

High Altitude Balloon

Power Bus Development Team

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Faculty Advisors

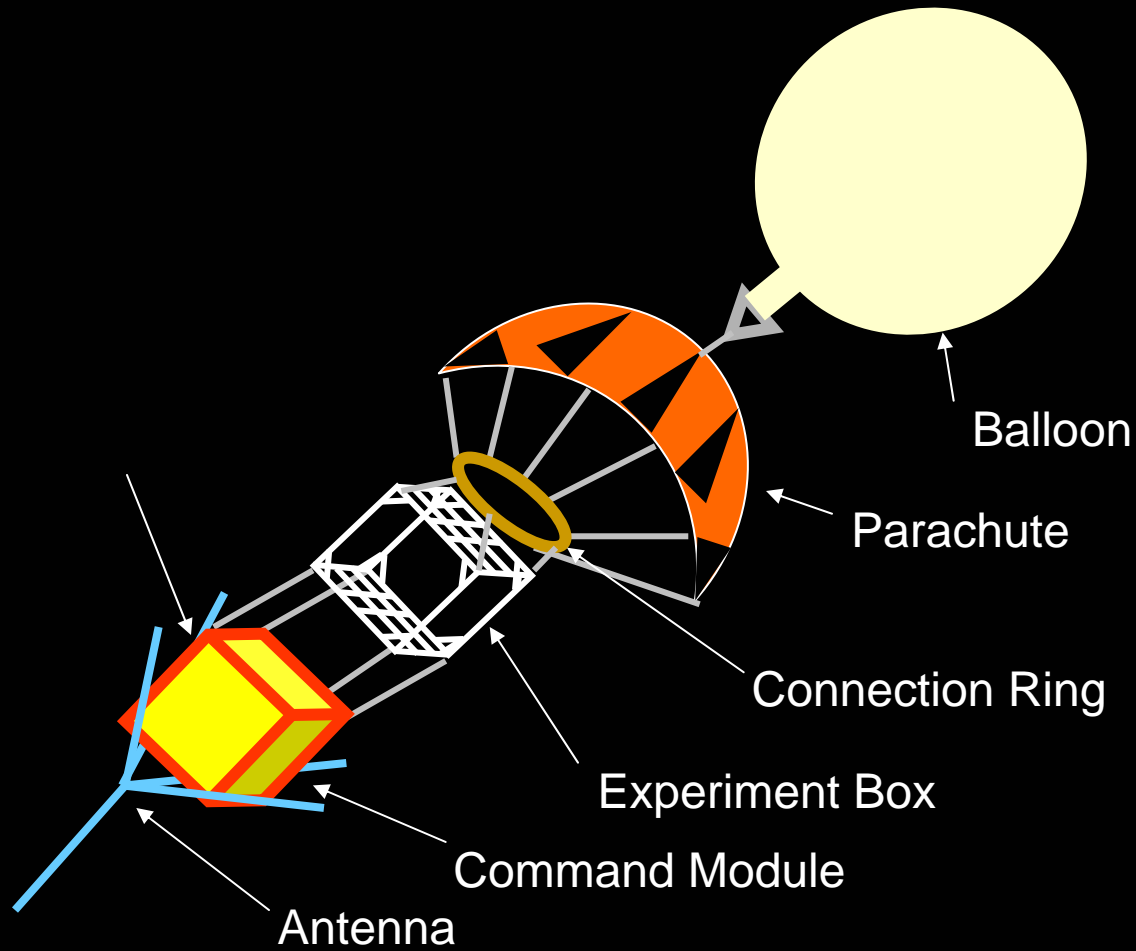


- John Wu
- John Gallagher
- Joseph Slater
- Bruce Rahn (Mentor)

Introduction to HIBAL Design

- What is HIBAL?
 - Dedicated to the exploration of near space for scientific and educational purposes
 - Undergraduate and Graduate Students
 - Multidisciplinary projects

Balloon Setup



Objective

- Design a universal power bus that replaces multiple power sources
 - Reduce weight
 - Space (physical access)
 - Providing power for 5 to 8 hours
- Research alternate power source
 - Solar panels
 - Secondary power supply

Specifications for Centralized Power Bus Battery Design



- Light weight (two boxes, 12 lb limit)
- Small size (area inside box is limited)
- Temperature sensitive (0° C at 85 K ft.)
- Rechargeable
- Power all components for 5 hours
- Adding future components

Centralized Power Bus Battery Design (5 hrs)

