

## FEATURES

- 3.3V or 5V power supply options
- 180ps typical propagation delay
- Maximum frequency >3GHz typical
- Internal input resistors: pulldown on D, pulldown and pullup on /D
- Q output will default LOW with inputs open or at  $V_{EE}$
- Transistor count: 126
- Available in 8-pin MSOP and SOIC packages



ECL Pro™

## DESCRIPTION

The SY10EP05V is a 2-input differential AND/NAND gate. The device is functionally equivalent to the EL05 device. With AC performance much faster than the EL05 device, the EP05V is ideal for applications requiring the fastest AC performance available.

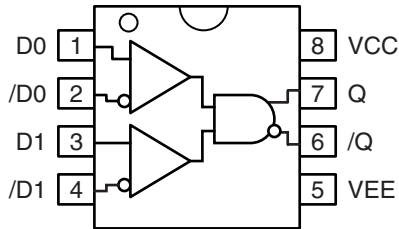
## PIN NAMES

Pin	Function
$D_0, D_1, /D_0, /D_1$	ECL Data Inputs
$Q, /Q$	ECL Data Outputs

## TRUTH TABLE

$D_0$	$D_1$	$/D_0$	$/D_1$	Q	$/Q$
L	L	H	H	L	H
L	H	H	L	L	H
H	L	L	H	L	H
H	H	L	L	H	L

**PACKAGE/ORDERING INFORMATION**



Available in 8-Pin SOIC and MSOP Packages

**Ordering Information<sup>(1)</sup>**

Part Number	Package Type	Operating Range	Package Marking	Lead Finish
SY10EP05VZC	Z8-1	Commercial	HEP05V	Sn-Pb
SY10EP05VZCTR <sup>(2)</sup>	Z8-1	Commercial	HEP05V	Sn-Pb
SY10EP05VKC	K8-1	Commercial	HP05	Sn-Pb
SY10EP05VKCTR <sup>(2)</sup>	K8-1	Commercial	HP05	Sn-Pb
SY10EP05VZI	Z8-1	Industrial	HEP05V	Sn-Pb
SY10EP05VZITR <sup>(2)</sup>	Z8-1	Industrial	HEP05V	Sn-Pb
SY10EP05VKI	K8-1	Industrial	HP05	Sn-Pb
SY10EP05VKITR <sup>(2)</sup>	K8-1	Industrial	HP05	Sn-Pb
SY10EP05VZG <sup>(3)</sup>	Z8-1	Industrial	HEP05V with Pb-Free bar-line indicator	Pb-Free NiPdAu
SY10EP05VZGTR <sup>(2, 3)</sup>	Z8-1	Industrial	HEP05V with Pb-Free bar-line indicator	Pb-Free NiPdAu
SY10EP05VKG <sup>(3)</sup>	K8-1	Industrial	HP05 with Pb-Free bar-line indicator	Pb-Free NiPdAu
SY10EP05VKGTR <sup>(2, 3)</sup>	K8-1	Industrial	HP05 with Pb-Free bar-line indicator	Pb-Free NiPdAu

**Notes:**

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

**ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>**

Symbol	Rating	Value	Unit
$V_{CC} - V_{EE}$	Power Supply Voltage	6V	V
$V_{IN}$	Input Voltage ( $V_{CC} = 0V$ , $V_I$ not more negative than $V_{EE}$ ) Input Voltage ( $V_{EE} = 0V$ , $V_I$ 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
$T_{LEAD}$	Lead Temperature	+260	°C
$T_A$	Operating Temperature Range	-40 to +85	°C
$T_{store}$	Storage Temperature Range	-65 to +150	°C
$\theta_{JA}$	Package Thermal Resistance (Junction-to-Ambient) -Still-Air (SOIC) -500lfpm (SOIC) -Still-Air (MSOP) -500lfpm (MSOP)	160 109 206 155	°C/W °C/W
$\theta_{JC}$	Package Thermal Resistance (Junction-to-Case) (SOIC) (MSOP)	39 39	°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<sup>(1)</sup>**

$V_{CC} = 4.5V$  to  $5.5V$ ;  $V_{EE} = 0V$ <sup>(2)</sup>

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 <sup>(3)</sup>	—	22	29	—	24	29	—	22	29	mA
$V_{OH}$	Output HIGH Voltage <sup>(4)</sup>	3865	3940	4115	3930	4055	4180	3990	4115	4240	mV
$V_{OL}$	Output LOW Voltage <sup>(4)</sup>	3050	3190	3315	3050	3255	3380	3050	3315	3440	mV
$V_{IH}$	Input HIGH Voltage	3790	—	4115	3855	—	4180	3915	—	4240	mV
$V_{IL}$	Input LOW Voltage	3065	—	3390	3130	—	3455	3190	—	3515	mV
$V_{IHCMR}$	Input HIGH Voltage Common Mode Range	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  $V_{CC}$ .

