

# ISO776x 高速で堅牢な EMC 強化型 6 チャンネル・デジタル・アイソレータ

## 1 特長

- 100Mbps のデータレート
- 堅牢な絶縁バリア:
  - 推定寿命: 30 年超
  - 最高 5000V<sub>RMS</sub> の絶縁定格
  - 最高 12.8kV のサージ耐量
  - CMTI: ±100kV/μs (標準値)
- 広い電源電圧範囲: 2.25V ~ 5.5V
- 2.25V から 5.5V への電圧変換
- デフォルト出力が HIGH (ISO776x) と LOW (ISO776xF) のオプション
- 広い温度範囲: -55°C ~ +125°C
- 低消費電力: 1Mbps でチャンネルごとに標準値 1.4mA
- 小さい伝搬遅延時間: 11ns (標準値、5V 時)
- 堅牢な電磁環境適合性 (EMC):
  - システムレベルでの ESD、EFT、サージ耐性
  - 絶縁バリアの両側で ±8kV の IEC 61000-4-2 接触放電保護
  - 低い放射
- Wide-SOIC (DW-16) および SSOP (DBQ-16) パッケージ オプション
- 車載用バージョンを利用可能: ISO776x-Q1
- 安全関連認証:
  - DIN EN IEC 60747-17 (VDE 0884-17) に準拠した強化絶縁
  - UL 1577 部品認定プログラム
  - IEC 62368-1 および IEC 60601-1 準拠の CSA 認定
  - GB4943.1 準拠の CQC 認定
  - EN 62368-1 および EN 61010-1 による TUV 認証

## 2 アプリケーション

- 産業用オートメーション
- モータ制御
- 電源
- 太陽光インバータ
- 医療用機器

## 3 概要

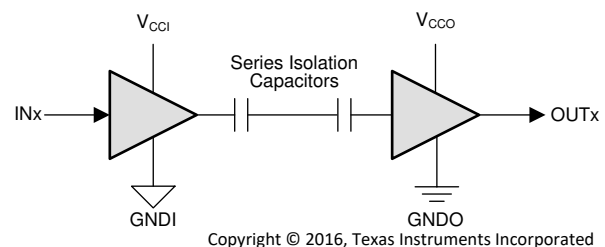
ISO776x デバイスは、高性能の 6 チャンネル・デジタル・アイソレータであり、UL 1577 準拠で 5000V<sub>RMS</sub> (DW パッケージ) および 3000V<sub>RMS</sub> (DBQ パッケージ) の絶縁定格を備えています。このファミリのデバイスは、VDE、CSA、TUV、CQC についても認定済みです。

ISO776x ファミリのデバイスは電磁気耐性が高く、放射が低く、低消費電力を実現し、CMOS または LVCMOS デジタル I/O が絶縁されています。それぞれの絶縁チャンネルにはロジック入力およびロジック出力バッファがあり、二重の容量性二酸化ケイ素 (SiO<sub>2</sub>) の絶縁バリアによって分離されています。ISO776x ファミリのデバイスは、6 つのチャンネルすべてが同じ方向、または 1、2、3 チャンネルが逆方向で他のチャンネルが順方向など、可能なすべてのピン構成で利用可能です。入力電力または入力信号が失われた場合のデフォルト出力は、接尾辞 F のないデバイスでは HIGH、接尾辞 F のあるデバイスでは LOW になります。詳細は「[デバイスの機能モード](#)」のセクションを参照してください。

絶縁電源と組み合わせて使用することで、このデバイスファミリは、データ・バス (たとえば RS-485、RS-232、CAN など) または他の回路からのノイズ電流がローカル・グランドに入り込み、敏感な回路に干渉や損傷を引き起こすことを防ぐのに役立ちます。革新的なチップ設計およびレイアウト技法により、ISO776x ファミリのデバイスは電磁環境適合性が大幅に強化されているため、システムレベルの ESD、EFT、サージ、および放射に関するコンプライアンスを容易に達成できます。ISO776x ファミリのデバイスは、16 ピンの SOIC および SSOP パッケージで供給されます。

### 製品情報

部品番号	パッケージ	本体サイズ (公称)
ISO7760 ISO7761	SOIC (16)	10.30mm × 7.50mm
ISO7762 ISO7763	SSOP (16)	4.90mm × 3.90mm



V<sub>CCI</sub> = 入力 V<sub>CC</sub>、V<sub>CCO</sub> = 出力 V<sub>CC</sub>

GNDI = 入力グランド、GNDO = 出力グランド

### 概略回路図



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## 4 Pin Configuration and Functions

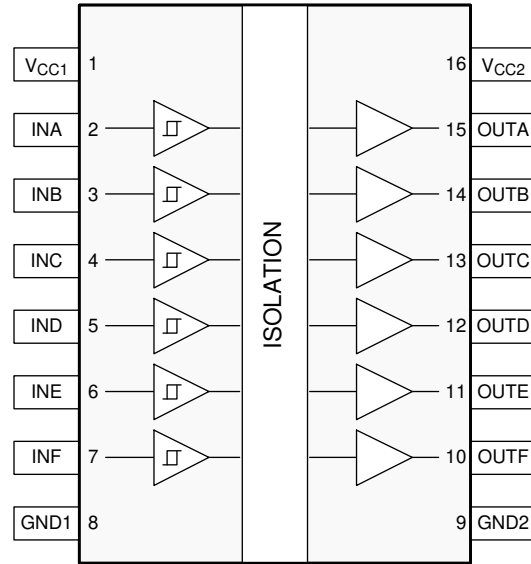


図 4-1. ISO7760 DW and DBQ Packages 16-Pin SOIC and SSOP Top View

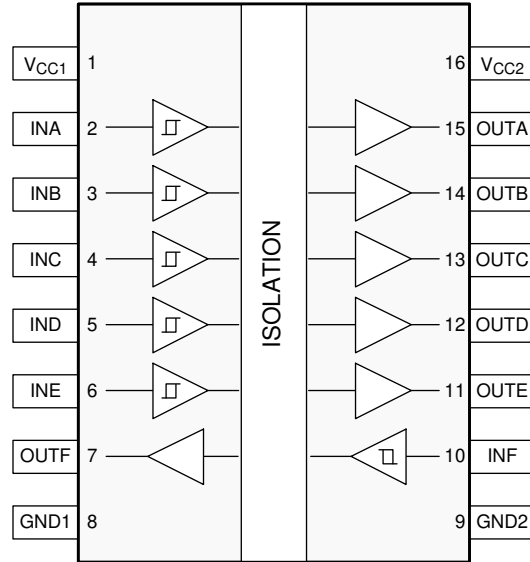


図 4-2. ISO7761 DW and DBQ Packages 16-Pin SOIC and SSOP Top View

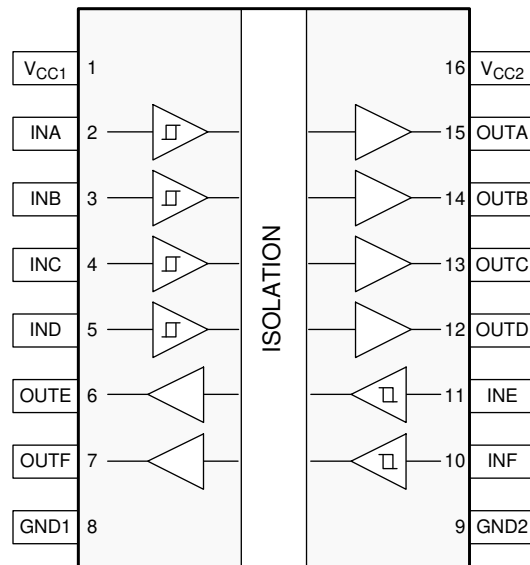


図 4-3. ISO7762 DW and DBQ Packages 16-Pin SOIC and SSOP Top View

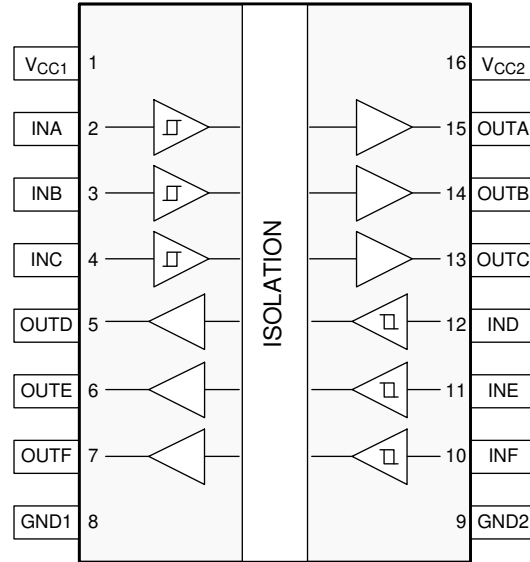


図 4-4. ISO7763 DW and DBQ Packages 16-Pin SOIC and SSOP Top View

表 4-1. Pin Functions

NAME	PIN NO.				I/O	DESCRIPTION
	ISO7760	ISO7761	ISO7762	ISO7763		
GND1	8	8	8	8	—	Ground connection for $V_{CC1}$
GND2	9	9	9	9	—	Ground connection for $V_{CC2}$
INA	2	2	2	2	I	Input, channel A
INB	3	3	3	3	I	Input, channel B
INC	4	4	4	4	I	Input, channel C
IND	5	5	5	12	I	Input, channel D
INE	6	6	11	11	I	Input, channel E
INF	7	10	10	10	I	Input, channel F
OUTA	15	15	15	15	O	Output, channel A
OUTB	14	14	14	14	O	Output, channel B
OUTC	13	13	13	13	O	Output, channel C
OUTD	12	12	12	5	O	Output, channel D
OUTE	11	11	6	6	O	Output, channel E
OUTF	10	7	7	7	O	Output, channel F
$V_{CC1}$	1	1	1	1	—	Power supply, side 1
$V_{CC2}$	16	16	16	16	—	Power supply, side 2

## 5 Specifications

### 5.1 Absolute Maximum Ratings

See<sup>(1)</sup>

		MIN	MAX	UNIT
$V_{CC1}, V_{CC2}$	Supply voltage <sup>(2)</sup>	-0.5	6	V
V	Voltage at INx, OUTx	-0.5	$V_{CCX} + 0.5$ <sup>(3)</sup>	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.

### 5.2 ESD Ratings

(1) (2)

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

### 5.3 Recommended Operating Conditions

		MIN	NOM	MAX	UNIT
V <sub>CC1</sub> , V <sub>CC2</sub>	Supply Voltage	2.25		5.5	V
V <sub>cc (UVLO+)</sub>	UVLO threshold when supply voltage is rising		2	2.25	V
V <sub>cc (UVLO-)</sub>	UVLO threshold when supply voltage is falling	1.7	1.8		V
V <sub>HYS (UVLO)</sub>	Supply voltage UVLO hysteresis	100	200		mV
I <sub>OH</sub>	High level output current	V <sub>CCO</sub> <sup>(1)</sup> = 5 V		-4	mA
		V <sub>CCO</sub> = 3.3 V		-2	
		V <sub>CCO</sub> = 2.5 V		-1	
I <sub>OL</sub>	Low level output current	V <sub>CCO</sub> = 5 V		4	mA
		V <sub>CCO</sub> = 3.3 V		2	
		V <sub>CCO</sub> = 2.5 V		1	
V <sub>IH</sub>	High level Input voltage	0.7 x V <sub>CCI</sub> <sup>(1)</sup>		V <sub>CCI</sub>	V
V <sub>IL</sub>	Low level Input voltage	0		0.3 x V <sub>CCI</sub>	V
DR <sup>(2)</sup>	Data Rate	0		100	Mbps
T <sub>A</sub>	Ambient temperature	-55	25	125	°C

(1) V<sub>CCI</sub> = Input-side V<sub>CC</sub>; V<sub>CCO</sub> = Output-side V<sub>CC</sub>

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

## 5.4 Thermal Information

THERMAL METRIC <sup>(1)</sup>		ISO776x		UNIT
		DW (SOIC)	DBQ (SSOP)	
		16 PINS	16 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	60.3	86.5	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	24.0	26.9	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	29.3	36.6	°C/W
$\psi_{JT}$	Junction-to-top characterization parameter	3.3	1.7	°C/W
$\psi_{JB}$	Junction-to-board characterization parameter	28.7	36.1	°C/W
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	n/a	n/a	°C/W

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

## 5.5 Power Ratings

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>ISO7760</b>						
$P_D$	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			314	mW
$P_{D1}$	Maximum power dissipation (side-1)				55	mW
$P_{D2}$	Maximum power dissipation (side-2)				259	mW
<b>ISO7761</b>						
$P_D$	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			314	mW
$P_{D1}$	Maximum power dissipation (side-1)				88	mW
$P_{D2}$	Maximum power dissipation (side-2)				226	mW
<b>ISO7762</b>						
$P_D$	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			314	mW
$P_{D1}$	Maximum power dissipation (side-1)				122	mW
$P_{D2}$	Maximum power dissipation (side-2)				192	mW
<b>ISO7763</b>						
$P_D$	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			314	mW
$P_{D1}$	Maximum power dissipation (side-1)				157	mW
$P_{D2}$	Maximum power dissipation (side-2)				157	mW



