3.5Ω，400MHz Bandwidth，Dual SPDT Analog Switch

Features

- Wide Power Supply Range:1.8V to 5.5V
- On-Resistance: 3.5Ω(TYP) at 5.0V
- Low On-Resistance Flatness
- High Bandwidth: 400MHz
- Break-Before-Make Switching
- Rail-to-Rail Signal Range
- High Off-Isolation: -75dB (f=1MHz)
- Crosstalk Rejection: -98dB (f=1MHz)
- Operation Temperature Range:
  -40°C to +125°C
- Available in QFN1.8x1.4-10L package

Applications

- Wearable Devices
- Portable Instrumentation
- Battery-Operated Equipment
- Computer Peripherals
- Cell Phones

Description

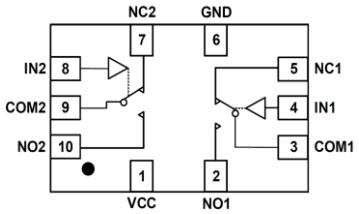
The BL1557 is a dual, single-pole double-throw (SPDT) analog switch that is designed to operate from 1.8 V to 5.5 V.

The BL1557 can handle both analog and digital signals. It features high-bandwidth(400MHz) and low on-resistance (3.5Ω TYP).

The BL1557 is available in QFN1.8x1.4-10L package

Pin Configuration

QFN1.8x1.4-10L



Function Table

IN_X	Function
0	NC_X Connected to COM_X
1	NO_X Connected to COM_X

Pin Description

Pin Name	Type	Description
VCC	PWR	Power Supply
GND	Ground	Ground
COMx	Input/Output	Data Port
NCx	Input/Output	Data Port
NOx	Input/Output	Data Port
IN_X	Input	Logic Control Signal

** X = 1or 2

Ordering Information

Order No.	Package	Packing
BL1557QN	QFN1.8×1.4-10L	Tape and Reel, 3000

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Units
DC Supply Voltage	V_{CC}	-0.5	6	V
DC Switch Voltage	V_{NCX}/ V_{NOX}/ V_{COMX}	-0.5	V_{SUP} + 0.3	V
DC Input Voltage	V_{INX}	-0.5	6	V
Continuous Current	$I_{(NCX/NOX/COMX)}$	-200	+200	mA
Peak Current(1)	$I_{PEAK(NCX/NOX/COMX)}$	-300	+300	mA
Storage Temperature Range	T_{STG}	-65	150	℃

Notes:

(1) Pulsed at 1ms, 50% duty circle

(2) Stress beyond above listed “Absolute Maximum Ratings” may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

(3) Control input(V_{INX}) must be held HIGH or LOW, and mustn’t be floated.

RECOMMENDED OPERATING CONDITIONS

DC Supply Voltage (V_{CC}) ……1.8V to 5.5V

Switch Input Voltage (V_S) ……...0V to V_{CC}

Control Input Voltage (V_{IN}) …… 0V to V_{CC}

Operation Temperature (TA) ……..-40℃ to +125℃

DC ELECTRICAL CHARACTERISTICS

（V_{CC}=5V，T_A=-40℃ to ＋125℃. Typical values are at V_{CC}=＋25℃, unless otherwise noted）

