BCT4222B

350MHz DPDT Analog Switch

Features

♦ VCC Operating Range: 1.65V to 4.2V
♦ Rail-to-Rail Signal Range
♦ ON-Resistance Matching: 0.04 Ω (TYP)
♦ ON-Resistance Flatness: 0.08Ω (TYP)
♦ High Off Isolation: 58dB at 10MHz
♦ 54dB (10MHz) Crosstalk Rejection Reduces Signal Distortion
♦ Break-Before-Make Switching
♦ -3dB Bandwidth: 350MHz
♦ Extended Industrial Temperature Range: –40°C to 85°C
♦ Packaging (Pb-free & Green available)

Applications

Cell Phones
PDAs
Portable Instrumentation
Differential Signal Data Routings

Connection Diagram

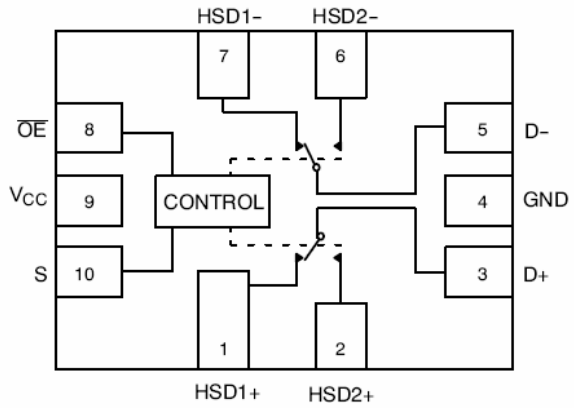


Figure 1. Pin Connections and Logic Diagram (BCT4222B Top View)

General Description

The BCT4222B is a high bandwidth, fast double-pole double-throw (DPDT) analog switch. Its wide bandwidth and low bit-to-bit skew allow it to pass high-speed differential signals with good signal integrity. Each switch is bidirectional and offers little or no attenuation of the high-speed signals at the outputs. Industry-leading advantages include a propagation delay of less than 250ps, resulting from its low channel resistance and low I/O capacitance. Its high channel-to-channel crosstalk rejection results in minimal noise interference.

Pin Description

Pin Number	Name	Description
10	S	Select Input
4	GND	Ground
1 , 2	HSD1+,HSD2-	Data Ports
7 , 6	HSD1-,HSD2-	Data Ports
3 , 5	D+, D-	Data Ports
9	Vcc	Positive Power Supply
8	/OE	Output Enable

Logic Function Table

/OE	S	HSD1+HSD1-	HSD2+HSD2-
1	X	OFF	OFF
0	0	ON	OFF
0	1	OFF	ON

BCT4222B 350MHz DPDT Analog Switch

ORDERING INFORMATION

Ordering Code	Package Description	Temp Range	Top Marking
BCT4222BETB	10-pin WQFN 1.4X1.8	–40°C to +85°C	AJX

MAXIMUM RATINGS

Symbol	Pins	Parameter	Value	Unit
V_{CC}	V_{CC}	Positive DC Supply Voltage	-0.5 to +4.6	V
V_{IS}	HSD1+, HSD1-,HSD2+, HSD2-	Analog Signal Voltage	-0.5 to V_{CC} + 0.3	V
	D+, D-		-0.5 to +4.6	
V_{IN}	/OE	Control Input Voltage	-0.5 to +4.6	V
I_{CC}	V_{CC}	Positive DC Supply Current	50	mA
T_S		Storage Temperature	-65 to +150	°C
I_{IN}	/OE	Control Input Current	±20mA	mA

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

RECOMMENDED OPERATING CONDITIONS

Symbol	Pins	Parameter	Min	Max	Unit
V_{CC}		Positive DC Supply Voltage	1.65	4.2	V
V_{IS}	HSD1+, HSD1HSD2+, HSD2	Analog Signal Voltage	GND	V_{CC}	V
	D+, D		GND	4.2	
V_{IN}	OE	Digital Select Input Voltage	GND	V_{CC}	V
T_A		Operating Temperature Range	−40	+85	°C

Minimum and maximum values are guaranteed through test or design across the Recommended Operating Conditions, where applicable. Typical values are listed for guidance only and are based on the particular conditions listed for section, where applicable. These conditions are valid for all values found in the characteristics tables unless otherwise specified in the test conditions.

