



Integrated Device Technology, Inc.

CMOS STATIC RAM 256K (64K x 4-BIT)

IDT61298SA

FEATURES:

- 64K x 4 high-speed static RAM
- Fast Output Enable (\overline{OE}) pin available for added system flexibility
- High speed (equal access and cycle times)
 - Commercial: 12/15 ns (max.)
- JEDEC standard pinout
- 300 mil 28-pin SOJ
- Produced with advanced CMOS technology
- Bidirectional data inputs and outputs
- Inputs/Outputs TTL-compatible
- Three-state outputs
- Military product compliant to MIL-STD-883, Class B

DESCRIPTION:

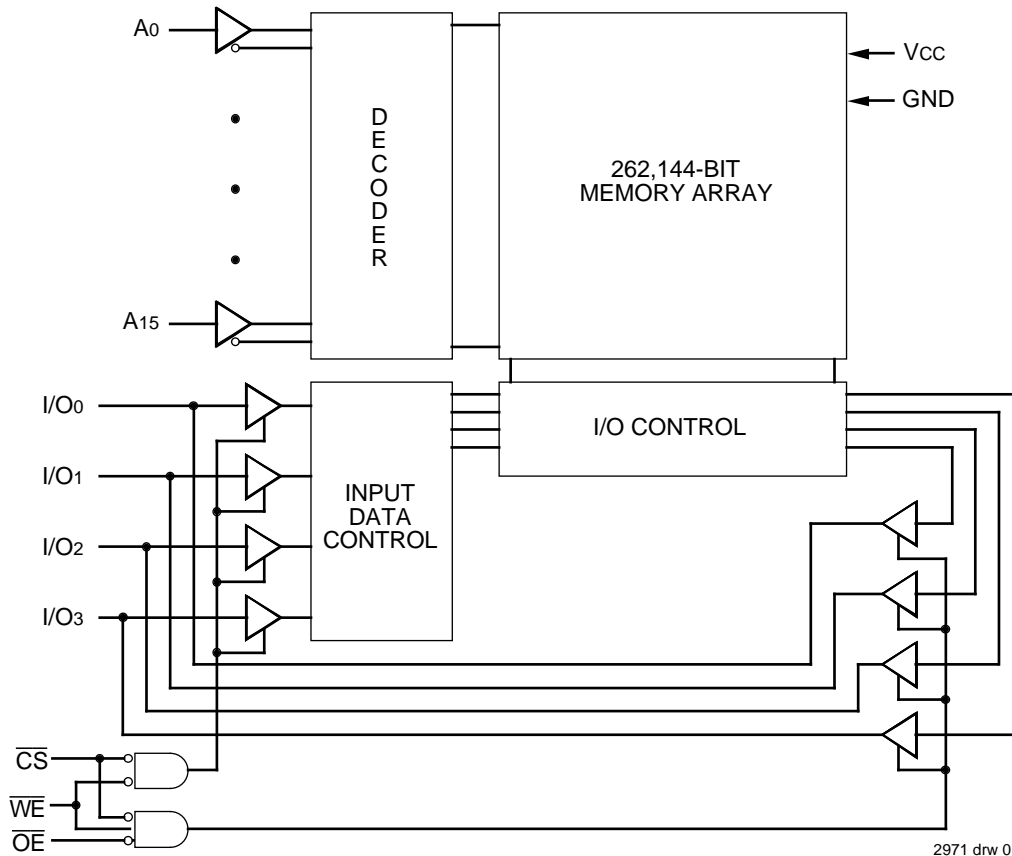
The IDT61298SA is a 262,144-bit high-speed static RAM organized as 64K x 4. It is fabricated using IDT's high-performance, high-reliability CMOS technology. This state-of-the-art technology, combined with innovative circuit design techniques, provides a cost-effective approach for memory intensive applications.

The IDT61298SA features two memory control functions: Chip Select (\overline{CS}) and Output Enable (\overline{OE}). These two functions greatly enhance the IDT61298SA's overall flexibility in high-speed memory applications.

Access times as fast as 12ns are available. The IDT61298SA offers a reduced power standby mode, ISB_1 , which enables the designer to considerably reduce device power requirements. This capability significantly decreases system power and cooling levels, while greatly enhancing system reliability.

