

HPDE.io

Data Access

- [FTPS from the MMS SDC \(not with most browsers\)](#)
- [HTTPS from the MMS SDC](#)
- [FTPS from SPDF \(not with most browsers\)](#)
- [HTTPS from SPDF](#)
- [CDAWeb](#)
- [HAPI: CDAWeb HAPI Server](#)

MMS 1 Hot Plasma Composition Analyzer (HPCA) Ions, Level 2 (L2), Burst Mode, 0.625 s Data

Fuselier, S.A., Young, D.T., Gomez, R.G., and Burch, J.L. (2022). MMS 1 Hot Plasma Composition Analyzer (HPCA) Ions, Level 2 (L2), Burst Mode, 0.625 s Data [Data set]. NASA Space Physics Data Facility.

<https://doi.org/10.48322/ek80-vc69>. Accessed on 2023-April-5.

ResourceID

spase://NASA/NumericalData/MMS/1/HotPlasmaCompositionAnalyzer/Burst/Level2/Ion/PT0.625!

Description

Hot Plasma Composition Analyzer (HPCA) Ions, Level 2, Burst Survey, 0.625 s Data. The MMS HPCA instruments measure the energy and composition of magnetospheric plasmas in the energy range from 1 eV to 40 keV. An electrostatic energy analyzer (ESA) that is optically coupled to a carbon-foil based Time-of-Flight (TOF) section comprises each HPCA. The basic HPCA data product is an array of counts for 5 ion species, at 63 energies, for each of 16 elevation anodes. Sixteen basic products, also called azimuths, are acquired every 0.625 s; half a spacecraft spin period nominally has 16 azimuths. The five ion species are protons (H+), alpha particles (He++), helium ions (He+), singly charged Oxygen (O+), and background counts.

Details

[View XML](#) | [View JSON](#) | [Edit](#)

Version:2.5.0

NumericalData**ResourceID**

spase://NASA/NumericalData/MMS/1/HotPlasmaCompositionAnalyzer/Burst/Level2/Ion/PT0.625S

ResourceHeader**ResourceName**

MMS 1 Hot Plasma Composition Analyzer (HPCA) Ions, Level 2 (L2), Burst Mode, 0.625 s Data

AlternateName

MMS1_HPCA_BRST_L2_ION

DOI

<https://doi.org/10.48322/ek80-vc69>

ReleaseDate

2023-03-04 12:34:56.789

RevisionHistory**RevisionEvent****ReleaseDate**

2021-04-27 15:38:11

Note

Only known prior ReleaseDate of the metadata

RevisionEvent**ReleaseDate**

2022-08-04 12:34:56.789

Note

Added DOI and PublicationInfo minted by LFB, updated the RepositoryID, updated the SPDF MetadataContact Person to Robert M. Candey, metadata updated to SPASE 2.4.1, reviewed by LFB 20220803

RevisionEvent**ReleaseDate**

2023-03-04 12:34:56.789

Note

Standardized the ResourceName Format, Set AlternateName equal to the ProductKey, Revised the Acknowledgement, PublicationInfo Authors, and Contact Person list per request of the MMS HPCA team, metadata updated to SPASE 2.5.0, reviewed by LFB 20230304

Description

Hot Plasma Composition Analyzer (HPCA) Ions, Level 2, Burst Survey, 0.625 s Data. The MMS HPCA instruments measure the energy and composition of magnetospheric plasmas in the energy range from 1 eV to 40 keV. An electrostatic energy analyzer (ESA) that is optically coupled to a carbon-foil based Time-of-Flight (TOF) section comprises each HPCA. The basic HPCA data product is an array of counts for 5 ion species, at 63 energies, for each of 16 elevation anodes. Sixteen basic products, also called azimuths, are acquired every 0.625 s; half a spacecraft spin period nominally has 16 azimuths. The five ion species are protons (H+), alpha particles (He++), helium ions (He+), singly charged Oxygen (O+), and background counts.

Acknowledgement

Please acknowledge S.A. Fuselier, D.T. Young, R.G. Gomez, and J.L. Burch for use of these data

PublicationInfo

Authors

Fuselier, Stephen, A.; Young, David, T.; Gomez, Roman, G.; Burch, James, L.

PublicationDate

2022-01-01 00:00:00

PublishedBy

NASA Space Physics Data Facility

Contacts

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1.	InstrumentLead CoInvestigator	spase://SMWG/Person/Stephen.A.Fuselier			
2.	InstrumentLead CoInvestigator	spase://SMWG/Person/David.T.Young			Retired
3.	CoInvestigator	spase://SMWG/Person/Roman.G.Gomez			
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6.	MetadataContact	spase://SMWG/Person/Robert.M.Candey			
7.	MetadataContact	spase://SMWG/Person/Lee.Frost.Bargatze			

InformationURL

Name

The Magnetospheric Multiscale (MMS) Mission home page at Goddard Space Flight Center (GSFC)

URL

<https://mms.gsfc.nasa.gov/>

Description

The Magnetospheric Multiscale (MMS) Mission Home Page hosted by the Goddard Space Flight Center (GSFC).