BCT4222B 350MHz DPDT Analog Switch

ESD PROTECTION

Symbol	Parameter	Value	Unit
ESD	Human Body Model - All Pins	2.0	kV
ESD	Human Body Model - I/O to GND	8.0	kV

DC ELECTRICAL CHARACTERISTICS CONTROL INPUT (Typical: T = 25°C, VCC = 3.3 V)

BCT4222B SUPPLY AND LEAKAGE CURRENT

Symbol	Pins	Parameter	Test Conditions	VCC (V)	−40°C to +85°C			Unit
					Min	Typ	Max	
CC	VCC	Quiescent Supply Current	VIS = VCC or GND; IOUT = 0 A	1.65 - 4.2	-	-	1.0	uA
ICCT	VCC	Increase in ICC per Control Voltage	VIN = 2.6 V	3.6	-	-	10	uA
IOZ	HSD1+, HSD1HSD2+, HSD2	OFF State Leakage Current	0 ≤ VIS ≤ VCC	1.65 - 4.2	-	-	±1.0	uA
IOFF	D+, D-	Power OFF Leakage Current	0 ≤ VIS ≤ 4.5 V	0	-	-	±1.0	uA

BCT4222B HIGH SPEED ON RESISTANCE

Symbol	Pins	Parameter	Test Conditions	VCC (V)	−40°C to +85°C			Unit
					Min	Typ	Max	
RON	VCC	On-Resistance	V IS = 0 V to 0.4 V, ION = 8 mA	2.7 3.3 4.2	-	8.8 7.8 6.7	12 10 8.0	Ω
RFLAT		On-Resistance Flatness	VIS = 0 V to 1.0 V, ION = 8 mA	2.7 3.3 4.2	-	1.5 1.3 1.2		Ω
RON		On-Resistance Matching	VIS = 0 V to 0.4 V, ION =8 mA	2.7 3.3 4.2		1.4 1.3 1.2		Ω

BCT4222B 350MHz DPDT Analog Switch

BCT4222B DC ELECTRICAL CHARACTERISTICS (continued)

FULL SPEED ON RESISTANCE (Typical: T = 25°C, V_{CC} = 3.3 V)

Symbol	Pins	Parameter	Test Conditions	V_{CC} (V)	−40°C to +85°C			Unit
R_{ON}		On-Resistance	V_{IS} = 0 V to V_{CC}, I_{ON} = 8 mA	2.7		8.8	12	Ω
				3.3		8.3	10.5	
				4.2		7.3	8.5	
R_{FLAT}		On-Resistance Flatness	V_{IS} = 0 V to 1.0 V, I_{ON} = 8 mA	2.7		1.5		Ω
				3.3		1.4		
				4.2		1.2		
R_{ON}		On-Resistance Matching	V_{IS} = 0 V to V_{CC}, I_{ON} = 8 mA	2.7		2.0		Ω
				3.3		2.3		
				4.2		2.5		

BCT4222B AC ELECTRICAL CHARACTERISTICS

TIMING/FREQUENCY (Typical: T = 25°C, VCC = 3.3 V, RL = 50Ω , CL = 5 pF, f = 1 MHz)

Symbol	Pins	Parameter	Test Conditions	V_{CC} (V)	−40°C to +85°C			Unit
					Min	Typ	Max	
t_{ON}	Closed to Open	Turn-ON Time	See test circuit 2	1.65 - 4.5	-	14	30	ns
t_{OFF}	Open to Closed	Turn-OFF Time	See test circuit 2	1.65 - 4.5	-	10	20	ns
t_{BBM}		Break-Before-Make Delay	See test circuit 1	1.65 - 4.5	3.0	4.4	7.0	ns
BW		-3 dB Bandwidth	C_L = 5 pF	1.65 - 4.5	-	270	-	MHz
			C_L = 0 pF		-	300	-	

BCT4222B 350MHz DPDT Analog Switch

BCT4222B ISOLATION (Typical: T = 25°C, VCC = 3.3 V, RL = 50Ω , CL = 5 pF, f = 1 MHz)

Symbol	Pins	Parameter	Test Conditions	VCC (V)	−40°C to +85°C			Unit
					Min	Typ	Max	
OIRR	Open	OFF-Isolation	f = 250 MHz	1.65 - 4.5	-	-22	-	dB
XTALK	HSD1+ to HSD1	Non-Adjacent Channel Crosstalk	f = 250 MHz	1.65 - 4.5	-	-30	-	dB

BCT4222B CAPACITANCE (Typical: T = 25°C, VCC = 3.3 V, RL = 50Ω , CL = 5 pF, f = 1 MHz)

