



Integrated Device Technology, Inc.

CMOS STATIC RAM 16K (16K x 1-BIT)

IDT6167SA
IDT6167LA

FEATURES:

- High-speed (equal access and cycle time)
 - Military: 15/20/25/35/45/55/70/85/100ns (max.)
 - Commercial: 15/20/25/35ns (max.)
- Low power consumption
- Battery backup operation — 2V data retention voltage (IDT6167LA only)
- Available in 20-pin Cerdip and Plastic DIP, and 20-pin SOJ
- Produced with advanced CMOS high-performance technology
- CMOS process virtually eliminates alpha particle soft-error rates
- Separate data input and output
- Military product compliant to MIL-STD-883, Class B

DESCRIPTION:

The IDT6167 is a 16,384-bit high-speed static RAM organized as 16K x 1. The part is fabricated using IDT's high-performance, high reliability CMOS technology.

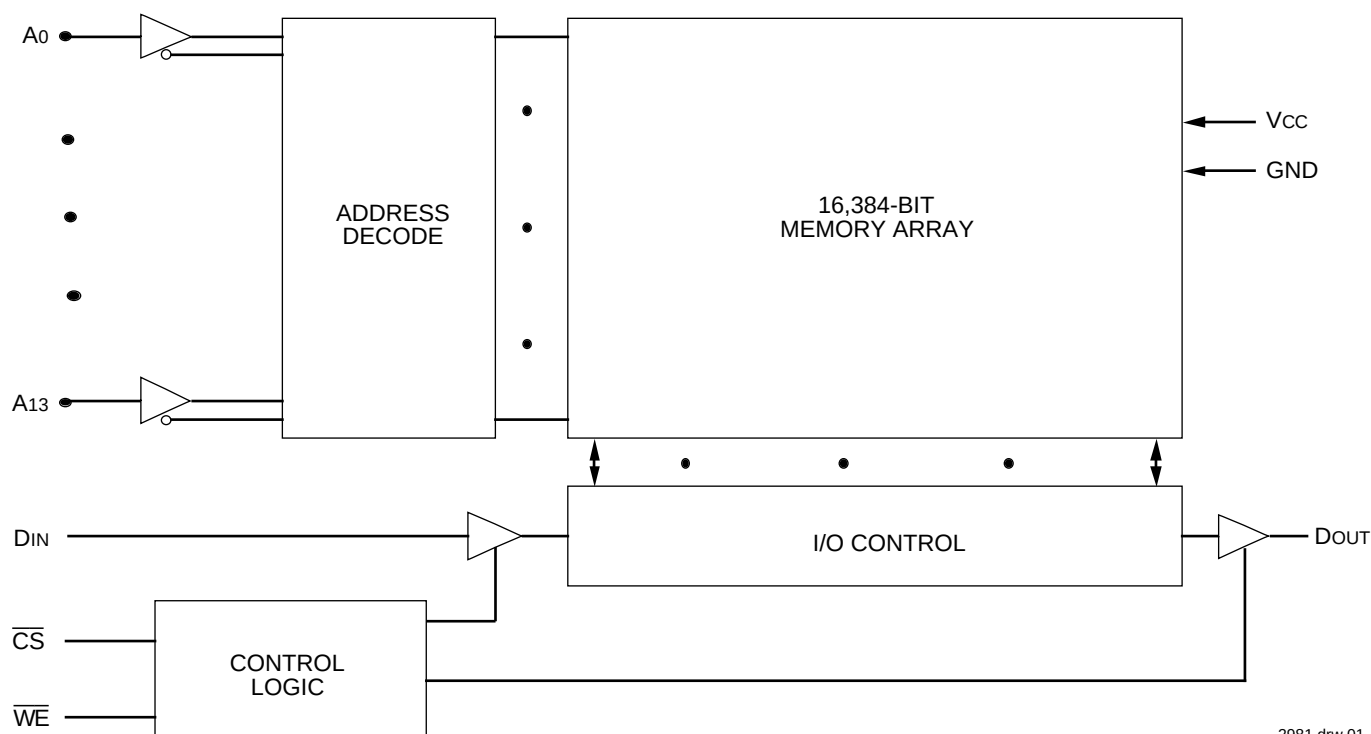
Access times as fast as 15ns are available. The circuit also offers a reduced power standby mode. When $\overline{CS}$ goes HIGH, the circuit will automatically go to, and remain in, a standby mode as long as $\overline{CS}$ remains HIGH. This capability provides significant system-level power and cooling savings. The low-power (LA) version also offers a battery backup data retention capability where the circuit typically consumes only 1 μ W operating off a 2V battery.

