

1.2V to 3.6V, 12-Bit, Nanopower, 4-Wire TOUCH SCREEN CONTROLLER with I²C™ Interface

Check for Samples: [TSC2014](#)

FEATURES

- 4-Wire Touch Screen Interface
- Ratiometric Conversion
- Single 1.2V to 3.6V Supply
- Preprocessing to Reduce Bus Activity
- High-Speed I²C-Compatible Interface
- Internal Detection of Screen Touch
- Register-Based Programmable:
 - 10-Bit or 12-Bit Resolution
 - Sampling Rates
 - System Timing
- On-Chip Temperature Measurement
- Touch Pressure Measurement
- Auto Power-Down Control
- Low Power:
 - 430μW at 1.8V, 50SSPS
 - 320μW at 1.6V, 50SSPS
 - 190μW at 1.2V, 50SSPS
 - 58μW at 1.6V, 8.2kSPS Eq. Rate
 - 37μW at 1.2V, 8.2kSPS Eq. Rate
- Enhanced ESD Protection:
 - ±8kV HBM
 - ±1kV CDM
 - ±25kV Air Gap Discharge
 - ±11kV Contact Discharge
- 1.5 x 2.0 WCSP-12 Package

U.S. Patent No. 6,246,394; other patents pending.

APPLICATIONS

- Cellular Phones
- Portable Instruments
- MP3 Players, Pagers
- Multiscreen Touch Control

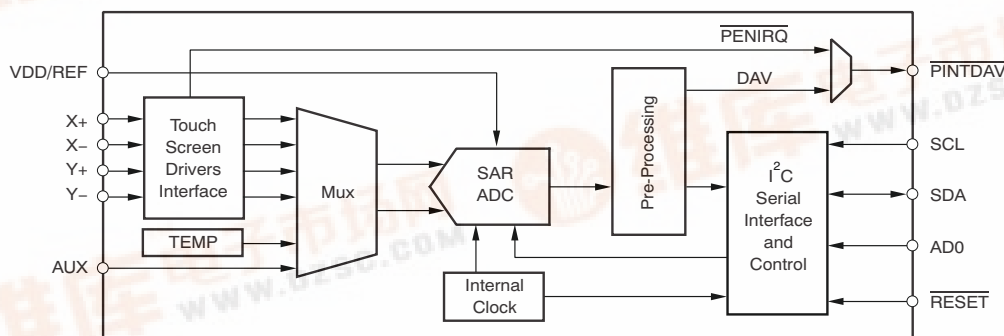
DESCRIPTION

The TSC2014 is a very low-power touch screen controller designed to work with power-sensitive, handheld applications that are based on advanced low-voltage processors. It works with a supply voltage as low as 1.2V, which can be supplied by a single-cell battery. It contains a complete, ultralow-power, 12-bit, analog-to-digital (A/D) resistive touch screen converter, including drivers and the control logic to measure touch pressure.

In addition to these standard features, the TSC2014 offers preprocessing of the touch screen measurements to reduce bus loading, thus reducing the consumption of host processor resources that can then be redirected to more critical functions.

The TSC2014 supports an I²C serial bus and data transmission protocol in all three defined modes: standard, fast, and high-speed. It offers programmable resolution of 10 or 12 bits to accommodate different screen sizes and performance needs.

The TSC2014 is available in a miniature, 12-lead, 3 x 4 array, (1.555 ±0.055)mm x (2.055 ±0.055)mm wafer chip-scale package (WCSP) package. The device is characterized for the –40°C to +85°C industrial temperature range.



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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.

