

# 3.3 V LVTTTL/LVCMOS to LVPECL Translator

## MC100EPT622

### Description

The MC100EPT622 is a 10-Bit LVTTTL/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  $3.8\text{ V}$  with  $V_{EE} = 0\text{ V}$
- PNP LVTTTL Inputs for Minimal Loading
- Q Output Will Default HIGH with Inputs Open
- The 100 Series Contains Temperature Compensation
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant



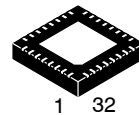
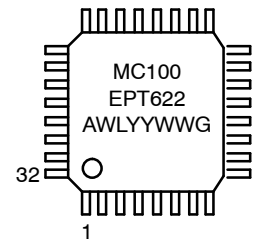
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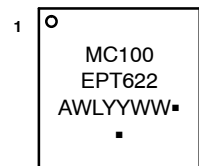
### MARKING DIAGRAMS\*



**LQFP-32**  
**FA SUFFIX**  
**CASE 561AB**



**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)

\*For additional marking information, refer to Application Note [AND8002/D](#).

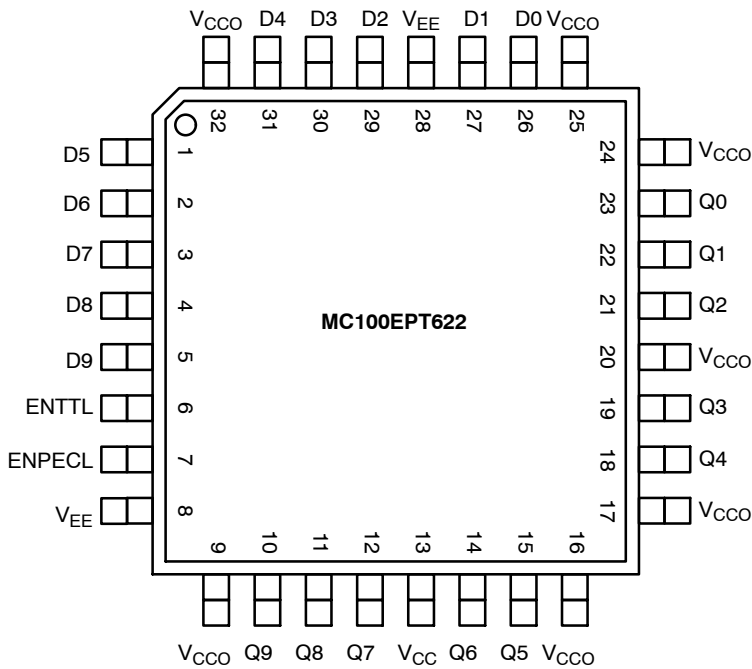
**Table 1. TRUTH TABLE**

ENPECL	ENTTL	D	Q
H	X	H	H
H	X	L	L
X	H	H	H
X	H	L	L
L	L	X	L

### ORDERING INFORMATION

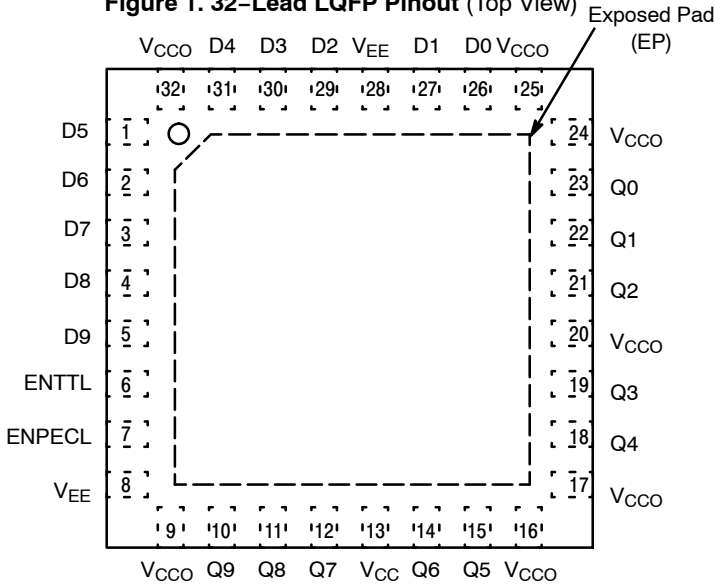
See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

