

6.8Ω、高速、低压、双通道、双刀双掷模拟开关

UM3671QAG QFN16 2.6×1.8
UM3671QCG QFN16 3.0×3.0

1 描述

UM3671 是一款高速、双通道、双刀双掷（DPDT）模拟开关。该器件仅需单电源供电，工作电压范围为 +1.65V 至 +5.5V。此外，UM3671 仅有一个选择引脚，用于控制 COM 引脚连接至 NC 引脚还是 NO 引脚。

UM3671 具备两路 R_{ON} 为 6.8Ω(典型值) DPDT 开关，具有 500MHz 带宽和低串扰特性。其高性能和低功耗特性使其成为便携式设备、音频和视频信号路由的理想选择。

UM3671 提供 QFN16 2.6×1.8 和 QFN16 3.0×3.0 封装。该器件的工作环境温度范围为 -40℃至125℃

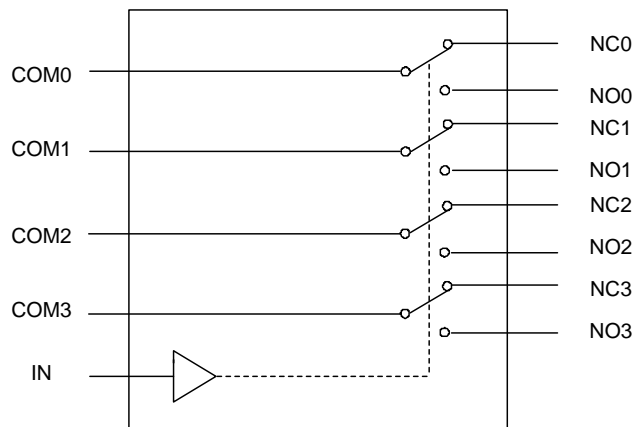
2 应用

- 通信系统
- 手机
- 便携式设备
- 音频信号路由
- 音视频切换
- 计算机外设
- 调制解调器
- PDA

3 特性

- 单电源供电：1.65V 至 5.5V
- -3dB 带宽：500MHz
- 低导通电阻：6.8Ω（典型值）
- 低导通电阻平坦度
- 高关断隔离度：-60dB (10MHz)
- 低串扰：-60dB (10MHz)
- 快速开关时间（ $V_+=5V$ ）：
 - t_{ON} : 29ns
 - t_{OFF} : 15ns
- 典型功耗：0.5μW
- 断电保护：当 $V_{CC}=0V$ 时，输入可耐受高达 5.5V 电压
- 轨到轨工作
- 兼容 TTL/CMOS

4 功能框图



5 Order Information

Part Number	Packaging Type	Marking Code	Shipping Qty
UM3671QAG	QFN16 2.6×1.8	3671	3000pcs/7 Inch Tape & Reel
UM3671QCG	QFN16 3.0×3.0	UM3671	3000pcs/13 Inch Tape & Reel

6 Pin Configuration and Function

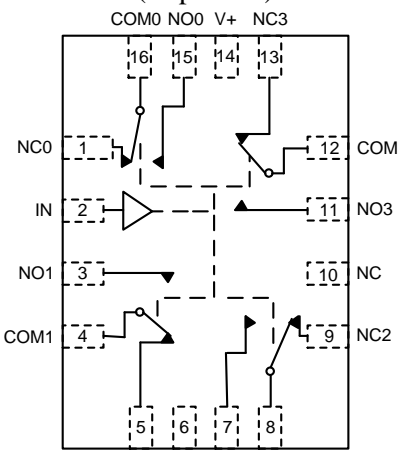

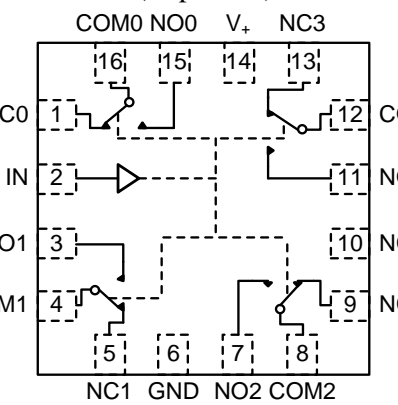
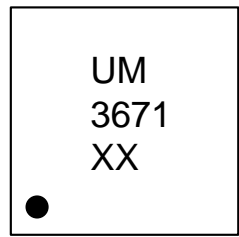
<p>(Top View)</p> 	 <p>XX: Week Code UM3671QAG QFN16 2.6×1.8</p>
<p>(Top View)</p> 	 <p>XX: Week Code UM3671QCG QFN16 3.0×3.0</p>

Table 6-1. Pin Functions

Pin No.	Pin Name	Function
1, 5, 9, 13	NCx	Normally Closed Pins.
2	IN	Digital Control Input Pin to Connect the COM Pins to the NO or NC Pins.
6	GND	Ground.
10	NC	Not Internally Connected.
14	V+	Positive Power Supply.
15, 3, 7, 11	NOx	Normally Open Pins.
16, 4, 8, 12	COMx	Common Pins.
Exposed Pad	GND	Exposed Pad for QFN16 3.0×3.0 package. It should be soldered to PCB board and connected to GND.

