

## Serial Shift Register

### Dual 64-Bit

The TRW TDC1005 is a dual 64-bit positive-edge-triggered serial shift register which operates at 25MHz. This device is cascadable in the number of words and the word size.

Complementary TTL outputs  $Q$  and  $\bar{Q}$  are provided. The two data inputs in each shift register,  $D_0$  and  $D_1$ , are controlled by a data select input,  $DS$ . This provides on-chip recirculate gating when the true output is hard-wired to one of the inputs.

### Features

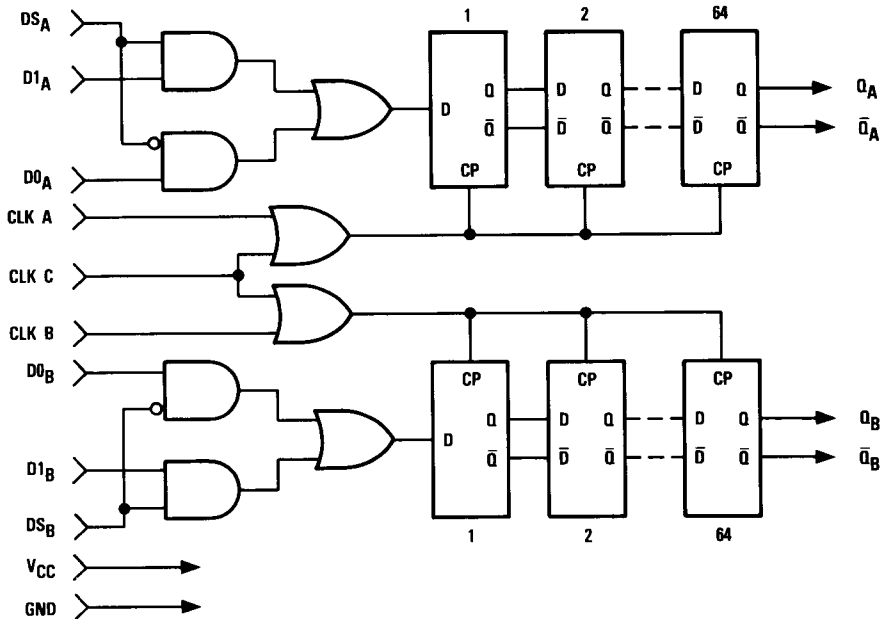
- 25MHz Guaranteed Clock Frequency
- Fully TTL Compatible

- True and Complementary Outputs
- Proven High-Reliability Radiation Hard Bipolar Process
- Single +5V Power Supply
- Available In A 16 Pin CERDIP
- Horizontal And Vertical Cascadability

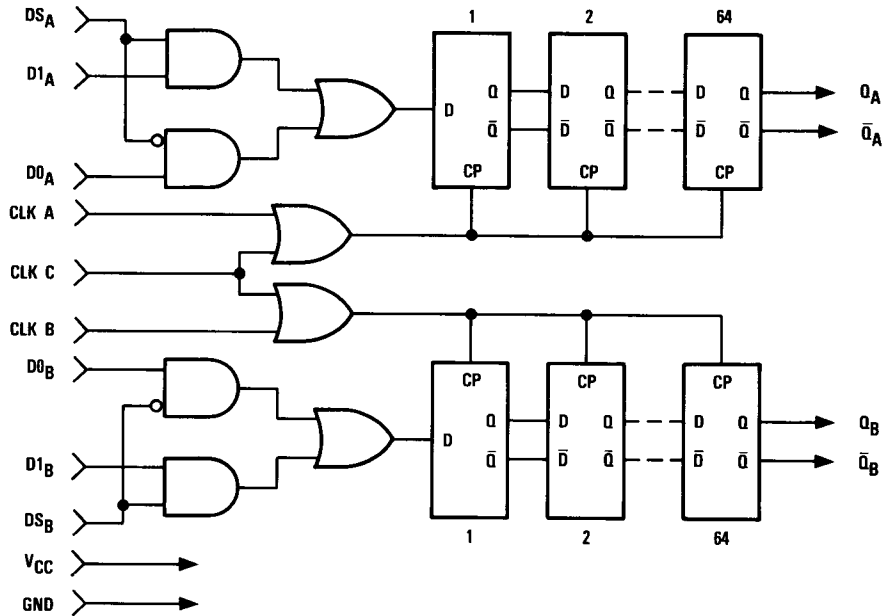
### Applications

- High-Speed Data Acquisition
- First-In First-Out Data Buffers
- Coefficient Storage For FIR Filters
- Digital Delay Lines
- Local Storage Registers

