

CWB308 / CWB309

FEATURES

- Low Insertion Loss 0.9 x DC @ 100MHz
- Low Channel-to-Channel Crosstalk..... -80dB
- High OFF Isolation 68dB @ 10MHz
- Fast Switching <140ns
- Low ON Resistance..... 40Ω (typ)

APPLICATIONS

- High Speed Multiplexing
- RF & Video Switches
- Sample and Hold Switches
- Track and Hold Switches
- Computer Peripherals

DESCRIPTION

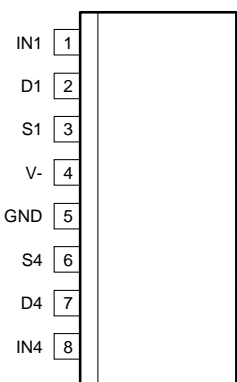
The Calogic CWB308 and CWB309 feature fast switching (<140ns) and low ON resistance (<40Ω) for excellent performance in applications in communications, computer peripherals and instrument controls. This series combines low power CMOS input logic and level translation circuitry with high speed, low capacitance DMOS switches in a monolithic structure. The CWB308 and CWB309 have CMOS compatible inputs and also have a standard pin configuration for second sourcing.

ORDERING INFORMATION

| Part | Package | Temperature Range |
|----------|-----------------------------|-------------------|
| CWB308CP | Plastic 16-Pin Dip | 0 to +85°C |
| CWB308CY | Plastic SO-16 Surface Mount | 0 to +85°C |
| XCWB308 | Sorted Chips in Carriers | 0 to +85°C |
| CWB309CP | Plastic 16-Pin Dip | 0 to +85°C |
| CWB309CY | Plastic SO-16 Surface Mount | 0 to +85°C |
| XCWB309 | Sorted Chips in Carriers | 0 to +85°C |

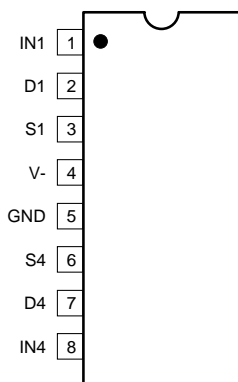
PIN CONFIGURATION

SO-16



TOP VIEW
CWB308CY
CWB309CY

16-PIN DIP

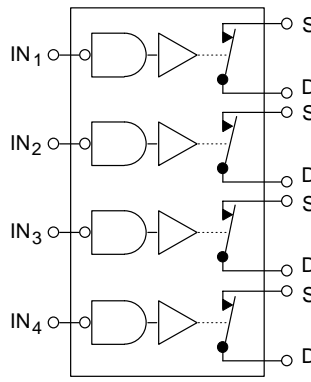


TOP VIEW
CWB308CP
CWB309CP

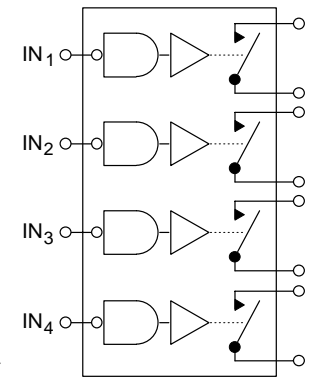
CWB

FUNCTIONAL BLOCK DIAGRAMS

CWB308



CWB309



Four SPST Switches per Package.
Switches shown in Logic '1' Input Position.

LOGIC TABLE

| Logic | CWB308 | CWB309 |
|-------|--------|--------|
| 0 | OFF | ON |
| 1 | ON | OFF |

All devices contain diodes to protect inputs against damage due to high static voltages or electric fields; however, it is advised that precautions be taken not to exceed the maximum recommended input voltages. All unused inputs must be connected to an appropriate logic level (either V_{cc} or GND).

