





Herschel/Planck Frequency Plans

Product Code : 000000

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Entité Emettrice : Alcatel Space - Cannes
(détentrice de l'original) :

HERSCHEL/PLANCK		DISTRIBUTION RECORD	
DOCUMENT NUMBER : H-P-1-ASPI-PL-0201		Issue <u>2</u> / Rev. : <u>0</u> Date: <u>09/07/2004</u>	
EXTERNAL DISTRIBUTION		INTERNAL DISTRIBUTION	
ESA	X	HP team	X
ASTRIUM	X		
ALENIA	X		
CONTRAVES			
TICRA			
TECNOLOGICA			
		Clf Documentation	Orig.

ENREGISTREMENT DES EVOLUTIONS / CHANGE RECORDS

ISSUE	DATE	§ : DESCRIPTION DES EVOLUTIONS § : CHANGE RECORD	REDACTEUR AUTHOR
<p>1 1.1 <u>2.0</u></p>	<p>03/05/2002 23/01/2003 <u>09/07/2004</u></p>	<p>Initial issue <u>Update of frequency tables</u></p>	<p><u>J. Gallagher</u></p>

TABLE OF CONTENTS

1. SCOPE	6
2. DOCUMENTS	7
2.1 Applicable documents	7
2.2 Reference documents	7
3. ACRONYMS	8
3.1 SVM acronyms	8
3.2 HPLM acronyms	8
3.3 SPIRE acronyms	8
3.4 PACS acronyms	8
3.5 HIFI acronyms	9
3.6 LFI acronyms	9
3.7 HFI acronyms	9
4. SVM FREQUENCY PLAN	10
4.1 XPND	10
4.2 TWTA	11
4.3 ACC	11
4.4 RCS	11
4.5 GYR	12
4.6 STR	12
4.7 RWE	12
4.8 SAS	12
4.9 QRS	12
4.10 CDMU	13
4.11 PCDU	14

4.12	SREM	14
4.13	FOG	14
5.	HERSCHEL PLM FREQUENCY PLAN	15
5.1	CCU	15
5.2	SPIRE	16
5.3	PACS	17
5.4	HIFI	19
6.	PLANCK PLM FREQUENCY PLAN	22
6.1	LFI	22
6.2	Sorption Cooler	23
6.3	HFI	24

1. SCOPE

The present document is a summary of the various SVM and Instruments frequency plans.

It is meant to be used as a reference document for engineering purpose.

In case of discrepancy with the Instrument Interface Documents part B, they shall take precedence.

2. DOCUMENTS

2.1 Applicable documents

[AD-01] First/Planck System Requirements Specification (SRS), SCI-PT-RS-05991, [Issue 3.2](#)

[AD-02] IID Part A, SCI-PT-IIDA-04624, Issue [3.1](#), [12/02/2004](#)

[AD-03] IID Part B, Bolometer Instrument, SCI-PT-IIDB/SPIRE-02124, Issue [3.2](#), 01/[03/2004](#)

[AD-04] IID Part B, Heterodyne Instrument, SCI-PT-IIDB/HIFI-02125, Issue [3.2](#), [05/03/2004](#)

[AD-05] IID Part B, Photoconductor Instrument, SCI-PT-IIDB/PACS-02126, Issue [3.2](#), [02/03/2004](#)

[AD-06] IID Part B, HFI, SCI-PT-IIDB/HFI-04141, Issue [3.1](#), [05/03/2004](#)

[AD-07] IID Part B, LFI, SCI-PT-IIDB/LFI-04142, Issue [3.0](#), [30/04/2004](#)

[\[AD-08\] Sorption Cooler ICD, PL-LFI-PST-ID-002](#), Issue [3.0](#), [05/03/2004](#)

[AD-09] Ariane 5 user manual, Issue 3/Rev. 00 - March 2000

[AD-10] General Design and Interface Requirements, H-P-1-ASPI-SP-0027, [Issue 4.2](#)

[AD-11] EMC Specification, H-P-1-ASPI-SP-0037, [Issue 4](#)

[AD-12] EMC/ESD Control Plan, H-P-1-ASPI-PL-0038, [Issue 3.1](#)

2.2 Reference documents

- PACS EMC Control Plan & Frequency Plan, PACS-ME-PL-015, Draft 0.2, 14-01-02
- Draft Planck HFI EMC Control Plan, PL-PH251-200168-IAS, Issue 0, Rev 0, [18/06/2002](#)
- Alenia Fax "Herschel-Planck : SVM Frequency Plan", SIEL/EC/02-0034

