

Low-Voltage Dual-Supply 4-Bit Signal Translator with Configurable Voltage Supplies and Signal Levels and 3-STATE Outputs and Independent Direction Controls

FXL4TD245

General Description

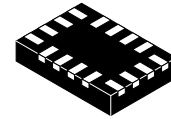
The FXL4TD245 is a configurable 4-bit dual-voltage-supply translator designed for both uni-directional and bi-directional voltage translation between two logic levels. The device allows translation between voltages as high as 3.6 V to as low as 1.1 V. The A port tracks the V_{CCA} level, and the B port tracks the V_{CCB} level. This allows for bi-directional voltage translation over a variety of voltage levels: 1.2 V, 1.5 V, 1.8 V, 2.5 V, and 3.3 V.

The device remains in 3-STATE until both V_{CC} s reach active levels allowing either V_{CC} to be powered-up first. Internal power down control circuits place the device in 3-STATE if either V_{CC} is removed.

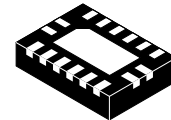
The Transmit/Receive ($T/\bar{R}$) inputs independently determine the direction of data through each of the four bits. The $\overline{OE}$ input, when HIGH, disables both the A and B Ports by placing them in a 3-STATE condition. The FXL4TD245 is designed so that the control pins ($T/\bar{R}$ and $\overline{OE}$) are supplied by V_{CCA} .

Features

- Bi-directional Interface between Any 2 Levels from 1.1 V to 3.6 V
- Fully Configurable: Inputs Track V_{CC} Level
- Non-preferential Power-up Sequencing; either V_{CC} May be Powered-up First
- Outputs Remain in 3-STATE until Active V_{CC} Level is Reached
- Outputs Switch to 3-STATE if Either V_{CC} is at GND
- Power-off Protection
- Control Inputs ($T/\bar{R}$, $\overline{OE}$) Levels are Referenced to V_{CCA} Voltage
- Packaged in 16-terminal DQFN (2.5 mm x 3.5 mm) and 16-terminal MicroMLP (1.8 mm x 2.6 mm)
- ESD Protections Exceeds:
 - ◆ 4 kV HBM ESD (per JESD22-A114 & Mil Std 883e 3015.7)
 - ◆ 8 kV HBM I/O to GND ESD (per JESD22-A114 & Mil Std 883e 3015.7)
 - ◆ 1 kV CDM ESD (per ESD STM 5.3)
 - ◆ 200 V MM ESD (per JESD22-A115 & ESD STM5.2)
- These Devices are Pb-Free, Halide Free and are RoHS Compliant

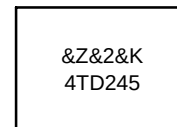
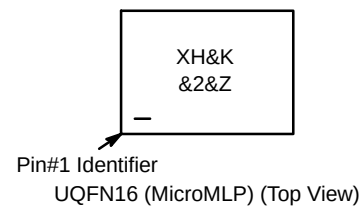


UQFN16 1.80x2.60x0.50, 0.40P
CASE 523BF



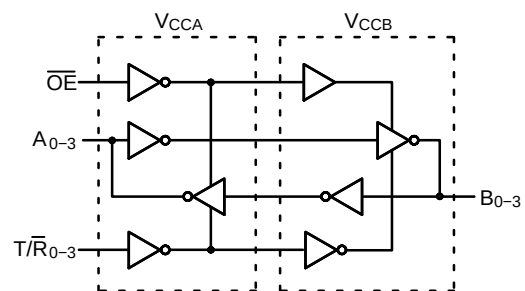
WQFN16 3.5x2.5, 0.5P
CASE 510CC

MARKING DIAGRAM



4TD245, XH = Specific Device Code
 &Z = Assembly Plant Code
 &2 = 2-Digit Date Code
 &K = 2-Digits Lot Run Traceability Code