InformationURL

Name

Data Caveats and Current Release Notes at LASP MMS SDC

URL

<https://lasp.colorado.edu/mms/sdc/public/datasets/hpca/>

Description

The Magnetospheric Multiscale (MMS) Mission home page hosted by the Laboratory of Atmospheric and Space Physics, Science Data Center (LASP, SDC) at the University of Colorado, Boulder.

PriorIDs

<spase://VSPO/NumericalData/MMS/1/HotPlasmaCompositionAnalyzer/Burst/Level2/Ion/PT0.625S>

AccessInformation

RepositoryID

spase://SMWG/Repository/UCOLO/LASP/MMS_SDC

Availability

Online

AccessRights

Open

AccessURL

Name

FTPS from the MMS SDC (not with most browsers)

URL

<https://lasp.colorado.edu/mms/sdc/public/data/mms1/hpca/brst/l2/ion/>

Description

In CDF via ftp from the MMS Science Data Center

AccessURL**Name**

HTTPS from the MMS SDC

URL<https://lasp.colorado.edu/mms/sdc/public/data/mms1/hpca/brst/l2/ion/>**Description**

In CDF via http from the MMS Science Data Center

Format

CDF

Encoding

None

Acknowledgement

Please acknowledge S.A. Fuselier, D.T. Young, R.G. Gomez, and J.L. Burch. Also please acknowledge the data providers and CDAWeb when using these data.

AccessInformation**RepositoryID**<spase://SMWG/Repository/NASA/GSFC/SPDF/CDAWeb>**Availability**

Online

AccessRights

Open

AccessURL**Name**

FTPS from SPDF (not with most browsers)

URL<ftps://spdf.gsfc.nasa.gov/pub/data/mms/mms1/hpca/brst/l2/ion/>**Description**

In CDF via ftp from SPDF

AccessURL**Name**

HTTPS from SPDF

URL<https://spdf.gsfc.nasa.gov/pub/data/mms/mms1/hpca/brst/l2/ion/>**Description**

In CDF via http from SPDF

AccessURL**Name**

CDAWeb

URLhttps://cdaweb.gsfc.nasa.gov/cgi-bin/eval2.cgi?dataset=MMS1_HPCA_BRST_L2_ION&index=sp_phys**ProductKey**

MMS1_HPCA_BRST_L2_ION

Description

Access to ASCII, CDF, and plots via NASA/GSFC CDAWeb

Format

CDF

Encoding

None

Acknowledgement

Please acknowledge S.A. Fuselier, D.T. Young, R.G. Gomez, and J.L. Burch. Also please acknowledge the data providers and CDAWeb when using these data.

AccessInformation**RepositoryID**<spase://SMWG/Repository/NASA/GSFC/SPDF/CDAWeb>**Availability**

Online

AccessRights

Open

AccessURL

Name

CDAWeb HAPI Server

URL<https://cdaweb.gsfc.nasa.gov/hapi>**Style**

HAPI

ProductKey

MMS1_HPCA_BRST_L2_ION

Description

Web Service to this product using the HAPI interface

Format

CSV

Acknowledgement

Please acknowledge S.A. Fuselier, D.T. Young, R.G. Gomez, and J.L. Burch. Also please acknowledge the data providers and CDAWeb when using these data.

ProcessingLevel

Calibrated

InstrumentIDs[spase://SMWG/Instrument/MMS/1/FIELDS/FGM](#)[spase://SMWG/Instrument/MMS/1/HotPlasmaCompositionAnalyzer](#)**MeasurementType**

