

Reinforced, Ultra-Low-Power, Two-Channel Digital Isolators

MAX22420, MAX22421
MAX22820, MAX22821

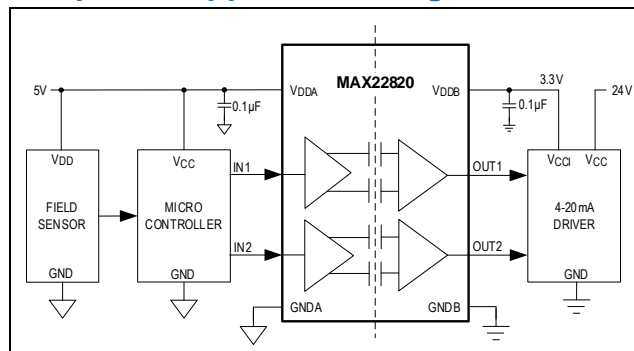
Product Highlights

- Ultra-Low Power Consumption
 - 11.4 μ A per Channel at DC with VDD = 3.3V
 - 15.4 μ A per Channel at 100kbps with VDD = 3.3V
 - 54.7 μ A per Channel at 1Mbps with VDD = 3.3V
- Wide Supply Range Supports from 1.71V to 5.5V
- Reinforced Galvanic Isolation for Digital Signals
 - 8-NSOIC with 4mm Creepage and Clearance Withstands 3kVRMS for 60s (VISO) and Continuously Withstands 445VRMS (VIOWM)
 - 8-WSOIC with 8mm Creepage and Clearance Withstands 5kVRMS for 60s (VISO) and Continuously Withstands 848VRMS (VIOWM)
 - Withstands ± 10 kV Surge Between GNDA and GNDB with 1.2/50 μ s Waveform
 - High CMTI (200kV/ μ s, min)
- Low Propagation Delay and Low Jitter
 - Maximum Data Rate Up to 10Mbps
 - Low Propagation Delay 51ns (typ) at VDD = 3.3V
 - Clock Jitter RMS 15.4ps (typ)
- Safety Regulatory Approvals
 - UL According to UL1577
 - cUL According to CSA Bulletin 5A
 - VDE 0884-11 Reinforced Insulation (Pending)
 - IECEx and ATEX Intrinsic Safety (IS): Sira 0518 II 1G Ex ia IIC Ga (Pending)

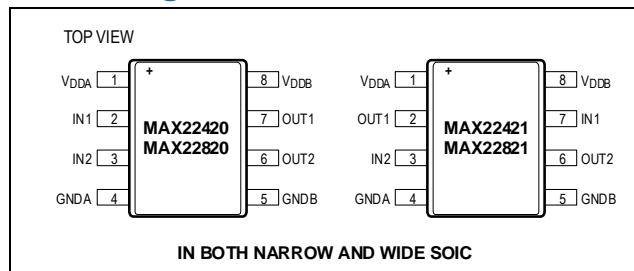
Key Applications

- 4-20mA Loop Process Control
 - Battery Management
 - Compact Micro PLC
 - Parasitically Powered Applications
- The MAX22420/1, MAX22820/1 are a family of 2-channel, reinforced, ultra-low-power digital galvanic isolators using Analog Devices' proprietary process technology. The MAX22420/1 feature reinforced isolation with a withstand voltage rating of 3kVRMS for 60 seconds. The MAX22820/1 feature reinforced isolation with a withstand voltage rating of 5kVRMS for 60 seconds. Devices are rated for operation at ambient temperature from -40°C to +125°C.

Simplified Application Diagram



Pin Configurations



These devices transfer digital signals between circuits with different power domains, using as little as 90.7 μ W per channel at 1Mbps (1.8V supply). The ultra-low-power feature reduces system dissipation, increases reliability, and enables compact designs.

Devices are available with a glitch rejection filter of either 29ns or 70ns (typ) and with default-high or default-low outputs. The devices feature low propagation delay and low clock jitter, which reduces system latency.

Independent 1.71V to 5.5V supplies on each side also make the devices suitable for use as level translators.

The MAX22420/MAX22820 feature two channels transferring data in the same direction. The two channels of the MAX22421/MAX22821 transfer data in opposite directions.

[Ordering Information](#) appears at end of data sheet.

Absolute Maximum Ratings

| | |
|----------------------------------|------------------------------------|
| V _{DDA} to GNDA | -0.3V to +6V |
| V _{ddb} to GNDB | -0.3V to +6V |
| IN_ on Side A to GNDA | -0.3V to +6V |
| IN_ on Side B to GNDB | -0.3V to +6V |
| OUT_ on Side A to GNDA | -0.3V to (V _{DDA} + 0.3)V |
| OUT_ on Side B to GNDB | -0.3V to (V _{ddb} + 0.3)V |
| Short-Circuit Continuous Current | |
| OUT_ on Side A to GNDA | ±30mA |
| OUT_ on Side B to GNDB | ±30mA |

Continuous Power Dissipation (T_A = +70°C)

Narrow SOIC (derate 5.79mW/°C above +70°C) 462.96mW

Wide SOIC (derate 11.35mW/°C above +70°C) 908.06mW

Temperature Ratings

Operating Temperature Range -40°C to +125°C

Maximum Junction Temperature +150°C

Storage Temperature Range -60°C to +150°C

Lead Temperature (soldering, 10s) +300°C

Soldering Temperature (reflow) +260°C

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Package Information

8 Narrow SOIC

| | |
|--|-------------------------|
| Package Code | S8MS+24 |
| Outline Number | 21-0041 |
| Land Pattern Number | 90-0096 |
| Thermal Resistance, Four Layer Board: | |
| Junction-to-Ambient (θ _{JA}) | 172.80°C/W |
| Junction-to-Case Thermal Resistance (θ _{JC}) | 67.60°C/W |

8 Wide SOIC

| | |
|--|---------------------------|
| Package Code | W8MS+7 |
| Outline Number | 21-100415 |
| Land Pattern Number | 90-100146 |
| Thermal Resistance, Four Layer Board: | |
| Junction-to-Ambient (θ _{JA}) | 88.10°C/W |
| Junction-to-Case Thermal Resistance (θ _{JC}) | 42.40°C/W |

Package thermal resistances were obtained using the method described in JEDEC specification JESD51-7, using a four-layer board. For detailed information on package thermal considerations, refer to www.maximintegrated.com/thermal-tutorial.

For the latest package outline information and land patterns (footprints), go to www.maximintegrated.com/packages. Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

DC Electrical Characteristics

($V_{DDA} - V_{GNDA} = 1.71V$ to $5.5V$, $V_{DDB} - V_{GNDB} = 1.71V$ to $5.5V$, $C_L = 15pF$, $T_A = -40^{\circ}C$ to $+125^{\circ}C$, unless otherwise noted. Typical values are at $V_{DDA} - V_{GNDA} = 3.3V$, $V_{DDB} - V_{GNDB} = 3.3V$, $V_{GNDA} = V_{GNDB}$, $T_A = +25^{\circ}C$, unless otherwise noted.) (Notes 1, 3)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|------------------|---------------------------------|------------------|------|-------|---------|
| SUPPLY VOLTAGE | | | | | | |
| Supply Voltage | V_{DDA} | Relative to GNDA | 1.71 | | 5.5 | V |
| | V_{DDB} | Relative to GNDB | 1.71 | | 5.5 | |
| Undervoltage-Lockout Threshold | $V_{UVLO_}$ | $V_{DD_}$ rising | 1.5 | 1.59 | 1.69 | V |
| Undervoltage-Lockout Threshold Hysteresis | V_{UVLO_HYST} | | | 30 | | mV |
| MAX22420, MAX22820 SUPPLY CURRENT (Note 2) | | | | | | |
| Side A Supply Current | I_{DDA} | DC, $C_L = 0pF$ | $V_{DDA} = 5V$ | 6.9 | 21.6 | μA |
| | | | $V_{DDA} = 3.3V$ | 6.7 | 20.8 | |
| | | | $V_{DDA} = 2.5V$ | 6.6 | 20.6 | |
| | | | $V_{DDA} = 1.8V$ | 6.6 | 20.0 | |
| | | 5kHz square wave, $C_L = 0pF$ | $V_{DDA} = 5V$ | 7.6 | 21.6 | |
| | | | $V_{DDA} = 3.3V$ | 7.4 | 21.8 | |
| | | | $V_{DDA} = 2.5V$ | 7.3 | 20.6 | |
| | | | $V_{DDA} = 1.8V$ | 6.6 | 20.0 | |
| | | 50kHz square wave, $C_L = 0pF$ | $V_{DDA} = 5V$ | 13.4 | 31.5 | |
| | | | $V_{DDA} = 3.3V$ | 12.9 | 30.3 | |
| | | | $V_{DDA} = 2.5V$ | 12.7 | 29.9 | |
| | | | $V_{DDA} = 1.8V$ | 12.5 | 29.0 | |
| | | 500kHz square wave, $C_L = 0pF$ | $V_{DDA} = 5V$ | 75.1 | 129.5 | |
| | | | $V_{DDA} = 3.3V$ | 72.1 | 126.1 | |
| | | | $V_{DDA} = 2.5V$ | 70.6 | 124.1 | |
| | | | $V_{DDA} = 1.8V$ | 70.3 | 117.3 | |
| Side B Supply Current | I_{DDB} | DC, $C_L = 0pF$ | $V_{DDB} = 5V$ | 16.1 | 31.4 | μA |
| | | | $V_{DDB} = 3.3V$ | 16.0 | 30.6 | |
| | | | $V_{DDB} = 2.5V$ | 15.9 | 30.3 | |
| | | | $V_{DDB} = 1.8V$ | 15.9 | 29.7 | |
| | | 5kHz square wave, $C_L = 0pF$ | $V_{DDB} = 5V$ | 16.4 | 31.6 | |
| | | | $V_{DDB} = 3.3V$ | 16.2 | 30.7 | |
| | | | $V_{DDB} = 2.5V$ | 16.1 | 30.4 | |
| | | | $V_{DDB} = 1.8V$ | 15.9 | 29.8 | |
| | | 50kHz square wave, $C_L = 0pF$ | $V_{DDB} = 5V$ | 18.9 | 34.7 | |
| | | | $V_{DDB} = 3.3V$ | 17.9 | 32.9 | |
| | | | $V_{DDB} = 2.5V$ | 17.6 | 32.3 | |
| | | | $V_{DDB} = 1.8V$ | 17.3 | 31.3 | |
| | | | $V_{DDB} = 5V$ | 44.7 | 65.5 | |

