



5V/3.3V 3GHz COAXIAL CABLE DRIVER

ECL Pro™
SY10EP89V

FEATURES

- 3.3V and 5V power supply options
- 3.0GHz typical toggle frequency
- 310ps typical propagation delay
- 1.6V (5V) and 1.4V (3.3V) swing
- Internal input resistors: pulldown on D, pulldown and pullup on /D
- New differential input common mode range
- Available in 8-pin MSOP and SOIC packages

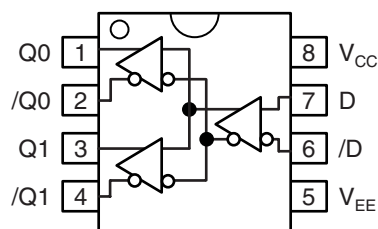
DESCRIPTION

The SY10EP89V is a differential fanout gate specifically designed to drive coaxial cables. The device is especially useful in digital video broadcasting applications; for this application, since the system is polarity free, each output can be used as an independent driver. The driver produces swings 70% larger than a standard ECL output. When driving a coaxial cable, proper termination is required at both ends of the line, while maintaining a 800mV (5V) or 700mV (3.3V) swing at the receiving end of the cable. Because of the larger output swings, the device cannot be terminated into the standard $V_{CC} - 2.0V$. All of the DC parameters are tested with a 50Ω to $V_{CC} - 3.0V$ load. The driver accepts a standard differential ECL input and can run off of the digital video broadcast standard $-5.0V$ supply.

PIN NAMES

Pin	Function
D, /D	ECL Data Inputs
Q0, Q1, /Q0, /Q1	ECL Data Outputs
V_{CC}	Positive Supply
V_{EE}	Negative Supply

PACKAGE/ORDERING INFORMATION



8-Pin SOIC (Z8-1)
8-Pin MSOP (K8-1)

Ordering Information⁽¹⁾

Part Number	Package Type	Operating Range	Package Marking	Lead Finish
SY10EP89VZC	Z8-1	Commercial	HEP89V	Sn-Pb
SY10EP89VZCTR ⁽²⁾	Z8-1	Commercial	HEP89V	Sn-Pb
SY10EP89VKC	K8-1	Commercial	HP89	Sn-Pb
SY10EP89VKCTR ⁽²⁾	K8-1	Commercial	HP89	Sn-Pb
SY10EP89VZI	Z8-1	Industrial	HEP89V	Sn-Pb
SY10EP89VZITR ⁽²⁾	Z8-1	Industrial	HEP89V	Sn-Pb
SY10EP89VKI	K8-1	Industrial	HP89	Sn-Pb
SY10EP89VKITR ⁽²⁾	K8-1	Industrial	HP89	Sn-Pb
SY10EP89VZG ⁽³⁾	Z8-1	Industrial	HEP89V with Pb-Free bar line indicator	NiPdAu Pb-Free
SY10EP89VZGTR ^(2, 3)	Z8-1	Industrial	HEP89V with Pb-Free bar line indicator	NiPdAu Pb-Free
SY10EP89VKG ⁽³⁾	K8-1	Industrial	HP89 with Pb-Free bar line indicator	NiPdAu Pb-Free
SY10EP89VKGTR ^(2, 3)	K8-1	Industrial	HP89 with Pb-Free bar line indicator	NiPdAu Pb-Free

Notes:

1. Contact factory for die availability. Dice are guaranteed at $T_A = 25^\circ\text{C}$, 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 (Junction-to-Ambient) -Still-Air (SOIC) -500lfpm (SOIC) -Still-Air (MSOP) -500lfpm (MSOP)	160 109 206 155	°C/W °C/W
θ_{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.

