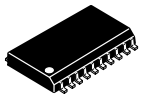
MC100EP139



SO–20, DW SUFFIX
20–LEAD PLASTIC WIDE SOIC PACKAGE
CASE 751D

ORDERING INFORMATION
MC100EP139DW SOIC

ECLinPS Plus™

Product Preview

÷2/4, ÷4/5/6 Clock Generation Chip

- Maximum Frequency > 2.7GHz
- 50ps Output–to–Output Skew
- 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
- Synchronous Enable/Disable
- Master Reset for Synchronization
- Q Output will default LOW with inputs open or at V_{EE}
- ESD Protection: >4KV HBM, >200V MM
- V_{BB} Output
- 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 = 758 devices

PIN NAMES

PIN	FUNCTION
CLK, $\overline{CLK}$	ECL Diff Clock Inputs
$\overline{EN}$	ECL Sync Enable
MR	ECL Master Reset
V_{BB}	ECL Reference Output
Q0, Q1, $\overline{Q0}$, $\overline{Q1}$	ECL Diff ÷2/4 Outputs
Q2, Q3, $\overline{Q2}$, $\overline{Q3}$	ECL Diff ÷4/5/6 Outputs
DIVSELa	ECL Freq. Select Input ÷2/4
DIVSELb0	ECL Freq. Select Input ÷4/5/6
DIVSELb1	ECL Freq. Select Input ÷4/5/6
V_{CC}, V_{CC0}	ECL Positive Supply
V_{EE}	ECL Negative, 0 Supply

FUNCTION TABLES

CLK	$\overline{EN}$	MR	FUNCTION
Z	L	L	Divide
ZZ	H	L	Hold Q0:3
X	X	H	Reset Q0:3

Z = Low–to–High Transition
ZZ = High–to–Low Transition

DIVSELa	Q0:1 OUTPUTS
0	Divide by 2
1	Divide by 4

DIVSELb0	DIVSELb1	Q2:3 OUTPUTS
0	0	Divide by 4
1	0	Divide by 6
0	1	Divide by 5
1	1	Divide by 5

The MC100EP139 is a low skew ÷2/4, ÷4/5/6 clock generation chip designed explicitly for low skew clock generation applications. The internal dividers are synchronous to each other, therefore, the common output edges are all precisely aligned. The device can be driven by either a differential or single–ended ECL or, if positive power supplies are used, LVPECL input signals. In addition, by using the V_{BB} output, a sinusoidal source can be AC coupled into the device. If a single–ended input is to be used, the V_{BB} output should be connected to the $\overline{CLK}$ input and bypassed to ground via a 0.01µF capacitor.

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

The common enable ($\overline{EN}$) is synchronous so that the internal dividers will only be enabled/disabled when the internal clock is already in the LOW state. This avoids any chance of generating a runt clock pulse on the internal clock when the device is enabled/disabled as can happen with an asynchronous control. The internal enable flip–flop is clocked on the falling edge of the input clock, therefore, all associated specification limits are referenced to the negative edge of the clock input.

Upon startup, the internal flip–flops will attain a random state; therefore, for systems which utilize multiple EP139s, the master reset (MR) input must be asserted to ensure synchronization. For systems which only use one EP139, the MR pin need not be exercised as the internal divider design ensures synchronization between the ÷2/4 and the ÷4/5/6 outputs of a single device.

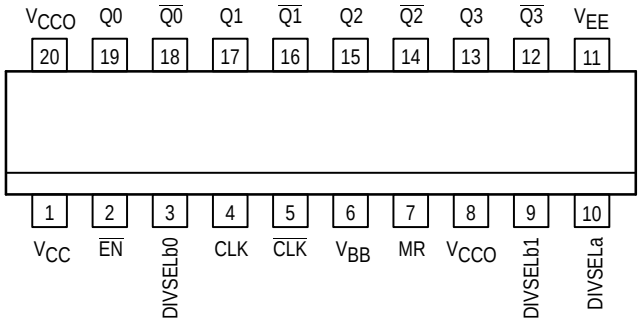


Figure 1. 20–Lead SOIC (Top View)

