



Pulse Oximetry

KIHT Technical Compendium

PULSE OXIMETRY

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Version 1.0

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TABLE OF CONTENTS

LIST OF TABLES.....	ii
LIST OF FIGURES.....	iii
LIST OF ABBREVIATIONS.....	v
EXECUTIVE SUMMARY.....	viii
1 INTRODUCTION.....	1
2 WORKING PRINCIPLE.....	3
2.1 Photoplethysmography.....	3
3 PULSE OXIMETER.....	31
3.1 Clinical Need.....	32
3.2 Clinical Requirements.....	33
3.3 Types.....	33
3.3.1 Adult pulse oximeter.....	33
3.3.2 Fetal Pulse-oximetry.....	44
3.4 System Architecture.....	45
3.4.1 Transmit Path: Driving the LEDs.....	46
3.4.2 Receive Path: Photodiode Interface, Signal Conditioning, and Data Conversion	48
3.4.3 Microprocessor.....	49
3.4.4 Display and Backlighting.....	49
3.4.5 Speaker.....	50
3.4.6 Data Acquisition.....	50
3.4.7 Data Interface.....	50
3.4.8 Data conversion/Signal processing.....	50
3.4.9 Micro Control Unit (MCU).....	51
3.4.10 Power and Battery Management.....	51
3.4.11 Electrostatic Discharge.....	52
3.5 Factors that Interfere with Reading.....	52
4 CLINICAL WORKFLOW.....	53
5 MORBIDITY CAUSED BY PULSE OXIMETERS.....	54
6 CLINICAL ENVIRONMENTS AND APPLICATIONS OF PULSE OXIMETRY.....	55
7 FUTURE DIRECTIONS.....	55
8 COMPONENTS.....	57
9 STANDARDS.....	58
9.1.1 Types of Standards.....	58

9.2	Pulse Oximeter Standards.....	62
10	REGULATIONS	63
10.1	Introduction.....	63
10.2	Life Cycle of a Medical Device	63
10.2.1	Pre-market phase.....	63
10.2.2	Post Market Surveillance	64
10.3	US FDA Regulation of Medical Devices	64
10.3.1	Premarket Notification or the 510(k) Process.....	65
10.3.2	Premarket Approval (PMA)	65
10.3.3	<i>De Novo</i> Submissions for new devices.....	66
10.3.4	Device classification methodology under FDA.....	67
10.4	Medical Device Regulations in Europe.....	67
10.4.1	Device classification methodology under EU	68
10.4.2	European Union CE Marking / Certifications.....	68
10.5	Medical Device classifications under Indian Regulations	69
10.6	Therapeutic Goods Administration Medical Device Regulations in Australia.....	69
10.7	JAPAN MHLW & PMDA	70
10.8	CFDA or NMPA Medical Device Regulations.....	71
10.9	Regulations for Quality Systems.....	71
10.10	Device Classification	72
11	MARKET INFORMATION	73
11.1	Global Market Overview	73
11.2	Market Segmentation.....	73
11.3	Indian Market.....	73
11.3.1	Pulse Oximeter Market by Type.....	74
11.4	Prominent Manufacturers of Pulse Oximeter – Global.....	75
11.5	Prominent Manufacturers of Pulse Oximeter – India	75
12	EXPORT IMPORT INFORMATION	76

LIST OF TABLES

Label	Title	Page No.
Table 2.1	Factors affecting systolic amplitude in PPG signals	8
Table 2.2	APG Wave Form types	17
Table 8.1	Components	57
Table 9.1	List of Collateral standards applicable to medical devices	59
Table 9.2	List of ISO/IEC particular standards: Requirements for basic safety and essential performance	59
Table 10.1	Established device classifications under US FDA	67
Table 10.2	Established device classes under Europe	68
Table 10.3	Established device classes under Indian Regulations	69
Table 10.4	Established device classes under Australia	69
Table 10.5	Established device classes under Japan	70
Table 10.6	Established device classes under China	71
Table 10.7	Applicable Classifications of Pulse Oximeter	72
Table 11.1	Pulse Oximeter Market – By Type (INR Crores) (USD Millions)	74
Table 12.1	Value of Exports and Imports and Y-o-Y Growth % of HS Code 90189019 INR CR (USD MN)	76
Table 12.2	Quantity (Thousands NOs) of Exports and Imports and Y-o-Y Growth % of HS Code 90189019	77
Table 12.3	Top 10 Countries from which Imports originate (2017-18) HS Code:90189019	77
Table 12.4	Value of Exports and Imports and Y-o-Y Growth % of HS Code 90189099 INR CR (USD MN)	78
Table 12.5	Quantity (Thousands NOs) of Exports and Imports and Y-o-Y Growth % of HS Code 90189099	78
Table 12.6	Top 10 Countries from which Imports originate (2017-18) HS Code:90189099	79

