

**UMX2211**

Preliminary

CMOS IC

**USB 2.0 HIGH-SPEED  
(480Mbps) DUAL 2:1  
MUX/DEMUX ANALOG SWITCH****■ DESCRIPTION**

The **UMX2211** is a differential channel 2:1 multiplexer/demultiplexer switch designed for the application of high speed USB 2.0. The wide bandwidth of this switch allows signals to pass with minimum distortion. The device multiplexes differential outputs from a USB host device to one of two corresponding outputs. It is bidirectional and designed for low bit-to-bit skew, high channel-to-channel noise isolation.

The **UMX2211** offers a high-performance, low-cost solution for the switching of high-speed USB2.0 signals.

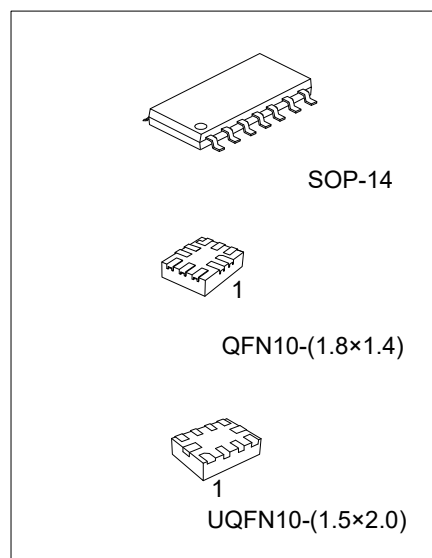
**■ FEATURES**

- \* USB 2.0 compliant (high speed and full speed)
- \*  $V_{DD}$  Supply : 2.8V ~ 5V
- \* Channel On Capacitance : 6.5pF
- \* Low On-Resistance : 4.5Ω at  $V_{DD}=3V$

**■ ORDERING INFORMATION**

| Ordering Number     |                     | Package          | Packing   |
|---------------------|---------------------|------------------|-----------|
| Lead Free           | Halogen Free        |                  |           |
| UMX2211L-S14-R      | UMX2211G-S14-R      | SOP-14           | Tape Reel |
| UMX2211L-Q10-1814-R | UMX2211G-Q10-1814-R | QFN-10(1.8×1.4)  | Tape Reel |
| UMX2211L-QAN-R      | UMX2211G-QAN-R      | UQFN-10(1.5×2.0) | Tape Reel |

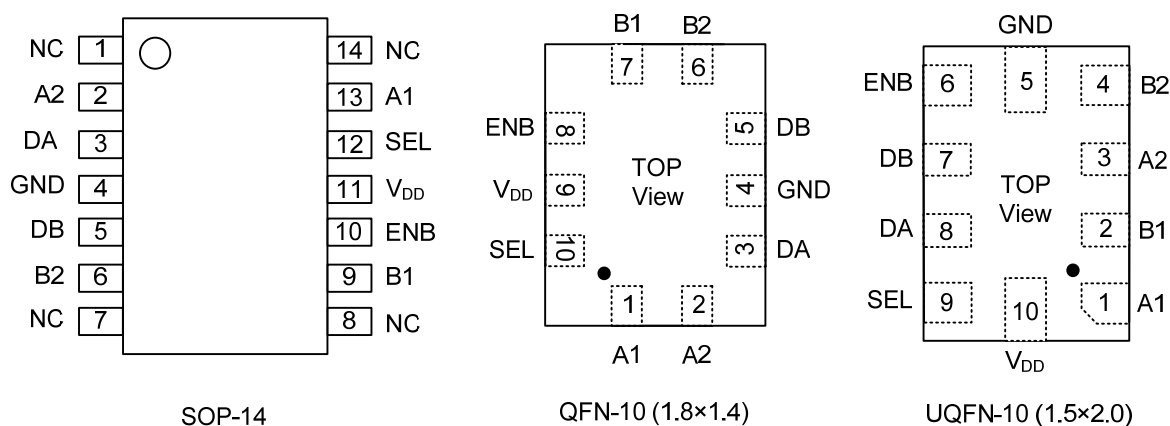
|                |                   |                                                                     |
|----------------|-------------------|---------------------------------------------------------------------|
| UMX2211G-S14-R | (1) Packing Type  | (1) R: Tape Reel                                                    |
|                | (2) Package Type  | (2) S14: SOP-14, Q10-1814: QFN-10(1.8×1.4)<br>QAN: UQFN-10(1.5×2.0) |
|                | (3) Green Package | (3) G: Halogen Free and Lead Free, L: Lead Free                     |