PARAMETER	SYMBOL	CONDITIONS	TA	MIN	TYP	MAX	UNITS
ANALOG SWITCH							
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}		-40~+125℃	0		VCC	V
On-Resistance	R_{ON}	V_{CC}=5V，I_{COM} = -10mA, V_{NO} or V_{NC}=3.5V	+25℃		3.5	7.5	Ω
			-40~+125℃			8	
On-Resistance Match Between Channels(1)	ΔR_{ON}	V_{CC}=5V，I_{COM} = -10mA, V_{NO} or V_{NC}=3.5V	+25℃		0.15	0.5	Ω
			-40~+125℃			0.7	
On-Resistance Flatness(2)	$R_{FLAT(ON)}$	V_{CC}=5V，I_{COM} = -10mA, V_{NO} or V_{NC}=0~VCC	+25℃		1.2	2	Ω
			-40~+125℃			2.2	
NC or NO OFF Leakage Current	$I_{NC(OFF)}$, $I_{NOFF)}$	V_{CC} = 5.5V; V_{NO} or V_{NC} = 3.3V/0.3V; V_{COM} = 0.3V/3.3V	+25℃		0.01	0.1	μA
			-40~+125℃			1	
NC,NO,COM ON Leakage Current	$I_{NC(ON)}$, $I_{NO(ON)}$, $I_{COM(ON)}$	V_{CC} = 5.5V; V_{COM} = 0.3V/3.3V;V_{NO} or V_{NC} = 0.3V/3.3V,or floating	+25℃		0.01	0.1	μA
			-40~+125℃			1	
DIGITAL CONTROL INPUTS							
Input High Voltage	V_{IH}	V_{CC}=5.5V	-40~+125℃	1.7			V
Input Low Voltage	V_{IL}	V_{CC}=5.5V	-40~+125℃			0.6	V
Input Leakage Current	I_{IN}	V_{CC}=5.5V, V_{IN} = 0 or 5.5V	-40~+125℃		0.01	1	μA
DYNAMIC CHARACTERISTICS							
Turn-On Time	t_{ON}	V_{NO} or V_{NC} = 3.0V, R_L = 50Ω; C_L = 35pF, V_{IH}=1.5V,V_{IL}=0V (50% to 50%)	+25℃		20		ns
Turn-Off Time	t_{OFF}	V_{NO} or V_{NC} = 3.0V, R_L = 50Ω; C_L = 35pF, V_{IH}=1.5V,V_{IL}=0V (50% to 50%)	+25℃		15		ns
Break-Before-Make Time Delay	t_{BBM}	V_{A1} or V_{A2} = 3.0V, R_L = 50Ω; C_L = 35pF(90% to 90%)	+25℃		12		ns
-3dB Bandwidth	BW	Signal = 0dBm, RL = 50Ω , CL = 5pF	+25℃		400		MHz
Off Isolation(3)	O_{ISO}	RL = 50Ω, CL = 5pF, Signal = 0dBm, f = 1MHz	+25℃		-75		dB
		RL = 50Ω, CL = 5pF, Signal = 0dBm, f = 10MHz	+25℃		-55		dB

Crosstalk(4)	X_{TALK}	RL = 50Ω, CL=5pF	f = 1MHz	+25℃		-98		dB
			f = 10MHz	+25℃		-85		dB
NC,NO OFF Capacitance	$C_{NC(OFF)}$, $C_{NO(OFF)}$			+25℃		6		pF
NC,NO,COM ON Capacitance	$C_{NC(ON)}$, $C_{NO(ON)}$, $C_{COM(ON)}$			+25℃		18		pF
Charge Injection	Q	CL = 1.0nF, VG = 0V, RG = 0Ω		+25℃		45		pC
POWER REQUIREMENTS								
Power Supply Current	I_{CC}			-40~+125℃		0.01	1	uA

DC ELECTRICAL CHARACTERISTICS

（V_{CC}=2.7V，T_A=-40℃ to ＋125℃. Typical values are at V_{CC}=＋25℃, unless otherwise noted）