ABSOLUTE MAXIMUM RATINGS

| | | |
|-----------------|--|----------------------|
| V- | Negative Supply Voltage | -20V |
| V+ | Positive Supply Voltage | +20V |
| V _{IN} | Control Input Voltage Range | V+ +0.3V V- -0.3V |
| I _L | Continuous Current, any Pin except S or D | 20mA |
| I _S | Continuous Current, S or D | 30mA |
| I _S | Peak Pulsed Current, S or D, 80μsec, 1%, Duty Cycle | 180mA |
| T _J | Junction Temperature Range | -55 to +125°C |
| T _S | Storage Temperature Range | -55 to +125°C |
| P _D | Power Dissipation | 500mW |

RECOMMENDED OPERATING CONDITIONS

| | | |
|-----------------|-----------------------------|--------------|
| V- | Negative Supply Voltage | -8.0 to -15V |
| V+ | Positive Supply Voltage | +8.0 to +15V |
| V _{IN} | Control Input Voltage Range | 0 to +5V |
| V _S | Analog Switch Voltage Range | -10 to +10V |
| T _{OP} | Operating Temperature | 0 to +85°C |

ELECTRICAL CHARACTERISTICS (V₋ = -15V, V₊ = +15V unless otherwise noted, T_A = +25°C)

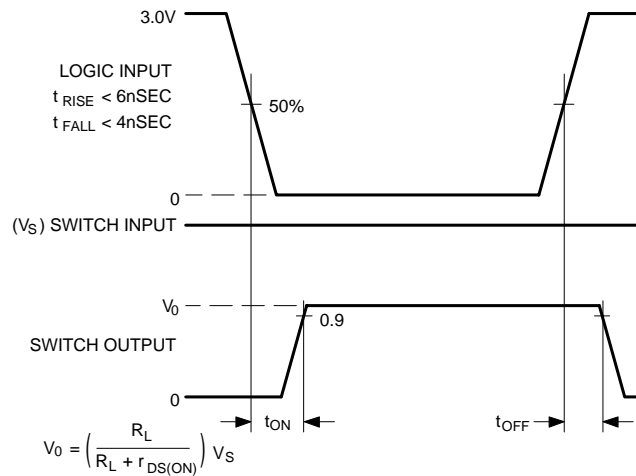
| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|---------------------|-----------------------------------|-----|------|------|-------|--|
| STATIC | | | | | | |
| V _{ANALOG} | Analog Signal Range | -10 | | +10 | V | |
| r _{DS(ON)} | Switch ON Resistance | | 40 | 80 | ohms | V _S = -10V |
| | | | 45 | 80 | | V _S = +2.0V |
| | | | | 100 | | 160 |
| V _{IH} | High Level Input Voltage | 4.5 | 3.4 | | V | |
| V _{IL} | Low Level Input Voltage | | | 1.0 | | |
| I _{IN} | Logic Input Leakage Current | | 0.01 | 0.1 | μA | V _{IN} = +5.0V |
| | | | | 0.02 | | 0.1 |
| I _{D(OFF)} | Switch OFF Leakage Current | | 0.2 | 5.0 | nA | V _D = +10V, V _S = -10V |
| I _{S(OFF)} | | | 0.4 | 5.0 | | V _S = +10V, V _D = -10V |
| I ₋ | Negative Supply Quiescent Current | | -0.1 | -0.5 | μA | CWB309 V _{IN} = 5.0V CWB308 V _{IN} = 1.0V |
| I ₊ | Positive Supply Quiescent Current | | 0.1 | 0.5 | | |
| DYNAMIC | | | | | | |
| t _{ON} | Switch Turn-ON Time | | 140 | 250 | nSec | V _{IN} = 1.0V CWB308 |
| t _{OFF} | Switch Turn-OFF Time | | 80 | 220 | | V _{IN} = 5.0V CWB309 |
| O _{IRR} | Off Isolation Rejection Ratio | 60 | 62 | | dB | f = 10MHz, R _L = 50Ω |
| C _{CRR} | Cross-Coupling Rejection Ratio | | 80 | | | f = 10MHz, R _L = 50Ω |
| C _d | Drain-Node Capacitance | | 0.3 | | pF | V _{IN} = 1.0V CGWB308 |
| C _s | Source-Node Capacitance | | 3.0 | | | V _{IN} = 5.0V CWB309 V _D = V _S = 0, f = 1MHz |

ELECTRICAL CHARACTERISTICS ($V_- = -15V$, $V_+ = +15V$ unless otherwise noted)

