Preliminary Information

October 6, 1999

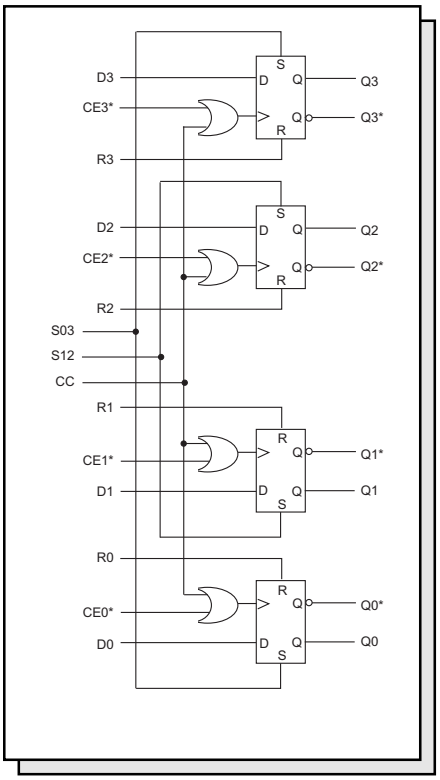
This document contains information on a new product. The parametric information, although not fully characterized, is the result of testing initial devices.

4-Bit D Flip-Flop

28 Pin
PLCC Package

Features

- 1100 MHz Minimum Toggle Frequency
- Differential Outputs
- Individual and Common Clocks
- Individual Resets (asynchronous)
- Paired Sets (asynchronous)
- Extended 100E VEE Range of –4.2V to –5.5V
- 75kΩ Input Pulldown Resistors
- Fully Compatible with Motorola MC10E131 and MC100E131
- Specified Over Industrial Temperature Range: –40˚C to 85˚C
- ESD Protection of >2000V
- Available in 28-pin PLCC Package



Description

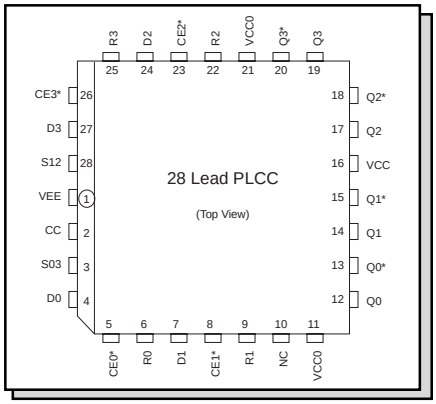
The SK10E/100E131 is a Quad master-slave D-type flip-flop with differential outputs. Each flip-flop may be clocked separately by holding Common Clock (CC) LOW and using the Clock Enable (CE*) inputs for clocking. Common clocking is achieved by holding the CE inputs LOW and using CC to clock all four flip-flops. In this case, the CE inputs perform the function of controlling the common clock to each flip-flop.

Individual asynchronous resets are provided (R). Asynchronous set controls (S) are ganged together in pairs, with the pairing chosen to reflect physical chip symmetry.

Data enters the master when both CC and CE* are LOW, and transfers to the slave when either CC or CE (or both) go HIGH.

Pin Names

Pin	Function
D0 – D8	Data Inputs
CE0* – CE3*	Clock Enables (individual)
R0 – R3	Resets
CC	Common Clock
S03, S12	Sets (paired)
Q0 – Q3	True Outputs
Q0* – Q3*	Inverting Outputs



Absolute Maximum Ratings *(Note 3)*

Symbol	Parameter	Rating	Unit
V_{EE}	Power Supply (VCC = 0V)	-8.0 to 0	V
V_I	Input Voltage (VCC = 0V)	0 to -6.0	V
I_{OUT}	Output Current: Continuous Surge	 50 100	 mA mA
T_A	Operating Temperature Range	-40 to +85	°C
V_{EE} (note 4)	Operating Range	-5.7 to -4.2	V
T_{store}	Storage Temperature Range	-65 to +150	°C

