Welcome To My Presentation

My Presentation Topic is

Digital IC Terminology, IC Data Sheet

Presented By

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What is IC?

- An integrated circuit (IC) is a small semiconductor-based electronic device consisting of fabricated transistors, resistors and capacitors.

- An integrated circuit is also known as a chip or microchip.

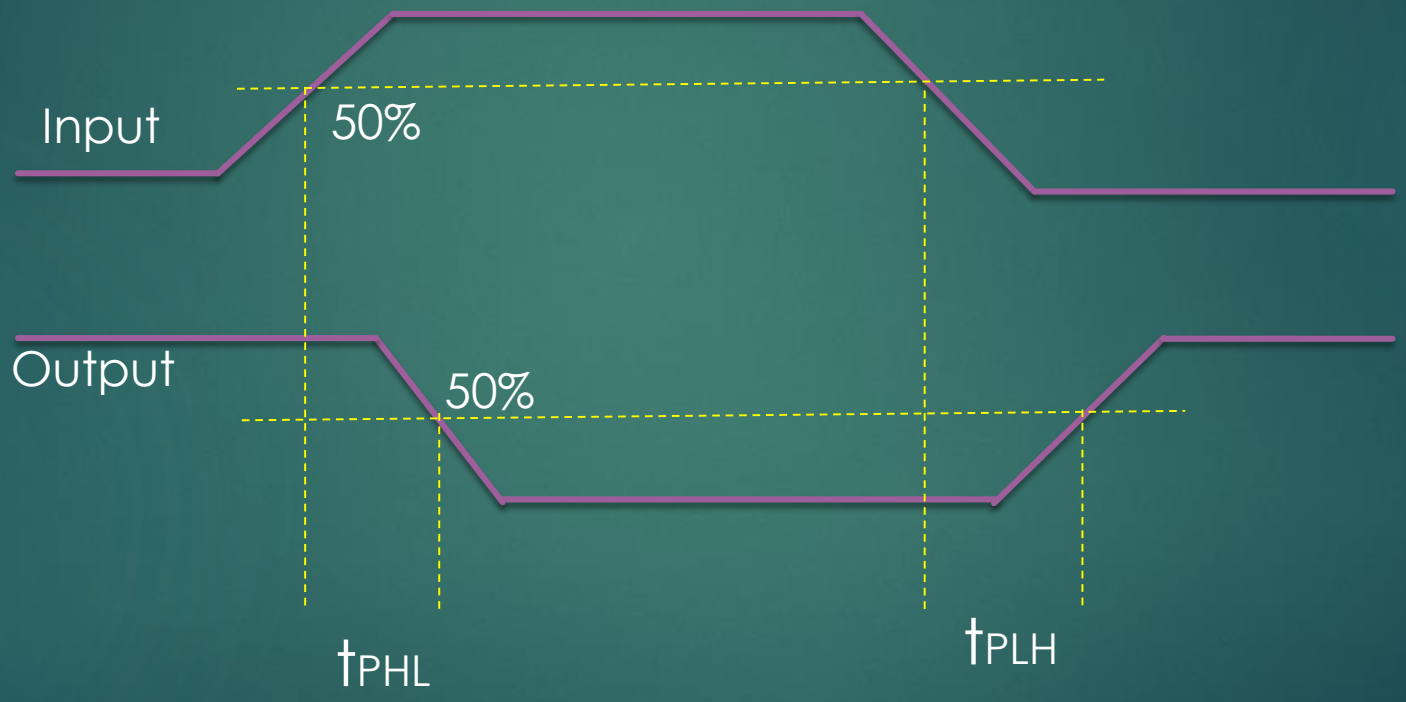
Propagation Delay

- Propagation delay is the time required to change the output after application of input.
- It’s basically have two types:

  1.High to Low (tPHL)

  2.Low to High(tPLH)

