AAHH74

PRELIMINARY DATA

Radiation Tolerant Dual D Flip-Flop with Set/Reset

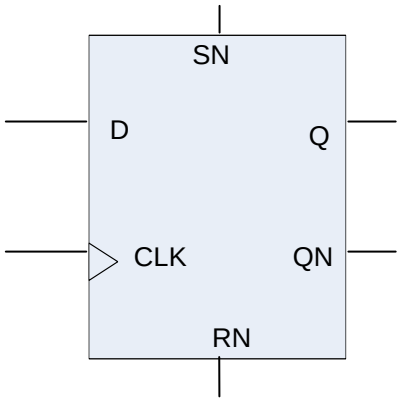
DESCRIPTION

The AAHH74 is part of ASIC Advantage's family of Radiation Tolerant products aimed at the military and aerospace markets. The AAHH74 is a Radiation-Tolerant Dual-D Flip-Flop. It utilizes Bi-CMOS technology and is a replacement to the obsolete part 5962R9576301VXC.

FEATURES

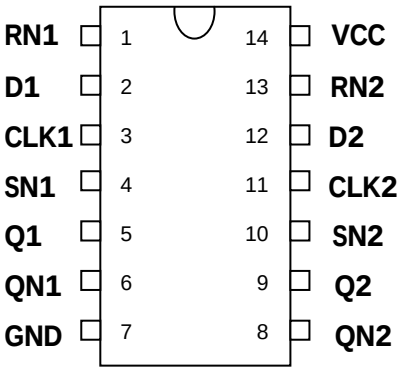
- Tolerance to 200kRad(Si) Total Dose
- Latch-Up Free Design
- Input Compatible to LSTTL
  VIL = 0.8V , VIH=VCC/2
- Low Power ICs
- Operating Temperature Range of -55°C to +125°C
- Input Compatibility to CMOS
  Ii<=5uA at VOL, VOH
- SEP Effective LET no Upsets:>100MeV-cm^2/mg
- Immunity to SEU up to <5x10^{-16} errors/Bit-Day
- Available in Die or 14-pin Ceramic Dual-In-Line FLATPACK package.

FUNCTIONAL DIAGRAM



PIN CONFIGURATION:

14-pin CERAMIC DUAL–IN-LINE FLATPACK



Absolute Maximum Ratings

Supply voltage: ..... -0.5V to 7V

Input Voltage Range: ..... -0.5V to VCC+0.5V

Dc Input Current: ..... ± 10mA

DC Drain Current: ..... ± 25mA

Storage Temperature Range: ..... -65°C to 150°C

Lead Temperature Range: ..... 265°C

Junction Temperature: ..... 175°C

ESD Classification: ..... Class 1

Reliability Information

TBD

Operating Conditions:

Supply Voltage: ..... 4.5V to 5.5V

Input rise and Fall Times: 100ns/Vmax

Input Low Voltage(VIL): ..... 0.0 to 0.8V

Input High Voltage(VIH): ..... VCC/2 to VCC

Operating Temperature Range: ..... -55°C to 125°C

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	GROUP	TEMPERATURE	LIMITS		UNIT
					MIN	MAX	
Quiescent Current	ICC	VCC=5.5V VIN=VCC or GND	1	25°C		20	uA
			2, 3	-55°C, 125°C		400	uA
Output Current(sink)	IOL	VCC=4.5V, VIH =4.5V VOUT=0.4V, VIL=0V	1	25°C	4.8		mA
			2, 3	-55°C, 125°C	4.0		mA
Output Current (source)	IOH	VCC=4.5V,VIH=4.5V, VOUT=VCC-0.4V, VIL=0V	1	25°C		-4.8	mA
			2, 3	-55°C, 125°C		-4.0	mA
Output Voltage Low	VOL	VCC=4.5V, VIH=2.25V	1, 2, 3	25°C		0.1	V
		VCC=5.5V,VIH=2.75V IOL=50uA,VIL=0.8V	1, 2, 3	-55°C, 125°C		0.1	V
Output Voltage High	VOH	VCC=4.5V,VIH=2.25V IOH= -50uA,VIL=0.8V	1, 2, 3	25°C	VCC-0.1		V
		VCC=5.5V,VIH=2.75V IOH= -50uA,VIL=0.8V	1, 2, 3	-55°C, 125°C	VCC-0.1		V
Input Leakage Current	IIN	VCC=5.5V, VIN=VCC or GND	1	25°C		± 0.5	uA
			2, 3	-55°C, 125°C		± 5.0	uA
Noise Immunity Functional Test	FN	VCC=4.5V,VIH=2.25V VIL=0.8V	7, 8A, 8B	25°C, -55°C, 125°C			

