

# ISO7841x 高性能 8000V<sub>PK</sub> 強化絶縁型クワッド チャネル デジタル アイソレータ

## 1 特長

- 信号速度: 最大 100Mbps
- 広い電源電圧範囲: 2.25V~5.5V
- 2.25V から 5.5V への電圧変換
- 広い温度範囲: -55°C~125°C
- 低い消費電力: 1Mbps でチャンネルごとに標準値 1.7mA
- 小さい伝搬遅延時間: 標準値 11ns (5V 電源)
- 業界をリードする CMTI (最小値): ±100kV/μs
- 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
- 低い放射
- 絶縁バリアの寿命: 40 年超
- ワイド ボディ SOIC-16 パッケージまたは超ワイド ボディ SOIC-16 パッケージを選択可能
- 安全および規制の認定:
  - DIN EN IEC 60747-17 (VDE 0884-17) に準拠した強化絶縁耐圧: 8000V<sub>PK</sub>
  - UL 1577 に準拠した絶縁耐圧: 5.7kV<sub>RMS</sub> (1 分間)
  - CSA Component Acceptance Notice 5A、IEC 60950-1、および IEC 60601-1 最終機器標準
  - GB4943.1 準拠の CQC 認定
  - EN 61010-1 および EN 62368-1 準拠の TUV 認定

## 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
- ソーラー インバータ
- 医療機器
- ハイブリッド電気自動車 (HEV)

## 3 概要

ISO7841x デバイスは、8000V<sub>PK</sub> の絶縁電圧を持つ高性能クワッド チャネル デジタル アイソレータです。このデバイスは、VDE、CSA、TUV、CQC に準拠した強化絶縁認証を取得しています。本アイソレータは、CMOS や LVC MOS のデジタル I/O を絶縁しながら、低消費電力で高い電磁気耐性と低い放射を実現します。各絶縁チャンネルは、二酸化ケイ素 (SiO<sub>2</sub>) の絶縁バリアで分離されたロジック入力および出力バッファを備えています。

このデバイスは複数のイネーブル ピンを備えています。これらのイネーブル ピンを使うと、マルチコントローラ駆動ア

プリケーションにおいて、各出力を高インピーダンス状態にすることで、消費電力を低減できます。ISO7841 デバイスには、3 個の順方向チャンネルと 1 個の逆方向チャンネルがあります。入力電源または信号が失われた場合のデフォルト出力は、ISO7841 デバイスでは「High」、ISO7841F デバイスでは「Low」です。詳細については、「デバイスの機能モード」セクションを参照してください。

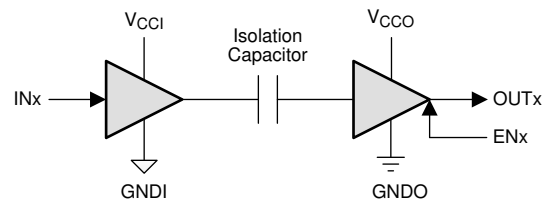
このデバイスを絶縁型電源と組み合わせて使用すると、データバスや他の回路上のノイズ電流がローカル グランドに入り込んでノイズに敏感な回路に干渉または損傷を与えることを、防止できます。革新的なチップ設計およびレイアウト技法により、ISO7841 デバイスは電磁両立性が大幅に強化されているため、システムレベルの ESD、EFT、サージ、放射のコンプライアンスを容易に達成できます。

ISO7841 デバイスは、16 ピン SOIC ワイド ボディ (DW) および超ワイド ボディ (DWW) パッケージで供給されます。

### パッケージ情報

部品番号	パッケージ (1)	パッケージ サイズ (2)	本体サイズ (公称)
ISO7841 ISO7841F	DW (16)	10.30mm × 10.30mm	10.30mm × 7.50mm
	DWW (16)	10.30mm × 17.25mm	10.30mm × 14.0mm

- (1) 利用可能なすべてのパッケージについては、データシートの末尾にある注文情報を参照してください。
- (2) パッケージ サイズ (長さ × 幅) は公称値であり、該当する場合はピンも含まれます。



V<sub>CCI</sub> および GNDI は、それぞれ入力チャンネルの電源およびグランド接続です。

V<sub>CCO</sub> および GNDO は、それぞれ出力チャンネルの電源およびグランド接続です。

### 概略回路図



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## 4 Pin Configuration and Functions

### Pin Functions

PIN		Type <sup>(1)</sup>	DESCRIPTION
NAME	NO.		
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	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	—	Ground connection for V <sub>CC1</sub>
	8		
GND2	9	—	Ground connection for V <sub>CC2</sub>
	15		
INA	3	I	Input, channel A
INB	4	I	Input, channel B
INC	5	I	Input, channel C
IND	11	I	Input, channel D
OUTA	14	O	Output, channel A
OUTB	13	O	Output, channel B
OUTC	12	O	Output, channel C
OUTD	6	O	Output, channel D
V <sub>CC1</sub>	1	—	Power supply, V <sub>CC1</sub>
V <sub>CC2</sub>	16	—	Power supply, V <sub>CC2</sub>

(1) I = Input, O = Output

## 5 Specifications

### 5.1 Absolute Maximum Ratings

See (1)

		MIN	MAX	UNIT
V <sub>CC1</sub> , V <sub>CC2</sub>	Supply voltage <sup>(2)</sup>	-0.5	6	V
Voltage	INx	-0.5	V <sub>CCX</sub> + 0.5 <sup>(3)</sup>	V
	OUTx	-0.5	V <sub>CCX</sub> + 0.5 <sup>(3)</sup>	
	ENx	-0.5	V <sub>CCX</sub> + 0.5 <sup>(3)</sup>	
I <sub>O</sub>	Output current	-15	15	mA
	Surge immunity		12.8	kV
T <sub>stg</sub>	Storage temperature	-65	150	°C

- (1) Operation outside the *Absolute Maximum Ratings* may cause permanent device damage. *Absolute Maximum Ratings* do not imply functional operation of the device at these or any other conditions beyond those listed under *Recommended Operating Conditions*. If used outside the *Recommended Operating Conditions* but within the *Absolute Maximum Ratings*, the device may not be fully functional, and this may affect device reliability, functionality, performance, and shorten the device lifetime.
- (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 6V

### 5.2 ESD Ratings

		VALUE	UNIT
V <sub>(ESD)</sub>	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

- (1) JEDEC document JEP155 states that 500V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250V CDM allows safe manufacturing with a standard ESD control process.

### 5.3 Recommended Operating Conditions

		MIN	NOM	MAX	UNIT
V <sub>CC1</sub> , V <sub>CC2</sub>	Supply voltage	2.25		5.5	V
I <sub>OH</sub>	High-level output current	V <sub>CCO</sub> <sup>(2)</sup> = 5V		-4	mA
		V <sub>CCO</sub> <sup>(2)</sup> = 3.3V		-2	
		V <sub>CCO</sub> <sup>(2)</sup> = 2.5V		-1	
I <sub>OL</sub>	Low-level output current	V <sub>CCO</sub> <sup>(2)</sup> = 5V		4	mA
		V <sub>CCO</sub> <sup>(2)</sup> = 3.3V		2	
		V <sub>CCO</sub> <sup>(2)</sup> = 2.5V		1	
V <sub>IH</sub>	High-level input voltage	0.7 × V <sub>CC1</sub> <sup>(2)</sup>		V <sub>CC1</sub> <sup>(2)</sup>	V
V <sub>IL</sub>	Low-level input voltage	0		0.3 × V <sub>CC1</sub> <sup>(2)</sup>	V
DR	Signaling Rate	0		100	Mbps
T <sub>J</sub>	Junction temperature <sup>(1)</sup>	-55		150	°C
T <sub>A</sub>	Ambient temperature	-55	25	125	°C

- (1) To maintain the recommended operating conditions for T<sub>J</sub>, see [セクション 5.4](#).
- (2) V<sub>CC1</sub> = Input-side V<sub>CC</sub>; V<sub>CCO</sub> = Output-side V<sub>CC</sub>.

## 5.4 Thermal Information

THERMAL METRIC <sup>(1)</sup>		ISO7841		UNIT
		DW (SOIC)	DWW (SOIC)	
		16 Pins	16 Pins	
R <sub>θJA</sub>	Junction-to-ambient thermal resistance	78.9	78.9	°C/W
R <sub>θJC(top)</sub>	Junction-to-case(top) thermal resistance	41.6	41.1	°C/W
R <sub>θJB</sub>	Junction-to-board thermal resistance	43.6	49.5	°C/W
ψ <sub>JT</sub>	Junction-to-top characterization parameter	15.5	15.2	°C/W
ψ <sub>JB</sub>	Junction-to-board characterization parameter	43.1	48.8	°C/W
R <sub>θJC(bottom)</sub>	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 note.

## 5.5 Power Ratings

V<sub>CC1</sub> = V<sub>CC2</sub> = 5.5V, T<sub>J</sub> = 150°C, C<sub>L</sub> = 15pF, input a 50MHz 50% duty cycle square wave

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
P <sub>D</sub>	Maximum power dissipation by ISO7841x				200	mW
P <sub>D1</sub>	Maximum power dissipation by side-1 of ISO7841x				75	mW
P <sub>D2</sub>	Maximum power dissipation by side-2 of ISO7841x				125	mW

## 5.6 Insulation Specifications

PARAMETER		TEST CONDITIONS	SPECIFICATION		UNIT
			DW	DWW	
<b>GENERAL</b>					
CLR	External clearance <sup>(1)</sup>	Shortest pin-to-pin distance through air	>8	>14.5	mm
CPG	External creepage <sup>(1)</sup>	Shortest pin-to-pin distance across the package surface	>8	>14.5	mm
DTI	Distance through the insulation	Minimum internal gap (internal clearance)	>21	>21	μm
CTI	Comparative tracking index	DIN EN 60112 (VDE 0303-11); IEC 60112; UL 746A	>600	>600	V
	Material group		I	I	
	Overvoltage category per IEC 60664-1	Rated mains voltage ≤ 600V <sub>RMS</sub>	I–IV	I–IV	
		Rated mains voltage ≤ 1000V <sub>RMS</sub>	I–III	I–IV	
<b>DIN EN IEC 60747-17 (VDE 0884-17)<sup>(2)</sup></b>					
V <sub>IORM</sub>	Maximum repetitive peak isolation voltage		2121	2828	V <sub>PK</sub>
V <sub>IOWM</sub>	Maximum isolation working voltage	AC voltage (sine wave); Time dependent dielectric breakdown (TDDb) Test, see <a href="#">§ 5-1</a> and <a href="#">§ 5-2</a>	1500	2000	V <sub>RMS</sub>
		DC voltage	2121	2828	V <sub>DC</sub>
V <sub>IOTM</sub>	Maximum transient isolation voltage	V <sub>TEST</sub> = 1.2 × V <sub>IOTM</sub> t = 60s (qualification) t = 1s (100% production)	8000	8000	V <sub>PK</sub>
V <sub>IMP</sub>	Maximum impulse voltage <sup>(3)</sup>	Tested in air, 1.2/50μs waveform per IEC 62368-1	9800	9800	V <sub>PK</sub>
V <sub>IOSM</sub>	Maximum surge isolation voltage <sup>(4)</sup>	V <sub>IOSM</sub> ≥ 1.3 × V <sub>IMP</sub> ; Tested in oil (qualification test), 1.2/50-μs waveform per IEC 62368-1	12800	12800	V <sub>PK</sub>
Q <sub>pd</sub>	Apparent charge <sup>(5)</sup>	Method a: After I/O safety test subgroup 2/3, V <sub>ini</sub> = V <sub>IOTM</sub> , t <sub>ini</sub> = 60s; V <sub>pd(m)</sub> = 1.2 × V <sub>IOTM</sub> = 2545V <sub>PK</sub> (DW) and 3394V <sub>PK</sub> (DWW), t <sub>m</sub> = 10s	≤5	≤5	pC
		Method a: After environmental tests subgroup 1, V <sub>ini</sub> = V <sub>IOTM</sub> , t <sub>ini</sub> = 60s; V <sub>pd(m)</sub> = 1.6 × V <sub>IORM</sub> = 3394V <sub>PK</sub> (DW) and 4525V <sub>PK</sub> (DWW), t <sub>m</sub> = 10s	≤5	≤5	
		Method b: At routine test (100% production); V <sub>ini</sub> = 1.2 × V <sub>IOTM</sub> , t <sub>ini</sub> = 1s; V <sub>pd(m)</sub> = 1.875 × V <sub>IORM</sub> , t <sub>m</sub> = 1s (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 × sin(2πft), f = 1MHz	2	2	pF
R <sub>IO</sub>	Isolation resistance, input to output <sup>(6)</sup>	V <sub>IO</sub> = 500V, T <sub>A</sub> = 25°C	>10 <sup>12</sup>	>10 <sup>12</sup>	Ω
		V <sub>IO</sub> = 500V, 100°C ≤ T <sub>A</sub> ≤ 125°C	>10 <sup>11</sup>	>10 <sup>11</sup>	
		V <sub>IO</sub> = 500V at 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>	Withstand isolation voltage	V <sub>TEST</sub> = V <sub>ISO</sub> = 5700V <sub>RMS</sub> , t = 60s (qualification), V <sub>TEST</sub> = 1.2 × V <sub>ISO</sub> = 6840V <sub>RMS</sub> , t = 1s (100% production)	5700	5700	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, ribs, or both on a printed circuit board are used to help increase these specifications.

