

4-Bit Dual-Supply Level Translator

T30LMXT3V4T244

The T30LMXT3V4T244 is a 4-bit configurable dual-supply level translator with 3-state outputs. The A- and B- ports are designed to track two different power supply rails, V_{CCA} and V_{CCB} respectively. Both supply rails are configurable from 0.9 V to 3.6 V, allowing universal voltage level translation between the A- to B- ports.

The T30LMXT3V4T244 is a 4-bit level translator that allows non-inverting translations from A to B ports.

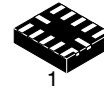
The output enable pin ($\overline{OE}$), when High, disables all the output ports by putting them in 3-state. The $\overline{OE}$ pin is designed to track V_{CCA} .

Features

- Wide V_{CCA} and V_{CCB} Operating Range: 0.9 V to 3.6 V
- Balanced Output Drive: ± 24 mA @ 3.0 V
- High-Speed w/ Balanced Propagation Delay:
2.8 ns max at 3.0 to 3.6 V
- Input/Output Pins OVT to 3.6 V
- Non-preferential V_{CC} Sequencing
- Outputs at 3-State until Active V_{CC} is Reached
- Partial Power-Off Protection
- Outputs Switch to 3-State with either V_{CC} at GND
- Typical Max Data Rates:
400 Mbps (≥ 1.8 -V to 3.3-V Translation)
200 Mbps (≥ 1.1 -V to [1.8-V, 2.5-V, 3.3-V] Translation)
150 Mbps (≥ 1.1 -V to 1.5-V Translation)
100 Mbps (≥ 1.1 -V to 1.2-V Translation)
- Small Pb-Free Packaging: UQFN12
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

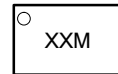
Typical Applications

- Mobile Phones, PDAs, Other Portable Devices
- Industrial Applications



UQFN12
MU SUFFIX
CASE 523AE

MARKING DIAGRAMS



XX = Specific Device Code
M = Date Code

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 8 of this data sheet.

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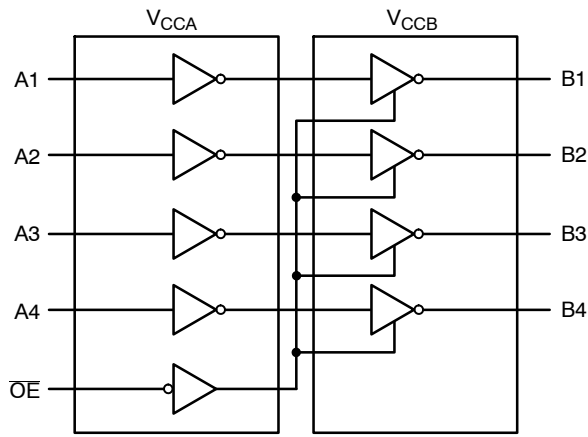
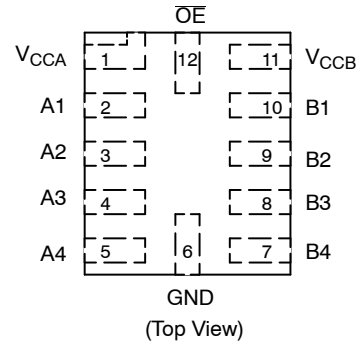


Figure 1. Logic Diagram



UQFN12

Figure 2. Pin Assignments (Top View)

PIN NAMES

PIN	FUNCTION
VCCA	A-Port DC Power Supply
VCCB	B-Port DC Power Supply
GND	Ground
OE	Output Enable
A1, A2, A3, A4	Input Ports
B1, B2, B3, B4	Output Ports

