



Integrated Device Technology, Inc.

HIGH-SPEED 1K x 8 DUAL-PORT STATIC RAM

IDT7130SA/LA
IDT7140SA/LA

FEATURES

- High-speed access
 - Military: 25/35/55/100ns (max.)
 - Commercial: 25/35/55/100ns (max.)
 - Commercial: 20ns 7130 in PLCC and TQFP
- Low-power operation
 - IDT7130/IDT7140SA
 - Active: 550mW (typ.)
 - Standby: 5mW (typ.)
 - IDT7130/IDT7140LA
 - Active: 550mW (typ.)
 - Standby: 1mW (typ.)
- MASTER IDT7130 easily expands data bus width to 16-or-more-bits using SLAVE IDT7140
- On-chip port arbitration logic (IDT7130 Only)
- \overline{BUSY} output flag on IDT7130; \overline{BUSY} input on IDT7140
- Interrupt flags for port-to-port communication
- Fully asynchronous operation from either port
- Battery backup operation—2V data retention (LA only)
- TTL-compatible, single 5V $\pm 10\%$ power supply
- Military product compliant to MIL-STD-883, Class B
- Standard Military Drawing #5962-86875
- Industrial temperature range (-40°C to $+85^{\circ}\text{C}$) is available, tested to military electrical specifications

DESCRIPTION

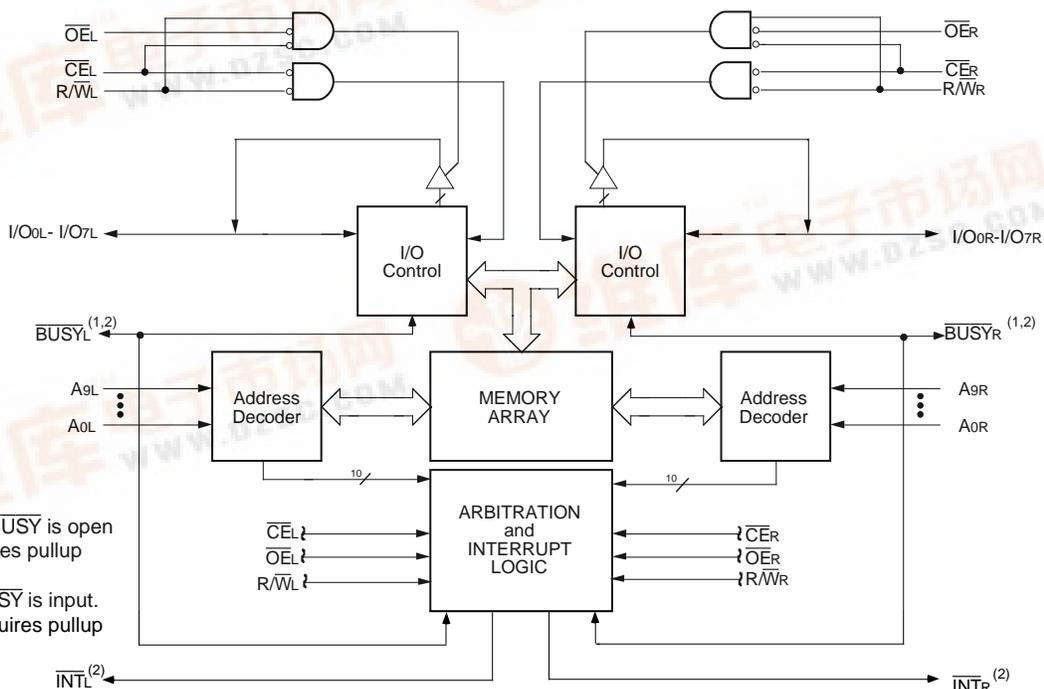
The IDT7130/IDT7140 are high-speed 1K x 8 Dual-Port Static RAMs. The IDT7130 is designed to be used as a stand-alone 8-bit Dual-Port RAM or as a "MASTER" Dual-Port RAM together with the IDT7140 "SLAVE" Dual-Port in 16-bit-or-more word width systems. Using the IDT MASTER/SLAVE Dual-Port RAM approach in 16-or-more-bit memory system applications results in full-speed, error-free operation without the need for additional discrete logic.

Both devices provide two independent ports with separate control, address, and I/O pins that permit independent asynchronous access for reads or writes to any location in memory. An automatic power down feature, controlled by \overline{CE} , 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 550mW of power. Low-power (LA) versions offer battery backup data retention capability, with each Dual-Port typically consuming 200 μW from a 2V battery.

The IDT7130/IDT7140 devices are packaged in 48-pin sidebrase or plastic DIPs, LCCs, or flatpacks, 52-pin PLCC, and 64-pin TQFP and STQFP. Military grade product is manufactured in compliance with the latest revision of MIL-STD-883, Class B, making it ideally suited to military temperature applications demanding the highest level of performance and reliability.

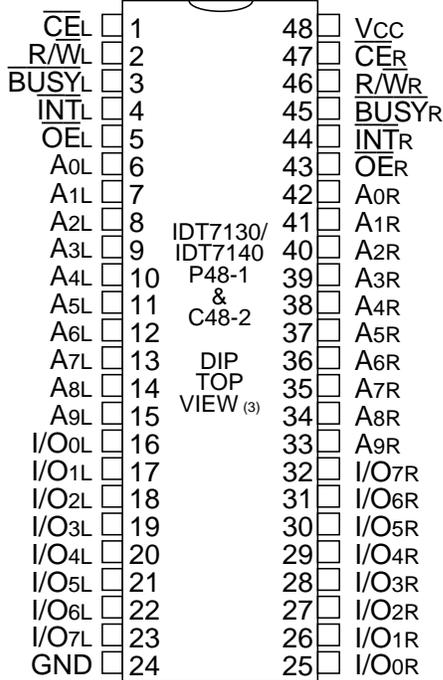
FUNCTIONAL BLOCK DIAGRAM



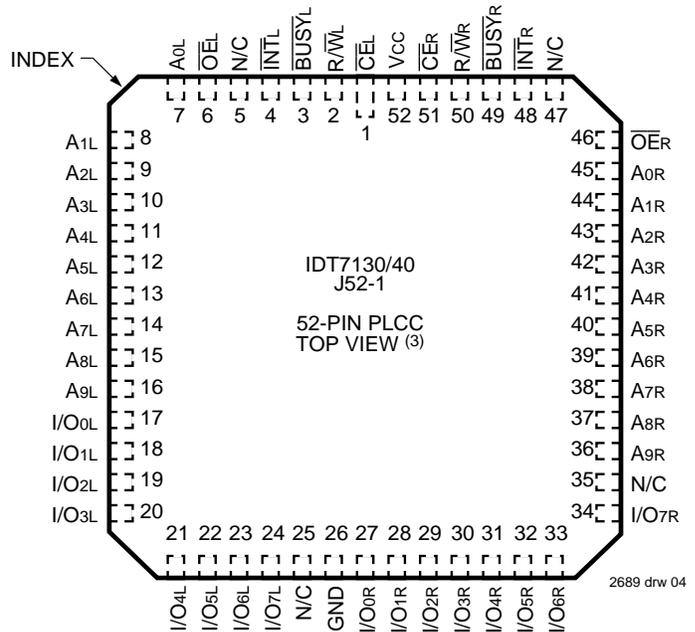
NOTES:

1. IDT7130 (MASTER): \overline{BUSY} is open drain output and requires pullup resistor of 270 Ω .
IDT7140 (SLAVE): \overline{BUSY} is input.
2. Open drain output: requires pullup resistor of 270 Ω .

