

## FEATURES

- 3.3V and 5V power supply options
- 250ps propagation delay
- Very high voltage gain vs. standard EL16 or EL16V
- Ideal for Pulse Amplifier and Limiting Amplifier applications
- Data synchronous Enable/Disable (/EN) on QHG and /QHG provides for complete glitchless gating of the outputs
- Ideal for gating timing signals
- Complete solution for high quality, high frequency crystal oscillator applications
- Internal 75K Ohm input pull-down resistors
- Available in both 8 and 16-pin SOIC package; 8 and 10-pin (3mm) MSOP and in DIE form

## PIN NAMES

Pin	Function
D	Data Inputs
Q	Data Outputs
QHG	Data Outputs w/High Gain
V <sub>BB</sub>	Reference Voltage Output
/EN	Enable Input

## TRUTH TABLE

/EN	QHG Output
0	Data
1	Logic Low

## DESCRIPTION

The SY10/100EL16VA-VF are differential receivers. The devices are equivalent to SY10/100EL16 or SY10/100EL16V with enhanced capabilities. The QHG, /QHG outputs have a DC gain several times larger than the DC gain of the Q output.

The SY10/100EL16VA have an identical pinout to the SY10/100EL16 or SY10/100EL16V. It provides a V<sub>BB</sub> output for either single-ended application or as a DC bias for AC coupling to the device.

The SY10/100EL16VB are very similar to the SY10/100EL16VA. The /Q output is provided for feedback purposes.

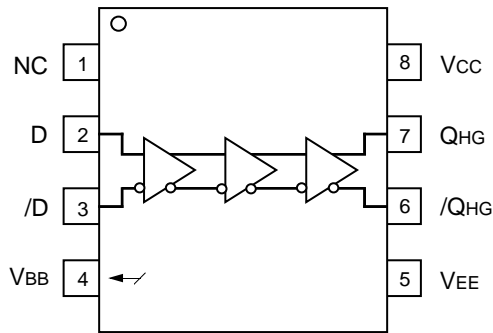
The SY10/100EL16VC provides an /EN input which is synchronized with the data input (D) signal in a way that provides glitchless gating of the QHG and /QHG outputs. When the /EN signal is LOW, the input is passed to the outputs and the data output equals the data input. When the data input is HIGH and the /EN goes HIGH, it will force the QHG LOW and the /QHG HIGH on the next negative transition of the data input. If the data input is LOW when the /EN goes HIGH, the next data transition to a HIGH is ignored and QHG remains LOW and /QHG remains HIGH. The next positive transition of the data input is not passed on to the data outputs under these conditions. The QHG and /QHG outputs remain in their disabled state as long as the /EN input is held HIGH. The /EN input has no influence on the /Q output and the data input is passed on (inverted) to this output whether /EN is HIGH or LOW. This configuration is ideal for crystal oscillator applications, where the oscillator can be free running and gated on and off synchronously without adding extra counts to the output.

The SY10/100EL16VD provides the flexibility of all the combinations in DIE form, in 16-pin 150mil SOIC package or in 10-pin MSOP package. The 16-pin SOIC and 10-pin MSOP packages are ideal for prototyping DIE applications.

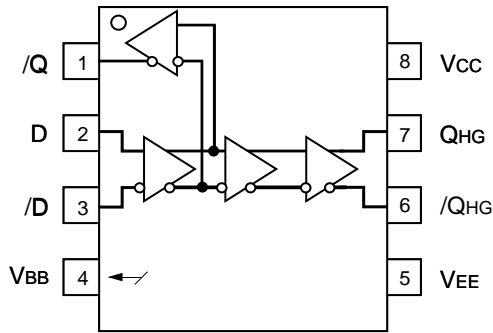
The SY10/100EL16VE are similar to the SY10/100EL16VB where the Q, /Q output is made available differently. In this package option, V<sub>BB</sub> is no longer provided.

The SY10/100EL16VF are similar to the SY10/100EL16VC, offering the D, /D inputs rather than the V<sub>BB</sub> output.

