Operational Description – FOR FCC Filing FCCID: TS9-DVS-R-100

Dose Verification System (DVS)
Sicel Technologies, Inc.

1 Overview

The DVS System is made up of three primary components: The Reader System, the Implantable Dosimeter, and the Database. The Reader System is comprised of two main components: The Wand and the Base Station. This Document will briefly describe the operation of the DVS Reader System and its interaction with the dosimeter and database.

2 Reader System

A block diagram of the DVS System is shown below:

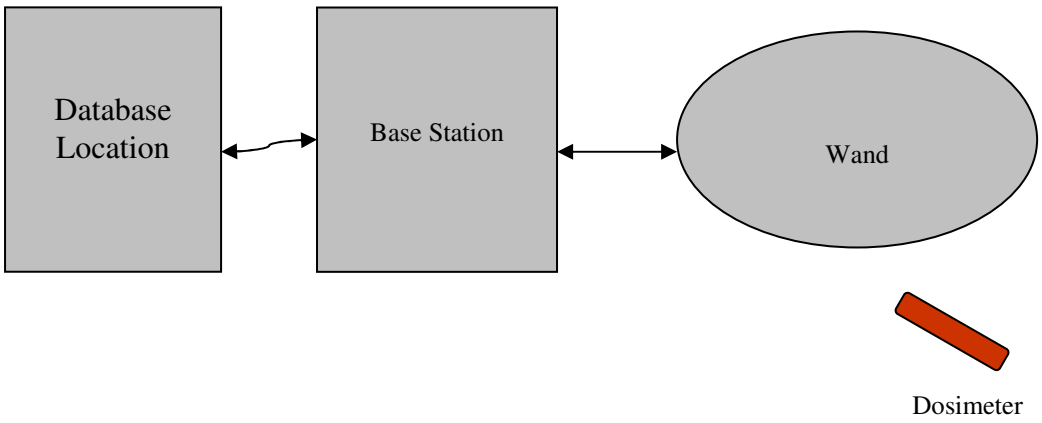

Fig 1 – Block Diagram of System

2.1 Base Station

Power comes into the unit through an IEC-power entry module that contains an EMI filter, a switch and two fuses. The power is routed to two separate medical grade power supplies; one dedicated for the panel PC (+12V/5V) and one for the DVS Wand (+15V). The Panel PC has a 300MHZ processor.
The Panel PC's I/O connects through the back panel as follows:

- USB connection- for use by field service personnel (not used in normal operation)
- Ethernet connection – for ethernet connectivity to a centralized dosimetry database (DVS data records and storage).
- The Wand Connector- contains a 3-wire RS232 serial connection for communications with the Wand. The RS232 communications is configured at 9600 Baud. This connector also has the +15V and power return (ground) for the Wand's electronics.
- The IEC power entry module is connected to the safety ground on the metal I/O panel.
- Both power supplies' inputs and output are referenced to the chassis ground point, also on the back I/O panel.

2.2 Wand

The DVS Wand Connects to the Base Station through the Wand Connector on the back panel of the Base Station. The Wand's retractile cord is a 5 conductor shielded cable with the shield referenced to chassis ground on the base station. The Wand side of the shield is not grounded.

The Wand contains the transmitter board assembly (three circuit boards) which communicates with the dosimeters (through the electromagnetic field energy) and the base station (through the Wand cable).

The transmitter draws approximately 1.4Amps DC from the +15V supply.

The transmitter is a self-resonant topology that operates at ~133kHz (nominal). The series Inductor-Capacitor (LC tank) transmitter operates at ~3A RMS with about 650VAC (peak) while transmitting. The Transmitter is referenced to the Power return which is referenced to chassis ground through the Wand Cable.

During addressing (or interrogation) of a dosimeter, the Transmitter will modulate an address request for a specific dosimeter. Any dosimeters in the presence of the electromagnetic field will power up but will only respond upon proper addressing.

When a dosimeter is properly addressed, it will perform the requested channel calculation (each dosimeter has four channels of data) and modulate the data back to the Wand using Manchester encoded frequency shift keying (FSK). The FSK data signal is centered around 20.5kHz. The Wand's 133 kHz transmitter provides both the energy to power the dosimeter(s) as well as the carrier frequency for the FSK data signal.

The Wand's receiver decodes the data received and sends it to a microcontroller for conversion to RS232 data format. The microcontroller then sends the data to the RS232 transceiver which sends the data to the panel PC for interpretation. Results are then stored in the database.

2.3 Operation

The Clinical Operator accesses a patient's profile through the touch screen on the Panel PC. The panel PC communicates with the remote database to access the patient's information. Once loaded, the Clinical Operator will prepare to read a patient's dosimeter(s). The Operator presses the Wand button which turns on the transmitter. The transmitter then modulates an interrogation pattern requesting information from a specific dosimeter. This dosimeter performs a calculation and transmits the data back to the Wand. The Wand receiver decodes the data and sends it to the panel PC thru the RS232 connection (Wand cable). The Panel PC then sends the data to the database. The patient's profile details the number of dosimeters to interrogate and the Reader will continue to address each dosimeter as requested by the Panel PC.