

2.5 V/3.3 V ECL/PECL/LVDS Dual Differential 2:1 Multiplexer

The MC100ES6056 is a dual, fully differential 2:1 multiplexer. The differential data path makes the device ideal for multiplexing low skew clock or other skew sensitive signals. Multiple V_{BB} pins are provided.

The V_{BB} pin, an internally generated voltage supply, is available to this device only. For single-ended input conditions, the unused differential input is connected to V_{BB} as a switching reference voltage. V_{BB} may also rebias AC coupled inputs. When used, decouple V_{BB} and V_{CC} via a 0.01 μF capacitor and limit current sourcing or sinking to 0.5 mA. When not used, V_{BB} should be left open.

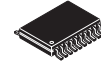
The device features both individual and common select inputs to address both data path and random logic applications.

The 100ES Series contains temperature compensation.

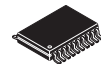
Features

- 360 ps Typical Propagation Delays
- Maximum Frequency > 3 GHz Typical
- PECL Mode Operating Range: $V_{CC} = 2.375 \text{ V to } 3.8 \text{ V}$ with $V_{EE} = 0 \text{ V}$
- ECL Mode Operating Range: $V_{CC} = 0 \text{ V}$ with $V_{EE} = -2.375 \text{ V to } -3.8 \text{ V}$
- Open Input Default State
- Separate and Common Select
- Q Output Will Default LOW with Inputs Open or at V_{EE}
- V_{BB} Outputs
- LVDS Input Compatible
- 20-Lead Pb-Free Package Available

MC100ES6056



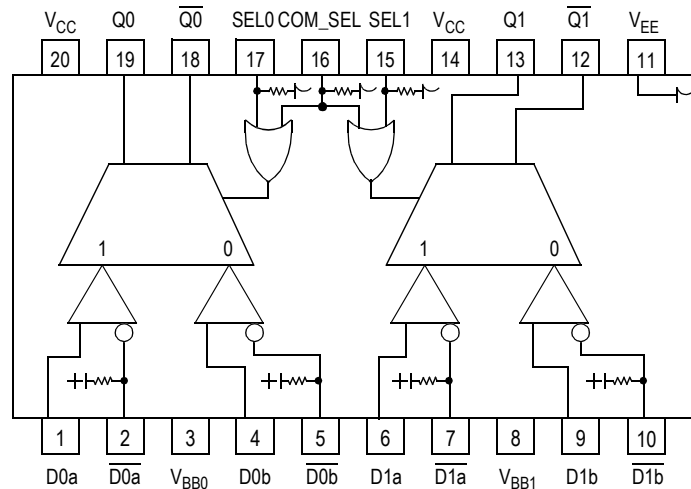
DT SUFFIX
20-LEAD TSSOP PACKAGE
CASE 948E-03



EJ SUFFIX
20-LEAD TSSOP PACKAGE
Pb-FREE PACKAGE
CASE 948E-03

ORDERING INFORMATION

| Device | Package |
|-----------------|--------------------|
| MC100ES6056DT | TSSOP-20 |
| MC100ES6056DTR2 | TSSOP-20 |
| MC100ES6056EJ | TSSOP-20 (Pb-Free) |
| MC100ES6056EJR2 | TSSOP-20 (Pb-Free) |



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

Figure 1. 20-Lead Pinout (Top View) and Logic Diagram

Table 1. Pin Description

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| Pin | Function |
|---------------------------------------|--------------------------|
| D0a* – D1a* | ECL Input Data a |
| $\overline{D0a^*} - \overline{D1a^*}$ | ECL Input Data a Invert |
| D0b* – D1b* | ECL Input Data b |
| $\overline{D0b^*} - \overline{D1b^*}$ | ECL Input Data b Invert |
| SEL0* – SEL1* | ECL Indiv. Select Input |
| COM_SEL* | ECL Common Select Input |
| V _{BB0} , V _{BB1} | Output Reference Voltage |
| Q0 – Q1 | ECL True Outputs |
| $\overline{Q0} - \overline{Q1}$ | ECL Inverted Outputs |
| V _{CC} | Positive Supply |
| V _{EE} | Negative Supply |

* Input function will default LOW when left open.

