SGS-THOMSON MICROELECTRONICS

M54/M74HC257
M54/M74HC258

HC257 QUAD 2 CHANNEL MULTIPLEXER (3-STATE)
HC258 QUAD 2 CHANNEL MULTIPLEXER (3-STATE, INVERTING)

- HIGH SPEED
  t_{PD} = 10 ns (TYP.) at V_{CC} = 5 V
- 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
  $|IOH|$ = I_{OL} = 6 mA (MIN.)
- BALANCED PROPAGATION DELAYS
  t_{PLH} = t_{PHL}
- WIDE OPERATING VOLTAGE RANGE
  V_{CC} (OPR) = 2 V to 6 V
- PIN AND FUNCTION COMPATIBLE
  WITH 54/74LS257/258

B1R
(Plastic Package)

F1R
(Ceramic Package)

M1R
(Micro Package)

C1R
(Chip Carrier)

ORDER CODES :

| M54HCXXXF1R	M74HCXXXM1R
M74HCXXXB1R	M74HCXXXC1R
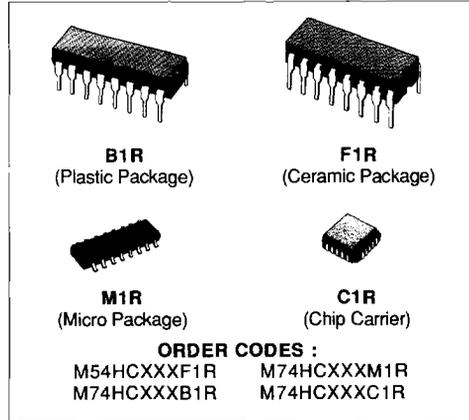
DESCRIPTION

The M54/74HC257 and the M54/74HC258 are high speed CMOS MULTIPLEXERs fabricated with silicon gate C²MOS technology.

They have the same high speed performance of LSTTL combined with true CMOS low power consumption.

These IC's are composed of an independent 2-channel multiplexer with common SELECT and ENABLE INPUT.

The M54/74HC258 is an inverting multiplexer while the M54/74HC257 is a non-inverting multiplexer. When the ENABLE INPUT is held "High", outputs of both IC's become high-impedance state. If SELECT INPUT is held "Low", "A" data is selected, when SELECT INPUT is high "H", "B" data is chosen.

All inputs are equipped with protection circuits against static discharge and transient excess voltage.

PIN CONNECTIONS (top view)

HC257

HC258
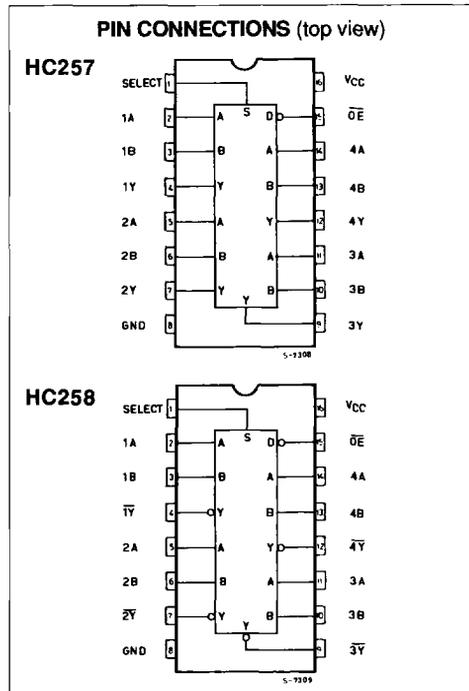
INPUT AND OUTPUT EQUIVALENT CIRCUIT