AC ELECTRICAL PERFORMANCE CHARACTERISTICS							
PARAMETER	**SYMBOL**	**CONDITIONS**	**GROUP**	**TEMPERATURE**	**LIMITS**		**UNITS**
					MIN	**MAX**	
CLK to QN, Q	TPHL	VCC=4.5V	9	25°C	2	31	ns
			10, 11	125°C, -55°C	2	37	
	TPLH	VCC=4.5V	9	25°C	2	27	
			10, 11	125°C, -55°C	2	31	
SN to Q	TPLH	VCC=4.5V	9	25°C	2	21	ns
			10, 11	125°C, -55°C	2	24	ns
SN to QN	TPHL	VCC=4.5V	9	25°C	2	33	ns
			10, 11	125°C, -55°C	2	38	ns
RN to Q	TPHL	VCC=4.5V	9	25°C	2	35	ns
			10, 11	125°C, -55°C	2	40	ns
RN to QN	TPLH	VCC=4.5V	9	25°C	2	29	ns
			10, 11	125°C, -55°C	2	34	ns

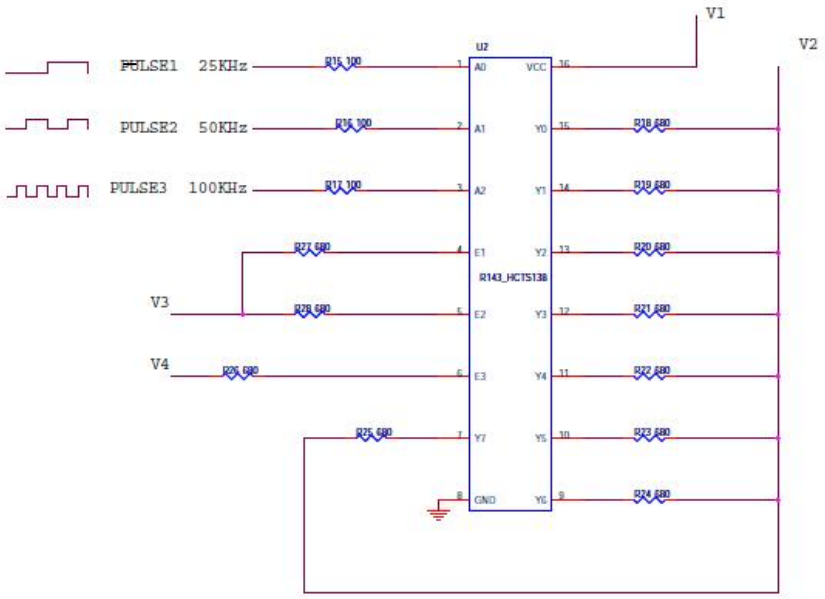
Notes: RL=500ohms, CL=50pF, TR=TF=3ns

ELECTRICAL PERFORMANCE CHARACTERISTICS						
PARAMETER	**SYMBOL**	**CONDITIONS**	**TEMPERATURE**	**LIMITS**		**UNITS**
				MIN	**MAX**	
Capacitance Power Dissipation	CPD	VCC=5.0V ,f=1Mhz	25°C		53	pF
			125°C, -55°C		55	
Input Capacitance	CIN	VCC=5.0V ,f=1Mhz	25°C		10	pF
			125°C		10	
Output Transition Time	TTHL TTLH	VCC=4.5V	25°C		15	ns
			125°C		22	
Max Operating Frequency	FMAX	VCC=4.5V	25°C		25	MHz
			125°C, -55°C		16	
Setup Time	TSU	VCC=4.5V	25°C	11		ns
			125°C, -55°C	12		
Hold Time	TH	VCC=4.5V	25°C	3		ns
			125°C, -55°C	3		
Removal Time RN, SN to CLK	TREM	VCC=4.5V	25°C	5		ns
			125°C, -55°C	6		
Pulse Width RN, SN	TW	VCC=4.5V	25°C	14		ns
			125°C, -55°C	16		
Pulse Width CLK	TW	VCC=4.5V	25°C	14		ns
			125°C, -55°C	16		

