TOPAZ SEMICONDUCTOR

CDG211

QUAD MONOLITHIC SPST CMOS/D-MOS ANALOG SWITCH

ORDERING INFORMATION

Quad SPST Switch, Logic '0' ON, Break-before-make	16-Pin Plastic DIP	SO-16 Surface Mount Package
Commercial Temp. Range	CDG211CJ	—
Ext. Industrial Temp. Range	—	CDG211DY

FEATURES

- High OFF Isolation, 66 dB @ 10MHz
- Wide Bandwidth Switches, 0.9 x DC @ 100MHz
- Low Channel-to-Channel Cross Talk, -80 dB @ 10MHz
- TTL Compatible
- Low 'OFF' Leakage
- Industry Standard Pin-Outs

APPLICATIONS

- Glitch-Free Analog Switches
- RF & Video Switches
- Track and Hold Switches
- Sample and Hold Switches

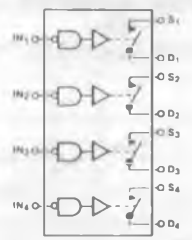
DESCRIPTION

The Topaz Semiconductor CDG211 low cost Analog Switch features TTL compatible input logic and wide-band Lateral D-MOS switches on a single chip. The on-chip reference used for TTL compatibility gives the added advantage of constant logic switching over a wide range of supply voltages and temperature without a separate power supply. Industry standard pin-out makes the CDG211 particularly suitable for replacement of existing analog switches and at the same time upgrading high frequency performance.

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 voltage level (V_{DD} or GND).

FUNCTIONAL BLOCK DIAGRAM

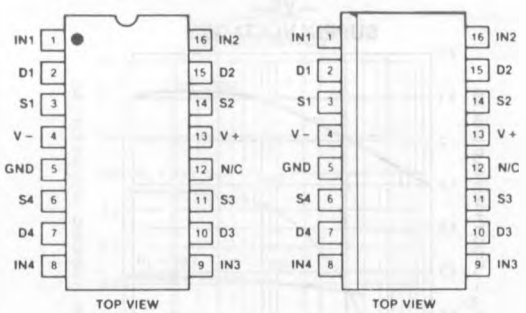


Four SPST Switches per Package
Switches shown in Logic "1" Input Position

LOGIC TABLE

Logic	Switch	
0	ON	Logic '0' ≤ 0.8V
1	OFF	Logic '1' ≥ 2.4V

PIN CONFIGURATIONS



CDG211CJ
(See Package 10)

CDG211DY
(See Package 21)

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 ..... 30 mA
I_S Continuous Current, S or D ..... 30 mA
I_S Peak Pulsed Current, S or D, 80μsec, 1%, Duty Cycle ..... 90 mA
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 (C Suffix) .... 0 to +70°C
(D Suffix) ..... -40 to +85°C

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

#		SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS	
1	STATIC	V_{ANALOG}	Analog Signal Range	-10		+10	V		
2		$r_{DS(on)}$	Switch ON Resistance		40	80	Ω	V_S = -10V	V_{IN} = 0
3					45	80		V_S = +2.0V	
4					100	160		V_S = +10V	
5		V_{IH}	High Level Input Voltage	2.4			V		
6		V_{IL}	Low Level Input Voltage			0.8			
7		I_{IN}	Logic Input Leakage Current		0.01	0.1	μA	V_{IN} = +2.4V	
8					0.02	0.1		V_{IN} = +15V	
9		$I_{D(OFF)}$	Switch OFF Leakage Current		0.2	5.0	nA	V_D = +10V, V_S = -10V	V_{IN} = +2.4V
10		$I_{S(OFF)}$			0.4	5.0		V_S = +10V, V_D = -10V	
11		I-	Negative Supply Quiescent Current		-0.3	-1.0	mA	V_{IN} = 0 or +2.4V	
12		I+	Positive Supply Quiescent Current		0.6	2.0			
13	DYNAMIC	t_{ON}	Switch Turn-ON Time		400	600	nSec	See Switching Times Test Circuit	
14		t_{OFF}	Switch Turn-OFF Time		70	300			
15		O_{IRR}	OFF Isolation, Rejection Ratio	60	66		dB	f = 10MHz R_L = 50Ω	
16		C_{CRR}	Cross-Coupling Rejection Ratio		80				
17		c_d	Drain-Node Capacitance		0.3		pF	V_D = V_S = 0 f = 1MHz	V_{IN} = +2.4V
18		c_s	Source-Node Capacitance		3.0				

