MC100EPT622

3.3V LVTTL/LVCMOS to LVPECL Translator

ON Semiconductor®

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Description

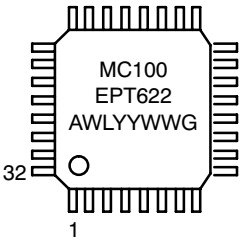
The MC100EPT622 is a 10- Bit LVTTL/LVCMOS to LVPECL translator. Because LVPECL (Positive ECL) levels are used only +3.3 V and ground are required. The device has an OR- ed enable input which can accept either LVPECL (ENPECL) or TTL/LVCMOS inputs (ENTTL). If the inputs are left open, they will default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

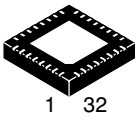
Features

- 450 ps Typical Propagation Delay
- Maximum Frequency > 1.5 GHz Typical
- PECL Mode
- Operating Range: V_{CC} = 3.0 V to 3.8 V with V_{EE} = 0 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*

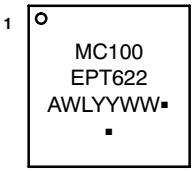
LQFP-32
FA SUFFIX
CASE 873A

MARKING DIAGRAMS*





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

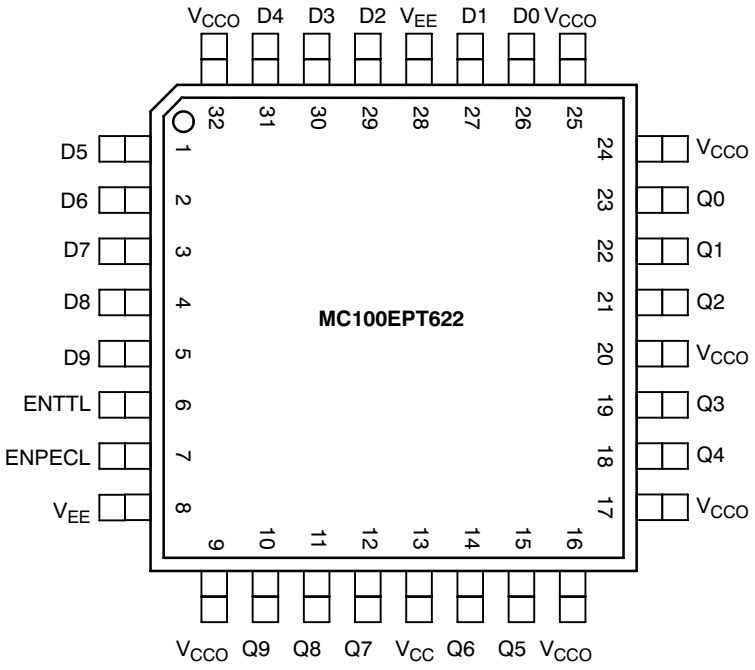
ENPECL	ENTTL	D	Q
H	X	H	H
H	X	L	L
X	H	H	H
X	H	L	L
L	L	X	L

ORDERING INFORMATION

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

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

Publication Order Number:
MC100EPT622/D



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)

