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Aptiv Rapid Power Reserve

FAIL-OPERATIONAL BACKUP POWER FOR SAFETY-CRITICAL SYSTEMS



Product Overview

Aptiv Rapid Power Reserve (ARPR) is an advanced ultracapacitor based solution that delivers instant backup power for electrical systems when primary electrical sources are disrupted.

ARPR reduces reliance on traditional batteries, lowers system complexity and supports stable operation across a wide range of conditions, helping maintain control of critical functions when it matters most.

Key Benefits & Value Drivers

- Delivers rapid burst power (up to ~2kW) with microsecond response to stabilize transient events
- Reduces stress on the main battery by preventing voltage sags, minimizing degradation
- 500K-1M+ cycles and 10-15 year life eliminate service requirements for the duration of the automotive lifecycle
- Real-time SOC/SOH tracking and system diagnostics optimize performance and reliability
- Supports ASIL-rated systems with built-in diagnostics, redundancy and controlled fault response
- Supports wide temperature performance, operating from -40°C to 65°C with safe storage from -40°C to 85°C.
- Enhances system safety through ultracapacitor technology, which is not subject to the thermal runaway mechanisms associated with many battery-based energy storage solutions.

Potential Applications

- Backup power for ASIL-rated safety-critical loads
- Transient power support for L2+ / ADAS-ready systems
- Peak-load support for emergency braking, brake actuators, and electric power steering
- Anti-roll stabilization and controlled failure-mode support
- Backup door unlock and post-crash safety functions
- 48V backup power support for hybrid and ICE vehicle architectures

* Use cases and module configurations are application-dependent and can be tailored to customer requirements.

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TECHNICAL DETAILS



Representative RPR configurations

Energy Storage

STORAGE TECHNOLOGY	EDLC ultracapacitor
MODULE CAPACITANCE	3F to 500F+, scalable by application
ENERGY STORED	500–10,000 J, application-dependent
VOLTAGE ARCHITECTURE	Supports 12V and 48V vehicle architectures

Power Management

DISCHARGE POWER	Up to 2kW, scalable
POWER TRANSFER	Bidirectional charge / discharge support
CHARGING TIME	<90 seconds, configuration-dependent
CELL BALANCING	Configuration-dependent cell balancing
MONITORING	Real-time SOC/SOH monitoring
DIAGNOSTICS	Voltage, current, and temperature sampling

Safety & Reliability

LIFETIME	>500,000 cycles or up to 15 years
OPERATING TEMPERATURE	-40° C to 65° C
STORAGE TEMPERATURE	-40° C to 85° C
IP PROTECTION	Automotive-grade sealed module / up to IP67*
FUNCTIONAL SAFETY	ASIL-B / ASPICE L2 certified; ASIL-D target for backup power

Communication & Integration

VEHICLE NETWORK	CAN / CAN FD / LIN
SOFTWARE UPDATE	OTA supported

* Specifications and module configurations are application-dependent and can be tailored to customer requirements.