HIGH-SPEED 2K x 8 FourPort™ STATIC RAM

IDT7052S/L

LEAD FINISH (SnPb) ARE IN EOL PROCESS - LAST TIME BUY EXPIRES JUNE 15, 2018

Features

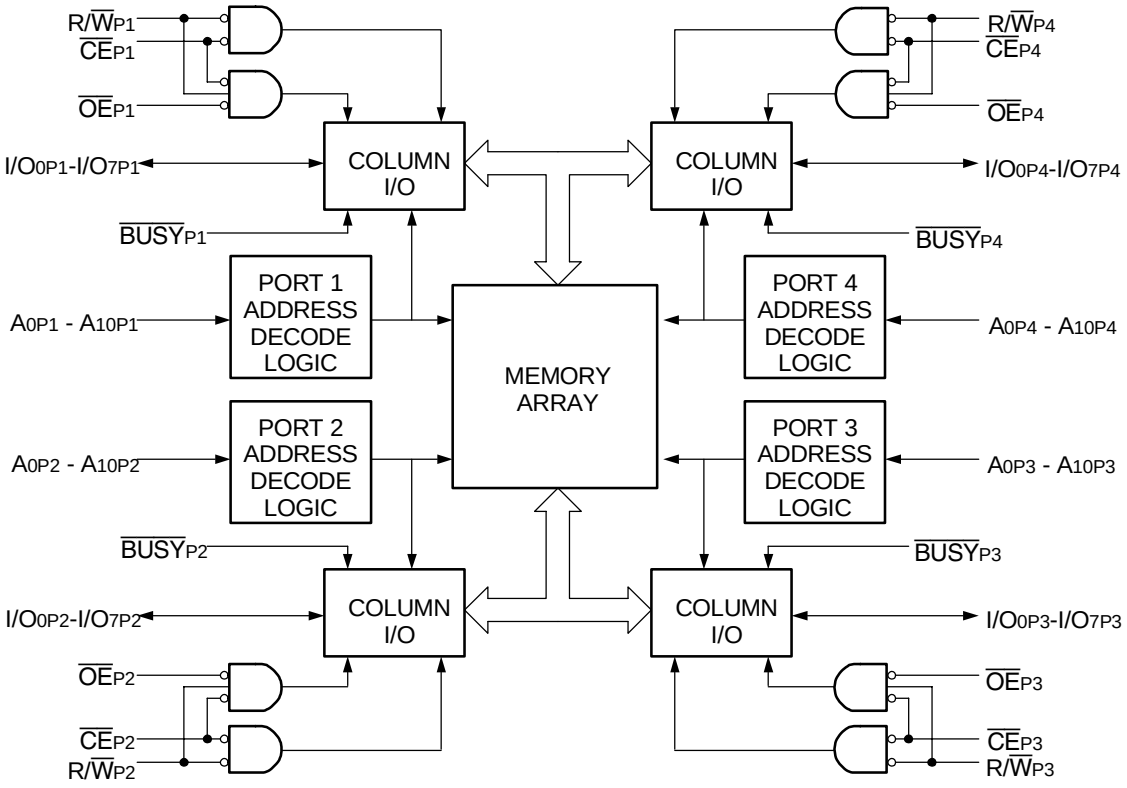
- **High-speed access**
  - *Commercial: 20/25/35ns (max.)*
  - *Industrial: 25ns (max.)*
  - *Military: 25/35ns (max.)*
- **Low-power operation**
  - *IDT7052S*
    Active: 750mW (typ.)
    Standby: 7.5mW (typ.)
  - *IDT7052L*
    Active: 750mW (typ.)
    Standby: 1.5mW (typ.)
- **True FourPort memory cells which allow simultaneous access of the same memory locations**
- **Fully asynchronous operation from each of the four ports: P1, P2, P3, P4**
- **Versatile control for write-inhibit: separate $\overline{BUSY}$ input to control write-inhibit for each of the four ports**
- **Battery backup operation—2V data retention**
- **TTL-compatible; single 5V (±10%) power supply**
- **Available in 120 pin Thin Quad Flatpacks and 108 pin PGA**
- **Military product compliant to MIL-PRF-38535 QML**
- **Industrial temperature range (–40°C to +85°C) is available for selected speeds**
- **Green parts available, see ordering information**

Description

The IDT7052 is a high-speed 2K x 8 FourPort™ Static RAM designed to be used in systems where multiple access into a common RAM is required. This FourPort Static RAM offers increased system performance in multiprocessor systems that have a need to communicate in real time and also offers added benefit for high-speed systems in which multiple access is required in the same cycle.

The IDT7052 is also designed to be used in systems where on-chip hardware port arbitration is not needed. This part lends itself to those

Functional Block Diagram



2674 drw 01

JUNE 2018

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systems which cannot tolerate wait states or are designed to be able to externally arbitrate or withstand contention when all ports simultaneously access the same FourPort RAM location.

The IDT7052 provides four independent ports with separate control, address, and I/O pins that permit independent, asynchronous access for reads or writes to any location in memory. It is the user's responsibility to ensure data integrity when simultaneously accessing the same memory location from all ports. An automatic power down feature, controlled by $\overline{CE}$, permits the on-chip circuitry of each port to enter a very low power standby power mode.

Fabricated using CMOS high-performance technology, this FourPort SRAM typically operates on only 750mW of power. Low-power (L) versions offer battery backup data retention capability, with each port typically consuming 50µW from a 2V battery.