LIST OF FIGURES

Label	Title	Page No.
Figure 1.1	Photoplethysmogram	1
Figure 2.1	The near-infrared therapeutic window of 600–1000 nm, where tissue absorption is small compared to scattering	3
Figure 2.2	PPG measurement diagram of building blocks	5
Figure 2.3	Basic PPG Working Configurations	6
Figure 2.4	AC and DC components	6
Figure 2.5	Elements of PPG	7
Figure 2.6	A typical waveform of the PPG	8
Figure 2.7	Fingertip photoplethysmogram	9
Figure 2.8	Two consecutive PPG waves	10
Figure 2.9	Typical waveform of the PPG and its ΔT feature	11
Figure 2.10	Typical PPG waveforms show the parameters changes with age	12
Figure 2.11	Signal Measurements (a) Original fingertip photoplethysmogram (b) first derivative wave of photoplethysmogram	13
Figure 2.12	Signal Measurements (a) Original fingertip photoplethysmogram (b) second	14
Figure 2.13	APG waveforms and types of photoplethysmogram	18
Figure 2.14	An external biasing circuit	20
Figure 2.15	First stage signal conditioning	21
Figure 2.16	Second stage signal conditioning	22
Figure 2.17	Interfacing with Microcontroller	22
Figure 2.18	Adaptive lattice-type respiratory rate estimator (ALRE) system	24
Figure 2.19	PPG pulse recording in a patient with unilateral lower limb peripheral arterial occlusive disease	25
Figure 2.20	A typical central aortic pressure wave from a middle-aged subject	27
Figure 2.21	Principle of pulse transit time calculation	29
Figure 3.1	Gas Diffusion by Pulmonary Alveoli	34
Figure 3.2	Blood Circulation Diagram	35
Figure 3.3	Structure of hemoglobin	36
Figure 3.4	Components of Spectrophotometer	39

Figure 3.5	Schematic diagram of light absorbance by a pulse oximeter	43
Figure 3.6	Finger Detection	44
Figure 3.7	Fetus pulse oximeter	45
Figure 3.8	Functional Block Diagram of a Pulse Oximeter	46
Figure 3.9	Digital to Analog Converter Circuit	47
Figure 3.10	Simplified photodiode receive path circuit	48
Figure 7.1	A)When light passes through tissues some of the light is absorbed. Without motion, the only variable light absorption is by the arterial blood (AC). B) During motion, conventional SpO2 displays falsely low value since it measures arterial and non-arterial	56
Figure 9.1	Standards applicable to Pulse Oximeter	62
Figure 10.1	Life-Cycle of Medical Device	64
Figure 11.1	Indian Pulse Oximeter Market Size (INR Crores)	73
Figure 11.2	Pulse Oximeter Market – By Type	75
Figure 12.1	Value of Exports and Imports of HS Code 90189019 INR CR (USD MN)	76
Figure 12.2	Quantity (Thousands NOs) of Exports and Imports of HS Code 90189019	77
Figure 12.3	Value of Exports and Imports of HS Code 90189099 INR CR (USD MN)	78
Figure 12.4	Quantity (Thousands NOs) of Exports and Imports of HS Code 90189099	79

LIST OF ABBREVIATIONS

Acronym	Definition
AC	Alternating Current
ADC	Analog to Digital Converter
AIMDD	Active Implantable Medical Device Directive
AIX	Augmentation index
ALNF	Adaptive lattice notch filter
ALRE	Adaptive lattice-type respiratory rate estimator
ANS	Autonomic nervous system
APG	Acceleration plethysmogram
ATP	Adenosine triphosphate
BP	Blood Pressure
BRS	Baroreflex sensitivity
CAGR	Compounded Annual Growth
CCD	Charge Coupled Device
CDRH	Center for Devices and Radiological Health
CE	European Conformity
CO	Carbon Monoxide
COPD	Chronic Pulmonary Obstructive Disease
CPU	Central Processing Unit
CR	Cardiac Rate
CT	Crest time
CVI	Chronic venous insufficiency
DAC	Digital to Analog Converter
DC	Direct Current
DPA	Digital Pulse Wave Analysis
EC	European Commission
ECG	Electro Cardiogram
EU	European Union

