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2.5 V/3.3 V 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.

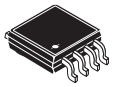
The 100ES Series contains temperature compensation.

Features

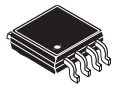
- 270 ps Typical Propagation Delay
- Maximum Frequency > 3 GHz Typical
- PECL Mode Operating Range: V_{CC} = 2.375 V to 3.8 V with V_{EE} = 0 V
- ECL Mode Operating Range: V_{CC} = 0 V with V_{EE} = -2.375 V to -3.8 V
- Open Input Default State
- Q Output Will Default LOW with Inputs Open or at V_{EE}
- LVDS Input Compatible
- 8-Lead SOIC and TSSOP Pb-Free Packages Available

D SUFFIX
8-LEAD SOIC PACKAGE
CASE 751-07

EF SUFFIX
8-LEAD SOIC PACKAGE
Pb-FREE PACKAGE
CASE 751-07



DT SUFFIX
8-LEAD TSSOP PACKAGE
CASE 1640-01



EJ SUFFIX
8-LEAD TSSOP PACKAGE
Pb-FREE PACKAGE
CASE 1640-01

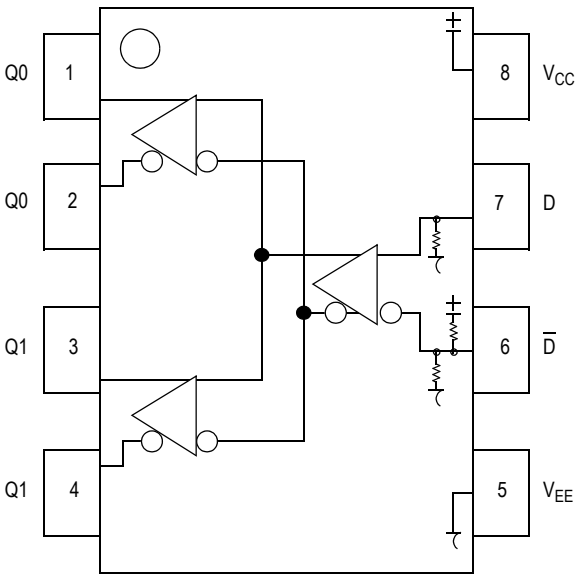


Figure 1. 8-Lead Pinout (Top View) and Logic Diagram

ORDERING INFORMATION	
Device	**Package**
MC100ES6011D	SO-8
MC100ES6011DR2	SO-8
MC100ES6011EF	SO-8 (Pb-Free)
MC100ES6011EFR2	SO-8 (Pb-Free)
MC100ES6011DT	TSSOP-8
MC100ES6011DTR2	TSSOP-8
MC100ES6011EJ	TSSOP-8 (Pb-Free)
MC100ES6011EJR2	TSSOP-8 (Pb-Free)

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.

freescale semiconductor

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 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 ± 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}–1135		V_{CC}–760	V_{CC}–1070		V_{CC}–760	mV
V_{OL}	Output LOW Voltage(2)	V_{CC}–1950		V_{CC}–1350	V_{CC}–1950		V_{CC}–1520	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} –1135		V_{CC} –760	V_{CC} –1070		V_{CC} –760	mV
V_{OL}	Output LOW Voltage[2]	V_{CC} –1950		V_{CC} –1500	V_{CC} –1950		V_{CC} –1520	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.

