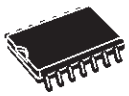
74LVQ4066

QUAD BILATERAL SWITCH

PRELIMINARY DATA

- HIGH SPEED: t_{PD} = 0.4 ns (TYP.) at V_{CC} = 3.3V
- COMPATIBLE WITH TTL LEVEL
- LOW POWER DISSIPATION:
  I_{CC} = 1 µA (MAX.) at T_A = 25 °C
- LOW "ON" RESISTANCE:
  R_{ON} = 20Ω at V_{CC} = 3.3V, $I_{I/O} \leq$ 1mA
- SINE WAVE DISTORTION:
  0.04% at V_{CC} = 3.3V, f = 1KHz
- OPERATING VOLTAGE RANGE:
  $V_{CC(OPR)}$ = 2V to 3.6V
- PIN AND FUNCTION COMPATIBLE WITH
  74 SERIES 4066
- IMPROVED LATCH-UP IMMUNITY



M
(Micro Package)

T
(TSSOP Package)

ORDER CODES :

74LVQ4066M 74LVQ4066T

DESCRIPTION

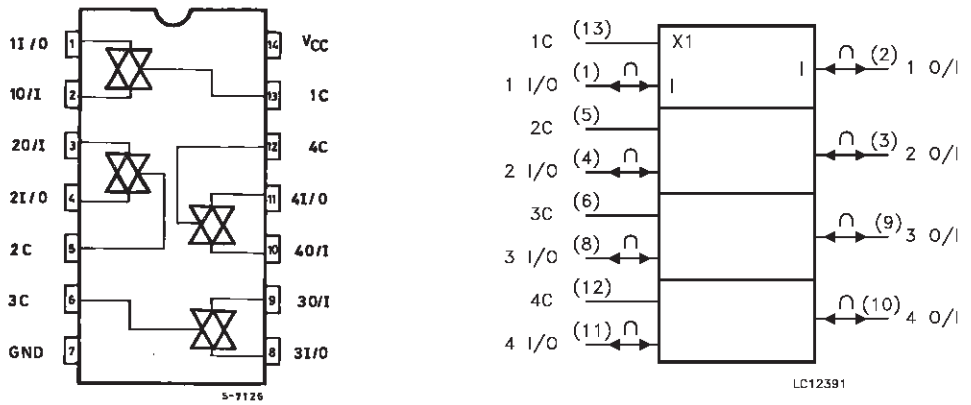
The LVQ4066 is a low voltage CMOS QUAD BILATERAL SWITCH fabricated with sub-micron silicon gate and double-layer metal wiring C^2MOS technology. It is ideal for low power and low noise 3.3V applications.

It has an ON-resistance wich is greatly reduced in comparison witn 74HC4066.

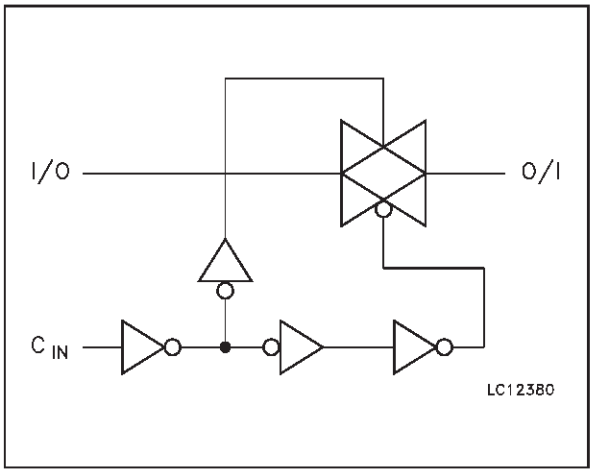
The C input is provided to control the switch; the switch is ON when the C input is held high and OFF when C is held low.

All inputs and outputs are equipped with protection circuits against static discharge, giving them 2KV ESD immunity and transient excess voltage.

