ISO672x General Purpose Dual-Channel Digital Isolators with Robust EMC

1 Features

- 50-Mbps data rate
- Robust isolation barrier:
  - High lifetime at 450 V_{RMS} working voltage
  - Up to 3000 V_{RMS} isolation rating
  - ±75 kV/µs typical CMTI
- Wide supply range: 1.71 V to 1.89 V and 2.25 V to 5.5 V
- 1.71-V to 5.5-V level translation
- Default output *High* (ISO6721B) and *Low* (ISO6721FB) Options
- Wide temperature range: –40°C to +125°C
- 1.8 mA per channel typical at 1 Mbps
- Low propagation delay: 11 ns typical
- Robust electromagnetic compatibility (EMC)
  - System-Level ESD, EFT, and surge immunity
  - ±8 kV IEC 61000-4-2 contact discharge protection across isolation barrier
  - Low emissions
- Narrow-SOIC (D-8) package
- Safety-Related Certifications (pending):
  - DIN V VDE 0884-11:2017-01
  - UL 1577 component recognition program
  - IEC 60950-1, IEC 62368-1, IEC 61010-1, IEC 60601-1 and GB 4943.1-2011 certifications

2 Applications

- Power supplies
- Grid, Electricity meter
- Motor drives
- Factory automation
- Building automation
- Lighting
- Appliances

3 Description

The ISO672xB devices are high-performance, dual-channel digital isolators ideal for cost sensitive applications requiring up to 3000 V_{RMS} isolation ratings per UL 1577. These devices are also certified by VDE, TUV, CSA, and CQC.

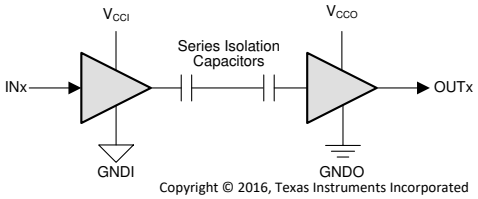
The ISO672xB devices provide high electromagnetic immunity and low emissions at low power consumption, while isolating CMOS or LVCMOS digital I/Os. Each isolation channel has a logic input and output buffer separated by TI's double capacitive silicon dioxide (SiO_2) insulation barrier. ISO6721B device has 2 isolation channels with 1 channel in each direction. In the event of input power or signal loss, the default output is *high* for devices without suffix F and *low* for devices with suffix F. See Device Functional Modes section for further details.

Used in conjunction with isolated power supplies, these devices help prevent noise currents on data buses, such as UART, SPI, RS-485, RS-232, and CAN from damaging sensitive circuitry. Through innovative chip design and layout techniques, the electromagnetic compatibility of the ISO672xB devices has been significantly enhanced to ease system-level ESD, EFT, surge, and emissions compliance. The ISO672xB family of devices is available in a 8-pin SOIC narrow-body (D) package and is a pin-to-pin upgrade to the older generations.

Device Information

PART NUMBER(1)	PACKAGE	BODY SIZE (NOM)
ISO6721B	D (8)	4.90 mm × 3.91 mm
ISO6721FB		

(1) For all available packages, see the orderable addendum at the end of the datasheet.



V_{CCI}=Input supply, V_{CCO}=Output supply
GNDI=Input ground, GNDO=Output ground

Simplified Schematic

ADVANCE INFORMATION

ADVANCE INFORMATION

Table of Contents

1 Features....1
2 Applications....1
3 Description....1
4 Revision History....2
5 Pin Configuration and Functions....3
Pin Functions....3
6 Specifications....4
6.1 Absolute Maximum Ratings....4
6.2 ESD Ratings....4
6.3 Recommended Operating Conditions....5
6.4 Thermal Information....6
6.5 Power Ratings....6
6.6 Insulation Specifications....7
6.7 Safety-Related Certifications....8
6.8 Safety Limiting Values....8
6.9 Electrical Characteristics—5-V Supply....9
6.10 Supply Current Characteristics—5-V Supply....9
6.11 Electrical Characteristics—3.3-V Supply....10
6.12 Supply Current Characteristics—3.3-V Supply....10
6.13 Electrical Characteristics—2.5-V Supply....11
6.14 Supply Current Characteristics—2.5-V Supply....11
6.15 Electrical Characteristics—1.8-V Supply....12
6.16 Supply Current Characteristics—1.8-V Supply....12
6.17 Switching Characteristics—5-V Supply....13
6.18 Switching Characteristics—3.3-V Supply....13
6.19 Switching Characteristics—2.5-V Supply....13
6.20 Switching Characteristics—1.8-V Supply....14
7 Parameter Measurement Information....15
8 Detailed Description....16
8.1 Overview....16
8.2 Functional Block Diagram....16
8.3 Feature Description....17
8.4 Device Functional Modes....18
9 Layout....24
9.1 Layout Guidelines....24
9.2 Layout Example....24
10 Device and Documentation Support....25
10.1 Device Support....25
10.2 Documentation Support....25
10.3 Related Links....25
10.4 Receiving Notification of Documentation Updates....25
10.5 Support Resources....25
10.6 Trademarks....25
10.7 Electrostatic Discharge Caution....26
10.8 Glossary....26
11 Mechanical, Packaging, and Orderable Information....26
11.1 Package Option Addendum....30

4 Revision History

DATE	REVISION	NOTES
July 2020	*	Initial release.

5 Pin Configuration and Functions

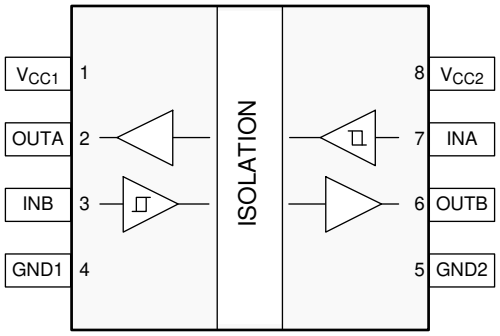


Figure 5-1. ISO6721B D Package 8-Pin SOIC Top View

Pin Functions

PIN		I/O	DESCRIPTION
NAME	D PACKAGE ISO6721B		
GND1	4	—	Ground connection for V_{CC1}
GND2	5	—	Ground connection for V_{CC2}
INA	7	I	Input, channel A
INB	3	I	Input, channel B
OUTA	2	O	Output, channel A
OUTB	6	O	Output, channel B
V_{CC1}	1	—	Power supply, V_{CC1}
V_{CC2}	8	—	Power supply, V_{CC2}

ADVANCE INFORMATION

ADVANCE INFORMATION

6 Specifications

6.1 Absolute Maximum Ratings

See(1)

		MIN	MAX	UNIT
Supply Voltage (2)	V_{CC1} to GND1	-0.5	6	V
	V_{CC2} to GND2	-0.5	6	
Input/Output Voltage	INx to GNDx	-0.5	V_{CCX} + 0.5 (3)	V
	OUTx to GNDx	-0.5	V_{CCX} + 0.5 (3)	
Output Current	Io	-15	15	mA
Temperature	Operating junction temperature, T_J		150	°C
	Storage temperature, T_{stg}	-65	150	°C

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) All voltage values except differential I/O bus voltages are with respect to the local ground terminal (GND1 or GND2) and are peak voltage values
(3) Maximum voltage must not exceed 6 V.

6.2 ESD Ratings

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

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

6.3 Recommended Operating Conditions

			MIN	NOM	MAX	UNIT
V_{CC1} (1)	Supply Voltage Side 1		1.71		1.89	V
V_{CC1} (1)	Supply Voltage Side 1		2.25		5.5	V
V_{CC2} (1)	Supply Voltage Side 2		1.71		1.89	V
V_{CC2} (1)	Supply Voltage Side 2		2.25		5.5	V
Vcc (UVLO +)	UVLO threshold when supply voltage is rising			1.53	1.71	V
Vcc (UVLO-)	UVLO threshold when supply voltage is falling		1.1	1.41		V
Vhys (UVLO)	Supply voltage UVLO hysteresis		0.08	0.13		V
V_{IH}	High level Input voltage		0.7 x V_{CCI} (2)		V_{CCI}	V
V_{IL}	Low level Input voltage		0		0.3 x V_{CCI}	V
I_{OH}	High level output current	V_{CCO} (2) = 5 V	-4			mA
		V_{CCO} = 3.3 V	-2			mA
		V_{CCO} = 2.5 V	-1			mA
		V_{CCO} = 1.8 V	-1			mA
I_{OL}	Low level output current	V_{CCO} = 5 V			4	mA
		V_{CCO} = 3.3 V			2	mA
		V_{CCO} = 2.5 V			1	mA
		V_{CCO} = 1.8 V			1	mA
DR	Data Rate		0		50	Mbps
T_A	Ambient temperature		-40	25	125	°C

(1) V_{CC1} and V_{CC2} can be set independent of one another
(2) V_{CCI} = Input-side V_{CC}; V_{CCO} = Output-side V_{CC}

ADVANCE INFORMATION

6.4 Thermal Information

THERMAL METRIC (1)		ISO6721B D (SOIC) 8 PINS	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance	104.6	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	48.9	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	52.9	°C/W
ψ_{JT}	Junction-to-top characterization parameter	7.9	°C/W
ψ_{JB}	Junction-to-board characterization parameter	52.1	°C/W
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	—	°C/W

6.5 Power Ratings

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
ISO6721B						
P_D	Maximum power dissipation (both sides)	$V_{CC1} = V_{CC2} = 5.5$ V, $T_J = 150°C$, $C_L = 15$ pF, Input a 25-MHz 50% duty cycle square wave			72.7	mW
P_{D1}	Maximum power dissipation (side-1)	$V_{CC1} = V_{CC2} = 5.5$ V, $T_J = 150°C$, $C_L = 15$ pF, Input a 25-MHz 50% duty cycle square wave			36.35	mW
P_{D2}	Maximum power dissipation (side-2)	$V_{CC1} = V_{CC2} = 5.5$ V, $T_J = 150°C$, $C_L = 15$ pF, Input a 25-MHz 50% duty cycle square wave			36.35	mW

