

ISO773x EMC 性能优异的高速、增强型和基础型三通道数字隔离器

1 特性

- 100 Mbps 数据速率
- 稳健可靠的隔离栅：
 - 在 1500V_{RMS} 工作电压下预计寿命超过 30 年
 - 隔离等级高达 5000V_{RMS}
 - 浪涌能力高达 12.8kV
 - CMTI 典型值为 $\pm 100\text{kV}/\mu\text{s}$
- 宽电源电压范围：2.25V 至 5.5V
- 2.25V 至 5.5V 电平转换
- 默认输出高电平 (ISO773x) 和低电平 (ISO773xF) 选项
- 宽温度范围：-55°C 至 +125°C
- 低功耗，1Mbps 时每通道的电流典型值为 1.5mA
- 低传播延迟：典型值为 11ns (5V 电源)
- 优异的电磁兼容性 (EMC)
 - 系统级 ESD、EFT 和浪涌抗扰性
 - 在整个隔离栅具有 $\pm 8\text{kV}$ IEC 61000-4-2 接触放电保护
 - 低辐射
- 宽体 SOIC (DW-16) 和 QSOP (DBQ-16) 封装选项
- 提供汽车版本：[ISO773x-Q1](#)
- 安全相关认证：
 - DIN EN IEC 60747-17 (VDE 0884-17)
 - UL 1577 组件认证计划
 - IEC 61010-1、IEC 62368-1、IEC60601-1 和 GB 4943.1 认证

2 应用

- 工业自动化
- 电机控制
- 电源
- 光伏逆变器
- 医疗设备

3 说明

ISO773x 器件是高性能三通道数字隔离器，可提供符合 UL 1577 的 5000V_{RMS} (DW 封装) 和 3000V_{RMS} (DBQ 封装) 隔离额定值。

该系列包含的器件具有符合 VDE、CSA、TUV 和 CQC 标准的增强绝缘等级。ISO7731B 器件专为仅需要基本绝缘额定值的应用而设计。

在隔离 CMOS 或 LVCMOS 数字 I/O 时，ISO773x 系列器件可提供高电磁抗扰度和低辐射，并具备低功耗特性。每条隔离通道的逻辑输入和输出缓冲器均由双电容二氧化硅 (SiO₂) 绝缘栅相隔离。该器件配有使能引

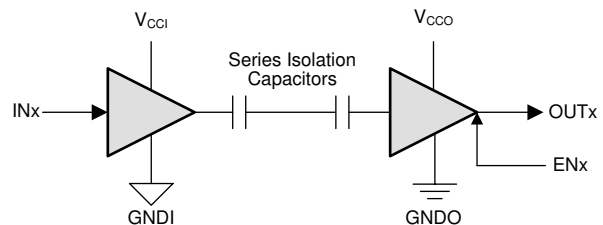
脚，可用于将各自输出置于高阻态以适用于多主驱动应用中，并降低功耗。

ISO7730 器件具有三条全部同向的通道，而 ISO7731 器件具有两条正向通道和一条反向通道。如果输入电源或信号丢失，不带后缀 F 的器件默认输出高电平，带后缀 F 的器件默认输出低电平。更多详细信息，请参阅 [器件功能模式](#) 部分。

该系列器件与隔离式电源结合使用，有助于防止数据总线 (例如，RS-485、RS-232 和 CAN) 或者其他电路上的噪声电流进入本地接地以及干扰或损坏敏感电路。凭借创新型芯片设计和布局技术，ISO773x 器件的电磁兼容性得到了显著增强，可轻松满足系统级 ESD、EFT、浪涌和辐射方面的合规性。ISO773x 系列器件采用 16 引脚宽体 SOIC 和 QSOP 封装。

器件信息

| 器件型号 | 封装 | 封装尺寸 (标称值) |
|----------|------------|------------------|
| ISO7730 | SOIC (DW) | 10.30mm × 7.50mm |
| ISO7731 | SSOP (DBQ) | 4.90mm × 3.90mm |
| ISO7731B | SOIC (DW) | 10.30mm × 7.50mm |



V_{CCI} = 输入电源, V_{CCO} = 输出电源
GNDI = 输入接地, GNDO = 输出接地

简化版原理图



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4 Revision History

注：以前版本的页码可能与当前版本的页码不同

| Changes from Revision H (March 2023) to Revision I (August 2023) | Page |
|--|------|
| • Updated Thermal Characteristics, Safety Limiting Values, and Thermal Derating Curves to provide more accurate system-level thermal calculations..... | 8 |
| • Updated electrical and switching characteristics to match device performance..... | 13 |
| Changes from Revision G (March 2020) to Revision H (March 2023) | Page |
| • 将整个文档中的标准名称从“DIN V VDE V 0884-11:2017-01”更改为“DIN EN IEC 60747-17 (VDE 0884-17)”..... | 1 |
| • 通篇删除了对标准 IEC/EN/CSA 60950-1 的引用..... | 1 |
| • 通篇删除了所有标准名称中的标准版本和年份参考..... | 1 |
| • Added Maximum impulse voltage (V_{IMP}) specification per DIN EN IEC 60747-17 (VDE 0884-17)..... | 9 |
| • Changed test conditions and values of Maximum surge isolation voltage (V_{IOSM}) specification per DIN EN IEC 60747-17 (VDE 0884-17)..... | 9 |
| • Clarified method b test conditions of Apparent charge (q_{PD})..... | 9 |
| • Changed values of Maximum surge isolation voltage (V_{IOSM}) specification per DIN EN IEC 60747-17 (VDE 0884-17)..... | 11 |
| Changes from Revision F (May 2019) to Revision G (March 2020) | Page |
| • 向此数据表中添加了 ISO7731B 器件，适用于仅需要基础型绝缘的应用。ISO7731B 之前的数据表文献编号为 SLLSF65A..... | 1 |
| • 通篇将 VDE 标准名称从“DIN V VDE V 0884-11:2017-01”更改为“DIN VDE V 0884-11:2017-01”..... | 1 |
| • 将节 1 中的 UL 认证要点从“符合 UL 1577 的 5000V _{RMS} (DW) 和 3000V _{RMS} (DBQ) 隔离额定值”更改为“UL 1577 组件认证计划”..... | 1 |

| | |
|--|----|
| • 将 CSA、CQC 和 TUV (节 1) 要点合并为一个要点..... | 1 |
| • 删除了节 1 中的“所有认证均已完成”要点..... | 1 |
| • Updated table entries..... | 11 |

| | |
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| Changes from Revision E (January 2018) to Revision F (May 2019) | Page |
|--|-------------|

| | |
|--|----|
| • 通篇进行了编辑性和修饰性更改..... | 1 |
| • 将“隔离栅寿命：超过 40 年”更改为“在 1500V _{RMS} 工作电压下预计寿命超过 100 年”（位于节 1）..... | 1 |
| • 在节 1 中添加了“隔离等级高达 5000V _{RMS} ”..... | 1 |
| • 在节 1 中添加了“浪涌能力高达 12.8kV”..... | 1 |
| • 在节 1 中添加了“在整个隔离栅具有 ±8kV IEC 61000-4-2 接触放电保护”..... | 1 |
| • 将“提供汽车版本：ISO773x-Q1”添加到节 1 中..... | 1 |
| • 更正了 DBQ 封装的 UL 1577 隔离额定值中的拼写错误，将“2500V _{RMS} ”更正为“3000V _{RMS} ”（在节 1 中）..... | 1 |
| • 将“除 DBQ-16 封装器件的 CQC 认证外，所有认证均已完成”更改为“所有认证均已完成”（在节 1 中）.. | 1 |
| • 更新了图 3-1，以便显示每个通道的两个串联隔离电容器，而不是单个隔离电容器..... | 1 |
| • Added ±8000V contact discharge..... | 6 |
| • Added table note..... | 7 |
| • Updated valules for DW package and test conditions..... | 9 |
| • Updated table entries..... | 11 |
| • Changed ground symbols for "Input (Devices with F suffix)" in 节 8.4.1 | 29 |
| • Added 'How to use isolation to improve ESD, EFT, and Surge immunity in industrial systems' application report to 节 12.1 section..... | 36 |

| | |
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| Changes from Revision D (May 2017) to Revision E (January 2018) | Page |
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| | |
|--|---|
| • 通篇更改了 DIN 认证编号和认证状态..... | 1 |
| • 将 DBQ 封装的隔离等级从 2500V _{RMS} 更改为 3000V _{RMS} | 1 |
| • Added V _{TEST} conditions for V _{IOTM} , updated DBQ package throughout the document, and updated method b1 condition..... | 9 |

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| Changes from Revision C (December 2016) to Revision D (May 2017) | Page |
|---|-------------|

| | |
|--|----|
| • Updated table entries..... | 11 |
| • Updated CMTI value from 40 to 85 in all Electrical Characteristics tables..... | 13 |

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| Changes from Revision B (October 2016) to Revision C (December 2016) | Page |
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| | |
|--|----|
| • Changed title of "Regulatory Information" to "Safety-Related Certifications" and updated certifications..... | 11 |
|--|----|

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| Changes from Revision A (September 2016) to Revision B (October 2016) | Page |
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| | |
|---|----|
| • 将特性从“VDE 和 UL 认证...”修改为“VDE、UL 和 TUV 认证...” | 1 |
| • Updated unit value of CLR to mm..... | 9 |
| • Updated all certifications marked as planned to certified and updated certificates and table descriptions | 11 |

| | |
|--|-------------|
| Changes from Revision * (September 2016) to Revision A (September 2016) | Page |
|--|-------------|

| | |
|--|----|
| • Changed V _{I(HYS)} MIN value in Electrical Characteristic tables throughout the document..... | 13 |
| • Updated timing specs in Switching Characteristics tables throughout the document..... | 19 |
| • Added Note B to 图 7-3 | 25 |

5 Pin Configuration and Functions

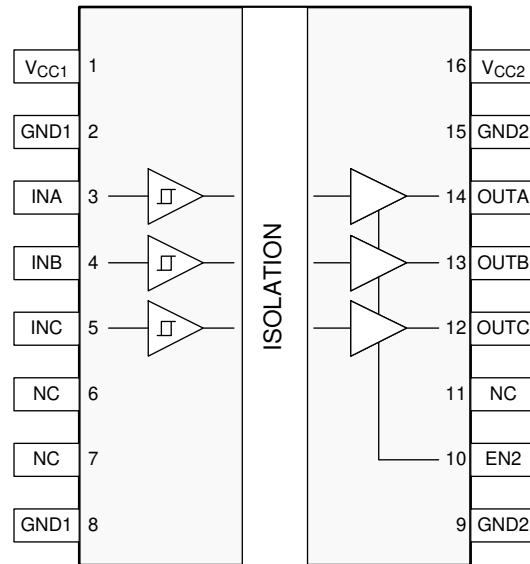


图 5-1. ISO7730 DW and DBQ Packages 16-Pin SOIC-WB and QSOP Top View

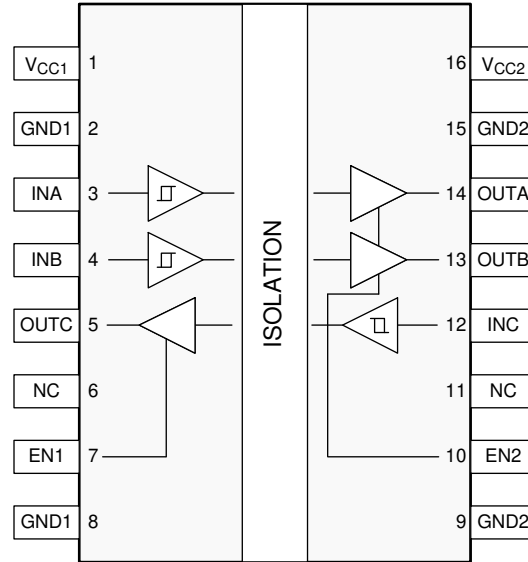


图 5-2. ISO7731 DW and DBQ Packages 16-Pin SOIC-WB and QSOP Top View

表 5-1. Pin Functions

| NAME | PIN | | I/O | DESCRIPTION |
|-----------|----------|---------|-----|--|
| | NO. | | | |
| | ISO7730 | ISO7731 | | |
| EN1 | — | 7 | I | Output enable 1. Output pins on side 1 are enabled when EN1 is high or open and in high-impedance state when EN1 is low. |
| EN2 | 10 | 10 | I | Output enable 2. Output pins on side 2 are enabled when EN2 is high or open and in high-impedance state when EN2 is low. |
| GND1 | 2, 8 | 2, 8 | — | Ground connection for V_{CC1} |
| GND2 | 9, 15 | 9, 15 | — | Ground connection for V_{CC2} |
| INA | 3 | 3 | I | Input, channel A |
| INB | 4 | 4 | I | Input, channel B |
| INC | 5 | 12 | I | Input, channel C |
| NC | 6, 7, 11 | 6, 11 | — | Not connected |
| OUTA | 14 | 14 | O | Output, channel A |
| OUTB | 13 | 13 | O | Output, channel B |
| OUTC | 12 | 5 | O | Output, channel C |
| V_{CC1} | 1 | 1 | — | Power supply, V_{CC1} |
| V_{CC2} | 16 | 16 | — | Power supply, V_{CC2} |

6 Specifications

6.1 Absolute Maximum Ratings

See⁽¹⁾

| | | MIN | MAX | UNIT |
|--------------------|-------------------------------|------|--------------------------------|------|
| V_{CC1}, V_{CC2} | Supply voltage ⁽²⁾ | -0.5 | 6 | V |
| V | Voltage at INx, OUTx, ENx | -0.5 | $V_{CCX} + 0.5$ ⁽³⁾ | V |
| I_O | Output current | -15 | 15 | mA |
| T_J | Junction temperature | | 150 | °C |
| T_{stg} | Storage temperature | -65 | 150 | °C |

- (1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. 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
- (3) Maximum voltage must not exceed 6 V.

6.2 ESD Ratings

| | | | VALUE | UNIT |
|-------------|-------------------------|--|-------|------|
| $V_{(ESD)}$ | Electrostatic discharge | Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins ⁽¹⁾ | ±6000 | V |
| | | Charged device model (CDM), per JEDEC specification JESD22-C101, all pins ⁽²⁾ | ±1500 | |
| | | Contact discharge per IEC 61000-4-2; Isolation barrier withstand test ^{(3) (4)} | ±8000 | |

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.
- (3) IEC ESD strike is applied across the barrier with all pins on each side tied together creating a two-terminal device.
- (4) Testing is carried out in air or oil to determine the intrinsic contact discharge capability of the device.

