CARLO GAVAZZI SPACE SpA

HSO/FIRST-DPU

DOCUMENT TYPE : TEST PROCEDURE

DRD : -

TITLE: CPU BOARD TEST PROCEDURE

DOCUMENT No: DPU-PR-CGS-001

PAGE: 1 **OF** 57

ISSUE No: 2

DATE: 24/10/2001

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DOCUMENT CHANGE RECORD				
ISSUE N°	**DATE**	**CHANGE AUTHORITY**	**PAGES AFFECTED**	**REMARKS**
1	29/07/2001			
2	24/10/2001		All	

LIST OF VALID PAGES

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LIST OF ACRONYMS

DPU	Data Processing Unit
EDAC	Error Detector And Corrector
DPR	Dual Port Ram
EEPROM	Electrically Erasable Programmable Read Only Memory
EM	Engineering Model
EPROM	Erasable Programmable Read Only Memory
EQM	Engineering Qualification Model
FIRST	Far Infra-Red and Sub-millimeter Telescope
FM	Flight Model
FPGA	Field Programmable Gate Array
FS	Flight Spare
HIFI	Heterodyne Instrument for First
HSO	Herschel Space Observatory
IF	Interface
ISR	Interrupt Service Routine
LSA	Logic State Analyzer
PACS	Photoconductor Array Camera and Spectrometer
PCB	Printed Circuit Board
PROM	Programmable Read Only Memory
PL	Payload
RAM	Random Access Memory
SC	Spacecraft
SPIRE	Spectral and Photometric Imaging Receiver
TE	Test Equipment

1   SCOPE

The aim of the present document is to define a procedure to test the EM version of CPU board to be used in the Data Processing Units, developed in the framework of the HSO/FIRST program. Particularly it must be tested each of the following block:

1. DSP and Program Memory

2. Data Memory

3. 32-Bit Internal Bus

4. Interval Timer & Interrupt Manager

5. Watchdog

6. EEPROM

7. IEEE 1355 Interface

It is not mandatory to follow the previous order. Each part can be tested independently from the others.

2   APPLICABLE DOCUMENTS

The current issue of the following documents is applicable:

[AD1]:   DPU-PL-CGS-001 "Product Assurance Plan for FIRST-DPU"

3   REFERENCE DOCUMENTS

To test the board the user needs the current issue of the following documents:

[RD1]:   DPU-SP-CGS-001, FIRST CPU BOARD SPECIFICATION

[RD2]:   DPU-MA-CGS-001, CPU BOARD USER MANUAL

4   PARTICIPANTS REQUIRED

4.1 General

All tests shall be performed under QA surveillance in accordance with and following detailed procedure of CGS PA Plan [AD1].

The test shall be notified to the Customer as applicable.

4.2 Responsibility

The technical responsibilities for testing and test results is of the Engineering department.
Project and test managers are responsible for the test program. The test engineer is responsible for the correct execution of the test program and for the fulfilment of the requirements, for measurement and recording and for the preparation of the test report.

QA is responsible for ensuring that all the agreed procedures are carefully observed, that test equipment and instrumentation used during testing are calibrated and within validity date, that the test results are recorded in the relative Test Report and signed by the operators and QA, that all non conforming condition and test results are properly documented and notified to the customer and that all requirements of applicable PA Plan, Specification and Statement Of Work pertaining to the acceptance tests, are fully satisfied.

4.3 QA witness of Tests and Sign-off

QA inspector or his representative shall witness all tests described in this procedure and shall sign the test data sheet.

4.4 Non-conformance and failures

Any malfunction occurred during the tests shall be processed according to the Non-Conformance Procedure.

4.5 Calibration Requirements

All instruments used for testing shall be calibrated.

Evidence of certification shall be provided by a label attached to the instruments itself, showing the calibration date, the expire date and the signature of the operator.

5 TEST CONDITIONS

- The Unit shall be tested in its defined configuration: it shall be properly mounted, all the electrical loads (if any) shall be present and the unit interface function(s) shall be simulated.
- Unless otherwise specified, all the measurements are to be performed at the following ambient conditions:

  - Temperature :   22°C ±3°C
  - Relative humidity: 55% ±10% RH
  - Pressure   :   Ambient
  - Cleanliness :   NA

- All tests, unless otherwise specified, shall be performed internally to CGS laboratories in a proper clean area.
  General disposition shall be applied to maximise personnel safety from potential hazards.

- Connectors savers shall be used to protect the Unit Under Test (UUT) interface connectors.

- Skilled personnel shall be employed.

  -    All used instruments shall meet the necessary accuracy and shall not degrade the UUT performance.

6 INSTRUMENTATION

The complete list of the instruments used during the test shall be reported in Table 6-1. The list shall be filled up during tests and reported in Test Report.

