

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.

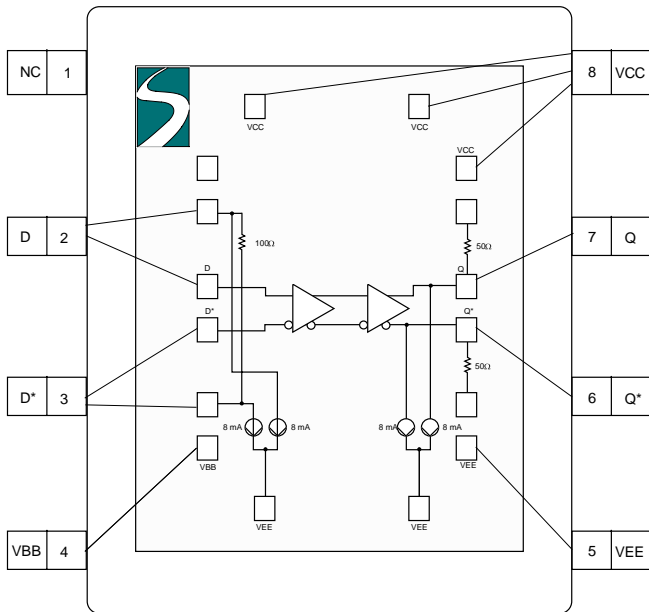
The SK10/100EL16TA-TD provides a VBB output for either single-ended use or as a DC bias for AC coupling to the device. The VBB pin should be used only as a bias for the EL16TA-TD as its current sink/source capability is limited. Whenever used, the VBB pin should be bypassed to VCC via a 0.01 μF capacitor.

Features

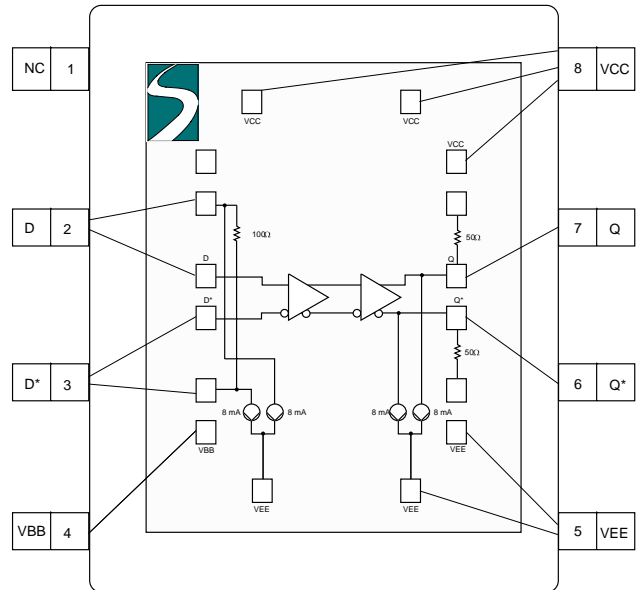
- Extended Supply Voltage Range (VEE = -5.5V to -3.0V, VCC = 0V) or (VCC = +3.0V to +5.5V, VEE = 0V)
- High Bandwidth Output Transitions
- 300 ps Propagation Delay
- VBB Output
- Internal Input Resistors: Pulldown on D, Pulldown and Pullup on D*
- ESD Protection of >4000V
- Specified Over Industrial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

Pin Names

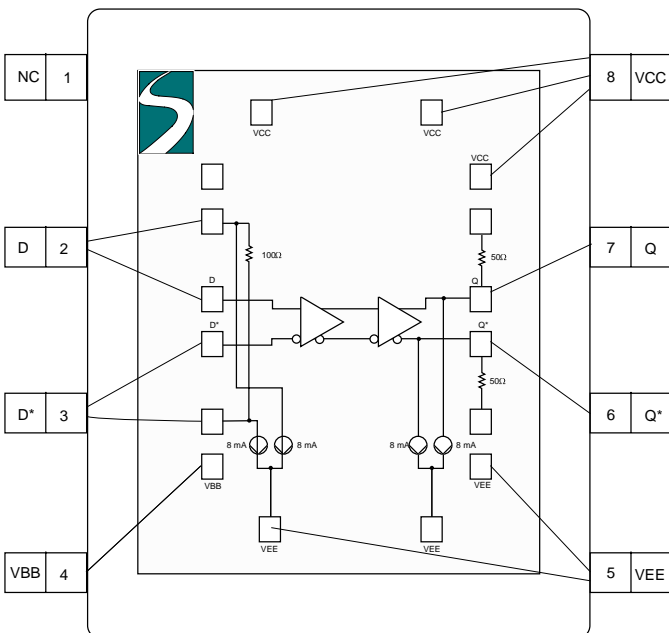
| Pin | Function |
|-------|---------------------------|
| D, D* | Differential Data Inputs |
| Q, Q* | Differential Data Outputs |
| VBB | Reference Output Voltage |

