MC10EP89

Coaxial Cable Driver

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 1.6 (5V) and 1.4V (3.3V) swing allow for termination at both ends of the cable, while maintaining a 800mV (5V) and 700mV (3.3V) 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.

The MC10EP89 meets ANSI/SMPTE standard 292M–Bit Serial Digital Interface for High Definition Television Systems 8.1.3 and 8.1.5 requirements.

- 310ps Typical Propagation Delay
- 3.0 GHz Typical Toggle Frequency
- 1.6V (5V) and 1.4V (3.3V) Swing
- 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: >4KV 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

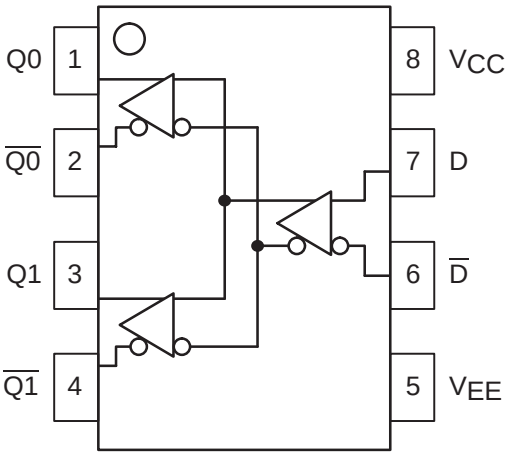

Figure 1. 8–Lead Pinout (Top View) **and Logic Diagram**

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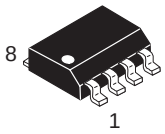
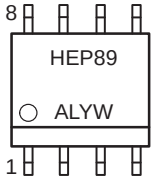


SO–8
D SUFFIX
CASE 751

MARKING DIAGRAM



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

*For additional information, see Application Note AND8002/D

PIN DESCRIPTION	
PIN	**FUNCTION**
D, $\overline{D}$	ECL Data Inputs
Q0, Q1, $\overline{Q0}$, $\overline{Q1}$	ECL Data Outputs
V_{CC}	Positive Supply
V_{EE}	Negative, 0 Supply

ORDERING INFORMATION

Device	Package	Shipping
MC10EP89D	SOIC	98 Units/Rail
MC10EP89DR2	SOIC	2500 Tape & Reel

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.

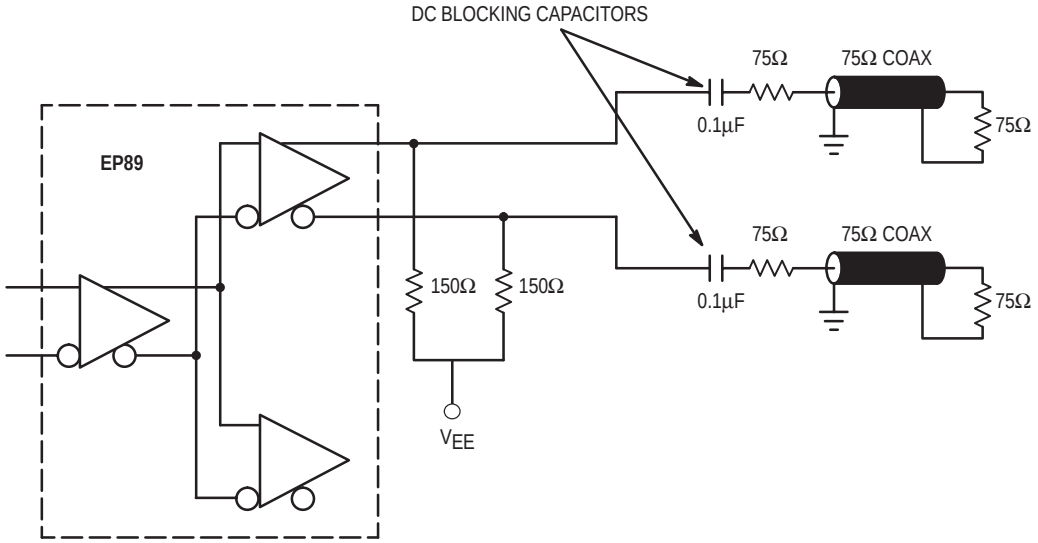


Figure 2. EP89 Termination Configuration

DC CHARACTERISTICS, ECL/LVECL (V_{CC} = 0V; V_{EE} = –3.3 ± 0.01V) (Note 4.)

