5V ECL Dual 1:3 Fanout Buffer

The MC100EL13 is a dual, fully differential 1:3 fanout buffer. The Low Output-Output Skew of the device makes it ideal for distributing two different frequency synchronous signals.

The differential inputs have special circuitry which ensures device stability under open input conditions. When both differential inputs are left open the D input will pull down to V_{EE} , The \overline{D} input will bias around $V_{CC}/2$ and the Q output will go LOW.

Features

- 500 ps Typical Propagation Delays
- 50 ps Output-Output Skews
- The 100 Series Contains Temperature Compensation
- PECL Mode Operating Range: $V_{CC} = 4.2 \text{ V}$ to 5.7 V with $V_{EE} = 0 \text{ V}$
- NECL Mode Operating Range: $V_{CC} = 0 \text{ V}$ with $V_{EE} = -4.2 \text{ V}$ to -5.7 V
- Internal Input Pulldown Resistors
- ullet Q Output will Default LOW with Inputs Open or at V_{EE}
- Internal Input Pulldown Resistors on All Inputs, Pullup Resistors on Inverted Inputs
- Pb-Free Packages are Available*



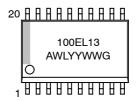
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http://onsemi.com



SO-20L DW SUFFIX CASE 751D

MARKING DIAGRAM*



A = Assembly Location

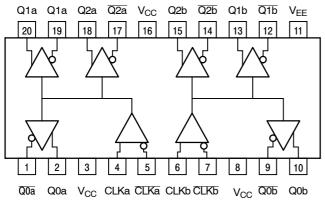
WL = Wafer Lot
YY = Year
WW = Work Week
G = Pb-Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

^{*}For additional marking information, refer to Application Note AND8002/D.

^{*}For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



* All V_{CC} pins are tied together on the die.

Warning: All $V_{\mbox{\footnotesize{CC}}}$ and $V_{\mbox{\footnotesize{EE}}}$ pins must be externally connected to Power Supply to guarantee proper operation.

Figure 1. Logic Diagram and Pinout: Assignment

Table 1. PIN DESCRIPTION

PIN	FUNCTION
Qna, Qna	ECL Differential Clock Outputs
Qnb, Qnb	ECL Differential Clock Outputs
CLKn, CLKn	ECL Differential Clock Inputs
V _{CC}	Positive Supply
VEE	Negative Supply

Table 2. ATTRIBUTES

Characteristi	Value	
Internal Input Pulldown Resistor		75 kΩ
Internal Input Pullup Resistor		75 kΩ
ESD Protection	Human Body Model Machine Model Charge Device Model	> 2 kV > 200 V > 4 kV
Moisture Sensitivity (Note 1)		Level 1
Flammability Rating	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in
Transistor Count		143 Devices
Meets or Exceeds JEDEC Spec EIA/J	ESD78 IC Latchup Test	

^{1.} For additional Moisture Sensitivity information, refer to Application Note AND8003/D.

Table 3. MAXIMUM RATINGS

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
V _{CC}	PECL Mode Power Supply	V _{EE} = 0 V		8	V
V _{EE}	NECL Mode Power Supply	V _{CC} = 0 V		-8	V
V _I	PECL Mode Input Voltage	V _{EE} = 0 V	$V_{I} \leq V_{CC}$	6	V
	NECL Mode Input Voltage	$V_{CC} = 0 V$	$V_{I} \ge V_{EE}$	-6	V
l _{out}	Output Current	Continuous		50	mA
		Surge		100	mA
I _{BB}	V _{BB} Sink/Source			± 0.5	mA
T _A	Operating Temperature Range			-40 to +85	°C
T _{stg}	Storage Temperature Range			−65 to +150	°C
$\theta_{\sf JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfpm	SO-20L	90	°C/W
		500 lfpm	SO-20L	60	°C/W
$\theta_{\sf JC}$	Thermal Resistance (Junction-to-Case)	Standard Board	SO-20L	30 to 35	°C/W
T _{sol}	Wave Solder Pb-Free	<2 to 3 sec @ 248°C <2 to 3 sec @ 260°C		265 265	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 4. 100EL SERIES PECL DC CHARACTERISTICS V_{CC} = 5.0 V; V_{EE} = 0.0 V (Note 2)

			-40°C			25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I _{EE}	Power Supply Current		30	38		30	38		32	40	mA
V _{OH}	Output HIGH Voltage (Note 3)	3915	3995	4120	3975	4045	4120	3975	4050	4120	mV
V _{OL}	Output LOW Voltage (Note 3)	3170	3305	3445	3190	3295	3380	3190	3295	3380	mV
V _{IH}	Input HIGH Voltage (Single-Ended)	3835		4120	3835		4120	3835		4120	mV
V_{IL}	Input LOW Voltage (Single-Ended)	3190		3525	3190		3525	3190		3525	mV
V_{BB}	Output Voltage Reference	3.62		3.74	3.62		3.74	3.62		3.74	V
V _{IHCMR}	Common Mode Range (Differential Configuration) (Note 4) $V_{PP} < 500 \text{ mV}$ $V_{PP} \ge 500 \text{ mV}$	1.3 1.5		4.6 4.6	1.2 1.4		4.6 4.6	1.2 1.4		4.6 4.6	V
I _{IH}	Input HIGH Current			150			150			150	μΑ
I _{IL}	Input LOW Current	0.5			0.5			0.5			μΑ

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

- 2. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary +0.8 V / -0.5 V.
- 3. Outputs are terminated through a 50 Ω resistor to V_{CC} 2.0 V.
- 4. V_{IHCMR} min varies 1:1 with V_{EE}, V_{IHCMR} max varies 1:1 with V_{CC}. The V_{IHCMR} range is referenced to the most positive side of the differential