3. ACRONYMS

ADC : Analogue to Digital Converter
CV : Converter
DPU : Digital Processing Unit
DSP : Digital Signal Processor
FPU : Focal Plane Unit
HK : Housekeeping

3.1 SVM acronyms

ACC : Attitude Control Computer
CDMS : Central Data Management Subsystem
CDMU : Central Data Management Unit
FOG: Fibre Optic Gyro
GYR : Gyro Blocks
PCDU : Power Control and Distribution Unit
QRS : Quartz Rate Sensor
RCS : Reaction Control System
RWE : Reaction Wheels Equipment
SAS : Sun Acquisition Sensor
SREM : Standard Radiation Environment Monitor
STR : Star Trackers
XPND: Transponder
TWTA: Travelling Wave Tube Amplifier

3.2 HPLM acronyms

CCU : Cryostat Control Unit

3.3 SPIRE acronyms

MCU :
DCU : Detection Control Unit
SCU :

3.4 PACS acronyms

BOLC : BOLOmeter and cooler Control unit
DEC : DEtector Control unit
MEC : MEchanism Control unit
SPU : Signal Processing Unit

3.5 HIFI acronyms

FHIFH : IF up-converter Horizontal

FHIFV : IF up-converter Vertical

FHFPU : HIFI Focal Plane Unit

FHFCU : HIFI Focal plane Control Unit

FHLOU : HIFI Local Oscillator Unit

FHLCU : HIFI Local oscillator Control Unit

FHLOR : HFLOU radiator

FHLSU : HIFI Local oscillator Source Unit

FHLWU : HIFI Local oscillator Wave-guide Unit

FHHRV : HIFI High Resolution spectrometer, Vertical polarisation

FHHRH : HIFI High Resolution spectrometer, Horizontal polarisation

FHICU : HIFI Instrument Control Unit

FHWEH : HIFI Wide Band Spectrometer Electronics Horizontal Polarisation

FHWEV : HIFI Wide Band Spectrometer Electronics Vertical Polarisation

FHWOH : HIFI Wide Band Spectrometer Optics Horizontal Polarisation

FHWOV : HIFI Wide Band Spectrometer Optics Vertical Polarisation

FHWIH : HIFI Warm Interconnect Harness

3.6 LFI acronyms

DAE : Data Acquisition Electronics

REBA : Radiometer Electronics Box Assembly

3.7 HFI acronyms

REU : Readout Electronics Unit

4. SVM FREQUENCY PLAN

4.1 XPND

Source : Fax "Herschel-Planck : SVM Frequency Plan", SIEL/EC/02-0034, from Alenia

XPND receiver F0	9.62330796	MHz	Herschel	XPND
XPND receiver 4F0	38.49323182	MHz	Herschel	XPND
XPND receiver 19F0	182.8428512	MHz	Herschel	XPND
XPND receiver 24 F0	230.959391	MHz	Herschel	XPND
X-Band Uplink (749F0)	7207.857662	MHz	Herschel	XPND
XPND receiver 768F0	7390.700513	MHz	Herschel	XPND
XPND transmitter 4F0	38.49323182	MHz	Herschel	XPND
XPND transmitter 40F0	384.9323182	MHz	Herschel	XPND
XPND transmitter 80F0	769.8646368	MHz	Herschel	XPND
XPND transmitter 240F0	2309.593910	MHz	Herschel	XPND
XPND transmitter 640F0	6158.917094	MHz	Herschel	XPND
X-Band Downlink (880F0)	8468.511005	MHz	Herschel	XPND

XPND receiver F0	9.607955	MHz	Planck	XPND
XPND receiver 4F0	38.431818	MHz	Planck	XPND
XPND receiver 19F0	182.551145	MHz	Planck	XPND
XPND receiver 24 F0	230.590920	MHz	Planck	XPND
X-Band Uplink (749F0)	7196.358295	MHz	Planck	XPND
XPND receiver 768F0	7378.909440	MHz	Planck	XPND
XPND transmitter 4F0	38.431818	MHz	Planck	XPND
XPND transmitter 40F0	384.318200	MHz	Planck	XPND
XPND transmitter 80F0	768.636400	MHz	Planck	XPND
XPND transmitter 240F0	2305.909200	MHz	Planck	XPND
XPND transmitter 640F0	6149.091200	MHz	Planck	XPND
X-Band Downlink (880F0)	8455.000400	MHz	Planck	XPND