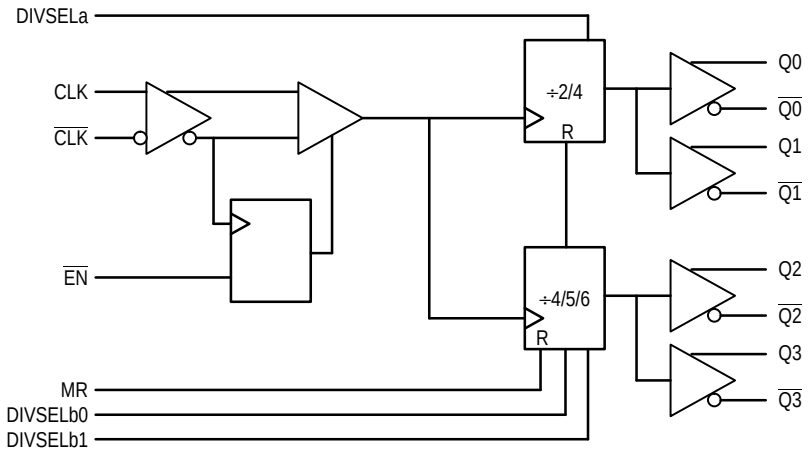


Figure 2. Logic Diagram

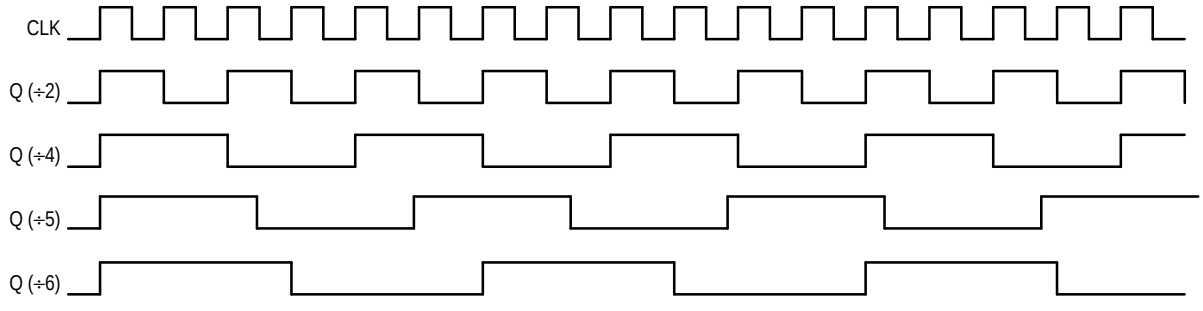


Figure 3. Timing Diagrams

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
I_{BB}	V_{BB} Sink/Source Current†	± 0.5	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	90 60	°C/W
θ_{JC}	Thermal Resistance (Junction–to–Case)	33 to 35 ± 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.

† Use for inputs of same package only.

DC CHARACTERISTICS (V_{EE} = –5V; V_{CC} = V_{CCO} = GND; T_A = 0°C to +85°C)

Symbol	Characteristic	Min	Typ	Max	Unit	Conditions	
V_{OH}	Output HIGH Voltage			–895	mV	V_{IN} = V_{IH}(max) or V_{IL}(min)	Loading with 50Ω to –2.0V
V_{OL}	Output LOW Voltage	–1945			mV		
V_{OHA}	Output HIGH Voltage	–1145			mV	V_{IN} = V_{IH}(min) or V_{IL}(max)	
V_{OLA}	Output LOW Voltage			–1695	mV		
V_{IH}	Input HIGH Voltage		–1022.5		mV	Guaranteed HIGH Signal for All Inputs	
V_{IL}	Input LOW Voltage		–1642.5		mV	Guaranteed LOW Signal for All Inputs	
I_{IL}	Input LOW Current	0.5			μA	V_{IN} = V_{IL}(min)	

