

FORMAT OF VISSR ARCHIVE DATA (GMS, GMS-2, GMS-3 and GMS-4)

1. VISSR IR DATA

(1) File specifications

Items	Specifications	Comments
Block length	14016bytes	Fixed length

Byte order : Big endian

Data type : I\*2(2-bytes Integer), I\*4(4-bytes Integer), R\*4(4-bytes Real),  
R\*8(8-bytes Real)

(2) File composition

(A) CONTROL BLOCK

Block	14016bytes
1	Control block

(B) IMAGE PARAMETER BLOCK

Block	2688bytes	2688bytes	1632bytes	2688bytes	2688bytes	1632byte
2	①Mode block	②Informat- ion of S/DB operation	Reserved	③IR calibration	④VIS calibration	Reserved
3	⑤Coordina- te transfo- rmation ar- ameters	⑥Attitude prediction data	Reserved	⑦Orbit prediction data	⑦Orbit prediction data	Reserved
4	⑧Informa- tion of DCD communicat- ion	Reserved	Reserved	Reserved	⑨ $\beta$ -angle sampling	Reserved
5	Same as the second block					
6	Same as the third block					
7	Same as the fourth block					

(C) IMAGE DATA BLOCK ( One block contains image data for two line)

Block	64bytes	256bytes	6688bytes	64bytes	256bytes	6688bytes
8- final	LCW	DOC	Image data	LCW	DOC	Image data

(3) File contents

(A) CONTROL BLOCK (Note: This block does not apply to VISSR archive data)

Position (bytes)	Items	Contents	Type
1-2	Control block size	Block size of IR image file =1	I*2
3-4	Head block number of parameter block	Parameter block number of IR image data file =2	I*2
5-6	Parameter block Number of image data	Parameter block size of IR image data file =6	I*2
7-8	Head block number	Parameter block number of IR image data file	I*2

	of image data	=8	
9-10	Total block size of image data	Total block size of image data	I*2
11-12	Available block size of image data	Available block size of image data	I*2
13-14	Head valid line number	Head valid line number of image data	I*2
15-16	Final valid line number	Line number of final input valid data	I*2
17-32	Reserved		-
33-	Address table	Block number of available data ( Not available = -1)	I*2

(B) IMAGE PARAMETER BLOCK

See Table-1 Contents of image parameter block

(C) IMAGE DATA BLOCK

LCW (Line Control Word)

Position (bytes)	Items	Contents	Type
1-4	Data ID	Higher 16 bits = Image segment, Lower 16bits = Data segment  Image segment 0000 = standard (part) observation 0008 = test observation Data segment 0001 = IR 1ch 0002 = VIS 1ch 0004 = VIS 2ch 0008 = VIS 3ch 0010 = VIS 4ch	-
5-8	Line number	Added by VISSR collection signal	I*4
9-12	Line name	Contents of VISSR data 00 = test data 01 = image data 04 = black body shutter data 08 = test 10 = annotation data 20 = gray scale data	I*4
13-16	Error line flag	Normal/Error line 0000 = normal line	I*4
17-20	Error message	Message number of S/DB mode error 0 = normal	I*4
21-24	Mode error flag	Bit data of S/DB mode error 0 = normal	I*4
25-32	Scan time	MJD of VISSR scan time	R*8
33-36	$\beta$ angle	Sun-Earth angle in radian	R*4
37-40	West side earth edge	Pixel position of west side earth edge	I*4
41-44	East side earth	Pixel position of east side earth edge	I*4

	edge		
45-52	Received time	Received time of host side	I*4
53-64	Reserved		-

DOC (Document)

Position (bytes)	Items	Contents	Type
65-320	DOC	Omitted	-

Image data

Position (bytes)	Items	Contents	Type
321-	Image data	Brightness value of each pixel (one byte/pixel)	Binary

