Standard 8K x 8 SRAM

Features

- 8192 x 8 bit static CMOS RAM
- 70 and 100 ns Access Times
- Common data inputs and outputs
- Three-state outputs
- Typ. operating supply current
  70 ns: 45 mA
  100 ns: 37 mA
- Data retention current at 3 V: < 10 µA (standard)
- Standby current standard < 30 µA
- Standby current low power (L) < 10 µA
- Standby current very low power (LL) < 1 µA
- Standby current for LL-version at 25 °C and 5 V: typ. 50 nA
- TTL/CMOS-compatible
- Automatic reduction of power dissipation in long Read or Write cycles
- Power supply voltage 5 V
- Operating temperature ranges:
  0 to 70 °C
  -25 to 85 °C
  -40 to 85 °C
- Quality assessment according to CECC 90000, CECC 90100 and CECC 90111
- ESD protection > 2000 V (MIL STD 883C M3015.7)
- Latch-up immunity > 100 mA
- Packages: PDIP28 (600 mil)
  SOP28 (300 mil)
  SOP28 (330 mil)

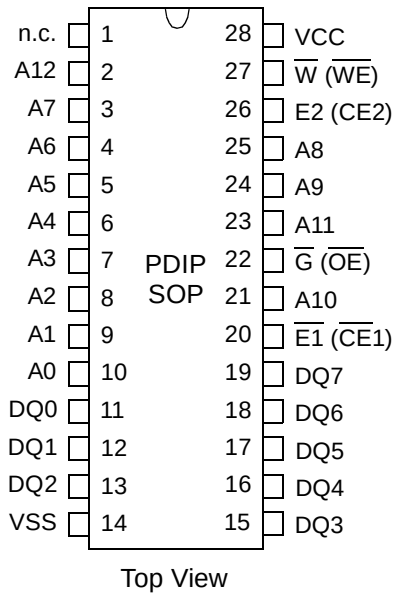
Description

The U6264A is a static RAM manufactured using a CMOS process technology with the following operating modes:
- Read - Standby
- Write - Data Retention

The memory array is based on a 6-transistor cell.
The circuit is activated by the rising edge of E2 (at $\overline{E1}$ = L), or the falling edge of $\overline{E1}$ (at E2 = H). The address and control inputs open simultaneously. According to the information of $\overline{W}$ and $\overline{G}$, the data inputs, or outputs, are active. During the active state ($\overline{E1}$ = L and E2 = H), each address change leads to a new Read or Write cycle. In a Read cycle, the data outputs are activated by the falling edge of $\overline{G}$, afterwards the data word read will be available at the outputs DQ0 - DQ7. After the address change, the data outputs go High-Z until the new read information is available. The data outputs have no preferred state. If the memory is driven by CMOS levels in the active state, and if there is no change of the address, data input and control signals $\overline{W}$ or $\overline{G}$, the operating current (at I_O = 0 mA) drops to the value of the operating current in the Standby mode. The Read cycle is finished by the falling edge of E2 or $\overline{W}$, or by the rising edge of $\overline{E1}$, respectively.

Data retention is guaranteed down to 2 V. With the exception of E2, all inputs consist of NOR gates, so that no pull-up/pull-down resistors are required. This gate circuit allows to achieve low power standby requirements by activation with TTL-levels too.
If the circuit is inactivated by E2 = L, the standby current (TTL) drops to 150 µA typ.