EnergeticParticles

MeasurementType

MagneticField

TemporalDescription**TimeSpan****StartDate**

2015-09-01 12:11:00

RelativeStopDate

-P2M

Cadence

PT0.625S

ObservedRegion

Earth.Magnetosheath

ObservedRegion

Earth.Magnetosphere

ObservedRegion

Earth.Magnetosphere.Magnetotail

ObservedRegion

Earth.Magnetosphere.Main

ObservedRegion

Earth.Magnetosphere.RadiationBelt

ObservedRegion

Earth.NearSurface.EquatorialRegion

ObservedRegion

Earth.NearSurface.Plasmasphere

ObservedRegion

Heliosphere.NearEarth

Parameter #1

Name

UTC converted from TAI time

ParameterKey

Epoch

Description

Start Time for the Record

Cadence

PT0.625S

Units

ns

UnitsConversion

1.0e-9>s

RenderingHints**ValueFormat**

e14.8

ValidMin

1990-01-01T00:00:00.000000000

ValidMax

2100-01-01T00:00:01.000000000

Support**SupportQuantity**

Temporal

Parameter #2

Name

Delta Start Time

ParameterKey

Epoch_MINUS

Description

Delta Start Time for the Record from the Central Time

Cadence

PT0.625S

Units

ms

UnitsConversion

1.0e-3>s

RenderingHints**ValueFormat**

I

ValidMin

0

ValidMax

1000

Support**SupportQuantity**

Temporal

Parameter #3

Name

Delta Stop Time

ParameterKey

Epoch_PLUS

Description

Delta Stop Time for the Record from the Central Time

Cadence

PT0.625S

Units

ms

UnitsConversion

1.0e-3>s

RenderingHints**ValueFormat**

I

ValidMin

0

ValidMax

1000

Support**SupportQuantity**

Temporal

Parameter #4

Name

Polar Anode Number

ParameterKey

mms1_hpca_polar_anode_number

Description

Polar Anode Index Value

Cadence

PT0.625S

RenderingHints**ValueFormat**

I

Structure**Size**

16

Element**Name**

Element 1

Index

1

Element**Name**

Element 2

Index

2

Element**Name**

Element 3

Index

3

Element**Name**

Element 4

Index

4

Element**Name**

Element 5

Index

5

Element**Name**

Element 6

Index

6

Element**Name**

Element 7

Index

7

Element**Name**

Element 8

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Element

Name
Element 15

Index
15

Element

Name
Element 16

Index
16

ValidMin
0

ValidMax
15

Support

SupportQuantity
Other

Parameter #5

Name
Azimuth Decimation Factor

Set
Time series defined by using: EPOCH

ParameterKey
mms1_hpca_azimuth_decimation_factor

Description
Azimuth Decimation Factor

Cadence
PT0.625S

RenderingHints

DisplayType

TimeSeries

AxisLabel

Azimuth Decimation

ValueFormat

I

ValidMin

1

ValidMax

16

FillValue

65535

Support**SupportQuantity**

Other

Parameter #6

Name

Polar Anode Decimation Factor

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_polar_decimation_factor

Description

Polar Anode Decimation Factor

Cadence

PT0.625S

RenderingHints**DisplayType**

TimeSeries

AxisLabel

Polar Anode Decimation

ValueFormat

I

ValidMin

1

ValidMax

16

FillValue

65535

Support**SupportQuantity**

Other

Parameter #7

Name

Energy Decimation Factor

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_energy_decimation_factor

Description

Energy Decimation Factor

Cadence

PT0.625S

RenderingHints**DisplayType**

TimeSeries

AxisLabel

Energy Decimation

ValueFormat

I

ValidMin

1

ValidMax

64

FillValue

65535

Support**SupportQuantity**

Other

Parameter #8

Name

Sweep Table Number

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_sweep_table_number

Description

Sweep Table Index as defined in the HPCA Science Algorithm Document

Cadence

PT0.625S

RenderingHints**ValueFormat**

I

ValidMin

0

ValidMax

15

FillValue

255

Support**SupportQuantity**

InstrumentMode

Parameter #9

Name

Start Azimuth

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_start_azimuth

Description

Start Azimuth

Cadence

PT0.625S

RenderingHints**ValueFormat**

I

ValidMin

0

ValidMax

15

FillValue

255

Particle**ParticleType**

Ion

ParticleQuantity
ArrivalDirection

Parameter #10

Name

Science Mode Number

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_science_mode

Description

Science Mode Value as defined in the HPCA Science Algorithm Document

Cadence

PT0.625S

RenderingHints**ValueFormat**

I

ValidMin

0

ValidMax

15

FillValue

255

Support**SupportQuantity**

InstrumentMode

Parameter #11

Name

Electron Volts

ParameterKey

mms1_hpca_ion_energy

Description

Electron Voltage associated with the Ion Counts

Cadence

PT0.625S

Units

eV

UnitsConversion

1.602176565e-19>J

RenderingHints**ValueFormat**

e13.6

Structure**Size**

63

Element**Name**

Element 1

Index

1

Element**Name**

Element 2

Index

2

Element

Name	Element 3
Index	3
Element	
Name	Element 4
Index	4
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Index	61
Element	
Name	Element 62
Index	62
Element	
Name	Element 63
Index	63
ValidMin	0.0
ValidMax	37600.0
FillValue	-1.0e+31
Particle	
ParticleType	Ion
Qualifier	Differential
ParticleQuantity	Energy

Parameter #12

Name	Hydrogen+ Flux
Set	Time series defined by using: EPOCH
ParameterKey	mms1_hpca_hplus_flux
Description	Hydrogen+ Flux for all Elevation Anodes across all Energies <ul style="list-style-type: none"> ▪ Column 1 Labels: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15] ▪ Column 2 Labels: [1.35500, 1.57180, 1.84280, 2.22220, 2.60160, 3.08940, 3.63140, 4.28180, 5.04060, 5.96200, 6.99180, 8.23840, 9.75600, 11.4904, 13.5500, 15.9890, 18.8616, 22.2762, 26.2328, 30.9482, 36.5308, 43.0890, 50.7854, 59.9452, 70.6768, 83.4138, 98.3730, 116.042, 136.855, 161.462, 190.459, 224.659, 264.984, 312.571, 368.723, 434.955, 513.057, 605.197, 713.868, 842.051, 993.323, 1171.70, 1382.10, 1630.28, 1923.07, 2268.43, 2675.80, 3156.28, 3723.11, 4391.72, 5180.44, 6110.73, 7208.11, 8502.57, 10029.5, 11830.6, 13955.2, 16461.3, 19417.5, 22904.6, 27017.9, 31869.8, 37593.1]
Cadence	PT0.625S
Units	(cm ² s sr eV) ⁻¹
UnitsConversion	6.24181e18>(m ² s sr J) ⁻¹
CoordinateSystem	
CoordinateRepresentation	Cartesian
CoordinateSystemName	SR
RenderingHints	
DisplayType	Spectrogram
ValueFormat	e13.6
Structure	

