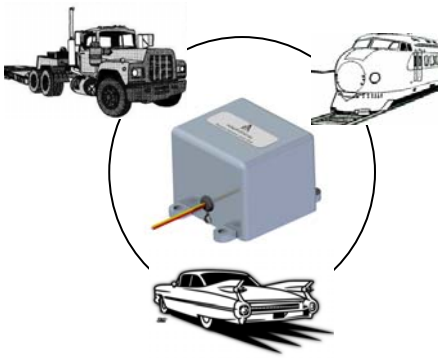
Ground Transport Energy Harvester (JTRB-e12)

Joule-Thief™ Ground Transport Energy Harvesters are engineered to power smart sensor solutions incorporating today's most popular wireless communication protocols. These high power density devices include AdaptivEnergy's new *e12* Energy Key™ collection and conversion electronics, which efficiently store harvested energy in a low leakage battery or supercapacitor.



Electrical Characteristics

JTRB-e12 Comparison with Batteries	Number of Batteries Equivalent to JTRB-e12 Energy Ouput Over Time and Temperature (20 mA pulse current, typical 802.15.4 transmit)					
	3 yr, -30°C	5 yr, -30°C	3 yr, 25°C	5 yr, 25°C	3 yr, 50°C	5 yr, 50°C
1 Lithium Thionyl Chloride (AA) Battery	13	23	5	8	4	8
1 Lithium Thionyl Chloride (D) Battery	1	2	1	1	1	1
3 Alkaline (AA) Batteries	n/a	n/a	4	7	n/a	n/a
1 JTRB-e12	**1**	**1**	**1**	**1**	**1**	**1**

Specifications	Energy Storage and Delivery Options		
	S1	S2	S3
Maximum Continuous Current (25°C)	35 mA	8 mA	15 mA
Maximum Pulse Current (25°C, per msec)	35 mA[1]	25 mA	25 mA
Supply Voltage	3.0 volts (or custom)		

S1: Super Capacitor Storage (0.2 mAh, 0.55 F)
S2: Thin Film Rechargeable Battery (0.15 mAh)
S3: Thin Film Rechargeable Battery (0.3 mAh)

[1]High Current Model Available (200 mA)

Mechanical Characteristics

Length	44 mm
Width	51 mm
Height	42 mm
Weight	255 g
Housing Material	Anodized Aluminum

Operating Conditions

Operating Temperature Range	-40 to +80°C
Storage Temperature Range	-40 to +80°C

Technology
- Vibration/Impact-based Energy Harvester
- Energy Collector, Storage, and Delivery Electronics Included
- Powers Radio Platforms:
  - 802.15.4 (ZigBee)
  - 802.11 (WiFi)
  - Wireless Hart
  - Proprietary Networks

Key Features
- Ruggedized, Long Life Design
- Self-sustaining Energy Harvesting
- Available with Custom Regulated Voltages
- Battery Replacement or Battery Life Extension

Main Applications
- Asset Tracking, Asset Sensing
- Battery Life Extension
- GPS/Sensor Data Logging

Industry - Transportation
- Automotive
- Train
- Shipping Containers
- Tractor Trailer

Ordering Part Number
- S1: JTRB-e12-S1
- S2: JTRB-e12-S2
- S3: JTRB-e12-S3

AdaptivEnergy designs, manufacturers and markets energy harvesting power solutions enabling wireless sensing and asset tracking devices.

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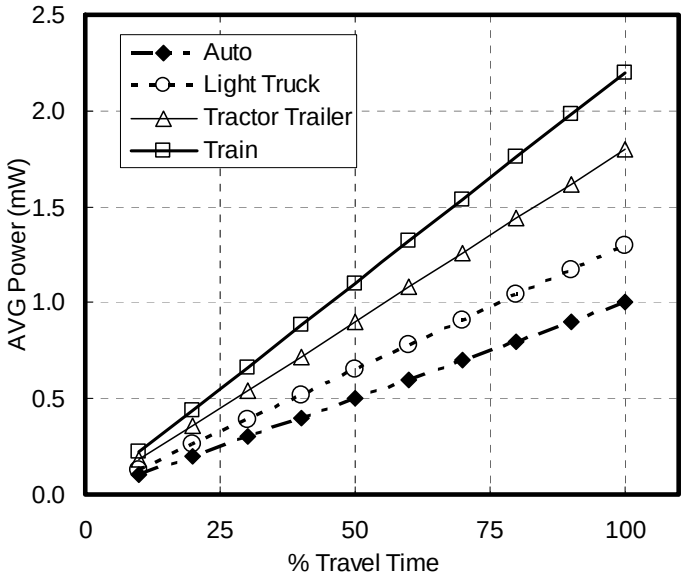
REV B, Oct 2009