All inputs and the output of the IDT6167 are TTL-compatible and operate from a single 5V supply, thus simplifying system designs.

The IDT6167 is packaged in a space-saving 20-pin, 300 mil Plastic DIP or Cerdip, Plastic 20-pin SOJ, providing high board-level packing densities.

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

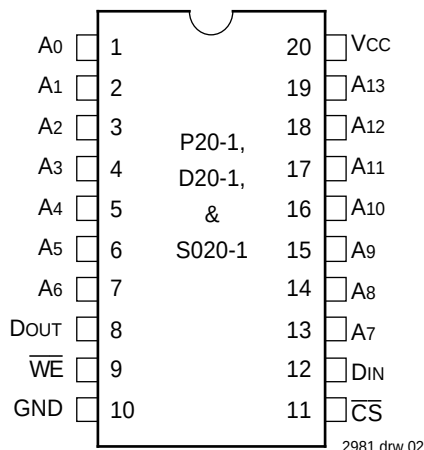


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MILITARY AND COMMERCIAL TEMPERATURE RANGES

MARCH 1996

PIN CONFIGURATIONS



DIP/SOJ
TOP VIEW

PIN DESCRIPTIONS

A0–A13	Address Inputs
$\overline{CS}$	Chip Select
$\overline{WE}$	Write Enable
VCC	Power
DIN	DATAIN
DOUT	DATAOUT
GND	Ground

2981 tbl 01

TRUTH TABLE (1)

Mode	$\overline{CS}$	$\overline{WE}$	Output	Power
Standby	H	X	High-Z	Standby
Read	L	H	DATAOUT	Active
Write	L	L	High-Z	Active

NOTE:

1. H = V_{IH} , L = V_{IL} , X = Don't Care.

2981 tbl 02

RECOMMENDED OPERATING TEMPERATURE AND SUPPLY VOLTAGE

Grade	Temperature	GND	Vcc
Military	–55°C to +125°C	0V	5V ± 10%
Commercial	0°C to +70°C	0V	5V ± 10%

2981 tbl 06

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Rating	Com'l.	Mil.	Unit
VTERM	Terminal Voltage with Respect to GND	–0.5 to +7.0	–0.5 to +7.0	V
TA	Operating Temperature	0 to +70	–55 to +125	°C
TBIAS	Temperature Under Bias	–55 to +125	–65 to +135	°C
TSTG	Storage Temperature	–55 to +125	–65 to +150	°C
PT	Power Dissipation	1.0	1.0	W
IOUT	DC Output Current	50	50	mA

NOTE:

2981 tbl 03

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.

CAPACITANCE (TA = +25°C, f = 1.0MHz)

Symbol	Parameter ⁽¹⁾	Conditions	Max.	Unit
CIN	Input Capacitance	VIN = 0V	7	pF
COUT	Output Capacitance	VOUT = 0V	7	pF

NOTE:

2981 tbl 04

1. This parameter is determined by device characterization, but is not production tested.

RECOMMENDED DC OPERATING CONDITIONS

Symbol	Parameter	Min.	Typ.	Max.	Unit
VCC	Supply Voltage	4.5	5.0	5.5	V
GND	Supply Voltage	0	0	0	V
VIH	Input High Voltage	2.2	—	6.0	V
VIL	Input Low Voltage	–0.5 ⁽¹⁾	—	0.8	V

NOTE:

2981 tbl 05

1. VIL (min.) = –3.0V for pulse width less than 20ns, once per cycle.

DC ELECTRICAL CHARACTERISTICS⁽¹⁾

($V_{CC} = 5.0V \pm 10\%$, $V_{LC} = 0.2V$, $V_{HC} = V_{CC} - 0.2V$)