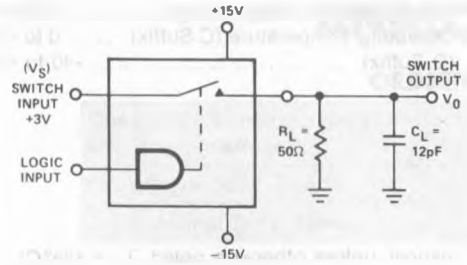
ELECTRICAL CHARACTERISTICS (V- = -15V, V+ = +15V unless otherwise noted)

Limits at Temperature Extremes

#	SYMBOL	PARAMETER	MAXIMUM @ T_A = -40°C	0°C	+70°C	+85°C	UNITS	TEST CONDITIONS	
1	V_{ANALOG}	Analog Signal Range	±10	±10	±10	±10	V		
2	$r_{DS(on)}$	Switch ON Resistance	80	80	120	120	Ω	V_S = -10V	V_{IN} = 0
3			80	80	120	120		V_S = +2.0V	
4			160	160	240	240		V_S = +10V	
5	I_{IN}	Logic Input Leakage Current	0.1	0.1	1.0	1.0	μA	V_{IN} = +2.4V	
6			0.1	0.1	2.0	2.0		V_{IN} = +15V	
7	$I_{D(OFF)}$	Switch OFF Leakage Current	5.0	5.0	100	100	nA	V_D = +10V, V_S = -10V	V_{IN} = +2.4V
8	$I_{S(OFF)}$		5.0	5.0	100	100		V_S = +10V, V_D = -10V	
9	I-	Negative Supply Quiescent Current	-1.0	-1.0	-1.0	-1.0	mA	V_{IN} = 0 or +2.4V	
10	I+	Positive Supply Quiescent Current	2.0	2.0	2.0	2.0			

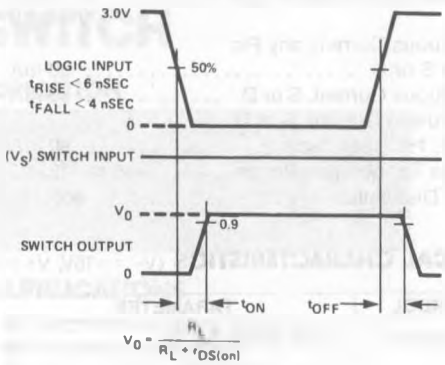
TYPICAL PERFORMANCE CHARACTERISTICS (T_A = +25°C, per channel, unless otherwise specified)

