



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

MC100ES6056

NRND

DATASHEET

NRND – Not Recommend for New Designs

Product Discontinuance Notice – Last Time Buy Expires on (12/23/2013)

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



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



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



EG SUFFIX
20-LEAD SOIC PACKAGE
Pb-FREE PACKAGE
CASE 751D-07

ORDERING INFORMATION	
Device	Package
MC100ES6056DT	TSSOP-20
MC100ES6056DTR2	TSSOP-20
MC100ES6056EJ	TSSOP-20 (Pb-Free)
MC100ES6056EJR2	TSSOP-20 (Pb-Free)
MC100ES6056EG	SOIC-20 (Pb-Free)
MC100ES6056EGR2	SOIC-20 (Pb-Free)

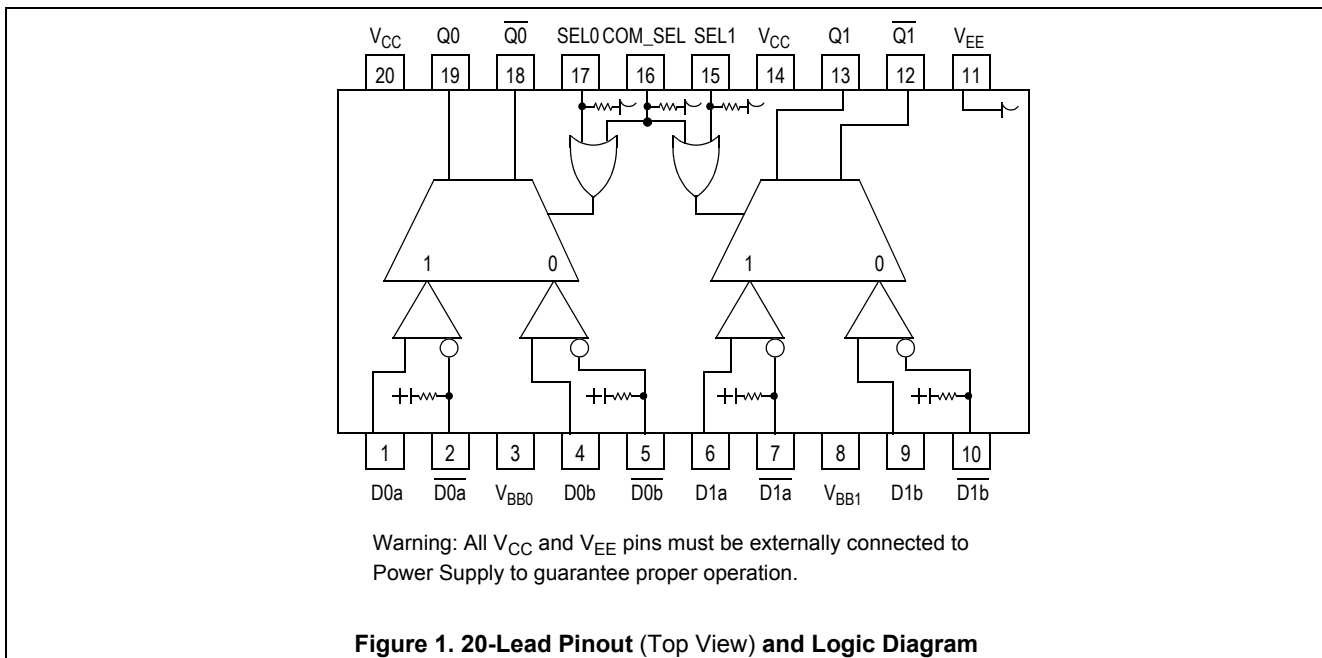


Table 1. Pin Description

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. DC 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 , $V_{EE} = 0\text{ V}$)

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⁾	$V_{CC} - 1150$	$V_{CC} - 1020$	$V_{CC} - 800$	$V_{CC} - 1200$	$V_{CC} - 970$	$V_{CC} - 750$	mV
V_{OL}	Output LOW Voltage ⁽¹⁾	$V_{CC} - 1950$	$V_{CC} - 1620$	$V_{CC} - 1250$	$V_{CC} - 2000$	$V_{CC} - 1680$	$V_{CC} - 1300$	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	-200			-200			μA

