



U74LVC2G3157

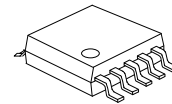
Preliminary

CMOS IC

10Ω SPDT Analog Switch

DESCRIPTION

The UTC U74LVC2G3157 is a dual, single-pole, double-throw(SPDT) analog switch or 2:1 multiplexer/de-multiplexer bus switch which can handle both digital and analog signals. This device operates from 1.65V to 5.5V.



MSOP-10

FEATURES

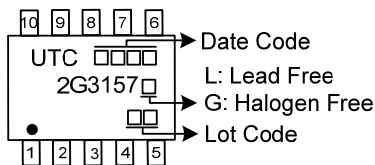
- *Useful in Both Analog and Digital Applications
- *Specified Break-Before-Make Switching
- *Low ON-State Resistance: 10Ω
- *Wide Single-Supply Operation: 1.65V to 5.5V

ORDERING INFORMATION

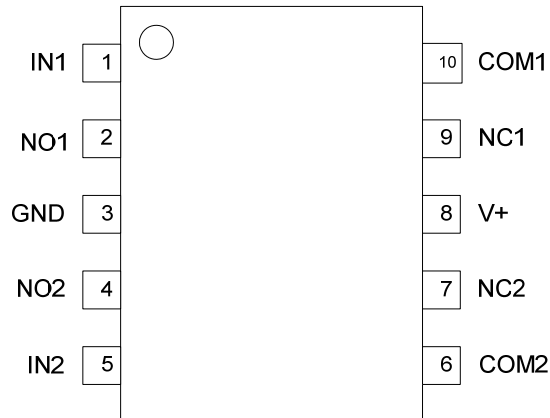
| Ordering Number | | Package | Packing |
|---------------------|---------------------|---------|-----------|
| Lead Free | Halogen Free | | |
| U74LVC2G3157L-SM2-R | U74LVC2G3157G-SM2-R | MSOP-10 | Tape Reel |

| | |
|---|--|
| <p>U74LVC2G3157G-SM2-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p> | <p>(1) R: Tape Reel (2) SM2: MSOP-10 (3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|---|--|

MARKING



■ PIN CONFIGURATION

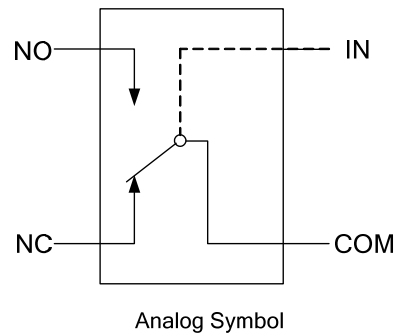
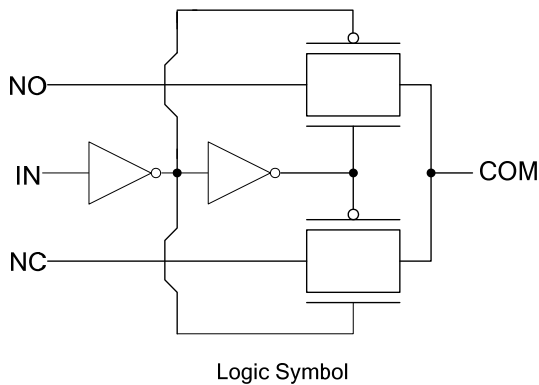


■ FUNCTION TABLE

| INPUTS(IN) | FUNCTION |
|------------|---------------------|
| H | NO Connected to COM |
| L | NC Connected to COM |

Note:H: HIGH voltage level; L: LOW voltage level.

