

TMCS2100-Q1 Coreless Multi-Sensor Hall-Effect Current Sensor

1 Features

- AEC-Q100 qualified for automotive applications
 - Temperature grade 0: -40°C to 150°C
- Functional Safety-Capable
 - Documentation available to aid in functional safety system design
- Programmable gain
- Fully differential output
- Fast Response
 - Signal bandwidth: 250kHz
 - Response time: 2.6µs
 - Propagation delay: 0.7µs
 - Overcurrent detection response: 500ns
- Operating supply range: 3V to 5.5V

2 Applications

- [EV Traction Inverter](#)
- [Off-Highway Vehicle](#)
- [Solar Inverter](#)

3 Description

The TMCS2100-Q1 is a precision multi-sensor coreless current sensing device, designed specifically for the demanding requirements of high voltage, high-current multi-phase systems. This measurement design meets the performance requirements of

significantly larger, heavier and more expensive magnetic core-based products while achieving a space-saving footprint, without the requirement to modify or notch the high current carrying bus bars.

AC or DC current flows through a busbar generating a magnetic field. The integrated on-chip Hall-effect sensors measure the magnetic field. Typically, differential coreless current sensing devices are highly susceptible to changes in magnetic field strength due to system manufacturing tolerances, displacement and vibration. The TMCS2100-Q1 utilizes a TI proprietary algorithm to significantly reduce the effect of displacement. Additionally, active frequency compensation is available for eddy current-induced amplitude errors.

The TMCS2100-Q1 characterization process minimizes phase-to-phase magnetic crosstalk error and enables measurement errors below 0.5% at full-scale current levels that can exceed 1000A.

Package Information

PART NUMBER	PACKAGE ⁽¹⁾	PACKAGE SIZE ⁽²⁾
TMCS2100-Q1	PW (TSSOP, 14)	5mm × 6.4mm

- (1) For all available packages, see [Section 7](#).
- (2) The package size (length × width) is a nominal value and includes pins, where applicable.

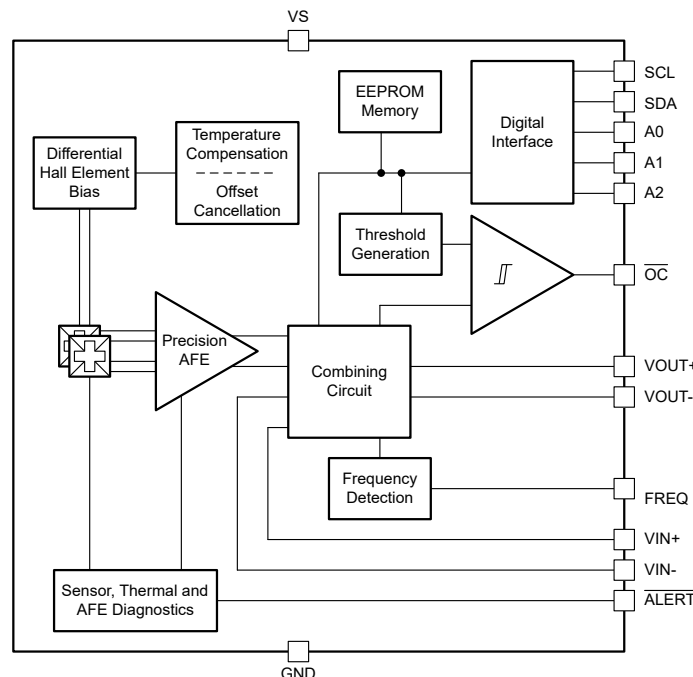


Figure 3-1. Functional Block Diagram



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4 Device Comparison

Table 4-1. Device Comparison

DEVICE NAME	FULL SCALE OUTPUT MAGNETIC FIELD RANGE
TMCS2100A1QPWRQ1	±10.6mT to ±84.4mT
TMCS2100A2QPWRQ1	±5.3mT to ±42.2mT
TMCS2100A3QPWRQ1	±2.6mT to ±21.2mT

