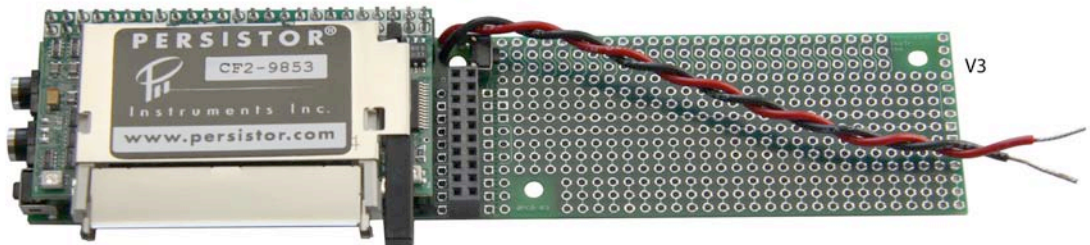
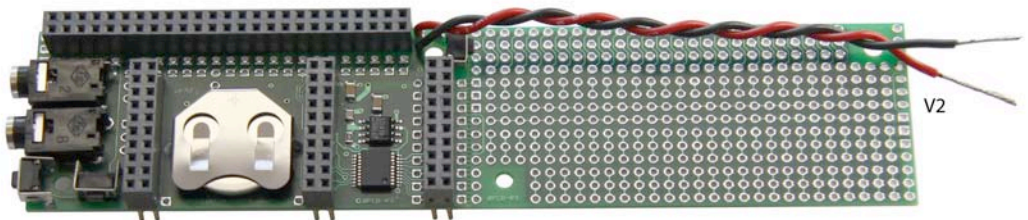
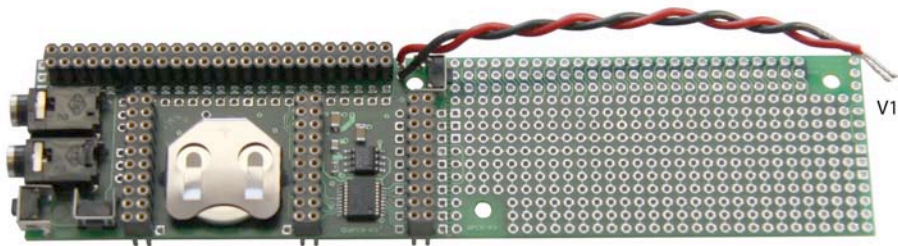


# PERSISTOR INSTRUMENTS

## Datasheet For The

### MRCP

### (Micro RecipeCard)



March 2010

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## Introduction and Warnings

Thank you for your purchase of the MRCP. This product is optimized for deploying the CF2 in a narrow space. Some customer convenience was traded for space reduction. Please read the following warnings.

**DO NOT** insert the CF2 directly into the MRCP sockets without making provisions to remove it later. It is very difficult to separate the CF2 from any version of the MRCP. For development, we recommend the CF2 be mounted with an extra set of long pinned sockets between it and the MRCP. For deployment, we suggest 2 loops of strong nylon fishing line be placed between the MRCP and the CF2 so the loops can be used to pull out the CF2 if necessary.

**Prying against the CF2 components voids the warranty.** Broken or dislodged CF2 or MRCP components will not be replaced under the warranty.

**Pulling the CF2 out of sockets by the memory card voids the warranty.** Broken or dislodged CF2 memory card headers will not be replaced under the warranty.

**Bent or broken pins will not be covered under the warranty.** The pins protruding from the bottom of the MRCP-V1 are softer than standard bronze pins and are very easily bent or broken. Please be careful to protect the pins from bending. The MRCP is packaged to protect the pins during shipping.

**Damage from misapplied or unlimited voltage is not covered under the warranty.** There is no power jack provided. MRCPs in development kits will have red and black tinned wires for power connection. However, the user should be careful to prevent the positive supply from shorting to the CF2 and MRCP. Please observe the current limit and voltage recommendations in the CF2 Getting Started Guide.

**The + notation on the MRCP battery input pads is incorrect. The ground pad is incorrectly marked with +.**

The outer pad is VBAT and the inner pad is GND.