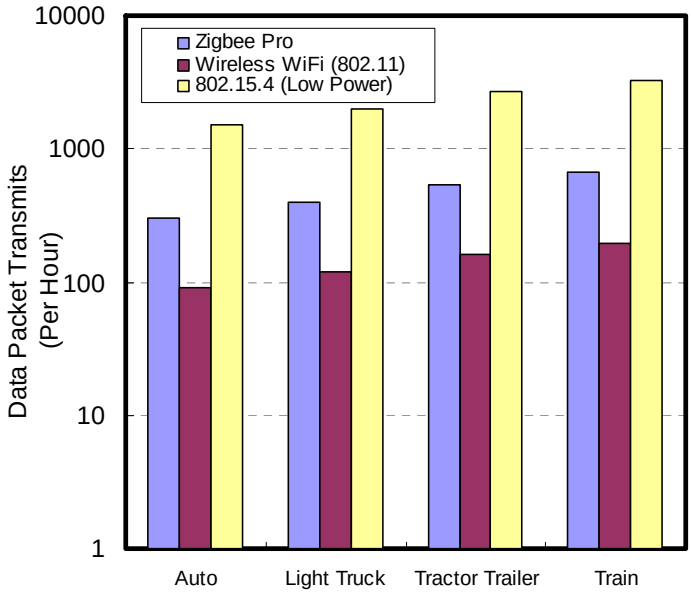
Performance Data

Average Power Output of JTRB-e12 for Different Ground Transportation



Percent travel time is the vehicle time in transit *vs.* total time. For example, an over-the-road tractor trailer that is idle 8 hours per day has a percent travel time of 67%. The power numbers are for typical energy harvester deployment locations and represent effective power *delivered to the application* including idle time.

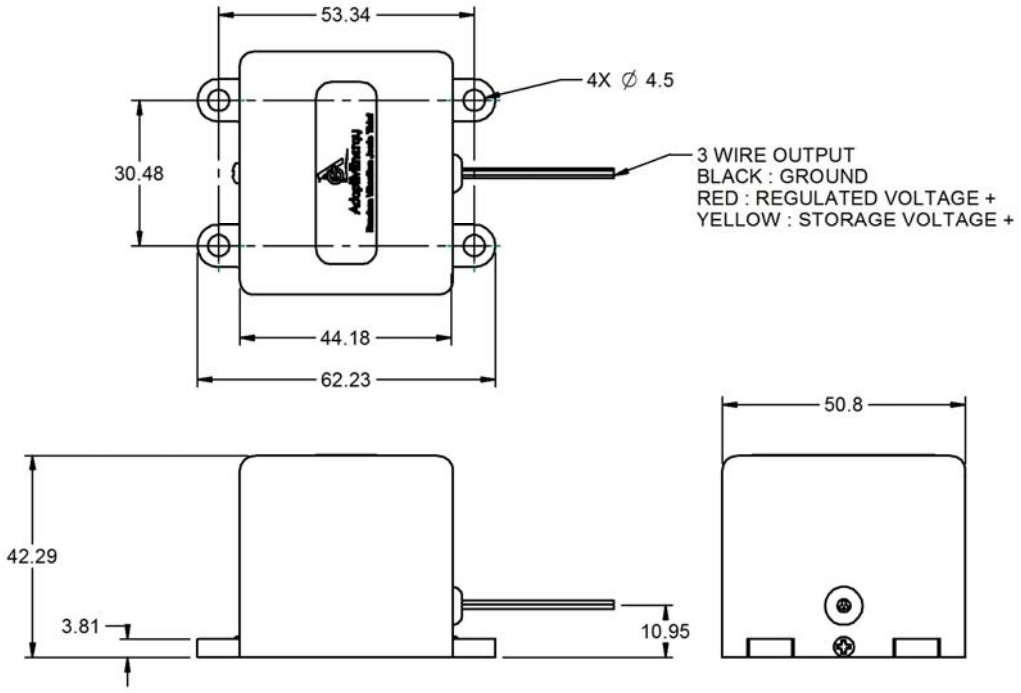
Power Solution for Wireless Sensor Node

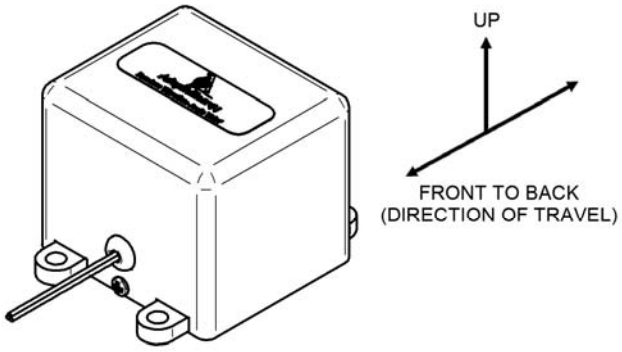


Average performance of JTRB-e12 is shown when it powers selected wireless microcontroller products. A 25% travel time is estimated for all transport modes and a low power microcontroller sleep mode in between transmits.

Mechanical Drawings

Outline and Mounting Diagram for Joule-Thief™ Ground Transport Energy Harvester (units in mm)





INPUT AXIS OF VIBRATION ↑
DEVICE MUST BE ORIENTED SUCH THAT PRODUCT LABEL FACES UP