5 Pin Configuration and Functions

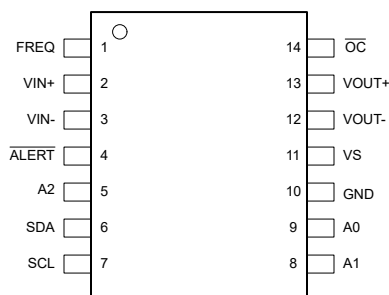


Figure 5-1. PW Package 14-Pin TSSOP Top View

Table 5-1. Pin Functions

PIN		TYPE	DESCRIPTION
NO.	NAME		
1	FREQ	Digital Input/Output	Frequency Detection Signal
2	VIN+	Analog Input	Positive Differential Input
3	VIN-	Analog Input	Negative Differential Input
4	ALERT	Digital Output	Sensor diagnostics open-drain active low. Connect pin to GND if not used
5	A2	Digital Input	I2C Address Pin. Connect to GND or VS
6	SDA	Digital Input/Output	Open-drain Bidirectional I2C Data
7	SCL	Digital Input	Open-drain I2C Clock Input
8	A1	Digital Input	I2C Address Pin. Connect to GND, SCL, SDA, or VS
9	A0	Digital Input	I2C Address Pin. Connect to GND, SCL, SDA, or VS
10	GND	Ground	Ground
11	VS	Power	Power Supply
12	VOUT-	Analog Output	Negative Differential Output
13	VOUT+	Analog Output	Positive Differential Output
14	OC	Digital Output	Overcurrent output, open-drain active low. Connect pin to GND if not used

6 Revision History

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

DATE	REVISION	NOTES
September 2025	*	Initial Release

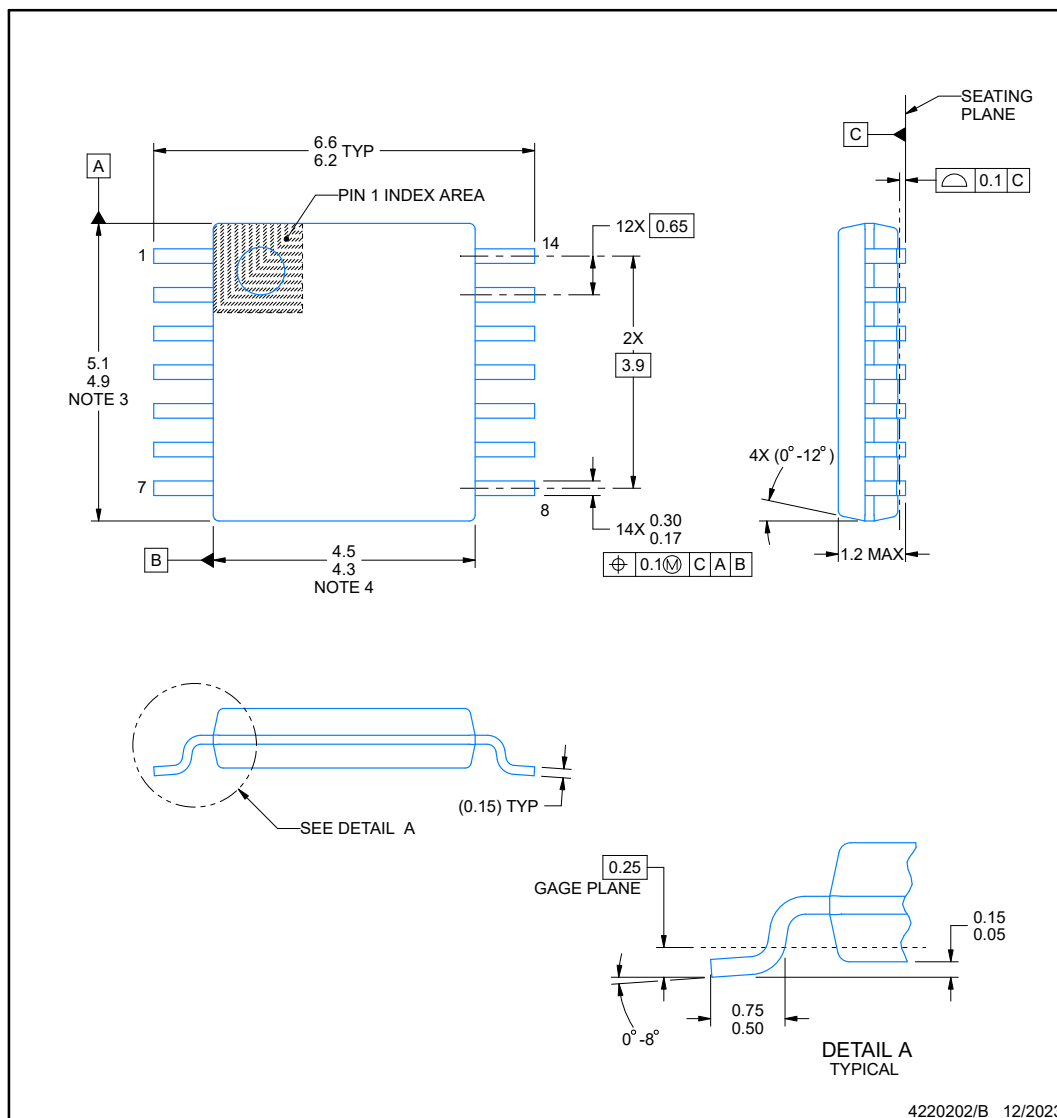
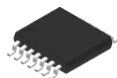
7 Mechanical, Packaging, and Orderable Information