Pin Configuration

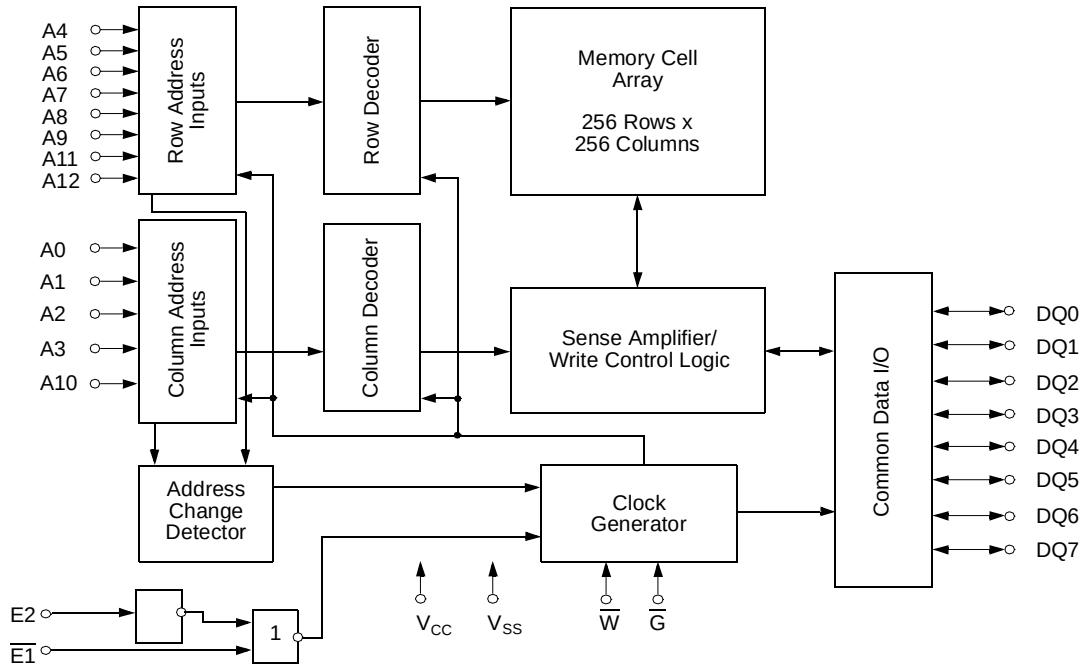


Top View

Pin Description

Signal Name	Signal Description
A0 - A12	Address Inputs
DQ0 - DQ7	Data In/Out
$\overline{E1}$	Chip Enable 1
E2	Chip Enable 2
$\overline{G}$	Output Enable
$\overline{W}$	Write Enable
VCC	Power Supply Voltage
VSS	Ground
n.c.	not connected

Block Diagram



Truth Table

Operating Mode	$\overline{E1}$	E2	$\overline{W}$	$\overline{G}$	DQ0 - DQ7
Standby/not selected	*	L	*	*	High-Z
	H	*	*	*	High-Z
Internal Read	L	H	H	H	High-Z
Read	L	H	H	L	Data Outputs Low-Z
Write	L	H	L	*	Data Inputs High-Z

* H or L

Characteristics

All voltages are referenced to V_{SS} = 0 V (ground).
All characteristics are valid in the power supply voltage range and in the operating temperature range specified.
Dynamic measurements are based on a rise and fall time of ≤ 5 ns, measured between 10 % and 90 % of V_I, as well as input levels of V_{IL} = 0 V and V_{IH} = 3 V. The timing reference level of all input and output signals is 1.5 V, with the exception of the t_{dis}-times, in which cases transition is measured ± 200 mV from steady-state voltage.

Maximum Ratings		Symbol	Min.	Max.	Unit
Power Supply Voltage		V_{CC}	-0.3	7	V
Input Voltage		V_I	-0.3	V_{CC} + 0.5	V
Output Voltage		V_O	-0.3	V_{CC} + 0.5	V
Power Dissipation		P_D	-	1	W
Operating Temperature	C-Type G-Type K-Type	T_a	0 -25 -40	70 85 85	°C °C °C
Storage Temperature		T_{stg}	-55	125	°C

Recommended Operating Conditions	Symbol	Conditions	Min.	Max.	Unit
Power Supply Voltage	V_{CC}		4.5	5.5	V
Data Retention Voltage	$V_{CC(DR)}$		2.0		V
Input Low Voltage*	V_{IL}		-0.3	0.8	V
Input High Voltage	V_{IH}		2.2	V_{CC} + 0.3	V