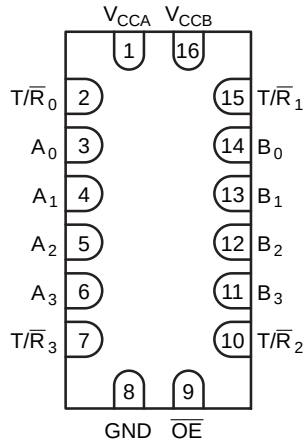
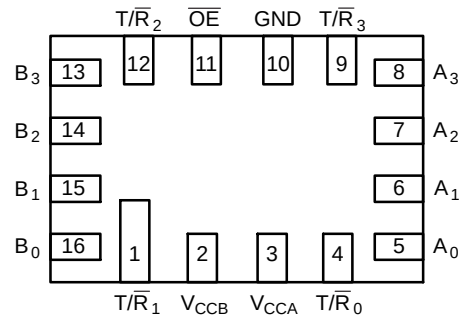
FUNCTIONAL DIAGRAM



ORDERING INFORMATION

See detailed ordering and shipping information on page 8 of this data sheet.

Connection Diagrams

Figure 1. DQFN Pad Assignments
(Top Through View)Figure 2. MicroMLP Pad Assignments
(Top Through View)

PIN ASSIGNMENT

DQFN Pin #	μMLP Pin #	Terminal Name	Description
1	3	V _{CCA}	Side A Power Supply
2	4	T/ $\overline{R}_0$	Transmit/Receive Input
3–6	5–8	A ₀ –A ₃	Side A Inputs or 3-STATE Outputs
7	9	T/ $\overline{R}_3$	Transmit/Receive Input
8	10	GND	Ground
9	11	$\overline{OE}$	Output Enable Input
10	12	T/ $\overline{R}_2$	Transmit/Receive Input
11–14	13–16	B ₃ –B ₀	Side B Inputs or 3-STATE Outputs
15	1	T/ $\overline{R}_1$	Transmit/Receive Input
16	2	V _{CCB}	Side B Power Supply

TRUTH TABLE

Inputs					Outputs
$\overline{OE}$	T/ $\overline{R}_0$	T/ $\overline{R}_1$	T/ $\overline{R}_2$	T/ $\overline{R}_3$	
L	L	X	X	X	B0 Data to A0 Output
L	H	X	X	X	A0 Data to B0 Output
L	X	L	X	X	B1 Data to A1 Output
L	X	H	X	X	A1 Data to B1 Output
L	X	X	L	X	B2 Data to A2 Output
L	X	X	H	X	A2 Data to B2 Output
L	X	X	X	L	B3 Data to A3 Output
L	X	X	X	H	A3 Data to B3 Output
H	X	X	X	X	3-State

H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care

Power-Up/Power-Down Sequencing

FXL translators offer an advantage in that either V_{CC} may be powered up first. This benefit derives from the chip design. When either V_{CC} is at 0 volts, outputs are in a HIGH-Impedance state. The control inputs (T/ $\overline{R}_n$ and $\overline{OE}$) are designed to track the V_{CCA} supply. A pull-up resistor tying $\overline{OE}$ to V_{CCA} should be used to ensure that bus contention, excessive currents, or oscillations do not occur during power-up/power-down. The size of the pull-up resistor is based upon the current-sinking capability of the $\overline{OE}$ driver.

The recommended power-up sequence is the following:

1. Apply power to either V_{CC}.
2. Apply power to the T/ $\overline{R}_n$ inputs (Logic HIGH for A-to-B operation; Logic LOW for B-to-A operation) and to the respective data inputs (A Port or B Port). This may occur at the same time as Step 1.
3. Apply power to other V_{CC}.
4. Drive the $\overline{OE}$ input LOW to enable the device.

The recommended power-down sequence is the following:

1. Drive $\overline{OE}$ input HIGH to disable the device.
2. Remove power from either V_{CC}.
3. Remove power from other V_{CC}.

