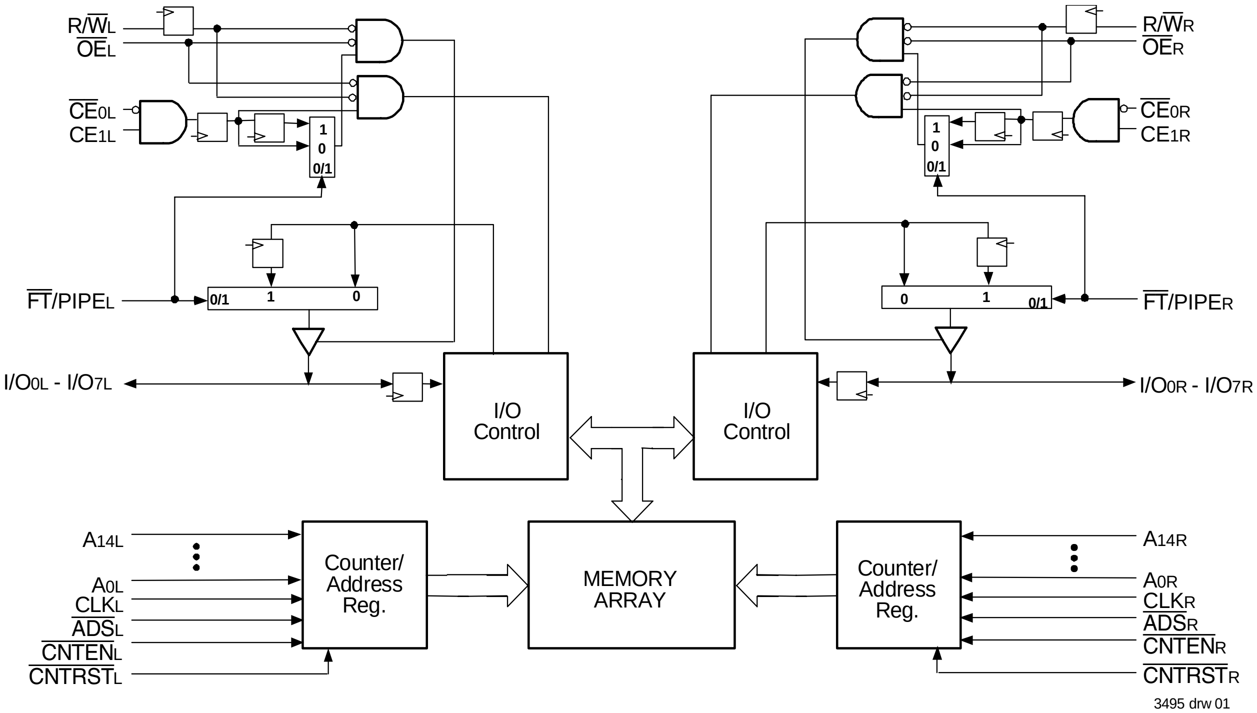
HIGH-SPEED 32K x 8 SYNCHRONOUS DUAL-PORT STATIC RAM

PRELIMINARY
IDT709079S/L

Features:

- True Dual-Ported memory cells which allow simultaneous access of the same memory location
- High-speed clock to data access
  - *Commercial: 9/12/15ns (max.)*
  - *Industrial: 12ns (max.)*
- Low-power operation
  - IDT709079S
    Active: 950mW (typ.)
    Standby: 5mW (typ.)
  - *IDT709079L*
    Active: 950mW (typ.)
    Standby: 1mW (typ.)
- Flow-Through or Pipelined output mode on either port via the $\overline{\text{FT}}$/PIPE$_R$ pin
- Counter enable and reset features
- Dual chip enables allow for depth expansion without additional logic
- Full synchronous operation on both ports
  - *4ns setup to clock and 1ns hold on all control, data, and address inputs*
  - *Data input, address, and control registers*
  - *Fast 9ns clock to data out in the Pipelined output mode*
  - *Self-timed write allows fast cycle time*
  - *15ns cycle time, 66MHz operation in the Pipelined output mode*
- TTL- compatible, single 5V (±10%) power supply
- Industrial temperature range (–40°C to +85°C) is available for selected speeds
- Available in a 100 pin Thin Quad Flatpack (TQFP)

Functional Block Diagram



3495 drw 01

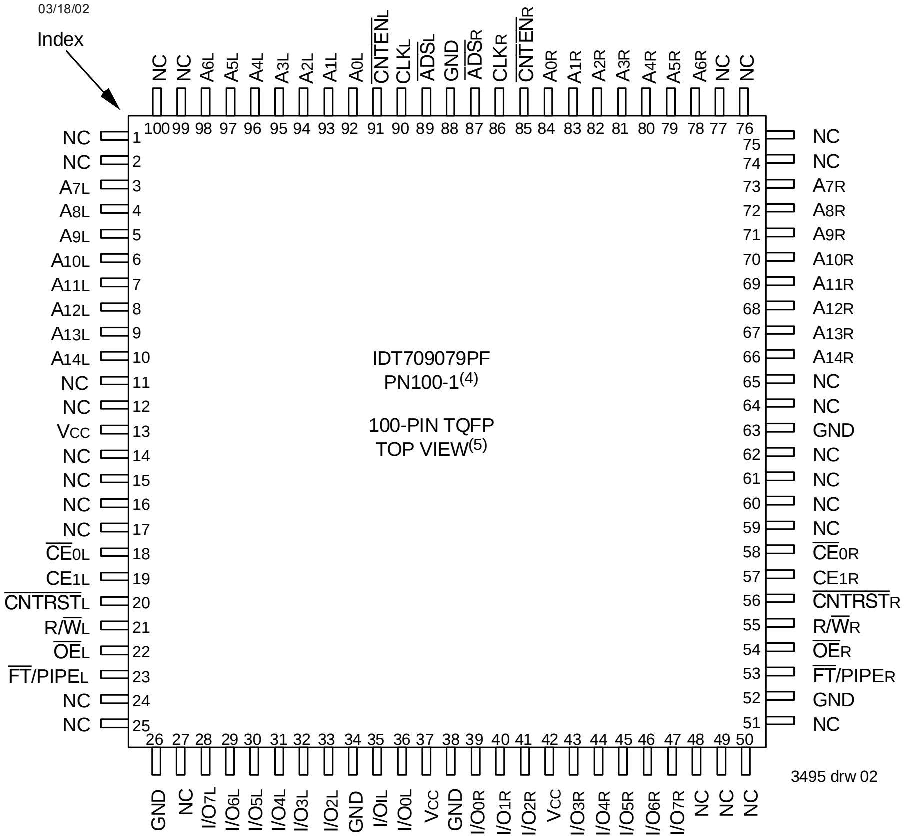
DECEMBER 2002

Description:

The IDT709079 is a high-speed 32K x 8 bit synchronous Dual-Port RAM. The memory array utilizes Dual-Port memory cells to allow simultaneous access of any address from both ports. Registers on control, data, and address inputs provide minimal setup and hold times. The timing latitude provided by this approach allows systems to be designed with very short cycle times.

With an input data register, the IDT709079 has been optimized for applications having unidirectional or bidirectional data flow in bursts. An automatic power down feature, controlled by $\overline{CE}_0$ and CE_1, permits the on-chip circuitry of each port to enter a very low standby power mode. Fabricated using IDT's CMOS high-performance technology, these devices typically operate on only 950mW of power.

Pin Configurations[1,2,3]



NOTES:
1. All Vcc pins must be connected to power supply.
2. All GND pins must be connected to ground supply.
3. Package body is approximately 14mm x 14mm x 1.4mm.
4. This package code is used to reference the package diagram.
5. This text does not indicate orientation of the actual part-marking.

Pin Names

Left Port	Right Port	Names
$\overline{\text{CE}}_{0L}$, CE_{1L}	$\overline{\text{CE}}_{0R}$, CE_{1R}	Chip Enables
$\text{R}/\overline{\text{W}}_{L}$	$\text{R}/\overline{\text{W}}_{R}$	Read/Write Enable
$\overline{\text{OE}}_{L}$	$\overline{\text{OE}}_{R}$	Output Enable
A_{0L} - A_{14L}	A_{0R} - A_{14R}	Address
I/O_{0L} - I/O_{7L}	I/O_{0R} - I/O_{7R}	Data Input/Output
CLK_{L}	CLK_{R}	Clock
$\overline{\text{ADS}}_{L}$	$\overline{\text{ADS}}_{R}$	Address Strobe
$\overline{\text{CNTEN}}_{L}$	$\overline{\text{CNTEN}}_{R}$	Counter Enable
$\overline{\text{CNTRST}}_{L}$	$\overline{\text{CNTRST}}_{R}$	Counter Reset
$\overline{\text{FT}}/\text{PIPE}_{L}$	$\overline{\text{FT}}/\text{PIPE}_{R}$	Flow-Through/Pipeline
V_{CC}		Power
GND		Ground

3495 tbl 01

Truth Table I—Read/Write and Enable Control[1,2,3]

$\overline{\text{OE}}$	CLK	$\overline{\text{CE}}_0$	CE_1	$\text{R}/\overline{\text{W}}$	I/O_{0-7}	Mode
X	↑	H	X	X	High-Z	Deselected
X	↑	X	L	X	High-Z	Deselected
X	↑	L	H	L	D_{IN}	Write
L	↑	L	H	H	D_{OUT}	Read
H	X	L	H	X	High-Z	Outputs Disabled

3495 tbl 02

NOTES:
1. "H" = V_{IH}, "L" = V_{IL}, "X" = Don't Care.
2. $\overline{\text{ADS}}$, $\overline{\text{CNTEN}}$, $\overline{\text{CNTRST}}$ = X.
3. $\overline{\text{OE}}$ is an asynchronous input signal.

