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

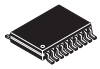
MC100ES6056

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.

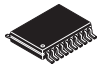
The V_{BB} pin, an internally generated voltage supply, is available to this device only. For single-ended input conditions, the unused differential input is connected to V_{BB} as a switching reference voltage. V_{BB} may also rebias AC coupled inputs. When used, decouple V_{BB} and V_{CC} via a 0.01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



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



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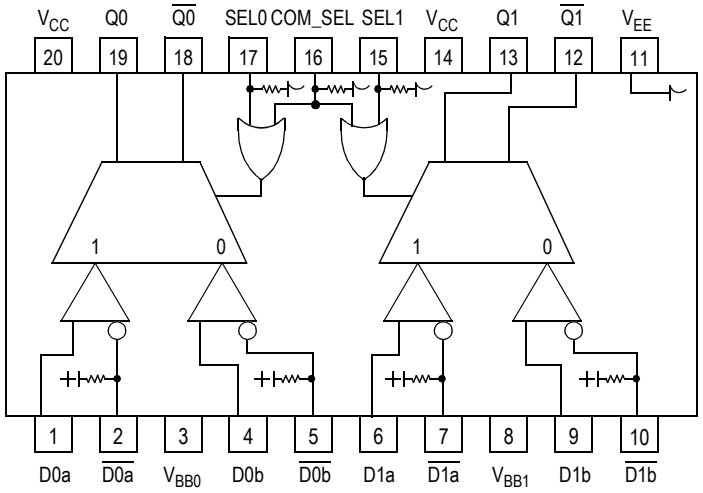
Features

- 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

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

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. 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 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 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			Unit
			Min	Typ	Max	
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.

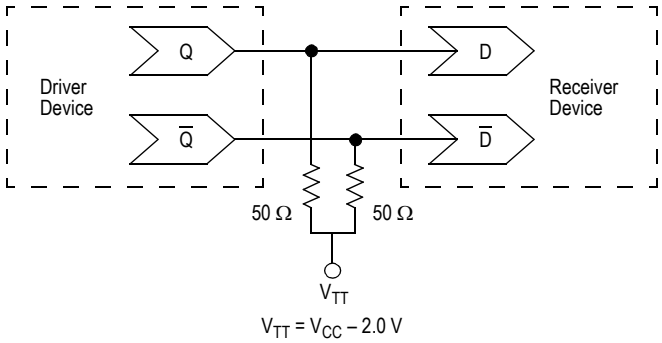
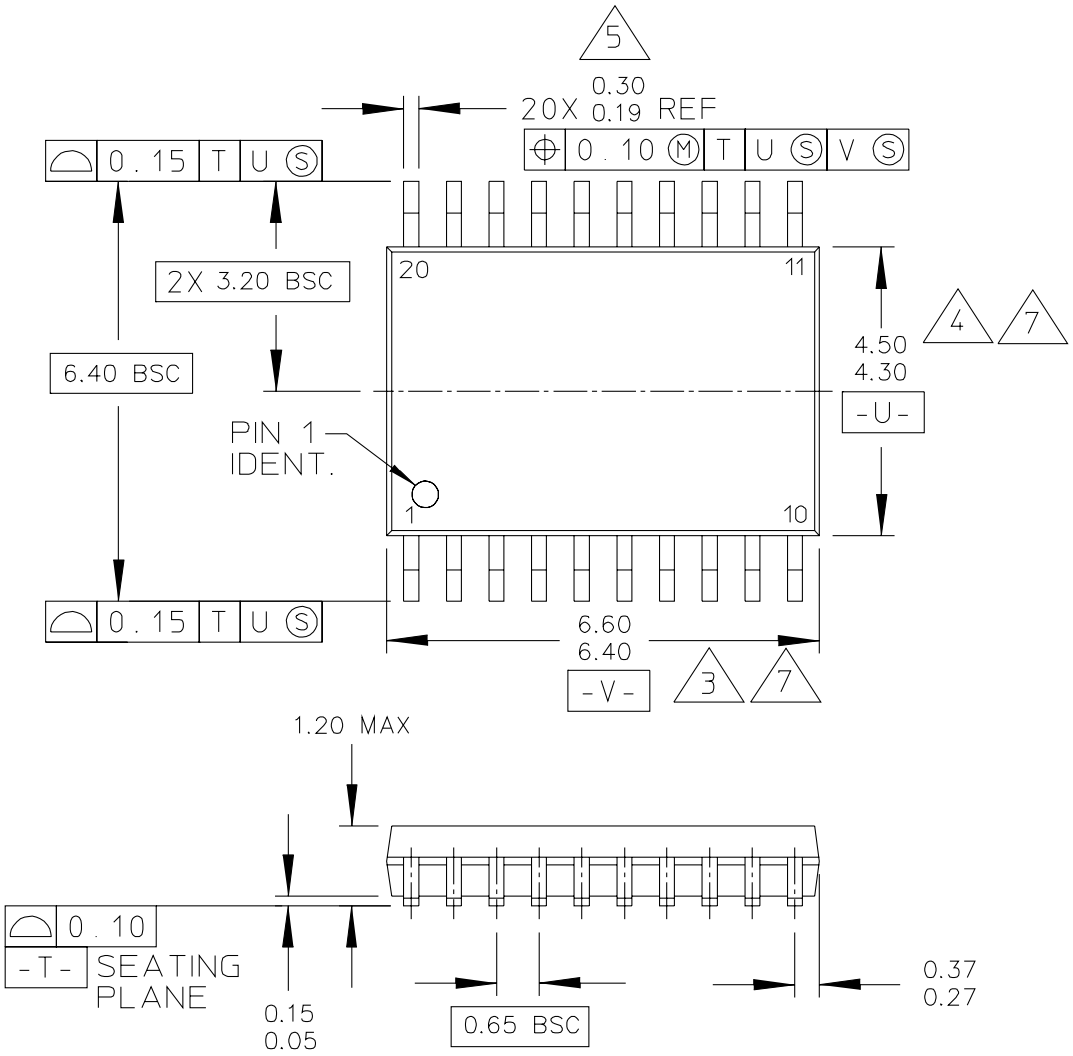