PROJECT: HSO/FIRST-DPU							
N.	**EQUIPMENT**	**MANUFACTURER**	**P/N**	**S/N**	**ACCURACY**	**NEXT CAL. DATE**	**REMARKS**

Table 6-1

7 EXECUTING TEST

In this chapter the steps that the user has to follow are presented. Before starting, the user has to check the correct board setup (see [RD2]) and verify that no short circuits are present.

TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST: S/N:		
STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
1	**DSP and Program Memory**			
1.1	Insert the EZ ICE probe in the JTAG plug (JP12)			
1.2	Supply electrical power to the board	Green led on		
1.3	Open the program ADSP-21020 Emulator			
1.4	Type Enter two times to end Row JTAG and Opcode Scan Test			
1.5	From menu Memory select "Program"	P.M. window appears		
1.6	From menu Memory select "Data"	D.M. window appears		
1.7	From menu File select "Load File…"	A prompt window appears		
1.8	In the HSO folder select "hsoconf.ach"	"RAM" (left side mem. loc.)		
1.9	From menu File select "Load File…"	A prompt window appears		
1.10	In the HSO folder select "dsp_init.exe"			
1.11	Select Program Memory window			

DATE	TEST CONDUCTOR	PRODUCT ASSURANCE	CUSTOMER

TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST:		S/N:
STEP N°	**TEST SEQUENCE**	**EXPECTED VALUE**	**MEASURED VALUE**	**REMARKS**
1.12	Search "done" with the scroll bar and select the line			
1.13	Double click on the memory location	" * " appears after "RAM"		
1.14	From menu Execution select "Run"	"Target running" (status bar)		
1.15	Select "OK" in the FYI dialogue window	"Target halted" (status bar)		
1.16	From menu Execution select "Chip Reset"			
1.17	Select "OK"			
1.18	From menu Execution select "Assembly Breaks"			
1.19	Select "Delete All"			
1.20	From menu File select "Load File…"	A prompt window appears		
1.21	In the HSO folder select "hsoconf.ach"			
1.22	From menu File select "Load File…"	A prompt window appears		
1.23	In the HSO folder select "pm_test2.exe"			

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TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST:	S/N:	
STEP N°	**TEST SEQUENCE**	**EXPECTED VALUE**	**MEASURED VALUE**	**REMARKS**
1.24	Select Program Memory window			
1.25	Search "done" with the scroll bar and select the line			
1.26	Double click on the memory location	" * " appears after "RAM"		
1.27	From menu Core select "Register File"	The Active Register File window appears		
1.28	From menu Execution select "Run"	"Target running" (status bar)		
1.29	Select "OK" in the dialogue window FYI	"Target halted" (status bar)		
1.30	Check the R2 register in the Active Register File window	R2: 0000000000		
1.31	Check Program Memory content from address location 00000120 to 0007ffff	Value increases from 000001200000 to 0007ffff0000		

DATE	TEST CONDUCTOR	PRODUCT ASSURANCE	CUSTOMER

TITLE: CPU BOARD TEST PROCEDURE	UNIT UNDER TEST:	S/N:

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
2	**Data Memory**			
2.1	Insert the EZ ICE probe in the JTAG plug (JP12)			
2.2	Supply electrical power to the board	Green led on		
2.3	Open the program ADSP-21020 Emulator			
2.4	Type Enter two times to end Row JTAG and Opcode Scan Test			
2.5	From menu Memory select "Program"	P.M. window appears		
2.6	From menu Memory select "Data"	D.M. window appears		
2.7	From menu File select "Load File…"	A prompt window appears		
2.8	In the HSO folder select "hsoconf.ach"	"RAM" (left side mem. loc.)		
2.9	From menu File select "Load File…"	A prompt window appears		
2.10	In the HSO folder select "dsp_init.exe"			
2.11	Select Program Memory window			

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TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST:	S/N:

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
2.12	Search "done" with the scroll bar and select the line			
2.13	Double click on the memory location	" * " appears after "RAM"		
2.14	From menu Execution select "Run"	"Target running" (status bar)		
2.15	Select "OK" in the FYI dialogue window	"Target halted" (status bar)		
2.16	From menu Execution select "Chip Reset"			
2.17	Select "OK"			
2.18	From menu Execution select "Assembly Breaks"			
2.19	Select "Delete All"			
2.20	From menu File select "Load File…"	A prompt window appears		
2.21	In the HSO folder select "hsoconf.ach"			
2.22	From menu File select "Load File…"	A prompt window appears		
2.23	In the HSO folder select "dm_rw1cy.exe"			

