

General Description

The ELN3005 is a dual, low on-resistance, low voltage, bidirectional, single-pole/double-throw (SPDT) CMOS analog switches designed to operate from a single +1.8V to +5.5V supply. Targeted applications include battery powered equipment that benefit from low R_{ON} (0.5 Ω) and fast switching speeds ($t_{ON} = 16$ ns, $t_{OFF} = 15$ ns). The on resistance profile is very flat over the full analog signal range. This ensures excellent linearity and low distortion when switching audio signals.

The ELN3005 is a committed dual single-pole/double-throw (SPDT) that consist of two normally open (NO) and two normally close (NC) switches. This configuration can be used as a dual 2-to-1 multiplexer.

Features

- Low voltage operation : 1.8 V to 5.5 V
- Low on-resistance: 0.5 Ω (TYP)
- Low on-resistance flatness
- -3 dB bandwidth: 30 MHz
- Fast switching time : $t_{on}=16$ ns, $t_{OFF}=15$ ns
- Rail-to-rail operation
- Typical power consumption (<0.01 μ W)
- TTL/CMOS compatible
- Microsize package

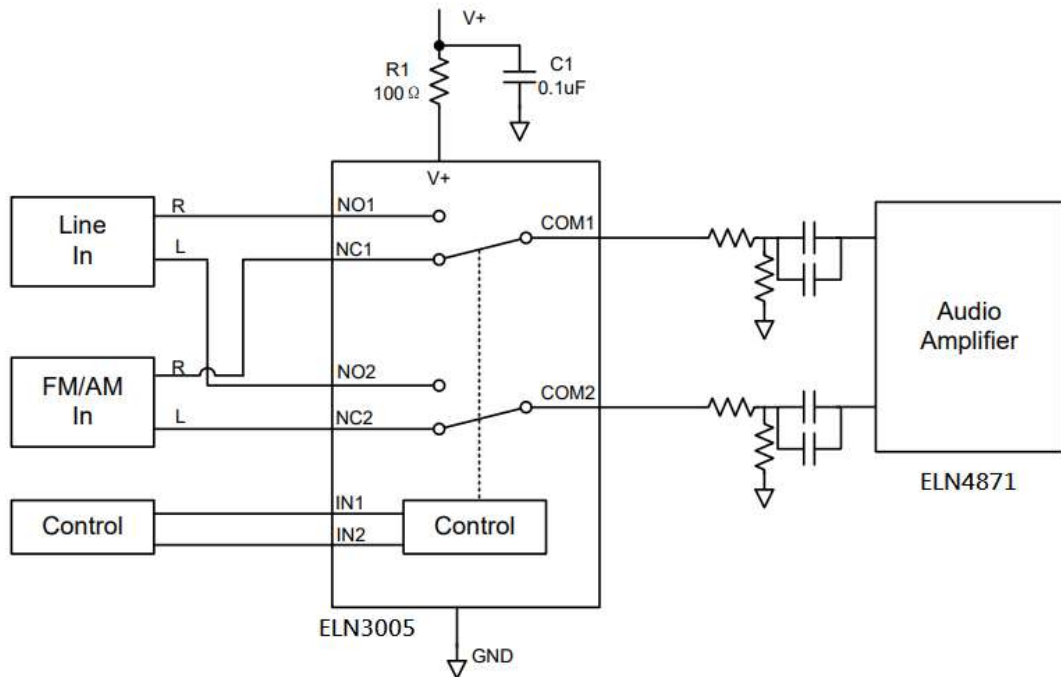
Applications

- Battery powered, handheld and portable equipments
- Cellular/mobile phones
- Laptops, notebooks, palmtops
- Communication systems
- Sample-and-hold Circuits
- Audio signal routing
- Audio and video switching
- Portable test and measurement
- Medical equipment