FXL4TD245

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Conditions	Rating
V_{CCA} to V_{CCB}	Supply Voltage		-0.5 V to +4.6 V
V_I	DC Input Voltage	I/O Port A	-0.5 V to +4.6 V
		I/O Port B	-0.5 V to +4.6 V
		Control Inputs ($T/\bar{R}_n$, $\overline{OE}$)	-0.5 V to +4.6 V
V_O	Output Voltage (Note 1)	Outputs 3-STATE	-0.5 V to +4.6 V
		Outputs Active (A_n)	-0.5 V to $V_{CCA} + 0.5$ V
		Outputs Active (B_n)	-0.5 V to $V_{CCB} + 0.5$ V
I_{IK}	DC Input Diode Current	$V_I < 0$ V	-50 mA
I_{OK}	DC Output Diode Current	$V_O < 0$ V	-50 mA
		$V_O > V_{CC}$	+50 mA
I_{OH}/I_{OL}	DC Output Source/Sink Current		-50 mA / +50 mA
I_{CC}	DC V_{CC} or Ground Current per Supply Pin		± 100 mA
T_{STG}	Storage Temperature Range		-65 °C to +150 °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.

1. I_O Absolute Maximum Rating must be observed.

RECOMMENDED OPERATING CONDITIONS (Note 2)

Symbol	Parameter	Conditions		Value
V_{CCA} or V_{CCB}	Power Supply Operating			1.1 V to 3.6 V
	Input Voltage	Port A		0.0 to 3.6 V
		Port B		0.0 to 3.6 V
		Control Inputs ($T/\bar{R}_n$, $\overline{OE}$)		0.0 to V_{CCA}
	Output Current in I_{OH}/I_{OL}	V_{CC}	3.0 V to 3.6 V	± 24 mA
			2.3 V to 2.7 V	± 18 mA
			1.65 V to 1.95 V	± 6 mA
			1.40 V to 1.65 V	± 2 mA
			1.1 V to 1.4 V	± 0.5 mA
T_A	Free Air Operating Temperature			-40 to +85 °C
$\Delta V/\Delta t$	Minimum Input Edge Rate	$V_{CCA/B} = 1.1$ V to 3.6 V		10 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.

2. All unused inputs and I/O pins must be held at V_{CCI} or GND.

FXL4TD245

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CCA} (V)	V _{CCB} (V)	Min	Max	Unit
V _{IH}	High Level Input Voltage (Note 3)	Data Inputs A _n , B _n	2.7–3.6	1.1–3.6	2.0	–	V
			2.3–2.7		1.6	–	
			1.65–2.3		0.65 × V _{CCI}	–	
			1.4–1.65		0.65 × V _{CCI}	–	
			1.1–1.4		0.9 × V _{CCI}	–	
		Control Pins $\overline{OE}$, T/ $\overline{R_n}$ (Referenced to V _{CCA})	2.7–3.6	1.1–3.6	2.0	–	
			2.3–2.7		1.6	–	
			1.65–2.3		0.65 × V _{CCA}	–	
			1.4–1.65		0.65 × V _{CCA}	–	
			1.1–1.4		0.9 × V _{CCA}	–	
V _{IL}	Low Level Input Voltage (Note 3)	Data Inputs A _n , B _n	2.7–3.6	1.1–3.6	–	0.8	V
			2.3–2.7		–	0.7	
			1.65–2.3		–	0.35 × V _{CCI}	
			1.4–1.65		–	0.35 × V _{CCI}	
			1.1–1.4		–	0.1 × V _{CCI}	
		Control Pins $\overline{OE}$, T/ $\overline{R_n}$ (Referenced to V _{CCA})	2.7–3.6	1.1–3.6	–	0.8	
			2.3–2.7		–	0.7	
			1.65–2.3		–	0.35 × V _{CCA}	
			1.4–1.65		–	0.35 × V _{CCA}	
			1.1–1.4		–	0.1 × V _{CCA}	
V _{OH}	High Level Output Voltage (Note 4)	I _{OH} = –100 μA	1.1–3.6	1.1–3.6	V _{CC0} –0.2	–	V
		I _{OH} = –12 mA	2.7	2.7	2.2	–	
		I _{OH} = –18 mA	3.0	3.0	2.4	–	
		I _{OH} = –24 mA	3.0	3.0	2.2	–	
		I _{OH} = –6 mA	2.3	2.3	2.0	–	
		I _{OH} = –12 mA	2.3	2.3	1.8	–	
		I _{OH} = –18 mA	2.3	2.3	1.7	–	
		I _{OH} = –6 mA	1.65	1.65	1.25	–	
		I _{OH} = –2 mA	1.4	1.4	1.05	–	
		I _{OH} = –0.5 mA	1.1	1.1	0.75 × V _{CC0}	–	
V _{OL}	Low Level Output Voltage (Note 4)	I _{OL} = 100 μA	1.1–3.6	1.1–3.6	–	0.2	V
		I _{OL} = 12 mA	2.7	2.7	–	0.4	
		I _{OL} = 18 mA	3.0	3.0	–	0.4	
		I _{OL} = 24 mA	3.0	3.0	–	0.55	
		I _{OL} = 12 mA	2.3	2.3	–	0.4	
		I _{OL} = 18 mA	2.3	2.3	–	0.6	
		I _{OL} = 6 mA	1.65	1.65	–	0.3	
		I _{OL} = 2 mA	1.4	1.4	–	0.35	
		I _{OL} = 0.5 mA	1.1	1.1	–	0.3 × V _{CC0}	
I _I	Input Leakage Current. Control Pins	V _I = V _{CCA} or GND	1.1–3.6	3.6	–	±1.0	μA