PARAMETER	SYMBOL	CONDITIONS	TA	MIN	TYP	MAX	UNITS
ANALOG SWITCH							
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}		-40~+125℃	0		VCC	V
On-Resistance	R_{ON}	V_{CC}=2.7V，I_{COM} = -10mA, V_{NO} or V_{NC}=1.5V	+25℃		8.8	12	Ω
			-40~+125℃			15	
On-Resistance Match Between Channels(1)	ΔR_{ON}	V_{CC}=2.7V，I_{COM} = -10mA, V_{NO} or V_{NC}=1.5V	+25℃		0.1	0.5	Ω
			-40~+125℃			0.7	
On-Resistance Flatness(2)	RFLAT(ON)	V_{CC}=2.7V，I_{COM} = -10mA, V_{NO} or V_{NC}=0~VCC	+25℃		4.4	6	Ω
			-40~+125℃			7	
NC or NO OFF Leakage Current	$I_{NC(OFF)}$, $I_{NO(OFF)}$	V_{CC} = 3.6V; V_{NO} or V_{NC} = 0.3V, 3.3V; V_{COM}= 0.3V, 3.3 V	+25℃		0.01	0.1	μA
			-40~+125℃			1	
NC,NO,COM ON Leakage Current	$I_{NC(ON)}$, $I_{NO(ON)}$, $I_{COM(ON)}$	V_{CC} = 3.6V; V_{COM} = 0.3V, 3.3 V;V_{NO} or V_{NC} = 0.3V, 3.3V,or floating	+25℃		0.01	0.1	μA
			-40~+125℃			1	
DIGITAL CONTROL INPUTS(1)							
Input High Voltage	V_{IH}	V_{IN} = 3.6V	-40~+125℃	1.5			V
Input Low Voltage	V_{IL}	V_{IN} = 3.6V	-40~+125℃			0.5	V
Input Leakage Current	I_{IN}	V_{IN} = 0 ~ 3.6V	-40~+125℃			1	μA
DYNAMIC CHARACTERISTICS							
Turn-On Time	t_{ON}	V_{NO} or V_{NC} = 1.5V, R_L = 50Ω; C_L = 35pF, V_{IH}=1.5V,V_{IL}=0V	+25℃		23		ns

Turn-Off Time	t_{OFF}	V_{NO} or V_{NC} = 1.5V, R_L = 50Ω; CL = 35pF, V_{IH}=1.5V,V_{IL}=0V		+25℃		21		ns
Break-Before-Make Time Delay	t_{BBM}	V_{NO} or V_{NC} = 1.5V, R_L = 50Ω; CL = 35pF		+25℃		18		ns
-3dB Bandwidth	BW	Signal = 0dBm, RL = 50Ω , CL = 5pF		+25℃		400		MHz
Off Isolation(3)	O_{ISO}	R_L = 50Ω, CL = 5pF, Signal = 0dBm	f = 1MHz	+25℃		-73		dB
			f = 10MHz	+25℃		-50		dB
Crosstalk(4)	X_{TALK}	R_L = 50Ω, CL=5pF	f = 1MHz	+25℃		-100		dB
			f = 10MHz	+25℃		-85		dB
NC,NO OFF Capacitance	$C_{NC(OFF)}$, $C_{NO(OFF)}$			+25℃		6		pF
NC,NO,COM ON Capacitance	$C_{NC(ON)}$, $C_{NO(ON)}$, $C_{COM(ON)}$			+25℃		18		pF
Charge Injection	Q	C_L = 1.0nF, V_G = 0V, R_G = 0Ω,		+25℃		30		pC
POWER REQUIREMENTS								
Power Supply Current	I_{CC}			-40~+125℃		0.01	1	uA

Note:

(1) $\triangle R_{ON} = R_{ON(MAX)} - R_{ON(MIN)}$, between channels

(2) Flatness is defined as the difference between the maximum and minimum value of on resistance as measured over the specified analog signal ranges.

