

# MC100LVE164

## 3.3V ECL 16:1 Multiplexer

The MC100LVE164 is a 16:1 multiplexer with a differential output. The select inputs (SEL0, 1, 2, 3) control which one of the sixteen data inputs (A0–A15) is propagated to the output. The device is functionally equivalent to the MC100E164 except it operates from a 3.3 V supply. The device is packaged in the 32-lead LQFP. The LQFP has a 7x7 mm body with a 0.8 mm lead pitch.

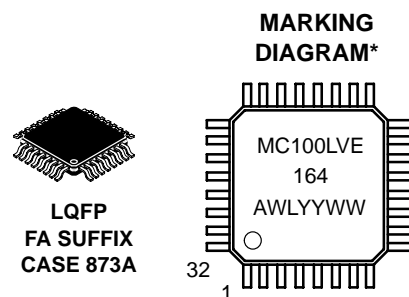
Special attention to the design layout results in a typical skew between the 16 inputs of only 50 ps.

- 850 ps Data Input to Output
- Differential Output
- ESD Protection: >2 KV HBM, >200 V MM
- The 100 Series Contains Temperature Compensation
- PECL Mode Operating Range:  $V_{CC} = 3.0\text{ V to }3.8\text{ V}$  with  $V_{EE} = 0\text{ V}$
- NECL Mode Operating Range:  $V_{CC} = 0\text{ V}$  with  $V_{EE} = -3.0\text{ V to }-3.8\text{ V}$
- Internal Input Pulldown Resistors
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity Level 2  
For Additional Information, see Application Note AND8003/D
- Flammability Rating: UL-94 code V-0 @ 1/8", Oxygen Index 28 to 34
- Transistor Count = 307 devices



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A = Assembly Location  
WL = Wafer Lot  
YY = Year  
WW = Work Week

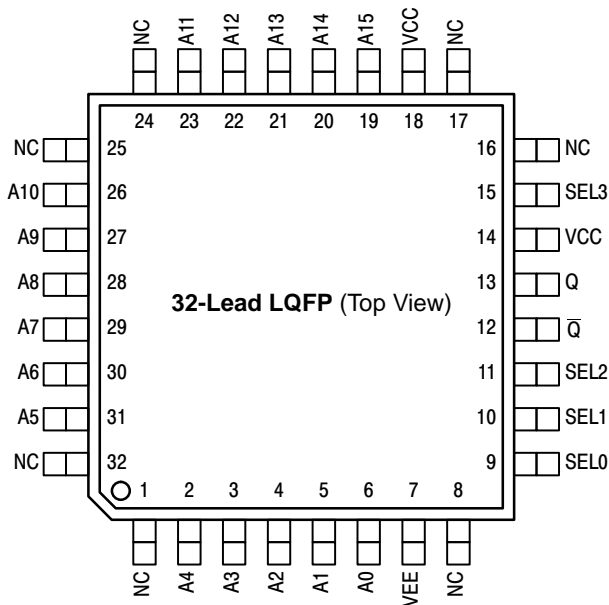
\*For additional information, see Application Note AND8002/D

### ORDERING INFORMATION

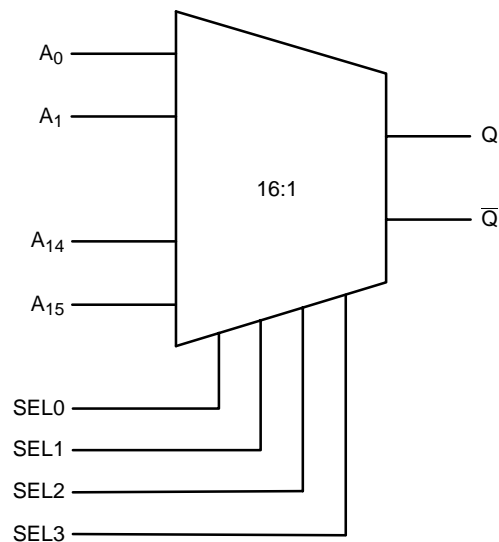
Device	Package	Shipping
MC100LVE164FA	LQFP	250 Units/Tray
MC100LVE164FAR2	LQFP	2000 Tape & Reel

# MC100LVE164

## LOGIC DIAGRAM AND PINOUT ASSIGNMENT



## LOGIC DIAGRAM



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

## PIN DESCRIPTION

PIN	FUNCTION
$A_0 - A_{15}$	ECL Data Inputs
$SEL[0:3]$	ECL Select Inputs
$Q, \bar{Q}$	ECL Differential Outputs
$V_{CC}$	Positive Supply
$V_{EE}$	Negative Supply
NC	No Connect

