

## 低功耗三通道和四通道数字隔离器

查询样品: [ISO7631FM](#), [ISO7631FC](#), [ISO7641FC](#)

### 特性

- 信号发送速率: **150Mbps (M 级)**, **25Mbps (C 级)**
- 具有集成噪声滤波器 (C 级) 的稳健设计
- 低功耗、每通道典型  $I_{CC}$  (3.3V 电源):
  - **ISO7631FM**: 在 **10Mbps** 时为 **2mA**
  - **ISO7631FC**: **10Mbps** 时为 **1.5mA**
  - **ISO7641FC**: 在 **10Mbps** 时为 **1.3 mA**
- 极低的  $I_{CC\_disable}$  (C 级)
- 低传播延迟: 典型值为 **7ns (M 级)**
- 在故障安全模式下输出默认为低电平状态
- 宽温度范围: **-40°C 至 125°C**
- **50KV/μs** 典型瞬态抗扰度
- 使用 **SiO<sub>2</sub>** 绝缘隔栅实现长使用寿命
- 在 **2.7V (M 级)**, **3.3V** 和 **5V** 电源和逻辑电平下运行
- 宽体小外形尺寸集成电路 (**SOIC)-16** 封装

### 应用范围

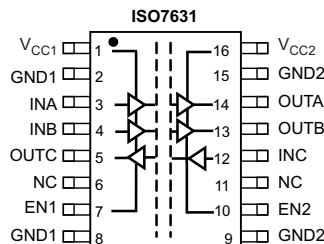
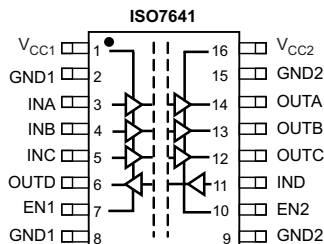
- 是下列应用中光耦合器的替代产品:
  - 工业现场总线 (**Fieldbus**)
  - **Profibus** 现场总线
  - **Modbus** 串行通信协议
  - **DeviceNet™** 数据总线
  - 伺服器控制接口
  - 电机控制
  - 电源
  - 电池组

### 安全及管理批准

- 符合 **UL1577** 的 **1 分钟 2500 V<sub>RMS</sub>** (已批准)
- 针对 **DIN EN 60747-5-2 (VDE 0884 修订版本 2)** 标准的 **4242 V<sub>PK</sub>** VDE 额定值, **1414 V<sub>PK</sub>** 工作电压 (已批准)
- **CSA** 组件接受通知 **5A** (已批准)
- 针对 **EN/UL/CSA 60950-1** 和 **EN/UL/CSA 61010-1** (已获批准) 符合 **TUV** 标准的 **3000 V<sub>RMS</sub>** 增强隔离

### 说明

ISO7631F 和 ISO7641F 提供符合 VDE 规范的高达 4242 V<sub>PK</sub> 的电流隔离。ISO7631F 具有 3 个通道, 其中 2 个正向和 1 个反向通道, 而 ISO7641F 具有 4 个通道, 其中 3 个正向通道和 1 个反向通道。后缀 F 说明在故障安全情况下输出默认为低电平状态 (参见 [Table 1](#))。M 级器件是具有快速传播延迟且数据速率可达 150Mbps 的高速隔离器, 而 C 级器件在低功耗下的数据速率可高达 25Mbps 且具有针对易于产生噪音应用的集成滤波器。建议将 C 级器件用于低速应用, 在此类应用中需要抑制持续时间少于 6ns 的输入噪声脉冲或者应用中的低功耗十分重要。



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

## 说明（继续）

每个隔离通道都有一个由二氧化硅 (SiO<sub>2</sub>) 绝缘隔栅分开的逻辑输入和输出缓冲器。与隔离电源配合使用，这些器件可防止数据总线或者其它电路上的噪声电流进入本地接地或者干扰或损坏敏感电路。此器件具有 TTL 输入阈值并可在 2.7V (M 级)，3.3V 和 5V 电源供电的情况下运行。当由 3.3V 或者 2.7V 电源供电时，所有输入均可耐受 5V 电压。

## PIN DESCRIPTIONS

| PIN              |         |         | I/O | DESCRIPTION                                                                                                                                                                                           |
|------------------|---------|---------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NAME             | ISO7641 | ISO7631 |     |                                                                                                                                                                                                       |
| INA              | 3       | 3       | I   | Input, channel A                                                                                                                                                                                      |
| INB              | 4       | 4       | I   | Input, channel B                                                                                                                                                                                      |
| INC              | 5       | 12      | I   | Input, channel C                                                                                                                                                                                      |
| IND              | 11      | -       | I   | Input, channel D                                                                                                                                                                                      |
| OUTA             | 14      | 14      | O   | Output, channel A                                                                                                                                                                                     |
| OUTB             | 13      | 13      | O   | Output, channel B                                                                                                                                                                                     |
| OUTC             | 12      | 5       | O   | Output, channel C                                                                                                                                                                                     |
| OUTD             | 6       | -       | O   | Output, channel D                                                                                                                                                                                     |
| EN1              | 7       | 7       | I   | Enables (when input is High or Open) or Disables (when input is Low) OUTD of ISO7641 and OUTC of ISO7631                                                                                              |
| EN2              | 10      | 10      | I   | Enables (when input is High or Open) or Disables (when input is Low) OUTA, OUTB, and OUTC of ISO7641<br>Enables (when input is High or Open) or Disables (when input is Low) OUTA and OUTB of ISO7631 |
| V <sub>CC1</sub> | 1       | 1       | –   | Power supply, V <sub>CC1</sub>                                                                                                                                                                        |
| V <sub>CC2</sub> | 16      | 16      | –   | Power supply, V <sub>CC2</sub>                                                                                                                                                                        |
| GND1             | 2,8     | 2,8     | –   | Ground connection for V <sub>CC1</sub>                                                                                                                                                                |
| GND2             | 9,15    | 9,15    | –   | Ground connection for V <sub>CC2</sub>                                                                                                                                                                |
| NC               | -       | 6,11    | -   | No Connect pins are floating with no internal connection                                                                                                                                              |

**Table 1. FUNCTION TABLE<sup>(1)</sup>**

| INPUT<br>V <sub>CC</sub> | OUTPUT<br>V <sub>CC</sub> | INPUT<br>(INx) | OUTPUT ENABLE<br>(ENx) | OUTPUT<br>(OUTx) |
|--------------------------|---------------------------|----------------|------------------------|------------------|
| PU                       | PU                        | H              | H or Open              | H                |
|                          |                           | L              | H or Open              | L                |
|                          |                           | X              | L                      | Z                |
|                          |                           | Open           | H or Open              | L                |
| PD                       | PU                        | X              | H or Open              | L                |
| PD                       | PU                        | X              | L                      | Z                |
| PU                       | PD                        | X              | X                      | Undetermined     |

(1) PU = Powered Up (V<sub>CC</sub> ≥ 2.7 V); PD = Powered Down (V<sub>CC</sub> ≤ 2.1 V); X = Irrelevant; H = High Level; L = Low Level; Z = High Impedance

**AVAILABLE OPTIONS**

| PRODUCT   | RATED ISOLATION                                             | PACKAGE | INPUT THRESHOLD             | DATA RATE and FILTER             | CHANNEL DIRECTION    | MARKED AS | ORDERING NUMBER     |
|-----------|-------------------------------------------------------------|---------|-----------------------------|----------------------------------|----------------------|-----------|---------------------|
| ISO7631FM | 4242 V <sub>PK</sub> / 2500 V <sub>RMS</sub> <sup>(1)</sup> | DW-16   | 1.5 V TTL (CMOS Compatible) | 150 Mbps, No Noise Filter        | 2 Forward, 1 Reverse | ISO7631FM | ISO7631FMDW (rail)  |
|           |                                                             |         |                             |                                  |                      |           | ISO7631FMDWR (reel) |
| ISO7631FC |                                                             |         |                             | 25 Mbps, Integrated Noise Filter | 2 Forward, 1 Reverse | ISO7631FC | ISO7631FCDW (rail)  |
|           |                                                             |         |                             |                                  |                      |           | ISO7631FCDWR (reel) |
| ISO7641FC |                                                             |         |                             |                                  | 3 Forward, 1 Reverse | ISO7641FC | ISO7641FCDW (rail)  |
|           |                                                             |         |                             |                                  |                      |           | ISO7641FCDWR (reel) |

(1) See the [Regulatory Information](#) table for detailed isolation ratings.

**ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>**

| PARAMETER                                    |                                     |                         |          | VALUE |      | UNIT |
|----------------------------------------------|-------------------------------------|-------------------------|----------|-------|------|------|
|                                              |                                     |                         |          | MIN   | MAX  |      |
| Supply voltage <sup>(2)</sup>                | V <sub>CC1</sub> , V <sub>CC2</sub> |                         |          | -0.5  | 6    | V    |
| Voltage                                      | INx, OUTx, ENx                      |                         |          | -0.5  | 6    | V    |
| Output Current, I <sub>O</sub>               |                                     |                         |          |       | ±15  | mA   |
| Electrostatic discharge                      | Human Body Model                    | ESDA, JEDEC JS-001-2012 | All pins |       | ±4   | kV   |
|                                              | Field-Induced Charged Device Model  | JEDEC JESD22-C101E      |          |       | ±1.5 | kV   |
|                                              | Machine Model                       | JEDEC JESD22-A115-A     |          |       | ±200 | V    |
|                                              |                                     |                         |          |       |      |      |
| Maximum junction temperature, T <sub>J</sub> |                                     |                         |          |       | 150  | °C   |
| Storage temperature, T <sub>STG</sub>        |                                     |                         |          | -65   | 150  | °C   |

- (1) 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 under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) All voltage values except differential I/O bus voltages are with respect to the local ground terminal (GND1 or GND2) and are peak voltage values.

**RECOMMENDED OPERATING CONDITIONS**

| PARAMETER                 |                    |                        | MIN  | TYP | MAX      | UNIT |
|---------------------------|--------------------|------------------------|------|-----|----------|------|
| Supply voltage            | $V_{CC1}, V_{CC2}$ | M-Grade                | 2.7  |     | 5.5      | V    |
|                           |                    | C-Grade                | 3    |     | 5.5      |      |
| High-level output current | $I_{OH}$           |                        | -4   |     |          | mA   |
| Low-level output current  | $I_{OL}$           |                        |      |     | 4        | mA   |
| High-level input voltage  | $V_{IH}$           |                        | 2    |     | $V_{CC}$ | V    |
| Low-level input voltage   | $V_{IL}$           |                        | 0    |     | 0.8      | V    |
| Input pulse duration      | $t_{ui}$           | M-Grade: ≥3V-Operation | 6.67 |     |          | ns   |
|                           |                    | M-Grade: <3V-Operation | 10   |     |          |      |
|                           |                    | C-Grade: ≥3V-Operation | 40   |     |          |      |
| Signaling rate            | $1 / t_{ui}$       | M-Grade: ≥3V-Operation | 0    |     | 150      | Mbps |
|                           |                    | M-Grade: <3V-Operation | 0    |     | 100      |      |
|                           |                    | C-Grade: ≥3V-Operation | 0    |     | 25       |      |
| Junction temperature      | $T_J$              |                        | -40  |     | 136      | °C   |
| Ambient temperature       | $T_A$              |                        | -40  | 25  | 125      | °C   |

**THERMAL INFORMATION**

| THERMAL METRIC <sup>(1)</sup> |                                              |                                                                                                         | ISO76xx      | UNITS |
|-------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------------------------|--------------|-------|
|                               |                                              |                                                                                                         | DW (16 Pins) |       |
| $\theta_{JA}$                 | Junction-to-ambient thermal resistance       |                                                                                                         | 72           | °C/W  |
| $\theta_{JC(top)}$            | Junction-to-case(top) thermal resistance     |                                                                                                         | 38           |       |
| $\theta_{JB}$                 | Junction-to-board thermal resistance         |                                                                                                         | 39           |       |
| $\Psi_{JT}$                   | Junction-to-top characterization parameter   |                                                                                                         | 9.4          |       |
| $\Psi_{JB}$                   | Junction-to-board characterization parameter |                                                                                                         | n/a          |       |
| $\theta_{JC(bottom)}$         | Junction-to-case(bottom) thermal resistance  |                                                                                                         | n/a          |       |
| $P_D$                         | Maximum Device Power Dissipation             | $V_{CC1} = V_{CC2} = 5.5V, T_J = 150^{\circ}C, C_L = 15pF$<br>Input a 75 MHz 50% duty cycle square wave | 399          | mW    |

- (1) 有关传统和全新热度的更多信息，请参阅 *IC 封装热度量 应用报告*（文献号：ZHCA543）。

## ELECTRICAL CHARACTERISTICS

 $V_{CC1}$  and  $V_{CC2}$  at 5 V  $\pm$  10% (over recommended operating conditions unless otherwise noted)

| ISO7631F, ISO7641F                              |                                      | M-Grade               |     |     | C-Grade               |     |     | UNIT        |
|-------------------------------------------------|--------------------------------------|-----------------------|-----|-----|-----------------------|-----|-----|-------------|
| PARAMETER                                       | TEST CONDITIONS                      | MIN                   | TYP | MAX | MIN                   | TYP | MAX |             |
| $V_{OH}$ High-level output voltage              | $I_{OH} = -4$ mA; see Figure 1       | $V_{CCx}^{(1)} - 0.8$ | 4.8 |     | $V_{CCx}^{(1)} - 0.8$ | 4.7 |     | V           |
|                                                 | $I_{OH} = -20$ $\mu$ A; see Figure 1 | $V_{CCx}^{(1)} - 0.1$ | 5   |     | $V_{CCx}^{(1)} - 0.1$ | 5   |     |             |
| $V_{OL}$ Low-level output voltage               | $I_{OL} = 4$ mA; see Figure 1        |                       | 0.2 | 0.4 |                       | 0.3 | 0.5 | V           |
|                                                 | $I_{OL} = 20$ $\mu$ A; see Figure 1  |                       | 0   | 0.1 |                       | 0   | 0.1 |             |
| $V_{I(HYS)}$ Input threshold voltage hysteresis |                                      |                       | 450 |     |                       | 450 |     | mV          |
| $I_{IH}$ High-level input current               | $V_{IH} = V_{CC}$ at INx or ENx      |                       |     | 10  |                       |     | 10  | $\mu$ A     |
| $I_{IL}$ Low-level input current                | $V_{IL} = 0$ V at INx or ENx         | -10                   |     |     | -10                   |     |     |             |
| CMTI Common-mode transient immunity             | $V_I = V_{CC}$ or 0 V; see Figure 4  | 25                    | 75  |     | 25                    | 75  |     | kV/ $\mu$ s |

(1)  $V_{CCx}$  is the supply voltage,  $V_{CC1}$  or  $V_{CC2}$ , for the output channel that is being measured.

