CERN MIT L3 A&C/AMS

CARLO GAVAZZI SPACE SpA

AMS02-PDS

Request for [X] waiver [ ] deviation

Doc. N°: PDS-WV-CGS-001
Issue: 1 Date 07/04/2009
Page 1 of 1 attach. Annex A
NCR ref: NCR-PDS-CGS-C-133

TITLE OF WAIVER / DEVIATION:
ESEM 3-A over current protections limitation time out of specification

OTHER SYSTEMS / CI's AFFECTED
[ ] YES [X] NO

BASELINE AFFECTED
Over current protection duration

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	3.2.3.8

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

DESCRIPTION OF REQUEST:
To increase the tolerance of the time duration for all the ESEM 3-A boards.

NEED / REASON FOR REQUEST:
See annex A.

PROPOSAL / RECOVERY ACTION:
See annex A.

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 X ACCEPTED / ~~REJECTED~~	C. CINQUEPALMI [signature] 7/4/09 Signature Date	[signature] 7/04/09 Signature Date	E. FRANCINI [signature] 07/04/09 Signature Date	M. OLIVAER [signature] 07-04-09 Signature Date
PRIME CONTRACTOR ACCEPTED / ~~REJECTED~~	AMS Collab, Michael Capell [signature] 9 Apr 09 Signature Date	Signature Date	ASA · E. MARCHETTI [signature] 23/4/09 Signature Date	ASI - E. RUSSO [signature] 23/4/09 Signature Date

CUSTOMER	ENGINEERING	PRODUCT ASSURANCE	PROGRAM MANAGER
ACCEPTED / REJECTED	Signature Date	Signature Date	Signature Date

Annex A to PDS-WV-CGS-001

During PDS thermal check (as foreseen by NCR-PDS-CGS-C-129) at high temperature (+53°C) the duration of current limiting phase during ESEM 3-A short circuit test exceeds the specified limit . See next comparative table.

Outlet	Current limitation Limit	Current limitation value (A)	Current limitation time Limit	Current limitation time(mS)
E3A-1 Out1 TPD3	6.5A ± 10%	6	5ms<T<6ms	5
E3A-1 Out8 TTPD_R	13A ± 10%	12,4	5ms<T<6ms	4,96
E3A-2 out 1 ER1_N	6.5A ± 10%	6,4	5ms<T<6ms	4,88
E3A-2 Out8 CAB_R	13A ± 10%	12,6	5ms<T<6ms	4,84
E3A-3 out 1 TPD0	6.5A ± 10%	6,2	5ms<T<6ms	4,96
E3A-3 out 8 CAB_N	13A ± 10%	12,4	5ms<T<6ms	4,92
E3A-4 out 1 JPD_R	6.5A ± 10%	6	5ms<T<6ms	4,92
E3A-3 out 8 TTPD_N	13A ± 10%)	12,2	5ms<T<6ms	4,92

Tab. 1: Section A TRP=53°C over current protection

For every ESEM 3-A of section A two outlets have been tested. This problem has been verified for all the ESEM 3-A of this section. The same happens for the ESEM 3-A located on section B, as shown in next table.

Outlet	Current limitation Limit	Current limitation value (A)	Current limitation time Limit	Current limitation time(mS)
E3A-1 Out1 TPD3	6.5A ± 10%	6,4	5ms<T<6ms	4,88
E3A-1 Out8 TTPD_R	13A ± 10%	12,8	5ms<T<6ms	4,92
E3A-2 out 1 ER1_N	6.5A ± 10%	6,4	5ms<T<6ms	4,92
E3A-2 Out8 CAB_r	13A ± 10%	13,0	5ms<T<6ms	4,92
E3A-3 out 1 TPD0	6.5A ± 10%	6,4	5ms<T<6ms	4,92
E3A-3 out 8 CAB_N	13A ± 10%	12,6	5ms<T<6ms	4,72
E3A-4 out 1 JPD_R	6.5A ± 10%	6,6	5ms<T<6ms	4,92
E3A-3 out 8 TTPD_N	13A ± 10%	13,0	5ms<T<6ms	4,88

Tab. 2: Section B TRP=53°C over current protection

In order to reduce the temperature sensitivity of the over current circuits, a study for the individuation of the most temperature sensitive components is required. These components needs to be substituted with less temperature sensitive component. A thermal test should be repeated. These operations could have major impact on project schedule and there is risk of damage to the FM hardware.

Proposed solution: to extend the limitation time range to 4.5ms<T<6.5ms.

The lower limit of the limitation time impacts on the outlet capability to power, without intervention, a capacitive load. While the upper limit impacts on the mosfet junction temperature reached during current limitation.

Lower limit analysis: this change does not generate problems for the connected loads. From PDS FM DESIGN REPORT (PDS-TN-CGS-009 is.1 Par. 4.5.2.6) the maximum loads capacity for ESEM 3-A outlets from 1 to 7 is set to Cload_max = 250uF with a current limitation time of 3mS. For outlet 8 the maximum load capacity is set to Cload_max = 750uF F with a current limitation time of 3mS. Margin is present while setting the new lower limit to 4,5ms.

Upper limit analysis: for the new upper limit (6.5mS), considering an operative temperature of 80°C, the expected junction temperature of the JANTXV2N7236 power MOSFETs (which are used to limit the current for outlets form 1 to 7) should reach 120°C. This value is 30°C lower than maximum temperature declared on reference specification MIL-PRF-19500/595. For outlet 8 the junction of used power MOSFET JANSR2N7426 should reach a temperature around 105°C which is 45°C lower than maximum temperature declared on reference specification MIL-PRF-19500/660.

From the above analysis no problem are expected modifying the limitation time range.