

MC10EL89

5V ECL Coaxial Cable Driver

The MC10EL89 is a differential fanout gate specifically designed to drive coaxial cables. The device is especially useful in Digital Video Broadcasting applications; for this application, since the system is polarity free, each output can be used as an independent driver. The driver boasts a gain of approximately 40 and produces output swings twice as large as a standard ECL output. When driving a coaxial cable, proper termination is required at both ends of the line to minimize signal loss. The 1.6 V output swings allow for termination at both ends of the cable, while maintaining the required 800 mV swing at the receiving end of the cable. Because of the larger output swings, the device cannot be terminated into the standard -2.0 V. All of the DC parameters are tested with a 50Ω to -3.0 V load. The driver accepts a standard differential ECL input and can run off of the Digital Video Broadcast standard -5.0 V supply.

- 375 ps Propagation Delay
- 1.6 V Output Swings
- ESD Protection: >1 kV HBM, >100 V MM
- 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
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity Level 1
- For Additional Information, refer to Application Note AND8003/D
- Flammability Rating: UL-94 code V-0 @ 1/8", Oxygen Index 28 to 34
- Transistor Count = 31 devices

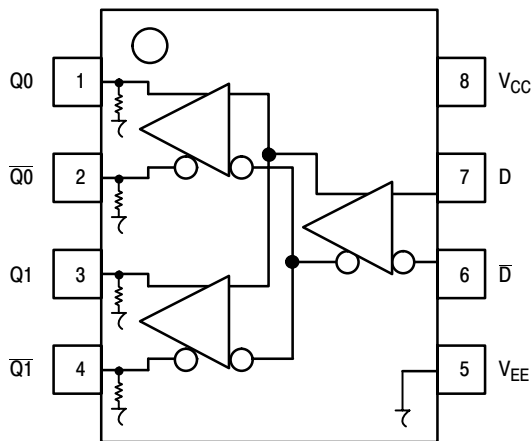


Figure 1. Logic Diagram and Pinout Assignment

PIN DESCRIPTION

PIN	Function
D, \bar{D}	ECL Data Inputs
Q0, $\bar{Q0}$; Q1, $\bar{Q1}$	ECL Data Outputs (1.6 V _{pp})
V _{CC}	Positive Supply
V _{EE}	Negative Supply



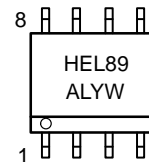
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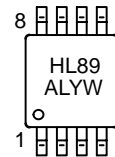
MARKING DIAGRAMS*



SO-8
D SUFFIX
CASE 751



TSSOP-8
DT SUFFIX
CASE 948R



A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week

*For additional information, refer to Application Note AND8002/D

ORDERING INFORMATION

Device	Package	Shipping
MC10EL89D	SO-8	98 Units / Rail
MC10EL89DR2	SO-8	2500 / Reel
MC10EL89DT	TSSOP-8	100 Units / Rail
MC10EL89DTR2	TSSOP-8	2500 / Reel

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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	V _{EE} = 0 V	V _I ≤ V _{CC}	6	V
	NECL Mode Input Voltage	V _{CC} = 0 V	V _I ≥ V _{EE}	-6	V
I _{out}	Output Current	Continuous		50	mA
		Surge		100	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	8 SOIC	190	°C/W
		500 LFPM	8 SOIC	130	°C/W
θ _{JC}	Thermal Resistance (Junction to Case)	std bd	8 SOIC	41 to 44	°C/W
θ _{JA}	Thermal Resistance (Junction to Ambient)	0 LFPM	8 TSSOP	185	°C/W
		500 LFPM	8 TSSOP	140	°C/W
θ _{JC}	Thermal Resistance (Junction to Case)	std bd	8 TSSOP	41 to 44 ± 5%	°C/W
T _{sol}	Wave Solder	<2 to 3 sec @ 248°C		265	°C

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

10EL SERIES PECL DC CHARACTERISTICS V_{CC} = 5.0 V; V_{EE} = 0.0 V (Note 2.)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I _{EE}	Power Supply Current		23	28		23	28		23	28	mA
V _{OH}	Output HIGH Voltage (Note 6.)	3.77	3.90	4.02	3.87	3.98	4.10	3.94	4.04	4.19	V
V _{OL}	Output LOW Voltage (Note 3.)	2.10	2.28	2.42	2.00	2.30	2.44	1.95	2.33	2.49	V
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 _{IHCMR}	Input HIGH Voltage Common Mode Range (Differential) (Note 4.)	2.5		4.6	2.5		4.6	2.5		4.6	V
I _{IH}	Input HIGH Current		70	150		50	150		40	150	μA
I _{IL}	Input LOW Current	0.5	50		0.5	30		0.3	25		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.

