

# Datasheet

---

## SMC31 – *Mont Aigoual* – Linear TEC Driver

### C-Series Modules – Diode Laser Controller

- Power Voltage-to-Current Converter
- Bridge-Tied Load power stage
- Continuous output current:  $\pm 1$  A
- Compliance voltage: 4 V min.
- Power stage protection features including:
  - Current limiter
  - Over-temperature
  - Short-circuit
- For use with SMC20 Temperature Controller
- Linear analog design - Free of digital noise
- EMI noise immunity
- Ideal for rapid prototyping
- All schematic diagrams included



### Overview

The SMC-Series modules are the ideal instruments for controlling the current and the temperature of diodes laser for AMO physics. With an ultra-low current noise density  $\leq 20 \text{ pA}/\sqrt{\text{Hz}}$  (SMC11) and sub-mK thermal control stability (SMC20), the SMC-Series is the right choice for the most demanding applications.

Because the SMC31 TEC Driver was first designed as power stage of the SMC20 temperature controller, it features an efficient power voltage-to-current converter. Using the SMC31, continuous output currents up to 1 A under 4 V can be delivered to the thermoelectric cooler. Since noise is a primary concern, the SMC31 is based on a linear power amplifier stage providing a clean output current. In addition, the SMC31 offers multiple protection features, including current limitation, over-temperature and short-circuit detection. Thermistor and TEC connections between the laser head and the SMC-Series Laser Controller modules are made through a DSUB-9 connector located on front-panel.

Like all SM-Series modules, the SMC31 is shipped with the schematic diagrams of its electronic circuitry providing all required information for advanced users.

## Important Notice

The specifications provided apply to the SMC31-R19A module. Information in this document is subject to change without notice. Copyright © SISYPH, 2019. All rights reserved.

## Power Amplifier Specifications

### TEC Output

Terminals	AIO bus connector (50-pin stack-through) or Male DSUB9 connector (front panel)
DC Current Range	±1 A
Compliance Voltage	4 V min.
Offset Current	±5 mA
DC Current Limit	±1.2 A

## Digital Interface Specifications

### Common Characteristics

Terminal	DIO bus connector (50-pin stack-through)
Range	5-V TTL-CMOS compatible
Input Pull-up Resistor	100 k $\Omega$
Output Current Limit Resistor	1 k $\Omega$

### /Enable Input

Activates (low) or disables (high) the power stage.

### Positive/Negative Input

The sensitivity is negative (low) or positive (high).

### /Fault Output

Fault (low) is detected from power stage (over-temperature).

### /Limiter Output

Current limiter is engaged (low).

### /On Output

The power stage is operating (low).

## Analog Interface Specifications

### Common Characteristics

Terminals AIO bus connector (50-pin stack-through)

### Command Input

Input Range  $\pm 10$  V  
 Sensitivity  $+100$  mA/V<sup>c</sup>  
 Settling Time  $20$  ms<sup>d</sup>  
 Power Bandwidth  $20$  Hz<sup>d</sup>  
 Input Resistance  $100$  k $\Omega$ , Differential amplifier

### Current Monitor

Range  $\pm 2$  V  
 Output Resistance  $100$   $\Omega$   
 Sensitivity  $+1$  V/A

### TEC Output

Refer to *Power Amplifier Specifications* table.

### Thermistor Terminals<sup>a</sup>

DC Voltage  $+2.5$  V<sup>b</sup>  
 DC Current  $+250$   $\mu$ A<sup>b</sup>

### Spare Low-Power Inputs/Outputs<sup>a</sup>

Max. DC Voltage  $\pm 24$  V  
 Max. DC Current  $\pm 10$  mA

### Spare Power Inputs/Outputs<sup>a</sup>

Max. DC Voltage  $\pm 24$  V  
 Max. DC Current  $\pm 1$  A

<sup>a</sup>Connected to the DSUB-9 connector on front-panel.

<sup>b</sup>Refer to the *SMC20 Temperature Controller Datasheet* and *SMC20 Temperature Controller User's Guide* for detailed information.

<sup>c</sup>Applies when the digital input /NEG is high or left open. The sensitivity is  $-100$  mA/V if the digital input /NEG is driven low.

<sup>d</sup> $I_{OUT} = \pm 1$  A.

### Front Panel Specifications

**Status Leds**

Green	Power amplifier operating
Yellow	Current limiter engaged
Red	Fault (over-temperature) detected

**D-SUB9 Connector**

Thermistor	Laser head to AIO Bus Interface
TEC	Laser head to AIO Bus Interface
Spare Input/Output	Laser head to AIO Bus Interface

### Male D-SUB9 Connector Pinout

Pin	Signal	Description
1	<i>TEC+</i>	TEC positive terminal
2	<i>TEC-</i>	TEC negative terminal
3	<i>PWR1</i>	power signal, custom application
4	<i>PWR2</i>	power signal, custom application
5	<i>SIG3</i>	low-power signal, custom application
6	<i>RT+</i>	thermistor terminal
7	<i>RT-</i>	thermistor terminal
8	<i>SIG1</i>	low-power signal, custom application
9	<i>SIG2</i>	low-power signal, custom application
Shield	<i>Chassis</i>	Earth ground

### Printed Circuit Board Settings Specifications

**Positive/Negative Polarity Switch**

**Digital Voltmeter Connector**

Signal	Current Monitor
Range	$\pm 2$ V
Sensitivity	+1 V/A
Power Supply	+5 V/100 mA max.

## General Specifications

*This module is designed to be operated in laboratory environment.*

### Operating

Temperature +15°C to +30°C

### Power Requirements

+15 V	< 20 mA
-15 V	< 20 mA
+5 V	1 A <sup>a</sup>
+24 V	Not used

### Physical Properties

Height (component side)	≤ 17 mm
Weight	≈ 100 g
PCB	4-layer FR4, 100 × 100 mm

### Warranty

One year parts and labor on defects in material and workmanship

<sup>a</sup>Refers to full power handling.

## Ordering Information

### Front-Panel Options

SMC31-FP-xx	Shielded 3U-4HP front-panel
SMC31-NP-xx	none

### Stack-through Header Options

SMC31-xx-SC	50-pin header <sup>a</sup>
SMC31-xx-NC	none

### Ordering Code

SMC31-FP-SC	Standard
-------------	----------

<sup>a</sup>Tyco Part Number: 1-173145-4.

## Document Revision History

Release	Comments
SMC31-SS01-R19A	Changed J601 gender Changed module identifier to SMC31-R19A Updated current noise density of SMC11 Added DSUB9 pinout
SMC31-SS01-R17A	Completed module name First release