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TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST:	S/N:	
STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
2.24	Select Program Memory window			
2.25	Search "done" with the scroll bar and select the line			
2.26	Double click on the memory location	" * " appears after "RAM"		
2.27	From menu Core select "Register File"	The Active Register File window appears		
2.28	From menu Execution select "Run"	"Target running" (status bar)		
2.29	Select "OK" in the dialogue window FYI	"Target halted" (status bar)		
2.30	Check the R2 register in the Active Register File window	R2: 0000000000		
2.31	Check Data Memory content from address location 00000000 to 0007ffff	Value increases from 0000000000 to 0007ffff00		

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TITLE: CPU BOARD TEST PROCEDURE	UNIT UNDER TEST: S/N:		
STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
3	**32-Bit Internal Bus**			
3.1	Insert the EZ ICE probe in the JTAG plug (JP12)			
3.2	Connect JP15 with POD1 and POD2 of LSA			
3.3	Connect the probe channel 1 oscilloscope with pin 23 of P1			
3.4	Connect the probe channel 2 oscilloscope with pin 77 of P1			
3.5	Connect the probe channel 0 POD3 of LSA with pin 77 of P1			
3.6	Set LSA trigger on channel 0 POD3 signal			
3.7	Supply electrical power to the board	Green led on		
3.8	Open the program ADSP-21020 Emulator			
3.9	Type Enter two times to end Row JTAG and Opcode Scan Test			

	Test			
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TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST: S/N:		
STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
3.10	From menu Memory select "Program"	P.M. window appears		
3.11	From menu Memory select "Data"	D.M. window appears		
3.12	From menu File select "Load File…"	A prompt window appears		
3.13	In the HSO folder select "hsoconf.ach"	"RAM" (left side mem. loc.)		
3.14	From menu File select "Load File…"	A prompt window appears		
3.15	In the HSO folder select "bus_rw0.exe"			
3.16	Select Program Memory window			
3.17	Search "done" with the scroll bar and select the line			
3.18	Double click on the memory location	" * " appears after "RAM"		
3.19	From menu Execution select "Run"	"Target running" (status bar)		
3.20	Verify signal on channel 1 of the oscilloscope	Sequence of two negative pulses (width < 80 ns each)		

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STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
3.21	Verify signal on channel 2 of the oscilloscope	Sequence of a negative pulse (width < 60 ns)		
3.22	Check on the screen of the LSA	Value increases from 880000000 to 88FFFFFF		
3.23	Select "OK" in the dialogue window FYI	"Target halted" (status bar)		
3.24	From menu Execution select "Chip Reset"			
3.25	Select "OK"			
3.26	From menu Execution select "Assembly Breaks"			
3.27	Select "Delete All"			
3.28	Connect the probe channel 1 oscilloscope with pin 55 of P1			
3.29	Select "Run" on LSA			
3.30	From menu File select "Load File…"	A prompt window appears		

3.31	In the HSO folder select "hsoconf.ach"			

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STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
3.32	From menu File select "Load File…"	A prompt window appears		
3.33	In the HSO folder select "bus_rw1.exe"			
3.34	Select Program Memory window			
3.35	Search "done" with the scroll bar and select the line			
3.36	Double click on the memory location	" * " appears after "RAM"		
3.37	From menu Execution select "Run"	"Target running" (status bar)		
3.38	Verify signal on channel 1 of the oscilloscope	Sequence of two negative pulses (width < 80 ns each)		
3.39	Verify signal on channel 2 of the oscilloscope	Sequence of a negative pulse (width < 60 ns)		
3.40	Check on the screen of the LSA	Value increases from 89000000 to 89FFFFFF		
3.41	Select "OK" in the dialogue window FYI	"Target halted" (status bar)		

3.42	From menu Execution select "Chip Reset"			

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STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
3.43	Select "OK"			
3.44	From menu Execution select "Assembly Breaks"			
3.45	Select "Delete All"			
3.46	Connect the probe channel 1 oscilloscope with pin 87 of P1			
3.47	Select "Run" on LSA			
3.48	From menu File select "Load File…"	A prompt window appears		
3.49	In the HSO folder select "hsoconf.ach"			
3.50	From menu File select "Load File…"	A prompt window appears		
3.51	In the HSO folder select "bus_rw2.exe"			
3.52	Select Program Memory window			
3.53	Search "done" with the scroll bar and select the line			

3.54	Double click on the memory location	" * " appears after "RAM"		

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TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST:	S/N:	

