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.

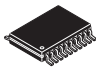
The V_{BB} pin, an internally generated voltage supply, is available to this device only. For single-ended input conditions, the unused differential input is connected to V_{BB} as a switching reference voltage. V_{BB} may also rebias AC coupled inputs. When used, decouple V_{BB} and V_{CC} via a 0.01 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.

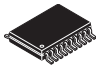
The 100ES Series contains temperature compensation.

Features

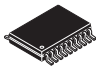
- 360 ps Typical Propagation Delays
- Maximum Frequency > 3 GHz Typical
- PECL Mode Operating Range: V_{CC} = 2.375 V to 3.8 V with V_{EE} = 0 V
- ECL Mode Operating Range: V_{CC} = 0 V with V_{EE} = –2.375 V to –3.8 V
- Open Input Default State
- Separate and Common Select
- Q Output Will Default LOW 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



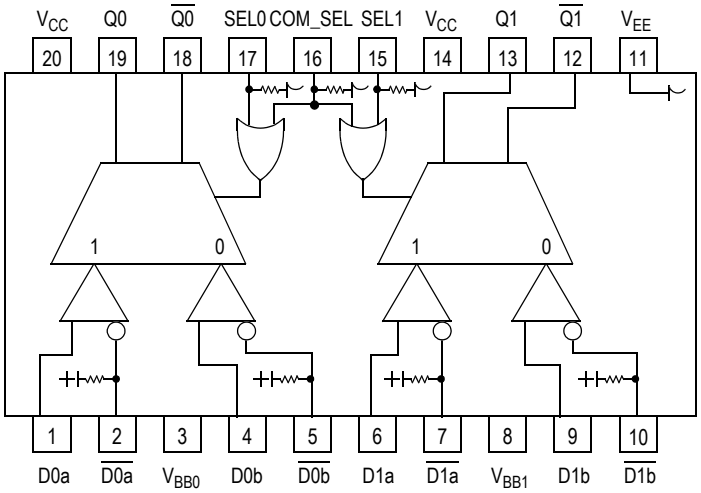
EJ SUFFIX
20-LEAD TSSOP PACKAGE
Pb-FREE PACKAGE
CASE 948E-03



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 MC100ES6056EGR2	SOIC-20 (Pb-Free) SOIC-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

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

Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test

Table 4. 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} –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 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 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	$V_{CC} - V_{EE} \leq 3.6$ 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 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)[1]

Symbol	Characteristics		–40°C to 85°C Min	Typ	Max	Unit
f_{max}	Maximum Frequency			> 3		GHz
t_{PLH}, t_{PHL}	Propagation Delay to Output Differential	D to Q, $\overline{Q}$	300	400	500	ps
		SEL to Q, $\overline{Q}$	300	430	600	ps
		COM_SEL to Q, 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	RMS (1σ)			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 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.

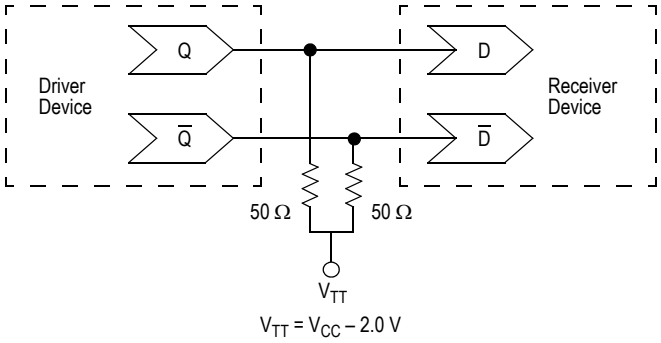
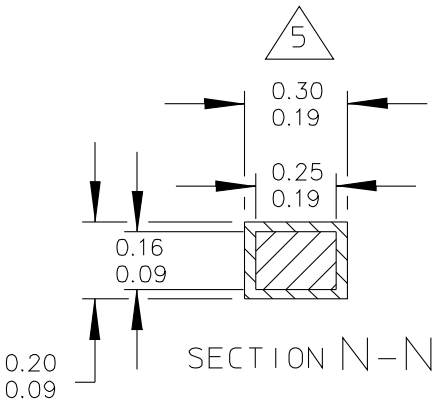
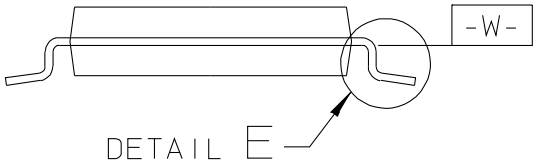
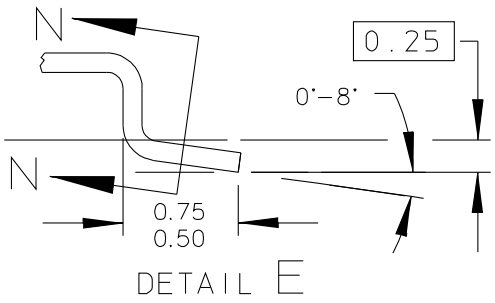


