

MC100EPT21

3.3V Differential LVPECL to LVTTTL Translator

The MC100EPT21 is a Differential LVPECL to LVTTTL translator. Because LVPECL (Positive ECL) levels are used only +3.3 V and ground are required. The small outline 8-lead SOIC package makes the EPT21 ideal for applications which require the translation of a clock or data signal.

The V_{BB} output allows this EPT21 to be cap coupled in either single-ended or differential input mode. When single-ended cap coupled, V_{BB} output is tied to the \bar{D} input and D is driven for a non-inverting buffer, or V_{BB} output is tied to the D input and \bar{D} is driven for an inverting buffer. When cap coupled differentially, V_{BB} output is connected through a resistor to each input pin. If used, the V_{BB} pin should be bypassed to V_{CC} via a 0.01 μ F capacitor. For additional information see AND8020. For a single-ended direct connection use an external voltage reference source such as a resistor divider. Do not use V_{BB} for a single-ended direct connection or port to another device.

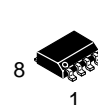
- 1.4 ns Typical Propagation Delay
- Maximum Frequency > 275 MHz Typical
- 24 mA TTL outputs
- Operating Range: $V_{CC} = 3.0$ V to 3.6 V with GND = 0 V
- Open Input Default State
- Q Output Will Default LOW with Inputs Open or at GND
- The 100 Series Contains Temperature Compensation
- V_{BB} Output
- New Differential Input Common Mode Range



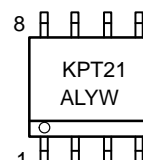
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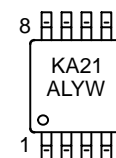
MARKING DIAGRAMS*



SO-8
D SUFFIX
CASE 751



TSSOP-8
DT SUFFIX
CASE 948R



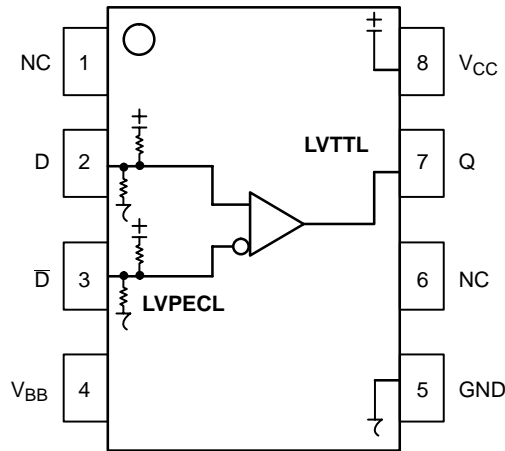
A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week

*For additional information, see Application Note AND8002/D

ORDERING INFORMATION

| Device | Package | Shipping |
|----------------|---------|------------------|
| MC100EPT21D | SO-8 | 98 Units/Rail |
| MC100EPT21DR2 | SO-8 | 2500 Tape & Reel |
| MC100EPT21DT | TSSOP-8 | 100 Units/Rail |
| MC100EPT21DTR2 | TSSOP-8 | 2500 Tape & Reel |

MC100EPT21



PIN DESCRIPTION

| PIN | FUNCTION |
|-------------------|--------------------------------|
| Q | LVTTTL Output |
| D**, \bar{D} ** | Differential LVPECL Input Pair |
| V _{CC} | Positive Supply |
| V _{BB} | Output Reference Voltage |
| GND | Ground |
| NC | No Connect |

** Pins will default to V_{CC}/2 when left open.

Figure 1. 8-Lead Pinout (Top View) and Logic Diagram

ATTRIBUTES

| Characteristics | Value |
|---|---|
| Internal Input Pulldown Resistor | 75 k Ω |
| Internal Input Pullup Resistor | 37.5 k Ω |
| ESD Protection | Human Body Model Machine Model Charged Device Model |
| | > 1.5 kV > 100 V > 2 kV |
| Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1) | Level 1 |
| Flammability Rating | Oxygen Index: 28 to 34 |
| | UL 94 V-0 @ 0.125 in |
| Transistor Count | 81 Devices |
| Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test | |

