BCT4223H

Low-Voltage, 0.4Ω Dual-SPDT Analog Switch

GENERAL DESCRIPTION

The BCT4223H is a committed dual single-pole/double-throw (SPDT) that consist of two normally open (NO) and two normally close (NC) switches. This configuration can be used as a dual 2-to-1 multiplexer. It operates from a 1.8V to 5.5V single power supply.

The BCT4223H features ultra-low on-resistance, low voltage and fast switching times. The high performances make it very suitable for multiple applications, such as portable equipment, audio and video signal routing, etc.

Break-before-make switching prevents both switches being enabled simultaneously. This eliminates signal disruption during switching.

FEATURES

- Single Supply Voltage Range: 1.8V to 5.5V
- Ultra Low On-Resistance: 0.4Ω (TYP) at 5.0V
- Low On-Resistance Flatness: 0.1Ω (TYP)
- Low On-Resistance Matching: 0.04Ω (TYP)
- -3dB Bandwidth: 65MHz
- Fast Switching Times at V_{CC} = 5.0V:
  t_{ON}: 25ns
  t_{OFF}: 28ns
- High Off-Isolation: -70dB at 100kHz
- Low Crosstalk: -100dB at 100kHz
- Low Power Consumption
- Break-Before-Make Switching
- Rail-to-Rail Input and Output Operation
- Extended Industrial Temperature Range:
  –40°C to 85°C
- QFN1.8x1.4-10L

APPLICATIONS

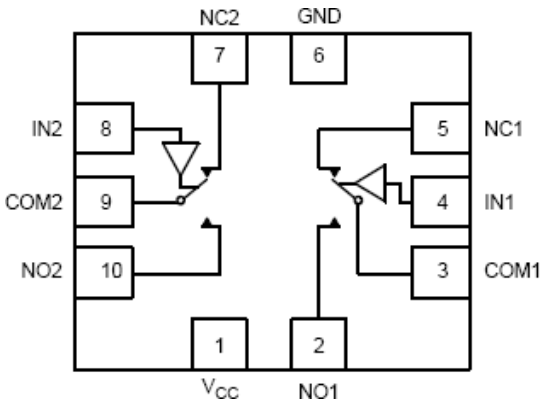
- Cellular Phones
- Medical Equipment
- Computer Peripherals
- Portable Equipment
- Sample-and-Hold Circuits
- Battery-Powered Systems
- Audio and Video Signal Routing

ORDERING INFORMATION

Ordering Code	Package Type	Temp Range	Marking	QTY/Reel
BCT4223HETB−TR	QFN1.8x1.4-10L	–40°C to +85°C	AFX	3000

Note: "AFX" in marking is product short code for BCT4223H.

PIN CONFIGURATION (TOP VIEW)



PIN DESCRIPTION

PIN	NAME	FUNCTION
2 , 10	NO1,NO2	Data Port (Normally Opened)
6	GND	Ground
5 , 7	NC1,NC2	Data Port (Normally Closed)
3 , 9	COM1,COM2	Data Port (Common Port)
1	V_{CC}	Power Supply
4 , 8	IN1,IN2	Digital control pin to connect the COM terminal to the NO or NC terminals

FUNCTION TABLE

IN1,IN2 INPUT	ON SWITCHES
0	NC1/NC2 Connected to COM1/COM2
1	NO1/NO2 Connected to COM1/COM2

ABSOLUTE MAXIMUM RATINGS

V_{CC} to GND..... -0.3V to +6V
Analog, Digital voltage range(1)..... -0.3V to (V_{CC} +0.3V)
Continuous Current NO, NC, or COM.....±200mA
Peak Current NO, NC, or COM.....±300mA
Operating Temperature Range.....-40°C to +85°C
Junction Temperature.....150°C
Storage Temperature..... - 65°C to +150°C
Lead Temperature (soldering, 10s).....260°C
ESD (HBM).....4kV

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.

(1) Signals on NC, NO, or COM or IN exceeding VCC will be clamped by internal diodes. Limit forward diode current to maximum current ratings.

