MC10E336, MC100E336

5V ECL 3-Bit Registered Bus Transceiver

The MC10E/MC100E336 contains three bus transceivers with both transmit and receive registers. The bus outputs ($\overline{BUS0}$–$\overline{BUS2}$) are specified for driving a 25 Ω bus; the receive outputs (Q0 – Q2) are specified for 50 Ω. The bus outputs feature a normal HIGH level (V_{OH}) and a cutoff LOW level — when LOW, the outputs go to –2.0 V and the output emitter-follower is "off", presenting a high impedance to the bus. The bus outputs also feature edge slow-down capacitors.

The Transmit Enable pins (TEN) control whether current data is held in the transmit register, or new data is loaded from the A/B inputs. A LOW on both of the Bus Enable inputs (BUSEN), when clocked through the register, disables the bus outputs to –2.0 V.

The receiver section clocks bus data into the receive registers, after gating with the Receive Enable ($\overline{RXEN}$) input.

All registers are clocked by a positive transition of CLK1 or CLK2 (or both).

Additional leadframe grounding is provided through the Ground pins (GND) which should be connected to 0 V. The GND pins are not electrically connected to the chip.

The 100 Series contains temperature compensation.

- 25 Ω Cutoff Bus Outputs
- 50 Ω Receiver Outputs
- Transmit and Receive Registers
- 1500 ps Max. Clock to Bus
- 1000 ps Max. Clock to Q
- Bus Outputs Feature Internal Edge Slow-Down Capacitors
- Additional Package Ground Pins
- PECL Mode Operating Range: V_{CC}= 4.2 V to 5.7 V with V_{EE}= 0 V
- NECL Mode Operating Range: V_{CC}= 0 V with V_{EE}= –4.2 V to –5.7 V
- Internal Input Pulldown Resistors
- ESD Protection: > 1 KV HBM, > 75 V MM
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity Level 1
  For Additional Information, see Application Note AND8003/D
- Flammability Rating: UL–94 code V–0 @ 1/8",
  Oxygen Index 28 to 34
- Transistor Count = 430 devices

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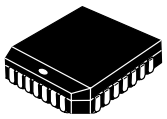
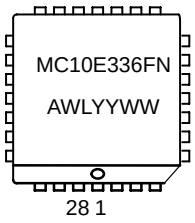


PLCC–28
FN SUFFIX
CASE 776

MARKING DIAGRAMS



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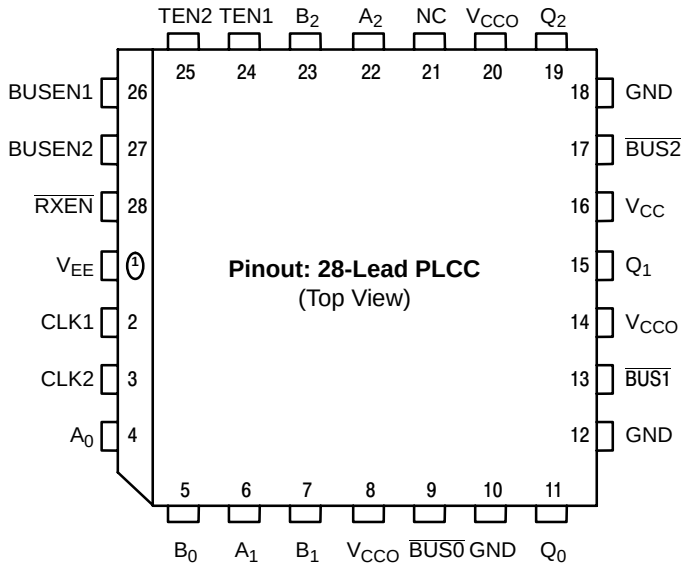
28 1

A = Assembly Location
WL = Wafer Lot
YY = Year
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping
MC10E336FN	PLCC–28	37 Units/Rail
MC10E336FNR2	PLCC–28	500 Units/Reel
MC100E336FN	PLCC–28	37 Units/Rail
MC100E336FNR2	PLCC–28	500 Units/Reel

