blue mountain avionics

Engineering Note

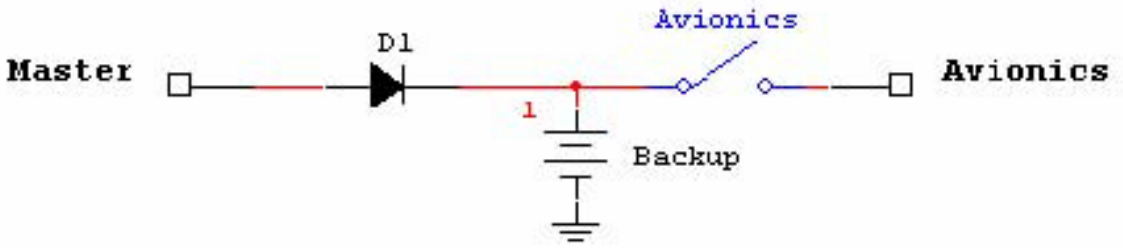
Product	EFIS/One & EFIS/Lite
Release	ALL
Subject	Backup Battery Circuit
Revised	09/08/04 Greg Richter

Common aircraft wiring practice can result in avionics buss voltages dropping to well below that required to run the EFIS or your radios during engine starts. This simple circuit provides a backup battery system to keep your EFIS/One or EFIS/Lite running during startup, and in the event of a main buss power outage.

We recommend replacing the battery at every 100 hour or annual inspection since it is so cheap, it is easier to replace it that load test it. The battery specified here will run the EFIS/One for about an hour when new. Plan on 45 minutes and check to actual available backup time for you installation.

During normal operations the Master Buss will supply power, through the diode, to the Avionics Buss. Additionally, the backup battery will be charged from the Master Buss. If power is lost on the master buss, or if it is turned off, the backup battery will automatically supply power to the avionics buss. The diode prevents any power being provided to the master buss from the backup battery.

Here's the circuit:



Starting sequence for this system would be:

1. Master OFF, Avionics ON
2. Verify backup battery voltage is good
3. Master ON
4. Engine start

Parts can be purchased from http://digikey.com. The only critical part is the diode, which needs a low forward voltage drop, Vf. Vf should be less than 1/2 of a volt. The battery can be any sealed battery with a C20 rating of 3 ampere-hours or more. The battery specified below is a 12 volt battery. For 24 volt systems use two of them connected in series.

Diode International Rectifier 120NQ045, Digikey P/N 120NQ045-ND
Battery Panasonic LC-R123R4P, Digikey P/N P172-ND

Bulletin PD-2.224 rev. D 07/04

International
IOR Rectifier

120NQ...(R) SERIES

SCHOTTKY RECTIFIER

120 Amp

$I_{F(AV)}$ = 120 A
V_R = 35 to 45V

Major Ratings and Characteristics

Characteristics	120NQ..	Units
$I_{F(AV)}$ Rectangular waveform	120	A
V_{RRM} range	35 to 45	V
I_{FSM} @ tp = 5 µs sine	29,000	A
V_F @ 120Apk, T_J=125°C	0.52	V
T_J range	-55 to 150	°C

Description/ Features

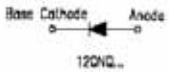
The 120NQ...(R) high current Schottky rectifier module series has been optimized for very low forward voltage drop, with moderate leakage. The proprietary barrier technology allows for reliable operation up to 150° C junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

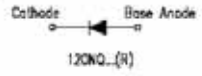
- 150° C T_J operation
- Unique high power, Half-Pak module
- Replaces two parallel DO-5's
- Easier to mount and lower profile than DO-5's
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Very low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability

Case Styles

120NQ...(R)

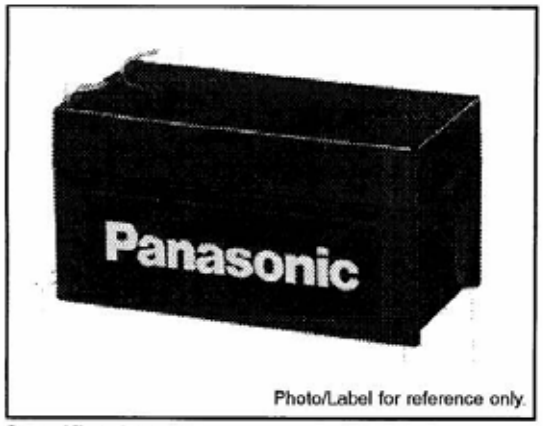
D-67





LC-R123R4P

For main and standby power supplies.
Expected trickle life: 3-5 years at 25°C, Approx. 5 years at 20°C.



Photo/Label for reference only.

Specifications

Nominal voltage		12V
Rated capacity (20 hour rate)		3.4Ah
Dimensions	Length	5.276 inches (134.0 mm)
	Width	2.638 inches (67.0 mm)
	Height	2.362 inches (60.0 mm)
	Total Height	2.598 inches (66.0 mm)
Approx. mass		2.65 inches (1.20 kg)
Standard Terminals and Resin	UL94HB Faston 187	LC-R123R4P
Optional Terminals and Resin	UL94V-0 Faston 187	♦ LC-P123R4P

♦ Please contact Panasonic for availability on optional items. Optional items may be subject to minimum order quantities.

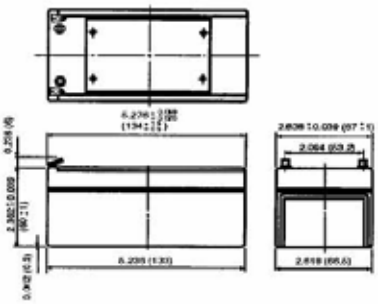
Characteristics

Capacity (Note) 77°F (25°C)		20 hour rate (170mA)	3.4Ah
		10 hour rate (300mA)	3Ah
		5 hour rate (540mA)	2.7Ah
		1 hour rate (2100mA)	2.1Ah
		1.5 hour rate discharge Cut-off voltage 10.5 V	1.5A
Internal resistance		Fully charged battery 77°F (25°C)	Approx. 60mΩ
Temperature dependency of capacity (20 hour rate)		104°F (40°C)	102%
		77°F (25°C)	100%
		32°F (0°C)	85%
		5°F (-15°C)	65%
Self discharge 77°F (25°C)		Residual capacity after standing 3 months	91%
		Residual capacity after standing 6 months	82%
		Residual capacity after standing 12 months	64%
Charge Method (Constant Voltage)	Cycle use (Repeating use)	Initial current	1.36 A or smaller
		Control voltage	14.5V to 14.9 V (per 12V cell 25°C)
	Trickle use	Initial current	0.51 A or smaller
		Control voltage	13.6V to 13.8V (per 12V cell 25°C)

(Note) The above characteristics data are average values obtained within three charge/discharge. Cycles not the minimum values.

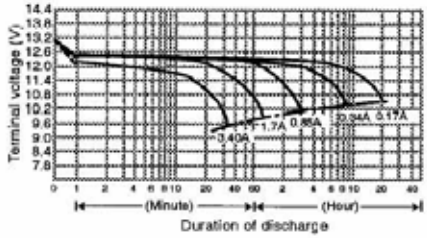
Dimensions (mm)

Terminal type: Faston 187



Battery case resin: Standard (UL94HB) Color is black.
Optional (UL94V-0) Color is grey.

Discharge characteristics 77°F (25°C) (Note)



Duration of discharge vs. Discharge current (Note)