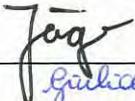
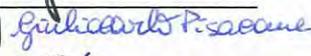
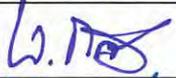
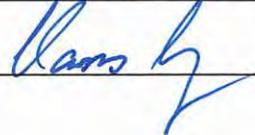


**Title: EarthCARE Products Definitions
 Volume 4a - MSI L0 Products Definitions**

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Change Record

Issue	Date	ISP Version	Sheet	Description of Change
1	10.07.2009	-	All	First Issue
2	04.12.2009	-	All	Document restructured as described in EC.MN.ASD.SY.00233
3	10.06.2010	3.0	All	Modified after ECGP Pre-TEB
4	21.10.2010	5.0	All	Update for ECGP KO

Table of Contents

4.1 Multi-Spectral Imager - Level 0	4
4.1.1 Instrument Modes.....	5
4.1.2 Level-0 Products	8
4.1.2.1 MSI_NOM_0.....	9
4.1.2.2 MSI_ANC_0.....	13

4.1 Multi-Spectral Imager - Level 0

This specification arises in the frame of the ESSS and ECGP. The purpose of this document is to specify the format and content of the Instrument Source Packets as well as of the L0 products for the MSI Instrument.

The current ISP format version is 5.0.

TBDs/TBCs/TBWs mark specifications that are yet to be completed. Currently, this document includes the following TBDs/TBCs/TBWs.

TBD

Geographic coverage of the MIS_NOM_0_ product.....	4
Geometric Information for the MSI_NOM_0_ product	4
Radiometric Information for the MSI_NOM_0_ product.....	4

The MSI Instrument generates the following products.

Table 4.1-1: Products Summary Table

Instrument Mode	Product Id	Description	Record Size (Byte)	Granularity	Product Size	Coverage	Geometric Information	Radiometric Information
Nominal	MSI_NOM_0_	Level-0 product.	4692 (782 x 6 Bands [*])	14,29 s ⁻¹	372 MB (TBC)	TBD	TBD	TBD
Nominal	MSI_ANC_0	Ancillary product	188	14,29 s ⁻¹	15 MB (TBC)			

^{*} 3 TIR bands and 1 reference band for a full orbit and 4 VNS bands for dayside only. This gives a mean number of 6 bands for a full orbit.

4.1.1 Instrument Modes

The MSI Instrument generates two types of ISP:

- (1) Nominal ISPs containing measurement data (4.1.2.1.4.4.3)
- (2) Ancillary ISPs (4.1.2.2.4.4.3)

Nominal ISPs and Ancillary ISPs can be generated in a number of instrument modes as follows:

Table 4.1-2: MSI Instrument Modes

Instrument Mode value	MSI Mode	Description	Software Activity
0	<Invalid>	<Invalid>	<Invalid Mode, ISP should be treated as corrupt>
1	INS-OFF	OFF	During these instrument modes, no processing or output will be provided. The software simulation will exit cleaning, stating a message "not a functional mode".
2	INS-LAU	OFF	
3	INS-INI	INIT	These instrument modes are common in the fact they are actively processing and output telemetry. However, no optical information is carried. The simulator will provide telemetry output, in the correct data format. However, real data will not be provided and no processing of image data will be conducted. Random figures will be used to in-fill image data output.
4	INS-SBY	STANDBY	
5	INS-SBR	STANDBY/REFUSE	
6	INS-IDLE	IDLE	
7	INS-IDR	IDLE/REFUSE	
8	INS-NOM	NORMAL OPERATION	The software simulation will be in fully-configured and active mode. The actual image data to be processed will be dependent on the calibration mode, as described below.

