

### HIGH-PERFORMANCE PRODUCTS

#### Description

The SK10/100EL16V is a differential receiver with variable output swing. Its VCTRL input controls the amplitude of the Q and Q\* outputs. The operating range of the EL16V control input, VCTRL, is from VBB (large swing) to VCC (min swing), see Figure 2. Simple control of the output swing can be obtained by a variable resistor between the VBB and VCC pins, with wiper driving CTRL. Typical application circuits and results are described in Figures 1a, 1b, and 2.

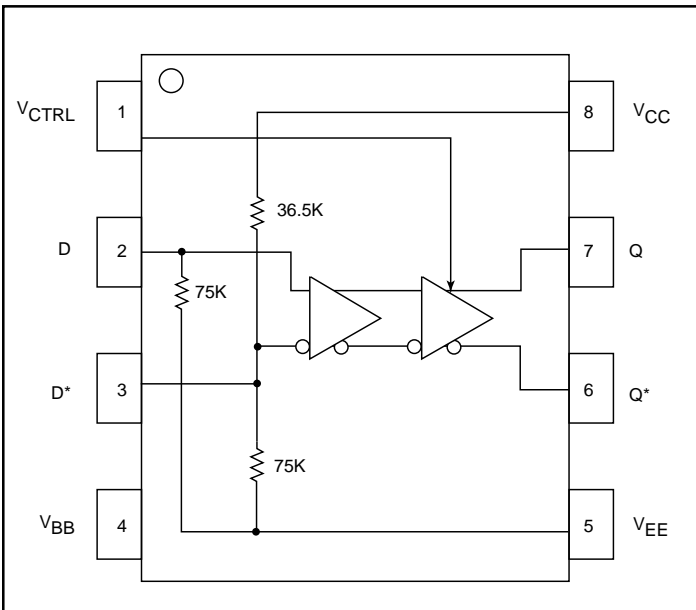
The SK10/100EL16V provides a VBB output for either single-ended use or as a DC bias for AC coupling to the device. The VBB pin should be used only as a bias for the EL16V as its current sink/source capability is limited. Whenever used, the VBB pin should be bypassed to VCC via a 0.01  $\mu$ F capacitor.

Under open input conditions, the pulldown resistor on D, pulldown and pullup resistors on D\* will force the Q output LOW and Q\* output HIGH. The VCTRL pin should be bypassed to VCC via a 0.01  $\mu$ F capacitor when the pin is used.

#### Features

- Extended Supply Voltage Range: (VEE = -5.5V to -3.0V, VCC = 0V) or (VCC = +3.0V to +5.5V, VEE = 0V)
- High Bandwidth Output Transitions
- 300 ps Propagation Delay
- VBB Output
- Internal Input Resistors: Pulldown on D, Pulldown and Pullup on D\*
- Q Output will Default Low with Inputs Open or at VEE
- New Differential Input Common Mode Range
- ESD Protection of >4000V
- Specified Over Industrial Temperature Range: -40°C to 85°C
- Available in Both 8 Pin SOIC (150 mil) and MSOP (3mm x 3mm) Packages