Table 2. Function Table

| SEL0 | SEL1 | COM_SEL | Q0, $\overline{Q0}$ | Q1, $\overline{Q1}$ |
|------|------|---------|---------------------|---------------------|
| X | X | H | a | a |
| L | L | L | b | b |
| L | H | L | b | a |
| H | H | L | a | a |
| H | L | L | a | b |

Table 3. General Specifications

| Characteristics | | Value |
|---|----------------------|---------------|
| Internal Input Pulldown Resistor | | 75 k Ω |
| Internal Input Pullup Resistor | | 75 k Ω |
| ESD Protection | Human Body Model | > 4 kV |
| | Machine Model | > 400 V |
| | Charged Device Model | > 2 kV |
| Thermal Resistance (Junction-to-Ambient) | 0 LFPM, 20 TSSOP | 140°C/W |
| | 500 LFPM, 20 TSSOP | 100°C/W |

Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test

Table 4. Absolute Maximum Ratings⁽¹⁾

| Symbol | Characteristic | Conditions | Rating | Units |
|---------------------|-------------------------------------|--|--|----------|
| V _{SUPPLY} | Power Supply Voltage | Difference between V _{CC} & V _{EE} | 3.9 | V |
| V _{IN} | Input Voltage | V _{CC} - V _{EE} ≤ 3.6 V | V _{CC} + 0.3 V _{EE} - 0.3 | V |
| I _{OUT} | Output Current | Continuous Surge | 50 100 | mA mA |
| I _{BB} | V _{BB} Sink/Source Current | | ±0.5 | °C |
| T _A | Operating Temperature Range | | -40 to +85 | °C |
| T _{STG} | Storage Temperature Range | | -65 to +150 | °C |

1. Absolute maximum continuous ratings are those maximum values beyond which damage to the device may occur. Exposure to these conditions or conditions beyond those indicated may adversely affect device reliability. Functional operation at absolute-maximum-rated conditions is not implied.

Table 5. DC Characteristics (V_{CC} = 0 V, V_{EE} = -2.5 V ± 5% or 3.8 V to -3.135 V; V_{CC} = 2.5 V ± 5% or 3.135 V to 3.8 V, V_{EE} = 0 V)

| Symbol | Characteristics | -40°C | | | 0°C to 85°C | | | Unit |
|------------------|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------|
| | | Min | Typ | Max | Min | Typ | Max | |
| I _{EE} | Power Supply Current | | 30 | 60 | | 30 | 60 | mA |
| V _{OH} | Output HIGH Voltage ⁽¹⁾ | V _{CC} -1085 | V _{CC} -960 | V _{CC} -880 | V _{CC} -1025 | V _{CC} -930 | V _{CC} -860 | mV |
| V _{OL} | Output LOW Voltage ⁽¹⁾ | V _{CC} -1950 | V _{CC} -1695 | V _{CC} -1500 | V _{CC} -1950 | V _{CC} -1705 | V _{CC} -1500 | mV |
| V _{IH} | Input HIGH Voltage | V _{CC} -1165 | | V _{CC} -880 | V _{CC} -1165 | | V _{CC} -880 | mV |
| V _{IL} | Input LOW Voltage | V _{CC} -1810 | | V _{CC} -1475 | V _{CC} -1810 | | V _{CC} -1475 | mV |
| V _{BB} | Output Reference Voltage | V _{CC} -1380 | V _{CC} -1290 | V _{CC} -1220 | V _{CC} -1380 | V _{CC} -1290 | V _{CC} -1200 | mV |
| V _{PP} | Differential Input Voltage ⁽²⁾ | 0.15 | | 1.3 | 0.15 | | 1.3 | V |
| V _{CMR} | Differential Cross Point Voltage ⁽³⁾ | V _{CC} -2.3 | | V _{CC} -0.8 | V _{CC} -2.3 | | V _{CC} -0.8 | V |
| I _{IH} | Input HIGH Current | | | 150 | | | 150 | μA |
| I _{IL} | Input LOW Current | 0.5 | | | 0.5 | | | μA |

1. Output termination voltage V_{TT} = 0 V for V_{CC} = 2.5 V operation is supported but the power consumption of the device will increase.
 2. V_{PP} (DC) is the minimum differential input voltage swing required to maintain device functionality.
 3. V_{CMR} (DC) is the crosspoint of the differential input signal. Functional operation is obtained when the crosspoint is within the V_{CMR} (DC) range and the input swing lies within the V_{PP} (DC) specification.

