



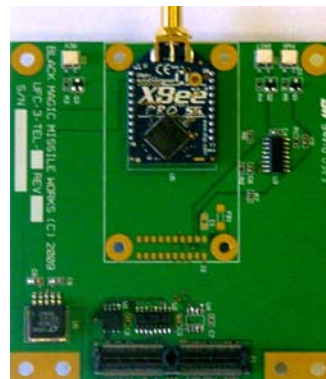
# Black Magic Missile Works



UFC-3 CPU (base) Module (\$600) – actual size



900 MHz Telemetry – North America (\$825)



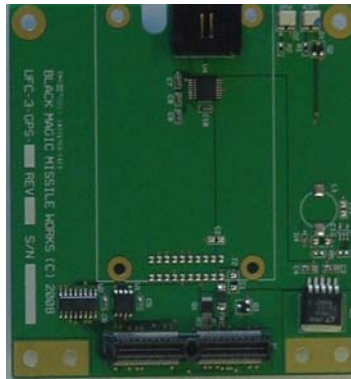
868 MHz Telemetry – Europe Only (\$600)



Inertial Sensor (\$1,300)



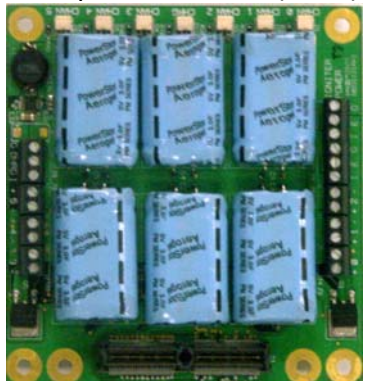
8 Input 16-bit ADC (\$425)



5 fps External GPS (\$450)



Battery (\$125-\$500)



6 Port Pyro (\$300-\$525)



20 fps GPS with External Antenna (\$2,375)



**Highest performance, most flexible modular Flight Computers for Class III HPR**

Prices subject to change without notice – 10% Discount on System Packages – Two week lead time



## Specifications (cont)

GPS Module UFC-3-GPS			
Option (-1/-2)	Garmin GPS-18 5Hz.	NovAtel OEMV-1(G)	
Type	External Receiver/Antenna Module (RS-232)	Internal Receiver External Antenna	
Fixes per Second	5	20	
Position Accuracy	15m Standard, 3m WAAS	1.8m Standard, 0.8m WAAS	
Velocity Accuracy	0.12m/s	0.03m/s	
Maximum Altitude	60,000' (18,288m)	60,000' (18,288m)	
Maximum Velocity	1,150 mph (514m/s)	1,150 mph (514m/s)	
Removal of COCOM limits available	No	Yes <sup>1</sup>	
Indicator LEDs	Power, GPS Lock		
Module Weight (grams/ounces)	42/1.5	66/2.3	
External Element Weight (grams/ounces)	70/2.5	113/4.0	
External Element Size	61mm dia., 19.5mm high	66mm dia., 18mm high	
Analog to Digital Converter Module(s) UFC-3-ADC			
Number of Channels	8 per Module (up to four modules per node)		
Digital Resolution	16-bit		
Standard D.C. Input Range	0-5 Volts (up to 50 Volts as an option)		
D.C. Accuracy (est.)	0.1% max./0.05% typical		
Options (per channel)	Custom Input Scale, Programmable Gain Amplifier (PGA), Thermocouple Input (Type K)		
PGA Accuracy (est.)	0.5% max./0.25% typical		
PGA Gain (1mV max. full scale)	1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096		
Thermocouple Range (Type K)	-180°C to +1,200°C		
Internal Excitation Supply	8V @ 100 ma. on each ADC Module		
Module Weight (grams/ounces)	56/2.0		
6 Channel Pyro Module(s) UFC-3-PYR			
Number of Channels	6 per Module (up to three modules per node)		
Energy Source Option (-1/-2)	External Battery	Internal using Super Capacitors (10 VDC Min. Input, 1.3 Amp maximum charge current)	
Current per Channel (constant current)	4 Amps. (channels fired simultaneously limited by battery)	4 Amps. (all channels may be fired simultaneously for 24 Amps. total)	
Indicator LEDs	Six Continuity (individual), Charged (-2 only)		
Module Weight (grams/ounces)	54/1.9	100/3.5	
Inertial Module (Roll, Pitch, Yaw) UFC-3-3XS			
Sensor	Analog Devices ADIS16355 (Internal)		
Resolution	14-bits		
Range	±300 degree/second, ±10g		
Bandwidth	350 Hz., 819.2 samples per second maximum		
Temperature Range	-40°C to +85°C		
Indicator LEDs	Power		
Module Weight (grams/ounces)	58/2.1		
Battery Module(s) <sup>2</sup> UFC-3-BAT			
Option	-1	-2/-3	-4/-5
Capacity (nominal), Type (note that Lithium are in 1, 2, or 4 banks at either 7.2V or 14.4V)	9.6 Volts @ 2 Ah NiMH	1 x 14.4 Volts @ .7Ah 2 x 7.2 Volts @ .7Ah Lithium	2 x 14.4 Volts @ .7Ah 4 x 7.2 Volts @ .7Ah Lithium
Temperature Range	-10°C to +65°C	-40°C to +85°C	-40°C to +85°C
Surge Current (1 second)	4 Amps	1 or 2 x 15 Amps	2 or 4 x 15 Amps
Connection Options	Single, Series or Parallel (Redundant Power)		
Module Weight (grams/ounces)	250/8.8		

