

# MC100EPT23

## 3.3V Dual Differential LVPECL to LVTTTL Translator

The MC100EPT23 is a dual 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 package and the dual gate design of the EPT23 makes it ideal for applications which require the translation of a clock and a data signal.

The EPT23 is available in only the ECL 100K standard. Since there are no LVPECL outputs or an external  $V_{BB}$  reference, the EPT23 does not require both ECL standard versions. The LVPECL inputs are differential. Therefore, the MC100EPT23 can accept any standard differential LVPECL input referenced from a  $V_{CC}$  of +3.3 V.

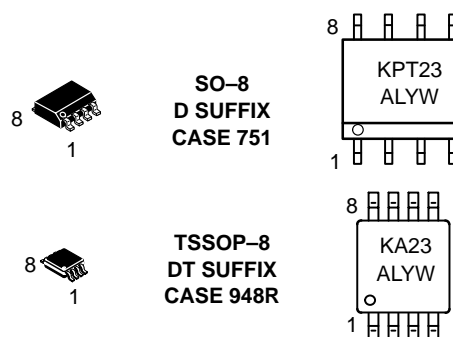
- 1.5 ns Typical Propagation Delay
- Maximum Operating Frequency > 275 MHz
- 24 mA LVTTTL Outputs
- Operating Range:  $V_{CC} = 3.0\text{ V}$  to  $3.6\text{ V}$  with  $GND = 0\text{ V}$
- Open Input Default State
- Q Output Will Default LOW with Inputs Open or at GND



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### MARKING DIAGRAMS\*



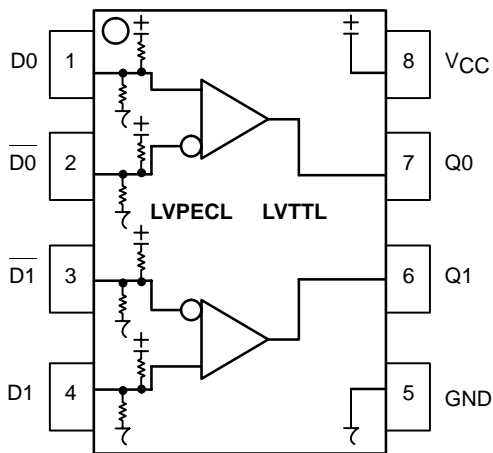
A = Assembly Location  
L = Wafer Lot  
Y = Year  
W = Work Week

\*For additional information, see Application Note AND8002/D

### ORDERING INFORMATION

Device	Package	Shipping
MC100EPT23D	SO-8	98 Units/Rail
MC100EPT23DR2	SO-8	2500 Tape & Reel
MC100EPT23DT	TSSOP-8	100 Units/Rail
MC100EPT23DTR2	TSSOP-8	2500 Tape & Reel

# MC100EPT23



## PIN DESCRIPTION

PIN	FUNCTION
Q0, Q1	LVTTTL Outputs
D0**, D1** D0**-, D1**-	Differential LVPECL Inputs
VCC	Positive Supply
GND	Ground

\*\* 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 $\Omega$
Internal Input Pullup Resistor	37.5 k $\Omega$
ESD Protection	Human Body Model Machine Model Charged Device Model
	> 1.2 kV > 150 V > 2 kV
Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1)	Level 1
Flammability Rating Oxygen Index	UL-94 code V-0 A 1/8" 28 to 34
Transistor Count	91 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
VCC	Power Supply	GND = 0 V		3.8	V
V <sub>I</sub>	Input Voltage	GND = 0 V	$V_I \leq V_{CC}$	3.8	V
I <sub>out</sub>	Output Current	Continuous Surge		50 100	mA mA
T <sub>A</sub>	Operating Temperature Range			-40 to +85	°C
T <sub>stg</sub>	Storage Temperature Range			-65 to +150	°C
$\theta_{JA}$	Thermal Resistance (Junction to Ambient)	0 LFPM 500 LFPM	8 SOIC 8 SOIC	190 130	°C/W °C/W
$\theta_{JC}$	Thermal Resistance (Junction to Case)	std bd	8 SOIC	41 to 44	°C/W
$\theta_{JA}$	Thermal Resistance (Junction to Ambient)	0 LFPM 500 LFPM	8 TSSOP 8 TSSOP	185 140	°C/W °C/W
$\theta_{JC}$	Thermal Resistance (Junction to Case)	std bd	8 TSSOP	41 to 44	°C/W
T <sub>sol</sub>	Wave Solder	<2 to 3 sec @ 248°C		265	°C

