

MC10E137

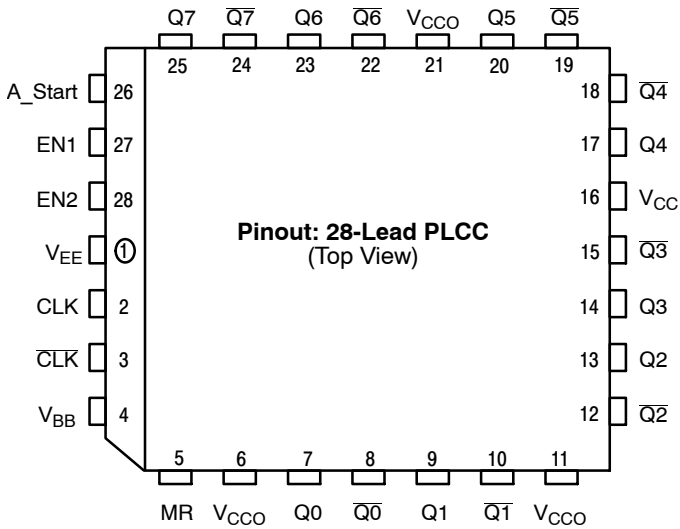


Table 1. PIN DESCRIPTION

PIN	FUNCTION
CLK, $\overline{\text{CLK}}$	ECL Differential Clock Inputs
Q0-Q7, $\overline{\text{Q0-Q7}}$	ECL Differential Q Outputs
A_Start	ECL Asynchronous Enable Input
EN1, EN2	ECL Synchronous Enable Inputs
MR	Asynchronous Master Reset
V _{BB}	Reference Voltage Output
V _{CC} , V _{CCO}	Positive Supply
V _{EE}	Negative Supply

* 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.

Figure 1. 28-Lead Pinout

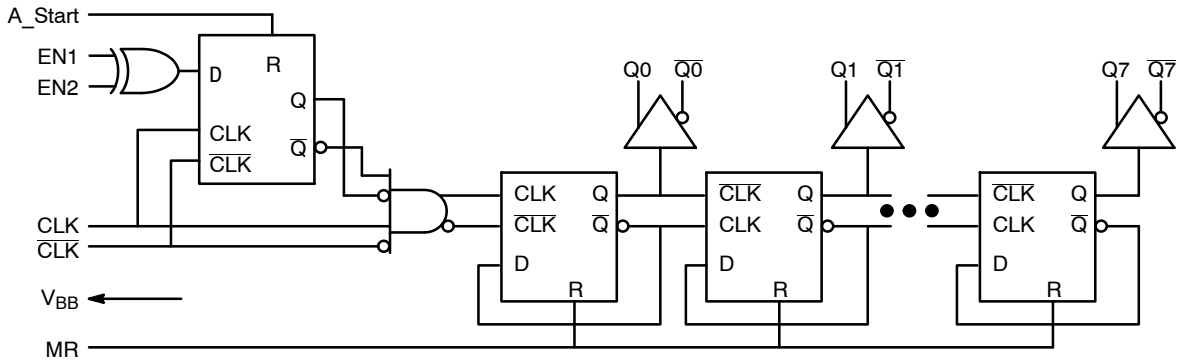


Figure 2. Logic Diagram

MC10E137

Table 2. SEQUENTIAL TRUTH TABLE

Function	EN1	EN2	A_Start	MR	CLK	Q7	Q6	Q5	Q4	Q3	Q2	Q1	Q0
Reset	X	X	X	H	X	L	L	L	L	L	L	L	L
Count	L	L	L	L	Z	L	L	L	L	L	L	L	H
	L	L	L	L	Z	L	L	L	L	L	L	H	L
	L	L	L	L	Z	L	L	L	L	L	L	H	H
Stop	H	L	L	L	Z	L	L	L	L	L	L	H	H
	H	L	L	L	Z	L	L	L	L	L	L	H	H
Asynch Start	H	L	H	L	Z	L	L	L	L	L	H	L	L
	H	L	H	L	Z	L	L	L	L	L	H	L	H
	L	L	H	L	Z	L	L	L	L	L	H	H	L
Count	L	L	L	L	Z	L	L	L	L	L	H	H	H
	L	L	L	L	Z	L	L	L	L	H	L	L	L
	L	L	L	L	Z	L	L	L	L	H	L	L	H
Stop	L	H	L	L	Z	L	L	L	L	H	L	L	H
	L	H	L	L	Z	L	L	L	L	H	L	L	H
Synch Start	H	H	L	L	Z	L	L	L	L	H	L	H	L
	H	H	L	L	Z	L	L	L	L	H	L	H	H
	H	H	L	L	Z	L	L	L	L	H	H	L	L
Stop	H	L	L	L	Z	L	L	L	L	H	H	L	L
	H	L	L	L	Z	L	L	L	L	H	H	L	L
Count	L	L	L	L	Z	L	L	L	L	H	H	L	H
	L	L	L	L	Z	L	L	L	L	H	H	H	L
	L	L	L	L	Z	L	L	L	L	H	H	H	H
Reset	X	X	X	H	X	L	L	L	L	L	L	L	L

