

MC10E445, MC100E445

5V ECL 4-Bit Serial/Parallel Converter

Description

The MC10/100E445 is an integrated 4-bit serial to parallel data converter. The device is designed to operate for NRZ data rates of up to 2.0 Gb/s. The chip generates a divide by 4 and a divide by 8 clock for both 4-bit conversion and a two chip 8-bit conversion function. The conversion sequence was chosen to convert the first serial bit to Q0, the second to Q1 etc.

Two selectable serial inputs provide a loopback capability for testing purposes when the device is used in conjunction with the E446 parallel to serial converter.

The start bit for conversion can be moved using the SYNC input. A single pulse applied asynchronously for at least two input clock cycles shifts the start bit for conversion from Qn to Qn-1. For each additional shift required an additional pulse must be applied to the SYNC input. Asserting the SYNC input will force the internal clock dividers to "swallow" a clock pulse, effectively shifting a bit from the Qn to the Qn-1 output (see Timing Diagram B).

The MODE input is used to select the conversion mode of the device. With the MODE input LOW, or open, the device will function as a 4-bit converter. When the mode input is driven HIGH the data on the output will change on every eighth clock cycle thus allowing for an 8-bit conversion scheme using two E445's. When cascaded in an 8-bit conversion scheme the devices will not operate at the 2.0 Gb/s data rate of a single device. Refer to the applications section of this data sheet for more information on cascading the E445.

Upon power-up the internal flip-flops will attain a random state. To synchronize multiple E445's in a system the master reset must be asserted.

The V_{BB} pin, an internally generated voltage supply, is available to this device only. For single-ended input conditions, the unused differential input is connected to V_{BB} as a switching reference voltage. V_{BB} may also rebias AC coupled inputs. When used, decouple V_{BB} and V_{CC} via a 0.01 μF capacitor and limit current sourcing or sinking to 0.5 mA. When not used, V_{BB} should be left open.

The 100 Series contains temperature compensation.

Features

- On-Chip Clock $\div 4$ and $\div 8$
- 2.0 Gb/s Data Rate Capability
- Differential Clock and Serial Inputs
- V_{BB} Output for Single-Ended Input Applications
- Asynchronous Data Synchronization
- Mode Select to Expand to 8-Bits
- PECL Mode Operating Range: V_{CC} = 4.2 V to 5.7 V with V_{EE} = 0 V
- NECL Mode Operating Range: V_{CC} = 0 V with V_{EE} = -4.2 V to -5.7 V
- Internal Input 50 kΩ Pulldown Resistors

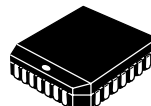
- ESD Protection: Human Body Model; > 2 kV, Machine Model; > 100 V
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity Level: Pb = 1; Pb-Free = 3 For Additional Information, see Application Note AND8003/D
- Flammability Rating: UL 94 V-0 @ 0.125 in, Oxygen Index: 28 to 34
- Transistor Count = 528 devices
- PECL Mode Operating Range: V_{CC} = 4.2 V to 5.7 V with V_{EE} = 0 V
- Pb-Free Packages are Available*

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



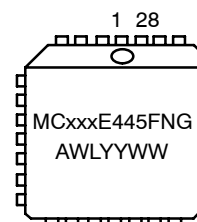
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PLCC-28
FN SUFFIX
CASE 776

MARKING DIAGRAM*



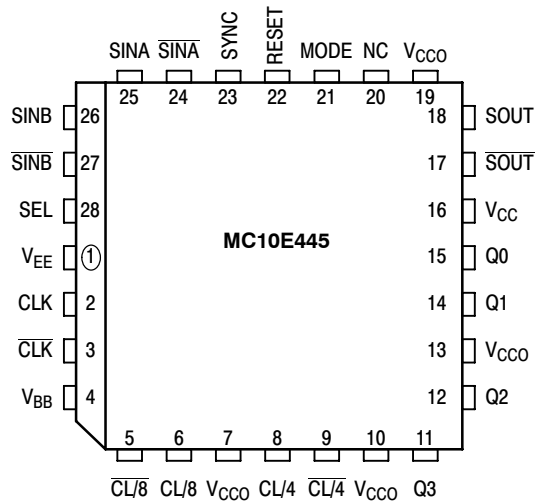
| | |
|-----|---------------------|
| xxx | = 10 or 100 |
| A | = Assembly Location |
| WL | = Wafer Lot |
| YY | = Year |
| WW | = Work Week |
| G | = Pb-Free Package |

*For additional marking information, refer to Application Note AND8002/D.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 11 of this data sheet.

MC10E445, MC100E445



* All V_{CC} and V_{CC0} pins are tied together on the die.

Warning: All V_{CC}, V_{CC0}, and V_{EE} pins must be externally connected to Power Supply to guarantee proper operation.