Pin Configuration


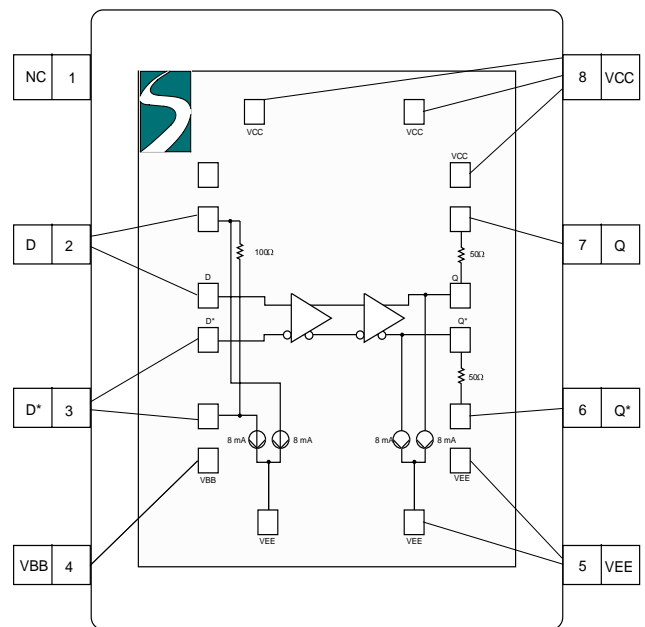
SK10/100EL16TA
with 100Ω Resistor Across
the Differential Input



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

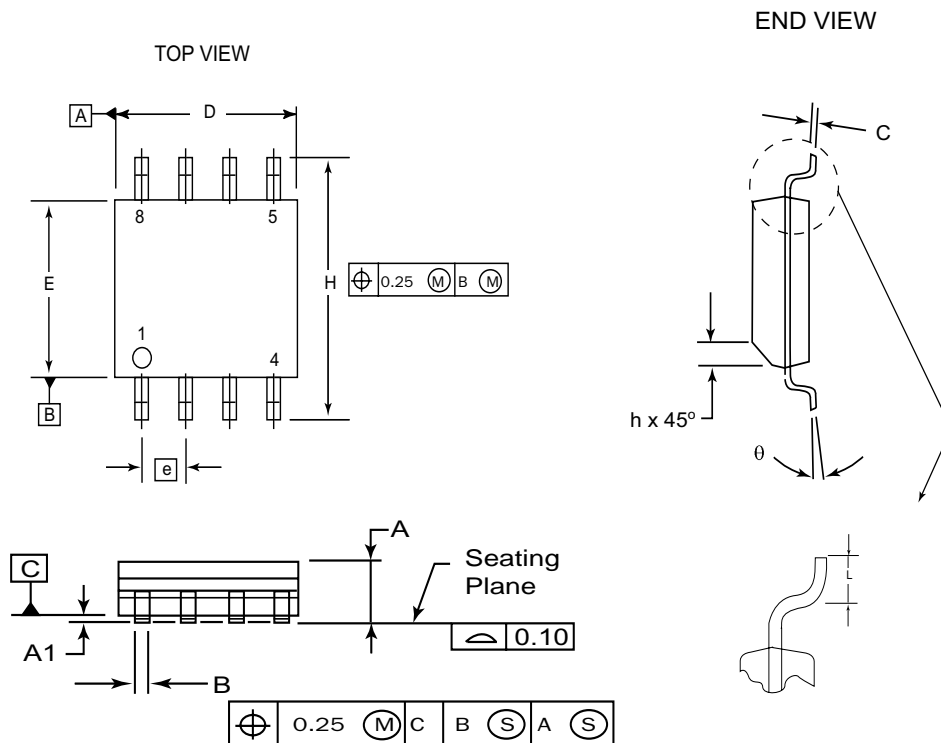


SK10/100EL16TB
Input Termination with 100Ω Resistor and 8 mA
Current Source across the Differential Inputs and
without on chip Output Termination



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 |
| 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.