($V_{DDA} - V_{GNDA} = 1.71V$ to $5.5V$, $V_{DDB} - V_{GNDB} = 1.71V$ to $5.5V$, $C_L = 15pF$, $T_A = -40^{\circ}C$ to $+125^{\circ}C$, unless otherwise noted. Typical values are at $V_{DDA} - V_{GNDA} = 3.3V$, $V_{DDB} - V_{GNDB} = 3.3V$, $V_{GNDA} = V_{GNDB}$, $T_A = +25^{\circ}C$, unless otherwise noted.) (Notes 1, 3)

| PARAMETER | SYMBOL | CONDITIONS | | MIN | TYP | MAX | UNITS |
|--|------------------|--|-------------------------|-----|------|------|-------|
| | | 500kHz square wave, C _L = 0pF | V _{DDB} = 3.3V | | 37.2 | 56.4 | |
| | | | V _{DDB} = 2.5V | | 33.9 | 52.3 | |
| | | | V _{DDB} = 1.8V | | 30.5 | 46.8 | |
| MAX22421, MAX22821 SUPPLY CURRENT (Note 2) | | | | | | | |
| Side A Supply Current | I _{DDA} | DC, C _L = 0pF | V _{DDA} = 5V | | 11.4 | 26.5 | μA |
| | | | V _{DDA} = 3.3V | | 11.3 | 25.7 | |
| | | | V _{DDA} = 2.5V | | 11.2 | 25.4 | |
| | | | V _{DDA} = 1.8V | | 11.1 | 24.9 | |
| | | 5kHz square wave, C _L = 0pF | V _{DDA} = 5V | | 12.0 | 26.6 | |
| | | | V _{DDA} = 3.3V | | 11.8 | 25.8 | |
| | | | V _{DDA} = 2.5V | | 11.7 | 25.5 | |
| | | | V _{DDA} = 1.8V | | 11.3 | 24.9 | |
| | | 50kHz square wave, C _L = 0pF | V _{DDA} = 5V | | 16.1 | 33.1 | |
| | | | V _{DDA} = 3.3V | | 15.4 | 31.6 | |
| | | | V _{DDA} = 2.5V | | 15.1 | 31.1 | |
| | | | V _{DDA} = 1.8V | | 14.9 | 30.1 | |
| | | 500kHz square wave, C _L = 0pF | V _{DDA} = 5V | | 60.1 | 97.2 | |
| | | | V _{DDA} = 3.3V | | 55.3 | 91.1 | |
| | | | V _{DDA} = 2.5V | | 53.0 | 88.1 | |
| | | | V _{DDA} = 1.8V | | 50.4 | 81.9 | |
| Side B Supply Current | I _{DDB} | DC, C _L = 0pF | V _{DDB} = 5V | | 11.4 | 26.5 | μA |
| | | | V _{DDB} = 3.3V | | 11.3 | 25.7 | |
| | | | V _{DDB} = 2.5V | | 11.2 | 25.4 | |
| | | | V _{DDB} = 1.8V | | 11.1 | 24.9 | |
| | | 5kHz square wave, C _L = 0pF | V _{DDB} = 5V | | 12.0 | 26.6 | |
| | | | V _{DDB} = 3.3V | | 11.8 | 25.8 | |
| | | | V _{DDB} = 2.5V | | 11.7 | 25.5 | |
| | | | V _{DDB} = 1.8V | | 11.3 | 24.9 | |
| | | 50kHz square wave, C _L = 0pF | V _{DDB} = 5V | | 16.1 | 33.1 | |
| | | | V _{DDB} = 3.3V | | 15.4 | 31.6 | |
| | | | V _{DDB} = 2.5V | | 15.1 | 31.1 | |
| | | | V _{DDB} = 1.8V | | 14.9 | 30.1 | |
| | | 500kHz square wave, C _L = 0pF | V _{DDB} = 5V | | 60.1 | 97.2 | |
| | | | V _{DDB} = 3.3V | | 55.3 | 91.1 | |
| | | | V _{DDB} = 2.5V | | 53.0 | 88.1 | |
| | | | V _{DDB} = 1.8V | | 50.4 | 81.9 | |
| LOGIC INTERFACE (IN_, OUT_) | | | | | | | |

($V_{DDA} - V_{GNDA} = 1.71V$ to $5.5V$, $V_{DDB} - V_{GNDB} = 1.71V$ to $5.5V$, $C_L = 15pF$, $T_A = -40^{\circ}C$ to $+125^{\circ}C$, unless otherwise noted. Typical values are at $V_{DDA} - V_{GNDA} = 3.3V$, $V_{DDB} - V_{GNDB} = 3.3V$, $V_{GNDA} = V_{GNDB}$, $T_A = +25^{\circ}C$, unless otherwise noted.) (Notes 1, 3)

| PARAMETER | SYMBOL | CONDITIONS | | MIN | TYP | MAX | UNITS |
|-----------------------|------------|---------------------------------|----------------------------------|------------------------|-----|-----|---------|
| Input High Voltage | V_{IH} | $2.25V \leq V_{DD_} \leq 5.5V$ | | $0.7 \times V_{DD_}$ | | | V |
| | | $1.71V \leq V_{DD_} < 2.25V$ | | $0.76 \times V_{DD_}$ | | | |
| Input Low Voltage | V_{IL} | $2.25V \leq V_{DD_} \leq 5.5V$ | | | | 0.8 | V |
| | | $1.71V \leq V_{DD_} < 2.25V$ | | | | 0.7 | |
| Input Hysteresis | V_{HYS} | | | | 410 | | mV |
| Input Leakage Current | I_{LEAK} | | | -1 | | +1 | μA |
| Input Capacitance | C_{IN} | $f_{SW} = 1MHz$ | | | 2 | | pF |
| Output Voltage High | V_{OH} | $I_{OUT} = -4mA$ source | $4.5V \leq V_{DD_} \leq 5.5V$ | $V_{DD_} - 0.4$ | | | V |
| | | $I_{OUT} = -2mA$ source | $3.0V \leq V_{DD_} \leq 3.6V$ | $V_{DD_} - 0.3$ | | | |
| | | $I_{OUT} = -1mA$ source | $2.25V \leq V_{DD_} \leq 2.75V$ | $V_{DD_} - 0.2$ | | | |
| | | | $1.71V \leq V_{DD_} \leq 1.89V$ | $V_{DD_} - 0.2$ | | | |
| Output Voltage Low | V_{OL} | $I_{OUT} = 4mA$ sink | $4.5V \leq V_{DD_} \leq 5.5V$ | | | 0.4 | V |
| | | $I_{OUT} = 2mA$ sink | $3.0V \leq V_{DD_} \leq 3.6V$ | | | 0.3 | |
| | | $I_{OUT} = 1mA$ sink | $2.25V \leq V_{DD_} \leq 2.75V$ | | | 0.2 | |
| | | | $1.71V \leq V_{DD_} \leq 1.89V$ | | | 0.2 | |

Dynamic Characteristics—MAX22_2_C/F

($V_{DDA} - V_{GNDA} = 1.71V$ to $5.5V$, $V_{DDB} - V_{GNDB} = 1.71V$ to $5.5V$, $C_L = 15pF$, $T_A = -40^{\circ}C$ to $+125^{\circ}C$, unless otherwise noted. Typical values are at $V_{DDA} - V_{GNDA} = 3.3V$, $V_{DDB} - V_{GNDB} = 3.3V$, $V_{GNDA} = V_{GNDB}$, $T_A = +25^{\circ}C$, unless otherwise noted.) (Notes 2, 4)

| PARAMETER | SYMBOL | CONDITIONS | | MIN | TYP | MAX | UNITS |
|---|----------------------|---|---------------------------------|-----|-----|-----|-------------|
| Common-Mode Transient Immunity | CMTI | (Note 5) | | 200 | | | kV/ μ s |
| Maximum Data Rate | DR _{MAX} | | | 10 | | | Mbps |
| Minimum Pulse Width | PW _{MIN} | | | | | 100 | ns |
| Glitch Rejection | | | | 24 | 29 | 37 | ns |
| Propagation Delay (Figure 1) | t _{PLH} | IN ₋ to OUT ₋ , C _L = 15pF | $4.5V \leq V_{DD-} \leq 5.5V$ | 45 | 51 | 61 | ns |
| | | | $3.0V \leq V_{DD-} \leq 3.6V$ | 46 | 52 | 63 | |
| | | | $2.25V \leq V_{DD-} \leq 2.75V$ | 47 | 53 | 65 | |
| | | | $1.71V \leq V_{DD-} \leq 1.89V$ | 50 | 58 | 72 | |
| | t _{PHL} | IN ₋ to OUT ₋ , C _L = 15pF | $4.5V \leq V_{DD-} \leq 5.5V$ | 45 | 50 | 61 | |
| | | | $3.0V \leq V_{DD-} \leq 3.6V$ | 46 | 51 | 63 | |
| | | | $2.25V \leq V_{DD-} \leq 2.75V$ | 47 | 52 | 65 | |
| | | | $1.71V \leq V_{DD-} \leq 1.89V$ | 50 | 56 | 72 | |
| Pulse Width Distortion | PWD | t _{PLH} - t _{PHL} | $4.5V \leq V_{DD-} \leq 5.5V$ | | | 6 | ns |
| | | | $3.0V \leq V_{DD-} \leq 3.6V$ | | | 6 | |
| | | | $2.25V \leq V_{DD-} \leq 2.75V$ | | | 6 | |
| | | | $1.71V \leq V_{DD-} \leq 1.89V$ | | | 6.5 | |
| Propagation Delay Skew Part-to-Part (Same Channel) | t _{SPLH} | $4.5V \leq V_{DD-} \leq 5.5V$ | | | | 16 | ns |
| | | $3.0V \leq V_{DD-} \leq 3.6V$ | | | | 17 | |
| | | $2.25V \leq V_{DD-} \leq 2.75V$ | | | | 18 | |
| | | $1.71V \leq V_{DD-} \leq 1.89V$ | | | | 22 | |
| | t _{SPHL} | $4.5V \leq V_{DD-} \leq 5.5V$ | | | | 16 | |
| | | $3.0V \leq V_{DD-} \leq 3.6V$ | | | | 17 | |
| | | $2.25V \leq V_{DD-} \leq 2.75V$ | | | | 18 | |
| | | $1.71V \leq V_{DD-} \leq 1.89V$ | | | | 22 | |
| Propagation Delay Skew Channel-to-Channel (Same Direction) (Figure 1) | t _{SCSLH} | $1.71V \leq V_{DD-} \leq 5.5V$ | | | | 6 | ns |
| | t _{SCSHL} | $1.71V \leq V_{DD-} \leq 5.5V$ | | | | 6 | |
| Propagation Delay Skew Channel-to-Channel (Opposite Direction) | t _{SCOLH} | $1.71V \leq V_{DD-} \leq 5.5V$ | | | | 6 | ns |
| | t _{SCOHL} | $1.71V \leq V_{DD-} \leq 5.5V$ | | | | 6 | |
| Peak Eye Diagram Jitter | t _{JIT(PK)} | 1Mbps | | | 130 | | ps |

($V_{DDA} - V_{GNDA} = 1.71V$ to $5.5V$, $V_{DDB} - V_{GNDB} = 1.71V$ to $5.5V$, $C_L = 15pF$, $T_A = -40^{\circ}C$ to $+125^{\circ}C$, unless otherwise noted. Typical values are at $V_{DDA} - V_{GNDA} = 3.3V$, $V_{DDB} - V_{GNDB} = 3.3V$, $V_{GNDA} = V_{GNDB}$, $T_A = +25^{\circ}C$, unless otherwise noted.) (Notes 2, 4)

| PARAMETER | SYMBOL | CONDITIONS | | MIN | TYP | MAX | UNITS |
|---|-----------------|--|----------------------------------|-----|------|-----|-------|
| Clock Jitter RMS | $t_{JCLK(RMS)}$ | 500kHz clock input, rising/falling edges | | | 15.4 | | ps |
| Rise Time (Figure 1) | t_R | $C_L = 15pF$ | $4.5V \leq V_{DD_} \leq 5.5V$ | | | 5 | ns |
| | | | $3.0V \leq V_{DD_} \leq 3.6V$ | | | 5 | |
| | | | $2.25V \leq V_{DD_} \leq 2.75V$ | | | 5 | |
| | | | $1.71V \leq V_{DD_} \leq 1.89V$ | | | 8 | |
| Fall Time (Figure 1) | t_F | $C_L = 15pF$ | $4.5V \leq V_{DD_} \leq 5.5V$ | | | 5 | ns |
| | | | $3.0V \leq V_{DD_} \leq 3.6V$ | | | 5 | |
| | | | $2.25V \leq V_{DD_} \leq 2.75V$ | | | 5 | |
| | | | $1.71V \leq V_{DD_} \leq 1.89V$ | | | 8 | |
| Output UVLO to Output Data Valid (Figure 2) | t_{UVLO_EN} | $C_L = 15pF$, $V_{DD_}$ rising | | | 1.1 | 1.7 | ms |
| Input UVLO to Output Default (Figure 2) | t_{UVLO_DE} | $C_L = 15pF$, $V_{DD_}$ falling | | | | 0.5 | ms |
| Refresh Rate | F_R | | | | 10 | | kHz |

