

BRITISH STANDARDS INSTITUTION

2 PARK STREET, LONDON. W1A 2BS

Specification available from:- AS SHOWN IN PD 9002
AND CECC 00 200 AND

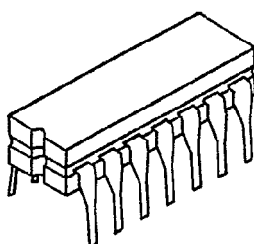
BS CECC 90 104 - 195

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Page 1 of 28 pages

ELECTRONIC COMPONENTS OF ASSESSED QUALITY
DETAIL SPECIFICATION IN ACCORDANCE WITH:BS CECC 90 000 : 1976
BS CECC 90 100 : 1977Outline not to scale: Isometric projection
Marking information see page 12

For detail dimensions see IEC 191-2 (A50B)

MANUFACTURERS TYPE NUMBER

4505BSEE PD 9002 AND CECC 00 200
For ordering information
see page 13SIXTY-FOUR-BIT (SIXTY-FOUR
TIMES ONE) STATIC RANDOM
ACCESS MEMORY WITH THREE
STATE OUTPUTSSILICON COMPLEMENTARY MOS.
WITH (B) BUFFERED OUTPUTS AND
CAVITY PACKAGING.Assessment levels
R, S, T and V
and optional screening
categories A, B, C and D**CAUTION: THESE ARE STATIC SENSITIVE DEVICES - See clause 1.11****1. Limiting conditions of use (not for inspection purposes)**All voltages referenced to V_{SS}

1.1	Maximum supply voltage, positive	V_{DD}	+18,0V
1.2	Maximum supply voltage, negative	V_{DD}	-0,5V
1.3	Maximum positive input voltage	V_I V_{DD}	+0,5V
1.4	Maximum negative input voltage	V_I	-0,5V

Refer to Qualified Products List PD 9002 and/or CECC 00 200
for details of manufacturers approved to this specification

1. Limiting conditions of use (contd)

1.5	Maximum power dissipation, per package per output	P_{D1}	200,0mW
		P_{D2}	200,0mW
1.6	Maximum continuous current into any input.	$ I_I $	10,0mA
1.7	Maximum continuous current into any output.	$ I_O $	10,0mA
1.8	Operating temperature range	T_{amb}	
		Full	-55 to +125°C
		Limited	-40 to + 85°C
1.9	Storage temperature range	T_{stg}	-65 to +150°C
1.10	Transient energy rating		400V at 100pF through 1,5kΩ

1.11 Recommended handling precautions

- 1.11.1 Store devices in either conductive foam or conductive rails, or connect all leads together using a similar electrical shorting method.
- 1.11.2 Use grounded tip soldering irons.
- 1.11.3 Ground all test equipment.
- 1.11.4 Connect all unused device inputs to V_{DD} or V_{SS} .
- 1.11.5 PC boards used to mount MOS devices should have all metal leads grounded during device mounting or flow soldering operations.
- 1.11.6 Soldering equipment, solder pots or flow soldering equipment should be grounded whenever in contact with PC boards and/or MOS devices.
- 1.11.7 Do not use ungrounded automatic insertion equipment or other handling equipment that precludes the use of suitable device lead grounding techniques during inspection or handling.
- 1.11.8 When PC boards containing mounted MOS devices are removed from equipment for test, shipping or storage, 'Dummy connectors' should be used to electrically short all PC board terminals together.
- 1.11.9 Switch off power supply before inserting or removing devices from circuits.
- 1.11.10 Disconnect all low impedance equipment and input signals from the device before d.c. power supplies are switched off.

2. Recommended conditions of use and associated characteristics (not for inspection purposes)

These apply over the operating temperature range unless otherwise stated. All voltages referenced to V_{SS} .

