TOPAZ SEMICONDUCTOR

CDG2214

HIGH SPEED ANALOG SWITCH

ORDERING INFORMATION

One SPST Switch	8-Pin Plastic Dip (Package 8)	8-Pin Ceramic Dip (Package 13)	SO-8 Plastic (Package 19)
Industrial Temperature Range	CDG2214BJ	—	CDG2214CY
Military Temperature Range		CDG2214AK	—

Available in Chip form.
Contact factory for Ordering Information.

FEATURES

- Ultra High OFF Isolation, > 40 dB @ 100MHz and > 25 dB @ 200 MHz
- High Speed Switching, t_{on} 40 nS and t_{off} 20 nS
- CMOS Compatible Inputs
- Low ON Resistance, <50Ω
- Wide Bandwidth, -3 dB @ 250MHz

APPLICATIONS

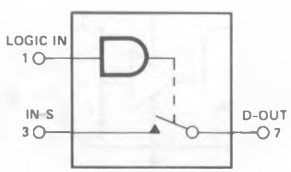
- RF & Video Switches
- High Frequency Data Acquisition
- High Frequency Multiplexers

DESCRIPTION

Topaz Semiconductor CMOS/D-MOS Analog Switches feature high-speed, low-power CMOS input logic and level translation circuitry and high speed, low capacitance Lateral D-MOS switches. CMOS and Lateral D-MOS circuitry are fabricated together on a single silicon chip.

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).

FUNCTIONAL DIAGRAM



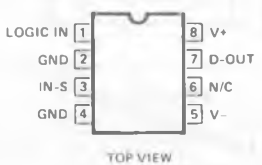
One SPST Switch per Package.

Switch shown in Logic "1" Input Position.

Logic '0' ≤ 1.0V
Logic '1' ≥ 4.5V

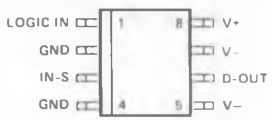
PIN CONFIGURATION

8-Pin Plastic DIP



TOP VIEW

SO-8 Plastic



TOP VIEW

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 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
TOP Operating Temperature Range
A Suffix ..... -55 to +125°C
B Suffix ..... -25 to +85°C

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

#	SYMBOL		PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
1	V_{ANALOG}	STATIC	Analog Signal Range	-10		+10	V	
2	$r_{DS(on)}$	STATIC	Switch ON Resistance		45	80	Ω	V_S = -10V
3		STATIC			50	80	Ω	V_S = +2.0V
4		STATIC			130	160	Ω	V_S = +10V
5	V_{IH}	STATIC	High Level Input Voltage	4.5	3.4		V	
6	V_{IL}	STATIC	Low Level Input Voltage			1.0	V	
7	I_{IN}	STATIC	Logic Input Leakage Current		0.01	0.1	µA	V_{IN} = +5.0V
8		STATIC			0.02	0.1	µA	V_{IN} = +15V
9	$I_{D(OFF)}$	STATIC	Switch OFF Leakage Current		0.2	5.0	nA	V_D = +10V, V_S = -10, V_{IN} = 5V
10	$I_{S(OFF)}$	STATIC			0.2	5.0	nA	V_S = +10V, V_D = -10, V_{IN} = 5V
11	I-	STATIC	Negative Supply Quiescent Current			-8.0	mA	V_{IN} = 0 or V+
12	I+	STATIC	Positive Supply Quiescent Current			8.0	mA	
13	t_{ON}	DYNAMIC	Switch Turn-On Time		40	60	nsec	V_{IN} = 5.0V, R_L = 50Ω, C_L = 12 pF
14	t_{OFF}	DYNAMIC	Switch Turn-OFF Time		20	40	nsec	
15	O_{IRR}	DYNAMIC	OFF Isolation Rejection Ratio	37	40		dB	R_L = 50Ω, f = 100 MHz
16		DYNAMIC		22	25		dB	R_L = 50Ω, f = 200 MHz
17	I_L	DYNAMIC	Insertion Loss		7.8	13	dB	R_L = 50Ω, f = 200 MHz
18	C_d	DYNAMIC	Drain-Node Capacitance		0.3		pF	V_D = 0, f = 1MHz, V_{IN} = 0
19	C_s	DYNAMIC	Source-Node Capacitance		3.0		pF	V_S = 0, f = 1MHz, V_{IN} = 0

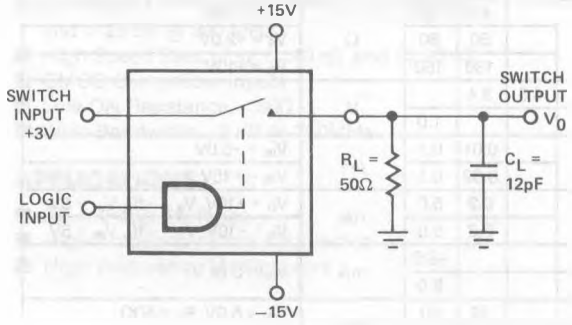
ELECTRICAL CHARACTERISTICS (V- = -15V, V+ = +15V, per channel unless otherwise noted)

