MC10EPT20, MC100EPT20

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 8−lead SOIC 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 V to 3.6 V with GND = 0 V
- PNP TTL Input for Minimal Loading
- Q Output will Default HIGH with Input Open

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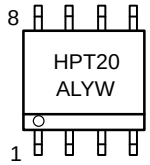
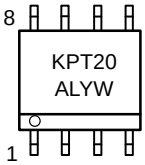
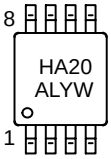
MARKING DIAGRAMS*

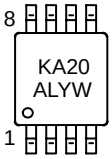
SO−8
D SUFFIX
CASE 751





TSSOP−8
DT SUFFIX
CASE 948R





H = MC10
K = MC100
A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week

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

ORDERING INFORMATION

Device	Package	Shipping†
MC10EPT20D	SO−8	98 Units/Rail
MC10EPT20DR2	SO−8	2500 Tape & Reel
MC100EPT20D	SO−8	98 Units/Rail
MC100EPT20DR2	SO−8	2500 Tape & Reel
MC10EPT20DT	TSSOP−8	100 Units/Rail
MC10EPT20DTR2	TSSOP−8	2500 Tape & Reel
MC100EPT20DT	TSSOP−8	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.

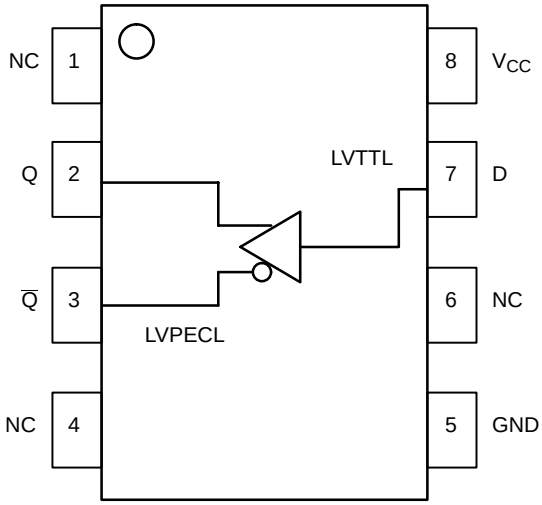


Figure 1. 8−Lead Pinout (Top View) **and Logic Diagram**

Table 1. PIN DESCRIPTION

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

Table 2. ATTRIBUTES

Characteristics		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 Time 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 (Note 2)

Symbol	Parameter	Condition 1	Condition 2	Rating	Units
V_{CC}	Power Supply	GND = 0 V		6	V
V_I	Input Voltage	GND = 0 V	$V_I \leq V_{CC}$	6	V
I_{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	8 SOIC 8 SOIC	190 130	°C/W °C/W
θ_{JC}	Thermal Resistance (Junction−to−Case)	Standard Board	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)	Standard Board	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.

Table 4. LVTTL INPUT DC CHARACTERISTICS V_{CC} = 3.3 V, GND = 0 V, T_A = −40°C to +85°C

Symbol	Characteristic	Min	Typ	Max	Unit
I_{IH}	Input HIGH Current (V_{in} = 2.7 V)			20	μA
I_{IHH}	Input HIGH Current MAX (V_{in} = 6.0 V)			100	μA
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

Table 5. 10EPT PECL OUTPUT DC CHARACTERISTICS V_{CC} = 3.3 V, GND = 0 V (Note 3)

		−40°C			25°C			85°C			
Symbol	Characteristic	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Unit
ICC	Positive Power Supply Current “HIGH”	18	23	28	18	23	28	19	24	29	mA
V_{OH}	Output HIGH Voltage (Note 4)	2165	2290	2415	2230	2355	2480	2290	2415	2540	mV
V_{OL}	Output LOW Voltage (Note 4)	1365	1490	1615	1430	1555	1680	1490	1615	1740	mV

NOTE: 10EPT 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 lfpm is maintained.
3. Output parameters vary 1:1 with V_{CC}.
4. All loading with 50 Ω to V_{CC} − 2.0 V.

