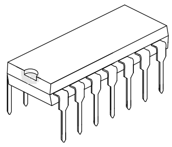
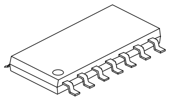
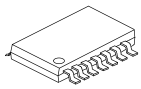
QUAD BILATERAL SWITCH



DIP-14



SOP-14



TSSOP-14

■ DESCRIPTION

The UTC **4066** is a quad bilateral switch intended for the transmission or multiplexing of analog or digital signals.

■ FEATURES

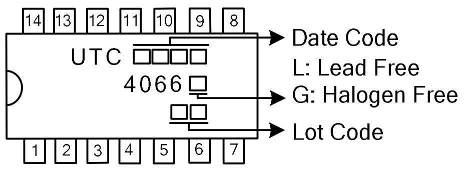
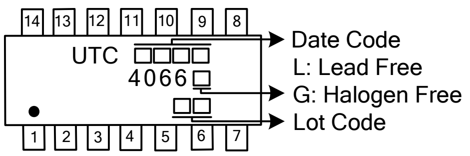
* Wide supply voltage range: 3V ~ 15V.
* High noise immunity : 0.45V_{DD} (typ.)
* Wide range of digital and ± 7.5V_{PEAK} analog switching
* "ON" resistance for 15V operation : 80Ω
* Matched "ON" resistance : ΔR_{ON}=5Ω (typ.)
  over 15V signal input
* "ON" resistance flat over peak-to-peak signal range
* High "ON" / "OFF" : 65 dB (typ.)
  output voltage ratio @ f_{IS}=10kHz, R_L=10kΩ
* High degree linearity: 0.1% distortion (typ.).
  @ f_{IS}=1kHz, V_{IS}=5Vp-p.
* V_{DD}-V_{SS}=10V, R_L=10kΩ
* Extremely low "OFF" : 0.1nA (typ.)
* switch leakage @V_{DD}-V_{SS}=10V, T_A=25°C
* Extremely high control input impedance : 10^{12}Ω (typ.)
* Low crosstalk : -50dB (typ.)
* between switches @ f_{IS}=0.9MHz, R_L=1kΩ
* Frequency response, switch "ON" : 40MHz (typ.)

■ ORDERING INFORMATION

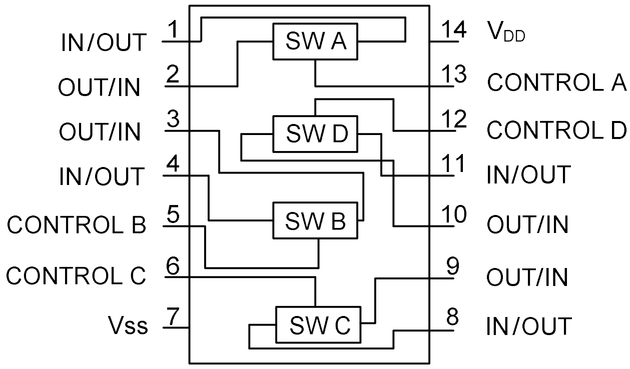
Ordering Number		Package	Packing
Lead Free	Halogen Free		
4066L-D14-T	4066G-D14-T	DIP-14	Tube
4066L-S14-R	4066G-S14-R	SOP-14	Tape Reel
4066L-P14-R	4066G-P14-R	TSSOP-14	Tape Reel

4066G-D14-T	
(1)Packing Type	(1) T: Tube, R: R: Tape Reel
(2)Package Type	(2) D14: DIP-14, S14: SOP-14, P14: TSSOP-14
(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

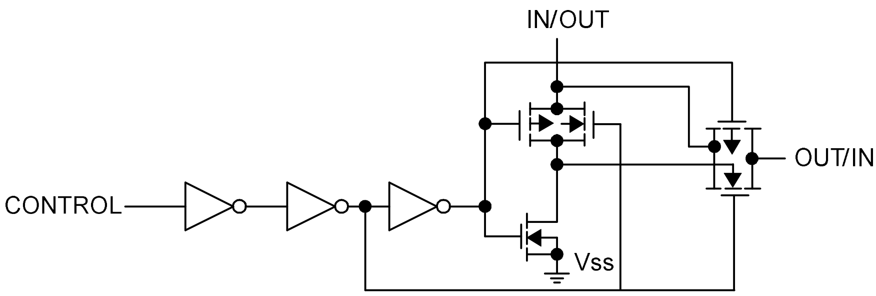
■ MARKING

DIP-14	SOP-14 / TSSOP-14
	

■ PIN CONFIGURATION



■ SCHEMATIC DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (V_{SS}=0V, unless otherwise specified))