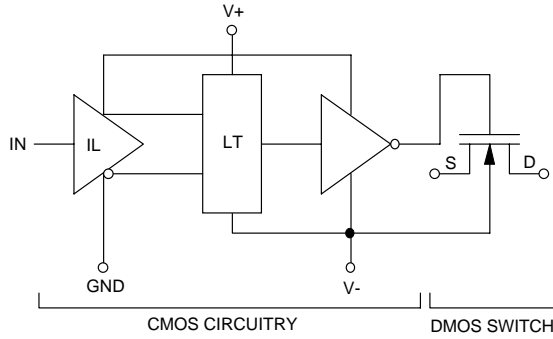
LIMITS AT TEMPERATURE EXTREMES

| SYMBOL | PARAMETER | MAXIMUM @ $T_A =$ | UNITS | TEST CONDITIONS |
|---------------|-----------------------------|-------------------|---------|--------------------------|
| | | +85°C | | |
| STATIC | | | | |
| V_{ANALOG} | Analog Signal Range | ± 10 | V | |
| $r_{DS(ON)}$ | Switch ON Resistance | 120 | ohms | $V_S = -10V$ |
| | | 120 | | $V_S = +2.0V$ |
| | | 240 | | $V_S = +10V$ |
| I_{IN} | Logic Input Leakage Current | 1.0 | μA | $V_{IN} = +5.0V$ |
| | | 2.0 | | $V_{IN} = +15V$ |
| $I_{D(OFF)}$ | Switch OFF Leakage Current | 100 | nA | $V_D = +10V, V_S = -10V$ |
| $I_{S(OFF)}$ | | 100 | | $V_S = +10V, V_D = -10V$ |
| I_- | Supply Quiescent Current | -20 | μA | |
| I_+ | | 20 | | |

TEST WAVE FORMS



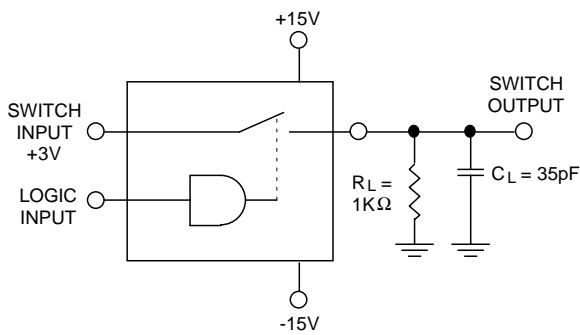
FUNCTIONAL BLOCK DIAGRAMS (1 of 4 channels)



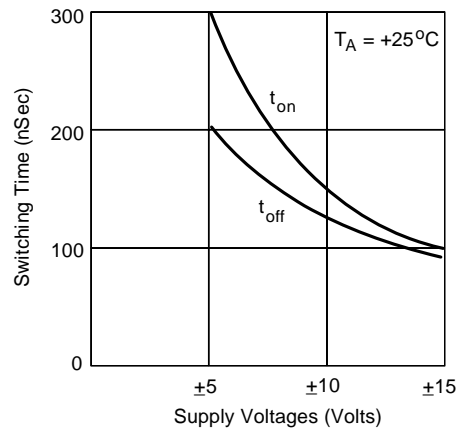
Switch Contacts:

Switches are bi-directional (Analog Input can be to Source or Drain. However, for optimum performance in Video Application, connect Input to Source and Output to Drain.

