OP5330 USER GUIDE

Digital to Analog Converter Module

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GETTING STARTED

Before you begin, verify that your system meets the requirements of the OP5330 board:

SOFTWARE REQUIREMENTS

- RT-LAB 8.4.0 and higher
- MATLAB 32 bits 6.5 and higher
- Windows XP and higher

HARDWARE REQUIREMENTS

- OP4500 Simulator
- OP5600 HIL simulator
- OP5600 I/O Expansion Unit
- OP5607 I/O Expansion Unit
- OP7000 Expansion Unit with OP7220 Type A Carrier

FEATURES

- HYPERSIM compatible
- 16 single-ended analog output channels
- All outputs are sampled simultaneously, up to 1 MS/s
- 16 bit resolution
- ±16 V voltage range output
- ±15 mA maximum current per channel
- Factory calibrated

INTRODUCTION

DESCRIPTION

The OP5330 digital to analog converter (DAC) provides 16 single-ended digital output channels. Each channel uses a 16-bit resolution digital-to-analog converter.

The OP5330 is a part of the OP5000 series of optional modules for OPAL-RT's state of the art HIL (hardware-in-the-loop) systems, intended for use with OPAL-RT carrier boards (see "Hardware Requirements" on previous page). Designed for OPAL-RT's simulation systems, the OP5330 converts digital signals to analog.

Each OP5330 can sample up to 1 MS/s, giving a total throughput of 8 MS/s, all channels are simultaneously sampled. The onboard EEPROM provides offset and gain data adjustment written during the calibration process, as well as over-voltage protection.

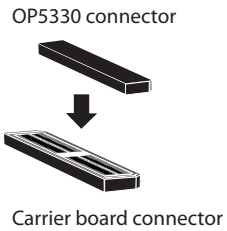
By default, the maximum output signal is set to ±16 volts.

OFFSET AND GAIN CALIBRATION

The OP5330 contains a serial EEPROM to store the module identification, calibration information and other important information. Each OP5330 is factory calibrated after assembly; during calibration, gain and offset are adjusted to ensure accurate target output values at ±20 mV noise and offset.

MODULE INSTALLATION AND CONFIGURATION

The OP5330 digital to analog converter must be inserted into the OPAL-RT carrier board using great care. Two polarized connectors fasten the module in the suitable position and four screws affix it for a more secure connection to the carrier.



Make sure that the connectors are properly aligned; they should fit together easily. Use light pressure to push the OP5330 board into the carrier board.

The OP5330 module can only be used with OPAL-RT's carrier boards. Its location and identification on the carrier board are determined by the FPGA controller bitstream.

CIRCUIT LAYOUT DIAGRAMS

When the OP5330 is installed on the carrier board, only the top of the circuit board is visible, as shown in Figure 1. The connectors are located on the bottom of the board (see Figure 2) and fit snugly into the connectors on the carrier.

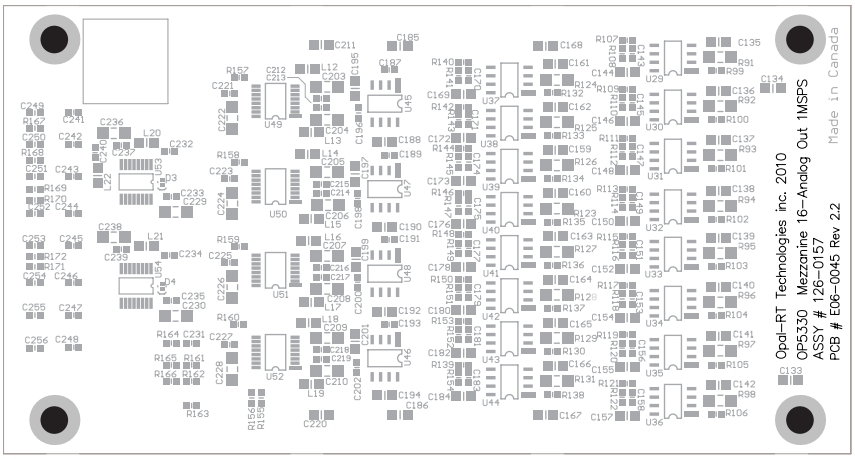


Figure 1: OP5330 module (top view)

