M74HC623

OCTAL BUS TRANSCEIVER WITH 3 STATE OUTPUTS (NON INVERTING)

- **HIGH SPEED:**
  t_{PD} = 10ns (TYP.) at V_{CC} = 6V
- **LOW POWER DISSIPATION:**
  I_{CC} = 4µA(MAX.) at T_A=25°C
- **HIGH NOISE IMMUNITY:**
  $V_{NIH} = V_{NIL}$ = 28 % V_{CC} (MIN.)
- **SYMMETRICAL OUTPUT IMPEDANCE:**
  $|I_{OH}| = I_{OL}$ = 6mA (MIN)
- **BALANCED PROPAGATION DELAYS:**
  $t_{PLH} \cong t_{PHL}$
- **WIDE OPERATING VOLTAGE RANGE:**
  V_{CC} (OPR) = 2V to 6V
- **PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 623**

DIP　　**SOP**　　**TSSOP**
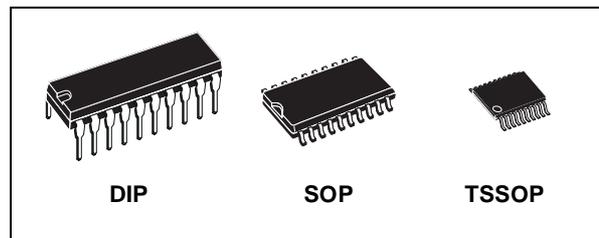
ORDER CODES

PACKAGE	TUBE	T & R
DIP	M74HC623B1R	
SOP	M74HC623M1R	M74HC623RM13TR
TSSOP		M74HC623TTR

DESCRIPTION

The 74HC623 is an advanced high-speed CMOS OCTAL BUS TRANSCEIVER (3-STATE) fabricated with silicon gate technology.

This IC is intended for two-way asynchronous communication between data buses. The control function implementation allows maximum flexibility in timing.

This device allows data transmission from the A bus to B bus or from the B to the A bus depending upon the logic level levels at the enable inputs (GBA and GAB). The enable inputs can be used to disable the device so that the buses are effectively isolated. The dual enable configuration gives this device the capability to store data by simultaneous enabling of GBA and GAB.

Each output reinforces its input in this transceiver configuration. Thus, when both control inputs are enabled and all other data sources to the two sets of bus lines are at high impedance, both sets of bus lines (16 in all) will remain at their last states. The 8-bit codes appearing on the two sets of buses will be identical.

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

PIN CONNECTION AND IEC LOGIC SYMBOLS
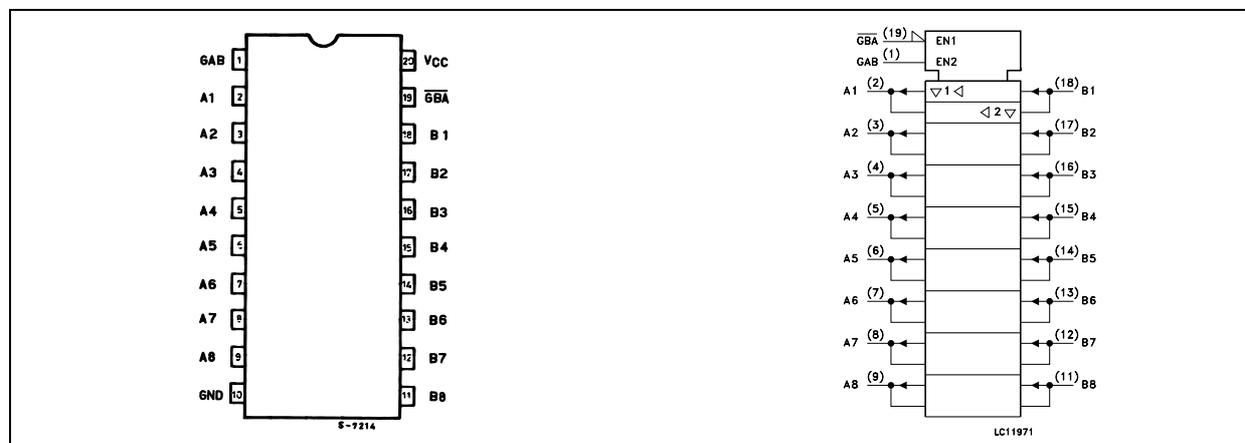
INPUT AND OUTPUT EQUIVALENT CIRCUIT
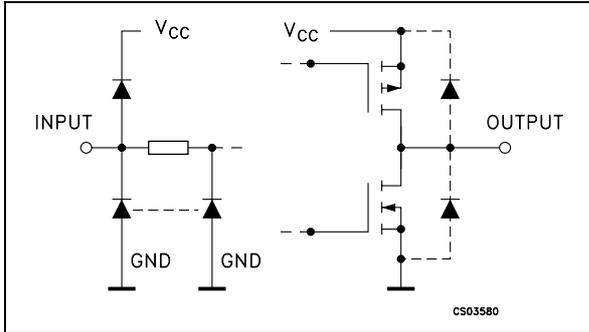

PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
1, 19	$\overline{GBA}$, GAB	Direction Control
2, 3, 4, 5, 6, 7, 8, 9	A1 to A8	Data Inputs/Outputs
11, 12, 13, 14, 15, 16, 17, 18	B1 to B8	Data Inputs/Outputs
10	GND	Ground (0V)
20	V_{CC}	Positive Supply Voltage

TRUTH TABLE

INPUTS		FUNCTION		OUTPUT
GAB	$\overline{GBA}$	A BUS	B BUS	
L	L	OUTPUT	INPUT	A = B
H	H	INPUT	OUTPUT	B = A
L	H	HIGH IMPEDANCE		Z
H	L	HIGH IMPEDANCE		Z

X : Don't Care
Z : High Impedance

LOGIC DIAGRAM
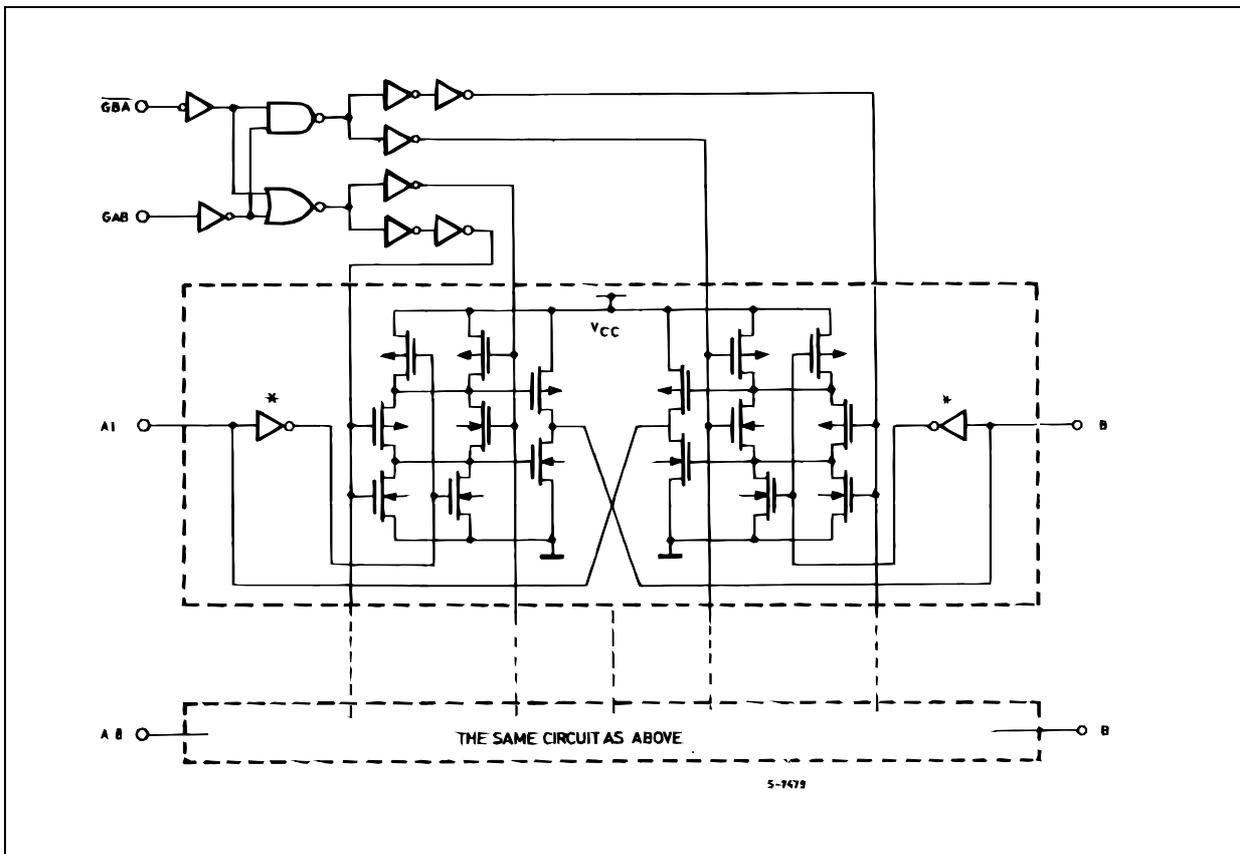
This logic diagram has not be used to estimate propagation delays

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 Current	± 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
T_L	Lead Temperature (10 sec)	300	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied
(*) 500mW at 65 °C; derate to 300mW by 10mW/°C from 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_{op}	Operating Temperature		-55 to 125	°C
t_r, t_f	Input Rise and Fall Time	V_{CC} = 2.0V	0 to 1000	ns
		V_{CC} = 4.5V	0 to 500	ns
		V_{CC} = 6.0V	0 to 400	ns

DC SPECIFICATIONS

Symbol	Parameter	Test Condition V_CC (V)		Value T_A = 25°C			-40 to 85°C		-55 to 125°C		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	I_O=-20 µA	1.9	2.0		1.9		1.9		V
		4.5	I_O=-20 µA	4.4	4.5		4.4		4.4		
		6.0	I_O=-20 µA	5.9	6.0		5.9		5.9		
		4.5	I_O=-6.0 mA	4.18	4.31		4.13		4.10		
		6.0	I_O=-7.8 mA	5.68	5.8		5.63		5.60		
V_{OL}	Low Level Output Voltage	2.0	I_O=20 µA		0.0	0.1		0.1		0.1	V
		4.5	I_O=20 µA		0.0	0.1		0.1		0.1	
		6.0	I_O=20 µA		0.0	0.1		0.1		0.1	
		4.5	I_O=6.0 mA		0.17	0.26		0.33		0.40	
		6.0	I_O=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		± 1	µA
I_{OZ}	High Impedance Output Leakage Current	6.0	V_I = V_{IH} or V_{IL} V_O = V_{CC} or GND			± 0.5		± 5		± 10	µA
I_{CC}	Quiescent Supply Current	6.0	V_I = V_{CC} or GND			4		40		80	µA

AC ELECTRICAL CHARACTERISTICS (C$_L$ = 50 pF, Input t$_r$ = t$_f$ = 6ns)

Symbol	Parameter	Test Condition			Value							Unit
		V$_{CC}$ (V)	C$_L$ (pF)		T$_A$ = 25°C			-40 to 85°C		-55 to 125°C		
					Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
t$_{TLH}$ t$_{THL}$	Output Transition Time	2.0	50			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	50			38	85		105		130	ns
		4.5				12	17		21		26	
		6.0				10	14		18		22	
		2.0	150			51	130		165		195	ns
		4.5				16	26		33		39	
		6.0				14	22		28		33	
t$_{PZL}$ t$_{PZH}$	High Impedance Output Enable Time	2.0	50	R$_L$ = 1 KΩ		57	150		190		225	ns
		4.5				19	30		38		45	
		6.0				16	26		32		38	
		2.0	150	R$_L$ = 1 KΩ		69	180		225		270	ns
		4.5				23	36		45		54	
		6.0				20	31		38		46	
t$_{PLZ}$ t$_{PHZ}$	High Impedance Output Disable Time	2.0	50	R$_L$ = 1 KΩ		43	125		155		190	ns
		4.5				18	25		31		38	
		6.0				15	21		26		32	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Condition		Value							Unit
		V$_{CC}$ (V)		T$_A$ = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
C$_{IN}$	Input Capacitance				5	10		10		10	pF
C$_{PD}$	Power Dissipation Capacitance (note 1)				34						pF

1) 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 operating current can be obtained by the following equation. I$_{CC(opr)}$ = C$_{PD}$ x V$_{CC}$ x f$_{IN}$ + I$_{CC}$

TEST CIRCUIT

SC11700
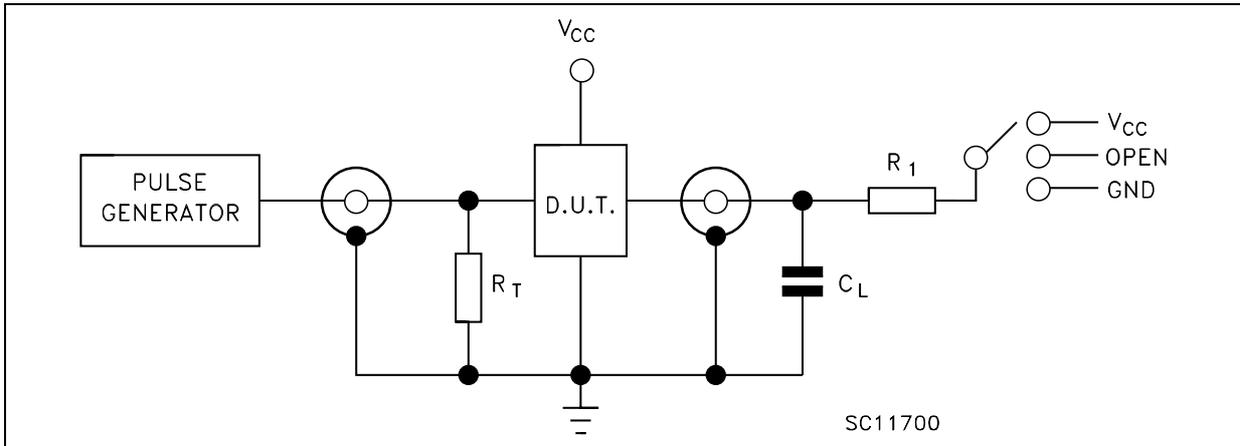
TEST	SWITCH
t_{PLH}, t_{PHL}	Open
t_{PZL}, t_{PLZ}	V_{CC}
t_{PZH}, t_{PHZ}	GND

C_L = 50pF/150pF or equivalent (includes jig and probe capacitance)
R_1 = 1KΩ or equivalent
R_T = Z_{OUT} of pulse generator (typically 50Ω)

WAVEFORM 1: PROPAGATION DELAY TIME (f=1MHz; 50% duty cycle)

CS04890
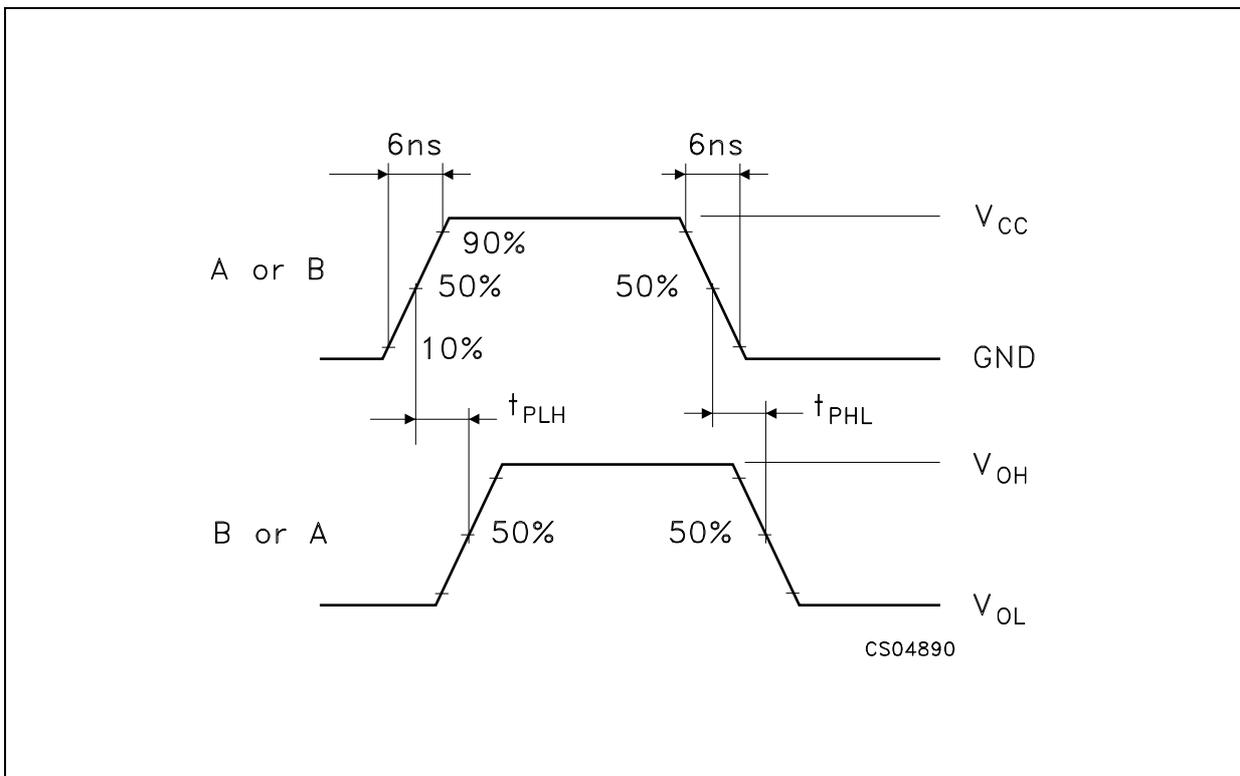
WAVEFORM 2 : OUTPUT ENABLE AND DISABLE TIME (f=1MHz; 50% duty cycle)

S-10530
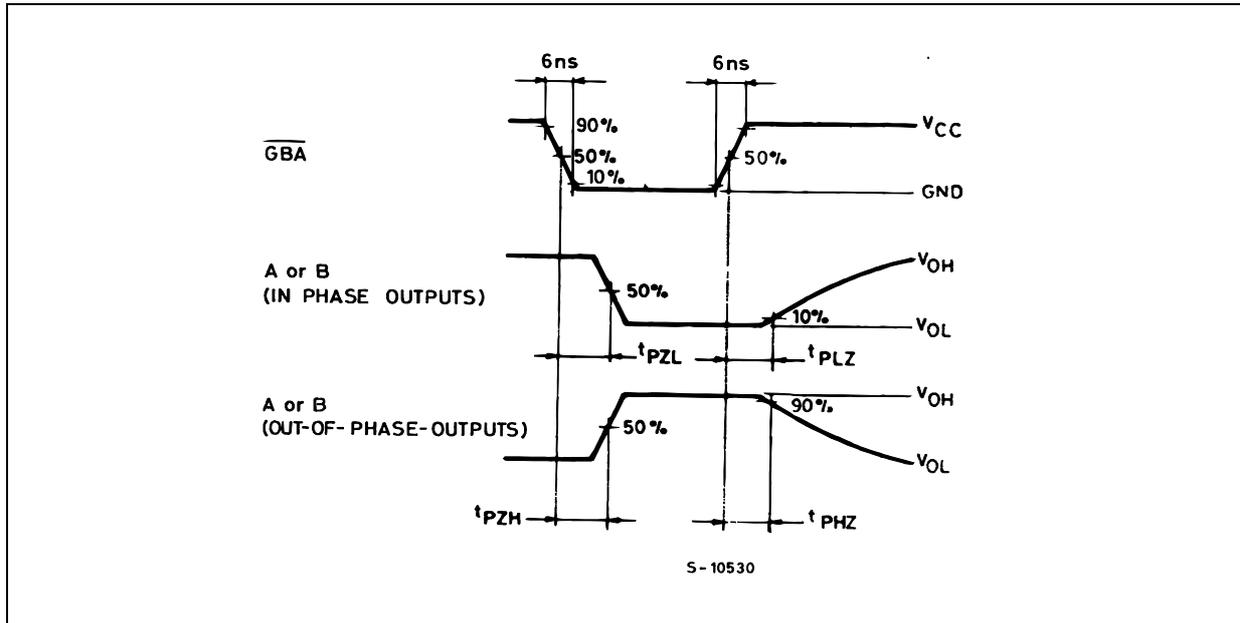
Plastic DIP-20 (0.25) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.254			0.010		
B	1.39		1.65	0.055		0.065
b		0.45			0.018	
b1		0.25			0.010	
D			25.4			1.000
E		8.5			0.335	
e		2.54			0.100	
e3		22.86			0.900	
F			7.1			0.280
I			3.93			0.155
L		3.3			0.130	
Z			1.34			0.053
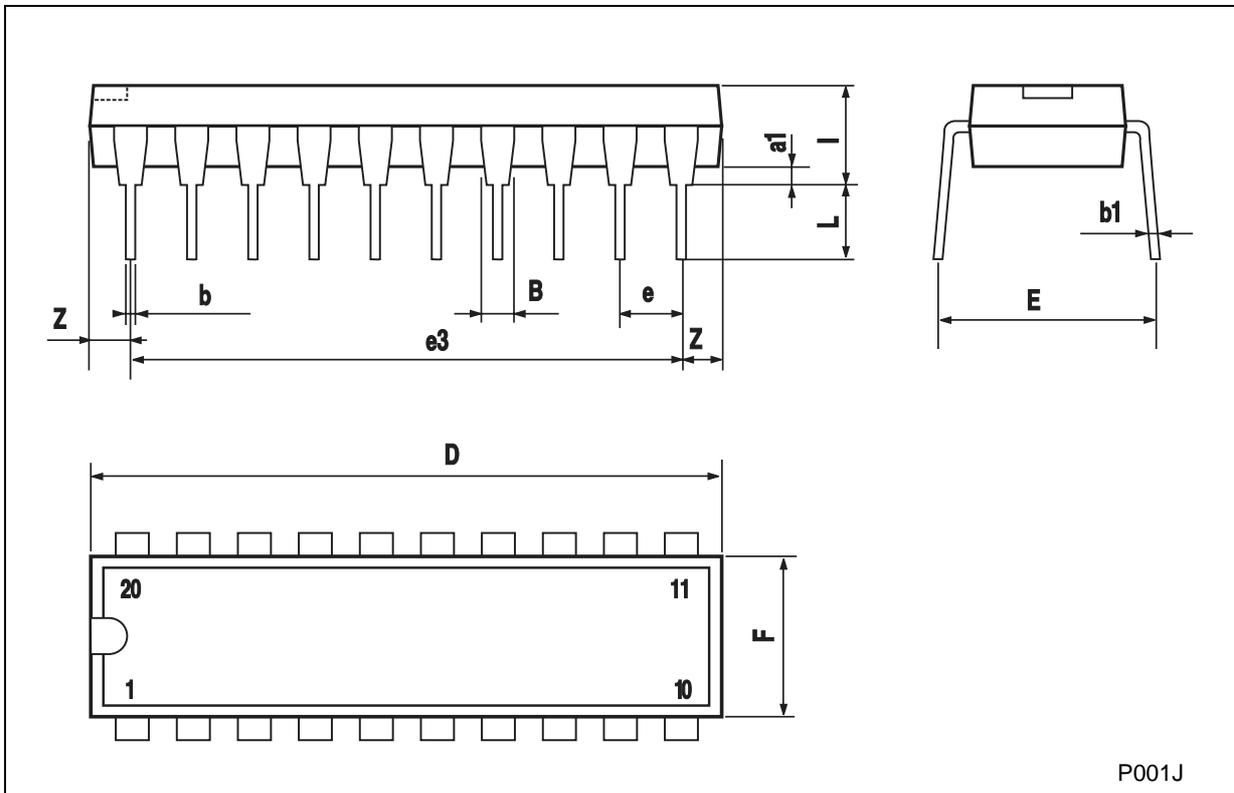
P001J