Symbol	Parameter	Power	6167SA/LA15		6167SA/LA20		6167SA/LA25		Unit
			Com'l.	Mil.	Com'l.	Mil.	Com'l.	Mil.	
ICC1	Operating Power Supply Current $\overline{CS} \leq V_{IL}$, Outputs Open, $V_{CC} = \text{Max.}$, $f = 0^{(3)}$	SA	90	90	90	90	90	90	mA
		LA	55	60	55	60	55	60	
ICC2	Dynamic Operating Current $\overline{CS} \leq V_{IL}$, Outputs Open, $V_{CC} = \text{Max.}$, $f = f_{\text{MAX}}^{(3)}$	SA	120	130	100	110	100	100	mA
		LA	100	110	80	85	70	75	
ISB	Standby Power Supply Current (TTL Level) $\overline{CS} \geq V_{IH}$, Outputs Open, $V_{CC} = \text{Max.}$, $f = f_{\text{MAX}}^{(3)}$	SA	50	50	35	35	35	35	mA
		LA	35	35	30	30	25	25	
ISB1	Full Standby Power Supply Current (CMOS Level) $\overline{CS} \geq V_{HC}$, $V_{CC} = \text{Max.}$ $V_{IN} \geq V_{HC}$ or $V_{IN} \leq V_{LC}$, $f = 0^{(3)}$	SA	5	10	5	10	5	10	mA
		LA	0.9	2	0.05	2	0.05	0.9	

DC ELECTRICAL CHARACTERISTICS⁽¹⁾ (CONTINUED)

($V_{CC} = 5.0V \pm 10\%$, $V_{LC} = 0.2V$, $V_{HC} = V_{CC} - 0.2V$)

Symbol	Parameter	Power	6167SA/LA35		6167SA/LA45 ⁽²⁾		6167SA/LA55 ⁽²⁾		6167SA/LA70 ⁽²⁾		Unit
			Com'l.	Mil.	Com'l.	Mil.	Com'l.	Mil.	Com'l.	Mil.	
ICC1	Operating Power Supply Current $\overline{CS} \leq V_{IL}$, Outputs Open, $V_{CC} = \text{Max.}$, $f = 0^{(3)}$	SA	90	90	—	90	—	90	—	90	mA
		LA	55	60	—	60	—	60	—	60	
ICC2	Dynamic Operating Current $\overline{CS} \leq V_{IL}$, Outputs Open, $V_{CC} = \text{Max.}$, $f = f_{\text{MAX}}^{(3)}$	SA	100	100	—	100	—	100	—	100	mA
		LA	65	70	—	65	—	60	—	60	
ISB	Standby Power Supply Current (TTL Level) $\overline{CS} \geq V_{IH}$, Outputs Open, $V_{CC} = \text{Max.}$, $f = f_{\text{MAX}}^{(3)}$	SA	35	35	—	35	—	35	—	35	mA
		LA	20	20	—	20	—	20	—	15	
ISB1	Full Standby Power Supply Current (CMOS Level) $\overline{CS} \geq V_{HC}$, $V_{CC} = \text{Max.}$ $V_{IN} \geq V_{HC}$ or $V_{IN} \leq V_{LC}$, $f = 0^{(3)}$	SA	5	10	—	10	—	10	—	10	mA
		LA	0.05	0.9	—	0.9	—	0.9	—	0.9	

NOTES:

1. All values are maximum guaranteed values.
2. -55°C to $+125^{\circ}\text{C}$ temperature range only. Also available; 85ns and 100ns Military devices.
3. $f_{\text{MAX}} = 1/\text{trc}$, only address inputs cycling at f_{MAX} . $f = 0$ means no Address inputs change.