XPND TM data clock	500	Hz	Low rate	XPND
XPND TM data clock	5	kHz	Low rate	XPND
XPND TM data clock	107	kHz	Medium rate	XPND
XPND TM data clock	1,5	MHz	High rate	XPND
XPND TM Subcarrier	45,844	kHz		XPND
XPND TC data clock	125	Hz		XPND
XPND TC data clock	4	kHz		XPND
XPND clock	20,647800	MHz		XPND
XPND Rx/Tx DC/DC converter	TBD			XPND

4.2 TWTA

Source : Fax "Herschel-Planck : SVM Frequency Plan", SIEL/EC/02-0034, from Alenia

TWTA X-Band Downlink	8468,5	MHz	Herschel, 7MHz BW	TWTA
TWTA X-Band Downlink	8455,0	MHz	Planck, 7MHz BW	TWTA

4.3 ACC

Source : P-HPL-NOT-00058-SE-4

PM Osc I	40	MHz	ERC32SC	ACC
PM Osc I	20	MHz	COCOS ASIC	ACC
PM Osc I	20	MHz	SpaceWire	ACC
PM Osc II	16	MHz	1553 Modules	ACC
PM Osc II	16	MHz	OBDH Module	ACC
RM Osc	16	MHz	CROME ASIC	ACC
RM Osc	1	MHz	MIL-1553 Bus	ACC
RM Osc	16	MHz	SpaceWire	ACC
OBT (PPS)	1	Hz	COCOS ASIC	ACC
ObtClk on PM	8388608	Hz	COCOS ASIC	ACC
ObtClk on RM	8388608	Hz	CROME ASIC	ACC
Mil-1553 (output)	1	MHz		ACC
OBDH bus (litton code)	1	MHz		ACC
ACMS sync signal	4	Hz		ACC
PCDH	180	kHz	PS Converter	ACC
PCDH	130	kHz		ACC

4.4 RCS

Source : Fax "Herschel-Planck : SVM Frequency Plan", SIEL/EC/02-0034, from Alenia

RCS PWM	TBD		RCS
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4.5 GYR

Source : Fax "Herschel-Planck : SVM Frequency Plan", SIEL/EC/02-0034, from Alenia

GYR DC/DC converter	TBD			GYR
GYR TM/TC Module DC/DC converter	TBD			GYR
GYR Oscillators/Clocks	TBD			GYR
GYR Command & Monitoring clock	TBD			GYR
GYR main bus clock 1553	1	MHz		GYR

4.6 STR

Source : Fax "Herschel-Planck : SVM Frequency Plan", SIEL/EC/02-0034, from Alenia

STR DC/DC converter	TBD			STR
STR TM/TC Module DC/DC converter	TBD			STR
STR Oscillators/Clocks	TBD			STR
STR Command & Monitoring clock	TBD			STR
STR main bus clock 1553	1	MHz		STR

4.7 RWE

Source : Fax "Herschel-Planck : SVM Frequency Plan", SIEL/EC/02-0034, from Alenia

RWE DC/DC converter	TBD			RWE
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4.8 SAS

Source : Fax "Herschel-Planck : SVM Frequency Plan", SIEL/EC/02-0034, from Alenia

SAS DC/DC converter	TBD			SAS
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4.9 QRS

Source : Fax "Herschel-Planck : SVM Frequency Plan", SIEL/EC/02-0034, from Alenia

QRS DC/DC converter	550	kHz	(TBC)	QRS
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4.10 CDMU

