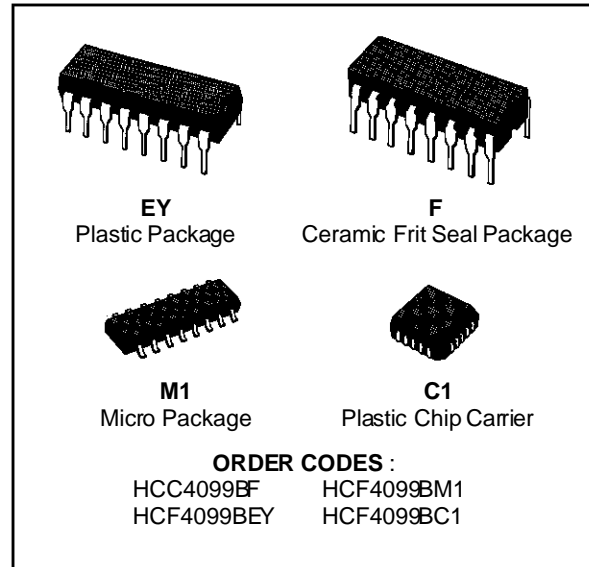# SGS-THOMSON MICROELECTRONICS
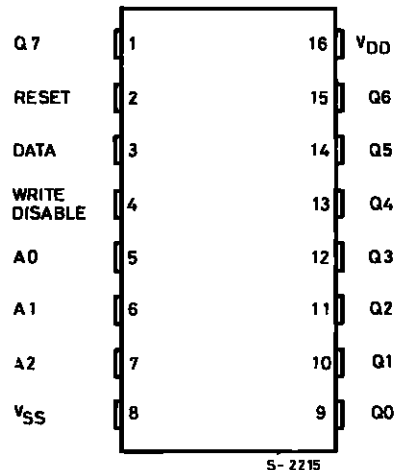
HCC/HCF4099B

8-BIT ADDRESSABLE LATCH

- SERIAL DATA INPUT - ACTIVE PARALLEL OUTPUT
- STORAGE REGISTER CAPABILITY - MASTER CLEAR
- CAN FUNCTION AS DEMULTIPLEXER
- STANDARDIZED SYMMETRICAL OUTPUT CHARACTERISTICS
- QUIESCENT CURRENT SPECIFIED TO 20V FOR HCC DEVICE
- 5V, 10V, AND 15V PARAMETRIC RATINGS
- INPUT CURRENT OF 100nA AT 18V AND 25°C FOR HCC DEVICE
- 100% TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC TENTATIVE STANDARD N°. 13A, "STANDARD SPECIFICATIONS FOR DESCRIPTION OF "B" SERIES CMOS DEVICES"
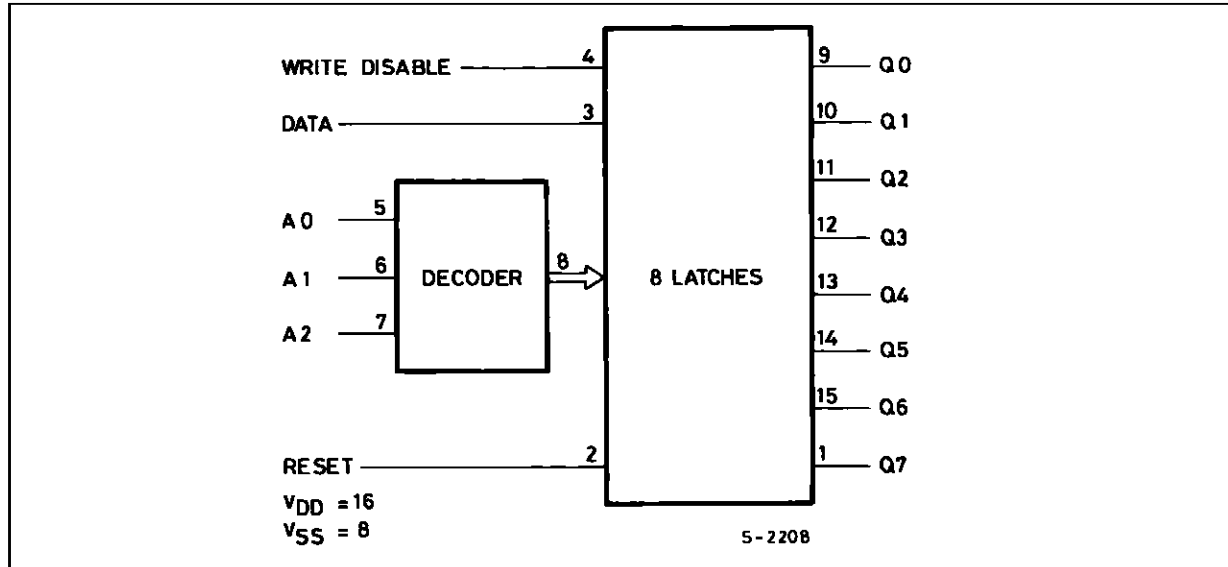
EY
Plastic Package