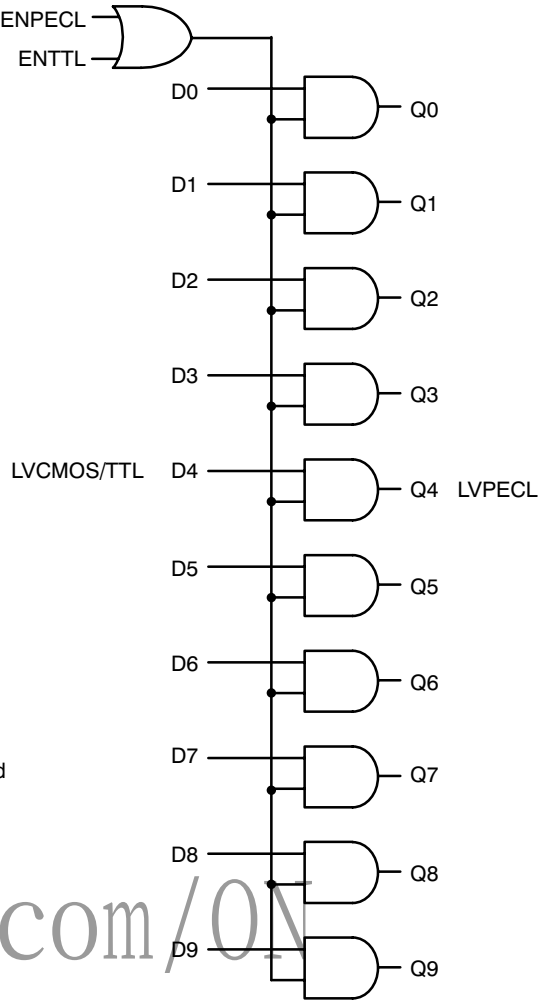


Figure 2. Logic Symbol

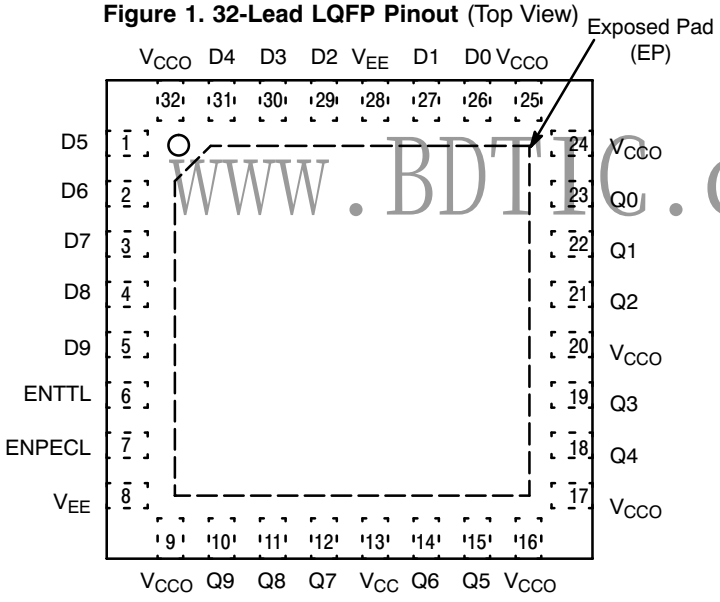


Figure 3. 32-Lead QFN Pinout (Top View)

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}.

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 Pkg	Pb-Free Pkg
	LQFP-32 QFN-32	Level 2 N/A	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 V		5	V
V_I	Input Voltage	V_{EE} = 0 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
θ_{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	32 LQFP 32 LQFP	80 55	°C/W °C/W
θ_{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	32 LQFP	12 to 17	°C/W
θ_{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	QFN-32 QFN-32	31 27	°C/W °C/W
θ_{JC}	Thermal Resistance (Junction-to-Case)	2S2P	QFN-32	12	°C/W
T_{sol}	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 V, GND= 0.0 V, T_A = -40°C to 85°C

Symbol	Characteristic	Condition	Min	Typ	Max	Unit
I_{IH}	Input HIGH Current	V_{IN}= 2.7 V			25	μA
I_{IHH}	Input HIGH Current MAX	V_{IN}= V_{CC}			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	-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 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 V, GND= 0.0 V, T_A = -40°C to 85°C

Symbol	Characteristic	Condition	Min	Typ	Max	Unit
I_{IH}	Input HIGH Current	V_{IN}= 2420 mV			150	μA
I_{IL}	Input LOW Current	V_{IN}= 1490 mV			200	μA
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 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_{CC} = 3.3 V, GND = 0.0 V (Note 1)

Symbol	Characteristic	-40 °C			25°C			85°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}	Input High Voltage (Note 2)	2155	2280	2405	2155	2280	2405	2155	2280	2405	mV
V_{OL}	Input Low Current (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_{CC}.
2. All loading with 50 Ω to V_{CC}- 2.0 V.

