DESCRIPTION

The A4722 is a quad, low on-resistance, low voltage, bidirectional 4-channel single-pole double-throw (SPDT) analog switch with two control inputs, which is designed to operate from 1.8V to 5.5V. This A4722 is also known as a 2 channels double-pole double-throw (DPDT) configuration.

The A4722 can handle both analog and digital signals. It features bandwidth(30MHz) and low on-resistance (0.6Ω Typ).

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

The A4722 is available in QFN16 Package.

ORDERING INFORMATION

Package Type	Part Number	
QFN16 SPQ: 3,000pcs/Reel	Q16	A4722Q16R
		A4722Q16VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

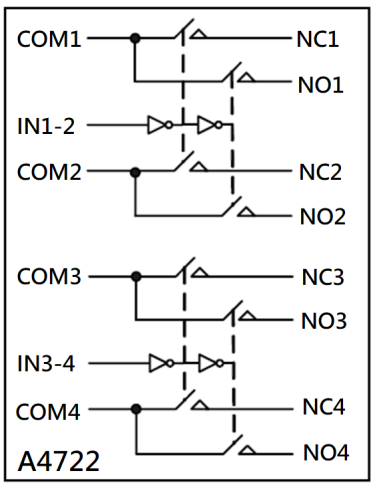
FEATURES

- Bandwidth: 30MHz
- High Speed, Typically 50ns
- Supply Range: +1.8V to +5.5V
- Low On-State Resistance, 0.6Ω(Typ)
- Break-Before-Make Switching
- Rail-to-Rail Operation
- TTL/CMOS Compatible
- Extended Industrial Temperature Range: -40°C ~ +125°
- Available in QFN16 Package.

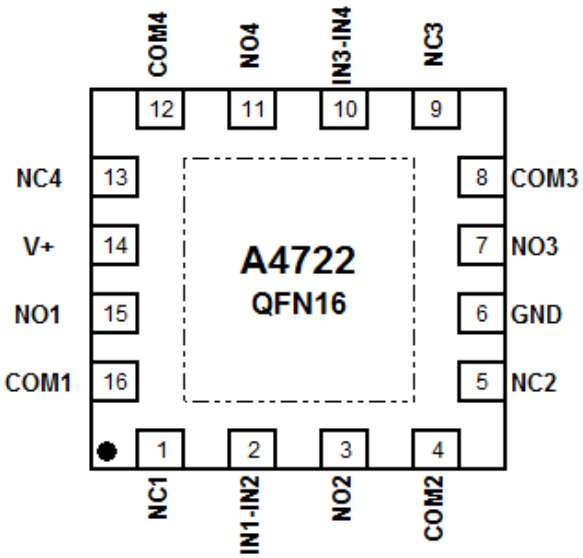
APPLICATION

- Communication Systems
- Cell Phones
- Portable Instrumentation
- Audio Signal Routing
- Audio and Video Switching
- PCMCIA Cards
- Computer Peripherals
- Modems
- PDAs

TYPICAL CIRCUIT



PIN DESCRIPTION



QFN16, Q16
Top View

Pin #	Symbol	Function
1, 5, 9, 13	NCx	Normally-Closed Terminal
2	IN1-2	Digital Control Pin
3, 7, 11, 15	NOx	Normally-Open Terminal
4, 8, 12, 16	COMx	Common Terminal
6	GND	Ground
10	IN3-4	Digital Control Pin
14	V+	Power Supply

NOTE: NOx, NCx and COMx terminal may be an input or output.

FUNCTION TABLE

IN1-2	NO1 & NO2	NC1 & NC2
0	OFF	ON
1	ON	OFF

IN3-4	NO3 & NO4	NC3 & NC4
0	OFF	ON
1	ON	OFF

ABSOLUTE MAXIMUM RATINGS

V+, IN to GND		0.3V ~ +6.0V
Analog, Digital voltage range *		- 0.3V ~ V+ + 0.3V
Continuous Current NO, NC, or COM		±500mA
Peak Current NO, NC, or COM		±800mA
Storage Temperature		-65℃ ~ +150℃
Operating Temperature		-40℃ ~ +85℃
Junction Temperature		150°C
Package Thermal Resistance @ T_A = +25°C		41°C/W
Lead Temperature (soldering, 10s)		260°C
ESD Susceptibility	HBM	1000V
	MM	100V