Figure 1. Pinout: PLCC-28 (Top View)

Table 1. PIN DESCRIPTION

| PIN | FUNCTION |
|------------------------------------|--------------------------------------|
| SINA, SINA | ECL Differential Serial Data Input A |
| SINB, SINB | ECL Differential Serial Data Input B |
| SEL | ECL Serial Input Selector Pin |
| Q0-Q3 | ECL Parallel Data Outputs |
| CLK, CLK | ECL Differential Clock Inputs |
| CL/4, CL/4 | ECL Differential +4 Clock Output |
| CL/8, CL/8 | ECL Differential +8 Clock Output |
| MODE | ECL Conversion Mode 4-Bit/8-Bit |
| SYNCH | ECL Conversion Synchronizing Input |
| V _{BB} | Reference Voltage Output |
| V _{CC} , V _{CC0} | Positive Supply |
| V _{EE} | Negative Supply |
| NC | No Connect |

MC10E445, MC100E445

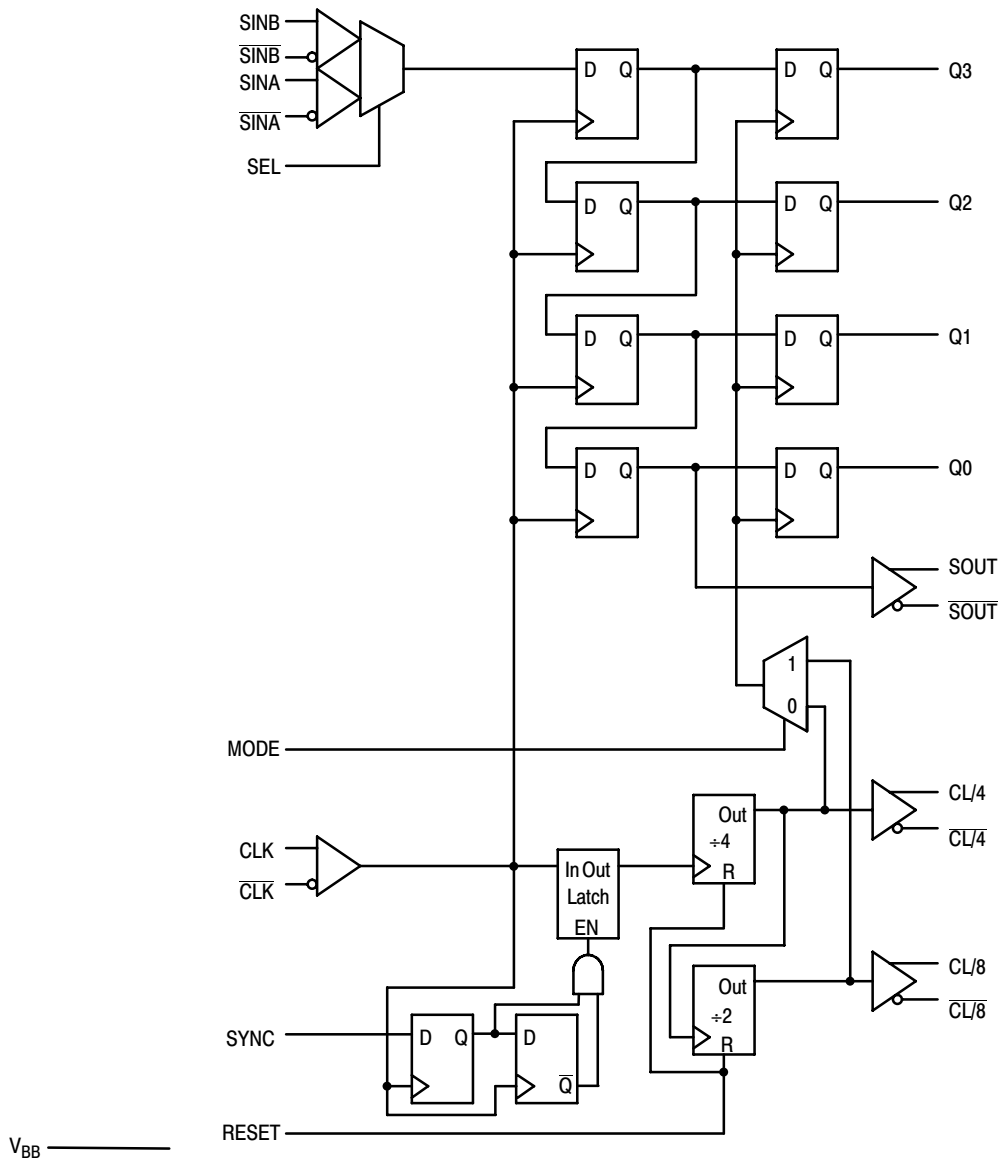


Figure 2. Logic Diagram

Table 2. FUNCTION TABLES

| Mode | Conversion | SEL | Serial Input |
|------|------------|-----|--------------|
| L | 4-Bit | H | A |
| H | 8-Bit | L | B |

MC10E445, MC100E445

Table 3. MAXIMUM RATINGS

| Symbol | Parameter | Condition 1 | Condition 2 | Rating | Unit |
|---------------|--|-----------------------|-------------------|-------------|-----------------------------|
| V_{CC} | PECL Mode Power Supply | $V_{EE} = 0\text{ V}$ | | 8 | V |
| V_I | PECL Mode Input Voltage | $V_{EE} = 0\text{ V}$ | $V_I \leq V_{CC}$ | 6 | V |
| | NECL Mode Input Voltage | $V_{CC} = 0\text{ V}$ | $V_I \geq V_{EE}$ | -6 | V |
| I_{out} | Output Current | Continuous Surge | | 50 | mA |
| | | | | 100 | mA |
| I_{BB} | V_{BB} Sink/Source | | | ± 0.5 | mA |
| T_A | Operating Temperature Range | | | 0 to +85 | $^{\circ}\text{C}$ |
| T_{stg} | Storage Temperature Range | | | -65 to +150 | $^{\circ}\text{C}$ |
| θ_{JA} | Thermal Resistance (Junction-to-Ambient) | 0 lfpm | PLCC-28 | 63.5 | $^{\circ}\text{C}/\text{W}$ |
| | | 500 lfpm | PLCC-28 | 43.5 | $^{\circ}\text{C}/\text{W}$ |
| θ_{JC} | Thermal Resistance (Junction-to-Case) | Standard Board | PLCC-28 | 22 to 26 | $^{\circ}\text{C}/\text{W}$ |
| T_{sol} | Wave Solder | Pb Pb-Free | | 265 | $^{\circ}\text{C}$ |
| | | | | 265 | |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

