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The S-2860B and the S-2864B are low power 8Kx8-bit parallel E²PROMs. The S-2860B features wide operating voltage range, and the S-2864B features 5-V single power supply. Since provided with 32-byte page write function, they can perform fast programming operation.

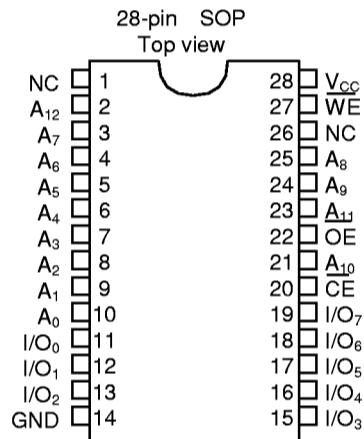
■ Features

- Access time: 150 ns
(V_{CC}=5 V±10%, Ta=0 °C to 70 °C).
- Low power consumption.
Operating: 30 mA max. (V_{CC}=5 V±10%)
Standby: 1 µA max. (V_{CC}=5 V±10%)
- Operating voltage range

S-2860B	S-2864B
Read: 1.8 to 5.5 V	5 V±10%
Write: 2.7 to 5.5 V	5 V±10%
- Write inhibition

S-2860B: 2.1 V typ
S-2864B: 3.5 V typ
- Data polling
- Page write for 32 bytes
- Rewritings : 10⁵ times
- Data retention: 10 years
- Program noise immunity
- Package: 28-pin SOP/TSOP
- Supply in bare chip is also available

■ Pin Assignment



Pin name	Function
A ₀ to A ₁₂	Address input
I/O ₀ to I/O ₇	Data input / output
\overline{CE}	Chip Enable
\overline{OE}	Output Enable
\overline{WE}	Write Enable
V _{CC}	Power supply voltage
GND	Ground (0 V)

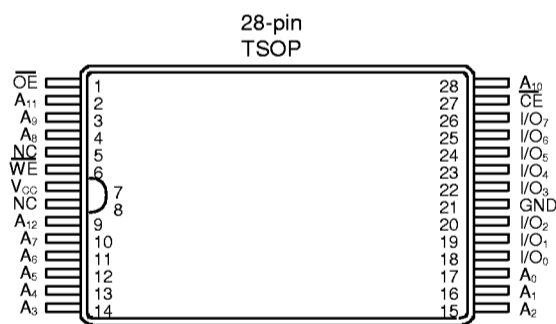


Figure 1

**CMOS 64K-bit PARALLEL E²PROM
S-2860A/2864A**

■ **Block Diagram**

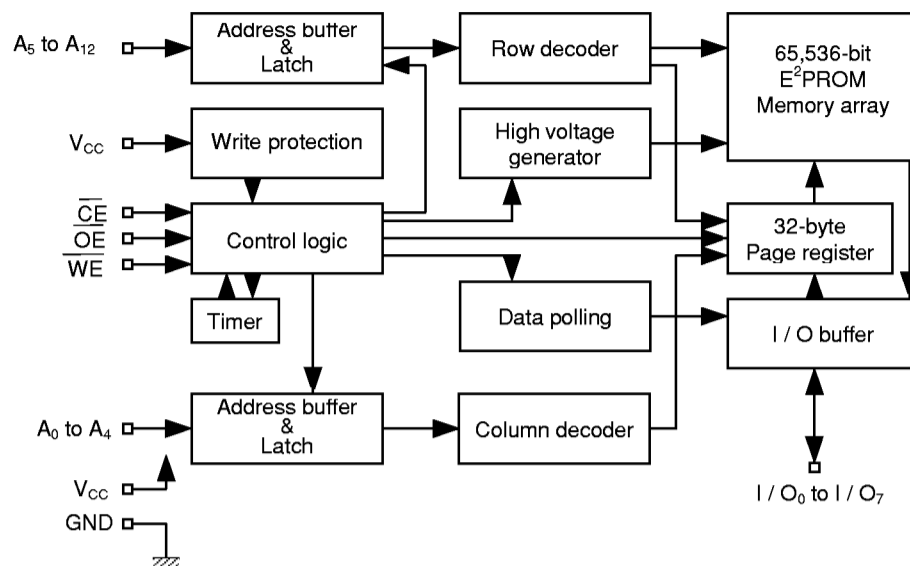


Figure 2

■ **Operation Mode**

Table 1

Mode	\overline{CE}	\overline{OE}	\overline{WE}	I/O
Read	L	L	H	Data output
Write	L	H	L	Data input
Write inhibition	x	x	H	—
	x	L	x	—
Standby	H	x	x	High-Z