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

(V_{CC} = 1.8V to 5.5V, TA = -40°C to +85°C, unless otherwise noted. Typical values are at V_{CC} = 3.3V, TA = +25°C.)

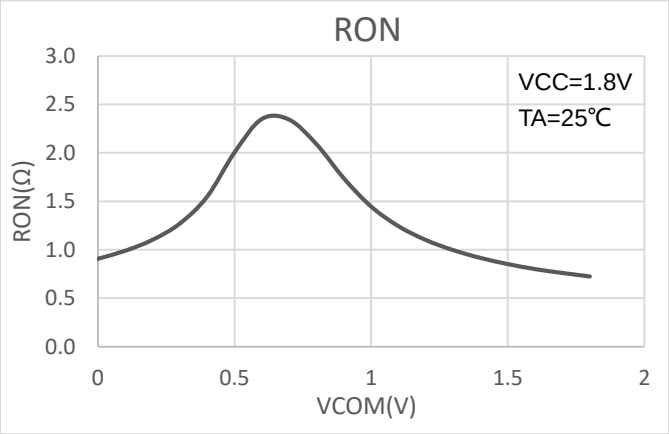
PARAMETER	SYM	CONDITIONS	MIN	TYP	MAX	UNITS
ANALOG SWITCH						
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}		0		V_{CC}	V
On-Resistance	R_{ON}	0 ≤ V_{NO} or V_{NC} ≤ V_{CC}, I_{COM} = -10mA ,V_{CC}=3.3V		0.6	1.0	Ω
		0 ≤ V_{NO} or V_{NC} ≤ V_{CC}, I_{COM} = -10mA ,V_{CC}=5.5V		0.4	0.6	
On-Resistance Match	$\triangle R_{ON}$	0 ≤ V_{NO} or V_{NC} ≤ V_{CC}, I_{COM} = -10mA ,V_{CC}=3.3V		0.05	0.10	Ω
		0 ≤ V_{NO} or V_{NC} ≤ V_{CC}, I_{COM} = -10mA ,V_{CC}=5.5V		0.04	0.08	
On-Resistance Flatness	R_{FLAT}	0 ≤ V_{NO} or V_{NC} ≤ V_{CC}, I_{COM} = -10mA ,V_{CC}=3.3V		0.25	0.30	Ω
		0 ≤ V_{NO} or V_{NC} ≤ V_{CC}, I_{COM} = -10mA ,V_{CC}=5.5V		0.10	0.15	
LEAKAGE CURRENTS						
Source off Leakage Current	$I_{NC(OFF)}$, $I_{NO(OFF)}$	V_{NO} or V_{NC} = 3V/1V, V_{COM} = 1V/3V,V_{CC} = 3.3V			1	uA
		V_{NO} or V_{NC} = 4.5V/1V, V_{COM} = 1V/4.5V,V_{CC} = 5.5V				
Channel On Leakage Current	$I_{NC(ON)}$, $I_{NO(ON)}$, $I_{COM(ON)}$	V_{NO} or V_{NC} = V_{COM} = 1V or 3V, V_{CC} = 3.3V			1	uA
		V_{NO} or V_{NC} = V_{COM} = 1V or 4.5V, V_{CC} = 5.5V				
DIGITAL INPUTS						
Input-Logic High	V_{IH}	V_{CC} =3.3V	2.0			V
		V_{CC} =5.5V	2.4			
Input-Logic Low	V_{IL}	V_{CC} =3.3V			0.4	V
		V_{CC} =5.5V			0.7	
Input Current	I_{IN}	V_{IN} = V_{IH} or V_{IL}	-1		1	uA