Symbol	Pins	Parameter	Test Conditions	−40°C to +85°C			Unit
				Min	Typ	Max	
CIN	OE	Control Pin Input Capacitance	VCC = 0 V	-	3.0	-	pF
CON	D+ to HSD1+ or HSD2+	ON Capacitance	VCC = 3.3 V; OE = 0 V	-	8.0	-	pF
COFF	HSD2+, HSD2	OFF Capacitance	VCC = VIS = 3.3 V; OE = 3.3 V	-	4.5	-	pF

BCT4222B 350MHz DPDT Analog Switch

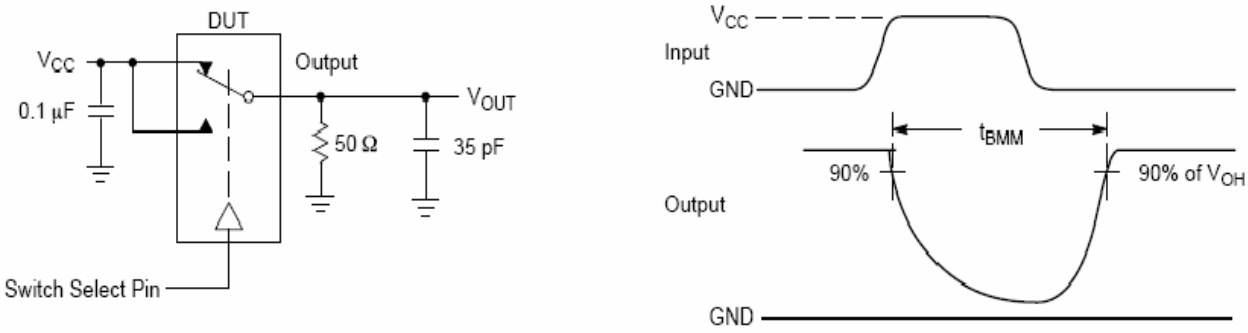


Figure 1. t_{BBM} (Time Break-Before-Make)