Truth Table II—Address Counter Control[1,2]

Address	Previous Address	Addr Used	CLK	$\overline{\text{ADS}}$	$\overline{\text{CNTEN}}$	$\overline{\text{CNTRST}}$	I/O[3]	MODE
X	X	0	↑	X	X	L[4]	$\text{D}_{I/O}(0)$	Counter Reset to Address 0
An	X	An	↑	L[4]	X	H	$\text{D}_{I/O}$ (n)	External Address Used
An	Ap	Ap	↑	H	H	H	$\text{D}_{I/O}(p)$	External Address Blocked—Counter disabled (Ap reused)
X	Ap	Ap + 1	↑	H	L[5]	H	$\text{D}_{I/O}(p+1)$	Counter Enabled—Internal Address generation

3495 tbl 03

NOTES:
1. "H" = V_{IH}, "L" = V_{IL}, "X" = Don't Care.
2. $\overline{\text{CE}}_0$ and $\overline{\text{OE}}$ = V_{IL}; CE_1 and $\text{R}/\overline{\text{W}}$ = V_{IH}.
3. Outputs configured in Flow-Through Output mode; if outputs are in Pipelined mode the data out will be delayed by one cycle.
4. $\overline{\text{ADS}}$ is independent of all other signals including $\overline{\text{CE}}_0$ and CE_1.
5. The address counter advances if $\overline{\text{CNTEN}}$ = V_{IL} on the rising edge of CLK, regardless of all other signals including $\overline{\text{CE}}_0$ and CE_1.

Recommended Operating Temperature and Supply Voltage(1)

Grade	Ambient Temperature(1)	GND	Vcc
Commercial	0°C to +70°C	0V	5.0V ± 10%
Industrial	-40°C to +85°C	0V	5.0V ± 10%

3495 tbl 04

NOTES:

1. This is the parameter T_A. This is the "instant on" case temperature.

Absolute Maximum Ratings(1)

Symbol	Rating	Commercial & Industrial	Unit
V_{TERM}(2)	Terminal Voltage with Respect to GND	-0.5 to +7.0	V
T_{BIAS}	Temperature Under Bias	-55 to +125	°C
T_{STG}	Storage Temperature	-65 to +150	°C
I_{OUT}	DC Output Current	50	mA

3495 tbl 06

NOTES:

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.
2. V_{TERM} must not exceed V_{CC} +10% for more than 25% of the cycle time or 10ns maximum, and is limited to ≤ 20mA for the period of V_{TERM} ≥ V_{CC} + 10%.

Recommended DC Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{CC}	Supply Voltage	4.5	5.0	5.5	V
GND	Ground	0	0	0	V
V_{IH}	Input High Voltage	2.2	—	6.0(1)	V
V_{IL}	Input Low Voltage	-0.5(2)	—	0.8	V

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NOTES:

1. V_{TERM} must not exceed V_{CC} +10%.
2. V_{IL} ≥ -1.5V for pulse width less than 10ns.

Capacitance (T_A = +25°C, f = 1.0MHz)

Symbol	Parameter(1)	Conditions(2)	Max.	Unit
C_{IN}	Input Capacitance	V_{IN} = 3dV	9	pF
C_{OUT}(3)	Output Capacitance	V_{OUT} = 3dV	10	pF

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NOTES:

1. These parameters are determined by device characterization, but are not production tested.
2. 3dV references the interpolated capacitance when the input and output switch from 0V to 3V or from 3V to 0V.
3. C_{OUT} also references $C_{I/O}$.

DC Electrical Characteristics Over the Operating Teamperature and Supply Voltage Range (V_{CC} = 5.0V ± 10%)

Symbol	Parameter	Test Conditions	709079S/L Min.	709079S/L Max.	Unit
$\|I_{LI}\|$	Input Leakage Current[1]	V_{CC} = 5.5V, V_{IN} = 0V to V_{CC}	—	10	µA
$\|I_{LO}\|$	Output Leakage Current	$\overline{CE}_0 = V_{IH}$ or $CE_1 = V_{IL}$, V_{OUT} = 0V to V_{CC}	—	10	µA
V_{OL}	Output Low Voltage	I_{OL} = +4mA	—	0.4	V
V_{OH}	Output High Voltage	I_{OH} = -4mA	2.4	—	V

3495 tbl 08

NOTE:

1. At Vcc $\leq$ 2.0V input leakages are undefined.

DC Electrical Characteristics Over the Operating Temperature and Supply Voltage Range[6] (V_{CC} = 5V ± 10%)

Symbol	Parameter	Test Condition	Version		709079X9 Com'l Only		709079X12 Com'l & Ind		709079X15 Com'l Only		Unit
					Typ.[4]	Max.	Typ.[4]	Max.	Typ.[4]	Max.	
I_{CC}	Dynamic Operating Current (Both Ports Active)	$\overline{CE}_L$ and $\overline{CE}_R = V_{IH}$, Outputs Disabled f = f_{MAX}[1]	COM'L	S	210	390	200	345	190	325	mA
				L	210	350	200	305	190	285	
			IND	S	—	—	200	380	—	—	
				L	—	—	200	340	—	—	
I_{SB1}	Standby Current (Both Ports - TTL Level Inputs)	$\overline{CE}_L$ and $\overline{CE}_R = V_{IH}$ f = f_{MAX}[1]	COM'L	S	50	135	50	110	50	110	mA
				L	50	115	50	90	50	90	
			IND	S	—	—	50	125	—	—	
				L	—	—	50	105	—	—	
I_{SB2}	Standby Current (One Port - TTL Level Inputs)	$\overline{CE}_{"A"} = V_{IL}$ and $\overline{CE}_{"B"} = V_{IH}$[3] Active Port Outputs Disabled, f=f_{MAX}[1]	COM'L	S	140	270	130	230	120	220	mA
				L	140	240	130	200	120	190	
			IND	S	—	—	130	245	—	—	
				L	—	—	130	215	—	—	
I_{SB3}	Full Standby Current (Both Ports - CMOS Level Inputs)	Both Ports $\overline{CE}_R$ and $\overline{CE}_L \geq V_{CC} - 0.2V$ $V_{IN} \geq V_{CC} - 0.2V$ or $V_{IN} \leq 0.2V$, f = 0[2]	COM'L	S	1.0	15	1.0	15	1.0	15	mA
				L	0.2	5	0.2	5	0.2	5	
			IND	S	—	—	1.0	15	—	—	
				L	—	—	0.2	5	—	—	
I_{SB4}	Full Standby Current (One Port - CMOS Level Inputs)	$\overline{CE}_{"A"} \leq 0.2V$ and $\overline{CE}_{"B"} \geq V_{CC} - 0.2V$[5] $V_{IN} \geq V_{CC} - 0.2V$ or $V_{IN} \leq 0.2V$ Active Port Outputs Disabled f = f_{MAX}[1]	COM'L	S	130	245	120	205	110	195	mA
				L	130	225	120	185	110	175	
			IND	S	—	—	120	220	—	—	
				L	—	—	120	200	—	—	

3495 tbl 09

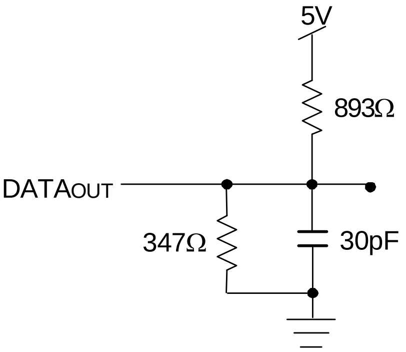
NOTES:

1. At f = f_{MAX}, address and control lines (except Output Enable) are cycling at the maximum frequency clock cycle of 1/t_{CYC}, using "AC TEST CONDITIONS" at input levels of GND to 3V.
2. f = 0 means no address, clock, or control lines change. Applies only to input at CMOS level standby.
3. Port "A" may be either left or right port. Port "B" is the opposite from port "A".
4. Vcc = 5V, T_A = 25°C for Typ, and are not production tested. $I_{CC\ DC}$(f=0) = 150mA (Typ).
5. $\overline{CE}_X = V_{IL}$ means $\overline{CE}_{0X} = V_{IL}$ and $CE_{1X} = V_{IH}$
   $\overline{CE}_X = V_{IH}$ means $\overline{CE}_{0X} = V_{IH}$ or $CE_{1X} = V_{IL}$
   $\overline{CE}_X \leq 0.2V$ means $\overline{CE}_{0X} \leq 0.2V$ and $CE_{1X} \geq V_{CC} - 0.2V$
   $\overline{CE}_X \geq V_{CC} - 0.2V$ means $\overline{CE}_{0X} \geq V_{CC} - 0.2V$ or $CE_{1X} \leq 0.2V$
   "X" represents "L" for left port or "R" for right port.
6. 'X' in part number indicates power rating (S or L).

