



# CMOS ASYNCHRONOUS FIFO

2,048 x 9, 4,096 x 9  
8,192 x 9, 16,384 x 9  
32,768 x 9 and 65,536 x 9

IDT7203  
IDT7204  
IDT7205  
IDT7206  
IDT7207  
IDT7208

## FEATURES:

- First-In/First-Out Dual-Port memory
- 2,048 x 9 organization (IDT7203)
- 4,096 x 9 organization (IDT7204)
- 8,192 x 9 organization (IDT7205)
- 16,384 x 9 organization (IDT7206)
- 32,768 x 9 organization (IDT7207)
- 65,636 x 9 organization (IDT7208)
- High-speed: 12ns access time
- Low power consumption
  - Active: 660mW (max.)
  - Power-down: 44mW (max.)
- Asynchronous and simultaneous read and write
- Fully expandable in both word depth and width
- Pin and functionally compatible with IDT720X family
- Status Flags: Empty, Half-Full, Full
- Retransmit capability
- High-performance CMOS technology
- Military product compliant to MIL-STD-883, Class B
- Standard Military Drawing for #5962-88669 (IDT7203), 5962-89567 (IDT7203), and 5962-89568 (IDT7204) are listed on this function

- Industrial temperature range (-40°C to +85°C) is available (plastic packages only)
- Green parts available, see ordering information

## DESCRIPTION:

The IDT7203/7204/7205/7206/7207/7208 are dual-port memory buffers with internal pointers that load and empty data on a first-in/first-out basis. The device uses Full and Empty flags to prevent data overflow and underflow and expansion logic to allow for unlimited expansion capability in both word size and depth.

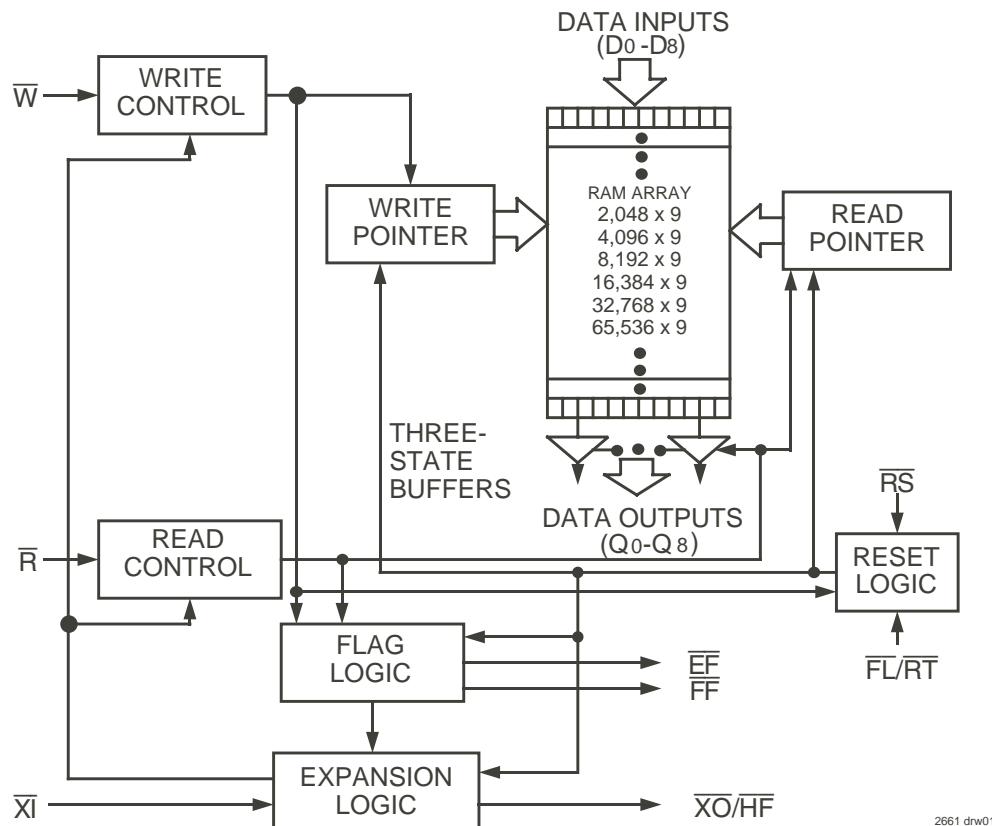
Data is toggled in and out of the device through the use of the Write ( $\bar{W}$ ) and Read ( $\bar{R}$ ) pins.

