ISO7841x High-Performance, 8000V_{PK} Reinforced Quad-Channel Digital Isolator

1 Features

- Signaling Rate: Up to 100Mbps
- Wide Supply Range: 2.25V to 5.5V
- 2.25V to 5.5V Level Translation
- Wide Temperature Range: –55°C to 125°C
- Low-Power Consumption, Typical 1.7mA per Channel at 1Mbps
- Low Propagation Delay: 11ns Typical (5V Supplies)
- Industry leading CMTI (Min): ±100kV/µs
- Robust Electromagnetic Compatibility (EMC)
- System-Level ESD, EFT, and Surge Immunity
- Low Emissions
- Isolation Barrier Life: >40 Years
- Wide Body SOIC-16 Package and Extra-Wide Body SOIC-16 Package Options
- Safety and Regulatory Approvals:
  - 8000V_{PK} Reinforced Isolation per DIN EN IEC 60747-17 (VDE 0884-17)
  - 5.7kV_{RMS} Isolation for 1 Minute per UL 1577
  - CSA Component Acceptance Notice 5A, IEC 60950-1 and IEC 60601-1 End Equipment Standards
  - CQC Certification per GB4943.1
  - TUV Certification per EN 61010-1 and EN 62368-1

2 Applications

- Industrial Automation
- Motor Control
- Power Supplies
- Solar Inverters
- Medical Equipment
- Hybrid Electric Vehicles

3 Description

The ISO7841x device is a high-performance, quad-channel digital isolator with a 8000V_{PK} isolation voltage. This device has reinforced isolation certifications according to VDE, CSA, CQC, and TUV. The isolator provides high electromagnetic immunity and low emissions at low-power consumption while isolating CMOS or LVCMOS digital I/Os. Each isolation channel has a logic input and output buffer separated by a silicon-dioxide (SiO_2) insulation barrier.

This device comes with enable pins that can be used to put the respective outputs in high impedance for multi-controller driving applications and to reduce power consumption. The ISO7841 device has three forward and one reverse-direction channels. If the input power or signal is lost, the default output is *high* for the ISO7841 device and *low* for the ISO7841F device. See the *Device Functional Modes* section for further details.

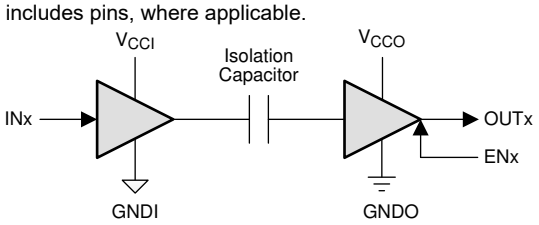
Used in conjunction with isolated power supplies, this device helps prevent noise currents on a data bus or other circuits from entering the local ground and interfering with or damaging sensitive circuitry. Through innovative chip design and layout techniques, electromagnetic compatibility of the ISO7841 device has been significantly enhanced to ease system-level ESD, EFT, surge, and emissions compliance.

The ISO7841 device is available in 16-pin SOIC wide-body (DW) and extra-wide body (DWW) packages.

Package Information

PART NUMBER	PACKAGE(1)	PACKAGE SIZE(2)	BODY SIZE (NOM)
ISO7841 ISO7841F	DW (16)	10.30mm × 10.30mm	10.30mm × 7.50mm
	DWW (16)	10.30mm × 17.25mm	10.30mm × 14.0mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.
(2) The package size (length × width) is a nominal value and includes pins, where applicable.



V_{CCI} and GNDI are supply and ground connections respectively for the input channels.
V_{CCO} and GNDO are supply and ground connections respectively for the output channels.

Simplified Schematic

An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCTION DATA.

Table of Contents

1 Features....1
2 Applications....1
3 Description....1
4 Pin Configuration and Functions....2
Pin Functions....2
5 Specifications....3
5.1 Absolute Maximum Ratings....3
5.2 ESD Ratings....3
5.3 Recommended Operating Conditions....3
5.4 Thermal Information....4
5.5 Power Ratings....4
5.6 Insulation Specifications....5
5.7 Safety-Related Certifications....6
5.8 Safety Limiting Values....6
5.9 Electrical Characteristics—5V Supply....7
5.10 Supply Current Characteristics—5V Supply....8
5.11 Electrical Characteristics—3.3V Supply....9
5.12 Supply Current Characteristics—3.3V Supply....10
5.13 Electrical Characteristics—2.5V Supply....11
5.14 Supply Current Characteristics—2.5V Supply....12
5.15 Switching Characteristics—5V Supply....13
5.16 Switching Characteristics—3.3V Supply....14
5.17 Switching Characteristics—2.5V Supply....15
5.18 Insulation Characteristics Curves....16
5.19 Typical Characteristics....17
6 Parameter Measurement Information....18
7 Detailed Description....20
7.1 Overview....20
7.2 Functional Block Diagram....20
7.3 Feature Description....21
7.4 Device Functional Modes....21
8 Application and Implementation....22
8.1 Application Information....22
8.2 Typical Application....22
8.3 Power Supply Recommendations....24
8.4 Layout....25
9 Device and Documentation Support....26
9.1 Documentation Support....26
9.2 Related Links....26
9.3 Receiving Notification of Documentation Updates....26
9.4 Support Resources....26
9.5 Trademarks....26
9.6 Electrostatic Discharge Caution....26
9.7 Glossary....26
10 Revision History....26
11 Mechanical, Packaging, and Orderable Information....27

4 Pin Configuration and Functions

Pin Functions

PIN		Type[1]	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_{CC1}
	8		
GND2	9	—	Ground connection for V_{CC2}
	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_{CC1}	1	—	Power supply, V_{CC1}
V_{CC2}	16	—	Power supply, V_{CC2}

(1) I = Input, O = Output

Copyright © 2024 Texas Instruments Incorporated

5 Specifications

5.1 Absolute Maximum Ratings

See (1)

			MIN	MAX	UNIT
V_{CC1}, V_{CC2}	Supply voltage(2)		–0.5	6	V
	Voltage	INx	–0.5	V_{CCX} + 0.5(3)	V
		OUTx	–0.5	V_{CCX} + 0.5(3)	
		ENx	–0.5	V_{CCX} + 0.5(3)	
I_O	Output current		–15	15	mA
	Surge immunity			12.8	kV
T_{stg}	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
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins(1)	±6000	V
		Charged device model (CDM), per JEDEC specification JESD22-C101, all pins(2)	±1500	

(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_{CC1}, V_{CC2}	Supply voltage		2.25		5.5	V
I_{OH}	High-level output current	V_{CCO} (2) = 5V	-4			mA
		V_{CCO} (2) = 3.3V	-2			
		V_{CCO} (2) = 2.5V	-1			
I_{OL}	Low-level output current	V_{CCO} (2) = 5V		4		mA
		V_{CCO} (2) = 3.3V		2		
		V_{CCO} (2) = 2.5V		1		
V_{IH}	High-level input voltage		0.7 × V_{CCI} (2)		V_{CCI} (2)	V
V_{IL}	Low-level input voltage		0		0.3 × V_{CCI} (2)	V
DR	Signaling Rate		0		100	Mbps
T_J	Junction temperature(1)		-55		150	°C
T_A	Ambient temperature		-55	25	125	°C

(1) To maintain the recommended operating conditions for T_J, see *Section 5.4*.
(2) V_{CCI} = Input-side V_{CC}; V_{CCO} = Output-side V_{CC}.

Copyright © 2024 Texas Instruments Incorporated

5.4 Thermal Information

THERMAL METRIC[1]		ISO7841		UNIT
		DW (SOIC)	DWW (SOIC)	
		16 Pins	16 Pins	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	78.9	78.9	°C/W
$R_{\theta JC(top)}$	Junction-to-case(top) thermal resistance	41.6	41.1	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	43.6	49.5	°C/W
ψ_{JT}	Junction-to-top characterization parameter	15.5	15.2	°C/W
ψ_{JB}	Junction-to-board characterization parameter	43.1	48.8	°C/W
$R_{\theta JC(bottom)}$	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_{CC1} = V_{CC2} = 5.5V, T_J = 150°C, C_L = 15pF, input a 50MHz 50% duty cycle square wave

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
P_D	Maximum power dissipation by ISO7841x				200	mW
P_{D1}	Maximum power dissipation by side-1 of ISO7841x				75	mW
P_{D2}	Maximum power dissipation by side-2 of ISO7841x				125	mW

Copyright © 2024 Texas Instruments Incorporated

5.6 Insulation Specifications

PARAMETER		TEST CONDITIONS	SPECIFICATION		UNIT
			DW	DWW	
GENERAL					
CLR	External clearance(1)	Shortest pin-to-pin distance through air	>8	>14.5	mm
		Shortest pin-to-pin distance through air (typical)		15.0	mm
CPG	External creepage(1)	Shortest pin-to-pin distance across the package surface	>8	>14.5	mm
		Shortest pin-to-pin distance across the package surface (typical)		15.0	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_{RMS}	I–IV	I–IV	
		Rated mains voltage ≤ 1000V_{RMS}	I–III	I–IV	
DIN EN IEC 60747-17 (VDE 0884-17)(2)					
V_{IORM}	Maximum repetitive peak isolation voltage		2121	2828	V_{PK}
V_{IOWM}	Maximum isolation working voltage	AC voltage (sine wave); Time dependent dielectric breakdown (TDDB) Test, see Figure 5-1 and Figure 5-2	1500	2000	V_{RMS}
		DC voltage	2121	2828	V_{DC}
V_{IOTM}	Maximum transient isolation voltage	V_{TEST} = 1.2 × V_{IOTM} t = 60s (qualification) t= 1s (100% production)	8000	8000	V_{PK}
V_{IMP}	Maximum impulse voltage (3)	Tested in air, 1.2/50µs waveform per IEC 62368-1	9800	9800	V_{PK}
V_{IOSM}	Maximum surge isolation voltage (4)	V_{IOSM} ≥ 1.3 x V_{IMP}; Tested in oil (qualification test), 1.2/50-µs waveform per IEC 62368-1	12800	12800	V_{PK}
q_{pd}	Apparent charge (5)	Method a: After I/O safety test subgroup 2/3, V_{ini} = V_{IOTM}, t_{ini} = 60s; $V_{pd(m)}$ = 1.2 × V_{IOTM} = 2545V_{PK} (DW) and 3394V_{PK} (DWW), t_m = 10s	≤5	≤5	pC
		Method a: After environmental tests subgroup 1, V_{ini} = V_{IOTM}, t_{ini} = 60s; $V_{pd(m)}$ = 1.6 × V_{IORM} = 3394V_{PK} (DW) and 4525V_{PK} (DWW), t_m = 10s	≤5	≤5	
		Method b: At routine test (100% production); V_{ini} = 1.2 x V_{IOTM}, t_{ini} = 1s; $V_{pd(m)}$ = 1.875 x V_{IORM}, t_m = 1s (method b1) or $V_{pd(m)}$ = V_{ini}, t_m = t_{ini} (method b2)	≤5	≤5	
C_{IO}	Barrier capacitance, input to output(6)	V_{IO} = 0.4 × sin (2πft), f = 1MHz	2	2	pF
R_{IO}	Isolation resistance, input to output (6)	V_{IO} = 500V, T_A = 25°C	>10^{12}	>10^{12}	Ω
		V_{IO} = 500V, 100°C ≤ T_A ≤ 125°C	>10^{11}	>10^{11}	
		V_{IO} = 500V at T_S = 150°C	>10^9	>10^9	
	Pollution degree		2	2	
	Climatic category		55/125/21	55/125/21	
UL 1577					
V_{ISO}	Withstand isolation voltage	V_{TEST} = V_{ISO} = 5700V_{RMS}, t = 60s (qualification), V_{TEST} = 1.2 × V_{ISO} = 6840V_{RMS}, t = 1s (100% production)	5700	5700	V_{RMS}