All inputs and outputs are TTL-compatible and the device operates from a single 5 volt supply. Fully static asynchronous

FUNCTIONAL BLOCK DIAGRAM



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COMMERCIAL TEMPERATURE RANGES

MAY 1996

DESCRIPTION (Continued)

circuitry, along with matching access and cycle times, favor the simplified system design approach.

The IDT61298SA is packaged in a 300 mil, 28-pin SOJ, providing improved board-level packing densities.

TRUTH TABLE^(1,2)

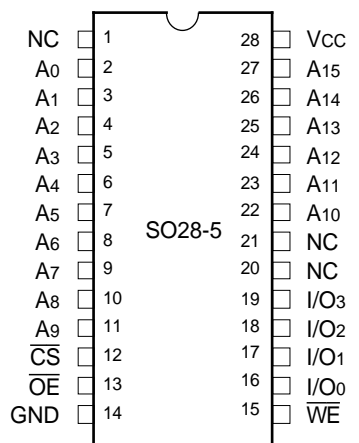
\overline{CS}	\overline{OE}	\overline{WE}	I/O	Function
L	L	H	DATAOUT	Read Data
L	X	L	DATAIN	Write Data
L	H	H	High-Z	Outputs Disabled
H	X	X	High-Z	Deselected - Standby (ISB)
V _{HC} ⁽³⁾	X	X	High-Z	Deselected - Standby (ISB1)

NOTES:

2971 tbl 01

- H = V_{IH}, L = V_{IL}, x = Don't care.
- V_{LC} = 0.2V, V_{HC} = V_{CC} - 0.2V.
- Other inputs \geq V_{HC} or \leq V_{LC}.

PIN CONFIGURATION



2971 drw 02

SOJ
TOP VIEW

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Rating	Com'l.	Unit
V _{TERM} ⁽²⁾	Terminal Voltage with Respect to GND	-0.5 to +7.0	V
T _A	Operating Temperature	0 to +70	°C
T _{BIAS}	Temperature Under Bias	-55 to +125	°C
T _{STG}	Storage Temperature	-55 to +125	°C
P _T	Power Dissipation	1.0	W
I _{OUT}	DC Output Current	50	mA

NOTES:

2971 tbl 02

- 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 V_{CC} + 0.5V.

PIN DESCRIPTIONS

Name	Description
A ₀ -A ₁₄	Addresses
I/O ₀ -I/O ₇	Data Input/Output
\overline{CS}	Chip Select
\overline{WE}	Write Enable
\overline{OE}	Output Enable
GND	Ground
V _{CC}	Power

2971 tbl 04

CAPACITANCE

(T_A = +25°C, f = 1.0MHz, SOJ Package)

Symbol	Parameter ⁽¹⁾	Conditions	Max.	Unit
C _{IN}	Input Capacitance	V _{IN} = 3dV	5	pF
C _{I/O}	I/O Capacitance	V _{OUT} = 3dV	7	pF

NOTE:

2971 tbl 03

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

RECOMMENDED OPERATING TEMPERATURE AND SUPPLY VOLTAGE

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

2971 tbl 05

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
V _{IH}	Input High Voltage	2.2	—	VCC + 0.5V	V
V _{IL}	Input Low Voltage	-0.5 ⁽¹⁾	—	0.8	V

NOTE:

2971 tbl 06

- V_{IL} (min.) = -1.5V for pulse width less than 10ns, once per cycle.

DC ELECTRICAL CHARACTERISTICS⁽¹⁾

(VCC = 5V ± 10%, V_{LC} = 0.2V, V_{HC} = VCC - 0.2V)

Symbol	Parameter	61298SA12		61298SA15		Unit
		Com'l.	Mil.	Com'l.	Mil.	
I _{CC}	Dynamic Operating Current CS = V _{IL} , Outputs Open VCC = Max., f = f _{MAX} ⁽²⁾	160	—	140	—	mA
I _{SB}	Standby Power Supply Current (TTL Level) CS ≥ V _{IH} , VCC = Max., Outputs Open, f = f _{MAX} ⁽²⁾	50	—	45	—	mA
I _{SB1}	Full Standby Power Supply Current (CMOS Level) CS ≥ V _{HC} , VCC = Max., f = 0 ⁽²⁾ , V _{LC} ≥ V _{IN} ≥ V _{HC}	20	—	20	—	mA

NOTES:

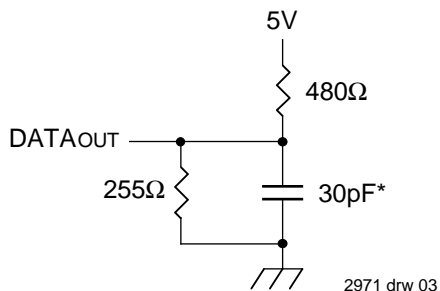
2971 tbl 07

- All values are maximum guaranteed values.
- f_{MAX} = 1/trc (all address inputs are cycling at f_{MAX}); f = 0 means no address input lines are changing.