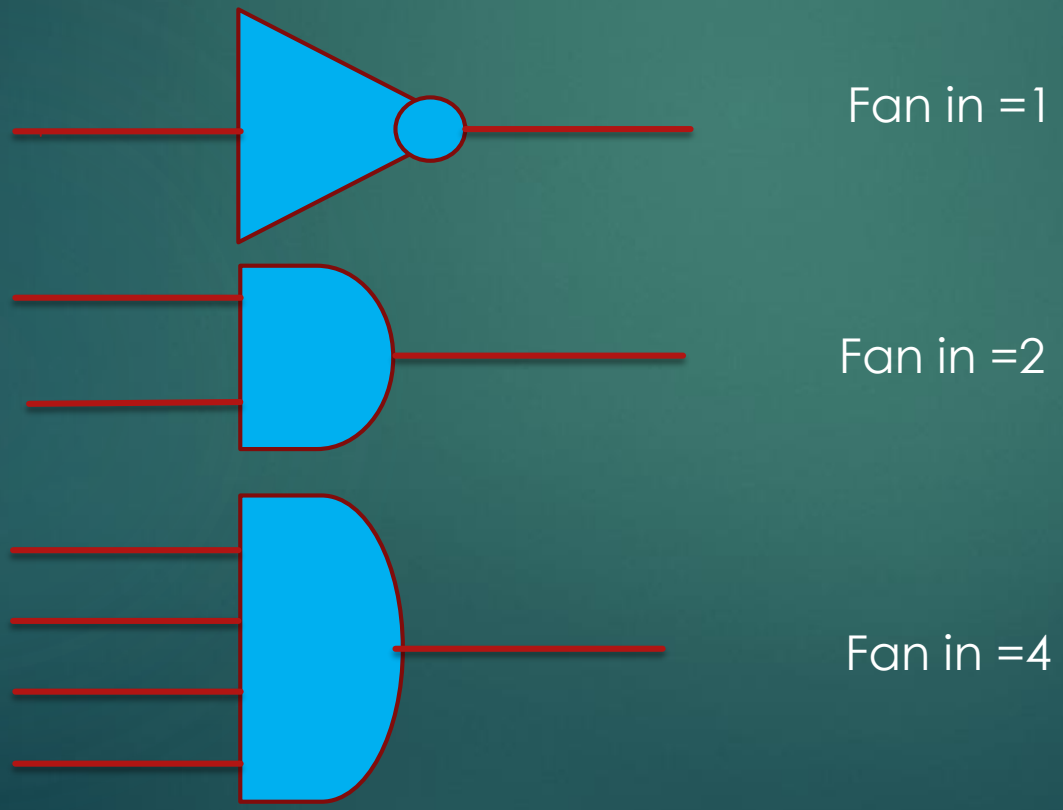
Propagation delay diagram



$$\text{Avg prop. Delay} = \frac{t_{PHL} + t_{PHL}}{2}$$

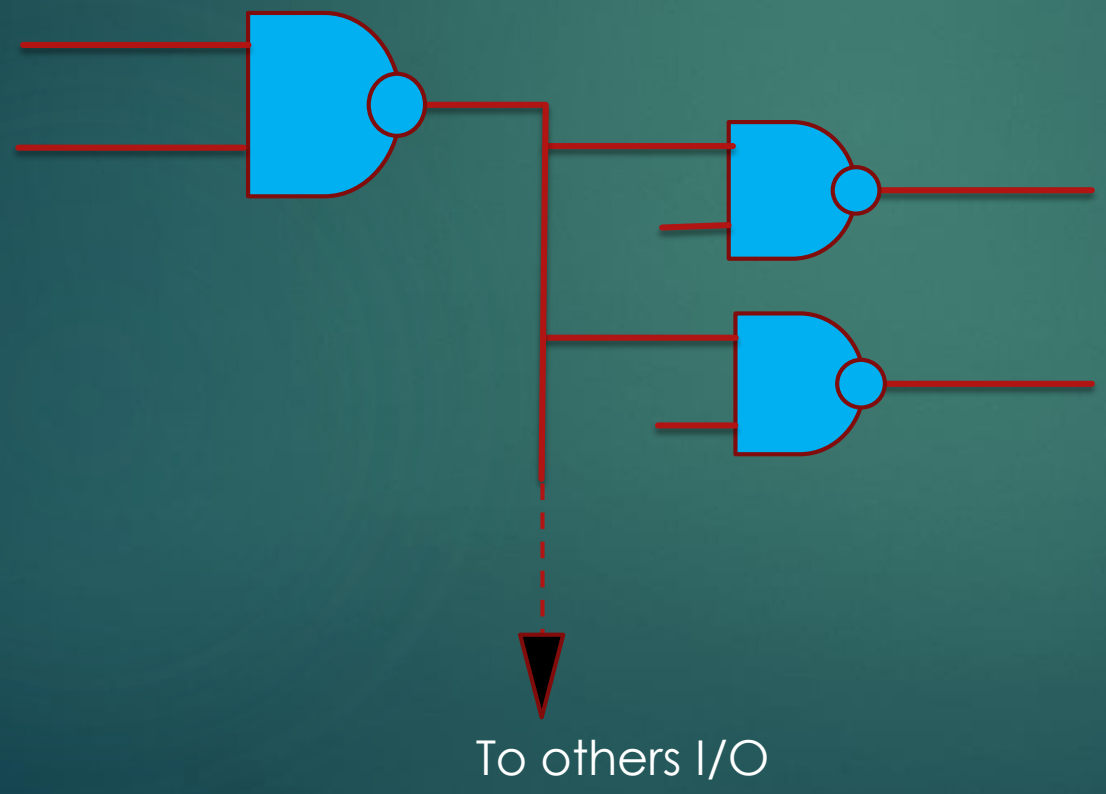
Fan IN

- The number of inputs of a gate that it can handle impairing it's normal operation.