## SWITCHING CHARACTERISTICS

 $V_{CC1}$  and  $V_{CC2}$  at 5 V  $\pm$  10% (over recommended operating conditions unless otherwise noted)

| ISO7631F, ISO7641F                                                 |                             | M-Grade |     |      | C-Grade |       |                      | UNIT    |
|--------------------------------------------------------------------|-----------------------------|---------|-----|------|---------|-------|----------------------|---------|
| PARAMETER                                                          | TEST CONDITIONS             | MIN     | TYP | MAX  | MIN     | TYP   | MAX                  |         |
| $t_{PLH}$ , $t_{PHL}$ Propagation delay time                       | See Figure 1                | 3.5     | 7   | 10.5 | 11      | 17    | 28                   | ns      |
| PWD <sup>(1)</sup> Pulse width distortion [ $t_{PHL} - t_{PLH}$ ]  |                             |         |     | 2    |         |       | 3                    |         |
| $t_{sk(o)}$ <sup>(2)</sup> Channel-to-channel output skew time     | Same-direction Channels     |         |     | 2    |         |       | 3                    |         |
|                                                                    | Opposite-direction Channels |         |     | 3    |         |       | 4                    |         |
| $t_{sk(pp)}$ <sup>(3)</sup> Part-to-part skew time                 |                             |         |     | 4.5  |         |       | 13                   |         |
| $t_r$ Output signal rise time                                      | See Figure 1                |         | 1.6 |      |         | 2.8   |                      | ns      |
| $t_f$ Output signal fall time                                      |                             |         | 1   |      |         | 2.9   |                      |         |
| $t_{PHZ}$ Disable Propagation Delay, high-to-high impedance output | See Figure 2                |         | 5   | 16   |         | 8     | 20                   | ns      |
| $t_{PLZ}$ Disable Propagation Delay, low-to-high impedance output  |                             |         | 5   | 16   |         | 7     | 20                   |         |
| $t_{PZH}$ Enable Propagation Delay, high impedance-to-high output  |                             |         | 4   | 16   |         | 11000 | 22000 <sup>(4)</sup> |         |
| $t_{PZL}$ Enable Propagation Delay, high impedance-to-low output   |                             |         | 4   | 16   |         | 8     | 20                   |         |
| $t_{fs}$ Fail-safe output delay time from input data or power loss | See Figure 3                |         | 9.5 |      |         | 9     |                      | $\mu$ s |

(1) Also known as Pulse Skew.

(2)  $t_{sk(o)}$  is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.

(3)  $t_{sk(pp)}$  is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals and loads.

(4) The enable signal rate for C-grade devices should be  $\leq$  45 Kbps.

**SUPPLY CURRENT**
 $V_{CC1}$  and  $V_{CC2}$  at 5 V  $\pm$  10% (over recommended operating conditions unless otherwise noted)

| ISO7631F         |                 |                                                                                                                                               | M-Grade         |     |      | C-Grade        |     |     |      |    |
|------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----|------|----------------|-----|-----|------|----|
| PARAMETER        | TEST CONDITIONS |                                                                                                                                               | MIN             | TYP | MAX  | MIN            | TYP | MAX | UNIT |    |
| I <sub>CC1</sub> | Disable         | EN1 = EN2 = 0 V                                                                                                                               | 2.5             |     | 4    | 1.1            |     | 1.9 | mA   |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               | 3.7             |     | 5.4  | 1.5            |     | 2.6 |      |    |
| I <sub>CC1</sub> | DC to 1 Mbps    | DC Signal: V <sub>I</sub> = V <sub>CC</sub> or 0 V<br>AC Signal: All channels switching with square wave clock input; C <sub>L</sub> = 15 pF  | 2.6             |     | 4.1  | 1.8            |     | 2.7 |      |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               | 3.8             |     | 5.5  | 2.6            |     | 3.9 |      |    |
| I <sub>CC1</sub> | 10 Mbps         |                                                                                                                                               | 3.3             |     | 4.5  | 2.7            |     | 3.7 |      |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               | 4.9             |     | 6.6  | 3.9            |     | 5.3 |      |    |
| I <sub>CC1</sub> | 25 Mbps         |                                                                                                                                               | 4.5             |     | 6    | 4.1            |     | 5.4 |      |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               | 6.8             |     | 9    | 5.9            |     | 7.8 |      |    |
| I <sub>CC1</sub> | 150 Mbps        |                                                                                                                                               | 15              |     | 19.5 | Not Applicable |     |     |      |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               | 22              |     | 30   |                |     |     |      |    |
| ISO7641F         |                 |                                                                                                                                               |                 |     |      | C-Grade        |     |     |      |    |
| I <sub>CC1</sub> | Disable         |                                                                                                                                               | EN1 = EN2 = 0 V |     |      |                | 1.2 |     | 2.1  | mA |
| I <sub>CC2</sub> |                 | 1.6                                                                                                                                           |                 |     |      |                | 2.6 |     |      |    |
| I <sub>CC1</sub> | DC to 1 Mbps    | DC Signal: V <sub>I</sub> = V <sub>CC</sub> or 0 V,<br>AC Signal: All channels switching with square wave clock input; C <sub>L</sub> = 15 pF |                 |     |      | 1.8            |     | 2.8 |      |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               |                 |     |      | 3.1            |     | 4.2 |      |    |
| I <sub>CC1</sub> | 10 Mbps         |                                                                                                                                               |                 |     |      | 3              |     | 4   |      |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               |                 |     |      | 4.9            |     | 6.1 |      |    |
| I <sub>CC1</sub> | 25 Mbps         |                                                                                                                                               |                 |     |      | 4.8            |     | 6   |      |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               |                 |     |      | 7.7            |     | 9.5 |      |    |

## ELECTRICAL CHARACTERISTICS

 $V_{CC1}$  at 5 V  $\pm$  10% and  $V_{CC2}$  at 3.3 V  $\pm$  10% (over recommended operating conditions unless otherwise noted)

| ISO7631F, ISO7641F                              |                                      | M-Grade                       |                 |     | C-Grade         |     |     | UNIT        |
|-------------------------------------------------|--------------------------------------|-------------------------------|-----------------|-----|-----------------|-----|-----|-------------|
| PARAMETER                                       | TEST CONDITIONS                      | MIN                           | TYP             | MAX | MIN             | TYP | MAX |             |
| $V_{OH}$ High-level output voltage              | $I_{OH} = -4$ mA; see Figure 1       | OUTx on $V_{CC1}$ (5V) side   | $V_{CC1} - 0.8$ | 4.8 | $V_{CC1} - 0.8$ | 4.7 |     | V           |
|                                                 |                                      | OUTx on $V_{CC2}$ (3.3V) side | $V_{CC2} - 0.4$ | 3   | $V_{CC2} - 0.6$ | 2.9 |     |             |
|                                                 | $I_{OH} = -20$ $\mu$ A; see Figure 1 | OUTx on $V_{CC1}$ (5V) side   | $V_{CC1} - 0.1$ | 5   | $V_{CC1} - 0.1$ | 5   |     |             |
|                                                 |                                      | OUTx on $V_{CC2}$ (3.3V) side | $V_{CC2} - 0.1$ | 3.3 | $V_{CC2} - 0.1$ | 3.3 |     |             |
| $V_{OL}$ Low-level output voltage               | $I_{OL} = 4$ mA; see Figure 1        |                               | 0.2             | 0.4 |                 | 0.3 | 0.5 | V           |
|                                                 | $I_{OL} = 20$ $\mu$ A; see Figure 1  |                               | 0               | 0.1 |                 | 0   | 0.1 |             |
| $V_{I(HYS)}$ Input threshold voltage hysteresis |                                      |                               | 430             |     |                 | 430 |     | mV          |
| $I_{IH}$ High-level input current               | $V_{IH} = V_{CC}$ at INx or ENx      |                               |                 | 10  |                 |     | 10  | $\mu$ A     |
| $I_{IL}$ Low-level input current                | $V_{IL} = 0$ V at INx or ENx         | -10                           |                 |     | -10             |     |     |             |
| CMTI Common-mode transient immunity             | $V_I = V_{CC}$ or 0 V; see Figure 4  | 25                            | 50              |     | 25              | 50  |     | kV/ $\mu$ s |

## SWITCHING CHARACTERISTICS

 $V_{CC1}$  at 5 V  $\pm$  10% and  $V_{CC2}$  at 3.3 V  $\pm$  10% (over recommended operating conditions unless otherwise noted)

| ISO7631F, ISO7641F                                                 |                             | M-Grade |     |     | C-Grade |                      |     | UNIT    |
|--------------------------------------------------------------------|-----------------------------|---------|-----|-----|---------|----------------------|-----|---------|
| PARAMETER                                                          | TEST CONDITIONS             | MIN     | TYP | MAX | MIN     | TYP                  | MAX |         |
| $t_{PLH}, t_{PHL}$ Propagation delay time                          | See Figure 1                | 4       | 8   | 13  | 11      | 18                   | 32  | ns      |
| PWD <sup>(1)</sup> Pulse width distortion $ t_{PHL} - t_{PLH} $    |                             |         |     | 2   |         |                      | 3.5 |         |
| $t_{sk(o)}$ <sup>(2)</sup> Channel-to-channel output skew time     | Same-direction Channels     |         |     | 2.5 |         |                      | 4.5 |         |
|                                                                    | Opposite-direction Channels |         |     | 3.5 |         |                      | 5.5 |         |
| $t_{sk(pp)}$ <sup>(3)</sup> Part-to-part skew time                 |                             |         |     | 6   |         |                      | 15  |         |
| $t_r$ Output signal rise time                                      | See Figure 1                |         | 2   |     |         | 3.6                  |     | ns      |
| $t_f$ Output signal fall time                                      |                             |         | 1.2 |     |         | 3.3                  |     |         |
| $t_{PHZ}$ Disable Propagation Delay, high-to-high impedance output | See Figure 2                |         | 6.5 | 17  |         | 9                    | 20  | ns      |
| $t_{PLZ}$ Disable Propagation Delay, low-to-high impedance output  |                             |         | 6.5 | 17  |         | 8                    | 20  |         |
| $t_{PZH}$ Enable Propagation Delay, high impedance-to-high output  |                             |         | 5.5 | 17  | 11000   | 22000 <sup>(4)</sup> |     |         |
| $t_{PZL}$ Enable Propagation Delay, high impedance-to-low output   |                             |         | 5.5 | 17  |         | 10                   | 30  |         |
| $t_{fs}$ Fail-safe output delay time from input data or power loss | See Figure 3                |         | 9.5 |     |         | 8.5                  |     | $\mu$ s |

(1) Also known as Pulse Skew.

(2)  $t_{sk(o)}$  is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.

(3)  $t_{sk(pp)}$  is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals and loads.

(4) The enable signal rate for C-grade devices should be  $\leq 45$  Kbps.

**SUPPLY CURRENT**
 $V_{CC1}$  at 5 V  $\pm$  10% and  $V_{CC2}$  at 3.3V  $\pm$  10% (over recommended operating conditions unless otherwise noted)

| ISO7631F         |                 |                                                                                                                                               | M-Grade         |      |      | C-Grade        |     |     |      |    |
|------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------|------|----------------|-----|-----|------|----|
| PARAMETER        | TEST CONDITIONS |                                                                                                                                               | MIN             | TYP  | MAX  | MIN            | TYP | MAX | UNIT |    |
| I <sub>CC1</sub> | Disable         | EN1 = EN2 = 0 V                                                                                                                               |                 | 2.5  | 4    |                | 1.1 | 1.9 | mA   |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               |                 | 2.7  | 3.7  |                | 0.7 | 1.3 |      |    |
| I <sub>CC1</sub> | DC to 1 Mbps    | DC Signal: V <sub>I</sub> = V <sub>CC</sub> or 0 V<br>AC Signal: All channels switching with square wave clock input; C <sub>L</sub> = 15 pF  |                 | 2.6  | 4.1  |                | 1.8 | 2.7 |      |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               |                 | 2.8  | 3.8  |                | 1.8 | 2.6 |      |    |
| I <sub>CC1</sub> | 10 Mbps         |                                                                                                                                               |                 | 3.3  | 4.5  |                | 2.7 | 3.7 |      |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               |                 | 3.5  | 4.6  |                | 2.6 | 3.5 |      |    |
| I <sub>CC1</sub> | 25 Mbps         |                                                                                                                                               |                 | 4.5  | 6    |                | 4.1 | 5.4 |      |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               |                 | 4.7  | 5.9  |                | 3.8 | 5   |      |    |
| I <sub>CC1</sub> | 150 Mbps        |                                                                                                                                               |                 | 15   | 19.5 | Not Applicable |     |     |      |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               |                 | 14.6 | 19   |                |     |     |      |    |
| ISO7641F         |                 |                                                                                                                                               |                 |      |      | C-Grade        |     |     |      |    |
| I <sub>CC1</sub> | Disable         |                                                                                                                                               | EN1 = EN2 = 0 V |      |      |                |     | 1.2 | 2.1  | mA |
| I <sub>CC2</sub> |                 |                                                                                                                                               |                 |      |      | 0.8            | 1.3 |     |      |    |
| I <sub>CC1</sub> | DC to 1 Mbps    | DC Signal: V <sub>I</sub> = V <sub>CC</sub> or 0 V,<br>AC Signal: All channels switching with square wave clock input; C <sub>L</sub> = 15 pF |                 |      |      |                | 1.8 | 2.8 |      |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               |                 |      |      |                | 2   | 2.9 |      |    |
| I <sub>CC1</sub> | 10 Mbps         |                                                                                                                                               |                 |      |      |                | 3   | 4   |      |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               |                 |      |      |                | 3.2 | 4.1 |      |    |
| I <sub>CC1</sub> | 25 Mbps         |                                                                                                                                               |                 |      |      |                | 4.8 | 6   |      |    |
| I <sub>CC2</sub> |                 |                                                                                                                                               |                 |      |      |                | 5.1 | 7   |      |    |