DC POST RADIATION ELECTRICAL CHARACTERISTICS						
PARAMETER	**SYMBOL**	**CONDITION**	**TEMPERATURE**	**LIMITS**		**UNITS**
				MIN	**MAX**	
Quiescent Current	ICC	VCC=5.5V,VIN=VCC or GND	25°C		0.4	mA
Output Current (sink)	IOL	VCC=4.5V, VIH =4.5V VOUT=0.4V, VIL=0V	25°C	4.0		mA
Output Current (source)	IOH	VCC=4.5V,VIH=4.5V, VOUT=VCC-0.4V, VIL=0V	25°C		-4.0	mA
Output Voltage Low	VOL	VCC=4.5V, VIH=2.25V IOL=50uA, VIL=0.8V	25°C		0.1	V
Output Voltage High	VOH	VCC=4.5V,VIH=2.25V IOH= -50uA,VIL=0.8V	25°C	VCC-0.1		V
Input Leakage Current	IIN	VCC=5.5V, VIN=VCC or GND	25°C		± 5	uA
Noise Immunity Functional Test	FN	VCC=4.5V,VIH=2.25V VIL=0.8V	25°C			
CLK to Q,QN	TPHL	VCC=4.5V	25°C	2	37	ns
	TPLH	VCC=4.5V	25°C	2	31	ns
SN to Q	TPLH	VCC=4.5V	25°C	2	24	ns
SN to QN	TPHL	VCC=4.5V	25°C	2	38	ns
RN to Q	TPHL	VCC=4.5V	25°C	2	40	ns
RN to QN	TPLH	VCC=4.5V	25°C	2	34	ns

Burn-in and Operating Life Test , Delta Parameters (+25°C)		
PARAMETER	**GROUP**	**DELTA LIMIT**
ICC	5	3uA
IOL/IOH	5	-15% of 0 Hour

