Ultra Low ON-Resistance, Low Voltage, Dual, SPDT Analog Switch

FEATURES

- **-3dB Bandwidth: 30MHz**
- **High Speed, Typically 50ns**
- **Supply Range: +1.8V to +5.5V**
- **Low ON-State Resistance, 0.6Ω(TYP)**
- **Break-Before-Make Switching**
- **Rail-to-Rail Operation**
- **TTL/CMOS Compatible**
- **Extended Industrial Temperature Range: -40°C to +125°C**

DESCRIPTION

The RS2323 is a dual, low on-resistance, single-pole double-throw (SPDT) analog switch that is designed to operate from1.8 V to 5.5 V.

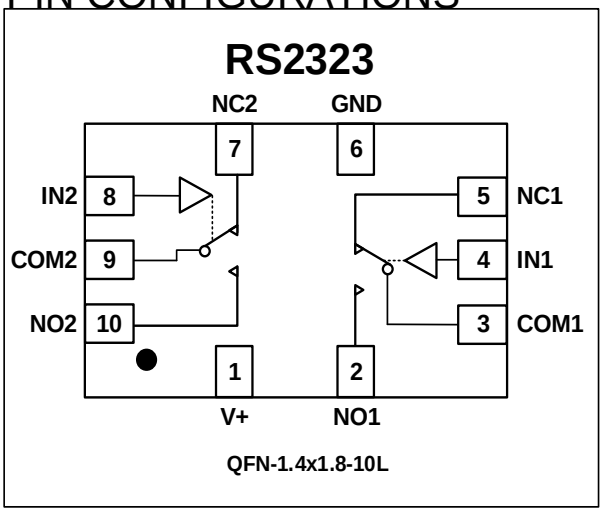
The RS2323 device can handle both analog and digital signals. It features fast switching speeds (50ns) and low on-resistance (0.6Ω TYP).

Applications include signal gating, chopping, modulation or demodulation (modem), and signal multiplexing for analog-to-digital and digital-to-analog conversion systems.

APPLICATIONS

- **Wearable Devices**
- **Battery-Operated Equipment**
- **Signal Gating, Chopping, Modulation or Demodulation (Modem)**
- **Portable Computing**
- **Cell Phones**

PIN CONFIGURATIONS



FUNCTION TABLE

LOGIC	NO	NC
0	OFF	ON
1	ON	OFF

PIN DESCRIPTION

NAME	PIN	FUNCTION
V+	1	Power Supply
NO1, NO2	2, 10	Normally-Open Terminal
COM1, COM2	3, 9	Common Terminal
IN1, IN2	4, 8	Digital Control Pin
NC1, NC2	5, 7	Normally-Closed Terminal
GND	6	Ground

ABSOLUTE MAXIMUM RATINGS (1)

V+, IN to GND	-0.3V to 6.0V
Analog, Digital Voltage Range (2)	– 0.3 to (V+) + 0.3V
Continuous Current NO, NC, or COM	±500mA
Peak Current NO, NC, or COM	±800mA
Storage Temperature	−65°C to +150°C
Operating Temperature	−40°C to +125°C
Junction Temperature	150°C
Package Thermal Resistance @ T_A = +25°C	
QFN-1.4x1.8-10L	120°C/W
Lead Temperature (Soldering, 10s)	260°C
ESD Susceptibility	
HBM	1000V
MM	100V

(1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.

(2) Input terminals are diode-clamped to the power-supply rails. Input signals that can swing more than 0.3V beyond the supply rails should be current-limited to 10mA or less.

ESD SENSITIVITY CAUTION

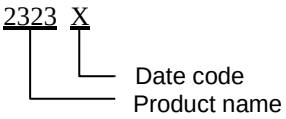
ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

PACKAGE/ORDERING INFORMATION

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING	PACKAGE OPTION
RS2323	RS2323XUTQK10	-40°C ~125°C	QFN-1.4x1.8-10L	2323X	Tape and Reel,3000

NOTE: X = Date Code

MARKING INFORMATION



ELECTRICAL CHARACTERISTICS

V+ = 5.0 V, T_A= –40°C to 125°C (unless otherwise noted)

