# 3.3V LVTTL/LVCMOS to LVPECL Translator

## Description

The MC100EPT622 is a 10-Bit LVTTL/LVCMOS to LVPECL translator. Because LVPECL (Positive ECL) levels are used only +3.3 V and ground are required. The device has an OR-ed enable input which can accept either LVPECL (ENPECL) or TTL/LVCMOS inputs (ENTTL). If the inputs are left open, they will default to the enable state. The device design has been optimized for low channel-to-channel skew.

## **Features**

- 450 ps Typical Propagation Delay
- Maximum Frequency > 1.5 GHz Typical
- PECL Mode
- Operating Range:  $V_{CC} = 3.0 \text{ V}$  to 3.8 V with  $V_{EE} = 0 \text{ V}$
- PNP LVTTL Inputs for Minimal Loading
- Q Output Will Default HIGH with Inputs Open
- The 100 Series Contains Temperature Compensation
- Pb-Free Packages are Available\*

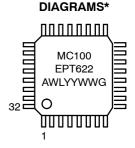


## ON Semiconductor®

http://onsemi.com



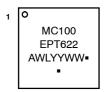
LQFP-32 FA SUFFIX CASE 873A



MARKING



QFN32 MN SUFFIX CASE 488AM



A = Assembly Location

WL = Wafer Lot
YY = Year
WW = Work Week
G or = Pb-Free Package

(Note: Microdot may be in either location)

**Table 1. TRUTH TABLE** 

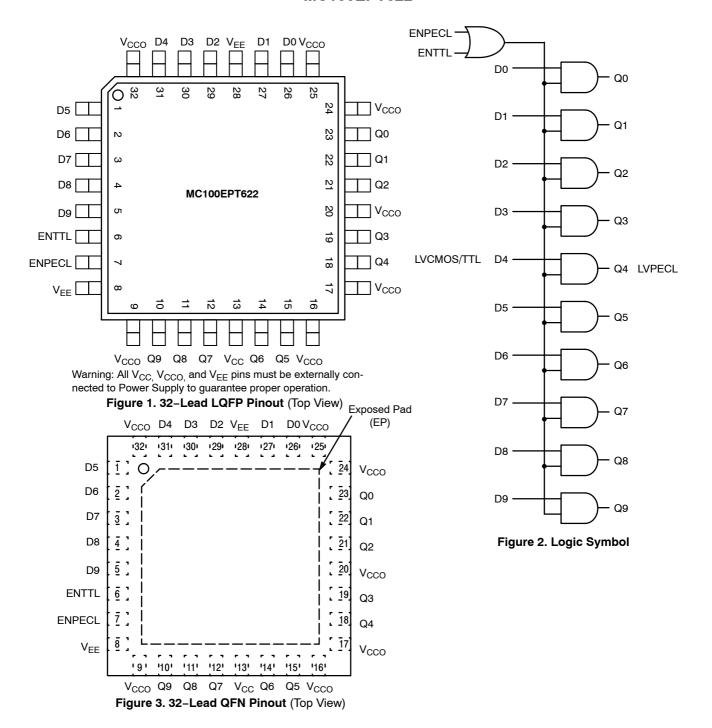
ENPECL	ENTTL	D	Q
Н	X	Н	Н
Н	Х	L	L
X	Н	Н	Н
Х	Н	L	L
L	L	Х	L

## **ORDERING INFORMATION**

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

<sup>\*</sup>For additional marking information, refer to Application Note AND8002/D.

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



**Table 1. PIN DESCRIPTION** 

Pin	Function
D0:9	Data Input (TTL)
Q0:9	Data Outputs (PECL)
ENTTL	Enable Control (TTL)
ENPECL	Enable Control (PECL)
V <sub>CC</sub> , V <sub>CCO</sub>	Positive Supply
V <sub>EE</sub>	Ground
EP	The exposed pad (EP) on the QFN-32 package bottom is thermally connected to the die for improved heat transfer out of the package. The exposed pad must be attached to a heat-sinking conduit. The pad is electrically connected to VEE.

**Table 2. ATTRIBUTES** 

Cha	Characteristics				
Internal Input Pulldown Res	N/A				
Internal Input Pullup Resist	Internal Input Pullup Resistor				
ESD Protection	> 2 kV > 150 V > 2 kV				
Moisture Sensitivity, Indefin	nite Time Out of Drypack	Pb Pkg	Pb-Free Pkg		
	Level 2 N/A	Level 2 Level 1			
Flammability Rating	UL 94 V-0	@ 0.125 in			
Transistor Count	596 D	evices			
Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test					

**Table 3. MAXIMUM RATINGS** 

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
V <sub>CC</sub>	Power Supply	V <sub>EE</sub> = 0 V		5	V
VI	Input Voltage	V <sub>EE</sub> = 0 V	$V_{I} \leq V_{CC}$	5 to 0	V
l <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	32 LQFP 32 LQFP	80 55	°C/W °C/W
$\theta_{\sf JC}$	Thermal Resistance (Junction-to-Case)	Standard Board	32 LQFP	12 to 17	°C/W
$\theta_{JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	QFN-32 QFN-32	31 27	°C/W
$\theta_{\sf JC}$	Thermal Resistance (Junction-to-Case)	2S2P	QFN-32	12	°C/W
T <sub>sol</sub>	Wave Solder Pb Pb-Free			265 265	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 4. TTL INPUT DC CHARACTERISTICS  $V_{CC} = 3.3 \text{ V}$ , GND= 0.0 V,  $T_A = -40 ^{\circ} C$  to  $85 ^{\circ} C$ 

