

Features

- This Circuit is Processed in Accordance to MIL-STD-883 and is Fully Conformant Under the Provisions of Paragraph 1.2.1.
- Block Oriented 24-Bit Sequencer
- Configurable as Two Independent 12-Bit Sequencers
- 24 x 24 Crosspoint Switch
- Programmable Delay on 12 Outputs
- Multi-Chip Synchronization Signals
- Standard μ P Interface
- 100pF Drive on Outputs
- DC to 40MHz Clock Rate

Applications

- 1-D, 2-D Filtering
- Pan/Zoom Addressing
- FFT Processing
- Matrix Math Operations

Description

The Harris HSP45240 is a high speed Address Sequencer which provides specialized addressing for functions like FFTs, 1-D and 2-D filtering, matrix operations, and image manipulation. The sequencer supports block oriented addressing of large data sets up to 24 bits at clock speeds up to 40MHz.

Specialized addressing requirements are met by using the onboard 24 x 24 crosspoint switch. This feature allows the mapping of the 24 address bits at the output of the address generator to the 24 address outputs of the chip. As a result, bit reverse addressing, such as that used in FFTs, is made possible.

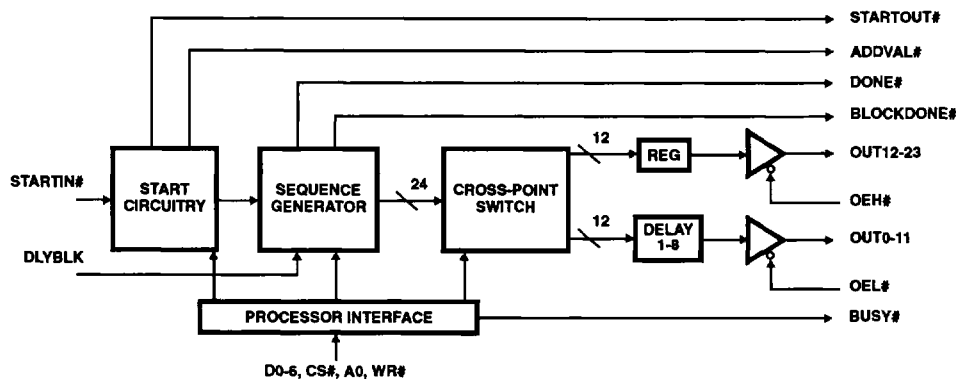
A single chip solution to read/write addressing is also made possible by configuring the HSP45240 as two 12-bit sequencers. To compensate for system pipeline delay, a programmable delay is provided on 12 of the address outputs.

The HSP45240 is manufactured using an advanced CMOS process, and is a low power fully static design. The configuration of the device is controlled through a standard micro-processor interface and all inputs/outputs, with the exception of clock, are TTL compatible.

Ordering Information

PART NUMBER	TEMPERATURE RANGE	PACKAGE
HSP45240GM-25/883	-55°C to +125°C	68 Lead PGA
HSP45240GM-33/883	-55°C to +125°C	68 Lead PGA
HSP45240GM-40/883	-55°C to +125°C	68 Lead PGA

Block Diagram



CAUTION: These devices are sensitive to electrostatic discharge. Users should follow proper I.C. Handling Procedures.
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File Number 2816.2

Specifications HSP45240/883

Absolute Maximum Ratings

Supply Voltage	+8.0V
Input, Output Voltage Applied	GND-0.5V to $V_{CC}+0.5V$
Storage Temperature Range	-65°C to +150°C
Junction Temperature	+175°C
Lead Temperature (Soldering, Ten Seconds)	+300°C
ESD Classification	Class 1

Reliability Information

Thermal Resistance	θ_{ja}	θ_{jc}
Ceramic PGA Package	37.1°C/W	10.1°C/W
Maximum Package Power Dissipation at +125°C		
Ceramic PGA Package	1.35 Watt	
Gate Count	8,388 Gates	

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Operating Conditions

Operating Voltage Range	+4.5V to +5.5V
Operating Temperature Range	-55°C to +125°C