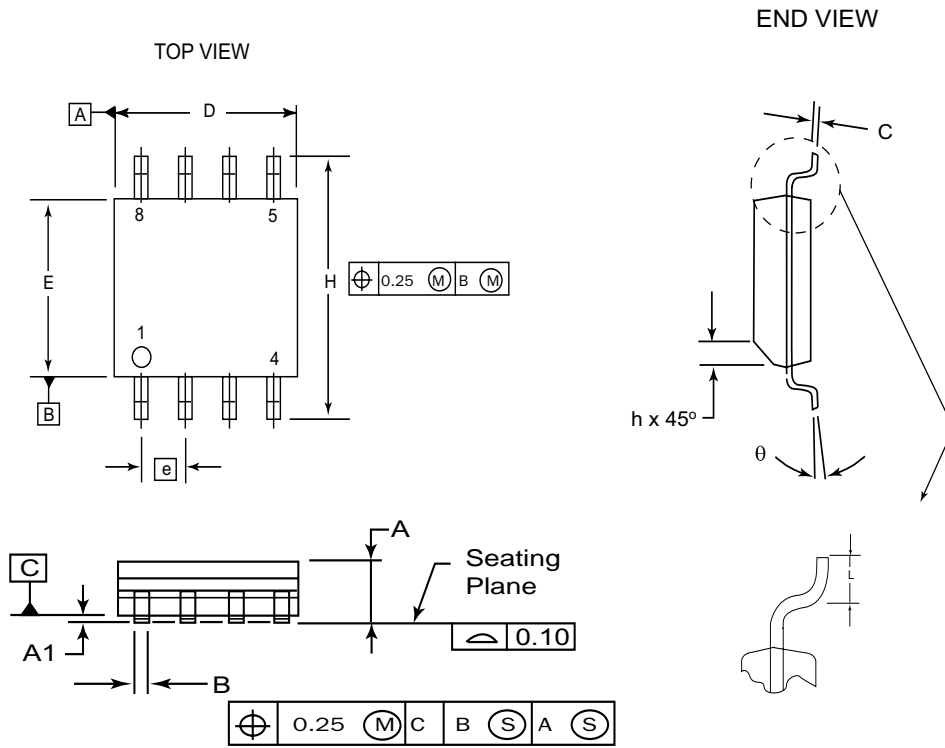
#### Functional Block Diagram



#### PIN Description

Pin	Function
D, D*	Differential Data Inputs
Q, Q*	Differential Data Outputs
VBB	Reference Output Voltage
VCTRL	Output Swing Control

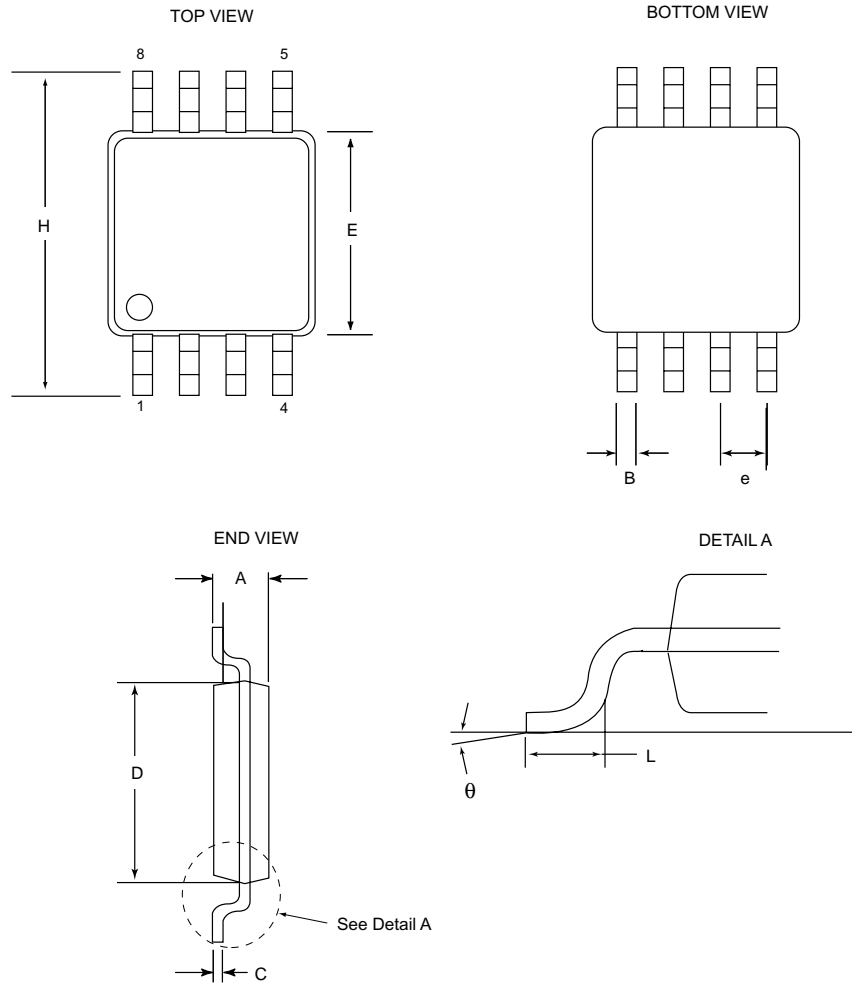
## 8 Pin SOIC Package



DIM	MILLIMETERS	
	MIN	MAX
A	1.35	1.75
A1	0.10	0.25
B	0.33	0.51
C	0.19	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.27
$\theta$	0°	8°

**NOTES:**

1. Dimensions are in millimeters.
2. Dimensions D and E do not include mold protrusion.
3. Maximum mold protrusion 0.15 per side.
4. Dimension B does not include Dambar protrusion. Allowable Dambar protrusion shall be 0.127 total in excess of the B dimension at maximum material condition.

