

# 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.

### Features

- 850 ps Data Input to Output
- Differential Output
- ESD Protection: Human Body Model; >2 kV,  
Machine Model >200 V
- 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 @ 0.125 in,  
Oxygen Index: 28 to 34
- Transistor Count = 307 devices
- Pb-Free Packages are Available\*



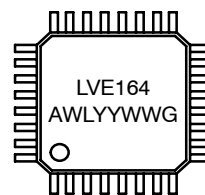
**ON Semiconductor®**

<http://onsemi.com>

### MARKING DIAGRAM\*



**32 LQFP  
FA SUFFIX  
CASE 873A**



|    |                     |
|----|---------------------|
| A  | = Assembly Location |
| WL | = Wafer Lot         |
| YY | = Year              |
| WW | = Work Week         |
| G  | = Pb-Free Package   |

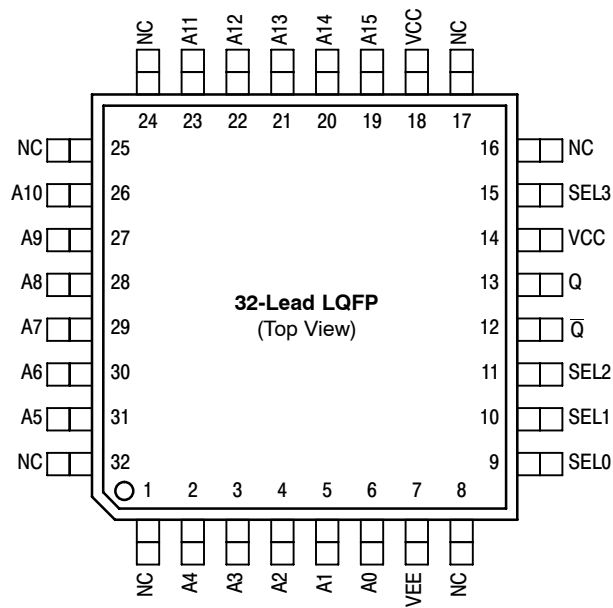
\*For additional marking information, refer to Application Note AND8002/D.

### 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.

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Warning: All V<sub>CC</sub> and V<sub>EE</sub> pins must be externally connected to Power Supply to guarantee proper operation.

Figure 1. Logic Diagram and Pinout Assignment

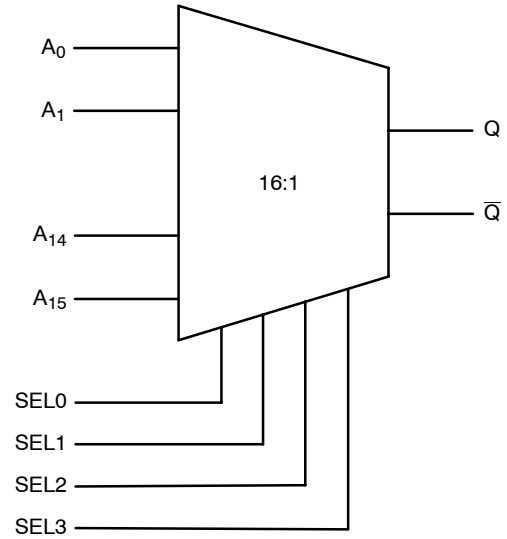


Figure 2. Logic Diagram

Table 1. PIN DESCRIPTION

| PIN                              | FUNCTION                 |
|----------------------------------|--------------------------|
| A <sub>0</sub> – A <sub>15</sub> | ECL Data Inputs          |
| SEL[0:3]                         | ECL Select Inputs        |
| Q, $\bar{Q}$                     | ECL Differential Outputs |
| V <sub>CC</sub>                  | Positive Supply          |
| V <sub>EE</sub>                  | Negative Supply          |
| NC                               | No Connect               |

