

## Dual 4-Channel Analog Multiplexer/Demultiplexer

### Features

- Wide Power Supply Range: 2.5V to 5.5V
- On-Resistance:  $42\ \Omega$  (TYP) at 5.0V
- -3dB Bandwidth: 550MHz
- Break-Before-Make Switching
- Rail-to-Rail Signal Range
- High Off-Isolation: -83dB ( $f=1\text{MHz}$ )
- Low Crosstalk: -95dB ( $f=1\text{MHz}$ )
- Operation Temperature Range:  
-40°C to +125°C
- Available in SOP16 package

### Description

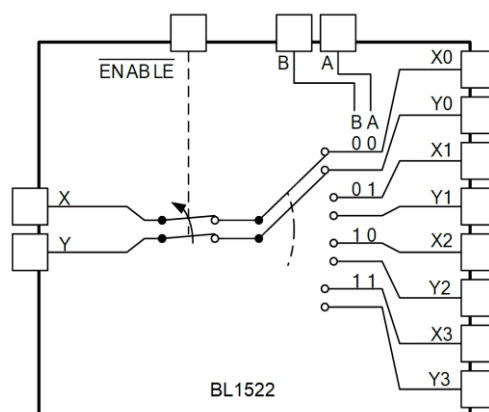
The BL1522 is a dual 4-Channel Analog Multiplexers and Demultiplexers designed for 2.5V to 5.5V  $V_{CC}$  operation. It has low on-resistance ( $42\ \Omega$  TYP) and very low off-leakage current (1nA TYP). The BL1522 devices handle both analog and digital signals.

The BL1522 is available in SOP16 package.

### Applications

- Sensors
- Audio and Video Signal Routing
- Communications Circuits
- Battery-Operated Equipment
- Factory Automation
- Medical instruments

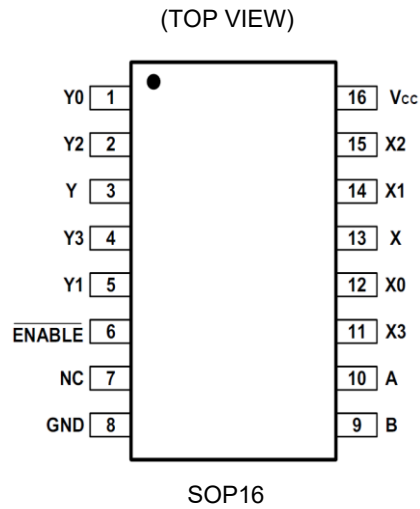
### Functional Diagrams of BL1522



### Ordering Information

| Order No. | Package | Packing             |
|-----------|---------|---------------------|
| BL1522SO  | SOP16   | Tape and Reel, 2500 |

## Pin Configurations



## Pin Description

| NAME                       | PIN<br>(SOP16) | FUNCTION                                         |
|----------------------------|----------------|--------------------------------------------------|
| X0 – X3                    | 12,14,15,11    | Analog Switch Inputs X0-X3                       |
| Y0 – Y3                    | 1,5,2,4        | Analog Switch Inputs Y0-Y3                       |
| X                          | 13             | Analog Switch “X” Output.                        |
| Y                          | 3              | Analog Switch “Y” Output.                        |
| V <sub>cc</sub>            | 16             | Positive Analog and Digital Supply Voltage Input |
| A                          | 10             | Digital Address “A” Input                        |
| B                          | 9              | Digital Address “B” Input                        |
| GND                        | 8              | Ground. Connect to digital ground                |
| NC                         | 7              | No Connect.                                      |
| $\overline{\text{ENABLE}}$ | 6              | Digital Enable Input. Normally connected to GND  |

## Function Table

| INPUTS                     |   |   | ON<br>CHANNEL |
|----------------------------|---|---|---------------|
| $\overline{\text{ENABLE}}$ | B | A |               |
| L                          | L | L | X0, Y0        |
| L                          | L | H | X1, Y1        |
| L                          | H | L | X2, Y2        |
| L                          | H | H | X3, Y3        |
| H                          | X | X | None          |