Acronym	Definition
EXIM	Export Import
FDA	Food and Drug Administration
GMP	Good Manufacturing Practice
HITU	High-intensity therapeutic ultrasound
HR	Hear Rate
HRV	Heart Rate Variability
HS	Harmonized System
IC	Integrated Circuit
IEC	International Electrotechnical Committee
IIR	Infinite impulse response
INR	Indian National Rupee
IPA	Inflection point area
IR	Infrared
IRLED	Infrared Light Emitting Diode
ISO	International Organization for Standardization
IVDMDD	In-vitro Diagnostics Medical Device Directive
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LRR	Light reflection rheography
LV	Left Ventricle
MCU	Micro Controller Unit
MDD	Medical Device Directive
ME	Medical Equipment
NIRS	Near Infrared Spectroscopy
PACU	Post-anesthesia care unit
PAOD	Peripheral Arterial Occlusive Disease
PD	Photodiode
PFT	Pulmonary Function Test

Acronym	Definition
PH	Potential of Hydrogen
PLC	Product Life Cycle
PMA	Premarket Approval
PMS	Post-market Surveillance
PPG	Photoplethysmogram
PTT	Pulse transit time
PW	Pulse Wave
PWV	Pulse wave velocity
RP	Raynaud phenomenon
RR	Respiration Rate
SD	Standard Deviation
SI	System of Units
SNR	Signal to Noise Ratio
SV	Stroke Volume
TIA	Transimpedance Amplifier
USB	Universal Serial Bus
USD	United States Dollars
UV	Ultraviolet

EXECUTIVE SUMMARY

Optical techniques are well-known for its application in healthcare owing to its low-cost and simpler form. Advances in medical optics could make life easier and safer for both patients and medical staff by minimizing invasive tests and providing continuous and non-invasive monitoring. With the continued exponential growth in optoelectronic components and advanced signal processing techniques, the development of novel intelligent multiparametric non-invasive optical technologies, both wearable and non-contact, will contribute greatly in how healthcare will be delivered in the near future.

Out of the many optical measurement techniques, Photoplethysmography (PPG) is extensively used in the detection of changes in the volume of microvascular blood running in tissues. It is a non-invasive technique that measures the physiological parameters at the skin surface. It mainly measures blood pressure, oxygen saturation, and cardiac output assesses autonomic function and also used in the detection of peripheral vascular disease. A pulse oximeter is a classic example of PPG technology.

A pulse oximeter is an early-warning device. It has revolutionized modern medicine with its ability to continuously and transcutaneously monitor the functional oxygen saturation of hemoglobin in arterial blood (SaO_2). It is so widely prevalent in medical care that it is often regarded as a fifth vital sign. Pulse oximetry can detect hypoxia much sooner than the anaesthesia provider can see clinical signs of hypoxia such as cyanosis. This ability to provide an early warning has made the pulse oximeter essential for safe anaesthesia. In its most common (transmissive) application mode, a sensor device is placed on a thin part of the patient's body, usually a fingertip or earlobe, or in the case of an infant, across a foot due to its higher vascular density than, for example, the skin of the chest wall. The device passes two wavelengths of light through the body part to a photodetector. It measures the changing absorbance at each of the wavelengths, allowing it to determine the absorbances due to the pulsing arterial blood alone, excluding venous blood, skin, bone, muscle, fat, and (in most cases) nail polish.

A blood-oxygen monitor displays the percentage of blood that is loaded with oxygen. More specifically, it measures what percentage of haemoglobin, the protein in blood that carries oxygen, is loaded. Acceptable normal ranges for patients without pulmonary pathology are from 95 to 99 percent. For a patient breathing room air at or near sea level, an estimate of arterial pO_2 can be made from the blood-oxygen monitor "saturation of peripheral oxygen" (SpO_2) reading.

ABOUT:

Andhra Pradesh MedTech Zone (AMTZ) is an enterprise under the Government of Andhra Pradesh, a 270 Acre zone dedicated for medical device manufacturing with 200-250 manufacturing units. AMTZ provides the one-stop solution for all the manufacturers by providing, common scientific testing facilities (EMI/EMC, Electrical Safety, Radiation, Biomaterials Testing, 3D printing facilities), commercial facilities such as expo halls and warehouse.

Kalam Institute of Health Technology (KIHT) in the premises of AMTZ facilitates focused research on critical components pertaining to medical devices, technology transfer of innovative technologies through e-auction, market innovation, and access. These end to end solutions help to reduce the cost of manufacturing up to 40% and make health care products more affordable and accessible.

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