CMOS ASYNCHRONOUS FIFO 256 x 9, 512 x 9 and 1,024 x 9

IDT7200L
IDT7201LA
IDT7202LA

FEATURES:

- **First-In/First-Out dual-port memory**
- **256 x 9 organization (IDT7200)**
- **512 x 9 organization (IDT7201)**
- **1,024 x 9 organization (IDT7202)**
- **Low power consumption**
  - *— Active: 440mW (max.)*
  - *—Power-down: 28mW (max.)*
- **Ultra high speed—12ns access time**
- **Asynchronous and simultaneous read and write**
- **Fully expandable by both word depth and/or bit width**
- **Pin and functionally compatible with 720X family**
- **Status Flags: Empty, Half-Full, Full**
- **Auto-retransmit capability**
- **High-performance CEMOS™ technology**
- **Military product compliant to MIL-STD-883, Class B**
- **Standard Military Drawing #5962-87531, 5962-89666, 5962-89863 and 5962-89536 are listed on this function**
- **Dual versions available in the TSSOP package. For more information, see IDT7280/7281/7282 data sheet**
  - **IDT7280 = 2 x IDT7200**
  - **IDT7281 = 2 x IDT7201**
  - **IDT7282 = 2 x IDT7202**
- **Industrial temperature range (–40°C to +85°C) is available (plastic packages only)**
- **Green parts available, see ordering information**

DESCRIPTION:

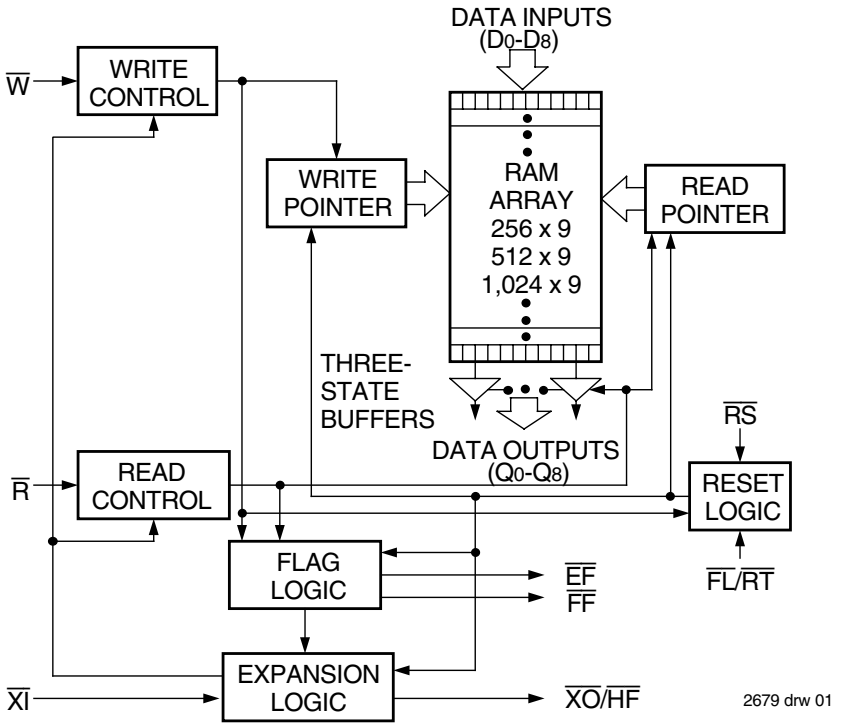
The IDT7200/7201/7202 are dual-port memories that load and empty data on a first-in/first-out basis. The devices use Full and Empty flags to prevent data overflow and underflow and expansion logic to allow for unlimited expansion capability in both word size and depth.

The reads and writes are internally sequential through the use of ring pointers, with no address information required to load and unload data. Data is toggled in and out of the devices through the use of the Write ($\overline{W}$) and Read ($\overline{R}$) pins.

