DESCRIPTION

The A4705 is a 2-channel, single-pole, double-throw (SPDT) analog switch that is designed to operate from 1.8 V to 5.5 V.

The A4705 offers Ultra-Low ON-Resistance and excellent ON-state resistance matching with the break-before-make feature, to prevent signal distortion during the transfer of a signal from one channel to another.

The A4705 device can handle both analog and digital signals. It features fast switching speeds (50ns) and low on-resistance (0.6Ω TYP).

The A4705 has excellent total harmonic distortion (THD) performance and consumes very-low power. These features make A4705 suitable for portable audio applications.

A4705 is available for DFN10 (3x3) and MSOP10 packages.

ORDERING INFORMATION

Package Type	Part Number	
MSOP-10 SPQ: 4,000pcs/Reel	MS10	A4705MS10R
		A4705MS10VR
TDFN10 (3x3) SPQ: 5,000pcs/Reel	TJ10	A4705TJ10R
		A4705TJ10VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

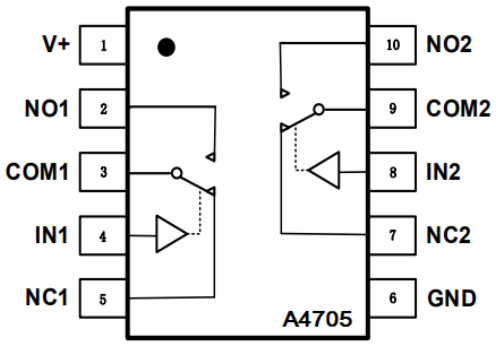
FEATURES

- Specified Break-Before-Make Switching
- Low ON-State Resistance, 0.6Ω(TYP)
- -3dB Bandwidth: 30MHz
- Supply Range: +1.8V to +5.5V
- High Speed, Typically 50ns
- Rail-to-Rail Operation
- TTL/CMOS Compatible
- Temp: -40°C to +125°C

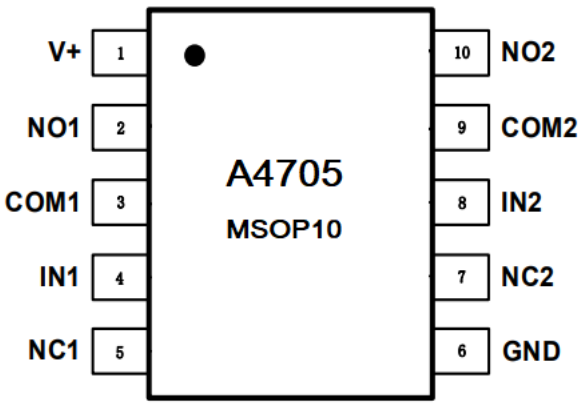
APPLICATION

- Cell Phones
- PDAs
- Portable Instrumentation
- Audio and Video Signal Routing
- Low-Voltage Data Acquisition Systems
- Communication Circuits
- Modems
- Hard Drives
- Computer Peripherals
- Wireless Terminals and Peripherals
- Wearable Devices
- Battery-Operated Equipment
- Signal Gating, Chopping, Modulation

SIMPLIFIED APPLICATION

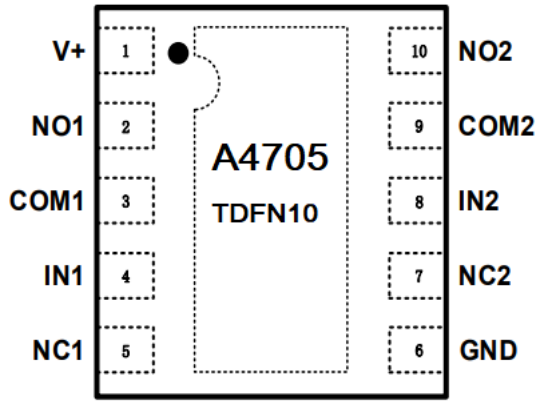


PIN DESCRIPTION



MSOP10, MS10

Top View



TDFN10 (3x3), TJ10

Top View

Pin#		Symbol	Function
MSOP-10	TDFN10(3x3)		
1	1	V+	Power Supply
2	2	NO1	Normally-Open Terminal
3	3	COM1	Common Terminal
4	4	IN1	Digital Control Pin
5	5	NC1	Normally-Closed Terminal
6	6	GND	Ground
7	7	NC2	Normally-Closed Terminal
8	8	IN2	Digital Control Pin
9	9	COM2	Common Terminal
10	10	NO2	Normally-Open Terminal

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range, unless otherwise noted

V+, Supply Voltage		-0.3V ~ 6.0V
V_{IN}, Input Voltage (All inputs)		-0.3V ~(V+)0.3V
I_{IN}, Continuous Current NO, NC, or COM		±500mA
I_{PEAKC} Peak Current NO, NC, or COM		±800mA
T_J, Junction Temperature		150℃
T_{STG}, Storage Temperature		-65℃ ~ 150℃
ESD Ratings		
$V_{(ESD)}$, Electrostatic Discharge	Human-body model (HBM)	±1000V
	Machine model (MM)	±300V

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.