SC05850

CHIP CARRIER

HC257

HC258

NC = No Internal Connection
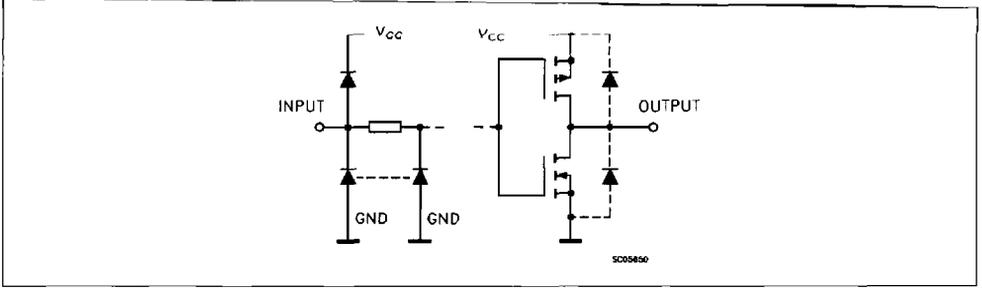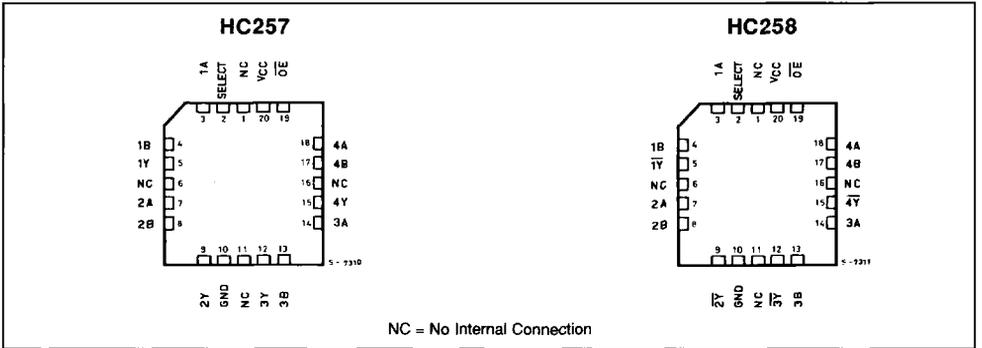
PIN DESCRIPTION (HC257)

PIN No	SYMBOL	NAME AND FUNCTION
1	SELECT	Common Data Select Input
2, 5, 14, 11	1A to 4A	Data Input From Source A
3, 6, 13, 10	1B to 4B	Data Inputs from Source B
4, 7, 12, 9	1Y to 4Y	3 State Multiplexer Outputs
15	$\overline{OE}$	3 State Output Enable Inputs (Active LOW)
8	GND	Ground (0V)
16	V_{CC}	Positive Supply Voltage

PIN DESCRIPTION (HC258)

PIN No	SYMBOL	NAME AND FUNCTION
1	SELECT	Common Data Select Input
2, 5, 14, 11	1A to 4A	Data Input From Source A
3, 6, 13, 10	1B to 4B	Data Inputs from Source B
4, 7, 12, 9	$\overline{1Y}$ to $\overline{4Y}$	3 State Multiplexer Outputs
15	$\overline{OE}$	3 State Output Enable Inputs (Active LOW)
8	GND	Ground (0V)
16	V_{CC}	Positive Supply Voltage

SGS-THOMSON
MICROELECTRONICS

IEC LOGIC SYMBOL
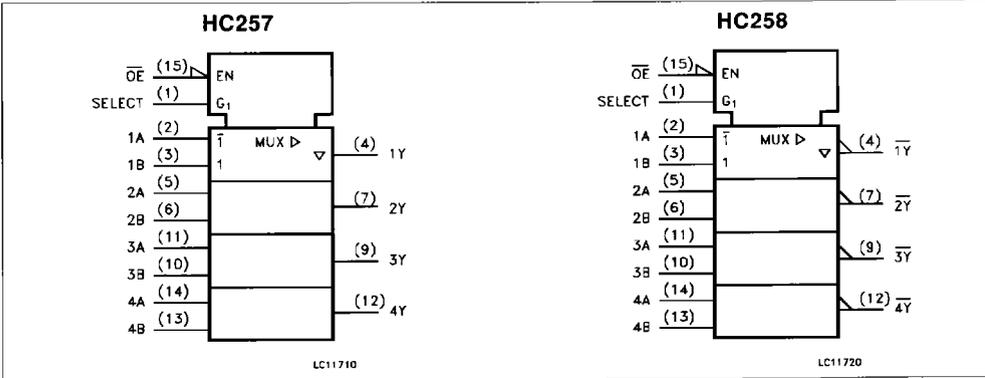
LOGIC DIAGRAM
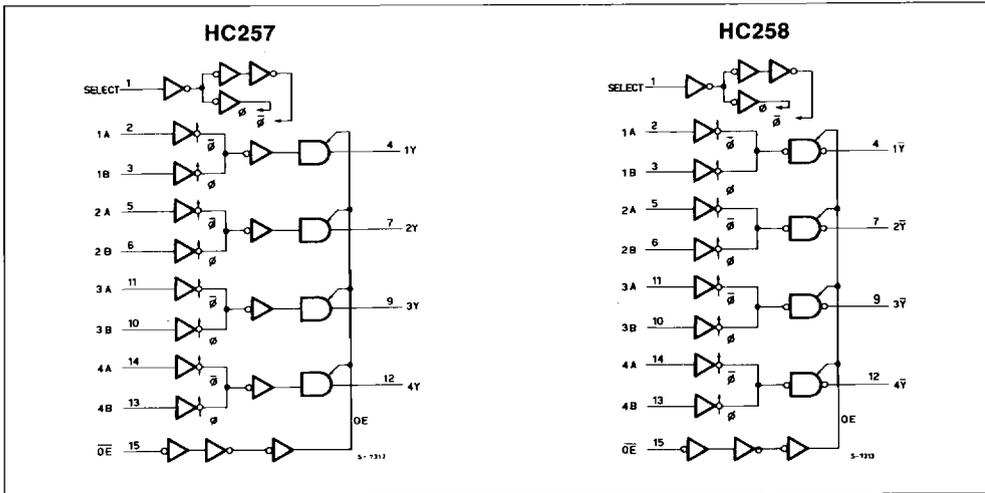
TRUTH TABLE