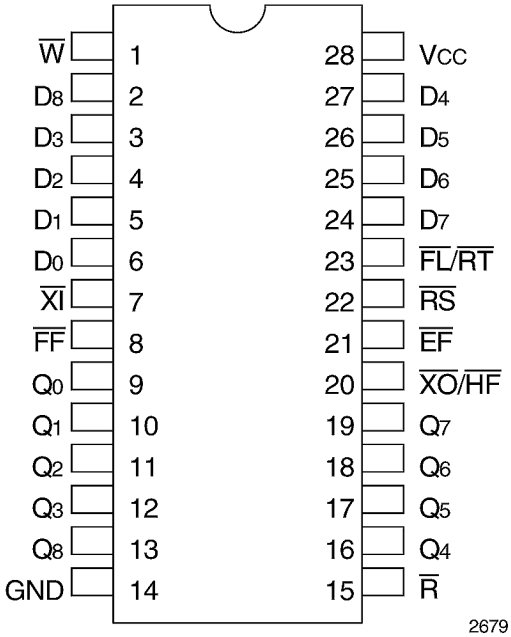
The devices utilize a 9-bit wide data array to allow for control and parity bits at the user's option. This feature is especially useful in data communications applications where it is necessary to use a parity bit for transmission/reception error checking. It also features a Retransmit ($\overline{RT}$) capability that allows for reset of the read pointer to its initial position when $\overline{RT}$ is pulsed LOW to allow for retransmission from the beginning of data. A Half-Full Flag is available in the single device mode and width expansion modes.

These FIFOs are fabricated using IDT's high-speed CMOS technology. They are designed for those applications requiring asynchronous and simultaneous read/writes in multiprocessing and rate buffer applications. Military grade product is manufactured in compliance with the latest revision of MIL-STD-883, Class B.

FUNCTIONAL BLOCK DIAGRAM



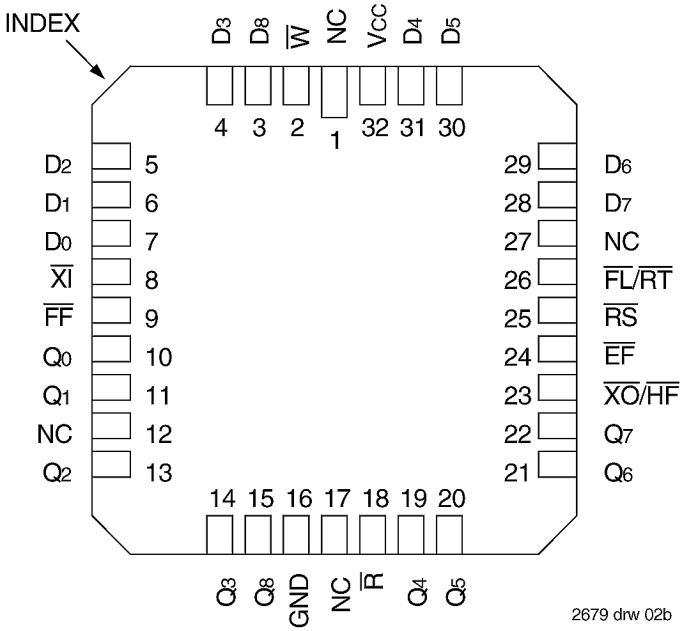
PIN CONFIGURATIONS



2679 drw 02a

Package Type	Reference Identifier	Order Code
PLASTIC DIP(1)	P28-1	P
PLASTIC THIN DIP	P28-2	TP
CERDIP(1)	D28-1	D
THIN CERDIP	D28-3	TD
SOIC	SO28-3	SO

TOP VIEW



2679 drw 02b

Package Type	Reference Identifier	Order Code
LCC(1)	L32-1	L
PLCC	J32-1	J

TOP VIEW

NOTE:
1. The 600-mil-wide DIP (P28-1 and D28-1) and LCC are not available for the IDT7200.

ABSOLUTE MAXIMUM RATINGS

Symbol	Rating	Com'l & Ind'l	Mil.	Unit
V_{TERM}	Terminal Voltage with Respect to GND	–0.5 to +7.0	–0.5 to +7.0	V
T_{STG}	Storage Temperature	–55 to +125	–65 to +155	°C
I_{OUT}	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
V_{CC}	Supply Voltage Commercial/Industrial/Military	4.5	5.0	5.5	V
GND	Supply Voltage	0	0	0	V
V_{IH}(1)	Input High Voltage Com'l/Ind'l	2.0	—	—	V
V_{IH}(1)	Input High Voltage Military	2.2	—	—	V
V_{IL}(2)	Input Low Voltage Commercial/Industrial/Military	—	—	0.8	V
TA	Operating Temperature Commercial	0	—	70	°C
TA	Operating Temperature Industrial	–40	—	85	°C
TA	Operating Temperature Military	–55	—	125	°C

NOTES:
1. For $\overline{RT}/\overline{RS}/\overline{XI}$ input, V_{IH} = 2.6V (commercial).
   For $\overline{RT}/\overline{RS}/\overline{XI}$ input, V_{IH} = 2.8V (military).
2. 1.5V undershoots are allowed for 10ns once per cycle.