6.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)

| | | MIN | NOM | MAX | UNIT |
|--------------------|---|------------------------------|-----|----------------------|------|
| V_{CC1}, V_{CC2} | Supply voltage | 2.25 | | 5.5 | V |
| $V_{CC(UVLO+)}$ | UVLO threshold when supply voltage is rising | | 2 | 2.25 | V |
| $V_{CC(UVLO-)}$ | UVLO threshold when supply voltage is falling | 1.7 | 1.8 | | V |
| $V_{HYS(UVLO)}$ | Supply voltage UVLO hysteresis | 100 | 200 | | mV |
| I_{OH} | High level output current | $V_{CCO}^{(1)} = 5\text{ V}$ | | -4 | mA |
| | | $V_{CCO} = 3.3\text{ V}$ | | -2 | |
| | | $V_{CCO} = 2.5\text{ V}$ | | -1 | |
| I_{OL} | Low level output current | $V_{CCO} = 5\text{ V}$ | | 4 | mA |
| | | $V_{CCO} = 3.3\text{ V}$ | | 2 | |
| | | $V_{CCO} = 2.5\text{ V}$ | | 1 | |
| V_{IH} | High-level input voltage | $0.7 \times V_{CCI}^{(1)}$ | | V_{CCI} | V |
| V_{IL} | Low-level input voltage | 0 | | $0.3 \times V_{CCI}$ | V |
| DR ⁽²⁾ | Data rate | 0 | | 100 | Mbps |
| T_A | Ambient temperature | -55 | 25 | 125 | °C |

(1) V_{CCI} = Input-side V_{CC} ; V_{CCO} = Output-side V_{CC}

(2) 100 Mbps is the maximum specified data rate, although higher data rates are possible.

6.4 Thermal Information

| THERMAL METRIC ⁽¹⁾ | | ISO773x | | UNIT |
|-------------------------------|--|-----------|------------|------|
| | | DW (SOIC) | DBQ (QSOP) | |
| | | 16 PINS | 16 PINS | |
| $R_{\theta JA}$ | Junction-to-ambient thermal resistance | 81.4 | 109 | °C/W |
| $R_{\theta JC(top)}$ | Junction-to-case (top) thermal resistance | 44.9 | 46.8 | °C/W |
| $R_{\theta JB}$ | Junction-to-board thermal resistance | 45.9 | 60.6 | °C/W |
| ψ_{JT} | Junction-to-top characterization parameter | 28.1 | 35.9 | °C/W |
| ψ_{JB} | Junction-to-board characterization parameter | 45.5 | 60 | °C/W |
| $R_{\theta JC(bot)}$ | Junction-to-case (bottom) thermal resistance | - | - | °C/W |

(1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC Package Thermal Metrics application report](#).

6.5 Power Ratings

| PARAMETER | | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|----------------|--|---|-----|-----|-----|------|
| ISO7730 | | | | | | |
| P_D | Maximum power dissipation (both sides) | $V_{CC1} = V_{CC2} = 5.5\text{ V}$, $T_J = 150^\circ\text{C}$, $C_L = 15\text{ pF}$, input a 50-MHz 50% duty cycle square wave | | | 160 | mW |
| P_{D1} | Maximum power dissipation (side-1) | | | | 30 | mW |
| P_{D2} | Maximum power dissipation (side-2) | | | | 130 | mW |
| ISO7731 | | | | | | |
| P_D | Maximum power dissipation (both sides) | $V_{CC1} = V_{CC2} = 5.5\text{ V}$, $T_J = 150^\circ\text{C}$, $C_L = 15\text{ pF}$, input a 50-MHz 50% duty cycle square wave | | | 160 | mW |
| P_{D1} | Maximum power dissipation (side-1) | | | | 60 | mW |
| P_{D2} | Maximum power dissipation (side-2) | | | | 100 | mW |

6.6 Insulation Specifications

| PARAMETER | | TEST CONDITIONS | VALUE | | UNIT | |
|---|---|--|--|-------------------|-----------------|------------------|
| | | | DW-16 | DBQ -16 | | |
| CLR | External clearance ⁽¹⁾ | Shortest terminal-to-terminal distance through air | >8 | >3.7 | mm | |
| CPG | External creepage ⁽¹⁾ | Shortest terminal-to-terminal distance across the package surface | >8 | >3.7 | mm | |
| DTI | Distance through the insulation | Minimum internal gap (internal clearance) | >17 | >17 | μm | |
| CTI | Comparative tracking index | DIN EN 60112 (VDE 0303-11); IEC 60112, UL 746A | >600 | >600 | V | |
| | Material group | According to IEC 60664-1 | I | I | | |
| | Overvoltage category per IEC 60664-1 | Rated mains voltage ≤ 150 V _{RMS} | I-IV | I-IV | | |
| | | Rated mains voltage ≤ 300 V _{RMS} | I-IV | I-III | | |
| | | Rated mains voltage ≤ 600 V _{RMS} | I-IV | n/a | | |
| | | Rated mains voltage ≤ 1000 V _{RMS} | I-III | n/a | | |
| DIN EN IEC 60747-17 (VDE 0884-17) ⁽²⁾ | | | | | | |
| V _{IORM} | Maximum repetitive peak isolation voltage | AC voltage (bipolar) | ISO773x | 2121 | 566 | V _{PK} |
| | | | ISO7731B | 1414 | n/a | |
| V _{IOWM} | Maximum working isolation voltage | AC voltage; Time dependent dielectric breakdown (TDDb) Test; See | ISO773x | 1500 | 400 | V _{RMS} |
| | | | ISO7731B | 1000 | n/a | |
| | | DC voltage | ISO773x | 2121 | 566 | V _{DC} |
| | | | ISO7731B | 1414 | n/a | |
| V _{IOTM} | Maximum transient isolation voltage | V _{TEST} = V _{IOTM} , t = 60 s (qualification); V _{TEST} = 1.2 x V _{IOTM} , t = 1 s (100% production) | 8000 | 4242 | V _{PK} | |
| V _{IMP} | Maximum impulse voltage ⁽³⁾ | Tested in air, 1.2/50- μs waveform per IEC 62368-1 | ISO773x | 8000 | 5000 | V _{PK} |
| | | | ISO7731B | 6000 | n/a | |
| V _{IOSM} | Maximum surge isolation voltage ⁽⁴⁾ | V _{IOSM} ≥ 1.3 x V _{IMP} ; Tested in oil (qualification test), 1.2/50- μs waveform per IEC 62368-1 | ISO773x | 12800 | 10000 | V _{PK} |
| | | | ISO7731B | 7800 | n/a | |
| q _{pd} | Apparent charge ⁽⁵⁾ | Method a, After Input/Output safety test subgroup 2/3, V _{ini} = V _{IOTM} , t _{ini} = 60 s; V _{pd(m)} = 1.2 x V _{IORM} , t _m = 10 s | | ≤5 | ≤5 | pC |
| | | Method a, After environmental tests subgroup 1, V _{ini} = V _{IOTM} , t _{ini} = 60 s; | V _{pd(m)} = 1.6 x V _{IORM} , t _m = 10 s (ISO773x) | ≤5 | ≤5 | |
| | | | V _{pd(m)} = 1.3 x V _{IORM} , t _m = 10 s (ISO7731B) | ≤5 | n/a | |
| | | Method b; At routine test (100% production) and preconditioning (type test); V _{ini} = 1.2 x V _{IOTM} , t _{ini} = 1 s; V _{pd(m)} = 1.875 x V _{IORM} (ISO773x) or V _{pd(m)} = 1.5 x V _{IORM} (ISO7731B), t _m = 1 s (method b1) or V _{pd(m)} = V _{ini} , t _m = t _{ini} (method b2) | | ≤5 | ≤5 | |
| C _{IO} | Barrier capacitance, input to output ⁽⁶⁾ | V _{IO} = 0.4 x sin (2 π ft), f = 1 MHz | ~0.7 | ~0.7 | pF | |
| R _{IO} | Isolation resistance ⁽⁶⁾ | V _{IO} = 500 V, T _A = 25°C | >10 ¹² | >10 ¹² | Ω | |
| | | V _{IO} = 500 V, 100°C ≤ T _A ≤ 125°C | >10 ¹¹ | >10 ¹¹ | | |
| | | V _{IO} = 500 V at T _S = 150°C | >10 ⁹ | >10 ⁹ | | |
| | Pollution degree | | 2 | 2 | | |
| | Climatic category | | 55/125/ 21 | 55/125/21 | | |
| UL 1577 | | | | | | |

| PARAMETER | | TEST CONDITIONS | VALUE | | UNIT |
|-----------|--|---|-------|---------|-----------|
| | | | DW-16 | DBQ -16 | |
| V_{ISO} | Maximum withstanding isolation voltage | $V_{TEST} = V_{ISO}$, $t = 60$ s (qualification), $V_{TEST} = 1.2 \times V_{ISO}$, $t = 1$ s (100% production) | 5000 | 3000 | V_{RMS} |

- (1) 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 in certain cases. Techniques such as inserting grooves and/or ribs on a printed-circuit board are used to help increase these specifications.
- (2) This coupler is suitable for *safe electrical insulation* (ISO773x) and basic electrical insulation (ISO7731B) only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.
- (3) Testing is carried out in air to determine the surge immunity of the package
- (4) Testing is carried out in oil to determine the intrinsic surge immunity of the isolation barrier.
- (5) Apparent charge is electrical discharge caused by a partial discharge (pd).
- (6) All pins on each side of the barrier tied together creating a two-terminal device.

6.7 Safety-Related Certifications

| VDE | CSA | UL | CQC | TUV |
|--|---|---|---|--|
| Certified according to DIN EN IEC 60747-17 (VDE 0884-17) | Certified according to IEC 62368-1 and IEC 60601 | Certified according to UL 1577 Component Recognition Program | Certified according to GB4943.1 | Certified according to EN 61010-1 and EN 62368-1 |
| Maximum transient isolation voltage, 8000 V _{PK} (DW-16) and 4242 V _{PK} (DBQ-16); Maximum repetitive peak isolation voltage, 2121 V _{PK} (DW-16, Reinforced), 1414 V _{PK} (DW-16, Basic) and 566 V _{PK} (DBQ-16); Maximum surge isolation voltage, 12800 V _{PK} (DW-16, Reinforced), 7800 V _{PK} (DW-16, Basic) and 10000 V _{PK} (DBQ-16) | Reinforced insulation per CSA 62368-1 and IEC 62368-1, 800 V _{RMS} (DW-16) and 370 V _{RMS} (DBQ-16) max working voltage (pollution degree 2, material group I); 2 MOPP (Means of Patient Protection) per CSA 60601-1 and IEC 60601-1, 250 V _{RMS} (DW-16) max working voltage | DW-16: Single protection, 5000 V _{RMS} ; DBQ-16: Single protection, 3000 V _{RMS} | DW-16: Reinforced Insulation, Altitude ≤ 5000 m, Tropical Climate, 700 V _{RMS} maximum working voltage; DBQ-16: Basic Insulation, Altitude ≤ 5000 m, Tropical Climate, 400 V _{RMS} maximum working voltage | 5000 V _{RMS} (DW-16) and 3000 V _{RMS} (DBQ-16) Reinforced insulation per EN 61010-1 up to working voltage of 600 V _{RMS} (DW-16) and 300 V _{RMS} (DBQ-16) 5000 V _{RMS} (DW-16) and 3000 V _{RMS} (DBQ-16) Reinforced insulation per EN 62368-1 up to working voltage of 800 V _{RMS} (DW-16) and 370 V _{RMS} (DBQ-16) of 600 V _{RMS} |
| Certificate numbers: 40040142 (Reinforced) 40047657 (Basic) | Master contract number: 220991 | File number: E181974 | Certificate numbers: CQC21001304083 (DW-16) CQC18001199097 (DBQ-16) | Client ID number: 077311 |

6.8 Safety Limiting Values

Safety limiting⁽¹⁾ intends to minimize potential damage to the isolation barrier upon failure of input or output circuitry. A failure of the I/O 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 |
|-----------------------|---|---|-----|-----|------|------|
| DW-16 PACKAGE | | | | | | |
| I _S | Safety input, output, or supply current | R _{θJA} = 81.4°C/W, V _I = 5.5 V, T _J = 150°C, T _A = 25°C, see 图 6-1 | | | 279 | mA |
| | | R _{θJA} = 81.4°C/W, V _I = 3.6 V, T _J = 150°C, T _A = 25°C, see 图 6-1 | | | 427 | |
| | | R _{θJA} = 81.4°C/W, V _I = 2.75 V, T _J = 150°C, T _A = 25°C, see 图 6-1 | | | 558 | |
| P _S | Safety input, output, or total power | R _{θJA} = 81.4°C/W, T _J = 150°C, T _A = 25°C, see 图 6-3 | | | 1536 | mW |
| T _S | Maximum safety temperature | | | | 150 | °C |
| DBQ-16 PACKAGE | | | | | | |
| I _S | Safety input, output, or supply current | R _{θJA} = 109.0°C/W, V _I = 5.5 V, T _J = 150°C, T _A = 25°C, see 图 6-2 | | | 209 | mA |
| | | R _{θJA} = 109.0°C/W, V _I = 3.6 V, T _J = 150°C, T _A = 25°C, see 图 6-2 | | | 319 | |
| | | R _{θJA} = 109.0°C/W, V _I = 2.75 V, T _J = 150°C, T _A = 25°C, see 图 6-2 | | | 417 | |
| P _S | Safety input, output, or total power | R _{θJA} = 109.0°C/W, T _J = 150°C, T _A = 25°C, see 图 6-4 | | | 1147 | mW |
| T _S | Maximum safety temperature | | | | 150 | °C |

(1) The maximum safety temperature, T_S, has the same value as the maximum junction temperature, T_J, specified for the device. The I_S and P_S parameters represent the safety current and safety power respectively. The maximum limits of I_S and P_S should not be exceeded. These limits vary with the ambient temperature, T_A.

The junction-to-air thermal resistance, $R_{\theta JA}$, in the table is that of a device installed on a high-K test board for leaded surface-mount packages. Use these equations to calculate the value for each parameter:

$T_J = T_A + R_{\theta JA} \times P$, where P is the power dissipated in the device.

$T_{J(max)} = T_S = T_A + R_{\theta JA} \times P_S$, where $T_{J(max)}$ is the maximum allowed junction temperature.

$P_S = I_S \times V_I$, where V_I is the maximum input voltage.

