5V/3.3V DIFFERENTIAL DATA AND CLOCK D FLIP-FLOP WITH SET AND RESET

ECL Pro™
SY10EP53V

FEATURES

- 3.3V and 5V power supply options
- 3.0GHz toggle frequency
- 75KΩ internal input pulldown resistors
- Available in 10-pin MSOP package

ECL Pro™

DESCRIPTION

The SY10EP53V is a differential data, differential clock D flip-flop with set and reset. The EP53V is ideally suited for those applications which require the ultimate in AC performance.

Data enters the master portion of the flip-flop when the clock is LOW and is transferred to the slave, and thus the outputs, upon a positive transition of the clock. The differential clock inputs also allow the EP53V to be used as a negative edge triggered device. Both set and reset inputs are asynchronous, level triggered signals.

The EP53V employs input clamping circuitry so that, under open input conditions (pulled down to V_{EE}), the outputs of the device will remain stable.

PIN NAMES

Pin	Function
D, /D	Data Input (ECL)
CLK, /CLK	Clock Input (ECL)
Q, /Q	Data Output (ECL)
V_{CC}, V_{EE}	Power Supply
SET	ECL Asynchonous Set
RESET	ECL Asynchonous Reset

TRUTH TABLE(1)

D	SET	RESET	CLK	Q
L	L	L	Z	L
H	L	L	Z	H
X	H	L	X	H
X	L	H	X	L
X	H	H	X	UNDEF

Note 1. Z = LOW-to-HIGH transition.

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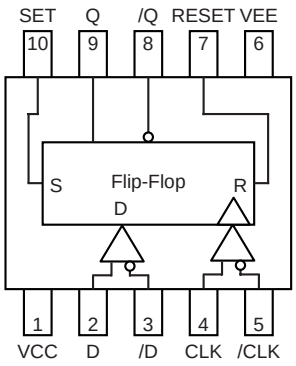
PACKAGE/ORDERING INFORMATION



10-Pin MSOP (K10-1)

Ordering Information[1]

Part Number	Package Type	Operating Range	Package Marking	Lead Finish
SY10EP53VKC	K10-1	Commercial	HP53	Sn-Pb
SY10EP53VKCTR[2]	K10-1	Commercial	HP53	Sn-Pb
SY10EP53VKI	K10-1	Industrial	HP53	Sn-Pb
SY10EP53VKITR[2]	K10-1	Industrial	HP53	Sn-Pb
SY10EP53VKG[3]	K10-1	Industrial	HP53 with Pb-Free bar line indicator	NiPdAu Pb-Free
SY10EP53VKGTR[2, 3]	K10-1	Industrial	HP53 with Pb-Free bar line indicator	NiPdAu Pb-Free

Notes:

1. Contact factory for die availability. Dice are guaranteed at T_A = 25°C, DC Electricals only.
2. Tape and Reel.
3. Pb-Free package is recommended for new designs.

ABSOLUTE MAXIMUM RATINGS[1]

Symbol	Rating	Value	Unit
V_{CC} — V_{EE}	Power Supply Voltage	6V	V
V_{IN}	Input Voltage (V_{CC} = 0V, V_{IN} not more negative than V_{EE}) Input Voltage (V_{EE} = 0V, V_{IN} not more positive than V_{CC})	–6.0 to 0 +6.0 to 0	V V
I_{OUT}	Output Current –Continuous –Surge	50 100	mA
T_A	Operating Temperature Range	–40 to +85	°C
T_{LEAD}	Lead Temperature (Soldering, 20 sec.)	+260	°C
T_{store}	Storage Temperature Range	–65 to +150	°C
θ_{JA}	Package Thermal Resistance –Still-Air –500lfpm	113 96	°C/W
θ_{JC}	Package Thermal Resistance (Junction-to-Case)	42	°C/W

Note 1. Permanent Device Damage May Occur If Absolute Maximum Ratings Are Exceeded. This Is A Stress Rating Only And Functional Operation Is Not Implied At Conditions Other Than Those Detailed In The Operational Sections Of This Data Sheet. Exposure To Absolute Maximum Ratlng Conditions For Extended Periods May Affect Device Reliability.