LIMITS AT TEMPERATURE EXTREMES

#	SYMBOL		PARAMETER	MAXIMUM @ T_A =				UNITS	TEST CONDITIONS
				-55°C	-25°C	+85°C	+125°C		
1	V_{ANALOG}		Analog Signal Range	±10	±10	±10	±10	V	
2	$r_{DS(on)}$		Switch On Resistance	80	80	120	150	Ω	V_S = -10V
3				80	80	120	150		V_S = +2.0V
4		STATIC		160	160	240	300		V_S = +10V
5	I_N		Logic Input Leakage Current	0.1	0.1	1.0	10	µA	V_{IN} = +5.0V
6				0.1	0.1	2.0	20		V_{IN} = +15V
7	$I_{D(OFF)}$		Switch OFF Leakage Current	5.0	5.0	200	1000	nA	V_D=+10V,V_S=-10V,V_{IN}=5V
8	$I_{S(OFF)}$			5.0	5.0	200	1000		V_S=+10V,V_D=-10V,V_{IN}=5V
9	I_-		Negative Supply Quiescent Current	-8.0	-8.0	-10	-10	mA	V_{IN} = 0 or V+
10	I_+		Positive Supply Quiescent Current	8.0	8.0	10	10		

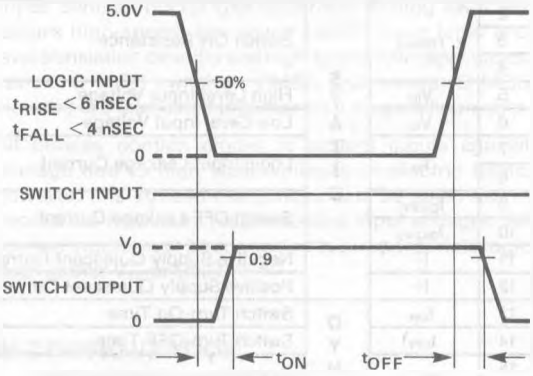
TYPICAL PERFORMANCE CHARACTERISTICS (T_A = +25°C unless otherwise specified)

SWITCHING TIMES TEST CIRCUIT

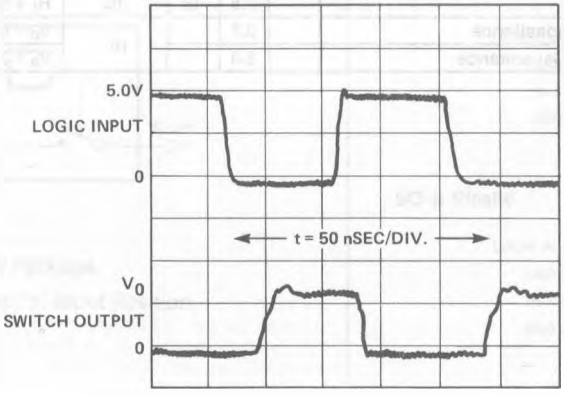


SWITCH ILLUSTRATED IN LOGIC "1", SWITCH OFF, POSITION

TEST WAVEFORMS

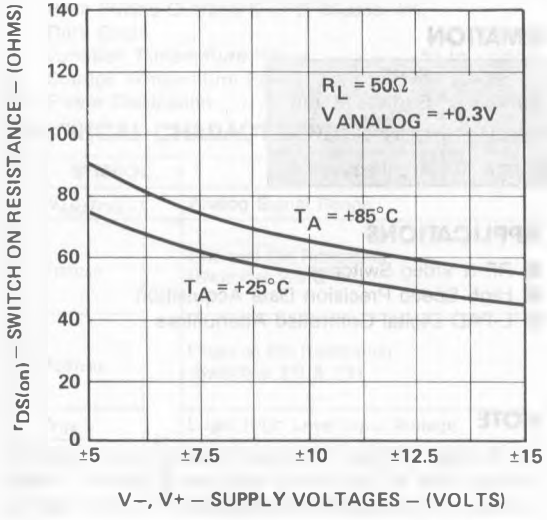


TEST RESULTS

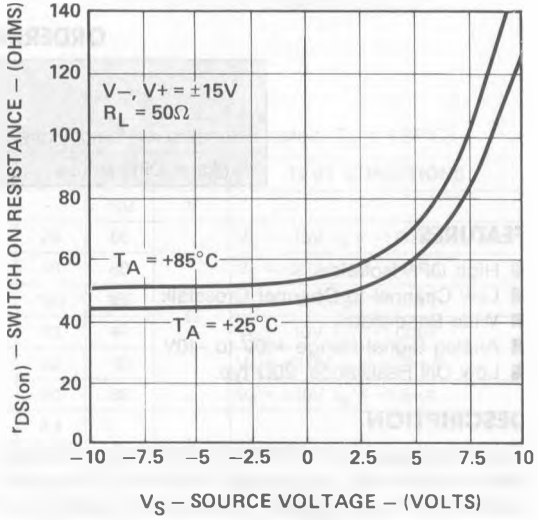


TYPICAL PERFORMANCE CHARACTERISTICS (T_A = +25°C unless otherwise specified)

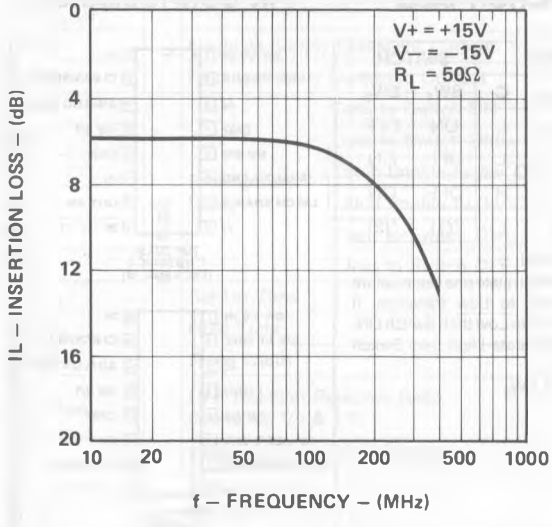
SWITCH ON RESISTANCE —VS— SUPPLY VOLTAGES



SWITCH ON RESISTANCE —VS— ANALOG VOLTAGE



INSERTION LOSS —VS— FREQUENCY



OFF ISOLATION —VS— FREQUENCY