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Pin Configurations

Figure 1. Pin Diagram - DIP (Top View)

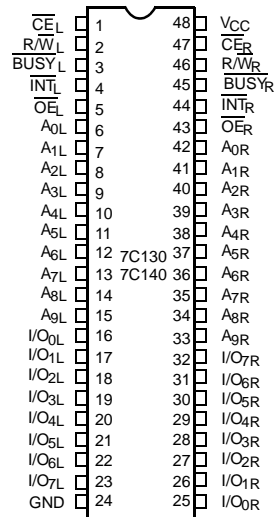


Figure 2. Pin Diagram - PLCC (Top View)

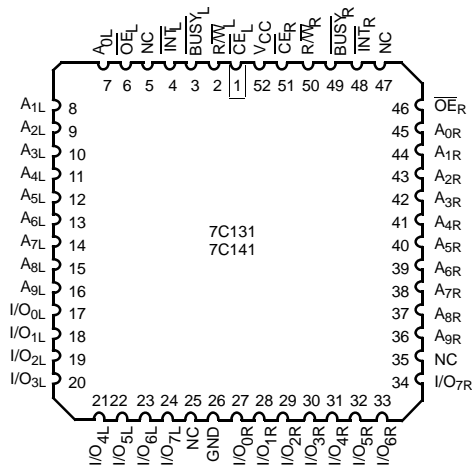
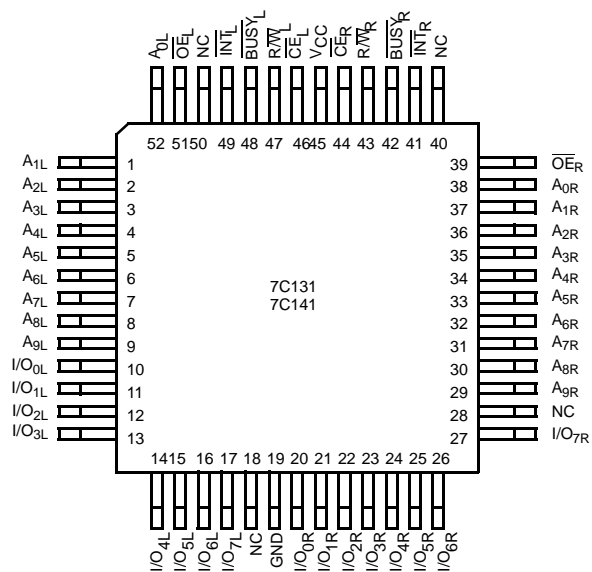


Figure 3. Pin Diagram - PQFP (Top View)



Pin Definitions

Left Port	Right Port	Description
\overline{CE}_L	\overline{CE}_R	Chip enable
R/\overline{W}_L	R/\overline{W}_R	Read/write enable
\overline{OE}_L	\overline{OE}_R	Output enable
$A_{0L}-A_{11/12L}$	$A_{0R}-A_{11/12R}$	Address
$I/O_{0L}-I/O_{15/17L}$	$I/O_{0R}-I/O_{15/17R}$	Data bus input/output
\overline{INT}_L	\overline{INT}_R	Interrupt flag
\overline{BUSY}_L	\overline{BUSY}_R	Busy flag
V_{CC}		Power
GND		Ground

Selection Guide

Parameter		7C131-15 ^[4] 7C131A-15 7C141-15	7C131-25 ^[4] 7C141-25	7C130-30 7C130A-30 7C131-30 7C140-30 7C141-30	7C130-35 7C131-35 7C140-35 7C141-35	7C130-45 7C131-45 7C140-45 7C141-45	7C130-55 7C131-55 7C140-55 7C141-55	Unit
Maximum access time		15	25	30	35	45	55	ns
Maximum operating current	Commercial/ Industrial	190	170	170	120	120	110	mA
Maximum standby current	Commercial/ Industrial	75	65	65	45	45	35	mA

Shaded areas contain preliminary information.

Note

4. 15 and 25 ns version available only in PLCC/PQFP packages.



Maximum Ratings^[5]

Exceeding maximum ratings may shorten the useful life of the device. User guidelines are not tested.

Storage temperature -65 °C to +150 °C
 Ambient temperature with power applied -55 °C to +125 °C
 Supply voltage to ground potential (pin 48 to pin 24) -0.5 V to +7.0 V
 DC voltage applied to outputs in high Z State -0.5 V to +7.0 V

DC input voltage -3.5 V to +7.0 V
 Output current into outputs (LOW) 20 mA
 Static discharge voltage > 2001 V (per MIL-STD-883, method 3015)
 Latch-up current > 200 mA

Operating Range

Range	Ambient Temperature	V _{CC}
Commercial	0 °C to +70 °C	5 V ± 10%
Industrial	-40 °C to +85 °C	5 V ± 10%
Military ^[6]	-55 °C to +125 °C	5 V ± 10%

Electrical Characteristics

Over the Operating Range^[7]

Parameter	Description	Test Conditions	7C131-15 ^[4]		7C130-30 ^[4] 7C130A-30 7C131-25,30 7C140-30 7C141-25,30		7C130-35,45 7C131-35,45 7C140-35,45 7C141-35,45		7C130-55 7C131-55 7C140-55 7C141-55		Unit	
			Min	Max	Min	Max	Min	Max	Min	Max		
V _{OH}	Output HIGH voltage	V _{CC} = Min, I _{OH} = -4.0 mA	2.4	-	2.4	-	2.4	-	2.4	-	V	
V _{OL}	Output LOW voltage	I _{OL} = 4.0 mA	-	0.4	-	0.4	-	0.4	-	0.4	V	
		I _{OL} = 16.0 mA ^[8]	-	0.5	-	0.5	-	0.5	-	0.5	V	
V _{IH}	Input HIGH voltage		2.2	-	2.2	-	2.2	-	2.2	-	V	
V _{IL}	Input LOW voltage		-	0.8	-	0.8	-	0.8	-	0.8	V	
I _{IX}	Input leakage current	GND ≤ V _I ≤ V _{CC}	-5	+5	-5	+5	-5	+5	-5	+5	µA	
I _{OZ}	Output leakage current	GND ≤ V _O ≤ V _{CC} , output disabled	-5	+5	-5	+5	-5	+5	-5	+5	µA	
I _{OS}	Output short circuit current ^[9, 10]	V _{CC} = Max, V _{OUT} = GND	-	-350	-	-350	-	-350	-	-350	mA	
I _{CC}	V _{CC} operating supply current	CE = V _{IL} , outputs open, f = f _{MAX} ^[11]	Commercial	-	190	-	170	-	120	-	110	mA
I _{SB1}	Standby current both ports, TTL inputs	CE _L and CE _R ≥ V _{IH} , f = f _{MAX} ^[11]	Commercial	-	75	-	65	-	45	-	35	mA
I _{SB2}	Standby current one port, TTL inputs	CE _L or CE _R ≥ V _{IH} , active port outputs open, f = f _{MAX} ^[11]	Commercial	-	135	-	115	-	90	-	75	mA
I _{SB3}	Standby current both ports, CMOS inputs	Both ports CE _L and CE _R ≥ V _{CC} - 0.2 V, V _{IN} ≥ V _{CC} - 0.2 V or V _{IN} ≤ 0.2 V, f = 0	Commercial	-	15	-	15	-	15	-	15	mA
I _{SB4}	Standby current one port, CMOS inputs	One port CE _L or CE _R ≥ V _{CC} - 0.2 V, V _{IN} ≥ V _{CC} - 0.2 V or V _{IN} ≤ 0.2 V, active port outputs open, f = f _{MAX} ^[11]	Commercial	-	125	-	105	-	85	-	70	mA

Shaded areas contain preliminary information.