■ LOGIC DIAGRAM (each channel)



■ **ABSOLUTE MAXIMUM RATING** ($T_A=25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|-------------------------|---------------------|------------------|
| Supply Voltage | V_+ | -0.5 ~ +6.5 | V |
| Analog Voltage(NC,NO,COM) | $V_{NC} V_{NO} V_{COM}$ | -0.5 ~ $V_+ + 0.5V$ | V |
| Analog Port Diode Current ($V_{NC} V_{NO} V_{COM} < 0$ or $V_{NC} V_{NO} V_{COM} > V_+$) | $I_{I/OK}$ | ± 50 | mA |
| On-State Switch Current ($V_{NC} V_{NO} V_{COM} = 0$ to V_+) | $I_{NC} I_{NO} I_{COM}$ | ± 50 | mA |
| Digital Input Voltage | V_{IN} | -0.5 ~ +6.5 | V |
| Digital Input Clamp Current ($V_{IN} < 0$) | I_{IK} | -50 | mA |
| V_+ or GND Current | I_+ | ± 100 | mA |
| Storage Temperature | T_{STG} | -65 ~ + 150 | $^\circ\text{C}$ |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ **OPERATING RATINGS**

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-------------------------------|-------------------------|-------------|------------------|
| Supply Voltage | V_+ | 1.65 ~ 5.5 | V |
| Analog Signal Voltage | $V_{NC} V_{NO} V_{COM}$ | 0 ~ V_+ | V |
| Ambient Operating Temperature | T_A | -40 ~ + 125 | $^\circ\text{C}$ |

■ **THERMAL DATA**

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---------------------|---------------|---------|--------------------|
| Junction to Ambient | θ_{JA} | 165 | $^\circ\text{C/W}$ |

■ **ELECTRICAL CHARACTERISTICS** (T_A=25°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|-------------------------------------|-----------------------------------|----------------------------|---|--------------------------|------|--------------------------|------|
| ANALOG SWITCH | | | | | | | |
| Switch On Resistance | R _{ON} | V ₊ =1.65V | V _{NO} or V _{NC} =0~V ₊ , I _{COM} =-4mA | | | 140 | Ω |
| | | V ₊ =2.3V | V _{NO} or V _{NC} =0~V ₊ , I _{COM} =-8mA | | | 45 | Ω |
| | | V ₊ =3V | V _{NO} or V _{NC} =0~V ₊ , I _{COM} =-24mA | | | 18 | Ω |
| | | V ₊ = 4.5V | V _{NO} or V _{NC} =0~V ₊ , I _{COM} =-30mA | | | 10 | Ω |
| On Resistance Match Between Channel | ΔR _{ON} | V ₊ =1.65V | V _{NO} or V _{NC} =1.15V, I _{COM} =-4mA | | 1 | | Ω |
| | | V ₊ =2.3V | V _{NO} or V _{NC} =1.6V, I _{COM} =-8mA | | 0.5 | | Ω |
| | | V ₊ =3V | V _{NO} or V _{NC} =2.1V, I _{COM} =-24mA | | 0.2 | | Ω |
| | | V ₊ = 4.5V | V _{NO} or V _{NC} =3.15V, I _{COM} =-30mA | | 0.15 | | Ω |
| On Resistance Flatness | R _{ON(flat)} | V ₊ =1.65V | V _{NO} or V _{NC} =0~V ₊ , I _{COM} =-4mA | | 110 | | Ω |
| | | V ₊ =2.3V | V _{NO} or V _{NC} =0~V ₊ , I _{COM} =-8mA | | 27 | | Ω |
| | | V ₊ =3V | V _{NO} or V _{NC} =0~V ₊ , I _{COM} =-24mA | | 9 | | Ω |
| | | V ₊ = 4.5V | V _{NO} or V _{NC} =0~V ₊ , I _{COM} =-30mA | | 4 | | Ω |
| NC,NO OFF Leakage Current | I _{NC} (OFF) | V ₊ =1.95V | V _{NO} or V _{NC} =0~V ₊ , V _{COM} =0~V ₊ | -1 | 0.05 | 1 | uA |
| | | V ₊ =2.7V | V _{NO} or V _{NC} =0~V ₊ , V _{COM} =0~V ₊ | -1 | 0.05 | 1 | uA |
| | I _{NO} (OFF) | V ₊ =3.6V | V _{NO} or V _{NC} =0~V ₊ , V _{COM} =0~V ₊ | -1 | 0.05 | 1 | uA |
| | | V ₊ = 5.5V | V _{NO} or V _{NC} =0~V ₊ , V _{COM} =0~V ₊ | -1 | 0.05 | 1 | uA |
| NC,NO ON Leakage Current | I _{NC} (ON) | V ₊ =1.95V | V _{NO} or V _{NC} =0~V ₊ , V _{COM} =OPEN | -1 | | 1 | uA |
| | | V ₊ =2.7V | V _{NO} or V _{NC} =0~V ₊ , V _{COM} =OPEN | -1 | | 1 | uA |
| | I _{NO} (ON) | V ₊ =3.6V | V _{NO} or V _{NC} =0~V ₊ , V _{COM} =OPEN | -1 | | 1 | uA |
| | | V ₊ = 5.5V | V _{NO} or V _{NC} =0~V ₊ , V _{COM} =OPEN | -1 | | 1 | uA |
| COM ON Leakage Current | I _{COM} (ON) | V ₊ =1.95V | V _{NO} or V _{NC} =OPEN, V _{COM} =0~V ₊ | -1 | | 1 | uA |
| | | V ₊ =2.7V | V _{NO} or V _{NC} =OPEN, V _{COM} =0~V ₊ | -1 | | 1 | uA |
| | | V ₊ =3.6V | V _{NO} or V _{NC} =OPEN, V _{COM} =0~V ₊ | -1 | | 1 | uA |
| | | V ₊ = 5.5V | V _{NO} or V _{NC} =OPEN, V _{COM} =0~V ₊ | -1 | | 1 | uA |
| DIGITAL INPUTS(IN1,IN2) | | | | | | | |
| Input Logic High | V _{IH} | V ₊ =1.65V~5.5V | | 0.7× V _{CC+} | | | V |
| Input Logic Low | V _{IL} | V ₊ =1.65V~5.5V | | | | 0.3× V _{CC+} | V |
| Input Leakage Current | I _{IH} , I _{IL} | V ₊ =1.65V~5.5V | V _{IN} =5.5V or 0 | -1 | 0.05 | 1 | uA |
| SUPPLY | | | | | | | |
| Quiescent Supply Current | I ₊ | V ₊ =1.65V~5.5V | V _{IN} = V ₊ or GND | | | 1 | μA |
| Additional Quiescent Supply Current | ΔI ₊ | V ₊ =1.65V~5.5V | V _{IN} = V ₊ - 0.6V | | | 500 | uA |