FUNCTION TABLE

Inputs	Inputs	Output
OE	A _n	B _n
L	L	L
L	H	H
H	X	3-State



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MAXIMUM RATINGS

Symbol	Rating	Value	Condition	Unit
V_{CCA}, V_{CCB}	DC Supply Voltage	-0.5 to +4.3		V
V_I	DC Input Voltage $\overline{OE}$, A, B	-0.5 to +4.3		V
V_O	DC Output Voltage (Power Down Mode) A, B	-0.5 to +4.3	$V_{CCA} = V_{CCB} = 0$	V
	(3-State Mode) A, B	-0.5 to +4.3		
	(Active Mode) A	-0.5 to $V_{CCA}+0.5$		
	(Active Mode) B	-0.5 to $V_{CCB}+0.5$		
I_{IK}	DC Input Diode Current	-50	$V_I < \text{GND}$	mA
I_{OK}	DC Output Diode Current	-50	$V_O < \text{GND}$	mA
I_O	DC Output Source/Sink Current	± 50		mA
I_{CC}	DC Supply Current Per Supply Pin	± 100		mA
I_{GND}	DC Ground Current per Ground Pin	± 100		mA
T_{STG}	Storage Temperature Range	-65 to +150		°C
θ_{JA}	Thermal Resistance (Note 1) UQFN12		143	°C/W
P_D	Power Dissipation in Still Air UQFN12		875	mW
MSL	Moisture Sensitivity Level		Level 1	-
F_R	Flammability Rating Oxygen Index: 28 to 34		UL 94 V-0 @ 0.125 in	-
V_{ESD}	ESD Withstand Voltage (Note 2) Human Body Model Charged Device Model		2 1	kV
$I_{LATCHUP}$	Latchup Performance (Note 3)		± 100	mA

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.

1. Measured with minimum pad spacing on an FR4 board, using 76mm-by-114mm, 2-ounce copper trace no air flow per JESD51-7.

2. HBM tested to ANSI/ESDA/JEDEC JS-001-2017. CDM tested to EIA/JESD22-C101-A. JEDEC recommends that ESD qualification to EIA/JESD22-A115A (Machine Model) be discontinued per JEDEC/JEP172A.

3. Tested to EIA/JESD78 Class II.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CCA}, V_{CCB}	Positive DC Supply Voltage	0.9	3.6	V
V_I	Input Voltage	GND	3.6	V
V_{IO}	Output Voltage (Power Down Mode) A, B	GND	3.6	V
	(3-State Mode) A, B	GND	3.6	
	(Active Mode) A	GND	V_{CCA}	
	(Active Mode) B	GND	V_{CCB}	
T_A	Operating Temperature Range	-40	+125	°C
$\Delta t / \Delta V$	Input Transition Rise or Rate	0	5	nS/V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.



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DC ELECTRICAL CHARACTERISTICS – INPUT VOLTAGES

Symbol	Parameter	Test Conditions	Port	V _{CCA} (V)	V _{CCB} (V)	T _A = –40 °C to +85 °C			T _A = –40 °C to +125 °C		Unit
						Min	Typ (Note 4)	Max	Min	Max	
V _{IH}	Input HIGH Voltage		OE, A	2.7 – 3.6	0.9 – 3.6	2.0	–	–	2.0	–	V
				2.3 – 2.7		1.6	–	–	1.6	–	
				0.9 – 1.95		0.65 V _{CCA}	–	–	0.65 V _{CCA}	–	
			B	0.9 – 3.6	2.7 – 3.6	2.0	–	–	2.0	–	
				2.3 – 2.7		1.6	–	–	1.6	–	
				0.9 – 1.95		0.65 V _{CCB}	–	–	0.65 V _{CCB}	–	
V _{IL}	Input LOW Voltage		OE, A	2.7 – 3.6	0.9 – 3.6	–	–	0.8	–	0.8	V
				2.3 – 2.7		–	–	0.7	–	0.7	
				0.9 – 1.95		–	–	0.35 V _{CCA}	–	0.35 V _{CCA}	
			B	0.9 – 3.6	2.7 – 3.6	–	–	0.8	–	0.8	
				2.3 – 2.7		–	–	0.7	–	0.7	
				0.9 – 1.95		–	–	0.35 V _{CCB}	–	0.35 V _{CCB}	

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. All typical values are at T_A = 25 °C.