INPUTS				OUTPUTS	
OE	SELECT	A	B	Y (257)	Ȳ (258)
H	X	X	X	Z	Z
L	L	L	X	L	H
L	L	H	X	H	L
L	H	X	L	L	H
L	H	X	H	H	L

X = DON'T CARE   Z = HIGH IMPEDANCE

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	$^{\circ}$C
T_L	Lead Temperature (10 sec)	300	$^{\circ}$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 $^{\circ}$C derate to 300 mW by 10mW/$^{\circ}$C: 65 $^{\circ}$C to 85 $^{\circ}$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_{op}	Operating Temperature: **M54HC** Series		-55 to +125	$^{\circ}$C
	M74HC Series		-40 to +85	$^{\circ}$C
t_r, t_f	Input Rise and Fall Time	V_{CC} = 2 V	0 to 1000	ns
		V_{CC} = 4.5 V	0 to 500	
		V_{CC} = 6 V	0 to 400	

SGS-THOMSON
MICROELECTRONICS

DC SPECIFICATIONS

Symbol	Parameter	Vcc (V)	Test Conditions	TA = 25 °C 54HC and 74HC Min.	Typ.	Max.	-40 to 85 °C 74HC Min.	Max.	-55 to 125 °C 54HC Min.	Max.	Unit
VIH	High Level Input Voltage	2.0		1.5			1.5		1.5		
		4.5		3.15			3.15		3.15		V
		6.0		4.2			4.2		4.2		
VIL	Low Level Input Voltage	2.0				0.5		0.5		0.5	
		4.5				1.35		1.35		1.35	V
		6.0				1.8		1.8		1.8	
VOH	High Level Output Voltage	2.0	VI = VIH or VIL, IO=-20 µA	1.9	2.0		1.9		1.9		
		4.5		4.4	4.5		4.4		4.4		
		6.0		5.9	6.0		5.9		5.9		V
		4.5	IO=-6.0 mA	4.18	4.31		4.13		4.10		
		6.0	IO=-7.8 mA	5.68	5.8		5.63		5.60		
VOL	Low Level Output Voltage	2.0	VI = VIH or VIL, IO= 20 µA	0.0		0.1		0.1		0.1	
		4.5		0.0		0.1		0.1		0.1	
		6.0		0.0		0.1		0.1		0.1	V
		4.5	IO= 6.0 mA		0.17	0.26		0.33		0.40	
		6.0	IO= 7.8 mA		0.18	0.26		0.33		0.40	
II	Input Leakage Current	6.0	VI = VCC or GND		±0.1			±1		±1	µA
IOZ	Output Leakage Current	6.0	VI = VIH or VIL, VO = VCC or GND		±0.5			±5		±10	µA
ICC	Quiescent Supply Current	6.0	VI = VCC or GND		4			40		80	µA