Package

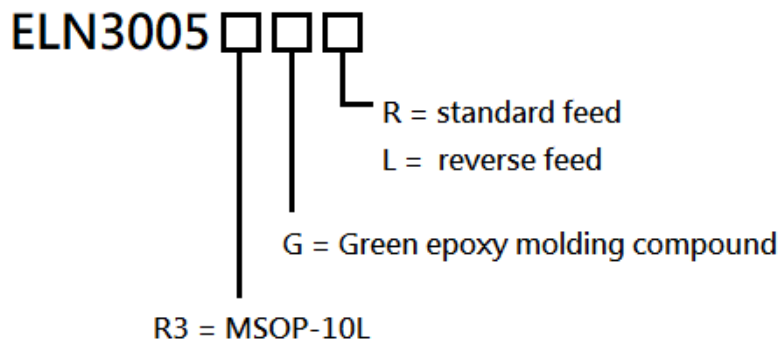
- MSOP-10L

Typical Application Circuit



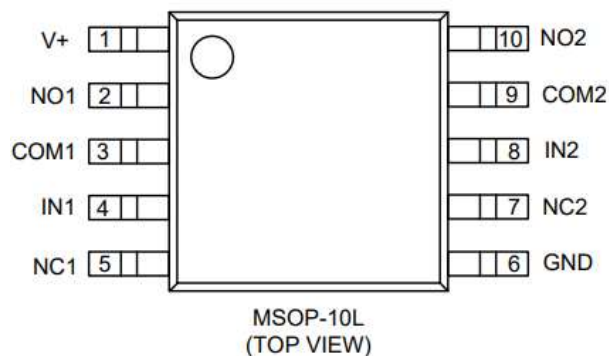
This application circuit is only for reference, not for practical application guidance, please fully consider the actual situation of noise, isolation, bandwidth and so on in the PCB circuit design layout, prohibit the use beyond the chip design scope.

Ordering Information



Designator	Symbol	Description
①	M	MSOP-10L
②	G	Green epoxy molding compound
③	R	Embossed tape : standard feed
	L	Embossed tape : reverse feed

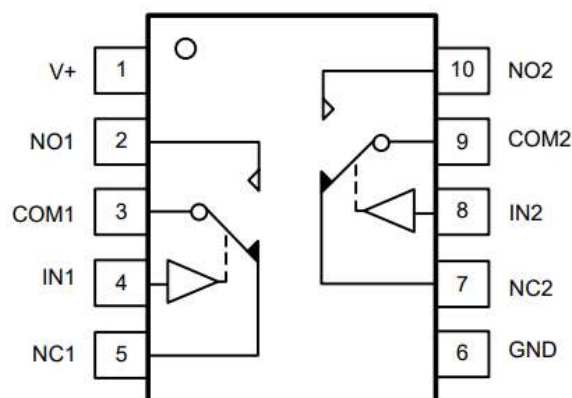
Pin Configuration



Pin Assignment

Pin Name	Pin Number	Function Description
V+	1	Power Supply
GND	6	Ground
IN1,IN2	4,8	Digital control pin to connect the COM terminal to the NO or NC terminals
COM1,COM2	3,9	Common terminal
NO1,NO2	2,10	Normal OPEN
NC1,NC2	5,7	Normal Connect

Block Diagram



LOGIC	NC1, NC2	NO1, NO2
0	ON	OFF
1	OFF	ON

Absolute Maximum Ratings

Parameter	Symbol	Maximum Rating	Unit
V+ to GND	V_{IN}	0.3~+6	V
Analog, digital voltage range	V_{OUT}	-0.3~ $V_{IN}+0.3$	
Continuous current NO, NC, COM	I_{CON}	±300	mA
Peak current NO, NC, or COM	I_{peak}	±500	
Operating temperature range	T_{opr}	-40~+85	°C
Storage temperature	T_{stg}	-40~+125	
Junction temperature	T_J	+150	
Lead temperature(soldering, 10s)	T_{PIN}	+300	
ESD	V_{ESD}	4000	V

Electrical Characteristics

(V+ = +5 V ± 10%, GND = 0 V, TA = - 40°C to +125°C, unless otherwise noted. Typical values are at TA = + 25°C.)