Table 6. AC Characteristics ($V_{CC} = 0\text{ V}$; $V_{EE} = -2.5\text{ V} \pm 5\%$ or -3.8 V to -3.135 V ; $V_{CC} = 2.5\text{ V} \pm 5\%$ or 3.135 V to 3.8 V ;
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| Symbol | Characteristics | -40°C to 85°C | | | Unit |
|--------------------|--|---------------|-----|--------------|------|
| | | Min | Typ | Max | |
| f_{\max} | Maximum Frequency | | > 3 | | GHz |
| t_{PLH}, t_{PHL} | Propagation Delay to Output Differential | | | | |
| | D to Q, \bar{Q} | 300 | 400 | 500 | ps |
| | SEL to Q, \bar{Q} | 300 | 430 | 600 | ps |
| | COM_SEL to Q, \bar{Q} | 300 | 490 | 650 | ps |
| t_{SKEW} | Skew | | | | |
| | Output-to-Output ⁽²⁾ | | 10 | 50 | ps |
| | Part-to-Part | | | 200 | ps |
| t_{JITTER} | Cycle-to-Cycle Jitter | | | 1 | ps |
| V_{PP} | Minimum Input Swing | 200 | 800 | 1200 | mV |
| V_{CMR} | Differential Cross Point Voltage | $V_{CC}-2.1$ | | $V_{CC}-1.1$ | V |
| t_r / t_f | Output Rise/Fall Time (20%–80%) | 70 | 120 | 230 | ps |

1. Measured using a 750 mV source, 50% duty cycle clock source. All loading with 50Ω to $V_{CC}-2.0\text{ V}$.
2. Skew is measured between outputs under identical transitions. Duty cycle skew is defined only for differential operation when the delays are measured from the cross point of the inputs to the cross point of the outputs.

