

Description

The SK10/100EL16X is a high gain differential receiver with variable output swing. Its VCTRL input controls the amplitude of the QHG and QHG* outputs. The operating range of the EL16X 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 circuit and results are described in Figures 1a, 1b, and 2.

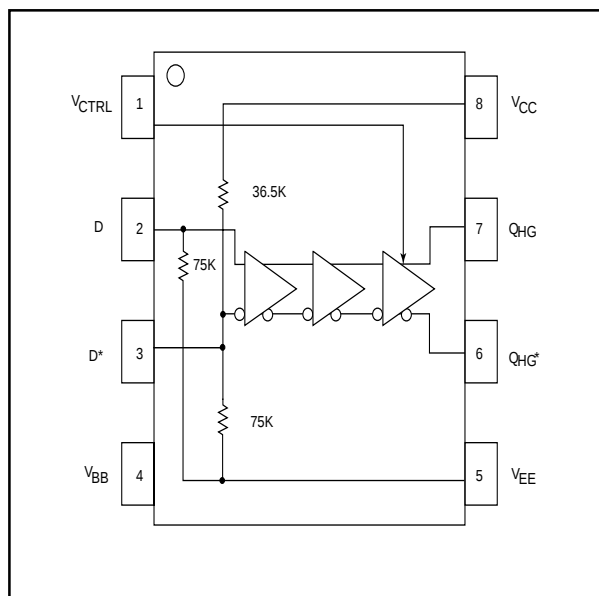
The SK10/100EL16X provides a VBB output for either single-ended use or as a DC bias for AC coupling to the device. The VBB pin should be used only as a bias for the EL16X as its current sink/source capability is limited. Whenever used, the VBB pin should be bypassed to VCC via a 0.01 μ F capacitor.

Under open input conditions, the pulldown resistor on D, pulldown and pullup resistors on D* will force the QHG output LOW and QHG* output HIGH. The VCTRL pin should be bypassed to VCC via a 0.01 μ 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
- 350 ps Propagation Delay
- VBB Output
- Internal Input Resistors: Pulldown on D, Pulldown and Pullup on D*
- QHG 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