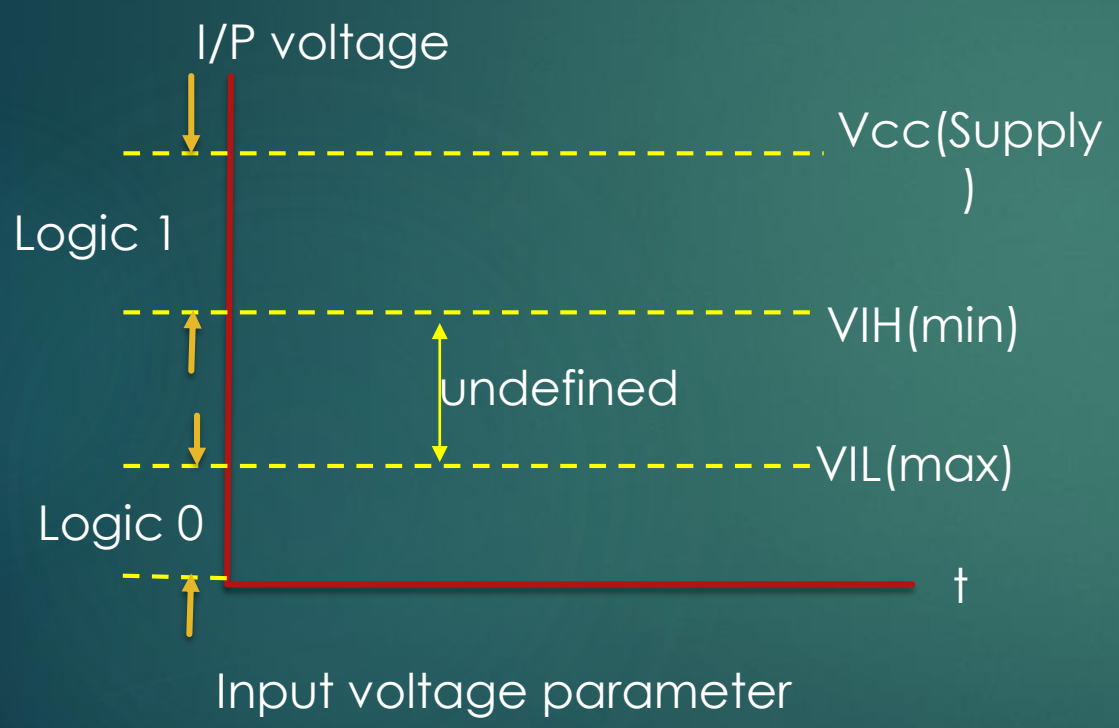


Fan Out

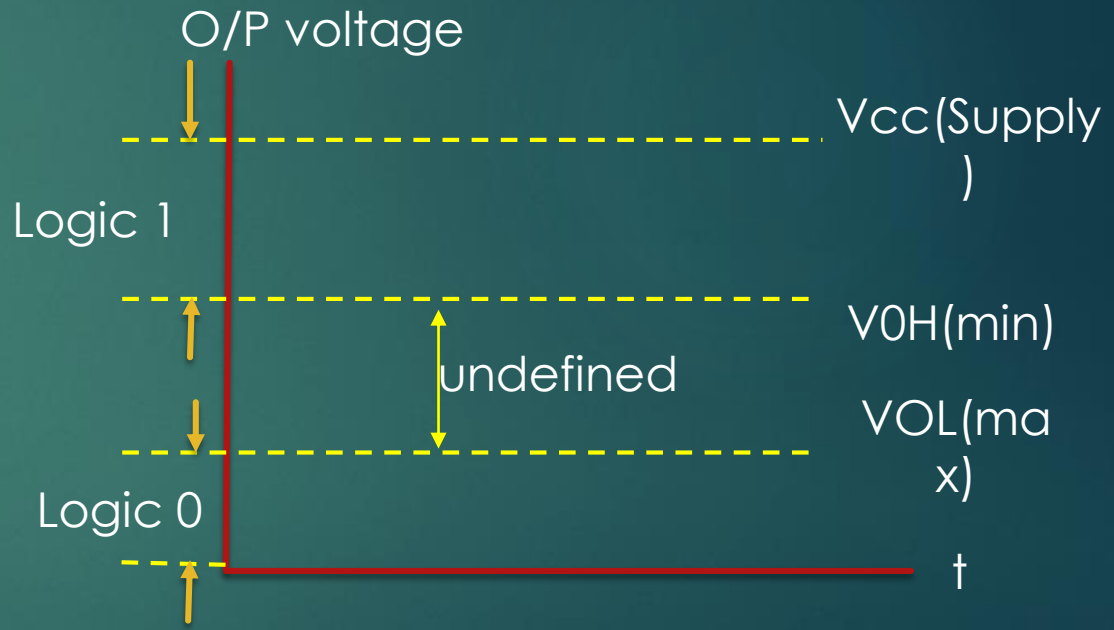
- Fan out is no of output signals a gate can drive without degrading it's output voltage level.