FUNCTION TABLE

LOGIC	NO	NC
0	OFF	ON
1	ON	OFF

RECOMMENDED OPERATING CONDITIONS

Over operating free-air temperature range (unless otherwise noted) (3)

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	V_{CC}	1.8	5.5	V
Operating temperature	T_A	-40	+125	℃

ELECTRICAL CHARACTERISTICS

V+ = 5.0 V, T_A= 25°C (unless otherwise noted)

Parameter		Conditions	V+	TEMP	Min	Typ	Max	Unit
DIGITAL CONTROL INPUTS								
V_{NO}	Analog Signal Range			-40~+125℃	0	-	V+	V
V_{NC}	Analog Signal Range			-40~+125℃	0		V+	V
V_{COM}	Analog Signal Range			-40~+125℃	0		V+	V
R_{ON}	On Resistance	0 (V_{NO} or V_{NC}) V+ I_{COM} = 10mA, Switch ON See Figure1	5V	+25℃	-	0.6	1.0	Ω
				-40~+125℃			1.2	Ω
			3.3V	+25℃		1.0	1.5	Ω
				-40~+125℃			1.7	Ω
ΔR_{ON}	On Resistance Match Between Channels	0 (V_{NO} or V_{NC}) V+ I_{COM} = 10mA Switch ON, See Figure1	5V			0.04	0.1	Ω
				-40~+125℃			0.12	Ω
			3.3V	+25℃		0.04	0.1	Ω
				-40~+125℃			0.12	Ω
$R_{FLAT(ON)}$	On-Resistance Flatness	0 (V_{NO} or V_{NC}) V+ I_{COM} = 10mA Switch ON, See Figure1	5V	+25℃		0.18	0.3	Ω
				-40~+125℃			0.4	Ω
			3.3V	+25℃		0.54	0.7	Ω
				-40~+125℃			0.8	Ω
$I_{NC(OFF)}$, $I_{NO(OFF)}$	NC, NO OFF Leakage Current	V_{NO} or V_{NC} = 0.3V V+/2 V_{COM} = V+/2, 0.3V See Figure2	1.8V to 5.5V	-40~+125℃			1	μA
$I_{NC(ON)}$, $I_{NO(ON)}$, $I_{COM(ON)}$	NC, NO, COM ON Leakage Current	V_{NO} or V_{NC} = 0.3V Open V_{COM} = Open 0.3V See Figure2	1.8V to 5.5V	-40~+125℃			1	μA
DIGITAL CONTROL INPUTS								
V_{INH}			5V	-40~+125℃	1.5			V
			3.3	-40~+125℃	1.3			V
V_{INL}			5V	-40~+125℃			0.6	V
			1.8V to 5.5V	-40~+125℃			0.5	V
I_{IN}	Input Leakage Current	V_{IN} = V_{IO} or 0		-40~+125℃			1	μA

All unused digital inputs of the device must be held at VIO or GND to ensure proper device operation.

ELECTRICAL CHARACTERISTICS (Conti)

V+ = 5.0 V, T_A=25°C (unless otherwise noted)

Parameter		Conditions		V+	TEMP	Min	Typ	Max	Unit
t_{ON}	Turn On Time	V_{COM} = V+, R_L = 300Ω, C_L = 35pF See Figure5		5V	+25°C	-	50		ns
				3.3V			50		
t_{OFF}	Turn-Off Time	V_{COM} = V+, R_L = 300Ω, C_L = 35pF See Figure5		5V	+25°C		15		ns
				3.3V			17		
t_{BBM}	Break Before Make Time Delay	V_{NO1} = V_{NC1} = V_{NO2} = V_{NC2} = 3V R_L = 300Ω, C_L = 35pF, See Figure6		5V	+25°C		10		ns
				3.3			11		
O_{ISO}	Off Isolation	R_L = 50Ω, Switch OFF See Figure8	f = 100KHz		+25°C		-68		dB
			f = 10KHz		+25°C		-86		dB
BW	-3dB Bandwidth	Switch ON, R_L = 50Ω See Figure7			+25°C		30		MHZ
$C_{NC(OFF)}$, $C_{NO(OFF)}$	NC, NO OFF Capacitance	V_{NC} or V_{NO}=V+/2 or GND, Switch OFF See Figure4			+25°C		80		pF
$C_{NC(ON)}$,$C_{NO(ON)}$, $C_{COM(ON)}$	NC, NO, COM ON Capacitance	V_{NC} or V_{NO}=V+/2 or GND, Switch ON See Figure4			+25°C				pF
POWER REQUIREMENTS									
V+	Power Supply Range				–40°C to 125°C			5.52	V
I+	Power Supply Current	V_{IN} = GND or V+		5.5V	–40°C to 125°C			1	μA

