# Product Preview

# Low-Voltage Dual 1:10 Differential ECL/PECL Clock Driver

The MC100EP220 is a dual low skew 1–to–10 differential driver, designed with clock distribution in mind. The  $V_{BB}$  output provides a DC threshold bias for single ended sources. The  $V_{BB}$  can be connected to the true input or the complementary input, the latter will produce an inverted output. If used, the  $V_{BB}$  output should be bypassed to ground.

- 150ps Part-to-Part Skew
- 50ps Output-to-Output Skew
- · Differential Design
- V<sub>BB</sub> Output
- Voltage and Temperature Compensated Outputs
- Low Voltage V<sub>EE</sub> Range of −2.375 to −3.8V
- 75kΩ Input Pulldown Resistors

The EP220 is specifically designed, modeled and produced with low skew as the key goal. Optimal design and layout serve to minimize gate—to—gate skew within a device, and empirical modeling is used to determine process control limits that ensure consistent  $t_{pd}$  distributions from lot to lot. The net result is a dependable, guaranteed low skew device.

To ensure that the tight skew specification is met it is necessary that both pairs of the differential outputs are terminated into  $50\Omega$ , even if only one side is being used. In applications which do not use all of the outputs, it is best to leave unused pairs open to minimize power consumption in the device.

MC100EP220

LOW-VOLTAGE
DUAL 1:10 DIFFERENTIAL
ECL/PECL CLOCK DRIVER

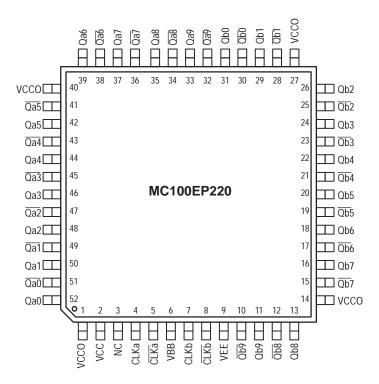


The MC100EP220, as with most other ECL devices, can be operated from a positive  $V_{CC}$  supply in PECL mode. This allows the EP220 to be used for high performance clock distribution in +3.3V or +2.5V systems. Designers can take advantage of the EP220's performance to distribute low skew clocks across the backplane. In a PECL environment, series or Thevenin line terminations are typically used as they require no additional power supplies. For more information on using PECL, designers should refer to Motorola Application Note AN1406/D.

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



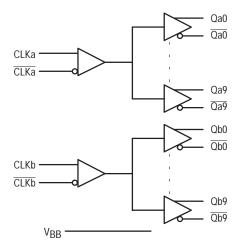
Pinout: 52-Lead TQFP (Top View)



## **PIN NAMES**

Pins	Function
CLKn, CLKn	Differential Input Pairs
Qan, Qan	Differential Outputs
Qbn, Qbn	Differential Outputs
VBB	V <sub>BB</sub> Output

## **LOGIC SYMBOL**



## **ECL DC CHARACTERISTICS**

			–40°C		0°C				25°C					
Symbol	Characteristic	Min	Тур	Max	Unit									
VOH	Output HIGH Voltage	-1.025	-0.955	-0.880	-1.025	-0.955	-0.880	-1.025	-0.955	-0.880	-1.025	-0.955	-0.880	V
VOL	Output LOW Voltage	-1.810	-1.705	-1.620	-1.810	-1.705	-1.620	-1.810	-1.705	-1.620	-1.810	-1.705	-1.620	V
VIH	Input HIGH Voltage	-1.165		-0.880	-1.165		-0.880	-1.165		-0.880	-1.165		-0.880	V
V <sub>IL</sub>	Input LOW Voltage	-1.810		-1.475	-1.810		-1.475	-1.810		-1.475	-1.810		-1.475	V
V <sub>BB</sub>	Output Reference Voltage	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	V
VEE	Power Supply Voltage	-2.375		-3.8	-2.375		-3.8	-2.375		-3.8	-2.375		-3.8	V
lіН	Input HIGH Current			150			150			150			150	μΑ
IEE	Power Supply Current													mA

## PECL DC CHARACTERISTICS

			–40°C		0°C 25°C									
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
VOH	Output HIGH Voltage (Note 1)	2.275	2.345	2.420	2.275	2.345	2.420	2.275	2.345	2.420	2.275	2.345	2.420	V
VOL	Output LOW Voltage (Note 1)	1.490	1.595	1.680	1.490	1.595	1.680	1.490	1.595	1.680	1.490	1.595	1.680	V
VIH	Input HIGH Voltage (Note 1)	2.135		2.420	2.135		2.420	2.135		2.420	2.135		2.420	V
V <sub>IL</sub>	Input LOW Voltage (Note 1)	1.490		1.825	1.490		1.825	1.490		1.825	1.490		1.825	V
V <sub>BB</sub>	Output Reference Voltage (Note 1)	1.92		2.04	1.92		2.04	1.92		2.04	1.92		2.04	V
Vcc	Power Supply Voltage	2.375		3.8	2.375		3.8	2.375		3.8	2.375		3.8	V
ΙΗ	Input HIGH Current			150			150			150			150	μΑ
IEE	Power Supply Current		125			125			125			125		mA

<sup>1.</sup> These values are for  $V_{CC}$  = 3.3V. Level Specifications will vary 1:1 with  $V_{CC}$ .