LOGIC DIAGRAM AND PINOUT ASSIGNMENT



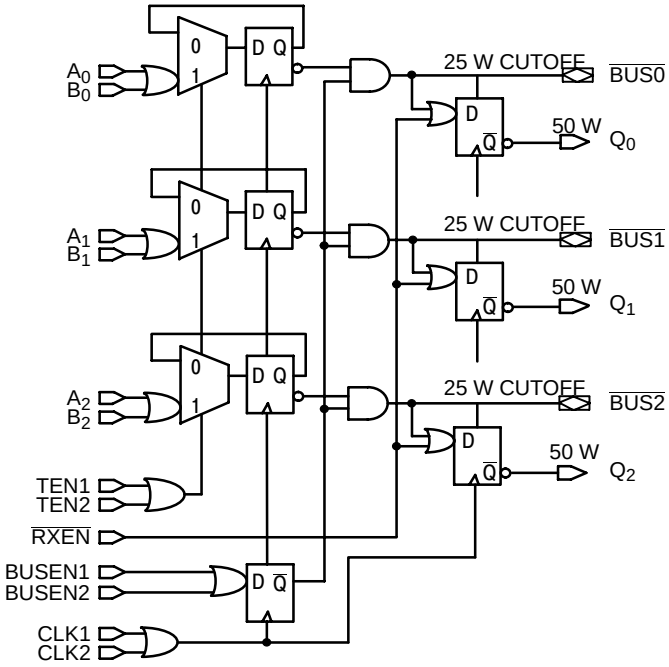
* All V_{CC} and V_{CCO} pins are tied together on the die.

Warning: All V_{CC}, V_{CCO}, and V_{EE} pins must be externally connected to Power Supply to guarantee proper operation.

PIN DESCRIPTION

PIN	FUNCTION
TEN1, TEN2	ECL Transit Enable
A0–A2	ECL Data Inputs A
B0–B2	ECL Data Inputs B
Q0–Q1	ECL Output
BUSEN1, BUSEN2	ECL Bus Enables
$\overline{BUS0}$–$\overline{BUS2}$	ECL Bus Outputs
$\overline{RXEN}$	ECL Receive Enable
CLK1, CLK2	ECL Clock Input
V_{CC}, V_{CCO}	Positive Supply
V_{EE}	Negative Supply
GND	Ground
NC	No Connect

LOGIC DIAGRAM



MAXIMUM RATINGS (Note 1.)

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
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 –6	V V
I_{out}	Output Current	Continuous Surge		50 100	mA mA
TA	Operating Temperature Range			0 to +85	°C
T_{stg}	Storage Temperature Range			–65 to +150	°C
θ_{JA}	Thermal Resistance (Junction to Ambient)	0 LFPM 500 LFPM	28 PLCC 28 PLCC	63.5 43.5	°C/W °C/W
θ_{JC}	Thermal Resistance (Junction to Case)	std bd	28 PLCC	22 to 26	°C/W
V_{EE}	PECL Operating Range NECL Operating Range			4.2 to 5.7 –5.7 to –4.2	V V
T_{sol}	Wave Solder	<2 to 3 sec @ 248°C		265	°C

1. Maximum Ratings are those values beyond which device damage may occur.

10E SERIES PECL DC CHARACTERISTICS V_{CCx}= 5.0 V; V_{EE}= 0.0 V (Note 1.)

		0°C			25°C			85°C			
Symbol	Characteristic	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Unit
I_{EE}	Power Supply Current		125	150		125	150		125	150	mA
V_{OH}	Output HIGH Voltage (Note 2.)	3980	4070	4160	4020	4105	4190	4090	4185	4280	mV
V_{OL}	Output LOW Voltage (Note 2.)	3050	3210	3370	3050	3210	3370	3050	3227	3405	mV
V_{IH}	Input HIGH Voltage	3830	3995	4160	3870	4030	4190	3940	4110	4280	mV
V_{IL}	Input LOW Voltage	3050	3285	3520	3050	3285	3520	3050	3302	3555	mV
V_{CUT}	Cut-off Output Voltage (Note 2.)	2.9		2.97	2.9		2.97	2.9		2.97	V
I_{IH}	Input HIGH Current $\overline{RXEN}$ All Other Inputs			 225 150			 225 150			 225 150	µA
I_{IL}	Input LOW Current	0.5	0.3		0.5	0.25		0.3	0.2		µA

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfpm is maintained.