Table 2. 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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**Table 3. MAXIMUM RATINGS**

| Symbol        | Parameter                                          | Condition 1                                    | Condition 2                            | Rating            | Unit         |
|---------------|----------------------------------------------------|------------------------------------------------|----------------------------------------|-------------------|--------------|
| $V_{CC}$      | PECL Mode Power Supply                             | $V_{EE} = 0\text{ V}$                          |                                        | 8 to 0            | V            |
| $V_{EE}$      | NECL Mode Power Supply                             | $V_{CC} = 0\text{ V}$                          |                                        | –8 to 0           | V            |
| $V_I$         | PECL Mode Input Voltage<br>NECL Mode Input Voltage | $V_{EE} = 0\text{ V}$<br>$V_{CC} = 0\text{ V}$ | $V_I \leq V_{CC}$<br>$V_I \geq V_{EE}$ | 6 to 0<br>–6 to 0 | V<br>V       |
| $I_{out}$     | Output Current                                     | Continuous<br>Surge                            |                                        | 50<br>100         | mA<br>mA     |
| $T_A$         | Operating Temperature Range                        |                                                |                                        | –40 to +85        | °C           |
| $T_{stg}$     | Storage Temperature Range                          |                                                |                                        | –65 to +150       | °C           |
| $\theta_{JA}$ | Thermal Resistance (Junction–to–Ambient)           | 0 lfpm<br>500 lfpm                             | 32 LQFP<br>32 LQFP                     | 80<br>55          | °C/W<br>°C/W |
| $\theta_{JC}$ | Thermal Resistance (Junction–to–Case)              | Standard Board                                 | 32 LQFP                                | 12 to 17          | °C/W         |
| $T_{sol}$     | Wave Solder<br>Pb<br>Pb–Free                       | <2 to 3 sec @ 248°C<br><2 to 3 sec @ 260°C     |                                        | 265<br>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. LVPECL DC CHARACTERISTICS**  $V_{CC} = 3.3\text{ V}$ ;  $V_{EE} = 0.0\text{ V}$  (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              |       | 34   | 45   |      | 34   | 45   |      | 37   | 45   | mA   |
| $V_{OH}$ | Output HIGH Voltage (Note 2)      | 2215  | 2295 | 2420 | 2275 | 2345 | 2420 | 2275 | 2345 | 2420 | mV   |
| $V_{OL}$ | Output LOW Voltage (Note 2)       | 1470  | 1605 | 1745 | 1490 | 1595 | 1680 | 1490 | 1595 | 1680 | mV   |
| $V_{IH}$ | Input HIGH Voltage (Single–Ended) | 2135  |      | 2420 | 2135 |      | 2420 | 2135 |      | 2420 | mV   |
| $V_{IL}$ | Input LOW Voltage (Single–Ended)  | 1490  |      | 1825 | 1490 |      | 1825 | 1490 |      | 1825 | mV   |
| $I_{IH}$ | Input HIGH Current                |       |      | 150  |      |      | 150  |      |      | 150  | μA   |
| $I_{IL}$ | Input LOW Current                 | 0.5   |      |      | 0.5  |      |      | 0.5  |      |      | μA   |

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  $V_{CC}$ .  $V_{EE}$  can vary  $\pm 0.3\text{ V}$ .
2. Outputs are terminated through a 50  $\Omega$  resistor to  $V_{CC} - 2.0\text{ V}$ .

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**Table 5. LVNECL DC CHARACTERISTICS**  $V_{CC} = 0.0\text{ V}$ ;  $V_{EE} = -3.3\text{ V}$  (Note 3)

| Symbol   | Characteristic                    | -40°C |       |       | 25°C  |       |       | 85°C  |       |       | Unit          |
|----------|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|
|          |                                   | Min   | Typ   | Max   | Min   | Typ   | Max   | Min   | Typ   | Max   |               |
| $I_{EE}$ | Power Supply Current              |       | 34    | 45    |       | 34    | 45    |       | 37    | 45    | mA            |
| $V_{OH}$ | Output HIGH Voltage (Note 4)      | -1085 | -1005 | -880  | -1025 | -955  | -880  | -1025 | -955  | -880  | mV            |
| $V_{OL}$ | Output LOW Voltage (Note 4)       | -1830 | -1695 | -1555 | -1810 | -1705 | -1620 | -1810 | -1705 | -1620 | mV            |
| $V_{IH}$ | Input HIGH Voltage (Single-Ended) | -1165 |       | -880  | -1165 |       | -880  | -1165 |       | -880  | mV            |
| $V_{IL}$ | Input LOW Voltage (Single-Ended)  | -1810 |       | -1475 | -1810 |       | -1475 | -1810 |       | -1475 | mV            |
| $I_{IH}$ | Input HIGH Current                |       |       | 150   |       |       | 150   |       |       | 150   | $\mu\text{A}$ |
| $I_{IL}$ | Input LOW Current                 | 0.5   |       |       | 0.5   |       |       | 0.5   |       |       | $\mu\text{A}$ |

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 lfm. 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. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary  $\pm 0.3\text{ V}$ .

