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CORPORATION

CMOS/DMOS Quad Monolithic SPST Wide Band Analog Switches

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**

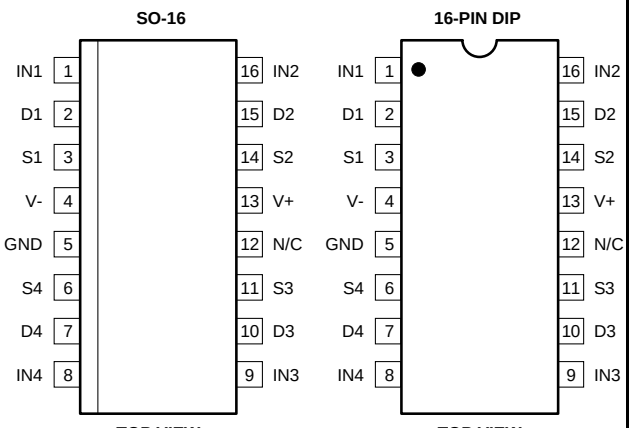
DESCRIPTION

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

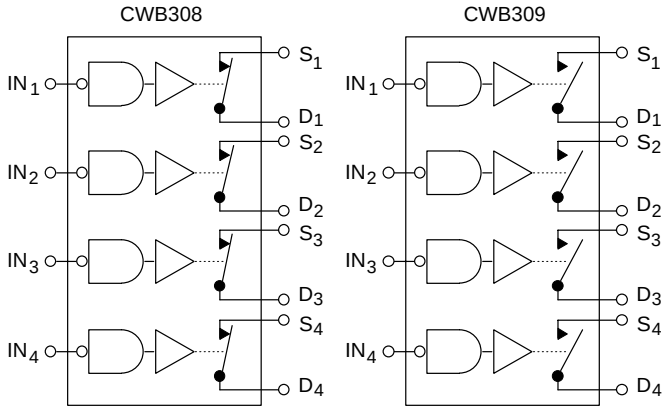
Part	Package	Temperature Range
CWB308CP	Plastic 16-Pin Dip	0 to +85°C
CWB308CY	Plastic SO-16 Surface Mount	0 to +85°C
XCWB308	Sorted Chips in Carriers	0 to +85°C
CWB309CP	Plastic 16-Pin Dip	0 to +85°C
CWB309CY	Plastic SO-16 Surface Mount	0 to +85°C
XCWB309	Sorted Chips in Carriers	0 to +85°C

PIN CONFIGURATION



CWB

FUNCTIONAL BLOCK DIAGRAMS



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).

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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)

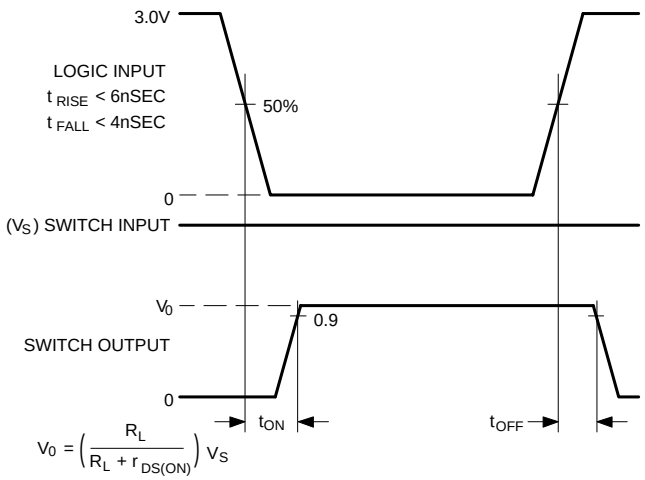
SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
STATIC						
V_{ANALOG}	Analog Signal Range	-10		+10	V	
$r_{DS(ON)}$	Switch ON Resistance		40	80	ohms	V_S = -10V
			45	80		V_S = +2.0V
			100	160		V_S = +10V
V_{IH}	High Level Input Voltage	4.5	3.4		V	
V_{IL}	Low Level Input Voltage			1.0		
I_{IN}	Logic Input Leakage Current		0.01	0.1	µA	V_{IN} = +5.0V
			0.02	0.1		V_{IN} = +15V
$I_{D(OFF)}$	Switch OFF Leakage Current		0.2	5.0	nA	V_D = +10V, V_S = -10V; CWB309 V_{IN} = 5.0V; CWB308 V_{IN} = 1.0V
$I_{S(OFF)}$			0.4	5.0		V_S = +10V, V_D = -10V; CWB309 V_{IN} = 5.0V; CWB308 V_{IN} = 1.0V
I-	Negative Supply Quiescent Current		-0.1	-0.5	µA	
I+	Positive Supply Quiescent Current		0.1	0.5		
DYNAMIC						
t_{ON}	Switch Turn-ON Time		140	250	nSec	V_{IN} = 1.0V CWB308 V_{IN} = 5.0V CWB309
t_{OFF}	Switch Turn-OFF Time		80	220		
O_{IRR}	Off Isolation Rejection Ratio	60	62		dB	f = 10MHz, R_L = 50Ω
C_{CRR}	Cross-Coupling Rejection Ratio		80			f = 10MHz, RL = 50Ω
C_d	Drain-Node Capacitance		0.3		pF	V_{IN} = 1.0V CGWB308 V_{IN} = 5.0V CWB309 V_D = V_S = 0, f = 1MHz
C_s	Source-Node Capacitance		3.0			