ADVANCE INFORMATION

6.6 Insulation Specifications

PARAMETER		TEST CONDITIONS	VALUE 8-D	UNIT
IEC 60664-1				
CLR	External clearance(1)	Side 1 to side 2 distance through air	4	mm
CPG	External creepage(1)	Side 1 to side 2 distance across package surface	4	mm
DTI	Distance through the insulation	Minimum internal gap (internal clearance)	>17	µm
CTI	Comparative tracking index	IEC 60112; UL 746A	>400	V
	Material Group	According to IEC 60664-1	II	
	Overvoltage category	Rated mains voltage ≤ 150 V_{RMS}	I-IV	
		Rated mains voltage ≤ 300 V_{RMS}	I-III	
DIN VDE V 0884-11:2017-01(2)				
V_{IORM}	Maximum repetitive peak isolation voltage	AC voltage (bipolar)	637	V_{PK}
V_{IOWM}	Maximum isolation working voltage	AC voltage (sine wave); time-dependent dielectric breakdown (TDDB) test	450	V_{RMS}
		DC voltage	637	V_{DC}
V_{IOTM}	Maximum transient isolation voltage	$V_{TEST} = V_{IOTM}$, t = 60 s (qualification); $V_{TEST} = 1.2 \times V_{IOTM}$, t = 1 s (100% production)	4242	V_{PK}
V_{IOSM}	Maximum surge isolation voltage(3)	Test method per IEC 62368-1, 1.2/50 µs waveform, $V_{TEST} = 1.3 \times V_{IOSM} = 6500\ V_{PK}$ (qualification)	5000	V_{PK}
q_{pd}	Apparent charge(4)	Method a: After I/O safety test subgroup 2/3, $V_{ini} = V_{IOTM}$, t_{ini} = 60 s; $V_{pd(m)} = 1.2 \times V_{IORM}$, t_m = 10 s	≤ 5	pC
		Method a: After environmental tests subgroup 1, $V_{ini} = V_{IOTM}$, t_{ini} = 60 s; $V_{pd(m)} = 1.2 \times V_{IORM}$, t_m = 10 s	≤ 5	
		Method b1: At routine test (100% production) and preconditioning (type test), $V_{ini} = V_{IOTM}$, t_{ini} = 1 s; $V_{pd(m)} = 1.5 \times V_{IORM}$, t_m = 1 s	≤ 5	
C_{IO}	Barrier capacitance, input to output(5)	V_{IO} = 0.4 × sin (2 πft), f = 1 MHz	1	pF
R_{IO}	Insulation resistance, input to output(5)	V_{IO} = 500 V, T_A = 25°C	> 10^{12}	Ω
		V_{IO} = 500 V, 100°C ≤ T_A ≤ 150°C	> 10^{11}	
		V_{IO} = 500 V at T_S = 150°C	> 10^9	
	Pollution degree		2	
	Climatic category		40/125/21	
UL 1577				
V_{ISO}	Withstand isolation voltage	$V_{TEST} = V_{ISO}$, t = 60 s (qualification); $V_{TEST} = 1.2 \times V_{ISO}$, t = 1 s (100% production)	3000	V_{RMS}

(1) Creepage and clearance requirements should be applied according to the specific equipment isolation standards of an application. Care should be taken to maintain the creepage and clearance distance of a board design to ensure that the mounting pads of the isolator on the printed-circuit board do not reduce this distance. Creepage and clearance on a printed-circuit board become equal in certain cases. Techniques such as inserting grooves, ribs, or both on a printed circuit board are used to help increase these specifications.

(2) ISO672x is suitable for *basic 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 or oil to determine the intrinsic surge immunity of the isolation barrier.

(4) Apparent charge is electrical discharge caused by a partial discharge (pd).

(5) All pins on each side of the barrier tied together creating a two-pin device.

ADVANCE INFORMATION

6.7 Safety-Related Certifications

VDE	CSA	UL	CQC	TUV
Plan to certify according to DIN VDE V 0884-11:2017-01	Plan to certify according to IEC 60950-1 and IEC 62368-1	Plan to certify according to UL 1577 Component Recognition Program	Plan to certify according to GB4943.1-2011	Plan to certify according to EN 61010-1:2010/A1:2019, EN 60950-1:2006/A2:2013 and EN 62368-1:2014
Maximum transient isolation voltage, 4242 V_{PK}; Maximum repetitive peak isolation voltage, 637 V_{PK}; Maximum surge isolation voltage, 5000 V_{PK}	400 V_{RMS} basic insulation per CSA 60950-1-07+A1+A2, IEC 60950-1 2nd Ed.+A1+A2, CSA 62368-1- 14 and IEC 62368-1:2014, (pollution degree 2, material group 2)	Single protection, 3000 V_{RMS}	Basic insulation, Altitude ≤ 5000 m, Tropical Climate, 250 V_{RMS} maximum working voltage	3000 VRMS (D-8) Reinforced insulation per EN 61010-1:2010/A1:2019 up to working voltage of 300 VRMS (D-8) 3000 VRMS (D-8) Reinforced insulation per EN 60950-1:2006/A2:2013 and EN 62368-1:2014 up to working voltage of 400 VRMS (D-8)
Certificate planned	Certificate planned	Certificate planned	Certificate planned	Certificate planned

6.8 Safety Limiting Values

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
D-8 PACKAGE						
I_S	Safety input, output, or supply current (1)	$R_{\theta JA}$ =104.6°C/W, V_I = 5.5 V, T_J = 150°C, T_A = 25°C			217.2	mA
		$R_{\theta JA}$ = 104.6°C/W, V_I = 3.6 V, T_J = 150°C, T_A = 25°C			332	mA
		$R_{\theta JA}$ = 104.6°C/W, V_I = 2.75 V, T_J = 150°C, T_A = 25°C			434.5	mA
		$R_{\theta JA}$ = 104.6°C/W, V_I = 1.89 V, T_J = 150°C, T_A = 25°C			628.9	mA
P_S	Safety input, output, or total power (1)	$R_{\theta JA}$ = 104.6°C/W, T_J = 150°C, T_A = 25°C			1195	mW
T_S	Maximum safety temperature (1)				150	°C

(1) The maximum safety temperature, T_S, has the same value as the maximum junction temperature, T_J, specified for the device. The I_S and P_S parameters represent the safety current and safety power respectively. The maximum limits of I_S and P_S should not be exceeded. These limits vary with the ambient temperature, T_A.
The junction-to-air thermal resistance, $R_{\theta JA}$, in the table is that of a device installed on a high-K test board for leaded surface-mount packages. Use these equations to calculate the value for each parameter:
$T_J = T_A + R_{\theta JA} \times P$, where P is the power dissipated in the device.
$T_{J(max)} = T_S = T_A + R_{\theta JA} \times P_S$, where $T_{J(max)}$ is the maximum allowed junction temperature.
$P_S = I_S \times V_I$, where V_I is the maximum input voltage.

ADVANCE INFORMATION

6.9 Electrical Characteristics—5-V Supply

over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{OH}	High-level output voltage	I_{OH} = -4 mA; See Figure 7-1	V_{CCO} - 0.4			V
V_{OL}	Low-level output voltage	I_{OL} = 4 mA; See Figure 7-1			0.4	V
$V_{IT+(IN)}$	Rising input switching threshold				0.7 x V_{CCI} (1)	V
$V_{IT-(IN)}$	Falling input switching threshold		0.3 x V_{CCI}			V
$V_{I(HYS)}$	Input threshold voltage hysteresis		0.1 x V_{CCI}			V
I_{IH}	High-level input current	V_{IH} = V_{CCI} (1) at INx			10	µA
I_{IL}	Low-level input current	V_{IL} = 0 V at INx	-10			µA
CMTI	Common mode transient immunity	V_I = V_{CC} or 0 V, V_{CM} = 1200 V	50	75		kV/us
C_i	Input Capacitance (2)	V_I = V_{CC}/ 2 + 0.4×sin(2πft), f = 2 MHz, V_{CC} = 5 V ; See Figure 7-3		1.3		pF

(1) V_{CCI} = Input-side V_{CC}; V_{CCO} = Output-side V_{CC}
(2) Measured from input pin to same side ground.

6.10 Supply Current Characteristics—5-V Supply

over recommended operating conditions (unless otherwise noted)

PARAMETER	TEST CONDITIONS		SUPPLY CURRENT	MIN	TYP	MAX	UNIT
ISO6721B							
Supply current - DC signal	V_I = V_{CCI} (ISO6721B); V_I = 0 V (ISO6721B with F suffix)		I_{CC1}, I_{CC2}		1.2	2.1	mA
	V_I = 0 V (ISO6721B); V_I = V_{CCI} (ISO6721B with F suffix)		I_{CC1}, I_{CC2}		2.3	3.5	
Supply current - AC signal	All channels switching with square wave clock input; C_L = 15 pF	1 Mbps	I_{CC1}, I_{CC2}		1.9	2.9	
		10 Mbps	I_{CC1}, I_{CC2}		2.5	3.6	
		50 Mbps	I_{CC1}, I_{CC2}		5.2	6.7	

ADVANCE INFORMATION

6.11 Electrical Characteristics—3.3-V Supply

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 7-1	V_{CCO} - 0.2			V
V_{OL}	Low-level output voltage	I_{OL} = 2mA ; See Figure 7-1			0.2	V
$V_{IT+(IN)}$	Rising input switching threshold				0.7 x V_{CCI} (1)	V
$V_{IT-(IN)}$	Falling input switching threshold		0.3 x V_{CCI}			V
$V_{I(HYS)}$	Input threshold voltage hysteresis		0.1 x V_{CCI}			V
I_{IH}	High-level input current	V_{IH} = V_{CCI} (1) at INx			10	µA
I_{IL}	Low-level input current	V_{IL} = 0 V at INx	-10			µA
CMTI	Common mode transient immunity	V_I = V_{CC} or 0 V, V_{CM} = 1200 V	50	75		kV/us
C_i	Input Capacitance(2)	V_I = V_{CC}/ 2 + 0.4×sin(2πft), f = 2 MHz, V_{CC} = 3.3 V ; See Figure 7-3		1.3		pF

(1) V_{CCI} = Input-side V_{CC}; V_{CCO} = Output-side V_{CC}
(2) Measured from input pin to same side ground.

