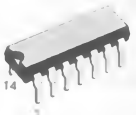
SGS-THOMSON MICROELECTRONICS

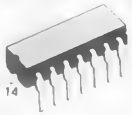
M54/74HC125
M54/74HC126

QUAD BUS BUFFERS (3-STATE)

- HIGH SPEED
  t_{PD} = 10 ns (TYP.) at V_{CC} = 5V
- LOW POWER DISSIPATION
  I_{CC} = 4 μA (MAX.) at T_A = 25°C
- HIGH NOISE IMMUNITY
  V_{NIH} = V_{NIL} = 28% V_{CC} (MIN.)
- OUTPUT DRIVE CAPABILITY
  15 LSTTL LOADS
- SYMMETRICAL OUTPUT IMPEDANCE
  $|I_{OH}|$ = I_{OL} = 6 mA (MIN.)
- BALANCED PROPAGATION DELAYS
  t_{PLH} = t_{PHL}
- WIDE OPERATING VOLTAGE RANGE
  V_{CC} (OPR) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE
  WITH 54/74LS125/126



B1N
Plastic Package



F1
Ceramic Frit Seal Package

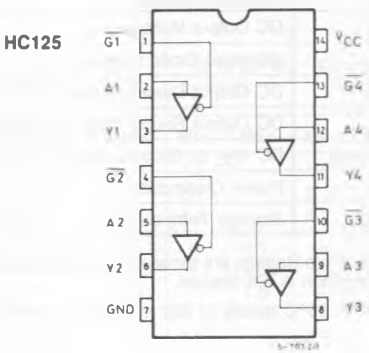
M1
Micro Package

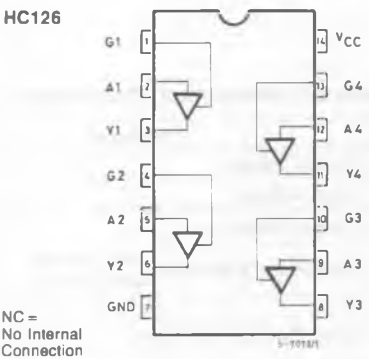
C1
Plastic Chip Carrier

ORDERING NUMBERS:

M54HCXXX F1	M74HCXXX C1
M74HCXXX B1N	M74HCXXX M1
M74HCXXX F1	

PIN CONNECTIONS (top view)





NC = No Internal Connection

DESCRIPTION

The M54/74HC125 and the M54/74HC126 are high speed CMOS QUAD BUS BUFFERS (3-STATE) fabricated in silicon gate C²MOS technology.
They have the same high speed performance of LSTTL combined with true CMOS low power consumption.
These devices require the 3-STATE control input G to be taken high to make the output go into the high impedance state.
All inputs are equipped with protection circuits against static discharge and transient excess voltage.

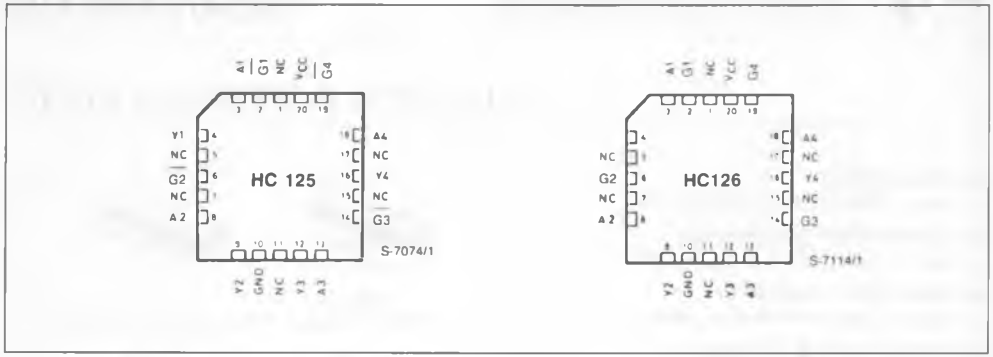
TRUTH TABLES

HC 125		
INPUTS		OUTPUT
A	$\overline{G}$	Y
X	H	Z
L	L	L
H	L	H

HC126		
INPUTS		OUTPUT
A	G	Y
X	L	Z
L	H	L
H	H	H

X: DON'T CARE Z: HIGH IMPEDANCE

CHIP CARRIER



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	− 0.5 to 7	V
V_I	DC Input Voltage	− 0.5 to V_{CC} + 0.5	V
V_O	DC Output Voltage	− 0.5 to V_{CC} + 0.5	V
I_{IK}	DC Input Diode Current	± 20	mA
I_{OK}	DC Output Diode Current	± 20	mA
I_O	DC Output Source Sink Current Per Output Pin	± 35	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 70	mA
P_D	Power Dissipation	500 (*)	mW
T_{stg}	Storage Temperature	− 65 to 150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

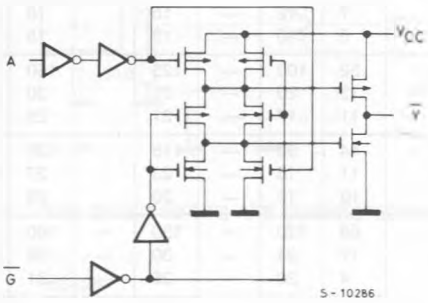
(*) 500 mW: ≅ 65°C derate to 300 mW by 10 mW/°C: 65°C to 85°C.

RECOMMENDED OPERATING CONDITIONS

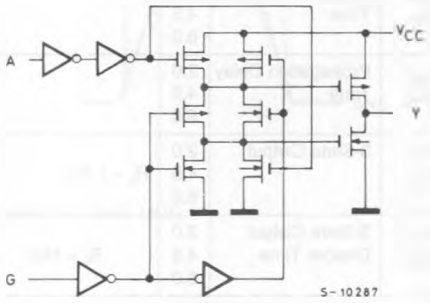
Symbol	Parameter	Value		Unit
V_{CC}	Supply Voltage	2 to 6		V
V_I	Input Voltage	0 to V_{CC}		V
V_O	Output Voltage	0 to V_{CC}		V
T_A	Operating Temperature 74HC Series 54HC Series	− 40 to 85 − 55 to 125		°C
t_r, t_f	Input Rise and Fall Time	V_{CC} 2 V	0 to 1000	ns
		V_{CC} 4.5V	0 to 500	
		V_{CC} 6 V	0 to 400	

CIRCUIT DIAGRAM

HC125



HC126



DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	V_{CC}	Test Condition		$T_A = 25°C$ 54HC and 74HC			−40 to 85°C 74HC		−55 to 125°C 54HC		Unit
					Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
V_{IH}	High Level Input Voltage	2.0			1.5	—	—	1.5	—	1.5	—	V
		4.5			3.15	—	—	3.15	—	3.15	—	
		6.0			4.2	—	—	4.2	—	4.2	—	
V_{IL}	Low Level Input Voltage	2.0			—	—	0.5	—	0.5	—	0.5	V
		4.5			—	—	1.35	—	1.35	—	1.35	
		6.0			—	—	1.8	—	1.8	—	1.8	
V_{OH}	High Level Output Voltage	2.0	V_I	I_O	1.9	2.0	—	1.9	—	1.9	—	V
		4.5	V_{IH} or V_{IL}	−20 μA	4.4	4.5	—	4.4	—	4.4	—	
		6.0			5.9	6.0	—	5.9	—	5.9	—	
		4.5		−6.0 mA	4.18	4.31	—	4.13	—	4.10	—	
		6.0		−7.8 mA	5.68	5.8	—	5.63	—	5.60	—	
V_{OL}	Low Level Output Voltage	2.0	V_{IH} or V_{IL}	20 μA	—	0.0	0.1	—	0.1	—	0.1	V
		4.5			—	0.0	0.1	—	0.1	—	0.1	
		6.0			—	0.0	0.1	—	0.1	—	0.1	
		4.5		6.0 mA	—	0.17	0.26	—	0.33	—	0.40	
		6.0		7.8 mA	—	0.18	0.26	—	0.33	—	0.40	
I_I	Input Leakage Current	6.0	$V_I = V_{CC}$ or GND		—	—	±0.1	—	±1.0	—	±1.0	μA
I_{OZ}	3-State Output Off-State Current	6.0	$V_I = V_{IH}$ or V_{IL} $V_O = V_{CC}$ or GND		—	—	±0.5	—	±5.0	—	±10	μA
I_{CC}	Quiescent Supply Current	6.0	$V_I = V_{CC}$ or GND		—	—	4	—	40	—	80	μA

AC ELECTRICAL CHARACTERISTICS ($C_L = 50pF$, Input $t_r = t_f = 6ns$)

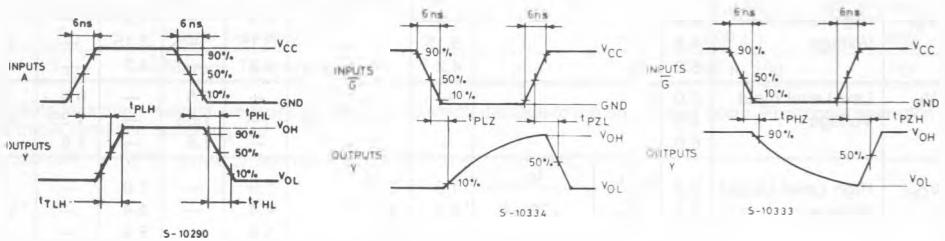
Symbol	Parameter	V_{CC}	Test Condition	T_A = 25°C 54HC and 74HC			−40 to 85°C 74HC		−55 to 125°C 54HC		Unit
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
t_{TLH} t_{THL}	Output Transition Time	2.0		—	25	60	—	75		90	ns
		4.5		—	7	12	—	15		18	
		6.0		—	6	10	—	13		15	
t_{PLH} t_{PHL}	Propagation Delay Time	2.0		—	52	100	—	125		150	ns
		4.5		—	13	20	—	25		30	
		6.0		—	11	17	—	21		26	
t_{PLH} t_{PHL}	3-State Output	2.0		—	44	90	—	115		135	ns
		4.5	$R_L = 1\ K\Omega$	—	11	18	—	23		27	
		6.0		—	19	15	—	20		23	
t_{PLZ} t_{PHZ}	3-State Output Disable Time	2.0		—	68	120	—	150	—	180	pF
		4.5	$R_L = 1K\Omega$	—	17	24	—	30	—	36	
		6.0		—	4	20	—	26	—	31	
C_{IN}	Input Capacitance			—	5	10	—	10			pF
C_{PD} (*)	Power Dissipation Capacitance			—	34	—	—	—			pF

Note (*) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load.

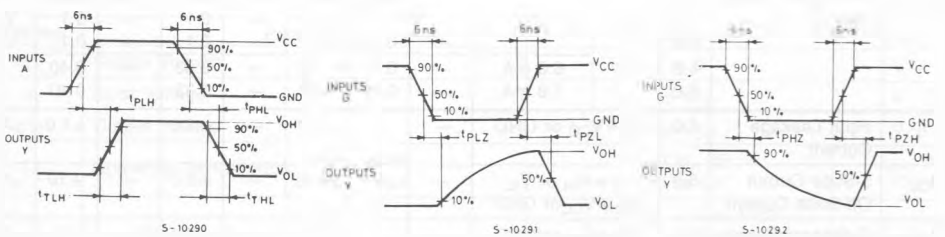
Average operating current can be obtained by the following equation.
$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/4$ (per Circuit)

SWITCHING CHARACTERISTICS TEST WAVEFORM

HC125

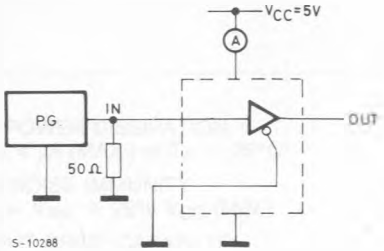


HC126

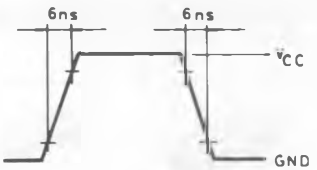


TEST CIRCUIT I_{CC} (Opr.)

HC125

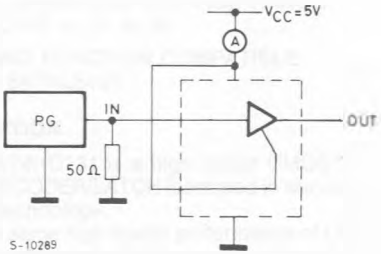


INPUT WAVEFORM

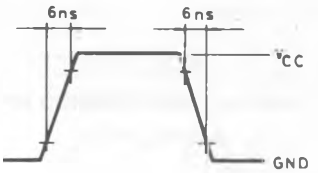


THE OTHER INPUTS ARE CONNECTED TO V_{CC} LINE OR GND LINE.

HC126



INPUT WAVEFORM



THE OTHER INPUTS ARE CONNECTED TO V_{CC} LINE OR GND LINE.