# MC100EPT622

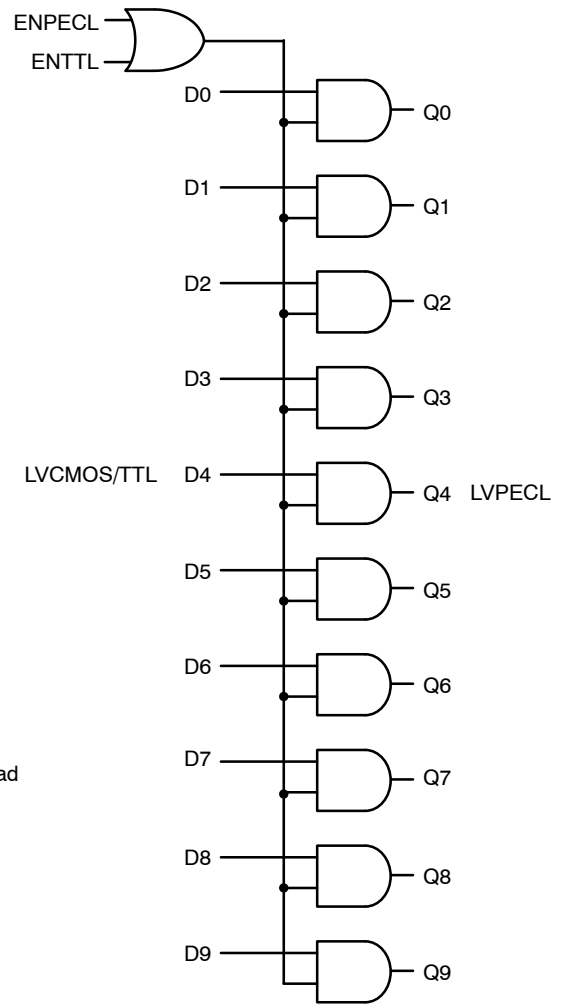


Warning: All  $V_{CC}$ ,  $V_{CCO}$ , and  $V_{EE}$  pins must be externally connected to Power Supply to guarantee proper operation.

**Figure 1. 32-Lead LQFP Pinout (Top View)**



**Figure 3. 32-Lead QFN Pinout (Top View)**



**Figure 2. Logic Symbol**

**Table 1. PIN DESCRIPTION**

Pin	Function
D0:9	Data Input (TTL)
Q0:9	Data Outputs (PECL)
ENTTL	Enable Control (TTL)
ENPECL	Enable Control (PECL)
$V_{CC}$ , $V_{CCO}$	Positive Supply
$V_{EE}$	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 $V_{EE}$ .

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**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	> 2 kV > 150 V > 2 kV
Moisture Sensitivity, Indefinite Time Out of Drypack	Pb-Free Pkg
LQFP-32 QFN-32	Level 2 Level 1
Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in
Transistor Count	596 Devices
Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test	

**Table 3. MAXIMUM RATINGS**

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
$V_{CC}$	Power Supply	$V_{EE} = 0\text{ V}$		5	V
$V_I$	Input Voltage	$V_{EE} = 0\text{ V}$	$V_I \leq V_{CC}$	5 to 0	V
$I_{out}$	Output Current	Continuous Surge		50 100	mA mA
$T_A$	Operating Temperature Range			-40 to +85	°C
$T_{stg}$	Storage Temperature Range			-65 to +150	°C
$\theta_{JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfp 500 lfp	32 LQFP 32 LQFP	80 55	°C/W °C/W
$\theta_{JC}$	Thermal Resistance (Junction-to-Case)	Standard Board	32 LQFP	12 to 17	°C/W
$\theta_{JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfp 500 lfp	QFN-32 QFN-32	31 27	°C/W °C/W
$\theta_{JC}$	Thermal Resistance (Junction-to-Case)	2S2P	QFN-32	12	°C/W
$T_{sol}$	Wave Solder			265	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

**Table 4. TTL INPUT 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
$I_{IH}$	Input HIGH Current	$V_{IN} = 2.7\text{ V}$			25	$\mu\text{A}$
$I_{IHH}$	Input HIGH Current MAX	$V_{IN} = V_{CC}$			100	$\mu\text{A}$
$I_{IL}$	Input LOW Current	$V_{IN} = 0.5\text{ V}$			-0.6	mA
$V_{IK}$	Input Clamp Voltage	$I_{IN} = -18\text{ mA}$	-1.2	-0.9		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 lfp.