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

Symbol	Characteristic	-40 °C			25°C			85°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)										ps
	D to Q	100	450	800	100	500	875	100	500	800	
	ENPECL to Q	150	500	875	150	500	875	200	550	925	
	ENTTL to Q	300	450	800	300	500	800	300	500	800	
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)										ps
	D to Q Channel 0-7		120	375		120	375		120	375	
	Channel 8-9		200	775		200	775		200	775	
	ENPECL to Q		120	400		120	400		120	400	
	ENTTL to Q		100	275		100	275		100	275	

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 Ω to V_{CC}-2.0 V.
4. 1.5 V to 50% point of the output.
5. Duty cycle skew $|t_{PLH} - t_{PHL}|$ on the specific path.

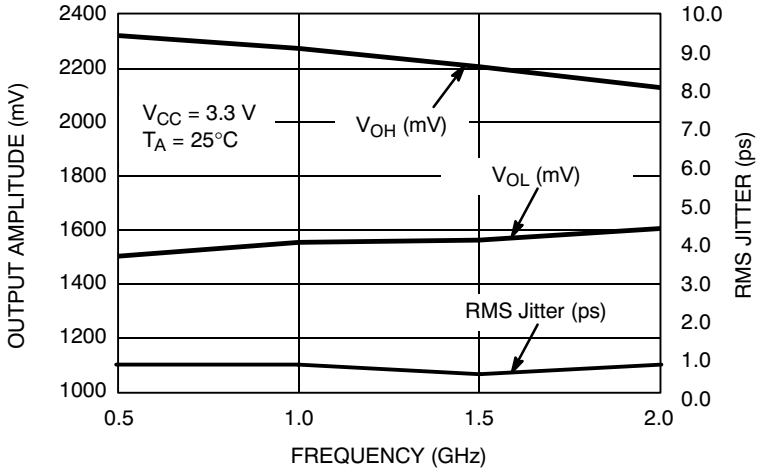


Figure 4. Average Output Amplitude/Jitter (3.3 V, 25°C)

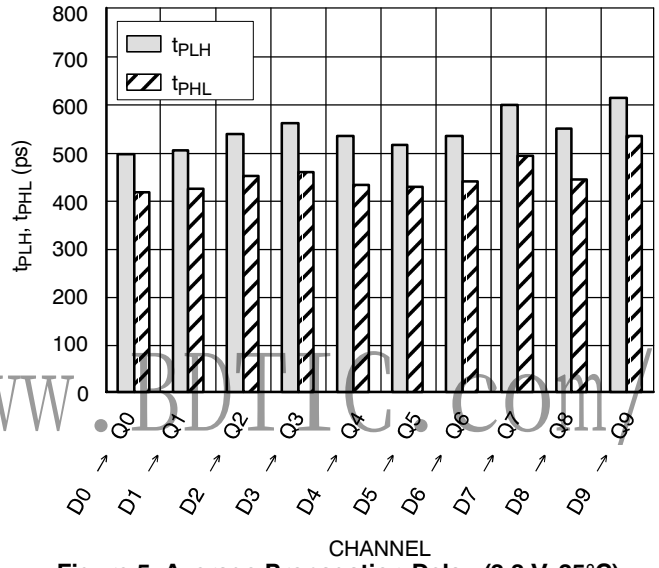


Figure 5. Average Propagation Delay (3.3 V, 25°C)

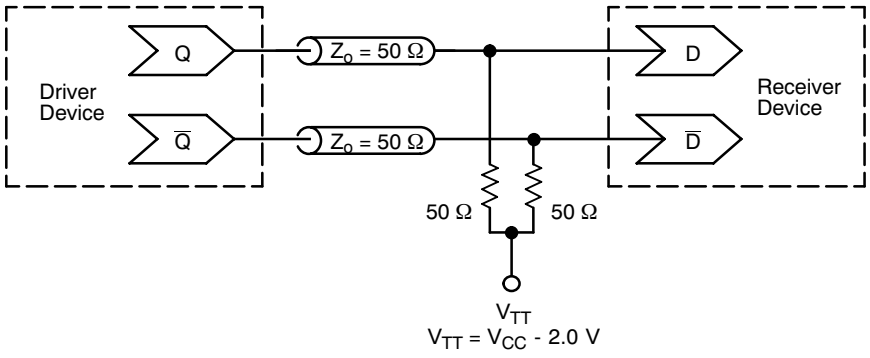


Figure 6. Typical Termination for Output Driver and Device Evaluation (See Application Note AND8020/D - Termination of ECL Logic Devices.)

