High Speed,Low Voltage Dual DPDT Analog Switch

1 Features

- High bandwidth: 350 MHz
- Operate from1.65 V to 5.5 V
- Low on-state resistance: 3.5 Ω @ 4.5 V(typ)
- Break-before-make switching
- Rail-to-Rail operation
- TTL/CMOS compatible
- Operation temperature range:-40°C to +85°C

2 Application

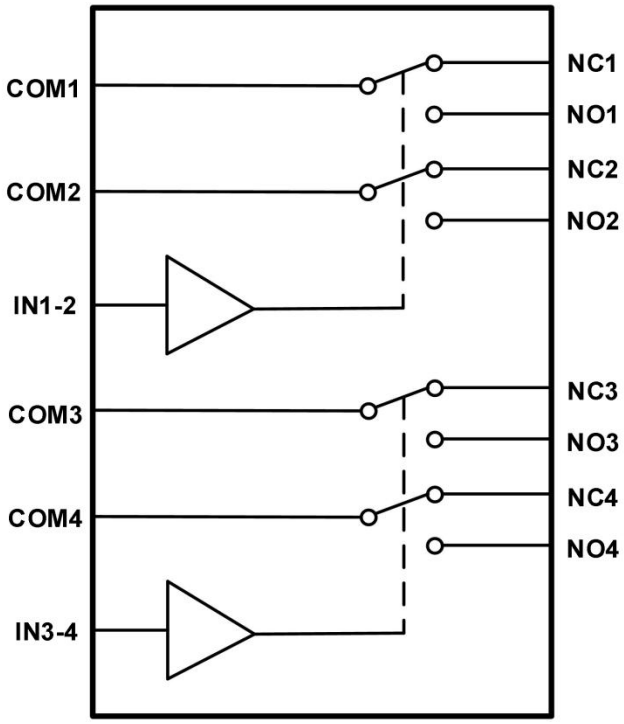
- Cell phones
- Video switching
- Portable instrumentation
- Battery-Operated equipment
- Communication systems

3 Description

The WB4899 is a high-speed, low-voltage, dual-independent double-pole double-throw (DPDT) COMS analog switch that is designed to operate from a single +1.65V to +5.5V power supply. It features high-bandwidth (350 MHz) and low on-resistance (3.5 Ω @ 4.5 V).

The WB4899 is configured as a DPDT device with two logic control inputs that control two multiplexer/demultiplexer each. The configuration can also be used as a dual differential 2-to-1 multiplexer/demultiplexer.

4 Circuit diagram



5 Device Pin and Packages

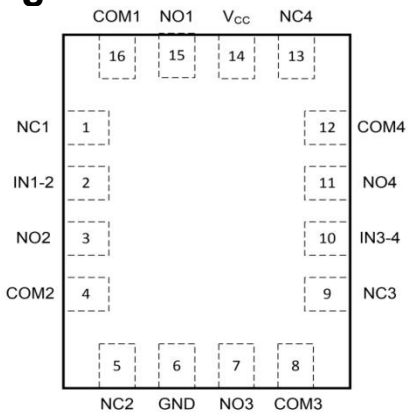


Table 5-1 Pin definition

Name	Pin	Description
NC1	1	Normal closed terminal switch 1
IN1-2	2	Select input,control switch 1 and switch 2
NO2	3	Normal open terminal switch 2
COM2	4	Common terminal switch 2
NC2	5	Normal closed terminal switch 2
GND	6	Ground
NO3	7	Normal open terminal switch 3
COM3	8	Common terminal switch 3
NC3	9	Normal closed terminal switch 3
IN3-4	10	Select input,control switch 3 and switch 4
NO4	11	Normal open terminal switch 4
COM4	12	Common terminal switch 4
NC4	13	Normal closed terminal switch 4
V_{CC}	14	Supply Voltage
NO1	15	Normal open terminal switch 1
COM1	16	Common terminal switch 1

