# CMOS/DMOS High Speed Analog Switch

## CWB2214

### FEATURES

- **High OFF Isolation. . . . . >40dB @ 100MHz**
  **. . . . . >25dB @ 200MHz**
- **Fast Switching**
- **CMOS Compatible Inputs**
- **Wide Bandwidth. . . . . -3dB @ 250MHz**
- **Low ON Resistance**

### APPLICATIONS

- **RF and Video Switches**
- **High Frequency Data Acquisition**
- **High Frequency Multiplexing**

### DESCRIPTION

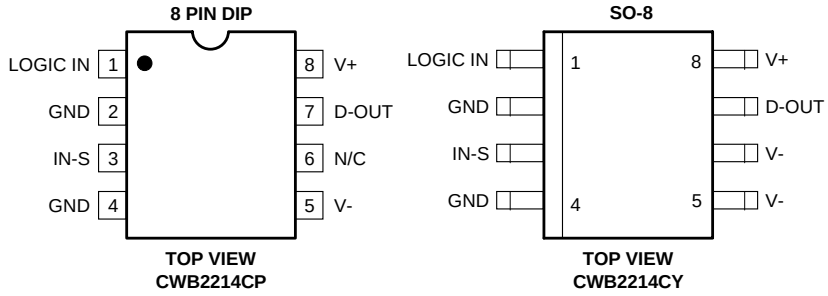
The CWB2214 is a High Speed SPST Analog Switch designed utilizing Calogic's proprietary CMOS/DMOS processing techniques. The device features low-power CMOS input logic and level translation circuitry and high speed, low capacitance lateral DMOS switches fabricated together in a monolithic structure.

### ORDERING INFORMATION

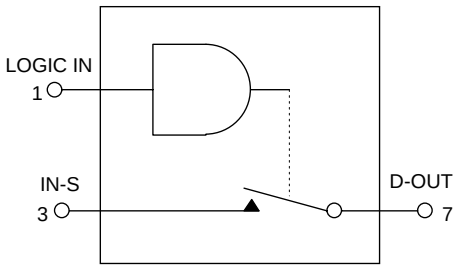
| Part | Package | Temperature Range |
|---|---|---|
| CWB2214CP | Plastic 8-Pin Dip | 0 to 85°C |
| CWB2214CY | Plastic SO-8 | 0 to 85°C |
| XCWB2214 | Sorted Chips in Carriers | 0 to 85°C |

### PIN CONFIGURATION

**CWB**




### FUNCTIONAL DIAGRAM




One SPST Switch per Package.
Switch shown in Logic '1' Input Position.
Logic '0' $\leq$ 1.0V
Logic '1' $\geq$ 4.5V

NOTE: 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 ($V_{DD}$ 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<br>V- -0.3V |
| $I_L$ | Continuous Current, any Pin except S or D | 20mA |
| $I_S$ | Continuous Current, S or D | 40mA |
| $I_S$ | Peak Pulsed Current, S or D, 80µsec, 1%, Duty Cycle | 100mA |
| $T_J$ | Junction Temperature Range | -55 to +125°C |
| $T_S$ | Storage Temperature Range | -55 to +125°C |
| $P_D$ | Power Dissipation (derate at 12mW/ °C, above +85°C) | 500mW |

## RECOMMENDED OPERATING CONDITIONS

| | | |
|---|---|---|
| V- | Negative Supply Voltage | -5 to -15V |
| V+ | Positive Supply Voltage | +5 to +15V |
| $V_{IN}$ | Control Input Voltage Range | 0 to +5V |
| $T_{OP}$ | Operating Temperature | 0 to +85°C |

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

| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS | |
|---|---|---|---|---|---|---|---|
| **STATIC** | | | | | | | |
| $V_{ANALOG}$ | Analog Signal Range | -10 | | +10 | V | | |
| $r_{DS(ON)}$ | Switch ON Resistance | | 45 | 80 | Ω | $V_S$ = -10V | |
| | | | 50 | 80 | | $V_S$ = +2.0V | |
| | | | 130 | 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, $V_{IN}$ = 5V | |
| $I_{S(OFF)}$ | | | 0.2 | 5.0 | | $V_S$ = +10V, $V_D$ = -10V, $V_{IN}$ = 5V | |
| I- | Negative Supply Quiescent Current | | | -8.0 | mA | $V_{IN}$ = 0 or V+ | |
| I+ | Positive Supply Quiescent Current | | | 8.0 | | | |
| **DYNAMIC** | | | | | | | |
| $t_{ON}$ | Switch Turn-ON Time | | 40 | 60 | nsec | $V_{IN}$ = 5.0V, $R_L$ = 50Ω<br>$C_L$ = 12pF | |
| $t_{OFF}$ | Switch Turn-OFF Time | | 20 | 40 | | | |
| $O_{IRR}$ | OFF Isolation Rejection Ratio | 37 | 40 | | dB | $R_L$ = 50Ω | f = 100MHz |
| | | 22 | 25 | | | | f = 200MHz |
| $I_L$ | Insertion Loss | | 7.8 | 13 | | $R_L$ = 50Ω, f = 200MHz | |
| $C_d$ | Drain-Node Capacitance | | 0.3 | | pF | $V_D$ = 0 | f = 1MHz, $V_{IN}$ = 0 |
| $C_s$ | Source-Node Capacitance | | 3.0 | | | $V_S$ = 0 | |