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

Copyright © 2024 Texas Instruments Incorporated

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_{PK}; Maximum repetitive peak isolation voltage, 2121V_{PK} (DW), 2828V_{PK} (DWW); Maximum surge isolation voltage, 12800V_{PK}	Reinforced insulation per CSA 60950-1-07+A1+A2 and IEC 60950-1 2nd Ed., 800V_{RMS} (DW) and 1450V_{RMS} (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_{RMS} (DW) and 400V_{RMS} (DWW) max working voltage	Single protection, 5700V_{RMS}	Reinforced Insulation, Altitude ≤ 5000m, Tropical Climate, 700V_{RMS} (DW) and 1450V_{RMS} (DWW) maximum working voltage	5700 V_{RMS} Reinforced insulation per EN 61010-1 up to working voltage of 600V_{RMS} (DW) and 1000V_{RMS} (DWW); 5700V_{RMS} Reinforced insulation per EN 62368-1 up to working voltage of 800V_{RMS} (DW) and 1450V_{RMS} (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_S	Safety input, output, or supply current	$R_{\theta JA}$ = 78.9°C/W, V_I = 5.5V, T_J = 150°C, T_A = 25°C			288	mA
		$R_{\theta JA}$ = 78.9°C/W, V_I = 3.6V, T_J = 150°C, T_A = 25°C			440	
		$R_{\theta JA}$ = 78.9°C/W, V_I = 2.75V, T_J = 150°C, T_A = 25°C			576	
P_S	Safety input, output, or total power	$R_{\theta JA}$ = 78.9°C/W, T_J = 150°C, T_A = 25°C			1584	mW
T_S	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 *Section 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.

Copyright © 2024 Texas Instruments Incorporated

5.9 Electrical Characteristics—5V Supply

V_{CC1} = V_{CC2} = 5V ±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 Figure 6-1	V_{CCO} (1) – 0.4	V_{CCO} (1) – 0.2		V
V_{OL}	Low-level output voltage	I_{OL} = 4mA; see Figure 6-1		0.2	0.4	V
$V_{I(HYS)}$	Input threshold voltage hysteresis		0.1 × V_{CCI} (1)			V
I_{IH}	High-level input current	V_{IH} = V_{CCI} (1) at INx or ENx			10	µA
I_{IL}	Low-level input current	V_{IL} = 0V at INx or ENx	–10			µA
CMTI	Common-mode transient immunity	V_I = V_{CCI} (1) or 0V, V_{CM} = 1500V; see Figure 6-4	100			kV/µs
C_I	Input capacitance	V_I = V_{CC}/2 + 0.4 × sin (2πft), f = 1MHz, V_{CC} = 5V		2		pF

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

Copyright © 2024 Texas Instruments Incorporated

5.10 Supply Current Characteristics—5V Supply

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

PARAMETER	TEST CONDITIONS		SUPPLY CURRENT	MIN	TYP	MAX	UNIT
ISO7841DW AND ISO7841FDW							
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	
ISO7841DWW AND ISO7841FDWW							
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}.

Copyright © 2024 Texas Instruments Incorporated

5.11 Electrical Characteristics—3.3V Supply

V_{CC1} = V_{CC2} = 3.3V ±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 Figure 6-1	V_{CCO} (1) – 0.4	V_{CCO} (1) – 0.2		V
V_{OL}	Low-level output voltage	I_{OL} = 2mA; see Figure 6-1		0.2	0.4	V
$V_{I(HYS)}$	Input threshold voltage hysteresis		0.1 × V_{CCI} (1)			V
I_{IH}	High-level input current	V_{IH} = V_{CCI} (1) at INx or ENx			10	µA
I_{IL}	Low-level input current	V_{IL} = 0V at INx or ENx	-10			µA
CMTI	Common-mode transient immunity	V_I = V_{CCI} (1) or 0V, V_{CM} = 1500V; see Figure 6-4	100			kV/µs

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

Copyright © 2024 Texas Instruments Incorporated

5.12 Supply Current Characteristics—3.3V Supply

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

PARAMETER	TEST CONDITIONS		SUPPLY CURRENT	MIN	TYP	MAX	UNIT
ISO7841DW AND ISO7841FDW							
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	
ISO7841DWW AND ISO7841FDWW							
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}.

Copyright © 2024 Texas Instruments Incorporated

5.13 Electrical Characteristics—2.5V Supply

V_{CC1} = V_{CC2} = 2.5V ±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 Figure 6-1	V_{CCO} (1) – 0.4	V_{CCO} (1) – 0.2		V
V_{OL}	Low-level output voltage	I_{OL} = 1mA; see Figure 6-1		0.2	0.4	V
$V_{I(HYS)}$	Input threshold voltage hysteresis		0.1 × V_{CCI} (1)			V
I_{IH}	High-level input current	V_{IH} = V_{CCI} (1) at INx or ENx			10	µA
I_{IL}	Low-level input current	V_{IL} = 0V at INx or ENx	–10			µA
CMTI	Common-mode transient immunity	V_I = V_{CCI} (1) or 0V, V_{CM} = 1500V; see Figure 6-4	100			kV/µs

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

Copyright © 2024 Texas Instruments Incorporated

5.14 Supply Current Characteristics—2.5V Supply

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

PARAMETER	TEST CONDITIONS		SUPPLY CURRENT	MIN	TYP	MAX	UNIT
ISO7841DW AND ISO7841FDW							
Supply current	Disable	EN1 = EN2 = 0V, V_I = 0V (ISO7841F), V_I = V_{CCI} (1) (ISO7841)	I_{CC1}		1.1	1.7	mA
			I_{CC2}		0.8	1.2	
		EN1 = EN2 = 0V, V_I = V_{CCI} (1) (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} (1) (ISO7841)	I_{CC1}		1.6	2.3	mA
			I_{CC2}		2.2	3.1	
		V_I = V_{CCI} (1) (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	
ISO7841DWW AND ISO7841FDWW							
Supply current	Disable	EN1 = EN2 = 0V, V_I = 0V (ISO7841F), V_I = V_{CCI} (1) (ISO7841)	I_{CC1}		1.1	1.7	mA
			I_{CC2}		0.8	1.2	
		EN1 = EN2 = 0V, V_I = V_{CCI} (1) (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} (1) (ISO7841)	I_{CC1}		1.6	2.4	mA
			I_{CC2}		2.2	3.3	
		V_I = V_{CCI} (1) (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}.

Copyright © 2024 Texas Instruments Incorporated

5.15 Switching Characteristics—5V Supply

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay time	See Figure 6-1	6	11	16	ns
PWD	Pulse width distortion(1) $\lvert t_{PHL} - t_{PLH} \rvert$			0.55	4.1	ns
$t_{sk(o)}$	Channel-to-channel output skew time(2)	Same-direction channels			2.5	ns
$t_{sk(pp)}$	Part-to-part skew time(3)				4.5	ns
t_r	Output signal rise time	See Figure 6-1		1.7	3.9	ns
t_f	Output signal fall time			1.9	3.9	ns
t_{PHZ}	Disable propagation delay, high-to-high impedance output	See Figure 6-2		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	µs
t_{PZL}	Enable propagation delay, high impedance-to-low output for ISO7841			2	2.5	µs
	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 Figure 6-3		0.2	9	µs
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.

Copyright © 2024 Texas Instruments Incorporated

5.16 Switching Characteristics—3.3V Supply

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay time	See Figure 6-1	6	10.8	16	ns
PWD	Pulse width distortion(1) $\lvert t_{PHL} - t_{PLH} \rvert$	See Figure 6-1		0.7	4.2	ns
$t_{sk(o)}$	Channel-to-channel output skew time(2)	Same-direction channels			2.2	ns
$t_{sk(pp)}$	Part-to-part skew time				4.5	ns
t_r	Output signal rise time	See Figure 6-1		0.8	3	ns
t_f	Output signal fall time	See Figure 6-1		0.8	3	ns
t_{PHZ}	Disable propagation delay, high-to-high impedance output	See Figure 6-2		17	32	ns
t_{PLZ}	Disable propagation delay, low-to-high impedance output	See Figure 6-2		17	32	ns
t_{PZH}	Enable propagation delay, high impedance-to-high output for ISO7841	See Figure 6-2		17	32	ns
	Enable propagation delay, high impedance-to-high output for ISO7841F	See Figure 6-2		2	2.5	µs
t_{PZL}	Enable propagation delay, high impedance-to-low output for ISO7841	See Figure 6-2		2	2.5	µs
	Enable propagation delay, high impedance-to-low output for ISO7841F	See Figure 6-2		17	32	ns
t_{fs}	Default output delay time from input power loss	Measured from the time V_{CC} goes below 1.7V. See Figure 6-3		0.2	9	µs
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.

Copyright © 2024 Texas Instruments Incorporated

5.17 Switching Characteristics—2.5V Supply

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay time	See Figure 6-1	7.5	11.7	17.5	ns
PWD	Pulse width distortion(1) $\lvert t_{PHL} - t_{PLH} \rvert$			0.66	4.2	ns
$t_{sk(o)}$	Channel-to-channel output skew time(2)	Same-direction Channels			2.2	ns
$t_{sk(pp)}$	Part-to-part skew time(3)				4.5	ns
t_r	Output signal rise time	See Figure 6-1		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 Figure 6-2		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	µs
t_{PZL}	Enable propagation delay, high impedance-to-low output for ISO7841			2	2.5	µs
	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 Figure 6-3		0.2	9	µs
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.