X=Don't care

## ABSOLUTE MAXIMUM RATINGS

| Parameter                                                                        | Min  | Max                   | Units |
|----------------------------------------------------------------------------------|------|-----------------------|-------|
| V <sub>CC</sub> to GND                                                           | -0.3 | 6                     | V     |
| Voltage into Any Terminal                                                        | -0.3 | V <sub>CC</sub> + 0.3 | V     |
| Continuous Current into Any Terminal                                             | -20  | +20                   | mA    |
| Peak Current, X <sub>-</sub> , Y <sub>-</sub><br>(Pulsed at 1ms, 10% duty cycle) | -40  | +40                   | mA    |
| Operating Temperature                                                            | -40  | +125                  | °C    |
| Storage Temperature Range                                                        | -65  | +150                  | °C    |

### Notes:

- (1) 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.

## DC ELECTRICAL CHARACTERISTICS

( V<sub>CC</sub>=5V, Full = -40°C to +125°C. Typical values are at V<sub>CC</sub>=+25°C, unless otherwise noted )

| PARAMETER                                           | SYMBOL                                                                 | CONDITIONS                                                                                                          | TA    | MIN | TYP | MAX             | UNITS |
|-----------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-------|-----|-----|-----------------|-------|
| <b>ANALOG SWITCH</b>                                |                                                                        |                                                                                                                     |       |     |     |                 |       |
| Analog Signal Range                                 | V <sub>X-</sub> , V <sub>Y-</sub> ,<br>V <sub>X</sub> , V <sub>Y</sub> |                                                                                                                     | Full  | GND |     | V <sub>CC</sub> | V     |
| On-Resistance                                       | R <sub>ON</sub>                                                        | V <sub>CC</sub> =5V, I <sub>X</sub> , I <sub>Y</sub> =1mA                                                           | +25°C |     | 42  | 58              | Ω     |
|                                                     |                                                                        |                                                                                                                     | Full  |     |     | 67              |       |
| On-Resistance Match Between Channels                | ΔR <sub>ON</sub>                                                       | V <sub>CC</sub> =5V, I <sub>X</sub> , I <sub>Y</sub> =1mA                                                           | +25°C |     | 1   | 5               | Ω     |
|                                                     |                                                                        |                                                                                                                     | Full  |     |     | 5.3             |       |
| On-Resistance Flatness                              | R <sub>FLAT(ON)</sub>                                                  | V <sub>CC</sub> =5V, I <sub>X</sub> , I <sub>Y</sub> =1mA                                                           | +25°C |     | 9   | 15              | Ω     |
|                                                     |                                                                        |                                                                                                                     | Full  |     |     | 20              |       |
| X <sub>-</sub> , Y <sub>-</sub> Off Leakage Current | I <sub>X(OFF)</sub> ,<br>I <sub>Y(OFF)</sub>                           | V <sub>CC</sub> = 5.0V, V <sub>X-</sub> , V <sub>Y-</sub> = 1V,<br>4.5V, V <sub>X</sub> , V <sub>Y</sub> = 4.5V, 1V | +25°C |     | 1   | 1000            | nA    |
| X, Y Off Leakage Current                            | I <sub>X(OFF)</sub> ,<br>I <sub>Y(OFF)</sub>                           | V <sub>CC</sub> = 5.0V, V <sub>X</sub> , V <sub>Y</sub> = 1V,<br>4.5V, V <sub>X-</sub> , V <sub>Y-</sub> = 4.5V, 1V | +25°C |     | 1   | 1000            | nA    |
| X, Y On Leakage Current                             | I <sub>X(ON)</sub> , I <sub>Y(ON)</sub>                                | V <sub>CC</sub> = 5.0V, V <sub>X</sub> , V <sub>Y</sub> = 4.5V,<br>1V                                               | +25°C |     | 1   | 1000            | nA    |
| <b>DIGITAL CONTROL INPUTS</b>                       |                                                                        |                                                                                                                     |       |     |     |                 |       |
| Logic Input Logic Threshold High                    | V <sub>AH</sub> , V <sub>BH</sub> ,<br>V <sub>ENABLE</sub>             |                                                                                                                     | +25°C | 1.7 |     |                 | V     |