PARAMETER	SYMBOL	CONDITIONS	V+	T_A	MIN	TYP	MAX	UNITS
ANALOG SWITCH								
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}			FULL	0		V+	V
On-Resistance	R_{ON}	0 ≤ (V_{NO} or V_{NC}) ≤V+, I_{COM} = -10mA, Switch ON, See Figure 1	5V	+25℃		0.6	1.0	Ω
				FULL			1.2	Ω
			3.3V	+25℃		1.0	1.5	Ω
				FULL			1.7	Ω
On-Resistance Match Between Channels	ΔR_{ON}	0 ≤ (V_{NO} or V_{NC}) ≤V+, I_{COM} = -10mA, Switch ON, See Figure 1	5V	+25℃		0.04	0.1	Ω
				FULL			0.12	Ω
			3.3V	+25℃		0.04	0.1	Ω
				FULL			0.12	Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	0 ≤ (V_{NO} or V_{NC}) ≤V+, I_{COM} = -10mA, Switch ON, See Figure 1	5V	+25℃		0.18	0.3	Ω
				FULL			0.4	Ω
			3.3V	+25℃		0.54	0.7	Ω
				FULL			0.8	Ω
NC,NO OFF Leakage Current	$I_{NC(OFF)}$, $I_{NO(OFF)}$	V_{NO} or V_{NC} = 0.3V, V+/2 V_{COM} = V+/2, 0.3V See Figure 2	1.8 to 5.5V	FULL			1	μA
NC,NO,COM ON Leakage Current	$I_{NC(ON)}$, $I_{NO(ON)}$, $I_{COM(ON)}$	V_{NO} or V_{NC} = 0.3V, Open V_{COM} = Open, 0.3V See Figure 2	1.8 to 5.5V	FULL			1	μA
DIGITAL CONTROL INPUTS(1)								
Input High Voltage	V_{INH}		5V	FULL	1.5			V
			3.3V	FULL	1.3			V
Input Low Voltage	V_{INL}		5V	FULL			0.6	V
			3.3V	FULL			0.5	V
Input Leakage Current	I_{IN}	V_{IN} = V_{IO} or 0	1.8 to 5.5V	FULL			1	μA

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

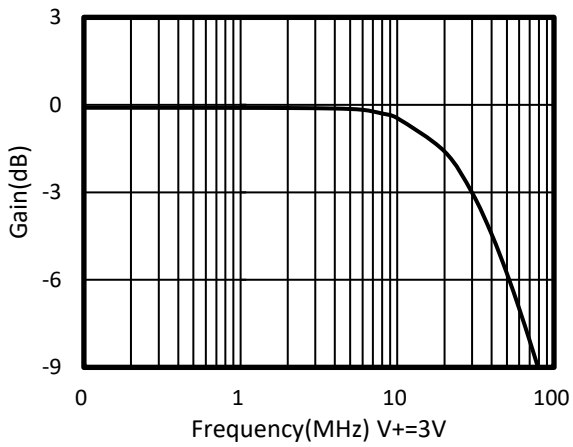
ELECTRICAL CHARACTERISTICS (continued)

V+ = 5.0 V, TEMP= –40°C to 125°C (unless otherwise noted))

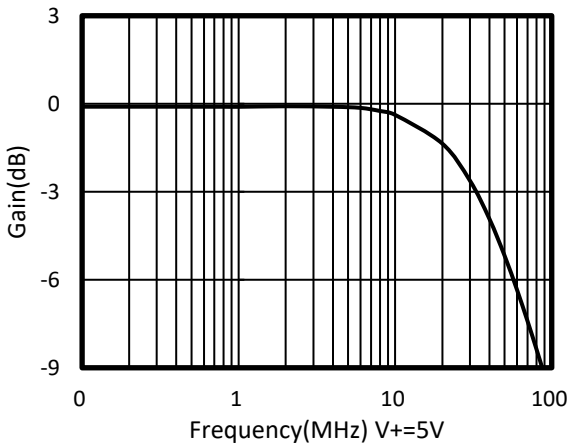
PARAMETER	SYMBOL	CONDITIONS		V+	TEMP	MIN	TYP	MAX	UNITS
DYNAMIC CHARACTERISTICS									
Turn-On Time	t_{ON}	V_{COM} = V+, R_L = 300Ω, C_L = 35pF, See Figure 5		5V	+25℃		50		ns
				3.3V			50		
Turn-Off Time	t_{OFF}	V_{COM} = V+, R_L = 300Ω, C_L = 35pF, See Figure 5		5V	+25℃		15		ns
				3.3V			17		
Break-Before-Make Time Delay	t_{BBM}	V_{NO1} = V_{NC1} = V_{NO2} = V_{NC2} = 3V, R_L = 300Ω, C_L = 35pF,See Figure 6		5V	+25℃		10		ns
				3.3V			11		
Off Isolation	O_{ISO}	R_L = 50Ω, Switch OFF, See Figure 8	f = 100KHz		+25℃		-68		dB
			f = 10KHz		+25℃		-86		dB
-3dB Bandwidth	BW	Switch ON, R_L = 50Ω See Figure 7			+25℃		30		MHz
NC,NO OFF Capacitance	$C_{NC(OFF)}$, $C_{NO(OFF)}$	V_{NC} or V_{NO}=V+/2 or GND, Switch OFF See Figure 4			+25℃		80		pF
NC,NO,COM ON Capacitance	$C_{NC(ON)}$, $C_{NO(ON)}$, $C_{COM(ON)}$	V_{NC} or V_{NO}=V+/2 or GND, Switch ON See Figure 4			+25℃		350		pF
POWER REQUIREMENTS									
Power Supply Range	V_+				FULL	1.8		5.5	V
Power Supply Current	I_+	V_{IN} = GND or V_+		5.5V	FULL			1	μA