	Input Voltage - Max	Input Current (A) Nominal	Power Consumption (Watts)	Amp Hours
Garmin GPS model number GPS15L	5.4	0.085	2.805 - 4.59	0.53
Garmin GPS 25-lvs	6	0.12	0.432 - .72	0.75
Microtrak 300	9	0.18	1.62	1.13
Basic Stamp Version 2.2	9	0.5	27	3.13
Servo	12	0.01859	0.26	0.12
Cutter	14	0.085	0.459	0.53
3rd gps	3.3	0.085	2.805-4.59	0.53
			Total Power Required 35 Watts	Total Amp Hours 6.72 Ah

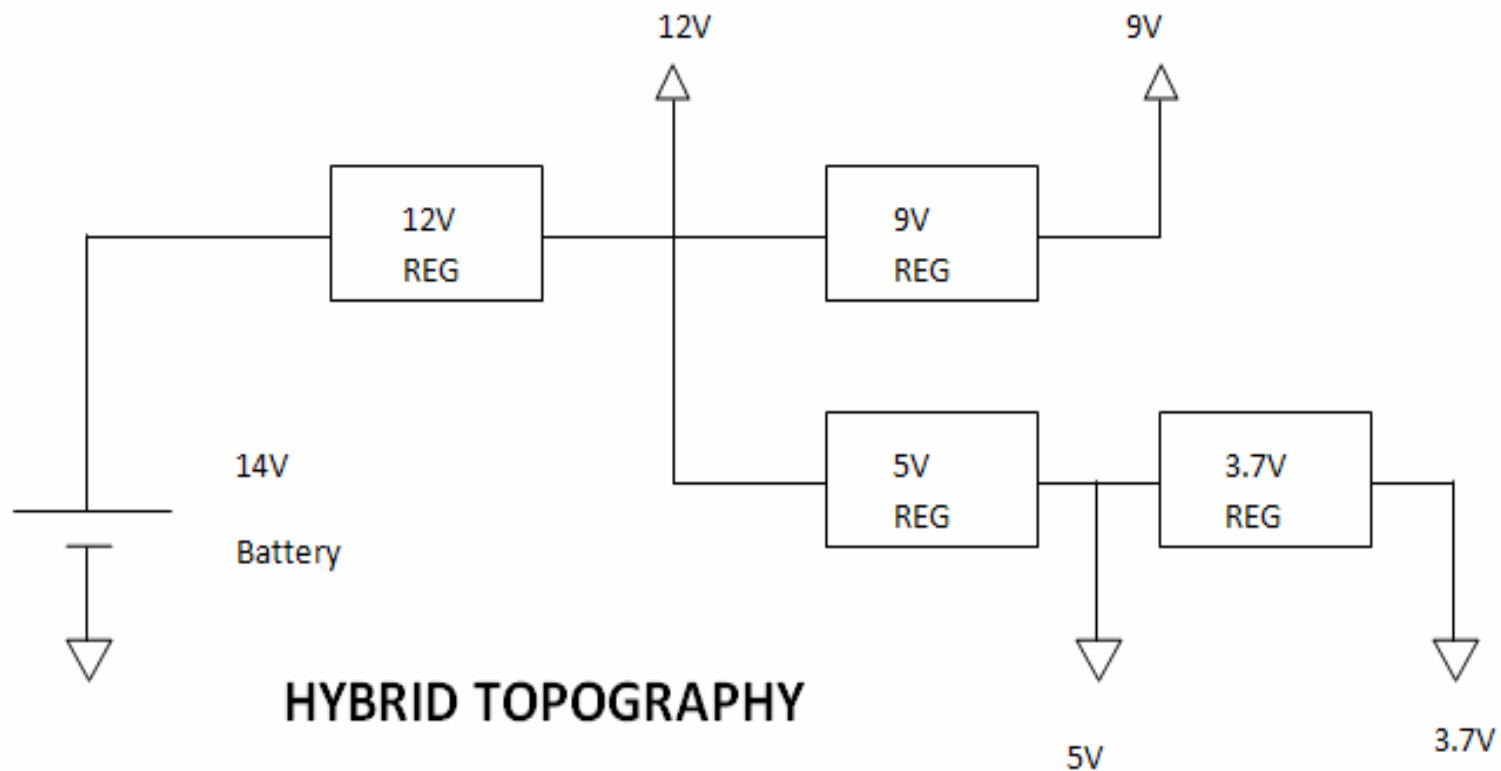
Lithium-Ion Battery

14.8V – 7 Ah -95 W



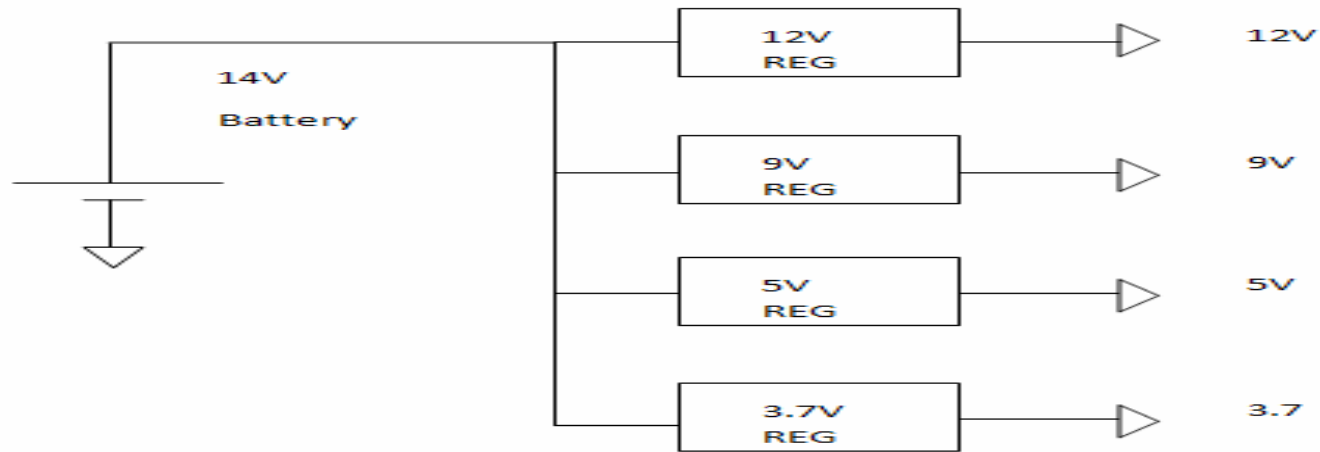
- Light weight (1.1 lbs)
- Rechargeable
- Small size (7.0" L x 2.2" W x 1.2" H)
- Low internal impedance
- Temperature range (-40° C to +80° C)
- If battery completely discharges, it's ruined
- No memory effect (charge at any time)
- Higher cost than nickel-cadmium