Characteristics	Conditions	Symbol	$V_{DD}(V)$	T_{amb} LOW	T_{amb} = 25°C	T_{amb} HIGH	Unit
Quiescent device current	$V_{IL} = 0V$ $V_{IH} = V_{DD}$						
Full temperature range	Outputs open circuit	I_{DDA}	5,0	5,0	5,0	150,0	μA
		I_{DDA}	10,0	10,0	10,0	300,0	μA
		I_{DDA}	15,0	20,0	20,0	600,0	μA
Limited temperature range		I_{DDA}	5,0	20,0	20,0	150,0	μA
		I_{DDA}	10,0	40,0	40,0	300,0	μA
		I_{DDA}	15,0	80,0	80,0	600,0	μA
LOW level output voltage at $ I_O < 1,0\mu A$	$V_{IL} = 0V$ $V_{IH} = V_{DD}$	V_{OLA}	5,0	0,05	0,05	0,05	V
		V_{OLA}	10,0	0,05	0,05	0,05	V
		V_{OLA}	15,0	0,05	0,05	0,05	V
HIGH level output voltage at $ I_O < 1,0\mu A$	$V_{IL} = 0V$ $V_{IH} = V_{DD}$	V_{OHB}	5,0	4,95	4,95	4,95	V
		V_{OHB}	10,0	9,95	9,95	9,95	V
		V_{OHB}	15,0	14,95	14,95	14,95	V
LOW level output voltage (for worst case combinations) at $ I_O < 1,0\mu A$	$V_{IL} = 1,5V$ $V_{IL} = 3,0V$ $V_{IL} = 4,0V$	V_{OLA}	5,0	0,5	0,5	0,5	V
		V_{OLA}	10,0	1,0	1,0	1,0	V
		V_{OLA}	15,0	1,5	1,5	1,5	V
HIGH level output voltage (for worst case combinations) at $ I_O < 1,0\mu A$	$V_{IH} = 3,5V$ $V_{IH} = 7,0V$ $V_{IH} = 11,0V$	V_{OHB}	5,0	4,5	4,5	4,5	V
		V_{OHB}	10,0	9,0	9,0	9,0	V
		V_{OHB}	15,0	13,5	13,5	13,5	V
Output LOW (sink) current							
Full temperature range	$V_O = 0,4V$	I_{OLB}	5,0	0,3	0,25	0,18	mA
	$V_O = 0,5V$	I_{OLB}	10,0	0,9	0,75	0,50	mA
	$V_O = 1,5V$	I_{OLB}	15,0	2,2	1,70	1,20	mA
Limited temperature range	$V_O = 0,4V$	I_{OLB}	5,0	0,2	0,15	0,1	mA
	$V_O = 0,5V$	I_{OLB}	10,0	0,6	0,50	0,4	mA
	$V_O = 1,5V$	I_{OLB}	15,0	3,9	0,75	0,6	mA

Characteristics	Conditions	Symbol	$V_{DD}(V)$	T_{amb} LOW	T_{amb} = 25°C	T_{amb} HIGH	Unit
Output HIGH (source) current							
Full temperature range	$V_O = 4,6V$	$-I_{OHB}$	5,0	0,25	0,2	0,14	mA
	$V_O = 9,5V$	$-I_{OHB}$	10,0	0,62	0,5	0,35	mA
	$V_O = 13,5V$	$-I_{OHB}$	15,0	1,80	1,5	1,10	mA
Limited temperature range	$V_O = 4,6V$	$-I_{OHB}$	5,0	0,2	0,16	0,12	mA
	$V_O = 9,5V$	$-I_{OHB}$	10,0	0,5	0,40	0,30	mA
	$V_O = 13,5V$	$-I_{OHB}$	15,0	1,4	1,20	1,00	mA
Input leakage current	$V_{IL} = 0V$ $V_{IH} = V_{DD}$						
Full temperature range		I_{IA}	15,0	0,10	0,10	1,00	μA
Limited temperature range		I_{IA}	15,0	0,30	0,30	1,00	μA
Three state output leakage current (combined to obtain a high impedance output state)	$V_{IL} = 0V$ $V_{IH} = V_{DD}$						
Full temperature range		I_{OZA}	15,0	0,4	0,4	12,0	μA
Limited temperature range		I_{OZA}	15,0	1,6	1,6	12,0	μA
Input capacitance per unit load (Any input)	$V_I = 0V$ $f = 1MHz$	C_{IA}	-	-	7,5	-	pF
Noise margin at LOW level output (equal to the difference between V_{IL} and V_{OL} for worst case combinations)		V_{NLB} V_{NLB} V_{NLB}	5,0 10,0 15,0	1,0 2,0 2,5	1,0 2,0 2,5	1,0 2,0 2,5	V V V
Noise margin at HIGH level output (equal to the difference between V_{IH} and V_{OH} for worst case combinations)		V_{NHB} V_{NHB} V_{NHB}	5,0 10,0 15,0	1,0 2,0 2,5	1,0 2,0 2,5	1,0 2,0 2,5	V V V