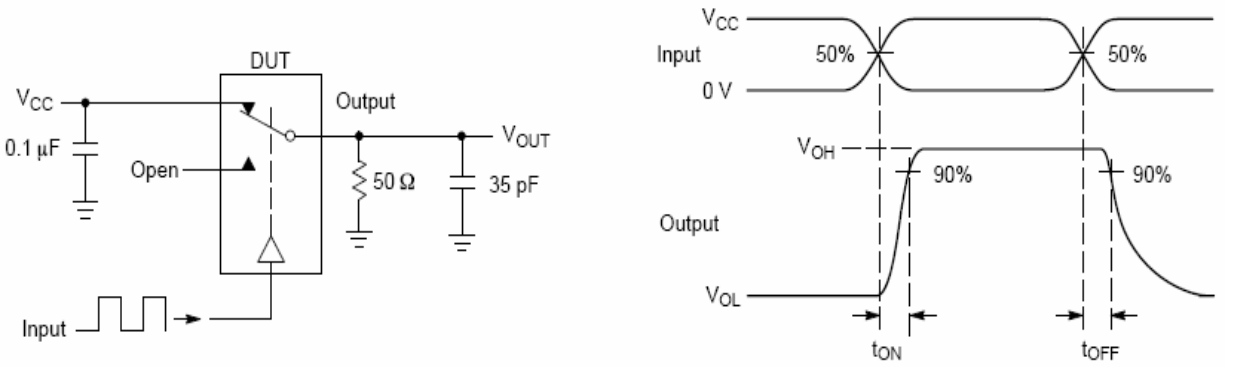


Figure 2. $t_{ON/OFF}$

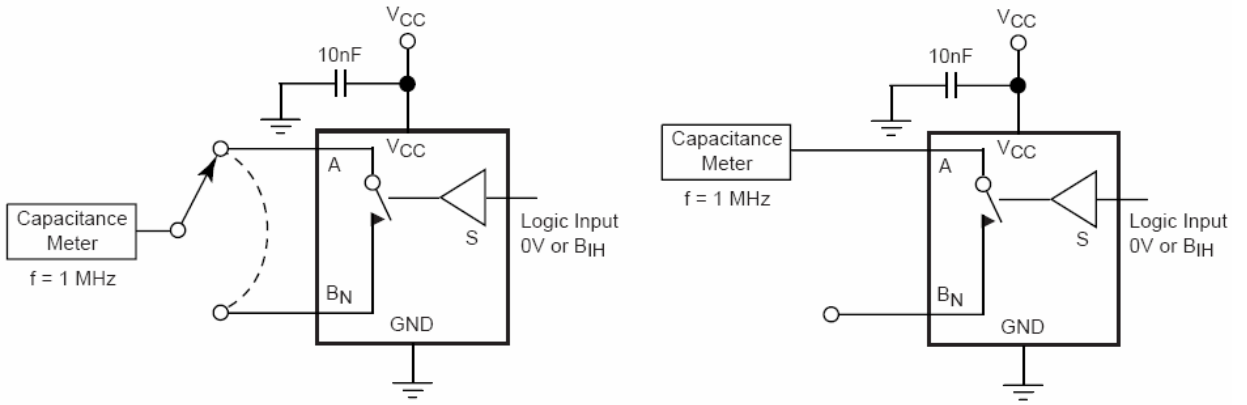


Figure 3. Channel ON/OFF Capacitance

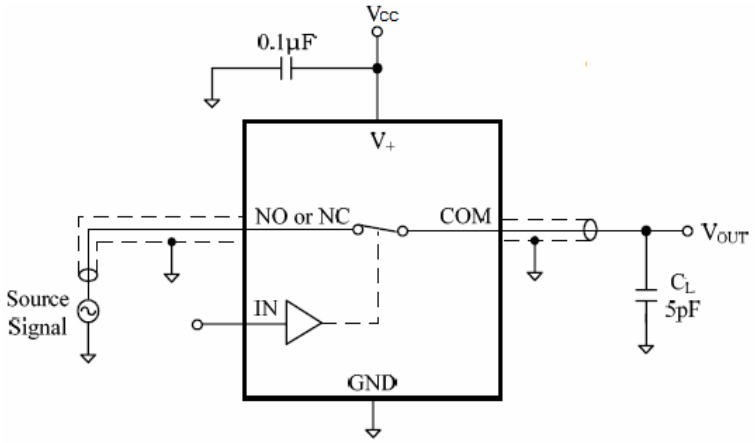


Figure 4. Bandwidth -3dB

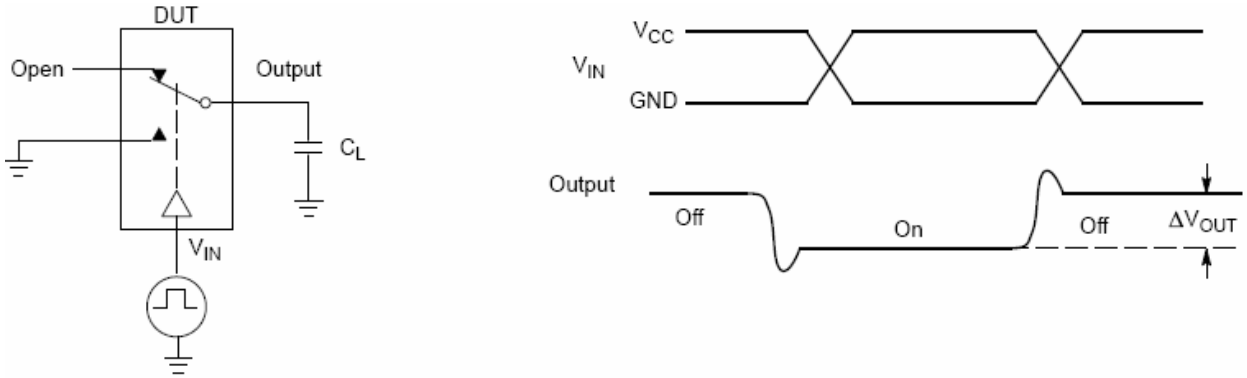


Figure 5. Charge Injecting (Q)

