



Track C (WPT; Wireless Power Transfer): WPT Mini 4WD 400-cm Drag Race World Championship 2018

Requirement for applicants: students and young engineers; team entry is allowed

Abstract

Create your masterpiece, bring it to APMC 2018, and join our competition! Your system shall consist of a DC-to-RF power converter, a wireless coupler, and a miniature model car converted from battery base into WPT driven. We provide a DC power supply and mechanical stuff for a set of 400-cm twin roadway courses on site.

We welcome students as well as young engineers to our competition. There is no age limit.

1. Configuration of the Competition

- The competition will be done in either a tournament or a round-robin battle depending upon the number of competitors. Each game is a one-versus-one drag race.
- Prepare your system so that you can set it up promptly on site within your allotted time slot. You will be notified about the precise time schedule in the final announcement.
- Use one DC power supply, which will be prepared by the competition organizer.
- At the beginning of each game, you can adjust the DC power supply at your favorite voltage within the common specified range. You can also do so for the DC current limitation.
- To let the two competing cars start exactly at the same time, we use dual DC switches with a common turn-on mechanism that synchronizes two DC power supplies even for independent voltages and currents. The turn on is executed by our staff member. Also we measure your start-to-finish time by an automatic scoring clock for accurate record.
- If the car has a power switch onboard, it is supposed to be turned ON before starting the race.
- During the race, no one can touch the cars, power supplies, converters, courses, bridge girders, or any other part of the system pertaining the race.
- The car shall be placed so that its front end keeps behind the starting line.
- The finish line is drawn 400 cm far away from the starting line.
- The time of finish is defined as when the sensors detects that the front end of the car reaches the finish line.
- The car that reaches the finish line in the shorter amount of time than the other wins.
- However, if neither car reaches the finish line within one minute after starting, one that runs longer distance wins.
- In addition to the automatic scoring clock, when necessary, the judgment may be visually done by an officer or using a motion picture.
- After your race, you have to clean up your system and restore everything we provided. That must



be done within the specified time.

Remarks:

- The rules may be added or changed.
- See the latest information at the APMC 2018 website (<http://www.apmc2018.org/>).
- All students and WPT lovers are eligible to enter this competition! There is no age limit.
- You can take part as an individual or as a member of a team. In any case, registration fee is needed for each person to enter the venue.

2. System components:

2.1. We provide:

- DC power supply (maximum voltage 18 V and maximum current 2 A)
- Start switch (to control the DC power supply)
- 400 cm straight course made of a plastic cardboard (Fig. 1)
- Time measurement instrument
- Bridge girder (made by foam material)

2.2. You bring up:

- RF power transmitter (DC-to-RF power converter, cables, primary coil or electrode, etc.)
- Miniature model car (including RF power receiver)
- Curing tapes, clips, ribbons, etc. to help assemble your system on site.

Remarks:

- You have to hand carry everything you need to the venue.
- Never send any stuff via delivery agents such as EMS to the venue.
- In fabrication and remodeling of your system you must be careful enough for safety of yourself and others. You are supposed to take all the responsibility of any trouble caused by what you bring.

3. Restrictions on RF power transmitter and miniature model car:

3.1. Entire system:

- Put your RF power transmitter within the blue lines shown in Fig. 2.
- Put your car within the red lines shown in Fig. 2.
- You must set up your system in a way after your race, you have to clean up your system and restore everything we provided. Never leave damages on the course, bridge girder, or floor.
- The course shall be set 0 to 200 mm in height above the floor. See Fig. 2.
- The starting position must not be higher than the finish.
- You may be required to disclose the inside of your system to show that it actually meets our regu-



lations.

3.2. RF power transmitter:

- You cannot use any other power but only the DC power supply we provide.
- You can use any frequency between 45 Hertz and 3 THz for WPT.
- You can create the transmitter by yourself, or employ commercial products or those you modified.
- You must put the transmitter within the blue dotted line shown in the top view in Fig. 3.
- The course can be supported by a bridge girder or alternative structure beneath the course and on the floor. We provide bridge girders with a height 100 mm. You can also lay the course directly on the floor without using girders.
- The transmitter must not involve any mechanically driven mechanisms.