## FUNCTION TABLE

SEL3	SEL2	SEL1	SEL0	Data
L	L	L	L	A0
L	L	L	H	A1
L	L	H	L	A2
L	L	H	H	A3
L	H	L	L	A4
L	H	L	H	A5
L	H	H	L	A6
L	H	H	H	A7
H	L	L	L	A8
H	L	L	H	A9
H	L	H	L	A10
H	L	H	H	A11
H	H	L	L	A12
H	H	L	H	A13
H	H	H	L	A14
H	H	H	H	A15

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## MAXIMUM RATINGS (Note 1)

Symbol	Parameter	Condition 1	Condition 2	Rating	Units
V <sub>CC</sub>	PECL Mode Power Supply	V <sub>EE</sub> = 0 V		8 to 0	V
V <sub>EE</sub>	NECL Mode Power Supply	V <sub>CC</sub> = 0 V		-8 to 0	V
V <sub>I</sub>	PECL Mode Input Voltage NECL Mode Input Voltage	V <sub>EE</sub> = 0 V V <sub>CC</sub> = 0 V	V <sub>I</sub> ≤ V <sub>CC</sub> V <sub>I</sub> ≥ V <sub>EE</sub>	6 to 0 -6 to 0	V V
I <sub>out</sub>	Output Current	Continuous Surge		50 100	mA mA
T <sub>A</sub>	Operating Temperature Range			-40 to +85	°C
T <sub>stg</sub>	Storage Temperature Range			-65 to +150	°C
θ <sub>JA</sub>	Thermal Resistance (Junction to Ambient)	0 LFPM 500 LFPM	32 LQFP 32 LQFP	80 55	°C/W °C/W
θ <sub>JC</sub>	Thermal Resistance (Junction to Case)	std bd	32 LQFP	12 to 17	°C/W
T <sub>sol</sub>	Wave Solder	<2 to 3 sec @ 248°C		265	°C

1. Maximum Ratings are those values beyond which device damage may occur.

## LVPECL DC CHARACTERISTICS V<sub>CC</sub>= 3.3 V; V<sub>EE</sub>= 0.0 V (Note 2)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I <sub>EE</sub>	Power Supply Current		34	45		34	45		37	45	mA
V <sub>OH</sub>	Output HIGH Voltage (Note 3)	2215	2295	2420	2275	2345	2420	2275	2345	2420	mV
V <sub>OL</sub>	Output LOW Voltage (Note 3)	1470	1605	1745	1490	1595	1680	1490	1595	1680	mV
V <sub>IH</sub>	Input HIGH Voltage (Single Ended)	2135		2420	2135		2420	2135		2420	mV
V <sub>IL</sub>	Input LOW Voltage (Single Ended)	1490		1825	1490		1825	1490		1825	mV
I <sub>IH</sub>	Input HIGH Current			150			150			150	μA
I <sub>IL</sub>	Input LOW Current	0.5			0.5			0.5			μA

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfpm is maintained.

2. Input and output parameters vary 1:1 with V<sub>CC</sub>. V<sub>EE</sub> can vary ±0.3 V.  
3. Outputs are terminated through a 50 ohm resistor to V<sub>CC</sub>-2 volts.

## LVNECL DC CHARACTERISTICS V<sub>CC</sub>= 0.0 V; V<sub>EE</sub>= -3.3 V (Note 4)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I <sub>EE</sub>	Power Supply Current		34	45		34	45		37	45	mA
V <sub>OH</sub>	Output HIGH Voltage (Note 5)	-1085	-1005	-880	-1025	-955	-880	-1025	-955	-880	mV
V <sub>OL</sub>	Output LOW Voltage (Note 5)	-1830	-1695	-1555	-1810	-1705	-1620	-1810	-1705	-1620	mV
V <sub>IH</sub>	Input HIGH Voltage (Single Ended)	-1165		-880	-1165		-880	-1165		-880	mV
V <sub>IL</sub>	Input LOW Voltage (Single Ended)	-1810		-1475	-1810		-1475	-1810		-1475	mV
I <sub>IH</sub>	Input HIGH Current			150			150			150	μA
I <sub>IL</sub>	Input LOW Current	0.5			0.5			0.5			μA

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfpm is maintained.

4. Input and output parameters vary 1:1 with V<sub>CC</sub>. V<sub>EE</sub> can vary ±0.3 V.  
5. Outputs are terminated through a 50 ohm resistor to V<sub>CC</sub>-2 volts.