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DC ELECTRICAL CHARACTERISTICS – OUTPUT VOLTAGES

Symbol	Parameter	Test Conditions	V _{CCA} (V)	V _{CCB} (V)	T _A = -40 °C to +85 °C			T _A = -40 °C to +125 °C		Unit
					Min	Typ (Note 4)	Max	Min	Max	
V _{OH}	Output HIGH Voltage	V _I = V _{IH} or V _{IL} :								V
		I _{OH} = -100 µA	A 0.9 – 3.6	0.9 – 3.6	V _{CCA} - 0.1	–	–	V _{CCA} - 0.1	–	
			B 0.9 – 3.6	0.9 – 3.6	V _{CCB} - 0.1	–	–	V _{CCB} - 0.1	–	
		I _{OH} = -0.5 mA	0.9	0.9	0.7	–	–	0.7	–	
		I _{OH} = -2 mA	1.1	1.1	0.85	–	–	0.85	–	
		I _{OH} = -6 mA	1.4	1.4	1.05	–	–	1.05	–	
		I _{OH} = -8 mA	1.65	1.65	1.2	–	–	1.2	–	
		I _{OH} = -12 mA	2.3	2.3	1.8	–	–	1.8	–	
			2.7	2.7	2.2	–	–	2.2	–	
		I _{OH} = -18 mA	2.3	2.3	1.7	–	–	1.7	–	
			3.0	3.0	2.4	–	–	2.4	–	
		I _{OH} = -24 mA	3.0	3.0	2.2	–	–	2.2	–	
V _{OL}	Output LOW Voltage	V _I = V _{IH} or V _{IL} :								V
		I _{OL} = 100 µA	0.9 – 3.6	0.9 – 3.6	–	–	0.1	–	0.1	
		I _{OL} = 0.5 mA	0.9	0.9	–	–	0.2	–	0.2	
		I _{OL} = 2 mA	1.1	1.1	–	–	0.25	–	0.25	
		I _{OL} = 6 mA	1.4	1.4	–	–	0.35	–	0.35	
		I _{OL} = 8 mA	1.65	1.65	–	–	0.3	–	0.3	
		I _{OL} = 12 mA	2.3	2.3	–	–	0.4	–	0.4	
			2.7	2.7	–	–	0.4	–	0.4	
		I _{OL} = 18 mA	2.3	2.3	–	–	0.4	–	0.4	
			3.0	3.0	–	–	0.4	–	0.4	
		I _{OL} = 24 mA	3.0	3.0	–	–	0.55	–	0.55	

DC ELECTRICAL CHARACTERISTICS – LEAKAGE AND SUPPLY CURRENTS

Symbol	Parameter	Test Conditions	V _{CCA} (V)	V _{CCB} (V)	T _A = -40 °C to +85 °C		T _A = -40 °C to +125 °C		Unit
					Min	Max	Min	Max	
I _I	Input Leakage Current	V _I = 3.6 V or GND	0.9 – 3.6	0.9 – 3.6	–	±0.1	–	±1.0	µA
I _{OZ}	3-State Output Leakage	$\overline{OE}$ = V _{IH} ; V _I = 3.6 V or GND, V _O = GND to 3.6 V	3.6	3.6	–	±0.1	–	±1.0	µA
I _{OFF}	Power-Off Leakage Current	V _I or V _O = 0 to 3.6 V	A 0	0.9 – 3.6	–	±0.1	–	±1.0	µA
			B 0.9 – 3.6	0	–	±0.1	–	±1.0	
I _{CCA}	Quiescent Supply Current	V _I = V _{CCA} or GND; I _O = 0	0.9 – 3.6	0.9 – 3.6	–	0.5	–	1.0	µA
			0	0.9 – 3.6	–	-0.1	–	-1	
			0.9 – 3.6	0	–	0.1	–	1.0	
I _{CCB}	Quiescent Supply Current	V _I = V _{CCB} or GND; I _O = 0	0.9 – 3.6	0.9 – 3.6	–	0.5	–	1.0	µA
			0	0.9 – 3.6	–	0.1	–	1.0	
			0.9 – 3.6	0	–	-0.1	–	-1.0	

NOTE: Connect ground before applying supply voltage V_{CCA} or V_{CCB}. This device is designed with the feature that the power-up sequence of V_{CCA} and V_{CCB} will not damage the IC.



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AC ELECTRICAL CHARACTERISTICS (Notes 5 and 6)

