

MC100LVEL17

3.3V ECL Quad Differential Receiver

Description

The MC100LVEL17 is a 3.3 V ECL, quad differential receiver. The device is functionally equivalent to the E116 device with the capability of operation from either a -3.3 V or +3.3 V supply voltage.

Under open input conditions, the \bar{D} input will be biased at $V_{CC}/2$ and the D input will be pulled down to V_{EE} . This operation will force the Q output LOW and ensure stability.

The V_{BB} pin, an internally generated voltage supply, is available to this device only. For single-ended input conditions, the unused differential input is connected to V_{BB} as a switching reference voltage. V_{BB} may also rebias AC coupled inputs. When used, decouple V_{BB} and V_{CC} via a 0.01 μ F capacitor and limit current sourcing or sinking to 0.5 mA. When not used, V_{BB} should be left open.

Features

- 325 ps Propagation Delay
- High Bandwidth Output Transitions
- The 100 Series Contains Temperature Compensation
- PECL Mode Operating Range: $V_{CC} = 3.0$ V to 3.8 V with $V_{EE} = 0$ V
- NECL Mode Operating Range: $V_{CC} = 0$ V with $V_{EE} = -3.0$ V to -3.8 V
- Internal Input Pulldown Resistors D Inputs; Pullup and Pulldown on \bar{D} Inputs
- Q Output will Default LOW with Inputs Open or at V_{EE}
- Pb-Free Packages are Available*



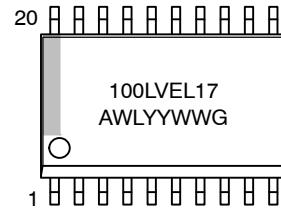
ON Semiconductor®

<http://onsemi.com>



SO-20 WB
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.

MC100LVEL17

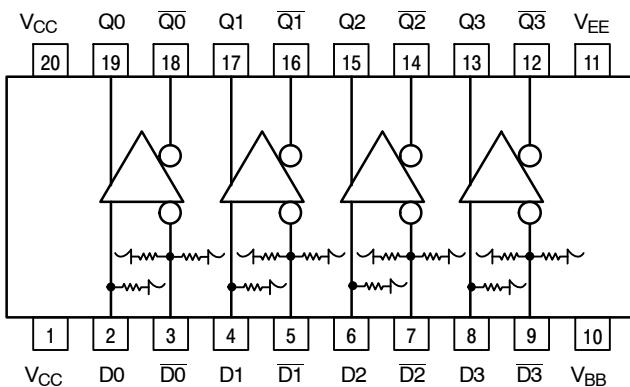


Table 1. PIN DESCRIPTION

PIN	FUNCTION
D _n , D̄ _n	ECL Differential Data Inputs
Q _n , Q̄ _n	ECL Differential Data Outputs
V _{BB}	Reference Voltage Output
V _{CC}	Positive Supply
V _{EE}	Negative Supply

* 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: (Top View)

Table 2. ATTRIBUTES

Characteristics	Value
Internal Input Pulldown Resistor	75 kΩ
Internal Input Pullup Resistor	75 kΩ
ESD Protection	Human Body Model Machine Model Charged Device Model
Moisture Sensitivity, (Note 1)	> 2 kV > 200 V > 4 kV
Pb (Indefinite Time Out of Drypack) Pb-Free	Level 1 Level 3
Flammability Rating	Oxygen Index: 28 to 34
Transistor Count	UL 94 V-0 @ 0.125 in
Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test	141

1. For additional information, see 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 to 0	V
V_{EE}	NECL Mode Power Supply	$V_{CC} = 0$ V		-8 to 0	V
V_I	PECL Mode Input Voltage NECL Mode Input Voltage	$V_{EE} = 0$ V $V_{CC} = 0$ V	$V_I \leq V_{CC}$ $V_I \geq V_{EE}$	6 to 0 -6 to 0	V 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	°C
T_{stg}	Storage Temperature Range			-65 to +150	°C
θ_{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	SO-20L SO-20L	90 60	°C/W °C/W
θ_{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	SO-20L	30 to 35	°C/W
T_{sol}	Wave Solder Pb 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. LVPECL DC CHARACTERISTICS $V_{CC} = 3.3$ V; $V_{EE} = 0.0$ 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		26	31		26	31		27	33	mA
V_{OH}	Output HIGH Voltage (Note 3)	2215	2295	2420	2275	2345	2420	2275	2345	2420	mV
V_{OL}	Output LOW Voltage (Note 3)	1470	1605	1745	1490	1595	1680	1490	1595	1680	mV
V_{IH}	Input HIGH Voltage (Single-Ended)	2135		2420	2135		2420	2135		2420	mV
V_{IL}	Input LOW Voltage (Single-Ended)	1490		1825	1490		1825	1490		1825	mV
V_{BB}	Output Voltage Reference	1.92		2.04	1.92		2.04	1.92		2.04	V
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Differential) (Note 4)										
	$V_{pp} < 500$ mV	1.3		2.9	1.2		2.9	1.2		2.9	V
	$V_{pp} \geq 500$ mV	1.5		2.9	1.4		2.9	1.4		2.9	V
I_{IH}	Input HIGH Current			150			150			150	μA
I_{IL}	Input LOW Current	D_n	0.5		\overline{D}_n	-300	0.5		\overline{D}_n	-300	μA
											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 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 ± 0.3 V.
3. Outputs are terminated through a 50Ω resistor to $V_{CC} - 2.0$ V.
4. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} . The V_{IHCMR} range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between V_{ppmin} and 1 V.