2981 tbl 07

DC ELECTRICAL CHARACTERISTICS

$V_{CC} = 5.0V \pm 10\%$

Symbol	Parameter	Test Condition		IDT6167SA		IDT6167LA		Unit
				Min.	Max.	Min.	Max.	
I _{LI}	Input Leakage Current	V _{CC} = Max., V _{IN} = GND to V _{CC}	MIL	—	10	—	5	μA
			COM'L	—	5	—	2	
I _{LO}	Output Leakage Current	V _{CC} = Max., $\overline{\text{CS}}$ = V _{IH} , V _{OUT} = GND to V _{CC}	MIL	—	10	—	5	μA
			COM'L	—	5	—	2	
V _{OL}	Output Low Voltage	I _{OL} = 8mA, V _{CC} = Min.		—	0.4	—	0.4	V
V _{OH}	Output High Voltage	I _{OH} = −4mA, V _{CC} = Min.		2.4	—	2.4	—	V

2981 tbl 08

DATA RETENTION CHARACTERISTICS OVER ALL TEMPERATURE RANGES

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

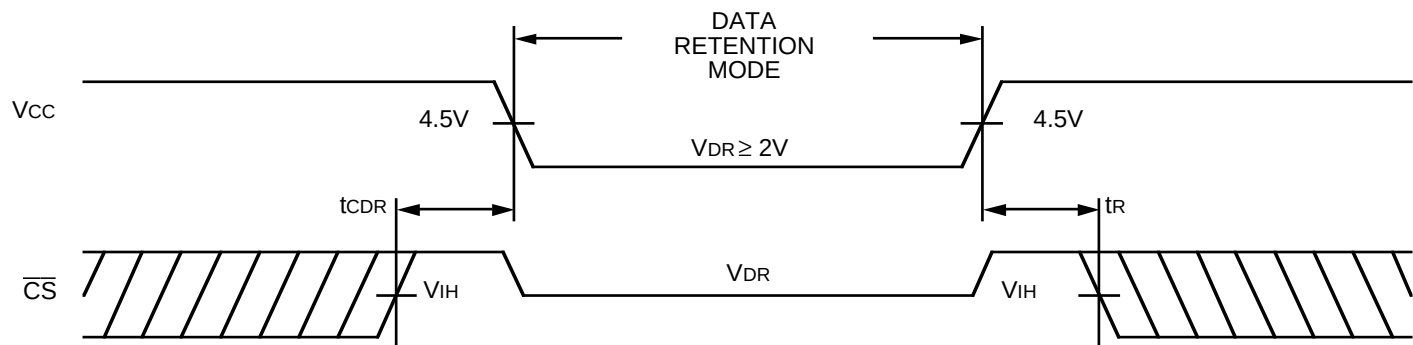
Symbol	Parameter	Test Condition		Min.	Typ. ⁽¹⁾ Vcc @		Max. Vcc @		Unit
					2.0v	3.0V	2.0V	3.0V	
VDR	Vcc for Data Retention	—		2.0	—	—	—	—	V
ICCDR	Data Retention Current	CS ≥ VHC VIN ≥ VHC or ≤ VLC	MIL.	—	0.5	1.0	200	300	μA
			COM'L.	—	0.5	1.0	20	30	
tCDR	Chip Deselect to Data Retention Time			0	—	—	—	—	ns
tR ⁽³⁾	Operation Recovery Time		tRC ⁽²⁾	—	—	—	—	ns	
ILI ⁽³⁾	Input Leakage Current	—		—	—	—	2	2	μA

NOTES:

- $T_A = +25^\circ C$.
- t_{RC} = Read Cycle Time.
- This parameter is guaranteed by device characterization, but is not production tested.

2981 tbl 09

LOW V_{CC} DATA RETENTION WAVEFORM



2981 drw 03

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
AC Test Load	See Figures 1 and 2