## 5.6 Insulation Specifications

PARAMETER		TEST CONDITIONS	VALUE		UNIT
			DW-16	DBQ-16	
CLR	External clearance <sup>(1)</sup>	Shortest terminal-to-terminal distance through air	>8	>3.7	mm
CPG	External creepage <sup>(1)</sup>	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 <sub>RMS</sub>	I-IV	I-IV	
		Rated mains voltage ≤ 300 V <sub>RMS</sub>	I-IV	I-III	
		Rated mains voltage ≤ 600 V <sub>RMS</sub>	I-IV	n/a	
		Rated mains voltage ≤ 1000 V <sub>RMS</sub>	I-III	n/a	
<b>DIN EN IEC 60747-17 (VDE 0884-17)<sup>(2)</sup></b>					
V <sub>IORM</sub>	Maximum repetitive peak isolation voltage	AC voltage (bipolar)	2121	566	V <sub>PK</sub>
V <sub>IOWM</sub>	Maximum working isolation voltage	AC voltage; Time dependent dielectric breakdown (TDDB) test; See <a href="#">8-7</a>	1500	400	V <sub>RMS</sub>
		DC voltage	2121	566	V <sub>DC</sub>
V <sub>IOTM</sub>	Maximum transient isolation voltage	V <sub>TEST</sub> = V <sub>IOTM</sub> , t = 60 s (qualification); V <sub>TEST</sub> = 1.2 x V <sub>IOTM</sub> , t = 1 s (100% production)	ISO7760 8000	4242	V <sub>PK</sub>
			ISO7761, ISO7762, ISO7763 7071		
V <sub>IMP</sub>	Maximum impulse voltage <sup>(3)</sup>	Tested in air, 1.2/50-μs waveform per IEC 62368-1	8000	4000	V <sub>PK</sub>
V <sub>IOSM</sub>	Maximum surge isolation voltage <sup>(4)</sup>	V <sub>IOSM</sub> ≥ 1.3 x V <sub>IMP</sub> ; Tested in oil (qualification test), 1.2/50-μs waveform per IEC 62368-1	12800	10000	V <sub>PK</sub>
q <sub>pd</sub>	Apparent charge <sup>(5)</sup>	Method a, After Input-output safety test subgroup 2/3, V <sub>ini</sub> = V <sub>IOTM</sub> , t <sub>ini</sub> = 60 s; V <sub>pd(m)</sub> = 1.2 x V <sub>IORM</sub> , t <sub>m</sub> = 10 s	≤5	≤5	pC
		Method a, After environmental tests subgroup 1, V <sub>ini</sub> = V <sub>IOTM</sub> , t <sub>ini</sub> = 60 s; V <sub>pd(m)</sub> = 1.6 x V <sub>IORM</sub> , t <sub>m</sub> = 10 s	≤5	≤5	
		Method b: At routine test (100% production) and preconditioning (type test); V <sub>ini</sub> = 1.2 x V <sub>IOTM</sub> , t <sub>ini</sub> = 1 s; V <sub>pd(m)</sub> = 1.875 x V <sub>IORM</sub> , t <sub>m</sub> = 1 s (method b1) or V <sub>pd(m)</sub> = V <sub>ini</sub> , t <sub>m</sub> = t <sub>ini</sub> (method b2)	≤5	≤5	
C <sub>IO</sub>	Barrier capacitance, input to output <sup>(6)</sup>	V <sub>IO</sub> = 0.4 x sin (2πft), f = 1 MHz	~1.1	~0.9	pF
R <sub>IO</sub>	Isolation resistance <sup>(6)</sup>	V <sub>IO</sub> = 500 V, T <sub>A</sub> = 25°C	>10 <sup>12</sup>	>10 <sup>12</sup>	Ω
		V <sub>IO</sub> = 500 V, 100°C ≤ T <sub>A</sub> ≤ 125°C	>10 <sup>11</sup>	>10 <sup>11</sup>	
		V <sub>IO</sub> = 500 V, T <sub>S</sub> = 150°C	>10 <sup>9</sup>	>10 <sup>9</sup>	
	Pollution degree		2	2	
	Climatic category		55/125/ 21	55/125/ 21	
<b>UL 1577</b>					
V <sub>ISO</sub>	Maximum withstanding isolation voltage	V <sub>TEST</sub> = V <sub>ISO</sub> , t = 60 s (qualification), V <sub>TEST</sub> = 1.2 x V <sub>ISO</sub> , t = 1 s (100% production)	5000	3000	V <sub>RMS</sub>

- (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.

**ISO7760, ISO7761, ISO7762, ISO7763**JAJSDM1H – AUGUST 2017 – REVISED JANUARY 2024

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- (2) This coupler is suitable for *safe electrical insulation* 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.

## 5.7 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 60601-1	Recognized under UL 1577 Component Recognition Program	Certified according to GB 4943.1	Certified according to EN 61010-1 and EN 62368-1
Reinforced Insulation; Maximum transient isolation voltage, 8000 V <sub>PK</sub> (ISO7760 in DW-16), 7071 V <sub>PK</sub> (ISO7761, ISO7762, ISO7763 in DW-16) and 4242 V <sub>PK</sub> (DBQ-16); Maximum repetitive peak isolation voltage, 2121 V <sub>PK</sub> (DW-16) and 566 V <sub>PK</sub> (DBQ-16); Maximum surge isolation voltage, 12800 V <sub>PK</sub> (DW-16) and 10000 V <sub>PK</sub> (DBQ-16)	Reinforced insulation per CSA 62368-1 and IEC 62368-1 800 V <sub>RMS</sub> (DW-16) and 370 V <sub>RMS</sub> (DBQ-16) maximum working voltage (pollution degree 2, material group I); DW-16: 2 MOPP (Means of Patient Protection) per CSA 60601-1 and IEC 60601-1, 250 V <sub>RMS</sub> maximum working voltage	DW-16: Single protection, 5000 V <sub>RMS</sub> ; DBQ-16: Single protection, 3000 V <sub>RMS</sub>	DW-16: Reinforced Insulation, Altitude ≤ 5000 m, Tropical Climate, 700 V <sub>RMS</sub> maximum working voltage; DBQ-16: Basic Insulation, Altitude ≤ 5000 m, Tropical Climate, 400 V <sub>RMS</sub> maximum working voltage	5000 V <sub>RMS</sub> Reinforced insulation per EN 61010-1 up to working voltage of 600 V <sub>RMS</sub> (DW-16) and 300 V <sub>RMS</sub> (DBQ-16) 5000 V <sub>RMS</sub> Reinforced insulation per EN 62368-1 up to working voltage of 600 V <sub>RMS</sub> (DW-16) and 370 V <sub>RMS</sub> (DBQ-16)
Certificate number: 40040142	Master contract number: 220991	File number: E181974	Certificate numbers: CQC15001121716 (DW) CQC18001199097 (DBQ)	Client ID number: 77311

## 5.8 Safety Limiting Values

Safety limiting<sup>(1)</sup> intends to minimize potential damage to the isolation barrier upon failure of input or output circuitry.

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>DW-16 PACKAGE</b>						
I <sub>S</sub>	Safety input, output, or supply current <sup>(1)</sup>	R <sub>θJA</sub> = 60.3°C/W, V <sub>I</sub> = 5.5 V, T <sub>J</sub> = 150°C, T <sub>A</sub> = 25°C, see <a href="#">5-1</a>			377	mA
		R <sub>θJA</sub> = 60.3°C/W, V <sub>I</sub> = 3.6 V, T <sub>J</sub> = 150°C, T <sub>A</sub> = 25°C, see <a href="#">5-1</a>			576	
		R <sub>θJA</sub> = 60.3°C/W, V <sub>I</sub> = 2.75 V, T <sub>J</sub> = 150°C, T <sub>A</sub> = 25°C, see <a href="#">5-1</a>			754	
P <sub>S</sub>	Safety input, output, or total power <sup>(1)</sup>	R <sub>θJA</sub> = 60.3°C/W, T <sub>J</sub> = 150°C, T <sub>A</sub> = 25°C, see <a href="#">5-3</a>			2073	mW
T <sub>S</sub>	Maximum safety temperature <sup>(1)</sup>				150	°C
<b>DBQ-16 PACKAGE</b>						
I <sub>S</sub>	Safety input, output, or supply current <sup>(1)</sup>	R <sub>θJA</sub> = 86.5°C/W, V <sub>I</sub> = 5.5 V, T <sub>J</sub> = 150°C, T <sub>A</sub> = 25°C, see <a href="#">5-2</a>			263	mA
		R <sub>θJA</sub> = 86.5°C/W, V <sub>I</sub> = 3.6 V, T <sub>J</sub> = 150°C, T <sub>A</sub> = 25°C, see <a href="#">5-2</a>			401	
		R <sub>θJA</sub> = 86.5°C/W, V <sub>I</sub> = 2.75 V, T <sub>J</sub> = 150°C, T <sub>A</sub> = 25°C, see <a href="#">5-2</a>			525	
P <sub>S</sub>	Safety input, output, or total power <sup>(1)</sup>	R <sub>θJA</sub> = 86.5°C/W, T <sub>J</sub> = 150°C, T <sub>A</sub> = 25°C, see <a href="#">5-4</a>			1445	mW
T <sub>S</sub>	Maximum safety temperature <sup>(1)</sup>				150	°C

(1) The maximum safety temperature, T<sub>S</sub>, has the same value as the maximum junction temperature, T<sub>J</sub>, specified for the device. The I<sub>S</sub> and P<sub>S</sub> parameters represent the safety current and safety power respectively. The maximum limits of I<sub>S</sub> and P<sub>S</sub> should not be exceeded. These limits vary with the ambient temperature, T<sub>A</sub>.

The junction-to-air thermal resistance, R<sub>θJA</sub>, 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<sub>J</sub> = T<sub>A</sub> + R<sub>θJA</sub> × P, where P is the power dissipated in the device.

T<sub>J(max)</sub> = T<sub>S</sub> = T<sub>A</sub> + R<sub>θJA</sub> × P<sub>S</sub>, where T<sub>J(max)</sub> is the maximum allowed junction temperature.

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

### 5.9 Electrical Characteristics—5-V Supply

VCC1 = VCC2 = 5 V ± 10% (over recommended operating conditions unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V <sub>OH</sub>	High-level output voltage	I <sub>OH</sub> = -4 mA; See <a href="#">6-1</a>	V <sub>CCO</sub> <sup>(1)</sup> - 0.4	4.8		V
V <sub>OL</sub>	Low-level output voltage	I <sub>OL</sub> = 4 mA; See <a href="#">6-1</a>		0.2	0.4	V
V <sub>IT+(IN)</sub>	Rising input switching threshold			0.6 x V <sub>CCI</sub>	0.7 x V <sub>CCI</sub>	V
V <sub>IT-(IN)</sub>	Falling input switching threshold		0.3 x V <sub>CCI</sub>	0.4 x V <sub>CCI</sub>		V
V <sub>I(HYS)</sub>	Input threshold voltage hysteresis		0.1 x V <sub>CCI</sub>	0.2 x V <sub>CCI</sub>		V
I <sub>IH</sub>	High-level input current	V <sub>IH</sub> = V <sub>CCI</sub> <sup>(1)</sup> at INx			10	μA
I <sub>IL</sub>	Low-level input current	V <sub>IL</sub> = 0 V at INx	-10			μA
CMTI	Common mode transient immunity	V <sub>I</sub> = V <sub>CCI</sub> or 0 V, V <sub>CM</sub> = 1200 V; See <a href="#">6-3</a>	85	100		kV/μs
C <sub>I</sub>	Input Capacitance <sup>(2)</sup>	V <sub>I</sub> = V <sub>CC</sub> / 2 + 0.4 × sin(2πft), f = 1 MHz, V <sub>CC</sub> = 5 V		2		pF

(1) V<sub>CCI</sub> = Input-side V<sub>CC</sub>; V<sub>CCO</sub> = Output-side V<sub>CC</sub>

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

### 5.10 Supply Current Characteristics—5-V Supply

VCC1 = VCC2 = 5 V ± 10% (over recommended operating conditions unless otherwise noted).