The IDT7052 is packaged in a ceramic 108-pin Pin Grid Array (PGA) and 120-pin Thin Quad Flatpack (TQFP). Military grade product is manufactured in compliance with the latest revision of MIL-PRF-38535 QML, making it ideally suited to military temperature applications demanding the highest level of performance and reliability.

Pin Configurations[1,2,3]

A	B	C	D	E	F	G	H	J	K	L	M	
81 R/$\overline{W}$ P2	80 NC	77 A_7 P2	74 A_5 P2	72 A_3 P2	69 A_0 P2	68 A_0 P3	65 A_3 P3	63 A_5 P3	60 A_7 P3	57 NC	54 R/$\overline{W}$ P3	12
84 $\overline{BUSY}$ P2	83 $\overline{OE}$ P2	78 A_8 P2	76 A_{10} P2	73 A_4 P2	70 A_1 P2	67 A_1 P3	64 A_4 P3	61 A_{10} P3	59 A_8 P3	56 $\overline{OE}$ P3	53 $\overline{BUSY}$ P3	11
87 A_2 P1	86 A_1 P1	82 $\overline{CE}$	79 A_9 P2	75 A_6 P2	71 A_2 P2	66 A_2 P3	62 A_6 P3	58 A_9 P3	55 $\overline{CE}$ P3	51 A_1 P4	50 A_2 P4	10
90 A_5 P1	88 A_3 P1	85 A_0 P1							52 A_0 P4	49 A_3 P4	47 A_5 P4	09
92 A_{10} P1	91 A_6 P1	89 A_4 P1							48 A_4 P4	46 A_6 P4	45 A_{10} P4	08
95 A_8 P1	94 A_7 P1	93 V_{CC}							44 GND	43 A_7 P4	42 A_8 P4	07
96 A_9 P1	97 NC	98 $\overline{CE}$ P1							39 $\overline{CE}$ P4	40 NC	41 A_9 P4	06
99 R/$\overline{W}$ P1	100 $\overline{OE}$ P1	102 I/O_0 P1							35 GND	37 $\overline{OE}$ P4	38 R/$\overline{W}$ P4	05
101 $\overline{BUSY}$ P1	103 I/O_1 P1	106 GND							31 GND	34 I/O_7 P4	36 $\overline{BUSY}$ P4	04
104 I/O_2 P1	105 I/O_3 P1	1 I/O_6 P1	4 V_{CC}	8 GND	12 V_{CC}	17 V_{CC}	21 GND	25 V_{CC}	28 I/O_2 P4	32 I/O_5 P4	33 I/O_6 P4	03
107 I/O_4 P1	2 I/O_7 P1	5 I/O_0 P2	7 I/O_2 P2	10 I/O_4 P2	13 I/O_6 P2	16 I/O_1 P3	19 I/O_3 P3	22 I/O_5 P3	24 I/O_7 P3	29 I/O_3 P4	30 I/O_4 P4	02
108 I/O_5 P1	3 NC	6 I/O_1 P2	9 I/O_3 P2	11 I/O_5 P2	14 I/O_7 P2	15 I/O_0 P3	18 I/O_2 P3	20 I/O_4 P3	23 I/O_6 P3	26 I/O_0 P4	27 I/O_1 P4	01

IDT7052G
G108[4]

108-Pin PGA
Top View[5]

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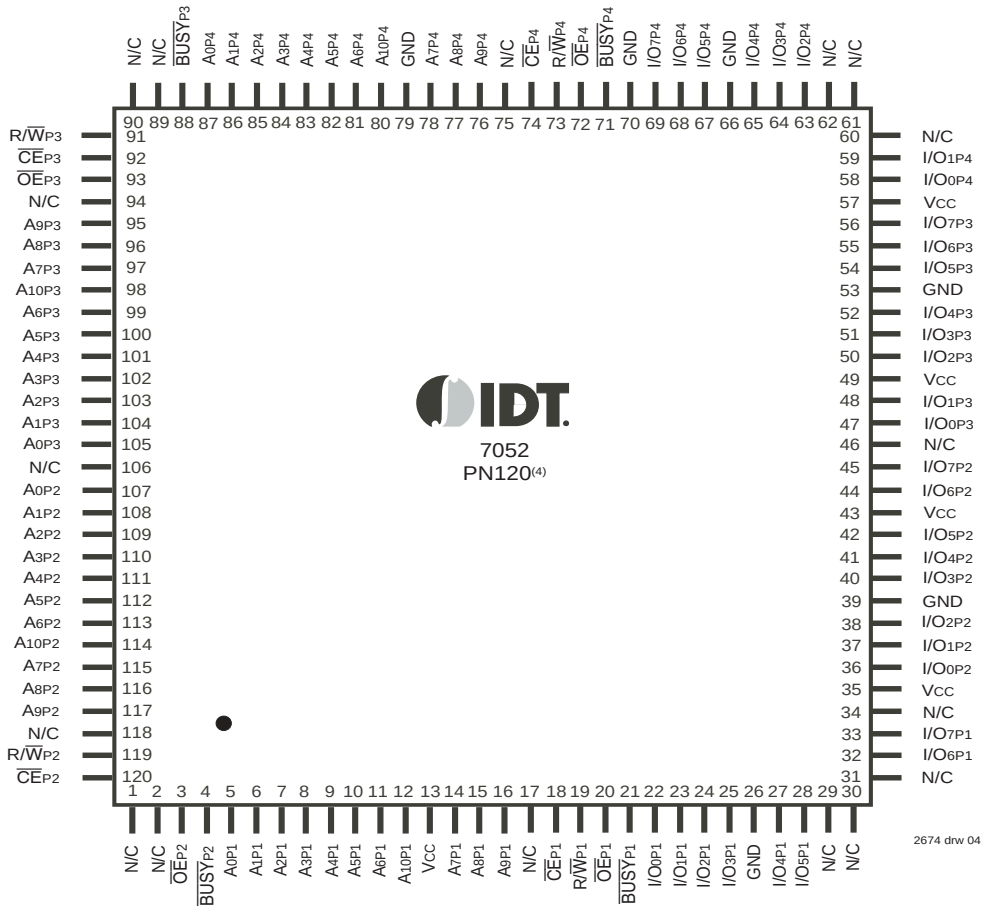
NOTES:
1. All V_{CC} pins must be connected to the power supply.
2. All GND pins must be connected to the ground supply.
3. Package body is approximately 1.21 in x 1.21 in x .16 in.
4. This package code is used to reference the package diagram.
5. This text does not indicate orientation of the actual part-marking.

