

AAHH04

Radiation Hardened Hex Inverter

PRELIMINARY DATA

DESCRIPTION

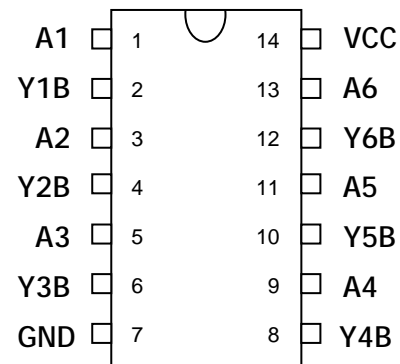
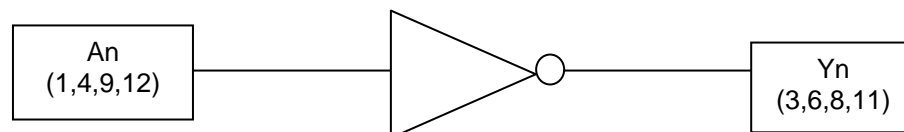
The AAHH04 is part of ASIC Advantage's family of Radiation Tolerant products aimed at the military and aerospace markets. The AAHH04 is a Radiation-Tolerant Hex Inverter. It utilizes Bi-CMOS technology and is a replacement to the obsolete part 5962R9573201VXC.

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-cm²/mg
- Immunity to SEU up to <5x10⁻¹⁶ errors/Bit-Day
- Available in Die or 14-pin Ceramic Dual-In-Line FLATPACK Package.

TRUTH TABLE

Input	Output
An	Yn
L	H
H	L

PIN CONFIGURATION:**14-pin CERAMIC DUAL-IN-LINE FLATPACK****FUNCTIONAL DIAGRAM**

Radiation Tolerant AAHH04

Absolute Maximum Ratings

Supply voltage: -0.5V to 7V
 Input Voltage Range: -0.5V to VCC+0.5V
 Dc Input Current: ± 10 mA
 DC Drain Current: ± 25 mA
 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		10	μ A
			2, 3	-55°C, 125°C		200	μ A
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=50 μ A, VIL=0.8V	1, 2, 3	-55°C, 125°C		0.1	V
Output Voltage High	VOH	VCC=4.5V, VIH=2.25V IOH= -50 μ A, VIL=0.8V	1, 2, 3	25°C	VCC-0.1		V
		VCC=5.5V, VIH=2.75V IOH= -50 μ A, 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	μ A
			2, 3	-55°C, 125°C		± 5.0	μ A
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	
Input to YN	TPHL	VCC=4.5V	9	25°C	2	18	ns
			10, 11	125°C, -55°C	2	20	ns
Input to YN	TPLH	VCC=4.5V	9	25°C	2	20	ns
			10, 11	125°C, -55°C	2	22	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		38	pF
			125°C, -55°C		72	pF
Input Capacitance	CIN	VCC=5.0V, f=1Mhz	25°C		10	pF
			125°C		10	pF
Output Transition Time	TTHL TTLH	VCC=4.5V	25°C		15	ns
			125°C		22	ns

DC POST RADIATION ELECTRICAL CHARACTERISTICS

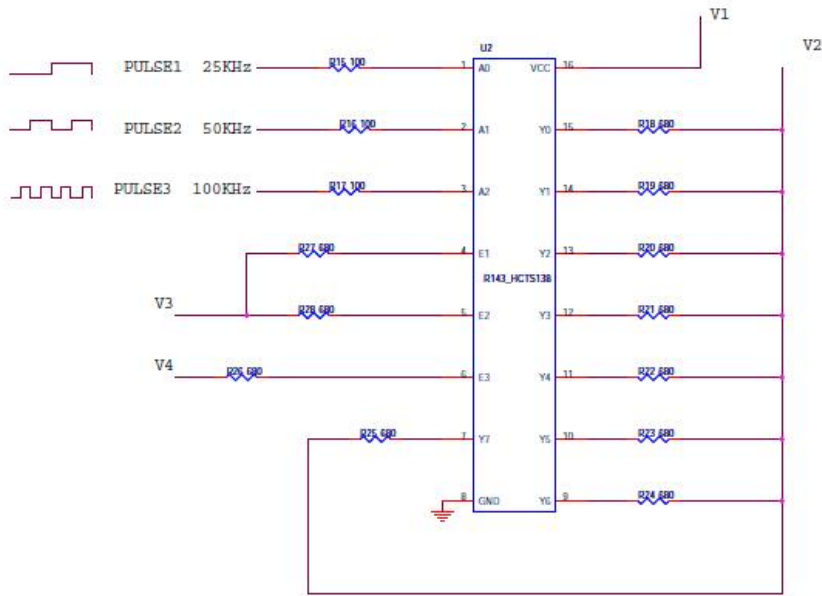
PARAMETER	SYMBOL	CONDITION	TEMPERATURE	LIMITS		UNITS
				MIN	MAX	
Quiescent Current	ICC	VCC=5.5V, VIN=VCC or GND	25°C		0.2	mA
Output Current (sink)	IOL	VCC=4.5V, VIH=4.5V VOUT=0.4V, VIL=0V	25°C	4.0		mA
Output Current (source)	IOH	VCC=4.5V, VIH=4.5V, VOUT=VCC-0.4V, VIL=0V	25°C		-4.0	mA
Output Voltage 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			
Input to Yn	TPHL	VCC=4.5V	25°C	2	20	ns
	TPLH	VCC=4.5V	25°C	2	22	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