Voltage Parameters

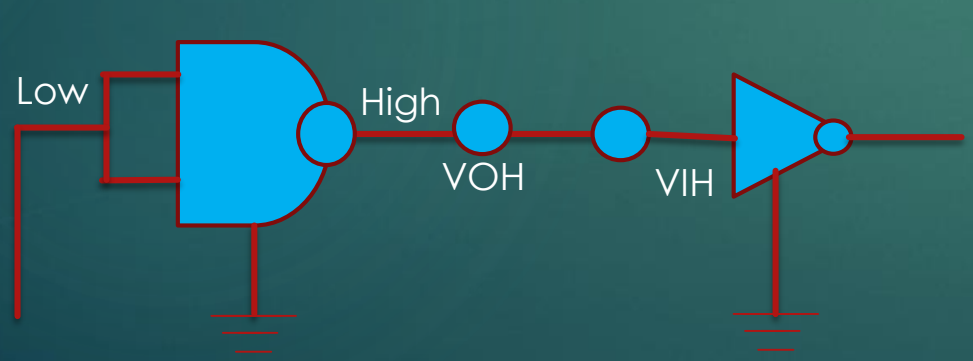


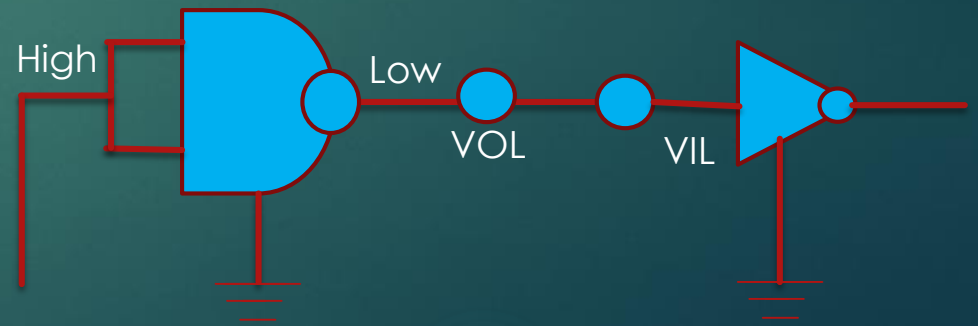
Input voltage parameter



Output voltage parameter

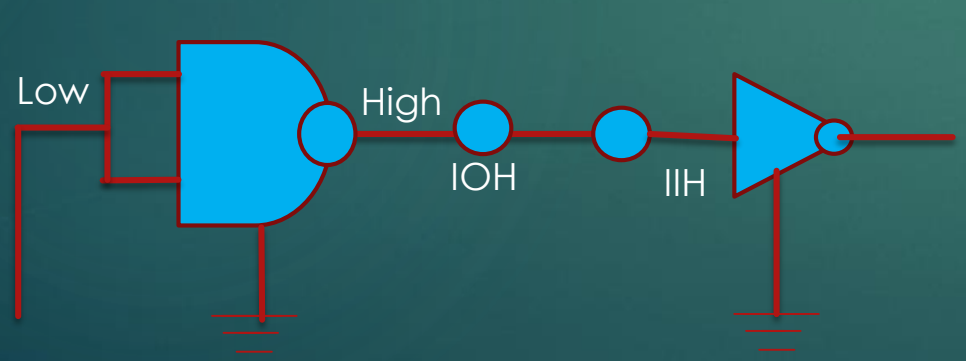
- VIL= Low level I/P voltage
- VIH=High level I/P voltage