## 1. VISSR VIS DATA

### (1) File specification

Items	Specification	Comments
Block length	27008bytes	Fixed length

Byte order : Big endian

Data type : I\*2(2-bytes Integer), I\*4(4-bytes Integer), R\*4(4-bytes Real),  
R\*8(8-bytes Real)

### (2) File composition

#### (A) CONTROL BLOCK

Block	27008byte
1	Control block
2	Control block (Same as first block)

#### (B) IMAGE PARAMETER BLOCK

Block	2688bytes	2688bytes	2688bytes	2688bytes	2752byte
3	①Mode block	②Information of S/DB operation	③IR calibration	④VIS calibration	Reserved
	⑤Coordinate transformation parameters	⑥Attitude prediction data	⑦Orbit prediction data	⑦Orbit prediction data	Reserved
4	⑧Information Of S/DB operation	Reserved	Reserved	⑨ $\beta$ -angle sampling	Reserved
	Reserved	Reserved	Reserved	Reserved	Reserved
5	Same as the third block				
6	Same as fourth block				

#### (C) IMAGE DATA BLOCK ( One block contains image data for two line)

Block	64bytes	64bytes	13376bytes	64bytes	64bytes	13376bytes
7-final	LCW	DOC	Image Data	LCW	DOC	Image Data

### (3) File contents

#### (A) Control Block (Note: This block does not apply to VISSR archive data)

Position (bytes)	Items	Contents	Type
1-2	Control block size	Number of control block =2	I*2
3-4	Head block number of parameter block	Head block-number of parameter block =3	I*2
5-6	Parameter block size	Number of parameter block =3	I*2
7-8	Head block number of image data	Head block-number of image data block =6	I*2
9-10	Total block line	Number of total block of image data	I*2

	size of image data		
11-12	Available block size of image data	Number of normal line of image data	I*2
13-14	Head valid line-number	Head line-number of image data	I*2
15-16	Final valid line-number	Line-number of final input available data	I*2
17-18	Final data block number	Block-number of final input data	I*2
19-32	Reserved		-
33-	Address table	Block-number of available data ( Not available = -1 )	I*2

(B) Image parameter block

See Table-1 Contents of image parameter block

(C) Image data block

LCW (Line Control Word)

Position (bytes)	Items	Contents	Type
1-4	Data ID	Higher 16 bits = Image segment, Lower 16bits = Data segment  Image segment 0000 = standard (part) observation 0008 = test observation Data segment 0001 = IR 1ch 0002 = VIS 1ch 0004 = VIS 2ch 0008 = VIS 3ch 0010 = VIS 4ch	-
5-8	Line number	Added by VISSR collection signal	I*4
9-12	Line name	Contents of VISSR data 01 = VISSR image data 08 = test 10 = annotation data 20 = gray scale data	I*4
13-16	Error line flag	Normal/Error line 0000 = normal line	-
17-20	Error message	Message number of S/DB mode error 0 = normal	I*4
21-24	Mode error flag	Bit data of S/DB mode error 0 = normal	I*4
25-32	Scan time	MJD of VISSR scan time	R*8
33-36	Beta angle	Sun-Earth angle in radian	R*4
37-40	West side earth edge	Pixel position of west side earth edge	I*4
41-44	East side earth edge	Pixel position of east side earth edge	I*4
45-52	Received time	Received time of host side	I*4
53-64	Reserved		-

DOC (ドキュメント)

Position (bytes)	Items	Contents	Type
65-128	DOC	Omitted	-

画像データ部

Position (bytes)	Items	Contents	Type
129-	Image data	Brightness value of each pixel (one byte/pixel)	Binary

Table-1: Contents of Image parameter block

① Mode block( The position is a relative address. 1word=4bytes)