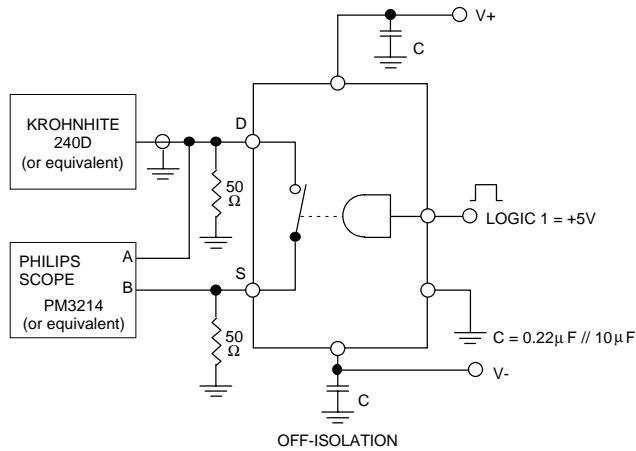
SWITCHING TIMES TEST CIRCUIT



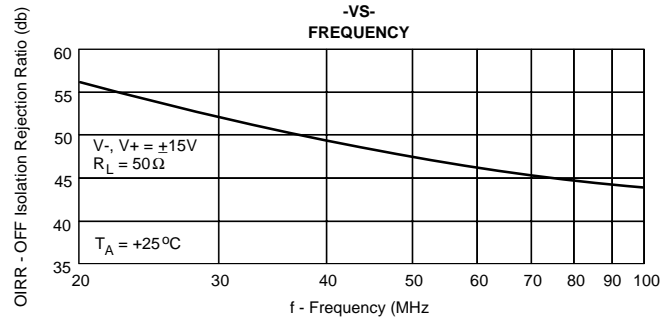
**SWITCHING TIMES
-VS-
SUPPLY VOLTAGES**



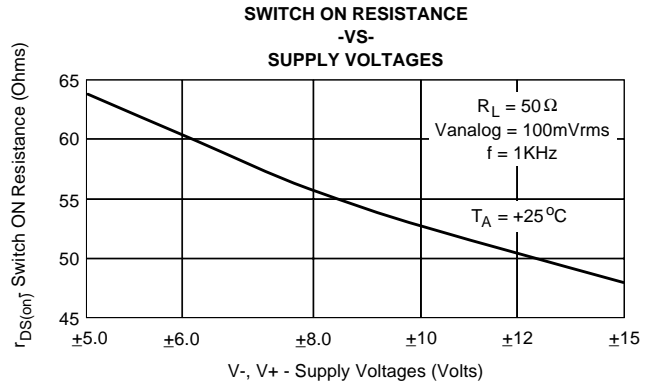
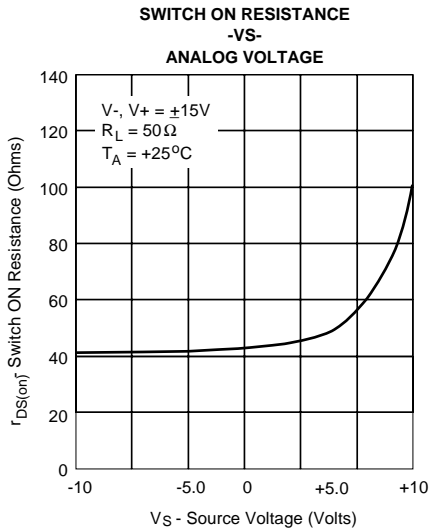
OFF ISOLATION TEST CIRCUIT



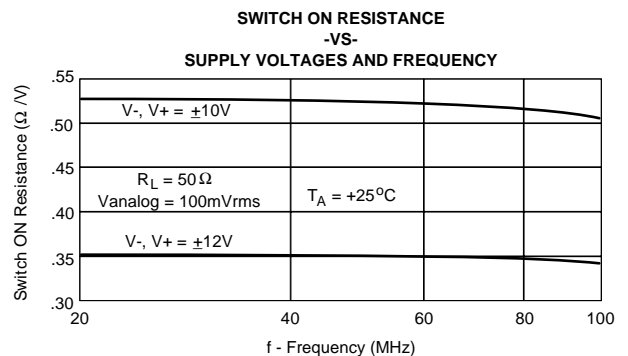
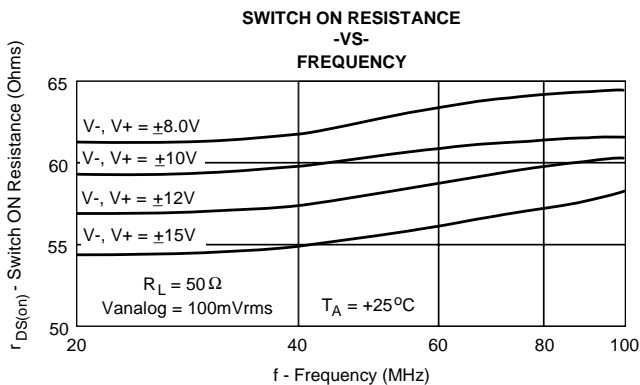
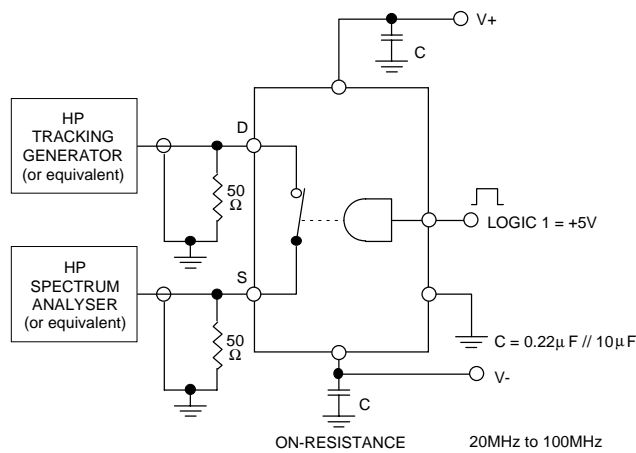
**OFF ISOLATION REJECTION RATIO
-VS-
FREQUENCY**