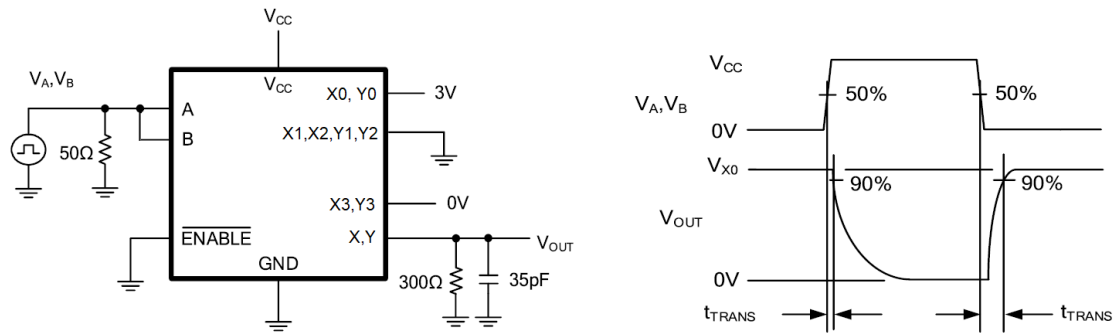
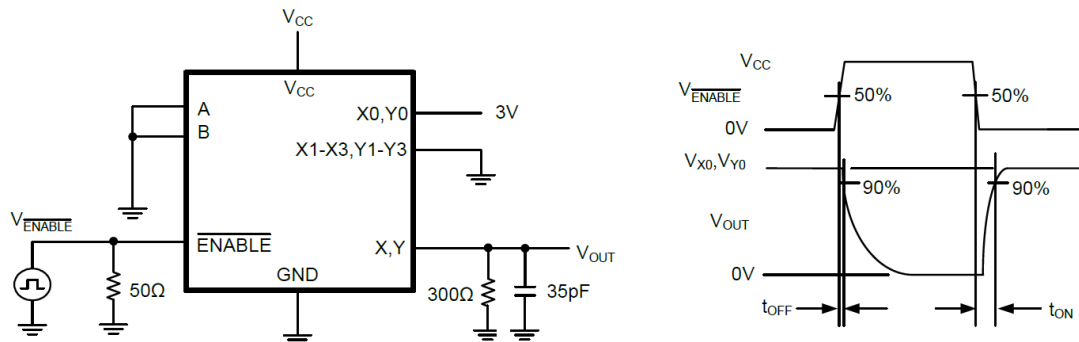
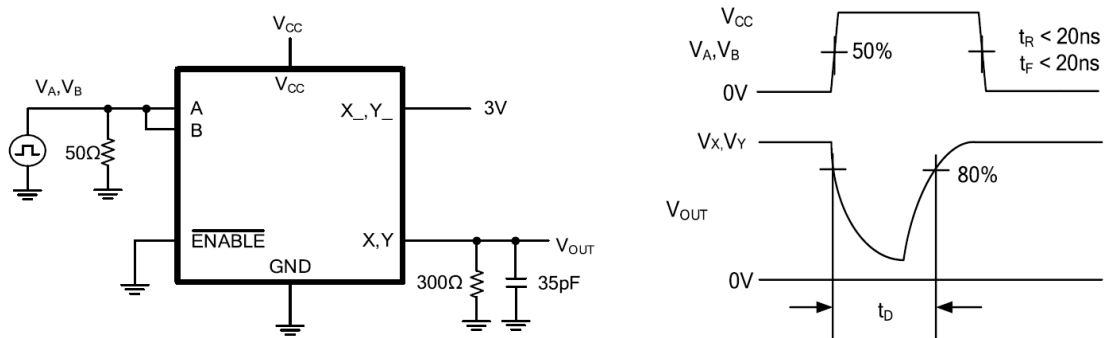
|                                   |                              |                                                                          |       |     |       |      |     |
|-----------------------------------|------------------------------|--------------------------------------------------------------------------|-------|-----|-------|------|-----|
| Logic Input Logic Threshold Low   | $V_{AL}, V_{BL}, V_{ENABLE}$ |                                                                          | +25°C |     |       | 0.5  | V   |
| Input-Current High                | $I_{AH}, I_{BH}, I_{ENABLE}$ | $V_A, V_B, V_{ENABLE} = V_{CC}$                                          | +25°C |     | 1     | 1000 | nA  |
| Input-Current Low                 | $I_{AL}, I_{BL}, I_{ENABLE}$ | $V_A, V_B, V_{ENABLE} = 0V$                                              | +25°C |     | 1     | 1000 | nA  |
| <b>DYNAMIC CHARACTERISTICS</b>    |                              |                                                                          |       |     |       |      |     |
| Address Transition Time           | $t_{TRANS}$                  | $V_{X\_}, V_{Y\_} = 3V/0V, R_L = 300\Omega, C_L = 35pF$ , Test Circuit 1 | +25°C |     | 100   |      | ns  |
| $\overline{ENABLE}$ Turn-On Time  | $t_{ON}$                     | $V_{X\_}, V_{Y\_} = 3V, R_L = 300\Omega, C_L = 35pF$ , Test Circuit 2    | +25°C |     | 65    |      | ns  |
| $\overline{ENABLE}$ Turn-Off Time | $t_{OFF}$                    | $V_{X\_}, V_{Y\_} = 3V, R_L = 300\Omega, C_L = 35pF$ , Test Circuit 2    | +25°C |     | 35    |      | ns  |
| Internal A, B Rise Time           | $t_R$                        |                                                                          | +25°C |     | 65    |      | ns  |
| Internal A, B Fall Time           | $t_F$                        |                                                                          | +25°C |     | 60    |      | ns  |