MC100LVEL17

Table 5. LVNECL DC CHARACTERISTICS $V_{CC} = 0.0$ V; $V_{EE} = -3.3$ 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		26	31		26	31		27	33	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}	Input HIGH Voltage Common Mode Range (Differential) (Note 7)										
	$V_{pp} < 500$ mV	-2.0		-0.4	-2.1		-0.4	-2.1		-0.4	V
	$V_{pp} \geq 500$ mV	-1.8		-0.4	-1.9		-0.4	-1.9		-0.4	V
I_{IH}	Input HIGH Current			150			150			150	μ A
I_{IL}	Input LOW Current	Dn	0.5			0.5			0.5		μ A
		\overline{Dn}	-300			-300			-300		μ A

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.

5. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary ± 0.3 V.
6. Outputs are terminated through a 50Ω resistor to $V_{CC} - 2.0$ V.
7. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} . The V_{IHCMR} range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between V_{ppmin} and 1 V.

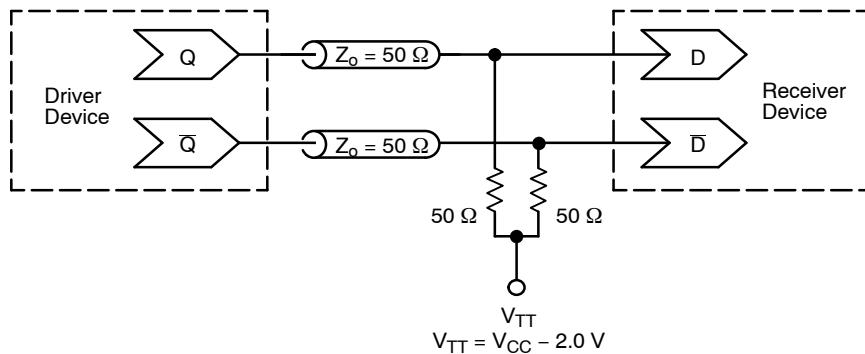
Table 6. AC CHARACTERISTICS $V_{CC} = 3.3$ V; $V_{EE} = 0.0$ V or $V_{CC} = 0.0$ V; $V_{EE} = -3.3$ V (Note 8)

Symbol	Characteristic	-40°C			25°C			85°C			Unit	
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max		
f_{max}	Maximum Toggle Frequency				1.75						GHz	
t_{PLH}	Propagation Delay D to Q	Diff	330		530	350		550	360		560	ps
t_{PHL}		S.E.	280		580	300		600	310		610	
t_{SKEW}	Skew	Output-to-Output (Note 9)		75			75			75	ps	
		Part-to-Part (Diff) (Note 9)		200			200			200		
		Duty Cycle (Diff) (Note 10)		25			25			25		
t_{JITTER}	Random Clock Jitter (RMS)				0.7						ps	
V_{pp}	Input Swing (Note 11)	150		1000	150		1000	150		1000	mV	
t_r	Output Rise/Fall Times Q (20% – 80%)	280		550	280		550	280		550	ps	
t_f												

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 ± 0.3 V.
9. Skews are valid across specified voltage range, part-to-part skew is for a given temperature.
10. Duty cycle skew is the difference between a t_{PLH} and t_{PHL} propagation delay through a device.
11. $V_{pp(min)}$ is minimum input swing for which AC parameters guaranteed. The device has a DC gain of ≈ 40 .

MC100LVEL17



**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 [†]
MC100LVEL17DW	SO-20 WB	38 Units / Rail
MC100LVEL17DWG	SO-20 WB (Pb-Free)	38 Units / Rail
MC100LVEL17DWR2	SO-20 WB	1000 / Tape & Reel
MC100LVEL17DWR2G	SO-20 WB (Pb-Free)	1000 / Tape & Reel

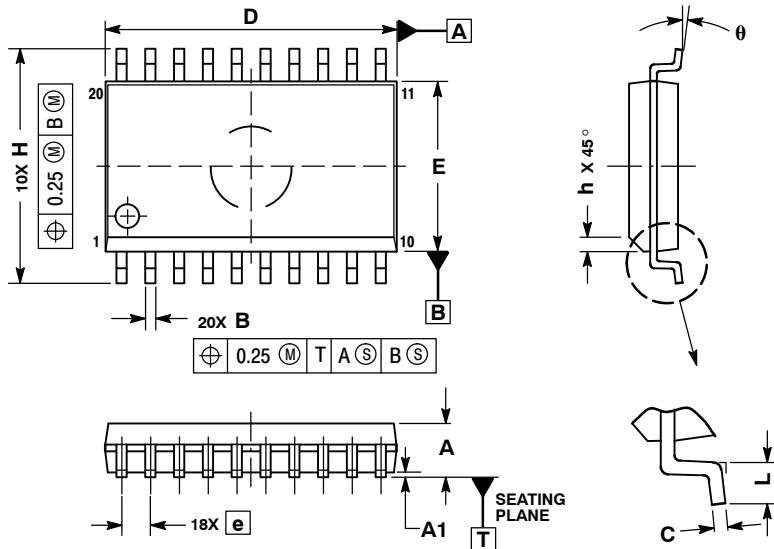
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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

SO-20 WB
DW SUFFIX
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 °

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