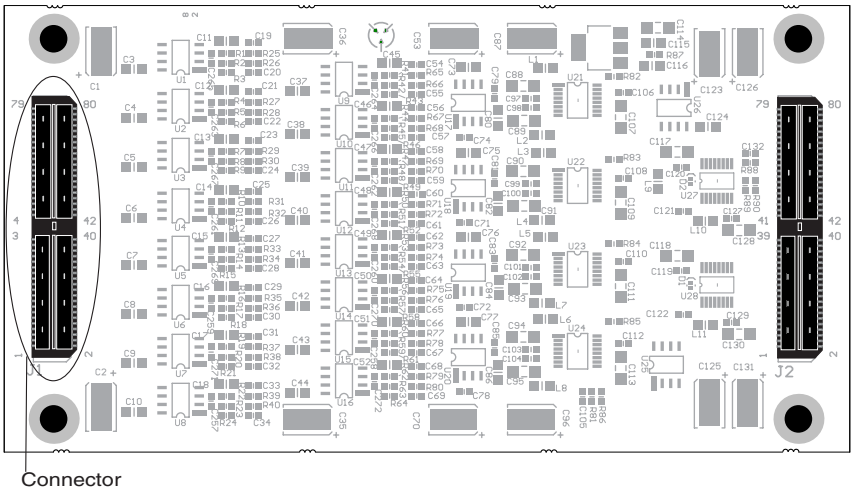


Figure 2: OP5330 module (bottom view)

NOTE: Images shown represent revision 2.2 of the board. Versions may vary according to your board.

SCHEMATICS

Figure 3 represents a simplified schematic of one channel of the OP5330 module. It is composed of three stages: the first stage consists of one gain DAC and one offset DAC; the second stage consists of a signal DAC with an operational amplifier that allows for gain adjustments; the third stage consists of an operational amplifier that receives final signal value and integrates the offset.

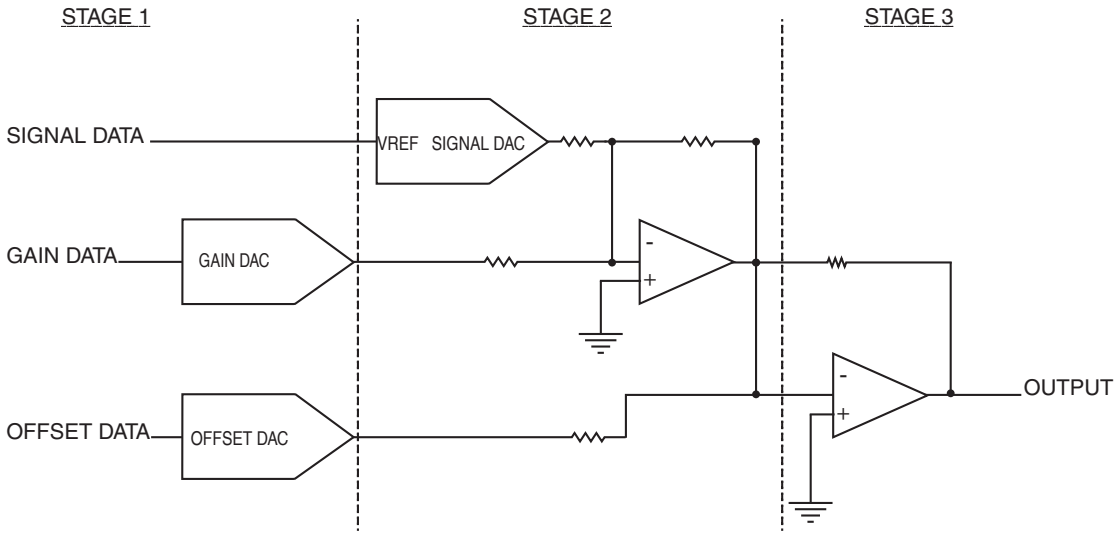
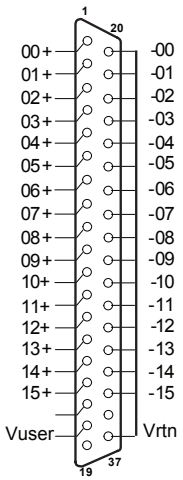