2981 tbl 10

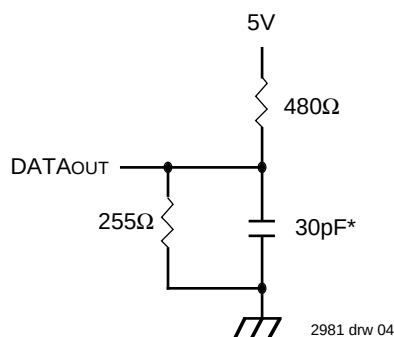


Figure 1. AC Test Load

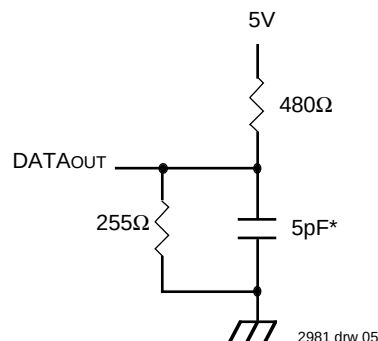


Figure 2. AC Test Load
(for tCLZ, tCHZ, tWHZ and tOW)

*Includes scope and jig.

AC ELECTRICAL CHARACTERISTICS (V_{CC} = 5.0V ± 10%, All Temperature Ranges)

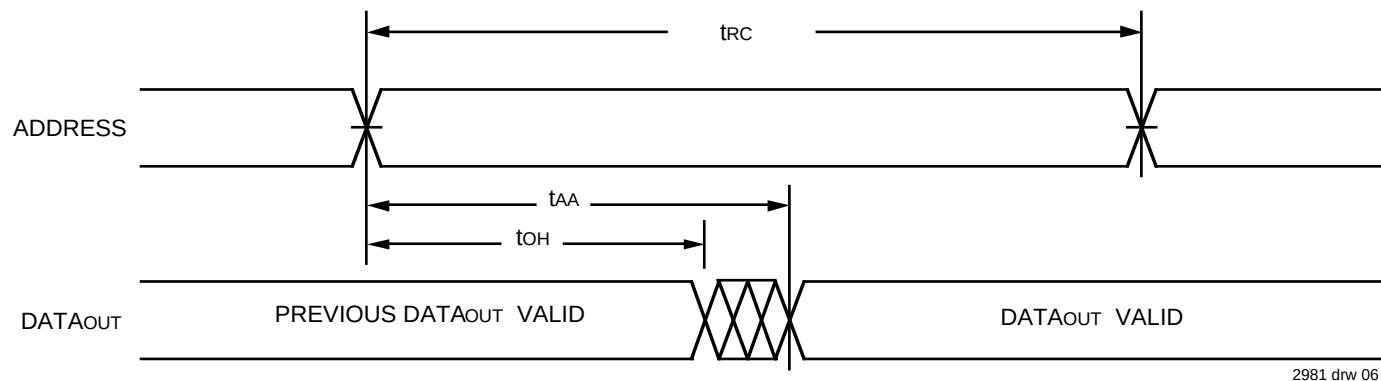
Symbol	Parameter	6167SA15 6167LA15		6167SA20/25 6167LA20/25		6167SA35/45 ⁽¹⁾ 6167LA35/45 ⁽¹⁾		6167SA55 ⁽¹⁾ /70 ⁽¹⁾ 6167LA55 ⁽¹⁾ /70 ⁽¹⁾		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Read Cycle										
tRC	Read Cycle Time	15	—	20/25	—	35/45	—	55/70	—	ns
tAA	Address Access Time	—	15	—	20/25	—	35/45	—	55/70	ns
tACS	Chip Select Access Time	—	15	—	20/25	—	35/45	—	55/70	ns
tCLZ ⁽²⁾	Chip Deselect to Output in Low-Z	3	—	5/5	—	5/5	—	5/5	—	ns
tCHZ ⁽²⁾	Chip Select to Output in High-Z	—	10	—	10/10	—	15/30	—	40/40	ns
tOH	Output Hold from Address Change	3	—	5/5	—	5/5	—	5/5	—	ns
tPU ⁽²⁾	Chip Select to Power-Up Time	0	—	0/0	—	0/0	—	0/0	—	ns
tPD ⁽²⁾	Chip Deselect to Power-Down Time	—	15	—	20/25	—	35/45	—	55/70	ns
Write Cycle										
tWC	Write Cycle Time	15	—	20/20	—	30/45	—	55/70	—	ns
tcw	Chip Select to End-of-Write	15	—	15/20	—	30/40	—	45/55	—	ns
tAW	Address Valid to End-of-Write	15	—	15/20	—	30/40	—	45/55	—	ns
tAS	Address Set-up Time	0	—	0/0	—	0/0	—	0/0	—	ns
tWP	Write Pulse Width	13	—	15/20	—	30/30	—	35/40	—	ns
tWR	Write Recovery Time	0	—	0/0	—	0/0	—	0/0	—	ns
tdW	Data Valid to End-of-Write	10	—	12/15	—	17/20	—	25/30	—	ns
tDH	Data Hold Time	0	—	0/0	—	0/0	—	0/0	—	ns
tWHZ ⁽²⁾	Write Enable to Output in High-Z	—	7	—	8/8	—	15/30	—	40/40	ns
tow ⁽²⁾	Output Active from End-of-Write	0	—	0/0	—	0/0	—	0/0	—	ns