6.12 Supply Current Characteristics—3.3-V Supply

over recommended operating conditions (unless otherwise noted)

PARAMETER	TEST CONDITIONS		SUPPLY CURRENT	MIN	TYP	MAX	UNIT
ISO6721B							
Supply current - DC signal	V_I = V_{CCI} (ISO6721B); V_I = 0 V (ISO6721B with F suffix)		I_{CC1}, I_{CC2}		1.2	2.1	mA
Supply current - DC signal	V_I = 0 V (ISO6721B); V_I = V_{CCI} (ISO6721B with F suffix)		I_{CC1}, I_{CC2}		2.3	3.5	mA
Supply current - AC signal	All channels switching with square wave clock input; C_L = 15 pF	1 Mbps	I_{CC1}, I_{CC2}		1.8	2.8	mA
		10 Mbps	I_{CC1}, I_{CC2}		2.3	3.3	mA
		50 Mbps	I_{CC1}, I_{CC2}		4.2	5.5	mA

6.13 Electrical Characteristics—2.5-V Supply

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 7-1	V_{CCO} - 0.1			V
V_{OL}	Low-level output voltage	I_{OL} = 1mA ; See Figure 7-1			0.1	V
$V_{IT+(IN)}$	Rising input switching threshold				0.7 x V_{CCI} (1)	V
$V_{IT-(IN)}$	Falling input switching threshold		0.3 x V_{CCI}			V
$V_{I(HYS)}$	Input threshold voltage hysteresis		0.1 x V_{CCI}			V
I_{IH}	High-level input current	V_{IH} = V_{CCI} (1) at INx			10	µA
I_{IL}	Low-level input current	V_{IL} = 0 V at INx	-10			µA
CMTI	Common mode transient immunity	V_I = V_{CC} or 0 V, V_{CM} = 1200 V	50	75		kV/us
C_i	Input Capacitance(2)	V_I = V_{CC}/ 2 + 0.4×sin(2πft), f = 2 MHz, V_{CC} = 2.5 V ; See Figure 7-3		1.3		pF

(1) V_{CCI} = Input-side V_{CC}; V_{CCO} = Output-side V_{CC}
(2) Measured from input pin to same side ground.

6.14 Supply Current Characteristics—2.5-V Supply

over recommended operating conditions (unless otherwise noted)

PARAMETER	TEST CONDITIONS		SUPPLY CURRENT	MIN	TYP	MAX	UNIT
ISO6721B							
Supply current - DC signal	V_I = V_{CCI} (ISO6721B); V_I = 0 V (ISO6721B with F suffix)		I_{CC1}, I_{CC2}		1.2	2.1	mA
Supply current - DC signal	V_I = 0 V (ISO6721B); V_I = V_{CCI} (ISO6721B with F suffix)		I_{CC1}, I_{CC2}		2.3	3.5	mA
Supply current - AC signal	All channels switching with square wave clock input; C_L = 15 pF	1 Mbps	I_{CC1}, I_{CC2}		1.8	2.8	mA
		10 Mbps	I_{CC1}, I_{CC2}		2.1	3.2	mA
		50 Mbps	I_{CC1}, I_{CC2}		3.6	4.9	mA

ADVANCE INFORMATION

6.15 Electrical Characteristics—1.8-V Supply

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 7-1	V_{CCO} - 0.1			V
V_{OL}	Low-level output voltage	I_{OL} = 1mA ; See Figure 7-1			0.1	V
$V_{IT+(IN)}$	Rising input switching threshold				0.7 x V_{CCI} (1)	V
$V_{IT-(IN)}$	Falling input switching threshold		0.3 x V_{CCI}			V
$V_{I(HYS)}$	Input threshold voltage hysteresis		0.1 x V_{CCI}			V
I_{IH}	High-level input current	V_{IH} = V_{CCI} (1) at INx			10	µA
I_{IL}	Low-level input current	V_{IL} = 0 V at INx	-10			µA
CMTI	Common mode transient immunity	V_I = V_{CC} or 0 V, V_{CM} = 1200 V	50	75		kV/us
C_i	Input Capacitance(2)	V_I = V_{CC}/ 2 + 0.4×sin(2πft), f = 2 MHz, V_{CC} = 1.8 V ; SeeFigure 7-3		1.3		pF

(1) V_{CCI} = Input-side V_{CC}; V_{CCO} = Output-side V_{CC}
(2) Measured from input pin to same side ground.

6.16 Supply Current Characteristics—1.8-V Supply

over recommended operating conditions (unless otherwise noted)

PARAMETER	TEST CONDITIONS		SUPPLY CURRENT	MIN	TYP	MAX	UNIT
ISO6721B							
Supply current - DC signal	V_I = V_{CCI} (ISO6721B); V_I = 0 V (ISO6721B with F suffix)		I_{CC1}, I_{CC2}		1.1	2	mA
	V_I = 0 V (ISO6721B); V_I = V_{CCI} (ISO6721B with F suffix)		I_{CC1}, I_{CC2}		2.1	3.4	mA
Supply current - AC signal	All channels switching with square wave clock input; C_L = 15 pF	1 Mbps	I_{CC1}, I_{CC2}		1.6	2.7	mA
		10 Mbps	I_{CC1}, I_{CC2}		1.9	3	mA
		50 Mbps	I_{CC1}, I_{CC2}		3	4.2	mA

ADVANCE INFORMATION

6.17 Switching Characteristics—5-V Supply

V_{CC1}, V_{CC2} = 1.71 V to 1.89 V or 2.25 V to 5.5 V (over recommended operating conditions unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay time	See Figure 7-1		11	18	ns
$t_{P(dft)}$	Propagation delay drift			8		ps/°C
t_{UI}	Minimum pulse width	See Figure 7-1	20			ns
PWD	Pulse width distortion	See Figure 7-1			7	ns
$t_{sk(o)}$	Channel to channel output skew time	Same direction channels			6	ns
$t_{sk(p-p)}$	Part to part skew time				6	ns
t_r	Output signal rise time	See Figure 7-1			4.5	ns
t_f	Output signal fall time				4.5	ns
t_{DO}	Default output delay time from input power loss	See Figure 7-2		0.1	0.3	us
t_{PU}	Time from UVLO to valid output data				300	us
tie	Time interval error			1		ns

6.18 Switching Characteristics—3.3-V Supply

V_{CC1}, V_{CC2} = 1.71 V to 1.89 V or 2.25 V to 5.5 V (over recommended operating conditions unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay time	See Figure 7-1		11	18	ns
$t_{P(dft)}$	Propagation delay drift			9.2		ps/°C
t_{UI}	Minimum pulse width	See Figure 7-1	20			ns
PWD	Pulse width distortion	See Figure 7-1			7	ns
$t_{sk(o)}$	Channel to channel output skew time	Same direction channels			6	ns
$t_{sk(p-p)}$	Part to part skew time				6	ns
t_r	Output signal rise time	See Figure 7-1			3.2	ns
t_f	Output signal fall time				3.2	ns
t_{DO}	Default output delay time from input power loss	See Figure 7-2		0.1	0.3	us
t_{PU}	Time from UVLO to valid output data				300	us
tie	Time interval error			1		ns

6.19 Switching Characteristics—2.5-V Supply

V_{CC1}, V_{CC2} = 1.71 V to 1.89 V or 2.25 V to 5.5 V (over recommended operating conditions unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay time	See Figure 7-1		12	20.5	ns
$t_{P(dft)}$	Propagation delay drift			14.3		ps/°C
t_{UI}	Minimum pulse width	See Figure 7-1	20			ns
PWD	Pulse width distortion	See Figure 7-1			7.1	ns
$t_{sk(o)}$	Channel to channel output skew time	Same direction channels			6	ns
$t_{sk(p-p)}$	Part to part skew time				6.1	ns
t_r	Output signal rise time	See Figure 7-1			4	ns
t_f	Output signal fall time				4	ns
t_{DO}	Default output delay time from input power loss	See Figure 7-2		0.1	0.3	us

ADVANCE INFORMATION

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PU}	Time from UVLO to valid output data				300	us
tie	Time interval error			1		ns

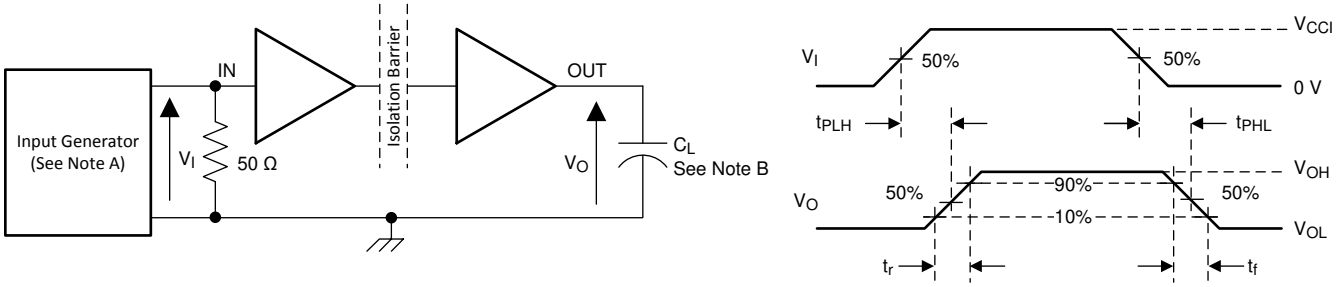
6.20 Switching Characteristics—1.8-V Supply

V_{CC1}, V_{CC2} = 1.71 V to 1.89 V or 2.25 V to 5.5 V (over recommended operating conditions unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay time	See Figure 7-1		15	24	ns
$t_{P(dft)}$	Propagation delay drift			15.2		ps/°C
t_{UI}	Minimum pulse width	See Figure 7-1	20			ns
PWD	Pulse width distortion	See Figure 7-1			8.2	ns
$t_{sk(o)}$	Channel to channel output skew time	Same direction channels			6	ns
$t_{sk(p-p)}$	Part to part skew time				8.8	ns
t_r	Output signal rise time	See Figure 7-1			5.3	ns
t_f	Output signal fall time				5.3	ns
t_{DO}	Default output delay time from input power loss	See Figure 7-2		0.1	0.3	us
t_{PU}	Time from UVLO to valid output data				300	us
tie	Time interval error			1		ns