## Features

- Allows CF2 deployment in narrow spaces.
- Choice of socket types for mating Persistor CF2
- 8 channel, 16 bit A/D converter
- 3.5mm jacks for SCI and TPU UARTs
- Backup Battery
- Buttons for Reset, Wake, and PBM
- Prototype section can be separated and mated to the other half

## The Difference Between MRCP-V1, -V2, and -V3

The MRCP-V1, -V2 and -V3 are exactly the same, except for the type of connector used.

**MRCP-V1** uses low profile, stackable, machine screw sockets. This version allows the minimum distance between the CF2 and the MRCP and to an additional stacked PCB board if desired. The pins can be clipped off, if stacking is not necessary. Since the MRCP-V1 was released, these custom connectors have become significantly more expensive. These connectors are also the most fragile choice.

**MRCP-V2** uses standard stackable Samtec sockets for 0.025" square pins. The pins are much sturdier than the V1 pins. The total height of the CF2 with MRCP-V2 is slightly more than with the V1.

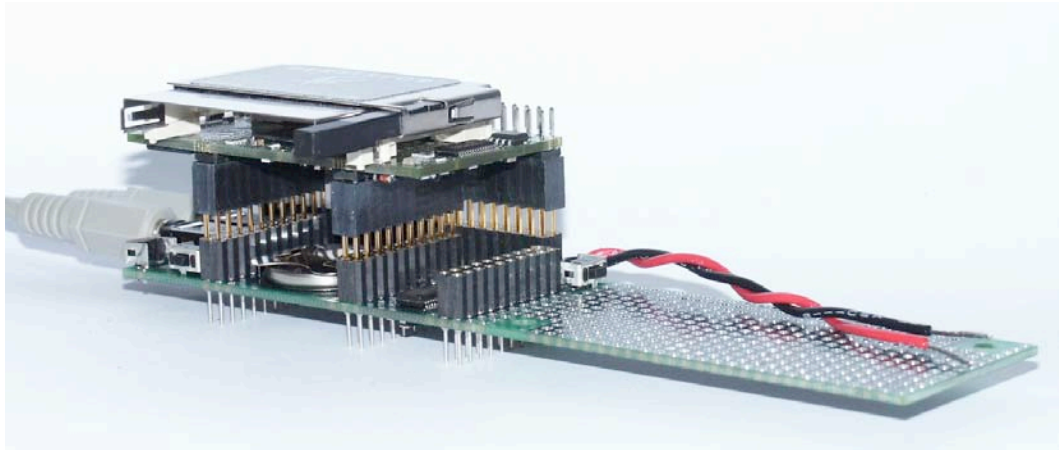
**MRCP-V3** uses standard non-stacking Samtec sockets for 0.025" square pins. They are the same sockets used on the R212 and R216AU base boards.



All measurements are typical, subject to manufacturing variation

## The MRCP starter kit

The MRCP starter kit contains an extra set of long pinned socket strips for 0.025 square pins. These are provided to place between the MRCP and the CF2 during development to make it easier to remove the CF2 from the MRCP. The following photograph illustrates the CF2 elevated off an MRCP-V1 by the connectors.



The starter kit for MRCP-V1 (only) also contains an extra set of low profile socket strips of the same type as installed in the MRCP-V1. The extra connectors are provided for your connections to another board, or the MRCP's other half.

Finally, all MRCP starter kits contain two cables for the communication ports, and the Persistor PicoDEV CD for software development. You will also need Metrowerks CodeWarrior. Contact Persistor Instruments for information on the currently supported version.

## Separating the MRCP Prototyping Area

The MRCP can be carefully cut in half and the half with prototyping area will line up with the connectors and mounting holes of the CF2 half. The pads that line up with the CF2 'C' connector are divided out to make convenient connections to the functions on the CF2 half. However, the pads that line up with the Address, Data, and A/D connectors are not so conveniently brought out. Be sure to cut the traces that short connections if you install these connectors.

Perforations are provided as a guide for sawing the two halves apart. DO NOT try to break the circuit board along these perforations. We recommend using a hack saw to avoid breaking the surface mount components or bending the fragile connector pins. Pinch the bare half gently in a shop vise, using card board pads to prevent the vise from scratching or damaging the bare half.