AC Test Conditions

Input Pulse Levels	GND to 3.0V
Input Rise/Fall Times	3ns Max.
Input Timing Reference Levels	1.5V
Output Reference Levels	1.5V
Output Load	Figures 1,2 and 3

3495 tbl 10



3495 drw 03

Figure 1. AC Output Test load.

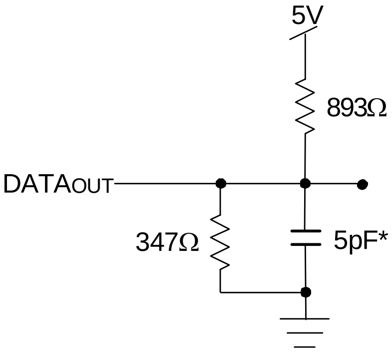


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Figure 2. Output Test Load
(For t_{CKLZ}, t_{CKHZ}, t_{OLZ}, and t_{OHZ}).
*Including scope and jig.

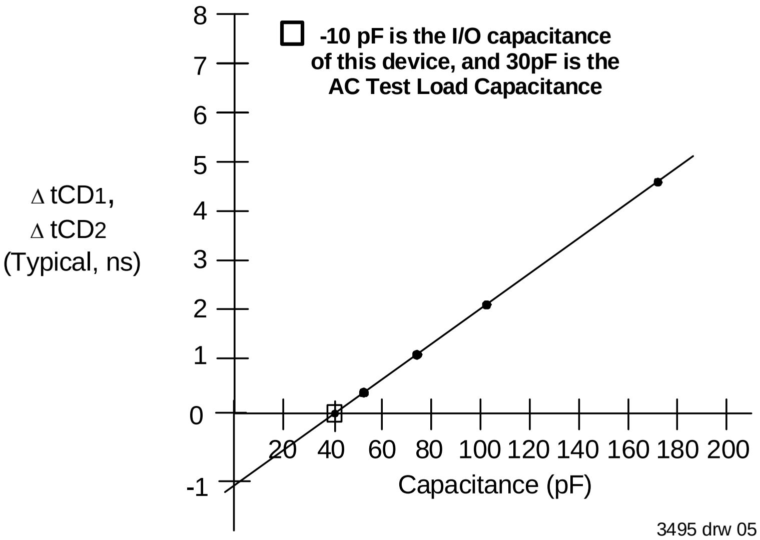

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Figure 3. Typical Output Derating (Lumped Capacitive Load).

AC Electrical Characteristics Over the Operating Temperature Range (Read and Write Cycle Timing)(3,4) (V_{CC} = 5V ± 10%, T_A = 0°C to +70°C)

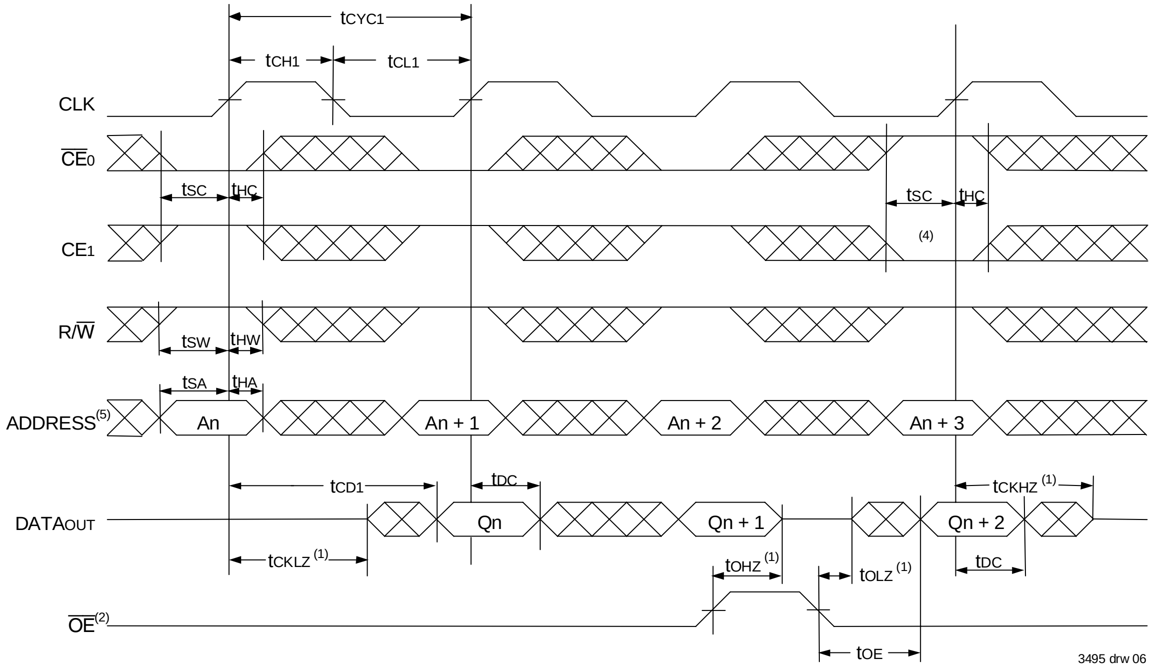
		709079X9 Com'l Only		709079X12 Com'l & Ind		709079X15 Com'l Only		
Symbol	**Parameter**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Unit**
t_{CYC1}	Clock Cycle Time (Flow-Through)(2)	25	—	30	—	35	—	ns
t_{CYC2}	Clock Cycle Time (Pipelined)(2)	15	—	20	—	25	—	ns
t_{CH1}	Clock High Time (Flow-Through)(2)	12	—	12	—	12	—	ns
t_{CL1}	Clock Low Time (Flow-Through)(2)	12	—	12	—	12	—	ns
t_{CH2}	Clock High Time (Pipelined)(2)	6	—	8	—	10	—	ns
t_{CL2}	Clock Low Time (Pipelined)(2)	6	—	8	—	10	—	ns
t_R	Clock Rise Time	—	3	—	3	—	3	ns
t_F	Clock Fall Time	—	3	—	3	—	3	ns
t_{SA}	Address Setup Time	4	—	4	—	4	—	ns
t_{HA}	Address Hold Time	1	—	1	—	1	—	ns
t_{SC}	Chip Enable Setup Time	4	—	4	—	4	—	ns
t_{HC}	Chip Enable Hold Time	1	—	1	—	1	—	ns
t_{SW}	R/W Setup Time	4	—	4	—	4	—	ns
t_{HW}	R/W Hold Time	1	—	1	—	1	—	ns
t_{SD}	Input Data Setup Time	4	—	4	—	4	—	ns
t_{HD}	Input Data Hold Time	1	—	1	—	1	—	ns
t_{SAD}	$\overline{ADS}$ Setup Time	4	—	4	—	4	—	ns
t_{HAD}	$\overline{ADS}$ Hold Time	1	—	1	—	1	—	ns
t_{SCN}	$\overline{CNTEN}$ Setup Time	4	—	4	—	4	—	ns
t_{HCN}	$\overline{CNTEN}$ Hold Time	1	—	1	—	1	—	ns
t_{SRST}	$\overline{CNTRST}$ Setup Time	4	—	4	—	4	—	ns
t_{HRST}	$\overline{CNTRST}$ Hold Time	1	—	1	—	1	—	ns
t_{OE}	Output Enable to Data Valid	—	12	—	12	—	15	ns
t_{OLZ}	Output Enable to Output Low-Z(1)	2	—	2	—	2	—	ns
t_{OHZ}	Output Enable to Output High-Z(1)	1	7	1	7	1	7	ns
t_{CD1}	Clock to Data Valid (Flow-Through)(2)	—	20	—	25	—	30	ns
t_{CD2}	Clock to Data Valid (Pipelined)(2)	—	9	—	12	—	15	ns
t_{DC}	Data Output Hold After Clock High	2	—	2	—	2	—	ns
t_{CKHZ}	Clock High to Output High-Z(1)	2	9	2	9	2	9	ns
t_{CKLZ}	Clock High to Output Low-Z(1)	2	—	2	—	2	—	ns
Port-to-Port Delay								
t_{CWDD}	Write Port Clock High to Read Data Delay	—	40	—	40	—	50	ns
t_{CCS}	Clock-to-Clock Setup Time	—	15	—	15	—	20	ns

3495 tbl 11

NOTES:

1. Transition is measured 0mV from Low or High-impedance voltage with the Output Test Load (Figure 2). This parameter is guaranteed by device characterization, but is not production tested.
2. The Pipelined output parameters (t_{CYC2}, t_{CD2}) apply to either port. The Right Port uses the Pipelined t_{CYC2} and t_{CD2} when $\overline{FT}$/PIPE"X" = V_{IH} and the Flow-Through parameters (t_{CYC1}, t_{CD1}) when $\overline{FT}$/PIPE"X" = V_{IL}.
3. All input signals are synchronous with respect to the clock except for the asynchronous Output Enable (OE) and $\overline{FT}$/PIPE"X". $\overline{FT}$/PIPE"X" should be treated as a DC signal, i.e. steady state during operation.
4. 'X' in part number indicates power rating (S or L).

