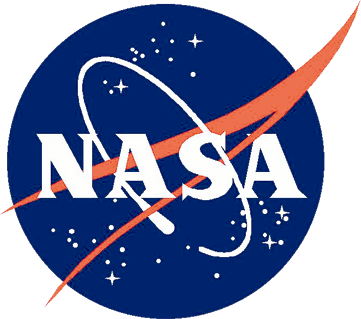
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**Ames Research Center**

**Moffett Field, California**

**Lunar Atmosphere and Dust Environment Explorer**

**(LADEE)**

**(NMS PDS Software Interface Specification)**

Mehdi Benna

**(04/24/2013)**

**National Aeronautics and**

**Space Administration**

**National Aeronautics and**

**Space Administration**

This document is approved in accordance with LADEE Configuration Management Plan, C04.LADEE.CM, paragraph 3.6.1.1 Document Release Routing Approval Process.

Page three of this document contains the approved routed release of this document.

**Approval Signatures**

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**CONFIGURATION MANAGEMENT PLAN**

This document is an LADEE Project Configuration Management (CM)-controlled document. Changes to this document require prior approval of the LADEE Project Manager. Proposed changes shall be submitted to the LADEE CM office along with supportive material justifying the proposed change. Changes to this document will be made by complete revision.

Questions or comments concerning this document should be addressed to:

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# ACRONYMS

|  |  |
| --- | --- |
| ATM  C&DH  DAC  DAWG  DMAP  EOM  GSFC  ICD  I&T  INMS  LADEE  LLCD  NMS  NGIMS  OLAF  PDS RF  SIS  SQL  SOC  TBD | Planetary Atmospheres Node  Command and Data Handling  Digital to Analogue Converter  Data and Archives Working Group  Data Management and Archive Plan  End of (LADEE) Mission  Goddard Space Flight Center  Interface Control Document  Integration and Testing  Ion and Neutral Gas Mass Spectrometer  Lunar Atmosphere and Dust Environment Explorer  Lunar Laser Communication Demonstrator  Neutral Mass Spectrometer  Neutral Gas and Ion Mass Spectrometer  Online Archive Facility  Planetary Data System  Radio Frequency  Software Interface Specification  Structured Query Language  Science Operation Center  To Be Determined |

# INTRODUCTION

# Purpose and Scope

This document describes the format and the content of the Neutral Mass Spectrometer (NMS) products as archived in the Planetary Atmospheres Discipline Node (ATM) in PDS. The data products stored in PDS are a subset of the holdings of the NMS team database at NASA’s Goddard Space Flight Center (GSFC).

This SIS is intended to provide enough information to enable users to read and understand the NMS data products as stored in PDS. The users for whom this SIS is intended are software developers of the programs used in generating the NMS products and scientists who will analyze the data, including those associated with the LADEE mission and those in the general lunar science community.

# Contents

NMS is an instrument on the LADEE spacecraft designed to analyze the composition of the lunar exosphere during the mission. This Data Product SIS describes how the NMS instrument acquires its data and how the data are processed.

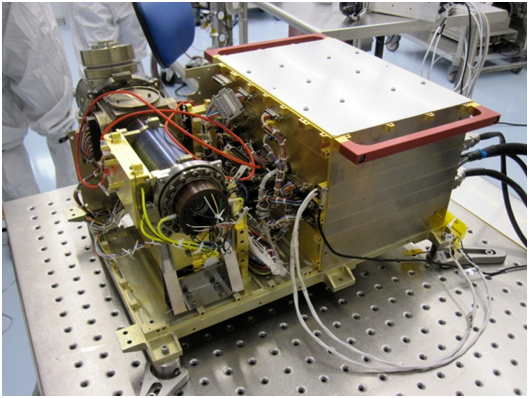
# Applicable Documents and Constraints

1. Planetary Data System Standards Reference, JPL D-7669 part 2, version 4.0.6, October 8, 2012.
2. LADEE Project Data Management and Archive Plan, version 2.2, May, 2011.
3. LADEE NMS PDS Interface Control Document, version 1.1 April 24, 2013.
4. LADEE NMS Calibration Report, version 0, April 1, 2013.

# Relationships with Other Interfaces

The NMS data products are stored in multiple locations according to the LADEE Project Data Management and Archive Plan (DMAP). The master copy stored in an SQL (Structured Query Language) relational database for rapid instrument team access will be used by the NMS science team to retrieve and process data for delivery to PDS as described by the LADEE NMS PDS Interface Control Document.

**Figure 1: The LADEE NMS Instrument during Integration and Testing (I&T).**



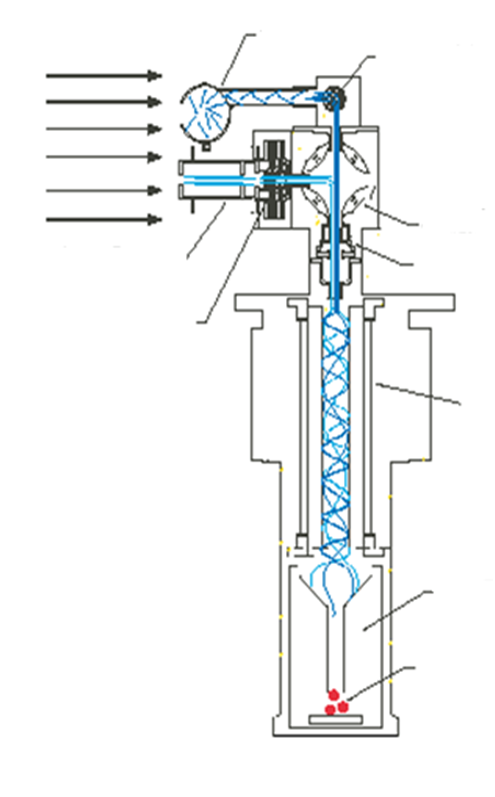
# MANAGEMENT AND OVERSIGHT

Data will be produced by the NMS science team for submission to PDS. Data delivered to PDS will be managed and verified according to the LADEE NMS PDS Interface Control Document and the PDS Standards Reference.

# DATA PRODUCT CHARACTERISTICS AND ENVIRONMENT

# Instrument Overview

The LADEE Neutral Mass Spectrometer (NMS) is a high sensitivity quadrupole mass spectrometer with a mass range of 2 to 150 Dalton and unit mass resolution (Figure 1). The sensor of the NMS instrument is the upgraded engineering unit of the Neutral Gas and Ion Mass Spectrometer (NGIMS) developed for the CONTOUR mission [1]. This mass spectrometer is similar to the CASSINI Ion and Neutral Gas Mass Spectrometer (INMS) designed and developed at GSFC [2].



Neutral gas and ions

Collimators

Open source ionization region

Antechamber

Closed source ionization region

Quadrupole deflectors

Ion lens system

Quadrupole mass filter

Ion detector

Secondary ions

**Figure 2: Schematics illustrating the principal components of the NMS sensor.**

The LADEE NMS instrument was modified from the heritage CONTOUR NGIMS instrument to increase the instrument sensitivity, field of view and overall operational flexibility.

The NMS sensor consists of:

* two separate ion sources for sampling ambient neutrals and ions,
* an ion deflector/trap,
* four hot-filament electron guns,
* an electrostatic quadrupole switching lens that selects between the sources,
* various focusing lenses,
* a quadrupole mass analyzer, and
* two secondary electron multiplier (SEM) detectors.

The instrument control is provided by the Command and Data Handling (C&DH) unit, according to the instructions given to a user defined script. The C&DH and all the related electronics boards are packaged together. A sketch of the key NMS components is shown in Figure 2, and the primary instrument parameters are listed in Table 1.

# Ion Sources

The NMS instrument uses two separate ion sources, a closed source and an open source in order to optimize interpretation of the neutral species (Figure 3).

In the closed source mode, the ram pressure of the inflowing gas creates a density enhancement in the source antechamber, allowing the sampled species to be measured with relatively high precision and sensitivity. This mode will be used to measure species, such as He and Ar, which do not react with the antechamber surfaces.

Table 1: Key NMS parameters

|  |  |
| --- | --- |
| **NMS Instrument Parameters** | |
| Neutral gas sampling systems | 1. Closed source (non wall reactive species) 2. Open source (wall reactive species) |
| Ion sampling system | Thermal and suprathermal positive ions |
| Source switching system | Electrostatic quadrupole deflector |
| Field of view | 1. Closed source: 2 π steradians 2. Open source 10° cone half angle |
| Neutral mode ionization sources | Electron impact ionization with redundant filaments   1. Closed source: 200 μA and 70eV 2. Open source: 200 μA and 70eV |
| Mass analyzer | Quadrupole mass filter; 0.508 cm field radius, 15 cm rod length; Radio frequencies: 1.43 and 3.10 MHz |
| Mass range | 2 – 150 Daltons |
| Scan modes | 1. Survey: scan mass range in 0.1 Daltons steps 2. Adaptive mode: select mass values |
| Crosstalk | 10-6 for adjacent masses |
| Detector system | Two secondary electron multiplier detectors operating in pulse counting mode (detector noise <1 count per min)  Dynamic range ~ 108 |
| Data rate | Integration period from 27 ms to 250 ms with a 3 ms setup time per period. |

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**# 2**

**# 3**

**# 4**

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**# 74**

**# 49**

**Open Source**

**Closed Source**

**Antechamber**

**Transfer tube**

**Electron gun # 1**

**Electron gun # 2**

**Switching Lenses**

**Ion Focusing**

**Quadrupole Mass Filter**

**Detector**

**Electron gun # 1**

**Electron gun # 2**

**Neutrals and ions**

**Neutrals and ions**

**Ions path**

**Electron beam (primary gun)**

**Electron beam (secondary gun)**

**Figure 3: Schematics of NMS electrostatic elements. Table 3 provides the related nomenclature.**

The open source has the advantage that it can measure reactive neutral radicals, such as atomic oxygen, and ions. In this mode, the ambient neutral gas density is sampled directly with no stagnation enhancement and no collisions with the surfaces of the instrument. For open source ion measurements, the NMS angular response can be increased beyond the geometric view cone by adjusting the voltages on the ion collimator lenses. For neutral sampling in the open source mode, the ion collimator lenses and the repeller lens remove incoming ions and electrons, which could cause spurious ionization of neutral species, and allow only neutrals to pass into the ionization region.

# Ion Optics

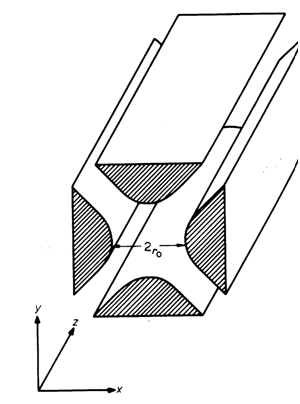
In both closed and open source modes, impacting electrons emitted from the hot-filament electron guns ionize the sampled neutrals. Electrostatic lenses are used to focus the ambient ions and those created from ambient neutrals by electron impact into the quadrupole switching lens (Mahaffy and Lai, 1990), an electrostatic device that steers ions from either the closed or open source through a system of focusing lenses into a dual radio frequency (RF) quadrupole mass analyzer.

# Mass Analyzer

The mass analyzer selectively filters the ions according to their mass-to-charge ratio using a set of 4 hyperbolic rods excited with a RF wave form.

Two opposing potentials of the form drive each pair of rods (Figure 4). Ions with the appropriate ratio of mass to charge achieve stable trajectories while the rest of the ions diverge and end up impacting the rods.

During a mass scan the absolute values of and are increased while the ratio is kept constant. The DC and AC potentials are calculated for the given target mass as:



**Figure 4: Quadrupole mass filter and driving RF potentials.**

Where is the mass of the targeted ion, is the hyperbolic rods radius, the RF frequency, and the electron charge. and are constants that drive the mass resolution of the analyzer.

In order to cover the mass range of 2 to 150 Da while keeping the voltages relatively low, the RF frequency is switched from to at mass .

When the NMS is operating in the open source mode, a quadrupole bias voltage is added to the DC voltage applied to the RF mass analyzer rods to slow down incoming ions and increase their residence time in the analyzer’s RF field.

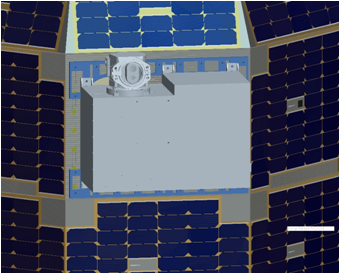
# Detectors

Ions exiting the quadrupole mass filter are detected by one of two redundant secondary electron multipliers. The multipliers are associated electrodes electronically biased such that most of the ions are deflected into one of the detectors. Charge pulses at the anode of the multiplier are amplified and counted. The detection threshold is determined by the background noise in the multiplier (approximately one count per minute). The upper count rate of each detector system is about 10 MHz, limited by the product of the multiplier pulse width and gain bandwidth of the pulse amplifier counter system. There is a non-linear response that occurs in the range of 1–10 MHz and needs to be accounted for.

# Instrument Accommodation on the LADEE spacecraft

The NMS instrument is mounted on the Payload Module on the opposite panel from the Lunar Laser Communication Demonstrator (LLCD). The outward normal to both the open and closed source INMS apertures lies in the spacecraft −X direction. The instrument apertures are directed toward the nominal spacecraft motion direction with a clear field of view of any spacecraft structure in order to avoid any induced contamination (from spacecraft structure or thrusters firing).

NMS



Interface plate

Apertures

**Figure 5: NMS accommodation on the spacecraft.**

Payload module

# Instrument Calibration

NMSwas designed, built and tested at the Planetary Environment Laboratory (Code 699) of NASA’s Goddard Space Flight Center (GSFC). During I&T, the NMS instrument was mounted on a vacuum chamber in order to characterize its sensitivity for a set of gases and gas mixes. Detailed descriptions of the calibration procedure and calibration results are provided in the NMS calibration report.

# Data Products

This document uses the LADEE data definitions for all products. These data have been reviewed and accepted by PDS to comply with anticipated PDS4 standards. NMS will deliver both raw and calibrated data to PDS as defined in the LADEE definitions table, Table 2, and delineated in Table 3.

# NMS Product Definitions

All NMS products delivered to the PDS are in “spreadsheet” format with comma-delimited columns or as ASCII text files. These products are described in Table 3. Deliveries will be made to PDS in accordance with the schedule defined in the LADEE NMS PDS Interface Control Document.

# Data Product Detailed Description and Format

Data generated by the NMS instrument will be organized in products according to their processing state. NMS data processing pipeline adheres to the nomenclature of product definition set by the LADEE project (Table 2).

**Table 2: LADEE Data Processing Levels**

|  |  |
| --- | --- |
| **Product** | **Product Description** |
| Packet Data | Telemetry data stream as received at the ground station, with science and engineering data embedded. |
| Raw | Original data from an instrument. If compression, reformatting, packetization or other translation has been applied to facilitate data transmission or storage, those processes will be reversed so that the archived data are in a PDS approved archive format. |
| Reduced | Data that have been processed beyond the raw stage but which are not yet entirely independent of the instrument. |
| Calibrated | Data converted to physical units entirely independent of the instrument. |
| Derived | Results that have been distilled from one or more calibrated data products (for example, maps, gravity or magnetic fields, or ring particle size distributions). Supplementary data, such as calibration tables or tables of viewing geometry, used to interpret observational data should also be classified as derived data if not easily matched to one of the other three categories |

The NMS pipeline processes the Packet Data (binary files as generated by the instrument) to generate the Raw, Calibrated and Derived products. Only these latter products will be archived at the PDS (Table 3).

The Packet Data will be separated by telemetry channel (Housekeeping, Science and Instrument Log) and converted to ASCII to generate the Raw Housekeeping, the Raw Science and the Message Log. These data will be checked for anomalies and will be time-stamped. The Housekeeping units will be expressed in engineering units (the units of the ADC or DAC units) when applicable.

Then, the Raw Science will be corrected for detector response (dead time correction) and the Raw Housekeeping will be converted to scientific units (physical unit corresponding to the measurement being made: deg C for Temp, A for current or emission, and V for voltage monitor circuits) when applicable. These data will be checked for anomalies and the time-stamp will be corrected for any offset between the instrument and spacecraft clocks. This process will yield Calibrated Housekeeping and Calibrated Science ASCII files.

Finally, for a subset of Calibrated data sets a Derived product will be generated to reflect the abundances of key species that exhibit a sufficient SNR. This conversion will assume lab measured sensitivities for He, Ar and Ne and for interpolated sensitivities for the rest of the reported species.

Table 3: Data Definitions for NMS.

|  |  |  |  |
| --- | --- | --- | --- |
| **Product Name** | **Description** | **Estimated File**  **(B = Bytes)** | **Type** |
| Raw Housekeeping | Instrument housekeeping packets | TBD | Raw |
| Raw Science | Instrument science packets | TBD | Raw |
| Message Log | Instrument message log | TBD | Raw |
| Calibrated Housekeeping | Instrument housekeeping packets | TBD | Calibrated |
| Calibrated Science | Instrument science packets | TBD | Calibrated |
| Species Abundance | Abundances of key exospheric species | TBD | Derived |

Appendix A provides detailed information about the formats and content descriptions of the archived data products.