The device's 9-bit width provides a bit for a control or parity at the user's option. It also features a Retransmit ( $\bar{RT}$ ) capability that allows the read pointer to be reset to its initial position when  $\bar{RT}$  is pulsed LOW. A Half-Full Flag is available in the single device and width expansion modes.

These FIFOs are fabricated using IDT's high-speed CMOS technology. They are designed for applications requiring asynchronous and simultaneous read/writes in multiprocessing, rate buffering and other applications.

Military grade product is manufactured in compliance with the latest revision of MIL-STD-883, Class B.

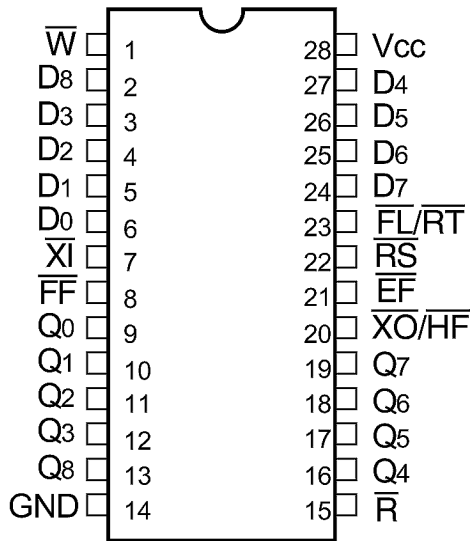
## FUNCTIONAL BLOCK DIAGRAM



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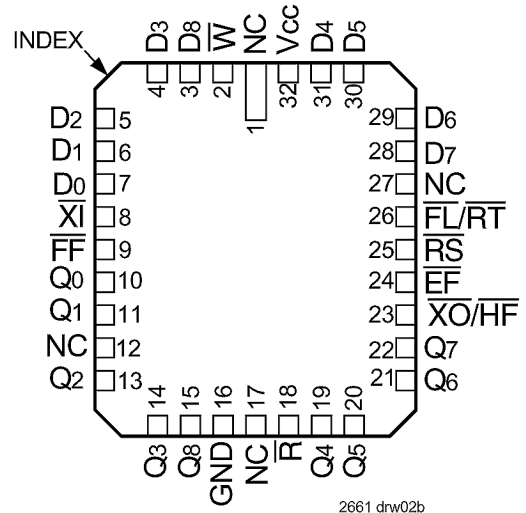
COMMERCIAL, MILITARY AND INDUSTRIAL TEMPERATURE RANGES

## PIN CONFIGURATIONS



2661 drw02a

TOP VIEW



2661 drw02b

TOP VIEW

Package Type	Reference Identifier	Order Code	Device Availability
PLASTIC DIP	P28-1	P	All devices
PLASTIC THIN DIP	P28-2	TP	All except IDT7207/7208
CERDIP	D28-1	D	All except IDT7208
THIN CERDIP	D28-3	TD	Only for IDT7203/7204/7205
SOIC	SO28-3	SO	Only for IDT7204

Package Type	Reference Identifier	Order Code	Device Availability
PLCC	J32-1	J	All devices
LCC <sup>(1)</sup>	L32-1	L	All except IDT7208

**NOTE:**

1. This package is only available in the military temperature range.

## ABSOLUTE MAXIMUM RATINGS

Symbol	Rating	Com'l & Ind'l	Military	Unit
VTERM	Terminal Voltage with Respect to GND	-0.5 to +7.0	-0.5 to +7.0	V
TSTG	Storage Temperature	-55 to +125	-65 to +155	°C
IOUT	DC Output +Current	-50 to +50	-50 to +50	mA