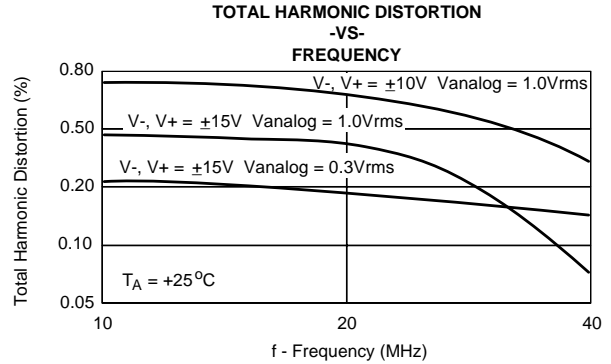
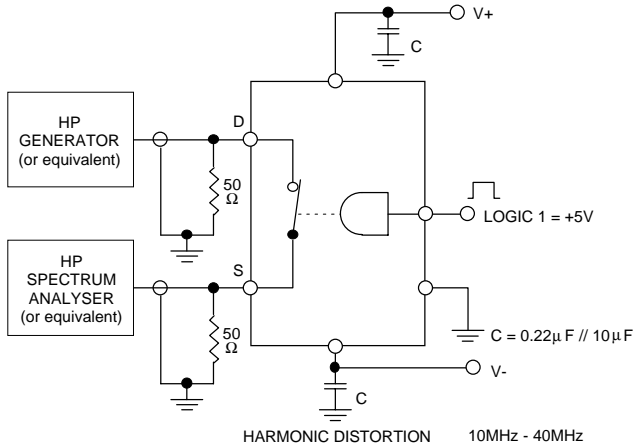
SWITCH ON RESISTANCE



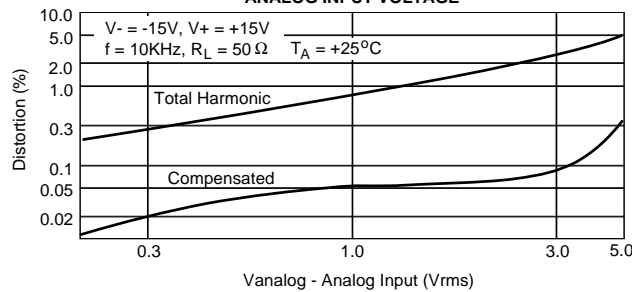
SWITCH ON RESISTANCE -VS- FREQUENCY TEST CIRCUIT



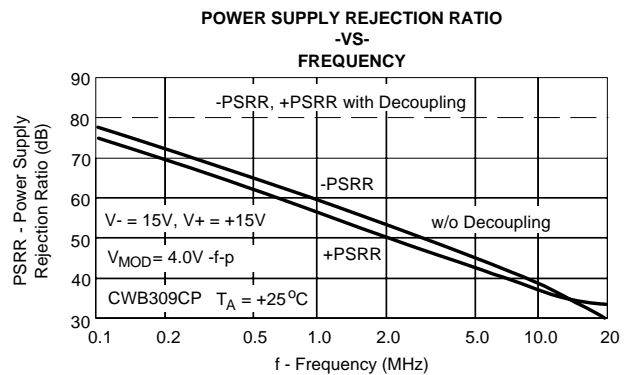
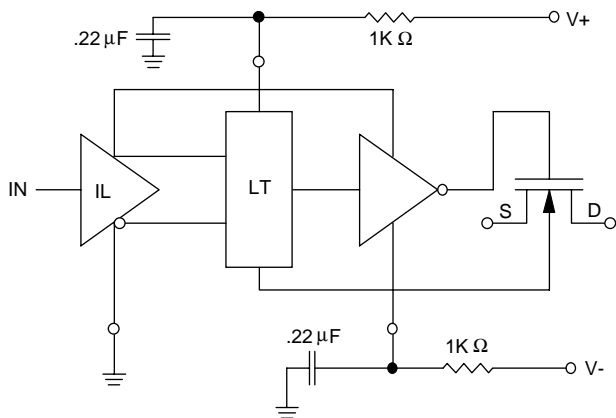
DISTORTION -VS- FREQUENCY



