BCT4221
USB2.0 Hi-Speed Switches

GENERAL DESCRIPTION

The BCT4221 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.

The BCT4221 is available in Green QFN2.0X1.5-10L packages. It operates over an ambient temperature range of -40°C to +85°C.

FEATURES

- V_{CC} Operating Range: 2.7V-5.5V
- Analog Signal Range: 0 to V_{CC}
- -3dB Bandwidth: 720MHz
- Off Isolation:-38dB @250MHz
- Crosstalk Rejection:- 38dB @250MHz
- ON-Resistance:6Ω Typical
- Extended Temperature Range: –40°C to 85°C
- Green QFN2.0X1.5-10L packages
- ESD:HBM 8000V

APPLICATIONS

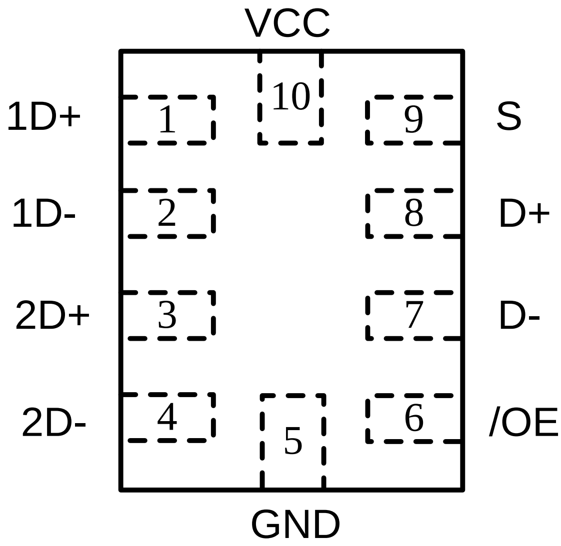
Cell Phones
Hi-Fi Audio Switching
USB 2.0 High Speed Data Switching
USB 3.x Type C Switching

ORDERING INFORMATION

Order Number	Package Type	Temperature Range	Marking	QTY/Reel
BCT4221EGB-TR	QFN2.0X1.5-10L	-40°C to +85°C	4221 YWTG	3000