- (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)	Approved under CSA Component Acceptance Notice 5A, IEC 60950-1 and IEC 60601-1	Certified according to 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, 8000V <sub>PK</sub> ; Maximum repetitive peak isolation voltage, 2121V <sub>PK</sub> (DW), 2828V <sub>PK</sub> (DWW); Maximum surge isolation voltage, 12800V <sub>PK</sub>	Reinforced insulation per CSA 60950-1-07+A1+A2 and IEC 60950-1 2nd Ed., 800V <sub>RMS</sub> (DW) and 1450V <sub>RMS</sub> (DWW) max working voltage (pollution degree 2, material group I); 2 MOPP (Means of Patient Protection) per CSA 60601-1:14 and IEC 60601-1 Ed. 3.1, 250V <sub>RMS</sub> (DW) and 400V <sub>RMS</sub> (DWW) max working voltage	Single protection, 5700V <sub>RMS</sub>	Reinforced Insulation, Altitude ≤ 5000m, Tropical Climate, 700V <sub>RMS</sub> (DW) and 1450V <sub>RMS</sub> (DWW) maximum working voltage	5700 V <sub>RMS</sub> Reinforced insulation per EN 61010-1 up to working voltage of 600V <sub>RMS</sub> (DW) and 1000V <sub>RMS</sub> (DWW); 5700V <sub>RMS</sub> Reinforced insulation per EN 62368-1 up to working voltage of 800V <sub>RMS</sub> (DW) and 1450V <sub>RMS</sub> (DWW)
Certificate number: 40040142	Master contract number: 220991	File number: E181974	Certificate number: CQC15001121716	Client ID number: 77311

### 5.8 Safety Limiting Values

Safety limiting 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
I <sub>S</sub> Safety input, output, or supply current	R <sub>θJA</sub> = 78.9°C/W, V <sub>I</sub> = 5.5V, T <sub>J</sub> = 150°C, T <sub>A</sub> = 25°C			288	mA
	R <sub>θJA</sub> = 78.9°C/W, V <sub>I</sub> = 3.6V, T <sub>J</sub> = 150°C, T <sub>A</sub> = 25°C			440	
	R <sub>θJA</sub> = 78.9°C/W, V <sub>I</sub> = 2.75V, T <sub>J</sub> = 150°C, T <sub>A</sub> = 25°C			576	
P <sub>S</sub> Safety input, output, or total power	R <sub>θJA</sub> = 78.9°C/W, T <sub>J</sub> = 150°C, T <sub>A</sub> = 25°C			1584	mW
T <sub>S</sub> Maximum safety temperature				150	°C

The maximum safety temperature is the maximum junction temperature specified for the device. The power dissipation and junction-to-air thermal impedance of the device installed in the application hardware determines the junction temperature. The assumed junction-to-air thermal resistance in the [セクション 5.4](#) is that of a device installed on a high-K test board for leaded surface-mount packages. The power is the recommended maximum input voltage times the current. The junction temperature is then the ambient temperature plus the power times the junction-to-air thermal resistance.

## 5.9 Electrical Characteristics—5V Supply

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{OH}$	High-level output voltage	$I_{OH} = -4mA$ ; see <a href="#">Figure 6-1</a>	$V_{CCO}^{(1)} - 0.4$	$V_{CCO}^{(1)} - 0.2$		V
$V_{OL}$	Low-level output voltage	$I_{OL} = 4mA$ ; see <a href="#">Figure 6-1</a>		0.2	0.4	V
$V_{I(HYS)}$	Input threshold voltage hysteresis		$0.1 \times V_{CCI}^{(1)}$			V
$I_{IH}$	High-level input current	$V_{IH} = V_{CCI}^{(1)}$ at INx or ENx			10	$\mu A$
$I_{IL}$	Low-level input current	$V_{IL} = 0V$ at INx or ENx	-10			$\mu A$
CMTI	Common-mode transient immunity	$V_I = V_{CCI}^{(1)}$ or 0V, $V_{CM} = 1500V$ ; see <a href="#">Figure 6-4</a>	100			kV/ $\mu s$
$C_i$	Input capacitance	$V_I = V_{CC}/2 + 0.4 \times \sin(2\pi ft)$ , $f = 1MHz$ , $V_{CC} = 5V$		2		pF

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

### 5.10 Supply Current Characteristics—5V Supply

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

PARAMETER	TEST CONDITIONS		SUPPLY CURRENT	MIN	TYP	MAX	UNIT	
<b>ISO7841DW AND ISO7841FDW</b>								
Supply current	Disable	EN1 = EN2 = 0V, $V_I = 0V$ (ISO7841F), $V_I = V_{CCI}^{(1)}$ (ISO7841)	$I_{CC1}$	1.1	1.8		mA	
			$I_{CC2}$	0.8	1.3			
			EN1 = EN2 = 0V, $V_I = V_{CCI}^{(1)}$ (ISO7841F), $V_I = 0V$ (ISO7841)	$I_{CC1}$	4.5	6.6		mA
				$I_{CC2}$	2	2.9		
	DC signal	$V_I = 0V$ (ISO7841F), $V_I = V_{CCI}^{(1)}$ (ISO7841)	$I_{CC1}$	1.5	2.4		mA	
			$I_{CC2}$	2.1	3.1			
			$V_I = V_{CCI}^{(1)}$ (ISO7841F), $V_I = 0V$ (ISO7841)	$I_{CC1}$	5	7.3		mA
				$I_{CC2}$	3.4	4.9		
	All channels switching with square wave clock input; $C_L = 15pF$	1Mbps		$I_{CC1}$	3.3	4.9		mA
				$I_{CC2}$	2.9	4.2		
		10Mbps		$I_{CC1}$	3.9	5.5		mA
				$I_{CC2}$	4.4	5.7		
100Mbps			$I_{CC1}$	9.2	11.6		mA	
			$I_{CC2}$	19	21.9			
<b>ISO7841DWW AND ISO7841FDWW</b>								
Supply current	Disable	EN1 = EN2 = 0V, $V_I = 0V$ (ISO7841F), $V_I = V_{CCI}^{(1)}$ (ISO7841)	$I_{CC1}$	1.1	1.8		mA	
			$I_{CC2}$	0.8	1.3			
			EN1 = EN2 = 0V, $V_I = V_{CCI}^{(1)}$ (ISO7841F), $V_I = 0V$ (ISO7841)	$I_{CC1}$	4.5	6.6		mA
				$I_{CC2}$	2	2.9		
	DC signal	$V_I = 0V$ (ISO7841F), $V_I = V_{CCI}^{(1)}$ (ISO7841)	$I_{CC1}$	1.5	2.4		mA	
			$I_{CC2}$	2.1	3.3			
			$V_I = V_{CCI}^{(1)}$ (ISO7841F), $V_I = 0V$ (ISO7841)	$I_{CC1}$	5	7.5		mA
				$I_{CC2}$	3.4	5.2		
	All channels switching with square wave clock input; $C_L = 15pF$	1Mbps		$I_{CC1}$	3.4	5		mA
				$I_{CC2}$	3	4.4		
		10Mbps		$I_{CC1}$	4	5.6		mA
				$I_{CC2}$	4.5	6.1		
100Mbps			$I_{CC1}$	9.4	12.1		mA	
			$I_{CC2}$	19.5	22.6			

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



## 5.11 Electrical Characteristics—3.3V Supply

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{OH}$	High-level output voltage	$I_{OH} = -2mA$ ; see <a href="#">Figure 6-1</a>	$V_{CCO}^{(1)} - 0.4$	$V_{CCO}^{(1)} - 0.2$		V
$V_{OL}$	Low-level output voltage	$I_{OL} = 2mA$ ; see <a href="#">Figure 6-1</a>		0.2	0.4	V
$V_{I(HYS)}$	Input threshold voltage hysteresis		$0.1 \times V_{CCI}^{(1)}$			V
$I_{IH}$	High-level input current	$V_{IH} = V_{CCI}^{(1)}$ at INx or ENx			10	$\mu A$
$I_{IL}$	Low-level input current	$V_{IL} = 0V$ at INx or ENx	-10			$\mu A$
CMTI	Common-mode transient immunity	$V_I = V_{CCI}^{(1)}$ or 0V, $V_{CM} = 1500V$ ; see <a href="#">Figure 6-4</a>	100			kV/ $\mu s$

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

### 5.12 Supply Current Characteristics—3.3V Supply

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

PARAMETER	TEST CONDITIONS	SUPPLY CURRENT	MIN	TYP	MAX	UNIT
<b>ISO7841DW AND ISO7841FDW</b>						
Supply current	Disable	EN1 = EN2 = 0V, $V_I = 0V$ (ISO7841F), $V_I = V_{CCI}^{(1)}$ (ISO7841)	$I_{CC1}$	1.1	1.8	mA
			$I_{CC2}$	0.8	1.3	
		EN1 = EN2 = 0V, $V_I = V_{CCI}^{(1)}$ (ISO7841F), $V_I = 0V$ (ISO7841)	$I_{CC1}$	4.5	6.6	mA
			$I_{CC2}$	1.9	2.9	
	DC signal	$V_I = 0V$ (ISO7841F), $V_I = V_{CCI}^{(1)}$ (ISO7841)	$I_{CC1}$	1.5	2.4	mA
			$I_{CC2}$	2.1	3.1	
		$V_I = V_{CCI}^{(1)}$ (ISO7841F), $V_I = 0V$ (ISO7841)	$I_{CC1}$	5	7.3	mA
			$I_{CC2}$	3.3	4.9	
	All channels switching with square wave clock input; $C_L = 15pF$	1Mbps	$I_{CC1}$	3.3	4.9	mA
			$I_{CC2}$	2.8	4.1	
		10Mbps	$I_{CC1}$	3.7	5.3	mA
			$I_{CC2}$	3.9	5.2	
100Mbps		$I_{CC1}$	7.4	9.3	mA	
		$I_{CC2}$	14.5	16.9		
<b>ISO7841DWW AND ISO7841FDWW</b>						
Supply current	Disable	EN1 = EN2 = 0V, $V_I = 0V$ (ISO7841F), $V_I = V_{CCI}^{(1)}$ (ISO7841)	$I_{CC1}$	1.1	1.8	mA
			$I_{CC2}$	0.8	1.3	
		EN1 = EN2 = 0V, $V_I = V_{CCI}^{(1)}$ (ISO7841F), $V_I = 0V$ (ISO7841)	$I_{CC1}$	4.5	6.6	mA
			$I_{CC2}$	2	2.9	
	DC signal	$V_I = 0V$ (ISO7841F), $V_I = V_{CCI}^{(1)}$ (ISO7841)	$I_{CC1}$	1.5	2.4	mA
			$I_{CC2}$	2.1	3.3	
		$V_I = V_{CCI}^{(1)}$ (ISO7841F), $V_I = 0V$ (ISO7841)	$I_{CC1}$	5	7.5	mA
			$I_{CC2}$	3.4	5.2	
	All channels switching with square wave clock input; $C_L = 15pF$	1Mbps	$I_{CC1}$	3.4	5	mA
			$I_{CC2}$	2.9	4.4	
		10Mbps	$I_{CC1}$	3.8	5.4	mA
			$I_{CC2}$	4	5.5	
100Mbps		$I_{CC1}$	7.5	9.9	mA	
		$I_{CC2}$	14.8	17.2		

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

### 5.13 Electrical Characteristics—2.5V Supply

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{OH}$	High-level output voltage $I_{OH} = -1mA$ ; see <a href="#">6-1</a>	$V_{CCO}^{(1)} - 0.4$	$V_{CCO}^{(1)} - 0.2$		V
$V_{OL}$	Low-level output voltage $I_{OL} = 1mA$ ; see <a href="#">6-1</a>		0.2	0.4	V
$V_{I(HYS)}$	Input threshold voltage hysteresis	$0.1 \times V_{CCI}^{(1)}$			V
$I_{IH}$	High-level input current $V_{IH} = V_{CCI}^{(1)}$ at INx or ENx			10	$\mu A$
$I_{IL}$	Low-level input current $V_{IL} = 0V$ at INx or ENx	-10			$\mu A$
CMTI	Common-mode transient immunity $V_I = V_{CCI}^{(1)}$ or 0V, $V_{CM} = 1500V$ ; see <a href="#">6-4</a>	100			kV/ $\mu s$