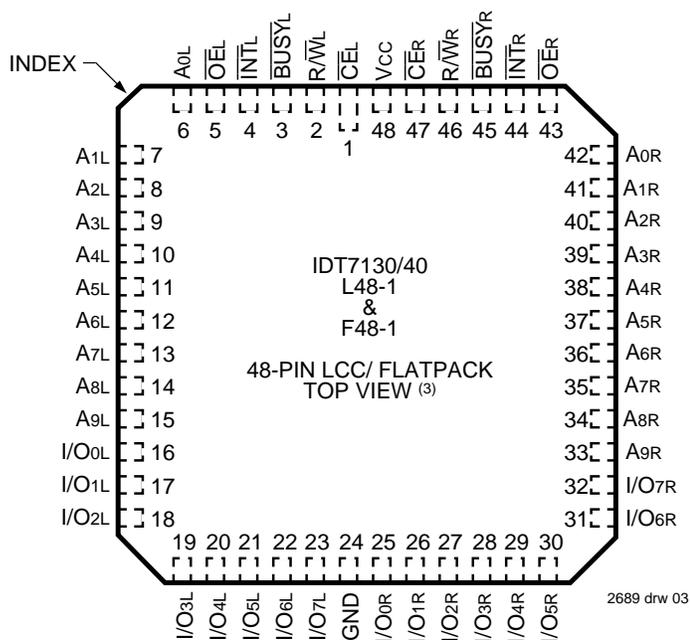
PIN CONFIGURATIONS (1,2)



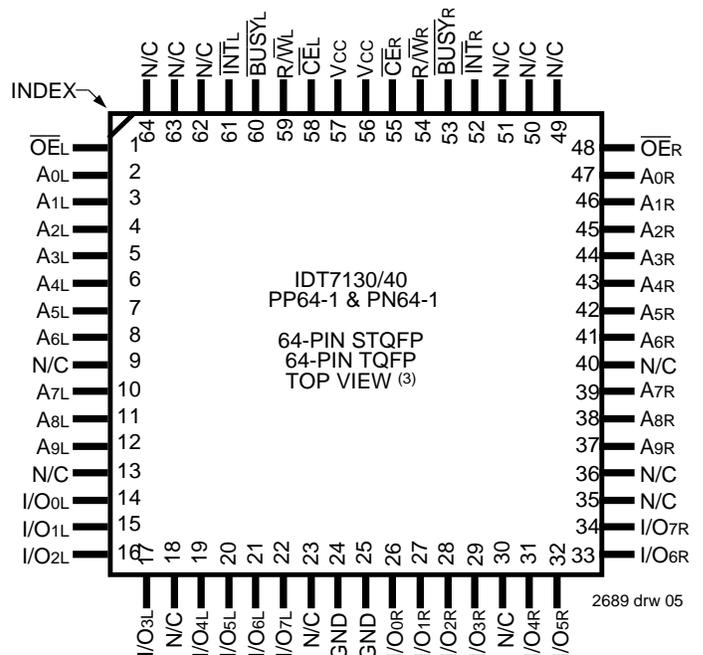
2689 drw 02



2689 drw 04



2689 drw 03



2689 drw 05

NOTES:

1. All Vcc pins must be connected to the power supply.
2. All GND pins must be connected to the ground supply.
3. This text does not indicate orientation of the actual part-marking.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Rating	Commercial	Military	Unit
V _{TERM} ⁽²⁾	Terminal Voltage with Respect to GND	-0.5 to +7.0	-0.5 to +7.0	V
T _A	Operating Temperature	0 to +70	-55 to +125	°C
T _{BIAS}	Temperature Under Bias	-55 to +125	-65 to +135	°C
T _{STG}	Storage Temperature	-55 to +125	-65 to +150	°C
I _{OUT}	DC Output Current	50	50	mA

2689 tbl 01

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 the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.
- V_{TERM} must not exceed V_{CC} + 0.5 for more than 25% of the cycle time or 10ns maximum, and is limited to ≤ 20mA for the period of V_{TERM} ≥ V_{CC} + 0.5V.

RECOMMENDED DC OPERATING CONDITIONS

Symbol	Parameter	Min.	Typ.	Max.	Unit
V _{CC}	Supply Voltage	4.5	5.0	5.5	V
GND	Supply Voltage	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

NOTES:

- V_{IL} (min.) ≥ -1.5V for pulse width less than 10ns.
- V_{TERM} must not exceed V_{CC} + 0.5V.

2689 tbl 02

RECOMMENDED OPERATING TEMPERATURE AND SUPPLY VOLTAGE

Grade	Ambient Temperature	GND	V _{CC}
Military	-55°C to +125°C	0V	5.0V ± 10%
Commercial	0°C to +70°C	0V	5.0V ± 10%

2689 tbl 03

DC ELECTRICAL CHARACTERISTICS OVER THE OPERATING TEMPERATURE AND SUPPLY VOLTAGE RANGE (V_{CC} = 5.0V ± 10%)

Symbol	Parameter	Test Conditions	7130SA 7140SA		7130LA 7140LA		Unit
			Min.	Max.	Max.	Max.	
I _L	Input Leakage Current ⁽¹⁾	V _{CC} = 5.5V, V _{IN} = 0V to V _{CC}	—	10	—	5	μA
I _{LO}	Output Leakage Current ⁽¹⁾	V _{CC} = 5.5V, $\overline{CE} = V_{IH}$, V _{OUT} = 0V to V _{CC}	—	10	—	5	μA
V _{OL}	Output Low Voltage (I/O0-I/O7)	I _{OL} = 4mA	—	0.4	—	0.4	V
V _{OL}	Open Drain Output Low Voltage (\overline{BUSY} , \overline{INT})	I _{OL} = 16mA	—	0.5	—	0.5	V
V _{OH}	Output High Voltage	I _{OH} = -4mA	2.4	—	2.4	—	V

NOTE:

- At V_{CC} ≤ 2.0V leakages are undefined.

2689 tbl 04

CAPACITANCE⁽¹⁾

(T_A = +25°C, f = 1.0MHz) TQFP ONLY⁽³⁾

Symbol	Parameter	Conditions ⁽²⁾	Max.	Unit
C _{IN}	Input Capacitance	V _{IN} = 3dV	9	pF
C _{OUT}	Output Capacitance	V _{IN} = 3dV	10	pF

2689 tbl 05

NOTES:

- This parameter is determined by device characterization but is not production tested.
- 3dv references the interpolated capacitance when the input and output signals switch from 0V to 3V or from 3V to 0V.
- 11pF max. for other packages.