AC TEST CONDITIONS

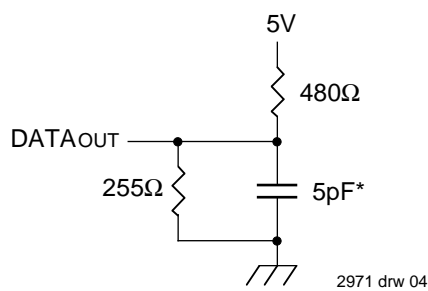
Input Pulse Levels	GND to 3.0V
Input Rise/Fall Times	3ns
Input Timing Reference Levels	1.5V
Output Reference Levels	1.5V
AC Test Load	See Figures 1 and 2

2971 tbl 08



2971 drw 03

Figure 1. AC Test Load



2971 drw 04

Figure 2. AC Test Load
(for t_{CLZ}, t_{OLZ}, t_{CHZ}, t_{OHZ}, t_{OW}, t_{WHZ})

*Includes scope and jig capacitances

DC ELECTRICAL CHARACTERISTICS

VCC = 5.0V ± 10%

Symbol	Parameter	Test Condition	IDT61298SA			Unit
			Min.	Typ.	Max.	
ILI	Input Leakage Current	VCC = Max., VIN = GND to VCC	—	—	5	μA
ILO	Output Leakage Current	VCC = Max., $\overline{CS} = V_{IH}$, VOUT = GND to VCC	—	—	5	μA
VOL	Output Low Voltage	IOL = 8mA, VCC = Min. IOL = 10mA, VCC = Min.	—	—	0.4 0.5	V
VOH	Output High Voltage	IOH = -4mA, VCC = Min.	2.4	—	—	V

2971 tbl 09

AC ELECTRICAL CHARACTERISTICS (VCC = 5.0V ± 10%)

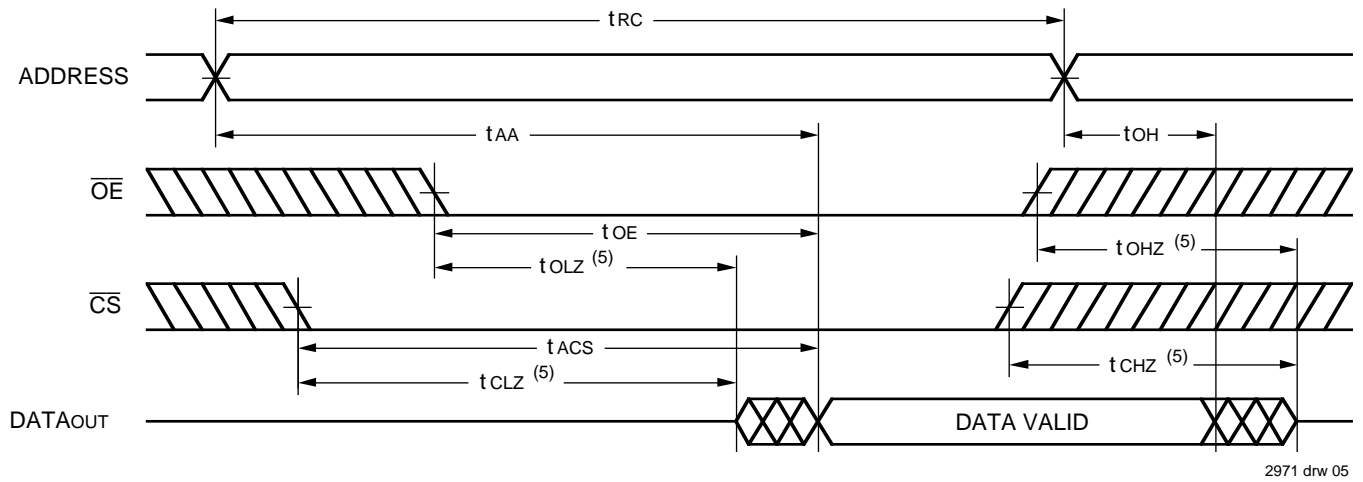
Symbol	Parameter	61298SA12		61298SA15		Unit
		Min.	Max.	Min.	Max.	
Read Cycle						
tRC	Read Cycle Time	12	—	15	—	ns
tAA	Address Access Time	—	12	—	15	ns
tACS	Chip Select Access Time	—	12	—	15	ns
tCLZ ⁽¹⁾	Chip Select to Output in Low-Z	4	—	4	—	ns
tCHZ ⁽¹⁾	Chip Deselect to Output in High-Z	—	6	—	7	ns
tOE	Output Enable to Output Valid	—	6	—	7	ns
tOLZ ⁽¹⁾	Output Enable to Output in Low-Z	0	—	0	—	ns
tOHZ ⁽¹⁾	Output Disable to Output in High-Z	—	6	—	6	ns
tOH	Output Hold from Address Change	3	—	3	—	ns
tPU ⁽¹⁾	Chip Select to Power-Up Time	0	—	0	—	ns
tPD ⁽¹⁾	Chip Deselect to Power-Down Time	—	12	—	15	ns
Write Cycle						
tWC	Write Cycle Time	12	—	15	—	ns
tCW	Chip Select to End-of-Write	9	—	10	—	ns
tAW	Address Valid to End-of-Write	9	—	10	—	ns
tAS	Address Set-up Time	0	—	0	—	ns
tWP	Write Pulse Width	9	—	10	—	ns
tWR	Write Recovery Time	0	—	0	—	ns
tDW	Data Valid to End-of-Write	6	—	7	—	ns
tDH	Data Hold Time	0	—	0	—	ns
tWHZ ⁽¹⁾	Write Enable to Output in High-Z	—	6	—	6	ns
tOW ⁽¹⁾	Output Active from End-of-Write	4	—	4	—	ns