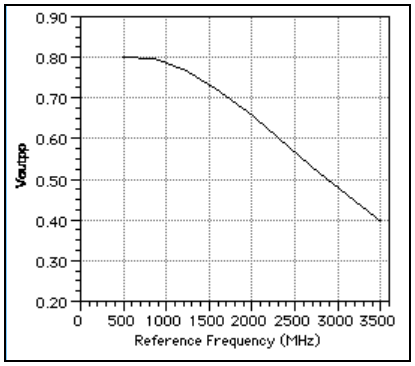


Figure 2. V_{OUTPP} versus Frequency

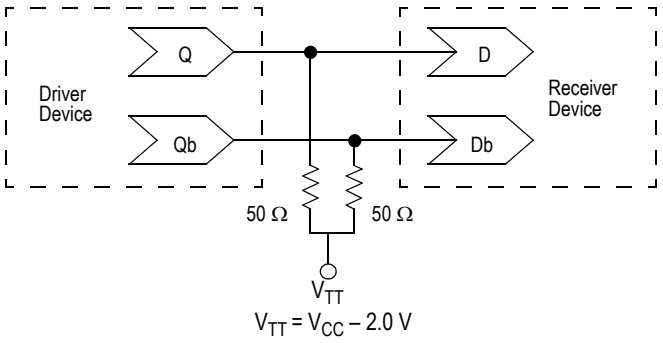
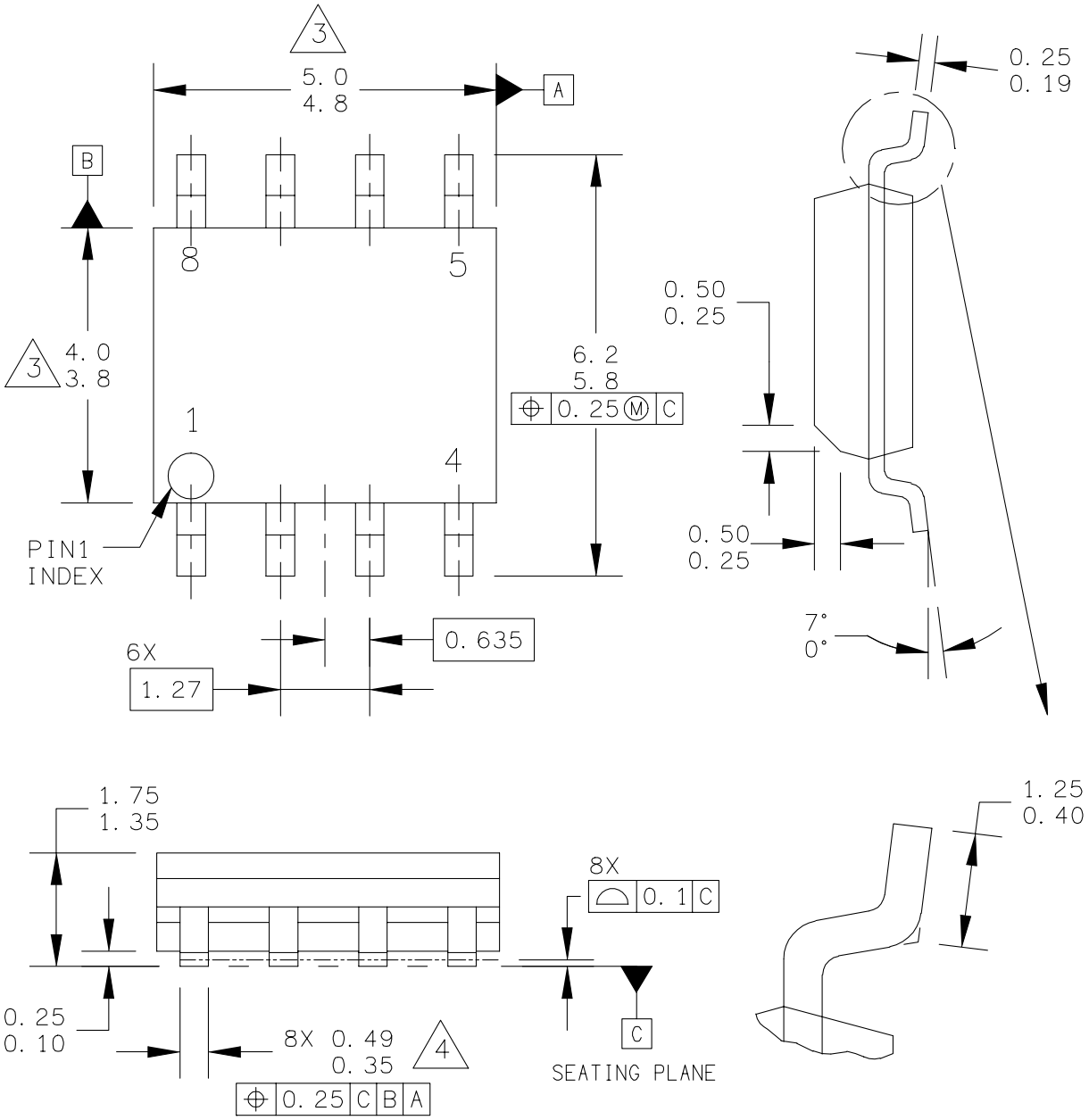


Figure 3. Typical Termination for Output Driver and Device Evaluation

PACKAGE DIMENSIONS



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	CASE NUMBER: 751-07	07 APR 2005
	STANDARD: JEDEC MS-012AA	

PAGE 1 OF 2

CASE 751-07
ISSUE U
8-LEAD SOIC PACKAGE

PACKAGE DIMENSIONS

NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M–1994.
3. DIMENSION DOES NOT INCLUDE MOLD PROTRUSION. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
4. DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE DIMENSION AT MAXIMUM MATERIAL CONDITION.

MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE

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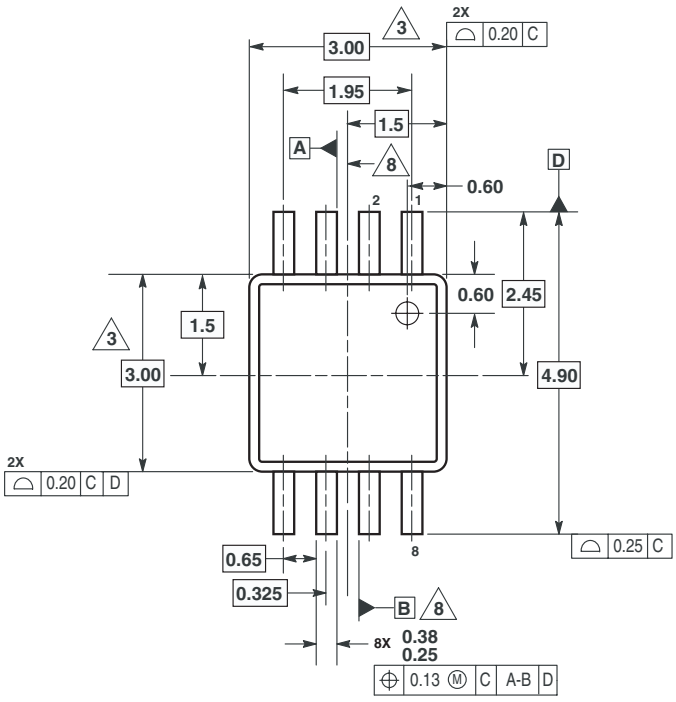
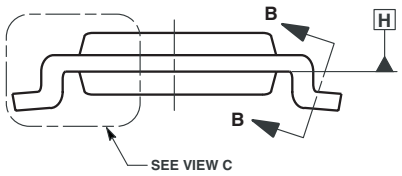
8LD SOIC NARROW BODY	CASE NUMBER: 751–07	07 APR 2005
	STANDARD: JEDEC MS–012AA	

CASE 751-07
ISSUE U
8-LEAD SOIC PACKAGE

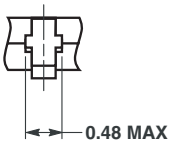
PACKAGE DIMENSIONS



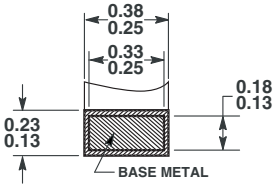
TOP VIEW



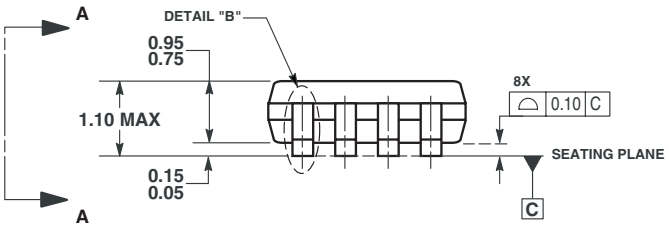
VIEW A-A



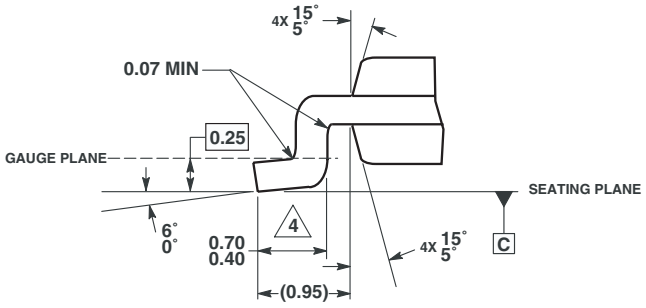
DETAIL "B"
DAMBAR PROTRUSION



SECTION B-B
SEE NOTE 6



SIDE VIEW



VIEW C

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. DIMENSIONS ARE IN MILLIMETERS.
3. THIS DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT DATUM H, MOLD FLASH OR PROTRUSIONS, SHALL NOT EXCEED 0.15mm PER SIDE.
4. DIMENSION IS THE LENGTH OF TERMINAL FOR SOLDERING TO A SUBSTRATE.
5. THE LEAD WIDTH DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08mm TOTAL IN EXCESS OF THE LEAD WIDTH DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE LEAD FOOT. MINIMUM SPACE BETWEEN PROTRUSIONS AND ADJACENT LEAD TO BE 0.14mm SEE DETAIL "B" AND SECTION B-B.
6. SECTION B-B TO BE DETERMINED AT 0.10 TO 0.25mm FROM THE LEAD TIP.
7. THIS PART IS COMPLIANT WITH JEDEC REGISTRATION MO-187 AA.
8. DATUMS A AND B TO BE DETERMINED DATUM PLANE H.

CASE 1640-01
ISSUE O
8-LEAD TSSOP PACKAGE

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Home Page:
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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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