6.9 Electrical Characteristics—5-V Supply

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

| PARAMETER | | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------|------------------------------------|--|--------------------------------|----------------------|----------------------|-------------------------|
| V_{OH} | High-level output voltage | $I_{OH} = -4\text{ mA}$; see 图 7-1 | $V_{CCO} - 0.4$ ⁽¹⁾ | 4.8 | | V |
| V_{OL} | Low-level output voltage | $I_{OL} = 4\text{ mA}$; see 图 7-1 | | 0.2 | 0.4 | V |
| $V_{IT+(IN)}$ | Rising input switching threshold | | | $0.6 \times V_{CCI}$ | $0.7 \times V_{CCI}$ | V |
| $V_{IT-(IN)}$ | Falling input switching threshold | | $0.3 \times V_{CCI}$ | $0.4 \times V_{CCI}$ | | V |
| $V_{I(HYS)}$ | Input threshold voltage hysteresis | | $0.1 \times V_{CCI}$ | $0.2 \times V_{CCI}$ | | V |
| I_{IH} | High-level input current | $V_{IH} = V_{CCI}$ ⁽¹⁾ at INx or ENx | | | 10 | μA |
| I_{IL} | Low-level input current | $V_{IL} = 0\text{ V}$ at INx or ENx | -10 | | | μA |
| CMTI | Common mode transient immunity | $V_I = V_{CCI}$ or 0 V , $V_{CM} = 1200\text{ V}$; see 图 7-4 | 85 | 100 | | $\text{kV}/\mu\text{s}$ |
| C_i | Input capacitance ⁽²⁾ | $V_I = V_{CC}/2 + 0.4 \times \sin(2\pi ft)$, $f = 1\text{ MHz}$, $V_{CC} = 5\text{ V}$ | | 2 | | pF |

(1) V_{CCI} = Input-side V_{CC} ; V_{CCO} = Output-side V_{CC}

(2) Measured from input pin to same side ground.

6.10 Supply Current Characteristics—5-V Supply

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

| PARAMETER | TEST CONDITIONS | SUPPLY CURRENT | MIN | TYP | MAX | UNIT | |
|----------------------------|---|----------------|-----------|-----|------|------|----|
| ISO7730 | | | | | | | |
| Supply current - disable | EN2 = 0 V; $V_I = V_{CC1}$ (ISO7730); $V_I = 0\text{ V}$ (ISO7730 with F suffix) | I_{CC1} | | 1 | 2.3 | mA | |
| | | I_{CC2} | | 0.3 | 0.8 | mA | |
| | EN2 = 0 V; $V_I = 0\text{ V}$ (ISO7730); $V_I = V_{CC1}$ (ISO7730 with F suffix) | I_{CC1} | | 4.3 | 6 | mA | |
| | | I_{CC2} | | 0.3 | 0.8 | mA | |
| Supply current - DC signal | EN2 = V_{CC2} ; $V_I = V_{CC1}$ (ISO7730); $V_I = 0\text{ V}$ (ISO7730 with F suffix) | I_{CC1} | | 1 | 2.3 | mA | |
| | | I_{CC2} | | 1.6 | 3.7 | mA | |
| | EN2 = V_{CC2} ; $V_I = 0\text{ V}$ (ISO7730); $V_I = V_{CC1}$ (ISO7730 with F suffix) | I_{CC1} | | 4.3 | 6 | mA | |
| | | I_{CC2} | | 1.8 | 3.9 | mA | |
| Supply current - AC signal | EN2 = V_{CC1} ; All channels switching with square wave clock input; $C_L = 15\text{ pF}$ | 1 Mbps | I_{CC1} | | 2.6 | 4.1 | mA |
| | | | I_{CC2} | | 1.9 | 4 | mA |
| | | 10 Mbps | I_{CC1} | | 2.7 | 4.3 | mA |
| | | | I_{CC2} | | 3.3 | 5.7 | mA |
| | | 100 Mbps | I_{CC1} | | 3.6 | 5.6 | mA |
| | | | I_{CC2} | | 17.5 | 23.2 | mA |
| ISO7731 | | | | | | | |
| Supply current - disable | EN1 = EN2 = 0 V; $V_I = V_{CCI}$ ⁽¹⁾ (ISO7731); $V_I = 0\text{ V}$ (ISO7731 with F suffix) | I_{CC1} | | 0.8 | 2.2 | mA | |
| | | I_{CC2} | | 0.7 | 1.6 | mA | |
| | EN1 = EN2 = 0 V; $V_I = 0\text{ V}$ (ISO7731); $V_I = V_{CCI}$ (ISO7731 with F suffix) | I_{CC1} | | 3 | 4.6 | mA | |
| | | I_{CC2} | | 1.8 | 2.8 | mA | |
| Supply current - DC signal | EN1 = EN2 = V_{CCI} ; $V_I = V_{CCI}$ ⁽¹⁾ (ISO7731); $V_I = 0\text{ V}$ (ISO7731 with F suffix) | I_{CC1} | | 1.3 | 2.9 | mA | |
| | | I_{CC2} | | 1.6 | 3.7 | mA | |
| | EN1 = EN2 = V_{CCI} ; $V_I = 0\text{ V}$ (ISO7731); $V_I = V_{CCI}$ (ISO7731 with F suffix) | I_{CC1} | | 3.5 | 5.4 | mA | |
| | | I_{CC2} | | 2.8 | 5.1 | mA | |
| Supply current - AC signal | EN1 = EN2 = V_{CCI} ; All channels switching with square wave clock input; $C_L = 15\text{ pF}$ | 1 Mbps | I_{CC1} | | 2.7 | 4.2 | mA |
| | | | I_{CC2} | | 2.3 | 4.6 | mA |
| | | 10 Mbps | I_{CC1} | | 3 | 4.9 | mA |
| | | | I_{CC2} | | 3.3 | 5.8 | mA |
| | | 100 Mbps | I_{CC1} | | 8.5 | 11.5 | mA |
| | | | I_{CC2} | | 13.1 | 17.8 | mA |

(1) $V_{CCI} = \text{Input-side } V_{CC}$

6.11 Electrical Characteristics—3.3-V Supply

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

| PARAMETER | | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------|------------------------------------|--|--------------------------------|----------------------|----------------------|-------------------------|
| V_{OH} | High-level output voltage | $I_{OH} = -2\text{mA}$; see 图 7-1 | $V_{CCO} - 0.3$ ⁽¹⁾ | 3.2 | | V |
| V_{OL} | Low-level output voltage | $I_{OL} = 2\text{mA}$; see 图 7-1 | | 0.1 | 0.3 | V |
| $V_{IT+(IN)}$ | Rising input switching threshold | | | $0.6 \times V_{CCI}$ | $0.7 \times V_{CCI}$ | V |
| $V_{IT-(IN)}$ | Falling input switching threshold | | $0.3 \times V_{CCI}$ | $0.4 \times V_{CCI}$ | | V |
| $V_{I(HYS)}$ | Input threshold voltage hysteresis | | $0.1 \times V_{CCI}$ | $0.2 \times V_{CCI}$ | | V |
| I_{IH} | High-level input current | $V_{IH} = V_{CCI}$ ⁽¹⁾ at INx or ENx | | | 10 | μA |
| I_{IL} | Low-level input current | $V_{IL} = 0\text{ V}$ at INx or ENx | -10 | | | μA |
| CMTI | Common mode transient immunity | $V_I = V_{CCI}$ or 0 V , $V_{CM} = 1200\text{ V}$; see 图 7-4 | 85 | 100 | | $\text{kV}/\mu\text{s}$ |

(1) V_{CCI} = Input-side V_{CC} ; V_{CCO} = Output-side V_{CC}

6.12 Supply Current Characteristics—3.3-V Supply

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

| PARAMETER | TEST CONDITIONS | SUPPLY CURRENT | MIN | TYP | MAX | UNIT | |
|----------------------------|---|----------------|-----------|-----|-----|------|----|
| ISO7730 | | | | | | | |
| Supply current - disable | EN2 = 0 V; $V_I = V_{CC1}$ (ISO7730); $V_I = 0 \text{ V}$ (ISO7730 with F suffix) | I_{CC1} | | 1 | 2.3 | mA | |
| | | I_{CC2} | | 0.3 | 0.8 | mA | |
| | EN2 = 0 V; $V_I = 0 \text{ V}$ (ISO7730); $V_I = V_{CC1}$ (ISO7730 with F suffix) | I_{CC1} | | 4.3 | 5.9 | mA | |
| | | I_{CC2} | | 0.3 | 0.7 | mA | |
| Supply current - DC signal | EN2 = V_{CC2} ; $V_I = V_{CC1}$ (ISO7730); $V_I = 0 \text{ V}$ (ISO7730 with F suffix) | I_{CC1} | | 1 | 2.3 | mA | |
| | | I_{CC2} | | 1.6 | 3.6 | mA | |
| | EN2 = V_{CC2} ; $V_I = 0 \text{ V}$ (ISO7730); $V_I = V_{CC1}$ (ISO7730 with F suffix) | I_{CC1} | | 4.3 | 5.8 | mA | |
| | | I_{CC2} | | 1.8 | 3.8 | mA | |
| Supply current - AC signal | EN2 = V_{CC1} ; All channels switching with square wave clock input; $C_L = 15 \text{ pF}$ | 1 Mbps | I_{CC1} | | 2.6 | 4.1 | mA |
| | | | I_{CC2} | | 1.8 | 3.9 | mA |
| | | 10 Mbps | I_{CC1} | | 2.7 | 4.1 | mA |
| | | | I_{CC2} | | 2.8 | 5.1 | mA |
| | | 100 Mbps | I_{CC1} | | 3.3 | 4.9 | mA |
| | | | I_{CC2} | | 13 | 17.7 | mA |
| ISO7731 | | | | | | | |
| Supply current - disable | EN1 = EN2 = 0 V; $V_I = V_{CCI}$ ⁽¹⁾ (ISO7731); $V_I = 0 \text{ V}$ (ISO7731 with F suffix) | I_{CC1} | | 0.8 | 2.1 | mA | |
| | | I_{CC2} | | 0.7 | 1.5 | mA | |
| | EN1 = EN2 = 0 V; $V_I = 0 \text{ V}$ (ISO7731); $V_I = V_{CCI}$ (ISO7731 with F suffix) | I_{CC1} | | 3 | 4.5 | mA | |
| | | I_{CC2} | | 1.8 | 2.8 | mA | |
| Supply current - DC signal | EN1 = EN2 = V_{CCI} ; $V_I = V_{CCI}$ (ISO7731); $V_I = 0 \text{ V}$ (ISO7731 with F suffix) | I_{CC1} | | 1.3 | 2.8 | mA | |
| | | I_{CC2} | | 1.6 | 3.7 | mA | |
| | EN1 = EN2 = V_{CCI} ; $V_I = 0 \text{ V}$ (ISO7731); $V_I = V_{CCI}$ (ISO7731 with F suffix) | I_{CC1} | | 3.5 | 5.3 | mA | |
| | | I_{CC2} | | 2.8 | 5 | mA | |
| Supply current - AC signal | EN1 = EN2 = V_{CCI} ; All channels switching with square wave clock input; $C_L = 15 \text{ pF}$ | 1 Mbps | I_{CC1} | | 2.4 | 4.1 | mA |
| | | | I_{CC2} | | 2.2 | 4.5 | mA |
| | | 10 Mbps | I_{CC1} | | 2.8 | 4.6 | mA |
| | | | I_{CC2} | | 2.9 | 5.3 | mA |
| | | 100 Mbps | I_{CC1} | | 6.7 | 9.2 | mA |
| | | | I_{CC2} | | 10 | 14 | mA |

(1) $V_{CCI} = \text{Input-side } V_{CC}$

6.13 Electrical Characteristics—2.5-V Supply

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

| PARAMETER | | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------|------------------------------------|--|--------------------------------|----------------------|-------------------------------------|-------------------------|
| V_{OH} | High-level output voltage | $I_{OH} = -1\text{mA}$; see 图 7-1 | $V_{CCO} - 0.2$ ⁽¹⁾ | 2.45 | | V |
| V_{OL} | Low-level output voltage | $I_{OL} = 1\text{mA}$; see 图 7-1 | | 0.05 | 0.2 | V |
| $V_{IT+(IN)}$ | Rising input switching threshold | | | $0.6 \times V_{CCI}$ | $0.7 \times V_{CCI}$ ⁽¹⁾ | V |
| $V_{IT-(IN)}$ | Falling input switching threshold | | $0.3 \times V_{CCI}$ | $0.4 \times V_{CCI}$ | | V |
| $V_{I(HYS)}$ | Input threshold voltage hysteresis | | $0.1 \times V_{CCI}$ | $0.2 \times V_{CCI}$ | | V |
| I_{IH} | High-level input current | $V_{IH} = V_{CCI}$ ⁽¹⁾ at INx or ENx | | | 10 | μA |
| I_{IL} | Low-level input current | $V_{IL} = 0\text{ V}$ at INx or ENx | -10 | | | μA |
| CMTI | Common mode transient immunity | $V_I = V_{CCI}$ or 0 V , $V_{CM} = 1200\text{ V}$; see 图 7-4 | 85 | 100 | | $\text{kV}/\mu\text{s}$ |

(1) V_{CCI} = Input-side V_{CC} ; V_{CCO} = Output-side V_{CC}

6.14 Supply Current Characteristics—2.5-V Supply

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

| PARAMETER | TEST CONDITIONS | SUPPLY CURRENT | MIN | TYP | MAX | UNIT | |
|----------------------------|--|----------------|-----------|-----|------|------|----|
| ISO7730 | | | | | | | |
| Supply current - disable | EN2 = 0 V; $V_I = V_{CC1}$ (ISO7730); $V_I = 0\text{ V}$ (ISO7730 with F suffix) | I_{CC1} | | 1 | 2.2 | mA | |
| | | I_{CC2} | | 0.3 | 0.7 | mA | |
| | EN2 = 0 V; $V_I = 0\text{ V}$ (ISO7730); $V_I = V_{CC1}$ (ISO7730 with F suffix) | I_{CC1} | | 4.3 | 5.8 | mA | |
| | | I_{CC2} | | 0.3 | 0.7 | mA | |
| Supply current - DC signal | EN2 = V_{CC2} ; $V_I = V_{CC1}$ (ISO7730); $V_I = 0\text{ V}$ (ISO7730 with F suffix) | I_{CC1} | | 1 | 2.2 | mA | |
| | | I_{CC2} | | 1.6 | 3.6 | mA | |
| | EN2 = V_{CC2} ; $V_I = 0\text{ V}$ (ISO7730); $V_I = V_{CC1}$ (ISO7730 with F suffix) | I_{CC1} | | 4.3 | 5.8 | mA | |
| | | I_{CC2} | | 1.8 | 3.8 | mA | |
| Supply current - AC signal | EN2 = V_{CC1} ; All channels switching with square wave clock input; $C_L = 15\text{ pF}$ | 1 Mbps | I_{CC1} | | 2.6 | 4 | mA |
| | | | I_{CC2} | | 1.8 | 3.8 | mA |
| | | 10 Mbps | I_{CC1} | | 2.6 | 4.1 | mA |
| | | | I_{CC2} | | 2.5 | 4.8 | mA |
| | | 100 Mbps | I_{CC1} | | 3.1 | 4.7 | mA |
| | | | I_{CC2} | | 10.2 | 14.3 | mA |
| ISO7731 | | | | | | | |
| Supply current - disable | EN1 = EN2 = 0 V; $V_I = V_{CCI}$ ⁽¹⁾ (ISO7731); $V_I = 0\text{ V}$ (ISO7731 with F suffix) | I_{CC1} | | 0.8 | 2.1 | mA | |
| | | I_{CC2} | | 0.7 | 1.5 | mA | |
| | EN1 = EN2 = 0 V; $V_I = 0\text{ V}$ (ISO7731); $V_I = V_{CCI}$ (ISO7731 with F suffix) | I_{CC1} | | 3 | 4.5 | mA | |
| | | I_{CC2} | | 1.8 | 2.7 | mA | |
| Supply current - DC signal | EN1 = EN2 = V_{CCI} ; $V_I = V_{CCI}$ (ISO7731); $V_I = 0\text{ V}$ (ISO7731 with F suffix) | I_{CC1} | | 1.3 | 2.8 | mA | |
| | | I_{CC2} | | 1.6 | 3.7 | mA | |
| | EN1 = EN2 = V_{CCI} ; $V_I = 0\text{ V}$ (ISO7731); $V_I = V_{CCI}$ (ISO7731 with F suffix) | I_{CC1} | | 3.5 | 5.3 | mA | |
| | | I_{CC2} | | 2.8 | 5 | mA | |
| Supply current - AC signal | EN1 = EN2 = V_{CCI} ; All channels switching with square wave clock input; $C_L = 15\text{ pF}$ | 1 Mbps | I_{CC1} | | 2.4 | 4.1 | mA |
| | | | I_{CC2} | | 2.2 | 4.4 | mA |
| | | 10 Mbps | I_{CC1} | | 2.7 | 4.4 | mA |
| | | | I_{CC2} | | 2.7 | 5.1 | mA |
| | | 100 Mbps | I_{CC1} | | 5.6 | 8 | mA |
| | | | I_{CC2} | | 8 | 11.6 | mA |