DC ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Conditions	V _{CCA} (V)	V _{CCB} (V)	Min	Max	Unit
I _{OFF}	Power Off Leakage Current	A _n , V _I or V _O = 0 V to 3.6 V	0	3.6	–	±10.0	μA
		B _n , V _I or V _O = 0 V to 3.6 V	3.6	0	–	±10.0	
I _{OZ}	3-STATE Output Leakage (Note 5) 0 ≤ V _O ≤ 3.6V V _I = V _{IH} or V _{IL}	A _n , B _n , $\overline{OE}$ = V _{IH}	3.6	3.6	–	±10.0	μA
		B _n , $\overline{OE}$ = Don't Care	0	3.6	–	+10.0	
		A _n , $\overline{OE}$ = Don't Care	3.6	0	–	+10.0	
I _{CCA/B}	Quiescent Supply Current (Note 6)	V _I = V _{CC1} or GND; I _O = 0	1.1–3.6	1.1–3.6	–	20.0	μA
I _{CCZ}	Quiescent Supply Current (Note 6)	V _I = V _{CC1} or GND; I _O = 0	1.1–3.6	1.1–3.6	–	20.0	μA
I _{CCA}	Quiescent Supply Current	V _I = V _{CCA} or GND; I _O = 0	0	1.1–3.6	–	–10.0	μA
		V _I = V _{CCA} or GND; I _O = 0	1.1–3.6	0	–	10.0	μA
I _{CCB}	Quiescent Supply Current	V _I = V _{CCB} or GND; I _O = 0	1.1–3.6	0	–	–10.0	μA
		V _I = V _{CCB} or GND; I _O = 0	0	1.1–3.6	–	10.0	μA
ΔI _{CCA/B}	Increase in I _{CC} per Input; Other Inputs at V _{CC} or GND	V _{IH} = 3.0	3.6	3.6	–	500	μA

3. V_{CC1} = the V_{CC} associated with the data input under test.
4. V_{CC0} = the V_{CC} associated with the output under test.
5. Don't care = Any valid logic level.
6. Reflects current per supply, V_{CCA} or V_{CCB}.