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

### 5.14 Supply Current Characteristics—2.5V Supply

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

PARAMETER	TEST CONDITIONS		SUPPLY CURRENT	MIN	TYP	MAX	UNIT
<b>ISO7841DW AND ISO7841FDW</b>							
Supply current	Disable	EN1 = EN2 = 0V, $V_I = 0V$ (ISO7841F), $V_I = V_{CCI}$ <sup>(1)</sup> (ISO7841)	$I_{CC1}$	1.1	1.7	mA	
			$I_{CC2}$	0.8	1.2		
		EN1 = EN2 = 0V, $V_I = V_{CCI}$ <sup>(1)</sup> (ISO7841F), $V_I = 0V$ (ISO7841)	$I_{CC1}$	4.5	6.5	mA	
			$I_{CC2}$	1.9	2.8		
		DC signal	$V_I = 0V$ (ISO7841F), $V_I = V_{CCI}$ <sup>(1)</sup> (ISO7841)	$I_{CC1}$	1.6	2.3	mA
				$I_{CC2}$	2.2	3.1	
	$V_I = V_{CCI}$ <sup>(1)</sup> (ISO7841F), $V_I = 0V$ (ISO7841)		$I_{CC1}$	5.1	7.2	mA	
			$I_{CC2}$	3.5	4.8		
	All channels switching with square wave clock input; $C_L = 15pF$	1Mbps	$I_{CC1}$	3.4	4.8	mA	
			$I_{CC2}$	2.9	4		
		10Mbps	$I_{CC1}$	3.7	5.1	mA	
			$I_{CC2}$	3.7	4.8		
100Mbps		$I_{CC1}$	6.8	8.1	mA		
		$I_{CC2}$	12	14.2			
<b>ISO7841DWW AND ISO7841FDWW</b>							
Supply current	Disable	EN1 = EN2 = 0V, $V_I = 0V$ (ISO7841F), $V_I = V_{CCI}$ <sup>(1)</sup> (ISO7841)	$I_{CC1}$	1.1	1.7	mA	
			$I_{CC2}$	0.8	1.2		
		EN1 = EN2 = 0V, $V_I = V_{CCI}$ <sup>(1)</sup> (ISO7841F), $V_I = 0V$ (ISO7841)	$I_{CC1}$	4.5	6.5	mA	
			$I_{CC2}$	1.9	2.8		
		DC signal	$V_I = 0V$ (ISO7841F), $V_I = V_{CCI}$ <sup>(1)</sup> (ISO7841)	$I_{CC1}$	1.6	2.4	mA
				$I_{CC2}$	2.2	3.3	
	$V_I = V_{CCI}$ <sup>(1)</sup> (ISO7841F), $V_I = 0V$ (ISO7841)		$I_{CC1}$	5.1	7.5	mA	
			$I_{CC2}$	3.5	5.2		
	All channels switching with square wave clock input; $C_L = 15pF$	1Mbps	$I_{CC1}$	3.5	5	mA	
			$I_{CC2}$	3	4.3		
		10Mbps	$I_{CC1}$	3.8	5.3	mA	
			$I_{CC2}$	3.8	5.2		
100Mbps		$I_{CC1}$	6.9	8.8	mA		
		$I_{CC2}$	12.3	14.2			

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

## 5.15 Switching Characteristics—5V Supply

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}, t_{PHL}$ Propagation delay time	See <a href="#">6-1</a>	6	11	16	ns
PWD Pulse width distortion <sup>(1)</sup> $ t_{PHL} - t_{PLH} $			0.55	4.1	ns
$t_{sk(o)}$ Channel-to-channel output skew time <sup>(2)</sup>	Same-direction channels			2.5	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>		1.7	3.9	ns
$t_f$ Output signal fall time				1.9	3.9
$t_{PHZ}$ Disable propagation delay, high-to-high impedance output	See <a href="#">6-2</a>		12	20	ns
$t_{PLZ}$ Disable propagation delay, low-to-high impedance output			12	20	ns
$t_{PZH}$ Enable propagation delay, high impedance-to-high output for ISO7841			10	20	ns
Enable propagation delay, high impedance-to-high output for ISO7841F			2	2.5	$\mu s$
$t_{PZL}$ Enable propagation delay, high impedance-to-low output for ISO7841			2	2.5	$\mu s$
Enable propagation delay, high impedance-to-low output for ISO7841F		10	20	ns	
$t_{fs}$ Default output delay time from input power loss	Measured from the time $V_{CC}$ goes below 1.7V. See <a href="#">6-3</a>		0.2	9	$\mu s$
$t_{ie}$ Time interval error	$2^{16} - 1$ PRBS data at 100Mbps		0.90		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—3.3V Supply

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
$t_{PLH}, t_{PHL}$ Propagation delay time	See <a href="#">6-1</a>	6	10.8	16	ns	
PWD Pulse width distortion <sup>(1)</sup> $ t_{PHL} - t_{PLH} $			0.7	4.2	ns	
$t_{sk(o)}$ Channel-to-channel output skew time <sup>(2)</sup>	Same-direction channels			2.2	ns	
$t_{sk(pp)}$ Part-to-part skew time				4.5	ns	
$t_r$ Output signal rise time	See <a href="#">6-1</a>		0.8	3	ns	
$t_f$ Output signal fall time				0.8	3	ns
$t_{PHZ}$ Disable propagation delay, high-to-high impedance output	See <a href="#">6-2</a>		17	32	ns	
$t_{PLZ}$ Disable propagation delay, low-to-high impedance output			17	32	ns	
$t_{PZH}$ Enable propagation delay, high impedance-to-high output for ISO7841				17	32	ns
		Enable propagation delay, high impedance-to-high output for ISO7841F		2	2.5	$\mu s$
$t_{PZL}$ Enable propagation delay, high impedance-to-low output for ISO7841				2	2.5	$\mu s$
		Enable propagation delay, high impedance-to-low output for ISO7841F		17	32	ns
$t_{fs}$ Default output delay time from input power loss	Measured from the time $V_{CC}$ goes below 1.7V. See <a href="#">6-3</a>		0.2	9	$\mu s$	
$t_{ie}$ Time interval error	$2^{16} - 1$ PRBS data at 100Mbps		0.91		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.

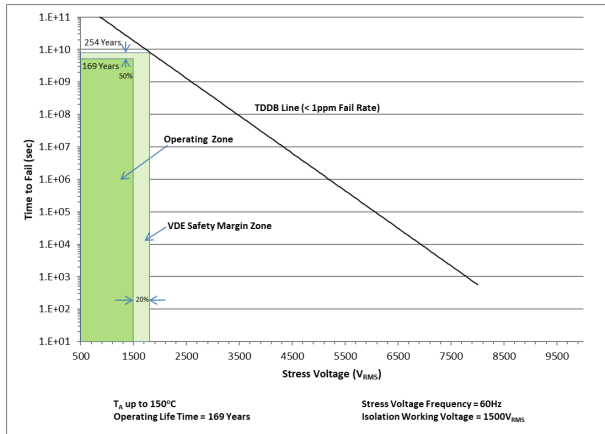
## 5.17 Switching Characteristics—2.5V Supply

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

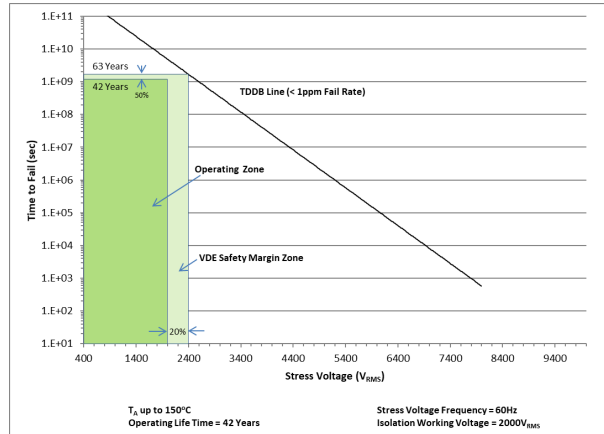
PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
$t_{PLH}, t_{PHL}$ Propagation delay time	See <a href="#">6-1</a>	7.5	11.7	17.5	ns	
PWD Pulse width distortion <sup>(1)</sup> $ t_{PHL} - t_{PLH} $			0.66	4.2	ns	
$t_{sk(o)}$ Channel-to-channel output skew time <sup>(2)</sup>	Same-direction Channels			2.2	ns	
$t_{sk(pp)}$ Part-to-part skew time <sup>(3)</sup>				4.5	ns	
$t_r$ Output signal rise time	See <a href="#">6-1</a>		1	3.5	ns	
$t_f$ Output signal fall time				1.2	3.5	ns
$t_{PHZ}$ Disable propagation delay, high-to-high impedance output	See <a href="#">6-2</a>		22	45	ns	
$t_{PLZ}$ Disable propagation delay, low-to-high impedance output			22	45	ns	
$t_{PZH}$ Enable propagation delay, high impedance-to-high output for ISO7841				18	45	ns
		Enable propagation delay, high impedance-to-high output for ISO7841F		2	2.5	$\mu$ s
$t_{PZL}$ Enable propagation delay, high impedance-to-low output for ISO7841				2	2.5	$\mu$ s
		Enable propagation delay, high impedance-to-low output for ISO7841F		18	45	ns
$t_{fs}$ Default output delay time from input power loss	Measured from the time $V_{CC}$ goes below 1.7V. See <a href="#">6-3</a>		0.2	9	$\mu$ s	
$t_{ie}$ Time interval error	$2^{16} - 1$ PRBS data at 100Mbps		0.91		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.

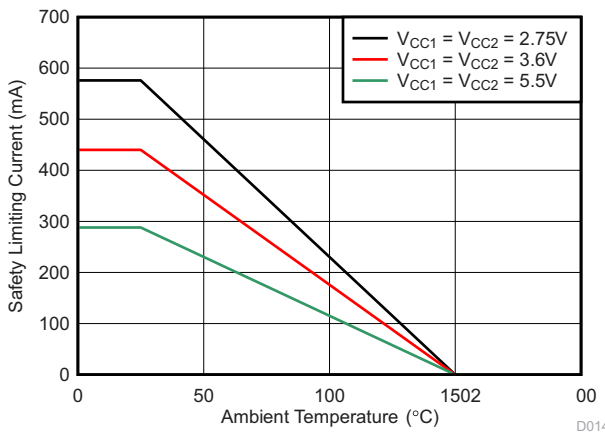
### 5.18 Insulation Characteristics Curves



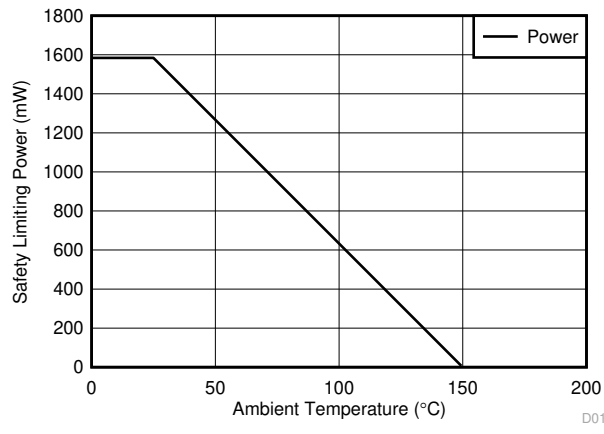
**5-1. Reinforced Isolation Capacitor Life Time Projection for Devices in DW Package**



**5-2. Reinforced Isolation Capacitor Life Time Projection for Devices in DWW Package**



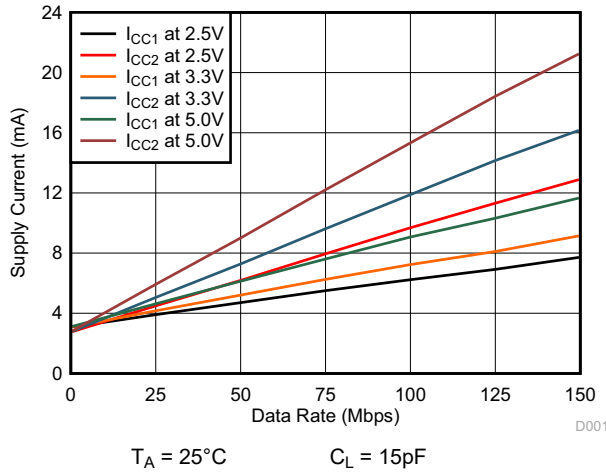
**5-3. Thermal Derating Curve for Limiting Current per VDE**