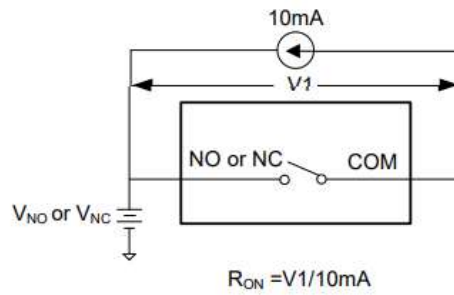
Parameter	Symbol	Conditions	+25°C	-40°C~+125°C	Max/Min	Unit
Analog Signal Range	V_{COM}	-	-	0	MIN	V
	V_{NC}, V_{NO}			V+	MAX	V
On-Resistance	R_{ON}	0≤ V_{NO} or V_{NC} ≤V+, I_{COM} =-10mA TEST Circuit 1	0.5	-	TYP	Ω
			0.9	1.1	MAX	Ω
On-Resistance Match Between Channels	ΔR_{ON}	0≤ V_{NO} or V_{NC} ≤V+, I_{COM} =-10mA TEST Circuit 1	0.05	-	TYP	Ω
			0.10	0.13	MAX	Ω
On-Resistance Flatness	$R_{FLAT (ON)}$	0≤ V_{NO} or V_{NC} ≤V+, I_{COM} =-10mA TEST Circuit 1	0.25	-	TYP	Ω
			0.3	0.4	MAX	Ω
Source OFF Leakage current	$I_{NC(OFF)}$	V_{NO} or V_{NC} =4.5V/1V, V+=5.5V, V_{COM} =1V/4.5V Test Circuit 2	±4	-	TYP	nA
	$I_{NO(OFF)}$		±10	±1000	MAX	nA
Channel ON Leakage current	$I_{NC(ON)}$	V_{NO} or V_{NC} = V_{COM} =1V/4.5V V+=5.5V, Test Circuit 3	±4	-	TYP	nA
	$I_{NO(ON)}$ $I_{COM(ON)}$		±10	±1000	MAX	nA
Input High Voltage	V_{INH}	-	-	2.4	MIN	V
Input Low Voltage	V_{INL}	-	-	0.8	MAX	V
Input Current	I_{INH} or I_{INL}	$V_{IN}=V_{INH}$ or V_{INL}	±0.01	-	TYP	μA
			±0.1	±1	MAX	μA
Turn-On Time	t_{ON}	V_{NO} or V_{NC} =3V, R_L =300Ω, C_L =35Pf, Test Circuit 4	16	-	TYP	ns
Turn-Off Time	t_{OFF}		15	-	TYP	ns
Bandwidth-3dB	BW	R_L =50Ω, C_L =5Pf, Test Circuit 5	30	-	TYP	MHz
Source OFF Capacitance	$C_{NC(OFF)}$	-	82	-	TYP	pF
	$C_{NO(OFF)}$					
Channel ON Capacitance	$C_{NC(ON)}, C_{NO(ON)}$	-	380	-	TYP	pF
	$C_{COM(ON)}$					
Power Supply Current	I_+	V+ = 5.5V, V_{IN} =0V or V+	0.001	-	TYP	μA
			0.1	1	MAX	μA



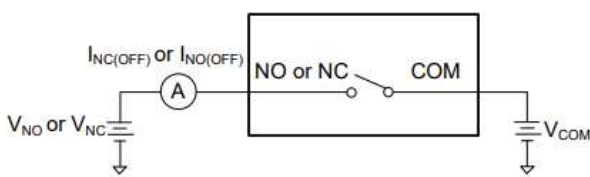
(V+ = +3 V ± 10%, GND = 0 V, TA = - 40°C to +125°C, unless otherwise noted. Typical values are at TA = + 25°C.)

