

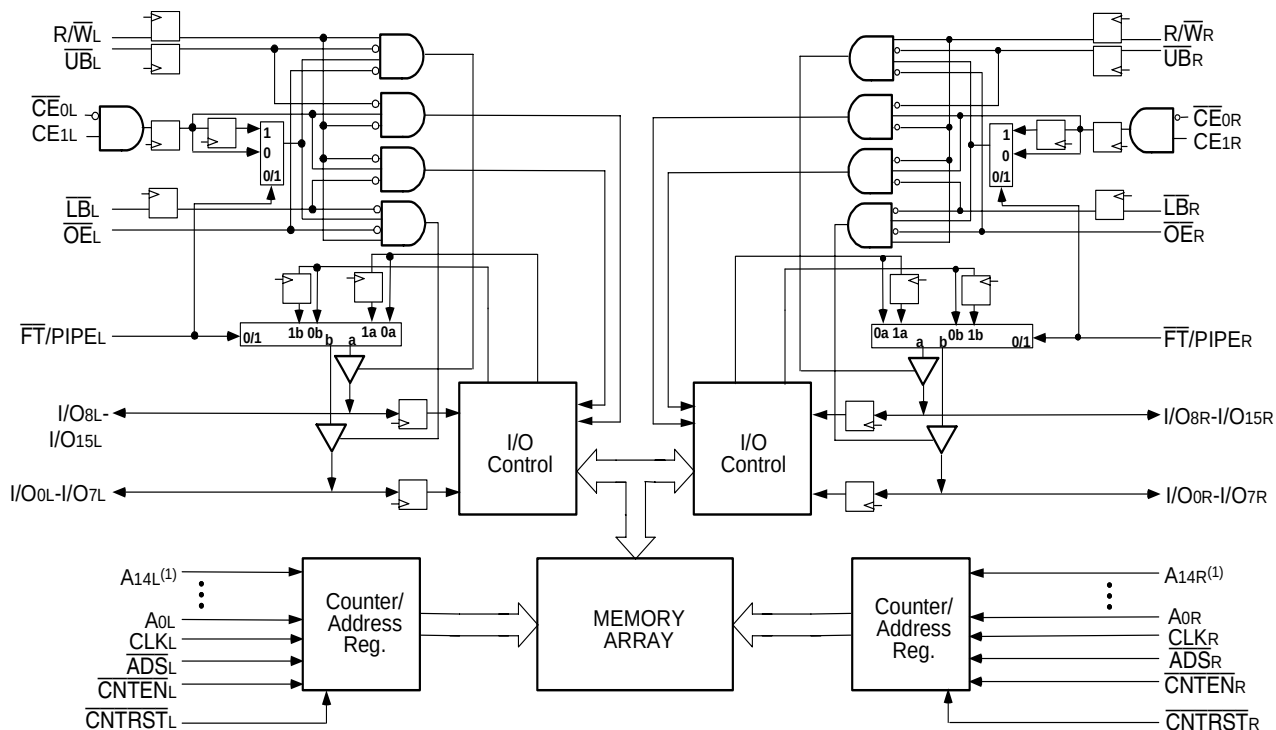
*SPECIFIED PART IS OBSOLETE NOT RECOMMENDED FOR NEW DESIGNS

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
 - IDT709279/69S
Active: 950mW (typ.)
Standby: 5mW (typ.)
 - IDT709279/69L
Active: 950mW (typ.)
Standby: 1mW (typ.)
- ♦ Flow-Through or Pipelined output mode on either port via the $\overline{\text{FT}}/\text{PIPE}$ pin
- ♦ Dual chip enables allow for depth expansion without additional logic
- ♦ Counter enable and reset features
- ♦ 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, 67MHz operation in Pipelined output mode
- ♦ Separate upper-byte and lower-byte controls for multiplexed bus and bus matching compatibility
- ♦ TTL-compatible, single 5V ($\pm 10\%$) power supply
- ♦ Industrial temperature range (-40°C to $+85^{\circ}\text{C}$) is available for selected speeds
- ♦ Available in a 100-pin Thin Quad Flatpack (TQFP) package
- ♦ Green parts available. See ordering information

Note that information regarding recently obsoleted parts is included in this datasheet for customer convenience.

Functional Block Diagram



3243 drw 01

NOTE:

1. A14x is a NC for IDT709269.

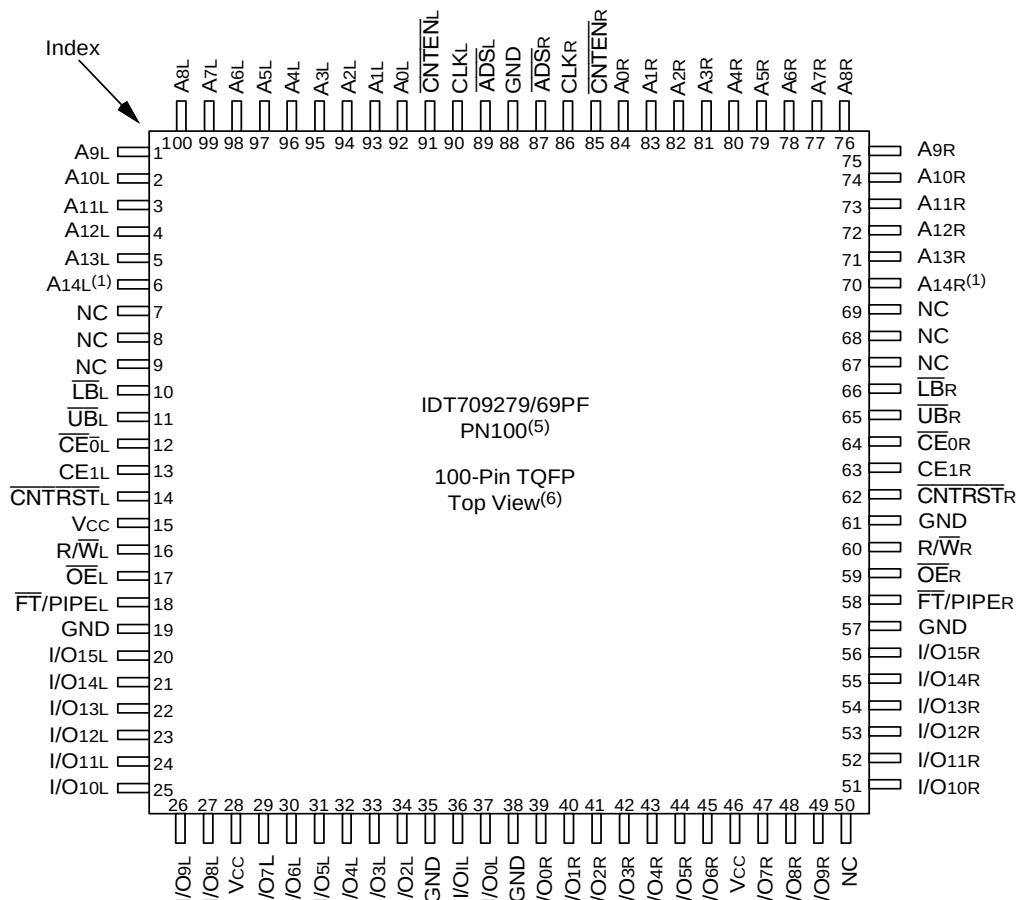
FEBRUARY 2018

Description

The IDT709279/69 is a high-speed 32/16K x 16 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 IDT709279/69 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 CMOS high-performance technology, these devices typically operate on only 950mW of power.

Pin Configurations^(2,3,4)



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NOTES:

1. A14x is a NC for IDT709269.
2. All Vcc pins must be connected to power supply.
3. All GND pins must be connected to ground supply.
4. Package body is approximately 14mm x 14mm x 1.4mm
5. This package code is used to reference the package diagram.
6. This text does not indicate orientation of the actual part-marking.