DC ELECTRICAL CHARACTERISTICS OVER THE OPERATING TEMPERATURE AND SUPPLY VOLTAGE RANGE^(1,6) ($V_{CC} = 5.0V \pm 10\%$)

Symbol	Parameter	Test Conditions	Version	7130X20 ⁽²⁾	7130X25 ⁽³⁾	7130X35	7130X55	7130X100	Unit					
				Typ.	Max.	7140X25 ⁽³⁾	Typ.	Max.		7140X35	Typ.	Max.	7140X55	Typ.
I _{CC}	Dynamic Operating Current (Both Ports Active)	\overline{CE}_L and $\overline{CE}_R = V_{IL}$, Outputs open, $f = f_{MAX}^{(4)}$	MIL. SA	—	—	110	280	110	230	110	190	110	190	mA
				LA	—	—	110	220	110	170	110	140	110	
			COM'L. SA	110	250	110	220	110	165	110	155	110	155	
LA	110	200		110	170	110	120	110	110	110	110			
I _{SB1}	Standby Current (Both Ports - TTL Level Inputs)	\overline{CE}_L and $\overline{CE}_R = V_{IH}$, $f = f_{MAX}^{(4)}$	MIL. SA	—	—	30	80	25	80	20	65	20	65	mA
				LA	—	—	30	60	25	60	20	45	20	
			COM'L. SA	30	65	30	65	25	65	20	65	20	55	
LA	30	45		30	45	25	45	20	35	20	35			
I _{SB2}	Standby Current (One Port - TTL Level Inputs)	$\overline{CE}^A = V_{IL}$ and $\overline{CE}^B = V_{IH}^{(7)}$ Active Port Outputs Open, $f = f_{MAX}^{(4)}$	MIL. SA	—	—	65	160	50	150	40	125	40	125	mA
				LA	—	—	65	125	50	115	40	90	40	
			COM'L. SA	65	165	65	150	50	125	40	110	40	110	
LA	65	125		65	115	50	90	40	75	40	75			
I _{SB3}	Full Standby Current (Both Ports - All CMOS Level Inputs)	\overline{CE}_L and $\overline{CE}_R \geq V_{CC} - 0.2V$, $V_{IN} \geq V_{CC} - 0.2V$ or $V_{IN} \leq 0.2V, f = 0^{(6)}$	MIL. SA	—	—	1.0	30	1.0	30	1.0	30	1.0	30	mA
				LA	—	—	0.2	10	0.2	10	0.2	10	0.2	
			COM'L. SA	1.0	15	1.0	15	1.0	15	1.0	15	1.0	15	
LA	0.2	5		0.2	5	0.2	4	0.2	4	0.2	4			
I _{SB4}	Full Standby Current (One Port - All CMOS Level Inputs)	$\overline{CE}^A \leq 0.2V$ and $\overline{CE}^B \geq V_{CC} - 0.2V^{(7)}$ $V_{IN} \geq V_{CC} - 0.2V$ or $V_{IN} \leq 0.2V$, Active Port Outputs Open, $f = f_{MAX}^{(4)}$	MIL. SA	—	—	60	155	45	145	40	110	40	110	mA
				LA	—	—	60	115	45	105	40	85	40	
			COM'L. SA	60	155	60	145	45	110	40	100	40	95	
LA	60	115		60	105	45	85	40	70	40	70			

NOTES:

2689 tbl 06

- 'X' in part numbers indicates power rating (SA or LA).
- Com'l Only, 0°C to +70°C temperature range. PLCC and TQFP packages.
- Not available in DIP packages.
- 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.
- $f = 0$ means no address or control lines change. Applies only to inputs at CMOS level standby.
- $V_{CC} = 5V$, $T_A = +25^\circ C$ for Typ and is not production tested. $V_{CC DC} = 100 mA$ (Typ.)
- Port "A" may be either left or right port. Port "B" is opposite from port "A".

DATA RETENTION CHARACTERISTICS (LA Version Only)

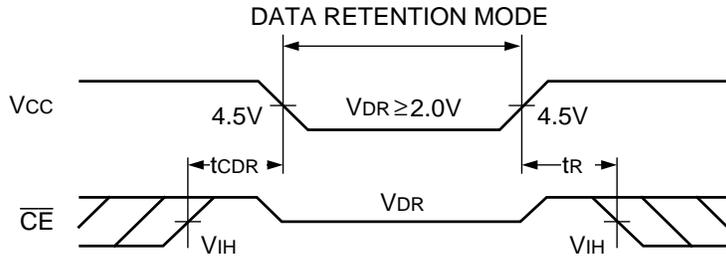
Symbol	Parameter	Test Conditions	IDT7130LA/IDT7140LA			Unit	
			Min.	Typ. ⁽¹⁾	Max.		
V _{DR}	V _{CC} for Data Retention	$V_{CC} = 2.0V, \overline{CE} \geq V_{CC} - 0.2V$	2.0	—	—	V	
I _{CCDR}	Data Retention Current		Mil.	—	100	4000	μA
		$V_{IN} \geq V_{CC} - 0.2V$ or $V_{IN} \leq 0.2V$	Com'l.	—	100	1500	μA
t _{CDR} ⁽³⁾	Chip Deselect to Data Retention Time		0	—	—	ns	
t _R ⁽³⁾	Operation Recovery Time		t _{RC} ⁽²⁾	—	—	ns	

NOTES:

2689 tbl 07

- $V_{CC} = 2V$, $T_A = +25^\circ C$, and is not production tested.
- t_{RC} = Read Cycle Time
- This parameter is guaranteed but not production tested.

DATA RETENTION WAVEFORM



2692 drw 06

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	Figures 1, 2, and 3

2689 tbl 08

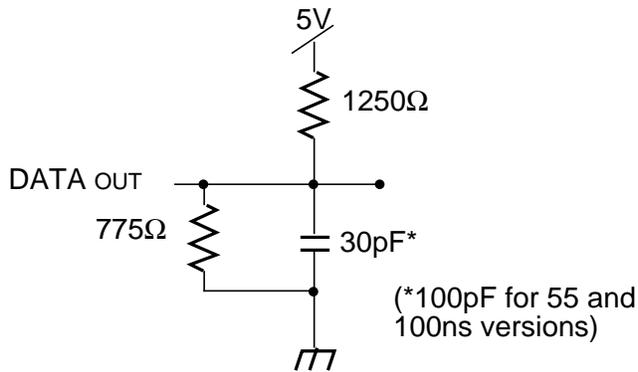


Figure 1. Output Test Load

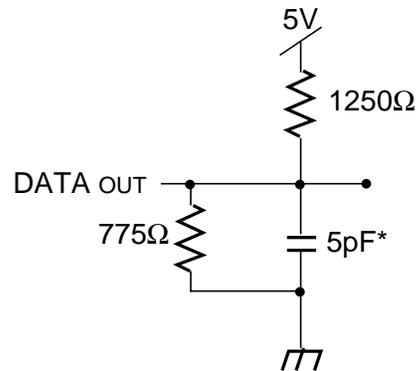
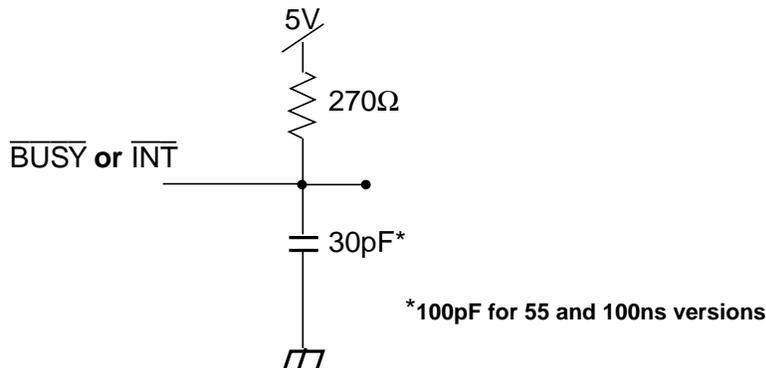