**NOTE:**

1. Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

## RECOMMENDED DC OPERATING CONDITIONS

Symbol	Parameter	Min.	Typ.	Max.	Unit
Vcc	Supply Voltage Commercial/Industrial/Military	4.5	5.0	5.5	V
GND	Supply Voltage	0	0	0	V
V <sub>IH</sub> <sup>(1)</sup>	Input High Voltage Commercial/Industrial	2.0	—	—	V
V <sub>IH</sub> <sup>(1)</sup>	Input High Voltage Military	2.2	—	—	V
V <sub>IL</sub> <sup>(2)</sup>	Input Low Voltage Commercial/Industrial/Military	—	—	0.8	V
T <sub>A</sub>	Operating Temperature Commercial	0	—	70	°C
T <sub>A</sub>	Operating Temperature Industrial	-40	—	85	°C
T <sub>A</sub>	Operating Temperature Military	-55	—	125	°C

**NOTES:**

- For  $\overline{RT}/\overline{RS}/\overline{XI}$  input, V<sub>IH</sub> = 2.6V (commercial).  
For  $\overline{RT}/\overline{RS}/\overline{XI}$  input, V<sub>IH</sub> = 2.6V (military).
- 1.5V undershoots are allowed for 10ns once per cycle.

## DC ELECTRICAL CHARACTERISTICS

(Commercial: VCC = 5V ± 10%, TA = 0°C to +70°C; Industrial: VCC = 5V ± 10%, TA = -40°C to +85°C; Military: VCC = 5V ± 10%, TA = -55°C to +125°C)

Symbol	Parameter	IDT7203 <sup>(1)</sup> IDT7204 <sup>(1)</sup> Commercial and Industrial tA = 12, 15, 20, 25, 35, 50 ns			IDT7203 IDT7204 Military <sup>(3)</sup> tA = 20, 30, 40 ns			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
ILI <sup>(6)</sup>	Input Leakage Current (Any Input)	-1	—	1	-1	—	1	μA
ILO <sup>(7)</sup>	Output Leakage Current	-10	—	10	-10	—	10	μA
VOH	Output Logic "1" Voltage IOH = -2mA	2.4	—	—	2.4	—	—	V
VOL	Output Logic "0" Voltage IOL = 8mA	—	—	0.4	—	—	0.4	V
ICC1 <sup>(8,9,10)</sup>	Active Power Supply Current	—	—	120	—	—	150	mA
ICC2 <sup>(8,10,11)</sup>	Standby Current ( $\overline{R}=\overline{W}=\overline{RS}=\overline{FL}/\overline{RT}=V_{IH}$ )	—	—	12	—	—	25	mA
ICC3 <sup>(8,10,12)</sup>	Power Down Current	—	—	2	—	—	4	mA
Symbol	Parameter	IDT7205 <sup>(2)</sup> IDT7206 <sup>(2,4)</sup> IDT7207 <sup>(2,4)</sup> IDT7208 <sup>(2,5)</sup> Commercial and Industrial tA = 12, 15, 20, 25, 35, 50 ns			IDT7205 IDT7206 IDT7207 Military tA = 20, 30 ns			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
ILI <sup>(6)</sup>	Input Leakage Current (Any Input)	-1	—	1	-1	—	1	μA
ILO <sup>(7)</sup>	Output Leakage Current	-10	—	10	-10	—	10	μA
VOH	Output Logic "1" Voltage IOH = -2mA	2.4	—	—	2.4	—	—	V
VOL	Output Logic "0" Voltage IOL = 8mA	—	—	0.4	—	—	0.4	V
ICC1 <sup>(8,9,10)</sup>	Active Power Supply Current	—	—	120	—	—	150	mA
ICC2 <sup>(8,10,11)</sup>	Standby Current ( $\overline{RS}=\overline{FL}/\overline{RT}=V_{IH}$ )	—	—	12	—	—	25	mA
ICC3 <sup>(8,10,12)</sup>	Power Down Current	—	—	8	—	—	12	mA