PECL DC ELECTRICAL CHARACTERISTICS[1]

V_{CC} = 5.0V, V_{EE} = 0V[2]

Symbol	Parameter	T_A = –40°C			T_A = +25°C			T_A = +85°C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
I_{EE}	Power Supply Current	—	—	47	—	35	47	—	—	47	mA
V_{OH}	Output HIGH Voltage[3]	3865	3990	4115	3930	4055	4180	3990	4115	4240	mV
V_{OL}	Outuput LOW Voltage[3]	3050	3190	3315	3050	3255	3380	3050	3315	3440	mV
V_{IH}	Input HIGH Voltage (Single-Ended)	3790	—	4115	3855	—	4180	3915	—	4240	mV
V_{IL}	Input LOW Voltage (Single-Ended)	3065	—	3390	3130	—	3455	3190	—	3515	mV
V_{IHCMR}	Input HIGH Voltage[4] Common Mode Range (Diff.)	2.0	—	V_{CC}	2.0	—	V_{CC}	2.0	—	V_{CC}	V
I_{IH}	Input HIGH Current	—	—	150	—	—	150	—	—	150	µA
I_{IL}	Input LOW Current D /D	0.5 –150	— —	— —	0.5 –150	— —	— —	0.5 –150	— —	— —	µA

Note 1. 10EP circuits are designed to meet the DC specifications shown in the above table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and traverse airflow greater than 500lfpm is maintained.

Note 2. Input and output parameters vary 1:1 with V_{CC}. V_{CC} can vary –0.5V to +0.5V.

Note 3. All loading with 50Ω to V_{CC} –2.0V.

Note 4. V_{IHCMR} (min) varies 1:1 with V_{EE}, V_{IHCMR} (max) varies 1:1 with V_{CC}. The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

LVPECL DC ELECTRICAL CHARACTERISTICS[1]

V_{CC} = 3.3V, V_{EE} = 0V[2]

Symbol	Parameter	T_A = –40°C			T_A = +25°C			T_A = +85°C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
I_{EE}	Power Supply Current	—	—	47	—	35	47	—	—	47	mA
V_{OH}	Output HIGH Voltage[3]	2165	2290	2415	2230	2355	2480	2290	2415	2540	mV
V_{OL}	Outuput LOW Voltage[3]	1350	1490	1615	1350	1555	1680	1350	1615	1740	mV
V_{IH}	Input HIGH Voltage (Single-Ended)	2090	—	2415	2155	—	2480	2215	—	2540	mV
V_{IL}	Input LOW Voltage (Single-Ended)	1365	—	1690	1430	—	1755	1490	—	1815	mV
V_{IHCMR}	Input HIGH Voltage[4] Common Mode Range (Diff.)	2.0	—	V_{CC}	2.0	—	V_{CC}	2.0	—	V_{CC}	V
I_{IH}	Input HIGH Current	—	—	150	—	—	150	—	—	150	µA
I_{IL}	Input LOW Current D /D	0.5 –150	— —	— —	0.5 –150	— —	— —	0.5 –150	— —	— —	µA

Note 1. 10EP circuits are designed to meet the DC specifications shown in the above table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and traverse airflow greater than 500lfpm is maintained.

Note 2. Input and output parameters vary 1:1 with V_{CC}. V_{CC} can vary –0.3V to +0.5V.

Note 3. All loading with 50Ω to V_{CC} –2.0V.

Note 4. V_{IHCMR}(min) varies 1:1 with V_{EE}, V_{IHCMR}(max) varies 1:1 with V_{CC}. The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

ECL/LVECL DC ELECTRICAL CHARACTERISTICS[1]

V_{CC} = 0V, V_{EE} = –5.5V to –3.0V[2]

Symbol	Parameter	T_A = –40°C			T_A = +25°C			T_A = +85°C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
I_{EE}	Power Supply Current[3]	—	—	47	—	35	47	—	—	47	mA
V_{OH}	Output HIGH Voltage[4]	–1135		–0885	–1070	–0945	–0820	–1010		–0760	mV
V_{OL}	Outuput LOW Voltage[4]	–1950		–1685	–1950	–1745	–1620	–1950		–1560	mV
V_{IH}	Input HIGH Voltage	–1210		–0885	–1145	—	–0820	–1085	—	–0760	mV
V_{IL}	Input LOW Voltage	–1935		–1610	–1870	—	–1545	–1810	—	–1485	mV
V_{IHCMR}	Input HIGH Voltage Common Mode Range[5]	V_{EE}+2.0		V_{CC}	V_{EE}+2.0		V_{CC}	V_{EE}+2.0		V_{CC}	V
I_{IH}	Input HIGH Current	—	—	150	—	—	150	—	—	150	µA
I_{IL}	Input LOW Current	0.5	—	—	0.5	—	—	0.5	—	—	µA

Note 1. 10EP circuits are designed to meet the DC specifications shown in the above table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and traverse airflow greater than 500lfpm is maintained.