(3) Off Channel Isolation = $20\log_{10}[(V_{NO\backslash NC})/V_{COM}]$

(4) Between any two switches

TEST SETUP CIRCUITS

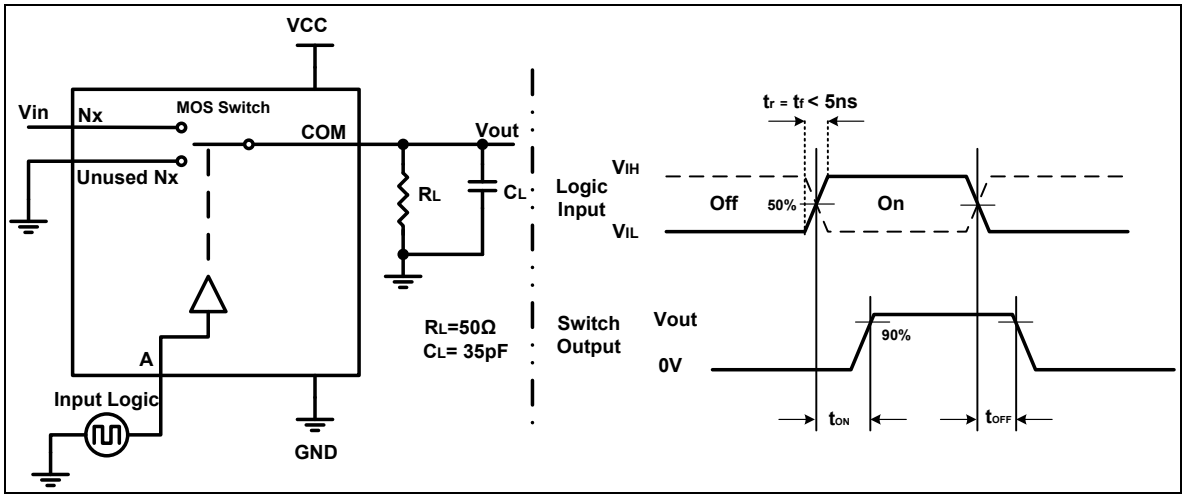


Figure1. AC Test Circuit & Waveforms

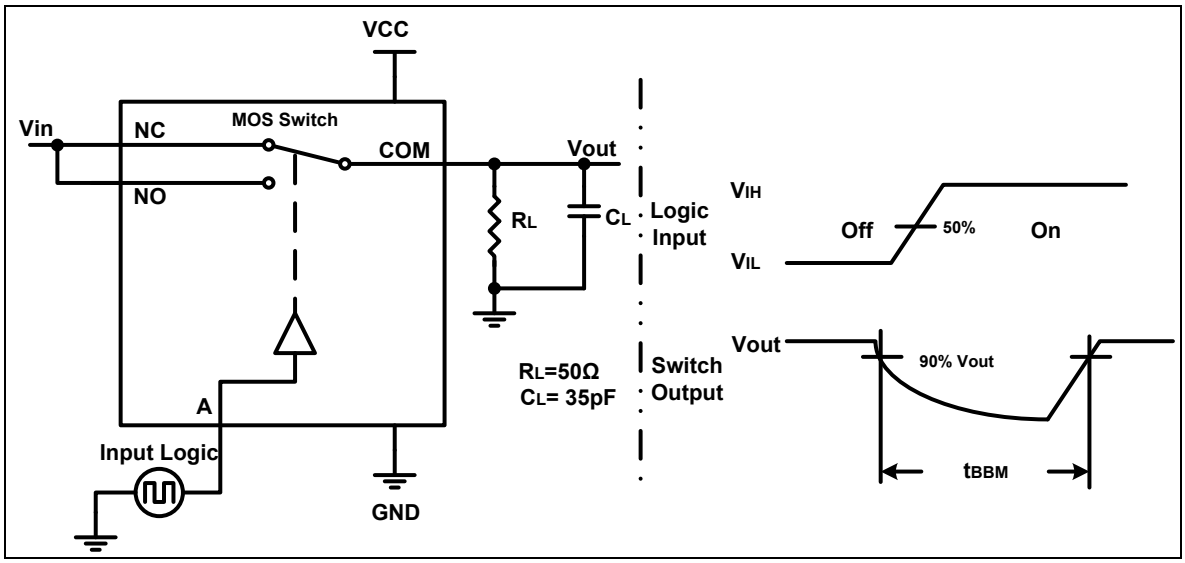


Figure2. Break-Before-Make Time (t_{BBM})

