

MC100EL13

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 \bar{D} input will bias around $V_{CC}/2$ and the Q output will go LOW.

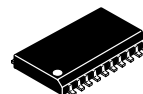
Features

- 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
- 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*



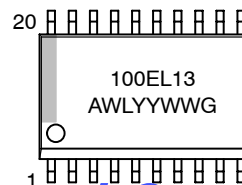
ON Semiconductor®

<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

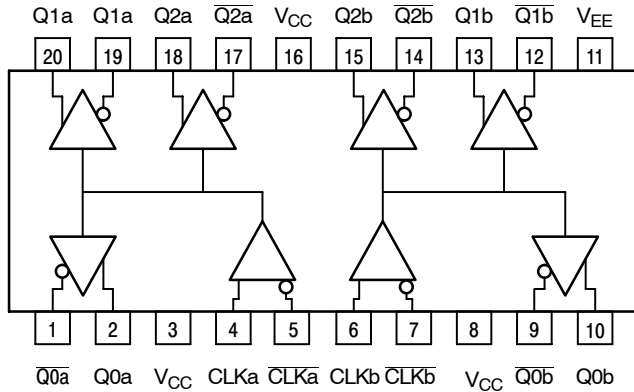
*For additional marking information, refer to Application Note AND8002/D.

ORDERING INFORMATION

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

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

MC100EL13



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

Warning: All V_{CC} and V_{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, \overline{Qna}	ECL Differential Clock Outputs
Qnb, \overline{Qnb}	ECL Differential Clock Outputs
CLKn, \overline{CLKn}	ECL Differential Clock Inputs
V_{CC}	Positive Supply
V_{EE}	Negative Supply

Table 2. ATTRIBUTES

Characteristics	Value
Internal Input Pulldown Resistor	75 k Ω
Internal Input Pullup Resistor	75 k Ω
ESD Protection	Human Body Model Machine Model Charge Device Model
Moisture Sensitivity (Note 1)	Level 1
Flammability Rating	Oxygen Index: 28 to 34
Transistor Count	143 Devices
Meets or Exceeds JEDEC Spec EIA/JESD78 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	$V_{EE} = 0 \text{ V}$		8	V
V_{EE}	NECL Mode Power Supply	$V_{CC} = 0 \text{ V}$		-8	V
V_I	PECL Mode Input Voltage NECL Mode Input Voltage	$V_{EE} = 0 \text{ V}$ $V_{CC} = 0 \text{ V}$	$V_I \leq V_{CC}$ $V_I \geq V_{EE}$	6 -6	V
I_{out}	Output Current	Continuous Surge		50 100	mA mA
I_{BB}	V_{BB} Sink/Source			± 0.5	mA
T_A	Operating Temperature Range			-40 to +85	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range			-65 to +150	$^{\circ}\text{C}$
θ_{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	SO-20L SO-20L	90 60	$^{\circ}\text{C/W}$ $^{\circ}\text{C/W}$
θ_{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	SO-20L	30 to 35	$^{\circ}\text{C/W}$
T_{sol}	Wave Solder Pb Pb-Free	<2 to 3 sec @ 248 $^{\circ}\text{C}$ <2 to 3 sec @ 260 $^{\circ}\text{C}$		265 265	$^{\circ}\text{C}$

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.

MC100EL13

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

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
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) $V_{PP} < 500 \text{ mV}$ $V_{PP} \geq 500 \text{ mV}$	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	μA
I_{IL}	Input LOW Current	0.5			0.5			0.5			μA

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 lfm. 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.

- Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary +0.8 V / -0.5 V.
- Outputs are terminated through a 50 Ω resistor to $V_{CC} - 2.0 \text{ V}$.
- 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 5. 100EL SERIES NECL DC CHARACTERISTICS $V_{CC} = 0.0 \text{ V}$; $V_{EE} = -5.0 \text{ V}$ (Note 5)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
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)	-1810	-1690	-1555	-1810	-1705	-1620	-1810	-1705	-1620	mV
V_{IH}	Input HIGH Voltage (Single-Ended)	-1135		-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) $V_{PP} < 500 \text{ mV}$ $V_{PP} \geq 500 \text{ mV}$	-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	μA
I_{IL}	Input LOW Current	0.5			0.5			0.5			μA

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 lfm. 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.

- Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary +0.8 V / -0.5 V.
- Outputs are terminated through a 50 Ω resistor to $V_{CC} - 2.0 \text{ V}$.
- 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.

