



Herschel SPIRE DPU Physical Properties Test Procedures

Ref.: SPIRE-IFS-PRC-001589

Issue: 1

Date: 8/04/2003

Herschel SPIRE DPU Physical Properties Test Procedure

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Issue 1

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Acronyms

ASI	Agenzia Spaziale Italiana (Italian Space Agency)
AVM	AVionic Model
CDMS	Central Data Management System
CDMU	Central Data Management Unit
CGS	Carlo Gavazzi Space
EEPROM	Electrically Erasable Programmable Read Only Memory
EGSE	Electrical Ground Support Equipment
EIDP	End Item Data Package
EMC	ElectroMagnetic Compatibility
ESD	Electro Static Discharge
EQM	Electrical Qualification Model
DPU	Digital Processing Unit
FIRST	Far Infra-Red and Sub-millimetre Telescope
FCU	Focal plane Control Unit
FM	Flight Model
FP S/S	Focal Plane sub-system
FPU	Focal Plane Unit
FS	Flight Spare
HIFI	Heterodyne Instrument for First
HK	House-Keeping
HRS	High Resolution Spectrometer
HRSU	High Resolution Spectrometer Unit
HW	HardWare
IC	Instrument Control
ICD	Interface Control Document
ICE	In Circuit Emulator
ICU	Instrument Control Unit
I/F	Interface
ILT	Instrument Level Test
LCU	Local oscillator Control Unit
LOA	Local Oscillator Assembly
LO S/S	Local Oscillator sub-system
LOU	Local Oscillator Unit
NCR	Non Conformance Report



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OBS	On Board Software
PA	Product Assurance
PACS	Photoconductor Array Camera and Spectrometer
PFM	Proto Flight Model
PROM	Programmable Read Only memory
QA	Quality Assurance
QM	Qualification Model
S/C	Spacecraft
S/S	Subsystem
SPIRE	Spectral and Photometric Imaging Receiver
SW	SoftWare
TBC	To Be Confirmed
TBD	To Be Defined
TBW	To Be Written
TLP	Transfer Layer Protocol
TRB	Test Review Board
TRRB	Test Readiness Review Board
UR	User Requirement
URD	UR Document
VCD	Verification Control Document
WBS S/S	Wide Band Spectrometer sub-system
WBSU	Wide Band Spectrometer Unit

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1 INTRODUCTION

1.1 General

The content of this procedure is based on the DPU model philosophy and the DPU subsystem specification (AD03), the DPU product tree; it is consistent with the interface documents AD01 and AD02. This document specifies how the physical tests (metrological tests) will be carried-out on the DPU, to be sure that the DPU fulfils its mechanical interfaces with the S/C.

The subsystem that is delivered for integration and tests at instrument level consists of an electronic box called DPU and of the On Board Software both appropriate for each of the delivered models.

1.2 Scope

This document describes the detailed procedure with pass/fail criteria for the various measurements. This procedure applies to the following deliverable models of the DPU subsystem:

- AVM subsystem
- EQM subsystem
- FM subsystem

The letters AVM, EQM and FM identify these models respectively.

1.3 Objectives

Verification by means of testing of the DPU subsystem with respect to the subsystem specification, especially with reference to AD01, AD02, AD03 and RD09.

1.4 Tools

Normal mechanical tools are used to carry out the measurements, moreover:

- the mass will be measured with an automatic electronic weighing machine;

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- the CoG will be measured with the help of a reference plane with a sharp edge and suitable simple measurements for the three axes;
- the MoI will not be measured but computed .