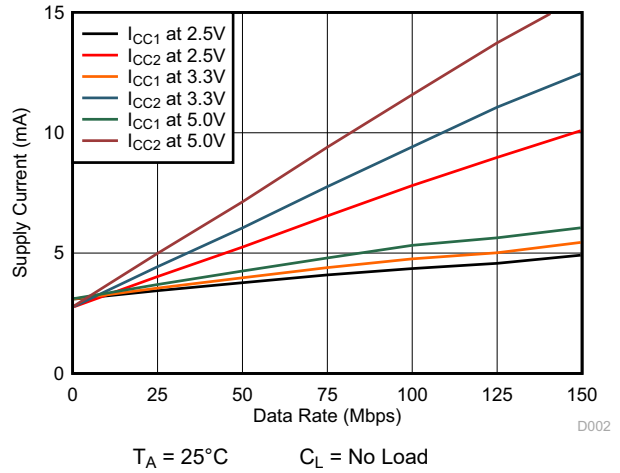
**5-4. Thermal Derating Curve for Limiting Power per VDE**



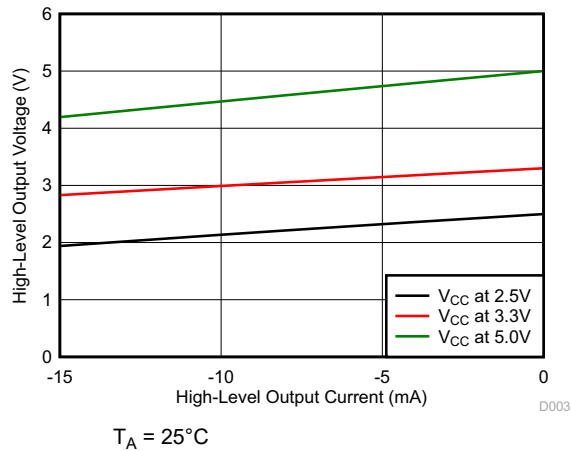
### 5.19 Typical Characteristics



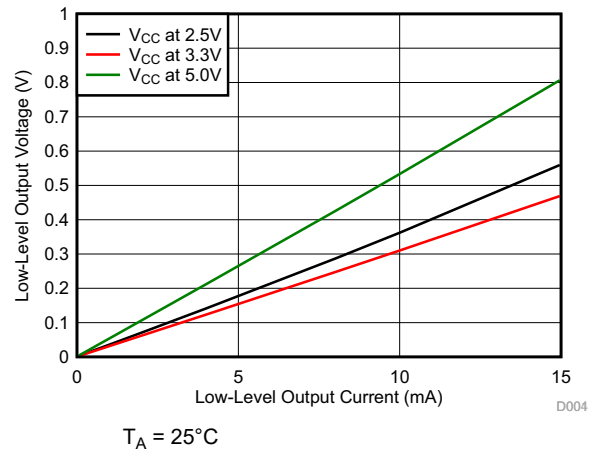
5-5. Supply Current vs Data Rate (With 15pF Load)



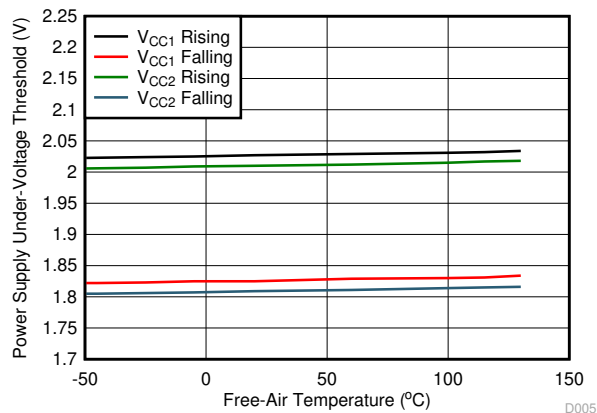
5-6. Supply Current vs Data Rate (With No Load)



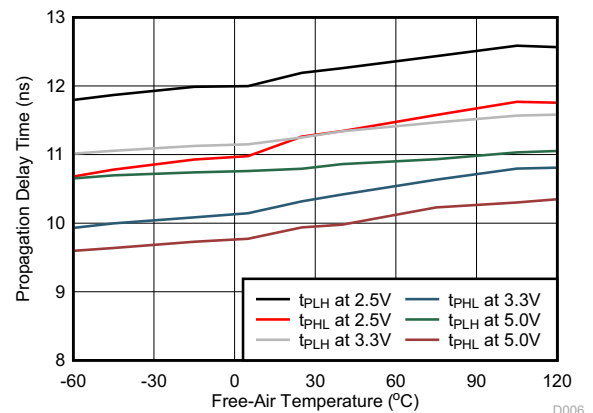
5-7. High-Level Output Voltage vs High-level Output Current



5-8. Low-Level Output Voltage vs Low-Level Output Current

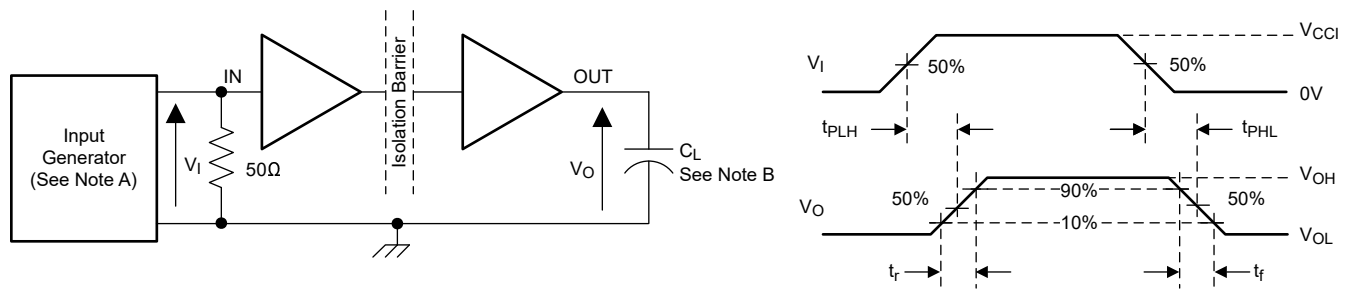


5-9. Power Supply Undervoltage Threshold vs Free-Air Temperature



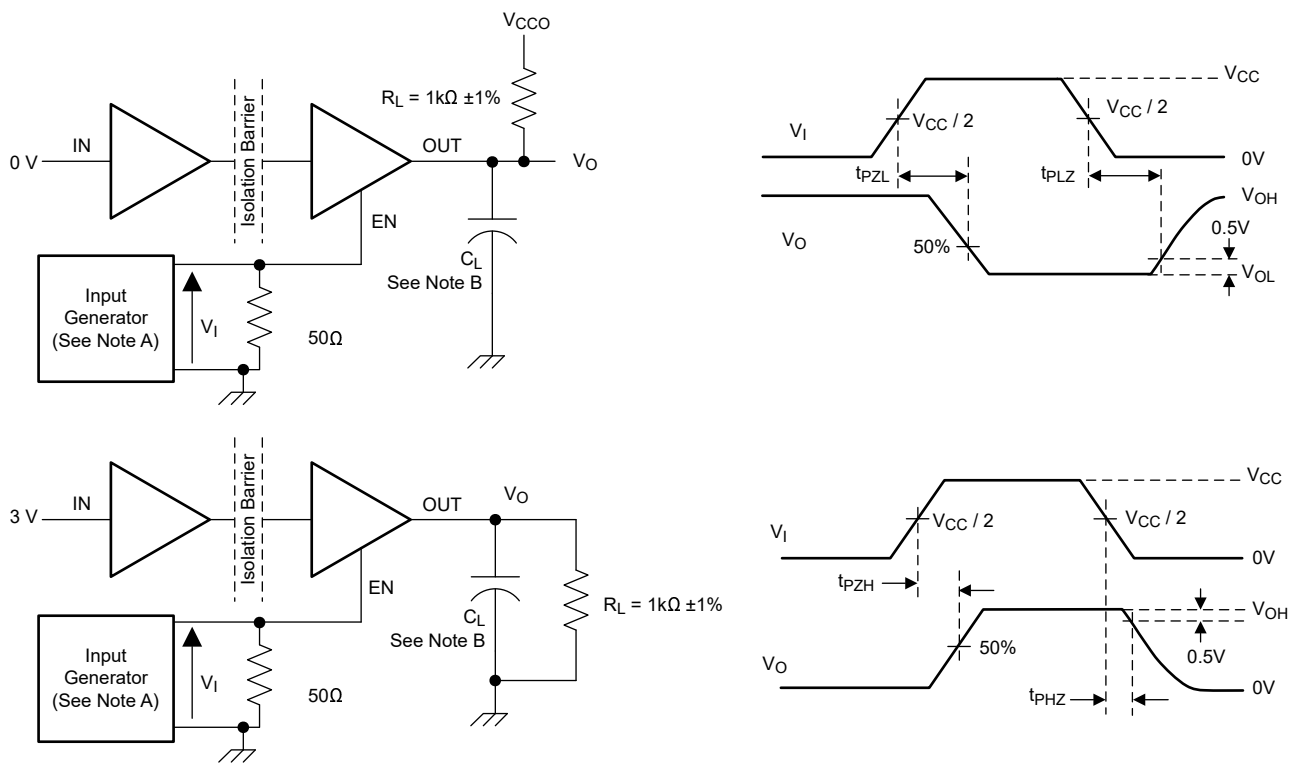
5-10. Propagation Delay Time vs Free-Air Temperature

## 6 Parameter Measurement Information



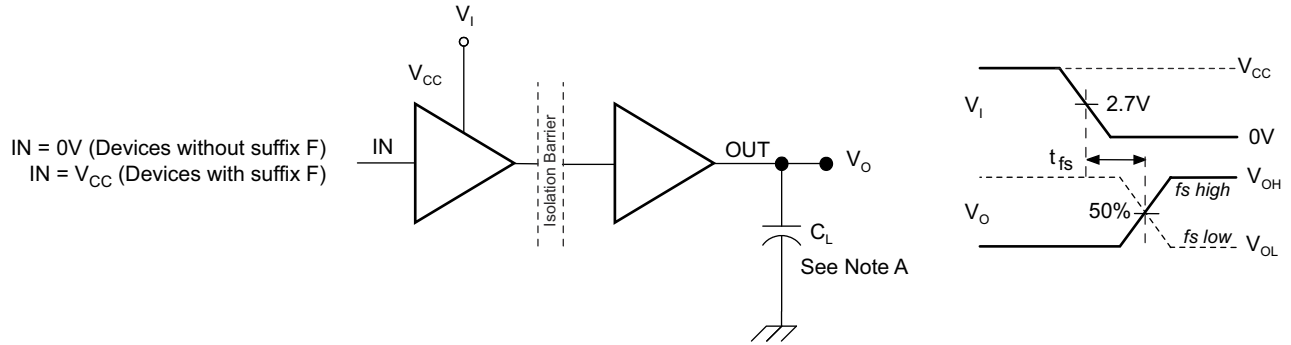
- A. The input pulse is supplied by a generator having the following characteristics: PRR  $\leq$  50kHz, 50% duty cycle,  $t_r \leq$  3ns,  $t_f \leq$  3ns,  $Z_O = 50\Omega$ . At the input, a 50Ω resistor is required to terminate Input Generator signal. The 50Ω resistor is not needed in actual application.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

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



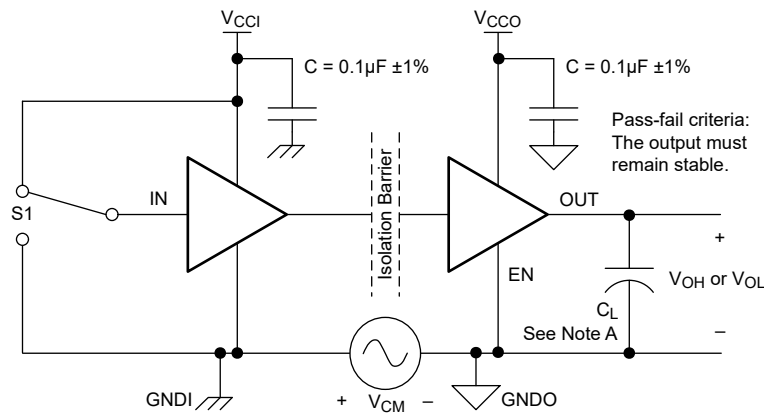
- A. The input pulse is supplied by a generator having the following characteristics: PRR  $\leq$  10kHz, 50% duty cycle,  $t_r \leq$  3ns,  $t_f \leq$  3ns,  $Z_O = 50\Omega$ .
- B.  $C_L = 15$ pF and includes instrumentation and fixture capacitance within  $\pm 20\%$ .