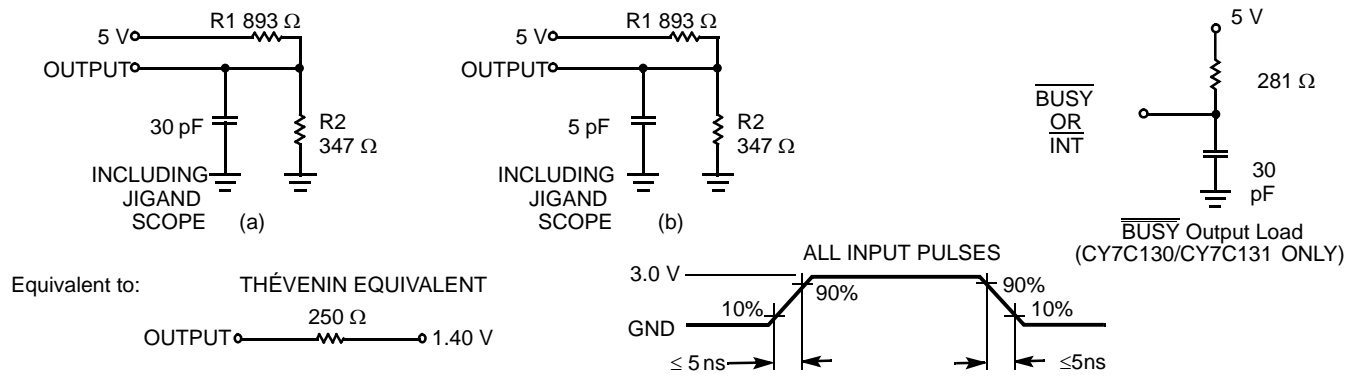
Notes

- The voltage on any input or I/O pin cannot exceed the power pin during power up.
- T_A is the "instant on" case temperature
- See the last page of this specification for Group A subgroup testing information.
- BUSY and INT pins only.
- Duration of the short circuit should not exceed 30 seconds.
- This parameter is guaranteed but not tested.
- At f = f_{MAX}, address and data inputs are cycling at the maximum frequency of read cycle of 1/t_{RC} and using AC Test Waveforms input levels of GND to 3 V.

Capacitance^[10]

Parameter	Description	Test Conditions	Max	Unit
C _{IN}	Input capacitance	T _A = 25 °C, f = 1 MHz, V _{CC} = 5.0 V	15	pF
C _{OUT}	Output capacitance		10	pF

Figure 4. AC Test Loads and Waveforms



Switching Characteristics

Over the Operating Range^[12, 13]

Parameter	Description	7C131-15 ^[14] 7C131A-15 7C141-15		7C130-25 ^[14] 7C131-25 7C140-25 7C141-25		7C130-30 7C130A-30 7C131-30 7C140-30 7C141-30		Unit
		Min	Max	Min	Max	Min	Max	
Read Cycle								
t _{RC}	Read cycle time	15	–	25	–	30	–	ns
t _{AA}	Address to data valid ^[15]	–	15	–	25	–	30	ns
t _{OHA}	Data hold from address change	0	–	0	–	0	–	ns
t _{ACE}	CE LOW to data valid ^[15]	–	15	–	25	–	30	ns
t _{DOE}	OE LOW to data valid ^[15]	–	10	–	15	–	20	ns
t _{LZOE}	OE LOW to low Z ^[16, 17, 18]	3	–	3	–	3	–	ns
t _{HZOE}	OE HIGH to high Z ^[16, 17, 18]	–	10	–	15	–	15	ns
t _{LZCE}	CE LOW to low Z ^[16, 17, 18]	3	–	5	–	5	–	ns
t _{HZCE}	CE HIGH to high Z ^[16, 17, 18]	–	10	–	15	–	15	ns
t _{PU}	CE LOW to power-up ^[16]	0	–	0	–	0	–	ns
t _{PD}	CE HIGH to power-down ^[16]	–	15	–	25	–	25	ns
Write Cycle^[19]								
t _{WC}	Write cycle time	15	–	25	–	30	–	ns
t _{SCE}	CE LOW to write end	12	–	20	–	25	–	ns
t _{AW}	Address setup to write end	12	–	20	–	25	–	ns
t _{HA}	Address hold from write end	2	–	2	–	2	–	ns
t _{SA}	Address setup to write start	0	–	0	–	0	–	ns
t _{PWE}	R/W pulse width	12	–	15	–	25	–	ns
t _{SD}	Data setup to write end	10	–	15	–	15	–	ns
t _{HD}	Data hold from write end	0	–	0	–	0	–	ns
t _{HZWE}	R/W LOW to high Z ^[18]	–	10	–	15	–	15	ns
t _{LZWE}	R/W HIGH to low Z ^[18]	0	–	0	–	0	–	ns

Shaded areas contain preliminary information.

Notes

12. See the last page of this specification for Group A subgroup testing information.
13. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 1.5 V, input pulse levels of 0 to 3.0 V and output loading of the specified I_{OL}/I_{OH} and 30 pF load capacitance.
14. 15 and 25 ns version available only in PLCC/PQFP packages.
15. AC Test Conditions use V_{OH} = 1.6 V and V_{OL} = 1.4 V.
16. This parameter is guaranteed but not tested.
17. At any given temperature and voltage condition for any given device, t_{HZCE} is less than t_{LZCE} and t_{HZOE} is less than t_{LZOE}.
18. t_{LZCE}, t_{LZWE}, t_{HZOE}, t_{LZOE}, t_{HZCE} and t_{HZWE} are tested with C_L = 5 pF as in part (b) of AC Test Loads. Transition is measured ±500 mV from steady state voltage.
19. The internal write time of the memory is defined by the overlap of CS LOW and R/W LOW. Both signals must be low to initiate a write and either signal can terminate a write by going high. The data input setup and hold timing should be referenced to the rising edge of the signal that terminates the write.

Switching Characteristics

Over the Operating Range^[12, 13] (continued)

Parameter	Description	7C131-15 ^[14] 7C131A-15 7C141-15		7C130-25 ^[14] 7C131-25 7C140-25 7C141-25		7C130-30 7C130A-30 7C131-30 7C140-30 7C141-30		Unit
		Min	Max	Min	Max	Min	Max	
Busy/Interrupt Timing								
t _{BLA}	BUSY LOW from address match	–	15	–	20	–	20	ns
t _{BHA}	BUSY HIGH from address mismatch ^[20]	–	15	–	20	–	20	ns
t _{BLC}	BUSY LOW from CE LOW	–	15	–	20	–	20	ns
t _{BHC}	BUSY HIGH from CE HIGH ^[20]	–	15	–	20	–	20	ns
t _{PS}	Port set-up for priority	5	–	5	–	5	–	ns
t _{WB} ^[21]	R/W LOW after BUSY LOW	0	–	0	–	0	–	ns
t _{WH}	R/W HIGH after BUSY HIGH	13	–	20	–	30	–	ns
t _{BDD}	BUSY HIGH to valid data	–	15	–	25	–	30	ns
t _{DDD}	Write data valid to read data valid	–	Note 22	–	Note 22	–	Note 22	ns
t _{WDD}	Write pulse to data delay	–	Note 22	–	Note 22	–	Note 22	ns
Interrupt Timing								
t _{WINS}	R/W to INTERRUPT set time	–	15	–	25	–	25	ns
t _{EINS}	CE to INTERRUPT set time	–	15	–	25	–	25	ns
t _{INS}	Address to INTERRUPT set time	–	15	–	25	–	25	ns
t _{OINR}	OE to INTERRUPT reset time ^[20]	–	15	–	25	–	25	ns
t _{EINR}	CE to INTERRUPT reset time ^[20]	–	15	–	25	–	25	ns
t _{INR}	Address to INTERRUPT reset time ^[20]	–	15	–	25	–	25	ns

Shaded areas contain preliminary information.

