RS3SW4223

Low-Voltage, 1.2Ω Dual-SPDT Analog Switch

Features

- Single Supply Voltage Range: 1.65V to 5.0V
- Low On-Resistance: 1.2Ω at 4.2V
- ON-Resistance Matching: 0.1Ω (TYP)
- ON-Resistance Flatness: 0.2Ω (TYP)
- Break-Before-Make Switching
- -3dB Bandwidth: 150 MHz
- High Off Isolation: -65dB at 1MHz
- Temperature Range: -40°C to 125°C
- Micro Size Packages: UQFN1.8X1.4-10

Applications

- Cell Phones
- PADs
- Portable Instrumentation
- Battery Powered Communications

Description

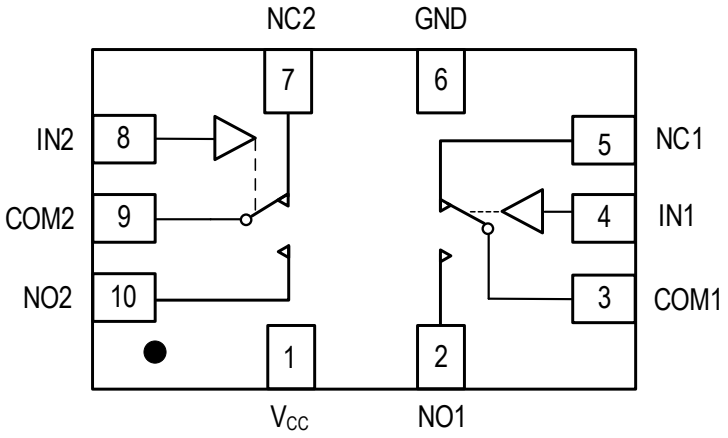
The RS3SW4223 is a high-performance, dual single-pole double-throw (SPDT) analog switch. Specified over a wide operating power supply voltage range 1.65V to 5.0V. Targeted applications include battery powered equipment that benefit from ultra-low ON-resistance (1.2Ω) and fast switching speeds.

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

Ordering Information

Part Number	Package	Description
RS3SW4223ZN	UQFN10	1.80mmx1.40mm

Pin Configuration and Functions



RS3SW4223

UQFN1.4X1.8-10, Top View

Table 1. Pin Functions: RS3SW4223ZN

PINS		TYPE (1)	Description
NAME	No.		
NO1, NO2	2,10	I/O	Normally-Open Terminal
NC1, NC2	5,7	I/O	Normally-Closed Terminal
IN1, IN2	4, 8	I/O	Digital Control Pin
COM1, COM2	3, 9	I/O	Common Terminal
V_{CC}	1	P	Power supply
GND	6	G	Ground

I/O=input or output, P=power, G=ground.

Function Table

Table 2. Function Table

Logic	NO1, NO2	NC1, NC2
0	OFF	ON
1	ON	OFF

Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted) (1)

Symbol	Parameter		MIN	MAX	Unit
V_{CC}	VCC, IN1, IN2 to GND		-0.3	5.5	V
	Analog Input Voltage (VNO, VNC, or VCOM) (2)		-0.3	(V_{CC})+0.3	
	Continuous Current into COM to NC/NO		-300	+300	mA
I_{PEAK}	Peak Current COM to NC/NO (Pulsed at 1ms, 10% duty cycle)		-500	+500	
θ_{JA}	Package thermal impedance (3)	UQFN1.4X1.8-10		200	℃/W
T_L	Lead Temperature (Soldering, 10 sec)			260	℃
T_J	Junction Temperature (4)		-40	150	℃
T_{stg}	Storage temperature		-65	+150	

(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.

(3) The package thermal impedance is calculated in accordance with JESD-51.

(4) The maximum power dissipation is a function of $T_{J(MAX)}$, $R_{\theta JA}$, and T_A. The maximum allowable power dissipation at any ambient temperature is $P_D = (T_{J(MAX)} - T_A) / R_{\theta JA}$. All numbers apply for packages soldered directly onto a PCB.

ESD, Electrostatic Discharge Protection

The following ESD information is provided for handling of ESD-sensitive devices in an ESD protected area only.