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 ohm resistor to V_{CC} -3 volts.

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_{ppmin} and 1 V.

10EL SERIES NECL DC CHARACTERISTICS V_{CC} = 0.0 V; V_{EE} = -5.0 V (Note 5.)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I _{EE}	Power Supply Current		23	28		23	28		23	28	mA
V _{OH}	Output HIGH Voltage (Note 6.)	-1.23	-1.10	-0.98	-1.13	-1.02	-0.90	-1.06	-0.96	-0.81	V
V _{OL}	Output LOW Voltage (Note 6.)	-2.90	-2.72	-2.58	-3.00	-2.70	-2.56	-3.05	-2.67	-2.51	V
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 _{IHCMR}	Input HIGH Voltage Common Mode Range (Differential) (Note 7.)	-2.5		-0.4	-2.5		-0.4	-2.5		-0.4	V
I _{IH}	Input HIGH Current		70	150		50	150		20	150	μA
I _{IL}	Input LOW Current	0.5	50		0.5	30		0.3	25		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.

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 ohm resistor to V_{CC} -3 volts.

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_{ppmin} and 1 V.

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AC CHARACTERISTICS $V_{CC} = 5.0\text{ V}$; $V_{EE} = 0.0\text{ V}$ or $V_{CC} = 0.0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (Note 8.)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f_{\max}	Maximum Toggle Frequency		TBD			1.5			TBD		GBs
t_{PLH} t_{PHL}	Propagation Delay to Output	200	340	480	260	350	440	310	400	490	ps
t_{SKEW}	Within-Device Skew		5	20		5	20		5	20	ps
t_{JITTER}	Cycle-to-Cycle Jitter (PRBS) @ 1.5 GBs		TBD			400			TBD		ps
V_{PP}	Input Swing (Note 9.)	150			150			150			mV
t_r t_f	Output Rise/Fall Times Q (20% – 80%)	205	330	455	205	330	455	205	330	455	ps

8. V_{EE} can vary +0.25 V / -0.5 V.

9. $V_{\text{PP}}(\text{min})$ is the minimum input swing for which AC parameters are guaranteed. The device has a DC gain of ≈ 40 .

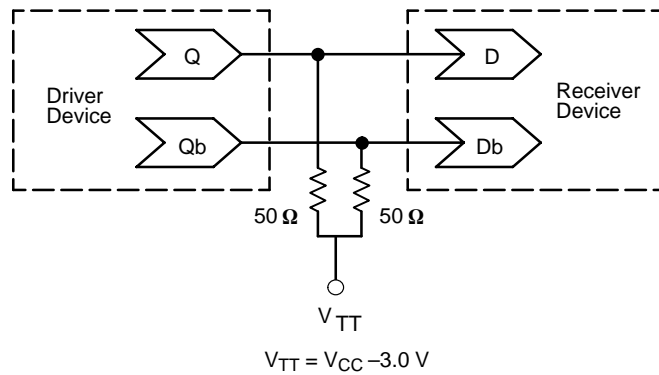


Figure 2. Typical Termination for Output Driver and Device Evaluation
(Refer to Application Note AND8020 – Termination of ECL Logic Devices)