DISTORTION -VS- ANALOG INPUT VOLTAGE



POWER SUPPLY REJECTION RATIO POWER SUPPLY DECOUPLING CIRCUIT

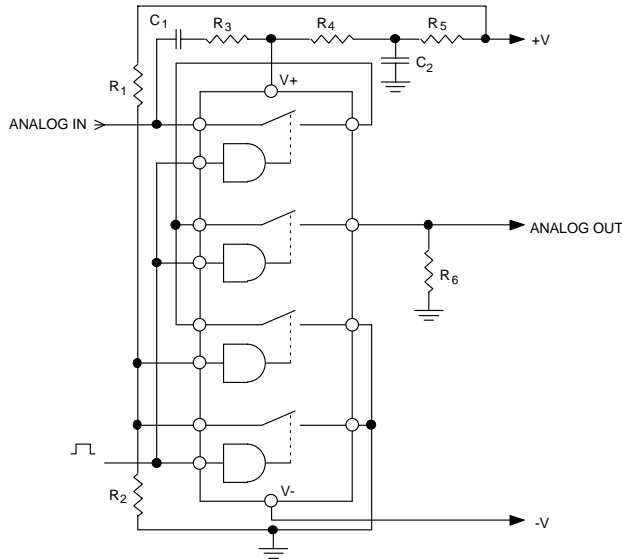


By inserting 1K ohm resistors in series with V+ and V- power supply lines and decoupling both pins at the device socket, it is possible to improve power supply rejection ratios of a video switch by 50dB at frequencies of 20MHz and higher.

APPLICATIONS

LOW DISTORTION, RAIL-TO-RAIL ANALOG SWITCH

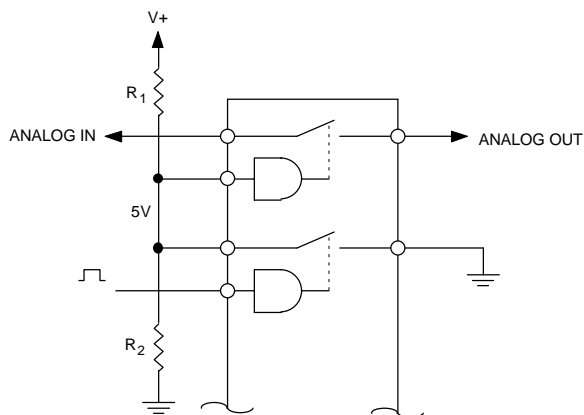
Features very low distortion for low frequency and large signal applications.



VERY LOW DISTORTION CIRCUIT FOR LOW FREQUENCY AND LARGE SIGNAL APPLICATIONS

This circuit provides very low distortion ($<0.1\%$) and high off isolation (>90 dB) at signal levels equal to the supply voltage. The signal passes through a T switch configuration and at the same time is modulating the power supply. This modulation maintains a constant on resistance $r_{DS(on)}$ which in turn reduces the distortion. R5 is for bypassing the power supply and has a typical value of 1K ohm, R4 should be a value that can be accommodated by the signal source as load, R3 is only necessary at loads lower than 100 ohms and should be selected during the initial design of the circuit, C1 has to be large enough for the lowest signal to pass and C2 will have to bypass all signals. R1 and R2 set up the one logic level for the control input and should be set to 5 volts.

LOGIC INVERTER



This circuit provides logic inversion with two resistors and one switch. It does not require additional logic parts. The resistors divide the supply voltage down to a 5 volt level when high and are switched to a low level via the switch. This configuration allows a single pole, single throw switch to be changed into a single pole, double throw switch.