Topographies Slides

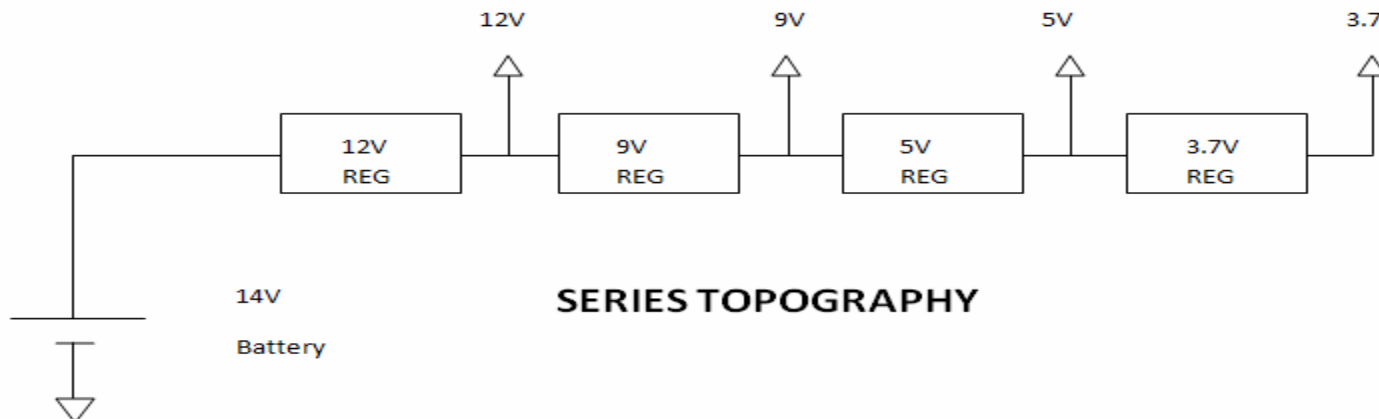


Topographies Cont'd

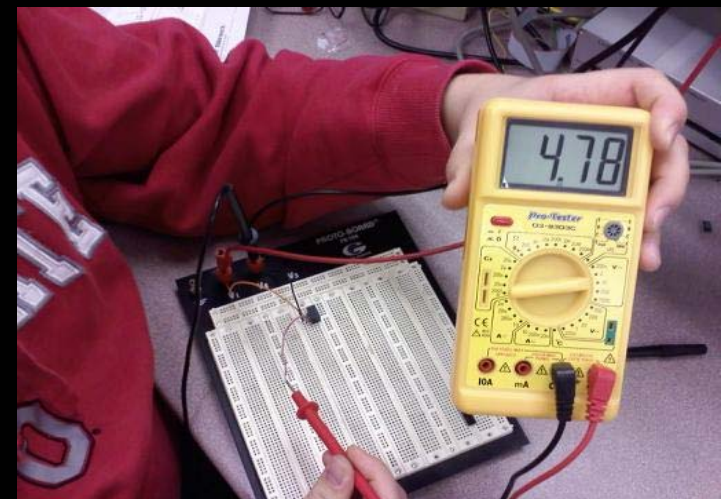
PARALLEL TOPOGRAPHY



SERIES TOPOGRAPHY



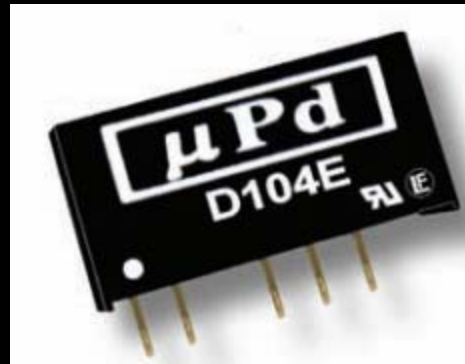
Testing Parts



Updated List

- 3 GPS
 - Antenna's with each
- Basic Stamp (Being replaced)
- Video System
 - 3 cameras
- Remote Cut down Servo (M.E Project)
- List is always changing with many groups

