# GR3281 (32K x 8) NON-VOLATILE RAM



#### DESCRIPTION

The GR3281 is a 32768 word by 8 bits (32K x 8) non-volatile CMOS Static Ram, fabricated from advanced silicon gate CMOS technology and a high reliability lithium power cell.

The pin-out of the GR3281 conforms to the JEDEC standards and is fully compatible with normal static Vout RAM.

The power down circuit is fully automatic and is referenced at 4.5 volts. At this point the GR3281 is write protected by an internal inhibit function for Data Protection and the memory contents are retained by the lithium power source.

Power down is very fast, this being essential for data integrity, taking a maximum of 15 µS (15 microseconds) to power down from 5 volts to 0 volts This is much faster than system power failure conditions. Therefore there are no special conditions required when installing the GR3281.

The GR3281 can, without external power, retain data almost indefinitely. The limiting factor will be the shelf life of the lithium cell, which is typically ten years. It is possible that this figure may be extended in view of the extremely light duty imposed upon the cell.

#### APPLICATION

When powered down, the GR3281 is transportable and data can be moved from system to system, this makes it ideal for program development, data collection in data loggers, program changes in process control, automation and robotics and user definable lookup tables, etc.

#### DISPOSAL INSTRUCTIONS

Do not dispose of non-volatile memory devices by incineration or crushing. Devices may be returned carriage paid to Greenwich Instruments Ltd., for disposal.

#### UK

Greenwich Instruments Ltd., Meridian House, Park Road, Swanley, Kent, BR8 8AH Tele: 08700 505 404 Fax: 08700 505 405

Greenwich Instruments Ltd., are continually developing their products and reserve the right to alter specifications without prior notice. Standard Terms and Conditions of Sale apply.



#### ABSOLUTE MAXIMUM RATINGS

Symbol

Vdd

Vi/o Temp

A14 A12 2

A7 3

A6 4

Α5 5

A4 6

A3

A2 8

A1 9

A0

D0 11 12

D1

GND 14

7

10

13 D2

Min	Max	Units
- 0.3	7.0	Volts
- 0.3	Vdd +0.3	Volts
- 20	+70	deg. C

OPERATING CONDITIONS					
Symbol	Min	Тур	Max	Unit	
Vdd	4.75	5.0	5.5	Volts	
Vin (1)	2.2			Volts	
Vin (0)			0.8	Volts	
lin (any other pin)	- 1.0		+1.0	μΑ.	
Vout $(1)(lout = -1mA)$	2.4			Volts	
Vout (0)(lout = +2mA	)		0.4	Volts	

Idd (Active)	30		mA.
Idd (Deselected)	1.0		mA.
Tcycle		100	nS.
Cin (any pin)	10		pF

a	CE	OE	WR	MODE	OUTPUT	ldd
5	н	Х	Х	Unsel.	Hi-Z	Deselected
s.	L	н	н	Unsel.	Hi-Z	Active
е	L	L	н	Read	Dout	Active
IS	L	Х	L	Write	Din	Active

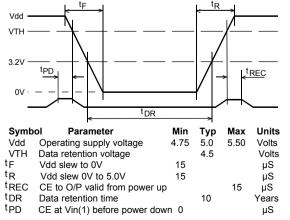
**PIN CONNECTIONS** 

#### PIN DESIGNATIONS

28	Vdd		
27	WR	Pin	Function
26	A13	A0-A12	Address I/P`s
25	A8	D0-D7	Data in/out
24	A9	OE	
23	A11		Output Enable
22	OE	CE	Chip Enable
21	A10	WR	Write Enable
20	CE	Vdd	+5Volt Power
19	D7	GND	Ground
18	D6		
17	D5		
16	D4		