# Data Products Generation

All data products and associated documentation will be generated by the NMS team. The PDS Planetary Atmospheres Discipline Node will assist in the definition and development of first delivery products and their associated PDS documentation, which will act as templates for subsequent updates. When new products are developed by the NMS team, PDS Planetary Atmospheres Discipline Node will likewise assist in the definition and development of those products and their associated PDS documentation in preparation for their initial delivery.

# Data Validation

Data content validation will be performed by the NMS science team prior to delivery to PDS. Data structure and format will be performed by the NMS science team and the PDS data review team as described in Section 4.3.

# ARCHIVE VOLUMES

## Generation

The NMS Data Product Archive Collection and its updates are produced by the NMS Instrument Team in cooperation with the Planetary Atmospheres Discipline Node (ATM) of PDS. The Archive Collection will include data acquired during calibration, commissioning, and science phases.

The Planetary Atmospheres Discipline Node and NMS will collaborate to design the PDS documentation files associated with the initial data delivery by the NMS team. All data formats are based on the Planetary Data System standards as documented in the PDS Standards Reference.

## Data Transfer

The NMS team will submit data to PDS via the OnLine Archive Facility (OLAF). This submission tool is a product of the Planetary Atmospheres Data Node of PDS to help facilitate the exchange of data and will be maintained by PADN. The NMS and PADN teams will work together in the submission via OLAF to ensure a product meeting the requirements of PDS.

## Review and Revision

The Planetary Atmospheres Discipline Node is responsible for organizing the Peer Review of the NMS data sets, according to PDS policy. The Peer Review Committee will include a small number of scientists, selected by ATM and from outside the NMS Team, who have an interest in the anticipated data products. The Peer Review committee will also include NMS Team members and PDS representatives.

For NMS there will be two such reviews. There will be a pre-launch review approximately 6 months from launch. This review will contain sample data and documentation in the format of the final archived data set. This sample data will be produced by the flight instrument pre-launch and will differ in the final data set only in specific values and size. Data format and archive method will be the equivalent.

There will be a final review within 6 weeks after the end of mission (EOM). This review will include all the data produced by NMS from the beginning of the commissioning phase through the first 20 days of the science phase. Three months after EOM, NMS will deliver the final data set for archive.

## Data Volume Architecture

The complete set of LADEE NMS data will be archived in PDS in a single bundle in the PDS4 standard. In the outline below, each .csv, .txt. and .pdf file is assumed to have an .xml label file with the same filename base, which is not mentioned in the outline. Labels for other types of files are mentioned explicitly.

**Root Level of NMS Bundle**

Bundle label, including inventory for the bundle (bundle\_1.xml)

Bundle table of contents (readme\_1.0.txt)

**Context Collection** – contains mission, spacecraft, instrument, and other context objects. These context objects refer to the full descriptions in the document collection.

/context

Inventory of context collection (collection\_1.0.tab)

Instrument context object (instrument\_nms.xml)

Instrument host (spacecraft) context object (instrument\_host\_ladee.xml)

Investigation (LADEE mission) context object (investigation\_ladee.xml)

Target object (target\_moon.xml)

**Data Collection** – contains all data products and their labels

/data

Inventory of the data collection (collection\_1.0.tab)

/ground (contains all the ground calibration products)

/raw (contains all the raw products)

Housekeeping data tables (file\_name.tab)

Science data table (file\_name.tab)

Message log (file\_name.txt)

/calibrated (contains all calibrated data products)

Housekeeping data tables (file\_name.tab)

Science data table (file\_name.tab)

/flight (contains all the flight products)

/raw (contains all the raw products)

Housekeeping data tables (file\_name.tab)

Science data table (file\_name.tab)

Message log (file\_name.txt)

/calibrated (contains all calibrated data products)

Housekeeping data tables (file\_name.tab)

Science data table (file\_name.tab)

Time-corrected message log (file\_name.txt)

/derived (contains all derived products)

Species abundances (file\_name.tab)

**Document Collection** – contains documents relevant to the bundle

/document

Inventory of the document collection (collection\_1.0.tab)

NMS instrument calibration report (instrument\_calibration\_nms.pdf)

LADEE mission description (investigation\_ladee.pdf)

LADEE spacecraft description (instrument\_host\_ladee.pdf)

LADEE NMS bundle description (bundle\_nms.txt)

LADEE NMS SIS (instrument\_pds\_nms.pdf)

**Schema Collection** – contains the schemas used in the bundle

/xml\_schema

Inventory of the schema collection (collection\_1.0.tab)

catalog.xml - Lists PDS schemas and namespaces used in the bundle

catalog\_label.xml - Label for catalog.xml

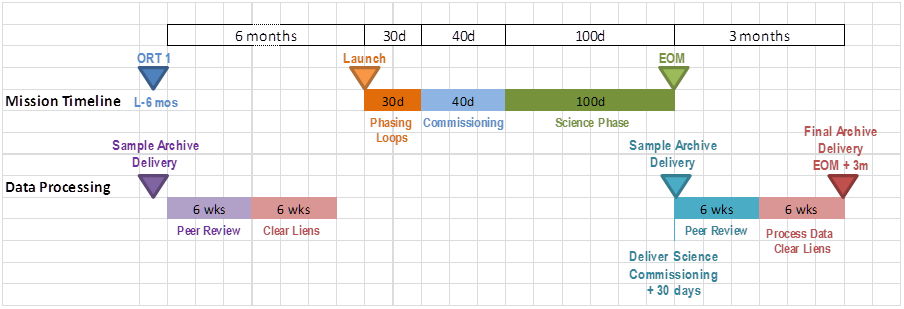
PDS4\_PDS\_0300a.xml - Label for Main PDS schema

PDS4\_PDS\_0300a.xsd - Main PDS schema – defines the element structure for PDS4

PDS4\_PDS\_0300a.sch - Main PDS schema – defines valid element values and other semantic constraints for PDS4

# ARCHIVE RELEASE SCHEDULE

Figure 6 shows the delivery schedule in reference to the mission timeline. Three months from EOM, the final dataset with liens resolved will be delivered.



**Figure 6: Data processing timeline against mission events and milestones.**

# COGNIZANT PERSONS

Table 4: Cognizant Persons for NMS PDS Data

|  |  |  |
| --- | --- | --- |
| **NMS Team** | | |
| Principal Investigator,  **Dr. Paul Mahaffy** | Planetary Environment Laboratory  NASA Goddard Space Flight Center  Code 699  8800 Greenbelt road  Greenbelt, MD 20771 | 301 614-6379  Paul.mahaffy@nasa.gov |
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| NMS Scientist  **Dr. Richard Hodges** |  | 301 614-6392  hodges@lasp.colorado.edu |
| NMS Calibration Engineer  **Mr. Eric Raeen** | Planetary Environment Laboratory  NASA Goddard Space Flight Center  Code 699  8800 Greenbelt road  Greenbelt, MD 20771 | 301 614-6363  eric.raeen@nasa.gov |
| NMS Archive  Engineer  **Mr. Matthew Lefavor** | Planetary Environment Laboratory  NASA Goddard Space Flight Center  Code 699  8800 Greenbelt road  Greenbelt, MD 20771 | 301 614-6818  Matthew.lefavor@nasa.gov |
| **PDS Planetary Atmospheres Data Node** | | |
| PDS Atmospheres Node Manager  **Dr. Reta Beebe** | Astronomy Department  New Mexico State University  P.O. Box 30001, MSC 4500  Las Cruces, NM 88003 | 575 646-1938  rbeebe@nmsu.edu |
| PDS Atmospheres Archive Manager  **Mr. Lyle Huber** | Astronomy Department  New Mexico State University  P.O. Box 30001, MSC 4500  Las Cruces, NM 88003 | 575 646-1862  lhuber@nmsu.edu |

# REFERENCES

[1] Mahaffy, P.; Veverka, J.; Niemann, H.; Harpold, D.; Chiu, M.; Reynolds, E.; Owen, T.; Kasprzak, W.; Raaen, E.; Patrick, E.; Demick, J. (2001), An Overview of the Comet Nucleus TOUR Discovery Mission and a Description of Neutral Gas and Ion Measurements Planned, American Astronomical Society, DPS Meeting #33, #57.21; Bulletin of the American Astronomical Society, Vol. 33, p.1148.

[2] Waite, J. H.; Lewis, W. S.; Kasprzak, W. T.; Anicich, V. G.; Block, B. P.; Cravens, T. E.; Fletcher, G. G.; Ip, W.-H.; Luhmann, J. G.; McNutt, R. L.; Niemann, H. B.; Parejko, J. K.; Richards, J. E.; Thorpe, R. L.; Walter, E. M.; Yelle, R. V. (2004), The Cassini Ion and Neutral Mass Spectrometer (INMS) Investigation, Space Science Reviews, Volume 114, Issue 1-4, pp. 113-231.

# APPENDICES

## NMS Electrodes Designation

Table A-1: NMS Electrode list and designation (see Figure 3)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Lens #** | **Designation** | **Abbreviation** | **Min Potential (V)** | **Max Potential (V)** |
| **Open Source (OS) Sub Assembly** | | | | |
| 1 | OS Collimator (a) (Split) | OS\_COLa | -150 | 150 |
| 2 | OS Collimator (b) (Split) | OS\_COLb | -150 | 150 |
| 3 | OS Lens 1 | OS\_OL1 | -10 | 10 |
| 4 | OS Lens 2 | OS\_OL2 | -10 | 10 |
| 5 | OS Lens 3 | OS\_OL3 | -150 | 150 |
| 6 | OS Lens 4 | OS\_OL4 | -300 | 0 |
| 7 | OS Lens 5 | OS\_OL5 | -900 | 100 |
| 8 | OS Nozzle | OS\_OL6 | -900 | 100 |
| 9 | OS Electron Restrictor 1 | OS\_RES1 | -150 | 150 |
| 10 | OS Electron Deflector 1 (c) | OS\_EF1c | -100 | 0 |
| 11 | OS Electron Deflector 1 (d) | OS\_EF1d | -100 | 0 |
| 12 | OS Electron Focus 1 (a) | OS\_EF1a | -100 | 0 |
| 13 | OS Electron Focus 1 (b) | OS\_EF1b | -100 | 0 |
| 14 | OS Filament Shield 1 | OS\_FS1 | -100 | 0 |
| 15 | OS Filament 1-P | OS\_FIL1-P | -70 | -70 |
| 16 | OS Filament 1-M | OS\_FIL1-M | -70 | -70 |
| 17 | OS Electron Accelerator 1 | OS\_EA1 | -100 | 200 |
| 18 | OS Electron Restrictor 2 | OS\_RES2 | -150 | 150 |
| 19 | OS Electron Deflector 2 (c) | OS\_EF2c | -100 | 0 |
| 20 | OS Electron Deflector 2 (d) | OS\_EF2d | -100 | 0 |
| 21 | OS Electron Focus 2 (a) | OS\_EF2a | -100 | 0 |
| 22 | OS Electron Focus 2 (b) | OS\_EF2b | -100 | 0 |
| 23 | OS Filament Shield 2 | OS\_FS2 | -100 | 0 |
| 24 | OS Filament 2-P | OS\_FIL2-P | -70 | -70 |
| 25 | OS Filament 2-M | OS\_FIL2-M | -70 | -70 |
| 26 | OS Electron Accelerator 2 | OS\_EA2 | -100 | 200 |
| **Closed Source (CS) Sub Assembly** | | | | |
| 27 | CS Ion Accelerator | CS\_IA | -10 | 10 |
| 28 | CS Ion Focus a | CS\_IFa | -300 | 0 |
| 29 | CS Ion Focus b | CS\_IFb | -300 | 0 |
| 30 | CS Nozzle | CS\_NZ | -300 | 0 |
| 31 | CS Repeller | CS\_RP | -10 | 10 |
| 32 | CS Repeller Shield | CS\_RS | -10 | 10 |
| 33 | CS Anode 1 | CS\_AN1 | 0 | 300 |
| 34 | CS Electron Accelerator 1 | CS\_EA1 | 0 | 300 |
| 35 | CS Electron Focus 1 (a) | CS\_EF1a | -100 | 0 |
| 36 | CS Electron Focus 1 (b) | CS\_EF1b | -100 | 0 |
| 37 | CS Electron Deflector 1 (c) | CS\_EF1c | -100 | 0 |
| 38 | CS Electron Deflector 1 (d) | CS\_EF1d | -100 | 0 |
| 39 | CS Filament 1-P | CS\_FIL1-P | -70 | -70 |
| 40 | CS Filament 1-M | CS\_FIL1-M | -70 | -70 |
| 41 | CS Filament Shield 1 | CS\_FS1 | -100 | 0 |
| 42 | CS Anode 2 | CS\_AN2 | 0 | 300 |
| 43 | CS Electron Accelerator 2 | CS\_EA2 | 0 | 300 |
| 44 | CS Electron Focus 2 (a) | CS\_EF2a | -100 | 0 |
| 45 | CS Electron Focus 2 (b) | CS\_EF2b | -100 | 0 |
| 46 | CS Electron Deflector 2 (c) | CS\_EF2c | -100 | 0 |
| 47 | CS Electron Deflector 2 (d) | CS\_EF2d | -100 | 0 |
| 48 | CS Filament 2-P | CS\_FIL2-P | -70 | -70 |
| 49 | CS Filament 2-M | CS\_FIL2-M | -70 | -70 |
| 50 | CS Filament Shield 2 | CS\_FS2 | -100 | 0 |
| **Switching Lens (SL) Sub Assembly** | | | | |
| 51 | Sl Quad Lens Top Front | SL\_TF | -200 | 100 |
| 52 | SL Quad Lens Top Back | SL\_TB | -900 | 100 |
| 53 | SL Quad Lens Bottom Back | SL\_BB | -200 | 100 |
| 54 | Sl Quad Lens Bottom Front | SL\_BF | -900 | 100 |
| 55 | SL End Lens 1 | SL\_EL1 | -100 | 900 |
| 56 | SL End Lens 2 | SL\_EL2 | -100 | 900 |
| **Ion Analyzer (IA) Sub Assembly** | | | | |
| 57 | IA Lens 1 | IA\_L1 | -900 | 0 |
| 58 | IA Lens 2 | IA\_L2 | -900 | 0 |
| 59 | IA Lens 4 (a) (Split) | IA\_L4a | -300 | 0 |
| 60 | IA Lens 4 (b) (Split) | IA\_L4b | -300 | 0 |
| 61 | IA Lens 5 (a) (Split) | IA\_L5a | -900 | 0 |
| 62 | IA Lens 5 (b) (Split) | IA\_L5b | -900 | 0 |
| 63 | IA Lens 6 | IA\_L6 | -900 | 0 |
| **Quadrupole (QD) Sub Assembly** | | | | |
| 64 | Rod 1 | QD\_R1 | RF | RF |
| 65 | Rod 2 | QD\_R2 | RF | RF |
| 66 | Rod 3 | QD\_R3 | RF | RF |
| 67 | Rod 4 | QD\_R4 | RF | RF |
| 68 | Beam Shaping Lens | QD\_BS | -150 | 150 |
| **Multiplier (MT) Sub Assembly** | | | | |
| 69 | Einzel Lens | MT\_EZ | -200 | 100 |
| 70 | Mask 1 | MT\_MA1 | -200 | 100 |
| 71 | Mask 2 | MT\_MA2 | -200 | 100 |
| 72 | Window | MT\_WD | -200 | 100 |
| 73 | Multiplier Neg 1 | MT\_MU1 | -3500 | 0 |
| 74 | Multiplier Neg 2 | MT\_MU2 | -3500 | 0 |
| 75 | Faraday Cup | MT\_FC | -150 | 150 |

## NMS DAC ID designation:

This table provides the ID number of all Digital to Analog Converters (DAC) that can be displayed in the science data tables under DAC\_ID (Table A-4 and A-6).

