

**Description**

The SK10/100EL16TA-TD are differential receivers with optional input/output terminations. The EL16TA-TD family is pin-to-pin compatible with SK10/100EL16W and Motorola's MC10/100EL16 and MC10/100LVEL16, with added features of input/output terminations. The different options of input/output terminations of the EL16TA-TD make them ideal for use in high frequency design applications. It can also reduce the part count where board space is scarce.

The SK10/100EL16TA has a 100Ω resistor across its differential inputs. The output of this device has emitter follower structure and must be terminated with 50Ω to -2V. This device is used in applications where the driving source has terminated outputs. Please refer to Figure 1 for more details.

The SK10/100EL16TB has a 100Ω resistor and 8 mA current sources across its differential inputs. The latter will provide a DC path for the output currents of the driving source. The output of this device has emitter follower structure and must be terminated with 50Ω to -2V. This device is used in applications where the driving source may not need output termination. Please refer to Figure 2 for more details.

The SK10/100EL16TC has a 100Ω resistor across its differential inputs and 8 mA current sources across its differential outputs. This device is used in applications where the driving source may not need output termination. Please refer to Figure 3 for more details.

The SK10/100EL16TD has a 100Ω resistor across its differential inputs, 50Ω series resistance, and 8 mA current sources at its outputs. The outputs of this device may not need any termination because of the internal output 50Ω series resistor and current source. This device is used in applications where the driving source may not need output termination. Please refer to Figure 4 for more details.

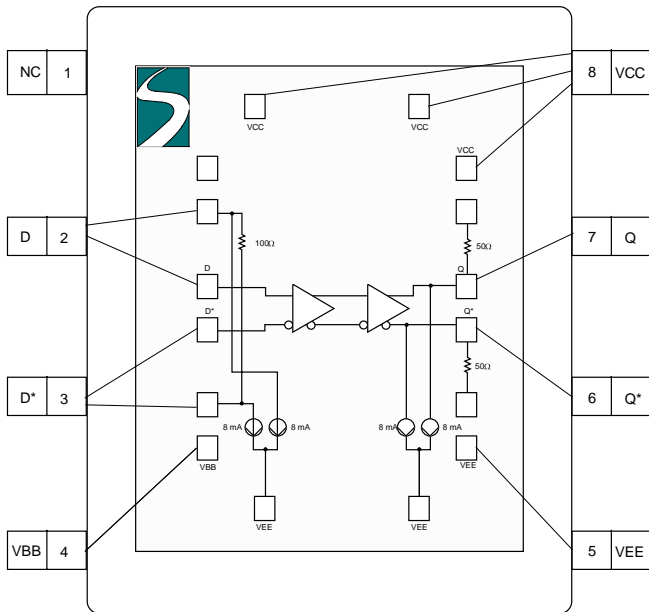
The SK10/100EL16TA-TD provides a VBB output for either single-ended use or as a DC bias for AC coupling to the device. The VBB pin should be used only as a bias for the EL16TA-TD as its current sink/source capability is limited. Whenever used, the VBB pin should be bypassed to VCC via a 0.01 μF capacitor.

**Features**

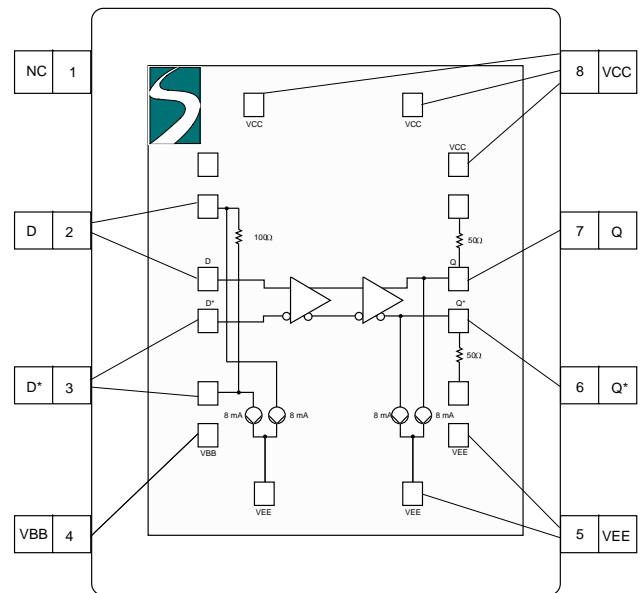
- Extended Supply Voltage Range (VEE = -5.5V to -3.0V, VCC = 0V) or (VCC = +3.0V to +5.5V, VEE = 0V)
- High Bandwidth Output Transitions
- 300 ps Propagation Delay
- VBB Output
- Internal Input Resistors: Pulldown on D, Pulldown and Pullup on D\*
- ESD Protection of >4000V
- Specified Over Industrial Temperature Range: -40°C to 85°C
- Available in 8 Pin SOIC Package