Copyright © 2024 Texas Instruments Incorporated

5.18 Insulation Characteristics Curves

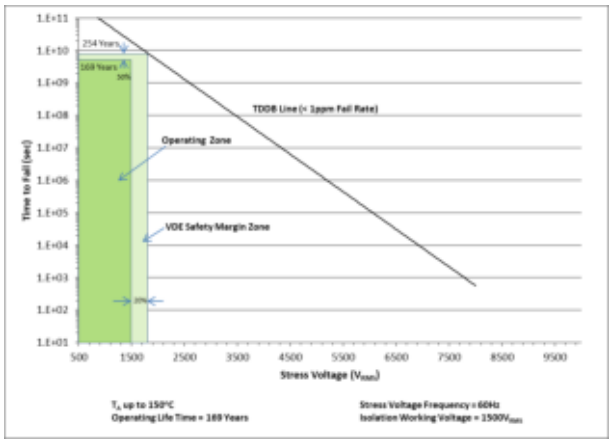


Figure 5-1. Reinforced Isolation Capacitor Life Time Projection for Devices in DW Package

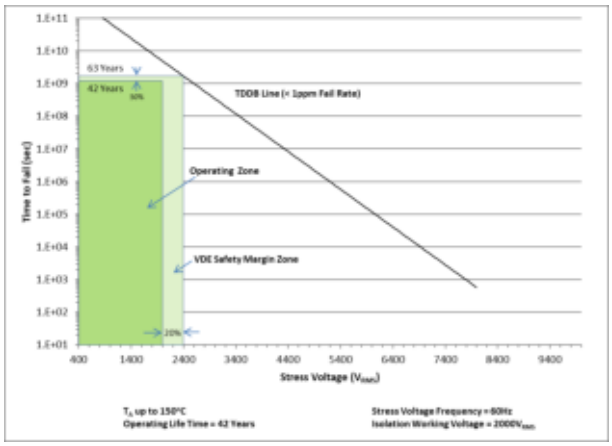


Figure 5-2. Reinforced Isolation Capacitor Life Time Projection for Devices in DWW Package

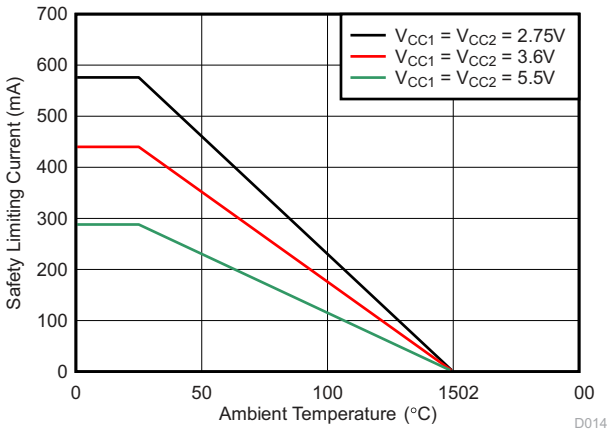


Figure 5-3. Thermal Derating Curve for Limiting Current per VDE

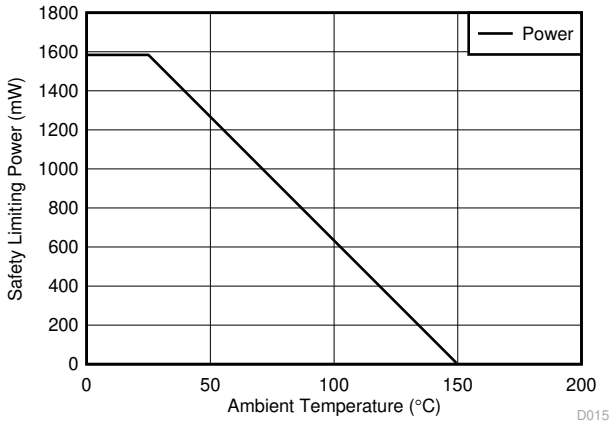
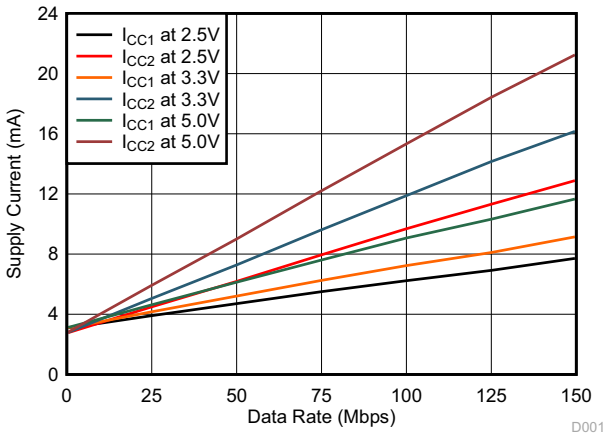


Figure 5-4. Thermal Derating Curve for Limiting Power per VDE

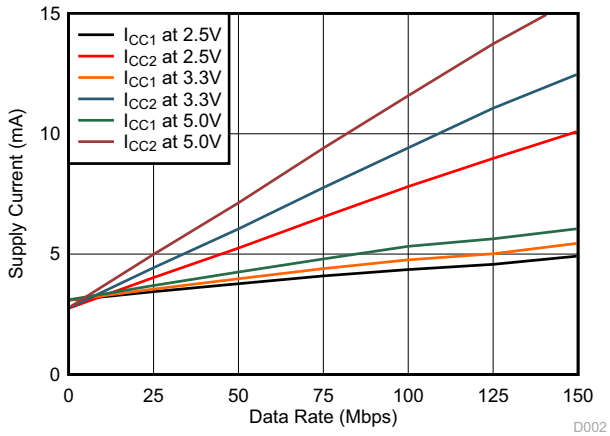
Copyright © 2024 Texas Instruments Incorporated

5.19 Typical Characteristics



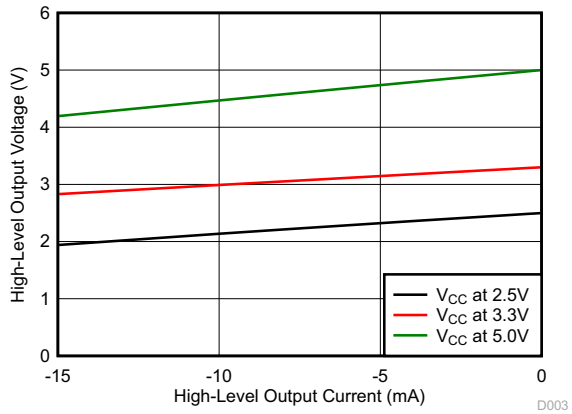
T_A = 25°C C_L = 15pF

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



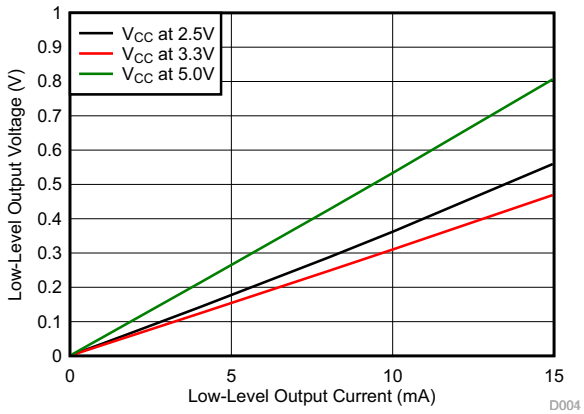
T_A = 25°C C_L = No Load

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



T_A = 25°C

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



T_A = 25°C

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

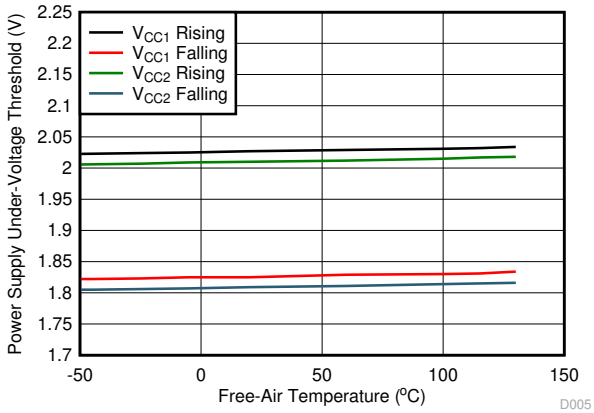


Figure 5-9. Power Supply Undervoltage Threshold vs Free-Air Temperature

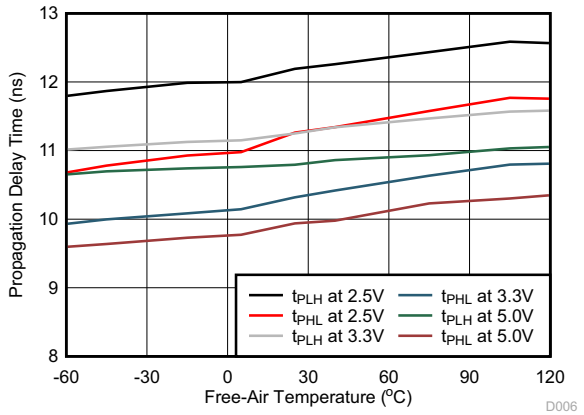
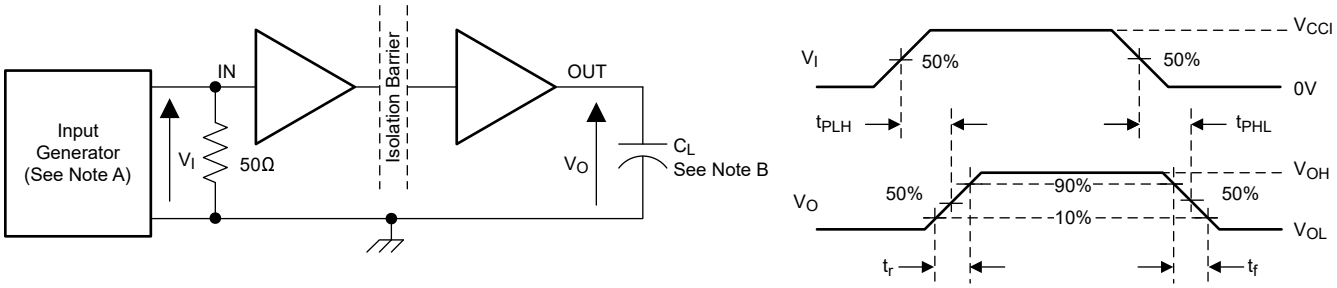


