

OPT8320-CDK-EVM

Quick Start Guide



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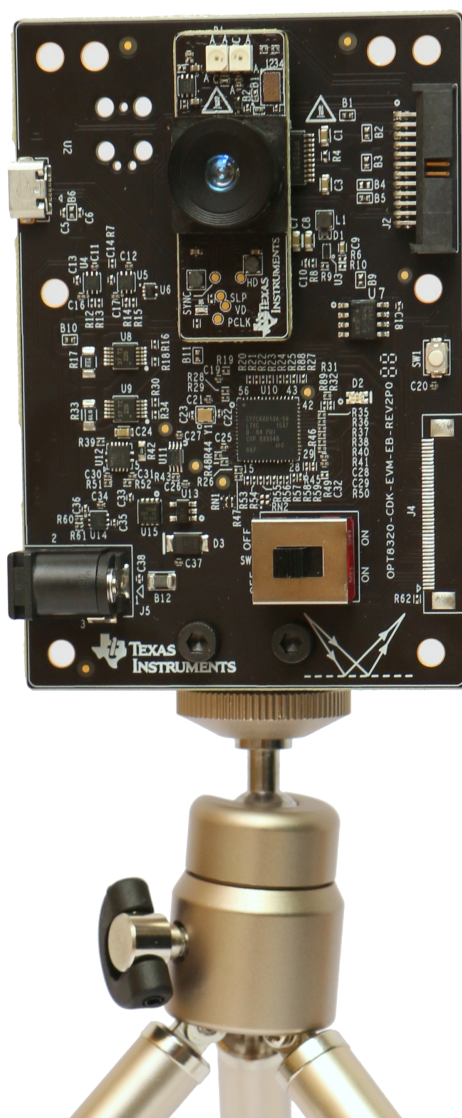
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OPT8320-CDK-EVM

This Quick Start Guide describes the characteristics, operation, and use of the OPT8320-CDK-EVM evaluation module. It discusses how to set up and configure the software and hardware, and reviews various aspects of the program operation. Throughout this document, the terms evaluation board, evaluation module, and EVM are synonymous with the OPT8320-CDK-EVM.



1 Overview

The OPT8320-CDK-EVM is the official evaluation module for the third-generation single chip 3D Time-of-Flight (3D-ToF) sensor from Texas Instruments. This document describes the kit contents and the basic setup of the EVM hardware and software. The EVM showcases the high-performance QQQVGA resolution 3D Time-of-Flight sensor OPT8320. [Figure 1](#) highlights the important components of the EVM.