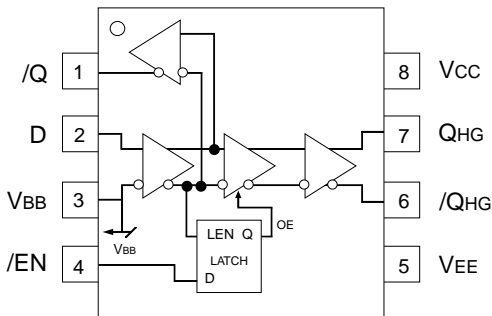
**PIN CONFIGURATION/BLOCK DIAGRAM**



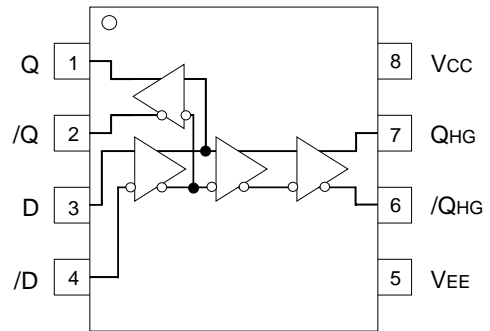
**SY10/100EL16VA**  
5V/3.3V Differential Receiver w/High Gain  
(Available in 8-pin SOIC or 8-pin MSOP)



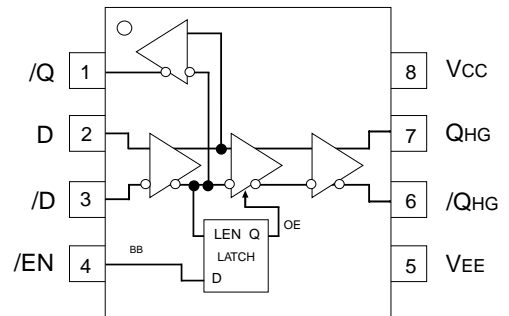
**SY10/100EL16VB**  
EL16VA w/Extra QB output  
(Available in 8-pin SOIC or 8-pin MSOP)