7 Function Table

IN	Function	
	NC0, NC1, NC2, NC3	NO0, NO1, NO2, NO3
0	ON	OFF
1	OFF	ON

8 Specifications

8.1 Absolute Maximum Ratings (Note1)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V ₊	Supply voltage		-0.3		6.0	V
V _I	Input Voltage on COMx, NCx, NOx pins		-0.3		V ₊ +0.3	V
	Input Voltage on IN pin		-0.3		V ₊ +0.3	V
V _{ESD}	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001	All pins		±8		kV
I _O	Continuous Current		-200		200	mA
T _A	Operating free-air temperature		-40		125	°C
T _J	Junction Temperature		-40		150	°C
T _{STG}	Storage temperature		-65		150	°C
T _L	Lead Temperature for Soldering 10 Seconds				260	°C

Note 1: Operation outside the Absolute Maximum Ratings may cause permanent device damage. Functional operation of the device at these or any other conditions beyond those indicated in the operational section of the specification is not implied. Operating the device in this manner may affect device reliability, functionality, performance, and shorten the device lifetime.

8.2 Electrical Characteristics

V_+ =4.5V to 5.5V, T_A = -40 °C to 125 °C, unless otherwise noted. Typical values are at V_+ =5V, T_A =25 °C.

Symbol	Parameter	Test Conditions	Temp	Min	Typ	Max	Unit
Analog Switch							
V_{NO}	Analog Signal Range		Full	0		V_+	V
V_{NO}				0		V_+	V
V_{COM}				0		V_+	V
R_{ON}	On-Resistance	$V_+ = 4.5V, V_{NO}$ or $V_{NC} = 1.2V, I_{COM} = -100mA$, see Figure 9-1	25 °C		6.8	9	Ω
			Full			10	Ω
ΔR_{ON}	On-Resistance Match Between Channels	$V_+ = 4.5V, V_{NO}$ or $V_{NC} = 1.2V, I_{COM} = -100mA$, see Figure 9-1	25 °C		0.4	2.5	Ω
			Full			3	Ω
$R_{FLAT(ON)}$	Resistance Flatness	$V_+ = 4.5V, V_{NO}$ or $V_{NC} = 1.2V, 4.5V, I_{COM} = -100mA$, see Figure 9-1	25 °C		2	3	Ω
			Full			3.5	Ω
$I_{NC(OFF)}$	Source Off Leakage Current	$V_+ = 5.5V, V_{COM} = 3.3V/0.3V, V_{NO}$ or $V_{NC} = 3.3V/0.3V$	Full			1	μA
$I_{NO(OFF)}$						1	μA
$I_{NC(ON)}$	Channel On Leakage Current	$V_+ = 5.5V, V_{COM} = 3.3V/0.3V, V_{NO}$ or $V_{NC} = \text{floating}$	Full			1	μA
$I_{NO(ON)}$						1	μA
Digital Inputs							
V_{IH}	Input High Voltage		Full	1.6			V
V_{IL}	Input Low Voltage		Full			0.5	V
I_{IN}	Input Leakage Current	$V_+ = 5.5V, V_{IN} = 0V$ or $5.5V$	Full			1	μA
Dynamic Characteristics							
t_{ON}	Turn On Time	V_{NC} or $V_{NO} = 3V, R_L = 300\Omega, C_L = 35pF$, see Figure 9-2	25 °C		29		ns
t_{OFF}	Turn Off Time		25 °C		15		ns
t_D	Break-Before-Make Time Delay	V_{NC} or $V_{NO} = 3V, R_L = 300\Omega, C_L = 35pF$, see Figure 9-4	25 °C		14		ns
Q	Charge Injection	$V_S = GND, R_S = 0\Omega, V_{IH} = 3V, V_{IL} = 0V, C_L = 1nF, Q = C_L \times V_{OUT}$, see Figure 9-3	25 °C		30		pC
O_{ISO}	Off Isolation	Signal = 0dBm, $R_L = 50\Omega$, see Figure 9-5	1MHz	25 °C		-75	dB
			10MHz	25 °C		-55	dB
X_{TALK}	Channel-to-Channel Crosstalk	Signal = 0dBm, $R_L = 50\Omega$, see Figure 9-6	1MHz	25 °C		-75	dB
			10MHz	25 °C		-60	dB
BW	-3dB Bandwidth	Signal = 0dBm, $R_L = 50\Omega$, see Figure 9-7	25 °C		500		MHz

8.2 Electrical Characteristics (continued)

V_+ =4.5V to 5.5V, T_A = -40 °C to 125 °C, unless otherwise noted. Typical values are at V_+ =5V, T_A =25 °C.

Symbol	Parameter	Test Conditions	Temp	Min	Typ	Max	Unit
Dynamic Characteristics							
$C_{NC(ON)}$	Channel On Capacitance		25 °C		43		pF
$C_{NO(ON)}$					43		pF
$C_{COM(ON)}$					43		pF
Power Requirements							
V_+	Power Supply Range		Full	1.65		5.5	V
I_+	Power Supply Current	V_+ =5.5V, V_{IN} =0V or V_+	Full			1	μA

8.2 Electrical Characteristics (continued)

V_+ =2.7V to 3.6V, T_A = -40 °C to 125 °C, unless otherwise noted. Typical values are at V_+ =3V, T_A =25 °C.