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V_{DD}	-0.5 ~ +18	V
Input Voltage		V_{IN}	-0.5 ~ V_{CC}+0.5	V
Power Dissipation	DIP-14	P_D	700	mW
	SOP-14/TSSOP-14		500	
Junction Temperature		T_J	+125	°C
Storage Temperature		T_{STG}	-40 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ RECOMMENDED OPERATING CONDITIONS (V_{SS}=0V, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{DD}	3 ~ 15	V
Input Voltage	V_{IN}	0 ~ V_{DD}	V
Operating Temperature Range	T_{OPR}	-40 ~ +85	°C

■ DC ELECTRICAL CHARACTERISTICS (V_{SS}=0V, unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT
Quiescent Device Current	I_{DD}	V_{DD}=5V			0.01	1.0	µA
		V_{DD}=10V			0.01	2.0	
		V_{DD}=15V			0.01	4.0	
SIGNAL INPUTS AND OUTPUTS							
Input or Output Leakage Switch “OFF”	I_{IS}	V_C=0			±0.1	±50	nA
“ON” Resistance	R_{ON}	R_L=10kΩ~ (V_{DD}-V_{SS}/2) V_C=V_{DD}, V_{SS} ~ V_{DD}	V_{DD}=5V		270	1050	Ω
			V_{DD}=10V		120	400	
			V_{DD}=15V		80	240	
Δ”ON” Resistance Between Any 2 of 4 Switches	$ΔR_{ON}$	R_L=10kΩ~ (V_{DD}-V_{SS}/2) V_C=V_{DD}, V_{IS}=V_{SS} ~V_{DD}	V_{DD}=5V		20		Ω
			V_{DD}=10V		10		
			V_{DD}=15V		5		
CONTROL INPUTS							
Low Level Input Voltage	V_{ILC}	V_{IS}=V_{SS} and V_{DD} V_{OS}=V_{DD} and V_{SS} I_{IS}=±10µA	V_{DD}=5V		2.25	1.5	V
			V_{DD}=10V		4.5	3.0	
			V_{DD}=15V		6.75	4.0	
HIGH Level Input Voltage	V_{IHC}	V_{DD}=5V		3.5	2.75		V
		V_{DD}=10V (Note)		7.0	5.5		
		V_{DD}=15V		11.0	8.25		
Input Current	I_{IN}	V_{DD}-V_{SS}=15V, V_{DD}≧V_{IS}≧V_{SS}, V_{DD}≧V_C≧V_{SS}			$±10^{-5}$	±0.3	µA

Note: Conditions for V_{IHC}: (a) V_{IS}=V_{DD}, I_{OS}=standard B series I_{OH}. (b) V_{IS}=0V, I_{OL}=standard B series I_{OL}

■ AC ELECTRICAL CHARACTERISTICS (AC Parameters are guaranteed by DC correlated testing)