MC100EL13

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)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f_{\max}	Maximum Toggle Frequency		TBD			TBD			TBD		GHz
t_{PLH} t_{PHL}	Propagation Delay CLK→Q/ \bar{Q}	410		600	430		620	450		640	ps
$t_{sk(O)}$	Output-Output Skew Any $Q_a \rightarrow Q_a$, Any $Q_b \rightarrow Q_b$ Any $Q_a \rightarrow$ Any Q_b			50 75			50 75			50 75	ps
$t_{sk(DC)}$	Duty Cycle Skew $ t_{PLH} - t_{PHL} $			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 lfm. 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_{ppmin} is minimum input swing for which AC parameters guaranteed. The device has a DC gain of ≈ 40 .

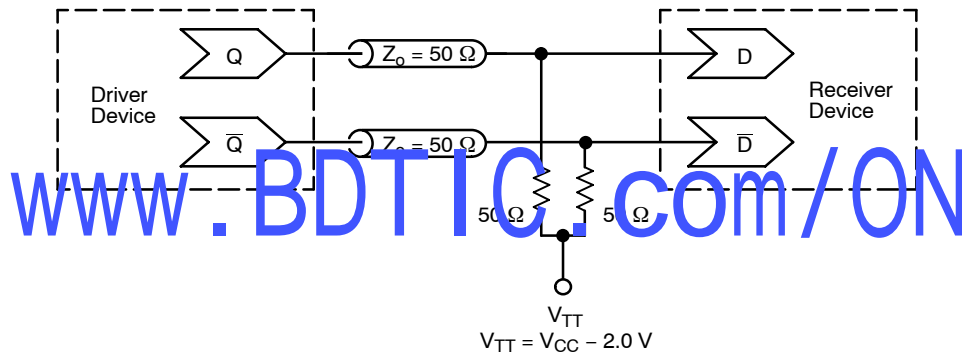


Figure 2. Typical Termination for Output Driver and Device Evaluation
(See Application Note AND8020/D – Termination of ECL Logic Devices.)

MC100EL13

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

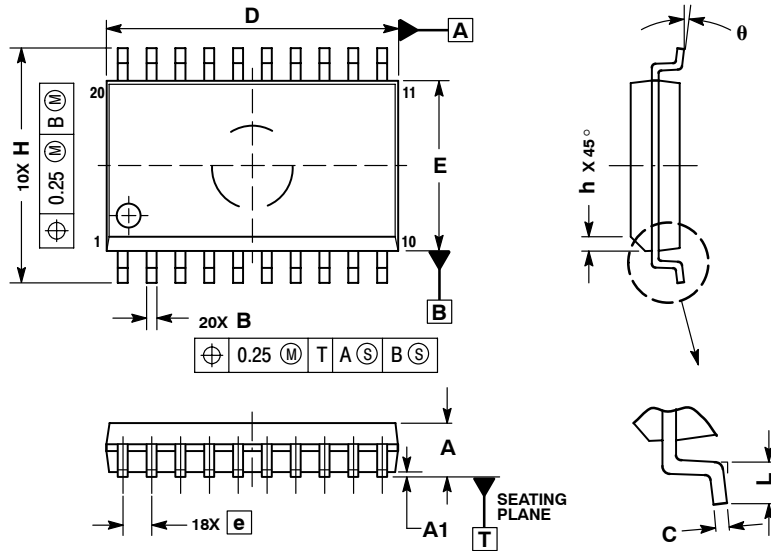
- AN1405/D** – ECL Clock Distribution Techniques
- AN1406/D** – Designing with PECL (ECL at +5.0 V)
- AN1503/D** – ECLinPS™ I/O SPICE Modeling Kit
- AN1504/D** – Metastability and the ECLinPS Family
- AN1568/D** – Interfacing Between LVDS and ECL
- AN1672/D** – The ECL Translator Guide
- AND8001/D** – 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

www.BDTIC.com/ON

MC100EL13

PACKAGE DIMENSIONS

SO-20 WB CASE 751D-05 ISSUE G



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS 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 PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS	
	MIN	MAX
A	2.35	2.65
A1	0.10	0.25
B	0.35	0.49
C	0.23	0.32
D	12.65	12.95
E	7.40	7.60
e	1.27 BSC	
H	10.05	10.55
h	0.25	0.75
L	0.50	0.90
θ	0°	7°

www.BDTIC.com/ON

ECLinPS is a trademark of Semiconductor Components Industries, LLC (SCILLC).

ON Semiconductor and **ON** are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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 special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC 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. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC 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 SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC 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 SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com
Order Literature: <http://www.onsemi.com/orderlit>
For additional information, please contact your local Sales Representative

www.BDTIC.com/ON/

MC100EL13/D