**8 Pin MSOP Package**


DIM	Millimeters	
	MIN	MAX
A	0.94	1.1
B	0.21	0.45
C	0.13	0.22
D	2.90	3.10
E	2.90	3.10
e	0.65	BSC
H	4.7	5.1
L	0.4	0.7
$\theta$	0°	6°

**NOTES:**

1. Dimensions are in mm.
2. Controlling dimension: mm
3. Dimension does not include mold flash or protrusions, either of which shall not exceed 0.20.

**HIGH-PERFORMANCE PRODUCTS**
**DC Characteristics**

SK10/100EL16V DC Electrical Characteristics (Notes 1, 2)

 ( $V_{CC} - V_{EE} = 3.0V$  to  $5.5V$ ;  $V_{OUT}$  loaded  $50\Omega$  to  $V_{CC} - 2.0V$ )

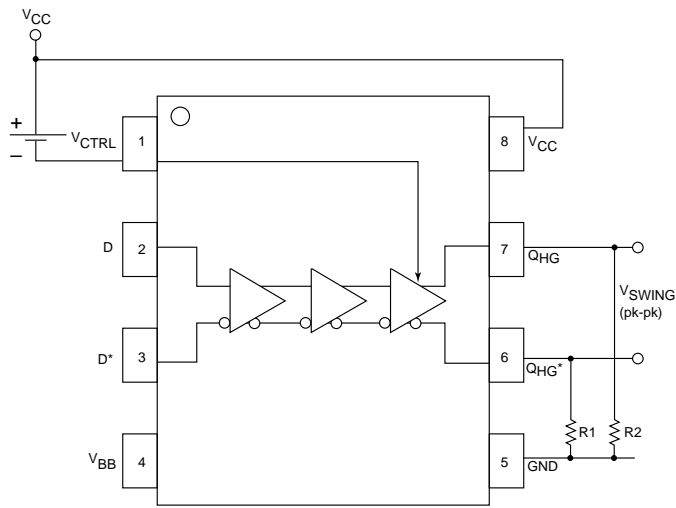
Symbol	Characteristic	TA = -40°C		TA = 0°C		TA = +25°C		TA = +85°C		Unit	Condition
		Min	Max	Min	Max	Min	Max	Min	Max		
I <sub>EE</sub>	Power Supply Current										
	10EL	14	27	14	27	14	27	14	27	mA	
	100EL	16	32	16	32	16	32	16	32	mA	
V <sub>BB</sub>	Output Reference Voltage <sup>9</sup>										
	10EL	-1.43	-1.30	-1.38	-1.27	-1.35	-1.25	-1.31	-1.19	V	
	100EL	-1.38	-1.26	-1.38	-1.26	-1.38	-1.26	-1.38	-1.26	V	
V <sub>CC</sub> - V <sub>EE</sub>	Supply Voltage Range	3.0	5.5	3.0	5.5	3.0	5.5	3.0	5.5	V	
I <sub>IN</sub>	Input Current: D, D*, (Diff)	-150	150	-150	150	-150	150	-150	150	μA	
	D, D*; V <sub>CTRL</sub> (SE)		150		150		150		150	μA	
V <sub>OP,P</sub>	Output Voltage <sup>8</sup>	570		600		650		650		mV	V <sub>CTRL</sub> = Open
V <sub>OP,P</sub>	Output Voltage <sup>8</sup>	100		100		100		100		mV	V <sub>CTRL</sub> = V <sub>CC</sub>
V <sub>PP</sub>	Differential Input Swing <sup>10</sup>	150	1000	150	1000	150	1000	150	1000	mV	

**HIGH-PERFORMANCE PRODUCTS**
**AC Characteristics**
**SK10/100EL16V AC Electrical Characteristics**
**( $V_{CC} - V_{EE} = 3.0V$  to  $5.5V$ ;  $V_{OUT}$  loaded  $50\Omega$  to  $V_{CC} - 2.0V$ )**