**SY10/100EL16VC**  
EL16VB w/Enable Input  
(Available in 8-pin SOIC or 8-pin MSOP)

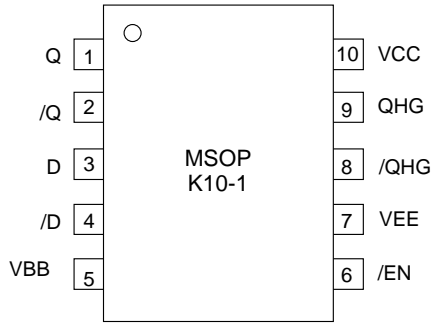


**SY10/100EL16VE**  
EL16VB w/Differential Q, QB output (no VBB)  
(Available in 8-pin SOIC or 8-pin MSOP)

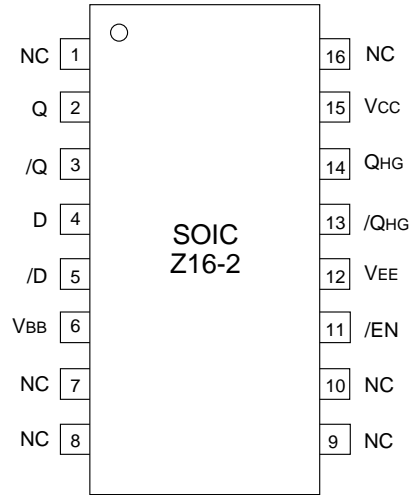


**SY10/100EL16VF**  
EL16VC w/Differential Data Input  
(Available in 8-pin SOIC or 8-pin MSOP)

**PIN CONFIGURATION/BLOCK DIAGRAM**



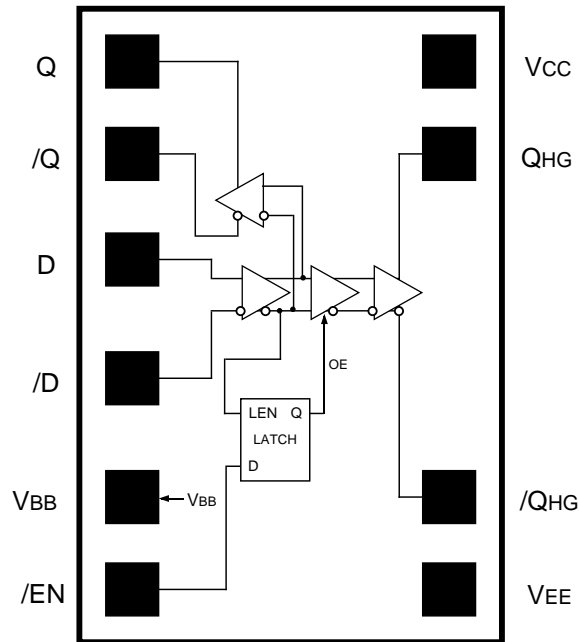
**SY10/100EL16VDKC**  
EL16VDXC packaged in 10-pin MSOP



**SY10/100EL16VDZC**  
EL16VDXC packaged in 16-pin SOIC

**DIE LAYOUT**

All options in DIE form w/Extra Q output and VBB output  
Die Size (mils) 39. X 52. X 14.5



**SY10/100EL16VDXC**  
**DIE**  
**TOP VIEW**

### DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>

V<sub>EE</sub> = V<sub>EE</sub> (Min) to V<sub>EE</sub> (Max), V<sub>CC</sub> = GND

Symbol	Parameter	T <sub>A</sub> = -40°C			T <sub>A</sub> = 0°C			T <sub>A</sub> = +25°C			T <sub>A</sub> = +85°C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
I <sub>EE</sub>	Power Supply Current													mA
	10EL	—	—	40	—	—	40	—	—	40	—	—	40	
	100EL	—	—	40	—	—	40	—	—	40	—	—	46	
V <sub>BB</sub>	Output Reference Voltage													V
	10EL	-1.43	—	-1.30	-1.38	—	-1.27	-1.35	—	-1.25	-1.31	—	-1.19	
	100EL	-1.38	—	-1.26	-1.38	—	-1.26	-1.38	—	-1.26	-1.38	—	-1.26	
I <sub>IH</sub>	Input HIGH Current	—	—	150	—	—	150	—	—	150	—	—	150	μA

**NOTE:**

1. Parametric values specified at: 10/100EL16VA-VF Series: -3.0V to -5.5V.

### AC ELECTRICAL CHARACTERISTICS<sup>(4)</sup>

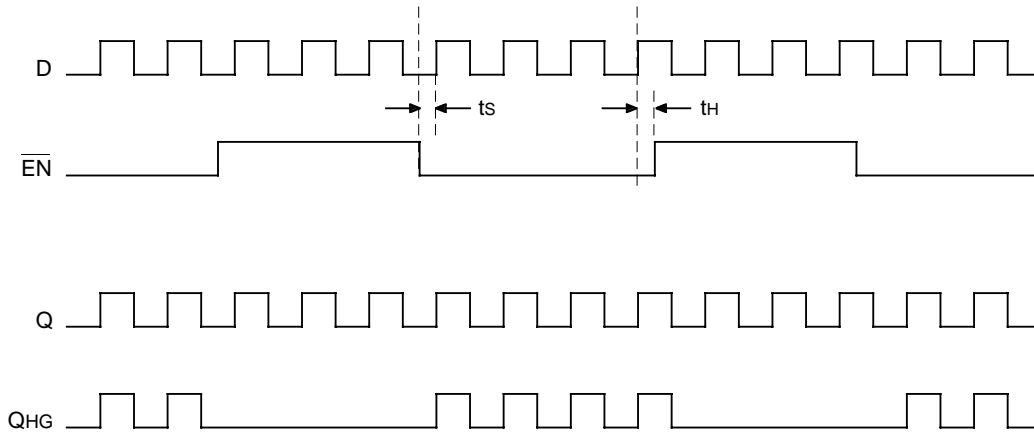
V<sub>EE</sub> = V<sub>EE</sub> (Min) to V<sub>EE</sub> (Max), V<sub>CC</sub> = GND

