

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

Ordering Information

PS25101
Custom package

0°C to +50°C

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

The PS25101 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 (C_{in}) and boost the input resistance (R_{in}). 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.

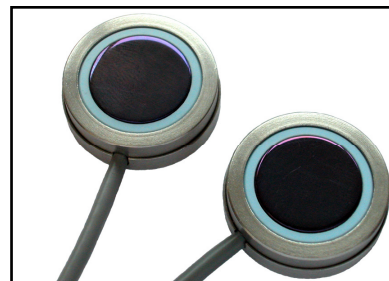
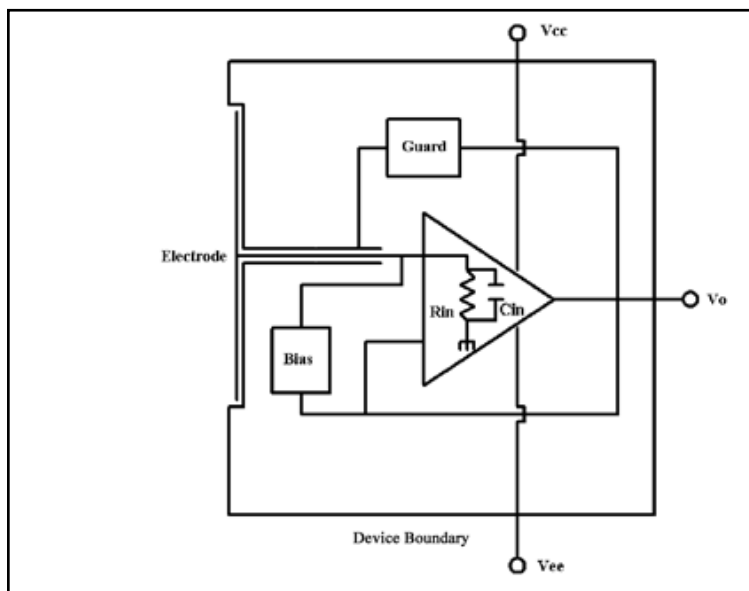


Fig. 1 Internal circuit and image of EPIC ECG Sensor

ELECTRICAL CHARACTERISTICS

$T_{amb} = 0^{\circ}\text{C}$ to $+50^{\circ}\text{C}$, $V_{dd} = +5\text{V}$. 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.

Characteristics	Value			Units	Conditions
	Min.	Typ.	Max.		
Supply (V_{dd})	+4.75	5.00	8.0		Unipolar ($V_{ss}=0\text{V}$)
Supply current		4.5		mA	@ $V_{dd}=5.0\text{V}$
Voltage Gain (A_v)		50			Peak-to-peak
Effective input resistance (R_{ine})		20		$\text{G}\Omega$	
Effective input capacitance (C_{ine})		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

