

MC10E156, MC100E156

5V ECL 3-Bit 4:1 Mux-Latch

The MC10E/100E156 contains three 4:1 multiplexers followed by transparent latches with differential outputs. When both Latch Enables (LEN1, LEN2) are LOW, the latch is transparent, and output data is controlled by the multiplexer select controls (SEL0, SEL1). A logic HIGH on either LEN1 or LEN2 (or both) latches the outputs. The Master Reset (MR) overrides all other controls to set the Q outputs LOW.

The 100 Series contains temperature compensation.

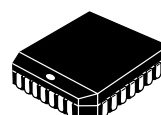
- 950 ps Max. D to Output
- 850 ps Max. LEN to Output
- Differential Outputs
- Asynchronous Master Reset
- Dual Latch-Enables
- PECL Mode Operating Range: V_{CC} = 4.2 V to 5.7 V with V_{EE} = 0 V
- NECL Mode Operating Range: V_{CC} = 0 V with V_{EE} = -4.2 V to -5.7 V
- Internal Input Pulldown Resistors
- ESD Protection: > 2 KV HBM, > 200 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 = 271 devices



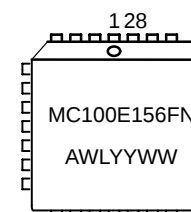
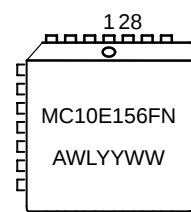
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MARKING DIAGRAMS



PLCC-28
FN SUFFIX
CASE 776



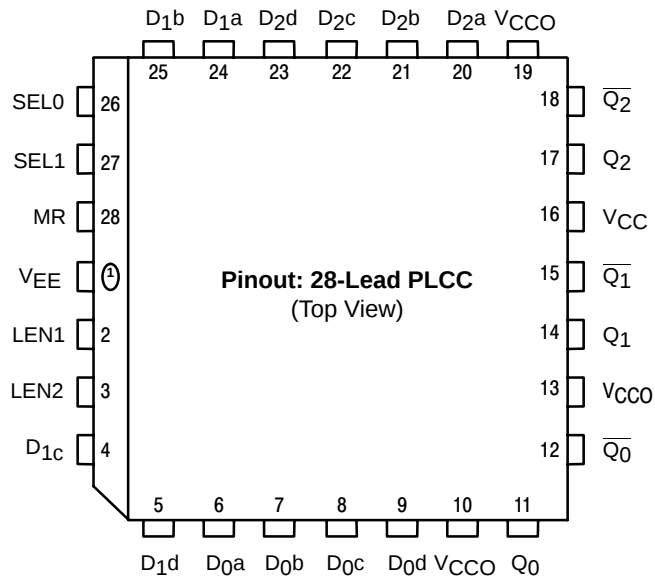
A = Assembly Location
WL = Wafer Lot
YY = Year
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping
MC10E156FN	PLCC-28	37 Units/Rail
MC10E156FNR2	PLCC-28	500 Units/Reel
MC100E156FN	PLCC-28	37 Units/Rail
MC100E156FNR2	PLCC-28	500 Units/Reel

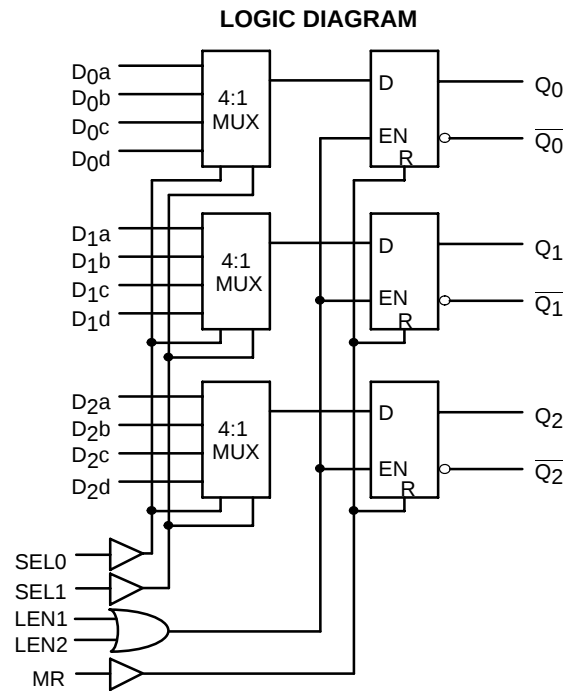
MC10E156, MC100E156

LOGIC DIAGRAM AND PINOUT ASSIGNMENT



* All VCC and VCCO pins are tied together on the die.