1. Output termination voltage $V_{TT} = 0\text{ V}$ for $V_{CC} = 2.5\text{ V}$ 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 5. Absolute Maximum Ratings⁽¹⁾

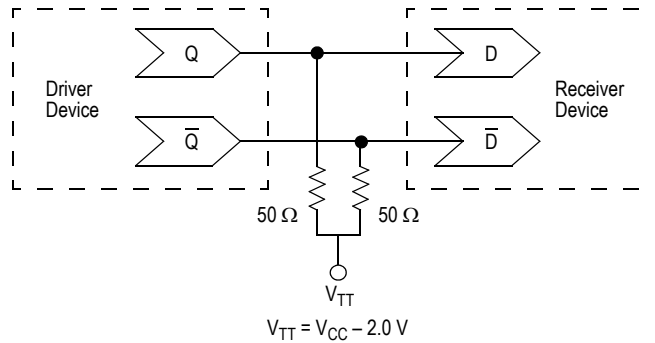
Symbol	Characteristic	Conditions	Rating	Units
V_{SUPPLY}	Power Supply Voltage	Difference between V_{CC} & V_{EE}	3.9	V
V_{IN}	Input Voltage	$V_{CC} - V_{EE} \leq 3.6\text{ V}$	$V_{CC} + 0.3$ $V_{EE} - 0.3$	V
I_{OUT}	Output Current	Continuous Surge	50 100	mA mA
I_{BB}	V_{BB} Sink/Source Current		± 0.5	°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.

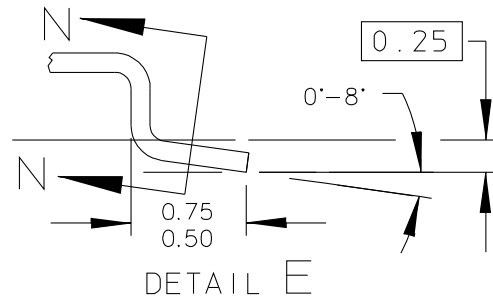
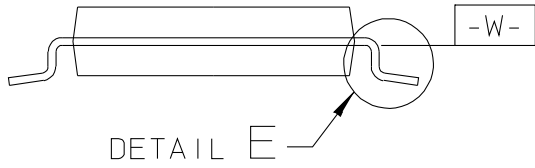
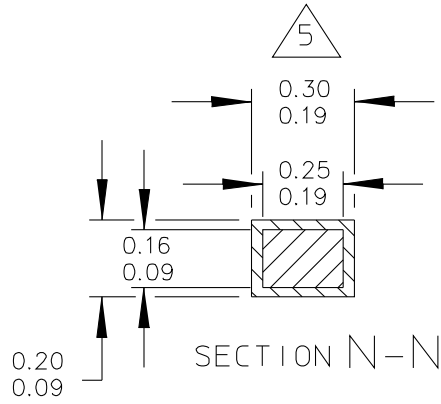
Table 6. AC Characteristics ($V_{CC} = 0\text{ V}$; $V_{EE} = -2.5\text{ V} \pm 5\%$ or -3.8 V to -3.135 V ; $V_{CC} = 2.5\text{ V} \pm 5\%$ or 3.135 V to 3.8 V ; $V_{EE} = 0\text{ V}$)⁽¹⁾

Symbol	Characteristics	-40°C to 85°C			Unit	
		Min	Typ	Max		
f_{\max}	Maximum Frequency		> 3		GHz	
$t_{\text{PLH}}, t_{\text{PHL}}$	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



© FREESCALE SEMICONDUCTOR, INC. ALL RIGHTS RESERVED.	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE	
TITLE: 20 LD TSSOP, PITCH 0.65MM	DOCUMENT NO: 98ASH70169A	REV: B	
	CASE NUMBER: 948E-03	09 MAR 2005	
	STANDARD: JEDEC		

**CASE 948E-03
ISSUE B
20-LEAD TSSOP PACKAGE**

PACKAGE DIMENSIONS

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.