1. Input and output parameters vary 1:1 with V_{CC}. V_{EE} can vary +0.46 V / –0.06 V.
2. Outputs are terminated through a 50 ohm resistor to V_{CC} –2.10 volts.

10E SERIES NECL DC CHARACTERISTICS V_{CCx}= 0.0 V; V_{EE}= –5.0 V (Note 1.)

		0°C			25°C			85°C			
Symbol	Characteristic	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Unit
I_{EE}	Power Supply Current		125	150		125	150		125	150	mA
V_{OH}	Output HIGH Voltage (Note 2.)	–1020	–930	–840	–980	–895	–810	–910	–815	–720	mV
V_{OL}	Output LOW Voltage (Note 2.)	–1950	–1790	–1630	–1950	–1790	–1630	–1950	–1773	–1595	mV
V_{IH}	Input HIGH Voltage	–1170	–1005	–840	–1130	–970	–810	–1060	–890	–720	mV
V_{IL}	Input LOW Voltage	–1950	–1715	–1480	–1950	–1715	–1480	–1950	–1698	–1445	mV
V_{CUT}	Cut-off Output Voltage (Note 2.)	2.9		2.97	2.9		2.97	2.9		2.97	V
I_{IH}	Input HIGH Current $\overline{RXEN}$ All Other Inputs			 225 150			 225 150			 225 150	µA
I_{IL}	Input LOW Current	0.5	0.3		0.5	0.065		0.3	0.2		µA

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfpm is maintained.

1. Input and output parameters vary 1:1 with V_{CC}. V_{EE} can vary +0.46 V / –0.06 V.
2. Outputs are terminated through a 50 ohm resistor to V_{CC} –2.10 volts.

100E SERIES PECL DC CHARACTERISTICS V_{CCx}= 5.0 V; V_{EE}= 0.0 V (Note 1.)

		0°C			25°C			85°C			
Symbol	**Characteristic**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
I_{EE}	Power Supply Current		125	150		125	150		144	173	mA
V_{OH}	Output HIGH Voltage (Note 2.)	3975	4050	4120	3975	4050	4120	3975	4050	4120	mV
V_{OL}	Output LOW Voltage (Note 2.)	3190	3295	3380	3190	3255	3380	3190	3260	3380	mV
V_{IH}	Input HIGH Voltage	3835	4050	4120	3835	4120	4120	3835	4120	4120	mV
V_{IL}	Input LOW Voltage	3190	3300	3525	3190	3525	3525	3190	3525	3525	mV
V_{CUT}	Cut-off Output Voltage (Note 2.)	2.9		2.97	2.9		2.97	2.9		2.97	V
I_{IH}	Input HIGH Current $\overline{RXEN}$ All Other Inputs			 225 150			 225 150			 225 150	µA
I_{IL}	Input LOW Current	0.5	0.3		0.5	0.25		0.5	0.2		µA

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfpm is maintained.

1. Input and output parameters vary 1:1 with V_{CC}. V_{EE} can vary +0.46 V / –0.8 V.
2. Outputs are terminated through a 50 ohm resistor to V_{CC} –2.10 volts.

100E SERIES NECL DC CHARACTERISTICS V_{CCx}= 0.0 V; V_{EE}= –5.0 V (Note 1.)

		0°C			25°C			85°C			
Symbol	**Characteristic**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
I_{EE}	Power Supply Current		125	150		125	150		144	173	mA
V_{OH}	Output HIGH Voltage (Note 2.)	–1025	–950	–880	–1025	–950	–880	–1025	–950	–880	mV
V_{OL}	Output LOW Voltage (Note 2.)	–1810	–1705	–1620	–1810	–1745	–1620	–1810	–1740	–1620	mV
V_{IH}	Input HIGH Voltage	–1165	–950	–880	–1165	–880	–880	–1165	–880	–880	mV
V_{IL}	Input LOW Voltage	–1810	–1700	–1475	–1810	–1475	–1475	–1810	–1475	–1475	mV
V_{CUT}	Cut-off Output Voltage (Note 2.)	2.9		2.97	2.9		2.97	2.9		2.97	V
I_{IH}	Input HIGH Current $\overline{RXEN}$ All Other Inputs			 225 150			 225 1502			 225 150	µA
I_{IL}	Input LOW Current	0.5	0.3		0.5	0.25		0.5	0.2		µA