Source : P-HPL-NOT-00058-SE-4

CDMU PM Osc I	40	MHz	ERC32TSC	CDMU
CDMU PM Osc I	20	MHz	COCOS ASIC	CDMU
CDMU PM Osc I	20	MHz	SpaceWire	CDMU
PM Osc II	16	MHz	1553 Module	CDMU
PM Osc II	16	MHz	OBDH Module	CDMU
TTR Osc	16	MHz	CROME ASIC	CDMU
	16	MHz	SpaceWire	CDMU
	1	MHz	MIL-1553 bus	CDMU
	250	kHz	PacketWire	CDMU
Spacecraft data bus protocol subframe frequency	64	Hz		CDMU
Tme Oscillator	6.882511	MHz	CROME ASIC	CDMU
TC	125	Hz	CROME ASIC	CDMU
TC	4	kHz	CROME ASIC	CDMU
TM info bit rate	500	Hz		CDMU
TM info bit rate	5	kHz		CDMU
TM info bit rate	150	kHz		CDMU
TM info bit rate	1,5	MHz		CDMU
TM symbol rate	1147	Hz		CDMU
TM symbol rate	11,47	kHz		CDMU
TM symbol rate	344	kHz		CDMU
TM symbol rate	3,44	MHz		CDMU
TM sub carrier	Not used			CDMU
OBT (PPS)	1	Hz	Major BSW cycle	CDMU
ObtClk	8388608	Hz		CDMU
Mil-1553	1	MHz		CDMU
MM Osc I	40	MHz		CDMU
MM Osc I	20	MHz	SpaceWire	CDMU
MM Osc I	10	MHz	ASIC + SDRAM	CDMU
MM Osc I	2,5	MHz	TM PacketWire	CDMU
MM Osc II	16	MHz		CDMU
MM Osc II	1	MHz	MIL-1553 Bus	CDMU
OBDH bus	1	MHz		CDMU
External Sync	131072	Hz		CDMU
ML/DS Clk	250	kHz		CDMU
ML/DS Data	125	kHz		CDMU
ML/DS Sample	15625	Hz		CDMU
ML/DS Sample	7812	Hz		CDMU
PCDH	180	kHz	PS Converter	CDMU
PCDH	130	kHz		CDMU

4.11 PCDUSource : ND_040510_0100_Frequency Plan - ETCA

PCDU BDR switching	90 to 110	kHz	2 unsynchronised BDR's	PCDU
PCDU S3R switching	350 to 3000	Hz		PCDU
PCDU BDR low level	180 to 220	kHz	2 unsynchronised BDR's	PCDU
PCDU μ ST pump charge	500	kHz		PCDU
PCDU Oscillators/Clocks	7 to 13	MHz	μ ST backup clock	PCDU
PCDU Oscillators/Clocks	10	MHz	LVDS databus	PCDU
PCDU Oscillators/Clocks	12	MHz	FPGA	PCDU
PCDU μ ST ADC FONS	5	MHz		PCDU
PCDU Mil-1553 databus	1	MHz		PCDU

4.12 SREM

Source : Fax "Herschel-Planck : SVM Frequency Plan", SIEL/EC/02-0034, from Alenia

SREM DC/DC converter	TBD			SREM
SREM Oscillators/Clocks	TBD			SREM

4.13 FOGSource : FOG-ICD-345-T-ASTR_01

DC/DC CV with free running PWM frequency	235,5	kHz	+/- 6 % (no external frequency synchronisation)	FOG
ASIC functions, Oscillator frequency	16	MHz		FOG
Gyroscope loop and ASIC functions, Oscillator frequency	14 or 12,8 17,28	MHz (Astrix 200), or MHz(Astrix 120), MHz (Astrix 90).		FOG

5. HERSCHEL PLM FREQUENCY PLAN

5.1 CCU

Source : [HP-2-ASED-PL-0013, issue 3](#)

CCU DC/DC CV	100	kHz	+/-10% free running	Cryostat
CCU 1553 Quartz	16	MHz	D.C.: 33...67%	Cryostat
AD Conversion out	400	kHz		Cryostat
DC/DC converter internal sync signal	100	kHz		Cryostat
CCU 1553 Clock	1	MHz		Cryostat

5.2 SPIRE

Source : [SCI-PT-IIDB/SPIRE-02124, issue 3.2](#)

DCU Cmd IF Clock	312	kHz	RS422, rectangular, differential	SPIRE
DCU Data IF	1 to 2.5	MHz	RS422, rectangular, differential	SPIRE
DCU Master Clock	10	MHz	rectangular, Crystal Oscillator internal to unit	SPIRE
DCU Bolometer Bias	50 to 300	Hz	Sine, Signal level 100mV, differential, Highly sensitive signal	SPIRE
DCU T/C Bias	50 to 300	Hz	Sine, Signal level 500mV, differential, Highly sensitive signal	SPIRE
MCU Cmd IF Clock	312	kHz	RS422, rectangular, differential	SPIRE
MCU Data IF Clock	1 to 2.5	MHz	RS422, rectangular, differential	SPIRE
MCU Master Clock	40	MHz	Crystal Oscillator internal to unit	SPIRE
MCU DSP Clock	20	MHz	Master clock / 2 internal to unit	SPIRE
MCU LVDT Excitation	2,5	kHz	Sine, 3V, Differential +/- 20%	SPIRE
MCU DAC change	3.0 to 10	kHz	10V, Internal to unit	SPIRE
MCU Position encoder	0 to 2.5	kHz	Sine, 3mV, differential, 250Hz at nominal speed	SPIRE
SCU Cmd IF Clock	312	kHz	RS422	SPIRE
SCU Data IF	1 to 2.5	MHz	RS422	SPIRE
SCU Master Clock	10	MHz	Crystal Oscillator internal to unit	SPIRE
SCU 300mK TS bias	20	Hz	Rect., Signal level 6mV, tr/tf = 1ms, Highly sensitive	SPIRE
SCU Photo Stimulus	0 to 5	Hz	Rect.	
PSU DC/DC CV	131	kHz	Free running +/- 10%, internal to unit	SPIRE