Warning: All VCC, VCCO, and VEE pins must be externally connected to Power Supply to guarantee proper operation.



PIN DESCRIPTION

PIN	FUNCTION
D0x – D3x	ECL Input Data
SEL0, SEL1	ECL Select Inputs
LEN1, LEN2	ECL Latch Enables
Q0 – Q2, Q0-bar – Q2-bar	ECL Differential Outputs
MR	ECL Master Reset
VCC, VCCO	Positive Supply
VEE	Negative Supply

FUNCTION TABLE

SEL1	SEL0	Data
L	L	a
L	H	b
H	L	c
H	H	d

MC10E156, MC100E156

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 ≤ V _{CC} V _I ≥ V _{EE}	6 −6	V V
I _{out}	Output Current	Continuous Surge		50 100	mA 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	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)

Symbol	Characteristic	0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I _{EE}	Power Supply Current		75	90		75	90		75	90	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
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: 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 volts.

10E SERIES NECL DC CHARACTERISTICS 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	
I _{EE}	Power Supply Current		75	90		75	90		75	90	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
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: 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 volts.

MC10E156, MC100E156

100E 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		75	90		75	90		86	103	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
I_{IH}	Input HIGH Current			150			150			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 lfm is maintained.

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

100E 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		75	90		75	90		86	103	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
I_{IH}	Input HIGH Current			150			150			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 lfm is maintained.

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

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 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} t_{PHL}	Propagation Delay to Output										ps
	D	400	600	900	400	600	900	400	600	900	
	SEL0	550	775	1050	550	775	1050	550	775	1050	
	SEL1	450	650	900	450	650	900	450	650	900	
	LEN	350	500	800	350	500	800	350	500	800	
	MR	350	600	825	350	600	825	350	600	825	
t_s	Setup Time										ps
	D	400	275		400	275		400	275		
	SEL0	700	300		700	300		700	300		
	SEL1	600	400		600	400		600	400		
t_h	Hold Time										ps
	D	300	- 275		300	- 275		300	- 275		
	SEL0	100	- 300		100	- 300		100	- 300		
	SEL1	200	- 400		200	- 400		200	- 400		
t_{RR}	Reset Recovery Time	800	600		800	600		800	600		ps
t_{PW}	Minimum Pulse Width										ps
	MR	400			400			400			
t_{SKEW}	Within-Device Skew (Note 2)		50			50			50		ps
t_{JITTER}	Cycle-to-Cycle Jitter		TBD			TBD			TBD		ps
t_r t_f	Rise/Fall Times (20 - 80%)	275	475	700	275	475	700	275	475	700	ps

1. 10 Series: V_{EE} can vary $+0.46\text{ V} / -0.06\text{ V}$.
100 Series: V_{EE} can vary $+0.46\text{ V} / -0.8\text{ V}$.
2. Within-device skew is defined as identical transitions on similar paths through a device.

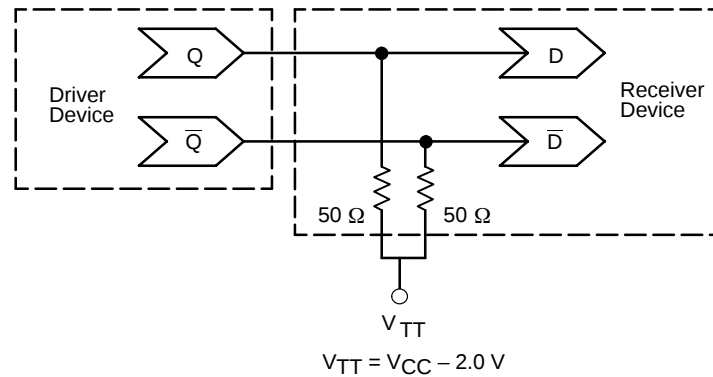


Figure 1. Typical Termination for Output Driver and Device Evaluation
(See Application Note AND8020 – Termination of ECL Logic Devices.)