Symbol	Parameter	T <sub>A</sub> = -40°C			T <sub>A</sub> = 0°C			T <sub>A</sub> = +25°C			T <sub>A</sub> = +85°C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay to Q, /Q Output													ps
	D (Diff)	—	—	350	—	—	350	—	—	350	—	—	380	
	D (SE)	—	—	400	—	—	400	—	—	400	—	—	430	
	QHG, /QHG Output													
	D (Diff)	—	—	650	—	—	650	—	—	650	—	—	730	
	D (SE)	—	—	700	—	—	700	—	—	700	—	—	780	
t <sub>s</sub>	Setup Time /EN	—	150	—	—	150	—	—	150	—	—	150	—	ps
t <sub>h</sub>	Hold Time /EN	—	150	—	—	150	—	—	150	—	—	150	—	ps
t <sub>skew</sub>	Duty Cycle Skew <sup>(1)</sup> (Diff)	—	5	—	—	5	20	—	5	20	—	5	20	ps
V <sub>PP</sub>	Minimum Input Swing <sup>(2)</sup>	150	—	—	150	—	—	150	—	—	150	—	—	mV
V <sub>CMR</sub>	Common Mode Range <sup>(3)</sup>	-1.3	—	-0.4	-1.4	—	-0.4	-1.4	—	-0.4	-1.4	—	-0.4	V
t <sub>r</sub> t <sub>f</sub>	Output Q Rise/Fall Time (20% TO 80%)	100	225	350	100	225	350	100	225	350	100	225	350	ps

**NOTES:**

1. Duty cycle skew is the difference between a t<sub>PLH</sub> and t<sub>PHL</sub> propagation delay through a device.
2. Minimum input swing for which AC parameters are guaranteed. The device has a DC gain of ≈ 40 to Q, /Q outputs and a DC gain of ≈ 200 or higher to /QHG/QHG outputs.
3. The CMR range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between V<sub>PP</sub> min. and 1V. The lower end of the CMR range varies 1:1 with V<sub>EE</sub>. The numbers in the spec table assume a nominal V<sub>EE</sub> = -3.3V. Note for PECL operation, the V<sub>CMR</sub> (min) will be fixed at 3.3V - |V<sub>CMR</sub> (min)|.
4. Parametric values specified at: 10/100EL16VA-VF Series: -3.0V to -5.5V.

**TIMING DIAGRAM**



**PRODUCT ORDERING CODE**

Ordering Code	Package Type	Operating Range	Marking Code
SY10EL16VAZC	Z8-1	Commercial	HEL16VA
SY10EL16VAZCTR*	Z8-1	Commercial	HEL16VA
SY100EL16VAZC	Z8-1	Commercial	XEL16VA
SY100EL16VAZCTR*	Z8-1	Commercial	XEL16VA
SY10EL16VBZC	Z8-1	Commercial	HEL16VB
SY10EL16VBZCTR*	Z8-1	Commercial	HEL16VB
SY100EL16VBZC	Z8-1	Commercial	XEL16VB
SY100EL16VBZCTR*	Z8-1	Commercial	XEL16VB
SY10EL16VCZC	Z8-1	Commercial	HEL16VC
SY10EL16VCZCTR*	Z8-1	Commercial	HEL16VC
SY100EL16VCZC	Z8-1	Commercial	XEL16VC
SY100EL16VCZCTR*	Z8-1	Commercial	XEL16VC
SY10EL16VDZC	Z16-2	Commercial	HEL16VD
SY10EL16VDZCTR*	Z16-2	Commercial	HEL16VD
SY100EL16VDZC	Z16-2	Commercial	XEL16VD
SY100EL16VDZCTR*	Z16-2	Commercial	XEL16VD
SY10EL16VEZC	Z8-1	Commercial	HEL16VE
SY10EL16VEZCTR*	Z8-1	Commercial	HEL16VE
SY100EL16VEZC	Z8-1	Commercial	XEL16VE
SY100EL16VEZCTR*	Z8-1	Commercial	XEL16VE
SY10EL16VFZC	Z8-1	Commercial	HEL16VF
SY10EL16VFZCTR*	Z8-1	Commercial	HEL16VF
SY100EL16VFZC	Z8-1	Commercial	XEL16VF
SY100EL16VFZCTR*	Z8-1	Commercial	XEL16VF