F
Ceramic Frit Seal Package

M1
Micro Package

C1
Plastic Chip Carrier

ORDER CODES :
HCC4099BF   HCF4099BM1
HCF4099BEY   HCF4099BC1

DESCRIPTION

The **HCC4099B** (extended temperature range) and **HCF4099B** (intermediate temperature range) are monolithic integrated circuits, available in 16-lead dual in-line plastic or ceramic package and plastic micro package. The HCC/HCF4099B 8-bit addressable latch is a serial-input, parallel-output storage register that can perform a variety of functions. Data are inputted to a particular bit in the latch when that bit is addressed (by means of inputs A0, A1, A2) and when WRITE DISABLE is at a low level. When WRITE DISABLE is high, data entry is inhibited ; however, all 8 outputs can be continuously read independent of WRITE DISABLE and address inputs. A master RESET input is available, which resets all bits to a logic "0" level when RESET and WRITE DISABLE are at a high level. When RESET is at a high level, and WRITE DISABLE is at a low level, the latch acts as a 1-of-8 demultiplexer ; the bit that is addressed has an active output which follows the data input, while all unaddressed bits are held to a logic "0" level.

PIN CONNECTIONS

Q7	1	16	VDD
RESET	2	15	Q6
DATA	3	14	Q5
WRITE DISABLE	4	13	Q4
A0	5	12	Q3
A1	6	11	Q2
A2	7	10	Q1
VSS	8	9	Q0

S- 2215

FUNCTIONAL DIAGRAM

ABSOLUTE MAXIMUM RATINGS

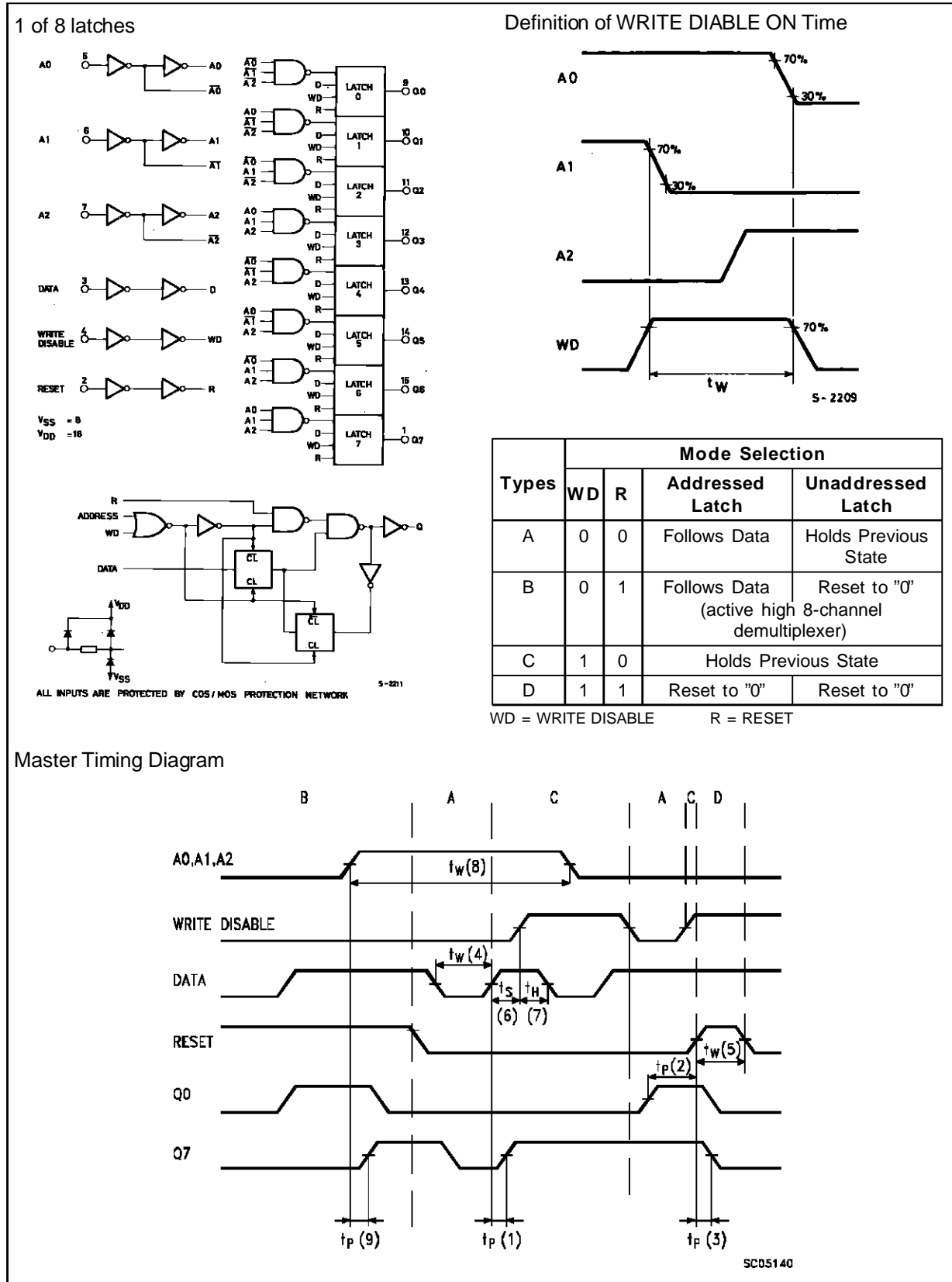| Symbol	Parameter	Value	Unit
V_{DD}*	Supply Voltage : **HCC** Types **HCF** Types	− 0.5 to + 20 − 0.5 to + 18	V V
V_i	Input Voltage	− 0.5 to V_{DD} + 0.5	V
I_I	DC Input Current (any one input)	± 10	mA
P_{tot}	Total Power Dissipation (per package) Dissipation per Output Transistor for T_{op} = Full Package-temperature Range	200 100	mW mW
T_{op}	Operating Temperature : **HCC** Types **HCF** Types	− 55 to + 125 − 40 to + 85	°C °C
T_{stg}	Storage Temperature	− 65 to + 150	°C