NOTES:

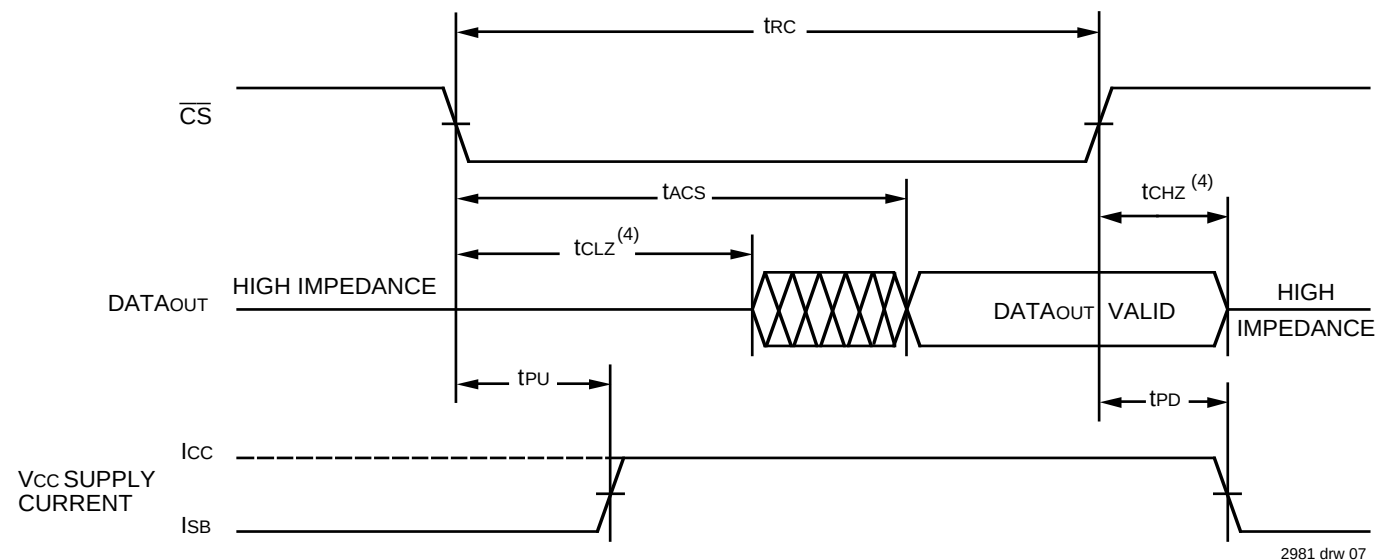
1. -55°C to +125°C temperature range only. Also available: 85ns and 100ns Military devices.
2. This parameter is guaranteed with AC Load (Figure 2) by device characterization, but is not production tested.

