0.4Ω Ultra Low ON-Resistance, Dual, SPDT Analog Switch

UM2268 *QFN10 1.8×1.4*

General Description

The UM2268 is a dual, low-power single-pole/double-throw (SPDT) analog switch that operates from a single +1.8V to +4.4V supply.

The UM2268 features guaranteed on-resistance matching (0.04Ω TYP) between switches and guaranteed on resistance flatness over the signal range (0.08Ω TYP), as well as high off-isolation and low crosstalk. This ensures excellent linearity and low distortion when switching audio signals.

The UM2268 is available in Pb-free QFN10 package.

Applications

- Portable Instrumentation
- Battery-Operated Equipment
- Computer Peripherals
- Speaker and Earphone Switching
- Medical Equipment
- Audio and Video Switching

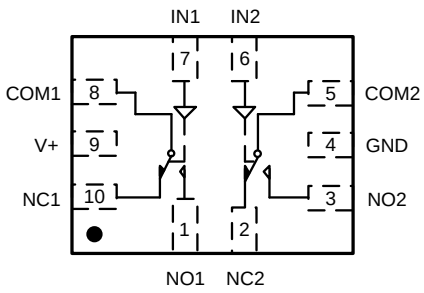
Features

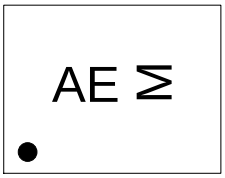
- V_{CC} Operating Range: +1.8V to +4.4V
- Low On-Resistance: 0.4Ω (TYP) @ +4.4V
- On-Resistance Matching: 0.04Ω (TYP)
- On-Resistance Flatness: 0.08Ω (TYP)
- -3dB Bandwidth: 80MHz
- High Off-Isolation: -78dB (100kHz)
- Low Crosstalk: -93dB (100kHz)
- TTL/CMOS Compatible
- Break-Before-Make Switching
- Rail-to-Rail Input and Output Operation
- Lead (Pb)-Free QFN10 Package

Pin Configurations

Top View

(Top View)





M: Month Code
UM2268
QFN10 1.8×1.4

Ordering Information

Part Number	Packaging Type	Marking Code	Shipping Qty
UM2268	QFN10 1.8×1.4	AE	3000pcs/7 Inch Tape & Reel

Pin Description

Pin Number	Pin Name	Function
1, 3	NO1, NO2	Normally-Open Terminal
10, 2	NC1, NC2	Normally-Closed Terminal
4	GND	Ground
8, 5	COM1, COM2	Common Terminal
7, 6	IN1, IN2	Digital Control Pin to Connect the COM Terminal to the NO or NC Terminals
9	V+	Power Supply

Function Table

LOGIC	NO	NC
0	OFF	ON
1	ON	OFF

Absolute Maximum Ratings

Symbol	Parameter	Limit	Unit
V_+	Supply Voltage	0 to +4.6	V
V_{IS}	Analog Switch Input Voltage	-0.3 to (V_{CC}+0.3)	
V_{IN}	Digital Select Input Voltage	0 to +4.6	
I_D	Continuous DC Current	250	mA
I_P	Peak Current	350	mA
T_O	Operating Temperature Range	-40 to +85	℃
T_{STG}	Storage Temperature Range	-65 to +150	
ESD	HBM	4000	V

Electrical Characteristics

V_+=+4.4V, GND=0V, T_A=-40℃ to +85℃, unless otherwise noted.