(T_A=25°C, t_R=t_F=20 ns and V_{SS}=0V unless otherwise)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT
Propagation Delay Time Signal Input to Signal Output	T_{PHL}, T_{PLH}	V_C=V_{DD}, C_L=50Pf (Figure1) R_L=200k	V_{DD}=5V		25	55	ns
			V_{DD}=10V		15	35	
			V_{DD}=15V		10	25	
Propagation Delay Time Control Input to Signal Output High Impedance to Logical Level	t_{PZH}, t_{PLZ}	R_L=1.0kΩ, C_L=50pF (Fig. 2, 3)	V_{DD}=5V			125	ns
			V_{DD}=10V			60	
			V_{DD}=15V			50	
Propagation Delay Time Control Input to Signal Output Logical Level to High Impedance	t_{PHZ}, t_{PLZ}	R_L=1.0kΩ, C_L=50pF (Fig. 2, 3)	V_{DD}=5V			125	ns
			V_{DD}=10V			60	
			V_{DD}=15V			50	
Sine Wave Distortion		V_C=V_{DD}=5V, V_{SS}= -5V R_L=10kΩ, V_{IS}=5V_{P-P}, f=1kHz, (Fig. 4)			0.1		%
Frequency Response -Switch “ON” (Frequency at-3dB)		V_C=V_{DD}=5V, V_{SS}= -5V R_L=1kΩ, V_{IS}=5Vp-p 20 Log10 V_{OS}/V_{OS} (1kHz)-dB (Fig. 4)			40		MHz
Feedthrough - Switch “OFF” (Frequency at –50 dB)		V_{DD}=5.0V, V_{CC}=V_{SS}= -5.0V, R_L=1kΩ, V_{IS}=5.0V_{P-P}, 20Log_{10}, V_{OS}/V_{IS}= -50dB, (Fig. 4)			1.25		MHz
Crosstalk Between Any Two Switches(Frequency at-50dB)		V_{DD}=V_C(A)=5.0V; V_{SS}=V_C (B)=5.0V, R_L=1kΩ, V_{IS}(A)=5.0V_{P-P}, 20Log_{10}, V_{OS}(B)/V_{IS} (A)= -50dB (Fig. 5)			0.9		MHz
Crosstalk; Control Input to Signal Output		V_{DD}=10V, R_L=10kΩ, R_{IN}=1.0kΩ, V_{CC}=10V Square Wave, C_L=50pF (Fig. 6)			150		mV_{p-p}
Maximum Control Input		R_L=1.0kΩ, C_L=50pF (Fig. 7) V_{OS} (f) =1/2Vos (1.0kHz)	V_{DD}=5.0V		6.0		MHz
			V_{DD}=10V		8.0		
			V_{DD}=15V		8.5		
Signal Input Capacitance	C_{IS}				8.0		pF
Signal Output Capacitance	C_{OS}	V_{DD}=10V			8.0		pF
Feedthrough Capacitance	C_{IOS}	V_C=0V			0.5		pF
Control Input Capacitance	C_{IN}				5.0	7.5	pF

■ SPECIAL CONSIDERATIONS

In applications where separate power sources are used to drive V_{DD} and the signal input, the V_{DD} current capability should exceed V_{DD}/R_L (R_L=effective external load of the UTC **4066** bilateral switches).This provision avoids any permanent current flow or clamp action of the V_{DD} supply when power is applied or removed from UTC 4066.

In certain applications, the external load-resistor current may include both V_{DD} and Signal-line components. To avoid drawing V_{DD} current when switch current flows into terminals 1,4,8 or 11,the voltage drop across the bidirectional swith must not exceed 0.6V at $T_A \le 25°C$, or 0.4V at T_A >25°C (calculated from R_{ON} values shown).

NO V_{DD} current will flow through R_L if the switch current flows into terminals2, 3, 9 or 10.