TYPICAL CHARACTERISTICS

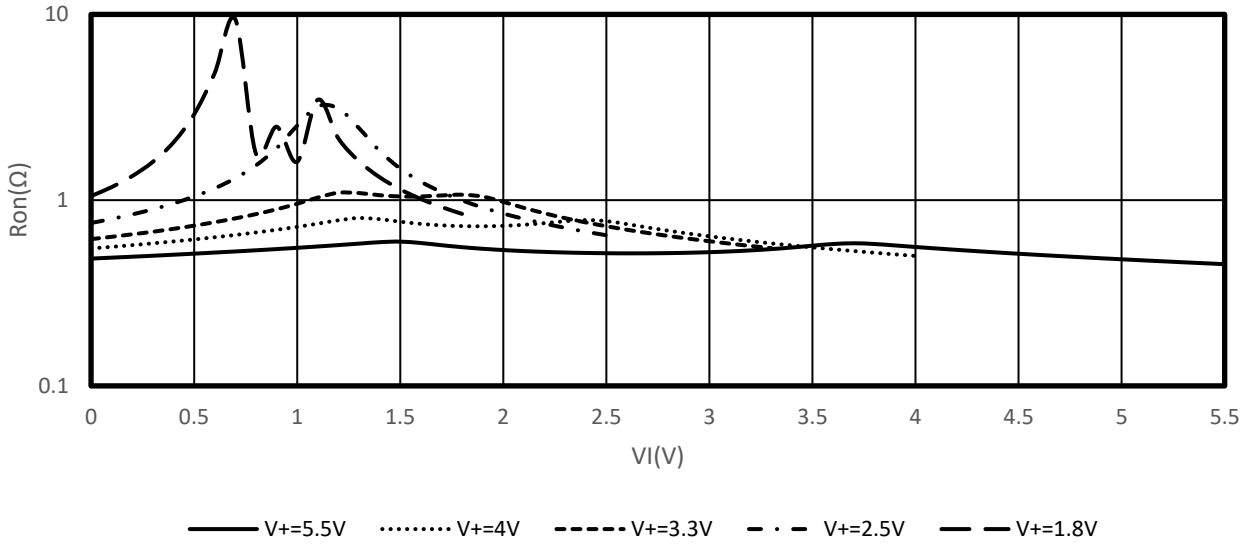
BANDWIDTH



BANDWIDTH



Typical ron as a Function of Input Voltage (VI) for VI = 0 to V+



Parameter Measurement Information

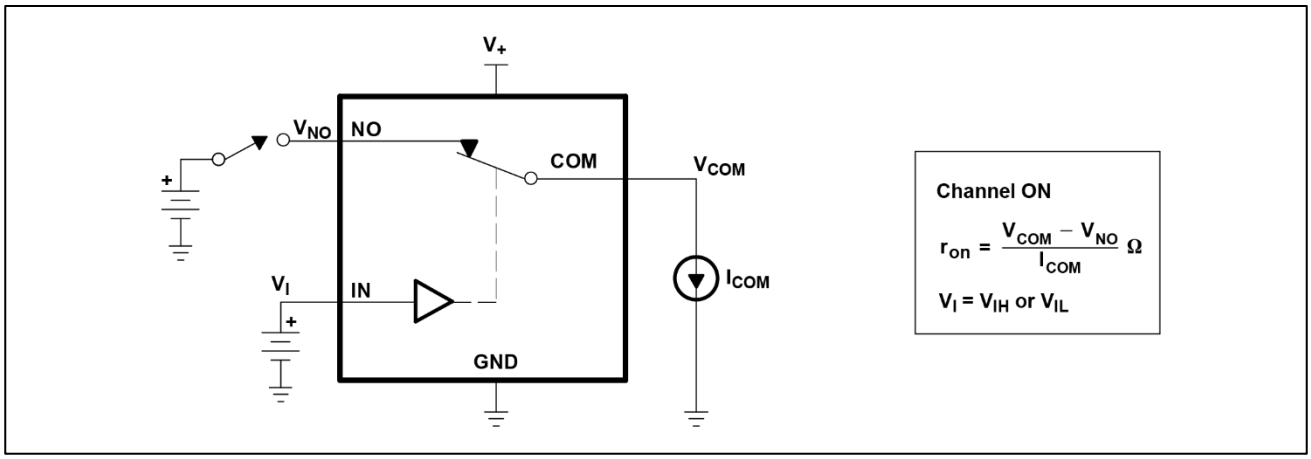