Table A-2: NMS Electrode list and designation (see Figure 3)

|  |  |
| --- | --- |
| **DAC Designation** | **DAC ID** |
| 16 | OS\_FIL1\_VCTL |
| 17 | OS\_FIL1\_ECTL |
| 18 | OS\_FS1\_VCTL |
| 19 | OS\_FIL2\_VCTL |
| 20 | OS\_FIL2\_ECTL |
| 21 | OS\_FS2\_VCTL |
| 22 | CS\_FIL1\_VCTL |
| 23 | CS\_FIL1\_ECTL |
| 24 | CS\_FS1\_VCTL |
| 25 | CS\_FIL2\_VCTL |
| 26 | CS\_FIL2\_ECTL |
| 27 | CS\_FS2\_VCTL |
| 28 | DT1\_VCTL |
| 29 | DT2\_VCTL |
| 30 | QB\_VCTL |
| 32 | FIL\_ON\_CTRL |
| 34 | ROD\_AC |
| 36 | ROD\_DC |
| 37 | RF\_FREQ |
| 47 | FIL\_SEL |
| 48 | BA\_FIL\_VCTL |
| 49 | CS\_NZ\_VCTL |
| 50 | MT\_MU1\_VCTL |
| 51 | MT\_MU2\_VCTL |
| 52 | CS\_EA1\_VCTL |
| 53 | CS\_AN1\_VCTL |
| 54 | CS\_EA2\_VCTL |
| 55 | CS\_AN2\_VCTL |
| 56 | QD\_BS\_VCTL |
| 57 | MT\_EZ\_VCTL |
| 58 | MT\_MA1\_VCTL |
| 59 | MT\_MA2\_VCTL |
| 60 | MT\_WD\_VCTL |
| 61 | MT\_FC\_VCTL |
| 62 | OS\_EA1\_VCTL |
| 63 | OS\_RES1\_VCTL |
| 64 | OS\_EA2\_VCTL |
| 65 | OS\_RES2\_VCTL |
| 66 | OS\_OL1\_VCTL |
| 67 | OS\_OL2\_VCTL |
| 68 | OS\_COLA\_VCTL |
| 69 | OS\_COLB\_VCTL |
| 70 | CS\_IA\_VCTL |
| 71 | CS\_RP\_VCTL |
| 72 | CS\_RS\_VCTL |
| 76 | IA\_L1\_VCTL |
| 77 | IA\_L2\_VCTL |
| 78 | IA\_L4A\_VCTL |
| 79 | IA\_L4B\_VCTL |
| 80 | IA\_L5\_VCTL |
| 81 | IA\_L6\_VCTL |
| 82 | OS\_EF1A\_VCTL |
| 83 | OS\_EF1B\_VCTL |
| 84 | OS\_EF1C\_VCTL |
| 85 | OS\_EF1D\_VCTL |
| 86 | OS\_EF2A\_VCTL |
| 87 | OS\_EF2B\_VCTL |
| 88 | OS\_EF2C\_VCTL |
| 89 | OS\_EF2D\_VCTL |
| 90 | CS\_EF1A\_VCTL |
| 91 | CS\_EF1B\_VCTL |
| 92 | CS\_EF1C\_VCTL |
| 93 | CS\_EF1D\_VCTL |
| 94 | CS\_EF2A\_VCTL |
| 95 | CS\_EF2B\_VCTL |
| 96 | CS\_EF2C\_VCTL |
| 97 | CS\_EF2D\_VCTL |
| 100 | OS\_OL4\_VCTL |
| 101 | CS\_IFA\_VCTL |
| 102 | CS\_IFB\_VCTL |
| 103 | SL\_TB\_VCTL |
| 104 | SL\_BB\_VCTL |
| 105 | SL\_BF\_VCTL |
| 106 | SL\_EL\_VCTL |
| 107 | OS\_OL3\_VCTL |
| 108 | SL\_TF\_VCTL |
| 109 | OS\_OL5\_VCTL |
| 110 | OS\_OL6\_VCTL |

## NMS Data Product Column Descriptions

# Raw housekeeping data table

This table contains the raw housekeeping packets values generated while the instrument is on.