## ELECTRICAL CHARACTERISTICS

 $V_{CC1}$  at 3.3V  $\pm$  10% and  $V_{CC2}$  at 5V  $\pm$  10% (over recommended operating conditions unless otherwise noted)

| ISO7631F, ISO7641F |                                    | M-Grade                              |                                |               | C-Grade |               |       | UNIT        |
|--------------------|------------------------------------|--------------------------------------|--------------------------------|---------------|---------|---------------|-------|-------------|
| PARAMETER          |                                    | TEST CONDITIONS                      |                                |               | MIN     | TYP           | MAX   |             |
| $V_{OH}$           | High-level output voltage          | $I_{OH} = -4$ mA; see Figure 1       | OUTx on $V_{CC1}$ (3.3 V) side | $V_{CC1}-0.4$ | 3       | $V_{CC1}-0.6$ | 2.9   | V           |
|                    |                                    |                                      | OUTx on $V_{CC2}$ (5 V) side   | $V_{CC2}-0.8$ | 4.8     | $V_{CC2}-0.8$ | 4.7   |             |
|                    |                                    | $I_{OH} = -20$ $\mu$ A; see Figure 1 | OUTx on $V_{CC1}$ (3.3 V) side | $V_{CC1}-0.1$ | 3.3     | $V_{CC1}-0.1$ | 3.3   |             |
|                    |                                    |                                      | OUTx on $V_{CC2}$ (5 V) side   | $V_{CC2}-0.1$ | 5       | $V_{CC2}-0.1$ | 5     |             |
| $V_{OL}$           | Low-level output voltage           | $I_{OL} = 4$ mA; see Figure 1        |                                | 0.2           | 0.4     | 0.3           | 0.5   | V           |
|                    |                                    | $I_{OL} = 20$ $\mu$ A; see Figure 1  |                                | 0             | 0.1     | 0             | 0.1   |             |
| $V_{I(HYS)}$       | Input threshold voltage hysteresis |                                      |                                |               | 430     |               | 430   | mV          |
| $I_{IH}$           | High-level input current           | $V_{IH} = V_{CC}$ at INx or ENx      |                                |               |         |               | 10    | $\mu$ A     |
| $I_{IL}$           | Low-level input current            | $V_{IL} = 0$ V at INx or ENx         |                                |               | -10     |               | -10   |             |
| CMTI               | Common-mode transient immunity     | $V_I = V_{CC}$ or 0 V; see Figure 4  |                                |               | 25      | 50            | 25 50 | kV/ $\mu$ s |

## SWITCHING CHARACTERISTICS

 $V_{CC1}$  at 3.3 V  $\pm$  10% and  $V_{CC2}$  at 5 V  $\pm$  10% (over recommended operating conditions unless otherwise noted)

| ISO7631F, ISO7641F                  |                                                             |                              | M-Grade                 |     |       | C-Grade              |      |     |      |
|-------------------------------------|-------------------------------------------------------------|------------------------------|-------------------------|-----|-------|----------------------|------|-----|------|
| PARAMETER                           |                                                             | TEST CONDITIONS              | MIN                     | TYP | MAX   | MIN                  | TYP  | MAX | UNIT |
| t <sub>PLH</sub> , t <sub>PHL</sub> | Propagation delay time                                      | See <a href="#">Figure 1</a> | 4                       | 7.5 | 12.5  | 11                   | 18.5 | 32  | ns   |
| PWD <sup>(1)</sup>                  | Pulse width distortion  t <sub>PHL</sub> – t <sub>PLH</sub> |                              | 2                       | 2.5 |       |                      |      |     |      |
| t <sub>sk(o)</sub> <sup>(2)</sup>   | Channel-to-channel output skew time                         |                              | Same-direction Channels | 2.5 | 4.5   |                      |      |     |      |
|                                     |                                                             | Opposite-direction Channels  | 3.5                     | 5.5 |       |                      |      |     |      |
| t <sub>sk(pp)</sub> <sup>(3)</sup>  | Part-to-part skew time                                      | 6                            | 15                      |     |       |                      |      |     |      |
| t <sub>r</sub>                      | Output signal rise time                                     | See <a href="#">Figure 1</a> | 1.7                     | 2.9 | ns    |                      |      |     |      |
| t <sub>f</sub>                      | Output signal fall time                                     |                              | 1.1                     | 2.9 |       |                      |      |     |      |
| t <sub>PHZ</sub>                    | Disable Propagation Delay, high-to-high impedance output    | See <a href="#">Figure 2</a> | 5.5                     | 17  | 8     | 20                   | ns   |     |      |
| t <sub>PLZ</sub>                    | Disable Propagation Delay, low-to-high impedance output     |                              | 5.5                     | 17  | 7     | 20                   |      |     |      |
| t <sub>PZH</sub>                    | Enable Propagation Delay, high impedance-to-high output     |                              | 4.5                     | 17  | 11000 | 22000 <sup>(4)</sup> |      |     |      |
| t <sub>PZL</sub>                    | Enable Propagation Delay, high impedance-to-low output      |                              | 4.5                     | 17  | 8     | 30                   |      |     |      |
| t <sub>fs</sub>                     | Fail-safe output delay time from input data or power loss   | See <a href="#">Figure 3</a> | 9.5                     | 7.5 | μs    |                      |      |     |      |

(1) Also known as Pulse Skew.

(2)  $t_{sk(o)}$  is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.

(3)  $t_{sk(pp)}$  is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals and loads.

(4) The enable signal rate for C-grade devices should be  $\leq$  45 Kbps.

**SUPPLY CURRENT**
 $V_{CC1}$  at  $3.3V \pm 10\%$  and  $V_{CC2}$  at  $5V \pm 10\%$  (over recommended operating conditions unless otherwise noted)

| ISO7631F         |                 |                                                                                                                                               | M-Grade |      |         | C-Grade        |     |     |      |
|------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---------|------|---------|----------------|-----|-----|------|
| PARAMETER        | TEST CONDITIONS |                                                                                                                                               | MIN     | TYP  | MAX     | MIN            | TYP | MAX | UNIT |
| I <sub>CC1</sub> | Disable         | EN1 = EN2 = 0 V                                                                                                                               | 1.8     | 2.8  |         | 0.6            | 1.1 |     | mA   |
| I <sub>CC2</sub> |                 |                                                                                                                                               | 3.7     | 5.4  |         | 1.5            | 2.6 |     |      |
| I <sub>CC1</sub> | DC to 1 Mbps    | DC Signal: V <sub>I</sub> = V <sub>CC</sub> or 0 V<br>AC Signal: All channels switching with square wave clock input; C <sub>L</sub> = 15 pF  | 1.9     | 2.9  |         | 1.2            | 1.8 |     |      |
| I <sub>CC2</sub> |                 |                                                                                                                                               | 3.8     | 5.5  |         | 2.6            | 3.9 |     |      |
| I <sub>CC1</sub> | 10 Mbps         |                                                                                                                                               | 2.4     | 3.4  |         | 1.8            | 2.6 |     |      |
| I <sub>CC2</sub> |                 |                                                                                                                                               | 4.9     | 6.6  |         | 3.9            | 5.3 |     |      |
| I <sub>CC1</sub> | 25 Mbps         |                                                                                                                                               | 3.2     | 4.2  |         | 2.7            | 3.6 |     |      |
| I <sub>CC2</sub> |                 |                                                                                                                                               | 6.8     | 9    |         | 5.9            | 7.8 |     |      |
| I <sub>CC1</sub> | 150 Mbps        |                                                                                                                                               | 9.3     | 12.5 |         | Not Applicable |     |     |      |
| I <sub>CC2</sub> |                 |                                                                                                                                               | 22      | 30   |         |                |     |     |      |
| ISO7641F         |                 |                                                                                                                                               |         |      | C-Grade |                |     |     |      |
| I <sub>CC1</sub> | Disable         | EN1 = EN2 = 0 V                                                                                                                               |         |      |         | 0.7            | 1.1 |     | mA   |
| I <sub>CC2</sub> |                 |                                                                                                                                               |         |      |         | 1.6            | 2.6 |     |      |
| I <sub>CC1</sub> | DC to 1 Mbps    | DC Signal: V <sub>I</sub> = V <sub>CC</sub> or 0 V,<br>AC Signal: All channels switching with square wave clock input; C <sub>L</sub> = 15 pF |         |      |         | 1.2            | 1.9 |     |      |
| I <sub>CC2</sub> |                 |                                                                                                                                               |         |      |         | 3.1            | 4.2 |     |      |
| I <sub>CC1</sub> | 10 Mbps         |                                                                                                                                               |         |      |         | 2              | 2.8 |     |      |
| I <sub>CC2</sub> |                 |                                                                                                                                               |         |      |         | 4.9            | 6.1 |     |      |
| I <sub>CC1</sub> | 25 Mbps         |                                                                                                                                               |         |      |         | 3.1            | 4   |     |      |
| I <sub>CC2</sub> |                 |                                                                                                                                               |         |      |         | 7.7            | 9.5 |     |      |

## ELECTRICAL CHARACTERISTICS

 $V_{CC1}$  and  $V_{CC2}$  at 3.3 V  $\pm$  10% (over recommended operating conditions unless otherwise noted)

| ISO7631F, ISO7641F  |                                    |                                                                       | M-Grade                               |     |     | C-Grade                               |     |     |       |
|---------------------|------------------------------------|-----------------------------------------------------------------------|---------------------------------------|-----|-----|---------------------------------------|-----|-----|-------|
| PARAMETER           |                                    | TEST CONDITIONS                                                       | MIN                                   | TYP | MAX | MIN                                   | TYP | MAX | UNIT  |
| V <sub>OH</sub>     | High-level output voltage          | I <sub>OH</sub> = −4 mA; see <a href="#">Figure 1</a>                 | V <sub>CCx</sub> <sup>(1)</sup> − 0.4 | 3   |     | V <sub>CCx</sub> <sup>(1)</sup> − 0.6 | 2.9 |     | V     |
|                     |                                    | I <sub>OH</sub> = −20 μA; see <a href="#">Figure 1</a>                | V <sub>CCx</sub> <sup>(1)</sup> − 0.1 | 3.3 |     | V <sub>CCx</sub> <sup>(1)</sup> − 0.1 | 3.3 |     |       |
| V <sub>OL</sub>     | Low-level output voltage           | I <sub>OL</sub> = 4 mA; see <a href="#">Figure 1</a>                  |                                       | 0.2 | 0.4 |                                       | 0.3 | 0.5 | V     |
|                     |                                    | I <sub>OL</sub> = 20 μA; see <a href="#">Figure 1</a>                 |                                       | 0   | 0.1 |                                       | 0   | 0.1 |       |
| V <sub>I(HYS)</sub> | Input threshold voltage hysteresis |                                                                       |                                       | 425 |     |                                       | 425 |     | mV    |
| I <sub>IH</sub>     | High-level input current           | V <sub>IH</sub> = V <sub>CC</sub> at INx or ENx                       |                                       |     | 10  |                                       |     | 10  | μA    |
| I <sub>IL</sub>     | Low-level input current            | V <sub>IL</sub> = 0 V at INx or ENx                                   | -10                                   |     |     | -10                                   |     |     |       |
| CMTI                | Common-mode transient immunity     | V <sub>I</sub> = V <sub>CC</sub> or 0 V; see <a href="#">Figure 4</a> | 25                                    | 50  |     | 25                                    | 50  |     | kV/μs |

(1)  $V_{CCx}$  is the supply voltage,  $V_{CC1}$  or  $V_{CC2}$ , for the output channel that is being measured.

## SWITCHING CHARACTERISTICS

 $V_{CC1}$  and  $V_{CC2}$  at 3.3 V  $\pm$  10% (over recommended operating conditions unless otherwise noted)

| ISO7631F, ISO7641F                  |                                                             |                             | M-Grade |     |     | C-Grade |       |                      |      |
|-------------------------------------|-------------------------------------------------------------|-----------------------------|---------|-----|-----|---------|-------|----------------------|------|
| PARAMETER                           |                                                             | TEST CONDITIONS             | MIN     | TYP | MAX | MIN     | TYP   | MAX                  | UNIT |
| t <sub>PLH</sub> , t <sub>PHL</sub> | Propagation delay time                                      | See Figure 1                | 4       | 8.5 | 14  | 12      | 23    | 35                   | ns   |
| PWD <sup>(1)</sup>                  | Pulse width distortion  t <sub>PHL</sub> – t <sub>PLH</sub> |                             |         |     | 2   |         |       | 3                    |      |
| t <sub>sk(o)</sub> <sup>(2)</sup>   | Channel-to-channel output skew time                         | Same-direction Channels     |         |     | 3   |         |       | 5                    |      |
|                                     |                                                             | Opposite-direction Channels |         |     | 4   |         |       | 6                    |      |
| t <sub>sk(pp)</sub> <sup>(3)</sup>  | Part-to-part skew time                                      |                             |         |     | 6.5 |         |       | 16                   |      |
| t <sub>r</sub>                      | Output signal rise time                                     | See Figure 1                |         |     | 2   |         |       | 3.7                  | ns   |
| t <sub>f</sub>                      | Output signal fall time                                     |                             |         |     | 1.3 |         |       | 3.4                  |      |
| t <sub>PHZ</sub>                    | Disable Propagation Delay, high-to-high impedance output    | See Figure 2                |         |     | 6.5 | 17      | 9     | 20                   | ns   |
| t <sub>PLZ</sub>                    | Disable Propagation Delay, low-to-high impedance output     |                             |         |     | 6.5 | 17      | 8     | 20                   |      |
| t <sub>PZH</sub>                    | Enable Propagation Delay, high impedance-to-high output     |                             |         |     | 5.5 | 17      | 11000 | 22000 <sup>(4)</sup> |      |
| t <sub>PZL</sub>                    | Enable Propagation Delay, high impedance-to-low output      |                             |         |     | 5.5 | 17      | 10    | 30                   |      |
| t <sub>fs</sub>                     | Fail-safe output delay time from input data or power loss   | See Figure 3                |         |     | 9.2 |         | 7.5   |                      | μs   |

(1) Also known as Pulse Skew.

