



Features

- Qualified for automotive applications
- High Bandwidth: 300MHz
- High Speed: Typically 30ns
- Supply Range: +1.8V to +5.5V
- Low ON-State Resistance: 4.5Ω(TYP)
- Break-Before-Make Switching
- Rail-to-Rail Operation
- TTL/CMOS Compatible
- AEC-Q100 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.
- Grade 1 temperature range (- 40°C ~ +125 °C)

Application

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

Description

The RS3SW2158Q is a dual, single-pole double-throw (SPDT) analog switch that is designed to operate from 1.8 V to 5.5 V.

The RS3SW2158Q device can handle both analog and digital signals. It features high-bandwidth (300MHz) and low on-resistance (4.5Ω TYP).

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

Ordering Information

Ordering Code	Package	Description
RS3SW2158QZN	UQFN1.4X1.8-10	1.80mm×1.40mm
RS3SW2158QU	MSOP10	3.00mm×3.00mm

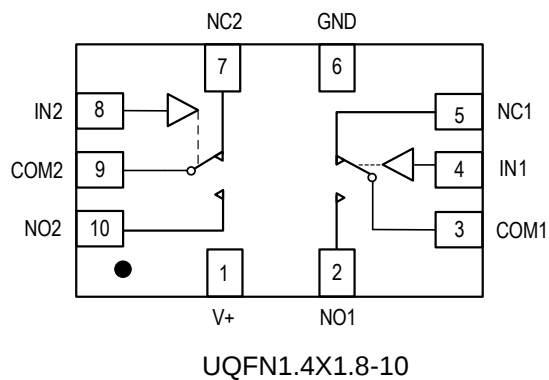
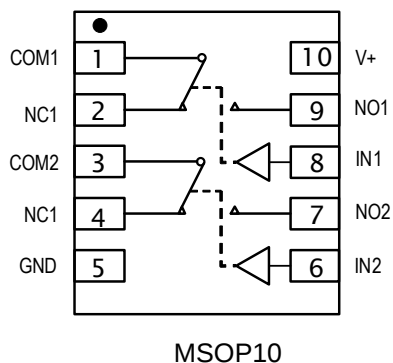
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RS3SW2158Q

Low Voltage Dual SPDT Analog Switch

Pin Configuration



NAME	PIN	PIN	FUNCTION
	MSOP10	UQFN10	
COM1, COM2	1, 3	3, 9	Common Terminal
NC1, NC2	2, 4	5, 7	Normally-Closed Terminal
GND	5	6	Ground
IN2, IN1	6, 8	8, 4	Digital Control Pin
NO2, NO1	7, 9	10, 2	Normally-Open Terminal
V+	10	1	Power Supply

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 ₊	Supply Voltage		-0.3	6.0	V
V _{IN}	Input Voltage ⁽²⁾		-0.3	6.0	
	Analog, Digital Voltage Range		-0.3	(V ₊)+0.3	
	Continuous Current NO, NC, or COM		-300	+300	mA
I _{PEAK}	Peak Current NO, NC, or COM		-500	+500	
θ _{JA}	Package thermal impedance ⁽³⁾	MSOP10		200	°C/W
		UQFN1.4X1.8-10		115	
T _J	Junction Temperature ⁽⁴⁾		-40	150	°C
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_{θJA}, and T_A. The maximum allowable power dissipation at any ambient temperature is P_D = (T_{J(MAX)} - T_A) / R_{θJA}. All numbers apply for packages soldered directly onto a PCB.

ESD Ratings

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)	±2000	V
		Charged-Device Model (CDM)	±1000	V

Recommended Operating Conditions

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

SYMBOL	PARAMETER	MIN	MAX	UNIT
V _{CC}	Supply Voltage	1.8	5.5	V
T _A	Operating temperature	-40	+125	°C



Electrical Characteristics

$V_+ = 5.0\text{ V}$, $T_A = -40^\circ\text{C}$ to 125°C (unless otherwise noted)