1. For additional information, see Application Note AND8003/D.

MAXIMUM RATINGS (Note 2)

| Symbol | Parameter | Condition 1 | Condition 2 | Rating | Units |
|------------------|--|----------------------|----------------------------------|-------------|--------------|
| V _{CC} | PECL Power Supply | GND = 0 V | | 3.8 | V |
| V _{IN} | PECL Input Voltage | GND = 0 V | V _I ≤ V _{CC} | 0 to 3.8 | V |
| I _{BB} | V _{BB} Sink/Source | | | ± 0.5 | mA |
| T _A | Operating Temperature Range | | | -40 to +85 | °C |
| T _{stg} | Storage Temperature Range | | | -65 to +150 | °C |
| θ _{JA} | Thermal Resistance (Junction-to-Ambient) | 0 LFPM 500 LFPM | 8 SOIC 8 SOIC | 190 130 | °C/W °C/W |
| θ _{JC} | Thermal Resistance (Junction-to-Case) | std bd | 8 SOIC | 41 to 44 | °C/W |
| θ _{JA} | Thermal Resistance (Junction-to-Ambient) | 0 LFPM 500 LFPM | 8 TSSOP 8 TSSOP | 185 140 | °C/W °C/W |
| θ _{JC} | Thermal Resistance (Junction-to-Case) | std bd | 8 TSSOP | 41 to 44 | °C/W |
| T _{sol} | Wave Solder | < 2 to 3 sec @ 248°C | | 265 | °C |

2. Maximum Ratings are those values beyond which device damage may occur.

MC100EPT21

PECL INPUT DC CHARACTERISTICS $V_{CC} = 3.3\text{ V}$, $GND = 0.0\text{ V}$ (Note 3)

| Symbol | Characteristic | -40 °C | | | 25 °C | | | 85 °C | | | Unit |
|-------------|---|--------|------|------|-------|------|------|-------|------|------|---------------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| V_{IH} | Input HIGH Voltage (Single-Ended) | 2075 | | 2420 | 2075 | | 2420 | 2075 | | 2420 | mV |
| V_{IL} | Input LOW Voltage (Single-Ended) | 1355 | | 1675 | 1355 | | 1675 | 1355 | | 1675 | mV |
| V_{BB} | Output Voltage Reference | 1775 | 1875 | 1975 | 1775 | 1875 | 1975 | 1775 | 1875 | 1975 | V |
| V_{IHCMR} | Input HIGH Voltage Common Mode Range (Differential) (Note 4) | 2.0 | | 3.3 | 2.0 | | 3.3 | 2.0 | | 3.3 | V |
| I_{IH} | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| I_{IL} | Input LOW Current $\begin{smallmatrix} D \\ \overline{D} \end{smallmatrix}$ | -150 | | 0.5 | -150 | | 0.5 | -150 | | 0.5 | μA |

NOTE: Devices are designed to meet the DC 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 lpm is maintained.

3. Input parameters vary 1:1 with V_{CC} .

4. V_{IHCMR} min varies 1:1 with GND , V_{IHCMR} max varies 1:1 with V_{CC} . The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

TTL OUTPUT DC CHARACTERISTICS $V_{CC} = 3.3\text{ V}$, $GND = 0.0\text{ V}$, $T_A = -40^\circ\text{C}$ to 85°C

| Symbol | Characteristic | Condition | Min | Typ | Max | Unit |
|-----------|------------------------------|---------------------------|------|-----|-----|------|
| V_{OH} | Output HIGH Voltage (Note 5) | $I_{OH} = -3.0\text{ mA}$ | 2.4 | | | V |
| V_{OL} | Output LOW Voltage (Note 5) | $I_{OL} = 24\text{ mA}$ | | | 0.5 | V |
| I_{CCH} | Power Supply Current | Outputs set to HIGH | 5 | 12 | 20 | mA |
| I_{CCL} | Power Supply Current | Outputs set to LOW | 8 | 18 | 26 | mA |
| I_{OS} | Output Short Circuit Current | | -130 | | -80 | mA |

5. All loading with $500\ \Omega$ to GND .

AC CHARACTERISTICS $V_{CC} = 3.0\text{ V}$ to 3.6 V , $GND = 0.0\text{ V}$ (Note 6)