PARAMETER	TEST CONDITIONS	SUPPLY CURRENT	MIN	TYP	MAX	UNIT
<b>ISO7760</b>						
Supply current - DC signal	V <sub>I</sub> = V <sub>CC1</sub> (ISO7760); V <sub>I</sub> = 0 V (ISO7760 with F suffix)	I <sub>CC1</sub>		1.6	2.9	mA
		I <sub>CC2</sub>		3	5.3	
	V <sub>I</sub> = 0 V (ISO7760); V <sub>I</sub> = V <sub>CC1</sub> (ISO7760 with F suffix)	I <sub>CC1</sub>		8	11.3	
		I <sub>CC2</sub>		3.3	5.7	
Supply current - AC signal	All channels switching with square wave clock input; C <sub>L</sub> = 15 pF	1 Mbps	I <sub>CC1</sub>		5	6.5
			I <sub>CC2</sub>		3.5	5.9
		10 Mbps	I <sub>CC1</sub>		5.2	6.7
			I <sub>CC2</sub>		6.4	9.7
		100 Mbps	I <sub>CC1</sub>		7	9.2
			I <sub>CC2</sub>		35	47
<b>ISO7761</b>						
Supply current - DC signal	V <sub>I</sub> = V <sub>CCI</sub> <sup>(1)</sup> (ISO7761); V <sub>I</sub> = 0 V (ISO7761 with F suffix)	I <sub>CC1</sub>		1.9	3.5	mA
		I <sub>CC2</sub>		2.9	5.4	
	V <sub>I</sub> = 0 V (ISO7761); V <sub>I</sub> = V <sub>CCI</sub> (ISO7761 with F suffix)	I <sub>CC1</sub>		7.3	10.6	
		I <sub>CC2</sub>		4.2	6.9	
Supply current - AC signal	All channels switching with square wave clock input; C <sub>L</sub> = 15 pF	1 Mbps	I <sub>CC1</sub>		4.7	6.6
			I <sub>CC2</sub>		3.8	6.5
		10 Mbps	I <sub>CC1</sub>		5.3	8
			I <sub>CC2</sub>		6.3	9.6
		100 Mbps	I <sub>CC1</sub>		11.5	15.6
			I <sub>CC2</sub>		30.5	40.3
<b>ISO7762</b>						

**ISO7760, ISO7761, ISO7762, ISO7763**

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

PARAMETER	TEST CONDITIONS	SUPPLY CURRENT	MIN	TYP	MAX	UNIT	
Supply current - DC signal	$V_I = V_{CCI}$ (ISO7762); $V_I = 0\text{ V}$ (ISO7762 with F suffix)	$I_{CC1}$		2.1	4.1	mA	
		$I_{CC2}$		2.6	4.9		
	$V_I = 0\text{ V}$ (ISO7762); $V_I = V_{CCI}$ (ISO7762 with F suffix)	$I_{CC1}$		6.5	9.3		
		$I_{CC2}$		5	7.6		
Supply current - AC signal	All channels switching with square wave clock input; $C_L = 15\text{ pF}$	1 Mbps	$I_{CC1}$		4.5		6.7
			$I_{CC2}$		4		6.5
		10 Mbps	$I_{CC1}$		5.6		8
			$I_{CC2}$		6		8.9
		100 Mbps	$I_{CC1}$		16.5	21.3	
			$I_{CC2}$		25.7	34	
<b>ISO7763</b>							
Supply current - DC signal	$V_I = V_{CCI}$ (ISO7763); $V_I = 0\text{ V}$ (ISO7763 with F suffix)	$I_{CC1}, I_{CC2}$		2.4	4.7	mA	
		$I_{CC1}, I_{CC2}$		5.7	8.6		
Supply current - AC signal	All channels switching with square wave clock input; $C_L = 15\text{ pF}$	1 Mbps	$I_{CC1}, I_{CC2}$		4.2		6.8
			$I_{CC1}, I_{CC2}$		5.8		8.7
		10 Mbps	$I_{CC1}, I_{CC2}$		5.8		8.7
			$I_{CC1}, I_{CC2}$		21		28.4

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

### 5.11 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 <a href="#">6-1</a>	$V_{CCO}^{(1)} - 0.3$	3.2		V
$V_{OL}$	Low-level output voltage	$I_{OL} = 2\text{mA}$ ; See <a href="#">6-1</a>		0.1	0.3	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			10	$\mu\text{A}$
$I_{IL}$	Low-level input current	$V_{IL} = 0\text{ V}$ at INx	-10			$\mu\text{A}$
CMTI	Common mode transient immunity	$V_I = V_{CC}$ or $0\text{ V}$ , $V_{CM} = 1200\text{ V}$ ; See <a href="#">6-3</a>	85	100		kV/us

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

### 5.12 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
<b>ISO7760</b>						
Supply current - DC signal	$V_I = V_{CC1}$ (ISO7760); $V_I = 0\text{ V}$ (ISO7760 with F suffix)	$I_{CC1}$		1.6	2.9	mA
		$I_{CC2}$		3	5.3	
	$V_I = 0\text{ V}$ (ISO7760); $V_I = V_{CC1}$ (ISO7760 with F suffix)	$I_{CC1}$		8	11.4	
		$I_{CC2}$		3.3	5.7	
Supply current - AC signal	All channels switching with square wave clock input; $C_L = 15\text{ pF}$	1 Mbps	$I_{CC1}$		4.9	6.4
			$I_{CC2}$		3.4	5.7
		10 Mbps	$I_{CC1}$		5	6.6
			$I_{CC2}$		5.5	8.5
		100 Mbps	$I_{CC1}$		6.3	8.1
			$I_{CC2}$		26	35
<b>ISO7761</b>						
Supply current - DC signal	$V_I = V_{CCI}^{(1)}$ (ISO7761); $V_I = 0\text{ V}$ (ISO7761 with F suffix)	$I_{CC1}$		1.8	3.5	mA
		$I_{CC2}$		2.9	5.3	
	$V_I = 0\text{ V}$ (ISO7761); $V_I = V_{CCI}$ (ISO7761 with F suffix)	$I_{CC1}$		7.2	10.3	
		$I_{CC2}$		4.2	6.9	
Supply current - AC signal	All channels switching with square wave clock input; $C_L = 15\text{ pF}$	1 Mbps	$I_{CC1}$		4.6	6.5
			$I_{CC2}$		3.7	6.3
		10 Mbps	$I_{CC1}$		5.1	7.5
			$I_{CC2}$		5.5	8.6
		100 Mbps	$I_{CC1}$		9.4	12.7
			$I_{CC2}$		22.8	30.5
<b>ISO7762</b>						

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

PARAMETER	TEST CONDITIONS		SUPPLY CURRENT	MIN	TYP	MAX	UNIT
Supply current - DC signal	$V_I = V_{CCI}$ (ISO7762); $V_I = 0\text{ V}$ (ISO7762 with F suffix)		$I_{CC1}$		2.1	4	mA
			$I_{CC2}$		2.5	4.8	
	$V_I = 0\text{ V}$ (ISO7762); $V_I = V_{CCI}$ (ISO7762 with F suffix)		$I_{CC1}$		6.5	9.4	
			$I_{CC2}$		5	7.5	
Supply current - AC signal	All channels switching with square wave clock input; $C_L = 15\text{ pF}$	1 Mbps	$I_{CC1}$		4.4	6.6	
			$I_{CC2}$		3.9	6.3	
		10 Mbps	$I_{CC1}$		5.2	7.5	
			$I_{CC2}$		5.4	8.1	
		100 Mbps	$I_{CC1}$		12.9	16.9	
			$I_{CC2}$		19.5	26	
<b>ISO7763</b>							
Supply current - DC signal	$V_I = V_{CCI}$ (ISO7763); $V_I = 0\text{ V}$ (ISO7763 with F suffix)		$I_{CC1}, I_{CC2}$		2.4	4.6	mA
			$I_{CC1}, I_{CC2}$		5.7	8.4	
Supply current - AC signal	All channels switching with square wave clock input; $C_L = 15\text{ pF}$	1 Mbps	$I_{CC1}, I_{CC2}$		4.2	6.6	
		10 Mbps	$I_{CC1}, I_{CC2}$		5.2	8.1	
		100 Mbps	$I_{CC1}, I_{CC2}$		16	21.9	

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



### 5.13 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 <a href="#">6-1</a>	$V_{CCO}^{(1)} - 0.2$	2.45		V
$V_{OL}$	Low-level output voltage	$I_{OL} = 1\text{ mA}$ ; See <a href="#">6-1</a>		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			10	$\mu\text{A}$
$I_{IL}$	Low-level input current	$V_{IL} = 0\text{ V}$ at INx	-10			$\mu\text{A}$
CMTI	Common mode transient immunity	$V_I = V_{CC}$ or $0\text{ V}$ , $V_{CM} = 1200\text{ V}$ ; See <a href="#">6-3</a>	85	100		kV/us

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

### 5.14 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	
<b>ISO7760</b>							
Supply current - DC signal	$V_I = V_{CC1}$ (ISO7760); $V_I = 0\text{ V}$ (ISO7760 with F suffix)	$I_{CC1}$		1.6	2.9	mA	
		$I_{CC2}$		3	5.2		
	$V_I = 0\text{ V}$ (ISO7760); $V_I = V_{CC1}$ (ISO7760 with F suffix)	$I_{CC1}$		8	11.6		
		$I_{CC2}$		3.3	5.7		
Supply current - AC signal	All channels switching with square wave clock input; $C_L = 15\text{ pF}$	1 Mbps	$I_{CC1}$		4.9		6.4
			$I_{CC2}$		3.4		5.7
		10 Mbps	$I_{CC1}$		5		6.5
			$I_{CC2}$		4.9		7.7
		100 Mbps	$I_{CC1}$		6	7.7	
			$I_{CC2}$		20.3	27.9	
<b>ISO7761</b>							
Supply current - DC signal	$V_I = V_{CCI}^{(1)}$ (ISO7761); $V_I = 0\text{ V}$ (ISO7761 with F suffix)	$I_{CC1}$		1.8	3.4	mA	
		$I_{CC2}$		2.9	5.3		
	$V_I = 0\text{ V}$ (ISO7761); $V_I = V_{CCI}$ (ISO7761 with F suffix)	$I_{CC1}$		7.2	10.3		
		$I_{CC2}$		4.2	6.8		
Supply current - AC signal	All channels switching with square wave clock input; $C_L = 15\text{ pF}$	1 Mbps	$I_{CC1}$		4.6		6.5
			$I_{CC2}$		3.7		6.3
		10 Mbps	$I_{CC1}$		4.9		7.2
			$I_{CC2}$		5		7.9
		100 Mbps	$I_{CC1}$		8.3	11.2	
			$I_{CC2}$		18.1	24.6	
<b>ISO7762</b>							

**ISO7760, ISO7761, ISO7762, ISO7763**

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

PARAMETER	TEST CONDITIONS	SUPPLY CURRENT	MIN	TYP	MAX	UNIT
Supply current - DC signal	$V_I = V_{CC1}$ (ISO7762); $V_I = 0\text{ V}$ (ISO7762 with F suffix)	$I_{CC1}$		2.1	4	mA
		$I_{CC2}$		2.6	4.8	
	$V_I = 0\text{ V}$ (ISO7762); $V_I = V_{CC1}$ (ISO7762 with F suffix)	$I_{CC1}$		6.5	9.6	
		$I_{CC2}$		4.9	7.4	
Supply current - AC signal	All channels switching with square wave clock input; $C_L = 15\text{ pF}$	1 Mbps	$I_{CC1}$		4.4	6.5
			$I_{CC2}$		3.9	6.3
		10 Mbps	$I_{CC1}$		5	7.2
			$I_{CC2}$		5	7.6
		100 Mbps	$I_{CC1}$		10.9	14.4
			$I_{CC2}$		15.6	21.3
<b>ISO7763</b>						
Supply current - DC signal	$V_I = V_{CC1}$ (ISO7763); $V_I = 0\text{ V}$ (ISO7763 with F suffix)	$I_{CC1}, I_{CC2}$		2.3	4.6	mA
		$I_{CC1}, I_{CC2}$		5.7	8.4	
Supply current - AC signal	All channels switching with square wave clock input; $C_L = 15\text{ pF}$	1 Mbps	$I_{CC1}, I_{CC2}$		4.1	6.6
		10 Mbps	$I_{CC1}, I_{CC2}$		4.9	7.6
		100 Mbps	$I_{CC1}, I_{CC2}$		13	18.1

 (1)  $V_{CC1} = \text{Input-side } V_{CC}$

## 5.15 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
<b>ISO776x</b>						
$t_{PLH}, t_{PHL}$	Propagation delay time	See <a href="#">6-1</a>	6	11	17	ns
PWD	Pulse width distortion <sup>(1)</sup> $ t_{PHL} - t_{PLH} $		0.4	5.9	ns	
$t_{sk(o)}$	Channel-to-channel output skew time <sup>(2)</sup>	Same-direction channels			4	ns
$t_{sk(pp)}$	Part-to-part skew time <sup>(3)</sup>				4.5	ns
$t_r$	Output signal rise time	See <a href="#">6-1</a>		1.1	3.9	ns
$t_f$	Output signal fall time		1.4	3.9	ns	
$t_{DO}$	Default output delay time from input power loss	Measured from the time $V_{CC}$ goes below 1.7V. See <a href="#">6-2</a>		0.2	0.3	$\mu\text{s}$
$t_{ie}$	Time interval error	$2^{16} - 1$ PRBS data at 100 Mbps		1.3		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.

## 5.16 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
<b>ISO776x</b>						
$t_{PLH}, t_{PHL}$	Propagation delay time	See <a href="#">6-1</a>	6	12	18.5	ns
PWD	Pulse width distortion <sup>(1)</sup> $ t_{PHL} - t_{PLH} $			0.5	5.9	ns
$t_{sk(o)}$	Channel-to-channel output skew time <sup>(2)</sup>	Same-direction channels			4.4	ns
$t_{sk(pp)}$	Part-to-part skew time <sup>(3)</sup>				5	ns
$t_r$	Output signal rise time	See <a href="#">6-1</a>		1	3	ns
$t_f$	Output signal fall time			1	3	ns
$t_{DO}$	Default output delay time from input power loss	Measured from the time $V_{CC}$ goes below 1.7V. See <a href="#">6-2</a>		0.2	0.3	$\mu\text{s}$
$t_{ie}$	Time interval error	$2^{16} - 1$ PRBS data at 100 Mbps		1.3		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.