Figure 5-10. Propagation Delay Time vs Free-Air Temperature

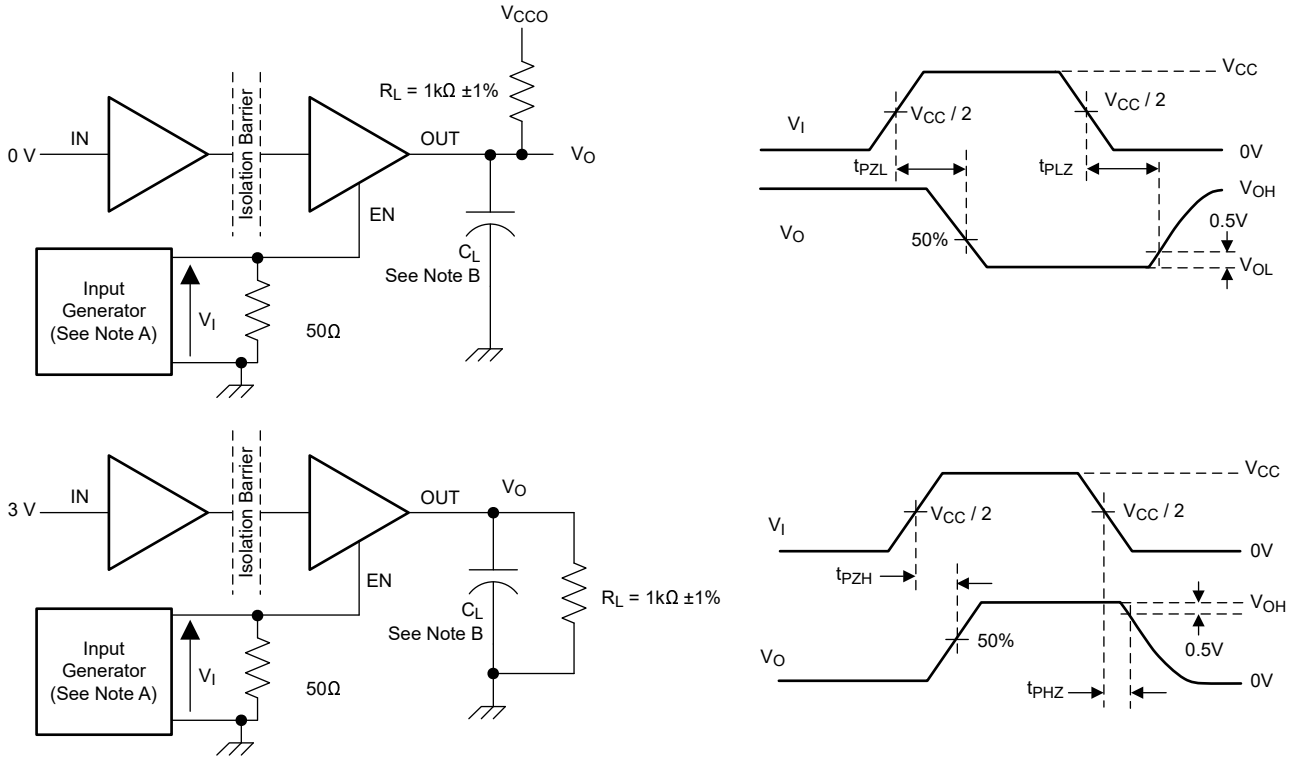
6 Parameter Measurement Information



A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 50kHz, 50% duty cycle, t_r ≤ 3ns, t_f ≤ 3ns, Z_O = 50Ω. 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 = 15pF and includes instrumentation and fixture capacitance within ±20%.

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

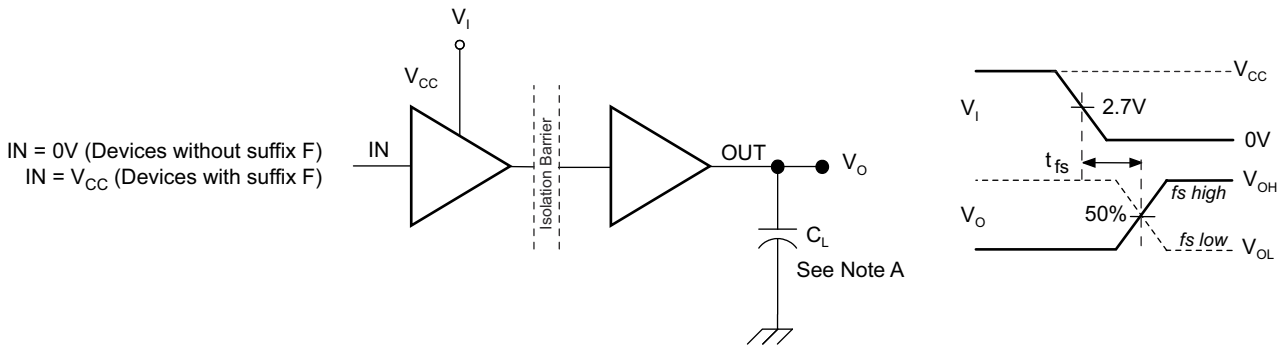


A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 10kHz, 50% duty cycle, t_r ≤ 3ns, t_f ≤ 3ns, Z_O = 5Ω.

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

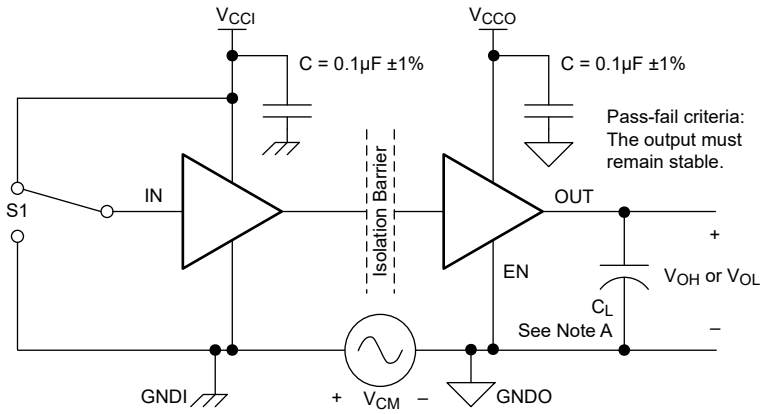
Figure 6-2. Enable/Disable Propagation Delay Time Test Circuit and Waveform

Copyright © 2024 Texas Instruments Incorporated



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

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



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

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

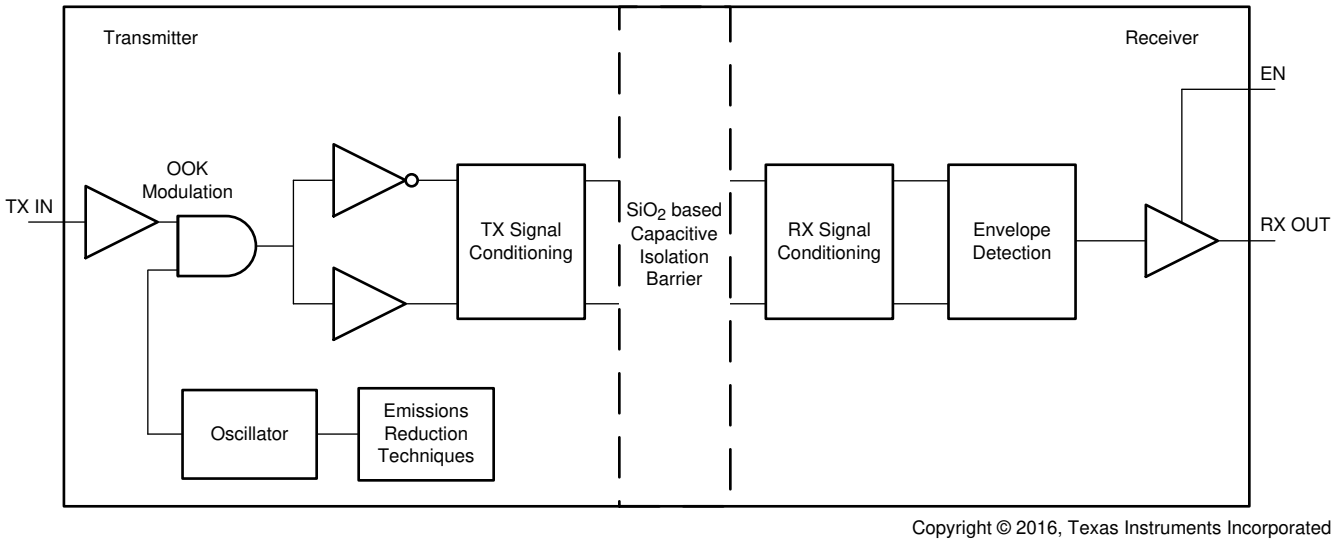
Copyright © 2024 Texas Instruments Incorporated

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, Figure 7-1, shows a functional block diagram of a typical channel.

7.2 Functional Block Diagram



Copyright © 2016, Texas Instruments Incorporated

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

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

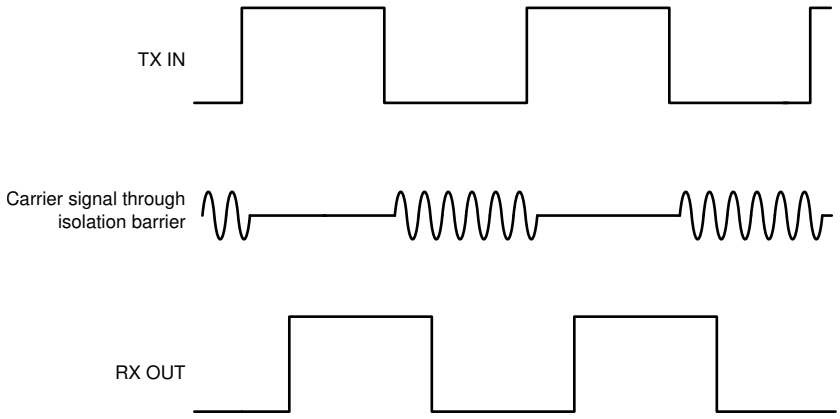


Figure 7-2. On-Off Keying (OOK) Based Modulation Scheme

Copyright © 2024 Texas Instruments Incorporated

7.3 Feature Description

Table 7-1 lists the device features.

Table 7-1. Device Features

PART NUMBER	CHANNEL DIRECTION	RATED ISOLATION	MAXIMUM DATA RATE	DEFAULT OUTPUT
ISO7841	3 Forward, 1 Reverse	5700V_{RMS} / 8000V_{PK} (1)	100Mbps	High
ISO7841F	3 Forward, 1 Reverse	5700V_{RMS} / 8000V_{PK} (1)	100Mbps	Low

(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

Table 7-2 lists the ISO7841 functional modes.