Position (word)	Items	Contents	Type
1	Satellite number	Serial number of satellite	I*4
2-4	Satellite name	Satellite name (within 8 characters)	ASCII
5-8	Observation time	AD[UTC]	ASCII
9-10	Observation time	MJD	R*8
11	GMS operation mode	1 = S1 6 = S6 7 = S7 0 = Not specified	I*4
12	DPC operation mode	1 = Automatic 2 = Manual	I*4
13	VISSR observation mode	1 = Scheduled 2 = Wind vectors 3 = Unscheduled 4 = Special	I*4
14	Scanner selection	1 = Primary-1 2 = Redundant-1 11= Primary-2 12= Redundant-2 0 = Not specified	I*4
15	Sensor selection	1 = Primary 2 = Redundant 0 = Not specified	I*4
16	Sensor mode	1 = only VIS 2 = only IR 3 = VIS and IR 3 = Not specified	I*4
17	Scan frame mode	1 = Normal frame ( 2500 steps) 0 = Not specified	I*4
18	Scan mode	1 = Normal scan 2 = Partial scan 3 = Single scan 0 = Not specified	I*4
19	Upper limit of scan number	Scan line-number of upper limit	I*4
20	Lower limit of scan number	Scan line-number of lower limit	I*4
21	Equatorial scan line number	Line-number of equatorial scan	I*4
22	Spin rate	Rotational rate [spins/minute]	R*4
23-30	VIS frame parameters	23 Bit length 24 Number of lines 25 Number of pixels 26 Stepping angle 27 Sampling angle 28 LCW-pixel size 29 DOC-pixel size 30 reserved	I*4 I*4 I*4 R*4 R*4 I*4 I*4 -

31-38	IR frame parameters	31 Bit length 32 Number of lines 33 Number of pixels 34 Stepping angle 35 Sampling angle 36 LCW-pixel size 37 DOC-pixel size 38 reserved	I*4 I*4 I*4 R*4 R*4 I*4 I*4 -											
39	Satellite height	Nominal height of satellite = $3.59 \times 10^7$ m	R*4											
40	Earth radius	Earth radius = $6.3702895 \times 10^6$ m	R*4											
41	SSP-longitude	Nominal SSP-longitude	R*4											
42-50	Reserved		-											
51-60	Table of sensor trouble	51 VIS primary 1ch 52 VIS primary 2ch 53 VIS primary 3ch 54 VIS primary 4ch 55 VIS redundant 1ch 56 VIS redundant 2ch 57 VIS redundant 3ch 58 VIS redundant 4ch 59 IR1 primary 60 IR1 redundant (1 = VISSR sensor is available)	I*4											
61-100	Reserved		-											
101-140	Status tables of data relative address segment	Relative address <table border="1" style="margin-left: 20px;"> <tr> <td style="width: 20px; text-align: center;">0</td> <td>Data segment</td> </tr> <tr> <td style="text-align: center;">1</td> <td>Data presence</td> </tr> <tr> <td style="text-align: center;">2</td> <td rowspan="2">Generated day &amp; time</td> </tr> <tr> <td style="text-align: center;">3</td> </tr> </table> Data segment 1=Information of S/DB operation 2=IR1 calibration 3=VIS calibration 4=Parameters for coordinate transformation 5=Precise attitude prediction data 7=Rough attitude prediction data 8=DCD Communication data 0=Reserved Data presence 1=Exist 2=Not exist Data generation time <table border="1" style="margin-left: 20px;"> <tr> <td style="width: 40px; text-align: center;">YYMMDD</td> <td>Date</td> </tr> <tr> <td style="width: 40px; text-align: center;">hhmmss</td> <td>Time</td> </tr> </table>	0	Data segment	1	Data presence	2	Generated day & time	3	YYMMDD	Date	hhmmss	Time	I*4
0	Data segment													
1	Data presence													
2	Generated day & time													
3														
YYMMDD	Date													
hhmmss	Time													
141-672	Reserved		-											

② Information of S/DB operation  
Omitted

③ IR1 calibration table (The position is a relative address. 1word=4bytes)