Figure 1.ON-State Resistance (r_{on})

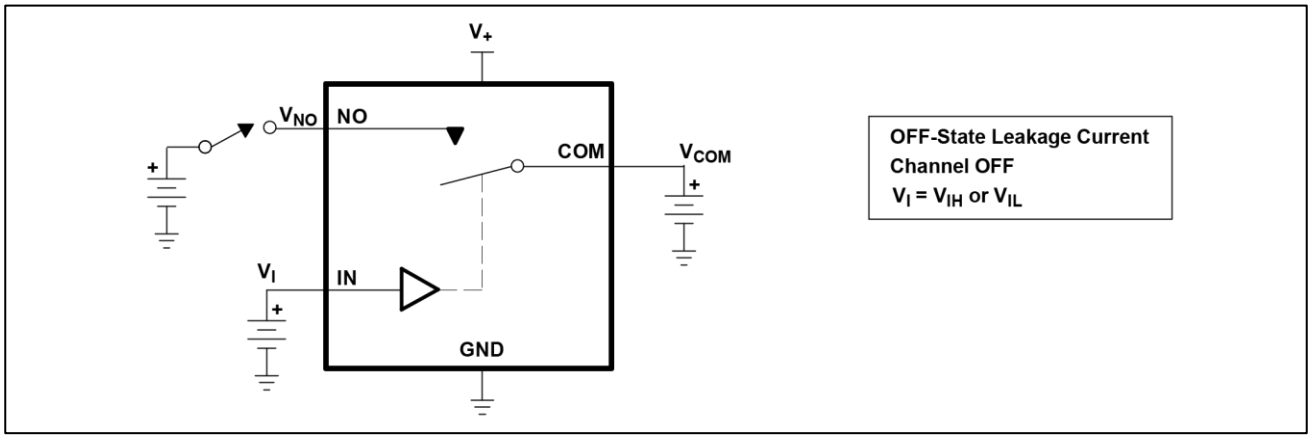


Figure 2.OFF-State Leakage Current ($I_{COM(OFF)}$, $I_{NO(OFF)}$)

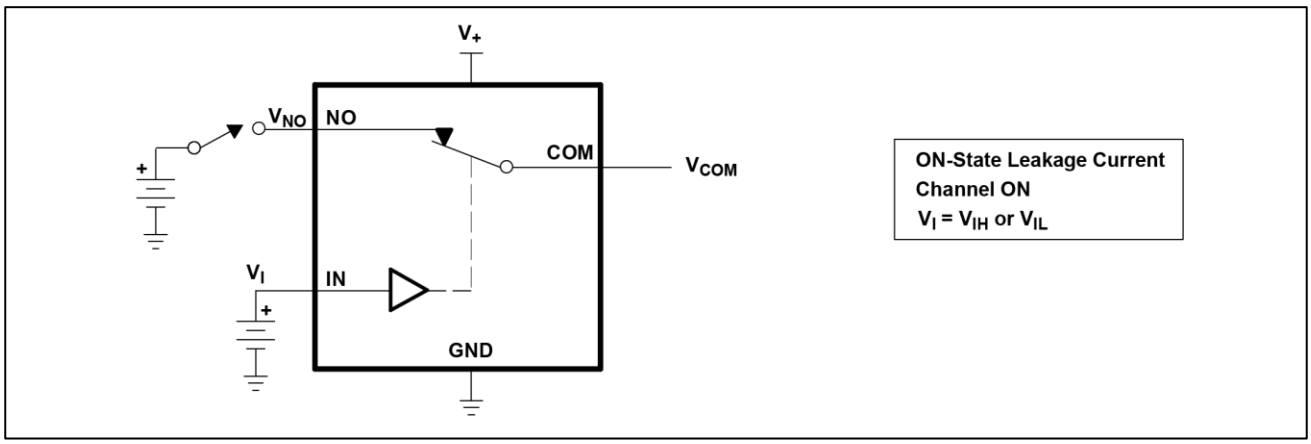


Figure 3.ON-State Leakage Current ($I_{COM(ON)}$, $I_{NO(ON)}$)