DATA RETENTION OPERATING CONDITIONS

15 D3



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tDR

tPD

Data retention time

CE at Vin(1) before power down 0



Max

7.0

Units

Volts

ABSOLUTE MAXIMUM RATINGS

Min

- 0.3

Symbol

Vdd

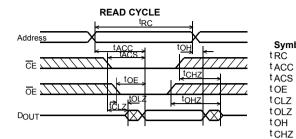
	Vido Vi/o Temp	1	- 0 - 2	.3	Vdd +0.3 +70	3	Volts Volts deg. C	
	OPERATING CONDITIONS							
	OPERATING   Symbol Min   Vdd 4.75   Vin (1) 2.2   Vin (0) in (any other pin) - 1.0   Vout (1)(lout = -1mA) 2.4   Vout (0)(lout = +2mA) Idd (Active)   Idd (Active) Idd (Deselected)   Tcycle Cin (any pin)		Min 4.75 2.2 - 1.0 ) 2.4	Тур Мах		Unit Volts Volt Volt Volt Volt mA mA nS pF	s s s t s s s s s s s s s	
a				OPERATIN				
	CE H L L	OE X H L X	WR X H H L	MODE Unsel. Unsel. Read Write	<b>OUTPL</b> Hi-Z Hi-Z Dout Din	D A A	dd eselecto ctive ctive ctive	ed
a	PI	N CON	INECTIO	NS	PIN D	ESIGN/		;
ftv. esan	A14 A12 A7 A6 A5 A4 A3 A2 A1 A0 D0 D1 D2 GND	1 2 3 4 5 6 7 8 9 10 11 12 13 14	28 27 26 25 24 23 22 21 20 19 18 17 16 15	Vdd   WR   A13   A8   A9   A11   OE   A10   CE   D7   D6   D5   D4   D3	Pin A0-A12 D0-D7 OE CE WR Vdd GND	Data Outpu Chip Write	ess I/P`s in/out ut Enable Enable Enable It Powe	le
		DATA		TION OPE	ERATING C		ONS	
/ 1 r	Vdd — VTH — 3.2V — 0V ·			> 	 			REC
	Symb Vdd VTH <sup>t</sup> F <sup>t</sup> R <sup>t</sup> REC	Opera Data Vdd s Vdd s	retention lew to 0 lew 0V to	e <b>ter</b> ply voltage voltage /	Min e 4.75 15 15		<b>Max</b> 5.50 15	Units Volts Volts µS µS µS

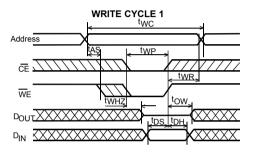
10

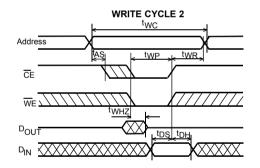
Years

μS

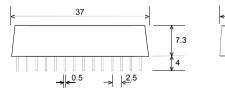
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### TIMING (nS-nano seconds)

Read Cycle	100nS	
Parameter	Min	Max
Read cycle time	100	
Access time		100
CE to output valid		100
OE to output valid		50
CE to output active	10	
OE to output active	10	
Output hold time	20	
CE to output disable		35
OE to output disable		35

Write Cycle	100nS		
Parameter	Min	Max	
Write cycle time	100		
Write pulse width	60		
Address setup time	0		
Write recovery time	0		
WR to output disable		35	
Output active from WR	10		
Data setup time	35		
Data HOLD TIME	0		

Notes

18

15.24

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0.38

Symbol

tOHZ

tWC

tWP

tAS

twR

t WHZ

tow

tDS

t DH

Symbol

- 1. WE must be high during address transitions. 2. A Write occurs during the overlap of a low  $\overline{CE}$ and a low  $\overline{WE}$ .
- 3. WE is high for a read cycle.

REPLACES 62256., 43256., 55257., etc.



# GR3281 (32K x 8) NON-VOLATILE RAM

READ CYCLE

tACC

I, <sup>t</sup>OE

WRITE CYCLE 1

twhż

twc

twp

τĊι

ĮĄŞ

POUT

Address

DOUT

Address

CE

WE

DIN

CE 777////

tor

tон

<sup>t</sup>CHZ

tOH2

twr,

XXXXX

XXXXX

Notes

and a low  $\overline{WE}$ .

3. WE is high for a read cycle.

tow

tDS tDF



#### TIMING (nS-nano seconds)

	Read Cycle	100nS		
Symbol	Parameter	Min	Max	
tRC	Read cycle time	100		
t ACC	Access time		100	
tACS	CE to output valid		100	
tOE	OE to output valid		50	
t CLZ	CE to output active	10		
tolz	OE to output active	10		
tOH	Output hold time	20		
t CHZ	CE to output disable		35	
t ohz	OE to output disable		35	

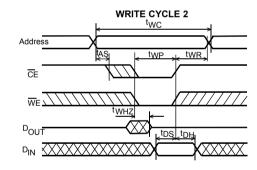
	Write Cycle	100nS		
Symbol	Parameter	Min	Max	
WC	Write cycle time	100		
WP	Write pulse width	60		
AS	Address setup time	0		
WR	Write recovery time	0		
WHZ	WR to output disable		35	
OW	Output active from WR	10		
DS	Data setup time	35		
DH	Data HOLD TIME	0		

1. WE must be high during address transitions.

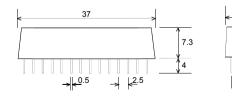
2. A Write occurs during the overlap of a low CE

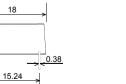
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REPLACES



## DIMENSIONS (mm)







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#### ISSUE 4 OCT 2005