X : Don't care

■ **Absolute Maximum Ratings**

Table 2

Parameter	Symbol	Ratings	Unit
Power supply voltage	V_{CC}	-0.3 to +7.0	V
Input voltage	V_{IN}	-0.3 to $V_{CC}+0.3$	V
Output voltage	V_{OUT}	-0.3 to V_{CC}	V
Storage temperature under bias	T_{bias}	-50 to +95	°C
Storage temperature	T_{stg}	-65 to +150	°C

■ **Recommended Operating Conditions**

Table 3

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Power supply voltage	V_{CC}	S-2860B	Read	1.8	—	5.5	V
			Write	2.7	—	5.5	V
		S-2864B		4.5	5.0	5.5	V
High level input voltage	V_{IH}	$V_{CC}=2.7$ to 5.5 V	2.2	—	$V_{CC}+0.3$	V	
		$V_{CC}=1.8$ to 2.7 V	$0.8 \times V_{CC}$	—	$V_{CC}+0.3$	V	
Low level input voltage	V_{IL}	$V_{CC}=4.5$ to 5.5 V	-0.3	—	0.8	V	
		$V_{CC}=2.7$ to 4.5 V	-0.3	—	0.4	V	
		$V_{CC}=1.8$ to 2.7 V	-0.3	—	$0.2 \times V_{CC}$	V	
Operating temperature	T_{opr}		-40	—	85	°C	

■ DC Electrical Characteristics

1. S-2860B

Table 4

(Ta=-40°C to 85°C)

Parameter	Symbol	Conditions	5 V±10%			3 V±10%			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Current consumption (Read)	I _{CC1}	$\overline{CE} \leq V_{IL}, V_{IN} \leq V_{IL} \text{ or } V_{IN} \geq V_{IH}$ $I_{OUT}=0 \text{ mA}, f=1/t_{RC}$	—	—	30	—	—	15	mA
	I _{CC2}	$CE \leq 0.2 \text{ V}, V_{IN} \leq 0.2 \text{ V or } V_{IN} \geq V_{CC}-0.2 \text{ V}$ $I_{OUT}=0 \text{ mA}, f=1/t_{RC}$	—	—	25	—	—	10	mA
Current consumption (Program)	I _{CC3}	$\overline{CE} \leq V_{IL}, V_{IN} \leq V_{IL} \text{ or } V_{IN} \geq V_{IH}$	—	—	30	—	—	15	mA
	I _{CC4}	$CE \leq 0.2 \text{ V}, V_{IN} \leq 0.2 \text{ V or } V_{IN} \geq V_{CC}-0.2 \text{ V}$	—	—	25	—	—	10	mA
Standby current	I _{SB1}	$\overline{CE} \geq V_{IH}$	—	—	1	—	—	0.5	mA
	I _{SB2}	$CE \geq V_{CC}-0.2 \text{ V}$	—	—	1.0	—	—	1.0	μA
Input leakage current	I _{LI}	$V_{IN}=\text{GND to } V_{CC}$	—	—	1.0	—	—	1.0	μA
Output leakage current	I _{LO}	$V_{I/O}=\text{GND to } V_{CC}$	—	—	1.0	—	—	1.0	μA
High level output voltage	V _{OH}	5-V operation: I _{OH} =-400 μA 3-V operation: I _{OH} =-100 μA	2.4	—	—	2.4	—	—	V
Low level output voltage	V _{OL}	5-V operation: I _{OL} =2.1 mA 3-V operation: I _{OL} =400 μA	—	—	0.4	—	—	0.4	V