| Break-Before-Make Time Delay      | $t_D$                        | $V_{X\_}, V_{Y\_} = 3V, R_L = 300\Omega, C_L = 35pF$ , Test Circuit 3    | +25°C |     | 68    |      | ns  |
| Charge Injection                  | Q                            | $R_S = 0\Omega, C_L = 1nF$ , Test Circuit 4                              | +25°C |     | 6     |      | pC  |
| Off Isolation                     | $O_{ISO}$                    | $f = 1MHz$ , Test Circuit 5                                              | +25°C |     | -83   |      | dB  |
| Crosstalk                         | $X_{TALK}$                   | $f = 1MHz$ , Test Circuit 5                                              | +25°C |     | -95   |      | dB  |
| Input Off-Capacitance             | $C_{X(OFF)}, C_{Y(OFF)}$     | $f = 1MHz$ , Test Circuit 6                                              | +25°C |     | 6     |      | pF  |
| Output Off-Capacitance            | $C_{X(OFF)}, C_{Y(OFF)}$     | $f = 1MHz$ , Test Circuit 6                                              | +25°C |     | 10    |      | pF  |
| Output On-Capacitance             | $C_{X(ON)}, C_{Y(ON)}$       | $f = 1MHz$ , Test Circuit 6                                              | +25°C |     | 13    |      | pF  |
| -3dB Bandwidth                    | BW                           | $R_L = 50\Omega$                                                         | +25°C |     | 550   |      | MHz |
| Total Harmonic Distortion         | THD                          | $R_L = 600\Omega, 5V_{P-P}, f = 20Hz$ to 20kHz                           | +25°C |     | 0.6   |      | %   |
| <b>POWER REQUIREMENTS</b>         |                              |                                                                          |       |     |       |      |     |
| Power Supply Range                | $V_{CC}$                     |                                                                          | full  | 2.5 |       | 5.5  | V   |
| Power Supply Current              | $I_{CC}$                     | $V_{CC} = 5.5V, V_A, V_B, V_{ENABLE} = V_{CC}$ or 0V                     | +25°C |     | 0.001 | 1    | uA  |