Table 7-2. Function Table

V_{CCI}	V_{CCO}	INPUT (INx)(2)	OUTPUT ENABLE (ENx)	OUTPUT (OUTx)	COMMENTS
PU	PU	H	H or open	H	Normal Operation: A channel output assumes the logic state of the input.
		L	H or open	L	
		Open	H or open	Default	Default mode: When INx is open, the corresponding channel output goes to the default logic state. Default= High for ISO7841 and Low for ISO7841F.
X	PU	X	L	Z	A low value of Output Enable causes the outputs to be high-impedance
PD	PU	X	H or open	Default	Default mode: When V_{CCI} is unpowered, a channel output assumes the logic state based on the selected default option. Default= High for IISO7841 and Low for ISO7841F. When V_{CCI} transitions from unpowered to powered-up, a channel output assumes the logic state of the input. When V_{CCI} transitions from powered-up to unpowered, channel output assumes the selected default state.
X	PD	X	X	Undetermined	When V_{CCO} is unpowered, a channel output is undetermined (1). When V_{CCO} transitions from unpowered to powered-up, a channel output assumes the logic state of the input

(1) The outputs are undetermined when 1.7V < V_{CCI}, V_{CCO} < 2.25V.
(2) A strongly driven input signal can weakly power the floating V_{CC} through an internal protection diode and cause undetermined output.

Copyright © 2024 Texas Instruments Incorporated

7.4.1 Device I/O Schematics

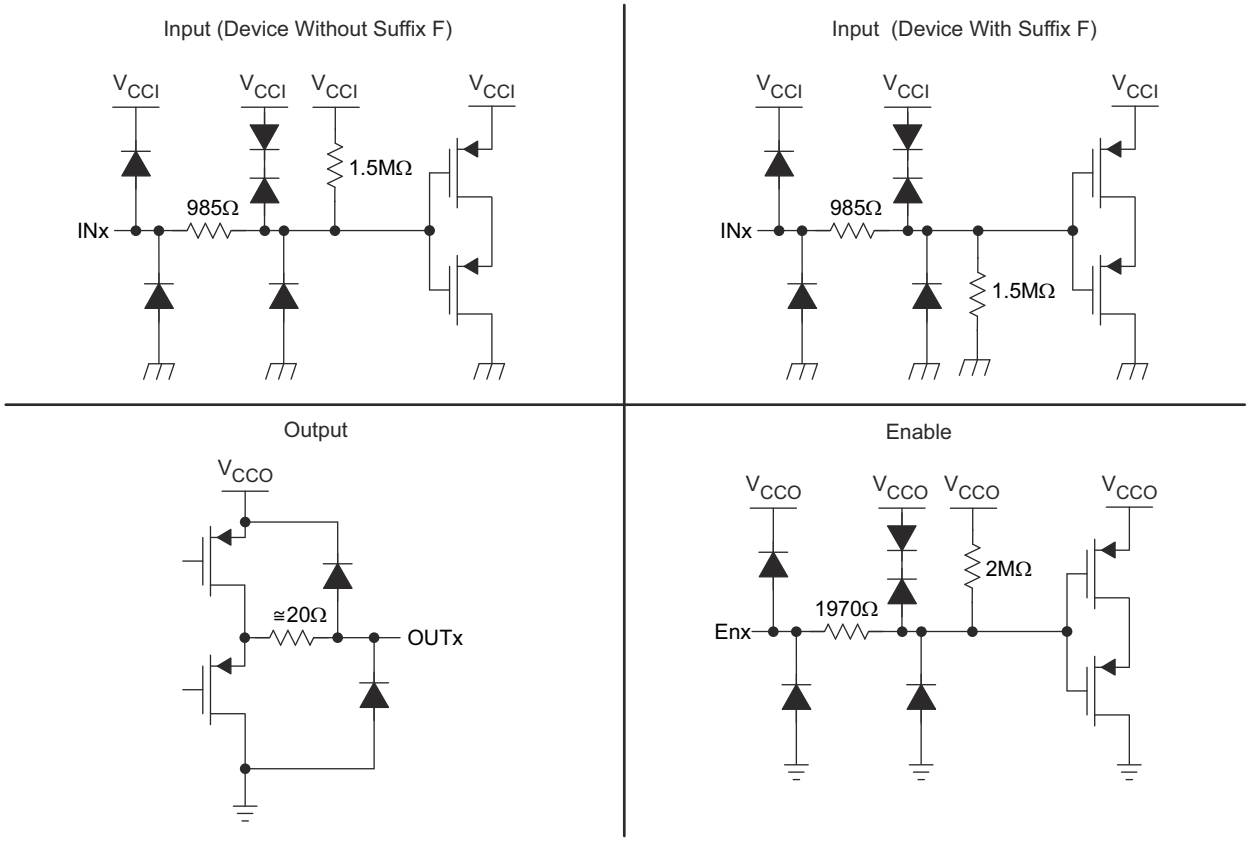


Figure 7-3. Device I/O Schematics

8 Application and Implementation

Note

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 5.7kV$_{RMS}$ 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_{CC1} and V_{CC2}. When designing with digital isolators, keep in mind that because of the single-ended design structure, digital isolators do not conform to any specific interface standard and are only intended for isolating single-ended CMOS or TTL digital signal lines. The isolator is typically placed between the data controller (that is, µC or UART), and a data converter or a line transceiver, regardless of the interface type or standard.

8.2 Typical Application

Figure 8-1 shows the isolated SPI.

Copyright © 2024 Texas Instruments Incorporated

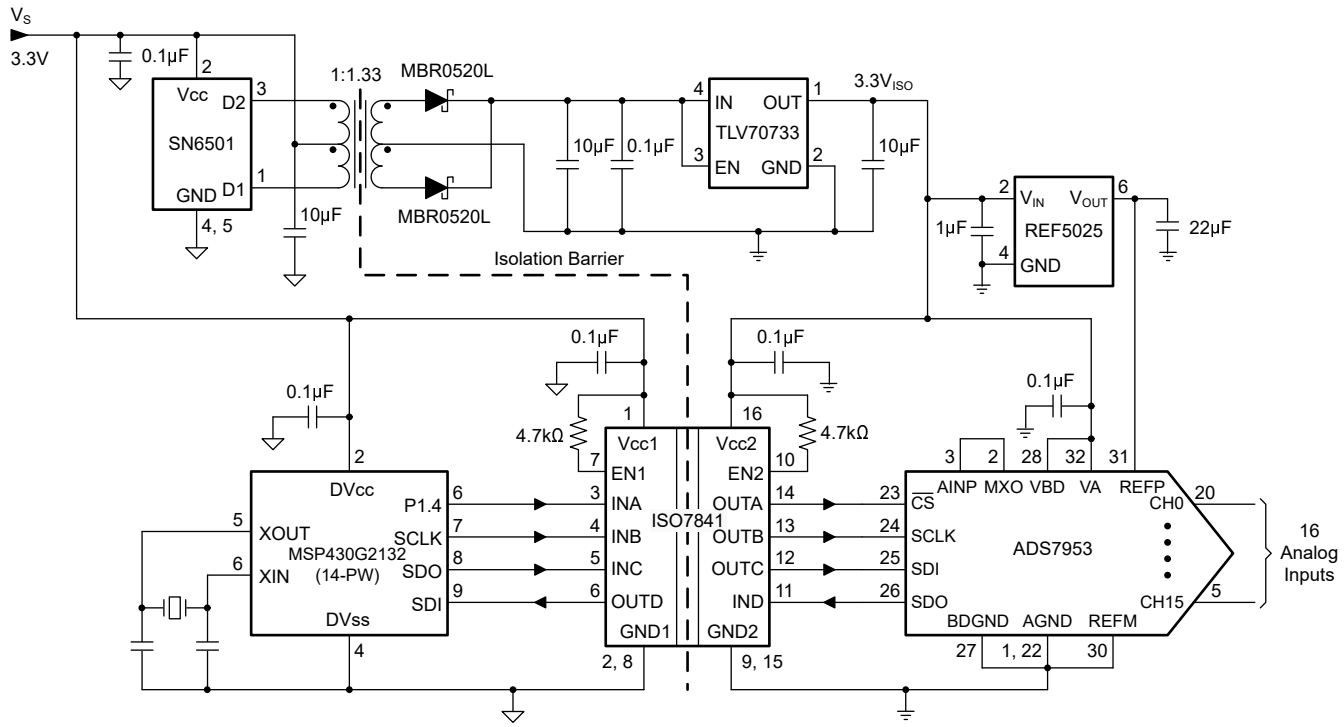


Figure 8-1. Isolated SPI for an Analog Input Module With 16 Input

8.2.1 Design Requirements

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

Table 8-1. Design Parameters

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

Copyright © 2024 Texas Instruments Incorporated

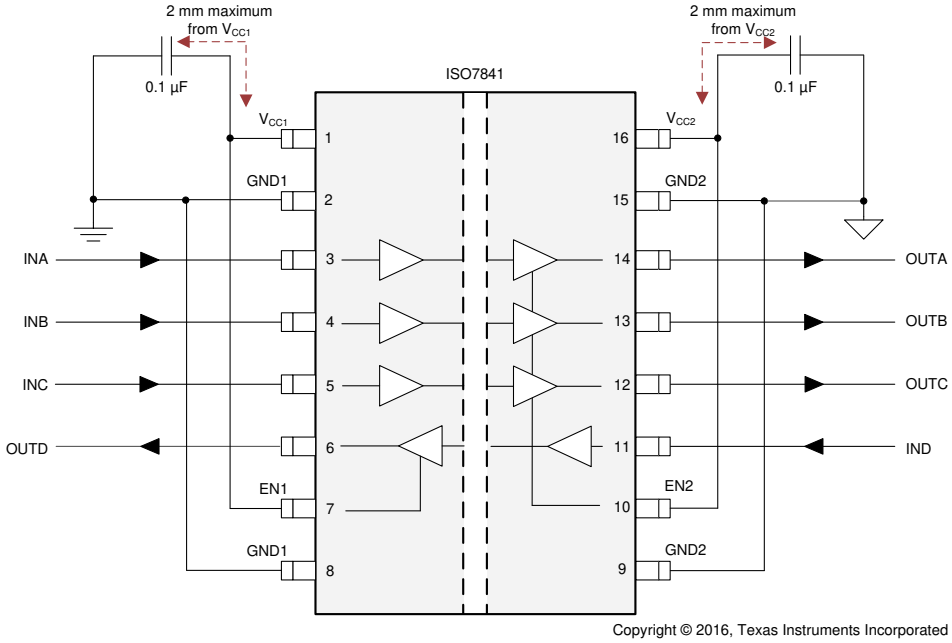


Figure 8-2. Typical ISO7841 Circuit Hook-Up

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.