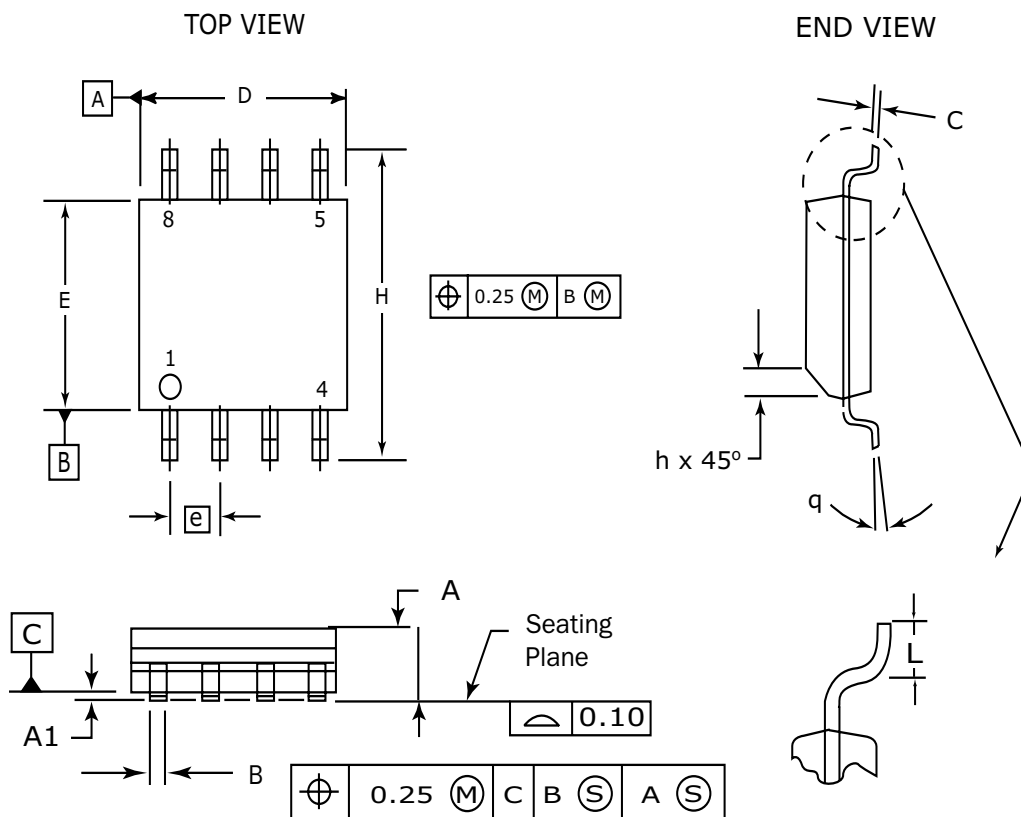


PIN Description

Pin	Function
D, D*	Differential Data Inputs
QHG, QHG*	Differential Data Outputs
VBB	VBB Ref Voltage Output
VCTRL	Output Swing Control

Package Information

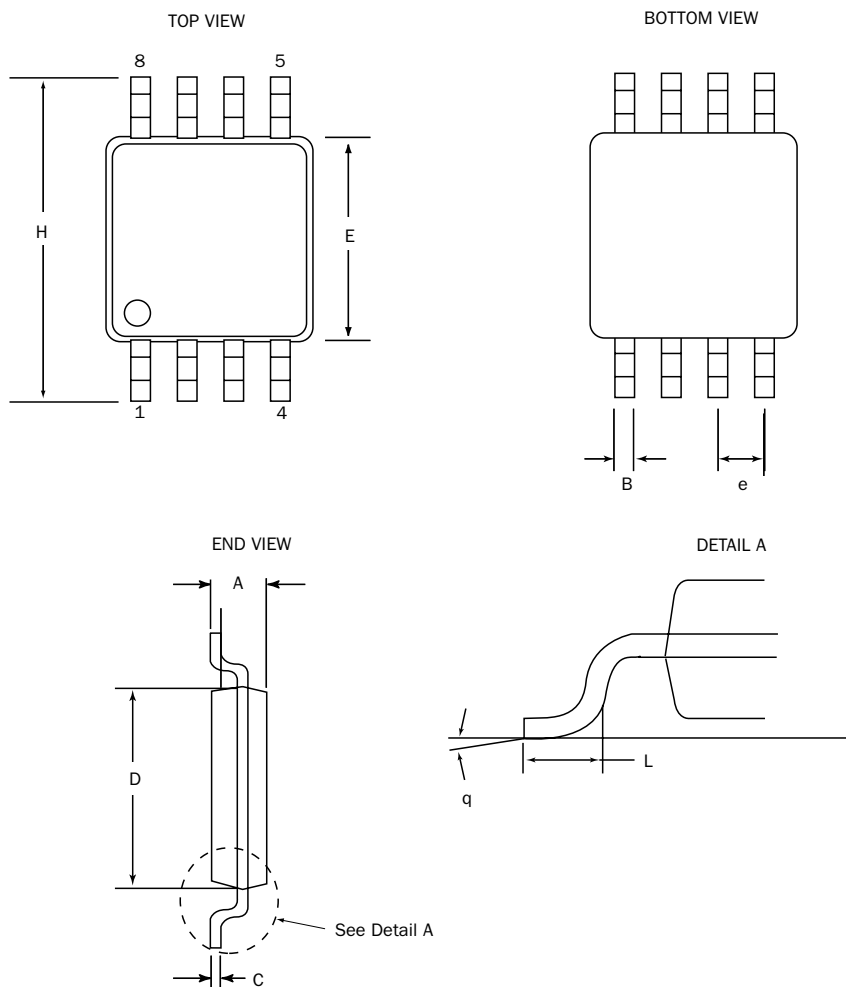
8 Lead SOIC Package



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
θ	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
θ	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.