Table A-3: Definition of the raw housekeeping data table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Name** | **Format** | **Units** | **Range** | **Description** |
| 1 | TIME. | Real | s | N/A | SCLK timestamp of any corresponding observed value. |
| 2 | MKID | Integer | N/A | N/A | Marker ID of the current data point. Markers are tag numbers given to related set of measurements. |
| 3 | CDH:+13A\_VMON | Real | V | 0 – 5 | Engineering value of +13A\_VMON at TIME. |
| 4 | CDH:+13V\_MON | Real | V | 0 – 5 | Engineering value of +13V\_MON at TIME. |
| 5 | CDH:+15RF\_VMON | Real | V | 0 – 5 | Engineering value of +15RF\_VMON at TIME. |
| 6 | CDH:+160\_VMON | Real | V | 0 – 5 | Engineering value of +160\_VMON at TIME. |
| 7 | CDH:+5D\_VMON | Real | V | 0 – 5 | Engineering value of +5D\_VMON at TIME. |
| 8 | CDH:+5VREF\_DAC | Real | V | 0 – 5 | Engineering value of +5VREF\_DAC at TIME. |
| 9 | CDH:+80RF\_VMON | Real | V | 0 – 5 | Engineering value of +80RF\_VMON at TIME. |
| 10 | CDH:-13A\_VMON | Real | V | 0 – 5 | Engineering value of -13A\_VMON at TIME. |
| 11 | CDH:-13V\_MON | Real | V | 0 – 5 | Engineering value of -13V\_MON at TIME. |
| 12 | CDH:-15RF\_VMON | Real | V | 0 – 5 | Engineering value of -15RF\_VMON at TIME. |
| 13 | CDH:-160\_VMON | Real | V | 0 – 5 | Engineering value of -160\_VMON at TIME. |
| 14 | CDH:-5.7VREF | Real | V | 0 – 5 | Engineering value of -5.7VREF at TIME. |
| 15 | CDH:-5VREF\_DAC | Real | V | 0 – 5 | Engineering value of -5VREF\_DAC at TIME. |
| 16 | CDH:3.3V\_IMON | Real | V | 0 – 5 | Engineering value of 3.3V\_IMON at TIME. |
| 17 | CDH:5V\_IMON | Real | V | 0 – 5 | Engineering value of 5V\_IMON at TIME. |
| 18 | CDH:AGC\_TMP | Real | V | 0 – 5 | Engineering value of AGC\_TMP at TIME. This value captures the temperature of the RF AGC board. |
| 19 | CDH:ARM1\_MON | Real | V | 0 – 5 | Engineering value of ARM1\_MON at TIME. |
| 20 | CDH:ARM2\_MON | Real | V | 0 – 5 | Engineering value of ARM2\_MON at TIME. |
| 21 | CDH:BA\_FIL\_EMIS | Real | V | 0 – 5 | Engineering value of BA\_FIL\_EMIS at TIME. |
| 22 | CDH:BA\_FIL\_IMON | Real | V | 0 – 5 | Engineering value of BA\_FIL\_IMON at TIME. |
| 23 | CDH:BA\_FIL\_VMON | Real | V | 0 – 5 | Engineering value of BA\_FIL\_VMON at TIME. |
| 24 | CDH:BA\_GRID\_IMON | Real | V | 0 – 5 | Engineering value of BA\_GRID\_IMON at TIME. |
| 25 | CDH:BA\_PRES | Real | V | 0 – 5 | Engineering value of BA\_PRES at TIME. |
| 26 | CDH:CDH\_+5VREF | Real | V | 0 – 5 | Engineering value of CDH\_+5VREF at TIME. |
| 27 | CDH:CDH\_-5VREF | Real | V | 0 – 5 | Engineering value of CDH\_-5VREF at TIME. |
| 28 | CDH:CDH\_2.5VMON | Real | V | 0 – 5 | Engineering value of CDH\_2.5VMON at TIME. |
| 29 | CDH:CDH\_3.3VMON | Real | V | 0 – 5 | Engineering value of CDH\_3.3VMON at TIME. |
| 30 | CDH:CDH\_TMP | Real | V | 0 – 5 | Engineering value of CDH\_TMP at TIME. This value captures the temperature of the CDH board. |
| 31 | CDH:CS\_+13A\_MON | Real | V | 0 – 5 | Engineering value of CS\_+13A\_MON at TIME. |
| 32 | CDH:CS\_+5REF\_MON | Real | V | 0 – 5 | Engineering value of CS\_+5REF\_MON at TIME. |
| 33 | CDH:CS\_-5REF\_MON | Real | V | 0 – 5 | Engineering value of CS\_-5REF\_MON at TIME. |
| 34 | CDH:CS\_AN1\_MON | Real | V | 0 – 5 | Engineering value of CS\_AN1\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_AN1 electrode. |
| 35 | CDH:CS\_AN2\_MON | Real | V | 0 – 5 | Engineering value of CS\_AN2\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_AN2 electrode. |
| 36 | CDH:CS\_EA1\_MON | Real | V | 0 – 5 | Engineering value of CS\_EA1\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_EA1 electrode. |
| 37 | CDH:CS\_EA2\_MON | Real | V | 0 – 5 | Engineering value of CS\_EA2\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_EA2 electrode. |
| 38 | CDH:CS\_EF1A\_MON | Real | V | 0 – 5 | Engineering value of CS\_EF1A\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_EF1A electrode. |
| 39 | CDH:CS\_EF1B\_MON | Real | V | 0 – 5 | Engineering value of CS\_EF1B\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_EF1B electrode. |
| 40 | CDH:CS\_EF1C\_MON | Real | V | 0 – 5 | Engineering value of CS\_EF1C\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_EF1C electrode. |
| 41 | CDH:CS\_EF1D\_MON | Real | V | 0 – 5 | Engineering value of CS\_EF1D\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_EF1D electrode. |
| 42 | CDH:CS\_EF2A\_MON | Real | V | 0 – 5 | Engineering value of CS\_EF2A\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_EF2A electrode. |
| 43 | CDH:CS\_EF2B\_MON | Real | V | 0 – 5 | Engineering value of CS\_EF2B\_MON at TIME. This value captures the drive circuit input to 0 – 5 control the voltage on the CS\_ EF2B electrode. |
| 44 | CDH:CS\_EF2C\_MON | Real | V | 0 – 5 | Engineering value of CS\_EF2C\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_EF2C electrode. |
| 45 | CDH:CS\_EF2D\_MON | Real | V | 0 – 5 | Engineering value of CS\_EF2D\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_EF2D electrode. |
| 46 | CDH:CS\_FIL1\_IMON | Real | V | 0 – 5 | Engineering value of CS\_FIL1\_IMON at TIME. This value captures CS\_FIL1 current. |
| 47 | CDH:CS\_FIL1\_VMON | Real | V | 0 – 5 | Engineering value of CS\_FIL1\_VMON at TIME. This value captures CS\_FIL1 voltage. |
| 48 | CDH:CS\_FIL2\_IMON | Real | V | 0 – 5 | Engineering value of CS\_FIL2\_IMON at TIME. This value captures CS\_FIL2 current. |
| 49 | CDH:CS\_FIL2\_VMON | Real | V | 0 – 5 | Engineering value of CS\_FIL2\_VMON at TIME. This value captures CS\_FIL2 voltage. |
| 50 | CDH:CS\_FIL\_EMON | Real | V | 0 – 5 | Engineering value of CS\_FIL\_EMON at TIME. This value captures the emission value on the active CS filament. |
| 51 | CDH:CS\_FIL\_SEL\_ST | Real | N/A | N/A | Engineering value of CS\_FIL\_SEL\_ST at TIME. |
| 52 | CDH:CS\_FS1\_MON | Real | V | 0 – 5 | Engineering value of CS\_FS1\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_FS1 electrode. |
| 53 | CDH:CS\_FS2\_MON | Real | V | 0 – 5 | Engineering value of CS\_FS2\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_FS2 electrode. |
| 54 | CDH:CS\_GND\_REF | Real | V | 0 – 5 | Engineering value of CS\_GND\_REF at TIME. |
| 55 | CDH:CS\_IA\_MON | Real | V | 0 – 5 | Engineering value of CS\_IA\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_IA electrode. |
| 56 | CDH:CS\_IFA\_MON | Real | V | 0 – 5 | Engineering value of CS\_IFA\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_IFA electrode. |
| 57 | CDH:CS\_IFB\_MON | Real | V | 0 – 5 | Engineering value of CS\_IFB\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_IFB electrode. |
| 58 | CDH:CS\_NZ\_MON | Real | V | 0 – 5 | Engineering value of CS\_NZ\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_NZ electrode. |
| 59 | CDH:CS\_RP\_MON | Real | V | 0 – 5 | Engineering value of CS\_RP\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_RP electrode. |
| 60 | CDH:CS\_RS\_MON | Real | V | 0 – 5 | Engineering value of CS\_RS\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_RS electrode. |
| 61 | CDH:CS\_SPARE | Real | N/A | N/A | Unused channel. |
| 62 | CDH:CS\_TMP | Real | V | 0 – 5 | Engineering value of CS\_TMP at TIME. This value captures the temperature of the CS board. |
| 63 | CDH:CS\_TRAP\_MON | Real | V | 0 – 5 | Engineering value of CS\_TRAP\_MON at TIME. |
| 64 | CDH:CTL\_+13VMON | Real | V | 0 – 5 | Engineering value of CTL\_+13VMON at TIME. |
| 65 | CDH:CTL\_+2.5VMON | Real | V | 0 – 5 | Engineering value of CTL\_+2.5VMON at TIME. |
| 66 | CDH:CTL\_+3.3VMON | Real | V | 0 – 5 | Engineering value of CTL\_+3.3VMON at TIME. |
| 67 | CDH:CTL\_+4VMON | Real | V | 0 – 5 | Engineering value of CTL\_+4VMON at TIME. |
| 68 | CDH:CTL\_+5VMON | Real | V | 0 – 5 | Engineering value of CTL\_+5VMON at TIME. |
| 69 | CDH:CTL\_+5VREF | Real | V | 0 – 5 | Engineering value of CTL\_+5VREF at TIME. |
| 70 | CDH:CTL\_+6VMON | Real | V | 0 – 5 | Engineering value of CTL\_+6VMON at TIME. |
| 71 | CDH:CTL\_-13VMON | Real | V | 0 – 5 | Engineering value of CTL\_-13VMON at TIME. |
| 72 | CDH:CTL\_-5VREF | Real | V | 0 – 5 | Engineering value of CTL\_-5VREF at TIME. |
| 73 | CDH:CTL\_SPARE | Real | N/A | N/A | Unused channel. |
| 74 | CDH:CTL\_TMP | Real | V | 0 – 5 | Engineering value of CTL\_TMP at TIME. This value captures the temperature of the CTL board. |
| 75 | CDH:DET\_TMP | Real | V | 0 – 5 | Engineering value of DET\_TMP at TIME. This value captures the temperature of the DET board. |
| 76 | CDH:EM1\_IMON | Real | V | 0 – 5 | Engineering value of EM1\_IMON at TIME. This value captures the current drawn by Multiplier 1. |
| 77 | CDH:EM2\_IMON | Real | V | 0 – 5 | Engineering value of EM2\_IMON at TIME. This value captures the current drawn by Multiplier 2. |
| 78 | CDH:EXT\_THERM1 | Real | V | 0 – 5 | Engineering value of EXT\_THERM1 at TIME. |
| 79 | CDH:EXT\_THERM2 | Real | V | 0 – 5 | Engineering value of EXT\_THERM2 at TIME. |
| 80 | CDH:EXT\_THERM3 | Real | V | 0 – 5 | Engineering value of EXT\_THERM3 at TIME. |
| 81 | CDH:FLASH\_VMON | Real | V | 0 – 5 | Engineering value of FLASH\_VMON at TIME. |
| 82 | CDH:IA\_L1\_MON | Real | V | 0 – 5 | Engineering value of IA\_L1\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the IA\_L1 electrode. |
| 83 | CDH:IA\_L2\_MON | Real | V | 0 – 5 | Engineering value of IA\_L2\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the IA\_L2 electrode. |
| 84 | CDH:IA\_L4A\_MON | Real | V | 0 – 5 | Engineering value of IA\_L4A\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the IA\_L4A electrode. |
| 85 | CDH:IA\_L4B\_MON | Real | V | 0 – 5 | Engineering value of IA\_L4B\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the IA\_L4B electrode. |
| 86 | CDH:IA\_L5\_MON | Real | V | 0 – 5 | Engineering value of IA\_L5\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the IA\_L5 electrode. |
| 87 | CDH:IA\_L6\_MON | Real | V | 0 – 5 | Engineering value of IA\_L6\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the IA\_L6 electrode. |
| 88 | CDH:IF\_+5REF\_MON | Real | V | 0 – 5 | Engineering value of IF\_+5REF\_MON at TIME. |
| 89 | CDH:IF\_-5REF\_MON | Real | V | 0 – 5 | Engineering value of IF\_-5REF\_MON at TIME. |
| 90 | CDH:IF\_GND\_REF | Real | V | 0 – 5 | Engineering value of IF\_GND\_REF at TIME. |
| 91 | CDH:IF\_TMP | Real | V | 0 – 5 | Engineering value of IF\_TMP at TIME. This value captures the temperature of the IF board. |
| 92 | CDH:MT\_EZ\_MON | Real | V | 0 – 5 | Engineering value of MT\_EZ\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the MT\_EZ electrode. |
| 93 | CDH:MT\_FC\_MON | Real | V | 0 – 5 | Engineering value of MT\_FC\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the MT\_FC electrode. |
| 94 | CDH:MT\_MA1\_MON | Real | V | 0 – 5 | Engineering value of MT\_MA1\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the MT\_MA1 electrode. |
| 95 | CDH:MT\_MA2\_MON | Real | V | 0 – 5 | Engineering value of MT\_MA2\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the MT\_MA2 electrode. |
| 96 | CDH:MT\_WD\_MON | Real | V | 0 – 5 | Engineering value of MT\_WD\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the MT\_WD electrode. |
| 97 | CDH:MULTANA1 | Real | V | 0 – 5 | Engineering value of MULTANA1 at TIME. |
| 98 | CDH:MULTANA2 | Real | V | 0 – 5 | Engineering value of MULTANA2 at TIME. |
| 99 | CDH:OS\_+13A\_MON | Real | V | 0 – 5 | Engineering value of OS\_+13A\_MON at TIME. |
| 100 | CDH:OS\_+5REF\_MON | Real | V | 0 – 5 | Engineering value of OS\_+5REF\_MON at TIME. |
| 101 | CDH:OS\_-5REF\_MON | Real | V | 0 – 5 | Engineering value of OS\_-5REF\_MON at TIME. |
| 102 | CDH:OS\_COLA\_MON | Real | V | 0 – 5 | Engineering value of OS\_COLA\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_COLA electrode. |
| 103 | CDH:OS\_COLB\_MON | Real | V | 0 – 5 | Engineering value of OS\_COLB\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_COLB electrode. |
| 104 | CDH:OS\_EA1\_MON | Real | V | 0 – 5 | Engineering value of OS\_EA1\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EA1 electrode. |
| 105 | CDH:OS\_EA2\_MON | Real | V | 0 – 5 | Engineering value of OS\_EA2\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EA2 electrode. |
| 106 | CDH:OS\_EF1A\_MON | Real | V | 0 – 5 | Engineering value of OS\_EF1A\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF1A electrode. |
| 107 | CDH:OS\_EF1B\_MON | Real | V | 0 – 5 | Engineering value of OS\_EF1B\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF1B electrode. |
| 108 | CDH:OS\_EF1C\_MON | Real | V | 0 – 5 | Engineering value of OS\_EF1C\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF1C electrode. |
| 109 | CDH:OS\_EF1D\_MON | Real | V | 0 – 5 | Engineering value of OS\_EF1D\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF1D electrode. |
| 110 | CDH:OS\_EF2A\_MON | Real | V | 0 – 5 | Engineering value of OS\_EF2A\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF2A electrode. |
| 111 | CDH:OS\_EF2B\_MON | Real | V | 0 – 5 | Engineering value of OS\_EF2B\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF2B electrode. |
| 112 | CDH:OS\_EF2C\_MON | Real | V | 0 – 5 | Engineering value of OS\_EF2C\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF2C electrode. |
| 113 | CDH:OS\_EF2D\_MON | Real | V | 0 – 5 | Engineering value of OS\_EF2D\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF2D electrode. |
| 114 | CDH:OS\_FIL1\_IMON | Real | V | 0 – 5 | Engineering value of OS\_FIL1\_IMON at TIME. This value captures OS\_FIL1 current. |
| 115 | CDH:OS\_FIL1\_VMON | Real | V | 0 – 5 | Engineering value of OS\_FIL1\_VMON at TIME. This value captures OS\_FIL1 voltage. |
| 116 | CDH:OS\_FIL2\_IMON | Real | V | 0 – 5 | Engineering value of OS\_FIL2\_IMON at TIME. This value captures OS\_FIL2 current. |
| 117 | CDH:OS\_FIL2\_VMON | Real | V | 0 – 5 | Engineering value of OS\_FIL2\_VMON at TIME. This value captures OS\_FIL2 voltage. |
| 118 | CDH:OS\_FIL\_EMON | Real | V | 0 – 5 | Engineering value of OS\_FIL\_EMON at TIME. This value captures the emission value on the active OS filament. |
| 119 | CDH:OS\_FIL\_SEL\_ST | Real | N/A | N/A | Engineering value of OS\_FIL\_SEL\_ST at TIME. |
| 120 | CDH:OS\_FS1\_MON | Real | V | 0 – 5 | Engineering value of OS\_FS1\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_FS1 electrode. |
| 121 | CDH:OS\_FS2\_MON | Real | V | 0 – 5 | Engineering value of OS\_FS2\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_FS2 electrode. |
| 122 | CDH:OS\_GND\_REF | Real | V | 0 – 5 | Engineering value of OS\_GND\_REF at TIME. |
| 123 | CDH:OS\_OL1\_MON | Real | V | 0 – 5 | Engineering value of OS\_OL1\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_OL1 electrode. |
| 124 | CDH:OS\_OL2\_MON | Real | V | 0 – 5 | Engineering value of OS\_OL2\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_OL2 electrode. |
| 125 | CDH:OS\_OL3\_MON | Real | V | 0 – 5 | Engineering value of OS\_OL3\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_OL3 electrode. |
| 126 | CDH:OS\_OL4\_MON | Real | V | 0 – 5 | Engineering value of OS\_OL4\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_OL4 electrode. |
| 127 | CDH:OS\_OL5\_MON | Real | V | 0 – 5 | Engineering value of OS\_OL5\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_OL5 electrode. |
| 128 | CDH:OS\_OL6\_MON | Real | V | 0 – 5 | Engineering value of OS\_OL6\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_OL6 electrode. |
| 129 | CDH:OS\_RES1\_MON | Real | V | 0 – 5 | Engineering value of OS\_RES1\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_RES1 electrode. |
| 130 | CDH:OS\_RES2\_MON | Real | V | 0 – 5 | Engineering value of OS\_RES2\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_RES2 electrode. |
| 131 | CDH:OS\_SPARE | Real | N/A | N/A | Unused channel. |
| 132 | CDH:OS\_TMP | Real | V | 0 – 5 | Engineering value of OS\_TMP at TIME. This value captures the temperature of the OS board. |
| 133 | CDH:OS\_TRAP\_MON | Real | V | 0 – 5 | Engineering value of OS\_TRAP\_MON at TIME. |
| 134 | CDH:PS\_IMON | Real | V | 0 – 5 | Engineering value of PS\_IMON at TIME. |
| 135 | CDH:PS\_IMON\_2 | Real | V | 0 – 5 | Engineering value of PS\_IMON\_2 at TIME. |
| 136 | CDH:PS\_TMP | Real | V | 0 – 5 | Engineering value of PS\_TMP at TIME. This value captures the temperature of the PS board. |
| 137 | CDH:PYRO1\_MON | Real | V | 0 – 5 | Engineering value of PYRO1\_MON at TIME. |
| 138 | CDH:PYRO2\_MON | Real | V | 0 – 5 | Engineering value of PYRO2\_MON at TIME. |
| 139 | CDH:PulseCounter | Real | CTS | N/A | Engineering value of PulseCounter at TIME. This value captures the number of counts detected with active multiplier during the duration of the integration period. |
| 140 | CDH:QD\_BS\_MON | Real | V | 0 – 5 | Engineering value of QD\_BS\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the QD\_BS electrode. |
| 141 | CDH:RF\_AGC\_MON | Real | V | 0 – 5 | Engineering value of RF\_AGC\_MON at TIME. |
| 142 | CDH:RF\_Cntr | Real | N/A | N/A | Engineering value of RF\_Cntr at TIME. This value captures the current RF frequency. |
| 143 | CDH:RF\_TMP | Real | V | 0 – 5 | Engineering value of RF\_TMP at TIM. This value captures the temperature of the RF board. |
| 144 | CDH:SL\_BB\_MON | Real | V | 0 – 5 | Engineering value of SL\_BB\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the SL\_BB electrode. |
| 145 | CDH:SL\_BF\_MON | Real | V | 0 – 5 | Engineering value of SL\_BF\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the SL\_BF electrode. |
| 146 | CDH:SL\_EL\_MON | Real | V | 0 – 5 | Engineering value of SL\_EL\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the SL\_EL electrode. |
| 147 | CDH:SL\_TB\_MON | Real | V | 0 – 5 | Engineering value of SL\_TB\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the SL\_TB electrode. |
| 148 | CDH:SL\_TF\_MON | Real | V | 0 – 5 | Engineering value of SL\_TF\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the SL\_TF electrode. |
| 149 | CDH:SPARE\_0 | Real | N/A | N/A | Unused channel. |
| 150 | CDH:SPARE\_1 | Real | N/A | N/A | Unused channel. |
| 151 | CDH:SPARE\_2 | Real | N/A | N/A | Unused channel. |
| 152 | CDH:SPARE\_3 | Real | N/A | N/A | Unused channel. |
| 153 | CDH:SPARE\_4 | Real | N/A | N/A | Unused channel. |
| 154 | CDH:SPARE\_5 | Real | N/A | N/A | Unused channel. |
| 155 | CDH:SPARE\_6 | Real | N/A | N/A | Unused channel. |
| 156 | CDH:THERM\_COM | Real | N/A | N/A | Engineering value of THERM\_COM at TIME. |
| 157 | FSW:ALARM\_LEVEL | Real | N/A | N/A | Engineering value of ALARM\_LEVEL at TIME. |
| 158 | FSW:ALARM\_STAT | Real | N/A | N/A | Engineering value of ALARM\_STAT at TIME. |
