# High Speed Dual Channel Digital Isolator

## GENERAL DESCRIPTION

The SiLM572x devices are high performance, dual channel digital isolator with 5.0 kV$_{RMS}$ (SOP8W) and 3 kV$_{RMS}$ (SOP8) isolation rating per UL1577. The SiLM572x devices provide high electromagnetic immunity and low emissions at low power consumption.

The SiLM5720 device has both channels in the same direction while the SiLM5721 device has both channels in the opposite direction. In the event of input power or signal loss, the default output is high for devices without suffix F and low for devices with suffix F.

## APPLICATION

- Isolated line receiver
- Microprocessor system interface
- Digital isolation for A/D, D/A conversion
- PLC, ATE input/output isolation
- Power transistor isolation in motor drives
- Isolation of high-speed logic systems

## FEATURES

- Data rate 100Mbps
- Propagation delay 12ns (Typ)
- CMTI 150kV/us (Min)
- Low power consumption: 1.5mA/Channel (Typ)
- Wide supply voltage: 2.25V to 5.5V
- 2.25V to 5.5V level translation
- Default output High (SiLM572x) and Low (SiLM572xF) Options
- Robust electromagnetic compatibility (EMC)
  - System Level ESD, EFT, and surge immunity
  - ±8 kV IEC 61000-4-2 contact discharge protection across isolation barrier
  - Low emissions
- Operation temperature: –40°C to +125°C
- Safety certifications:
  - 3kV$_{RMS}$ isolation for 1 minute per UL 1577 for SOP8 package
  - 5.0kV$_{RMS}$ isolation for 1 minute per UL 1577 for SOP8W package
  - CQC certification per GB4943.1-2022
  - TUV certification per EN/IEC 61010-1: 2010+A1 and EN/IEC 62368-1: 2018
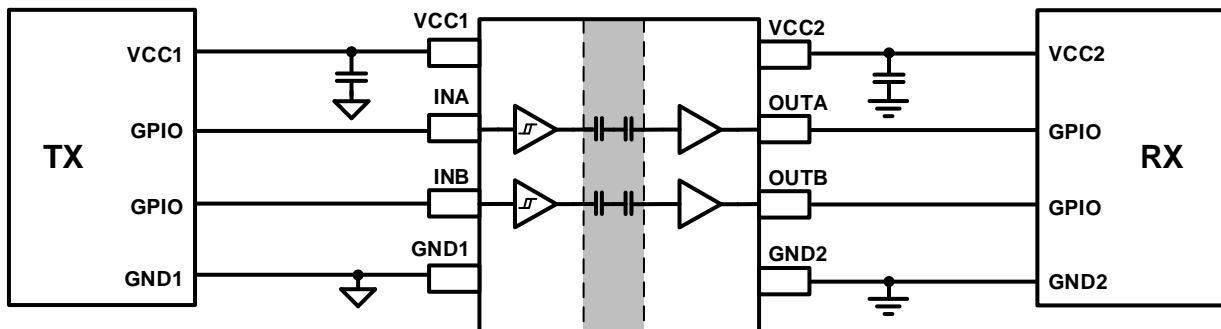  - DIN VDE 0884-17: 2021-10 (Pending)



Figure 1. SiLM5720 Typical Application Circuit

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## PIN CONFIGURATION

| Part Name | Pin Configuration (Top View) |
|---|---|
| | **SOP8/SOP8W** |
| **SiLM5720** | VCC1 **1**      **8** VCC2 <br> INA **2**      **7** OUTA <br> INB **3**      **6** OUTB <br> GND1 **4**      **5** GND2 |
| **SiLM5721** | VCC1 **1**      **8** VCC2 <br> OUTA **2**      **7** INA <br> INB **3**      **6** OUTB <br> GND1 **4**      **5** GND2 |
| **SiLM5722** | VCC1 **1**      **8** VCC2 <br> INA **2**      **7** OUTA <br> OUTB **3**      **6** INB <br> GND1 **4**      **5** GND2 |

## PIN DESCRIPTION

Table 1. SiLM5720 SOP8/SOP8W Pin Description

| No. | Pin Name | Description |
|---|---|---|
| 1 | VCC1 | Input power supply |
| 2 | INA | Channel A input |
| 3 | INB | Channel B input |
| 4 | GND1 | Input power ground |
| 5 | GND2 | Output power ground |
| 6 | OUTB | Channel B output |
| 7 | OUTA | Channel A output |
| 8 | VCC2 | Output power supply |

Table 2. SiLM5721 SOIC8/SOP8W Pin Description

| No. | Pin Name | Description |
|---|---|---|
| 1 | VCC1 | Input power supply |
| 2 | OUTA | Channel A output |
| 3 | INB | Channel B input |
| 4 | GND1 | Input power ground |
| 5 | GND2 | Output power ground |
| 6 | OUTB | Channel B output |
| 7 | INA | Channel A input |
| 8 | VCC2 | Output power supply |

Table 3. SiLM5722 SOIC8/SOP8W Pin Description

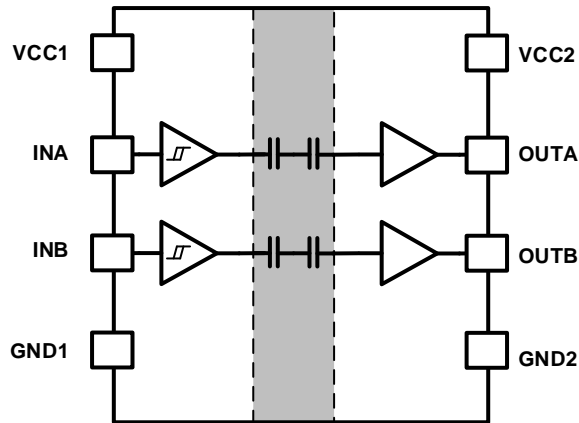| No. | Pin Name | Description |
|---|---|---|
| 1 | VCC1 | Input power supply |
| 2 | INA | Channel A input |
| 3 | OUTB | Channel B output |
| 4 | GND1 | Input power ground |
| 5 | GND2 | Output power ground |
| 6 | INB | Channel B input |
| 7 | OUTA | Channel A output |
| 8 | VCC2 | Output power supply |

## FUNCTIONAL BLOCK DIAGRAM



Figure 2. SiLM5720 Functional Block



Figure 3. SiLM5721 Functional Block



Figure 4. SiLM5722 Functional Block

## ORDERING INFORMATION

| Order Part No. | Package | QTY |
|---|---|---|
| SiLM5720CA-DG | SOP8, Pb-Free | 2500/Reel |
| SiLM5720CM-DG | SOP8W, Pb-Free | 1000/Reel |
| SiLM5720FCA-DG | SOP8, Pb-Free | 2500/Reel |
| SiLM5720FCM-DG | SOP8W, Pb-Free | 1000/Reel |
| SiLM5721CA-DG | SOP8, Pb-Free | 2500/Reel |
| SiLM5721CM-DG | SOP8W, Pb-Free | 1000/Reel |
| SiLM5721FCA-DG | SOP8, Pb-Free | 2500/Reel |
| SiLM5721FCM-DG | SOP8W, Pb-Free | 1000/Reel |
| SiLM5722CA-DG | SOP8, Pb-Free | 2500/Reel |
| SiLM5722CM-DG | SOP8W, Pb-Free | 1000/Reel |
| SiLM5722FCA-DG | SOP8, Pb-Free | 2500/Reel |
| SiLM5722FCM-DG | SOP8W, Pb-Free | 1000/Reel |

