MICREL
The Infinite Bandwidth Company™

HEX D FLIP-FLOP

SY100S351

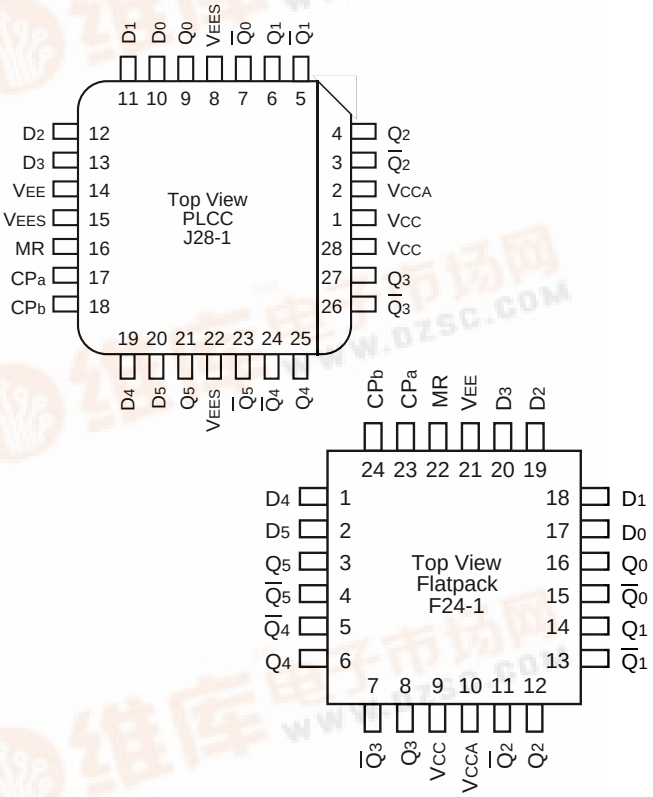
FEATURES

- **Max. toggle frequency of 700MHz**
- **Clock to Q max. of 1200ps**
- **I_{EE} min. of –98mA**
- **Industry standard 100K ECL levels**
- **Extended supply voltage option: V_{EE} = –4.2V to –5.5V**
- **Voltage and temperature compensation for improved noise immunity**
- **Internal 75KΩ input pull-down resistors**
- **50% faster than Fairchild 300K**
- **Better than 20% lower power than Fairchild**
- **Function and pinout compatible with Fairchild F100K**
- **Available in 24-pin CERPACK and 28-pin PLCC packages**

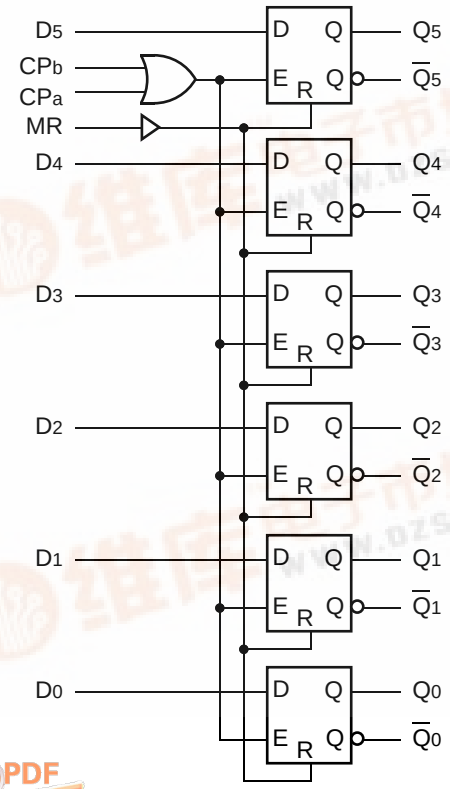
DESCRIPTION

The SY100S351 offers six D-type, edge-triggered, master/slave flip-flops with differential outputs, and is designed for use in high-performance ECL systems. The flip-flops are controlled by the signal from the logical OR operation on a pair of common clock signals (CP_a, CP_b). Data enters the master when both CP_a and CP_b are LOW and transfers to the slave when either CP_a or CP_b (or both) go to a logic HIGH. The Master Reset (MR) input overrides all other inputs and takes the Q outputs to a logic LOW. The inputs on this device have 75KΩ pull-down resistors.