NOTE 1: Y: year, W: weeks

PIN CONFIGURATION



TOP VIEW

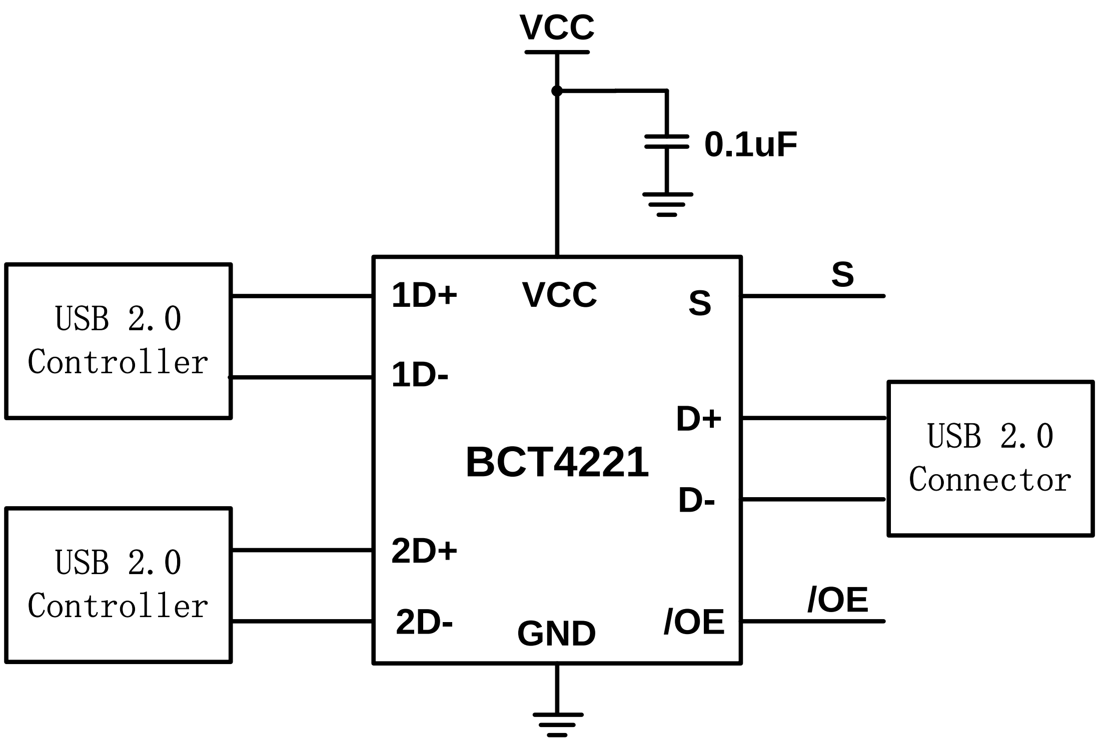
PIN DESCRIPTION

PIN	NAME	FUNCTION
1	1D+	USB port 1 DATA+
2	1D-	USB Port 1 DATA-
3	2D+	USB port 2 DATA+
4	2D-	USB Port 2 DATA-
5	GND	Power Ground
6	/OE	Outputs enable input, active low.
7	D-	USB data bus DATA-
8	D+	USB data bus DATA+
9	S	Logic Control, 0 select port 1
10	VCC	Power Supply

Truth Table

S1	/OE	PORT 1	PORT 2
0	0	ON	OFF
1	0	OFF	ON
X	1	OFF	OFF

TYPICAL APPLICATION CIRCUIT



ABSOLUTE MAXIMUM RATINGS

VCC to GND.. -0.5V to +6.0V
All Other Pins to GND..-0.5V to (V_{CC} + 0.3V)
Continuous Current (D+/-, 1 D+/-, 2D+/-).. ±120mA
Continuous Power Dissipation...0.4W
Operating Temperature Range ....-40°C to +85°C
Storage Temperature Range...-65°C to +150°C
Junction Temperature...+150°C
Lead Temperature (soldering, 10s)..+260°C

ESD Protection

Human Body Model………………...8000V

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.

CAUTION

This integrated circuit can be damaged by ESD if you don’t pay attention to ESD protection. Broadchip recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

Broadchip reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact Broadchip sales office to get the latest datasheet.

ELECTRICAL CHARACTERISTICS

(VCC = 2.7V to 5.5V, TA = -40°C to +85°C, unless otherwise noted. Typical values are at VCC = 3.3V, TA = +25°C.) (Note 2)

PARAMETER	SYM	CONDITIONS	MIN	TYP	MAX	UNITS
POWER SUPPLY						
Supply Voltage Range	V_{CC}		2.7		5.5	V
Supply Current	I_{CC}	V_{CC}=3.6V, S =0 or V_{CC} , D+/-,nD+/- = floating		0.02	1	uA
Analog Signal Range			0		V_{CC}	V
On-Resistance	R_{ON}	I_{SW} = 30mA, V_{D+}, V_{D-} = 0V (Note 3)		6	12	Ω
On-Resistance Match	ΔR_{ON}	I_{SW} = 30mA, V_{D+}, V_{D-} =0V (Note 3,4)		0.2		Ω
On-Resistance Flatness	RFLAT	I_{SW} = 30mA, V_{D+}, V_{D-} = 0 to V_{CC} (Note 5)		1		Ω
D+,D-,1D+,1D-,2D+,2D- Power off Leakage Current	I_{OFF}	V_{CC}=0V ,V_{SW} = 0 to 3.6V			1	uA
D+,D-,1D+,1D-,2D+,2D- Off Leakage Current	I_{OZ}	Switch off, V_{SW}= 0 to V_{CC}			1	uA
Input-Logic High	V_{IH}	V_{CC} =2.7 – 5.5V	1.5		V_{CC}	V
Input-Logic Low	V_{IL}	V_{CC} =2.7 – 5.5V	0		0.4	V
Input Leakage Current	I_{IN}	V_{IN} = 0 to V_{CC}	-1		1	uA