**Pin Names**

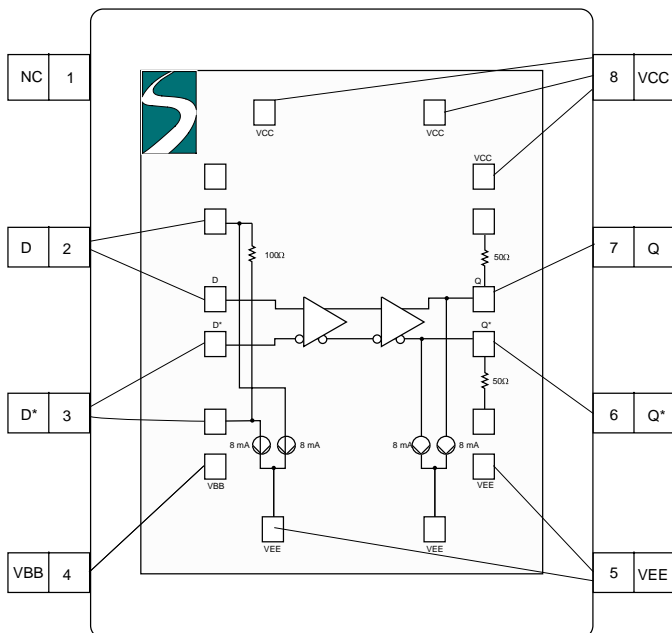
Pin	Function
D, D*	Differential Data Inputs
Q, Q*	Differential Data Outputs
VBB	Reference Output Voltage

**Pin Configuration**


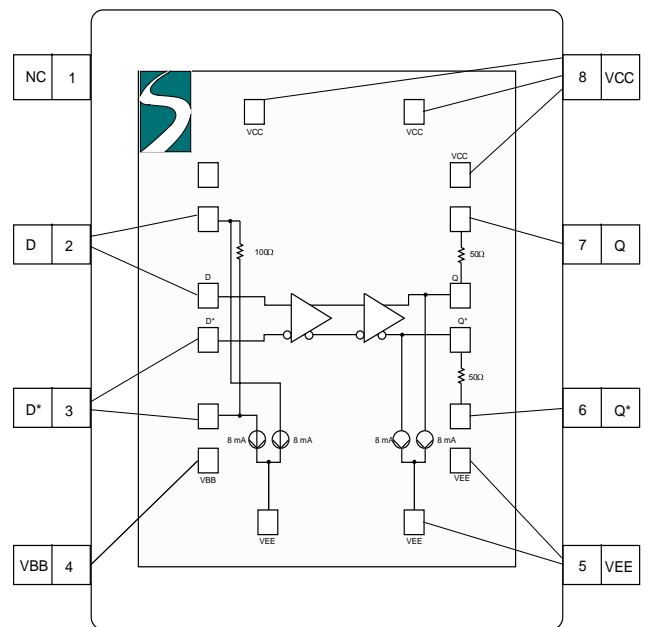
**SK10/100EL16TA**  
with 100Ω Resistor Across  
the Differential Input



**SK10/100EL16TC**  
Input Termination with 100Ω Resistor  
Across the Differential Inputs and  
8 mA Output Source Termination