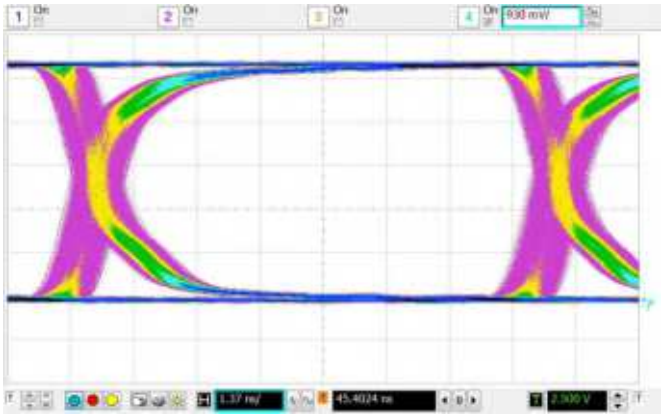


Figure 8-3. Eye Diagram at 100Mbps PRBS, 5V and 25°C

8.3 Power Supply Recommendations

To help provide reliable operation at data rates and supply voltages, a 0.1µF bypass capacitor is recommended at input and output supply pins (V_{CC1} and V_{CC2}). The capacitors must 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.

Copyright © 2024 Texas Instruments Incorporated

8.4 Layout

8.4.1 Layout Guidelines

A minimum of four layers is required to accomplish a low EMI PCB design (see Figure 8-4). 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^2.
- Routing the slower speed control signals on the bottom layer allows for greater flexibility as these signal links typically 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*.

8.4.1.1 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.

8.4.2 Layout Example

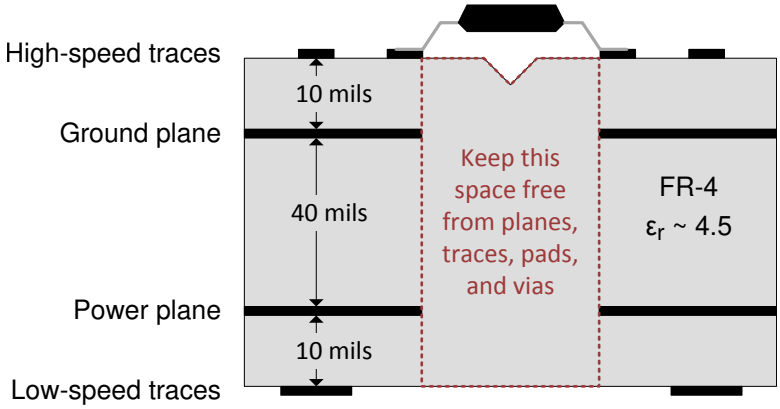


Figure 8-4. Layout Example Schematic

9 Device and Documentation Support

9.1 Documentation Support

9.1.1 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

9.2 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.

Table 9-1. Related Links

PARTS	PRODUCT FOLDER	ORDER NOW	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
ISO7841	Click here	Click here	Click here	Click here	Click here
ISO7841F	Click here	Click here	Click here	Click here	Click here

9.3 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.

9.4 Support Resources

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

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

9.5 Trademarks

TI E2E™ is a trademark of Texas Instruments.
All trademarks are the property of their respective owners.

9.6 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

9.7 Glossary

TI Glossary — This glossary lists and explains terms, acronyms, and definitions.

10 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Copyright © 2024 Texas Instruments Incorporated

Changes from Revision H (November 2014) to Revision I (November 2024) **Page**

- Updated the numbering format for tables, figures, and cross-references throughout the document..... 1
- Added 15mm (typ) creepage/clearance to *Insulation Specifications* table..... 5

Changes from Revision G (March 2017) to Revision H (May 2024) **Page**

- Updated the number format for tables, figures, and cross-references throughout the document..... 1
- Updated the standard name "DIN V VDE V 0884-10 (VDE V 0884-10):2006-12" to "DIN EN IEC 60747-17 (VDE 0884-17)" throughout the document..... 1
- Added Maximum impulse voltage (V_{IMP}) specification to the *Insulation Specifications* 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 *Electrical Characteristics—3.3V Supply* section to *Supply Current Characteristics—3.3V Supply* 10
- Changed *Reinforced Isolation Capacitor Life Time Projection* for DW and DWW packages per DIN EN IEC 60747-17 (VDE 0884-17)..... 16

Changes from Revision F (April 2016) to Revision G (March 2017) **Page**

- Changed part numbers in the *Power Ratings* table (previously *Power Dissipation Characteristics*) 4
- Changed the input-to-output test voltage parameter to apparent charge in the *Insulation Specifications* 5
- Added the *Receiving Notification of Documentation Updates* section.....26

Changes from Revision E (March 2016) to Revision F (April 2016) **Page**

- Changed the number of years for the isolation barrier life in the *Features* section 1
- VDE certification is now complete 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 *Safety Limiting Values* section 16

11 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.

Copyright © 2024 Texas Instruments Incorporated

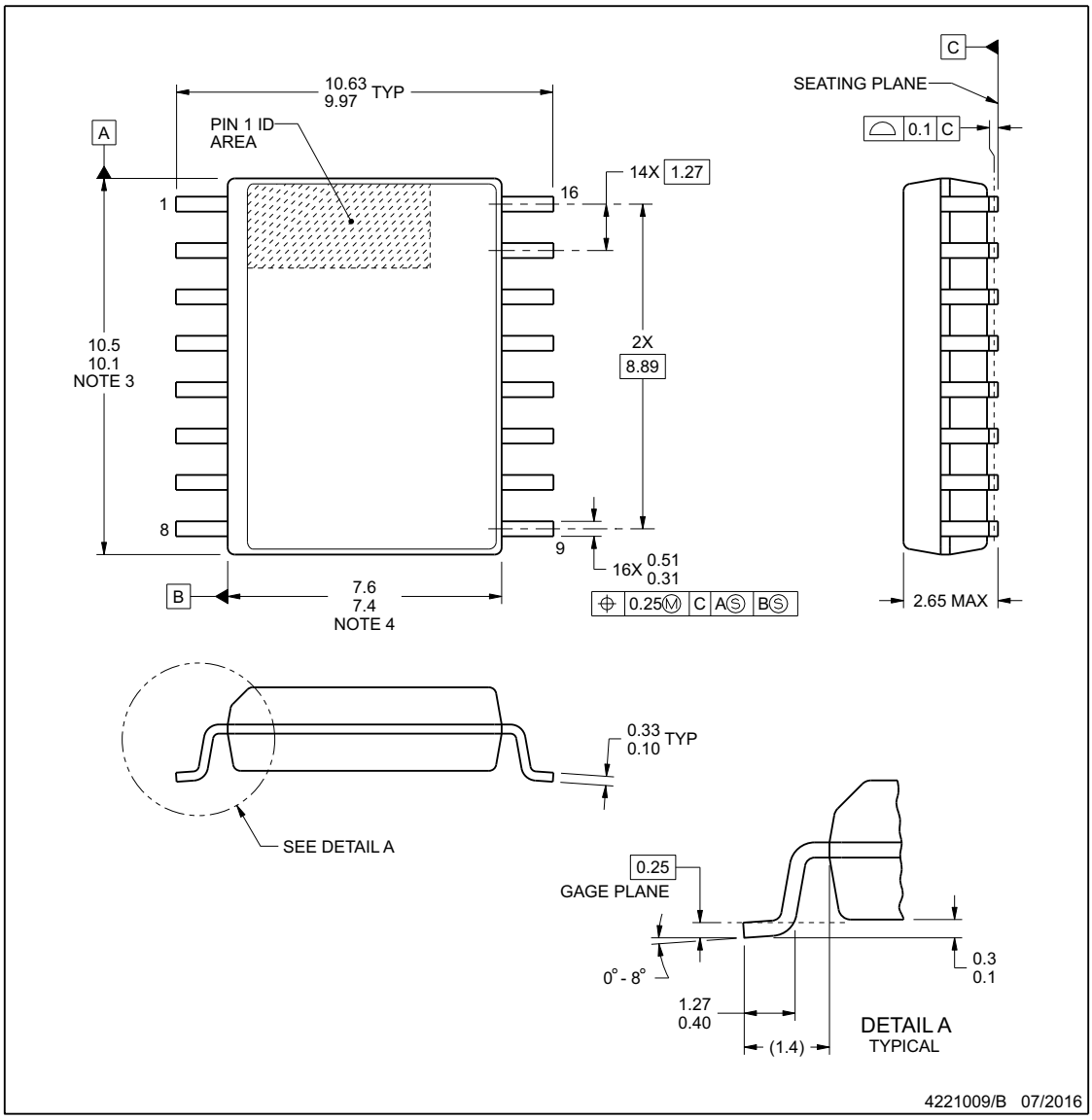


PACKAGE OUTLINE

DW0016B

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.

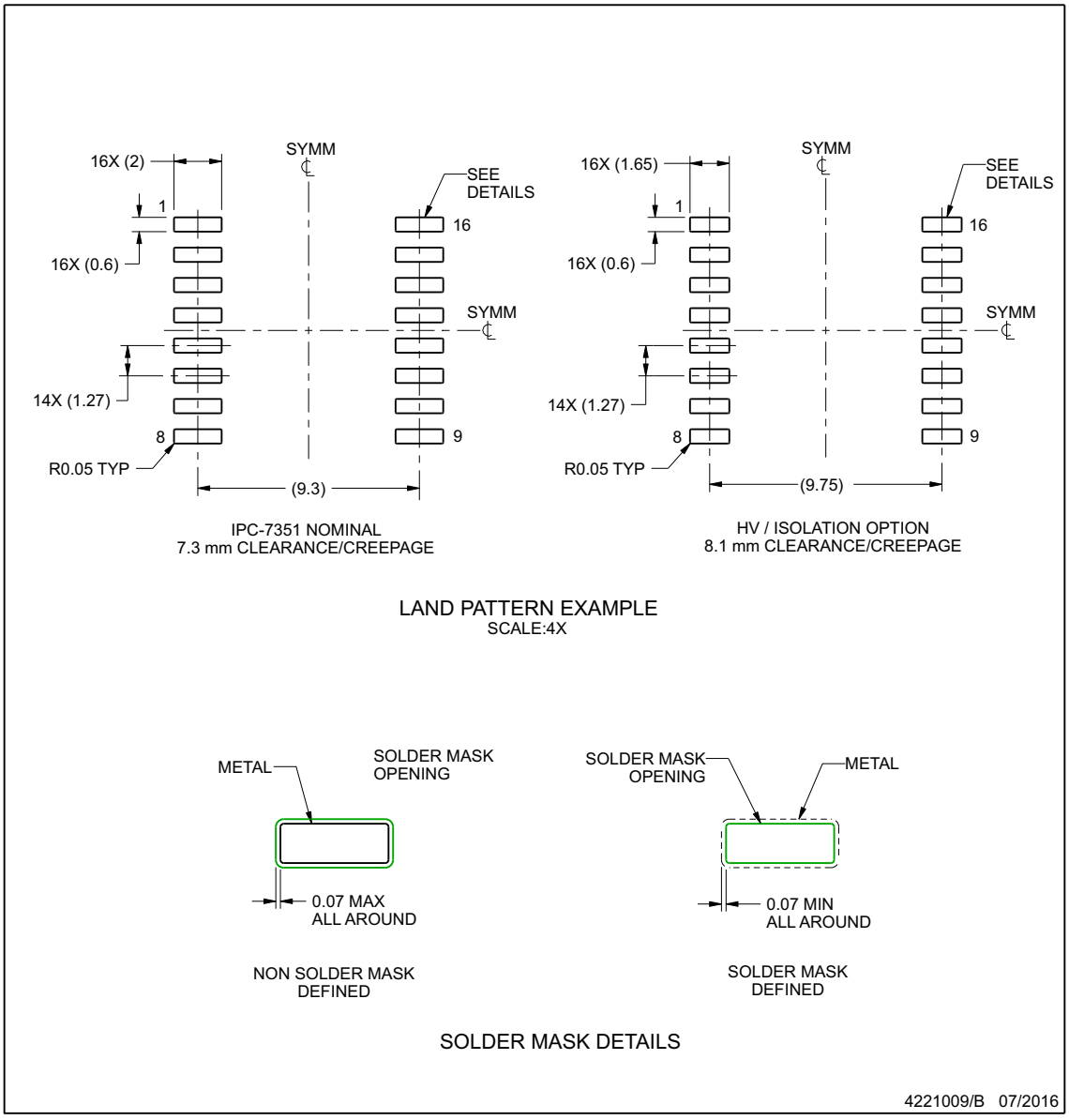
Copyright © 2024 Texas Instruments Incorporated