Symbol	Parameter		Value	Unit
$V_{(ESD)}$	Electrostatic discharge	Human-Body Model (HBM)	±3000	V

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.

Recommended Operating Conditions

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

Symbol	Parameter	MIN	MAX	Unit
V_{CC}	Supply Voltage	1.65	5	V
T_A	Operating temperature	-40	+125	℃

Electrical Characteristics

V_{CC}= 4.2V, T_A =+25°C. unless otherwise noted.

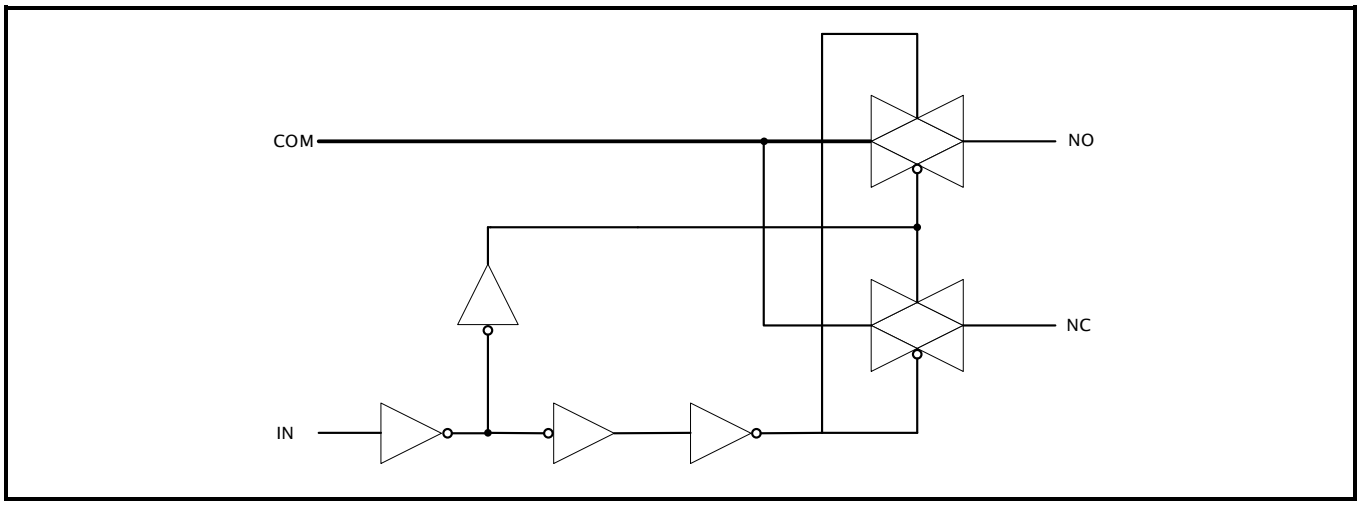
Parameter	Symbol	Conditions	T_A	MIN	TYP	MAX	Unit
Analog Switch							
Analog I/O Voltage Range	V_{NO}, V_{NC} V_{COM}		-40°C to +125°C	0		V_{CC}	V
On-Resistance	R_{ON}	V_{CC}= 4.2V, V_{NO}, V_{NC} or V_{com} = 1V I_{com} = -100mA, See Test Figure 1	+25°C		1.2	1.8	Ω
			-40°C to +125°C			2	
On-Resistance Match Between Channels	ΔR_{ON}	V_{CC}= 4.2V, V_{NO}, V_{NC} or V_{com} = 1V I_{com} = -100mA, See Figure 1	+25°C		0.1	0.3	Ω
			-40°C to +125°C			0.4	
On-Resistance Flatness	$R_{FLAT(ON)}$	V_{CC}= 4.2V, V_{NO}, V_{NC} or V_{com} = 0V,1V,2V I_{com} = -100mA, See Figure 1	+25°C		0.2	0.4	Ω
			-40°C to +125°C			0.5	
Source Off Leakage Current	$I_{NC(OFF)}$ $I_{NO(OFF)}$	V_{CC}= 4.2V, V_{NO}, V_{NO} or V_{NC} = 3.3V/0.3V V_{COM} = 0.3V/3.3V	-40°C to +125°C			1	uA
Channel On Leakage Current	$I_{NC(ON)}$ $I_{NO(NO)}$ $I_{COM(ON)}$	V_{CC}= 4.2V, V_{COM} = 0.3V/3.3V V_{NO} or V_{NC} = 0.3V/3.3V, or floating	-40°C to +125°C			1	uA
Digital Control Inputs							
Input High Voltage	V_{INH}		-40°C to +125°C	1.6			V
Input Low Voltage	V_{INL}		-40°C to +125°C			0.5	V
Input Leakage Current	I_{IN}	V_{CC}=4.2V, V_{IN}=0V or 4.2V	-40°C to +125°C			1	uA
Dynamic Characteristics							
Turn-On Time	t_{ON}	V_{IN}=2.1V to 0V,R_L=50Ω,C_L=35pF, V_{NO1} or V_{NC1}=V_{NO2} or V_{NC2}=2.1V See Test Figure 2	+25°C		30		ns
Turn-Off Time	t_{OFF}		+25°C		16		ns
Break-Before-Make Time Delay	t_D	V_{IN}=2.1V to 0V,R_L=50Ω,C_L=35pF, V_{NO1} or V_{NC1}=V_{NO2} or V_{NC2}=2.1V See Test Figure 3	+25°C		10		ns
Off Isolation	O_{ISO}	V_{IN}=2.1V, V_{source}=0dBm See Test Figure 4	100kHz		-78		dB
			1MHz		-65		
Channel-to-Channel Crosstalk	X_{TALK}	V_{IN}=2.1V, V_{source}=0dBm See Test Figure 5	100kHz		-103		dB
			1MHz		-90		
-3dB Bandwidth	BW	V_{IN}=2.1V, V_{source}=0dBm See Test Figure 6	+25°C		150		MHz
Charge Injection Select Input to Common I/O	Q	V_{NO1} or V_{NC1}=V_{NO2} or V_{NC2}=0V CL=1.0nF See Test Figure 7	+25°C		4		pC
Channel ON Capacitance	C_{ON}		+25°C		50		pF
Power Requirements							
Power Supply Range	V_{CC}		-40°C to +125°C	1.65		5	V
Power Supply Current	I_{CC}	V_{CC}=4.2V, V_{IN}=0V or V_{CC}	-40°C to +125°C			1	uA