## ABSOLUTE MAXIMUM RATINGS

| Symbol | Definition | Min. | Max. | Units |
|---|---|---|---|---|
| $V_{CC1}$, $V_{CC2}$ | Supply voltage, VCC1 and VCC2 | -0.3 | 6 | V |
| $V_I$ | Voltage at Inx, referenced to input side ground | -0.3 | $V_{CC}+0.3$ | V |
| $V_{OUT}$ | Voltage at OUTx, reference to output side ground | -0.3 | $V_{CC}+0.3$ | V |
| $I_O$ | Output Current | -15 | 15 | mA |
| $T_J$ | Junction temperature | -55 | 150 | °C |
| $T_S$ | Storage temperature | -65 | 150 | °C |

**Note:** 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 condition beyond those indicated in the Recommended Operation Conditions is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. All voltage parameters are referenced to local ground terminal, GND1 or GND2.

## RECOMMENDED OPERATION CONDITIONS

| Symbol | Definition | Min. | Max. | Units |
|---|---|---|---|---|
| $V_{CC1}$, $V_{CC2}$ | Supply voltage | 2.25 | 5.5 | V |
| | High level output current @ $V_{CCO}$[1]=5V | -4 | | mA |
| $I_{OH}$ | High level output current @ $V_{CCO}$=3.3V | -2 | | mA |
| | High level output current @ $V_{CCO}$=2.5V | -1 | | mA |
| | Low level output current @ $V_{CCO}$=5V | | 4 | mA |
| $I_{OL}$ | Low level output current @ $V_{CCO}$=3.3V | | 2 | mA |
| | Low level output current @ $V_{CCO}$=2.5V | | 1 | mA |
| $V_{IH}$ | High Level Input Voltage | $0.7\times V_{CCI}$ | $V_{CCI}$[1] | V |
| $V_{IL}$ | Low Level Input Voltage | 0 | $0.3\times V_{CCI}$ | V |
| DR | Data Rate | 0 | 100 | Mbps |
| $T_J$ | Junction temperature | -40 | 150 | °C |
| $T_A$ | Ambient temperature | -40 | 125 | °C |

(1)  $V_{CCI}$ =Input side $V_{CC}$, $V_{CCO}$=Output side $V_{CC}$

## ESD RATINGS

| Symbol | Definition | Value | Units |
|---|---|---|---|
| $V_{ESD}$ | HBM | ±8000 | V |
| | CDM | ±2000 | V |

## THERMAL INFORMATION

| Symbol | Definition | Value | | Unit |
|---|---|---|---|---|
| | | SOP8 | SOP8W | |
| $R_{\theta JA}$ | Junction to ambient thermal resistance | 135.3 | 84.5 | °C/W |
| $R_{\theta JC}$ | Junction to case (top) thermal resistance | 48 | 43 | °C/W |

## PACKAGE SPECIFICATIONS

| Symbol | Definition | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| $R_{IO}$ | Resistance (Input Side to Output Side) | | $10^{12}$ | | $\Omega$ |
| $C_{IO}$ | Capacitance (Input Side to Output Side) | | 0.95 | | pF |

## INSULATION SPECIFICATIONS

| Symbol | Definition | Test Condition | Value | | Units |
|---|---|---|---|---|---|
| | | | SOP8 | SOP8W | |
| CLR | External clearance | Shortest terminal to terminal distance through air | >4.0 | >8.0 | mm |
| CPG | External creepage | Shortest terminal to terminal distance across the package surface | >4.0 | >8.0 | mm |
| DTI | Distance through the insulation | Minimum internal gap | >16 | >16 | um |
| CTI | Comparative tracking index | DIN EN 60112 (VDE 0303-11), IEC 60112 | >600 | >600 | V |
| | Material Group | | I | | |
| | Overvoltage category | Rated mains voltage ≤150$V_{RMS}$ | I-IV | I-IV | |
| | | Rated mains voltage ≤300 $V_{RMS}$ | I-III | I-IV | |
| | | Rated mains voltage ≤600 $V_{RMS}$ | I-II | I-III | |
| | | Rated mains voltage ≤1000 $V_{RMS}$ | I-I | I-II | |
| DIN VDE 0884-17[1] | | | | | |
| $V_{IORM}$ | Maximum repetitive peak isolation voltage | | 1000 | 1414 | $V_{PK}$ |
| $V_{IOWM}$ | Maximum isolation working voltage | | 707 | 1000 | $V_{RMS}$ |
| $V_{IOTM}$ | Maximum transient isolation voltage | 60s | 4242 | 7000 | $V_{PK}$ |
| $V_{IOSM}$ | Maximum surge isolation voltage | Test method per IEC62368, 1.2/50us waveform, $V_{TEST}=1.3 \times V_{IOSM}$ for SOP8, $V_{TEST}=1.6 \times V_{IOSM}$ for SOP8W | 6000 | 6250 | $V_{PK}$ |
| $q_{pd}$ | Apparent charge | | ≤5 | ≤5 | pC |
| | Climatic Category | | 40/125/21 | 40/125/21 | |
| | Pollution Degree | | 2 | 2 | |

| Symbol | Definition | Test Condition | Value | | Units |
|---|---|---|---|---|---|
| | | | SOP8 | SOP8W | |
| UL1577 | | | | | |
| $V_{ISO}$ | Withstand Isolation Voltage | $V_{TEST}=V_{ISO}$, t=60s (qualification), $V_{TEST}=1.2$ x $V_{ISO}$, t=1s (100% production) | 3000 | 5000 | $V_{RMS}$ |

Note1: Certification pending

## SAFETY RELATED CERTIFICATIONS (SOP8)

| VDE | UL | CQC | TUV |
|---|---|---|---|
| DIN VDE 0884-17: 2021-10 | UL 1577 component recognition program | Certified according to GB4943.1-2022 | Certified according to EN IEC 61010-1: 2010+A1 and EN IEC 62368-1: 2018 |
| Basic Insulation, $V_{IORM}$ = 1000 $V_{PK}$<br><br>$V_{IOTM}$ = 4242 $V_{PK}$ | Single protection, 3000 $V_{RMS}$ | Basic insulation, Altitude $\leqslant$ 5000m | 3000Vrms basic insulation |
| Certification Pending | File number: E521801 | File number: CQC23001373092 | Ref.Certif.No: DE 2-040207<br><br>Ref.Certif.No: JPTUV-152104<br><br>Certificate No: R 50600851 0001 |