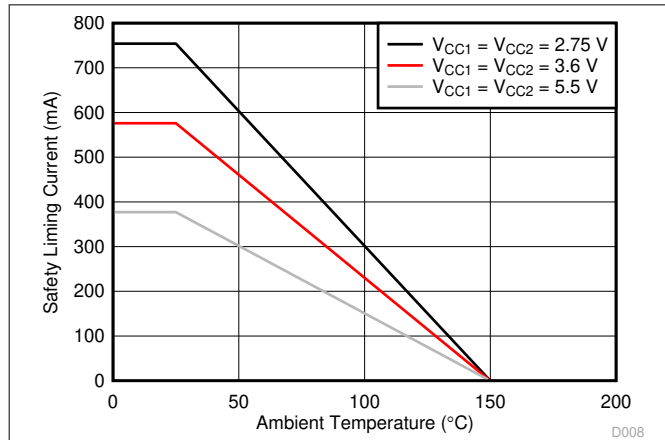
## 5.17 Switching Characteristics—2.5-V Supply

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

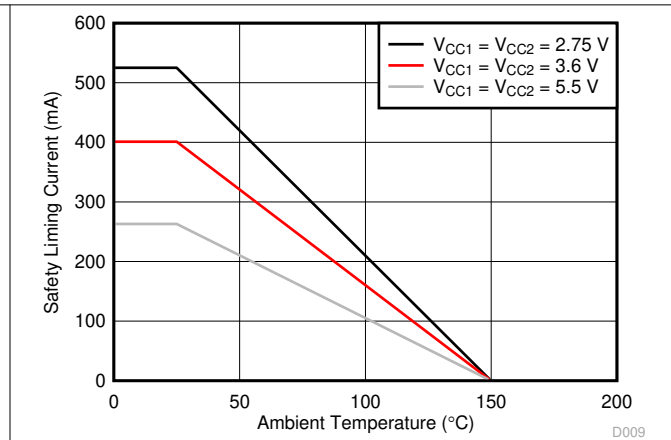
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>ISO776x</b>						
$t_{PLH}, t_{PHL}$	Propagation delay time	See <a href="#">6-1</a>	7.5	13	21	ns
PWD	Pulse width distortion <sup>(1)</sup> $ t_{PHL} - t_{PLH} $		0.6	5.9	ns	
$t_{sk(o)}$	Channel-to-channel output skew time <sup>(2)</sup>	Same-direction channels			4.4	ns
$t_{sk(pp)}$	Part-to-part skew time <sup>(3)</sup>				5.3	ns
$t_r$	Output signal rise time	See <a href="#">6-1</a>		1	3.5	ns
$t_f$	Output signal fall time		1	3.5	ns	
$t_{DO}$	Default output delay time from input power loss	Measured from the time $V_{CC}$ goes below 1.7V. See <a href="#">6-2</a>		0.1	0.3	$\mu\text{s}$
$t_{ie}$	Time interval error	$2^{16} - 1$ PRBS data at 100 Mbps		1.3		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.

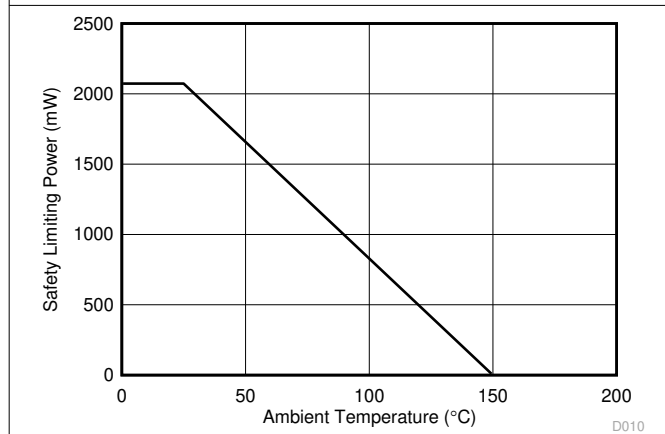
## 5.18 Insulation Characteristics Curves



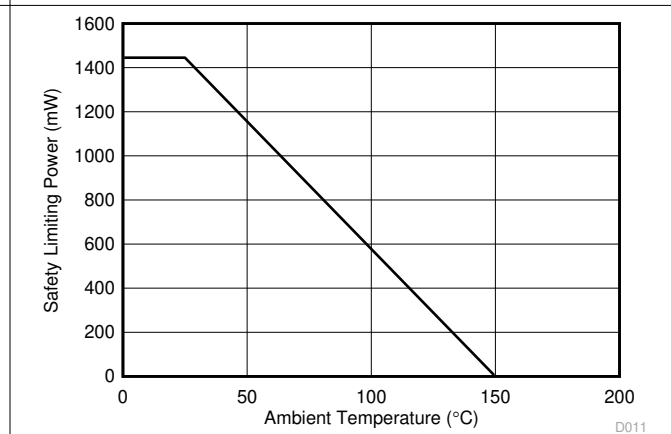
**5-1. Thermal Derating Curve for Limiting Current per VDE for DW-16 Package**



**5-2. Thermal Derating Curve for Limiting Current per VDE for DBQ-16 Package**

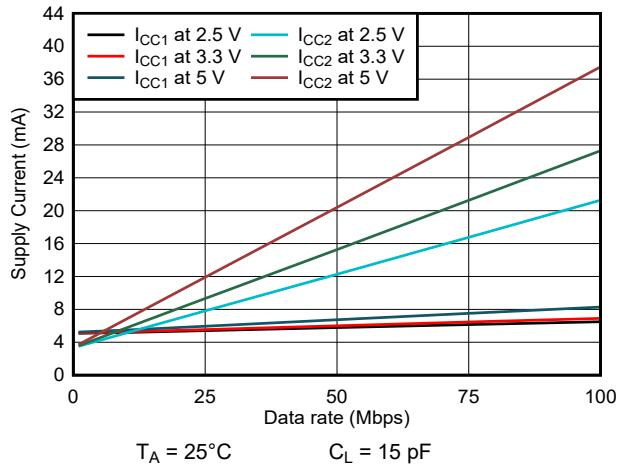


**5-3. Thermal Derating Curve for Limiting Power per VDE for DW-16 Package**

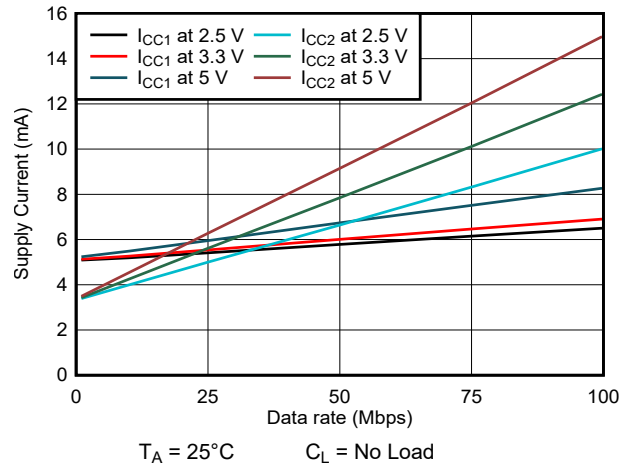


**5-4. Thermal Derating Curve for Limiting Power per VDE for DBQ-16 Package**

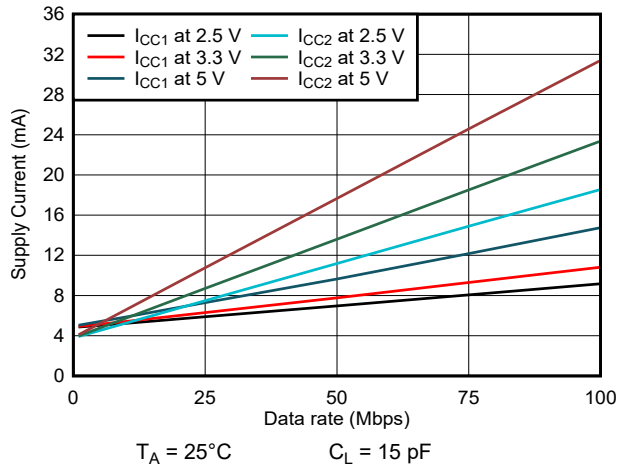
### 5.19 Typical Characteristics



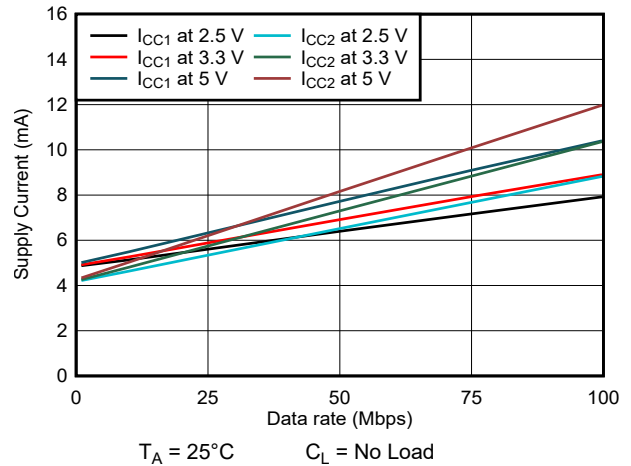
5-5. ISO7760 Supply Current vs Data Rate (With 15-pF Load)



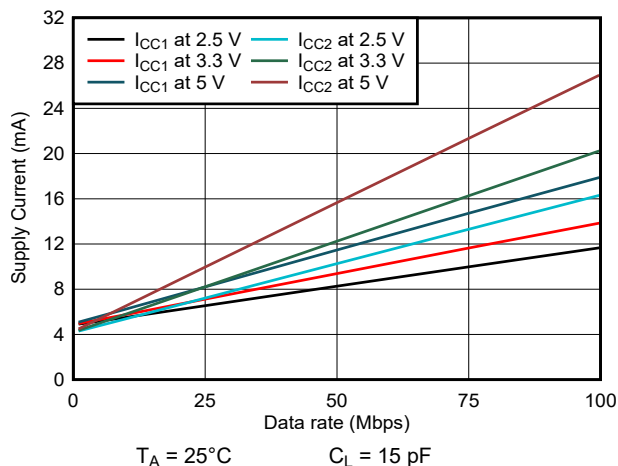
5-6. ISO7760 Supply Current vs Data Rate (With No Load)



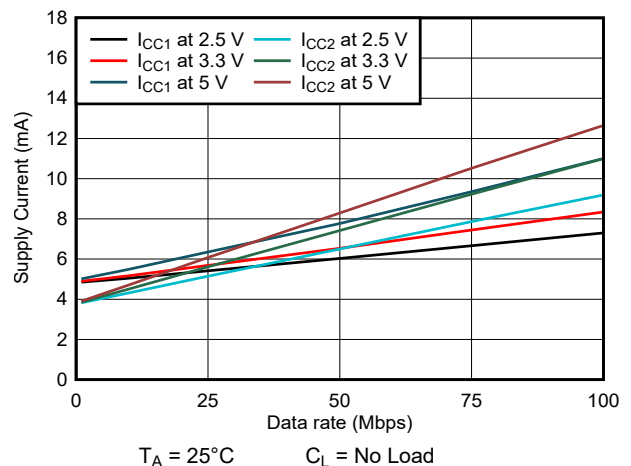
5-7. ISO7761 Supply Current vs Data Rate (With 15-pF Load)



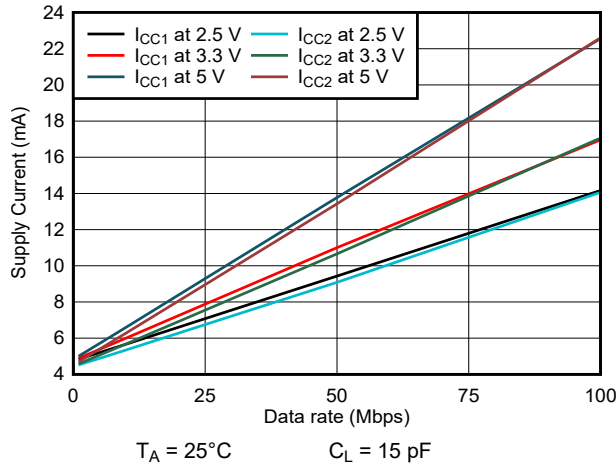
5-8. ISO7761 Supply Current vs Data Rate (With No Load)



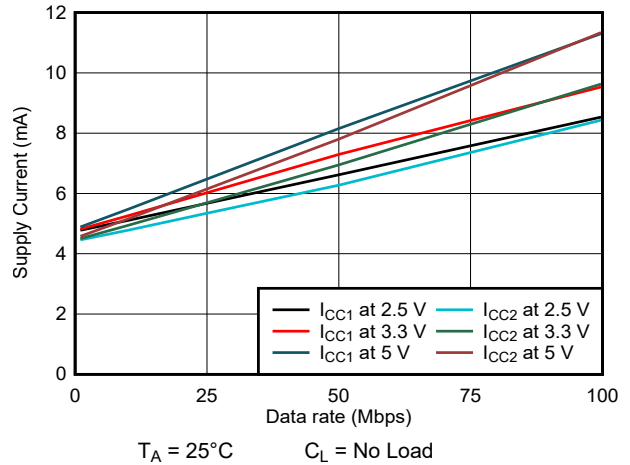
5-9. ISO7762 Supply Current vs Data Rate (With 15-pF Load)



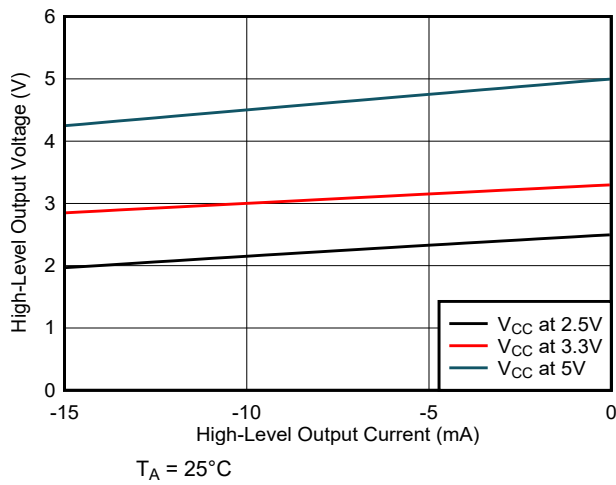
5-10. ISO7762 Supply Current vs Data Rate (With No Load)