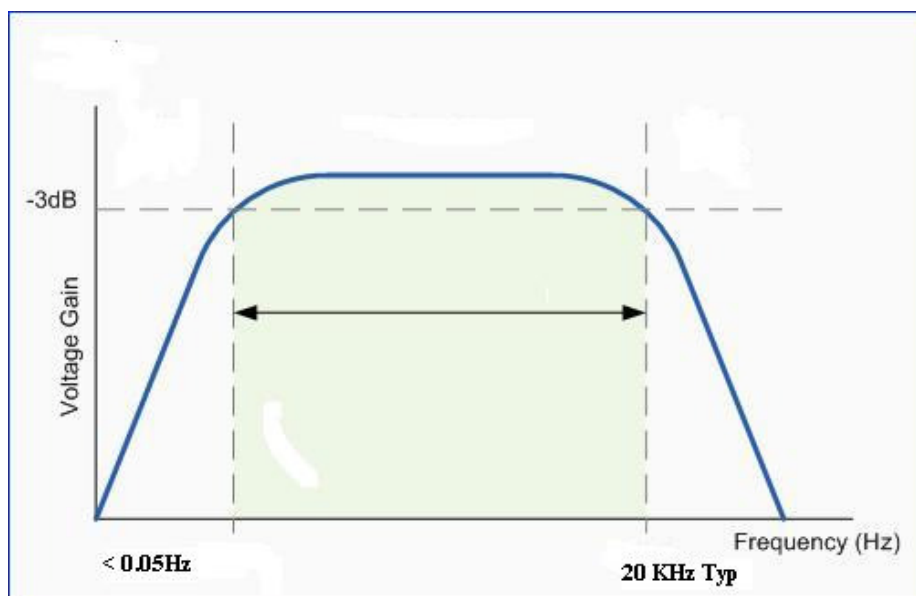


Fig. 2 Typical Bode Plot for EPIC ECG Sensor

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.

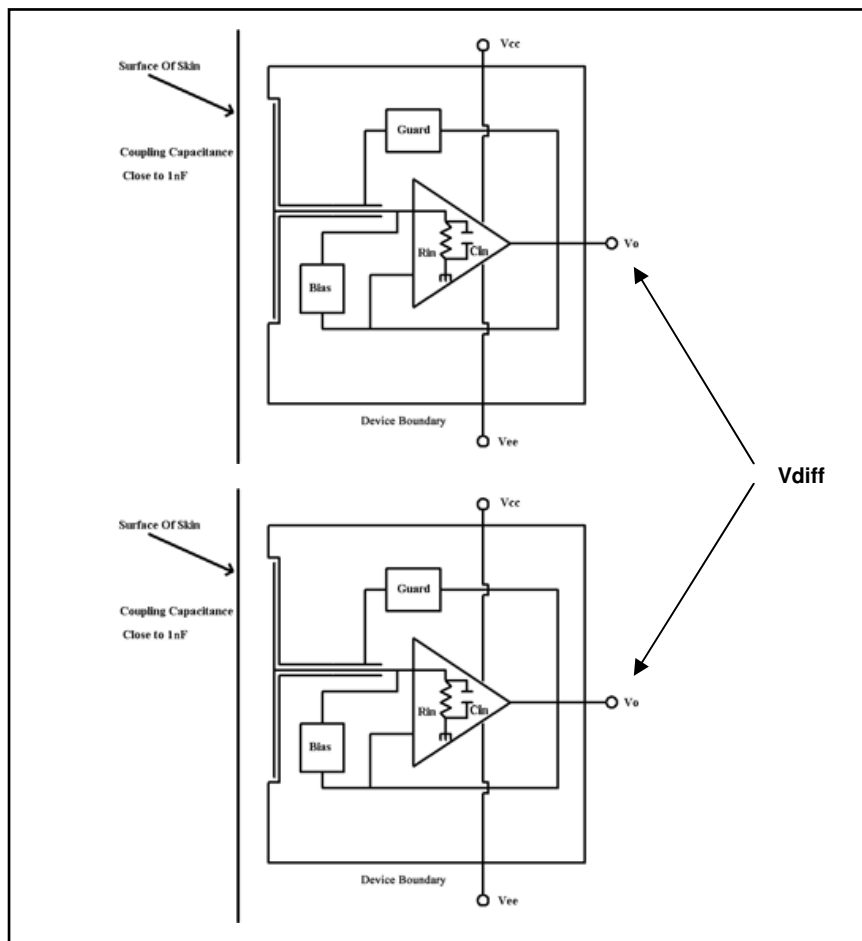


Fig. 3 Differential measurement of body (skin) surface potential to produce ECG trace



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)

AU2007228660

CA2646411

CN200780026584.8

EP1451595 (CH)

EP1451595 (ES)

EP1451595 (FR)

EP1451595 (IE)

EP1451595 (IT)

EP1451595 (NL)

EP2002273

EP2047284

EP2174416

GB1118970.1

JP2009-500908

JP4391823

TW097126903

TW1308066

US12/293872

US12/374359

US12/669615

US13/020890

US13/163988

US788570

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