PIN CONFIGURATIONS



BLOCK DIAGRAM



PIN NAMES

Pin	Function
D_0 — D_5	Data Inputs
CP_a, CP_b	Common Clock Inputs
MR	Asynchronous Master Reset Input
Q_0 — Q_5	Data Outputs
$\overline{Q}_0$ — $\overline{Q}_5$	Complementary Data Outputs
V_{EES}	V_{EE} Substrate
V_{CCA}	V_{CCO} for ECL Outputs

TRUTH TABLES

Asynchronous Operation[1]				
Inputs				Outputs
D_n	CP_a	CP_b	MR	Q_n (t+1)
X	X	X	H	L

NOTE:

1. H = High Voltage Level
   L = Low Voltage Level
   X = Don't Care
   t = Time before CP Positive Transition
   t+1 = Time after CP Positive Transition
   u = LOW-to-HIGH Transition

Synchronous Operation[1]				
Inputs				Outputs
D_n	CP_a	CP_b	MR	Q_n (t+1)
L	u	L	L	L
H	u	L	L	H
L	L	u	L	L
H	L	u	L	H
X	H	u	L	Q_n(t)
X	u	H	L	Q_n(t)
X	L	L	L	Q_n(t)

DC ELECTRICAL CHARACTERISTICS

V_{EE} = –4.2V to –5.5V unless otherwise specified; V_{CC} = V_{CCA} = GND

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
I_{IH}	Input HIGH Current MR D_0 – D_5 CP_a, CP_b	 — — —	 — — —	 270 200 300	µA	V_{IN} = V_{IH} (Max.)
I_{EE}	Power Supply Current	–98	–71	–49	mA	Inputs Open

AC ELECTRICAL CHARACTERISTICS

CERPACK

V_{EE} = –4.2V to –5.5V unless otherwise specified; V_{CC} = V_{CCA} = GND

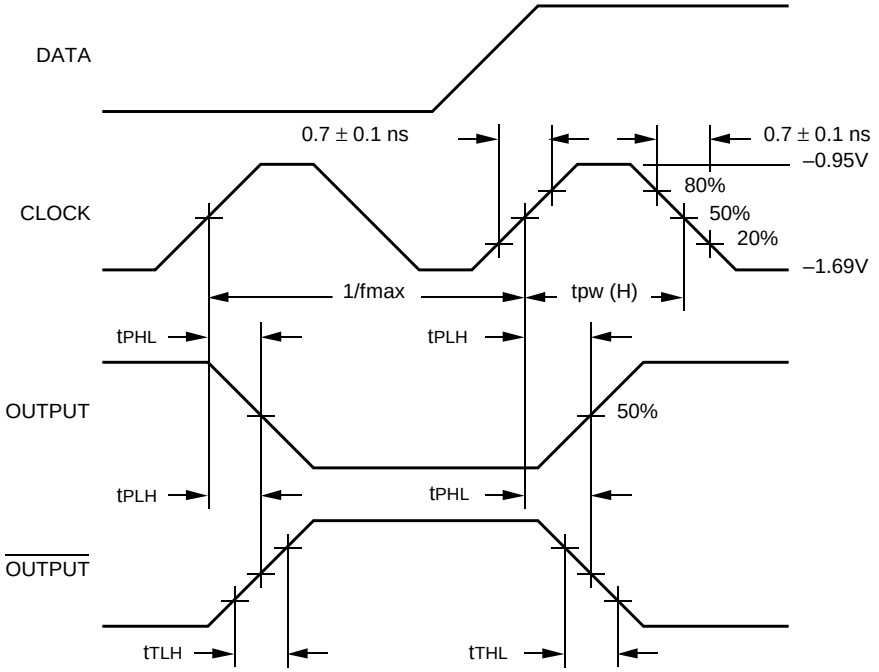
Symbol	Parameter	T_A = 0°C		T_A = +25°C		T_A = +85°C		Unit	Condition
		Min.	Max.	Min.	Max.	Min.	Max.		
f_{MAX}	Toggle Frequency	700	—	700	—	700	—	MHz	
t_{PLH} t_{PHL}	Propagation Delay CP_a, CP_b to Output	—	1200	—	1200	—	1200	ps	
t_{PLH} t_{PHL}	Propagation Delay MR to Output	—	1200	—	1200	—	1200	ps	
t_{TLH} t_{THL}	Transition Time 20% to 80%, 80% to 20%	300	900	300	900	300	900	ps	
t_S	Set-up Time D_0–D_5 MR (Release Time)	 500 1000	 — —	 500 1000	 — —	 500 1000	 — —	ps	
t_H	Hold Time, D_0–D_5	550	—	550	—	550	—	ps	
t_{PW} (H)	Pulse Width HIGH CP_a, CP_b, MR	1000	—	1000	—	1000	—	ps	