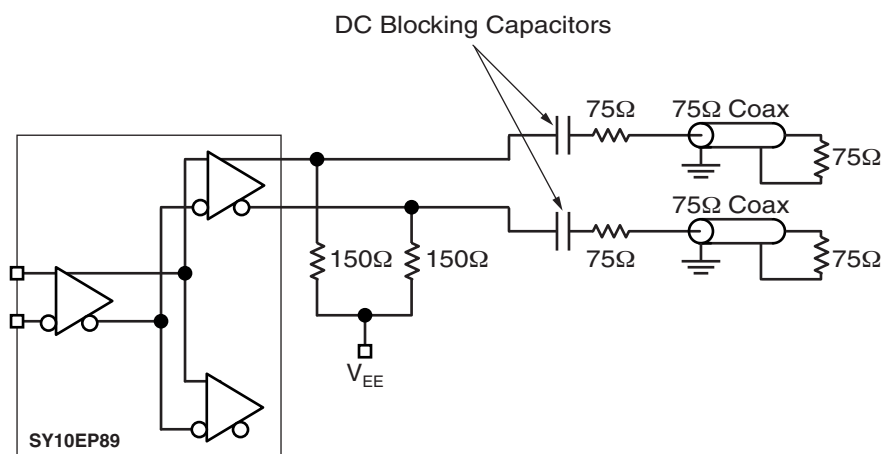


Figure 1. EP89V Termination Configuration

5.0V 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	27	34	45	30	37	45	32	39	50	mA
V_{OH}	Output HIGH Voltage ⁽³⁾	3780	3880	3980	3850	3950	4050	3925	4025	4125	mV
V_{OL}	Output LOW Voltage ⁽³⁾	2075	2225	2375	2060	2210	2360	2090	2240	2390	mV
V_{IH}	Input HIGH Voltage (Single-Ended)	3770	—	4110	3870	—	4190	3940	—	4280	mV
V_{IL}	Input LOW Voltage (Single-Ended)	3050	—	3500	3050	—	3520	3050	—	3555	mV
V_{IHCMR}	Input HIGH Voltage Common Mode Range ⁽⁴⁾	$V_{EE} + 2.0$		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	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. All loading with 50Ω to $V_{CC} - 3.0V$.

Note 4. The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

3.3V 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	22	28	34	24	32	38	28	34	40	mA
V_{OH}	Output HIGH Voltage ⁽³⁾	2080	2180	2280	2150	2250	2350	2225	2325	2425	mV
V_{OL}	Output LOW Voltage ⁽³⁾	620	720	820	630	730	830	670	770	870	mV
V_{IH}	Input HIGH Voltage (Single-Ended)	2070	—	2410	2170	—	2490	2240	—	2580	mV
V_{IL}	Input LOW Voltage (Single-Ended)	1350	—	1800	1350	—	1820	1350	—	1855	mV
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Diff.) ⁽⁴⁾	$V_{EE} + 2.0$		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	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. All loading with 50Ω to $V_{CC} - 3.0V$.

Note 4. The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

LVECL DC ELECTRICAL CHARACTERISTICS⁽¹⁾ $V_{CC} = 0V$, $V_{EE} = -3.3V$.

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	22	28	34	24	32	38	28	34	40	mA
V_{OH}	Output HIGH Voltage ⁽²⁾	-1220	-1120	-1020	-1150	-1050	-950	-1075	-975	-875	mV
V_{OL}	Output LOW Voltage ⁽²⁾	-2680	-2580	-2480	-2670	-2570	-2470	-2630	-2530	-2430	mV
V_{IH}	Input HIGH Voltage (Single-Ended)	-1230	—	-890	-1130	—	-810	-1060	—	-720	mV
V_{IL}	Input LOW Voltage (Single-Ended)	-1950	—	-1500	-1950	—	-1480	-1950	—	-1445	mV
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Diff.) ⁽³⁾	$V_{EE} + 2.0$		0.0	$V_{EE} + 2.0$		0.0	$V_{EE} + 2.0$		0.0	V
I_{IH}	Input HIGH Current	—	—	150	—	—	150	—	—	150	μA
I_{IL}	Input LOW Current	D /D	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. All loading with 50Ω to $V_{CC} - 3.0V$.