| Symbol | Characteristic | -40 °C | | | 25 °C | | | 85 °C | | | Unit |
|---|---|--------------|--------------|-----------------|--------------|--------------|-----------------|--------------|--------------|-----------------|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| f_{max} | Maximum Frequency (See Figure 2. $F_{max}/JITTER$) | 275 | 350 | | 275 | 350 | | 275 | 350 | | MHz |
| t_{PLH} , t_{PHL} | Propagation Delay to Output Differential | 1200 1200 | 1450 1400 | 1800 1800 | 1200 1200 | 1450 1400 | 1800 1800 | 1300 1200 | 1450 1400 | 1900 1900 | ps |
| t_{SK++} , t_{SK-} , t_{SKPP} | Output-to-Output Skew++ Output-to-Output Skew- - Part-to-Part Skew (Note 7) | | | 60 25 500 | | | 60 25 500 | | | 60 25 500 | ps |
| t_{JITTER} | Cycle-to-Cycle Jitter (See Figure 2 $F_{max}/JITTER$) | | 0.2 | < 1 | | 0.2 | < 1 | | 0.2 | < 1 | ps |
| V_{PP} | Input Voltage Swing (Differential) | 150 | 800 | 1200 | 150 | 800 | 1200 | 150 | 800 | 1200 | mV |
| t_r , t_f | Output Rise/Fall Times (0.8V - 2.0V) Q, \overline{Q} | 330 | 500 | 900 | 330 | 500 | 900 | 330 | 500 | 900 | ps |

6. Measured with a 750 mV 50% duty-cycle clock source. $R_L = 500\ \Omega$ to GND and $C_L = 20\text{ pF}$ to GND . Refer to Figure 3.

7. Skews are measured between outputs under identical transitions.

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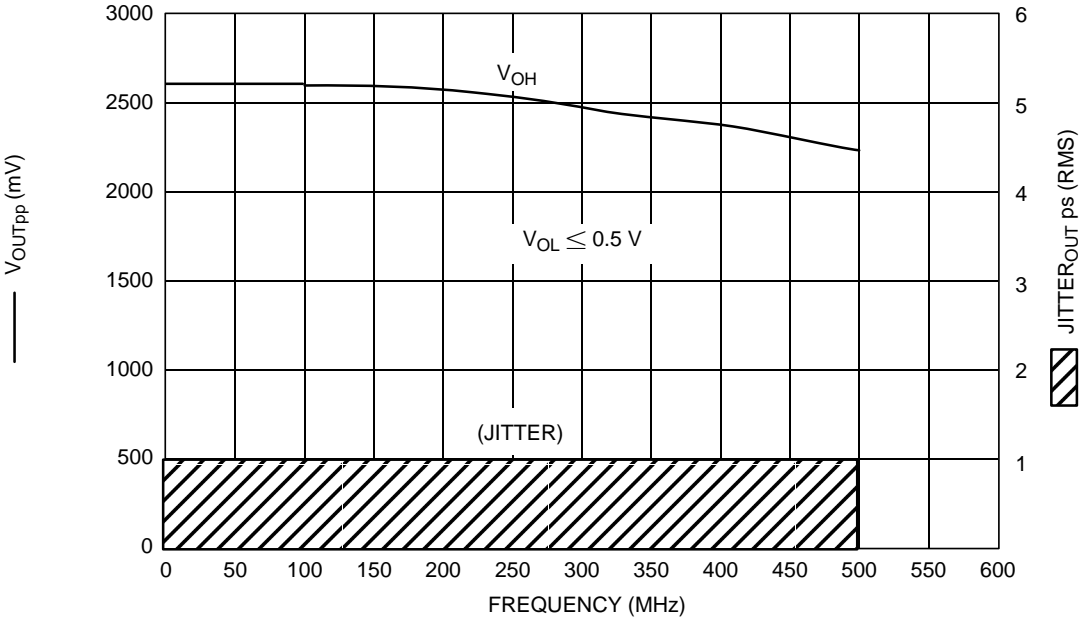


