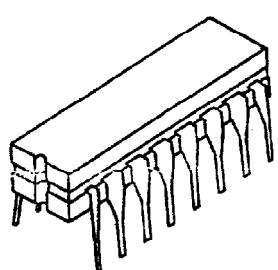


BRITISH STANDARDS INSTITUTION 2, PARK STREET, LONDON, W1A 2BS		BS CECC 90 104 - 209 ISSUE 1 JUNE 1983	
Specification available from:- AS SHOWN IN PD 9002 AND CECC 00 200 AND MOTOROLA LTD KELVIN ESTATE EAST KILBRIDE G75 0TG TEL: (03552) 39101		Page 1 of 30 pages	
ELECTRONIC COMPONENTS OF ASSESSED QUALITY DETAIL SPECIFICATION IN ACCORDANCE WITH: BS CECC 90 000 : 1982 BS CECC 90 100 : 1983		MANUFACTURERS TYPE NUMBER 45100B SEE PD 9002 AND CECC 00 200 For ordering information see page 12	
Outline not to scale: Isometric projection Marking information see page 11 		4 x 4 CROSSPOINT SWITCH WITH CONTROL MEMORY SILICON COMPLEMENTARY MOS. WITH (B) BUFFERED OUTPUTS AND CAVITY PACKAGING.	
For detail dimensions see IEC 191-2 (A50C)		Assessment levels R, 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}	25,0mW
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 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	110	110	1650	μA
		I_{DDA}	10,0	230	230	3450	μA
		I_{DDA}	15,0	340	340	5100	μA
Limited temperature range		I_{DDA}	5,0	165	165	1230	μA
		I_{DDA}	10,0	345	345	2590	μA
		I_{DDA}	15,0	510	510	3825	μA
Switch ON resistance ON conditions at output obtained as Table 1	$V_{IN} = V_{SS} + 1,5V$ $I_{IN} = 10\mu A$ $V_{IN} = 0V$ $V_{IN} = V_{DD} - 1,5V$	$r_{DS(ON)A}$	5,0	48,0	550,0	700,0	Ω
	$V_{IN} = V_{SS} + 2,0V$ $I_{IN} = 10\mu A$ $V_{IN} = 0V$ $V_{IN} = V_{DD} - 2,0V$	$r_{DS(ON)A}$	10,0	170,0	220,0	290,0	Ω
	$V_{IN} = V_{SS} + 2,5V$ $I_{IN} = 10\mu A$ $V_{IN} = 0V$ $V_{IN} = V_{DD} - 2,5V$	$r_{DS(ON)A}$	15,0	140,0	170,0	230,0	Ω
Switch OFF Leakage current, any channel	$V_{IN}, V_{OUT} = V_{DD}$						
Full temperature range		$I_{S(OFF)A} /$ $I_{D(OFF)A}$	15,0	$\pm 100,0$	$\pm 100,0$	$\pm 1000,0$	nA
Limited temperature range		$I_{S(OFF)A} /$ $I_{D(OFF)A}$	15,0	$\pm 300,0$	$\pm 300,0$	$\pm 1000,0$	nA