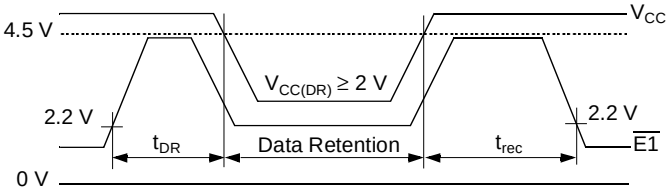
* -2 V at Pulse Width 10 ns

Electrical Characteristics	Symbol	Conditions	Min.	Max.	Unit
Supply Current - Operating Mode	$I_{CC(OP)}$	V_{CC} = 5.5 V V_{IL} = 0.8 V V_{IH} = 2.2 V			
Standard		t_{cW} = 70 ns t_{cW} = 100 ns		70 60	mA mA
Low Power (L)		t_{cW} = 70 ns t_{cW} = 100 ns		70 60	mA mA
Very Low Power (LL)		t_{cW} = 70 ns t_{cW} = 100 ns		55 45	mA mA
Supply Current - Standby Mode (CMOS level)	$I_{CC(SB)}$	V_{CC} = 5.5 V $V_{\overline{E1}} = V_{E2}$ = V_{CC} - 0.2 V or V_{E2} = 0.2 V			
Standard				30	µA
Low Power (L)				10	µA
Very Low Power (LL)				1	µA
Supply Current - Standby Mode (TTL level)	$I_{CC(SB)1}$	V_{CC} = 5.5 V $V_{\overline{E1}} = V_{E2}$ = 2.2 V or V_{E2} = 0.2 V			
Standard				5	mA
Low Power (L)				5	mA
Very Low Power (LL)				3	mA
Supply Current - Data Retention Mode	$I_{CC(DR)}$	$V_{CC(DR)}$ = 3 V $V_{\overline{E1}} = V_{E2}$ = $V_{CC(DR)}$ - 0.2 V or V_{E2} = 0.2 V			
Standard				10	µA
Low Power (L)				10	µA
Very Low Power (LL)				1	µA

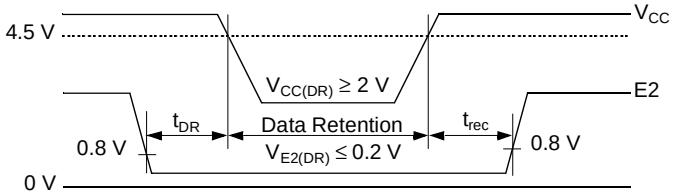
Electrical Characteristics		Symbol	Conditions	Min.	Max.	Unit
Output High Voltage		V_{OH}	V_{CC} = 4.5 V I_{OH} = -1.0 mA	2.4		V
Output Low Voltage		V_{OL}	V_{CC} = 4.5 V I_{OL} = 3.2 mA		0.4	V
Input Leakage Current Standard & Low Power (L)	High	I_{IH}	V_{CC} = 5.5 V V_{IH} = 5.5 V		2	µA
	Low	I_{IL}	V_{CC} = 5.5 V V_{IL} = 0 V	-2		µA
Very Low Power (LL)	High	I_{IH}	V_{CC} = 5.5 V V_{IH} = 5.5 V		1	µA
	Low	I_{IL}	V_{CC} = 5.5 V V_{IL} = 0 V	-1		µA
Output High Current		I_{OH}	V_{CC} = 4.5 V V_{OH} = 2.4 V		-1	mA
Output Low Current		I_{OL}	V_{CC} = 4.5 V V_{OL} = 0.4 V	3.2		mA
Output Leakage Current Standard & Low Power (L) High at Three-State Outputs		I_{OHZ}	V_{CC} = 5.5 V V_{OH} = 5.5 V		2	µA
Low at Three-State Outputs		I_{OLZ}	V_{CC} = 5.5 V V_{OL} = 0 V	-2		µA
Very Low Power (LL) High at Three-State Outputs		I_{OHZ}	V_{CC} = 5.5 V V_{OH} = 5.5 V		1	µA
Low at Three-State Outputs		I_{OLZ}	V_{CC} = 5.5 V V_{OL} = 0 V	-2	-	µA