Symbol	Parameter	Test Conditions	Temp	Min	Typ	Max	Unit
Analog Switch							
V_{NO}	Analog Signal Range		Full	0		V_+	V
V_{NO}				0		V_+	V
V_{COM}				0		V_+	V
R_{ON}	On-Resistance	$V_+ = 2.7V, V_{NO}$ or $V_{NC} = 1.2V, I_{COM} = -10mA$, see Figure 9-1	25 °C		15	17	Ω
			Full			20	Ω
ΔR_{ON}	On-Resistance Match Between Channels	$V_+ = 2.7V, V_{NO}$ or $V_{NC} = 1.2V, I_{COM} = -10mA$, see Figure 9-1	25 °C		1	3	Ω
			Full			4	Ω
$R_{FLAT(ON)}$	Resistance Flatness	$V_+ = 4.5V, V_{NO}$ or $V_{NC} = 1.2V, 4.5V, I_{COM} = -10mA$, see Figure 9-1	25 °C		6	9	Ω
			Full			12	Ω
$I_{NC(OFF)}$	Source Off Leakage Current	$V_+ = 3.6V, V_{COM} = 3.3V/0.3V, V_{NO}$ or $V_{NC} = 3.3V/0.3V$	Full			1	μA
$I_{NO(OFF)}$						1	μA
$I_{NC(ON)}$	Channel On Leakage Current	$V_+ = 3.6V, V_{COM} = 3.3V/0.3V, V_{NO}$ or $V_{NC} = \text{floating}$	Full			1	μA
$I_{NO(ON)}$						1	μA
Digital Inputs							
V_{IH}	Input High Voltage		Full	1.5			V
V_{IL}	Input Low Voltage		Full			0.4	V
I_{IN}	Input Leakage Current	$V_+ = 5.5V, V_{IN} = 0V$ or $3.6V$	Full			1	μA
Dynamic Characteristics							
t_{ON}	Turn On Time	V_{NC} or $V_{NO} = 1.5V, R_L = 300\Omega, C_L = 35pF$, see Figure 9-2	25 °C		35		ns
t_{OFF}	Turn Off Time		25 °C		20		ns
t_D	Break-Before-Make Time Delay	V_{NC} or $V_{NO} = 1.5V, R_L = 300\Omega, C_L = 35pF$, see Figure 9-4	25 °C		14		ns
Q	Charge Injection	$V_S = GND, R_S = 0\Omega, V_{IH} = 1.5V, V_{IL} = 0V, C_L = 1nF, Q = C_L \times V_{OUT}$, see Figure 9-3	25 °C		30		pC
O_{ISO}	Off Isolation	Signal = 0dBm, $R_L = 50\Omega$, see Figure 9-5	1MHz	25 °C		-75	dB
			10MHz	25 °C		-55	dB
X_{TALK}	Channel-to-Channel Crosstalk	Signal = 0dBm, $R_L = 50\Omega$, see Figure 9-6	1MHz	25 °C		-75	dB
			10MHz	25 °C		-60	dB
BW	-3dB Bandwidth	Signal = 0dBm, $R_L = 50\Omega$, see Figure 9-7	25 °C		500		MHz

8.2 Electrical Characteristics (continued)

$V_+ = 2.7V$ to $3.6V$, $T_A = -40\text{ }^\circ\text{C}$ to $125\text{ }^\circ\text{C}$, unless otherwise noted. Typical values are at $V_+ = 3V$, $T_A = 25\text{ }^\circ\text{C}$.

Symbol	Parameter	Test Conditions	Temp	Min	Typ	Max	Unit
Dynamic Characteristics							
$C_{NC(ON)}$	Channel On Capacitance		25 °C		43		pF
$C_{NO(ON)}$					43		pF
$C_{COM(ON)}$					43		pF

9 Parameter Measurement Information

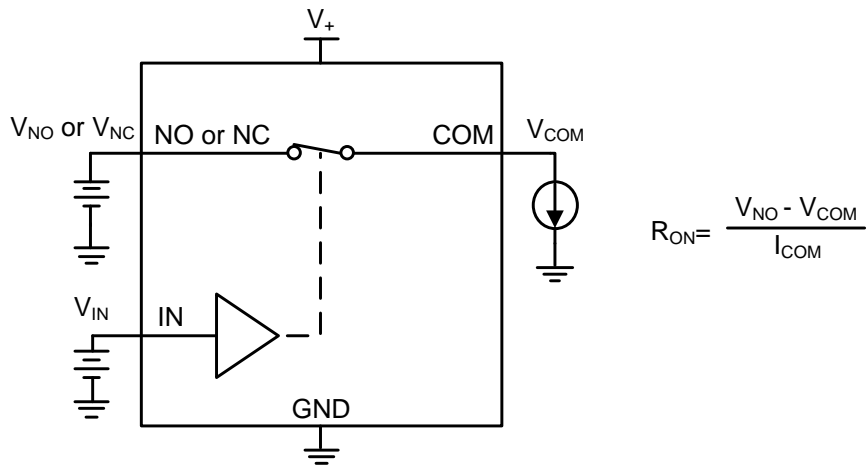


Figure 9-1. On-state Resistance (R_{ON})