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

Symbol	Parameter	Vcc (V)	CL (pF)		TA = 25 °C 54HC and 74HC Min.	Typ.	Max.	-40 to 85 °C 74HC Min.	Max.	-55 to 125 °C 54HC Min.	Max.	Unit
t_{TLH} t_{THL}	Output Transition Time	2.0	50			25	60		75		90	ns
		4.5				7	12		15		19	
		6.0				6	10		13		15	
t_{PLH} t_{PHL}	Propagation Delay Time (A, B - Y)	2.0	50			45	100		125		150	ns
		4.5				13	20		25		30	
		6.0				11	17		21		26	
		2.0	150			62	140		175		210	ns
		4.5				18	28		35		42	
		6.0				15	24		30		36	
t_{PLH} t_{PHL}	Propagation Delay Time (SELECT - Y)	2.0	50			45	100		125		150	ns
		4.5				13	20		25		30	
		6.0				11	17		21		26	
		2.0	150			62	140		175		210	ns
		4.5				18	28		35		42	
		6.0				15	24		30		36	
t_{PZL} t_{PZH}	Output Enable Time	2.0	50	$R_L = 1\ K\Omega$		40	110		140		165	ns
		4.5				12	22		28		33	
		6.0				10	19		24		28	
		2.0	150	$R_L = 1\ K\Omega$		57	150		190		225	ns
		4.5				17	30		38		45	
		6.0				14	26		32		38	
t_{PLZ} t_{PHZ}	Output Disable Time	2.0	50	$R_L = 1\ K\Omega$		28	140		175		210	ns
		4.5				14	28		35		42	
		6.0				13	24		30		36	
C_{IN}	Input Capacitance					5	10		10		10	pF
C_{OUT}	Output Capacitance					10						pF
C_{PD} (*)	Power Dissipation Capacitance					47						pF

(*) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operting current can be obtained by the following equation. $I_{CC}(opr) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/4$ (per Channel)

SGS-THOMSON
MICROELECTRONICS

SWITCHING CHARACTERISTICS TEST WAVEFORM

TEST CIRCUIT Icc (Opr.)

INPUT WAVEFORM IS THE SAME AS THAT IN CASE OF
SWITCHING CHARACTERSISTICS TESt.
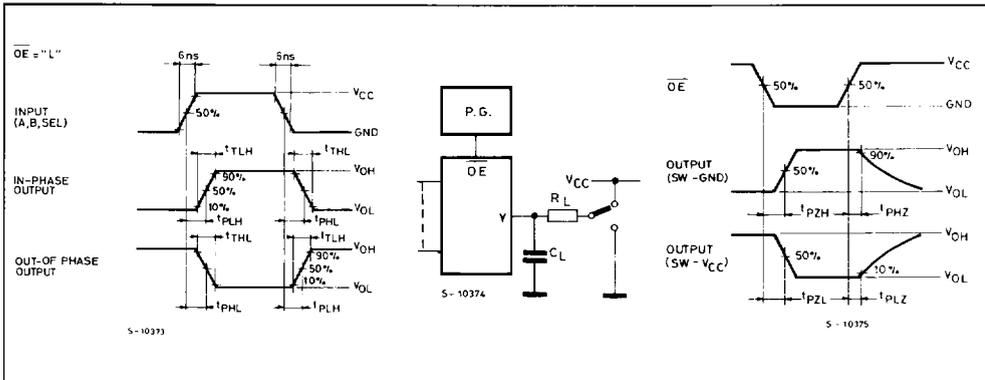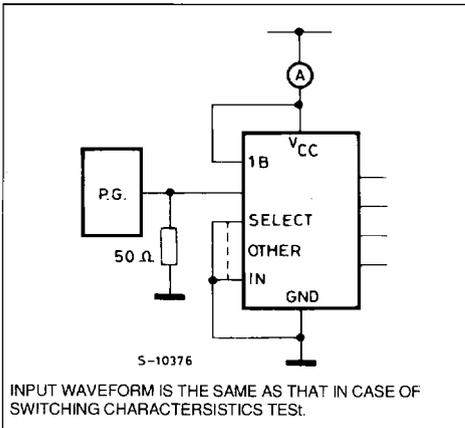
Cₚᴅ CALCULATION

C$_{PD}$ is to be calculated with the following
formula by using the measured value of
ICC (opr.) in the test circuit opposite.

$$C_{PD} = \frac{I_{CC}\,(opr)}{f_{IN} \times V_{CC}}$$