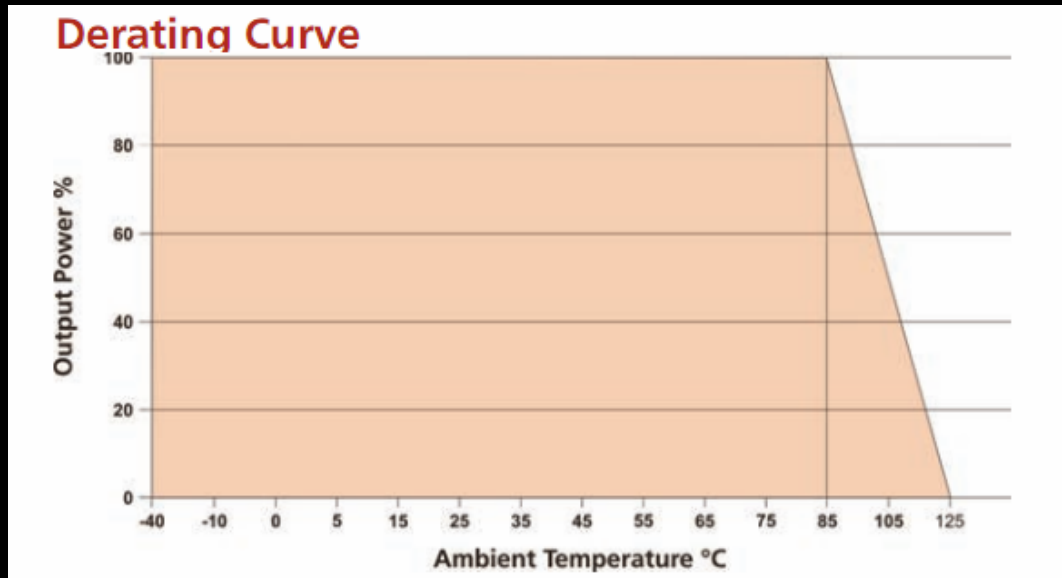
D100E Series



Features:

- 1 W Output Power
- Miniature Case
- Single and Dual outputs
- D111E
 - Step down
 - 12V_{in} -> 5.0V_{out}
 - Power systems like GPS, and DVR

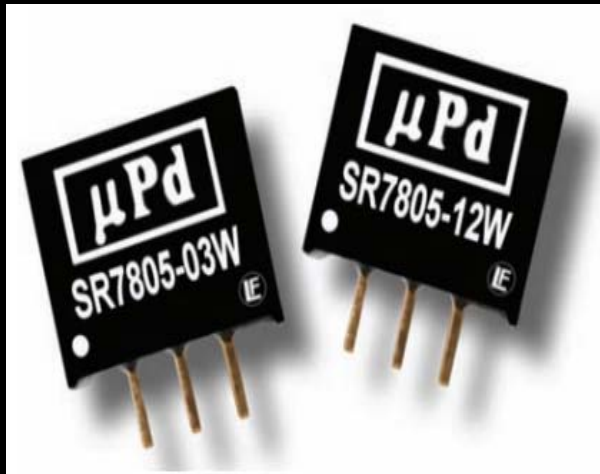
D100E



Graph: Output power vs. Ambient Temperature

- Temperature range experienced in the module:
 - 0 degrees to 60 degrees
- This converter meets weight and temperature requirement