2981 tbl 11

TIMING WAVEFORM OF READ CYCLE NO. 1(1, 2)



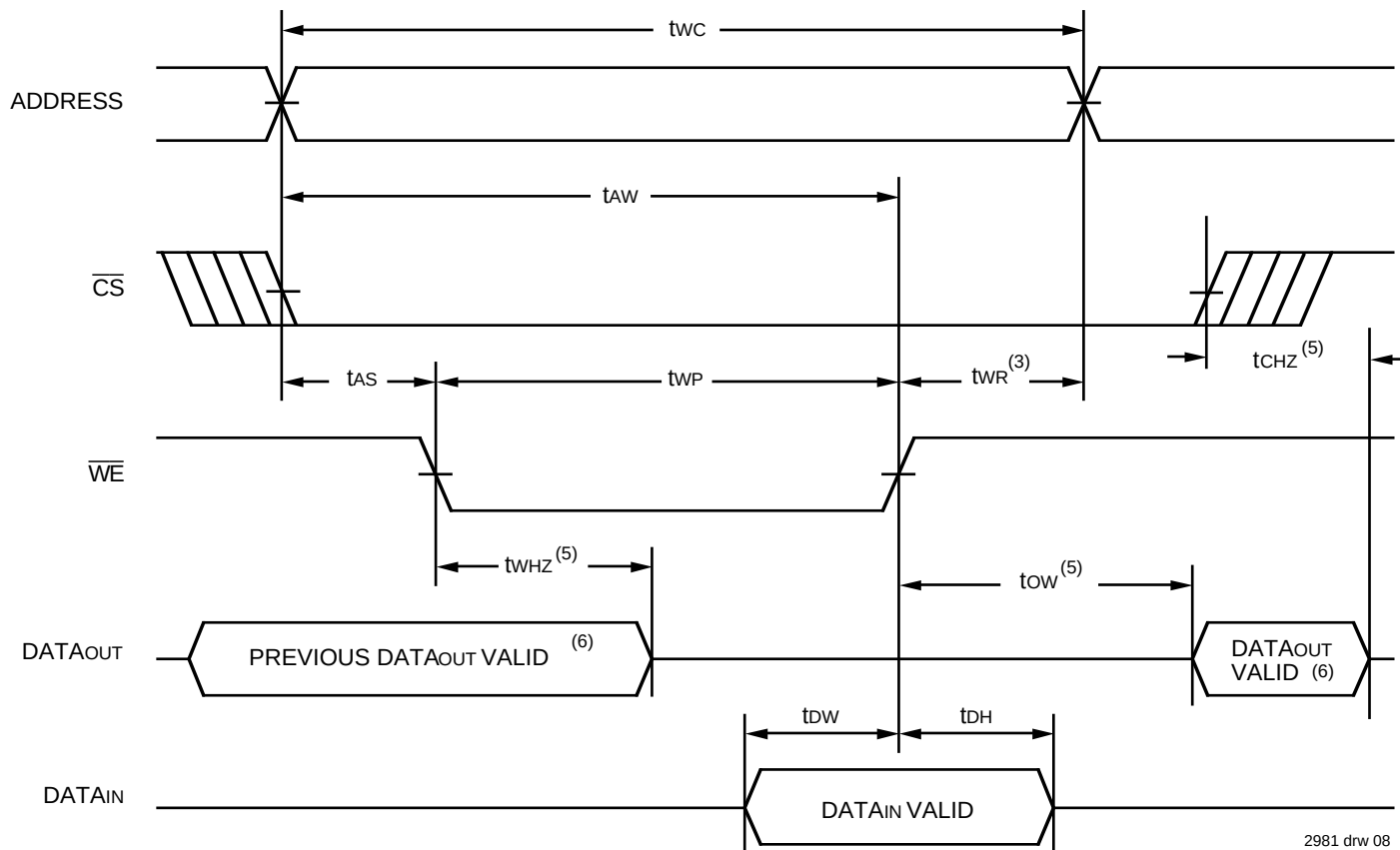
TIMING WAVEFORM OF READ CYCLE NO. 2(1, 3)