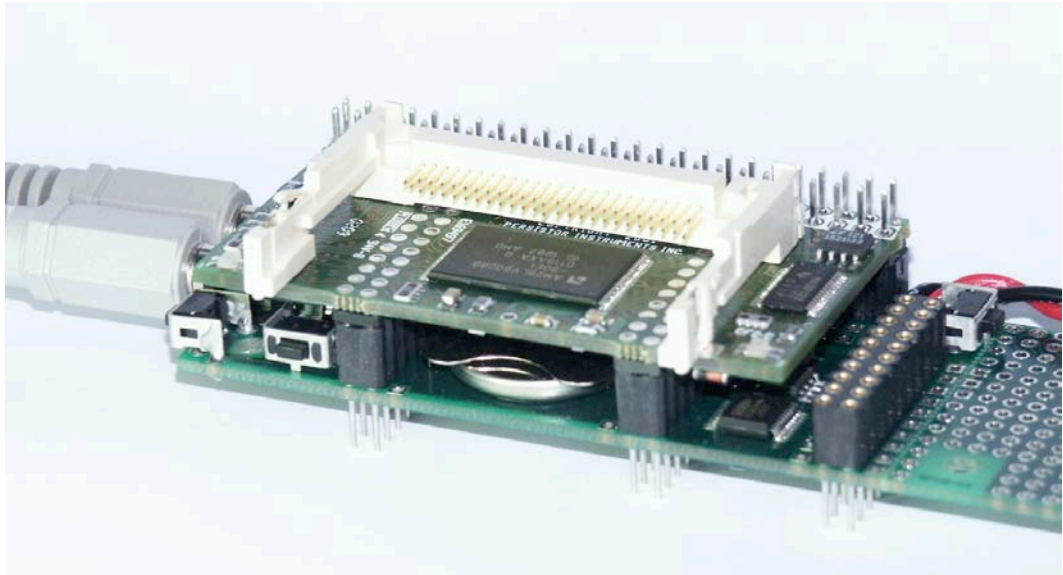
## Removing the CF2 CompactFlash shroud and Ejector

For the smallest configuration, the CF2 CompactFlash ejector and shroud can be removed. If you intend to use a CompactFlash card, there is no point in removing the shroud, but removing the ejector will remove the ejector button that protrudes significantly. The ejector button could also be cut off, but we recommend removing the ejector, before cutting the button, and then replacing the ejector.

The ejector snaps onto the header. Two metal holes snap over plastic nubs on the left side of the ejector as you read the Persistor label. Using a hobby knife, pry these two metal tabs over the plastic nubs; the ejector should lift off. Be careful not to scrape the plastic nubs off if you intend to reuse the ejector in the future.

If you will not be using a memory card, you can remove the shroud to make the assembly narrower. Old CF2s have a large metal shroud under the ejector. The large metal shroud pulls straight up out of slits in the plastic header. Newer CF2s have a narrow metal shroud that extends beyond the plastic entry to the header. The narrow shroud does not easily separate from the header and careful prying will be required to break the shroud out of the plastic header.

The photograph shows the CF2 with the ejector and shroud removed.



## CF2 Pin Names and Identification

Please refer to the CF2 getting started guide for CF2 pin names and functions. All are brought to pads on the MRCP.