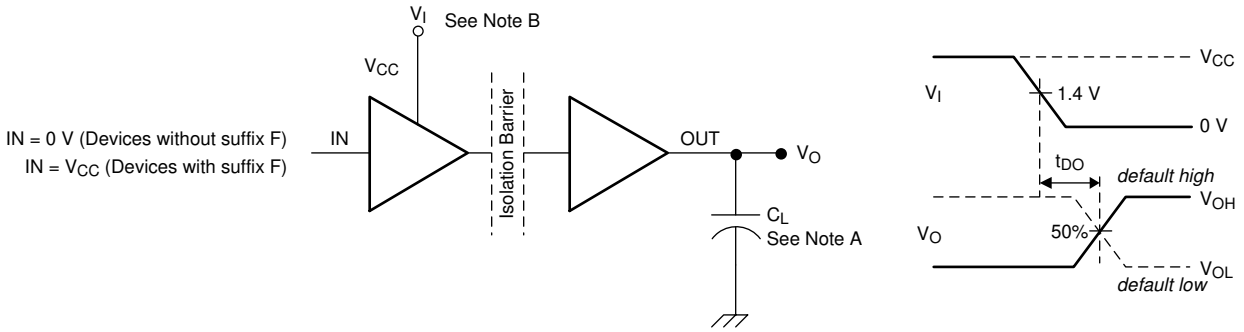
ADVANCE INFORMATION

7 Parameter Measurement Information



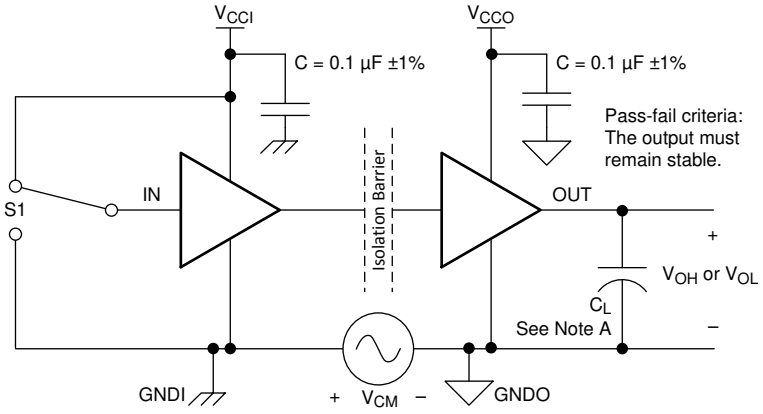
A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 50 kHz, 50% duty cycle, t_r ≤ 3 ns, t_f ≤ 3 ns, Z_O = 50 Ω. At the input, 50 Ω resistor is required to terminate Input Generator signal. It is not needed in actual application.
B. C_L = 15 pF and includes instrumentation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

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



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

Figure 7-2. Default Output Delay Time Test Circuit and Voltage Waveforms



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

Figure 7-3. Common-Mode Transient Immunity Test Circuit

ADVANCE INFORMATION

8 Detailed Description

8.1 Overview

The ISO672xB family of devices has an ON-OFF keying (OOK) modulation scheme to transmit the digital data across a silicon dioxide based isolation barrier. The transmitter sends a high frequency carrier across the barrier to represent one digital state and sends no signal to represent the other digital state. The receiver demodulates the signal after advanced signal conditioning and produces the output through a buffer stage. These devices also incorporate advanced circuit techniques to maximize the CMTI performance and minimize the radiated emissions due the high frequency carrier and IO buffer switching. The conceptual block diagram of a digital capacitive isolator, Figure 8-1, shows a functional block diagram of a typical channel.

8.2 Functional Block Diagram

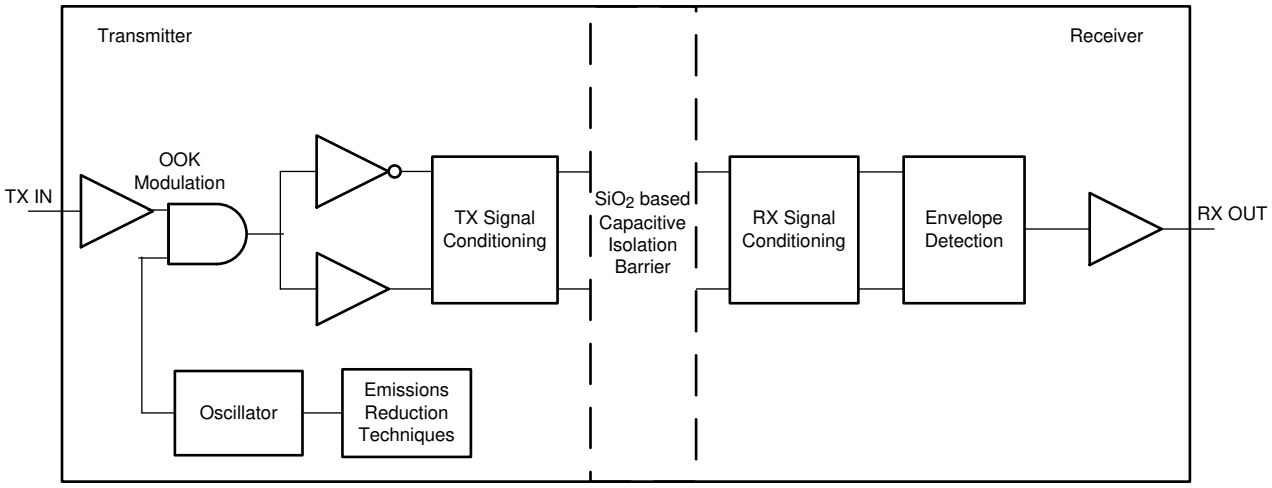


Figure 8-1. Conceptual Block Diagram of a Digital Capacitive Isolator

Figure 8-2 shows a conceptual detail of how the OOK scheme works.

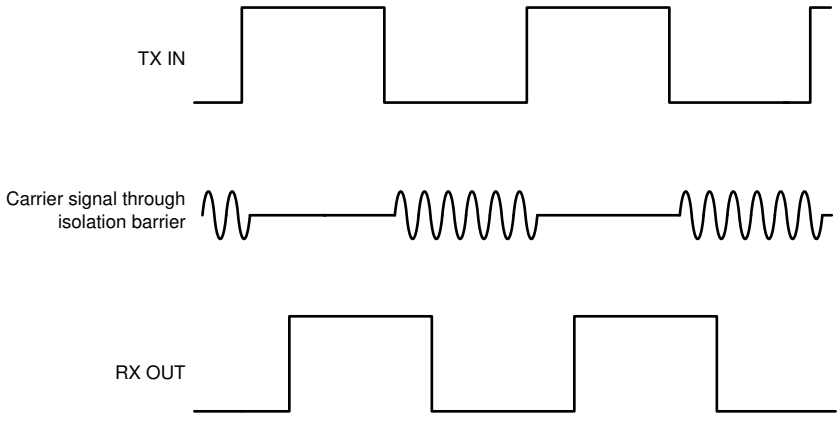


Figure 8-2. On-Off Keying (OOK) Based Modulation Scheme

8.3 Feature Description

The ISO672xB family of devices is available in two channel configurations and default output state options to enable a variety of application uses. Table 8-1 lists the device features of the ISO672xB devices.

Table 8-1. Device Features

PART NUMBER	MAXIMUM DATA RATE	CHANNEL DIRECTION	DEFAULT OUTPUT STATE	PACKAGE	RATED ISOLATION(1)
ISO6721B	50 Mbps	1 Forward, 1 Reverse	High	D-8	3000 V_{RMS} / 4242 V_{PK}
ISO6721FB	50 Mbps	1 Forward, 1 Reverse	Low	D-8	3000 V_{RMS} / 4242 V_{PK}

(1) See *Section 6.8* for detailed isolation ratings.

8.3.1 Electromagnetic Compatibility (EMC) Considerations

Many applications in harsh industrial environment are sensitive to disturbances such as electrostatic discharge (ESD), electrical fast transient (EFT), surge and electromagnetic emissions. These electromagnetic disturbances are regulated by international standards such as IEC 61000-4-x and CISPR 22. Although system-level performance and reliability depends, to a large extent, on the application board design and layout, the ISO672xB family of devices incorporates many chip-level design improvements for overall system robustness. Some of these improvements include:

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

ADVANCE INFORMATION

8.4 Device Functional Modes

Table 8-2 lists the functional modes for the ISO672xB devices.

Table 8-2. Function Table

V_{CCI} (1)	V_{CCO}	INPUT (INx)(2)	OUTPUT (OUTx)	COMMENTS
PU	PU	H	H	Normal Operation: A channel output assumes the logic state of the input.
		L	L	
		Open	Default	Default mode: When INx is open, the corresponding channel output goes to the default logic state. The default is *High* for ISO672xB and *Low* for ISO672xB with F suffix.
PD	PU	X	Default	Default mode: When V_{CCI} is unpowered, a channel output assumes the logic state based on the selected default option. The default is *High* for ISO672xB and *Low* for ISO672xB with F suffix. 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	Undetermined	When V_{CCO} is unpowered, a channel output is undetermined(3). When V_{CCO} transitions from unpowered to powered-up, a channel output assumes the logic state of the input

(1) V_{CCI} = Input-side V_{CC}; V_{CCO} = Output-side V_{CC}; PU = Powered up (V_{CC} ≥ 1.71V); PD = Powered down (V_{CC} ≤ 1.05 V); X = Irrelevant; H = High level; L = Low level

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

(3) The outputs are in undetermined state when 1.7 V < V_{CCI}, V_{CCO} < 2.25 V and 1.05 V < V_{CCI}, V_{CCO} < 1.71 V