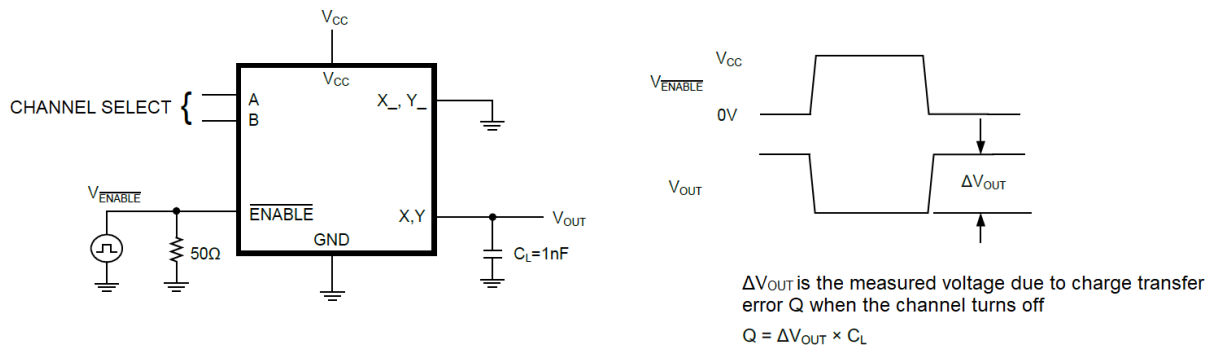
## DC ELECTRICAL CHARACTERISTICS

( $V_{CC}=3.3V$ , Full=-40°C to +125°C. Typical values are at  $V_{CC}=+25^\circ C$ , unless otherwise noted)

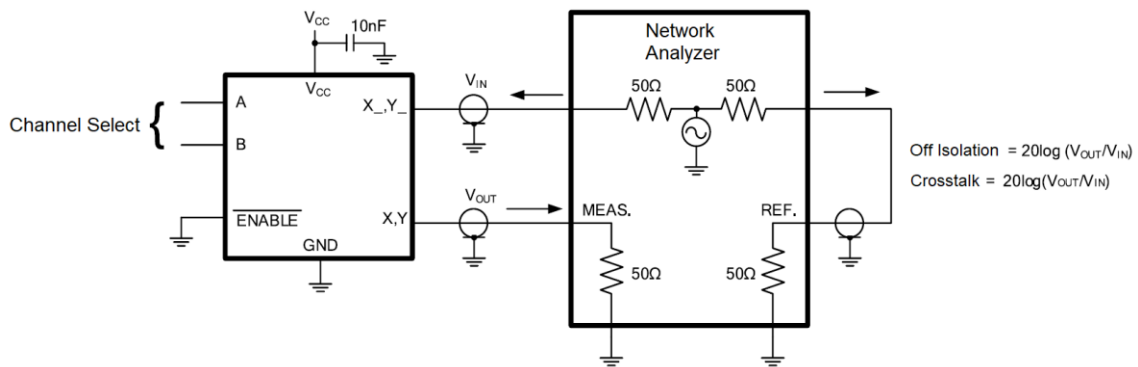
| PARAMETER            | SYMBOL                       | CONDITIONS | TA   | MIN | TYP | MAX | UNITS |
|----------------------|------------------------------|------------|------|-----|-----|-----|-------|
| <b>ANALOG SWITCH</b> |                              |            |      |     |     |     |       |
| Analog Signal Range  | $V_{X\_}, V_{Y\_}, V_X, V_Y$ |            | Full | GND |     | VCC | V     |