## SAFETY LIMITING VALUES (SOP8)

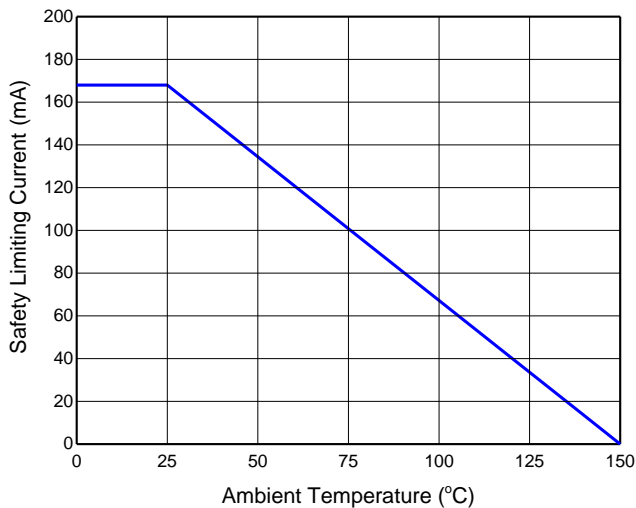| Symbol | Parameter | Condition | Value | Unit |
|---|---|---|---|---|
| $I_S$ | Safety input, output, or supply current | $R_{\theta JA}$=135.3°C/W, VCC1=VCC2=5.5V, $T_J$=150°C, $T_A$=25°C | 168 | mA |
| $P_S$ | Safety input, output, or total power | $R_{\theta JA}$=135.3°C/W, $T_J$=150°C, $T_A$=25°C | 924 | mW |
| $T_S$ | Maximum safety temperature | | 150 | °C |



Figure 5. Thermal Derating Curve for Limiting Current per VDE (SOP8)


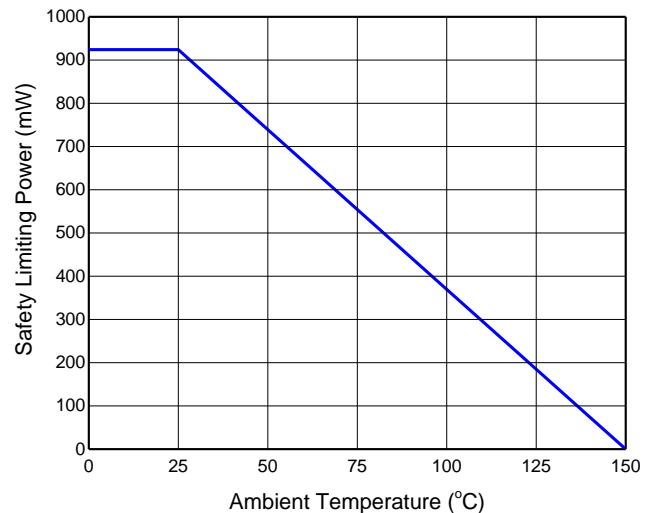
Figure 6. Thermal Derating Curve for Limiting Power per VDE (SOP8)

## SAFETY RELATED CERTIFICATIONS (SOP8W)

| VDE | UL | CQC | TUV |
|---|---|---|---|
| DIN VDE 0884-17: 2021-10 | UL 1577 component recognition program | Certified according to GB4943.1-2022 | Certified according to EN IEC 61010-1: 2010+A1 and EN IEC 62368-1: 2018 |
| Reinforced insulation, $V_{IORM}$ = 1500 $V_{PK}$ $V_{IOTM}$ = 7000 $V_{PK}$ | Single protection, 5000 $V_{RMS}$ | Reinforced insulation, Altitude ≤ 5000m | 5000Vrms reinforced insulation |
| Certification Pending | File number: E521801 | File number: CQC23001376521 | Ref.Certif.No: DE 2-040497 Ref.Certif.No: JPTUV-153602 Certificate No: R 50605766 0001 |

## SAFETY LIMITING VALUES (SOP8W)

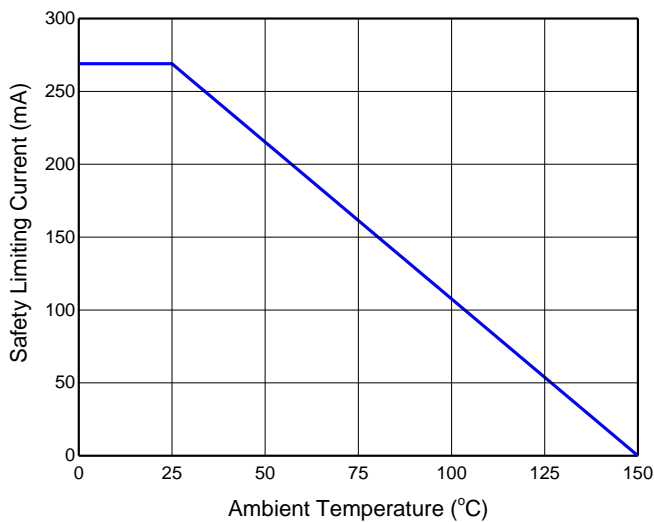| Symbol | Parameter | Condition | Value | Unit |
|---|---|---|---|---|
| $I_S$ | Safety input, output, or supply current | $R_{\theta JA}$=84.5°C/W, VCC1=VCC2=5.5V, $T_J$=150°C, $T_A$=25°C | 269 | mA |
| $P_S$ | Safety input, output, or total power | $R_{\theta JA}$=84.5°C/W, $T_J$=150°C, $T_A$=25°C | 1480 | mW |
| $T_S$ | Maximum safety temperature | | 150 | °C |

Figure 7. Thermal Derating Curve for Limiting Current per VDE (SOP8W)

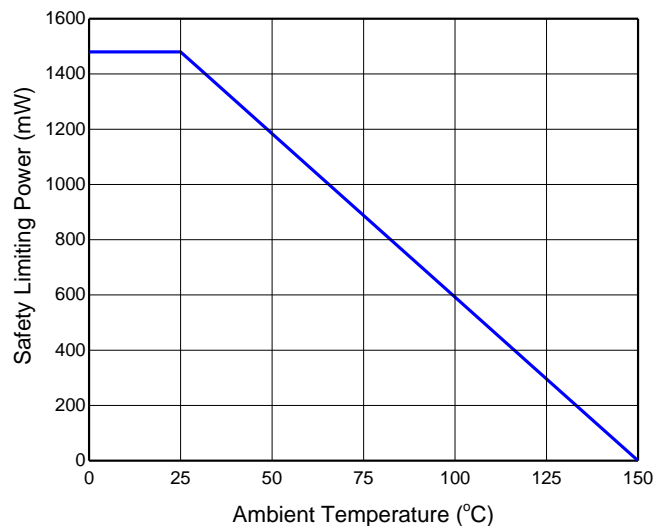Figure 8. Thermal Derating Curve for Limiting Power per VDE (SOP8W)