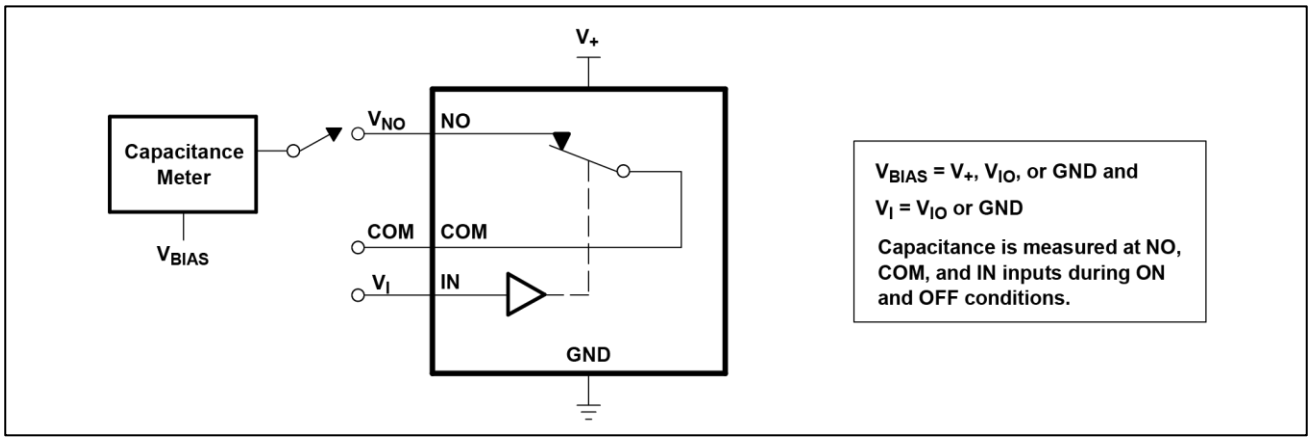


Figure 4.Capacitance (C_I, $C_{COM(OFF)}$, $C_{COM(ON)}$, $C_{NO(OFF)}$, $C_{NO(ON)}$)

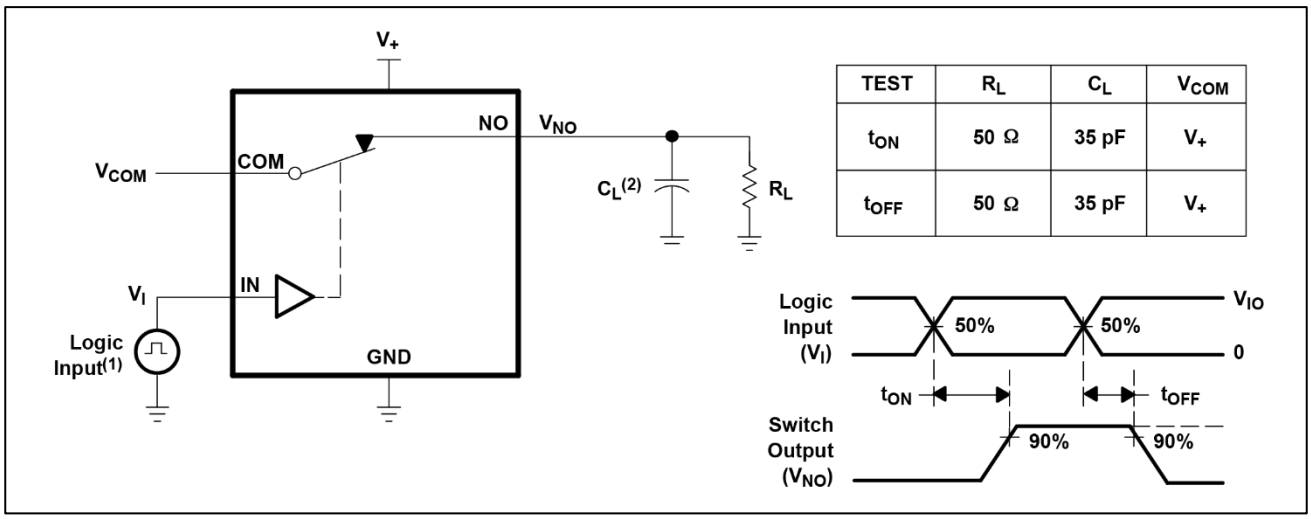


Figure 5.Turn-On (t_{ON}) and Turn-Off Time (t_{OFF})