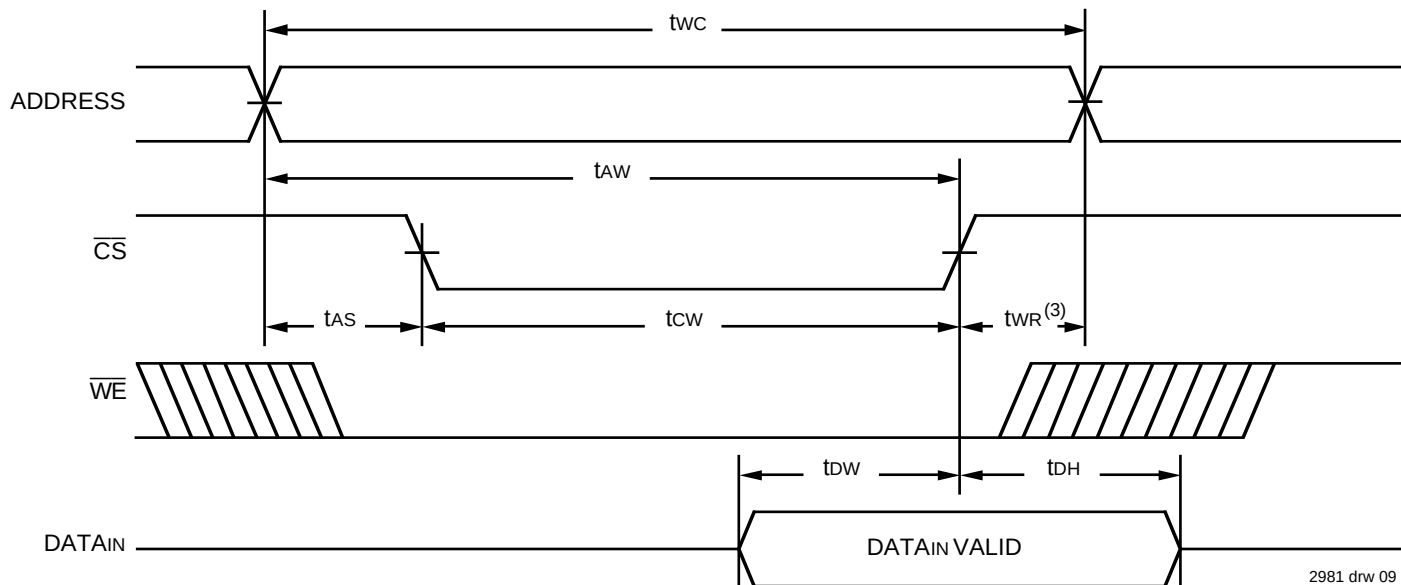
NOTES:

1. $\overline{WE}$ is HIGH for Read cycle.
2. Device is continuously selected, $\overline{CS}$ is LOW.
3. Address valid prior to or coincident with $\overline{CS}$ transition LOW.
4. Transition is measured $\pm 200\text{mV}$ from steady state.

TIMING WAVEFORM OF WRITE CYCLE NO. 1, ($\overline{WE}$ CONTROLLED TIMING)^(1, 2, 4)



TIMING WAVEFORM OF WRITE CYCLE NO. 2, ($\overline{CS}$ CONTROLLED TIMING)^(1, 2, 4)



NOTES:

1. $\overline{WE}$ or $\overline{CS}$ must be inactive during all address transitions.
2. A write occurs during the overlap of a LOW $\overline{CS}$ and a LOW $\overline{WE}$.
3. t_{WR} is measured from the earlier of $\overline{CS}$ or $\overline{WE}$ going HIGH to the end of the write cycle.
4. If the $\overline{CS}$ low transition occurs simultaneously with or after the $\overline{WE}$ LOW transition, the outputs remain in the high-impedance state.
5. Transition is measured $\pm 200\text{mV}$ from steady state.
6. During this period, the I/O pins are in the output state and the input signals must not be applied.

ORDERING INFORMATION

IDT	6167	XX	XXX	XX	X		
	Device Type	Power	Speed	Package	Process/ Temperature Range		
						Blank	Commercial (0°C to +70°C)
						B	Military (−55°C to +125°C) Compliant to MIL-STD-883, Class B
						P	300MIL Plastic DIP (P20−1)
						D	300MIL Cerdip (D20−1)
						Y	300MIL SOJ (SO20−1)
						15	} Speed in nanoseconds
						20	
						25	
						35	
						45	
						55	
						70	Military Only
						85	Military Only
						100	Military Only
						SA	Standard Power
						LA	Low Power

2981 drw 10



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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