EXAMPLE BOARD LAYOUT

DW0016B

SOIC - 2.65 mm max height

SOIC



NOTES: (continued)

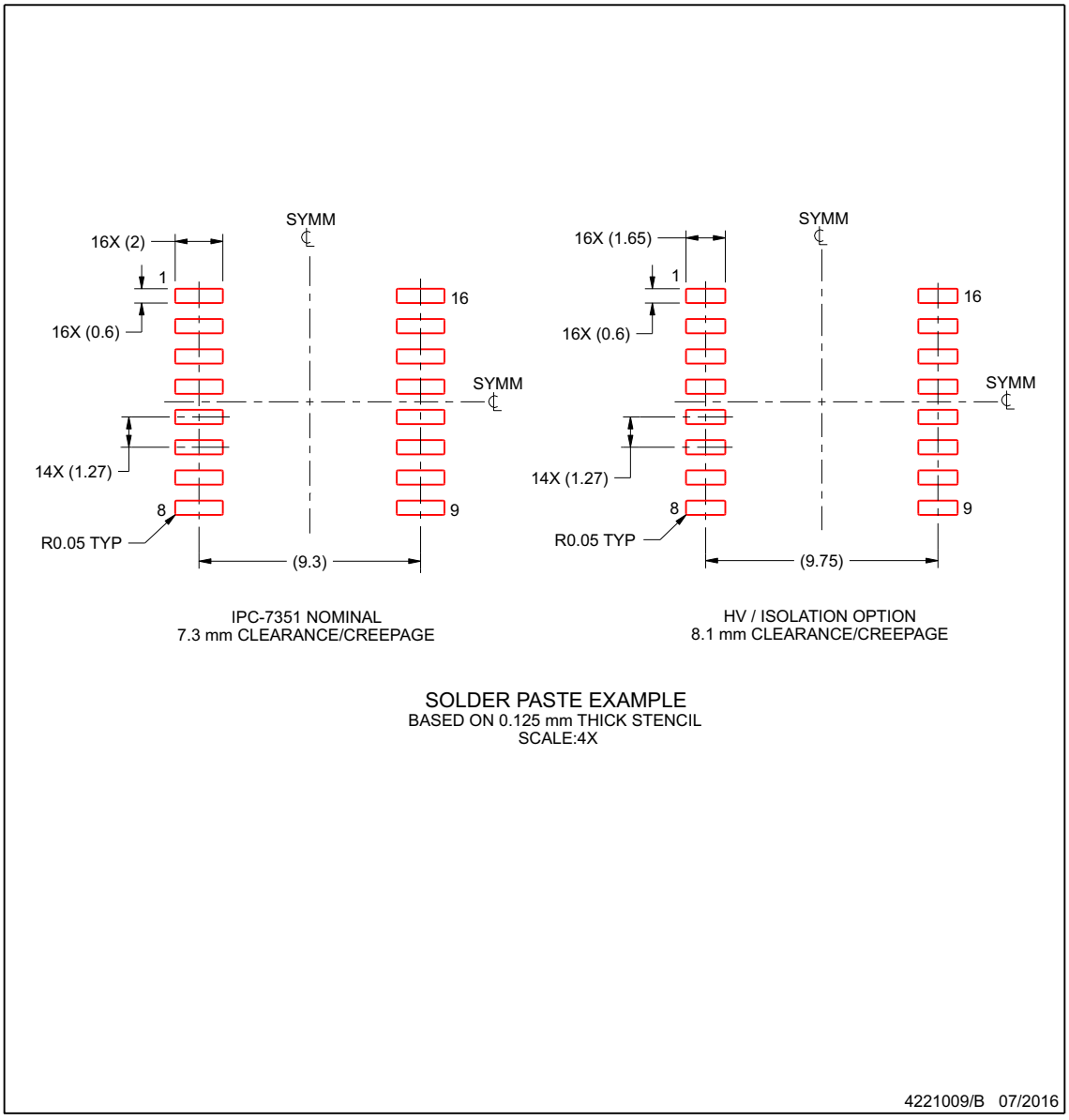
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

Copyright © 2024 Texas Instruments Incorporated

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.

Copyright © 2024 Texas Instruments Incorporated

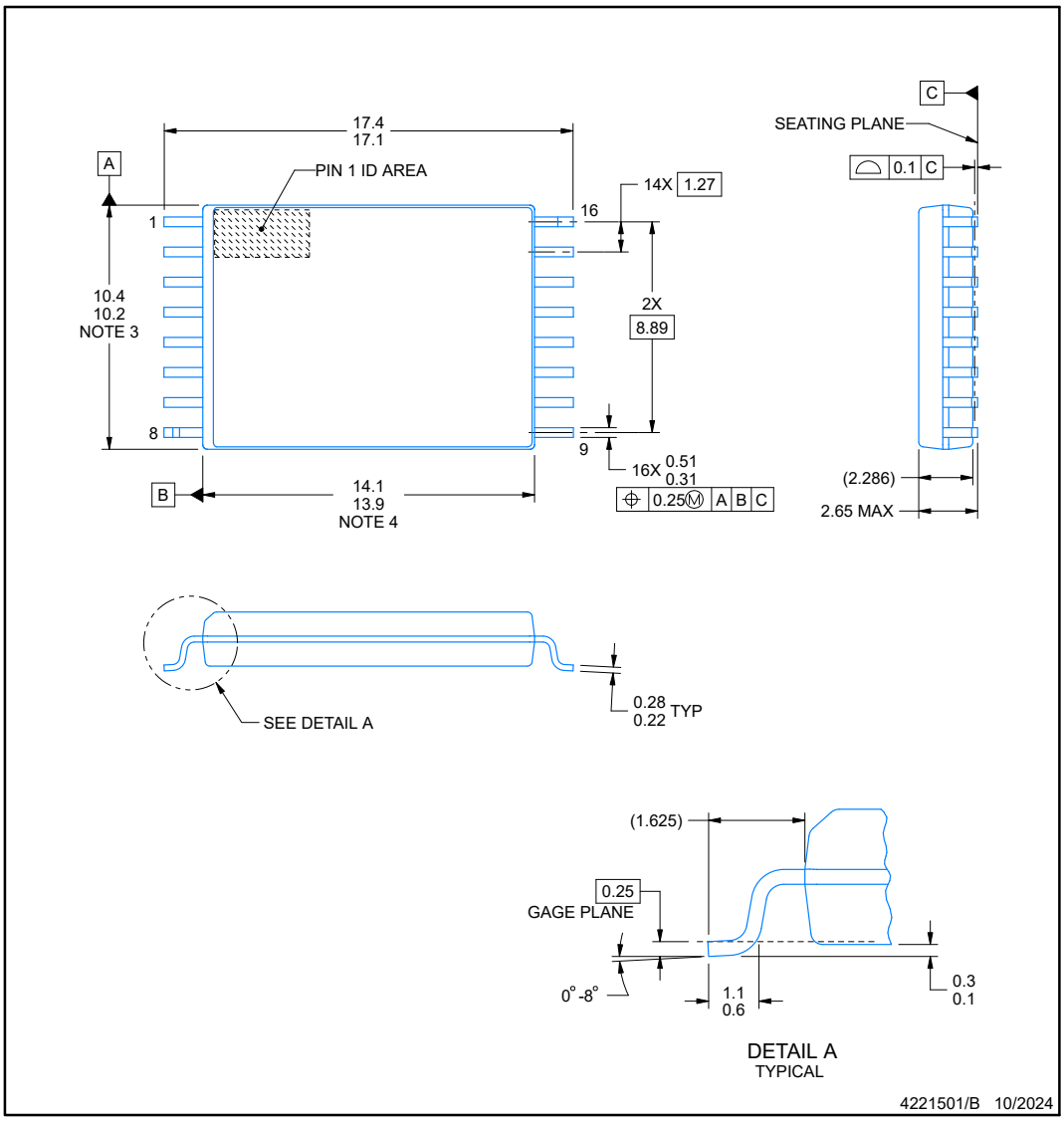


PACKAGE OUTLINE

DWW0016A

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.