| 159 | FSW:BAD\_CMD\_ERR | Real | N/A | N/A | Engineering value of BAD\_CMD\_ERR at TIME. |
| 160 | FSW:BAD\_CMD\_OP | Real | N/A | N/A | Engineering value of BAD\_CMD\_OP at TIME. |
| 161 | FSW:CODE\_CSUM | Real | N/A | N/A | Engineering value of CODE\_CSUM at TIME. |
| 162 | FSW:DWELL\_MON\_ADDR | Real | N/A | N/A | Engineering value of DWELL\_MON\_ADDR at TIME. |
| 163 | FSW:DWELL\_MON\_VAL | Real | N/A | N/A | Engineering value of DWELL\_MON\_VAL at TIME. |
| 164 | FSW:FSW\_VER | Real | N/A | N/A | Engineering value of FSW\_VER at TIME. |
| 165 | FSW:INST\_MODE | Real | N/A | N/A | Engineering value of INST\_MODE at TIME. |
| 166 | FSW:LARGEST\_FREE\_BLOCK | Real | N/A | N/A | Engineering value of LARGEST\_FREE\_BLOCK at TIME. |
| 167 | FSW:LAST\_CMD | Real | N/A | N/A | Engineering value of LAST\_CMD at TIME. |
| 168 | FSW:LAST\_FILE\_ID | Real | N/A | N/A | Engineering value of LAST\_FILE\_ID at TIME. |
| 169 | FSW:LAST\_MARKER | Real | N/A | N/A | Engineering value of LAST\_MARKER at TIME. |
| 170 | FSW:LAST\_RESET | Real | N/A | N/A | Engineering value of LAST\_RESET at TIME. |
| 171 | FSW:LIB\_CSUM | Real | N/A | N/A | Engineering value of LIB\_CSUM at TIME. |
| 172 | FSW:LIB\_VER | Real | N/A | N/A | Engineering value of LIB\_VER at TIME. |
| 173 | FSW:LOAD\_TYPE | Real | N/A | N/A | Engineering value of LOAD\_TYPE at TIME. |
| 174 | FSW:MEM\_ALLOC | Real | N/A | N/A | Engineering value of MEM\_ALLOC at TIME. |
| 175 | FSW:MEM\_FREE | Real | N/A | N/A | Engineering value of MEM\_FREE at TIME. |
| 176 | FSW:N\_ALARMS | Real | N/A | N/A | Engineering value of N\_ALARMS at TIME. |
| 177 | FSW:N\_ALARM\_ACTIVE | Real | N/A | N/A | Engineering value of N\_ALARM\_ACTIVE at TIME. |
| 178 | FSW:N\_ALARM\_ENAB | Real | N/A | N/A | Engineering value of N\_ALARM\_ENAB at TIME. |
| 179 | FSW:N\_ALLOCS | Real | N/A | N/A | Engineering value of N\_ALLOCS at TIME. |
| 180 | FSW:N\_CMDS | Real | N/A | N/A | Engineering value of N\_CMDS at TIME. |
| 181 | FSW:N\_CMD\_ERRS | Real | N/A | N/A | Engineering value of N\_CMD\_ERRS at TIME. |
| 182 | FSW:N\_FREES | Real | N/A | N/A | Engineering value of N\_FREES at TIME. |
| 183 | FSW:PKT\_REV | Real | N/A | N/A | Engineering value of PKT\_REV at TIME. |
| 184 | FSW:POWER\_STAT | Real | N/A | N/A | Engineering value of POWER\_STAT at TIME. |
| 185 | FSW:SCRIPT\_CSUM | Real | N/A | N/A | Engineering value of SCRIPT\_CSUM at TIME. |
| 186 | FSW:SCRIPT\_ID | Real | N/A | N/A | Engineering value of SCRIPT\_ID at TIME. |
| 187 | FSW:SCRIPT\_MODE | Real | N/A | N/A | Engineering value of SCRIPT\_MODE at TIME. |
| 188 | FSW:SCRIPT\_VER | Real | N/A | N/A | Engineering value of SCRIPT\_VER at TIME. |
| 189 | FSW:SIDE\_A | Real | N/A | N/A | Engineering value of SIDE\_A at TIME. |
| 190 | FSW:TELEM\_MODE | Real | N/A | N/A | Engineering value of TELEM\_MODE at TIME. |
| 191 | FSW:ZONE\_ALERT | Real | N/A | N/A | Engineering value of ZONE\_ALERT at TIME. |
| 192 | QMS:ADC\_STATUS | Integer | N/A | N/A | Engineering value of ADC\_STATUS at TIME. |
| 193 | QMS:AMUX1 | Integer | N/A | N/A | Engineering value of AMUX1 at TIME. |
| 194 | QMS:AMUX2 | Integer | N/A | N/A | Engineering value of AMUX2 at TIME. |
| 195 | QMS:AMUX\_ADDR1 | Integer | N/A | N/A | Engineering value of AMUX\_ADDR1 at TIME. |
| 196 | QMS:AMUX\_ADDR2 | Integer | N/A | N/A | Engineering value of AMUX\_ADDR2 at TIME. |
| 197 | QMS:AMUX\_ADDR3 | Integer | N/A | N/A | Engineering value of AMUX\_ADDR3 at TIME. |
| 198 | QMS:AMUX\_ADDR4 | Integer | N/A | N/A | Engineering value of AMUX\_ADDR4 at TIME. |
| 199 | QMS:BA\_FIL\_VCTL | Real | N/A | N/A | Engineering value of BA\_FIL\_VCTL at TIME. |
| 200 | QMS:COUNT1 | Integer | N/A | NA | Engineering value of COUNT1 at TIME. This value captures the number of counts detected with multiplier 1 during the duration of the integration period. |
| 201 | QMS:COUNT2 | Integer | N/A | NA | Engineering value of COUNT2 at TIME. This value captures the number of counts detected with multiplier 2 during the duration of the integration period. |
| 202 | QMS:CS\_AN1\_VCTL | Real | N/A | 0 – 256 | Engineering value of CS\_AN1\_VCTL at TIME. This value captures the DAC setting for the CS\_AN1 electrode. |
| 203 | QMS:CS\_AN2\_VCTL | Real | N/A | 0 – 256 | Engineering value of CS\_AN2\_VCTL at TIME. This value captures the DAC setting for the CS\_AN2 electrode. |
| 204 | QMS:CS\_EA1\_VCTL | Real | N/A | 0 – 256 | Engineering value of CS\_EA1\_VCTL at TIME. This value captures the DAC setting for the CS\_EA1 electrode. |
| 205 | QMS:CS\_EA2\_VCTL | Real | N/A | 0 – 256 | Engineering value of CS\_EA2\_VCTL at TIME. This value captures the DAC setting for the CS\_EA2 electrode. |
| 206 | QMS:CS\_EF1A\_VCTL | Real | N/A | 0 – 4096 | Engineering value of CS\_EF1A\_VCTL at TIME. This value captures the DAC setting for the CS\_EF1A electrode. |
| 207 | QMS:CS\_EF1B\_VCTL | Real | N/A | 0 – 4096 | Engineering value of CS\_EF1B\_VCTL at TIME. This value captures the DAC setting for the CS\_EF1B electrode. |
| 208 | QMS:CS\_EF1C\_VCTL | Real | N/A | 0 – 4096 | Engineering value of CS\_EF1C\_VCTL at TIME. This value captures the DAC setting for the CS\_EF1C electrode. |
| 209 | QMS:CS\_EF1D\_VCTL | Real | N/A | 0 – 4096 | Engineering value of CS\_EF1D\_VCTL at TIME. This value captures the DAC setting for the CS\_EF1D electrode. |
| 210 | QMS:CS\_EF2A\_VCTL | Real | N/A | 0 – 4096 | Engineering value of CS\_EF2A\_VCTL at TIME. This value captures the DAC setting for the CS\_EF2A electrode. |
| 211 | QMS:CS\_EF2B\_VCTL | Real | N/A | 0 – 4096 | Engineering value of CS\_EF2B\_VCTL at TIME. This value captures the DAC setting for the CS\_EF2B electrode. |
| 212 | QMS:CS\_EF2C\_VCTL | Real | N/A | 0 – 4096 | Engineering value of CS\_EF2C\_VCTL at TIME. This value captures the DAC setting for the CS\_EF2C electrode. |
| 213 | QMS:CS\_EF2D\_VCTL | Real | N/A | 0 – 4096 | Engineering value of CS\_EF2D\_VCTL at TIME. This value captures the DAC setting for the CS\_EF2D electrode. |
| 214 | QMS:CS\_FIL1\_ECTL | Real | N/A | 0 – 256 | Engineering value of CS\_FIL1\_ECTL at TIME. This value captures the DAC setting for the CS\_FIL1 electrode. |
| 215 | QMS:CS\_FIL1\_VCTL | Real | N/A | 0 – 256 | Engineering value of CS\_FIL1\_VCTL at TIME. This value captures the DAC setting for the CS\_FIL1 electrode. |
| 216 | QMS:CS\_FIL2\_ECTL | Real | N/A | 0 – 256 | Engineering value of CS\_FIL2\_ECTL at TIME. This value captures the DAC setting for the CS\_FIL2 electrode. |
| 217 | QMS:CS\_FIL2\_VCTL | Real | N/A | 0 – 256 | Engineering value of CS\_FIL2\_VCTL at TIME. This value captures the DAC setting for the CS\_FIL2 electrode. |
| 218 | QMS:CS\_FS1\_VCTL | Real | N/A | 0 – 256 | Engineering value of CS\_FS1\_VCTL at TIME. This value captures the DAC setting for the CS\_FS1 electrode. |
| 219 | QMS:CS\_FS2\_VCTL | Real | N/A | 0 – 256 | Engineering value of CS\_FS2\_VCTL at TIME. This value captures the DAC setting for the CS\_FS2 electrode. |
| 220 | QMS:CS\_IA\_VCTL | Real | N/A | 0 – 256 | Engineering value of CS\_IA\_VCTL at TIME. This value captures the DAC setting for the CS\_IA electrode. |
| 221 | QMS:CS\_IFA\_VCTL | Real | N/A | 0 – 4096 | Engineering value of CS\_IFA\_VCTL at TIME. This value captures the DAC setting for the CS\_IFA electrode. |
| 222 | QMS:CS\_IFB\_VCTL | Real | N/A | 0 – 4096 | Engineering value of CS\_IFB\_VCTL at TIME. This value captures the DAC setting for the CS\_IFB electrode. |
| 223 | QMS:CS\_NZ\_VCTL | Real | N/A | 0 – 256 | Engineering value of CS\_NZ\_VCTL at TIME. This value captures the DAC setting for the CS\_NZ electrode. |
| 224 | QMS:CS\_RP\_VCTL | Real | N/A | 0 – 256 | Engineering value of CS\_RP\_VCTL at TIME. This value captures the DAC setting for the CS\_RP electrode. |
| 225 | QMS:CS\_RS\_VCTL | Real | N/A | 0 – 256 | Engineering value of CS\_RS\_VCTL at TIME. This value captures the DAC setting for the CS\_RS electrode. |
| 226 | QMS:CTL\_DIGITAL\_STATUS | Integer | N/A | N/A | Engineering value of CTL\_DIGITAL\_STATUS at TIME. |
| 227 | QMS:CTL\_ERROR\_COUNT | Integer | N/A | N/A | Engineering value of CTL\_ERROR\_COUNT at TIME. |
| 228 | QMS:CTL\_PACKET\_COUNT | Integer | N/A | N/A | Engineering value of CTL\_PACKET\_COUNT at TIME. |
| 229 | QMS:CTL\_SYNC\_CODE | Integer | N/A | N/A | Engineering value of CTL\_SYNC\_CODE at TIME. |
| 230 | QMS:DAC12BSPARE1 | Real | N/A | N/A | Unused channel. |
| 231 | QMS:DAC12BSPARE2 | Real | N/A | N/A | Unused channel. |
| 232 | QMS:DAC12BSPARE3 | Real | N/A | N/A | Unused channel. |
| 233 | QMS:DAC12USPARE1 | Real | N/A | N/A | Unused channel. |
| 234 | QMS:DAC12USPARE2 | Real | N/A | N/A | Unused channel. |
| 235 | QMS:DAC16BSPARE1 | Real | N/A | N/A | Unused channel. |
| 236 | QMS:DAC16BSPARE2 | Real | N/A | N/A | Unused channel. |
| 237 | QMS:DAC8B\_SPARE1 | Real | N/A | N/A | Unused channel. |
| 238 | QMS:DAC8B\_SPARE2 | Real | N/A | N/A | Unused channel. |
| 239 | QMS:DAC8B\_SPARE3 | Real | N/A | N/A | Unused channel. |
| 240 | QMS:DAC\_SPARE | Real | N/A | N/A | Unused channel. |
| 241 | QMS:DT1\_VCTL | Real | N/A | 0 – 256 | Engineering value of DT1\_VCTL at TIME. This value captures the DAC setting for the DET1 discriminator. |
| 242 | QMS:DT2\_VCTL | Real | N/A | 0 – 256 | Engineering value of DT2\_VCTL at TIME. This value captures the DAC setting for the DET1 discriminator. |
| 243 | QMS:FIL\_ON\_CTRL | Real | N/A | N/A | Engineering value of FIL\_ON\_CTRL at TIME. |
| 244 | QMS:FIL\_SELECT | Integer | N/A | N/A | Engineering value of FIL\_SELECT at TIME. |
| 245 | QMS:IA\_L1\_VCTL | Real | N/A | 0 – 4096 | Engineering value of IA\_L1\_VCTL at TIME. This value captures the DAC setting for the IA\_L1 electrode. |
| 246 | QMS:IA\_L2\_VCTL | Real | N/A | 0 – 4096 | Engineering value of IA\_L2\_VCTL at TIME. This value captures the DAC setting for the IA\_L2 electrode. |
| 247 | QMS:IA\_L4A\_VCTL | Real | N/A | 0 – 4096 | Engineering value of IA\_L4A\_VCTL at TIME. This value captures the DAC setting for the IA\_L4A electrode. |
| 248 | QMS:IA\_L4B\_VCTL | Real | N/A | 0 – 4096 | Engineering value of IA\_L4B\_VCTL at TIME. This value captures the DAC setting for the IA\_L4B electrode. |
| 249 | QMS:IA\_L5\_VCTL | Real | N/A | 0 – 4096 | Engineering value of IA\_L5\_VCTL at TIME. This value captures the DAC setting for the IA\_L5 electrode. |
| 250 | QMS:IA\_L6\_VCTL | Real | N/A | 0 – 4096 | Engineering value of IA\_L6\_VCTL at TIME. This value captures the DAC setting for the IA\_L6 electrode. |
| 251 | QMS:IP\_COUNT | Real | ms | N/A | Engineering value of IP\_COUNT at TIME. This value captures the current integration period (IP) duration. |
| 252 | QMS:IP\_SETUP | Real | ms | N/A | Engineering value of IP\_SETUP at TIME. This value captures the current settling period duration. |
| 253 | QMS:MT\_EZ\_VCTL | Real | N/A | 0 – 256 | Engineering value of MT\_EZ\_VCTL at TIME. This value captures the DAC setting for the MT\_EZ electrode. |
| 254 | QMS:MT\_FC\_VCTL | Real | N/A | 0 – 256 | Engineering value of MT\_FC\_VCTL at TIME. This value captures the DAC setting for the MT\_FC electrode. |
| 255 | QMS:MT\_MA1\_VCTL | Real | N/A | 0 – 256 | Engineering value of MT\_MA1\_VCTL at TIME. This value captures the DAC setting for the MT\_MA1 electrode. |
| 256 | QMS:MT\_MA2\_VCTL | Real | N/A | 0 – 256 | Engineering value of MT\_MA2\_VCTL at TIME. This value captures the DAC setting for the MT\_MA2 electrode. |
| 257 | QMS:MT\_MU1\_VCTL | Real | N/A | 0 – 256 | Engineering value of MT\_MU1\_VCTL at TIME. This value captures the DAC setting for the MT\_MU1 electrode. |
| 258 | QMS:MT\_MU2\_VCTL | Real | N/A | 0 – 256 | Engineering value of MT\_MU2\_VCTL at TIME. This value captures the DAC setting for the MT\_MU2 electrode. |
| 259 | QMS:MT\_WD\_VCTL | Real | N/A | 0 – 256 | Engineering value of MT\_WD\_VCTL at TIME. This value captures the DAC setting for the MT\_WD electrode. |
| 260 | QMS:OS\_COLA\_VCTL | Real | N/A | 0 – 256 | Engineering value of OS\_COLA\_VCTL at TIME. This value captures the DAC setting for the OS\_COLA electrode. |
| 261 | QMS:OS\_COLB\_VCTL | Real | N/A | 0 – 256 | Engineering value of OS\_COLB\_VCTL at TIME. This value captures the DAC setting for the OS\_COLB electrode. |
| 262 | QMS:OS\_EA1\_VCTL | Real | N/A | 0 – 256 | Engineering value of OS\_EA1\_VCTL at TIME. This value captures the DAC setting for the OS\_EA1 electrode. |
| 263 | QMS:OS\_EA2\_VCTL | Real | N/A | 0 – 256 | Engineering value of OS\_EA2\_VCTL at TIME. This value captures the DAC setting for the OS\_EA2 electrode. |
| 264 | QMS:OS\_EF1A\_VCTL | Real | N/A | 0 – 4096 | Engineering value of OS\_EF1A\_VCTL at TIME. This value captures the DAC setting for the OS\_EF1A electrode. |
| 265 | QMS:OS\_EF1B\_VCTL | Real | N/A | 0 – 4096 | Engineering value of OS\_EF1B\_VCTL at TIME. This value captures the DAC setting for the OS\_EF1B electrode. |
| 266 | QMS:OS\_EF1C\_VCTL | Real | N/A | 0 – 4096 | Engineering value of OS\_EF1C\_VCTL at TIME. This value captures the DAC setting for the OS\_EF1C electrode. |
| 267 | QMS:OS\_EF1D\_VCTL | Real | N/A | 0 – 4096 | Engineering value of OS\_EF1D\_VCTL at TIME. This value captures the DAC setting for the OS\_EF1D electrode. |
| 268 | QMS:OS\_EF2A\_VCTL | Real | N/A | 0 – 4096 | Engineering value of OS\_EF2A\_VCTL at TIME. This value captures the DAC setting for the OS\_EF2A electrode. |
| 269 | QMS:OS\_EF2B\_VCTL | Real | N/A | 0 – 4096 | Engineering value of OS\_EF2B\_VCTL at TIME. This value captures the DAC setting for the OS\_EF2B electrode. |
| 270 | QMS:OS\_EF2C\_VCTL | Real | N/A | 0 – 4096 | Engineering value of OS\_EF2C\_VCTL at TIME. This value captures the DAC setting for the OS\_EF2C electrode. |
| 271 | QMS:OS\_EF2D\_VCTL | Real | N/A | 0 – 4096 | Engineering value of OS\_EF2D\_VCTL at TIME. This value captures the DAC setting for the OS\_EF2D electrode. |
| 272 | QMS:OS\_FIL1\_ECTL | Real | N/A | 0 – 256 | Engineering value of OS\_FIL1\_ECTL at TIME. This value captures the DAC setting for the OS\_FIL1 emission control. |
| 273 | QMS:OS\_FIL1\_VCTL | Real | N/A | 0 – 256 | Engineering value of OS\_FIL1\_VCTL at TIME. This value captures the DAC setting for the OS\_FIL1 electrode. |
| 274 | QMS:OS\_FIL2\_ECTL | Real | N/A | 0 – 256 | Engineering value of OS\_FIL2\_ECTL at TIME. This value captures the DAC setting for the OS\_FIL2 emission control. |
| 275 | QMS:OS\_FIL2\_VCTL | Real | N/A | 0 – 256 | Engineering value of OS\_FIL2\_VCTL at TIME. This value captures the DAC setting for the OS\_FIL2 electrode. |
| 276 | QMS:OS\_FS1\_VCTL | Real | N/A | 0 – 256 | Engineering value of OS\_FS1\_VCTL at TIME. This value captures the DAC setting for the OS\_FS1 electrode. |
| 277 | QMS:OS\_FS2\_VCTL | Real | N/A | 0 – 256 | Engineering value of OS\_FS2\_VCTL at TIME. This value captures the DAC setting for the OS\_FS2 electrode. |
| 278 | QMS:OS\_OL1\_VCTL | Real | N/A | 0 – 256 | Engineering value of OS\_OL1\_VCTL at TIME. This value captures the DAC setting for the OS\_OL1 electrode. |
| 279 | QMS:OS\_OL2\_VCTL | Real | N/A | 0 – 256 | Engineering value of OS\_OL2\_VCTL at TIME. This value captures the DAC setting for the OS\_OL2 electrode. |
| 280 | QMS:OS\_OL3\_VCTL | Real | N/A | 0 – 4096 | Engineering value of OS\_OL3\_VCTL at TIME. This value captures the DAC setting for the OS\_OL3 electrode. |
| 281 | QMS:OS\_OL4\_VCTL | Real | N/A | 0 – 4096 | Engineering value of OS\_OL4\_VCTL at TIME. This value captures the DAC setting for the OS\_OL4 electrode. |
| 282 | QMS:OS\_OL5\_VCTL | Real | N/A | 0 – 4096 | Engineering value of OS\_OL5\_VCTL at TIME. This value captures the DAC setting for the OS\_OL5 electrode. |
| 283 | QMS:OS\_OL6\_VCTL | Real | N/A | 0 – 4096 | Engineering value of OS\_OL6\_VCTL at TIME. This value captures the DAC setting for the OS\_OL6 electrode. |
| 284 | QMS:OS\_RES1\_VCTL | Real | N/A | 0 – 256 | Engineering value of OS\_RES1\_VCTL at TIME. This value captures the DAC setting for the OS\_RES1 electrode. |
| 285 | QMS:OS\_RES2\_VCTL | Real | N/A | 0 – 256 | Engineering value of OS\_RES2\_VCTL at TIME. This value captures the DAC setting for the OS\_RES2 electrode. |
| 286 | QMS:QB\_VCTL | Real | V | 0 – 256 | Engineering value of QB\_VCTL at TIME. |
| 287 | QMS:QD\_BS\_VCTL | Real | N/A | 0 – 256 | Engineering value of QD\_BS\_VCTL at TIME. This value captures the DAC setting for the QD\_BS electrode. |
| 288 | QMS:RF\_FREQ | Real | N/A | N/A | Engineering value of RF\_FREQ at TIME. |
| 289 | QMS:RF\_FREQ\_SET | Integer | N/A | N/A | Engineering value of RF\_FREQ\_SET at TIME. |
| 290 | QMS:RODAC\_CTRL | Real | N/A | 0 – 65536 | Engineering value of RODAC\_CTRL at TIME. This value captures the DAC setting for the RF AC amplitude. |
| 291 | QMS:RODDC\_CTL | Real | N/A | 0 – 65536 | Engineering value of RODDC\_CTL at TIME. This value captures the DAC setting for the RF DC amplitude. |
| 292 | QMS:SERIAL\_NUM | Integer | N/A | N/A | Engineering value of SERIAL\_NUM at TIME. |
| 293 | QMS:SERIAL\_NUM\_SET | Integer | N/A | N/A | Engineering value of SERIAL\_NUM\_SET at TIME. |
| 294 | QMS:SL\_BB\_VCTL | Real | N/A | 0 – 4096 | Engineering value of SL\_BB\_VCTL at TIME. This value captures the DAC setting for the SL\_BB electrode. |
| 295 | QMS:SL\_BF\_VCTL | Real | N/A | 0 – 4096 | Engineering value of SL\_BF\_VCTL at TIME. This value captures the DAC setting for the SL\_BF electrode. |
| 296 | QMS:SL\_EL\_VCTL | Real | N/A | 0 – 4096 | Engineering value of SL\_EL\_VCTL at TIME. This value captures the DAC setting for the SL\_EL electrode. |
| 297 | QMS:SL\_TB\_VCTL | Real | N/A | 0 – 4096 | Engineering value of SL\_TB\_VCTL at TIME. This value captures the DAC setting for the SL\_TB electrode. |
| 298 | QMS:SL\_TF\_VCTL | Real | N/A | 0 – 4096 | Engineering value of SL\_TF\_VCTL at TIME. This value captures the DAC setting for the SL\_TF electrode. |
| 299 | QMS:SYNC\_CODE | Integer | N/A | N/A | Engineering value of SYNC\_CODE at TIME. |
| 300 | QMS:WAIT | Integer | N/A | N/A | Engineering value of WAIT at TIME. |
| 301 | TM:TMMarker | Real | N/A | N/A | Engineering value of TMMarker at TIME. This value captures the Marker ID of the current data point. Markers are tag numbers given to related set of measurements. |
| 302 | TM:TMMarkerText | Text | N/A | N/A | Engineering value of TMMarkerText at TIME. This value captures the current Marker description. |
| 303 | TM:TMSync | Real | N/A | N/A | Engineering value of TMSync at TIME. |
| 304 | TM:TMSystemID | Real | N/A | N/A | Engineering value of TMSystemID at TIME. |
| 305 | TM:TMTick | Real | N/A | N/A | Engineering value of TMTick at TIME. |