4. Outputs are terminated through a  $50\ \Omega$  resistor to  $V_{CC} - 2.0\text{ V}$ .

**Table 6. 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 5)

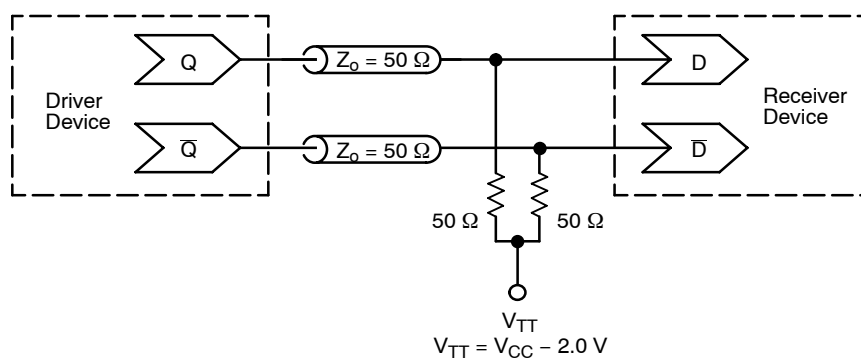
| Symbol                               | Characteristic                 | -40°C                                   |                                 |                                 | 25°C                            |                                 |                                 | 85°C                            |                                 |                                 | Unit                            |    |
|--------------------------------------|--------------------------------|-----------------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|----|
|                                      |                                | Min                                     | Typ                             | Max                             | Min                             | Typ                             | Max                             | Min                             | Typ                             | Max                             |                                 |    |
| f <sub>max</sub>                     | Maximum Toggle Frequency       |                                         | 700                             |                                 |                                 | 700                             |                                 |                                 | 700                             |                                 | MHz                             |    |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay<br>to Output | A Input<br>SEL0<br>SEL1<br>SEL2<br>SEL3 | 350<br>500<br>400<br>400<br>400 | 600<br>700<br>675<br>675<br>550 | 850<br>900<br>900<br>900<br>700 | 350<br>500<br>400<br>400<br>400 | 600<br>700<br>675<br>675<br>550 | 850<br>900<br>900<br>900<br>700 | 350<br>500<br>400<br>400<br>400 | 600<br>700<br>675<br>675<br>550 | 850<br>900<br>900<br>900<br>700 | ps |
| t <sub>SKEW</sub>                    | Within Device Skew (Note 6)    |                                         | 75                              |                                 |                                 | 50                              |                                 |                                 | 50                              |                                 |                                 | ps |
| t <sub>JITTER</sub>                  | RMS Random Clock Jitter        |                                         | <1                              |                                 |                                 | <1                              |                                 |                                 | <1                              |                                 |                                 | ps |
| t <sub>r</sub><br>t <sub>f</sub>     | Rise/Fall Times (20% – 80%)    |                                         | 275                             | 400                             | 550                             | 275                             | 400                             | 550                             | 275                             | 400                             | 550                             | ps |

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 lfm. 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.

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

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

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**Figure 3. Typical Termination for Output Driver and Device Evaluation**  
(See Application Note AND8020/D – Termination of ECL Logic Devices.)