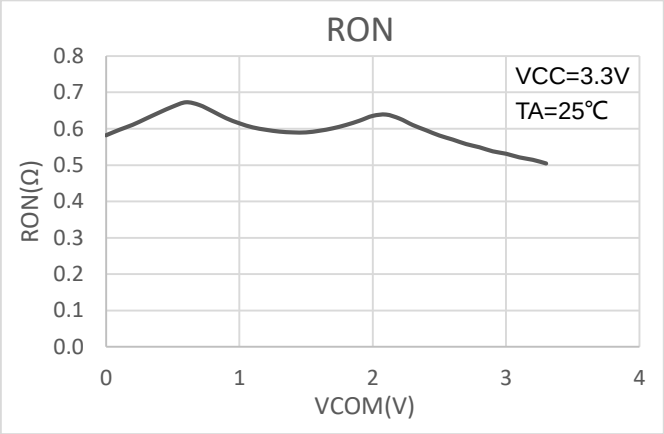
ELECTRICAL CHARACTERISTICS(Continued)

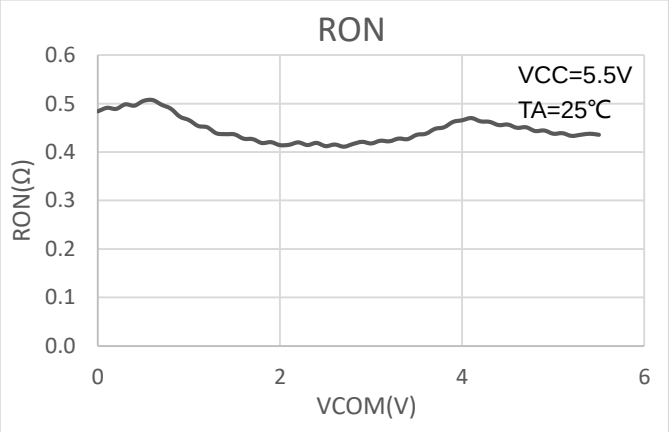
(V_{CC} = 1.8V to 5.5V, TA = -40°C to +85°C, unless otherwise noted. Typical values are at V_{CC} = 3.3V, TA = +25°C.)

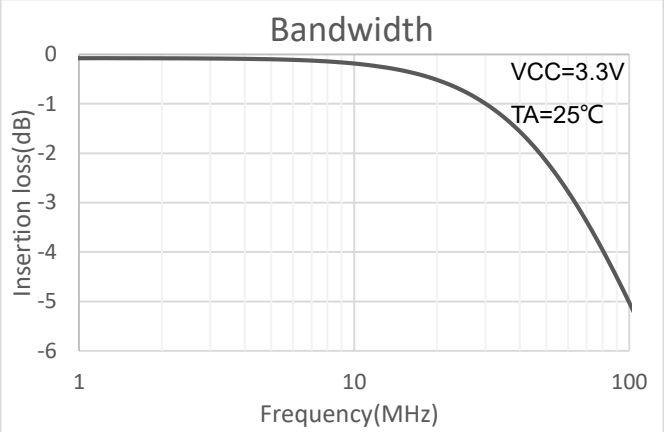
PARAMETER	SYM	CONDITIONS		MIN	TYP	MAX	UNITS
DYNAMIC CHARACTERISTICS							
Turn-On Time	T_{ON}	V_{NO} or V_{NC} = 2V, R_L = 50Ω, C_L = 15pF, V_{CC}=3.3V			30		ns
		V_{NO} or V_{NC} = 3V, R_L = 50Ω, C_L = 15pF, V_{CC}=5.5V			25		
Turn-Off Time	T_{OFF}	V_{NO} or V_{NC} = 2V, R_L = 50Ω, C_L = 15pF, V_{CC}=3.3V			32		ns
		V_{NO} or V_{NC} = 3V, R_L = 50Ω, C_L = 15pF, V_{CC}=5.5V			28		
Break-Before-Make Time	T_{BBM}	V_{NO1} or V_{NC1} = V_{NO2} or V_{NC2} = 2V, R_L = 50Ω, C_L = 15 pF V_{CC}=3.3V			11		ns
		V_{NO1} or V_{NC1} = V_{NO2} or V_{NC2} = 3V, R_L = 50Ω, C_L = 15 pF V_{CC}=5.5V			10		
On-Channel Bandwidth -3dB	BW	RL = 50Ω, C_L = 5pF			65		MHz
Off-Isolation	O_{IRR}	RL = 50Ω, C_L = 5pF	f = 100kHz		-70		dB
			f = 10kHz		-85		
Crosstalk	X_{TALK}	RL = 50Ω, C_L = 5pF	f = 100kHz		-100		dB
			f = 10kHz		-105		
Source Off-Capacitance	$C_{NC(OFF)}$, $C_{NO(OFF)}$				25		pF
Channel On-Capacitance	$C_{NC(ON)}$, $C_{NO(ON)}$, $C_{COM(ON)}$				95		pF
Power Supply Current	I_{CC}	V_{CC} = 3.3V, V_{IN} = 0V or 3V			0.001	1	uA
		V_{CC} = 5.5V, V_{IN} = 0V or 5V					