Electrical Characteristics

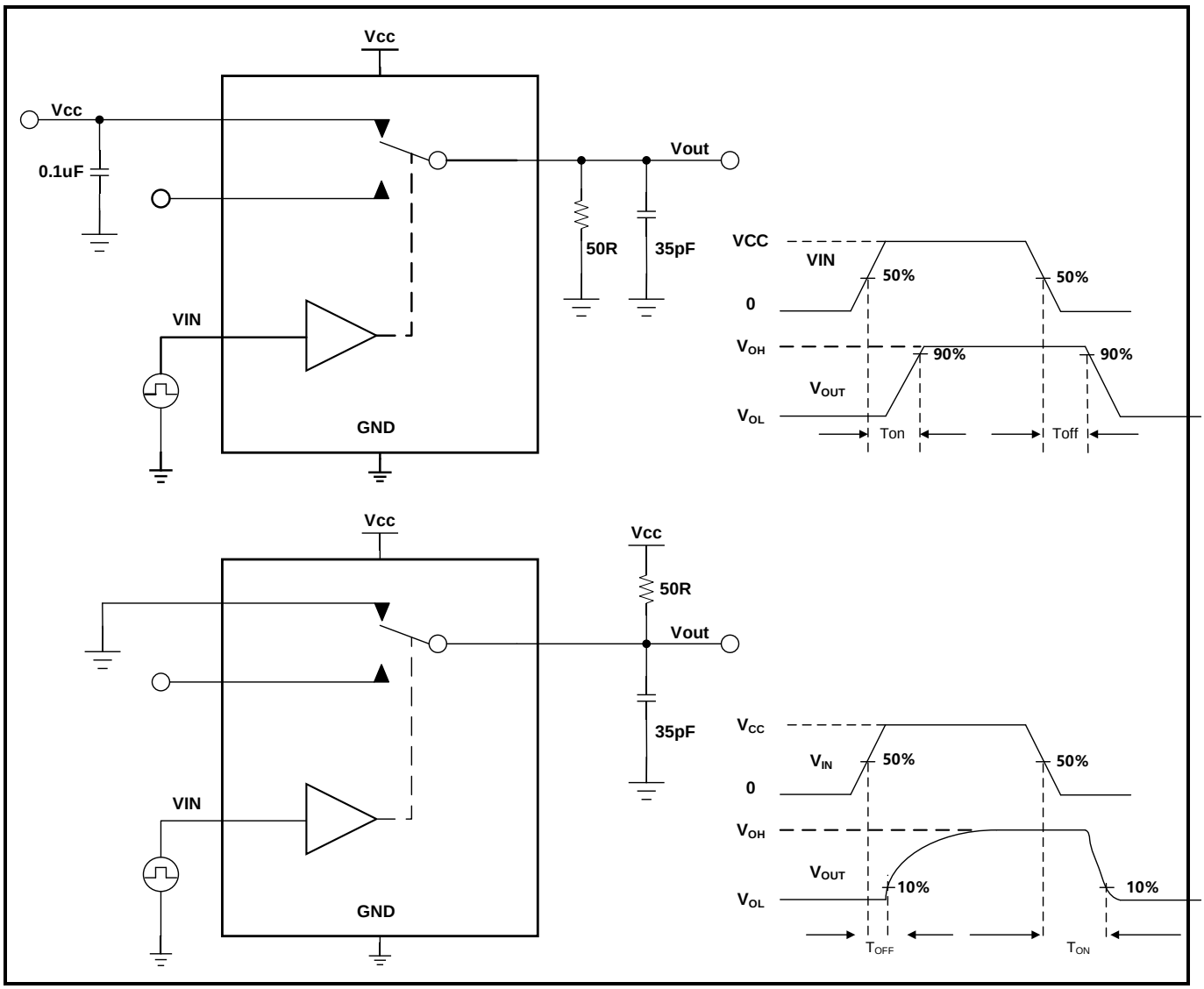
V_{CC}= 2.7V, T_A =+25°C. unless otherwise noted.

