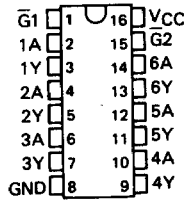
D2630, JANUARY 1981—REVISED APRIL 1985

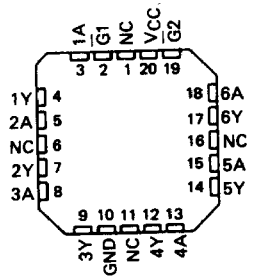
MOS MEMORY INTERFACE

- **Can Drive High-Impedance Loads**
- **Interchangeable with National DS16149 DS16179 Drivers**
- **High-Speed Switching**
- **Minimum Input Current Required**
- **Damping Output Resistor Reduces Transients**

SN54S436, SN54S437 . . . J OR W PACKAGE
SN74S436, SN74S437 . . . D, J OR N PACKAGE
(TOP VIEW)



SN54S436, SN54S437 . . . FK PACKAGE
SN74S436, SN74S437 . . . FN PACKAGE
(TOP VIEW)



NC - No internal connection

description

The SN54S436, SN54S437, SN74S436 and SN74S437 are monolithic integrated TTL-to-MOS drivers and interface circuits. The p-n-p input transistors use minimum current allowing increased fan-out to these drivers. Schottky-clamped transistor logic permits high-speed operation, minimum propagation time.

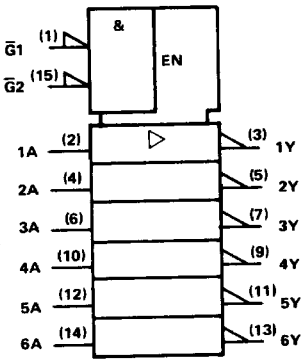
A small series damping resistor has been included in the design of the 'S436 to eliminate undesired output transient overshoot. Either enable, $\overline{G}$, when high, sets the outputs to the high level for MOS RAM refresh applications.

FUNCTION TABLE

ENABLE INPUTS		INPUT	OUTPUT
$\overline{G1}$	$\overline{G2}$		
L	L	L	H
L	L	H	L
X	H	X	H
H	X	X	H

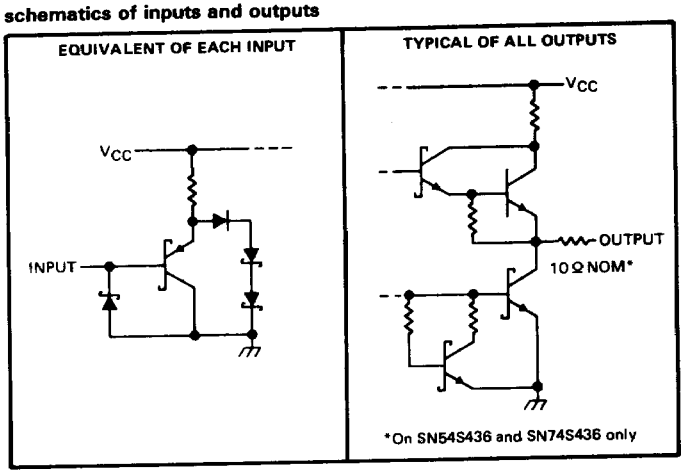
H = high level, L = low level, X = irrelevant

logic symbol



Pin numbers shown on logic notation are for D, J or N packages.

schematics of inputs and outputs



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

Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage range . . . . . −1.5 V to 7 V
Continuous total dissipation at (or below) 25°C free-air temperature (see Note 2)
J package . . . . . 1375 mW
N package . . . . . 1150 mW
W package . . . . . 1000 mW
Operating free-air temperature range: SN54S436, SN54S437 . . . . . −55°C to 125°C
SN74S436, SN74S437 . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

NOTES 1: All voltage values are with respect to network ground terminal.
2: For operation above 25°C free-air temperature, derate as follows: J package, 11.0 mW/°C, N package, 9.2 mW/°C, W package, 8.0 mW/°C.