Figure 2. Output Test Load
(for tHZ, tLZ, twZ, and tow)
* including scope and jig



2689 drw 07

Figure 3. $\overline{\text{BUSY}}$ and $\overline{\text{INT}}$
AC Output Test Load

AC ELECTRICAL CHARACTERISTICS OVER THE OPERATING TEMPERATURE AND SUPPLY VOLTAGE RANGE⁽³⁾

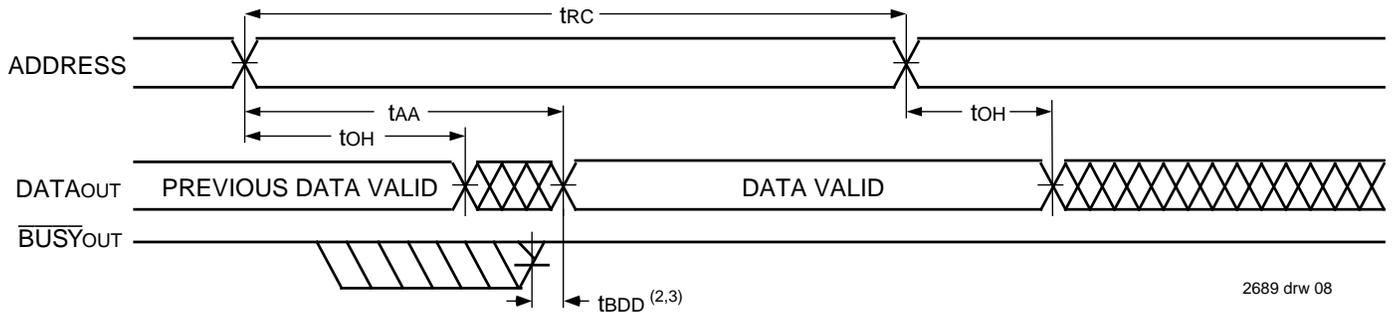
Symbol	Parameter	7130X20 ⁽²⁾		7130X25 ⁽⁵⁾ 7140X25 ⁽⁵⁾		7130X35 7140X35		7130X55 7140X55		7130X100 7140X100		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Read Cycle												
t _{RC}	Read Cycle Time	20	—	25	—	35	—	55	—	100	—	ns
t _{AA}	Address Access Time	—	20	—	25	—	35	—	55	—	100	ns
t _{ACE}	Chip Enable Access Time	—	20	—	25	—	35	—	55	—	100	ns
t _{AOE}	Output Enable Access Time	—	11	—	12	—	20	—	25	—	40	ns
t _{OH}	Output Hold From Address Change	3	—	3	—	3	—	3	—	10	—	ns
t _{LZ}	Output Low-Z Time ^(1,4)	0	—	0	—	0	—	5	—	5	—	ns
t _{HZ}	Output High-Z Time ^(1,4)	—	10	—	10	—	15	—	25	—	40	ns
t _{PU}	Chip Enable to Power Up Time ⁽⁴⁾	0	—	0	—	0	—	0	—	0	—	ns
t _{PD}	Chip Disable to Power Down Time ⁽⁴⁾	—	20	—	25	—	35	—	50	—	50	ns

NOTES:

1. Transition is measured ±500mV from Low or High-impedance voltage Output Test Load (Figure 2).
2. Com'I Only, 0°C to +70°C temperature range. PLCC and TQFP package.
3. "X" in part numbers indicates power rating (SA or LA).
4. This parameter is guaranteed by device characterization, but is not production tested.
5. Not available in DIP packages.

2689 tbl 09

TIMING WAVEFORM OF READ CYCLE NO. 1, EITHER SIDE⁽¹⁾

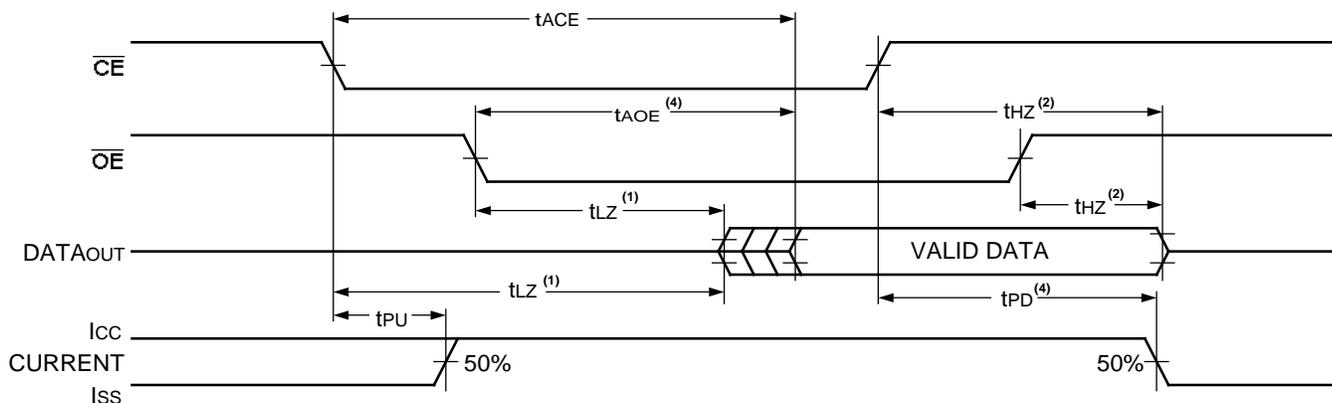


2689 drw 08

NOTES:

1. $R/\overline{W} = V_{IH}$, $\overline{CE} = V_{IL}$, and is $\overline{OE} = V_{IL}$. Address is valid prior to the coincidental with \overline{CE} transition Low.
2. t_{BDD} delay is required only in the case where the opposite port is completing a write operation to the same the address location. For simultaneous read operations, \overline{BUSY} has no relationship to valid output data.
3. Start of valid data depends on which timing becomes effective last t_{AOE} , t_{ACE} , t_{AA} , and t_{BDD} .