MC10E445, MC100E445

Table 4. 10E SERIES PECL DC CHARACTERISTICS $V_{CCx} = 5.0 \text{ V}$; $V_{EE} = 0.0 \text{ V}$ (Note 1)

| Symbol | Characteristic | 0°C | | | 25°C | | | 85°C | | | Unit |
|--------------|--|------|------|------|------|------|------|------|------|------|---------------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| I_{EE} | Power Supply Current | | 154 | 185 | | 154 | 185 | | 154 | 185 | mA |
| V_{OH} | Output HIGH Voltage (Note 2) | 3980 | 4070 | 4160 | 4020 | 4105 | 4190 | 4090 | 4185 | 4280 | mV |
| VOH_{sout} | Output HIGH Voltage $sout/\overline{sout}$ | 3975 | | 4170 | 3975 | | 4170 | 3975 | | 4170 | mV |
| V_{OL} | Output LOW Voltage (Note 2) | 3050 | 3210 | 3370 | 3050 | 3210 | 3370 | 3050 | 3227 | 3405 | mV |
| V_{IH} | Input HIGH Voltage (Single-Ended) | 3830 | 3995 | 4160 | 3870 | 4030 | 4190 | 3940 | 4110 | 4280 | mV |
| V_{IL} | Input LOW Voltage (Single-Ended) | 3050 | 3285 | 3520 | 3050 | 3285 | 3520 | 3050 | 3302 | 3555 | mV |
| V_{BB} | Output Voltage Reference | 3.62 | | 3.74 | 3.65 | | 3.75 | 3.69 | | 3.81 | V |
| V_{IHCMR} | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3) | 2.2 | | 4.6 | 2.2 | | 4.6 | 2.2 | | 4.6 | V |
| I_{IH} | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| I_{IL} | Input LOW Current | 0.5 | 0.3 | | 0.5 | 0.25 | | 0.3 | 0.2 | | μA |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

1. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary $-0.46 \text{ V} / +0.06 \text{ V}$.
2. Outputs are terminated through a 50Ω resistor to $V_{CC} - 2.0 \text{ V}$.
3. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .

Table 5. 10E SERIES NECL DC CHARACTERISTICS $V_{CCx} = 0.0 \text{ V}$; $V_{EE} = -5.0 \text{ V}$ (Note 4)

| Symbol | Characteristic | 0°C | | | 25°C | | | 85°C | | | Unit |
|--------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| I_{EE} | Power Supply Current | | 154 | 185 | | 154 | 185 | | 154 | 185 | mA |
| V_{OH} | Output HIGH Voltage (Note 5) | -1020 | -930 | -840 | -980 | -895 | -810 | -910 | -815 | -720 | mV |
| VOH_{sout} | Output HIGH Voltage $sout/\overline{sout}$ | -1025 | | -830 | -1025 | | -830 | -1025 | | -830 | mV |
| V_{OL} | Output LOW Voltage (Note 5) | -1950 | -1790 | -1630 | -1950 | -1790 | -1630 | -1950 | -1773 | -1595 | mV |
| V_{IH} | Input HIGH Voltage (Single-Ended) | -1170 | -1005 | -840 | -1130 | -970 | -810 | -1060 | -970 | -720 | mV |
| V_{IL} | Input LOW Voltage (Single-Ended) | -1950 | -1715 | -1480 | -1950 | -1715 | -1480 | -1950 | -1698 | -1445 | mV |
| V_{BB} | Output Voltage Reference | -1.38 | | -1.27 | -1.35 | | -1.25 | -1.31 | | -1.19 | V |
| V_{IHCMR} | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 6) | -2.8 | | -0.4 | -2.8 | | -0.4 | -2.8 | | -0.4 | V |
| I_{IH} | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| I_{IL} | Input LOW Current | 0.5 | 0.3 | | 0.5 | 0.065 | | 0.3 | 0.2 | | μA |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

4. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary $-0.46 \text{ V} / +0.06 \text{ V}$.
5. Outputs are terminated through a 50Ω resistor to $V_{CC} - 2.0 \text{ V}$.
6. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .

MC10E445, MC100E445

Table 6. 100E SERIES PECL DC CHARACTERISTICS $V_{CCx} = 5.0\text{ V}$; $V_{EE} = 0.0\text{ V}$ (Note 7)

| Symbol | Characteristic | 0°C | | | 25°C | | | 85°C | | | Unit |
|--------------|--|------|------|------|------|------|------|------|------|------|---------------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| I_{EE} | Power Supply Current | | 154 | 185 | | 154 | 185 | | 177 | 212 | mA |
| V_{OH} | Output HIGH Voltage (Note 8) | 3975 | 4050 | 4120 | 3975 | 4050 | 4120 | 3975 | 4050 | 4120 | mV |
| VOH_{sout} | Output HIGH Voltage $sout/\sqrt{out}$ | 3975 | | 4170 | 3975 | | 4170 | 3975 | | 4170 | mV |
| V_{OL} | Output LOW Voltage (Note 8) | 3190 | 3295 | 3380 | 3190 | 3255 | 3380 | 3190 | 3260 | 3380 | mV |
| V_{IH} | Input HIGH Voltage (Single-Ended) | 3835 | 3975 | 4120 | 3835 | 3975 | 4120 | 3835 | 3975 | 4120 | mV |
| V_{IL} | Input LOW Voltage (Single-Ended) | 3190 | 3355 | 3525 | 3190 | 3355 | 3525 | 3190 | 3355 | 3525 | mV |
| V_{BB} | Output Voltage Reference | 3.62 | | 3.74 | 3.62 | | 3.74 | 3.62 | | 3.74 | V |
| V_{IHCMR} | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 9) | 2.2 | | 4.6 | 2.2 | | 4.6 | 2.2 | | 4.6 | V |
| I_{IH} | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| I_{IL} | Input LOW Current | 0.5 | 0.3 | | 0.5 | 0.25 | | 0.5 | 0.2 | | μA |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

7. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary $-0.46\text{ V} / +0.8\text{ V}$.

