ISO734x Robust EMC, Low Power, Quad-Channel Digital Isolators

PRODUCT PREVIEW

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:
  - ISO7340: 0.9 mA (5 V Supplies), 0.7 mA (3.3 V Supplies)
  - ISO7341: 1.2 mA (5 V Supplies), 0.9 mA (3.3 V Supplies)
  - ISO7342: 1.2 mA (5 V Supplies), 0.9 mA (3.3 V Supplies)
- Low Propagation Delay: 32 ns Typical (5 V Supplies)
- 3.3 V and 5 V Level Translation
- Wide Temperature Range: –40°C to 125°C
- 65 KV/µs Transient Immunity, Typical (5 V 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
- Wide Body SOIC-16 Package
- Safety and Regulatory Approvals:
  - 4242 V_{PK} Basic 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

- Optocoupler Replacement in:
  - Industrial Fieldbus
    - Profibus
    - Modbus
    - DeviceNet™ Data Buses
  - Servo Control Interface
  - Motor Control
  - Power Supplies
  - Battery Packs

3 Description

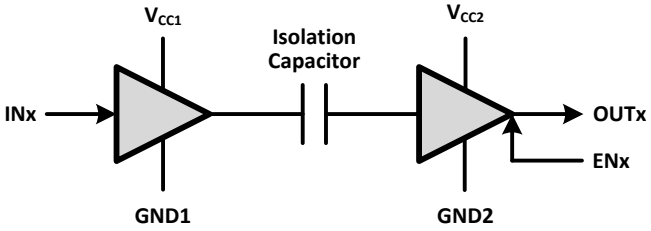
ISO734x provide galvanic isolation up to 3000 V_{RMS} for 1 minute per UL and 4242 V_{PK} per VDE. These devices have four isolated channels comprised of logic input and output buffers separated by a silicon dioxide (SiO_2) insulation barrier. ISO7340 has four channels in forward direction, ISO7341 has three forward and one reverse-direction channels; and ISO7342 has two forward and two reverse-direction channels. In case of input power or signal loss, default output is 'low' for devices with suffix 'F' and 'high' for devices without suffix 'F'. See *Device Functional Modes* for further details. 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. ISO734x has integrated noise filter for harsh industrial environment where short noise pulses may be present at the device input pins. ISO734x has TTL input thresholds and operates from 3 V to 5.5 V supply levels. Through innovative chip design and layout techniques, electromagnetic compatibility of ISO734x has been significantly enhanced to enable system-level ESD, EFT, Surge and Emissions compliance.

Device Information(1)

ORDER NUMBER	PACKAGE	BODY SIZE
ISO7340C	SOIC (16)	10.3mm x 7.50mm
ISO7340FC		
ISO7341C		
ISO7341FC		
ISO7342C		
ISO7342FC		

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

Simplified Schematic



4 Revision History

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

DATE	REVISION	NOTES
September 2014	*	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
ISO7340C	Click here	Click here	Click here	Click here	Click here
ISO7340FC	Click here	Click here	Click here	Click here	Click here
ISO7341C	Click here	Click here	Click here	Click here	Click here
ISO7341FC	Click here	Click here	Click here	Click here	Click here
ISO7342C	Click here	Click here	Click here	Click here	Click here
ISO7342FC	Click here	Click here	Click here	Click here	Click here

5.2 Trademarks

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*.

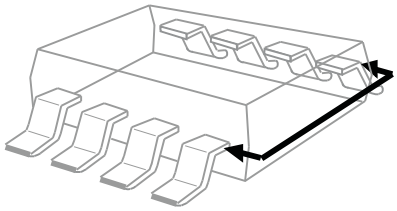
This glossary lists and explains terms, acronyms, and definitions.

5.5 Isolation Glossary

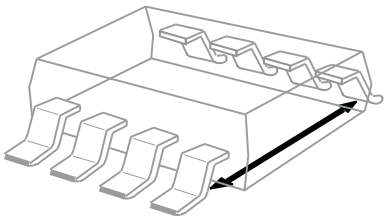
Primary Circuit — A circuit that is directly connected to an external mains supply for its power needs.

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.



PRODUCT PREVIEW

Isolation Glossary (continued)

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 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 ≤ CTI
- Material group II: 400V ≤ CTI < 600
- Material group II: 175V ≤ CTI < 400
- Material group II: 100V ≤ 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.

Isolation Glossary (continued)

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.

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.