TIMING WAVEFORM OF READ CYCLE NO. 2, EITHER SIDE⁽³⁾



2689 drw 09

NOTES:

1. Timing depends on which signal is asserted last, \overline{OE} or \overline{CE} .
2. Timing depends on which signal is deasserted first, \overline{OE} or \overline{CE} .
3. $R/\overline{W} = V_{IH}$ and the address is valid prior to or coincidental with \overline{CE} transition Low.
4. Start of valid data depends on which timing becomes effective last t_{AOE} , t_{ACE} , t_{AA} , and t_{BDD} .

AC ELECTRICAL CHARACTERISTICS OVER THE OPERATING TEMPERATURE AND SUPPLY VOLTAGE RANGE⁽⁵⁾

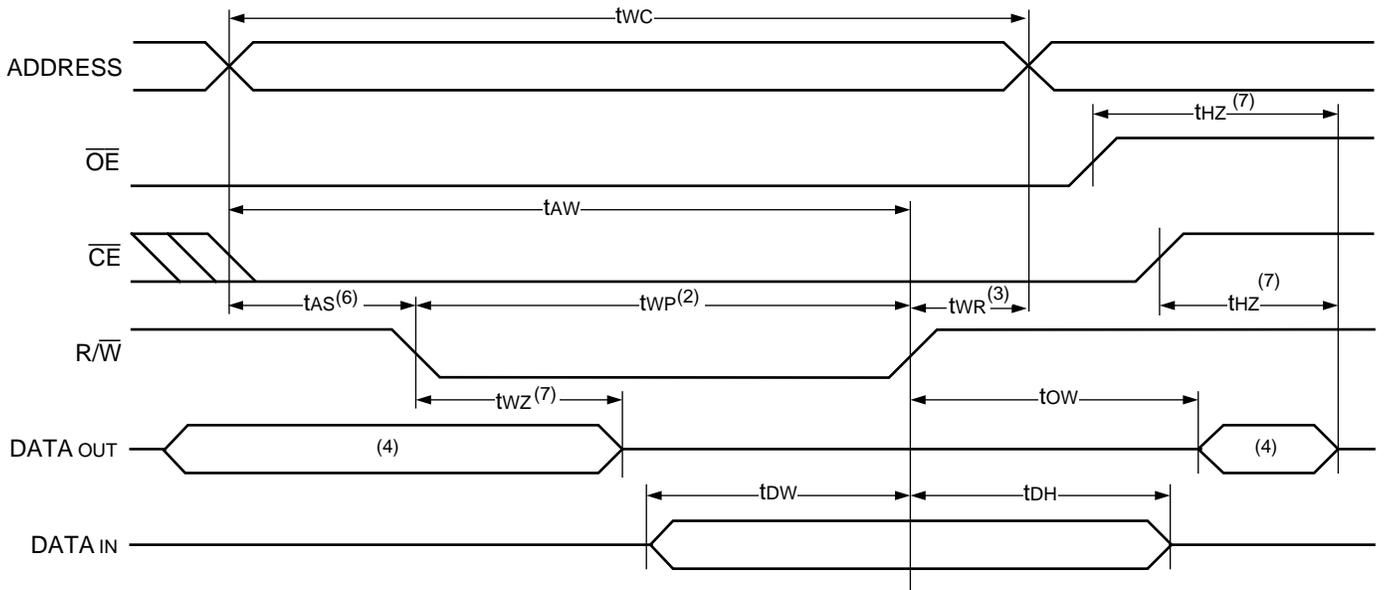
Symbol	Parameter	7130X20 ⁽²⁾		7130X25 ⁽⁶⁾ 7140X25 ⁽⁶⁾		7130X35 7140X35		7130X55 7140X55		7130X100 7140X100		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Write Cycle												
t _{WC}	Write Cycle Time ⁽³⁾	20	—	25	—	35	—	55	—	100	—	ns
t _{EW}	Chip Enable to End-of-Write	15	—	20	—	30	—	40	—	90	—	ns
t _{AW}	Address Valid to End-of-Write	15	—	20	—	30	—	40	—	90	—	ns
t _{AS}	Address Set-up Time	0	—	0	—	0	—	0	—	0	—	ns
t _{WP}	Write Pulse Width ⁽⁴⁾	15	—	15	—	25	—	30	—	55	—	ns
t _{WR}	Write Recovery Time	0	—	0	—	0	—	0	—	0	—	ns
t _{DW}	Data Valid to End-of-Write	10	—	12	—	15	—	20	—	40	—	ns
t _{HZ}	Output High-Z Time ⁽¹⁾	—	10	—	10	—	15	—	25	—	40	ns
t _{DH}	Data Hold Time	0	—	0	—	0	—	0	—	0	—	ns
t _{WZ}	Write Enabled to Output in High-Z ⁽¹⁾	—	10	—	10	—	15	—	25	—	40	ns
t _{OW}	Output Active From End-of-Write ⁽¹⁾	0	—	0	—	0	—	0	—	0	—	ns

2689 tbl 10

NOTES:

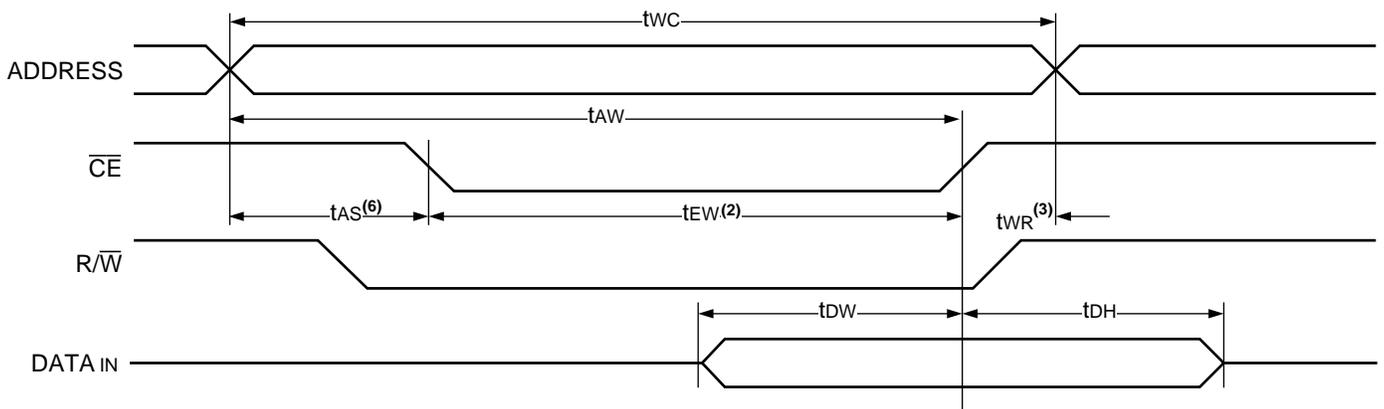
1. Transition is measured $\pm 500mV$ from Low or High-impedance voltage with Output Test Load (Figure 2). This parameter is guaranteed by device characterization but is not production tested.
2. 0°C to +70°C temperature range only, PLCC and TQFP packages.
3. For MASTER/SLAVE combination, $t_{WC} = t_{BAA} + t_{WP}$, since $R/\overline{W} = V_{IL}$ must occur after t_{BAA} .
4. If \overline{OE} is low 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} is High during a R/\overline{W} controlled write cycle, this requirement does not apply and the write pulse can be as short as the specified t_{WP} .
5. "X" in part numbers indicates power rating (SA or LA).
6. Not available in DIP packages.