DC Characteristics
SK10EL16X DC Electrical Characteristics (Note 1)
 $(V_{EE} = -3.0V \text{ to } -5.5V; V_{CC} = 0V; V_{OUT} \text{ loaded } 50\Omega \text{ to } V_{CC} - 2.0V)$

Symbol	Characteristic	TA = - 40°C		TA = 0°C		TA = + 25°C		TA = + 85°C		Unit
		Min	Max	Min	Max	Min	Max	Min	Max	
V _{OH}	Output HIGH Voltage	- 1080	- 890	- 1020	- 840	-980	- 810	- 910	- 720	mV
V _{OL}	Output LOW Voltage	- 1950	- 1650	- 1950	- 1630	- 1950	- 1630	- 1950	- 1595	mV
V _{IH}	Input HIGH Voltage	- 1230	- 890	- 1170	- 840	- 1130	- 810	- 1060	- 720	mV
V _{IL}	Input LOW Voltage	- 1950	- 1500	- 1950	- 1480	- 1950	- 1480	- 1950	- 1445	mV
V _{BB}	Reference Output Voltage	-1430	-1300	-1380	-1270	-1350	-1250	-1310	-1190	mV
I _{EE}	Power Supply Current		39		39		39		39	mA
I _{IN}	Input Current: D, D* (Diff) VCTRL (SE)	-150	150 150	-150	150 150	-150	150 150	-150	150 150	μ A μ A

SK100EL16X DC Electrical Characteristics (Note 2)
 $(V_{EE} = -3.0V \text{ to } -5.5V; V_{CC} = 0V; V_{OUT} \text{ loaded } 50\Omega \text{ to } V_{CC} - 2.0V)$

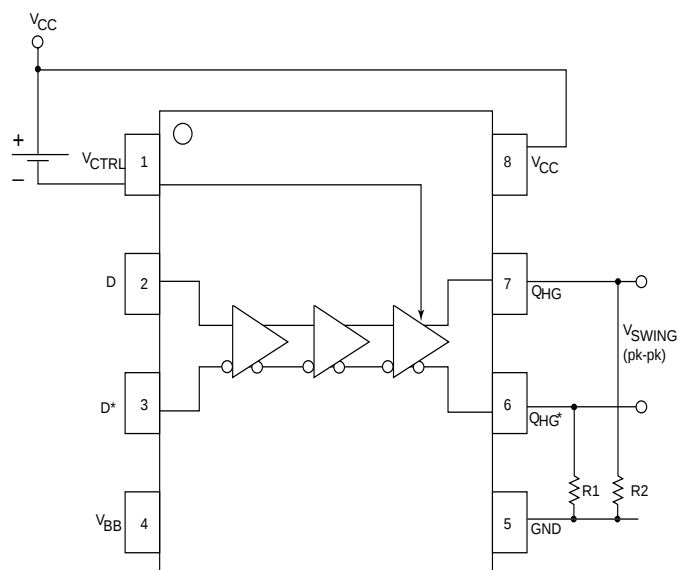
Symbol	Characteristic	TA = -40°C		TA = 0°C to 85°C		Unit	Condition
		Min	Max	Min	Max		
V _{OH}	Output HIGH Voltage	- 1085	- 880	- 1025	- 880	mV	V _{IN} = V _{IHmax} or V _{ILmin}
V _{OL}	Output LOW Voltage	- 1950	- 1555	- 1950	- 1620	mV	V _{IN} = V _{IHmax} or V _{ILmin}
V _{IH}	Input HIGH Voltage	- 1165	- 880	- 1165	- 880	mV	Guaranteed HIGH signal for all inputs
V _{IL}	Input LOW Voltage	- 1810	- 1475	- 1810	- 1475	mV	Guaranteed LOW signal for all inputs
V _{BB}	Reference Output Voltage	-1430	-1260	-1430	-1260	mV	
I _{EE}	Power Supply Current		45		45	mA	
I _{IN}	Input Current: D, D* (Diff) VCTRL (SE)	-150	150 150	-150	150 150	μ A μ A	