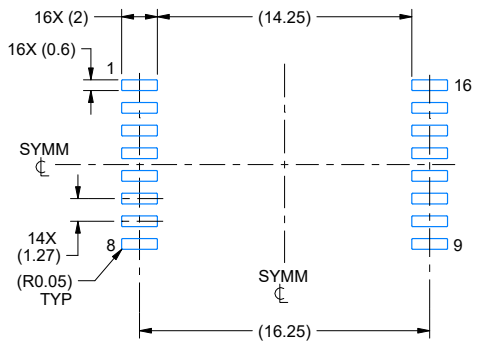
Copyright © 2024 Texas Instruments Incorporated

EXAMPLE BOARD LAYOUT

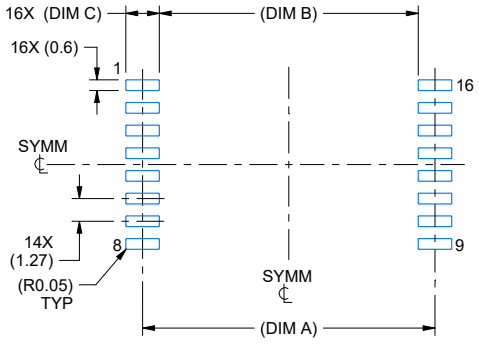
DWW0016A

SOIC - 2.65 mm max height

PLASTIC SMALL OUTLINE

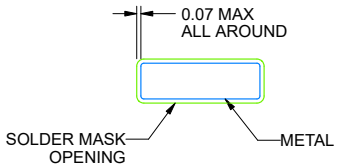


LAND PATTERN EXAMPLE
STANDARD
SCALE:3X

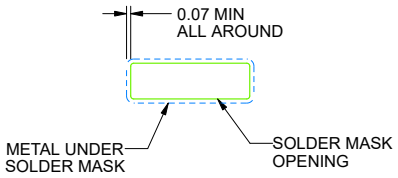


LAND PATTERN EXAMPLE
PCB CLEARANCE & CREEPAGE OPTIMIZED
SCALE:3X

OPTION	DIM A	DIM B	DIM C
01	16.375	14.5	1.875
02	16.625	15	1.625
03	16.725	15.2	1.525



NON SOLDER MASK
DEFINED
(PREFERRED)



SOLDER MASK
DEFINED

SOLDER MASK DETAILS

4221501/B 10/2024

NOTES: (continued)

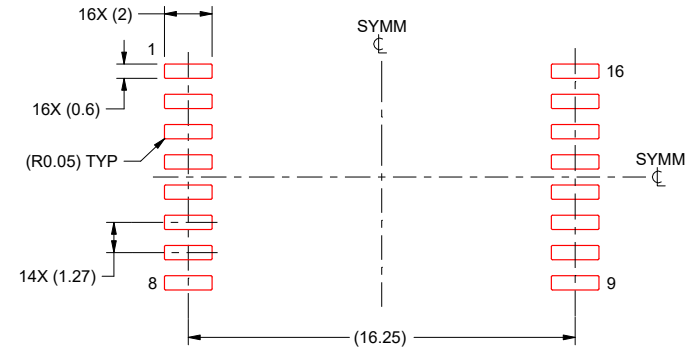
5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

Copyright © 2024 Texas Instruments Incorporated

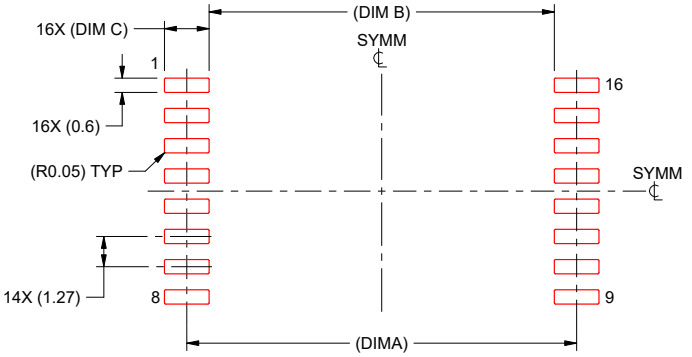
EXAMPLE STENCIL DESIGN

DWW0016A — **SOIC - 2.65 mm max height**

PLASTIC SMALL OUTLINE



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



SOLDER PASTE EXAMPLE
PCB CLEARANCE & CREEPAGE OPTIMIZED
BASED ON 0.125 mm THICK STENCIL
SCALE:4X

OPTION	DIM A	DIM B	DIM C
01	16.375	14.5	1.875
02	16.625	15	1.625
03	16.725	15.2	1.525

4221501/B 10/2024

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.

Copyright © 2024 Texas Instruments Incorporated

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
ISO7841DW	Active	Production	SOIC (DW) | 16	40 | TUBE	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841
ISO7841DW.A	Active	Production	SOIC (DW) | 16	40 | TUBE	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841
ISO7841DWR	Active	Production	SOIC (DW) | 16	2000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841
ISO7841DWR.A	Active	Production	SOIC (DW) | 16	2000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841
ISO7841DWW	Active	Production	SOIC (DWW) | 16	45 | TUBE	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841
ISO7841DWW.A	Active	Production	SOIC (DWW) | 16	45 | TUBE	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841
ISO7841DWWR	Active	Production	SOIC (DWW) | 16	1000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841
ISO7841DWWR.A	Active	Production	SOIC (DWW) | 16	1000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841
ISO7841FDW	Active	Production	SOIC (DW) | 16	40 | TUBE	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841F
ISO7841FDW.A	Active	Production	SOIC (DW) | 16	40 | TUBE	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841F
ISO7841FDWR	Active	Production	SOIC (DW) | 16	2000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841F
ISO7841FDWR.A	Active	Production	SOIC (DW) | 16	2000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841F
ISO7841FDWW	Active	Production	SOIC (DWW) | 16	45 | TUBE	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841F
ISO7841FDWW.A	Active	Production	SOIC (DWW) | 16	45 | TUBE	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841F
ISO7841FDWWR	Active	Production	SOIC (DWW) | 16	1000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841F
ISO7841FDWWR.A	Active	Production	SOIC (DWW) | 16	1000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-55 to 125	ISO7841F

(1) **Status:** For more details on status, see our product life cycle.

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

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

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

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

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

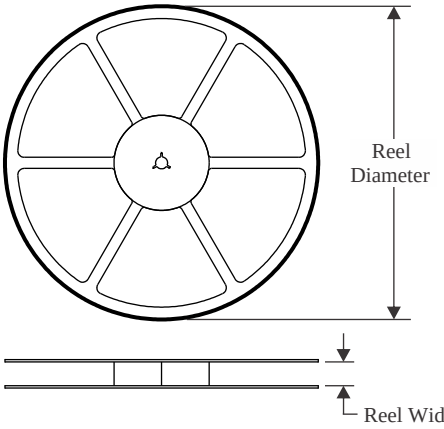
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

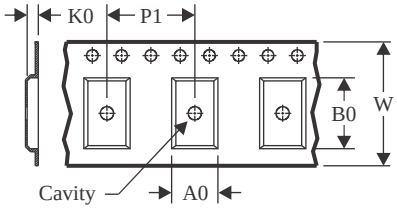
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

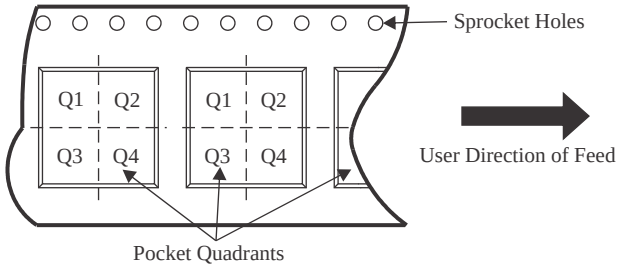


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

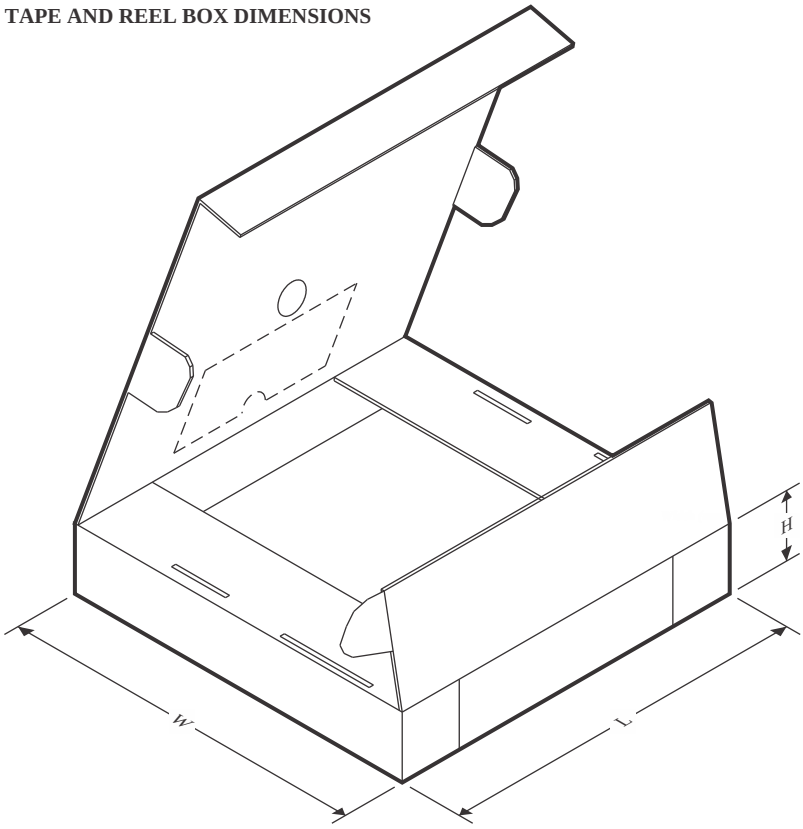
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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

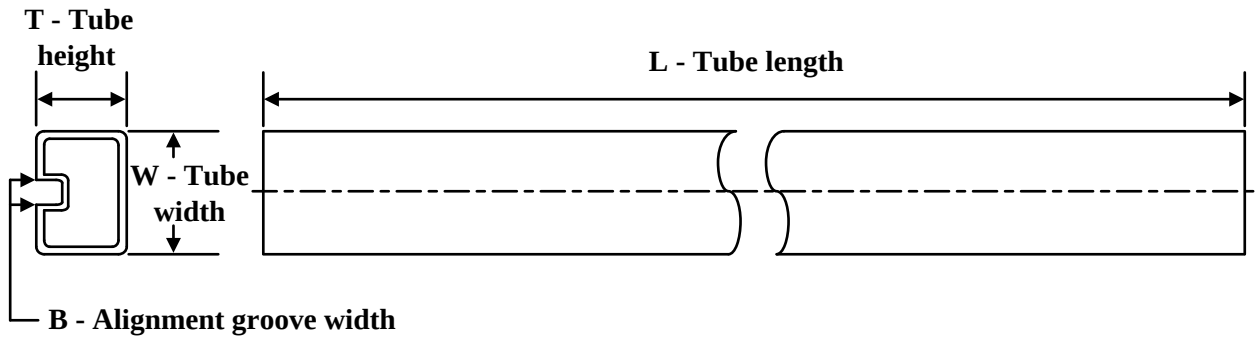
TAPE AND REEL BOX DIMENSIONS



*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
ISO7841DW.A	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7841DWW	DWW	SOIC	16	45	507	20	5000	9
ISO7841DWW.A	DWW	SOIC	16	45	507	20	5000	9
ISO7841FDW	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7841FDW.A	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7841FDWW	DWW	SOIC	16	45	507	20	5000	9
ISO7841FDWW.A	DWW	SOIC	16	45	507	20	5000	9

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale, TI’s General Quality Guidelines, or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Copyright © 2026, Texas Instruments Incorporated

Last updated 10/2025