8. Outputs are terminated through a $50\ \Omega$ resistor to $V_{CC} - 2.0\text{ V}$.

9. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .

Table 7. 100E SERIES NECL DC CHARACTERISTICS $V_{CCx} = 0.0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (Note 10)

| Symbol | Characteristic | 0°C | | | 25°C | | | 85°C | | | Unit |
|--------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| I_{EE} | Power Supply Current | | 154 | 185 | | 154 | 185 | | 177 | 212 | mA |
| V_{OH} | Output HIGH Voltage (Note 11) | -1025 | -950 | -880 | -1025 | -950 | -880 | -1025 | -950 | -880 | mV |
| VOH_{sout} | Output HIGH Voltage $sout/\sqrt{out}$ | -1025 | | -830 | -1025 | | -830 | -1025 | | -830 | mV |
| V_{OL} | Output LOW Voltage (Note 11) | -1810 | -1705 | -1620 | -1810 | -1745 | -1620 | -1810 | -1740 | -1620 | mV |
| V_{IH} | Input HIGH Voltage (Single-Ended) | -1165 | -1025 | -880 | -1165 | -1025 | -880 | -1165 | -1025 | -880 | mV |
| V_{IL} | Input LOW Voltage (Single-Ended) | -1810 | -1645 | -1475 | -1810 | -1645 | -1475 | -1810 | -1645 | -1475 | mV |
| V_{BB} | Output Voltage Reference | -1.38 | | -1.26 | -1.38 | | -1.26 | -1.38 | | -1.26 | V |
| V_{IHCMR} | Input HIGH Voltage Common Mode Range (Differential) Configuration (Note 12) | -2.8 | | -0.4 | -2.8 | | -0.4 | -2.8 | | -0.4 | V |
| I_{IH} | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| I_{IL} | Input LOW Current | 0.5 | 0.3 | | 0.5 | 0.25 | | 0.5 | 0.2 | | μA |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

10. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary $-0.46\text{ V} / +0.8\text{ V}$.

11. Outputs are terminated through a $50\ \Omega$ resistor to $V_{CC} - 2.0\text{ V}$.

12. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .

MC10E445, MC100E445

Table 8. AC CHARACTERISTICS $V_{CCx} = 5.0\text{ V}$; $V_{EE} = 0.0\text{ V}$ or $V_{CCx} = 0.0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (Note 13)

| Symbol | Characteristic | 0°C | | | 25°C | | | 85°C | | | Unit |
|------------------------|---|-----------------------------|-----------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|-------------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| f_{MAX} | Maximum Conversion Frequency | 2.0 | | | 2.0 | | | 2.0 | | | Gb/s NRZ |
| t_{PLH} t_{PHL} | Propagation Delay to Output CLK to Q, Reset to Q CLK to SOUT (Diff) CLK to CL/4(Diff) CLK to CL/8(Diff) | 1500 800 1100 1100 | 1800 975 1325 1325 | 2100 1150 1550 1550 | 1500 800 1100 1100 | 1800 975 1325 1325 | 2100 1150 1550 1550 | 1500 800 1100 1100 | 1800 975 1325 1325 | 2100 1150 1550 1550 | ps |
| t_s | Setup Time SINA, SINB SEL | -100 0 | -250 -200 | | -100 0 | -250 -200 | | -100 0 | -250 -200 | | ps |
| t_h | Hold Time SINA, SINB, SEL | 450 | 300 | | 450 | 300 | | 450 | 300 | | ps |
| t_{RR} | Reset Recovery Time | 500 | 300 | | 500 | 300 | | 500 | 300 | | ps |
| t_{PW} | Minimum Pulse Width CLK, MR | 400 | | | 400 | | | 400 | | | ps |
| t_{JITTER} | Random Clock Jitter (RMS) | | < 1 | | | < 1 | | | < 1 | | ps |
| V_{PP} | Input Voltage Swing (Differential Configuration) | 150 | | 1000 | 150 | | 1000 | 150 | | 1000 | mV |
| t_r t_f | Rise/Fall Times 20%–80% SOUT Other | 100 200 | 225 425 | 350 650 | 100 200 | 225 425 | 350 650 | 100 200 | 225 425 | 350 650 | ps |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

