

**MN54LCX245-X REV 0A0**

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**Low Voltage Octal Bidirectional Transceiver With 5V Tolerant Inputs and Outputs**

**General Description**

The LCX245 contains eight non-inverting bidirectional buffers with Tri-State outputs and is intended for bus oriented applications. The device is designed for low voltage (3.3V) Vcc applications with capability of interfacing to a 5V signal environment. The T/R input determines the direction of data flow through the device. The OE input disables both the A and B ports by placing them in a high impedance state.

The LCX245 is fabricated with an advanced CMOS technology to achieve high speed operation while maintaining CMOS low power dissipation.

**Industry Part Number**

54LCX245

**NS Part Numbers**

54LCX245E-QML\*  
54LCX245J-QML\*\*  
54LCX245W-QML\*\*\*

**Prime Die**

LCX245

**Controlling Document**

5962-97543

**Processing**

MIL-STD-883, Method 5004

**Quality Conformance Inspection**

MIL-STD-883, Method 5005

Subgrp	Description	Temp ( °C)
1	Static tests at	+25 C
2	Static tests at	+125 C
3	Static tests at	-55 C
4	Dynamic tests at	+25 C
5	Dynamic tests at	+125 C
6	Dynamic tests at	-55 C
7	Functional tests at	+25 C
8A	Functional tests at	+125 C
8B	Functional tests at	-55 C
9	Switching tests at	+25 C
10	Switching tests at	+125 C
11	Switching tests at	-55 C

**Features**

- 5V tolerant inputs and outputs
- Power down high impedance inputs and outputs
- Supports live insertion / withdrawl
- Standard Military Drawing (SMD)
  - LCX245: 5962-9754302Q2A\*, QRA\*\*, QSA\*\*\*

**(Absolute Maximum Ratings)**

(Note 1)

Supply Voltage (Vcc)	-0.5V to +7.0V
DC Input Diode Current (Iik) Vi < GND	-50 mA
DC Input Voltage (Vi)	-0.5V to 7.0V
DC Output Diode Current (Iok) Vo < GND Vo > Vcc	-50 mA +50 mA
DC Output Voltage (Vo) Output in High or Low State (Note 2) Output in TRI-STATE	-0.5V to Vcc +0.5V -0.5V to 7.0V
DC Output Source or Sink Current (Io)	±50 mA
DC Vcc or Ground Current (Icc or Ignd)	±200 mA
Storage Temperature (Tstg)	-65 C to +150 C
Junction Temperature (Tj) CDIP	175 C

Note 1: Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.

Note 2: The DC output current (Io) absolute maximum rating must be observed.

**Recommended Operating Conditions**

Supply Voltage (Vcc) Operating	2.7V to 3.6V
Input Voltage (Vi)	0V to 5.5V
Output Voltage (Vo) High or low state Tri-State	0V to Vcc 0V to 5.5V
Operating Temperature	-55 C to +125 C
Input Edge Rate (Delta t / Delta V) Vin = 0.8V to 2.0V, Vcc = 3.0 V	0 ns/V to 10 ns/V
Output Current (Ioh / Iol) Vcc = 3.0V to 3.6V Vcc = 2.7V	±24mA ±12mA
Minimum high-level input voltage (Vih) Vcc = 2.7V to 3.6V	2.0V
Maximum low-level input voltage (Vil) Vcc = 2.7V to 3.6V	0.8V