■ AC TEST CIRCUITS AND SWITCHING TIME WAVEFORMS

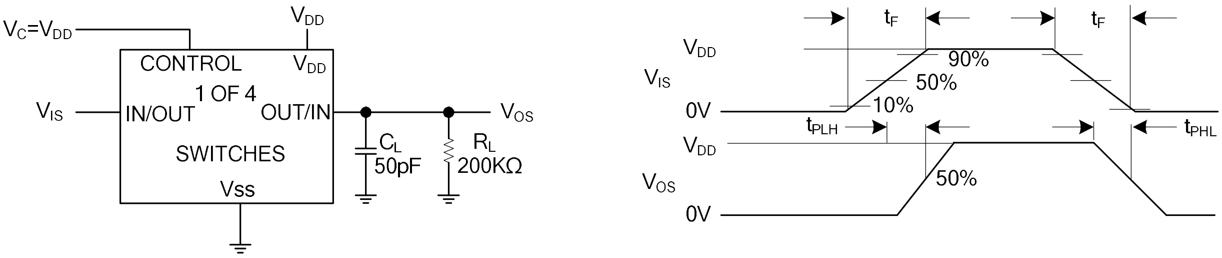


Fig.1 t_{PHL}, t_{PLH} Propagation Delay Time Signal Input to Signal Output

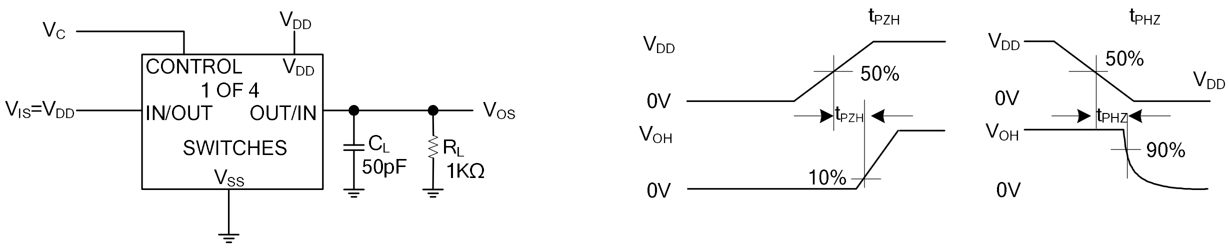


Fig. 2 t_{PZH},t_{PHZ} Propagation Delay Time Control to Signal Output

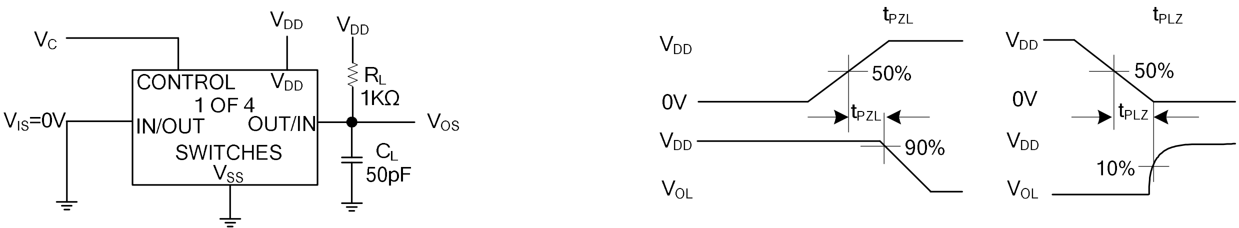
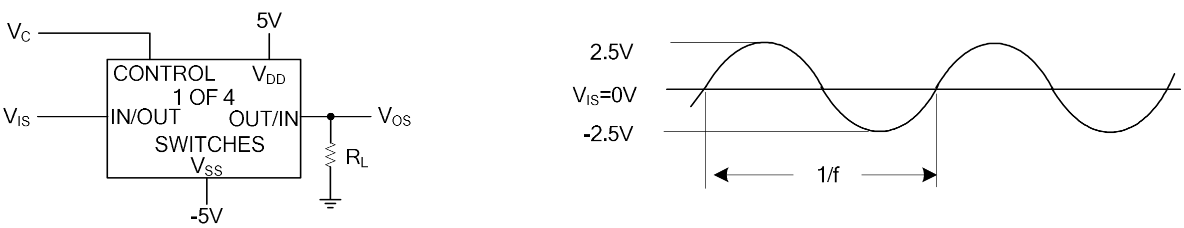


Fig. 3 t_{PZL}, t_{PLZ} Propagation Delay Time Control to Signal Output



$V_C=V_{DD}$ for distortion and frequency response tests
V_C=Vss for feedthrough test

Fig. 4 Sine Wave Distortion,Frequency Response and Feedthrough

■ AC TEST CIRCUITS AND SWITCHING TIME WAVEFORMS (Cont.)