Symbol	Parameter	V _{CCA} (V)	T _A = −40 °C to +85 °C					T _A = −40 °C to +125 °C					Unit
			V _{CCB} (V)					V _{CCB} (V)					
			3.3	2.5	1.8	1.5	1.2	3.3	2.5	1.8	1.5	1.2	
			Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	
t _{PLH} , t _{PHL}	Propagation Delay, A to B	3.3	2.9	3.3	4.5	5.6	9.3	3.3	3.8	5.0	6.2	9.5	nS
		2.5	3.3	3.7	4.6	5.7	9.4	4.0	4.0	5.1	6.3	9.6	
		1.8	3.9	4.0	4.9	6.0	9.6	4.3	4.3	5.4	6.6	9.8	
		1.5	4.2	4.3	5.2	6.3	9.8	4.7	4.7	5.8	7.0	10	
		1.2	5.1	5.2	6.2	7.1	11.0	5.7	5.8	6.9	7.9	11.2	
	Propagation Delay, B to A	3.3	2.8	3.0	3.4	4.2	5.1	3.3	3.4	4.3	4.7	5.7	
		2.5	3.3	3.4	3.9	4.2	5.2	3.8	3.9	4.3	4.7	5.8	
		1.8	4.5	4.6	4.9	5.3	6.2	5.0	5.1	5.4	5.9	6.9	
		1.5	5.6	5.7	6.0	6.3	7.1	6.2	6.3	6.6	7.0	7.9	
		1.2	9.3	9.4	9.6	9.8	11.0	9.5	9.6	9.8	10	11.2	
t _{PZH} , t _{PZL}	Output Enable, OE to A	3.3	3.8	3.8	3.8	4.0	5.3	4.2	4.2	4.2	4.2	5.4	nS
		2.5	4.8	4.8	4.8	4.8	5.7	5.3	5.3	5.3	5.3	5.9	
		1.8	7.2	7.2	7.2	7.2	7.2	8.0	8.0	8.0	8.0	8.0	
		1.5	9.4	9.4	9.4	9.4	9.4	10.4	10.4	10.4	10.4	10.4	
		1.2	12.8	12.8	12.8	12.8	13.3	14.1	14.1	14.1	14.1	14.1	
	Output Enable, OE to B	3.3	3.8	4.7	6.8	8.7	11.3	4.2	5.2	7.5	9.6	12.4	
		2.5	4.0	4.8	7.0	8.8	11.3	4.4	5.3	7.7	9.7	12.4	
		1.8	4.6	5.3	7.4	9.2	11.7	5.1	5.9	8.2	10.2	12.9	
		1.5	5.6	5.8	7.7	9.6	12.1	6.2	6.4	8.5	10.6	13.3	
		1.2	7.7	7.9	8.9	10.0	13.5	8.5	8.7	9.8	11.0	14.7	
t _{PHZ} , t _{PLZ}	Output Disable OE to A	3.3	6.7	6.7	6.7	6.7	6.7	8.5	8.5	8.5	8.5	8.5	nS
		2.5	6.2	6.2	6.2	6.2	6.2	6.9	6.9	6.9	6.9	6.9	
		1.8	8.6	8.6	8.6	8.6	8.6	9.5	9.5	9.5	9.5	9.5	
		1.5	10.2	10.2	10.2	10.2	10.2	11.3	11.3	11.3	11.3	11.3	
		1.2	11.0	11.0	11.0	11.0	11.0	12.0	12.0	12.0	12.0	12.0	
	Output Disable, OE to B	3.3	6.2	5.2	7.4	7.8	8.3	6.9	5.8	7.7	8.2	9.0	
		2.5	6.4	6.2	6.9	7.4	8.8	7.1	6.9	7.6	8.4	10.1	
		1.8	8.1	8.2	8.7	9.1	9.5	9.0	9.1	9.6	10.1	10.5	
		1.5	9.3	8.8	9.9	10.3	9.6	10.3	10.4	10.9	11.4	10.6	
		1.2	10.2	10.4	10.9	11.3	12.4	11.3	11.5	12.0	12.5	13.7	

5. Propagation delays defined per Figure 3.

6. These parameters are guaranteed by characterization and are not production tested.

CAPACITANCE

Symbol	Parameter	Test Conditions	Typ (Note 4)	Unit
C _{IN}	Control Pin Input Capacitance	V _{CCA} = V _{CCB} = 3.3 V, V _I = 0 V or V _{CCA}	2.5	pF
C _{I/O}	I/O Pin Input Capacitance	V _{CCA} = V _{CCB} = 3.3 V, V _I = 0 V or V _{CCA}	5.0	pF
C _{PD} (Note 7)	Power Dissipation Capacitance	V _{CCA} = V _{CCB} = 3.3 V, V _I = 0 V or V _{CCA} , f = 10 MHz	12	pF

7. C_{PD} is defined as the value of the IC's equivalent capacitance from which the operating current can be calculated from:
 $I_{CC(operating)} \approx C_{PD} \times V_{CC} \times f_{IN} \times N_{SW}$ where $I_{CC} = I_{CCA} + I_{CCB}$ and N_{SW} = total number of outputs switching.

