CERN MIT L3 A&C/AMS

CARLO GAVAZZI SPACE SpA

AMS02-PDS

Request for [X] waiver [ ] deviation

Doc. N°: PDS-WV-CGS-005
Issue: 1 Date 23/09/2009
Page 1 of 1 attach. 1
NCR ref: NCR-PDS-CGS-C-139

TITLE OF WAIVER / DEVIATION:
PDS Operating temperature limits

OTHER SYSTEMS / CI's AFFECTED	BASELINE AFFECTED
[ ] YES [X] NO	Operating temperature limit requirement

SPECIFICATION / DRAWINGS AFFECTED RELATED TO THIS WAIVER/DEVIATION

NUMBER	ISSUE/REV.	DATE	TITLE	PARAGRAPHS / REQUIREMENTS
AMS-RQ-CGS-002	1	April 2007	POWER DISTRIBUTION SYSTEM (PDS) SPECIFICATIONS	4.3.3 4.1.4.1
PDS-TN-CGS-009	1	26/03/2008	POWER DISTRIBUTION SYSTEM (PDS)	5.

EFFECT ON COST/PRICE	EFFECT ON DELIVERY SCHEDULE	QUANTITY	EFFECT ON LOGISTIC SUPPORT INTERFACE PERFORMANCE
NONE	NONE	/	/

DESCRIPTION OF REQUEST:

The operating temperature of PDS unit was -25°C + 51.4°C (see AMS-RQ-CGS-002 Is1)

The new operating temperature of AMS-RQ-CGS-002 is defined as -25°C + 48°C (see also PDS-TN-CGS-009 Is1)
Based on 1. below, the protoflight margin of PDS-TN-CGS-009 becomes 2°C.

NEED / REASON FOR REQUEST:

1. During TVT test, the PDS unit was tested successfully (in nominal input voltage range, 113V ÷126,5V) at a TRP maximum temperature of 50.3°C with respect to a required temperature of 53°C, based on rationale of PDS Design report PDS-TN-CGS-009 Is. 1.
2. As investigation for NCR closure, a new AMS-02 analysis run has been performed with measured power dissipation and PDS expected on orbit maximum temperature on TRP is 50.0°C (see Annex 1); following the same rationale of Design report PDS-TN-CGS-009 Is. 1 the tested maximum temperature is in any case enveloping the maximum on orbit temperature.

PROPOSAL / RECOVERY ACTION:

To use the unit as it is.

EFFECTIVITY	C.I. NUMBER	C.I. NOMENCLATURE	MODEL
	PDS 18	AMS02-PDS p/n:10-AMS02PDS-000.00 s/n:FM01	PFM

NOTES AND LIMITATION:

NONE

NEEDED DATE FOR WAIVER / DEVIATION APPROVAL: ASAP

AUTHORITY DISPOSITION	CONFIGURATION CONTROL	ENGINEERING	PRODUCT ASSURANCE	PROGRAM MANAGER
CONTRACTOR ACCEPTED / REJECTED	C. CARRETTA / E. Cappelli 23/9/09 (Signature / Date)	R. [illegible] 23/9/09 (Signature / Date)	E. FRANCIN 23/09/09 (Signature / Date)	R. OLIVICI 23-09-09 (Signature / Date)
PRIME CONTRACTOR ACCEPTED / REJECTED	Signature / Date	Signature / Date	Signature / Date	Signature / Date
CUSTOMER ACCEPTED / REJECTED	ENGINEERING: Michael Cavell / AMS 30/9/09 (Signature / Date)	PRODUCT ASSURANCE: 28/9/09 (Signature / Date)	PROGRAM MANAGER: 28/09/09 (Signature / Date)	