# ELECTRICAL CHARACTERISTICS (DC) WITH 5V SUPPLY

$V_{CC1} = V_{CC2} = 5V \pm 10\%$ (over recommended operating conditions unless otherwise specified.)

| Symbol | Parameter | Condition | Min | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Power Supply UVLO** | | | | | | |
| UVLO$_R$ | Under Voltage Lockout V$_{CCx}$ rising | | | 2.05 | 2.25 | V |
| UVLO$_F$ | Under Voltage Lockout V$_{CCx}$ falling | | 1.7 | 1.9 | | V |
| UVLO$_{HYS}$ | Under Voltage Lockout Hysteresis | | | 0.15 | | V |
| **Power Supply Current (SiLM5720)** | | | | | | |
| I$_{CC1\_QH}$ | Current on VCC1 with DC Signal | V$_I$ = V$_{CCI}$ (SiLM5720), V$_I$ = 0 V (SiLM5720F) | | 0.4 | 0.6 | mA |
| I$_{CC1\_QL}$ | | V$_I$ = 0 V (SiLM5720), V$_I$ = V$_{CCI}$ (SiLM5720F) | | 2.8 | 4.1 | mA |
| I$_{CC2\_QH}$ | Current on VCC2 with DC Signal | V$_I$ = V$_{CCI}$ (SiLM5720), V$_I$ = 0 V (SiLM5720F) | | 1.4 | 2.0 | mA |
| I$_{CC2\_QL}$ | | V$_I$ = 0 V (SiLM5720), V$_I$ = V$_{CCI}$ (SiLM5720F) | | 1.5 | 2.2 | mA |
| I$_{CC1\_OP\_1M}$ | Current on VCC1 with AC Signal. All channel switching with square wave clock input | 1 Mbps, C$_L$ = 15pF | | 1.6 | 2.3 | mA |
| I$_{CC1\_OP\_10M}$ | | 10 Mbps, C$_L$ = 15pF | | 1.6 | 2.4 | mA |
| I$_{CC1\_OP\_100M}$ | | 100 Mbps, C$_L$ = 15pF | | 2.1 | 2.9 | mA |
| I$_{CC2\_OP\_1M}$ | Current on VCC2 with AC Signal. All channel switching with square wave clock input | 1 Mbps, C$_L$ = 15pF | | 1.7 | 2.3 | mA |
| I$_{CC2\_OP\_10M}$ | | 10 Mbps, C$_L$ = 15pF | | 3.6 | 4.9 | mA |
| I$_{CC2\_OP\_100M}$ | | 100 Mbps, C$_L$ = 15pF | | 15.9 | 22 | mA |
| **Power Supply Current (SiLM5721/2)** | | | | | | |
| I$_{CC1\_QH}$ | Current on VCC1 with DC Signal | V$_I$ = V$_{CCI}$ (SiLM5721/2), V$_I$ = 0 V (SiLM5721/2F) | | 0.9 | 1.3 | mA |
| I$_{CC1\_QL}$ | | V$_I$ = 0 V (SiLM5721/2), V$_I$ = V$_{CCI}$ (SiLM5721/2F) | | 2.1 | 3.1 | mA |
| I$_{CC2\_QH}$ | Current on VCC2 with DC Signal | V$_I$ = V$_{CCI}$ (SiLM5721/2), V$_I$ = 0 V (SiLM5721/2F) | | 0.9 | 1.3 | mA |
| I$_{CC2\_QL}$ | | V$_I$ = 0 V (SiLM5721/2), V$_I$ = V$_{CCI}$ (SiLM5721/2F) | | 2.2 | 3.1 | mA |
| I$_{CC1\_OP\_1M}$ | Current on VCC1 with AC Signal. All channel switching with square wave clock input | 1 Mbps, C$_L$ = 15pF | | 1.6 | 2.3 | mA |

| Symbol | Parameter | Condition | Min | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CC1\_OP\_10M}$ | Current on VCC1 with AC Signal. All channel switching with square wave clock input | 10 Mbps, $C_L$ = 15pF | | 2.7 | 3.7 | mA |
| $I_{CC1\_OP\_100M}$ | | 100 Mbps, $C_L$ = 15pF | | 8.8 | 12 | mA |
| $I_{CC2\_OP\_1M}$ | Current on VCC2 with AC Signal. All channel switching with square wave clock input | 1 Mbps, $C_L$ = 15pF | | 1.6 | 2.3 | mA |
| $I_{CC2\_OP\_10M}$ | | 10 Mbps, $C_L$ = 15pF | | 2.7 | 3.7 | mA |
| $I_{CC2\_OP\_100M}$ | | 100 Mbps, $C_L$ = 15pF | | 8.8 | 12 | mA |
| **Input Logic Interface** | | | | | | |
| $V_{IH}$ | Rising input threshold voltage | | | $0.6 \times V_{CCI}$ | $0.7 \times V_{CCI}$ | V |
| $V_{IL}$ | Falling input threshold voltage | | $0.3 \times V_{CCI}$ | $0.4 \times V_{CCI}$ | | V |
| $V_{IHYS}$ | Input threshold voltage hysteresis | | | $0.2 \times V_{CCI}$ | | V |
| $I_{IH}$ | High level input current | INx = $V_{CCI}$ | | | 15 | uA |
| $I_{IL}$ | Low level input current | Inx = 0V | -15 | | | uA |
| **Output Logic Interface** | | | | | | |
| $V_{OH}$ | High level output voltage | $I_{OH}$ = -4mA | $V_{CCO}$ -0.4 | 4.8 | | V |
| $V_{OL}$ | Low level output voltage | $I_{OL}$ = 4mA | | 0.12 | 0.3 | V |
| **CMTI** | | | | | | |
| $CMTI_H$ | Output High Level Common Mode Transient Immunity | $V_I = V_{CCI}$, $V_{CM}$=1200V, $C_L$=15pF | 150 | 200 | | kV/us |
| $CMTI_L$ | Output Low Level Common Mode Transient Immunity | $V_I$ = 0V, $V_{CM}$=1200V, $C_L$=15pF | 150 | 200 | | kV/us |

## SWITCHING CHARACTERISTICS (AC) WITH 5V SUPPLY

$V_{CC1}$ = $V_{CC2}$=5V±10% (over recommended operating conditions unless otherwise specified.)