Symbol	Characteristic	–40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
IEE	Power Supply Current (Note 1.)	22	28	34	24	32	38	28	34	40	mA
V_{OH}	Output HIGH Voltage (Note 2.)	–1220	–1120	–1020	–1150	–1050	–950	–1075	–975	–875	mV
V_{OL}	Output LOW Voltage (Note 2.)	–2680	–2580	–2480	–2670	–2570	–2470	–2630	–2530	–2430	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.)	–1.3		0.0	–1.3		0.0	–1.3		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} = –3.3V, 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, ECL/LVECL (V_{CC} = 0V; V_{EE} = –5.2 ± 0.01V) (Note 8.)

Symbol	Characteristic	–40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
IEE	Power Supply Current (Note 5.)	25	32	39	28	35	42	31	38	45	mA
V_{OH}	Output HIGH Voltage (Note 6.)	–1220	–1120	–1020	–1150	–1050	–950	–1075	–975	–875	mV
V_{OL}	Output LOW Voltage (Note 6.)	–2950	–2800	–2650	–2950	–2850	–2650	–2950	–2800	–2650	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 7.)	–3.2		0.0	–3.2		0.0	–3.2		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.

5. V_{CC} = 0V, V_{EE} = –5.2V, 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, LVPECL (V_{CC} = 3.3V ± 0.01V, V_{EE} = 0V) (Note 12.)

Symbol	Characteristic	–40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
IEE	Power Supply Current (Note 9.)	22	28	34	24	32	38	28	34	40	mA
V_{OH}	Output HIGH Voltage (Note 10.)	2080	2180	2280	2150	2250	2350	2225	2325	2425	mV
V_{OL}	Output LOW Voltage (Note 10.)	620	720	820	630	730	830	670	770	870	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 11.)	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.

9. V_{CC} = 3.3V, 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}.

DC CHARACTERISTICS, PECL (V_{CC} = 5.0V ± 0.5V, V_{EE} = 0V) (Note 16.)

Symbol	Characteristic	–40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
IEE	Power Supply Current (Note 13.)	27	34	41	30	37	44	32	39	46	mA
V_{OH}	Output HIGH Voltage (Note 14.)	3780	3880	3980	3850	3950	4050	3925	4025	4125	mV
V_{OL}	Output LOW Voltage (Note 14.)	2075	2225	2375	2060	2210	2360	2090	2240	2390	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 15.)	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.

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

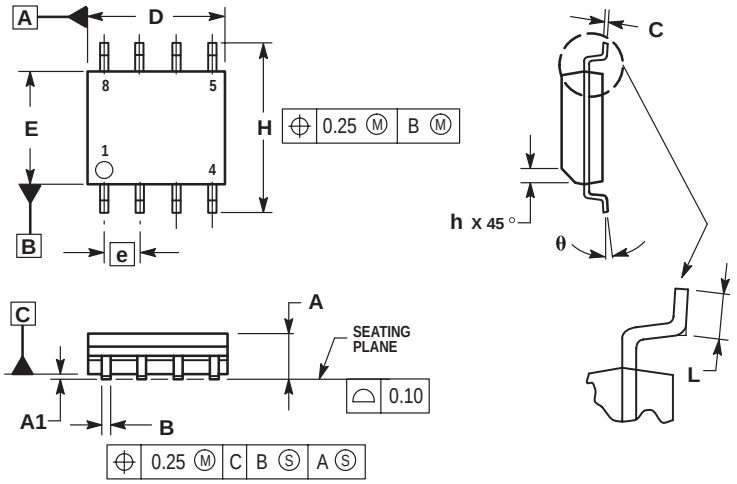
AC CHARACTERISTICS (V_{CC} = 0V; V_{EE} = –3.0V to –5.5V) or (V_{CC} = 3.0V to 5.5V; V_{EE} = 0V)

		–40°C			25°C			85°C			
Symbol	**Characteristic**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
f_{max}	Maximum Toggle Frequency (Note 17.)					3.0					GHz
t_{PLH}, t_{PHL}	Propagation Delay to Output Differential	200	280	380	220	310	400	250	330	420	ps
t_{SKEW}	Duty Cycle Skew (Note 18.)		5.0	20		5.0	20		5.0	20	ps
t_{JITTER}	Cycle–to–Cycle Jitter		TBD			TBD			TBD		ps
V_{PP}	Input Voltage Swing (Diff.) (Note 19.)	150	800	1200	150	800	1200	150	800	1200	mV
t_r t_f	Output Rise/Fall Times Q (20% – 80%)	120	230	380	130	250	410	150	270	430	ps

17. F_{max} guaranteed for functionality only.
18. 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.
19. V_{IL} must not go below V_{CC} – 3V.

PACKAGE 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 °

Notes

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