DC ELECTRICAL CHARACTERISTICS

(Commercial: V_{CC} = 5V ± 10%, T_A = 0ºC to +70ºC; Industrial: V_{CC} = 5V ± 10%, T_A = –40ºC to +85ºC; Military: V_{CC} = 5V ± 10%, T_A = –55ºC to +125ºC)

Symbol	Parameter	IDT7200L IDT7201LA IDT7202LA Com'l & Ind'l[1] t_A = 12, 15, 20, 25, 35, 50 ns		IDT7200L IDT7201LA IDT7202LA Military[2] t_A = 20, 30, 50, 80 ns		Unit
		Min.	Max.	Min.	Max.	
I_{LI}[3]	Input Leakage Current (Any Input)	–1	1	–10	10	µA
I_{LO}[4]	Output Leakage Current	–10	10	–10	10	µA
V_{OH}	Output Logic "1" Voltage I_{OH} = –2mA	2.4	—	2.4	—	V
V_{OL}	Output Logic "0" Voltage I_{OL} = 8mA	—	0.4	—	0.4	V
I_{CC1}[5,6,7]	Active Power Supply Current	—	80	—	100	mA
I_{CC2}[5,8]	Standby Current ($\overline{R}$=$\overline{W}$=$\overline{RS}$=$\overline{FL}$/$\overline{RT}$=V_{IH})	—	5	—	15	mA

NOTES:
1. Industrial temperature range product for the 15ns and 25 ns speed grades are available as a standard device.
2. Military speed grades of 50ns and 80ns are only available for the IDT7201LA.
3. Measurements with 0.4 ≤ V_{IN} ≤ V_{CC}.
4. $\overline{R}$ ≥ V_{IH}, 0.4 ≤ V_{OUT} ≤ V_{CC}.
5. Tested with outputs open (I_{OUT} = 0).
6. Tested at f = 20 MHz.
7. Typical I_{CC1} = 15 + 2*fs + 0.02*C_L*fs (in mA) with V_{CC} = 5V, T_A = 25°C, fs = WCLK frequency = RCLK frequency (in MHz, using TTL levels), data switching at fs/2, C_L = capacitive load (in pF).
8. All Inputs = V_{CC} - 0.2V or GND + 0.2V.

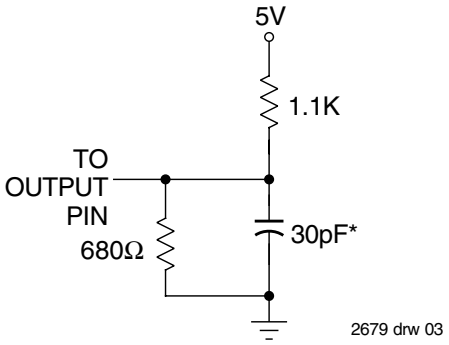
CAPACITANCE (T_A = +25°C, f = 1.0 MHz)

Symbol	Parameter	Condition	Max.	Unit
C_{IN}	Input Capacitance	V_{IN} = 0V	8	pF
C_{OUT}	Output Capacitance	V_{OUT} = 0V	8	pF

NOTE:
1. Characterized values, not currently tested.

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



or equivalent circuit

Figure 1. Output Load

* Includes scope and jig capacitances.

AC ELECTRICAL CHARACTERISTICS[1]

(Commercial: V_{CC} = 5V ± 10%, T_A = 0°C to +70°C; Industrial: V_{CC} = 5V ± 10%, T_A = –40°C to +85°C; Military: V_{CC} = 5V ± 10%, T_A = –55°C to +125°C)