Size

16 63

FillValue

-1.0e+31

Particle**ParticleType**

Proton

Qualifier

Differential

ParticleQuantity

EnergyFlux

Parameter #13

Name

Hydrogen+ Phase Space Density

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_hplus_phase_space_density

Description

Hydrogen+ Phase Space Density for all Elevation Anodes across all Energies

- Column 1 Labels: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15]
- Column 2 Labels: [1.35500, 1.57180, 1.84280, 2.22220, 2.60160, 3.08940, 3.63140, 4.28180, 5.04060, 5.96200, 6.99180, 8.23840, 9.75600, 11.4904, 13.5500, 15.9890, 18.8616, 22.2762, 26.2328, 30.9482, 36.5308, 43.0890, 50.7854, 59.9452, 70.6768, 83.4138, 98.3730, 116.042, 136.855, 161.462, 190.459, 224.659, 264.984, 312.571, 368.723, 434.955, 513.057, 605.197, 713.868, 842.051, 993.323, 1171.70, 1382.10, 1630.28, 1923.07, 2268.43, 2675.80, 3156.28, 3723.11, 4391.72, 5180.44, 6110.73, 7208.11, 8502.57, 10029.5, 11830.6, 13955.2, 16461.3, 19417.5, 22904.6, 27017.9, 31869.8, 37593.1]

Cadence

PT0.625S

Unitscm⁻⁶ s³**UnitsConversion**1.0e13>m⁻⁶ s³**CoordinateSystem****CoordinateRepresentation**

Cartesian

CoordinateSystemName

SR

RenderingHints**DisplayType**

Spectrogram

ValueFormat

e13.6

Structure**Size**

16 63

FillValue

-1.0e+31

Particle**ParticleType**

Proton

Qualifier

Tensor

ParticleQuantity

PhaseSpaceDensity

Parameter #14

Name

Data Quality for Hydrogen+

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_hplus_data_quality

Description

Per Sweep Status for H+ (0: Bad; 1: Good; 2: Good, RF On, Bkgd On; 3: Good, RF Off, Bkgd On; 4: Good, RF On, Bkgd Off; 5: Good, RF Off, Bkgd Off; 6: Good, Non-Sweeping Data)

Cadence

PT0.625S

RenderingHints**DisplayType**

TimeSeries

AxisLabel

Data Quality

ValueFormat

I

ValidMin

0

ValidMax

255

FillValue

65535

Support**SupportQuantity**

Other

Parameter #15

Name

Helium+ Flux

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_heplus_flux

Description

Helium+ Flux for all Elevation Anodes across all Energies

- Column 1 Labels: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15]
- Column 2 Labels: [1.35500, 1.57180, 1.84280, 2.22220, 2.60160, 3.08940, 3.63140, 4.28180, 5.04060, 5.96200, 6.99180, 8.23840, 9.75600, 11.4904, 13.5500, 15.9890, 18.8616, 22.2762, 26.2328, 30.9482, 36.5308, 43.0890, 50.7854, 59.9452, 70.6768, 83.4138, 98.3730, 116.042, 136.855, 161.462, 190.459, 224.659, 264.984, 312.571, 368.723, 434.955, 513.057, 605.197, 713.868, 842.051, 993.323, 1171.70, 1382.10, 1630.28, 1923.07, 2268.43, 2675.80, 3156.28, 3723.11, 4391.72, 5180.44, 6110.73, 7208.11, 8502.57, 10029.5, 11830.6, 13955.2, 16461.3, 19417.5, 22904.6, 27017.9, 31869.8, 37593.1]

Cadence

PT0.625S

Units(cm² s sr eV)⁻¹**UnitsConversion**6.24181e18>(m² s sr J)⁻¹**CoordinateSystem****CoordinateRepresentation**

Cartesian

CoordinateSystemName

SR

RenderingHints**DisplayType**

Spectrogram

ValueFormat

e13.6

Structure

Size
16 63

FillValue
-1.0e+31

Particle

ParticleType
Ion

Qualifier
Differential

ParticleQuantity
EnergyFlux

Parameter #16

Name
Helium+ Phase Space Density

Set
Time series defined by using: EPOCH

ParameterKey
mms1_hpca_heplus_phase_space_density

Description
Helium+ Phase Space Density for all Elevation Anodes across all Energies

- Column 1 Labels: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15]
- Column 2 Labels: [1.35500, 1.57180, 1.84280, 2.22220, 2.60160, 3.08940, 3.63140, 4.28180, 5.04060, 5.96200, 6.99180, 8.23840, 9.75600, 11.4904, 13.5500, 15.9890, 18.8616, 22.2762, 26.2328, 30.9482, 36.5308, 43.0890, 50.7854, 59.9452, 70.6768, 83.4138, 98.3730, 116.042, 136.855, 161.462, 190.459, 224.659, 264.984, 312.571, 368.723, 434.955, 513.057, 605.197, 713.868, 842.051, 993.323, 1171.70, 1382.10, 1630.28, 1923.07, 2268.43, 2675.80, 3156.28, 3723.11, 4391.72, 5180.44, 6110.73, 7208.11, 8502.57, 10029.5, 11830.6, 13955.2, 16461.3, 19417.5, 22904.6, 27017.9, 31869.8, 37593.1]