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
3.55	From menu Execution select "Run"	"Target running" (status bar)		
3.56	Verify signal on channel 1 of the oscilloscope	Sequence of two negative pulses (width < 80 ns each)		
3.57	Verify signal on channel 2 of the oscilloscope	Sequence of a negative pulse (width < 60 ns)		
3.58	Check on the screen of the LSA	Value increases from 8A000000 to 8AFFFFFF		
3.59	Select "OK" in the dialogue window FYI	"Target halted" (status bar)		
3.60	From menu Execution select "Chip Reset"			
3.61	Select "OK"			
3.62	From menu Execution select "Assembly Breaks"			
3.63	Select "Delete All"			
3.64	Connect the probe channel 1 oscilloscope with pin 24 of P1			

	P1				
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TITLE: CPU BOARD TEST PROCEDURE   UNIT UNDER TEST: S/N:

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
3.65	Select "Run" on LSA			
3.66	From menu File select "Load File…"	A prompt window appears		
3.67	In the HSO folder select "hsoconf.ach"			
3.68	From menu File select "Load File…"	A prompt window appears		
3.69	In the HSO folder select "bus_rw3.exe"			
3.70	Select Program Memory window			
3.71	Search "done" with the scroll bar and select the line			
3.72	Double click on the memory location	" * " appears after "RAM"		
3.73	From menu Execution select "Run"	"Target running" (status bar)		
3.74	Verify signal on channel 1 of the oscilloscope	Sequence of two negative pulses (width < 80 ns each)		
3.75	Verify signal on channel 2 of the oscilloscope	Sequence of a negative pulse (width < 60 ns)		

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STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
3.76	Check on the screen of the LSA	Value increases from 8B000000 to 8BFFFFFF		
3.77	Select "OK" in the dialogue window FYI	"Target halted" (status bar)		
3.78	From menu Execution select "Chip Reset"			
3.79	Select "OK"			
3.80	From menu Execution select "Assembly Breaks"			
3.81	Select "Delete All"			
3.82	Connect the probe channel 1 oscilloscope with pin 56 of P1			
3.83	Select "Run" on LSA			
3.84	From menu File select "Load File…"	A prompt window appears		
3.85	In the HSO folder select "hsoconf.ach"			
3.86	From menu File select "Load File…"	A prompt window appears		

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STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
3.87	In the HSO folder select "bus_rw4.exe"			
3.88	Select Program Memory window			
3.89	Search "done" with the scroll bar and select the line			
3.90	Double click on the memory location	" * " appears after "RAM"		
3.91	From menu Execution select "Run"	"Target running" (status bar)		
3.92	Verify signal on channel 1 of the oscilloscope	Sequence of two negative pulses (width < 80 ns each)		
3.93	Verify signal on channel 2 of the oscilloscope	Sequence of a negative pulse (width < 60 ns)		
3.94	Check on the screen of the LSA	Value increases from 8C000000 to 8CFFFFFF		
3.95	Select "OK" in the dialogue window FYI	"Target halted" (status bar)		
3.96	From menu Execution select "Chip Reset"			
3.97	Select "OK"			

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STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
3.98	From menu Execution select "Assembly Breaks"			
3.99	Select "Delete All"			
3.100	Connect the probe channel 1 oscilloscope with pin 88 of P1			
3.101	Select "Run" on LSA			
3.102	From menu File select "Load File…"	A prompt window appears		
3.103	In the HSO folder select "hsoconf.ach"			
3.104	From menu File select "Load File…"	A prompt window appears		
3.105	In the HSO folder select "bus_rw5.exe"			
3.106	Select Program Memory window			
3.107	Search "done" with the scroll bar and select the line			
3.108	Double click on the memory location	" * " appears after "RAM"		
3.109	From menu Execution select "Run"	"Target running" (status bar)		

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STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
3.110	Verify signal on channel 1 of the oscilloscope	Sequence of two negative pulses (width < 80 ns each)		
3.111	Verify signal on channel 2 of the oscilloscope	Sequence of a negative pulse (width < 60 ns)		
3.112	Check on the screen of the LSA	Value increases from 8D000000 to 8DFFFFFF		
3.113	Select "OK" in the dialogue window FYI	"Target halted" (status bar)		
3.114	From menu Execution select "Chip Reset"			
3.115	Select "OK"			
3.116	From menu Execution select "Assembly Breaks"			
3.117	Select "Delete All"			
3.118	Connect the probe channel 1 oscilloscope with pin 25 of P1			
3.119	Select "Run" on LSA			

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STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
3.120	From menu File select "Load File…"	A prompt window appears		
3.121	In the HSO folder select "hsoconf.ach"			
3.122	From menu File select "Load File…"	A prompt window appears		
3.123	In the HSO folder select "bus_rw6.exe"			
3.124	Select Program Memory window			
3.125	Search "done" with the scroll bar and select the line			
3.126	Double click on the memory location	" * " appears after "RAM"		
3.127	From menu Execution select "Run"	"Target running" (status bar)		
3.128	Verify signal on channel 1 of the oscilloscope	Sequence of two negative pulses (width < 80 ns each)		
3.129	Verify signal on channel 2 of the oscilloscope	Sequence of a negative pulse (width < 60 ns)		