Pin Configurations[1,2,3] (con't.)



NOTES:
1. All Vcc pins must be connected to the power supply.
2. All GND pins must be connected to the ground supply.
3. PN120-1 package body is approximately 14mm x 14mm x 1.4mm.
4. This package code is used to reference the package diagram.

Pin Configurations[1,2]

Symbol	Pin Name
A_0 P1 - A_{10} P1	Address Lines - Port 1
A_0 P2 - A_{10}P2	Address Lines - Port 2
A_0 P3 - A_{10} P3	Address Lines - Port 3
A_0 P4 - A_{10} P4	Address Lines - Port 4
I/O_0 P1 - I/O_7 P1	Data I/O - Port 1
I/O_0 P2 - I/O_7 P2	Data I/O - Port 2
I/O_0 P3 - I/O_7 P3	Data I/O - Port 3
I/O_0 P4 - I/O_7 P4	Data I/O - Port 4
R/W P1	Read/Write - Port 1
R/W P2	Read/Write - Port 2
R/W P3	Read/Write - Port 3
R/W P4	Read/Write - Port 4
GND	Ground
CE P1	Chip Enable - Port 1
CE P2	Chip Enable - Port 2
CE P3	Chip Enable - Port 3
CE P4	Chip Enable - Port 4
OE P1	Output Enable - Port 1
OE P2	Output Enable - Port 2
OE P3	Output Enable - Port 3
OE P4	Output Enable - Port 4
BUSY P1	Write Disable - Port 1
BUSY P2	Write Disable - Port 2
BUSY P3	Write Disable - Port 3
BUSY P4	Write Disable - Port 4
V_{CC}	Power

2674 tbl 01

NOTES:
1. All V_{CC} pins must be connected to the power supply.
2. All GND pins must be connected to the ground supply

Capacitance[1]

(T_A = +25°C, f = 1.0MHz) TQFP only

Symbol	Parameter	Conditions[2]	Max.	Unit
C_{IN}	Input Capacitance	V_{IN} = 0V	9	pF
C_{OUT}	Output Capacitance	V_{OUT} = 0V	10	pF

2674 tbl 03

NOTES:
1. This parameter is determined by device characterization but is not production tested.
2. 3dV references the interpolated capacitance when the input and the output signals switch from 0V to 3V or from 3V to 0V.

Absolute Maximum Ratings[1]

Symbol	Rating	Commercial & Industrial	Military	Unit
V_{TERM}[2]	Terminal Voltage with Respect to GND	-0.5 to +7.0	-0.5 to +7.0	V
T_{BIAS}	Temperature Under Bias	-55 to +125	-65 to +135	°C
T_{STG}	Storage Temperature	-65 to +150	-65 to +150	°C
I_{OUT}	DC Output Current	50	50	mA

2674 tbl 02

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 Vcc + 10% for more than 25% of the cycle time or 10ns maximum, and is limited to $\leq$ 20mA for the period of $V_{TERM} \geq V_{CC}$ + 10%.

Maximum Operating Temperature and Supply Voltage[1]

Grade	Ambient Temperature	GND	Vcc
Military	-55°C to+125°C	0V	5.0V ± 10%
Commercial	0°C to +70°C	0V	5.0V ± 10%
Industrial	-40°C to +85°C	0V	5.0V ± 10%

2674 tbl 04

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

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[2]	V
V_{IL}	Input Low Voltage	-0.5[1]	—	0.8	V

2674 tbl 05

NOTES:
1. $V_{IL} \geq$ -1.5V for pulse width less than 10ns.
2. V_{TERM} must not exceed Vcc + 10%.

DC Electrical Characteristics Over the Operating Temperature and Supply Voltage Range[1,5] (V_{CC} = 5.0V ± 10%)

Symbol	Parameter	Condition	Version		7052X20 Com'l Only Typ.[2]	7052X20 Com'l Only Max.	7052X25 Com'l, Ind & Military Typ.[2]	7052X25 Com'l, Ind & Military Max.	7052X35 Com'l & Military Typ.[2]	7052X35 Com'l & Military Max.	Unit
I_{CC1}	Operating Power Supply Current (All Ports Active)	$\overline{CE}$ = V_{IL} Outputs Disabled f = 0[3]	COM'L.	S	150	300	150	300	150	300	mA
				L	150	250	150	250	150	250	
			MIL. & IND.	S	—	—	150	360	150	360	
				L	—	—	150	300	150	300	
I_{CC2}	Dynamic Operating Current (All Ports Active)	$\overline{CE}$ = V_{IL} Outputs Disabled f = f_{MAX}[4]	COM'L.	S	240	370	225	350	210	335	mA
				L	210	325	195	305	180	290	
			MIL. & IND.	S	—	—	225	400	210	395	
				L	—	—	195	340	180	330	
I_{SB}	Standby Current (All Ports - TTL Level Inputs)	$\overline{CE}$ = V_{IH} f = f_{MAX}[4]	COM'L.	S	70	95	45	85	40	75	mA
				L	60	80	40	70	35	60	
			MIL. & IND.	S	—	—	45	115	40	110	
				L	—	—	40	85	35	80	
I_{SB1}	Full Standby Current (All Ports - All CMOS Level Inputs)	All Ports $\overline{CE} \geq V_{CC}$ - 0.2V $V_{IN} \geq V_{CC}$ - 0.2V or $V_{IN} \leq$ 0.2V, f = 0[3]	COM'L.	S	1.5	15	1.5	15	1.5	15	mA
				L	0.3	1.5	0.3	1.5	0.3	1.5	
			MIL. & IND.	S	—	—	1.5	30	1.5	30	
				L	—	—	0.3	4.5	0.3	4.5	