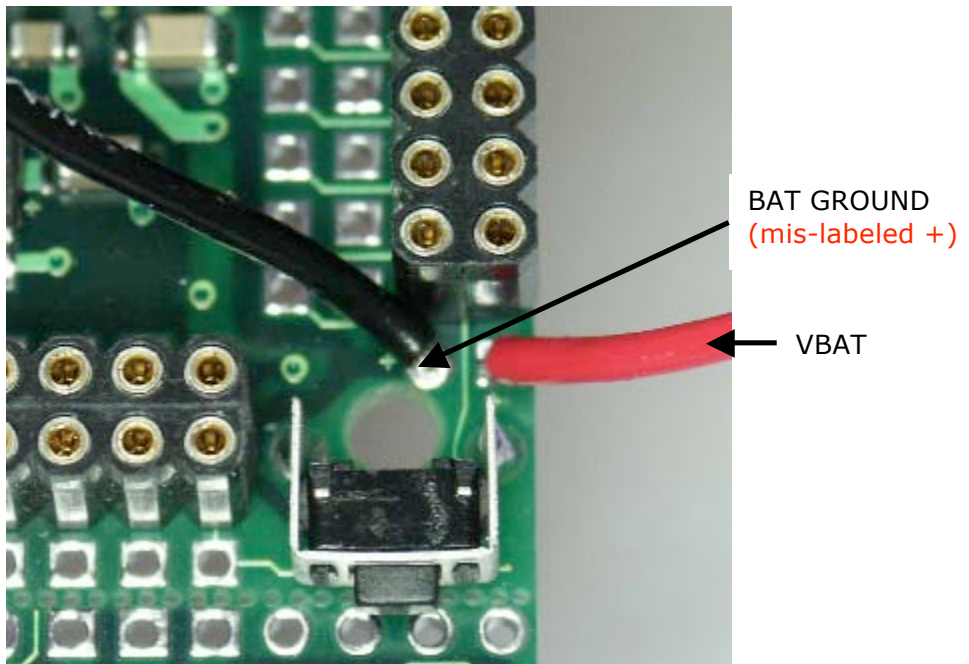
## Power Connection

The MRCP does not have a power jack. If your MRCP came from an MRCP starter kit, there are short red and black wires soldered into pads for power connection. These wires are connected to pads next to the pin 1 / pin 2 end of the CF2 connector C.

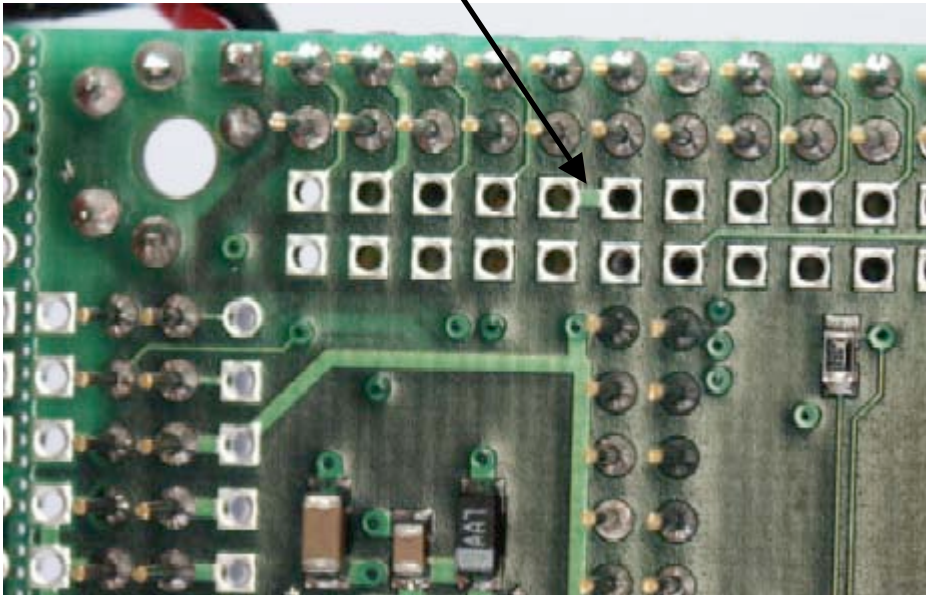
**NOTE** the MRCP does not protect against over voltage or reverse voltage. Please review the warnings and precautions in the CF2 Getting Started Guide.

**WARNING** The + notation on the MRCP battery input pads is wrong. Ground is incorrectly marked with +. The outer pad is VBAT and the inner pad is GND. The illustration on the next page shows the correct VBAT and GND connection points.

The CF2 has an on board regulator to provide 3.3 volts. The output is called VLIN. Normally, VLIN is brought off the CF2 and then fed back in to VREG; the positive input to the CF2 components. The MRCP makes this connection on the back of the MRCP between the solder pads for their connection at CF2 connector C. The connection is illustrated on the next page.



VLIN to VREG connection



## **RESET, PBM and WAKE Buttons**

Three right angled buttons are presented at various edges of the RecipeCard.

**RESET** is located near the pin 1 - 2 end of the CF2 connector C (near the power wires, if installed). This button, when momentarily depressed, will cause a full hardware reset.

**PBM** is located at the "side" of the MRCP. The PBM (IRQ5) button is used to pull a CF2 back to the PBM monitor, instead of running an installed program, when power is applied. See your CF2 documentation for more information about using the PBM function.