### NOTES:

- Industrial temperature range product for 15ns and 25ns speed grades are available as a standard device.
- Industrial temperature range product for 25ns speed grade only is available as a standard device. All other speed grades are available by special order.
- Military temperature range product for the 40ns is only available for 7203.
- Commercial temperature range product for the 12ns not available.
- Commercial temperature range product for the 12ns, 15ns and 50ns not available.
- Measurements with  $0.4 \leq V_{IN} \leq V_{CC}$ .
- $\overline{R} \geq V_{IH}$ ,  $0.4 \leq V_{OUT} \leq V_{CC}$ .
- Tested with outputs open (IOUT = 0).
- $\overline{R}$  and  $\overline{W}$  toggle at 20 MHz and data inputs switch at 10 MHz.
- ICC measurements are made with outputs open.
- All Inputs = VCC - 0.2V or GND + 0.2V, except  $\overline{R}$  and  $\overline{W}$ , which toggle at 20MHz.
- All Inputs = VCC - 0.2V or GND + 0.2V, except  $\overline{R}$  and  $\overline{W}$  = VCC - 0.2V.

## AC TEST CONDITIONS

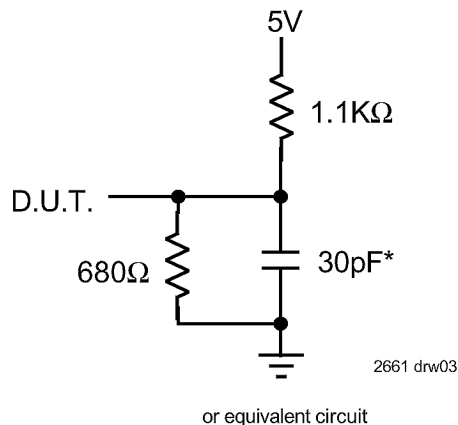
Input Pulse Levels	GND to 3.0V
Input Rise/Fall Times	5ns
Input Timing Reference Levels	1.5V
Output Reference Levels	1.5V
Output Load	See Figure 1

## CAPACITANCE<sup>(1)</sup> (TA = +25°C, f = 1.0 MHz)

Symbol	Parameter	Condition	Max.	Unit
CIN <sup>(1)</sup>	Input Capacitance	VIN = 0V	10	pF
COU <sup>(1,2)</sup>	Output Capacitance	VOUT = 0V	10	pF

### NOTES:

- This parameter is sampled and not 100% tested.
- With output deselected.



**Figure 1. Output Load**

\*Includes jig and scope capacitances.