**図 6-2. Enable/Disable Propagation Delay Time Test Circuit and Waveform**



A. C<sub>L</sub> = 15pF and includes instrumentation and fixture capacitance within ±20%.

### 6-3. Default Output Delay Time Test Circuit and Voltage Waveforms

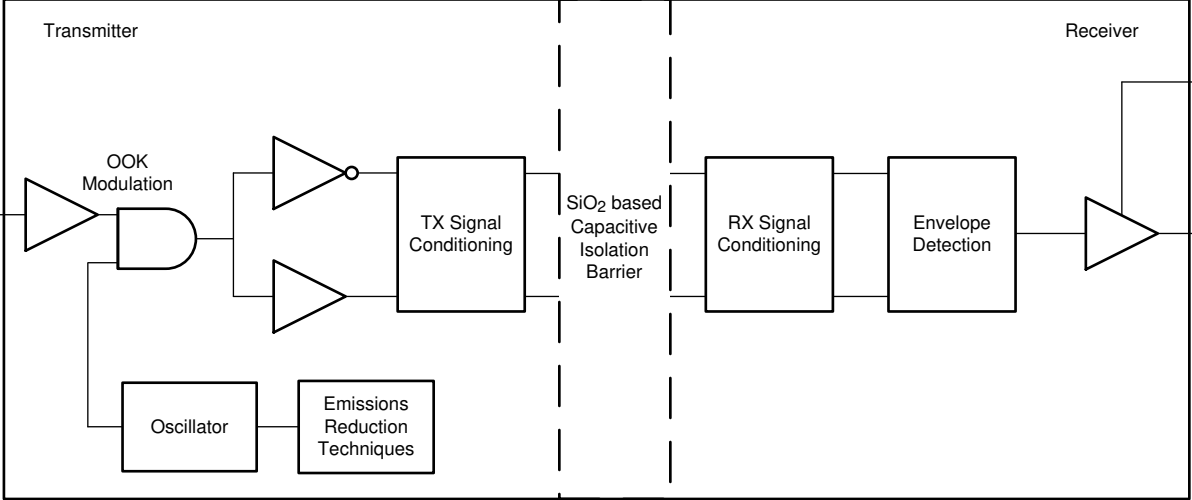


A. C<sub>L</sub> = 15pF and includes instrumentation and fixture capacitance within ±20%.

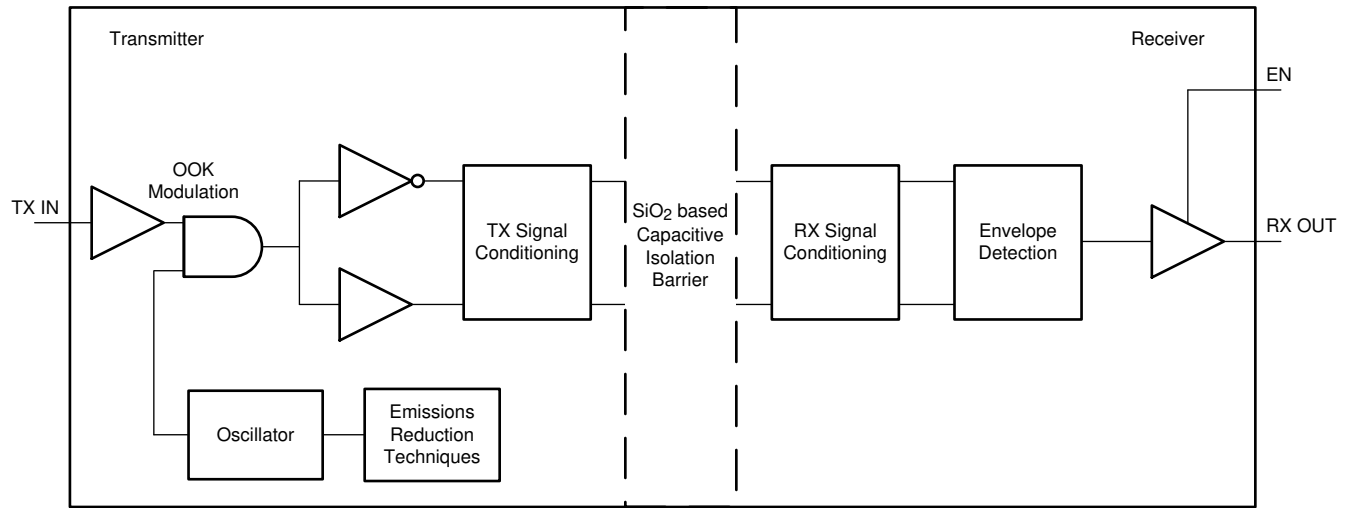
### 6-4. Common-Mode Transient Immunity Test Circuit

## 7 Detailed Description

### 7.1 Overview

The ISO7841 device 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. If the EN pin is low then the output goes to high impedance. The ISO7841 device 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, , shows a functional block diagram of a typical channel.

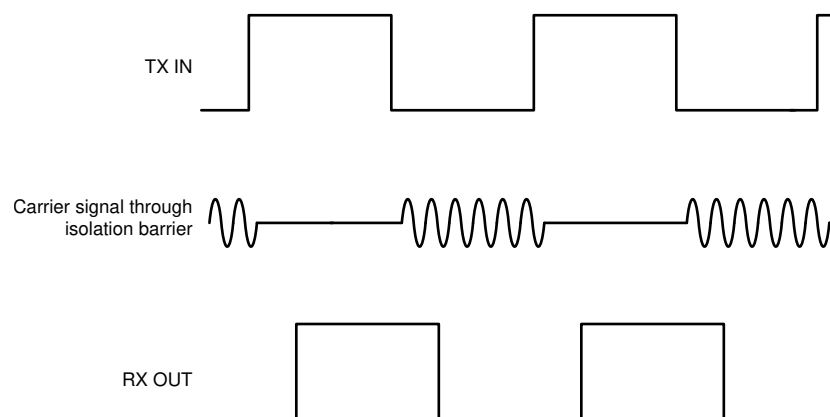
### 7.2 Functional Block Diagram




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

 **7-2** shows a conceptual detail of how the ON-OFF keying scheme works.



 **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	RATED ISOLATION	MAXIMUM DATA RATE	DEFAULT OUTPUT
ISO7841	3 Forward,	5700V <sub>RMS</sub> / 8000V <sub>PK</sub> <sup>(1)</sup>	100Mbps	High
	1 Reverse			
ISO7841F	3 Forward,	5700V <sub>RMS</sub> / 8000V <sub>PK</sub> <sup>(1)</sup>	100Mbps	Low
	1 Reverse			

(1) See *Insulation Specifications* 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 ISO7841 device 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 providing purely differential internal operation.

## 7.4 Device Functional Modes

表 7-2 lists the ISO7841 functional modes.

**表 7-2. Function Table**

V <sub>CCI</sub>	V <sub>CCO</sub>	INPUT (IN <sub>x</sub> ) <sup>(2)</sup>	OUTPUT ENABLE (EN <sub>x</sub> )	OUTPUT (OUT <sub>x</sub> )	COMMENTS
PU	PU	H	H or open	H	Normal Operation: A channel output assumes the logic state of the input.  Default mode: When IN <sub>x</sub> is open, the corresponding channel output goes to the default logic state. Default= High for ISO7841 and Low for ISO7841F.
		L	H or open	L	
		Open	H or open	Default	
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 <sub>CCI</sub> is unpowered, a channel output assumes the logic state based on the selected default option. Default= High for IISO7841 and Low for ISO7841F. When V <sub>CCI</sub> transitions from unpowered to powered-up, a channel output assumes the logic state of the input. When V <sub>CCI</sub> transitions from powered-up to unpowered, channel output assumes the selected default state.
X	PD	X	X	Undetermined	When V <sub>CCO</sub> is unpowered, a channel output is undetermined <sup>(1)</sup> . When V <sub>CCO</sub> transitions from unpowered to powered-up, a channel output assumes the logic state of the input

(1) The outputs are undetermined when 1.7V < V<sub>CCI</sub>, V<sub>CCO</sub> < 2.25V.

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

### 7.4.1 Device I/O Schematics

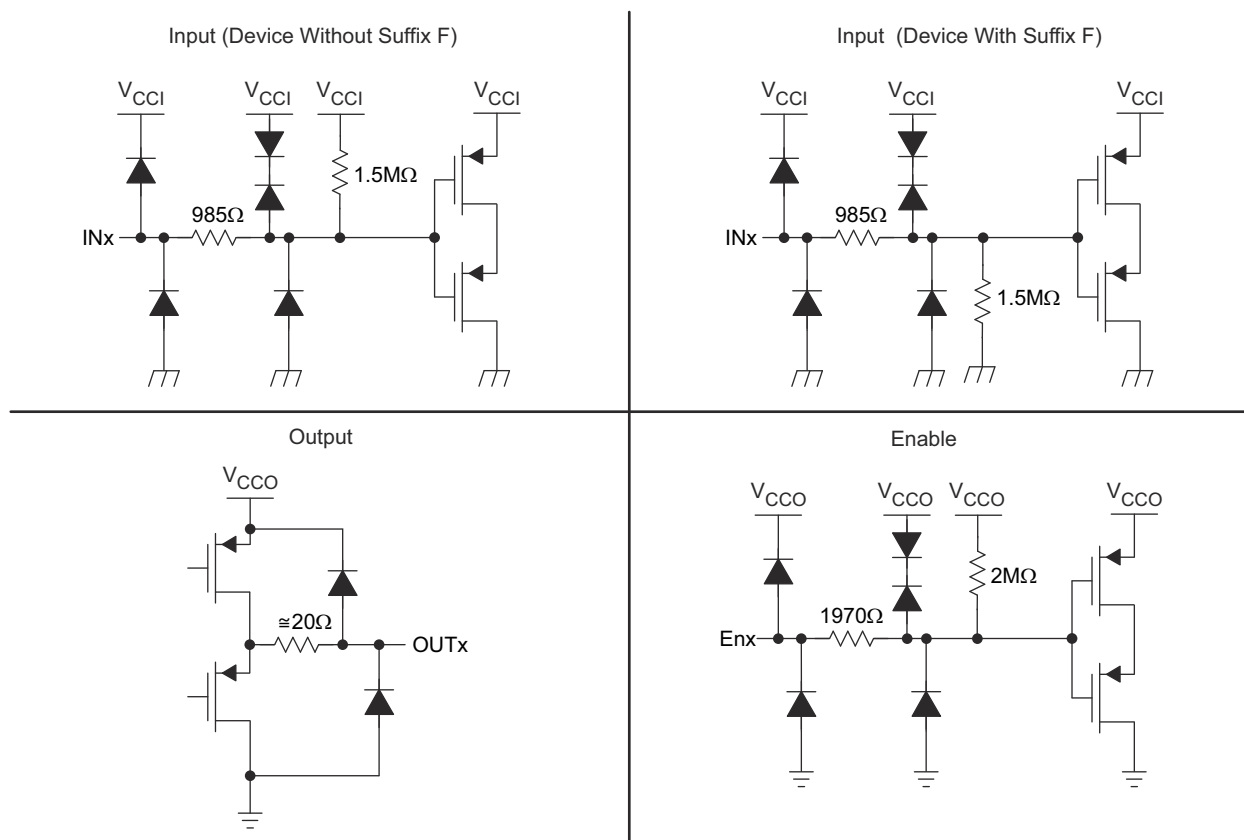


図 7-3. Device I/O Schematics

## 8 Application and Implementation

### 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.

### 8.1 Application Information

The ISO7841 device is a high-performance, quad-channel digital isolator with a  $5.7\text{kV}_{\text{RMS}}$  isolation voltage per UL 1577. The device comes with enable pins on each side that can be used to put the respective outputs in high impedance for multi-controller driving applications and reduce power consumption. The ISO7841 device uses single-ended CMOS-logic switching technology. The supply voltage range is from 2.25V to 5.5V for both supplies,  $V_{\text{CC1}}$  and  $V_{\text{CC2}}$ . 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,  $\mu\text{C}$  or UART), and a data converter or a line transceiver, regardless of the interface type or standard.

### 8.2 Typical Application

図 8-1 shows the isolated SPI.