- VOH =High Level O/P voltage
- VOL= Low level O/P voltage





Current Parameters

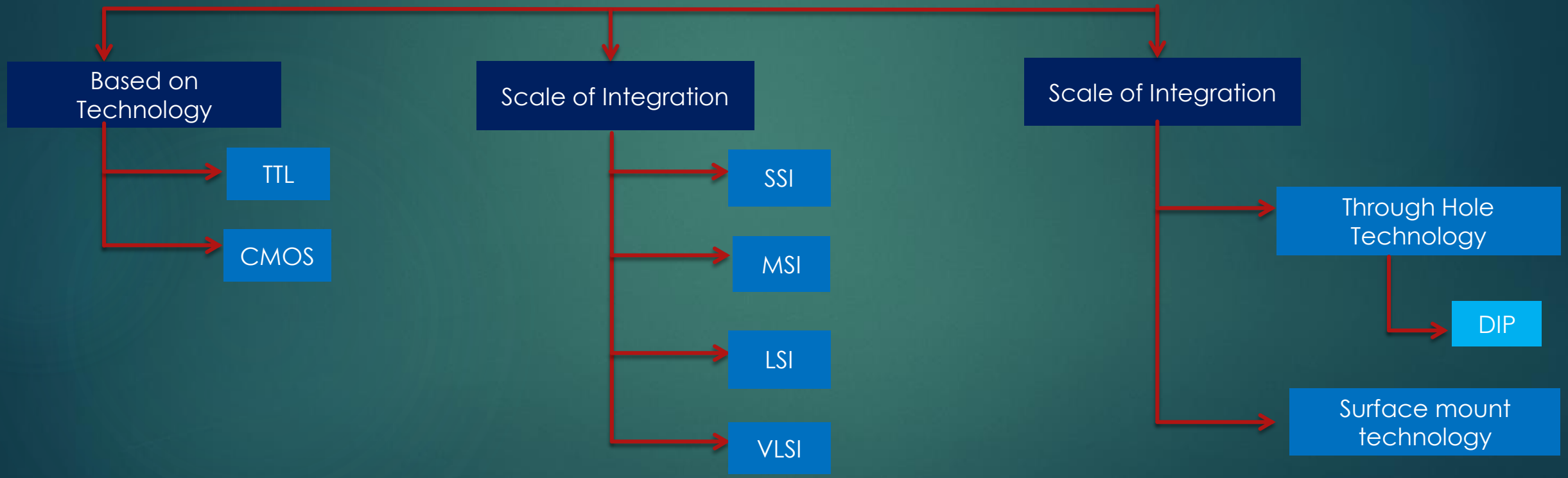
- IIL = Low level I/P current
- IIH =High level I/P current
- IOH =High Level O/P current
- IOL= Low level O/P current



