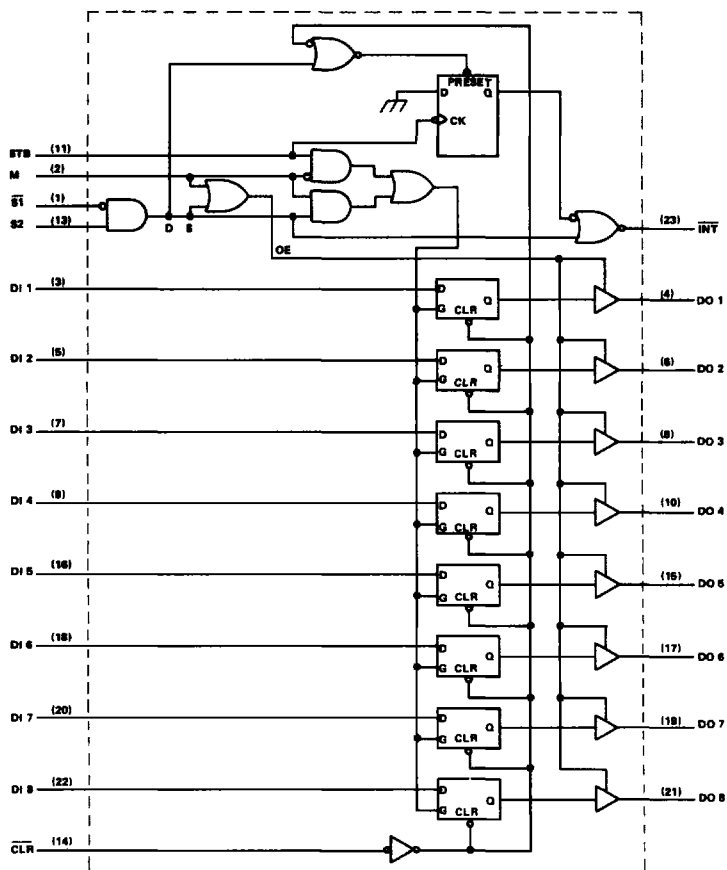


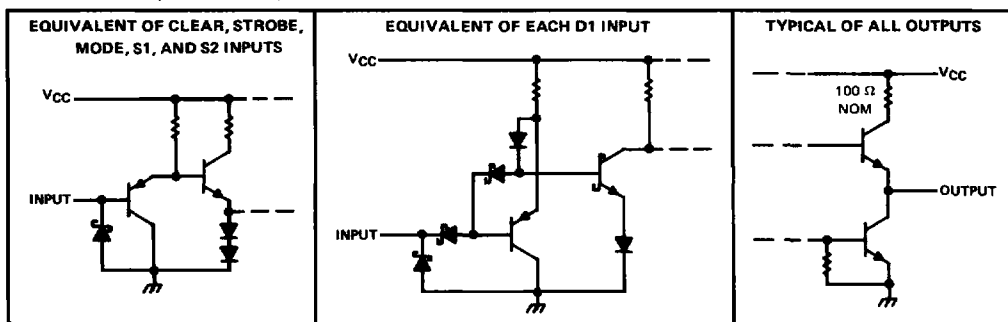


# TYPES SN54S412, SN74S412 (TIM8212) MULTI-MODE BUFFERED LATCHES

functional block diagram



schematics of inputs and outputs



# TYPES SN54S412, SN74S412 (TIM8212)

## MULTI-MODE BUFFERED LATCHES

DATA LATCHES FUNCTION TABLE

FUNCTION	CLEAR	M	$\bar{S}1$	S2	STB	DATA IN	DATA OUT
Clear	L	H	H	X	X	X	L
	L	L	L	H	L	X	L
De-select	X	L	X	L	X	X	Z
	X	L	H	X	X	X	Z
Hold	H	H	H	L	X	X	$Q_0$
	H	L	L	H	L	X	$\bar{Q}_0$
Data Bus	H	H	L	H	X	L	L
	H	H	L	H	X	H	H
Data Bus	H	L	L	H	H	L	L
	H	L	L	H	H	H	H

STATUS FLIP-FLOP FUNCTION TABLE

CLEAR	$\bar{S}1$	S2	STB	$\bar{INT}$
L	H	X	X	H
L	X	L	X	H
H	X	X	↓	L
H	L	H	X	L

- H = high level (steady state)  
 L = low level (steady state)  
 X = irrelevant (any input, including transitions)  
 Z = high impedance (off)  
 ↓ = transition from low to high level

**absolute maximum ratings over operating free-air temperature range (unless otherwise noted)**

Supply voltage, $V_{CC}$ (see Note 1)	7 V
Input voltage	5.5 V
Operating free-air temperature range: SN54S412	-55°C to 125°C
SN74S412	0°C to 70°C
Storage temperature range	-65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.