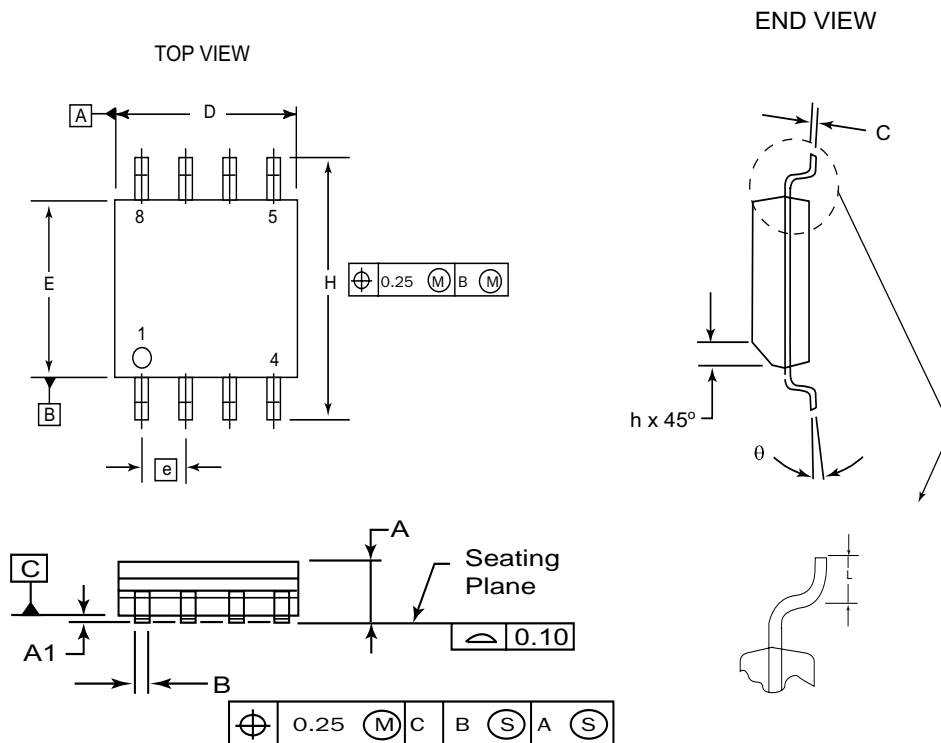


**SK10/100EL16TB**  
Input Termination with 100Ω Resistor and 8 mA  
Current Source across the Differential Inputs and  
without on chip Output Termination



**SK10/100EL16TD**  
Input Termination with 100Ω Resistor  
Across the Differential Inputs and  
8 mA Output Source Termination  
with 50Ω Series Resistor

## 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.

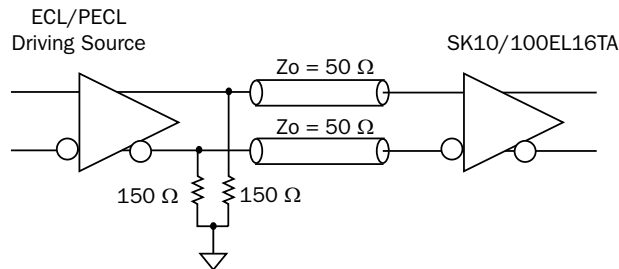
**Circuit Description**


Figure 1.

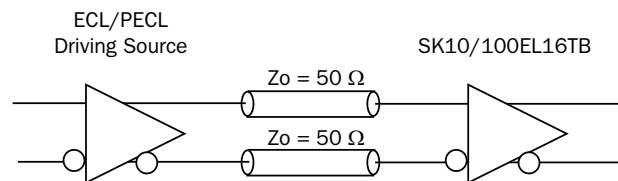


Figure 2.

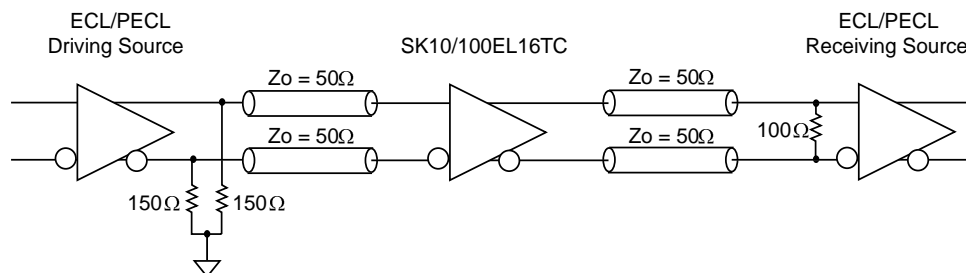


Figure 3.