Table 5-2 Function Table

IN1-2	Switch state
0	NC1=COM1,NC2=COM2
1	NO1=COM1,NO2=COM2
IN3-4	**Switch state**
0	NC3=COM3,NC4=COM4
1	NO3=COM3,NO4=COM4

6 Voltage, Temperature, ESD and Thermal Ratings

6.1 Absolute Maximum Ratings(1)

Parameters		Min.	Max.	Unit
V_{CC}	Supply voltage range	-0.3	6.0	V
V_{IN}	Input voltage	-0.3	6.0	V
	Analog,digital voltage range(2)	-0.3	(V_{CC})+0.3	V
	Continuous current NO,NC or COM	-100	+100	mA
I_{PEAK}	Continuous channel current	-160	+160	mA
T_J	Junction temperature under bias	-65	150	°C
T_{stg}	Storage temperature range	-65	150	°C

(1)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 under "Recommended Operating Conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2)The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

6.2 ESD Ratings

ESD			Value	Unit
V(ESD)	Electrostatic discharge	Human-Body Model (HBM)(1)	3.5K	V
		Charged-Device Model (CDM)(2)	2K	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions(1)

Over operating free-air temperature range (unless otherwise noted)

Symbol	Parameter		Min	Max	Units
V_{CC}	Supply voltage	Operating	1.65	5.5	V
V_{CTRL}	Control Input voltage	Operating	0	V_{CC}	V
V_{SW}	Switch I/O voltage	Operating	0	V_{CC}	V
T_A	Ambient temperature		-40	85	°C

(1) All unused digital inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

7 Electrical Specifications

7.1 DC Electrical Characteristics

V_{CC}=1.65V to 5.5V, FULL=–40°C to +125°C. Typical values are at TA=+25°C (unless otherwise noted)

Parameter	Symbol	Conditions	VCC	Temp	Min	Typ	Max	Units
Analog Signal Range	V_{NO} ,V_{NC},V_{COM}				0		V_{CC}	V
On-Resistance	R_{ON}	V_{NO} or V_{NC}=V_{CC}/2, I_{COM}=-100mA	4.5V	+25°C		3.5	6	Ω
			3V	+25°C		7	10	
			2.3V	+25°C		12	22	
			1.65V	+25°C		15	27	
On-Resistance Match Between Channels	ΔR_{ON}	V_{NO} or V_{NC}=V_{CC}/2, I_{COM}=-100mA	4.5V	+25°C		0.3	1	Ω
			3V	+25°C		1	3	
On-Resistance Flatness	RFLAT(ON)	0≤V_{NO} or V_{NC}≤V_{CC}, I_{COM}=-100mA	4.5V	+25°C		1	1.5	Ω
			3V	+25°C		3.5	5.5	
			2.3V	+25°C		9	14	
			1.65V	+25°C		12	18	
NC,NO Off Leakage Current	$I_{NC(OFF)}$,$I_{NO(OFF)}$	V_{NO} or V_{NC}=1V, 4.5V,V_{COM}=4.5V, 1V	5.5 V	Full			1	μA
NC,NO,COM On Leakage Current	$I_{NC(ON)}$,$I_{NO(ON)}$, $I_{COM(ON)}$	V_{COM}=1V, 4.5V, V_{NO} or V_{NC}=1V, 4.5V,or floating	5.5 V	Full			1	μA
Input High Voltoge	V_{INH}		4.5V	Full	1.8			V
			3V	Full	1.5			V
Input Low Voltage	V_{INL}		4.5V	Full			0.5	V
			3V	Full			0.4	V
Input Leakage Current	I_{IN}	V_S=V_{CC} or 0	5.5 V	Full			1	μA
Power Supply Current	I_{CC}	V_S=GND or V_{CC}	5.5 V	Full			1	μA

7.2 Switch And AC Characteristics

V_{CC}=1.65V to 5.5V, FULL=–40°C to +125°C. Typical values are at TA=+25°C (unless otherwise noted)