Dynamic Burn-In Schematic

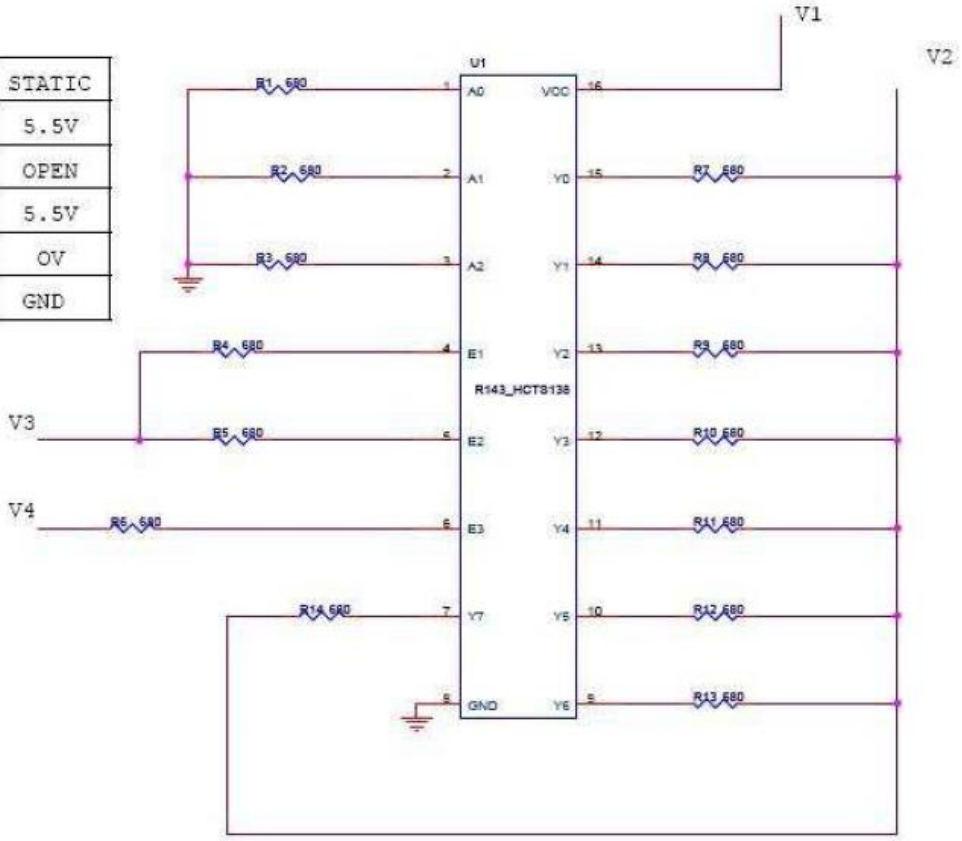


	STATIC	DYNAMIC	TOLERANCES
V1	5.5V	5.5V	5%
V2	OPEN	2.75V	5%
V3	5.5V	OV	5%
V4	OV	5.5V	5%
PULSE1	GND	25KHz/0-5.5V	5%
PULSE2	GND	50KHz/0-5.5V	5%
PULSE3	GND	100KHz/0-5.5V	5%

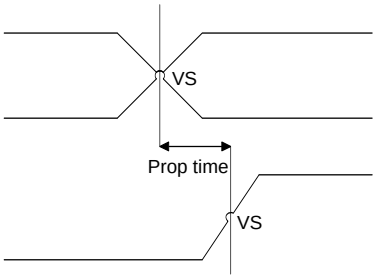
Total Ionization Dose Schematic:

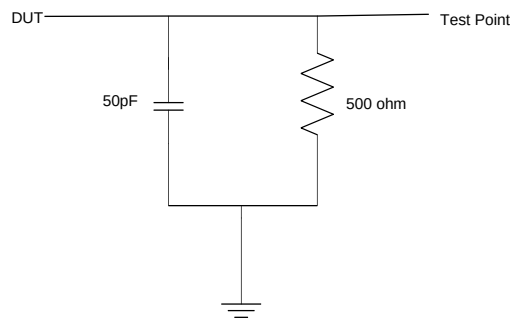
The biasing used for the TID irradiation exposure will be the same as the static burn-in one.

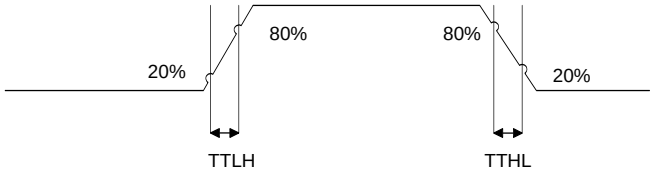
	STATIC
V1	5.5V
V2	OPEN
V3	5.5V
V4	OV
CLOCKS	GND



