

## ISO732x Robust EMC, Low Power, Dual-Channel Digital Isolators

### 1 Features

- Signaling Rate: 25 Mbps
- Integrated Noise Filter on the Inputs
- Default Output 'High' and 'Low' Options
- Low Power Consumption: Typical  $I_{CC}$  per Channel at 1 Mbps:
  - ISO7320: 1.2 mA (5 V Supplies), 0.9 mA (3.3 V Supplies)
  - ISO7321: 1.7 mA (5 V Supplies), 1.2 mA (3.3 V Supplies)
- Low Propagation Delay: 34 ns Typical (5V Supplies)
- 3.3 V and 5 V Level Translation
- Wide Temperature Range:  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
- 65 KV/ $\mu\text{s}$  Transient Immunity, Typical (5V Supplies)
- Robust Electromagnetic Compatibility (EMC)
  - System-level ESD, EFT, and Surge Immunity
  - Low Emissions
- Isolation Barrier Life: > 25 Years
- Operates from 3.3 V and 5 V Supplies
- Narrow Body SOIC-8 Package
- Safety and Regulatory Approvals:
  - 4242  $V_{PK}$  Isolation per DIN V VDE 0884-10
  - 3  $KV_{RMS}$  Isolation for 1 minute per UL 1577
  - CSA Component Acceptance Notice #5A, IEC 60950-1 and IEC 61010-1 End Equipment Standards
  - GB4943.1-2011 CQC Certification
  - All Agencies Approvals Pending

### 2 Applications

- Opto-Coupler Replacement in:
  - Industrial FieldBus
    - ProfiBus
    - ModBus
    - DeviceNet™ Data Buses
  - Servo Control Interface
  - Motor Control
  - Power Supplies
  - Battery Packs

### 3 Description

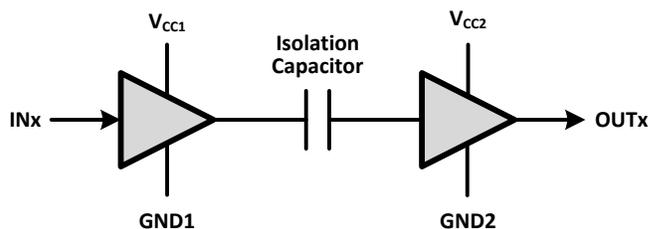
ISO732x provide galvanic isolation up to 3000  $V_{RMS}$  for 1 minute per UL and 4242  $V_{PK}$  per VDE. These devices have two isolated channels comprised of logic input and output buffers separated by silicon dioxide ( $\text{SiO}_2$ ) insulation barriers. ISO7320 has both channels in the same direction while ISO7321 has the two channels in opposite direction. In case of input power or signal loss, default output is 'low' for devices with suffix 'F' and 'high' for devices without suffix 'F'. Used in conjunction with isolated power supplies, these devices prevent noise currents on a data bus or other circuits from entering the local ground and interfering with or damaging sensitive circuitry. ISO732x have integrated noise filters for harsh industrial environment where short noise pulses may be present at the device input pins. ISO732x have TTL input thresholds and operate from 3 V to 5.5 V supply levels. Through innovative chip design and layout techniques, electromagnetic compatibility of ISO732x have been significantly enhanced to enable system-level ESD, EFT, Surge and Emissions compliance.

Device Information<sup>(1)</sup>

PART NUMBER	PACKAGE	BODY SIZE (NOM)
ISO7320C	SOIC (8)	4,90mm x 3,91mm
ISO7320FC		
ISO7321C		
ISO7321FC		

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

Simplified Schematic



## 4 Revision History

DATE	REVISION	NOTES
January 2015	*	Initial release.

## 5 Device and Documentation Support

### 5.1 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 1. Related Links**

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
ISO7320C	<a href="#">Click here</a>				
ISO7320FC	<a href="#">Click here</a>				
ISO7321C	<a href="#">Click here</a>				
ISO7321FC	<a href="#">Click here</a>				

### 5.2 Trademarks

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### 5.3 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

### 5.4 Glossary

[SLYZ022](#) — *TI Glossary*.

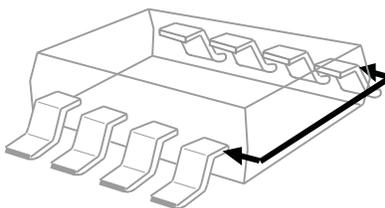
This glossary lists and explains terms, acronyms, and definitions.

### 5.5 Isolation Glossary

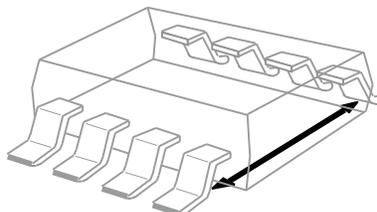
**Primary Circuit** — A circuit that is directly connected to an external mains supply for its power needs.

**Secondary Circuit** — A circuit that has no direct connection to a primary circuit and derives its power from a transformer, converter or equivalent isolation device, or from a battery.