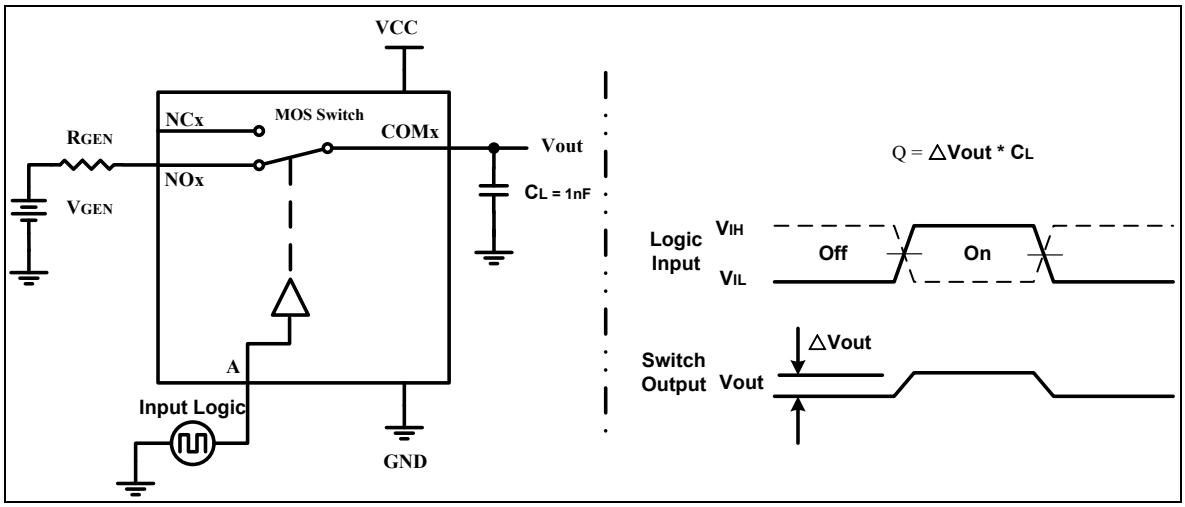


Figure3. Charge Injection (Q)

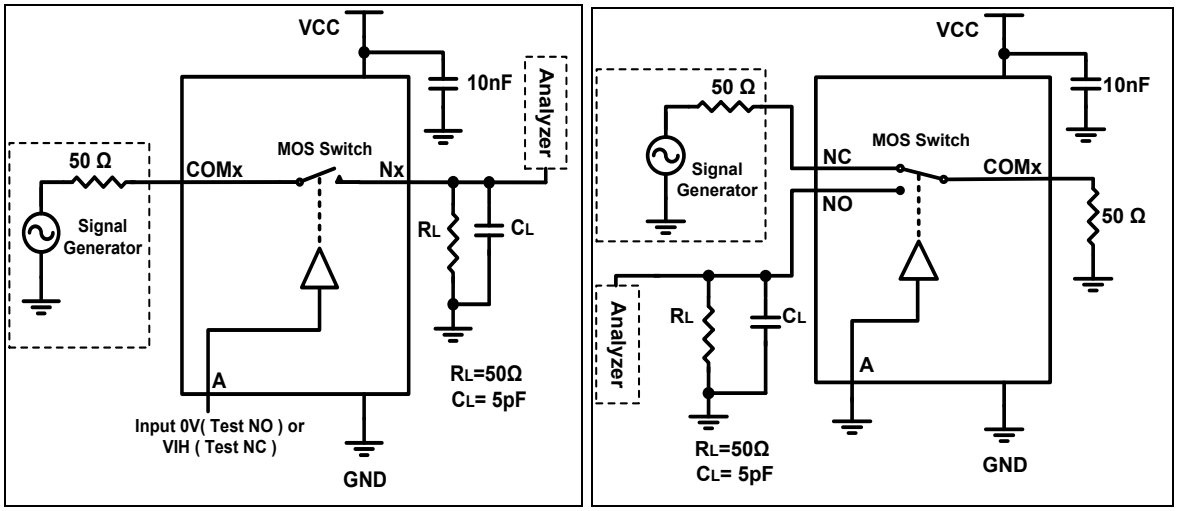


Figure4. Off Isolation (V_{ISO})