8.4.1 Device I/O Schematics

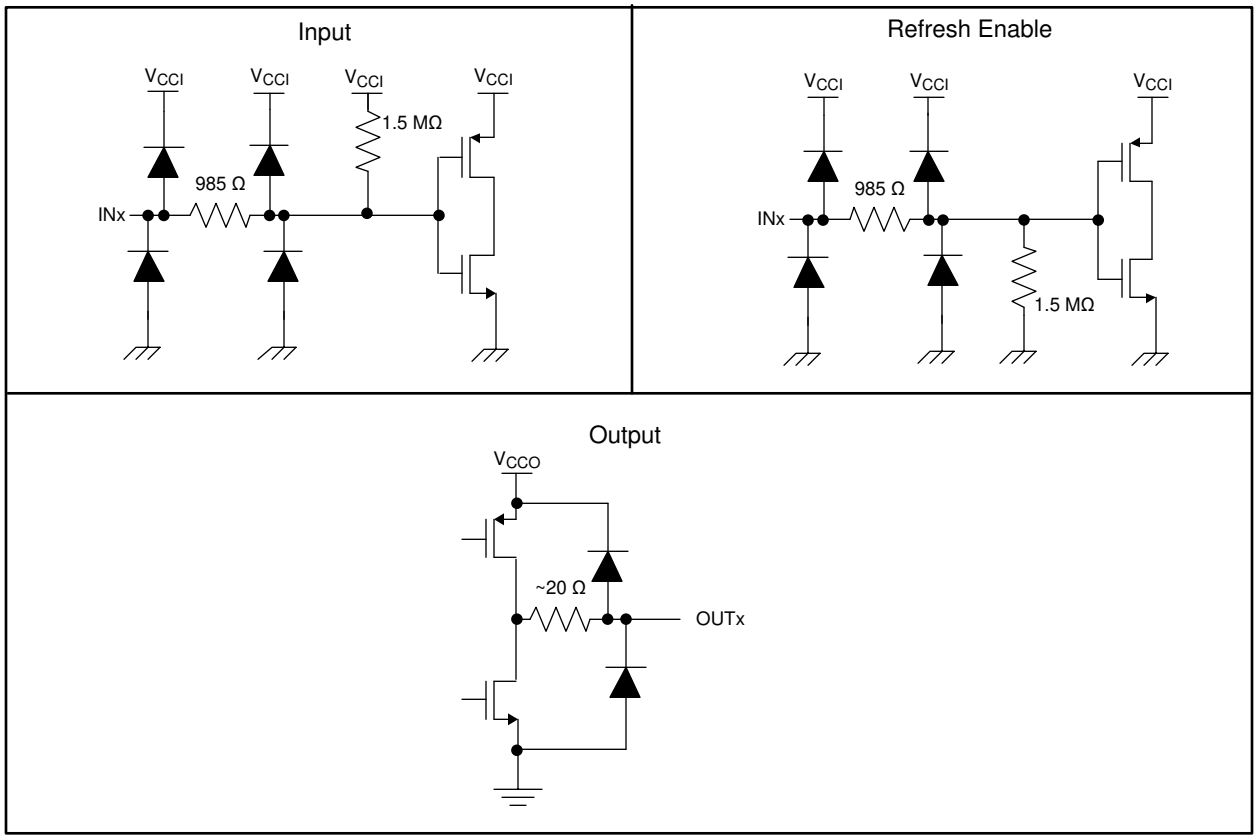


Figure 8-3. Device I/O Schematics

Application and Implementation

Note

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

9.1 Application Information

The ISO672xB devices are high-performance, dual-channel digital isolators. The devices use single-ended CMOS-logic switching technology. The supply voltage range is from 1.71 V to 5.5 V for both supplies, V_{CC1} and V_{CC2}. Since an isolation barrier separates the two sides, each side can be sourced independently with any voltage within recommended operating conditions. As an example, it is possible to supply ISO672xB V_{CC1} with 3.3 V (which is within 1.71 V to 5.5 V) and V_{CC2} with 5V (which is also within 1.71 V to 5.5 V). You can use the digital isolator as a logic-level translator in addition to providing isolation. When designing with digital isolators, keep in mind that because of the single-ended design structure, digital isolators do not conform to any specific interface standard and are only intended for isolating single-ended CMOS or TTL digital signal lines. The isolator is typically placed between the data controller (that is, µC or UART), and a data converter or a line transceiver, regardless of the interface type or standard.

9.2 Typical Application

For industrial applications, the ISO672xB device can be used with Texas Instruments' mixed signal microcontroller, digital-to-analog converter, transformer driver, and voltage regulator to create an isolated 4-mA to 20-mA current loop.

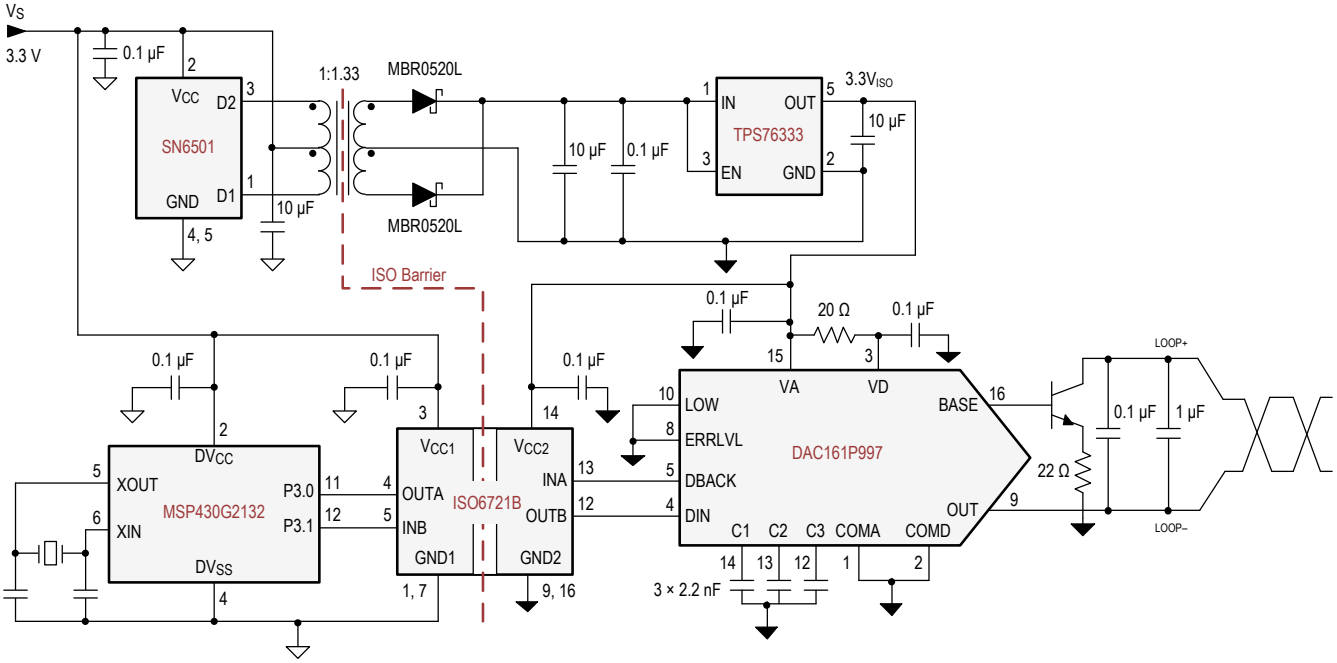


Figure 9-1. Isolated 4-mA to 20-mA Current Loop

ADVANCE INFORMATION

9.2.1 Design Requirements

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

Table 9-1. Design Parameters

PARAMETER	VALUE
Supply voltage, V_{CC1} and V_{CC2}	1.71 V to 1.89 V and 2.25 V to 5.5 V
Decoupling capacitor between V_{CC1} and GND1	0.1 µF
Decoupling capacitor from V_{CC2} and GND2	0.1 µF

9.2.2 Detailed Design Procedure

Unlike optocouplers, which require external components to improve performance, provide bias, or limit current, the ISO672xB devices only require two external bypass capacitors to operate.

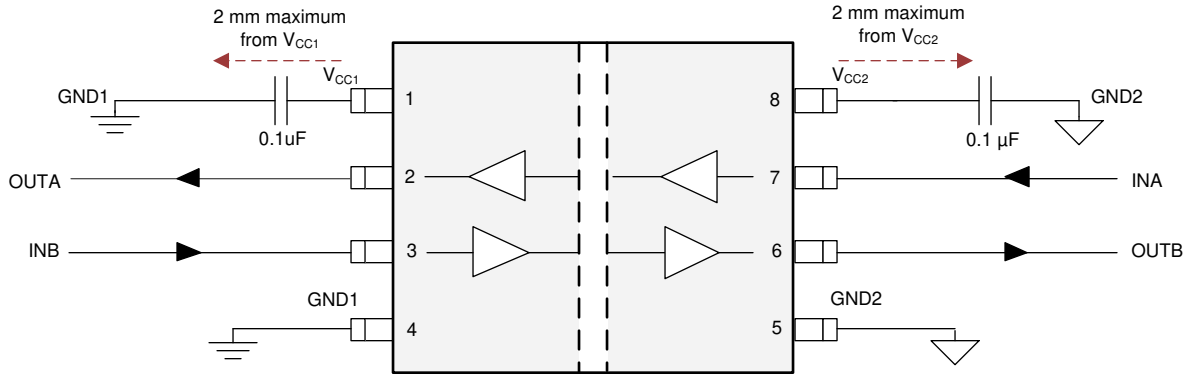


Figure 9-2. Typical ISO672xB Circuit Hook-up

ADVANCE INFORMATION

9.2.3 Application Curve

The following typical eye diagrams of the ISO672xB family of devices indicate low jitter and wide open eye at the maximum data rate of 50 Mbps.

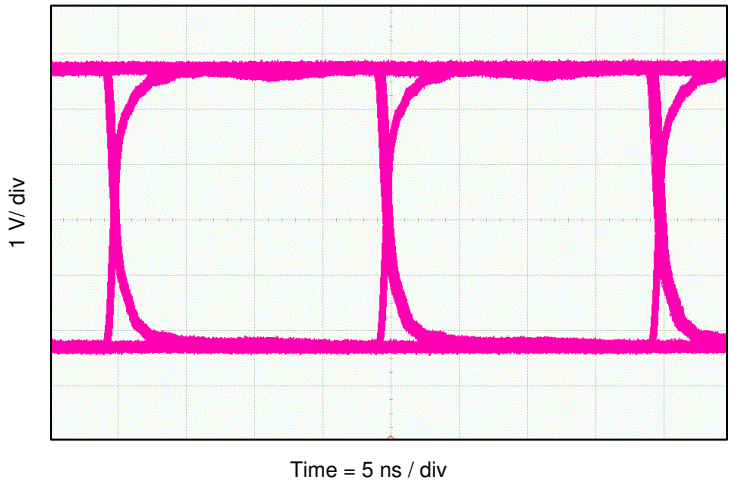


Figure 9-3. ISO6721B Eye Diagram at 50 Mbps PRBS, 5-V Supplies and 25°C

9.2.3.1 Insulation Lifetime

Insulation lifetime projection data is collected by using industry-standard Time Dependent Dielectric Breakdown (TDDB) test method. In this test, all pins on each side of the barrier are tied together creating a two-terminal device and high voltage applied between the two sides; See Figure 9-4 for TDDB test setup. The insulation breakdown data is collected at various high voltages switching at 60 Hz over temperature. For reinforced insulation, VDE standard requires the use of TDDB projection line with failure rate of less than 1 part per million (ppm). Even though the expected minimum insulation lifetime is 20 years at the specified working isolation voltage, VDE reinforced certification requires additional safety margin of 20% for working voltage and 87.5% for lifetime which translates into minimum required insulation lifetime of 37.5 years at a working voltage that's 20% higher than the specified value.