### MARKING

| PACKAGE          | MARKING |
|------------------|---------|
| SOP-14           |         |
| QFN-10 (1.8×1.4) |         |
| UQFN-10(1.5×2.0) |         |

### PIN CONFIGURATION



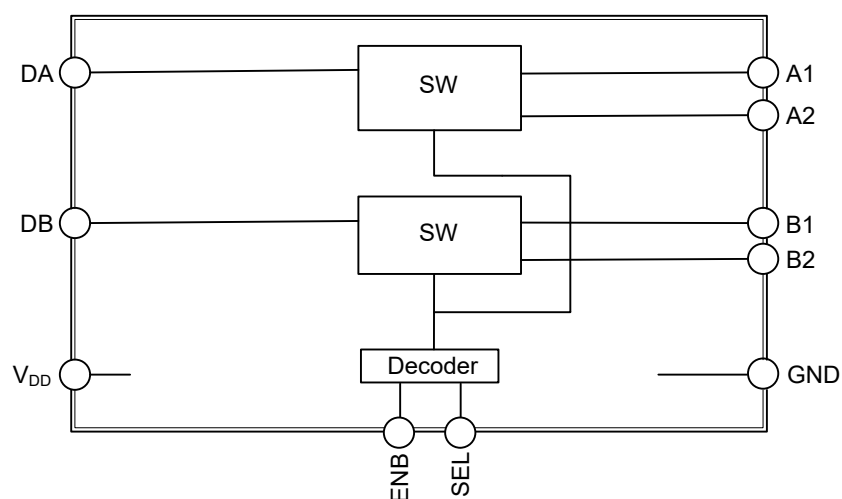
### PIN DESCRIPTION

| PIN NO. |                  |                  | PIN NAME        | DESCRIPTION     |
|---------|------------------|------------------|-----------------|-----------------|
| SOP-14  | QFN-10 (1.8×1.4) | QFN-10 (1.5×2.0) |                 |                 |
| 2       | 2                | 3                | A2              | Analog Data I/O |
| 3       | 3                | 8                | DA              | Analog Data I/O |
| 4       | 4                | 5                | GND             | Ground          |
| 5       | 5                | 7                | DB              | Analog Data I/O |
| 6       | 6                | 4                | B2              | Analog Data I/O |
| 9       | 7                | 2                | B1              | Analog Data I/O |
| 10      | 8                | 6                | ENB             | Logic Control   |
| 11      | 9                | 10               | V <sub>DD</sub> | Power           |
| 12      | 10               | 9                | SEL             | Logic Control   |
| 13      | 1                | 1                | A1              | Analog Data I/O |

### ■ TRUTH TABLE

| SEL | ENB | DA   | DB   |
|-----|-----|------|------|
| X   | H   | Hi-Z | Hi-Z |
| L   | L   | A1   | B1   |
| H   | L   | A2   | B2   |

### ■ BLOCK DIAGRAM



## ■ ABSOLUTE MAXIMUM RATING

Over operating free-air temperature range (unless otherwise specified)

| PARAMETER                          | SYMBOL    | RATINGS     | UNIT |
|------------------------------------|-----------|-------------|------|
| DC Input Voltage                   | $V_{DD}$  | -0.5 ~ +7.0 | V    |
| DC Output Current                  |           | 120         | mA   |
| Supply Voltage to Ground Potential |           | -0.5 ~ +7.0 | V    |
| Operating Temperature              | $T_{OPR}$ | -40 ~ +85   | °C   |
| Storage Temperature                | $T_{STG}$ | -65 ~ +150  | °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.

