

0.5Ω Ultra Low ON-Resistance Dual SPDT Analog Switch

UM5223 QFN-10

General Description

The UM5223 is a low on-resistance (R_{ON}), dual single-pole/double-throw (SPDT) analog switch operates from a single +1.65V to +4.5V supply. The device's targeted applications include battery powered equipment that benefit from its low on-resistance.

The UM5223 features two 0.5Ω R_{ON} (max) SPDT switches with 0.15Ω flatness and 0.05Ω matching between channels. The switch offers break-before-make switching (1ns) with $t_{ON} < 60ns$ and $t_{OFF} < 40ns$ at +2.7V.

The switch is available in Pb-free QFN-10 package.

Applications

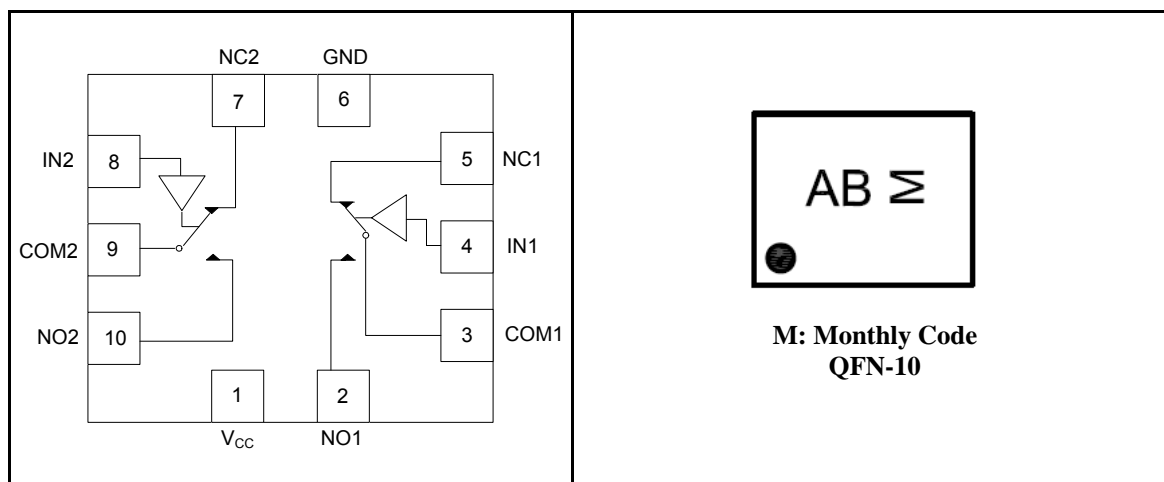
- Cell Phone Audio Block
- Speaker and Earphone Switching
- Portable Instrumentation
- Battery-Operated Equipment
- Modems
- Medical Equipment
- Computer Peripherals
- Ring-Tone Chip/Amplifier Switching

Features

- Ultra-Low $R_{ON} < 0.5\Omega$ at $V_{CC} = 3.0 \pm 0.3V$
- R_{ON} Flatness of 0.15Ω
- Single-Supply Operation from +1.65V to +4.5V
- Interfaces with 2.8V chipset
- Full 0-V_{CC} Signal Handling Capability
- Power Off Protection:
When $V_{CC} = 0V$, Input Signal Can Tolerate up to 4.5V
- High Off-Isolation: -78dB (100kHz)
- Low Crosstalk: -92dB (100kHz)
- Low Distortion: 0.12%
- High Continuous Current Capability:
 $\pm 300mA$ through each switch
- Lead (Pb) Free QFN-10 Package

Pin Configurations

Top View



Pin Description

Pin	Name	Function
1	V _{CC}	Positive Supply Voltage
2	NO1	Analog Switch 1-Normally Open Terminal
3	COM1	Analog Switch 1 –Common Terminal
4	IN1	Analog Switch 1-Digital Control Input
5	NC1	Analog Switch 1-Normally Closed Terminal
6	GND	Ground Connection
7	NC2	Analog Switch 2-Normally Closed Terminal
8	IN2	Analog Switch 2-Digital Control Input
9	COM2	Analog Switch 2 –Common Terminal
10	NO2	Analog Switch 2-Normally Open Terminal

Ordering Information

Part Number	Packaging Type	Marking Code	Shipping Qty
UM5223	QFN-10	AB	3000pcs/7 Inch Tape & Reel