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{PLH}$ | Propagation delay, Low to High | $C_L$=15pF | | 12 | 20 | ns |
| $t_{PHL}$ | Propagation delay, High to Low | $C_L$=15pF | | 12 | 20 | ns |
| $t_r$ | Turn on rise time | $C_L$=15pF | | 2 | | ns |

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|--------|-----------|-----------|------|------|------|------|
| $t_f$ | Turn off fall time | $C_L$=15pF | | 2 | | ns |
| $t_{PWD}$ | Pulse Width Distortion | $C_L$=15pF | | | 10 | ns |
| $t_{SKO}$ | Channel to Channel Output Skew Time | $C_L$=15pF, same direction in single device | | | 8 | ns |
| $t_{SKP}$ | Part to Part Skew Time | $C_L$=15pF, same direction | | | 8 | ns |
| $t_{DO}$ | Default output delay time from input power loss | Measured from the time that the input voltage goes below 1.7V, $C_L$ = 15pF | | 40 | | ns |

## ELECTRICAL CHARACTERISTICS (DC) WITH 3.3V SUPPLY

$V_{CC1} = V_{CC2} = 3.3V \pm 10\%$ (over recommended operating conditions unless otherwise specified.)

| Symbol | Parameter | Condition | Min | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Power Supply UVLO** | | | | | | |
| $UVLO_R$ | Under Voltage Lockout $V_{CCx}$ rising | | | 2.05 | 2.25 | V |
| $UVLO_F$ | Under Voltage Lockout $V_{CCx}$ falling | | 1.7 | 1.9 | | V |
| $UVLO_{HYS}$ | Under Voltage Lockout Hysteresis | | | 0.15 | | V |
| **Power Supply Current (SiLM5720)** | | | | | | |
| $I_{CC1\_QH}$ | Current on VCC1 with DC Signal | $V_I = V_{CCI}$ (SiLM5720), $V_I = 0$ V (SiLM5720F) | | 0.4 | 0.6 | mA |
| $I_{CC1\_QL}$ | | $V_I = 0$ V (SiLM5720), $V_I = V_{CCI}$ (SiLM5720F) | | 2.8 | 4.0 | mA |
| $I_{CC2\_QH}$ | Current on VCC2 with DC Signal | $V_I = V_{CCI}$ (SiLM5720), $V_I = 0$ V (SiLM5720F) | | 1.3 | 2.0 | mA |
| $I_{CC2\_QL}$ | | $V_I = 0$ V (SiLM5720), $V_I = V_{CCI}$ (SiLM5720F) | | 1.5 | 2.1 | mA |
| $I_{CC1\_OP\_1M}$ | Current on VCC1 with AC Signal. All channel switching with square wave clock input | 1 Mbps, $C_L = 15pF$ | | 1.6 | 2.3 | mA |
| $I_{CC1\_OP\_10M}$ | | 10 Mbps, $C_L = 15pF$ | | 1.6 | 2.3 | mA |
| $I_{CC1\_OP\_100M}$ | | 100 Mbps, $C_L = 15pF$ | | 2.0 | 2.7 | mA |
| $I_{CC2\_OP\_1M}$ | Current on VCC2 with AC Signal. All channel switching with square wave clock input | 1 Mbps, $C_L = 15pF$ | | 1.5 | 2.2 | mA |
| $I_{CC2\_OP\_10M}$ | | 10 Mbps, $C_L = 15pF$ | | 2.3 | 3.3 | mA |
| $I_{CC2\_OP\_100M}$ | | 100 Mbps, $C_L = 15pF$ | | 10.2 | 13.7 | mA |
| **Power Supply Current (SiLM5721/2)** | | | | | | |
| $I_{CC1\_QH}$ | Current on VCC1 with DC Signal | $V_I = V_{CCI}$ (SiLM5721/2), $V_I = 0$ V (SiLM5721/2F) | | 0.9 | 1.3 | mA |
| $I_{CC1\_QL}$ | | $V_I = 0$ V (SiLM5721/2), $V_I = V_{CCI}$ (SiLM5721/2F) | | 2.1 | 3.0 | mA |
| $I_{CC2\_QH}$ | Current on VCC2 with DC Signal | $V_I = V_{CCI}$ (SiLM5721/2), $V_I = 0$ V (SiLM5721/2F) | | 0.9 | 1.3 | mA |
| $I_{CC2\_QL}$ | | $V_I = 0$ V (SiLM5721/2), $V_I = V_{CCI}$ (SiLM5721/2F) | | 2.1 | 3.0 | mA |
| $I_{CC1\_OP\_1M}$ | Current on VCC1 with AC Signal. All channel switching with square wave clock input | 1 Mbps, $C_L = 15pF$ | | 1.5 | 2.2 | mA |

| Symbol | Parameter | Condition | Min | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CC1\_OP\_10M}$ | Current on VCC1 with AC Signal. All channel switching with square wave clock input | 10 Mbps, $C_L$ = 15pF | | 2.0 | 2.8 | mA |
| $I_{CC1\_OP\_100M}$ | | 100 Mbps, $C_L$ = 15pF | | 5.8 | 7.8 | mA |
| $I_{CC2\_OP\_1M}$ | Current on VCC2 with AC Signal. All channel switching with square wave clock input | 1 Mbps, $C_L$ = 15pF | | 1.5 | 2.2 | mA |
| $I_{CC2\_OP\_10M}$ | | 10 Mbps, $C_L$ = 15pF | | 2.0 | 2.8 | mA |
| $I_{CC2\_OP\_100M}$ | | 100 Mbps, $C_L$ = 15pF | | 5.8 | 7.8 | mA |
| **Input Logic Interface** | | | | | | |
| $V_{IH}$ | Rising input threshold voltage | | | $0.6\times V_{CCI}$ | $0.7\times V_{CCI}$ | V |
| $V_{IL}$ | Falling input threshold voltage | | $0.3\times V_{CCI}$ | $0.4\times V_{CCI}$ | | V |
| $V_{IHYS}$ | Input threshold voltage hysteresis | | | $0.2\times V_{CCI}$ | | V |
| $I_{IH}$ | High level input current | INx = $V_{CCI}$ | | | 12 | uA |
| $I_{IL}$ | Low level input current | Inx = 0V | -12 | | | uA |
| **Output Logic Interface** | | | | | | |
| $V_{OH}$ | High level output voltage | $I_{OH}$ = -2mA | $V_{CCO}$ -0.3 | 3.2 | | V |
| $V_{OL}$ | Low level output voltage | $I_{OL}$ = 2mA | | 0.07 | 0.2 | V |
| **CMTI** | | | | | | |
| $CMTI_H$ | Output High Level Common Mode Transient Immunity | $V_I$ = $V_{CCI}$, $V_{CM}$=1200V, $C_L$=15pF | 150 | 200 | | kV/us |
| $CMTI_L$ | Output Low Level Common Mode Transient Immunity | $V_I$ = 0V, $V_{CM}$=1200V, $C_L$=15pF | 150 | 200 | | kV/us |

## SWITCHING CHARACTERISTICS (AC) WITH 3.3V SUPPLY

$V_{CC1}$ = $V_{CC2}$=3.3V$\pm$10% (over recommended operating conditions unless otherwise specified.)