# Raw science data table

This table contains the raw science packets values generated while the instrument is in a science telemetry mode.

Table A-4: Definition of the raw science data table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Name** | **Format** | **Units** | **Range** | **Description** |
| 1 | TIME. | Real | s | N/A | SCLK timestamp of any corresponding observed value. |
| 2 | MKID | Integer | N/A | N/A | Marker ID of the current data point. Markers are tag numbers given to related set of measurements. |
| 3 | IP | Real | s | N/A | Engineering value of IP at TIME. This value captures the current integration period (IP) duration. |
| 4 | TUNING | Integer | N/A | N/A | Engineering value of TUNING at TIME. This value captures the current focusing scheme of the sensor. |
| 5 | MASS | Real | M/Z | 0 – 150 | Engineering value of MASS at TIME. This value captures the current measured mass value. |
| 6 | COUNTS | Real | Hz | N/A | Engineering value of COUNTS at TIME. This value captures the number of counts detected with the active multiplier during the duration of the integration period. |
| 7 | DAC\_ID | Integer | N/A | N/A | Engineering value of DAC\_ID at TIME. This value captures the ID of DAC used during electrode voltage scan (See Table A-2). |
| 8 | DAC\_VOLTAGE | Real | N/A | N/A | Engineering value of DAC\_VOLTAGE at TIME. This value captures the voltage setting of the DAC\_ID electrode during its voltage scan. |

# Raw message log

The message log is an ASCII file that contains the messages generated by the C&DH as it executes the script. These messages are time tagged (in seconds) to allow the data user to correlate the data to the tasks executed by the instrument.

# Calibrated housekeeping table

This table contains the calibrated housekeeping packets values generated while the instrument is on.