(1) $V_{CCI} = \text{Input-side } V_{CC}$

6.15 Switching Characteristics—5-V Supply

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

| PARAMETER | | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-----------------------|---|-------------------------|---|-----|---------------|---------------|
| t_{PLH} , t_{PHL} | Propagation delay time | See 图 7-1 | 6 | 11 | 17 | ns |
| PWD | Pulse width distortion ⁽¹⁾ $ t_{PHL} - t_{PLH} $ | | 0.6 | 5.9 | ns | |
| $t_{sk(o)}$ | Channel-to-channel output skew time ⁽²⁾ | Same-direction channels | | | 4 | ns |
| $t_{sk(pp)}$ | Part-to-part skew time ⁽³⁾ | | | | 4.5 | ns |
| t_r | Output signal rise time | See 图 7-1 | | 1.3 | 3.9 | ns |
| t_f | Output signal fall time | | 1.4 | 3.9 | ns | |
| t_{PHZ} | Disable propagation delay, high-to-high impedance output | See 图 7-2 | | 8 | 22 | ns |
| t_{PLZ} | Disable propagation delay, low-to-high impedance output | | 8 | 20 | ns | |
| t_{PZH} | Enable propagation delay, high impedance-to-high output for ISO773x | | 7 | 20 | ns | |
| | Enable propagation delay, high impedance-to-high output for ISO773x with F suffix | | 3 | 8.5 | μs | |
| t_{PZL} | Enable propagation delay, high impedance-to-low output for ISO773x | | 3 | 8.5 | μs | |
| | Enable propagation delay, high impedance-to-low output for ISO773x with F suffix | | 7 | 20 | ns | |
| t_{DO} | Default output delay time from input power loss | | Measured from the time VCC goes below 1.7V. See 图 7-3 | 0.1 | 0.3 | μs |
| t_{ie} | Time interval error | | $2^{16} - 1$ PRBS data at 100 Mbps | 0.6 | | ns |

- (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.

6.16 Switching Characteristics—3.3-V Supply

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

| PARAMETER | | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-----------------------|---|---|-----|-----|------|---------------|
| t_{PLH} , t_{PHL} | Propagation delay time | See 图 7-1 | 6 | 11 | 18.5 | ns |
| PWD | Pulse width distortion ⁽¹⁾ $ t_{PHL} - t_{PLH} $ | | | | | |
| $t_{sk(o)}$ | Channel-to-channel output skew time ⁽²⁾ | Same-direction channels | | | 4.4 | ns |
| $t_{sk(pp)}$ | Part-to-part skew time ⁽³⁾ | | | | 5 | ns |
| t_r | Output signal rise time | See 图 7-1 | | 1.3 | 3 | ns |
| t_f | Output signal fall time | | | 1.3 | 3 | ns |
| t_{PHZ} | Disable propagation delay, high-to-high impedance output | See 图 7-2 | | 17 | 31 | ns |
| t_{PLZ} | Disable propagation delay, low-to-high impedance output | | | 17 | 30 | ns |
| t_{PZH} | Enable propagation delay, high impedance-to-high output for ISO773x | | | 17 | 30 | ns |
| | Enable propagation delay, high impedance-to-high output for ISO773x with F suffix | | | 3.2 | 8.5 | μs |
| t_{PZL} | Enable propagation delay, high impedance-to-low output for ISO773x | | | 3.2 | 8.5 | μs |
| | Enable propagation delay, high impedance-to-low output for ISO773x with F suffix | | | 17 | 30 | ns |
| t_{DO} | Default output delay time from input power loss | Measured from the time VCC goes below 1.7V. See 图 7-3 | | 0.1 | 0.3 | μs |
| t_{ie} | Time interval error | $2^{16} - 1$ PRBS data at 100 Mbps | | 0.9 | | ns |

- (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.

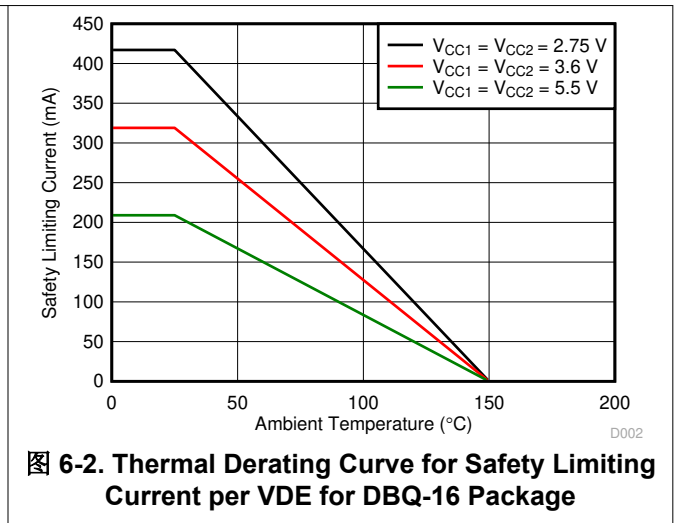
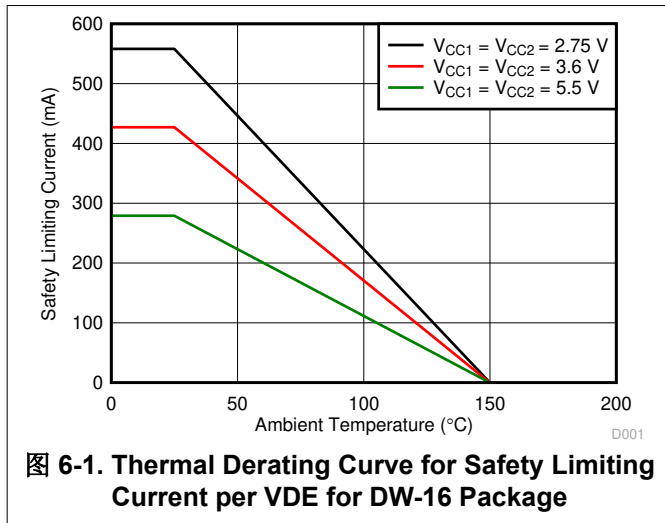
6.17 Switching Characteristics—2.5-V Supply

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

| PARAMETER | | TEST CONDITIONS | MIN | TYP | MAX | UNIT | |
|--------------------|---|---|-----|-----|-----|---------------|---------------|
| t_{PLH}, t_{PHL} | Propagation delay time | See 图 7-1 | 7.5 | 12 | 21 | ns | |
| PWD | Pulse width distortion ⁽¹⁾ $ t_{PHL} - t_{PLH} $ | | | 0.2 | 5.9 | ns | |
| $t_{sk(o)}$ | Channel-to-channel output skew time ⁽²⁾ | Same-direction channels | | | 4.4 | ns | |
| $t_{sk(pp)}$ | Part-to-part skew time ⁽³⁾ | | | | 5.3 | ns | |
| t_r | Output signal rise time | See 图 7-1 | | 1 | 3.5 | ns | |
| t_f | Output signal fall time | | | 1 | 3.5 | ns | |
| t_{PHZ} | Disable propagation delay, high-to-high impedance output | | | 22 | 41 | ns | |
| t_{PLZ} | Disable propagation delay, low-to-high impedance output | | | 22 | 40 | ns | |
| t_{PZH} | Enable propagation delay, high impedance-to-high output for ISO773x | See 图 7-2 | | 18 | 40 | ns | |
| | Enable propagation delay, high impedance-to-high output for ISO773x with F suffix | | | 3.3 | 8.5 | μs | |
| t_{PZL} | Enable propagation delay, high impedance-to-low output for ISO773x | | | | 3.3 | 8.5 | μs |
| | Enable propagation delay, high impedance-to-low output for ISO773x with F suffix | | | | 18 | 40 | ns |
| t_{DO} | Default output delay time from input power loss | Measured from the time VCC goes below 1.7V. See 图 7-3 | | 0.1 | 0.3 | μs | |
| t_{ie} | Time interval error | $2^{16} - 1$ PRBS data at 100 Mbps | | 0.7 | | ns | |

- (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.

6.18 Insulation Characteristics Curves



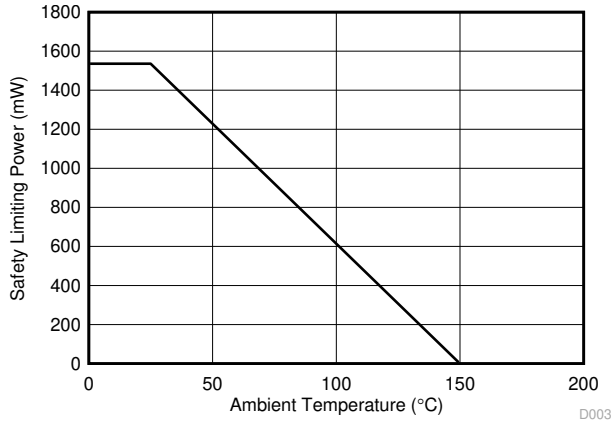


图 6-3. Thermal Derating Curve for Safety Limiting Power per VDE for DW-16 Package

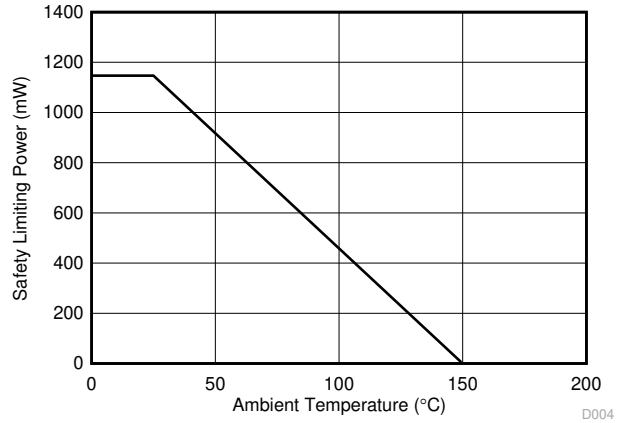


图 6-4. Thermal Derating Curve for Safety Limiting Power per VDE for DBQ-16 Package

6.19 Typical Characteristics

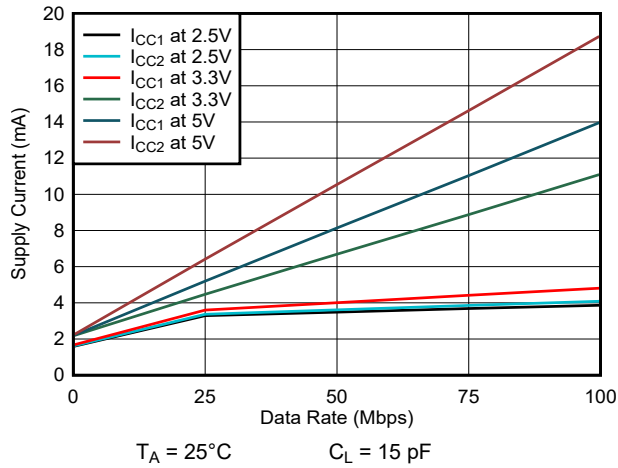


图 6-5. ISO7730 Supply Current vs Data Rate (With 15-pF Load)

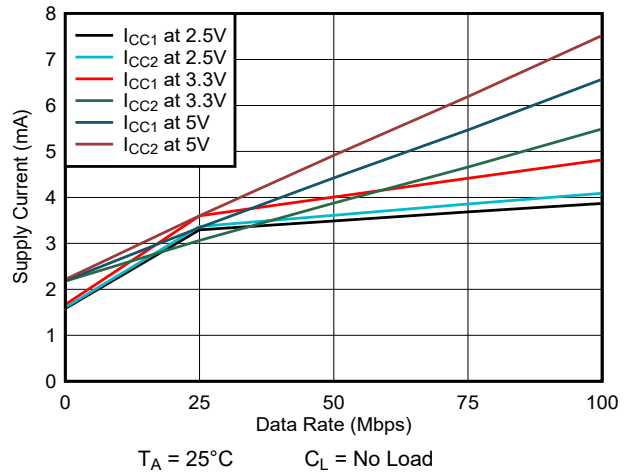


图 6-6. ISO7730 Supply Current vs Data Rate (With No Load)

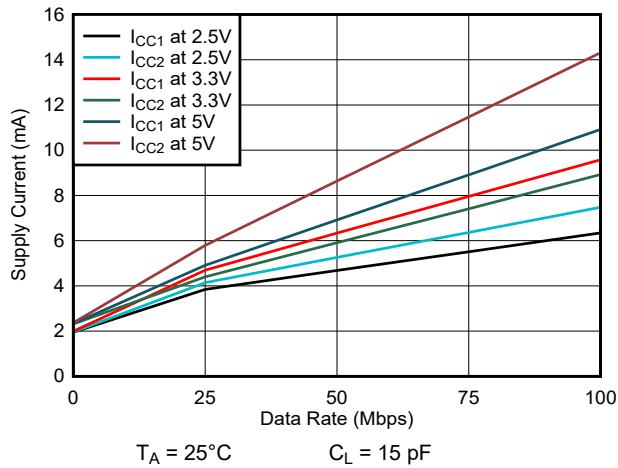


图 6-7. ISO7731 Supply Current vs Data Rate (With 15-pF Load)

