PS25102 EPIC sensor, development sensor, low gain

Datasheet

Plessey Semiconductors Electric Potential Integrated Circuit (EPIC) product line targets a range of applications.

The PS25102 is an ultra high impedance solid state ECG (electrocardiograph) sensor. It can be used as a dry contact ECG sensor without the need for potentially dangerous low impedance circuits across the heart. The resolution available is as good as or better than conventional wet electrodes.

The device uses active feedback techniques to both lower the effective input capacitance of the sensing element (Cin) and boost the input resistance (Rin). These techniques are used to realise a sensor with a frequency response suitable for both diagnostic and monitoring ECG applications. The total voltage gain of the system is a function of both the input coupling capacitance (variable) and the internal sensor configuration.

FEATURES

- Ultra high input resistance, typically $2 \times 10^{10} \, \Omega$
- Dry-contact capacitive coupling
- Input capacitance as low as 10pF
- Upper -3dB point typically 10kHz
- Lower -3dB point typically 100mHz
- Operates with single +4.75V to 8.0V supply
- Sensors supplied as custom engineered probe assemblies complete with connecting lead and DIN plug termination

APPLICATIONS

- Non-critical patient monitoring equipment
- Emergency response diagnostics
- Lifestyle sports and health products
- Suitable for long-term and remote monitoring
**ELECTRICAL CHARACTERISTICS**

\( T_{\text{amb}} = 0^\circ \text{C to } +50^\circ \text{C}, \ V_{\text{dd}} = +5\text{v}. \) The electrical characteristics are guaranteed by either production test or by design and characterisation. They apply within the specified ambient temperature and supply voltage unless otherwise stated.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Value</th>
<th>Units</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min.</td>
<td>Typ.</td>
<td>Max.</td>
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<tr>
<td>Supply (Vdd)</td>
<td>+4.75</td>
<td>5.00</td>
<td>8.0</td>
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<tr>
<td>Supply current</td>
<td></td>
<td></td>
<td>mA</td>
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<tr>
<td>Voltage Gain (Av)</td>
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<tr>
<td>Effective input resistance (Rine)</td>
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<td>GΩ</td>
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<tr>
<td>Effective input capacitance (Cine)</td>
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<td>pF</td>
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<tr>
<td>Coupling capacitance</td>
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<tr>
<td>Lower -3dB point</td>
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<td>Upper -3dB point</td>
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<td>Noise</td>
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<td>tbd</td>
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<td>Output voltage swing</td>
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<td>-2.4</td>
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<tr>
<td></td>
<td></td>
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<td>2.4 V</td>
</tr>
</tbody>
</table>

Unipolar (Vss=0v)

@Vdd=5.0V

Peak-to-peak

Sensor to skin

Set by internal DC signal rejection network – coupling capacitor 1nF

Output signal can swing negative and positive and is centred on 0V

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*Fig. 1 Internal circuit*
APPLICATION OF THE ECG SENSOR

Because of the large coupling capacitance to the body (around 1nF) the EPIC sensor’s internal electrometer can be used in differential mode to recover true surface potential ECG signals from the surface of the skin.
Fig. 3 Differential measurement of body (skin) surface potential to produce ECG trace

Fig. 4 Comparison of two ECG vectors from a pair of EPIC sensors (top) and two conventional Ag/AgCl electrodes (bottom)

**PATENTS**

This component and many of the associated applications are covered by the following international patents:
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