TABLE 1. D.C. ELECTRICAL PERFORMANCE CHARACTERISTICS

Devices Guaranteed and 100% Tested

PARAMETER	SYMBOL	CONDITIONS	GROUP A SUBGROUPS	TEMPERATURE	LIMITS		UNITS
					MIN	MAX	
Logical One Input Voltage	V_{IH}	$V_{CC} = 5.5V$	1, 2, 3	$-55^{\circ}C \leq T_A \leq +125^{\circ}C$	2.2	-	V
Logical Zero Input Voltage	V_{IL}	$V_{CC} = 4.5V$	1, 2, 3	$-55^{\circ}C \leq T_A \leq +125^{\circ}C$	-	0.8	V
Output HIGH Voltage	V_{OH}	$I_{OH} = -400\mu A$ $V_{CC} = 4.5V$ (Note 1)	1, 2, 3	$-55^{\circ}C \leq T_A \leq +125^{\circ}C$	2.6	-	V
Output LOW Voltage	V_{OL}	$I_{OL} = +2.0mA$ $V_{CC} = 4.5V$ (Note 1)	1, 2, 3	$-55^{\circ}C \leq T_A \leq +125^{\circ}C$	-	0.4	V
Input Leakage Current	I_I	$V_{IN} = V_{CC}$ or GND $V_{CC} = 5.5V$	1, 2, 3	$-55^{\circ}C \leq T_A \leq +125^{\circ}C$	-10	+10	μA
Output Leakage Current	I_O	$V_{OUT} = V_{CC}$ or GND $V_{CC} = 5.5V$	1, 2, 3	$-55^{\circ}C \leq T_A \leq +125^{\circ}C$	-10	+10	μA
Clock Input High	V_{IHC}	$V_{CC} = 5.5V$	1, 2, 3	$-55^{\circ}C \leq T_A \leq +125^{\circ}C$	3.0	-	V
Clock Input Low	V_{ILC}	$V_{CC} = 4.5V$	1, 2, 3	$-55^{\circ}C \leq T_A \leq +125^{\circ}C$	-	0.8	V
Standby Power Supply Current	I_{CCSB}	$V_{IN} = V_{CC}$ or GND $V_{CC} = 5.5V$, Outputs Open	1, 2, 3	$-55^{\circ}C \leq T_A \leq +125^{\circ}C$	-	500	μA
Operating Power Supply Current	I_{CCOP}	$f = 33MHz$ $V_{CC} = 5.5V$ (Note 2)	1, 2, 3	$-55^{\circ}C \leq T_A \leq +125^{\circ}C$	-	99	mA
Functional Test	FT	(Note 3)	7, 8	$-55^{\circ}C \leq T_A \leq +125^{\circ}C$	-	-	

NOTES:

1. Interchanging of force and sense conditions is permitted.
2. Operating Supply Current is proportional to frequency, typical rating is 3mA/MHz.
3. Tested as follows: $f = 1MHz$, $V_{IH} = 2.6$, $V_{IL} = 0.4$, $V_{OH} \geq 1.5V$, $V_{OL} \leq 1.5V$, $V_{IHC} = 3.4V$, and $V_{ILC} = 0.4V$.

Specifications HSP45240/883

TABLE 2. A.C. ELECTRICAL PERFORMANCE CHARACTERISTICS

Device Guaranteed and 100% Tested (Note 1)