Function Table

IN __	NO __	NC __
0	OFF	ON
1	ON	OFF

Absolute Maximum Ratings

Symbol	Parameter	Limit	Unit
V ₊	Supply Voltage	- 0.3 to + 5.5	V
V _S	DC Switch Voltage (Note1)	- 0.3 to (V ₊ + 0.3)	
IN __	DC IN Voltage	- 0.3 to + 5.5	
I _o	Continuous Current (COM __ , NO __ , NC __)	±300	mA
I _p	Peak Current (Pulsed at 1ms, 10% duty cycle)	±500	
T _O	Operating Temperature Range	- 40 to +85	°C
T _J	Junction Temperature	+150	
T _{STG}	Storage Temperature Range	- 65 to +150	
T _L	Junction Lead Temperature (Soldering, 10seconds)	+300	
ESD	ESD Method 3015.7	>2000	V

Note1: Signals on COM_{_}, NO_{_}, or NC_{_} exceeding V₊ or GND are clamped by internal diodes. Limit forward-diode current to maximum current rating.

DC Electrical Characteristics

Symbol	Parameter	Test Conditions	Vcc(V)	Temp	Limits (-40 to 85 °C)			Unit
					Min	Typ	Max	
I_{IN}	Input Leakage Current	$V_{IN} = 3.6V$ or GND	3.6	Room Full	-0.1 -1.0		0.1 1.0	μA
I_{OFF}	Power Off Leakage Current	$V_{IN} = 3.6V$ or GND	0	Room Full	-0.5 -2.0		0.5 2.0	μA
$I_{COM(ON)}$	COM ON Leakage Current	$V_{IN} = V_{IL}$ or V_{IH} $V_{NO} = 0.3V$ or $3.3V$ with V_{NC} floating or $V_{NC} = 0.3V$ or $3.3V$ with V_{NO} floating $V_{COM} = 0.3V$ or $3.3V$	3.6	Room Full	-0.01 -0.1		0.01 0.1	μA
$I_{NO/NC(OFF)}$	OFF State Leakage Current	$V_{IN} = V_{IL}$ or V_{IH} V_{NO} or $V_{NC} = 0.3V$ $V_{COM} = 3.3V$	3.6	Room Full	-0.3		0.3	μA
I_{CC}	Quiescent Supply Current	Select and $V_{IS} = V_{CC}$ or GND	1.65 to 3.6	Room Full	-1.0 -2.0		1.0 2.0	μA
V_{IH}	Input High Voltage		3.0	Full	1.4			V
			3.6		1.7			
V_{IL}	Input Low Voltage		3.0	Full			0.7	V
			3.6				0.8	
R_{ON}	On-Resistance (Note2)	$V_{IN} = V_{IL}$ or V_{IH} $V_{IS} = V_{CC}$ to GND $I_{COM} = 100mA$	3.0	Room Full		0.5 0.6		Ω
			3.6	Room Full		0.5 0.6		
ΔR_{ON}	On Resistance Match Between Channels (Note2,3,4)	$V_{IS} = 1.5V$ $I_{COM} = 100mA$; $V_{IS} = 1.8V$ $I_{COM} = 100mA$	3.0	Room Full			0.05 0.05	Ω
			3.6	Room Full			0.05 0.05	
R_{FLAT}	On Resistance Flatness (Note2,3,5)	$V_{IS} = V_{CC}$ to GND $I_{COM} = 100mA$	3.0	Room Full			0.15 0.15	Ω
			3.6	Room Full			0.15 0.15	

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

3: Parameter is characterized but not tested in production.

4: $\Delta R_{ON} = |R_{ON(B0)} - R_{ON(B1)}|$ measured at identical V_{CC} , temperature and voltage levels.

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

AC Electrical Characteristics

Symbol	Parameter	Test Conditions	Vcc(V)	Temp	Limits (-40 to 85 °C)			Unit
					Min	Typ	Max	
t _{ON}	Turn On Time	V _{IS} = 1.5V R _L = 50Ω, C _L = 35pF	2.3 to 3.6	Room Full		50 60		ns
t _{OFF}	Turn Off Time	V _{IS} = 1.5V R _L = 50Ω, C _L = 35pF	2.3 to 3.6	Room Full		30 40		ns
t _{BBM}	Break Before Make Time (Note 6)	V _{IS} = 3.0V R _L = 50Ω, C _L = 35pF	3.0	Room Full	2	15		ns
Q _{INJ}	Charge Injection (Note 6)	C _L = 1.0 nF, V _{GEN} = 0 V R _{GEN} = 0Ω	1.65 to 3.6	Room		38		pC
V _{ISO}	Off Isolation (Note 7)	C _L = 5.0pF, f = 100kHz	1.65 to 3.6	Room		-78		dB
V _{CT}	Crosstalk	R _L = 50Ω, C _L = 5.0pF, f = 100kHz	1.65 to 3.6	Room		-92		dB
BW	-3 dB Bandwidth		1.65 to 3.6	Room		75		MHz
THD	Total Harmonic Distortion (Note6)	F _{IS} = 20Hz to 20kHz, R _L = R _{GEN} = 600Ω C _L = 50pF, V _{IS} = 2.0V RMS	3.0	Room		0.12		%
Capacitance								
C _{IN}	IN Pin Input Capacitance (Note8)	V _{CC} = 3.6V				4.5		pF
C _{NO/NC}	NO/NC Port Off Capacitance (Note8)	V _{CC} = 3.6V				20		pF
C _{COM}	COM Port Capacitance when Switch is Enabled (Note8)	V _{CC} = 3.6V				55		pF