PARAMETER	SYMBOL	CONDITIONS	V_+	T_A	MIN ⁽²⁾	TYP ⁽³⁾	MAX ⁽²⁾	UNIT
ANALOG SWITCH								
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}			FULL	0		V_+	V
On-Resistance	R_{ON}	V_{NO} or $V_{NC} = V_+/2$, $I_{COM} = -10\text{mA}$, Switch ON, See Figure 1	5V	+25°C		4.5	8	Ω
				FULL			8.5	Ω
			3.3V	+25°C		7	10	Ω
				FULL			10.5	Ω
On-Resistance Match Between Channels	ΔR_{ON}	V_{NO} or $V_{NC} = V_+/2$, $I_{COM} = -10\text{mA}$, Switch ON, See Figure 1	5V	+25°C		0.15	0.3	Ω
				FULL			0.4	Ω
			3.3V	+25°C		0.15	0.3	Ω
				FULL			0.4	Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	$0 \leq (V_{NO} \text{ or } V_{NC}) \leq V_+/2$, $I_{COM} = -10\text{mA}$, Switch ON, See Figure 1	5V	+25°C		2	3	Ω
				FULL			3.3	Ω
			3.3V	+25°C		3	4	Ω
				FULL			4.3	Ω
NC, NO OFF Leakage Current	$I_{NC(OFF)}, I_{NO(OFF)}$	V_{NO} or $V_{NC} = 0.3\text{V}$, $V_+/2$ $V_{COM} = V_+/2$, 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 $V_{NC} = 0.3\text{V}$, Open $V_{COM} =$ Open, 0.3V See Figure 3	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.

(2) Limits are 100% production tested at 25°C. Limits over the operating temperature range are ensured through correlations using statistical quality control (SQC) method.

(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration.

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AC 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	UNIT
DYNAMIC CHARACTERISTICS								
Turn-On Time	t _{ON}	V _{COM} = V ₊ , R _L = 300Ω, C _L = 35pF, See Figure 4	5V	+25°C		30		ns
			3.3V			40		
Turn-Off Time	t _{OFF}	V _{COM} = V ₊ , R _L = 300Ω, C _L = 35pF, See Figure 4	5V	+25°C		25		ns
			3.3V			30		
Break-Before-Make Time Delay	t _{BBM}	V _{NO1} = V _{NC1} = V _{NO2} = V _{NC2} = 3V, R _L = 300Ω, C _L = 35pF, See Figure 5	5V	+25°C		5		ns
			3.3V			8		
Off Isolation	O _{ISO}	R _L = 50Ω, Switch OFF, See Figure 6		+25°C		-52		dB
				+25°C		-71		dB
-3dB Bandwidth	BW	Switch ON, R _L = 50Ω, See Figure 7		+25°C		300		MHz
NC, NO OFF Capacitance	C _{NC(OFF)} , C _{NO(OFF)}	V _{NC} or V _{NO} = V ₊ /2 or GND, Switch OFF See Figure 8		+25°C		5		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 8		+25°C		15		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



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Parameter Measurement Information

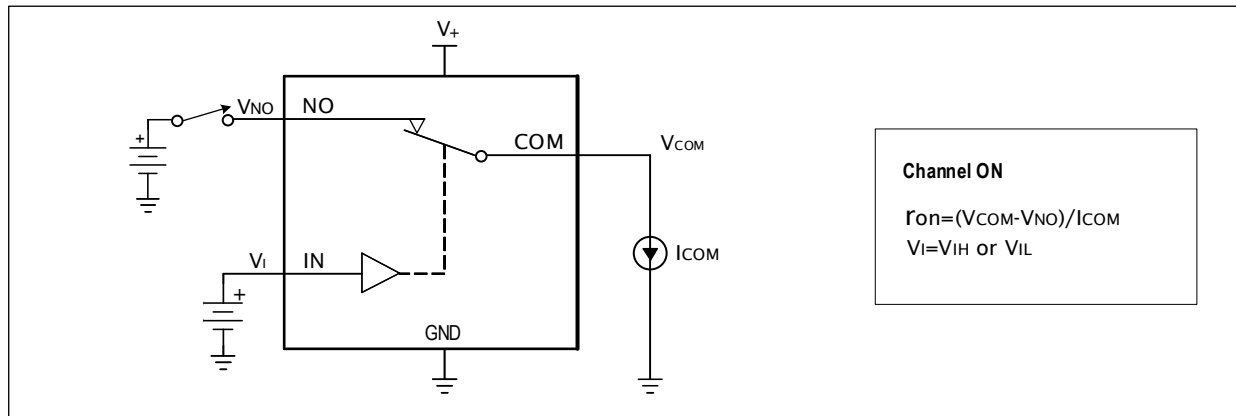


Figure 1、ON-State Resistance (R_{on})