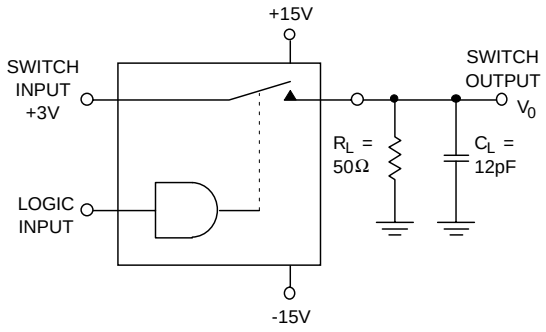
**ELECTRICAL CHARACTERISTICS** (V- = -15V, V+ = +15V unless otherwise noted)

**LIMITS AT TEMPERATURE EXTREMES**

| SYMBOL | PARAMETER | MAXIMUM TA @ $T_A$ = +85°C | UNITS | TEST CONDITIONS |
|---|---|---|---|---|
| **STATIC** | | | | |
| $V_{ANALOG}$ | Analog Signal Range | ±10 | V | |
| $r_{DS(ON)}$ | Switch ON Resistance | 120 | Ω | $V_S$ = -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 | 200 | nA | $V_D$ = +10V, $V_S$ = -10V, $V_{IN}$ = 5V |
| $I_{S(OFF)}$ | | 200 | | $V_S$ = +10V, $V_D$ = -10V, $V_{IN}$ = 5V |
| I- | Negative Supply Quiescent Current | -10 | mA | $V_{IN}$ = 0 or V+ |
| I+ | Positive Supply Quiescent Current | 10 | | |

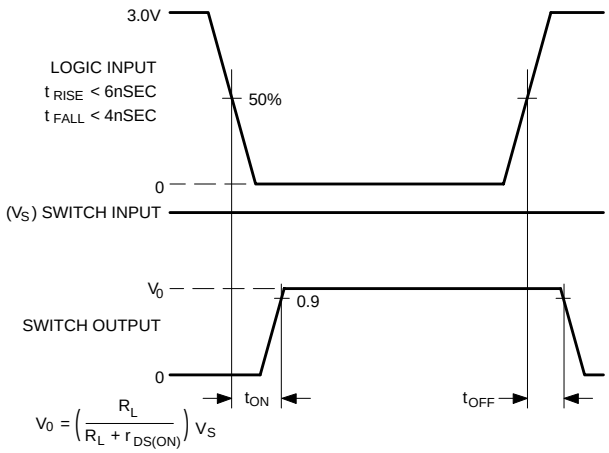
**TYPICAL PERFORMANCE CHARACTERISTICS** ($T_A$ = +25°C, unless otherwise specified)

**SWITCHING TIMES TEST CIRCUIT**



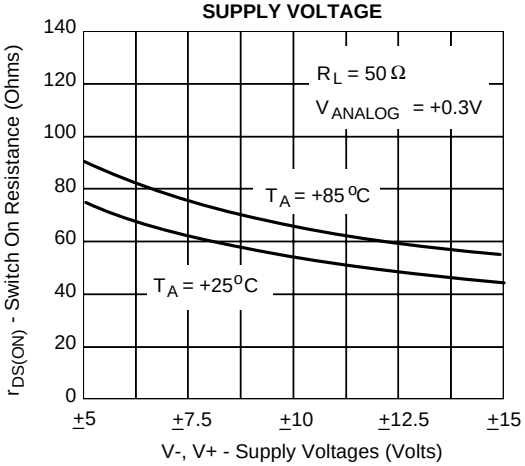

SWITCH ILLUSTRATED IN LOGIC '1', SWITCH OFF, POSITION

**TEST WAVEFORMS**

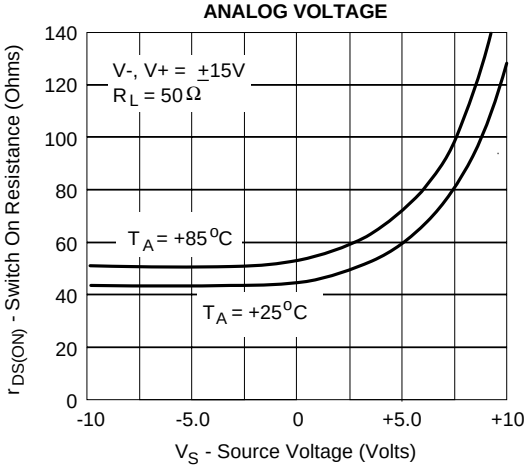


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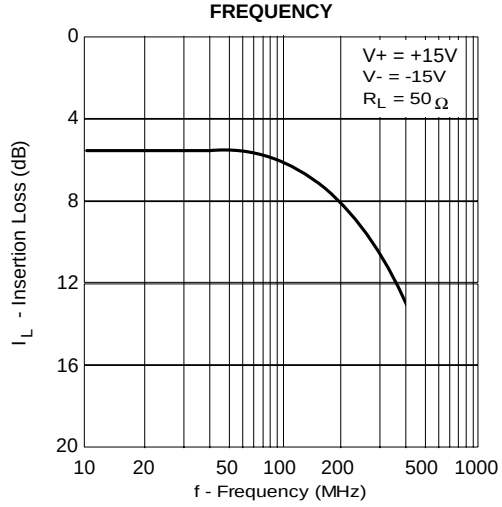
**SWITCH ON RESISTANCE -VS- SUPPLY VOLTAGE**




**SWITCH ON RESISTANCE -VS- ANALOG VOLTAGE**




**INSERTION LOSS -VS- FREQUENCY**




**OFF ISOLATION -VS- FREQUENCY**