PARAMETERS	SYMBOL	CONDI-TIONS	GROUP A SUB-GROUP	TEMPERATURE	LIMITS						UNITS
					-25 (25MHz)		-33 (33MHz)		-40 (40MHz)		
					MIN	MAX	MIN	MAX	MIN	MAX	
Clock Period	T _{CP}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	39	-	30	-	25	-	ns
Clock Pulse Width High	T _{CH}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	15	-	12	-	10	-	ns
Clock Pulse Width Low	T _{CL}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	15	-	12	-	10	-	ns
Setup Time D0-6 to WR# High	T _{DS}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	17	-	16	-	14	-	ns
Hold Time D0-6 from WR# Low	T _{DH}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	0	-	0	-	0	-	ns
Set-up Time A, CS#, to WR# Low	T _{AS}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	5	-	5	-	5	-	ns
Hold Time A, CS#, from WR# High	T _{AH}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	0	-	0	-	0	-	ns
Pulse Width for WR# Low	T _{WRL}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	18	-	14	-	12	-	ns
Pulse Width for WR# High	T _{WRH}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	18	-	14	-	12	-	ns
WR# Cycle Time	T _{WP}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	39	-	30	-	25	-	ns
Set-up Time STARTIN#, DLYBLK, to Clock High	T _{IS}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	15	-	12	-	10	-	ns
Hold Time STARTIN#, DLYBLK, to Clock High	T _{IH}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	0	-	0	-	0	-	ns
Clock to Output Prop. Delay on OUT0-23	T _{PDO}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	-	18	-	16	-	14	ns
Clock to Prop. Delay, on STARTOUT#, BLKDONE#, DONE#, ADVAL#, and BUSY#	T _{PDS}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	-	18	-	16	-	14	ns
Output Enable Time	T _{EN}	Note 2	9, 10, 11	-55°C ≤ T _A ≤ +125°C	-	22	-	20	-	15	ns
RST# Low Time	T _{RST}		9, 10, 11	-55°C ≤ T _A ≤ +125°C	2 Clock Cycles						ns

NOTES:

1. A.C. Testing: V_{CC} = 4.5V and 5.5V, Inputs are driven at 3.0V for Logic "1" and 0.0V for a Logic "0". Input and output timing measurements are made at 1.5V for both a logic "1" and "0". CLK is driven at 4.0V and 0V and measured at 2.0V.
2. Transition is measured at ±200mV from steady state voltage with loading as specified by test load circuit and C_L = 40pF.

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SPECIAL FUNCTION

TABLE 3. ELECTRICAL PERFORMANCE CHARACTERISTICS

PARAMETERS	SYMBOL	CONDI- TIONS	NOTES	TEMPERATURE	LIMITS						UNITS
					-25 (25MHz)		-33 (33MHz)		-40 (40MHz)		
					MIN	MAX	MIN	MAX	MIN	MAX	
Input Capacitance	C _{IN}	V _{CC} = Open, f = 1MHz, All measurements are referenced to device GND.	1	T _A = +25°C	-	10	-	10	-	10	pF
Output Capacitance	C _{OUT}	V _{CC} = Open, f = 1MHz, All measurements are referenced to device GND.	1	T _A = +25°C	-	10	-	10	-	10	pF
Output Disable Delay	TOEZ		1, 2	-55°C ≤ T _A ≤ +125°C	-	22	-	20	-	15	ns
Output Rise Time	T _{OR}		1, 2	-55°C ≤ T _A ≤ +125°C	-	5	-	5	-	3	ns
Output Fall Time	T _{OF}		1, 2	-55°C ≤ T _A ≤ +125°C	-	5	-	5	-	3	ns

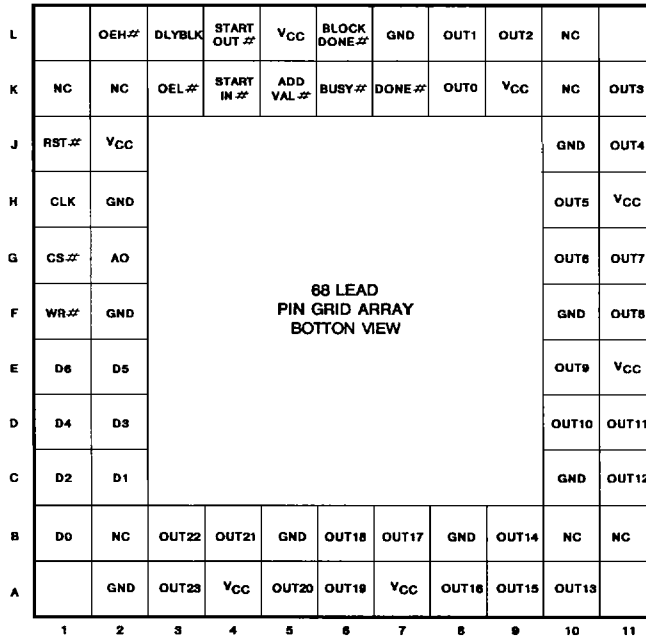
NOTES: 1. Parameters listed in Table 3 are controlled via design or process parameters and are not directly tested. These parameters are characterized upon initial design and after major process and/or design changes.