13.10 Series: V_{EE} can vary $-0.46\text{ V} / +0.06\text{ V}$.

100 Series: V_{EE} can vary $-0.46\text{ V} / +0.8\text{ V}$.

14. Devices are designed to meet the AC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfpm is maintained.

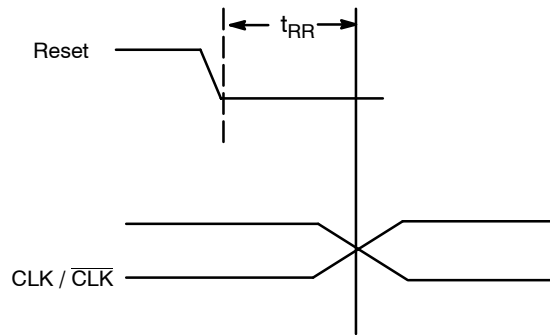
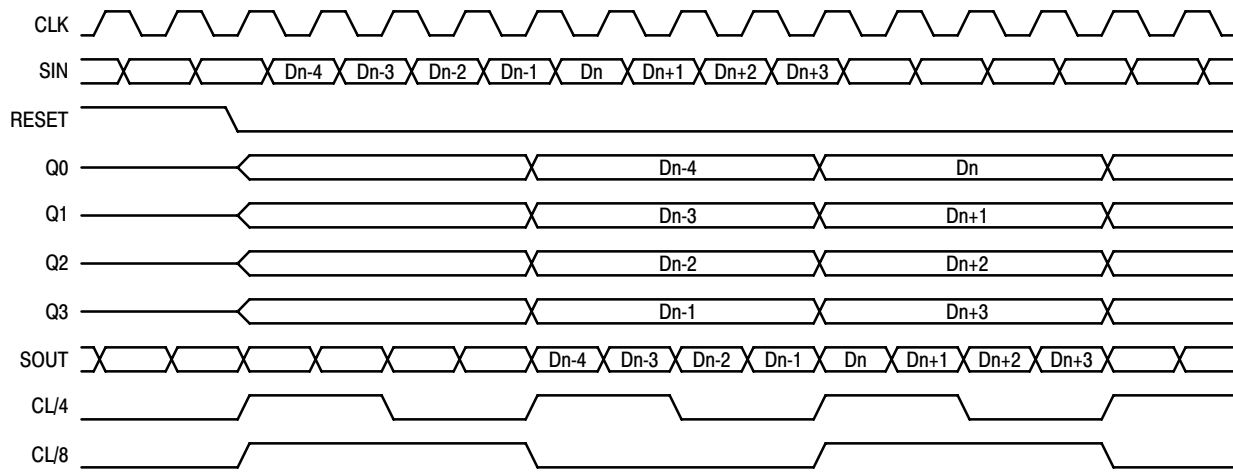
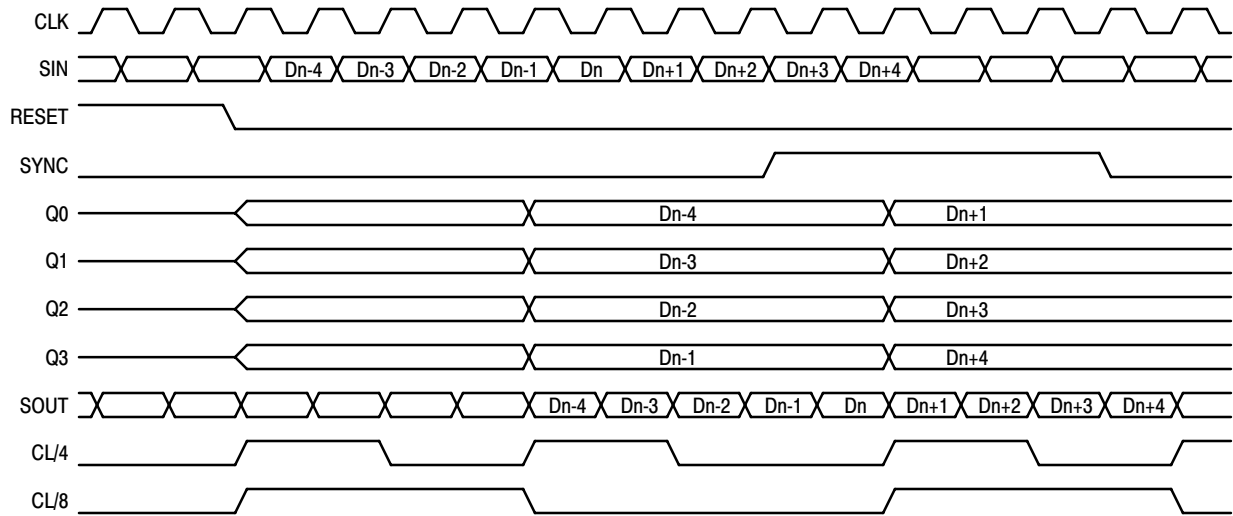


Figure 3.

MC10E445, MC100E445



Timing Diagram A. 1:4 Serial to Parallel Conversion



Timing Diagram B. 1:4 Serial to Parallel Conversion With SYNC Pulse

Figure 4. Timing Diagrams

APPLICATIONS INFORMATION

The MC10E/100E445 is an integrated 1:4 serial to parallel converter. The chip is designed to work with the E446 device to provide both transmission and receiving of a high speed serial data path. The E445, can convert up to a 2.0 Gb/s NRZ data stream into 4-bit parallel data. The device also provides a divide by four clock output to be used to synchronize the parallel data with the rest of the system.

The E445 features multiplexed dual serial inputs to provide test loop capability when used in conjunction with the E446. Figure 5 illustrates the loop test architecture. The architecture allows for the electrical testing of the link without requiring actual transmission over the serial data path medium. The SINA serial input of the E445 has an extra buffer delay and thus should be used as the loop back serial input.