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

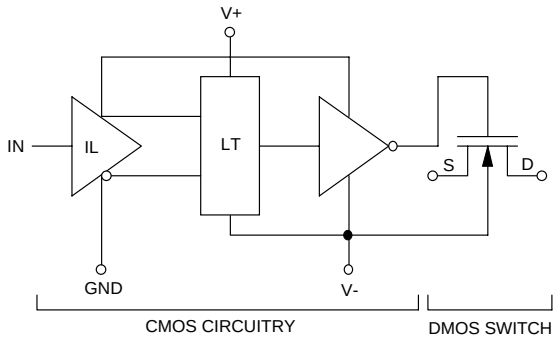
LIMITS AT TEMPERATURE EXTREMES

SYMBOL	PARAMETER	MAXIMUM @ T_A = +85°C	UNITS	TEST CONDITIONS
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



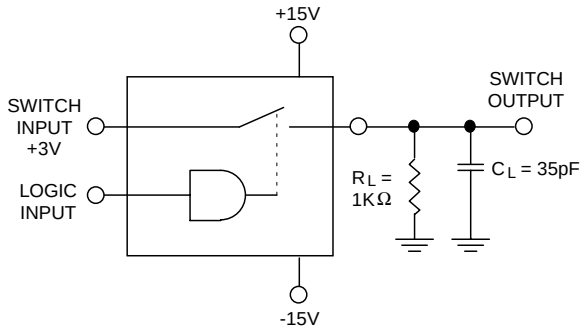
FUNCTIONAL BLOCK DIAGRAMS (1 of 4 channels)



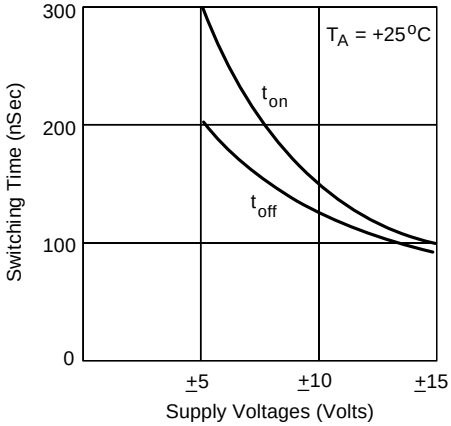
Switch Contacts:

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.