Figure 2. Typical Termination for Output Driver and Device Evaluation

PACKAGE DIMENSIONS



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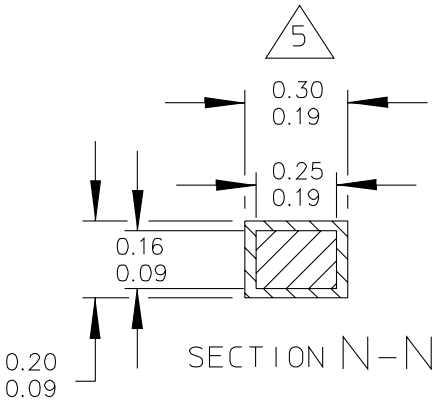
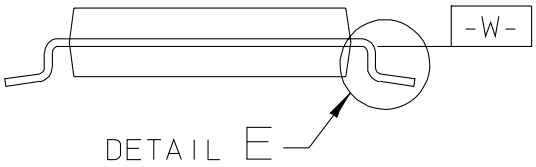
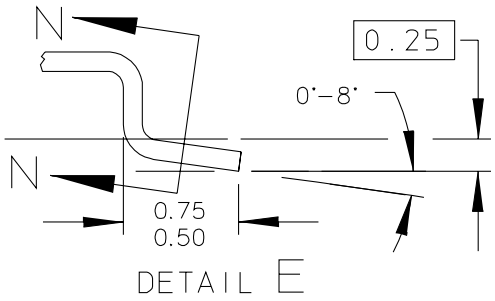
PAGE 1 OF 3

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

PACKAGE DIMENSIONS







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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-.

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CASE 948E-03
ISSUE B
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E-mail:
support@freescale.com

USA/Europe or Locations Not Listed:
Freescale Semiconductor
Technical Information Center, CH370
1300 N. Alma School Road
Chandler, Arizona 85224
+1-800-521-6274 or +1-480-768-2130
support@freescale.com

Europe, Middle East, and Africa:
Freescale Halbleiter Deutschland GmbH
Technical Information Center
Schatzbogen 7
81829 Muenchen, Germany
+44 1296 380 456 (English)
+46 8 52200080 (English)
+49 89 92103 559 (German)
+33 1 69 35 48 48 (French)
support@freescale.com

Japan:
Freescale Semiconductor Japan Ltd.
Headquarters
ARCO Tower 15F
1-8-1, Shimo-Meguro, Meguro-ku,
Tokyo 153-0064
Japan
0120 191014 or +81 3 5437 9125
support.japan@freescale.com

Asia/Pacific:
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