ELECTRICAL CHARACTERISTICS

(VCC = 2.7V to 5.5V, TA = -40°C to +85°C, unless otherwise noted. Typical values are at VCC = 3.3V, TA = +25°C.) (Note 2)

PARAMETER	SYM	CONDITIONS	MIN	TYP	MAX	UNITS
DYNAMIC CHARACTERISTICS						
Turn-On Time	T_{ON}	V_{nD+} or V_{nD-} = 1.5V, RL = 50Ω, CL = 35pF, (Figure 1)		20	50	nS
Turn-Off Time	T_{OFF}	V_{nD+} or V_{nD-} = 1.5V, RL = 50Ω, CL = 35pF, (Figure 1)		15	50	nS
Break-Before-Make Time	T_{BBM}	V_{nD+} and V_{nD-} = 1.5V RL = 50Ω, CL = 35pF, (Figure 2)	2	15		nS
On-Channel Bandwidth -3dB	BW	RL = 50Ω, (Figure 3)		720		MHz
Off-Isolation	Q_{IRR}	RL = 50Ω, f = 250MHz (Note 6)		-38		dB
Crosstalk	X_{TALK}	RL = 50Ω, f = 250MHz (Figure 4)		-38		dB
D+,D- Off-Capacitance	C_{OFF}	f = 1MHz, (Figure 5)		5		pF
D+,D- On-Capacitance	C_{ON}	f = 1MHz, (Figure 5)		7		pF

NOTES:

Note 2: Devices are 100% tested at TA = +25°C. Limits across the full temperature range are guaranteed by design and correlation.

Note 3: RON and RON matching specifications are guaranteed by design,

Note 4: ΔRON = RON(MAX) - RON(MIN).

Note 5: Flatness is defined as the difference between the maximum and minimum value of on-resistance, as measured over the specified analog signal ranges.

Note 6: Between any two switches.