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

# MC100EPT23

## PECL DC CHARACTERISTICS $V_{CC} = 3.3\text{ V}$ , $GND = 0\text{ V}$ (Note 3)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{CCH}$	Power Supply Current (Outputs set to HIGH)	10	18	25	10	18	25	10	18	25	mA
$I_{CCL}$	Power Supply Current (Outputs set to LOW)	15	26	33	15	26	33	15	26	33	mA
$V_{IH}$	Input HIGH Voltage	2075		2420	2075		2420	2075		2420	mV
$V_{IL}$	Input LOW Voltage	1355		1675	1355		1675	1355		1675	mV
$V_{IHCMR}$	Input HIGH Voltage Common Mode Range (Note 4)	2.0		3.3	2.0		3.3	2.0		3.3	V
$I_{IH}$	Input HIGH Current			150			150			150	$\mu\text{A}$
$I_{IL}$	Input LOW Current	$\frac{D}{D}$ -150		0.5	-150		0.5	-150		0.5	$\mu\text{A}$

NOTE: Circuits 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 airflow greater than 500 lfm is maintained.

3. All values vary 1:1 with  $V_{CC}$ .

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

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

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
$I_{OS}$	Output Short Circuit Current		-180		-50	mA

NOTE: Circuits 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 airflow greater than 500 lfm is maintained.

5. All loading with 500 ohms to GND.

## AC CHARACTERISTICS $V_{CC} = 3.0\text{ V}$ to $3.6\text{ V}$ , $GND = 0.0\text{ V}$ (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 (Note 7) $C_L = 20\text{ pF}$	1.2	1.5	1.8	1.2	1.5	1.8	1.3	1.7	2.2	ns
$t_{SK+}$ + $t_{SK-}$ - $t_{SKPP}$	Output-to-Output Skew++ Output-to-Output Skew-- Part-to-Part Skew (Note 8)			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 $C_L = 20\text{ pF}$ (0.8V - 2.0V) Q, Q	330	600	900	330	600	900	330	650	900	ps

6. Measured using a 750 mV source, 50% duty cycle clock source. All loading with 500 ohms to GND,  $C_L = 20\text{ pF}$ .