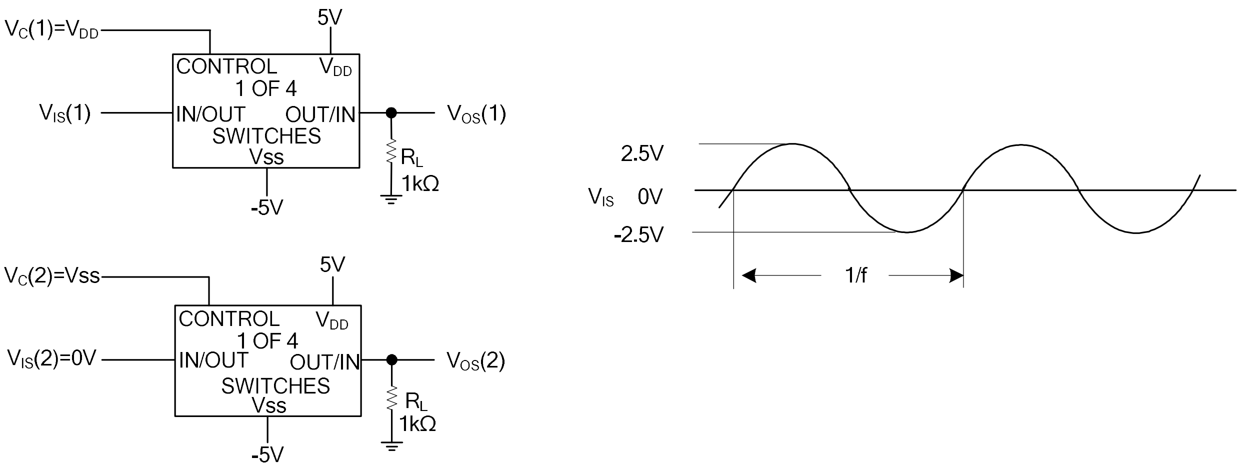


Fig. 5 Crosstalk Between Any Two Switches

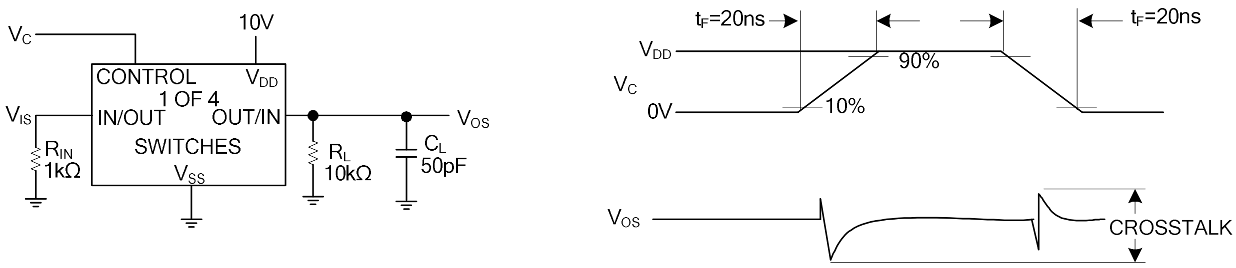


Fig.6 Crosstalk: Control Input to Signal Output

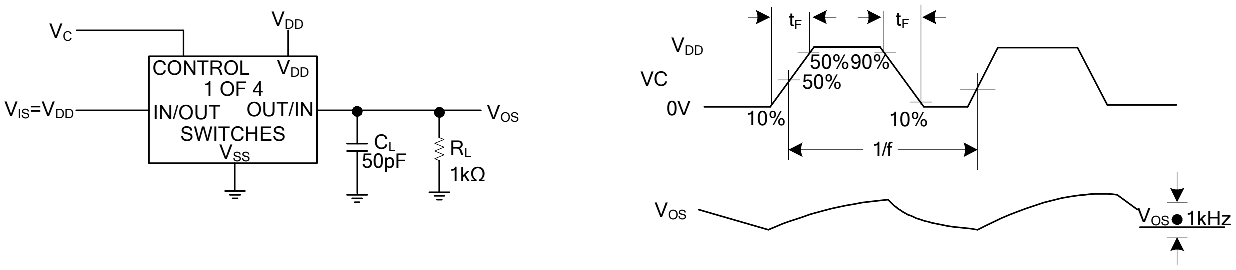
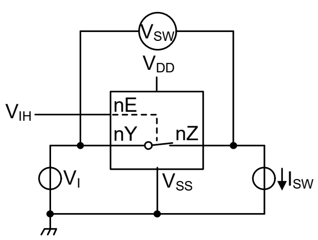


Fig. 7 Maximum Control Input Frequency



$R_{ON}=V_{SW} / I_{SW}$

I_{SW}=200uA

Fig. 8 Test circuit for measuring R_{ON}

■ TYPICAL CHARACTERISTICS