All unused digital inputs of the device must be held at VIO or GND to ensure proper device operation.

TYPICAL PERFORMANCE CHARACTERISTICS

Fig1 BANDWIDTH V+=3V

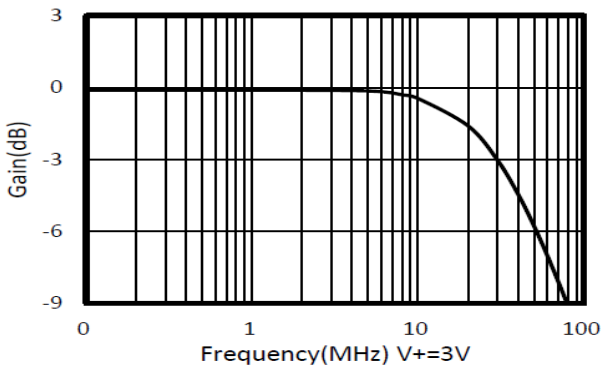


Fig2 BANDWIDTH V+=5V

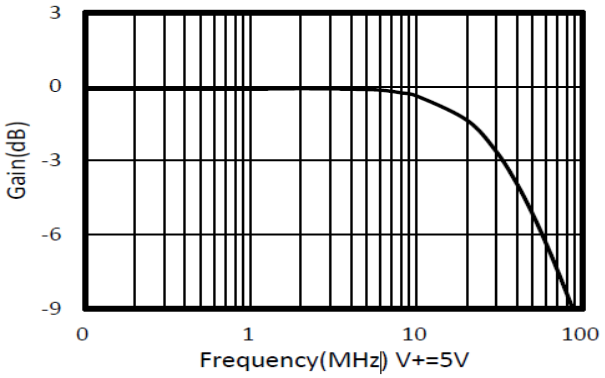
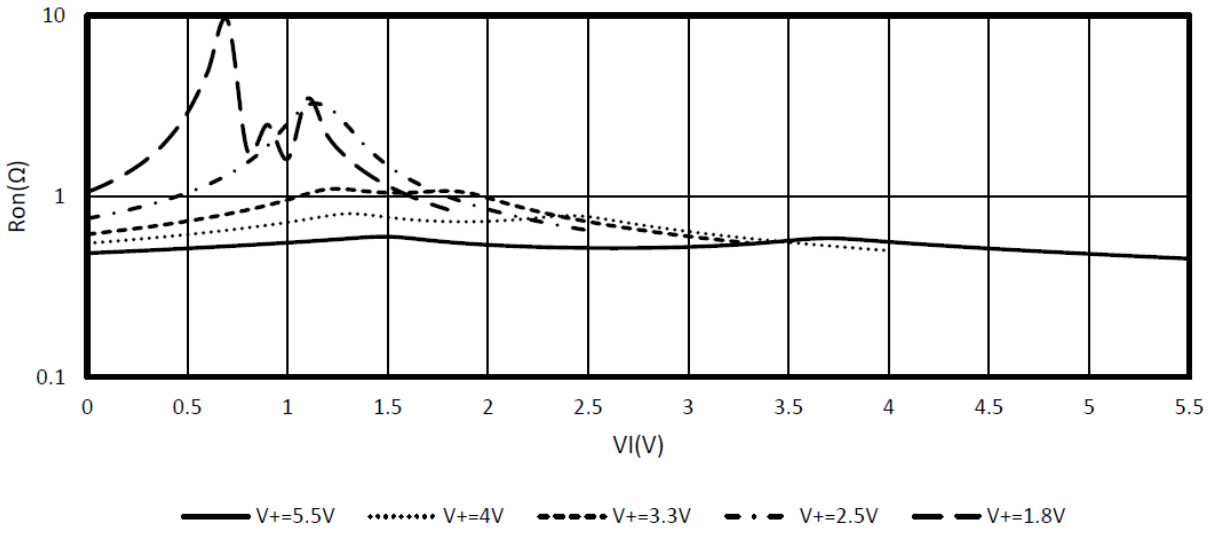