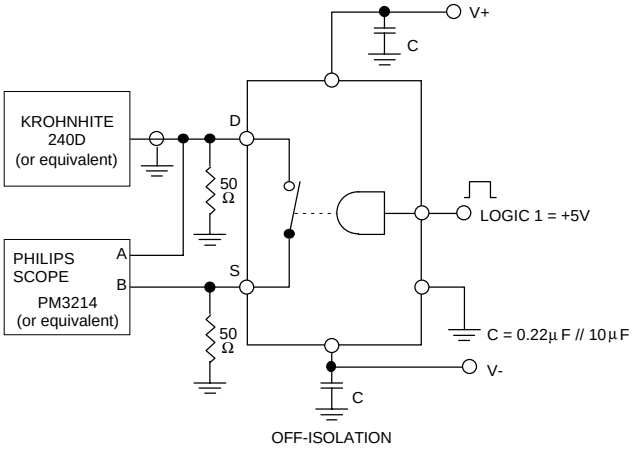
SWITCHING TIMES TEST CIRCUIT



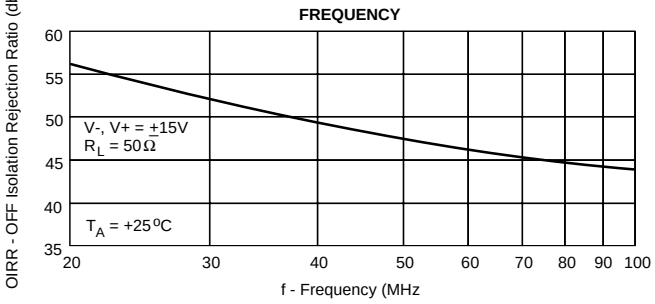
SWICHING TIMES -VS- SUPPLY VOLTAGES



OFF ISOLATION TEST CIRCUIT

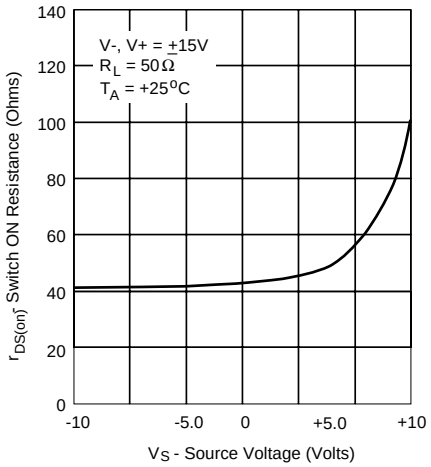


OFF ISOLATION REJECTION RATIO -VS- FREQUENCY

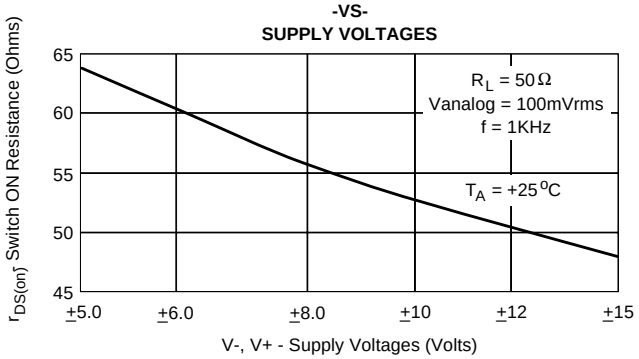


SWITCH ON RESISTANCE

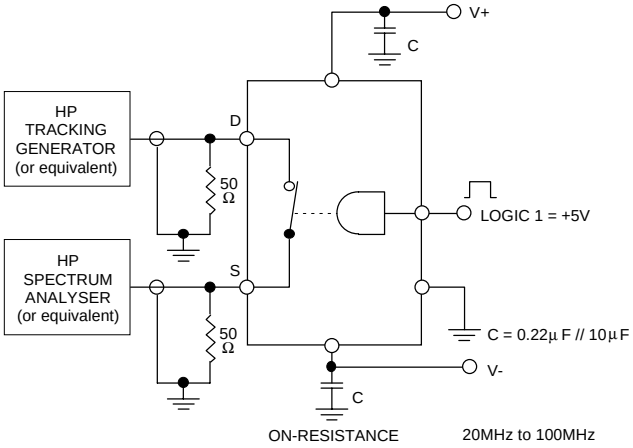
SWITCH ON RESISTANCE -VS- ANALOG VOLTAGE