Test Diagram

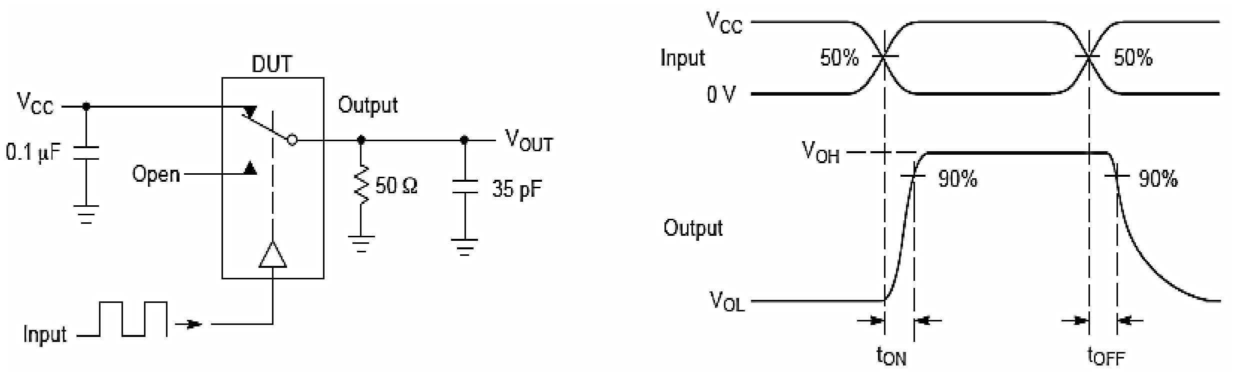


Figure 1. $t_{ON/OFF}$

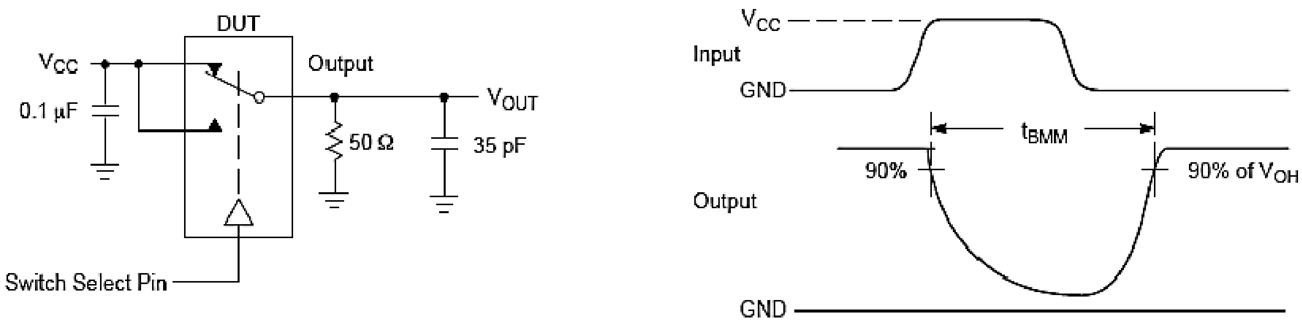


Figure 2. tBBM (Time Break-Before-Make)