AC Characteristics
SK10/100EL16X AC Electrical Characteristics
 $(V_{CC} - V_{EE} = 3.0V \text{ to } 5.5V; V_{OUT} \text{ loaded } 50\Omega \text{ to } V_{CC} - 2.0V)$

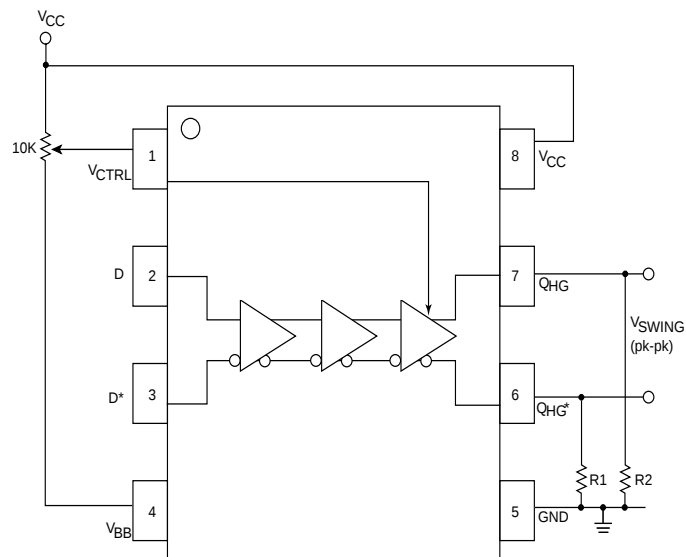
Symbol	Characteristic	TA = -40°C			TA = 0°C			TA = +25°C			TA = +85°C			Unit	Condition
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max		
f_{max}	Maximum Toggle Frequency ⁴	2.5			2.5			2.5			2.5			GHz	
t_{PLH} t_{PHL}	Propagation Delay to Output (Diff)	290	295	350	300	305	365	305	310	375	325	330	415	ps	
A_V	Small Signal Gain ⁵								46					dB	
$tskew$	Duty Cycle Skew ³ (Diff)		5	20		5	20		5	20		5	20	ps	
t_r, t_f	Output Rise/Fall Time Q_{HG} (20% to 80%)	95	120	150	100	120	155	100	120	160	100	120	165	ps	
V_{CMR}	Common Mode Range ⁷	$V_{EE}+1.5$		V_{CC}	$V_{EE}+1.5$		V_{CC}	$V_{EE}+1.5$		V_{CC}	$V_{EE}+1.5$		V_{CC}	V	
V_{PP}	Differential Input Swing ⁶	150		1000	150		1000	150		1000	150		1000	mV	
VO_{P-P}	Output Voltage ⁸	570		200	600		200	650		200	650		200	mV mV	$V_{CTRL}=Open$ $V_{CTRL}=V_{CC}$

Notes:

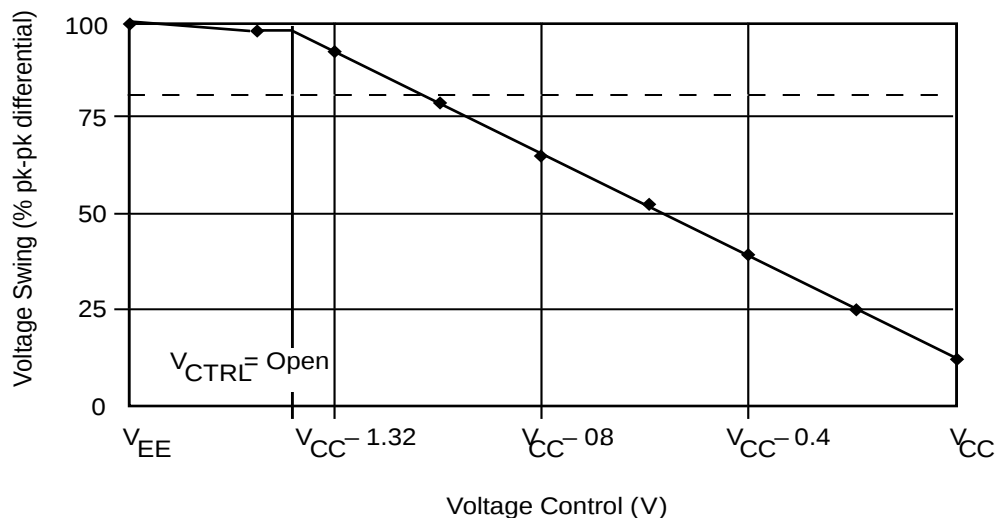
- 10EL circuits are designed to meet the DC specifications shown in the table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse airflow greater than 500 lfpm is maintained. Outputs are terminated through a 50W resistor to $V_{CC}-2.0V$.
- 100K circuits are designed to meet the DC specification shown in the table where transverse airflow greater than 500 lfpm is maintained.
- Duty cycle skew is the difference between T_{PLH} and T_{PHL} propagation delay through a device.
- F_{max} guaranteed for functionality only. See Figure 3 for typical output swing. VO_{P-P} levels are guaranteed at DC only.
- The device has a DC gain of ~200.
- Minimum input swing for which parameters are guaranteed.
- 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 $V_{PP(min)}$ and 1V. The lower end of the CMR range varies 1:1 with V_{EE} and is equal to $V_{EE} + 1.5V$.
- VO_{P-P} is obtained as follows: Voltages of Q_{HG} and Q_{HG}^* outputs with respect to V_{CC} are measured. The absolute difference between a high and a low state is equal to VO_{P-P} .
- For part ordering description, see HPP Part Ordering Information Data Sheet.

AC Characteristics (continued)

