3.3V LVTTL/LVCMOS to **Differential LVPECL Translator**

The MC10EPT20 is a 3.3 V TTL/CMOS to differential PECL translator. Because PECL (Positive ECL) levels are used, only +3.3 V and ground are required. The small outline SOIC-8 package and the single gate of the EPT20 makes it ideal for those applications where space, performance, and low power are at a premium.

The 100 Series contains temperature compensation.

- 390 ps Typical Propagation Delay
- Maximum Input Clock Frequency > 1 GHz Typical
- Operating Range $V_{CC} = 3.0 \text{ V}$ to 3.6 V with GND = 0 V
- PNP TTL Input for Minimal Loading
- Q Output will Default HIGH with Input Open
- Pb-Free Packages are Available



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MARKING DIAGRAMS*



SO-8 **D SUFFIX CASE 751**







TSSOP-8 **DT SUFFIX CASE 948R**





L = Wafer Lot H = MC10K = MC100Y = YearW = Work Week A = Assembly Location

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

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

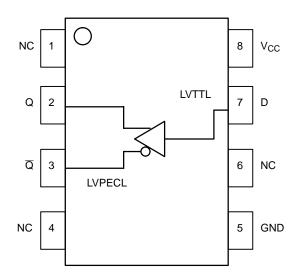


Table 1. PIN DESCRIPTION

PIN	FUNCTION
Q, \overline{Q}	Differential PECL Outputs
D	LVTTL Input
V _{CC}	Positive Supply
GND	Ground
NC	No Connect

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

Table 2. ATTRIBUTES

Characteri	Value						
Internal Input Pulldown Resistor	N/A						
Internal Input Pullup Resistor	N/A						
ESD Protection	Human Body Model Machine Model Charged Device Model	> 1.5 kV > 200 V > 2 kV					
Moisture Sensitivity, Indefinite Tim	e Out of Drypack (Note 1)	Level 1					
Flammability Rating	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in					
Transistor Count		150 Devices					
Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test							

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

Table 3. MAXIMUM RATINGS

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
V _{CC}	Power Supply	GND = 0 V		6	V
VI	Input Voltage	GND = 0 V	$V_{I} \leq V_{CC}$	6	V
l _{out}	Output Current	Continuous Surge		50 100	mA 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	SOIC-8 SOIC-8	190 130	°C/W
$\theta_{\sf JC}$	Thermal Resistance (Junction-to-Case)	Standard Board	SOIC-8	41 to 44	°C/W
θJA	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	TSSOP-8 TSSOP-8	185 140	°C/W
θ JC	Thermal Resistance (Junction-to-Case)	Standard Board	TSSOP-8	41 to 44	°C/W
T _{sol}	Wave Solder	<2 to 3 sec @ 248°C		265	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

Table 4. LVTTL INPUT DC CHARACTERISTICS $V_{CC} = 3.3 \text{ V}$, GND = 0 V, $T_A = -40 ^{\circ}\text{C}$ to +85 $^{\circ}\text{C}$

Symbol	Characteristic	Min	Тур	Max	Unit
I _{IH}	Input HIGH Current (V _{in} = 2.7 V)			20	μΑ
I _{IHH}	Input HIGH Current MAX (V _{in} = 6.0 V)			100	μΑ
I _{IL}	Input LOW Current (V _{in} = 0.5 V)			-0.6	mA
V _{IK}	Input Clamp Voltage (I _{in} = -18 mA)			-1.2	V
V _{IH}	Input HIGH Voltage	2.0			V
V _{IL}	Input LOW Voltage			0.8	V

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.

Table 5. 10EPT PECL OUTPUT DC CHARACTERISTICS $V_{CC} = 3.3 \text{ V}$, GND = 0 V (Note 2)

		-40°C		25°C			85°C				
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I _{CC}	Positive Power Supply Current "HIGH"	18	23	28	18	23	28	19	24	29	mA
V _{OH}	Output HIGH Voltage (Note 3)	2165	2290	2415	2230	2355	2480	2290	2415	2540	mV
V _{OL}	Output LOW Voltage (Note 3)	1365	1490	1615	1430	1555	1680	1490	1615	1740	mV

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.

- 2. Output parameters vary 1:1 with $V_{\mbox{\scriptsize CC}}$.
- 3. All loading with 50 Ω to V_{CC} 2.0 V.

Table 6. 100EPT PECL OUTPUT DC CHARACTERISTICS $V_{CC} = 3.3 \text{ V}$, GND = 0 V (Note 4)

		-40°C		25°C			85°C				
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I _{CC}	Negative Power Supply Current	20	25	30	22	27	32	23	28	33	mA
V _{OH}	Output HIGH Voltage (Note 5)	2155	2280	2405	2155	2280	2405	2155	2280	2405	mV
V _{OL}	Output LOW Voltage (Note 5)	1355	1480	1605	1355	1480	1605	1355	1480	1605	mV

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.

- 4. Output parameters vary 1:1 with V_{CC} . 5. All loading with 50 Ω to V_{CC} 2.0 V.

Table 7. AC CHARACTERISTICS V_{CC} = 3.0 V to 3.6 V, GND = 0 V (Note 6)

			-40°C			25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
f _{max}	Maximum Input Clock Frequency		> 1			> 1			> 1		GHz
t _{PLH} , t _{PHL}	Propagation Delay to Output Differential	280	350	430	300	370	450	320	400	490	ps
t _{SKEW}	Device-to-Device Skew (Note 7)			150			150			170	ps
t _{JITTER}	RMS Random Clock Jitter		< 1	< 2		< 1	< 2		< 1	< 2	ps
t _r t _f	Output Rise/Fall Times Q, \overline{Q} (20% – 80%)	70	100	170	80	120	180	90	140	190	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.