Symbol	Characteristic	TA = -40°C			TA = 0°C			TA = +25°C			TA = +85°C			Unit	Condition
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max		
f <sub>max</sub>	Maximum Toggle Frequency <sup>4</sup>	2.0			2.0			2.0			2.0			GHz	
t <sub>PLH</sub> t <sub>PHL</sub>	Input to Output Delay (DIFF) (SE)	275 250	290 300	310 340	280 250	300 310	320 350	290 250	305 315	325 360	295 250	320 330	340 370	ps ps	
A <sub>v</sub>	Small Signal Gain <sup>6</sup>								32					dB	
t <sub>skew</sub>	Duty Cycle Skew <sup>3</sup> (DIFF)		5	20		5	20		5	20		5	20	ps	
t <sub>r</sub> , t <sub>f</sub>	Output Rise/Fall Times Q (20% to 80%)	120	140	175	135	160	185	135	160	190	140	170	200	ps	
V <sub>CMR</sub>	Common Mode Range <sup>7</sup>	V <sub>EE</sub> + 1.7		V <sub>CC</sub> - 0.4	V <sub>EE</sub> + 1.7		V <sub>CC</sub> - 0.4	V <sub>EE</sub> + 1.7		V <sub>CC</sub> - 0.4	V <sub>EE</sub> + 1.7		V <sub>CC</sub> - 0.4	V	
V <sub>OP,P</sub>	Output Voltage <sup>8</sup>	570			600			650			650			mV	V <sub>CTRL</sub> = Open
V <sub>OP,P</sub>	Output Voltage <sup>8</sup>	100			100			100			100			mV	V <sub>CTRL</sub> = V <sub>CC</sub>

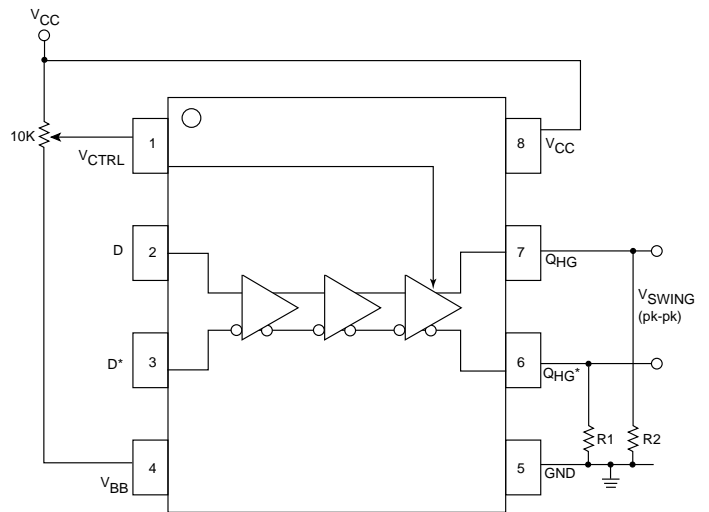
**Notes:**

- 10EL circuits are designed to meet the DC specifications shown in the table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse airflow greater than 500 lfm is maintained. Outputs are terminated through a 50Ω resistor to V<sub>CC</sub>-2.0V.
- 100K circuits are designed to meet the DC specification shown in the table where transverse airflow greater than 500 lfm is maintained.
- Duty cycle skew is the difference between T<sub>PLH</sub> and T<sub>PHL</sub> propagation delay through a device.
- F<sub>max</sub> guaranteed for functionality only. See Figure 3 for typical output swing. V<sub>OP,P</sub> levels are guaranteed at DC only.
- V<sub>CTRL</sub> voltage range should be between V<sub>BB</sub> to V<sub>CC</sub>.
- The device has a DC gain of ~40.
- 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(min)</sub> and 1V. The lower end of the CMR range varies 1:1 with V<sub>EE</sub> and is equal to V<sub>EE</sub> + 1.7V.
- V<sub>OP,P</sub> is obtained as follows: Voltages of Q and Q\* outputs with respect to V<sub>CC</sub> are measured. The absolute difference between a high and a low state is equal to V<sub>OP,P</sub>.
- Voltages referenced to V<sub>CC</sub> = 0V.
- Minimum input swing for which parameters are guaranteed.
- For standard ECL DC specifications, refer to the ECL Logic Family Standard DC Specifications Data Sheet.
- For part ordering description, see HPP Part Ordering Information Data Sheet.