ORDERING INFORMATION⁽¹⁾

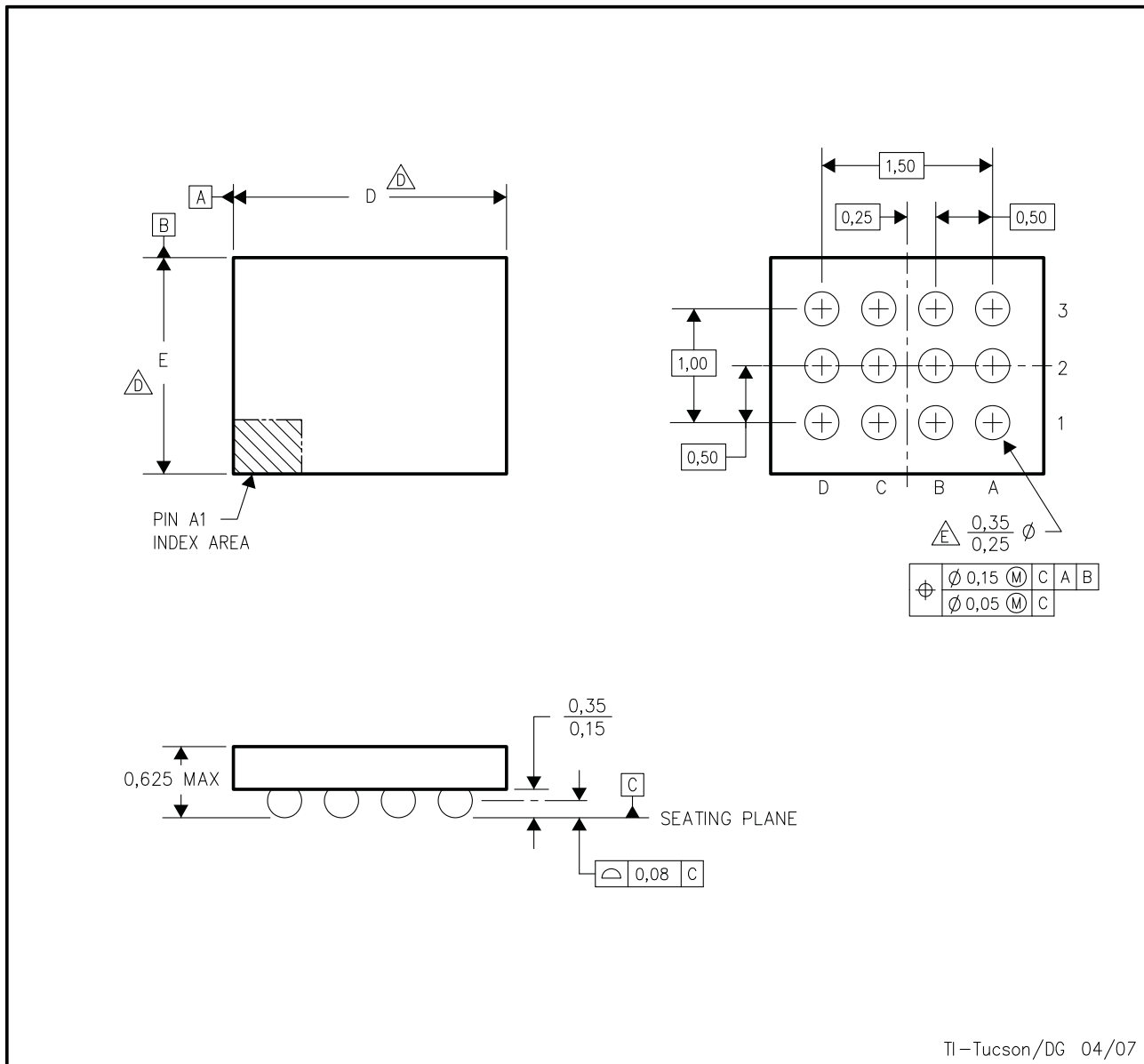
PRODUCT	TYPICAL INTEGRAL LINEARITY (LSB)	TYPICAL GAIN ERROR (LSB)	NO MISSING CODES RESOLUTION (BITS)	PACKAGE TYPE	PACKAGE DESIGNATOR	SPECIFIED TEMPERATURE RANGE	PACKAGE MARKING	ORDERING NUMBER	TRANSPORT MEDIA, QUANTITY
TSC2014I	-0.6 to +0.38	+0.32	11	12-Pin, 3 x 4 Matrix, 1.5 x 2.0 WCSP	YZG	-40°C to +85°C	TSC2014I	TSC2014IYZGT	Small Tape and Reel, 250
								TSC2014IYZGR	Tape and Reel, 3000

(1) For the most current package and ordering information, see the Package Option Addendum located at the end of this data sheet, or visit the device product folder at www.ti.com.