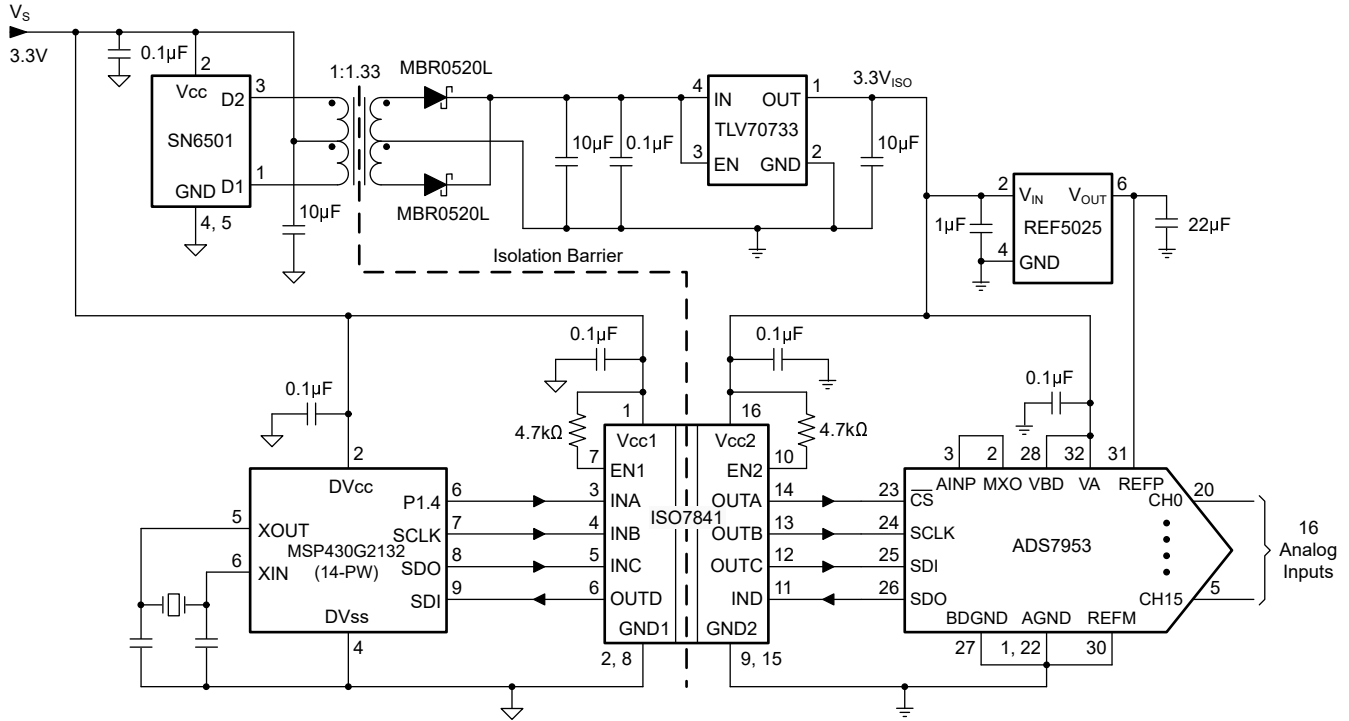


図 8-1. Isolated SPI for an Analog Input Module With 16 Input

### 8.2.1 Design Requirements

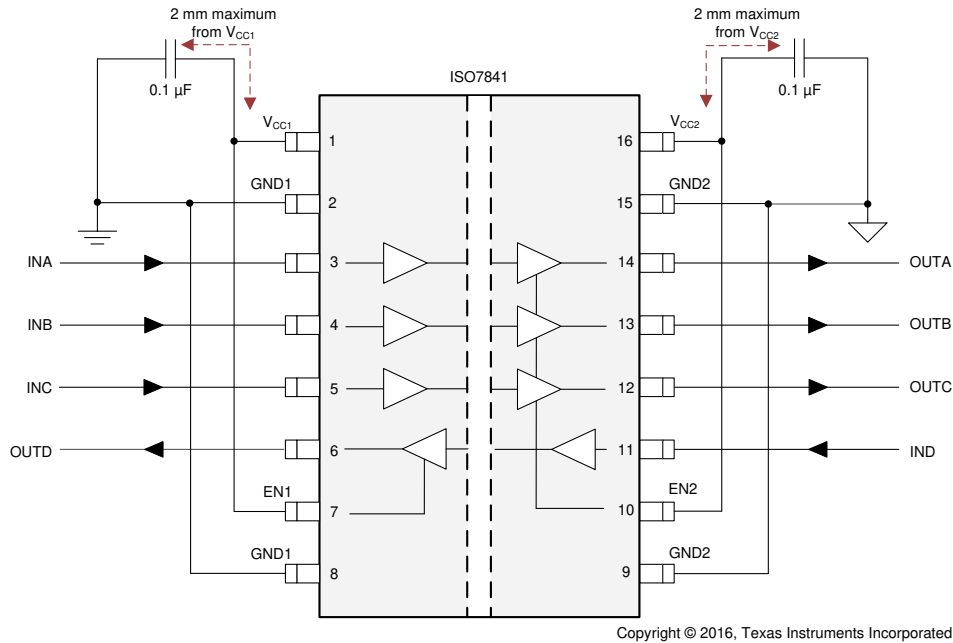
For this design example, use the parameters shown in 表 8-1.

表 8-1. Design Parameters

PARAMETER	VALUE
Supply voltage	2.25V to 5.5V
Decoupling capacitor between V <sub>CC1</sub> and GND1	0.1µF
Decoupling capacitor from V <sub>CC2</sub> and GND2	0.1µF

### 8.2.2 Detailed Design Procedure

Unlike optocouplers, which require external components to improve performance, provide bias, or limit current, the ISO7841 device only requires two external bypass capacitors to operate.

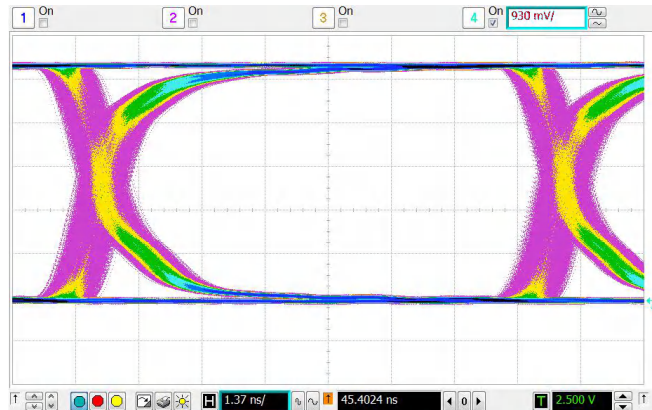


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☒ 8-2. Typical ISO7841 Circuit Hook-Up

### 8.2.3 Application Curve

The typical eye diagram of the ISO7841 device indicates low jitter and wide open eye at the maximum data rate of 100Mbps.



☒ 8-3. Eye Diagram at 100Mbps PRBS, 5V and 25°C

## 9 Power Supply Recommendations

To help ensure reliable operation at data rates and supply voltages, a 0.1 μF 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](#). For such applications, detailed power supply design and transformer selection recommendations are available in [SN6501 Transformer Driver for Isolated Power Supplies](#).



## 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 must 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 the 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 100pF/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.

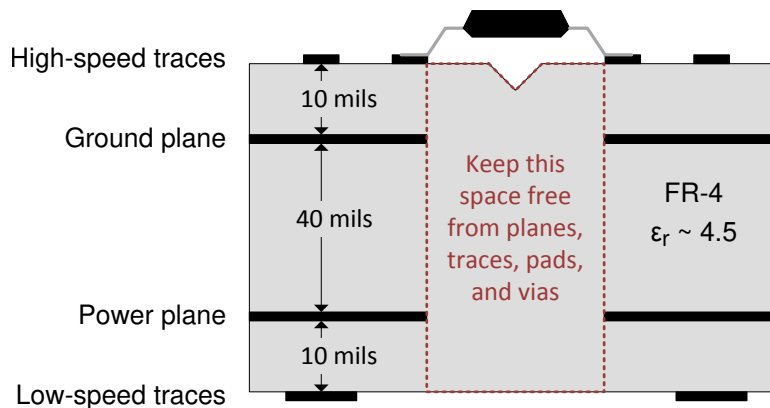
If an additional supply voltage plane or signal layer is needed, add a second power or ground plane system to the stack to keep the planes symmetrical. This makes the stack mechanically stable and prevents warping. Also the power and ground plane of each power system can be placed closer together, thus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

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

#### 10.1.1 PCB Material

For digital circuit boards operating at less than 150Mbps, (or rise and fall times greater than 1ns), 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, [ADS79xx Pin Compatible, 12-, 10-, 8-Bit, 1-MSPS, 16-, 12-, 8-, 4-Channel, Single-Ended, Serial Interface ADCs](#), data sheet
- Texas Instruments, [Digital Isolator Design Guide](#), application note
- Texas Instruments, [Isolation Glossary](#), application note
- Texas Instruments, [MSP430G2x32, MSP430G2x02 Mixed Signal Microcontrollers](#), data sheet
- Texas Instruments, [REF50xx Low-Noise, Very Low Drift, Precision Voltage Reference](#), data sheet
- Texas Instruments, [Transformer Driver for Isolated Power Supplies](#), data sheet
- Texas Instruments, [TLV707, TLV707P 200-mA, Low-IQ, Low-Noise, Low-Dropout Regulator for Portable Devices](#), data sheet

### 11.2 Related Links

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

表 11-1. Related Links

PARTS	PRODUCT FOLDER	ORDER NOW	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
ISO7841	<a href="#">Click here</a>	<a href="#">Click here</a>	<a href="#">Click here</a>	<a href="#">Click here</a>	<a href="#">Click here</a>
ISO7841F	<a href="#">Click here</a>	<a href="#">Click here</a>	<a href="#">Click here</a>	<a href="#">Click here</a>	<a href="#">Click here</a>

### 11.3 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.

### 11.4 サポート・リソース

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### 11.7 用語集

[テキサス・インスツルメンツ用語集](#)

この用語集には、用語や略語の一覧および定義が記載されています。

## 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。

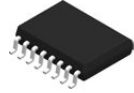
<b>Changes from Revision G (March 2017) to Revision H (May 2024)</b>	<b>Page</b>
• ドキュメント全体にわたって表、図、相互参照の採番方法を更新.....	1
• ドキュメント全体を通して規格名称を「DIN V VDE V 0884-10 (VDE V 0884-10):2006-12」から「DIN EN IEC 60747-17 (VDE 0884-17)」に更新.....	1
• Added Maximum impulse voltage ( $V_{IMP}$ ) specification to the <i>Insulation Specifications</i> section per DIN EN IEC 60747-17 (VDE 0884-17).....	5
• Changed test conditions and values of Maximum surge isolation voltage ( $V_{IOSM}$ ) specification per DIN EN IEC 60747-17 (VDE 0884-17).....	5
• Added clarification to method b test conditions for Apparent charge ( $q_{PD}$ ).....	5
• Changed the title of the <i>Electrical Characteristics—3.3V Supply</i> section to <i>Supply Current Characteristics—3.3V Supply</i> .....	10
• Changed <i>Reinforced Isolation Capacitor Life Time Projection</i> for DW and DWW packages per DIN EN IEC 60747-17 (VDE 0884-17).....	16

<b>Changes from Revision F (April 2016) to Revision G (March 2017)</b>	<b>Page</b>
• Changed part numbers in the <i>Power Ratings</i> table (previously <i>Power Dissipation Characteristics</i> ) .....	4
• Changed the input-to-output test voltage parameter to apparent charge in the <i>Insulation Specifications</i> .....	5
• Added the <i>Receiving Notification of Documentation Updates</i> section.....	26

<b>Changes from Revision E (March 2016) to Revision F (April 2016)</b>	<b>Page</b>
• 「特長」セクションの絶縁バリア寿命の年数を変更.....	1
• VDE の認証が完了.....	1
• Changed $V_{CCO}$ to $V_{CCI}$ for the minimum value of the input threshold voltage hysteresis parameter in all electrical characteristics tables.....	7
• Added $V_{CM}$ to the test condition of the common-mode transient immunity parameter in all electrical characteristics tables.....	7
• Added the lifetime projection graphs for DW and DWW packages to the <i>Safety Limiting Values</i> section .....	16