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**Table 5. PECL INPUT 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
$I_{IH}$	Input HIGH Current	$V_{IN} = 2420\text{ mV}$			150	$\mu\text{A}$
$I_{IL}$	Input LOW Current	$V_{IN} = 1490\text{ mV}$			200	$\mu\text{A}$
$V_{IH}$	Input HIGH Voltage		2075		2420	mV
$V_{IL}$	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 lpm.

**Table 6. PECL OUTPUT DC CHARACTERISTICS**  $V_{CC} = 3.3\text{ V}$ ,  $GND = 0.0\text{ V}$  (Note 1)

Symbol	Characteristic	$-40^\circ\text{C}$			$25^\circ\text{C}$			$85^\circ\text{C}$			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current	85	115	145	90	120	155	95	130	155	mA
$V_{OH}$	Output High Voltage (Note 2)	2155	2280	2405	2155	2280	2405	2155	2280	2405	mV
$V_{OL}$	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 lpm.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .
2. All loading with  $50\ \Omega$  to  $V_{CC}-2.0\text{ V}$ .

**Table 7. AC CHARACTERISTICS**  $V_{CC} = 3.0\text{ V}$  to  $3.8\text{ V}$  (Note 3)

Symbol	Characteristic	$-40^\circ\text{C}$			$25^\circ\text{C}$			$85^\circ\text{C}$			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$f_{max}$	Maximum Frequency (See Figure 4)	1.0	1.5		1.0	1.5		1.0	1.5		GHz
$t_{PLH}$ , $t_{PHL}$	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
$t_{JITTER}$	Random Clock Jitter (RMS) (See Figure 4)		0.7	3.0		0.7	3.0		0.7	3.0	ps
$t_r / t_f$	Output Rise/Fall Times (20% – 80%)	100	200	450	100	200	250	100	200	300	ps
$T_{SKEW}$	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 lpm.

3. Measured using a 2.4 V source, 50% duty cycle clock source. All loading with  $50\ \Omega$  to  $V_{CC}-2.0\text{ V}$ .
4. 1.5 V to 50% point of the output.
5. Duty cycle skew  $|t_{PLH} - t_{PHL}|$  on the specific path.

# MC100EPT622

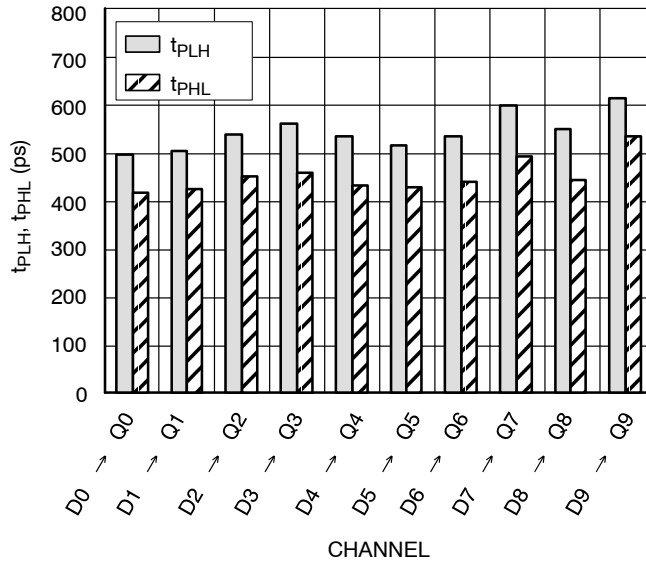
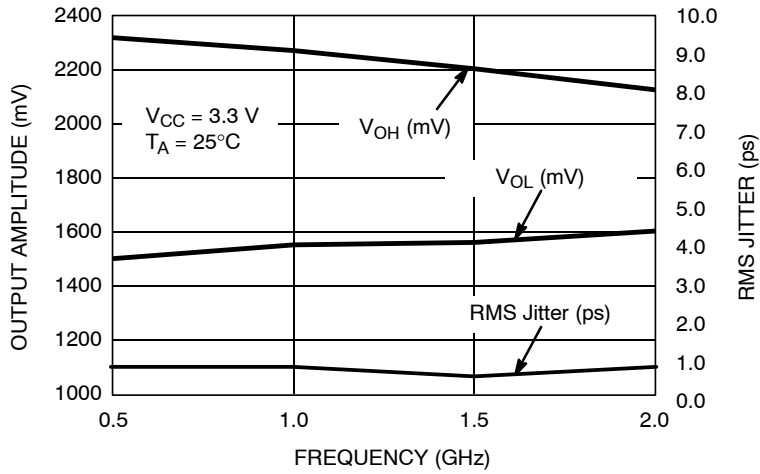