Table 4.1-3: MSI Instrument Sub-Modes (Calibration Modes)

Instrument Submode value	MSI Calibration Mode	Description
0	<Invalid>	<Invalid Mode, ISP should be treated as corrupt>
1	INS_NOM_VIEW	NADIR VIEW
2	INS_CAL_DARK	TIR COLD SPACE VIEW / VNS DARK VIEW
3	INS_CAL_BRIGHT	TIR BLACK BODY VIEW / VNS SOLAR DIFFUSER VIEW
4	INS_TEST_WARM	Uniform warm scene
5	INS_TEST_COLD	Uniform cold (0) scene
6	INS_TEST_HOT	Uniform hot scene
7	INS_TEST_CHECKER	A checker-board pattern using 25% grey and 75% grey respectively.
8	INS_TEST_HLINE	Horizontal line input
9	INS_TEST_VLINE	Vertical line input.
10	INS_TEST_SPOT_TL	Spot bright source on dark background, top left
11	INS_TEST_SPOT_TR	Spot bright source on dark background, top right
12	INS_TEST_SPOT_C	Spot bright source on dark background, centred
13	INS_TEST_SPOT_BL	Spot bright source on dark background, bottom left
14	INS_TEST_SPOT_BR	Spot bright source on dark background, bottom right
15	INS_TEST_GENERATED	The software will use its internal scene generator, producing realistic output with no input data.

The MSI Instrument generates ISPs with actual values in the Packet Header and the PUS Data Field Header fields as follows[†]:

Table 4.1-4: MSI Instrument Data Source Packet Structure - Actual Values

Parameter		MSB	Value
Version Number:		b ₀ -b ₂	000b
Type:		b ₃	0b
Data Field Header Flag:		b ₄	1b
Application Process ID (APID):	PID	b ₅ -b ₁₁	44h
	PCAT	b ₁₂ -b ₁₅	Several values possible.
Segmentation Flags		b ₁₆ -b ₁₇	11b
Source Sequence Count		b ₁₈ -b ₃₁	
Packet Length (16 bits)		b ₃₂ -b ₄₇	See below

Table 4.1-5: MSI PUS Data Field Header - Actual Values

Parameter	MSB	Value
Spare 1	b ₀	0
TM Source Packet PUS Version Number	b ₁ - b ₃	001b
Spare 2	b ₄ - b ₇	0000b
Service Type	b ₈ - b ₁₅	See Table 4.1-6
Service Subtype	b ₁₆ - b ₂₃	See Table 4.1-7
Destination ID	b ₂₄ - b ₃₁	0
Time	b ₃₂ - b ₈₇	
Time Quality	b ₈₈ - b ₉₅	

Table 4.1-6: MSI Service Type - Actual Values

Service type (dec)	Service (Band)	Valid Subtypes (dec)
235	MSI Science Data	1...8
236	MSI Ancillary Data	0
237	MSI Unprocessed Column Data	0
238	MSI Calibration Data	1...15

[†] Values for intrinsically variable fields such as the time stamp are not given of course.

Table 4.1-7: MSI Service Subtype - Actual Values

Service Subtype (dec)	Band
0	N/A
1	BAND_1
2	BAND_2
3	BAND_3
4	BAND_4
5	BAND_7
6	BAND_8
7	BAND_9
8	BAND_REF

As shown above, PCAT, Service Type and Service Subtype are all multiple-value fields, which lead to a number of possible combinations in the ISPs. On top of this, the Nominal ISP include two further multiple-values fields (Instrument Mode and Instrument Submode[‡]), which further increases the number of combinations.

[‡] Instrument Mode and Instrument Submode are addressed in the following sections.

4.1.2 Level-0 Products

The specification of the L0 Product for the MSI Instrument is given here, whereby the Specific Header is provided in Volume 1 since it is common to all EarthCARE L0 Products.

4.1.2.1 MSI_NOM_0_

4.1.2.1.1 Description

The specification of the nominal L0 Product for the MSI Instrument is given hereafter.

4.1.2.1.2 Input data

The MSI Level-0 data is a reorganisation and collation of the ISPs specified in section 4.1.1.1.1.1

Quality flags are computed as needed and stored in the L0 Products Header.

4.1.2.1.3 Auxiliary Data

No auxiliary data is needed apart from time correlation information in the case of invalid time stamps in the ISPs.