MECHANICAL DATA

YZG (R-XBGA-N12)

DIE-SIZE BALL GRID ARRAY



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. NanoFree™ package configuration.
 - $\triangle D$ Devices in YZG package can have dimension D ranging from 2.00 to 2.11 mm and dimension E ranging from 1.50 to 1.61 mm. To determine the exact package size of a particular device, refer to the device datasheet or contact a local TI representative.
 - $\triangle E$ Reference Product Data Sheet for array population. 4 x 3 matrix pattern is shown for illustration only.
 - F. This package contains lead-free balls. Refer to YEG (Drawing #4204182) for tin-lead (SnPb) balls.



www.ti.com

PACKAG

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp
TSC2014IYZGR	ACTIVE	DSBGA	YZG	12	3000	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C
TSC2014IYZGT	ACTIVE	DSBGA	YZG	12	250	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C

⁽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> for more 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 RoHS materials, with the exception of 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 high temperature applications.

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 eutectic solder used between the leadframe and die. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

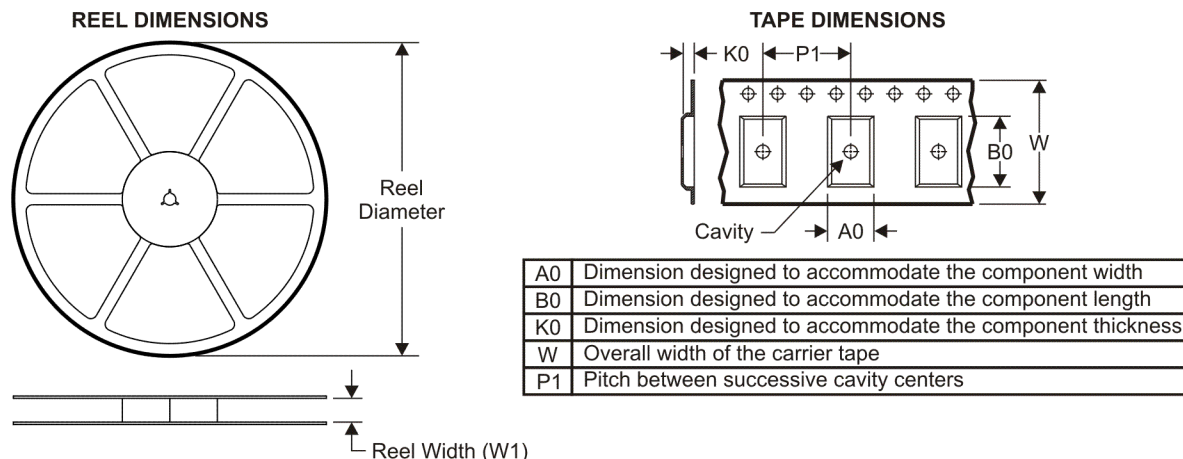
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (both of which are RoHS prohibited materials) in homogeneous material.

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

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TAPE AND REEL INFORMATION



QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TSC2014IYZGR	DSBGA	YZG	12	3000	180.0	8.4	1.75	2.25	0.81	4.0	8.0	Q1
TSC2014IYZGT	DSBGA	YZG	12	250	180.0	8.4	1.75	2.25	0.81	4.0	8.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TSC2014IYZGR	DSBGA	YZG	12	3000	190.5	212.7	31.8
TSC2014IYZGT	DSBGA	YZG	12	250	190.5	212.7	31.8

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