Parameter	Symbol	Conditions	T_A	MIN	TYP	MAX	Unit
Analog Switch							
Analog I/O Voltage Range	V_{NO}, V_{NC} V_{COM}		-40°C to +125°C	0		V_{CC}	V
On-Resistance	R_{ON}	V_{CC}= 2.7V, V_{NO}, V_{NC} or V_{com} = 1V I_{com} = -100mA, See Test Figure 1	+25°C		1.5	2	Ω
			-40°C to +125°C			2.2	
On-Resistance Match Between Channels	ΔR_{ON}	V_{CC}= 2.7V, V_{NO}, V_{NC} or V_{com} = 1V I_{com} = -100mA, See Figure 1	+25°C		0.1	0.4	Ω
			-40°C to +125°C			0.5	
On-Resistance Flatness	$R_{FLAT(ON)}$	V_{CC}= 2.7V, V_{NO}, V_{NC} or V_{com} = 0V,1V,2V I_{com} = -100mA, See Figure 1	+25°C		0.3	0.6	Ω
			-40°C to +125°C			0.7	
Source Off Leakage Current	$I_{NC(OFF)}$ $I_{NO(OFF)}$	V_{CC}=3.6V, V_{NO}, V_{NO} or V_{NC} = 3.3V/0.3V V_{COM} = 0.3V/3.3V	-40°C to +125°C			1	uA
Channel On Leakage Current	$I_{NC(ON)}$ $I_{NO(NO)}$ $I_{COM(ON)}$	V_{CC}= 3.6V, V_{COM} = 0.3V/3.3V V_{NO} or V_{NC} = 0.3V/3.3V, or floating	-40°C to +125°C			1	uA
Digital Control Inputs							
Input High Voltage	V_{INH}		-40°C to +125°C	1.5			V
Input Low Voltage	V_{INL}		-40°C to +125°C			0.4	V
Input Leakage Current	I_{IN}	V_{CC}=2.7V, V_{IN}=0V or 2.7V	-40°C to +125°C			1	uA
Dynamic Characteristics							
Turn-On Time	t_{ON}	V_{IN}=2.1V to 0V,R_L=50Ω, C_L=35pF,V_{NO1} or V_{NC1}=V_{NO2} or V_{NC2}=2.1V See Test Figure 2	+25°C		50		ns
Turn-Off Time	t_{OFF}		+25°C		30		ns
Break-Before-Make Time Delay	t_D	V_{IN}=1.5V to 0V,R_L=50Ω, C_L=35pF,V_{NO1} or V_{NC1}=V_{NO2} or V_{NC2}=1.5V See Test Figure 3	+25°C		15		ns
Off Isolation	O_{ISO}	V_{IN}=2.1V, V_{source}=0dBm See Test Figure 4	100kHz	+25°C	-78		dB
			1MHz		-65		
Channel-to-Channel Crosstalk	X_{TALK}	V_{IN}=2.1V, V_{source}=0dBm See Test Figure 5	100kHz	+25°C	-103		dB
			1MHz		-90		
-3dB Bandwidth	BW	V_{IN}=2.1V, V_{source}=0dBm See Test Figure 6	+25°C		150		MHz
Charge Injection Select Input to Common I/O	Q	V_{NO1} or V_{NC1}=V_{NO2} or V_{NC2}=0V CL=1.0nF See Test Figure 7	+25°C		3.0		pC
Channel ON Capacitance	C_{ON}		+25°C		50		pF