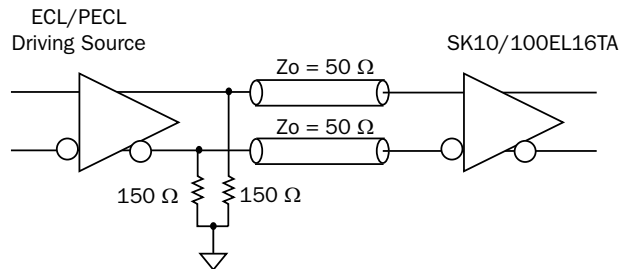
Circuit Description


Figure 1.

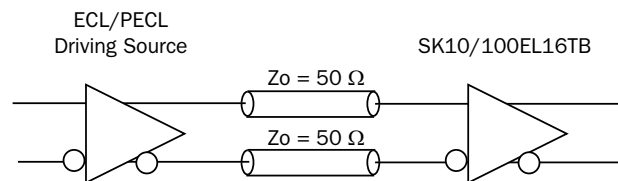


Figure 2.

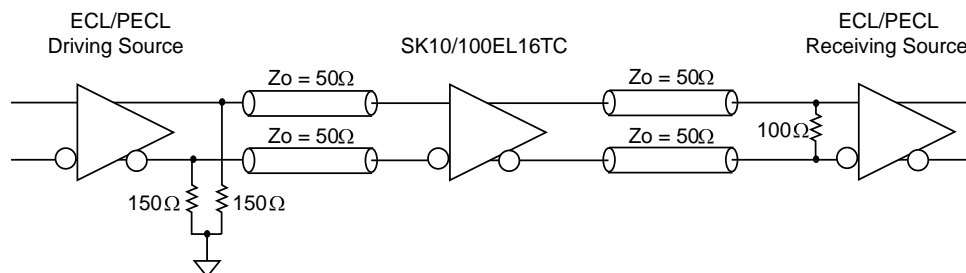


Figure 3.

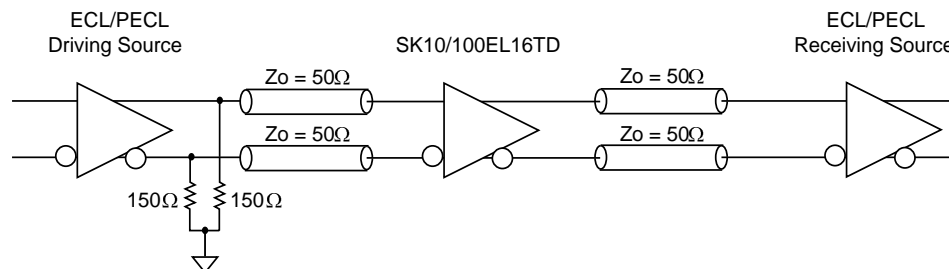


Figure 4.

NOTE: The figures above assume a low voltage power supply, $V_{CC} = 3.3V$.

DC Characteristics
SK10EL16TA-TD DC Electrical Characteristics (Note 1)
(V_{CC} – V_{EE} = 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 _{EE} | 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 _{BB} | Output Reference Voltage ⁵ | | | | | | | | | |
| | 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 _{CC} – V _{EE} | Supply Voltage Range | 3.0 | 5.5 | 3.0 | 5.5 | 3.0 | 5.5 | 3.0 | 5.5 | V |
| I _{IH} | 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 _{IL} | 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_{CC} – V_{EE} = 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 _{EE} | 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 _{BB} | Output Reference Voltage ⁵ | | | | | | | | | |
| | 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 _{CC} – V _{EE} | Supply Voltage Range | 3.0 | 5.5 | 3.0 | 5.5 | 3.0 | 5.5 | 3.0 | 5.5 | V |
| I _{IH} | 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 _{IL} | 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_{CC} – V_{EE} = 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 _{OH} | Output HIGH Voltage ⁵ | | | | | | | | | |
| | 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 _{OL} | Output LOW Voltage ⁵ | | | | | | | | | |
| | 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 _{OPP} | Output Voltage ⁸ | | | | | | | | | |
| | 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 _{PP} | Differential Input Swing ⁶ | 150 | 1000 | 150 | 1000 | 150 | 1000 | 150 | 1000 | mV |