3.130	Check on the screen of the LSA	Value increases from 8E000000 to 8EFFFFFF		

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STEP N°	**TEST SEQUENCE**	**EXPECTED VALUE**	**MEASURED VALUE**	**REMARKS**
3.131	Select "OK" in the dialogue window FYI	"Target halted" (status bar)		
3.132	From menu Execution select "Chip Reset"			
3.133	Select "OK"			
3.134	From menu Execution select "Assembly Breaks"			
3.135	Select "Delete All"			
3.136	Connect the probe channel 1 oscilloscope with pin 57 of P1			
3.137	Select "Run" on LSA			
3.138	From menu File select "Load File…"	A prompt window appears		
3.139	In the HSO folder select "hsoconf.ach"			
3.140	From menu File select "Load File…"	A prompt window appears		

3.141	In the HSO folder select "bus_rw7.exe"			
3.142	Select Program Memory window			

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STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
3.143	Search "done" with the scroll bar and select the line			
3.144	Double click on the memory location	" * " appears after "RAM"		
3.145	From menu Execution select "Run"	"Target running" (status bar)		
3.146	Verify signal on channel 1 of the oscilloscope	Sequence of two negative pulses (width < 400 ns each)		
3.147	Verify signal on channel 2 of the oscilloscope	Sequence of a pulse (width < 350 ns)		
3.148	Check on the screen of the LSA	Value increases from 8F000000 to 8FFFFFFF		
3.149	Select "OK" in the dialogue window FYI	"Target halted" (status bar)		
3.150	From menu Execution select "Chip Reset"			
3.151	Select "OK"			

3.152	From menu Execution select "Assembly Breaks"			
3.153	Select "Delete All"			

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STEP N°	**TEST SEQUENCE**	**EXPECTED VALUE**	**MEASURED VALUE**	**REMARKS**
4	**Interval Timer & Interrupt Manager**			
4.1	Insert the EZ ICE probe in the JTAG plug			
4.2	Supply electrical power to the board	Green led on		
4.3	Open the program ADSP-21020 Emulator			
4.4	Type Enter two times to end Row JTAG and Opcode Scan Test			
4.5	From menu Memory select "Program"	P.M. window appears		
4.6	From menu Memory select "Data"	D.M. window appears		
4.7	From menu File select "Load File…"	A prompt window appears		
4.8	In the HSO folder select "hsoconf.ach"			
4.9	From menu File select "Load File…"	A prompt window appears		

4.10	In the HSO folder select "it_test.exe"			
4.11	From menu Core select "Register File"	The A R F window appears		

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STEP N°	**TEST SEQUENCE**	**EXPECTED VALUE**	**MEASURED VALUE**	**REMARKS**
4.12	From menu Execution select "Run"	"Target running" (status bar)		
4.13	Wait 60 seconds			
4.14	From menu Execution select "Halt"	"Target halted" (status bar)		
4.15	Check the R5 register in the Active Register File window	R5: 000000003C		
4.16	Connect the probe channel 1 oscilloscope with pin 3 of JP2			
4.17	Verify signal on channel 1 of the oscilloscope	Sequence of a pulse (width ~200 ns) every second		

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TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST: S/N:		

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
5	**Watchdog**			
5.1	Insert the EZ ICE probe in the JTAG plug			
5.2	Verify that JP1 is not closed			
5.3	Connect the probe channel 1 oscilloscope with pin 2 of JP1			
5.4	Supply electrical power to the board	Green led on		
5.5	Open the program ADSP-21020 Emulator			
5.6	Type Enter two times to end Row JTAG and Opcode Scan Test			
5.7	From menu Memory select "Program"	P.M. window appears		
5.8	From menu Memory select "Data"	D.M. window appears		

5.9	From menu File select "Load File…"	A prompt window appears		
5.10	In the HSO folder select "hsoconf.ach"	"RAM" (left side mem. loc.)		