Symbol	Characteristic	Condition	Min	Тур	Max	Unit
I <sub>IH</sub>	Input HIGH Current	V <sub>IN</sub> = 2.7 V			25	μΑ
I <sub>IHH</sub>	Input HIGH Current MAX	V <sub>IN</sub> = V <sub>CC</sub>			100	μΑ
I <sub>IL</sub>	Input LOW Current	V <sub>IN</sub> = 0.5 V			-0.6	mA
V <sub>IK</sub>	Input Clamp Voltage	I <sub>IN</sub> = -18 mA	-1.2	-0.9		V
V <sub>IH</sub>	Input HIGH Voltage		2.0			V
V <sub>IL</sub>	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. PECL INPUT DC CHARACTERISTICS  $V_{CC} = 3.3 \text{ V}$ , GND= 0.0 V,  $T_A = -40 ^{\circ} \text{C}$  to  $85 ^{\circ} \text{C}$ 

Symbol	Characteristic	Condition	Min	Тур	Max	Unit
I <sub>IH</sub>	Input HIGH Current	V <sub>IN</sub> = 2420 mV			150	μΑ
I <sub>IL</sub>	Input LOW Current	V <sub>IN</sub> = 1490 mV			200	μΑ
V <sub>IH</sub>	Input HIGH Voltage		2075		2420	mV
V <sub>IL</sub>	Input LOW Voltage		1490		1675	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.

Table 6. PECL OUTPUT DC CHARACTERISTICS V<sub>CC</sub> = 3.3 V, GND = 0.0 V (Note 1)

			-40°C		25°C		85°C				
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I <sub>EE</sub>	Power Supply Current	85	115	145	90	120	155	95	130	155	mA
V <sub>OH</sub>	Output High Voltage (Note 2)	2155	2280	2405	2155	2280	2405	2155	2280	2405	mV
V <sub>OL</sub>	Output Low Voltage (Note 2)	1355	1520	1700	1355	1520	1700	1355	1520	1700	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.

- 1. Input and output parameters vary 1:1 with V<sub>CC</sub>.
- 2. All loading with 50  $\Omega$  to V<sub>CC</sub>-2.0 V.

Table 7. AC CHARACTERISTICS V<sub>CC</sub> = 3.0 V to 3.8 V (Note 3)

			-40°C			25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
f <sub>max</sub>	Maximum Frequency (See Figure 4)	1.0	1.5		1.0	1.5		1.0	1.5		GHz
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay to Output (Figure 5, Note 4)  D to Q  ENPECL to Q  ENTTL to Q	100 150 300	450 500 450	800 875 800	100 150 300	500 500 500	875 875 800	100 200 300	500 550 500	800 925 800	ps
t <sub>JITTER</sub>	Random Clock Jitter (RMS) (See Figure 4)		0.7	3.0		0.7	3.0		0.7	3.0	ps
t <sub>r</sub> / t <sub>f</sub>	Output Rise/Fall Times (20% – 80%)	100	200	450	100	200	250	100	200	300	ps
T <sub>SKEW</sub>	Duty Cycle Skew (Note 5) D to Q Channel 0-7 Channel 8-9 ENPECL to Q ENTTL to Q		120 200 120 100	375 775 400 275		120 200 120 100	375 775 400 275		120 200 120 100	375 775 400 275	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.

- 3. Measured using a 2.4 V source, 50% duty cycle clock source. All loading with 50  $\Omega$  to V<sub>CC</sub>-2.0 V.
- 4. 1.5 V to 50% point of the output.
- 5. Duty cycle skew |t<sub>PLH</sub> t<sub>PHL</sub>| on the specific path.

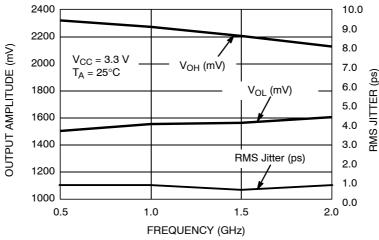
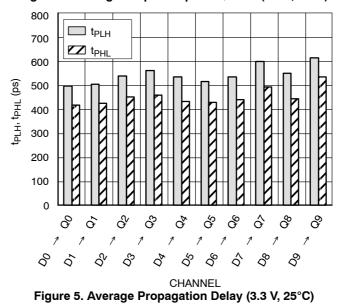


Figure 4. Average Output Amplitude/Jitter (3.3 V, 25°C)



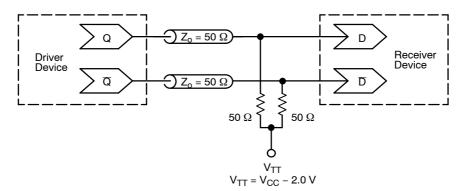


Figure 6. Typical Termination for Output Driver and Device Evaluation (See Application Note AND8020/D - Termination of ECL Logic Devices.)