(2)  $t_{sk(o)}$  is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.

(3)  $t_{sk(pp)}$  is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals and loads.

(4) The enable signal rate for C-grade devices should be  $\leq 45$  Kbps.

**SUPPLY CURRENT**
 $V_{CC1}$  and  $V_{CC2}$  at 3.3 V  $\pm$  10% (over recommended operating conditions unless otherwise noted)

| ISO7631F         |                 |                                                                                                                                               | M-Grade |      |      | C-Grade        |     |     |      |
|------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---------|------|------|----------------|-----|-----|------|
| PARAMETER        | TEST CONDITIONS |                                                                                                                                               | MIN     | TYP  | MAX  | MIN            | TYP | MAX | UNIT |
| I <sub>CC1</sub> | Disable         | EN1 = EN2 = 0 V                                                                                                                               |         | 1.8  | 2.8  |                | 0.6 | 1.1 | mA   |
| I <sub>CC2</sub> |                 |                                                                                                                                               |         | 2.7  | 3.7  |                | 0.7 | 1.3 |      |
| I <sub>CC1</sub> | DC to 1 Mbps    | DC Signal: V <sub>I</sub> = V <sub>CC</sub> or 0 V<br>AC Signal: All channels switching with square wave clock input; C <sub>L</sub> = 15 pF  |         | 1.9  | 2.9  |                | 1.2 | 1.8 |      |
| I <sub>CC2</sub> |                 |                                                                                                                                               |         | 2.8  | 3.8  |                | 1.8 | 2.6 |      |
| I <sub>CC1</sub> | 10 Mbps         |                                                                                                                                               |         | 2.4  | 3.4  |                | 1.8 | 2.6 |      |
| I <sub>CC2</sub> |                 |                                                                                                                                               |         | 3.5  | 4.6  |                | 2.6 | 3.5 |      |
| I <sub>CC1</sub> | 25 Mbps         |                                                                                                                                               |         | 3.2  | 4.2  |                | 2.7 | 3.6 |      |
| I <sub>CC2</sub> |                 |                                                                                                                                               |         | 4.7  | 5.9  |                | 3.8 | 5   |      |
| I <sub>CC1</sub> | 150 Mbps        |                                                                                                                                               |         | 9.3  | 12.5 | Not Applicable |     |     |      |
| I <sub>CC2</sub> |                 |                                                                                                                                               |         | 14.6 | 19   |                |     |     |      |
| ISO7641F         |                 |                                                                                                                                               |         |      |      | C-Grade        |     |     |      |
| I <sub>CC1</sub> | Disable         | EN1 = EN2 = 0 V                                                                                                                               |         |      |      |                | 0.7 | 1.1 | mA   |
| I <sub>CC2</sub> |                 |                                                                                                                                               |         |      |      |                | 0.8 | 1.3 |      |
| I <sub>CC1</sub> | DC to 1 Mbps    | DC Signal: V <sub>I</sub> = V <sub>CC</sub> or 0 V,<br>AC Signal: All channels switching with square wave clock input; C <sub>L</sub> = 15 pF |         |      |      |                | 1.2 | 1.9 |      |
| I <sub>CC2</sub> |                 |                                                                                                                                               |         |      |      |                | 2   | 2.9 |      |
| I <sub>CC1</sub> | 10 Mbps         |                                                                                                                                               |         |      |      |                | 2   | 2.8 |      |
| I <sub>CC2</sub> |                 |                                                                                                                                               |         |      |      |                | 3.2 | 4.1 |      |
| I <sub>CC1</sub> | 25 Mbps         |                                                                                                                                               |         |      |      |                | 3.1 | 4   |      |
| I <sub>CC2</sub> |                 |                                                                                                                                               |         |      |      |                | 5.1 | 7   |      |

## ELECTRICAL CHARACTERISTICS

 $V_{CC1}$  and  $V_{CC2}$  at 2.7 V<sup>(1)</sup> (over recommended operating conditions unless otherwise noted)

| ISO7631F            |                                    |                                                                       | M-Grade                              |     |     |       |
|---------------------|------------------------------------|-----------------------------------------------------------------------|--------------------------------------|-----|-----|-------|
| PARAMETER           |                                    | TEST CONDITIONS                                                       | MIN                                  | TYP | MAX | UNIT  |
| V <sub>OH</sub>     | High-level output voltage          | I <sub>OH</sub> = −4 mA; see <a href="#">Figure 1</a>                 | V <sub>CC</sub> <sup>(2)</sup> − 0.5 | 2.4 |     | V     |
|                     |                                    | I <sub>OH</sub> = −20 μA; see <a href="#">Figure 1</a>                | V <sub>CC</sub> <sup>(2)</sup> − 0.1 | 2.7 |     |       |
| V <sub>OL</sub>     | Low-level output voltage           | I <sub>OL</sub> = 4 mA; see <a href="#">Figure 1</a>                  |                                      | 0.2 | 0.4 | V     |
|                     |                                    | I <sub>OL</sub> = 20 μA; see <a href="#">Figure 1</a>                 |                                      | 0   | 0.1 |       |
| V <sub>I(HYS)</sub> | Input threshold voltage hysteresis |                                                                       |                                      | 350 |     | mV    |
| I <sub>IH</sub>     | High-level input current           | V <sub>IH</sub> = V <sub>CC</sub> at INx or ENx                       |                                      |     | 10  | μA    |
| I <sub>IL</sub>     | Low-level input current            | V <sub>IL</sub> = 0 V at INx or ENx                                   | -10                                  |     |     |       |
| CMTI                | Common-mode transient immunity     | V <sub>I</sub> = V <sub>CC</sub> or 0 V; see <a href="#">Figure 4</a> | 25                                   | 50  |     | kV/μs |

(1) Only M-Grade devices are recommended for operation down to 2.7 V supplies. For 2.7 V-operation, max data rate is 100 Mbps.

(2)  $V_{CCx}$  is the supply voltage,  $V_{CC1}$  or  $V_{CC2}$ , for the output channel that is being measured.

## SWITCHING CHARACTERISTICS

 $V_{CC1}$  and  $V_{CC2}$  at 2.7 V (over recommended operating conditions unless otherwise noted)

| ISO7631F                            |                                                             |                             | M-Grade |     |     |      |
|-------------------------------------|-------------------------------------------------------------|-----------------------------|---------|-----|-----|------|
| PARAMETER                           |                                                             | TEST CONDITIONS             | MIN     | TYP | MAX | UNIT |
| t <sub>PLH</sub> , t <sub>PHL</sub> | Propagation delay time                                      | See Figure 1                | 5       | 8   | 16  | ns   |
| PWD <sup>(1)</sup>                  | Pulse width distortion  t <sub>PHL</sub> – t <sub>PLH</sub> |                             |         |     | 2.5 |      |
| t <sub>sk(o)</sub> <sup>(2)</sup>   | Channel-to-channel output skew time                         | Same-direction Channels     |         |     | 4   |      |
|                                     |                                                             | Opposite-direction Channels |         |     | 5   |      |
| t <sub>sk(pp)</sub> <sup>(3)</sup>  | Part-to-part skew time                                      |                             |         |     | 8   |      |
| t <sub>r</sub>                      | Output signal rise time                                     | See Figure 1                |         | 2.3 |     | ns   |
| t <sub>f</sub>                      | Output signal fall time                                     |                             |         | 1.8 |     |      |
| t <sub>PHZ</sub>                    | Disable Propagation Delay, high-to-high impedance output    | See Figure 2                |         | 8   | 18  | ns   |
| t <sub>PLZ</sub>                    | Disable Propagation Delay, low-to-high impedance output     |                             |         | 8   | 18  |      |
| t <sub>PZH</sub>                    | Enable Propagation Delay, high impedance-to-high output     |                             |         | 7   | 18  |      |
| t <sub>PZL</sub>                    | Enable Propagation Delay, high impedance-to-low output      |                             |         | 7   | 18  |      |
| t <sub>fs</sub>                     | Fail-safe output delay time from input data or power loss   | See Figure 3                |         | 8.5 |     | μs   |

(1) Also known as Pulse Skew.

(2)  $t_{sk(o)}$  is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.

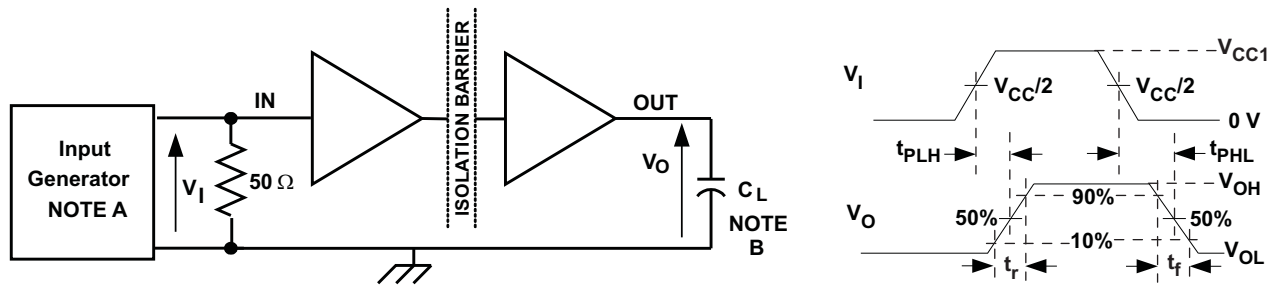
(3)  $t_{sk(pp)}$  is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals and loads.

## SUPPLY CURRENT

$V_{CC1}$  and  $V_{CC2}$  at 2.7 V (over recommended operating conditions unless otherwise noted)

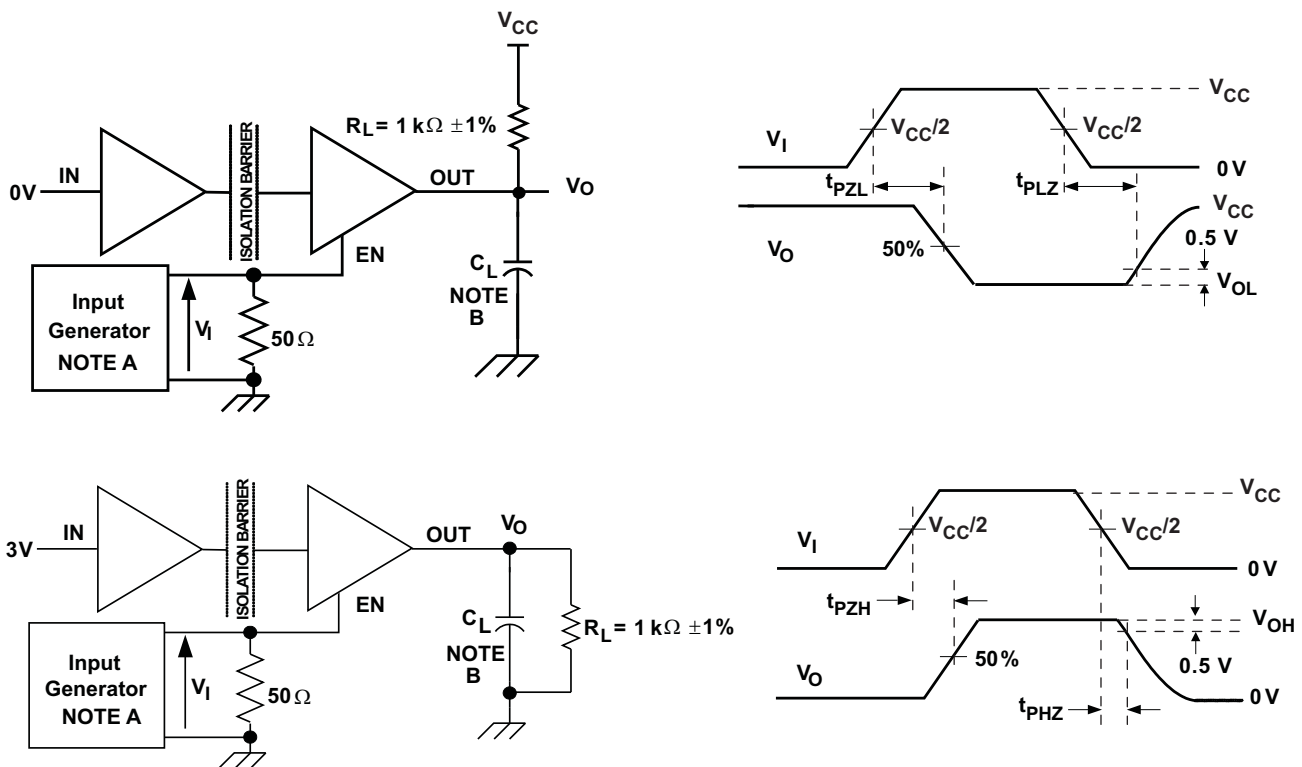
| ISO7631F         |                 |                                                                                                                                              | M-Grade |     |     |      |
|------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------|-----|-----|------|
| PARAMETER        | TEST CONDITIONS |                                                                                                                                              | MIN     | TYP | MAX | UNIT |
| I <sub>CC1</sub> | Disable         | EN1 = EN2 = 0 V                                                                                                                              | 1.5     |     | 2.4 | mA   |
| I <sub>CC2</sub> |                 |                                                                                                                                              | 2.2     |     | 3.2 |      |
| I <sub>CC1</sub> | DC to 1 Mbps    | DC Signal: V <sub>I</sub> = V <sub>CC</sub> or 0 V<br>AC Signal: All channels switching with square wave clock input; C <sub>L</sub> = 15 pF | 1.6     |     | 2.5 |      |
| I <sub>CC2</sub> |                 |                                                                                                                                              | 2.3     |     | 3.2 |      |
| I <sub>CC1</sub> | 10 Mbps         |                                                                                                                                              | 2       |     | 2.9 |      |
| I <sub>CC2</sub> |                 |                                                                                                                                              | 3       |     | 3.9 |      |
| I <sub>CC1</sub> | 25 Mbps         |                                                                                                                                              | 2.7     |     | 3.7 |      |
| I <sub>CC2</sub> |                 |                                                                                                                                              | 3.9     |     | 4.9 |      |
| I <sub>CC1</sub> | 100 Mbps        |                                                                                                                                              | 5.7     |     | 6.8 |      |
| I <sub>CC2</sub> |                 |                                                                                                                                              | 8.6     |     | 12  |      |

## PARAMETER MEASUREMENT INFORMATION



- The input pulse is supplied by a generator having the following characteristics: PRR  $\leq$  50 kHz, 50% duty cycle,  $t_r \leq$  3 ns,  $t_f \leq$  3 ns,  $Z_O = 50 \Omega$ . At the input,  $50 \Omega$  resistor is required to terminate Input Generator signal. It is not needed in actual application.
- $C_L = 15$  pF and includes instrumentation and fixture capacitance within  $\pm 20\%$ .