Fig3 Typical Ron as a Function of Input Voltage (VI) for VI = 0 to V+



PARAMETER MEASUREMENT INFORMATION

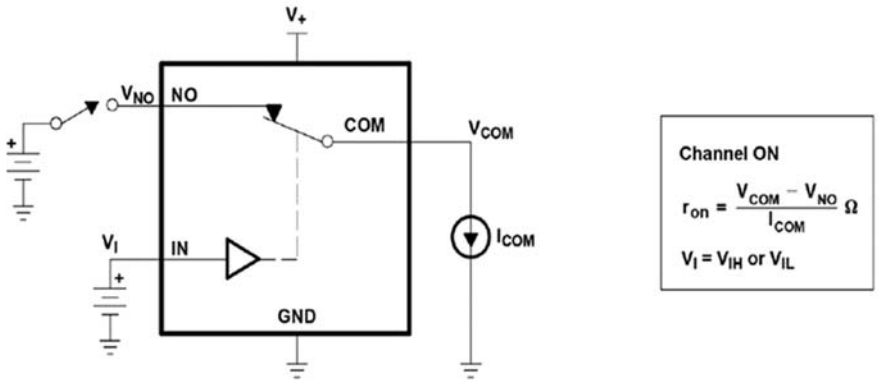


Figure1 ON-State Resistance (r_{on})

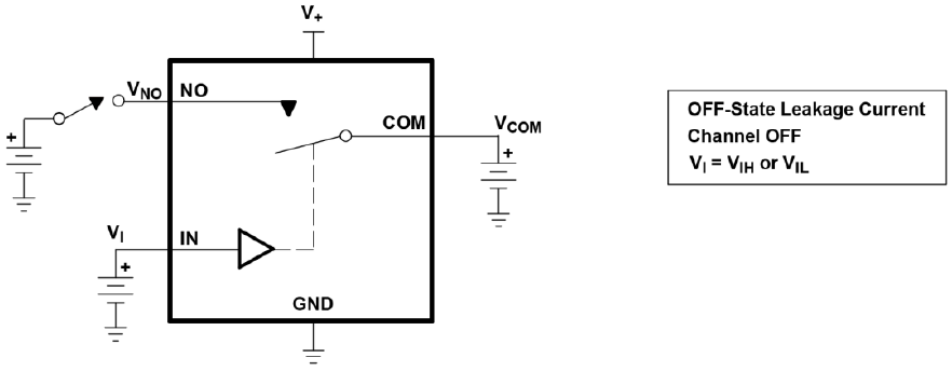


Figure2 OFF-State Leakage Current ($I_{COM(OFF)}$, $I_{NO(OFF)}$)

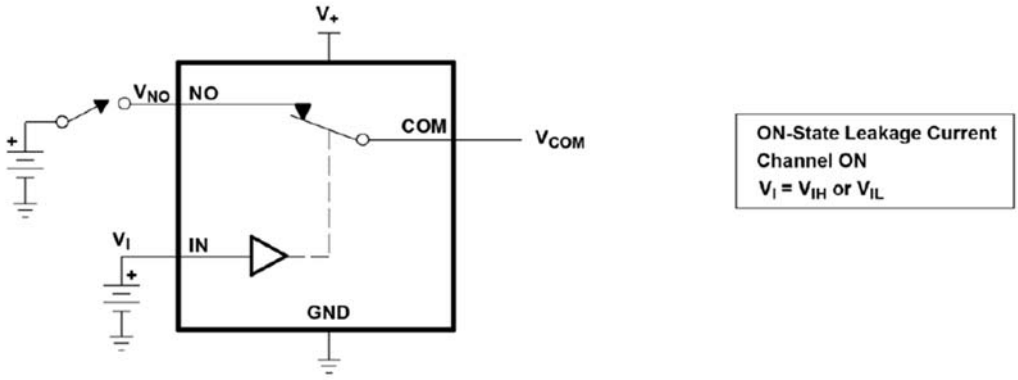


Figure3 ON-State Leakage Current ($I_{COM(ON)}$, $I_{NO(ON)}$)