## ■ DC ELECTRICAL CHARACTERISTICS ( $V_{DD}=2.8V\sim 5V$ , $T_A=-40\sim +85^{\circ}C$ unless otherwise specified)

| PARAMETER              | SYMBOL          | TEST CONDITIONS                                            | MIN  | TYP<br>(Note 1) | MAX      | UNIT     |
|------------------------|-----------------|------------------------------------------------------------|------|-----------------|----------|----------|
| Supply                 | $V_{DD}$        |                                                            | 2.8  |                 | 5        | V        |
| Power Supply Current   | $I_S$           | $V_{DD}=5.5V$                                              |      |                 | 1        | $\mu A$  |
| Analog Signal Range    | $V_{Switch}$    |                                                            | 0    |                 | $V_{DD}$ | V        |
| Input HIGH Voltage     | $V_{IH}$        | $V_{DD}=5V$                                                | 3    |                 |          | V        |
|                        |                 | $V_{DD}=3.3V$                                              | 2    |                 |          | V        |
| Input LOW Voltage      | $V_{IL}$        | $V_{DD}=3.3V$ or $5V$                                      | -0.5 |                 | 0.8      | V        |
| Input HIGH Current     | $I_H$           | $V_{DD}=5V$ , $V_{IN}=V_{DD}$                              |      |                 | $\pm 1$  | $\mu A$  |
| Input LOW Current      | $I_L$           | $V_{DD}=5V$ , $V_{IN}=GND$                                 |      |                 | $\pm 1$  | $\mu A$  |
| I/O Leakage Current    | $I_{LK}$        | $V_{DD}=5V$ , $V_{IN}=0$ to $5V$ ,<br>Switch OFF, ENB=HIGH |      |                 | $\pm 1$  | $\mu A$  |
| ON-Resistance          | $R_{ON}$        | $V_{DD}=3V$ , $V_{IN}=-0.4V$ to $1.0V$ , $I_{ON}=-40mA$    |      | 4.5             |          | $\Omega$ |
| Match Between Channels | $\Delta R_{ON}$ | $V_{DD}=3V$ , $V_{IN}=-0.4V$ to $1.0V$ , $I_{ON}=-40mA$    |      | 0.5             |          | $\Omega$ |
| Ron Flatness           | $R_{FLAT}$      | $V_{DD}=3V$ , $V_{IN}=-0.4V$ to $1.0V$ , $I_{ON}=-40mA$    |      | 1.9             |          | $\Omega$ |

Note:  $T_A=25^{\circ}C$  ambient and maximum loading unless otherwise specified.

## ■ SWITCHING CHARACTERISTICS ( $V_{DD}=3.3V$ , $T_A=-40^{\circ}C \sim +85^{\circ}C$ unless otherwise specified)

| PARAMETER                | SYMBOL     | TEST CONDITIONS                                  | MIN | TYP<br>(Note 1) | MAX | UNIT |
|--------------------------|------------|--------------------------------------------------|-----|-----------------|-----|------|
| Propagation Delay        | $t_{PD}$   | $R_L=50\Omega$ , $C_L=10pF$ (Note 2), see Fig. 1 |     | 0.25            |     | ns   |
| Turn On Time – SEL, ENB  | $t_{ON}$   | $R_L=50\Omega$ , $C_L=10pF$ (Note 2), see Fig. 2 |     | 12              |     | ns   |
| Turn OFF Time – SEL, ENB | $t_{OFF}$  | $R_L=50\Omega$ , $C_L=10pF$ (Note 2), see Fig. 2 |     | 4               |     | ns   |
| Capacitance, Switch ON   | $C_{(ON)}$ | $V_{IN}=0V$ , $f=1MHz$                           |     | 6.5             |     | pF   |
| -3dB Bandwidth           | BW         | see Fig. 3                                       |     | 800             |     | MHz  |
| Off Isolation            | $Q_{IRR}$  | see Fig. 4                                       |     | -36             |     | dB   |
| Crosstalk                | $X_{TALK}$ | see Fig. 5                                       |     | -32             |     | dB   |

Notes: 1.  $T_A=25^{\circ}C$  ambient and maximum loading unless otherwise specified.

2.  $C_L$  includes probe and jig capacitance.

3. All input pulses are supplied by generators having the following characteristics:  $Z_O=50\Omega$ ,  $t_r \leq 8ns$ ,  $t_f \leq 8ns$ .