2. S-2864B

Table 5

(Ta=-40°C to 85°C, V_{CC}=5 V±10%)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current consumption (Read)	I _{CC1}	$CE \leq V_{IL}, V_{IN} \leq V_{IL} \text{ or } V_{IN} \geq V_{IH}$ $I_{OUT}=0 \text{ mA}, f=1/t_{RC}$	—	—	30	mA
	I _{CC2}	$CE \leq 0.2 \text{ V}, V_{IN} \leq 0.2 \text{ V or } V_{IN} \geq V_{CC}-0.2 \text{ V}$ $I_{OUT}=0 \text{ mA}, f=1/t_{RC}$	—	—	25	mA
Current consumption (Program)	I _{CC3}	$CE \leq V_{IL}, V_{IN} \leq V_{IL} \text{ or } V_{IN} \geq V_{IH}$	—	—	30	mA
	I _{CC4}	$CE \leq 0.2 \text{ V}, V_{IN} \leq 0.2 \text{ V or } V_{IN} \geq V_{CC}-0.2 \text{ V}$	—	—	25	mA
Standby current	I _{SB1}	$CE \geq V_{IH}$	—	—	1	mA
	I _{SB2}	$CE \geq V_{CC}-0.2 \text{ V}$	—	—	1.0	μA
Input leakage current	I _{LI}	$V_{IN}=\text{GND to } V_{CC}$	—	—	1.0	μA
Output leakage current	I _{LO}	$V_{I/O}=\text{GND to } V_{CC}$	—	—	1.0	μA
High level output voltage	V _{OH}	I _{OH} =-400 μA	2.4	—	—□	V
Low level output voltage	V _{OL}	I _{OL} =2.1 mA	—	—	0.4	V

■ Rewriting Times

Table 6

Parameter	Symbol	Min.	Typ.	Max.	Unit
Rewriting times	N _W	10 ⁵	—	—	times/byte

■ Pin Capacitance

Table 7

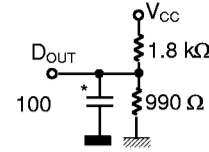
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input capacitance	C _{IN}	V _{IN} =0 V	—	—	10	pF
Input / output capacitance	C _{I/O}	V _{I/O} =0 V	—	—	10	pF

**CMOS 64K-bit PARALLEL E²PROM
S-2860B/2864B**

■ **AC Electrical Characteristics**

Table 8 Measuring conditions

Parameter	S-2860B	S-2864B
Input pulse levels	V _{IL} =0.2 V V _{IH} =2.4 V	V _{IL} =0.4 V V _{IH} =2.4 V
Input rise and fall time	10 ns	10 ns
I/O reference level	1.5 V	1.5 V
Output load	See Figure 3	See Figure 3



* (When measuring t_{CLZ}, t_{OLZ}, t_{CHZ}, t_{OHZ}, t_{WHZ}, t_{WLZ}) : 5pF

Figure 3 Output load measuring circuit

1. Read Cycle

(1) 5-V operation

Table 9

(V_{CC}=5 V±10%)

Parameter	Symbol	0°C to 70°C		-40°C to 85°C		Unit
		Min.	Max.	Min.	Max.	
Read cycle time	t _{RC}	150	—□	200	—□	ns
$\overline{\text{CE}}$ access time	t _{CE}	—□	150	—□	200	ns
Address access time	t _{AA}	—□	150	—□	200	ns
$\overline{\text{OE}}$ access time	t _{OE}	—□	70	—□	90	ns
Output enable time ($\overline{\text{CE}}$)	t _{CLZ}	10	—□	10	—	ns
Output enable time ($\overline{\text{OE}}$)	t _{OLZ}	10	—□	10	—	ns
Output disable time ($\overline{\text{CE}}$)	t _{CHZ}	10	70	10	90	ns
Output disable time ($\overline{\text{OE}}$)	t _{OHZ}	10	70	10	90	ns
Output data hold time	t _{OH}	5	—□	5	—□	ns

(2) 3-V operation (S-2860B only)

Table 10

(V_{CC}=3 V±10%)

Parameter	Symbol	0°C to 70°C		-40°C to 85°C		Unit
		Min.	Max.	Min.	Max.	
Read cycle time	t _{RC}	400	—□	500	—□	ns
$\overline{\text{CE}}$ access time	t _{CE}	—□	400	—□	500	ns
Address access time	t _{AA}	—□	400	—□	500	ns
$\overline{\text{OE}}$ access time	t _{OE}	—□	200	—□	250	ns
Output enable time ($\overline{\text{CE}}$)	t _{CLZ}	25	—□	30	—□	ns
Output enable time ($\overline{\text{OE}}$)	t _{OLZ}	25	—□	30	—□	ns
Output disable time ($\overline{\text{CE}}$)	t _{CHZ}	25	200	30	250	ns
Output disable time ($\overline{\text{OE}}$)	t _{OHZ}	25	200	30	250	ns
Output data hold time	t _{OH}	10	—□	15	—□	ns