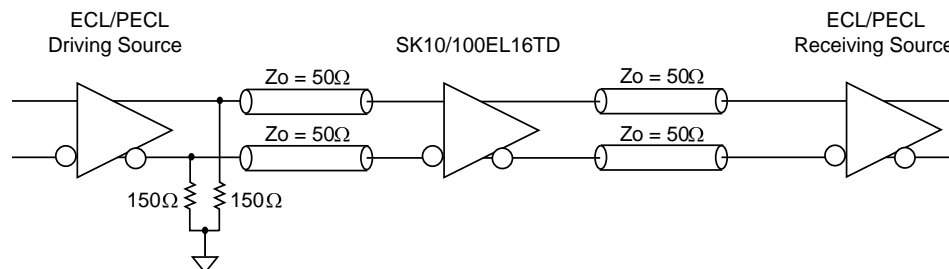


Figure 4.

NOTE: The figures above assume a low voltage power supply, VCC = 3.3V.

**DC Characteristics**
**SK10EL16TA-TD DC Electrical Characteristics (Note 1)**
**(V<sub>CC</sub> – V<sub>EE</sub> = 3.0V to 5.5V)**

Symbol	Characteristic	TA = -40°C		TA = 0°C		TA = +25°C		TA = +85°C		Unit
		Min	Max	Min	Max	Min	Max	Min	Max	
I <sub>EE</sub>	Power Supply Current									
	16TA	13	21	14	22	14	23	15	24	mA
	16TB	24	38	25	40	26	41	27	44	mA
	16TC	24	38	25	40	26	41	27	43	mA
	16TD	24	38	25	40	26	41	27	50	mA
V <sub>BB</sub>	Output Reference Voltage <sup>5</sup>									
	16TA	-1.38	-1.35	-1.35	-1.31	-1.33	-1.29	-1.27	-1.23	V
	16TB	-1.39	-1.36	-1.35	-1.32	-1.33	-1.30	-1.27	-1.23	V
	16TC	-1.39	-1.36	-1.35	-1.32	-1.33	-1.29	-1.27	-1.23	V
	16TD	-1.39	-1.36	-1.35	-1.32	-1.33	-1.29	-1.27	-1.23	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>IH</sub>	Input HIGH Current D, D*									
	16TA	-8.0		-8.3		-8.4		-9.0		mA
	16TB	-17.0		-17.3		-18.0		-19.0		mA
	16TC	-8.0		-8.3		-8.4		-9.0		mA
	16TD	-8.0		-8.3		-8.4		-9.0		mA
I <sub>IL</sub>	Input LOW Current D, D*									
	16TA		8.0		8.2		8.3		8.5	mA
	16TB		3.0		3.0		3.0		2.5	mA
	16TC		8.0		8.2		8.3		8.5	mA
	16TD		8.0		8.2		8.3		8.5	mA

**SK100EL16TA-TD DC Electrical Characteristics (Note 2)**
**(V<sub>CC</sub> – V<sub>EE</sub> = 3.0V to 5.5V)**

Symbol	Characteristic	TA = -40°C		TA = 0°C		TA = +25°C		TA = +85°C		Unit
		Min	Max	Min	Max	Min	Max	Min	Max	
I <sub>EE</sub>	Power Supply Current									
	16TA	15	24	16	26	17	27	19	30	mA
	16TB	26	41	27	43	28	45	30	48	mA
	16TC	26	41	27	43	28	45	30	48	mA
	16TD	26	41	27	43	28	45	30	48	mA
V <sub>BB</sub>	Output Reference Voltage <sup>5</sup>									
	16TA	-1.34	-1.31	-1.34	-1.30	-1.34	-1.29	-1.35	-1.29	V
	16TB	-1.35	-1.31	-1.35	-1.30	-1.35	-1.29	-1.35	-1.30	V
	16TC	-1.35	-1.31	-1.35	-1.30	-1.34	-1.29	-1.35	-1.30	V
	16TD	-1.35	-1.31	-1.35	-1.30	-1.34	-1.29	-1.35	-1.30	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>IH</sub>	Input HIGH Current D, D*									
	16TA	-8.0		-8.0		-8.0		-8.0		mA
	16TB	-16.2		-17.0		-17.0		-17.3		mA
	16TC	-8.0		-8.0		-8.0		-8.0		mA
	16TD	-8.0		-8.0		-8.0		-8.0		mA
I <sub>IL</sub>	Input LOW Current D, D*									
	16TA		8.0		8.0		8.0		8.0	mA
	16TB		3.0		3.0		3.0		3.0	mA
	16TC		8.0		8.0		8.0		8.0	mA
	16TD		8.0		8.0		8.0		8.0	mA