SK100EL16TA-TD Output DC Electrical Characteristics (Note 2)
(V_{CC} – V_{EE} = 3.0V to 5.5V)

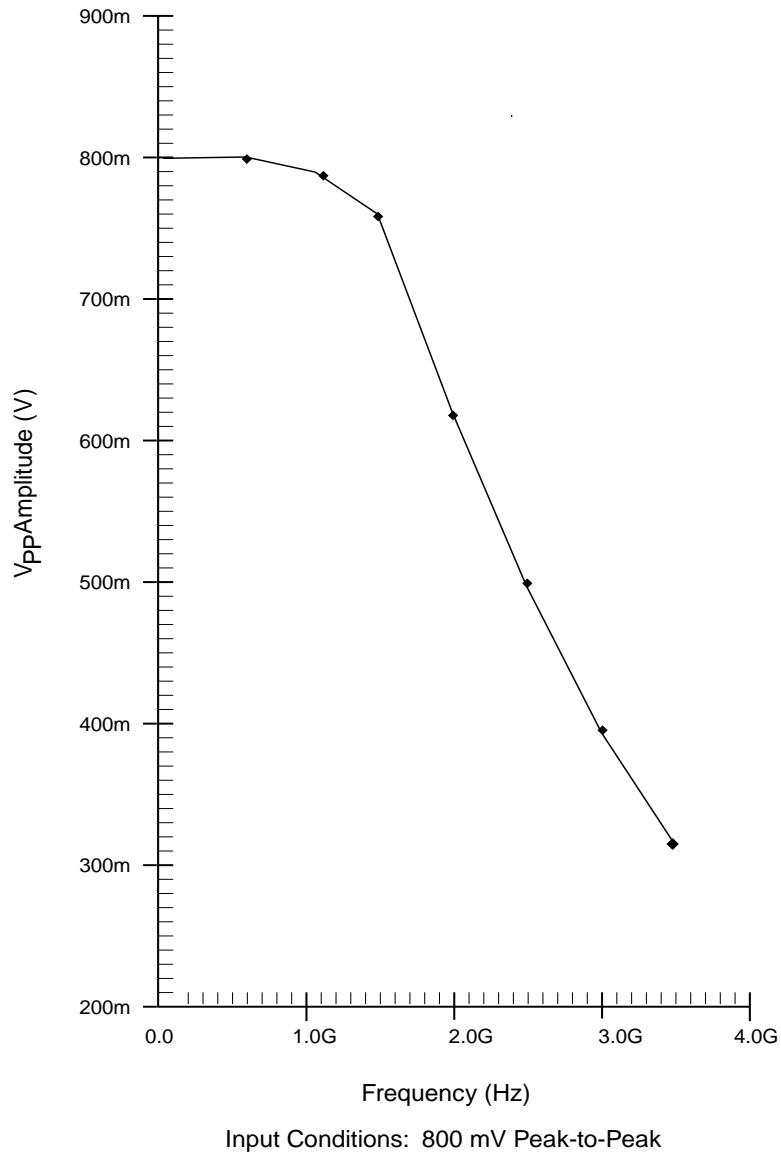
| Symbol | Characteristic | TA = -40°C | | TA = 0°C | | TA = +25°C | | TA = +85°C | | Unit |
|------------------|---------------------------------------|------------|-------|----------|-------|------------|-------|------------|-------|------|
| | | Min | Max | Min | Max | Min | Max | Min | Max | |
| V _{OH} | Output HIGH Voltage ⁵ | | | | | | | | | |
| | 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 _{OL} | Output LOW Voltage ⁵ | | | | | | | | | |
| | 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 _{OPP} | Output Voltage ⁸ | | | | | | | | | |
| | 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 _{PP} | Differential Input Swing ⁶ | 150 | 1000 | 150 | 1000 | 150 | 1000 | 150 | 1000 | mV |