ORDERING INFORMATION

Device	Package	Shipping†
MC100EPT622FA	LQFP-32	250 Units / Tray
MC100EPT622FAG	LQFP-32 (Pb-Free)	250 Units / Tray
MC100EPT622FAR2	LQFP-32	2000 / Tape & Reel
MC100EPT622FAR2G	LQFP-32 (Pb-Free)	2000 / Tape & Reel
MC100EPT622MNG	QFN32 (Pb-Free)	74 Units / Rail
MC100EPT622MNR4G	QFN32 (Pb-Free)	1000 / 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

AN1672/D - The ECL Translator Guide

AND8001/D - Odd Number Counters Design

AND8002/D - Marking and Date Codes

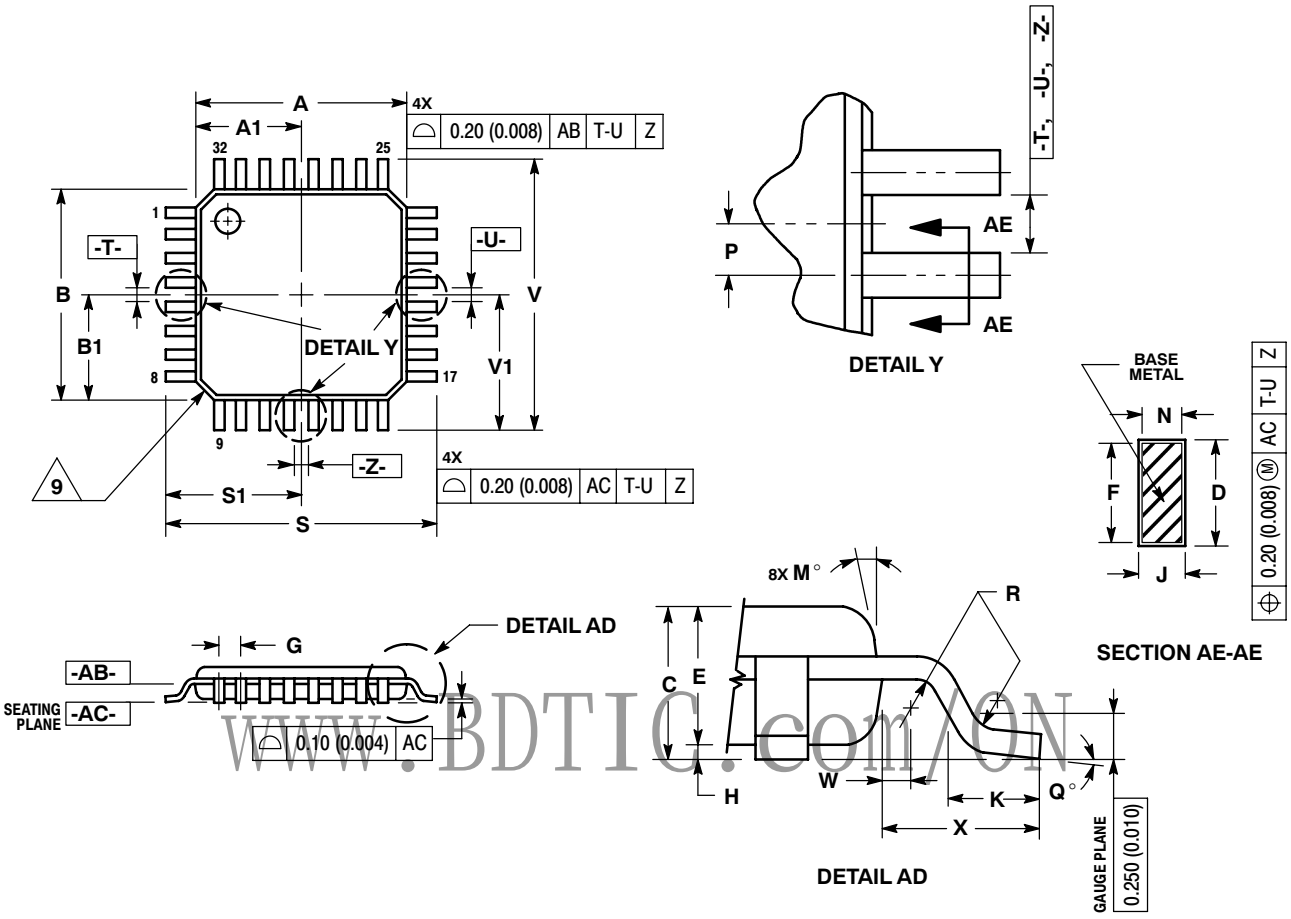
AND8020/D - Termination of ECL Logic Devices