		Commercial		Com'l & Ind'l[2]		Com'l & Mil.		Com'l & Ind'l[2]		
		IDT7200L12 IDT7201LA12 IDT7202LA12		IDT7200L15 IDT7201LA15 IDT7202LA15		IDT7200L20 IDT7201LA20 IDT7202LA20		IDT7200L25 IDT7201LA25 IDT7202LA25		
Symbol	Parameter	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Unit
t_S	Shift Frequency	—	50	—	40	—	33.3	—	28.5	MHz
t_{RC}	Read Cycle Time	20	—	25	—	30	—	35	—	ns
t_A	Access Time	—	12	—	15	—	20	—	25	ns
t_{RR}	Read Recovery Time	8	—	10	—	10	—	10	—	ns
t_{RPW}	Read Pulse Width[3]	12	—	15	—	20	—	25	—	ns
t_{RLZ}	Read Pulse Low to Data Bus at Low Z[4]	3	—	3	—	3	—	3	—	ns
t_{WLZ}	Write Pulse High to Data Bus at Low Z[4,5]	5	—	5	—	5	—	5	—	ns
t_{DV}	Data Valid from Read Pulse High	5	—	5	—	5	—	5	—	ns
t_{RHZ}	Read Pulse High to Data Bus at High Z[4]	—	12	—	15	—	15	—	18	ns
t_{WC}	Write Cycle Time	20	—	25	—	30	—	35	—	ns
t_{WPW}	Write Pulse Width[3]	12	—	15	—	20	—	25	—	ns
t_{WR}	Write Recovery Time	8	—	10	—	10	—	10	—	ns
t_{DS}	Data Set-up Time	9	—	11	—	12	—	15	—	ns
t_{DH}	Data Hold Time	0	—	0	—	0	—	0	—	ns
t_{RSC}	Reset Cycle Time	20	—	25	—	30	—	35	—	ns
t_{RS}	Reset Pulse Width[3]	12	—	15	—	20	—	25	—	ns
t_{RSS}	Reset Set-up Time[4]	12	—	15	—	20	—	25	—	ns
t_{RSR}	Reset Recovery Time	8	—	10	—	10	—	10	—	ns
t_{RTC}	Retransmit Cycle Time	20	—	25	—	30	—	35	—	ns
t_{RT}	Retransmit Pulse Width[3]	12	—	15	—	20	—	25	—	ns
t_{RTS}	Retransmit Set-up Time[4]	12	—	15	—	20	—	25	—	ns
t_{RTR}	Retransmit Recovery Time	8	—	10	—	10	—	10	—	ns
t_{EFL}	Reset to Empty Flag Low	—	12	—	25	—	30	—	35	ns
$t_{HFH,FFH}$	Reset to Half-Full and Full Flag High	—	17	—	25	—	30	—	35	ns
t_{RTF}	Retransmit Low to Flags Valid	—	20	—	25	—	30	—	35	ns
t_{REF}	Read Low to Empty Flag Low	—	12	—	15	—	20	—	25	ns
t_{RFF}	Read High to Full Flag High	—	14	—	15	—	20	—	25	ns
t_{RPE}	Read Pulse Width after $\overline{EF}$ High	12	—	15	—	20	—	25	—	ns
t_{WEF}	Write High to Empty Flag High	—	12	—	15	—	20	—	25	ns
t_{WFF}	Write Low to Full Flag Low	—	14	—	15	—	20	—	25	ns
t_{WHF}	Write Low to Half-Full Flag Low	—	17	—	25	—	30	—	35	ns
t_{RHF}	Read High to Half-Full Flag High	—	17	—	25	—	30	—	35	ns
t_{WPF}	Write Pulse Width after $\overline{FF}$ High	12	—	15	—	20	—	25	—	ns
t_{XOL}	Read/Write to $\overline{XO}$ Low	—	12	—	15	—	20	—	25	ns
t_{XOH}	Read/Write to $\overline{XO}$ High	—	12	—	15	—	20	—	25	ns
t_{XI}	$\overline{XI}$ Pulse Width[3]	12	—	15	—	20	—	25	—	ns
t_{XIR}	$\overline{XI}$ Recovery Time	8	—	10	—	10	—	10	—	ns
t_{XIS}	$\overline{XI}$ Set-up Time	8	—	10	—	10	—	10	—	ns

NOTES:
1. Timings referenced as in AC Test Conditions.
2. Industrial temperature range product for 15ns and 25ns speed grades are available as a standard device.
3. Pulse widths less than minimum value are not allowed.
4. Values guaranteed by design, not currently tested.
5. Only applies to read data flow-through mode