Dynamic Characteristics—MAX22_2_B/E

($V_{DDA} - V_{GNDA} = 1.71V$ to $5.5V$, $V_{DDB} - V_{GNDB} = 1.71V$ to $5.5V$, $C_L = 15pF$, $T_A = -40^{\circ}C$ to $+125^{\circ}C$, unless otherwise noted. Typical values are at $V_{DDA} - V_{GNDA} = 3.3V$, $V_{DDB} - V_{GNDB} = 3.3V$, $V_{GNDA} = V_{GNDB}$, $T_A = +25^{\circ}C$, unless otherwise noted.) (Notes 2, 4)

| PARAMETER | SYMBOL | CONDITIONS | | MIN | TYP | MAX | UNITS |
|--------------------------------|------------|----------------------------------|----------------------------------|-----|-----|-----|-------------|
| Common-Mode Transient Immunity | CMTI | (Note 5) | | 200 | | | kV/ μs |
| Maximum Data Rate | DR_{MAX} | | | 10 | | | Mbps |
| Minimum Pulse Width | PW_{MIN} | | | | | 100 | ns |
| Glitch Rejection | | | | 60 | 70 | 80 | ns |
| Propagation Delay (Figure 1) | t_{PLH} | $IN_$ to $OUT_$, $C_L = 15pF$ | $4.5V \leq V_{DD_} \leq 5.5V$ | 109 | 122 | 136 | ns |
| | | | $3.0V \leq V_{DD_} \leq 3.6V$ | 110 | 123 | 138 | |
| | | | $2.25V \leq V_{DD_} \leq 2.75V$ | 110 | 124 | 140 | |
| | | | $1.71V \leq V_{DD_} \leq 1.89V$ | 115 | 129 | 145 | |
| | t_{PHL} | $IN_$ to $OUT_$, $C_L = 15pF$ | $4.5V \leq V_{DD_} \leq 5.5V$ | 109 | 120 | 136 | |
| | | | $3.0V \leq V_{DD_} \leq 3.6V$ | 110 | 121 | 138 | |
| | | | $2.25V \leq V_{DD_} \leq 2.75V$ | 110 | 122 | 140 | |
| | | | $1.71V \leq V_{DD_} \leq 1.89V$ | 115 | 126 | 145 | |

($V_{DDA} - V_{GNDA} = 1.71V$ to $5.5V$, $V_{DDB} - V_{GNDB} = 1.71V$ to $5.5V$, $C_L = 15pF$, $T_A = -40^{\circ}C$ to $+125^{\circ}C$, unless otherwise noted. Typical values are at $V_{DDA} - V_{GNDA} = 3.3V$, $V_{DDB} - V_{GNDB} = 3.3V$, $V_{GNDA} = V_{GNDB}$, $T_A = +25^{\circ}C$, unless otherwise noted.) (Notes 2, 4)

| PARAMETER | SYMBOL | CONDITIONS | | MIN | TYP | MAX | UNITS |
|---|-----------------|--|----------------------------------|-----|------|-----|-------|
| Pulse Width Distortion | PWD | $ t_{PLH} - t_{PHL} $ | $1.71V \leq V_{DD_} \leq 5.5V$ | | | 15 | ns |
| Propagation Delay Skew Part-to-Part (Same Channel) | t_{SPLH} | $4.5V \leq V_{DD_} \leq 5.5V$ | | | | 27 | ns |
| | | $3.0V \leq V_{DD_} \leq 3.6V$ | | | | 28 | |
| | | $2.25V \leq V_{DD_} \leq 2.75V$ | | | | 30 | |
| | | $1.71V \leq V_{DD_} \leq 1.89V$ | | | | 30 | |
| | t_{SPHL} | $4.5V \leq V_{DD_} \leq 5.5V$ | | | | 27 | |
| | | $3.0V \leq V_{DD_} \leq 3.6V$ | | | | 28 | |
| | | $2.25V \leq V_{DD_} \leq 2.75V$ | | | | 30 | |
| | | $1.71V \leq V_{DD_} \leq 1.89V$ | | | | 30 | |
| Propagation Delay Skew Channel-to-Channel (Same Direction) (Figure 1) | t_{SCSLH} | $1.71V \leq V_{DD_} \leq 5.5V$ | | | | 10 | ns |
| | t_{SCSHL} | $1.71V \leq V_{DD_} \leq 5.5V$ | | | | 10 | |
| Propagation Delay Skew Channel-to-Channel (Opposite Direction) | t_{SCOLH} | $1.71V \leq V_{DD_} \leq 5.5V$ | | | | 10 | ns |
| | t_{SCOHL} | $1.71V \leq V_{DD_} \leq 5.5V$ | | | | 10 | |
| Peak Eye Diagram Jitter | $t_{JIT(PK)}$ | 1Mbps | | | 220 | | ps |
| Clock Jitter RMS | $t_{JCLK(RMS)}$ | 500kHz clock input, rising/falling edges | | | 26.5 | | ps |
| Rise Time (Figure 1) | t_R | $C_L = 15pF$ | $4.5V \leq V_{DD_} \leq 5.5V$ | | | 5 | ns |
| | | | $3.0V \leq V_{DD_} \leq 3.6V$ | | | 5 | |
| | | | $2.25V \leq V_{DD_} \leq 2.75V$ | | | 5 | |
| | | | $1.71V \leq V_{DD_} \leq 1.89V$ | | | 8 | |
| Fall Time (Figure 1) | t_F | $C_L = 15pF$ | $4.5V \leq V_{DD_} \leq 5.5V$ | | | 5 | ns |
| | | | $3.0V \leq V_{DD_} \leq 3.6V$ | | | 5 | |
| | | | $2.25V \leq V_{DD_} \leq 2.75V$ | | | 5 | |
| | | | $1.71V \leq V_{DD_} \leq 1.89V$ | | | 8 | |
| Output UVLO to Output Data Valid (Figure 2) | t_{UVLO_EN} | $C_L = 15pF$, $V_{DD_}$ rising | | | 1.1 | 1.7 | ms |
| Input UVLO to Output Default (Figure 2) | t_{UVLO_DE} | $C_L = 15pF$, $V_{DD_}$ falling | | | | 0.5 | ms |
| Refresh Rate | F_R | | | | 10 | | kHz |

Note 1: All devices are 100% production tested at $T_A = +25^{\circ}C$. Specifications over temperature are guaranteed by design and characterization.

Note 2: Not production tested. Guaranteed by design and characterization.

Note 3: All currents into the device are positive. All currents out of the device are negative. All voltages are referenced to their respective ground (GNDA or GNDB), unless otherwise noted.

Note 4: All measurements taken with $V_{DDA} = V_{ddb}$, unless otherwise noted.

Note 5: CMTI is the maximum sustainable common-mode voltage slew rate while maintaining the correct output. CMTI applies to both rising and falling common-mode voltage edges. Tested with the transient generator connected between GNDA and GNDB ($V_{CM} = 1000V$).

ESD Protection

| PARAMETER | SYMBOL | CONDITIONS | VALUE | UNITS |
|-----------|--------|-------------------------------------|---------|-------|
| ESD | | Human Body Model, All Pins | ± 4 | kV |
| | | IEC 61000-4-2 Contact, GNDB to GNDA | ± 6 | kV |

Safety Regulatory Approvals

| |
|--|
| UL |
| The devices are certified under UL1577. For more details, refer to File E351759. |
| The MAX22420/MAX22421 are rated up to 3000V _{RMS} isolation voltage for single protection. |
| The MAX22820/MAX22821 are rated up to 5000V _{RMS} isolation voltage for single protection. |
| cUL (Equivalent to CSA notice 5A) |
| The MAX22420/MAX22421 are certified up to 3000V _{RMS} for single protection. For more details, refer to File E351759. |
| The MAX22820/MAX22821 are certified up to 5000V _{RMS} for single protection. For more details, refer to File E351759. |
| VDE (Pending) |
| The MAX22420/MAX22421 are certified to DIN VDE V 0884-11: 2017-1. Reinforced Insulation, Maximum Transient Isolation Voltage 4242V _{PK} , Maximum Repetitive Peak Isolation Voltage 630V _{PK} . |
| The MAX22820/MAX22821 are certified to DIN VDE V 0884-11: 2017-1. Reinforced Insulation, Maximum Transient Isolation Voltage 7070V _{PK} , Maximum Repetitive Peak Isolation Voltage 1200V _{PK} . |
| CSA/Sira (Pending) |
| The devices are certified for use in intrinsic safety (IS) to IS applications under ATEX and IECEx. |
| ATEX: EN 60079-0:2012+A11:2013 and EN 60079-11:2012 |
| IECEx: IEC 60079-0:2011 Edition 6 and IEC 60079-11:2011 Edition 6 |
| II 1G Ex ia IIC Ga |

These couplers are suitable for safe electrical insulation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.

Test Circuits and Timing Diagrams

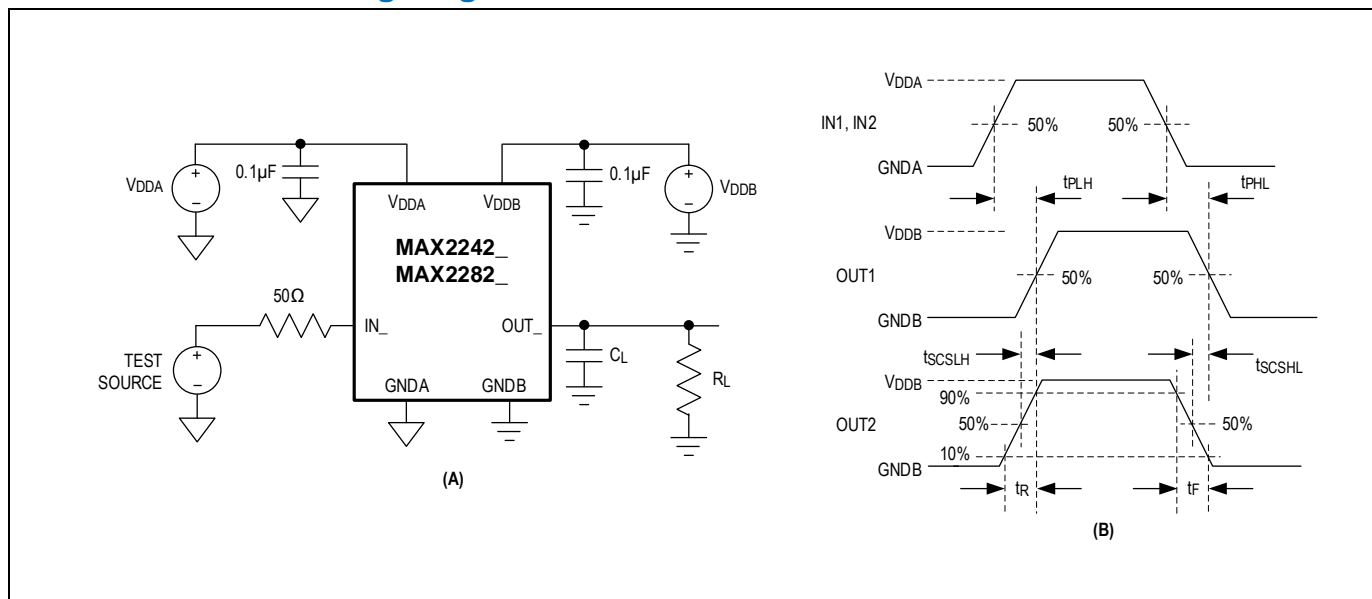


Figure 1. Test Circuit (A) and Timing Diagram (B)