**WAKE** is located next to the main SCI communication connector. This button can be used programmatically to wake the CF2 from certain low power modes. See your CF2 documentation for more information about using the /WAKE capability.

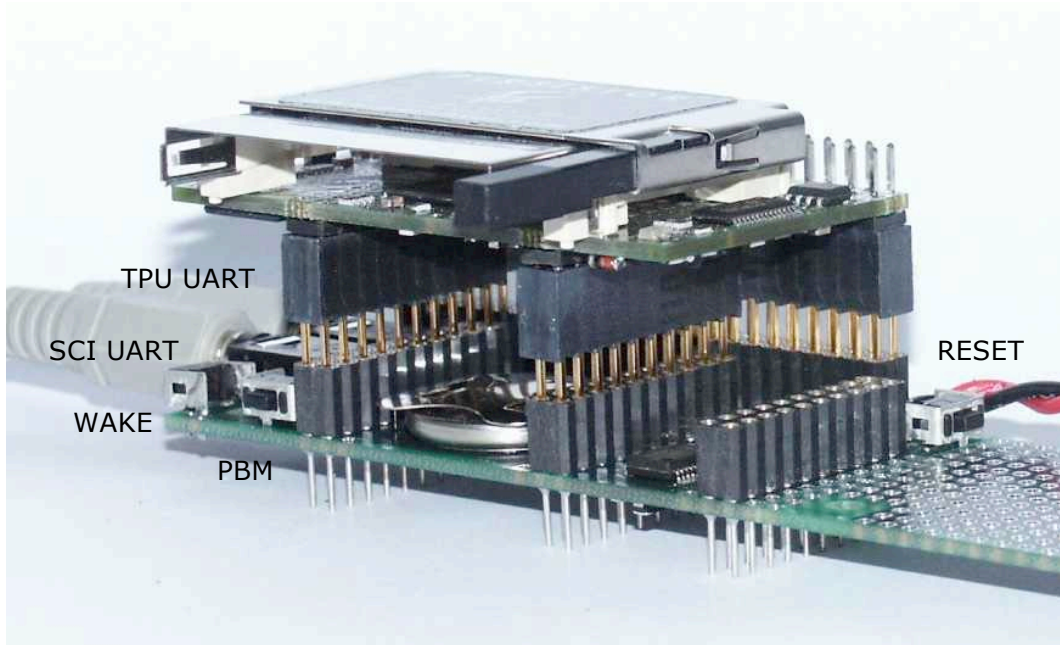
## Communication Connectors and Cable

The MRCP has two 3.5 mm jacks for communication cables (Persistor part number CAB-COM2-RCP). The jacks are at the end of the MRCP to allow cables to be connected when deployed in a tube. The jack adjacent to the button is the main SCI UART. The second jack is connected to TPU 12 and 13 as illustrated in the CF2 Getting Started Guide on page 26 at the heading;

### **2<sup>nd</sup> RS-232 Level TPU UART borrowing spare EIA drivers:**

Programming examples showing the use of the TPU UARTs are installed from the PicoDEV CD and should be located here;

C:\Program Files\Persistor\MotoCross Support\CFX\Examples\TPU\UARTs





## 16 bit A/D

The MRCP is built with a Burr Brown ADS8344 16 bit, 8 channel A/D converter with a 2.5 volt Linear Technology LT1461 voltage reference. The datasheet for the A/D converter is available on your PicoDEV CD as well as various programming examples from Persistor. Persistor programming examples can be compiled for a variety of A/D types, so be sure to compile for the ADS8344. The SPIIDAQ foreground function that permits continuous streaming recording of up to 64,000 samples per second also works with the MRCP.

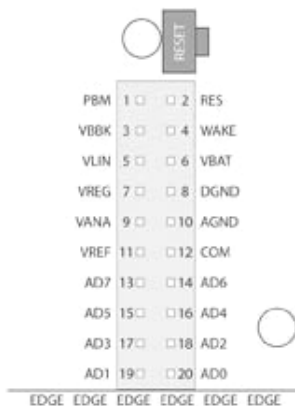
The layout for the converter is optimized to minimize conversion noise.

Condition	Noise*
10 $\Omega$ resistor divider powered from VREF	+/- 3 l.s.b
1K $\Omega$ resistor divider w/ 0.1uF caps on each channel	+/- 3.5 l.s.b.
Input of Nickel Metal Hydride battery (1.3 volts)	+/- 3 l.s.b.