Timing Waveform of Read Cycle for Flow-Through Output on Right Port ($\overline{\text{FT}}$/PIPE"x" = V_{IL})(3)



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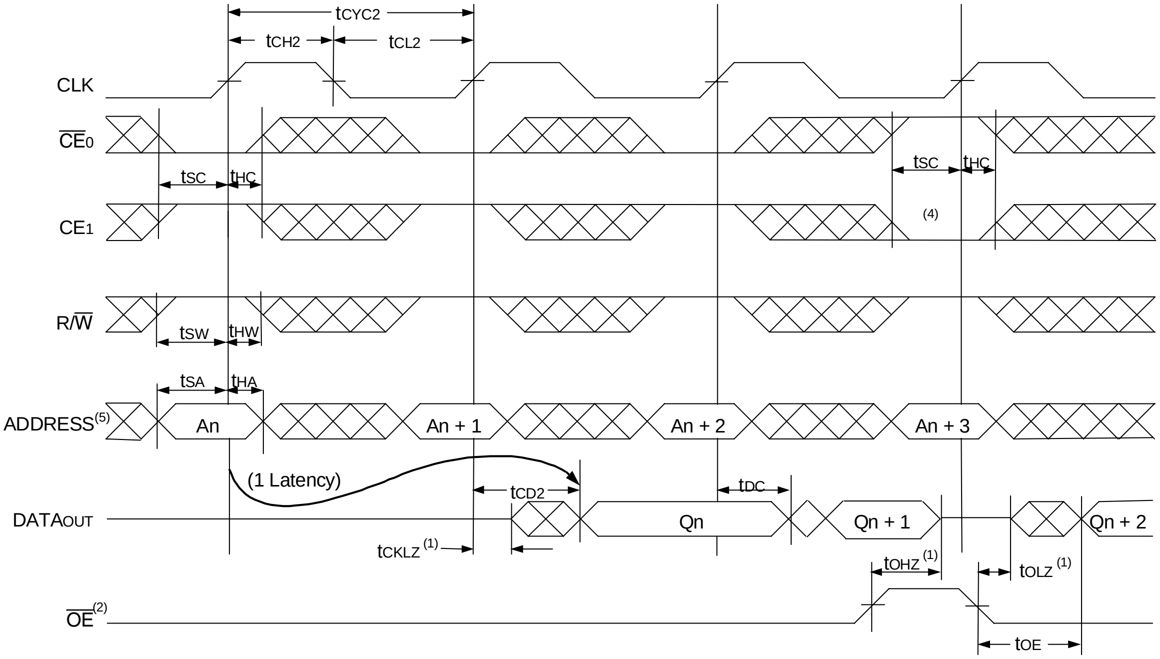
Timing Waveform of Read Cycle for Pipelined Operation ($\overline{\text{FT}}$/PIPE"x" = V_{IH})(3,6)

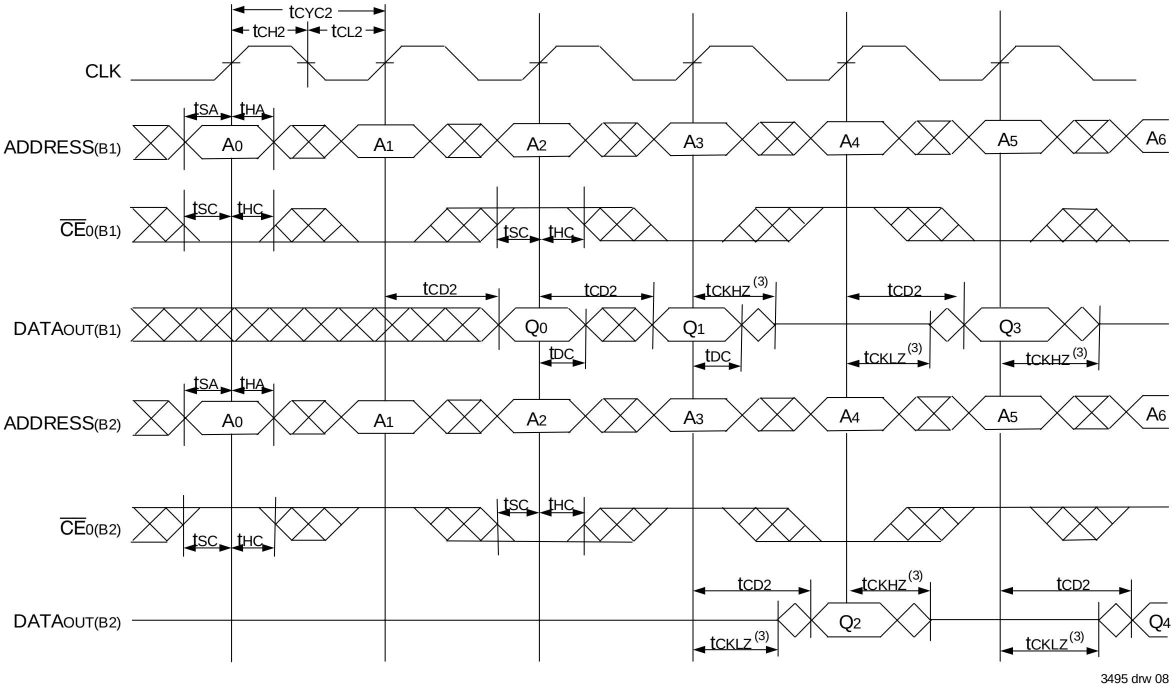


3495 drw 07

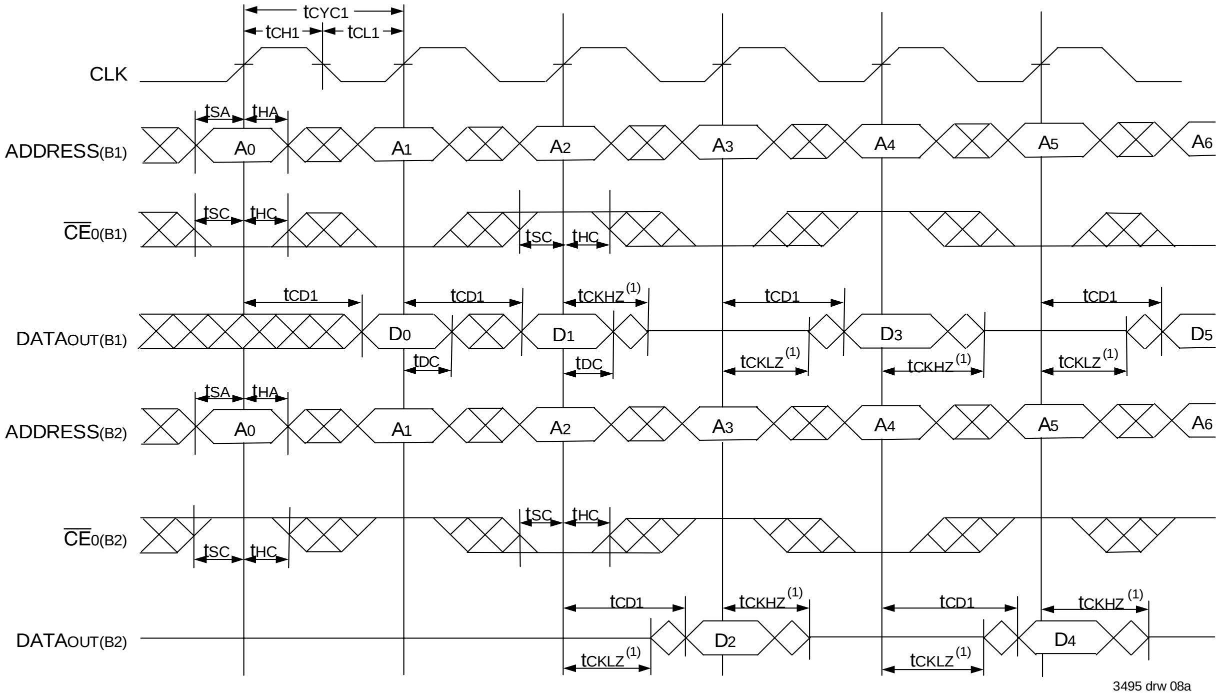
NOTES:

1. Transition is measured 0mV from Low or High-impedance voltage with the Output Test Load (Figure 2).
2. $\overline{\text{OE}}$ is asynchronously controlled; all other inputs are synchronous to the rising clock edge.
3. $\overline{\text{ADS}}$ = V_{IL}, $\overline{\text{CNTEN}}$ and $\overline{\text{CNTRST}}$ = V_{IH}.
4. The output is disabled (High-impedance state) by $\overline{\text{CE}}_0$ = V_{IH} or CE_1 = V_{IL} following the next rising edge of clock. Refer to Truth Table 1.
5. Addresses do not have to be accessed sequentially since $\overline{\text{ADS}}$ = V_{IL} constantly loads the address on the rising edge of the CLK; numbers are for reference use only.
6. "x" denotes Left or Right port. The diagram is with respect to that port.