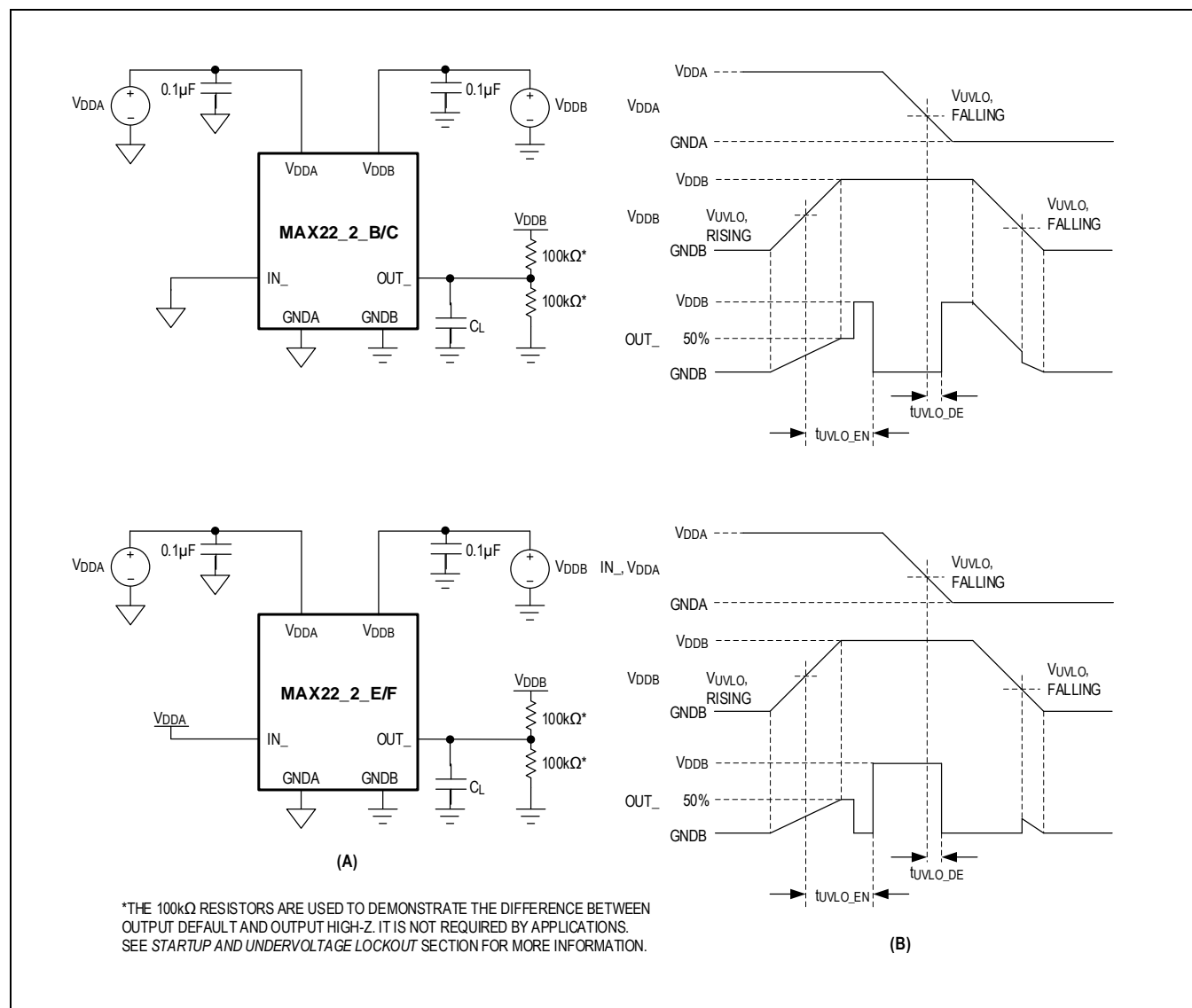


Figure 2. Enable to Output Timing Diagrams (t_{UVLO_EN} , t_{UVLO_DE})

Table 1. Insulation Characteristics (Narrow SOIC)

| PARAMETER | SYMBOL | CONDITIONS | VALUE | UNITS |
|---|------------|---|-------------|-----------|
| Partial Discharge Test Voltage | V_{PR} | Method B1 = $V_{IORM} \times 1.875$ ($t = 1s$, partial discharge < 5pC) | 1182 | V_P |
| Maximum Repetitive Peak Isolation Voltage | V_{IORM} | (Note 6) | 630 | V_P |
| Maximum Working Isolation Voltage | V_{IOWM} | Continuous RMS voltage (Note 6) | 445 | V_{RMS} |
| Maximum Transient Isolation Voltage | V_{IOTM} | $t = 1s$ (Note 6) | 4242 | V_P |
| Maximum Withstanding Isolation Voltage | V_{ISO} | $f_{SW} = 60Hz$, duration = 60s (Notes 6, 7) | 3000 | V_{RMS} |
| Maximum Surge Isolation Voltage | V_{IOSM} | Reinforced Insulation, test method per IEC 60065, $V_{TEST} = 1.6 \times V_{IOSM} = 10000V_{PEAK}$ (Notes 6, 9) | 6250 | V_P |
| Isolation Resistance | R_{IO} | $V_{IO} = 500V$, $T_A = 25^\circ C$ | $> 10^{12}$ | Ω |
| | | $V_{IO} = 500V$, $100^\circ C \leq T_A \leq 125^\circ C$ | $> 10^{11}$ | |
| | | $V_{IO} = 500V$, $T_S = 150^\circ C$ | $> 10^9$ | |
| Barrier Capacitance Side A to Side B | C_{IO} | $f_{SW} = 1MHz$ (Note 8) | 1.5 | pF |
| Minimum Creepage Distance | CPG | | 4 | mm |
| Minimum Clearance Distance | CLR | | 4 | mm |
| Internal Clearance | | Distance through insulation | 0.021 | mm |
| Comparative Tracking Index | CTI | Material Group I (IEC 60112) | > 600 | |
| Climate Category | | | 40/125/21 | |
| Pollution Degree (DIN VDE 0110, Table 1) | | | 2 | |

Table 2. Insulation Characteristics (Wide SOIC)

| PARAMETER | SYMBOL | CONDITIONS | VALUE | UNITS |
|---|------------|---|-------|-----------|
| Partial Discharge Test Voltage | V_{PR} | Method B1 = $V_{IORM} \times 1.875$ ($t = 1s$, partial discharge < 5pC) | 2250 | V_P |
| Maximum Repetitive Peak Isolation Voltage | V_{IORM} | (Note 6) | 1200 | V_P |
| Maximum Working Isolation Voltage | V_{IOWM} | Continuous RMS voltage (Note 6) | 848 | V_{RMS} |
| Maximum Transient Isolation Voltage | V_{IOTM} | $t = 1s$ (Note 6) | 7070 | V_P |
| Maximum Withstanding Isolation Voltage | V_{ISO} | $f_{SW} = 60Hz$, duration = 60s (Notes 6, 7) | 5000 | V_{RMS} |
| Maximum Surge Isolation Voltage | V_{IOSM} | Reinforced Insulation, test method per IEC 60065, $V_{TEST} = 1.6 \times V_{IOSM} = 12800V_{PEAK}$ (Notes 6, 9) | 8000 | V_P |

| | | | | |
|--|----------|--|-------------|----------|
| Isolation Resistance | R_{IO} | $V_{IO} = 500V, T_A = 25^\circ C$ | $> 10^{12}$ | Ω |
| | | $V_{IO} = 500V, 100^\circ C \leq T_A \leq 125^\circ C$ | $> 10^{11}$ | |
| | | $V_{IO} = 500V, T_S = 150^\circ C$ | $> 10^9$ | |
| Barrier Capacitance Side A to Side B | C_{IO} | $f_{SW} = 1MHz$ (Note 8) | 1.5 | pF |
| Minimum Creepage Distance | CPG | | 8 | mm |
| Minimum Clearance Distance | CLR | | 8 | mm |
| Internal Clearance | | Distance through insulation | 0.021 | mm |
| Comparative Tracking Index | CTI | Material Group I (IEC 60112) | > 600 | |
| Climate Category | | | 40/125/21 | |
| Pollution Degree (DIN VDE 0110, Table 1) | | | 2 | |

Note 6: V_{ISO} , V_{IOTM} , V_{IOWM} , V_{IORM} , and V_{IOSM} are defined by the IEC 60747-5-5 standard.

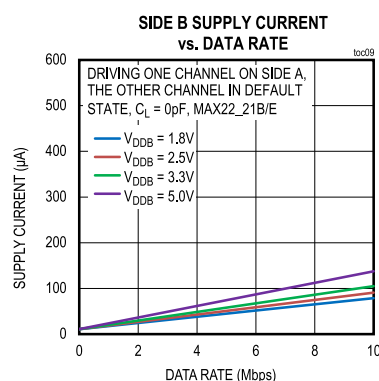
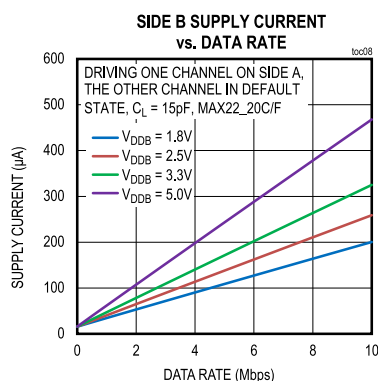
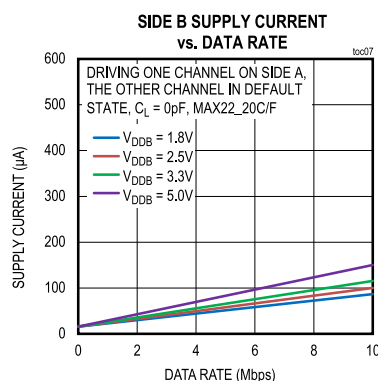
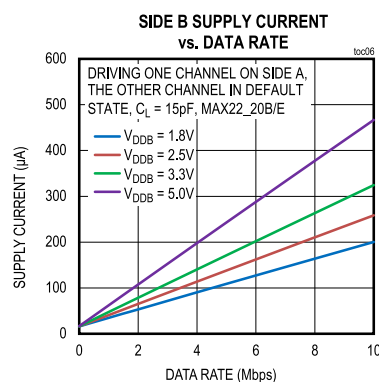
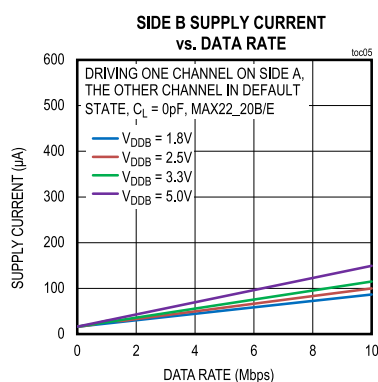
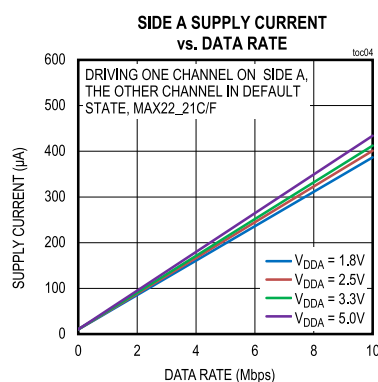
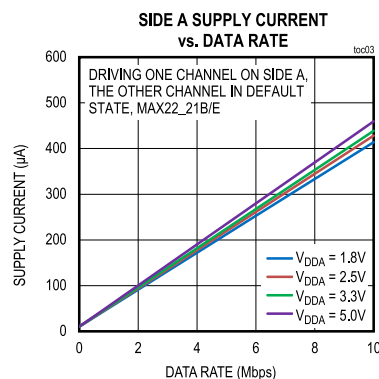
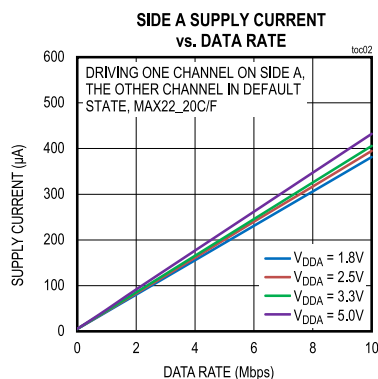
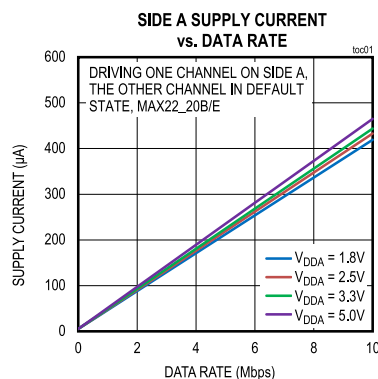
Note 7: Product is qualified at V_{ISO} for 60s and 100% production tested at 120% of V_{ISO} for 1s.