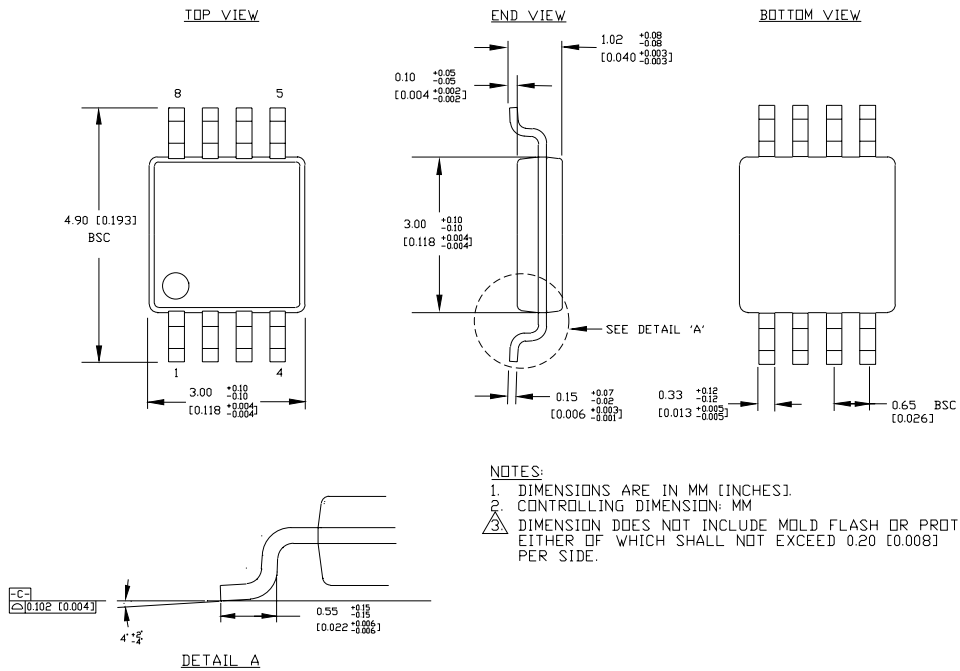
Ordering Code	Package Type	Operating Range	Marking Code
SY10EL16VAZI <sup>(1)</sup>	Z8-1	Industrial	HEL16VA
SY10EL16VAZITR* <sup>(1)</sup>	Z8-1	Industrial	HEL16VA
SY100EL16VAZI <sup>(1)</sup>	Z8-1	Industrial	XEL16VA
SY100EL16VAZITR* <sup>(1)</sup>	Z8-1	Industrial	XEL16VA
SY10EL16VBZI <sup>(1)</sup>	Z8-1	Industrial	HEL16VB
SY10EL16VBZITR* <sup>(1)</sup>	Z8-1	Industrial	HEL16VB
SY100EL16VBZI <sup>(1)</sup>	Z8-1	Industrial	XEL16VB
SY100EL16VBZITR* <sup>(1)</sup>	Z8-1	Industrial	XEL16VB
SY10EL16VCZI <sup>(1)</sup>	Z8-1	Industrial	HEL16VC
SY10EL16VCZITR* <sup>(1)</sup>	Z8-1	Industrial	HEL16VC
SY100EL16VCZI <sup>(1)</sup>	Z8-1	Industrial	XEL16VC
SY100EL16VCZITR* <sup>(1)</sup>	Z8-1	Industrial	XEL16VC
SY10EL16VDZI <sup>(1)</sup>	Z16-2	Industrial	HEL16VD
SY10EL16VDZITR* <sup>(1)</sup>	Z16-2	Industrial	HEL16VD
SY100EL16VDZI <sup>(1)</sup>	Z16-2	Industrial	XEL16VD
SY100EL16VDZITR* <sup>(1)</sup>	Z16-2	Industrial	XEL16VD
SY10EL16VEZI <sup>(1)</sup>	Z8-1	Industrial	HEL16VE
SY10EL16VEZITR* <sup>(1)</sup>	Z8-1	Industrial	HEL16VE
SY100EL16VEZI <sup>(1)</sup>	Z8-1	Industrial	XEL16VE
SY100EL16VEZITR* <sup>(1)</sup>	Z8-1	Industrial	XEL16VE
SY10EL16VFZI <sup>(1)</sup>	Z8-1	Industrial	HEL16VF
SY10EL16VFZITR* <sup>(1)</sup>	Z8-1	Industrial	HEL16VF
SY100EL16VFZIV	Z8-1	Industrial	XEL16VF
SY100EL16VFZITR* <sup>(1)</sup>	Z8-1	Industrial	XEL16VF