Position (word)	Items	Contents	Type			
1	Data segment	2 = IR calibration record	I*4			
2	Data validity	1 = available 2 = not available	I*4			
3-4	Updated time	3 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>YYMMDD</td></tr></table> Date 4 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>hhmmss</td></tr></table> Time	YYMMDD	hhmmss	I*4	
YYMMDD						
hhmmss						
5	Sensor group	1 = primary 2 = redundant	I*4			
6	Table ID	Increment when the table is updated.	I*4			
7-8	Reserved		-			
9-264	Conversion table of equivalent black body radiation	Radiation[W/cm <sup>2</sup> *sr] to brightness  Brightness= 0 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>Radiation</td></tr></table> 1 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>Radiation</td></tr></table> ..... 255 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>Radiation</td></tr></table>	Radiation	Radiation	Radiation	R*4
Radiation						
Radiation						
Radiation						
265-520	Conversion table of equivalent black body temperature	Temperature[K] to brightness  Brightness= 0 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>Temperature</td></tr></table> 1 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>Temperature</td></tr></table> ..... 255 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>Temperature</td></tr></table>	Temperature	Temperature	Temperature	R*4
Temperature						
Temperature						
Temperature						
521-526	Staircase brightness data	Brightness and voltage used to calculate regression curve for electric correction	R*4			
527-536	Coefficients table of staircase regression curve	Coefficients table of staircase regression curve	R*4			
537-539	Brightness data for calibration	537 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>Brightness of space</td></tr></table> 538 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>Brightness of black body shutter</td></tr></table> 539 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>Reserved</td></tr></table>	Brightness of space	Brightness of black body shutter	Reserved	R*4
Brightness of space						
Brightness of black body shutter						
Reserved						
540-542	Voltage table for brightness of calibration	540 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>Voltage of space</td></tr></table> 541 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>Voltage of black body shutter</td></tr></table> 542 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>Reserved</td></tr></table>	Voltage of space	Voltage of black body shutter	Reserved	R*4
Voltage of space						
Voltage of black body shutter						
Reserved						
543-544	Calibration coefficients of radiation observation	Equation of calibration of radiation Observation is $V = G * E + V_0$  543 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>G</td></tr></table> 544 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>V<sub>0</sub></td></tr></table>	G	V <sub>0</sub>	R*4	
G						
V <sub>0</sub>						
545	Valid shutter Temperature	Valid shutter temperature [K]	R*4			