TIMING WAVEFORM OF WRITE CYCLE NO. 1, ($\overline{R/\overline{W}}$ CONTROLLED TIMING)^(1,5,8)



2689 drw 10

TIMING WAVEFORM OF WRITE CYCLE NO. 2, (\overline{CE} CONTROLLED TIMING)^(1,5)



2689 drw 11

NOTES:

1. $\overline{R/\overline{W}}$ or \overline{CE} must be High during all address transitions.
2. A write occurs during the overlap (t_{EW} or t_{WP}) of $\overline{CE} = V_{IL}$ and $\overline{R/\overline{W}} = V_{IL}$.
3. t_{WR} is measured from the earlier of \overline{CE} or $\overline{R/\overline{W}}$ going High to the end of the 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} Low transition occurs simultaneously with or after the $\overline{R/\overline{W}}$ Low transition, the outputs remain in the High-impedance state.
6. Timing depends on which enable signal (\overline{CE} or $\overline{R/\overline{W}}$) is asserted last.
7. This parameter is determined by device characterization, but is not production tested. Transition is measured +/- 500mV from steady state with the Output Test Load (Figure 2).
8. If \overline{OE} is low during a $\overline{R/\overline{W}}$ 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 and data to be placed on the bus for the required t_{DW} . If \overline{OE} is High during a $\overline{R/\overline{W}}$ controlled write cycle, this requirement does not apply and the write pulse can be as short as the specified t_{WP} .

AC ELECTRICAL CHARACTERISTICS OVER THE OPERATING TEMPERATURE AND SUPPLY VOLTAGE RANGE⁽⁷⁾

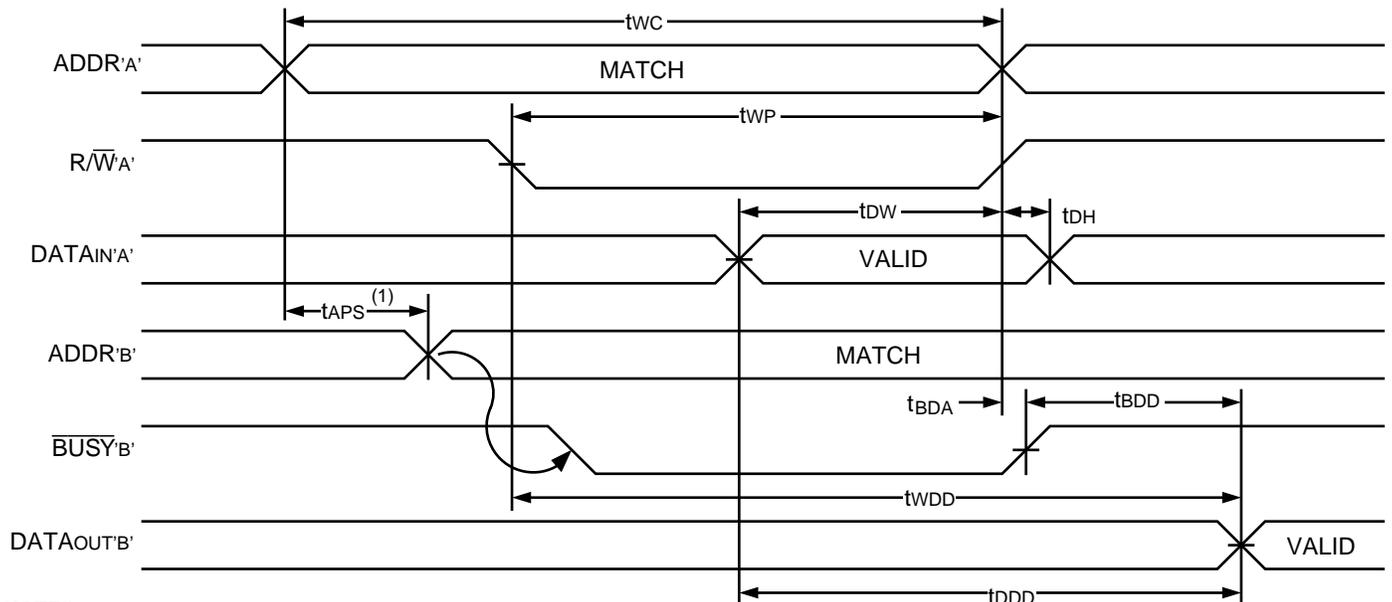
Symbol	Parameter	7130X20 ⁽¹⁾		7130X25 ⁽⁹⁾ 7140X25 ⁽⁹⁾		7130X35 7140X35		7130X55 7140X55		7130X100 7140X100		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Busy Timing (For Master IDT7130 Only)												
tBAA	$\overline{\text{BUSY}}$ Access Time from Address	—	20	—	20	—	20	—	30	—	50	ns
tBDA	$\overline{\text{BUSY}}$ Disable Time from Address	—	20	—	20	—	20	—	30	—	50	ns
tBAC	$\overline{\text{BUSY}}$ Access Time from Chip Enable	—	20	—	20	—	20	—	30	—	50	ns
tBDC	$\overline{\text{BUSY}}$ Disable Time from Chip Enable	—	20	—	20	—	20	—	30	—	50	ns
tWH	Write Hold After $\overline{\text{BUSY}}$ ⁽⁶⁾	12	—	15	—	20	—	20	—	20	—	ns
tWDD	Write Pulse to Data Delay ⁽²⁾	—	40	—	50	—	60	—	80	—	120	ns
tDDD	Write Data Valid to Read Data Delay ⁽²⁾	—	30	—	35	—	35	—	55	—	100	ns
tAPS	Arbitration Priority Set-up Time ⁽³⁾	5	—	5	—	5	—	5	—	5	—	ns
tBDD	$\overline{\text{BUSY}}$ Disable to Valid Data ⁽⁴⁾	—	25	—	35	—	35	—	50	—	65	ns
Busy Timing (For Slave IDT7140 Only)												
tWB	Write to $\overline{\text{BUSY}}$ Input ⁽⁵⁾	0	—	0	—	0	—	0	—	0	—	ns
tWH	Write Hold After $\overline{\text{BUSY}}$ ⁽⁶⁾	12	—	15	—	20	—	20	—	20	—	ns
tWDD	Write Pulse to Data Delay ⁽²⁾	—	40	—	50	—	60	—	80	—	120	ns
tDDD	Write Data Valid to Read Data Delay ⁽²⁾	—	30	—	35	—	35	—	55	—	100	ns

NOTES:

2689 tbl 11

- Com'I Only, 0°C to +70°C temperature range. PLCC and TQFP packages only.
- Port-to-port delay through RAM cells from the writing port to the reading port, refer to "Timing Waveform of Write with Port-to-Port Read and $\overline{\text{BUSY}}$."
- To ensure that the earlier of the two ports wins.
- tBDD is a calculated parameter and is the greater of 0, tWDD – tWP (actual), or tDDD – tDW (actual).
- To ensure that a write cycle is inhibited on port 'B' during contention on port 'A'.
- To ensure that a write cycle is completed on port 'B' after contention on port 'A'.
- "X" in part numbers indicates power rating (SA or LA).
- Not available in DIP packages.