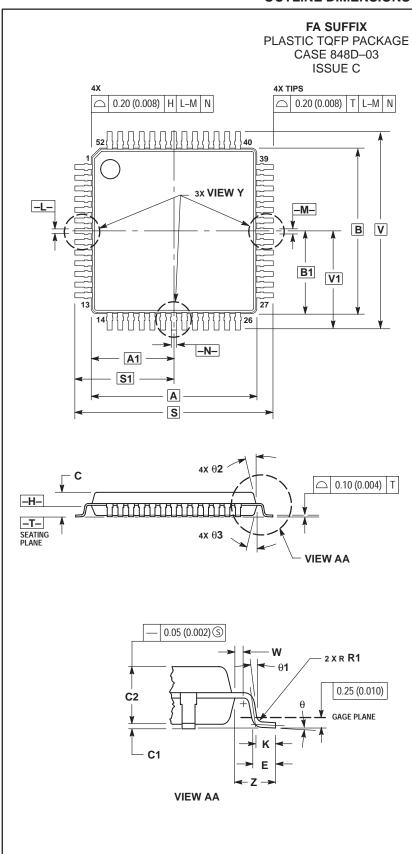
# AC CHARACTERISTICS ( $V_{EE} = V_{EE}$ (min) to $V_{EE}$ (max); $V_{CC} = V_{CCO} = GND$ )

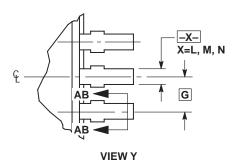
			–40°C			0°C		25°C		85°C					
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit	Condition
<sup>t</sup> PLH <sup>t</sup> PHL	Propagation Delay to Output IN (differential) IN (single–ended)								500 500					ps	
<sup>t</sup> skew	Within-Device Skew Part-to-Part Skew (Diff)		50 150			50 150			50 150			50 150		ps	
f <sub>max</sub>	Maximum Input Frequency		1.5			1.5			1.5			1.5		GHz	
V <sub>PP</sub>	Minimum Input Swing	500			500			500			500			mV	
V <sub>CMR</sub>	Common Mode Range													V	
t <sub>r</sub> /t <sub>f</sub>	Output Rise/Fall Time		200			200			200			200		ps	20%–80%

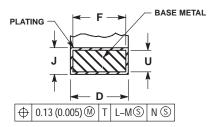
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## **OUTLINE DIMENSIONS**







#### **SECTION AB-AB** ROTATED 90° CLOCKWISE

### NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M,
- 1982.

  2. CONTROLLING DIMENSION: MILLIMETER.

  3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING
- 4. DATUMS -L-, -M- AND -N- TO BE DETERMINED AT DATUM
- 4. DATUMS -L-, -M- AND -N- TO BE DETERMINED AT DATUM PLANE -H-.

  5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -T-.

  6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.

  7. DIMENSION D DOES NOT INCLUDE TAMBAD PROPORTISION.
- 7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. DAMBAR PROTRUSION SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED 0.46 (0.018). MINIMUM SPACE BETWEEN PROTRUSION AND ADJACENT LEAD OR PROTRUSION 0.07 (0.003).

	MILLIN	IETERS	INC	HES			
DIM	MIN	MAX	MIN	MAX			
Α	10.00	BSC	0.394 BSC				
A1	5.00	BSC	0.197 BSC				
В	10.00	BSC	0.394	BSC			
B1	5.00	BSC	0.197	BSC			
С		1.70		0.067			
C1	0.05	0.20	0.002	0.008			
C2	1.30	1.50	0.051	0.059			
D	0.20	0.40	0.008	0.016			
E	0.45	0.75	0.018	0.030			
F	0.22	0.35	0.009	0.014			
G	0.65	BSC	0.026	BSC			
J	0.07	0.20	0.003	0.008			
K	0.50	REF	0.020	REF			
R1	0.08	0.20	0.003	0.008			
S	12.00	BSC	0.472	BSC			
S1	6.00	BSC	0.236	BSC			
U	0.09	0.16	0.004	0.006			
V	12.00	BSC	0.472	2 BSC			
V1	6.00	BSC	0.236	BSC			
W	0.20	REF	0.008	REF			
Z		REF	0.039	REF			
θ	0°	7°	0°	7°			
θ1	0°		0°				
θ2	12°	REF	12 °				
θ3	5°	13°	5°	13°			

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