Table 6. 100EPT PECL OUTPUT DC CHARACTERISTICS V_{CC} = 3.3 V, GND = 0 V (Note 5)

		−40°C			25°C			85°C			
Symbol	Characteristic	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Unit
I_{EE}	Negative Power Supply Current	20	25	30	22	27	32	23	28	33	mA
V_{OH}	Output HIGH Voltage (Note 6)	2155	2280	2405	2155	2280	2405	2155	2280	2405	mV
V_{OL}	Output LOW Voltage (Note 6)	1355	1480	1605	1355	1480	1605	1355	1480	1605	mV

NOTE: 100EPT 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 LFPM is maintained.
5. Output parameters vary 1:1 with V_{CC}.
6. 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 7)

		−40°C			25°C			85°C			
Symbol	Characteristic	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Unit
f_{max}	Maximum Input Clock Frequency (See Figure 2)		> 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 8)			150			150			170	ps
t_{JITTER}	RMS Random Clock Jitter (See Figure 2)		< 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: 100EPT circuits 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 airflow greater than 500 LFPM is maintained.
7. Measured using a LVTTL source, 50% duty cycle clock source. All loading with 50 Ω to V_{CC} − 2.0 V.
8. Skew is measured between outputs under identical transitions.

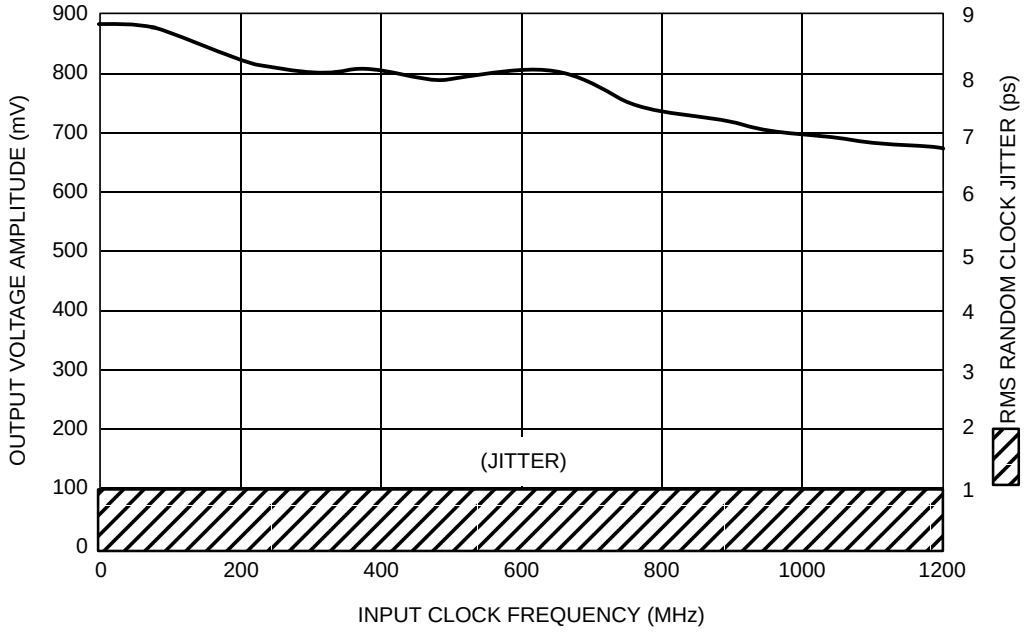
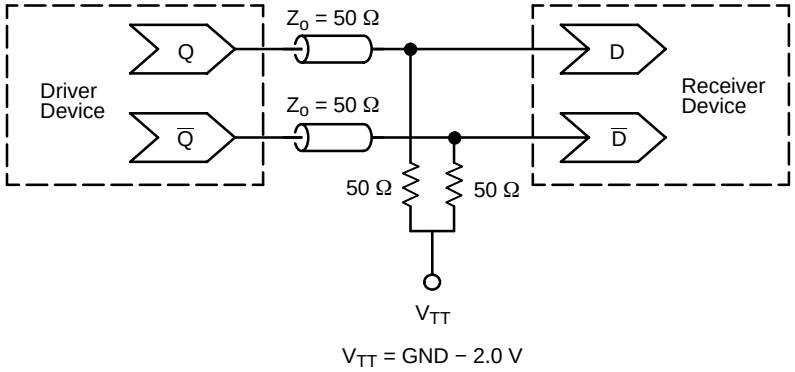