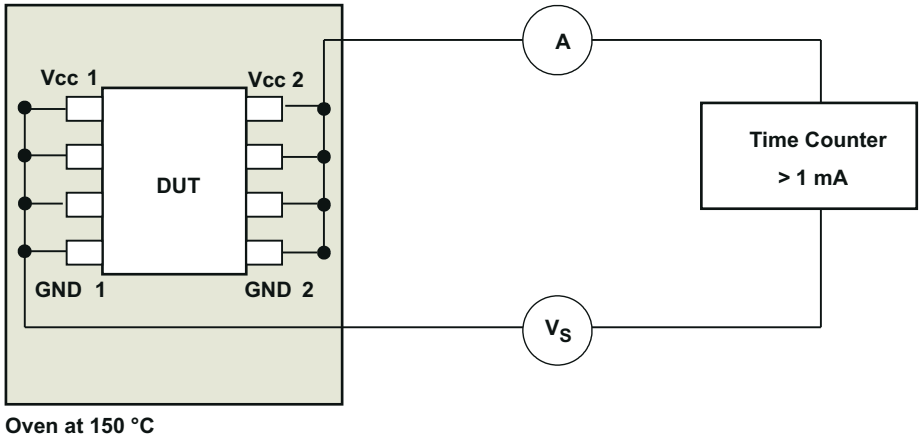


Figure 9-4. Test Setup for Insulation Lifetime Measurement

Power Supply Recommendations

To help ensure reliable operation at data rates and supply voltages, a 0.1-µF bypass capacitor is recommended at the input and output supply pins (V_{CC1} and V_{CC2}). The capacitors should be placed as close to the supply pins as possible. If only a single primary-side power supply is available in an application, isolated power can be generated for the secondary-side with the help of a transformer driver. For industrial applications, please use Texas Instruments' SN6501 or SN6505A. For such applications, detailed power supply design and transformer selection recommendations are available in *SN6501 Transformer Driver for Isolated Power Supplies* or *SN6505 Low-Noise 1-A Transformer Drivers for Isolated Power Supplies.*

ADVANCE INFORMATION

9 Layout

9.1 Layout Guidelines

A minimum of four layers is required to accomplish a low EMI PCB design (see Figure 9-1). Layer stacking should be in the following order (top-to-bottom): high-speed signal layer, ground plane, power plane and low-frequency signal layer.

- Routing the high-speed traces on the top layer avoids the use of vias (and the introduction of their inductances) and allows for clean interconnects between the isolator and the transmitter and receiver circuits of the data link.
- Placing a solid ground plane next to the high-speed signal layer establishes controlled impedance for transmission line interconnects and provides an excellent low-inductance path for the return current flow.
- Placing the power plane next to the ground plane creates additional high-frequency bypass capacitance of approximately 100 pF/in^2.
- Routing the slower speed control signals on the bottom layer allows for greater flexibility as these signal links usually have margin to tolerate discontinuities such as vias.

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

For detailed layout recommendations, refer to the *Digital Isolator Design Guide*.

9.1.1 PCB Material

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

9.2 Layout Example

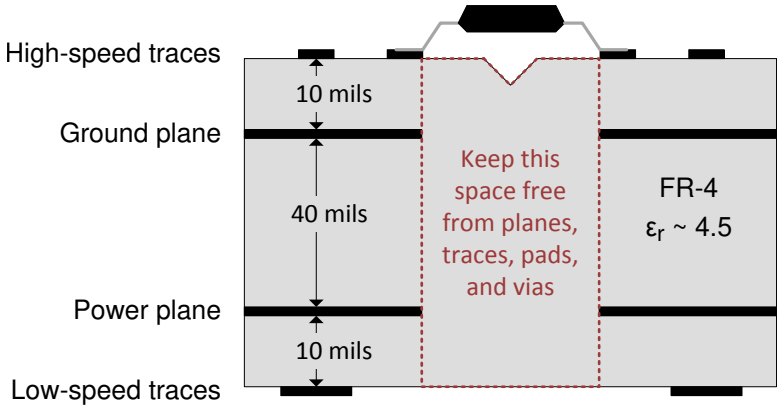


Figure 9-1. Layout Example

10 Device and Documentation Support

10.1 Device Support

10.1.1 Development Support

For development support, refer to:

- Isolated CAN Flexible Data (FD) Rate Repeater Reference Design
- Isolated 16-Channel AC Analog Input Module Reference Design Using Dual Simultaneously Sampled ADCs
- Polyphase Shunt Metrology with Isolated AFE Reference Design
- Reference Design for Power-Isolated Ultra-Compact Analog Output Module

10.2 Documentation Support

10.2.1 Related Documentation

For related documentation, see the following:

- Texas Instruments, *Digital Isolator Design Guide*
- Texas Instruments, *How to use isolation to improve ESD, EFT and Surge immunity in industrial systems* application report
- Texas Instruments, *Isolation Glossary*
- Texas Instruments, *Enabling high voltage signal isolation quality and reliability*
- Texas Instruments, *DAC161P997 Single-Wire 16-bit DAC for 4- to 20-mA Loops* data sheet
- Texas Instruments, MSP430G2132 *Mixed Signal Microcontroller* data sheet
- Texas Instruments, *SN6501 Transformer Driver for Isolated Power Supplies* data sheet
- Texas Instruments, TPS76333 *Low-Power 150-mA Low-Dropout Linear Regulators* data sheet

10.3 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 10-1. Related Links

PARTS	PRODUCT FOLDER	ORDER NOW	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
ISO6721B	Click here	Click here	Click here	Click here	Click here

10.4 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.

10.5 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.

10.6 Trademarks

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

ADVANCE INFORMATION

10.7 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.

10.8 Glossary

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

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.

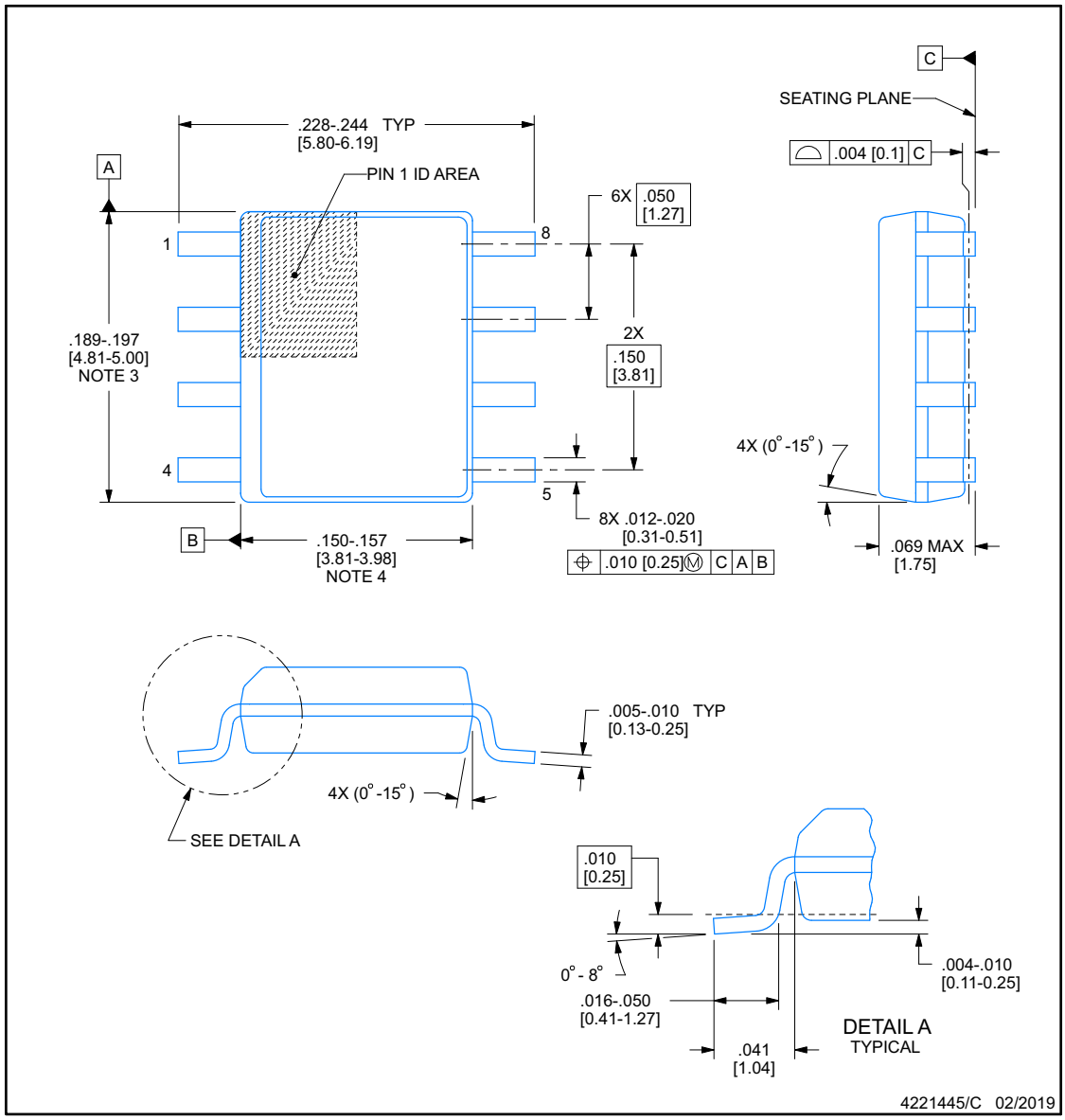
ADVANCE INFORMATION

PACKAGE OUTLINE

D0008B

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



NOTES:

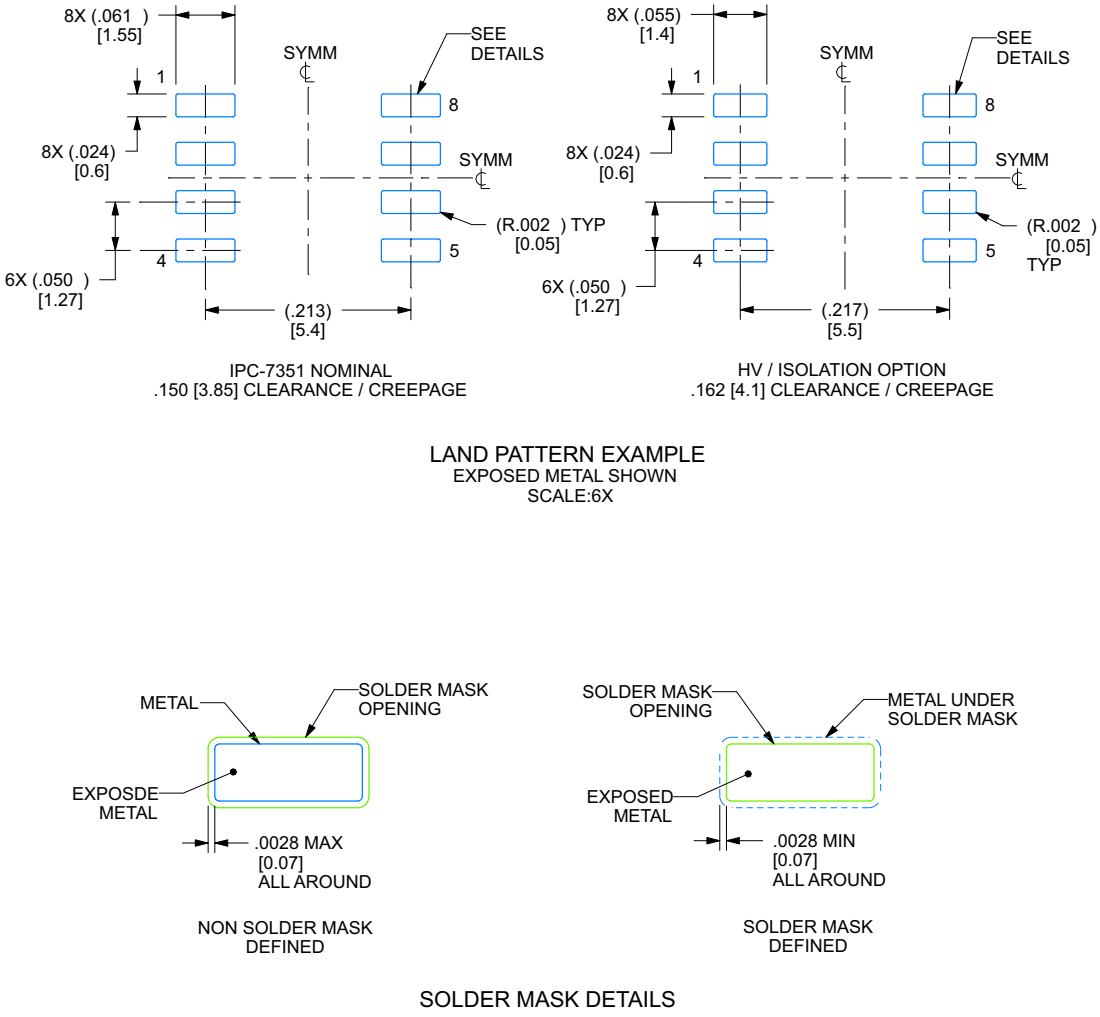
1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 [0.15], per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MS-012, variation AA.

EXAMPLE BOARD LAYOUT

D0008B

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



NOTES: (continued)

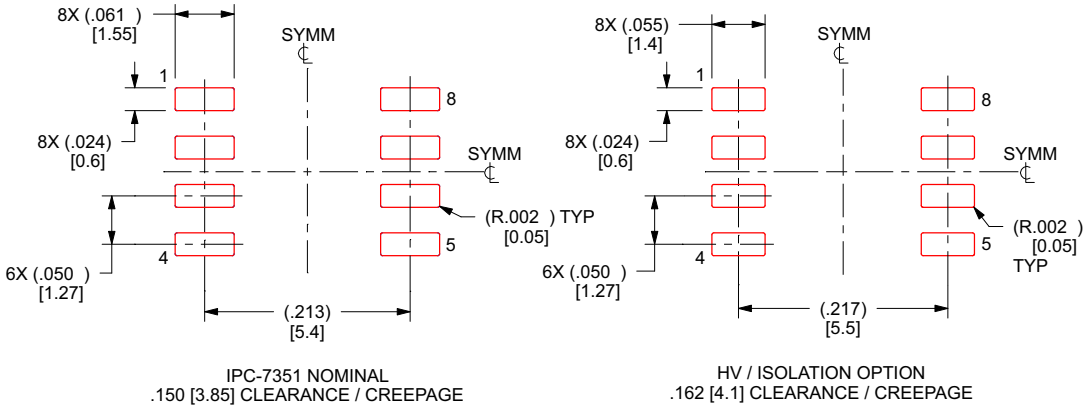
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0008B

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



IPC-7351 NOMINAL
.150 [3.85] CLEARANCE / CREEPAGE

HV / ISOLATION OPTION
.162 [4.1] CLEARANCE / CREEPAGE

SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.127 MM] THICK STENCIL
SCALE:6X

4221445/C 02/2019

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.

ADVANCE INFORMATION

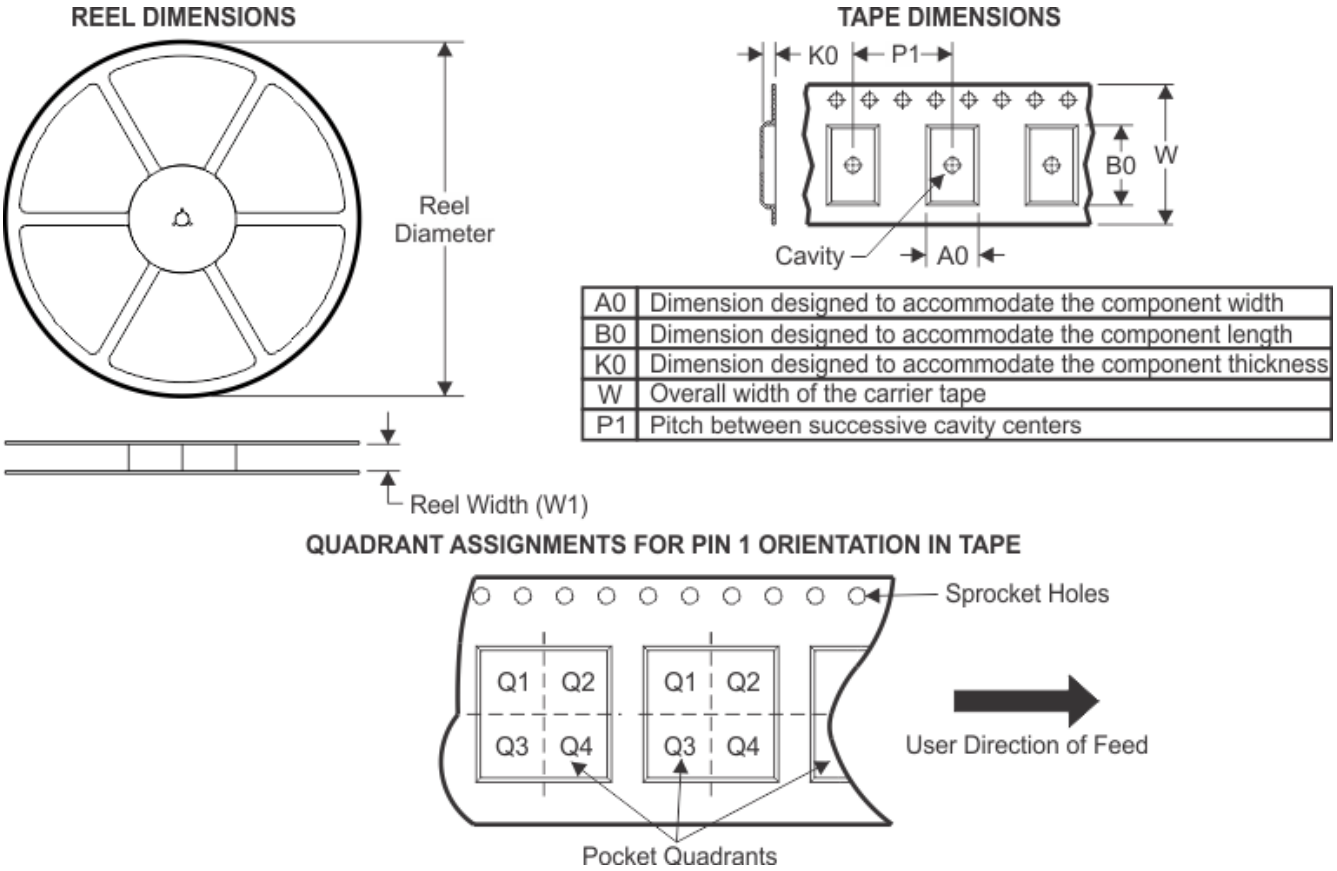
11.1 Package Option Addendum

Packaging Information

Orderable Device	Status(1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan(2)	Lead/Ball Finish(6)	MSL Peak Temp(3)	Op Temp (°C)	Device Marking(4) (5)
XISO6721BDR	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	X21A0
XISO6721FBDR	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	X21FA0

ADVANCE INFORMATION

11.1.1 Tape and Reel Information



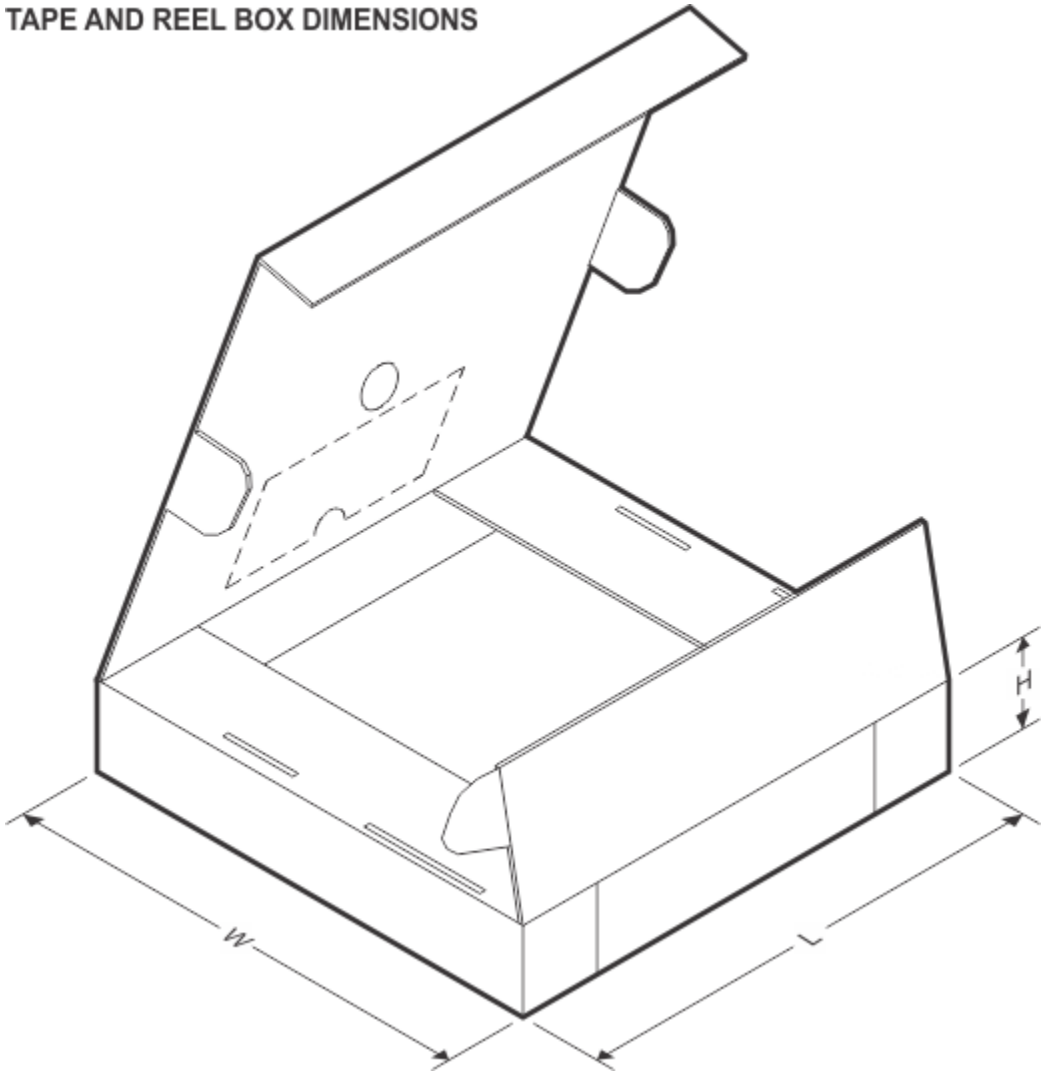
A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

