

MC10E452, MC100E452

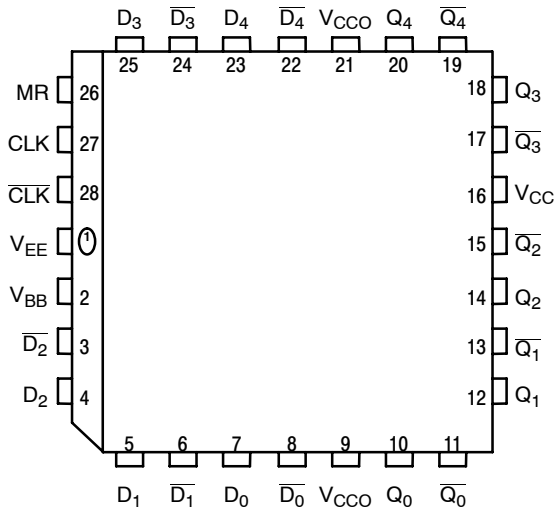


Table 1. PIN DESCRIPTION

PIN	FUNCTION
$D[0:4], \overline{D}[0:4]$	ECL Differential Data Inputs
MR	ECL Master Reset Input
CLK, \overline{CLK}	ECL Differential Clock Input
$Q[0:4], \overline{Q}[0:4]$	ECL Differential Data Outputs
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. Pinout: PLCC-28 (Top View)

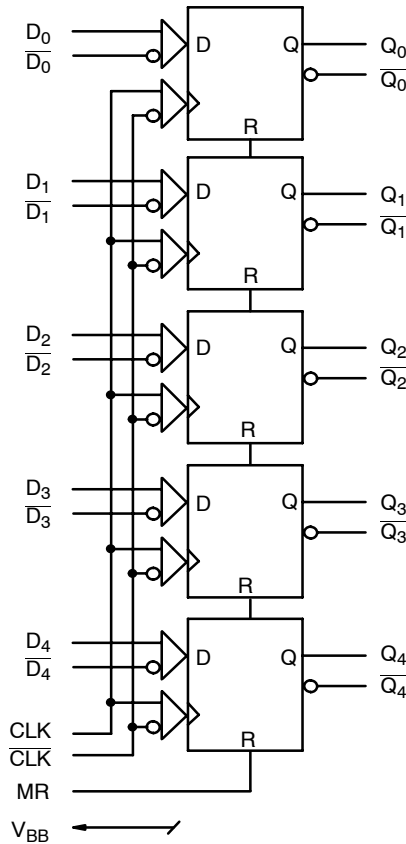


Figure 2. Logic Diagram

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Table 2. 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 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			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 PLCC–28	63.5 43.5	°C/W °C/W
θ _{JC}	Thermal Resistance (Junction–to–Case)	Standard Board	PLCC–28	22 to 26	°C/W
T _{sol}	Wave Solder Pb Pb–Free			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 3. 10E SERIES PECL DC CHARACTERISTICS V_{CCx} = 5.0 V; V_{EE} = 0.0 V (Note 1)

Symbol	Characteristic	–40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I _{EE}	Power Supply Current		74	89		74	89		74	89		74	89	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 (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	3.57		3.7	3.62		3.74	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			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 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.

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 Ω resistor to V_{CC} – 2.0 V.
3. V_{IHCMR} min varies 1:1 with V_{EE}, max varies 1:1 with V_{CC}.

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

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		74	89		74	89		74	89		74	89	mA
V_{OH}	Output HIGH Voltage (Note 5)				-1020	-930	-840	-980	-895	-810	-910	-815	-720	mV
V_{OL}	Output LOW Voltage (Note 5)				-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	-1.43		-1.3	-1.38		-1.27	-1.35		-1.25	-1.31		-1.19	V
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 6)				-2.8		-0.4	-2.8		-0.4	-2.8		-0.4	V
I_{IH}	Input HIGH Current			150			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. 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.