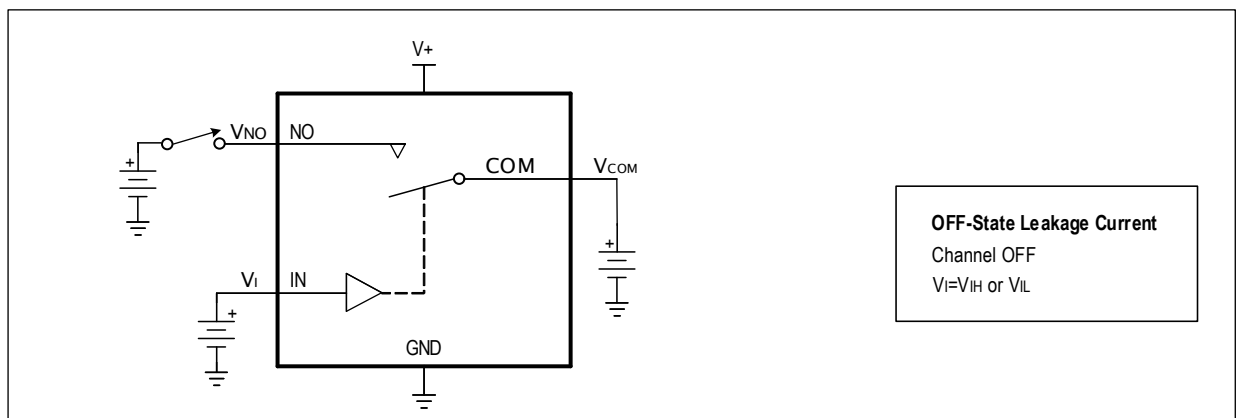


Figure 2、OFF-State Leakage Current ($I_{COM} \text{ (OFF)}$, $I_{NO} \text{ (OFF)}$)

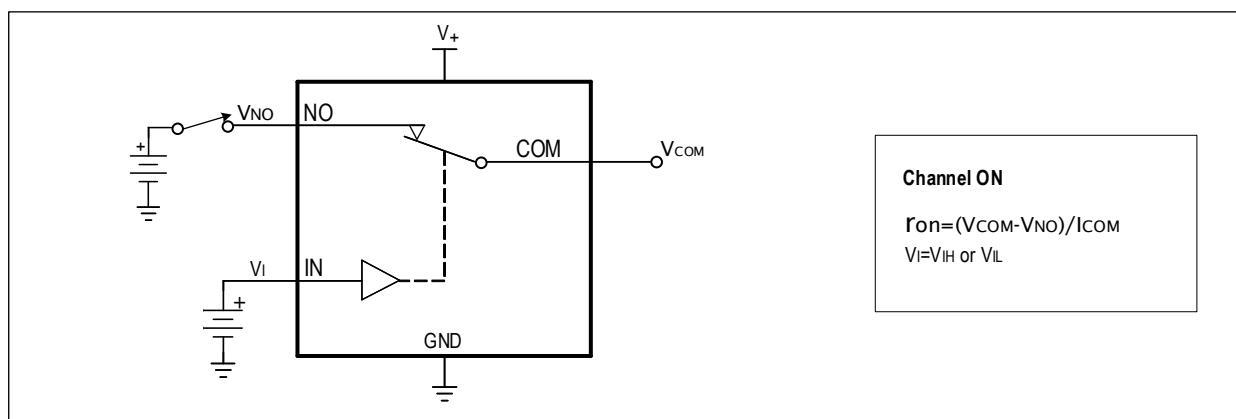


Figure 3、ON-State Leakage Current ($I_{COM} \text{ (ON)}$, $I_{NO} \text{ (ON)}$)