Stress beyond above listed “Absolute Maximum Ratings” may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

*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

ELECTRICAL CHARACTERISTICS

T_A = - 40°C ~ +125°C, V+ = 5V, unless otherwise noted

Parameter	Symbol	Conditions	V+	TEMP	Min.	Typ.	Max.	Unit
ANALOG SWITCH								
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}	-	-	- 40°C ~+125°C	0	-	V+	V
On-Resistance	R_{ON}	V_{NO} or V_{NC} = V+/2, I_{COM} = -10mA Switch on, See Fig 1.	5V	+25°C	-	0.60	1.0	Ω
				- 40°C to +125°C	-	-	1.20	
			3.3V	+25°C	-	1.0	1.50	
				- 40°C to +125°C	-	-	1.70	
On-Resistance Match Between Channels	ΔR_{ON}	V_{NO} or V_{NC} = V+/2, I_{COM} = -10mA, Switch on, See Fig 1.	5V	+25°C	-	0.04	0.10	Ω
				- 40°C to +125°C	-	-	0.12	
			3.3V	+25°C	-	0.04	0.10	
				- 40°C to +125°C	-	-	0.12	
On-Resistance Flatness	$R_{FLAT(ON)}$	0≤ (V_{NO} or V_{NC}) ≤V+/2, I_{COM} = -10mA, Switch on, See Fig 1.	5V	+25°C	-	0.18	0.30	Ω
				- 40°C to +125°C	-	-	0.40	
			3.3V	+25°C	-	0.54	0.70	
				- 40°C to +125°C	-	-	0.80	
NC, NO OFF Leakage current	$I_{NC(OFF)}$, $I_{NO(OFF)}$	V_{NO} or V_{NC} = 0.3V, V+/2V, V_{COM}=V+/2, 0.3V See Fig 2.	1.8V~ 5.5V	- 40°C to +125°C	-	-	1	μA
NC, NO, COM ON Leakage current	$I_{NC(ON)}$, $I_{NO(ON)}$, $I_{COM(ON)}$	V_{NO} or V_{NC} = 0.3V, Open V_{COM}=Open, 0.3V See Fig 2.	1.8V~ 5.5V	- 40°C to +125°C	-	-	1	μA
DIGITAL CONTROL INPUTS (1)								
Input High Voltage	V_{INH}	-	5V	- 40°C to +125°C	1.50	-	-	V
			3.3V	- 40°C to +125°C	1.30	-	-	
Input Low Voltage	V_{INL}	-	5V	- 40°C to +125°C	-	-	0.60	V
			3.3V	- 40°C to +125°C	-	-	0.50	
Input Leakage Current	I_{IN}	V_{IN} = V_{IO} or 0	1.8V~ 5.5V	- 40°C to +125°C	-	-	1	μA

T_A =25°C, unless otherwise noted

Parameter	Symbol	Conditions		V+	Min.	Typ.	Max.	Unit
DYNAMIC CHARACTERISTICS								
Turn-On Time	t_{ON}	V_{COM} = V+, R_L = 300Ω,		5V	-	50	-	ns
Turn-Off Time	t_{OFF}	C_L = 35pF, See Fig 5.		3.3V	-	50	-	
Break-Before-Make Time Delay	t_{BBM}	V_{NO} or V_{NC} = 3V, R_L = 300Ω,		5V	-	10	-	ns
		C_L = 35pF, See Fig 6.		3.3V		11		
Off Isolation	O_{ISO}	R_L = 50Ω, Switch OFF, See Fig 8.	f = 10MHz		-	-68	-	dB
			f = 1MHz		-	-86	-	dB
Bandwidth –3dB	BW	Switch ON, R_L = 50Ω, See Fig 7.			-	30	-	MHz
NC, NO OFF Capacitance	$C_{NC(OFF)}$, $C_{NO(OFF)}$,	V_{NC} or V_{NO}=V+/2 or GND, Switch OFF, See Fig 4.			-	80	-	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 Fig 4.				350		
POWER REQUIREMENTS								
Power Supply Range	V+	- 40°C to +125°C			1.8		5.5	V
Power Supply Current	I+	V_{IN}=GND or V+ - 40°C to +125°C		5.5V			1	uA

TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1. BANDWIDTH, V+=3V

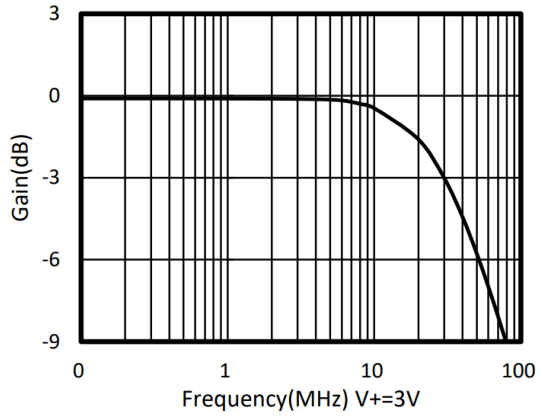


Fig 2. BANDWIDTH, V+=5V

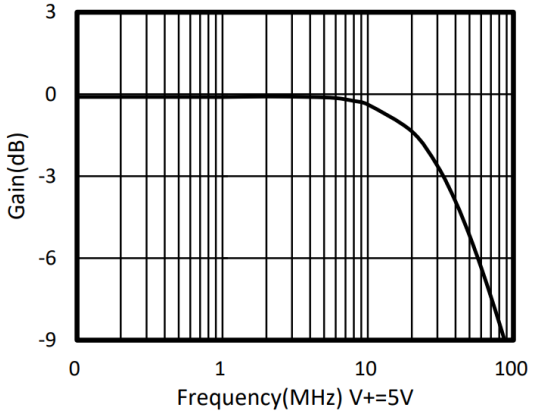
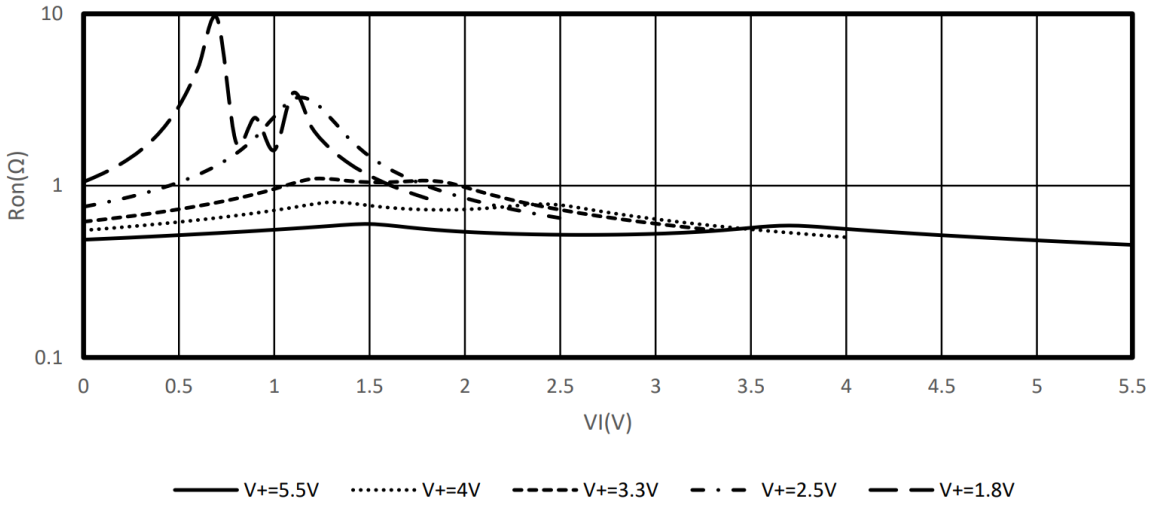
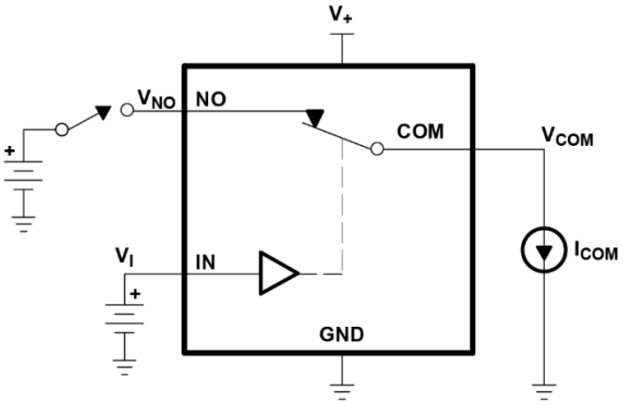