PLCC

V_{EE} = –4.2V to –5.5V unless otherwise specified; V_{CC} = V_{CCA} = GND

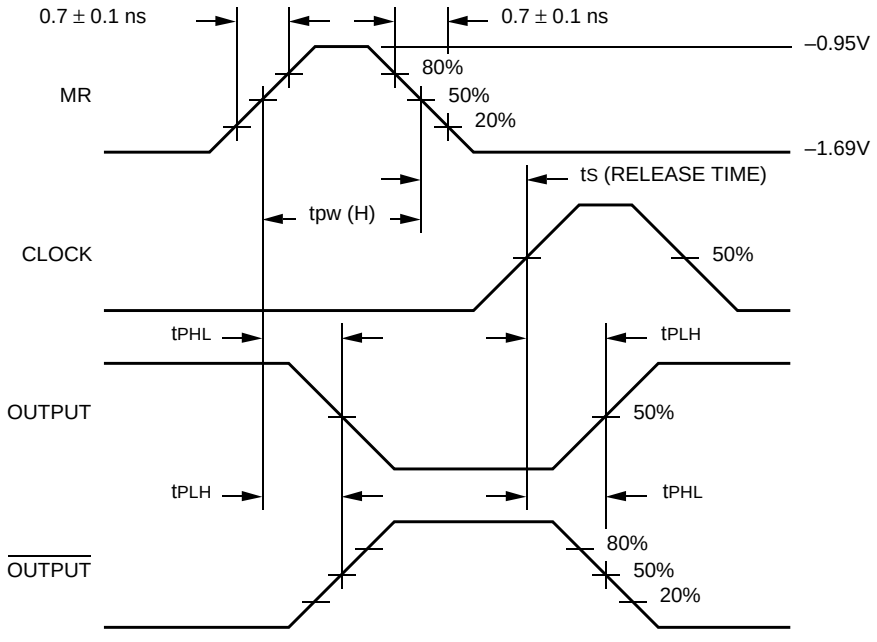
Symbol	Parameter	T_A = 0°C		T_A = +25°C		T_A = +85°C		Unit	Condition
		Min.	Max.	Min.	Max.	Min.	Max.		
f_{MAX}	Toggle Frequency	700	—	700	—	700	—	MHz	
t_{PLH} t_{PHL}	Propagation Delay CP_a, CP_b to Output	—	1200	—	1200	—	1200	ps	
t_{PLH} t_{PHL}	Propagation Delay MR to Output	—	1200	—	1200	—	1200	ps	
t_{TLH} t_{THL}	Transition Time 20% to 80%, 80% to 20%	300	900	300	900	300	900	ps	
t_S	Set-up Time D_0–D_5 MR (Release Time)	 500 1000	 — —	 500 1000	 — —	 500 1000	 — —	ps	
t_H	Hold Time, D_0–D_5	550	—	550	—	550	—	ps	
t_{PW} (H)	Pulse Width HIGH CP_a, CP_b, MR	1000	—	1000	—	1000	—	ps	