2. Loading is as specified in the test load circuit with C_L = 40pF.

TABLE 4. ELECTRICAL TEST REQUIREMENTS

CONFORMANCE GROUPS	METHOD	SUBGROUPS
Initial Test	100%/5004	-
Interim Test	100%/5004	-
PDA	100%	1
Final Test	100%	2, 3, 8A, 8B, 10, 11
Group A	-	1, 2, 3, 7, 8A, 8B, 9, 10, 11
Groups C & D	Samples/5005	1, 7, 9

Burn-In Circuit



PGA PIN	PIN NAME	BURN-IN SIGNAL	PGA PIN	PIN NAME	BURN-IN SIGNAL	PGA PIN	PIN NAME	BURN-IN SIGNAL	PGA PIN	PIN NAME	BURN-IN SIGNAL
A2	GND	GND	B9	OUT14	V _{CC} /2	F11	OUT8	V _{CC} /2	K6	BUSYB	V _{CC} /2
A3	OUT23	V _{CC} /2	C1	D2	F10	G1	CSB	F5	K7	DONEB	V _{CC} /2
A4	V _{CC}	V _{CC}	C2	D1	F9	G2	A0	F6	K8	OUT0	V _{CC} /2
A5	OUT20	V _{CC} /2	C10	GND	GND	G10	OUT6	V _{CC} /2	K9	V _{CC}	V _{CC}
A6	OUT19	V _{CC} /2	C11	OUT12	V _{CC} /2	G11	OUT7	V _{CC} /2	K11	OUT3	V _{CC} /2
A7	V _{CC}	V _{CC}	D1	D4	F12	H1	CLK	F0	L2	OEHB	F13
A8	OUT16	V _{CC} /2	D2	D3	F11	H2	GND	GND	L3	DLYBLK	F11
A9	OUT15	V _{CC} /2	D10	OUT10	V _{CC} /2	H10	OUT5	V _{CC} /2	L4	STARTOUTB	V _{CC} /2
A10	OUT13	V _{CC} /2	D11	OUT11	V _{CC} /2	H11	V _{CC}	V _{CC}	L5	V _{CC}	V _{CC}
B1	D0	F8	E1	D6	F7	J1	RSTB	F14	L6	BLOCKDONEB	V _{CC} /2
B3	OUT22	V _{CC} /2	E2	D5	F13	J2	V _{CC}	V _{CC}	L7	GND	GND
B4	OUT21	V _{CC} /2	E10	OUT9	V _{CC} /2	J10	GND	GND	L8	OUT1	V _{CC} /2
B5	GND	GND	E11	V _{CC}	V _{CC}	J11	OUT4	V _{CC} /2	L9	OUT2	V _{CC} /2
B6	OUT18	V _{CC} /2	F1	WRB	F4	K3	OELB	F12			
B7	OUT17	V _{CC} /2	F2	GND	GND	K4	STARTINB	F6			
B8	GND	GND	F10	GND	GND	K5	ADVALB	V _{CC} /2			

NOTES:

- V_{CC}/2 (2.7V ±10%) used for outputs only.
- 47KΩ (±20%) resistor connected to all pins except V_{CC} and GND.
- V_{CC} = 5.5 ±0.5V.
- 0.1μF (min) capacitor between V_{CC} and GND per position.
- F0 = 100KHz ±10%, F1 = F0/2, F2 = F1/2, ..., F11 = F10/2, 40% - 60% Duty Cycle.
- Input voltage limits: V_{IL} = 0.8V max., V_{IH} = 4.5V ±10%.

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SPECIAL FUNCTION

Metallization Topology

DIE DIMENSIONS:

186 x 222 x 19 ±1 mils

METALLIZATION:

Type: Si - Al or Si-Al-Cu

Thickness: 8kÅ

GLASSIVATION:

Type: Nitrox

Thickness: 10kÅ

WORST CASE CURRENT DENSITY:

1.8 x 10⁵A/cm²

Metallization Mask Layout

HSP45240/883