\* Results from sets of three 500 samples of 8 channels tests, taken at 1KHz. Values given for resistor divider tests are the worst observed noise on any channel over the three tests. For the Nickel Metal Hydride battery tests, channel zero was observed and the worst observed noise is reported.

## A/D (and other) connections

The analog (and a few other) connections are available at the 20 pin connector that does not connect to the CF2. Pins 19 and 20 are at the edge of the board. The pin numbering below is given looking down at the sockets from the CF2 side of the MRCP.



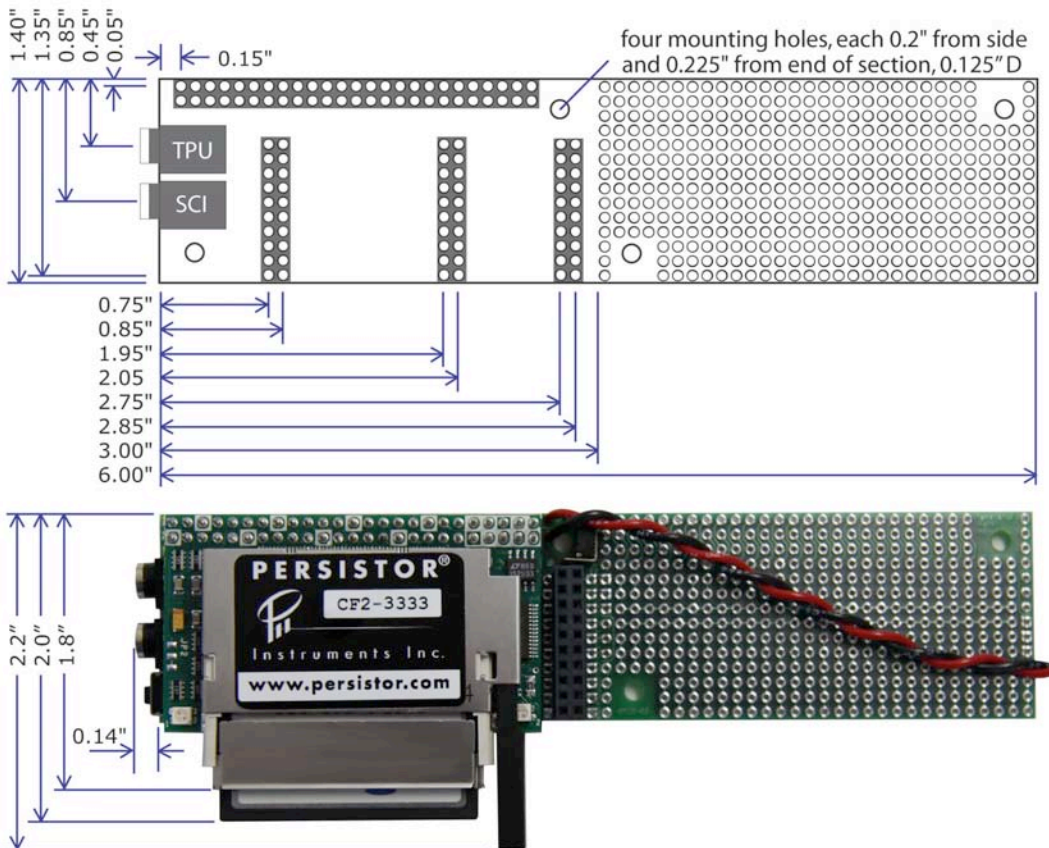
See the CF2 Getting Started Guide for descriptions of PBM, RES, VBBK, WAKE, VLIN, VBAT, VREG and DGND. VANA is the analog VDD and LT1461 input. See the ADS8344 datasheet for details on VREF, AGND and COM.