Characteristics	Conditions	Symbol	V _{DD} (V)	T _{amb} LOW	T _{amb} = 25°C	T _{amb} HIGH	Unit
Propagation and Transition Times	C _L = 50pF (Test conditions in Sub-group A5)						
Transition Time LOW to HIGH level		t _{TLHA}	5,0	-	360,0	-	ns
		t _{TLHA}	10,0	-	180,0	-	ns
		t _{TLHA}	15,0	-	150,0	-	ns
Transition Time HIGH to LOW level		t _{THLA}	5,0	-	320,0	-	ns
		t _{THLA}	10,0	-	160,0	-	ns
		t _{THLA}	15,0	-	130,0	-	ns
Read Access Time		t _{acc(R)} A	5,0	-	750,0	-	ns
		t _{acc(R)} A	10,0	-	400,0	-	ns
		t _{acc(R)} A	15,0	-	300,0	-	ns
Strobe Down Time		t _{PWBLB}	5,0	-	500,0	-	ns
		t _{PWBHB}	10,0	-	125,0	-	ns
		t _{PWBHB}	15,0	-	95,0	-	ns
Address Set-up Time		t _{PWSAB}	5,0	-	300,0	-	ns
		t _{PWSAB}	10,0	-	120,0	-	ns
		t _{PWSAB}	15,0	-	90,0	-	ns
Data Set-up Time		t _{PWSDB}	5,0	-	200,0	-	ns
		t _{PWSDB}	10,0	-	75,0	-	ns
		t _{PWSDB}	15,0	-	55,0	-	ns
Read Set-up Time		t _{PWSRB}	5,0	-	270,0	-	ns
		t _{PWSRB}	10,0	-	60,0	-	ns
		t _{PWSRB}	15,0	-	45,0	-	ns
Write Set-up Time		t _{PWSWB}	5,0	-	400,0	-	ns
		t _{PWSWB}	10,0	-	100,0	-	ns
		t _{PWSWB}	15,0	-	75,0	-	ns
Address Release Time		t _{PWARB}	5,0	-	75,0	-	ns
		t _{PWARB}	10,0	-	25,0	-	ns
		t _{PWARB}	15,0	-	20,0	-	ns

Characteristics	Conditions	Symbol	V _{DD} (V)	T _{amb} LOW	T _{amb} = 25°C	T _{amb} HIGH	Unit
Data Hold Time		t _{PWHB}	5,0	-	50,0	-	ns
		t _{PWHB}	10,0	-	15,0	-	ns
		t _{PWHB}	15,0	-	10,0	-	ns
Read Release Time		t _{PWRRB}	5,0	-	0	-	ns
		t _{PWRRB}	10,0	-	0	-	ns
		t _{PWRRB}	15,0	-	0	-	ns
Write Release Time		t _{PWWRB}	5,0	-	0	-	ns
		t _{PWWRB}	10,0	-	0	-	ns
		t _{PWWRB}	15,0	-	0	-	ns
Read Cycle Time		t _{PWRCA}	5,0	-	750,0	-	ns
		t _{PWRCA}	10,0	-	400,0	-	ns
		t _{PWRCA}	15,0	-	300,0	-	ns
Write Cycle Time		t _{PWWCA}	5,0	-	700,0	-	ns
		t _{PWWCA}	10,0	-	550,0	-	ns
		t _{PWWCA}	15,0	-	415,0	-	ns
HIGH or LOW level to output disabled		t _{PHZA} /	5,0	-	600,0	-	ns
		t _{PLZA}	10,0	-	200,0	-	ns
			15,0	-	150,0	-	ns
Output disabled to HIGH to LOW level		t _{PZHA} /	5,0	-	750,0	-	ns
		t _{PZLA}	10,0	-	400,0	-	ns
			15,0	-	300,0	-	ns