Note 8: Capacitance is measured with all pins on field-side and logic-side tied together.

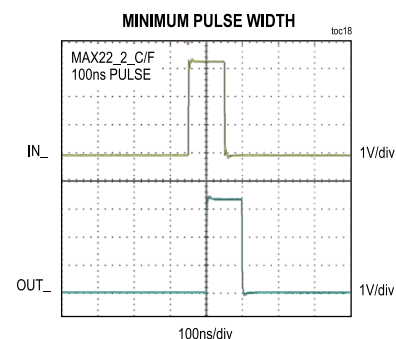
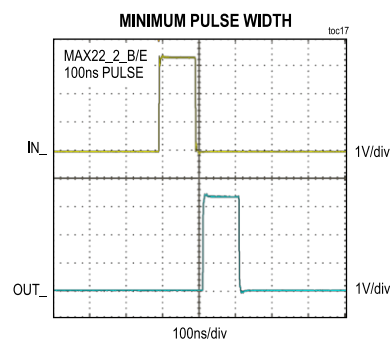
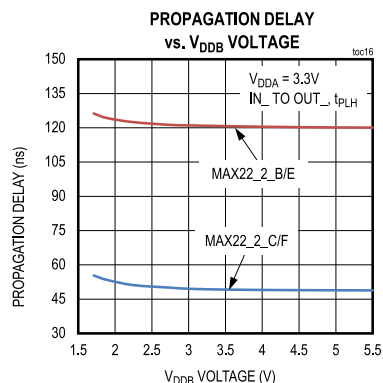
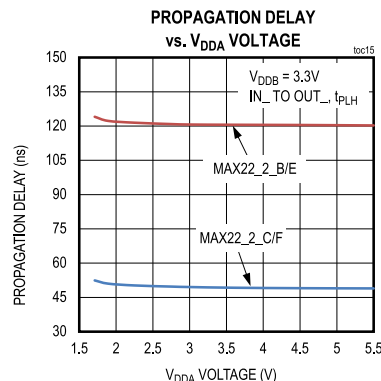
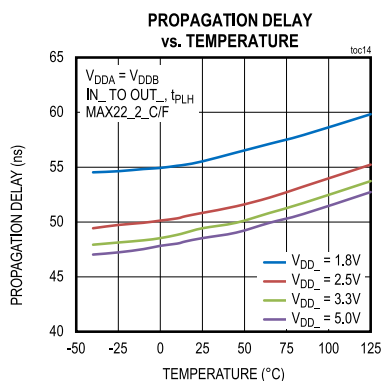
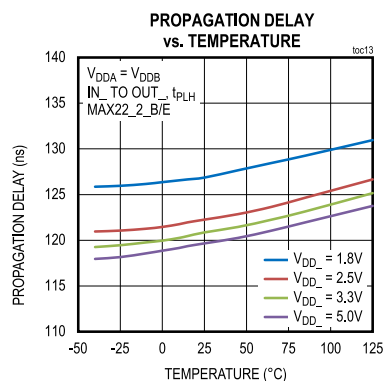
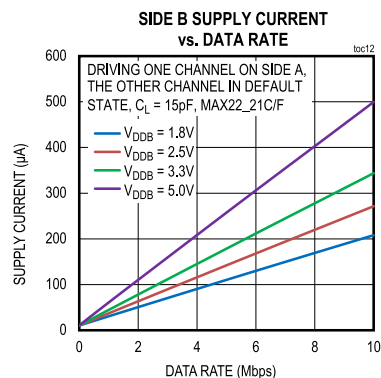
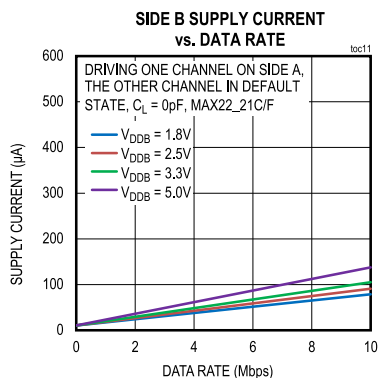
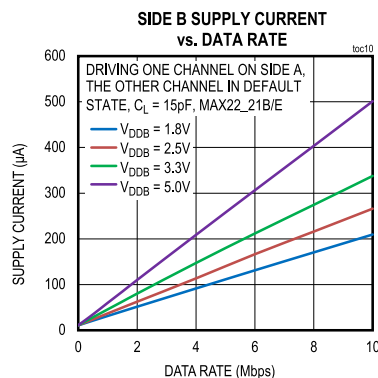
Note 9: Devices are immersed in oil during surge characterization.

Typical Operating Characteristics

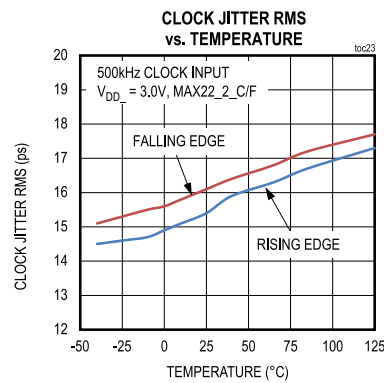
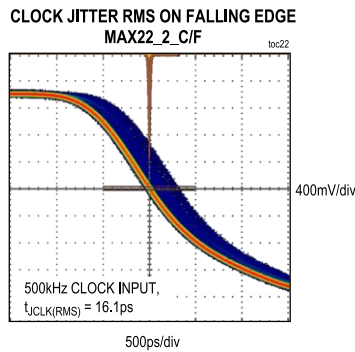
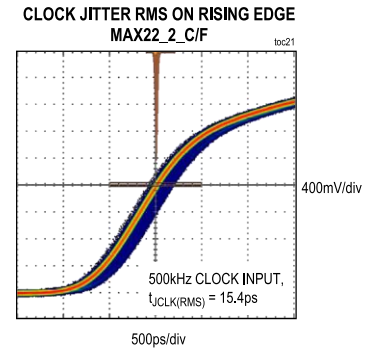
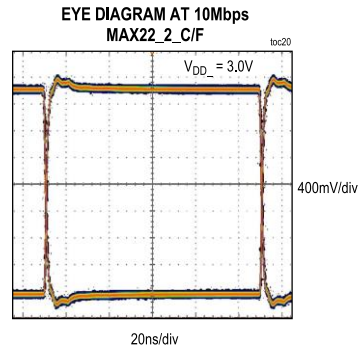
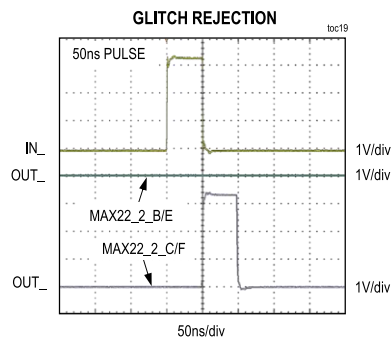
($V_{DDA} - V_{GNDA} = +3.3V$, $V_{DDB} - V_{GNDB} = +3.3V$, $V_{GNDA} = V_{GNDB}$, $T_A = +25^\circ C$, unless otherwise noted.)



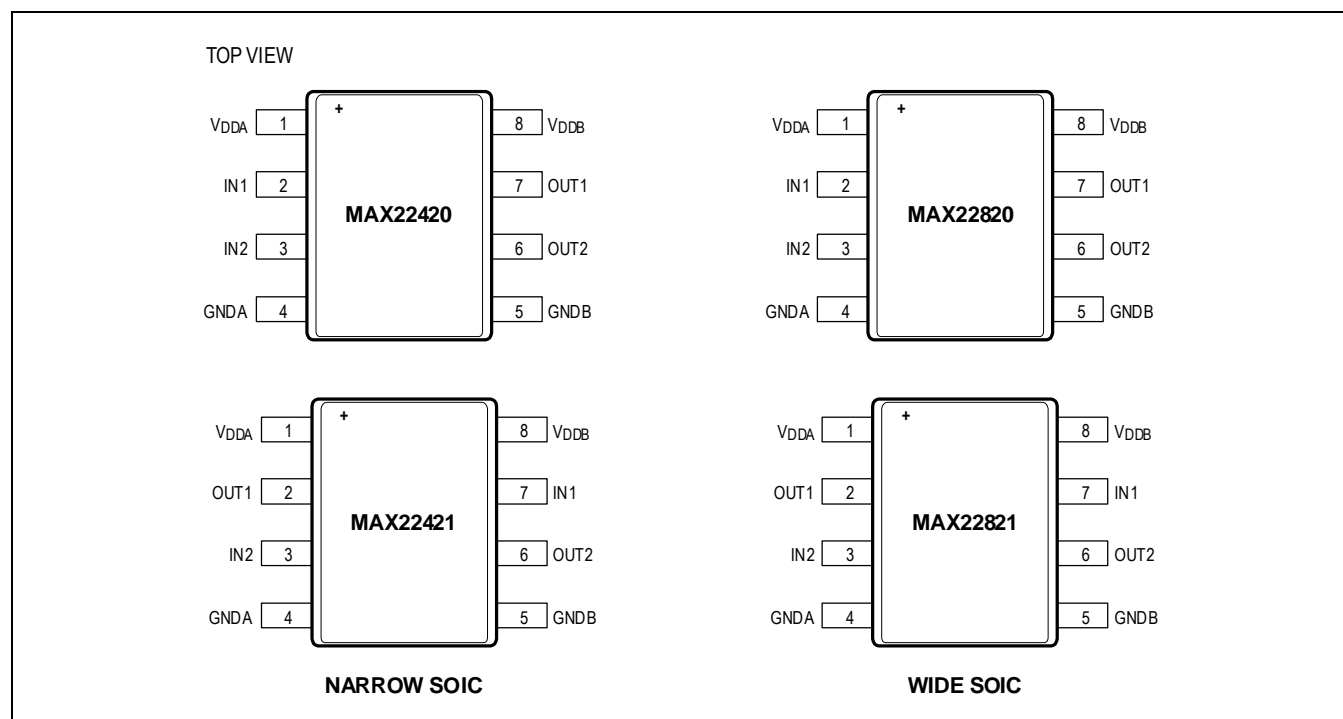
($V_{DDA} - V_{GNDA} = +3.3V$, $V_{DDB} - V_{GNDB} = +3.3V$, $V_{GNDA} = V_{GNDB}$, $T_A = +25^\circ C$, unless otherwise noted.)