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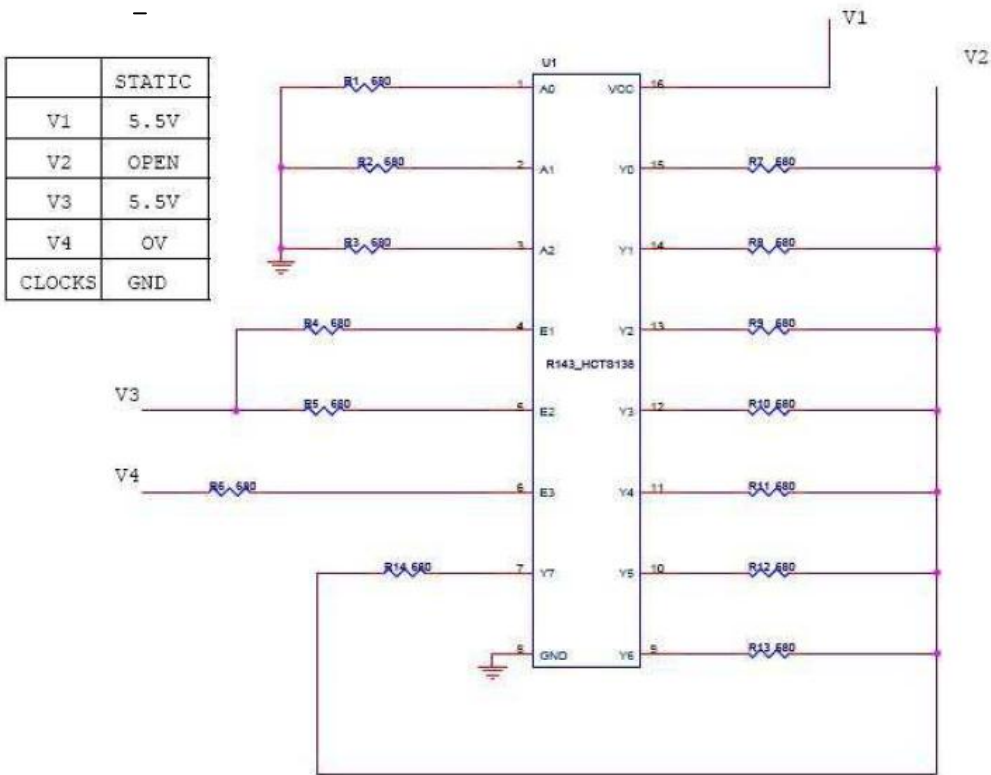
Dynamic Burn-In Schematic



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

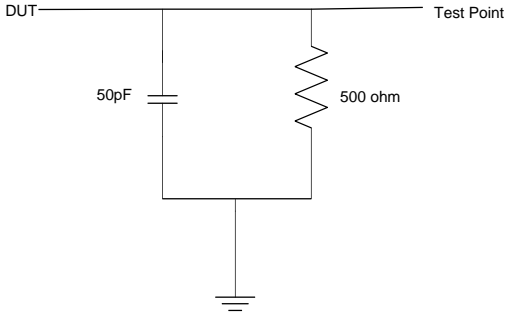
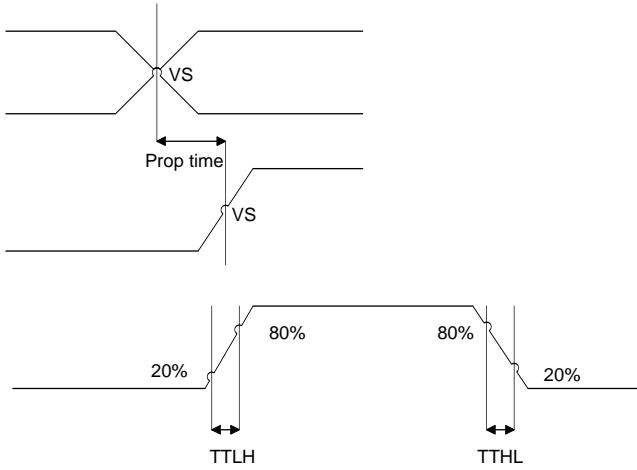
Total Ionization Dose Schematic