Parameter Measurement Information

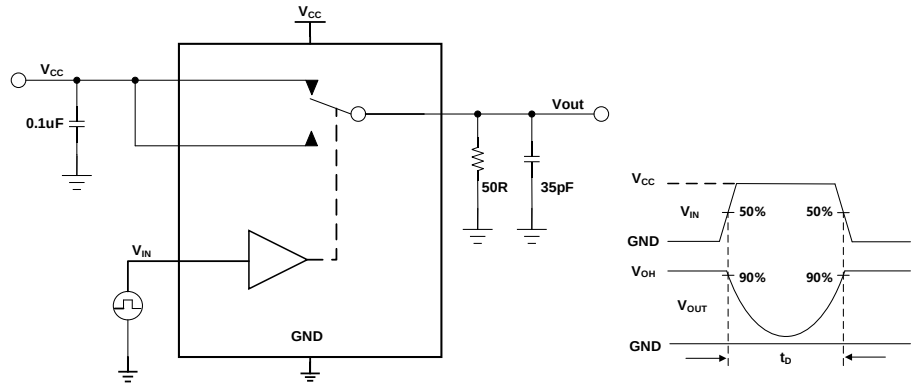


Test Figure 1. ON-State Resistance (R_{ON})

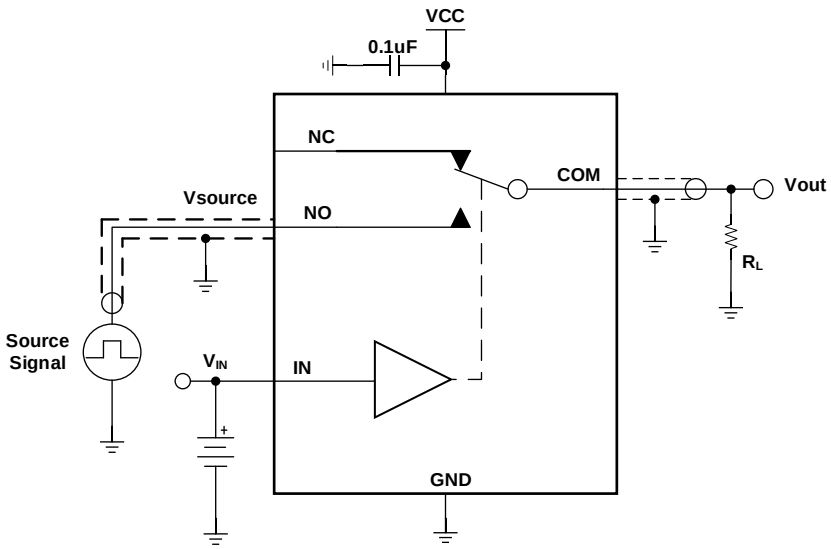


Test Figure 2. Turn-On(t_{ON}) and Turn-Off Time(t_{OFF})

Parameter Measurement Information (Continued)



Test Figure 3. Break-Before-Make Time (t_D)



Test Figure 4. OFF Isolation (O_{ISO})

Parameter Measurement Information (Continued)