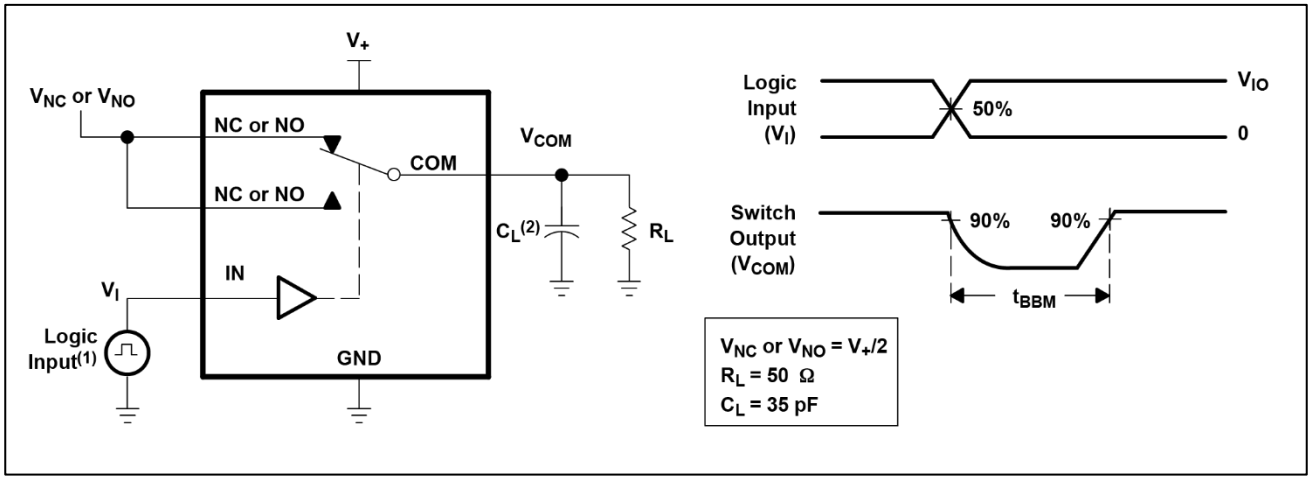


Figure 6.Break-Before-Make Time (t_{BBM})

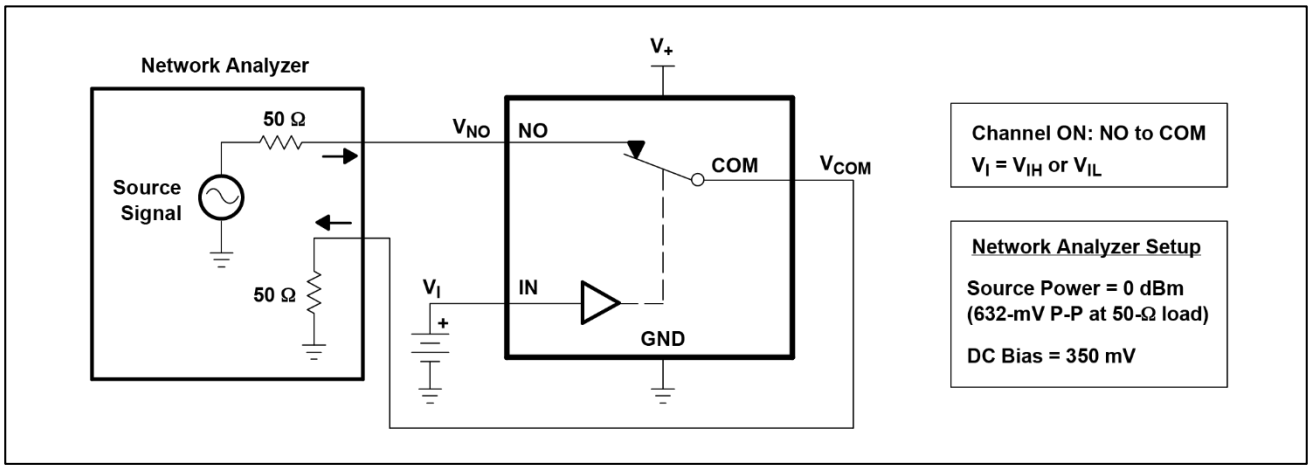


Figure 7.Bandwidth (BW)