- 6. Measured using a LVTTL source, 50% duty cycle clock source. All loading with 50 Ω to V_{CC} 2.0 V.
- 7. Skew is measured between outputs under identical transitions.

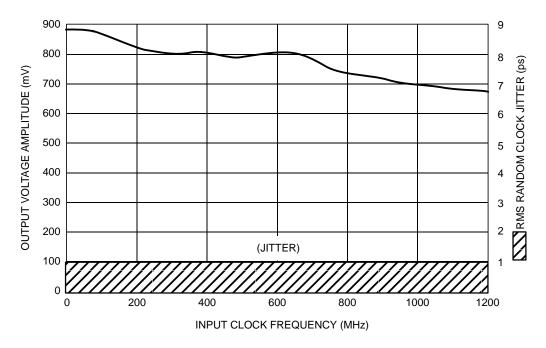


Figure 2. Output Voltage Amplitude (V_{OUTpp})/RMS Jitter vs. Input Clock Frequency at Ambient Temperature

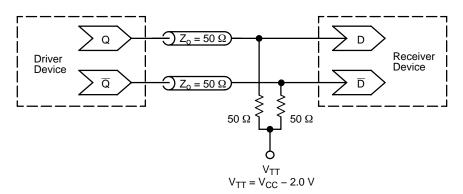


Figure 3. Typical Termination for Output Driver and Device Evaluation (See Application Note AND8020/D – Termination of ECL Logic Devices.)

ORDERING INFORMATION

Device	Package	Shipping †
MC10EPT20D	SO-8	98 Units / Rail
MC10EPT20DR2	SO-8	2500 / Tape & Reel
MC10EPT20DT	TSSOP-8	100 Units / Rail
MC10EPT20DTR2	TSSOP-8	2500 / Tape & Reel
MC100EPT20D	SO-8 98 Units / Rail	
MC100EPT20DG	SO-8 (Pb-Free)	98 Units / Rail
MC100EPT20DR2	SO-8	2500 / Tape & Reel
MC100EPT20DT	TSSOP-8	100 Units / Rail
MC100EPT20DTG	TSSOP-8 (Pb-Free)	100 Units / Rail
MC100EPT20DTR2	TSSOP-8	2500 / 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

AN1642/D - The ECL Translator Guide

AND8001/D - Odd Number Counters Design

AND8002/D - Marking and Date Codes

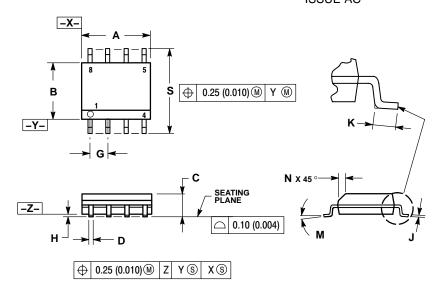
AND8020/D - Termination of ECL Logic Devices

AND8066/D - Interfacing with ECLinPS

AND8090/D - AC Characteristics of ECL Devices

PACKAGE DIMENSIONS

SOIC-8 NB **D SUFFIX** CASE 751-07 **ISSUE AC**



NOTES:

- NOTES:

 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

 2. CONTROLLING DIMENSION: MILLIMETER.

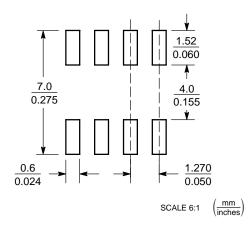
 3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.

 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.
- MAXIMUM MATERIAL CONDITION.
 6. 751–01 THRU 751–06 ARE OBSOLETE. NEW STANDARD IS 751–07.

	MILLIN	METERS	INCHES			
DIM	MIN	MAX	MIN	MAX		
Α	4.80	5.00	0.189	0.197		
В	3.80	4.00	0.150	0.157		
U	1.35	1.75	0.053	0.069		
D	0.33	0.51	0.013	0.020		
G	1.27	7 BSC	0.050 BSC			
Н	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		
М	0 °	8 °	0 °	8 °		
N	0.25	0.50	0.010	0.020		
S	5.80	6.20	0.228	0.244		

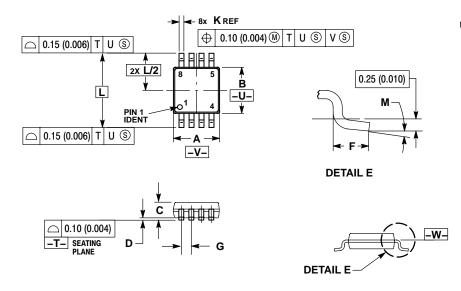
SOLDERING FOOTPRINT*



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

PACKAGE DIMENSIONS

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



NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M. 1982.
- 2. CONTROLLING DIMENSION: MILLIMETER
- 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.
- (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.
- DIMENSION A AND B ARE TO BE DETERMINED
 AT DATUM PLANE -W-.

	MILLIN	IETERS	INCHES			
DIM	MIN	MAX	MIN	MAX		
Α	2.90	3.10	0.114	0.122		
В	2.90	3.10	0.114	0.122		
С	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		0.193 BSC			
M	0°	6 °	0°	6°		

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