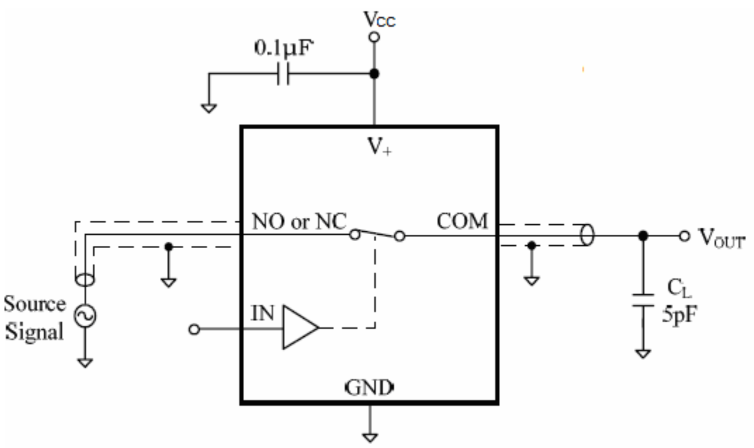


Figure 3. Bandwidth -3dB

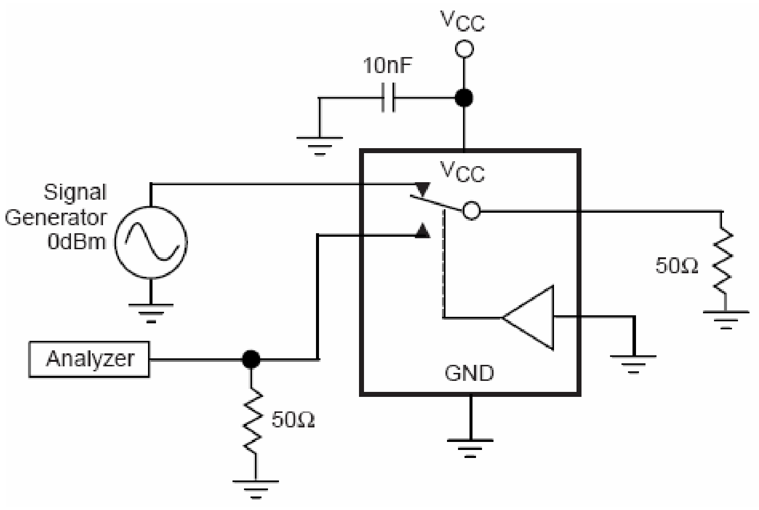


Figure 4. Crosstalk

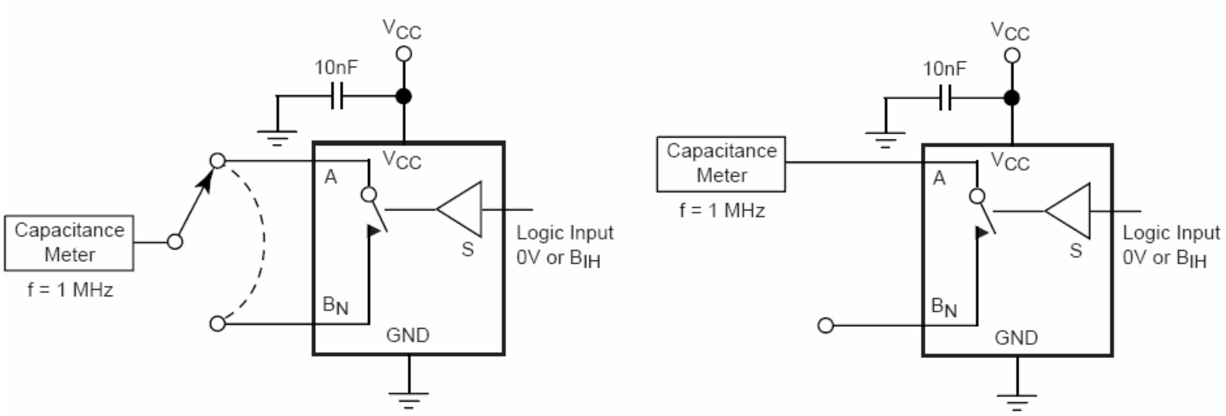
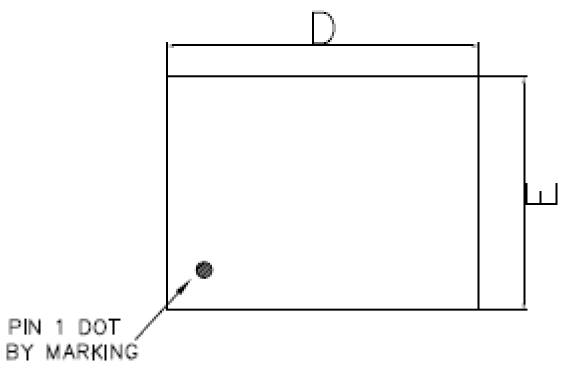