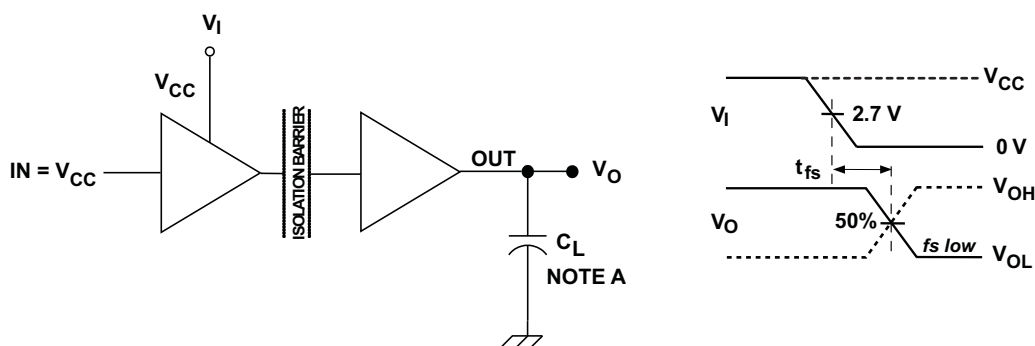
Figure 1. Switching Characteristics Test Circuit and Voltage Waveforms



- The input pulse is supplied by a generator having the following characteristics: PRR  $\leq$  10 kHz, 50% duty cycle,  $t_r \leq$  3 ns,  $t_f \leq$  3 ns,  $Z_O = 50 \Omega$ .
- $C_L = 15$  pF and includes instrumentation and fixture capacitance within  $\pm 20\%$ .

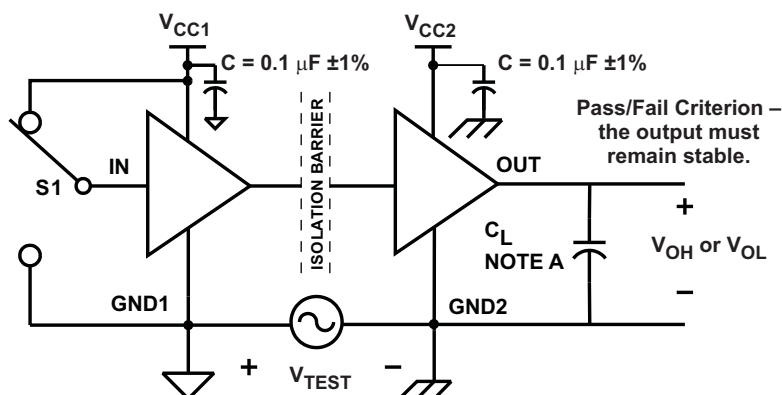
Figure 2. Enable/Disable Propagation Delay Time Test Circuit and Waveform

## PARAMETER MEASUREMENT INFORMATION (continued)



- A.  $C_L = 15 \text{ pF}$  and includes instrumentation and fixture capacitance within  $\pm 20\%$ .

Figure 3. Failsafe Delay Time Test Circuit and Voltage Waveforms



- A.  $C_L = 15 \text{ pF}$  and includes instrumentation and fixture capacitance within  $\pm 20\%$ .

Figure 4. Common-Mode Transient Immunity Test Circuit

## DEVICE INFORMATION

### IEC INSULATION AND SAFETY-RELATED SPECIFICATIONS FOR DW-16 PACKAGE

| PARAMETER                      |                                                  | TEST CONDITIONS                                                                       | MIN   | TYP               | MAX | UNIT |
|--------------------------------|--------------------------------------------------|---------------------------------------------------------------------------------------|-------|-------------------|-----|------|
| L(I01)                         | Minimum air gap (Clearance)                      | Shortest terminal to terminal distance through air                                    | 8.3   |                   |     | mm   |
| L(I02) <sup>(1)</sup>          | Minimum external tracking (Creepage)             | Shortest terminal to terminal distance across the package surface                     | 8.1   |                   |     | mm   |
| CTI                            | Tracking resistance (Comparative Tracking Index) | DIN IEC 60112 / VDE 0303 Part 1                                                       | ≥400  |                   |     | V    |
|                                | Minimum Internal Gap (Internal Clearance)        | Distance through the insulation                                                       | 0.014 |                   |     | mm   |
| R <sub>IO</sub> <sup>(2)</sup> | Isolation resistance, Input to Output            | V <sub>IO</sub> = 500 V, T <sub>A</sub> < 100°C                                       |       | >10 <sup>12</sup> |     | Ω    |
|                                |                                                  | V <sub>IO</sub> = 500 V, 100°C ≤ T <sub>A</sub> ≤ max                                 |       | >10 <sup>11</sup> |     |      |
| C <sub>IO</sub> <sup>(2)</sup> | Barrier capacitance, Input to Output             | V <sub>I</sub> = 0.4 sin (2πft), f = 1MHz                                             |       | 2                 |     | pF   |
| C <sub>I</sub> <sup>(3)</sup>  | Input capacitance                                | V <sub>I</sub> = V <sub>CC</sub> /2 + 0.4 sin (2πft), f = 1MHz, V <sub>CC</sub> = 5 V |       | 2                 |     | pF   |

- (1) Per JEDEC package dimensions.  
(2) All pins on each side of the barrier tied together creating a two-terminal device.  
(3) Measured from input pin to ground.

#### NOTE

Creepage and clearance requirements should be applied according to the specific equipment isolation standards of an application. Care should be taken to maintain the creepage and clearance distance of a board design to ensure that the mounting pads of the isolator on the printed circuit board do not reduce this distance.

Creepage and clearance on a printed circuit board become equal according to the measurement techniques shown in the Isolation Glossary. Techniques such as inserting grooves and/or ribs on a printed circuit board are used to help increase these specifications.

**Table 2. DIN EN 60747-5-2 (VDE 0884 TEIL 2) INSULATION CHARACTERISTICS<sup>(1)</sup>  
over recommended operating conditions (unless otherwise noted)**

| PARAMETER         |                                    | TEST CONDITIONS                                                                                                                     | SPECIFICATION    | UNIT              |
|-------------------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------|
| V <sub>IORM</sub> | Maximum working insulation voltage |                                                                                                                                     | 1414             | V <sub>PEAK</sub> |
| V <sub>PR</sub>   | Input-to-output test voltage       | After Input/Output safety test subgroup 2/3,<br>V <sub>PR</sub> = V <sub>IORM</sub> × 1.2, t = 10 s,<br>Partial discharge < 5 pC    | 1697             | V <sub>PEAK</sub> |
|                   |                                    | Method a, After environmental tests subgroup 1,<br>V <sub>PR</sub> = V <sub>IORM</sub> × 1.6, t = 10 s,<br>Partial Discharge < 5 pC | 2262             |                   |
|                   |                                    | Method b1, 100% Production test<br>V <sub>PR</sub> = V <sub>IORM</sub> × 1.875, t = 1 s<br>Partial discharge < 5 pC                 | 2652             |                   |
| V <sub>IOTM</sub> | Maximum transient overvoltage      | V <sub>TEST</sub> = V <sub>IOTM</sub><br>t = 60 sec (Qualification)<br>t = 1 sec (100% Production)                                  | 4242             | V <sub>PEAK</sub> |
| R <sub>S</sub>    | Insulation resistance              | V <sub>IO</sub> = 500 V at T <sub>S</sub>                                                                                           | >10 <sup>9</sup> | Ω                 |
|                   | Pollution degree                   |                                                                                                                                     | 2                |                   |

- (1) Climatic Classification 40/125/21

**Table 3. IEC 60664-1 RATINGS TABLE**

| PARAMETER                   | TEST CONDITIONS                         | SPECIFICATION |
|-----------------------------|-----------------------------------------|---------------|
| Basic Isolation Group       | Material Group                          | II            |
| Installation classification | Rated mains voltage $\leq 300 V_{RMS}$  | I–IV          |
|                             | Rated mains voltage $\leq 600 V_{RMS}$  | I–III         |
|                             | Rated mains voltage $\leq 1000 V_{RMS}$ | I–II          |

**REGULATORY INFORMATION**

| VDE                                                                                                        | TUV                                                                                                                                                   | CSA                                                | UL                                                  |
|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------|
| Certified according to DIN EN 60747-5-2                                                                    | Certified according to EN/UL/CSA 60950-1 and 61010-1                                                                                                  | Approved under CSA Component Acceptance Notice #5A | Recognized under 1577 Component Recognition Program |
| Basic Insulation<br>Maximum Transient Overvoltage, 4242 $V_{PK}$<br>Maximum Working Voltage, 1414 $V_{PK}$ | 3000 $V_{RMS}$ Reinforced Insulation, 400 $V_{RMS}$ maximum working voltage<br>3000 $V_{RMS}$ Basic Insulation, 600 $V_{RMS}$ maximum working voltage | 4242 $V_{PK}$ Insulation                           | Single Protection, 2500 $V_{RMS}$ <sup>(1)</sup>    |
| File Number: 40016131                                                                                      | Certificate Number: U8V 13 09 77311 010                                                                                                               | File Number: 220991                                | File Number: E181974                                |

(1) Production tested  $\geq 3000 V_{RMS}$  for 1 second in accordance with UL 1577.

**IEC SAFETY LIMITING VALUES**

Safety limiting intends to prevent potential damage to the isolation barrier upon failure of input or output circuitry. A failure of the IO can allow low resistance to ground or the supply and, without current limiting, dissipate sufficient power to overheat the die and damage the isolation barrier potentially leading to secondary system failures.

| PARAMETER                                     | TEST CONDITIONS |                                                                                        |  | MIN | TYP | MAX | UNIT       |
|-----------------------------------------------|-----------------|----------------------------------------------------------------------------------------|--|-----|-----|-----|------------|
| $I_S$ Safety input, output, or supply current | DW-16           | $\theta_{JA} = 72^\circ C/W$ , $V_I = 5.5V$ , $T_J = 150^\circ C$ , $T_A = 25^\circ C$ |  |     |     | 316 | mA         |
|                                               |                 | $\theta_{JA} = 72^\circ C/W$ , $V_I = 3.6V$ , $T_J = 150^\circ C$ , $T_A = 25^\circ C$ |  |     |     | 482 |            |
|                                               |                 | $\theta_{JA} = 72^\circ C/W$ , $V_I = 2.7V$ , $T_J = 150^\circ C$ , $T_A = 25^\circ C$ |  |     |     | 643 |            |
| $T_S$ Maximum case temperature                |                 |                                                                                        |  |     |     | 150 | $^\circ C$ |

The safety-limiting constraint is the absolute maximum junction temperature specified in the absolute maximum ratings table. The power dissipation and junction-to-air thermal impedance of the device installed in the application hardware determines the junction temperature. The assumed junction-to-air thermal resistance in the *Thermal Information* table is that of a device installed on a High-K Test Board for Leaded Surface Mount Packages. The power is the recommended maximum input voltage times the current. The junction temperature is then the ambient temperature plus the power times the junction-to-air thermal resistance.

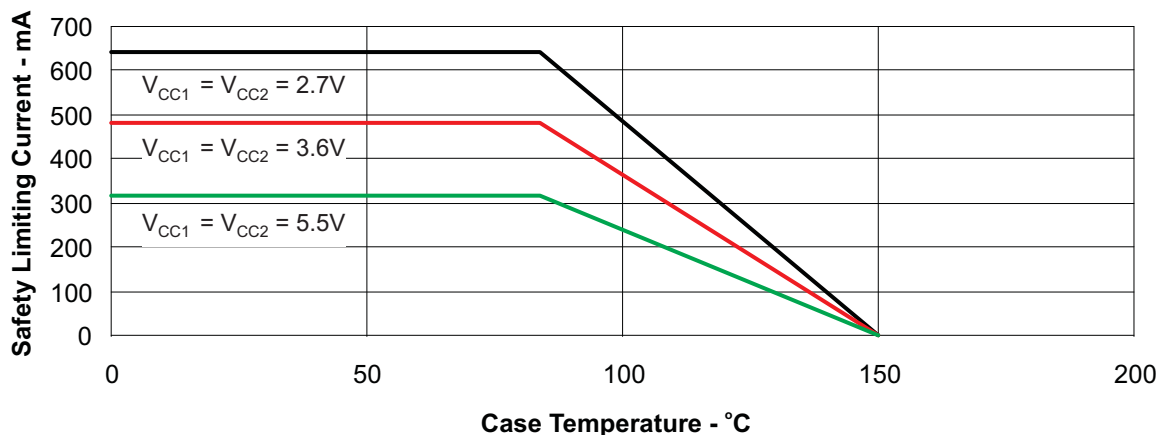


Figure 5. DW-16  $\theta_{JC}$  Thermal Derating Curve per IEC 60747-5-2

### APPLICATION INFORMATION

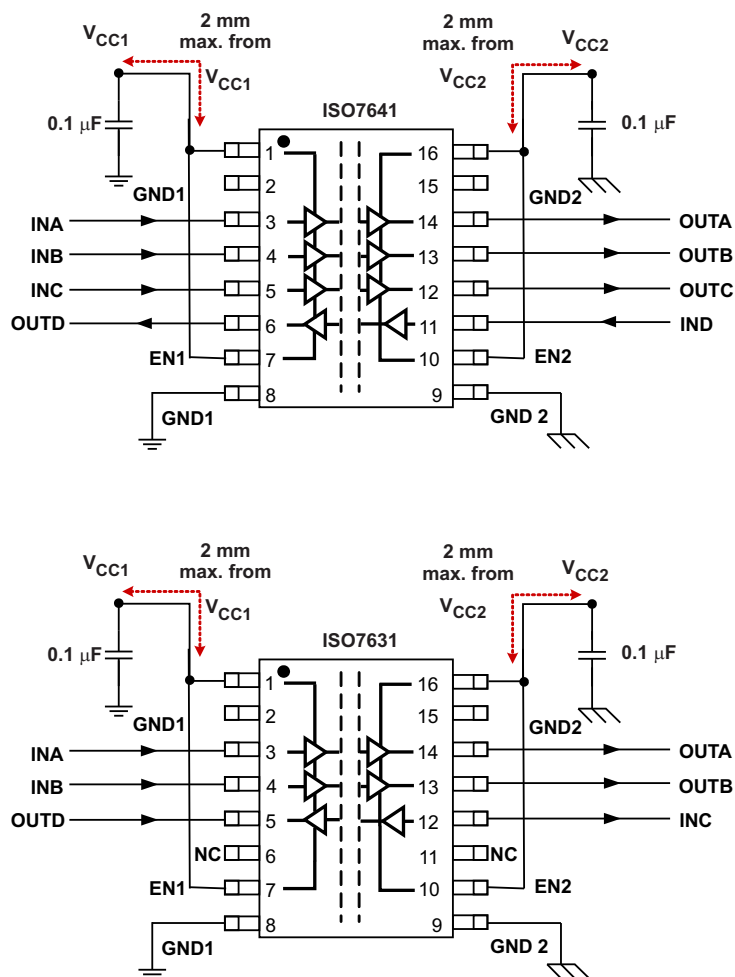


Figure 6. Typical ISO7641 and ISO7631 Application Circuit

Note: For detailed layout recommendations, see Application Note [SLLA284](#), *Digital Isolator Design Guide*.