Figure 2. Output Voltage Amplitude (V_{OUTpp})/RMS Jitter vs. Input Clock Frequency at Ambient Temperature



V_{TT} = GND − 2.0 V

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

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

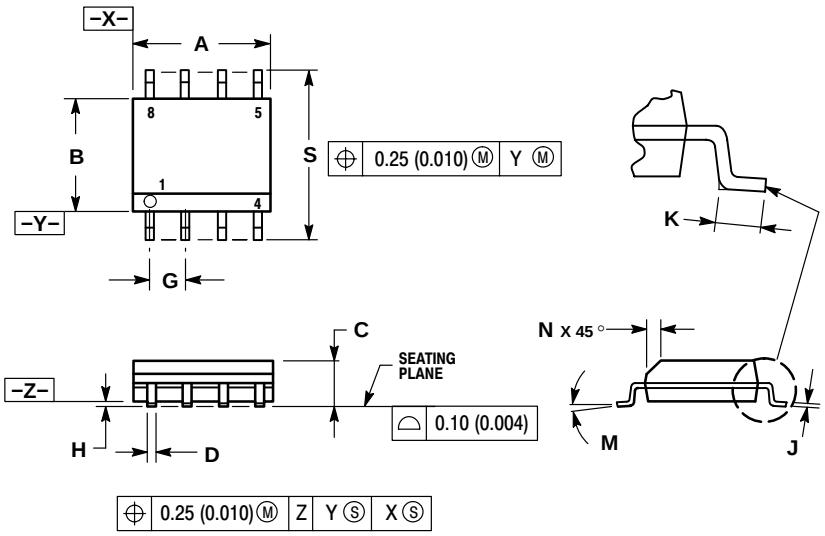
AND8009 − ECLinPS Plus Spice I/O Model Kit

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

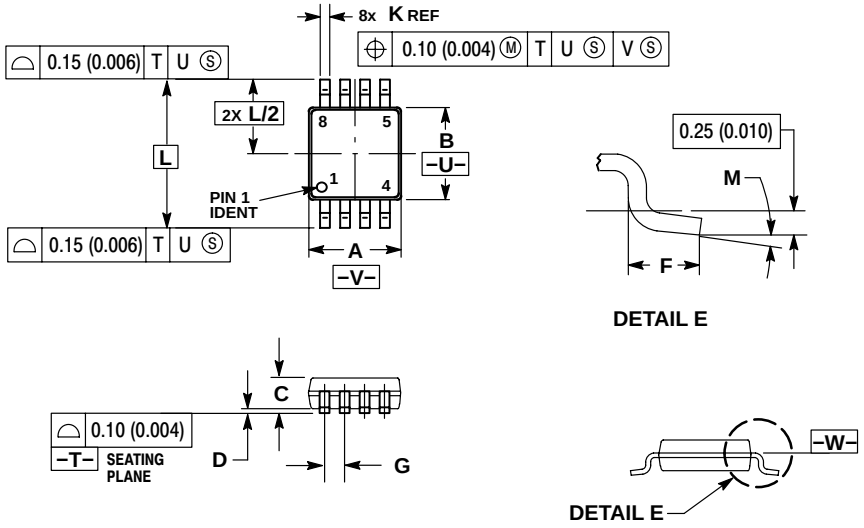


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005)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

Notes

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MC10EPT20/D