Figure 2. F_{max} /Jitter

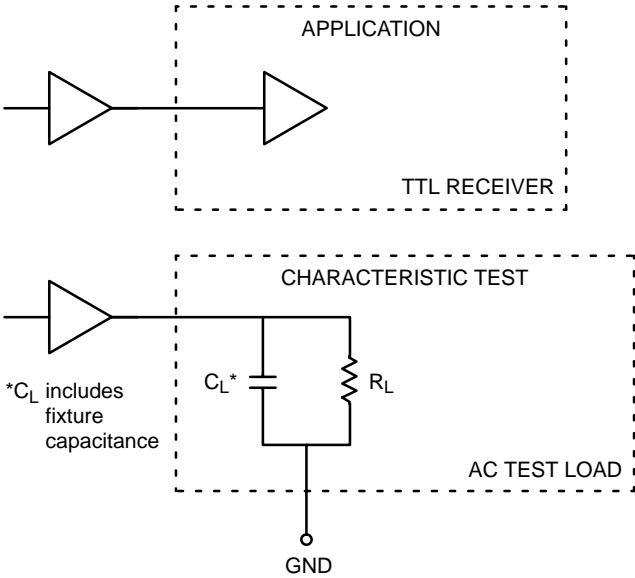


Figure 3. TTL Output Loading Used For Device Evaluation

Resource Reference of Application Notes

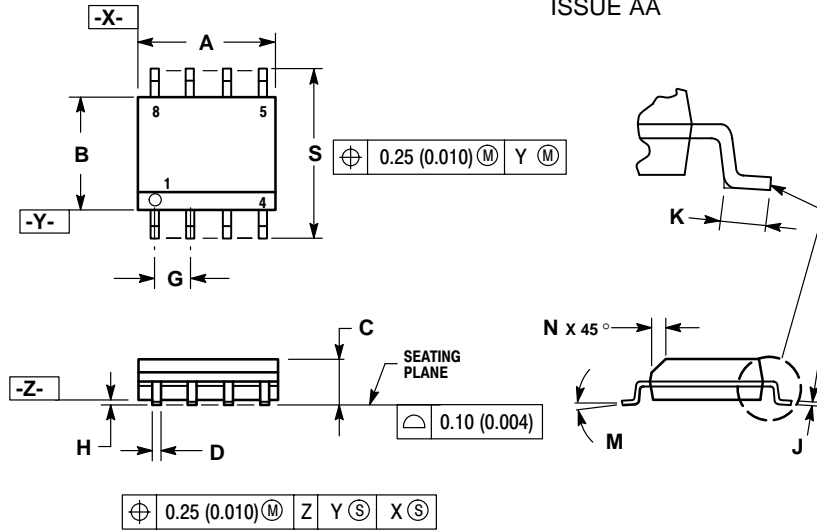
- AN1404** - ECLinPS Circuit Performance at Non-Standard V_{IH} Levels
- AN1405** - ECL Clock Distribution Techniques
- AN1406** - Designing with PECL (ECL at +5.0 V)
- AN1504** - Metastability and the ECLinPS Family
- AN1568** - Interfacing Between LVDS and ECL
- AN1650** - Using Wire-OR Ties in ECLinPS Designs
- AN1672** - The ECL Translator Guide
- AND8001** - Odd Number Counters Design
- AND8002** - Marking and Date Codes
- AND8009** - ECLinPS Plus Spice I/O Model Kit
- AND8020** - Termination of ECL Logic Devices

For an updated list of Application Notes, please see our website at <http://onsemi.com>.

MC100EPT21

PACKAGE DIMENSIONS

SO-8 D SUFFIX PLASTIC SOIC PACKAGE CASE 751-07 ISSUE AA



NOTES:

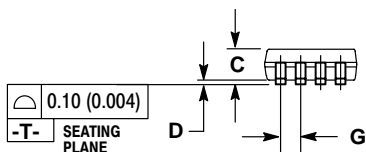
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 4.80 | 5.00 | 0.189 | 0.197 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.053 | 0.069 |
| D | 0.33 | 0.51 | 0.013 | 0.020 |
| G | 1.27 BSC | | 0.050 BSC | |
| H | 0.10 | 0.25 | 0.004 | 0.010 |
| J | 0.19 | 0.25 | 0.007 | 0.010 |
| K | 0.40 | 1.27 | 0.016 | 0.050 |
| M | 0° | 8° | 0° | 8° |
| N | 0.25 | 0.50 | 0.010 | 0.020 |
| S | 5.80 | 6.20 | 0.228 | 0.244 |

PACKAGE DIMENSIONS

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
6. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DETAIL E



DETAIL E

| | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| DIM | MIN | MAX | MIN | MAX |
| A | 2.90 | 3.10 | 0.114 | 0.122 |
| B | 2.90 | 3.10 | 0.114 | 0.122 |
| C | 0.80 | 1.10 | 0.031 | 0.043 |
| D | 0.05 | 0.15 | 0.002 | 0.006 |
| F | 0.40 | 0.70 | 0.016 | 0.028 |
| G | 0.65 BSC | | 0.026 BSC | |
| K | 0.25 | 0.40 | 0.010 | 0.016 |
| L | 4.90 BSC | | 0.193 BSC | |
| M | 0° | 6° | 0° | 6° |

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