PIN CONNECTION AND IEC LOGIC SYMBOLS



LOGIC DIAGRAM



PIN DESCRIPTION

PIN No	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

TRUTH TABLE

CONTROL	SWITCH FUNCTION
H	ON
L	OFF

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	± 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 values beyond which damage to the device may occur. Functional operation under these condition is not implied.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage (note 1)	2 to 3.6	V
V_I	Input Voltage	0 to V_{CC}	V
V_O	Output Voltage	0 to V_{CC}	V
T_{op}	Operating Temperature:	-40 to +85	°C
dt/dv	Input Rise and Fall Time (V_{CC} = 3V) (note 2)	0 to 10	ns/V

1) Truth Table guaranteed: 1.2V to 3.6V
2) V_{IN} from 0.8V to 2V

DC SPECIFICATIONS

Symbol	Parameter	Test Conditions		Value					Unit
		V_{CC} (V)		T_A = 25 °C			-40 to 85 °C		
				Min.	Typ.	Max.	Min.	Max.	
V_{IH}	High Level Input Voltage	3.0 to 3.6		2.0			2.0		V
V_{IL}	Low Level Input Voltage					0.8		0.8	V
R_{ON}	ON Resistance	3.0 to 3.6	$V_I = V_{IH}$ $V_{I/O} = V_{CC}$ to GND $I_{I/O} \leq 1mA$		20	30		40	Ω
			$V_I = V_{IH}$ $V_{I/O} = V_{CC}$ to GND $I_{I/O} \leq 1mA$		10	15		20	
ΔR_{ON}	Difference of ON Resistance Between Switches	3.0 to 3.6	$V_I = V_{IH}$ $V_{I/O} = V_{CC}$ to GND $I_{I/O} \leq 1mA$		2				Ω
I_{OFF}	Input/Output Leakage Current (SWITCH OFF)	3.6	$V_{OS} = V_{CC}$ to GND $V_{IS} = V_{CC}$ to GND $V_I = V_{IL}$			±0.1		±1.0	µA
I_{IZ}	Switch Input Leakage Current (SWITCH ON, OUTPUT OPEN)	3.6	$V_{OS} = V_{CC}$ to GND $V_I = V_{IH}$			±0.1		±1.0	µA
I_{IN}	Control Input Current	3.6	$V_I = V_{CC}$ to GND			0.1		1.0	µA
I_{CC}	Quiescent Supply Current	3.6	$V_I = V_{CC}$ or GND			1		10	µA

1) Maximum test duration 2ms, one output loaded at time
2) Incident wave switching is guaranteed on transmission lines with impedances as low as 50 Ω.
(*) All outputs loaded.

DYNAMIC SWITCHING CHARACTERISTICS

Symbol	Parameter	Test Conditions		Value					Unit
		V_{CC} (V)		T_A = 25 °C			-40 to 85 °C		
				Min.	Typ.	Max.	Min.	Max.	
V_{OLP}	Dynamic Low Voltage Quiet Output (note 1, 2)	3.3	C_L = 50 pF		0.3	0.8			V
V_{OLV}				-0.8	-0.3				
V_{IHD}	Dynamic High Voltage Input (note 1, 3)	3.3				2			
V_{ILD}	Dynamic Low Voltage Input (note 1, 3)	3.3		0.8					

1) Worst case package.
2) Max number of outputs defined as (n). Data inputs are driven 0V to 3.3V, (n -1) outputs switching and one output at GND.
3) Max number of data inputs (n) switching. (n-1) switching 0V to 3.3V. Inputs under test switching: 3.3V to threshold (V_{ILD}), 0V to threshold (V_{IHD}), f=1MHz.