TIMING WAVEFORM OF WRITE WITH PORT-TO-PORT READ AND $\overline{\text{BUSY}}$ ^(2,3,4)

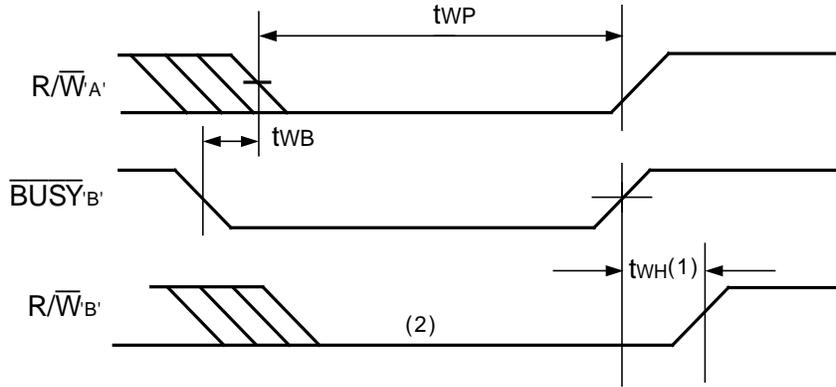


NOTES:

- To ensure that the earlier of the two ports wins. tBDD is ignored for slave (IDT7140).
- $\overline{\text{CEL}} = \overline{\text{CER}} = V_{IL}$.
- OE = V_{IL} for the reading port.
- All timing is the same for the left and right ports. Port 'A' may be either the left or right port. Port "B" is opposite from port "A".

2689 drw 12

TIMING WAVEFORM OF WRITE WITH $\overline{\text{BUSY}}^{(3)}$

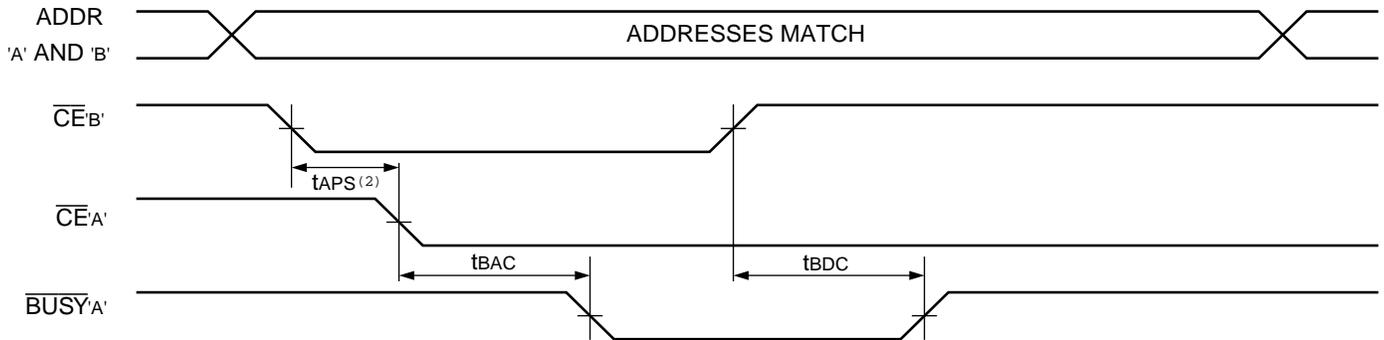


2689 drw 13

NOTES:

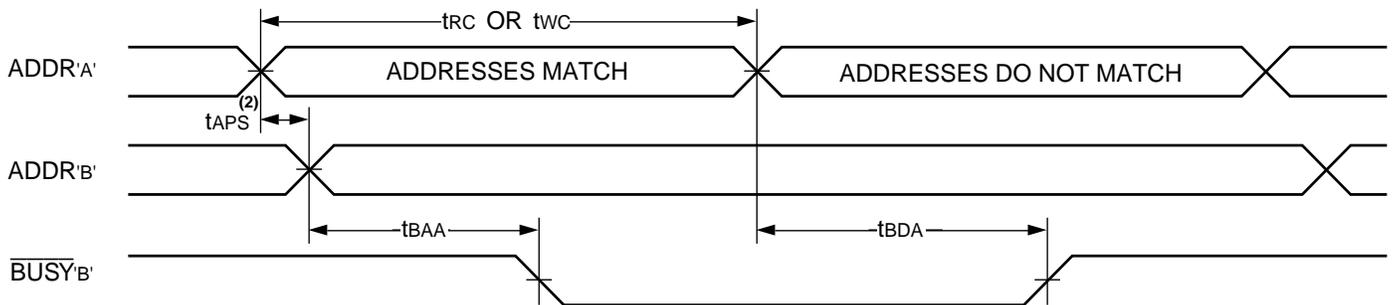
1. t_{WH} must be met for both $\overline{\text{BUSY}}$ Input (IDT7140, slave) or Output (IDT7130 master).
2. $\overline{\text{BUSY}}$ is asserted on port 'B' blocking R/W'B', until $\overline{\text{BUSY}}$ 'B' goes High.
3. All timing is the same for the left and right ports. Port 'A' may be either the left or right port. Port "B" is opposite from port "A".

TIMING WAVEFORM OF BUSY ARBITRATION CONTROLLED BY $\overline{\text{CE}}$ TIMING ⁽¹⁾



2689 drw 14

TIMING WAVEFORM OF BUSY ARBITRATION CONTROLLED BY ADDRESS MATCH TIMING ⁽¹⁾



2689 drw 15

NOTES:

1. All timing is the same for left and right ports. Port "A" may be either left or right port. Port "B" is the opposite from port "A".
2. If t_{APS} is not satisfied, the $\overline{\text{BUSY}}$ will be asserted on one side or the other, but there is no guarantee on which side $\overline{\text{BUSY}}$ will be asserted (7130 only).