## TYPICAL SUPPLY CURRENT EQUATIONS

(Calculated based on room temperature and typical Silicon process)

### ISO7631FM:

At  $V_{CC1} = V_{CC2} = 3.3V$

$$I_{CC1} = 1.8072 + 0.0244 \times f + 0.0016 \times f \times C_L$$

$$I_{CC2} = 2.4625 + 0.0252 \times f + 0.0033 \times f \times C_L$$

At  $V_{CC1} = V_{CC2} = 5V$

$$I_{CC1} = 2.3183 + 0.04 \times f + 0.0025 \times f \times C_L$$

$$I_{CC2} = 3.2582 + 0.0403 \times f + 0.0049 \times f \times C_L$$

### ISO7631FC:

At  $V_{CC1} = V_{CC2} = 3.3V$

$$I_{CC1} = 1.1762 + 0.0325 \times f + 0.0017 \times f \times C_L$$

$$I_{CC2} = 1.5285 + 0.0299 \times f + 0.0033 \times f \times C_L$$

At  $V_{CC1} = V_{CC2} = 5V$

$$I_{CC1} = 1.6001 + 0.0528 \times f + 0.0025 \times f \times C_L$$

$$I_{CC2} = 2.2032 + 0.0475 \times f + 0.005 \times f \times C_L$$

### ISO7641FC:

At  $V_{CC1} = V_{CC2} = 3.3V$

$$I_{CC1} = 1.2162 + 0.0462 \times f + 0.0017 \times f \times C_L$$

$$I_{CC2} = 1.8054 + 0.0411 \times f + 0.005 \times f \times C_L$$

At  $V_{CC1} = V_{CC2} = 5V$

$$I_{CC1} = 1.6583 + 0.0757 \times f + 0.0025 \times f \times C_L$$

$$I_{CC2} = 2.5008 + 0.0655 \times f + 0.0076 \times f \times C_L$$

$I_{CC1}$  and  $I_{CC2}$  are typical supply currents measured in mA;  $f$  is data rate measured in Mbps;  $C_L$  is the capacitive load on each channel measured in pF.