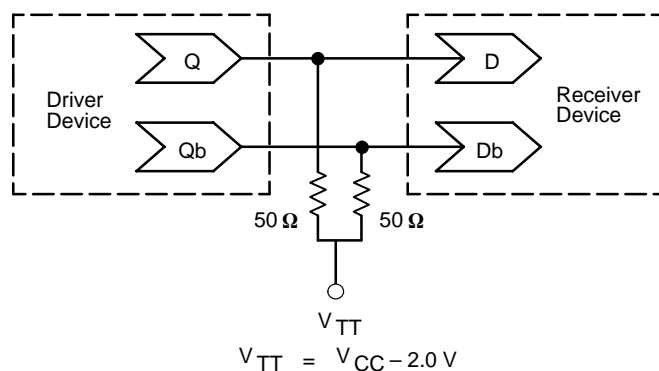
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**AC CHARACTERISTICS**  $V_{CC}= 3.3\text{ V}; V_{EE}= 0.0\text{ V}$  or  $V_{CC}= 0.0\text{ V}; V_{EE}= -3.3\text{ V}$  (Note 6)

Symbol	Characteristic	-40°C			25°C			85°C			Unit	
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max		
$f_{\max}$	Maximum Toggle Frequency		TBD			TBD			TBD		GHz	
$t_{PLH}$ $t_{PHL}$	Propagation Delay to Output	A Input	350	600	850	350	600	850	350	600	850	ps
		SEL0	500	700	900	500	700	900	500	700	900	
		SEL1	400	675	900	400	675	900	400	675	900	
		SEL2	400	675	900	400	675	900	400	675	900	
		SEL3	400	550	700	400	550	700	400	550	700	
$t_{SKEW}$	Within Device Skew (Note 7)		75			50			50		ps	
$t_{JITTER}$	Cycle-to-Cycle Jitter		TBD			TBD			TBD		ps	
$t_r$ $t_f$	Rise/Fall Times (20% – 80%)		275	400	550	275	400	550	275	400	550	ps

6.  $V_{EE}$  can vary  $\pm 0.3\text{ V}$ .

7. Within Device skew is defined as the difference in the A to Q delay between the 16 different A inputs.



**Figure 1. Typical Termination for Output Driver and Device Evaluation**  
(See Application Note AND8020 – Termination of ECL Logic Devices.)

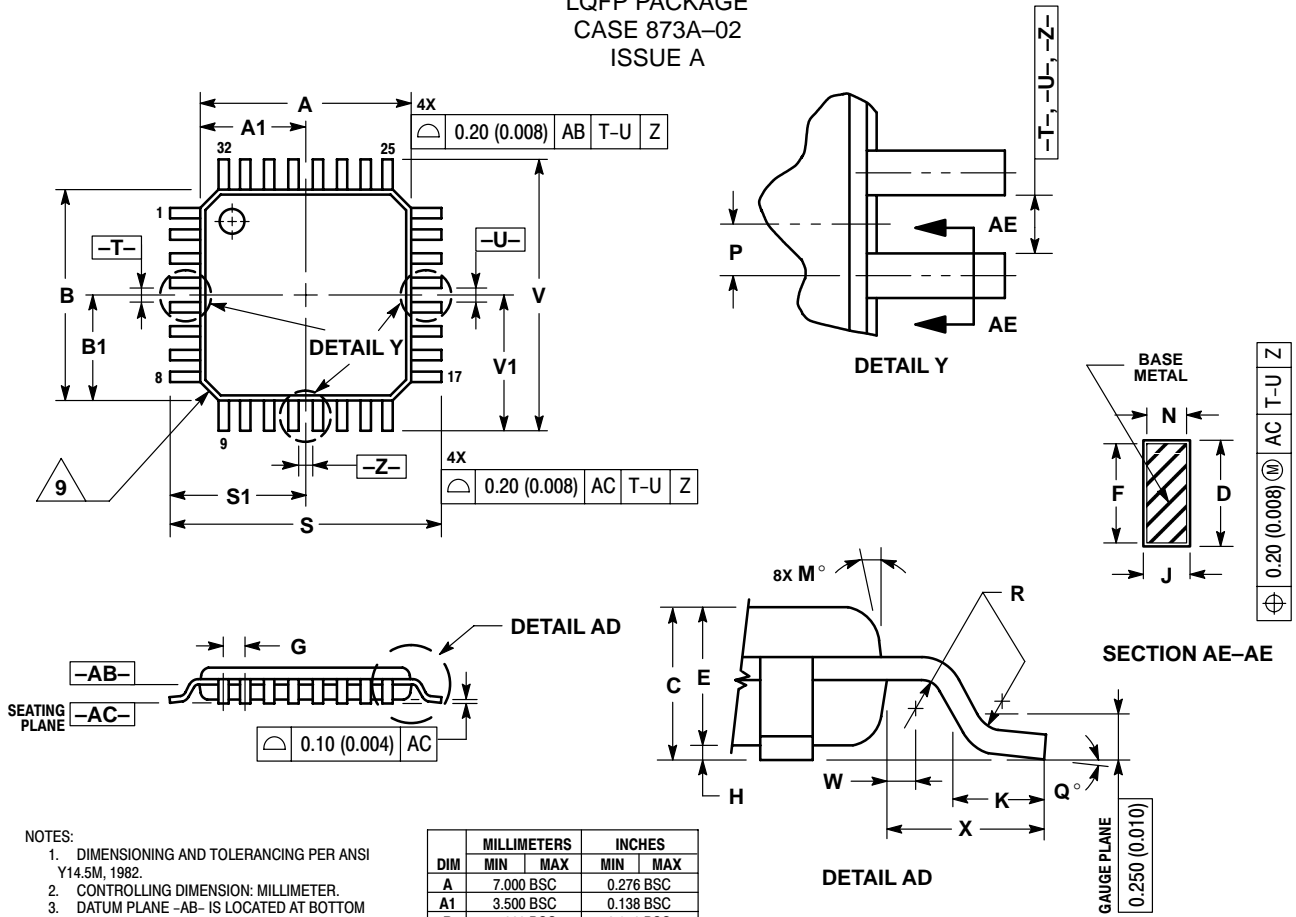
## Resource Reference of Application Notes

