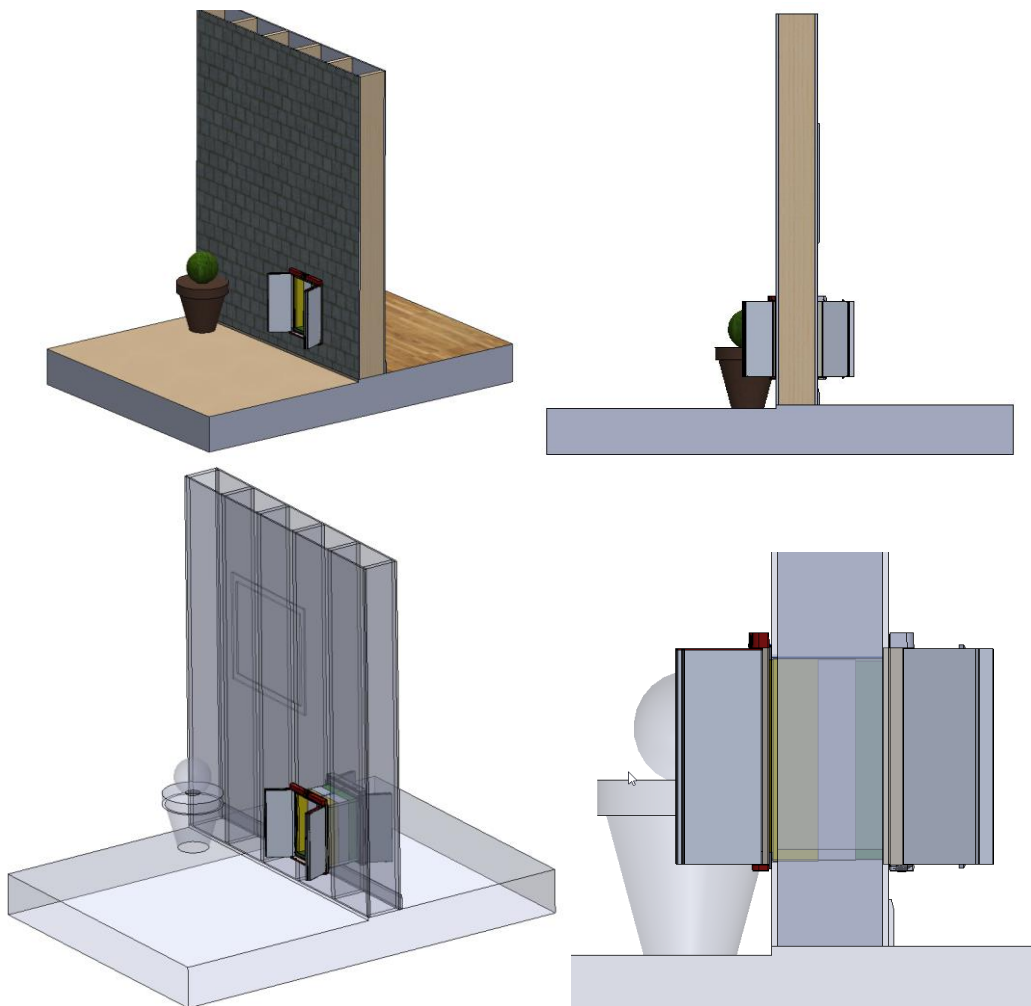


Figure 1. Full System Installation

UWB Transceivers Uses and Locations

The smart pet doors will open/close when the Smart Pet Tag is in a defined proximity of the doors using very low power UWB transceivers. The pet tag and sensors use the Spark SR1120 for the UWB transceiver, detecting proximity and Time of Flight. The SR1120 operates in the UWB spectrum with the fundamental emissions contained in the 5925–7250 MHz frequency band. It has a UWB PHY layer compliant with IEEE 802.15.4ab draft-clause 33 (see Spark SR1120 datasheet for more detailed operation).

Figure 2 shows a high-level block diagram of the complete system (inside and external doors). As discussed previously, the smart pet door can be used with just the inside doors or both the inside and external doors. The external doors are powered from the inside doors and cannot operate on their own. The transceivers are shown in orange and mounted on the boards shown in green.

The pet will wear the Pet Tag on its collar which has a UWB transceiver in it. There are 2 UWB transceivers in the inside door. They are both identical boards, just used in different places as shown below. One is orientated to detect pets from the inside of the home and the other is orientated to detect pets from the outside of the home. All transceivers have their own antenna on the board they are located on (no sharing of antennas). All transceivers are operating at the same time. The Pet tag transceiver is advertising all of the time and the 2 transceivers in the door are listening all of the time.