Cadence
PT0.625S

Units
cm⁻⁶ s³

UnitsConversion
1.0e13>m⁻⁶ s³

CoordinateSystem

CoordinateRepresentation
Cartesian

CoordinateSystemName
SR

RenderingHints

DisplayType
Spectrogram

ValueFormat
e13.6

Structure

Size
16 63

FillValue
-1.0e+31

Particle

ParticleType
Ion

Qualifier
Tensor

ParticleQuantity
PhaseSpaceDensity

Parameter #17

Name

Data Quality for Helium+

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_heplus_data_quality

Description

Per Sweep Status for He+ (0: Bad; 1: Good; 2: Good, RF On, Bkgd On; 3: Good, RF Off, Bkgd On; 4: Good, RF On, Bkgd Off; 5: Good, RF Off, Bkgd Off; 6: Good, Non-Sweeping Data)

Cadence

PT0.625S

RenderingHints**DisplayType**

TimeSeries

AxisLabel

Data Quality

ValueFormat

I

ValidMin

0

ValidMax

255

FillValue

65535

Support**SupportQuantity**

Other

Parameter #18

Name

Helium++ Flux

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_heplusplus_flux

Description

Helium++ Flux for all Elevation Anodes across all Energies

- Column 1 Labels: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15]
- Column 2 Labels: [1.35500, 1.57180, 1.84280, 2.22220, 2.60160, 3.08940, 3.63140, 4.28180, 5.04060, 5.96200, 6.99180, 8.23840, 9.75600, 11.4904, 13.5500, 15.9890, 18.8616, 22.2762, 26.2328, 30.9482, 36.5308, 43.0890, 50.7854, 59.9452, 70.6768, 83.4138, 98.3730, 116.042, 136.855, 161.462, 190.459, 224.659, 264.984, 312.571, 368.723, 434.955, 513.057, 605.197, 713.868, 842.051, 993.323, 1171.70, 1382.10, 1630.28, 1923.07, 2268.43, 2675.80, 3156.28, 3723.11, 4391.72, 5180.44, 6110.73, 7208.11, 8502.57, 10029.5, 11830.6, 13955.2, 16461.3, 19417.5, 22904.6, 27017.9, 31869.8, 37593.1]

Cadence

PT0.625S

Units(cm² s sr eV)⁻¹**UnitsConversion**6.24181e18>(m² s sr J)⁻¹**CoordinateSystem****CoordinateRepresentation**

Cartesian

CoordinateSystemName

SR

RenderingHints**DisplayType**

Spectrogram

ValueFormat

e13.6

Structure

Size
16 63

FillValue
-1.0e+31

Particle

ParticleType
AlphaParticle

Qualifier
Differential

ParticleQuantity
EnergyFlux

Parameter #19

Name
Helium++ Phase Space Density

Set
Time series defined by using: EPOCH

ParameterKey
mms1_hpca_heplusplus_phase_space_density

Description
Helium++ Phase Space Density for all Elevation Anodes across all Energies

- Column 1 Labels: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15]
- Column 2 Labels: [1.35500, 1.57180, 1.84280, 2.22220, 2.60160, 3.08940, 3.63140, 4.28180, 5.04060, 5.96200, 6.99180, 8.23840, 9.75600, 11.4904, 13.5500, 15.9890, 18.8616, 22.2762, 26.2328, 30.9482, 36.5308, 43.0890, 50.7854, 59.9452, 70.6768, 83.4138, 98.3730, 116.042, 136.855, 161.462, 190.459, 224.659, 264.984, 312.571, 368.723, 434.955, 513.057, 605.197, 713.868, 842.051, 993.323, 1171.70, 1382.10, 1630.28, 1923.07, 2268.43, 2675.80, 3156.28, 3723.11, 4391.72, 5180.44, 6110.73, 7208.11, 8502.57, 10029.5, 11830.6, 13955.2, 16461.3, 19417.5, 22904.6, 27017.9, 31869.8, 37593.1]

Cadence
PT0.625S

Units
cm⁻⁶ s³

UnitsConversion
1.0e13>m⁻⁶ s³

CoordinateSystem

CoordinateRepresentation
Cartesian

CoordinateSystemName
SR

RenderingHints

DisplayType
Spectrogram

ValueFormat
e13.6

Structure

Size
16 63

FillValue
-1.0e+31

Particle

ParticleType
AlphaParticle

Qualifier
Tensor

ParticleQuantity
PhaseSpaceDensity

Parameter #20

Name

Data Quality for Helium++

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_heplusplus_data_quality

Description

Per Sweep Status for He++ (0: Bad; 1: Good; 2: Good, RF On, Bkgd On; 3: Good, RF Off, Bkgd On; 4: Good, RF On, Bkgd Off; 5: Good, RF Off, Bkgd Off; 6: Good, Non-Sweeping Data)