Parameter	Symbol	Conditions	+25°C	-40°C~+125°C	Max/Min	Unit
Analog Signal Range	V_{COM} V_{NC}, V_{NO}	-	-	0	MIN	V
				V+	MAX	V
On-Resistance	R_{ON}	$0 \leq V_{NO}$ or $V_{NC} \leq V+$, $I_{COM} = -10mA$ TEST Circuit 1	0.6		TYP	Ω
			1.0	1.3	MAX	Ω
On-Resistance Match Between Channels	ΔR_{ON}	$0 \leq V_{NO}$ or $V_{NC} \leq V+$, $I_{COM} = -10mA$ TEST Circuit 1	0.05	-	TYP	Ω
			0.10	0.13	MAX	Ω
On-Resistance Flatness	$R_{FLAT (ON)}$	$0 \leq V_{NO}$ or $V_{NC} \leq V+$, $I_{COM} = -10mA$ TEST Circuit 1	0.25	-	TYP	Ω
			0.3	0.4	MAX	Ω
Source OFF Leakage current	$I_{NC(OFF)}$ $I_{NO(OFF)}$	V_{NO} or $V_{NC} = 3V/1V$, $V+ = 3.3V$, $V_{COM} = 1V/3V$ Test Circuit 2	±5		TYP	nA
			±11	±1000	MAX	nA
Channel ON Leakage current	$I_{NC(ON)}, I_{NO(ON)}$ $I_{COM(ON)}$	V_{NO} or $V_{NC} = V_{COM} = 1V/3V$ $V+ = 3.3V$, Test Circuit 3	±5		TYP	nA
			±11	±1000	MAX	nA
Input High Voltage	V_{INH}	-	-	2.4	MIN	V
Input Low Voltage	V_{INL}	-	-	0.5	MAX	V
Input Current	I_{INH} or I_{INL}	$V_{IN} = V_{INH}$ or V_{INL}	±0.01	-	TYP	μA
			±0.1	±1	MAX	μA
Turn-On Time	t_{ON}	V_{NO} or $V_{NC} = 2V$, $R_L = 300\Omega$, $C_L = 35pF$, Test Circuit 4	17	-	TYP	ns
Turn-Off Time	t_{OFF}	V_{NO} or $V_{NC} = 2V$, $R_L = 300\Omega$, $C_L = 35pF$, Test Circuit 4	16	-	TYP	ns
Bandwidth-3dB	BW	$R_L = 50\Omega$, $C_L = 5pF$, Test Circuit 5	30	-	TYP	MHz
Source OFF Capacitance	$C_{NC(OFF)}$ $C_{NO(OFF)}$	-	82	-	TYP	pF
Channel ON Capacitance	$C_{NC(ON)}$ $C_{NO(ON)}$ $C_{COM(ON)}$	-	380	-	TYP	pF
Power Supply Current	I_s	$V+ = 3.3V, V_{IN} = 0V$ or $V+$	0.001	-	TYP	μA
			0.1	1	MAX	μA