Switching Characteristics	Symbol		Min.		Max.		Unit
	Alt.	IEC	07	10	07	10	
Time to Output in Low-Z	t_{LZ}	$t_{t(QX)}$	5	5	10	10	ns
Cycle Time							
Write Cycle Time	t_{WC}	t_{cW}	70	100			ns
Read Cycle Time	t_{RC}	t_{cR}	70	100			ns
Access Time							
$\overline{E1}$ LOW or E2 HIGH to Data Valid	t_{ACE}	$t_{a(E)}$	-	-	70	100	ns
$\overline{G}$ LOW to Data Valid	t_{OE}	$t_{a(G)}$	-	-	40	50	ns
Address to Data Valid	t_{AA}	$t_{a(A)}$	-	-	70	100	ns
Pulse Widths							
Write Pulse Width	t_{WP}	$t_{w(W)}$	50	70			ns
Chip Enable to End of Write	t_{CW}	$t_{w(E)}$	65	90			ns
Setup Times							
Address Setup Time	t_{AS}	$t_{su(A)}$	0	0			ns
Chip Enable to End of Write	t_{CW}	$t_{su(E)}$	65	90			ns
Write Pulse Width	t_{WP}	$t_{su(W)}$	50	70			ns
Data Setup Time	t_{DS}	$t_{su(D)}$	35	40			ns
Data Hold Time	t_{DH}	$t_{h(D)}$	0	0			ns
Address Hold from End of Write	t_{AH}	$t_{h(A)}$	0	0			ns
Output Hold Time from Address Change	t_{OH}	$t_{v(A)}$	5	5			ns
$\overline{E1}$ HIGH or E2 LOW to Output in High-Z	t_{HZCE}	$t_{dis(E)}$	0	0	25	35	ns
$\overline{W}$ LOW to Output in High-Z	t_{HZWE}	$t_{dis(W)}$	0	0	30	35	ns
$\overline{G}$ HIGH to Output in High-Z	t_{HZOE}	$t_{dis(G)}$	0	0	25	35	ns

Data Retention Mode $\overline{E1}$-Controlled



Data Retention Mode E2-Controlled



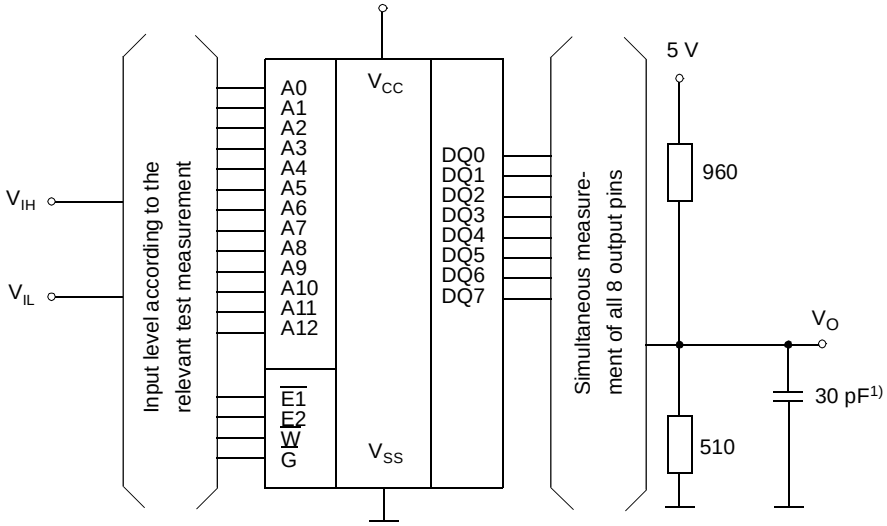
$V_{E2(DR)} \geq V_{CC(DR)}$ - 0.2 V or $V_{E2(DR)} \leq 0.2$ V

$V_{CC(DR)}$ - 0.2 V $\leq V_{E1(DR)} \leq V_{CC(DR)}$ + 0.3 V

Chip Deselect to Data Retention Time t_{DR} : min 0 ns

Operating Recovery Time t_{rec} : min t_{cR}

Test Configuration for Functional Check



[1)] In measurement of $t_{dis(E)}$, $t_{dis(W)}$, $t_{dis(G)}$ the capacitance is 5 pF.