5.3 PACS

Source : [SCI-PT-IIDB/PACS-02126, issue 3.2](#)

DPU 1553 Quartz	16	MHz	5V rect.	PACS
DPU clock	20	MHz	5V rect.	PACS
DPU DC/DC converter	131,072	kHz	56Vpp	PACS
DPU HK	4	kHz	5V rect.	PACS
DPU science data	120	kHz	subframes	PACS
DPU science data	50	kHz	subframes	PACS
DPU science data	300	kHz	subframes	PACS
DPU-MEC IEEE 1355 over RS422	10	MHz	3V rect. (LVDS)	PACS
DPU-SPU IEEE 1355 over RS422	10	MHz	3V rect. (LVDS)	PACS
SPU Main oscillator	36	MHz	5V (TBC) rect.	PACS
SPU processor (DSP)	18	MHz	5V (TBC) rect.	PACS
SPU DC/DC converter	131	kHz		PACS
DEC CRE clock	8192	Hz	5V square (cryoharness)	PACS
DEC CRE sync	256	Hz	5V pulse (cryoharness)	PACS
DEC internal logic	max. 18	MHz	3.3 V square (with FPGA)	PACS
DEC/MEC commun.	10	MHz	1V pulse/square (LVDS)	PACS
DEC power supply	64 TBC	kHz	square or sine 12 V TBC (on backplane)	PACS
DEC-MEC clock	8192	Hz	1V square (LVDS)	PACS
DEC-MEC sync	256	Hz	1V pulse (LVDS)	PACS
DEC-SPU Detector readout	4	MHz	5V rect.	PACS
DEC-SPU IEEE 1355	10	MHz	3V rect. (LVDS)	PACS
DEC DC/DC CV	128 TBC	kHz	28V TBC pulse (PWM) internal to CV	PACS

MEC DSP clock	36	MHz	5V TBC square (DSP module internal)	PACS
MEC DSP clock	18	MHz	5V TBC square (DSP and backplane)	PACS
MEC IEEE 1355 clock	10	MHz	5V TBC square (DSP and backplane)	PACS
MEC Inductosyn	16384	Hz	30V square and sine TBC (sine to cryoharness)	PACS
MEC HK	8192	Hz	5V TBC square (FPGA and backplane)	PACS
MEC Chopper	f0 = DC to 5	Hz	Photometer (f0 = trapez. + harmonics up to 2 kHz), 30Vp, cryoharness	PACS
MEC Chopper	f0 = DC to 8	Hz	Spectrometer, waveform TBC, cryoharness	PACS
MEC grating	4	Hz	30Vpp TBC pulse, cryoharness	PACS
MEC calibration sources	0 TBC	Hz	slowly varying, 1V TBC	PACS
MEC temp. Sensors	1 TBC	Hz	slowly varying, 1V TBC	PACS
MEC filter wheels	TBD	Hz	30Vpp TBC pulse, cryoharness	PACS
BOLC main oscillator	20	MHz	5V rect.	PACS
BOLC DC/DC CV(s)	131 TBC	kHz	56Vpp TBC	PACS
BOLC ADC readout/ LVDS	5	MHz	0.3V	PACS
BOLC-MEC IEEE 1355/ LVDS	10	MHz	3V rect.	PACS
BOLC-MEC Sync./ LVDS	40	Hz	0.3V rect.	PACS
BOLC-FPU 0.3K temp. probe	20	Hz	0.012Vpp rect.	PACS
BOLC-Bolometer Add.	100	kHz	3Vmax rect., 1 burst @ 640 Hz	PACS
BOLC-Other bolo. clocks	100	kHz	1Vmax rect.	PACS

5.4 HIFI

Source : [SCI-PT-IIDB/HIFI-02125 issue 3.2](#)