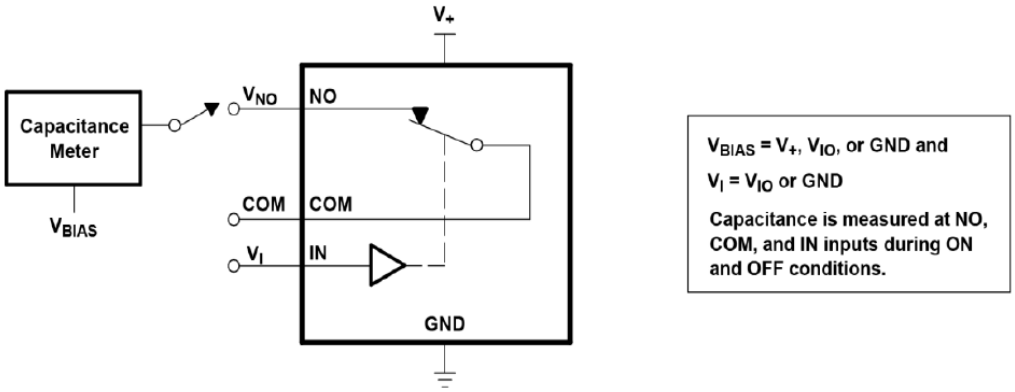
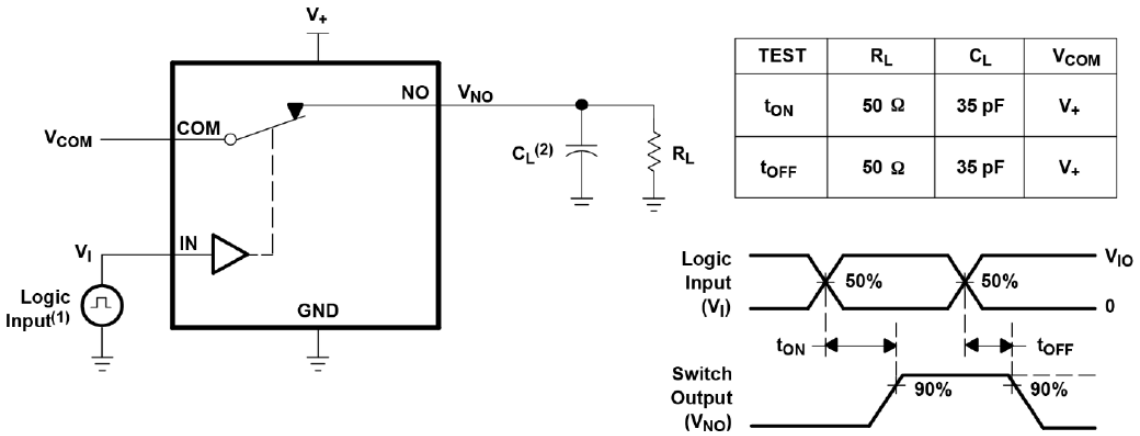


Figure4 Capacitance (C_I, $C_{COM(OFF)}$, $C_{COM(ON)}$, $C_{NO(OFF)}$, $C_{NO(ON)}$)



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

Figure5 Turn-On (t_{ON}) and Turn-Off Time (t_{OFF})