4.1.2.1.4 Product Structure

Table 4.1-8: Product Overview

Fixed Product Header
MSINOM_L0_MainProductHeader
L0 Specific Product Header
Instrument Source Packets

4.1.2.1.4.1 Fixed Product Header

See Products Definitions Volume 1.

4.1.2.1.4.2 MSINOM_L0_MainProductHeader

This is the Main Product Header for the MSI L0 Products. It is identical to the Main Product Header in Vol. 1 but has some predefined values specific to the MSI L0 product.

#	Field name	Units	NetCDF C-Types	Size of each element	Number of elements	Total size	Value
1	productName	unitless	NC_BYTE	55	1	55	
2	missionID	unitless	NC_BYTE	2	1	2	EC
3	fileClass	unitless	NC_BYTE	4	1	4	
4	fileCategory	unitless	NC_BYTE	4	1	4	MSI_
5	productType	unitless	NC_BYTE	3	1	3	
6	latency	unitless	NC_BYTE	1	1	1	
7	productLevel	unitless	NC_BYTE	2	1	2	0_
8	sensingStart	unitless	NC_BYTE	23	1	23	
9	sensingStop	unitless	NC_BYTE	23	1	23	
10	productVersion	unitless	NC_BYTE	4	1	4	
11	degradedProductQualityFlag	unitless	NC_SHORT	2	1	2	

12	processingMode	unitless	NC_BYTE	1	1	1	
13	dispositionMode	unitless	NC_BYTE	1	1	1	
14	description	unitless	NC_BYTE	1024	1	1024	
15	processorName	unitless	NC_BYTE	1024	1	1024	
16	processorMajorVersion	unitless	NC_SHORT	2	1	2	
17	processorMinorVersion	unitless	NC_SHORT	2	1	2	
18	formatVersion	unitless	NC_BYTE	26	1	26	
19	subsettedProduct	unitless	ECBool	1	1	1	
20	dataBlockSize	unitless	NC_UINT64	8	1	8	
21	productDuration	unitless	NC_UINT	4	1	4	
22	acquisitionStation	unitless	NC_BYTE	10	1	10	
23	processingCentre	unitless	NC_BYTE	4	1	4	
24	processingStart	unitless	NC_BYTE	23	1	23	
25	processingStop	unitless	NC_BYTE	23	1	23	
26	orbitStart	unitless	NC_USHORT	2	1	2	
27	orbitStop	unitless	NC_USHORT	2	1	2	
28	ANXTime	unitless	NC_BYTE	26	1	26	
29	ANXLongitude	unitless	NC_DOUBLE	8	1	8	
30	stateVectorSource	unitless	NC_BYTE	15	1	15	
31	stateVectorTimeStamp	unitless	NC_BYTE	26	1	26	
32	xPosition	unitless	NC_DOUBLE	8	1	8	
33	yPosition	unitless	NC_DOUBLE	8	1	8	
34	zPosition	unitless	NC_DOUBLE	8	1	8	
35	xVelocity	unitless	NC_DOUBLE	8	1	8	
36	yVelocity	unitless	NC_DOUBLE	8	1	8	
37	zVelocity	unitless	NC_DOUBLE	8	1	8	
38	subsatellitePointStart	unitless	GeographicCoordinates	45	1	45	
39	subsatellitePointStop	unitless	GeographicCoordinates	45	1	45	
TOTAL:						Size depends on XML format	

4.1.2.1.4.3 L0 Specific Product Header

See Products Definitions Volume 1.

4.1.2.1.4.4 Instrument Source Packets

4.1.2.1.4.4.1 MSI_NOM_PacketHeader Bit Vector Table

These are the actual values of the Packet Header for the Nominal MSI ISP.