Symbol	Parameter	Test Conditions		Vcc (V)	Temp	Limits (-40℃ to 85℃)			Unit
						Min	Typ (Note 1)	Max	
V_+	Power Supply Range				Full	1.8		4.4	V
I_{CC}	Quiescent Supply Current	V_{IN}=V_+ or 0		4.4	Full			1.0	μA
I_{IN}	Input Leakage Current	V_{IN}=0V/4.4V		4.4	Full			1.0	μA
I_{OFF}	Power Off Leakage Current	V_{NO}/V_{NC}=3.3V/0.3V, V_{COM}=0.3V/3.3V		4.4	Full			1.0	μA
I_{ON}	Channel ON Leakage Current	V_{COM}=0.3V/3.3V V_{NO} or V_{NC}=0.3V/3.3V, or Floating		4.4	Full			1.0	μA
R_{ON}	On-Resistance (Note 2)	$V_{NO,}V_{NC}$ or V_{COM}=1.0V, I_{COM}=-100mA		4.4	Room Full		0.4	0.75 0.85	Ω
ΔR_{ON}	On Resistance Match Between Channels (Note 2, 3, 4)	$V_{NO,}V_{NC}$ or V_{COM}=1.0V, I_{COM}=-100mA		4.4	Room Full		0.04	0.15 0.20	Ω
R_{FLAT}	On Resistance Flatness (Note 2, 3, 5)	$V_{NO,}V_{NC}$ or V_{COM}=1.0V, 2.5V I_{COM}=-100mA		4.4	Room Full		0.08	0.12 0.20	Ω
V_{IH}	Input High Voltage			4.4	Full	2.0			V
V_{IL}	Input Low Voltage			4.4	Full			0.5	V
t_{ON}	Turn On Time	V_{IN}=2.1V to 0V, R_L=50Ω, C_L=35pF, V_{NO1} or V_{NC1}=V_{NO2} or V_{NC2}=2.1V, Test Circuit 1		4.4	Room		88		ns
t_{OFF}	Turn Off Time	V_{IN}=2.1V to 0V, R_L=50Ω, C_L=35pF, V_{NO1} or V_{NC1}=V_{NO2} or V_{NC2}=2.1V, Test Circuit 1		4.4	Room		16		ns
t_{BBM}	Break Before Make Time (Note 6)	V_{IN}=2.1V to 0V, R_L=50Ω, C_L=35pF, V_{NO1} or V_{NC1}=V_{NO2} or V_{NC2}=2.1V, Test Circuit 2		4.4	Room		6		ns
O_{IRR}	Off Isolation (Note 7)	V_{BIAS}=2.1V, Signal=0dBm, Test Circuit 3	100kHz	4.4	Room		-78		dB
			1MHz		Room		-58		dB
X_{TALK}	Crosstalk	V_{BIAS}=2.1V, Signal=0dBm, Test Circuit 4	100kHz	4.4	Room		-93		dB
			1MHz		Room		-90		dB
BW	-3dB Bandwidth	V_{BIAS}=2.1V, Signal=0dBm, Test Circuit 5		4.4	Room		80		MHz
Q	Charge Injection Select Input to Common I/O	V_G=0V, R_S=0Ω, C_L=1.0nF, Test Circuit 6		4.4	Room		4.0		pC
C_{ON}	HSD+ HSD- ON Capacitance (Note 8)			4.4	Room		56		pF

Note 1: Typically values are at V_+=4.4V and T_A=+25℃.
Note 2: Guaranteed by design. Resistance measurements do not include test circuit or package resistance.
Note 3: Parameter is characterized but not tested in production.
Note 4: ΔR_{ON}= | $R_{ON\ (NO1/NC1)} - R_{ON(NO2/NC2)}$ | measured at identical V_{CC}, temperature and voltage levels.
Note 5: Flatness is defined as the difference between the maximum and minimum value of On Resistance over the specified range of conditions.
Note 6: Guaranteed by design.
Note 7: Off Isolation=20 log10 [V_{COM}/$V_{NO/NC}$].
Note 8: T_A=+25℃, f=1MHz, Capacitance is characterized but not tested in production.

Electrical Characteristics

V_+=+2.7V to +3.6V, T_A=-40℃ to +85℃, unless otherwise noted.