## 13 Mechanical, Packaging, and Orderable Information

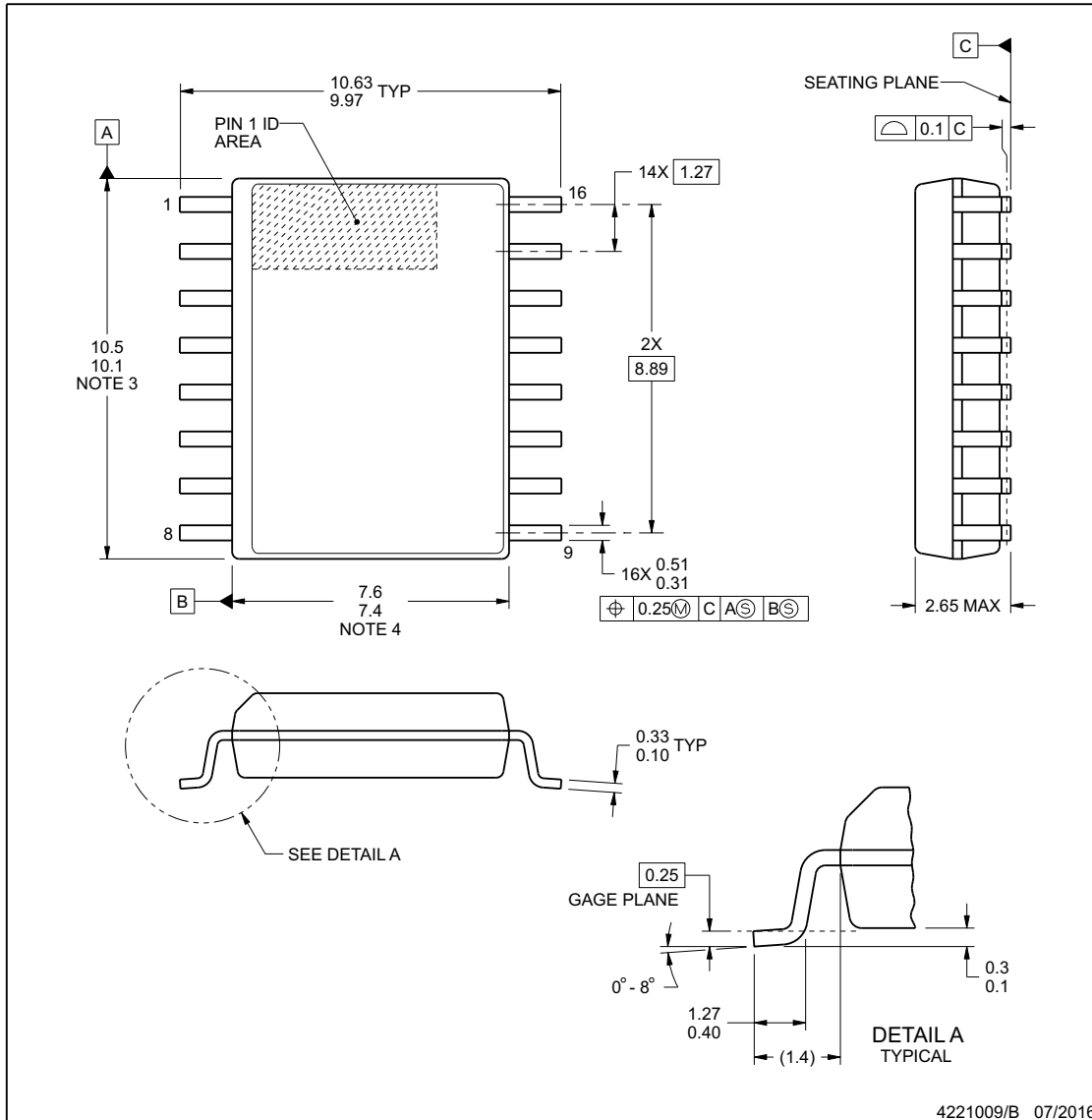
The following pages include mechanical packaging and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand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



**DW0016B**

**PACKAGE OUTLINE**  
**SOIC - 2.65 mm max height**

SOIC



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.

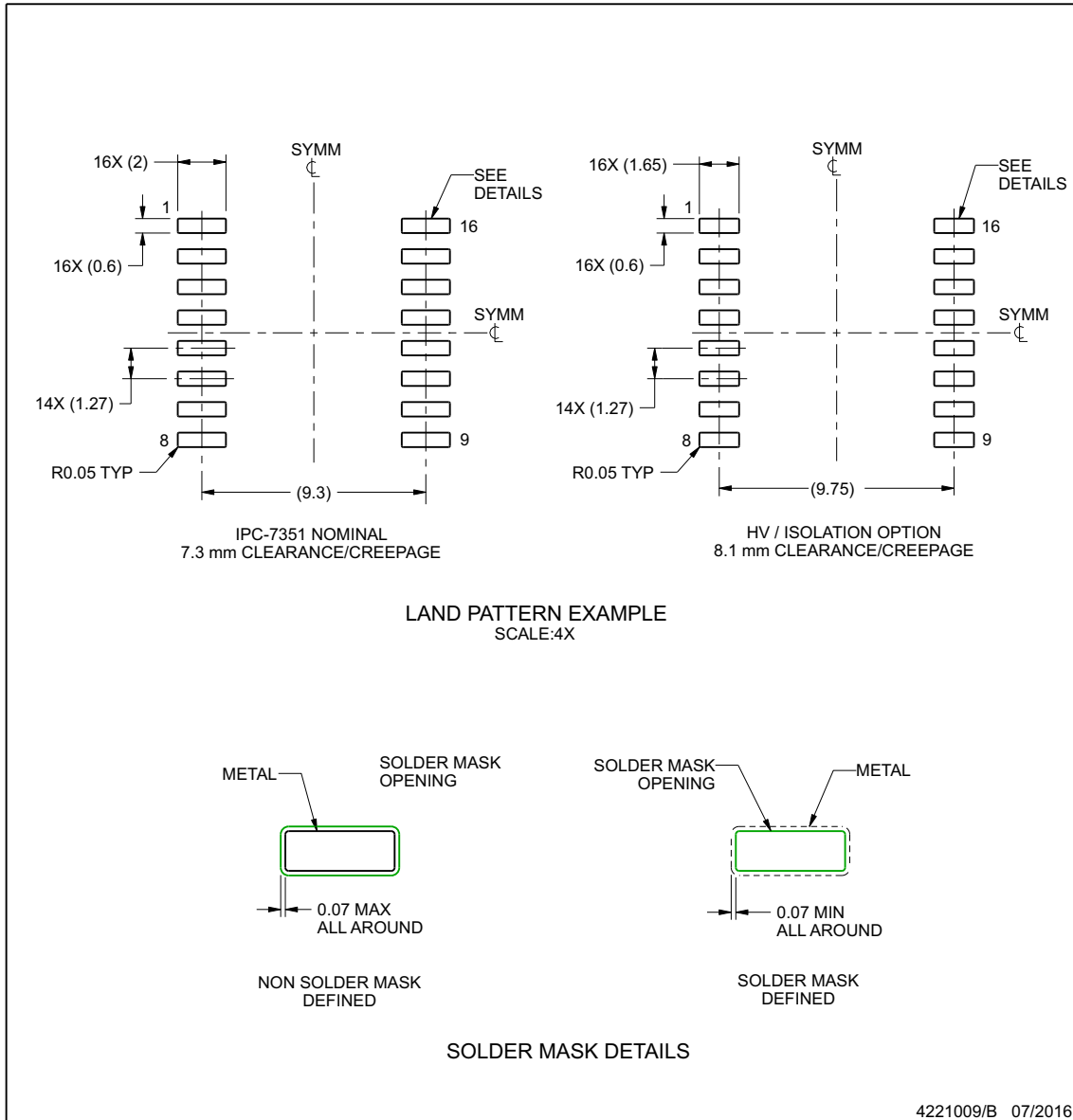
www.ti.com

## EXAMPLE BOARD LAYOUT

**DW0016B**

**SOIC - 2.65 mm max height**

SOIC



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.