FHLOU Multiplier	1704 to 1908	GHz	-20dBm	HIFI
FHLOU Multiplier	1418 to 1584	GHz	-16dBm	HIFI
FHLOU Multiplier	1200 to 1242	GHz	0dBm	HIFI
FHLOU Multiplier	1127 to 1200	GHz	-6dBm	HIFI
FHLOU Multiplier	852 to 954	GHz	3dBm	HIFI
FHLOU Multiplier	807 to 848	GHz	4dBm	HIFI
FHLOU Multiplier	704 to 796	GHz	5dBm	HIFI
FHLOU Multiplier	647 to 793	GHz	5dBm	HIFI
FHLOU Multiplier	488 to 633	GHz	5dBm	HIFI
FHLOU Multiplier	400 to 450	GHz	18dBm	HIFI
FHLOU Multiplier	396 to 416	GHz	13dBm	HIFI
FHLOU Multiplier	352 to 396	GHz	16dBm	HIFI
FHLOU Multiplier	284 to 318	GHz	18dBm	HIFI
FHLOU Multiplier	200 to 225	GHz	23dBm	HIFI
FHLOU Multiplier	198 to 200	GHz	20dBm	HIFI
FHLOU Multiplier	176 to 198	GHz	23dBm	HIFI
FHLOU Multiplier	142 to 159	GHz	23dBm	HIFI
FHLOU Multiplier	88 to 112,5	GHz	30dBm	HIFI
FHLOU Multiplier	79,5 to 88	GHz	28dBm	HIFI
FHLOU Multiplier	71 to 79,5	GHz	31dBm	HIFI
FHLSU output to FHLOU	23.7 to 35.7	GHz	26 dBm	HIFI
FHLSU YIG tuned oscillator (loop 3)	7.9 to 11.9	GHz	24 dBm	HIFI
FHLSU YIG tuned oscillator (loop 2)	8.5 to 10.5	GHz	13 dBm	HIFI
FHLSU PLO (loop 1)	8	GHz	13 dBm	HIFI
FHLSU PLO (internal)	4	GHz	13 dBm	HIFI
FHLSU mixer output	0.5 to 2.5	GHz	4 dBm	HIFI
FHLSU master oscillator	10	MHz	12 dBm	HIFI
Ref to FHHRH/FHHRV and FHWEH/FHWEV	10	MHz	4 dBm	HIFI
FHLSU command from FHLCU	2,5	kHz	5 V	HIFI
FHLCU micro-controller clock	10	MHz	5 V	HIFI
FHLCU command and HK from/to FHICU	312,5	kHz	5 V	HIFI
FHLCU DC/DC converter	131	kHz	+/- 10 %	HIFI
FHLCU command to FHLSU	2,5	kHz	5 V	HIFI

FHFPU IF signal to FHIFH/FHIFV (sensitivity level for HRS operational)	2.4 to 4.8	GHz	Nominal power level -68dBm/MHz Interference limit : -155 dBm	HIFI
FHFPU astronomical signal	1410 to 1910	GHz	Interference limit : -145 dBm	HIFI
FHFPU astronomical signal	480 to 1250	GHz	Interference limit : -151 dBm	HIFI
FHFPU IF output to FH3DH/FH3DV (HRS operational)	3.5 to 9	GHz	Nominal power level -82dBm/MHz Interference limit : -155 dBm	HIFI
FHIFH/FHIFV DRO signal, +/-40MHz	10,4	GHz	+17dBm	HIFI
FHIFH/FHIFV IF signal from FHFPU - IF signal to FHHRH/FHHRV and FHWEH/FHWEV (sensitivity level for HRS operational)	4 to 8	GHz	Nominal power level -90dBm/MHz Interference limit : -125 dBm	HIFI
FHIFH/FHIFV IF signal from FHFPU (sensitivity level for HRS operational)	2,4 to 4,8	GHz	Nominal power level -74dBm/MHz Interference limit : -109 dBm	HIFI
FHFCU command and HK from/to FHICU	312,5	kHz	5 V	HIFI
FHFCU command and HK	200	kHz	5 V	HIFI
FHFCU position sensors	5	kHz	5 V / 1 mA	HIFI
FHFCU ADC sample rate	2	kHz	5 V	HIFI
FHFCU mechanism control loop	1	kHz	5 V	HIFI
FHFCU temperature control loop	10	Hz	5 V	HIFI
FHFCU chopper actuator	5	Hz	30 mAp / 12 Vp	HIFI
FHHRH/FHHRV(IFproc) local oscillators	13 to 17	GHz	20 dBm	HIFI
FHHRH/FHHRV(IFproc) local oscillators	10,5	GHz	15 dBm	HIFI
FHHRH/FHHRV(IFproc) astronomical signal	9 to 10	GHz	-55dBm/MHz (nominal) interference limit : -30dB below min signal power, in 100kHz	HIFI
FHHRH/FHHRV(IFproc) IF signal from FHFCU	3.5 to 9	GHz	-65dBm/MHz (nominal) interference limit : -127 dBm	HIFI
FHHRH/FHHRV(IFproc) astronomical signal	1 to 1.5	GHz	-40dBm/MHz (nominal) interference limit : -110 dBm	HIFI
FHHRH/FHHRV(IFproc) local oscillators	1,25	GHz	15 dBm	HIFI
FHHRH/FHHRV(IFproc) ref. from FHLSU	10	MHz	4 dBm	HIFI
FHHRH/FHHRV(IFproc) ref. to ACS	10	MHz	0 dBm	HIFI
FHHRH/FHHRV(IFproc) signal to FHHRH/FHHRV	0 - 250	MHz	-38dBm/MHz (nominal) interference limit : -110 dBm	HIFI
FHHRH/FHHRV(IFproc) command from FHHRH/FHHRV	312,5	kHz	5 V	HIFI

