

TAOGLAS CASE STUDY

OJO COMMUTER SCOOTERS / 2019



TAOGLAS®

Ojo
Commuter
Scooter

Cal/Amp®



Ojo partners with **CalAmp**, a technology solutions pioneer, and **Taoglas**, a leading provider of antennas and RF solutions for the IoT and transportation industries, to help realize its vision for the Electric Scooter Market.



Taoglas and CalAmp Power Ojo to Revolutionize the Electric Scooter Market

Electric scooter sharing programs are a global phenomenon, with millions of them hitting city streets and college campuses from Portland, Oregon, to Paris, France. Scooters have matured well beyond a child's driveway toy. They are an easy-to-use, low-cost, environmentally friendly first- and last-mile transportation solution for cities.

Those same cities have also had challenges with adoption and community acceptance as users don't always obey the rules of the road or posted speed limits. Additionally, the scooters are often abandoned on city sidewalks or in out of the way places, making them difficult to retrieve and recharge. As cities navigate this new scooter conundrum, many are putting into place tighter regulations and, in a few cases, banning scooters altogether.

Ojo, an electric scooter company based in Oxnard, California, wants to solve the challenge posed by how scooter companies' existing models deal with cities and college campuses. To do so, it required a significant increase in functionality over other e-scooter micro-mobility offerings.

"Our goal is to create a safer, more collaborative e-scooter program for cities that want to have ride share," said Max Smith, CEO of Ojo. "Initial entrants in the electric scooter sharing space were market disruptors. We have the technologies in place to help keep riders in check and help them comply with city regulations. We're taking a different path by collaborating closely with municipalities and integrating advanced telematics to improve road safety and regulation compliance."



When looking for solutions to help them bring their vision of a safer scooter environment to life, Ojo had several key requirements on its wish list from its technology partners:

- GPS tracking
- Tilt detection
- Distance tracking
- SMS command capability
- Speed detection and thresholds
- Voltage and battery level tracking
- Smart Sleep state

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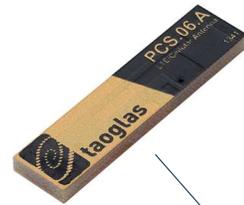
New Market Requirements

As leaders in their respective fields in telematics and IoT, both CalAmp and Taoglas are quite familiar with the requirements of the electric scooter market and other connected vehicle mobility and transportation applications. CalAmp's smart telematics device was able to quickly check off the critical functionality: GPS information, speed control to limit scooter speed, battery level indicators, lock/unlock metric locks—everything a rider needs to rent a scooter using a downloadable app.

However, Ojo wanted additional capabilities, new to the scooter market, to help it better partner with the cities and colleges at which it is launching. These included the ability to create geofences around areas where a scooter can be ridden and, even deeper, areas the ride may not be terminated such as busy city or campus sidewalks where parking is not allowed. This technology also allows for the enforcement of fines and penalties if riders don't comply with city regulations, enforcing social responsibility on the rider to leave the scooter in a mannerly fashion or else they may be fined for non-compliance.

Taoglas Antenna Locations on the Ojo Electric Scooter

The Havok PCS.06.A is a low profile SMT LTE/cellular 4G/3G/2G embedded antenna designed for direct SMT mount on a device PCB. It provides high efficiency in a very small factor 42*10*3mm.



Havok PCS.06
LTE Antenna

This miniaturized embedded RTK GNSS ceramic patch antenna is based on smart™ technology. It is mounted via pin and double-sided adhesive and been selected as the optimal solution for the customer device environment, especially for use with Real-Time Kinematics.



Custom
GNSS GP.1575
Patch Antenna



“Taoglas’ technologically advanced and best performing antennas paired with our smart telematics technology helped make this a reality.”

Carl Burrow
Senior Vice president
of Global Sales for CalAmp



Another new requirement was the ability to throttle speed based on different zones established by the city, for example, cap the scooter’s top speed at 8-10 mph on campus bike lanes, within a tourist district of the city or within a school zone. “These types of capabilities are new to the scooter industry, and important for sustainability and growth of the market,” Ojo’s Smith said.