Cadence

PT0.625S

RenderingHints**DisplayType**

TimeSeries

AxisLabel

Data Quality

ValueFormat

I

ValidMin

0

ValidMax

255

FillValue

65535

Support**SupportQuantity**

Other

Parameter #21

Name

Oxygen+ Flux

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_oplus_flux

Description

Oxygen+ Flux for all Elevation Anodes across all Energies

- Column 1 Labels: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15]
- Column 2 Labels: [1.35500, 1.57180, 1.84280, 2.22220, 2.60160, 3.08940, 3.63140, 4.28180, 5.04060, 5.96200, 6.99180, 8.23840, 9.75600, 11.4904, 13.5500, 15.9890, 18.8616, 22.2762, 26.2328, 30.9482, 36.5308, 43.0890, 50.7854, 59.9452, 70.6768, 83.4138, 98.3730, 116.042, 136.855, 161.462, 190.459, 224.659, 264.984, 312.571, 368.723, 434.955, 513.057, 605.197, 713.868, 842.051, 993.323, 1171.70, 1382.10, 1630.28, 1923.07, 2268.43, 2675.80, 3156.28, 3723.11, 4391.72, 5180.44, 6110.73, 7208.11, 8502.57, 10029.5, 11830.6, 13955.2, 16461.3, 19417.5, 22904.6, 27017.9, 31869.8, 37593.1]

Cadence

PT0.625S

Units(cm² s sr eV)⁻¹**UnitsConversion**6.24181e18>(m² s sr J)⁻¹**CoordinateSystem****CoordinateRepresentation**

Cartesian

CoordinateSystemName

SR

RenderingHints**DisplayType**

Spectrogram

ValueFormat

e13.6

Structure

Size

16 63

FillValue

-1.0e+31

Particle**ParticleType**

Ion

Qualifier

Differential

ParticleQuantity

EnergyFlux

Parameter #22

Name

Oxygen+ Phase Space Density

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_oplus_phase_space_density

Description

Oxygen+ Phase Space Density for all Elevation Anodes across all Energies

- Column 1 Labels: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15]
- Column 2 Labels: [1.35500, 1.57180, 1.84280, 2.22220, 2.60160, 3.08940, 3.63140, 4.28180, 5.04060, 5.96200, 6.99180, 8.23840, 9.75600, 11.4904, 13.5500, 15.9890, 18.8616, 22.2762, 26.2328, 30.9482, 36.5308, 43.0890, 50.7854, 59.9452, 70.6768, 83.4138, 98.3730, 116.042, 136.855, 161.462, 190.459, 224.659, 264.984, 312.571, 368.723, 434.955, 513.057, 605.197, 713.868, 842.051, 993.323, 1171.70, 1382.10, 1630.28, 1923.07, 2268.43, 2675.80, 3156.28, 3723.11, 4391.72, 5180.44, 6110.73, 7208.11, 8502.57, 10029.5, 11830.6, 13955.2, 16461.3, 19417.5, 22904.6, 27017.9, 31869.8, 37593.1]

Cadence

PT0.625S

Unitscm⁻⁶ s³**UnitsConversion**1.0e13>m⁻⁶ s³**CoordinateSystem****CoordinateRepresentation**

Cartesian

CoordinateSystemName

SR

RenderingHints**DisplayType**

Spectrogram

ValueFormat

e13.6

Structure**Size**

16 63

FillValue

-1.0e+31

Particle**ParticleType**

Ion

Qualifier

Tensor

ParticleQuantity

PhaseSpaceDensity

Parameter #23

Name

Data Quality for Oxygen+

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_oplus_data_quality

Description

Per Sweep Status for O+ (0: Bad; 1: Good; 2: Good, RF On, Bkgd On; 3: Good, RF Off, Bkgd On; 4: Good, RF On, Bkgd Off; 5: Good, RF Off, Bkgd Off; 6: Good, Non-Sweeping Data)

Cadence

PT0.625S

RenderingHints**DisplayType**

TimeSeries

AxisLabel

Data Quality

ValueFormat

I

ValidMin

0

ValidMax

255

FillValue

65535

Support**SupportQuantity**

Other

Parameter #24

Name

Magnetic Field Vector in DMPA plus Btotal (8 or 16 samples/s)

Set

Time series defined by using: EPOCH

ParameterKey

mms1_hpca_B_GSE_sweep_avg

Description

Magnetic Field Vector in Despun Major Principal Axis-Aligned (DMPA) Cartesian Coordinates plus Btotal (8 or 16 samples/s)

Cadence

PT0.625S

Units

nT

UnitsConversion

1.0e-9>T

CoordinateSystem**CoordinateRepresentation**

Cartesian

CoordinateSystemName

MFA

RenderingHints**DisplayType**

TimeSeries

ValueFormat

e13.5

Structure**Size**

4

Element**Name**

X

Index	1
Element	
Name	Y
Index	2
Element	
Name	Z
Index	3
Element	
Name	Magnitude
Index	4
ValidMin	-17000.0
ValidMax	17000.0
FillValue	-1.0e+31
Field	
Qualifier	Vector
FieldQuantity	Magnetic

