TZ202055 Patch Technical Description

Contents

1 Scope

This document is the technical description for the TZ202055 Patch as per the design requirements **[1]**.

The Sensium Digital Patch is designed to present the capabilities of the Sensium IC. The Sensium Digital Patch provides ultra-low power monitoring of temperature, heart rate (from a single lead ECG) and respiration with appropriate external sensors.

1.1 Reference Documents

[1] Patch Hardware Requirement Specification, TZ202055-HRS.

[2] Digital Patch Software Specification, TZ202055-SDS.

1.2 Abbreviations

ADC   Analogue to Digital Convertor

EEPROM   Electrically Erasable Programmable Read Only Memory

MAC   Media Access Control

NVRAM   Non-Volatile Random Access Memory

PCB   (Bare) Printed Circuit Board

PCBA   Printed Circuit Board Assembly

ROM   Read Only Memory

SAW   Surface Acoustic Wave

SPI   Serial Peripheral Interface

WLAN   Wireless Local Area Network

2 Patch overview

2.1 Description

The TZ202055 Patch involves embedding electronics inside a non-permeable fabric enclosure. This forms part of a hospital patient monitoring system.

The Patch will measure temperature, heart rate (From a single lead ECG) and respiration on patients in non-critical care areas. The actual data measured and the frequency at which it is updated is set by the Application Software, refer to **[2]**. The selected data is transmitted to a base station that is on a bridge unit. The bridge then passes the data onto the hospital infra-structure via either WLAN or Ethernet.

One or more Sensium enabled Patches continuously monitor key physiological parameters on the body and report to a bridge.

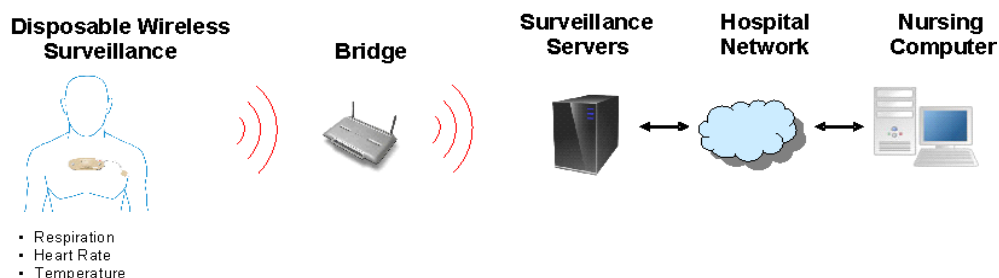**Figure 1: TZ202055 Patch**

Figure 2: Typical Patch Use

A disposable wireless battery powered Patch that is fixed to the patient and captures vital signs. The bridge relays the information to servers using standard network connection.

The Patch is not intended to be used in the Intensive Care Unit or Critical Care Unit.

The Patch consists of a PCB assembly mounted on a polyester film with ECG snaps and a thermal probe attachment within a flexible plastic enclosure.

Figure 3: Patch cross section.
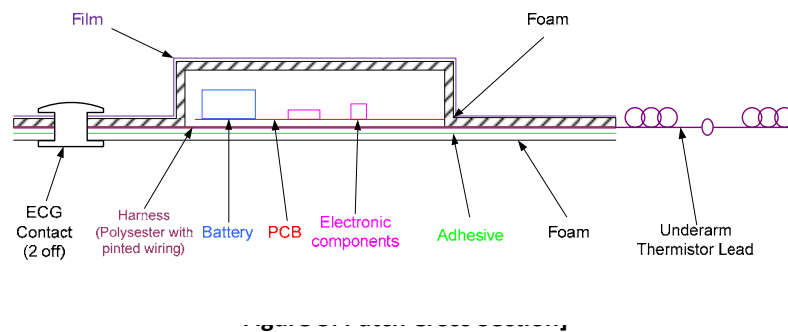
The Patch PCBA is a four layer rigid PCB with components only placed on the top layer with a printed antenna. On the bottom layer of the PCB there are pads for Heart rate / Respiration and a thermistor which are connection for harness.

The conversion process will bring together a Patch PCB, external temperature sensor with the harness and encapsulating them in layers of foams. A typical cross section of a converted Patch is shown above. The external temperature sensor (a thermistor) is attached to the Patch PCB on the on the harness. The snap connectors for the electrodes are crimped to the harness. The harness is bonded to the Patch PCB using a conductive adhesive that only conducts in z-axis. The whole structure is covered with the foam and film that protect the Patch electronics.

