MOMOEL:16#MC100EL16

5.0 V ECL Differential Receiver

The MC10EL/100EL16 is a differential receiver. The device is functionally equivalent to the E116 device with higher performance capabilities. With output transition times significantly faster than the E116, the EL16 is ideally suited for interfacing with high frequency sources.

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 $0.01~\mu F$ capacitor and limit current sourcing or sinking to 0.5~mA. When not used, V_{BB} should be left open.

Under open input conditions (pulled to V_{EE}) internal input clamps will force the Q output LOW.

The 100 Series contains temperature compensation.

Features

- 190 ps Propagation Delay
- 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
- Pb-Free Packages are Available

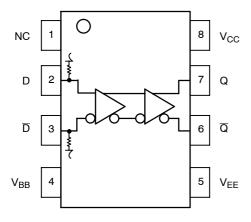


Figure 1. Logic Diagram and Pinout Assignment



ON Semiconductor®

http://onsemi.com

MARKING DIAGRAMS*



SOIC-8 D SUFFIX CASE 751







TSSOP-8 DT SUFFIX CASE 948R







1 4



DFN8 MN SUFFIX CASE 506AA

 $\begin{array}{lll} H &= MC10 & L &= Wafer\ Lot \\ K &= MC100 & Y &= Year \\ 4S &= MC10 & W &= Work\ Week \\ 2H &= MC100 & \overline{M} &= Date\ Code \\ A &= Assembly\ Location & \bullet &= Pb-Free\ Package \\ \end{array}$

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

1

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

""	
PIN	FUNCTION
D, D	ECL Data Inputs
Q, \overline{Q}	ECL Data Outputs
V_{BB}	Reference Voltage Output
V _{CC}	Positive Supply
V _{EE}	Negative Supply
NC	No Connect
EP	Exposed pad must be connected to a sufficient thermal conduit. Electrically connect to the most negative supply or leave floating open.

Table 2. ATTRIBUTES

Charact	eristics	Value
Internal Input Pulldown Resistor		75 KΩ
Internal Input Pullup Resistor	N/A	
ESD Protection	Human Body Model Machine Model Charge Device Model	> 500 V > 100 V > 2 KV
Moisture Sensitivity, Indefinite Ti	me Out of Drypack (Note 1)	Level 1
Flammability Rating	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in
Transistor Count		47
Meets or Exceeds JEDEC Spec	EIA/JESD78 IC Latchup Test	

^{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	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
I _{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
θ_{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm	SOIC-8	190	°C/W
		500 lfpm	SOIC-8	130	°C/W
θJC	Thermal Resistance (Junction-to-Case)	Standard Board	SOIC-8	41 to 44	°C/W
$\theta_{\sf JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfpm	TSSOP-8	185	°C/W
		500lfpm	TSSOP-8	140	°C/W
θ_{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	TSSOP-8	41 to 44 ± 5%	°C/W
θ_{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm	DFN8	129	°C/W
		500 lfpm	DFN8	84	°C/W
T _{sol}	Wave Solder Pb	<2 to 3 sec @ 248°C		265	°C
	Pb-Free	<2 to 3 sec @ 260°C		265	

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.

在地域 M (10日上3日内医3-P任C以口路 CHARACTERISTICS V_{CC} = 5.0 V; V_{EE} = 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		18	22		18	22		18	22	mA
V _{OH}	Output HIGH Voltage (Note 3)	3920	4010	4110	4020	4105	4190	4090	4185	4280	mV
V _{OL}	Output LOW Voltage (Note 3)	3050	3200	3350	3050	3210	3370	3050	3227	3405	mV
V _{IH}	Input HIGH Voltage (Single-Ended)	3770		4110	3870		4190	3940		4280	mV
V _{IL}	Input LOW Voltage (Single-Ended)	3050		3500	3050		3520	3050		3555	mV
V_{BB}	Output Voltage Reference	3.57		3.7	3.65		3.75	3.69		3.81	V
V _{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 4)	2.5		4.6	2.5		4.6	2.5		4.6	V
I _{IH}	Input HIGH Current			150			150			150	μΑ
I _{IL}	Input LOW Current	0.5			0.5			0.3			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 +0.25 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.