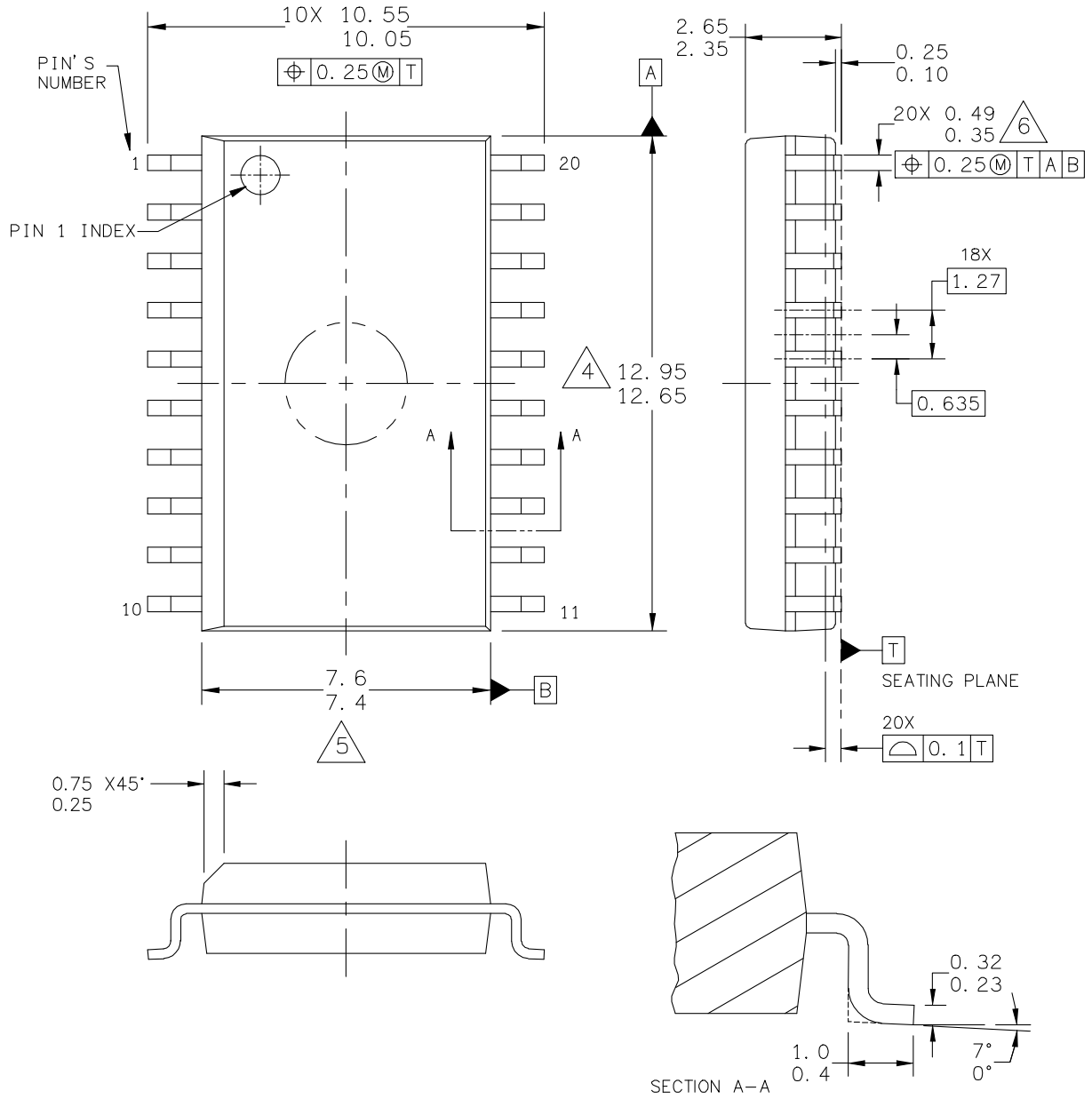
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

