

8 Bit 4 ADC, 1 DAC, 6 Digit Counter

November 26, 2008

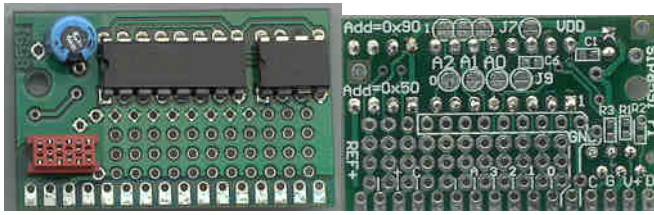
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1 Introduction

SIP8591 is an 8 bit ADC/DAC and 6 Digit Event Counter module based on the **NXP PCF8591** ADC/DAC and **PCF8393** counter.

This module does not require any surface mounted components, and is the chips are very simple to understand.



The PCF8591 is probably the simplest 8 bit ADC/DAC.

- 0-VDD range
- 4 ADC channels
- 1 DAC channel
- DIP package for easy field replacement
- VDD is reference

The PCF8593 is an RTC¹ chip, however it has an event counter mode which counts 6 BCD digits. The module does not contain any oscillator components, the PCF8593 is for use as an event counter only, not as a clock.

2 PCF8591 ADC/DAC

3 PCF8593 6 Digit Event Counter

The PCF8593 is a real time clock chip. It has a 6 digit event counter mode which directly counts the input. The result is in plain BCD format. So when it is read with an I2C2PC adaptor, the number will be plain decimal.

The alarm comparator is a

Clock Input

The clock input of the PCF8593 is an oscillator stage with feedback. It should not be left floating.

- Drive direct with logic input
- Pull up to VDD
- Pull down to gnd
- capacitor couple

Maximum input frequency is 1MHz. Input capacitance is 25pF.

To check that the input is being conditioned correctly you can puit an oscilloscope on pin2, Clock Out.

¹Realtime Clock

3.1 Extended Counting

Event counting mode allows a maximum count of 1 million.

The 50Hz clock mode will give a direct count of all edges. This gives a maximum count of 6.3e9, or 9 effective digits. The data will be in clock format (h:m:s,d:m:y), so a conversion to decimal will be required. However if a very large count is required this is an option.

You may also use the 32.768kHz clock mode, which provides an effective prescale of 327.68.

4 I2C Communications

The base address if PCF8591 is 0x90. 8 sub-addresses are available through J1-6.

The address if PCF8593 is 0xA2. There are no other subaddresses

5 Prototyping Area: Dividers and Filters

There is small prototyping area. You can use this for input dividers or RC or LC filters. The pads closest to IC1 are ground pads.

Coupling capacitor or pullup/down resistors on the PCF8593 clock in are fitted here also.

Optional Zener

You can fit Z1 the optional 6.2V protection zener where there is a chance of reversed or over voltage supply to the I2C bus, or where destructive voltages might get applied to the ADC inputs. In some cases it will prevent or limit damage spreading through the system

6 External Reference

Normally Ref+ and Ref- are VDD and GND. However J7 and J8 can be cut to use the external reference inputs

7 Jumpers

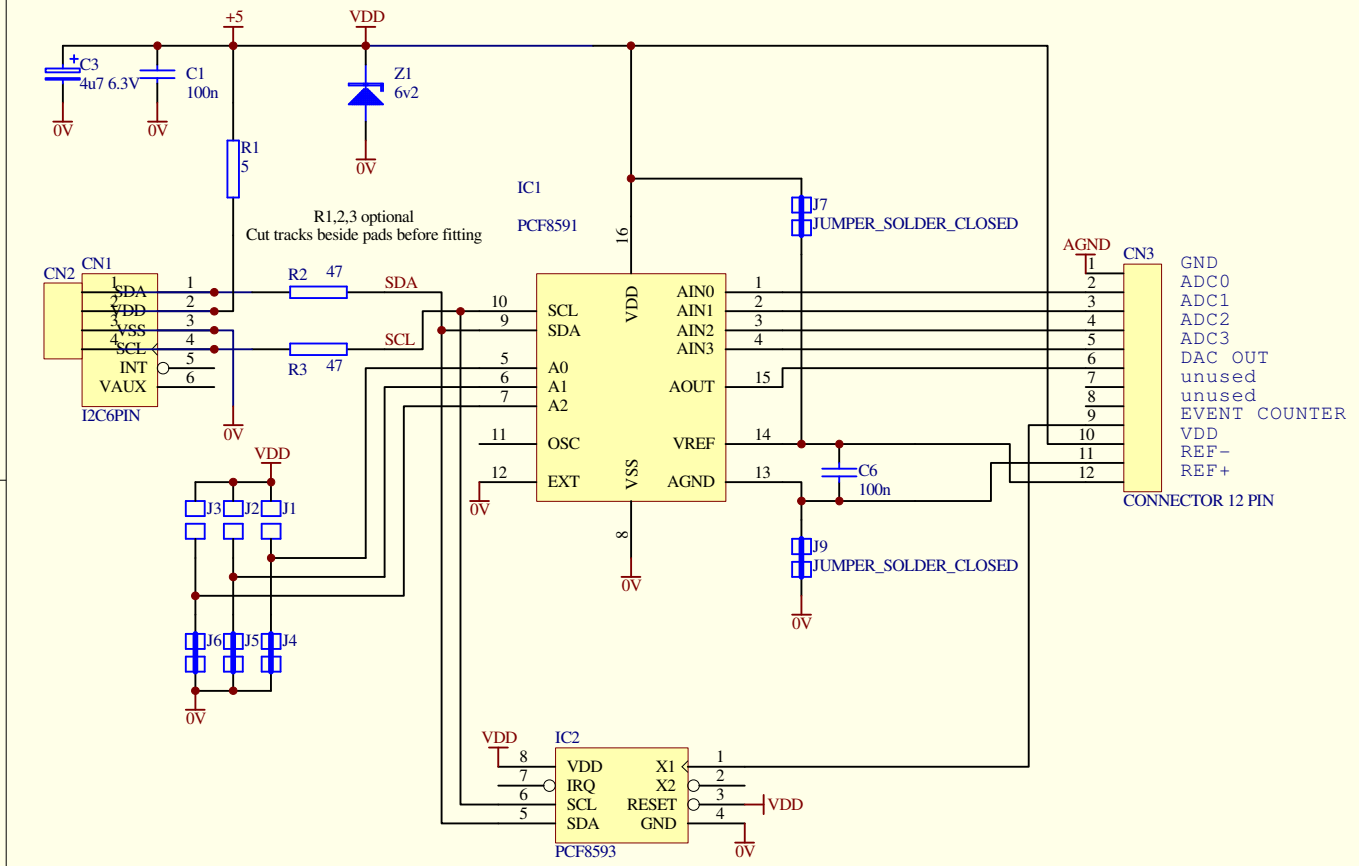
J#	Function	default	
J1-6	I2C Sub Address	joined to 0	
J7	Ref+ to VDD	closed	
J9	Ref- to GND	closed	