Fig 3. Typical Ron as a Function of Input Voltage (VI) for VI = 0 to V+



TEST CIRCUITS

Fig 1. On-State Resistance (R_{on})

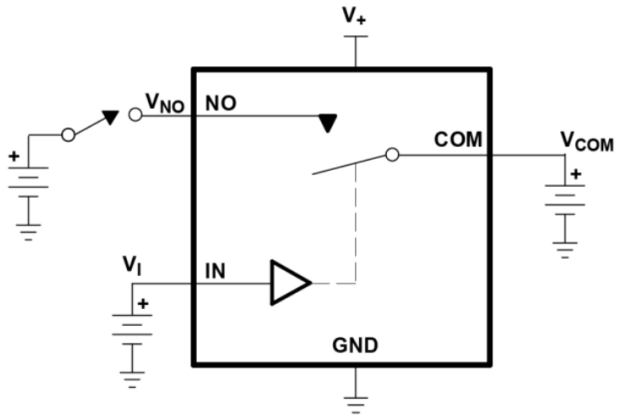


Channel ON

$$Ron = \frac{V_{COM}-V_{NO}}{I_{COM}} \ \Omega$$

$V_I=V_{IH}$ or V_{IL}

Fig 2. OFF-State Leakage Current ($I_{COM(OFF)}$, $I_{NO(OFF)}$)

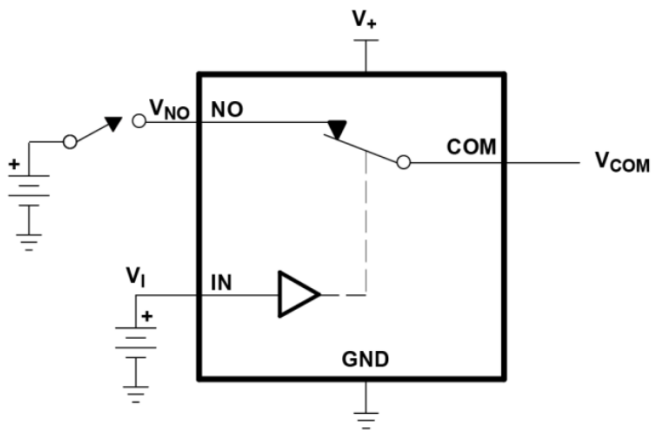


OFF-State Leakage Current

Channel OFF

$V_I=V_{IH}$ or V_{IL}

Fig 3. ON-State Leakage Current ($I_{COM(ON)}$, $I_{NO(ON)}$)

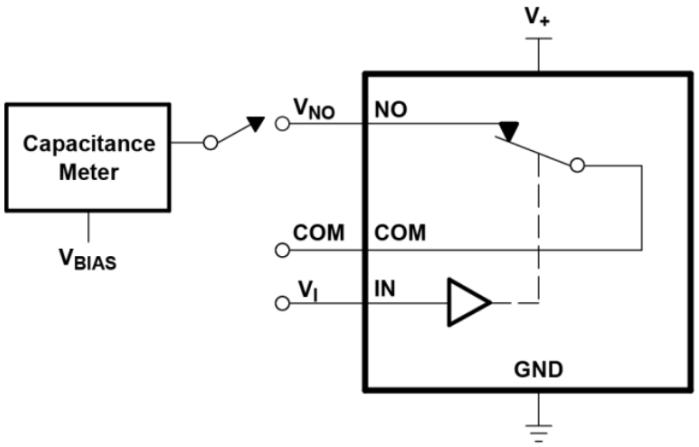


OFF-State Leakage Current

Channel ON

$V_I=V_{IH}$ or V_{IL}

Fig 4. Capacitance (C_I, $C_{COM(OFF)}$, $C_{COM(ON)}$, $C_{NO(OFF)}$, $C_{NO(ON)}$)