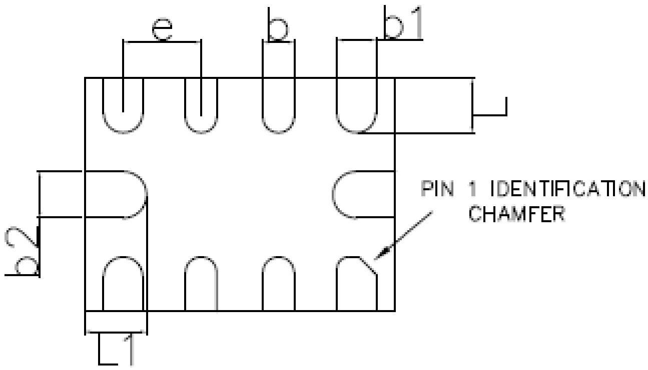
Figure 5. Channel ON/OFF Capacitance

PACKAGE OUTLINE DIMENSIONS

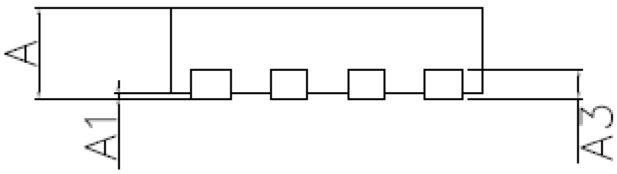
QFN2.0x1.5-10L



TOP VIEW



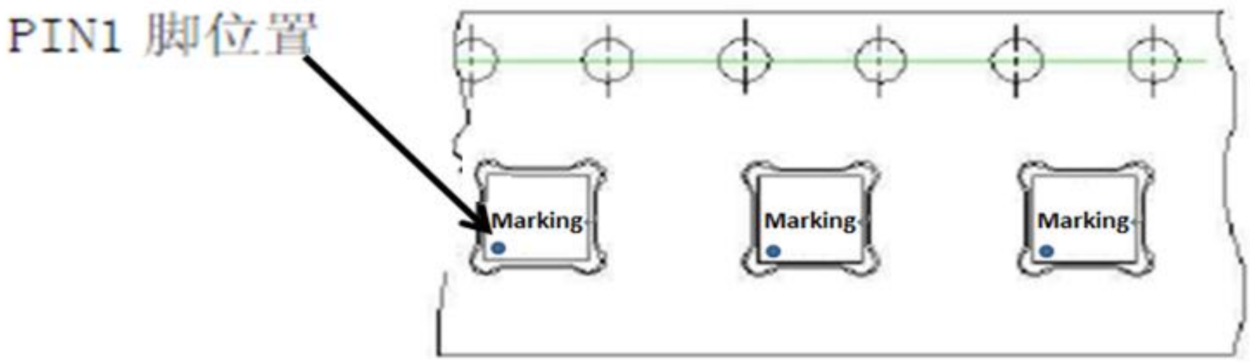
BOTTOM VIEW



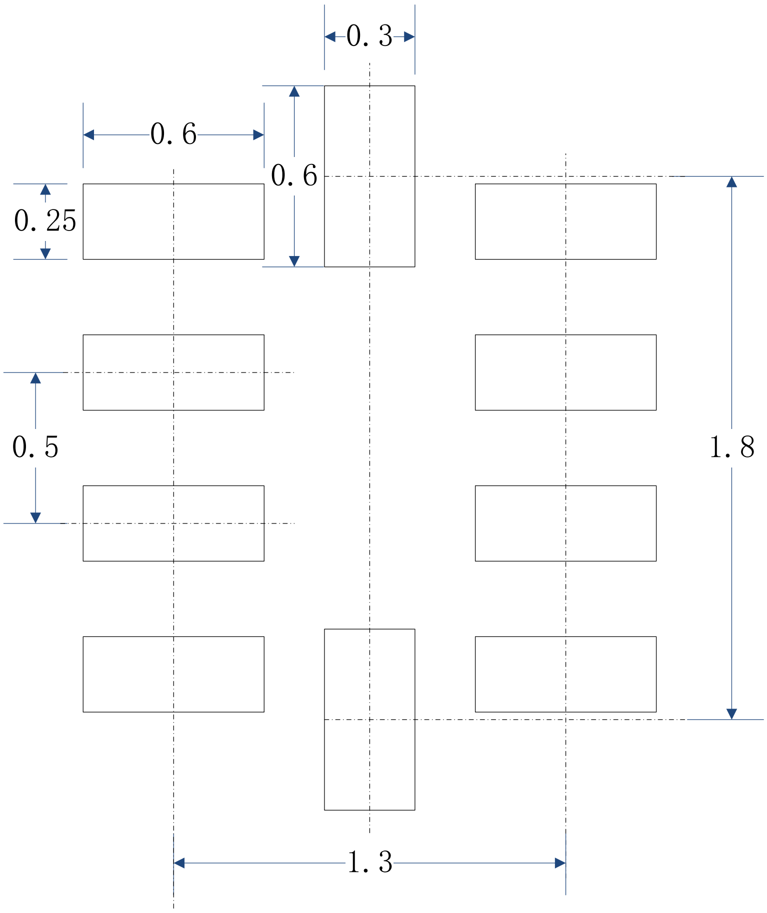
SIDE VIEW

COMMON DIMENSIONS(mm)			
PKG	**UT:ULTRA THIN**		
REF	**MIN**	**NOM**	**MAX**
A	0.50	0.55	0.60
A1	0.00	--	0.05
A3	0.15 REF		
D	1.95	2.00	2.05
E	1.45	1.50	1.55
b	0.15	0.20	0.25
b1	0.20	0.25	0.30
b2	0.25	0.30	0.35
L	0.30	0.35	0.40
L1	0.35	0.40	0.45
e	0.50 BSC		

TAPING DESCRIPTION



PCB Layout Pattern: QFN2.0x1.5-10L



RECOMMENDED PCB LAYOUT PATTERN (Unit: mm)