## AC ELECTRICAL CHARACTERISTICS<sup>(1)</sup> (CONTINUED)

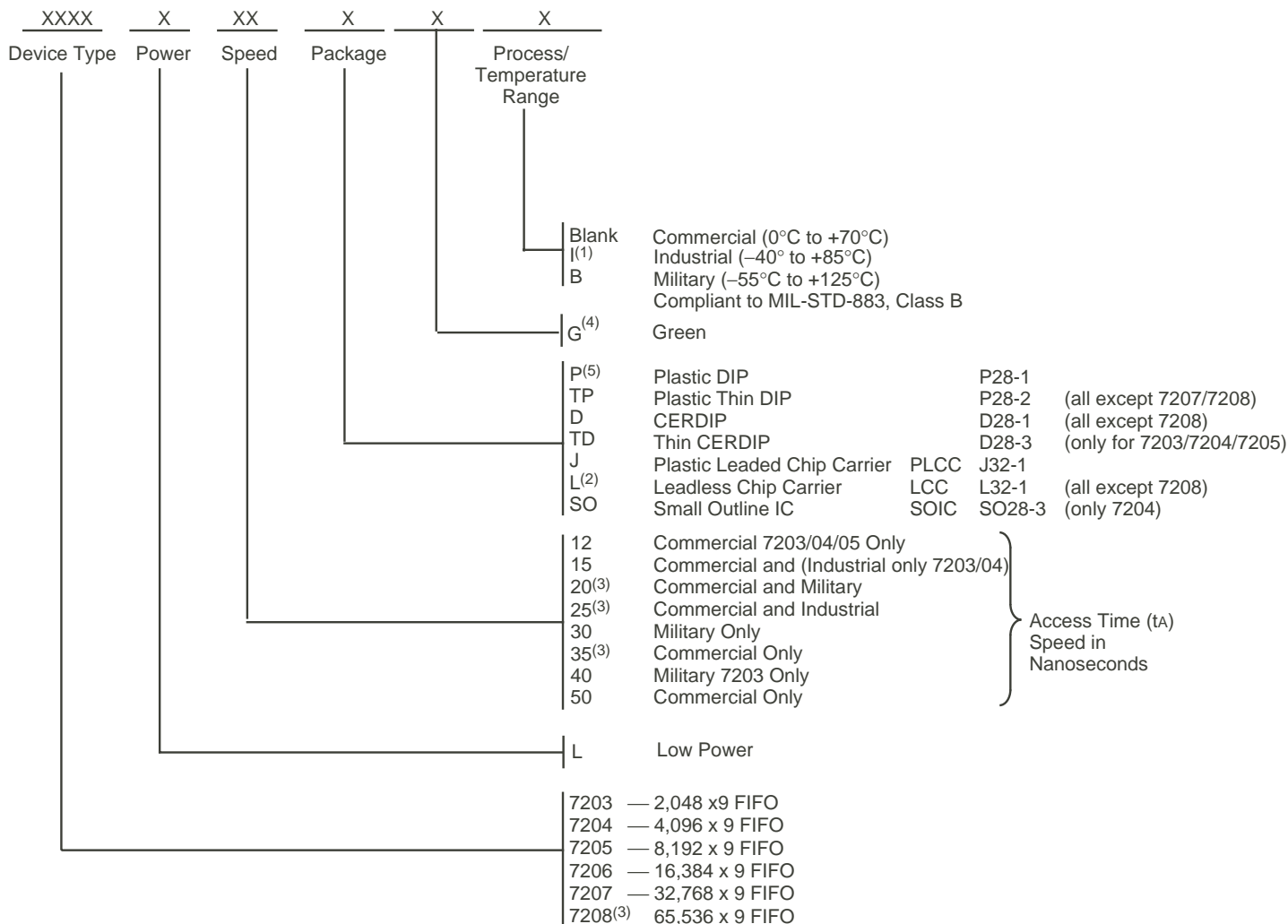
(Commercial: VCC = 5V ± 10%, TA = 0°C to +70°C; Industrial: VCC = 5V ± 10%, TA = -40°C to +85°C; Military: VCC = 5V ± 10%, TA = -55°C to +125°C)