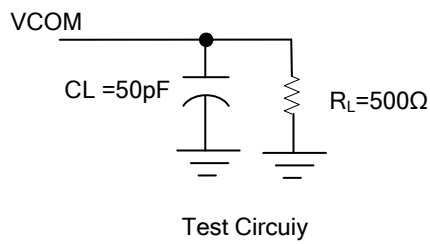
■ **SWITCHING CHARACTERISTICS** (T_A=25°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------------|-------------------|------------------------------|-----|-------|-----|------|
| Turn ON Time | t _{ON} | V ₊ =1.65 ~ 1.95V | 1 | | 28 | ns |
| | | V ₊ =2.3 ~ 2.7V | 1 | | 16 | ns |
| | | V ₊ =3.0 ~ 3.6V | 1 | | 12 | ns |
| | | V ₊ =4.5 ~ 5.5V | 0.5 | | 7.2 | ns |
| Turn OFF Time | t _{OFF} | V ₊ =1.65 ~ 1.95V | 1 | | 15 | ns |
| | | V ₊ =2.3 ~ 2.7V | 1 | | 9.5 | ns |
| | | V ₊ =3.0 ~ 3.6V | 1 | | 9.3 | ns |
| | | V ₊ =4.5 ~ 5.5V | 0.5 | | 6.8 | ns |
| Break-Before-Make Time | t _{BBM} | V ₊ =1.65 ~ 1.95V | 0.5 | | | ns |
| | | V ₊ =2.3 ~ 2.7V | 0.5 | | | ns |
| | | V ₊ =3.0 ~ 3.6V | 0.5 | | | ns |
| | | V ₊ =4.5 ~ 5.5V | 0.5 | | | ns |
| Charge Injection | Q _C | V ₊ =3.3V | | 3 | | pC |
| | | V ₊ =5V | | 7 | | pC |
| Bandwidth | BW | V ₊ =1.65 ~ 5.5V | | 200 | | MHz |
| OFF Isolation | O _{ISO} | V ₊ =1.8V | | -42 | | dB |
| | | V ₊ =2.3V | | -42 | | dB |
| | | V ₊ =3V | | -40 | | dB |
| | | V ₊ =4.5V | | -40 | | dB |
| Crosstalk | X _{TALK} | V ₊ =1.8V | | -54 | | dB |
| | | V ₊ =2.3V | | -54 | | dB |
| | | V ₊ =3V | | -54 | | dB |
| | | V ₊ =4.5V | | -54 | | dB |
| Total Harmonic Distortion | THD | V ₊ =1.8V | | 0.015 | | % |
| | | V ₊ =2.3V | | 0.025 | | % |
| | | V ₊ =3V | | 0.015 | | % |
| | | V ₊ =4.5V | | 0.01 | | % |