**HIGH-PERFORMANCE PRODUCTS**
**AC Characteristics (continued)**


NOTE:  $R_1 = R_2 = 150\Omega$  for  $V_{CC} = 3.3V$   
 $R_1 = R_2 = 330\Omega$  for  $V_{CC} = 5.0V$

Figure 1A



NOTE:  $R_1 = R_2 = 150\Omega$  for  $V_{CC} = 3.3V$   
 $R_1 = R_2 = 330\Omega$  for  $V_{CC} = 5.0V$

Figure 1B

Implementation of Voltage Source

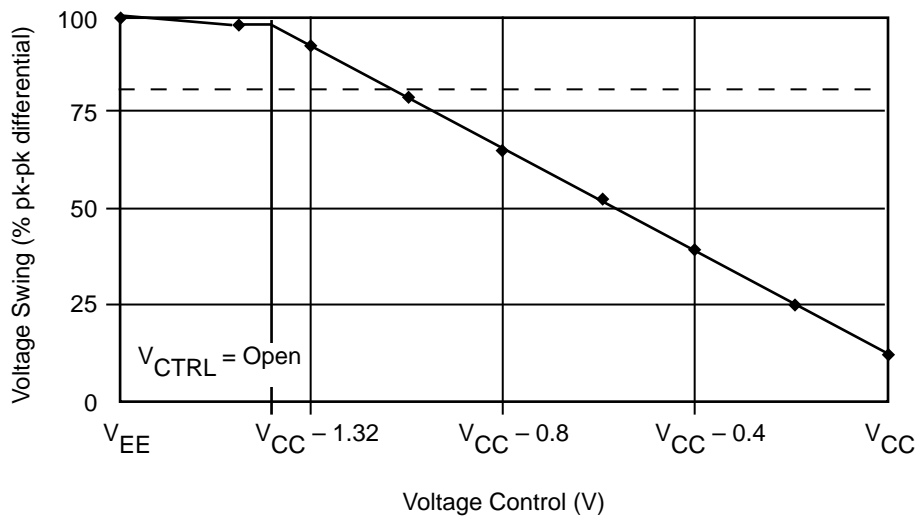
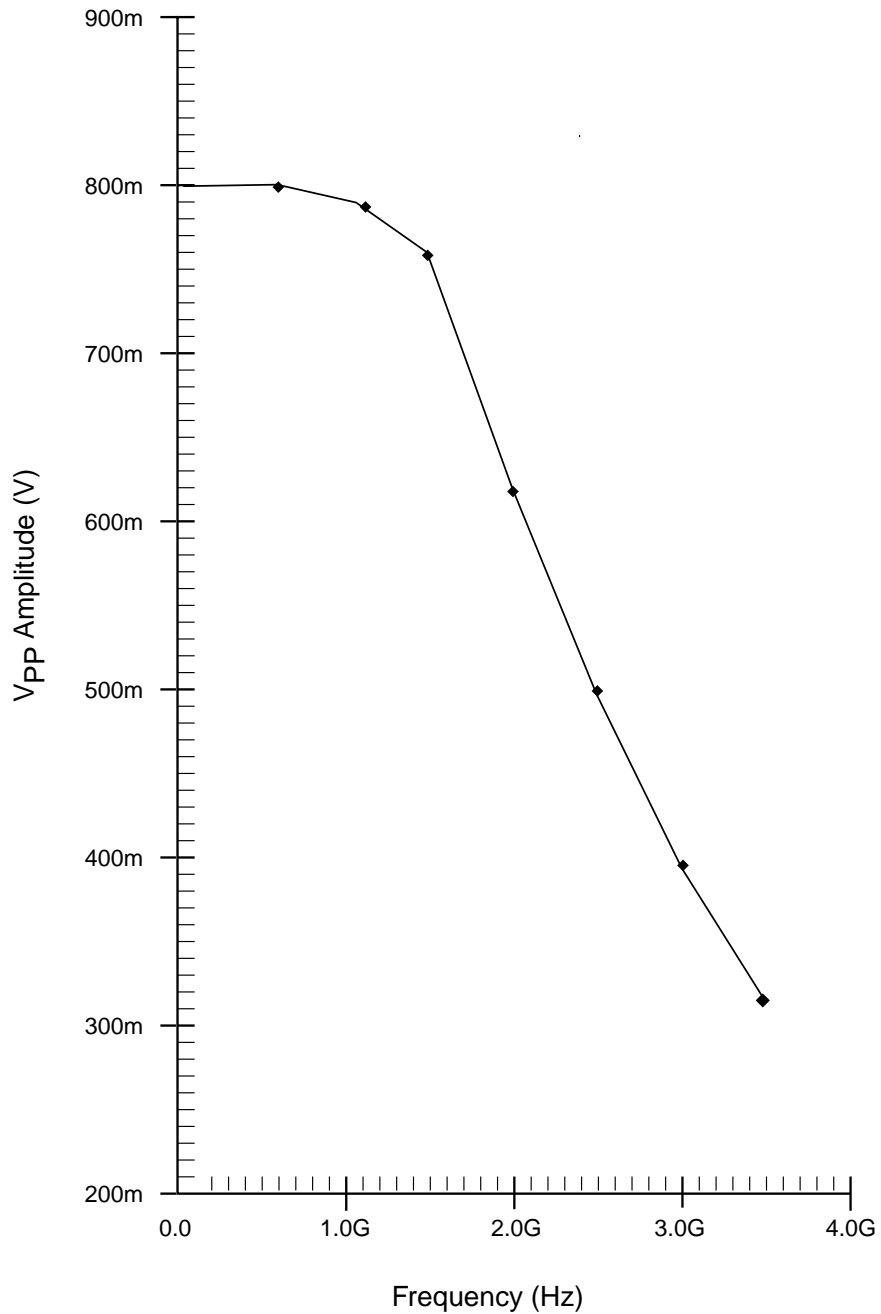