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

**Note 4.** All loading with  $50\Omega$  to  $V_{CC} - 2.0V$ .

**LVPECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 3.0V$  to  $3.6V$ ;  $V_{EE} = 0V$ <sup>(2)</sup>

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 <sup>(3)</sup>	—	22	29	—	22	29	—	24	29	mA
$V_{OH}$	Output HIGH Voltage <sup>(4)</sup>	2165	2240	2415	2230	2355	2480	2290	2415	2540	mV
$V_{OL}$	Output LOW Voltage <sup>(4)</sup>	1350	1490	1615	1350	1555	1680	1350	1615	1740	mV
$V_{IH}$	Input HIGH Voltage	2090	—	2415	2155	—	2480	2215	—	2540	mV
$V_{IL}$	Input LOW Voltage	1365	—	1690	1430	—	1755	1490	—	1815	mV
$V_{IHCMR}$	Input HIGH Voltage Common Mode Range	2.0	—	$V_{CC}$	2.0	—	$V_{CC}$	2.0	—	$V_{CC}$	V
$I_{IH}$	Input HIGH Current	—	—	150	—	—	150	—	—	150	$\mu A$
$I_{IL}$	Input LOW Current	D /D	0.5 -150	— —	0.5 -150	— —	— —	0.5 -150	— —	— —	$\mu A$

**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.**  $V_{CC} = 0V$ ,  $V_{EE} = V_{EE}(\text{Min})$  to  $V_{EE}(\text{Max})$ , all other pins floating.

**Note 4.** All loading with  $50\Omega$  to  $V_{CC} - 2.0V$ .

**ECL/LVECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 0V$ ,  $V_{EE} = -5.5V$  to  $-3.0V$ <sup>(2)</sup>

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 <sup>(3)</sup>	—	22	29	—	22	29	—	22	29	mA
$V_{OH}$	Output HIGH Voltage <sup>(4)</sup>	-1135	-1060	-885	-1070	-945	-820	-1010	-885	-760	mV
$V_{OL}$	Output LOW Voltage <sup>(4)</sup>	-1950	-1810	-1685	-1950	-1745	-1620	-1950	-1685	-1560	mV
$V_{IH}$	Input HIGH Voltage	-1210	—	-885	-1145	—	-820	-1085	—	-760	mV
$V_{IL}$	Input LOW Voltage	-1935	—	-1610	-1870	—	-1545	-1810	—	-1485	mV
$V_{IHCMR}$	Input HIGH Voltage Common Mode Range	$V_{EE}+2.0$		$V_{CC}$	$V_{EE}+2.0$		$V_{CC}$	$V_{EE}+2.0$		$V_{CC}$	V
$I_{IH}$	Input HIGH Current	—	—	150	—	—	150	—	—	150	$\mu A$
$I_{IL}$	Input LOW Current	D /D	0.5 -150	— —	0.5 -150	— —	— —	0.5 -150	— —	— —	$\mu A$

**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.**  $V_{CC} = 0V$ ,  $V_{EE} = V_{EE}(\text{min})$  to  $V_{EE}(\text{max})$ , all other pins floating.

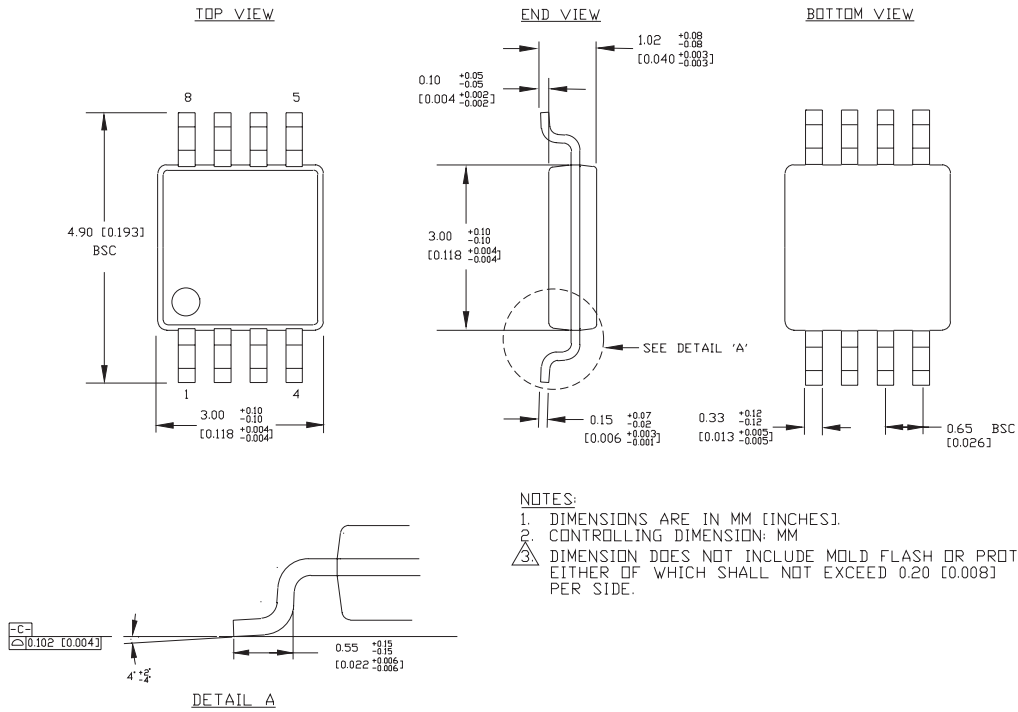
**Note 4.** All loading with  $50\Omega$  to  $V_{CC} - 2.0V$ .