AC ELECTRICAL CHARACTERISTICS OVER THE OPERATING TEMPERATURE AND SUPPLY VOLTAGE RANGE⁽²⁾

Symbol	Parameter	7130X20 ⁽¹⁾		7130X25 ⁽³⁾ 7140X25 ⁽³⁾		7130X35 7140X35		7130X55 7140X55		7130X100 7140X100		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Interrupt Timing												
tAS	Address Set-up Time	0	—	0	—	0	—	0	—	0	—	ns
tWR	Write Recovery Time	0	—	0	—	0	—	0	—	0	—	ns
tINS	Interrupt Set Time	—	20	—	25	—	25	—	45	—	60	ns
tINR	Interrupt Reset Time	—	20	—	25	—	25	—	45	—	60	ns

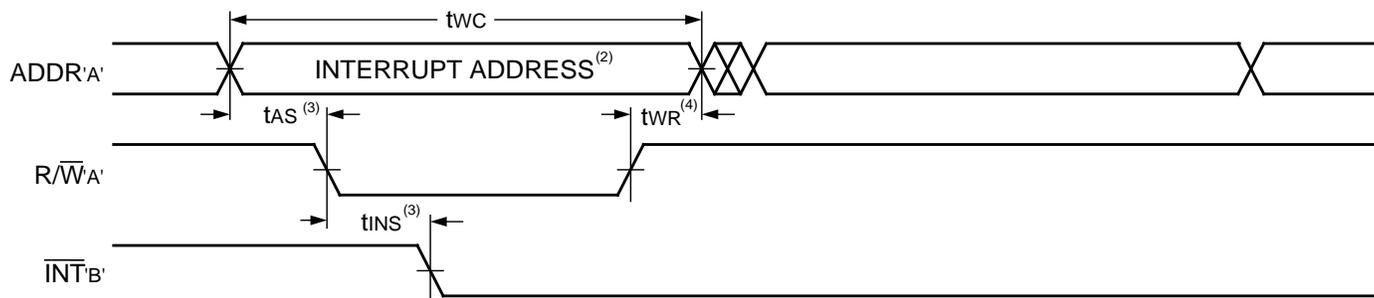
2689 tbl 12

NOTES:

- 0°C to +70°C temperature range only, PLCC and TQFP packages.
- “X” in part numbers indicates power rating (SA or LA).
- Not available in DIP packages .

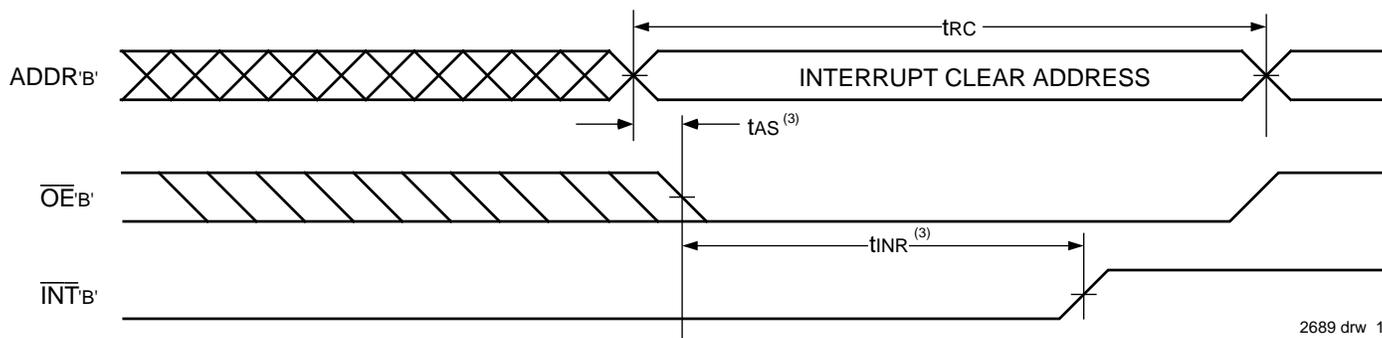
TIMING WAVEFORM OF INTERRUPT MODE

$\overline{\text{INT}}$ SET:



2689 drw 16

$\overline{\text{INT}}$ CLEAR:



2689 drw 17

NOTES:

- All timing is the same for left and right ports. Port “A” may be either left or right port. Port “B” is the opposite from port “A”.
- See Interrupt Truth Table.
- Timing depends on which enable signal ($\overline{\text{CE}}$ or $\text{R}/\overline{\text{W}}$) is asserted last.
- Timing depends on which enable signal ($\overline{\text{CE}}$ or $\text{R}/\overline{\text{W}}$) is de-asserted first.

TRUTH TABLES

TABLE I — NON-CONTENTION
READ/WRITE CONTROL⁽⁴⁾

Left or Right Port ⁽¹⁾				Function
R/W	CE	OE	D0-7	
X	H	X	Z	Port Disabled and in Power-Down Mode, ISB2 or ISB4
X	H	X	Z	CE _R = CE _L = V _{IH} , Power-Down Mode, ISB1 or ISB3
L	L	X	DATA _{IN}	Data on Port Written Into Memory ⁽²⁾
H	L	L	DATA _{OUT}	Data in Memory Output on Port ⁽³⁾
H	L	H	Z	High Impedance Outputs

- NOTES: 2689 tbl 13
1. A0L – A10L ≠ A0R – A10R.
 2. If BUSY = L, data is not written.
 3. If BUSY = L, data may not be valid, see twDD and tDD timing.
 4. 'H' = V_{IH}, 'L' = V_{IL}, 'X' = DON'T CARE, 'Z' = HIGH IMPEDANCE

TABLE II — INTERRUPT FLAG^(1,4)

Left Port					Right Port					Function
R/W	CE _L	OE _L	A9L – A0L	INT _L	R/W	CE _R	OE _R	A9L – A0R	INT _R	
L	L	X	3FF	X	X	X	X	X	L ⁽²⁾	Set Right INT _R Flag
X	X	X	X	X	X	L	L	3FF	H ⁽³⁾	Reset Right INT _R Flag
X	X	X	X	L ⁽³⁾	L	L	X	3FE	X	Set Left INT _L Flag
X	L	L	3FE	H ⁽²⁾	X	X	X	X	X	Reset Left INT _L Flag

- NOTES: 2689 tbl 14
1. Assumes BUSYL = BUSYR = V_{IH}
 2. If BUSYL = V_{IL}, then No Change.
 3. If BUSYR = V_{IL}, then No Change.
 4. 'H' = HIGH, 'L' = LOW, 'X' = DON'T CARE

TABLE III — ADDRESS BUSY ARBITRATION

Inputs			Outputs		Function
CE _L	CE _R	A0L-A9L A0R-A9R	BUSYL ⁽¹⁾	BUSYR ⁽¹⁾	
X	X	NO MATCH	H	H	Normal
H	X	MATCH	H	H	Normal
X	H	MATCH	H	H	Normal
L	L	MATCH	(2)	(2)	Write Inhibit ⁽³⁾

- NOTES: 2689 tbl 15
1. Pins BUSYL and BUSYR are both outputs for IDT7130 (master). Both are inputs for IDT7140 (slave). BUSYx outputs on the IDT7130 are open drain, not push-pull outputs. On slaves the BUSYx input internally inhibits writes.
 2. 'L' if the inputs to the opposite port were stable prior to the address and enable inputs of this port. 'H' if the inputs to the opposite port became stable after the address and enable inputs of this port. If tAPS is not met, either BUSYL or BUSYR = Low will result. BUSYL and BUSYR outputs can not be low simultaneously.
 3. Writes to the left port are internally ignored when BUSYL outputs are driving Low regardless of actual logic level on the pin. Writes to the right port are internally ignored when BUSYR outputs are driving Low regardless of actual logic level on the pin.

ORDERING INFORMATION

