MC100EPT21

3.3V Differential LVPECL to LVTTL Translator

The MC100EPT21 is a Differential LVPECL to LVTTL 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 $\overline{D}$ input and D is driven for a non-inverting buffer, or V_{BB} output is tied to the D input and $\overline{D}$ 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 μF 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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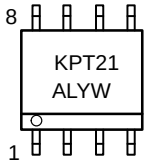
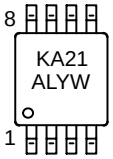
MARKING DIAGRAMS*

SO-8
D SUFFIX
CASE 751



TSSOP-8
DT SUFFIX
CASE 948R

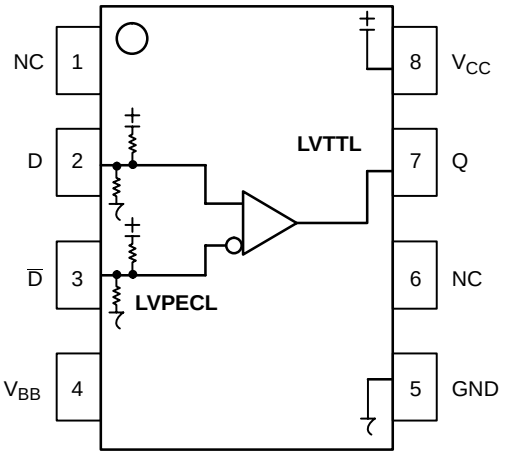


A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week

*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



PIN DESCRIPTION

PIN	FUNCTION
Q	LVTTL Output
D**, $\overline{D}$**	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 kΩ
Internal Input Pullup Resistor		37.5 kΩ
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	$V_I \leq V_{CC}$	0 to 3.8	V
I_{BB}	V_{BB} Sink/Source			± 0.5	mA
TA	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.

PECL INPUT DC CHARACTERISTICS V_{CC} = 3.3 V, GND = 0.0 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 D $\overline{D}$	 -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 lfpm 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 V, GND = 0.0 V, T_A = -40°C to 85°C

Symbol	Characteristic	Condition	Min	Typ	Max	Unit
V_{OH}	Output HIGH Voltage (Note 5)	I_{OH} = -3.0 mA	2.4			V
V_{OL}	Output LOW Voltage (Note 5)	I_{OL} = 24 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 Ω to GND.

AC CHARACTERISTICS V_{CC} = 3.0 V to 3.6 V, GND = 0.0 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 Ω to GND and C_L = 20 pF to GND. Refer to FIgure 3.
7. Skews are measured between outputs under identical transitions.