8 Edge Connector

Pin	Function	
1	SDA	
2	+5	
3	GND	
4	SCL	
5	AGND	
6	ADC0	
7	ADC1	
8	ADC2	
9	ADC3	
10	DAC OUT	
11		
12		
13	EVENT IN	
14	VDD	
15	REF -	
16	REF +	

9 Drawings

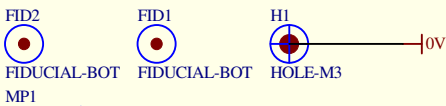
9.1 Circuit Diagram



Jumpers
 J1-J6 I2C Address
 J7: Cut for ext VREF+
 J9: Cut for external VREF-

PCF8591 I2C address 90h
 PCF8593 I2C address A2h

PSF8591 is an 8 bit, 4 channel ADC + 1 channel DAC
 PCF8593 is used as a 6 digit BCD event counter.
 Event Counter mode must be selected.
 The input can be AC coupled as it has oscillator bias.
 Alternatively it can be pulled up or down with a resistor.

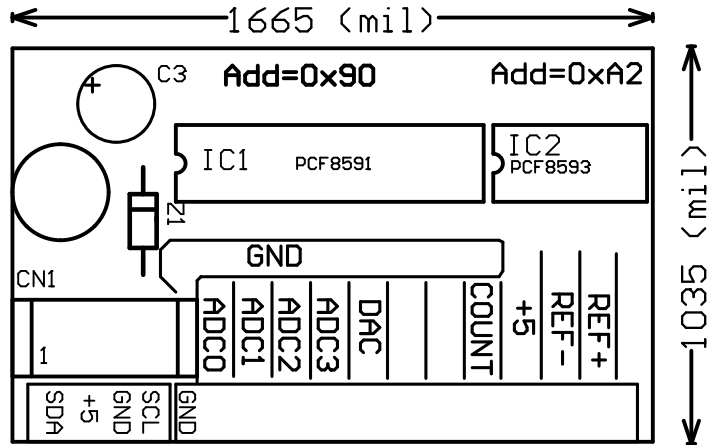


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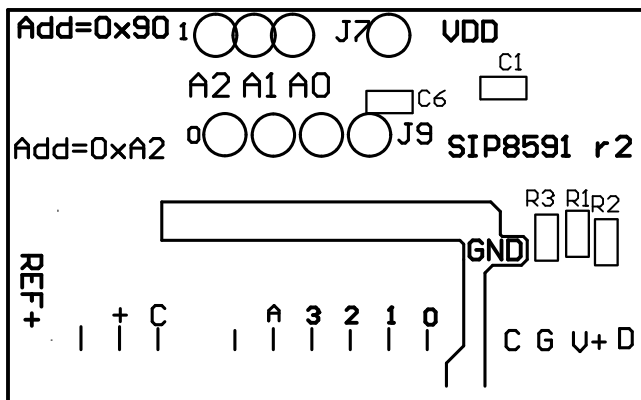


Title		
8 Bit ADC/DAC & 6 Digit Event Counter		
Size	Number	Revision
A4		
Date:	12-Oct-2008	Sheet of
File:	C:\cad\va\I2Cad\I2Cad.ddb	Drawn By:

9.2 PCB Drawings



Bottom Side View



10 Revision History

Date	Rev#	Changes
	0	pre-release