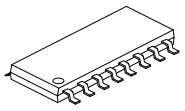
# LOW ON-RESISTANCE WIDE BANDWIDTH DUAL 4:1 MUX/DEMUX ANALOG SWITCH



SOP-16

## ■ DESCRIPTION

The **UMX2215** is a Rail-to-Rail Dual 4:1 multiplexer / demultiplexer CMOS switch designed with advanced CMOS technology. The On-Resistance is typically 4.5 ohm with signal voltage range from 0V to 5V. The **UMX2215** is integrated with ESD protection of system level up to +/-8KV and with low On-Resistance, high Off-Isolation, and wide bandwidth. It is a ideal high-performance, low-cost solution for digital or analog signal switch applications between signal sources.

## ■ FEATURES

*CMOS Technology for Bus and Analog Applications
*2V to 5.5V Supply Operation
* Rail-to-Rail Analog Signal Range at $V_{DD}$=2V to 5.5V
*Low On-Resistance: 4.5Ω at 5V
*High Off-Isolation: -66dB at 10MHz
*Low Crosstalk: -60dB at 10Mhz
*System Level ESD Protection Exceeds 8kV (direct contact) for Analog Signal I/O Pin

## ■ APPLICATIONS

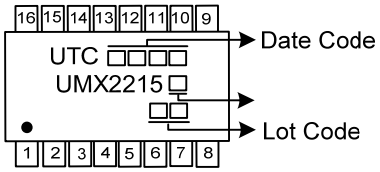
*Digital TV
*Cell Phones
* Computer Peripherals
*Portable Instrumentation

## ■ ORDERING INFORMATION

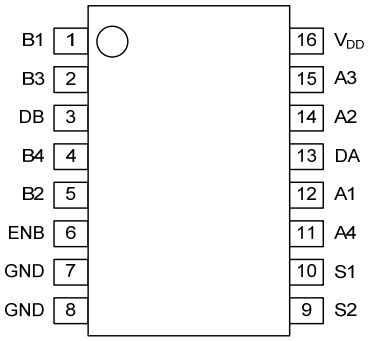
| Ordering Number | | Package | Packing |
|---|---|---|---|
| Lead Free | Halogen Free | | |
| UMX2215L-S16-R | UMX2215G-S16-R | SOP-16 | Tape Reel |

| | |
|---|---|
| UMX2215G-S16-R<br>(1)Packing Type<br>(2)Package Type<br>(3)Green Package | (1) R: Tape Reel<br>(2) S16: SOP-16<br>(3) G: Halogen Free and Lead Free, L: Lead Free |

## ■ MARKING




## ■ PIN CONFIGURATION



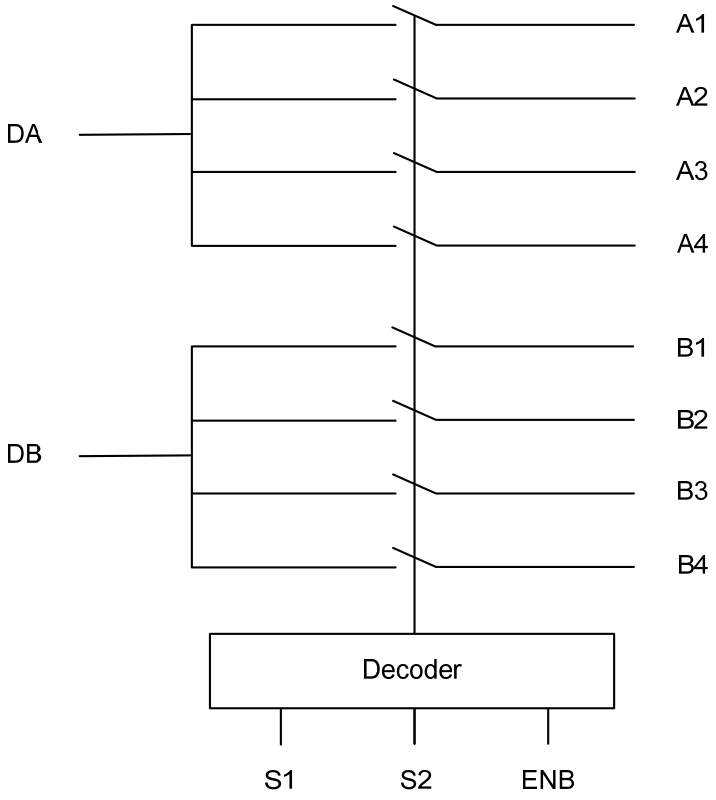

## ■ PIN DESCRIPTION

| PIN NO. | PIN NAME | DESCRIPTION |
|---|---|---|
| 1, 2, 4, 5<br>11, 12, 14, 15 | A1, A2, A3, A4<br>B1, B2, B3, B4 | Analog Data I/O |
| 3, 13 | DA, DB | Analog Data I/O |
| 6 | ENB | Logic Control - Enable |
| 7, 8 | GND | Ground |
| 9, 10 | S1, S2 | Logic Control - Selection |
| 16 | $V_{DD}$ | Power |