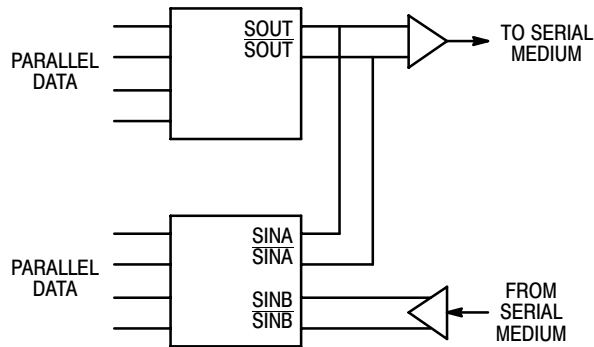


Figure 5. Loopback Test Architecture

The E445 features a differential serial output and a divide by 8 clock output to facilitate the cascading of two devices to build a 1:8 demultiplexer. Figure 6 illustrates the architecture for a 1:8 demultiplexer using two E445's; the timing diagram for this configuration can be found on the following page. Notice the serial outputs (SOUT) of the lower order converter feed the serial inputs of the the higher order device. This feed through of the serial inputs bounds the upper end of the frequency of operation. The clock to serial output propagation delay plus the setup time of the serial input pins must fit into a single clock period for the cascade architecture to function properly. Using the worst case values for these two parameters from the data sheet, TPD CLK to SOUT = 1150 ps and tS for SIN = -100 ps, yields a minimum period of 1050 ps or a clock frequency of 950 MHz.

The clock frequency is significantly lower than that of a single converter, to increase this frequency some games can be played with the clock input of the higher order E445. By delaying the clock feeding the second E445 relative to the clock of the first E445 the frequency of operation can be increased. The delay between the two clocks can be increased until the minimum delay of clock to serial out would potentially cause a serial bit to be swallowed (Figure 7).

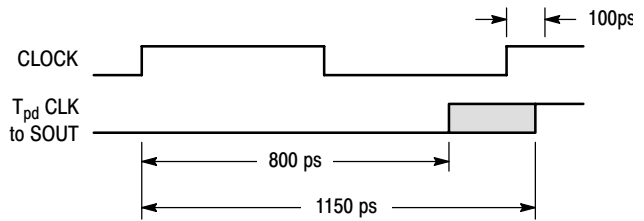
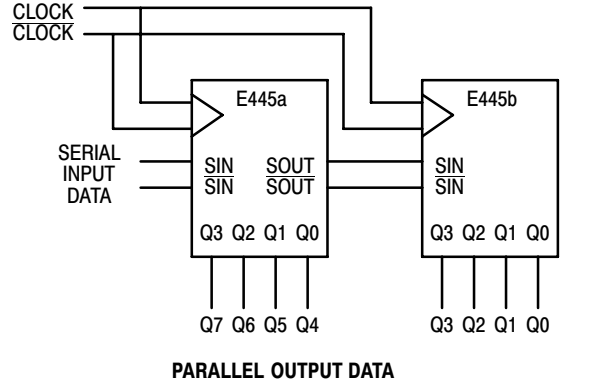


Figure 6. Cascaded 1:8 Converter Architecture

With a minimum delay of 800 ps on this output the clock for the lower order E445 cannot be delayed more than 800 ps relative to the clock of the first E445 without potentially missing a bit of information. Because the setup time on the serial input pin is negative coincident excursions on the data and clock inputs of the E445 will result in correct operation.

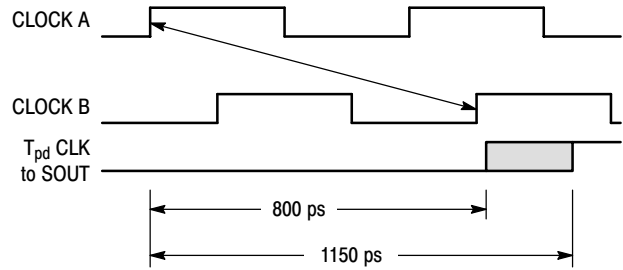


Figure 7. Cascade Frequency Limitation

Perhaps the easiest way to delay the second clock relative to the first is to take advantage of the differential clock inputs of the E445. By connecting the clock for the second E445 to the complementary clock input pin the device will clock a half a clock period after the first E445 (Figure 8). Utilizing this simple technique will raise the potential conversion frequency up to 1.4 GHz. The divide by eight clock of the second E445 should be used to synchronize the parallel data to the rest of the system as the parallel data of the two E445's will no longer be synchronized. This skew problem between the outputs can be worked around as the parallel information will be static for eight more clock pulses.