## Electrical Characteristics

### DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)  
DC: VCC 2.7 V to 3.6V, Temp. Range: -55C to 125C.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IIH	High Level Input Current	VCC=3.6V, VM=5.5V	1, 2	$\overline{OE}$ , T/ $\overline{R}$		5.0	uA	1, 2, 3
IIL	Low Level Input Current	VCC=3.6V, VM=0.0V	1, 2	$\overline{OE}$ , T/ $\overline{R}$		-5.0	uA	1, 2, 3
VOL	Low level output voltage	VCC=2.7V, VIL=0.8V, VIH=2.0V, IOL=100.0uA	1, 2	OUTPUT		.20	V	1, 2, 3
		VCC=3.6V, VIL=0.8V, VIH=2.0V, IOL=100.0uA	1, 2	OUTPUT		.20	V	1, 2, 3
		VCC=2.7V, VIL=0.8V, VIH=2.0V, IOL=12.0mA	1, 2	OUTPUT		.40	V	1, 2, 3
		VCC=3.0V, VIL=0.8V, VIH=2.0V, IOL=24.0mA	1, 2	OUTPUT		.55	V	1, 2, 3
VOH	High Level Output Voltage	VCC=2.7V, VIH=2.0V, VIL=0.8V, IOH=-100.0uA	1, 2	OUTPUT	2.5		V	1, 2, 3
		VCC=3.6V, VIH=2.0V, VIL=0.8V, IOH=-100.0uA	1, 2	OUTPUT	3.4		V	1, 2, 3
		VCC=2.7V, VIH=2.0V, VIL=0.8V, IOH=-12.0mA	1, 2	OUTPUT	2.2		V	1, 2, 3
		VCC=3.0V, VIH=2.0V, VIL=0.8V, IOH=-12mA	1, 2	OUTPUT	2.4		V	1, 2, 3
		VCC=3.0V, VIH=2.0V, VIL=0.8V, IOH=-24.0mA	1, 2	OUTPUT	2.2		V	1, 2, 3
IOZH	Maximum TRI-STATE Leakage Current	VCC=2.7V, VM=5.5V, VINL=0.0V, VINH=2.7V, VIH=2.0V	1, 2	OUTPUT		5.0	uA	1, 2, 3
		VCC=3.6V, VM=5.5V, VINL=0.0V, VINH=3.6V, VIH=2.0V	1, 2	OUTPUT		5.0	uA	1, 2, 3
IOZL	Maximum TRI-STATE Leakage Current	VCC=2.7V, VM=0.0V, VINH=2.7V, VINL=0.0V, VIH=2.0V	1, 2	OUTPUT		-5.0	uA	1, 2, 3
		VCC=3.6V, VM=0.0V, VINH=3.6V, VINL=0.0V, VIH=2.0V	1, 2	OUTPUT		-5.0	uA	1, 2, 3
ICCF	Quiescent Supply Current	VCC=3.6V, VINH=3.6V, VINL=0.0V	1, 2	VCC		10.0	uA	1, 2, 3
ICCZR	Supply Current Outputs Tri-State	VCC=3.6V, force 5.5V on all inputs and outputs	1, 2	VCC	-10.0	10.0	uA	1, 2, 3
		VCC=2.7V, force 5.5V on all inputs and outputs	1, 2	VCC	-10.0	10.0	uA	1, 2, 3
ICCT	Supply Current per Input (TTL Levels)	VCC=3.6V, VINT=VCC-0.6V, VINL=0.0V	1, 2	VCC		0.5	mA	1, 2, 3
		VCC=2.7V, VINT=VCC-0.6V, VINL=0.0V	1, 2	VCC		0.5	mA	1, 2, 3

## Electrical Characteristics

### DC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)  
DC: VCC 2.7 V to 3.6V, Temp. Range: -55C to 125C.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
I <sub>OFF</sub>	Power-Off Leakage Current	VCC=0.0V, VM=5.5V, VINL=0.0V	1, 2	INPUTS/ OUTPUTS		100.0	uA	1, 2, 3
V <sub>IKL</sub>	Clamp Diode Voltage	VCC=3.0V, IM=-18mA, VINL=0.0V, VINH=3.0V	1, 2	$\overline{OE}$ , T/ $\overline{R}$		-1.2	V	1, 2, 3
V <sub>OLP</sub>	Quiet Output Maximum Dynamic VOL	VCC=3.0V, LOAD 50pF / 500 OHMS	5	OUTPUT		1.0	V	4
V <sub>OLV</sub>	Quiet Output Minimum Dynamic VOL	VCC=3.0V, LOAD 50pF / 500 OHMS	5	OUTPUT		-0.8	V	4
V <sub>OLP</sub>	Quiet Output Maximum Dynamic VOH	VCC=3.0V, LOAD 50pF / 500 OHMS	5	OUTPUT		0.7	V	4
V <sub>OHV</sub>	Quiet Output Minimum Dynamic VOH	VCC=3.0V, LOAD 50pF / 500 OHMS	5	OUTPUT		-1.1	V	4
C <sub>IN</sub>	Input Capacitance	VCC=Gnd	5	$\overline{OE}$ , T/ $\overline{R}$		12	pF	4
C <sub>IO</sub>	Input/Output Capacitance	VCC=3.3V	5	I/O		12	pF	4
CPD	Power Dissipation Capacitance	VCC=3.3V, VIN=0.0V to VCC, F = 10 MHz	5	VCC		50	pF	4