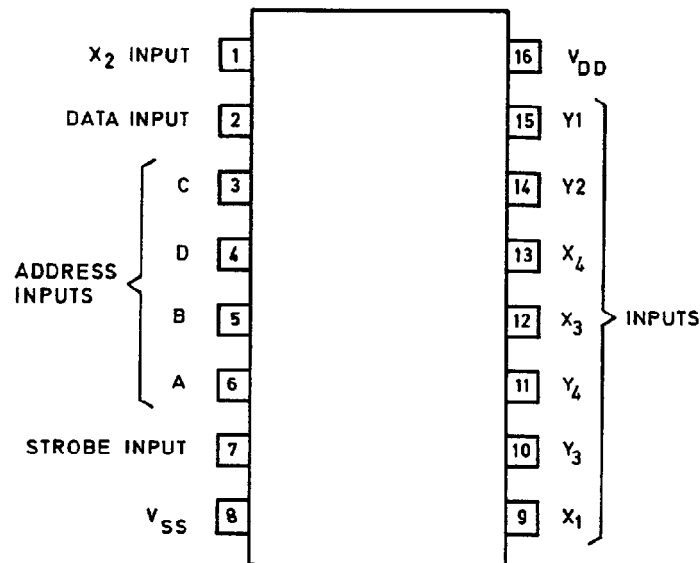
Characteristics	Conditions	Symbol	V _{DD} (V)	T _{amb} LOW	T _{amb} = 25°C	T _{amb} HIGH	Unit
Variation of switch ON resistance. ON conditions at output obtained as Table 1	V _{IN} = V _{SS} +1,5V I _{IN} = 10μA V _{IN} = 0V V _{IN} = V _{DD} -1,5V	Δr _{DS(ON)A}	5,0	200,0	200,0	500,0	Ω
	V _{IN} = V _{SS} +2,0V I _{IN} = 10μA V _{IN} = 0V V _{IN} = V _{DD} -2,0V	Δr _{DS(ON)A}	10,0	100,0	100,0	250,0	Ω
	V _{IN} = V _{SS} +2,5V I _{IN} = 10μA V _{IN} = 0V V _{IN} = V _{DD} -2,5V	Δr _{DS(ON)A}	15,0	100,0	100,0	250,0	Ω
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
Input capacitance per unit load (Any input)	V _I = 0V f = 1MHz	C _{IA}	-	-	7,50	-	pF
Switch terminal ON, leakage current into control circuit	V _{IN} = 3,75V or 11,25V	I _{D(ON)A}	15,0	1,0	1,0	10,0	μA
Low level input voltage	V _O = 4,5V or 0,5V	V _{ILA}	5,0	1,50	1,50	1,50	V
	V _O = 9,0V or 1,0V	V _{ILA}	10,0	3,00	3,00	3,00	V
	V _O = 13,5V or 1,5V	V _{ILA}	15,0	3,75	3,75	3,75	V
High level input voltage	V _O = 0,5V or 4,5V	V _{IHA}	5,0	3,50	3,50	3,50	V
	V _O = 1,0V or 9,0V	V _{IHA}	10,0	7,00	7,00	7,00	V
	V _O = 13,5V or 1,5V	V _{IHA}	15,0	3,75	3,75	3,75	V

Characteristics	Conditions	Symbol	$V_{DD}(V)$	T_{amb} LOW	T_{amb} = 25°C	T_{amb} HIGH	Unit
Propagation and Transition Times	$C_L = 50\text{ pF}$ (Test conditions as in Sub-group A5)						
Propagation delay time, input to output. HIGH to LOW and LOW to HIGH level	$R_L = 10\text{ k}\Omega$ $V_{SS} = 0\text{ V}$	t_{PHLA}/t_{PLHA}	5,0	-	60,0	-	ns
		t_{PHLA}/t_{PLHA}	10,0	-	30,0	-	ns
		t_{PHLA}/t_{PLHA}	15,0	-	20,0	-	ns
Three-state propagation delay times LOW or HIGH level to HIGH impedance							
Strobe to output		t_{PHZA}/t_{PLZA}	5,0	-	1040,0	-	ns
		t_{PHZA}/t_{PLZA}	10,0	-	430,0	-	ns
		t_{PHZA}/t_{PLZA}	15,0	-	280,0	-	ns
Data in to output		t_{PHZA}/t_{PLZA}	5,0	-	1000,0	-	ns
		t_{PHZA}/t_{PLZA}	10,0	-	400,0	-	ns
		t_{PHZA}/t_{PLZA}	15,0	-	240,0	-	ns
Address to outputs		t_{PHZA}/t_{PLZA}	5,0	-	1000,0	-	ns
		t_{PHZA}/t_{PLZA}	10,0	-	360,0	-	ns