Timing Waveform of a Bank Select Pipelined Read$^{(1,2)}$



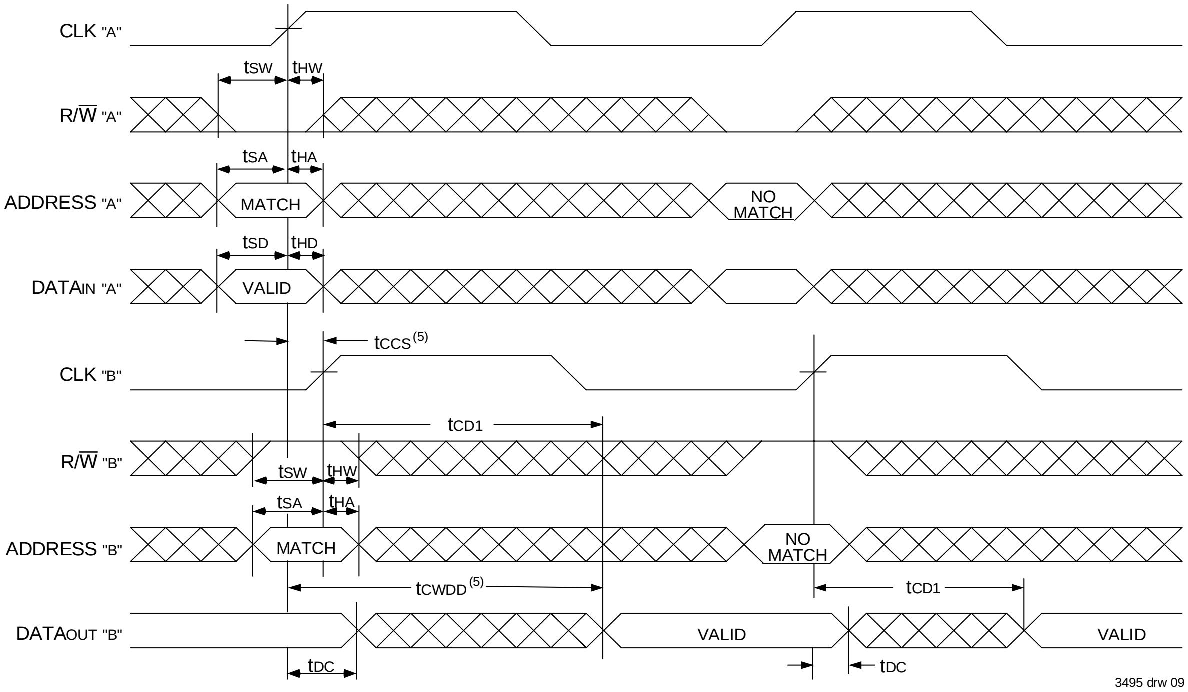
Timing Waveform of a Bank Select Flow-Through Read$^{(6)}$



NOTES:

1. B1 Represents Bank #1; B2 Represents Bank #2. Each Bank consists of one IDT709079 for this waveform, and are setup for depth expansion in this example. ADDRESS$_{(B1)}$ = ADDRESS$_{(B2)}$ in this situation.
2. $\overline{\text{OE}}$ and $\overline{\text{ADS}}$ = V$_{IL}$; CE$_{1(B1)}$, CE$_{1(B2)}$, R/$\overline{\text{W}}$, $\overline{\text{CNTEN}}$, and $\overline{\text{CNTRST}}$ = V$_{IH}$.
3. Transition is measured 0mV from Low or High-impedance voltage with the Output Test Load (Figure 2).
4. $\overline{\text{CE}}_0$ and $\overline{\text{ADS}}$ = V$_{IL}$; CE$_1$, $\overline{\text{CNTEN}}$, and $\overline{\text{CNTRST}}$ = V$_{IH}$.
5. $\overline{\text{OE}}$ = V$_{IL}$ for the Right Port, which is being read from. $\overline{\text{OE}}$ = V$_{IH}$ for the Left Port, which is being written to.
6. If t$_{CCS}$ $\leq$ maximum specified, then data from right port READ is not valid until the maximum specified for t$_{CWDD}$.
   If t$_{CCS}$ > maximum specified, then data from right port READ is not valid until t$_{CCS}$ + t$_{CD1}$. t$_{CWDD}$ does not apply in this case.

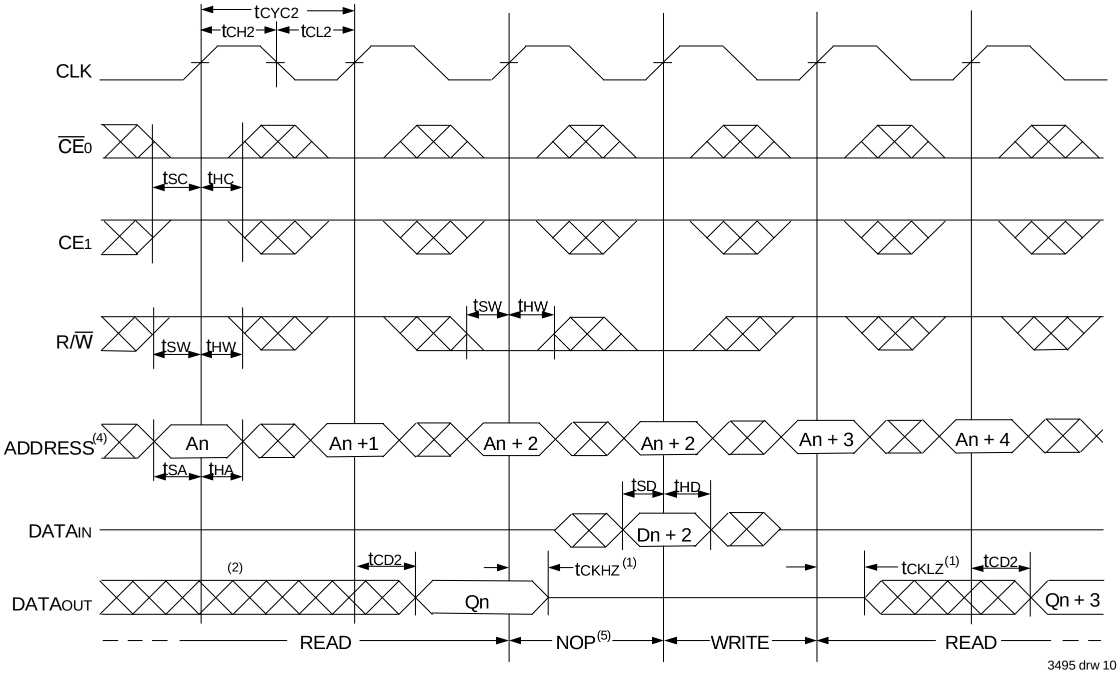
Timing Waveform of a Left Port Write Flow-Through Right Port Read(1,2,3,4)



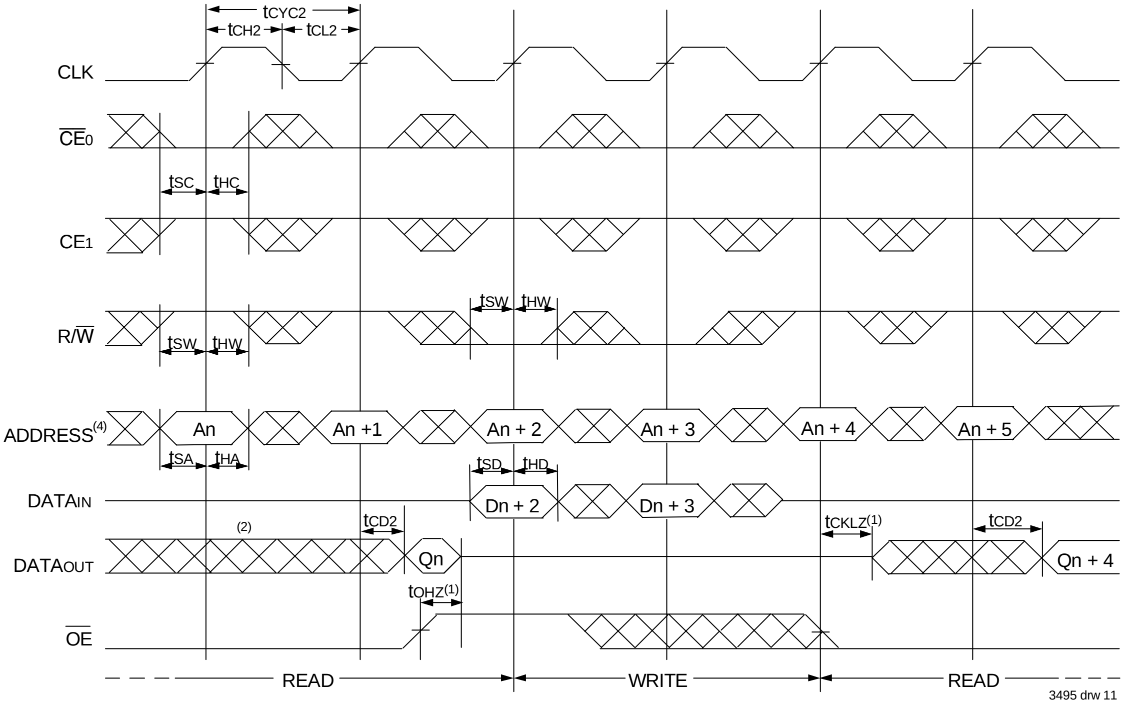
NOTES:

1. $\overline{OE}$ and $\overline{ADS}$ = V_{IL}; $CE_{1(B1)}$, $CE_{1(B2)}$, R/$\overline{W}$, $\overline{CNTEN}$, and $\overline{CNTRST}$ = V_{IH}.
2. Transition is measured 0mV from Low or High-impedance voltage with the Output Test Load (Figure 2).
3. $\overline{CE}_0$ and $\overline{ADS}$ = V_{IL}; CE_1, $\overline{CNTEN}$, and $\overline{CNTRST}$ = V_{IH}.
4. $\overline{OE}$ = V_{IL} for the Right Port, which is being read from. $\overline{OE}$ = V_{IH} for the Left Port, which is being written to.
5. If $t_{CCS} \leq$ maximum specified, then data from right port READ is not valid until the maximum specified for t_{CWDD}.
   If t_{CCS} > maximum specified, then data from right port READ is not valid until $t_{CCS} + t_{CD1}$. t_{CWDD} does not apply in this case.

Timing Waveform of Pipelined Read-to-Write-to-Read ($\overline{OE}$ = V_{IL})(3)



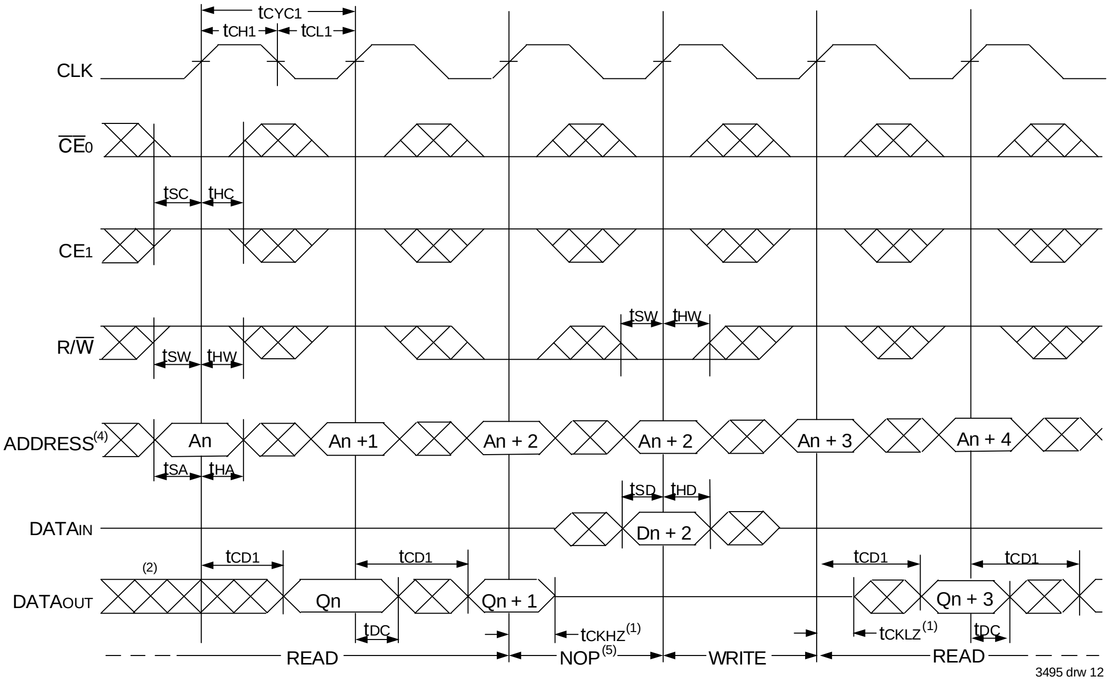
Timing Waveform of Pipelined Read-to-Write-to-Read ($\overline{OE}$ Controlled)(3)



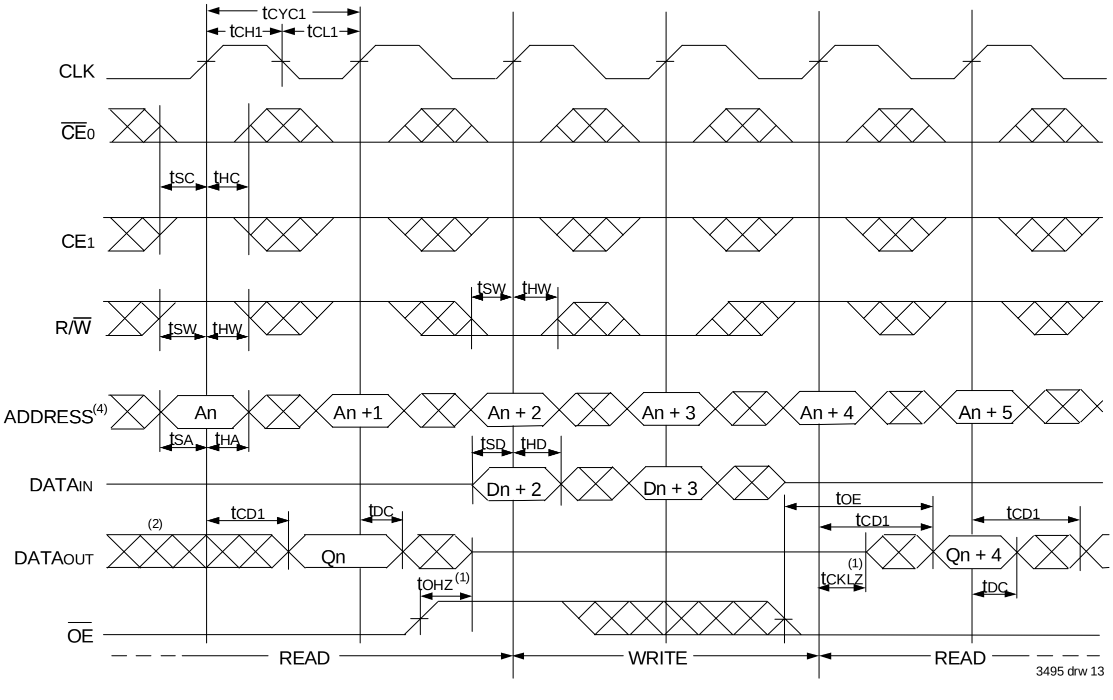
NOTES:

1. Transition is measured 0mV from Low or High-impedance voltage with the Output Test Load (Figure 2).
2. Output state (High, Low, or High-impedance) is determined by the previous cycle control signals.
3. $\overline{CE}_0$ and ADS = V_{IL}; CE_1, $\overline{CNTEN}$, and $\overline{CNTRST}$ = V_{IH}.
4. Addresses do not have to be accessed sequentially since $\overline{ADS}$ = V_{IL} constantly loads the address on the rising edge of the CLK; numbers are for reference use only.
5. "NOP" is "No Operation." Data in memory at the selected address may be corrupted and should be re-written to guarantee data integrity.

Timing Waveform of Flow-Through Read-to-Write-to-Read ($\overline{OE}$ = VIL)[3]



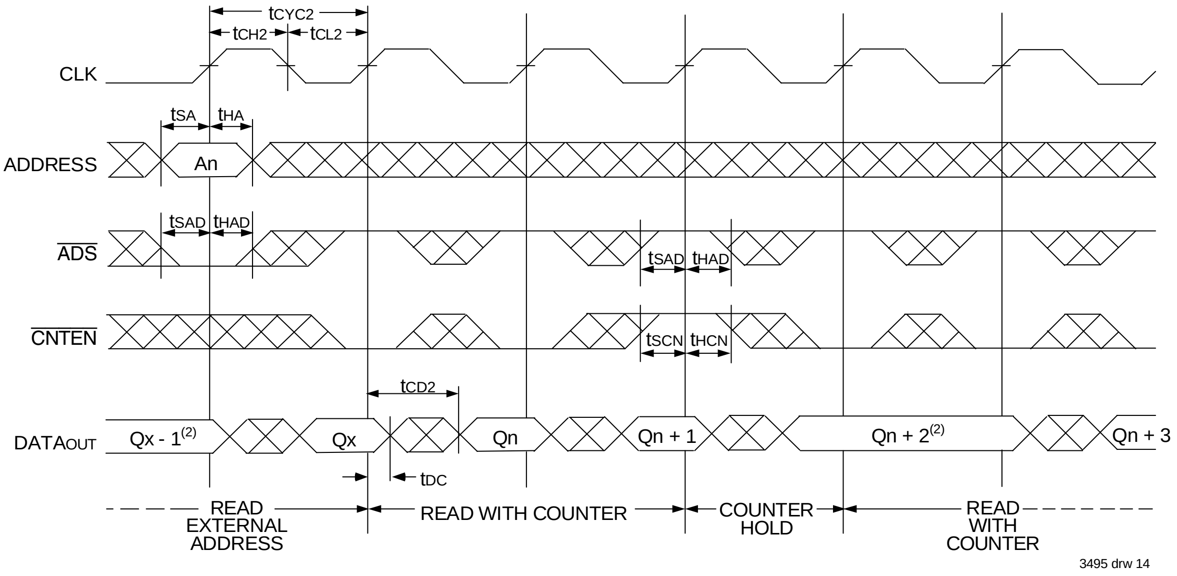
Timing Waveform of Flow-Through Read-to-Write-to-Read ($\overline{OE}$ Controlled)[3]