FXL4TD245

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	T _A = -40 °C to +85 °C										Unit
		V _{CCB} = 3.0 V to 3.6 V		V _{CCB} = 2.3 V to 2.7 V		V _{CCB} = 1.65 V to 1.95 V		V _{CCB} = 1.4 V to 1.6 V		V _{CCB} = 1.1 V to 1.3 V		
		Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Typ	

$V_{CCA} = 3.0\text{ V to }3.6\text{ V}$

t_{PLH}, t_{PHL}	Propagation Delay A to B	0.2	3.5	0.3	3.9	0.5	5.4	0.6	6.8	1.4	22.0	ns
	Propagation Delay B to A	0.2	3.5	0.2	3.8	0.3	4.0	0.5	4.3	0.8	13.0	
t_{PZH}, t_{PZL}	Output Enable OE to B	0.5	4.0	0.7	4.4	1.0	5.9	1.0	6.4	1.5	17.0	ns
	Output Enable OE to A	0.5	4.0	0.5	4.0	0.5	4.0	0.5	4.0	0.5	4.0	
t_{PHZ}, t_{PLZ}	Output Disable OE to B	0.2	3.8	0.2	4.0	0.7	4.8	1.5	6.2	2.0	17.0	ns
	Output Disable OE to A	0.2	3.7	0.2	3.7	0.2	3.7	0.2	3.7	0.2	3.7	

$V_{CCA} = 2.3\text{ V to }2.7\text{ V}$

t_{PLH}, t_{PHL}	Propagation Delay A to B	0.2	3.8	0.4	4.2	0.5	5.6	0.8	6.9	1.4	22.0	ns
	Propagation Delay B to A	0.3	3.9	0.4	4.2	0.5	4.5	0.5	4.8	1.0	7.0	
t_{PZH}, t_{PZL}	Output Enable OE to B	0.6	4.2	0.8	4.6	1.0	6.0	1.0	6.8	1.5	17.0	ns
	Output Enable OE to A	0.6	4.5	0.6	4.5	0.6	4.5	0.6	4.5	0.6	4.5	
t_{PHZ}, t_{PLZ}	Output Disable OE to B	0.2	4.1	0.2	4.3	0.7	4.8	1.5	6.7	2.0	17.0	ns
	Output Disable OE to A	0.2	4.0	0.2	4.0	0.2	4.0	0.2	4.0	0.2	4.0	

$V_{CCA} = 1.65\text{ V to }1.95\text{ V}$

t_{PLH}, t_{PHL}	Propagation Delay A to B	0.3	4.0	0.5	4.5	0.8	5.7	0.9	7.1	1.5	22.0	ns
	Propagation Delay B to A	0.5	5.4	0.5	5.6	0.8	5.7	1.0	6.0	1.2	8.0	
t_{PZH}, t_{PZL}	Output Enable OE to B	0.6	5.2	0.8	5.4	1.2	6.9	1.2	7.2	1.5	18.0	ns
	Output Enable OE to A	1.0	6.7	1.0	6.7	1.0	6.7	1.0	6.7	1.0	6.7	
t_{PHZ}, t_{PLZ}	Output Disable OE to B	0.2	5.1	0.2	5.2	0.8	5.2	1.5	7.0	2.0	17.0	ns
	Output Disable OE to A	0.5	5.0	0.5	5.0	0.5	5.0	0.5	5.0	0.5	5.0	

$V_{CCA} = 1.4\text{ V to }1.6\text{ V}$

t_{PLH}, t_{PHL}	Propagation Delay A to B	0.5	4.3	0.5	4.8	1.0	6.0	1.0	7.3	1.5	22.0	ns
	Propagation Delay B to A	0.6	6.8	0.8	6.9	0.9	7.1	1.0	7.3	1.3	9.5	
t_{PZH}, t_{PZL}	Output Enable OE to B	1.1	7.5	1.1	7.6	1.3	7.7	1.4	7.9	2.0	20.0	ns
	Output Enable OE to A	1.0	7.5	1.0	7.5	1.0	7.5	1.0	7.5	1.0	7.5	
t_{PHZ}, t_{PLZ}	Output Disable OE to B	0.4	6.1	0.4	6.2	0.9	6.2	1.5	7.5	2.0	18.0	ns
	Output Disable OE to A	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0	