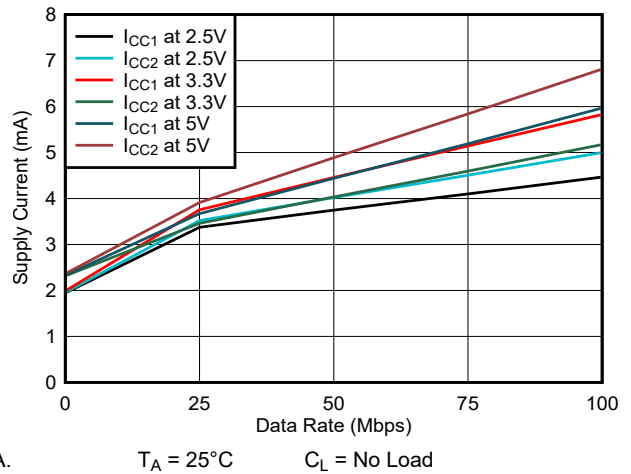


图 6-8. ISO7731 Supply Current vs Data Rate (With No Load)

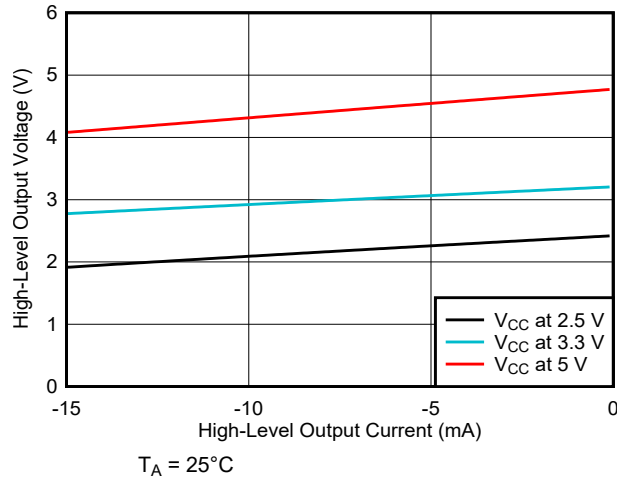


图 6-9. High-Level Output Voltage vs High-level Output Current

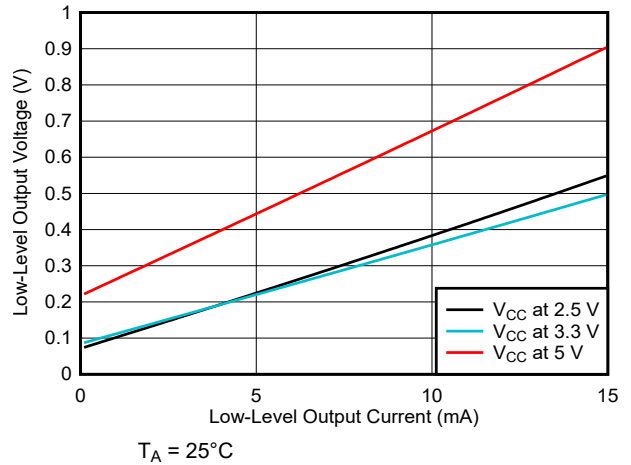


图 6-10. Low-Level Output Voltage vs Low-Level Output Current

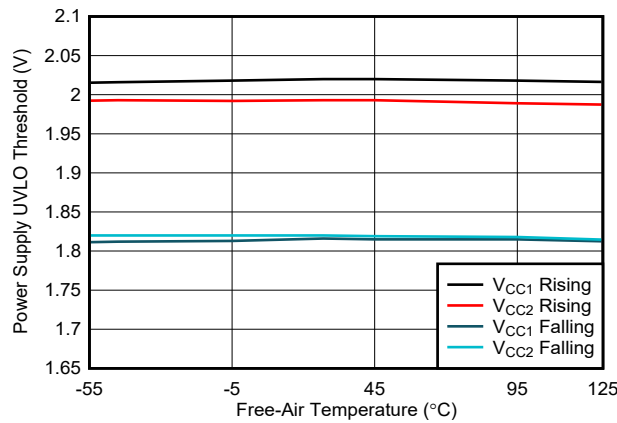


图 6-11. Power Supply Undervoltage Threshold vs Free-Air Temperature

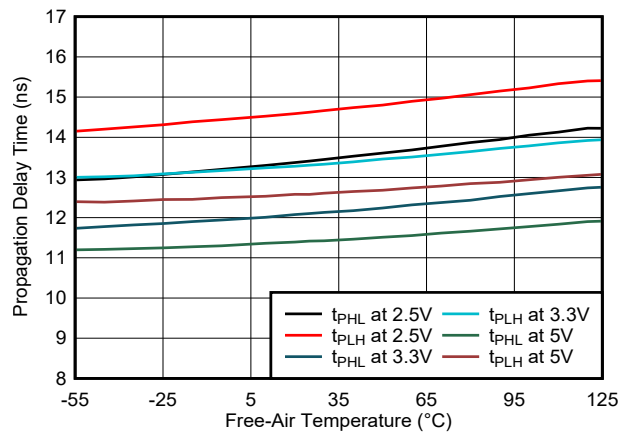
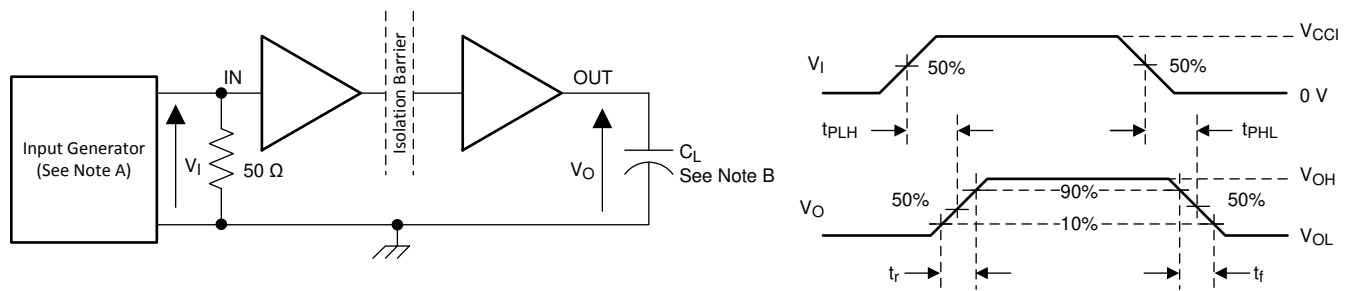


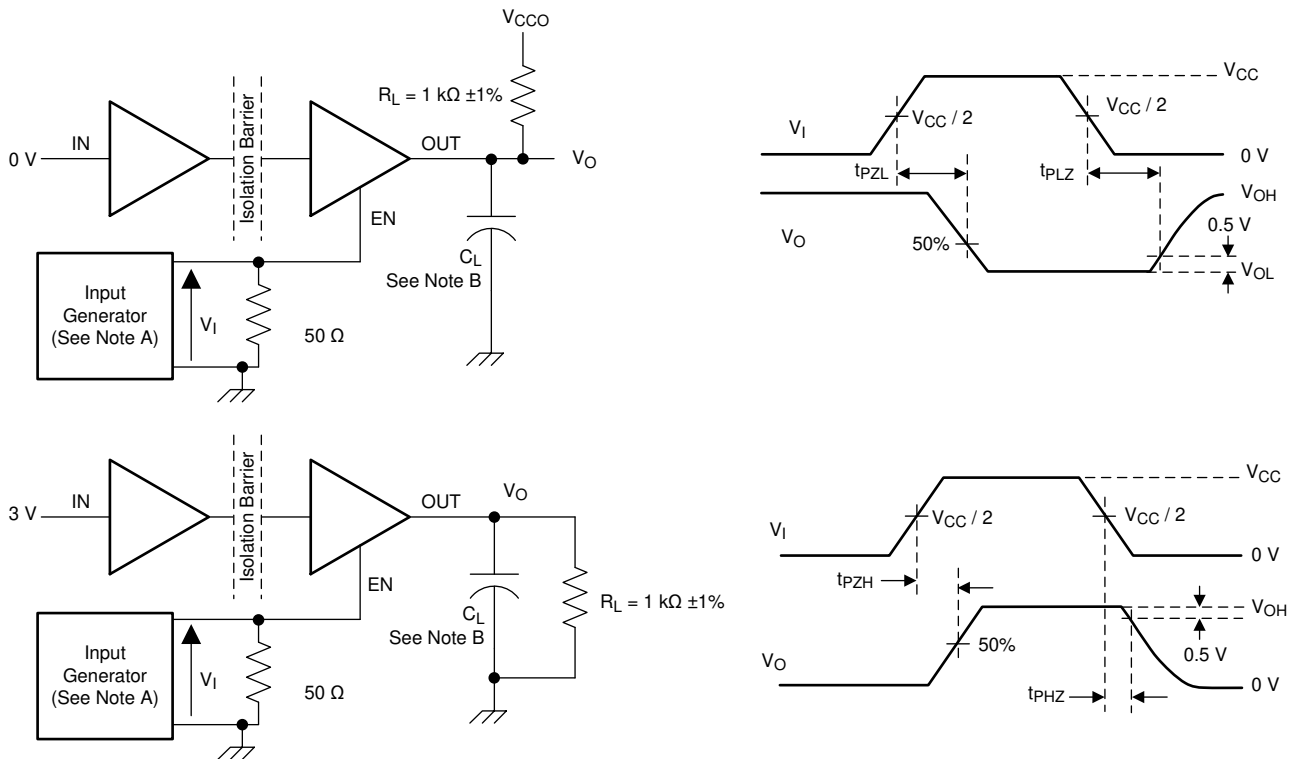
图 6-12. Propagation Delay Time vs Free-Air Temperature

7 Parameter Measurement Information



- A. 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, $Z_0 = 50 \Omega$. At the input, 50Ω resistor is required to terminate Input Generator signal. It is not needed in actual application.
- B. $C_L = 15$ pF and includes instrumentation and fixture capacitance within $\pm 20\%$.

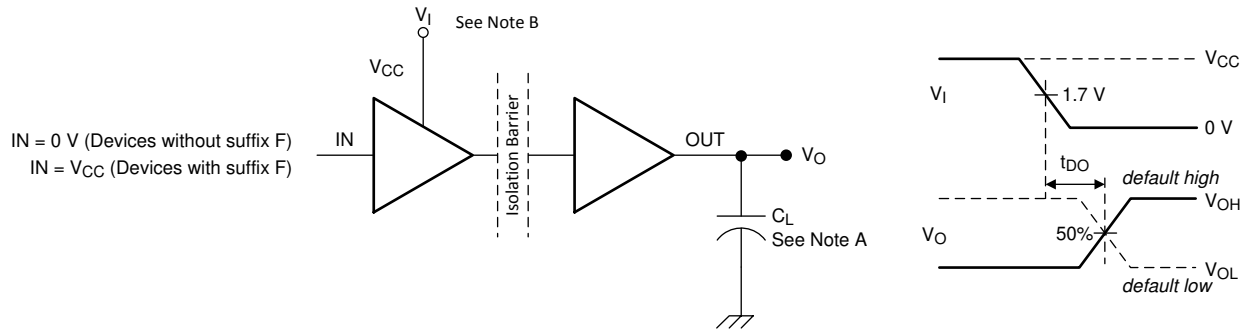
图 7-1. Switching Characteristics Test Circuit and Voltage Waveforms



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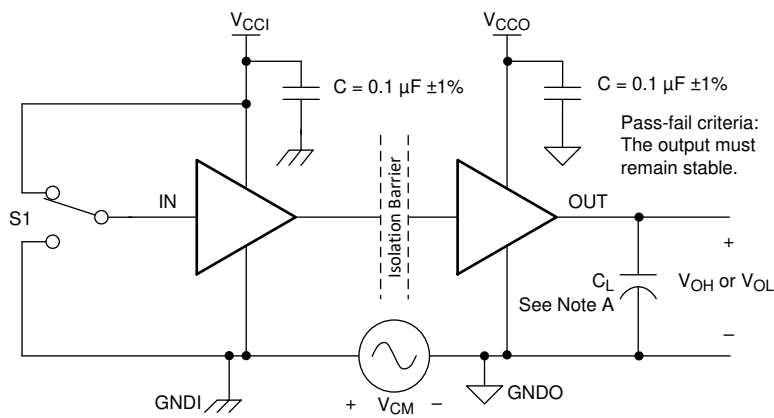
- A. The input pulse is supplied by a generator having the following characteristics: $PRR \leq 10$ kHz, 50% duty cycle, $t_r \leq 3$ ns, $t_f \leq 3$ ns, $Z_0 = 50 \Omega$.
- B. $C_L = 15$ pF and includes instrumentation and fixture capacitance within $\pm 20\%$.

图 7-2. Enable/Disable Propagation Delay Time Test Circuit and Waveform



- A. C_L = 15 pF and includes instrumentation and fixture capacitance within ±20%.
- B. Power Supply Ramp Rate = 10 mV/ns

图 7-3. Default Output Delay Time Test Circuit and Voltage Waveforms



- A. C_L = 15 pF and includes instrumentation and fixture capacitance within ±20%.

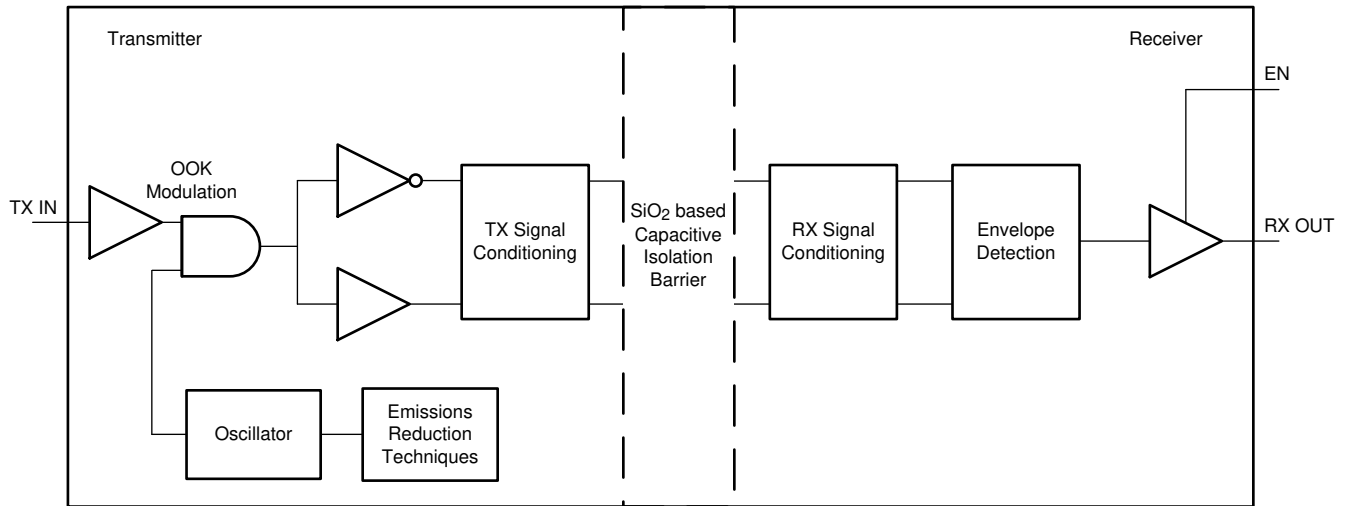
图 7-4. Common-Mode Transient Immunity Test Circuit

8 Detailed Description

8.1 Overview

The ISO773x family of devices has an ON-OFF keying (OOK) modulation scheme to transmit the digital data across a silicon dioxide based isolation barrier. The transmitter sends a high frequency carrier across the barrier to represent one digital state and sends no signal to represent the other digital state. The receiver demodulates the signal after advanced signal conditioning and produces the output through a buffer stage. If the ENx pin is low then the output goes to high impedance. The ISO773x family of devices also incorporates advanced circuit techniques to maximize the CMTI performance and minimize the radiated emissions due the high frequency carrier and IO buffer switching. The conceptual block diagram of a digital capacitive isolator, [图 8-1](#), shows a functional block diagram of a typical channel.