When there is an external door installed with the inside door, the UWB external board is used to detect the pet from the outside. The UWB sensor located in the left inside door is disabled. That means that there are only 2 UWB sensors operating for the doors at any given time.

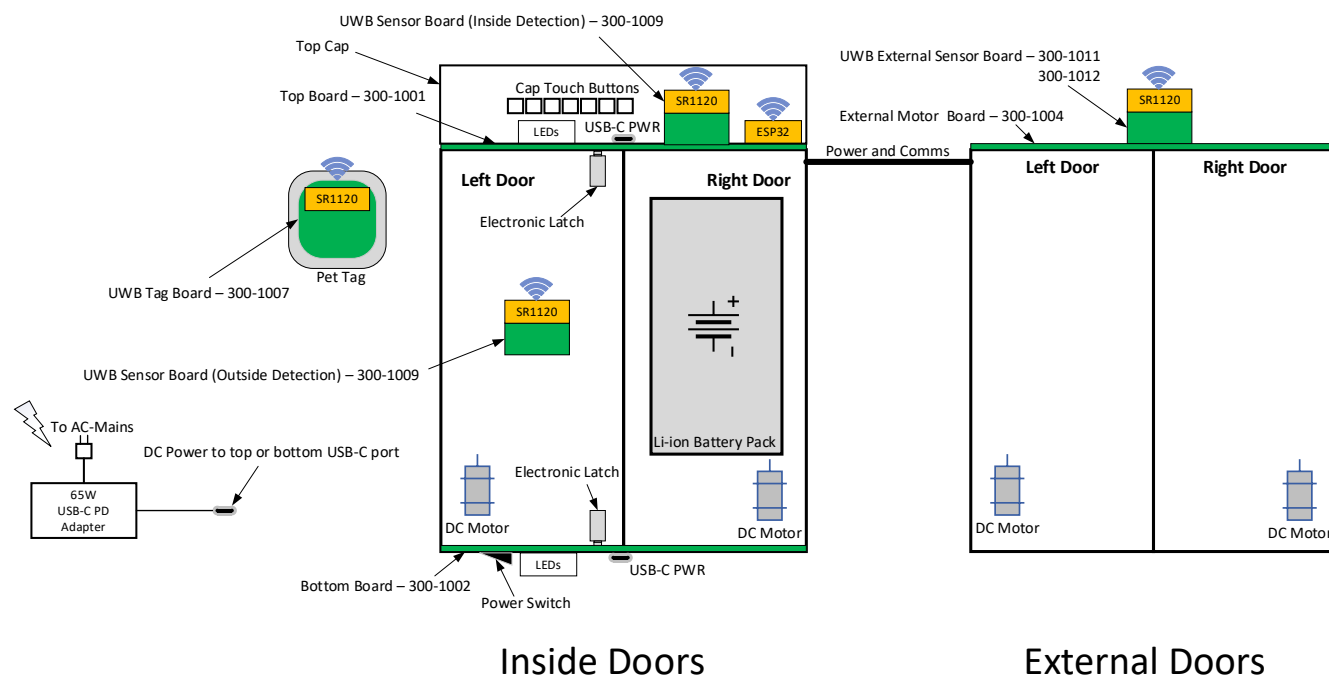


Figure 2. Pawport High-Level Block Diagram (Complete System)

UWB Operation

The UWB Pet Tag transmits short burst(~2ms) every 500 milliseconds to advertise its presence. The UWB transceivers in the door are not transmitting continuously. They are setup as hubs that listen for the Pet Tag when it is in range. When the Pet Tag is in range (~150cm or less), the hubs and tag transmit/receive to determine ranging. When the Pet Tag is in a predefined range, the pet doors will open. Just to clarify, only the Pet Tag is continuously transmitting. The transceivers in the doors only transmit when the Pet Tag is in range (~150cm or less).

UWB Pet Tag Board

The UWB Pet Tag board is 26mmx26mm board that uses the Spark SR1120 for the UWB transceiver and an MCU to control and configure it. It uses a ceramic antenna that is mounted on the board. With an average gain of -0.5dBi. There is an accelerometer used to detect pet movement. It is powered with a CR2050 Lithium coin cell battery. Figure 3 illustrates the block diagram for the UWB Pet Tag Board. It is enclosed in a plastic waterproof casing.