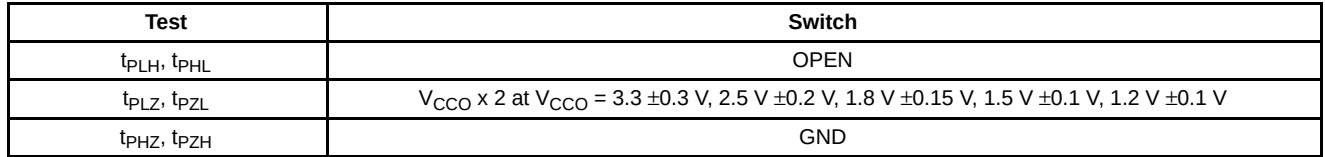
$V_{CCA} = 1.1\text{ V to }1.3\text{ V}$

t_{PLH}, t_{PHL}	Propagation Delay A to B	0.8	13.0	1.0	7.0	1.2	8.0	1.3	9.5	2.0	24.0	ns
	Propagation Delay B to A	1.4	22.0	1.4	22.0	1.5	22.0	1.5	22.0	2.0	24.0	
t_{PZH}, t_{PZL}	Output Enable OE to B	1.0	12.0	1.0	9.0	2.0	10.0	2.0	11.0	2.0	24.0	ns
	Output Enable OE to A	2.0	22.0	2.0	22.0	2.0	22.0	2.0	22.0	2.0	22.0	
t_{PHZ}, t_{PLZ}	Output Disable OE to B	1.0	15.0	0.7	7.0	1.0	8.0	2.0	10.0	2.0	20.0	ns
	Output Disable OE to A	2.0	15.0	2.0	12.0	2.0	12.0	2.0	12.0	2.0	12.0	

CAPACITANCE

Symbol	Parameter	Conditions	$T_A = +25\text{ }^{\circ}\text{C}$	Unit
			Typical	
C_{IN}	Input Capacitance Control Pins ($\overline{OE}$, T/R)	$V_{CCA} = V_{CCB} = 3.3\text{ V}$, $V_I = 0\text{ V}$ or $V_{CCA/B}$	4.0	pF
$C_{I/O}$	Input/Output Capacitance A_n , B_n Ports	$V_{CCA} = V_{CCB} = 3.3\text{ V}$, $V_I = 0\text{ V}$ or $V_{CCA/B}$	5.0	pF
C_{PD}	Power Dissipation Capacitance	$V_{CCA} = V_{CCB} = 3.3\text{ V}$, $V_I = 0\text{ V}$ or V_{CC} , $F = 10\text{ MHz}$	20.0	pF

7. For V_{mi} : $V_{CCI} = V_{CCA}$ for Control Pins $T/\overline{R}$ and $\overline{OE}$ or $V_{CCA} / 2$.



AC LOAD TABLE

Input $t_R = t_F = 2.0$ ns, 10% to 90%
 Input $t_R = t_F = 2.5$ ns, 10% to 90%, @ $V_I = 3.0$ V to 3.6 V only

Input $t_R = t_F = 2.0$ ns, 10% to 90%
 Input $t_R = t_F = 2.5$ ns, 10% to 90%, @ $V_I = 3.0$ V to 3.6 V only

Input $t_R = t_F = 2.0$ ns, 10% to 90%
 Input $t_R = t_F = 2.5$ ns, 10% to 90%, @ $V_I = 3.0$ V to 3.6 V only

Figure 6. 3-STATE Output High Enable and Disable Times for Low Voltage Logic

Symbol	V _{CC}				
	3.3 V ±0.3 V	2.5 V ±0.2 V	1.8 V ±0.15 V	1.5 V ±0.1 V	1.2 V ±0.1 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 _X	V _{OH} - 0.3 V	V _{OH} - 0.15 V	V _{OH} - 0.15 V	V _{OH} - 0.1 V	V _{OH} - 0.1 V
V _Y	V _{OL} + 0.3 V	V _{OL} + 0.15 V	V _{OL} + 0.15 V	V _{OL} + 0.1 V	V _{OL} + 0.1 V