\*Tape and Reel

**Note 1.** Recommended for new designs.

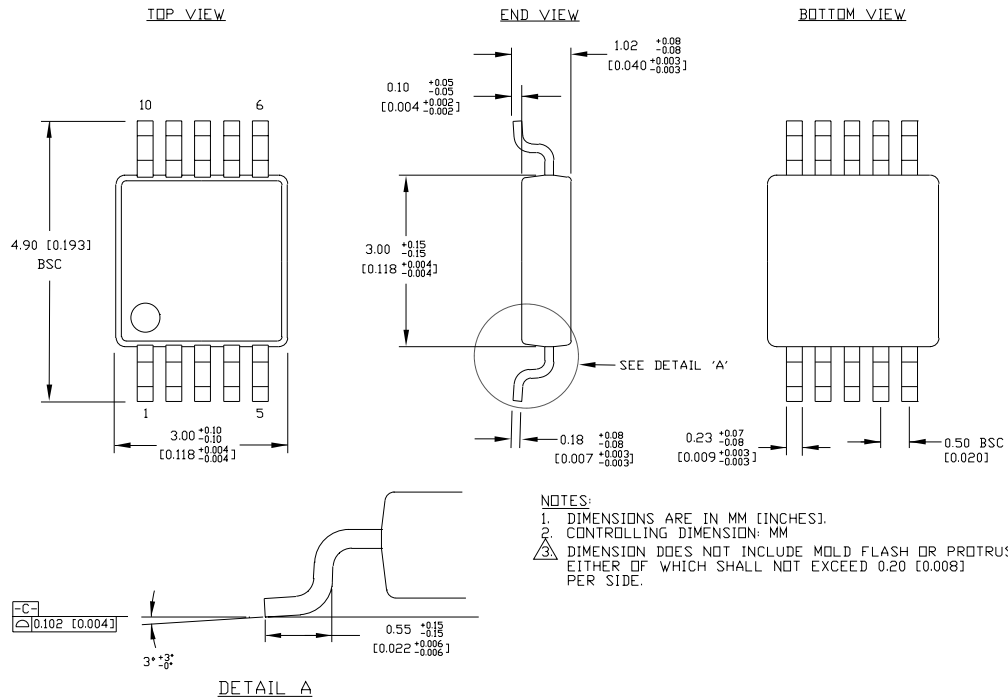
\*Tape and Reel

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



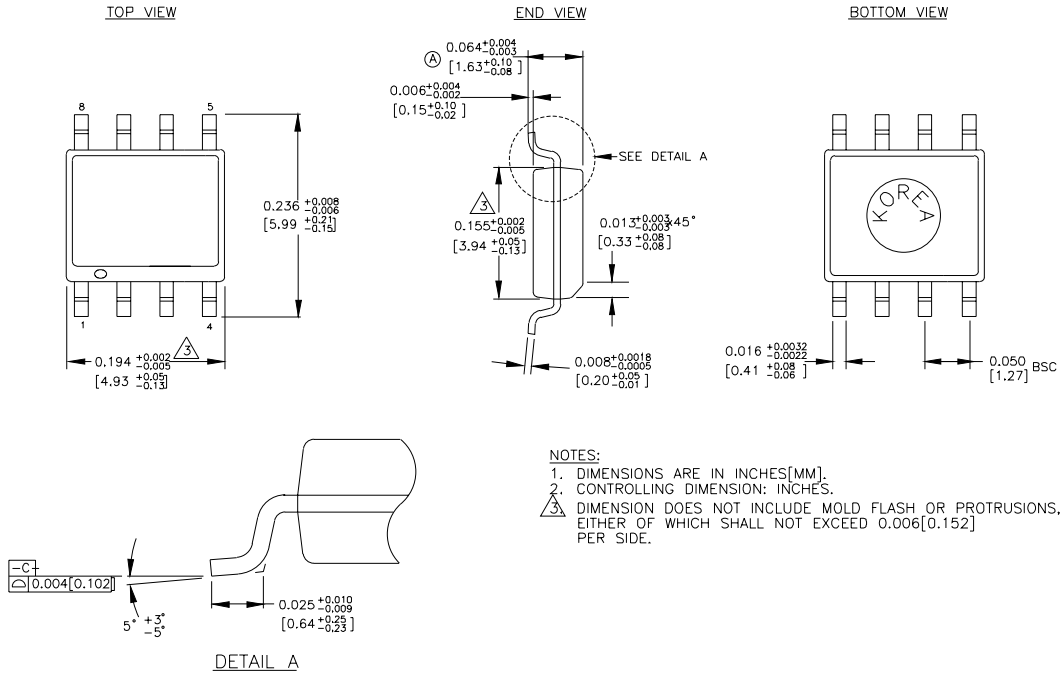
Rev.01

**10 LEAD MSOP (K10-1)**



Rev. 00

**8 LEAD SOIC .150" WIDE (Z8-1)**

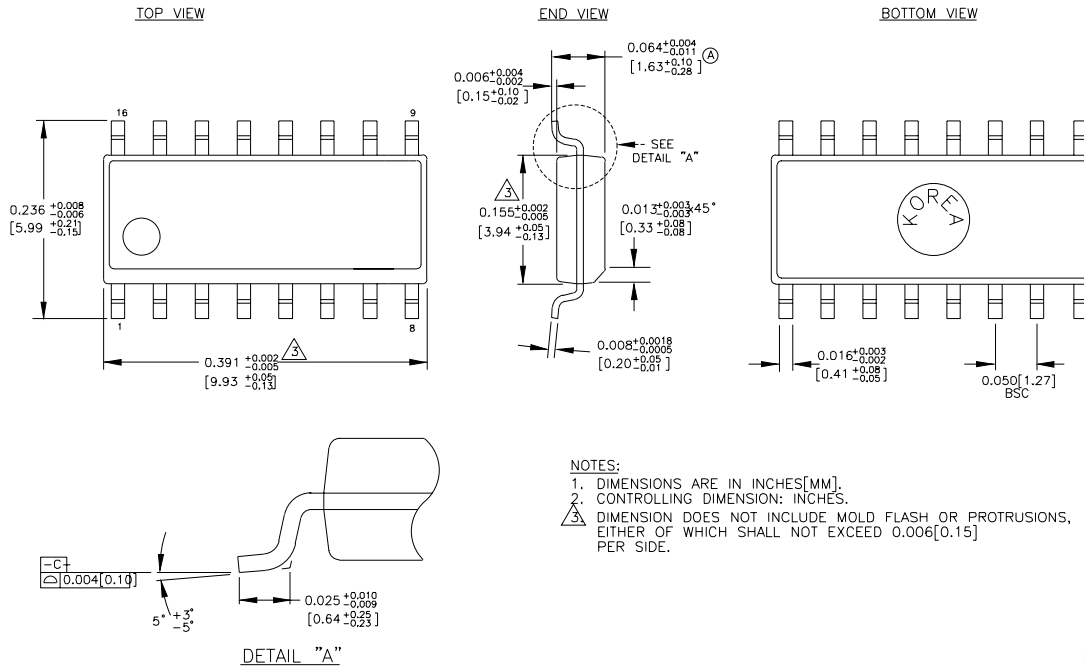


**NOTES:**  
 1. DIMENSIONS ARE IN INCHES[MM].  
 2. CONTROLLING DIMENSION: INCHES.  
 3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.006[0.152] PER SIDE.

Rev. 03



**16 LEAD SOIC .150" WIDE (Z16-2)**



Rev. 02

**MICREL, INC. 1849 FORTUNE DRIVE SAN JOSE, CA 95131 USA**

TEL + 1 (408) 944-0800 FAX + 1 (408) 944-0970 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.

© 2003 Micrel, Incorporated.