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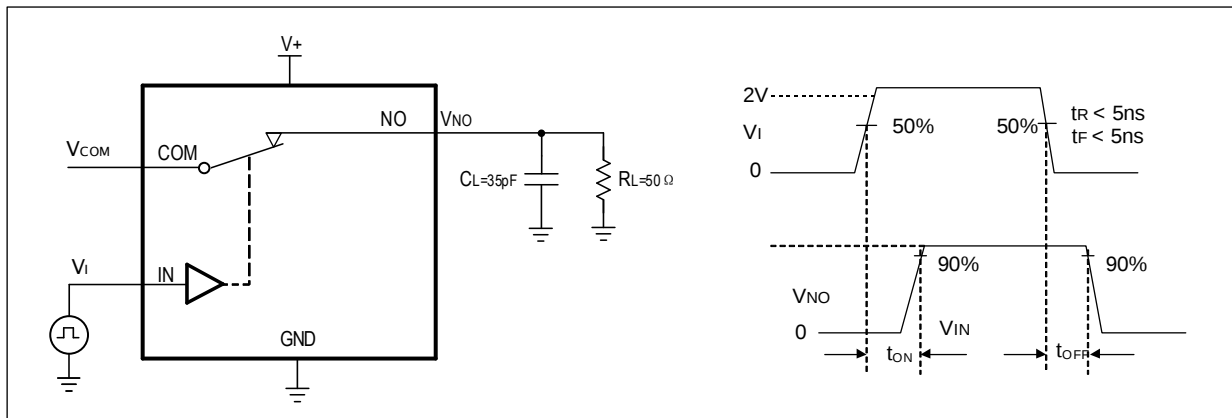


Figure 4、Turn-On (t_{ON}) and Turn-Off Time (t_{OFF})

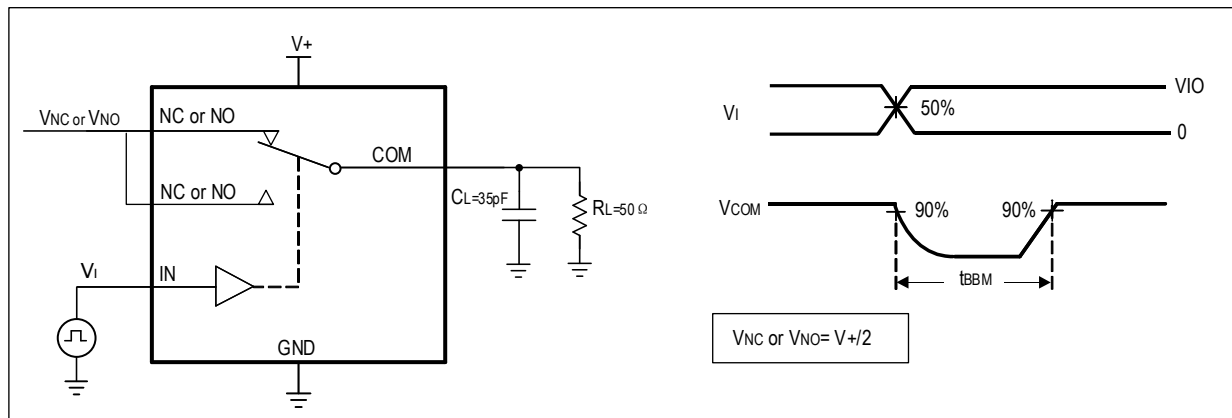


Figure 5、Break-Before-Make Time (t_{BBM})