8.2 Functional Block Diagram



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图 8-1. Conceptual Block Diagram of a Digital Capacitive Isolator

[图 8-2](#) shows a conceptual detail of how the ON-OFF keying scheme works.

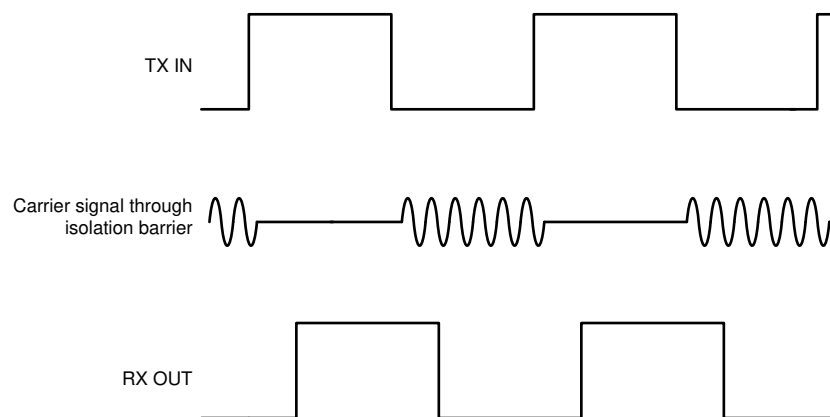


图 8-2. On-Off Keying (OOK) Based Modulation Scheme

8.3 Feature Description

表 8-1 provides an overview of the device features.

表 8-1. Device Features

| PART NUMBER | CHANNEL DIRECTION | MAXIMUM DATA RATE | DEFAULT OUTPUT | PACKAGE | RATED ISOLATION ⁽¹⁾ |
|------------------------|-------------------------|-------------------|----------------|---------|--|
| ISO7730 | 3 Forward, 0 Reverse | 100 Mbps | High | DW-16 | 5000 V _{RMS} / 8000 V _{PK} |
| | | | | DBQ-16 | 3000 V _{RMS} / 4242 V _{PK} |
| ISO7730 with F suffix | 3 Forward, 0 Reverse | 100 Mbps | Low | DW-16 | 5000 V _{RMS} / 8000 V _{PK} |
| | | | | DBQ-16 | 3000 V _{RMS} / 4242 V _{PK} |
| ISO7731 | 2 Forward, 1 Reverse | 100 Mbps | High | DW-16 | 5000 V _{RMS} / 8000 V _{PK} |
| | | | | DBQ-16 | 3000 V _{RMS} / 4242 V _{PK} |
| ISO7731 with F suffix | 2 Forward, 1 Reverse | 100 Mbps | Low | DW-16 | 5000 V _{RMS} / 8000 V _{PK} |
| | | | | DBQ-16 | 3000 V _{RMS} / 4242 V _{PK} |
| ISO7731B | 2 Forward, 1 Reverse | 100 Mbps | High | DW-16 | 5000 V _{RMS} / 8000 V _{PK} |
| ISO7731B with F suffix | 2 Forward, 1 Reverse | 100 Mbps | Low | DW-16 | 5000 V _{RMS} / 8000 V _{PK} |

(1) See 节 6.7 for detailed isolation ratings.

8.3.1 Electromagnetic Compatibility (EMC) Considerations

Many applications in harsh industrial environment are sensitive to disturbances such as electrostatic discharge (ESD), electrical fast transient (EFT), surge and electromagnetic emissions. These electromagnetic disturbances are regulated by international standards such as IEC 61000-4-x and CISPR 22. Although system-level performance and reliability depends, to a large extent, on the application board design and layout, the ISO773x family of devices incorporates many chip-level design improvements for overall system robustness. Some of these improvements include:

- Robust ESD protection cells for input and output signal pins and inter-chip bond pads.
- Low-resistance connectivity of ESD cells to supply and ground pins.
- Enhanced performance of high voltage isolation capacitor for better tolerance of ESD, EFT and surge events.
- Bigger on-chip decoupling capacitors to bypass undesirable high energy signals through a low impedance path.
- PMOS and NMOS devices isolated from each other by using guard rings to avoid triggering of parasitic SCRs.
- Reduced common mode currents across the isolation barrier by ensuring purely differential internal operation.

8.4 Device Functional Modes

表 8-2 lists the functional modes for the ISO773x devices.

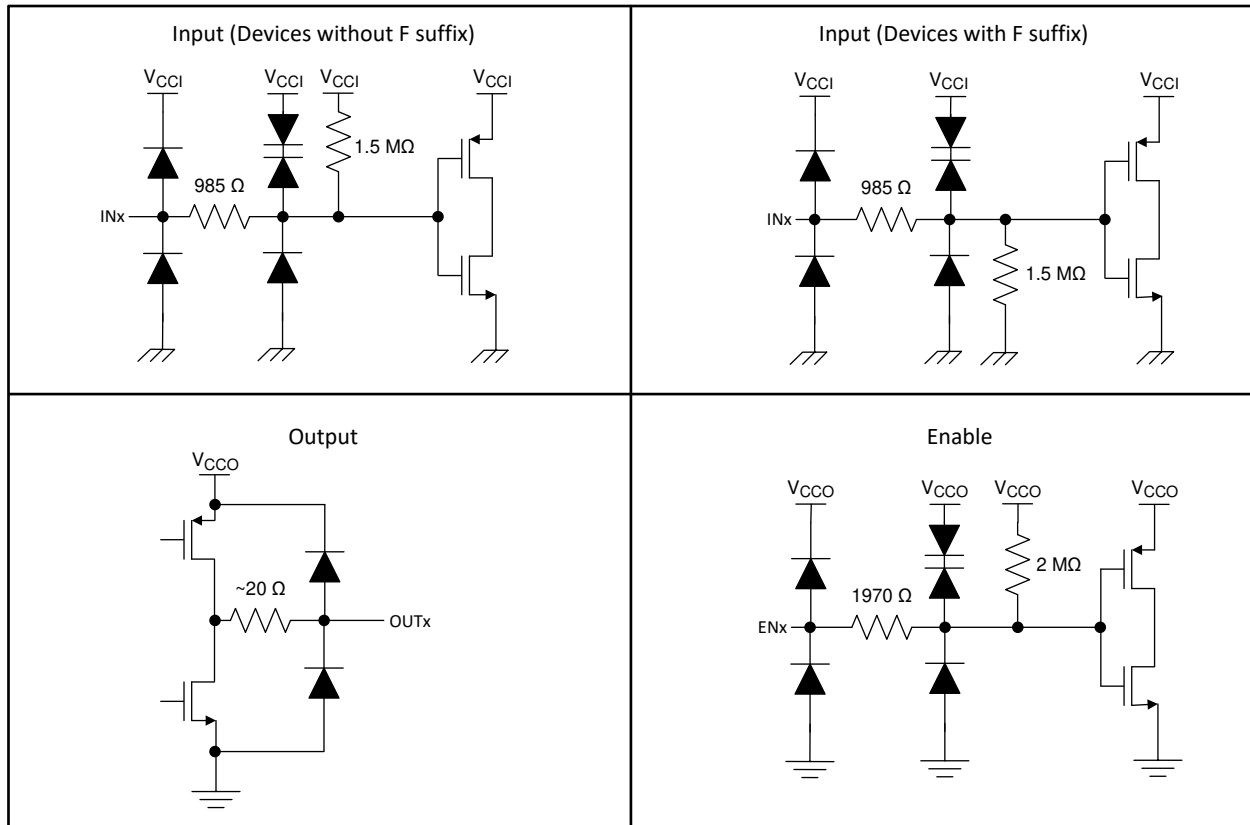
表 8-2. Function Table

| V _{CCI} | V _{CCO} | INPUT (IN _x) ⁽²⁾ | OUTPUT ENABLE (EN _x) | OUTPUT (OUT _x) | COMMENTS |
|------------------|------------------|---|----------------------------------|----------------------------|---|
| PU | PU | H | H or open | H | Normal Operation: A channel output assumes the logic state of its input. |
| | | L | H or open | L | |
| | | Open | H or open | Default | Default mode: When IN _x is open, the corresponding channel output goes to its default logic state. Default is <i>High</i> for ISO773x and <i>Low</i> for ISO773x with F suffix. |
| X | PU | X | L | Z | A low value of Output Enable causes the outputs to be high-impedance |
| PD | PU | X | H or open | Default | Default mode: When V _{CCI} is unpowered, a channel output assumes the logic state based on the selected default option. Default is <i>High</i> for ISO773x and <i>Low</i> for ISO773x with F suffix. When V _{CCI} transitions from unpowered to powered-up, a channel output assumes the logic state of its input. When V _{CCI} transitions from powered-up to unpowered, channel output assumes the selected default state. |
| X | PD | X | X | Undetermined | When V _{CCO} is unpowered, a channel output is undetermined ⁽¹⁾ . When V _{CCO} transitions from unpowered to powered-up, a channel output assumes the logic state of its input |

(1) The outputs are in undetermined state when $1.7\text{ V} < V_{CCI}, V_{CCO} < 2.25\text{ V}$.

(2) A strongly driven input signal can weakly power the floating V_{CC} via an internal protection diode and cause undetermined output.

8.4.1 Device I/O Schematics



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图 8-3. Device I/O Schematics

9 Application and Implementation

备注

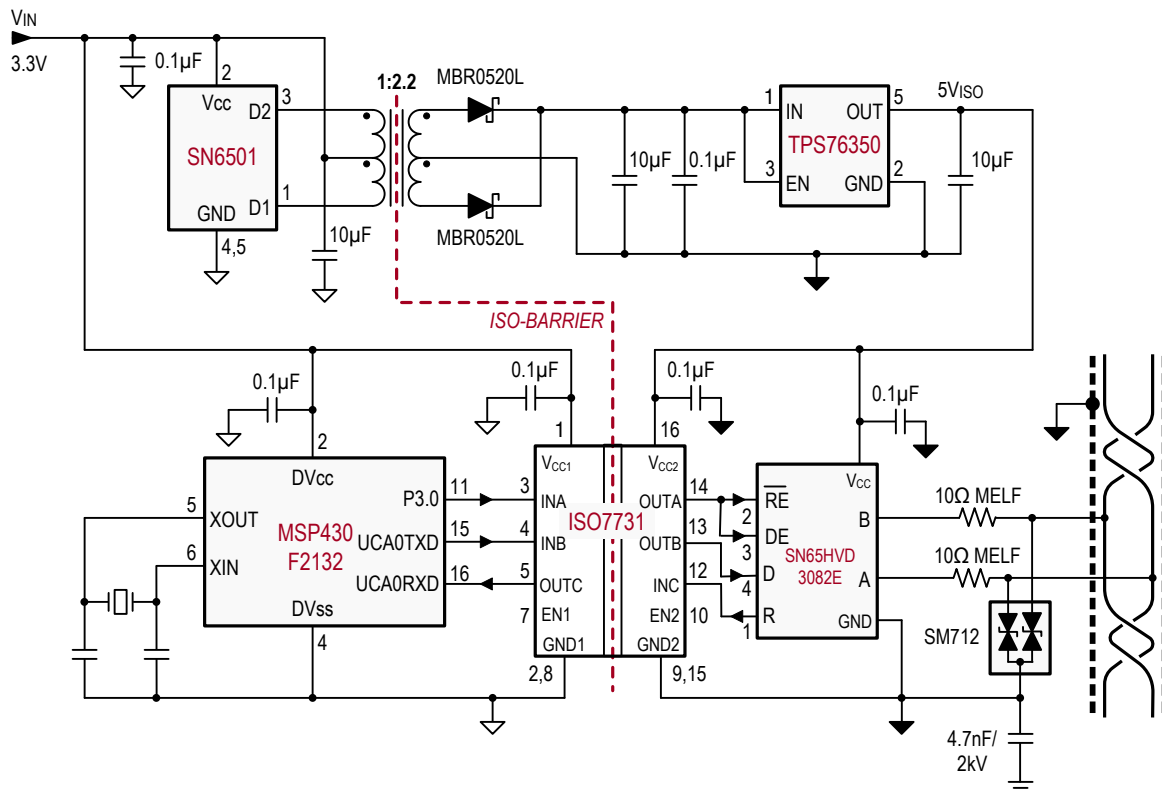
Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

9.1 Application Information

The ISO773x devices are high-performance, triple-channel digital isolators. These devices come with enable pins on each side which can be used to put the respective outputs in high impedance for multi-master driving applications and reduce power consumption. The ISO773x family of devices use single-ended CMOS-logic switching technology. The voltage range is from 2.25 V to 5.5 V for both supplies, V_{CC1} and V_{CC2} . When designing with digital isolators, keep in mind that because of the single-ended design structure, digital isolators do not conform to any specific interface standard and are only intended for isolating single-ended CMOS or TTL digital signal lines. The isolator is typically placed between the data controller (that is, μC or UART), and a data converter or a line transceiver, regardless of the interface type or standard.

9.2 Typical Application

The ISO7731 device, combined with Texas Instruments' mixed-signal microcontroller, RS-485 transceiver, transformer driver, and voltage regulator, can create an isolated RS-485 system as shown in [图 9-1](#).



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图 9-1. Isolated RS-485 Interface Circuit

9.2.1 Design Requirements

To design with these devices, use the parameters listed in 表 9-1.

表 9-1. Design Parameters

| PARAMETER | VALUE |
|---|-------------------|
| Supply voltage, V_{CC1} and V_{CC2} | 2.25 to 5.5 V |
| Decoupling capacitor between V_{CC1} and GND1 | 0.1 μF |
| Decoupling capacitor from V_{CC2} and GND2 | 0.1 μF |

9.2.2 Detailed Design Procedure

Unlike optocouplers, which require external components to improve performance, provide bias, or limit current, the ISO773x family of devices only requires two external bypass capacitors to operate. 图 9-2 and 图 9-3 show the typical circuit hook-up for the devices.