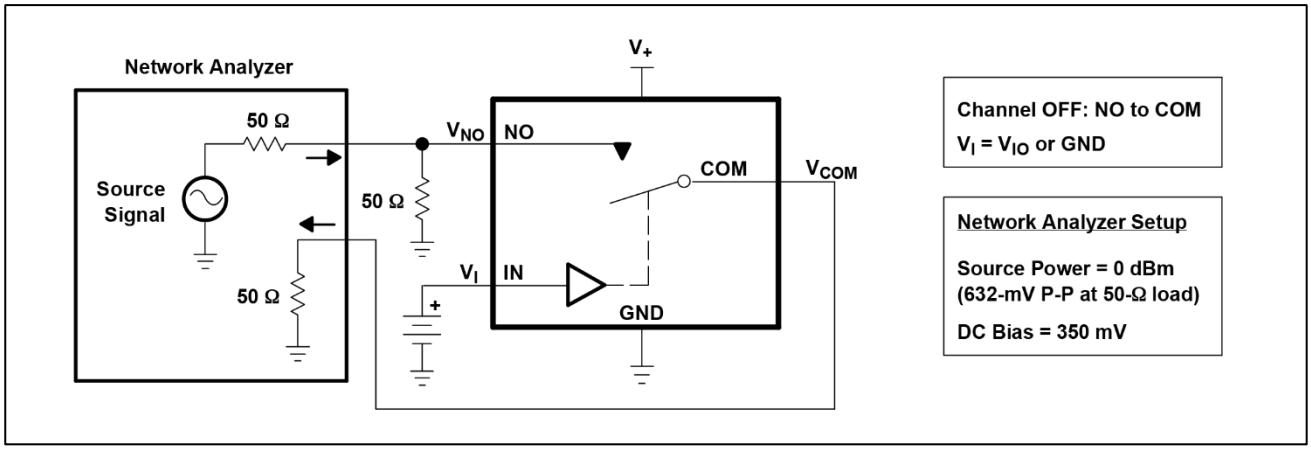


Figure 8.OFF Isolation (O_{ISO})

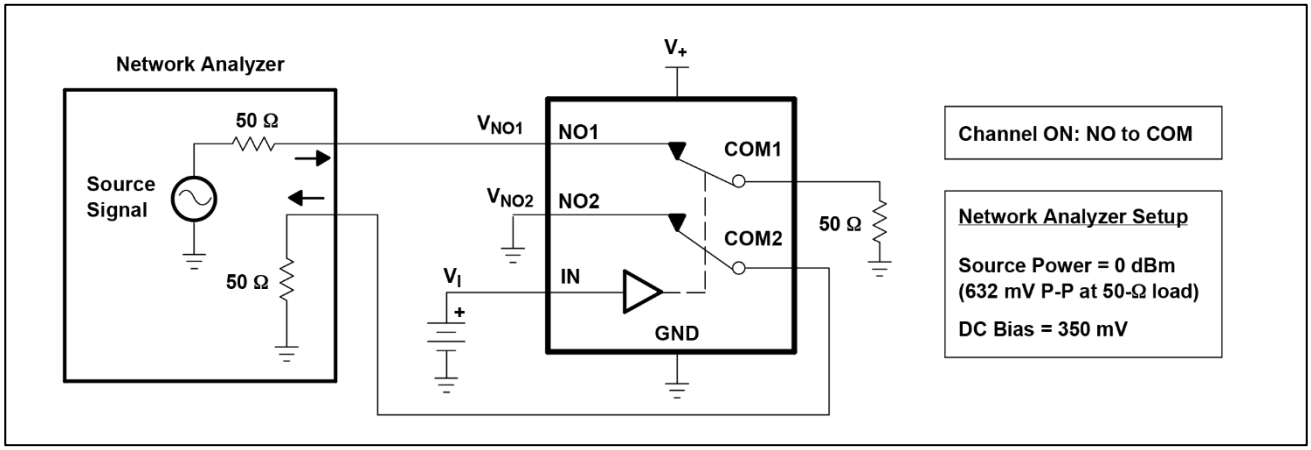


Figure 9.Crosstalk (X_{TALK})