Capacitance	Conditions	Symbol	Min.	Max.	Unit
Input Capacitance	V_{CC} = 5.0 V V_I = V_{SS} f = 1 MHz T_a = 25 °C	C_I		8	pF
Output Capacitance		C_O		10	pF

All pins not under test must be connected with ground by capacitors.

IC Code Numbers

Example

U6264A D G 07 L

Type

Package
D = PDIP
S = SOP (330 mil)
S1 = SOP (300 mil)

Operating Temperature Range
C = 0 to 70 °C
G = -25 to 85 °C
K = -40 to 85 °C

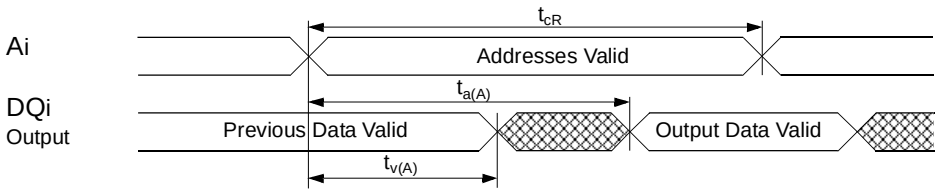
Access Time
07 = 70 ns
10 = 100 ns

Power Consumption
= Standard
L = Low Power
LL = Very Low Power

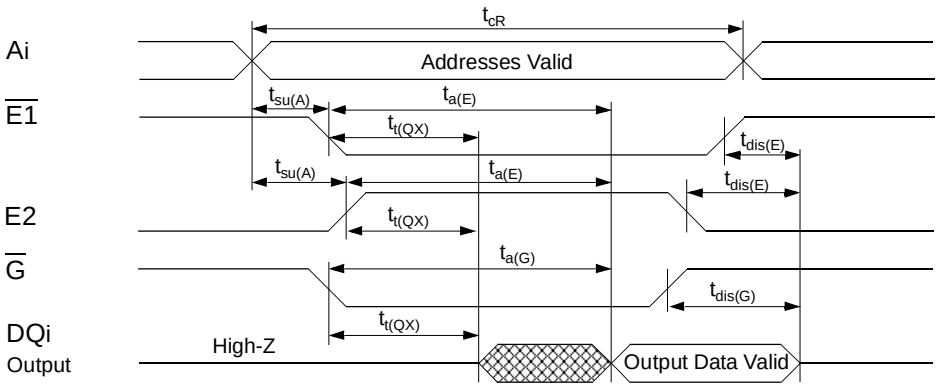
Internal Code

The date of manufacture is given by the last 4 digits of the mark, the first 2 digits indicating the year, and the last 2 digits the calendar week.

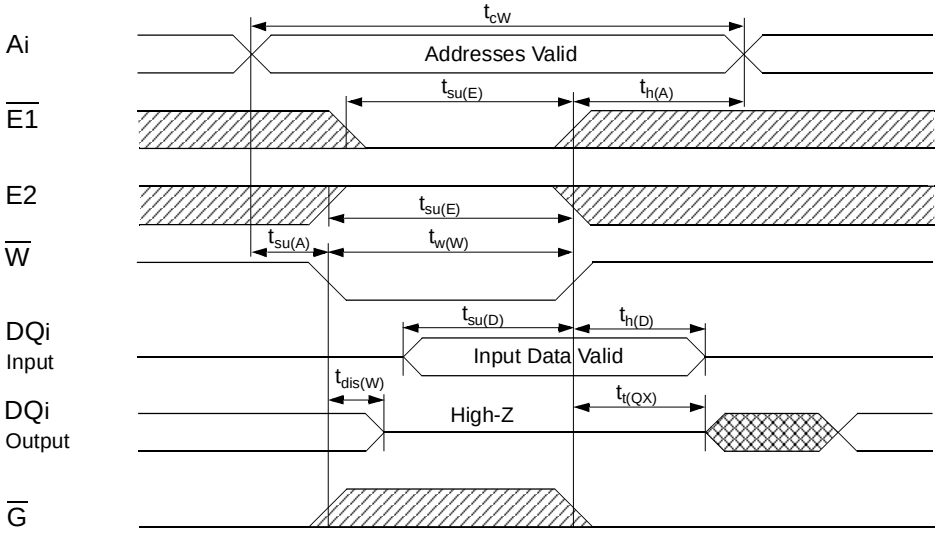
Read Cycle 1 (during Read cycle: $\overline{E1}$ = $\overline{G}$ = V_{IL}, E2 = $\overline{W}$ = V_{IH})