Parameter	Symbol	Conditions		VCC	Temp	Min	Typ	Max	Units
Turn-On Time	t_{ON}	V_{COM}=V_{CC}, R_L=300Ω , C_L=35pF		5V	+25°C		10		ns
				3.3V			14		
Turn-Off Time	t_{OFF}	V_{COM}=V_{CC}, R_L=300Ω , C_L=35pF		5V	+25°C		20		ns
				3.3V			22		
Break-Before - Make Time Delay	t_{BBM}	V_{NO1}=V_{NC1}=V_{NO2}=V_{NC2}=3V R_L=300Ω,C_L=35pF		5V	+25°C		12		ns
				3.3V			20		
Off Isolation	O_{ISO}	R_L=50Ω ,Switch OFF	f=10MHz	3.3V	+25°C		-52		dB
			f=1MHz				-73		
Crosstalk Isolation	X_{TALK}	R_L=50Ω ,Switch OFF,f=10MHz		3.3V	+25°C		-89		dB
-3dB Bandwidth	BW	R_L=50Ω ,Switch ON		3.3V	+25°C		350		MHz
Charge Injection	Q	C_L=1nF, V_{GEN}=0V, R_{GEN}=0Ω		5V	+25°C		6		pC
				3.3V			4		
NC,NO Off Capacitance	$C_{NC(OFF)}$, $C_{NO(OFF)}$	f=1MHz		3.3V	+25°C		15		pF
NC,NO,COM On Capacitance	$C_{NC(ON)}$, $C_{NO(ON)}$, $C_{COM(ON)}$	f=1MHz		3.3V	+25°C		8		pF

8 Typical Characteristics

V_{CC}=1.65V or 5.5V, FULL=–40°C to +125°C. Typical values are at TA=+25°C (unless otherwise noted)