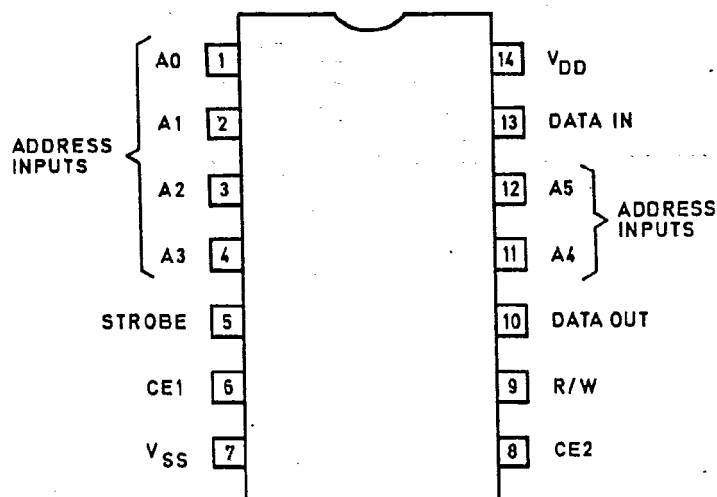


Figure 1

Function table

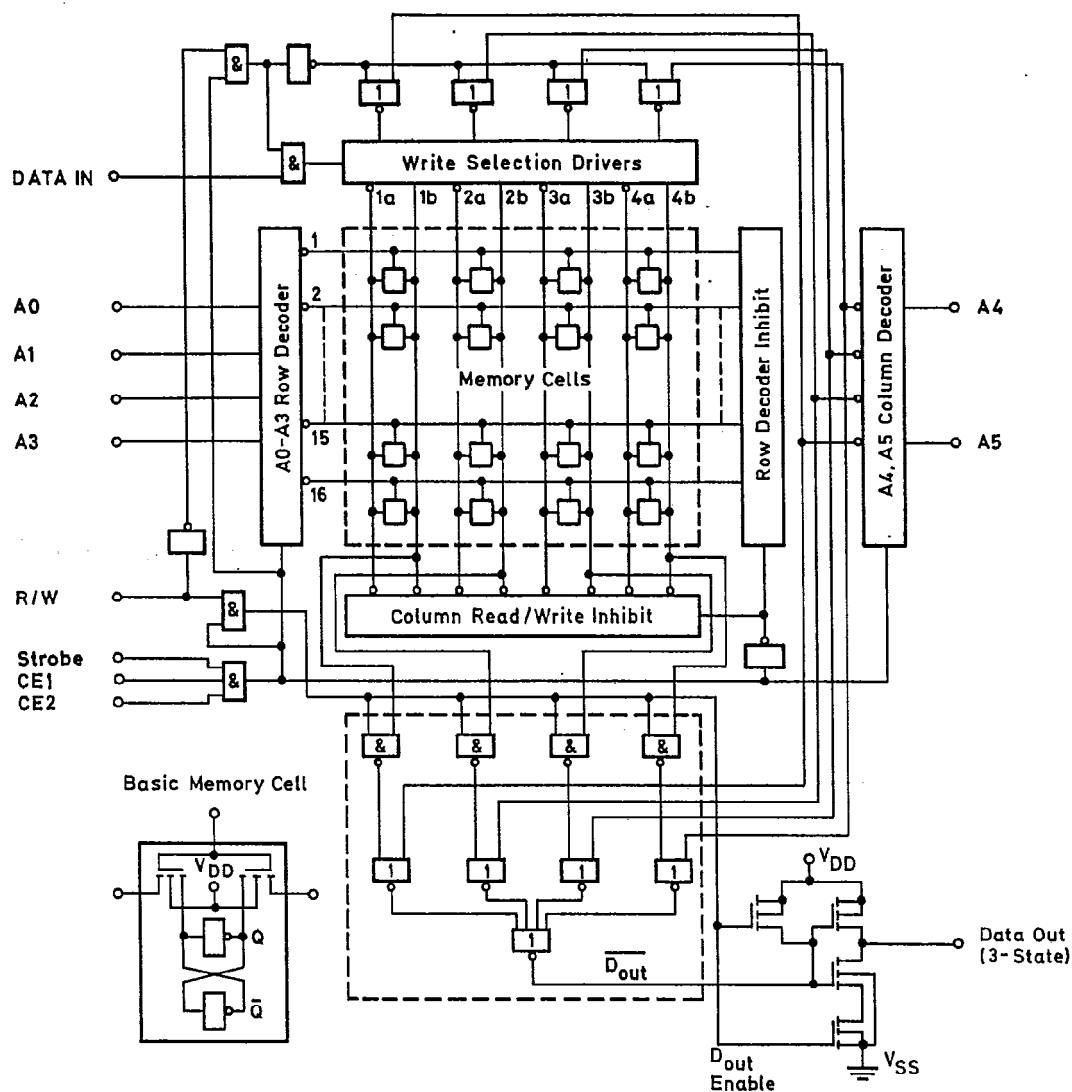
Table 1

STROBE	CE1	CE2	R/W	DATA OUT	ACTION
L	X	X	X	THREE STATE	DISABLED
X	X	X	L	THREE STATE	DISABLED
H	H	H	H	DATA	READ
H	H	H	L	THREE STATE	WRITE