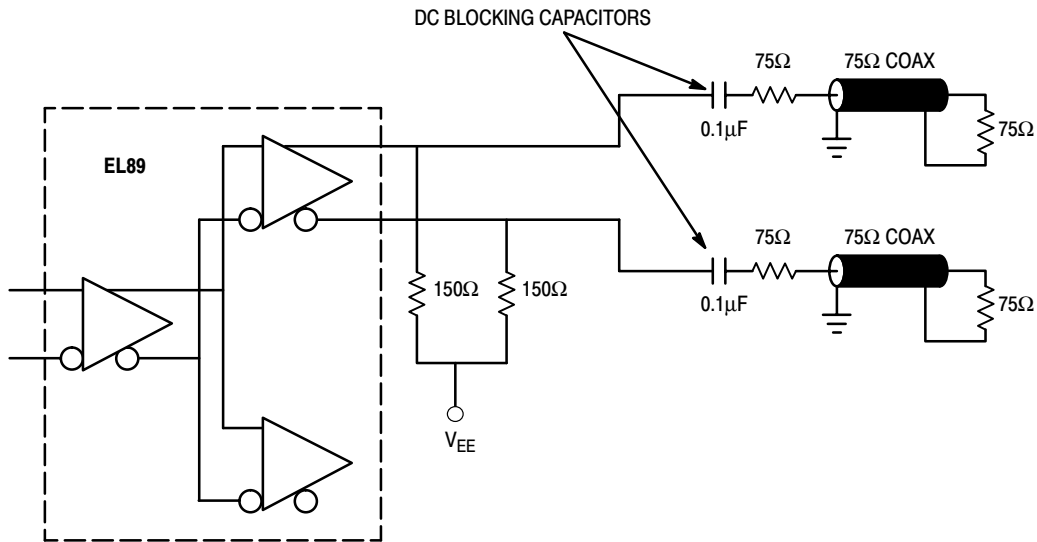


Figure 3. EL89 CATV Termination Configuration

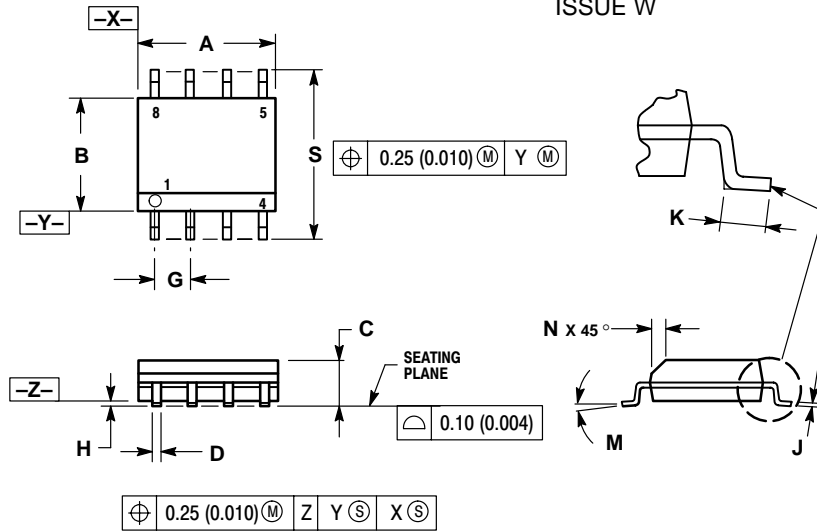
Resource Reference of Application Notes

- 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
- AN1560** – Low Voltage ECLinPS SPICE Modeling Kit
- 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

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PACKAGE DIMENSIONS

SO-8
D SUFFIX
PLASTIC SOIC PACKAGE
CASE 751-07
ISSUE W



NOTES:

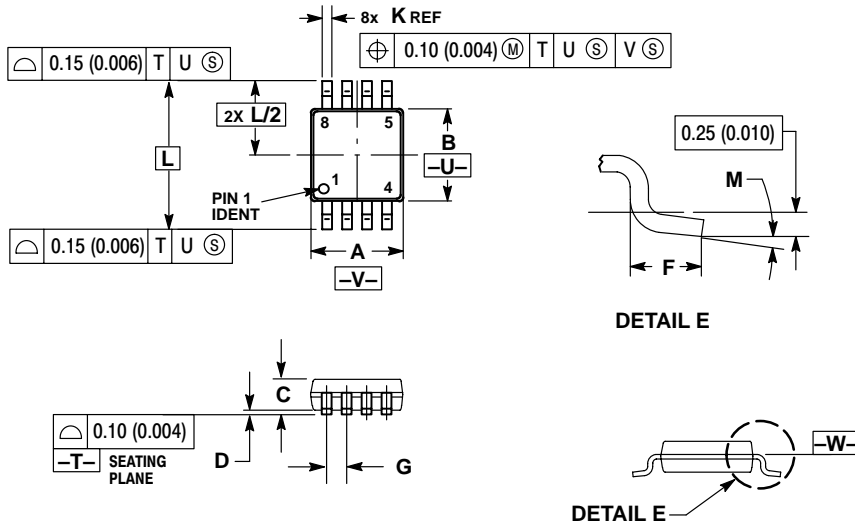
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	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 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

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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.
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-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.90	3.10	0.114	0.122
B	2.90	3.10	0.114	0.122
C	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°

Notes

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