Table 5. 100EL SERIES NECL DC CHARACTERISTICS V_{CC} = 0.0 V; V_{EE} = -5.0 V (Note 5)

			-40°C			25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I _{EE}	Power Supply Current		30	38		30	38		32	40	mA
V _{OH}	Output HIGH Voltage (Note 6)	-1085	-1005	-880	-1025	-955	-880	-1025	-955	-880	mV
V _{OL}	Output LOW Voltage (Note 6)	-1830	-1695	-1555	-1810	-1705	-1620	-1810	-1705	-1620	mV
V _{IH}	Input HIGH Voltage (Single-Ended)	-1165		-880	-1165		-880	-1165		-880	mV
V _{IL}	Input LOW Voltage (Single-Ended)	-1810		-1475	-1810		-1475	-1810		-1475	mV
V_{BB}	Output Voltage Reference	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	V
V _{IHCMR}	Common Mode Range (Differential Configuration) (Note 7) V _{PP} < 500 mV V _{PP} ≥ 500 mV	-3.7 -3.5		-0.4 -0.4	-3.8 -3.6		-0.4 -0.4	-3.8 -3.6		-0.4 -0.4	V
I _{IH}	Input HIGH Current			150			150			150	μΑ
I _{IL}	Input LOW Current	0.5			0.5			0.5			μА

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

- 5. Input and output parameters vary 1:1 with V $_{CC}$. V $_{EE}$ can vary +0.8 V / -0.5 V. 6. Outputs are terminated through a 50 Ω resistor to V $_{CC}$ 2.0 V.
- 7. V_{IHCMR} min varies 1:1 with V_{EE}, V_{IHCMR} max varies 1:1 with V_{CC}. The V_{IHCMR} range is referenced to the most positive side of the differential input signal.

Table 6. AC CHARACTERISTICS $V_{CC} = 5.0 \text{ V}; V_{EE} = 0.0 \text{ V}$ or $V_{CC} = 0.0 \text{ V}; V_{EE} = -5.0 \text{ V}$ (Note 8)

		−40°C			25°C			85°C			
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
f _{max}	Maximum Toggle Frequency		TBD			TBD			TBD		GHz
t _{PLH} t _{PHL}	Propagation Delay CLK→Q/Q	410		600	430		620	450		640	ps
t _{sk(O)}	Output-Output Skew Any Qa→Qa, Any Qb→Qb Any Qa→Any Qb			50 75			50 75			50 75	ps
t _{sk(DC)}	Duty Cycle Skew tplн-tpнl			50			50			50	ps
t _{JITTER}	Cycle-to-Cycle Jitter		TBD			TBD			TBD		ps
V_{PP}	Input Swing (Note 9)	150		1000	150		1000	150		1000	mV
t _r t _f	Output Rise/Fall Times Q (20% – 80%)	230		500	230		500	230		500	ps

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

- 8. V_{EE} can vary +0.8 V / −0.5 V.
 9. V_{PP}min is minimum input swing for which AC parameters guaranteed. The device has a DC gain of ≈40.

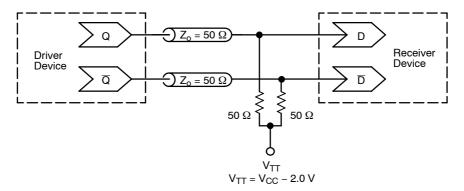


Figure 2. Typical Termination for Output Driver and Device Evaluation (See Application Note AND8020/D - Termination of ECL Logic Devices.)

ORDERING INFORMATION

Device	Package	Shipping [†]
MC100EL13DW	SO-20 WB	38 Units / Rail
MC100EL13DWG	SO-20 WB (Pb-Free)	38 Units / Rail
MC100EL13DWR2	SO-20 WB	1000 / Tape & Reel
MC100EL13DWR2G	SO-20 WB (Pb-Free)	1000 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

Resource Reference of Application Notes

AN1405/D - ECL Clock Distribution Techniques

AN1406/D - Designing with PECL (ECL at +5.0 V)

AN1503/D - ECLinPS™ I/O SPiCE Modeling Kit

AN1504/D - Metastability and the ECLinPS Family

AN1568/D - Interfacing Between LVDS and ECL

AN1672/D - The ECL Translator Guide

AND8001/D - Odd Number Counters Design

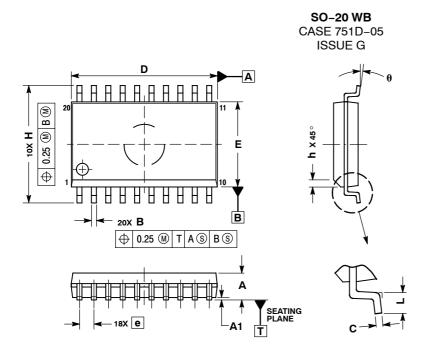
AND8002/D - Marking and Date Codes

AND8020/D - Termination of ECL Logic Devices

AND8066/D - Interfacing with ECLinPS

AND8090/D - AC Characteristics of ECL Devices

PACKAGE DIMENSIONS



- NOTES:
 1. DIMENSIONS ARE IN MILLIMETERS.
- INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M. 1994.
- DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
- MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
- DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION

	MILLIMETERS						
DIM	MIN MAX						
Α	2.35	2.65					
A1	0.10	0.25					
В	0.35	0.49					
С	0.23	0.32					
D	12.65	12.95					
Ε	7.40	7.60					
е	1.27	BSC					
Н	10.05	10.55					
h	0.25	0.75					
L	0.50	0.90					
θ	0 °	7 °					

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