Table 5. 10EL SERIES NECL DC CHARACTERISTICS V_{CC} = 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		18	22		18	22		18	22	mA
V _{OH}	Output HIGH Voltage (Note 6)	-1080	-990	-890	-980	-895	-810	-910	-815	-720	mV
V _{OL}	Output LOW Voltage (Note 6)	-1950	-1800	-1650	-1950	-1790	-1630	-1950	-1773	-1595	mV
V _{IH}	Input HIGH Voltage (Single-Ended)	-1230		-890	-1130		-810	-1060		-720	mV
V _{IL}	Input LOW Voltage (Single-Ended)	-1950		-1500	-1950		-1480	-1950		-1445	mV
V _{BB}	Output Voltage Reference	-1.43		-1.30	-1.35		-1.25	-1.31		-1.19	V
V _{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 7)	-2.5		-0.4	-2.5		-0.4	-2.5		-0.4	V
I _{IH}	Input HIGH Current			150			150			150	μΑ
I _{IL}	Input LOW Current	0.5			0.5			0.3			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.

- 5. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary +0.25 V / -0.5 V.
- 6. Outputs are terminated through a 50 Ω resistor to V_{CC} 2.0 V_{CC}
- 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. 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.

李神学 M (100年) SERTICS VCC = 5.0 V; VEE = 0 V (Note 8)

	, , , , , , , , , , , , , , , , , , ,	-40°C		25°C		85°C					
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I _{EE}	Power Supply Current		18	22		18	22		21	26	mA
V _{OH}	Output HIGH Voltage (Note 9)	3915	3995	4120	3975	4045	4120	3975	4050	4120	mV
V _{OL}	Output LOW Voltage (Note 9)	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}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 10)	2.5		4.6	2.5		4.6	2.5		4.6	٧
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.

- 8. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary +0.8 V / -0.5 V.

Table 7. 100EL SERIES NECL DC CHARACTERISTICS V_{CC} = 0 V; V_{EE} = -5.0 V (Note 11)

		-40°C		25°C		85°C					
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I _{EE}	Power Supply Current		18	22		18	22		21	26	mA
V _{OH}	Output HIGH Voltage (Note 12)	-1085	-1005	-880	-1025	-955	-880	-1025	-955	-880	mV
V _{OL}	Output LOW Voltage (Note 12)	-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 Configuration) (Note 13)	-2.5		-0.4	-2.5		-0.4	-2.5		-0.4	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.

- 11. Input and output parameters vary 1:1 with V_{CC}. V_{EE} can vary +0.8 V / -0.5 V. 12. Outputs are terminated through a 50 Ω resistor to V_{CC} 2.0 V.

^{9.} Outputs are terminated through a 50 Ω resistor to V_{CC} – 2.0 V_{CC} . The V_{IHCMR} many 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 Vppmin and 1 V.

^{13.} 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 Vppmin and 1 V.

THE BY ACCUTHARACTERISTICS V_{CC} = 5.0 V; V_{EE} = 0 V or V_{CC} = 0 V; V_{EE} = -5.0 V (Note 14)

			−40°C			25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
f _{max}	Maximum Toggle Frequency					1.75					GHz
t _{PLH} t _{PHL}	Propagation Delay to Output (Diff) (SE)	125 75	250 250	375 425	175 125	250 250	325 375	205 155	280 280	355 405	ps
t _{SKEW}	Duty Cycle Skew (Diff) (Note 15)		5	20		5	20		5	20	ps
t _{JITTER}	Random Clock Jitter (RMS)					0.7					ps
V_{PP}	Input Swing (Note 16)	150		1000	150		1000	150		1000	mV
t _r	Output Rise/Fall Times Q (20% – 80%)	100	190	350	100	190	350	100	190	350	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.