2 DOCUMENTS

2.1 Applicable Documents

AD	Name
01	Herschel/Planck Instrument Interface Document, part A
02	Herschel/Planck Instrument Interface Document, part B-Instrument SPIRE
03	Herschel SPIRE DPU Subsystem Specification Document
05	DPU/ICU P.A.Plan

2.2 Reference Documents

RD	Title
01	SPIRE DPU HW User manual
02	SPIRE DPU Electrical Test Procedure
03	CPU BOARD Test Procedure
04	I/F BOARD Test Procedure
05	DC/DC BOARD Test Procedure
06	DPU Vibration Test Procedure
07	DPU Thermal Vacuum Test Procedure
08	DPU EMC Test Procedure
09	SPIRE DPU Box Interface Control Drawing

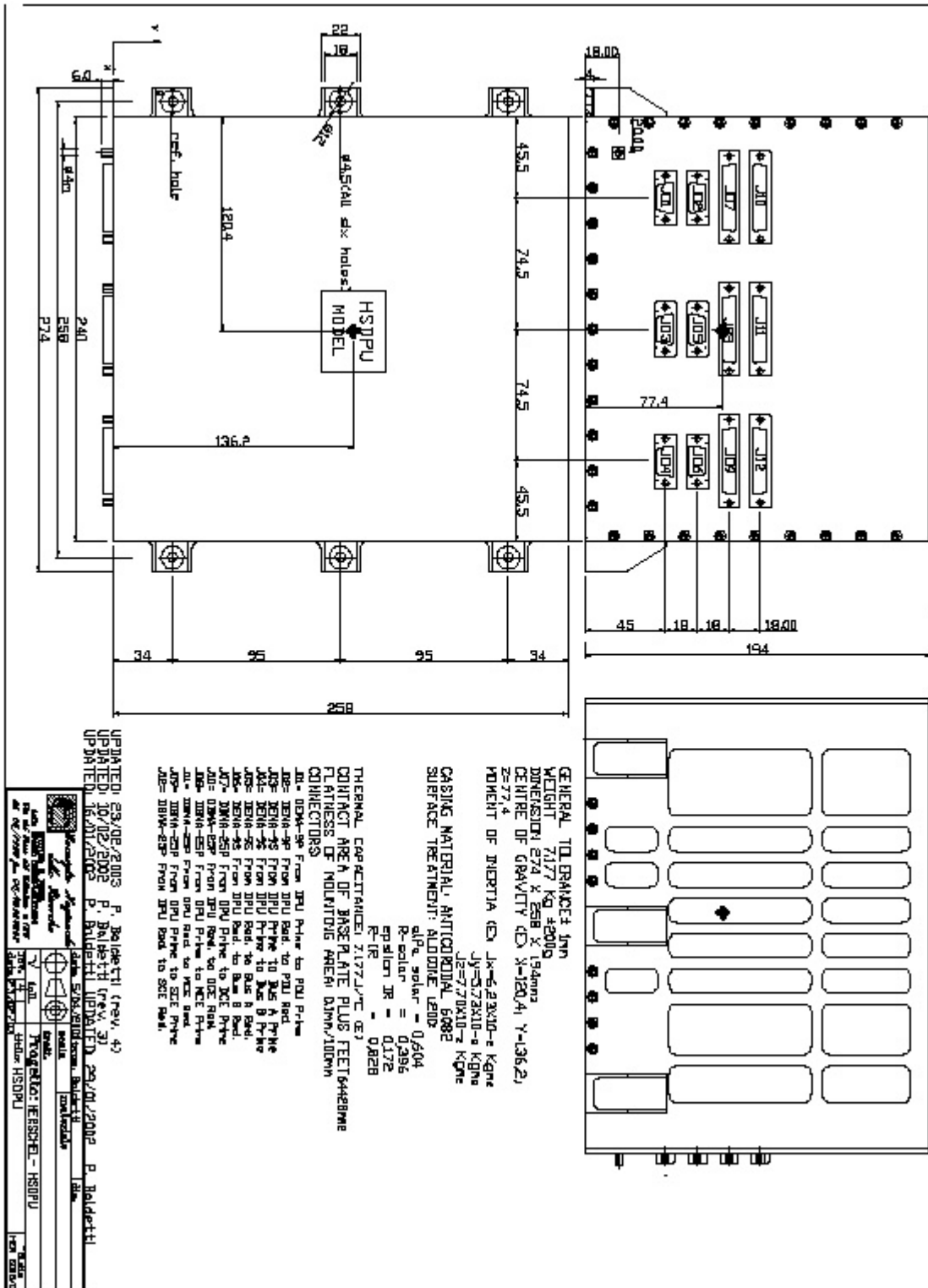


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UPDATED 29/08/2003 P. Baldeutti (rev. 4)
 UPDATED 10/02/2002 P. Baldeutti (rev. 3)
 UPDATED 16/01/2002 P. Baldeutti (rev. 2)
 UPDATED 16/01/2002 P. Baldeutti (rev. 1)