($V_{DDA} - V_{GNDA} = +3.3V$, $V_{DDB} - V_{GNDB} = +3.3V$, $V_{GNDA} = V_{GNDB}$, $T_A = +25^\circ C$, unless otherwise noted.)



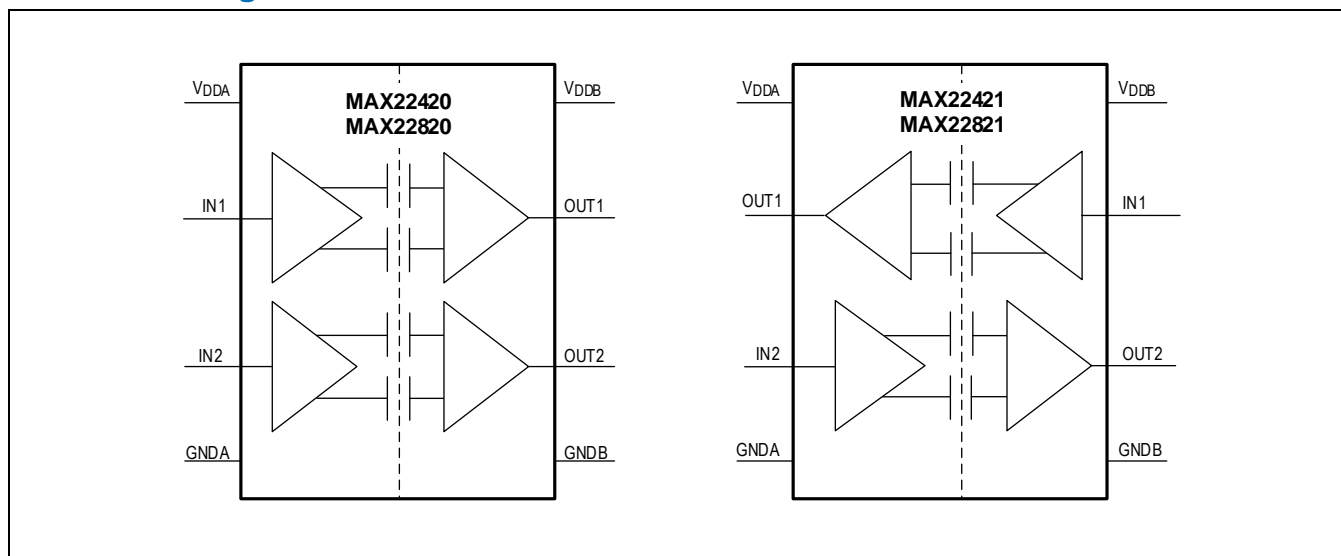
Pin Configurations



Pin Descriptions

| PIN | | NAME | FUNCTION |
|-----------------------|-----------------------|------------------|--|
| MAX22420/ MAX22820 | MAX22421/ MAX22821 | | |
| 1 | 1 | V _{DDA} | Power Supply Input for Side A. Bypass V _{DDA} to GNDA with a 0.1μF ceramic capacitor as close as possible to the pin. |
| 2 | — | IN1 | Logic Input 1 on Side A. |
| — | 2 | OUT1 | Logic Output 1 on Side A. |
| 3 | 3 | IN2 | Logic Input 2 on Side A. |
| 4 | 4 | GNDA | Ground Reference for Side A. |
| 5 | 5 | GNDB | Ground Reference for Side B. |
| 6 | 6 | OUT2 | Logic Output 2 on Side B. |
| 7 | — | OUT1 | Logic Output 1 on Side B. |
| — | 7 | IN1 | Logic Input 1 on Side B. |
| 8 | 8 | V _{DDB} | Power Supply Input for Side B. Bypass V _{DDB} to GNDB with a 0.1μF ceramic capacitor as close as possible to the pin. |

Functional Diagrams



Detailed Description

The MAX22_2_ are a family of 2-channel reinforced ultra-low-power digital isolators. The MAX22_2_ consume ultra-low power not only in DC but also across the entire operating speed range up to 10Mbps. The family offers two unidirectional channel configurations to accommodate any 2-channel design.

The MAX22_20 feature two channels transferring digital signals in one direction. The MAX22_21 have one channel to transmit data in one direction and the other channel to transmit in the opposite direction.

The MAX22420/1 are available in an 8-pin narrow-body SOIC package with 4mm creepage and clearance and are rated up to 3kV_{RMS}. The MAX22820/1 are available in an 8-pin wide-body SOIC package with 8mm creepage and clearance and are rated up to 5kV_{RMS}. This family of digital isolators offers ultra-low-power operation, high electromagnetic interference (EMI) immunity, and stable temperature performance through Analog Devices' proprietary process technology. The devices isolate different ground domains and block high-voltage/high-current transients from sensitive or human interface circuitry.

The family of devices has a maximum data rate of 10Mbps and can be ordered with two glitch filter options and default-high or default-low outputs. The default is the state the output assumes when the input is open circuit. The B/E versions have 70ns (typ) glitch filter and C/F versions have 29ns (typ) glitch filter. The devices have two supply inputs (V_{DDA} and V_{ddb}) that independently set the logic levels on either side of device. V_{DDA} and V_{ddb} are referenced to GNDA and GNDB, respectively. The family also features a refresh circuit to ensure output accuracy when an input remains in the same state indefinitely.

Digital Isolation

The MAX22_2_ provide reinforced galvanic isolation for digital signals that are transmitted between two ground domains. The MAX22420/1 withstand differences of up to 3kV_{RMS} for up to 60 seconds, and up to 630V_{PEAK} of continuous isolation. The MAX22820/1 withstand differences of up to 5kV_{RMS} for up to 60 seconds, and up to 1200kV_{PEAK} of continuous isolation.

Level Shifting

The wide supply voltage range of both V_{DDA} and V_{ddb} allows the family of devices to be used for level translation in addition to isolation. V_{DDA} and V_{ddb} can be independently set to any voltage from 1.71V to 5.5V. The supply voltage sets the logic level on the corresponding side of the isolator.

Unidirectional Channels

Each channel of the devices is unidirectional; it only passes data in one direction, as indicated in the [Functional Diagrams](#). Each device features two unidirectional channels that operate independently with guaranteed data rates from DC up to 10Mbps. The output driver of each channel is push-pull, eliminating the need for pullup resistors. The outputs are able to drive both TTL and CMOS logic inputs.

Startup and Undervoltage Lockout

The V_{DDA} and V_{ddb} supplies are both internally monitored for undervoltage conditions. Undervoltage events can occur during power-up, power-down, or during normal operation due to a sagging supply voltage. When an undervoltage condition is detected on the output supply, the outputs go to high-Z regardless of the state of the inputs. When an undervoltage condition is detected on the input supply, the outputs go to default regardless of the state of the inputs as seen in [Table 3](#). During the output supply rises above the UVLO (Powered), the output transitions from high-Z to default state for a short period of time before becoming valid. During the output supply drops below the UVLO (Undervoltage), the output transitions to high-Z immediately. [Figure 2](#) shows the output UVLO to output valid and input UVLO to output default timing diagrams. [Figure 3](#) through [Figure 6](#) show the behavior of the outputs during power-up and power-down.

Table 3. Output Behavior During Undervoltage Condition

| V _{IN_} | V _{DDA} | V _{ddb} | V _{OUTA} | V _{OUTB} |
|------------------|------------------|------------------|-------------------|-------------------|
| 1 | Powered | Powered | High | High |
| 0 | Powered | Powered | Low | Low |
| X | Undervoltage | Powered | High-Z | Default |
| X | Powered | Undervoltage | Default | High-Z |

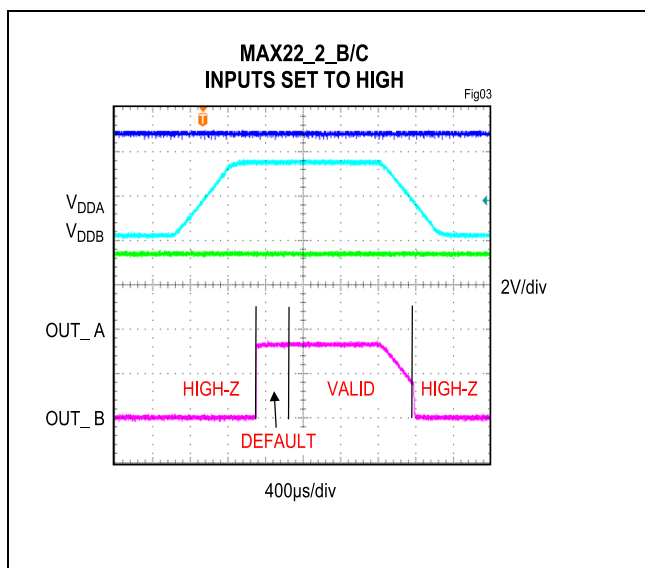


Figure 3. Undervoltage Lockout Behavior MAX22_2_B/C, Input High, Weak Outputs Pulldown to Ground

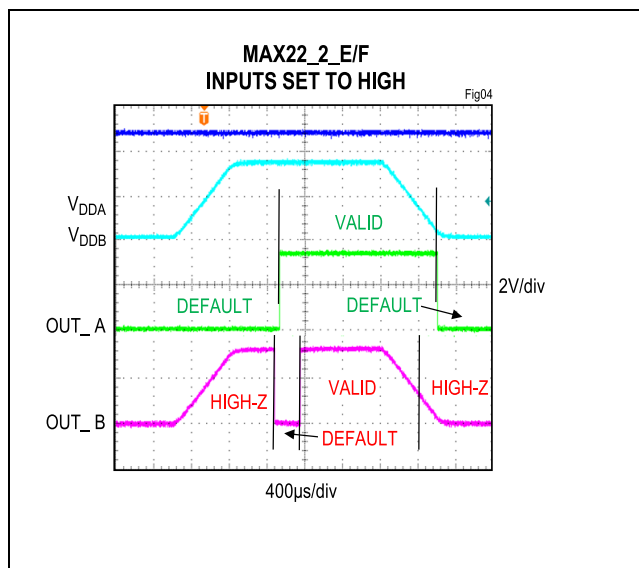


Figure 4. Undervoltage Lockout Behavior MAX22_2_E/F, Input High, Weak Outputs Pullup to Supply

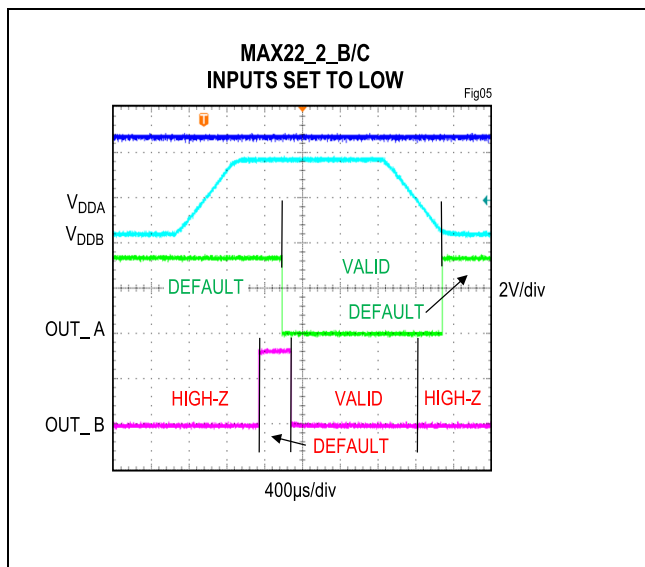


Figure 5. Undervoltage Lockout Behavior MAX22_2_B/C, Input Low, Weak Outputs Pulldown to Ground