IC Data Sheet

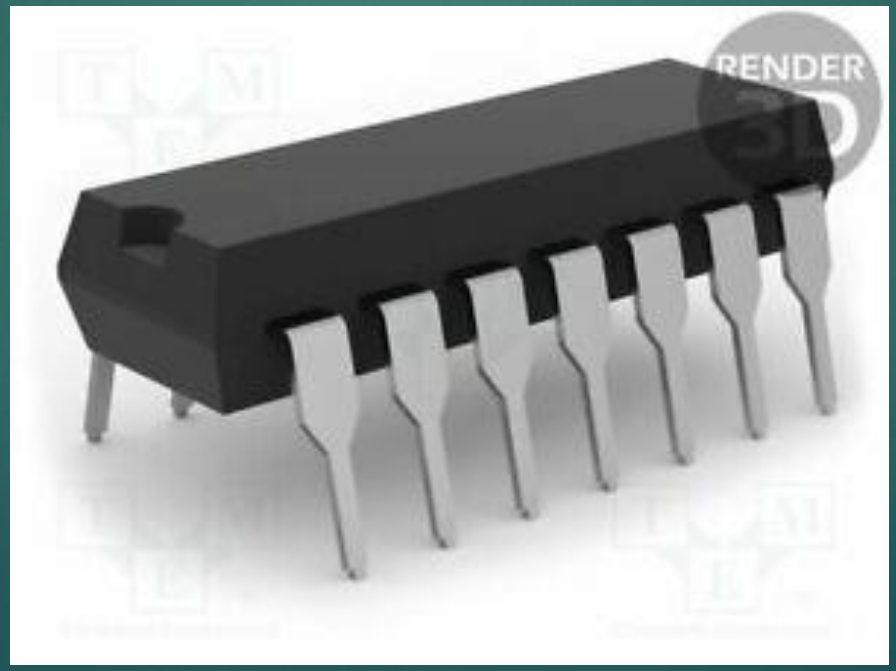
Types of IC

- IC categorize are following three ways:



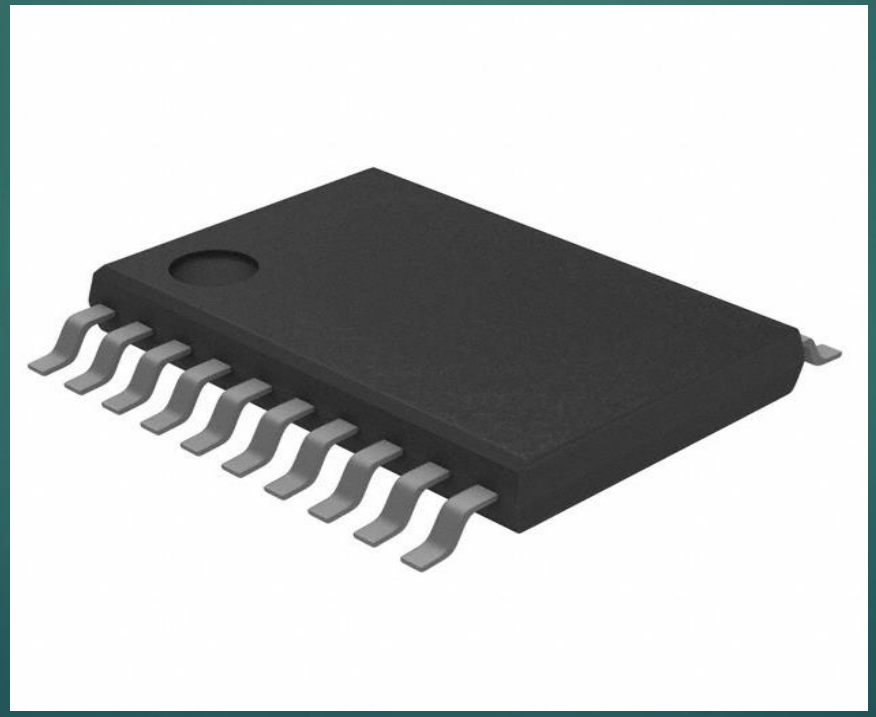
Through Hole Technology(THT)

- THT components have pins that are inserted into holes drilled in the PCB and soldered on the reverse side of the board.



Surface Mount Technology

- SMT components are mounted on the surface of the PCB, so no holes need to be drilled.



TTL logic sub families

TTL series	Infix	Example	Comments
Standard TTL	none	7404 ,7400	Original TTL series. Slowest & use lots of power.
Low power	L	74L00, 74L04	Consume less power than standard
Schottky	S	74S04,74S00	Optimized for speed consume lots of power.
Low power Schottky	LS	74LS01, 74LS02	Faster & lower power consume than L & LS.
Advanced Schottky	AS	74AS08	Very fast ,use lots of power.
Advanced Low Power Schottky	ALS	74ALS86	Very good speed power ratio. Quit popular number of this family.