Parameter #25

Name	Magnetic Field Vector in GSM plus Btotal (8 or 16 samples/s)
Set	Time series defined by using: EPOCH
ParameterKey	mms1_hpca_B_GSM_sweep_avg
Description	Magnetic Field Vector in Geocentric Solar Magnetospheric (GSM) Cartesian Coordinates plus Btotal (8 or 16 samples/s)
Cadence	PT0.625S
Units	nT
UnitsConversion	1.0e-9>T
CoordinateSystem	
CoordinateRepresentation	Cartesian
CoordinateSystemName	GSM
RenderingHints	
DisplayType	TimeSeries
ValueFormat	e13.5
Structure	
Size	4
Element	

Name	X
Index	1
Element	
Name	Y
Index	2
Element	
Name	Z
Index	3
Element	
Name	Magnitude
Index	4
ValidMin	-17000.0
ValidMax	17000.0
FillValue	-1.0e+31
Field	
Qualifier	Vector
FieldQuantity	Magnetic

Parameter #26

Name	UTC converted from TAI time
ParameterKey	Epoch_Angles
Description	Start Time for the Azimuth Angles associated with each Half-Spin
Cadence	PT0.625S
Units	ns
UnitsConversion	1.0e-9>s
RenderingHints	
ValueFormat	e14.8
ValidMin	1990-01-01T00:00:00.000000000
ValidMax	2100-01-01T00:00:01.000000000
Support	
SupportQuantity	Temporal

Parameter #27

Name	Delta Start Time for Azimuth Angles
ParameterKey	

Epoch_MINUS_Angles

Description

Delta Start Time for the Record from the Central Time

Cadence

PT0.625S

Units

ms

UnitsConversion

1.0e-3>s

RenderingHints**ValueFormat**

I

ValidMin

0

ValidMax

70000

Support**SupportQuantity**

Temporal

Parameter #28

Name

Delta Stop Time for Azimuth Angles

ParameterKey

Epoch_PLUS_Angles

Description

Delta Stop Time for the Record from the Central Time

Cadence

PT0.625S

Units

ms

UnitsConversion

1.0e-3>s

RenderingHints**ValueFormat**

I

ValidMin

0

ValidMax

70000

Support**SupportQuantity**

Temporal

Parameter #29

Name

Azimuth Angles in degrees

Set

Time series defined by using: EPOCH_ANGLES

ParameterKey

mms1_hpca_azimuth_angles_degrees

Description

Azimuth Angles in Degrees for each Anode for each HPCA Half-Spin

- Column 1 Labels: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15]
- Column 2 Labels: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15]

Cadence

PT0.625S

Units

degree

UnitsConversion

0.0174532925>rad

CoordinateSystem**CoordinateRepresentation**

Spherical

CoordinateSystemName

SR

RenderingHints**ValueFormat**

F

Structure**Size**

16 16

Element**Name**

Element 1 1

Index

1

Element**Name**

Element 2 1

Index

2

Element**Name**

Element 3 1

Index

3

Element**Name**

Element 4 1

Index

4

Element**Name**

Element 5 1

Index

5

Element**Name**

Element 6 1

Index

6

Element**Name**

Element 7 1

Index

7

Element**Name**

Element 8 1

Index

8

Element**Name**

Element 9 1

Index

9

Element**Name**

Element 10 1

Index

10

Element**Name**

Element 11 1

Index

11

Element**Name**

Element 12 1

Index

12

Element**Name**

Element 13 1

Index

13

Element**Name**

Element 14 1

Index

14

Element**Name**

Element 15 1

Index

15

Element**Name**

Element 16 1

Index

16

Element**Name**

Element 1 2

Index

17

Element**Name**

Element 2 2

Index

18

Element**Name**

Element 3 2

Index

19

Element**Name**

Element 4 2

Index

20

Element**Name**

Element 5 2

Index
21
Element
Name
Element 6 2
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22
Element
Name
Element 7 2
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23
Element
Name
Element 8 2
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24
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Name
Element 9 2
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25
Element
Name
Element 10 2
Index
26
Element
Name
Element 11 2
Index
27
Element
Name
Element 12 2
Index
28
Element
Name
Element 13 2
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29
Element
Name
Element 14 2
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Name
Element 15 2
Index
31
Element
Name
Element 16 2
Index
32
Element

Name	Element 1 3
Index	33
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Name	Element 2 3
Index	34
Element	
Name	Element 3 3
Index	35
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Name	Element 4 3
Index	36
Element	
Name	Element 5 3
Index	37
Element	
Name	Element 6 3
Index	38
Element	
Name	Element 7 3
Index	39
Element	
Name	Element 8 3
Index	40
Element	
Name	Element 9 3
Index	41
Element	
Name	Element 10 3
Index	42
Element	
Name	Element 11 3
Index	43
Element	
Name	Element 12 3
Index	44