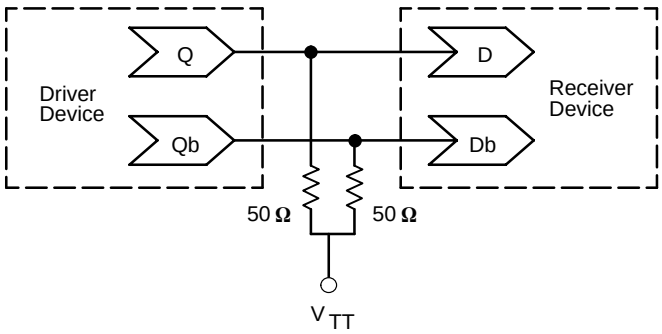
NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfpm is maintained.

1. Input and output parameters vary 1:1 with V_{CC}. V_{EE} can vary +0.46 V / –0.8 V.
2. Outputs are terminated through a 50 ohm resistor to V_{CC} –2.10 volts.

AC CHARACTERISTICS V_{CCx}= 5.0 V; V_{EE}= 0.0 V or V_{CCx}= 0.0 V; V_{EE}= –5.0 V (Note 1.)

Symbol	Characteristic	0°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}	Propagation Delay to Output										ps
t_{PHL}	Clk to Q	500	700	100	500	700	1000	500	700	1000	
	Clk to $\overline{BUS}$	825	1250	1800	825	1250	1800	825	1250	1800	
t_s	Setup Time										ps
	$\overline{BUS}$, $\overline{RXEN}$	150	–150		150	–150		150	–150		
	BUSEN	100	– 200		100	– 200		100	– 200		
	A, B Data	300	– 50		300	– 50		300	– 50		
	TEN	450	150		450	150		450	150		
t_h	Hold Time										ps
	$\overline{BUS}$, $\overline{RXEN}$	450	150		450	150		450	150		
	BUSEN	500	200		500	200		500	200		
	A, B Data	350	50		350	50		350	50		
	TEN	200	–150		200	–150		200	–150		
t_{PW}	Minimum Pulse Width										ps
	Clk	400			400			400			
t_{JITTER}	Cycle–to–Cycle Jitter		TBD			TBD			TBD		ps
t_r	Rise/Fall Times										ps
t_f	20 - 80% (Qn)	300	450	700	300	450	700	300	450	700	
	20 - 80% ($\overline{BUSn}$ Rise)	500	800	1000	500	800	1000	500	800	1000	
	20 - 80% ($\overline{BUSn}$ Fall)	300	500	800	300	500	800	300	500	800	

1. 10 Series: V_{EE} can vary +0.46 V / –0.06 V.
   100 Series: V_{EE} can vary +0.46 V / –0.8 V.