Symbol	Parameter	Test Conditions		Vcc (V)	Temp	Limits (-40℃ to 85℃)			Unit
						Min	Typ (Note 1)	Max	
V_{NO}, V_{NC}, V_{COM}	Analog Signal Range				Full	0		V+	V
I_{IN}	Input Leakage Current	V_{IN}=0V/2.7V		2.7	Full			1.0	μA
I_{OFF}	Power Off Leakage Current	V_{NO}/V_{NC}=3.3V/0.3V, V_{COM}=0.3V/3.3V		3.6	Full			1.0	μA
I_{ON}	Channel ON Leakage Current	V_{COM}=0.3V/3.3V V_{NO} or V_{NC}=0.3V/3.3V, or Floating		3.6	Full			1.0	μA
R_{ON}	On-Resistance (Note 2)	V_{NO},V_{NC} or V_{COM}=1.0V, I_{COM}=-100mA		2.7	Room Full		0.75	1.10 1.20	Ω
ΔR_{ON}	On Resistance Match Between Channels (Note 2, 3, 4)	V_{NO},V_{NC} or V_{COM}=1.0V, I_{COM}=-100mA		2.7	Room Full		0.03	0.15 0.20	Ω
R_{FLAT}	On Resistance Flatness (Note 2, 3, 5)	V_{NO},V_{NC} or V_{COM}=1.0V, 2.5V I_{COM}=-100mA		2.7	Room Full		0.10	0.18 0.20	Ω
V_{IH}	Input High Voltage			3.0	Full	1.5			V
V_{IL}	Input Low Voltage			3.0	Full			0.4	V
t_{ON}	Turn On Time	V_{IN}=1.5V to 0V, R_L=50Ω, C_L=35pF, V_{NO1} or V_{NC1}=V_{NO2} or V_{NC2}=1.5V, Test Circuit 1		3.0	Room		100		ns
t_{OFF}	Turn Off Time	V_{IN}=1.5V to 0V, R_L=50Ω, C_L=35pF, V_{NO1} or V_{NC1}=V_{NO2} or V_{NC2}=1.5V, Test Circuit 1		3.0	Room		20		ns
t_{BBM}	Break Before Make Time (Note 6)	V_{IN}=1.5V to 0V, R_L=50Ω, C_L=35pF, V_{NO1} or V_{NC1}=V_{NO2} or V_{NC2}=1.5V, Test Circuit 2		3.0	Room		9.2		ns
O_{IRR}	Off Isolation (Note 7)	V_{BIAS}=2.1V, Signal=0dBm, Test Circuit 3	100kHz	3.0	Room		-78		dB
			1MHz		Room		-58		dB
X_{TALK}	Crosstalk	V_{BIAS}=2.1V, Signal=0dBm, Test Circuit 4	100kHz	3.0	Room		-93		dB
			1MHz		Room		-90		dB
BW	-3dB Bandwidth	V_{BIAS}=2.1V, Signal=0dBm, Test Circuit 5		3.0	Room		80		MHz
Q	Charge Injection Select Input to Common I/O	V_G=0V, R_S=0Ω, C_L=1.0nF, Test Circuit 6		3.0	Room		3.0		pC
C_{ON}	HSD+ HSD- ON Capacitance (Note 8)			3.0	Room		56		pF

Note 1: T_A=+25℃.

Note 2: Guaranteed by design. Resistance measurements do not include test circuit or package resistance.

Note 3: Parameter is characterized but not tested in production.

Note 4: $\Delta R_{ON} = | R_{ON\,(NO1/NC1)} - R_{ON(NO2/NC2)} |$ measured at identical V_{CC}, temperature and voltage levels.

Note 5: Flatness is defined as the difference between the maximum and minimum value of On Resistance over the specified range of conditions.

Note 6: Guaranteed by design.

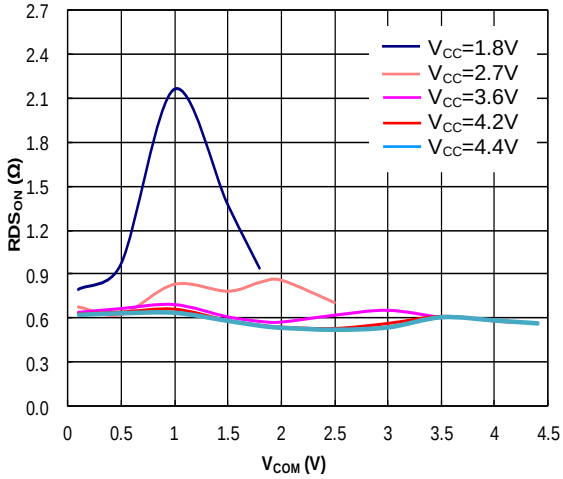
Note 7: Off Isolation=20 log10 [V_{COM}/$V_{NO/NC}$].

Note 8: T_A=+25℃, f=1MHz, Capacitance is characterized but not tested in production.

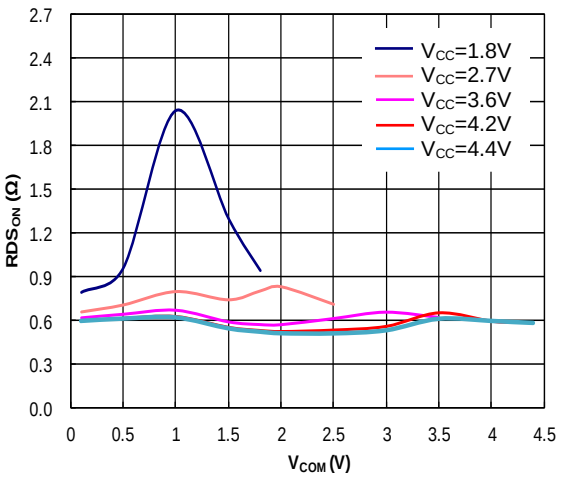
Typical Operating Characteristics

(T_A=+25 ℃, unless otherwise noted.)