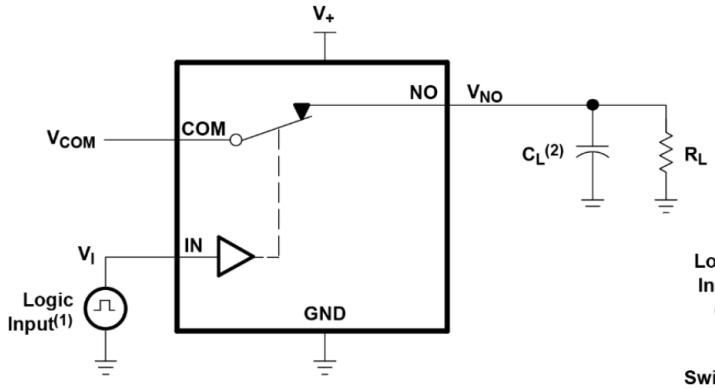


V_{BIAS}=V+, V_{IO}, or GND

VI=V_{IO} or GND

Capacitance is measured at NO, COM, and IN inputs during ON and OFF conditions

Fig 5. Turn-On (t_{ON}) and Turn-Off Time (t_{OFF})



TEST	R_L	C_L	V_{COM}
t_{ON}	50 Ω	35 pF	V_+
t_{OFF}	50 Ω	35 pF	V_+

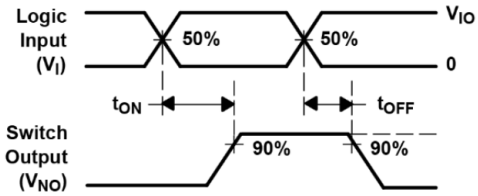
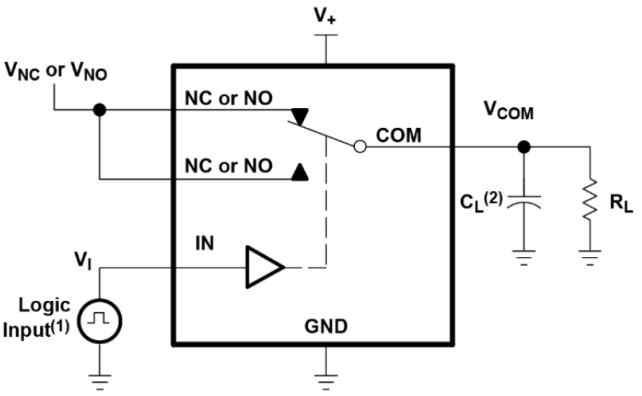
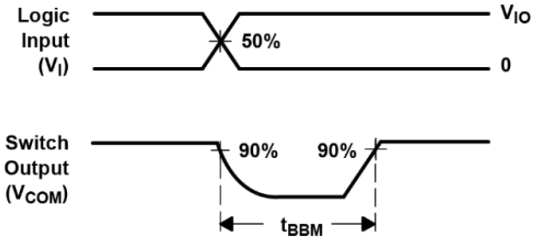


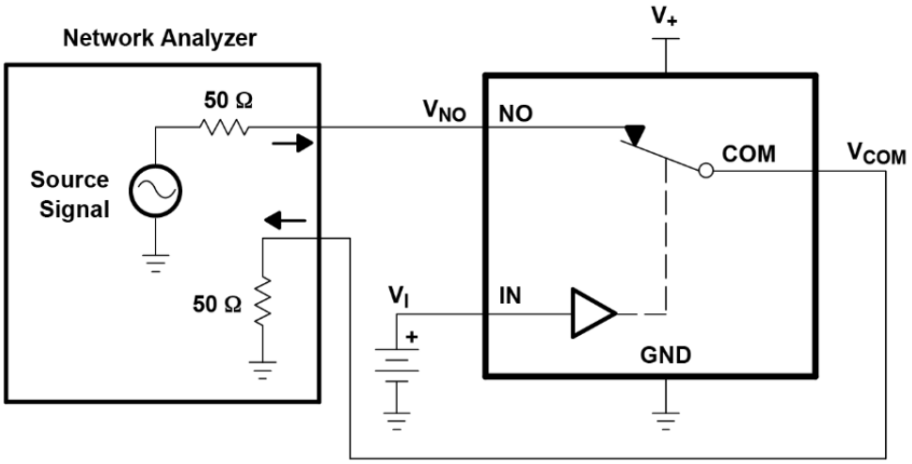
Fig 6. Break-Before-Make Time (t_{BBM})