Z = Low to High Transition

Table 3. MAXIMUM RATINGS

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
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 ≤ V _{CC} V _I ≥ V _{EE}	6 -6	V
I _{out}	Output Current	Continuous Surge		50 100	mA
T _A	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	PLCC-28	63.5 43.5	°C/W
θ _{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	PLCC-28	22 to 26	°C/W
V _{EE}	PECL Operating Range NECL Operating Range			4.2 to 5.7 -5.7 to -4.2	V
T _{sol}	Wave Solder (Pb-Free)			265	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

MC10E137

Table 4. 10E SERIES PECL DC CHARACTERISTICS ($V_{CCx} = 5.0\text{ V}$; $V_{EE} = 0.0\text{ V}$ (Note 1))

Symbol	Characteristic	0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		121	145		121	145		121	145	mA
V_{OH}	Output HIGH Voltage (Note 2)	3980	40 70	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 (Single-Ended)	3830	3995	4160	3870	4030	4190	3940	4110	4280	mV
V_{IL}	Input LOW Voltage (Single-Ended)	3050	3285	3520	3050	3285	3520	3050	3302	3555	mV
V_{BB}	Output Voltage Reference	3.62		3.73	3.65		3.75	3.69		3.81	V
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3)	2.2		4.6	2.2		4.6	2.2		4.6	V
I_{IH}	Input HIGH Current			150			150			150	μA
I_{IL}	Input LOW Current	0.5	0.3		0.5	0.25		0.3	0.2		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.

1. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary $-0.46\text{ V} / +0.06\text{ V}$.
2. Outputs are terminated through a $50\ \Omega$ resistor to $V_{CC} - 2.0\text{ V}$.
3. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .

Table 5. 10E SERIES NECL DC CHARACTERISTICS ($V_{CCx} = 0.0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (Note 1))

Symbol	Characteristic	0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		121	145		121	145		121	145	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 (Single-Ended)	-1170	-1005	-840	-1130	-970	-810	-1060	-890	-720	mV
V_{IL}	Input LOW Voltage (Single-Ended)	-1950	-1715	-1480	-1950	-1715	-1480	-1950	-1698	-1445	mV
V_{BB}	Output Voltage Reference	-1.38		-1.27	-1.35		-1.25	-1.31		-1.19	V
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3)	-2.8		-0.4	-2.8		-0.4	-2.8		-0.4	V
I_{IH}	Input HIGH Current			150			150			150	μA
I_{IL}	Input LOW Current	0.5	0.3		0.5	0.065		0.3	0.2		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.

1. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary $-0.46\text{ V} / +0.06\text{ V}$.
2. Outputs are terminated through a $50\ \Omega$ resistor to $V_{CC} - 2.0\text{ V}$.
3. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .

MC10E137

Table 6. AC CHARACTERISTICS ($V_{CCx} = 5.0\text{ V}$; $V_{EE} = 0.0\text{ V}$ or $V_{CCx} = 0.0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (Note NO TAG))

Symbol	Characteristic	0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f_{COUNT}	Maximum Count Frequency	1800	2200		1800	2200		1800	2200		MHz
t_{PLH} t_{PHL}	Propagation Delay to Output CLK to Q0 CLK to Q1 CLK to Q2 CLK to Q3 CLK to Q4 CLK to Q5 CLK to Q6 CLK to Q7 A_Start to Q0 MR to Q0	1300 1600 1950 2275 2625 2950 3250 3575 950 700	1700 2025 2425 2750 3125 3450 3775 4075 1325 1000	2150 2500 2925 3350 3750 4150 4450 4800 1700 1300	1300 1600 1950 2275 2625 2950 3250 3575 950 700	1700 2050 2450 2775 3150 3475 3800 4125 1325 1000	2150 2500 2925 3350 3750 4150 4450 4800 1700 1300	1350 1650 2025 2350 2700 3050 3375 3700 950 700	1750 2100 2500 2850 3225 3550 3925 4250 1325 1000	2200 2550 3000 3425 3825 4250 4600 4950 1700 1300	ps
t_s	Setup Time (EN1, EN2)	0	-150		0	-150		0	-150		ps
t_h	Hold Time (EN1, EN2)	300	150		300	150		300	150		ps
t_{RR}	Reset Recovery Time MR, A_Start	400	200		400	200		400	200		ps
t_{PW}	Minimum Pulse Width CLK, MR, A_Start	400			400			400			ps
V_{PP}	Input Voltage Swing CLK/CLK (Differential Configuration) (Note 4)	0.25		1.0	0.25		1.0	0.25		1.0	V
t_{JITTER}	Random Clock Jitter (RMS)		< 1			< 1			< 1		ps
t_r t_f	Rise/Fall Times (20%–80%) Q0,Q1 Q2 to Q7	150 275		400 600	150 275		400 600	150 275		400 600	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.

4. Minimum input swing for which AC parameters are guaranteed. Full DC ECL output swings will be generated with only 50 mV input swings.

