

OpenGrab Electro Permanent Magnet

EPM688-V2.X,

General Description

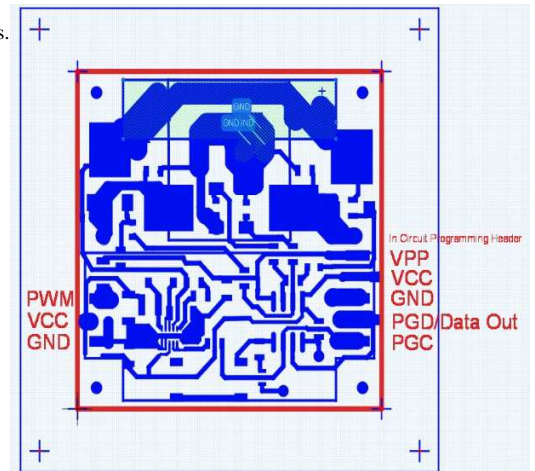
The EPM688-V2.X is an Electro Permanent Magnet, combining the advantages of electro and permanent magnets. This Device comes with integrated electronics that can be operated with 5V PWM signal common on RC electronics. The device is designed to hold 1kg of cargo. It is the user's responsibility to verify that this can be achieved in each particular case.

Applications

- Robot arm work holding
- Cargo lift for UAV's
- Educational demonstration of magnetic properties

Features

- CanAerospace? Daughter card is available
- 5V Vcc
- PWM signal
- Minimal steady state power <1mW
- Water resistant conformal coating
- 300ms Cycle times
- On board Pic12F with source code and in-circuit programming header



Recommended Operational Conditions

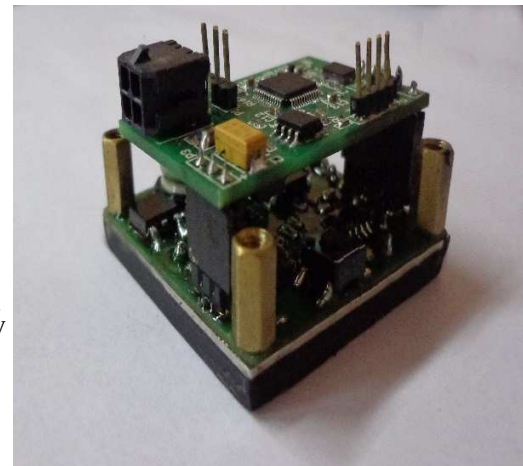
Symbol	Parameter	Rating	Units
Vcc max	Power supply Voltage max	7	V
Vcc min	Power supply Voltage min	3.3	V
Imax	Maximum Supply Current	600	mA
PWM on	Minimum signal high	1.75	ms
PWM off	Maximum signal high	1.25	ms
PWM error	PWM out of range	<0.75-2.25<	ms
Tmax	Maximum Temperature	80	deg C
Tmin	Minimum Temperature	-40	deg C
Tcharge	Charge time (1)	300	ms
Fmax	Max holding force	60	N
Mass	Mass	47	gram

(1) at 5V Vcc

CanAerospace Daughter card

OpenGrab? CAN Daughterboard (OGCAN) provides CAN interface for OpenGrab? EPM. Hardware part of this interface follows the UAV CAN convention (see "Hardware Interconnection"). As for protocol, currently only the CANaerospace protocol is supported (via libcanaerospace). Full support for UAV CAN is scheduled to be implemented by March or April 2014. Generally, OGCAN is the first commercially available piece of hardware that follows the UAV CAN RFC. For more information please see: https://docs.google.com/document/d/1Ybt6NxST_QbpNfdEGE-17oGNAbfmcufVGxpM0q9ekjc/pub

Pin Functions



GND

Ground pin

VCC

5V supply <100mV ripple

PWM

RC PWM signal input

Data

The Data pin puts out the current state of the EPM, TTL high for On and TTL low for Off.

VPP PGD PGC

These pins are broken out to provide the user with the ability to reprogram the on board PIC12F. Further information can be found in the documentation provided by Microchip

Operation

After connection VCC and GND the device will start charging the main capacitor. This takes around 300ms at 5V Vcc. After the charge is complete the EPM is ready to go in either the On or Off state. After a command has been issued there is a 300ms delay before the next switching command is accepted to ensure that the capacitor is charged. When operating at low voltages care must be taken to allow sufficient time for the charging to complete.

Push Button Mode

Pressing the Push button will toggle the EPM

PWM Mode

A RC Pulse Width Modulated signal can also be used. High times between 0.75 and 1.25ms are consider an Off command. 1.75-2.25ms is considered On command. Moving the signal on time from neutral, 1.25-1.75ms to either On or Off range will command the EPM to go into the respected state.

Error

The Led will blink once every 64 PWM signal errors. An error is either a missing or out time range PWM, about every 2 seconds for a missing PWM.

LED

Led goes on when the button is pressed. The Led will blink rapidly 6 times after a command has been executed, either going On or Off.

Drawing

<http://opengrab.googlecode.com/files/EPM%20688%20V2.pdf>