V_{NC} or V_{NO} = V_+/2
R_L = 50 Ω
C_L = 35 pF

Fig 7. Bandwidth (BW)



Channel ON: NO to COM

$V_I=V_{IH}$ or V_{IL}

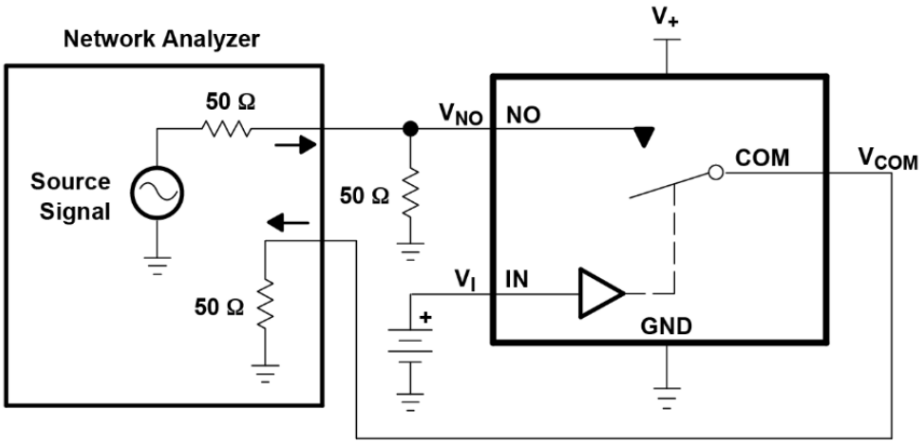
Network Analyzer Setup

Source Power = 0dBm

(632-mV P-P at 50Ω load)

DC Bias = 350mV

Fig 8. OFF Isolation (O_{ISO})



Channel OFF: NO to COM

$V_I=V_{IO}$ or GND

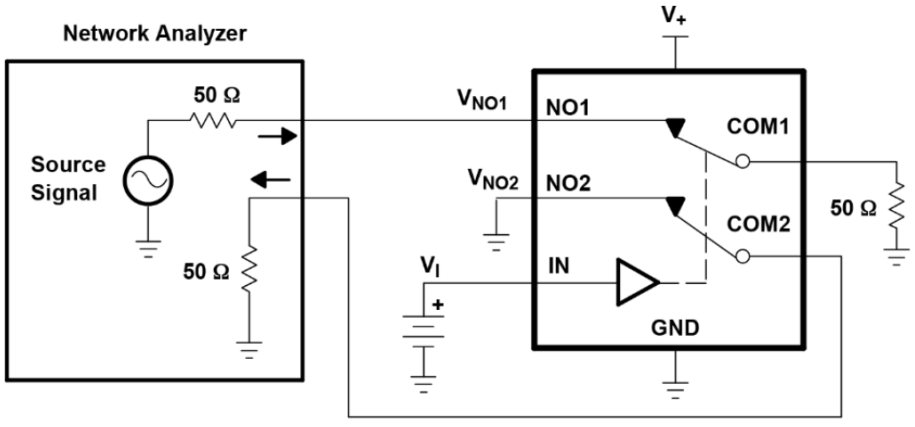
Network Analyzer Setup

Source Power = 0dBm

(632-mV P-P at 50Ω load)

DC Bias = 350mV

Fig 9. Crosstalk (X_{TALK})



Channel ON: NO to COM

Network Analyzer Setup

Source Power = 0dBm

(632-mV P-P at 50Ω load)

DC Bias = 350mV

Fig 10. Charge Injection (Q_C)