Note 3. The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

ECL DC ELECTRICAL CHARACTERISTICS⁽¹⁾ $V_{CC} = 0V$; $V_{EE} = -5.2V$.

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	27	32	41	30	37	44	32	39	50	mA
V_{OH}	Output HIGH Voltage ⁽²⁾	-1220	-1120	-1020	-1150	-1050	-950	-1075	-975	-875	mV
V_{OL}	Output LOW Voltage ⁽²⁾	-2950	-2800	-2650	-2950	-2850	-2650	-2950	-2800	-2650	mV
V_{IH}	Input HIGH Voltage (Single-Ended)	-1230	—	-890	-1130	—	-810	-1060	—	-720	mV
V_{IL}	Input LOW Voltage (Single-Ended)	-1950	—	-1500	-1950	—	-1480	-1950	—	-1445	mV
V_{IHCMR}	Input HIGH Voltage Common Mode Range ⁽³⁾	$V_{EE} + 2.0$		0	$V_{EE} + 2.0$		0	$V_{EE} + 2.0$		0	V
I_{IH}	Input HIGH Current	—	—	150	—	—	150	—	—	150	μA
I_{IL}	Input LOW Current	D /D	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. All loading with 50Ω to $V_{CC} - 3.0V$.

Note 3. The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

AC ELECTRICAL CHARACTERISTICS

$V_{CC} = 0V$, $V_{EE} = -3.0V$ to $-5.5V$; $V_{CC} = 3.0V$ to $5.5V$, $V_{EE} = 0V^{(1)}$.

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.	
f_{MAX}	Maximum Toggle Frequency ⁽²⁾	3	—	—	3	—	—	3	—	—	GHz
t_{PLH} t_{PHL}	Propagation Delay to Output Differential	200	—	380	220	310	400	250	—	420	ps
t_{SKEW}	Within Device Skew ⁽³⁾ Q, /Q Device-to-Device Skew	— —	5.0 —	20 120	— —	5 —	20 120	— —	— —	20 120	ps
t_{JITTER}	Cycle-to-Cycle Jitter	—	0.5	< 1.0	—	0.5	< 1.0	—	0.5	< 1.0	ps
V_{PP}	Input Voltage Swing ⁽⁴⁾ (Differential)	150	800	1200	150	800	1200	150	—	1200	mV
t_r t_f	Output Rise/Fall Times Q, /Q (20% to 80%)	120	—	350	130	250	350	150	—	350	ps

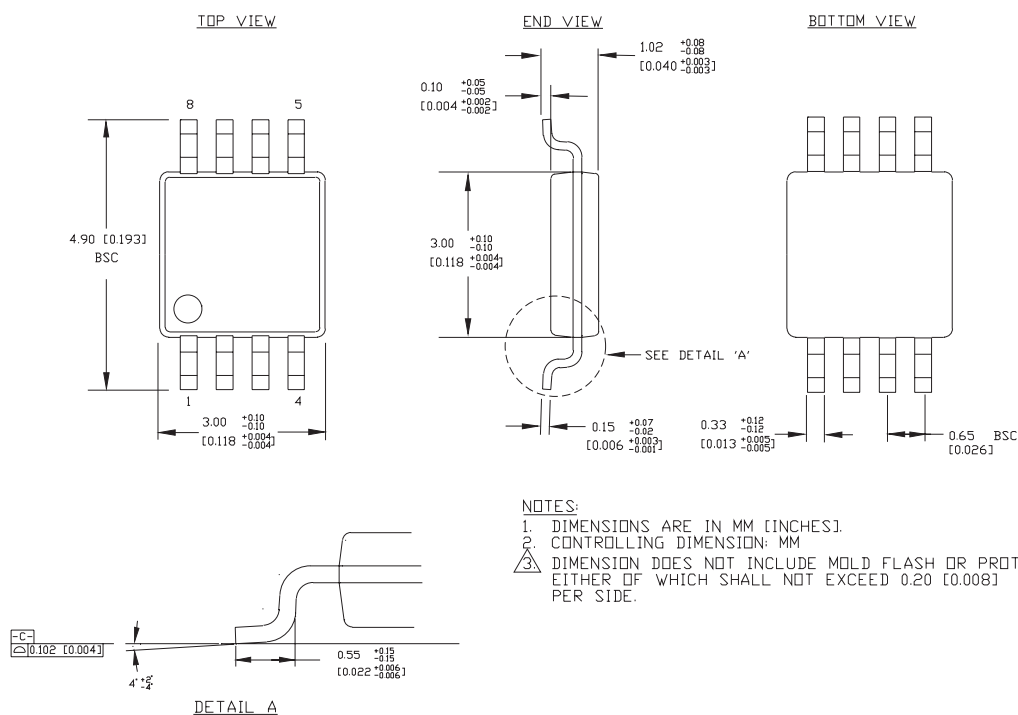
Note 1. Measured using a 750mV source, 50% duty cycle clock source. All loading with 50Ω to $V_{CC} - 3.0V$.