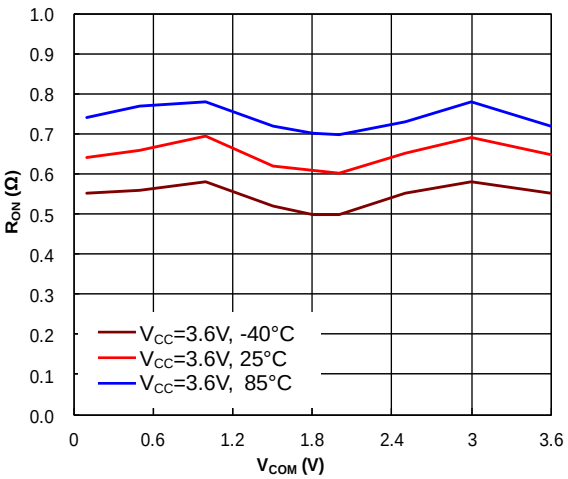
NC RDS_{ON}



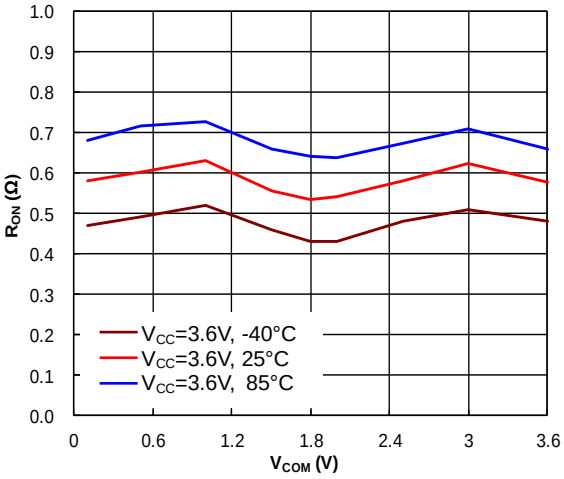
NO RDS_{ON}



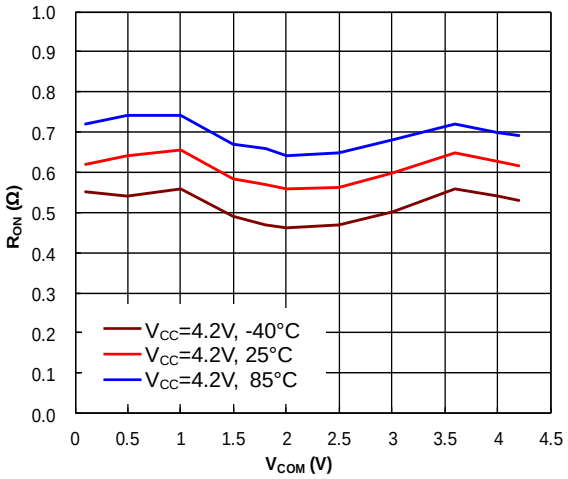
NC R_{ON} vs. V_{COM} (Temp)



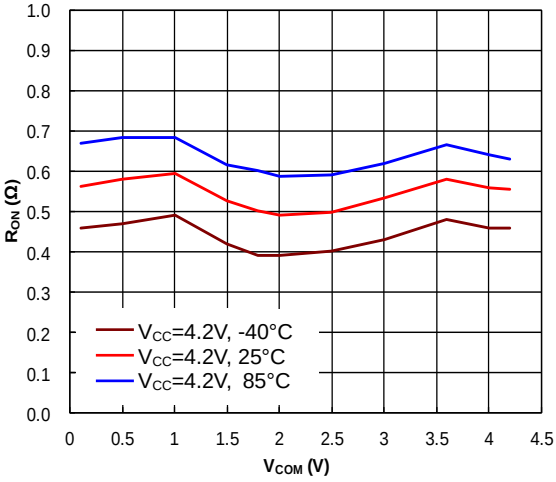
NO R_{ON} vs. V_{COM} (Temp)



NC R_{ON} vs. V_{COM} (Temp)



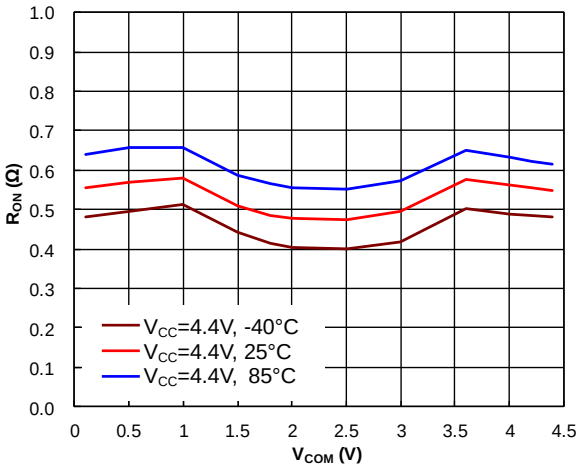
NO R_{ON} vs. V_{COM} (Temp)