$V^{TT} = V_{CC}$ –2.10 V

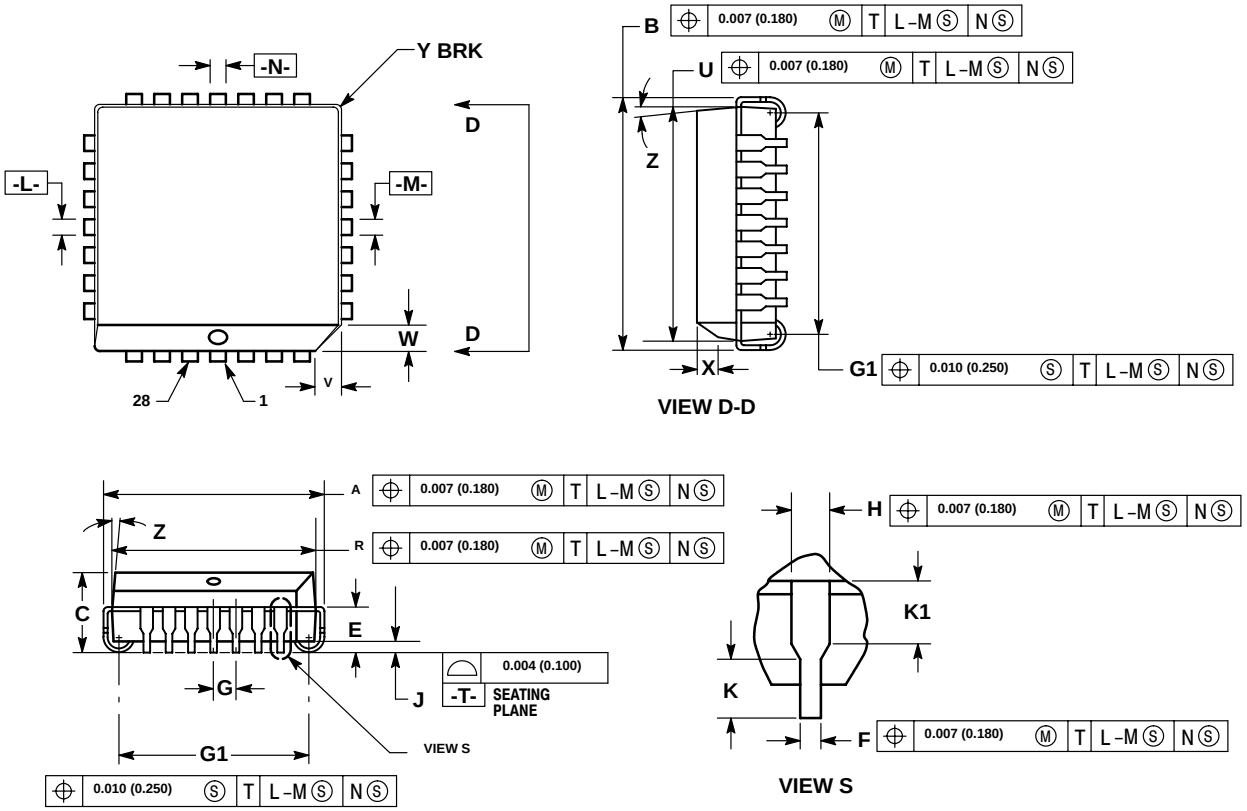
Figure 1. Typical Termination for Output Driver and Device Evaluation
(See Application Note AND8020 – Termination of ECL Logic Devices.)

Resource Reference of Application Notes

AN1404	–	ECLinPS Circuit Performance at Non–Standard V_{IH} Levels
AN1405	–	ECL Clock Distribution Techniques
AN1406	–	Designing with PECL (ECL at +5.0 V)
AN1503	–	ECLinPS I/O SPICE Modeling Kit
AN1504	–	Metastability and the ECLinPS Family
AN1568	–	Interfacing Between LVDS and ECL
AN1596	–	ECLinPS Lite Translator ELT Family SPICE I/O Model Kit
AN1650	–	Using Wire–OR Ties in ECLinPS Designs
AN1672	–	The ECL Translator Guide
AND8001	–	Odd Number Counters Design
AND8002	–	Marking and Date Codes
AND8020	–	Termination of ECL Logic Devices

PACKAGE DIMENSIONS

PLCC–28
FN SUFFIX
PLASTIC PLCC PACKAGE
CASE 776–02
ISSUE E



NOTES:
1. DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
2. DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
3. DIM R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
5. CONTROLLING DIMENSION: INCH.
6. THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
7. DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.485	0.495	12.32	12.57
B	0.485	0.495	12.32	12.57
C	0.165	0.180	4.20	4.57
E	0.090	0.110	2.29	2.79
F	0.013	0.019	0.33	0.48
G	0.050 BSC		1.27 BSC	
H	0.026	0.032	0.66	0.81
J	0.020	—	0.51	—
K	0.025	—	0.64	—
R	0.450	0.456	11.43	11.58
U	0.450	0.456	11.43	11.58
V	0.042	0.048	1.07	1.21
W	0.042	0.048	1.07	1.21
X	0.042	0.056	1.07	1.42
Y	—	0.020	—	0.50
Z	2°	10°	2°	10°
G1	0.410	0.430	10.42	10.92
K1	0.040	—	1.02	—

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