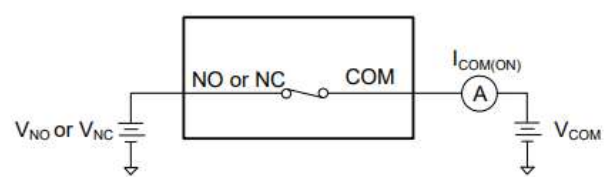
Test Circuits



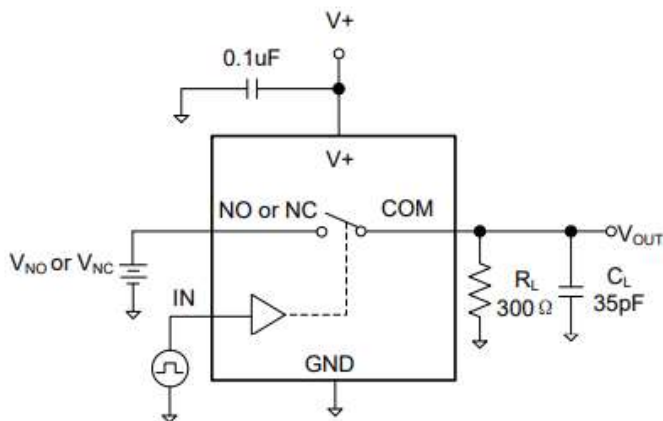
Test Circuit 1. On Resistance



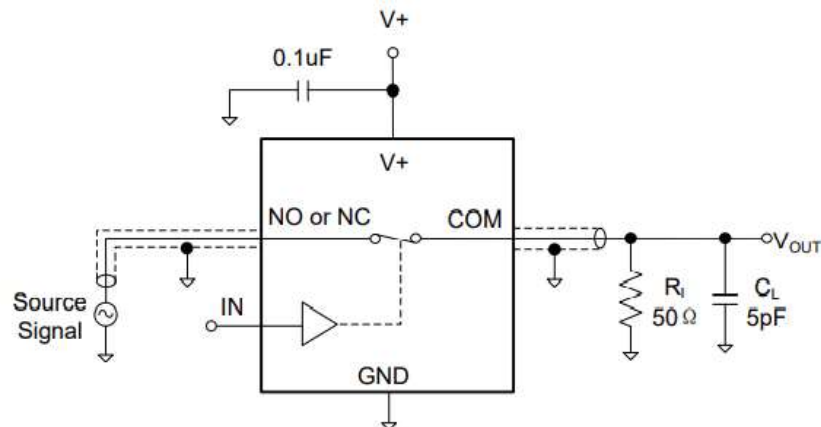
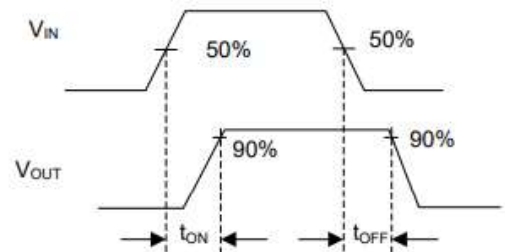
Test Circuit 2. Off Leakage



Test Circuit 3. On Leakage

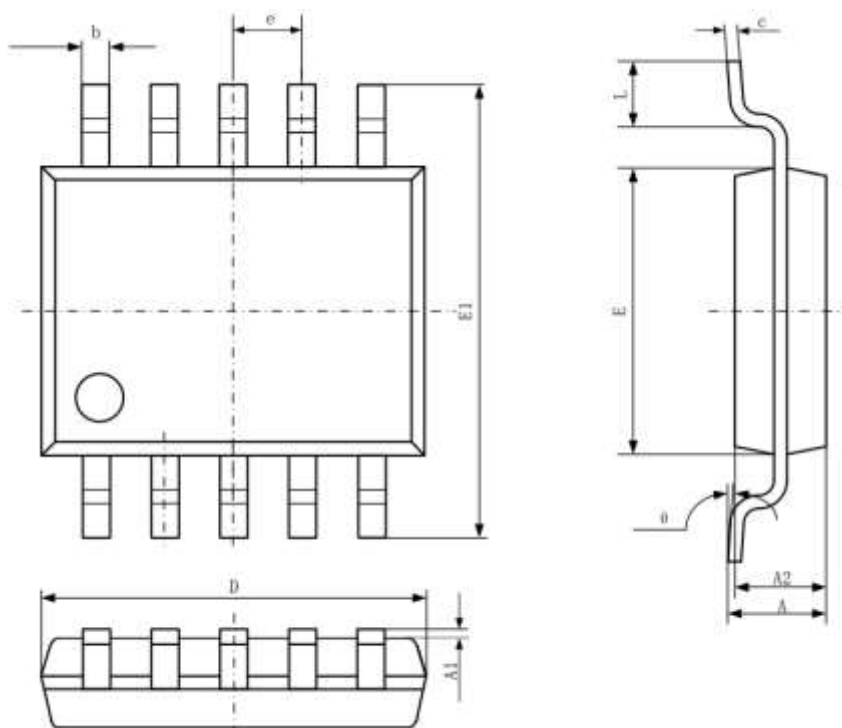


Test Circuit 4. Switching Times



Package Information

- MSOP-10L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.180	0.280	0.007	0.011
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
e	0.50(BSC)		0.020(BSC)	
E	2.900	3.100	0.144	0.122
E1	4.750	5.050	0.187	0.199
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°