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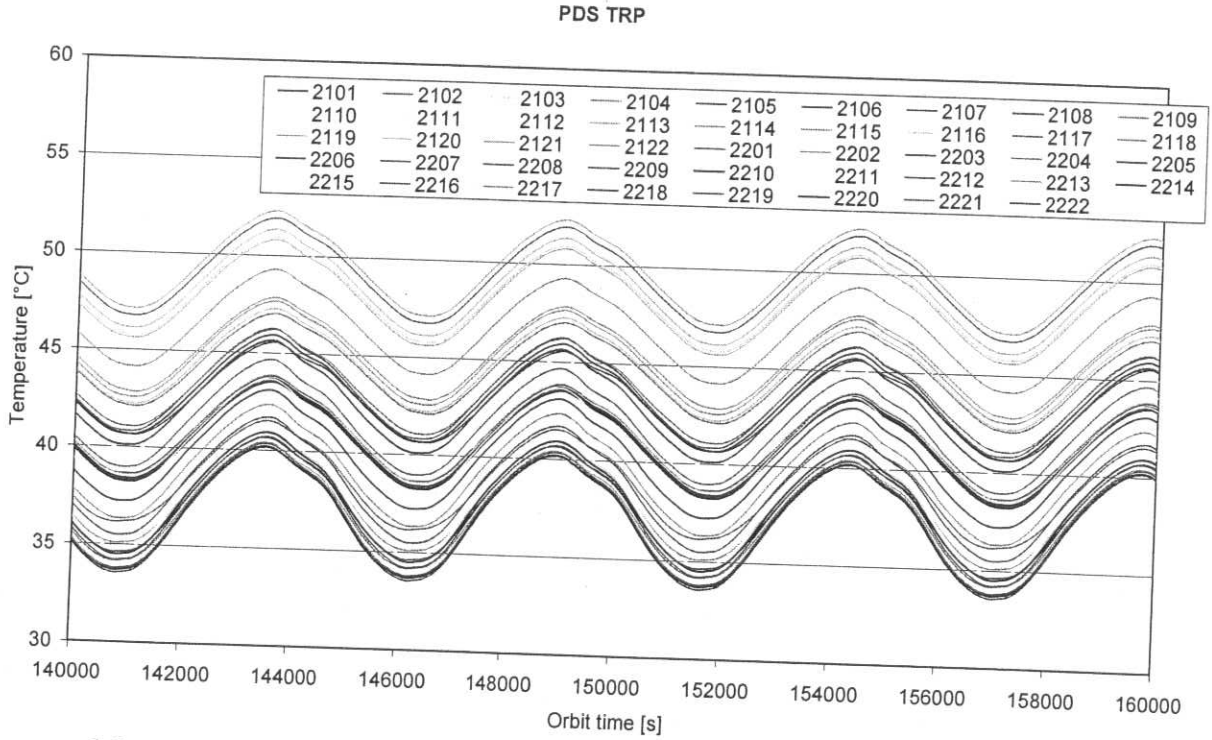
PDS: Evaluation of maximum temperature with updated PDS dissipation

Introduction

Thermal dissipation of PDS has been updated, according to data collected during the qualification test. Actual thermal dissipation obtained during testing is globally 310W vs the former 365W used for the design analyses.

From the previous analyses reported in AMSTCS-TN-CGS-004 MAIN AND TRACKER RADIATOR THERMAL ANALYSIS REPORT Tmax at TRP was 52.3°C

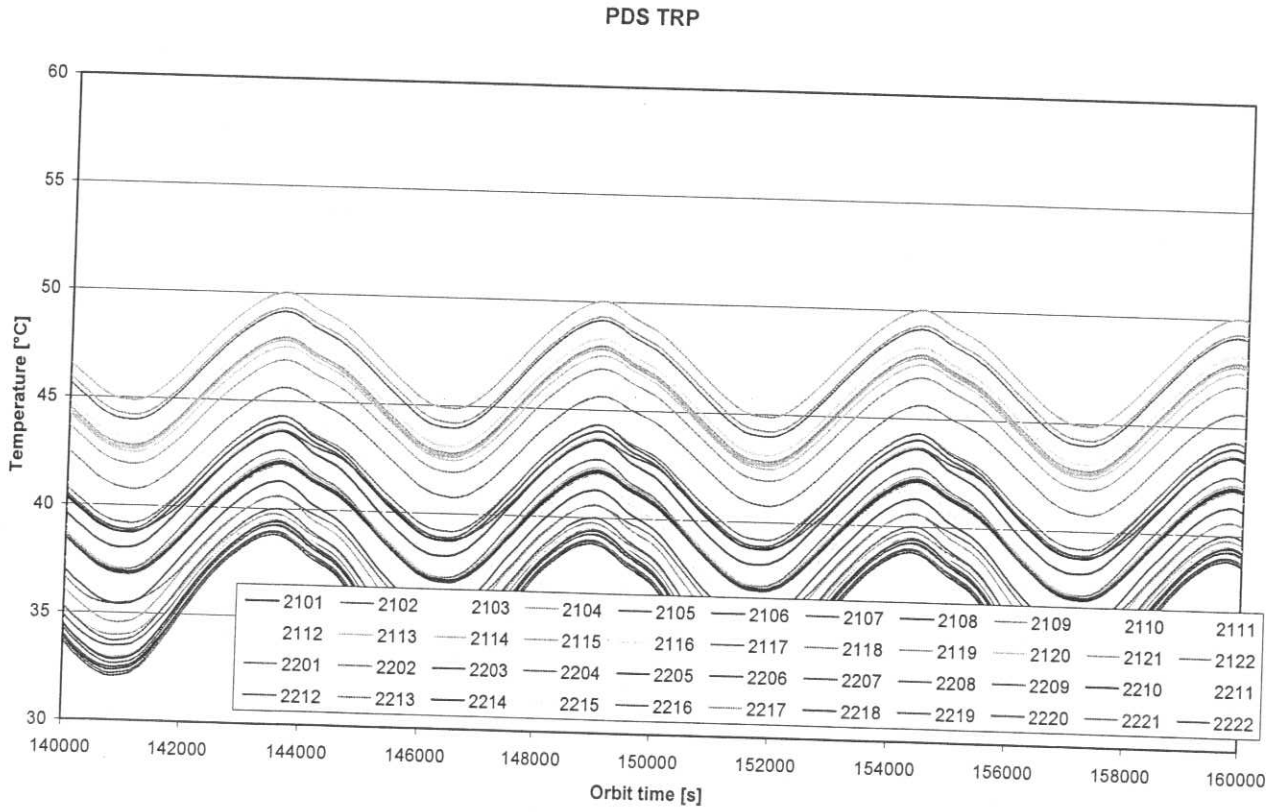


Power on each board has been updated to globally 310W distributed on two different nodes:

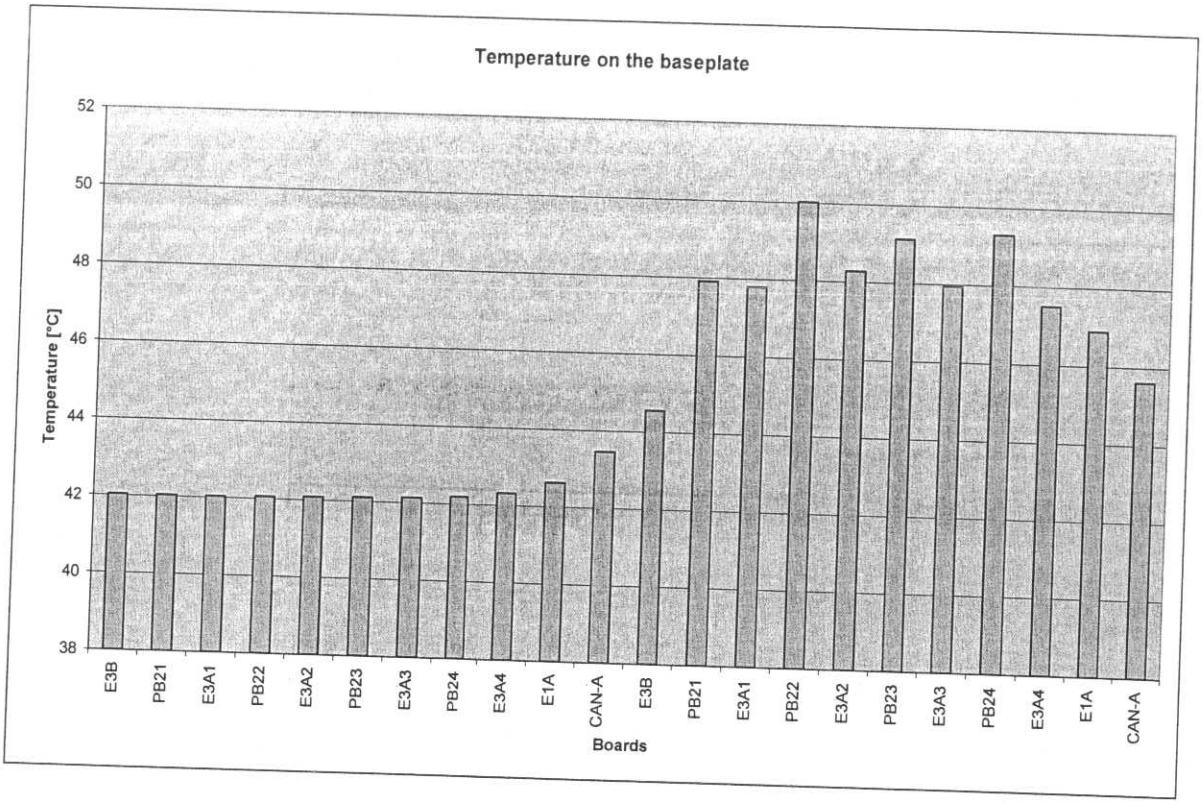
		Node	New Power	Node	New Power
BUS A	E3B	5001	0.00	5301	0.00
	PB21	5002	0.00	5302	0.00
	E3A1	5003	0.00	5303	0.00
	PB22	5004	0.00	5304	0.00
	E3A2	5005	0.00	5305	0.00
	PB23	5006	0.00	5306	0.00
	E3A3	5007	0.00	5307	0.00
	PB24	5008	0.00	5308	0.00
	E3A4	5009	0.00	5309	0.00
	E1A	5010	0.00	5310	0.00
	CAN-A	5011	0.00	5311	6.31
BUS B	E3B	5012	1.21	5312	2.12
	PB21	5013	3.09	5313	41.16
	E3A1	5014	2.35	5314	12.18
	PB22	5015	2.88	5315	54.47
	E3A2	5016	2.50	5316	14.28
	PB23	5017	2.59	5317	40.06
	E3A3	5018	2.20	5318	11.73
	PB24	5019	2.84	5319	38.83
	E3A4	5020	2.41	5320	11.26
	E1A	5021	0.00	5321	17.93
	CAN-A	5022	0.00	5322	6.37

Results

The New Tmax at PDS TRP is 50.0°C on node 2115



Temperature spatial distribution on the baseplate, board side (picked @ time with the higher temperature):



The maximum instantaneous temperature calculated in the worst hot case with the maximum PDS dissipation of 310W is 50°C, and is below the maximum tested temperature of 50.3°C to which the PDS unit is able to continuously operate with a 113 V input (see annex B).

Considering the margins taken in the worst hot case definition, the margin attained is sufficient to guarantee the correct operation of PDS on orbit without operational restrictions in nominal configuration.