Parameter	MSB	Description	Value
Version_Number	b0 - b2	CCSDS Version Number	000b
Type	b3	Packet type	0b
Data_Field_Header_Flag	b4	Indicates the presence of a secondary (data field) header (when set to 1).	0x01
Application_Process_ID_PID	b5 - b11	Process ID (part of the APID)	0x44
Application_Process_ID_PCAT	b12 - b15	Packet category	as above...
Segmentation_Flags	b16 - b17	Indicates the grouping (segmentation) of TM source packets.	11b
Source_Sequence_Count	b18 - b31	Wrap around counter used to count each TM packet. For the ESSS in contrast to the PUS, only one counter for all APIDs is maintained.	source packet count value modulo 2 ¹⁴ (0 - 16383)
Packet_Length	b32 - b47	Number of bytes contained in the packet data field minus 1.	number of octets in packed data field - 1

4.1.2.1.4.4.2 MSI_NOM_PUSDataFieldHeader Bit Vector Table

These are the actual values of the PUS Data Field Header described in Vol. 1 for the MSI Nominal ISP.

Parameter	MSB	Description	Value
Spare_1	b0	Not used.	Must be set to 0 for all TM source packets.
TM_Source_Packet_PUS_Version_Number	b1 - b3	Not used.	(0 was used for ESA PUS version) 1 for ECSS PUS
Spare_2	b4 - b7	Filler to complete the byte.	Must be set to 0 for all TM source packets
Service_Type	b8 - b15	Indicates the service to which the packet relates.	See [AD-110] and RD-04
Service_Subtype	b16 - b23	Indicates the service subtype to which the packet relates.	See [AD-110] and RD-04
Destination_ID	b24 - b31	Indicates the destination of the packet (May be omitted if only one destination exists).	0
Time	b32 - b87	Onboard time (OBT).	Coarse time: LSB = 1 sec Fine time: LSB = 1/16777215 sec
Time_Quality	b88 - b95	This shall give the status of the time reporting sub-service, i.e. current PPS source and whether synchronization is enabled.	Bit3 (Time type): 0 = Elapsed Time (ET); 1 = OBT Bit 4 (Sync. Source): 0 = internal; 1 = external Bit 5 (Ext. Sync. Source Detail): 0 = 1Hz Pulse; 1 = MIL-BUS Bit 6 (Sync. Status): 0 = NoSync; 1 = InSync Bit 7 (Sync. Enabled/Disabled): 0 = Disabled; 1 = Enabled

4.1.2.1.4.4.3 MSINominalISP

This is the Instrument Data Field for the MSI Nominal ISPs.

#	Field name	Description	Units	NetCDF C-Types	Size of each element	Number of elements	Total size	Value
1	stateVectorQuality	Contains details about the S/C state vector quality information as received from the S/C	units	NC_UINT	4	1	4	
2	ISPFormatVersion	Stores the version number of the ICD where the ISP format definition is specified. The most significant byte shall store the major version and the least significant byte shall store the minor version.	units	NC_USHORT	2	1	2	
3	QualityVector	Quality Information Vector	units	NC_USHORT	2	1	2	0
4	RawLine	Corresponding detector line (raw mode only)	units	NC_USHORT	2	1	2	0
5	InstrumentMode	MSIInstrumentModes enumeration	units	NC_CHAR	1	1	1	7
6	InstrumentSubMode	MSICalibrationModes enumeration	units	NC_CHAR	1	1	1	0
7	PixelValues	Pixel Values	units	NC_USHORT	2	384	768	0
8	AppendedCRC			AppendedCRC	2	1	2	
TOTAL:							782	

4.1.2.2 MSI_ANC_0_

4.1.2.2.1 Description

The specification of the ancillary L0 Product for the MSI Instrument is given hereafter.

4.1.2.2.2 Input data

The MSI Level-0 data is a reorganisation and collation of the ISPs specified in 4.1.2.2.4.3

Quality flags are computed as needed and stored in the L0 Products Header.

4.1.2.2.3 Auxiliary Data

No auxiliary data is needed apart from time correlation information in the case of invalid time stamps in the ISPs.

4.1.2.2.4 Product Structure

Table 4.1-9: Product Overview

Fixed Product Header
MSIANC_L0_MainProductHeader
L0 Specific Product Header
Instrument Source Packets

4.1.2.2.4.1 Fixed Product Header

See Products Definitions Volume 1.

4.1.2.2.4.2 MSIANC_L0_MainProductHeader

This is the Main Product Header for the MSI L0 Products. It is identical to the Main Product Header in Vol. 1 but has some predefined values specific to the MSI L0 product.