**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 <sup>(1)</sup>	—	3.0	—	—	3.0	—	—	3.0	—	GHz
$t_{PLH}$ $t_{PHL}$	Propagation Delay to Output Differential D→Q, /Q	160	180	260	160	180	260	160	180	260	ps
$t_{JITTER}$	Cycle-to-Cycle Jitter	—	—	—	—	TBD	—	—	—	—	ps
$V_{PP}$	Input Voltage Swing (Diff.)	150	800	1200	150	800	1200	150	800	1200	mV
$t_r$ $t_f$	Output Rise/Fall Times (20% to 80%) Q	70	—	170	80	130	180	100	—	200	ps

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

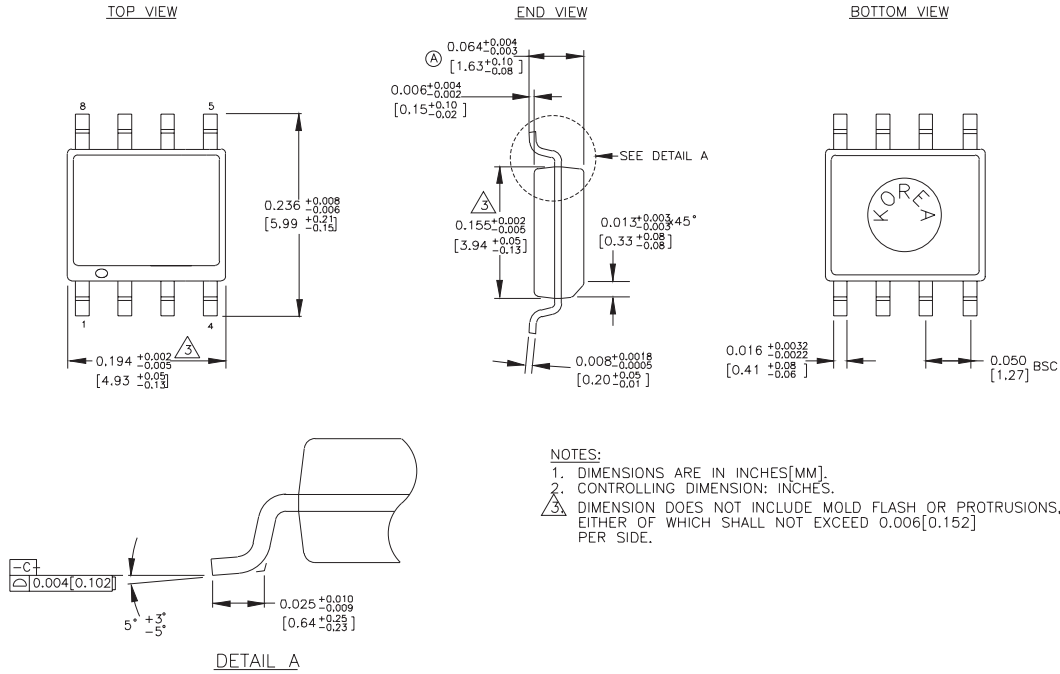
**8-PIN MSOP (K8-1)**



NOTES:  
 1. DIMENSIONS ARE IN MM [INCHES]  
 2. CONTROLLING DIMENSION: MM  
 3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.20 [0.008] PER SIDE.

Rev. 01

**8-PIN PLASTIC SOIC (Z8-1)**



Rev. 03

**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>

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