3.3. Miniature model car:

- The body must be based on the “Mini 4WD” series supplied from TAMIYA corporation. For detail, visit website.

(<http://www.tamiya.com/english/mini4wd/m4item/m4item.htm>)

- The car shall be powered only in electromagnetic energy that is wirelessly transmitted. Other energy is prohibited for powering and also controlling the car.
- The number of driving wheels on the model car is not limited.
- The length of the car shall not exceed 400 mm, even while running.
- The height of the car shall be 100 mm or less, even while running.

An energy-storage device, such as a capacitor, may be mounted. However, in such cases, you have to set the initial energy to zero. To confirm it, the car must have a test port.

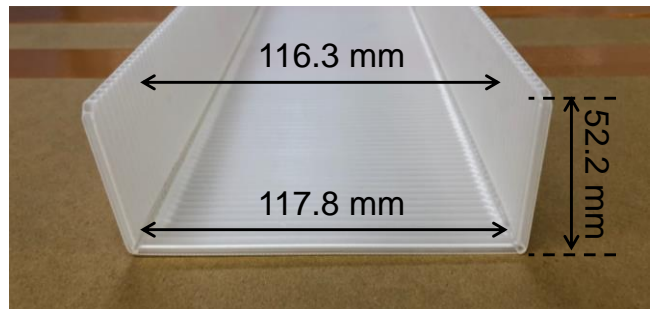
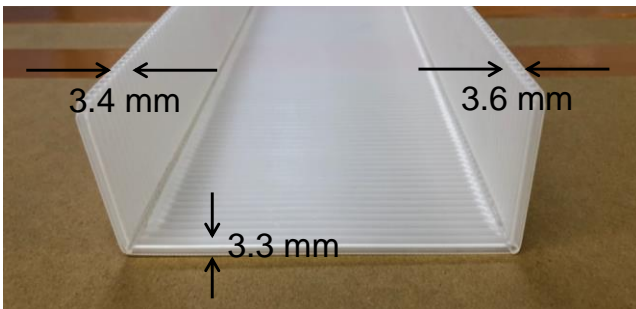
- You can create the devices and circuits for WPT reception onboard, or employ commercial products or those you modified.

Remarks:

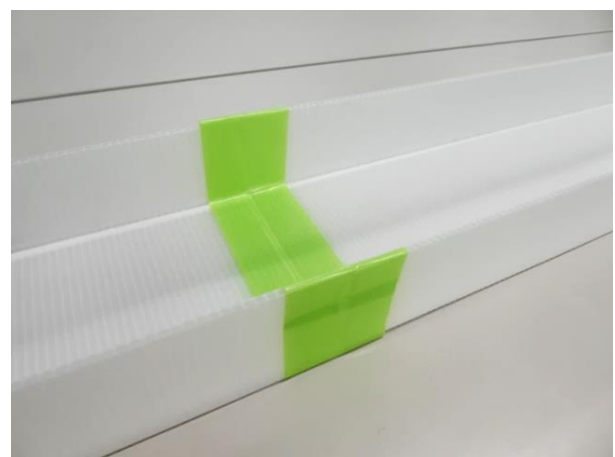
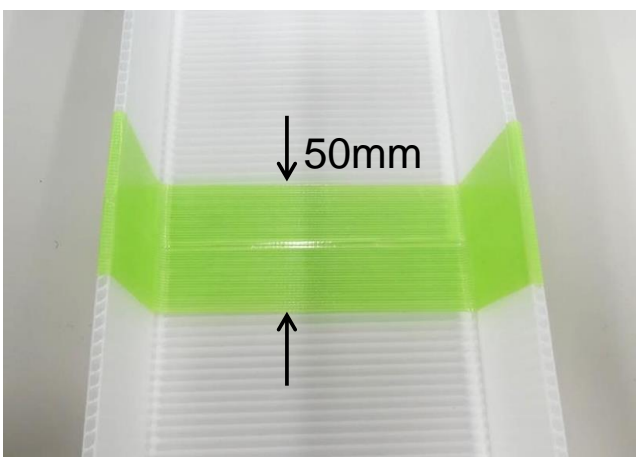
- “Mini 4WD” is a registered trademark of TAMIYA, INC.



Straight course (100cm length)



Actual size (one example)



Joint (use tapes)

Figure 1