#	Field name	Units	NetCDF C-Types	Size of each element	Number of elements	Total size	Value
1	productName	unitless	NC_BYTE	55	1	55	
2	missionID	unitless	NC_BYTE	2	1	2	EC
3	fileClass	unitless	NC_BYTE	4	1	4	
4	fileCategory	unitless	NC_BYTE	4	1	4	MSI_
5	productType	unitless	NC_BYTE	3	1	3	
6	latency	unitless	NC_BYTE	1	1	1	
7	productLevel	unitless	NC_BYTE	2	1	2	0_
8	sensingStart	unitless	NC_BYTE	23	1	23	
9	sensingStop	unitless	NC_BYTE	23	1	23	
10	productVersion	unitless	NC_BYTE	4	1	4	
11	degradedProductQualityFlag	unitless	NC_SHORT	2	1	2	

12	processingMode	unitless	NC_BYTE	1	1	1	
13	dispositionMode	unitless	NC_BYTE	1	1	1	
14	description	unitless	NC_BYTE	1024	1	1024	
15	processorName	unitless	NC_BYTE	1024	1	1024	
16	processorMajorVersion	unitless	NC_SHORT	2	1	2	
17	processorMinorVersion	unitless	NC_SHORT	2	1	2	
18	formatVersion	unitless	NC_BYTE	26	1	26	
19	subsettedProduct	unitless	ECBool	1	1	1	
20	dataBlockSize	unitless	NC_UINT64	8	1	8	
21	productDuration	unitless	NC_UINT	4	1	4	
22	acquisitionStation	unitless	NC_BYTE	10	1	10	
23	processingCentre	unitless	NC_BYTE	4	1	4	
24	processingStart	unitless	NC_BYTE	23	1	23	
25	processingStop	unitless	NC_BYTE	23	1	23	
26	orbitStart	unitless	NC_USHORT	2	1	2	
27	orbitStop	unitless	NC_USHORT	2	1	2	
28	ANXTime	unitless	NC_BYTE	26	1	26	
29	ANXLongitude	unitless	NC_DOUBLE	8	1	8	
30	stateVectorSource	unitless	NC_BYTE	15	1	15	
31	stateVectorTimeStamp	unitless	NC_BYTE	26	1	26	
32	xPosition	unitless	NC_DOUBLE	8	1	8	
33	yPosition	unitless	NC_DOUBLE	8	1	8	
34	zPosition	unitless	NC_DOUBLE	8	1	8	
35	xVelocity	unitless	NC_DOUBLE	8	1	8	
36	yVelocity	unitless	NC_DOUBLE	8	1	8	
37	zVelocity	unitless	NC_DOUBLE	8	1	8	
38	subsatellitePointStart	unitless	GeographicCoordinates	45	1	45	
39	subsatellitePointStop	unitless	GeographicCoordinates	45	1	45	
TOTAL:						Size depends on XML format	

4.1.2.2.4.3 L0 Specific Product Header

See Products Definitions Volume 1.

4.1.2.2.4.4 Instrument Source Packets

4.1.2.2.4.4.1 MSI_ANC_PacketHeader Bit Vector Table

These are the actual values of the Packet Header for the Ancillary MSI ISP.

Parameter	MSB	Description	Value
Version_Number	b0 - b2	CCSDS Version Number	000b
Type	b3	Packet type	0b
Data_Field_Header_Flag	b4	Indicates the presence of a secondary (data field) header (when set to 1).	0x01
Application_Process_ID_PID	b5 - b11	Process ID (part of the APID)	0x44
Application_Process_ID_PCAT	b12 - b15	Packet category	as above...
Segmentation_Flags	b16 - b17	Indicates the grouping (segmentation) of TM source packets.	11b
Source_Sequence_Count	b18 - b31	Wrap around counter used to count each TM packet. For the ESSS in contrast to the PUS, only one counter for all APIDs is maintained.	source packet count value modulo 2 ¹⁴ (0 - 16383)
Packet_Length	b32 - b47	Number of bytes contained in the packet data field minus 1.	number of octets in packed data field - 1

4.1.2.2.4.4.2 MSI_ANC_PUSDataFieldHeader Bit Vector Table

These are the actual values of the PUS Data Field Header described in Vol. 1 for the MSI Ancillary ISP.