## **ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
MC100EPT622FA	LQFP-32	250 Units / Tray
MC100EPT622FAG	LQFP-32 (Pb-Free)	250 Units / Tray
MC100EPT622FAR2G	LQFP-32 (Pb-Free)	2000 / Tape & Reel
MC100EPT622MNG	QFN32 (Pb-Free)	74 Units / Rail
MC100EPT622MNR4G	QFN32 (Pb-Free)	1000 / Tape & Reel

<sup>†</sup>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

AN1672/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

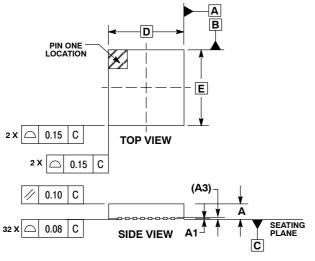
AND8090/D - AC Characteristics of ECL Devices

## **PACKAGE DIMENSIONS**

## 32 LEAD LQFP CASE 873A-02 ISSUE C -T-, -U-, -Z-○ 0.20 (0.008) AB T-U Z -U-Ρ ΑE Вı **DETAIL** Y ⊕ 0.20 (0.008) <sup>®</sup> AC | T-U | Z BASE METAL **DETAIL Y** 4X /9` ○ 0.20 (0.008) AC T-U Z вх М R **DETAIL AD** SECTION AE-AE -AB-С SEATING -AC-○ 0.10 (0.004) AC 0.250 (0.010) GAUGE PLANE **DETAIL AD**

#### PACKAGE DIMENSIONS

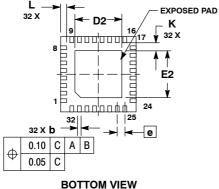
# **QFN32 5x5, 0.5 P** CASE 488AM-01 ISSUE O



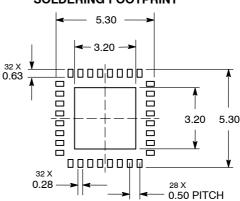
#### NOTES:

- DIMENSIONS AND TOLERANCING PER ASME Y14.5M, 1994.
- 2. CONTROLLING DIMENSION: MILLIMETERS. 3. DIMENSION & APPLIES TO PLATED
- DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30 MM TERMINAL
- 4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS						
DIM	MIN	MAX					
Α	0.800	0.900	1.000				
A1	0.000	0.025	0.050				
А3	0.	200 RE	=				
b	0.180	0.180 0.250					
D	5.	.00 BSC					
D2	2.950	3.100	3.250				
E	5.	.00 BSC					
E2	2.950	3.100	3.250				
е	0.500 BSC						
K	0.200						
l i	0.300	0.400	0.500				



## **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.

ECLinPS is a trademark of Semiconductor Components INdustries, LLC (SCILLC).

ON Semiconductor and a registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

#### **PUBLICATION ORDERING INFORMATION**

#### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor P.O. Box 5163, Denver, Colorado 80217 USA **Phone**: 303–675–2175 or 800–344–3860 Toll Free USA/Canada

Fax: 303-675-2173 or 800-344-3867 Toll Free USA/Canada Email: orderlit@onsemi.com N. American Technical Support: 800-282-9855 Toll Free USA/Canada

Europe, Middle East and Africa Technical Support: Phone: 421 33 790 2910 Japan Customer Focus Center

Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

# **X-ON Electronics**

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Translation - Voltage Levels category:

Click to view products by ON Semiconductor manufacturer:

Other Similar products are found below:

NLSX4373DMR2G NLSX5012MUTAG HV583GA-G MC10H641FNR2G NLSX0102FCT1G NLSX0102FCT2G
NLSX4302EBMUTCG NLVSX4373DR2G PCA9306FMUTAG SY10H351JZ MC100EPT622MNG MAX9374AEKA+T MAX3378EETD+
MAX34405BEZT+ NLSX3014MUTAG NVT4556BUKZ NLSV4T244EMUTAG NLSX5011MUTCG NLV9306USG
NLVSX4014MUTAG MAX34405BEZT+T NLSV4T3144MUTAG NSV12200LT1G NLVSX4373MUTAG NB3U23CMNTAG
MAX3371ELT+T MAX3008EUP+T NLVPCA9306AMUTCG NLSX3013BFCT1G MAX9378EUA+T NLV7WBD3125USG
NLV14504BDTG NLSX3012DMR2G NLSX5012DR2G MAX3391EEUD+T MAX3379EETD+ PI4ULS3V4857GEAEX
MAX3391EEBC+T MAX14842ATE+T 74AVCH1T45FZ4-7 CLVC16T245MDGGREP HEF4104BT TC74LCX16245(EL,F)
MC10H124FNG CAVCB164245MDGGREP 7WBD383USG NVT2001GM,115 CLVC8T245MRHLTEP 74LVC1G175GS,132