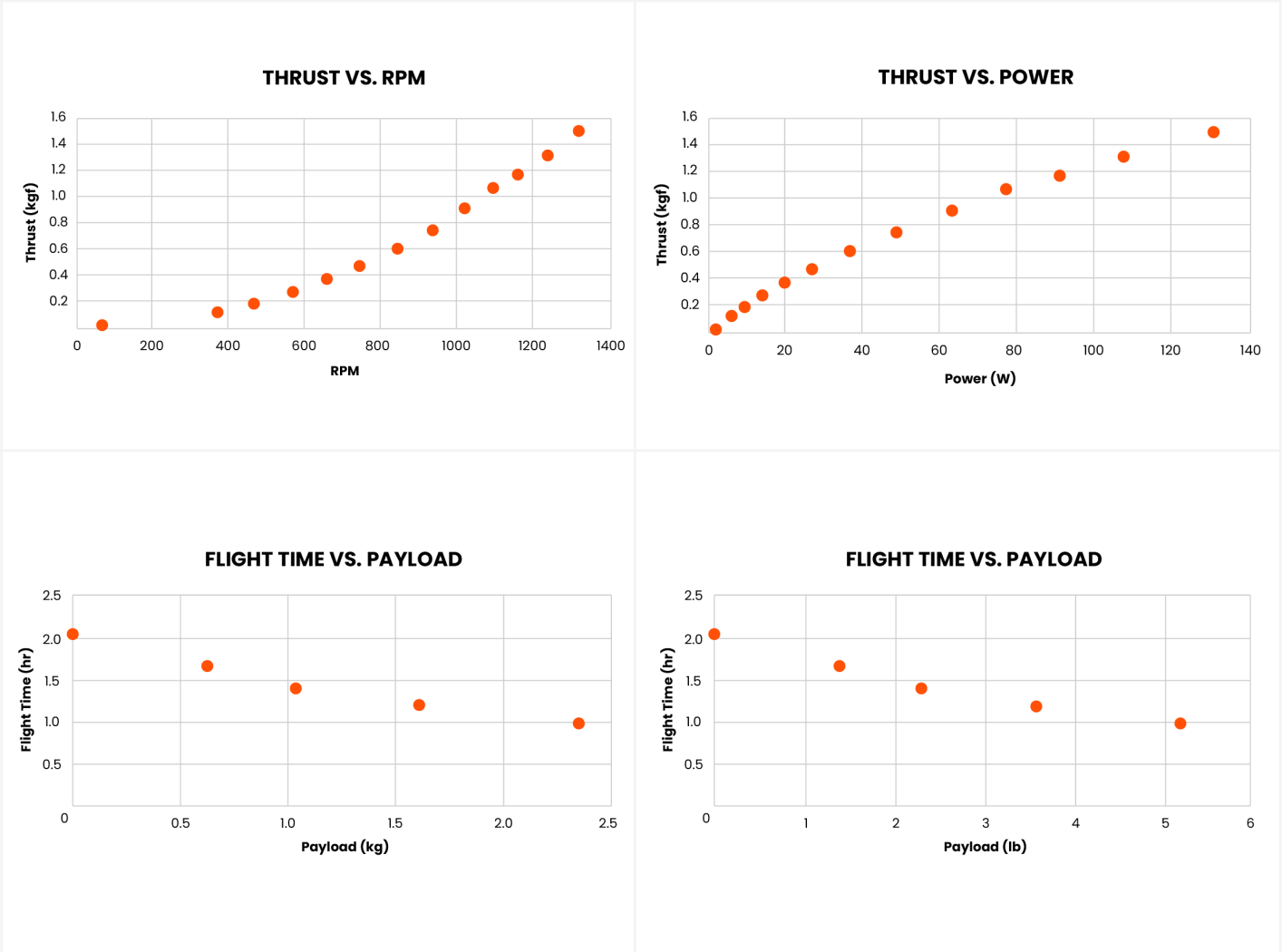
modovolo

Graphs and Specifications for Quad Configuration Prototype V1

The Graphs and Specifications listed below are for the Modovolo prototype (what we call “V1”), but we are in the process of developing the production version of the Modovolo Lift, which we are calling “V2.” V2 will have different (and better) specifications and graphs. We’ll send those to you as they evolve.

Graphs



The top two graphs (i.e., Thrust vs. RPM and Thrust vs. Power) are per Lift Pod and the bottom two graphs (i.e., Flight Time vs. Payload) are per Quad configuration.

