PB Product line

APB-S-TC	APB-L
APB-SA	APB-LA

DATASHEET | APB-S-TC

Aurora Plasma Brake – Small – TunaCan form factor

INTRODUCTION

The TunaCan Plasma Brake is a propellantless deorbiting system for LEO CubeSats. Designed especially for the CubeSat TunaCan volume, it can also be installed inside the satellite. This system has minimal mass and volume to provide the deorbiting capability with minimal budget overhead. The APB modules consist of a microtether, a deployment system, and control electronics. For satellites of bigger sizes, please refer to the APB-L, the large, gravity gradient stabilized Plasma Brake suitable for use in spacecraft up to 1000 kg in mass.

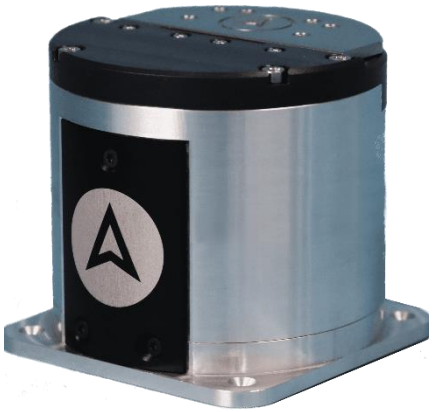

Figure 1: The TunaCan Plasma Brake

SCIENCE BEHIND THE TECHNOLOGY

A Plasma Brake uses Coulomb drag to interact with the upper atmosphere plasma, slowing down a spacecraft. This is done by charging a thinner-than-a-hair metallic microtether to -1000 V, resulting in an electric field that deflects the environmental plasma, causing the deorbiting force. No propellant is needed, and the power requirements are minimal. The time to deorbit depends on the initial orbit, satellite mass, tether length and voltage. You can read more about the scientific background here.

AUTONOMOUS DEORBITING ALLOWS HIGH RELIABILITY DISPOSAL

Autonomous variants of the product, the APB-SA and APB-LA are currently in development. They will allow fully automatic deorbiting even when the satellite has failed or is dead-on-arrival. Aurora will recommend the best variant based on mission profile and requirements.

SAFETY

The Plasma Brake is inherently safe due to the lack of volatile chemicals or pressurized tanks. It is also safe for other satellites due to the use of the ø50 µm microtether; even if it hits another satellite, it only leaves a mark few micrometers deep, equal to the daily micrometeoroid bombardment present in LEO.

For more details about plasma brake safety, please contact us at sales@auroraptfi

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APB-S-TC SPECIFICATION

Quantity	Value
Form	80 mm diameter, 75 mm depth (+ customizable bottom plate)
Satellite mass for < 5 year deorbiting	600 km orbit: up to 100 kg 800 km orbit: up to 25 kg 1000 km orbit: up to 16 kg
Power	< 1 W during deorbiting, 18 W peak
Data interface	RS422
Mass	< 450 g
Lead time	6-9 months (first Flight Models will be delivered for two satellites during 2025-Q1)
Customizability	A custom mounting plate can be produced.

Values are preliminary, exact figures provided in technical documentation.

EXAMPLE USE CASE

Scenario	Action
A 12U satellite launched into 700 km, needing to deorbit within 5 years	The satellite deorbits within 4 years of Plasma Brake deployment, depending on space weather conditions at the time of deployment. See Figure 3 for scenarios.

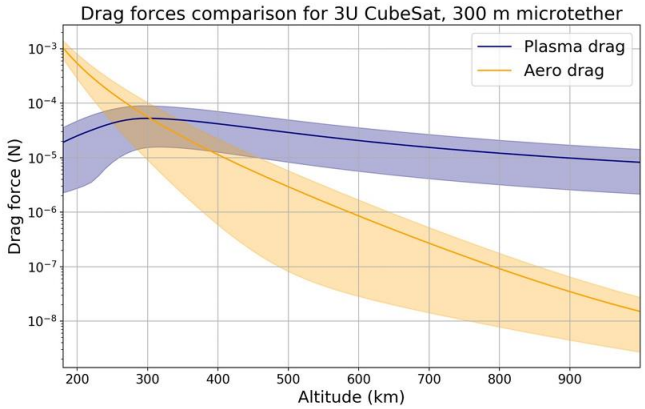

Figure 2: Comparison of coulomb and aerodynamic drags on different altitudes

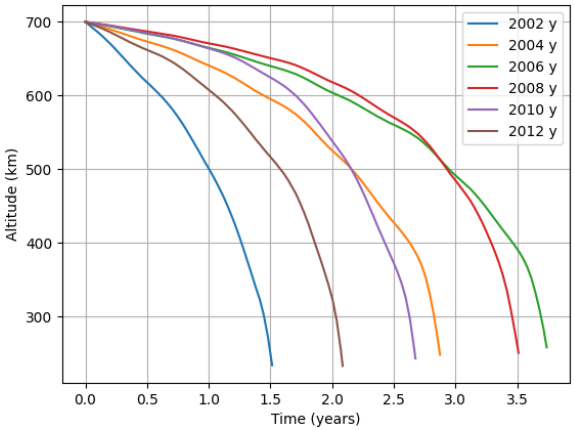

Figure 3: Example deorbit scenarios for a 20 kg satellite using the TunaCan Plasma Brake at different space weather conditions (set by simulation start year)