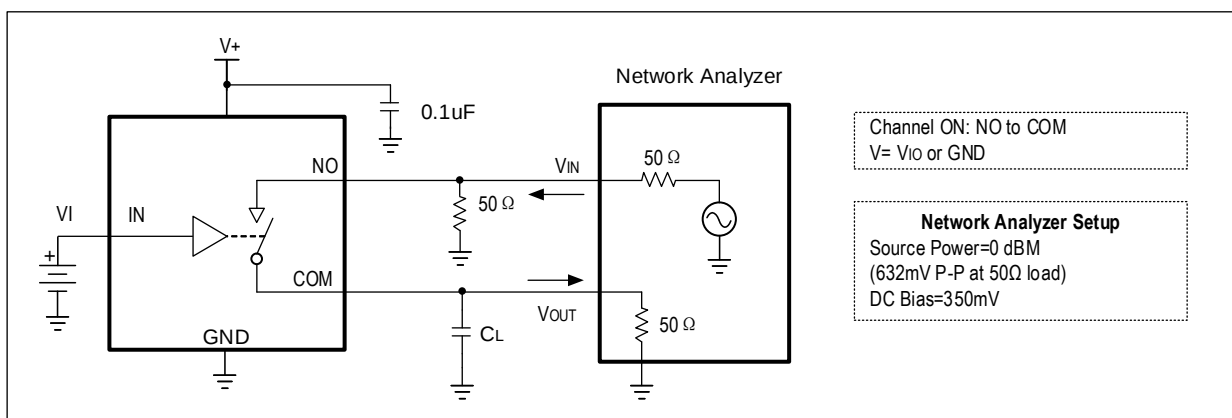


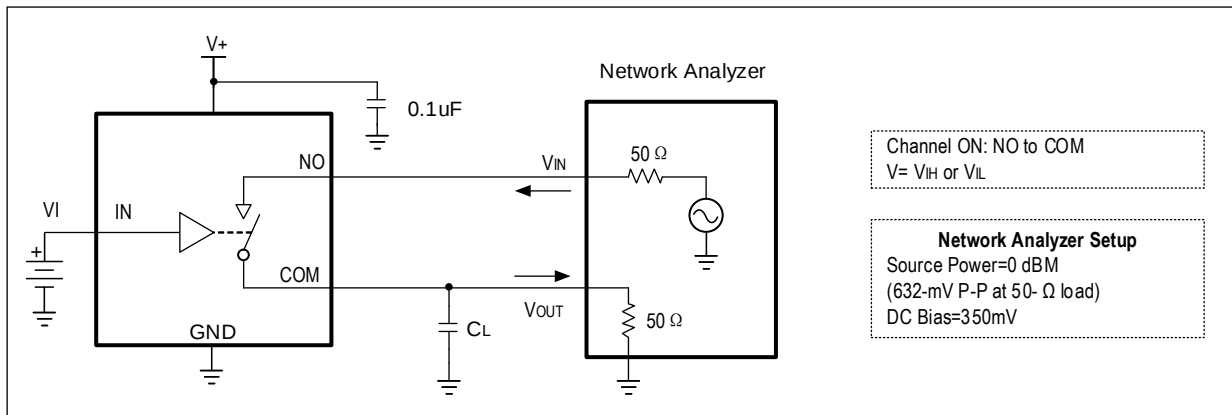
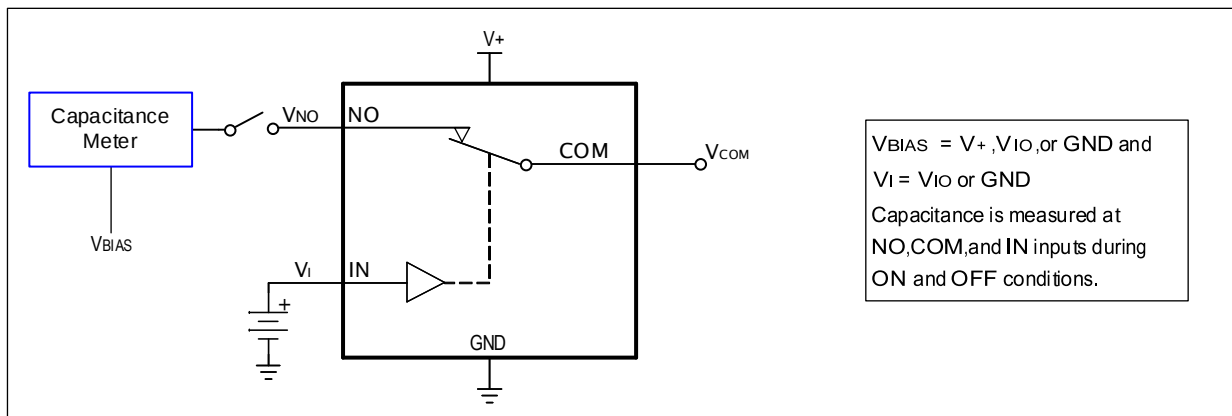
Figure 6、OFF Isolation (OISO)