Notes

20. These parameters are measured from the input signal changing, until the output pin goes to a high-impedance state.

21. CY7C140/CY7C141 only.

22. A write operation on Port A, where Port A has priority, leaves the data on Port B's outputs undisturbed until one access time after one of the following:

BUSY on Port B goes HIGH.

Port B's address is toggled.

CE for Port B is toggled.

R/W for Port B is toggled during valid read.

Switching Characteristics

Over the Operating Range^[23, 24]

Parameter	Description	7C130-35 7C131-35 7C140-35 7C141-35		7C130-45 7C131-45 7C140-45 7C141-45		7C130-55 7C131-55 7C140-55 7C141-55		Unit
		Min	Max	Min	Max	Min	Max	
Read Cycle								
t _{RC}	Read cycle time	35	–	45	–	55	–	ns
t _{AA}	Address to data valid ^[25]	–	35	–	45	–	55	ns
t _{OHA}	Data hold from address change	0	–	0	–	0	–	ns
t _{ACE}	CE LOW to data valid ^[25]	–	35	–	45	–	55	ns
t _{DOE}	OE LOW to data valid ^[25]	–	20	–	25	–	25	ns
t _{LZOE}	OE LOW to low Z ^[26, 27, 28]	3	–	3	–	3	–	ns
t _{HZOE}	OE HIGH to high Z ^[26, 27, 28]	–	20	–	20	–	25	ns
t _{LZCE}	CE LOW to low Z ^[26, 27, 28]	5	–	5	–	5	–	ns
t _{HZCE}	CE HIGH to high Z ^[26, 27, 28]	–	20	–	20	–	25	ns
t _{PU}	CE LOW to power-up ^[26]	0	–	0	–	0	–	ns
t _{PD}	CE HIGH to power-down ^[26]	–	35	–	35	–	35	ns
Write Cycle ^[29]								
t _{WC}	Write cycle time	35	–	45	–	55	–	ns
t _{SCE}	CE LOW to write end	30	–	35	–	40	–	ns
t _{AW}	Address set-up to write end	30	–	35	–	40	–	ns
t _{HA}	Address hold from write end	2	–	2	–	2	–	ns
t _{SA}	Address set-up to write start	0	–	0	–	0	–	ns
t _{PWE}	R/W pulse width	25	–	30	–	30	–	ns
t _{SD}	Data set-up to write end	15	–	20	–	20	–	ns
t _{HD}	Data hold from write end	0	–	0	–	0	–	ns
t _{HZWE}	R/W LOW to high Z ^[28]	–	20	–	20	–	25	ns
t _{LZWE}	R/W HIGH to low Z ^[28]	0	–	0	–	0	–	ns

Notes

23. See the last page of this specification for Group A subgroup testing information.

24. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 1.5 V, input pulse levels of 0 to 3.0 V and output loading of the specified I_{OL}/I_{OH} and 30 pF load capacitance.

25. AC Test Conditions use V_{OH} = 1.6 V and V_{OL} = 1.4 V.

26. This parameter is guaranteed but not tested.

27. At any given temperature and voltage condition for any given device, t_{HZCE} is less than t_{LZCE} and t_{HZOE} is less than t_{LZOE}.

28. t_{LZCE}, t_{LZWE}, t_{HZOE}, t_{LZOE}, t_{HZCE} and t_{HZWE} are tested with C_L = 5 pF as in part (b) of AC Test Loads. Transition is measured ±500 mV from steady state voltage.

29. The internal write time of the memory is defined by the overlap of CS LOW and R/W LOW. Both signals must be low to initiate a write and either signal can terminate a write by going high. The data input setup and hold timing should be referenced to the rising edge of the signal that terminates the write.

Switching Characteristics

Over the Operating Range^[23, 24] (continued)

Parameter	Description	7C130-35 7C131-35 7C140-35 7C141-35		7C130-45 7C131-45 7C140-45 7C141-45		7C130-55 7C131-55 7C140-55 7C141-55		Unit
		Min	Max	Min	Max	Min	Max	
Busy/Interrupt Timing								
t _{BLA}	BUSY LOW from address match	–	20	–	25	–	30	ns
t _{BHA}	BUSY HIGH from address mismatch ^[30]	–	20	–	25	–	30	ns
t _{BLC}	BUSY LOW from CE LOW	–	20	–	25	–	30	ns
t _{BHC}	BUSY HIGH from CE HIGH ^[30]	–	20	–	25	–	30	ns
t _{PS}	Port set-up for priority	5	–	5	–	5	–	ns
t _{WB} ^[31]	R/W LOW after BUSY LOW	0	–	0	–	0	–	ns
t _{WH}	R/W HIGH after BUSY HIGH	30	–	35	–	35	–	ns
t _{BDD}	BUSY HIGH to valid data	–	35	–	45	–	45	ns
t _{DDD}	Write data valid to read data valid	–	Note 32	–	Note 32	–	Note 32	ns
t _{WDD}	Write pulse to data delay	–	Note 32	–	Note 32	–	Note 32	ns
Interrupt Timing								
t _{WINS}	R/W to INTERRUPT set time	–	25	–	35	–	45	ns
t _{EINS}	CE to INTERRUPT set time	–	25	–	35	–	45	ns
t _{INS}	Address to INTERRUPT set time	–	25	–	35	–	45	ns
t _{OINR}	OE to INTERRUPT reset time ^[20]	–	25	–	35	–	45	ns
t _{EINR}	CE to INTERRUPT reset time ^[20]	–	25	–	35	–	45	ns
t _{INR}	Address to INTERRUPT reset time ^[20]	–	25	–	35	–	45	ns

Notes

30. These parameters are measured from the input signal changing, until the output pin goes to a high-impedance state.

31. CY7C140/CY7C141 only.

32. A write operation on Port A, where Port A has priority, leaves the data on Port B's outputs undisturbed until one access time after one of the following:

BUSY on Port B goes HIGH.

Port B's address is toggled.

CE for Port B is toggled.

R/W for Port B is toggled during valid read.