Pin Names

Left Port	Right Port	Names
$\overline{CE}_{0L}$, CE_{1L}	$\overline{CE}_{0R}$, CE_{1R}	Chip Enables ⁽³⁾
$R/\overline{W}_L$	$R/\overline{W}_R$	Read/Write Enable
$\overline{OE}_L$	$\overline{OE}_R$	Output Enable
$A_{0L} - A_{14L}^{(1)}$	$A_{0R} - A_{14R}^{(1)}$	Address
$I/O_{0L} - I/O_{15L}$	$I/O_{0R} - I/O_{15R}$	Data Input/Output
CLK_L	CLK_R	Clock
$\overline{UB}_L$	$\overline{UB}_R$	Upper Byte Select ⁽²⁾
$\overline{LB}_L$	$\overline{LB}_R$	Lower Byte Select ⁽²⁾
$\overline{ADS}_L$	$\overline{ADS}_R$	Address Strobe
$\overline{CNTEN}_L$	$\overline{CNTEN}_R$	Counter Enable
$\overline{CNTRST}_L$	$\overline{CNTRST}_R$	Counter Reset
$\overline{FT}/PIPE_L$	$\overline{FT}/PIPE_R$	Flow-Through/Pipeline
Vss		Power
GND		Ground

NOTES:

1. A14x is a NC for IDT709269.
2. $\overline{LB}$ and $\overline{UB}$ are single buffered regardless of state of $\overline{FT}/PIPE$.
3. $\overline{CE}_0$ and CE_1 are single buffered when $\overline{FT}/PIPE = V_{IL}$, $\overline{CE}_0$ and CE_1 are double buffered when $\overline{FT}/PIPE = V_{IH}$, i.e. the signals take two cycles to deselect.

3243 tbl 01

Truth Table I—Read/Write and Enable Control^(1,2,3)

$\overline{OE}$	CLK	$\overline{CE}_0$	CE_1	$\overline{UB}$	$\overline{LB}$	R/W	Upper Byte I/O ₈₋₁₅	Lower Byte I/O ₀₋₇	Mode
X	↑	H	X	X	X	X	High-Z	High-Z	Deselected—Power Down
X	↑	X	L	X	X	X	High-Z	High-Z	Deselected—Power Down
X	↑	L	H	H	H	X	High-Z	High-Z	Both Bytes Deselected
X	↑	L	H	L	H	L	DIN	High-Z	Write to Upper Byte Only
X	↑	L	H	H	L	L	High-Z	DIN	Write to Lower Byte Only
X	↑	L	H	L	L	L	DIN	DIN	Write to Both Bytes
L	↑	L	H	L	H	H	DOUT	High-Z	Read Upper Byte Only
L	↑	L	H	H	L	H	High-Z	DOUT	Read Lower Byte Only
L	↑	L	H	L	L	H	DOUT	DOUT	Read Both Bytes
H	X	L	H	L	L	X	High-Z	High-Z	Outputs Disabled

NOTES:

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

3243 tbl 02

Truth Table II—Address Counter Control^(1,2)

External Address	Previous Internal Address	Internal Address Used	CLK	$\overline{ADS}$	$\overline{CNTEN}$	$\overline{CNTRST}$	I/O ⁽³⁾	MODE
An	X	An	↑	L ⁽⁴⁾	X	H	D _{I/O} (n)	External Address Used
X	An	An + 1	↑	H	L ⁽⁵⁾	H	D _{I/O} (n+1)	Counter Enabled—Internal Address generation
X	An + 1	An + 1	↑	H	H	H	D _{I/O} (n+1)	External Address Blocked—Counter disabled (An + 1 reused)
X	X	A0	↑	X	X	L ⁽⁴⁾	D _{I/O} (0)	Counter Reset to Address 0

3243 tbl 03

NOTES:

- "H" = V_{IH}, "L" = V_{IL}, "X" = Don't Care.
- $\overline{CE0}$, $\overline{LB}$, $\overline{UB}$, and $\overline{OE}$ = V_{IL}; CE1 and R/W = V_{IH}.
- Outputs configured in Flow-Through Output mode: if outputs are in Pipelined mode the data out will be delayed by one cycle.
- $\overline{ADS}$ is independent of all other signals including $\overline{CE0}$, CE1, $\overline{UB}$ and $\overline{LB}$.
- The address counter advances if $\overline{CNTEN}$ = V_{IL} on the rising edge of CLK, regardless of all other signals including $\overline{CE0}$, CE1, $\overline{UB}$ and $\overline{LB}$.

Recommended Operating Temperature and Supply Voltage⁽¹⁾

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

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NOTES:

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

Recommended DC Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
Vcc	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

3243 tbl 05

NOTES:

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

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
T _{JN}	Junction Temperature	+150	°C
I _{OUT}	DC Output Current	50	mA

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NOTES:

- 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.
- V_{TERM} must not exceed Vcc + 10% for more than 25% of the cycle time or 10ns maximum, and is limited to ≤ 20mA for the period of V_{TERM} ≥ Vcc + 10%.
- Ambient Temperature Under Bias. No AC Conditions. Chip Deselect.

Capacitance⁽¹⁾

(T_A = +25°C, f = 1.0MHz)

Symbol	Parameter	Conditions ⁽²⁾	Max.	Unit
C _{IN}	Input Capacitance	V _{IN} = 0V	9	pF
C _{OUT} ⁽²⁾	Output Capacitance	V _{OUT} = 0V	10	pF

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NOTES:

- These parameters are determined by device characterization, but are not production tested.
- C_{OUT} also references C_{I/O}.

DC Electrical Characteristics Over the Operating Temperature Supply Voltage Range ($V_{CC} = 5.0V \pm 10\%$)

Symbol	Parameter	Test Conditions	709279/69S/L		Unit
			Min.	Max.	
$ I_{LI} $	Input Leakage Current ⁽¹⁾	$V_{CC} = 5.5V, V_{IN} = 0V \text{ to } V_{CC}$	—	10	μA
$ I_{LO} $	Output Leakage Current	$CE_0 = V_{IH} \text{ or } CE_1 = V_{IL}, V_{OUT} = 0V \text{ to } V_{CC}$	—	10	μA
V_{OL}	Output Low Voltage	$I_{OL} = +4mA$	—	0.4	V
V_{OH}	Output High Voltage	$I_{OH} = -4mA$	2.4	—	V

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NOTE:

- At $V_{CC} \leq 2.0V$ input leakages are undefined.

DC Electrical Characteristics Over the Operating Temperature and Supply Voltage Range⁽⁶⁾ ($V_{CC} = 5V \pm 10\%$)

Symbol	Parameter	Test Condition	Version		709279/69X9 Com'l Only		709279/69X12 Com'l & Ind		709279/69X15 Com'l Only		Unit
					Typ. ⁽⁴⁾	Max.	Typ. ⁽⁴⁾	Max.	Typ. ⁽⁴⁾	Max.	
ICC	Dynamic Operating Current (Both Ports Active)	$\overline{CE}_L$ and $\overline{CE}_R = V_{IL}$ Outputs Disabled $f = f_{MAX}^{(1)}$	COM'L	S L	210 210	390 350	200 200	345 305	190 190	325 285	mA
			IND	S L	— —	— —	200 200	380 340	— —	— —	
ISB1	Standby Current (Both Ports - TTL Level Inputs)	$\overline{CE}_L = \overline{CE}_R = V_{IH}$ $f = f_{MAX}^{(1)}$	COM'L	S L	50 50	135 115	50 50	110 90	50 50	110 90	mA
			IND	S L	— —	— —	50 50	125 105	— —	— —	
ISB2	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 L	140 140	270 240	130 130	230 200	120 120	220 190	mA
			IND	S L	— —	— —	130 130	245 215	— —	— —	
ISB3	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 L	1.0 0.2	15 5	1.0 0.2	15 5	1.0 0.2	15 5	mA
			IND	S L	— —	— —	1.0 0.2	15 5	— —	— —	
ISB4	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 L	130 130	245 225	120 120	205 185	110 110	195 175	mA
			IND	S L	— —	— —	120 120	220 200	— —	— —	

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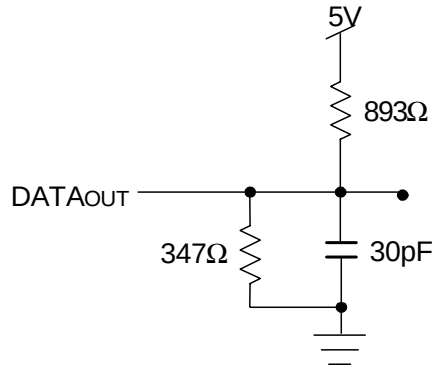
NOTES:

- 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.
- $f = 0$ means no address, clock, or control lines change. Applies only to input at CMOS level standby.
- Port "A" may be either left or right port. Port "B" is the opposite from port "A".
- $V_{CC} = 5V, T_A = 25^\circ C$ for Typ, and are not production tested. $I_{CC} @ f=0 = 150mA$ (Typ).
- $\overline{CE}_X = V_{IL}$ 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.
- "X" in part numbers indicate power rating (S or L).