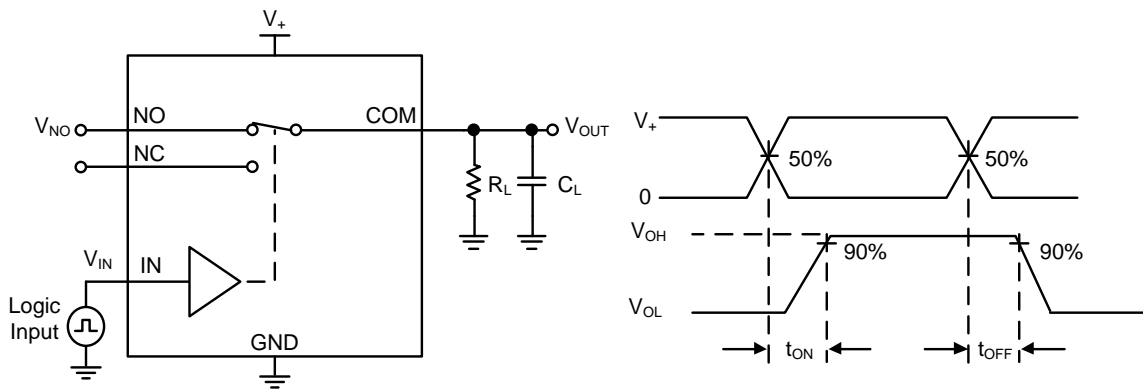


Figure 9-2. Switching Times (t_{ON} , t_{OFF})

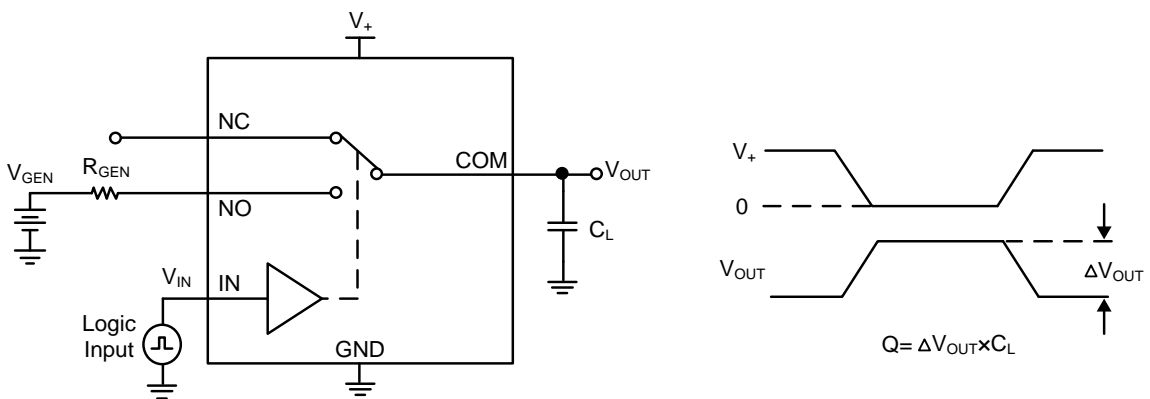


Figure 9-3. Charge Injection (Q)

9 Parameter Measurement Information (continued)

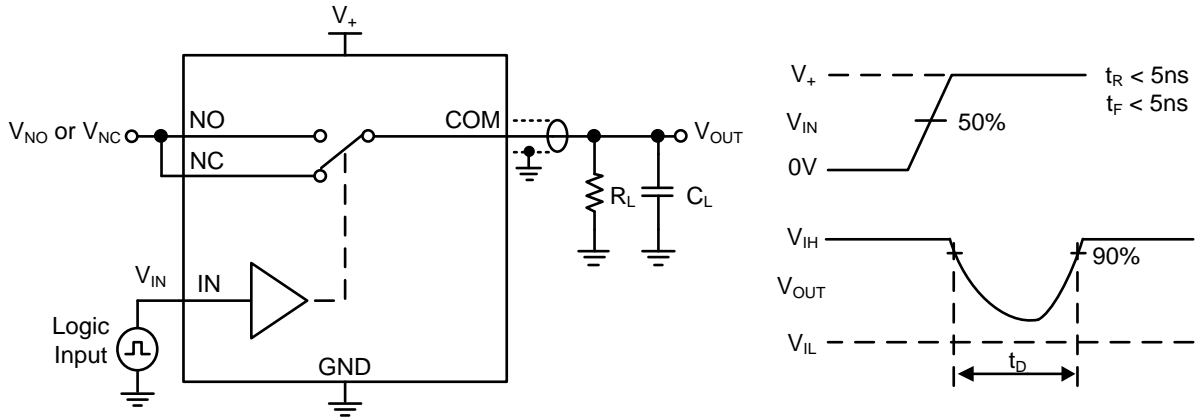


Figure 9-4. Break-Before-Make Time Delay (t_D)