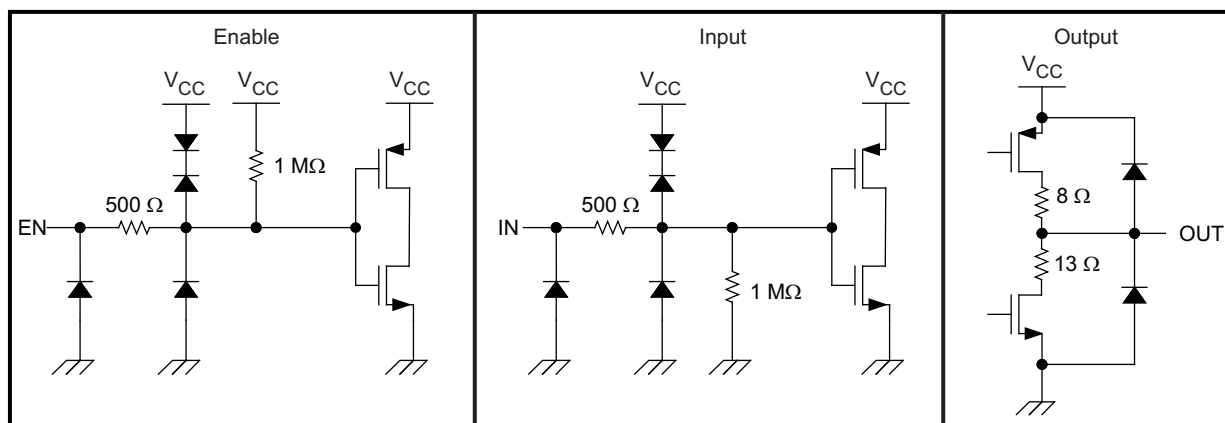


Figure 7. Device I/O Schematics

## TYPICAL CHARACTERISTICS

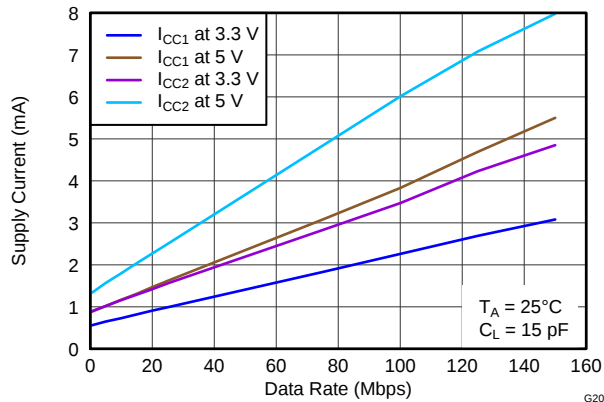


Figure 8. ISO7631FM Supply Current Per Channel vs Data Rate

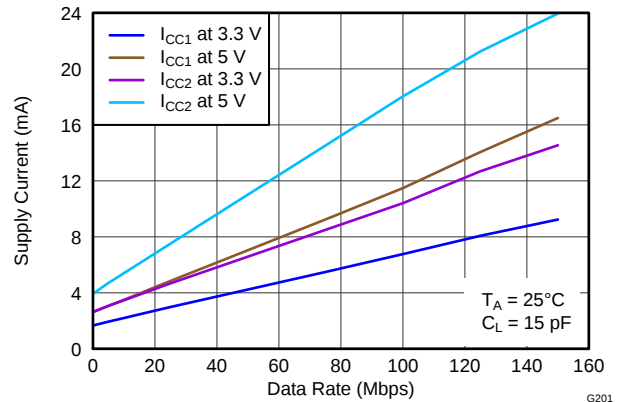


Figure 9. ISO7631FM Supply Current For All Channels vs Data Rate

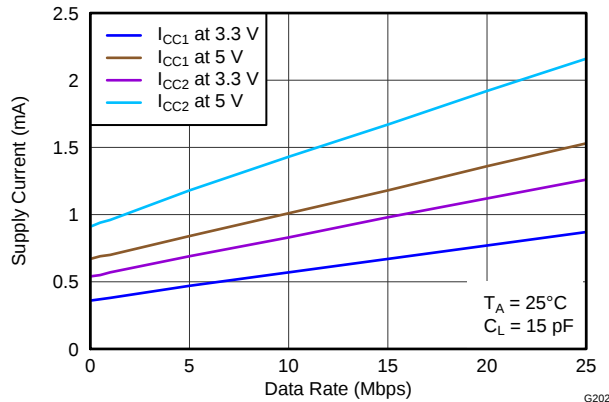


Figure 10. ISO7631FC Supply Current Per Channel vs Data Rate

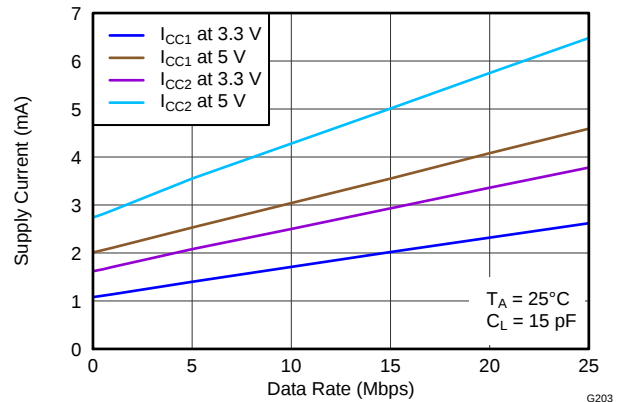


Figure 11. ISO7631FC Supply Current For All Channels vs Data Rate

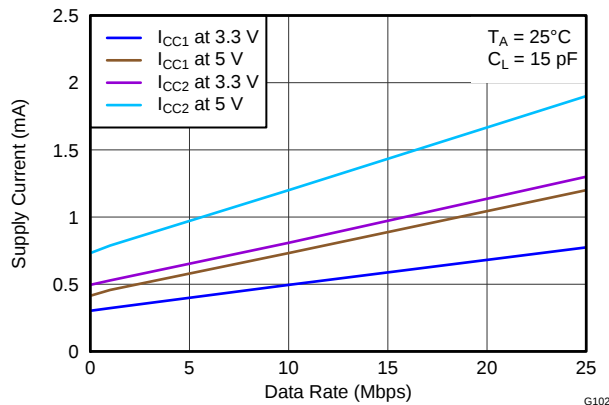


Figure 12. ISO7641FC Supply Current Per Channel vs Data Rate

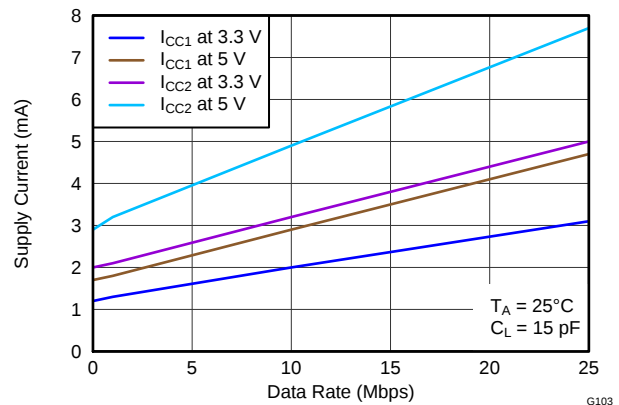


Figure 13. ISO7641FC Supply Current For All Channels vs Data Rate

## TYPICAL CHARACTERISTICS (continued)

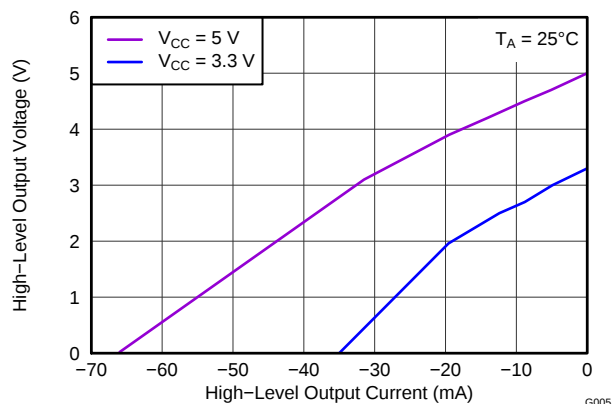


Figure 14. M-Grade High-Level Output Voltage vs High-Level Output Current

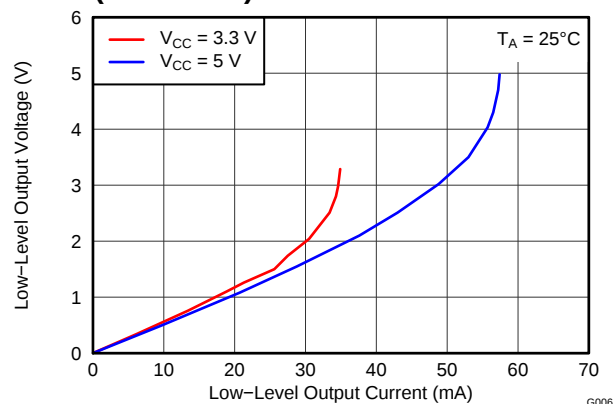


Figure 15. M-Grade Low-Level Output Voltage vs Low-Level Output Current

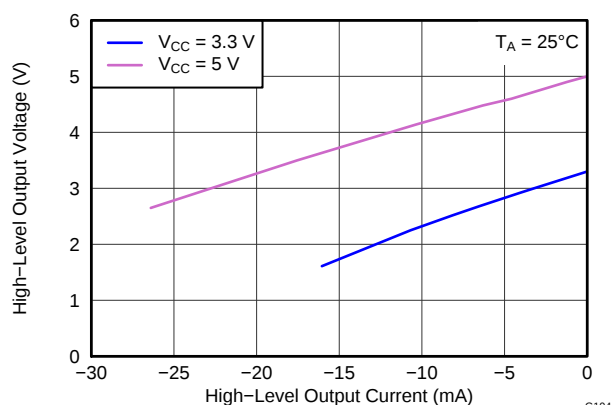


Figure 16. C-Grade High-Level Output Voltage vs High-Level Output Current

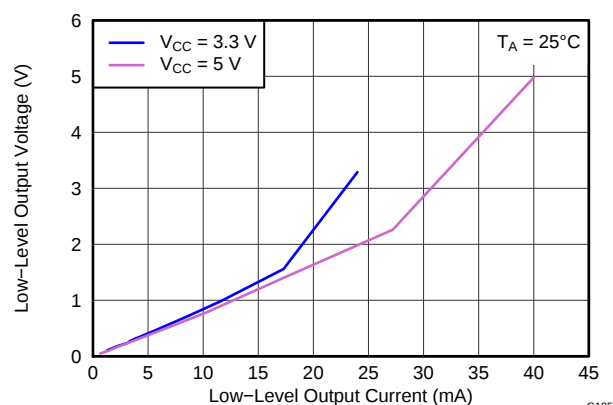


Figure 17. C-Grade Low-Level Output Voltage vs Low-Level Output Current

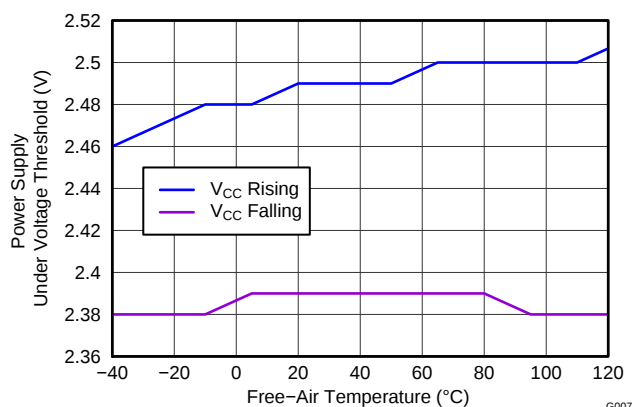


Figure 18.  $V_{CC}$  Undervoltage Threshold vs Free-Air Temperature

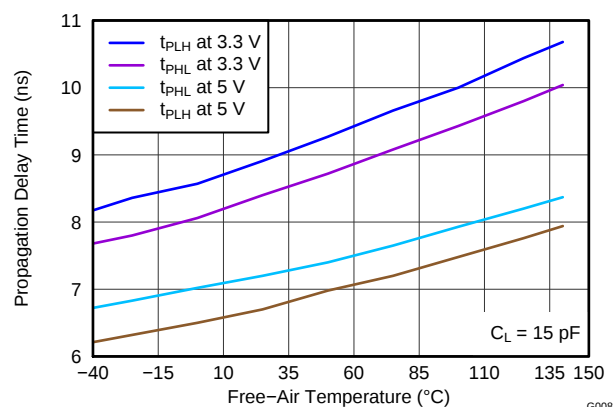
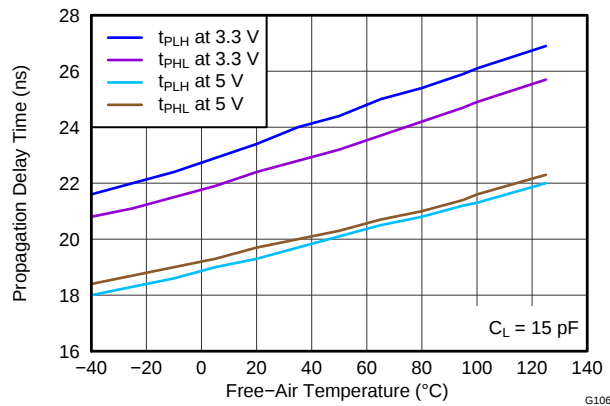
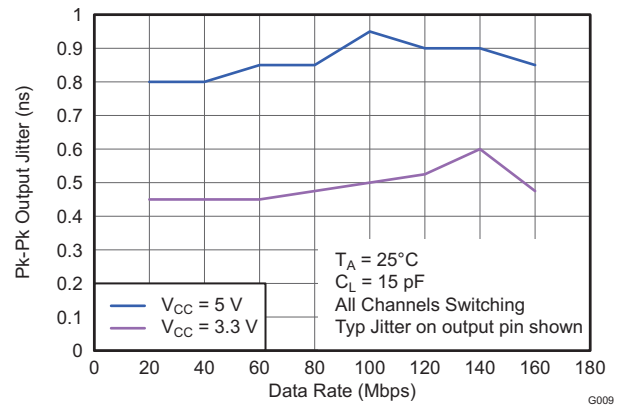


Figure 19. M-Grade Propagation Delay Time vs Free-Air Temperature

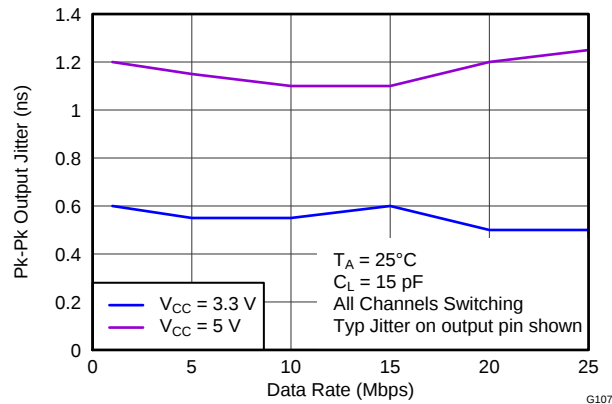
## TYPICAL CHARACTERISTICS (continued)



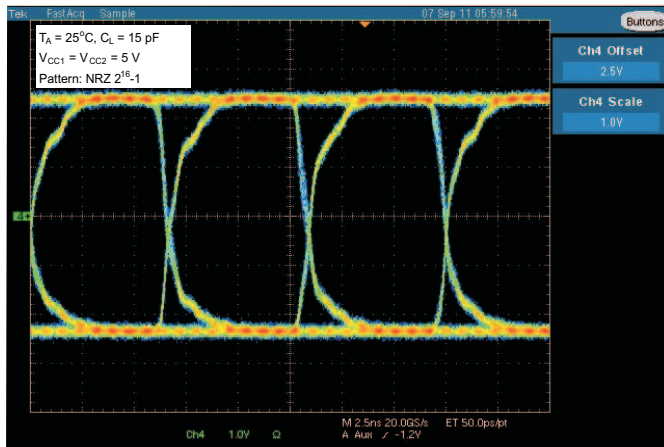
**Figure 20. C-Grade Propagation Delay Time vs Free Air Temperature**



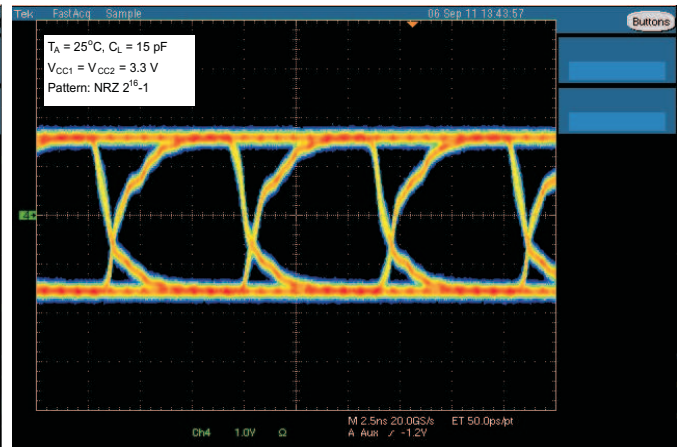
**Figure 21. M-Grade Output Jitter vs Data Rate**



**Figure 22. C-Grade Output Jitter vs Data Rate**



**Figure 23. M-Grade Typical Eye Diagram at 150 Mbps, 5 V Operation**



**Figure 24. M-Grade Typical Eye Diagram at 150 Mbps, 3.3 V Operation**

## TYPICAL CHARACTERISTICS (continued)

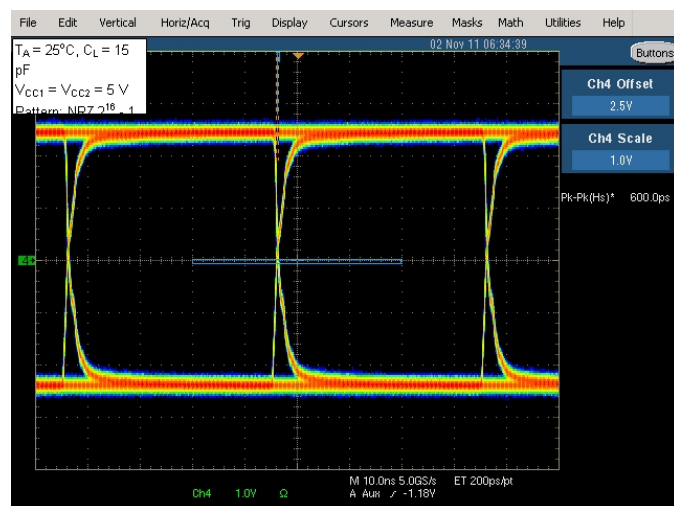


Figure 25. C-Grade Typical Eye Diagram at 25 Mbps, 5 V Operation

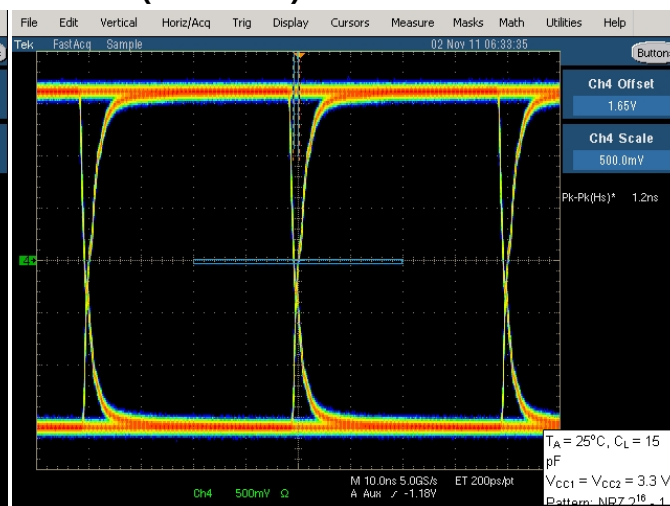


Figure 26. C-Grade Typical Eye Diagram at 25 Mbps, 3.3 V Operation

## REVISION HISTORY

### Changes from Original (September 2012) to Revision A Page

- 将说明文本从：“输入噪声脉冲持续时间少于 10ns 的应用。。。。。” 改为：“输入噪声脉冲持续时间少于 6ns 的应用。。。。。” ..... [1](#)
- Changed Input PU in the Function table From: Z To: 'Undetermined' ..... [2](#)
- Added note "Product Preview" to ISO7640FC in the Available Options table ..... [3](#)

### Changes from Revision A (September 2012) to Revision B Page

- 将安全特性从：针对 DIN EN 60747-5-2 ( VDE 0884 修订版本 2 ) 标准的 4000 V<sub>PK</sub>VDE 额定值改为：针对 DIN EN 60747-5-2 ( VDE 0884 修订版本 2 ) 标准的 4242 V<sub>PK</sub>VDE 额定值 ..... [1](#)
- Changed the V<sub>IOTM</sub> SPECIFICATION From: 4000 V<sub>PEAK</sub> to 4242 V<sub>PEAK</sub> ..... [17](#)
- Changed the REGULATORY INFORMATION table: 4242 V<sub>PK</sub> To: 4000 V<sub>PK</sub> ..... [18](#)

### Changes from Revision B (April 2013) to Revision C Page

- 已从页面顶部删除器件图 ..... [1](#)
- 已删除器件编号 ISO7640FC ..... [1](#)
- 已删除特性 ISO7640FC : 10Mbps 时为 1.1mA ..... [1](#)
- 已添加安全特性：针对 EN/UL/CSA 60950-1 和 EN/UL/CSA 61010-1 ( 已获批准 ) 符合 TUV 标准的 3000 V<sub>RMS</sub> 增强隔离 ..... [1](#)
- 已更改说明 ..... [1](#)
- 已删除 ISO7640 引脚分配图 ..... [1](#)
- Deleted ISO7640FC from the Available Options table ..... [3](#)
- Changed The ISO7631FC Rated Isolation values in the Available Options table ..... [3](#)
- Added the TUV column to the REGULATORY INFORMATION table ..... [18](#)
- Deleted the ISO7640 circuit from the APPLICATION INFORMATION section ..... [19](#)
- Deleted ISO7640FC from the TYPICAL SUPPLY CURRENT EQUATIONS section ..... [20](#)
- Deleted Graph ISO7640FC Supply Current Per Channel vs Data Rate ..... [21](#)
- Deleted Graph ISO7640FC Supply Current For All Channels vs Data Rate ..... [21](#)

### Changes from Revision C (August 2013) to Revision D Page

- Changed the REGULATORY INFORMATION table, TUV column From: Certificate Number: U8V 13 07 77311 009 To: Certificate Number: U8V 13 09 77311 010 ..... [18](#)

## PACKAGING INFORMATION

| Orderable part number        | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6) |
|------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| <a href="#">ISO7631FCDW</a>  | Active        | Production           | SOIC (DW)   16 | 40   TUBE             | Yes         | NIPDAU                               | Level-3-260C-168 HR               | -40 to 125   | ISO7631FC           |
| ISO7631FCDW.A                | Active        | Production           | SOIC (DW)   16 | 40   TUBE             | Yes         | NIPDAU                               | Level-3-260C-168 HR               | -40 to 125   | ISO7631FC           |
| <a href="#">ISO7631FCDWR</a> | Active        | Production           | SOIC (DW)   16 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-3-260C-168 HR               | -40 to 125   | ISO7631FC           |
| ISO7631FCDWR.A               | Active        | Production           | SOIC (DW)   16 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-3-260C-168 HR               | -40 to 125   | ISO7631FC           |
| <a href="#">ISO7631FMDW</a>  | Active        | Production           | SOIC (DW)   16 | 40   TUBE             | Yes         | NIPDAU                               | Level-3-260C-168 HR               | -40 to 125   | ISO7631FM           |
| ISO7631FMDW.A                | Active        | Production           | SOIC (DW)   16 | 40   TUBE             | Yes         | NIPDAU                               | Level-3-260C-168 HR               | -40 to 125   | ISO7631FM           |
| <a href="#">ISO7631FMDWR</a> | Active        | Production           | SOIC (DW)   16 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-3-260C-168 HR               | -40 to 125   | ISO7631FM           |
| ISO7631FMDWR.A               | Active        | Production           | SOIC (DW)   16 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-3-260C-168 HR               | -40 to 125   | ISO7631FM           |
| <a href="#">ISO7641FCDW</a>  | Active        | Production           | SOIC (DW)   16 | 40   TUBE             | Yes         | NIPDAU                               | Level-3-260C-168 HR               | -40 to 125   | ISO7641FC           |
| ISO7641FCDW.A                | Active        | Production           | SOIC (DW)   16 | 40   TUBE             | Yes         | NIPDAU                               | Level-3-260C-168 HR               | -40 to 125   | ISO7641FC           |
| <a href="#">ISO7641FCDWR</a> | Active        | Production           | SOIC (DW)   16 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-3-260C-168 HR               | -40 to 125   | ISO7641FC           |
| ISO7641FCDWR.A               | Active        | Production           | SOIC (DW)   16 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-3-260C-168 HR               | -40 to 125   | ISO7641FC           |

