MOTOROLA
Semiconductor Components

Order Number: MC10EP89/D
Rev. 0.1, 05/1999

MC10EP89

SO–8, D SUFFIX
8–LEAD PLASTIC SOIC PACKAGE
CASE 751

ORDERING INFORMATION

MC10EP89D SOIC

ECLinPS Plus™

Product Preview

Coaxial Cable Driver

- 225ps Propagation Delay
- 3.5 GHz Toggle Frequency
- 1.4V Output Swings
- PECL mode: 3.0V to 5.5V V_{CC} with V_{EE} = 0V
- ECL mode: 0V V_{CC} with V_{EE} = –3.0V to –5.5V
- Internal Input Resistors: Pulldown on D, Pulldown and Pullup on $\overline{D}$
- Q Output will default LOW with inputs open or at V_{EE}
- ESD Protection: >2KV HBM, >200V MM
- New Differential Input Common Mode Range
- Moisture Sensitivity Level 1, Indefinite Time Out of Drypack
- Flammability Rating: UL–94 code V–0 @ 1/8”, Oxygen Index 28 to 34
- Transistor Count = 152 devices

PIN DESCRIPTION

PIN	FUNCTION
D, $\overline{D}$	ECL Data Inputs
Q0, Q1, $\overline{Q0}$, $\overline{Q1}$	ECL Data Outputs

The MC10EP89 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 produces swings 70% larger than a standard ECL output. When driving a coaxial cable, proper termination is required at both ends of the line to minimize signal loss. The 1.4V swings allow for termination at both ends of the cable, while maintaining the 680mV swing at the receiving end of the cable. Because of the larger output swings, the device cannot be terminated into the standard V_{CC}–2.0V. All of the DC parameters are tested with a 50Ω to V_{CC}–3.0V load. The driver accepts a standard differential ECL input and can run off of the digital video broadcast standard –5.0V supply.

This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

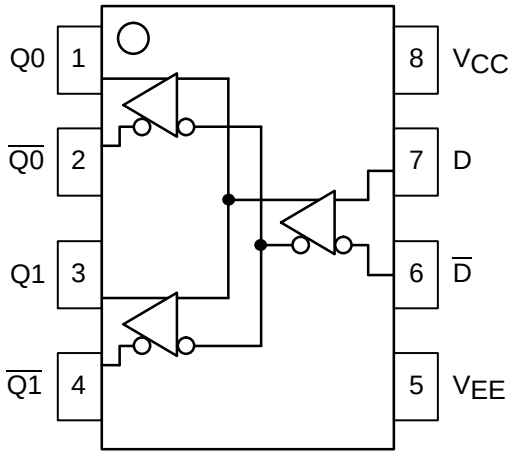


Figure 1. 8–Lead Pinout (Top View) **and Logic Diagram**

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V_{EE}	Power Supply (V_{CC} = 0V)	–6.0 to 0	VDC
V_{CC}	Power Supply (V_{EE} = 0V)	6.0 to 0	VDC
V_I	Input Voltage (V_{CC} = 0V, V_I not more negative than V_{EE})	–6.0 to 0	VDC
V_I	Input Voltage (V_{EE} = 0V, V_I not more positive than V_{CC})	6.0 to 0	VDC
I_{out}	Output Current — Continuous Surge	50 100	mA
T_A	Operating Temperature Range	–40 to +85	°C
T_{stg}	Storage Temperature	–65 to +150	°C
θ_{JA}	Thermal Resistance (Junction–to–Ambient) — Still Air 500lfpm	190 130	°C/W
θ_{JC}	Thermal Resistance (Junction–to–Case)	41 to 44 ± 5%	°C/W
T_{sol}	Solder Temperature (<2 to 3 Seconds: 245°C desired)	265	°C

* Maximum Ratings are those values beyond which damage to the device may occur.

DC CHARACTERISTICS, ECL/LVECL (V_{CC} = 0V; V_{EE} = –5.5V to –3.0V) (Note 4.)