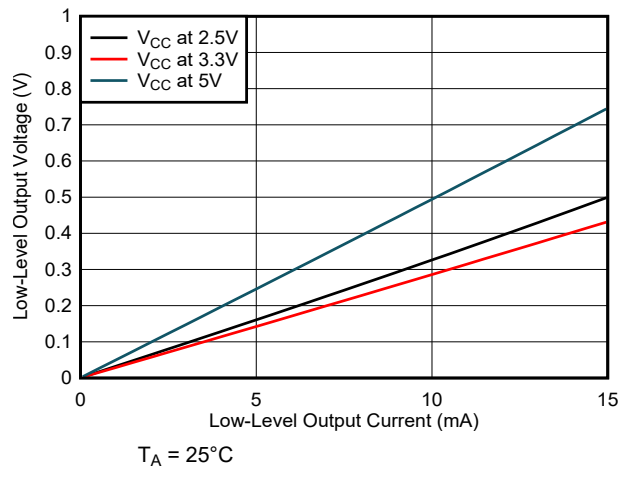
5-11. ISO7763 Supply Current vs Data Rate (With 15-pF Load)



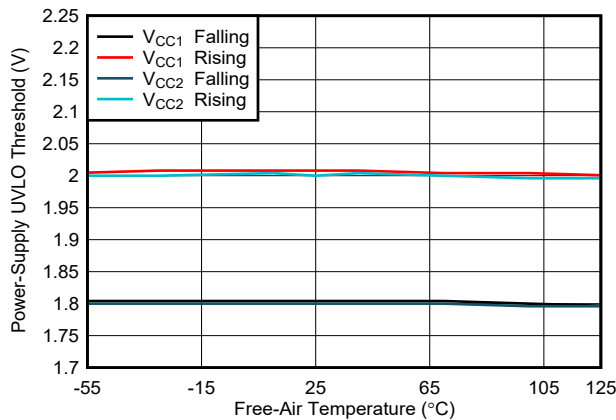
5-12. ISO7763 Supply Current vs Data Rate (With No Load)



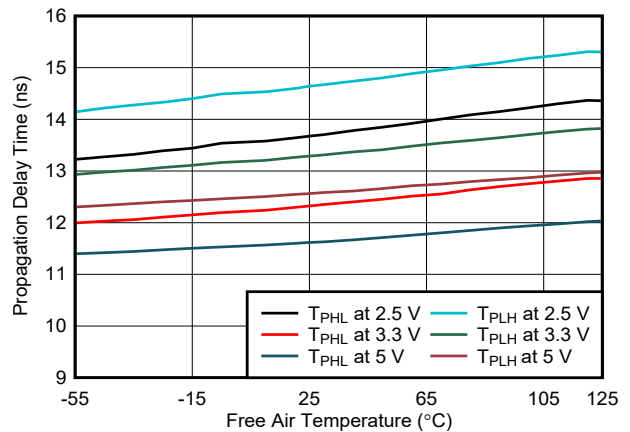
5-13. High-Level Output Voltage vs High-Level Output Current



5-14. Low-Level Output Voltage vs Low-Level Output Current

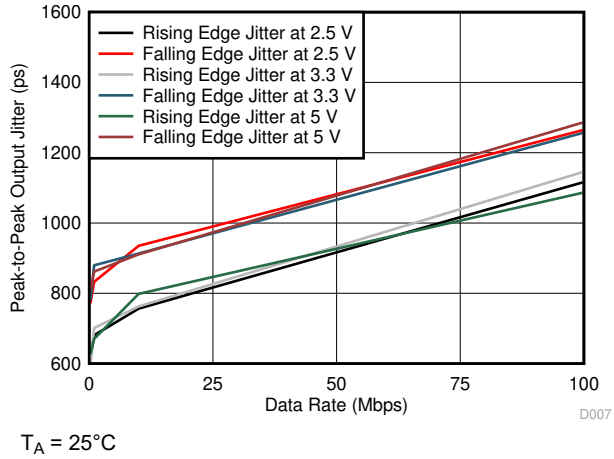


5-15. Power Supply Undervoltage Threshold vs Free-Air Temperature



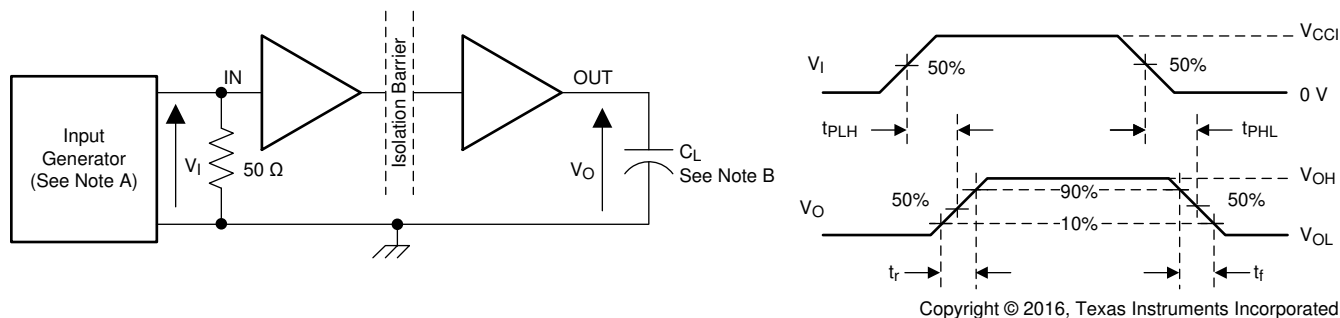
5-16. Propagation Delay Time vs Free-Air Temperature





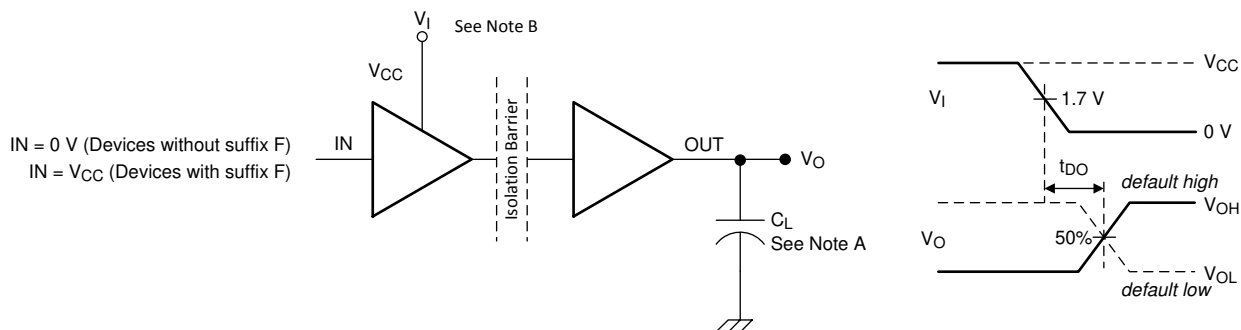
**5-17. Peak-to-Peak Output Jitter vs Data Rate**

## 6 Parameter Measurement Information



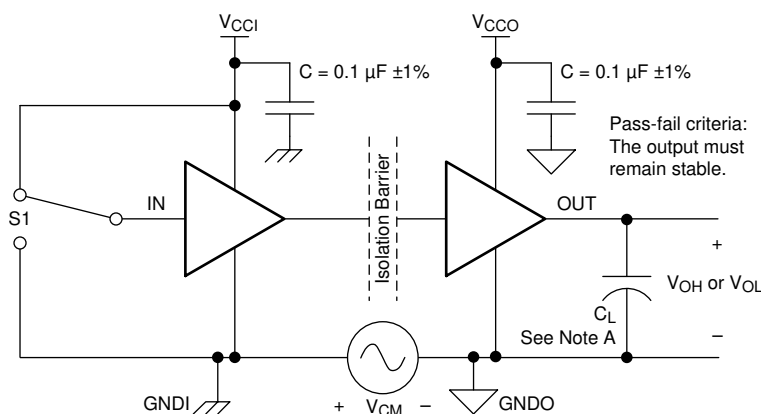
- A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 50 kHz, 50% duty cycle,  $t_r \leq 3$  ns,  $t_f \leq 3$  ns,  $Z_O = 50 \Omega$ . At the input, a 50- $\Omega$  resistor is required to terminate Input Generator signal. It is not needed in actual application.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

**6-1. Switching Characteristics Test Circuit and Voltage Waveforms**



- A.  $C_L = 15$  pF and includes instrumentation and fixture capacitance within  $\pm 20\%$ .
- B. Power-supply ramp rate = 10 mV/ns

**6-2. Default Output Delay Time Test Circuit and Voltage Waveforms**



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

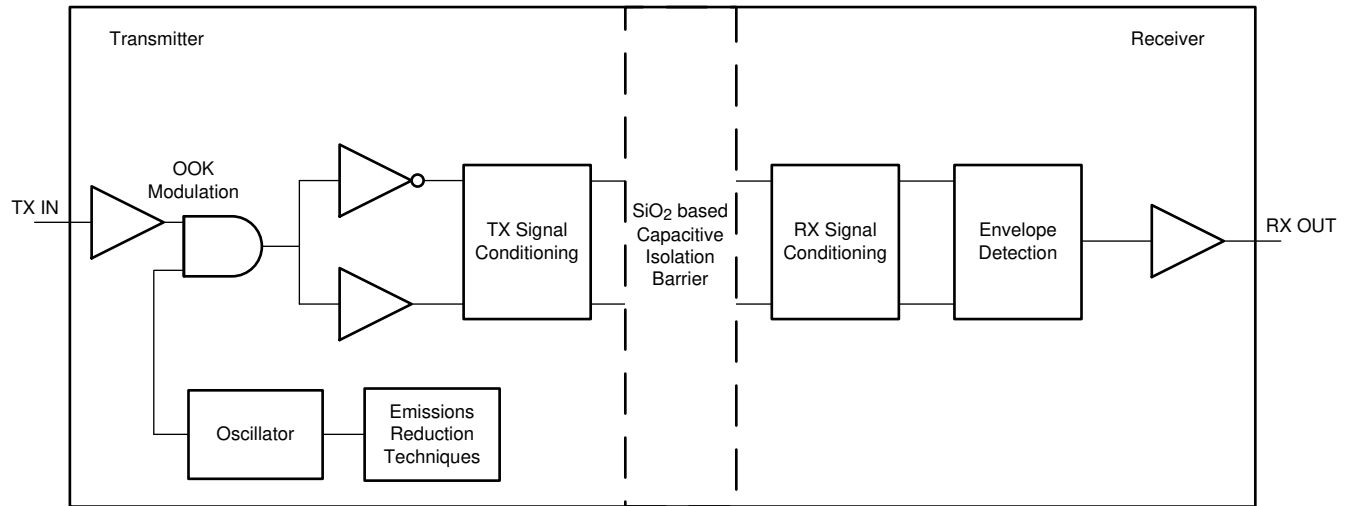
**6-3. Common-Mode Transient Immunity Test Circuit**

## 7 Detailed Description

### 7.1 Overview

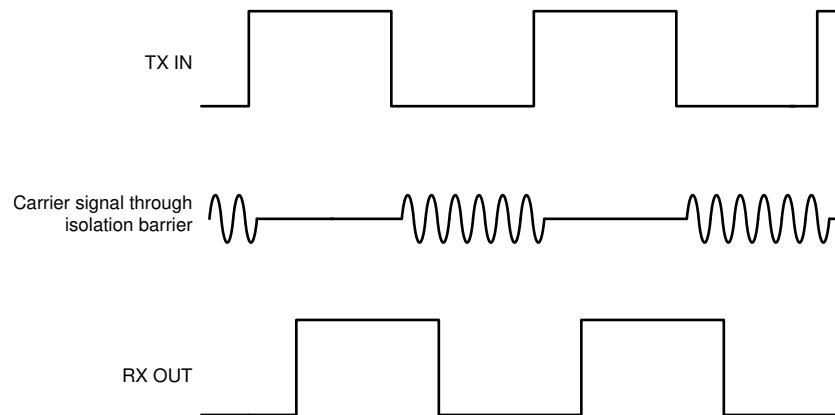
The ISO776x family of devices uses an ON-OFF keying (OOK) modulation scheme to transmit the digital data across a silicon-dioxide based isolation barrier. The transmitter sends a high-frequency carrier across the barrier to represent one digital state and sends no signal to represent the other digital state. The receiver demodulates the signal after advanced signal conditioning and produces the output through a buffer stage. The ISO776x family of devices also incorporates advanced circuit techniques to maximize the CMTI performance and minimize the radiated emissions because of the high-frequency carrier and IO buffer switching. The conceptual block diagram of a digital capacitive isolator, [Figure 7-1](#), shows a functional block diagram of a typical channel. [Figure 7-2](#) shows a conceptual detail of how the ON-OFF keying scheme works.

### 7.2 Functional Block Diagram



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**Figure 7-1. Conceptual Block Diagram of a Digital Capacitive Isolator**



**Figure 7-2. ON-OFF Keying (OOK) Based Modulation Scheme**

## 7.3 Feature Description

表 7-1 lists the device features.