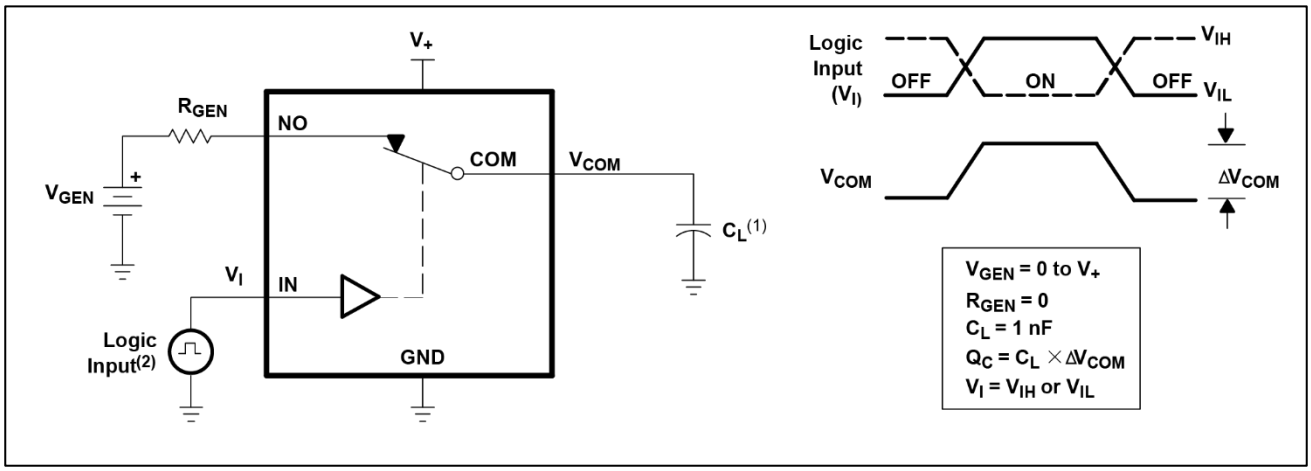


Figure 10.Charge Injection (Q_C)

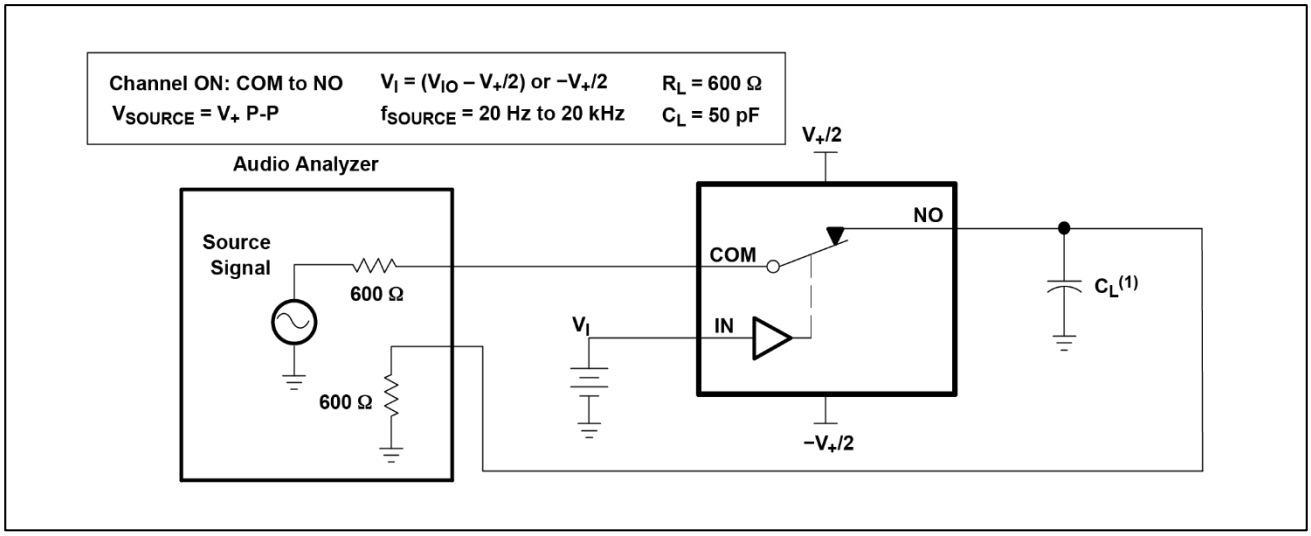


Figure11.Total Harmonic Distortion (THD)

PACKAGE OUTLINE DIMENSIONS

QFN-1.4x1.8-10L