7. DIMENSIONS ARE TO BE DETERMINED AT DATUM PLANE -W-.

© FREESCALE SEMICONDUCTOR, INC. ALL RIGHTS RESERVED.	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE	
TITLE: 20 LD TSSOP, PITCH 0.65MM		DOCUMENT NO: 98ASH70169A	REV: B
		CASE NUMBER: 948E-03	09 MAR 2005
		STANDARD: JEDEC	

**CASE 948E-03
ISSUE B
20-LEAD TSSOP PACKAGE**

PACKAGE DIMENSIONS



© FREESCALE SEMICONDUCTOR, INC. ALL RIGHTS RESERVED.	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE
TITLE: 20LD SOIC W/B, 1.27 PITCH CASE-OUTLINE	DOCUMENT NO: 98ASB42343B	REV: J
	CASE NUMBER: 751D-07	23 MAR 2005
	STANDARD: JEDEC MS-013AC	

**CASE 751D-07
ISSUE J
20-LEAD SOIC PACKAGE**

PACKAGE DIMENSIONS

NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. DATUMS A AND B TO BE DETERMINED AT THE PLANE WHERE THE BOTTOM OF THE LEADS EXIT THE PLASTIC BODY.
4. THIS DIMENSION DOES NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURRS. MOLD FLASH, PROTRUSION OR GATE BURRS SHALL NOT EXCEED 0.15 MM PER SIDE. THIS DIMENSION IS DETERMINED AT THE PLANE WHERE THE BOTTOM OF THE LEADS EXIT THE PLASTIC BODY.
5. THIS DIMENSION DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED 0.25 MM PER SIDE. THIS DIMENSION IS DETERMINED AT THE PLANE WHERE THE BOTTOM OF THE LEADS EXIT THE PLASTIC BODY.
6. THIS DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED 0.62 mm.

© FREESCALE SEMICONDUCTOR, INC. ALL RIGHTS RESERVED.	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE	
TITLE: 20LD SOIC W/B, 1.27 PITCH, CASE OUTLINE	DOCUMENT NO: 98ASB42343B	REV: J	
	CASE NUMBER: 751D-07	23 MAR 2005	
	STANDARD: JEDEC MS-013AC		

**CASE 751D-07
ISSUE J
20-LEAD SOIC PACKAGE**

Revision History Sheet

Rev	Table	Page	Description of Change	Date
6		1	NRND – Not Recommend for New Designs	12/19/12
6		1	Product Discontinuance Notice – Last Time Buy Expires on (12/23/2013)	2/26/13

We've Got Your Timing Solution



6024 Silver Creek Valley Road
San Jose, California 95138

Sales
800-345-7015 (inside USA)
+408-284-8200 (outside USA)
Fax: 408-284-2775
www.IDT.com/go/contactIDT

Technical Support
netcom@idt.com
+480-763-2056

DISCLAIMER Integrated Device Technology, Inc. (IDT) and its subsidiaries reserve the right to modify the products and/or specifications described herein at any time and at IDT's sole discretion. All information in this document, including descriptions of product features and performance, is subject to change without notice. Performance specifications and the operating parameters of the described products are determined in the independent state and are not guaranteed to perform the same way when installed in customer products. The information contained herein is provided without representation or warranty of any kind, whether express or implied, including, but not limited to, the suitability of IDT's products for any particular purpose, an implied warranty of merchantability, or non-infringement of the intellectual property rights of others. This document is presented only as a guide and does not convey any license under intellectual property rights of IDT or any third parties.

IDT's products are not intended for use in applications involving extreme environmental conditions or in life support systems or similar devices where the failure or malfunction of an IDT product can be reasonably expected to significantly affect the health or safety of users. Anyone using an IDT product in such a manner does so at their own risk, absent an express, written agreement by IDT.

Integrated Device Technology, IDT and the IDT logo are registered trademarks of IDT. Other trademarks and service marks used herein, including protected names, logos and designs, are the property of IDT or their respective third party owners.

Copyright 2013. All rights reserved.