546	Valid shutter radiation	Valid shutter radiation [W/cm <sup>2</sup> *sr]	R*4																																																			
547-562	Telemetry data table	Telemetry data of calibration and VISSR temperature. <table border="1"> <thead> <tr> <th></th> <th>Flag =0 GMS-3</th> <th>Flag =1 GMS-4</th> </tr> </thead> <tbody> <tr> <td>547</td> <td>Shutter temp. 1 [°C]</td> <td>Shutter temp. [°C]</td> </tr> <tr> <td>548</td> <td>Shutter temp. 2 [°C]</td> <td>Redundant mirror temp. [°C]</td> </tr> <tr> <td>549</td> <td>Scanner temp. 1 [°C]</td> <td>Primary mirror temp. [°C]</td> </tr> <tr> <td>550</td> <td>Scanner temp. 2 [°C]</td> <td>Baffle FW temp. [°C]</td> </tr> <tr> <td>551</td> <td>Scanner temp. 3 [°C]</td> <td>Baffle AF temp. [°C]</td> </tr> <tr> <td>552</td> <td colspan="2">+15 volt auxiliary power supply [V]</td> </tr> <tr> <td>553</td> <td colspan="2">Radiative cooler temp. 1 [K]</td> </tr> <tr> <td>554</td> <td colspan="2">Radiative cooler temp. 2 [K]</td> </tr> <tr> <td>555</td> <td colspan="2">Electronics module temp. [°C]</td> </tr> <tr> <td>556</td> <td colspan="2">Reserved</td> </tr> <tr> <td>557</td> <td colspan="2">Reserved</td> </tr> <tr> <td>558</td> <td colspan="2">Reserved</td> </tr> <tr> <td>559</td> <td colspan="2">Reserved</td> </tr> <tr> <td>560</td> <td colspan="2">Reserved</td> </tr> <tr> <td>561</td> <td colspan="2">Reserved</td> </tr> <tr> <td>562</td> <td colspan="2">Reserved</td> </tr> </tbody> </table>		Flag =0 GMS-3	Flag =1 GMS-4	547	Shutter temp. 1 [°C]	Shutter temp. [°C]	548	Shutter temp. 2 [°C]	Redundant mirror temp. [°C]	549	Scanner temp. 1 [°C]	Primary mirror temp. [°C]	550	Scanner temp. 2 [°C]	Baffle FW temp. [°C]	551	Scanner temp. 3 [°C]	Baffle AF temp. [°C]	552	+15 volt auxiliary power supply [V]		553	Radiative cooler temp. 1 [K]		554	Radiative cooler temp. 2 [K]		555	Electronics module temp. [°C]		556	Reserved		557	Reserved		558	Reserved		559	Reserved		560	Reserved		561	Reserved		562	Reserved		R*4
	Flag =0 GMS-3	Flag =1 GMS-4																																																				
547	Shutter temp. 1 [°C]	Shutter temp. [°C]																																																				
548	Shutter temp. 2 [°C]	Redundant mirror temp. [°C]																																																				
549	Scanner temp. 1 [°C]	Primary mirror temp. [°C]																																																				
550	Scanner temp. 2 [°C]	Baffle FW temp. [°C]																																																				
551	Scanner temp. 3 [°C]	Baffle AF temp. [°C]																																																				
552	+15 volt auxiliary power supply [V]																																																					
553	Radiative cooler temp. 1 [K]																																																					
554	Radiative cooler temp. 2 [K]																																																					
555	Electronics module temp. [°C]																																																					
556	Reserved																																																					
557	Reserved																																																					
558	Reserved																																																					
559	Reserved																																																					
560	Reserved																																																					
561	Reserved																																																					
562	Reserved																																																					
563	Flag of valid shutter temperature calculation	0 = GMS-3 方式 1 = GMS-4 方式	I*4																																																			
564-672	Reserved		-																																																			

④ VIS Calibration data (The position is a relative address. 1word=4bytes)

Position (word)	Items	Contents	Type						
1	Data segment	3 = VIS calibration	I*4						
2	Data validity	1 = available 2 = not available	I*4						
3-4	Data generation Time[UTC]	<table border="1"> <tr> <td>3</td> <td>YYMMDD</td> <td>Date</td> </tr> <tr> <td>4</td> <td>hhmmss</td> <td>Time</td> </tr> </table>	3	YYMMDD	Date	4	hhmmss	Time	I*4
3	YYMMDD	Date							
4	hhmmss	Time							
5	Sensor group	Sensor group calibration table of primary or redundant 3 (MSB)      2      1      0 (LSB) <table border="1"> <tr> <td>VIS ch. 1</td> <td>VIS ch. 2</td> <td>VIS ch. 3</td> <td>VIS ch. 4</td> </tr> </table> 1 = primary 2 = redundant	VIS ch. 1	VIS ch. 2	VIS ch. 3	VIS ch. 4	I*4		
VIS ch. 1	VIS ch. 2	VIS ch. 3	VIS ch. 4						
6-105	VIS1 calibration Table	See Table④-1	-						

106-205	VIS2 calibration table	See Table④-1	-
206-305	VIS3 calibration table	See Table④-1	-
306-405	VIS4 calibration table	See Table④-1	-
406-672	Reserved		-

④-1 Contents of VIS channel calibration table  
(The position is a relative address. 1word=4bytes)