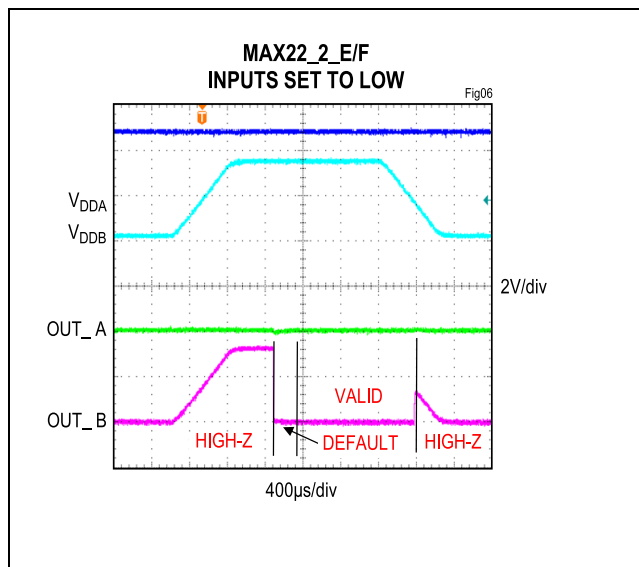


Figure 6. Undervoltage Lockout Behavior MAX22_2_E/F, Input Low, Weak Outputs Pullup to Supply

Safety Limits

Damage to the IC can result in a low-resistance path to ground or to the supply and, without current limiting, the devices can dissipate excessive amounts of power. Excessive power dissipation can damage the die and result in damage to the isolation barrier, potentially causing downstream issues. [Table 4](#) shows the safety limits for the MAX22_2_.

The maximum safety temperature (T_S) for the device is the 150°C maximum junction temperature specified in the [Absolute Maximum Ratings](#). The power dissipation (P_D) and junction-to-ambient thermal impedance (θ_{JA}) determine the junction temperature. Thermal impedance values (θ_{JA} and θ_{JC}) are available in the [Package Information](#) section and power dissipation calculations are discussed in the [Calculating Power Dissipation](#) section. Calculate the junction temperature (T_J) as:

$$T_J = T_A + (P_D \times \theta_{JA})$$

[Figure 7](#) shows the thermal derating curves for safety limiting the power of the device. [Figure 8](#) shows the thermal derating curve for safety limiting the current of the device. Ensure that the junction temperature does not exceed 150°C.

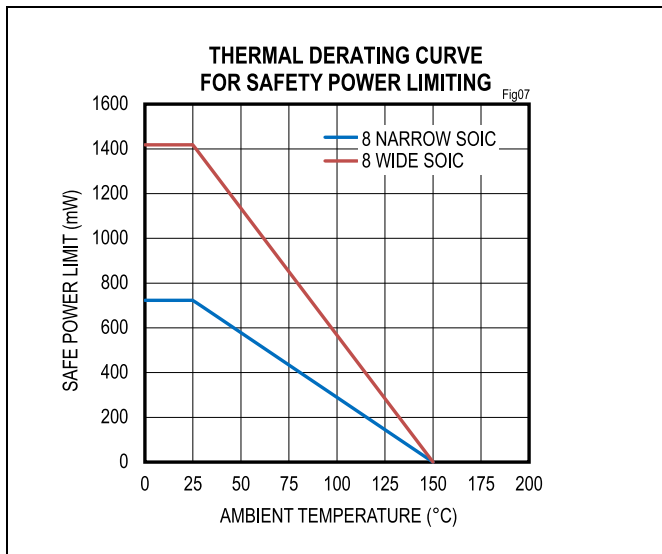


Figure 7. Thermal Derating Curve for Safety Power Limiting

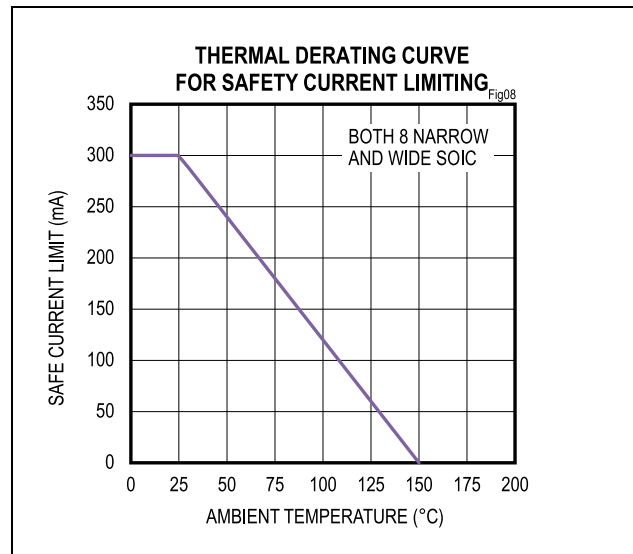


Figure 8. Thermal Derating Curve for Safety Current Limiting

Table 4. Safety Limiting Values

| PARAMETER | SYMBOL | TEST CONDITIONS | | MAX | UNIT |
|---|--------|--|---------------|------|------|
| Safety Current on Any Pin (No Damage to Isolation Barrier) | I_S | $T_J = 150^\circ\text{C}$, $T_A = 25^\circ\text{C}$ | | 300 | mA |
| Total Safety Power Dissipation | P_S | $T_J = 150^\circ\text{C}$, $T_A = 25^\circ\text{C}$ | 8 Narrow SOIC | 723 | mW |
| | | | 8 Wide SOIC | 1418 | |
| Maximum Safety Temperature | T_S | | | 150 | °C |

Applications Information

Power-Supply Sequencing

The family of devices does not require special power-supply sequencing. The logic levels are set independently on either side by V_{DDA} and V_{ddb} . Each supply can be present over the entire specified range regardless of the level or presence of the other supply.

Power-Supply Decoupling

To reduce ripple and the chance of introducing data errors, bypass V_{DDA} and V_{ddb} with 0.1 μ F low-ESR ceramic capacitors to GNDA and GNDB, respectively. Place the bypass capacitors as close to the power supply input pins as possible.

Layout Considerations

The PCB designer should follow some critical recommendation in order to get the best performance from the design.

- Keep the input/output traces as short as possible. To keep signal paths low inductance, avoid using vias.
- Have a solid ground plane underneath the high-speed signal layer.
- Keep the area underneath the devices free from ground and signal planes. Any galvanic or metallic connection between the field-side and logic-side defeats the isolation.

Calculating Power Dissipation

The required current for a given supply (V_{DDA} or V_{ddb}) can be estimated by summing the current required for each channel. The supply current for a channel depends on whether the channel is an input or an output, the channel's data rate, and the capacitive or resistive load if it is an output. The typical current for an input or output at any data rate can be estimated from the graphs in [Figure 9](#) and [Figure 10](#). Note that the data in [Figure 9](#) and [Figure 10](#) are extrapolated from the supply current measurements in a typical operating condition.

The total current for a single channel is the sum of the no load current (shown in [Figure 9](#) and [Figure 10](#)), which is a function of voltage and data rate, and the load current, which depends on the type of load. Current into a capacitive load is a function of the load capacitance, the switching frequency, and the supply voltage.

$$I_{CL} = C_L \times f_{SW} \times V_{DD}$$

where:

I_{CL} is the current required to drive the capacitive load.

C_L is the load capacitance on the isolator's output pin.

f_{SW} is the switching frequency (bits per second/2).

V_{DD} is the supply voltage on the output side of the isolator.

Current into a resistive load depends on the load resistance, the supply voltage and the average duty cycle of the data waveform. The DC load current can be conservatively estimated by assuming the output is always high.

$$I_{RL} = V_{DD} \div R_L$$

where:

I_{RL} is the current required to drive the resistive load.

V_{DD} is the supply voltage on the output side of the isolator.

R_L is the load resistance on the isolator's output pin.

Example (shown in [Figure 11](#)): A MAX22421C is operating with $V_{DDA} = 2.5V$, $V_{ddb} = 3.3V$, channel 1 operating at 2Mbps with a 15pF capacitive load, and channel 2 operating at 10Mbps with a 10k Ω resistive load. See [Table 5](#) and [Table 6](#) for V_{DDA} and V_{ddb} supply-current calculation worksheets.

V_{DDA} must supply:

- Channel 1 is an output channel operating at 2.5V and 2Mbps, consuming 23.93μA, estimated from [Figure 10](#).
- Channel 2 is an input channel operating at 2.5V and 10Mbps, consuming 393.35μA, estimated from [Figure 9](#).
- I_{CL} on Channel 1 for 15pF capacitor at 2.5V and 2Mbps is 37.5μA.

Total current for side A = 454.8μA (typ)

V_{ddb} must supply:

- Channel 1 is an input channel operating at 3.3V and 2Mbps, consuming 82.92μA, estimated from [Figure 9](#).
- Channel 2 is an output channel operating at 3.3V and 10Mbps, consuming 102.49μA, estimated from [Figure 10](#).
- I_{RL} on Channel 2 for 10kΩ resistor switching at 50% duty cycle and at 3.3V is 165μA.

Total current for side B = 350.4μA (typ)

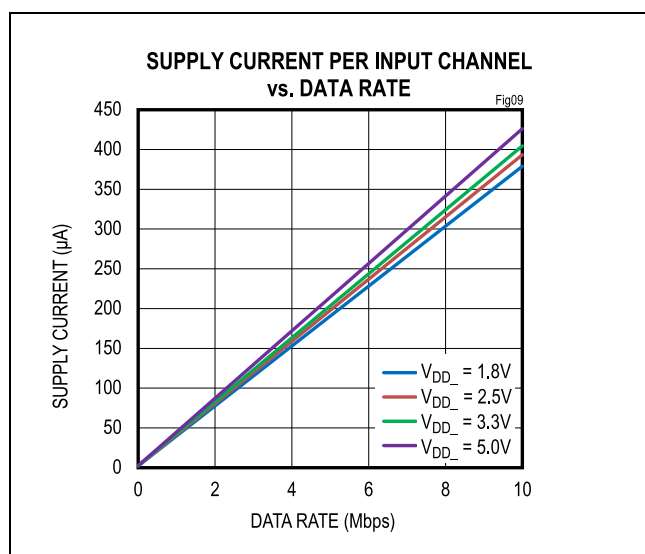


Figure 9. Supply Current per Input Channel (Estimated)

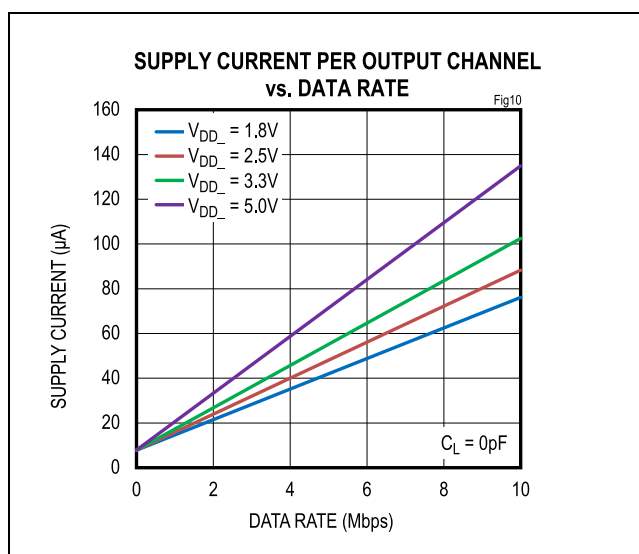


Figure 10. Supply Current per Output Channel (Estimated)