		–40°C			25°C			85°C			
Symbol	**Characteristic**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
IEE	Power Supply Current (Note 1.)	TBD	30	TBD	TBD	32	TBD	TBD	34	TBD	mA
V_{OH}	Output HIGH Voltage (Note 2.)	TBD	–1110	TBD	TBD	–1006	TBD	TBD	–910	TBD	mV
V_{OL}	Output LOW Voltage (Note 2.)	TBD	–2480	TBD	TBD	–2450	TBD	TBD	–2411	TBD	mV
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 (Note 3.)	V_{EE}+2.0		0.0	V_{EE}+2.0		0.0	V_{EE}+2.0		0.0	V
I_{IH}	Input HIGH Current			150			150			150	µA
I_{IL}	Input LOW Current D $\overline{D}$	0.5 –150			0.5 –150			0.5 –150			µA

NOTE: 10EP circuits 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 airflow greater than 500lfpm is maintained.

1. V_{CC} = 0V, V_{EE} = V_{EEmin} to V_{EEmax}, all other pins floating.
2. All loading with 50 ohms to V_{CC}–3.0 volts.
3. V_{IHCMR} min varies 1:1 with V_{EE}, max varies 1:1 with V_{CC}.
4. Input and output parameters vary 1:1 with V_{CC}.

DC CHARACTERISTICS, LVPECL (V_{CC} = 3.3V ± 0.3V, V_{EE} = 0V) (Note 8.)

		–40°C			25°C			85°C			
Symbol	**Characteristic**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
IEE	Power Supply Current (Note 5.)	TBD	30	TBD	TBD	32	TBD	TBD	34	TBD	mA
V_{OH}	Output HIGH Voltage (Note 6.)	TBD	2190	TBD	TBD	2294	TBD	TBD	2390	TBD	mV
V_{OL}	Output LOW Voltage (Note 6.)	TBD	820	TBD	TBD	850	TBD	TBD	889	TBD	mV
V_{IH}	Input HIGH Voltage Single Ended	2070		2410	2170		2490	2240		2580	mV
V_{IL}	Input LOW Voltage Single Ended	1350		1800	1350		1820	1350		1855	mV
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Note 7.)	2.0		3.3	2.0		3.3	2.0		3.3	V
I_{IH}	Input HIGH Current			150			150			150	µA
I_{IL}	Input LOW Current D $\overline{D}$	0.5 –150			0.5 –150			0.5 –150			µA

NOTE: 10EP circuits 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 airflow greater than 500lfpm is maintained.

5. V_{CC} = 3.3V, V_{EE} = 0V, all other pins floating.
6. All loading with 50 ohms to V_{CC}–3.0 volts.
7. V_{IHCMR} min varies 1:1 with V_{EE}, max varies 1:1 with V_{CC}.
8. Input and output parameters vary 1:1 with V_{CC}.

DC CHARACTERISTICS, PECL (V_{CC} = 5.0V ± 0.5V, V_{EE} = 0V) (Note 12.)

Symbol	Characteristic	–40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current (Note 9.)	TBD	30	TBD	TBD	32	TBD	TBD	34	TBD	mA
V_{OH}	Output HIGH Voltage (Note 10.)	TBD	3890	TBD	TBD	3994	TBD	TBD	4090	TBD	mV
V_{OL}	Output LOW Voltage (Note 10.)	TBD	2520	TBD	TBD	2550	TBD	TBD	2589	TBD	mV
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 (Note 11.)	2.0		5.0	2.0		5.0	2.0		5.0	V
I_{IH}	Input HIGH Current			150			150			150	µA
I_{IL}	Input LOW Current D $\overline{D}$	0.5 –150			0.5 –150			0.5 –150			µA

NOTE: 10EP circuits 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 airflow greater than 500lfpm is maintained.

9. V_{CC} = 5.0V, V_{EE} = 0V, all other pins floating.
10. All loading with 50 ohms to V_{CC}–3.0 volts.
11. V_{IHCMR} min varies 1:1 with V_{EE}, max varies 1:1 with V_{CC}.
12. Input and output parameters vary 1:1 with V_{CC}.