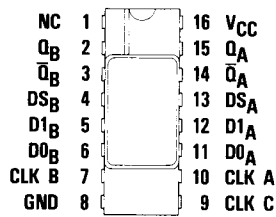
### Functional Block Diagram



## Functional Block Diagram



## Pin Assignments



16 Pin Cerdip - B9 Package

## Functional Description

### General Information

The TDC1005 is a positive-edge-triggered dual 64-bit serial shift register. One of two data inputs (D0 and D1) is selected

by the Data Select control (DS). Complementary outputs Q and  $\bar{Q}$  are available.

### Power

The TDC1005 operates from a single +5 Volt power supply.

Name	Function	Value	J9 Package
V <sub>CC</sub>	Positive Supply Voltage	+5.0V	Pin 16
GND	Ground	0.0V	Pin 8

### Data Inputs

The TDC1005 has two data inputs per block, (D0<sub>A</sub> and D0<sub>B</sub>, D1<sub>A</sub> and D1<sub>B</sub>).

Name	Function	Value	J9 Package
D0 <sub>A</sub>	Data Input 0, Block A	TTL	Pin 11
D1 <sub>A</sub>	Data Input 1, Block A	TTL	Pin 12
D0 <sub>B</sub>	Data Input 0, Block B	TTL	Pin 6
D1 <sub>B</sub>	Data Input 1, Block B	TTL	Pin 5

### Data Select

Two data select controls, one for Block A (DS<sub>A</sub>) and one for Block B (DS<sub>B</sub>), are provided to select between inputs 0 and 1.

The 0 input is selected when DS is LOW; the 1 input is selected when DS is HIGH.

Name	Function	Value	J9 Package
DS <sub>A</sub>	Block A Data Select	TTL	Pin 13
DS <sub>B</sub>	Block B Data Select	TTL	Pin 4

### Data Outputs

Complementary outputs Q and  $\bar{Q}$  are provided for the TDC1005.

Name	Function	Value	J9 Package
QA	Data Output Block A	TTL	Pin 15
$\bar{Q}A$	Data Output (Inv.) Block A	TTL	Pin 14
QB	Data Output Block B	TTL	Pin 2
$\bar{Q}B$	Data Output (Inv.) Block B	TTL	Pin 3

## Clocks

The TDC1005 has three clock inputs (CLK A, CLK B, CLK C) which are combined to provide the clock signals for the two blocks. Block A is clocked by the logical OR of CLK A and

CLK C. Block B is clocked by the logical OR of CLK B and CLK C. This allows the two blocks to be clocked either independently or simultaneously.

Name	Function	Value	J9 Package
CLK A	Clock A	TTL	Pin 10
CLK B	Clock B	TTL	Pin 7
CLK C	Clock C	TTL	Pin 9

## No Connects

Pin 1 on the TDC1005 is not connected internally. This pin may be left unconnected.

Name	Function	Value	J9 Package
NC	No connection	Open	Pin 1

Figure 1. Timing Diagram

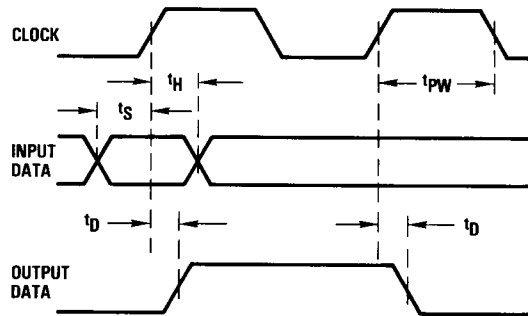


Figure 2. Input/Output Schematics

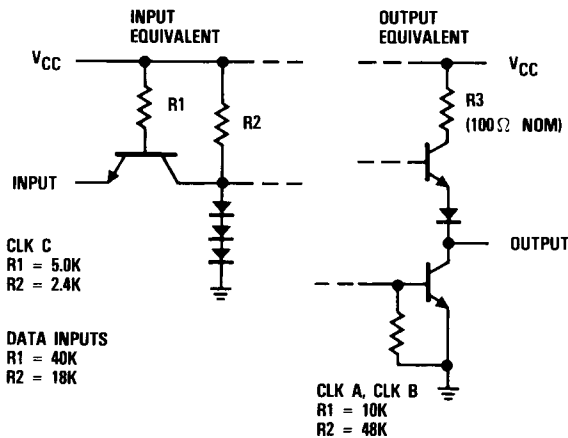
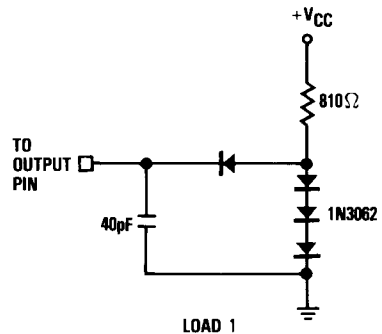