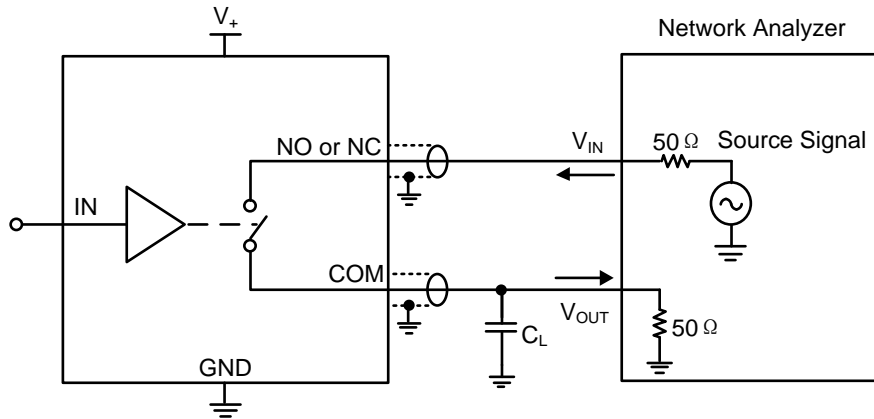
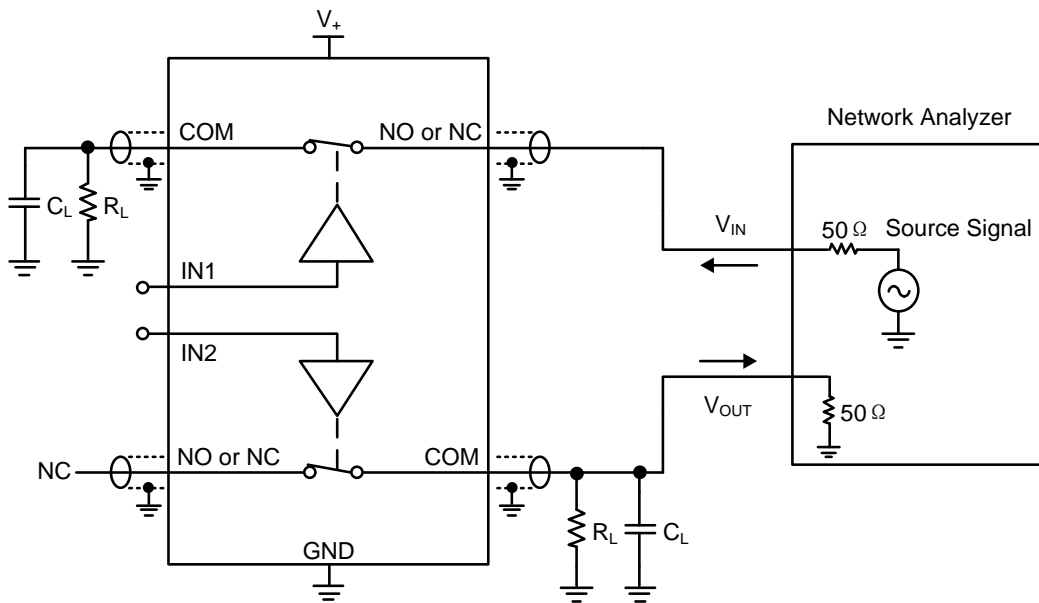


Figure 9-5. Off-Isolation (O_{ISO})



$$\text{Channel-to-Channel Crosstalk} = -20 \log(V_{NO}/V_{OUT})$$

Figure 9-6. Channel-to-Channel Crosstalk (X_{TALK})

9 Parameter Measurement Information (continued)

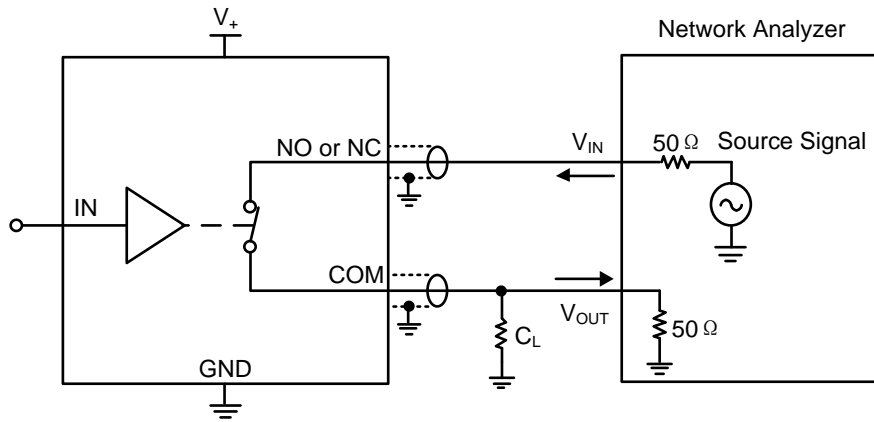
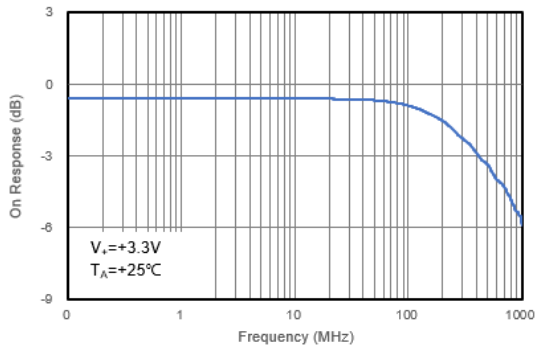