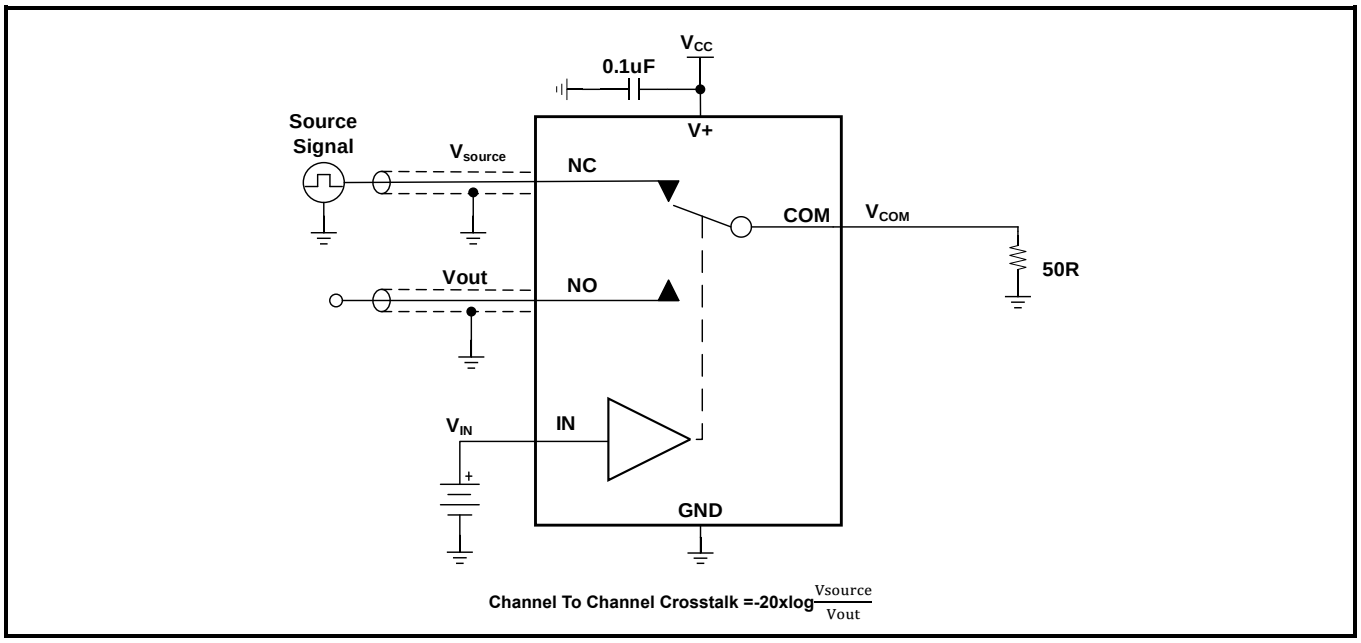


Figure 5. Channel-to-Channel Crosstalk

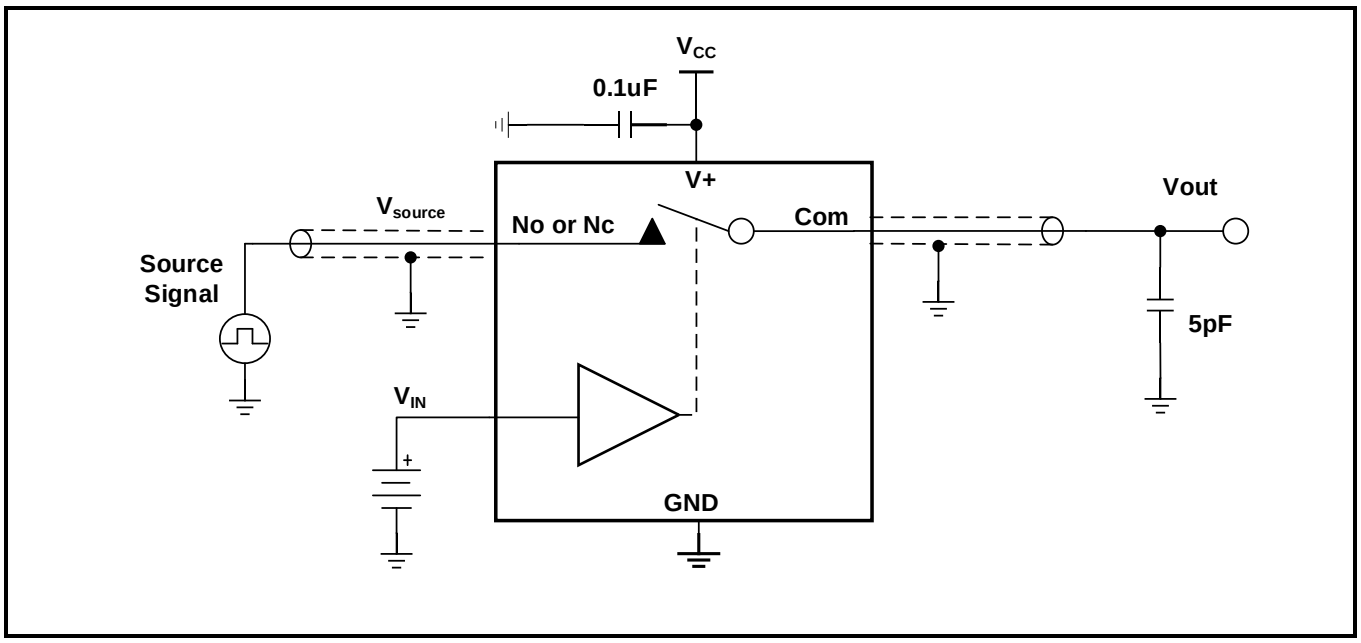


Figure 6. -3dB Bandwidth

Parameter Measurement Information (Continued)