2674 tbl 06

NOTES:
1. 'X' in part number indicates power rating (S or L).
2. V_{CC} = 5V, T_A = +25°C and are not production tested.
3. f = 0 means no address or control lines change.
4. At f = f_{MAX}, address and control lines (except Output Enable) are cycling at the maximum frequency read cycle of 1/t_{RC}, and using "AC Test Conditions" of input levels of GND to 3V.
5. For the case of one port, divide the appropriate current above by four.

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

Symbol	Parameter	Test Conditions	7052S Min.	7052S Max.	7052L Min.	7052L Max.	Unit
$\|I_{LI}\|$	Input Leakage Current[1]	V_{CC} = 5.5V, V_{IN} = 0V to V_{CC}	—	10	—	5	µA
$\|I_{LO}\|$	Output Leakage Current	$\overline{CE}$ = V_{IH}, V_{OUT} = 0V to V_{CC}	—	10	—	5	µA
V_{OL}	Output Low Voltage	I_{OL} = 4mA	—	0.4	—	0.4	V
V_{OH}	Output High Voltage	I_{OH} = -4mA	2.4	—	2.4	—	V

2674 tbl 07

NOTE:
1. At $V_{CC} \leq$ 2.0V input leakages are undefined.

Data Retention Characteristics Over All Temperature Ranges[4]

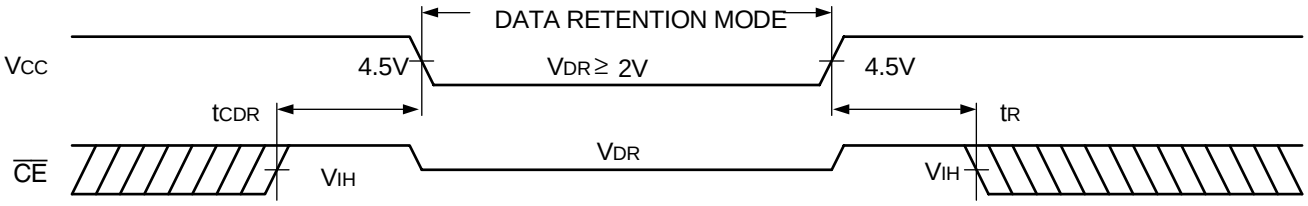
(L Version Only) V_{LC} = 0.2V, V_{HC} = V_{CC} - 0.2V

Symbol	Parameter	Test Condition		Min.	Typ.[1]	Max.	Unit
V_{DR}	V_{CC} for Data Retention	V_{CC} = 2V		2.0	—	—	V
I_{CCDR}	Data Retention Current	$\overline{CE} \geq V_{HC}$	Com'l.	—	25	600	µA
		$V_{IN} \geq V_{HC}$ or $\leq V_{LC}$	Mil. & Ind.	—	25	1800	
t_{CDR}[3]	Chip Deselect to Data Retention Time			0	—	—	ns
t_R[3]	Operation Recovery Time			t_{RC}[2]	—	—	ns

2674 tbl 08a

NOTES:
1. V_{CC} = 2V, T_A = +25°C
2. t_{RC} = Read Cycle Time
3. This parameter is guaranteed but not production tested.
4. Industrial temperature: For other speeds, packages and powers contact your sales office.

Low V_{CC} Data Retention Waveform



2674 drw 05

AC Test Conditions

Input Pulse Levels	GND to 3.0V
Input Rise/Fall Times	5ns Max.
Input Timing Reference Levels	1.5V
Output Reference Levels	1.5V
Output Load	Figures 1 and 2

2674 tbl 08b

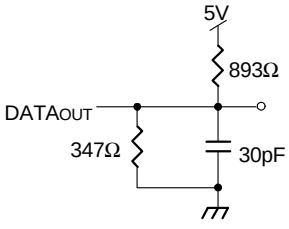
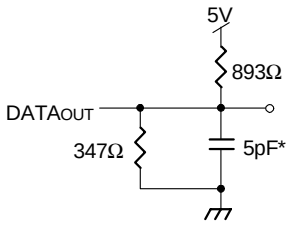


Figure 1. AC Output Test Load



2674 drw 06

Figure 2. Output Test Load (for t_{LZ}, t_{HZ}, t_{WZ}, t_{OW})
*Including scope and jig