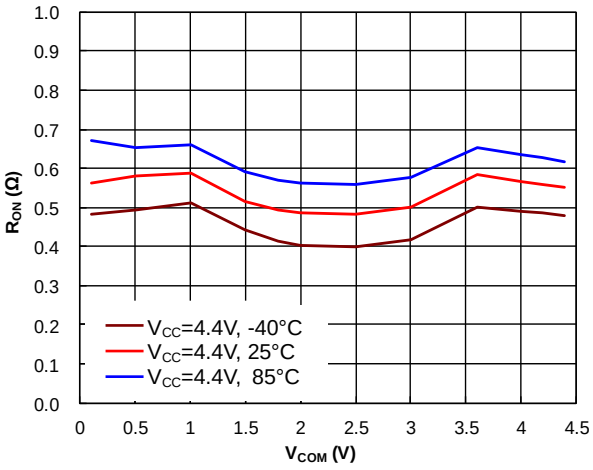
Typical Operating Characteristics (Continued)

(T_A=+25℃, unless otherwise noted.)

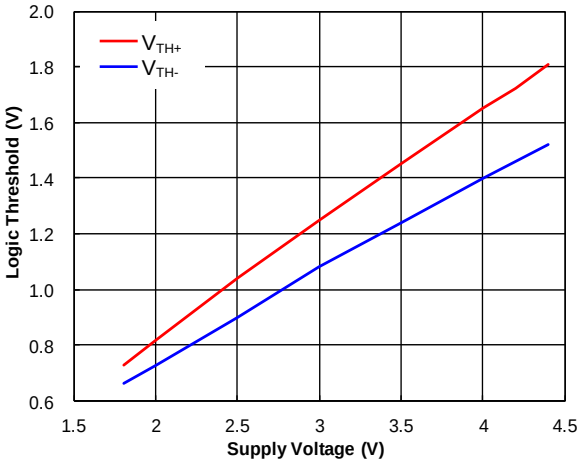
NC R_{ON} vs. V_{COM} (Temp)



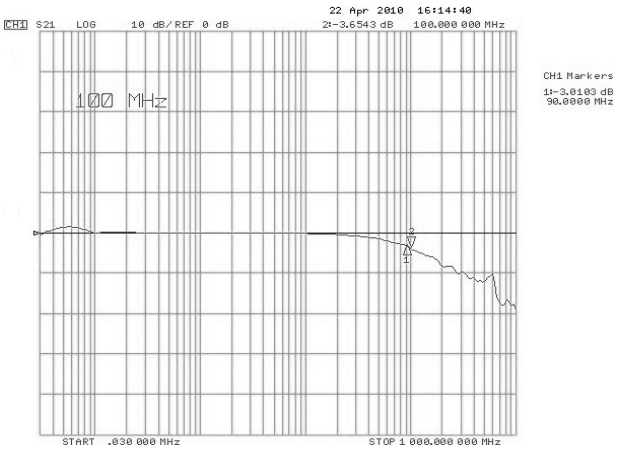
NO R_{ON} vs. V_{COM} (Temp)