AC ELECTRICAL CHARACTERISTICS (C_L = 50 pF, R_L = 500Ω, Input t_r = t_f =3 ns)

Symbol	Parameter	Test Condition		Value					Unit
		V_{CC} (V)		T_A = 25 °C			-40 to 85 °C		
				Min.	Typ.	Max.	Min.	Max.	
t_{PD}	Delay Time	3.3			0.4	0.8		1.2	ns
t_{PZL} t_{PZH}	Output Enable Time	3.3			2.5	4		5	ns
t_{PLZ} t_{PHZ}	Output Disable Time	3.3			5.0	7.5		9	ns
t_{MAX}	Control Input to Output	3.3			30				ns
C_{IN}	Input Capacitance	3.3			5				pF
$C_{I/O}$	Switch Terminal Capacitance	3.3			10				pF
C_{PD}	Power Dissipation Capacitance (note 1)	3.3			3				pF

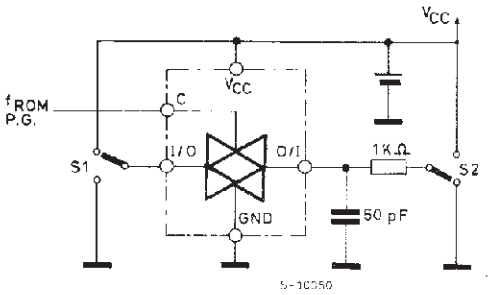
1) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC}(opr) = C_{PD} \bullet V_{CC} \bullet f_{IN} + I_{CC}$

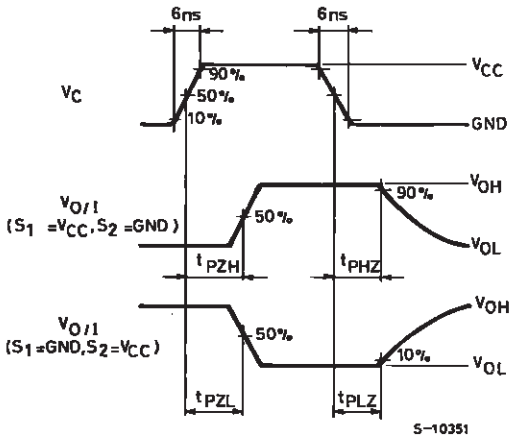
ANALOG SWITCH CHARACTERISTICS (GND = 0 V, T_A = 25°C)

Symbol	Parameter	Test Condition			Value	Unit
		V_{CC} (V)	V_{IN} (Vp-p)			
	Sine Wave Distortion (THD)	3.3	2.75	f_{IN} = 1 KHz R_L = 10KΩ C_L = 50 pF	0.04	%
f_{MAX}	Frequency Responce (Switch ON)	3.3	Adjust f_{IN} voltage to Obtain 0dBm at V_{OS}. Increase f_{IN} Frequency until dB Meter reads -3dB R_L = 50Ω, C_L = 10pF		150	MHz
	Feedthrought Attenuation (Switch OFF)	3.3	V_{IN} is centered at V_{CC}/2. Adjust input for 0dBm R_L = 600Ω, C_L = 50pF, f_{IN} = 1MHz sine wave		-60	dB
	Crosstalk (Control Input to Signal Ouput)	3.3	R_L = 600Ω, C_L = 50pF, f_{IN} = 1MHz square wave		60	mV
	Crosstalk (Between Any Switchies)	3.3	R_L = 600Ω, C_L = 50pF, f_{IN} = 1MHz sine wave		-60	dB

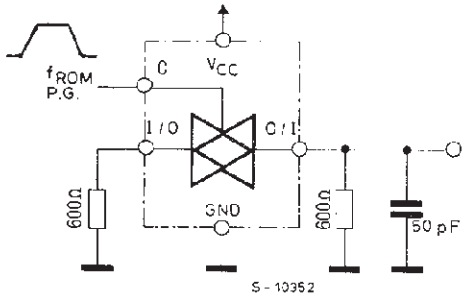
SWITCHING CHARACTERISTICS TEST CIRCUIT

t_{PLZ}, t_{PHZ}, t_{PZL}, t_{PZH}.