Element**Name**

Element 13 3

Index

45

Element**Name**

Element 14 3

Index

46

Element**Name**

Element 15 3

Index

47

Element**Name**

Element 16 3

Index

48

Element**Name**

Element 1 4

Index

49

Element**Name**

Element 2 4

Index

50

Element**Name**

Element 3 4

Index

51

Element**Name**

Element 4 4

Index

52

Element**Name**

Element 5 4

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53

Element**Name**

Element 6 4

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54

Element**Name**

Element 7 4

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55

Element**Name**

Element 8 4

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56

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Name
Element 9 4

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Element 10 4

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Element 11 4

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Element 12 4

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Element 13 4

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Element 14 4

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Element 15 4

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Element 16 4

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Name
Element 1 5

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Element 2 5

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Element 3 5

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67

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Name	Element 4 5
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Name	Element 6 5
Index	70
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Name	Element 7 5
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Name	Element 8 5
Index	72
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Name	Element 9 5
Index	73
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Name	Element 10 5
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Name	Element 11 5
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Name Element 4 6
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Element 10 7
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Element 11 7
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Element 12 7
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108
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Element 13 7
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109
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Element 14 7
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Element 15 7
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Element 16 7
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112
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Element 1 8
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Element 2 8
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114

Element**Name**

Element 3 8

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115

Element**Name**

Element 4 8

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116

Element**Name**

Element 5 8

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117

Element**Name**

Element 6 8

Index

118

Element**Name**

Element 7 8

Index

119

Element**Name**

Element 8 8

Index

120

Element**Name**

Element 9 8

Index

121

Element**Name**

Element 10 8

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122

Element**Name**

Element 11 8

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123

Element**Name**

Element 12 8

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124

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Element 13 8

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125

Element**Name**

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Element 3 9
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Element 4 9
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Element 10 9
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Name	Element 11 16
Index	251
Element	
Name	Element 12 16
Index	252
Element	
Name	Element 13 16
Index	253
Element	
Name	Element 14 16
Index	254

Element**Name**

Element 15 16

Index

255

Element**Name**

Element 16 16

Index

256

FillValue

720.0

Particle**ParticleType**

Ion

Qualifier

DirectionAngle.AzimuthAngle

ParticleQuantity

ArrivalDirection

Parameter #30

Name

Azimuth Angle per eV in degrees

Set

Time series defined by using: EPOCH_ANGLES

ParameterKey

mms1_hpca_azimuth_angles_per_ev_degrees

Description

Azimuth Angles per eV in Degrees for each Anode for each HPCA Half-Spin

- Column 1 Labels: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15]
- Column 2 Labels: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15]
- Column 3 Labels: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62]

Cadence

PT0.625S

Units

degree

UnitsConversion

0.0174532925>rad

CoordinateSystem**CoordinateRepresentation**

Spherical

CoordinateSystemName

SR

RenderingHints**ValueFormat**

F

Structure**Size**

16 16 63

FillValue

720.0

Particle**ParticleType**

Ion

Qualifier

DirectionAngle.AzimuthAngle

ParticleQuantity

ArrivalDirection

Parameter #31

Name

Center Elevation Angles

ParameterKey

mms1_hpca_centroid_elevation_angle

Description

Center Elevation Angles of each of the Anodes

Cadence

PT0.625S

Units

degree

UnitsConversion

0.0174532925>rad

CoordinateSystem**CoordinateRepresentation**

Spherical

CoordinateSystemName

SR

RenderingHints**ValueFormat**

F

Structure**Size**

16

Element**Name**

Element 1

Index

1

Element**Name**

Element 2

Index

2

Element**Name**

Element 3

Index

3

Element**Name**

Element 4

Index

4

Element**Name**

Element 5

Index

5

Element**Name**

Element 6

Index

6

Element**Name**

Element 7

Index

7

Element**Name**

Element 8

Index

8

Element**Name**

Element 9

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Element**Name**

Element 10

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Element**Name**

Element 11

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Element**Name**

Element 12

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Element**Name**

Element 13

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13

Element**Name**

Element 14

Index

14

Element**Name**

Element 15

Index

15

Element**Name**

Element 16

Index

16

ValidMin

11.25

ValidMax

168.75

Particle**ParticleType**

Ion

Qualifier

DirectionAngle.ElevationAngle

ParticleQuantity

ArrivalDirection

Parameter #32

Name

Azimuth Index

ParameterKey

mms1_hpca_azimuth_index

Description

Azimuth Index Value

Cadence

PT0.625S

RenderingHints**ValueFormat**

I

Structure**Size**

16

Element**Name**

Element 1

Index

1

Element**Name**

Element 2

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2

Element**Name**

Element 3

Index

3

Element**Name**

Element 4

Index

4

Element**Name**

Element 5

Index

5

Element**Name**

Element 6

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6

Element**Name**

Element 7

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Element**Name**

Element 8

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Element**Name**

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Element**Name**

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Element**Name**

Element 11

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Element 12

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Element**Name**

Element 13

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Element**Name**

Element 14

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Element**Name**

Element 15

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15

Element**Name**

Element 16

Index

16

ValidMin

0

ValidMax

15

Support**SupportQuantity**

Other

Parameter #33

Name

Energy Step Index

ParameterKey

mms1_hpca_energy_step_number

Description

Energy Step Index Value

Cadence

PT0.625S

RenderingHints**ValueFormat**

I

Structure

Size
63
Element
Name
Element 1
Index
1
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Element 2
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Element 3
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Element**Name**

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61

Element**Name**

Element 62

Index

62

Element**Name**

Element 63

Index

63

ValidMin

0

ValidMax

62

Support**SupportQuantity**

Other