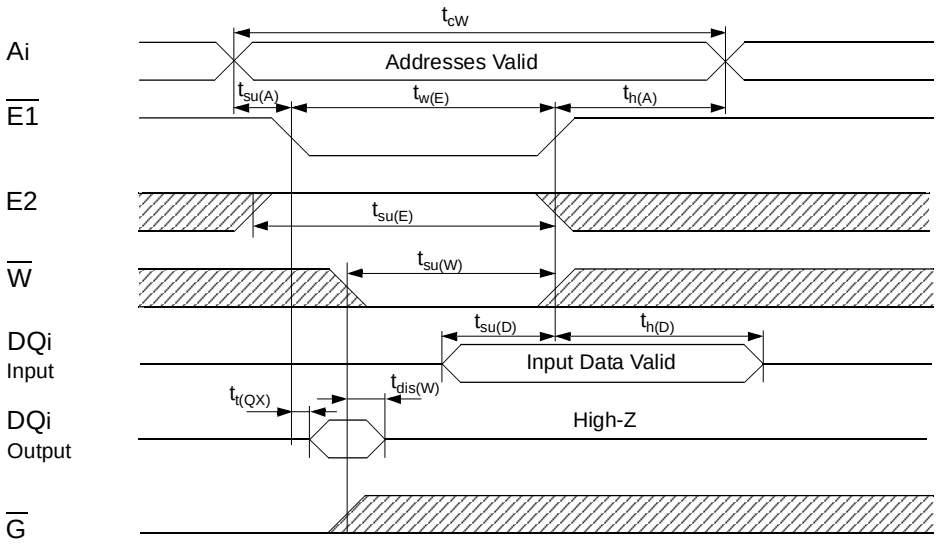
Read Cycle 2 (during Read cycle: $\overline{W}$ = V_{IH})



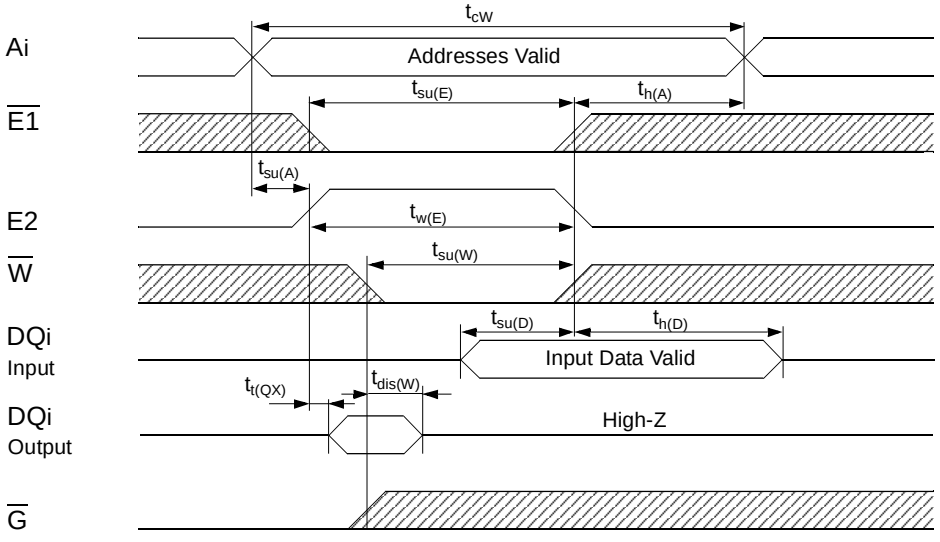
Write Cycle 1 ($\overline{W}$-controlled)

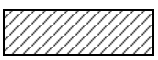


Write Cycle 2 ($\overline{E1}$-controlled)



Write Cycle 3 (E2-controlled)



undefined  L- or H-level 

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