Please complete and submit this ATLAS Standard Form to ATLAS RHA Coordinator (ARC), at least 2 weeks after the date of the test.

1. General information:

1.1	Date of the test:	May 16-18, 2002
1.2	Pre-selection, or Qualification ? (specify)	Pre-selection
1.3	Name of the ATLAS (or other) System:	MDT
1.4	Name of the board in the System:	MDT Mezzanine board
1.5	Person responsible for the test:	Yasuo Arai
1.6	Institute:	KEK
1.7	Email:	yasuo.arai@kek.jp
1.8	Person responsible for RHA of the Board:	Eric Hazen
1.9	Institute:	Boston University
1.10	Email:	Hazen@bu.edu

2. Component:

2.1	Name:	**AMT-2**
2.2	Part Number:	**TC220G10AF 0006**
2.3	Type (see section 13.1):	Front-end Electronics Device
2.4	Function (see section 13.1):	Drift Time Measurement
2.5	Main specification of the component: 24ch TDC device. Time resolution is 0.78 ns/bit.	
2.6	Design (specify: COTS/ASIC):	ASIC
2.7	Design center (if known):	KEK
Manufacturer:		
2.8	Name of the manufacturer:	Toshiba Co.
2.9	Address of the manufacturer (if known):	Kawasaki, Japan
2.10	Phone of the manufacturer (if known):	
2.11	Email of the manufacturer (if known):	
2.12	Web URL of the manufacturer (if known):	
Sampling:		
2.13	Number of tested components (irradiated):	4
2.14	Number of reference components (un-irradiated):	1
Batch origin:		
2.15	Batch origin (Homogeneous/Unknown):	Homogeneous
2.16	Manufacturing date code (for homogeneous batch):	0210EAI
2.17	Manufacturing line code (for homogeneous batch):	F005 3ABA
Technology:		
2.18	Name of the technology (if known):	TC220G
2.19	Technology (CMOS/BiCMOS/Bipolar/AsGa/Other):	CMOS
2.20	Minimum geometry (μm) :	0.3 μm
Package:		
2.21	Type:	QFP
2.22	Part number:	QFP144-2020-0.50
2.23	Number of pin:	144 pins
2.24	Ceramic ? Plastic ? hybrid ? (specify)	Plastic

3. Radiation:

3.1	Name of the radiation facility:	Cyclotron and RI Center, Tohoku Univ.
3.2	Address of the radiation facility:	Sendai, Japan
3.3	Radiation source (see 13.2) :	Accelerator
3.4	Radiation type (see 13.2) :	Proton
3.5	Radiation energy (MeV) :	70 MeV
3.6	Minimum & maximum flux (particle per second) :	3.7×10^8 protons/sec/cm^2
3.7	Total fluence after last step (1 MeV eq. n/cm^2) :	6×10^{11} protons/cm^2
3.8	TID after last step (Gy) :	1300 Gy
3.9	Dosimetry / Calibration method:	γ-ray intensity of Cu foil

4. Radiation test method (see 12.3):

4.1	ATLAS Standard SEE Test Method?	X
4.2	Other TID test method (specify)?	

5. Thermal and voltage stresses:

5.1	Temperature (°C) :	24 - 34 °C
5.2	Supply voltage (specify) :	3.3V
5.3	AC operation (Y/N) ?	Y
5.4	If “yes” to 5.3, which AC operation? Normal Operation with clock and PLL running, and CSR and BIST test.	
5.5	If “yes” to 5.3, which frequency?	40 MHz

Please select and complete one or several sections among sections 6 to 9, according to the device and function(s) you are testing:

6. If your circuit is an analog circuit or contains analog functions:

6.1	Did you search for parasitic transient if any?	N
6.2	Did you record parasitic transient if any?	N
6.3	Did you search for permanent dysfunction if any?	N
6.4	Did you record permanent dysfunction if any?	N
6.5	Did you measure current consumption?	Y
6.6	Did you record current consumption?	Y
6.7	Did you perform an automatic power cycle if a permanent dysfunction or current increase occurs?	N

6.8 Description of operation and measurements of the analog (part of) circuit:

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7. If your circuit is a digital circuit or contains digital functions:

7.1	Did you check all functions in the circuit (Y/N) ?	N
7.2	If "no" to 6.13, which function did you not exercise (specify) ? JTAG, CSR and Memory (BIST) functions.	
7.3	At what frequency did you exercise the circuit?	40 MHz
7.4	Did you search for transient errors (Y/N) ?	Y
7.5	Did you automatically record transient errors if any (Y/N) ?	Y
7.6	Did you search for permanent errors (Y/N) ?	Y
7.7	Did you automatically record permanent errors if any (Y/N) ?	Y
7.8	Did you perform an automatic reset after a permanent error if any (Y/N) ?	N
7.9	Did you perform an automatic power cycle after a permanent error if any (Y/N) ?	N
7.10	Description of operation and measurements of the digital (part of) circuit: CSR and Memory (BIST) read/write test through JTAG interface.	