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.

7.1 Mechanical Data

PW0014A

PACKAGE OUTLINE
TSSOP - 1.2 mm max height
SMALL OUTLINE PACKAGE



NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.

TSSOP - 1.2 mm max height

14X (1.5)

14X (0.45)

12X (0.65)

7

(5.8)

SYMM

(R0.05) TYP

14

8

SYMM

LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X

SOLDER MASK OPENING

METAL

EXPOSED METAL

0.05 MAX
ALL AROUND

NON-SOLDER MASK
DEFINED
(PREFERRED)

METAL UNDER
SOLDER MASK

SOLDER MASK
OPENING

EXPOSED METAL

0.05 MIN
ALL AROUND

SOLDER MASK
DEFINED

SOLDER MASK DETAILS

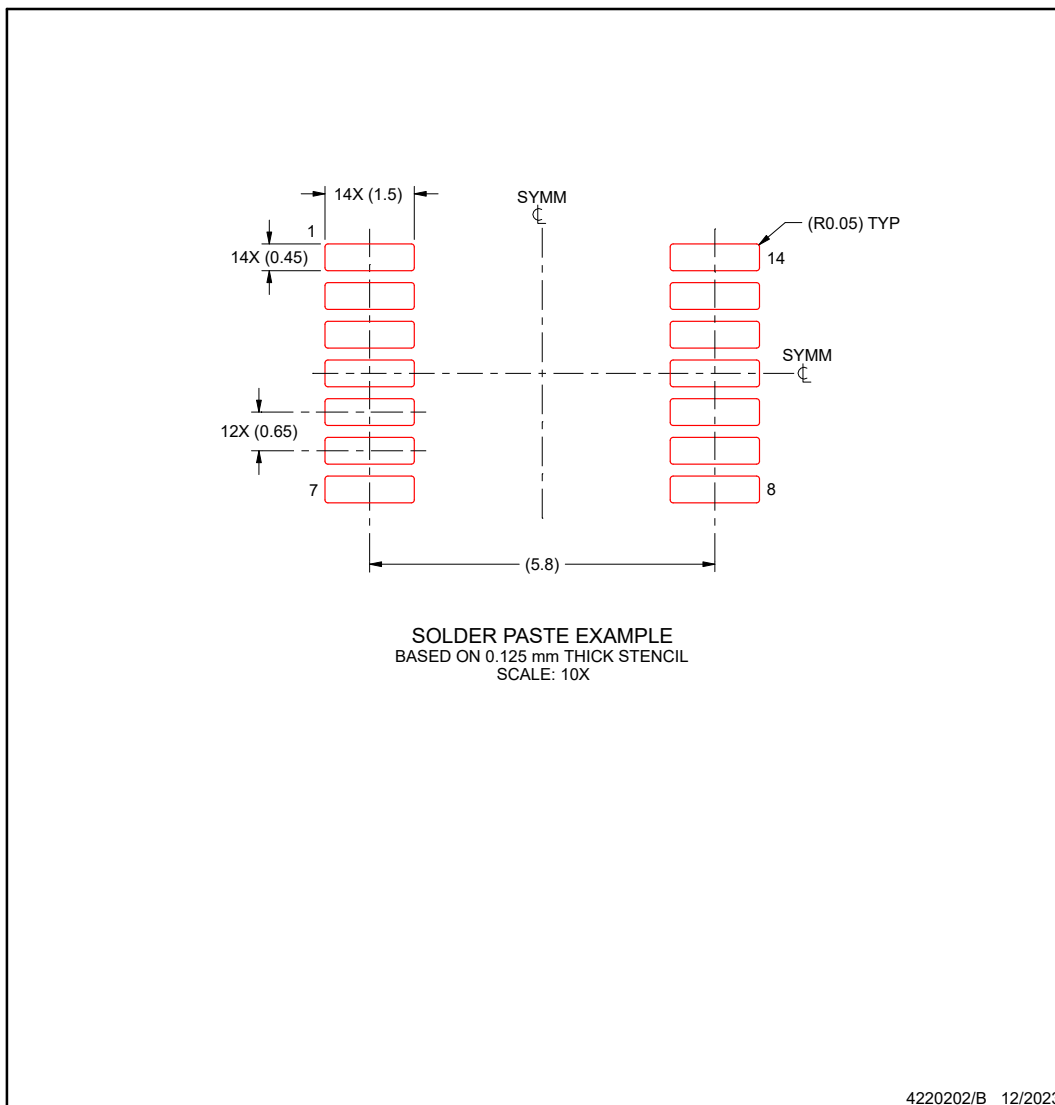
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