Timing Diagram



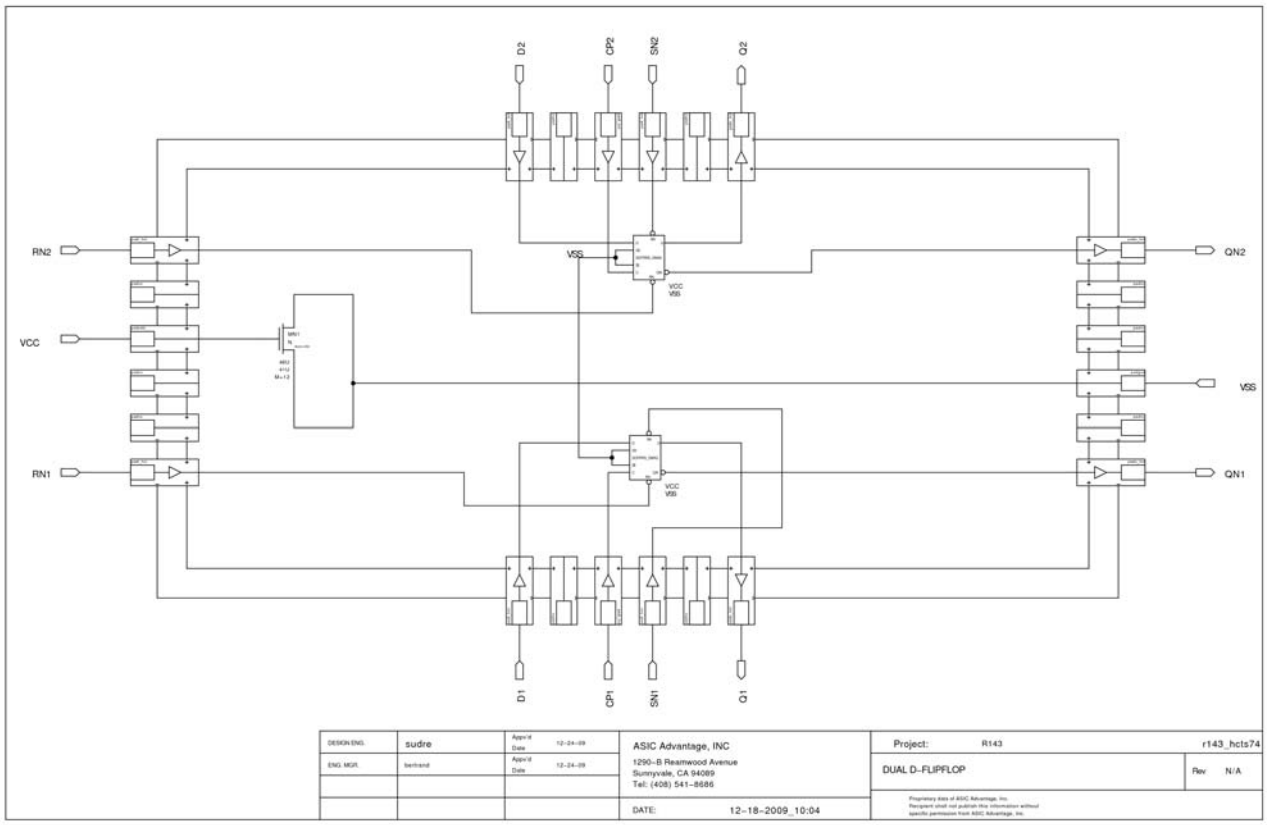




Note:

1. Rise/Fall time is 80% to 20%
2. The propagation time is measured at VS=1.3V

Schematic



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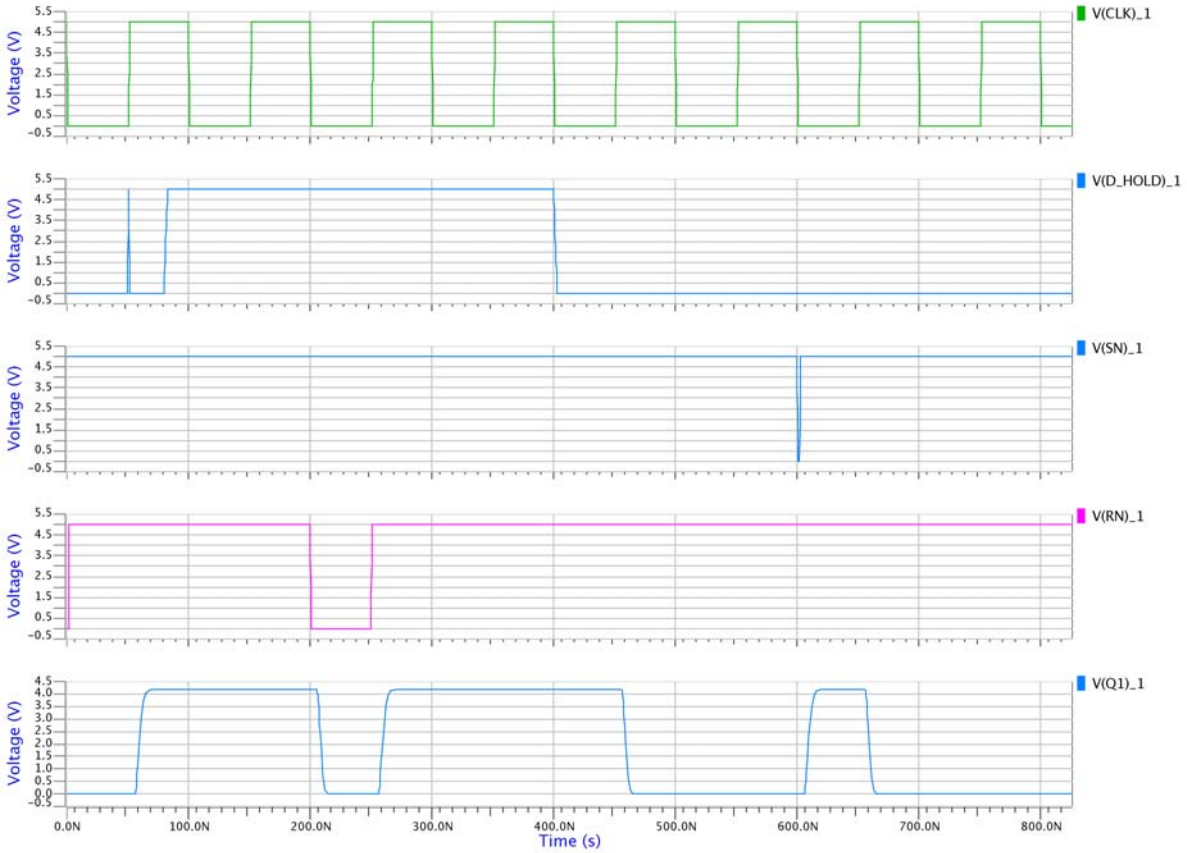
Simulation Readings