Stresses above listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for external periods may affect device reliability.
* All voltage values are referred to V_{SS} pin voltage.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage : **HCC** Types **HCF** Types	3 to 18 3 to 15	V V
V_I	Input Voltage	0 to V_{DD}	V
T_{op}	Operating Temperature : **HCC** Types **HCF** Types	− 55 to + 125 − 40 to + 85	°C °C

LOGIC DIAGRAM

1 of 8 latches

Definition of WRITE DIABLE ON Time

S-2209

ALL INPUTS ARE PROTECTED BY COS/MOS PROTECTION NETWORK

S-2211

Types	Mode Selection			
	WD	R	Addressed Latch	Unaddressed Latch
A	0	0	Follows Data	Holds Previous State
B	0	1	Follows Data (active high 8-channel demultiplexer)	Reset to "0"
C	1	0	Holds Previous State	
D	1	1	Reset to "0"	Reset to "0"

WD = WRITE DISABLE   R = RESET

Master Timing Diagram

SC05140

SGS-THOMSON
MICROELECTRONICS

STATIC ELECTRICAL CHARACTERISTICS (over recommended operating conditions)

Symbol	Parameter		V_I (V)	V_O (V)	$|I_O|$ (µA)	V_{DD} (V)	T_{Low}* Min.	T_{Low}* Max.	25°C Min.	25°C Typ.	25°C Max.	T_{High}* Min.	T_{High}* Max.	Unit
I_L	Quiescent Current	HCC Types	0/ 5			5		5		0.04	5		150	µA
			0/10			10		10		0.04	10		300	
			0/15			15		20		0.04	20		600	
			0/20			20		100		0.08	100		3000	
		HCF Types	0/ 5			5		20		0.04	20		150	
			0/10			10		40		0.04	40		300	
			0/15			15		80		0.04	80		600	
V_{OH}	Output High Voltage		0/ 5		< 1	5	4.95		4.95			4.95		V
			0/10		< 1	10	9.95		9.95			9.95		
			0/15		< 1	15	14.95		14.95			14.95		
V_{OL}	Output Low Voltage		5/0		< 1	5		0.05			0.05		0.05	V
			10/0		< 1	10		0.05			0.05		0.05	
			15/0		< 1	15		0.05			0.05		0.05	
V_{IH}	Input High Voltage			0.5/4.5	< 1	5	3.5		3.5			3.5		V
				1/9	< 1	10	7		7			7		
				1.5/13.5	< 1	15	11		11			11		
V_{IL}	Input Low Voltage			4.5/0.5	< 1	5		1.5			1.5		1.5	V
				9/1	< 1	10		3			3		3	
				13.5/1.5	< 1	15		4			4		4	
I_{OH}	Output Drive Current		0/ 5	2.5		5	− 2		− 1.6	− 3.2		− 1.15		mA
		HCC Types	0/ 5	4.6		5	− 0.64		− 0.51	− 1		− 0.36		
			0/10	9.5		10	− 1.6		− 1.3	− 2.6		− 0.9		
			0/15	13.5		15	− 4.2		− 3.4	− 6.8		− 2.4		
		HCF Types	0/ 5	2.5		5	− 1.53		− 1.36	− 3.2		− 1.1		
			0/ 5	4.6		5	− 0.52		− 0.44	− 1		− 0.36		
			0/10	9.5		10	− 1.3		− 1.1	− 2.6		− 0.9		
			0/15	13.5		15	− 3.6		− 3.0	− 6.8		− 2.4		
I_{OL}	Output Sink Current	HCC Types	0/ 5	0.4		5	0.64		0.51	1		0.36		mA
			0/10	0.5		10	1.6		1.3	2.6		0.9		
			0/15	1.5		15	4.2		3.4	6.8		2.4		
		HCF Types	0/ 5	0.4		5	0.52		0.44	1		0.36		
			0/10	0.5		10	1.3		1.1	2.6		0.9		
			0/15	1.5		15	3.6		3.0	6.8		2.4		
I_{IH}, I_{IL}	Input Leakage Current	HCC Types	0/18	Any Input		18		± 0.1		$\pm10^{-5}$	± 0.1		± 1	µA
		HCF Types	0/15	Any Input		15		± 0.3		$\pm10^{-5}$	± 0.3		± 1	
C_I	Input Capacitance			Any Input						5	7.5			pF

* T_{LOW} = − 55°C for HCC device : − 40°C for HCF device.
* T_{HIGH} = + 125°C for HCC device : + 85°C for HCF device.
The Noise Margin for both "1" and "0" level is : 1V min. with V_{DD} = 5V, 2V min. with V_{DD} = 10V, 2.5V min. with V_{DD} = 15V,