- AN1404** – ECLinPS Circuit Performance at Non-Standard  $V_{IH}$  Levels
- AN1405** – ECL Clock Distribution Techniques
- AN1406** – Designing with PECL (ECL at +5.0 V)
- AN1503** – ECLinPS I/O SPICE Modeling Kit
- AN1504** – Metastability and the ECLinPS Family
- AN1560** – Low Voltage ECLinPS SPICE Modeling Kit
- AN1568** – Interfacing Between LVDS and ECL
- AN1596** – ECLinPS Lite Translator ELT Family SPICE I/O Model Kit
- AN1650** – Using Wire-OR Ties in ECLinPS Designs
- AN1672** – The ECL Translator Guide
- AND8001** – Odd Number Counters Design
- AND8002** – Marking and Date Codes
- AND8020** – Termination of ECL Logic Devices

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## PACKAGE DIMENSIONS

FA SUFFIX  
LQFP PACKAGE  
CASE 873A-02  
ISSUE A



**NOTES:**

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETER.
- DATUM PLANE -AB- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
- DATUMS -T-, -U-, AND -Z- TO BE DETERMINED AT DATUM PLANE -AB-.
- DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -AC-.
- DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.250 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -AB-.
- DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. DAMBAR PROTRUSION SHALL NOT CAUSE THE D DIMENSION TO EXCEED 0.520 (0.020).
- MINIMUM SOLDER PLATE THICKNESS SHALL BE 0.0076 (0.0003).
- EXACT SHAPE OF EACH CORNER MAY VARY FROM DEPICTION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	7.000	BSC	0.276	BSC
A1	3.500	BSC	0.138	BSC
B	7.000	BSC	0.276	BSC
B1	3.500	BSC	0.138	BSC
C	1.400	1.600	0.055	0.063
D	0.300	0.450	0.012	0.018
E	1.350	1.450	0.053	0.057
F	0.300	0.400	0.012	0.016
G	0.800	BSC	0.031	BSC
H	0.050	0.150	0.002	0.006
J	0.090	0.200	0.004	0.008
K	0.500	0.700	0.020	0.028
M	12°	REF	12°	REF
N	0.090	0.160	0.004	0.006
P	0.400	BSC	0.016	BSC
Q	1°	5°	1°	5°
R	0.150	0.250	0.006	0.010
S	9.000	BSC	0.354	BSC
S1	4.500	BSC	0.177	BSC
V	9.000	BSC	0.354	BSC
V1	4.500	BSC	0.177	BSC
W	0.200	REF	0.008	REF
X	1.000	REF	0.039	REF

**Notes**

**Notes**

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