

BCT4224

USB2.0 High-Speed 4:1 Mux/DeMux Switch

GENERAL DESCRIPTION

The BCT4224 is a high bandwidth, fast dual 4-Channels (DP4T) Analog Mux/DeMux Switch. 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, resulting from its low channel resistance and low I/O capacitance. Its high channel-to-channel crosstalk rejection results in minimal noise interference.

The BCT4224 is available in QFN2.6x1.8-16L package.

FEATURES

- VCC Operating Range: 2.3V ~ 5.5V
- Analog Signal Range: 0V ~ 3.6V
- Differential -3dB Bandwidth: 1.6GHz Typical
- Off Isolation: -44dB@240MHz
-28dB@800MHz
- R_{ON} : 3.0 Ω Typical
- ESD Tolerance 4kV HBM on all pins
- QFN16L 2.6x1.8mm Package

APPLICATIONS

- Smart Phones
- Laptops
- USB 2.0 High Speed Data Switching

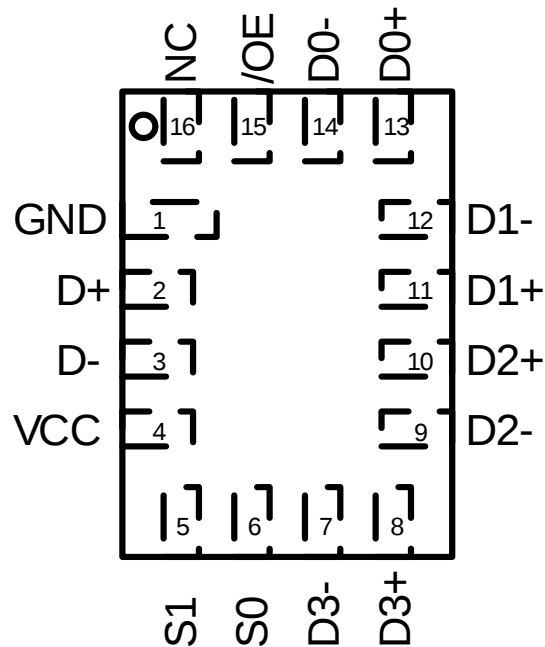
ORDERING INFORMATION

Order Number	Package Type	Temperature Range	Marking	QTY/Reel
BCT4224EFE-TR	QFN2.6x1.8-16L	-40°C to +85°C	KPPK XXXXXX	3000

Note:

1."XXXXXX" in Marking will be appeared as the batch code.

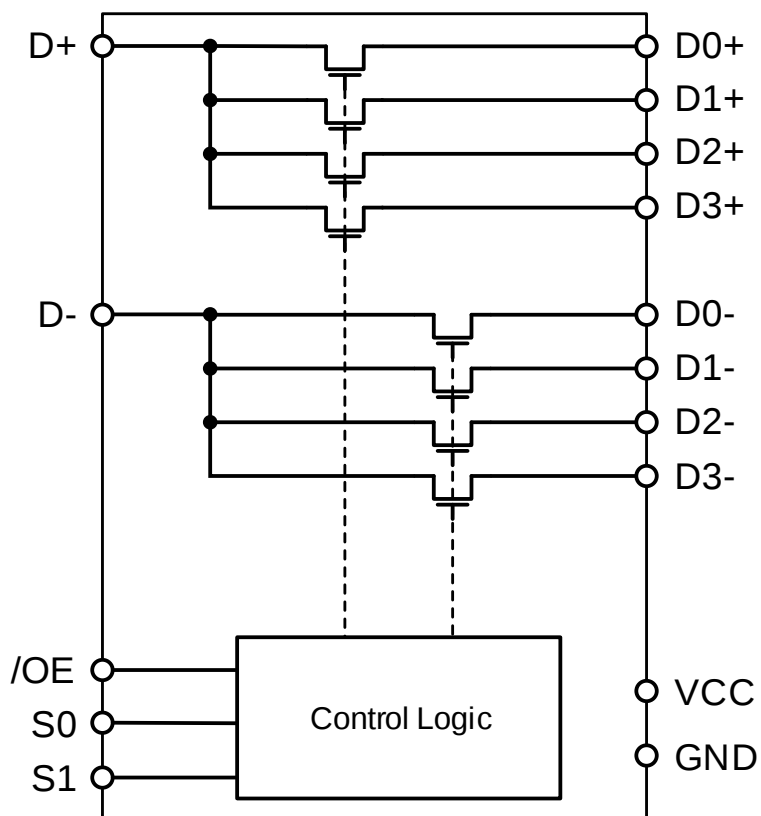
PIN CONFIGURATION (Top View)