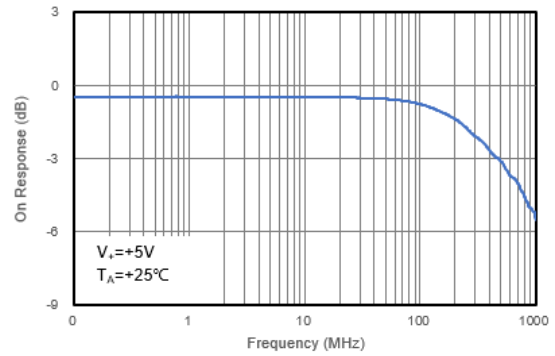
Figure 9-7. -3dB Bandwidth (BW)

10 Typical Performance Characteristics

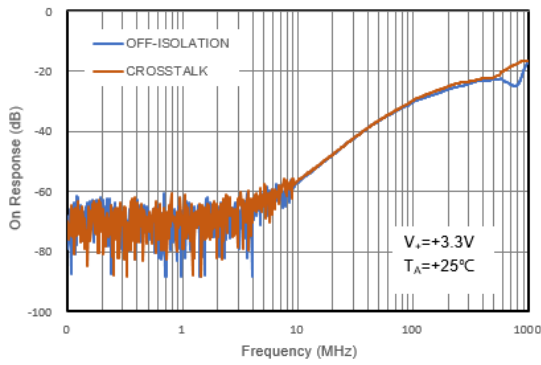
On Response vs. Frequency



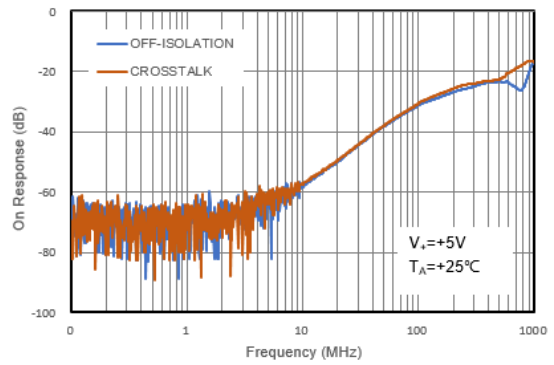
On Response vs. Frequency



Response vs. Frequency