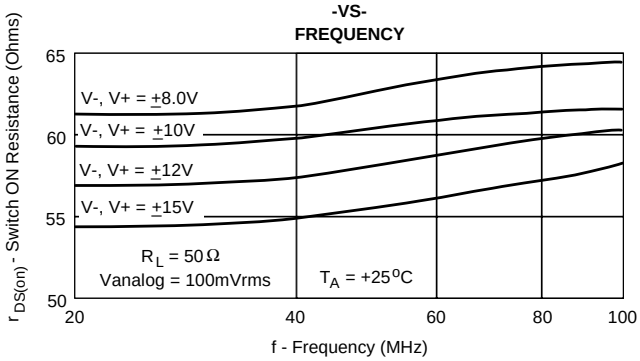
SWITCH ON RESISTANCE -VS- SUPPLY VOLTAGES



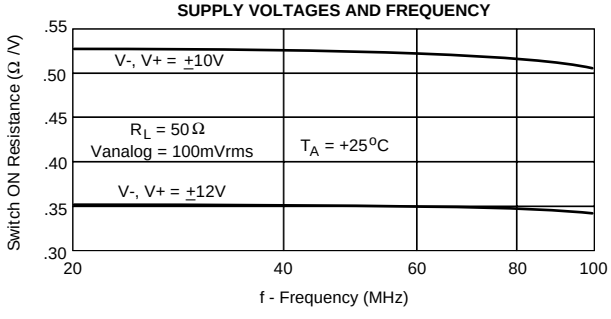
SWITCH ON RESISTANCE -VS- FREQUENCY TEST CIRCUIT



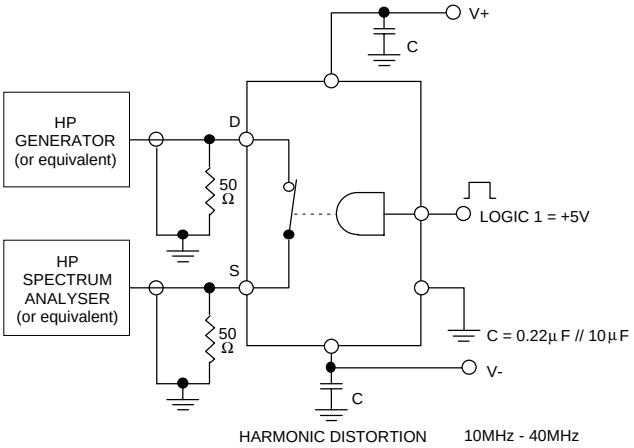
SWITCH ON RESISTANCE -VS- FREQUENCY

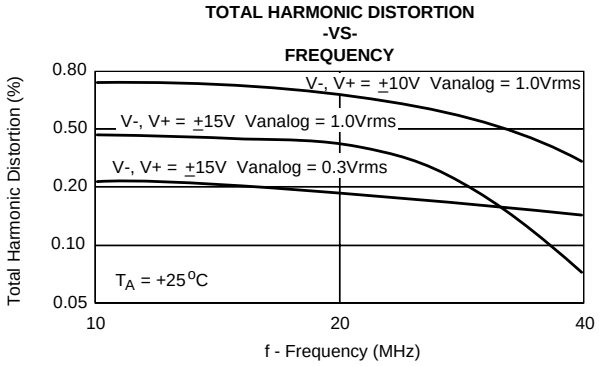


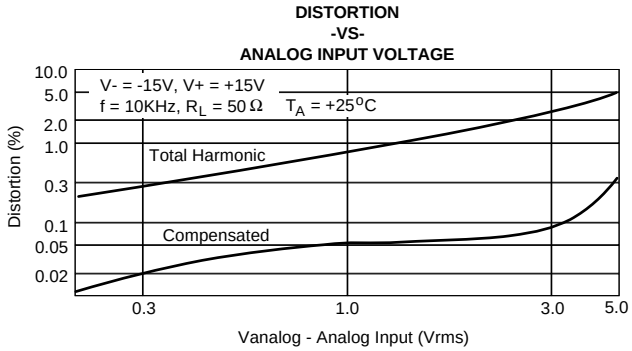
SWITCH ON RESISTANCE -VS- SUPPLY VOLTAGES AND FREQUENCY