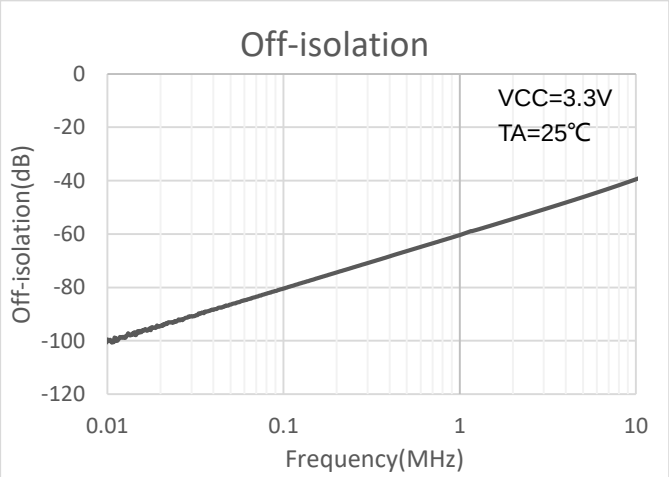
TYPICAL PERFORMANCE CHARACTERISTICS

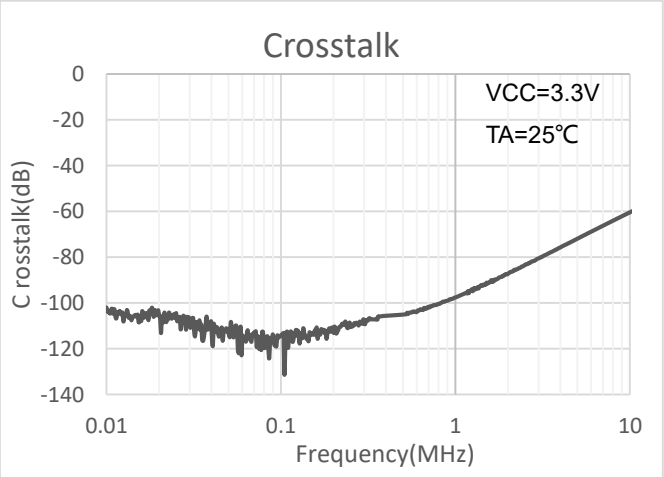












TEST CIRCUITS

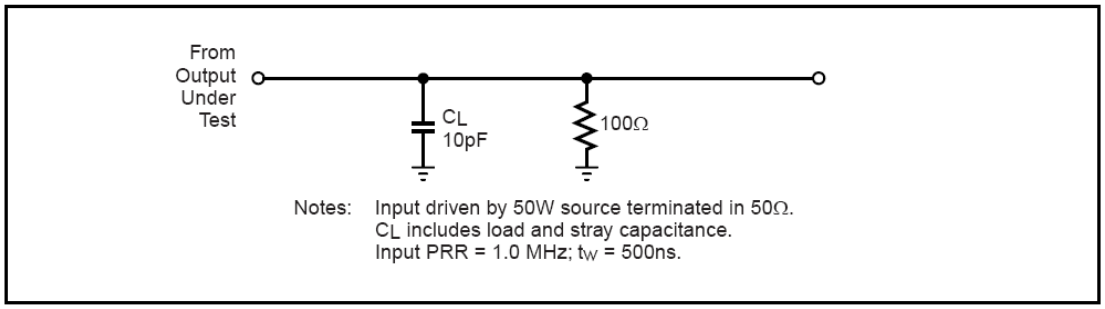


Figure 1. AC Test Circuit

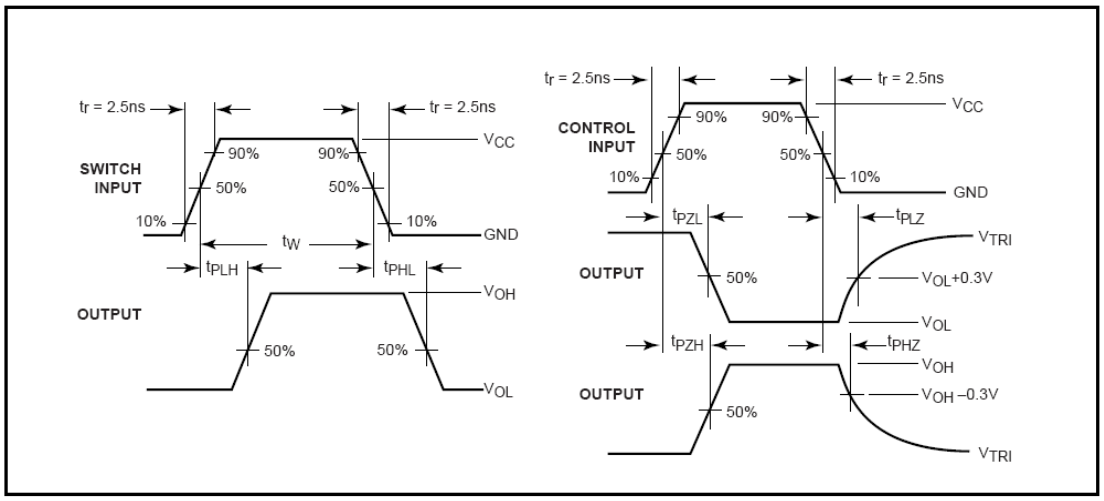


Figure 2. AC Waveforms

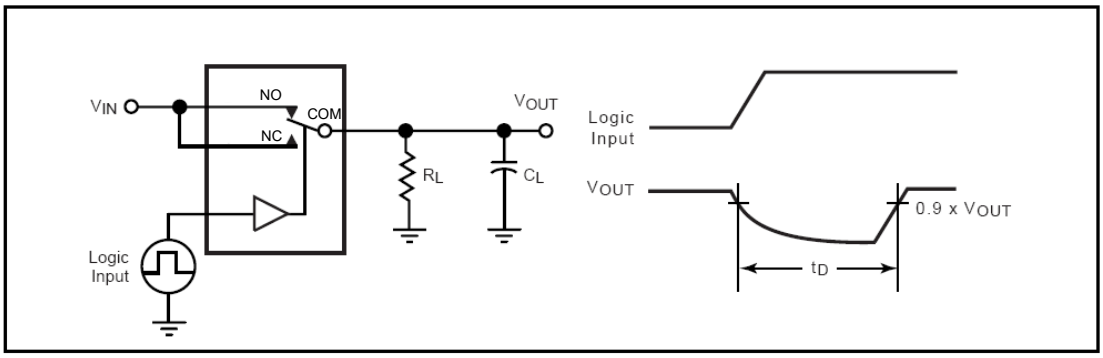