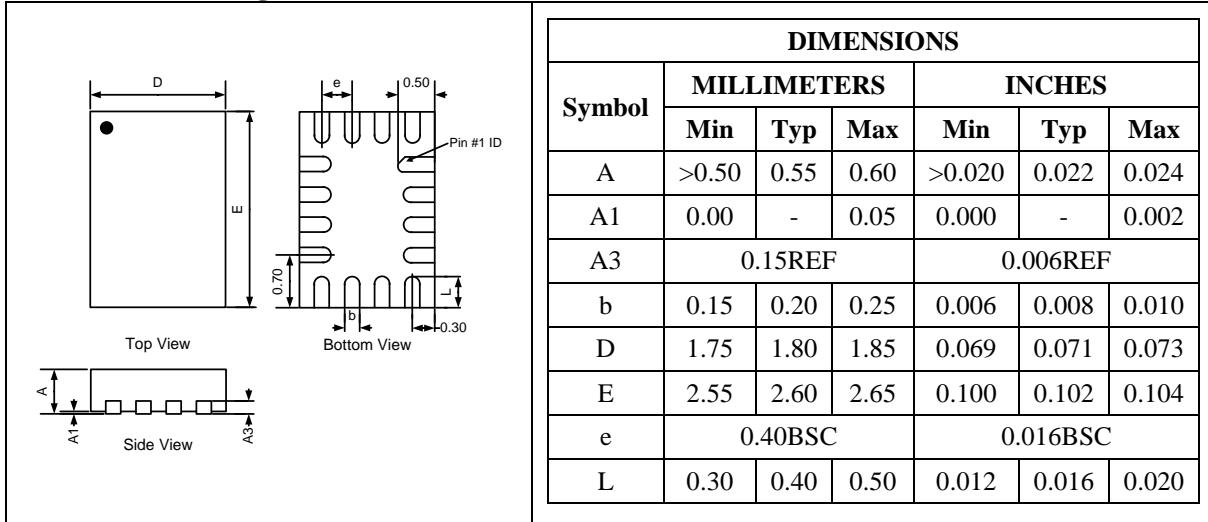
Response vs. Frequency



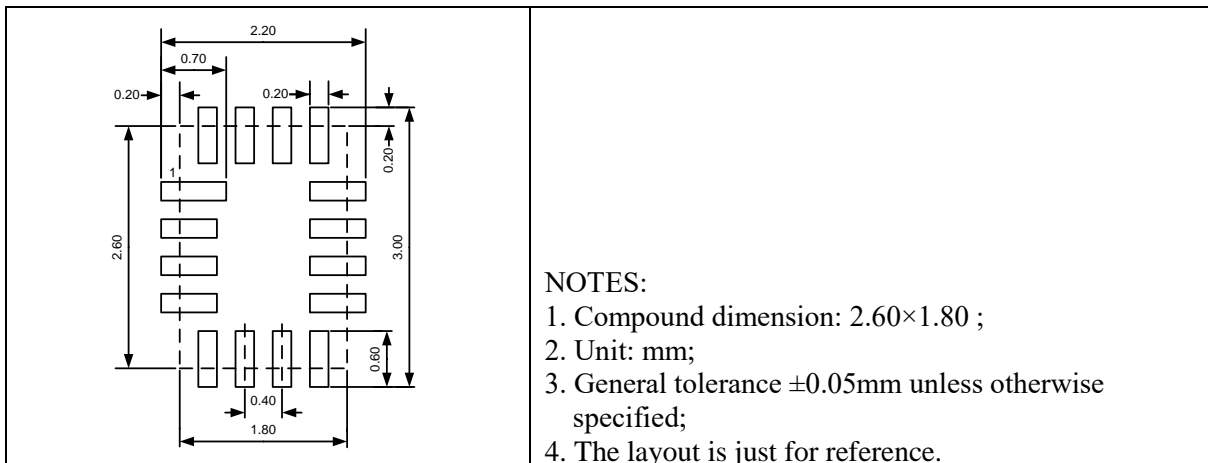
Package Information

QFN16 2.6×1.8

Outline Drawing

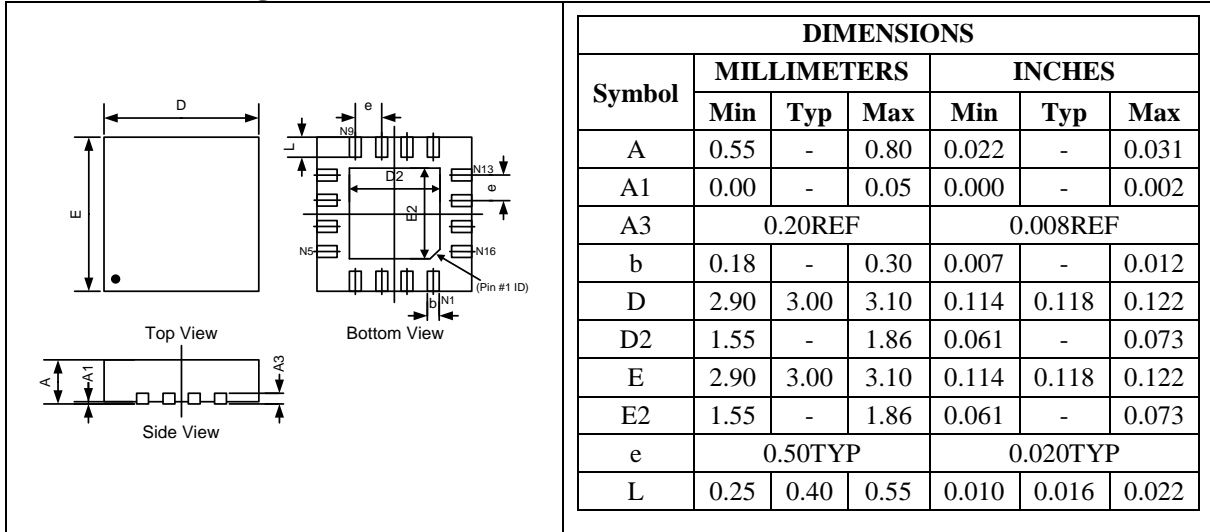


Land Pattern

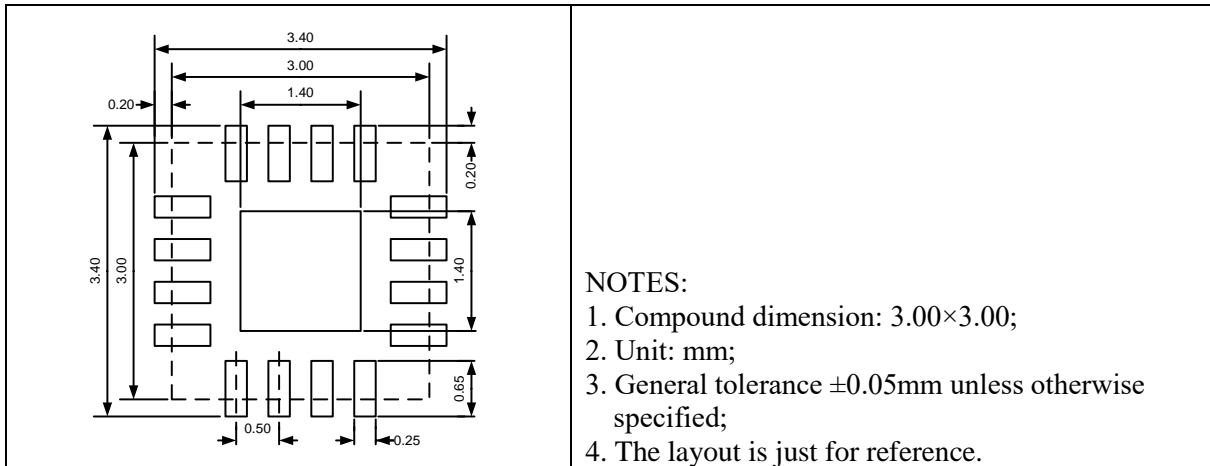


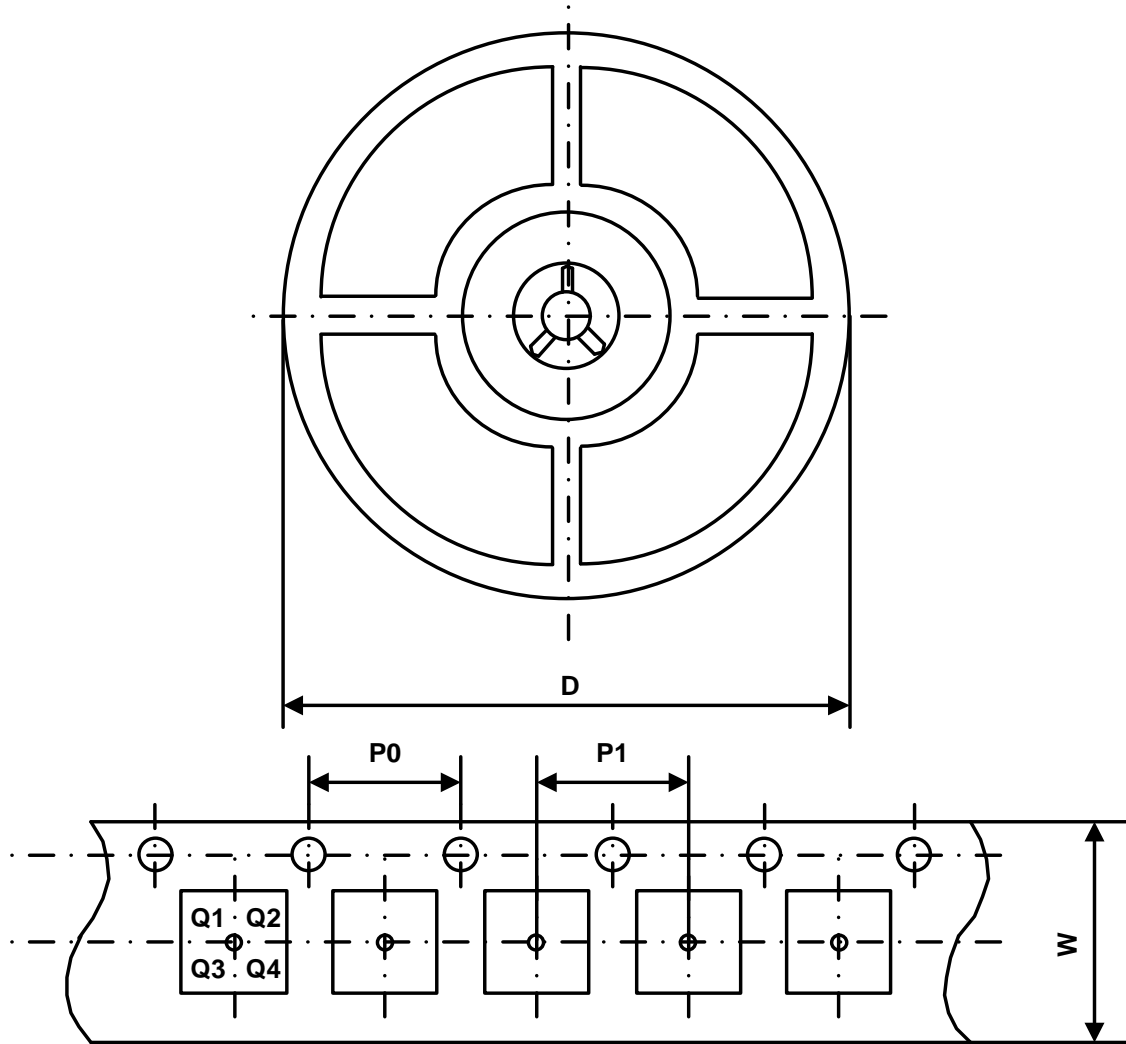
QFN16 3.0×3.0

Outline Drawing



Land Pattern



Packing Information


Part Number	Package Type	Carrier Width (W)	Pitch (P0)	Pitch (P1)	Reel Size (D)	PIN 1 Quadrant
UM3671QAG	QFN16 2.6×1.8	8 mm	4 mm	4 mm	180 mm	Q1
UM3671QCG	QFN16 3.0×3.0	12 mm	4 mm	8 mm	330 mm	Q1

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