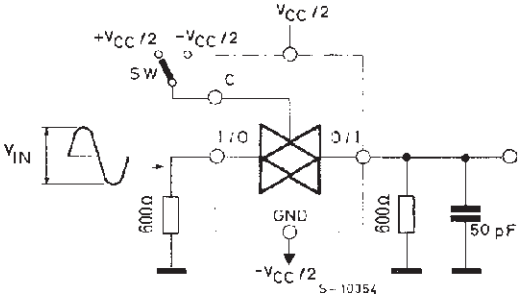




CROSSTALK (control to output)

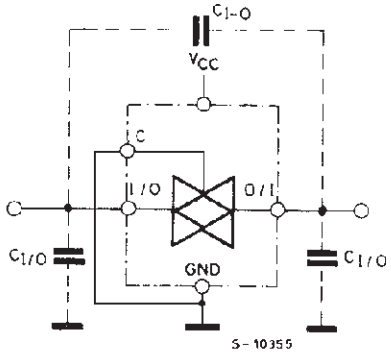


BANDWIDTH AND FEEDTHROUGH ATTENUATION



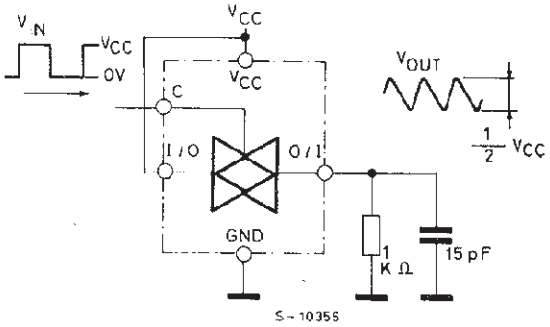
GND (V_{SS})

C_{I-O} $C_{I/O}$

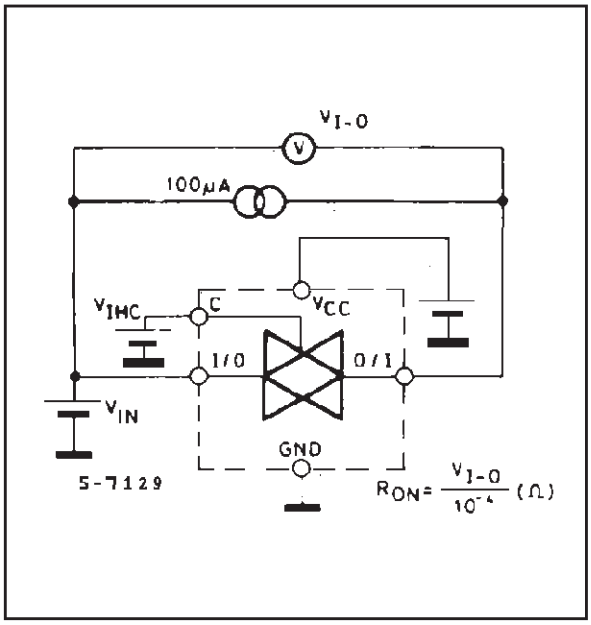


GND (V_{SS})

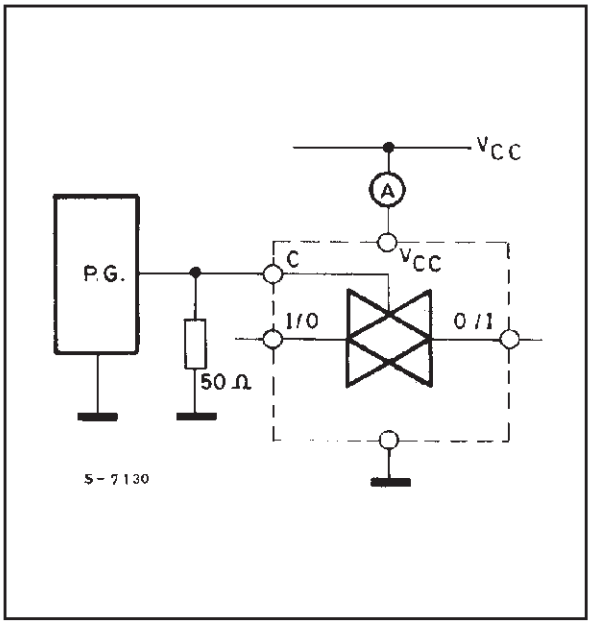
MAXIMUM CONTROL FREQUENCY



CHANNEL RESISTANCE (R_{ON})

