MOTOROLA
SEMICONDUCTOR TECHNICAL DATA

Order number: MC100ES6011
Rev 3, 05/2004

2.5V / 3.3V ECL 1:2 Differential Fanout Buffer

MC100ES6011

The MC100ES6011 is a differential 1:2 fanout buffer. The ES6011 is ideal for applications requiring lower voltage.

The 100ES Series contains temperature compensation.

Features

- 270 ps Typical Propagation Delay
- 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
- Q Output Will Default LOW with Inputs Open or at V_{EE}
- LVDS Input Compatible

D SUFFIX
8-LEAD SOIC PACKAGE
CASE 751

ORDERING INFORMATION

Device	Package
MC100ES6011D	SO-8
MC100ES6011DR2	SO-8

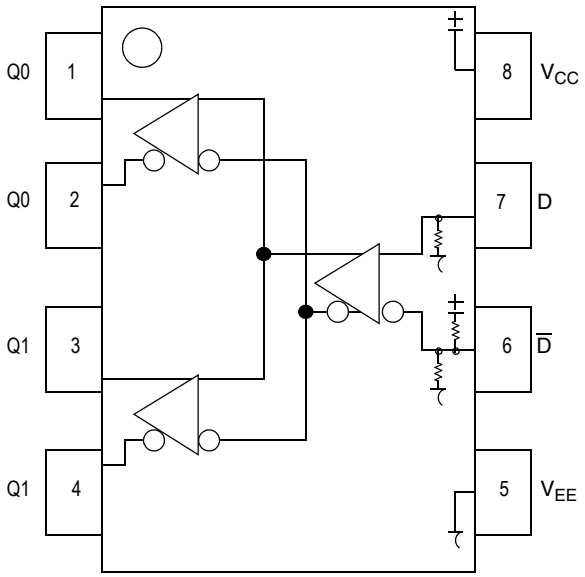


Figure 1. 8-Lead Pinout (Top View) **and Logic Diagram**

PIN DESCRIPTION

Pin	Function
D[1], $\overline{D}$[2]	ECL Data Inputs
Q0, $\overline{Q0}$ Q1, $\overline{Q1}$	ECL Data Outputs
V_{CC}	Positive Supply
V_{EE}	Negative Supply

1. Pins will default LOW when left open.
2. Pins will default to 0.572 V_{CC}/2 when left open.

Table 1. Attributes

Characteristics		Value
Internal Input Pulldown Resistor		75 kΩ
Internal Input Pullup Resistor		56 kΩ
ESD Protection	Human Body Model Machine Model Charged Device Model	> 4000 V > 200 V > 1500 V
θ_{JA} Thermal Resistance (Junction to Ambient)	0 LFPM, 8 SOIC 500 LFPM, 8 SOIC	190°C/W 130°C/W

Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test

Table 2. Maximum Ratings[1]

Symbol	Parameter	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 V
I_{OUT}	Output Current	Continuous Surge	50 100	mA mA
TA	Operating Temperature Range		–40 to +85	°C
T_{stg}	Storage Temperature Range		–65 to +150	°C

1. Absolute maxim 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 3. DC Characteristics (V_{CC} = 0 V; V_{EE} = –2.5 V ± 5% or V_{CC} = 2.5 V ± 5%; V_{EE} = 0 V)[1]

Symbol	Characteristic	–40°C			0°C to 85°C			Unit
		Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		12	25		12	25	mA
V_{OH}	Output HIGH Voltage[2]	V_{CC}–1160	V_{CC}–1005	V_{CC}–880	V_{CC}–1100	V_{CC}–955	V_{CC}–740	mV
V_{OL}	Output LOW Voltage[2]	V_{CC}–1830	V_{CC}–1605	V_{CC}–1305	V_{CC}–1810	V_{CC}–1705	V_{CC}–1405	mV
V_{OUTPP}	Output Peak-to-Peak Voltage	200			200			mV
V_{IH}	Input HIGH Voltage (Single Ended)	V_{CC}–1165		V_{CC}–880	V_{CC}–1165		V_{CC}–880	mV
V_{IL}	Input LOW Voltage (Single Ended)	V_{CC}–1810		V_{CC}–1475	V_{CC}–1810		V_{CC}–1475	mV
V_{PP}	Differential Input Voltage[3]	0.12		1.3	0.12		1.3	V
V_{CMR}	Differential Cross Point Voltage[4]	V_{EE+}1.0		V_{CC}–0.8	V_{EE+}1.0		V_{CC}–0.8	V
I_{IN}	Input Current			±150			±150	μA

1. ES6011 circuits are designed to meet the DC specifications shown in the above table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse airflow > 500 LFPM is maintained.
2. 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.
3. V_{PP} (DC) is the minimum differential input voltage swing required to maintain device functionality.
4. 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 4. DC Characteristics (V_{CC} = 0 V; V_{EE} = –3.8 to –3.135 or V_{CC} = 3.8 to 3.135 V; V_{EE} = 0 V)[1]