MC10E445, MC100E445

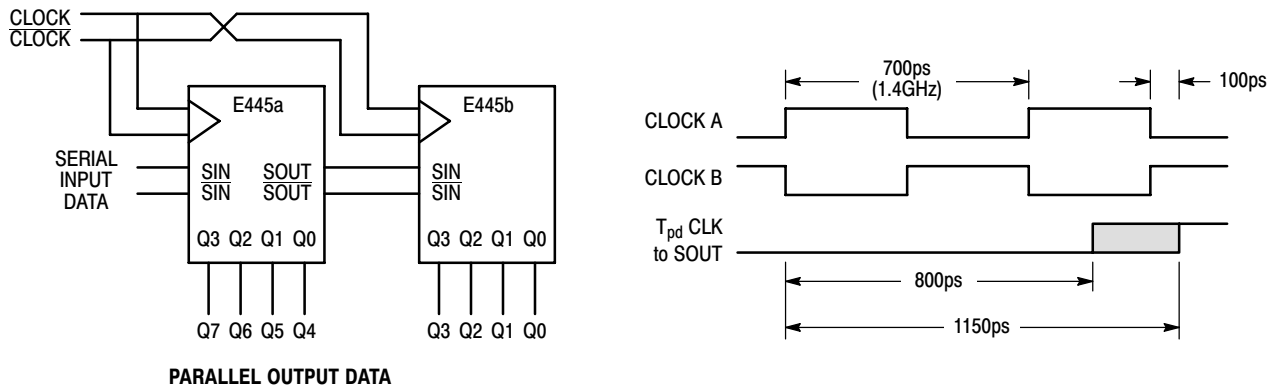


Figure 8. Extended Frequency 1:8 Demultiplexer

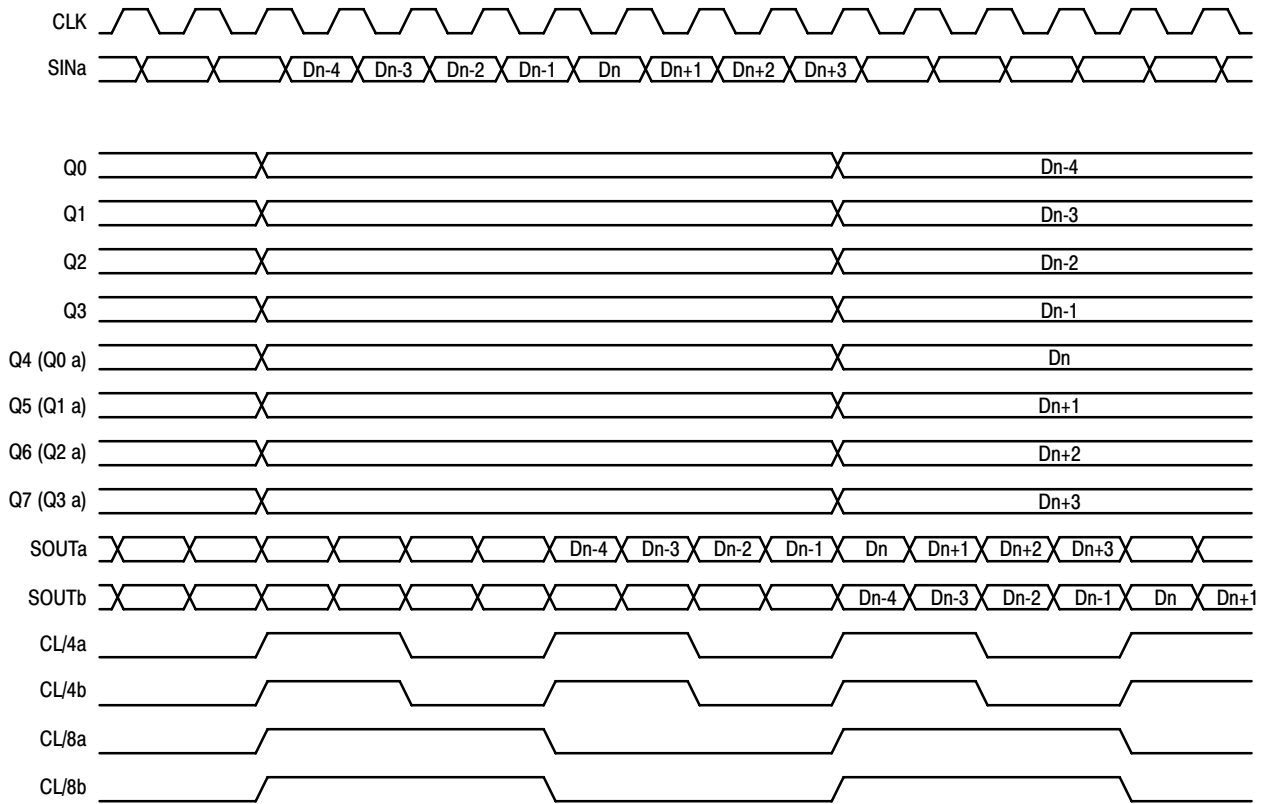
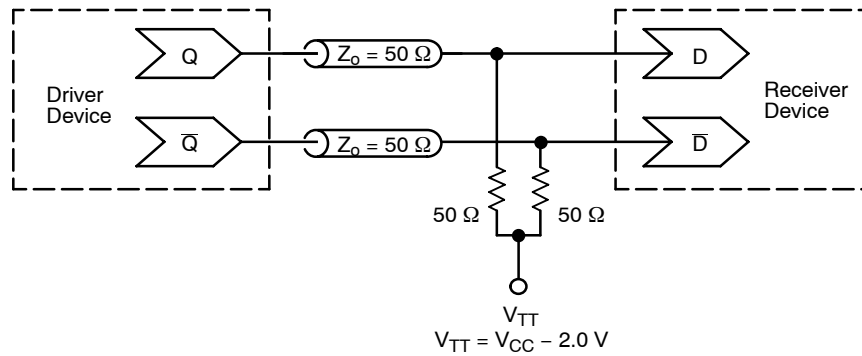


Figure 9. Timing Diagram A. 1:8 Serial to Parallel Conversion

MC10E445, MC100E445



**Figure 10. Typical Termination for Output Driver and Device Evaluation
(See Application Note AND8020/D – Termination of ECL Logic Devices.)**

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|----------------|----------------------|-----------------------|
| MC10E445FN | PLCC-28 | 37 Units / Rail |
| MC10E445FNG | PLCC-28 (Pb-Free) | 37 Units / Rail |
| MC10E445FNR2 | PLCC-28 | 500 / Tape & Reel |
| MC10E445FNR2G | PLCC-28 (Pb-Free) | 500 / Tape & Reel |
| MC100E445FN | PLCC-28 | 37 Units / Rail |
| MC100E445FNG | PLCC-28 (Pb-Free) | 37 Units / Rail |
| MC100E445FNR2 | PLCC-28 | 500 / Tape & Reel |
| MC100E445FNR2G | PLCC-28 (Pb-Free) | 500 / Tape & Reel |