## Electrical Characteristics

### AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pf, TR/TF=2.5ns, Vin=0V to 2.7V, VM(input)=1.5V, VM(output)=1.5V, Temp range: -55C to +125C.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpLH	Propagation Delay	VCC=2.7V	3, 4	An/Bn or Bn/An	1.5	9.0	ns	9, 10, 11
		VCC=3.0V to 3.6V	3, 4	An/Bn or Bn/An	1.5	8.0	ns	9, 10, 11
tpHL	Propagation Delay	VCC=2.7V	3, 4	An/Bn or Bn/An	1.5	9.0	ns	9, 10, 11
		VCC=3.0V to 3.6V	3, 4	An/Bn or Bn/An	1.5	8.0	ns	9, 10, 11
tpZL	Output Enable Time	VCC=2.7V	3, 4	$\overline{OE}$ to An or Bn	1.5	11.0	ns	9, 10, 11
		VCC=3.0V to 3.6V	3, 4	$\overline{OE}$ to An or Bn	1.5	10.0	ns	9, 10, 11
tpZH	Output Enable Time	VCC=2.7V	3, 4	$\overline{OE}$ to An or Bn	1.5	11.0	ns	9, 10, 11
		VCC=3.0V to 3.6V	3, 4	$\overline{OE}$ to An or Bn	1.5	10.0	ns	9, 10, 11
tpHZ	Output Disable Time	VCC=2.7V	3, 4	$\overline{OE}$ to An or Bn	1.5	9.0	ns	9, 10, 11
		VCC=3.0V to 3.6V	3, 4	$\overline{OE}$ to An or Bn	1.5	8.0	ns	9, 10, 11
tpLZ	Output Disable Time	VCC=2.7V	3, 4	$\overline{OE}$ to An or Bn	1.5	9.0	ns	9, 10, 11
		VCC=3.0V to 3.6V	3, 4	$\overline{OE}$ to An or Bn	1.5	8.0	ns	9, 10, 11
tOSHL	Output to Output Skew	VCC=2.7V to 3.6V	5	OUTPUT		1.0	ns	9, 10, 11
tOSLH	Output to Output Skew	VCC=2.7V to 3.6V	5	OUTPUT		1.0	ns	9, 10, 11

Note 1: SCREEN TESTED 100% ON EACH DEVICE AT +25C, +125C, & -55C TEMPERATURE, SUBGROUPS 1, 2, 3, 7, & 8.

Note 2: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C, +125C, & -55C TEMPERATURE, SUBGROUPS A1, 2, 3, 7, & 8.

Note 3: SCREEN TESTED 100% ON EACH DEVICE AT +25C, +125C, & -55C TEMPERATURE, SUBGROUPS A9, 10, & 11.

*(Continued)*

- Note 4: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C, +125C, & -55C  
TEMPERATURE, SUBGROUPS A9, 10, & 11.
- Note 5: GUARANTEED BUT NOT TESTED. (DESIGN CHARACTERIZATION DATA)

**Revision History**

Rev	ECN #	Rel Date	Originator	Changes
0A0	M0002892	03/09/99	Linda Collins	Initial MDS Release