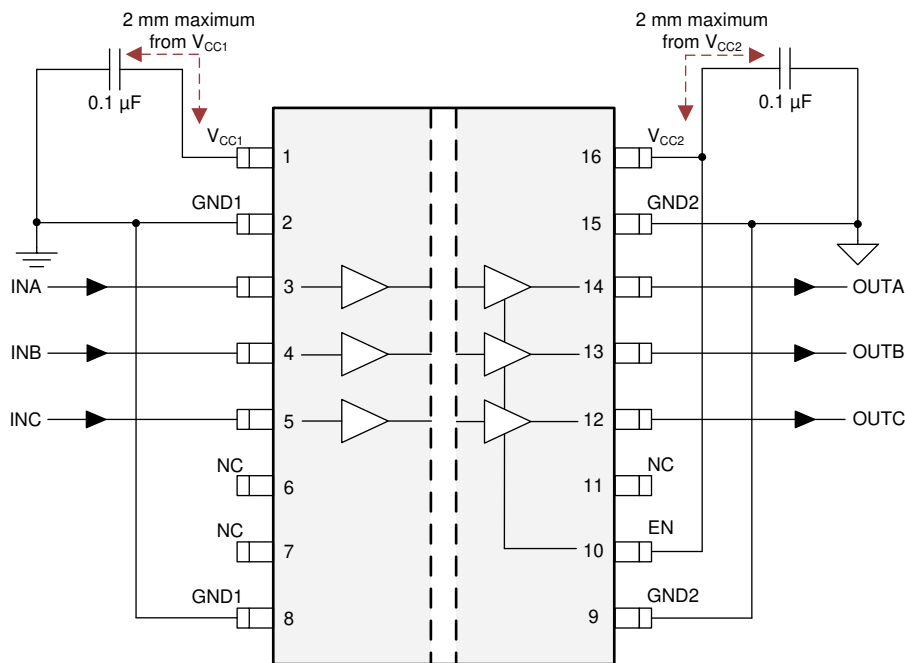


图 9-2. Typical ISO7730 Circuit Hook-Up

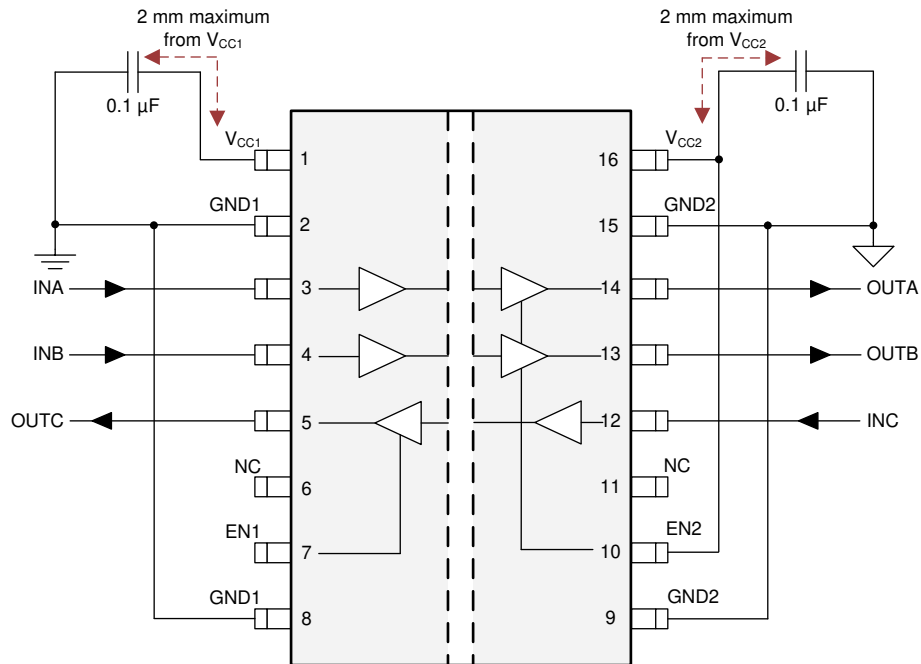
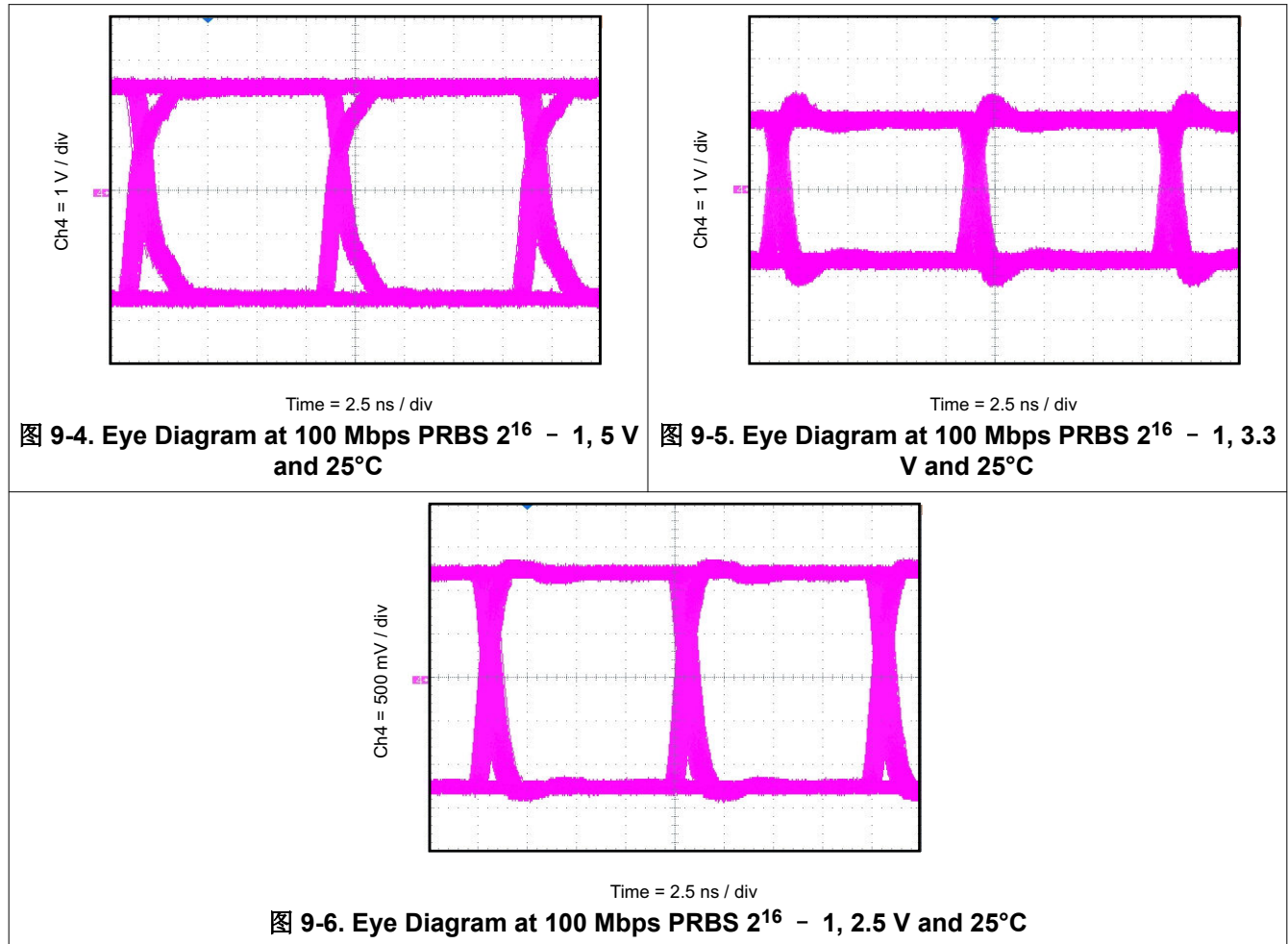


图 9-3. Typical ISO7731 Circuit Hook-Up

9.2.3 Application Curves

The following typical eye diagrams of the ISO773x family of devices indicate low jitter and wide open eye at the maximum data rate of 100 Mbps.



9.2.3.1 Insulation Lifetime

Insulation lifetime projection data is collected by using industry-standard Time Dependent Dielectric Breakdown (TDDB) test method. In this test, all pins on each side of the barrier are tied together creating a two-terminal device and high voltage applied between the two sides; See 图 9-7 for TDDB test setup. The insulation breakdown data is collected at various high voltages switching at 60 Hz over temperature. For reinforced insulation, VDE standard requires the use of TDDB projection line with failure rate of less than 1 part per million (ppm). Even though the expected minimum insulation lifetime is 20 years at the specified working isolation voltage, VDE reinforced certification requires additional safety margin of 20% for working voltage and 50% for lifetime which translates into minimum required insulation lifetime of 30 years at a working voltage that's 20% higher than the specified value.

图 9-8 shows the intrinsic capability of the isolation barrier to withstand high voltage stress over its lifetime. Based on the TDDB data, the intrinsic capability of the insulation is 1500 V_{RMS} with a lifetime of 36 years. Other factors, such as package size, pollution degree, material group, etc. can further limit the working voltage of the component. The working voltage of DW-16 package is specified upto 1500 V_{RMS}. At the lower working voltages, the corresponding insulation lifetime is much longer than 36 years. DBQ-16 package at 400 V_{RMS} working voltage has a much longer lifetime than DW-16 package.

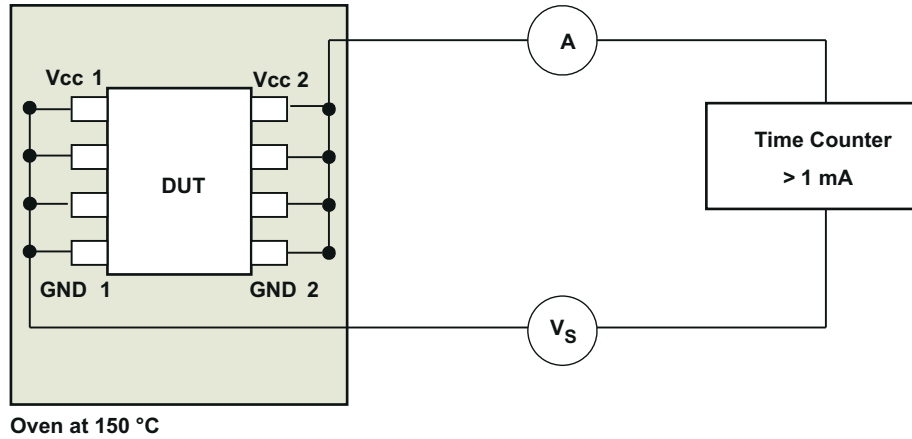


图 9-7. Test Setup for Insulation Lifetime Measurement

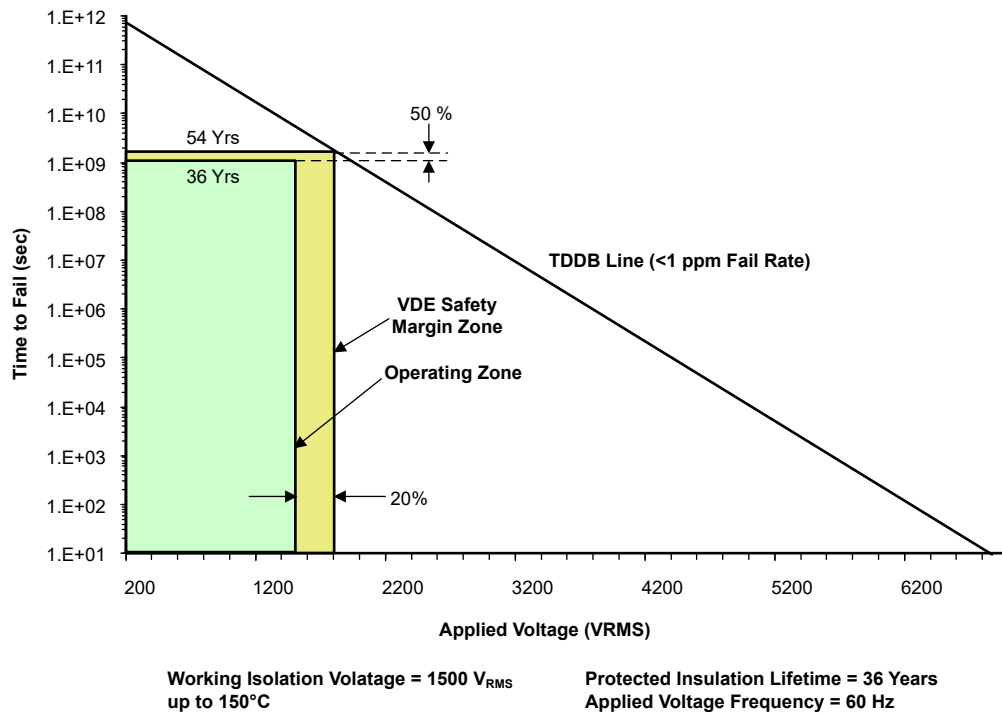


图 9-8. Insulation Lifetime Projection Data

10 Power Supply Recommendations

To help ensure reliable operation at data rates and supply voltages, a 0.1- μ F bypass capacitor is recommended at the input and output supply pins (V_{CC1} and V_{CC2}). The capacitors should be placed as close to the supply pins as possible. If only a single primary-side power supply is available in an application, isolated power can be generated for the secondary-side with the help of a transformer driver such as Texas Instruments' [SN6501](#) or [SN6505A](#). For such applications, detailed power supply design and transformer selection recommendations are available in the [SN6501 Transformer Driver for Isolated Power Supplies data sheet](#) or [SN6505A Low-Noise 1-A Transformer Drivers for Isolated Power Supplies](#) (SLLSEP9).

11 Layout

11.1 Layout Guidelines

A minimum of four layers is required to accomplish a low EMI PCB design (see [图 11-1](#)). Layer stacking should be in the following order (top-to-bottom): high-speed signal layer, ground plane, power plane and low-frequency signal layer.

- Routing the high-speed traces on the top layer avoids the use of vias (and the introduction of their inductances) and allows for clean interconnects between the isolator and the transmitter and receiver circuits of the data link.
- Placing a solid ground plane next to the high-speed signal layer establishes controlled impedance for transmission line interconnects and provides an excellent low-inductance path for the return current flow.
- Placing the power plane next to the ground plane creates additional high-frequency bypass capacitance of approximately 100 pF/inch².
- Routing the slower speed control signals on the bottom layer allows for greater flexibility as these signal links usually have margin to tolerate discontinuities such as vias.

If an additional supply voltage plane or signal layer is needed, add a second power or ground plane system to the stack to keep it symmetrical. This makes the stack mechanically stable and prevents it from warping. Also the power and ground plane of each power system can be placed closer together, thus increasing the high-frequency bypass capacitance significantly.

For detailed layout recommendations, refer to the [Digital Isolator Design Guide](#).

11.1.1 PCB Material

For digital circuit boards operating below 150 Mbps, (or rise and fall times higher than 1 ns), and trace lengths of up to 10 inches, use standard FR-4 UL94V-0 printed circuit boards. This PCB is preferred over cheaper alternatives due to its lower dielectric losses at high frequencies, less moisture absorption, greater strength and stiffness, and self-extinguishing flammability-characteristics.