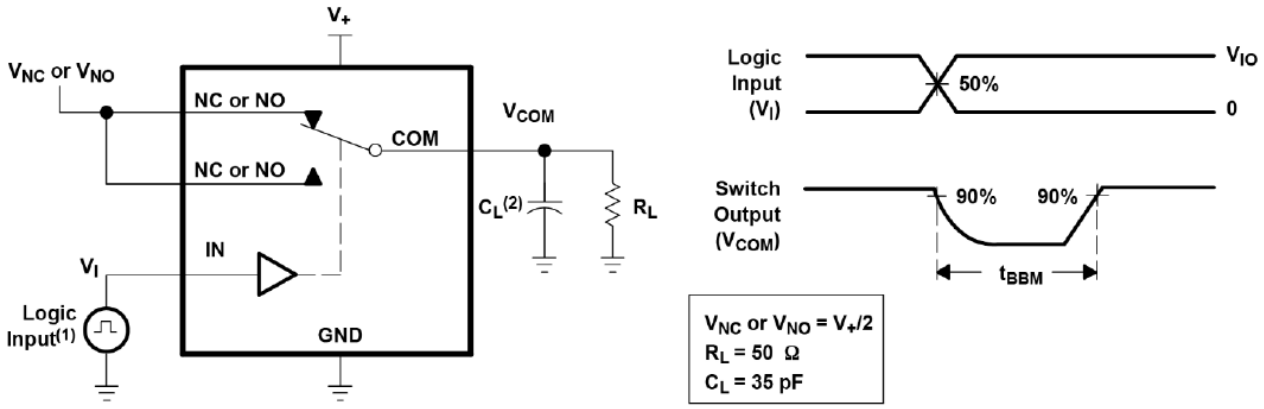


Figure6 Voltage Waveforms Enable and Disable

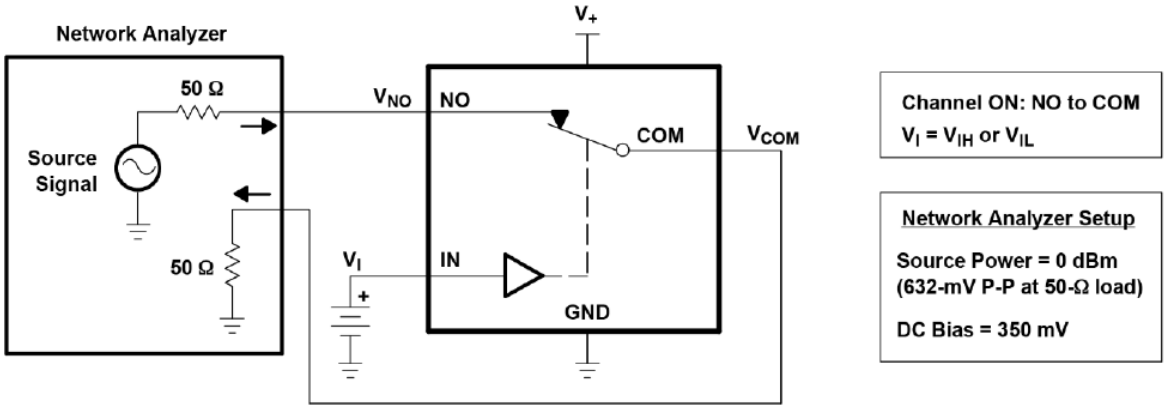


Figure7 Bandwidth (BW)

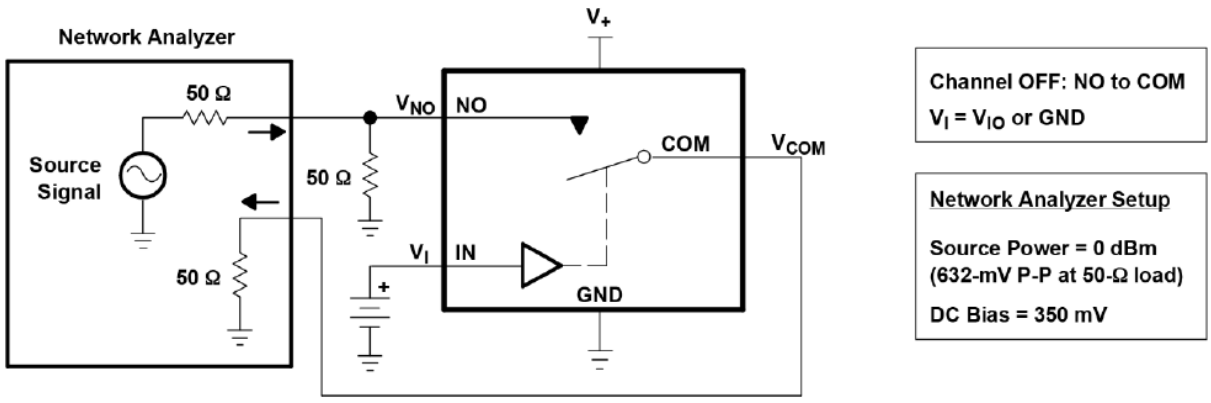


Figure8 OFF Isolation (OISO)