7. For V_{mi} : $V_{CCI} = V_{CCA}$ for Control Pins $\overline{T/R}$ and $\overline{OE}$ or $V_{CCA} / 2$.

FXL4TD245

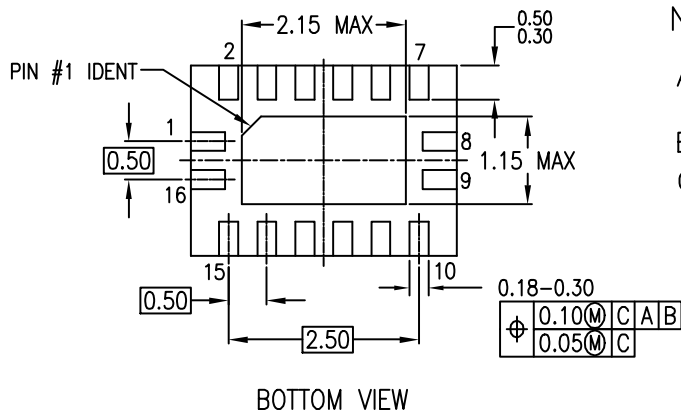
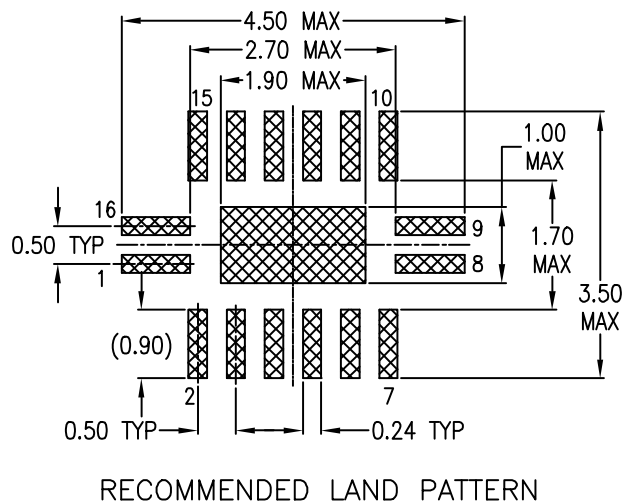
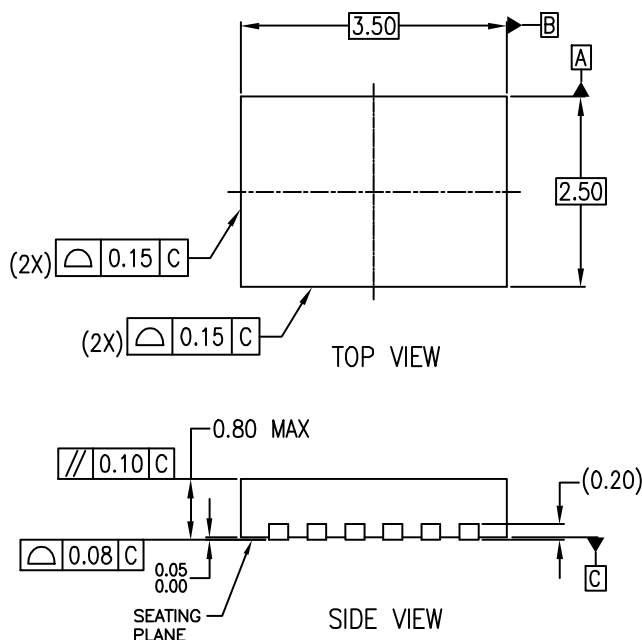
ORDERING INFORMATION

Order Number	Package Number	Package Description	Shipping [†]
FXL4TD245BQX	MLP016E	16-Terminal Depopulated Quad Very-Thin Flat Pack, No Leads (DQFN), JEDEC MO-241, 2.5 mm x 3.5 mm (Pb-Free, Halide Free)	3000 / Tape & Reel
FXL4TD245UMX	UMLP16A	16-Terminal Quad, Ultrathin, Molded Leadless Package (UMLP), 1.8 mm x 2.6 mm, 0.4 mm Pitch (Pb-Free, Halide Free)	5000 / 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.