SK10E131 DC Electrical Characteristics *(Note 1)*

(V_{EE} = V_{EE} (min) to V_{EE} (max); V_{CC} = GND) *(Note 4)*

Symbol	Characteristic	TA = –40˚C			TA = 0˚C			TA = +25˚C			TA = +85˚C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V_{OH}	Output HIGH Voltage	-1135		-890	-1080		-840	-1020		-810	-910		-720	mV
V_{OL}	Output LOW Voltage	-1950		-1650	-1950		-1630	-1950		-1630	-1950		-1595	mV
V_{IH}	Input HIGH Voltage	-1230		-890	-1170		-840	-1130		-810	-1060		-720	mV
V_{IL}	Input LOW Voltage	-1950		-1500	-1950		-1480	-1950		-1950	-1480		-1445	mV
I_{IL}	Input LOW Current	0.5			0.5			0.5			0.3			µA
I_{IH}	Input HIGH Current CC S R, CE D			 350 450 300 150			 350 450 300 150			 350 450 300 150			 350 450 300 150	µA
I_{EE}	Power Supply Current		43	60		43	60		43	60		43	60	mA

SK100E131 DC Electrical Characteristics *(Note 2)*

(V_{EE} = V_{EE} (min) to V_{EE} (max); V_{CC} = GND) *(Note 4)*

Symbol	Characteristic	TA = –40˚C			TA = 0˚C to +85˚C			Unit	Conditions	
		Min	Typ	Max	Min	Typ	Max			
V_{OH} V_{OL}	Output HIGH Voltage Output LOW Voltage	-1140 -1830	-1005 -1695	-880 -1555	-1080 -1810	-955 -1705	-880 -1620	mV mV	VIN or VIH(Max) or VIL(Min)	Loading with
V_{OHA} V_{OLA}	Output HIGH Voltage Output LOW Voltage	-1095 --	-- --	-- -1555	-1035 --	-- --	-- -1610	mV mV	VIN or VIH(Min) or VIL(Max)	50W to -2.0V
V_{IH}	Input HIGH Voltage (Note 5)	-1165	--	-880	-1165	--	-880	mV		
V_{IL}	Input LOW Voltage (Note 6)	-1810	--	-1475	-1810	--	-1475	mV		
IIL	Input LOW Current	0.5	--	--	0.5	--	--	µA	VIN = VIL(Min)	
I_{IH}	Input HIGH Current CC S R, CE D			 350 450 300 150			 350 450 300 150	µA		
I_{EE}	Power Supply Current		54	70		54	70	mA		

SK10/100E131 AC Characteristics

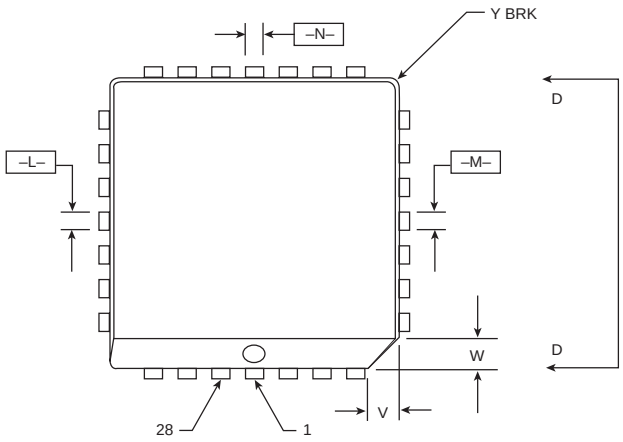
(V_{EE} = V_{EE} (min) to V_{EE} (max); V_{CC} = V_{CCO} = GND) ***(Note 4)***

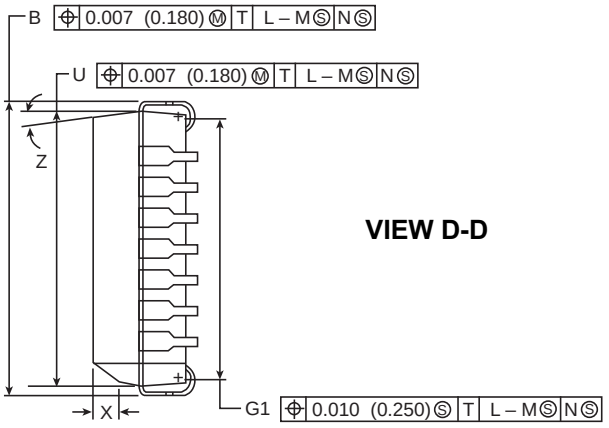
Symbol	Characteristic	–40˚C			0˚C to +85˚C			Unit	Cond
		Min	Typ	Max	Min	Typ	Max		
f_{MAX}	Max. Toggle Frequency	1000	1400		1100	1400		MHz	
t_{PLH} t_{PHL}	Propagation Delay to Output CE CC R S	 400 275 460 490	 600 600 625 550	 600 700 700 750	 400 325 460 350	 500 500 550 550	 600 650 725 740	ps	
t_S	Setup Time D	200	20		150	20		ps	7.
t_H	Hold Time D	225	-20		175	-20		ps	7.
t_{RR}	Reset Recovery Time	450	150		400	150		ps	
t_{PW}	Minimum Pulse Width CLK R, S	 400 400			 400 400			ps	
t_{SKEW}	Within Device Skew		60			60		ps	8.
t_r / t_f	Rise/Fall Times	220		400	220		400	ps	20-80%