Parameter	MSB	Description	Value
Spare_1	b0	Not used.	Must be set to 0 for all TM source packets.
TM_Source_Packet_PUS_Version_Number	b1 - b3	Not used.	(0 was used for ESA PUS version) 1 for ECSS PUS
Spare_2	b4 - b7	Filler to complete the byte.	Must be set to 0 for all TM source packets
Service_Type	b8 - b15	Indicates the service to which the packet relates.	See [AD-110] and RD-04
Service_Subtype	b16 - b23	Indicates the service subtype to which the packet relates.	See [AD-110] and RD-04
Destination_ID	b24 - b31	Indicates the destination of the packet (May be omitted if only one destination exists).	0
Time	b32 - b87	Onboard time (OBT).	Coarse time: LSB = 1 sec Fine time: LSB = 1/16777215 sec
Time_Quality	b88 - b95	This shall give the status of the time reporting sub-service, i.e. current PPS source and whether synchronization is enabled.	Bit3 (Time type): 0 = Elapsed Time (ET); 1 = OBT Bit 4 (Sync. Source): 0 = internal; 1 = external Bit 5 (Ext. Sync. Source Detail): 0 = 1Hz Pulse; 1 = MIL-BUS Bit 6 (Sync. Status): 0 = NoSync; 1 = InSync Bit 7 (Sync. Enabled/Disabled): 0 = Disabled; 1 = Enabled

4.1.2.2.4.4.3 MSIAncillaryISP

This is the Instrument Data Field for the MSI Ancillary ISPs.

#	Field name	Description	Units	NetCDF C-Types	Size of each element	Number of elements	Total size	Value
1	stateVectorQuality	Contains details about the S/C state vector quality information as received from the S/C	units	NC_UINT	4	1	4	
2	ISPFormatVersion	Stores the version number of the ICD where the ISP format definition is specified. The most significant byte shall store the major version and the least significant byte shall store the minor version.	units	NC_USHORT	2	1	2	
3	TIROUTemp1	Detector Hot Side Temperature Sensor via FEE	K	NC_FLOAT	4	1	4	305
4	TIROUTemp2	Rear Reference Temperature	K	NC_FLOAT	4	1	4	303
5	TIROUTemp3	Dichroic Block Assembly Temperature	K	NC_FLOAT	4	1	4	303
6	TIROUTemp4	Lens 2 + Fold Mirror 1 Temperature	K	NC_FLOAT	4	1	4	303
7	TIROUTemp5	Lens 8 Sensor Temperature	K	NC_FLOAT	4	1	4	303
8	TIROUTemp6	Base Plate PID Sensor 1 Temperature	K	NC_FLOAT	4	1	4	303
9	TIROUTemp7	Base Plate PID Sensor 2 Temperature	K	NC_FLOAT	4	1	4	303
10	TIROUTemp8	TIROU Radiator PID Sensor 1 Temperature	K	NC_FLOAT	4	1	4	301
11	TIROUTemp9	TIROU Radiator PID Sensor 2 Temperature	K	NC_FLOAT	4	1	4	301
12	VNSOUTemp1	Lens Assembly (SWIR1/NIR/VIS) PID Sensor 1 Temperature	K	NC_FLOAT	4	1	4	303
13	VNSOUTemp2	Lens Assembly (SWIR1/NIR/VIS) PID Sensor 2 Temperature	K	NC_FLOAT	4	1	4	303
14	VNSOUTemp3	SWIR2 PID Sensor 1 Temperature	K	NC_FLOAT	4	1	4	230
15	VNSOUTemp4	SWIR2 PID Sensor 2 Temperature	K	NC_FLOAT	4	1	4	230
16	VNSOUTemp5	Decontamination heater Temperature sensor.	K	NC_FLOAT	4	1	4	303
17	OBTemp1	Optical Bench PID Sensor 1 Temperature	K	NC_FLOAT	4	1	4	303
18	OBTemp2	Optical Bench PID Sensor 2 Temperature	K	NC_FLOAT	4	1	4	303
19	OBTemp3	Optical Bench Bipod +X Temperature	K	NC_FLOAT	4	1	4	303
20	OBTemp4	Optical Bench Bipod -X Temperature	K	NC_FLOAT	4	1	4	303
21	FEETemp1	FEE Box Sensor Temperature	K	NC_FLOAT	4	1	4	283
22	CalBBTemp1	Calibration Black Body Temperature 1	K	NC_FLOAT	4	1	4	295
23	CalBBTemp2	Calibration Black Body Temperature 2	K	NC_FLOAT	4	1	4	295
24	TIR_VDDA	Detector Voltage Analogue Supply	V	NC_FLOAT	4	1	4	5
25	TIR_VDDL	Detector Voltage Logic Supply	V	NC_FLOAT	4	1	4	3.3
26	TIR_VBUS	Detector Voltage Bus Supply	V	NC_FLOAT	4	1	4	3.2
27	TIR_VFID	Detector Voltage FID Supply	V	NC_FLOAT	4	1	4	3.55