Figure 3. Break Before Make Interval Timing

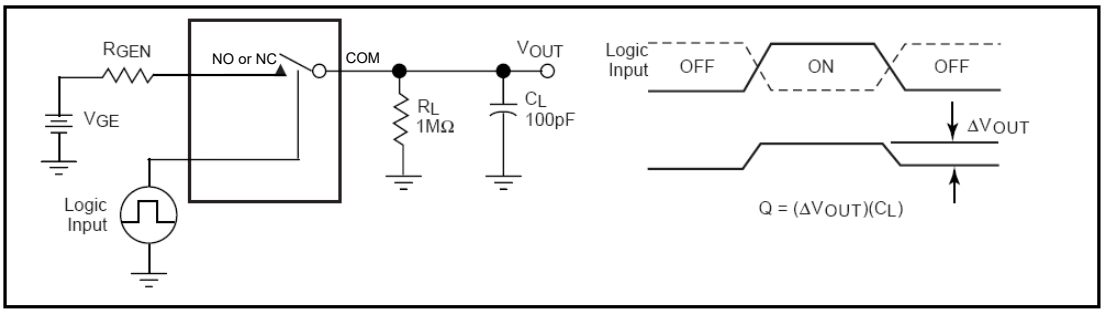


Figure 4. Charge Injection Test

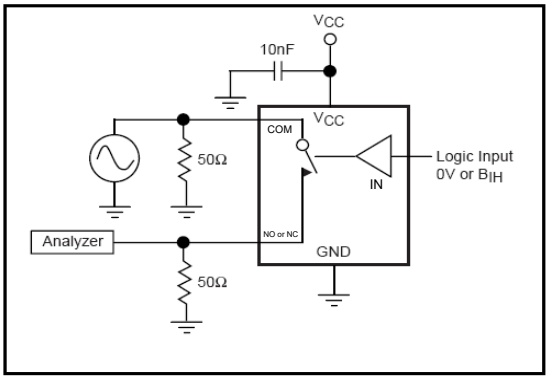


Figure 5. Off Isolation

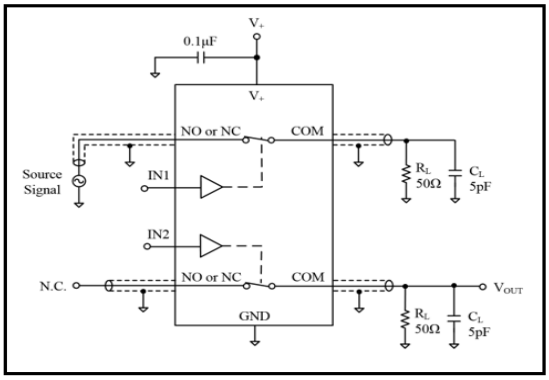


Figure 6. Crosstalk

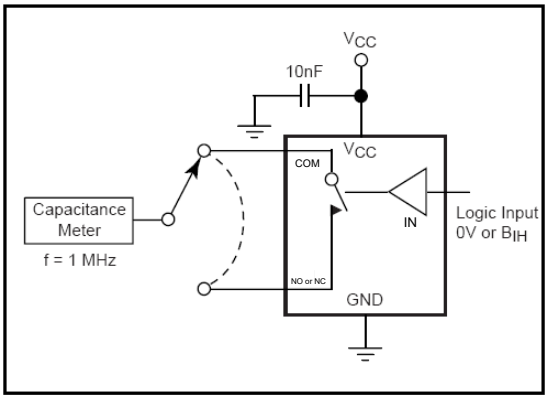


Figure 7. Channel Off Capacitance