Switching Waveforms

Figure 5. Read Cycle No. 1^[33, 34]

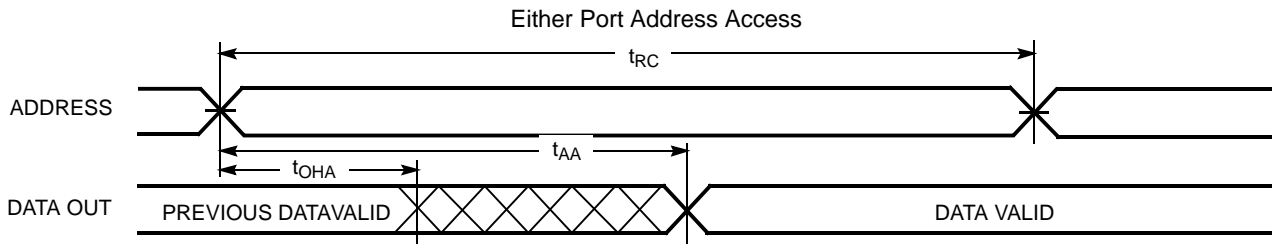


Figure 6. Read Cycle No. 2^[33, 35]

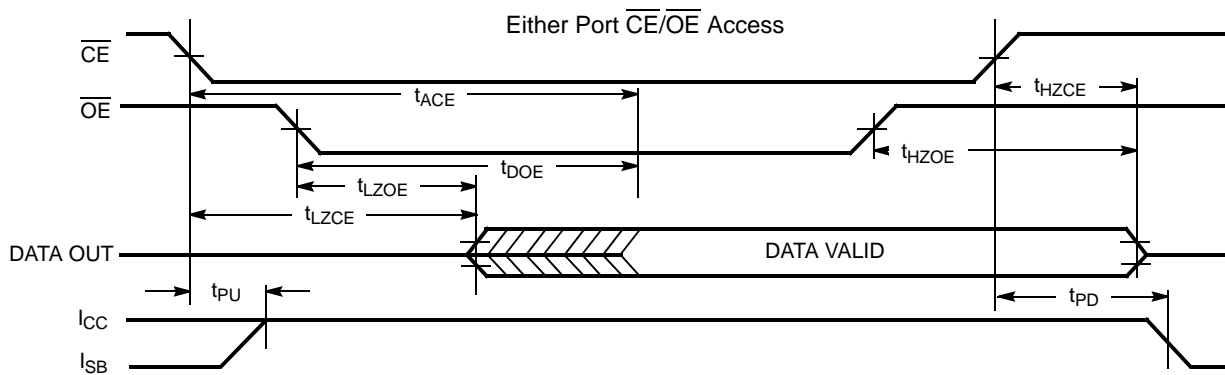
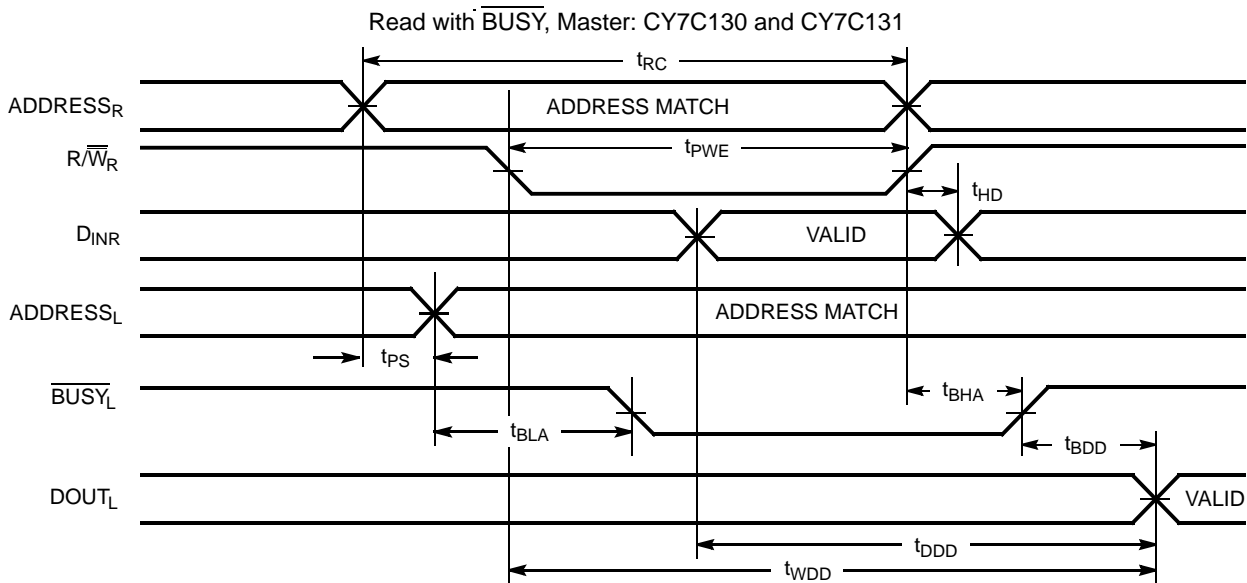


Figure 7. Read Cycle No. 3^[34]



Notes

- 33. R/\overline{W} is HIGH for read cycle.
- 34. Device is continuously selected, $\overline{CE} = V_{IL}$ and $\overline{OE} = V_{IL}$.
- 35. Address valid prior to or coincident with \overline{CE} transition LOW.

Switching Waveforms (continued)

Figure 8. Write Cycle No. 1 (OE Three-States Data I/Os—Either Port)^[36, 37]

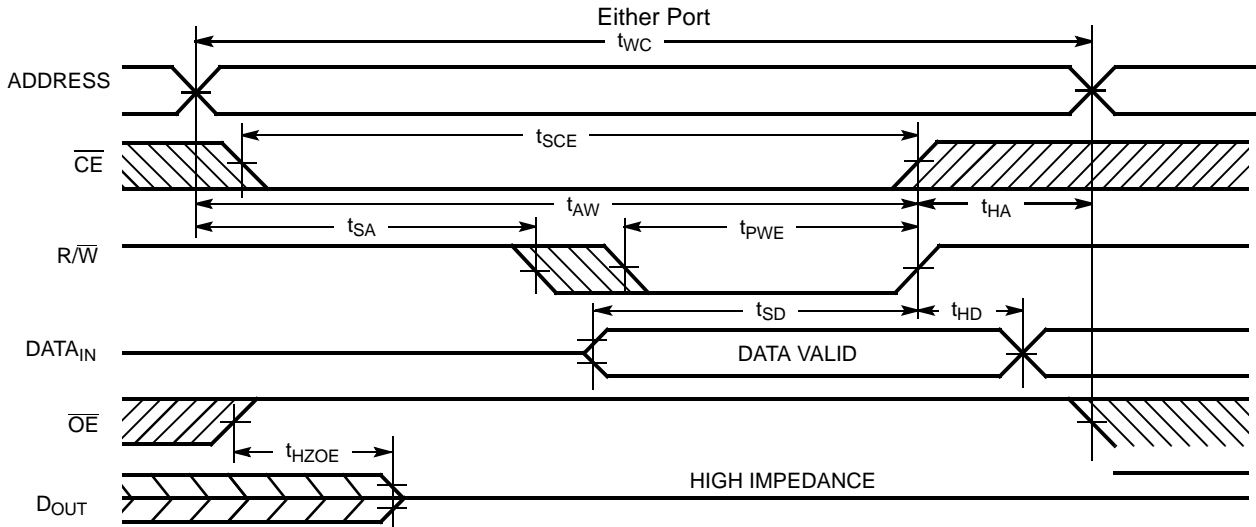
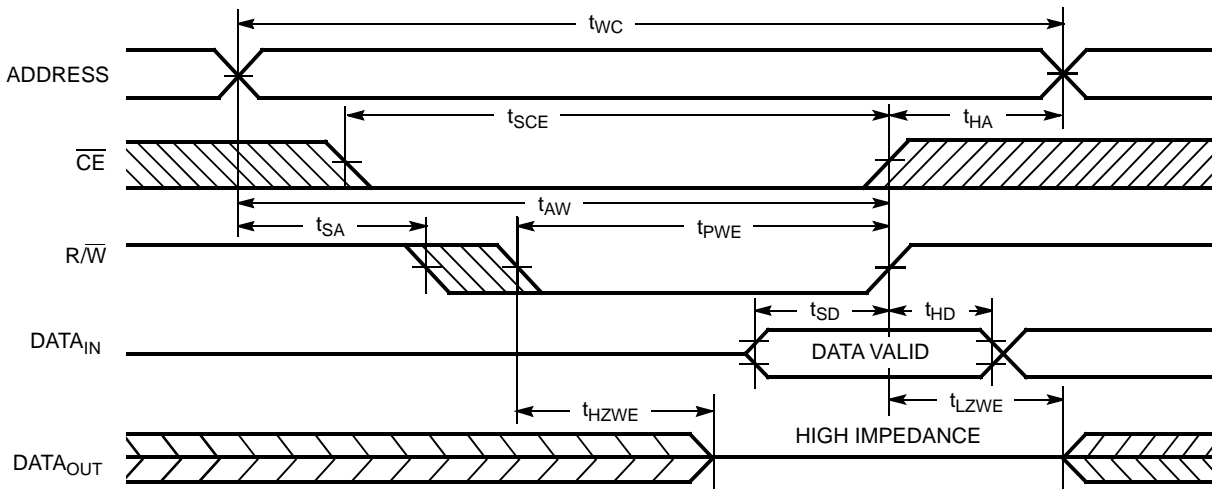