Manufacture Datasheets

A manufacturer datasheet for a logic gate contains the following information:

- General Description
- Connection (pin-out) Diagram
- Function Table
- Operating Conditions
- Electrical Characteristics
- Switching Characteristics
- Physical Dimensions

Function Table:

DM74ALS273

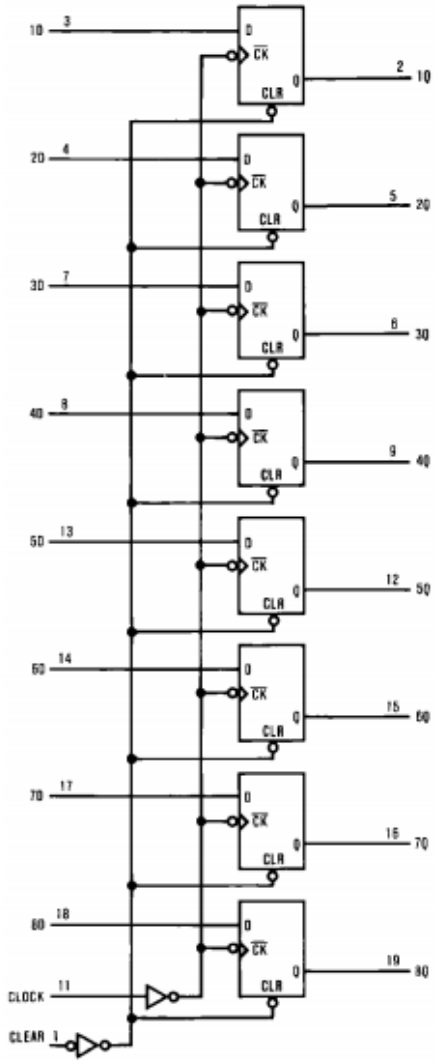
Function Table

(Each Flip-Flop)

Inputs			Output
Clear	Clock	D	Q
L	X	X	L
H	↑	H	H
H	↑	L	L
H	L	X	Q_0

L = LOW State
H = HIGH State
X = Don't Care
↑ = Positive Edge Transition
Q_0 = Previous Condition of Q

Logic Diagram



Operating Conditions:

Recommended Operating Conditions

Symbol	Parameter		Min	Nom	Max	Units
V_{CC}	Supply Voltage		4.5	5	5.5	V
V_{IH}	HIGH Level Input Voltage		2			V
V_{IL}	LOW Level Input Voltage				0.8	V
I_{OH}	HIGH Level Output Current				–2.6	mA
I_{OL}	LOW Level Output Current				24	mA
f_{CLK}	Clock Frequency		0		35	MHz
$t_{W(CLK)}$	Width of Clock Pulse	HIGH	14			ns
		LOW	14			ns
t_W	Width of Clear Pulse	LOW	10			ns
t_{SU}	Data Setup Time (Note 2)		10↑			ns
		Clear Inactive	15↑			
t_H	Data Hold Time		0↑			ns
T_A	Free Air Operating Temperature		0		70	°C

Note 2: The (↑) arrow indicates the positive edge of the Clock is used for reference.

Electrical Characteristics

Electrical Characteristics

over recommended operating free air temperature range. All typical values are measured at V_{CC} = 5V, T_A = 25°C.

Symbol	Parameter	Conditions		Min	Typ	Max	Units
V_{IK}	Input Clamp Voltage	V_{CC} = 4.5V, I_I = –18 mA				–1.5	V
V_{OH}	HIGH Level	V_{CC} = 4.5V	I_{OH} = –2.6 mA	2.4	3.3		V
	Output Voltage	V_{CC} = 4.5V to 5.5V	I_{OH} = –400 µA	V_{CC} – 2			V
V_{OL}	LOW Level	V_{CC} = 4.5V	I_{OL} = 12 mA		0.25	0.4	V
	Output Voltage		I_{OL} = 24 mA		0.35	0.5	V
I_I	Input Current @ Maximum Input Voltage	V_{CC} = 5.5V, V_{IH} = 7V				0.1	mA
I_{IH}	HIGH Level Input Current	V_{CC} = 5.5V, V_{IH} = 2.7V				20	µA
I_{IL}	LOW Level Input Current	V_{CC} = 5.5V, V_{IL} = 0.4V				–0.2	mA
I_O	Output Drive Current	V_{CC} = 5.5V	V_O = 2.25V	–30		–112	mA
I_{CC}	Supply Current	V_{CC} = 5.5V	Outputs HIGH		11	20	mA
		Outputs OPEN	Outputs LOW		19	29	mA