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



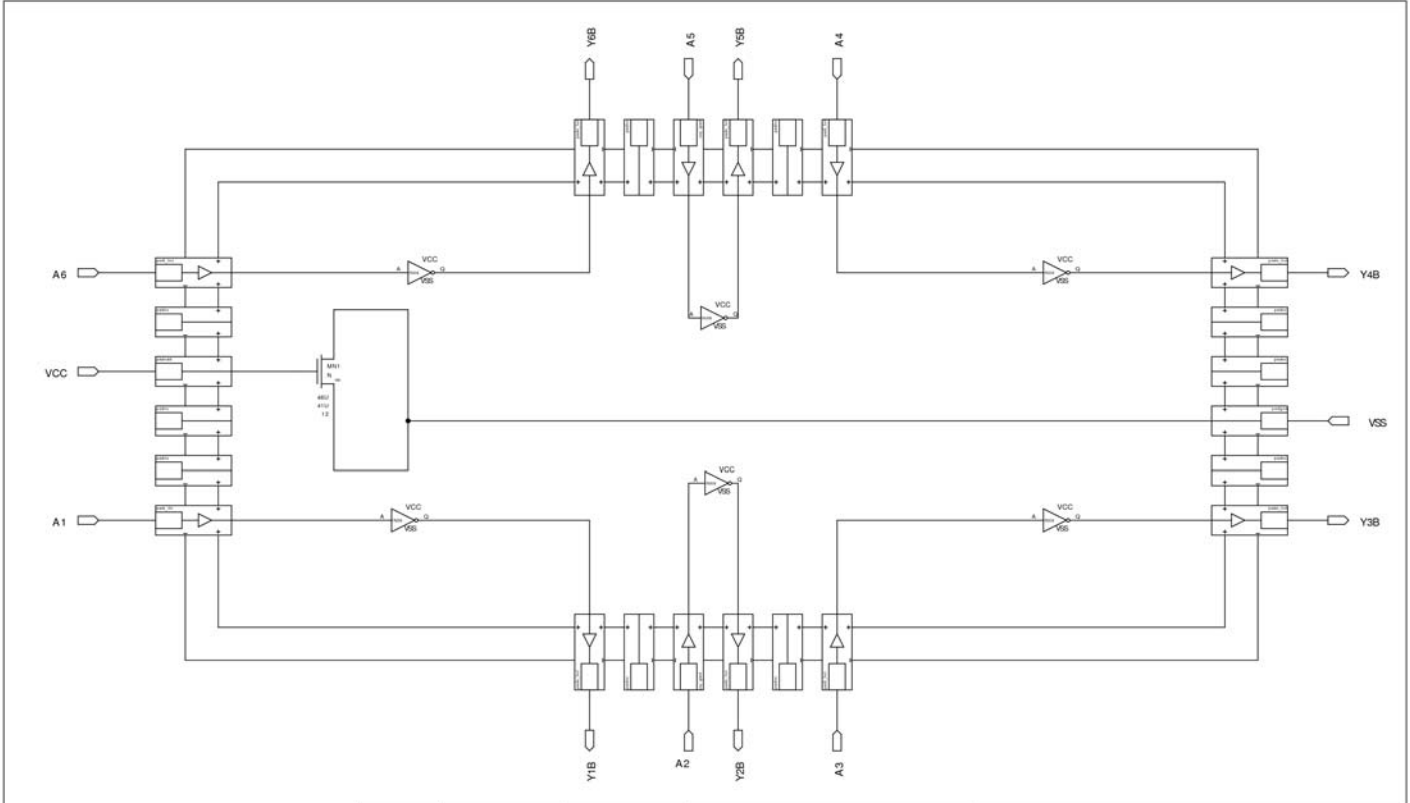
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Timing Diagram



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

Schematic



DESIGNING	sudre	Appr'd	12-24-09	ASIC Advantage, INC 1250-B Reamwood Avenue Sunnyvale, CA 94089 Tel: (408) 541-8886	Project:	R143	r143_hcts04
ENG MGR	bertrand	Appr'd	12-24-09		HEX INVERTER		Rrv N/A
				DATE:	12-18-2009_09:15		