Table A-5: Definition of the calibrated housekeeping table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Name** | **Format** | **Units** | **Range** | **Description** |
| 1 | TIME. | Real | s | N/A | SCLK timestamp of any corresponding observed value. |
| 2 | MKID | Integer | N/A | N/A | Marker ID of the current data point. Markers are tag numbers given to related set of measurements. |
| 3 | CDH:+13A\_VMON | Real | V | N/A | Scientific value of +13A\_VMON at TIME. |
| 4 | CDH:+13V\_MON | Real | V | N/A | Scientific value of +13V\_MON at TIME. |
| 5 | CDH:+15RF\_VMON | Real | V | N/A | Scientific value of +15RF\_VMON at TIME. |
| 6 | CDH:+160\_VMON | Real | V | N/A | Scientific value of +160\_VMON at TIME. |
| 7 | CDH:+5D\_VMON | Real | V | N/A | Scientific value of +5D\_VMON at TIME. |
| 8 | CDH:+5VREF\_DAC | Real | V | N/A | Scientific value of +5VREF\_DAC at TIME. |
| 9 | CDH:+80RF\_VMON | Real | V | N/A | Scientific value of +80RF\_VMON at TIME. |
| 10 | CDH:-13A\_VMON | Real | V | N/A | Scientific value of -13A\_VMON at TIME. |
| 11 | CDH:-13V\_MON | Real | V | N/A | Scientific value of -13V\_MON at TIME. |
| 12 | CDH:-15RF\_VMON | Real | V | N/A | Scientific value of -15RF\_VMON at TIME. |
| 13 | CDH:-160\_VMON | Real | V | N/A | Scientific value of -160\_VMON at TIME. |
| 14 | CDH:-5.7VREF | Real | V | N/A | Scientific value of -5.7VREF at TIME. |
| 15 | CDH:-5VREF\_DAC | Real | V | N/A | Scientific value of -5VREF\_DAC at TIME. |
| 16 | CDH:3.3V\_IMON | Real | A | N/A | Scientific value of 3.3V\_IMON at TIME. |
| 17 | CDH:5V\_IMON | Real | A | N/A | Scientific value of 5V\_IMON at TIME. |
| 18 | CDH:AGC\_TMP | Real | °C | N/A | Scientific value of AGC\_TMP at TIME. This value captures the temperature of the RF AGC board. |
| 19 | CDH:ARM1\_MON | Real | V | N/A | Scientific value of ARM1\_MON at TIME. |
| 20 | CDH:ARM2\_MON | Real | V | N/A | Scientific value of ARM2\_MON at TIME. |
| 21 | CDH:BA\_FIL\_EMIS | Real | V | N/A | Scientific value of BA\_FIL\_EMIS at TIME. |
| 22 | CDH:BA\_FIL\_IMON | Real | V | N/A | Scientific value of BA\_FIL\_IMON at TIME. |
| 23 | CDH:BA\_FIL\_VMON | Real | V | N/A | Scientific value of BA\_FIL\_VMON at TIME. |
| 24 | CDH:BA\_GRID\_IMON | Real | V | N/A | Scientific value of BA\_GRID\_IMON at TIME. |
| 25 | CDH:BA\_PRES | Real | V | N/A | Scientific value of BA\_PRES at TIME. |
| 26 | CDH:CDH\_+5VREF | Real | V | N/A | Scientific value of CDH\_+5VREF at TIME. |
| 27 | CDH:CDH\_-5VREF | Real | V | N/A | Scientific value of CDH\_-5VREF at TIME. |
| 28 | CDH:CDH\_2.5VMON | Real | V | N/A | Scientific value of CDH\_2.5VMON at TIME. |
| 29 | CDH:CDH\_3.3VMON | Real | V | N/A | Scientific value of CDH\_3.3VMON at TIME. |
| 30 | CDH:CDH\_TMP | Real | °C | N/A | Scientific value of CDH\_TMP at TIME. This value captures the temperature of the CDH board. |
| 31 | CDH:CS\_+13A\_MON | Real | V | N/A | Scientific value of CS\_+13A\_MON at TIME. |
| 32 | CDH:CS\_+5REF\_MON | Real | V | N/A | Scientific value of CS\_+5REF\_MON at TIME. |
| 33 | CDH:CS\_-5REF\_MON | Real | V | N/A | Scientific value of CS\_-5REF\_MON at TIME. |
| 34 | CDH:CS\_AN1\_MON | Real | V | N/A | Scientific value of CS\_AN1\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_AN1 electrode. |
| 35 | CDH:CS\_AN2\_MON | Real | V | N/A | Scientific value of CS\_AN2\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_AN2 electrode. |
| 36 | CDH:CS\_EA1\_MON | Real | V | N/A | Scientific value of CS\_EA1\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_EA1 electrode. |
| 37 | CDH:CS\_EA2\_MON | Real | V | N/A | Scientific value of CS\_EA2\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_EA2 electrode. |
| 38 | CDH:CS\_EF1A\_MON | Real | V | N/A | Scientific value of CS\_EF1A\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_EF1A electrode. |
| 39 | CDH:CS\_EF1B\_MON | Real | V | N/A | Scientific value of CS\_EF1B\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_EF1B electrode. |
| 40 | CDH:CS\_EF1C\_MON | Real | V | N/A | Scientific value of CS\_EF1C\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_EF1C electrode. |
| 41 | CDH:CS\_EF1D\_MON | Real | V | N/A | Scientific value of CS\_EF1D\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_EF1D electrode. |
| 42 | CDH:CS\_EF2A\_MON | Real | V | N/A | Scientific value of CS\_EF2A\_MON at TIME. This value captures the drive circuit input to control the voltage on the CS\_EF2A electrode. |
| 43 | CDH:CS\_EF2B\_MON | Real | V | N/A | Scientific value of CS\_EF2B\_MON at TIME. This value captures the drive circuit input to N/A control the voltage on the CS\_ EF2B electrode. |
| 44 | CDH:CS\_EF2C\_MON | Real | V | N/A | Scientific value of CS\_EF2C\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_EF2C electrode. |
| 45 | CDH:CS\_EF2D\_MON | Real | V | N/A | Scientific value of CS\_EF2D\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_EF2D electrode. |
| 46 | CDH:CS\_FIL1\_IMON | Real | V | N/A | Scientific value of CS\_FIL1\_IMON at TIME. This value captures CS\_FIL1 current. |
| 47 | CDH:CS\_FIL1\_VMON | Real | V | N/A | Scientific value of CS\_FIL1\_VMON at TIME. This value captures CS\_FIL1 voltage. |
| 48 | CDH:CS\_FIL2\_IMON | Real | V | N/A | Scientific value of CS\_FIL2\_IMON at TIME. This value captures CS\_FIL2 current. |
| 49 | CDH:CS\_FIL2\_VMON | Real | V | N/A | Scientific value of CS\_FIL2\_VMON at TIME. This value captures CS\_FIL2 voltage. |
| 50 | CDH:CS\_FIL\_EMON | Real | V | N/A | Scientific value of CS\_FIL\_EMON at TIME. This value captures the emission value on the active CS filament. |
| 51 | CDH:CS\_FIL\_SEL\_ST | Real | N/A | N/A | Scientific value of CS\_FIL\_SEL\_ST at TIME. |
| 52 | CDH:CS\_FS1\_MON | Real | V | N/A | Scientific value of CS\_FS1\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_FS1 electrode. |
| 53 | CDH:CS\_FS2\_MON | Real | V | N/A | Scientific value of CS\_FS2\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_FS2 electrode. |
| 54 | CDH:CS\_GND\_REF | Real | V | N/A | Scientific value of CS\_GND\_REF at TIME. |
| 55 | CDH:CS\_IA\_MON | Real | V | N/A | Scientific value of CS\_IA\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_IA electrode. |
| 56 | CDH:CS\_IFA\_MON | Real | V | N/A | Scientific value of CS\_IFA\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_IFA electrode. |
| 57 | CDH:CS\_IFB\_MON | Real | V | N/A | Scientific value of CS\_IFB\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_IFB electrode. |
| 58 | CDH:CS\_NZ\_MON | Real | V | N/A | Scientific value of CS\_NZ\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_NZ electrode. |
| 59 | CDH:CS\_RP\_MON | Real | V | N/A | Scientific value of CS\_RP\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_RP electrode. |
| 60 | CDH:CS\_RS\_MON | Real | V | N/A | Scientific value of CS\_RS\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the CS\_RS electrode. |
| 61 | CDH:CS\_SPARE | Real | N/A | N/A | Unused channel. |
| 62 | CDH:CS\_TMP | Real | °C | N/A | Scientific value of CS\_TMP at TIME. This value captures the temperature of the CS board. |
| 63 | CDH:CS\_TRAP\_MON | Real | V | N/A | Scientific value of CS\_TRAP\_MON at TIME. |
| 64 | CDH:CTL\_+13VMON | Real | V | N/A | Scientific value of CTL\_+13VMON at TIME. |
| 65 | CDH:CTL\_+2.5VMON | Real | V | N/A | Scientific value of CTL\_+2.5VMON at TIME. |
| 66 | CDH:CTL\_+3.3VMON | Real | V | N/A | Scientific value of CTL\_+3.3VMON at TIME. |
| 67 | CDH:CTL\_+4VMON | Real | V | N/A | Scientific value of CTL\_+4VMON at TIME. |
| 68 | CDH:CTL\_+5VMON | Real | V | N/A | Scientific value of CTL\_+5VMON at TIME. |
| 69 | CDH:CTL\_+5VREF | Real | V | N/A | Scientific value of CTL\_+5VREF at TIME. |
| 70 | CDH:CTL\_+6VMON | Real | V | N/A | Scientific value of CTL\_+6VMON at TIME. |
| 71 | CDH:CTL\_-13VMON | Real | V | N/A | Scientific value of CTL\_-13VMON at TIME. |
| 72 | CDH:CTL\_-5VREF | Real | V | N/A | Scientific value of CTL\_-5VREF at TIME. |
| 73 | CDH:CTL\_SPARE | Real | N/A | N/A | Unused channel. |
| 74 | CDH:CTL\_TMP | Real | °C | N/A | Scientific value of CTL\_TMP at TIME. This value captures the temperature of the CTL board. |
| 75 | CDH:DET\_TMP | Real | °C | N/A | Scientific value of DET\_TMP at TIME. This value captures the temperature of the DET board. |
| 76 | CDH:EM1\_IMON | Real | A | N/A | Scientific value of EM1\_IMON at TIME. This value captures the current drawn by Multiplier 1. |
| 77 | CDH:EM2\_IMON | Real | A | N/A | Scientific value of EM2\_IMON at TIME. This value captures the current drawn by Multiplier 2. |
| 78 | CDH:EXT\_THERM1 | Real | °C | N/A | Scientific value of EXT\_THERM1 at TIME. |
| 79 | CDH:EXT\_THERM2 | Real | °C | N/A | Scientific value of EXT\_THERM2 at TIME. |
| 80 | CDH:EXT\_THERM3 | Real | °C | N/A | Scientific value of EXT\_THERM3 at TIME. |
| 81 | CDH:FLASH\_VMON | Real | V | N/A | Scientific value of FLASH\_VMON at TIME. |
| 82 | CDH:IA\_L1\_MON | Real | V | N/A | Scientific value of IA\_L1\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the IA\_L1 electrode. |
| 83 | CDH:IA\_L2\_MON | Real | V | N/A | Scientific value of IA\_L2\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the IA\_L2 electrode. |
| 84 | CDH:IA\_L4A\_MON | Real | V | N/A | Scientific value of IA\_L4A\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the IA\_L4A electrode. |
| 85 | CDH:IA\_L4B\_MON | Real | V | N/A | Scientific value of IA\_L4B\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the IA\_L4B electrode. |
| 86 | CDH:IA\_L5\_MON | Real | V | N/A | Scientific value of IA\_L5\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the IA\_L5 electrode. |
| 87 | CDH:IA\_L6\_MON | Real | V | N/A | Scientific value of IA\_L6\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the IA\_L6 electrode. |
| 88 | CDH:IF\_+5REF\_MON | Real | V | N/A | Scientific value of IF\_+5REF\_MON at TIME. |
| 89 | CDH:IF\_-5REF\_MON | Real | V | N/A | Scientific value of IF\_-5REF\_MON at TIME. |
| 90 | CDH:IF\_GND\_REF | Real | V | N/A | Scientific value of IF\_GND\_REF at TIME. |
| 91 | CDH:IF\_TMP | Real | °C | N/A | Scientific value of IF\_TMP at TIME. This value captures the temperature of the IF board. |
| 92 | CDH:MT\_EZ\_MON | Real | V | N/A | Scientific value of MT\_EZ\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the MT\_EZ electrode. |
| 93 | CDH:MT\_FC\_MON | Real | V | N/A | Scientific value of MT\_FC\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the MT\_FC electrode. |
| 94 | CDH:MT\_MA1\_MON | Real | V | N/A | Scientific value of MT\_MA1\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the MT\_MA1 electrode. |
| 95 | CDH:MT\_MA2\_MON | Real | V | N/A | Scientific value of MT\_MA2\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the MT\_MA2 electrode. |
| 96 | CDH:MT\_WD\_MON | Real | V | N/A | Scientific value of MT\_WD\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the MT\_WD electrode. |
| 97 | CDH:MULTANA1 | Real | V | N/A | Scientific value of MULTANA1 at TIME. |
| 98 | CDH:MULTANA2 | Real | V | N/A | Scientific value of MULTANA2 at TIME. |
| 99 | CDH:OS\_+13A\_MON | Real | V | N/A | Scientific value of OS\_+13A\_MON at TIME. |
| 100 | CDH:OS\_+5REF\_MON | Real | V | N/A | Scientific value of OS\_+5REF\_MON at TIME. |
| 101 | CDH:OS\_-5REF\_MON | Real | V | N/A | Scientific value of OS\_-5REF\_MON at TIME. |
| 102 | CDH:OS\_COLA\_MON | Real | V | N/A | Scientific value of OS\_COLA\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_COLA electrode. |
| 103 | CDH:OS\_COLB\_MON | Real | V | N/A | Scientific value of OS\_COLB\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_COLB electrode. |
| 104 | CDH:OS\_EA1\_MON | Real | V | N/A | Scientific value of OS\_EA1\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EA1 electrode. |
| 105 | CDH:OS\_EA2\_MON | Real | V | N/A | Scientific value of OS\_EA2\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EA2 electrode. |
| 106 | CDH:OS\_EF1A\_MON | Real | V | N/A | Scientific value of OS\_EF1A\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF1A electrode. |
| 107 | CDH:OS\_EF1B\_MON | Real | V | N/A | Scientific value of OS\_EF1B\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF1B electrode. |
| 108 | CDH:OS\_EF1C\_MON | Real | V | N/A | Scientific value of OS\_EF1C\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF1C electrode. |
| 109 | CDH:OS\_EF1D\_MON | Real | V | N/A | Scientific value of OS\_EF1D\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF1D electrode. |
| 110 | CDH:OS\_EF2A\_MON | Real | V | N/A | Scientific value of OS\_EF2A\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF2A electrode. |
| 111 | CDH:OS\_EF2B\_MON | Real | V | N/A | Scientific value of OS\_EF2B\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF2B electrode. |
| 112 | CDH:OS\_EF2C\_MON | Real | V | N/A | Scientific value of OS\_EF2C\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF2C electrode. |
| 113 | CDH:OS\_EF2D\_MON | Real | V | N/A | Scientific value of OS\_EF2D\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_EF2D electrode. |
| 114 | CDH:OS\_FIL1\_IMON | Real | A | N/A | Scientific value of OS\_FIL1\_IMON at TIME. This value captures OS\_FIL1 current. |
| 115 | CDH:OS\_FIL1\_VMON | Real | V | N/A | Scientific value of OS\_FIL1\_VMON at TIME. This value captures OS\_FIL1 voltage. |
| 116 | CDH:OS\_FIL2\_IMON | Real | A | N/A | Scientific value of OS\_FIL2\_IMON at TIME. This value captures OS\_FIL2 current. |
| 117 | CDH:OS\_FIL2\_VMON | Real | V | N/A | Scientific value of OS\_FIL2\_VMON at TIME. This value captures OS\_FIL2 voltage. |
| 118 | CDH:OS\_FIL\_EMON | Real | A | N/A | Scientific value of OS\_FIL\_EMON at TIME. This value captures the emission value on the active OS filament. |
| 119 | CDH:OS\_FIL\_SEL\_ST | Real | N/A | N/A | Scientific value of OS\_FIL\_SEL\_ST at TIME. |
| 120 | CDH:OS\_FS1\_MON | Real | V | N/A | Scientific value of OS\_FS1\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_FS1 electrode. |
| 121 | CDH:OS\_FS2\_MON | Real | V | N/A | Scientific value of OS\_FS2\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_FS2 electrode. |
| 122 | CDH:OS\_GND\_REF | Real | V | N/A | Scientific value of OS\_GND\_REF at TIME. |
| 123 | CDH:OS\_OL1\_MON | Real | V | N/A | Scientific value of OS\_OL1\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_OL1 electrode. |
| 124 | CDH:OS\_OL2\_MON | Real | V | N/A | Scientific value of OS\_OL2\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_OL2 electrode. |
| 125 | CDH:OS\_OL3\_MON | Real | V | N/A | Scientific value of OS\_OL3\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_OL3 electrode. |
| 126 | CDH:OS\_OL4\_MON | Real | V | N/A | Scientific value of OS\_OL4\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_OL4 electrode. |
| 127 | CDH:OS\_OL5\_MON | Real | V | N/A | Scientific value of OS\_OL5\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_OL5 electrode. |
| 128 | CDH:OS\_OL6\_MON | Real | V | N/A | Scientific value of OS\_OL6\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_OL6 electrode. |
| 129 | CDH:OS\_RES1\_MON | Real | V | N/A | Scientific value of OS\_RES1\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_RES1 electrode. |
| 130 | CDH:OS\_RES2\_MON | Real | V | N/A | Scientific value of OS\_RES2\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the OS\_RES2 electrode. |
| 131 | CDH:OS\_SPARE | Real | N/A | N/A | Unused channel. |
| 132 | CDH:OS\_TMP | Real | °C | N/A | Scientific value of OS\_TMP at TIME. This value captures the temperature of the OS board. |
| 133 | CDH:OS\_TRAP\_MON | Real | V | N/A | Scientific value of OS\_TRAP\_MON at TIME. |
| 134 | CDH:PS\_IMON | Real | A | N/A | Scientific value of PS\_IMON at TIME. |
| 135 | CDH:PS\_IMON\_2 | Real | A | N/A | Scientific value of PS\_IMON\_2 at TIME. |
| 136 | CDH:PS\_TMP | Real | °C | N/A | Scientific value of PS\_TMP at TIME. This value captures the temperature of the PS board. |
| 137 | CDH:PYRO1\_MON | Real | V | N/A | Scientific value of PYRO1\_MON at TIME. |
| 138 | CDH:PYRO2\_MON | Real | V | N/A | Scientific value of PYRO2\_MON at TIME. |
| 139 | CDH:PulseCounter | Real | Hz | N/A | Scientific value of PulseCounter at TIME. This value captures the number of counts detected with active multiplier during the duration of the integration period. |
| 140 | CDH:QD\_BS\_MON | Real | V | N/A | Scientific value of QD\_BS\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the QD\_BS electrode. |
| 141 | CDH:RF\_AGC\_MON | Real | V | N/A | Scientific value of RF\_AGC\_MON at TIME. |
| 142 | CDH:RF\_Cntr | Real | KHz | N/A | Scientific value of RF\_Cntr at TIME. This value captures the current RF frequency. |
| 143 | CDH:RF\_TMP | Real | °C | N/A | Scientific value of RF\_TMP at TIM. This value captures the temperature of the RF board. |
| 144 | CDH:SL\_BB\_MON | Real | V | N/A | Scientific value of SL\_BB\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the SL\_BB electrode. |
| 145 | CDH:SL\_BF\_MON | Real | V | N/A | Scientific value of SL\_BF\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the SL\_BF electrode. |
| 146 | CDH:SL\_EL\_MON | Real | V | N/A | Scientific value of SL\_EL\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the SL\_EL electrode. |
| 147 | CDH:SL\_TB\_MON | Real | V | N/A | Scientific value of SL\_TB\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the SL\_TB electrode. |
| 148 | CDH:SL\_TF\_MON | Real | V | N/A | Scientific value of SL\_TF\_MON at TIME. This value captures the drive circuit input needed to control the voltage on the SL\_TF electrode. |
| 149 | CDH:SPARE\_0 | Real | N/A | N/A | Unused channel. |
| 150 | CDH:SPARE\_1 | Real | N/A | N/A | Unused channel. |
| 151 | CDH:SPARE\_2 | Real | N/A | N/A | Unused channel. |
| 152 | CDH:SPARE\_3 | Real | N/A | N/A | Unused channel. |
| 153 | CDH:SPARE\_4 | Real | N/A | N/A | Unused channel. |
| 154 | CDH:SPARE\_5 | Real | N/A | N/A | Unused channel. |
| 155 | CDH:SPARE\_6 | Real | N/A | N/A | Unused channel. |
| 156 | CDH:THERM\_COM | Real | N/A | N/A | Scientific value of THERM\_COM at TIME. |
| 157 | FSW:ALARM\_LEVEL | Real | N/A | N/A | Scientific value of ALARM\_LEVEL at TIME. |
| 158 | FSW:ALARM\_STAT | Real | N/A | N/A | Scientific value of ALARM\_STAT at TIME. |
| 159 | FSW:BAD\_CMD\_ERR | Real | N/A | N/A | Scientific value of BAD\_CMD\_ERR at TIME. |
| 160 | FSW:BAD\_CMD\_OP | Real | N/A | N/A | Scientific value of BAD\_CMD\_OP at TIME. |
| 161 | FSW:CODE\_CSUM | Real | N/A | N/A | Scientific value of CODE\_CSUM at TIME. |
| 162 | FSW:DWELL\_MON\_ADDR | Real | N/A | N/A | Scientific value of DWELL\_MON\_ADDR at TIME. |
| 163 | FSW:DWELL\_MON\_VAL | Real | N/A | N/A | Scientific value of DWELL\_MON\_VAL at TIME. |
| 164 | FSW:FSW\_VER | Real | N/A | N/A | Scientific value of FSW\_VER at TIME. |
| 165 | FSW:INST\_MODE | Real | N/A | N/A | Scientific value of INST\_MODE at TIME. |
| 166 | FSW:LARGEST\_FREE\_BLOCK | Real | N/A | N/A | Scientific value of LARGEST\_FREE\_BLOCK at TIME. |
| 167 | FSW:LAST\_CMD | Real | N/A | N/A | Scientific value of LAST\_CMD at TIME. |
| 168 | FSW:LAST\_FILE\_ID | Real | N/A | N/A | Scientific value of LAST\_FILE\_ID at TIME. |
| 169 | FSW:LAST\_MARKER | Real | N/A | N/A | Scientific value of LAST\_MARKER at TIME. |
| 170 | FSW:LAST\_RESET | Real | N/A | N/A | Scientific value of LAST\_RESET at TIME. |
| 171 | FSW:LIB\_CSUM | Real | N/A | N/A | Scientific value of LIB\_CSUM at TIME. |
| 172 | FSW:LIB\_VER | Real | N/A | N/A | Scientific value of LIB\_VER at TIME. |
| 173 | FSW:LOAD\_TYPE | Real | N/A | N/A | Scientific value of LOAD\_TYPE at TIME. |
| 174 | FSW:MEM\_ALLOC | Real | N/A | N/A | Scientific value of MEM\_ALLOC at TIME. |
| 175 | FSW:MEM\_FREE | Real | N/A | N/A | Scientific value of MEM\_FREE at TIME. |
| 176 | FSW:N\_ALARMS | Real | N/A | N/A | Scientific value of N\_ALARMS at TIME. |
| 177 | FSW:N\_ALARM\_ACTIVE | Real | N/A | N/A | Scientific value of N\_ALARM\_ACTIVE at TIME. |
| 178 | FSW:N\_ALARM\_ENAB | Real | N/A | N/A | Scientific value of N\_ALARM\_ENAB at TIME. |
| 179 | FSW:N\_ALLOCS | Real | N/A | N/A | Scientific value of N\_ALLOCS at TIME. |
| 180 | FSW:N\_CMDS | Real | N/A | N/A | Scientific value of N\_CMDS at TIME. |
| 181 | FSW:N\_CMD\_ERRS | Real | N/A | N/A | Scientific value of N\_CMD\_ERRS at TIME. |
| 182 | FSW:N\_FREES | Real | N/A | N/A | Scientific value of N\_FREES at TIME. |
| 183 | FSW:PKT\_REV | Real | N/A | N/A | Scientific value of PKT\_REV at TIME. |
| 184 | FSW:POWER\_STAT | Real | N/A | N/A | Scientific value of POWER\_STAT at TIME. |
| 185 | FSW:SCRIPT\_CSUM | Real | N/A | N/A | Scientific value of SCRIPT\_CSUM at TIME. |
| 186 | FSW:SCRIPT\_ID | Real | N/A | N/A | Scientific value of SCRIPT\_ID at TIME. |
| 187 | FSW:SCRIPT\_MODE | Real | N/A | N/A | Scientific value of SCRIPT\_MODE at TIME. |
| 188 | FSW:SCRIPT\_VER | Real | N/A | N/A | Scientific value of SCRIPT\_VER at TIME. |
| 189 | FSW:SIDE\_A | Real | N/A | N/A | Scientific value of SIDE\_A at TIME. |
| 190 | FSW:TELEM\_MODE | Real | N/A | N/A | Scientific value of TELEM\_MODE at TIME. |
| 191 | FSW:ZONE\_ALERT | Real | N/A | N/A | Scientific value of ZONE\_ALERT at TIME. |
| 192 | QMS:ADC\_STATUS | Integer | N/A | N/A | Scientific value of ADC\_STATUS at TIME. |
| 193 | QMS:AMUX1 | Integer | N/A | N/A | Scientific value of AMUX1 at TIME. |
| 194 | QMS:AMUX2 | Integer | N/A | N/A | Scientific value of AMUX2 at TIME. |
| 195 | QMS:AMUX\_ADDR1 | Integer | N/A | N/A | Scientific value of AMUX\_ADDR1 at TIME. |
| 196 | QMS:AMUX\_ADDR2 | Integer | N/A | N/A | Scientific value of AMUX\_ADDR2 at TIME. |
| 197 | QMS:AMUX\_ADDR3 | Integer | N/A | N/A | Scientific value of AMUX\_ADDR3 at TIME. |
| 198 | QMS:AMUX\_ADDR4 | Integer | N/A | N/A | Scientific value of AMUX\_ADDR4 at TIME. |
| 199 | QMS:BA\_FIL\_VCTL | Real | N/A | N/A | Scientific value of BA\_FIL\_VCTL at TIME. |
| 200 | QMS:COUNT1 | Integer | N/A | NA | Scientific value of COUNT1 at TIME. This value captures the number of counts detected with multiplier 1 during the duration of the integration period. |
| 201 | QMS:COUNT2 | Integer | N/A | NA | Scientific value of COUNT2 at TIME. This value captures the number of counts detected with multiplier 2 during the duration of the integration period. |
| 202 | QMS:CS\_AN1\_VCTL | Real | V | N/A | Scientific value of CS\_AN1\_VCTL at TIME. This value captures the DAC setting for the CS\_AN1 electrode. |
| 203 | QMS:CS\_AN2\_VCTL | Real | V | N/A | Scientific value of CS\_AN2\_VCTL at TIME. This value captures the DAC setting for the CS\_AN2 electrode. |
| 204 | QMS:CS\_EA1\_VCTL | Real | V | N/A | Scientific value of CS\_EA1\_VCTL at TIME. This value captures the DAC setting for the CS\_EA1 electrode. |
| 205 | QMS:CS\_EA2\_VCTL | Real | V | N/A | Scientific value of CS\_EA2\_VCTL at TIME. This value captures the DAC setting for the CS\_EA2 electrode. |
| 206 | QMS:CS\_EF1A\_VCTL | Real | V | N/A | Scientific value of CS\_EF1A\_VCTL at TIME. This value captures the DAC setting for the CS\_EF1A electrode. |
| 207 | QMS:CS\_EF1B\_VCTL | Real | V | N/A | Scientific value of CS\_EF1B\_VCTL at TIME. This value captures the DAC setting for the CS\_EF1B electrode. |
| 208 | QMS:CS\_EF1C\_VCTL | Real | V | N/A | Scientific value of CS\_EF1C\_VCTL at TIME. This value captures the DAC setting for the CS\_EF1C electrode. |
| 209 | QMS:CS\_EF1D\_VCTL | Real | V | N/A | Scientific value of CS\_EF1D\_VCTL at TIME. This value captures the DAC setting for the CS\_EF1D electrode. |
| 210 | QMS:CS\_EF2A\_VCTL | Real | V | N/A | Scientific value of CS\_EF2A\_VCTL at TIME. This value captures the DAC setting for the CS\_EF2A electrode. |
| 211 | QMS:CS\_EF2B\_VCTL | Real | V | N/A | Scientific value of CS\_EF2B\_VCTL at TIME. This value captures the DAC setting for the CS\_EF2B electrode. |
| 212 | QMS:CS\_EF2C\_VCTL | Real | V | N/A | Scientific value of CS\_EF2C\_VCTL at TIME. This value captures the DAC setting for the CS\_EF2C electrode. |
| 213 | QMS:CS\_EF2D\_VCTL | Real | V | N/A | Scientific value of CS\_EF2D\_VCTL at TIME. This value captures the DAC setting for the CS\_EF2D electrode. |
| 214 | QMS:CS\_FIL1\_ECTL | Real | A | N/A | Scientific value of CS\_FIL1\_ECTL at TIME. This value captures the DAC setting for the CS\_FIL1 electrode. |
| 215 | QMS:CS\_FIL1\_VCTL | Real | V | N/A | Scientific value of CS\_FIL1\_VCTL at TIME. This value captures the DAC setting for the CS\_FIL1 electrode. |
| 216 | QMS:CS\_FIL2\_ECTL | Real | A | N/A | Scientific value of CS\_FIL2\_ECTL at TIME. This value captures the DAC setting for the CS\_FIL2 electrode. |
| 217 | QMS:CS\_FIL2\_VCTL | Real | V | N/A | Scientific value of CS\_FIL2\_VCTL at TIME. This value captures the DAC setting for the CS\_FIL2 electrode. |
| 218 | QMS:CS\_FS1\_VCTL | Real | V | N/A | Scientific value of CS\_FS1\_VCTL at TIME. This value captures the DAC setting for the CS\_FS1 electrode. |
| 219 | QMS:CS\_FS2\_VCTL | Real | V | N/A | Scientific value of CS\_FS2\_VCTL at TIME. This value captures the DAC setting for the CS\_FS2 electrode. |
| 220 | QMS:CS\_IA\_VCTL | Real | V | N/A | Scientific value of CS\_IA\_VCTL at TIME. This value captures the DAC setting for the CS\_IA electrode. |
| 221 | QMS:CS\_IFA\_VCTL | Real | V | N/A | Scientific value of CS\_IFA\_VCTL at TIME. This value captures the DAC setting for the CS\_IFA electrode. |
| 222 | QMS:CS\_IFB\_VCTL | Real | V | N/A | Scientific value of CS\_IFB\_VCTL at TIME. This value captures the DAC setting for the CS\_IFB electrode. |
| 223 | QMS:CS\_NZ\_VCTL | Real | V | N/A | Scientific value of CS\_NZ\_VCTL at TIME. This value captures the DAC setting for the CS\_NZ electrode. |
| 224 | QMS:CS\_RP\_VCTL | Real | V | N/A | Scientific value of CS\_RP\_VCTL at TIME. This value captures the DAC setting for the CS\_RP electrode. |
| 225 | QMS:CS\_RS\_VCTL | Real | V | N/A | Scientific value of CS\_RS\_VCTL at TIME. This value captures the DAC setting for the CS\_RS electrode. |
| 226 | QMS:CTL\_DIGITAL\_STATUS | Integer | N/A | N/A | Scientific value of CTL\_DIGITAL\_STATUS at TIME. |
| 227 | QMS:CTL\_ERROR\_COUNT | Integer | N/A | N/A | Scientific value of CTL\_ERROR\_COUNT at TIME. |
| 228 | QMS:CTL\_PACKET\_COUNT | Integer | N/A | N/A | Scientific value of CTL\_PACKET\_COUNT at TIME. |
| 229 | QMS:CTL\_SYNC\_CODE | Integer | N/A | N/A | Scientific value of CTL\_SYNC\_CODE at TIME. |
| 230 | QMS:DAC12BSPARE1 | Real | N/A | N/A | Unused channel. |
| 231 | QMS:DAC12BSPARE2 | Real | N/A | N/A | Unused channel. |
| 232 | QMS:DAC12BSPARE3 | Real | N/A | N/A | Unused channel. |
| 233 | QMS:DAC12USPARE1 | Real | N/A | N/A | Unused channel. |
| 234 | QMS:DAC12USPARE2 | Real | N/A | N/A | Unused channel. |
| 235 | QMS:DAC16BSPARE1 | Real | N/A | N/A | Unused channel. |
| 236 | QMS:DAC16BSPARE2 | Real | N/A | N/A | Unused channel. |
| 237 | QMS:DAC8B\_SPARE1 | Real | N/A | N/A | Unused channel. |
| 238 | QMS:DAC8B\_SPARE2 | Real | N/A | N/A | Unused channel. |
| 239 | QMS:DAC8B\_SPARE3 | Real | N/A | N/A | Unused channel. |
| 240 | QMS:DAC\_SPARE | Real | N/A | N/A | Unused channel. |
| 241 | QMS:DT1\_VCTL | Real | N/A | N/A | Scientific value of DT1\_VCTL at TIME. This value captures the DAC setting for the DET1 discriminator. |
| 242 | QMS:DT2\_VCTL | Real | N/A | N/A | Scientific value of DT2\_VCTL at TIME. This value captures the DAC setting for the DET1 discriminator. |
| 243 | QMS:FIL\_ON\_CTRL | Real | N/A | N/A | Scientific value of FIL\_ON\_CTRL at TIME. |
| 244 | QMS:FIL\_SELECT | Integer | N/A | N/A | Scientific value of FIL\_SELECT at TIME. |
| 245 | QMS:IA\_L1\_VCTL | Real | V | N/A | Scientific value of IA\_L1\_VCTL at TIME. This value captures the DAC setting for the IA\_L1 electrode. |
| 246 | QMS:IA\_L2\_VCTL | Real | V | N/A | Scientific value of IA\_L2\_VCTL at TIME. This value captures the DAC setting for the IA\_L2 electrode. |
| 247 | QMS:IA\_L4A\_VCTL | Real | V | N/A | Scientific value of IA\_L4A\_VCTL at TIME. This value captures the DAC setting for the IA\_L4A electrode. |
| 248 | QMS:IA\_L4B\_VCTL | Real | V | N/A | Scientific value of IA\_L4B\_VCTL at TIME. This value captures the DAC setting for the IA\_L4B electrode. |
| 249 | QMS:IA\_L5\_VCTL | Real | V | N/A | Scientific value of IA\_L5\_VCTL at TIME. This value captures the DAC setting for the IA\_L5 electrode. |
| 250 | QMS:IA\_L6\_VCTL | Real | V | N/A | Scientific value of IA\_L6\_VCTL at TIME. This value captures the DAC setting for the IA\_L6 electrode. |
| 251 | QMS:IP\_COUNT | Real | ms | N/A | Scientific value of IP\_COUNT at TIME. This value captures the current integration period (IP) duration. |
| 252 | QMS:IP\_SETUP | Real | ms | N/A | Scientific value of IP\_SETUP at TIME. This value captures the current settling period duration. |
| 253 | QMS:MT\_EZ\_VCTL | Real | V | N/A | Scientific value of MT\_EZ\_VCTL at TIME. This value captures the DAC setting for the MT\_EZ electrode. |
| 254 | QMS:MT\_FC\_VCTL | Real | V | N/A | Scientific value of MT\_FC\_VCTL at TIME. This value captures the DAC setting for the MT\_FC electrode. |
| 255 | QMS:MT\_MA1\_VCTL | Real | V | N/A | Scientific value of MT\_MA1\_VCTL at TIME. This value captures the DAC setting for the MT\_MA1 electrode. |
| 256 | QMS:MT\_MA2\_VCTL | Real | V | N/A | Scientific value of MT\_MA2\_VCTL at TIME. This value captures the DAC setting for the MT\_MA2 electrode. |
| 257 | QMS:MT\_MU1\_VCTL | Real | V | N/A | Scientific value of MT\_MU1\_VCTL at TIME. This value captures the DAC setting for the MT\_MU1 electrode. |
| 258 | QMS:MT\_MU2\_VCTL | Real | V | N/A | Scientific value of MT\_MU2\_VCTL at TIME. This value captures the DAC setting for the MT\_MU2 electrode. |
| 259 | QMS:MT\_WD\_VCTL | Real | V | N/A | Scientific value of MT\_WD\_VCTL at TIME. This value captures the DAC setting for the MT\_WD electrode. |
| 260 | QMS:OS\_COLA\_VCTL | Real | V | N/A | Scientific value of OS\_COLA\_VCTL at TIME. This value captures the DAC setting for the OS\_COLA electrode. |
| 261 | QMS:OS\_COLB\_VCTL | Real | V | N/A | Scientific value of OS\_COLB\_VCTL at TIME. This value captures the DAC setting for the OS\_COLB electrode. |
| 262 | QMS:OS\_EA1\_VCTL | Real | V | N/A | Scientific value of OS\_EA1\_VCTL at TIME. This value captures the DAC setting for the OS\_EA1 electrode. |
| 263 | QMS:OS\_EA2\_VCTL | Real | V | N/A | Scientific value of OS\_EA2\_VCTL at TIME. This value captures the DAC setting for the OS\_EA2 electrode. |
| 264 | QMS:OS\_EF1A\_VCTL | Real | V | N/A | Scientific value of OS\_EF1A\_VCTL at TIME. This value captures the DAC setting for the OS\_EF1A electrode. |
| 265 | QMS:OS\_EF1B\_VCTL | Real | V | N/A | Scientific value of OS\_EF1B\_VCTL at TIME. This value captures the DAC setting for the OS\_EF1B electrode. |
| 266 | QMS:OS\_EF1C\_VCTL | Real | V | N/A | Scientific value of OS\_EF1C\_VCTL at TIME. This value captures the DAC setting for the OS\_EF1C electrode. |
| 267 | QMS:OS\_EF1D\_VCTL | Real | V | N/A | Scientific value of OS\_EF1D\_VCTL at TIME. This value captures the DAC setting for the OS\_EF1D electrode. |
| 268 | QMS:OS\_EF2A\_VCTL | Real | V | N/A | Scientific value of OS\_EF2A\_VCTL at TIME. This value captures the DAC setting for the OS\_EF2A electrode. |
| 269 | QMS:OS\_EF2B\_VCTL | Real | V | N/A | Scientific value of OS\_EF2B\_VCTL at TIME. This value captures the DAC setting for the OS\_EF2B electrode. |
| 270 | QMS:OS\_EF2C\_VCTL | Real | V | N/A | Scientific value of OS\_EF2C\_VCTL at TIME. This value captures the DAC setting for the OS\_EF2C electrode. |
| 271 | QMS:OS\_EF2D\_VCTL | Real | V | N/A | Scientific value of OS\_EF2D\_VCTL at TIME. This value captures the DAC setting for the OS\_EF2D electrode. |
| 272 | QMS:OS\_FIL1\_ECTL | Real | A | N/A | Scientific value of OS\_FIL1\_ECTL at TIME. This value captures the DAC setting for the OS\_FIL1 emission control. |
| 273 | QMS:OS\_FIL1\_VCTL | Real | V | N/A | Scientific value of OS\_FIL1\_VCTL at TIME. This value captures the DAC setting for the OS\_FIL1 electrode. |
| 274 | QMS:OS\_FIL2\_ECTL | Real | A | N/A | Scientific value of OS\_FIL2\_ECTL at TIME. This value captures the DAC setting for the OS\_FIL2 emission control. |
| 275 | QMS:OS\_FIL2\_VCTL | Real | V | N/A | Scientific value of OS\_FIL2\_VCTL at TIME. This value captures the DAC setting for the OS\_FIL2 electrode. |
| 276 | QMS:OS\_FS1\_VCTL | Real | V | N/A | Scientific value of OS\_FS1\_VCTL at TIME. This value captures the DAC setting for the OS\_FS1 electrode. |
| 277 | QMS:OS\_FS2\_VCTL | Real | V | N/A | Scientific value of OS\_FS2\_VCTL at TIME. This value captures the DAC setting for the OS\_FS2 electrode. |
| 278 | QMS:OS\_OL1\_VCTL | Real | V | N/A | Scientific value of OS\_OL1\_VCTL at TIME. This value captures the DAC setting for the OS\_OL1 electrode. |
| 279 | QMS:OS\_OL2\_VCTL | Real | V | N/A | Scientific value of OS\_OL2\_VCTL at TIME. This value captures the DAC setting for the OS\_OL2 electrode. |
| 280 | QMS:OS\_OL3\_VCTL | Real | V | N/A | Scientific value of OS\_OL3\_VCTL at TIME. This value captures the DAC setting for the OS\_OL3 electrode. |
| 281 | QMS:OS\_OL4\_VCTL | Real | V | N/A | Scientific value of OS\_OL4\_VCTL at TIME. This value captures the DAC setting for the OS\_OL4 electrode. |
| 282 | QMS:OS\_OL5\_VCTL | Real | V | N/A | Scientific value of OS\_OL5\_VCTL at TIME. This value captures the DAC setting for the OS\_OL5 electrode. |
| 283 | QMS:OS\_OL6\_VCTL | Real | V | N/A | Scientific value of OS\_OL6\_VCTL at TIME. This value captures the DAC setting for the OS\_OL6 electrode. |
| 284 | QMS:OS\_RES1\_VCTL | Real | V | N/A | Scientific value of OS\_RES1\_VCTL at TIME. This value captures the DAC setting for the OS\_RES1 electrode. |
| 285 | QMS:OS\_RES2\_VCTL | Real | V | N/A | Scientific value of OS\_RES2\_VCTL at TIME. This value captures the DAC setting for the OS\_RES2 electrode. |
| 286 | QMS:QB\_VCTL | Real | V | N/A | Scientific value of QB\_VCTL at TIME. |
| 287 | QMS:QD\_BS\_VCTL | Real | V | N/A | Scientific value of QD\_BS\_VCTL at TIME. This value captures the DAC setting for the QD\_BS electrode. |
| 288 | QMS:RF\_FREQ | Real | N/A | N/A | Scientific value of RF\_FREQ at TIME. |
| 289 | QMS:RF\_FREQ\_SET | Integer | N/A | N/A | Scientific value of RF\_FREQ\_SET at TIME. |
| 290 | QMS:RODAC\_CTRL | Real | V | N/A | Scientific value of RODAC\_CTRL at TIME. This value captures the DAC setting for the RF AC amplitude. |
| 291 | QMS:RODDC\_CTL | Real | V | N/A | Scientific value of RODDC\_CTL at TIME. This value captures the DAC setting for the RF DC amplitude. |
| 292 | QMS:SERIAL\_NUM | Integer | N/A | N/A | Scientific value of SERIAL\_NUM at TIME. |
| 293 | QMS:SERIAL\_NUM\_SET | Integer | N/A | N/A | Scientific value of SERIAL\_NUM\_SET at TIME. |
| 294 | QMS:SL\_BB\_VCTL | Real | V | N/A | Scientific value of SL\_BB\_VCTL at TIME. This value captures the DAC setting for the SL\_BB electrode. |
| 295 | QMS:SL\_BF\_VCTL | Real | V | N/A | Scientific value of SL\_BF\_VCTL at TIME. This value captures the DAC setting for the SL\_BF electrode. |
| 296 | QMS:SL\_EL\_VCTL | Real | V | N/A | Scientific value of SL\_EL\_VCTL at TIME. This value captures the DAC setting for the SL\_EL electrode. |
| 297 | QMS:SL\_TB\_VCTL | Real | V | N/A | Scientific value of SL\_TB\_VCTL at TIME. This value captures the DAC setting for the SL\_TB electrode. |
| 298 | QMS:SL\_TF\_VCTL | Real | V | N/A | Scientific value of SL\_TF\_VCTL at TIME. This value captures the DAC setting for the SL\_TF electrode. |
| 299 | QMS:SYNC\_CODE | Integer | N/A | N/A | Scientific value of SYNC\_CODE at TIME. |
| 300 | QMS:WAIT | Integer | N/A | N/A | Scientific value of WAIT at TIME. |
| 301 | TM:TMMarker | Real | N/A | N/A | Scientific value of TMMarker at TIME. This value captures the Marker ID of the current data point. Markers are tag numbers given to related set of measurements. |
| 302 | TM:TMMarkerText | Text | N/A | N/A | Scientific value of TMMarkerText at TIME. This value captures the current Marker description. |
| 303 | TM:TMSync | Real | N/A | N/A | Scientific value of TMSync at TIME. |
| 304 | TM:TMSystemID | Real | N/A | N/A | Scientific value of TMSystemID at TIME. |
| 305 | TM:TMTick | Real | N/A | N/A | Scientific value of TMTick at TIME. |