**DC Characteristics (continued)**
**SK10EL16TA-TD Output DC Electrical Characteristics (Note 1)**
**(V<sub>CC</sub> – V<sub>EE</sub> = 3.0V to 5.5V)**

Symbol	Characteristic	TA = -40°C		TA = 0°C		TA = +25°C		TA = +85°C		Unit
		Min	Max	Min	Max	Min	Max	Min	Max	
V <sub>OH</sub>	Output HIGH Voltage <sup>5</sup>									
	16TA	-1044	-1019	-973	-953	-929	-913	-832	-820	mV
	16TB	-1044	-1019	-974	-954	-929	-912	-832	-819	mV
	16TC	-997	-980	-933	-915	-893	-874	-800	-779	mV
	16TD	-1168	-1146	-1123	-1097	-1095	-1067	-1029	-996	mV
V <sub>OL</sub>	Output LOW Voltage <sup>5</sup>									
	16TA	-1796	-1768	-1791	-1759	-1786	-1752	-1768	-1730	mV
	16TB	-1811	-1780	-1804	-1769	-1798	-1762	-1779	-1739	mV
	16TC	-1755	-1485	-1739	-1447	-1727	-1424	-1694	-1366	mV
	16TD	-1620	-1560	-1595	-1531	-1579	-1512	-1533	-1460	mV
V <sub>OPP</sub>	Output Voltage <sup>8</sup>									
	16TA	724	777	786	837	822	873	898	948	mV
	16TB	736	792	795	849	833	886	907	959	mV
	16TC	505	758	533	806	550	835	588	895	mV
	16TD	414	452	433	472	445	484	463	505	mV
V <sub>PP</sub>	Differential Input Swing <sup>6</sup>	150	1000	150	1000	150	1000	150	1000	mV