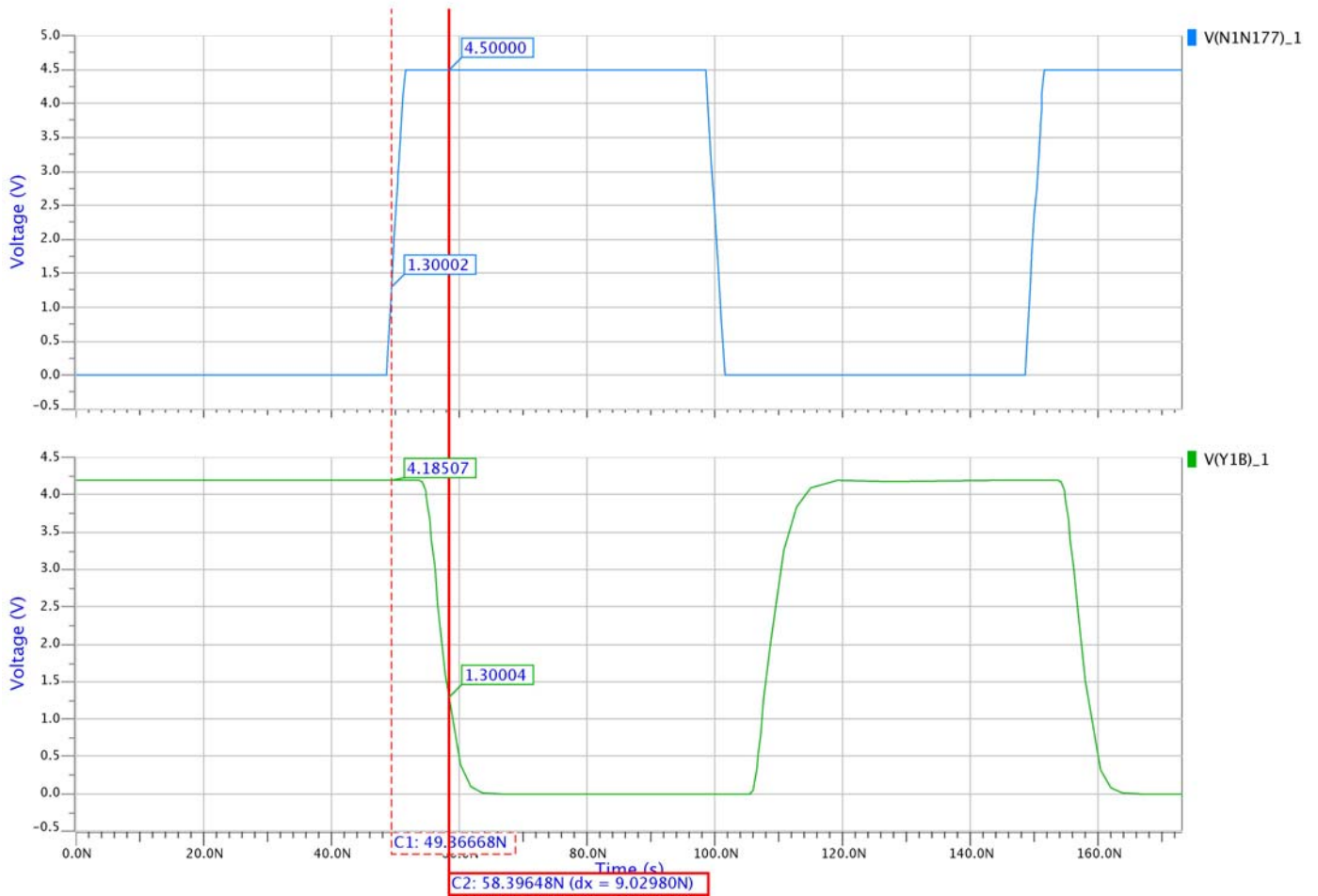
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Simulation Readings

Input to YN	TPHL	VCC=4.5V	Min			Max				
			25°C	8	15.17	ns	125°C -55°C	6.61	18.8	ns
Input to YN	TPLH	VCC=4.5V	25°C	5.79	14.2	ns	125°C -55°C	4.64	18.25	ns

Note: For DC Characteristics please refer the Pads Document

Simulation Waveforms



Radiation Tolerant AAHH04

ORDERING INFORMATION

Ordering PN(1)	Subgroup	Description	Temp. Range	Package	Packing Type	Packing Qty
AAHH04 S-L14A	Digital Interface	Hex Inverter	S - Special -55°C to +125°C	14-Pin Ceramic DFP	TBD	TBD
AAHH04 S-DIE-W-S	Digital Interface	Hex Inverter	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 AAHH04 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.

Radiation Tolerant AAHH04

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

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ASIC Advantage INC.

1290-B Reamwood Ave, Sunnyvale California 94089, USA

Tel: (1) 408-541-8686 Fax: (1) 408-541-8675

Website: <http://www.asicadvantage.com>