**Creepage** — The shortest distance between two conductive parts measured along the surface of a solid insulation. The shortest path is typically found around the end of the package body.



**Clearance** — The shortest distance between two conductive parts measured through air.



**Isolation Capacitance ( $C_{IO}$ )** — The total capacitance between the terminals on a first side of the isolation barrier connected together and the terminals on a second side of the isolation barrier connected together forming a two-terminal device.

## Isolation Glossary (continued)

**Isolation Resistance ( $R_{IO}$ )** — The resistance between the terminals on a first side of the isolation barrier connected together and all the terminals on a second side of the isolation barrier connected together forming a two-terminal device.

**Rated Isolation Voltages** — The maximum voltage between all input terminals (connected together) and all output terminals (connected together) respectively.

*Maximum Rated Isolation Working Voltage ( $V_{IOWM}$ )* — An r.m.s or equivalent d.c. voltage assigned by the manufacturer, characterizing the specified long term withstand capability of its isolation.

*Maximum Rated Repetitive Peak Isolation Voltage ( $V_{IORM}$ )* — A peak voltage assigned by the manufacturer, characterizing the specified withstand capability of its isolation against repetitive peak voltages. It includes all repetitive transient voltages, but excludes all non-repetitive transient voltages.

*Maximum Rated Transient Isolation Voltage ( $V_{IOTM}$ )* — A peak impulse voltage assigned by the manufacturer, characterizing the specified withstand capability of its isolation against transient overvoltages.

*Withstand Isolation Voltage ( $V_{ISO}$ )* — Maximum AC r.m.s. isolation voltage for one minute.

*Surge Isolation Voltage ( $V_{IOSM}$ )* — The highest instantaneous value of an isolation voltage pulse with short time duration and of specified wave shape.

**Partial Discharge** — Localized electrical discharge which occurs in the insulation between all terminals of the first side and all terminals of the second side of the coupler.

**Comparative Tracking Index (CTI)** — CTI is an index used for electrical insulating materials that is defined as the numerical value of the voltage which causes failure by tracking during standard testing. Tracking is the process that produces a partially conducting path of localized deterioration on or through the surface of an insulating material as a result of the action of electric discharges on or close to an insulation surface -- the higher the CTI value of the insulating material, the smaller the minimum creepage distance required.

Generally, insulation breakdown occurs either through the material, over its surface, or both. Surface failure may arise from flashover or from the progressive degradation of the insulation surface by small localized sparks. Such sparks are the result of the breaking of a surface film of conducting contaminant on the insulation. The resulting break in the leakage current produces an overvoltage at the site of the discontinuity, and an electric spark is generated. These sparks often cause carbonization on insulation material and lead to a carbon track between points of different potential. This process is known as *tracking*.

**Material Groups** — Materials are classified into four groups according to their CTI values. These values are determined in accordance with IEC 60112. The groups are as follows:

- Material group I:  $600V \leq CTI$
- Material group II:  $400V \leq CTI < 600$
- Material group II:  $175V \leq CTI < 400$
- Material group II:  $100V \leq CTI < 175$

### 5.5.1 Insulation:

*Functional insulation* — Insulation needed for the correct operation of the equipment.

*Basic insulation* — Insulation that provides basic protection against electric shock.

*Supplementary insulation* — Independent insulation applied in addition to basic insulation in order to ensure protection against electric shock in the event of a failure of the basic insulation.

*Double insulation* — Insulation comprising both basic and supplementary insulation.

*Reinforced insulation* — A single insulation system which provides a degree of protection against electric shock equivalent to double insulation.

### 5.5.2 Pollution Degree:

Pollution is any addition of foreign matter, solid, liquid, or gaseous that can result in a reduction of electric strength or surface resistivity of the insulation. There are four categories of pollution:

*Pollution Degree 1* — No pollution or only dry, nonconductive pollution occurs. The pollution has no influence.

## Isolation Glossary (continued)

*Pollution Degree 2* — Only nonconductive pollution occurs. However, a temporary conductivity caused by condensation is to be expected.

*Pollution Degree 3* — Conductive pollution occurs or dry non-conductive pollution occurs which becomes conductive due to condensation which is to be expected.

*Pollution Degree 4* – Continuous conductivity occurs due to conductive dust, rain, or other wet conditions.

### 5.5.3 Overvoltage Categories and Installation Classification:

*Overvoltage Categories* define transient overvoltage conditions. There are four different levels as indicated in IEC 60664.

I: Signal level — Special protected equipment or parts of equipment, e.g., circuit board inside a DVD player.

II: Local level — Portable equipment that is supplied from the wall outlet, e.g., a DVD player

III: Distribution level — Equipment in fixed installation such as HVAC system, Washers / Dryers, etc.

IV: Primary supply level — Equipment for use at the origin of the installations such as overhead lines, cable systems, etc.

Lower level category is subject to smaller transients than the category above.