11.2 Layout Example

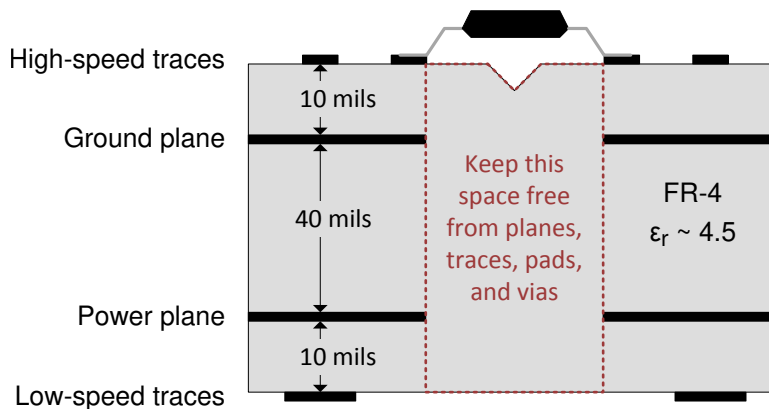


图 11-1. Layout Example Schematic

12 Device and Documentation Support

12.1 Documentation Support

12.1.1 Related Documentation

For related documentation, see the following:

- Texas Instruments, [Digital Isolator Design Guide](#)
- Texas Instruments, [Isolation Glossary](#)
- Texas Instruments, [How to use isolation to improve ESD, EFT, and Surge immunity in industrial systems application report](#)
- Texas Instruments, [SN6501 Transformer Driver for Isolated Power Supplies data sheet](#)
- Texas Instruments, [SNx5HVD308xE Low-Power RS-485 Transceivers, Available in a Small MSOP-8 Package data sheet](#)
- Texas Instruments, [TPS76350 Low-Power 150-mA Low-Dropout Linear Regulators data sheet](#)
- Texas Instruments, [MSP430F2132 Mixed Signal Microcontroller data sheet](#)

12.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. In the upper right corner, click on *Alert me* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

12.3 Community Resources

TI E2E™ [support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

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ESD 的损坏小至导致微小的性能降级, 大至整个器件故障。精密的集成电路可能更容易受到损坏, 这是因为非常细微的参数更改都可能会导致器件与其发布的规格不相符。

12.6 术语表

TI 术语表 本术语表列出并解释了术语、首字母缩略词和定义。

13 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead finish/ Ball material (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|---------|
| ISO7730DBQ | LIFEBUY | SSOP | DBQ | 16 | 75 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | 7730 | |
| ISO7730DBQR | ACTIVE | SSOP | DBQ | 16 | 2500 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | 7730 | Samples |
| ISO7730DW | LIFEBUY | SOIC | DW | 16 | 40 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7730 | |
| ISO7730DWR | ACTIVE | SOIC | DW | 16 | 2000 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7730 | Samples |
| ISO7730FDBQ | LIFEBUY | SSOP | DBQ | 16 | 75 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | 7730F | |
| ISO7730FDBQR | ACTIVE | SSOP | DBQ | 16 | 2500 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | 7730F | Samples |
| ISO7730FDW | LIFEBUY | SOIC | DW | 16 | 40 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7730F | |
| ISO7730FDWR | ACTIVE | SOIC | DW | 16 | 2000 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7730F | Samples |
| ISO7731BDW | LIFEBUY | SOIC | DW | 16 | 40 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7731B | |
| ISO7731BDWR | ACTIVE | SOIC | DW | 16 | 2000 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7731B | Samples |
| ISO7731DBQ | LIFEBUY | SSOP | DBQ | 16 | 75 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | 7731 | |
| ISO7731DBQR | ACTIVE | SSOP | DBQ | 16 | 2500 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | 7731 | Samples |
| ISO7731DW | LIFEBUY | SOIC | DW | 16 | 40 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7731 | |
| ISO7731DWR | ACTIVE | SOIC | DW | 16 | 2000 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7731 | Samples |
| ISO7731FBDW | LIFEBUY | SOIC | DW | 16 | 40 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7731FB | |
| ISO7731FBDWR | ACTIVE | SOIC | DW | 16 | 2000 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7731FB | Samples |
| ISO7731FDBQ | LIFEBUY | SSOP | DBQ | 16 | 75 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | 7731F | |
| ISO7731FDBQR | ACTIVE | SSOP | DBQ | 16 | 2500 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | 7731F | Samples |
| ISO7731FDW | LIFEBUY | SOIC | DW | 16 | 40 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7731F | |
| ISO7731FDWR | ACTIVE | SOIC | DW | 16 | 2000 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7731F | Samples |

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of ≤ 1000 ppm threshold. Antimony trioxide based flame retardants must also meet the ≤ 1000 ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices 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.

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OTHER QUALIFIED VERSIONS OF ISO7730, ISO7731 :

- Automotive : [ISO7730-Q1](#), [ISO7731-Q1](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

TAPE AND REEL INFORMATION



QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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 |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| ISO7730DBQR | SSOP | DBQ | 16 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| ISO7730DBQR | SSOP | DBQ | 16 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| ISO7730DWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7730DWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7730DWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7730FDBQR | SSOP | DBQ | 16 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| ISO7730FDBQR | SSOP | DBQ | 16 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| ISO7730FDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7730FDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7730FDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7731BDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7731BDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7731BDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7731DBQR | SSOP | DBQ | 16 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| ISO7731DBQR | SSOP | DBQ | 16 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| ISO7731DWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |

| 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 |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| ISO7731DWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7731DWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7731FBDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7731FBDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7731FBDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7731FDBQR | SSOP | DBQ | 16 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| ISO7731FDBQR | SSOP | DBQ | 16 | 2500 | 330.0 | 12.4 | 6.4 | 5.2 | 2.1 | 8.0 | 12.0 | Q1 |
| ISO7731FDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7731FDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7731FDWR | 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) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| ISO7730DBQR | SSOP | DBQ | 16 | 2500 | 350.0 | 350.0 | 43.0 |
| ISO7730DBQR | SSOP | DBQ | 16 | 2500 | 350.0 | 350.0 | 43.0 |
| ISO7730DWR | SOIC | DW | 16 | 2000 | 367.0 | 367.0 | 45.0 |
| ISO7730DWR | SOIC | DW | 16 | 2000 | 367.0 | 367.0 | 38.0 |
| ISO7730DWR | SOIC | DW | 16 | 2000 | 367.0 | 367.0 | 38.0 |
| ISO7730FDBQR | SSOP | DBQ | 16 | 2500 | 350.0 | 350.0 | 43.0 |
| ISO7730FDBQR | SSOP | DBQ | 16 | 2500 | 350.0 | 350.0 | 43.0 |
| ISO7730FDWR | SOIC | DW | 16 | 2000 | 367.0 | 367.0 | 38.0 |
| ISO7730FDWR | SOIC | DW | 16 | 2000 | 367.0 | 367.0 | 45.0 |
| ISO7730FDWR | SOIC | DW | 16 | 2000 | 367.0 | 367.0 | 38.0 |
| ISO7731BDWR | SOIC | DW | 16 | 2000 | 367.0 | 367.0 | 38.0 |
| ISO7731BDWR | SOIC | DW | 16 | 2000 | 353.0 | 353.0 | 32.0 |
| ISO7731BDWR | SOIC | DW | 16 | 2000 | 367.0 | 367.0 | 38.0 |
| ISO7731DBQR | SSOP | DBQ | 16 | 2500 | 350.0 | 350.0 | 43.0 |
| ISO7731DBQR | SSOP | DBQ | 16 | 2500 | 350.0 | 350.0 | 43.0 |
| ISO7731DWR | SOIC | DW | 16 | 2000 | 356.0 | 356.0 | 35.0 |
| ISO7731DWR | SOIC | DW | 16 | 2000 | 367.0 | 367.0 | 45.0 |
| ISO7731DWR | SOIC | DW | 16 | 2000 | 356.0 | 356.0 | 35.0 |

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| ISO7731FBDWR | SOIC | DW | 16 | 2000 | 353.0 | 353.0 | 32.0 |
| ISO7731FBDWR | SOIC | DW | 16 | 2000 | 367.0 | 367.0 | 38.0 |
| ISO7731FBDWR | SOIC | DW | 16 | 2000 | 367.0 | 367.0 | 38.0 |
| ISO7731FDBQR | SSOP | DBQ | 16 | 2500 | 350.0 | 350.0 | 43.0 |
| ISO7731FDBQR | SSOP | DBQ | 16 | 2500 | 350.0 | 350.0 | 43.0 |
| ISO7731FDWR | SOIC | DW | 16 | 2000 | 367.0 | 367.0 | 45.0 |
| ISO7731FDWR | SOIC | DW | 16 | 2000 | 367.0 | 367.0 | 38.0 |
| ISO7731FDWR | SOIC | DW | 16 | 2000 | 367.0 | 367.0 | 38.0 |

TUBE


*All dimensions are nominal

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (µm) | B (mm) |
|-------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| ISO7730DBQ | DBQ | SSOP | 16 | 75 | 505.46 | 6.76 | 3810 | 4 |
| ISO7730DW | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |
| ISO7730DW | DW | SOIC | 16 | 40 | 507 | 12.83 | 5080 | 6.6 |
| ISO7730FDBQ | DBQ | SSOP | 16 | 75 | 505.46 | 6.76 | 3810 | 4 |
| ISO7730FDW | DW | SOIC | 16 | 40 | 507 | 12.83 | 5080 | 6.6 |
| ISO7730FDW | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |
| ISO7731BDW | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |
| ISO7731BDW | DW | SOIC | 16 | 40 | 507 | 12.83 | 5080 | 6.6 |
| ISO7731DBQ | DBQ | SSOP | 16 | 75 | 505.46 | 6.76 | 3810 | 4 |
| ISO7731DW | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |
| ISO7731DW | DW | SOIC | 16 | 40 | 507 | 12.83 | 5080 | 6.6 |
| ISO7731FBDW | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |
| ISO7731FBDW | DW | SOIC | 16 | 40 | 507 | 12.83 | 5080 | 6.6 |
| ISO7731FDBQ | DBQ | SSOP | 16 | 75 | 505.46 | 6.76 | 3810 | 4 |
| ISO7731FDW | DW | SOIC | 16 | 40 | 507 | 12.83 | 5080 | 6.6 |
| ISO7731FDW | 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



4221009/B 07/2016

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

4221009/B 07/2016

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



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.

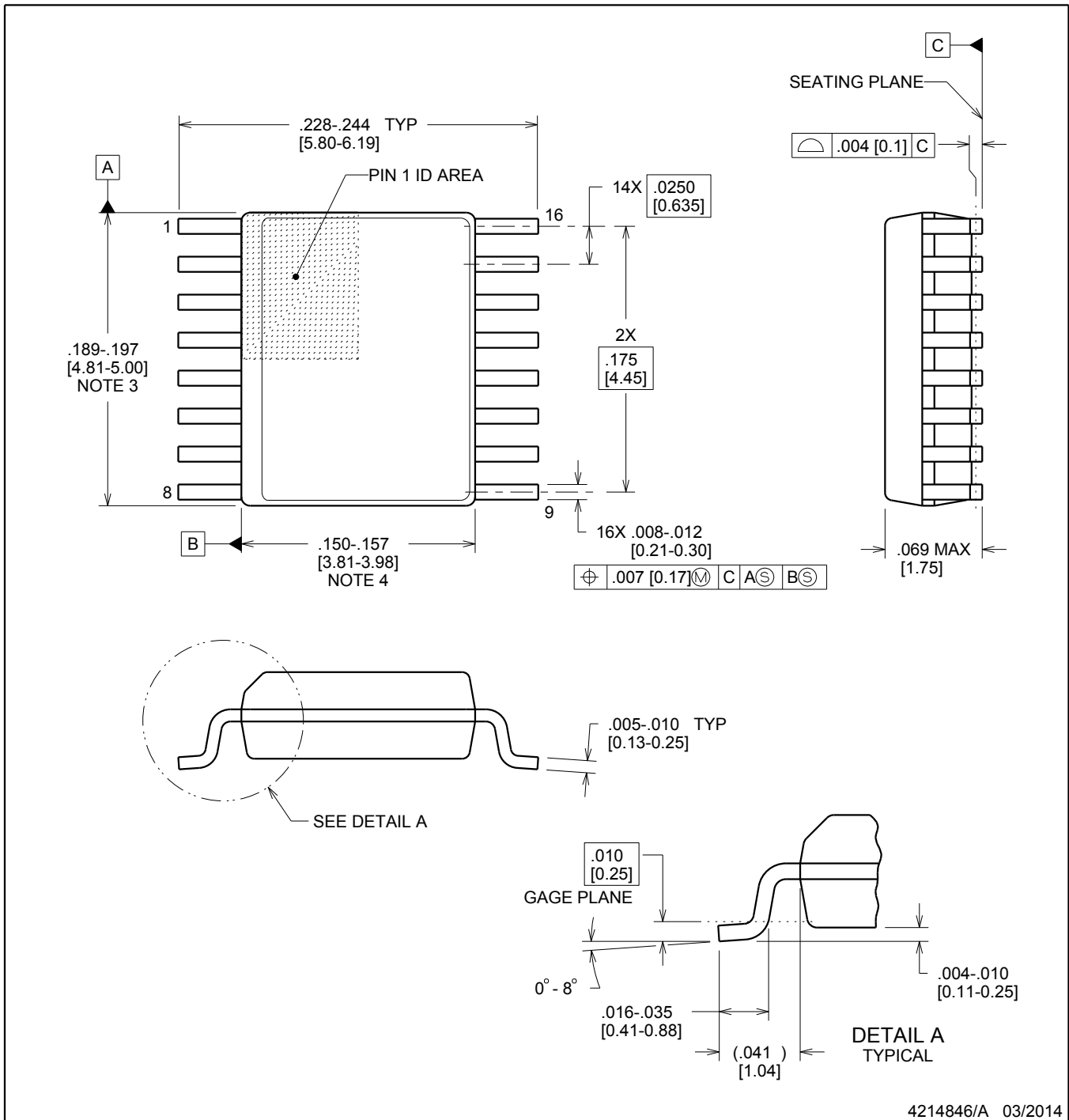


DBQ0016A

PACKAGE OUTLINE

SSOP - 1.75 mm max height

SHRINK SMALL-OUTLINE PACKAGE



NOTES:

1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. 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 .006 inch, per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MO-137, variation AB.

EXAMPLE BOARD LAYOUT

DBQ0016A

SSOP - 1.75 mm max height

SHRINK SMALL-OUTLINE PACKAGE



LAND PATTERN EXAMPLE
SCALE:8X



SOLDER MASK DETAILS

4214846/A 03/2014

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

DBQ0016A

SSOP - 1.75 mm max height

SHRINK SMALL-OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.127 MM] THICK STENCIL
SCALE:8X

4214846/A 03/2014

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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