FHHRH/FHHRV(ACS+electronics) ACS clock	550	MHz	12 dBm	HIFI
FHHRH/FHHRV(ACS+electronics) ref. from FHHRI	10	MHz	0 dBm	HIFI
FHHRH/FHHRV(ACS+electronics) FPGA clock (synchronous with the ref. from FHHRI)	10	MHz	3.3 V	HIFI
FHHRH/FHHRV(ACS+electronics) astronomical signal from FHHRI	0 - 250	MHz	interference limit : -110 dBm	HIFI
FHHRH/FHHRV(ACS+electronics) HK/science data to FHICU	2,5	MHz	5 V	HIFI
FHHRH/FHHRV(ACS+electronics) command from FHICU and command to FHHRH/FHHRV	312,5	kHz	5 V	HIFI
FHHRH/FHHRV(ACS+electronics) DC/DC converter	131	kHz	+/- 10%	HIFI
FHWEH/FHWEV IF signal from FHFCU	3.5 to 9	GHz	-90dBm/MHz interference limit : -120 dBm	HIFI
FHWEH/FHWEV DRO	6,6	GHz	13 dBm	HIFI
FHWEH/FHWEV DRO	7,6	GHz	13 dBm	HIFI
FHWEH/FHWEV DRO	8,6	GHz	13 dBm	HIFI
FHWEH/FHWEV DRO	9,6	GHz	13 dBm	HIFI
FHWEH/FHWEV IF signal to FHWOH/FHWOV	1.55 to 2.65	GHz	7dBm/GHz (nominal)	HIFI
FHWEH/FHWEV comb generator	100	MHz	23 dBm	HIFI
FHWEH/FHWEV ref. from FHLSU	10	MHz	4 dBm	HIFI
FHWEH/FHWEV basic timing clock	10	MHz	5 V	HIFI
FHWEH/FHWEV command from FHICU	312,5	kHz	5 V	HIFI
FHWEH/FHWEV video signal from FHWOH/FHWOV	250	kHz	Pixel clock	HIFI
	100	Hz	Transfer clock	
FHWEH/FHWEV pixel clock and HK/science data to FHICU	250	kHz	5 V	HIFI
FHWEH/FHWEV DC/DC converter	550	kHz	+/-10%	HIFI
FHWEH/FHWEV transfer clock	100	Hz	5 V	HIFI
FHWOH/FHWOV IF signal from FHWEH/FHWEV	1.55 to 2.65	GHz	7dBm/GHz (nominal)	HIFI
FHWOH/FHWOV video signal to FHWEH/FHWEV	250	kHz	Pixel clock	HIFI
	100	Hz	Transfer clock	
FHWOH/FHWOV pixel clock	250	kHz	5 V	HIFI
FHWOH/FHWOV transfer clock	100	Hz	5 V	HIFI
FHICU DSP clock	20	MHz	5 V	HIFI
FHICU 1553 chip clock	16	MHz	5 V	HIFI
FHICU HK/science data from HRS	2,5	MHz	5 V	HIFI
FHICU CDMS bus clock	1	MHz	5 V	HIFI
FHICU command and HK	312,5	kHz	5 V	HIFI
FHICU HK/science data from WBS	250	kHz	5 V	HIFI
FHICU DC/DC converter	131	kHz	+/- 10% ; 540 mA	HIFI
FHICU TM packet equivalent (nominal)	100	kHz	5 V	HIFI
FHICU TC packet equivalent	4	kHz	5 V	HIFI