## 6 Mechanical, Packaging, and Orderable Information

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

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
ISO7320CD	PREVIEW	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	7320C	
ISO7320CDR	PREVIEW	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	7320C	
ISO7320FCD	PREVIEW	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	7320FC	
ISO7320FCDR	PREVIEW	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	7320FC	
ISO7321CD	PREVIEW	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	7321C	
ISO7321CDR	PREVIEW	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	7321C	
ISO7321FCD	PREVIEW	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	7321FC	
ISO7321FCDR	PREVIEW	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	7321FC	

(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) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(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.

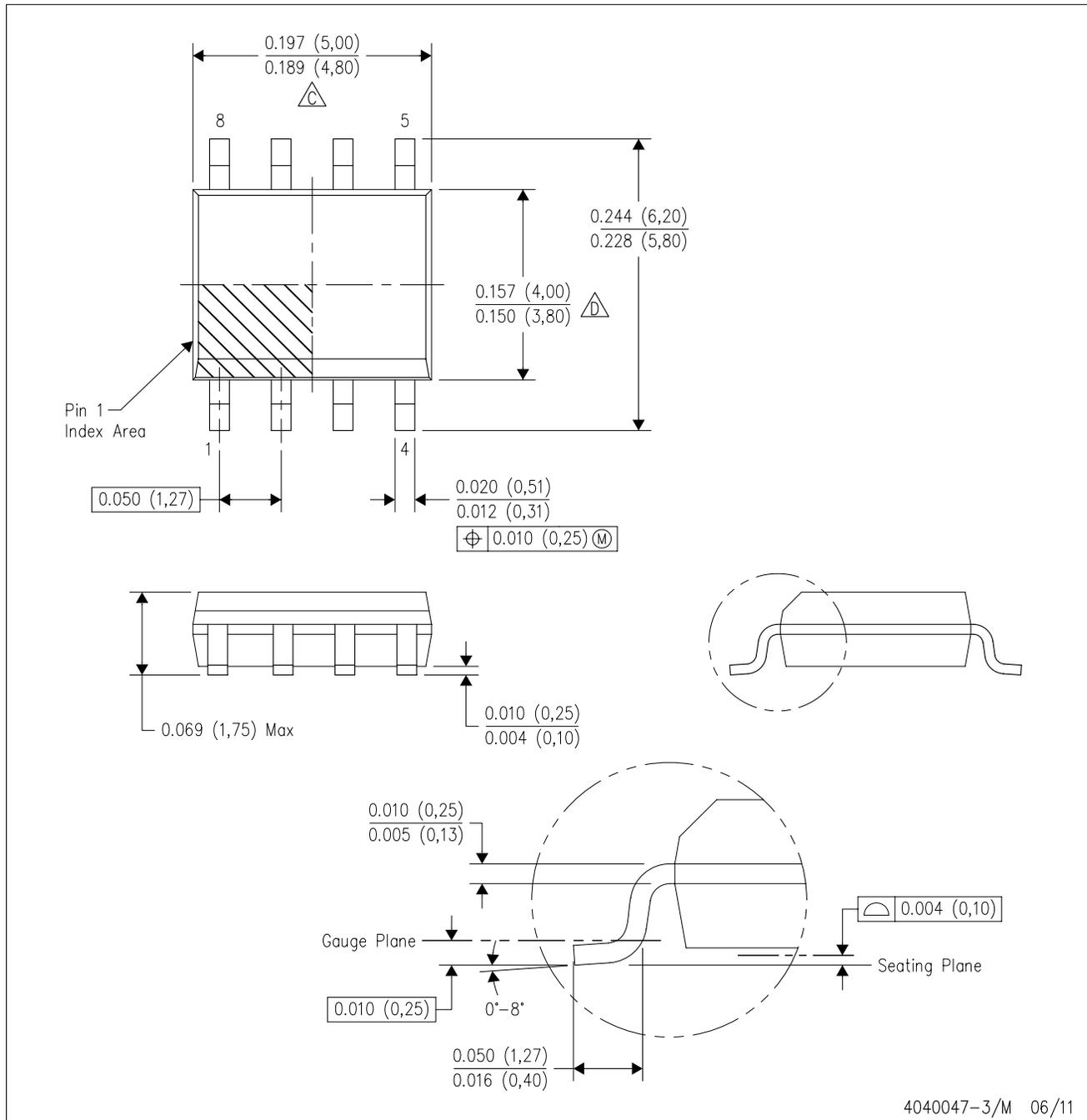
(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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D (R-PDSO-G8)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AA.

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### Products

Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>
DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
OMAP Applications Processors	<a href="http://www.ti.com/omap">www.ti.com/omap</a>
Wireless Connectivity	<a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a>

### Applications

Automotive and Transportation	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
Communications and Telecom	<a href="http://www.ti.com/communications">www.ti.com/communications</a>
Computers and Peripherals	<a href="http://www.ti.com/computers">www.ti.com/computers</a>
Consumer Electronics	<a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>
Energy and Lighting	<a href="http://www.ti.com/energy">www.ti.com/energy</a>
Industrial	<a href="http://www.ti.com/industrial">www.ti.com/industrial</a>
Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Space, Avionics and Defense	<a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a>
Video and Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>

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