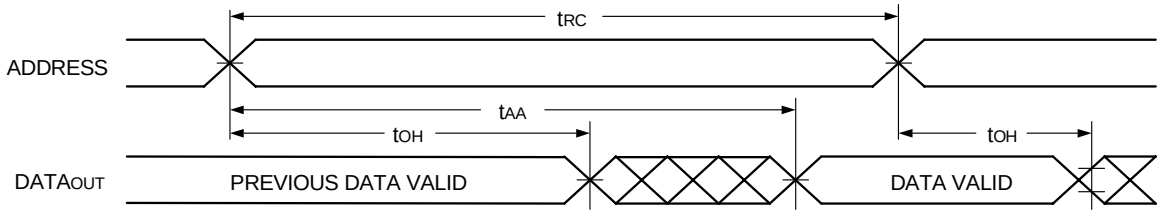
AC Electrical Characteristics Over the Operating Temperature and Supply Voltage[3]

Symbol	Parameter	7052X20 Com'l Only		7052X25 Com'l, Ind & Military		7052X35 Com'l & Military		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
READ CYCLE								
t_{RC}	Read Cycle Time	20	—	25	—	35	—	ns
t_{AA}	Address Access Time	—	20	—	25	—	35	ns
t_{ACE}	Chip Enable Access Time	—	20	—	25	—	35	ns
t_{AOE}	Output Enable Access Time	—	10	—	15	—	25	ns
t_{OH}	Output Hold from Address Change	0	—	0	—	0	—	ns
t_{LZ}	Output Low-Z Time[1,2]	5	—	5	—	5	—	ns
t_{HZ}	Output High-Z Time[1,2]	—	12	—	15	—	15	ns
t_{PU}	Chip Enable to Power Up Time[2]	0	—	0	—	0	—	ns
t_{PD}	Chip Disable to Power Down Time[2]	—	20	—	25	—	35	ns

2674 tbl 09

NOTES:
1. Transition is measured 0mV from Low or High-Impedance voltage with the Output Test Load (Figure 2)
2. This parameter is guaranteed by device characterization but is not production tested.
3. 'X' in part number indicates power rating (S or L)

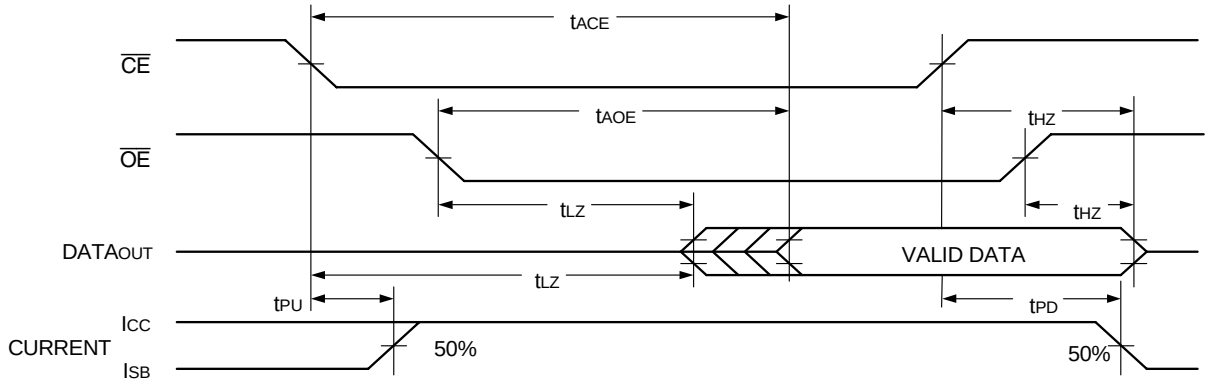
Timing Waveform of Read Cycle No. 1, Any Port[1]



2674 drw 07

NOTE:
1. R/$\overline{W}$ = V_{IH}, $\overline{OE}$ = V_{IL} and $\overline{CE}$ = V_{IL}.

Timing Waveform of Read Cycle No. 2, Any Port[1,2]



2674 drw 08

NOTES:
1. R/$\overline{W}$ = V_{IH} for Read Cycles.
2. Addresses valid prior to or coincident with $\overline{CE}$ transition LOW.

AC Electrical Characteristics Over the Operating Temperature and Supply Voltage[7]

Symbol	Parameter	7052X20 Com'l Only		7052X25 Com'l & Military		7052X35 Com'l & Military		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
WRITE CYCLE								
t_{WC}	Write Cycle Time	20	—	25	—	35	—	ns
t_{EW}	Chip Enable to End-of-Write[3]	15	—	20	—	30	—	ns
t_{AW}	Address Valid to End-of-Write	15	—	20	—	30	—	ns
t_{AS}	Address Set-up Time	0	—	0	—	0	—	ns
t_{WP}	Write Pulse Width[3]	15	—	20	—	30	—	ns
t_{WR}	Write Recovery Time	0	—	0	—	0	—	ns
t_{DW}	Data Valid to End-of-Write	15	—	15	—	20	—	ns
t_{HZ}	Output High-Z Time[1,2]	—	15	—	15	—	15	ns
t_{DH}	Data Hold Time	0	—	0	—	0	—	ns
t_{WZ}	Write Enable to Output in High-Z[1,2]	—	12	—	15	—	15	ns
t_{OW}	Output Active from End-of-Write[1,2]	0	—	0	—	0	—	ns
t_{WDD}	Write Pulse to Data Delay[4]	—	35	—	45	—	55	ns
t_{WDD}	Write Data Valid to Read Data Delay[4]	—	30	—	35	—	45	ns
$\overline{BUSY}$ INPUT TIMING								
t_{WB}	Write to $\overline{BUSY}$[5]	0	—	0	—	0	—	ns
t_{WH}	Write Hold After $\overline{BUSY}$[6]	15	—	15	—	20	—	ns