Figure 2. Typical Termination for Output Driver and Device Evaluation

PACKAGE DIMENSIONS







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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:

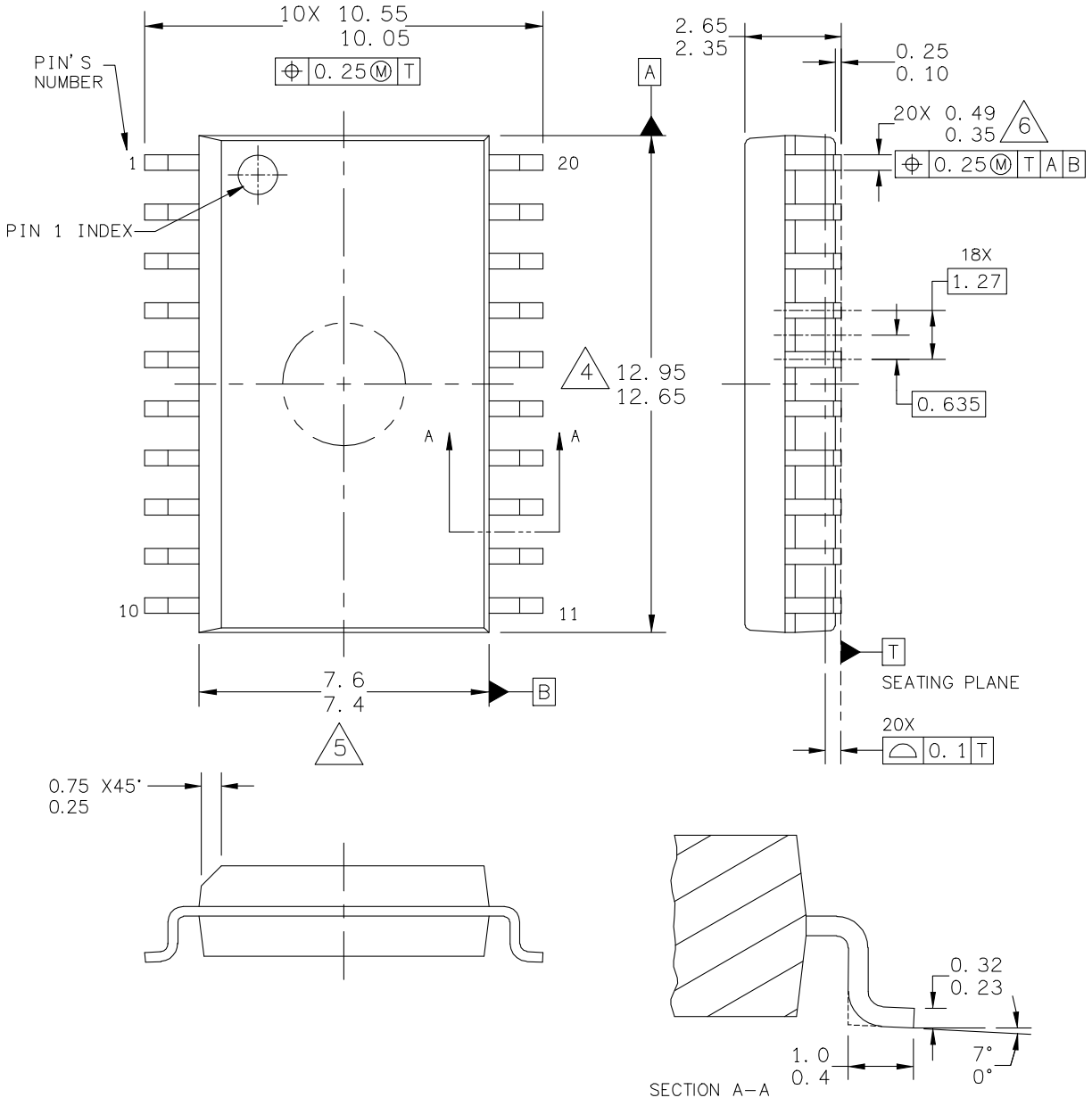
1. CONTROLLING DIMENSION: MILLIMETER
2. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M-1982.
3. DIMENSION DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE.
4. DIMENSION DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION 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-.

MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE

TITLE:	DOCUMENT NO: 98ASH70169A	REV: B
20 LD TSSOP, PITCH 0.65MM	CASE NUMBER: 948E-03	09 MAR 2005
	STANDARD: JEDEC	

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

PACKAGE DIMENSIONS



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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.

MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE

TITLE:	DOCUMENT NO: 98ASB42343B	REV: J
20LD SOIC W/B, 1.27 PITCH, CASE OUTLINE	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

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