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{PLH}$ | Propagation delay, Low to High | $C_L$=15pF | | 12 | 25 | ns |
| $t_{PHL}$ | Propagation delay, High to Low | $C_L$=15pF | | 12 | 25 | ns |
| $t_r$ | Turn on rise time | $C_L$=15pF | | 2 | | ns |

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|--------|-----------|-----------|------|------|------|------|
| $t_f$ | Turn off fall time | $C_L$=15pF | | 2 | | ns |
| $t_{PWD}$ | Pulse Width Distortion | $C_L$=15pF | | | 10 | ns |
| $t_{SKO}$ | Channel to Channel Output Skew Time | $C_L$=15pF, same direction in single device | | | 8 | ns |
| $t_{SKP}$ | Part to Part Skew Time | $C_L$=15pF, same direction | | | 8 | ns |
| $t_{DO}$ | Default output delay time from input power loss | Measured from the time that the input voltage goes below 1.7V, $C_L$ = 15pF | | 40 | | ns |

# ELECTRICAL CHARACTERISTICS (DC) WITH 2.5V SUPPLY

$V_{CC1}$ = $V_{CC2}$=2.5V±10% (over recommended operating conditions unless otherwise specified.)

| Symbol | Parameter | Condition | Min | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Power Supply UVLO** | | | | | | |
| UVLO$_R$ | Under Voltage Lockout $V_{CCx}$ rising | | | 2.05 | 2.25 | V |
| UVLO$_F$ | Under Voltage Lockout $V_{CCx}$ falling | | 1.7 | 1.9 | | V |
| UVLO$_{HYS}$ | Under Voltage Lockout Hysteresis | | | 0.15 | | V |
| **Power Supply Current (SiLM5720)** | | | | | | |
| I$_{CC1\_QH}$ | Current on VCC1 with DC Signal | $V_I$ = $V_{CCI}$ (SiLM5720), $V_I$ = 0 V (SiLM5720F) | | 0.4 | 0.6 | mA |
| I$_{CC1\_QL}$ | | $V_I$ = 0 V (SiLM5720), $V_I$ = $V_{CCI}$ (SiLM5720F) | | 2.8 | 3.9 | mA |
| I$_{CC2\_QH}$ | Current on VCC2 with DC Signal | $V_I$ = $V_{CCI}$ (SiLM5720), $V_I$ = 0 V (SiLM5720F) | | 1.3 | 1.9 | mA |
| I$_{CC2\_QL}$ | | $V_I$ = 0 V (SiLM5720), $V_I$ = $V_{CCI}$ (SiLM5720F) | | 1.5 | 2.1 | mA |
| I$_{CC1\_OP\_1M}$ | Current on VCC1 with AC Signal. All channel switching with square wave clock input | 1 Mbps, $C_L$ = 15pF | | 1.6 | 2.2 | mA |
| I$_{CC1\_OP\_10M}$ | | 10 Mbps, $C_L$ = 15pF | | 1.6 | 2.3 | mA |
| I$_{CC1\_OP\_100M}$ | | 100 Mbps, $C_L$ = 15pF | | 2.1 | 2.7 | mA |
| I$_{CC2\_OP\_1M}$ | Current on VCC2 with AC Signal. All channel switching with square wave clock input | 1 Mbps, $C_L$ = 15pF | | 1.5 | 2.1 | mA |
| I$_{CC2\_OP\_10M}$ | | 10 Mbps, $C_L$ = 15pF | | 2.1 | 3 | mA |
| I$_{CC2\_OP\_100M}$ | | 100 Mbps, $C_L$ = 15pF | | 8.1 | 10.8 | mA |
| **Power Supply Current (SiLM5721/2)** | | | | | | |
| I$_{CC1\_QH}$ | Current on VCC1 with DC Signal | $V_I$ = $V_{CCI}$ (SiLM5721/2), $V_I$ = 0 V (SiLM5721/2F) | | 0.9 | 1.3 | mA |
| I$_{CC1\_QL}$ | | $V_I$ = 0 V (SiLM5721/2), $V_I$ = $V_{CCI}$ (SiLM5721/2F) | | 2.1 | 3.0 | mA |
| I$_{CC2\_QH}$ | Current on VCC2 with DC Signal | $V_I$ = $V_{CCI}$ (SiLM5721/2), $V_I$ = 0 V (SiLM5721/2F) | | 0.9 | 1.3 | mA |
| I$_{CC2\_QL}$ | | $V_I$ = 0 V (SiLM5721/2), $V_I$ = $V_{CCI}$ (SiLM5721/2F) | | 2.1 | 3.0 | mA |
| I$_{CC1\_OP\_1M}$ | Current on VCC1 with AC Signal. All channel switching with square wave clock input | 1 Mbps, $C_L$ = 15pF | | 1.5 | 2.1 | mA |

| Symbol | Parameter | Condition | Min | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CC1\_OP\_10M}$ | Current on VCC1 with AC Signal. All channel switching with square wave clock input | 10 Mbps, $C_L$ = 15pF | | 1.8 | 2.6 | mA |
| $I_{CC1\_OP\_100M}$ | | 100 Mbps, $C_L$ = 15pF | | 4.7 | 6.2 | mA |
| $I_{CC2\_OP\_1M}$ | Current on VCC2 with AC Signal. All channel switching with square wave clock input | 1 Mbps, $C_L$ = 15pF | | 1.5 | 2.1 | mA |
| $I_{CC2\_OP\_10M}$ | | 10 Mbps, $C_L$ = 15pF | | 1.8 | 2.6 | mA |
| $I_{CC2\_OP\_100M}$ | | 100 Mbps, $C_L$ = 15pF | | 4.7 | 6.2 | mA |
| **Input Logic Interface** | | | | | | |
| $V_{IH}$ | Rising input threshold voltage | | | $0.6\times V_{CCI}$ | $0.7\times V_{CCI}$ | V |
| $V_{IL}$ | Falling input threshold voltage | | $0.3\times V_{CCI}$ | $0.4\times V_{CCI}$ | | V |
| $V_{IHYS}$ | Input threshold voltage hysteresis | | | $0.2\times V_{CCI}$ | | V |
| $I_{IH}$ | High level input current | INx = $V_{CCI}$ | | | 10 | uA |
| $I_{IL}$ | Low level input current | Inx = 0V | -10 | | | uA |
| **Output Logic Interface** | | | | | | |
| $V_{OH}$ | High level output voltage | $I_{OH}$ = -1mA | $V_{CCO}$-0.2 | 2.45 | | V |
| $V_{OL}$ | Low level output voltage | $I_{OL}$ = 1mA | | 0.04 | 0.1 | V |
| **CMTI** | | | | | | |
| $CMTI_H$ | Output High Level Common Mode Transient Immunity | $V_I$ = $V_{CCI}$, $V_{CM}$=1200V, $C_L$=15pF | 150 | 200 | | kV/us |
| $CMTI_L$ | Output Low Level Common Mode Transient Immunity | $V_I$ = 0V, $V_{CM}$=1200V, $C_L$=15pF | 150 | 200 | | kV/us |

## SWITCHING CHARACTERISTICS (AC) WITH 2.5V SUPPLY

$V_{CC1}$ = $V_{CC2}$=2.5V$\pm$10% (over recommended operating conditions unless otherwise specified.)