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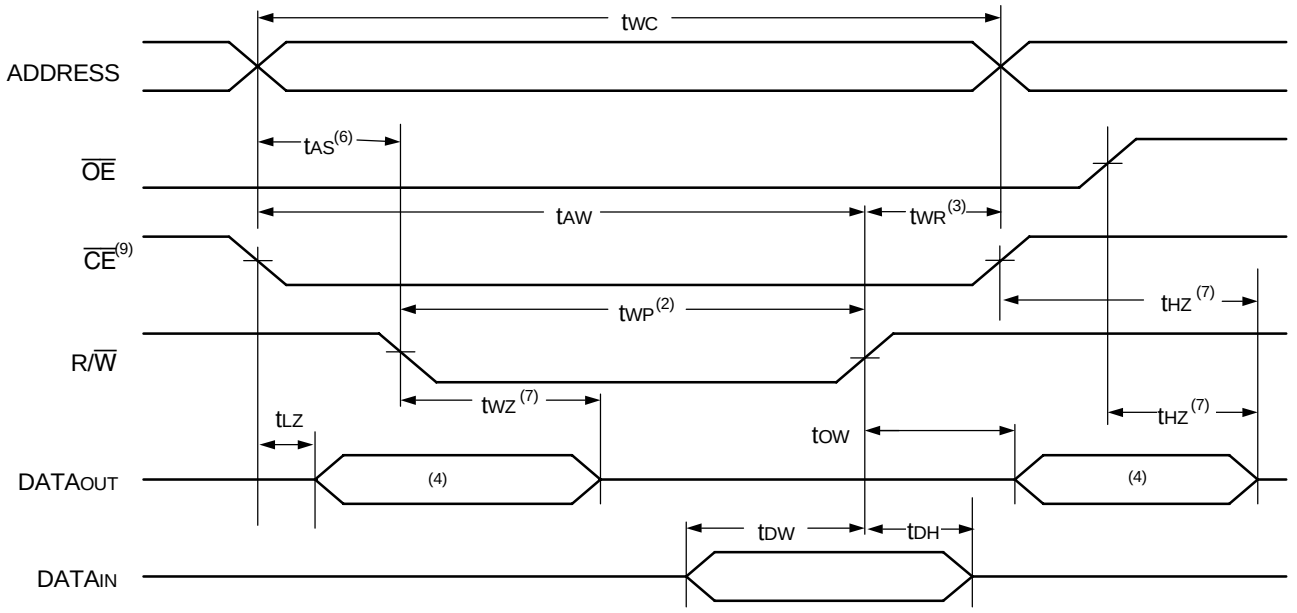
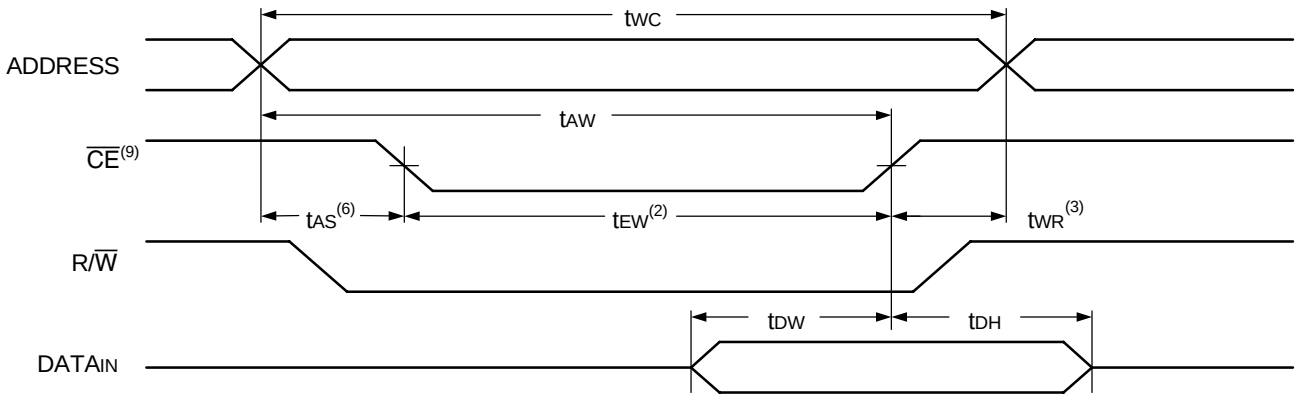
NOTES:
1. Transition is measured 0mV from Low or High-impedance voltage with the Output Test Load (Figure 2).
2. This parameter is guaranteed by device characterization but is not production tested.
3. If $\overline{OE}$ = V_{IL} during a R/$\overline{W}$ controlled write cycle, the write pulse width must be the larger of t_{WP} or (t_{WZ} + t_{DW}) to allow the I/O drivers to turn off data to be placed on the bus for the required t_{DW}. If $\overline{OE}$ = V_{IH} during an R/W controlled write cycle, this requirement does not apply and the write pulse can be as short as the specified t_{WP}. Specified for $\overline{OE}$ = V_{IH} (refer to "Timing Waveform of Write Cycle", Note 8).
4. Port-to-port delay through RAM cells from writing port to reading port, refer to "Timing Waveform of Write with Port-to-Port Read".
5. To ensure that the write cycle is inhibited on port "A" during contention from Port "B". Port "A" may be any of the four ports and Port "B" is any other port.
6. To ensure that a write cycle is completed on port "A" after contention from Port "B". Port "A" may be any of the four ports and Port "B" is any other port.
7. 'X' in part number indicates power rating.