Symbol	Parameters	Military		Commercial		Military		Commercial		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
		Military IDT7203L30 IDT7204L30 IDT7205L30 IDT7206L30 IDT7207L30		Commercial IDT7203L35 IDT7204L35 IDT7205L35 IDT7206L35 IDT7207L35 IDT7208L35		Military IDT7203L40		Commercial IDT7203L50 IDT7204L50 IDT7205L50 IDT7206L50 IDT7207L50		
tS	Shift Frequency	—	25	—	22.22	—	20	—	15	MHz
tRC	Read Cycle Time	40	—	45	—	50	—	65	—	ns
tA	Access Time	—	30	—	35	—	40	—	50	ns
tRR	Read Recovery Time	10	—	10	—	10	—	15	—	ns
tRPW	Read Pulse Width <sup>(2)</sup>	30	—	35	—	40	—	50	—	ns
tRLZ	Read LOW to Data Bus LOW <sup>(3)</sup>	5	—	5	—	5	—	10	—	ns
tWLZ	Write HIGH to Data Bus Low-Z <sup>(3,4)</sup>	5	—	10	—	10	—	15	—	ns
tDV	Data Valid from Read HIGH	5	—	5	—	5	—	5	—	ns
tRHZ	Read HIGH to Data Bus High-Z <sup>(3)</sup>	—	20	—	20	—	25	—	30	ns
tWC	Write Cycle Time	40	—	45	—	50	—	65	—	ns
tWPW	Write Pulse Width <sup>(2)</sup>	30	—	35	—	40	—	50	—	ns
tWR	Write Recovery Time	10	—	10	—	10	—	15	—	ns
tDS	Data Set-up Time	18	—	18	—	20	—	30	—	ns
tDH	Data Hold Time	0	—	0	—	0	—	5	—	ns
tRSC	Reset Cycle Time	40	—	45	—	50	—	65	—	ns
tRS	Reset Pulse Width <sup>(2)</sup>	30	—	35	—	40	—	50	—	ns
tRSS	Reset Set-up Time <sup>(3)</sup>	30	—	35	—	40	—	50	—	ns
tRTR	Reset Recovery Time	10	—	10	—	10	—	15	—	ns
tRTC	Retransmit Cycle Time	40	—	45	—	50	—	65	—	ns
tRT	Retransmit Pulse Width <sup>(2)</sup>	30	—	35	—	40	—	50	—	ns
tRTS	Retransmit Set-up Time <sup>(3)</sup>	30	—	35	—	40	—	50	—	ns
tRTR	Retransmit Recovery Time	10	—	10	—	10	—	15	—	ns
tEFL	Reset to $\overline{EF}$ LOW	—	40	—	45	—	50	—	65	ns
tHFH, tFFH	Reset to $\overline{HF}$ and $\overline{FF}$ HIGH	—	40	—	45	—	50	—	65	ns
tRTF	Retransmit LOW to Flags Valid	—	40	—	45	—	50	—	65	ns
tREF	Read LOW to $\overline{EF}$ LOW	—	30	—	30	—	35	—	45	ns
tRFF	Read HIGH to $\overline{FF}$ HIGH	—	30	—	30	—	35	—	45	ns
tRPE	Read Pulse Width after $\overline{EF}$ HIGH	30	—	35	—	40	—	50	—	ns
tWEF	Write HIGH to $\overline{EF}$ HIGH	—	30	—	30	—	35	—	45	ns
tWFF	Write LOW to $\overline{FF}$ LOW	—	30	—	30	—	35	—	45	ns
tWHF	Write LOW to $\overline{HF}$ Flag LOW	—	40	—	45	—	50	—	65	ns
tRHF	Read HIGH to $\overline{HF}$ Flag HIGH	—	40	—	45	—	50	—	65	ns
tWPF	Write Pulse Width after $\overline{FF}$ HIGH	30	—	35	—	40	—	50	—	ns
tXOL	Read/Write LOW to $\overline{XO}$ LOW	—	30	—	35	—	40	—	50	ns
tXOH	Read/Write HIGH to $\overline{XO}$ HIGH	—	30	—	35	—	40	—	50	ns
tXI	$\overline{XI}$ Pulse Width <sup>(2)</sup>	30	—	35	—	40	—	50	—	ns
tXIR	$\overline{XI}$ Recovery Time	10	—	10	—	10	—	10	—	ns
tXIS	$\overline{XI}$ Set-up Time	10	—	15	—	15	—	15	—	ns

### NOTES:

1. Timings referenced as in AC Test Conditions.
2. Pulse widths less than minimum are not allowed.
3. Values guaranteed by design, not currently tested.
4. Only applies to read data flow-through mode.

# ORDERING INFORMATION



2661 drw21

## NOTES:

- Industrial temperature range product for 15ns and 25ns speed grades are available as a standard device for IDT7203/7204, and 25ns speed grade only is available as a standard device for IDT7205/7206/7207/7208. All other speed grades are available by special order.
- The LCC is only available in the military temperature range.
- The IDT7208 is only available in commercial speed grades of 20, 25 and 35 ns.
- Green parts are available. For specific speeds and packages contact your local sales office.
- For "P", Plastic Dip, when ordering green package, the suffix is "PDG".