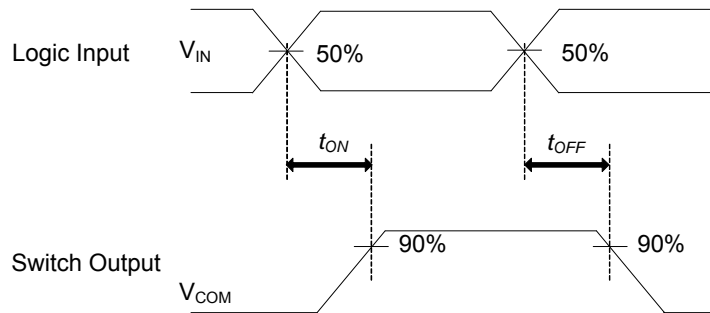
■ **CAPACITANCE CHARACTERISTICS** (T_A=25°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------------|-----------------------|---|-----|------|-----|------|
| NC,NO OFF Capacitance | C _{NC} (OFF) | V ₊ = 5V | | 5.5 | | pF |
| | C _{NO} (OFF) | V _{NO} or V _{NC} = V ₊ or GND | | | | |
| NC,NO ON Capacitance | C _{NC} (ON) | V ₊ = 5V | | 17.5 | | pF |
| | C _{NO} (ON) | V _{NO} or V _{NC} = V ₊ or GND | | | | |
| COM ON Capacitance | C _{COM} (ON) | V ₊ = 5V V _{COM} = V ₊ or GND | | 17.5 | | pF |
| Digital Input Capacitance | C _{IN} | V ₊ = 5V V _{IN} = V ₊ or GND | | 2.8 | | pF |

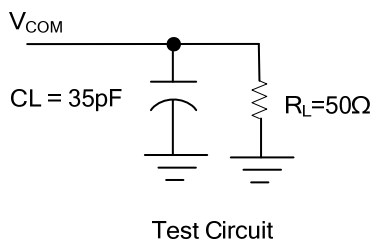
■ TEST CIRCUIT AND WAVEFORMS



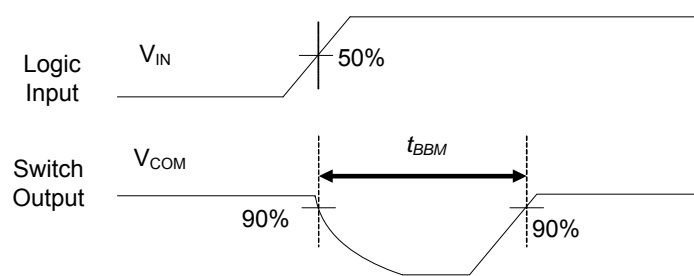
| TEST | V _{IN} | V _{NC} | V _{NO} |
|------------------|-----------------|-----------------|-----------------|
| t _{ON} | L->H | GND | V+ |
| | H->L | V+ | GND |
| t _{OFF} | H->L | GND | V+ |
| | L->H | V+ | GND |



Voltage Waveforms
T_{ON} & T_{OFF} Times



| TEST | V _{IN} | V _{NC} | V _{NO} |
|------------------|-----------------|-----------------|-----------------|
| t _{BBM} | L->H | V+/2 | V+/2 |



Voltage Waveforms
T_{BBM} Time

Note: CL includes probe and jig capacitance.
PRR ≤ 1MHz, Z_o = 50Ω, tr ≤ 5ns, tf ≤ 5ns.

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