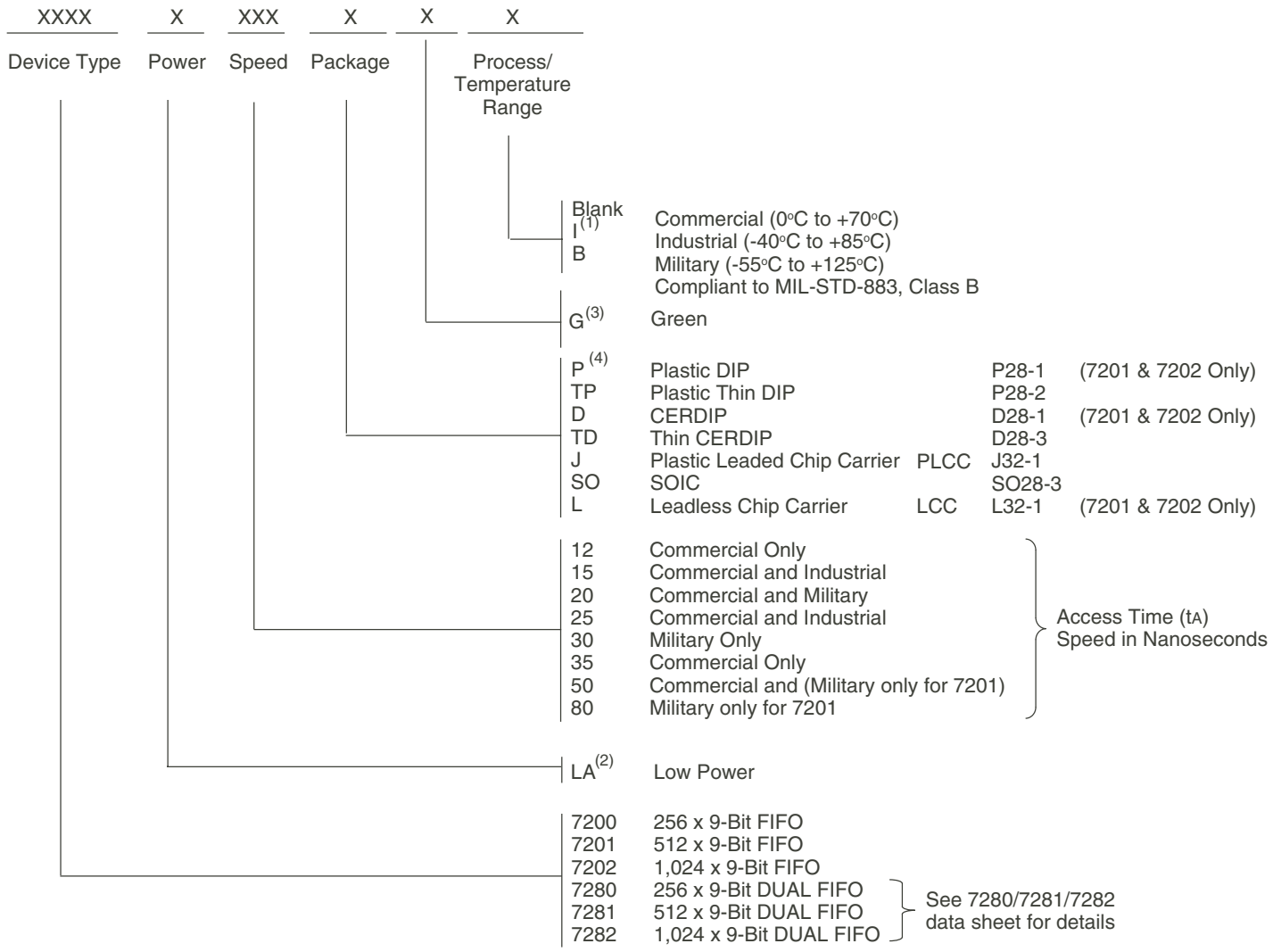
AC ELECTRICAL CHARACTERISTICS[1] (Continued)

(Commercial: V_{CC} = 5V ± 10%, T_A = 0°C to +70°C; Industrial: V_{CC} = 5V ± 10%, T_A = –40°C to +85°C; Military: V_{CC} = 5V ± 10%, T_A = –55°C to +125°C)