H = HIGH level
L = LOW level
X = Level irrelevant

NOTE: The output is initially disabled in READ mode and always goes to the logic LOW state before data is valid.

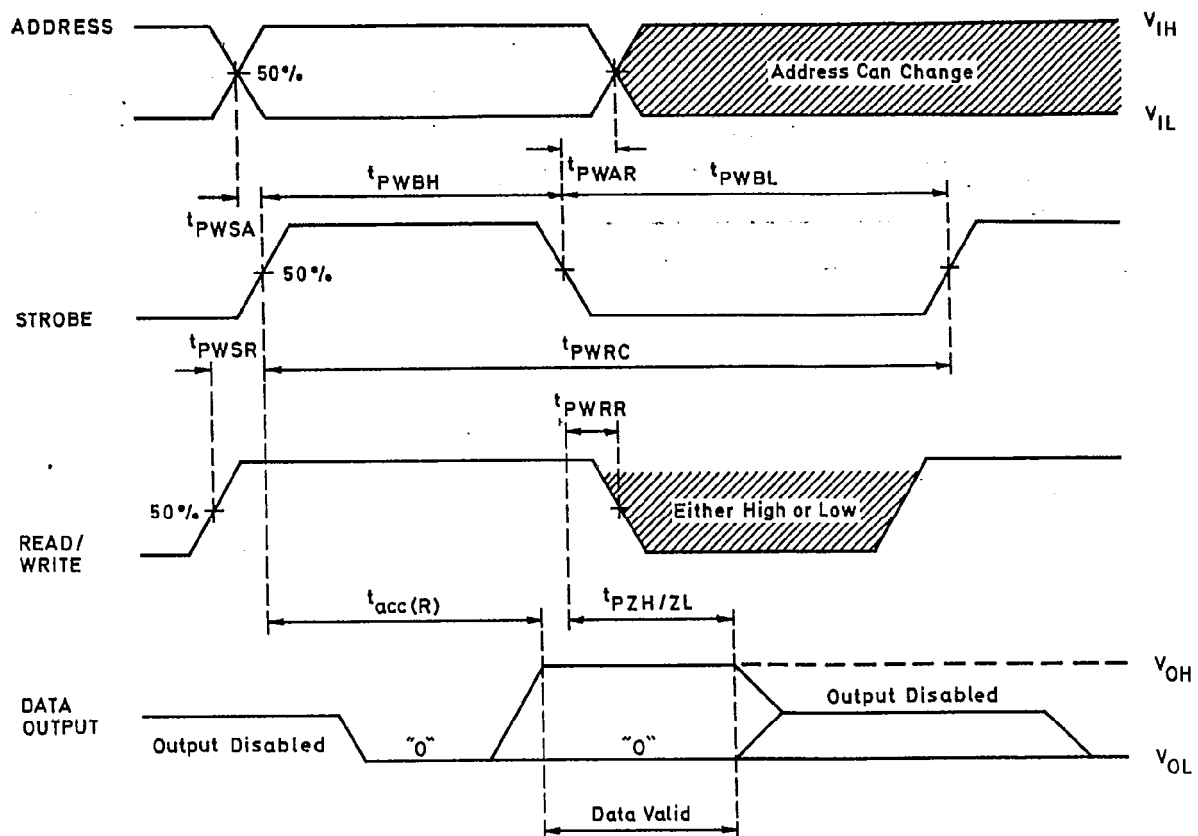
Typical logic diagram



This is a graphic representation, not a circuit diagram

Figure 2

Read cycle



$$t_{PWBHB} = t_{PWRCA} - t_{PWBLC}$$

NOTE: The read/write input can be maintained at a logical HIGH (HIGH voltage) during a read cycle.

Figure 3