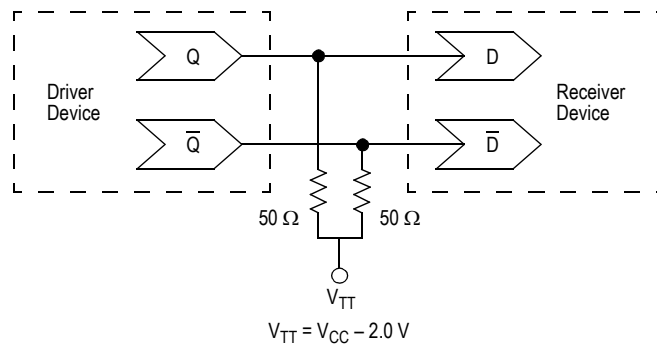
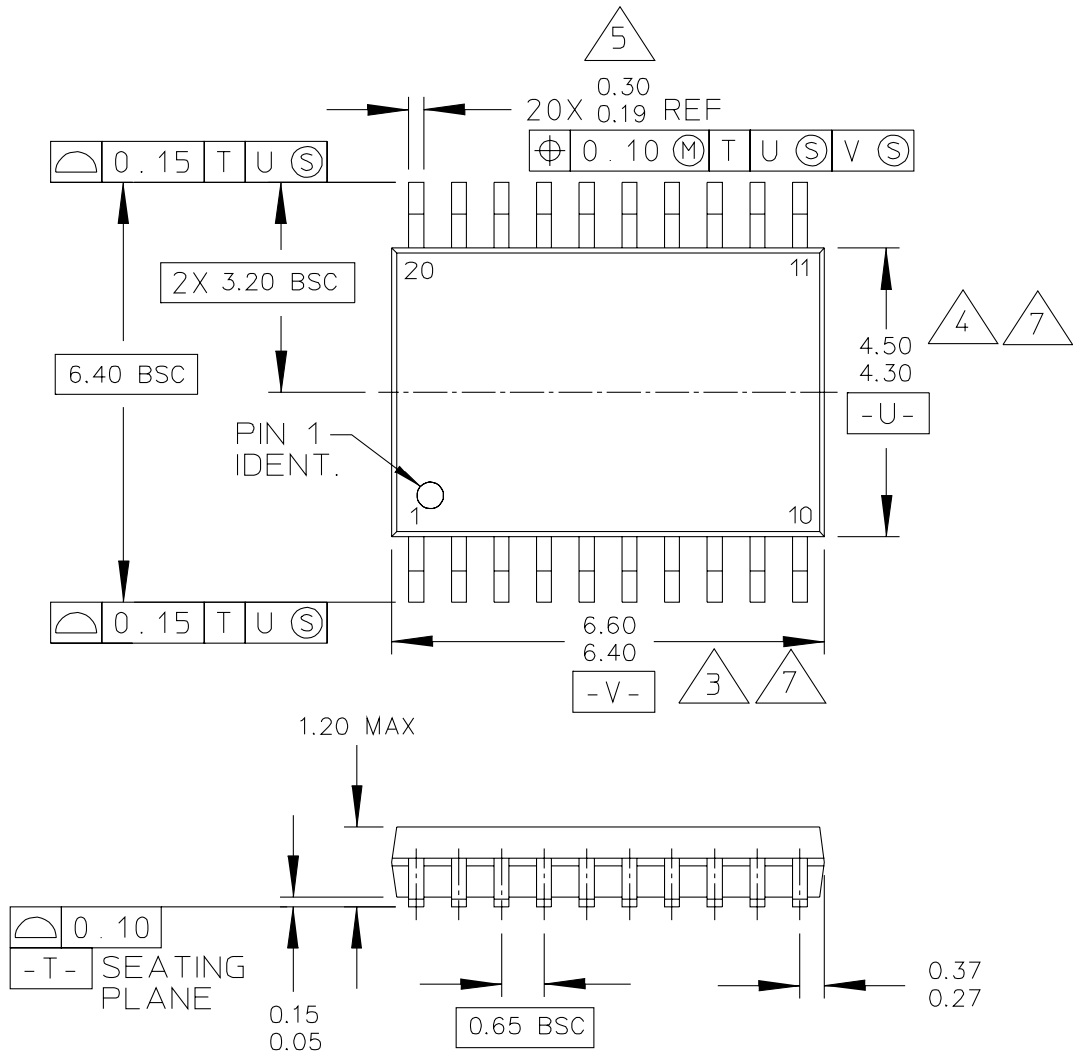


Figure 2. Typical Termination for Output Driver and Device Evaluation

PACKAGE DIMENSIONS

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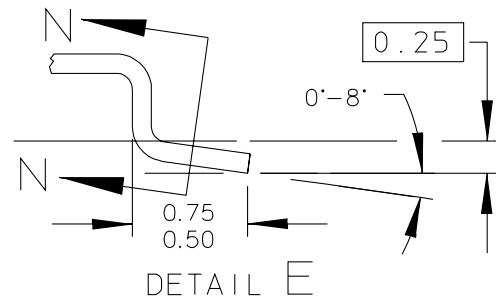
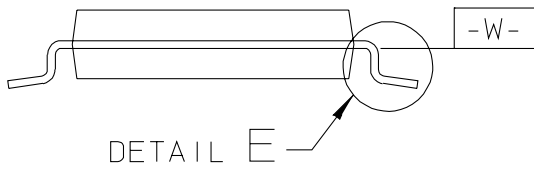
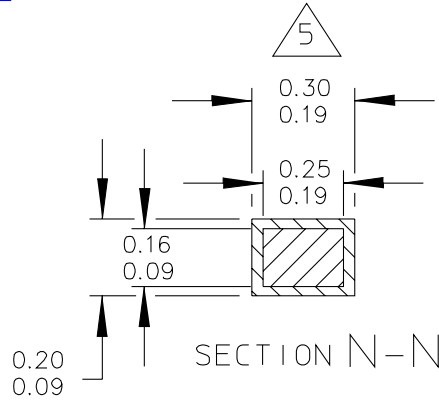
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NOTES:

1. CONTROLLING DIMENSION: MILLIMETER
2. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M-1982.
3. DIMENSION DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE.
4. DIMENSION DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 PER SIDE.
5. DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF THE DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSIONS ARE TO BE DETERMINED AT DATUM PLANE -W-.

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