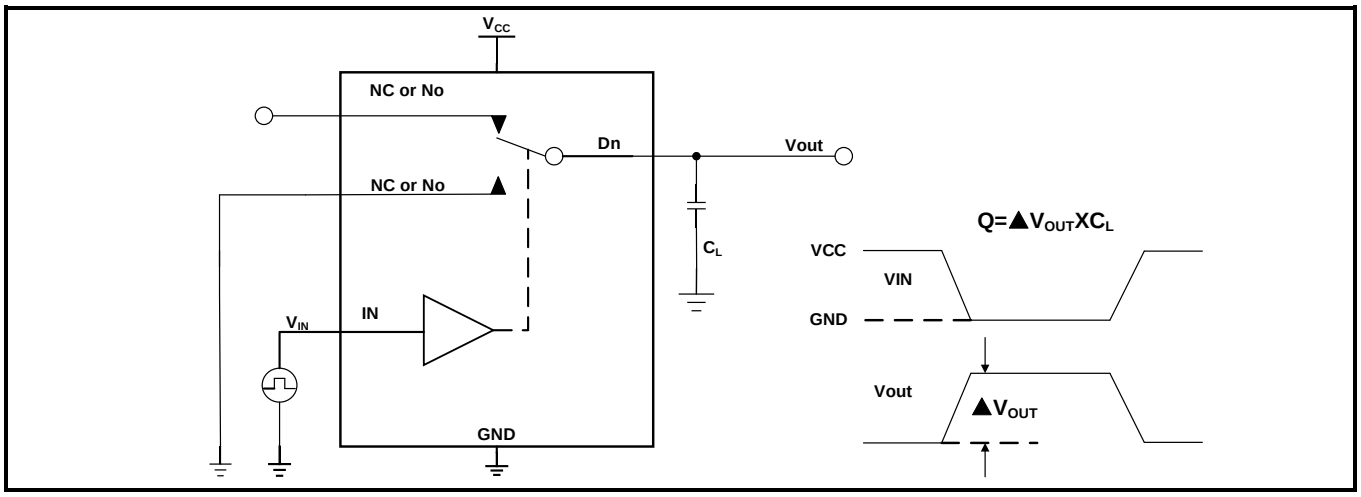
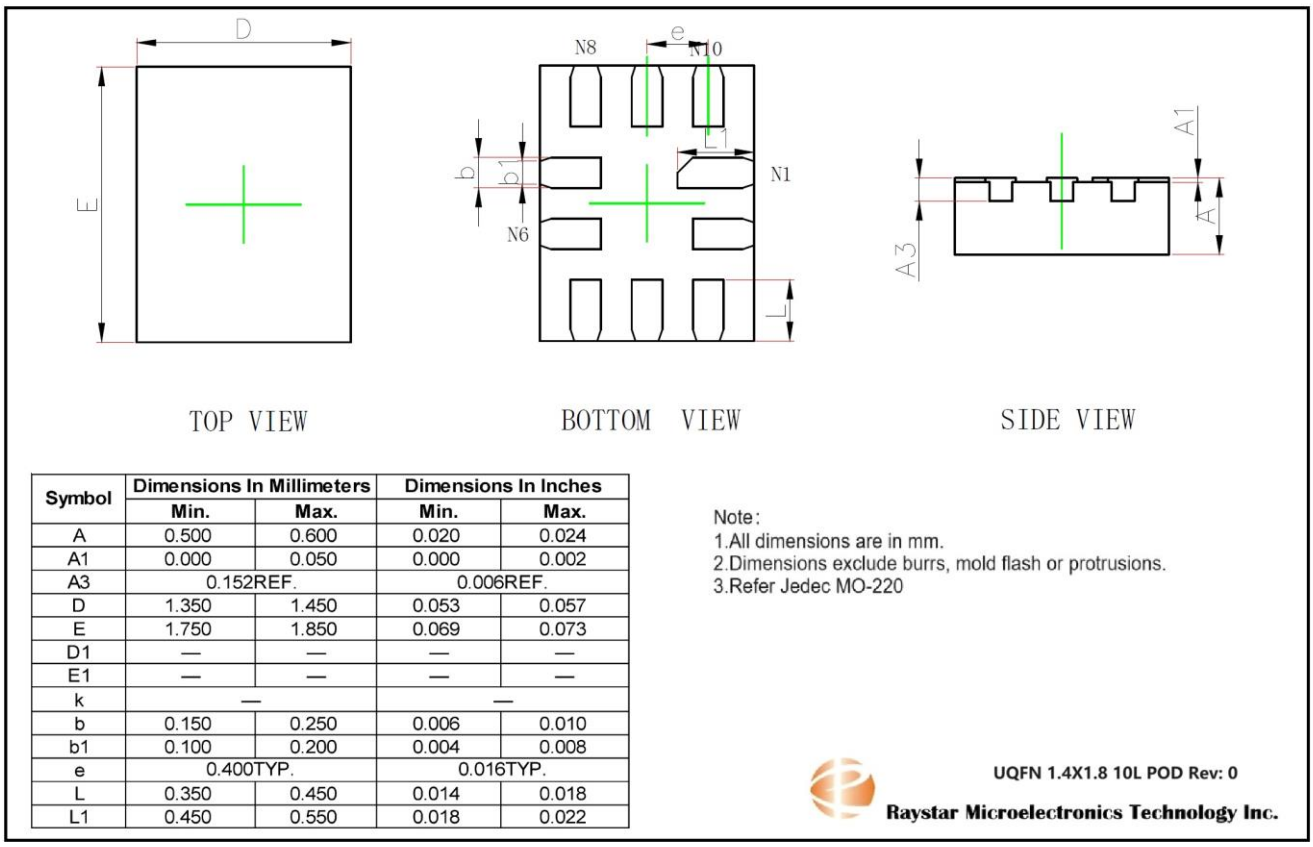


Figure 7. Charge Injection (Q)

Package Information

UQFN10



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.500	0.600	0.020	0.024
A1	0.000	0.050	0.000	0.002
A3	0.152REF.		0.006REF.	
D	1.350	1.450	0.053	0.057
E	1.750	1.850	0.069	0.073
D1	—	—	—	—
E1	—	—	—	—
k	—		—	
b	0.150	0.250	0.006	0.010
b1	0.100	0.200	0.004	0.008
e	0.400TYP.		0.016TYP.	
L	0.350	0.450	0.014	0.018
L1	0.450	0.550	0.018	0.022

Note:
1.All dimensions are in mm.
2.Dimensions exclude burrs, mold flash or protrusions.
3.Refer Jedec MO-220

UQFN 1.4X1.8 10L POD Rev: 0
Raystar Microelectronics Technology Inc.

Revision History

Revision	Description	Date
V0.9	Preliminary release	2024/11/07
V1.0	Initial Release	2025/03/26