PLANCK PLM FREQUENCY PLAN

6.1 LFI

Source : [SCI-PT-IIDB-LFI-04142 issue 3](#)

FEM Phase switch (50% duty cycle)	4096	Hz		LFI
DAE Power Box DC/DC converters PWM	131,072	kHz		LFI
DAE Power Box Command link from BEU box	1	MHz		LFI
DAE BEU Box On Board Clock signal	131,072	kHz		LFI
DAE BEU Box Sync signal from the REBA	1	Hz		LFI
DAE BEU Box Phase Switch	4096	Hz		LFI
DAE BEU Box Science data sampling	8192	Hz		LFI
DAE BEU Box Sequencer internal clock	20	MHz		LFI
DAE BEU Box HK acquisition frequency	1	Hz		LFI
DAE BEU Box 1355 serial data digital interface	10/80	MHz		LFI
DAE BEU Box Internal transfer of digital data	1	MHz		LFI
REBA DC/DC converters PWM	131,072	kHz	(TBC)	LFI
REBA On Board Clock signal	131,072	kHz		LFI
REBA Sync signal to the DAE	1	Hz		LFI
REBA 1553B bus	1	MHz		LFI
REBA 1355 serial data digital interface	10/80	MHz		LFI
REBA DSP clock	17,46	MHz		LFI

6.2 Sorption Cooler

Source : PL-LFI-PST-ID-002 issue 3.0

SC DSP processor clock	16	MHz	quartz	SC
SC 1553 bus	1	MHz	from 16 MHz quartz	SC
SC LOBT Clock	131,072	kHz	from S/C	SC
SC 12V DC/DC CV (1 unit)	200	kHz	(free running)	SC
SC 5 & 15V DC/DC CV	100	kHz	(free running)	SC
SC internal timer	10	Hz	from 16 MHz quartz	SC
SC ADC clock	8	MHz	from 16 MHz quartz	SC
SC Lockin clocks (3 units)	1	kHz	from 16 MHz quartz	SC

6.3 HFI

Source : [SCI-PT-IIDB-HFI-04141 issue 3.1](#)

DPU processor clock	20	MHz		HFI
DPU High Speed Link clock	2	MHz	from DPU 20 MHz	HFI
DPU 1553 clock	1	MHz	from 16 MHz quartz	HFI
DPU low speed link I/F	100	kHz	from 20 MHz	HFI
DPU DC/DC CV (5V & 15V)	100	kHz	(free running)	HFI
REU processor clock	20	MHz	from 40 MHz quartz	HFI
REU modulation	70-90	Hz	twice 4K compressors from 40 MHz	HFI
REU bolometers sampling	140-200	Hz	from 40 MHz quartz	HFI
REU ADC sampling	6,3-8,1	kHz	from 40 MHz quartz	HFI
REU FPGA clock	138-180	kHz	from 40 MHz	HFI
REU DC/DC CV	100	kHz	free running	HFI
or	131	kHz	from 40 MHz quartz	HFI
REU High Speed Link clock	2	MHz	from DPU	HFI
4K FO Cooler compressors	35-45	Hz	from REU (35-45 if free-running)	HFI
4K Cooler Sine Samples	6.3-8.1	kHz	from REU FOx180 (6.3-8.1 kHz if free-running)	HFI
4K Cooler low speed link I/F	100	kHz		HFI
4K Cooler DC/DC CV	100	kHz	(free running)	HFI
4K Cooler Processor Oscillator	40	MHz		HFI
4K Cooler Processor Clock Rate	20	MHz		HFI
4K Cooler Power Amplifiers	75	kHz	(67-75kHz if free-running)	HFI
4K Cooler PPO Power supply	495-605	kHz	i.e. 550kHz +/- 10%	HFI
4K Cooler Other Power supplie	250	kHz	(225-275 in free-running)	HFI
4K Cooler Getter PWM	78.125	kHz		HFI
0.1K Cooler DC/DC CV (5V & 15V)	100	kHz	(free running)	HFI
0.1K Cooler low speed link I/F	100	kHz	from DPU	HFI

END OF DOCUMENT