NOTES:

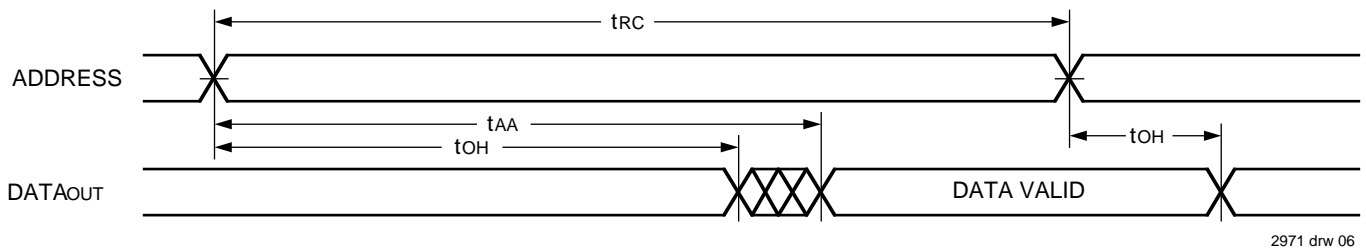
1. This parameter is guaranteed with AC test load (Figure 2) by device characterization, but is not production tested.

2971 tbl 10

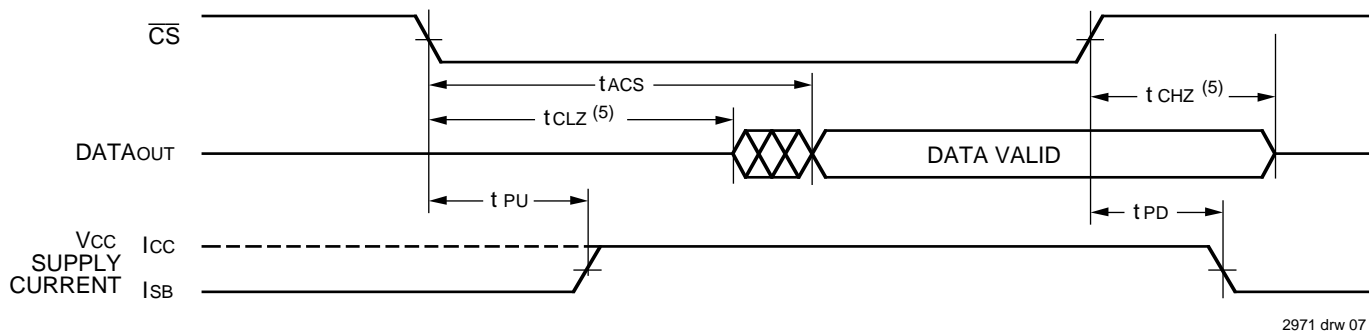
TIMING WAVEFORM OF READ CYCLE NO. 1⁽¹⁾



TIMING WAVEFORM OF READ CYCLE NO. 2^(1,2,4)