Rev.	Date	Author	Checker	Appr.
1	16/01/2002	P. Baldeutti	P. Baldeutti	P. Baldeutti
2	16/01/2002	P. Baldeutti	P. Baldeutti	P. Baldeutti
3	10/02/2002	P. Baldeutti	P. Baldeutti	P. Baldeutti
4	29/08/2003	P. Baldeutti	P. Baldeutti	P. Baldeutti

GENERAL TOLERANCES: JMN
 WEIGHT 7177 Kg ±200g
 DIMENSION 874 X 858 X 194mm
 CENTRE OF GRAVITY (X=120.4, Y=136.2, Z=77.4)
 MOMENT OF INERTIA (X=6.29X10⁻⁴ Kg/m², Y=0.77X10⁻⁴ Kg/m², Z=0.77X10⁻⁴ Kg/m²)
 CASING MATERIAL: ALUMINUM 6082
 SURFACE TREATMENT: ANODINE 1200
 THERMAL CHARACTERISTICS: T177J/T (C)
 CONTACT AREA OF BASEPLATE PLUS FEET: 6488mm²
 FLATNESS (E) NOMINATING AREA: 0.1mm/100mm
 CONNECTORS:
 J10- J10M-50P From JPU Pin to JPU Pin
 J11- J11M-50P From JPU Pin to JPU Pin
 J12- J12M-50P From JPU Pin to JPU Pin
 J13- J13M-50P From JPU Pin to JPU Pin
 J14- J14M-50P From JPU Pin to JPU Pin
 J15- J15M-50P From JPU Pin to JPU Pin
 J16- J16M-50P From JPU Pin to JPU Pin
 J17- J17M-50P From JPU Pin to JPU Pin
 J18- J18M-50P From JPU Pin to JPU Pin
 J19- J19M-50P From JPU Pin to JPU Pin
 J20- J20M-50P From JPU Pin to JPU Pin
 J21- J21M-50P From JPU Pin to JPU Pin
 J22- J22M-50P From JPU Pin to JPU Pin
 J23- J23M-50P From JPU Pin to JPU Pin
 J24- J24M-50P From JPU Pin to JPU Pin
 J25- J25M-50P From JPU Pin to JPU Pin
 J26- J26M-50P From JPU Pin to JPU Pin
 J27- J27M-50P From JPU Pin to JPU Pin
 J28- J28M-50P From JPU Pin to JPU Pin
 J29- J29M-50P From JPU Pin to JPU Pin
 J30- J30M-50P From JPU Pin to JPU Pin
 J31- J31M-50P From JPU Pin to JPU Pin
 J32- J32M-50P From JPU Pin to JPU Pin
 J33- J33M-50P From JPU Pin to JPU Pin
 J34- J34M-50P From JPU Pin to JPU Pin
 J35- J35M-50P From JPU Pin to JPU Pin
 J36- J36M-50P From JPU Pin to JPU Pin
 J37- J37M-50P From JPU Pin to JPU Pin
 J38- J38M-50P From JPU Pin to JPU Pin
 J39- J39M-50P From JPU Pin to JPU Pin
 J40- J40M-50P From JPU Pin to JPU Pin
 J41- J41M-50P From JPU Pin to JPU Pin
 J42- J42M-50P From JPU Pin to JPU Pin
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 J45- J45M-50P From JPU Pin to JPU Pin
 J46- J46M-50P From JPU Pin to JPU Pin
 J47- J47M-50P From JPU Pin to JPU Pin
 J48- J48M-50P From JPU Pin to JPU Pin
 J49- J49M-50P From JPU Pin to JPU Pin
 J50- J50M-50P From JPU Pin to JPU Pin
 J51- J51M-50P From JPU Pin to JPU Pin