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

Table 5. 100E SERIES PECL DC CHARACTERISTICS $V_{CCx} = 5.0\text{ V}$; $V_{EE} = 0.0\text{ V}$ (Note 7)

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		74	89		74	89		74	89		85	102	mA
V_{OH}	Output HIGH Voltage (Note 8)				3975	4050	4120	3975	4050	4120	3975	4050	4120	mV
V_{OL}	Output LOW Voltage (Note 8)				3190	3295	3380	3190	3255	3380	3190	3260	3380	mV
V_{IH}	Input HIGH Voltage (Single-Ended)				3835	3975	4120	3835	3975	4120	3835	3975	4120	mV
V_{IL}	Input LOW Voltage (Single-Ended)				3190	3355	3525	3190	3355	3525	3190	3355	3525	mV
V_{BB}	Output Voltage Reference	3.62		3.74	3.62		3.74	3.62		3.74	3.62		3.74	V
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 9)				2.2		4.6	2.2		4.6	2.2		4.6	V
I_{IH}	Input HIGH Current			150			150			150			150	μA
I_{IL}	Input LOW Current				0.5	0.3		0.5	0.25		0.5	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. 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.

7. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary $-0.46\text{ V} / +0.8\text{ V}$.
8. Outputs are terminated through a $50\ \Omega$ resistor to $V_{CC} - 2.0\text{ V}$.
9. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .

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Table 6. 100E SERIES NECL DC CHARACTERISTICS $V_{CCx} = 0.0 \text{ V}$; $V_{EE} = -5.0 \text{ V}$ (Note 10)

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		74	89		74	89		74	89		85	102	mA
V_{OH}	Output HIGH Voltage (Note 11)				-1025	-950	-880	-1025	-950	-880	-1025	-950	-880	mV
V_{OL}	Output LOW Voltage (Note 11)				-1810	-1705	-1620	-1810	-1745	-1620	-1810	-1740	-1620	mV
V_{IH}	Input HIGH Voltage (Single-Ended)				-1165	-1025	-880	-1165	-1025	-880	-1165	-1025	-880	mV
V_{IL}	Input LOW Voltage (Single-Ended)				-1810	-1645	-1475	-1810	-1645	-1475	-1810	-1645	-1475	mV
V_{BB}	Output Voltage Reference	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	V
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 12)				-2.8		-0.4	-2.8		-0.4	-2.8		-0.4	V
I_{IH}	Input HIGH Current			150			150			150			150	μA
I_{IL}	Input LOW Current				0.5	0.3		0.5	0.25		0.5	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. 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.

10. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary $-0.46 \text{ V} / +0.8 \text{ V}$.

11. Outputs are terminated through a 50Ω resistor to $V_{CC} - 2.0 \text{ V}$.

12. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .

Table 7. 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 13)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f_{MAX}	Maximum Toggle Frequency	1.1			1.1			1.1			GHz
t_{PLH} t_{PHL}	Propagation Delay to Output CLK (Diff) CLK (SE) MR	425 375 375	600 600 625	850 900 900	475 425 425	600 600 625	800 850 900	475 425 425	600 600 625	800 850 900	ps
t_S	Setup Time D	175	-50		150	-50		150	-50		ps
t_H	Hold Time D	225	50		200	50		200	50		ps
t_{RR}	Reset Recovery Time	750	450		700	450		700	450		
t_{PW}	Minimum Pulse Width CLK MR	400 400			400 400			400 400			ps
t_{skew}	Within-Device Skew (Note 14)		50						50		ps
t_{JITTER}	Random Clock Jitter (RMS)		< 1.0			< 1.0			< 1.0		ps
V_{PP}	Input Voltage Swing (Differential Configuration)	150		1000	150		1000	150		1000	mV
t_r/t_f	Rise/Fall Times 20–80%	250	475	725				275	475	675	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. 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.

13. 10 Series: V_{EE} can vary $-0.46 \text{ V} / +0.06 \text{ V}$.