Figure 5. Average Propagation Delay (3.3 V, 25°C)

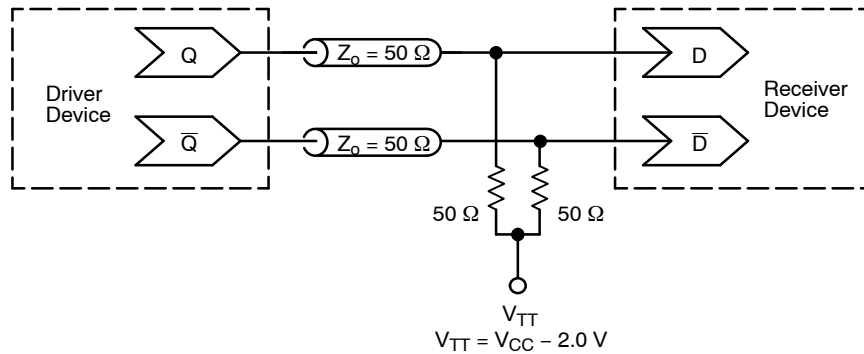


Figure 6. Typical Termination for Output Driver and Device Evaluation (See Application Note [AND8020/D](#) – Termination of ECL Logic Devices.)

# MC100EPT622

## ORDERING INFORMATION

Device	Package	Shipping
MC100EPT622FAG	LQFP-32 (Pb-Free)	250 Units / Tray
MC100EPT622MNG	QFN32 (Pb-Free)	74 Units / Rail

### Resource Reference of Application Notes

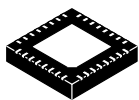
- AN1405/D** – ECL Clock Distribution Techniques
- AN1406/D** – Designing with PECL (ECL at +5.0 V)
- AN1503/D** – ECLinPS™ I/O SPiCE Modeling Kit
- AN1504/D** – Metastability and the ECLinPS Family
- AN1568/D** – Interfacing Between LVDS and ECL
- AN1672/D** – The ECL Translator Guide
- AND8001/D** – 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

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# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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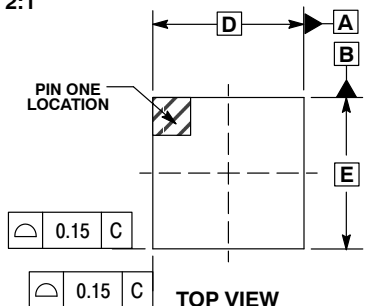


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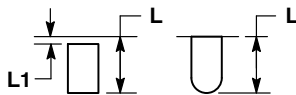
SCALE 2:1

QFN32 5x5, 0.5P  
CASE 488AM  
ISSUE A

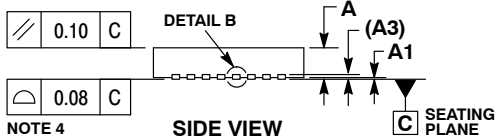
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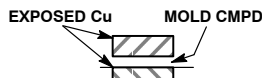
TOP VIEW



DETAIL A  
ALTERNATE TERMINAL  
CONSTRUCTIONS



SIDE VIEW



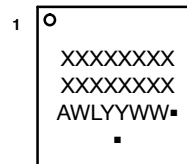
DETAIL B  
ALTERNATE  
CONSTRUCTION

NOTES:

1. DIMENSIONS AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30MM FROM THE TERMINAL TIP. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