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{PLH}$ | Propagation delay, Low to High | $C_L$=15pF | | 14 | 27 | ns |
| $t_{PHL}$ | Propagation delay, High to Low | $C_L$=15pF | | 14 | 27 | ns |
| $t_r$ | Turn on rise time | $C_L$=15pF | | 2 | | ns |

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|--------|-----------|-----------|------|------|------|------|
| $t_f$ | Turn off fall time | $C_L$=15pF | | 2 | | ns |
| $t_{PWD}$ | Pulse Width Distortion | $C_L$=15pF | | | 10 | ns |
| $t_{SKO}$ | Channel to Channel Output Skew Time | $C_L$=15pF, same direction in single device | | | 8 | ns |
| $t_{SKP}$ | Part to Part Skew Time | $C_L$=15pF, same direction | | | 8 | ns |
| $t_{DO}$ | Default output delay time from input power loss | Measured from the time that the input voltage goes below 1.7V, $C_L$ = 15pF | | 40 | | ns |

# PARAMETER MEASUREMENT INFORMATION

**Switching Characteristics Test Timing**

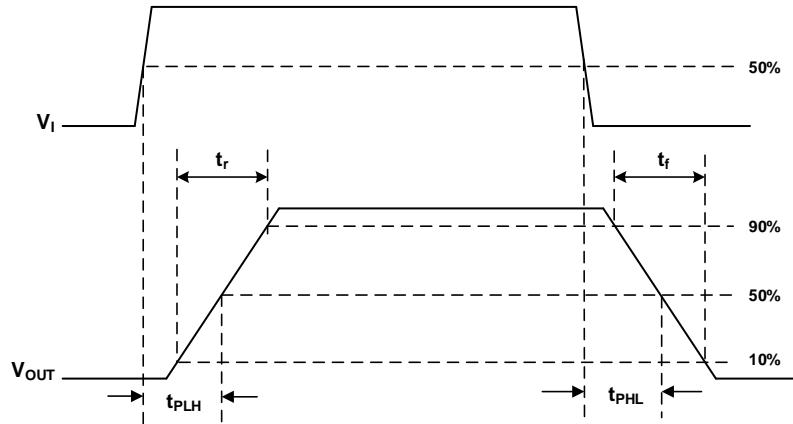Figure 9 shows the timing of propagation delay, rise and fall time



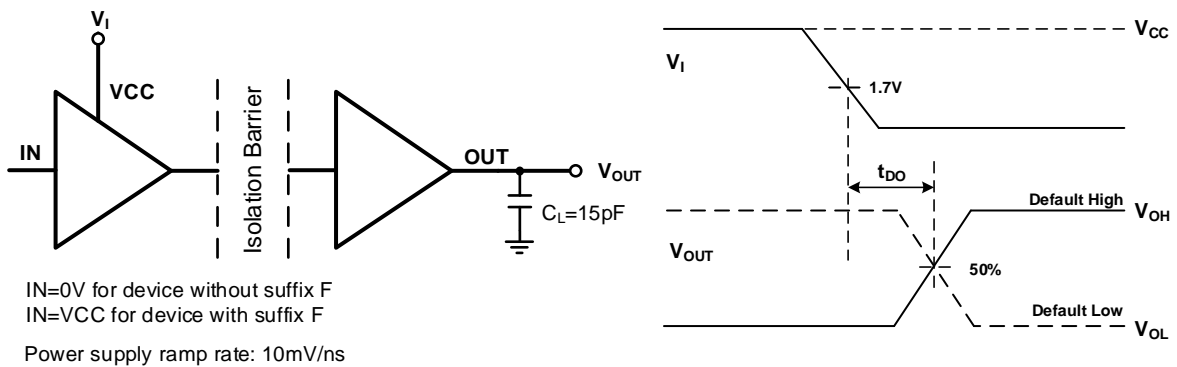Figure 9. Propagation Delay, Rise Time and Fall Time



IN=0V for device without suffix F
IN=VCC for device with suffix F

Power supply ramp rate: 10mV/ns

Figure 10. Default Output Delay Time Test

**CMTI Testing**
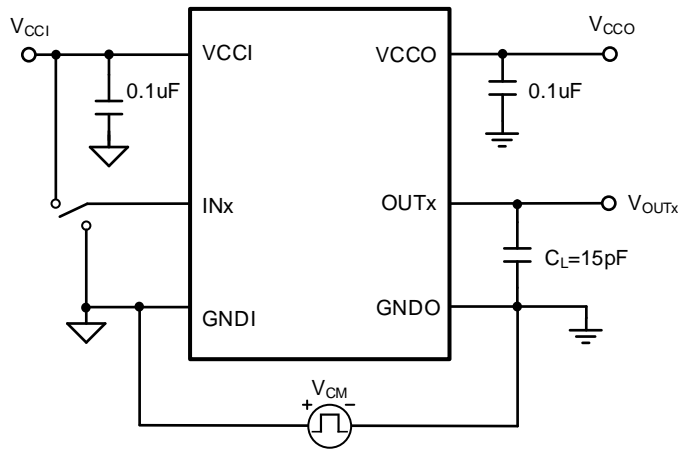


Figure 11. CMTI Test Configuration

# FEATURE DESCRIPTION

The SiLM572x devices are high-performance, dual-channel digital isolators with default output state options to enable a variety of application uses. The supply voltage range is from 2.25 V to 5.5 V for both supplies, $V_{CC1}$ and $V_{CC2}$. With innovative chip design and layout techniques, the electromagnetic compatibility of the SiLM572x devices has been significantly enhanced to improve the robustness of overall system.

**Device Functional Modes**

The Table 4 shows the functional modes of the SiLM572x.

Table 4. Function Table

| $V_{CCI}$ [1] | $V_{CCO}$ [1] | Input (Inx) | Output (OUTx) | Function Description |
|---|---|---|---|---|
| PU[2] | PU | H | H | Normal operation. The output is controlled by the input |
| | | L | L | |
| | | Open | Default | Default mode. When Inx is open, the corresponding output goes to the default logic. The default is high for SiLM572x and low for SiLM572xF. |
| PD[2] | PU | X | Default | Default mode. When VCCI is unpowered, channel output based on the default option. The default is high for SiLM572x and low for SiLM572xF. |
| X | PD | X | Undetermined[3] | When VCCO is unpowered, channel output is undermined. |

(1)    $V_{CCI}$ =Input side $V_{CC}$, $V_{CCO}$=Output side $V_{CC.}$

(2)    PU=Powered up, $V_{CC} \geqslant 2.25V$; PD=Powered down, $V_{CC} \leqslant 1.7V$