recommended operating conditions

		SN54S'			SN74S'			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.8			0.8	V
T_A	Operating free-air temperature	−55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS		SN54LS165A			SN74LS165A			UNIT
			MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	V_{CC} = MIN, I_I = −18 mA			−0.75	−1.2		−0.75	−1.2	V
V_{OH}	V_{CC} = MIN, I_{OH} = −10 μA		3.4	4.3		3.5	4.3		V
	V_{CC} = MIN, I_{OH} = −1 mA	'S436	2.4	3.5		2.6	3.5		
		'S437	2.5	3.5		2.7	3.5		
V_{OL}	V_{CC} = MIN, I_{OL} = 10 μA			0.25	0.4		0.25	0.35	V
	V_{CC} = MIN, I_{OL} = 20 mA	'S436		0.6	1.1		0.6	1	
		'S437		0.4	0.5		0.4	0.5	
I_{OL}	V_{CC} = MIN, V_O = 4.5 V, V_I = 2 V See Note 3			150	200		150	200	mA
I_{OS}§	V_{CC} = MAX, V_O = 0 V, See Note 3		−100	−250	−400	−100	−250	−400	mA
I_I	V_{CC} = MAX, V_{IH} = 5.5 V				1			1	mA
I_{IH}	V_{CC} = MAX, V_{IH} = 2.7 V			0.1	50		0.1	50	μA
I_{IL}	V_{CC} = MAX, V_{IL} = 0.5 V			−100	−250		−100	−250	μA
I_{CC}	V_{CC} = MAX, G inputs at 0 V, All other inputs at 4.5 V			33	60		33	60	mA
	V_{CC} = MAX, All inputs at 0 V			14	20		14	20	

† All typical values are at V_{CC} = 5 V, T_A = 25°C.
§ Not more than one output should be shorted at a time, and duration of the short-circuit should not exceed one second.
NOTE 3: When measuring output current on the SN54S437/SN74S437, a 10 Ω resistor should be placed in series with each output.

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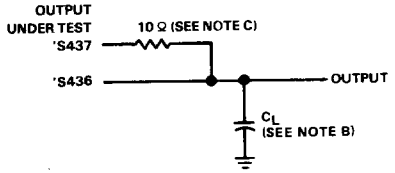
switching characteristics, V_{CC} = 5 V, T_A = 25°C, see note 3

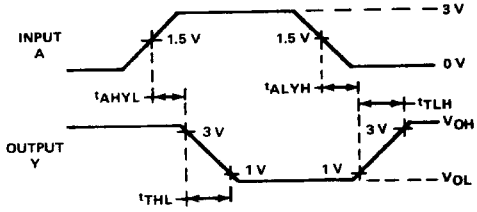
PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{AHYL}	Delay time from A high to Y starting low	See Figure 1	C_L = 50 pF		4.5	7	ns
			C_L = 500 pF		12	16	
t_{ALYH}	Delay time from A low to Y starting high	See Figure 1	C_L = 50 pF		5	8	ns
			C_L = 500 pF		11	16	
t_{GHYH}	Delay time from G high to Y starting high	R_L = 2 kΩ to Gnd, See Figure 2	C_L = 50 pF,		10	18	ns
t_{GLYL}	Delay time from G low to Y starting low	R_L = 2 kΩ to V_{CC}, See Figure 3	C_L = 50 pF,		11	18	ns
t_{THL}	Transition time, high-to-low-level output	See Figure 1	C_L = 50 pF		5	8	ns
			C_L = 500 pF		15	30	
t_{TLH}	Transition time, low-to-high-level output	See Figure 1	C_L = 50 pF		6	9	ns
			C_L = 500 pF		15	30	

NOTE 3: When measuring switching times on the SN54S437/SN74S437, a 10 Ω resistor should be placed in series with each output.

PARAMETER MEASUREMENT INFORMATION

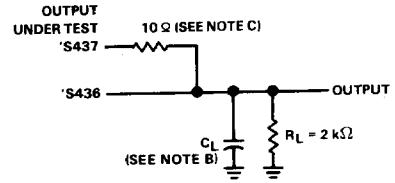


LOAD CIRCUIT

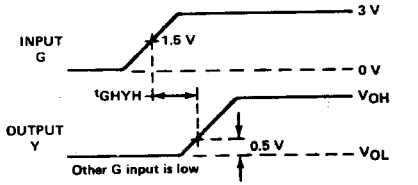


VOLTAGE WAVEFORMS

FIGURE 1

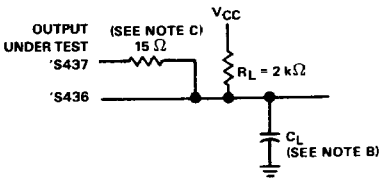


LOAD CIRCUIT

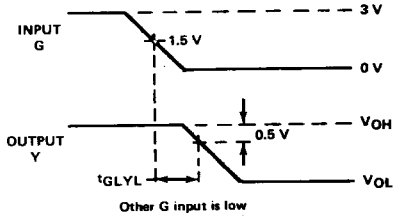


VOLTAGE WAVEFORMS

FIGURE 2



LOAD CIRCUIT



VOLTAGE WAVEFORMS

FIGURE 3

NOTES: A. Input pulses are supplied by a generator having the following characteristics: PRR< 1 MHz, $Z_{out} \approx 50\ \Omega$, $t_r < 5$ ns.
B. C_L includes probe and jig capacitance.
C. This 15-Ω resistor is required for testing the SN54S437/SN74S437, but it is internal to the SN54S436/SN74S436 and therefore an external resistor is not used for testing these devices.