Figure 3. Test Load for Delay Measurement (Typical)



## Absolute maximum ratings (beyond which the device may be damaged) <sup>1</sup>

Supply Voltage .....	-0.5 to +7.0V
Input Voltage .....	0 to +5.5V
<b>Output</b>	
Applied voltage (measured to GND) .....	0 to +5.5V <sup>2</sup>
Applied current, externally forced .....	-1.0 to 6.0mA <sup>3,4</sup>
Short circuit duration (single output in high state to ground) .....	1 sec
<b>Temperature</b>	
Operating, ambient .....	-55 to +150°C
junction .....	+175°C
Lead, soldering (10 seconds) .....	+300°C
Storage .....	-65 to +150°C

Notes:

1. Absolute maximum ratings are limiting values applied individually while all other parameters are within specified operating conditions. Functional operation under any of these conditions is NOT implied.
2. Applied voltage must be current limited to specified range.
3. Forcing voltage must be limited to specified range.
4. Current is specified as positive when flowing into the device.

## Operating conditions

Parameter		Temperature Range						Units
		Standard			Extended			
		Min	Nom	Max	Min	Nom	Max	
V <sub>CC</sub>	Supply Voltage	4.75	5.0	5.25	4.5	5.0	5.5	V
t <sub>PW</sub>	Clock Pulse Width	18			18			ns
t <sub>S</sub>	Input Register Setup Time	7			7			ns
t <sub>H</sub>	Input Register Hold Time	10			10			ns
V <sub>IL</sub>	Input Voltage, Logic LOW			0.8			0.8	V
V <sub>IH</sub>	Input Voltage, Logic HIGH	2.0			2.0			V
I <sub>OL</sub>	Output Current, Logic LOW			4.0			4.0	mA
I <sub>OH</sub>	Output Current, Logic HIGH			-400			-400	μA
T <sub>A</sub>	Ambient Temperature, Still Air	0		70				°C
T <sub>C</sub>	Case Temperature				-55		125	°C



## Electrical characteristics within specified operating conditions

Parameter	Test Conditions	Temperature Range				Units
		Standard		Extended		
		Min	Max	Min	Max	
$I_{CC}$ Supply Current	$V_{CC} = \text{Max}$		105		120	mA
$V_{OL}$ Output Voltage, Logic LOW	$V_{CC} = \text{Min}, I_{OL} = \text{Max}$		0.5		0.5	V
$V_{OH}$ Output Voltage, Logic HIGH	$V_{CC} = \text{Min}, I_{OH} = \text{Max}$	2.4		2.4		V
$I_{IL}$ Input Current, Logic LOW <sup>1</sup>	$V_{CC} = \text{Max}, V_{IL} = 0.4V$		-0.5		-0.8	mA/Load
$I_{IH}$ Input Current, Logic HIGH <sup>1</sup>	$V_{CC} = \text{Max}, V_{IH} = 2.4V$		20		50	$\mu\text{A}/\text{Load}$

Note: 1. CLK C: Eight equivalent loads  
CLK A, CLK B: Four equivalent loads

## Switching characteristics within specified operating conditions

Parameter	Test Conditions	Temperature Range				Units
		Standard		Extended		
		Min	Max	Min	Max	
$F_C$ Clock Frequency	See Figure 3	25		24		MHz
$t_D$ Output Delay	See Figure 3		35		35	ns

## Ordering Information

Product Number	Temperature Range	Screening	Package	Package Marking
TDC1005B9C	STD - $T_A = 0^\circ\text{C}$ to $70^\circ\text{C}$	Commercial	16 Pin CERDIP	1005B9C
TDC1005B9A	EXT - $T_C = -55^\circ\text{C}$ to $125^\circ\text{C}$	High Reliability	16 Pin CERDIP	1005B9A

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