AC Characteristics
SK10/100EL16TA-TD AC Electrical Characteristics
(V_{CC} – V_{EE} = 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 _{max} | Maximum Toggle Frequency ⁴ | 2.0 | | 2.0 | | 2.0 | | 2.0 | | GHz |
| t _{PHL} t _{PLH} | 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 ³ (DIFF) | | 20 | | 20 | | 20 | | 20 | ps |
| t _r , t _f | 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 _{CMR} | Common M0de Range ⁷ | V _{EE} + 1.7 | V _{CC} – 0.4 | V _{EE} + 1.7 | V _{CC} – 0.4 | V _{EE} + 1.7 | V _{CC} – 0.4 | V _{EE} + 1.7 | V _{CC} – 0.4 | V |

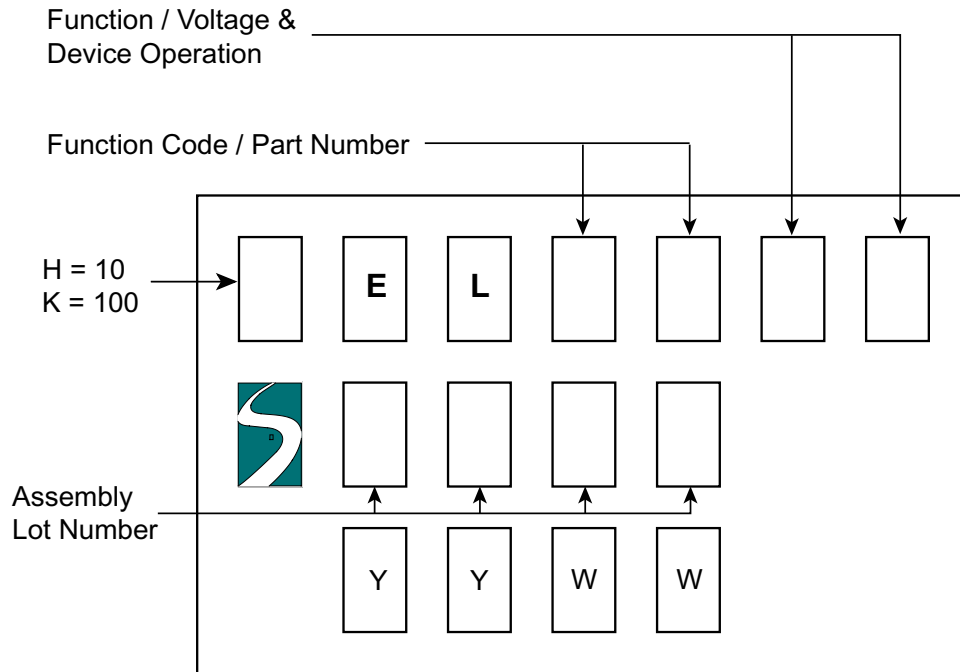
Notes:

- 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_{PLH} and T_{PHL} propagation delay through a device.
- F_{MAX} guaranteed for functionality only. See Figure 5 for typical output swing. V_{OL} and V_{OH} are guaranteed at DC only.
- Voltages referenced to V_{CC} = 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_{PP(min)} and 1V. The lower end of the CMR range varies 1:1 with V_{EE} and is equal to V_{EE} + 1.7V.
- V_{OP,p} is obtained as follows: Voltages of Q and Q* outputs with respect to V_{CC} are measured. The absolute difference between a high and a low state is equal to V_{O_{pp}}.
- 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_{pp} vs. Frequency

Ordering Information

| Ordering Code | Package ID | Temperature Range |
|----------------------|-------------------|--------------------------|
| 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


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

Contact Information

Division Headquarters
 10021 Willow Creek Road
 San Diego, CA 92131
 Phone: (858) 695-1808
 FAX: (858) 695-2633

Semtech Corporation
High-Performance Products Division

Marketing Group
 1111 Comstock Street
 Santa Clara, CA 95054
 Phone: (408) 566-8776
 FAX: (408) 727-8994