1. V_{BB} = V_{CC} – 1.425 ± 100mV

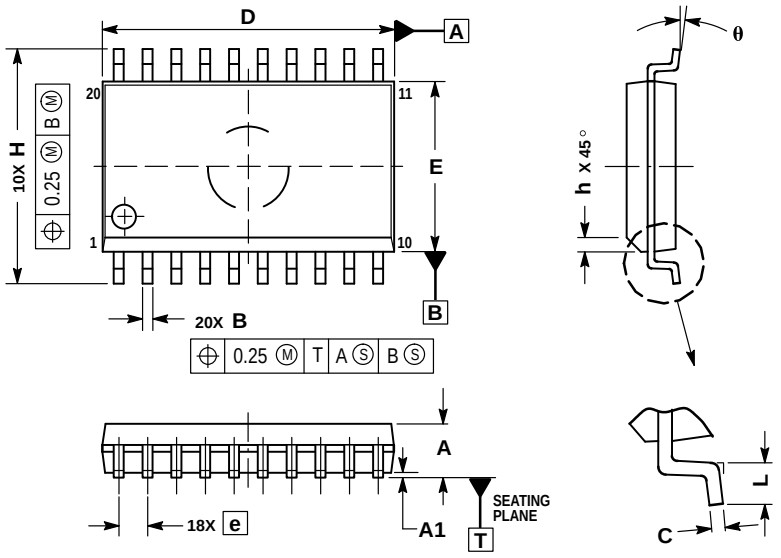
AC CHARACTERISTICS (V_{EE} = –3.8V to –3.0; V_{CC} = GND)

		–40°C			0°C			25°C			85°C			
Symbol	Characteristic	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Unit
f_{MAX}	Maximum Toggle Frequency		TBD			TBD			1500			TBD		MHz
t_{PLH} t_{PHL}	Propagation Delay CLK Q (Diff) to Output CLK Q (S.E.) MR Q		 TBD TBD TBD			 TBD TBD TBD			 550 570 620			 TBD TBD TBD		ps
t_{SKEW}	Within–Device Skew Q_0 – Q_3 (Note 2.)		TBD TBD			TBD TBD			50			TBD TBD		ps
	Part–to–Part Q_0 – Q_3 (Diff)		TBD			TBD			200			TBD		
t_S	Setup Time $\overline{EN}$ $\overline{CLK}$ DIVSEL CLK		TBD TBD			TBD TBD			300 450			TBD TBD		ps
t_H	Hold Time $\overline{CLK}$ $\overline{EN}$ CLK Div_Sel		TBD TBD			TBD TBD			150 200			TBD TBD		ps
V_{PP}	Minimum Input Swing (Note 3.) CLK		 TBD			 TBD			 300			 TBD		mV
V_{CMR}	Common Mode Range (Note 4.) V_{PP} < 500mV V_{PP} ≥ 500mV		 TBD TBD			 TBD TBD		 –2.1 –1.9		 –0.4 –0.4		 TBD TBD		V
t_{RR}	Reset Recovery Time		TBD			TBD			100			TBD		ps
t_{PW}	Minimum Pulse Width CLK MR		 TBD TBD			 TBD TBD			 400 500			 TBD TBD		ps
t_r, t_f	Output Rise/Fall Times (20% – 80%) Q		 TBD			 TBD			 165			 TBD		ps

2. Skew is measured between outputs under identical transitions.
3. Minimum input swing for which AC parameters are guaranteed. The device will function reliably with differential inputs down to 100mV.
4. The CMR 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_{PP}min and 1V. The lower end of the CMR range varies 1:1 with V_{EE}. The numbers in the spec table assume a nominal V_{EE} = –3.3V. Note for PECL operation, the V_{CMR}(min) will be fixed at 3.3V – |V_{CMR}(min)|.

OUTLINE DIMENSIONS

SO–20, DW SUFFIX
PLASTIC WIDE SOIC PACKAGE
CASE 751D–05
ISSUE F



NOTES:
1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS 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 PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS	
DIM	MIN	MAX
A	2.35	2.65
A1	0.10	0.25
B	0.35	0.49
C	0.23	0.32
D	12.65	12.95
E	7.40	7.60
e	1.27 BSC	
H	10.05	10.55
h	0.25	0.75
L	0.50	0.90
θ	0 °	7 °

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