# MX-826

## Precision, High-Speed 8-Channel, Analog Multiplexers

DATEL®
INNOVATION and EXCELLENCE

### FEATURES

- **170ns maximum settling time to ±0.1%**
- **225ns maximum settling time to ±0.01%**
- **400ns maximum settling time to ±0.003%**
- **8 Channels single-ended inputs**
- **395mW power dissipation**
- **Small, 24-pin DDIP package**


### GENERAL DESCRIPTION

The MX-826 is a precision, high-speed multiplexer characterized for 10, 12 and 14-bit applications. The performance benchmarks are its 225 nanoseconds maximum settling time to ±0.01% accuracy and its unprecedented specification of accuracy to ±0.003%.

The MX-826 provides eight single-ended inputs. Channel addressing is done by a three-bit binary code and break-before-make switching assures that no two channels are ever momentarily shorted together.

The MX-826 operates from ±15V and +5V power supplies. Models are available in two operating temperature ranges: 0 to +70°C and –55 to +125°C. MIL-STD-883 screening is optional.

### INPUT/OUTPUT CONNECTIONS

| PIN | FUNCTION | PIN | FUNCTION |
|---|---|---|---|
| 1 | A0 | 24 | +5V SUPPLY |
| 2 | A1 | 23 | GROUND |
| 3 | A2 | 22 | N.C. |
| 4 | IN1 | 21 | N.C. |
| 5 | IN2 | 20 | N.C. |
| 6 | IN3 | 19 | –15V SUPPLY |
| 7 | IN4 | 18 | GROUND |
| 8 | IN5 | 17 | GROUND |
| 9 | IN6 | 16 | +15V SUPPLY |
| 10 | IN7 | 15 | N.C. |
| 11 | IN8 | 14 | N.C. |
| 12 | GROUND | 13 | OUTPUT |

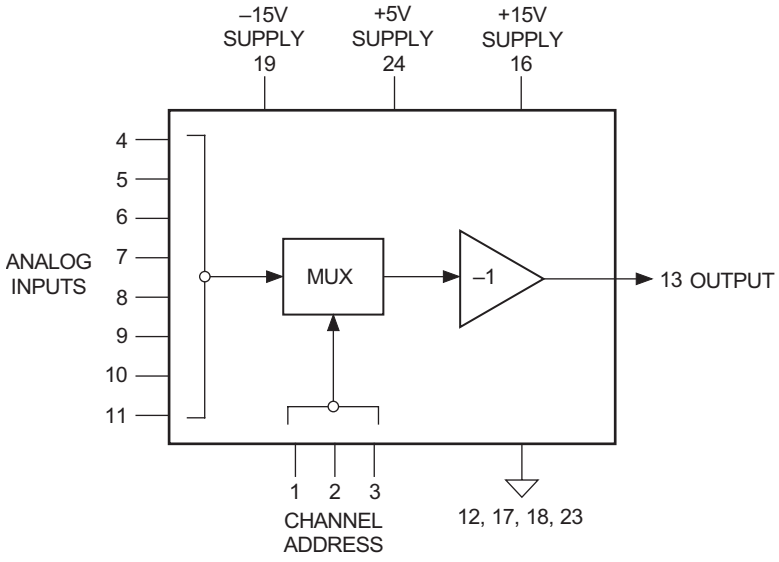



**Figure 1. Functional Block Diagram**

## ABSOLUTE MAXIMUM RATINGS

| PARAMETERS | LIMITS |
|---|---|
| **+15V Supply, Pin 16** | 0 to +18V |
| **–15V Supply, Pin 19** | 0 to –18V |
| **+5V Supply, Pin 24** | –0.5 to +7V |
| **Digital Inputs, Pins 1, 2, 3** | –0.3 to +5.5V |
| **Analog Inputs, Pins 4-11** | –15 to +15V |
| **Lead Temperature (10s)** | 300°C |
| **Short Circuit to Ground , Pin 13** | Continuous |

## FUNCTIONAL SPECIFICATIONS

(Apply over the operating temperature range and over the operating power supply range unless otherwise specified.)

| INPUTS | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|
| **Input Voltage Range** | ±10 | ±10.5 | — | Volts |
| **Digital Input, Logic Levels** | | | | |
| Logic 1 | +2.0 | — | — | Volts |
| Logic 0 | — | — | +0.8 | Volts |
| **Logic Loading** | | | | |
| Logic 1 | — | — | +10 | µA |
| Logic 0 | — | — | –10 | µA |
| **OUTPUTS** | | | | |
| **Output Range** | ±10.0 | ±10.5 | — | Volts |
| **Output Current** | ±15 | — | — | mA |
| **Stable Capacitive Load** | 100 | — | — | pF |
| **Output Impedance DC** | — | 0.1 | — | Ohms |
| **PERFORMANCE** | | | | |
| **Gain** | — | –1 | — | V/V |
| **Gain Error, 25°C** | — | — | ±0.03 | %FS |
| **Gain Tempco** | | | | |
| –55 to +125°C | — | ±0.5 | ±5 | ppm/°C |
| **Offset, 25°C** | — | ±0.1 | ±0.5 | mV |
| **Offset Voltage Drift** | — | <5 | ±15 | µV/°C |
| **Slew Rate** | ±250 | ±300 | — | V/µs |
| **Cross Talk** | | | | |
| 100kHz | — | –90 | –83 | dB |
| 1MHz | — | –80 | –75 | dB |
| **Bandwidth** | | | | |
| 3dB Small Signal | 8 | 8.5 | — | MHz |
| Full Power | 3 | 4.5 | — | MHz |
| **Input Impedance** | 2.45 | 2.5 | 2.55 | kΩ |
| **Output Settling Time** | | | | |
| (10V step, +25°C) 500Ω Load | | | | |
| ±0.1% 10 Bits | — | 100 | 170 | ns |
| ±0.01% 12 Bits | — | 150 | 225 | ns |
| ±0.003% 14 Bits | — | 300 | 400 | ns |
| (20V step, + 25°C) 1kΩ Load | | | | |
| ±0.1% 10 Bits | — | 150 | 200 | ns |
| ±0.01% 12 Bits | — | 200 | 300 | ns |
| ±0.003% 14 Bits | — | 600 | 720 | ns |
| **Switching Characteristics** | | | | |
| Break-Before-Make Delay | 8 | 15 | 25 | ns |
| Turn On Time | — | 20 | 50 | ns |
| Turn Off Time | — | 20 | 50 | ns |
| **Harmonic Distortion** | | | | |
| DC to 500kHz, 10Vp-p | — | –90 | –80 | dB |
| **Signal-to-Noise Ratio** | | | | |
| With Distortion | — | 72 | 69 | dB |
| Without Distortion | — | 80 | 75 | dB |

