

# IC Examples

20181536 엄석훈

## 1. DM74LS08 – Quad 2-Input AND Gates

### Function Table

$$Y = AB$$

Inputs		Output
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

H = HIGH Logic Level

L = LOW Logic Level

## 2. 74ALS74A – Dual D-type flip flop with set and reset

### FUNCTION TABLE

INPUTS				OUTPUTS		OPERATING MODE
$\bar{S}D$	$\bar{R}D$	CP	D	Q	$\bar{Q}$	
L	H	X	X	H	L	Asynchronous set
H	L	X	X	L	H	Asynchronous reset
L	L	X	X	H	H	Undetermined*
H	H	↑	h	H	L	Load "1"
H	H	↑	l	L	H	Load "0"
H	H	↑	X	NC	NC	Hold

H = High voltage level

h = High state must be present one setup time prior to Low-to-High clock transition

L = Low voltage level

l = Low state must be present one setup time prior to Low-to-High clock transition

NC= No change from the previous setup

X = Don't care

↑ = Low-to-High clock transition

↑ = Not Low-to-High clock transition

\* = Both outputs will be High while both  $\bar{S}D$  and  $\bar{R}D$  are Low, but the output states are unpredictable if  $\bar{S}D$  and  $\bar{R}D$  go High simultaneously

### 3. DM74LS279 – Quad S-R Latch

#### Function Table

Inputs		Output
$\bar{S}$ (Note 1)	$\bar{R}$	Q
L	L	H (Note 2)
L	H	H
H	L	L
H	H	Q <sub>0</sub>

H = HIGH Level

L = LOW Level

Q<sub>0</sub> = The Level of Q before the indicated input conditions were established.

**Note 1:** For latches with double  $\bar{S}$  inputs:

H = both  $\bar{S}$  inputs HIGH

L = one or both  $\bar{S}$  inputs LOW

**Note 2:** This output level is pseudo stable; that is, it may not persist when the  $\bar{S}$  and  $\bar{R}$  inputs return to their inactive (HIGH) level.

### 4. 74F299 – 8-bit universal shift/storage register

#### FUNCTION TABLE

INPUTS	INPUTS				OPERATING MODE
	OEn	MR	S1	S0	
L	L	X	X	X	Asynchronous Reset; Q0 – Q7 = LOW
L	H	H	H	↑	Parallel load; I/On → Qn (I/On outputs disabled)
L	H	L	H	↑	Shift right; DS0 → Q0, Q0 → Q1, etc.
L	H	H	L	↑	Shift left; DS7 → Q7, Q7 → Q6, etc.
L	H	L	L	X	Hold
H	X	X	X	X	Outputs in High-Z

H = HIGH voltage level

L = LOW voltage level

X = Don't care

↑ = LOW-to-HIGH clock transition

### 5. 74F163A – 4-bit binary counter

#### 74F163A MODE SELECT – FUNCTION TABLE

INPUTS						OUTPUTS		OPERATING MODE
SR	CP	CEP	CET	PE	Dn	Qn	TC	
l	↑	X	X	X	X	L	L	Reset (clear)
h	↑	X	X	l	l	L	L	Parallel load
h	↑	X	X	l	h	H	(2)	
h	↑	h	h	h	X	count	(2)	Count
h	X	l	X	h	X	q <sub>n</sub>	(2)	Hold (do nothing)
h	X	X	l	h	X	q <sub>n</sub>	L	

H = High voltage level

h = High voltage level one setup prior to the Low-to-High clock transition

L = Low voltage level

l = Low voltage level one setup prior to the Low-to-High clock transition

q<sub>n</sub> = Lower case letters indicate the state of the referenced output prior to the Low-to-High clock transition

X = Don't care

↑ = Low-to-High clock transition

(1) = The TC output is High when CET is High and the counter is at Terminal Count (HHHH for 74F161A)

(2) = The TC output is High when CET is High and the counter is at Terminal Count (HHHH for 74F163A)

## 6. 74F125 – Quad Buffer (3-STATE)

### Function Table

Inputs		Output
$\overline{A}_n$	$B_n$	O
L	L	L
L	H	H
H	X	Z

H = HIGH Voltage Level  
 L = LOW Voltage Level  
 Z = High Impedance  
 X = Immaterial

## 7. KM62256CL – 32Kx8 bit low Power CMOS Static Ram

### FUNCTIONAL DESCRIPTION

$\overline{CS}$	$\overline{OE}$	$\overline{WE}$	I/O Pin	Mode	Power
H	X	X	High-Z	Deselected	Standby
L	H	H	High-Z	Output Disabled	Active
L	L	H	Dout	Read	Active
L	X	L	Din	Write	Active