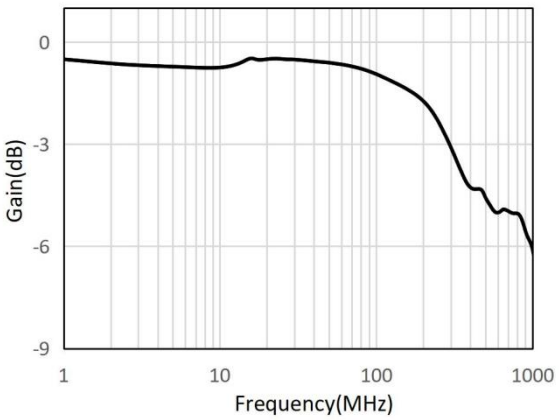


Fig.8-1. Bandwidth vs Frequency at 3.3V V_{CC}

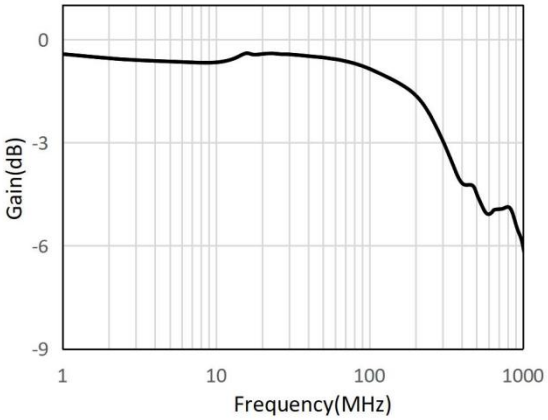


Fig.8-2. Bandwidth vs Frequency at 5V V_{CC}

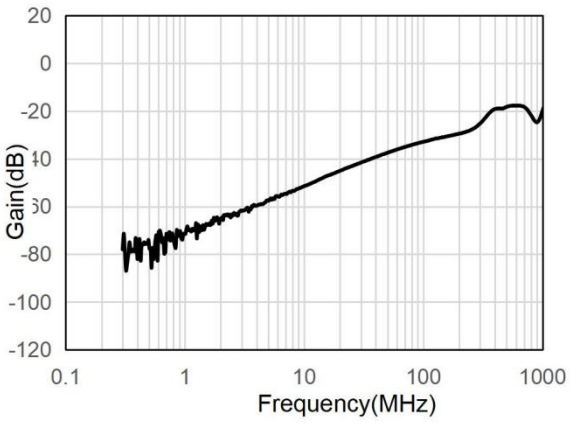


Fig.8-3. Off Isolation vs Frequency at 3.3V V_{CC}

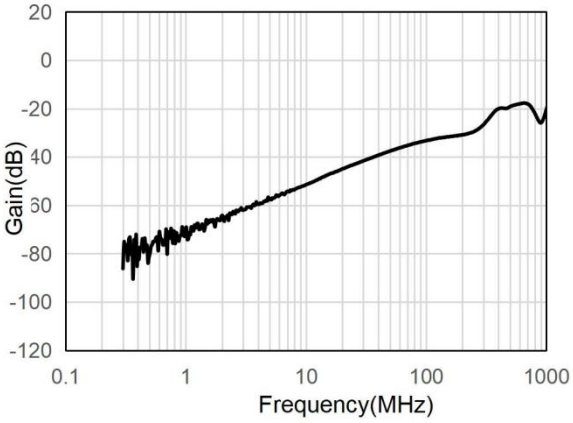


Fig.8-4. Off Isolation vs Frequency at 5V V_{CC}

9 Measurement Information