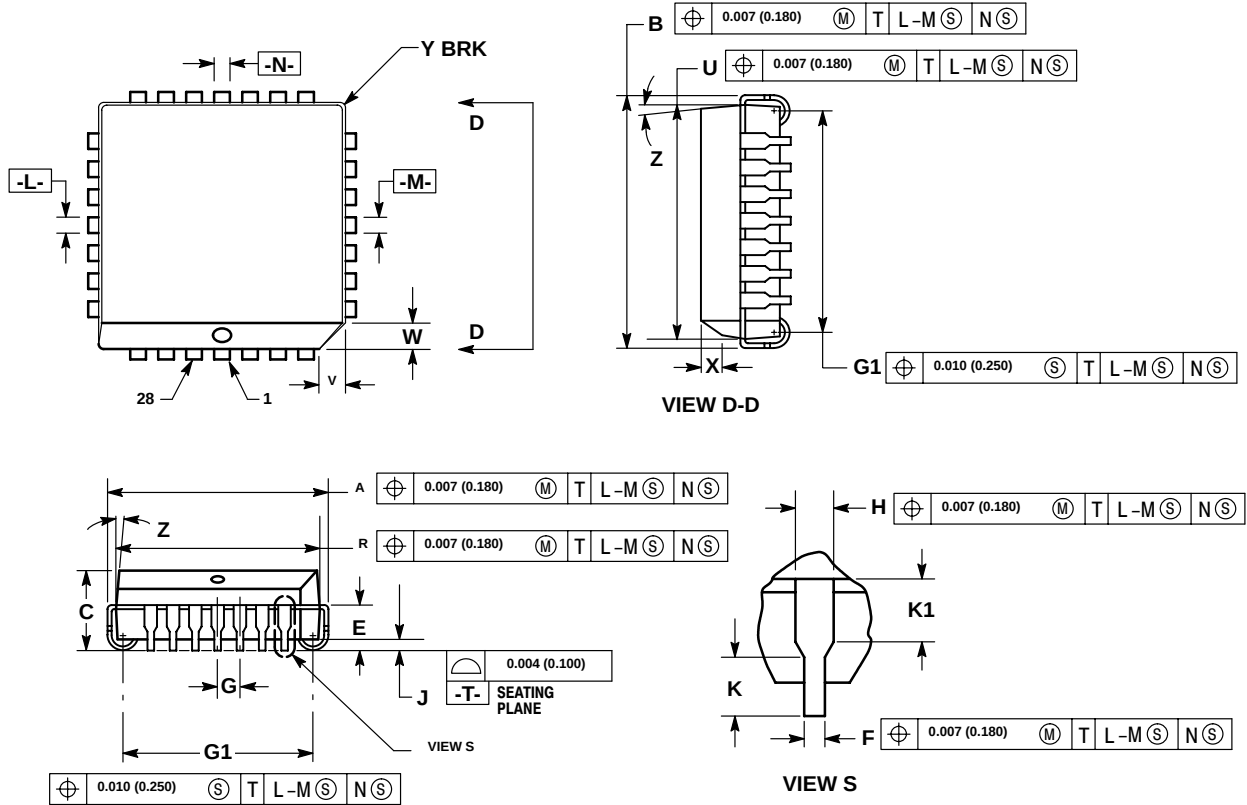
Resource Reference of Application Notes

- 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

MC10E156, MC100E156

PACKAGE DIMENSIONS

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



NOTES:

- DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
- DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
- DIM 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	—

Notes

MC10E156, MC100E156

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