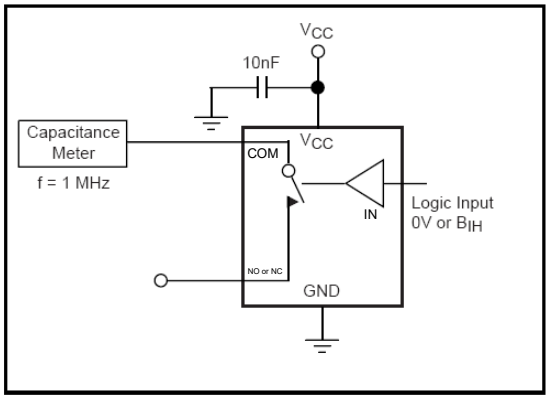


Figure 8. Channel On Capacitance

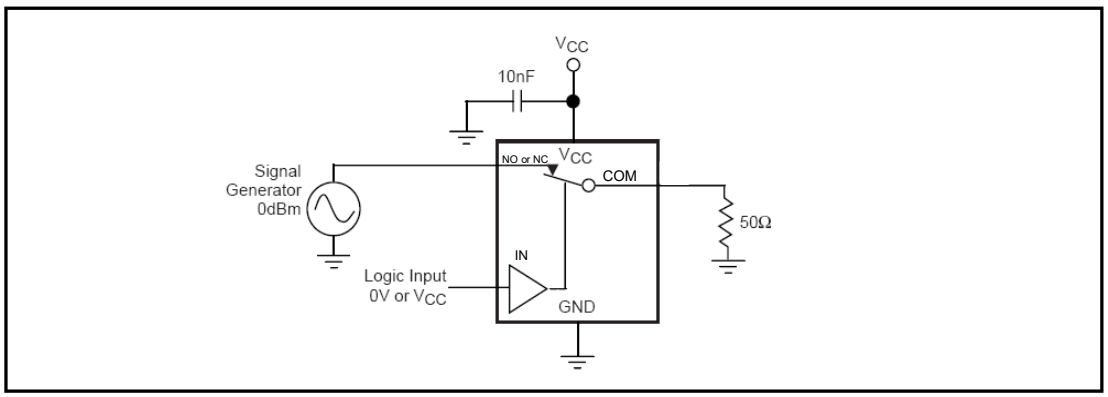
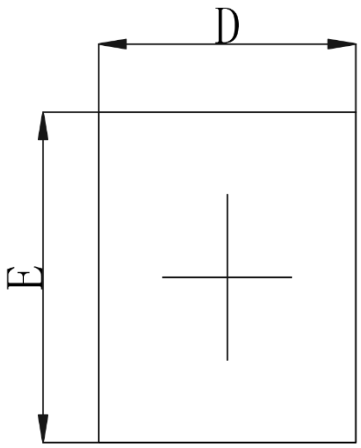


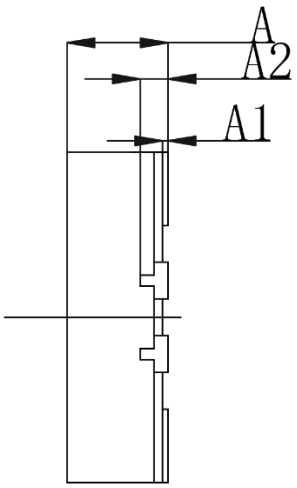
Figure 9. Bandwidth

PACKAGE OUTLINE DIMENSIONS

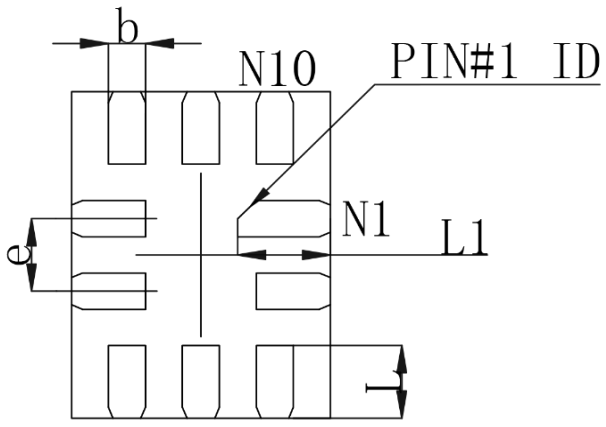
QFN1.8x1.4-10L



TOP VIEW



SIDE VIEW



BOTTOM VIEW

COMMON DIMENSIONS(mm)					
		SYMBOL	MIN.	NOM.	MAX.
TOTAL THICKNESS		A	0.500	0.550	0.600
STAND OFF		A1	0.000	--	0.050
LF THICKNESS		A2	0.152REF.		
LEAD WIDTH		b	0.150	0.200	0.250
BODY SIZE	X	D	1.324	1.400	1.476
	Y	E	1.724	1.800	1.876
LEAD PITCH		e	0.400BSC.		
LEAD LENGTH		L	0.350	0.400	0.450
		L1	0.450	0.500	0.550