DYNAMIC ELECTRICAL CHARACTERISTICS $(T_{amb} = 25°C, C_L = 50pF, R_L = 200k\Omega,$
typical temperature coefficient for all V_{DD} values is 0.3%/°C, all input rise and fall times = 20ns)

Symbol	Parameter		Test Conditions (see master timing diagram)	V_{DD} (V)	Value			Unit
					Min.	Typ.	Max.	
t_{PLH}, t_{PHL}	Propagation Delay Time	Data to Output	(1)	5		200	400	ns
				10		75	150	
				15		50	100	
		Write Disable to Output	(2)	5		200	400	
				10		80	160	
				15		60	120	
		Address to Output	(9)	5		225	450	
				10		100	200	
				15		75	150	
t_{PHL}	Propagation Delay Time	Reset to Output	(3)	5		175	350	
				10		80	160	
				15		65	130	
t_{THL}, t_{TLH}	Transition Time	Any Output		5		100	200	ns
				10		50	100	
				15		40	80	
t_W	Pulse Width	Data	(4)	5	200	100		ns
				10	100	50		
				15	80	40		
		Address	(8)	5	400	200		ns
				10	200	100		
				15	125	65		
		Reset	(5)	5	150	75		
				10	75	40		
				15	50	25		
t_{setup}	Setup Time	Data to Write Disable	(6)	5	100	50		ns
				10	50	25		
				15	35	20		
t_{hold}	Hold Time	Data to Write Disable	(7)	5	150	75		ns
				10	75	40		
				15	50	25		

SGS-THOMSON
MICROELECTRONICS

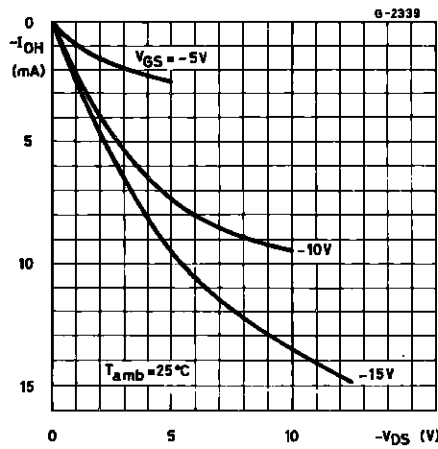Typical Output Low (sink) Current Characteristics.
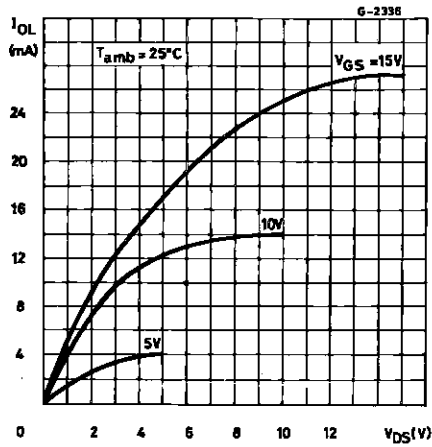
Minimum Output Low (sink) Current Characteristics.
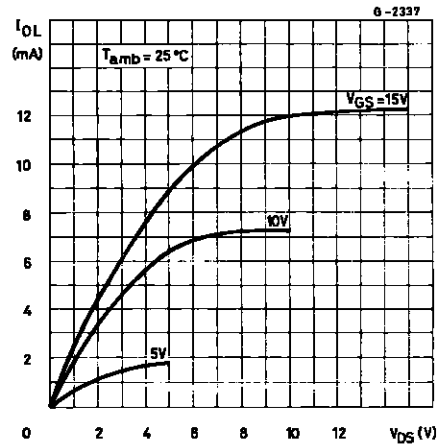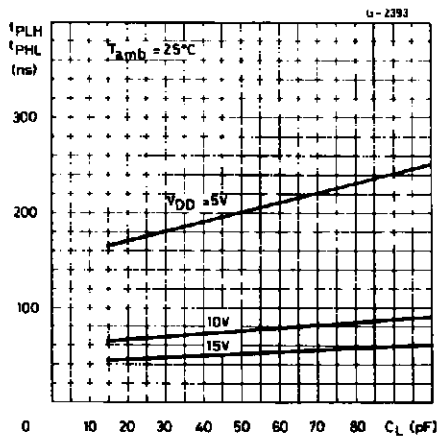

Typical Output High (source) Current Characteristics.
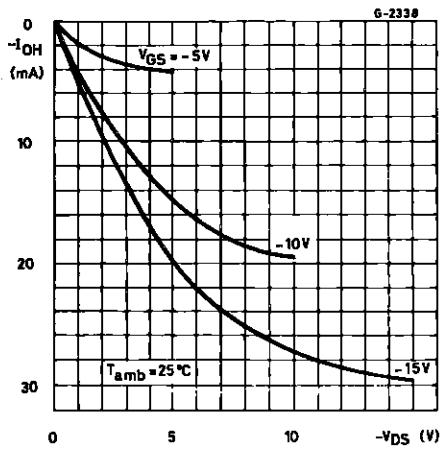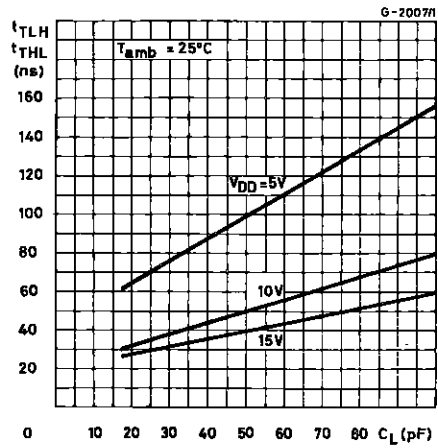