(3)    The outputs are in undermined state when $1.7 < V_{CCI}, V_{CCO} < 2.25V$

**Power Supply Recommendation**

A 0.1µF bypass capacitor is recommended at the input and output supply pins ($V_{CC1}$ and $V_{CC2}$) to help ensure reliable operation. The capacitors should be placed as close to the supply pins as possible.
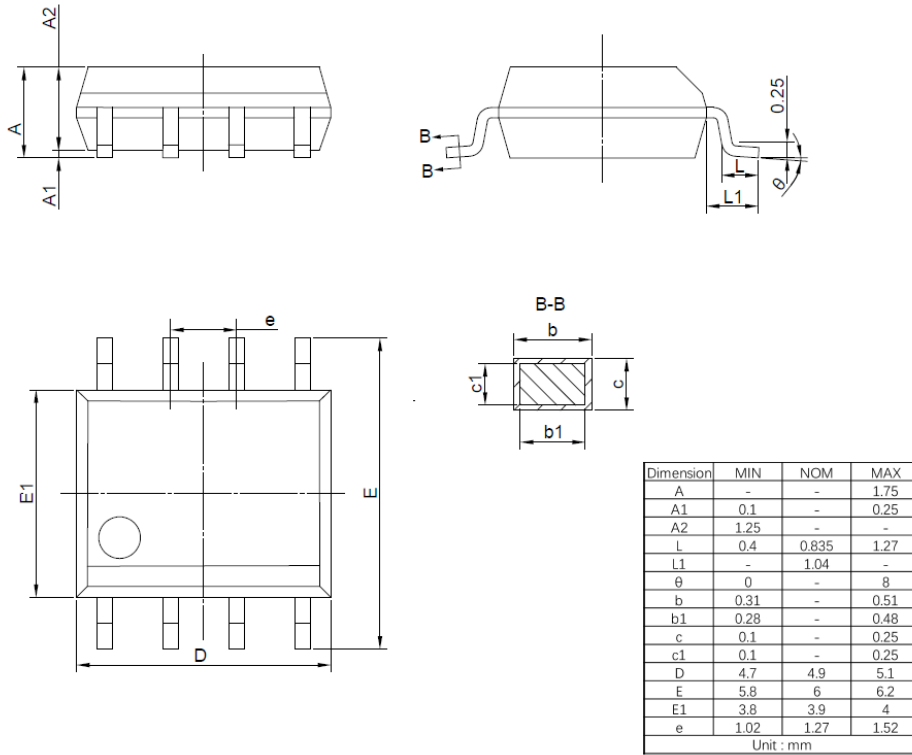
## PACKAGE CASE OUTLINES



| Dimension | MIN | NOM | MAX |
|-----------|-----|-----|-----|
| A | - | - | 1.75 |
| A1 | 0.1 | - | 0.25 |
| A2 | 1.25 | - | - |
| L | 0.4 | 0.835 | 1.27 |
| L1 | - | 1.04 | - |
| θ | 0 | - | 8 |
| b | 0.31 | - | 0.51 |
| b1 | 0.28 | - | 0.48 |
| c | 0.1 | - | 0.25 |
| c1 | 0.1 | - | 0.25 |
| D | 4.7 | 4.9 | 5.1 |
| E | 5.8 | 6 | 6.2 |
| E1 | 3.8 | 3.9 | 4 |
| e | 1.02 | 1.27 | 1.52 |
| Unit : mm | | | |

Figure 12. SOP8 Package Outline Dimensions



激光打印横线，标识PIN1点

PIN1点

SOP8W

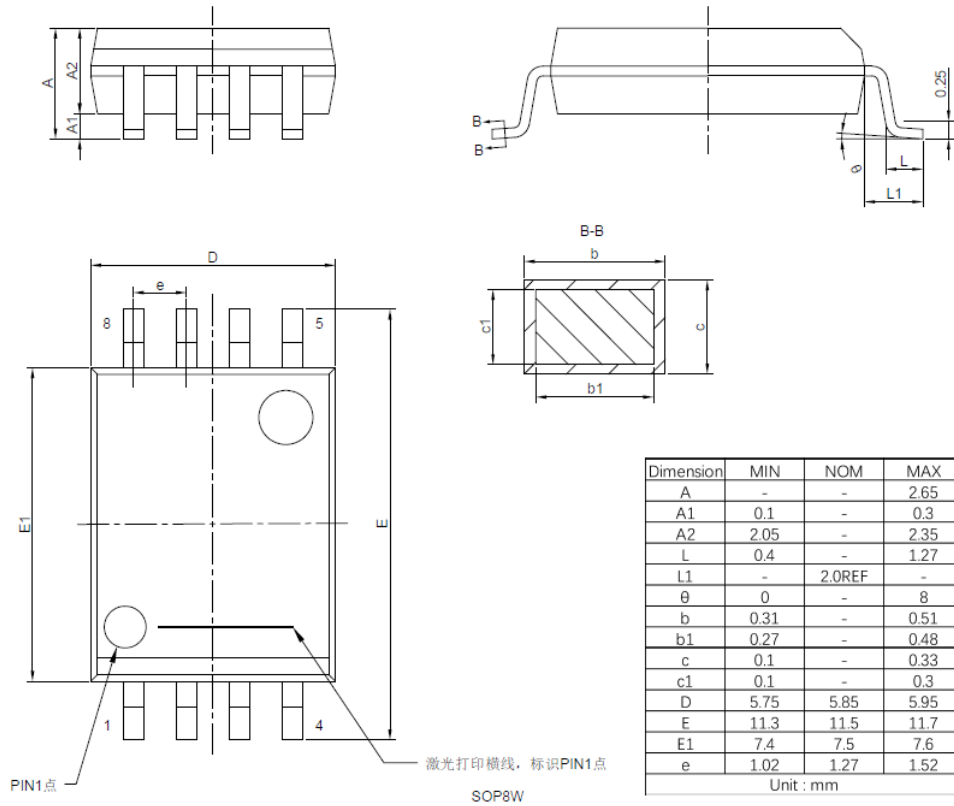| Dimension | MIN | NOM | MAX |
|-----------|-----|-----|-----|
| A | - | - | 2.65 |
| A1 | 0.1 | - | 0.3 |
| A2 | 2.05 | - | 2.35 |
| L | 0.4 | - | 1.27 |
| L1 | - | 2.0REF | - |
| θ | 0 | - | 8 |
| b | 0.31 | - | 0.51 |
| b1 | 0.27 | - | 0.48 |
| c | 0.1 | - | 0.33 |
| c1 | 0.1 | - | 0.3 |
| D | 5.75 | 5.85 | 5.95 |
| E | 11.3 | 11.5 | 11.7 |
| E1 | 7.4 | 7.5 | 7.6 |
| e | 1.02 | 1.27 | 1.52 |
| Unit : mm | | | |

Figure 13. SOP8W Package Outline Dimensions

## REVISION HISTORY

Note: page numbers for previous revisions may differ from page numbers in current version

| Page or Item | Subjects (major changes since previous revision) |
|---|---|
| **Rev 1.0 datasheet: 2023-05-30** | |
| Whole document | Initial datasheet release |
| **Rev 1.1 datasheet: 2023-10-30** | |
| Page 10, 11 | Add the TUV certification |