1. X means don't care

## 8. MT48LC16M4A2 – 4 Meg x 4 x 4 Banks SDR SDRAM

**Table 15: Truth Table – Current State Bank  $n$ , Command to Bank  $n$**

Notes 1–6 apply to all parameters and conditions

Current State	CS#	RAS#	CAS#	WE#	Command/Action	Notes
Any	H	X	X	X	COMMAND INHIBIT (NOP/continue previous operation)	
	L	H	H	H	NO OPERATION (NOP/continue previous operation)	
Idle	L	L	H	H	ACTIVE (select and activate row)	
	L	L	L	H	AUTO REFRESH	7
	L	L	L	L	LOAD MODE REGISTER	7
	L	L	H	L	PRECHARGE	8
Row active	L	H	L	H	READ (select column and start READ burst)	9
	L	H	L	L	WRITE (select column and start WRITE burst)	9
	L	L	H	L	PRECHARGE (deactivate row in bank or banks)	10
Read (auto precharge disabled)	L	H	L	H	READ (select column and start new READ burst)	9
	L	H	L	L	WRITE (select column and start WRITE burst)	9
	L	L	H	L	PRECHARGE (truncate READ burst, start PRECHARGE)	10
	L	H	H	L	BURST TERMINATE	11
Write (auto precharge disabled)	L	H	L	H	READ (select column and start READ burst)	9
	L	H	L	L	WRITE (select column and start new WRITE burst)	9
	L	L	H	L	PRECHARGE (truncate WRITE burst, start PRECHARGE)	10
	L	H	H	L	BURST TERMINATE	11

**Table 16: Truth Table – Current State Bank *n*, Command to Bank *m***

Notes 1–6 apply to all parameters and conditions

Current State	CS#	RAS#	CAS#	WE#	Command/Action	Notes
Any	H	X	X	X	COMMAND INHIBIT (NOP/continue previous operation)	
	L	H	H	H	NO OPERATION (NOP/continue previous operation)	
Idle	X	X	X	X	Any command otherwise supported for bank <i>m</i>	
Row activating, active, or precharging	L	L	H	H	ACTIVE (select and activate row)	
	L	H	L	H	READ (select column and start READ burst)	7
	L	H	L	L	WRITE (select column and start WRITE burst)	7
	L	L	H	L	PRECHARGE	
Read (auto precharge disabled)	L	L	H	H	ACTIVE (select and activate row)	
	L	H	L	H	READ (select column and start new READ burst)	7, 10
	L	H	L	L	WRITE (select column and start WRITE burst)	7, 11
	L	L	H	L	PRECHARGE	9
Write (auto precharge disabled)	L	L	H	H	ACTIVE (select and activate row)	
	L	H	L	H	READ (select column and start READ burst)	7, 12
	L	H	L	L	WRITE (select column and start new WRITE burst)	7, 13
	L	L	H	L	PRECHARGE	9
Read (with auto precharge)	L	L	H	H	ACTIVE (select and activate row)	
	L	H	L	H	READ (select column and start new READ burst)	7, 8, 14
	L	H	L	L	WRITE (select column and start WRITE burst)	7, 8, 15
	L	L	H	L	PRECHARGE	9
Write (with auto precharge)	L	L	H	H	ACTIVE (select and activate row)	
	L	H	L	H	READ (select column and start READ burst)	7, 8, 16
	L	H	L	L	WRITE (select column and start new WRITE burst)	7, 8, 17
	L	L	H	L	PRECHARGE	9

**Table 17: Truth Table – CKE**

Notes 1–4 apply to all parameters and conditions

Current State	CKE <sub><i>n-1</i></sub>	CKE <sub><i>n</i></sub>	Command <sub><i>n</i></sub>	Action <sub><i>n</i></sub>	Notes
Power-down	L	L	X	Maintain power-down	
Self refresh			X	Maintain self refresh	
Clock suspend			X	Maintain clock suspend	
Power-down	L	H	COMMAND INHIBIT or NOP	Exit power-down	5
Self refresh			COMMAND INHIBIT or NOP	Exit self refresh	6
Clock suspend			X	Exit clock suspend	7
All banks idle	H	L	COMMAND INHIBIT or NOP	Power-down entry	
All banks idle			AUTO REFRESH	Self refresh entry	
Reading or writing			VALID	Clock suspend entry	
	H	H	See Table 16 (page 37).		