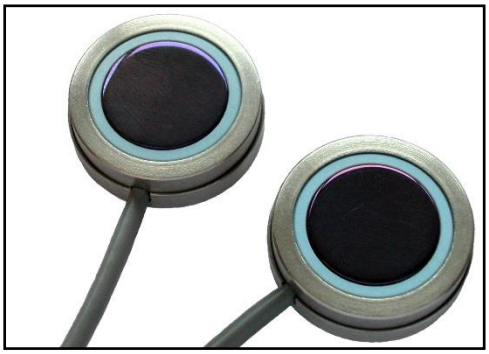
PS25102 EPIC sensor, development sensor, low gain

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 $2x10^{10}$ Ω
- 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

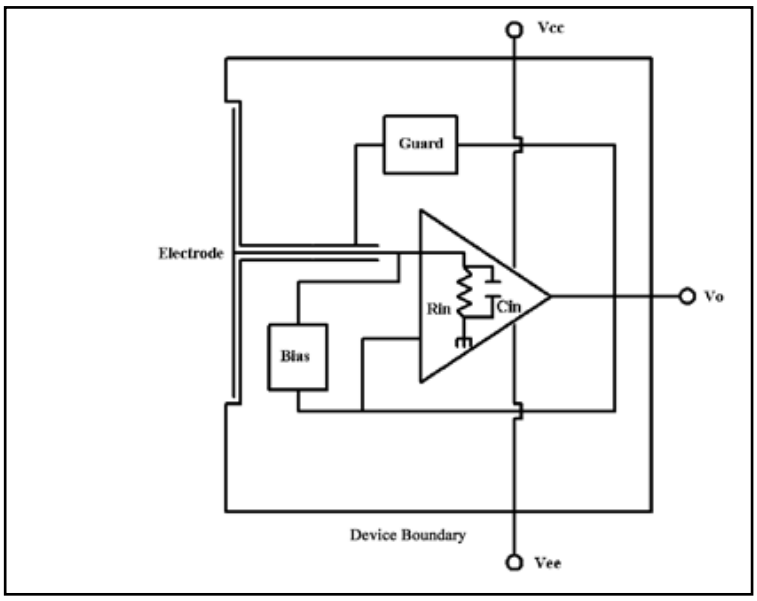


Fig. 1 Internal circuit

ELECTRICAL CHARACTERISTICS

T_{amb} = 0°C to +50°C, V_{dd} = +5v. 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.

Characteristics	Value			Units	Conditions
	Min.	Typ.	Max.		
Supply (Vdd)	+4.75	5.00	8.0		Unipolar (Vss=0v)
Supply current		4.5		mA	@Vdd=5.0V
Voltage Gain (Av)		10			Peak-to-peak
Effective input resistance (Rine)		20		GΩ	
Effective input capacitance (Cine)		15		pF	
Coupling capacitance		1		nF	Sensor to skin
Lower -3dB point		100		mHz	Set by internal DC signal rejection network – coupling capacitor 1nF
Upper -3dB point		10		kHz	
Noise		tbd			
Output voltage swing	-2.4		2.4	V	Output signal can swing negative and positive and is centred on 0V

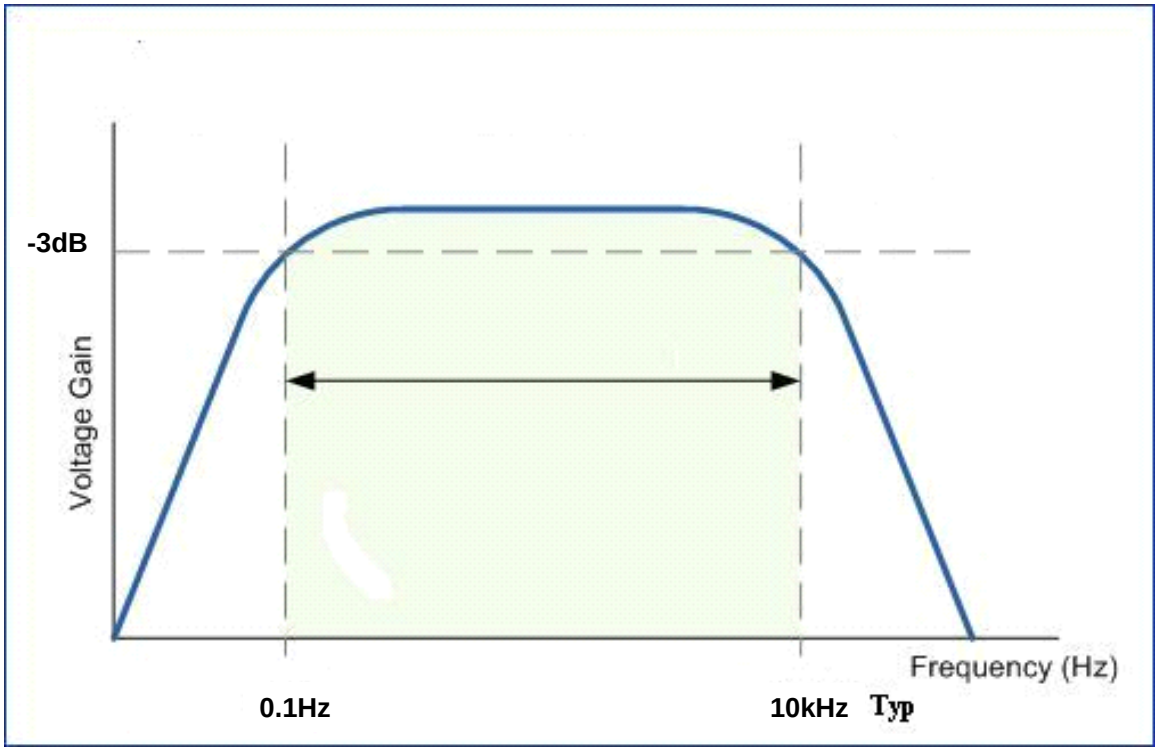


Fig. 2 Typical Bode Plot for EPIC ECG Sensor

4 PIN DIN PLUG TERMINATION

Pin1 Signal Out (Yellow)
Pin2 Earth (Green)
Pin3 +6V (Red)
Pin4 0V (Blue)

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.