## ■ TRUTH TABLE

| Selection | S1 | S2 | ENB |
|---|---|---|---|
| A1, B1 | 0 | 0 | 0 |
| A2, B2 | 1 | 0 | 0 |
| A3, B3 | 0 | 1 | 0 |
| A4, B4 | 1 | 1 | 0 |
| Disabled | X | X | 1 |

■ BLOCK DIAGRAM



## ■ ABSOLUTE MAXIMUM RATING ($T_A$=25°C, unless otherwise specified.)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Supply Voltage to Ground Potential | | -0.5 ~ 7.0 | V |
| DC Input Voltage | $V_{IN}$ | -0.5 ~ 7.0 | V |
| DC Output Current | $V_{OUT}$ | 120 | mA |
| Power Dissipation | $P_D$ | 0.5 | W |
| Ambient Temperature with Power applied | | -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 ($V_{DD}$=5.0V, $T_A$=-40~+85°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP (Note1) | MAX | UNIT |
|---|---|---|---|---|---|---|
| **SUPPLY POWER** | | | | | | |
| Power Supply Current | $I_S$ | $V_{DD}$=5V | | | ±1 | μA |
| Analog Signal Range | $V_{SWITCH}$ | $V_{DD}$=5V | 0 | | $V_{DD}$ | V |
| Input HIGH Voltage | $V_H$ | $V_{DD}$=5V | 3 | | | V |
| Input LOW Voltage | $V_L$ | $V_{DD}$=5V | -0.5 | | 0.8 | V |
| Input HIGH Current | $I_H$ | $V_{IN}$=$V_{DD}$ | | | ±1 | μA |
| Input LOW Current | $I_L$ | $V_{IN}$=GND | | | ±1 | μA |
| Analog I/O Leakage Current | $I_{LK}$ | Switch ON | | | ±1 | μA |
| ON-Resistance | $R_{ON}$ | $I_{ON}$=30mA | | 4.5 | | Ω |
| Match Between Channels | $\triangle R_{ON}$ | $I_{ON}$=30mA | | 0.3 | | Ω |
| Ron Flatness | $R_{FLAT}$ | $I_{ON}$=30mA | | 2 | | Ω |

Note: Typical values are at $V_{DD}$=5.0V, $T_A$=25°C ambient.

## ■ DYNAMIC CHARACTERISTICS ($V_{DD}$=5.0V, $T_A$=-40~+85°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP (Note1) | MAX | UNIT |
|---|---|---|---|---|---|---|
| Propagation Delay | $t_{pd}$ | $R_L$=50Ω, $C_L$=10pF (Note 1), seeFig.1 | | 5 | | ns |
| Turn On Time | $t_{ON}$ | $R_L$=50Ω, $C_L$=10pF (Note 1), seeFig.2 | | 40 | | ns |
| Turn OFF Time | $t_{OFF}$ | $R_L$=50Ω, $C_L$=10pF (Note 1), seeFig.2 | | 5 | | ns |
| Capacitance, switch ON | $C_{(ON)}$ | $V_{IN}$=0V, f=1MHz | | 8.6 | | pF |
| Bandwidth | BW | See Fig.3 | | 200 | | MHz |
| Off Isolation | $Q_{IRR}$ | 10MHz, see Fig.4 | | -66 | | dB |
| Crosstalk | $X_{TALK}$ | 10MHz, see Fig.5 | | 60 | | dB |

Notes: 1. Typical values are at $V_{DD}$=5.0V, $T_A$=25°C ambient.
2. $C_L$ includes probe and jig capacitance.

■ DC ELECTRICAL CHARACTERISTICS ($V_{DD}$=3.3V, $T_A$=-40~+85°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP (Note1) | MAX | UNIT |
|---|---|---|---|---|---|---|
| **SUPPLY POWER** | | | | | | |
| Power Supply Current | $I_S$ | $V_{DD}$=3.3V | | | ±1 | μA |
| Analog Signal Range | $V_{SWITCH}$ | | 0 | | $V_{DD}$ | V |
| Input HIGH Voltage | $V_H$ | | 2 | | | V |
| Input LOW Voltage | $V_L$ | | -0.5 | | 0.8 | V |
| Input HIGH Current | $I_H$ | $V_{IN}$=$V_{DD}$ | | | ±1 | μA |
| Input LOW Current | $I_L$ | $V_{IN}$=GND | | | ±1 | μA |
| Analog I/O Leakage Current | $I_{LK}$ | Switch ON | | | ±1 | μA |
| ON-Resistance | $R_{ON}$ | $I_{ON}$=30mA | | 7 | | Ω |
| Match Between Channels | $\triangle R_{ON}$ | $I_{ON}$=30mA | | 0.3 | | Ω |
| Ron Flatness | $R_{FLAT}$ | $I_{ON}$=30mA | | 4.5 | | Ω |

Note: Typical values are at $V_{DD}$=3.3V, $T_A$=25°C ambient.