				-55°C	25°C	125°C	
CLK to QN	TPHL	VCC=4.5V	nom	9.3	11.41	13.95	ns
			w.s	12.63	15.68	19.68	
			w.p	6.82	8.05	9.93	
CLK to Q	TPLH	VCC=4.5V	nom	7.64	9.63	12.08	ns
			w.s	11.48	14.74	18.75	
			w.p	4.99	6.17	7.64	
SN to QN	TPHL	VCC=4.5V	nom	9.09	11.06	13.97	ns
			w.s	12.61	15.86	19.87	
			w.p	6.61	7.82	9.64	
SN to Q	TPLH	VCC=4.5V	nom	7.45	9.40	11.95	ns
			w.s	11.41	14.85	19	
			w.p	4.78	5.93	7.36	
RN to Q	TPHL	VCC=4.5V	nom	9.05	11.12	14.02	ns
			w.s	12.60	15.90	20.01	
			w.p	6.63	7.86	9.85	
RN to QN	TPLH	VCC=4.5V	nom	7.77	9.94	12.73	ns
			w.s	12.06	15.71	20.20	
			w.p	5.12	6.22	7.92	

Setup Time : minimum of 1.5ns
Hold Time: minimum of 0.5ns
Removal time: minimum of 1ns before the clk
Note : **For DC Characteristics simulation results please refer the pads document

Simulation Waveforms



ORDERING INFORMATION

Ordering PN(1)	Subgroup	Description	Temp. Range	Package	Packing Type	Packing Qty
AAHH74 S-L14A	Digital Interface	Dual D Flip-Flop with Set/Reset	S - Special -55°C to +125°C	14-Pin Ceramic DFP	TBD	TBD
AAHH74 S-DIE-W-S	Digital Interface	Dual D Flip-Flop with Set/Reset	S - Special -55°C to +125°C	Die	Waffle Pack	TBD

(1) Add "-S" or "-B" to end of part number to specify Class S or Class B screening levels.
Add "-ENGR" for engineering samples, contact factory for more information.
Die is only offered with Class S screening, as indicated.

PACKAGE DIMENSIONS AND MARKING

The AAHH74 devices are available in a 14-Pin Ceramic Dual-In-Line Flatpack package and in Die form. Refer to the latest version of specification AAPS001 (ASIC Advantage's "Package Numbering, Marking, and Outline Standard", available at www.asicadvantage.com, for specific information concerning the package dimensions and package marking.

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- AAI's modified snubber network is patented under the US Patent # 6,233,165

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