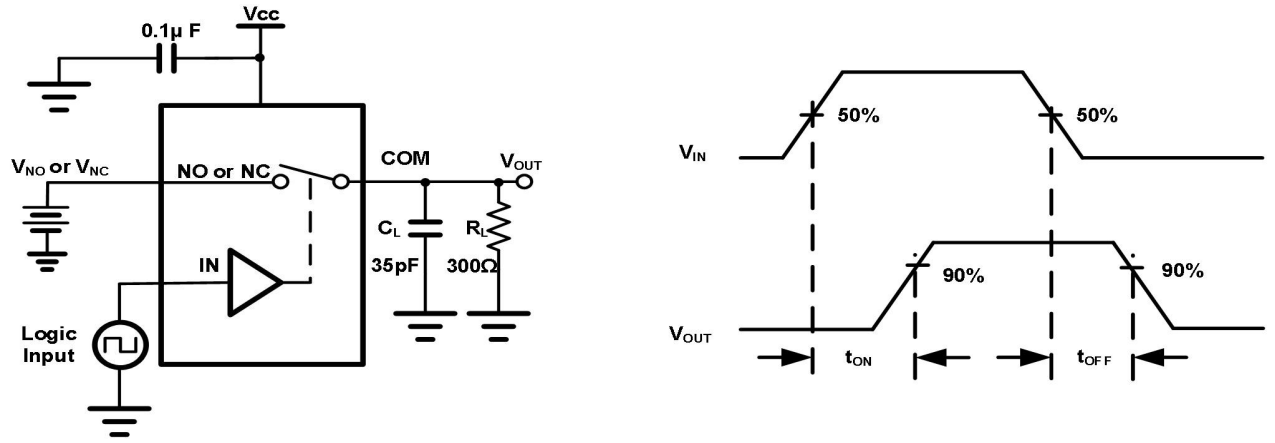


Fig.9-1. Switching Time

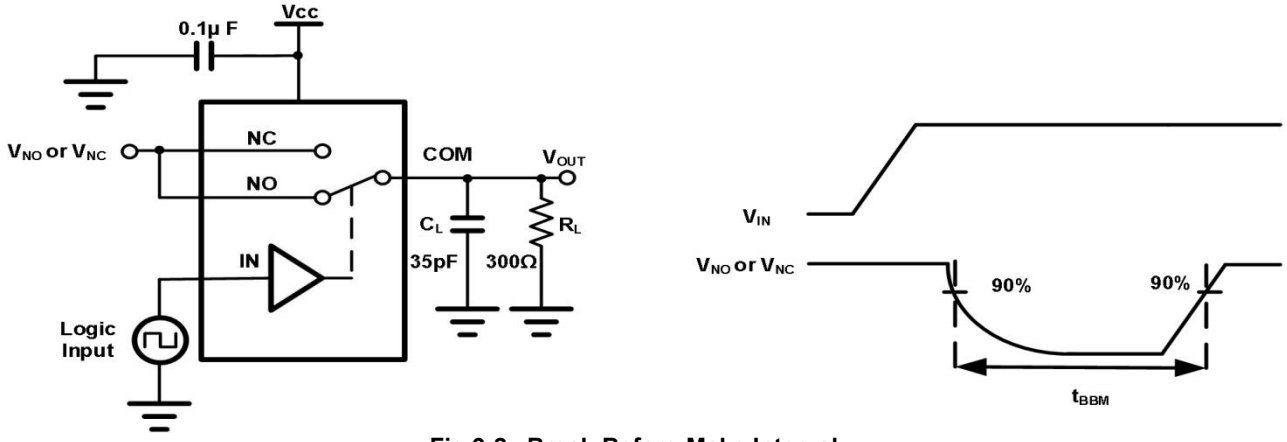


Fig.9-2. Break-Before-Make Interval

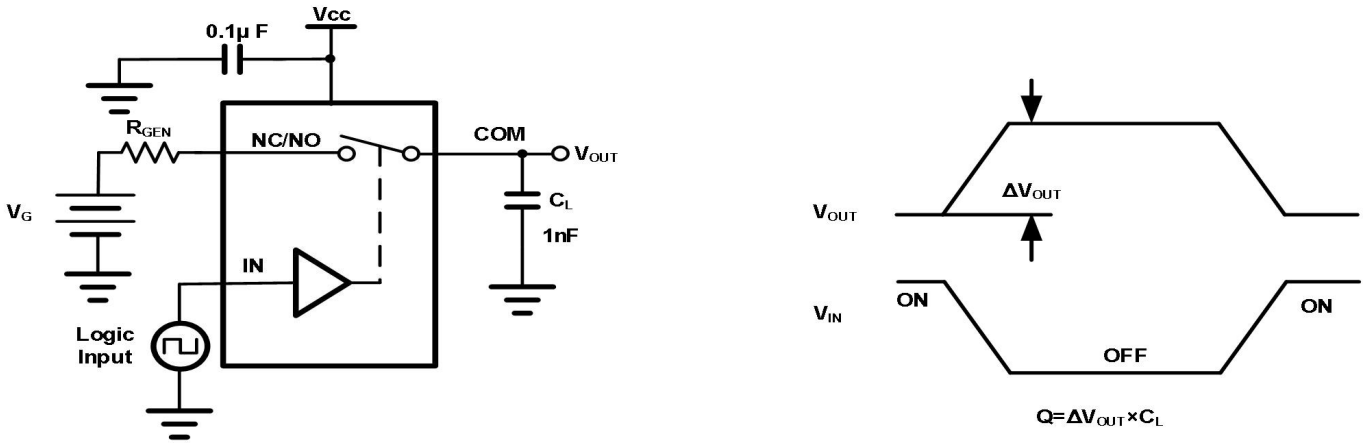


Fig.9-3. Charge Injection

9 Measurement Information(Continued)

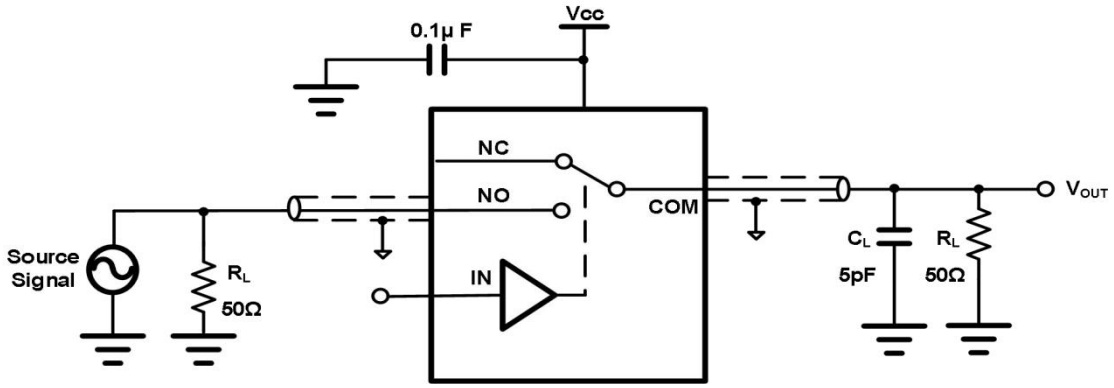


Fig.9-4. Off Isolation

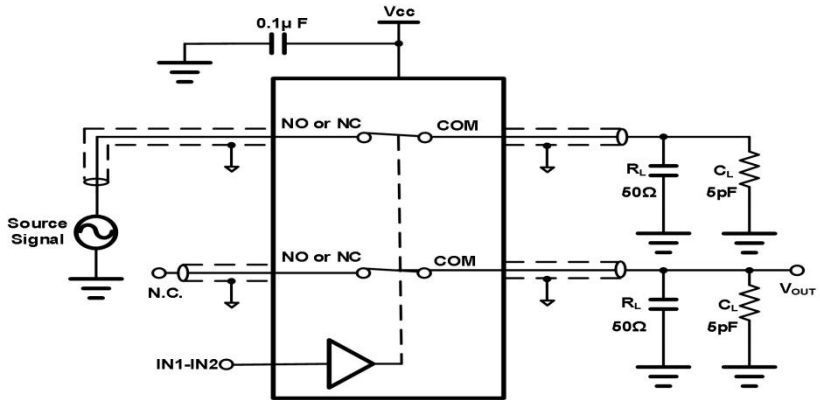


Fig.9-5. Channel To Channel Crosstalk