AC Test Conditions

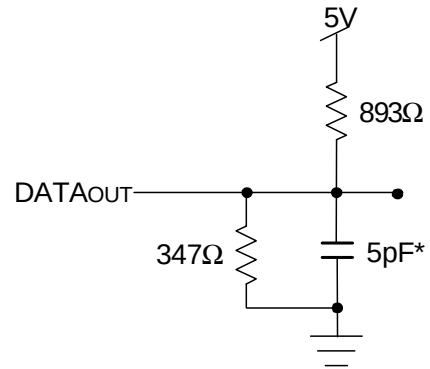
Input Pulse Levels	GND to 3.0V
Input Rise/Fall Times	3ns Max.
Input Timing Reference Levels	1.5V
Output Reference Levels	1.5V
Output Load	Figures 1,2 and 3

3243 tbl 10



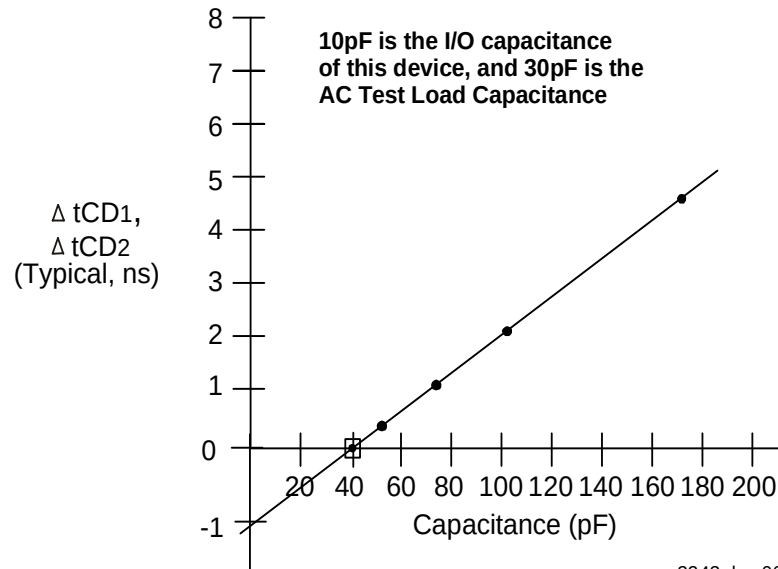
3243 drw 04

Figure 1. AC Output Test load.



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Figure 2. Output Test Load
(For tCKLZ, tCKHZ, tOLZ, and tOHZ).
*Including scope and jig.



3243 drw 06

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

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

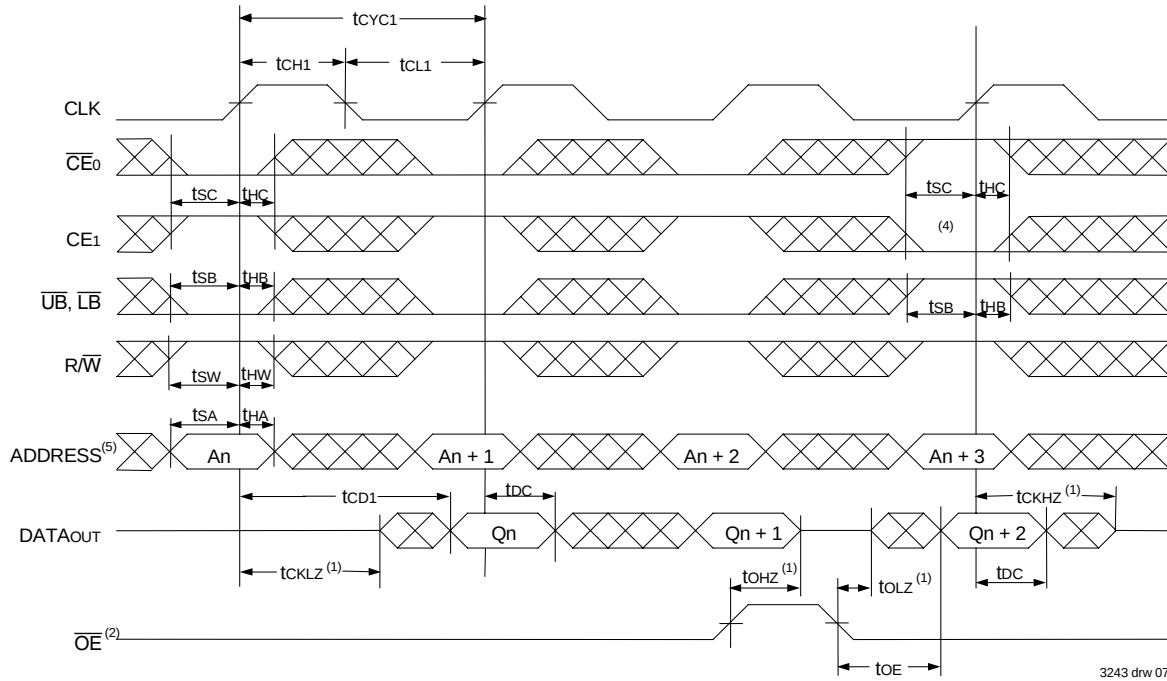
		709279/69X9 Com'l Only		709279/69X12 Com'l & Ind		709279/69X15 Com'l Only		
Symbol	Parameter	Min.	Max.	Min.	Max.	Min.	Max.	Unit
t _{CYC1}	Clock Cycle Time (Flow-Through) ⁽²⁾	25	—	30	—	35	—	ns
t _{CYC2}	Clock Cycle Time (Pipelined) ⁽²⁾	15	—	20	—	25	—	ns
t _{CH1}	Clock High Time (Flow-Through) ⁽²⁾	12	—	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 _{SB}	Byte Enable Setup Time	4	—	4	—	4	—	ns
t _{HB}	Byte 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}	$\overline{CNRST}$ Setup Time	4	—	4	—	4	—	ns
t _{HRST}	$\overline{CNRST}$ Hold Time	1	—	1	—	1	—	ns
t _{OE}	Output Enable to Data Valid	—	9	—	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	—	35	—	40	—	50	ns
t _{CCS}	Clock-to-Clock Setup Time	—	15	—	15	—	20	ns

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 or both left and right ports when $\overline{FT}/PIPE = V_{IH}$. Flow-through parameters (t_{CYC1}, t_{CD1}) apply when $\overline{FT}/PIPE = V_{IL}$ for that port.
3. All input signals are synchronous with respect to the clock except for the asynchronous Output Enable ($\overline{OE}$) and $\overline{FT}/PIPE$. $\overline{FT}/PIPE$ should be treated as a DC signal, i.e. steady state during operation.
4. 'X' in part number indicates power rating (S or L).

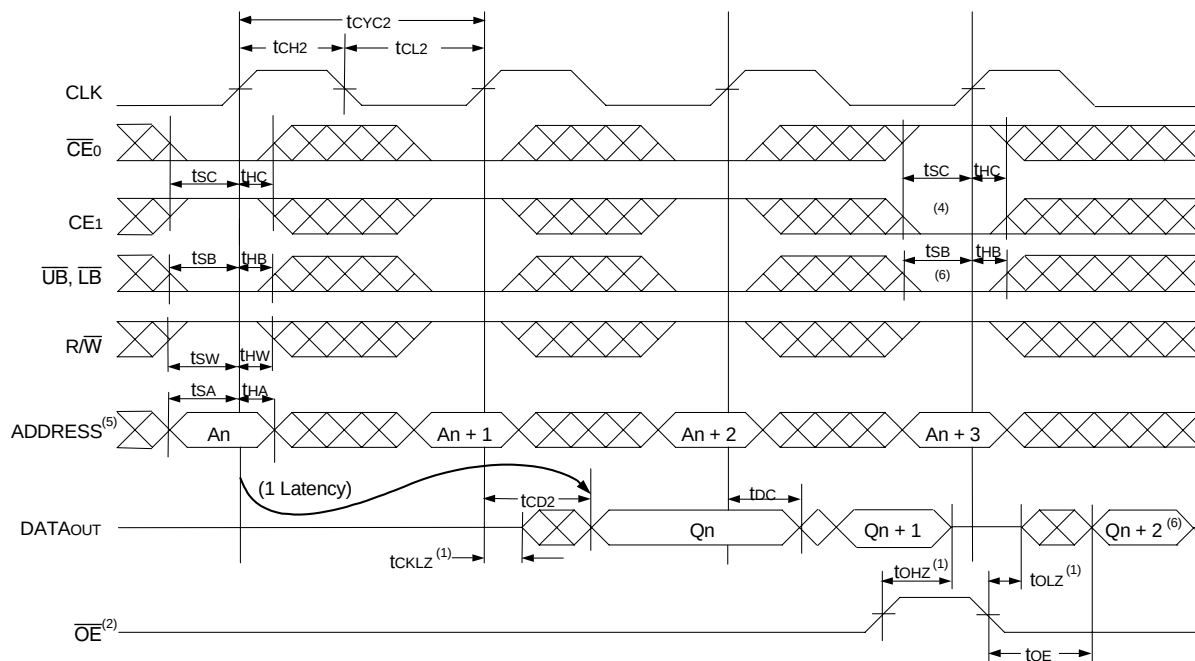
3243 tbl 11

Timing Waveform of Read Cycle for Flow-Through Output ($\overline{\text{FT}}/\text{PIPE} \text{ "X" } = \text{V}_{\text{IL}}$)^(3,7)