Note 2. f_{MAX} guaranteed for functionality only. V_{OL} and V_{OH} levels are guaranteed at DC only.

Note 3. Skew is measured between outputs under identical transitions. Duty cycle skew is defined only for differential operation when the delays are measured from the cross point of the inputs to the cross point of the outputs.

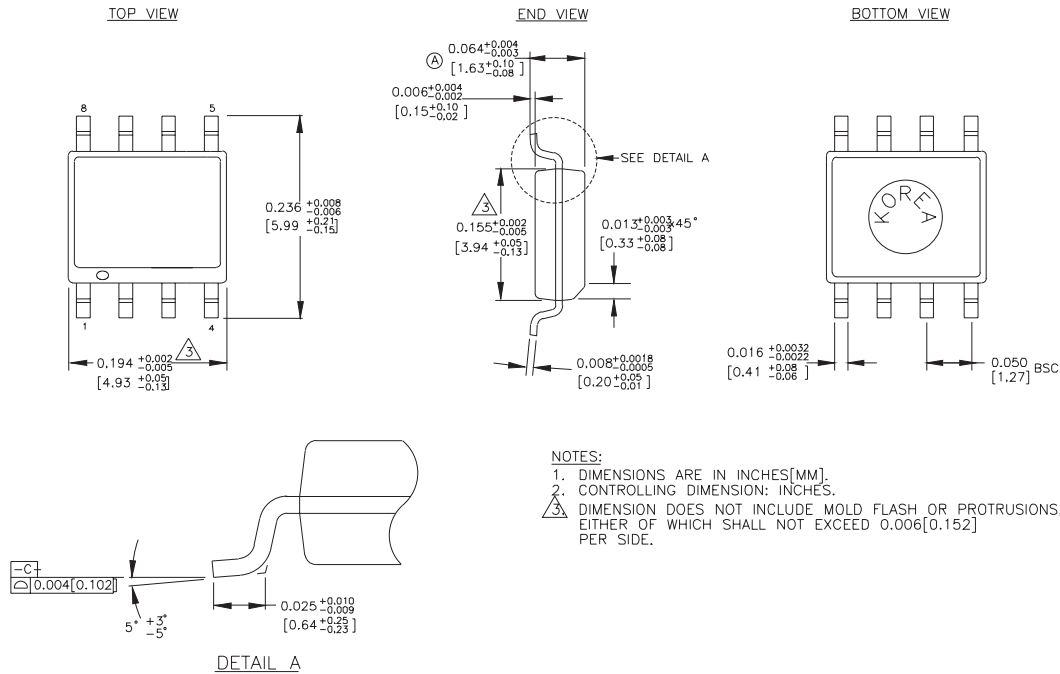
Note 4. V_{IL} must not go below $V_{CC} - 3.0V$.

8-PIN MSOP (K8-1)



Rev. 01

8-PIN PLASTIC SOIC (Z8-1)



Rev. 03

MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USATEL + 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.