Switching Characteristics

Switching Characteristics

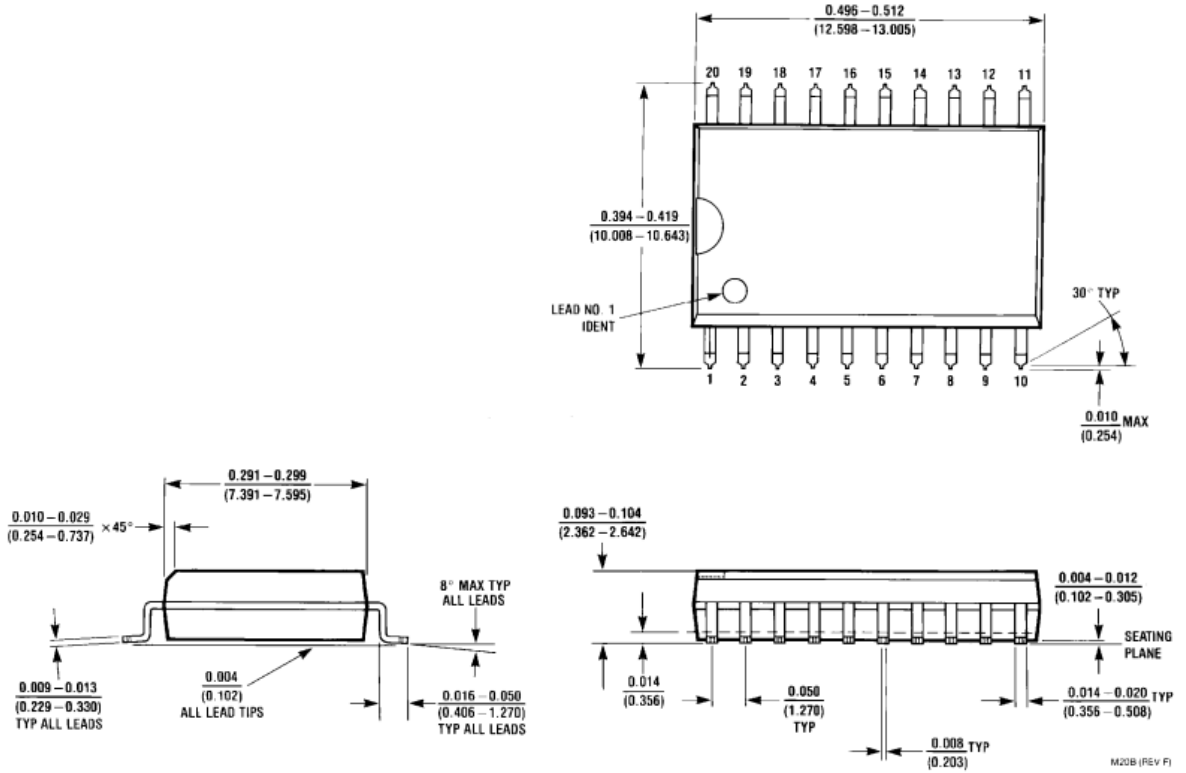
over recommended operating free air temperature range.

Symbol	Parameter	Conditions	From	To	Min	Max	Units
f_{MAX}	Maximum Clock Frequency	V_{CC} = 4.5V to 5.5V R_L = 500Ω C_L = 50 pF			35		MHz
t_{PHL}	Propagation Delay Time HIGH-to-LOW Level Output		Clear	Any Q	4	18	ns
t_{PLH}	Propagation Delay Time LOW-to-HIGH Level Output		Clock	Any Q	2	12	ns
t_{PHL}	Propagation Delay Time HIGH-to-LOW Level Output		Clock	Any Q	3	15	ns

Physical Dimensions

DM74ALS273

Physical Dimensions inches (millimeters) unless otherwise noted



20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
Package Number M20B

Thank You!