14.10 Series: V_{EE} can vary +0.25 V / -0.5 V.

100 Series: \overline{V}_{EE} can vary +0.8 V / -0.5 V.

15. Duty cycle skew is the difference between a t_{PLH} and t_{PHL} propagation delay through a device.

16. V_{PP}(min) is minimum input swing for which AC parameters guaranteed. The device has a DC gain of ≈ 40.

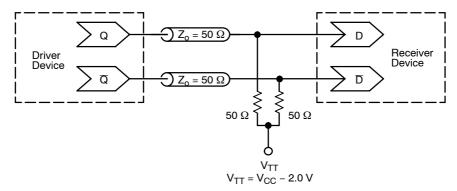


Figure 2. Typical Termination for Output Driver and Device Evaluation (See Application Note AND8020/D – Termination of ECL Logic Devices.)

查爾斯特他FORMATION应商

Device	Package	Shipping [†]
MC10EL16D	SOIC-8	98 Units / Rail
MC10EL16DG	SOIC-8 (Pb-Free)	98 Units / Rail
MC10EL16DR2	SOIC-8	2500 / Tape & Reel
MC10EL16DR2G	SOIC-8 (Pb-Free)	2500 / Tape & Reel
MC10EL16DT	TSSOP-8	98 Units / Rail
MC10EL16DTG	TSSOP-8 (Pb-Free)	98 Units / Rail
MC10EL16DTR2	TSSOP-8	2500 / Tape & Reel
MC10EL16DTR2G	TSSOP-8 (Pb-Free)	2500 / Tape & Reel
MC10EL16MNR4	DFN8	1000 / Tape & Reel
MC10EL16MNR4G	DFN8 (Pb-Free)	1000 / Tape & Reel
MC100EL16D	SOIC-8	98 Units / Rail
MC100EL16DG	SOIC-8 (Pb-Free)	98 Units / Rail
MC100EL16DR2	SOIC-8	2500 / Tape & Reel
MC100EL16DR2G	SOIC-8 (Pb-Free)	2500 / Tape & Reel
MC100EL16DT	TSSOP-8	98 Units / Rail
MC100EL16DTG	TSSOP-8 (Pb-Free)	98 Units / Rail
MC100EL16DTR2	TSSOP-8	2500 / Tape & Reel
MC100EL16DTR2G	TSSOP-8 (Pb-Free)	2500 / Tape & Reel
MC100EL16MNR4	DFN8	1000 / Tape & Reel
MC100EL16MNR4G	DFN8 (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

AND8001/D - The ECL Translator Guide
AND8001/D - Odd Number Counters Design

AND8002/D - Marking and Date Codes

AND8020/D - Termination of ECL Logic Devices

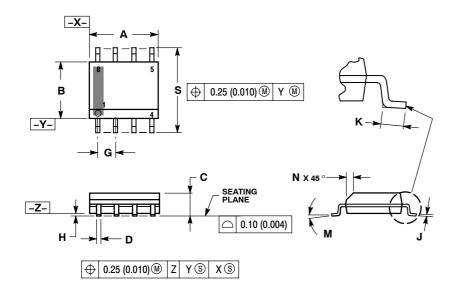
AND8066/D - Interfacing with ECLinPS

AND8090/D - AC Characteristics of ECL Devices

查询"MC10EL16DG"供应商

PACKAGE DIMENSIONS

SOIC-8 NB CASE 751-07 **ISSUE AH**



NOTES:

- NOTES:

 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

 2. CONTROLLING DIMENSION: MILLIMETER.

 3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.

 4. MAXIMUM MOLD PROTRUSION 0.15 (0.006)

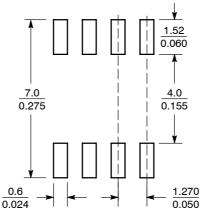
- PER SIDE.
- PER SIDE.

 5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

 6. 751-01 THRU 751-06 ARE OBSOLETE. NEW
- STANDARD IS 751-07.