SR7805 Miniature Series

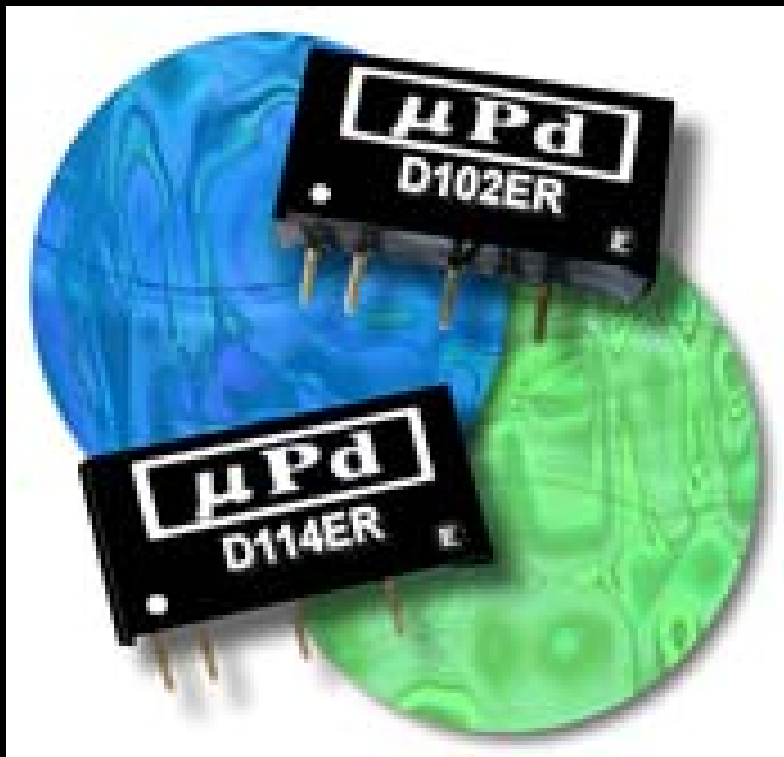


- SR7805-09W
- To power 9V Units (Cameras and Microtrak)
- Output Current 500mA
- Input V Range 11-32V
- Regulated Output.
- Greater Efficiency and wide input voltage range

SR7805-05W (V_o : 5V)

- Tested
- Our group favors this model
 - Wide Input voltage range
 - Easy set-up
 - Inexpensive
 - Cons: Single Output compared to other models
- Other models in this series currently investigating: SR7805-06, and SR7805-12W

D111ER DC/DC Converter



- Regulated output Voltage
- Input Voltage Range
 - 11.4-12.6 V
- Output Voltage/Current
 - 5V
 - 150mA

Allegro: ACS712

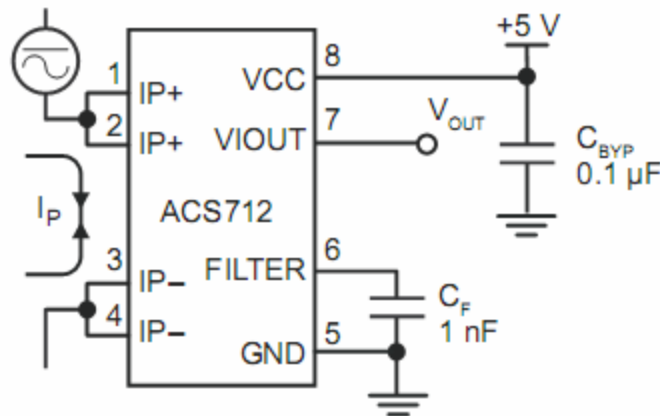


Approximate Scale 1:1



- Inexpensive method of measuring current.
- Easy implementation
- Total output error 1.5% at T: 25 degrees Celsius

Typical Application



Tasks

- Test all parts ordered
- Test the topographies
- Real-time test (Temperature)
- Debugging systems for maximum efficiency

Summary of Accomplishments

Current Accomplishments	Future Accomplishments
Design Specification	Prototype
Obtain Parts	Test Before Launch
Tested Equipment	Launch

Problem Faced



- Time Factor
- Class conflict
- Waiting Time
- Many new groups

Conclusion

- HIBAL – What is HIBAL?
- Our main objective and solution
 - Centralized Power bus system
- Battery
- Micro-converters, voltage converters
- Team is on schedule

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– ANY QUESTIONS?