表 7-1. Device Features

PART NUMBER	CHANNEL DIRECTION	MAXIMUM DATA RATE	DEFAULT OUTPUT	PACKAGE	RATED ISOLATION <sup>(1)</sup>
ISO7760	6 Forward, 0 Reverse	100 Mbps	High	DW-16	5000 V <sub>RMS</sub> / 8000 V <sub>PK</sub>
				DBQ-16	3000 V <sub>RMS</sub> / 4242 V <sub>PK</sub>
ISO7760 with F suffix	6 Forward, 0 Reverse	100 Mbps	Low	DW-16	5000 V <sub>RMS</sub> / 8000 V <sub>PK</sub>
				DBQ-16	3000 V <sub>RMS</sub> / 4242 V <sub>PK</sub>
ISO7761	5 Forward, 1 Reverse	100 Mbps	High	DW-16	5000 V <sub>RMS</sub> / 7071 V <sub>PK</sub>
				DBQ-16	3000 V <sub>RMS</sub> / 4242 V <sub>PK</sub>
ISO7761 with F suffix	5 Forward, 1 Reverse	100 Mbps	Low	DW-16	5000 V <sub>RMS</sub> / 7071 V <sub>PK</sub>
				DBQ-16	3000 V <sub>RMS</sub> / 4242 V <sub>PK</sub>
ISO7762	4 Forward, 2 Reverse	100 Mbps	High	DW-16	5000 V <sub>RMS</sub> / 7071 V <sub>PK</sub>
				DBQ-16	3000 V <sub>RMS</sub> / 4242 V <sub>PK</sub>
ISO7762 with F suffix	4 Forward, 2 Reverse	100 Mbps	Low	DW-16	5000 V <sub>RMS</sub> / 7071 V <sub>PK</sub>
				DBQ-16	3000 V <sub>RMS</sub> / 4242 V <sub>PK</sub>
ISO7763	3 Forward, 3 Reverse	100 Mbps	High	DW-16	5000 V <sub>RMS</sub> / 7071 V <sub>PK</sub>
				DBQ-16	3000 V <sub>RMS</sub> / 4242 V <sub>PK</sub>
ISO7763 with F suffix	3 Forward, 3 Reverse	100 Mbps	Low	DW-16	5000 V <sub>RMS</sub> / 7071 V <sub>PK</sub>
				DBQ-16	3000 V <sub>RMS</sub> / 4242 V <sub>PK</sub>

(1) See [セクション 5.7](#) for detailed isolation ratings.

### 7.3.1 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 ISO776x family of devices incorporates many chip-level design improvements for overall system robustness. Some of these improvements include:

- Robust ESD protection 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.

## 7.4 Device Functional Modes

表 7-2 lists the functional modes for the ISO776x.

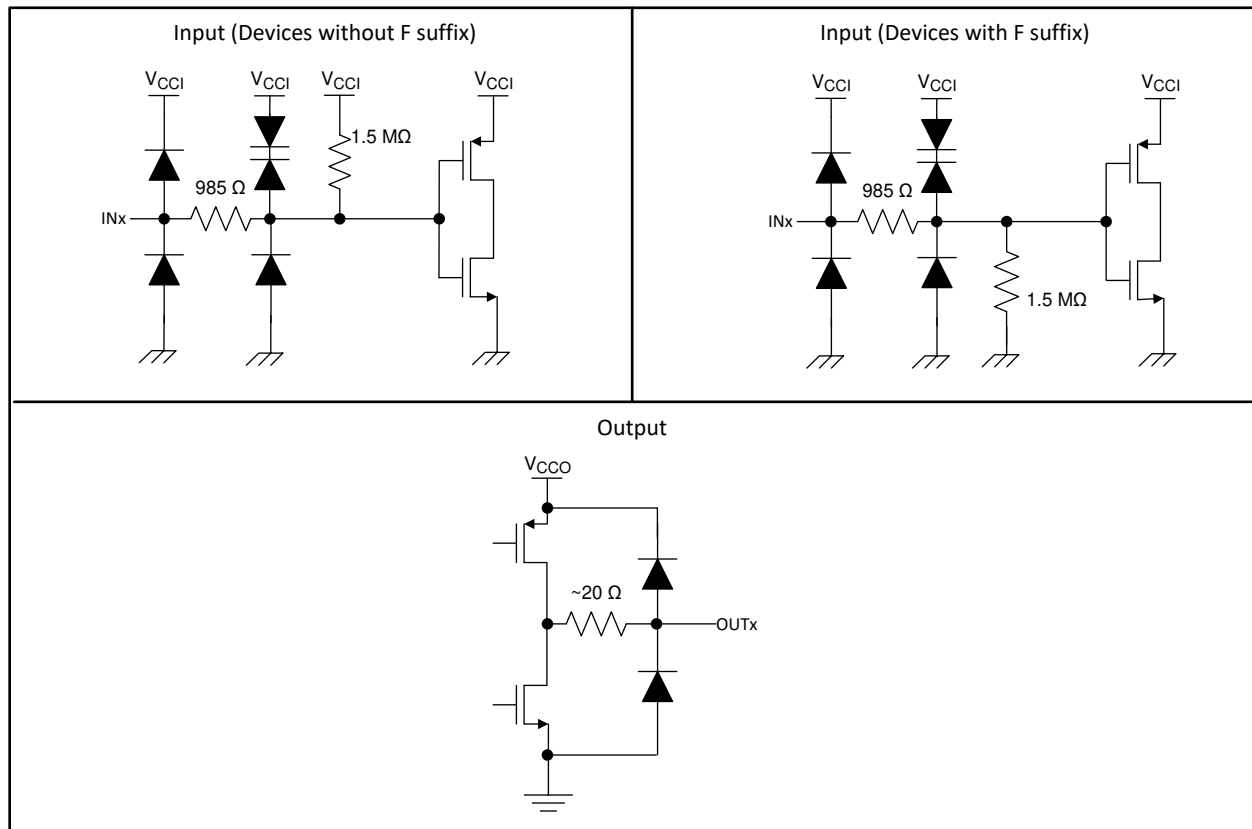
表 7-2. Function Table

V <sub>CC1</sub>	V <sub>CC0</sub>	INPUT (IN <sub>x</sub> ) <sup>(2)</sup>	OUTPUT (OUT <sub>x</sub> )	COMMENTS
PU	PU	H	H	Normal Operation: A channel output assumes the logic state of the input.
		L	L	
		Open	Default	Default mode: When IN <sub>x</sub> is open, the corresponding channel output goes to its default logic state. Default is <i>High</i> for ISO776x and <i>Low</i> for ISO776x with F suffix.
PD	PU	X	Default	Default mode: When V <sub>CC1</sub> is unpowered, a channel output assumes the logic state based on the selected default option. Default is <i>High</i> for ISO776x and <i>Low</i> for ISO776x with F suffix. When V <sub>CC1</sub> transitions from unpowered to powered-up, a channel output assumes the logic state of its input. When V <sub>CC1</sub> transitions from powered-up to unpowered, channel output assumes the selected default state.
X	PD	X	Undetermined	When V <sub>CC0</sub> is unpowered, a channel output is undetermined <sup>(1)</sup> . When V <sub>CC0</sub> transitions from unpowered to powered-up, a channel output assumes the logic state of the input

(1) The outputs are in undetermined state when  $1.7\text{ V} < V_{CC1}$ ,  $V_{CC0} < 2.25\text{ V}$ .

(2) A strongly driven input signal can weakly power the floating V<sub>CC</sub> via an internal protection diode and cause undetermined output.

### 7.4.1 Device I/O Schematics



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図 7-3. Device I/O Schematics

## 8 Application and Implementation

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### 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.

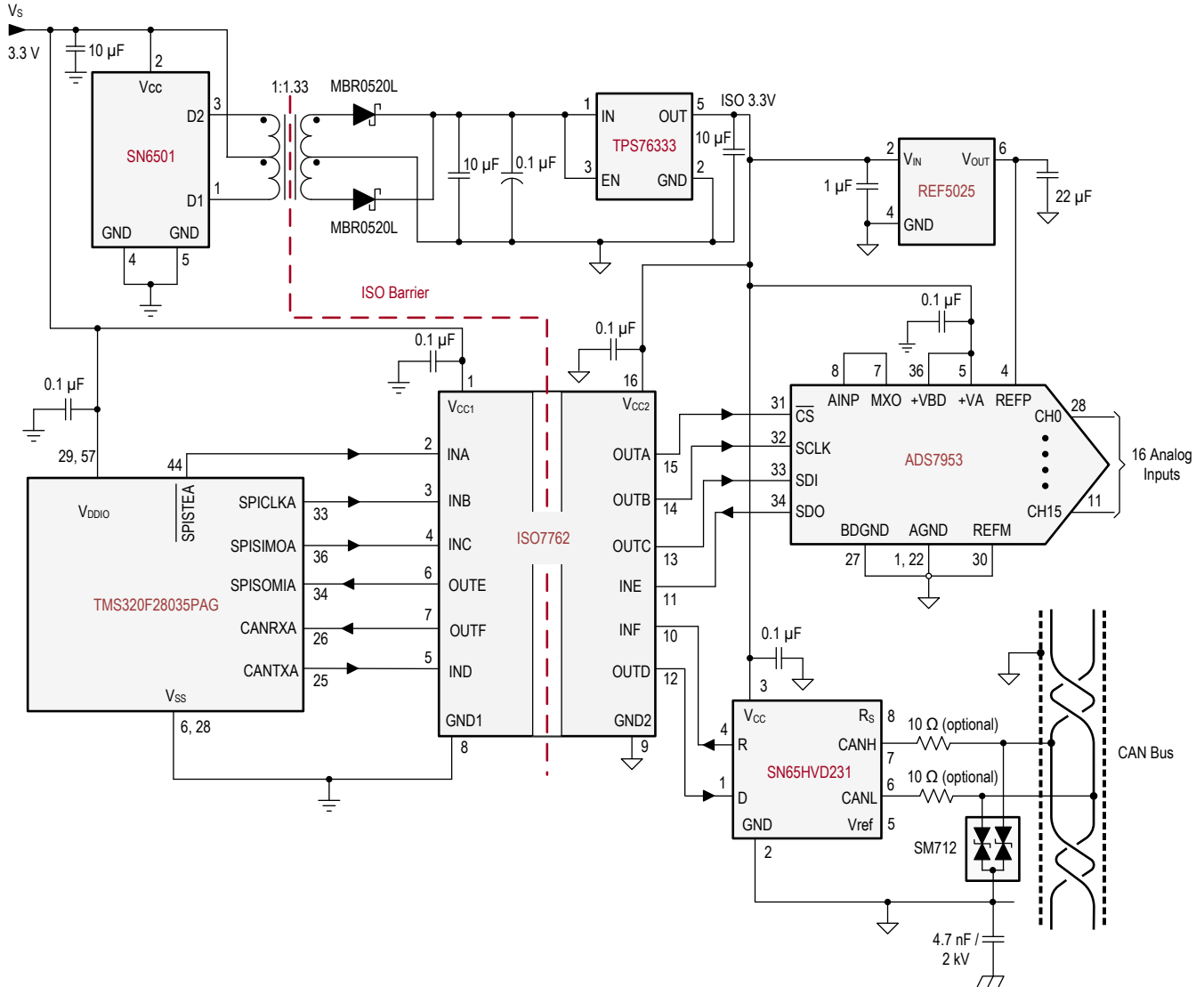
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### 8.1 Application Information

The ISO776x family of devices is a high-performance, six-channel digital isolators. The ISO776x family of devices uses 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,  $\mu$ C or UART), and a data converter or a line transceiver, regardless of the interface type or standard.

### 8.2 Typical Application

☒ 8-1 shows the isolated serial-peripheral interface (SPI) and controller-area network (CAN) interface implementation.



Multiple pins and discrete components omitted for clarity purpose.

### 8-1. Isolated SPI and CAN Interface

#### 8.2.1 Design Requirements

For this design example, use the parameters listed in 表 8-1.

表 8-1. 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 $\mu$ F
Decoupling capacitor from $V_{CC2}$ and GND2	0.1 $\mu$ F

#### 8.2.2 Detailed Design Procedure

Unlike optocouplers, which require external components to improve performance, provide bias, or limit current, the ISO776x family of devices only requires two external bypass capacitors to operate.