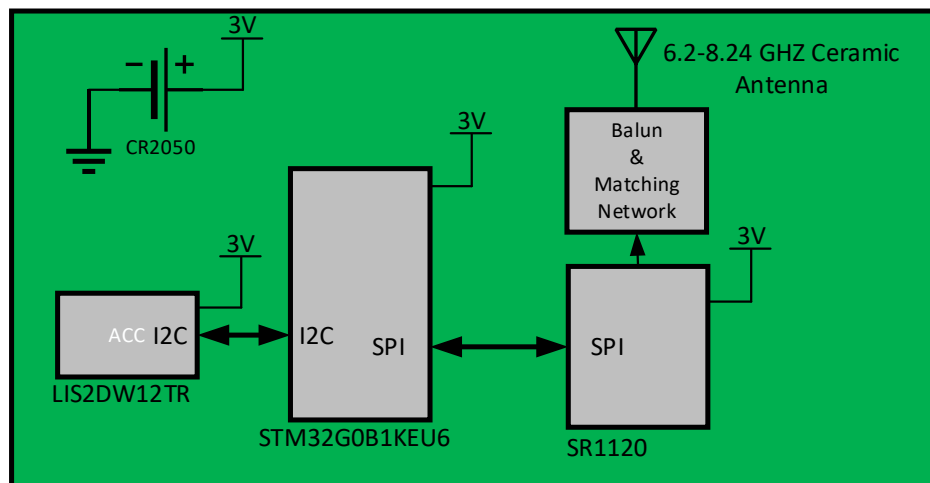


Figure 3. UWB Pet Tag Board Block Diagram

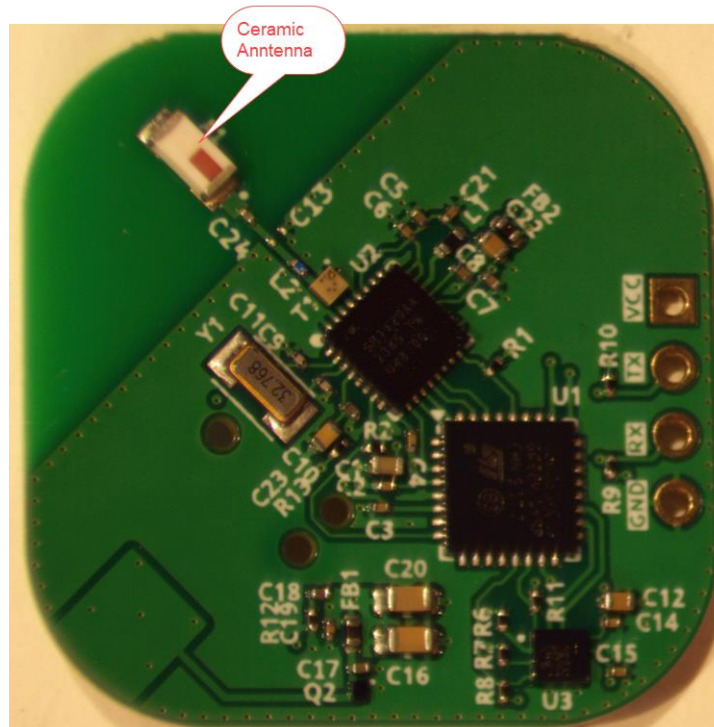


Figure 4. Antenna Location



P/N: 7000AT18A1600002E

Legacy P/N: 7000AT18A1600E-AEC

7 GHz UWB RF Chip Antenna, AEC-Q200 Qualified

- 6.2 – 8.24 GHz operational frequency
- For UWB Ch 5 to 9 applications
- SMD, EIA 1206
- Corner mount
- RoHS compliant

Johanson Technology, Inc. (JTI) miniature RF ceramic chip antennas are made using Low Temperature Co-fired Ceramic (LTCC) technology which has the ability to embed low and high dielectric constants inside our antenna. This enables our components to have high detuning resilience and stability over extreme temperatures (~2ppm).



Recommended mounting locations for this antenna



General Specifications^{1 2}

Passband Frequency (MHz)	6200 - 8240
Impedance (Ω)	50
Return Loss (dB)	9.5 Min.
Peak Gain (dBi)	2.0 Typ.
Average Gain (dBi)	-0.5 Typ.
Average Radiated Efficiency (%)	71

Figure 5. Ceramic Antenna Specifications