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "-" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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## TAPE AND REEL INFORMATION



\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| ISO7631FCDWR | SOIC         | DW              | 16   | 2000 | 330.0              | 16.4               | 10.75   | 10.7    | 2.7     | 12.0    | 16.0   | Q1            |
| ISO7631FMDWR | SOIC         | DW              | 16   | 2000 | 330.0              | 16.4               | 10.75   | 10.7    | 2.7     | 12.0    | 16.0   | Q1            |
| ISO7641FCDWR | SOIC         | DW              | 16   | 2000 | 330.0              | 16.4               | 10.75   | 10.7    | 2.7     | 12.0    | 16.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| ISO7631FCDWR | SOIC         | DW              | 16   | 2000 | 350.0       | 350.0      | 43.0        |
| ISO7631FMDWR | SOIC         | DW              | 16   | 2000 | 350.0       | 350.0      | 43.0        |
| ISO7641FCDWR | SOIC         | DW              | 16   | 2000 | 350.0       | 350.0      | 43.0        |

## TUBE



\*All dimensions are nominal

| Device        | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|---------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| ISO7631FCDW   | DW           | SOIC         | 16   | 40  | 506.98 | 12.7   | 4826   | 6.6    |
| ISO7631FCDW.A | DW           | SOIC         | 16   | 40  | 506.98 | 12.7   | 4826   | 6.6    |
| ISO7631FMDW   | DW           | SOIC         | 16   | 40  | 506.98 | 12.7   | 4826   | 6.6    |
| ISO7631FMDW.A | DW           | SOIC         | 16   | 40  | 506.98 | 12.7   | 4826   | 6.6    |
| ISO7641FCDW   | DW           | SOIC         | 16   | 40  | 506.98 | 12.7   | 4826   | 6.6    |
| ISO7641FCDW.A | DW           | SOIC         | 16   | 40  | 506.98 | 12.7   | 4826   | 6.6    |

## GENERIC PACKAGE VIEW

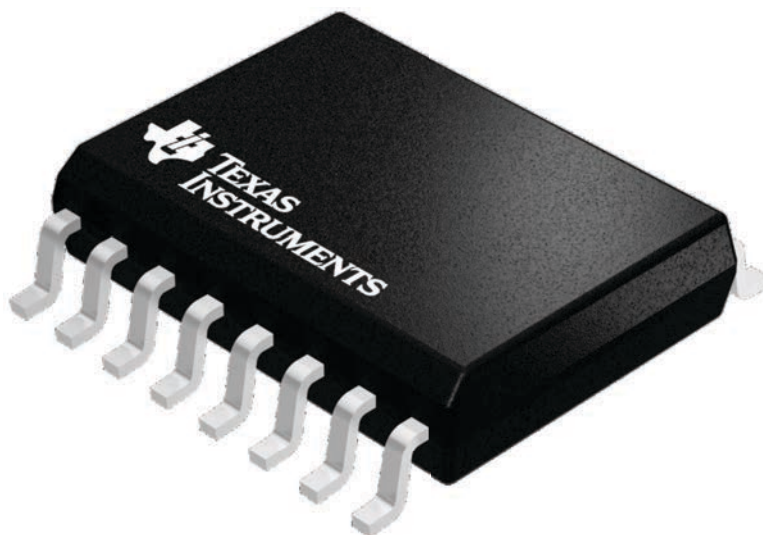
**DW 16**

**SOIC - 2.65 mm max height**

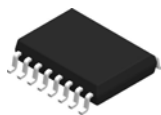
7.5 x 10.3, 1.27 mm pitch

SMALL OUTLINE INTEGRATED CIRCUIT

This image is a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.



4224780/A

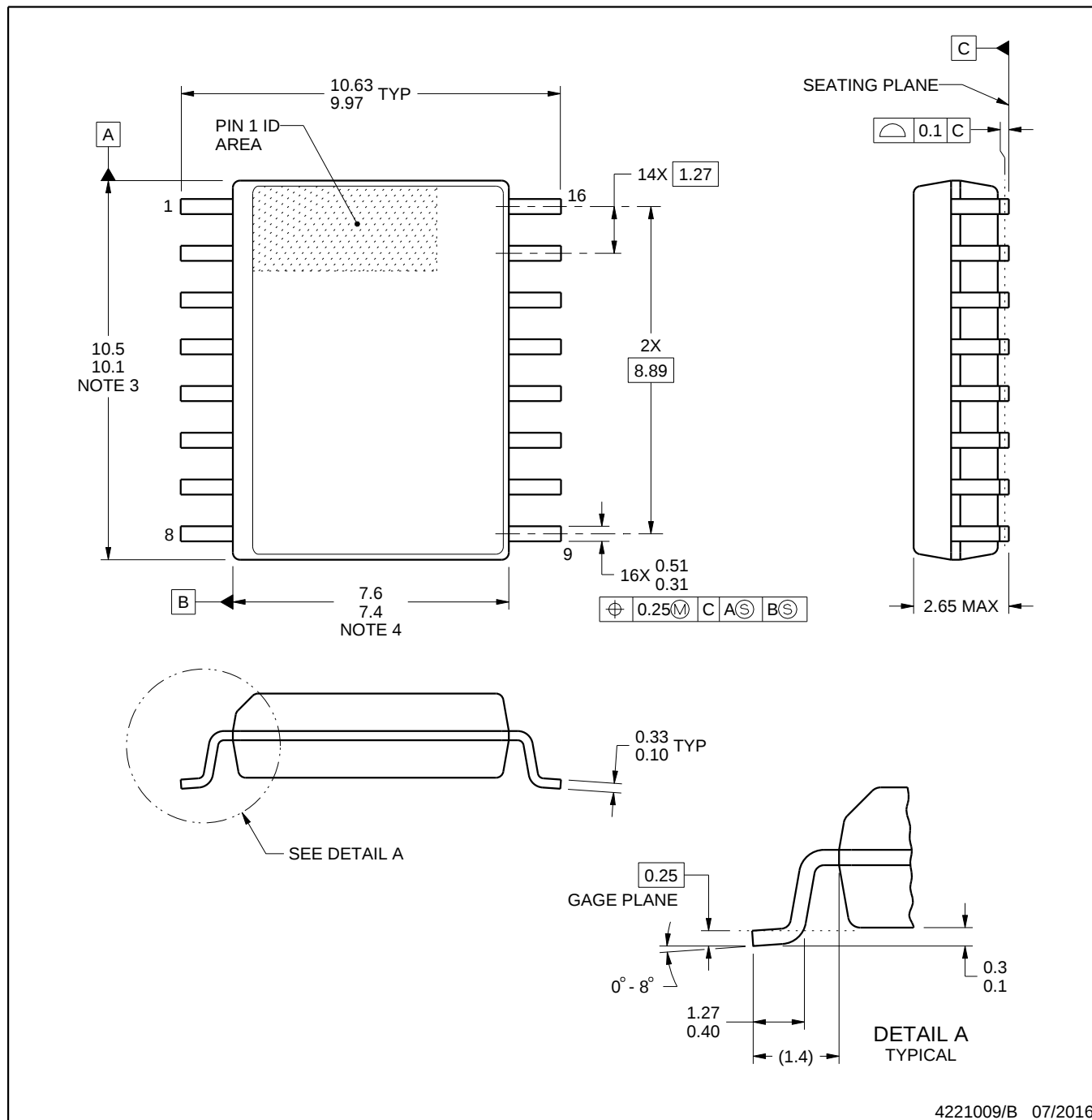


DW0016B

# PACKAGE OUTLINE

## SOIC - 2.65 mm max height

SOIC



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### NOTES:

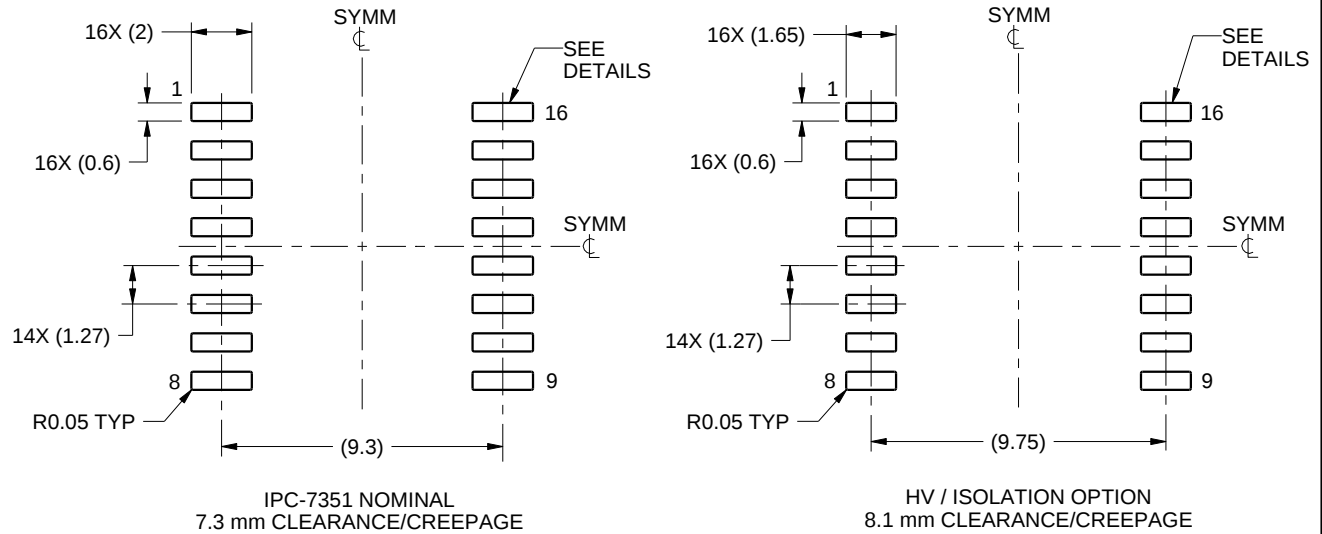
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm, per side.
5. Reference JEDEC registration MS-013.

# EXAMPLE BOARD LAYOUT

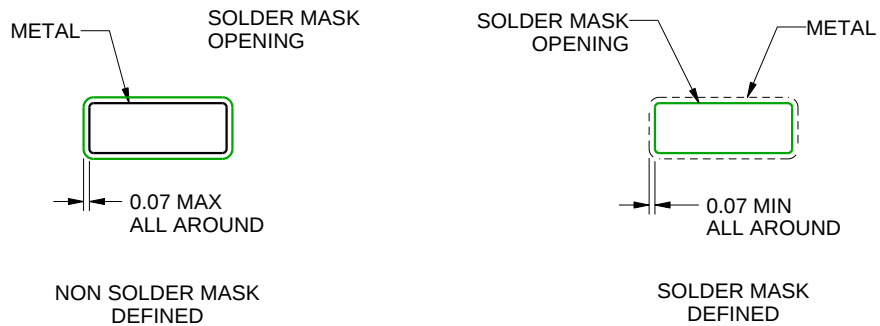
DW0016B

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE  
SCALE:4X



SOLDER MASK DETAILS

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NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

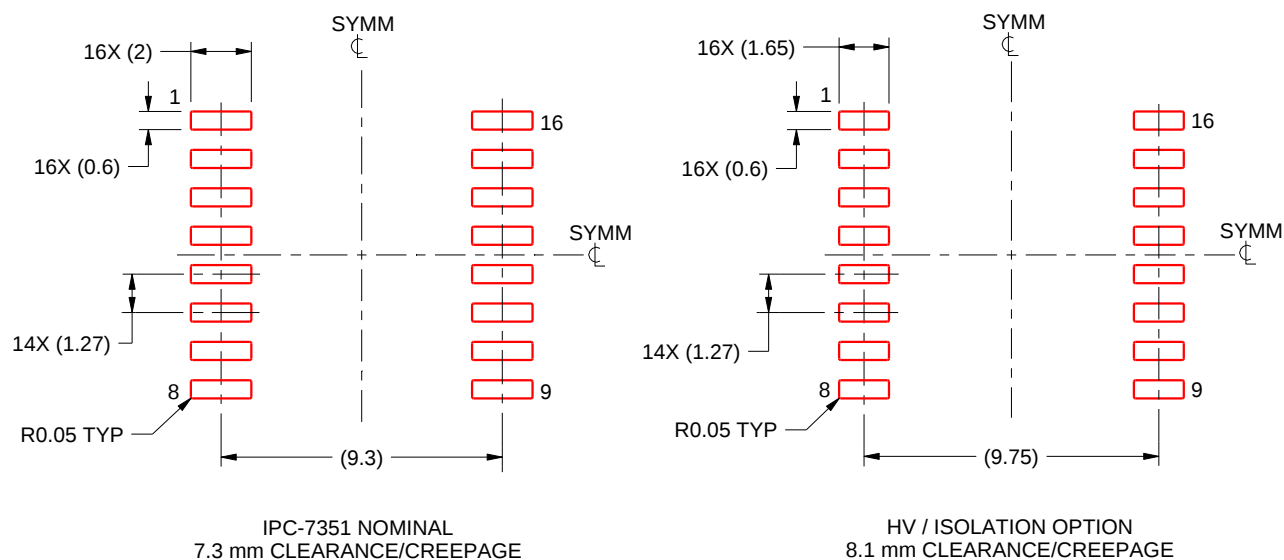
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DW0016B

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:4X

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NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

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