DATE	TEST CONDUCTOR	PRODUCT ASSURANCE	CUSTOMER

TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST:		S/N:

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
5.11	From menu File select "Load File…"	A prompt window appears		
5.12	In the HSO folder select "wdtrigg.exe"			
5.13	From menu Execution select "Run"	"Target running" (status bar)		
5.14	Verify signal on channel 1 of the oscilloscope	Signal goes up to 5V		
5.15	From menu Execution select "Halt"	"Target halted" (status bar)		
5.16	Close the program ADSP-21020 Emulator			
5.17	Switch the board off			
5.18	Close JP1			
5.19	Supply electrical power to the board	Green led on		
5.20	Check the red LED (D3)	Red led light on after 13 seconds		

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TITLE: CPU BOARD TEST PROCEDURE   UNIT UNDER TEST: S/N:

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
6	**EEPROM**			
6.1	Insert the EZ ICE probe in the JTAG plug			
6.2	Verify that JP3 is closed			
6.3	Supply electrical power to the board	Green led on		
6.4	Open the program ADSP-21020 Emulator			
6.5	Type Enter two times to end Row JTAG and Opcode Scan Test			
6.6	From menu Memory select "Program"	P.M. window appears		
6.7	From menu Memory select "Data"	D.M. window appears		
6.8	From menu File select "Load File…"	A prompt window appears		
6.9	In the HSO folder select "hsoconf.ach"	"RAM" (left side mem. loc.)		

6.10	From menu Memory select "Operation" and then "Fill"	Fill Memory Data window appears		

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TITLE: CPU BOARD TEST PROCEDURE   UNIT UNDER TEST: S/N:

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
6.11	Type "00000000"			
6.12	Select "OK"	Fill Memory Range window appears		
6.13	In Starting Address field type "80000000"			
6.14	In Ending Address field type "80000FFF"			
6.15	In Memory Space field select "DM"			
6.16	Select "OK"			
6.17	Verify the DM content from address 80000000 to 80000FFF	"FFFFFFFF00"		
6.18	Close the program ADSP-21020 Emulator			
6.19	Switch the board off			
6.20	Open JP3			

6.21	Supply electrical power to the board	Green led on		

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TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST: S/N:		
STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
6.22	Open the program ADSP-21020 Emulator			
6.23	Type Enter two times to end Row JTAG and Opcode Scan Test			
6.24	From menu Memory select "Program"	P.M. window appears		
6.25	From menu Memory select "Data"	D.M. window appears		
6.26	From menu File select "Load File…"	A prompt window appears		
6.27	In the HSO folder select "hsoconf.ach"	"RAM" (left side mem. loc.)		
6.28	From menu File select "Load File…"	A prompt window appears		
6.29	In the HSO folder select "eep_rw.exe"			
6.30	Select Program Memory window			
6.31	Search "done" with the scroll bar and select the line			

6.32	Double click on the memory location	" * " appears after "RAM"		
6.33	From menu Core select "Register File"	The A R F window appears		

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TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST:	S/N:	
STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
6.34	From menu Execution select "Run"	"Target running" (status bar)		
6.35	Select "OK" in the dialogue window FYI	"Target halted" (status bar)		
6.36	Check the R2 register in the Active Register File window	R2: 0000000000		
6.37	Verify the DM content from address 80000000 to 8003FFFF	Value increases from 8000000000 to 8003FFFF00		

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TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST:	S/N:

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
7	**IEEE 1355 Interface**			
7.1	Insert the EZ ICE probe in the JTAG plug			
7.2	Make the connections specified in Appendix A, point [a]			
7.3	Supply electrical power to the board	Green led on		
7.4	Open the program ADSP-21020 Emulator			
7.5	Type Enter two times to end Row JTAG and Opcode Scan Test			
7.6	From menu Memory select "Program"	P.M. window appears		
7.7	From menu Memory select "Data"	D.M. window appears		
7.8	From menu Execution select "CBUG"	CBUG window appears		
7.9	From menu File select "Load File…"	A prompt window appears		

7.10	In the HSO folder select "boot.ach"			
7.11	From menu File select "Load File…"	A prompt window appears		

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TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST: S/N:	

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
7.12	In the HSO folder select "1355ts1"			
7.13	From menu Execution select "Restart"			
7.14	Search line " /** START 1 LINK **/ " in the program			
7.15	Double click on " if (d_ErrorCode !=0)… "	" * " appears before the line		
7.16	From menu Execution select "Continue"			
7.17	Connect the probe channel 1 oscilloscope with pin 9 of U21			
7.18	Verify signal on channel 1 of the oscilloscope	Waveform as depicted in Picture 1		
7.19	Measure the first negative pulse duration	400 ns		
7.20	In the CBUG window search line " /** START 2 LINK **/ "			

7.21	Double click on " if (d_ErrorCode !=0)… "	" * " appears		
7.22	Open program "SpaceWireTest" on 1355TE	A DOS window appears		

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Picture 1 Data signal on link start

TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST:		S/N:

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
7.23	From menu select "2"	Link1, 2, 3 "Transfer Not Started"		
7.24	From menu select "10"	"Enter Link"		
7.25	Type "2"	"Enter file name"		
7.26	Type ""rx1.txt"	"Enter file size in byte"		
7.27	Type "1024"	"Confirm…"		
7.28	Type "Y"			
7.29	From menu Execution of emulator select "Continue"			
7.30	Open file "rx1.txt" on 1355TE	"Transmission was successful"		
7.31	In the CBUG window search "/** START 3 LINK **/			
7.32	Double click on " if (d_ErrorCode !=0)… "	" * " appears		
7.33	From menu of "SpaceWireTest" program select "12"	"Enter link"		

DATE	TEST CONDUCTOR	PRODUCT ASSURANCE	CUSTOMER

TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST:	S/N:	
STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
7.34	Type "2"	"Enter file name"		
7.35	Type "tx.txt"	"Enter packet size"		
7.36	Type "256"	"Confirm…"		
7.36	Type "Y"			
7.37	From menu Execution of emulator select "Continue"			
7.38	From menu Data select "Watch"	Watch window appears		
7.39	Type "RX_BUFFER"			
7.40	Select "OK"	Value increases from 00 to FF		
7.41	From menu File Select "Exit"	A prompt window appears		
7.42	Select "Yes"			
7.43	Switch off the Power Supply	Green led off		
7.44	Make the connections specified in Appendix A, point [b]			

DATE	TEST CONDUCTOR	PRODUCT ASSURANCE	CUSTOMER

TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST:	S/N:

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
7.45	Supply electrical power to the board	Green led on		
7.46	Open the program ADSP-21020 Emulator			
7.47	Type Enter two times to end Row JTAG and Opcode Scan Test			
7.48	From menu Memory select "Program"	P.M. window appears		
7.49	From menu Memory select "Data"	D.M. window appears		
7.50	From menu Execution select "CBUG"	CBUG window appears		
7.51	From menu File select "Load File…"	A prompt window appears		
7.52	In the HSO folder select "boot.ach"			
7.53	From menu File select "Load File…"	A prompt window appears		
7.54	In the HSO folder select "1355ts2"			
7.55	From menu Execution select "Restart"			
7.56	Search line " /** START 1 LINK **/ " in the program			

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TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST:	S/N:

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
7.57	Double click on " if (d_ErrorCode !=0)… "	" * " appears		
7.58	From menu Execution select "Continue"			
7.59	Connect the probe channel 1 oscilloscope with pin 7 of U23			
7.60	Verify signal on channel 1 of the oscilloscope	Waveform as depicted in Picture 1		
7.61	Measure the first negative pulse duration	400 ns		
7.62	In the CBUG window search line " /** START 2 LINK **/ "			
7.63	Double click on " if (d_ErrorCode !=0)… "	" * " appears		
7.64	Open program "SpaceWireTest" on 1355TE	A DOS window appears		
7.65	From menu select "2"	Link1, 2, 3 "Transfer Not Started"		
7.66	From menu select "10"	"Enter Link"		
7.67	Type "2"	"Enter file name"		

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TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST:		S/N:

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
7.68	Type ""rx2.txt"	"Enter file size in byte"		
7.69	Type "1024"	"Confirm…"		
7.70	Type "Y"			
7.71	From menu Execution of emulator select "Continue"			
7.72	Open file "rx2.txt" on 1355TE	"Transmission was successful"		
7.73	In the CBUG window search "/** START 3 LINK **/			
7.74	Double click on " if (d_ErrorCode !=0)… "	" * " appears		
7.75	From menu of "SpaceWireTest" program select "12"	"Enter link"		
7.76	Type "2"	"Enter file name"		
7.77	Type "tx.txt"	"Enter packet size"		
7.78	Type "256"	"Confirm…"		
7.79	From menu Execution of emulator select "Continue"			

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TITLE: CPU BOARD TEST PROCEDURE		UNIT UNDER TEST:	S/N:	

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
7.80	From menu Data select "Watch"	Watch window appears		
7.81	Type "RX_BUFFER"			
7.82	Select "OK"	Value increases from 00 to FF		
7.83	From menu File Select "Exit"	A prompt window appears		
7.84	Select "Yes"			
7.85	Switch off the Power Supply	Green led off		
7.86	Make the connections specified in Appendix A, point [c]			
7.87	Supply electrical power to the board	Green led on		
7.88	Open the program ADSP-21020 Emulator			
7.89	Type Enter two times to end Row JTAG and Opcode Scan Test			
7.90	From menu Memory select "Program"	P.M. window appears		

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TITLE: CPU BOARD TEST PROCEDURE	UNIT UNDER TEST: S/N:

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
7.91	From menu Memory select "Data"	D.M. window appears		
7.92	From menu Execution select "CBUG"	CBUG window appears		
7.93	From menu File select "Load File…"	A prompt window appears		
7.94	In the HSO folder select "boot.ach"			
7.95	From menu File select "Load File…"	A prompt window appears		
7.96	In the HSO folder select "1355ts3"			
7.97	From menu Execution select "Restart"			
7.98	Search line " /** START 1 LINK **/ " in the program			
7.99	Double click on " if (d_ErrorCode !=0)… "	" * " appears		
7.100	From menu Execution select "Continue"			
7.101	Connect the probe channel 1 oscilloscope with pin 9 of U24			
7.102	Verify signal on channel 1 of the oscilloscope	Waveform as depicted in P.1		

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TITLE: CPU BOARD TEST PROCEDURE	UNIT UNDER TEST:	S/N:

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
7.103	Measure the first negative pulse duration	400 ns		
7.104	In the CBUG window search line " /** START 2 LINK **/ "			
7.105	Double click on " if (d_ErrorCode !=0)… "	" * " appears		
7.106	Open program "SpaceWireTest" on 1355TE	A DOS window appears		
7.107	From menu select "2"	Link1, 2, 3 "Transfer Not Started"		
7.108	From menu select "10"	"Enter Link"		
7.109	Type "2"	"Enter file name"		
7.110	Type ""rx3.txt"	"Enter file size in byte"		
7.111	Type "1024"	"Confirm…"		
7.112	Type "Y"			
7.113	From menu Execution of emulator select "Continue"			

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TITLE: CPU BOARD TEST PROCEDURE	UNIT UNDER TEST:	S/N:

STEP N°	TEST SEQUENCE	EXPECTED VALUE	MEASURED VALUE	REMARKS
7.114	Open file "rx3.txt" on 1355TE	"Transmission was successful"		
7.115	In the CBUG window search "/** START 3 LINK **/			
7.116	Double click on " if (d_ErrorCode !=0)… "	" * " appears		
7.117	From menu of "SpaceWireTest" program select "12"	"Enter link"		
7.118	Type "2"	"Enter file name"		
7.119	Type "tx.txt"	"Enter packet size"		
7.120	Type "256"	"Confirm…"		
7.121	From menu Execution of emulator select "Continue"			
7.122	From menu Data select "Watch"	Watch window appears		
7.123	Type "RX_BUFFER"			
7.124	Select "OK"	Value increases from 00 to FF		

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8   DEVIATION

In case that for any reason the test procedure has to be changed, the change shall be described in a Procedure Variation Sheet (PVS) attached to this document in Table 8-1.
   The PVS shall contain:

- Reference to the procedure to be changed
- Reference to the relevant test, procedure page and paragraph
- Description of the change
- Reason for change
- Engineering and QA signature
- Customer signature (when required).

8.1 Procedure variation sheet

The Procedure Variation Sheet is shown in Table 8-1.

PROCEDURE VARIATION SHEET		
Test procedure Ref.:	Page revised	Para. revised
Description of changes:		
Reason for changes:		
CONCURRENCE		
TEST COND	P.A.	ENG.	CUSTOMER

Table 8-1

9   APPENDIX A

1355 Links Connections

a. To test Link 1 make the following connections between Micro-D plug and P2:

Din+ 10; Din- 11; Sin+ 14; Sin- 15; Sout+ 6; Sout- 7; Dout+ 2; Dout- 3.

b. To test Link 2 make the following connections between Micro-D plug and P2:

Din+ 44; Din- 45; Sin+ 48; Sin- 49; Sout+ 40; Sout- 41; Dout+ 36; Dout- 37.

c. To test Link 3 make the following connections between Micro-D plug and P2:

Din+ 74; Din- 75; Sin+ 78; Sin- 79; Sout+ 70; Sout- 71; Dout+ 66; Dout- 67.
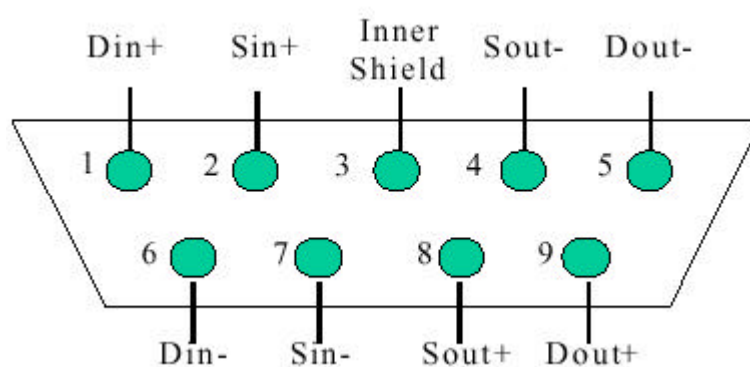
Picture 2 Viewed from rear of socket or front of plug