Position (word)	Items	Contents	Type			
0	Channel number	Channel number =1~4	I*4			
1	Data validity	1 = available 2 = not available	I*4			
2-3	Updated time	2 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>YYMMDD</td></tr> </table> Date 3 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>hhmmss</td></tr> </table> Time	YYMMDD	hhmmss	I*4	
YYMMDD						
hhmmss						
4	Table ID	Increment when the table is updated.	I*4			
5-68	Brightness-albedo conversion table	0 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>Albedo</td></tr> </table> Albedo = 0~1 1 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>Albedo</td></tr> </table> ..... 63 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>Albedo</td></tr> </table>	Albedo	Albedo	Albedo	R*4
Albedo						
Albedo						
Albedo						
69-74	VIS channel staircase brightness data	Brightness and voltage used to calculate the electric calibration regression curve	R*4			
75-84	Coefficients table of VIS staircase regression curve	Coefficients of VIS staircase regression Curve	R*4			
85-86	Brightness table for calibration	85 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>Universal space brightness</td></tr> </table> 86 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>Solar brightness</td></tr> </table>	Universal space brightness	Solar brightness	R*4	
Universal space brightness						
Solar brightness						
87-88	Calibration uses brightness correspondence voltage chart	87 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>Universal space voltage</td></tr> </table> 88 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>Solar voltage</td></tr> </table>	Universal space voltage	Solar voltage	R*4	
Universal space voltage						
Solar voltage						
89-90	Calibration coefficients of radiation observation	Equation of calibration of radiation Observation is $V = G * E + V_0$ 89 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>G</td></tr> </table> 90 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>V<sub>0</sub></td></tr> </table>	G	V <sub>0</sub>	R*4	
G						
V <sub>0</sub>						
91-99	Reserved		-			

⑤ Coordinate conversion parameters segment

(The position is a relative address. 1word=4bytes)

Position (word)	Items	Contents	Type						
1	Data segment	4 = Coordinate transformation parameters	I*4						
2	Reserved		-						
3-4	Data generation time	Generation time of this block parameters 3 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td>YYMMDD</td><td> </td></tr></table> Date 4 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td>hhmmss</td><td> </td></tr></table> Time		YYMMDD			hhmmss		I*4
	YYMMDD								
	hhmmss								
5-6	Scheduled	Scheduled observation time [MJD]	R*8						
7-10	Stepping angle along line	7 VIS channel 8 IR channel 9 VIS channel solar observation 10 IR channel solar observation	R*4						
11-14	Sampling angle along pixel	11 VIS channel 12 IR channel 13 VIS channel solar observation 14 IR channel solar observation	R*4						
15-18	Central line number of VISSR frame	15 VIS channel 16 IR channel 17 VIS channel solar observation 18 IR channel solar observation	R*4						
19-22	Center pixel number of VISSR frame	19 VIS channel 20 IR channel 21 VIS channel solar observation 22 IR channel solar observation	R*4						
23-26	Pixel difference of VISSR center from the normal position	23 VIS channel 24 IR channel 25 VIS channel solar observation 26 IR channel solar observation	R*4						
27-30	Number of sensor elements	27 VIS channel 28 IR channel 29 VIS channel solar observation 30 IR channel solar observation	R*4						
31-34	Total number of VISSR frame lines	31 VIS channel 32 IR channel 33 VIS channel solar observation 34 IR channel solar observation	R*4						