Figure 9. Write Cycle No. 2 (R/W Three-States Data I/Os—Either Port)^[38, 39]



Notes

- 36. The internal write time of the memory is defined by the overlap of \overline{CS} LOW and $\overline{R/W}$ LOW. Both signals must be low to initiate a write and either signal can terminate a write by going high. The data input setup and hold timing should be referenced to the rising edge of the signal that terminates the write.
- 37. If \overline{OE} is LOW during a $\overline{R/W}$ controlled write cycle, the write pulse width must be the larger of t_{PWE} or $t_{HZWE} + t_{SD}$ to allow the data I/O pins to enter high impedance and for data to be placed on the bus for the required t_{SD} .
- 38. These parameters are measured from the input signal changing, until the output pin goes to a high-impedance state.
- 39. If the \overline{CE} LOW transition occurs simultaneously with or after the $\overline{R/W}$ LOW transition, the outputs remain in the high impedance state.

Switching Waveforms (continued)

Figure 10. Busy Timing Diagram No. 1 ($\overline{\text{CE}}$ Arbitration)

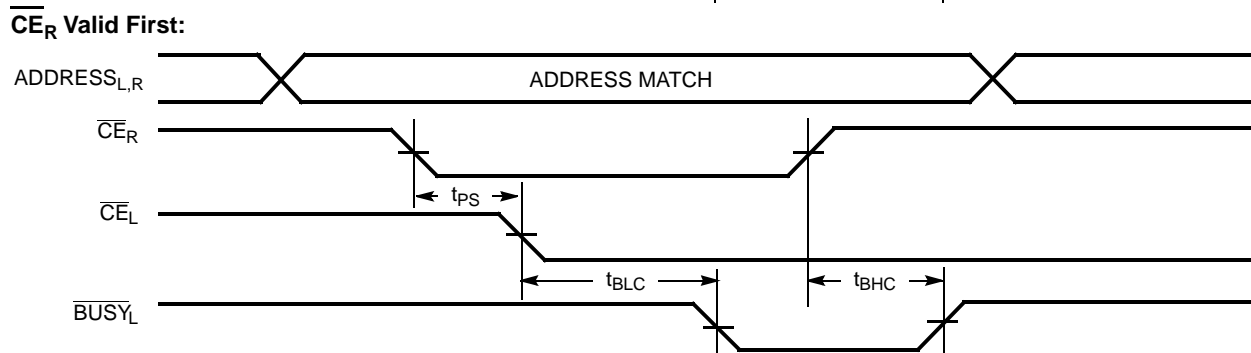
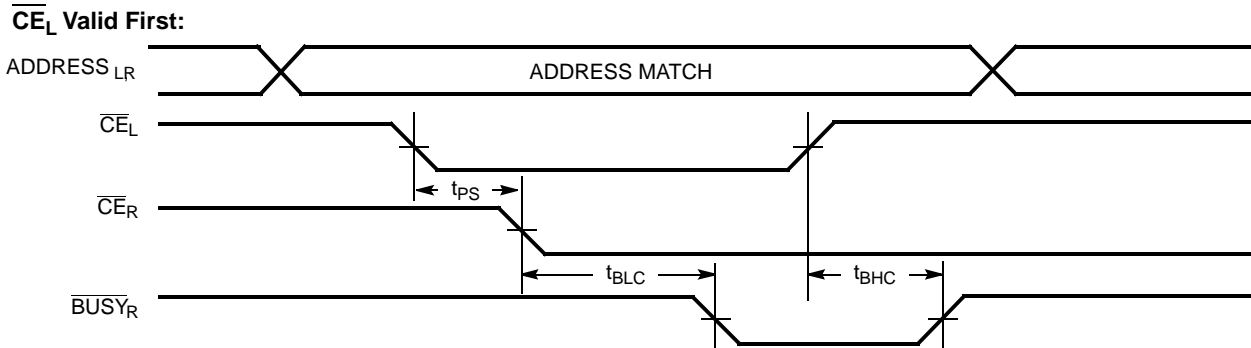
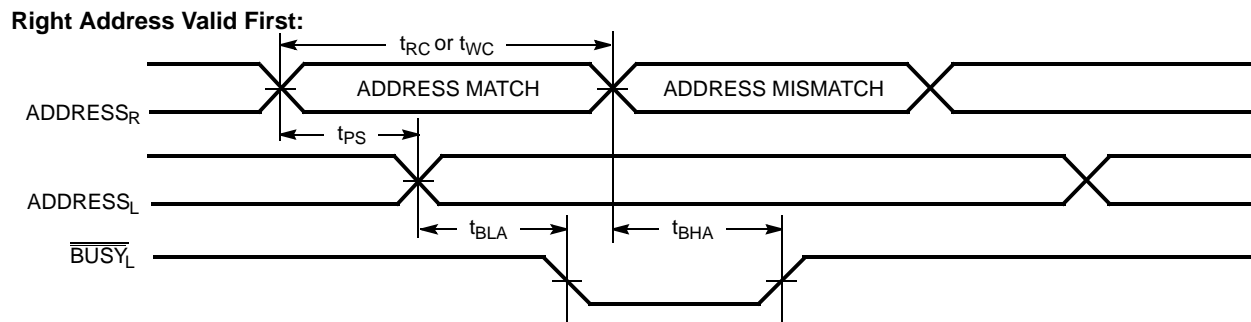
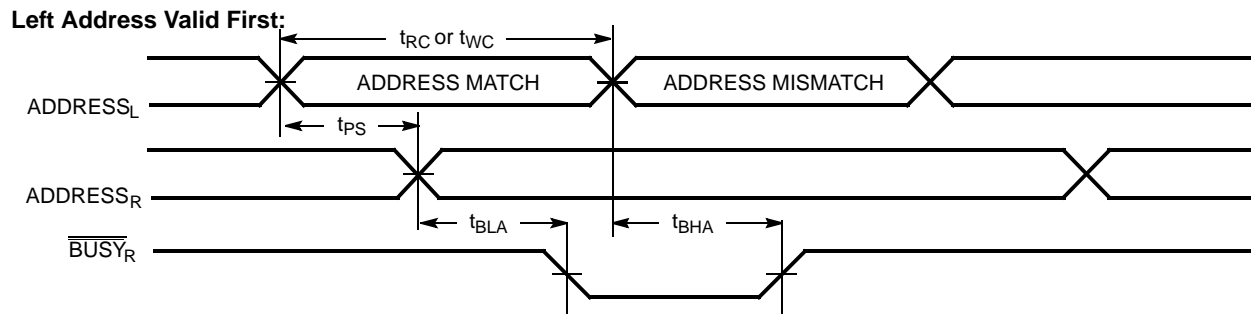