|                                                     |                                                         |                                                                                                         |       |     |       |      |     |
|-----------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------|-----|-------|------|-----|
| On-Resistance                                       | R <sub>ON</sub>                                         | I <sub>x</sub> , I <sub>y</sub> = 1mA                                                                   | +25°C |     | 70    | 110  | Ω   |
|                                                     |                                                         |                                                                                                         | Full  |     |       | 116  |     |
| X <sub>-</sub> , Y <sub>-</sub> Off Leakage Current | I <sub>X(OFF)</sub> , I <sub>Y(OFF)</sub>               | V <sub>X-</sub> , V <sub>Y-</sub> = 1V, 3V, V <sub>X</sub> , V <sub>Y</sub> = 3V, 1V                    | +25°C |     | 1     | 1000 | nA  |
| X, Y Off Leakage Current                            | I <sub>X(OFF)</sub> , I <sub>Y(OFF)</sub>               | V <sub>X-</sub> , V <sub>Y-</sub> = 1V, 3V, V <sub>X</sub> , V <sub>Y</sub> = 3V, 1V                    | +25°C |     | 1     | 1000 | nA  |
| X, Y On Leakage Current                             | I <sub>X(ON)</sub> , I <sub>Y(ON)</sub>                 | V <sub>X</sub> , V <sub>Y</sub> = 3V, 1V                                                                | +25°C |     | 1     | 1000 | nA  |
| <b>DIGITAL CONTROL INPUTS</b>                       |                                                         |                                                                                                         |       |     |       |      |     |
| Logic Input Logic Threshold High                    | V <sub>AH</sub> , V <sub>BH</sub> , V <sub>ENABLE</sub> |                                                                                                         | 25°C  | 1.7 |       |      | V   |
| Logic Input Logic Threshold Low                     | V <sub>AL</sub> , V <sub>BL</sub> , V <sub>ENABLE</sub> |                                                                                                         | 25°C  |     |       | 0.5  | V   |
| Input-Current High                                  | I <sub>AH</sub> , I <sub>BH</sub> , I <sub>ENABLE</sub> | V <sub>A</sub> , V <sub>B</sub> , V <sub>ENABLE</sub> = V <sub>CC</sub>                                 | 25°C  |     | 1     | 1000 | nA  |
| Input-Current Low                                   | I <sub>AL</sub> , I <sub>BL</sub> , I <sub>ENABLE</sub> | V <sub>A</sub> , V <sub>B</sub> , V <sub>ENABLE</sub> = 0V                                              | 25°C  |     | 1     | 1000 | nA  |
| <b>DYNAMIC CHARACTERISTICS</b>                      |                                                         |                                                                                                         |       |     |       |      |     |
| Address Transition Time                             | t <sub>TRANS</sub>                                      | V <sub>X-</sub> , V <sub>Y-</sub> = 3V/0V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, Test Circuit 1 | +25°C |     | 135   |      | ns  |
| ENABLE Turn-On Time                                 | t <sub>ON</sub>                                         | V <sub>X-</sub> , V <sub>Y-</sub> = 3V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, Test Circuit 2    | +25°C |     | 90    |      | ns  |
| ENABLE Turn-Off Time                                | t <sub>OFF</sub>                                        | V <sub>X-</sub> , V <sub>Y-</sub> = 3V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, Test Circuit 2    | +25°C |     | 50    |      | ns  |
| Internal A, B Rise Time                             | t <sub>R</sub>                                          |                                                                                                         | +25°C |     | 85    |      | ns  |
| Internal A, B Fall Time                             | t <sub>F</sub>                                          |                                                                                                         | +25°C |     | 65    |      | ns  |
| Break-Before-Make Time Delay                        | t <sub>D</sub>                                          | V <sub>X-</sub> , V <sub>Y-</sub> = 3V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, Test Circuit 3    | +25°C |     | 90    |      | ns  |
| Charge Injection                                    | Q                                                       | R <sub>S</sub> = 0Ω, C <sub>L</sub> = 1nF, Test Circuit 4                                               | +25°C |     | 5     |      | pC  |
| -3dB Bandwidth                                      | BW                                                      | R <sub>L</sub> = 50Ω                                                                                    | +25°C |     | 500   |      | MHz |
| <b>POWER REQUIREMENTS</b>                           |                                                         |                                                                                                         |       |     |       |      |     |
| Power Supply Current                                | I <sub>CC</sub>                                         | V <sub>CC</sub> = 3.6V, V <sub>A</sub> , V <sub>B</sub> , V <sub>ENABLE</sub> = V <sub>CC</sub> or 0V   | +25°C |     | 0.001 | 1    | uA  |