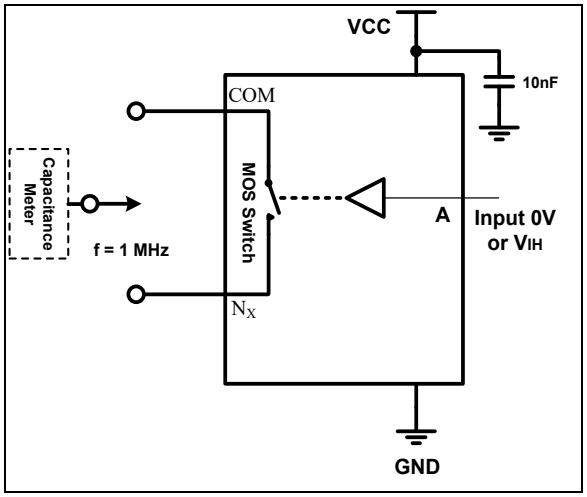


Figure5. Cross Talk (V_{CT})

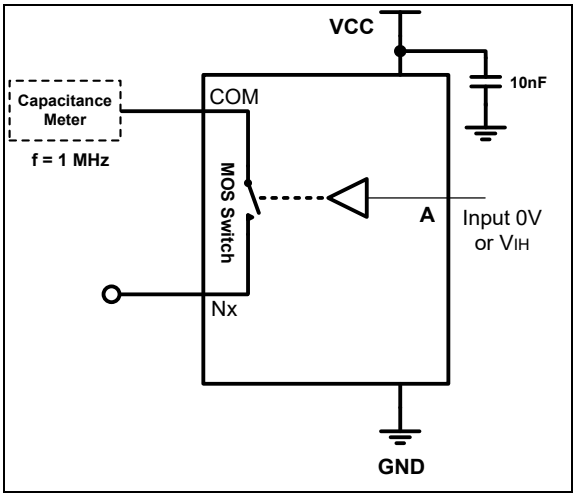


Figure6. Channel Off Capacitance($C_{OFF(NX)}$)

Figure7. Channel On Capacitance($C_{ON(NX)}$)