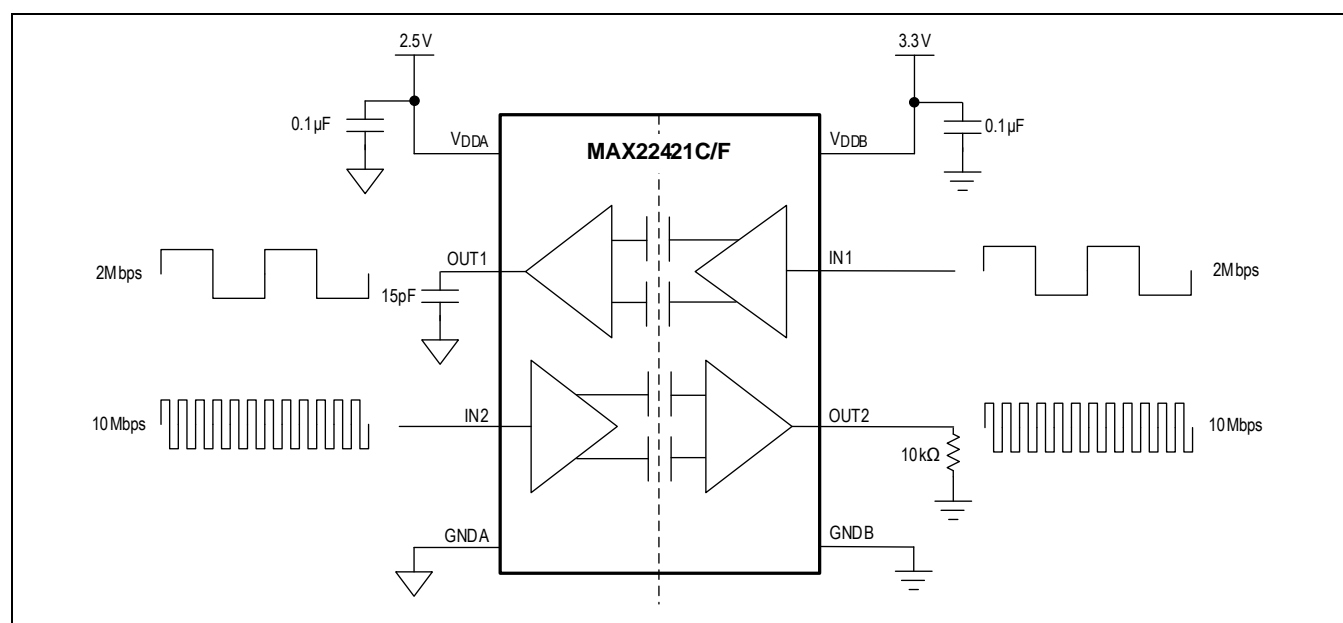


Figure 11. Example Circuit for Supply Current Calculation

Table 5. Side A Supply Current Calculation Worksheet

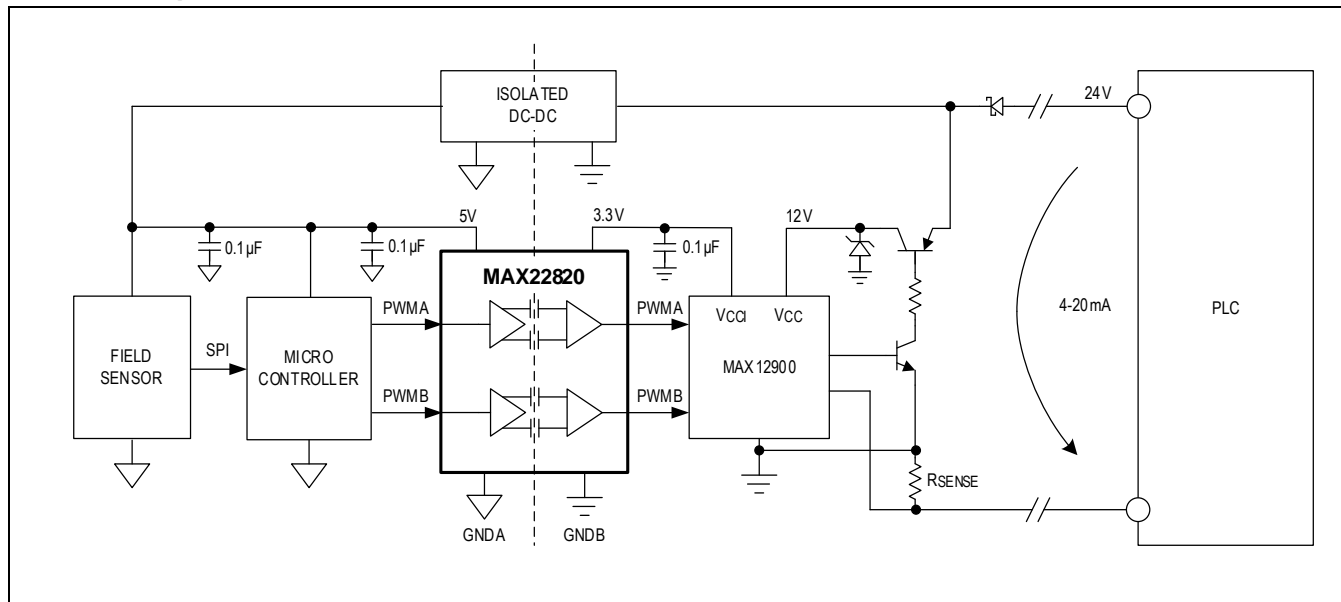
| SIDE A | | V _{DDA} = 2.5V | | | | |
|----------------|--------|-------------------------|------------|------|----------------------|-----------------------------|
| CHANNEL | IN/OUT | DATA RATE (Mbps) | LOAD TYPE | LOAD | NO LOAD CURRENT (μA) | LOAD CURRENT (μA) |
| 1 | OUT | 2 | Capacitive | 15pF | 23.93 | 2.5V x 1MHz x 15pF = 37.5μA |
| 2 | IN | 10 | | | 393.35 | |
| Total: 454.8μA | | | | | | |

Table 6. Side B Supply Current Calculation Worksheet

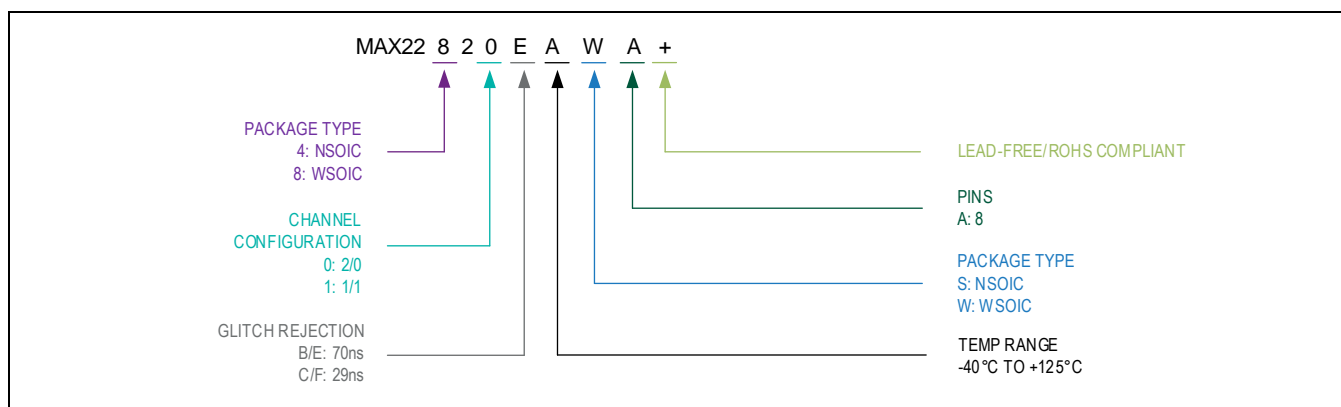
| SIDE B | | V _{ddb} = 3.3V | | | | |
|----------------|--------|-------------------------|-----------|------|----------------------|-------------------------|
| CHANNEL | IN/OUT | DATA RATE (Mbps) | LOAD TYPE | LOAD | NO LOAD CURRENT (μA) | LOAD CURRENT (μA) |
| 1 | IN | 2 | | | 82.92 | |
| 2 | OUT | 10 | Resistive | 10kΩ | 102.49 | 3.3V/10kΩ x 0.5 = 165μA |
| Total: 350.4μA | | | | | | |

Typical Application Circuits

4-20mA Loop Powered Control



Product Selector Guide



Ordering Information

| PART NUMBER | CHANNEL CONFIGURATION | GLITCH REJECTION (ns) | DEFAULT OUTPUT | PIN-PACKAGE | TEMPERATURE RANGE (°C) |
|----------------|-----------------------|-----------------------|----------------|---------------|------------------------|
| MAX22420BASA+* | 2/0 | 70 | High | 8 Narrow SOIC | -40 to +125 |
| MAX22420CASA+* | 2/0 | 29 | High | 8 Narrow SOIC | -40 to +125 |
| MAX22420EASA+* | 2/0 | 70 | Low | 8 Narrow SOIC | -40 to +125 |
| MAX22420FASA+* | 2/0 | 29 | Low | 8 Narrow SOIC | -40 to +125 |
| MAX22421BASA+ | 1/1 | 70 | High | 8 Narrow SOIC | -40 to +125 |
| MAX22421CASA+ | 1/1 | 29 | High | 8 Narrow SOIC | -40 to +125 |
| MAX22421EASA+* | 1/1 | 70 | Low | 8 Narrow SOIC | -40 to +125 |
| MAX22421FASA+* | 1/1 | 29 | Low | 8 Narrow SOIC | -40 to +125 |
| MAX22820BAWA+* | 2/0 | 70 | High | 8 Wide SOIC | -40 to +125 |
| MAX22820CAWA+* | 2/0 | 29 | High | 8 Wide SOIC | -40 to +125 |
| MAX22820EAWA+ | 2/0 | 70 | Low | 8 Wide SOIC | -40 to +125 |
| MAX22820FAWA+* | 2/0 | 29 | Low | 8 Wide SOIC | -40 to +125 |
| MAX22821BAWA+* | 1/1 | 70 | High | 8 Wide SOIC | -40 to +125 |
| MAX22821CAWA+* | 1/1 | 29 | High | 8 Wide SOIC | -40 to +125 |
| MAX22821EAWA+* | 1/1 | 70 | Low | 8 Wide SOIC | -40 to +125 |
| MAX22821FAWA+* | 1/1 | 29 | Low | 8 Wide SOIC | -40 to +125 |

*Future product—contact Analog Devices for availability.

+Denotes a lead(Pb)-free/RoHS-compliant package.

Chip Information

PROCESS: BiCMOS

Revision History

| REVISION NUMBER | REVISION DATE | DESCRIPTION | PAGES CHANGED |
|--------------------|------------------|--|------------------|
| 0 | 2/22 | Release for Market Intro | — |
| 1 | 3/22 | Remove future product asterisks in <i>Ordering Information</i> table | 26 |



Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Maxim Integrated:

[MAX22421BASA+](#) [MAX22421CASA+](#) [MAX22820EAWA+](#)