Characteristics	Conditions	Symbol	V _{DD} (V)	T _{amb} LOW	T _{amb} = 25°C	T _{amb} HIGH	Unit
Address to outputs (contd)		t _{PHZA} / t _{PLZA}	15,0	-	230,0	-	ns
Three-state propagation delay times HIGH impedance to HIGH or LOW level							
Strobe to output		t _{PZHA} / t _{PZLA}	5,0	-	1100,0	-	ns
		t _{PZHA} / t _{PZLA}	10,0	-	400,0	-	ns
		t _{PZHA} / t _{PZLA}	15,0	-	260,0	-	ns
Data in to input		t _{PZHA} / t _{PZLA}	5,0	-	1000,0	-	ns
		t _{PZHA} / t _{PZLA}	10,0	-	400,0	-	ns
		t _{PZHA} / t _{PZLA}	15,0	-	240,0	-	ns
Address to output		t _{PZHA} / t _{PZLA}	5,0	-	1000,0	-	ns
		t _{PZHA} / t _{PZLA}	10,0	-	360,0	-	ns
		t _{PZHA} / t _{PZLA}	15,0	-	230,0	-	ns
Set-up time		t _{PWSTB}	5,0	-	200,0	-	ns
Data in to Strobe		t _{PWSTB}	10,0	-	80,0	-	ns
		t _{PWSTB}	15,0	-	50,0	-	ns

Characteristics	Conditions	Symbol	V _{DD} (V)	T _{amb} LOW	T _{amb} = 25°C	T _{amb} HIGH	Unit
Address to Strobe		t _{PWSTB}	5,0	-	180,0	-	ns
		t _{PWSTB}	10,0	-	70,0	-	ns
		t _{PWSTB}	15,0	-	40,0	-	ns
Hold time Data in to Strobe Address to Strobe		t _{PWHB}	5,0	-	400,0	-	ns
		t _{PWHB}	10,0	-	200,0	-	ns
		t _{PWHB}	15,0	-	80,0	-	ns
		t _{PWHB}	5,0	-	110,0	-	ns
		t _{PWHB}	10,0	-	45,0	-	ns
		t _{PWHB}	15,0	-	30,0	-	ns
Strobe pulse width		t _{PWB}	5,0	-	300,0	-	ns
		t _{PWB}	10,0	-	100,0	-	ns
		t _{PWB}	15,0	-	80,0	-	ns
Maximum Switching frequency	R _L = 1,0kΩ	Freq B	5,0	-	0,6	-	MHz
		Freq B	10,0	-	1,6	-	MHz
		Freq B	15,0	-	2,5	-	MHz
Crosspoint Switches							
Sinewave distortion	R _L = 10kΩ f = 1,0kHz V _{SS} = -4,0V		10,0	-	0,5	-	%typ
Minimum Bandwidth at -3db	R _L = 1,0kΩ 20 log ₁₀ $\frac{V_{OUT}}{V_{IN}} = -3db$	F _{IB}	10,0	-	15,0	-	MHz
Feedthrough attenuation (Switch off)	R _L = 1,6kHz f = 1,6kHz V _{SS} = -5,0V		10,0	-	-80,0	-	db typ
Cross talk between any two switches (Switch X on, Switch Y off)	R _L = 1,0kΩ, C _L = 50pF 20 log ₁₀ $\frac{V_{OUT(Y)}}{V_{IN(X)}} = -40db$		10,0	-	1,5	-	MHz typ

Terminal identification



Function table

Table 1

(Positive logic)