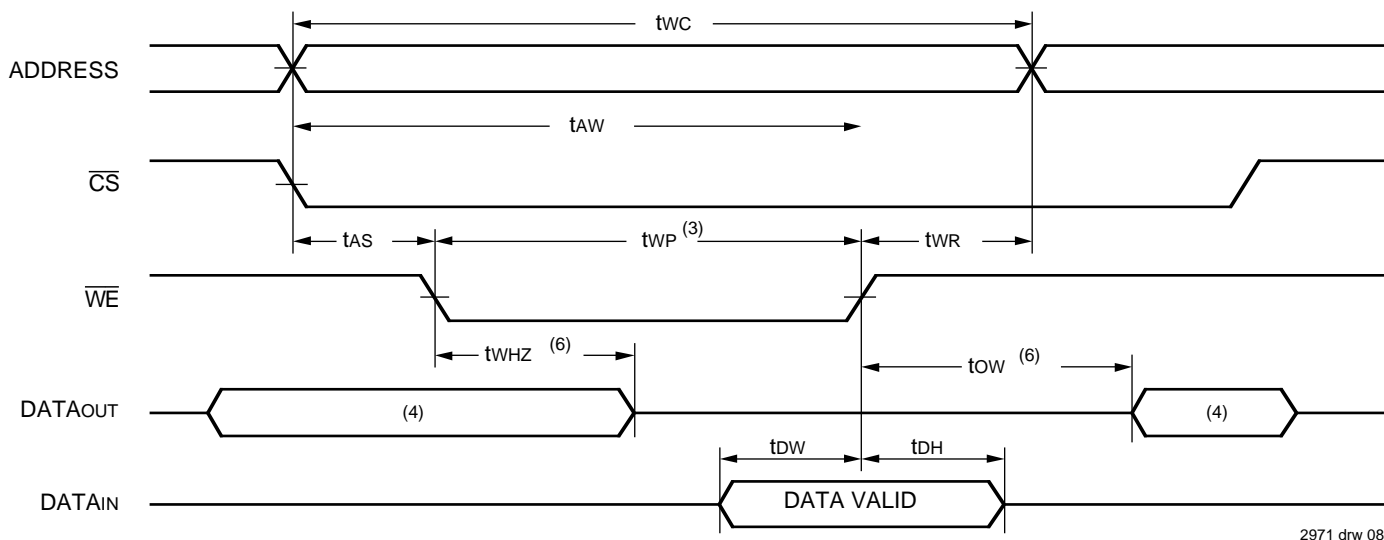
TIMING WAVEFORM OF READ CYCLE NO. 3^(1,3,4)



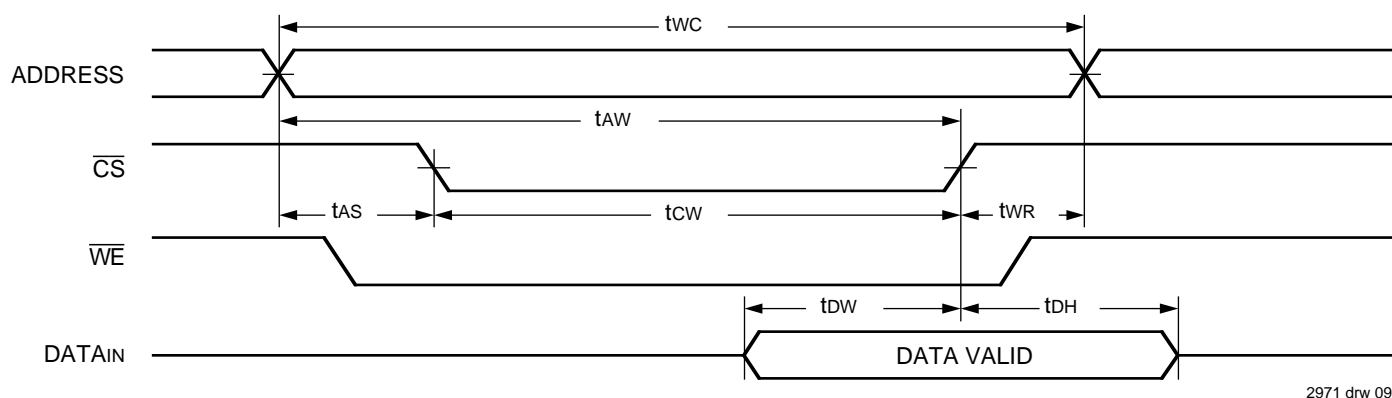
NOTES:

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. \overline{OE} is LOW.
5. Transition is measured $\pm 200\text{mV}$ from steady state.

TIMING WAVEFORM OF WRITE CYCLE NO. 1 (\overline{WE} CONTROLLED TIMING)^(1,2,3,5)



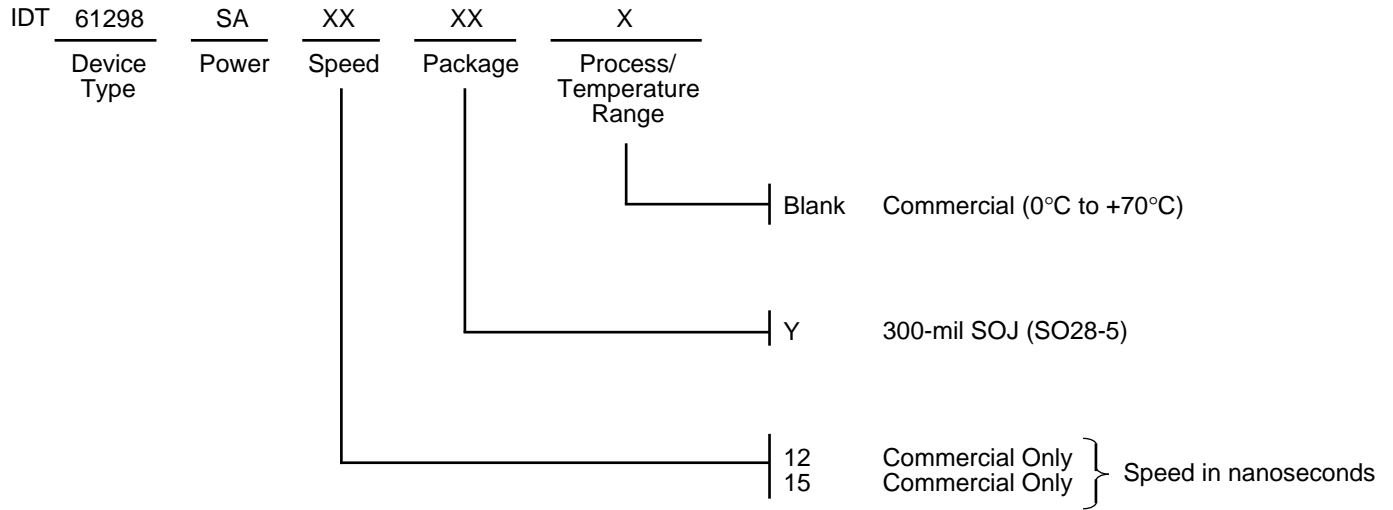
TIMING WAVEFORM OF WRITE CYCLE NO. 2 (\overline{CS} CONTROLLED TIMING)^(1,2,5)



NOTES:

1. \overline{WE} or \overline{CS} must be HIGH during all address transitions.
2. A write occurs during the overlap of a LOW \overline{CS} and a LOW \overline{WE} .
3. \overline{OE} is continuously HIGH. If \overline{OE} is LOW during a \overline{WE} controlled write cycle, the write pulse width must be the greater than or equal to $t_{WHZ} + t_{DW}$ 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{WE} controlled write cycle, this requirement does not apply and the minimum write pulse is as short as the specified t_{WP} .
4. During this period, I/O pins are in the output state so that the input signals must not be applied.
5. If the \overline{CS} LOW transition occurs simultaneously with or after the \overline{WE} LOW transition, the outputs remain in a high-impedance state.
6. Transition is measured $\pm 200\text{mV}$ from steady state.

ORDERING INFORMATION



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