Timing Waveform of Write Cycle No. 1, R/$\overline{W}$ Controlled Timing(5,8)



2674 drw 09

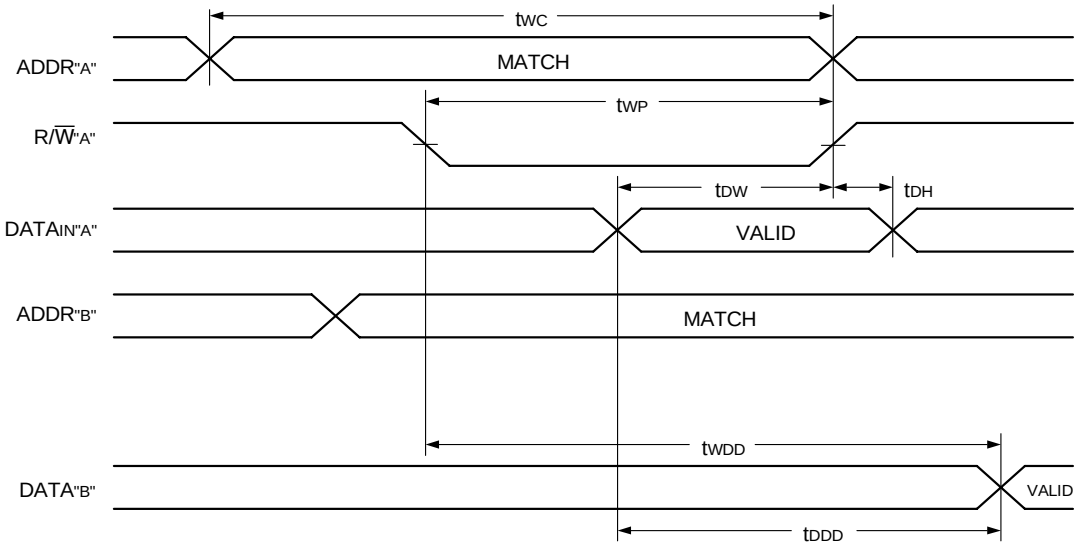
Timing Waveform of Write Cycle No. 2, CE Controlled Timing(1, 5)



2674 drw 10

NOTES:
1. R/$\overline{W}$ or $\overline{CE}$ = V_{IH} during all address transitions.
2. A write occurs during the overlap (t_{EW} or t_{WP}) of a $\overline{CE}$ = V_{IL} and a R/$\overline{W}$ = V_{IL}.
3. t_{WR} is measured from the earlier of $\overline{CE}$ or R/$\overline{W}$ = V_{IH} to the end of write cycle.
4. During this period, the I/O pins are in the output state, and input signals must not be applied.
5. If the $\overline{CE}$ = V_{IL} transition occurs simultaneously with or after the R/$\overline{W}$ = V_{IL} transition, the outputs remain in the High-impedance state.
6. Timing depends on which enable signal is asserted last, $\overline{CE}$ or R/$\overline{W}$.
7. Transition is measured 0mV from Low or High-impedance voltage with the Output Test Load (Figure 2). This parameter is guaranteed but is not production tested.
8. If $\overline{OE}$ = V_{IL} during a R/$\overline{W}$ controlled write cycle, the write pulse width must be the larger of t_{WP} or (t_{WZ} + t_{DW}) to allow the I/O drivers to turn off data to be placed on the bus for the required t_{DW}. If $\overline{OE}$ = V_{IH} during an R/$\overline{W}$ controlled write cycle, this requirement does not apply and the write pulse can be as short as the specified t_{WP}.

Timing Waveform of Write with Port-to-Port Read(1,2,3)



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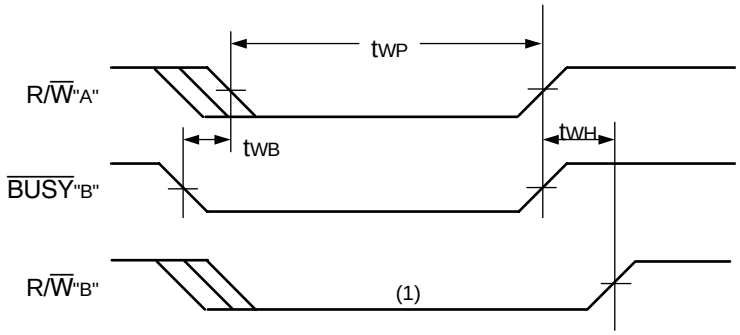
NOTES:
1. Assume $\overline{BUSY}$ input = V_{IH} and $\overline{CE}$ = V_{IL} for the writing port.
2. $\overline{OE}$ = V_{IL} for the reading ports.
3. All timing is the same for left and right ports. Port "A" may be either of the four ports and Port "B" is any other port.

Timing Waveform of Write with $\overline{BUSY}$ Input



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NOTE:
1. $\overline{BUSY}$ is asserted on Port "B" blocking R/$\overline{W}$"B" until $\overline{BUSY}$"B" goes HIGH.

Functional Description

The IDT7052 provides four ports with separate control, address, and I/O pins that permit independent access for reads or writes to any location in memory. These devices have an automatic power down feature controlled by $\overline{CE}$. The $\overline{CE}$ controls on-chip power down circuitry that permits the respective port to go into standby mode when not selected ($\overline{CE}$ = V_{IH}). When a port is enabled, access to the entire memory array is permitted. Each port has its own Output Enable control ($\overline{OE}$). In the read mode, the port's $\overline{OE}$ turns on the output drivers when set LOW. READ/WRITE conditions are illustrated in the table below.