WQFN16 3.5x2.5, 0.5P
CASE 510CC
ISSUE O

DATE 31 AUG 2016

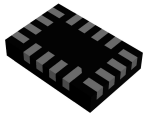


NOTES:

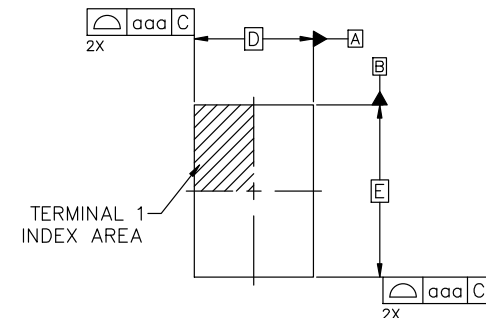
- A. CONFORMS TO JEDEC REGISTRATION
MO-241, VARIATION AB
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER
ASME Y14.5M, 1994

DOCUMENT NUMBER:	98AON13644G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	WQFN16 3.5X2.5, 0.5P	PAGE 1 OF 1

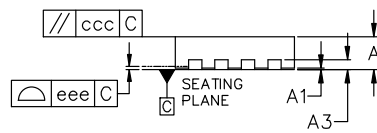
onsemi and **onsemi** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** 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. **onsemi** does not convey any license under its patent rights nor the rights of others.


UQFN16 1.80x2.60x0.50, 0.40P
CASE 523BF
ISSUE A

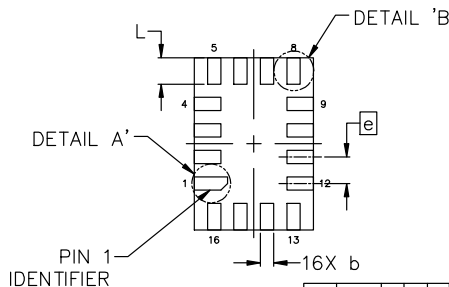
DATE 06 MAY 2024



TOP VIEW



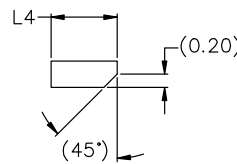
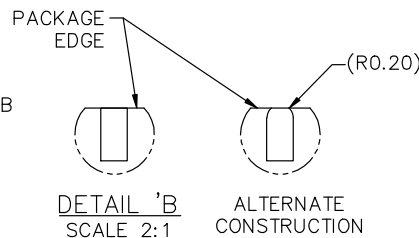
SIDE VIEW



BOTTOM VIEW

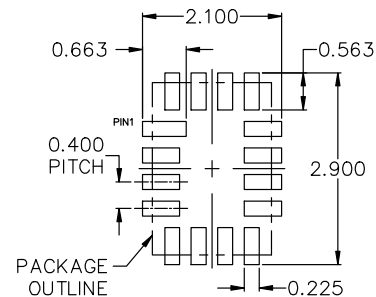
NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5M-2018.
2. ALL DIMENSIONS ARE IN MILLIMETERS, DEGREES IN ANGLE.
3. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.
4. TERMINAL SHAPE MAY VARY ACCORDING TO PACKAGE SUPPLIER, SEE TERMINAL SHAPE VARIANTS.


DETAIL 'A'
SCALE 2:1

DETAIL 'B'
SCALE 2:1

ALTERNATE
CONSTRUCTION

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.45	0.50	0.55
A1	0.00	---	0.05
A3	0.10	0.15	0.20
b	0.15	0.20	0.25
D	1.80 BSC		
E	2.60 BSC		
e	0.40 BSC		
L	0.35	0.40	0.45
L4	0.45	0.50	0.55
TOLERANCES FOR FEATURE CONTROL FRAME			
aaa	0.05		
bbb	0.10		
ccc	0.10		
ddd	0.05		
eee	0.05		



RECOMMENDED MOUNTING FOOTPRINT*

*FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

DOCUMENT NUMBER: 98AON13709G

Electronic versions are uncontrolled except when accessed directly from the Document Repository.
Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.

DESCRIPTION: UQFN16 1.80x2.60x0.50, 0.40P

PAGE 1 OF 1

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi 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. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales