

QUAD BILATERAL SWITCH

- HIGH SPEED:
 - $t_{PD} = 0.4 \text{ ns (TYP.)}$ at $V_{CC} = 3.3 \text{ V}$ $t_{PD} = 0.1 \text{ ns (TYP.)}$ at $V_{CC} = 5 \text{ V}$
- LOW POWER DISSIPATION: $I_{CC} = 2\mu A \text{ (MAX.)}$ at $T_A = 25^{\circ}\text{C}$
- LOW "ON " LOW RESISTANCE $R_{ON} = 14\Omega$ at $V_{CC} = 3.3V$, $I_{I/O} \le 1$ mA $R_{ON} = 12\Omega$ at $V_{CC} = 5.0V$, $I_{I/O} \le 1$ mA
- SINE WAVE DISTORTION: 0.04% at V_{CC} = 3.3V, f = 1KHz
- OPERATING VOLTAGE RANGE: V_{CC(OPR)} = 2V to 5.5V
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 4066
- IMPROVED LATCH-UP IMMUNITY

DESCRIPTION

The 74LVQ4066 is a low voltage CMOS QUAD BILATERAL SWITCH fabricated with sub-micron silicon gate and double-layer metal wiring C²MCS technology.

It is ideal for low power and low noise 5.3V applications and each switch is designed to handle both analog and digital signals

The switches permit signals with amplitudes up to V_{CC} (peak) to be transmitted in either direction

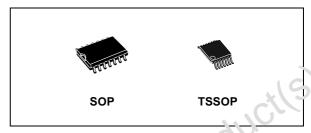


Table 1: Order Codes

PACKAGE	T & R
SOP	74LVQ4066MTR
TSSOP	74LVQ4066TTR

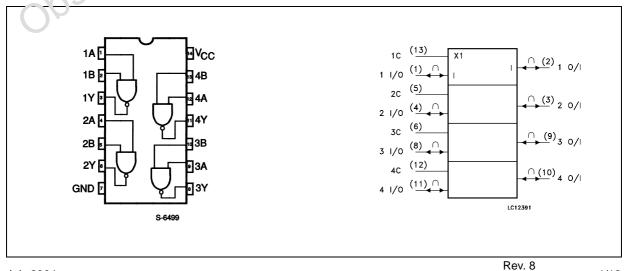
without relevant propagation delay and without generating additional ground bounce noise.

It has an ON-Resistance which is greatly reduced in comparison with 74HC4066.

It is provided of four individual enable inputs to control the switches; the switch is ON when the C input is held high and OFF (High Impedance) when C is held low.

All inputs and outputs are equipped with protection circuits against static discharge, giving them ESD immunity and transient excess voltage.

Figure 1: 2: Connection And IEC Logic Symbols



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Figure 2: Logic Diagram

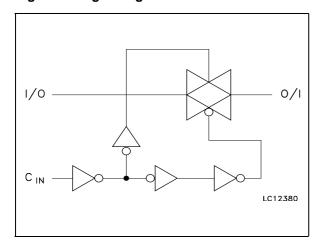


Table 2: Pin Description

PIN N°	SYMBOL	NAME AND FUNCTION
1, 4, 8, 11	1 to 4 I/O	Independent Input/Output
2, 3, 9, 10	1 to 4 O/I	Independent Output/Input
13, 5, 6, 12	1C to 4C	Enable Input (Active HIGH)
7	GND	Ground (0V)
14	V _{CC}	Positive Supply Voltage

Table 3: Truth Table

Α	В
Н	ON
L	OFF*

(*) High Impedance

Table 4: Absolute Maximum Ratings

Symbol	Parameter	Va!ue	Unit
V _{CC}	Supply Voltage	-0.5 to +7	V
V _I	DC Input Voltage	-0.5 to V _{CC} + 0.5	V
Vo	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
Ιο	DC Output Current	± 50	mA
I _{CC} or I _{GND}	DC V _{CC} or Ground Current	± 200	mA
T _{stg}	Storage Temperature	-65 to +150	°C
T _L	Lead Temperature (10 sec)	300	°C

Absolute Maximum Ratings are those value, bryond which damage to the device may occur. Functional operation under these conditions is not implied

Table 5: Recommended Operating Conditions

Symbol	Parameter	Value	Unit
V _{CC}	Supply Voltage (note 1)	2 to 5.5	V
· ·	input Voltage	0 to V _{CC}	V
V	Output Voltage	0 to V _{CC}	V
T _{op}	Operating Temperature	-55 to 125	°C
dt/dv	Input Rise and Fall Time on control pin V _{CC} = 3.0V (note 2)	0 to 10	ns/V

1) Truth Table guaranteed: 1.2V to 5.5V 2) $\rm V_{IN}$ from 30% to 70% $\rm V_{CC}$

Table 6: DC Specifications

		1	Test Condition		Value						
Symbol	Parameter	V _{CC}		Т	T _A = 25°C		-40 to 85°C		-55 to 125°C		Unit
		(V)		Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
V _{IH}	High Level Input Voltage	2.7 to		0.7 V _{CC}			0.7 V _{CC}		0.7 V _{CC}		V
V_{IL}	Low Level Input Voltage	5.5				0.3 V _{CC}		0.3 V _{CC}		0.3 V _{CC}	V
R _{ON}	ON Resistance	3.3 (**)	$V_I = V_{IH}$ $V_{I/O} = V_{CC}$ to GND		16.5	23		32		40	
		5.0(*)	I _{I/O} ≤ 1mA		12	17		22		26	Ω
		3.3 (**)	$V_I = V_{IH}$ $V_{I/O} = V_{CC}$ or GND		12	17		24		30	12
		5.0(*)	I _{I/O} ≤ 1mA		9.5	13		17	2	20	
R _{ON}	Difference of ON Resistance Between Switches	3.0 to 5.5	$V_{I}=V_{IH}$ $V_{I/O}=V_{CC} \text{to GND}$ $I_{I/O} \leq 1 \text{mA}$		2			P	(0)	<i>y</i> •	Ω
I _{OFF}	Input/Output Leakage Current (SWITCH OFF)	5.5	$V_{OS} = V_{CC}$ to GND $V_{IS} = V_{CC}$ to GND $V_{I} = V_{IL}$			± 0.1	Sil	± 1.0		± 1.0	μΑ
I _{IZ}	Switch Input Leakage Current (SWITCH ON, OUTPUT OFF)	5.5	$V_{OS} = V_{CC}$ to GND $V_I = V_{IH}$,(70,	± 0.1		± 1.0		± 1.0	μΑ
I _{IN}	Control Input Leakage Current	5.5	$V_I = V_{CC} \circ C_I v_I D$		_	± 0.1		± 1.0		± 1.0	μΑ
I _{CC}	Quiescent Supply Current	5.5	V _I = V _{CC} or GND			2		20		20	μΑ

(*)Voltage range is 5V ±0.5V (**)Voltage range is 3.3V ±0.3V

Table 7: AC Electrical Characteristics ($C_L = 50 \text{ pF}$, Input $t_r = t_f = 3 \text{ns}$)

		Test Condition		Value							
Symbol	Parameter	v _{cc}		Т	A = 25°	С	-40 to 85°C -55		-55 to	-55 to 125°C	
		(V)		Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
t _{PD}	Delay Time	3.3(*)			0.4	0.8		1.2		2.0	
		5.0 (**)			0.1	0.2		1.0		1.8	ns
t _{PZL}	Output Enable	3.3(*)			2.5	4.0		5.0		7.0	
t _{PZH}	Time	5.0 (**)	$R_L = 1 k\Omega$		2.0	4.0		5.0		7.0	ns
t _{PLZ}	Output Disable	3.3(*)			5.0	7.5		9.0		11.0	10
t_{PHZ}	Time	5.0 (**)	$R_L = 1 k\Omega$		5.0	7.5		9.0		11.0	l'S
C _{IN}	Input Capacitance				5						pF
C _{I/O}	Switch Terminal Capacitance				10				(0)		pF
_	Power Dissipation	3.3			2.5						
C_{PD}	Capacitance (note 1)	5.0			3		16				pF

¹⁾ C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculater; in the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following eq. (at on. $I_{CC}(opr) = C_{PD} \times V_{CC} \times I_{IN} + I_{CC}/4$ (Switch). (*) Voltage range is $3.3 \times 1.3 \times 1.3$

Table 8: Analog Switch Characteristics (GND = 0 V, T_A - 25°C)

			Test Condition						
Symbol	Parameter	V _{CC} (V)							
	Sine Wave Distortion (THD)	3.3	$f_{IN} = 1 \text{ KHz}$ $R_L = 10 \text{K}\Omega$ $C_L = 50 \text{ pF}$	0.04	. %				
	,	5.0(*)	4 110 2 2 1	0.04 150	MHz				
	Frequency Response	3.3	3.3 Adjust f _{IN} voltage to Obtain 0dBm at V _{OS} .						
f_{MAX}	(Switch ON)	E 0(*)	Increase f _{IN} Frequency until dB Meter reads -3dB	180					
	18/	5.0(*)							
	Feet through	3.3	V _{IN} is centered at V _{CC} /2. Adjust input for 0dBm	-60					
	Attunuation (Switch OFF)	5.0(*)	$R_L = 600\Omega$, $C_L = 50pF$, $F_{IN} = 1$ MHz sine wave	-60	dB				
	Crosstalk (Control Input	3.3	P = 6000 C = 50pE f = 1MHz causes wave	60	mV				
	to Signal Output)	5.0(*)	$R_L = 600\Omega$, $C_L = 50pF$, $f_{IN} = 1MHz$ square wave	60	IIIV				
	Crosstalk (Between Any	3.3	P 6000 C FORE f 1MHz ging wave	-60	40				
	Switches)	5.0(*)	$R_L = 600\Omega$, $C_L = 50$ pF, $f_{IN} = 1$ MHz sine wave	-60	dB				

^(*) Voltage range is $5V \pm 0.5V$

90% 90% t_{PLZ}, t_{PHZ}, t_{PZL}, t_{PZH} 1.5٧ V_{CC} 10% 10% GND _t_{PHZ} t_{PZH} f ROM P.G. V_{он} 90% 50% V_{OL} 50 pF †_{PZL} V_{0/I} V₁=GND V₂=V_{CC} 50% 10% V_{OL} BANDWIDTH AND FEEL'1 HF.OUGH ATTENUATION CROSSTALK (control to output) v_{CC} SELECT INPUT fROM P.G. 1/0 GND (V_{SS}) VEE S-10354 C_{I-C}, C_{I/2} MAXIMUM CONTROL FREQUENCY Γ.ς SW OFF GND (V_{SS})

Figure 3: Switching Characteristics Test Circuit

Figure 4: Channel Resistance (R_{ON})

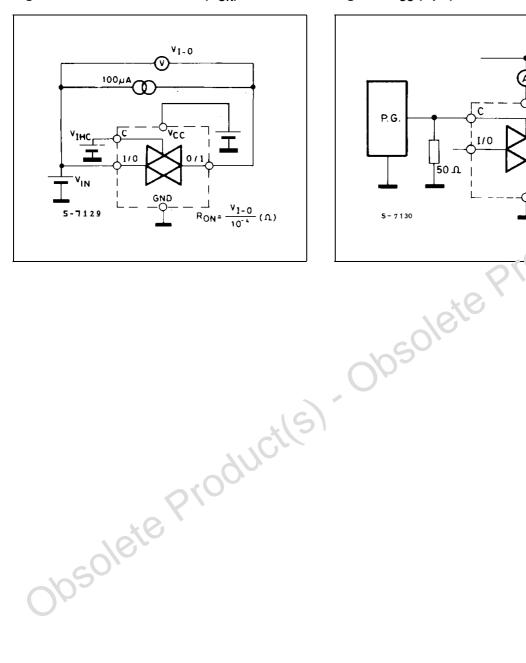
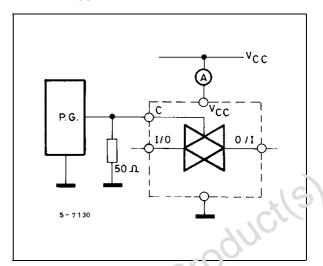
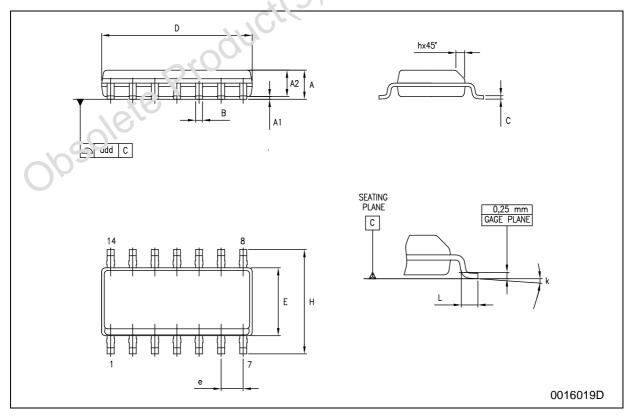


Figure 5: I_{CC} (Opr.)



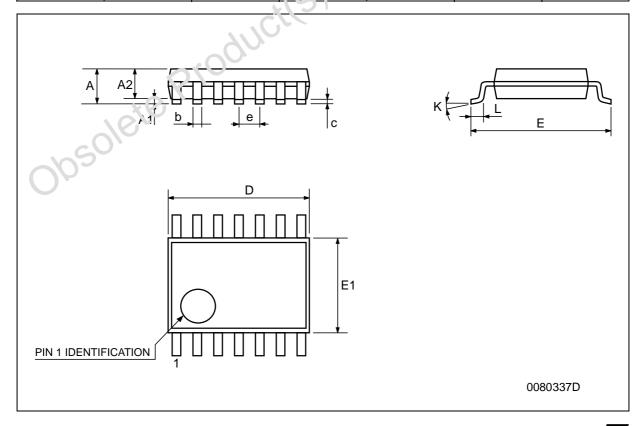
SO-14 MECHANICAL DATA

DIM.		mm.		inch		
DIWI.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
А	1.35		1.75	0.053		0.069
A1	0.1		0.25	0.004		0.010
A2	1.10		1.65	0.043		0.065
В	0.33		0.51	0.013		0.020
С	0.19		0.25	0.007		0.010
D	8.55		8.75	0.337		0.044
Е	3.8		4.0	0.150	.0	0.157
е		1.27			0.75%	
Н	5.8		6.2	0.228	10	0.244
h	0.25		0.50	0.010	7	0.020
L	0.4		1.27	0.0.6		0.050
k	0°		8°	0°		8°
ddd			0.100			0.004



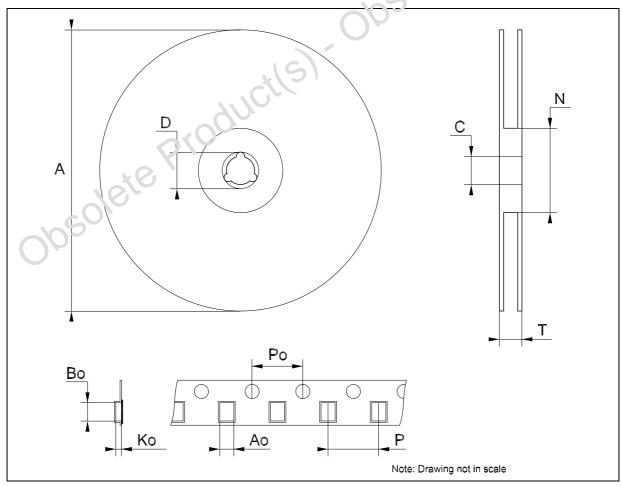
TSSOP14 MECHANICAL DATA

DIM.		mm.					
DIN.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.	
А			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	
С	0.09		0.20	0.004		0.7589	
D	4.9	5	5.1	0.193	0.197	0.201	
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	
е		0.65 BSC		120°	0.0256 BSC		
K	O°		8°	0°		8°	
L	0.45	0.60	C 75	0.018	0.024	0.030	



Tape & Reel SO-14 MECHANICAL DATA

DIM		mm.			inch	
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
А			330			12.992
С	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
Т			22.4			0.882
Ao	6.4		6.6	0.252		0.260
Во	9		9.2	0.354	~rC	0.362
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153	10	0.161
Р	7.9		8.1	0.3 1	7	0.319



Tape & Reel TSSOP14 MECHANICAL DATA

DIM.		mm.			inch	
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
Α			330			12.992
С	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		1.0
Т			22.4			0.882
Ao	6.7		6.9	0.264		0.272
Во	5.3		5.5	0.209	arC	0.217
Ko	1.6		1.8	0.063		0.071
Po	3.9		4.1	0.153	(0	0.161
Р	7.9		8.1	0.3 1)	0.319

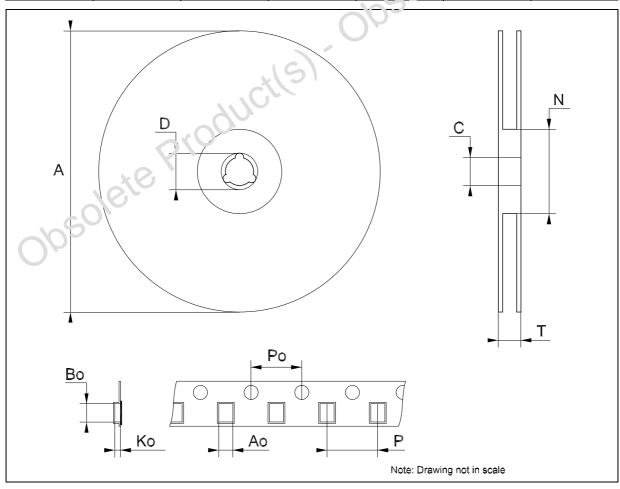


Table 9: Revision History

Date	Revision	Description of Changes
29-Jul-2004	8	Ordering Codes Revision - pag. 1.



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