AND8066/D - Interfacing with ECLinPS

AND8090/D - AC Characteristics of ECL Devices

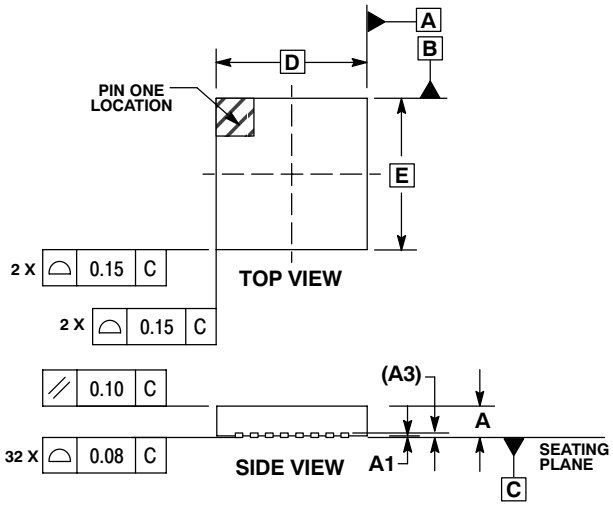
PACKAGE DIMENSIONS

32 LEAD LQFP
CASE 873A-02
ISSUE C



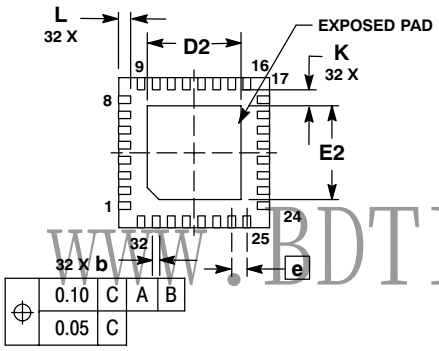
PACKAGE DIMENSIONS

QFN32 5*5*1 0.5 P
CASE 488AM-01
ISSUE O

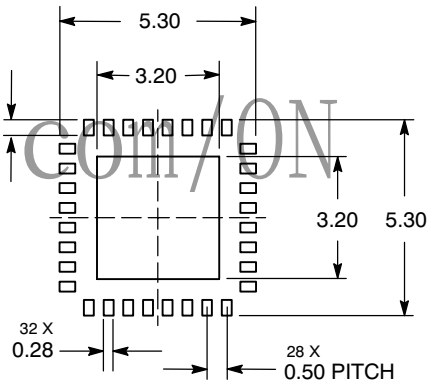


NOTES:
1. DIMENSIONS AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30 MM TERMINAL
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS		
DIM	MIN	NOM	MAX
A	0.800	0.900	1.000
A1	0.000	0.025	0.050
A3		0.200 REF	
b	0.180	0.250	0.300
D		5.00 BSC	
D2	2.950	3.100	3.250
E		5.00 BSC	
E2	2.950	3.100	3.250
e		0.500 BSC	
K	0.200	---	---
L	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.

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PUBLICATION ORDERING INFORMATION

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