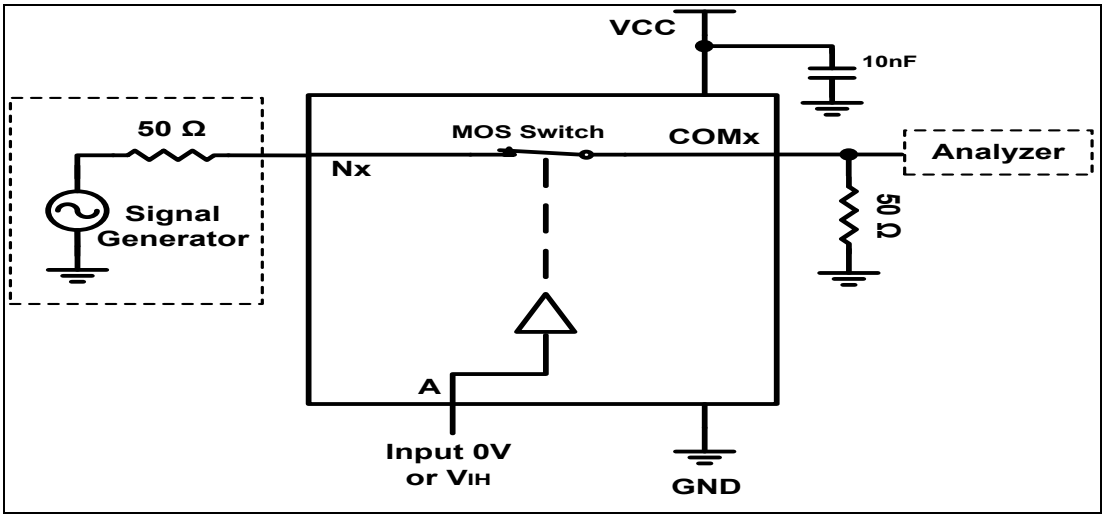
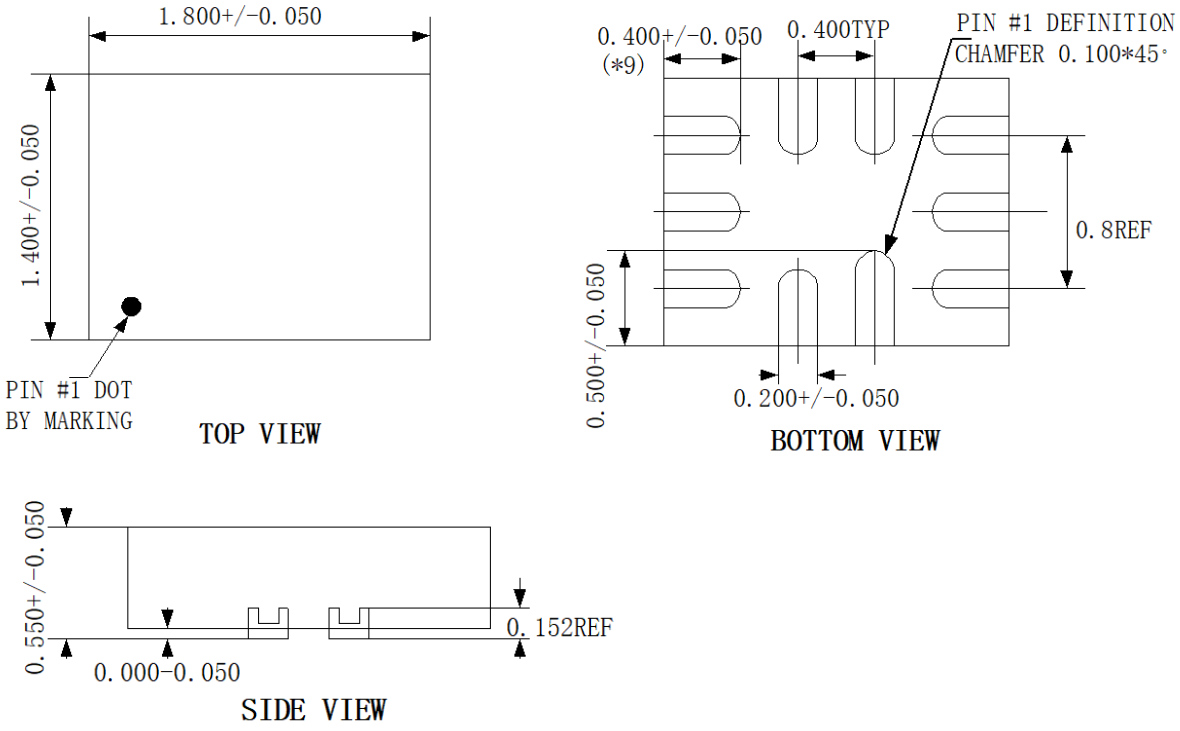


Figure8. -3dB Bandwidth (f_{3dB})

PACKAGE OUTLINE DIMENSIONS

QFN1.8×1.4-10L



NOTE: All linear dimensions are in millimeters.