Symbol	Parameter	Military IDT7200L30 IDT7201LA30 IDT7202LA30		Commercial IDT7200L35 IDT7201LA35 IDT7202LA35		Com'l & Mil.[2] IDT7200L50 IDT7201LA50 IDT7202LA50		Military[2] IDT7201LA80		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
t_S	Shift Frequency	—	25	—	22.2	—	15	—	10	MHz
t_{RC}	Read Cycle Time	40	—	45	—	65	—	100	—	ns
t_A	Access Time	—	30	—	35	—	50	—	80	ns
t_{RR}	Read Recovery Time	10	—	10	—	15	—	20	—	ns
t_{RPW}	Read Pulse Width[3]	30	—	35	—	50	—	80	—	ns
t_{RLZ}	Read Pulse Low to Data Bus at Low Z[4]	3	—	3	—	3	—	3	—	ns
t_{WLZ}	Write Pulse High to Data Bus at Low Z[4,5]	5	—	5	—	5	—	5	—	ns
t_{DV}	Data Valid from Read Pulse High	5	—	5	—	5	—	5	—	ns
t_{RHZ}	Read Pulse High to Data Bus at High Z[4]	—	20	—	20	—	30	—	30	ns
t_{WC}	Write Cycle Time	40	—	45	—	65	—	100	—	ns
t_{WPW}	Write Pulse Width[3]	30	—	35	—	50	—	80	—	ns
t_{WR}	Write Recovery Time	10	—	10	—	15	—	20	—	ns
t_{DS}	Data Set-up Time	18	—	18	—	30	—	40	—	ns
t_{DH}	Data Hold Time	0	—	0	—	5	—	10	—	ns
t_{RSC}	Reset Cycle Time	40	—	45	—	65	—	100	—	ns
t_{RS}	Reset Pulse Width[3]	30	—	35	—	50	—	80	—	ns
t_{RSS}	Reset Set-up Time[4]	30	—	35	—	50	—	80	—	ns
t_{RSR}	Reset Recovery Time	10	—	10	—	15	—	20	—	ns
t_{RTC}	Retransmit Cycle Time	40	—	45	—	65	—	100	—	ns
t_{RT}	Retransmit Pulse Width[3]	30	—	35	—	50	—	80	—	ns
t_{RTS}	Retransmit Set-up Time[4]	30	—	35	—	50	—	80	—	ns
t_{RTR}	Retransmit Recovery Time	10	—	10	—	15	—	20	—	ns
t_{EFL}	Reset to Empty Flag Low	—	40	—	45	—	65	—	100	ns
$t_{HFH,FFH}$	Reset to Half-Full and Full Flag High	—	40	—	45	—	65	—	100	ns
t_{RTF}	Retransmit Low to Flags Valid	—	40	—	45	—	65	—	100	ns
t_{REF}	Read Low to Empty Flag Low	—	30	—	30	—	45	—	60	ns
t_{RFF}	Read High to Full Flag High	—	30	—	30	—	45	—	60	ns
t_{RPE}	Read Pulse Width after $\overline{EF}$ High	30	—	35	—	50	—	80	—	ns
t_{WEF}	Write High to Empty Flag High	—	30	—	30	—	45	—	60	ns
t_{WFF}	Write Low to Full Flag Low	—	30	—	30	—	45	—	60	ns
t_{WHF}	Write Low to Half-Full Flag Low	—	40	—	45	—	65	—	100	ns
t_{RHF}	Read High to Half-Full Flag High	—	40	—	45	—	65	—	100	ns
t_{WPF}	Write Pulse Width after $\overline{FF}$ High	30	—	35	—	50	—	80	—	ns
t_{XOL}	Read/Write to $\overline{XO}$ Low	—	30	—	35	—	50	—	80	ns
t_{XOH}	Read/Write to $\overline{XO}$ High	—	30	—	35	—	50	—	80	ns
t_{XI}	$\overline{XI}$ Pulse Width[3]	30	—	35	—	50	—	80	—	ns
t_{XIR}	$\overline{XI}$ Recovery Time	10	—	10	—	10	—	10	—	ns
t_{XIS}	$\overline{XI}$ Set-up Time	10	—	10	—	15	—	15	—	ns

NOTES:
1. Timings referenced as in AC Test Conditions
2. Military speed grades of 50ns and 80ns are only available for IDT7201LA.
3. Pulse widths less than minimum value are not allowed.
4. Values guaranteed by design, not currently tested.
5. Only applies to read data flow-through mode.

ORDERING INFORMATION



2679 drw 21

NOTES:

1. Industrial temperature range product is available for the 15ns and 25ns as a standard product.
2. "A" to be included for IDT7201 and IDT7202 ordering part number.
3. Green parts are available. For specific speeds and packages contact your local sales office.
4. For "P", Plastic Dip, when ordering green package, the suffix is "PDG".