 J52- J52M-50P From JPU Pin to JPU Pin
 J53- J53M-50P From JPU Pin to JPU Pin
 J54- J54M-50P From JPU Pin to JPU Pin
 J55- J55M-50P From JPU Pin to JPU Pin
 J56- J56M-50P From JPU Pin to JPU Pin
 J57- J57M-50P From JPU Pin to JPU Pin
 J58- J58M-50P From JPU Pin to JPU Pin
 J59- J59M-50P From JPU Pin to JPU Pin
 J60- J60M-50P From JPU Pin to JPU Pin
 J61- J61M-50P From JPU Pin to JPU Pin
 J62- J62M-50P From JPU Pin to JPU Pin
 J63- J63M-50P From JPU Pin to JPU Pin
 J64- J64M-50P From JPU Pin to JPU Pin
 J65- J65M-50P From JPU Pin to JPU Pin
 J66- J66M-50P From JPU Pin to JPU Pin
 J67- J67M-50P From JPU Pin to JPU Pin
 J68- J68M-50P From JPU Pin to JPU Pin
 J69- J69M-50P From JPU Pin to JPU Pin
 J70- J70M-50P From JPU Pin to JPU Pin
 J71- J71M-50P From JPU Pin to JPU Pin
 J72- J72M-50P From JPU Pin to JPU Pin
 J73- J73M-50P From JPU Pin to JPU Pin
 J74- J74M-50P From JPU Pin to JPU Pin
 J75- J75M-50P From JPU Pin to JPU Pin
 J76- J76M-50P From JPU Pin to JPU Pin
 J77- J77M-50P From JPU Pin to JPU Pin
 J78- J78M-50P From JPU Pin to JPU Pin
 J79- J79M-50P From JPU Pin to JPU Pin
 J80- J80M-50P From JPU Pin to JPU Pin
 J81- J81M-50P From JPU Pin to JPU Pin
 J82- J82M-50P From JPU Pin to JPU Pin
 J83- J83M-50P From JPU Pin to JPU Pin
 J84- J84M-50P From JPU Pin to JPU Pin
 J85- J85M-50P From JPU Pin to JPU Pin
 J86- J86M-50P From JPU Pin to JPU Pin
 J87- J87M-50P From JPU Pin to JPU Pin
 J88- J88M-50P From JPU Pin to JPU Pin
 J89- J89M-50P From JPU Pin to JPU Pin
 J90- J90M-50P From JPU Pin to JPU Pin
 J91- J91M-50P From JPU Pin to JPU Pin
 J92- J92M-50P From JPU Pin to JPU Pin
 J93- J93M-50P From JPU Pin to JPU Pin
 J94- J94M-50P From JPU Pin to JPU Pin
 J95- J95M-50P From JPU Pin to JPU Pin
 J96- J96M-50P From JPU Pin to JPU Pin
 J97- J97M-50P From JPU Pin to JPU Pin
 J98- J98M-50P From JPU Pin to JPU Pin
 J99- J99M-50P From JPU Pin to JPU Pin
 J100- J100M-50P From JPU Pin to JPU Pin

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3 METROLOGICAL MEASUREMENTS OF THE DPU BOX (RD09)

With reference to the box interface control drawing shown in page 8:

MEASUREMENT	NOMINAL (mm)	ACTUAL	PASS/FAIL
3.1 Dimensions			
X (without feet)	240 + - 1		
X (including feet)	274 + - 1		
Y	258 + - 1		
Z	194 + - 1		