Figure 1A

Note: R1 = R2 150W for VCC = 3.3V
R1 = R2 330W for VCC = 5.0V


Figure 1B

Note: R1 = R2 150W for VCC = 3.3V
R1 = R2 330W for VCC = 5.0V

Implementation of Voltage Source

Figure 2. Typical Voltage Output Swing at 25°C

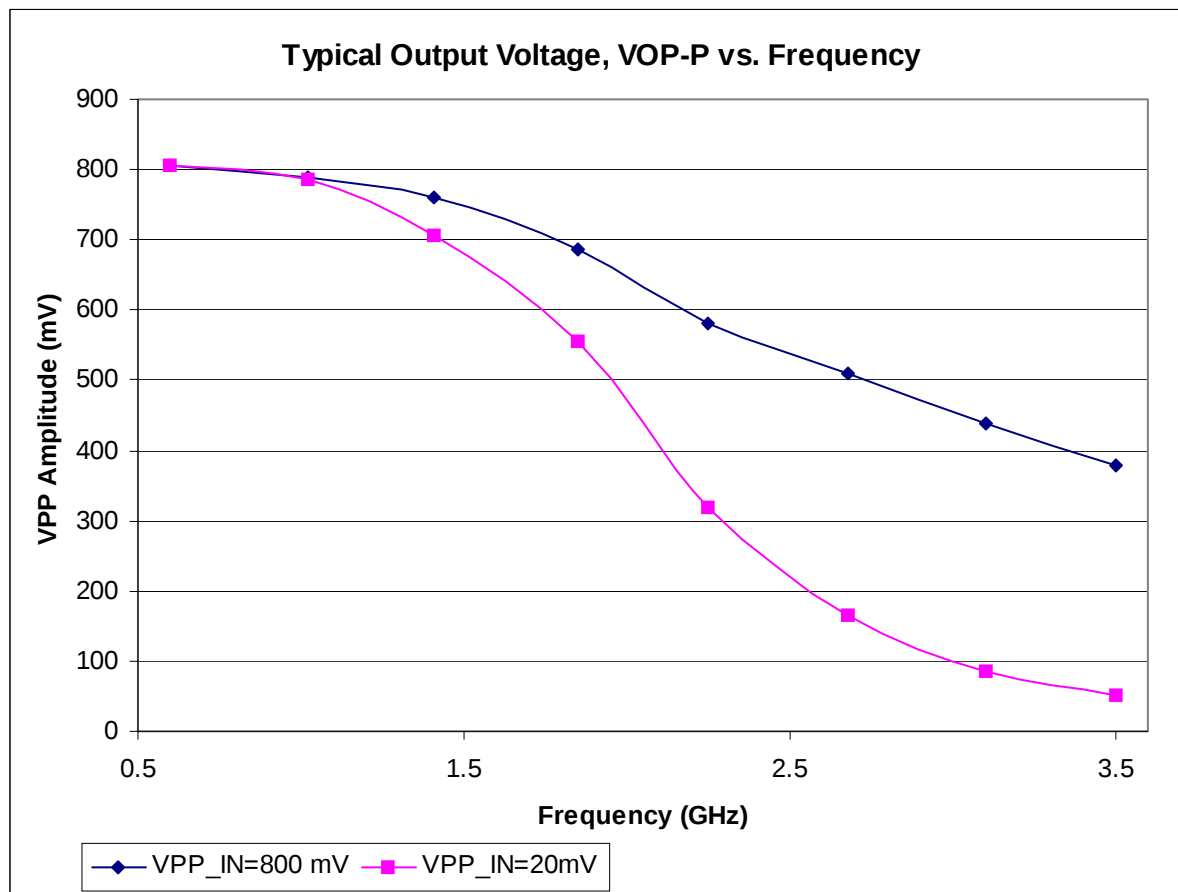
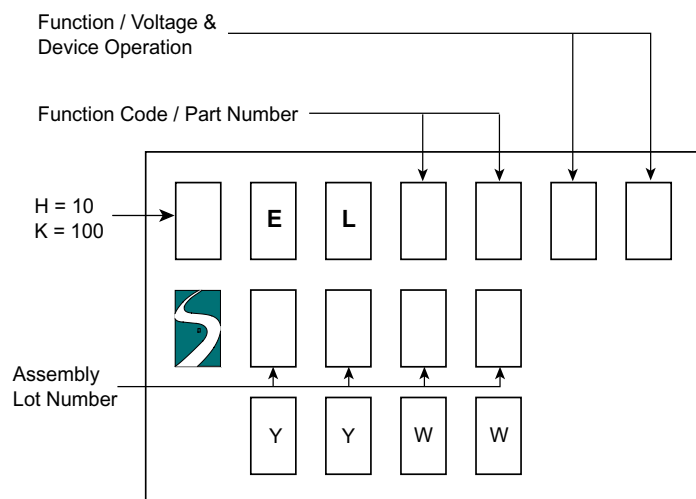
AC Characteristics (continued)


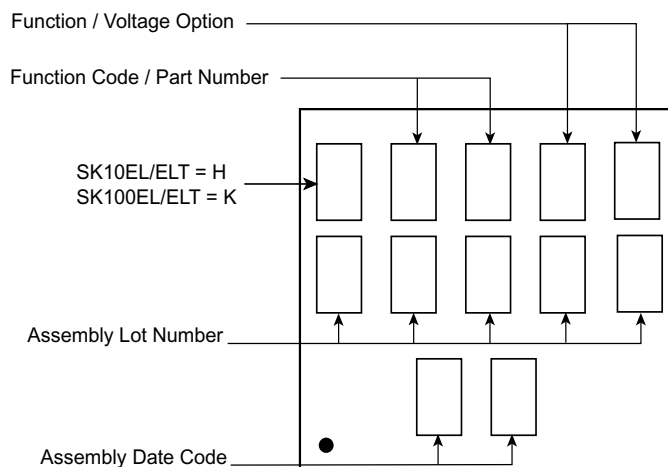
Figure 3. Typical Output VO_{P-P} vs. Frequency

Ordering Information

Ordering Code	Package ID	Temperature Range
SK10EL16XD	8-SOIC	Industrial
SK10EL16XDT	8-SOIC	Industrial
SK100EL16XD	8-SOIC	Industrial
SK100EL16XDT	8-SOIC	Industrial
SK10EL16XMS	8-MSOP	Industrial
SK10EL16XMST	8-MSOP	Industrial
SK100EL16XMS	8-MSOP	Industrial
SK100EL16XMST	8-MSOP	Industrial
SK10EL16XU	Die	
SK100EL16XU	Die	

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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