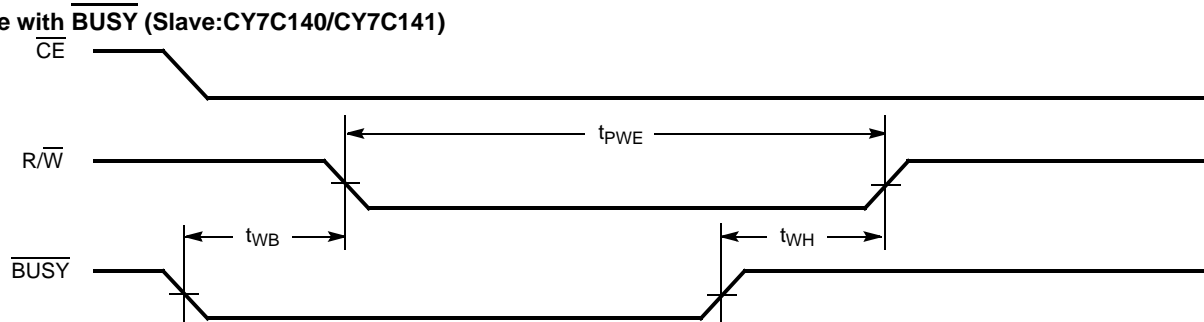
Figure 11. Busy Timing Diagram No. 2 (Address Arbitration)



Switching Waveforms (continued)

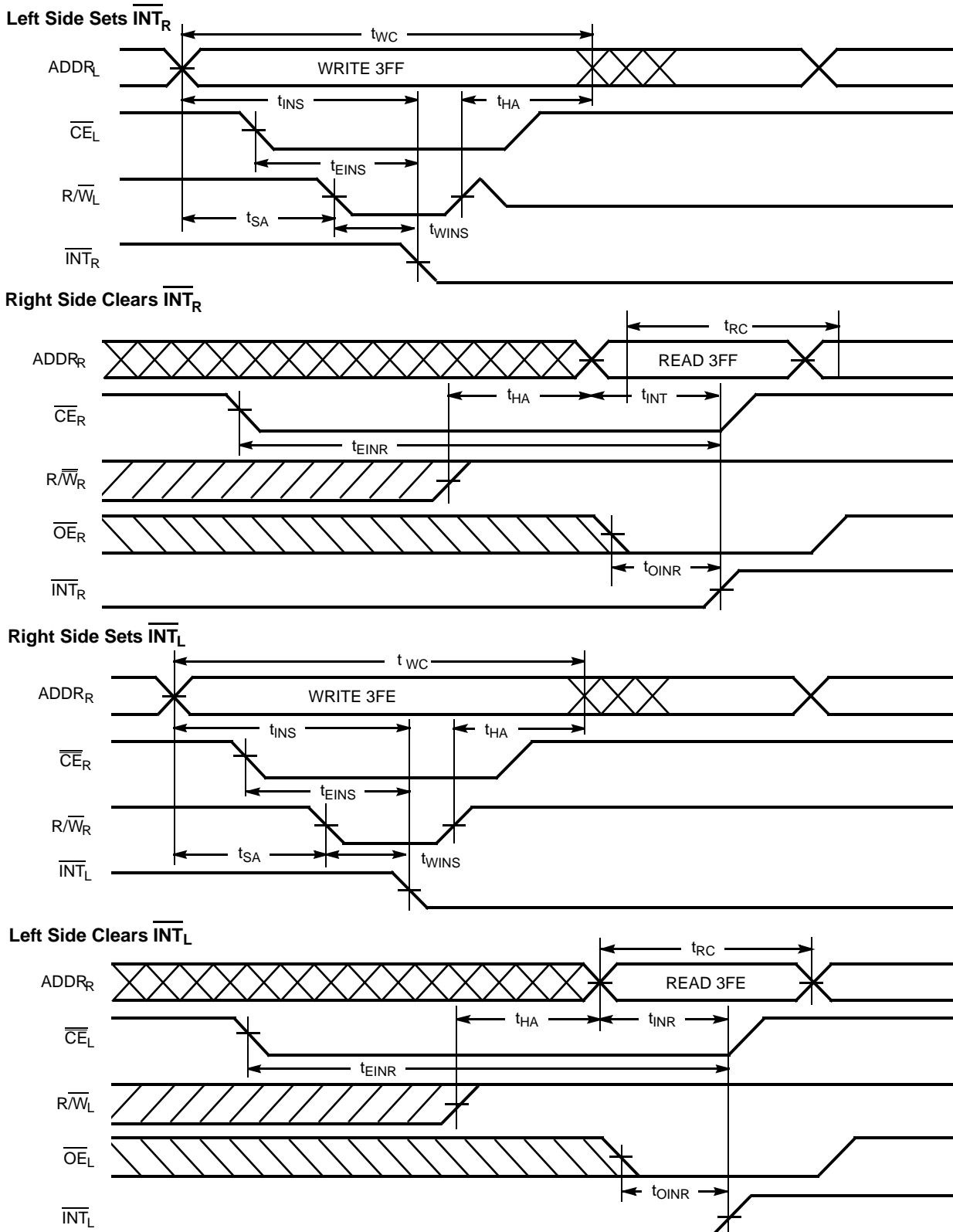
Figure 12. Busy Timing Diagram No. 3

Write with $\overline{\text{BUSY}}$ (Slave:CY7C140/CY7C141)