Note 2. Input and output parameters vary 1:1 with V_{CC}.

Note 3. V_{CC} = 0V, V_{EE} = V_{EE}(min) to V_{EE} (max), all other pins floating.

Note 4. All loading with 50Ω to V_{CC} – 2.0V.

Note 5. V_{IHCMR} min varies 1:1 with V_{EE}, max varies 1:1 with V_{CC}.

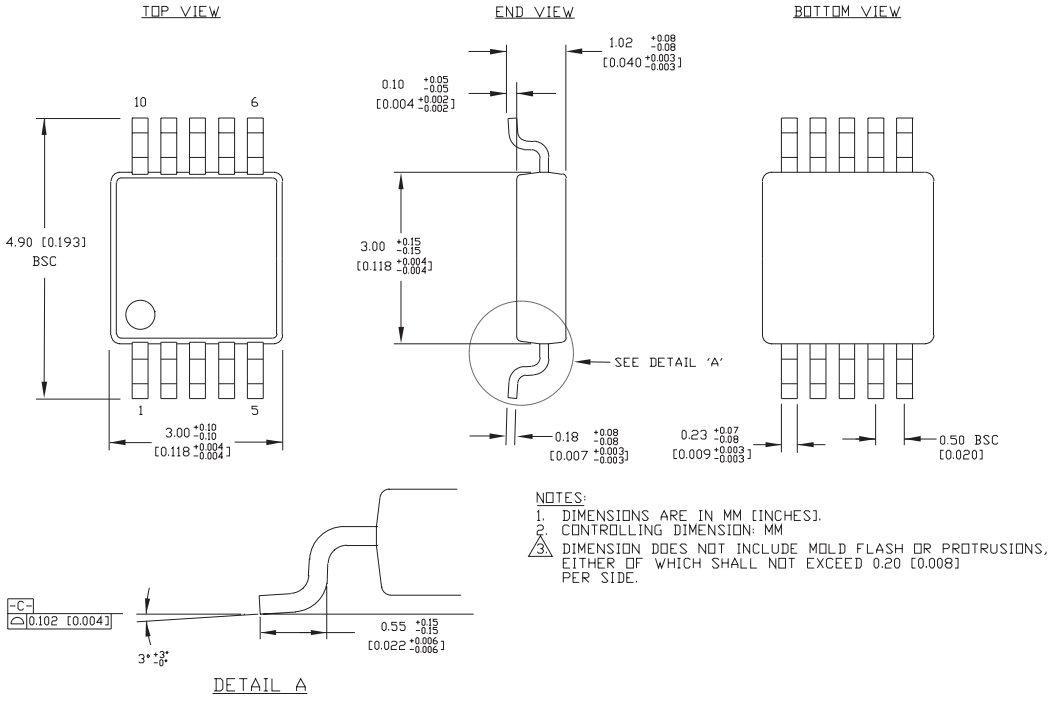
AC ELECTRICAL CHARACTERISTICS

V_{CC} = 0V, V_{EE} = –5.5V to –3.0V; V_{CC} = 3.0V to 5.5V, V_{EE} = 0V

Symbol	Parameter	T_A = –40°C			T_A = +25°C			T_A = +85°C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
f_{MAX}	Maximum Toggle Frequency(1)	—	3.0	—	—	3.0	—	—	3.0	—	GHz
t_{PLH} t_{PHL}	Propagation Delay to Output Differential CLK→ Q, /Q SET, RESET→ Q, /Q	 175 200	 — —	 325 360	 200 250	 275 330	 350 420	 250 325	 — —	 400 475	ps
t_{RR}	Reset Recovery Time	225	—	—	200	140	—	185	—	—	ps
t_S	Setup Time	150	50	—	150	50	—	150	50	—	ps
t_H	Hold Time	150	50	—	150	50	—	150	50	—	ps
t_{PW}	Minimum Pulse Width	550	450	—	550	450	—	550	450	—	ps
V_{PP}	Input Voltage Swing (Differential)	—	—	—	—	TBD	—	—	—	—	mV
t_r t_f	Output Rise/Fall Times Q (20% to 80%)	50	—	180	60	130	200	70	—	220	ps

Note 1. f_{MAX} guaranteed for functionality only. V_{OL} and V_{OH} levels are guaranteed at DC only.

10-PIN MSOP (K10-1)



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