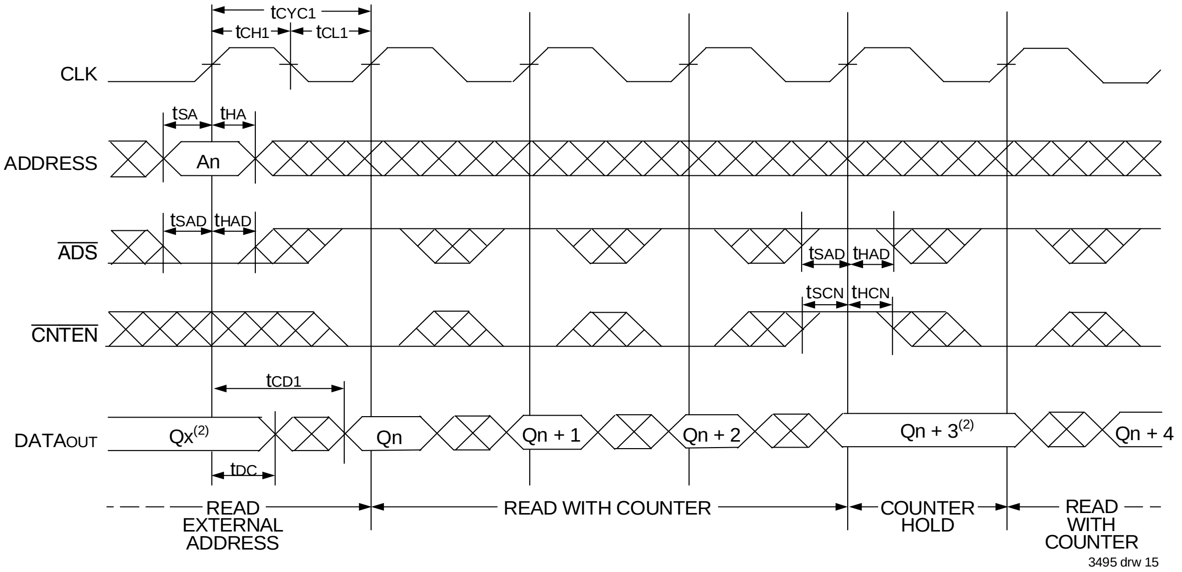
NOTES:

1. Transition is measured 0mV from Low or High-impedance voltage with the Output Test Load (Figure 2).
2. Output state (High, Low, or High-impedance) is determined by the previous cycle control signals.
3. $\overline{CE_0}$ and $\overline{ADS}$ = VIL; CE1, $\overline{CNTEN}$, and $\overline{CNTRST}$ = VIH.
4. Addresses do not have to be accessed sequentially since $\overline{ADS}$ = VIL constantly loads the address on the rising edge of the CLK; numbers are for reference use only.
5. "NOP" is "No Operation." Data in memory at the selected address may be corrupted and should be re-written to guarantee data integrity.

Timing Waveform of Pipelined Read with Address Counter Advance(1)



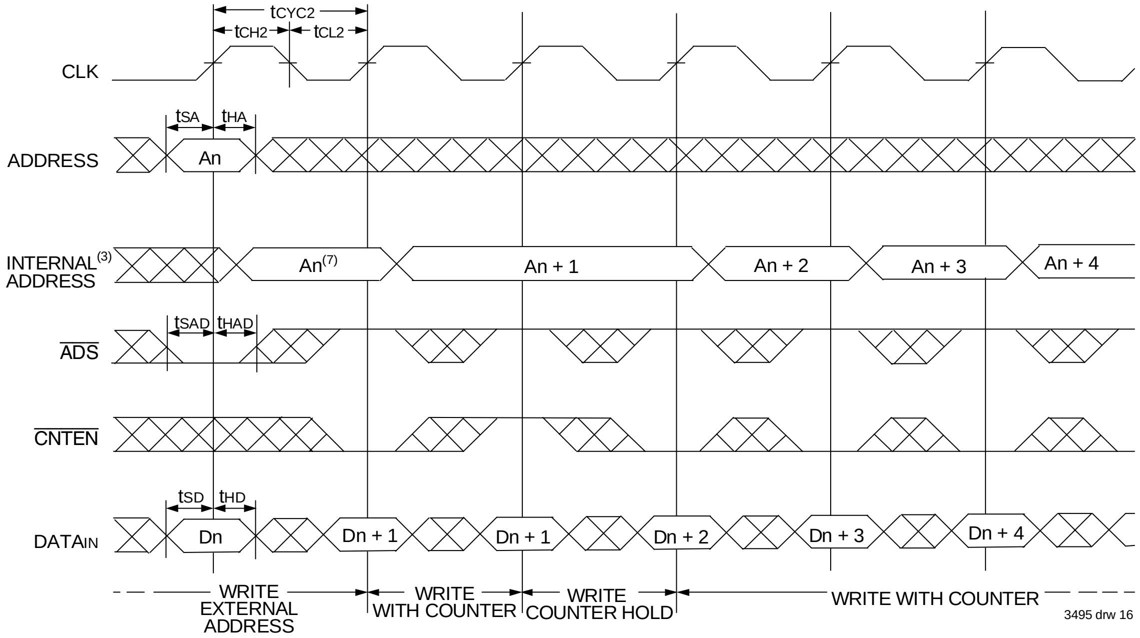
Timing Waveform of Flow-Through Read with Address Counter Advance(1)



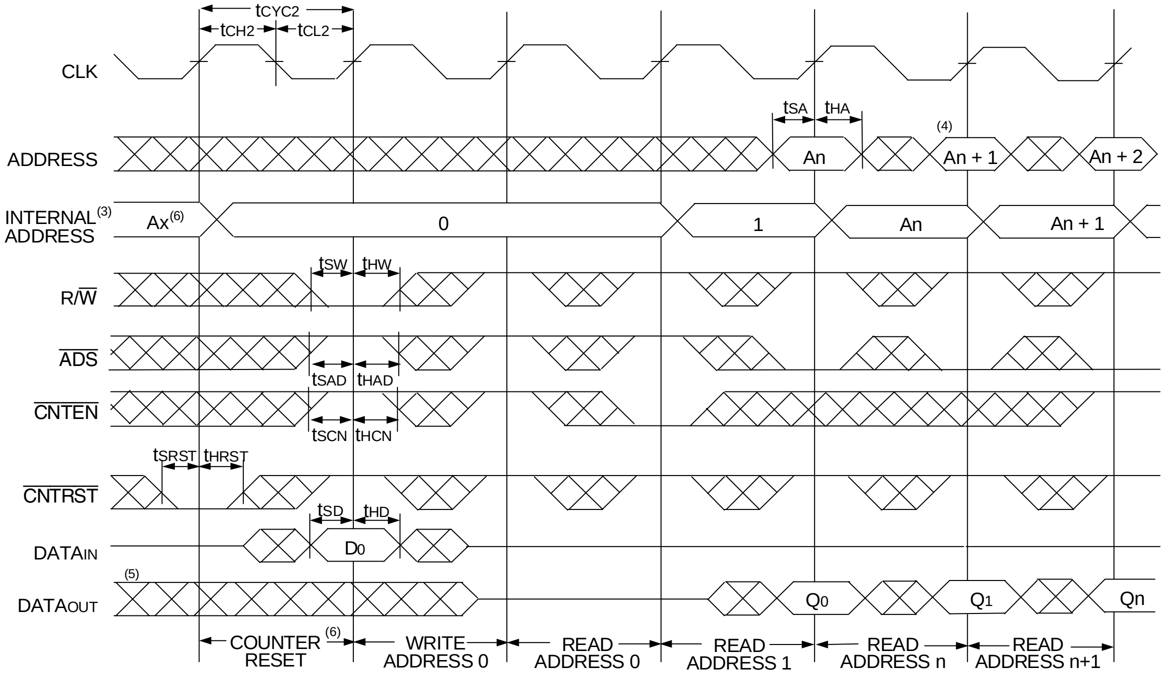
NOTES:

1. $\overline{CE}_0$ and $\overline{OE}$ = V_{IL}; CE_1, R/$\overline{W}$, and $\overline{CNTRST}$ = V_{IH}.
2. If there is no address change via $\overline{ADS}$ = V_{IL} (loading a new address) or $\overline{CNTEN}$ = V_{IL} (advancing the address), i.e. $\overline{ADS}$ = V_{IH} and $\overline{CNTEN}$ = V_{IH}, then the data output remains constant for subsequent clocks.