**SK100EL16TA-TD Output DC Electrical Characteristics (Note 2)**
**(V<sub>CC</sub> – V<sub>EE</sub> = 3.0V to 5.5V)**

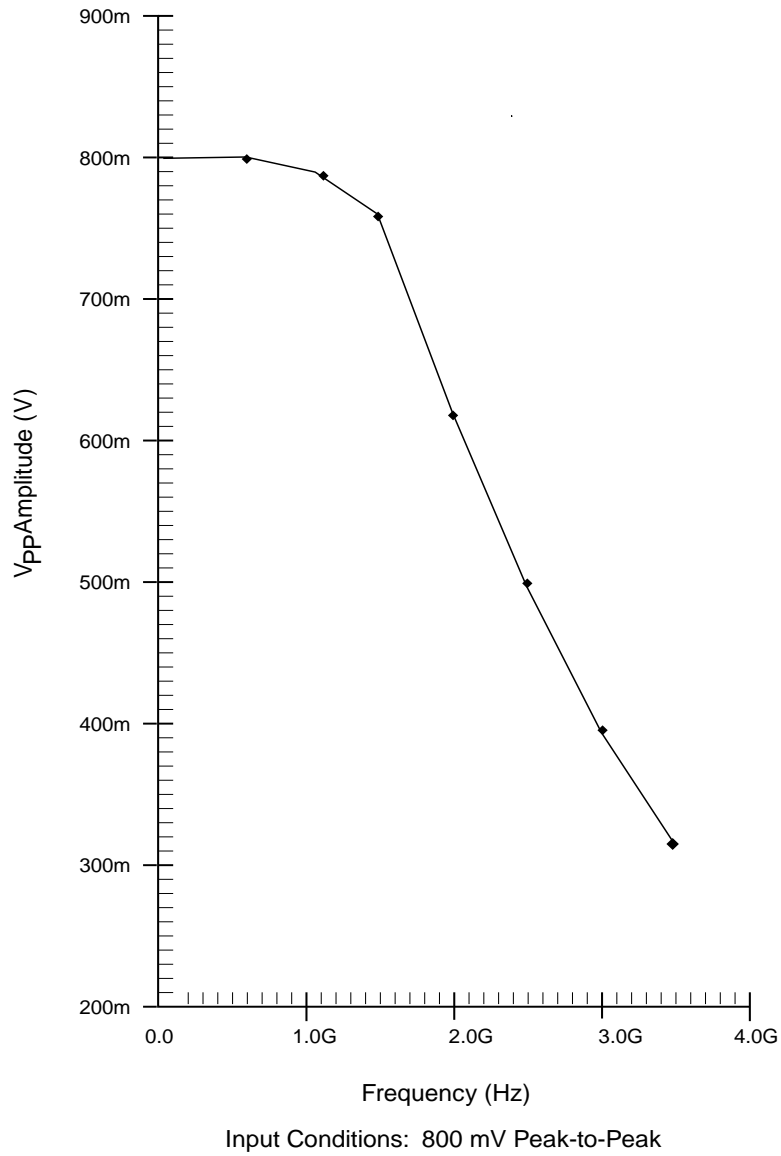
Symbol	Characteristic	TA = -40°C		TA = 0°C		TA = +25°C		TA = +85°C		Unit
		Min	Max	Min	Max	Min	Max	Min	Max	
V <sub>OH</sub>	Output HIGH Voltage <sup>5</sup>									
	16TA	-1044	-1019	-1003	-980	-979	-955	-965	-943	mV
	16TB	-1044	-1019	-1008	-984	-984	-961	-971	-949	mV
	16TC	-996	-979	-970	-942	-953	-919	-949	-910	mV
	16TD	-1162	-1140	-1152	-1118	-1146	-1104	-1162	-1114	mV
V <sub>OL</sub>	Output LOW Voltage <sup>5</sup>									
	16TA	-1775	-1752	-1789	-1755	-1797	-1757	-1837	-1792	mV
	16TB	-1791	-1764	-1806	-1768	-1815	-1771	-1853	-1805	mV
	16TC	-1731	-1471	-1741	-1456	-1747	-1446	-1784	-1463	mV
	16TD	-1601	-1544	-1604	-1535	-1607	-1529	-1635	-1549	mV
V <sub>OPP</sub>	Output Voltage <sup>8</sup>									
	16TA	708	756	757	802	789	832	840	881	mV
	16TB	720	771	767	815	797	842	848	890	mV
	16TC	493	736	514	771	526	793	553	835	mV
	16TD	404	439	417	452	425	461	435	473	mV
V <sub>PP</sub>	Differential Input Swing <sup>6</sup>	150	1000	150	1000	150	1000	150	1000	mV

**AC Characteristics**
**SK10/100EL16TA-TD AC Electrical Characteristics**
**(V<sub>CC</sub> – V<sub>EE</sub> = 3.0V to 5.5V)**

Symbol	Characteristic	TA = -40°C		TA = 0°C		TA = +25°C		TA = +85°C		Unit
		Min	Max	Min	Max	Min	Max	Min	Max	
f <sub>max</sub>	Maximum Toggle Frequency <sup>4</sup>	2.0		2.0		2.0		2.0		GHz
t <sub>PHL</sub> t <sub>PLH</sub>	Input to Output Delay 16TA 16TB 16TC 16TD	255 260 265 270	340 300 415 375	265 270 275 275	350 310 425 380	265 275 270 285	355 320 430 385	275 285 290 285	360 335 435 390	ps ps ps ps
tskew	Duty Cycle Skew <sup>3</sup> (DIFF)		20		20		20		20	ps
t <sub>r</sub> , t <sub>f</sub>	Output Rise Times Q, Q* (20% to 80%) 16TA 16TB 16TC 16TD	115 115 90 85	190 190 235 575	115 115 90 85	195 195 235 590	115 115 90 85	195 200 235 605	120 120 90 85	205 210 235 610	ps ps ps ps
V <sub>CMR</sub>	Common M <sub>ODE</sub> 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