**recommended operating conditions**

	SN54S412			SN74S412			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, $V_{CC}$	4.5	5	5.5	4.75	5	5.25	V
Pulse width, $t_W$ (see Figures 1, 2, and 4)	STB or $\bar{S}1 \cdot S2$			25			ns
	Clear low			25			
Setup time, $t_{SU}$ (see Figure 3)	15↓			15↓			ns
Hold time, $t_H$ (see Figures 1 and 3)	20↓			20↓			ns
Operating free-air temperature, $T_A$	-55		125	0		70	°C

↓ The arrow indicates that the falling edge of the clock pulse is used for reference.

## TYPES SN54S412, SN74S412 (TIM8212) MULTI-MODE BUFFERED LATCHES

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS†	SN54S412			SN74S412			UNIT
			MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V <sub>IH</sub>	High-level input voltage		2			2			V
V <sub>IL</sub>	Low-level input voltage		0.85			0.85			V
V <sub>IK</sub>	Input clamp voltage	V <sub>CC</sub> = MIN; I <sub>I</sub> = -18 mA	-1.2			-1.2			V
V <sub>OH</sub>	High-level output voltage	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V, I <sub>OH</sub> = -1 mA	3.65	4		3.65	4		V
V <sub>OL</sub>	Low-level output voltage	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V	I <sub>OL</sub> = 15 mA			0.45			V
			I <sub>OL</sub> = 20 mA			0.5			
I <sub>OZH</sub>	Off-state output current, high-level voltage applied	DO 1 thru DO 8 V <sub>CC</sub> = MAX, V <sub>O</sub> = 2.4 V	50			50			μA
I <sub>OZL</sub>	Off-state output current, low-level voltage applied	DO 1 thru DO 8 V <sub>CC</sub> = MAX, V <sub>O</sub> = 0.5 V	-50			-50			μA
I <sub>I</sub>	Input current at maximum input voltage	V <sub>CC</sub> = MAX, V <sub>I</sub> = 5.5 V	1			1			mA
I <sub>IH</sub>	High-level input current	V <sub>CC</sub> = MAX, V <sub>I</sub> = 5.25 V	20			10			μA
I <sub>IL</sub>	Low-level input current	S <sub>1</sub>	-1			-1			mA
		M	-0.75			-0.75			
		All others	-0.25			-0.25			
I <sub>OS</sub>	Short-circuit output current§	V <sub>CC</sub> = MAX	-20	-65	-20	-65		mA	
I <sub>CC</sub>	Supply current	V <sub>CC</sub> = MAX, see Note 2	82			82	130		mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

§ Not more than one output should be shorted at a time.

NOTE 2: I<sub>CC</sub> is measured with all outputs open, clear input at 4.5 V, and all other inputs grounded.

switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C

PARAMETER	FROM	TO	FIGURE	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
t <sub>PLH</sub>	STB, S <sub>1</sub> , or S <sub>2</sub>	Any DO	1	C <sub>L</sub> = 30 pF, See Note 3	18	27		ns	
t <sub>PHL</sub>					15	26			
t <sub>PHL</sub>	CLR	Any DO	2		18	27		ns	
t <sub>PLH</sub>					12	20			
t <sub>PHL</sub>	D <sub>Ij</sub>	D <sub>Oj</sub>	3		10	20		ns	
t <sub>PLH</sub>					12	20			
t <sub>PHL</sub>	S <sub>1</sub> or S <sub>2</sub>	INT	4	C <sub>L</sub> = 30 pF, See Note 3	12	20		ns	
t <sub>PHL</sub>	STB	INT	4	See Note 3	16	25			
t <sub>ZH</sub>	S <sub>1</sub> , S <sub>2</sub> , or M	Any DO	5	C <sub>L</sub> = 30 pF, See Note 3	21	35		ns	
t <sub>ZL</sub>					25	40			
t <sub>HZ</sub>	S <sub>1</sub> , S <sub>2</sub> , or M	Any DO	5		C <sub>L</sub> = 5 pF, See Note 3	9	20		ns
t <sub>LZ</sub>						12	20		