35-38	Total number of VISSR frame pixels	35 VIS channel 36 IR channel 37 VIS channel solar observation 38 IR channel solar observation	R*4
39-41	VISSR misalignment	39 x-component : $\delta a$ 40 y-component : $\delta b$ 41 z-component : $\delta c$	R*4
42-50	Matrix of misalignment	$\text{ELMIS} = \begin{pmatrix} \cos \delta c & \sin \delta c & 0 \\ -\sin \delta c & \cos \delta c & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} \cos \delta b & 0 & -\sin \delta b \\ 0 & 1 & 0 \\ \sin \delta b & 0 & \cos \delta b \end{pmatrix}$ $\times \begin{pmatrix} 1 & 0 & 0 \\ 0 & \cos \delta a & \sin \delta a \\ 0 & -\sin \delta a & \cos \delta a \end{pmatrix}$ ELMIS(1, 1) = CC × CB ELMIS(2, 1) = -SC × CB ELMIS(3, 1) = SB ELMIS(1, 2) = CC × SB × SA + SC × CA ELMIS(2, 2) = -SC × SB × SA + CC × CA ELMIS(3, 2) = -CB × SA ELMIS(1, 3) = -CC × SB × CA + SC × SA ELMIS(2, 3) = SC × SB × CA + CC × SA ELMIS(3, 3) = CB × CA where, SA= $\sin \delta a$ , CA= $\cos \delta a$ SB= $\sin \delta b$ , CB= $\cos \delta b$ SC= $\sin \delta c$ , CC= $\cos \delta c$	R*4
51-65	Parameters	51 Judgement of observation convergence time 52 Judgement of line convergence 53 E-W angle of Sun-light condense prism 54 N-S angle of Sun-light condense prism 55 $\pi$ 56 $\pi/180$ 57 $180/\pi$ 58 Equatorial radius 59 Oblateness of earth 60 Eccentricity of the earth orbit 61 First angle of VISSR observation in S/DB 62 Upper limited line of the 2nd prism for VIS solar observation 63 Lower limited line of the 1st prism for VIS solar observation 64 Upper limited line of the 3rd prism for VIS solar observation 65 Lower limited line of the 2nd prism for VIS solar observation	R*4

66-100	Reserved		-
101-118	Orbital parameters	101-102 Epoch time[MJD] 103-104 Semi-major axis 105-106 Eccentricity 107-108 Orbital inclination 109-110 Longitude of the ascending node 111-112 Argument of perigee 113-114 Mean anomaly 115-116 Longitude of SSP 117-118 Latitude of SSP	R*8
119-120	Reserved		-
121-132	Attitude parameters	121-122 Epoch time[MJD] 123-124 Angle between Z-axis and satellite spin axis at the epoch time 125-126 Angle change rate between spin axis and Z-axis 127-128 Angle between spin axis and ZY-axis 129-130 Angle change rate between spin axis and ZY-axis 131-132 Daily mean of spin rate[RPM]	R*8
133-672	Reserved		-

⑥ Attitude prediction (The position is a relative address. 1word=4bytes)

Position (word)	Items	Contents	Type				
1	データ区分	5 = Precise attitude prediction data 6 = Rough attitude prediction data	I*4				
2	Data validity	1 = available 2 = not available	I*4				
3-4	Data generation time	3 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px;">YYMMDD</td> <td>Date</td> </tr> <tr> <td>hhmmss</td> <td>Time</td> </tr> </table> 4	YYMMDD	Date	hhmmss	Time	I*4
YYMMDD	Date						
hhmmss	Time						
5-6	Start time	Start time of attitude prediction[MJD]	R*8				
7-8	End time	End time of attitude prediction[MJD]	R*8				
9-10	Prediction interval time	Interval time of attitude prediction[MJD]	R*8				
11	Number of prediction	Number of attitude prediction	I*4				
12	Data size	Number of attitude prediction data set	I*4				
13-672	Attitude prediction data	Attitude prediction data 1-33 (See ⑥-1)	-				

⑥-1 Contents of attitude prediction data (The position is a relative address. 1word=4bytes)

Position (word)	Items	Contents	Type				
0-1	Prediction time	Prediction time[MJD]	R*8				
2-3	Prediction time	Prediction time[UTC] 3 <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px;">YYMMDD</td> <td>Date</td> </tr> <tr> <td>hhmmss</td> <td>Time</td> </tr> </table> 4	YYMMDD	Date	hhmmss	Time	I*4
YYMMDD	Date						
hhmmss	Time						