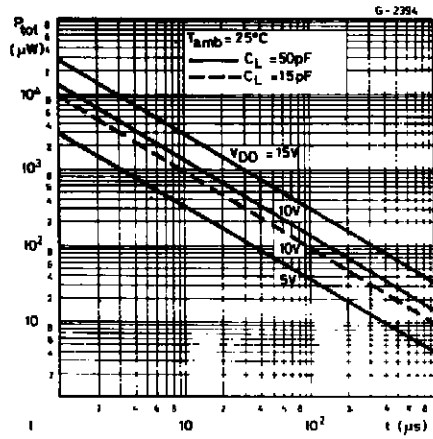Minimum Output High (source) Current Characteristics.

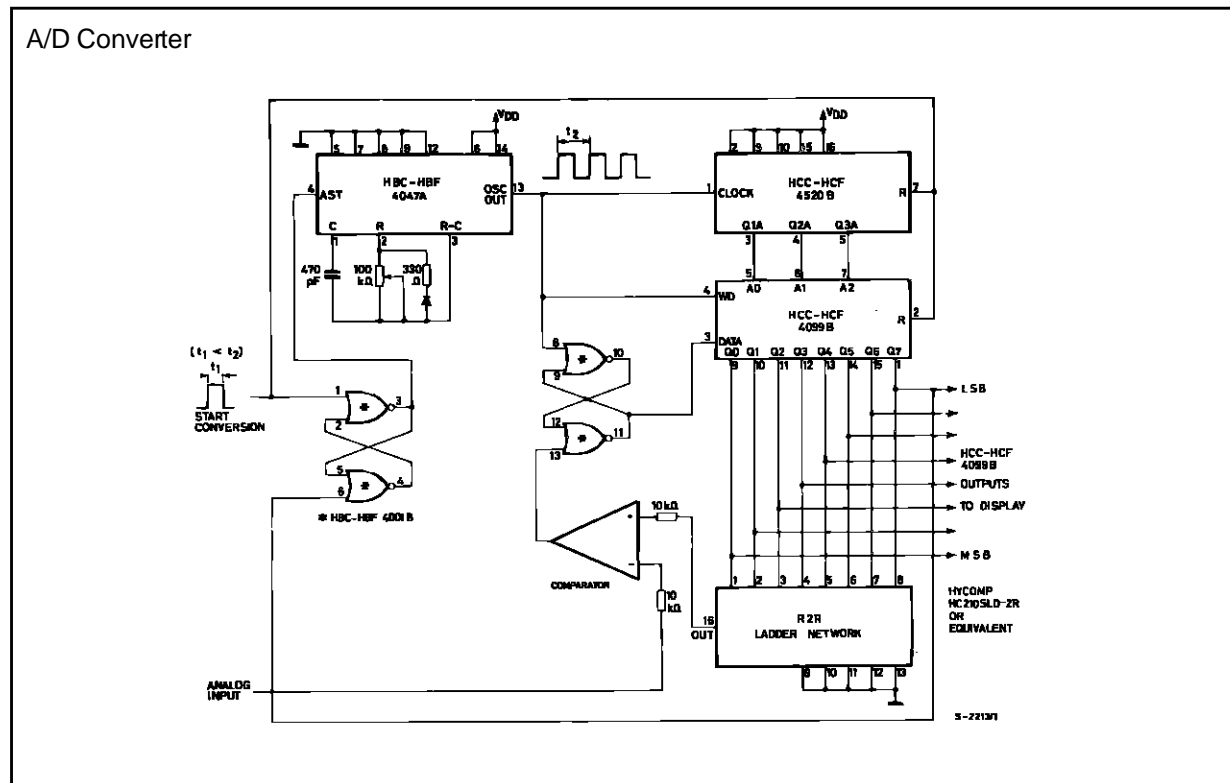Typical Propagation Delay Time (data to Qn) vs. Load Capacitance.

Typical Transition Time vs. Load Capacitance.

SGS-THOMSON
MICROELECTRONICS

Typical Dynamic power Dissipation vs. Address
Cycle Time.

TYPICAL APPLICATIONS

A/D Converter

SGS-THOMSON
MICROELECTRONICS

TYPICAL APPLICATIONS

Multiple Selection Decoding – 4x4 Crosspoint Switch
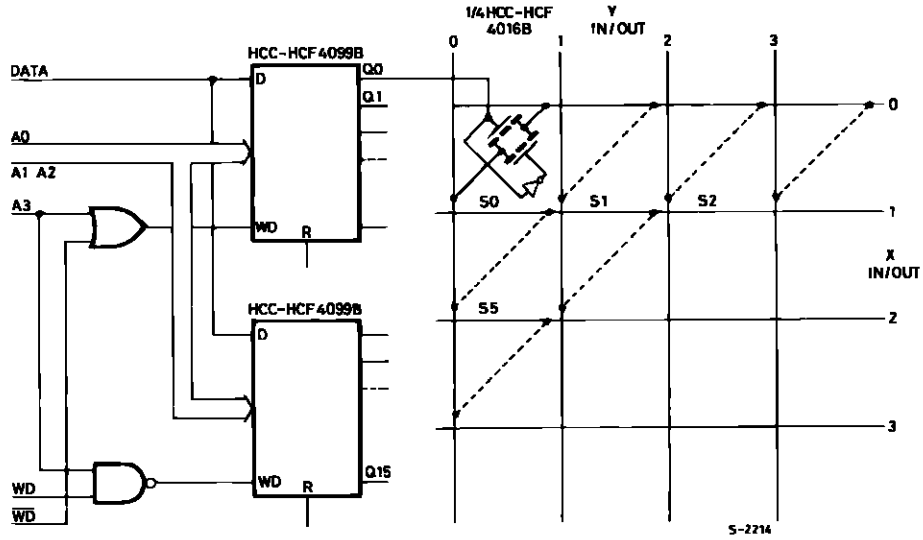
1 of 16 Decoder/demultiplexer

SGS-THOMSON
MICROELECTRONICS
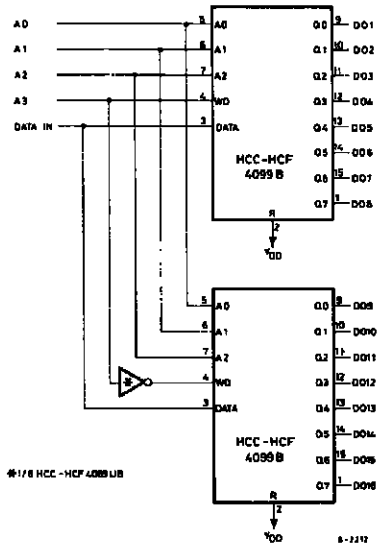
TEST CIRCUITS

Quiescent Device Current.

S-1992/1

Input Voltage.

NOTE :
TEST ANY COMBINATION
OF INPUTS

S-2079/1

Input Current.

NOTE: MEASURE INPUTS
SEQUENTIALLY TO BOTH
V_{DD} AND V_{SS}. CONNECT
ALL UNUSED INPUTS TO
EITHER V_{DD} OR V_{SS}

S-1994/2

SGS-THOMSON
MICROELECTRONICS
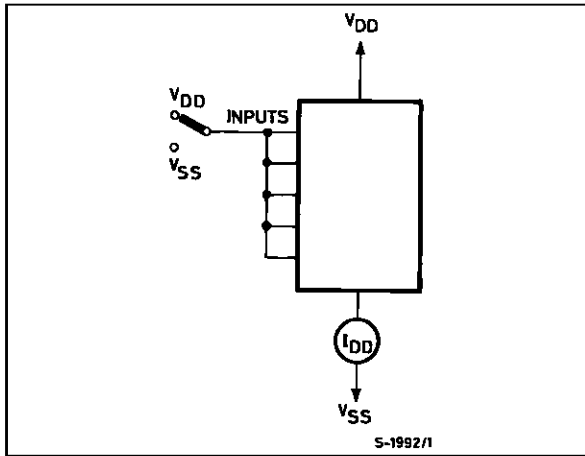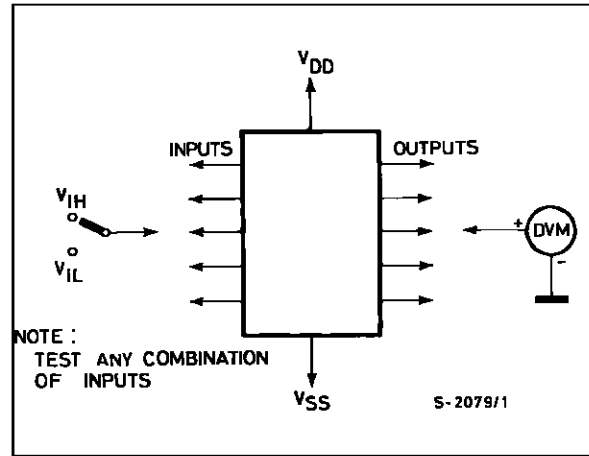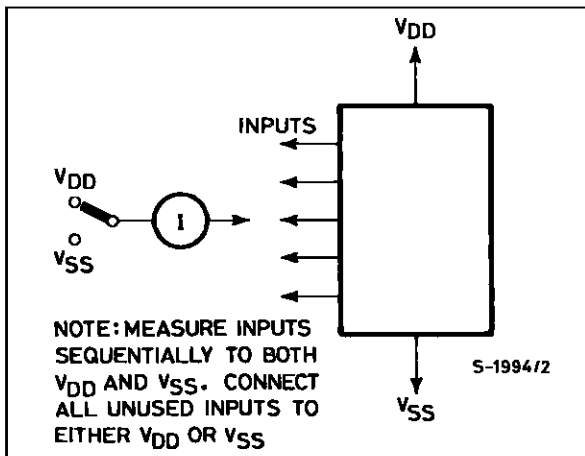
Plastic DIP16 (0.25) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050
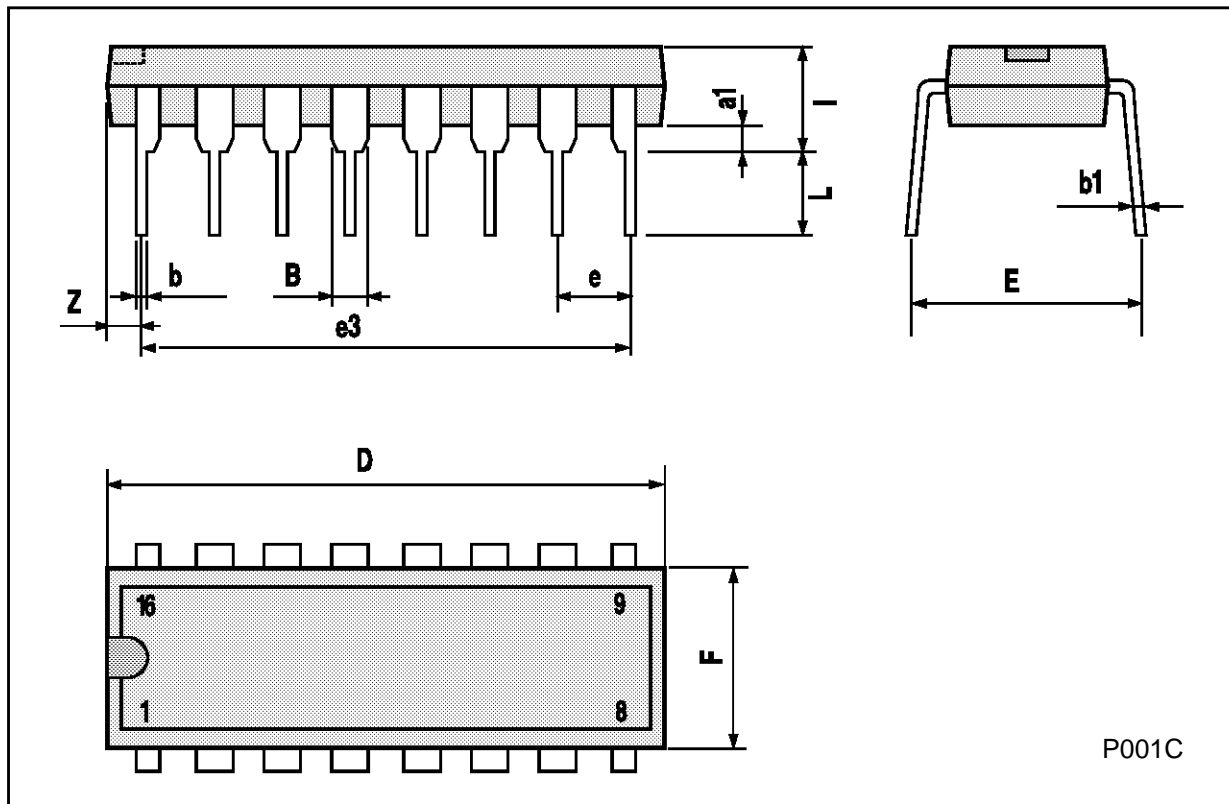
P001C

Ceramic DIP16/1 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			20			0.787
B			7			0.276
D		3.3			0.130	
E	0.38			0.015		
e3		17.78			0.700	
F	2.29		2.79	0.090		0.110
G	0.4		0.55	0.016		0.022
H	1.17		1.52	0.046		0.060
L	0.22		0.31	0.009		0.012
M	0.51		1.27	0.020		0.050
N			10.3			0.406
P	7.8		8.05	0.307		0.317
Q			5.08			0.200

P053D

SGS-THOMSON MICROELECTRONICS
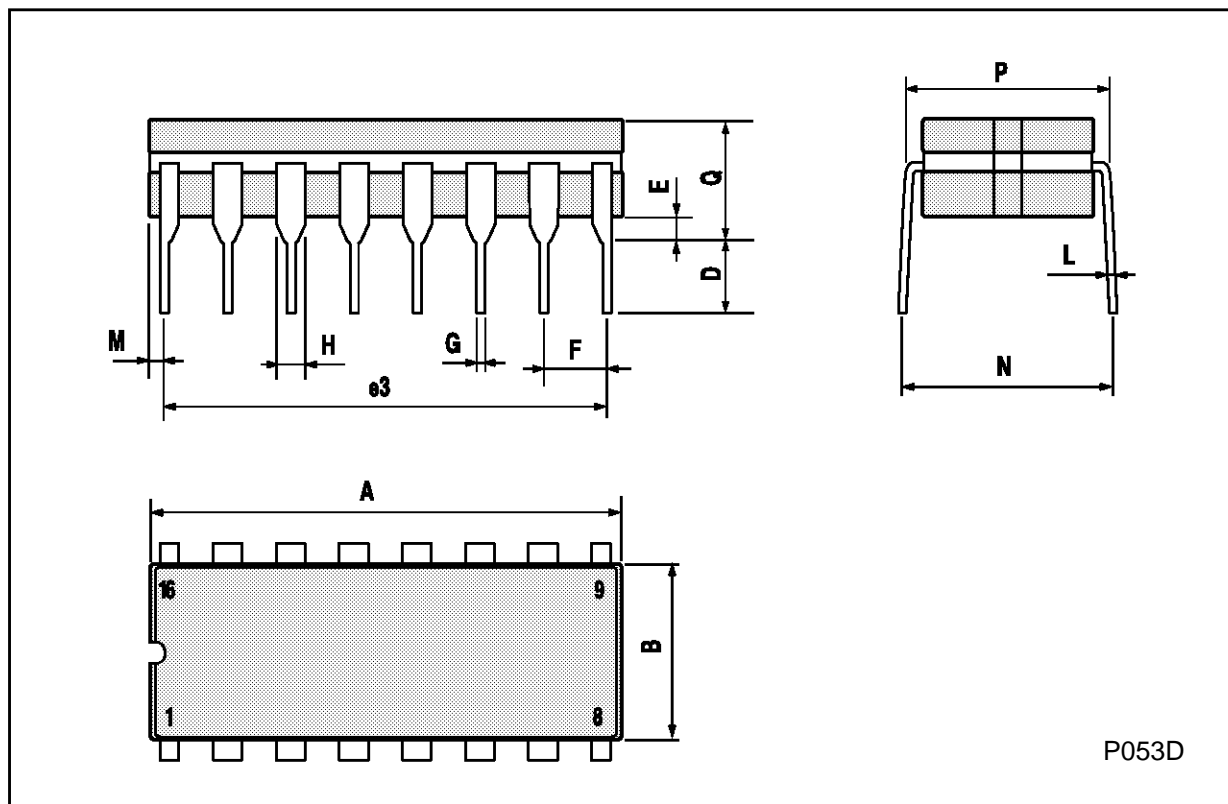
SO16 (Narrow) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.004		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.62			0.024
S	8° (max.)					