### 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

## MC100LVE164

### ORDERING INFORMATION

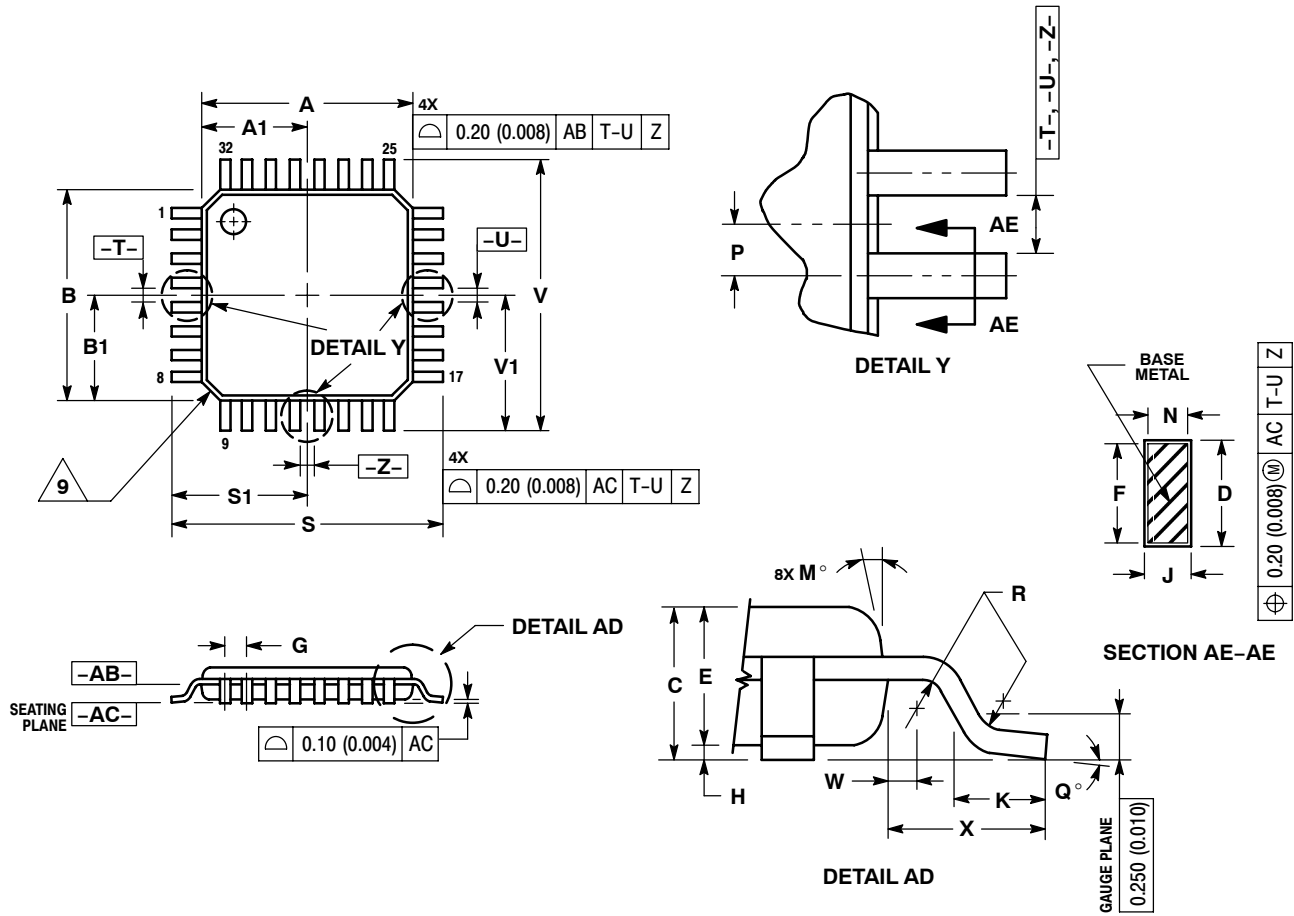
| Device           | Package           | Shipping†          |
|------------------|-------------------|--------------------|
| MC100LVE164FA    | LQFP              | 250 Units / Rail   |
| MC100LVE164FAG   | LQFP<br>(Pb-Free) | 250 Units / Rail   |
| MC100LVE164FAR2  | LQFP              | 2000 / Tape & Reel |
| MC100LVE164FAR2G | LQFP<br>(Pb-Free) | 2000 / 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.

# MC100LVE164

## PACKAGE DIMENSIONS

32 LEAD LQFP  
CASE 873A-02  
ISSUE C



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MC100LVE64/D

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