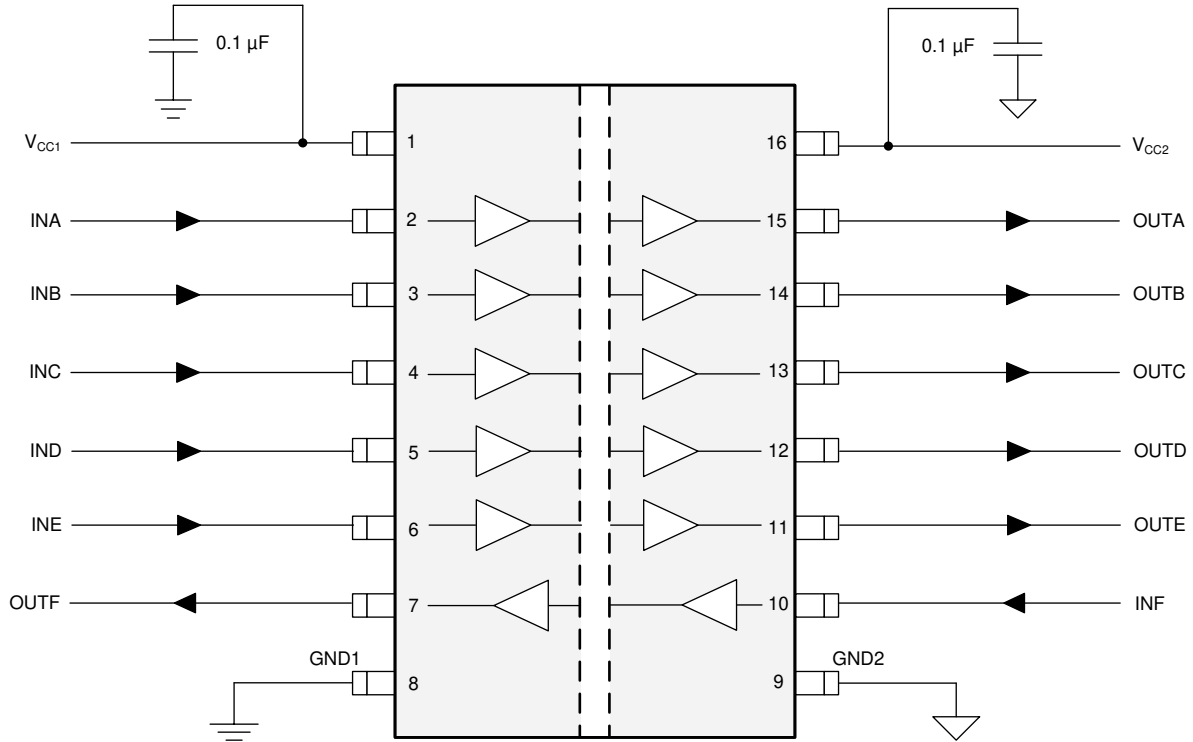
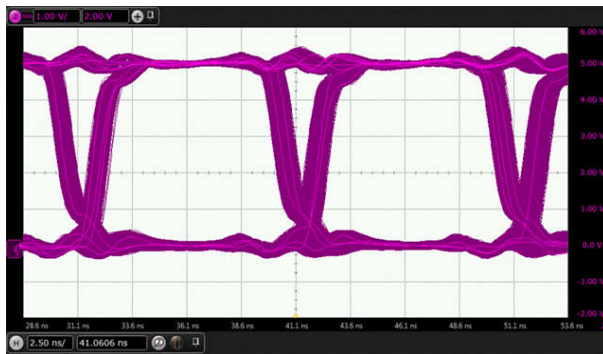



图 8-2. Typical ISO7761 Circuit Hook-up

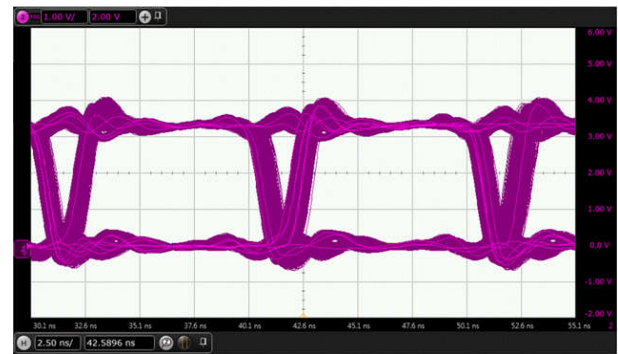



### 8.2.3 Application Curves

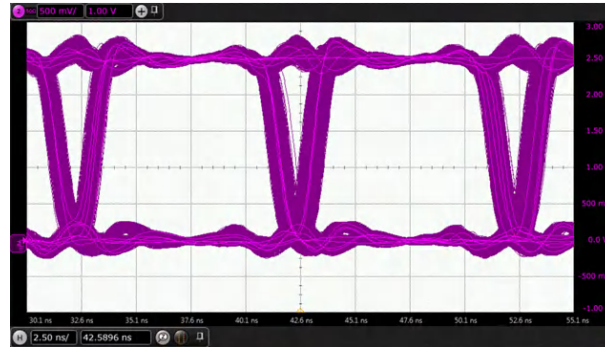
The typical eye diagram of the ISO776x family of devices indicates low jitter and a wide open eye at the maximum data rate of 100 Mbps.




**8-3. Eye Diagram at 100 Mbps PRBS  $2^{16} - 1$  Data, 5 V and 25°C**






**8-4. Eye Diagram at 100 Mbps PRBS  $2^{16} - 1$  Data, 3.3 V and 25°C**

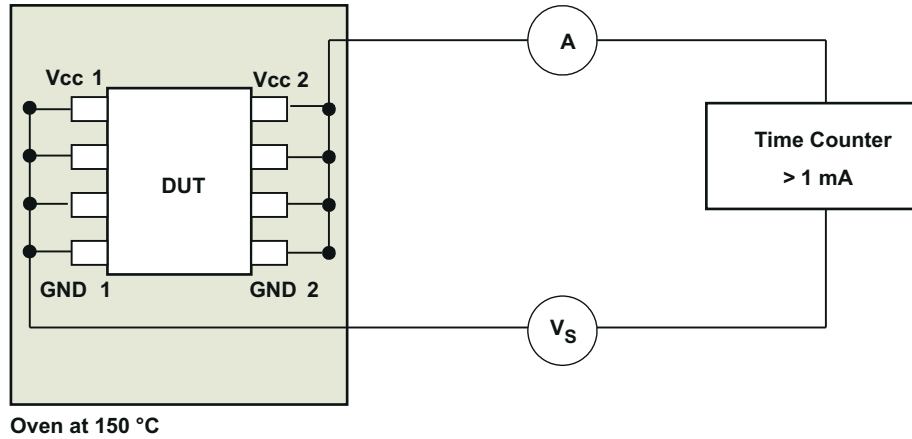



**8-5. Eye Diagram at 100 Mbps PRBS  $2^{16} - 1$  Data, 2.5 V and 25°C**

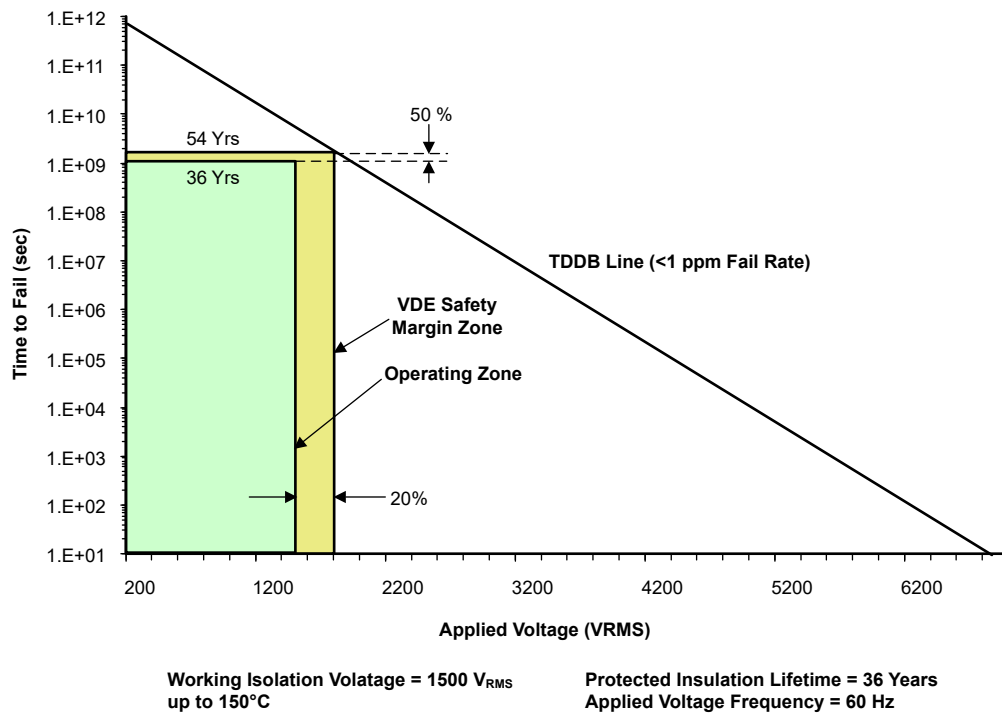
#### 8.2.3.1 Insulation Lifetime

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  8-6 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.

 8-7 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<sub>RMS</sub> 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 up to 1500 V<sub>RMS</sub> and DBQ-16 package up to 400 V<sub>RMS</sub>. At the lower working voltages, the corresponding insulation lifetime is much longer than 36 years.



8-6. Test Setup for Insulation Lifetime Measurement



8-7. Insulation Lifetime Projection Data

## 9 Power Supply Recommendations

To help ensure reliable operation at data rates and supply voltages, a 0.1- $\mu F$  bypass capacitor is recommended at 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 [SN6505](#). 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 the [SN6505 Low-Noise 1-A Transformer Drivers for Isolated Power Supplies data sheet](#).

## 10 Layout

### 10.1 Layout Guidelines

A minimum of four layers is required to accomplish a low EMI PCB design (see [Figure 10-1](#)). 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/inch<sup>2</sup>.
- 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.

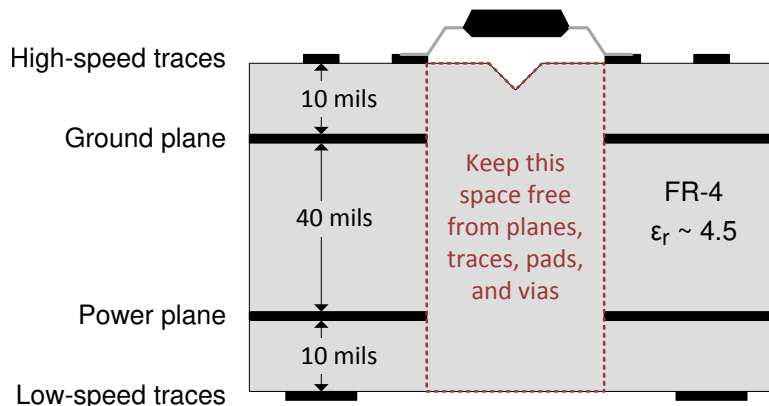
If an additional supply voltage plane or signal layer is needed, add a second power or ground plane system to the stack to keep it symmetrical. This makes the stack mechanically stable and prevents it from warping. Also the power and ground plane of each power system can be placed closer together, thus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

For detailed layout recommendations, see the [Digital Isolator Design Guide application report](#).

#### 10.1.1 PCB Material

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

#### 10.2 Layout Example



**Figure 10-1. Layout Example Schematic**

## 11 Device and Documentation Support

### 11.1 Documentation Support

#### 11.1.1 Related Documentation

For related documentation see the following:

- Texas Instruments, [Digital Isolator Design Guide application report](#)
- Texas Instruments, [How to use isolation to improve ESD, EFT and Surge immunity in industrial systems application report](#)
- Texas Instruments, [Isolation Glossary](#)
- Texas Instruments, [TMS320F2803xPiccolo™ Microcontrollers data sheet](#)
- Texas Instruments, [ADS79xx 12/10/8-Bit, 1 MSPS, 16/12/8/4-Channel, Single-Ended, MicroPower, Serial Interface ADCs data sheet](#)
- Texas Instruments, [REF50xx Low-Noise, Very Low Drift, Precision Voltage Reference data sheet](#)
- Texas Instruments, [SN6501 Transformer Driver for Isolated Power Supplies data sheet](#)
- Texas Instruments, [SN65HVD23x 3.3-V CAN Bus Transceivers data sheet](#)
- Texas Instruments, [TPS76333 Low-Power 150-mA Low-Dropout Linear Regulators data sheet](#)

#### 11.2 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.

### 11.3 Community Resources

#### 11.4 Trademarks


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## 12 Revision History

資料番号末尾の英字は改訂を表しています。その改訂履歴は英語版に準じています。

Changes from Revision G (June 2023) to Revision H (January 2024)	Page
ドキュメント全体にわたって表、図、相互参照の採番方法を更新.....	1
Updated Thermal Characteristics, Safety Limiting Values, and Thermal Derating Curves to provide more accurate system-level thermal calculations.....	6
Updated electrical and switching characteristics to match device performance.....	6

Changes from Revision F (November 2022) to Revision G (June 2023)	Page
標準名を次のように変更:「DIN V VDE V 0884-11:2017-01」から次のものに変更:「DIN EN IEC 60747-17 (VDE 0884-17)」(ドキュメント全体を通して).....	1
ドキュメント全体を通して、IEC/EN/CSA 60950-1 規格への参照を削除.....	1
ドキュメント全体を通して、すべての標準名から標準リビジョンおよび年への参照を削除.....	1
Added Maximum impulse voltage ( $V_{IMP}$ ) 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 maximum working voltage value From: 250 $V_{RMS}$ To: 400 $V_{RMS}$ for DBQ-16 devices per GB 4943.1.....	11
Changed working voltage lifetime margin from: 87.5% to: 50%, minimum required insulation lifetime from: 37.5 years to: 30 years and insulation lifetime per TDDb from: 135 years to: 169 years per DIN EN IEC 60747-17 (VDE 0884-17).....	33

- Changed  8-7 per DIN EN IEC 60747-17 (VDE 0884-17)..... 33



**Changes from Revision E (February 2019) to Revision F (November 2022) Page**

- 文書全体にわたって表、図、相互参照の採番方法を更新..... 1

**Changes from Revision D (November 2018) to Revision E (February 2019) Page**

- Changed CPG parameter description from "External clearance" to "External creepage"..... 9

**Changes from Revision C (January 2018) to Revision D (November 2018) Page**

- ドキュメント全体を通して編集上および体裁上の変更..... 1
- 次のように変更:「絶縁バリアの寿命:40 年超」を「推定寿命:100 年超」に変更 (セクション 1)..... 1
- セクション 1 に「最大 5000V<sub>RMS</sub> の絶縁定格」を追加..... 1
- セクション 1 に「最大 12.8kV のサージ能力」を追加 ..... 1
- セクション 1 に「絶縁バリアの両側で ±8kV の IEC 61000-4-2 接触放電保護」を追加..... 1
- 「車載用バージョンを利用可能:ISO776x-Q1」(セクション 1) を追加..... 1
- ドキュメント全体を通して「認定計画中」の表記を削除..... 1
- セクション 2 の一覧を更新..... 1
-  3-1 を変更して直列絶縁コンデンサを表示..... 1
- Added table note to Data rate specification..... 7
- Changed V<sub>IO<sub>RM</sub></sub> value for DW-16 package from "1414 V<sub>PK</sub>" to "2121 V<sub>PK</sub>" ..... 9
- Changed V<sub>IO<sub>WM</sub></sub> values for DW-16 package from "1000 V<sub>RMS</sub>" and "1414 V<sub>DC</sub>" to "1500 V<sub>RMS</sub>" and "2121 V<sub>DC</sub>" ..... 9
- Updated certification information..... 11
- Changed From: "Table 2" To: "Safety Related Certifications" in 表 7-1 table note..... 28
- Changed  7-3 ..... 29
- Added セクション 8.2.3.1 sub-section under セクション 8.2.3 section..... 33