100 Series: V_{EE} can vary $-0.46 \text{ V} / +0.8 \text{ V}$.

14. Within-device skew is defined as identical transitions on similar paths through a device.

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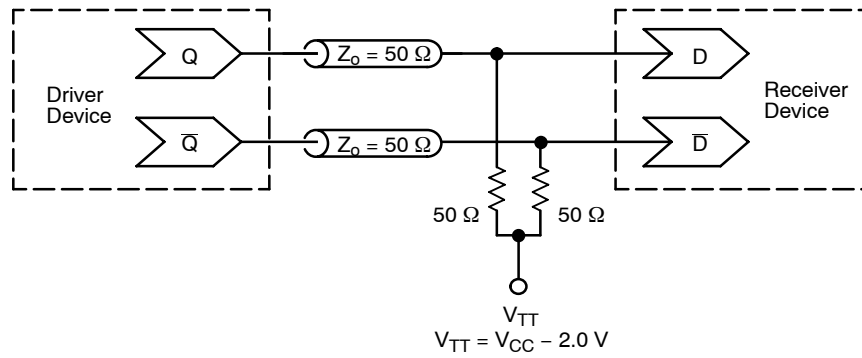


Figure 3. Typical Termination for Output Driver and Device Evaluation
(See Application Note AND8020/D – Termination of ECL Logic Devices.)

ORDERING INFORMATION

Device	Package	Shipping [†]
MC10E452FN	PLCC-28	37 Units / Rail
MC10E452FNG	PLCC-28 (Pb-Free)	37 Units / Rail
MC10E452FNR2	PLCC-28	500 / Tape & Reel
MC10E452FNR2G	PLCC-28 (Pb-Free)	500 / Tape & Reel
MC100E452FN	PLCC-28	37 Units / Rail
MC100E452FNG	PLCC-28 (Pb-Free)	37 Units / Rail
MC100E452FNR2	PLCC-28	500 / Tape & Reel
MC100E452FNR2G	PLCC-28 (Pb-Free)	500 / 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.

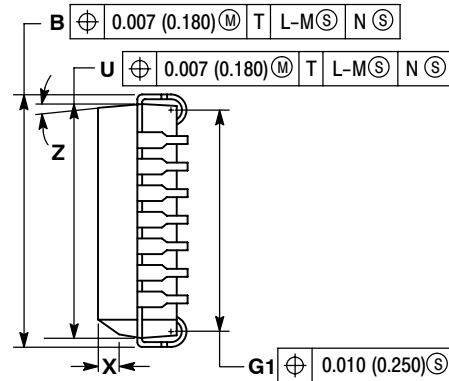
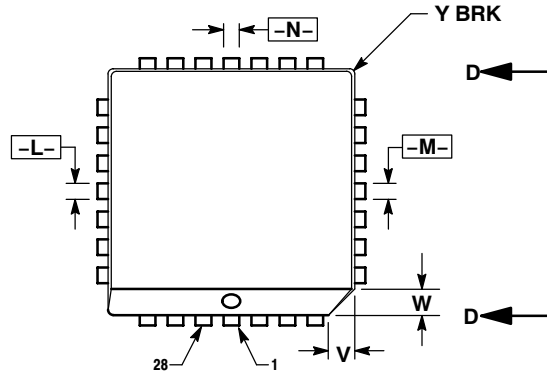
Resource Reference of Application Notes

- 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

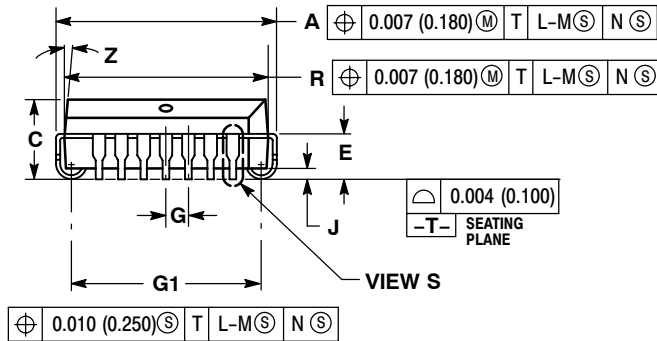
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PACKAGE DIMENSIONS

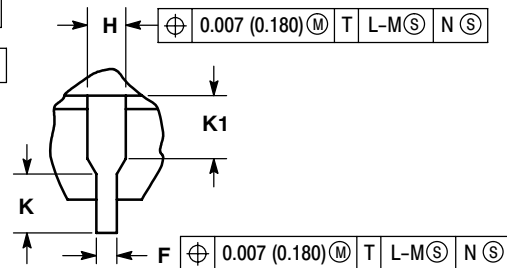
PLCC-28
FN SUFFIX
PLASTIC PLCC PACKAGE
CASE 776-02
ISSUE E



VIEW D-D



VIEW S



VIEW S


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	0.019	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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