8. If your circuit is a memory or a register, or contains memory(ies) or registers:

8.1	Did you check all the memories and registers of the device under test (Y/N) ?	Y
8.2	If "no" to 8.1, which memories or registers will you not check (specify)?	
8.3	Did you search for 0 => 1 upsets (Y/N) ?	Y
8.4	Did you search for 1 => 0 upsets (Y/N) ?	Y
8.5	Time required to write in the memory or in the register under test?	
8.6	After a "write" sequence, do you read the memory or register once, or periodically (answer by "*once*" or "*each [time between 2 consecutive read]*") ?	Once
8.7	After a "write" sequence, what is the time during which the memory or the register is (once or periodically) read ?	15 sec
8.8	Did you automatically record bit errors if any (Y/N) ?	Y
8.9	Did you check the "write" function of the memory or register after permanent upset if any (Y/N) ?	Y
8.10	Did you perform an automatic reset after permanent upset if any (Y/N) ?	N
8.11	Did you perform an automatic power cycle after permanent upset if any (Y/N) ?	N
8.12	Description of operation and measurements of the memories and/or of the registers: CSR and Memory (BIST) read/write test through JTAG interface.	

9. If your circuit is an elementary device:

Power transistors		
9.1	Did you search for burnout ignition?	
9.2	Did you record the rate of burnout ignition if any?	
Optocouplers		
9.3	Did you search for permanent dysfunction if any?	
9.4	Did you record permanent dysfunction if any?	
PIN diodes		
9.5	Did you measure the rate of parasitic transient pulses (Y/N) ?	
9.6	Did you record the rate of parasitic transient pulses?	

9.7 Description of operation and measurements of the device under test:

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10. Rejection criteria:

	Measured parameter	Rejection Criteria
10.1		
10.2		
10.3		
10.4		
10.5		

11. Results:

	11.1	11.2	11.3	11.4	11.4	11.5	11.6	11.7
	Serial number of the device under test	number of SEU / total fluence	number of bits permanently stuck / total fluence	number of SEL / total fluence	number of destructive SEE / Total fluence	recovery after power cycle (Y/N)?	recovery after reset (Y/N)?	Failure mechanism (if any): for component “dead” or out of specification, give explanations and numbers
1	AA	0	0	0	0			
		5.94E11	8.10E11	8.10E11	8.10E11			
2	CC	1	0	0	0			
		5.88E11	8.02E11	8.02E11	8.02E11			
3	DD	0	0	0	0			
		5.89E11	8.03E11	8.03E11	8.03E11			
4	FF	0	0	0	0			
		5.91E11	8.06e11	8.06e11	8.06e11			
5								

11. Results, cont.

	11.1	11.2	11.3	11.4	11.4	11.5	11.6	11.7
	Serial number of the device under test	number of SEU / total fluence	number of bits permanently stuck / total fluence	number of SEL / total fluence	number of destructive SEE / Total fluence	recovery after power cycle (Y/N)?	recovery after reset (Y/N)?	Failure mechanism (if any): for component "dead" or out of specification, give explanations and numbers
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

12. Comments

Use the space below to comment test results, or to report them if the above-dedicated space is inappropriate for you.

13. Guidelines

13.1 Type and Function

Type	Function
Analogue device	ADC; Analogue memory; Analogue multiplexor; DAC; LVDS driver; LVDS receiver; Modulator/Demodulator; Voltage/Frequency converter
Data transmission Component	Receiver; Transceiver; Transmitter
Front-end electronic device	Drift Time Measurement; Multiple functions; Readout memory
Linear device	Amplifier; Comparator; Operational amplifier; Voltage reference;
Memory	SRAM
Microprocessor or peripheral	Microcontroller; Microprocessor
Optoelectronic component	Laser; Light emitting diode – LED; PIN diode; VCSEL
Power device	DC-DC converter; Power transistor; Voltage regulator
Programmable device	EEPROM; FPGA; Lookup table; Programmable delay
Passive component	Capacitor
Interfaces/Communication	LVDS; Switch
Mixed A/D device	Multiple functions
Logic gates	NOR, NAND, etc.

13.2 Radiation source and type

Source of radiation	Type of radiation
Accelerator	Electron, proton, spallation neutron
Am-241	Ions (fission products)
Cf-252	Ions (fission products)
Co-60	Photon gamma 1.173 MeV and 1.332 MeV
Cs-137	Photon gamma 0.662 MeV
Cyclotron	Proton, ion (specify), spallation neutron
Reactor	Neutron
Tandem accelerator	Protons, ions
Van-de-Graaf	Electron
X-Ray generator	Photon X

13.3 Radiation test methods:

see ATLAS Policy on Radiation Tolerant Electronics rev. 2, pp. 20-26
http://atlas.web.cern.ch/Atlas/GROUPS/FRONTEND/WWW/RAD/RadWebPage/ATLASPolicy/APRTE_rev2_250800.pdf