<sup>1</sup> Additional charge and application for use to NovAtel required

<sup>2</sup> Battery modules are not counted as part of the 8 module maximum. Stack spacing is greater than standard.

## User Configurable System and Fully User Programmable Flight Control

A simple user created script (text file) provides complete flexibility in defining automated system preflight checks, preparation and flight operations. Any connected sensor can have its data recorded on board at up to 1,024 samples per second and transmitted via long range telemetry for real time tracking and control. Sensors include Accelerometers, Altimeter, up to 32 analog inputs supporting a variety of sensors, transducers and thermocouples (user defined scaling for data presentation), GPS data, 3-Axis Inertial Sensor (Roll/Pitch/Yaw position, rate and acceleration), digital inputs/outputs and system events/actions. Timing and rates of data logging is independently user programmable for on-board memory and telemetry.

Any sensor can be automatically checked for function or input value (and some may be automatically calibrated) as a part of pre-flight preparations. Any failure of a system check will abort the launch sequence. User defined complex events can cause any action(s) the system is capable of with optional time delays during flight.

Preflight		Flight	
Preparation	Checks	Events	Actions
Calibrate Altimeter	Analog Inputs	Ready (to launch)	Set Analog Recording
Calibrate Accelerometer	Digital Inputs	Stage (by occurrence)	Set Digital Recording
Calibrate Inertial Sensor	Pyro Continuity	Ascent Altitude	Set Altimeter Recording
UseGPS	Altimeter	Apogee	Set Accelerometer Recording
	Attitude	Descent Altitude	Set Inertial Sensor Recording
	Inertial Self Test	Landed (end of Descent)	Set GPS Recording
	Accelerometer Self Test	Remote (Telemetry uplink)	Set Temperature Recording
	Temperature	Remote (network message)	Set/Clear Digital Output
	GPS Lock	Analog Inputs	Change Telemetry Config.
	Battery Check	Digital Inputs	Activate Pyro Channel
		Roll (rate), Pitch, Yaw	Remote (network message)
		Temperature Input	Simulate Acceleration*
		Vertical Speed (fps)	Simulate Velocity*
		Horizontal Speed (knots)	End (shutdown)
		Flag Set/Clear	Set/Clear Flag

\* Simulation Actions only recognized during Simulated Launch, no effect during flight operations (allows complete test of user script and hardware functions)

Currently system configuration and control are based on a menu driven terminal I/O system (terminal emulator such as HyperTerminal or Procomm); data reduction and presentation are performed using Microsoft Excel (templates are provided). A Windows Graphical User Interface (GUI) is under development and will be made available free of charge to current system owners when available.

Black Magic Missile Works is constantly developing additional products (Isolation Module for redundant systems and Digital Flow Control Module for liquid and hybrid motors are in development) as well as fully supporting current users of the Second Generation UFC-2 controller. Custom modules, software and applications assistance are available at additional cost.

### Serious Flight Electronics for the Serious Flyer

Black Magic Missile Works is pleased to work with customers to create custom solutions

[www.BlackMagicMissileWorks.com](http://www.BlackMagicMissileWorks.com)

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