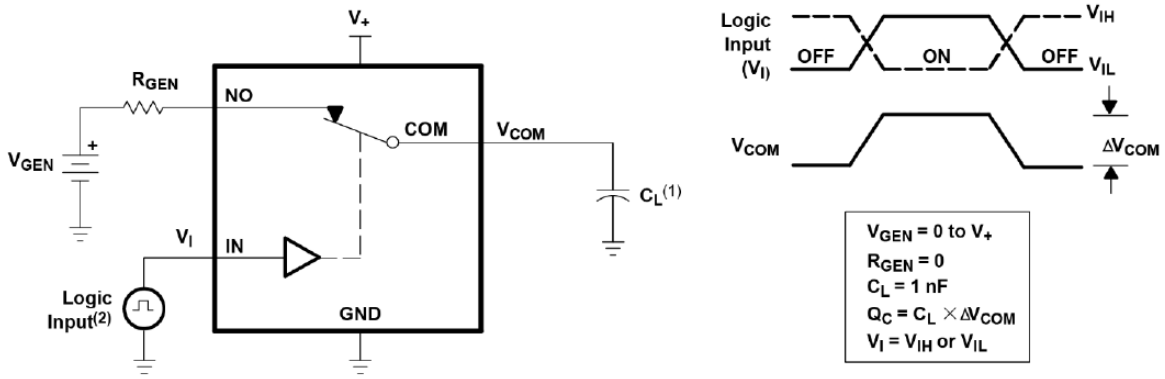


Figure9 Crosstalk (X_{TALK})

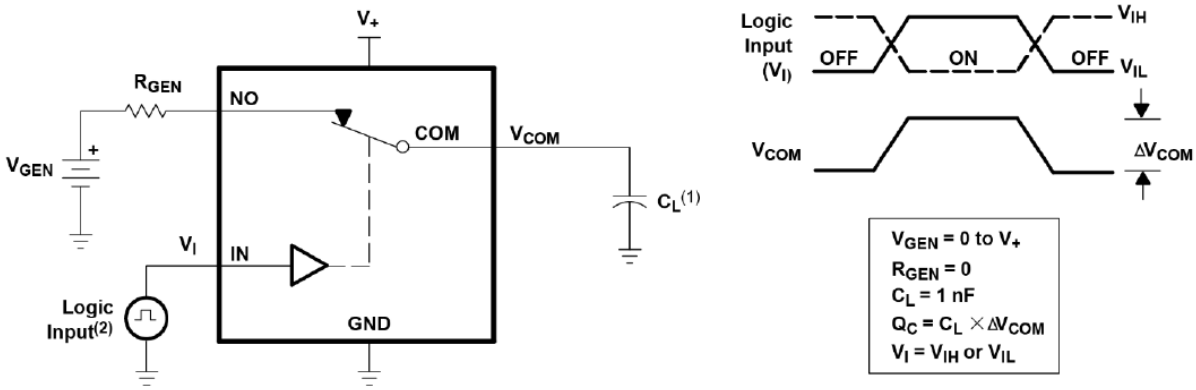


Figure10 Charge Injection (QC)

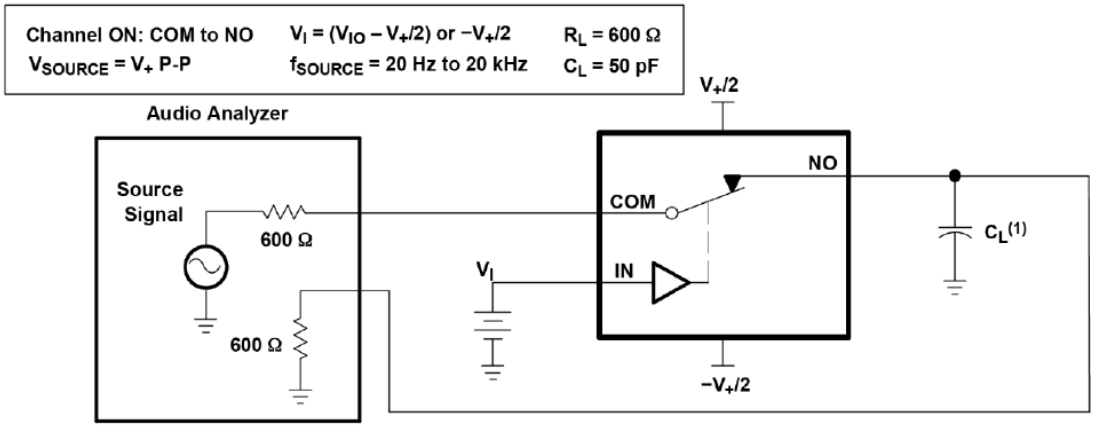
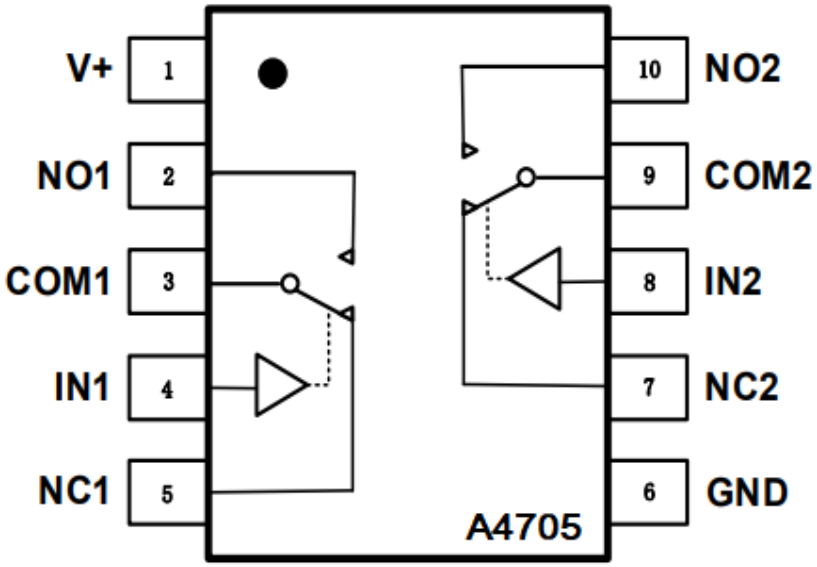