Figure 2. Typical Voltage Output Swing at 25°C

**HIGH-PERFORMANCE PRODUCTS****AC Characteristics (continued)**

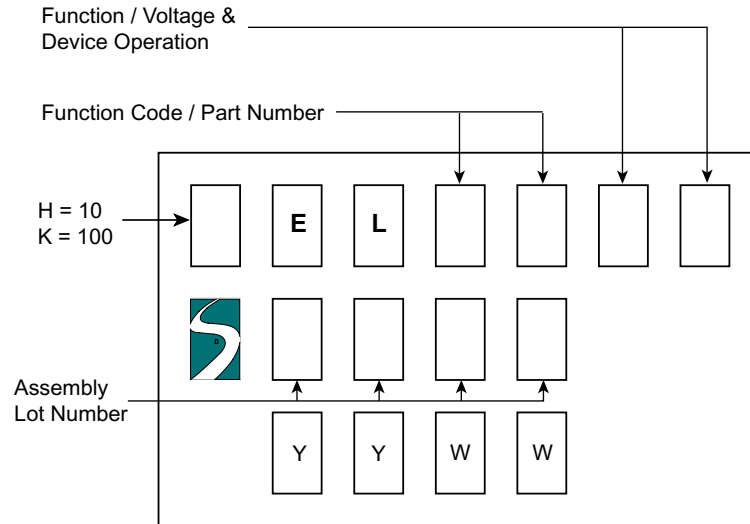
Input Conditions: 800 mV Peak-to-Peak

Figure 3. Typical Output V<sub>PP</sub> vs. Frequency

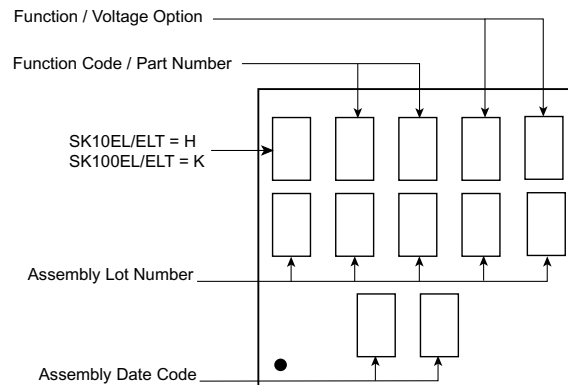
**HIGH-PERFORMANCE PRODUCTS****Ordering Information**

<b>Ordering Code</b>	<b>Package ID</b>	<b>Temperature Range</b>
SK10EL16VD	8-SOIC	Industrial
SK10EL16VDT	8-SOIC	Industrial
SK100EL16VD	8-SOIC	Industrial
SK100EL16VDT	8-SOIC	Industrial
SK10EL16VMS	8-MSOP	Industrial
SK10EL16VMST	8-MSOP	Industrial
SK100EL16VMS	8-MSOP	Industrial
SK100EL16VMST	8-MSOP	Industrial
SK10EL16VU	Die	
SK100EL16VU	Die	



**HIGH-PERFORMANCE PRODUCTS**
**Marking Information**
**8 PIN SOIC PACKAGE**


YY: Last two digits of the Year  
 WW: Working Week

**8/10 PIN MSOP PACKAGES**

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