Symbol	Characteristic	–40°C			0°C to 85°C			Unit
		Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		12	25		12	25	mA
V_{OH}	Output HIGH Voltage[2]	V_{CC}–1160	V_{CC}–1005	V_{CC}–880	V_{CC}–1100	V_{CC}–955	V_{CC}–740	mV
V_{OL}	Output LOW Voltage[2]	V_{CC}–1830	V_{CC}–1705	V_{CC}–1405	V_{CC}–1830	V_{CC}–1705	V_{CC}–1405	mV
V_{OUTPP}	Output Peak-to-Peak Voltage	200			200			mV
V_{IH}	Input HIGH Voltage (Single Ended)	V_{CC}–1165		V_{CC}–880	V_{CC}–1165		V_{CC}–880	mV
V_{IL}	Input LOW Voltage (Single Ended)	V_{CC}–1810		V_{CC}–1475	V_{CC}–1810		V_{CC}–1475	mV
V_{PP}	Differential Input Voltage[3]	0.12		1.3	0.12		1.3	V
V_{CMR}	Differential Cross Point Voltage[4]	V_{EE}+1.0		V_{CC}–0.8	V_{EE}+1.0		V_{CC}–0.8	V
I_{IN}	Input Current			±150			±150	µA

1. ES6011 circuits are designed to meet the DC specifications shown in the above table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse airflow > 500 LFPM is maintained.
2. 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.
3. V_{PP} (DC) is the minimum differential input voltage swing required to maintain device functionality.
4. 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. AC Characteristics (V_{CC} = 0 V; V_{EE} = –3.8 to –2.375 or V_{CC} = 2.375 to 3.8 V; V_{EE} = 0 V)[1]

Symbol	Characteristic	–40°C			25°C			0°C to 85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f_{MAX}	Maximum Frequency		> 3			> 3			> 3		GHz
t_{PLH}, t_{PHL}	Propagation Delay (Differential) CLK to Q, $\overline{Q}$	170	260	300	180	270	310	210	285	360	ps
t_{SKEW}	Within Device Skew Q, $\overline{Q}$ Device-to-Device Skew[2]		9	20 130		9	20 130		9	20 150	ps
t_{JITTER}	Cycle-to-Cycle Jitter RMS (1σ)			1			1			1	ps
V_{PP}	Input Voltage Swing (Differential)	150		1200	150		1200	150		1200	mV
V_{CMR}	Differential Cross Point Voltage	V_{EE}+1.2		V_{CC}–1.1	V_{EE}+1.2		V_{CC}–1.1	V_{EE}+1.2		V_{CC}–1.1	V
t_r t_f	Output Rise/Fall Times (20% – 80%)	70		220	70		220	70		220	ps

1. Measured using a 750 mV source 50% Duty Cycle clock source. All loading with 50 Ω to V_{CC}–2.0 V.
2. Skew is measured between outputs under identical transitions.

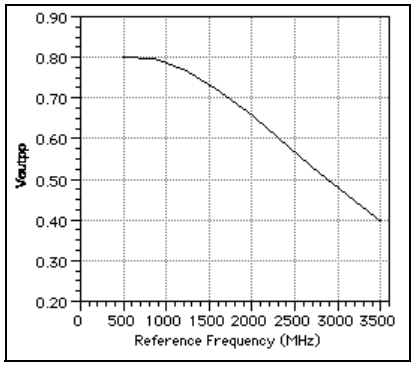


Figure 2. V_{OUTPP} versus Frequency

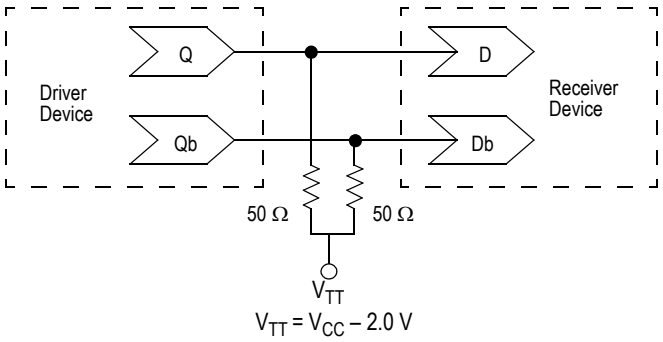


Figure 3. Typical Termination for Output Driver and Device Evaluation

MC100ES6011

Marking Notes:

Device Nomenclature	8-Lead SOIC Marking
MC100ES6011D	M6011

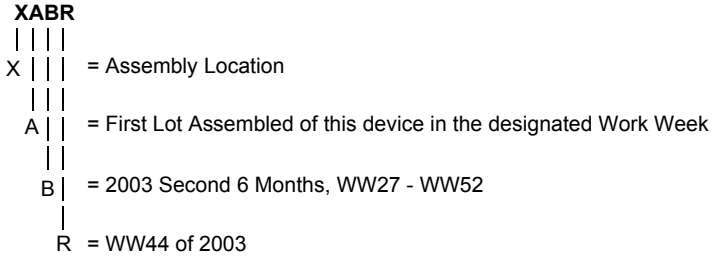
Trace Code Identification:

"A" — The First character indicates the Assembly location.
"L" — The Second character indicates the Source Wafer Lot Tracking Code.
"Y" — The Third character indicates the "ALPHA CODE" of the year device was assembled.
"W" — The Fourth character indicates the "ALPHA CODE" of the Work Week device was assembled.