PW0014A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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.

PACKAGE OPTION ADDENDUM

PACKAGING INFORMATION

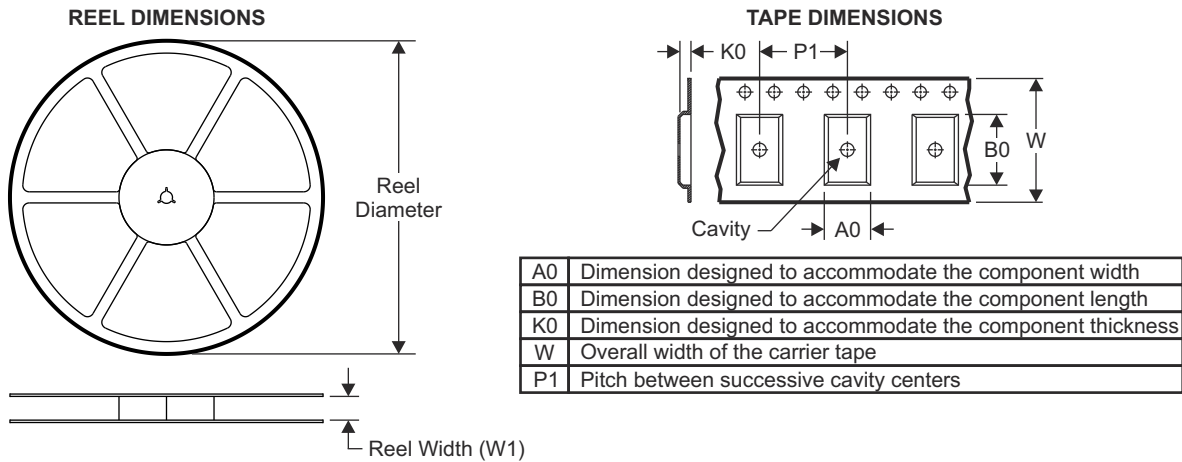
Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/Ball material (4)	MSL rating/Peak reflow (5)	Op temp (°C)	Part marking (6)
TMCS2100A1EPWRQ1	Active	Production	TSSOP (PW) 14	3000 Large T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 150	2100A1Q
TMCS2100A2EPWRQ1	Active	Production	TSSOP (PW) 14	3000 Large T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 150	2100A2Q
TMCS2100A3EPWRQ1	Active	Production	TSSOP (PW) 14	3000 Large T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 150	2100A3Q