	MILLIN	IETERS	INC	HES		
DIM	MIN	MAX	MIN	MAX		
Α	4.80	5.00	0.189	0.197		
В	3.80	4.00	0.150	0.157		
C	1.35	1.75	0.053	0.069		
D	0.33	0.51	0.013	0.020		
G	1.27	7 BSC	0.050 BSC			
H	0.10	0.25	0.004	0.010		
7	0.19	0.25	0.007	0.010		
K	0.40	1.27	0.016	0.050		
М	0 °	8 °	0 °	8 °		
N	0.25	0.50	0.010	0.020		
S	5.80	6.20	0.228	0.244		

SOLDERING FOOTPRINT*



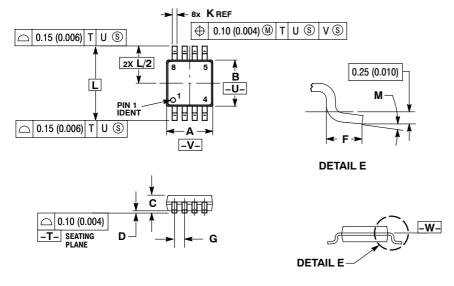
 $\left(\frac{\text{mm}}{\text{inches}}\right)$ SCALE 6:1

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

查询"MC10EL16DG"供应商

PACKAGE DIMENSIONS

TSSOP-8 **DT SUFFIX** PLASTIC TSSOP PACKAGE CASE 948R-02 **ISSUE A**



- NOTES:

 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

 2. CONTROLLING DIMENSION: MILLIMETER.
- 2. CONTINGUING DIMENSION, MILLIDIETER.
 3. DIMENSION A DOES NOT INCLUDE MOLD FLASH.
 PROTRUSIONS OR GATE BURRS. MOLD FLASH
 OR GATE BURRS SHALL NOT EXCEED 0.15
- (0.006) PER SIDE.

 4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.

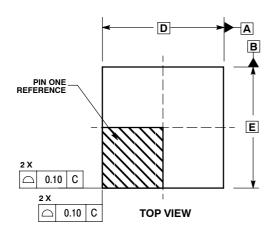
 5. TERMINAL NUMBERS ARE SHOWN FOR
- REFERENCE ONLY.
 6. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

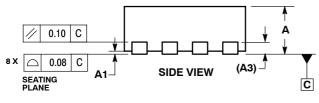
	MILLIN	IETERS	INC	HES	
DIM	MIN	MAX	MIN	MAX	
Α	2.90	3.10	0.114	0.122	
В	2.90	3.10	0.114	0.122	
С	0.80	1.10	0.031	0.043	
D	0.05	0.15	0.002	0.006	
F	0.40	0.70	0.016	0.028	
G	0.65	BSC	0.026	BSC	
K	0.25	0.40	0.010	0.016	
L	4.90	BSC	0.193 BSC		
M	0°	6 °	0°	6°	

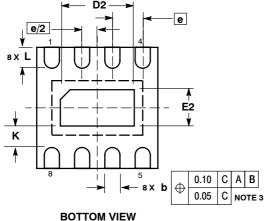
查询"MC10EL16DG"供应商

PACKAGE DIMENSIONS

DFN8 CASE 506AA-01 ISSUE D







NOTES:

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994 .
 CONTROLLING DIMENSION: MILLIMETERS.
- DIMENSION b APPLIES TO PLATED
 TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30 MM FROM TERMINAL.
 COPLANARITY APPLIES TO THE EXPOSED
- PAD AS WELL AS THE TERMINALS.

	MILLIN	IETERS					
DIM	MIN	MAX					
Α	0.80	1.00					
A1	0.00	0.05					
A3	0.20	0.20 REF					
b	0.20	0.30					
D	2.00	BSC					
D2	1.10	1.30					
E	2.00	BSC					
E2	0.70	0.90					
е	0.50	BSC					
K	0.20						
Ĺ	0.25	0.35					

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