**Changes from Revision B (November 2017) to Revision C (January 2018) Page**

- Changed the C<sub>IO</sub> value for the DBQ package from 1.1 to 0.9 pF..... 9

**Changes from Revision A (August 2017) to Revision B (November 2017) Page**

- 「特長」および「安全関連の認定」表の CSA 認定の表現を変更 ..... 1
- DBQ-16 パッケージの絶縁電圧を 2500V<sub>RMS</sub> から 3000V<sub>RMS</sub> に変更..... 1
- Added the maximum transient isolation voltage for the DW-16 package of the ISO7761, ISO7762, and ISO7763 devices and changed the maximum value for the DBQ-16 package from 3600 to 4242 for all devices..... 9
- Changed table note and table condition of safety limiting values..... 11
- Added the supply current vs data rate graphs for the ISO7761, ISO7762, and ISO7763 in the *Typical Characteristics* section..... 23

**Changes from Revision \* (August 2017) to Revision A (August 2017) Page**

- Deleted EN from the *Common-Mode Transient Immunity Test Circuit* figure..... 26

- Changed the  $V_{CC1}$  and  $V_{CC2}$  signals in the *Typical ISO7761 Circuit Hook-up* figure..... 31
- 

### 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
ISO7760DBQ	LIFEBUY	SSOP	DBQ	16	75	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7760	
ISO7760DBQR	ACTIVE	SSOP	DBQ	16	2500	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7760	Samples
ISO7760DW	LIFEBUY	SOIC	DW	16	40	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7760	
ISO7760DWR	ACTIVE	SOIC	DW	16	2000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7760	Samples
ISO7760FDBQ	LIFEBUY	SSOP	DBQ	16	75	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7760F	
ISO7760FDBQR	ACTIVE	SSOP	DBQ	16	2500	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7760F	Samples
ISO7760FDW	LIFEBUY	SOIC	DW	16	40	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7760F	
ISO7760FDWR	ACTIVE	SOIC	DW	16	2000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7760F	Samples
ISO7761DBQ	LIFEBUY	SSOP	DBQ	16	75	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7761	
ISO7761DBQR	ACTIVE	SSOP	DBQ	16	2500	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7761	Samples
ISO7761DW	LIFEBUY	SOIC	DW	16	40	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7761	
ISO7761DWR	ACTIVE	SOIC	DW	16	2000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7761	Samples
ISO7761FDBQ	LIFEBUY	SSOP	DBQ	16	75	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7761F	
ISO7761FDBQR	ACTIVE	SSOP	DBQ	16	2500	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7761F	Samples
ISO7761FDW	LIFEBUY	SOIC	DW	16	40	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7761F	
ISO7761FDWR	ACTIVE	SOIC	DW	16	2000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7761F	Samples
ISO7762DBQ	LIFEBUY	SSOP	DBQ	16	75	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7762	
ISO7762DBQR	ACTIVE	SSOP	DBQ	16	2500	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7762	Samples
ISO7762DW	LIFEBUY	SOIC	DW	16	40	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7762	
ISO7762DWR	ACTIVE	SOIC	DW	16	2000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7762	Samples
ISO7762FDBQ	LIFEBUY	SSOP	DBQ	16	75	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7762F	
ISO7762FDBQR	ACTIVE	SSOP	DBQ	16	2500	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7762F	Samples
ISO7762FDW	LIFEBUY	SOIC	DW	16	40	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7762F	
ISO7762FDWR	ACTIVE	SOIC	DW	16	2000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7762F	Samples

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
ISO7763DBQ	LIFEBUY	SSOP	DBQ	16	75	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7763	
ISO7763DBQR	ACTIVE	SSOP	DBQ	16	2500	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7763	Samples
ISO7763DW	LIFEBUY	SOIC	DW	16	40	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7763	
ISO7763DWR	ACTIVE	SOIC	DW	16	2000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7763	Samples
ISO7763FDBQ	LIFEBUY	SSOP	DBQ	16	75	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7763F	
ISO7763FDBQR	ACTIVE	SSOP	DBQ	16	2500	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	7763F	Samples
ISO7763FDW	LIFEBUY	SOIC	DW	16	40	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7763F	
ISO7763FDWR	ACTIVE	SOIC	DW	16	2000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7763F	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 <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm 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 ISO7760, ISO7761, ISO7762, ISO7763 :**

- Automotive : [ISO7760-Q1](#), [ISO7761-Q1](#), [ISO7762-Q1](#), [ISO7763-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
ISO7760DBQR	SSOP	DBQ	16	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
ISO7760DWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7760DWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7760FDBQR	SSOP	DBQ	16	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
ISO7760FDWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7760FDWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7760FDWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7761DBQR	SSOP	DBQ	16	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
ISO7761DWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7761DWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7761FDBQR	SSOP	DBQ	16	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
ISO7761FDWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7761FDWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7762DBQR	SSOP	DBQ	16	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
ISO7762DWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7762DWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7762DWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7762FDBQR	SSOP	DBQ	16	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	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
ISO7762FDWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7762FDWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7763DBQR	SSOP	DBQ	16	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
ISO7763DWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7763DWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7763FDBQR	SSOP	DBQ	16	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
ISO7763FDWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7763FDWR	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)
ISO7760DBQR	SSOP	DBQ	16	2500	350.0	350.0	43.0
ISO7760DWR	SOIC	DW	16	2000	356.0	356.0	35.0
ISO7760DWR	SOIC	DW	16	2000	356.0	356.0	35.0
ISO7760FDBQR	SSOP	DBQ	16	2500	350.0	350.0	43.0
ISO7760FDWR	SOIC	DW	16	2000	356.0	356.0	35.0
ISO7760FDWR	SOIC	DW	16	2000	356.0	356.0	35.0
ISO7761DBQR	SSOP	DBQ	16	2500	350.0	350.0	43.0
ISO7761DWR	SOIC	DW	16	2000	356.0	356.0	35.0
ISO7761DWR	SOIC	DW	16	2000	356.0	356.0	35.0
ISO7761FDBQR	SSOP	DBQ	16	2500	350.0	350.0	43.0
ISO7761FDWR	SOIC	DW	16	2000	356.0	356.0	35.0
ISO7761FDWR	SOIC	DW	16	2000	356.0	356.0	35.0
ISO7762DBQR	SSOP	DBQ	16	2500	350.0	350.0	43.0
ISO7762DWR	SOIC	DW	16	2000	356.0	356.0	35.0
ISO7762DWR	SOIC	DW	16	2000	356.0	356.0	35.0
ISO7762FDBQR	SSOP	DBQ	16	2500	350.0	350.0	43.0
ISO7762FDWR	SOIC	DW	16	2000	356.0	356.0	35.0
ISO7762FDWR	SOIC	DW	16	2000	356.0	356.0	35.0

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Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
ISO7763DBQR	SSOP	DBQ	16	2500	350.0	350.0	43.0
ISO7763DWR	SOIC	DW	16	2000	356.0	356.0	35.0
ISO7763DWR	SOIC	DW	16	2000	356.0	356.0	35.0
ISO7763FDBQR	SSOP	DBQ	16	2500	350.0	350.0	43.0
ISO7763FDWR	SOIC	DW	16	2000	356.0	356.0	35.0
ISO7763FDWR	SOIC	DW	16	2000	356.0	356.0	35.0

**TUBE**


\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
ISO7760DBQ	DBQ	SSOP	16	75	505.46	6.76	3810	4
ISO7760DW	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7760DW	DW	SOIC	16	40	507	12.83	5080	6.6
ISO7760FDBQ	DBQ	SSOP	16	75	505.46	6.76	3810	4
ISO7760FDW	DW	SOIC	16	40	507	12.83	5080	6.6
ISO7760FDW	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7761DBQ	DBQ	SSOP	16	75	505.46	6.76	3810	4
ISO7761DW	DW	SOIC	16	40	507	12.83	5080	6.6
ISO7761DW	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7761FDBQ	DBQ	SSOP	16	75	505.46	6.76	3810	4
ISO7761FDW	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7761FDW	DW	SOIC	16	40	507	12.83	5080	6.6
ISO7762DBQ	DBQ	SSOP	16	75	505.46	6.76	3810	4
ISO7762DW	DW	SOIC	16	40	507	12.83	5080	6.6
ISO7762DW	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7762FDBQ	DBQ	SSOP	16	75	505.46	6.76	3810	4
ISO7762FDW	DW	SOIC	16	40	507	12.83	5080	6.6
ISO7762FDW	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7763DBQ	DBQ	SSOP	16	75	505.46	6.76	3810	4
ISO7763DW	DW	SOIC	16	40	507	12.83	5080	6.6
ISO7763DW	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7763FDBQ	DBQ	SSOP	16	75	505.46	6.76	3810	4
ISO7763FDW	DW	SOIC	16	40	507	12.83	5080	6.6
ISO7763FDW	DW	SOIC	16	40	506.98	12.7	4826	6.6



# 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.

## 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:

- All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
- This drawing is subject to change without notice.
- 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.
- This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm, per side.
- 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)

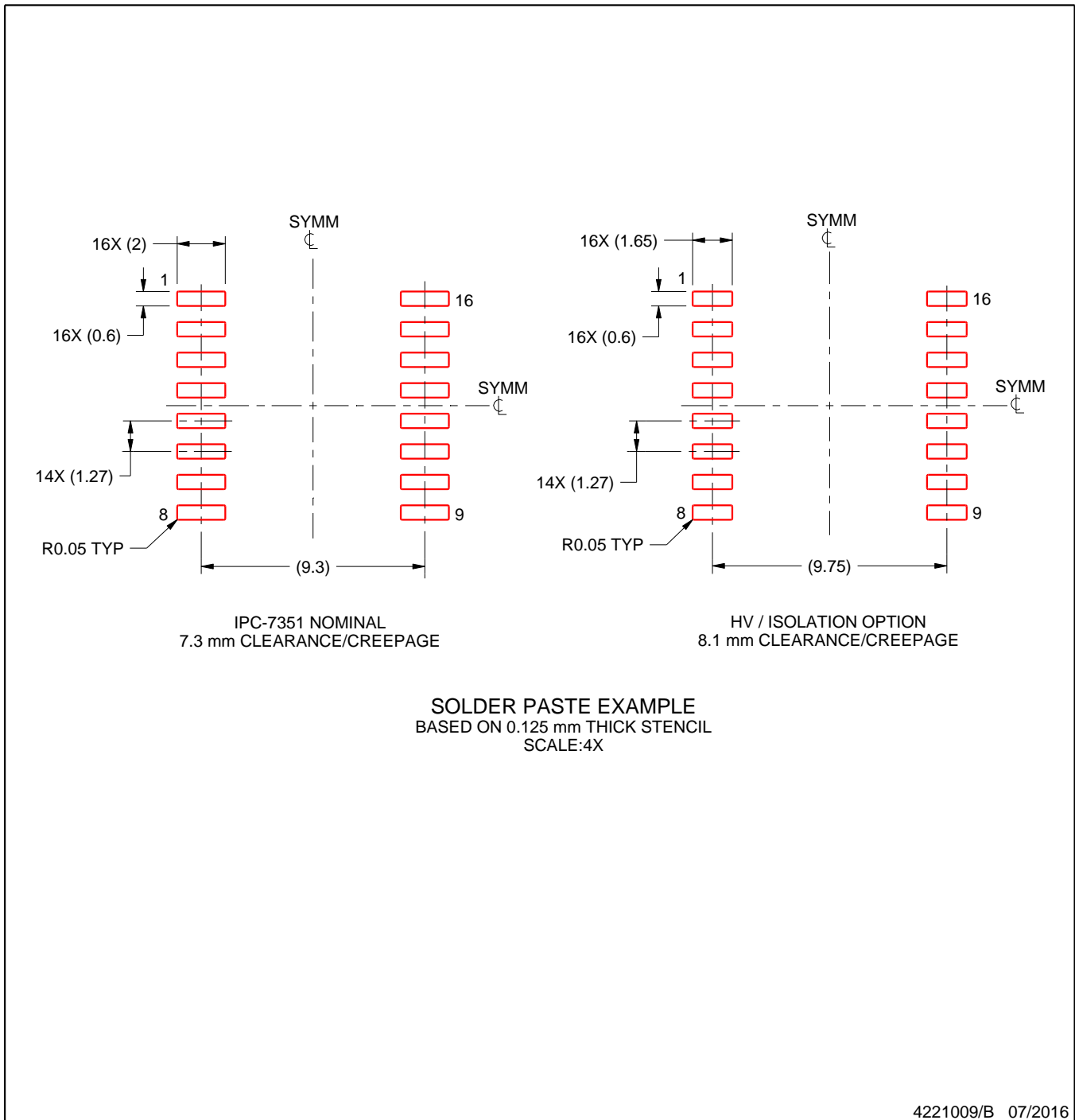
- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# 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.

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