- (1) **Status:** For more details on status, see our [product life cycle](#).
- (2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.
- (3) **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.
- (4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.
- (5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.
- (6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part. Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

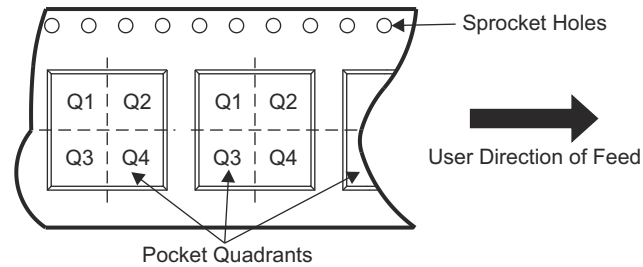
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7.2 Tape and Reel Information

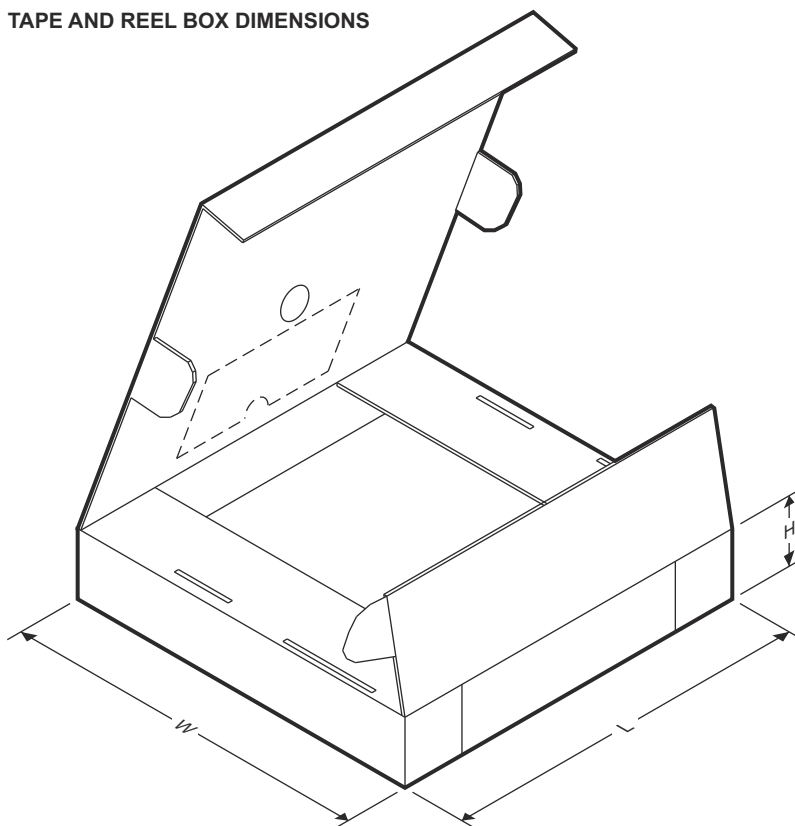


QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



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
TMCS2100A1EPWRQ1	TSSOP	PW	14	3000	330	12.4	6.9	5.6	1.6	8.0	12.0	Q1
TMCS2100A2EPWRQ1	TSSOP	PW	14	3000	330	12.4	6.9	5.6	1.6	8.0	12.0	Q1
TMCS2100A3EPWRQ1	TSSOP	PW	14	3000	330	12.4	6.9	5.6	1.6	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS



Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TMCS2100A1EPWRQ1	TSSOP	PW	14	3000	367	367	35
TMCS2100A2EPWRQ1	TSSOP	PW	14	3000	367	367	35
TMCS2100A3EPWRQ1	TSSOP	PW	14	3000	367	367	35

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