AC CHARACTERISTICS (V_{CC} = 0V; V_{EE} = –3.0V to –5.5V) or (V_{CC} = 3.0V to 5.5V; V_{EE} = 0V)

Symbol	Characteristic	–40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f_{max}	Maximum Toggle Frequency (Note 13.)	TBD	TBD	TBD	TBD	1.25	TBD	TBD	TBD	TBD	GHz
t_{PLH}, t_{PHL}	Propagation Delay to Output Differential		295			295			295		ps
t_{SKEW}	Duty Cycle Skew (Note 14.)		TBD			TBD			TBD		ps
t_{JITTER}	Cycle–to–Cycle Jitter		TBD			TBD			TBD		ps
V_{PP}	Input Voltage Swing (Diff.)	150	800	1200	150	800	1200	150	800	1200	mV
t_r t_f	Output Rise/Fall Times Q (20% – 80%)		TBD TBD			230 210			TBD TBD		ps

13. F_{max} guaranteed for functionality only. V_{OL} and V_{OH} levels are guaranteed at DC only.
14. Skew is measured between outputs under identical transitions. Duty cycle skew is defined only for differential operation when the delays are measured from the cross point of the inputs to the cross point of the outputs.

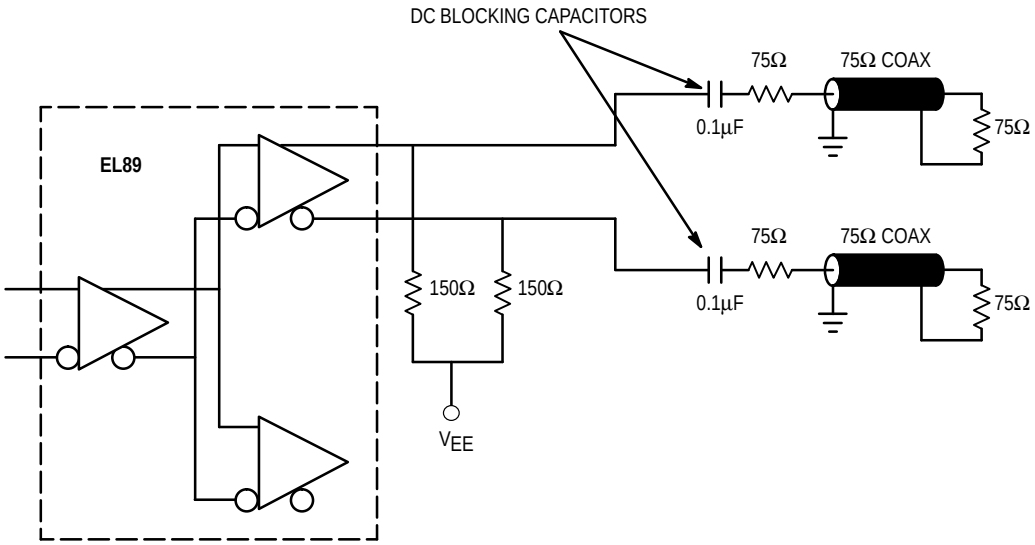
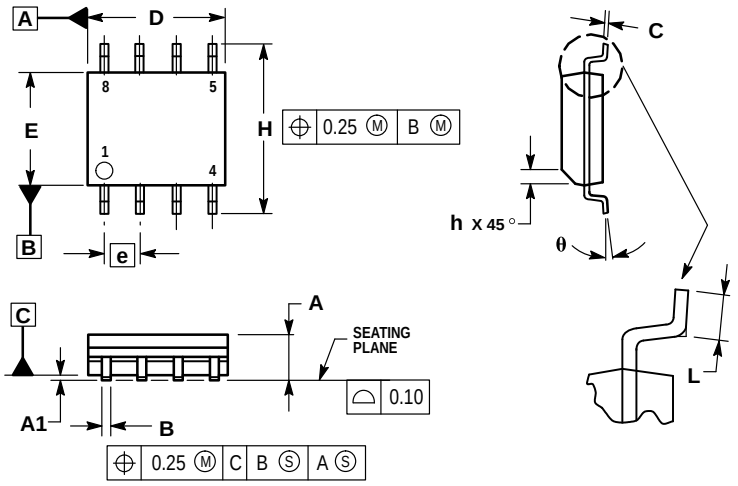


Figure 2. EP89 Termination Configuration

OUTLINE DIMENSIONS

SO–8, D SUFFIX
PLASTIC SOIC PACKAGE
CASE 751–06
ISSUE T



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. DIMENSIONS ARE IN MILLIMETER.
3. DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS	
DIM	MIN	MAX
A	1.35	1.75
A1	0.10	0.25
B	0.35	0.49
C	0.19	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.25
θ	0°	7°

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