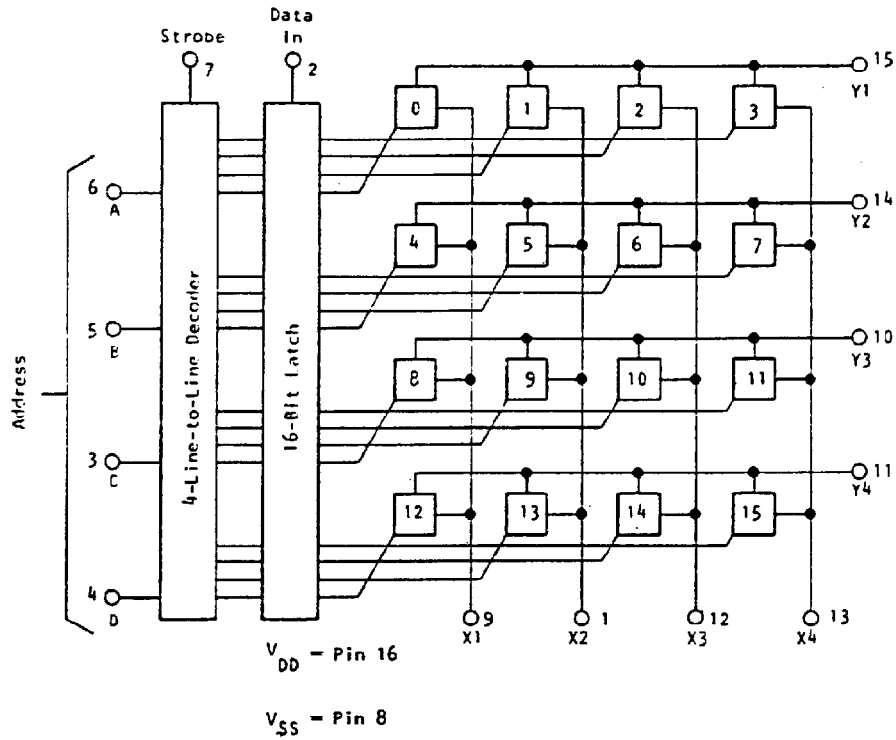
ADDRESS				SWITCH			SWITCHES			ADDRESS				SWITCH			SWITCHES		
A	B	C	D	SELECTED			CLEARED			A	B	C	D	SELECTED			CLEARED		
L	L	L	L	X ₁	Y ₁	0	1	2	3	L	L	L	H	X ₁	Y ₃	8	9	10	11
H	L	L	L	X ₂	Y ₁	1	0	2	3	H	L	L	H	X ₂	Y ₃	9	8	10	11
L	H	L	L	X ₃	Y ₁	2	0	1	3	L	H	L	H	X ₃	Y ₃	10	8	9	11
H	H	L	L	X ₄	Y ₁	3	0	1	2	H	H	L	H	X ₄	Y ₃	11	8	9	10
L	L	H	L	X ₁	Y ₂	4	5	6	7	L	L	H	H	X ₁	Y ₄	12	13	14	15
H	L	H	L	X ₂	Y ₂	5	4	6	7	H	L	H	H	X ₂	Y ₄	13	12	14	15
L	H	H	L	X ₃	Y ₂	6	4	5	7	L	H	H	H	X ₃	Y ₄	14	12	13	15
H	H	H	L	X ₄	Y ₂	7	4	5	6	H	H	H	H	X ₄	Y ₄	15	12	13	14

H = HIGH Level

L = LOW Level

Any of the 16 switches can be selected by applying its address to the device and a pulse to the strobe input. The selected switch will turn ON if, for the duration of the strobe pulse, Data Input was HIGH, and OFF if Data Input was a LOW. In addition all non-selected switches in the same row as the selected switch will be reset, other switches remain unaffected. An Internal power-on-reset disables all switches as power is applied.

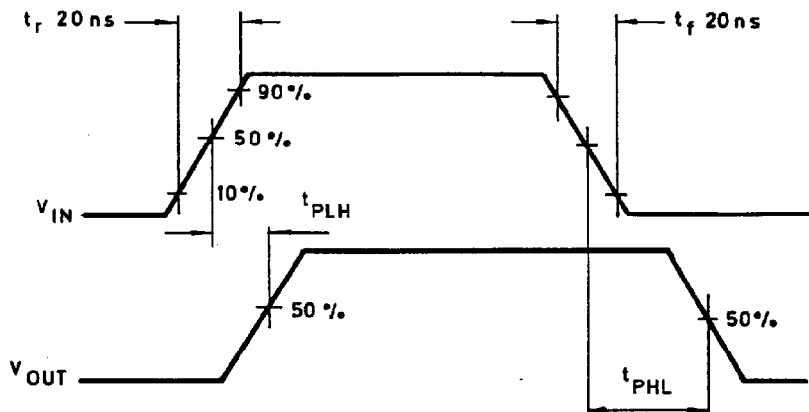
Typical logic diagram



This is a graphic representation, not a circuit diagram

Figure 2

Switching time waveforms



Signal propagation delay time

Figure 3