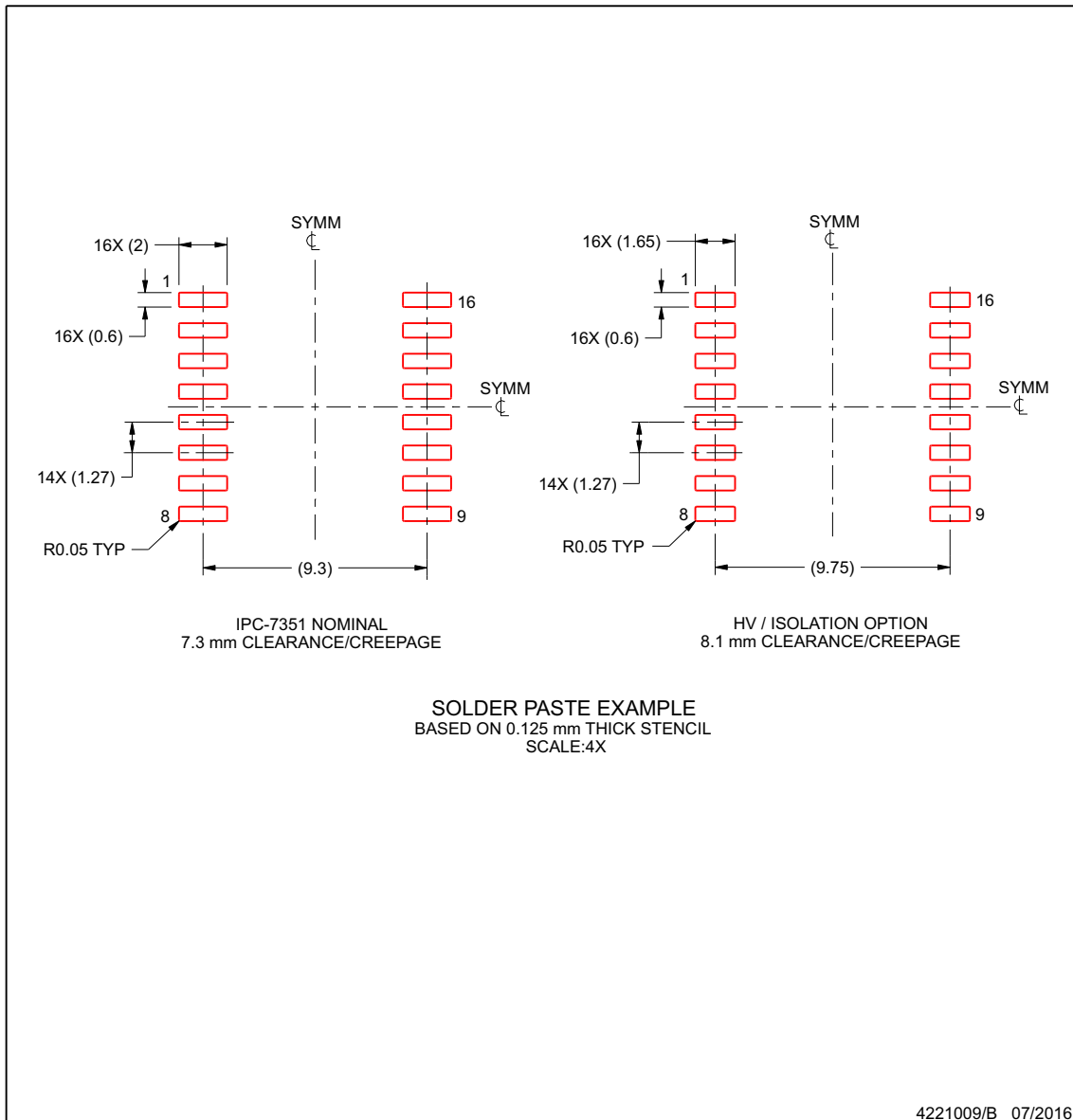
www.ti.com

## 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.

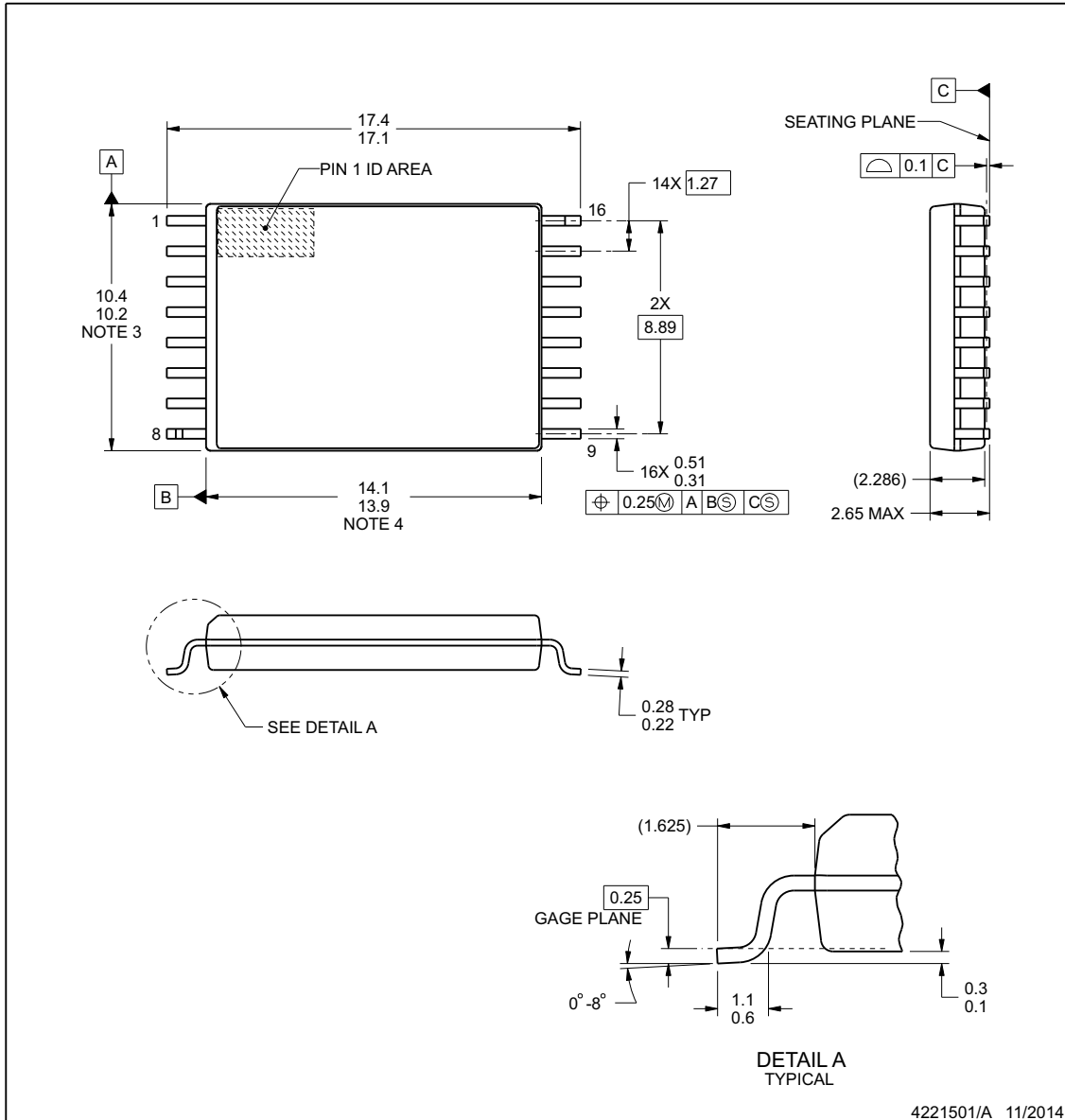
www.ti.com



**DWW0016A**

**PACKAGE OUTLINE**  
**SOIC - 2.65 mm max height**

PLASTIC SMALL OUTLINE



NOTES:

1. All linear dimensions are in millimeters. Any 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.

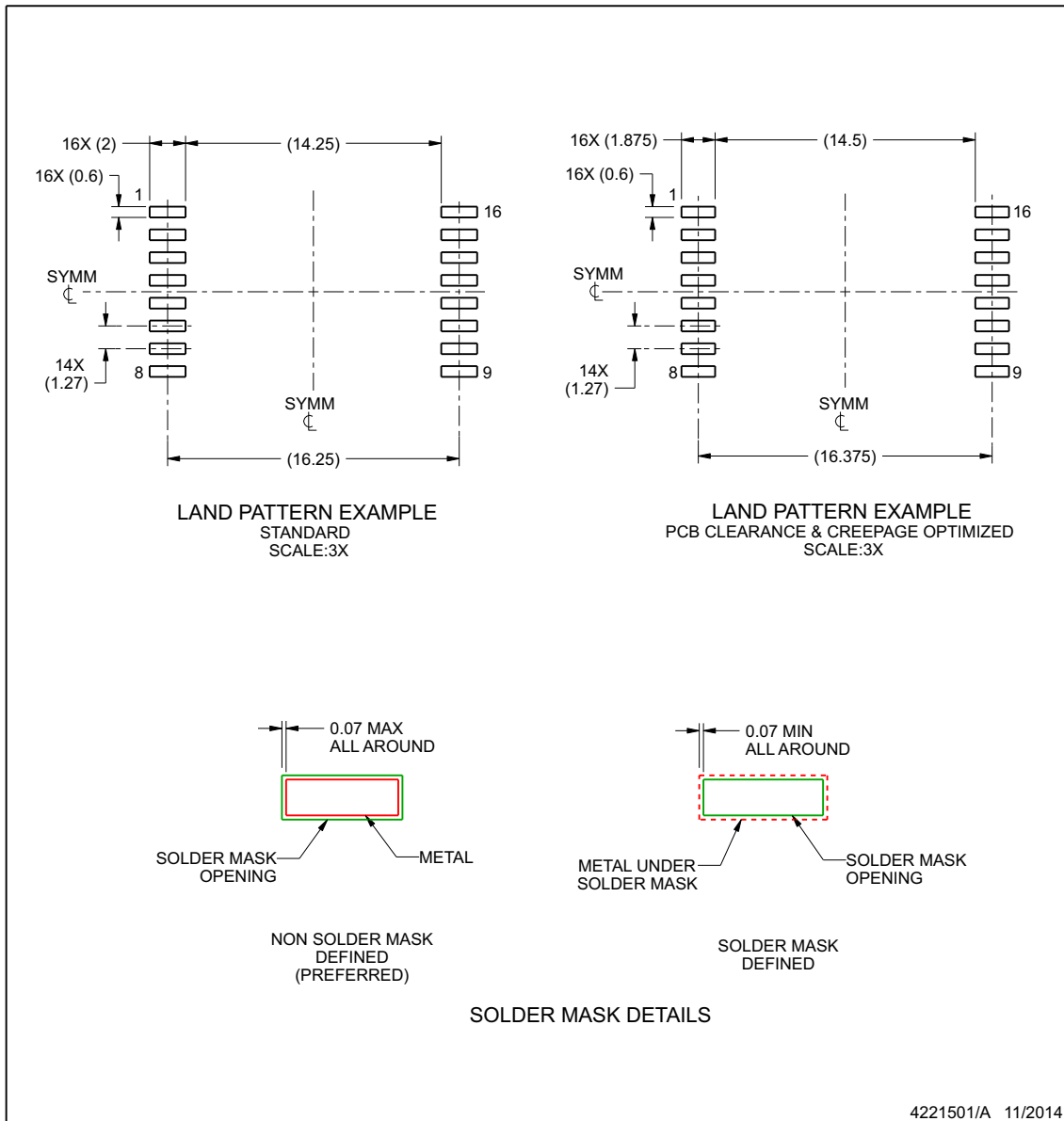
www.ti.com

## EXAMPLE BOARD LAYOUT

**DWW0016A**

**SOIC - 2.65 mm max height**

PLASTIC SMALL OUTLINE



NOTES: (continued)

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

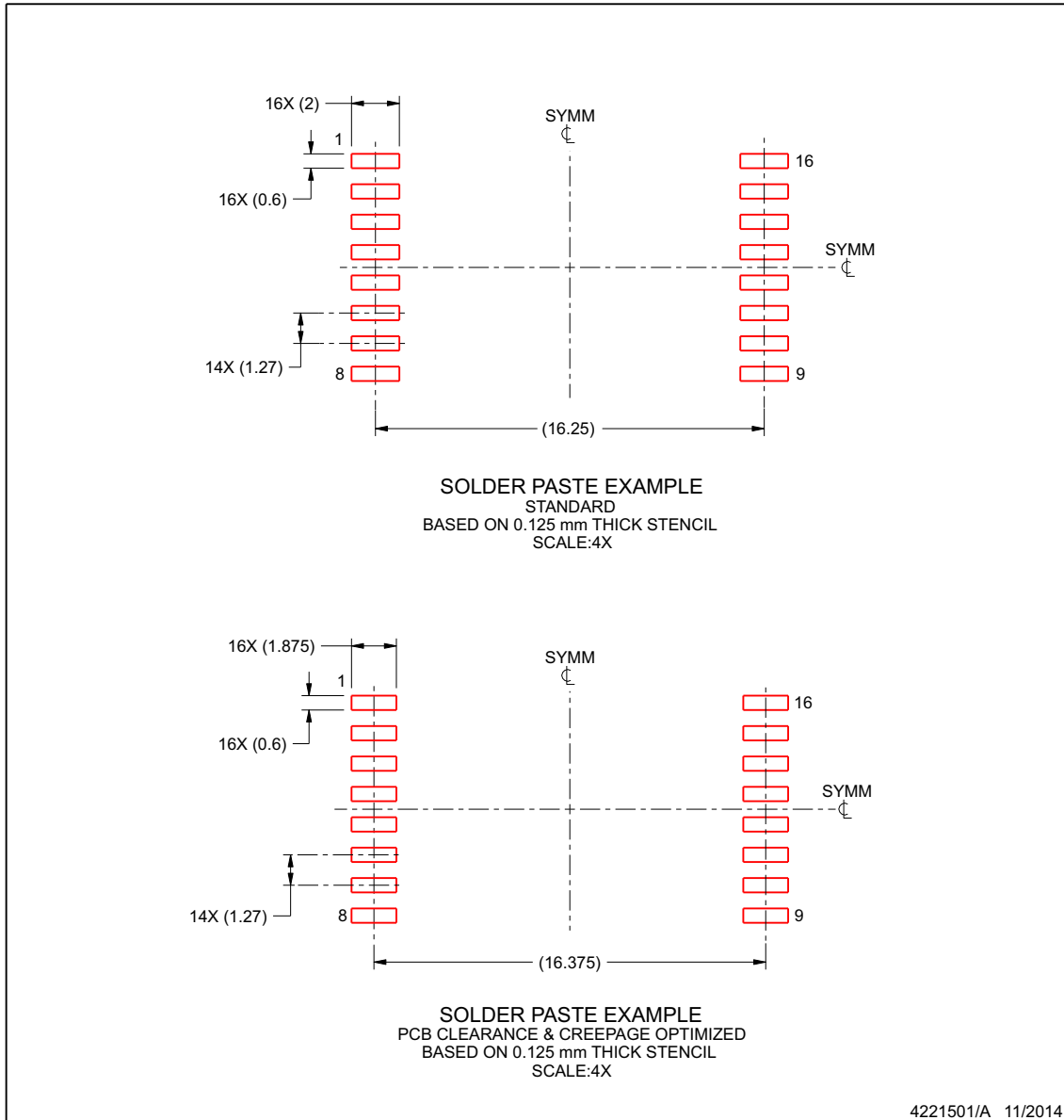


## EXAMPLE STENCIL DESIGN

**DWW0016A**

**SOIC - 2.65 mm max height**

PLASTIC SMALL OUTLINE



NOTES: (continued)

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

[www.ti.com](http://www.ti.com)

**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
ISO7841DW	ACTIVE	SOIC	DW	16	40	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841	<a href="#">Samples</a>
ISO7841DWR	ACTIVE	SOIC	DW	16	2000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841	<a href="#">Samples</a>
ISO7841DWW	ACTIVE	SOIC	DWW	16	45	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841	<a href="#">Samples</a>
ISO7841DWWR	ACTIVE	SOIC	DWW	16	1000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841	<a href="#">Samples</a>
ISO7841FDW	ACTIVE	SOIC	DW	16	40	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841F	<a href="#">Samples</a>
ISO7841FDWR	ACTIVE	SOIC	DW	16	2000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841F	<a href="#">Samples</a>
ISO7841FDWW	ACTIVE	SOIC	DWW	16	45	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841F	<a href="#">Samples</a>
ISO7841FDWWR	ACTIVE	SOIC	DWW	16	1000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841F	<a href="#">Samples</a>

(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.

**OBSELETE:** 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.

<sup>(6)</sup> 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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**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
ISO7841DWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7841DWWR	SOIC	DWW	16	1000	330.0	24.4	18.0	10.0	3.0	20.0	24.0	Q1
ISO7841FDWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7841FDWWR	SOIC	DWW	16	1000	330.0	24.4	18.0	10.0	3.0	20.0	24.0	Q1

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
ISO7841DWR	SOIC	DW	16	2000	350.0	350.0	43.0
ISO7841DWWR	SOIC	DWW	16	1000	350.0	350.0	43.0
ISO7841FDWR	SOIC	DW	16	2000	350.0	350.0	43.0
ISO7841FDWWR	SOIC	DWW	16	1000	350.0	350.0	43.0

**TUBE**


\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
ISO7841DW	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7841DWW	DWW	SOIC	16	45	507	20	5000	9
ISO7841FDW	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7841FDWW	DWW	SOIC	16	45	507	20	5000	9

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