SWITCHING TIMES TEST CIRCUIT



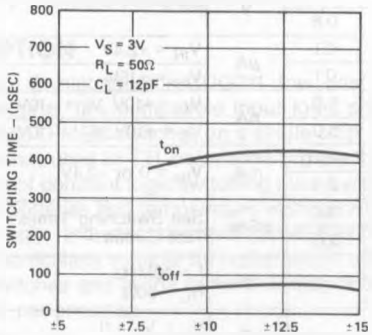
SWITCH ILLUSTRATED IN LOGIC "1" SWITCH OFF. POSITION

TEST WAVEFORMS

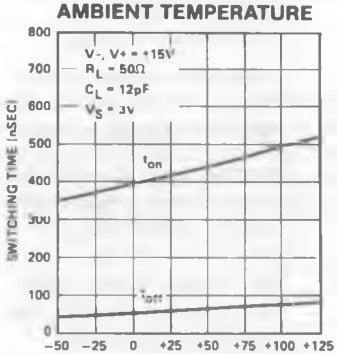


$V_O = \frac{R_L}{R_L + r_{DS(on)}}$

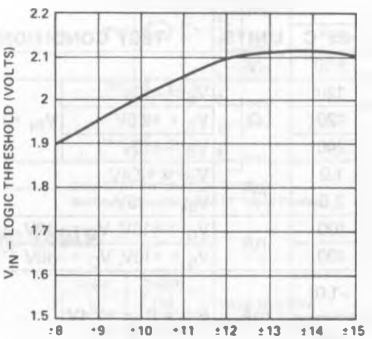
SWITCHING TIMES —VS— SUPPLY VOLTAGES



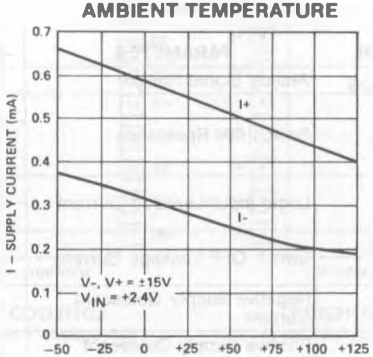
SWITCHING TIMES —VS— AMBIENT TEMPERATURE



LOGIC THRESHOLD —VS— SUPPLY VOLTAGES

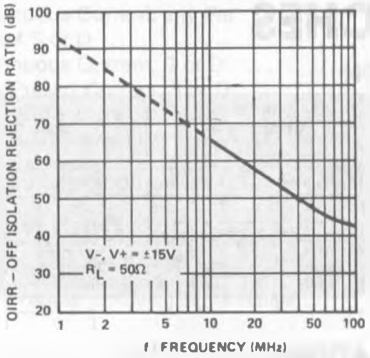


SUPPLY CURRENTS —VS— AMBIENT TEMPERATURE

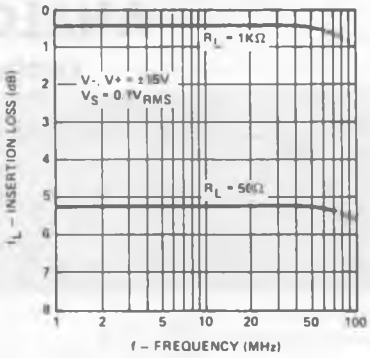


TYPICAL PERFORMANCE CHARACTERISTICS (T_A = +25°C, per channel, unless otherwise specified)

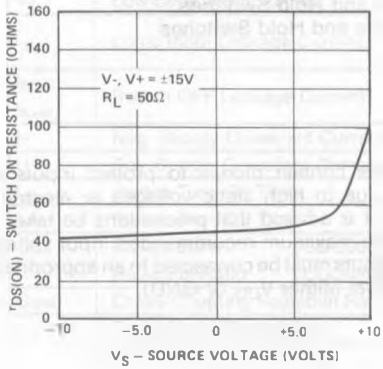
SWITCH-OFF ISOLATION REJECTION RATIO —VS— FREQUENCY



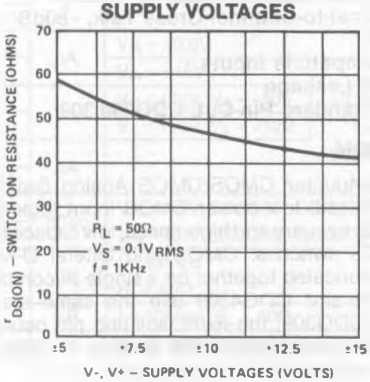
INSERTION LOSS —VS— FREQUENCY



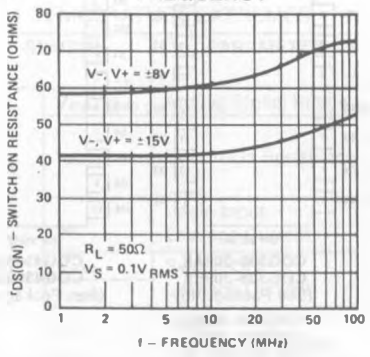
SWITCH ON RESISTANCE —VS— ANALOG VOLTAGE



SWITCH-ON RESISTANCE —VS— SUPPLY VOLTAGES



SWITCH-ON RESISTANCE —VS— FREQUENCY



TOTAL HARMONIC DISTORTION —VS— FREQUENCY