Truth Table I – Read/Write Control(3)

Any Port(1)				
R/$\overline{W}$	$\overline{CE}$	$\overline{OE}$	D_{0-7}	Function
X	H	X	Z	Port Deselected: Power-Down
X	H	X	Z	$\overline{CE}_{P1}$=$\overline{CE}_{P2}$=$\overline{CE}_{P3}$=$\overline{CE}_{P4}$=V_{IH} Power Down Mode I_{SB} or I_{SB1}
L	L	X	$DATA_{IN}$	Data on port written into memory(2)
H	L	L	$DATA_{OUT}$	Data in memory output on port
X	X	H	Z	Outputs Disabled

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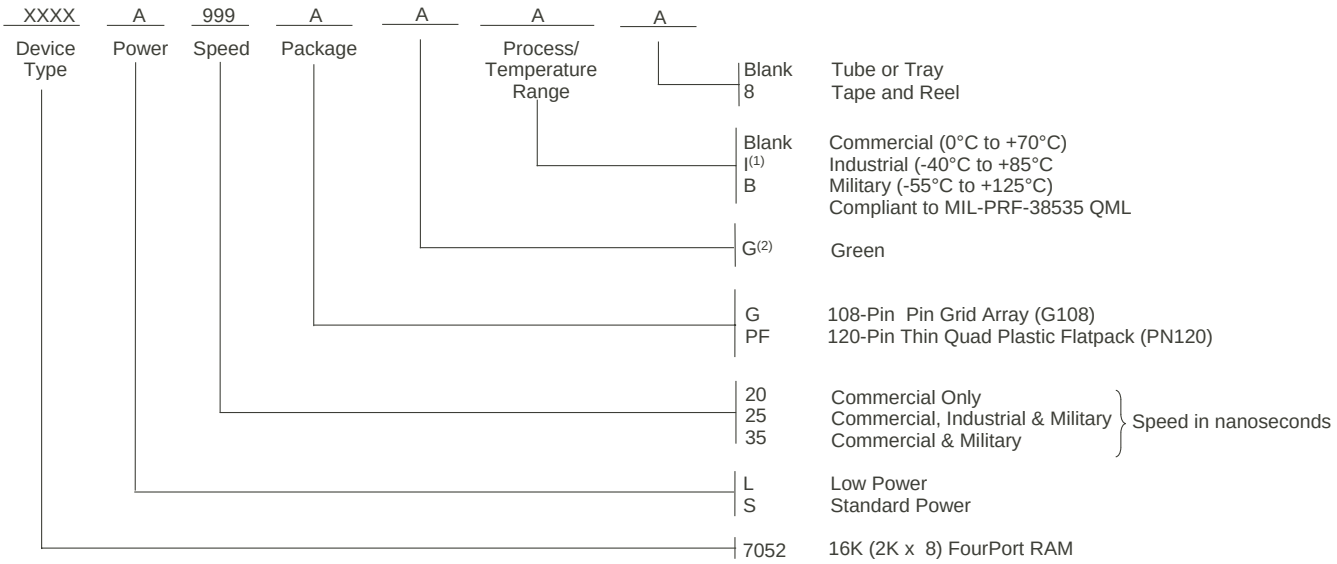
NOTES:
1. "H" = V_{IH}, "L" = V_{IL}, "X" = Don't Care, "Z "= High Impedance
2. If $\overline{BUSY}$ = V_{IL}, write is blocked.
3. For valid write operation, no more than one port can write to the same address location at the same time.

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 in EOL process. Product Discontinuation Notice - PDN# SP-17-02

Datasheet Document History

01/18/99:	Initiated datasheet document history
	Converted to new format
	Cosmetic typographical corrections
	Added additional notes to pin configurations
06/04/99:	Changed drawing format
	Page1 Corrected DSC number
11/10/99:	Replaced IDT logo
11/18/99:	Page 10 Fixed typo in caption for $\overline{BUSY}$ Input waveform
05/23/00:	Page 4 Increased storage temperature parameter
	Clarified T_A parameter
	Page 5 DC Electrical parameters–changed wording from "open" to "disabled"
	Changed ±200mV to 0mV in notes
10/22/01:	Pages 2 & 3 Added date revision for pin configurations
	Page 5, 7 & 8 Added Industrial temp to column heading for 25ns speed to DC & AC Electrical Characteristics
	Page 11 Added Industrial temp offering to 25ns ordering information
	Page 4, 5, 7 & 8 Removed Industrial temp footnote from all tables
	Page 1 & 11 Replace TM logo with ® logo
07/24/06:	Page 1 Added green availability to features
	Page 11 Added green indicator to ordering information
01/19/09:	Page 11 Removed "IDT" from orderable part number
02/05/15:	Page 2 Removed IDT in reference to fabrication
	Page 2,3 & 11 The package codes G108-1 & PN120-1 changed to G108 & PN120 respectively to match standard package codes
	Page 11 Added Tape and Reel to Ordering Information
	Page 1&3 Removed 132-pin PQF offering from the Features & the pin configuration
	Page 11 Removed the 132-pin PQF package from the Ordering Information

Datasheet Document History (con't)

07/08/16:	Page 3	Changed diagram for the PN120 pin configuration by rotating package pin labels and pin numbers 90 degrees counter clockwise to reflect pin 1 orientation and added pin 1 dot at pin 1 Added the IDT logo to the PN120 pin configurations and changed the text to be in alignment with new diagram marking specs and removed the date revision indicator from all pin configurations Updated footnote references for PN120 pin configuration by removing footnote 4 & 5
06/07/18:		Product Discontinuation Notice - PDN# SP-17-02 Last time buy expires June 15, 2018

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