28	TIR_VSKIMMING	Detector Voltage SKIMMING Supply	V	NC_FLOAT	4	1	4	5.4
29	TIR_VEB	Detector Voltage EB Supply	V	NC_FLOAT	4	1	4	2.2
30	TIR_VVIDEO	Video Buffer Amp Supply Voltage	V	NC_FLOAT	4	1	4	6
31	TIR_ADC_REF	Analogue to Digital Converter Reference Voltage	V	NC_FLOAT	4	1	4	1.235 00000 00000 001
32	SWIR_2_VDDA	SWIR 2 Analogue Supply Voltage	V	NC_FLOAT	4	1	4	5
33	SWIR_2_VDET_REF	SWIR 2 Detector Reference Voltage	V	NC_FLOAT	4	1	4	3
34	SWIR_2_VVIDEO	SWIR 2 Video Buffer Amp Supply Voltage	V	NC_FLOAT	4	1	4	6
35	SWIR_2_ADC_REF	SWIR 2 Analogue to Digital Converter Reference Voltage	V	NC_FLOAT	4	1	4	1.235 00000 00000 001
36	SWIR_1_VDDA	SWIR 1 Analogue Supply Voltage	V	NC_FLOAT	4	1	4	5
37	SWIR_1_VDET_REF	SWIR 1 Detector Reference Voltage	V	NC_FLOAT	4	1	4	3
38	SWIR_1_VVIDEO	SWIR 1 Video Buffer Amp Supply Voltage	V	NC_FLOAT	4	1	4	6
39	SWIR_1_ADC_REF	SWIR 1 Analogue to Digital Converter Reference Voltage	V	NC_FLOAT	4	1	4	1.235 00000 00000 001
40	NIR_VDDA	NIR Analogue Supply Voltage	V	NC_FLOAT	4	1	4	5
41	NIR_VDET_REF	NIR Detector Reference Voltage	V	NC_FLOAT	4	1	4	3
42	NIR_VVIDEO	NIR Video Buffer Amp Supply Voltage	V	NC_FLOAT	4	1	4	6
43	NIR_ADC_REF	NIR Analogue to Digital Converter Reference Voltage	V	NC_FLOAT	4	1	4	1.235 00000 00000 001
44	VIS_VDDA	VIS Analogue Supply Voltage	V	NC_FLOAT	4	1	4	5
45	VIS_VDET_REF	VIS Detector Reference Voltage	V	NC_FLOAT	4	1	4	3
46	VIS_VVIDEO	VIS Video Buffer Amp Supply Voltage	V	NC_FLOAT	4	1	4	6
47	VIS_ADC_REF	VIS Analogue to Digital Converter Reference Voltage	V	NC_FLOAT	4	1	4	1.235 00000 00000 001
48	AppendedCRC			AppendedCRC	2	1	2	
TOTAL:							188	