t<sub>PLH</sub> = propagation delay time, low-to-high-level output

t<sub>PHL</sub> = propagation delay time, high-to-low-level output

t<sub>ZH</sub> = output enable time to high level

t<sub>ZL</sub> = output enable time to low level

t<sub>HZ</sub> = output disable time from high level

t<sub>LZ</sub> = output disable time from low level

NOTE 3: Load circuit and voltage waveforms are shown on page 3-10.

# TYPES SN54S412, SN74S412 (TIM8212)

## MULTI-MODE BUFFERED LATCHES

### PARAMETER MEASUREMENT INFORMATION

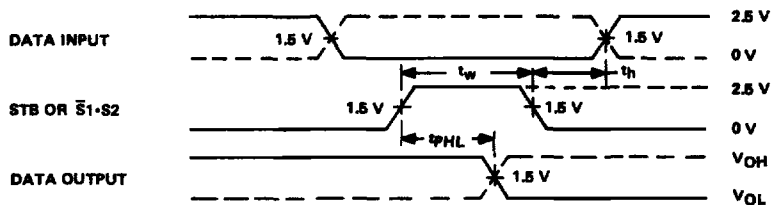


FIGURE 1 - STROBE OR SELECT TO DATA OUTPUT

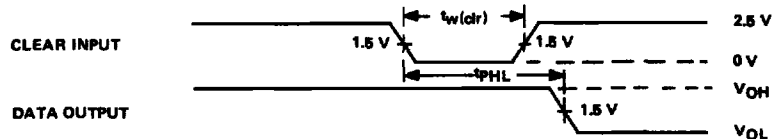


FIGURE 2 - CLEAR INPUT TO DATA OUTPUT

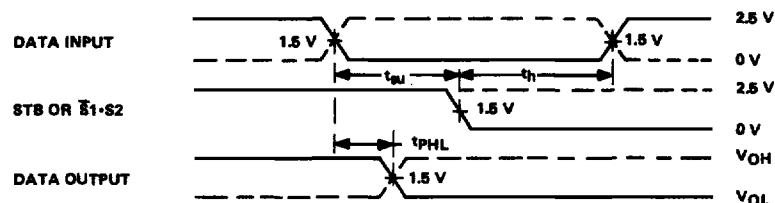


FIGURE 3 - DATA INPUT TO DATA OUTPUT

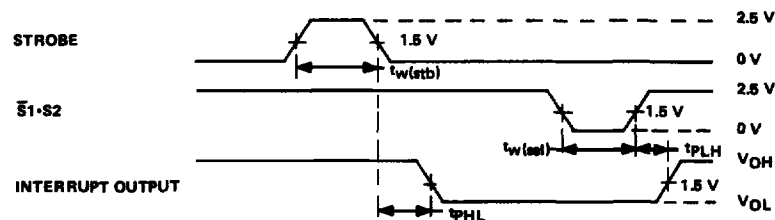


FIGURE 4 - STROBE OR SELECT TO INTERRUPT OUTPUT

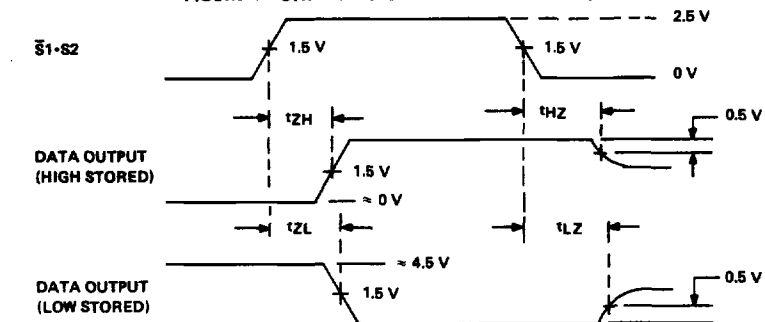


FIGURE 5 - SELECT TO DATA OUTPUT