Figure 3: Output DAC circuit

OP5330 DB37F PIN ASSIGNMENTS

Connector P1 Ch. 0-15			
DB37F	**OP5330 pin assignment**	**DB37F**	**OP5330 pin assignment**
1	+OUT00	20	-GND00
2	+OUT01	21	-GND01
3	+OUT02	22	-GND02
4	+OUT03	23	-GND03
5	+OUT04	24	-GND04
6	+OUT05	25	-GND05
7	+OUT06	26	-GND06
7	+OUT07	27	-GND07
9	+OUT08	28	-GND08
10	+OUT09	29	-GND09
11	+OUT10	30	-GND10
12	+OUT11	31	-GND11
13	+OUT12	32	-GND12
14	+OUT13	33	-GND13
15	+OUT14	34	-GND14
16	+OUT15	35	-GND15
17		36	
18	Reserved	37	Reserved
19			



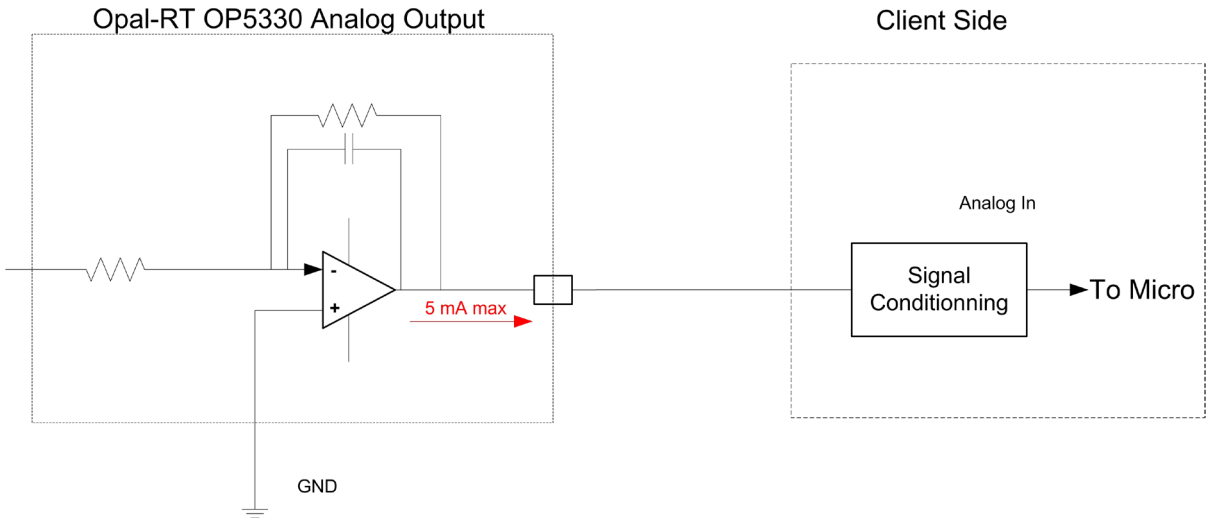
Standard OPAL-RT Simulator DB37 connector

SPECIFICATIONS

Product Name:	**OP5330**
Part Number:	126-0157
Number of channels:	16 single-ended
Resolution:	16 bits
Default range:	± 16 Volts
Maximum current:	15 mA
Max. Sampling Frequency:	1 MS/s
Min Conversion / Acquisition Time:	1 µs per channel
DAC Type:	8 x Dual DAC with 10 MBit/s Serial Output Transfer
Dc Transfer Characteristics	
CMRR:	100 dB
Dynamic Characteristics	
Calibration:	Programmable gain and offset calibration for each D/A. Calibration factors are stored in on-board non-volatile memory (EEPROM)
Maximum noise:	20 mV peak-to-peak
Maximum offset:	± 80 mV
Recommended warm-up time:	5 min.
Calibration interval:	as required
Dimensions:	6.60 cm x 12.50 cm (2.6” x 4.92”)
I/O connector:	80-pin high speed header to carrier
Environmental	
Operating temperature:	10 to 40 °C
Storage temperature:	-55 to 85 °C
Relative humidity:	10 to 90%, non condensing
Maximum altitude:	2,000 m

TYPICAL APPLICATIONS

The following diagrams provide an example of a typical application using the OP5330.



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