7. Reference ( $V_{CC} = 3.3\text{ V} \pm 5\%$ ;  $GND = 0\text{ V}$ )

8. Skews are measured between outputs under identical conditions.

# MC100EPT23

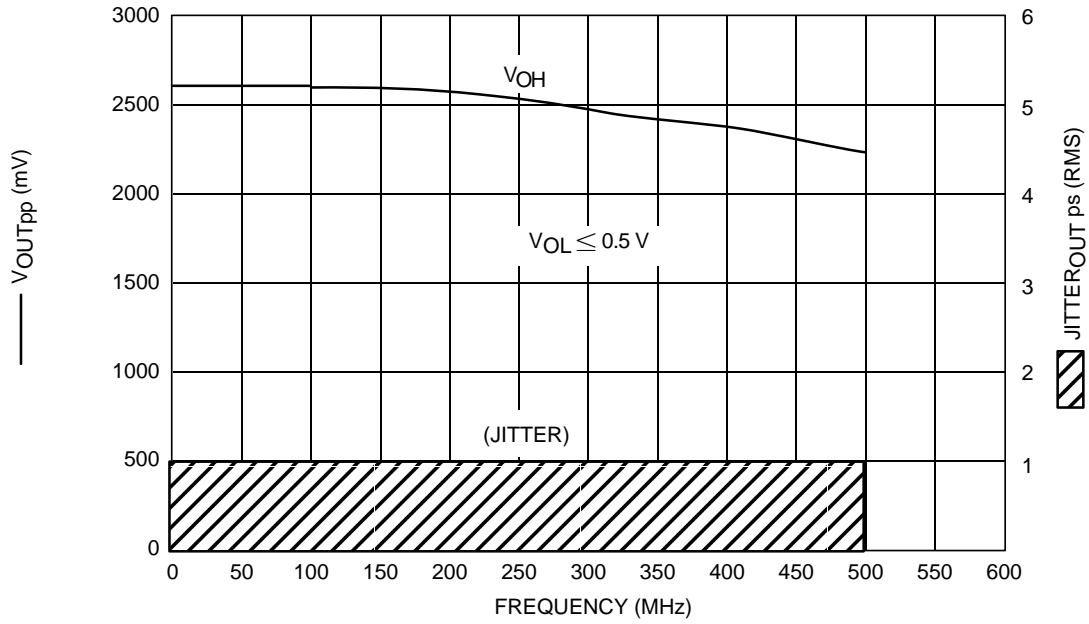


Figure 2.  $F_{max}/Jitter$

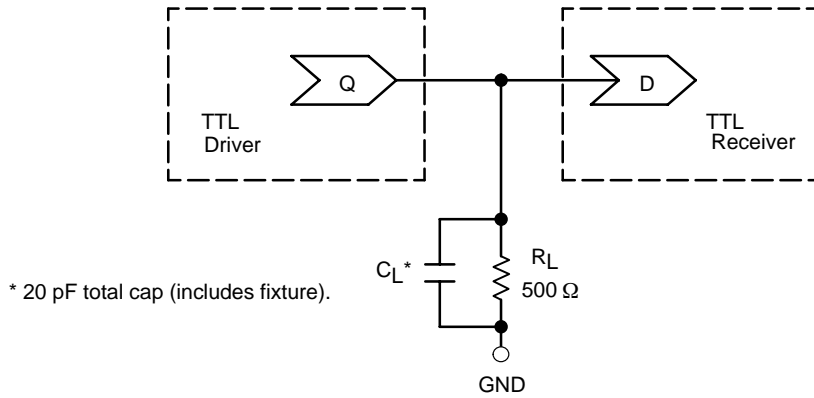


Figure 3. TTL Output Loading Used for Device Evaluation

## Resource Reference of Application Notes

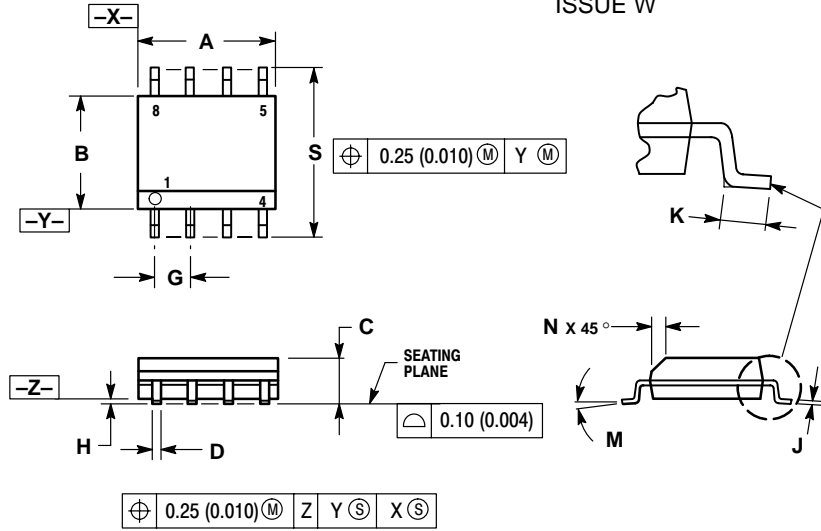
- AN1404** – ECLinPS Circuit Performance at Non-Standard  $V_{IH}$  Levels
- AN1405** – ECL Clock Distribution Techniques
- AN1406** – Designing with PECL (ECL at +5.0 V)
- AN1503** – ECLinPS I/O SPICE Modeling Kit
- AN1504** – Metastability and the ECLinPS Family
- AN1560** – Low Voltage ECLinPS SPICE Modeling Kit
- AN1568** – Interfacing Between LVDS and ECL
- AN1596** – ECLinPS Lite Translator ELT Family SPICE I/O Model Kit
- AN1650** – Using Wire-OR Ties in ECLinPS Designs
- AN1672** – The ECL Translator Guide
- AND8001** – Odd Number Counters Design
- AND8002** – Marking and Date Codes
- AND8020** – Termination of ECL Logic Devices

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

# MC100EPT23

## PACKAGE DIMENSIONS

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



#### NOTES:

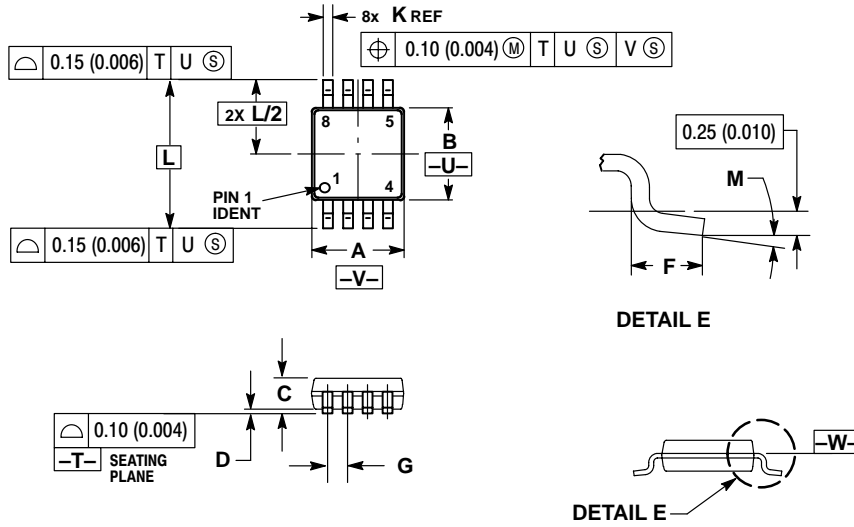
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL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

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

# MC100EPT23

## 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-.

DIM	MILLIMETERS		INCHES	
	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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