On top of the converted Patch there is an activation tab. The activation tab separates the battery from the battery contact on the Patch PCB. The patch is activated by pulling the activation tab which allows the battery to be connected to the Patch circuitry.

3 Functional Description

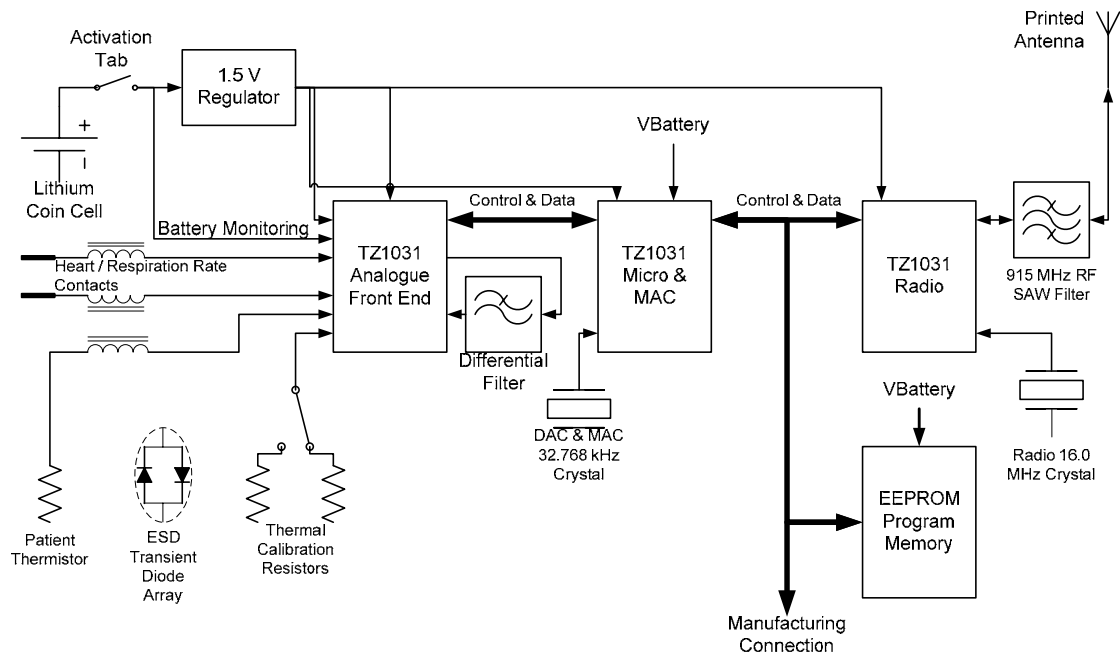A block diagram of the Patch PCBA TZ202050 is shown below.

Figure 4: TZ202050 Block Diagram

The Patch PCB comprises the Toumaz Sensium TZ1031 PS1 device, RF components including a front-end SAW, the Sensor Interface and Digital Section.

The Sensor part of the Patch PCB consists of an external leaded thermistor for temperature monitoring and differential filter for respiration monitoring.

The RF part of the Patch Design consists, in addition to the Sensium TZ1031, of an Antenna, SAW Filter, 16.000MHz crystal, VCO tank circuit, PLL Filter and other matching components. An antenna is matched to the 50Ω SAW filter by using capacitors.

The Digital Part of the Patch Design consists of a NVRAM containing the program code, a 32.768kHz crystal and passive pull ups components. When the Sensium device powers up, an internal reset causes the boot-ROM to load program data from the SPI NVRAM into program memory. The digital section uses a 32.768kHz crystal for the MAC and ADC as the RF 16.00MHz clock is turned off in low power modes. The 32.768kHz oscillator maintains timing accuracy during sleep mode.

3.1   Power Supply Functions

The Patch is powered using Lithium Coin Cell 3V (CR2032) Battery. Typical Capacity of this type of battery is between 220mAh and 240mAh. U4

The battery voltage is regulated down to 1V5. This voltage is used as core supply for Sensium TZ1031.

The EEPROM, is powered by Battery

3.2   Patch Technical Summary

Item.	Value	Comments
Power Supply Source	Lithium Coin Cell	CR2032 nominal 3V
Operational Supply Range	3.3V to 2.3V	
Dimensions	155mm x 60mm x 7mm	(w x h x d) Excluding temperature coil
Weight	<15g	
Temperature Range	10°C to 45°C	
Connections Ports	2 off ECG Snaps	
	10 and 6 ways analogue / digital	Only used for production set-up and test. Not accessible or used in normal operation.
Radio Transceiver	915 MHz	ISM radio transceiver