TIMING DIAGRAMS



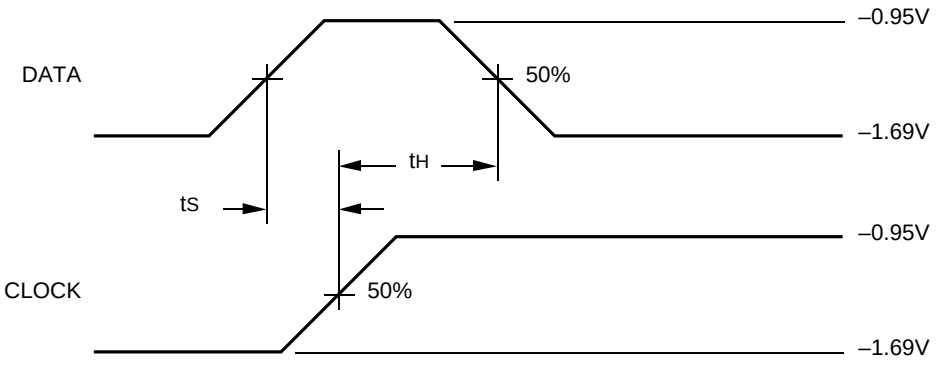
Propagation Delay (Clock) and Transition Times

NOTE:
V_{EE} = –4.2V to –5.5V unless otherwise specified; V_{CC} = V_{CCA} = GND



Propagation Delay (Resets)

TIMING DIAGRAMS



Data Set-up and Hold Time

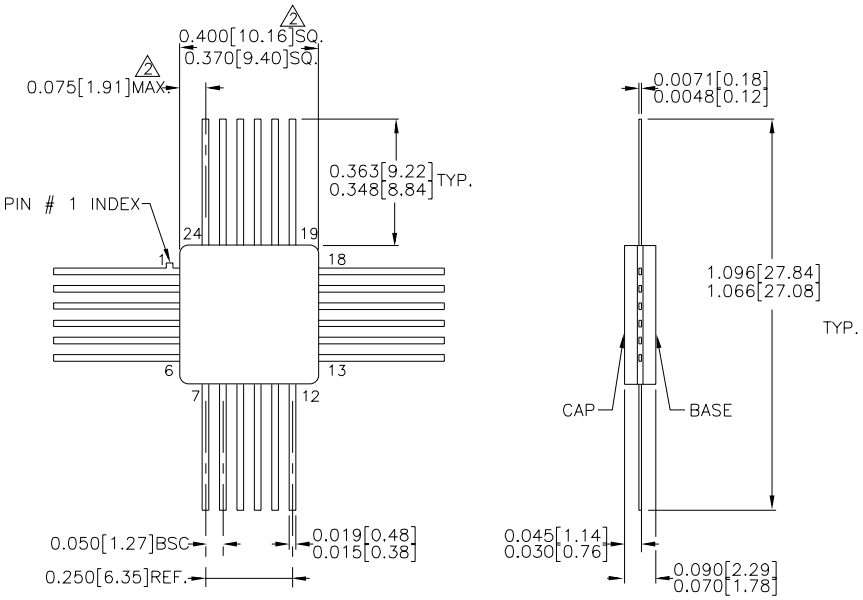
NOTES:

1. V_{EE} = –4.2V to –5.5V unless otherwise specified; V_{CC} = V_{CCA} = GND
2. t_S is the minimum time before the transition of the clock that information must be present at the data input.
3. t_H is the minimum time after the transition of the clock that information must remain unchanged at the data input.