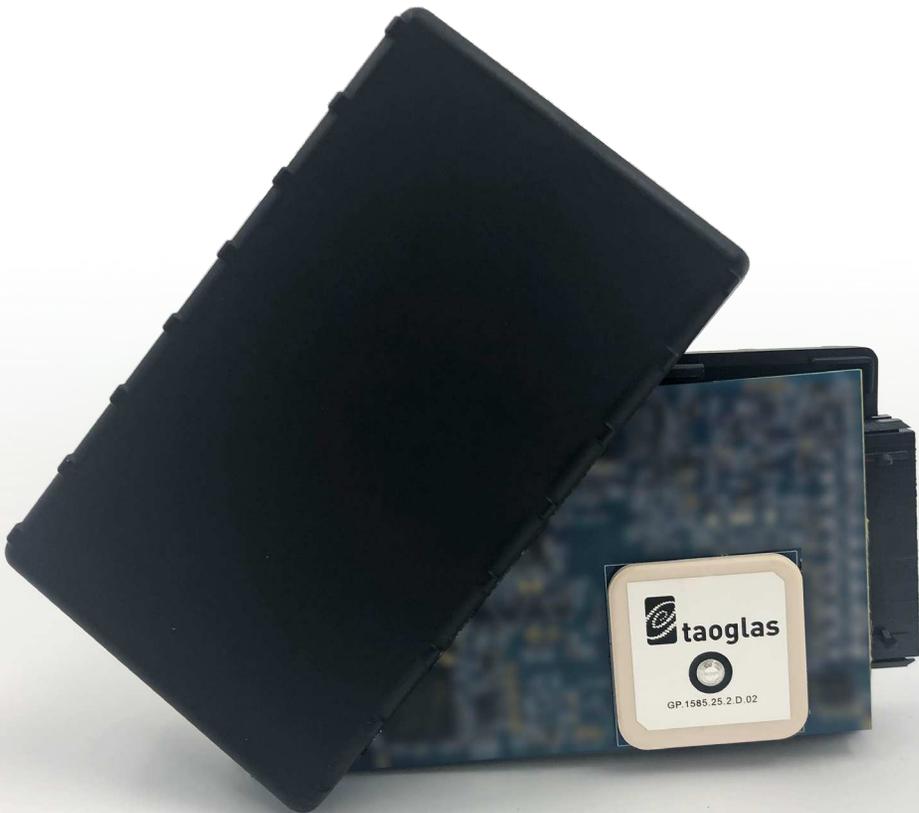
These new requirements needed a higher level of location precision that Taoglas enables. “For functionality like creating geozones, to encourage dropping off or picking up scooters in very specific areas, and speed control/throttling, it’s important to have very accurate location,” said Carl Burrow, senior vice president of global sales for CalAmp. “Taoglas’ technologically advanced and best performing antennas paired with our smart telematics technology helped make this a reality.”

The CalAmp smart telematics device contains two Taoglas antennas that are integrated and optimized specifically for the device topology to achieve maximum over-the-air performance in order to enhance send and receive efficiency. The PCB and housing were also custom made for Ojo. The goal: to pass first time and on time the rigorous carrier certification tests required of every device that needs to be deployed successfully in volumes on global cellular networks. CalAmp and Taoglas worked closely together to determine the RF performance needs of the CalAmp device, and as always, designed and tested some of the hardware at Taoglas’ state-of-the-art testing chambers in San Diego. This allows CalAmp not only to optimize its design but to pre-test the device to ensure it will pass type and carrier approval. The CalAmp smart telematics device is now certified for use on the Verizon and AT&T networks.

Additional requirements included the need for the electronics utilized to be extremely robust and ruggedized, since scooters are outdoors in all kinds of weather, and are often dropped rather than parked. **Taoglas CEO Dermot O’Shea** puts the strenuous requirements this way: “Believe it or not, electric share scooters have the same specifications as a fighter jet when it comes to designing electronics.”

“With CalAmp and Taoglas as our technology partners, we are well-poised for success.”

Max Smith
CEO of Ojo



For Cities, It's All About the Data

Ojo's business model includes cities front and center. *“With other companies, data has been an afterthought,”* Ojo's Smith said. *“We wanted to approach things differently and help cities understand how, where and when scooters are being used, what routes are not being used, how long trips are, and so on. This will help them better plan for their smart city infrastructure. We needed a partner that could help us set up a system to capture the most comprehensive and accurate data possible, and CalAmp, with Taoglas inside, has delivered. We chose CalAmp because of its record and have been thrilled with the creativity, professionalism and deliverables.”*

Together for Safer Roads® (TSR) is an innovative business coalition that brings together socially-minded private sector companies to collaborate on improving road safety. CalAmp is a member of TSR and has been coordinating with the group on best practices for road safety.

“Rolling out a well-organized shared mobility service with safety in mind requires close collaboration with municipalities. By using telematics technology such as geo-fencing and speed detection, micro-mobility providers can partner with local governments to improve safety, enforce proper usage and even facilitate better transit planning,” said David Braunstein, president of TSR.

The ability to establish geofences and throttle speeds based on location are groundbreaking additions to the scooter industry and help to set Ojo apart from other electric scooter companies, Ojo's Smith said. *“Everyone else has the same scooter, our scooter is unique to the marketplace and built to last,”* he said. *“We think we have a better hardware solution. It's stronger, built better, and goes up to 50 miles vs. 15 miles that other scooters can travel between charges. With CalAmp and Taoglas as our technology partners, we are well-poised for success.”*



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