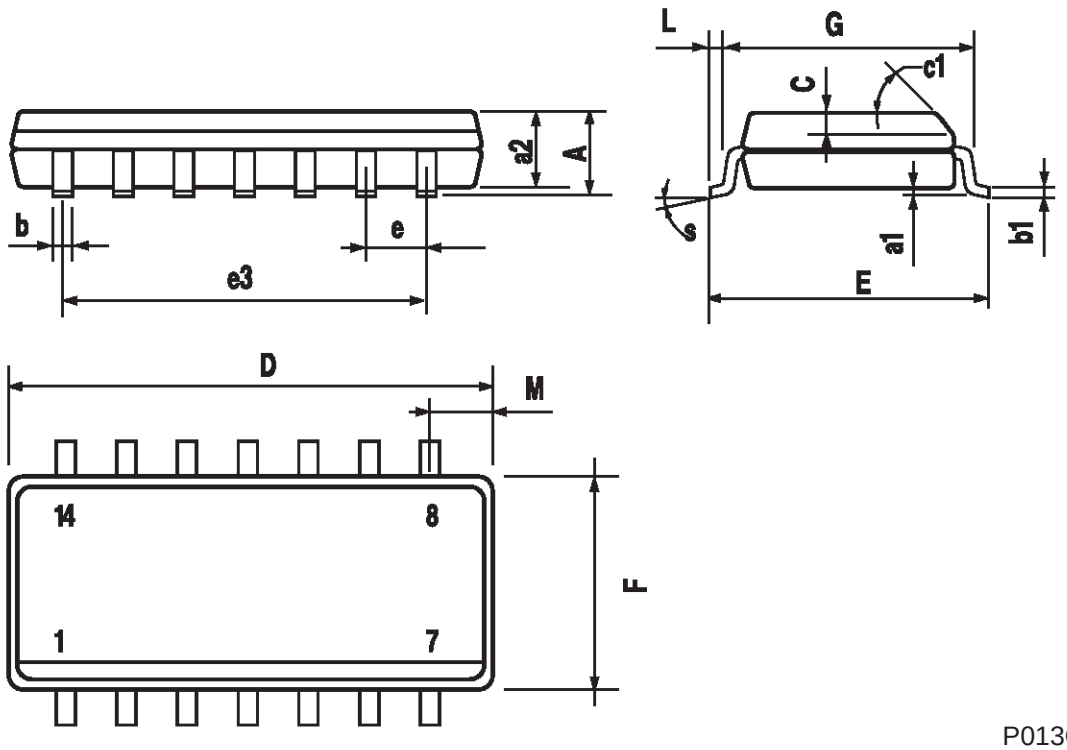


I_{CC} (Opr.)



SO-14 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.003		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	8.55		8.75	0.336		0.344
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
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			0.68			0.026
S	8 (max.)					



P013G

TSSOP14 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.1			0.433
A1	0.05	0.10	0.15	0.002	0.004	0.006
A2	0.85	0.9	0.95	0.335	0.354	0.374
b	0.19		0.30	0.0075		0.0118
c	0.09		0.20	0.0035		0.0079
D	4.9	5	5.1	0.193	0.197	0.201
E	6.25	6.4	6.5	0.246	0.252	0.256
E1	4.3	4.4	4.48	0.169	0.173	0.176
e		0.65 BSC			0.0256 BSC	
K	0^o	4^o	8^o	0^o	4^o	8^o
L	0.50	0.60	0.70	0.020	0.024	0.028