PRODUCT ORDERING CODE

Ordering Code	Package Type	Operating Range
SY100S351FC	F24-1	Commercial
SY100S351JC	J28-1	Commercial
SY100S351JCTR	J28-1	Commercial

24 LEAD CERPACK (F24-1)



NOTES:
1. DIMENSIONS ARE IN INCHES[MM].
2. THIS DIMENSION INCLUDES GLASS PROTRUSION AND CAP TO BASE ALIGNMENT TOLERANCES.
3. DIMENSIONS SHOWN ARE MAX/MIN, WHERE NOTED.

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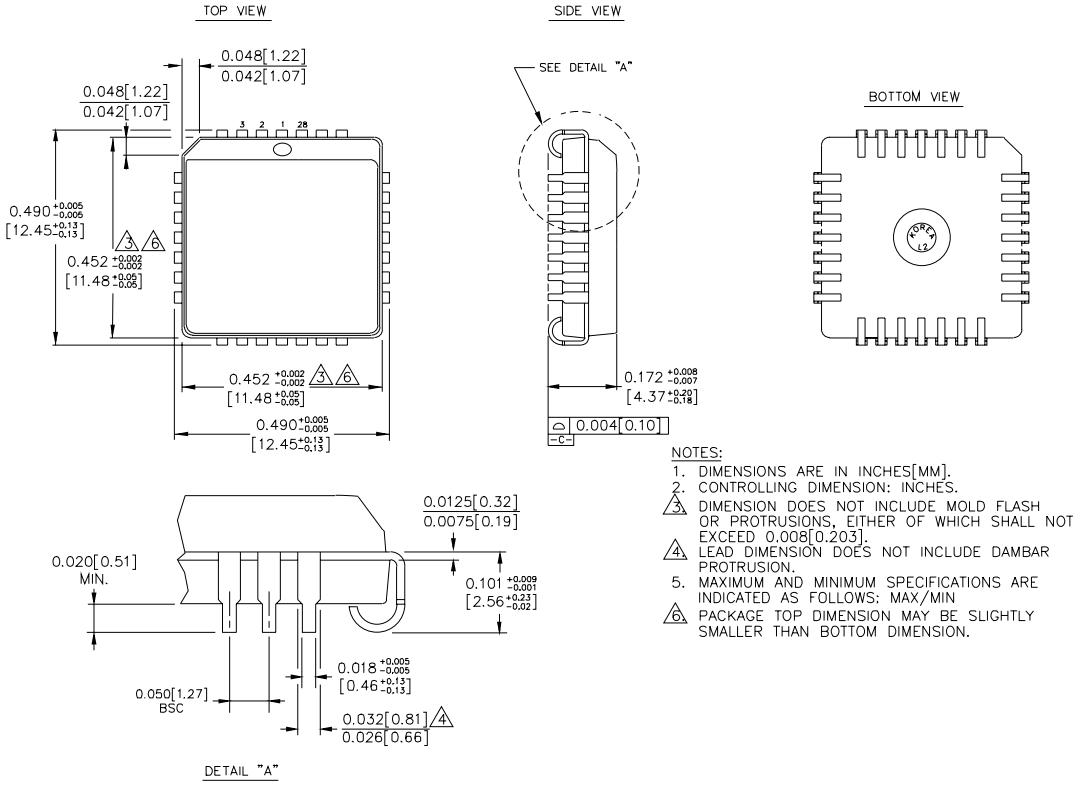
28 LEAD PLCC (J28-1)



NOTES:
1. DIMENSIONS ARE IN INCHES[MM].
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.008[0.203].
4. LEAD DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSION.
5. MAXIMUM AND MINIMUM SPECIFICATIONS ARE INDICATED AS FOLLOWS: MAX/MIN
6. PACKAGE TOP DIMENSION MAY BE SLIGHTLY SMALLER THAN BOTTOM DIMENSION.

Rev. 03

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