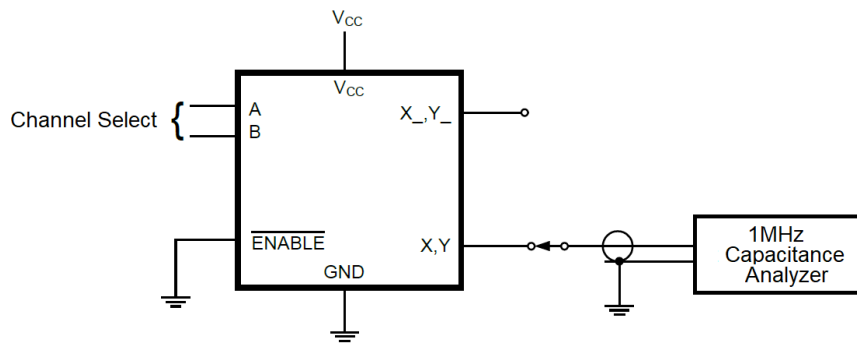
**TEST SETUP CIRCUITS**

 Test Circuit 1. Address Transition Times ( $t_{TRANS}$ )

 Test Circuit 2. Switching Times ( $t_{ON}$ ,  $t_{OFF}$ )

 Test Circuit 3. Break-Before-Make Time Delay ( $t_D$ )



Test Circuit 4. Charge Injection (Q)



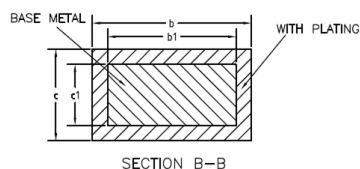
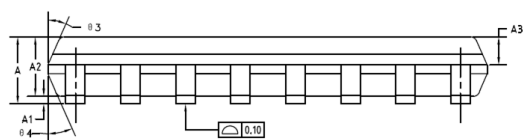
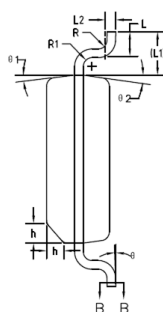
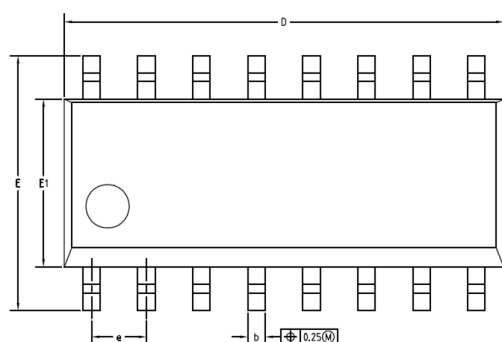
Test Circuit 5. Off Isolation and Crosstalk



Test Circuit 6. Capacitance

**PACKAGE OUTLINE DIMENSIONS**

**SOP16**



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

| SYMBOL | MIN     | NOM   | MAX   |
|--------|---------|-------|-------|
| A      | —       | —     | 1.75  |
| A1     | 0.10    | 0.15  | 0.25  |
| A2     | 1.25    | 1.45  | 1.65  |
| A3     | 0.55    | 0.65  | 0.75  |
| b      | 0.35    | —     | 0.51  |
| b1     | 0.34    | 0.40  | 0.45  |
| c      | 0.17    | —     | 0.25  |
| c1     | 0.17    | 0.20  | 0.23  |
| D      | 9.80    | 10.00 | 10.20 |
| E      | 5.80    | 6.00  | 6.20  |
| E1     | 3.80    | 3.90  | 4.00  |
| e      | 1.27BSC |       |       |
| L      | 0.40    | 0.60  | 0.80  |
| L1     | 1.04REF |       |       |
| L2     | 0.25BSC |       |       |
| R      | 0.07    | —     | —     |
| R1     | 0.07    | —     | —     |
| h      | 0.30    | 0.40  | 0.50  |
| θ      | 0°      | —     | 8°    |
| θ 1    | 6°      | 8°    | 10°   |
| θ 2    | 6°      | 8°    | 10°   |
| θ 3    | 5°      | 7°    | 9°    |
| θ 4    | 5°      | 7°    | 9°    |