4-5	Right ascension of attitude	Predicted right ascension of attitude[rad]	R*8
6-7	Declination of attitude	Predicted declination of attitude[rad]	R*8
8-9	Sun-earth angle	Sun-earth angle at prediction time	R*8
10-11	Spin rate	Satellite spin rate at prediction time	R*8
12-13	Right ascension of orbital plane	Right ascension of orbital plane at prediction time	R*8
14-15	Declination of orbital plane	Declination of orbital plane at prediction time	R*8
16-17	Reserved		-
18	Eclipse flag	0 = Out of eclipse period 1 = In eclipse period	I*4
19	Spin axis flag	0 = within 0.5degree 1 = beyond 0.5degree	I*4

⑦ Orbit prediction (The position is a relative address. 1word=4bytes)

Position (word)	Items	Contents	Type						
1	Data segment	7 = Orbit prediction data	I*4						
2	Data validity	1 = available 2 = not available	I*4						
3-4	Data generation time	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">YYMMDD</td> <td>Date</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">hhmmss</td> <td>Time</td> </tr> </table>	3	YYMMDD	Date	4	hhmmss	Time	I*4
3	YYMMDD	Date							
4	hhmmss	Time							
5-6	Start time	Start time of orbit prediction[MJD]	R*8						
7-8	End time	End time of orbit prediction[MJD]	R*8						
9-10	Prediction interval time	Interval time of orbit prediction[MJD]	R*8						
11	Number of prediction	Number of orbit prediction	I*4						
12	Data size	Number of orbit prediction data set	I*4						
13-642	Orbit prediction data	Orbit prediction data 1-9 (See ⑦-1)	-						
643-672	Reserved		-						

⑦-1 Contents of orbit prediction data (The position is a relative address. 1word=4bytes)

Position (word)	Items	Contents	Type						
0-1	Prediction time	Prediction time[MJD]	R*8						
2-3	Prediction time	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">YYMMDD</td> <td>Date</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">hhmmss</td> <td>Time</td> </tr> </table>	2	YYMMDD	Date	3	hhmmss	Time	I*4
2	YYMMDD	Date							
3	hhmmss	Time							
4-15	Satellite position and velocity in the 1950.0 yearly mean inertial coordinate system	4-5 X-component of position 6-7 Y-component of position 8-9 Z-component of position 10-11 X-component of velocity 12-13 X-component of velocity 14-15 X-component of velocity	R*8						

16-27	Satellite position and velocity in the earth-fixed coordinate system	16-17 X-component of position 18-19 Y-component of position 20-21 Z-component of position 22-23 X-component of velocity 24-25 X-component of velocity 26-27 X-component of velocity	R*8
28-29	Greenwich sidereal time	Greenwich sidereal time	R*8
30-33	Sun-directional vector	Vector from Satellite to Sun in 1950.0 yearly mean inertial coordinate system 30-31 Azimuth 32-33 Elevation	R*8
34-37	Sun-directional Vector	Vector from Satellite to Sun in the earth-fixed coordinate system 34-35 Azimuth 36-37 Elevation	R*8
38-55	Conversion matrix A <sub>1</sub> -A <sub>9</sub>	Matrix to convert from 1950.0 yearly mean inertial coordinate system(X, Y, Z) to the earth-fixed coordinate system(x, y, z) $\begin{pmatrix} X \\ y \\ z \end{pmatrix}^T = \begin{pmatrix} A_1 & A_4 & A_7 \\ A_2 & A_5 & A_8 \\ A_3 & A_6 & A_9 \end{pmatrix} \begin{pmatrix} X \\ Y \\ Z \end{pmatrix}^M$	R*8
56-61	Moon Directional vector	Vector from Satellite to Moon in 1950.0 yearly mean inertial coordinate system 56-57 X-component of vector 58-59 Y-component of vector 60-61 Z-component of vector	R*8
62-67	Satellite position	62-63 Latitude of SSP 64-65 Longitude of SSP 66-67 Satellite height	R*8
68	Eclipse period flag	0 = out of eclipse period 1 = in eclipse period	I*4
69	Reserved		-

⑧ DCD Communication  
Omitted

⑨  $\beta$ -angle sampling  
Omitted

(September 21 2016)