3243 drw 07

Timing Waveform of Read Cycle for Pipelined Output ($\overline{\text{FT}}/\text{PIPE} \text{ "X" } = \text{V}_{\text{IH}}$)^(3,7)

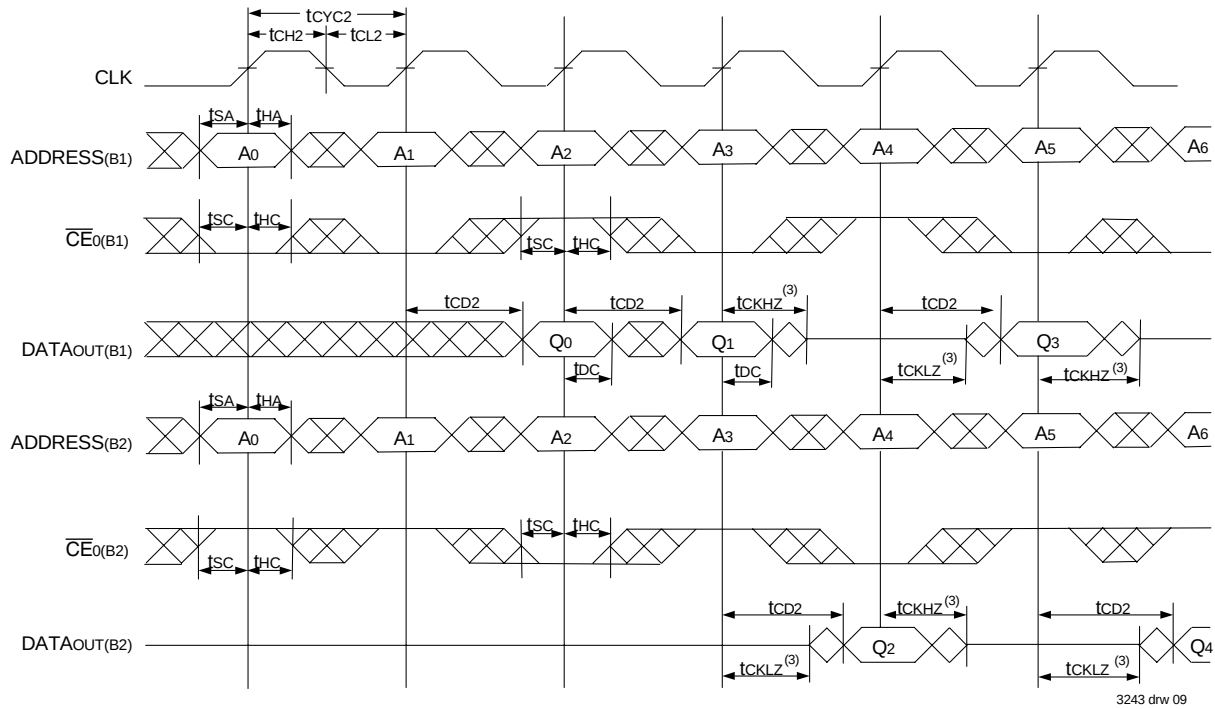


3243 drw 08

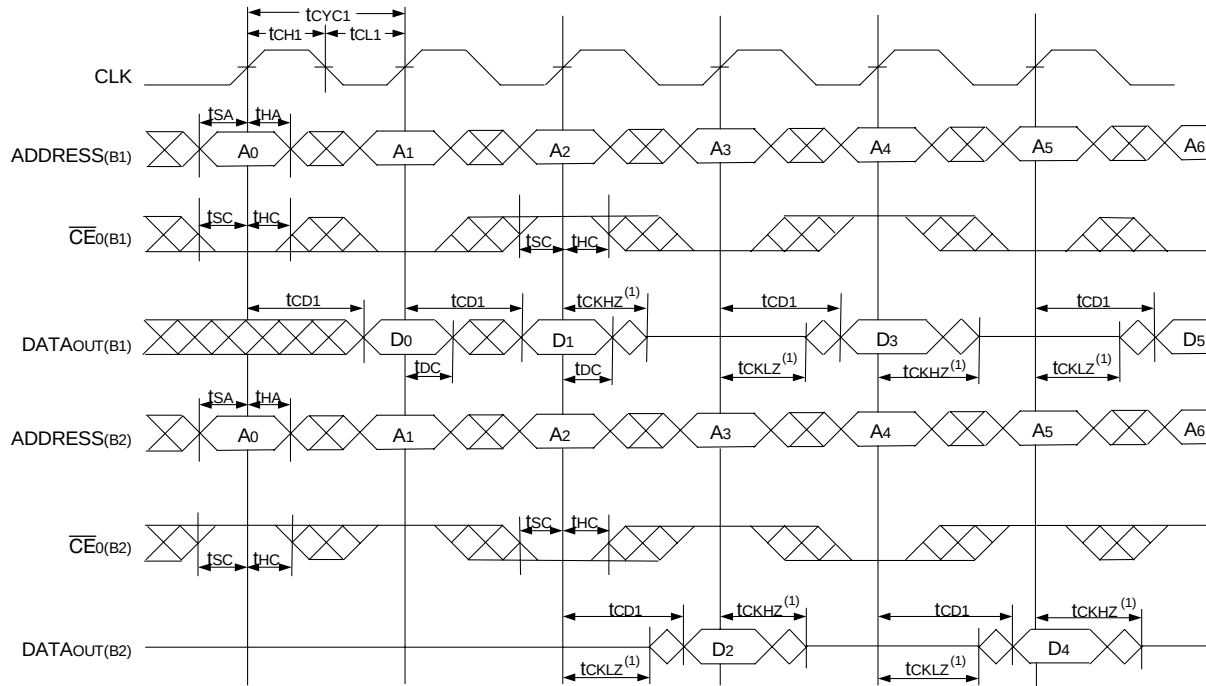
NOTES:

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. $\overline{\text{ADS}} = \text{V}_{\text{IL}}$, $\overline{\text{CNTEN}}$ and $\overline{\text{CNTRST}} = \text{V}_{\text{IH}}$.
4. The output is disabled (High-Impedance state) by $\overline{\text{CE}}_0 = \text{V}_{\text{IH}}$, $\text{CE}_1 = \text{V}_{\text{IL}}$, $\overline{\text{UB}} = \text{V}_{\text{IH}}$, or $\overline{\text{LB}} = \text{V}_{\text{IH}}$ following the next rising edge of the clock. Refer to Truth Table 1.
5. Addresses do not have to be accessed sequentially since $\overline{\text{ADS}} = \text{V}_{\text{IL}}$ constantly loads the address on the rising edge of the CLK; numbers are for reference use only.
6. If $\overline{\text{UB}}$ or $\overline{\text{LB}}$ was HIGH, then the Upper Byte and/or Lower Byte of DATA_{out} for $\text{Qn} + 2$ would be disabled (High-Impedance state).
7. "x" denotes Left or Right port. The diagram is with respect to that port.