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3.2 Weight	7.177 kg		
3.3 Centre of Gravity			
Xg	120,4		
Yg	136,2		
Zg	77,4		
3.4 Moment of Inertia			
Jx	$6.2 \times 10^{-2} \text{ kgm}^2$		
Jy	$5,7 \times 10^{-2} \text{ kgm}^2$		
Jz	$7.4 \times 10^{-2} \text{ kgm}^2$		
3.5 Feet Measurements			
Front Wall-1 st foot (right)	34 + - 1		
Front Wall-1 st foot (left)	34 + - 1		
Front Wall- 2 nd foot (right)	129 + - 1		



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Front Wall- 2 nd foot (left)	129 + - 1		
Front Wall- 3rd foot (right)	224 + - 1		
Front Wall- 3rd foot (left)	224 + - 1		
Feet Inter-axis (1 st from front wall)	258 + - 1		
Feet Inter-axis (2 nd from front wall)	258 + - 1		
Feet Inter-axis (3rd from front wall)	258 + - 1		
Foot dimension: 1 st from wall, left, internal	18 + - 1		
Foot dimension: 2nd from wall, left, internal	18 + - 1		
Foot dimension: 3rd from wall, left, internal	18 + - 1		
Foot dimension: 1 st from wall, right, internal	18 + - 1		
Foot dimension: 2nd from wall, right, internal	18 + - 1		
Foot dimension: 3rd from wall, right, internal	18 + - 1		
Foot dimension: 1 st from wall, left, external	22 + - 1		



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Foot dimension: 2nd from wall, left, external	22 + - 1		
Foot dimension: 3rd from wall, left, external	22 + - 1		
Foot dimension: 1 st from wall, right, external	22 + - 1		
Foot dimension: 2nd from wall, right, external	22 + - 1		
Foot dimension: 3rd from wall, right, external	22 + - 1		
Foot thickness: 1st from wall left	4 + - 1		
Foot thickness: 2nd from wall left	4 + - 1		
Foot thickness: 3rd from wall left	4 + - 1		
Foot thickness: 1st from wall right	4 + - 1		
Foot thickness: 2nd from wall right	4 + - 1		
Foot thickness: 3rd from wall right	4 + - 1		
Foot hole: 1st from wall left	4.5 + - 1		
Foot hole: 2nd from wall left	4.5 + - 1		



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Foot hole: 3rd from wall left	4.5 + - 1		
Foot hole: 1st from wall right	4.5 + - 1		
Foot hole: 2 nd from wall right	4.5 + - 1		
Foot hole: 3 rd from wall right	4.5 + - 1		
Foot washer spot area: 1 st from wall left	12 + - 1		
Foot washer spot area: 2nd from wall left	12 + - 1		
Foot washer spot area: 3rd from wall left	12 + - 1		
Foot washer spot area: 1 st from wall right	12 + - 1		
Foot washer spot area: 2nd from wall right	12 + - 1		
Foot washer spot area: 3rd from wall right	12 + - 1		
3.6 Bonding Stud			
Bonding stud position (x)	20 + - 1		
Bonding stud position (z)	18 + - 1		



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Bonding stud length	6 + - 1		
3.7 Connectors Positions			
J01 (x)	45.5 + - 1		
J01 (z)	45 + - 1		
J02 (x)	45.5 + - 1		
J02 (z)	63 + - 1		
J03 (x)	120 + - 1		
J03 (z)	45 + - 1		
J04 (x)	194.5 + - 1		
J04 (z)	45 + - 1		
J05 (x)	120 + - 1		
J05 (z)	63 + - 1		
J06 (x)	194.5 + - 1		



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J06 (z)	63 +- 1		
J07 (x)	45.5 +- 1		
J07 (z)	81 +- 1		
J08 (x)	120 +- 1		
J08 (z)	81 +- 1		
J09 (x)	194,5 +- 1		
J09 (z)	81 +- 1		
J10 (x)	45.5 +- 1		
J10 (z)	99 +- 1		
J11 (x)	120 +- 1		
J11 (z)	99 +- 1		
J12 (x)	194.5 +- 1		
J12 (z)	99 +- 1		

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3.8 Box Label			
3.9 Connectors Labels			
3.10 Flatness of Mounting Area	0.1 mm/100 mm		