

Smart, off-highway dedicated PDU

AN INNOVATIVE POWER DISTRIBUTION UNIT (PDU) IS NOW AVAILABLE FOR THE OFF-HIGHWAY SECTOR

▶ The Smart Fuse Box, developed by **MTA**, is an intelligent power distribution unit that drives, protects, diagnoses and monitors up to 30 electrical or electronic loads such as ECUs, ADAS systems, equipment, lights, heating, air conditioning, and interfaces analogue/digital signals and loads via the vehicle's CAN network.

Added value with e-fuse

The main innovative aspect of the **MTA** smart fuse box is the adoption of intelligent electronic fuses (STi2), ie integrated circuits, with ASIL (automotive safety integrity level) B components, that can replace larger conventional melting fuses or other protection devices. The e-fuses integrate relay function and vehicle cable protection even in failsafe and parking mode, optimising cable, cost and space.

Compared to traditional fuses, the electronic fuses have a series of advantages that make them essential for the architecture of the future. They are resettable, safer and more reliable over time. They have an intervention time with a higher accuracy and are 100 times faster than traditional fuses. Moreover, they can diagnose the 'health' of the load they drive.

The box, smart by nature

The smart fuse box has an important reduction of size, combining both fuse and relay functions in a single unit. With respect to a traditional relay, the



ABOVE: Smart Fuse Box is an innovative intelligent control unit that uses ST electronic fuses (STi2Fuse) and it is specifically developed for the off-highway world

BELOW: The main innovative aspect of the SFB is the adoption of intelligent electronic fuses

STiFuse	
HSDs embedding the programmable Fuse function	
Monolithic devices	<ul style="list-style-type: none"> • 2x Dual channel • 1x Quad channel • Full production starting from Q4 '23
System in package	<ul style="list-style-type: none"> • 3x Single channel • 3x Dual channel • Production starting from Q4 '24
Controller + Ext. MOSFET	<ul style="list-style-type: none"> • 2x Single channel • 1x double channel • VNF1048F in full production
Companion Chip	<ul style="list-style-type: none"> • 1x with 8 ch.supporting stby-on • Production by Q4 '25
Package	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>QFN</p> </div> <div style="text-align: center;"> <p>PowerQFN</p> </div> </div>

electronic one does not have mechanical contacts and duty cycle limitations for smoother switching. Furthermore, it does not require maintenance, even in the event of a load fault, since the electronic fuse is resettable via software facilitating service interventions. Through the electronics, in the presence of current peaks, it is then possible to manage the on-board loads more accurately and intelligently. It also allows to reduce current consumption to control loads.

The hardware and software architecture of the smart fuse box is designed to satisfy the most stringent functional safety and cyber security requirements, increasingly prescribed to electronic control units. However, it remains possible for

the OEM to develop its own application and its own customisable diagnostic policies based on a low-level software layer supplied by MTA and certifiable according to the requirements listed above. The smart fuse box, by its nature, brings important advantages. First of all, the nominal current, as well as the tripping curve, are programmable and the nominal current is optimised according to the load and not the size of the fuse, an aspect which leads to a consequent optimisation of the dimensions of the wiring and therefore to a weight reduction. Finally, the system diagnostics also allows to set health monitoring and predictive maintenance algorithms which minimise downtime of the vehicle. **ivT**



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