P013H

SGS-THOMSON
MICROELECTRONICS
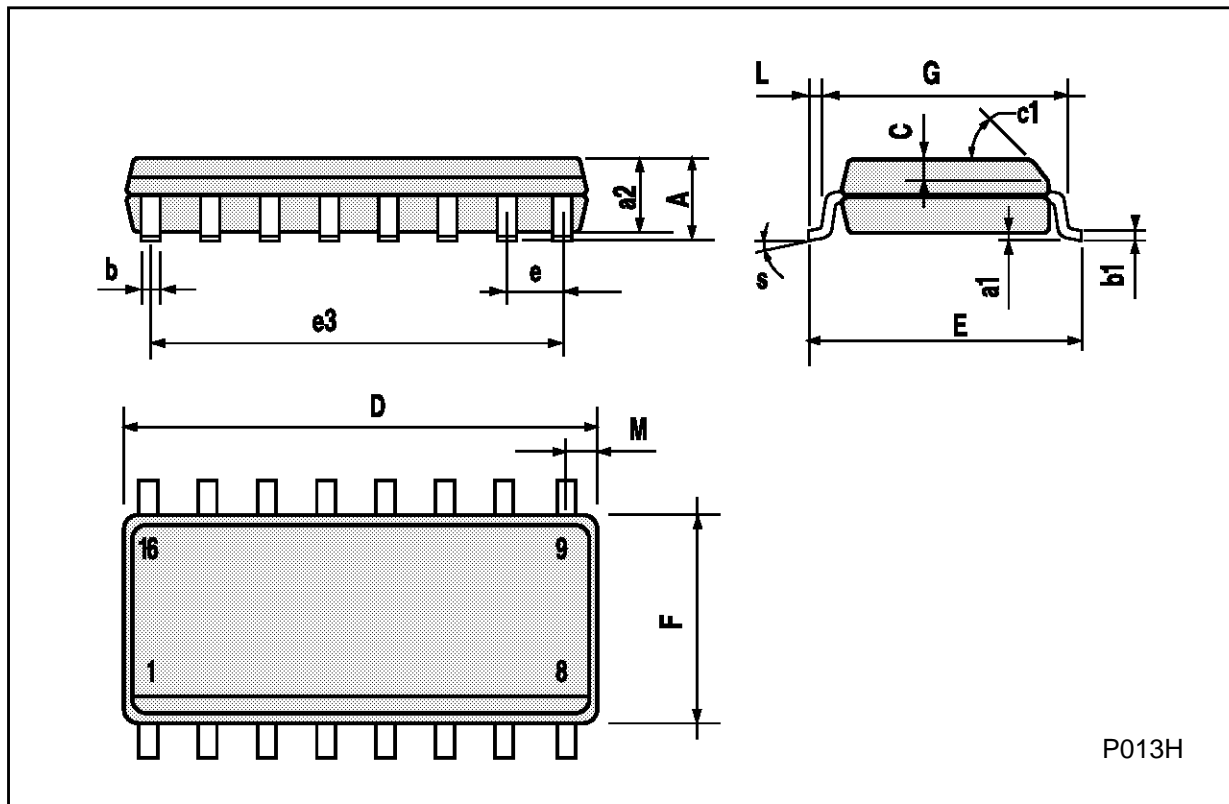
PLCC20 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	9.78		10.03	0.385		0.395
B	8.89		9.04	0.350		0.356
D	4.2		4.57	0.165		0.180
d1		2.54			0.100	
d2		0.56			0.022	
E	7.37		8.38	0.290		0.330
e		1.27			0.050	
e3		5.08			0.200	
F		0.38			0.015	
G			0.101			0.004
M		1.27			0.050	
M1		1.14			0.045	

P027A

SGS-THOMSON MICROELECTRONICS

SGS-THOMSON
MICROELECTRONICS