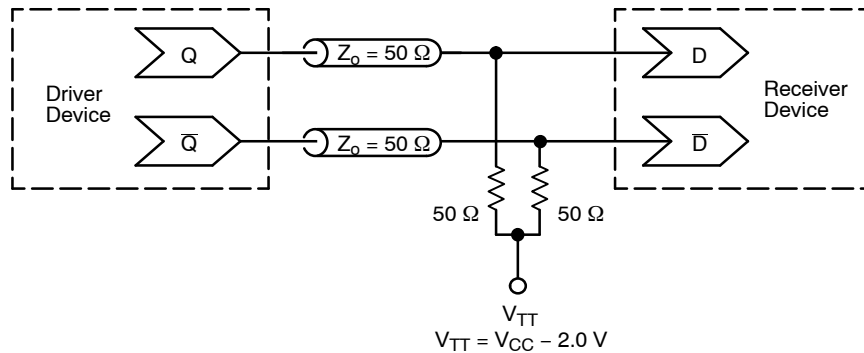


Figure 3. Typical Termination for Output Driver and Device Evaluation
(See Application Note [AND8020/D](#) – Termination of ECL Logic Devices.)

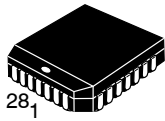
Resource Reference of Application Notes

- 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

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

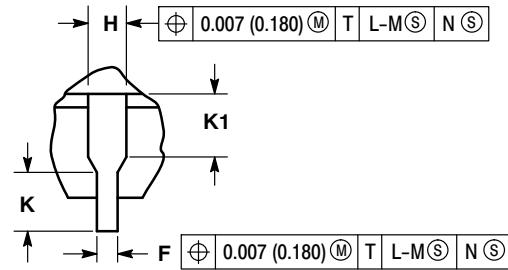
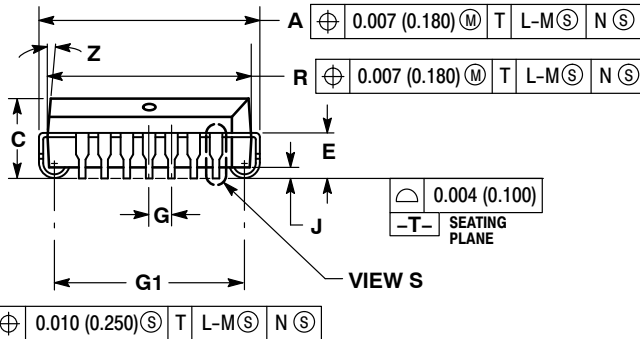
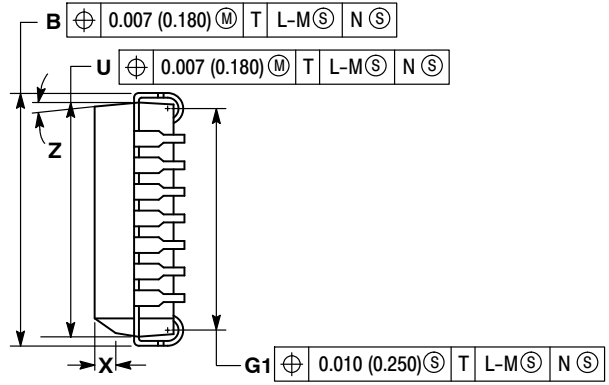
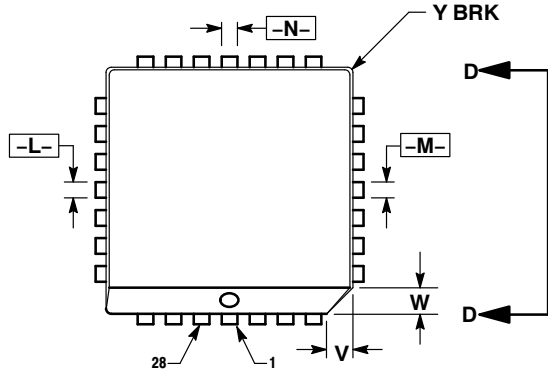
ON Semiconductor®



SCALE 1:1

28 LEAD PLCC
CASE 776-02
ISSUE G

DATE 06 APR 2021

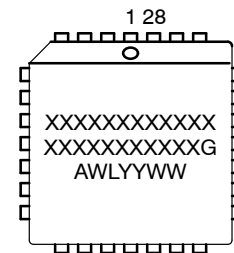


NOTES:

- DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
- DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
- DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- 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.
- 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).

DIM	INCHES		MILLIMETERS	
	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	0.021	0.33	0.53
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	---

GENERIC MARKING DIAGRAM*



- XXXXX = Specific Device Code
- A = Assembly Location
- WL = Wafer Lot
- YY = Year
- WW = Work Week
- G = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

DOCUMENT NUMBER:	98ASB42596B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	28 LEAD PLCC	PAGE 1 OF 1

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** 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:

Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

TECHNICAL SUPPORT

North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[onsemi:](#)

[MC10E137FN](#) [MC10E137FNG](#) [MC10E137FNR2](#) [MC10E137FNR2G](#)