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



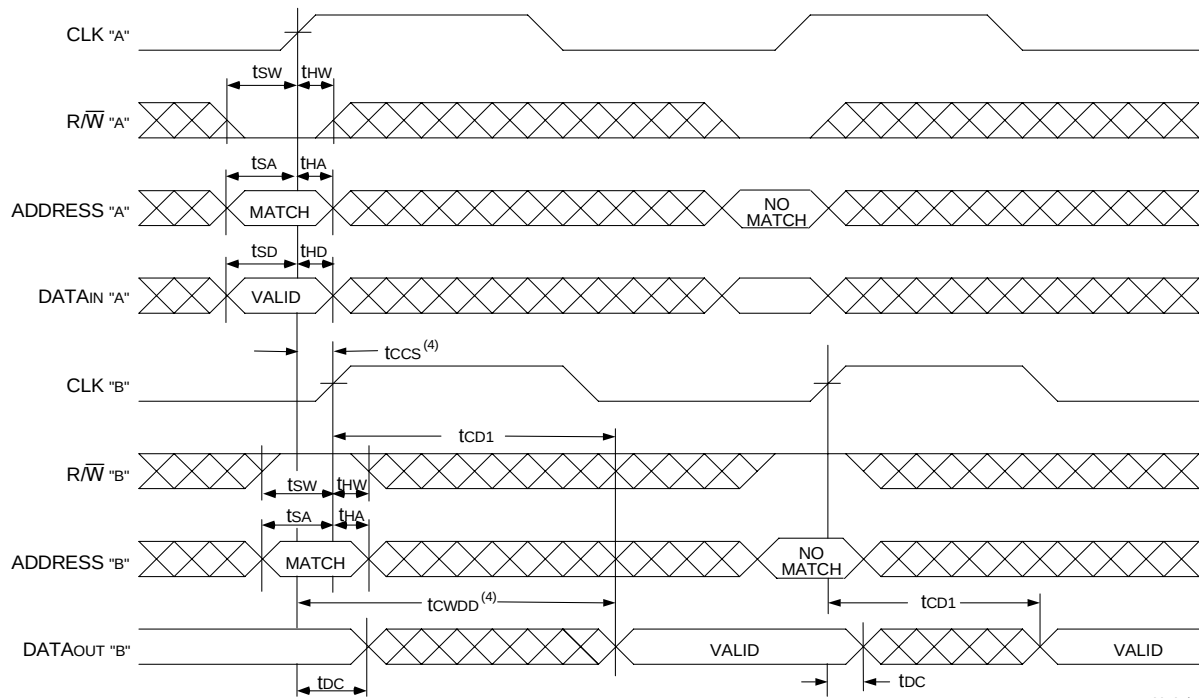
Timing Waveform of a Bank Select Flow-Through Read⁽⁶⁾



NOTES:

1. B1 Represents Bank #1; B2 Represents Bank #2. Each Bank consists of one IDT709279/69 for this waveform, and are setup for depth expansion in this example. ADDRESS(B1) = ADDRESS(B2) in this situation.
2. $\overline{UB}$, $\overline{LB}$, $\overline{OE}$, and $\overline{ADS} = V_{IL}$; $CE_1(B1)$, $CE_1(B2)$, R/W , $\overline{CNTEN}$, and $\overline{CNTRST} = V_{IH}$.
3. Transition is measured 0mV from Low or High-impedance voltage with the Output Test Load (Figure 2).
4. $\overline{CE_0}$, $\overline{UB}$, $\overline{LB}$, and $\overline{ADS} = V_{IL}$; CE_1 , $\overline{CNTEN}$, and $\overline{CNTRST} = V_{IH}$.
5. $\overline{OE} = V_{IL}$ for the Right Port, which is being read from. $\overline{OE} = V_{IH}$ for the Left Port, which is being written to.
6. If $t_{CCS} \leq$ maximum specified, then data from right port READ is not valid until the maximum specified for t_{CWD} .
If $t_{CCS} >$ maximum specified, then data from right port READ is not valid until $t_{CCS} + t_{CD1}$. t_{CWD} does not apply in this case.

Timing Waveform with Port-to-Port Flow-Through Read^(1,2,3,5)

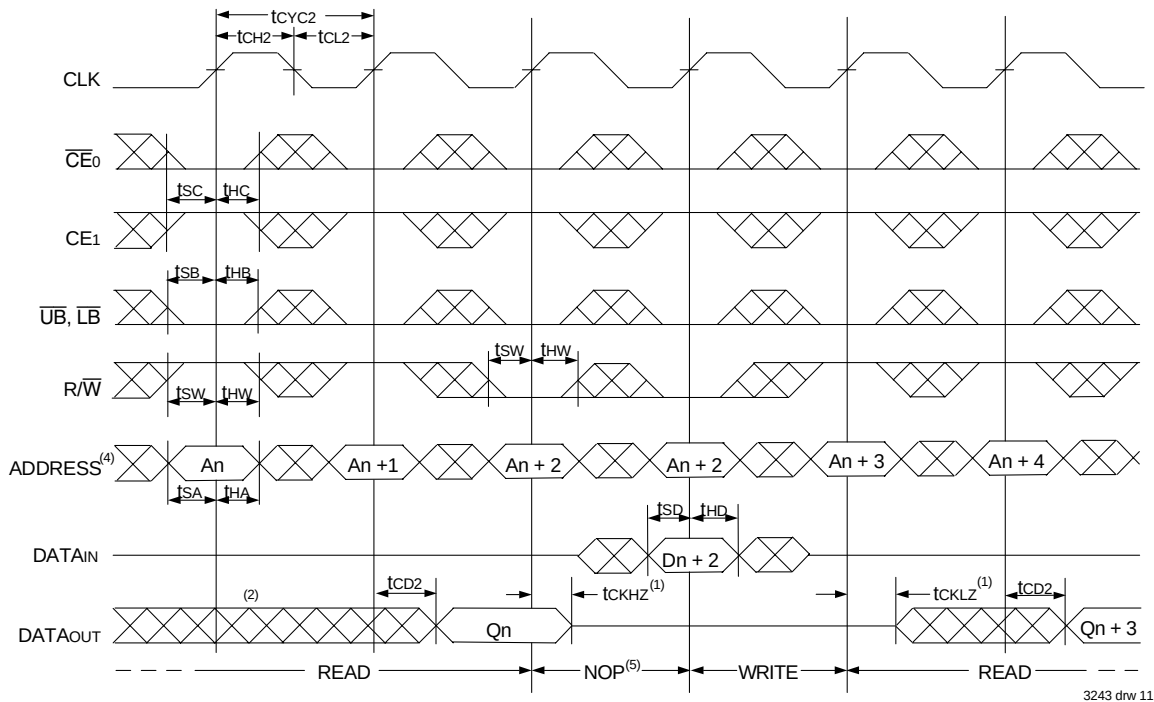


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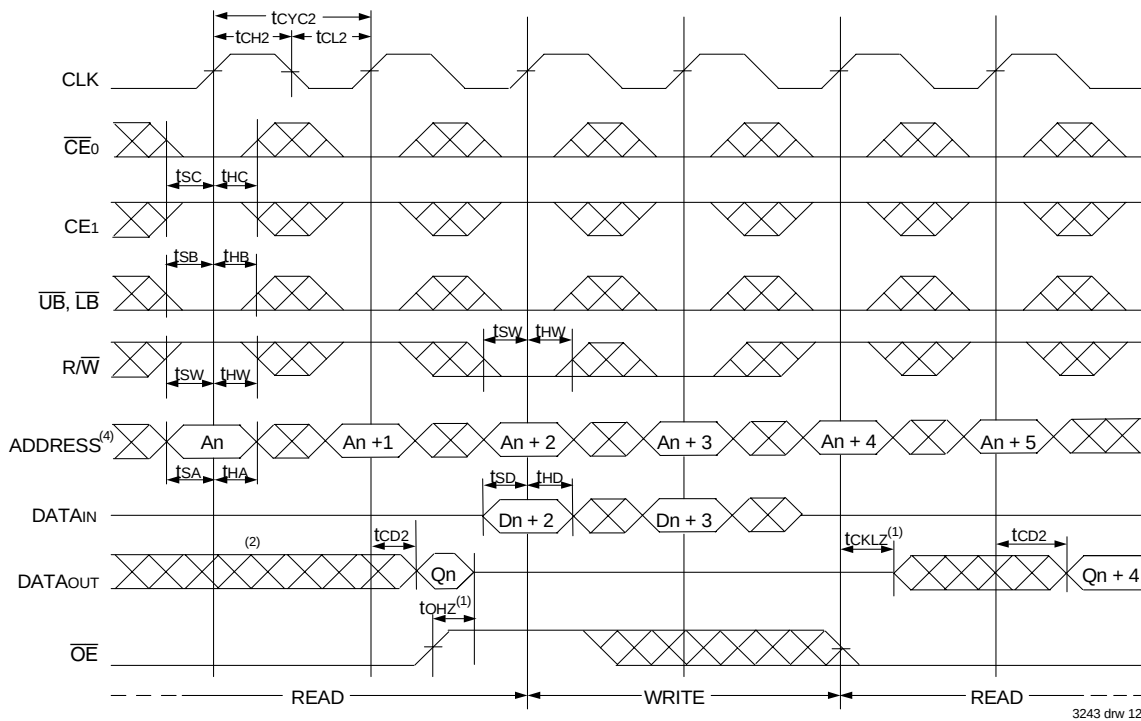
NOTES:

1. Transition is measured 0mV from Low or High-impedance voltage with the Output Test Load (Figure 2).
2. $\overline{CE_0}$, $\overline{UB}$, $\overline{LB}$, and $\overline{ADS} = V_{IL}$; CE_1 , $\overline{CNTEN}$, and $\overline{CNTRST} = V_{IH}$.
3. $\overline{OE} = V_{IL}$ for the Right Port, which is being read from. $\overline{OE} = V_{IH}$ for the Left Port, which is being written to.
4. 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.
5. All timing is the same for both left and right ports. Port "A" may be either left or right port. Port "B" is the opposite of Port "A".

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



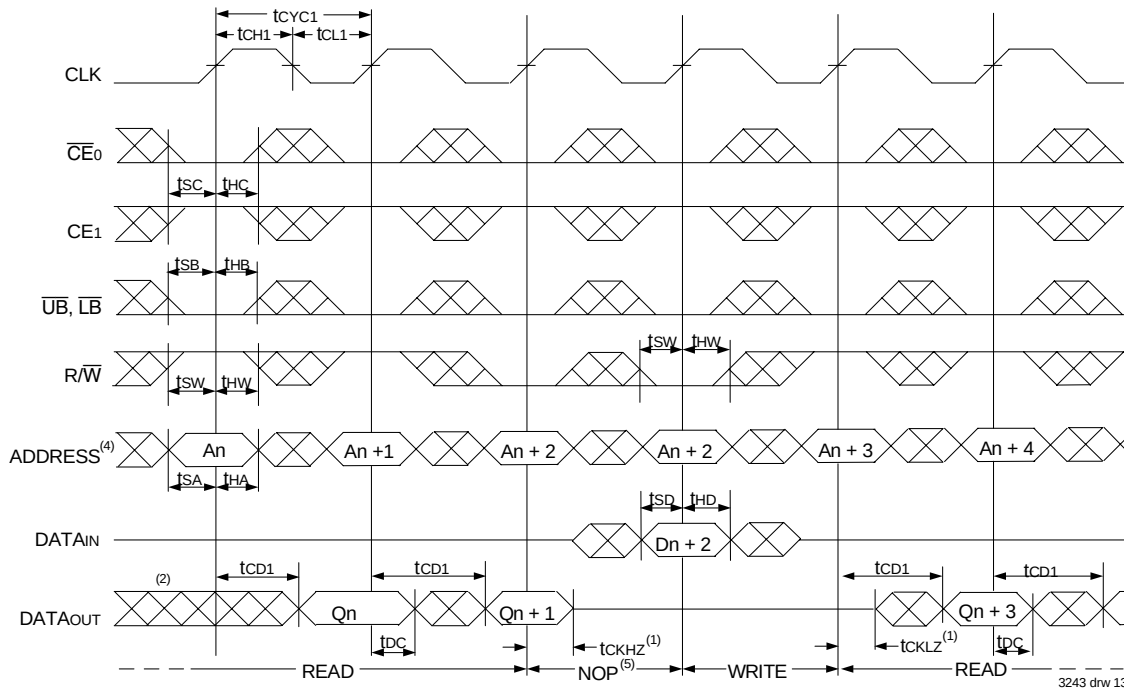
Timing Waveform of Pipelined Read-to-Write-to-Read (OE Controlled)⁽³⁾



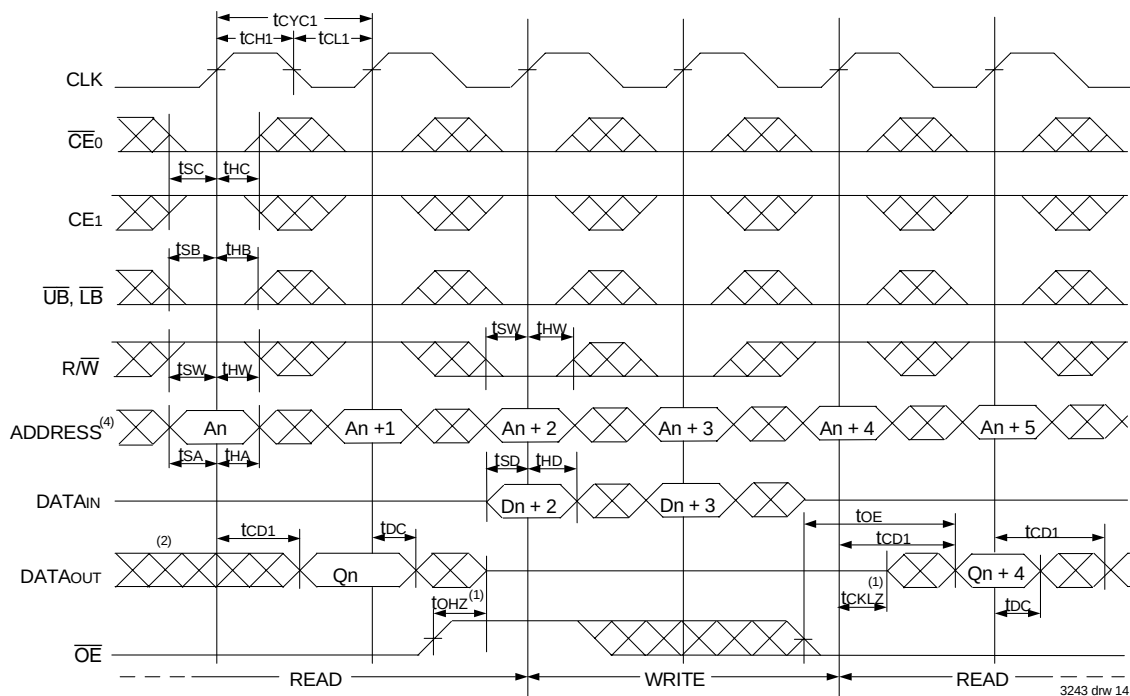
NOTES:

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. $\overline{CE0}$, $\overline{UB}$, $\overline{LB}$, and $\overline{ADS} = V_{IL}$; $\overline{CE1}$, $\overline{CNTEN}$, and $\overline{CNTST} = V_{IH}$.
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 ($\overline{OE} = V_{IL}$)⁽³⁾



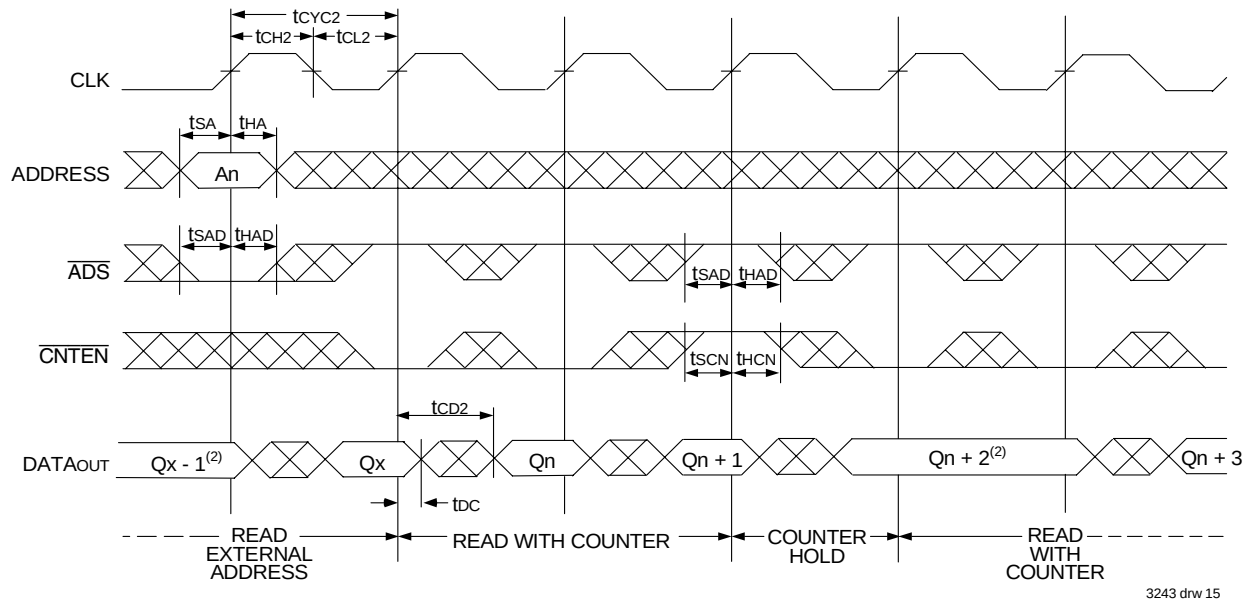
Timing Waveform of Flow-Through Read-to-Write-to-Read ($\overline{OE}$ Controlled)⁽³⁾