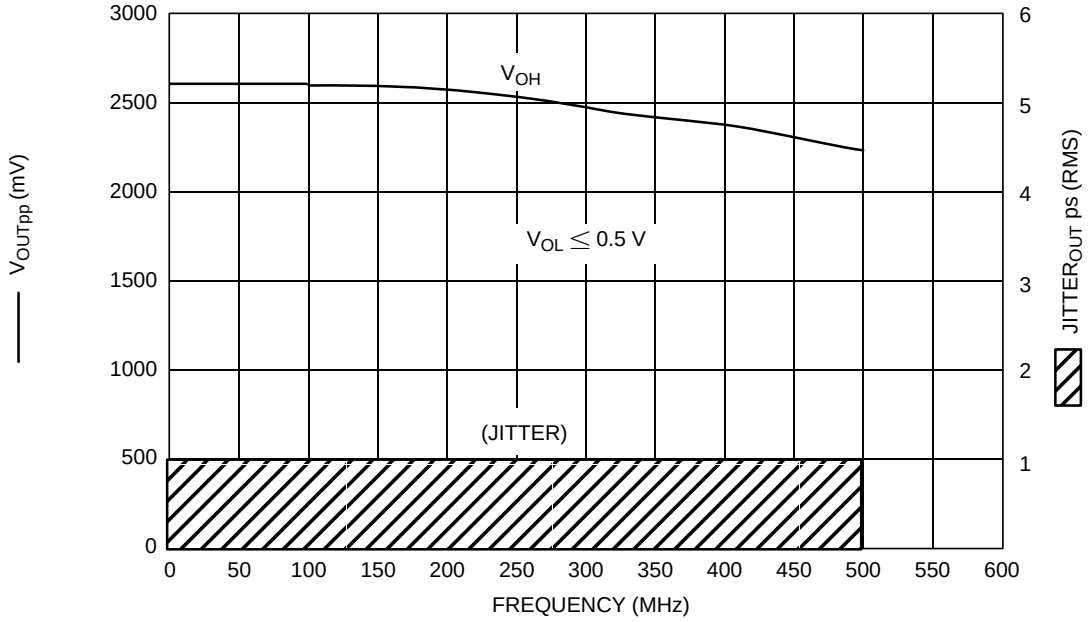


Figure 2. F_{max}/Jitter

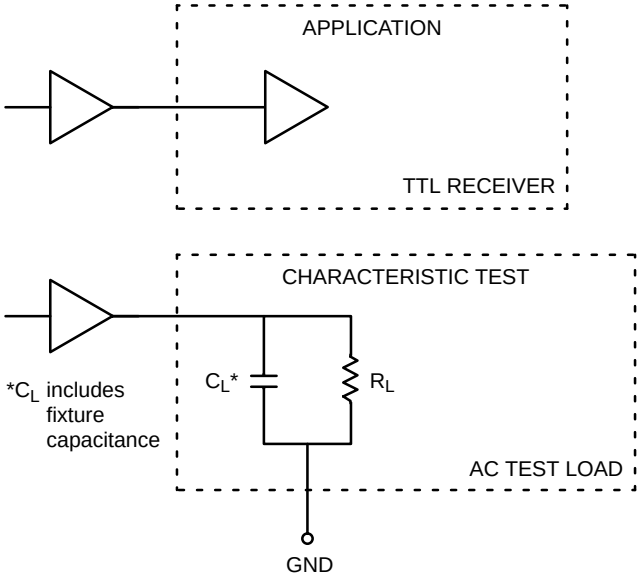


Figure 3. TTL Output Loading Used For Device Evaluation

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

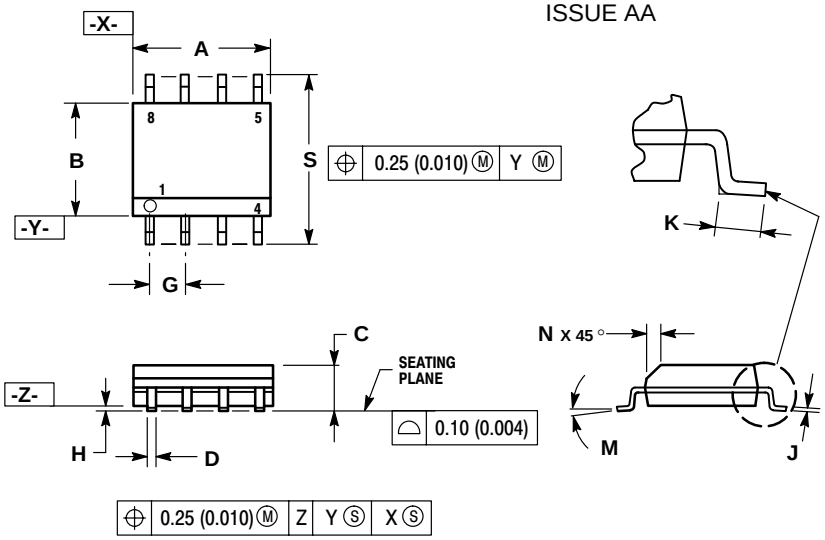
AND8009 - ECLinPS Plus Spice I/O Model Kit

AND8020 - Termination of ECL Logic Devices

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

PACKAGE DIMENSIONS

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

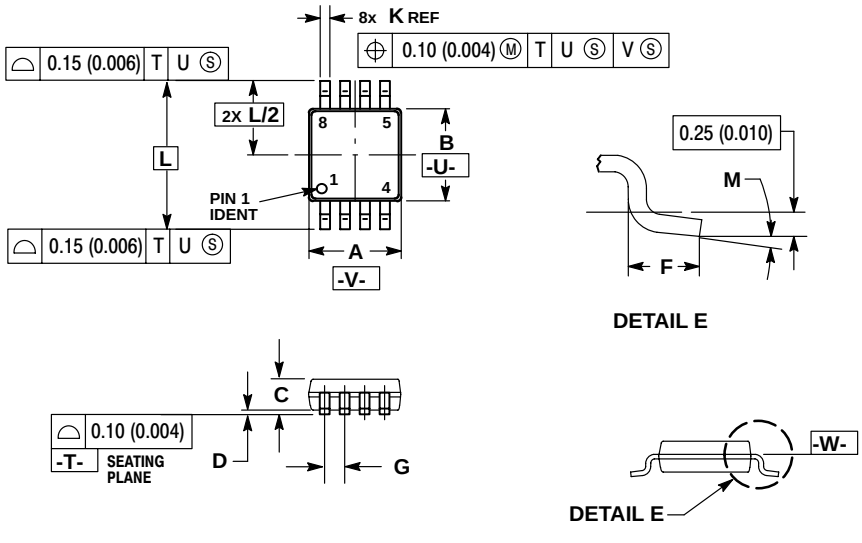


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005)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

	MILLIMETERS		INCHES	
DIM	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

TSSOP-8
DT SUFFIX
PLASTIC TSSOP PACKAGE
CASE 948R-02
ISSUE A



NOTES:
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–.

	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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