DS2401 Resistive Sensor Simulation Board

For simulating resistive sensors

Highlights

- 4 resistance output channels
- 10 Ω to 500 kΩ resistance range
- Channels individually insulated from system ground

Application Areas

In hardware-in-the-loop applications, the simulation of sensors plays an important role. While many sensors provide voltages or currents, others have a resistance output – for example, thermistors or resistance temperature detectors (RTDs) for temperature measurement. To simulate these resistive sensors, precise resistance values must be provided.

Key Benefits

The DS2401 features four resistance output channels of identical structure. All channels are insulated from system ground individually. The application running on the processor board writes the desired resistance to the DS2401 board, and the resistance is then simulated electronically between the two output pins of that channel.
## Technical Details

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
</table>
| **General**                     | - 4 simulated resistors  
|                                 | - 12-bit resolution  
|                                 | - Default resistance output during power-down (determined by external resistor)  
|                                 | - Overload relay state output                                                                                                                                 |
| **Resistor terminals**          | **Resistance range** - 10 Ω ... 500 kΩ total resistance range (programmable)  
|                                 | - Automatic range switching for each channel (by software): 10 Ω ... 250 Ω, 200 Ω ... 5 kΩ, 2 kΩ ... 50 kΩ, 20 kΩ ... 500 kΩ  
|                                 | **Cutoff frequency (-3 dB)** - 15 kHz (10 kHz at R > 50 kΩ)  
|                                 | **Settling time to 1%** - 50 μs  
|                                 | **Voltage across resistor** - Max. ±20 V  
|                                 | **Load current** - Max. ±20 mA  
|                                 | **Initial offset voltage error** - ±0.5 mV (typ.)  
|                                 | **Initial resistance error** - ±0.5% + 0.5 Ω (typ.)  
|                                 | **Total linearity error** - ±2 LSB  
|                                 | **Monotonicity** - 12 bit  
|                                 | **Offset drift** - ±100 μV/K  
|                                 | **Resistance drift** - ±40 ppm/K  
|                                 | **Noise voltage** - 10 mVrms (at 1 kΩ)  
|                                 | **Isolation** - All channels individually insulated from system ground  
| **Overload relay state outputs**| **Voltage output range** - TTL  
|                                 | **Output current** - Max. -0.4 mA/+4 mA  
| **DEF_EN output**               | **Voltage output range** - TTL  
|                                 | **Output current** - Max. -0.4 mA/+20 mA  
| **Triggering**                  | **By software from master processor board; immediate output or simultaneous update**  
| **Physical connections**        | **25-pin female Sub-D output connector**  
| **Host interface**              | **One 8- or 16-bit ISA slot (power supply only)**  
| **Physical characteristics**    | **Physical size** - 340 x 125 x 15 mm (13.4 x 4.9 x 0.6 in)  
|                                 | **Ambient temperature** - 0 ... 70 °C (32 ... 158 °F)  
|                                 | **Power supply** - +5 V ±5%, 0.6 A  
|                                 | - +12.5 ±5%, 1 A  

## Order Information

<table>
<thead>
<tr>
<th>Product</th>
<th>Order Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS2401 Resistive Sensor Simulation Board</td>
<td>DS2401</td>
</tr>
</tbody>
</table>

## Relevant Software

<table>
<thead>
<tr>
<th>Software</th>
<th>Order Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required</td>
<td>RTI</td>
</tr>
<tr>
<td>Real-Time Interface (p. 62)</td>
<td>RTI</td>
</tr>
</tbody>
</table>