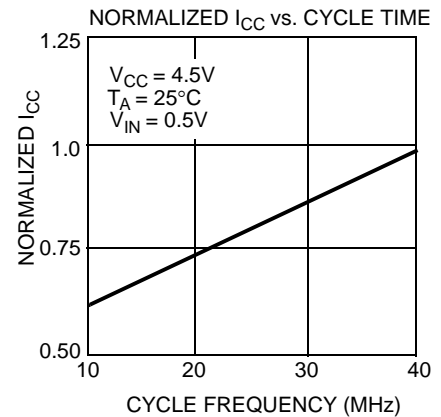
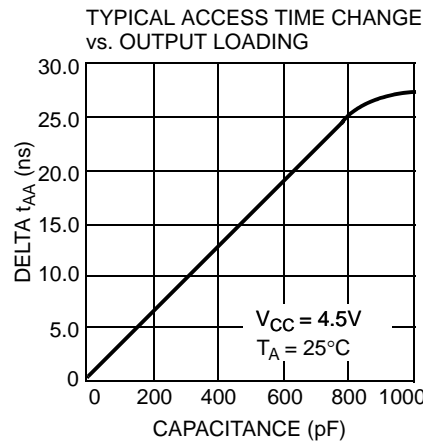
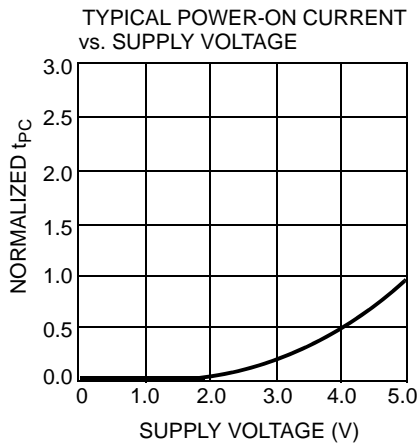
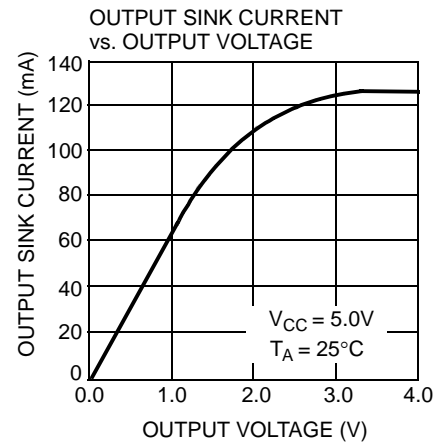
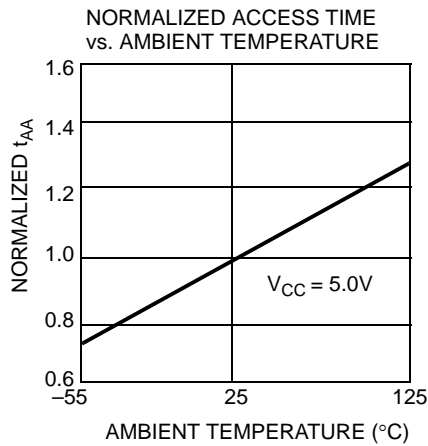
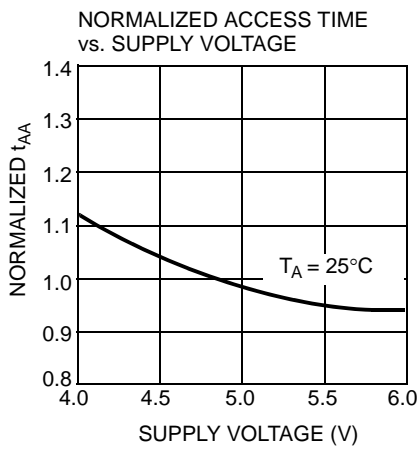
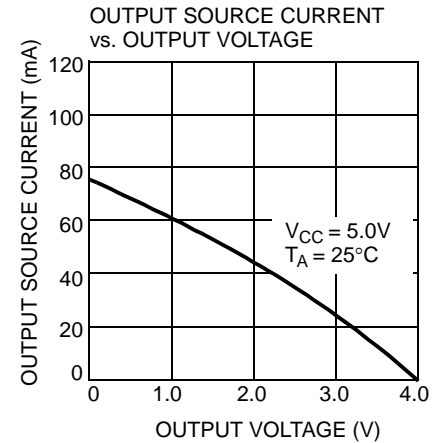
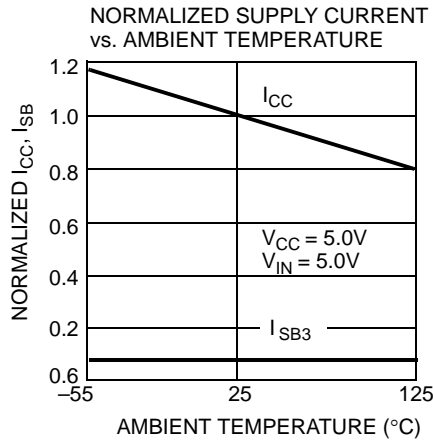
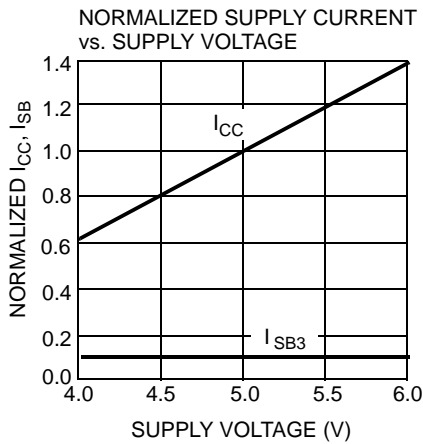


Switching Waveforms (continued)

Figure 13. Interrupt Timing Diagrams

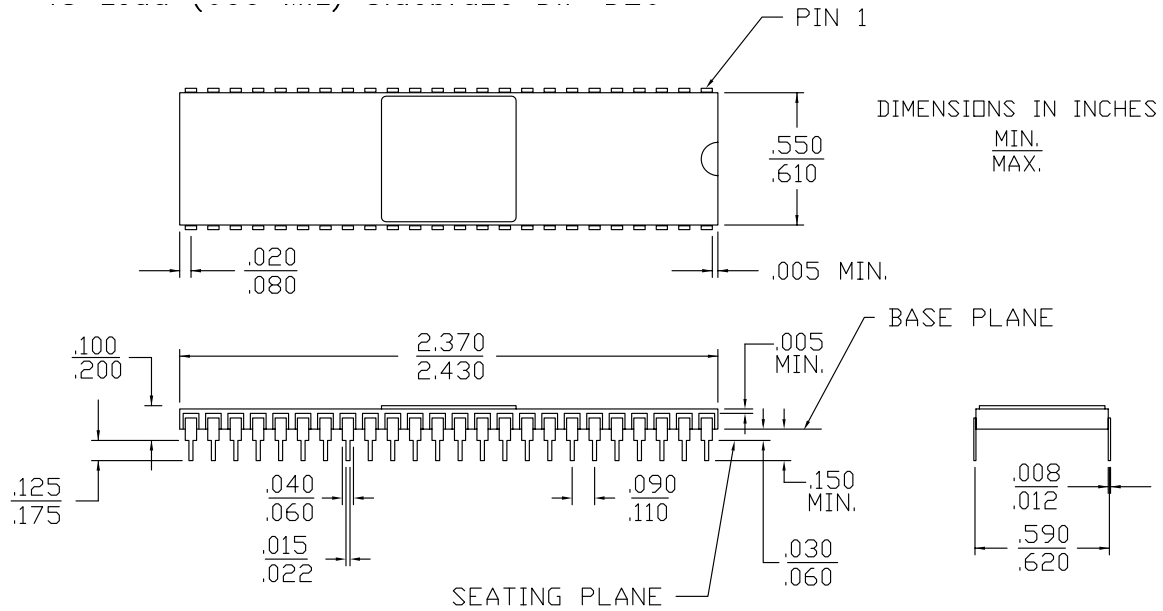


Typical DC and AC Characteristics



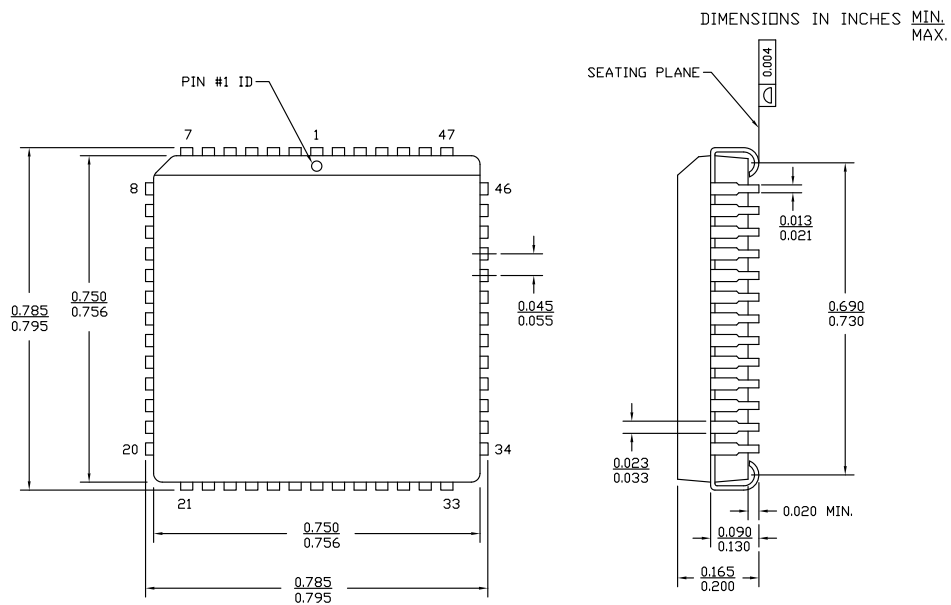
Package Diagrams

Figure 14. 48-pin (600 Mil) Sidebrazed DIP D26



51-80044 *B

Figure 15. 52-pin Pb-free Plastic Leaded Chip Carrier J69



51-85004 *C

Package Diagrams (continued)