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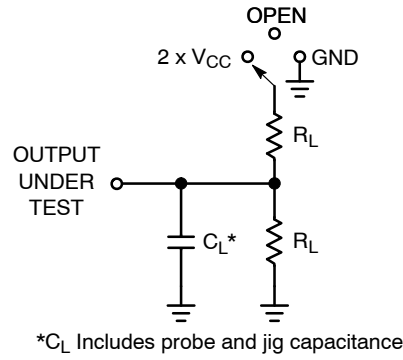


Figure 3. AC Test Circuit

Test	Switch	C _L	R _L
t _{PLH} , t _{PHL}	OPEN	15 pF	2 kΩ
t _{PLZ} , t _{PZL}	2 x V _{CC}		
t _{PHZ} , t _{PZH}	GND		
C _L includes probe and jig capacitance Pulse generator Z _O = 50 Ω Input f = 1.0 MHz; t _W = 500 ns			

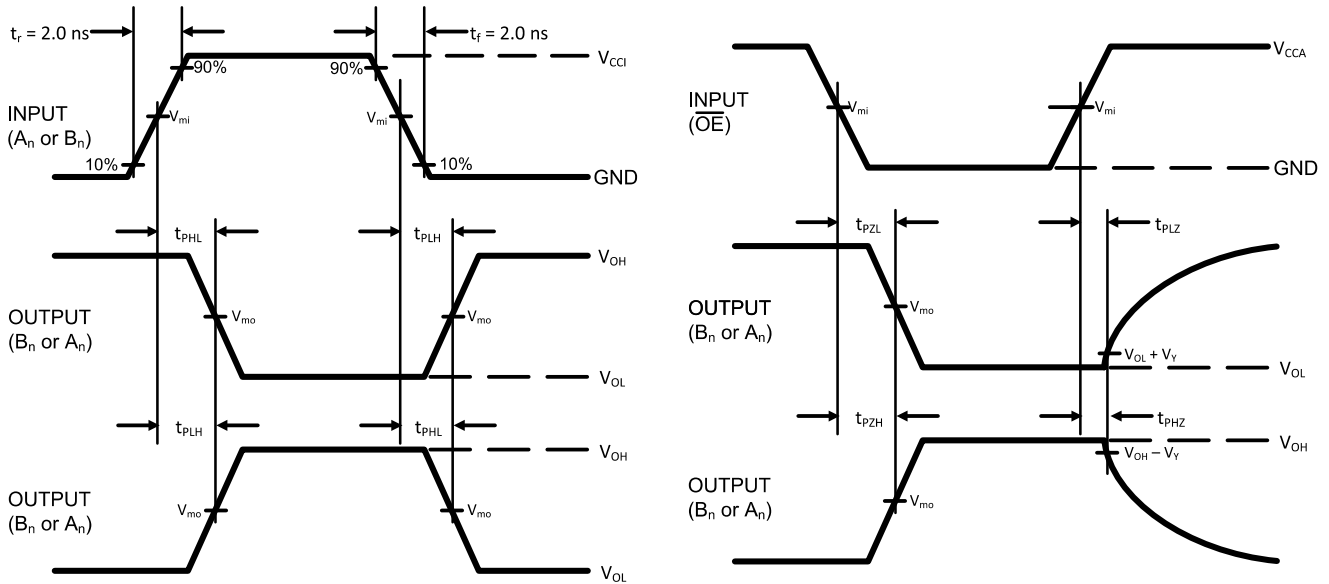


Figure 4. AC Waveforms

Symbol	V _{CC}				
	3.0 V – 3.6 V	2.3 V – 2.7 V	1.65 V – 1.95 V	1.4 V – 1.6 V	1.1 V – 1.3 V
V _{mi}	V _{CCI} /2	V _{CCI} /2	V _{CCI} /2	V _{CCI} /2	V _{CCI} /2
V _{mo}	V _{CCO} /2	V _{CCO} /2	V _{CCO} /2	V _{CCO} /2	V _{CCO} /2
V _Y	0.3 V	0.15 V	0.15 V	0.1 V	0.1 V