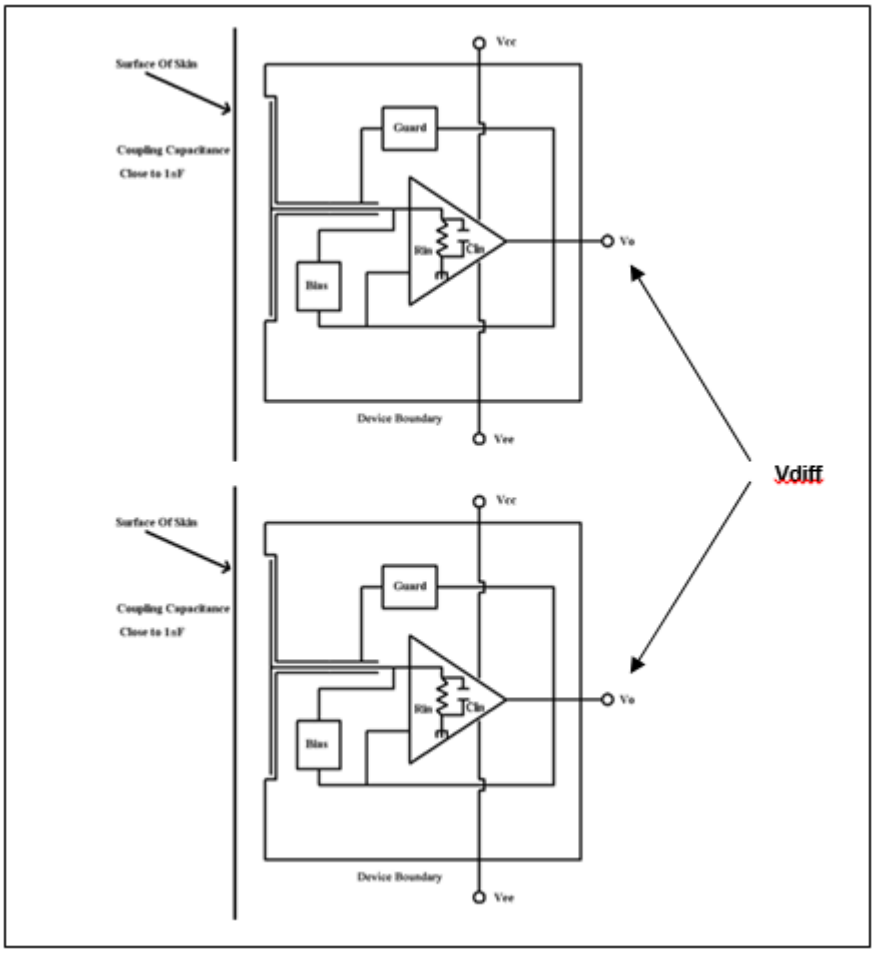


Fig. 3 Differential measurement of body (skin) surface potential to produce ECG trace

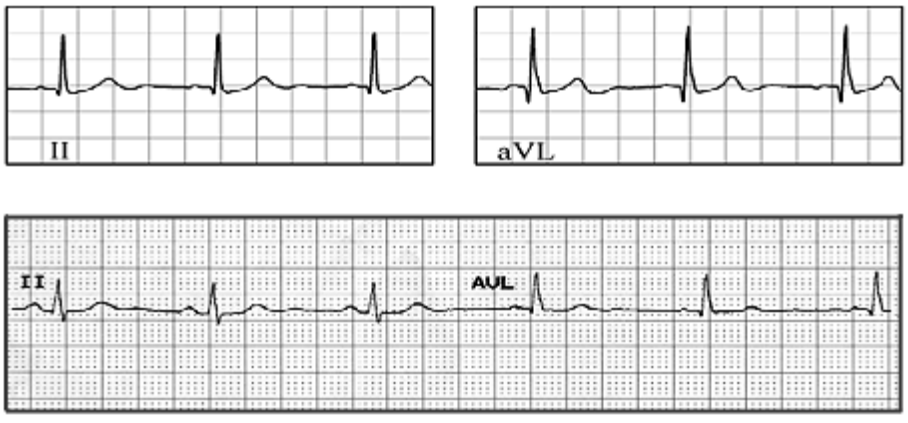


Fig. 4 Comparison of two ECG vectors from a pair of EPIC sensors (top) and two conventional Ag/AgCl electrodes (bottom)

PATENTS

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

602 32 911.6-08 (DE)	EP2174416
AU2007228660	GB1118970.1
CA2646411	JP2009-500908
CN200780026584.8	JP4391823
EP1451595 (CH)	TW097126903
EP1451595 (ES)	TW1308066
EP1451595 (FR)	US12/293872
EP1451595 (IE)	US12/374359
EP1451595 (IT)	US12/669615
EP1451595 (NL)	US13/020890
EP2002273	US13/163988
EP2047284	US788570

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