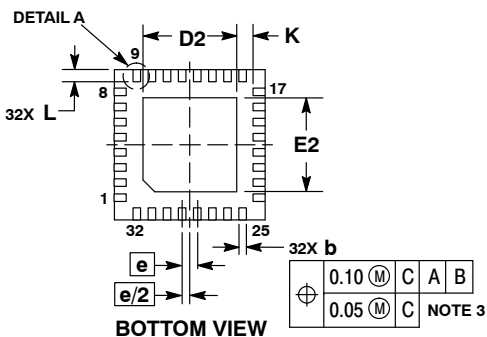
MILLIMETERS		
DIM	MIN	MAX
A	0.80	1.00
A1	---	0.05
A3	0.20	REF
b	0.18	0.30
D	5.00	BSC
D2	2.95	3.25
E	5.00	BSC
E2	2.95	3.25
e	0.50	BSC
K	0.20	---
L	0.30	0.50
L1	---	0.15

GENERIC MARKING DIAGRAM\*



- XXXXXX = Specific Device Code
- A = Assembly Location
- WL = Wafer Lot
- YY = Year
- WW = Work Week
- = Pb-Free Package

(Note: Microdot may be in either location)  
\*This information is generic. Please refer to device data sheet for actual part marking.  
Pb-Free indicator, "G" or microdot "▪", may or may not be present.

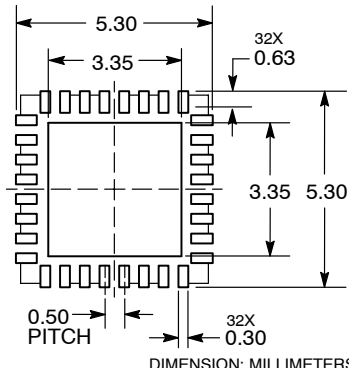


BOTTOM VIEW

⊕	0.10 (M)	C	A	B
	0.05 (M)	C		

NOTE 3

RECOMMENDED SOLDERING FOOTPRINT\*



DIMENSION: MILLIMETERS

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

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**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**

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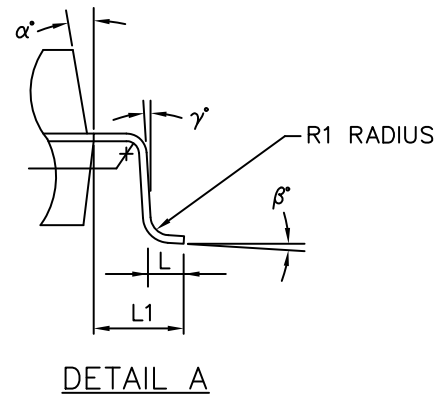
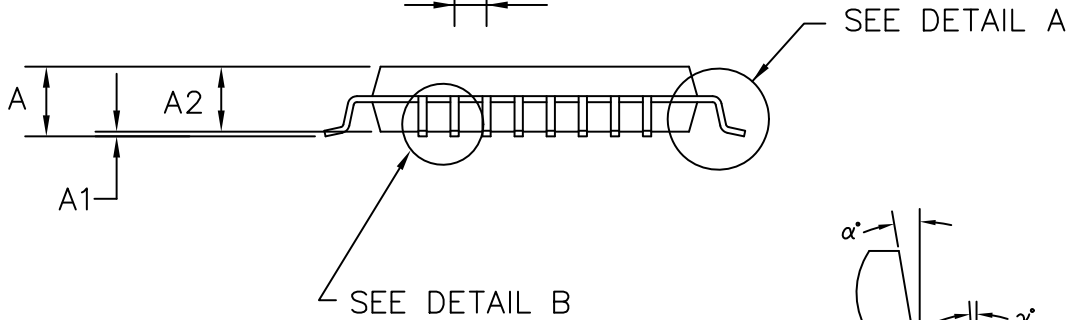


**LQFP-32, 7x7**  
**CASE 561AB-01**  
**ISSUE O**

DATE 19 JUN 2008



SYMBOL	MIN	NOM	MAX
A	—	—	1.60
A1	0.05	—	0.15
A2	1.35	1.40	1.45
B	0.30	0.37	0.45
B1	0.30	0.35	0.40
C	0.09	—	0.20
C1	0.09	—	0.16
D	9.00 BSC		
D1	7.00 BSC		
E	9.00 BSC		
E1	7.00 BSC		
e	0.80 BSC		
L	0.45	0.60	0.75
L1	1.00		
R1	0.08	—	0.20
$\alpha^\circ$	11	—	13
$\beta^\circ$	0	—	7
$\gamma^\circ$	0	—	—



ALL DIMENSIONS IN MM

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