## Backup Battery

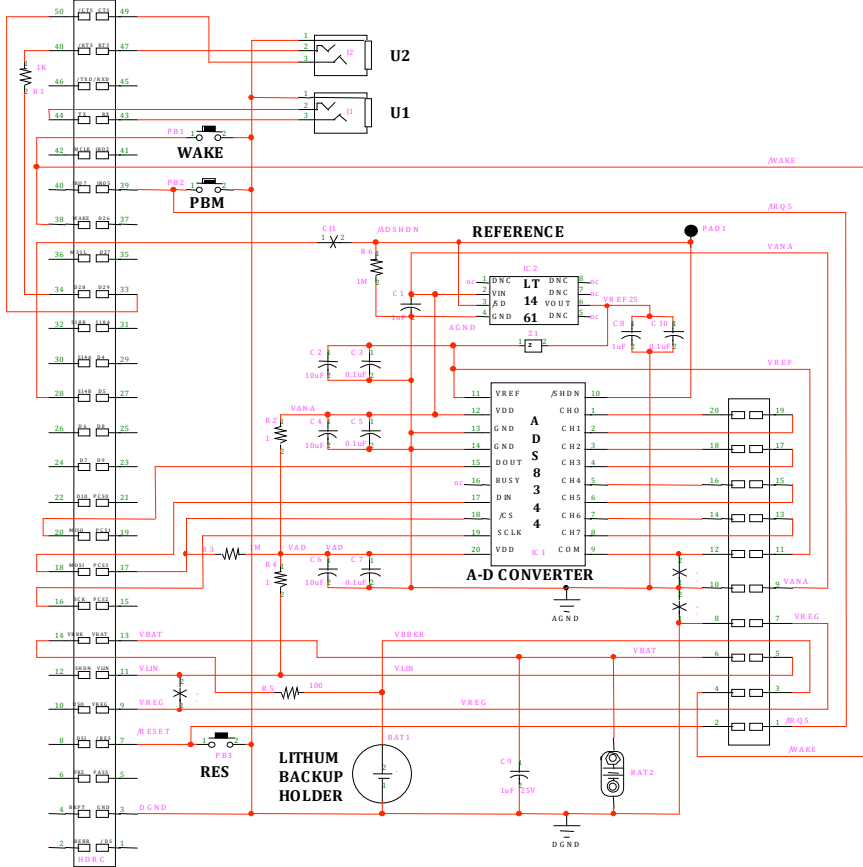
A CR2032 lithium backup battery can be installed on the MRCP. It is readily available in retail stores. When replacing the battery, be sure to install it with the + sign up; that is **NOT** facing the printed circuit board.

The CF2 does not require a backup battery to operate. However, if you intend to use the low power suspend mode of the CF2 (typ < 10uA) or if you will use dynamic CompactFlash card changes (CCC from PicoDOS) then you **WILL** need a backup battery. The backup battery will also maintain the real time clock of the CF2 when the main power is removed.

## Dimensions



**CF1/CF2  
Connector C**



## Part List

Customers who use Persistor Instruments CF2 products are welcome to use any part of the MRCP circuit in their own add on boards. Following is a list of components that are used on the MRCP. Small quantities of these can be purchased from Persistor Instruments. Some of these items are also available at [www.DigiKey.com](http://www.DigiKey.com).

### Low Profile Stacking Sockets used on MRCP-V1:

Socket, stacking, 2 X 10 pins	Persistor	0CON-STR-1-LPMSS-2X10
Socket, stacking, 2 X 25 pins	Persistor	0CON-STR-1-LPMSS-2X25
set of three 2X10 and one 2X25	Persistor	CON-SET-2

### Low Profile Stacking Sockets used on MRCP-V2:

Socket, stacking, 2 X 10 pins	Samtec	SSQ-110-23-G-D
Socket, stacking, 2 X 25 pins	Samtec	SSQ-125-23-G-G
Set of three 2X10 and one 2X25	Persistor	CON-SET-1

### Low Profile Stacking Sockets used on MRCP-V3:

Socket, stacking, 2 X 10 pins	Samtec	SSW-110-21-F-D
Socket, stacking, 2 X 25 pins	Samtec	SSW-125-21-F-G

### Sockets for cables

(2) 3.5mm stereo jacks	Shogyo	SJ-0537-3RT JACK
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### Mating cables

Mating cables	Persistor	CAB-COM2-RCP
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### Other standard items on MRCP

Backup battery holder	DigiKey	3003K-ND
Backup battery	Sanyo	CR2032
RES, WAKE, PBM Switches	C&K	PTS635VL39

### 16 bit, 8 channel A/D circuit

A/D converter	Texas Inst	ADS8344NB
Voltage Reference	Linear Tech	LT1461AIS8-2.5