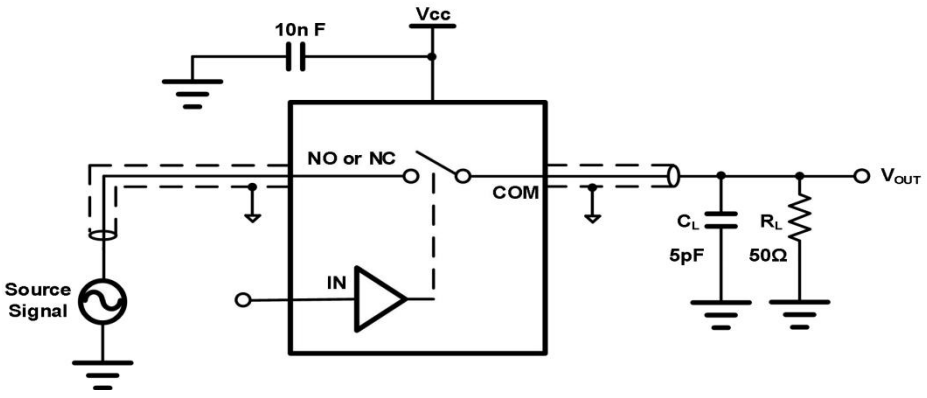
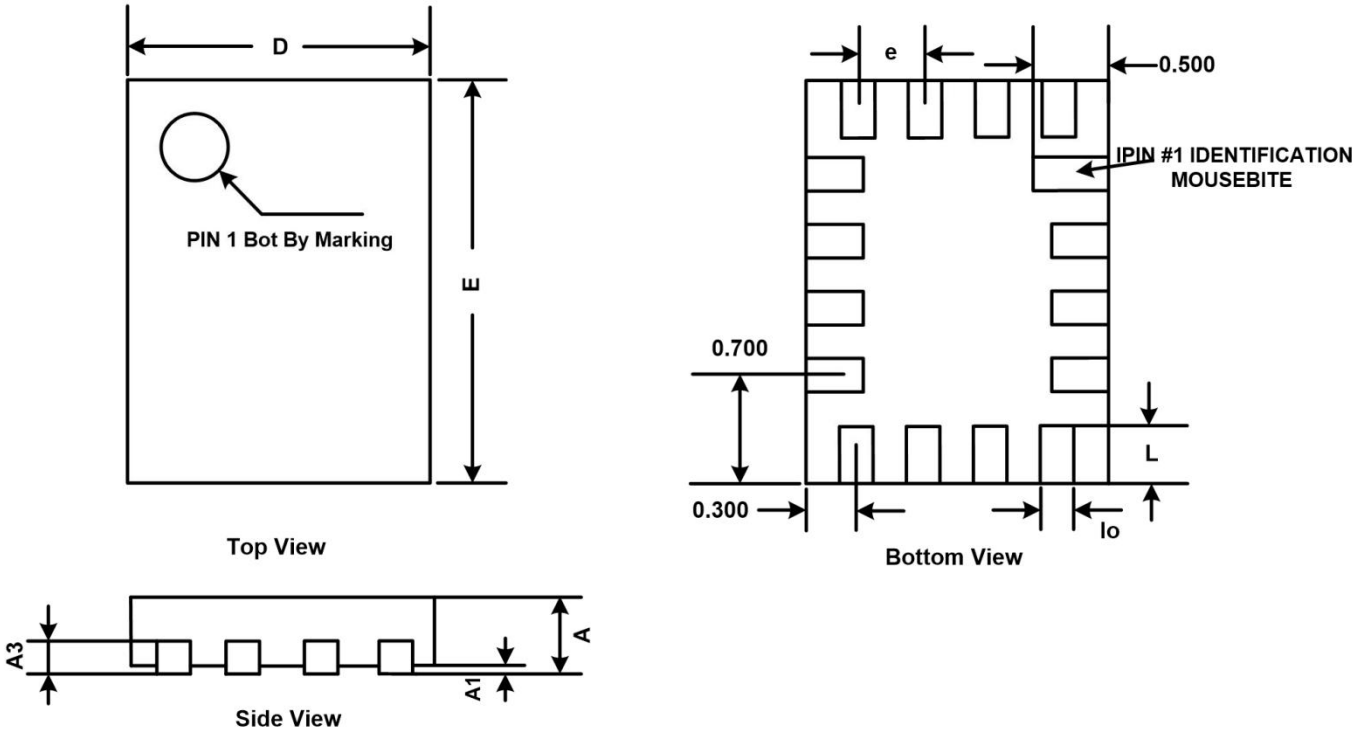


Fig.9-6. -3dB Bandwidth

10 Package Outline Dimension

UTQFN1.8×2.6-16L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	>0.50	0.55	0.60	>0.19	0.21	0.23
A1	0.00	-	0.05	0.00	-	0.02
A3	0.15REF			0.06REF		
D	1.75	1.80	1.85	0.68	0.70	0.72
E	2.55	2.60	2.65	0.99	1.01	1.03
L	0.30	0.40	0.50	0.12	0.16	0.19
lo	0.15	0.20	0.25	0.06	0.08	0.10
e	0.40BSC			0.16BSC		

Notes For Attention

- When making the purchase, please ensure you recognize the company's trademark. If you have any questions, please contact the company's headquarters.
- When designing the circuit, please do not exceed the absolute maximum ratings of the components; otherwise, it will affect the reliability of the entire machine.
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