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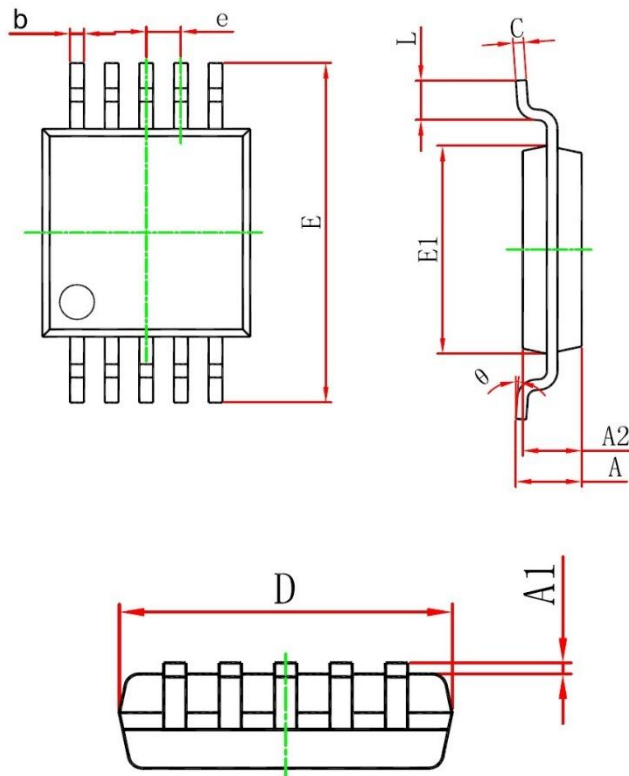
**Figure 7、Bandwidth (BW)****Figure 8、Capacitance (C_I , $C_{COM(OFF)}$, $C_{COM(ON)}$, $C_{NO(OFF)}$, $C_{NO(ON)}$)**

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Low Voltage Dual SPDT Analog Switch

Package Information**MSOP-10**

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	---	1.100	---	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.180	0.330	0.007	0.013
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
e	0.500 (BSC)		0.020 (BSC)	
E	4.750	5.050	0.187	0.199
E1	2.900	3.100	0.114	0.122
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

Note:

- 1.All dimensions are in mm. Angles in degrees.
- 2.Refer JEDEC MO-187
- 3.Dimensions exclude burrs, mold flash or protrusions.



MSOP10 POD Rev:0

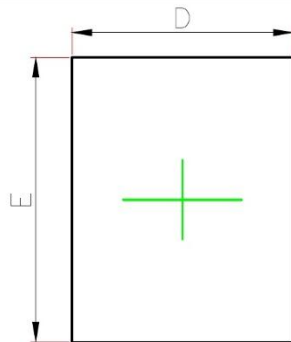
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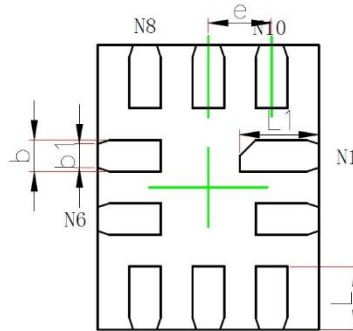
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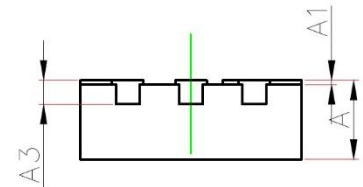
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UQFN-10

TOP VIEW



BOTTOM VIEW



SIDE VIEW

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 Jeduc MO-220

UQFN 1.4X1.8 10L POD Rev: 0
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Revision History

Revision	Description	DATE
V1.0	Initial Release	2024/4/19