PIN DESCRIPTION

Pin Number	Symbol	Description
1	GND	Ground
2	D+	D+ Common Port (HS or FS USB)
3	D-	D- Common Port (HS or FS USB)
4	VCC	Power Supply
5	S1	Path Selection Control Input
6	S0	Path Selection Control Input
7	D3-	D- From Fourth Source Path (HS or FS USB)
8	D3+	D+ From Fourth Source Path (HS or FS USB)
9	D2-	D- From Third Source Path (HS or FS USB)
10	D2+	D+ From Third Source Path (HS or FS USB)
11	D1+	D+ From Second Source Path (HS or FS USB)
12	D1-	D- From Second Source Path (HS or FS USB)
13	D0+	D+ From First Source Path (HS or FS USB)
14	D0-	D- From First Source Path (HS or FS USB)
15	/OE	Enable Control Input
16	NC	Not Connect

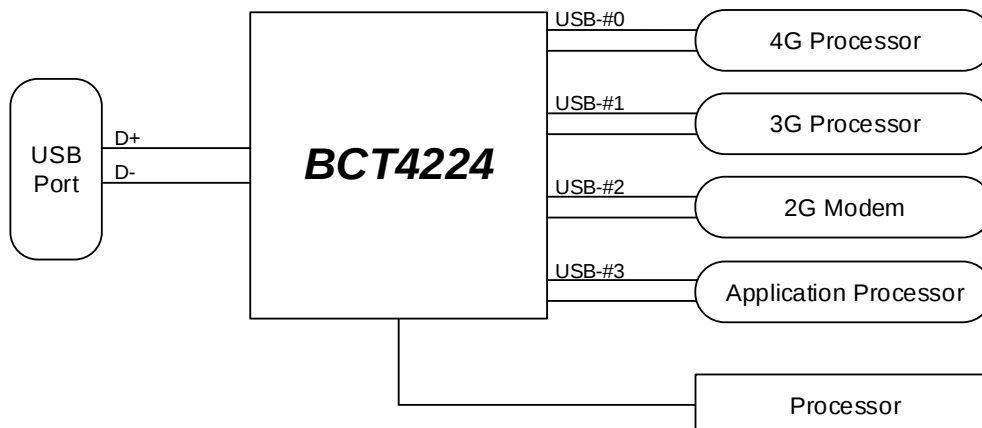
BLOCK DIAGRAM



TRUTH TABLE

Enable	Select		Function
/OE	S1	S0	
H	X	X	D+, D- Switch Paths Open
L	L	L	D+=D0+, D-=D0-
L	L	H	D+=D1+, D-=D1-
L	H	L	D+=D2+, D-=D2-
L	H	H	D+=D3+, D-=D3-

TYPICAL APPLICATIONS



ABSOLUTE MAXIMUM RATINGS

VCC to GND	-0.5V to +6.0V
All Other Pins to GND	-0.5V to (VCC + 0.3V)
Continuous Current (D+/-, Dn+/-)	±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 All Pins.....	±4kV
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Note:

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 = 2.3V to 5.5V, TA = -40°C to +85°C, unless otherwise noted. Typical values are at VCC = 3.6V, TA = +25°C.) ⁽²⁾

PARAMETER	SYM	CONDITIONS	MIN	TYP	MAX	UNITS
POWER SUPPLY						
Supply Voltage Range	VCC		2.3		5.5	V
Supply Current	I _{CC}	VCC=3.6V, S =0 or VCC, D+/-, Dn+/- = floating		37		uA
Analog Signal Range			0		3.6	V
On-Resistance ⁽³⁾	R _{ON}	I _{SW} = 30mA, V _{D+} , V _{D-} = 0V		3.0	4.5	Ω
		I _{SW} = 30mA, V _{D+} , V _{D-} = 2.4V		4.0	6.0	
On-Resistance Match ^(3,4)	ΔR _{ON}	I _{SW} = 30mA, V _{D+} , V _{D-} = 0V		0.2		Ω
		I _{SW} = 30mA, V _{D+} , V _{D-} = 2.4V		0.2		
On-Resistance Flatness ⁽⁵⁾	R _{FLAT}	I _{SW} = 30mA, V _{D+} , V _{D-} = 0 to 2.4V		1.0		Ω
D+, D-, Dn+, Dn- Power off Leakage Current	I _{OFF}	VCC=0V, V _{SW} = 0 to 3.6V			1	uA
D+, D-, Dn+, Dn- Off Leakage Current	I _{OZ}	Switch off, V _{SW} = 0 to 3.6V			1	uA
Input-Logic High	V _{IH}	VCC =2.3V to 5.5V	1.5			V
Input-Logic Low	V _{IL}	VCC =2.3V to 5.5V			0.4	V
Input Leakage Current	I _{IN}	V _{IN} = 0 to 5.5V, Vin=S or OE	-1		1	uA