## ■ TEST CIRCUIT AND WAVEFORMS

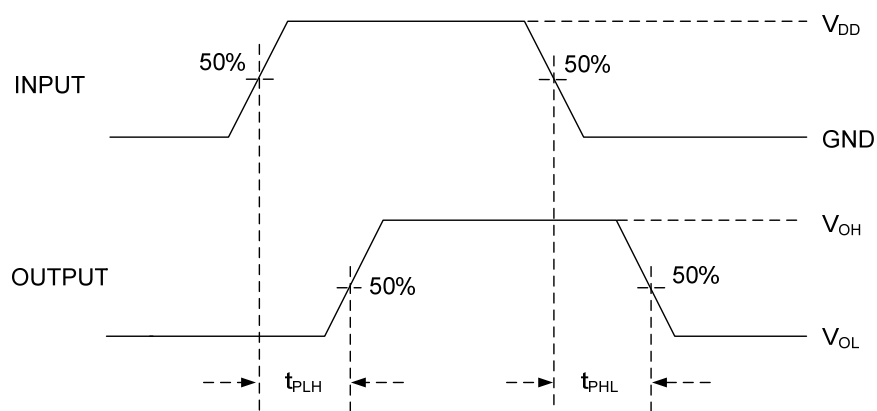


Fig.1 PROPAGATION DELAY TIMES

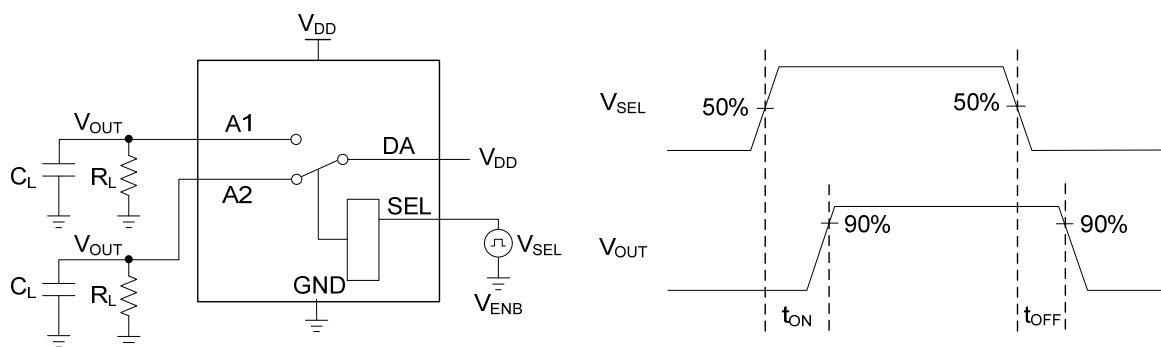


Fig.2 SWITCHING TIME

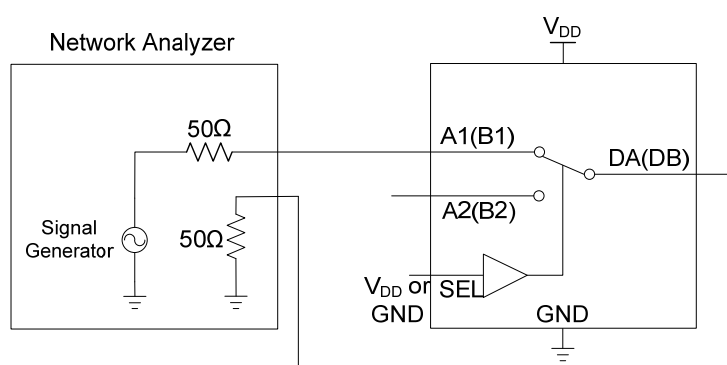


Fig.3 BANDWIDTH

■ TEST CIRCUIT AND WAVEFORMS

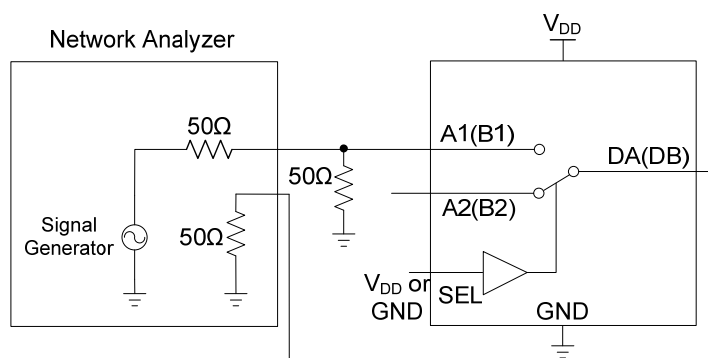


Fig.4 OFF ISOLATION

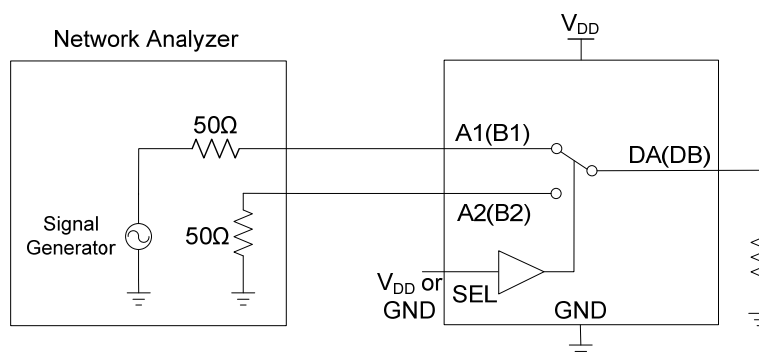


Fig.5 CROSSTALK

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