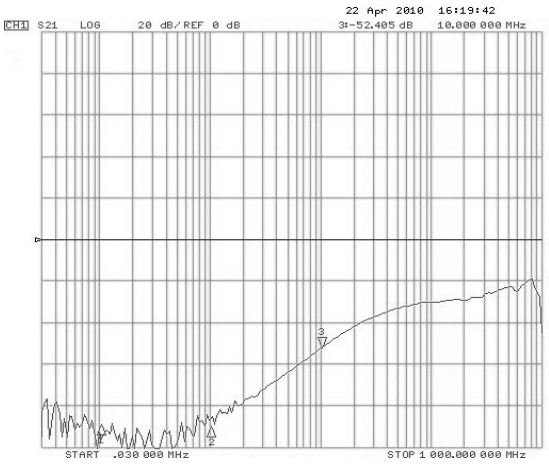
Logic Threshold vs. Supply Voltage



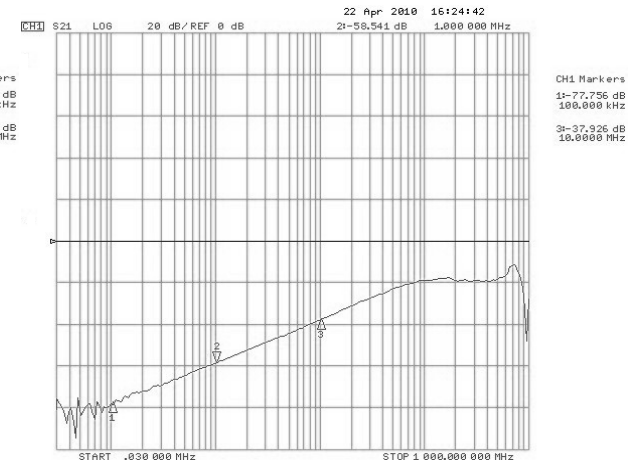
Bandwidth



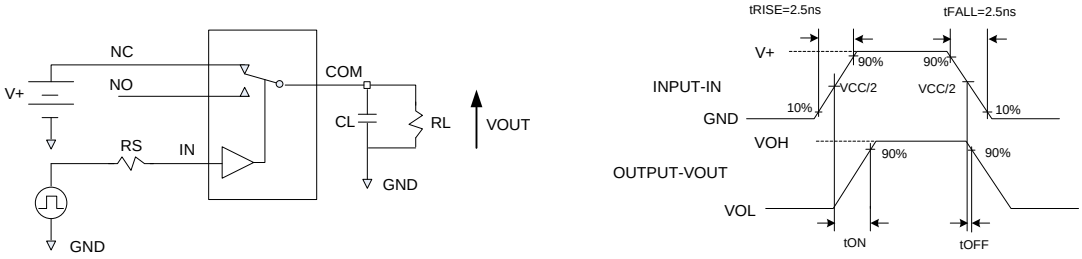
Crosstalk



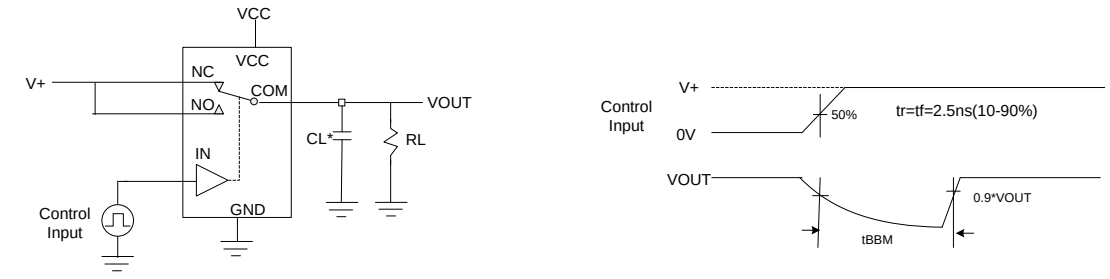
Off Isolation



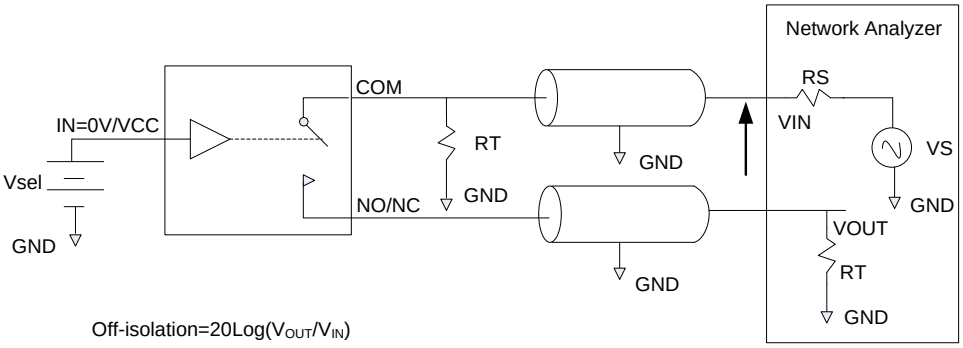
Test Circuits



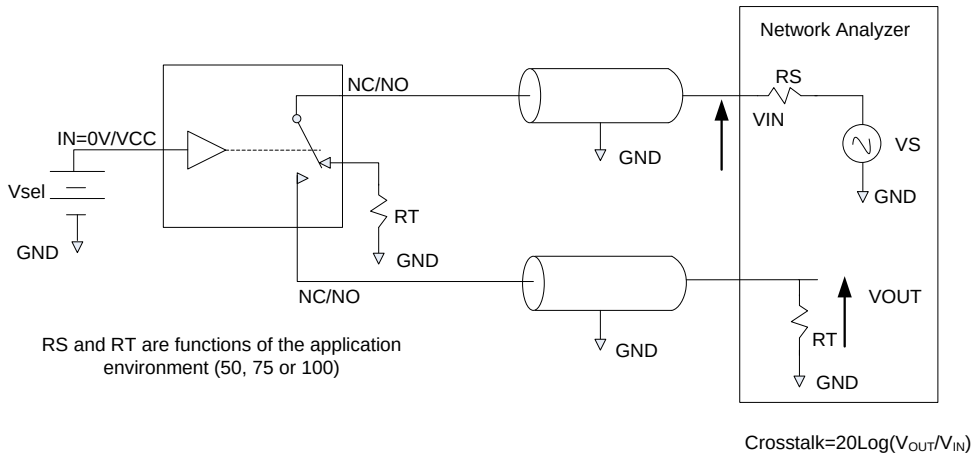
Test Circuit 1. Switching Timing (t_{ON}, t_{OFF})