# Calibrated science data table

This table contains the calibrated science packets values generated while the instrument is in a science telemetry mode.

Table A-6: Definition of the raw science data table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Name** | **Format** | **Units** | **Range** | **Description** |
| 1 | TIME. | Real | s | N/A | SCLK timestamp of any corresponding observed value. |
| 2 | MKID | Integer | N/A | N/A | Marker ID of the current data point. Markers are tag numbers given to related set of measurements. |
| 3 | IP | Real | s | N/A | Scientific value of IP at TIME. This value captures the current integration period (IP) duration. |
| 4 | TUNING | Integer | N/A | N/A | Engineering value of TUNING at TIME. This value captures the current focusing scheme of the sensor. |
| 5 | MASS | Real | M/Z | 0 – 150 | Scientific value of MASS at TIME. This value captures the current measured mass value. |
| 6 | COUNTS\_PER\_SECOND | Real | Hz | N/A | Scientific value of COUNTS\_PER\_SECOND at TIME. This value captures the number of counts per second detected with the active multiplier during the duration of the integration period. |
| 7 | DAC\_ID | Integer | N/A | N/A | Engineering value of DAC\_ID at TIME. This value captures the ID of DAC used during electrode voltage scan (See Table A-2). |
| 8 | DAC\_VOLTAGE | Real | V | N/A | Scientific value of DAC\_VOLTAGE at TIME. This value captures the voltage setting of the DAC\_ID electrode during its voltage scan. |

# Time-corrected message log

The time-corrected message log is an ASCII file identical to the raw message log but with time-corrected stamps (in seconds).

# Species abundance table

This table contains the derived abundances for the primary species measured by the NMS instrument. Abundances will be only reported for species that exhibit a sufficient SNR for the data set.

Table A-7: Definition of species abundance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Name** | **Format** | **Units** | **Range** | **Description** |
| 1 | TIME. | Real | s | N/A | SCLK timestamp of any corresponding observed value. |
| 2 | SC\_ALTITUDE | Real | Km | N/A | Spacecraft altitude at TIME |
| 3 | LOCAL\_TIME | Real | Deg | 0 – 360 | Solar Zenith Angle at the spacecraft location |
| 4 | MASS\_002 | Real | /cc | N/A | Abundance of species with mass per charge = 2 (Possibly reflected solar wind H, combined on QMS surfaces). |
| 5 | MASS\_004 | Real | /cc | N/A | Abundance of species with mass per charge = 4 (Helium). |
| 6 | MASS\_012 | Real | /cc | N/A | Abundance of species with mass per charge = 12 (fragment of CH4, CO, CO2). |
| 7 | MASS\_015 | Real | /cc | N/A | Abundance of species with mass per charge = 15 (CH3 fragment of CH4). |
| 8 | MASS\_016 | Real | /cc | N/A | Abundance of species with mass per charge = 16 (CH4 and O fragment). |
| 9 | MASS\_017 | Real | /cc | N/A | Abundance of species with mass per charge = 17 (OH fragment of H2O). |
| 10 | MASS\_018 | Real | /cc | N/A | Abundance of species with mass per charge = 18 (H2O). |
| 11 | MASS\_020 | Real | /cc | N/A | Abundance of species with mass per charge = 20 (Ne and Ar-402+). |
| 12 | MASS\_028 | Real | /cc | N/A | Abundance of species with mass per charge = 28 (N2 and CO) |
| 13 | MASS\_032 | Real | /cc | N/A | Abundance of species with mass per charge = 32 (O2 possibly reflected solar wind O, combined on QMS surfaces). |
| 14 | MASS\_036 | Real | /cc | N/A | Abundance of species with mass per charge = 36 (Ar-36). |
| 15 | MASS\_040 | Real | /cc | N/A | Abundance of species with mass per charge = 40 (Ar-40). |
| 16 | MASS\_044 | Real | /cc | N/A | Abundance of species with mass per charge = 44 (CO2). |