6: Guaranteed by Design.

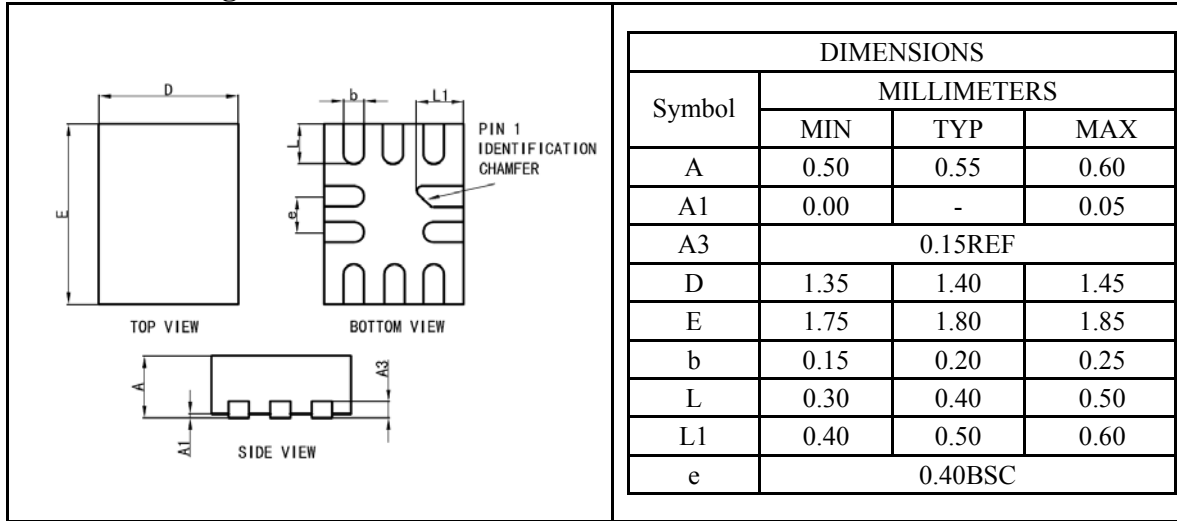
7: Off Isolation = 20 log₁₀ [V_{COM}/V_{NO/NC}].

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

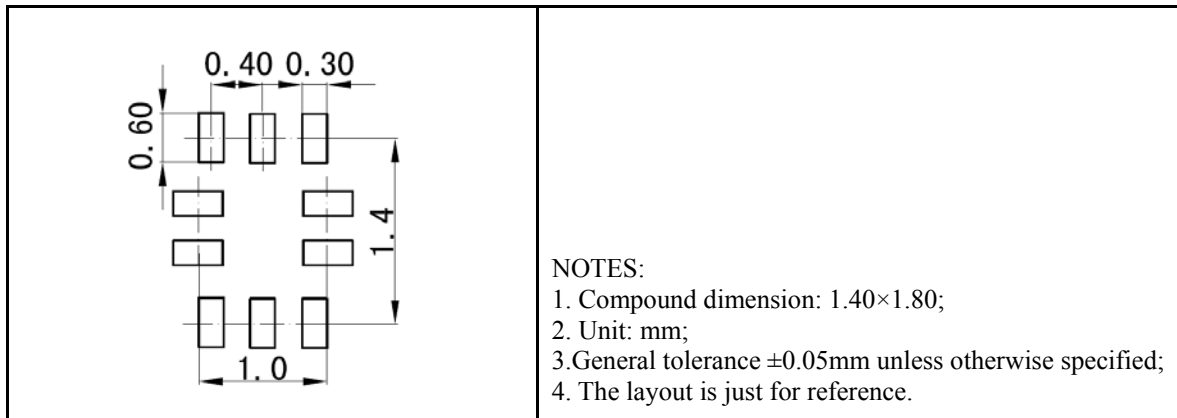
Package Information

UM5223 QFN-10

Outline Drawing



Land Pattern



Tape and Reel Orientation



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