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

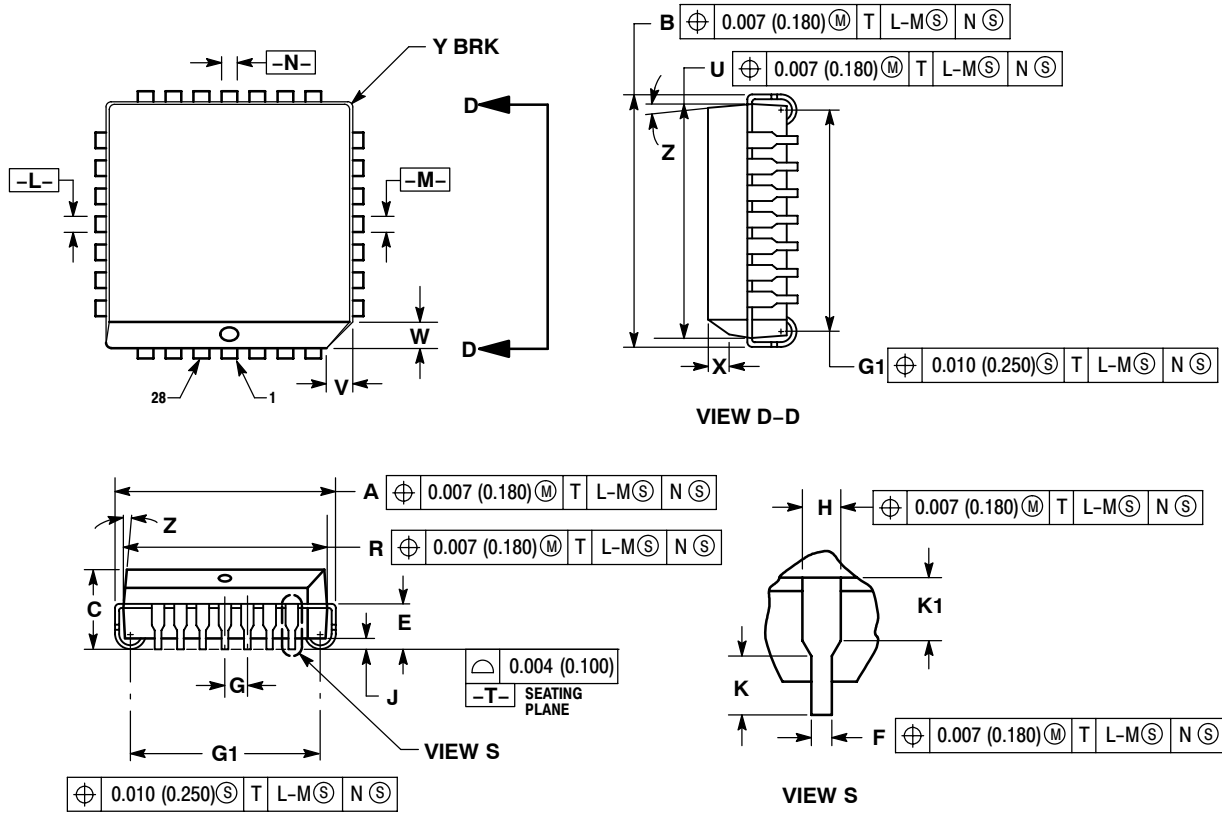
Resource Reference of Application Notes

- AN1405/D** – ECL Clock Distribution Techniques
- AN1406/D** – Designing with PECL (ECL at +5.0 V)
- AN1503/D** – ECLinPS™ I/O SPiCE Modeling Kit
- AN1504/D** – Metastability and the ECLinPS Family
- AN1568/D** – Interfacing Between LVDS and ECL
- AN1672/D** – The ECL Translator Guide
- AND8001/D** – Odd Number Counters Design
- AND8002/D** – Marking and Date Codes
- AND8020/D** – Termination of ECL Logic Devices
- AND8066/D** – Interfacing with ECLinPS
- AND8090/D** – AC Characteristics of ECL Devices

MC10E445, MC100E445

PACKAGE DIMENSIONS

PLCC-28
FN SUFFIX
PLASTIC PLCC PACKAGE
CASE 776-02
ISSUE E



NOTES:

- DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
- DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
- DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- THE PACKAGE BOTTOM MAY BE SMALLER THAN THE PACKAGE TOP BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
- DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.485 | 0.495 | 12.32 | 12.57 |
| B | 0.485 | 0.495 | 12.32 | 12.57 |
| C | 0.165 | 0.180 | 4.20 | 4.57 |
| E | 0.090 | 0.110 | 2.29 | 2.79 |
| F | 0.013 | 0.019 | 0.33 | 0.48 |
| G | 0.050 BSC | | 1.27 BSC | |
| H | 0.026 | 0.032 | 0.66 | 0.81 |
| J | 0.020 | --- | 0.51 | --- |
| K | 0.025 | --- | 0.64 | --- |
| R | 0.450 | 0.456 | 11.43 | 11.58 |
| U | 0.450 | 0.456 | 11.43 | 11.58 |
| V | 0.042 | 0.048 | 1.07 | 1.21 |
| W | 0.042 | 0.048 | 1.07 | 1.21 |
| X | 0.042 | 0.056 | 1.07 | 1.42 |
| Y | --- | 0.020 | --- | 0.50 |
| Z | 2° | | 10° | |
| G1 | 0.410 | 0.430 | 10.42 | 10.92 |
| K1 | 0.040 | --- | 1.02 | --- |

MC10E445, MC100E445

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