8. V_{CCI} is the V_{CC} associated with the input port.

9. V_{CCO} is the V_{CC} associated with the output port.

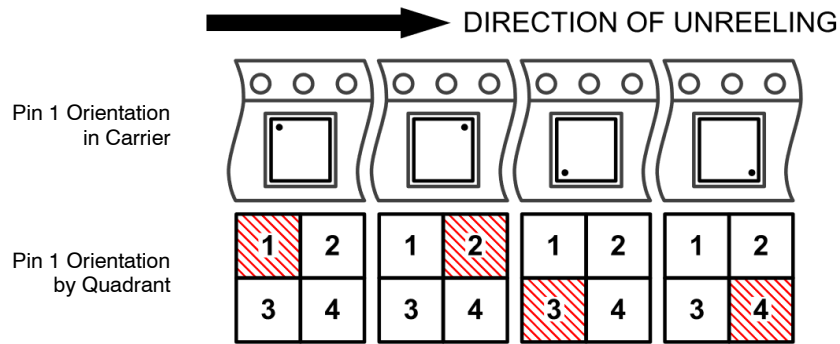
T30LMXT3V4T244

ORDERING INFORMATION

Device	Marking	Package	Pin 1 Quadrant	Shipping†
T30LMXT3V4T244MU2TAG	XC	UQFN12	1	3000 Units / 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](#).

Pin 1 Orientation in Tape and Reel



REVISION HISTORY

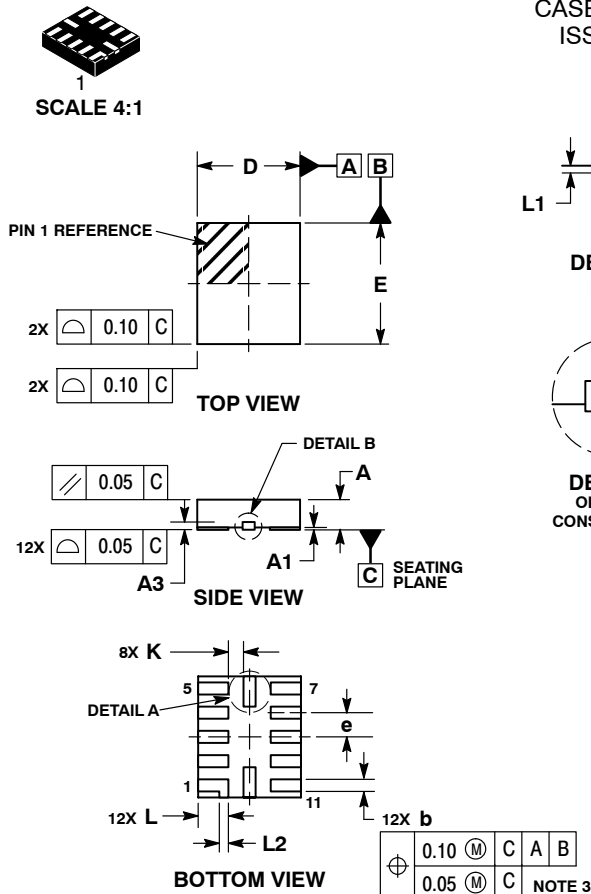
Revision	Description of Changes	Date
P4	Revision to correct one marking diagram and add one OPN marking only.	11/28/2025
0	Initial device release and remove TSSOP and SOIC package options.	3/4/2026

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.



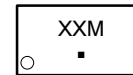
UQFN12 1.7x2.0, 0.4P
CASE 523AE
ISSUE A

DATE 11 JUN 2007


NOTES:

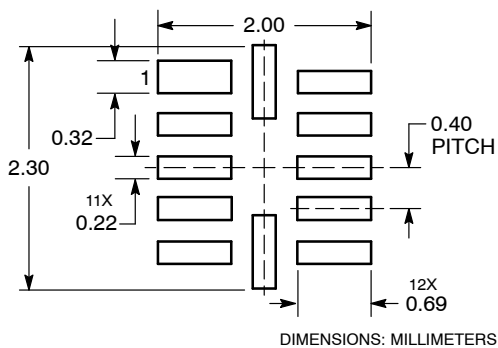
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 MM FROM TERMINAL TIP.
4. MOLD FLASH ALLOWED ON TERMINALS ALONG EDGE OF PACKAGE. FLASH 0.03 MAX ON BOTTOM SURFACE OF TERMINALS.
5. DETAIL A SHOWS OPTIONAL CONSTRUCTION FOR TERMINALS.

MILLIMETERS		
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.127 REF	
b	0.15	0.25
D	1.70 BSC	
E	2.00 BSC	
e	0.40 BSC	
K	0.20	---
L	0.45	0.55
L1	0.00	0.03
L2	0.15 REF	

GENERIC MARKING DIAGRAM*


XX = Specific Device Code
M = Date Code
■ = Pb-Free Package

*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.

MOUNTING FOOTPRINT
SOLDERMASK DEFINED


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DESCRIPTION:	UQFN12 1.7 X 2.0, 0.4P	PAGE 1 OF 1

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