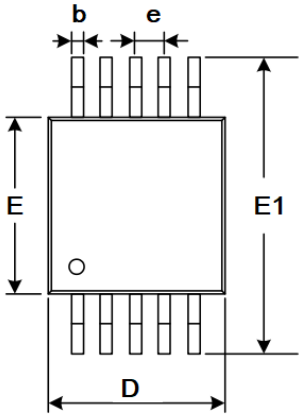
Figure11 Total Harmonic Distortion (THD)

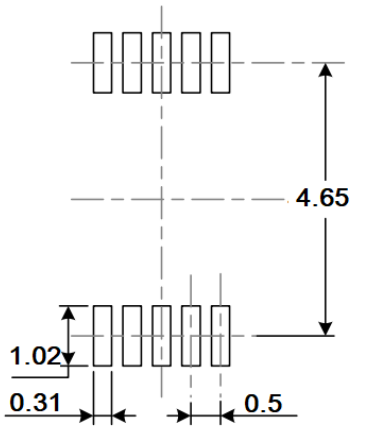
BLOCK DIAGRAM



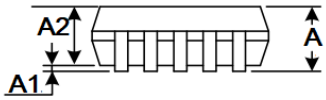
PACKAGE INFORMATION

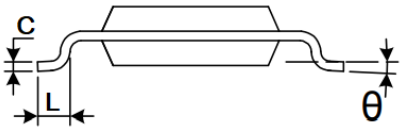
Dimension in MSOP-10 (Unit: mm)





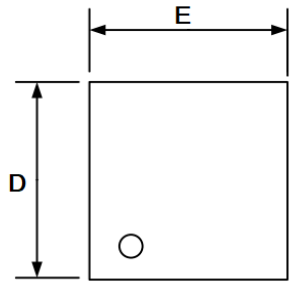
RECOMMENDED LAND PATTERN



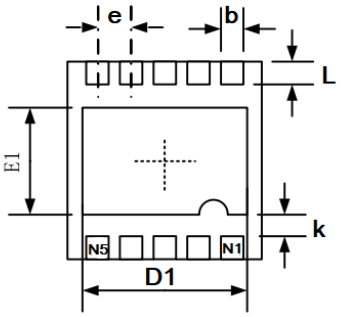


Symbol	Millimeters	
	Min	Max
A	0.820	1.100
A1	0.020	0.150
A2	0.750	0.950
b	0.180	0.280
c	0.090	0.230
D	2.900	3.100
e	0.50 BSC	
E	2.900	3.100
E1	4.750	5.050
L	0.400	0.800
θ	0°	6°

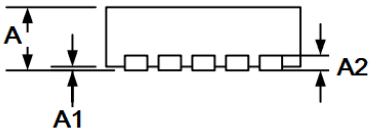
Dimension in TDFN10 (3X3) (Unit: mm)



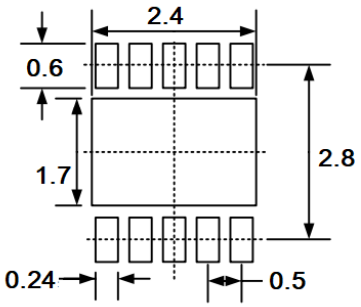
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN

Symbol	Millimeters	
	Min	Max
A	0.7000	0.800
A1	0.000	0.050
A2	0.203	
b	0.180	0.300
D	2.900	3.100
D1	2.300	2.600
E	2.900	3.100
E1	1.500	1.800
e	0.500TYP	
K	0.200MIN	
L	0.300	0.500

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