Figure 16. 48-pin (600 Mil) Molded DIP P25

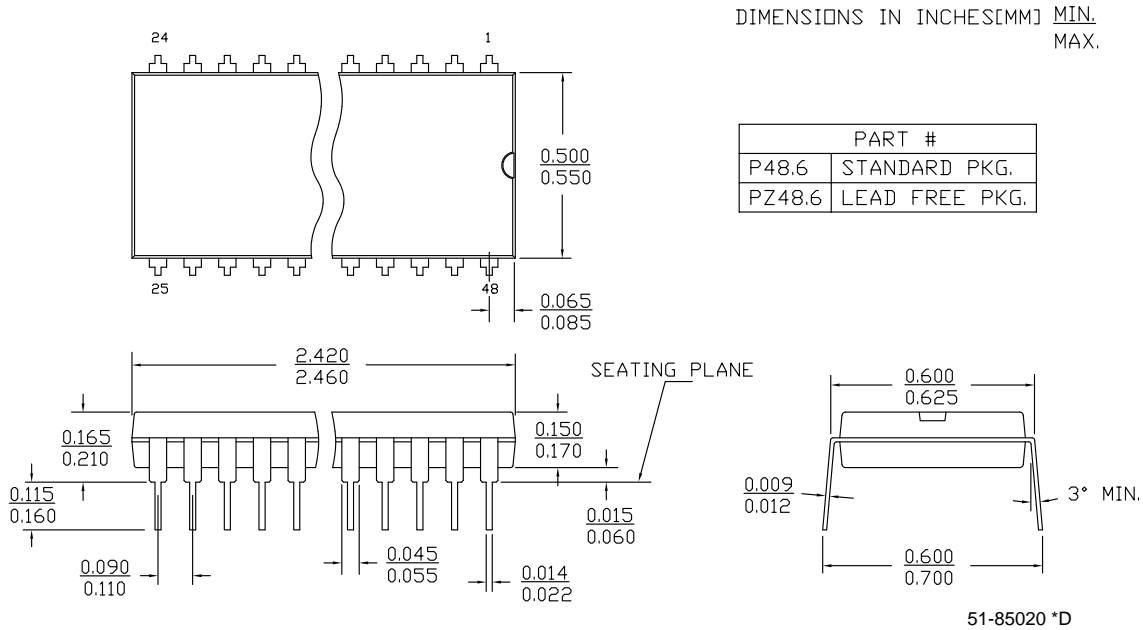
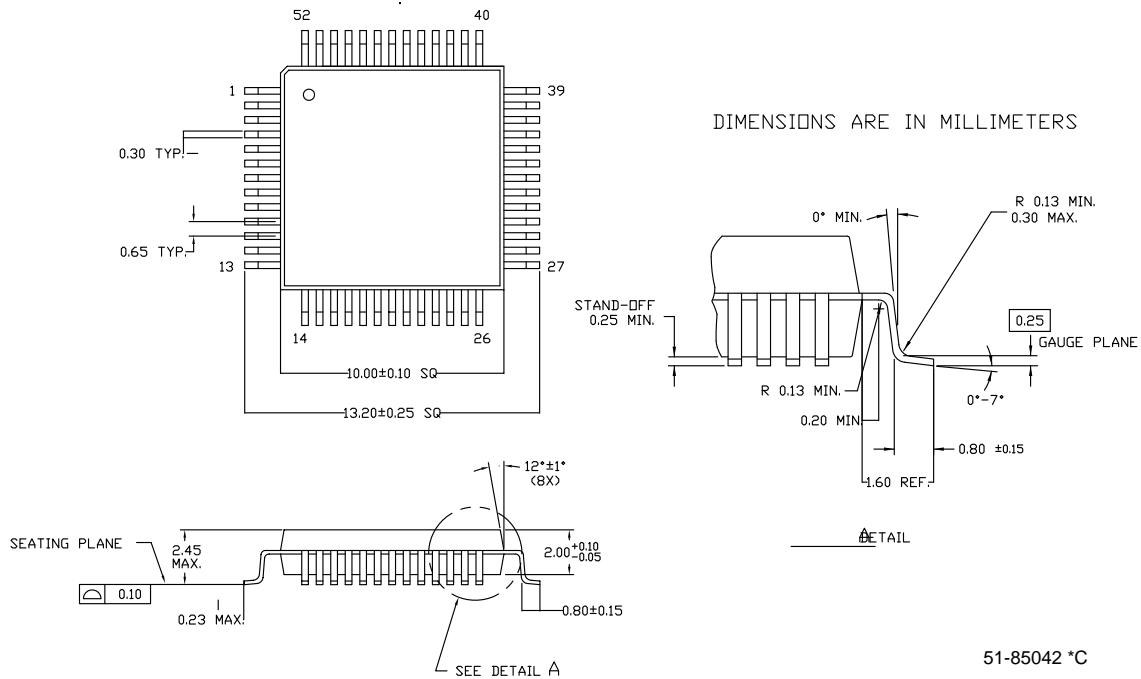


Figure 17. 52-pin Pb-free Plastic Quad Flatpack N52



Acronyms

Acronym	Description
CE	chip enable
CMOS	complementary metal oxide semiconductor
DIP	dual in-line package
I/O	input/output
OE	output enable
PLCC	plastic leaded chip carrier
PQFP	plastic quad flat pack
SRAM	static random access memory
TQFP	thin quad flat pack
TTL	Transistor–transistor logic

Document Conventions

Units of Measure

Symbol	Unit of Measure
°C	degree Celcius
MHz	megahertz
μA	microamperes
mA	milliamperes
ms	milliseconds
mV	millivolts
ns	nanoseconds
pF	picofarad
V	volts
W	watts

Document History Page

Document Title: CY7C130/CY7C130A/CY7C131/CY7C131A 1K x 8 Dual-Port Static RAM				
Document Number: 38-06002				
Rev.	ECN No.	Orig. of Change	Submission Date	Description of Change
**	110169	SZV	09/29/01	Change from Spec number: 38-00027 to 38-06002
*A	122255	RBI	12/26/02	Power up requirements added to Maximum Ratings Information
*B	236751	YDT	See ECN	Removed cross information from features section
*C	325936	RUJ	See ECN	Added pin definitions table, 52-pin PQFP package diagram and Pb-free information
*D	393153	YIM	See ECN	Added CY7C131-15JI to ordering information Added Pb-Free parts to ordering information: CY7C131-15JXI
*E	2623540	VKN/PYRS	12/17/08	Added CY7C130A and CY7C131A parts Removed military information Updated ordering information table
*F	2897217	RAME	03/22/2010	Updated Ordering Information Updated Package Diagrams
*G	3054633	ADMU	10/11/2010	Updated Ordering Information and added Ordering Code Definitions . Updated Package Diagrams . Added Acronyms and Units of Measure . Minor edits and updated in new template.
*H	3402163	ADMU	10/12/2011	Removed pruned part CY7C131-25NC from Ordering Information Updated Package Diagrams .

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