| POWER REQUIREMENTS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|
| **Range** | | | | |
| +15V Supply | +14.5 | +15 | +15.5 | Volts |
| –15V Supply | –14.5 | –15 | –15.5 | Volts |
| +5V Supply | +4.75 | +5 | +5.25 | Volts |
| **Current (Quiescent)** | | | | |
| +15V Supply | — | +13 | +21 | mA |
| –15V Supply | — | –13 | –21 | mA |
| +5V Supply | — | <1 | +1 | mA |
| **Power Supply Rejection Ratio** | 86 | — | — | dB |
| **Power Dissipation** | — | 395 | 575 | mW |
| **PHYSICAL/ENVIRONMMENTAL** | | | | |
| **Operating Temp. Range, Case** | | | | |
| MC Model | 0 | — | +70 | °C |
| MM Model | –55 | — | +125 | °C |
| **Storage Temp. Range** | –65 | — | +150 | °C |
| **Package Type** | 24-pin, metal-sealed, ceramic DDIP | | | |
| **Weight** | 0.42 oz. (12 grams) | | | |

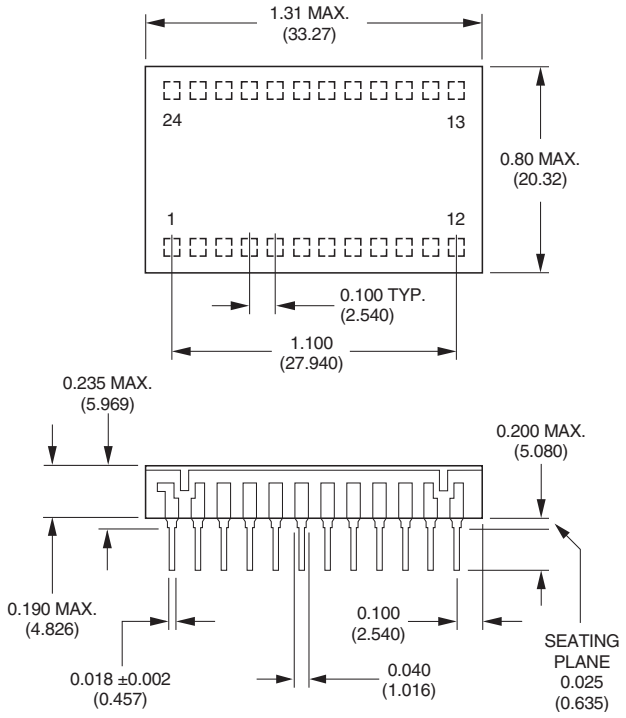
## TECHNICAL NOTES

1. Bypass the ±15V and +5V power supplies with a 1µF, 25V tantalum electrolytic capacitors in parallel with a 0.1µF ceramic capacitors.
2. Analog signals up to ±15V may be present while the MUX power supplies are off.
3. The absence of an RON specification or output leakage specification is related to the architecture of the switching network. The inputs see a constant 2.5k Ohm input impedance whether the channel is on or off.
4. Typical recovery time from an overvoltage condition of >±3V is approximately 200 nanoseconds from a negative overdrive and 700 nanoseconds from a positive overdrive.
5. Double-level multiplexing may be used to provide up to 64 channels (nine MX-826's required).

**Table 1. Channel Addressing**

| On Channel | MUX Address A2 | A1 | A0 |
|---|---|---|---|
| 1 | 0 | 0 | 0 |
| 2 | 0 | 0 | 1 |
| 3 | 0 | 1 | 0 |
| 4 | 0 | 1 | 1 |
| 5 | 1 | 0 | 0 |
| 6 | 1 | 0 | 1 |
| 7 | 1 | 1 | 0 |
| 8 | 1 | 1 | 1 |

## MECHANICAL DIMENSIONS
INCHES (mm)




### 24-PIN DDIP

**Dimension Tolerances** (unless otherwise indicated):
2 place decimal (.XX) ±0.010 (±0.254)
3 place decimal (.XXX) ±0.005 (±0.127)

**Lead Material:** Kovar alloy

**Lead Finish:** 50 microinches (minimum) gold plating over 100 microinches (nominal) nickel plating

## ORDERING INFORMATION

| MODEL NO. | CHANNELS | OPER. TEMP. RANGE |
|---|---|---|
| **MX-826MC** | 8SE | 0 to +70°C |
| **MX-826MM** | 8SE | –55 to +125°C |
| **MX-826/883** | 8SE | –55 to +125°C |

DESC drawing available: Drawing Number 5962-9450601.
For MIL-STD-883 product specifications, contact DATEL.

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