Specifications

Dimensions	
Propeller Diameter	671 mm (26.4 in)
4 Lift Pods (Quad Configuration)	1382 x 1382 mm (54.4 x 54.4 in)
Lift Pod Height	202 mm (7.95 in)
Lift Pod Height with Truss	222 mm (8.75 in)

Weights	
Empty Weight (No Batteries, Single Lift)	240 g (0.53 lb)
Empty Weight (No Batteries, 4 Lifts + Truss)	1166 g (2.57 lb)
Empty Weight (w/Batteries, 4 Lifts + Truss)	3528 g (7.78 lb)

Batteries	
Model[1]	Samsung 50G 21700
Battery Cell Chemistry	Lithium-Ion
Standard Charge (Per Cell)	0.33 C (1.6 A)
Quick Charge (Per Cell)	1 C (4.9 A)
Cell Maximum Continuous Discharge	9.8 A
Cell Voltage Range	2.5 – 4.2 V
Cell Weight[2]	~70 g
Cells Per Lift Pod	8
Total Cells in Quad Configuration[3]	32
Cell Capacity (Specification)	5000 mAh
Cell Capacity (Measured)[4]	~4900 mAh
Cell Configuration (Per Lift Pod)	4S2P
Pod & Quad Battery Voltage (Nominal)	4S, 14.8 V

[1] Higher capacity cells are now available.
[2] Cell weight varies slightly between cells.
[3] All batteries in all configurations are placed in parallel in flight through a connector so Lift Pods share power and have a common ground.
[4] All battery capacities and energies are based on measured data simulating flight conditions and not the specification from the manufacturer. Cell capacity varies slightly between cells.

Lift Pod Capacity	9,800 mAh
Quad Configuration Capacity	39,200 mAh
Cell Energy (Measured)	~17.2 Wh
Lift Pod Energy	137.6 Wh
Quad Configuration Energy	550.4 Wh
Charger[5]	iCharger X12

Powertrain	
Max Continuous Electrical Power[6]	>300 W
Combined Powertrain Weight[7]	35 g
Efficiency[8]	~71 - 77%
Motor RPM Range in Flight	~10,000 - 30,000 RPM
Motor RPM Hover	~21,000 RPM
Propeller RPM Range in Flight	~500 - 1500 RPM
Propeller RPM Hover	~1000 RPM
Hover Throttle (MOT_THST_HOVER)	0.28
Gear Ratio	21.3
Propeller Direction	2 x CW, 2 x CCW
Hover Amps Per Module[9]	~3.87 A
Hover Amps Total for Quad	~15.48 A
Hover Power Per Module[10]	~55 - 60 W
Hover Power Total for Quad	~220 - 240 W

[5] All batteries are charged in parallel using main and balance leads. iCharger X12 has regenerative discharge into a battery bank.

[6] Estimated, Maximum Not Yet Reached.

[7] Motor, ESC, Capacitor, Wiring, misc.

[8] Efficiency varies depending on load and voltage.

[9] Average Amp draw from 2 hr flight log.

[10] Powertrain draws slightly more than this on average in dynamic flight. 55 - 60 W is steady state measured on a thrust stand. Avionics draws a small amount of power.

Software and Hardware	
Ground Control Software	Mission Planner
Flight Controller	mRo Control Zero H7 - Full Cable Kit
Flight Controller Firmware	ArduCopter
Flight Controller Hardware	STM32H743 480 MHz CPU, BMI088, ICM-20602, ICM-20948, DPS310
Flight Controller Protocols	DSM, DSM2, DSM-X, SBUS, SBUS2, FRSKy Telemetry, SUMD, ST24, PPM Input, 8 x PWM & DHSOT Outputs, RSSI Input, 6 x UART, I2C, SPI, CAN, JTAG
Size	20 x 32 mm (0.79 x 1.26 in)
Weight (Without Case)	5.3 g (0.19 oz)
GPS	mRo SAM GPS M10038
Size	1 x 31 x 11.5 mm
Weight	7.86 g (0.28 oz)
Power Module	mRo Power Zero
Size	18 x 18 x 7.3 mm (0.7 x 0.7 x 0.28 in)
Weight	2.5 g (0.08 oz)
Power	50.4 V 12S, 90 A Continuous - 100 A Burst 5.3 V / 2 A to Flight Controller
Telemetry Radio	mRo SiK Air Telemetry Radio V2
Size	20.3 x 28.2 x 8.4 mm (0.8 x 1.11 x 0.33 in)
Weight	2.9 g (0.1 oz)
TX Power (Max)	20 dBm
RC Receiver	FrSky 2.4 GHz Access Archer RS
Size	16 x 11 x 2.5 mm (0.63 x 0.43 x 0.1 in)
Weight	1.3 g (0.05 oz)
RC Transmitter	FrSky Taranis X9D Plus SE 2019
RC Transmitter Telemetry Script	FlightDeck