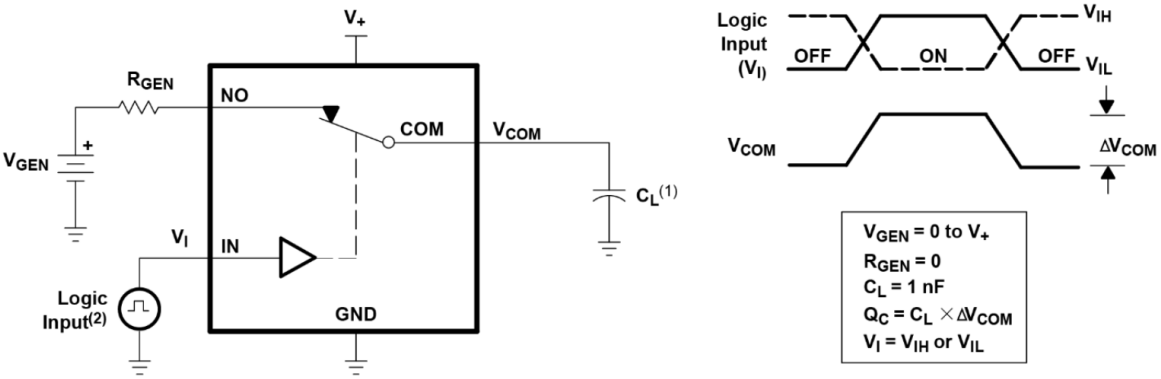
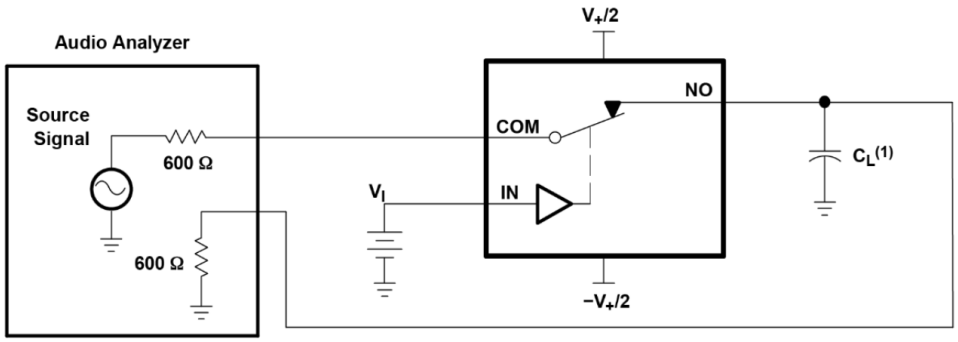


Fig 11. Total Harmonic Distortion (THD)



