

David eVTOL Aircraft

The **David** is a single-seat electric vertical take-off and landing aircraft built on an all-aluminum airframe with advanced multi-redundancy electric propulsion. Designed for personal short-haul air travel, urban aerial operations, and emergency logistics, David combines zero-emission flight with autonomous route capability and a compact footprint compatible with urban environments.



Technical Specifications:

Max Takeoff Weight

200 kg

Payload

85 kg

Max Speed

80 km/h

Range (Unloaded)

30 km

Hover Time

≥15 min (full load)

Airframe

- 6063-T5 aluminum alloy frame
- Tensile strength ≥ 288 MPa
- Yield strength ≥ 260 MPa
- Design life $\geq 2,000$ flight hours
- Anodized anti-corrosion finish
- Modular fuselage / wing / power units

Key Dimensions

Parameter	Value
Fuselage Length	3,500 mm
Axle Spread	2,600 mm
Height	1,400 mm
Cabin Interior Width	650 mm
Cabin Interior Height	900 mm

Propulsion System

Motor: 8× brushless inductive, 5.544 kW each, ~85% efficiency, 0–3,404 RPM, air + conductor cooling

Battery: Lithium-ion, 91.2 V nominal, 4,012.8 Wh total, 22.5 kg, max discharge 300 A, ≥800 cycles @ 80% capacity retention

Redundancy: 80% power margin; automatic torque redistribution on single motor failure

Flight Control Computer — FC1129

- ARM Cortex-M7 @ 600 MHz | 1 MB RAM | 2 MB Flash + SD up to 32 GB
- 16-ch PWM output (50–400 Hz), 4× UART, 2× CAN bus, Bluetooth 5.0
- 10 Hz position / attitude / speed output; data link range 30 km (LOS)
- Remote firmware upgrade via SD or network; onboard FDIR diagnostics

Navigation & Communications

Technology	Specification
GPS / BeiDou dual-mode	≤ 1 m accuracy (open sky)
RTK differential	≤ 0.5 m (base station / network)
Position update rate	10 Hz (configurable)
Attitude accuracy	± 0.5° pitch / roll
IMU gyroscope drift	≤ 0.1°/h
IMU accelerometer	≤ 0.01 m/s ²
2.4 GHz data link	20–30 km LOS range
4G cellular module	Backup telemetry

Battery Management System (BMS)

- SOC estimation error ≤ 10%; auto-balance charging at 70 mA
- Temperature sensors (NTC): -20 °C to +70 °C, ±3 °C accuracy, 10 Hz sampling
- Warning range: -12 °C to -10 °C or 55 °C to 60 °C (power limited)
- Shutdown range: below -20 °C or above 70 °C (automatic alarm + cutoff)
- CAN bus real-time telemetry to flight control computer

Application Scenarios: Personal short commutes (15–30 km) · Emergency medical logistics · Urban aerial patrol · Recreational and enthusiast flight · Aviation R&D and education platforms

Flight Performance

Parameter	Value
Economy cruise speed	≥ 30 km/h
Max level flight speed	80 km/h
Max climb rate	5 m/s
Max descent rate	3 m/s
Max flight altitude	1,000 m ASL
Max pitch / roll angle	15°
Max yaw rate	15°/s

Fault-Tolerant & Redundancy Architecture

Power Failure

Coaxial dual-rotor hardware redundancy + dynamic flight control compensation → controlled safe landing

Sensor Failure

Redundant sensor fusion; multi-source data cross-validation eliminates single-point errors

GPS Loss

Inertial navigation maintains short-term positioning; serious failure → hover and await operator instruction

FCC Failure

Primary → backup processor handover; dual failure → emergency slow-descent landing system activates

Battery Module Failure

Automatic isolation of faulty cell; remaining modules maintain flight; serious failure → emergency land

Fail-Safe Response Matrix

Fault Level	Automatic Response
Minor	Warning issued; flight envelope limited; return recommended
Moderate	Auto return-to-home; fly to nearest safe landing site
Serious	Emergency landing + emergency protection system
Catastrophic	Full emergency descent + parachute activation

Cockpit & Ground Station

- 12-inch touchscreen + manual joystick dual-mode operation
- Real-time altitude, speed, battery, attitude, and temperature display
- Color-coded priority warning and alert system
- Emergency power-off switch, manual parachute release, aviation-grade multi-point seat belts
- Windows-based ground station: map route planning, autonomous mission upload, manual/auto flight control

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