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USB2.0 High-Speed

4:1 Mux/DeMux Switch

ELECTRICAL CHARACTERISTICS

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PARAMETER	SYM	CONDITIONS	MIN	TYP	MAX	UNITS
DYNAMIC CHARACTERISTICS						
Turn-On Time	T _{ON}	V _{Dn+} or V _{Dn-} = 1.5V, RL = 50Ω, CL = 35pF		0.4	0.8	uS
Turn-Off Time	T _{OFF}	V _{Dn+} or V _{Dn-} = 1.5V, RL = 50Ω, CL = 35pF		0.4	0.8	uS
Break-Before-Make Time	T _{BBM}	V _{Dn+} and V _{Dn-} = 1.5V, RL = 50Ω, CL = 35pF	5	30		nS
On-Channel Bandwidth -3dB	BW	RL = 50Ω		1.6		GHz
Differential Insert Loss	DIL	RL = 50Ω, f = 240MHz		-0.5		dB
		RL = 50Ω, f = 800MHz		-1.2		
Off-Isolation	O _{IRR}	RL = 50Ω, f = 240MHz		-44		dB
		RL = 50Ω, f = 800MHz		-28		
Crosstalk ⁽⁶⁾	X _{TALK}	RL = 50Ω, f = 240MHz		-43		dB
		RL = 50Ω, f = 800MHz		-32		
D+,D- Off-Capacitance	C _{OFF}	f = 1MHz		2.6		pF
D+,D- On-Capacitance	C _{ON}	f = 1MHz		3.7		pF

NOTES:

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

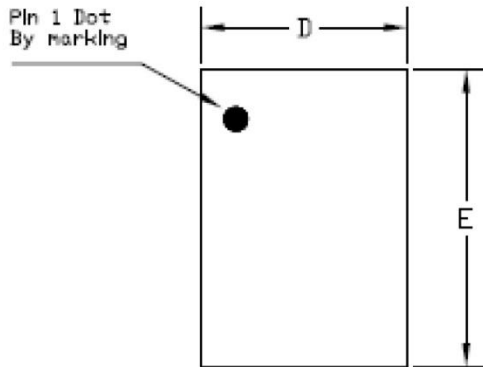
3: RON and RON matching specifications are guaranteed by design,

4: ΔRON = RON(MAX) - RON(MIN).

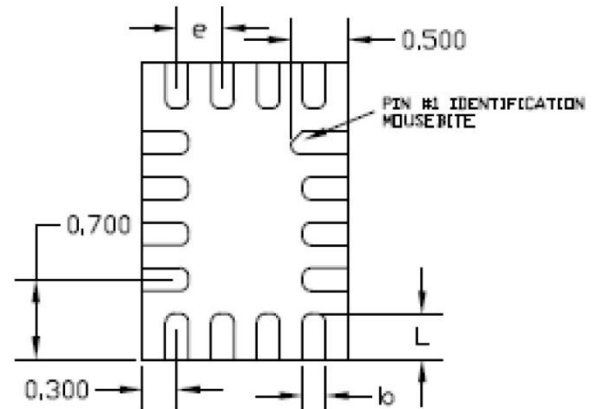
5: Flatness is defined as the difference between the maximum and minimum value of on-resistance, as measured over the specified analog signal ranges.

6: Between any two switches.

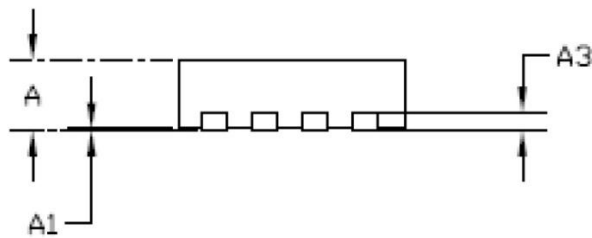
PACKAGE OUTLINE DIMENSIONS



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	1.75	0.18	1.85
E	2.55	2.60	2.65
L	0.30	0.40	0.50
b	0.15	0.20	0.25
e	0.40 BSC		