■ DYNAMIC CHARACTERISTICS ($V_{DD}$=3.3V, $T_A$=-40~+85°C, unless otherwise specified)

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| Bandwidth | BW | See Fig.3 | | 200 | | MHz |
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Notes: 1. Typical values are at $V_{DD}$=3.3V, $T_A$=25°C ambient.
2. $C_L$ includes probe and jig capacitance.

## ■ TEST CIRCUIT AND WAVEFORMS

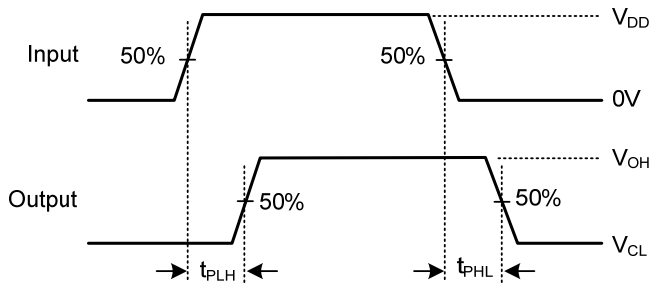


Fig. 1 Propagation Delay

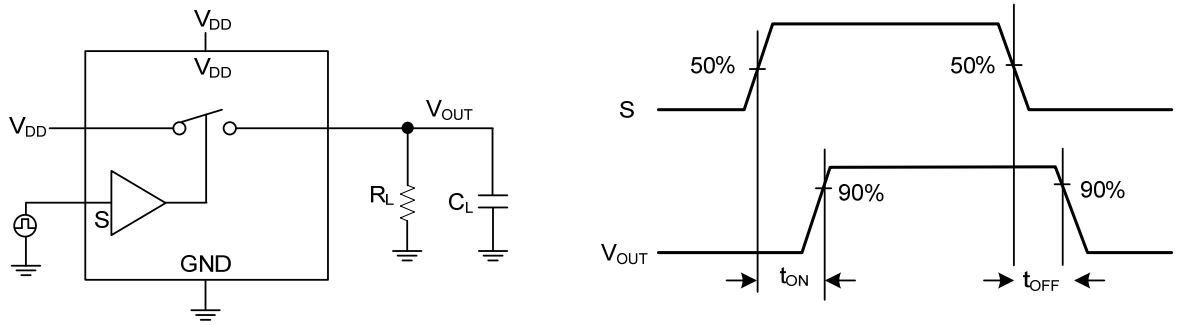


Fig. 2 Switching Time

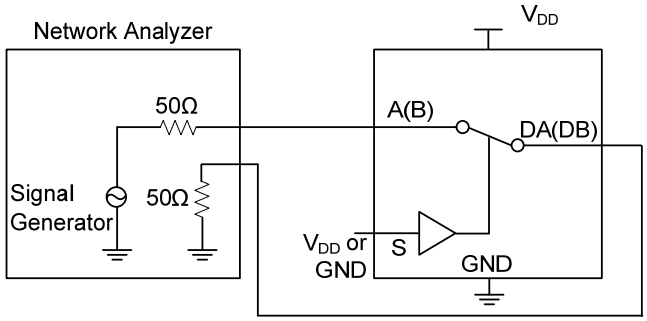


Fig. 3 Bandwidth

## ■ TEST CIRCUIT AND WAVEFORMS

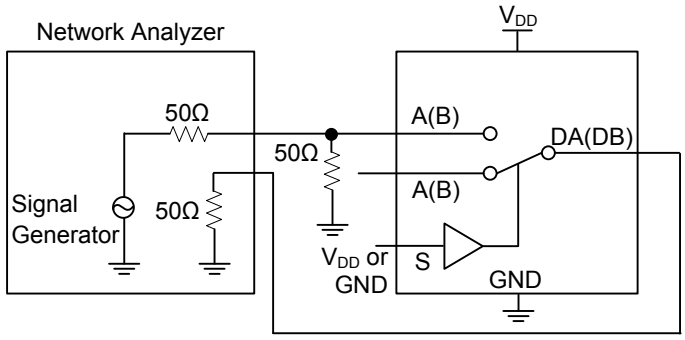


Fig. 4 Off Isolation

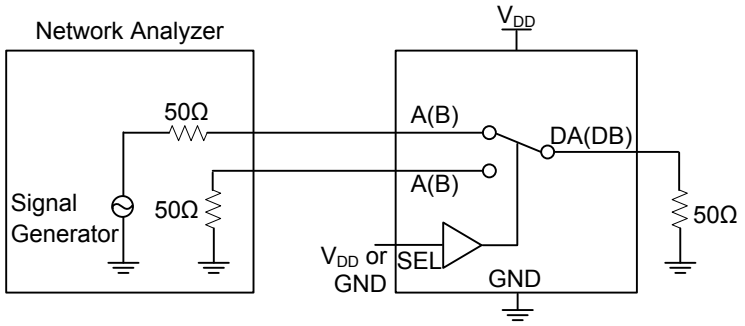


Fig. 5 Crosstalk