Test Packet Format

Monday, April 10, 2023 2:50 PM

Memory Organization

The test packet has a few sections that make up memory. These are listed as such:

Name	Size	Description
Version Header	2	Determines the structure of the entire test packet. The total size is set by the slot geometry and is bounded by what types of test formats are supported in the device. The header determines the size of the Test Info Header block, the Algorithm block, and the Sample Data block. This is done to ensure the device itself knows where to look for the three types of data.
Algorithm Header	2	Determines the format of the algorithm data and the size.
Sample Header	2	Determines the format of the sample data, the type, the samples, and the order of the data.
Packet Info		Contains all test related data that is related to patient data, test information. Does not contain algorithm units or data. Among this block should be some subsections: 1. Cartridge Info 2. Fluid and Method Info 3. Patient Info 4. Date and Time Info 5. Scan Info 6. Calibration Settings 7. Device Info 8. Well Scan Info
Algorithm Data		The result of analyzing the sample data.
Sample Data		The actual raw sample data. The format can vary but right now is geared towards square wave voltammetry for which we record the time, two voltage measurements and two current measurements per sample packet. The sample count can vary depending on user settings.

Test Parameters

The following table is a list of parameters that are included in the test packet stored in EEPROM. If a parameter has a "#" in the name, this indicates there are multiple entries relating to the variable. This only applies to:

Shunt# Calibration settings, 3 settings total
W# Calibration settings, 10 total

Version Header

The version header is given by an integer number. This determines the size of the Packet Info block, the algorithm block, and the sample data block.

Name	Format	Size	Description
Version Number	uint	2	Algorithm Header Offset: 2

			Sample Header Offset: 4 Packet Info Offset: 6 Sample Data: 502

Algorithm Header

An integer number indicates what type of data is stored in the algorithm block

Name	Format	Size	Description
Version Number	uint	2	Determines the format and size of the algorithm result block

Sample Header

An integer number indicates what type of data is stored in the sample data block.

Name	Format	Size	Description
Version Number	uint	2	

Packet Info

#1. Cartridge Info

Name	Format	Size	Description
GSID	ASCII	13	The global sensor ID, a unique 13-character alphanumeric string that shall be stored within memory on the one-time use cartridge. This is effectively the serial number that is attached to all information to be able to effectively recall it from memory.
Assay Name	ASCII	20	A name given to the cartridge type, since there are different types of test cartridges that test for different things. 20 characters allowed.
Well 1-10 Cal	int	16x10	Contains the coefficients of the polynomial calibration equation. The actual calibration equations have not been defined yet by the team.

#2. Fluidic and Method Info

Name	Format	Size	Description
Sample Name	ASCII	13	A name that can be given to the biofluid, such as "blood" to identify what substance is tested.
Method Name	ASCII	20	A name that can identify what kind of method was used to test the scample. A method consists of specific reagents, incubation times, wash fluids, etc etc.
eChem Name	ASCII	20	The name of the electrochemical used. Eventually needs to be expanded to account for multiple reagents being used but right now one is supported.
Wash Name	ASCII	20	The name of the wash liquid being used in the system.
Incubation Time	uint	4	The time (in minutes) for how long a sample has undergone incubation. A millisecond timebase might be more appropriate.

#3. Patient Info

Name	Format	Size	Description

Patient ID	ASCII	13	A unique 13-char alphanumeric string that is provided by the user via the app to associate the test with a specified patient.
Patient Name	ASCII	20	A string that records the patient's name
Patient DOB	YYYYMMDD	8	The patient's DOB

#4. Date and Time Info

Name	Format	Size	Description
Date	YYYYMMDD	8	The date the test was performed
Time	HHMMSS	4	The time the test performed
Time Zone	char	1	The local time zone where the test was performed using the UTC offset.

#5. Scan Info

Name	Format	Size	Description
Operator ID	ASCII	13	A unique 13-char string that is associated with the operator of the device.

#6. Calibration Settings

Name	Format	Size	Description
DAC Offset	int	3	Calibration data related to the device's DAC used to generate the test signal. The offset is effectively 3 bytes.
DAC Gain	uint	3	Calibration data related to the device's DAC used to generate the test signal. The gain is effectively 3 bytes.
Voltage Offset	int	4	An offset variable available to account for offsets in the device. Used in post-processing.
Current Offset	int	4	An offset variable available to account for offsets in the device. Used in post-processing.
Shunt 0 Cal	int	4	Used to account for variances in the shunt resistors onboard that are used to measure the test signal.
Shunt 1 Cal	int	4	Used to account for variances in the shunt resistors onboard that are used to measure the test signal.
Shunt 2 Cal	int	4	Used to account for variances in the shunt resistors onboard that are used to measure the test signal.
Range Select	uint	1	Determines the current range the device is operating in, where the 3 ranges are 20 mA, 0.2 mA, and 20 uA.

#7. Device Info

Name	Format	Size	Description
Instrument ID	ASCII	13	The instrument's unique ID, records what device performed the test.
Error and Service Code	ASCII	8	Records a short error or service code (4 bytes each) that indicates if there is some fault or condition that needs to be accounted for.

#8. Well Order

Name	Format	Size	Description
Well Info	struct	4x10	The well info struct contains some necessary info to understand the sample data, right now this the data type (e.g. SWV vs linear sweep), which well the data is from, and the number of samples that were taken for the well. This should be all that is required to be able to parse the data upon reading it. 1. Data format (10 bits), range from 0-511 2. Well number (4 bits), range from 0-15 3. Number of Samples (18 bits), range from 0-524287

Algorithm Data

Name	Format	Size	Description
Biomarker 1-10 Unit	ASCII	4x10	4 character string recording the units of the result
Well 1-10 Data	int	4x10	Stores the algorithm result for each well

Sample Data

Name	Format	Size	Description
SWV Sample	bytes	14	Contains a packet of: Time (ms), 2 bytes Voltage H, 3 bytes Current H, 3 bytes Voltage L, 3 bytes Current L, 3 bytes