The "Y" Year ALPHA CODES		
Year	**Month**	**Work Week Code**
A = 2003	FIRST 6 MONTHS	WW01 – WW26
B = 2003	SECOND 6 MONTHS	WW27 – WW52
C = 2004	FIRST 6 MONTHS	WW01 – WW26
D = 2004	SECOND 6 MONTHS	WW27 – WW52
E = 2005	FIRST 6 MONTHS	WW01 – WW26
F = 2005	SECOND 6 MONTHS	WW27 – WW52
G = 2006	FIRST 6 MONTHS	WW01 – WW26
H = 2006	SECOND 6 MONTHS	WW27 – WW52
I = 2007	FIRST 6 MONTHS	WW01 – WW26
J = 2007	SECOND 6 MONTHS	WW27 – WW52
K = 2008	FIRST 6 MONTHS	WW01 – WW26
L = 2008	SECOND 6 MONTHS	WW27 – WW52
M = 2009	FIRST 6 MONTHS	WW01 – WW26
N = 2009	SECOND 6 MONTHS	WW27 – WW52
O = 2010	FIRST 6 MONTHS	WW01 – WW26
P = 2010	SECOND 6 MONTHS	WW27 – WW52
Q = 2011	FIRST 6 MONTHS	WW01 – WW26
R = 2011	SECOND 6 MONTHS	WW27 – WW52
S = 2012	FIRST 6 MONTHS	WW01 – WW26
T = 2012	SECOND 6 MONTHS	WW27 – WW52
U = 2013	FIRST 6 MONTHS	WW01 – WW26
V = 2013	SECOND 6 MONTHS	WW27 – WW52
W = 2014	FIRST 6 MONTHS	WW01 – WW26
X = 2014	SECOND 6 MONTHS	WW27 – WW52
Y = 2015	FIRST 6 MONTHS	WW01 – WW26
Z = 2015	SECOND 6 MONTHS	WW27 – WW52

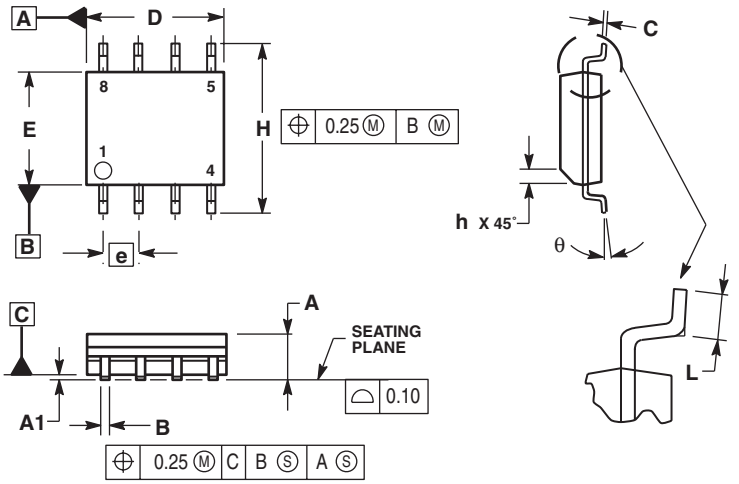
The "W" Work Week ALPHA CODES	
1st 6 Months (WW01 – WW26)	**2nd 6 Months (WW27 – WW52)**
A = WW01	A = WW27
B = WW02	B = WW28
C = WW03	C = WW29
D = WW04	D = WW30
E = WW05	E = WW31
F = WW06	F = WW32
G = WW07	G = WW33
H = WW08	H = WW34
I = WW09	I = WW35
J = WW10	J = WW36
K = WW11	K = WW37
L = WW12	L = WW38
M = WW13	M = WW39
N = WW14	N = WW40
O = WW15	O = WW41
P = WW16	P = WW42
Q = WW17	Q = WW43
R = WW18	R = WW44
S = WW19	S = WW45
T = WW20	T = WW46
U = WW21	U = WW47
V = WW22	V = WW48
W = WW23	W = WW49
X = WW24	X = WW50
Y = WW25	Y = WW51
Z = WW26	Z = WW52

Marking Example:



OUTLINE DIMENSIONS

D SUFFIX
8-LEAD SOIC PACKAGE
CASE 751-06
ISSUE T



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. DIMENSIONS ARE IN MILLIMETER.
3. DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS	
DIM	MIN	MAX
A	1.35	1.75
A1	0.10	0.25
B	0.35	0.49
C	0.19	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.25
q	0°	7°

NOTES

NOTES

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