SO-20 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			2.65			0.104
a1	0.1		0.2	0.004		0.008
a2			2.45			0.096
b	0.35		0.49	0.014		0.019
b1	0.23		0.32	0.009		0.012
C		0.5			0.020	
c1	45° (typ.)					
D	12.60		13.00	0.496		0.512
E	10.00		10.65	0.393		0.419
e		1.27			0.050	
e3		11.43			0.450	
F	7.40		7.60	0.291		0.300
L	0.50		1.27	0.020		0.050
M			0.75			0.029
S	8° (max.)					
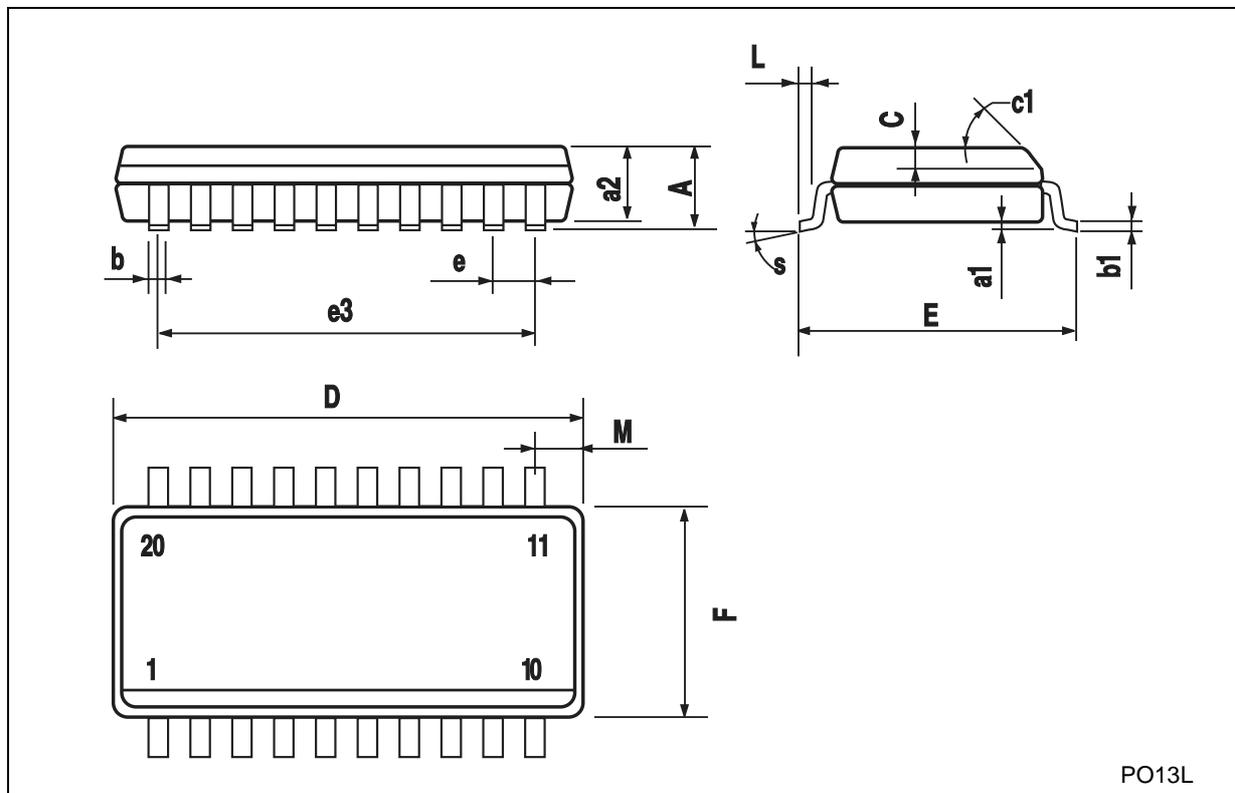
PO13L

TSSOP20 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.2			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.8	1	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.0089
D	6.4	6.5	6.6	0.252	0.256	0.260
E	6.2	6.4	6.6	0.244	0.252	0.260
E1	4.3	4.4	4.48	0.169	0.173	0.176
e		0.65 BSC			0.0256 BSC	
K	0°		8°	0°		8°
L	0.45	0.60	0.75	0.018	0.024	0.030

PIN 1 IDENTIFICATION

0087225C