



**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

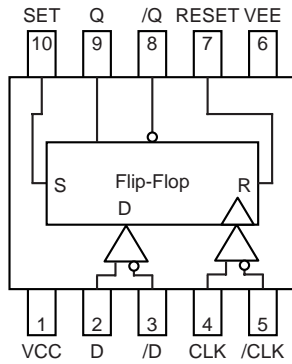
| Pin | Function |
|---------------------|------------------------|
| D, /D | Data Input (ECL) |
| CLK, /CLK | Clock Input (ECL) |
| Q, /Q | Data Output (ECL) |
| V_{CC} , V_{EE} | Power Supply |
| SET | ECL Asynchronous Set |
| RESET | ECL Asynchronous Reset |

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.

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 Rating Conditions For Extended Periods May Affect Device Reliability.

PECL DC ELECTRICAL CHARACTERISTICS⁽¹⁾

$V_{CC} = 5.0V$, $V_{EE} = 0V^{(2)}$

| Symbol | Parameter | $T_A = -40^\circ C$ | | | $T_A = +25^\circ C$ | | | $T_A = +85^\circ C$ | | | 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} | Output 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 | $T_A = -40^\circ C$ | | | $T_A = +25^\circ C$ | | | $T_A = +85^\circ C$ | | | 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} | Output 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⁾

$V_{CC} = 0V, V_{EE} = -5.5V \text{ to } -3.0V^{(2)}$

| Symbol | Parameter | $T_A = -40^\circ C$ | | | $T_A = +25^\circ C$ | | | $T_A = +85^\circ C$ | | | 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} | Output 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 $V_{CC} - 2.0V$.

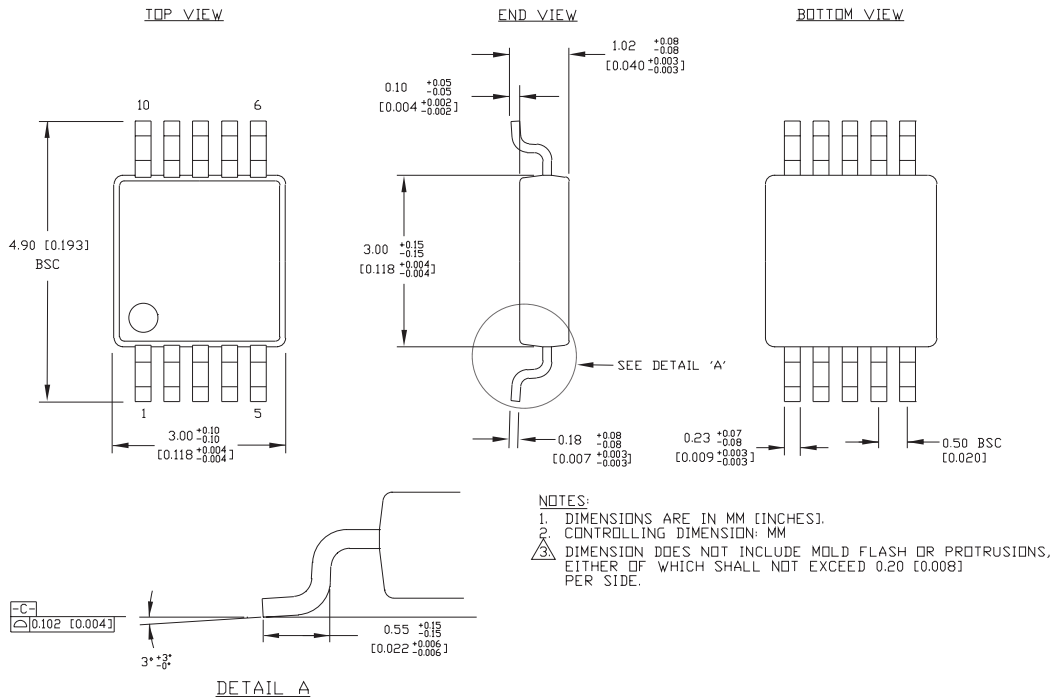
Note 5. $V_{IHCMR} \min$ varies 1:1 with V_{EE} , \max varies 1:1 with V_{CC} .

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 | $T_A = -40^\circ\text{C}$ | | | $T_A = +25^\circ\text{C}$ | | | $T_A = +85^\circ\text{C}$ | | | 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 (20% to 80%) Q | 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)



Rev. 00

MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA

TEL + 1 (408) 944-0800 FAX + 1 (408) 474-1000 WEB <http://www.micrel.com>

The information furnished by Micrel in this datasheet is believed to be accurate and reliable. However, no responsibility is assumed by Micrel for its use. Micrel reserves the right to change circuitry and specifications at any time without notification to the customer.

Micrel Products are not designed or authorized for use as components in life support appliances, devices or systems where malfunction of a product can reasonably be expected to result in personal injury. Life support devices or systems are devices or systems that (a) are intended for surgical implant into the body or (b) support or sustain life, and whose failure to perform can be reasonably expected to result in a significant injury to the user. A Purchaser's use or sale of Micrel Products for use in life support appliances, devices or systems is at Purchaser's own risk and Purchaser agrees to fully indemnify Micrel for any damages resulting from such use or sale.

© 2005 Micrel, Incorporated.

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

 [View SY10EP53VKI on WIN SOURCE](#)

 [Microchip Technology](#) Information

Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management