5V ECL Quad Differential Receiver

The MC100EL17 is a low-voltage, quad differential receiver. The device is functionally equivalent to the E116 device

Under open input conditions, the \overline{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 μF 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
- 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: $V_{CC} = 0$ V with $V_{EE} = -4.2$ V to -5.7 V
- Internal Input Pulldown Resistors on D Inputs, Pullup and Pulldown Resistors on D Inputs
- Q Output will Default LOW with Inputs Open or at V_{EE}
- Pb-Free Packages are Available*



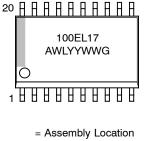
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SO-20WB DW SUFFIX CASE 751D

MARKING* DIAGRAM



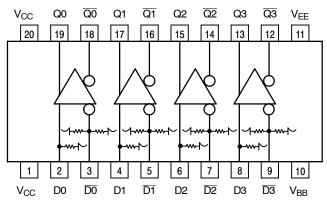
A= Assembly LocationWL= Wafer LotYY= YearWW= Work WeekG= Pb-Free Package

*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.



* 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)

Characteri	Value			
Internal Input Pulldown Resistor	75 KΩ			
Internal Input Pullup Resistor	Internal Input Pullup Resistor			
ESD Protection	> 2 KV > 200 V > 4 V			
Moisture Sensitivity, Indefinite Time	Out of Drypack (Note 1)	Level 1		
Flammability Rating	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in		
Transistor Count	141			
Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test				

Table 2. ATTRIBUTES

1. For additional information, see Application Note AND8003/D.

Table 3. MAXIMUM RATINGS

Symbol	Parameter	Condition 1	Condition 2	Rating	Units
V _{CC}	PECL Mode Power Supply	V _{EE} = 0 V		8	V
V_{EE}	NECL Mode Power Supply	$V_{CC} = 0 V$		-8	V
VI	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 -6	V
l _{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/ °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 1. PIN DESCRIPTION

PIN	FUNCTION
Dn, Dn	ECL Differential Data Inputs
Qn, Qn	ECL Differential Data Outputs
V _{BB}	Reference Voltage Output
V _{CC}	Positive Supply
V _{EE}	Negative Supply

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Table 4. 100EL SERIES PECL DC CHARACTERISTICS $V_{CC} = 5.0 \text{ V}; V_{EE} = 0 \text{ V}$ (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		26	31		26	31		27	33	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
VIHCMR	$\begin{array}{llllllllllllllllllllllllllllllllllll$	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
IIL	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 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 input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between V_{PP}min and 1 V.

			−40°C			25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
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
VIH	Input HIGH Voltage (Single-Ended)	-1165		-880	-1165		-880	-1165		-880	mV
VIL	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
VIHCMR	$\begin{array}{llllllllllllllllllllllllllllllllllll$	-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
Ι _{ΙL}	Input LOW Current	0.5			0.5			0.5			μA

Table 5. 100EL SERIES NECL DC CHARACTERISTICS $V_{CC} = 0 V$; $V_{EE} = -5.0 V$ (Note 5)

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.

 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. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between V_{PP}min and 1 V.

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Unit GHz ps

ps

ps mV

ps

			−40°C			25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	
f _{MAX}	Maximum Toggle Frequency					1.75					
t _{PLH} t _{PHL}	Propagation Delay Differential D to Q Single-Ended			530 580	350 300		550 600	360 310		560 610	
t _{SKEW}	Skew Output-to-Output (Note 9) Part-to-Part (Diff) (Note 9) Duty Cycle (Diff) (Note 10)			75 200 25			75 200 25			75 200 25	
t _{JITTER}	Random Clock Jitter (RMS)					0.7					
V _{PP}	Input Swing (Note 11)	150		1000	150		1000	150		1000	
t _r t _f	Output Rise/Fall Times Q (20% – 80%)	280		550	280		550	280		550	

Table 6, AC CHARACTERISTICS V 5 0 V/· V -5.0 V (Note 8) 0 V or V0 V/· V/

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. $V_{\mbox{\scriptsize EE}}$ can vary +0.8 V / –0.5 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 \approx 40.

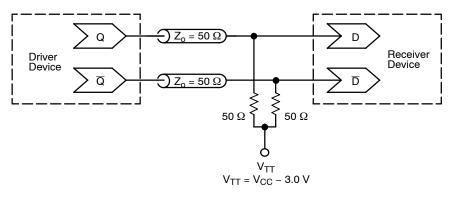


Figure 2. Typical Termination for Output Driver and Device Evaluation (See Application Note AND8020/D - Termination of ECL Logic Devices.)

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ORDERING INFORMATION

Device	Package	Shipping [†]
MC100EL17DW	SO-20 WB	38 Units / Rail
MC100EL17DWG	SO-20 WB (Pb-Free)	38 Units / Rail
MC100EL17DWR2	SO-20 WB	1000 / Tape & Reel
MC100EL17DWR2G	SO-20 WB (Pb-Free)	1000 / Tape & Reel

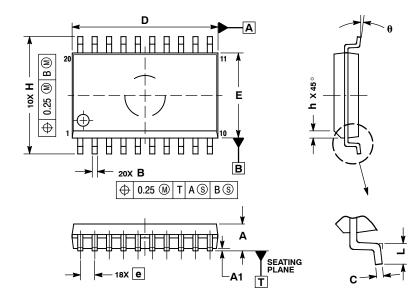
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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 CASE 751D-05 ISSUE G



NOTES:

- 1. DIMENSIONS ARE IN MILLIMETERS.
- 2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
- PER ASME Y14.5M, 1994.
 DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
- A. 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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