Channel ON: COM to NO

VI=(V_{IO}-V+/2) pr -V+/2

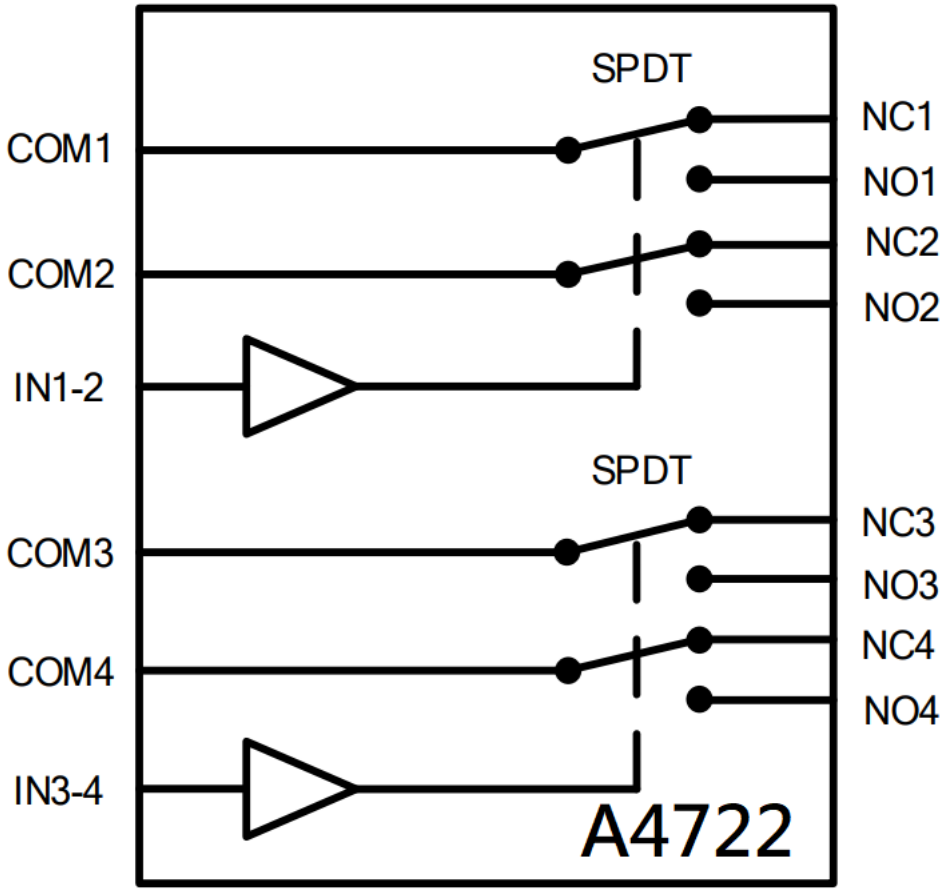
R_L=600Ω

V_{SOURCE}=V+P-P

f_{SOURCE}=20Hz to 20kHz

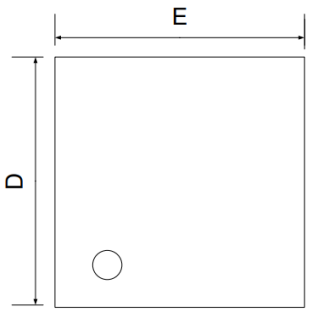
C_L=50pF

BLOCK DIAGRAM

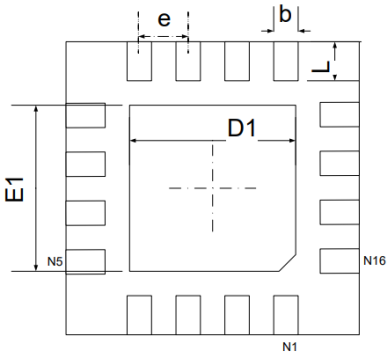


PACKAGE INFORMATION

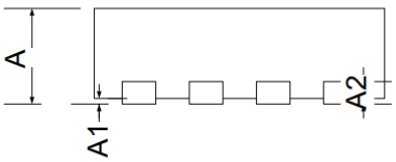
Dimension in QFN16 (Unit: mm)



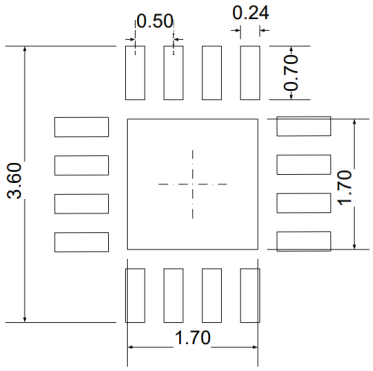
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Millimeters	
	Min	Max
A	0.700	0.800
A1	0.000	0.050
A2	0.203	
b	0.180	0.300
D	2.900	3.100
D1	1.600	1.800
E	2.900	3.100
E1	1.600	1.800
e	0.500 TYP.	
L	0.300	0.500

IMPORTANT NOTICE

AiT Semiconductor Inc. (AiT) reserves the right to make changes to any its product, specifications, to discontinue any integrated circuit product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

AiT Semiconductor Inc.'s integrated circuit products are not designed, intended, authorized, or warranted to be suitable for use in life support applications, devices or systems or other critical applications. Use of AiT products in such applications is understood to be fully at the risk of the customer. As used herein may involve potential risks of death, personal injury, or servere property, or environmental damage. In order to minimize risks associated with the customer's applications, the customer should provide adequate design and operating safeguards.

AiT Semiconductor Inc. assumes to no liability to customer product design or application support. AiT warrants the performance of its products of the specifications applicable at the time of sale.