PRODUCT PREVIEW

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
ISO7340CDW	PREVIEW	SOIC	DW	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	XISO7340C	
ISO7340CDWR	PREVIEW	SOIC	DW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	XISO7340C	
ISO7341CDW	PREVIEW	SOIC	DW	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	XISO7341C	
ISO7341CDWR	PREVIEW	SOIC	DW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	XISO7341C	
ISO7342CDW	PREVIEW	SOIC	DW	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	ISO7342C	
ISO7342CDWR	PREVIEW	SOIC	DW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	ISO7342C	

(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)

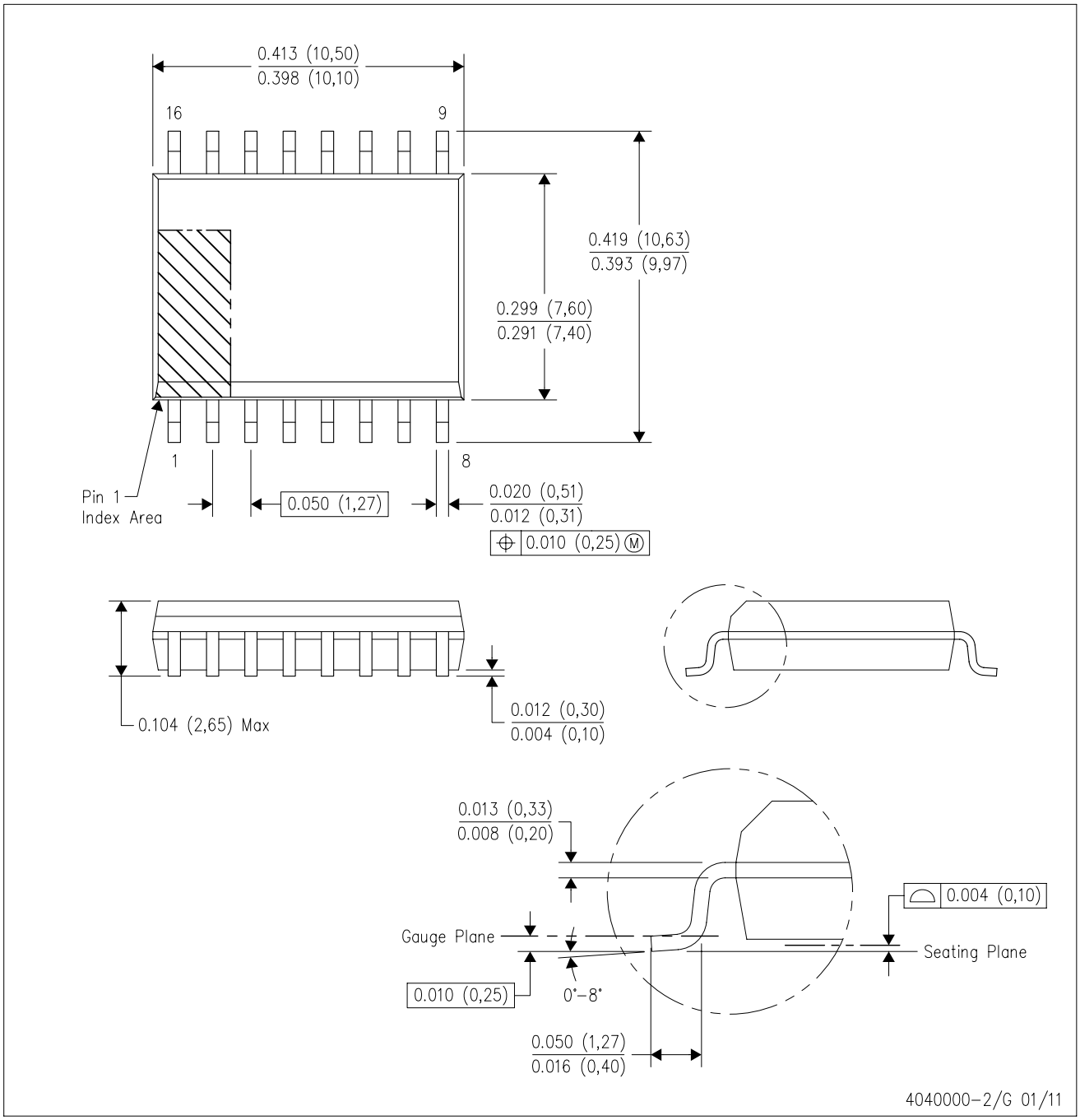
(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(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.

DW (R–PDSO–G16) PLASTIC SMALL OUTLINE



NOTES:
A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M–1994.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
D. Falls within JEDEC MS–013 variation AA.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as “components”) are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers’ products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products		**Applications**	
Audio	www.ti.com/audio	Automotive and Transportation	www.ti.com/automotive
Amplifiers	amplifier.ti.com	Communications and Telecom	www.ti.com/communications
Data Converters	dataconverter.ti.com	Computers and Peripherals	www.ti.com/computers
DLP® Products	www.dlp.com	Consumer Electronics	www.ti.com/consumer-apps
DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com		
OMAP Applications Processors	www.ti.com/omap	**TI E2E Community**	e2e.ti.com
Wireless Connectivity	www.ti.com/wirelessconnectivity		

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