**Notes:**

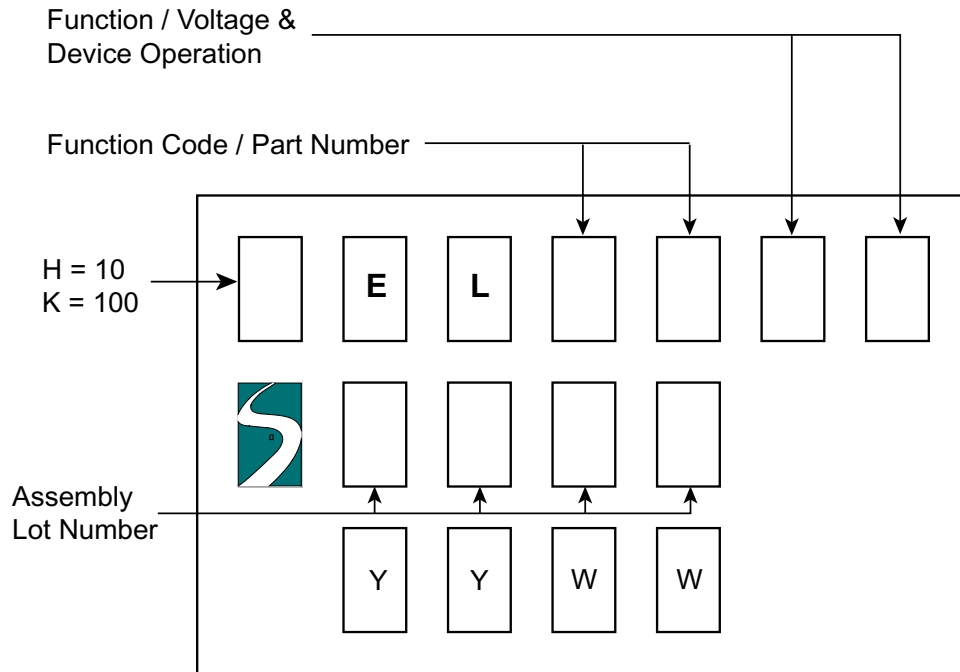
- 10EL circuits are designed to meet the DC specification shown in the table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board, and transverse airflow greater than 500 lfpm is maintained.
- 100K circuits are designed to meet the DC specification shown in the table where transverse airflow greater than 500 lfpm is maintained.
- Duty cycle skew is the difference between T<sub>PLH</sub> and T<sub>PHL</sub> propagation delay through a device.
- F<sub>MAX</sub> guaranteed for functionality only. See Figure 5 for typical output swing. V<sub>OL</sub> and V<sub>OH</sub> are guaranteed at DC only.
- Voltages referenced to V<sub>CC</sub> = 0V.
- Minimum input swing for which parameters are guaranteed. 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>O<sub>pp</sub></sub>.
- 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.

**AC Characteristics (continued)**Figure 5. Typical Output V<sub>pp</sub> vs. Frequency



**Ordering Information**

<b>Ordering Code</b>	<b>Package ID</b>	<b>Temperature Range</b>
SK10EL16TAD	8-SOIC	Industrial
SK10EL16TBD	8-SOIC	Industrial
SK10EL16TCD	8-SOIC	Industrial
SK10EL16TDD	8-SOIC	Industrial
SK10EL16TADT	8-SOIC	Industrial
SK10EL16TBDT	8-SOIC	Industrial
SK10EL16TCDT	8-SOIC	Industrial
SK10EL16TDDT	8-SOIC	Industrial
SK100EL16TAD	8-SOIC	Industrial
SK100EL16TBD	8-SOIC	Industrial
SK100EL16TCD	8-SOIC	Industrial
SK100EL16TDD	8-SOIC	Industrial
SK100EL16TADT	8-SOIC	Industrial
SK100EL16TBDT	8-SOIC	Industrial
SK100EL16TCDT	8-SOIC	Industrial
SK100EL16TDDT	8-SOIC	Industrial
SK10EL16TU	Die	Options A - D
SK100EL16TU	Die	Options A - D

**Marking Information**
**8 PIN SOIC PACKAGE**

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