Notes:

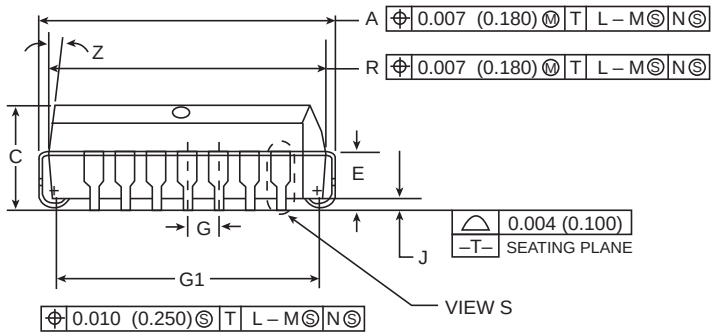
1. 10E circuits are designed to meet the DC specifications shown in the table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse airflow greater than 500 lfpm is maintained. Outputs are termionated through a 50Ω resistor to –2.0V.
2. The same DC parameter values apply across the full VEE range of –4.2 to –5.5V. Outputs are terminated through a 50Ω resistor to –2.0V. 100E circuits are designed to meet the DC specifications shown in the table where transverse airflow greater than 500 lfpm is maintained.
3. Absolute maximum rating, beyond which device life may be impaired unless otherwise specificed on an individual data sheet.
4. Parametric values specified at:
   100E Series: –4.2V to –5.5V
   10E Series: –4.75V to –5.5V.
5. Guaranteed HIGH signal for all inputs.
6. Guaranteed LOW signal for all inputs.
7. Setup/hold times guaranteed for both CC and CE.
8. Within-device skew is defined as identical transitions on similar paths through a device.

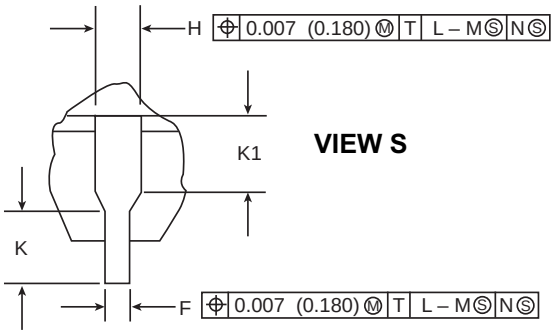
Package Information





VIEW D-D





VIEW S

NOTES:
1. Datums –L–, –M–, and –N– determined where top of lead shoulder exits plastic body at mold parting line.
2. DIM G1, true position to be measured at Datum –T–, Seating Plane.
3. DIM R and U do not include mold flash. Allowable mold flash is 0.010 (0.250) per side.
4. Dimensioning and tolerancing per ANSI Y14.5M, 1982.
5. Controlling Dimension: Inch.
6. The package top may be smaller than the package bottom by up to 0.012 (0.300). Dimensions R and U are determined at the outermost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs and interlead flash, but including any mismatch betweeen the top and bottom of the plastic body.
7. Dimension H does not include Dambar protrusion or intrusion. The Dambar protrusion(s) shall not cause the H dimension to be greater than 0.037 (0.940). The Dambar intrusion(s) shall not cause the H dimension to be smaller than 0.025 (0.635).

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.485	0.495	12.32	12.57
B	0.485	0.495	12.32	12.57
C	0.165	0.180	4.20	4.57
E	0.090	0.110	2.29	2.79
F	0.013	0.019	0.33	0.48
G	0.050 BSC		1.27 BSC	
H	0.026	0.032	0.66	0.81
J	0.020	--	0.51	--
K	0.025	--	0.64	--
R	0.450	0.456	11.43	11.58
U	0.450	0.456	11.43	11.58
V	0.042	0.048	1.07	1.21
W	0.042	0.048	1.07	1.21
X	0.042	0.056	1.07	1.42
Y	--	0.020	--	0.50
Z	2°	10°	2°	10°
G1	0.410	0.430	10.42	10.92
K1	0.040	--	1.02	--