

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

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: $V_{CC} = 2.375\text{ V}$ to 3.8 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 V
- Open Input Default State
- Q Output Will Default LOW with Inputs Open or at V_{EE}
- LVDS Input Compatible

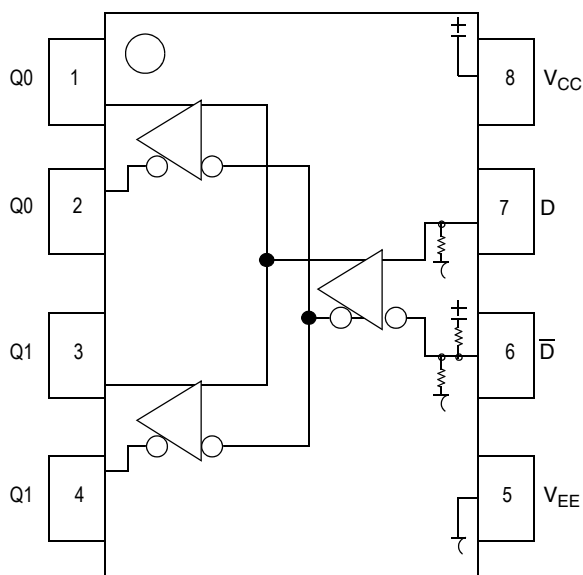


Figure 1. 8-Lead Pinout (Top View) and Logic Diagram

MC100ES6011



D SUFFIX
8-LEAD SOIC PACKAGE
CASE 751

ORDERING INFORMATION

Device	Package
MC100ES6011D	SO-8
MC100ES6011DR2	SO-8

PIN DESCRIPTION

Pin	Function
$D^1, \bar{D}^2$	ECL Data Inputs
$Q0, \bar{Q0}, Q1, \bar{Q1}$	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 k Ω
Internal Input Pullup Resistor		56 k Ω
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 Ratings¹

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
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 3. DC Characteristics ($V_{CC} = 0$ V; $V_{EE} = -2.5$ V $\pm$ 5% or $V_{CC} = 2.5$ V $\pm$ 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	μ A

- 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.
- 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.
- V_{PP} (DC) is the minimum differential input voltage swing required to maintain device functionality.
- 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 ($V_{CC} = 0\text{ V}$; $V_{EE} = -3.8\text{ to }-3.135\text{ V}$ or $V_{CC} = 3.8\text{ to }3.135\text{ V}$; $V_{EE} = 0\text{ V}$)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

- 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.
- 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.
- V_{PP} (DC) is the minimum differential input voltage swing required to maintain device functionality.
- 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 ($V_{CC} = 0\text{ V}$; $V_{EE} = -3.8\text{ to }-2.375\text{ V}$ or $V_{CC} = 2.375\text{ to }3.8\text{ V}$; $V_{EE} = 0\text{ V}$)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, $\bar{Q}$	170	260	300	180	270	310	210	285	360	ps
t_{SKEW}	Within Device Skew Q, $\bar{Q}$ 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

- Measured using a 750 mV source 50% Duty Cycle clock source. All loading with $50\ \Omega$ to $V_{CC}-2.0\text{ V}$.
- Skew is measured between outputs under identical transitions.

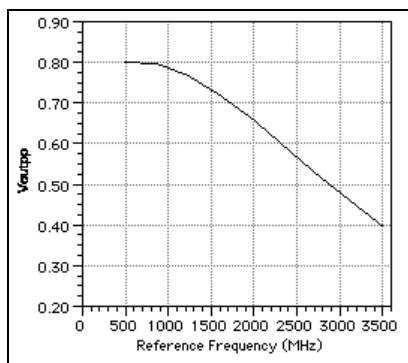


Figure 2. V_{OUTPP} versus Frequency

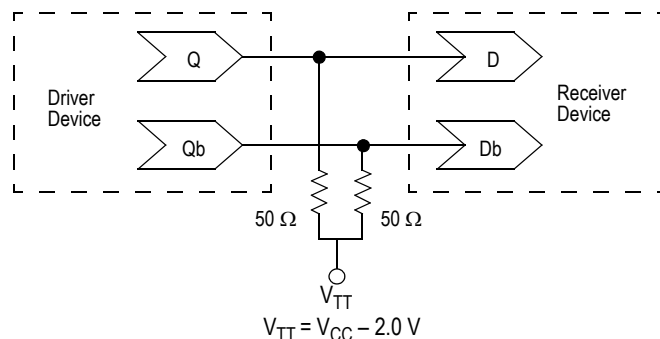


Figure 3. Typical Termination for Output Driver and Device Evaluation

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

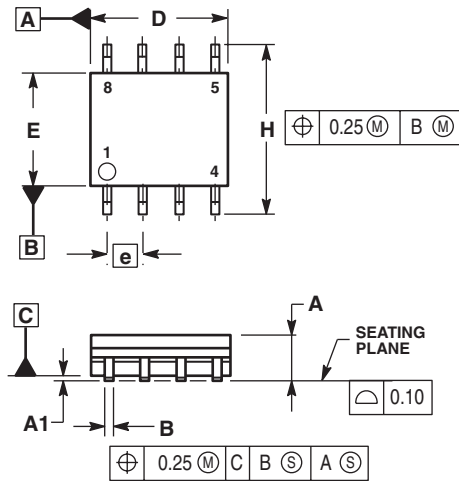
The “W” Work Week ALPHA CODES	
1st 6 Months (WW01 – WW26)	2nd 6 Months (WW27 – WW52)
A = WW01	A = WW27
B = WW02	B = WW28
C = WW03	C = WW29
D = WW04	D = WW30
E = WW05	E = WW31
F = WW06	F = WW32
G = WW07	G = WW33
H = WW08	H = WW34
I = WW09	I = WW35
J = WW10	J = WW36
K = WW11	K = WW37
L = WW12	L = WW38
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:

XABR
 | | | |
 X | | | = Assembly Location
 | | |
 A | | = First Lot Assembled of this device in the designated Work Week
 | |
 B | = 2003 Second 6 Months, WW27 - WW52
 |
 R = WW44 of 2003

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

Information in this document is provided solely to enable system and software implementers to use Motorola products. There are no express or implied copyright licenses granted hereunder to design or fabricate any integrated circuits or integrated circuits based on the information in this document.

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part.

MOTOROLA and the Stylized M Logo are registered in the US Patent and Trademark Office. All other product or service names are the property of their respective owners.

© Motorola, Inc. 2004

HOW TO REACH US:

USA/EUROPE/LOCATIONS NOT LISTED:
Motorola Literature Distribution
P.O. Box 5405, Denver, Colorado 80217
1-800-521-6274 or 480-768-2130

JAPAN: Motorola Japan Ltd.; SPS, Technical Information Center
3-20-1 Minami-Azabu, Minato-ku, Tokyo 106-8573, Japan
81-3-3440-3569

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Centre
2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong
852-26668334

HOME PAGE: <http://motorola.com/semiconductors>

**MOTOROLA****MC100ES6011**

**For More Information On This Product,
Go to: www.freescale.com**