NOTES:

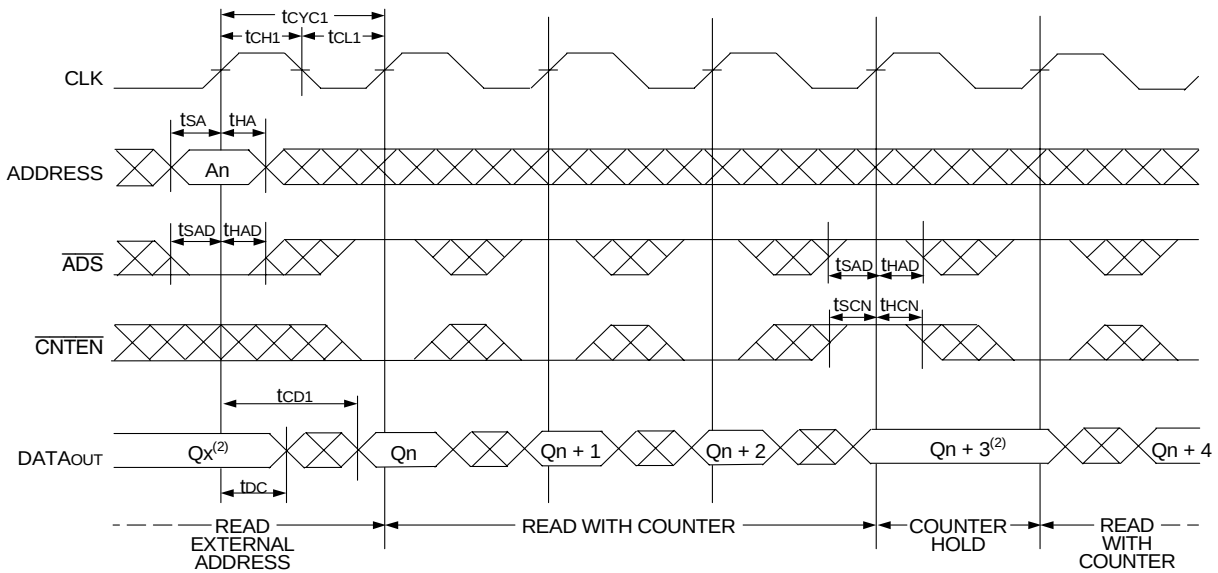
1. Transition is measured 0mV from Low or High-impedance voltage with the Output Test Load (Figure 2).
2. Output state (High, Low, or High-impedance) is determined by the previous cycle control signals.
3. $\overline{CE0}$, $\overline{UB}$, $\overline{LB}$, and $\overline{ADS} = V_{IL}$; $\overline{CE1}$, $\overline{CNTEN}$, and $\overline{CNTST} = V_{IH}$.
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 Pipelined Read with Address Counter Advance⁽¹⁾



3243 drw 15

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

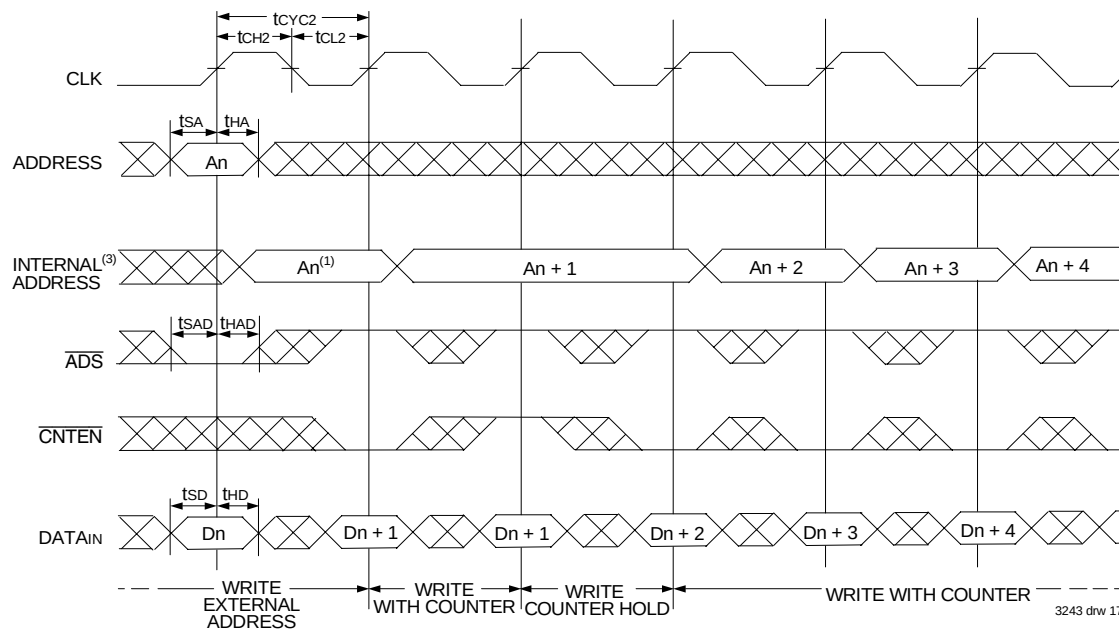


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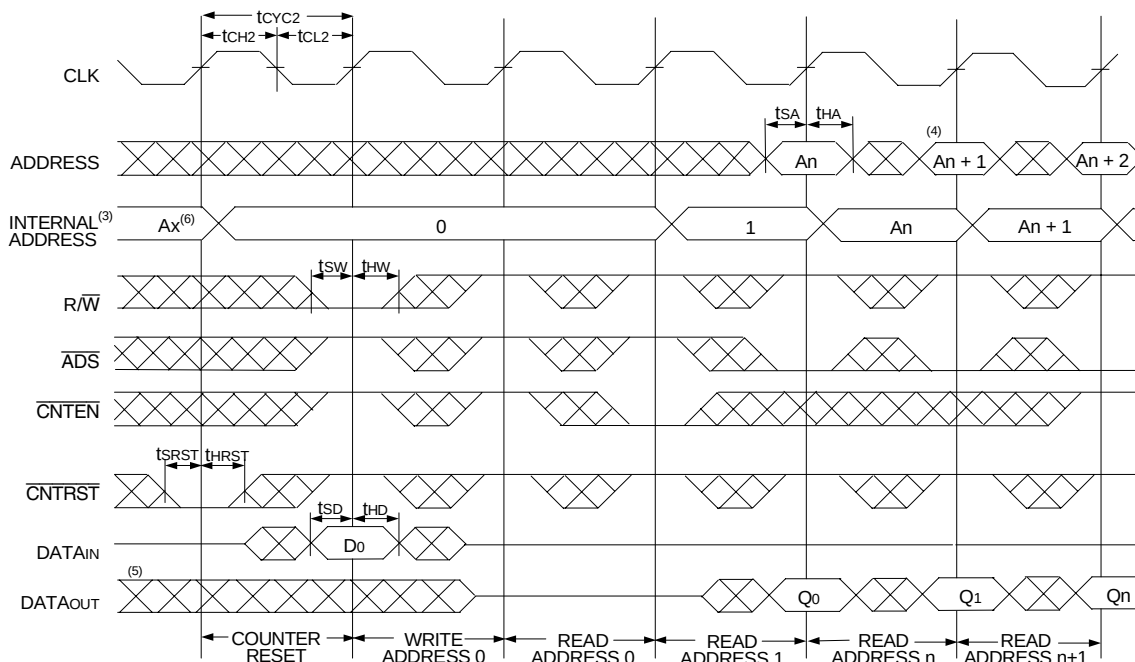
NOTES:

1. $\overline{CE}_0$, $\overline{OE}$, $\overline{UB}$, and $\overline{LB} = V_{IL}$; 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⁾



NOTES:

1. $\overline{CE0}$, $\overline{UB}$, $\overline{LB}$, and $R/\overline{W} = V_{IL}$; $CE1$ and $\overline{CNTRST} = V_{IH}$.
2. $\overline{CE0}$, $\overline{UB}$, $\overline{LB} = V_{IL}$; $CE1 = V_{IH}$.
3. The "Internal Address" is equal to the "External Address" when $\overline{ADS} = V_{IL}$ and equals the counter output when $\overline{ADS} = V_{IH}$.
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. 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 cycle. ADDR₀ will be accessed. Extra cycles are shown here simply for clarification.
7. $\overline{CNTEN} = V_{IL}$ 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.