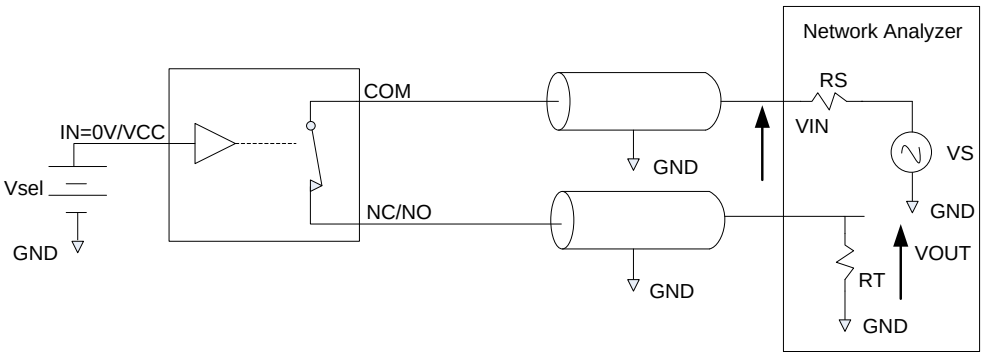
Test Circuit 2. Break-Before-Make Timing



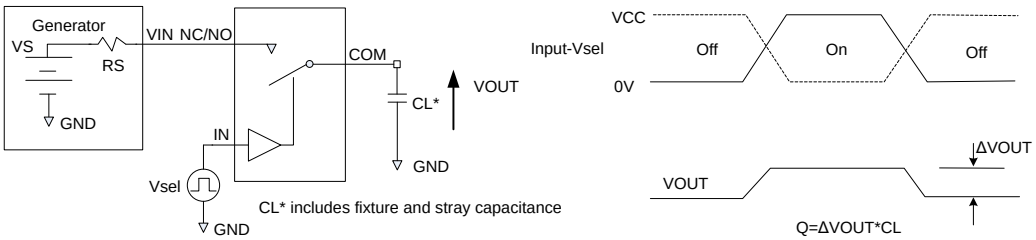
Test Circuit 3. Off-Isolation



Test Circuit 4. Channel-to-Channel Crosstalk



Test Circuit 5. Bandwidth

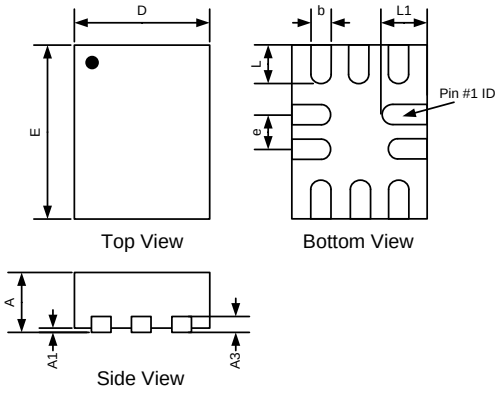


Test Circuit 6. Charge Injection Test

Package Information

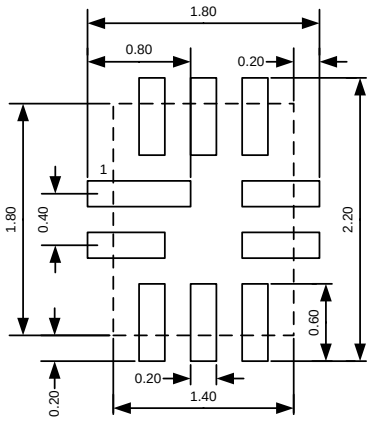
QFN10 1.8×1.4

Outline Drawing



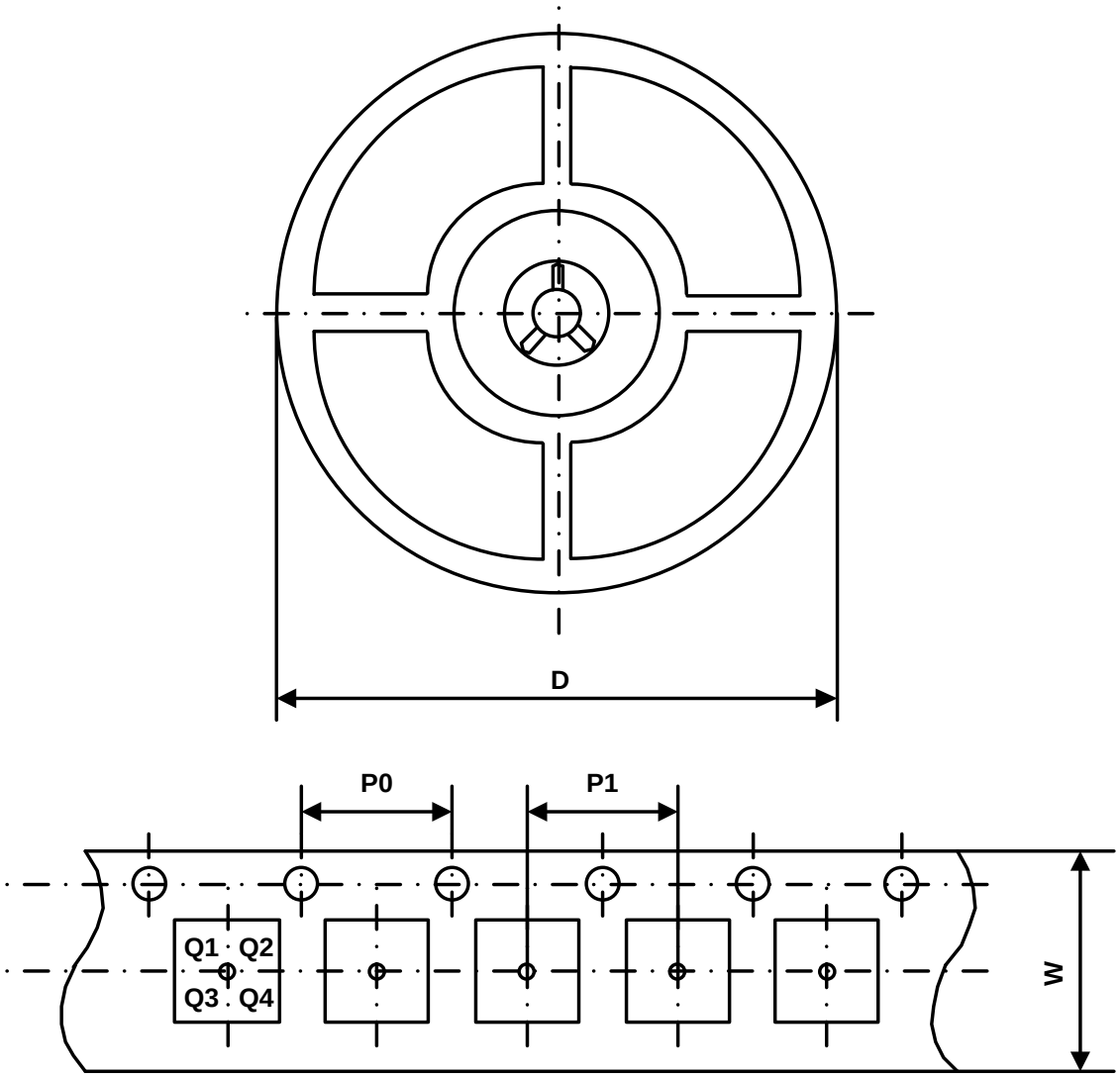
DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	0.40	-	0.60	0.016	-	0.024
A1	0.00	-	0.05	0.000	-	0.002
A3	0.15REF			0.006REF		
b	0.15	0.20	0.25	0.006	0.008	0.010
D	1.30	1.40	1.50	0.052	0.056	0.060
E	1.70	1.80	1.90	0.068	0.072	0.076
e	0.40BSC			0.016BSC		
L	0.30	0.40	0.50	0.012	0.016	0.020
L1	0.40	0.50	0.60	0.016	0.020	0.024

Land Pattern



NOTES:
1. Compound dimension: 1.80×1.40;
2. Unit: mm
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Packing Information



Part Number	Package Type	Carrier Width (W)	Pitch (P0)	Pitch (P1)	Reel Size (D)	PIN 1 Quadrant
UM2268	QFN10 1.8×1.4	8 mm	4 mm	8 mm	180 mm	Q1

GREEN COMPLIANCE

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