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
ISO6721BDR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
ISO6721FBDR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1

ADVANCE INFORMATION

ADVANCE INFORMATION

TAPE AND REEL BOX DIMENSIONS



Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
ISO6721BDR	SOIC	D	8	2500	350.0	350.0	43.0
ISO6721FBDR	SOIC	D	8	2500	350.0	350.0	43.0

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
ISO6721BDR	PREVIEW	SOIC	D	8	2500	TBD	Call TI	Call TI	-40 to 125		
ISO6721FBDR	PREVIEW	SOIC	D	8	2500	TBD	Call TI	Call TI	-40 to 125		
XISO6721BDR	ACTIVE	SOIC	D	8	2500	TBD	Call TI	Call TI	-40 to 125		Samples
XISO6721FBDR	ACTIVE	SOIC	D	8	2500	TBD	Call TI	Call TI	-40 to 125		Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

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

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

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

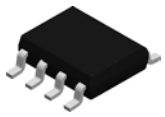
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF ISO6721 :

- Automotive: ISO6721-Q1

NOTE: Qualified Version Definitions:

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

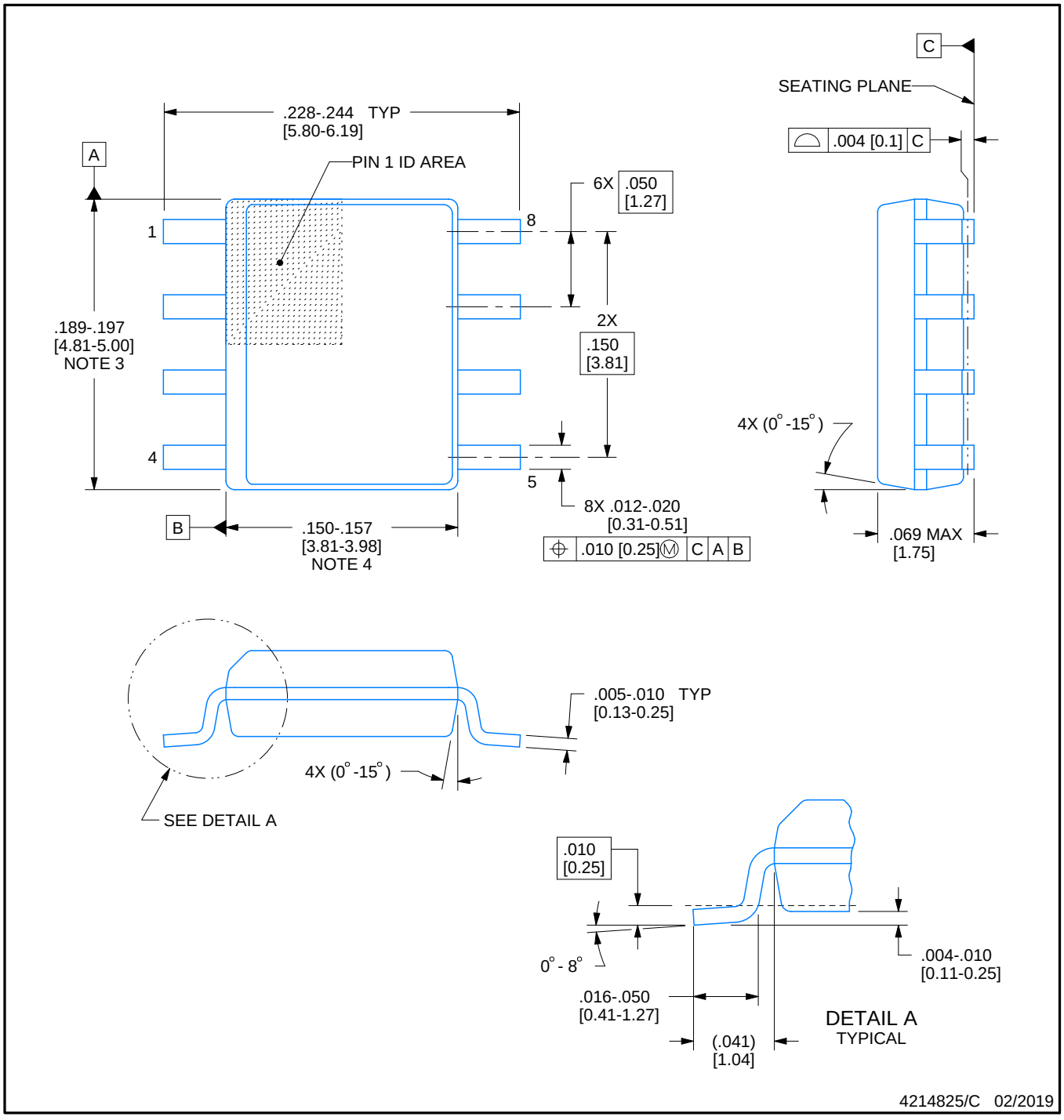


PACKAGE OUTLINE

D0008A

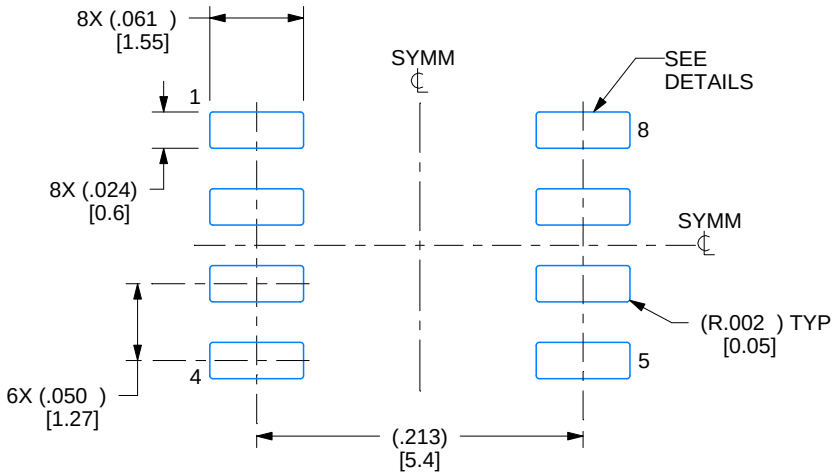
SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

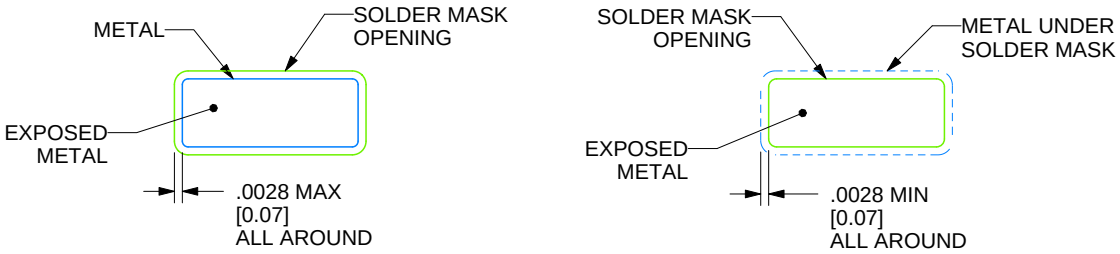


NOTES:

1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 [0.15] per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MS-012, variation AA.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X



SOLDER MASK DETAILS

4214825/C 02/2019

NOTES: (continued)

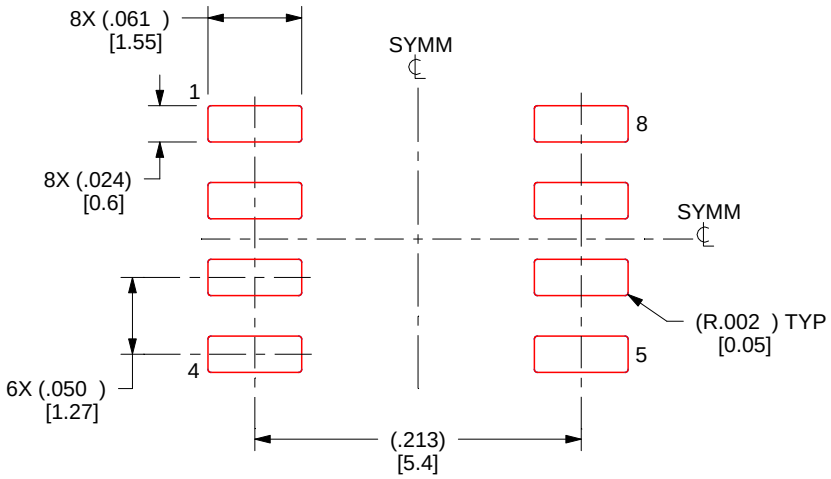
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.125 MM] THICK STENCIL
SCALE:8X

4214825/C 02/2019

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.

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, 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 will 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 (www.ti.com/legal/termsofsale.html) 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.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265