Depth and Width Expansion

The IDT709279/69 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.

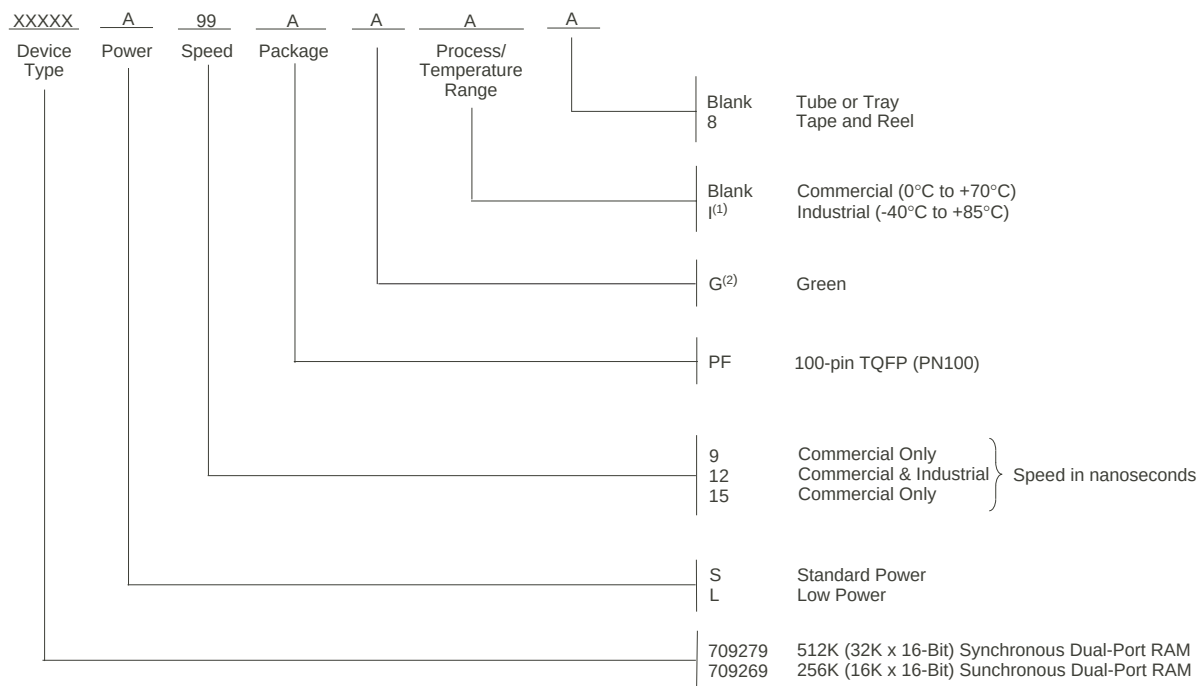
The IDT7092/9/69 can also be used in applications requiring expanded width, as indicated in Figure 4. Since the banks are allocated at the discretion of the user, the external controller can be set up to drive the input signals for the various devices as required to allow for 32-bit or wider applications.

The timing diagram shows four IDT709279/69 chips arranged in a 2x2 grid. The top-left chip has its $\overline{CE}_0$ pin connected to $A_{15}/A_{14}^{(1)}$ and its CE_1 pin connected to V_{CC} . The top-right chip also has its $\overline{CE}_0$ pin connected to $A_{15}/A_{14}^{(1)}$ and its CE_1 pin connected to V_{CC} . The bottom-left chip has its CE_1 pin connected to $A_{15}/A_{14}^{(1)}$ and its $\overline{CE}_0$ pin connected to ground (GND). The bottom-right chip has its CE_1 pin connected to $A_{15}/A_{14}^{(1)}$ and its $\overline{CE}_0$ pin connected to ground (GND). All chips have their "Control Inputs" pins connected to a common bus that receives signals from $\overline{\text{CNRST}}$, CLK, $\overline{\text{ADS}}$, $\overline{\text{CNTEN}}$, R/W, and $\overline{\text{OE}}$.

Figure 4. Depth and Width Expansion with IDT709279/69

1. A14 is for IDT709269.

Ordering Information



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NOTES:

1. Industrial temperature range is available. For specific speeds, packages and powers contact your sales office.

2. Green parts available. For specific speeds, packages and powers contact your local sales office.

LEAD FINISH (SnPb) parts are Obsolete. Product Discontinuation Notice - PDN# SP-17-02

Note that information regarding recently obsoleted parts is included in this datasheet for customer convenience.

Ordering Information for Flow-through Devices

Old Flow-through Part	New Combined Part
70927S/L20	709279S/L9
70927S/L25	709279S/L12
70927S/L30	709279S/L15

3243 tbl 12

IDT Clock Solution for IDT709279/69 Dual-Port

IDT Dual-Port Part Number	Dual-Port I/O Specifications		Clock Specifications				IDT Non-PLL Clock Device
	Voltage	I/O	Input Capacitance	Input Duty Cycle Requirement	Maximum Frequency	Jitter Tolerance	
709279/69	5	TTL	9pF	40%	100	150ps	49FCT805T

3243 tbl 13

Datasheet Document History

12/9/98:	Initiated datasheet document history Converted to new format Cosmetic and typographical corrections Added additional notes to pin configurations Pages 13 & 14 Updated timing waveforms Page 15 Added Depth and Width Expansion section
06/03/99:	Changed drawing format Page 3 Deleted note 6 for Table II
11/10/99:	Replaced IDT logo
03/31/00:	Combined Pipelined 709279 family and Flow-through 70927 family offerings into one data sheet Changed $\pm 200\text{mV}$ in waveform notes to 0mV Added corresponding part chart with ordering information
05/24/00:	Page 1 Inserted diamond in copy Page 4 Changed information in Truth Table II, Increased storage temperature parameter, clarified TA parameter Page 5 Changed DC Electrical parameters—changed wording from "Open" to "Disabled" Page 16 Fixed typeface in heading Added Industrial Temperature Ranges and removed related notes
08/24/01:	Pages 1, 16 and Page Header Removed Preliminary status Page 5 & 7 Removed Industrial Temperature Ranges for 15ns speed from DC and AC Electrical Characteristics Page 16 Removed Industrial Temperature from 15ns speed in ordering information
06/21/04:	Consolidated multiple devices into one datasheet Page 2 Added date revision to pin configuration Page 4 Added Junction Temperature to Absolute Maximum Ratings Table Added Ambient Temperature footnote Page 5 & 6 Added 6ns & 7ns speed DC power numbers to the DC Electrical Characteristics Table Page 8 Added 6ns & 7ns speed AC timing numbers to the AC Electrical Characteristics Table Page 17 Added 6ns & 7ns speed grades to ordering information Added IDT Clock Solution Table Page 1 & 18 Replaced old ® logo with new ™ logo
01/29/09:	Page 17 Removed "IDT" from orderable part number
06/24/15:	Page 1 Added green availability to Features Page 2 Removed IDT in reference to fabrication Page 2 Removed date from the 100-pin TQFP configuration Page 2 & 17 The package code PN100-1 changed to PN100 to match standard package codes Page 5 Removed the X6 & X7 speed grade options and combined the X9, X12 & X15 speed grade options into one DC Elec Chars table Page 7 Removed the X6 & X7 speed grade options from the AC Elec Chars table Page 16 Added Green and Tape & Reel indicators to the Ordering Information
02/02/18:	Product Discontinuation Notice - PDN# SP-17-02 Last time buy expires June 15, 2018
04/22/19:	709269 is obsolete 709279 is still active

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