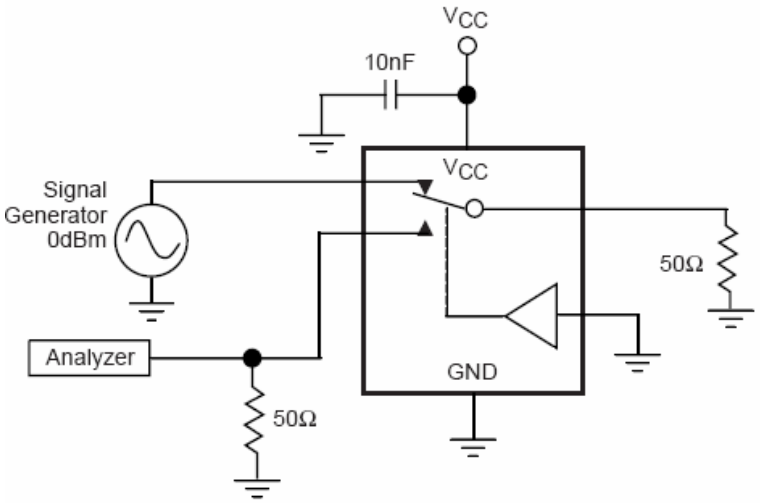
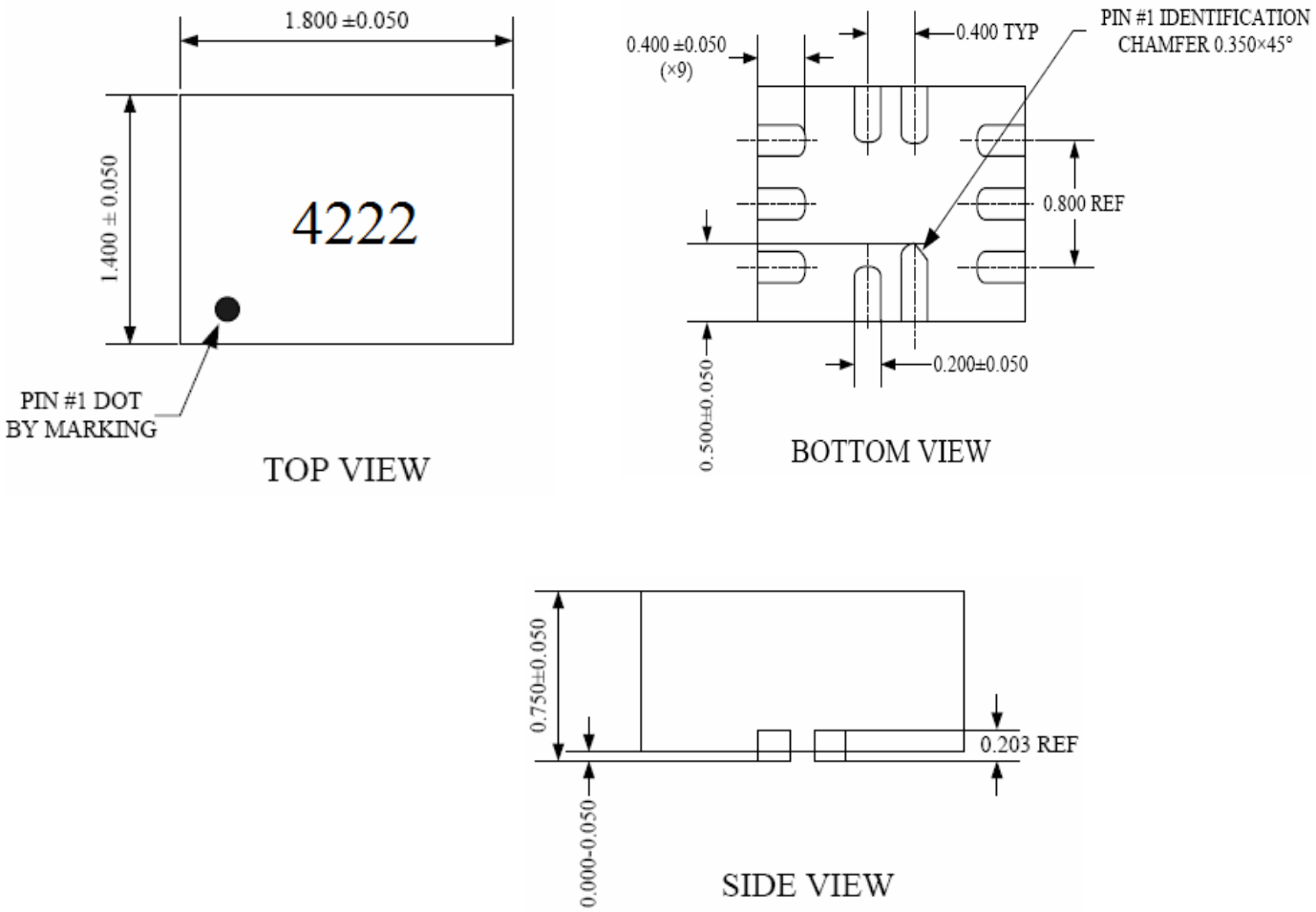


Figure 6. Crosstalk

BCT4222B 350MHz DPDT Analog Switch

Package Information



Note: All linear dimensions are in millimeters.