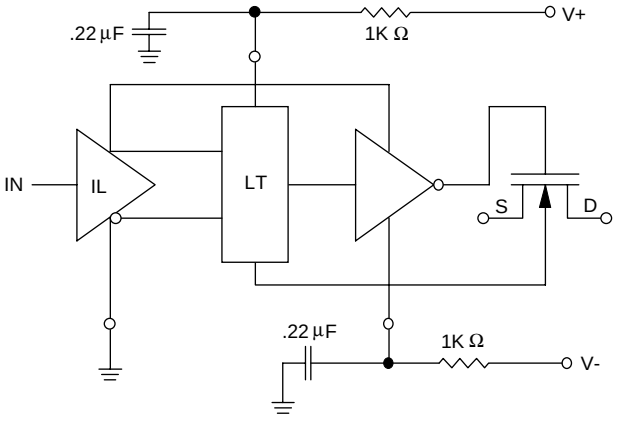
DISTORTION -VS- FREQUENCY

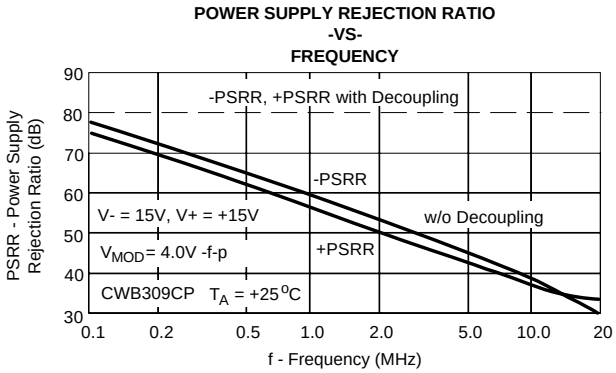






POWER SUPPLY REJECTION RATIO POWER SUPPLY DECOUPLING CIRCUIT



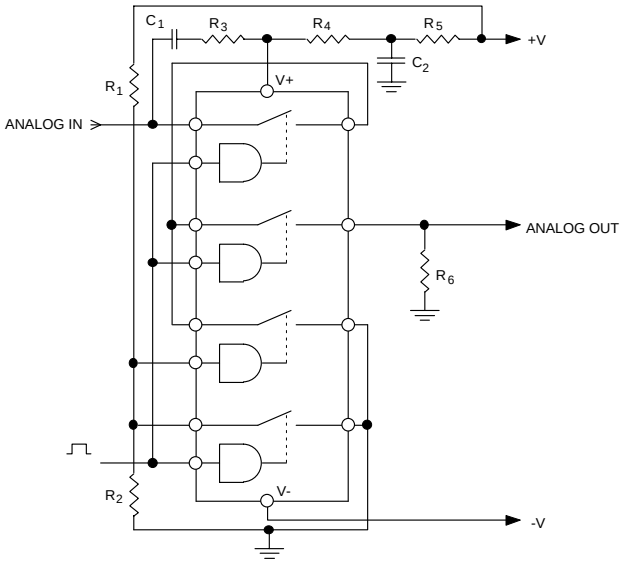


By inserting 1K ohm resistors in series with V+ and V- power supply lines and decoupling both pins at the device socket, it is possible to improve power supply rejection ratios of a video switch by 50dB at frequencies of 20MHz and higher.

APPLICATIONS

LOW DISTORTION, RAIL-TO-RAIL ANALOG SWITCH

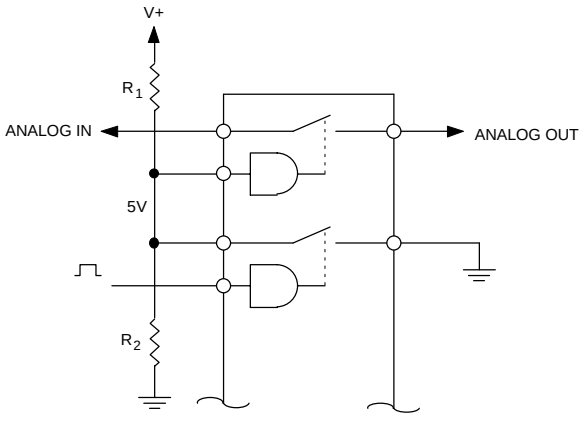
Features very low distortion for low frequency and large signal applications.



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 accommadated 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.