Timing Waveform of Write with Address Counter Advance (Flow-Through or Pipelined Outputs)(1)



Timing Waveform of Counter Reset (Pipelined Outputs)(2)



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NOTES:

1. $\overline{\text{CE}}_0$ and R/$\overline{\text{W}}$ = V_{IL}; CE_1 and $\overline{\text{CNTRST}}$ = V_{IH}.
2. $\overline{\text{CE}}_0$ = V_{IL}; CE_1 = V_{IH}.
3. The "Internal Address" is equal to the "External Address" when $\overline{\text{ADS}}$ = V_{IL} and equals the counter output when $\overline{\text{ADS}}$ = V_{IH}.
4. Addresses do not have to be accessed sequentially since $\overline{\text{ADS}}$ = V_{IL} constantly loads the address on the rising edge of the CLK; numbers are for reference use only.
5. Output state (High, Low, or High-impedance) is determined by the previous cycle control signals.
6. No dead cycle exists during counter reset. A READ or WRITE cycle may be coincidental with the counter reset. ADDR_0 will be accessed. Extra cycles are shown here simply for clarification.
7. $\overline{\text{CNTEN}}$ = V_{IL} advances Internal Address from ‘An’ to ‘An +1’. The transition shown indicates the time required for the counter to advance. The ‘An +1’Address is written to during this cycle.

Functional Description

The IDT709079 provides a true synchronous Dual-Port Static RAM interface. Registered inputs provide minimal set-up and hold times on address, data, and all critical control inputs. All internal registers are clocked on the rising edge of the clock signal, however, the self-timed internal write pulse is independent of the LOW to HIGH transition of the clock signal.

An asynchronous output enable is provided to ease asynchronous bus interfacing. Counter enable inputs are also provided to stall the operation of the counter registers for fast interleaved memory applications.

A HIGH on $\overline{\text{CE}}_0$ or a LOW on CE_1 for one clock cycle will power down the internal circuitry to reduce static power consumption. Multiple chip enables allow easier banking of multiple IDT709079's for depth expansion configurations. When the Pipelined output mode is enabled, two cycles are required with $\overline{\text{CE}}_0$ LOW and CE_1 HIGH to re-activate the outputs.

Depth and Width Expansion

The IDT709079 features dual chip enables (refer to Truth Table I) in order to facilitate rapid and simple depth expansion with no requirements for external logic. Figure 4 illustrates how to control the various chip enables in order to expand two devices in depth.

The 709079 can also be used in applications requiring expanded width, as indicated in Figure 4. Since the banks are allocated at the discretion of the user, the external controller can be set up to drive the input signals for the various devices as required to allow for 16-bit or wider applications.

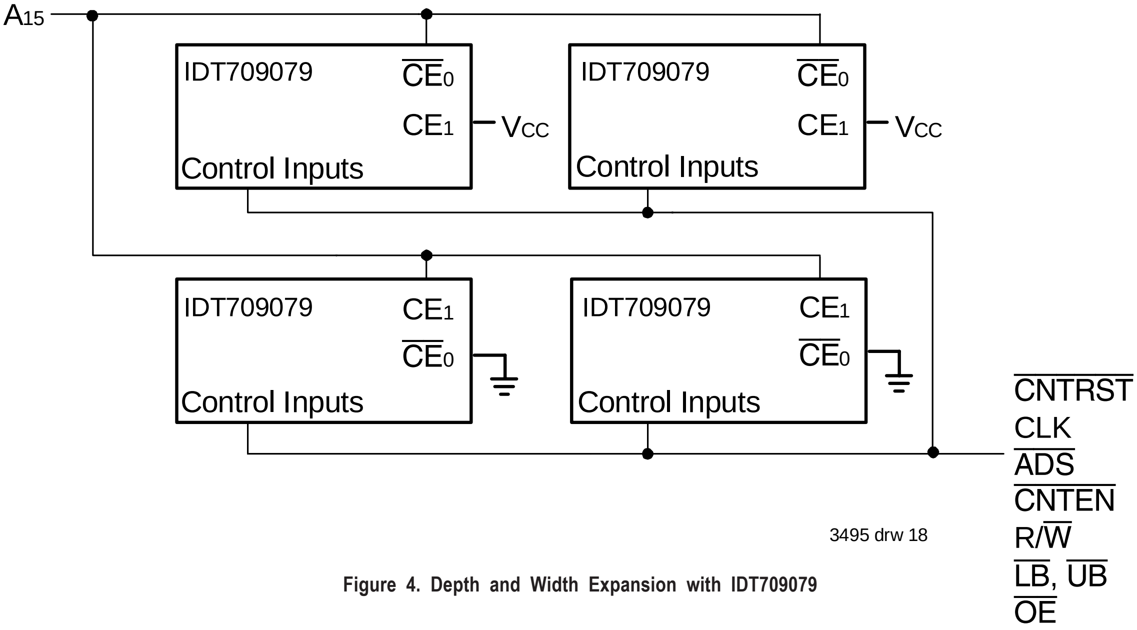
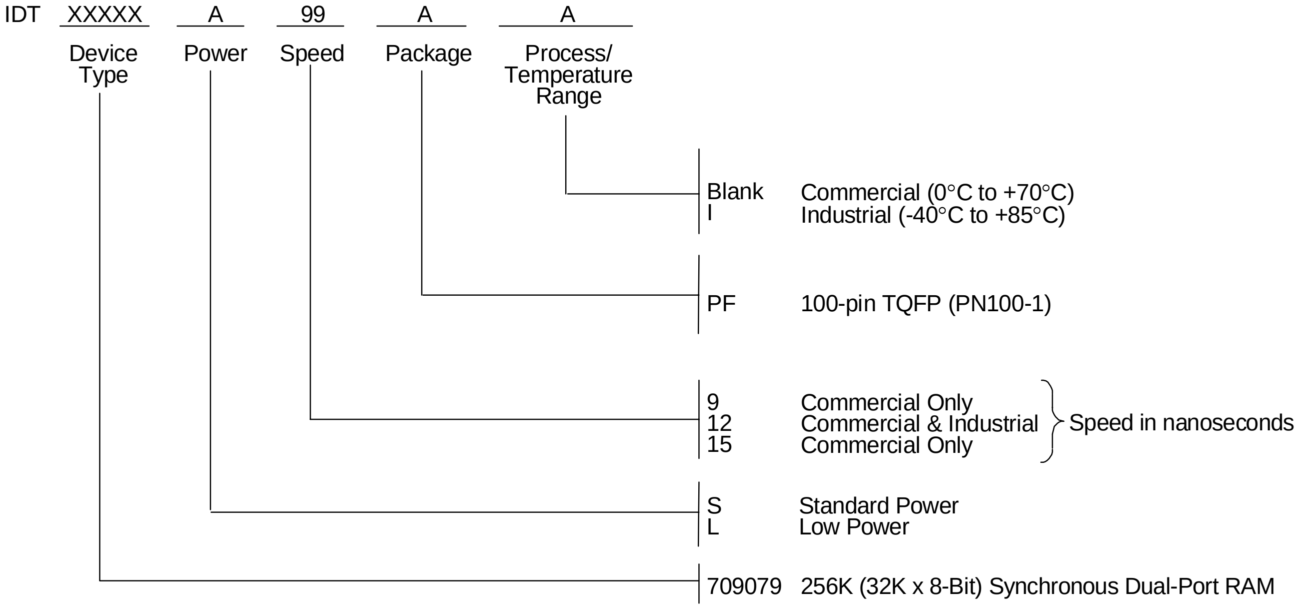


Figure 4. Depth and Width Expansion with IDT709079

Ordering Information



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NOTES:

1. Contact your local sales office for industrial temp range for other speeds, packages and powers.

Preliminary Datasheet: Definition

"PRELIMINARY" datasheets contain descriptions for products that are in early release.

Datasheet Document History

1/12/99:	Initiated datasheet document history
	Converted to new format
	Cosmetic and typographical corrections
	Added additional notes to pin configurations
	Page 14 Added Depth & Width section
6/7/99:	Changed drawing format
	Page 3 Deleted note 6 for Table II
12/08/02:	Combined Pipelined 70V9079 family and Flow-through 70V907 family offerings into one data sheet
	Page 2 Added date revision to pin configurations
	Page 3 Changed information in Truth Table II
	Page 4 Increased storage temperature parameter, clarified T_A parameter
	Page 5 Changed DC Electrical parameters–changed wording from "Open" to "Disabled"

Continued on page 17

Datasheet Document History (cont'd)

12/08/02: Page 4, 5 & 7 Removed industrial temp footnote from all tables
Page 5 & 7 Added 12ns industrial temp to DC & AC Electrical Characteristics
Page 7, 8, 11 & 12 Changed ±200mV in waveform notes to 0mV
Page 16 Added 12ns industrial temp and industrial temp offering footnote to ordering information
Page 1 & 17 Replaced TM logo with ® logo

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