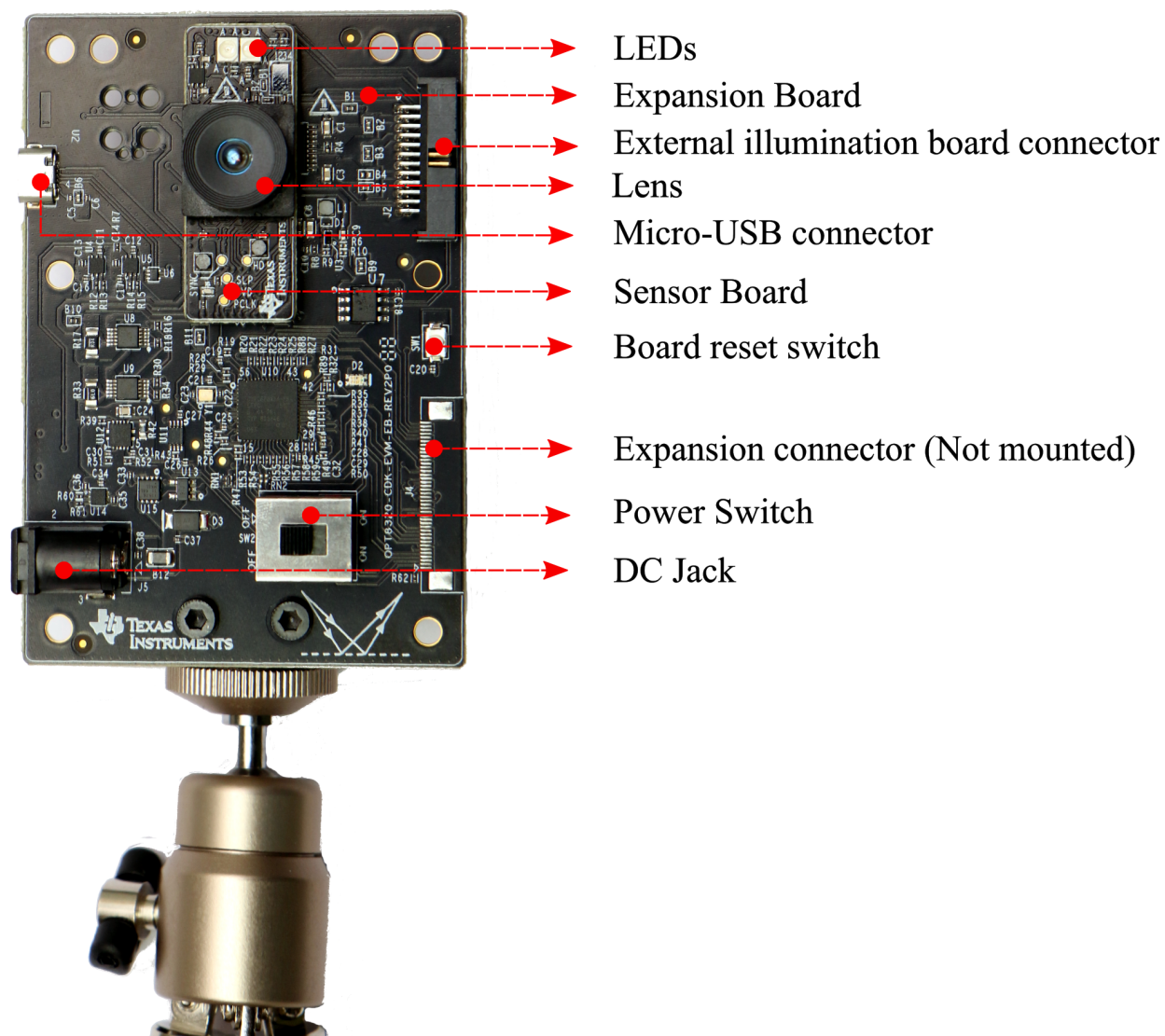


Figure 1. Components of EVM

2 Safety

This is a class A product as defined by standard EN 61326-1:2013. This product is not intended to be used in domestic establishments and also in establishments that are directly connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

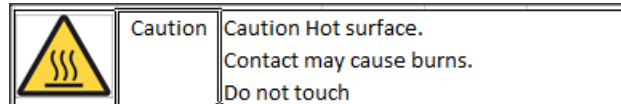


Figure 2. Hot To Touch

3 CDK Contents

[Table 1](#) lists the CDK contents.

Table 1. Contents of CDK

Content	Description	Number of Pieces
Board Assembly (Sensor Board + Expansion Board + Tripod Mount)	The Sensor Board houses the sensor and the illumination LEDs for active NIR illumination. The Expansion Board has the USB transceiver and power supply interface.	1
USB cable	Micro-USB cable for connecting the EVM to the PCM	1
Quick Start Guide	This document	1

4 Power Supply

The EVM can function on USB power alone when an external illumination board is not plugged in. However, an external power supply is required when external illumination boards are used. The Expansion Board can automatically switch between USB and external power supply as per availability. The recommended power adapter is [EMSA050300-P5RP-SZ](#). Note that the recommended power adapter is not included in the kit. The power adapter must be bought separately.

External Power Supply Specifications:

- Nom Output Voltage — 5 VDC
- Max Output Current — 3 A
- Efficiency Level — V

NOTE: TI recommends using an external power supply that complies with applicable regional safety standards such as (by example) UL, CSA, VDE, CCC, PSE, and so forth.

5 Top-Level Specifications of the EVM

The top-level specifications of the EVM are listed in [Table 2](#).

Table 2. EVM Specification

Item	Value (Typical)
Pixel resolution	80 x 60
Field of View	87° Diagonal. 74 (H) x 59 (V)
Connectivity	USB 2.0
Frame-rate	12 ... 240 fps
Illumination source median wavelength	850 nm
Average optical output power	70 mW
Output beam divergence	60° at 50% power relative to the center, cosine fall off
Operating range	Up to 1 m
Size	88.8 mm (L) x 60 mm (W) x 19.3 mm (H)
Operating Conditions	0°C to 40°C (Ambient)

6 System Requirements

The system requirements are as follows:

1. Microsoft® Windows® 7 / Ubuntu 14.04 64 bit PC
2. 2GB RAM
3. Minimum of 500MB free space

7 Software Setup

Implement the following steps to setup the software:

1. Download the software for the appropriate platform from the TI website:
<http://www.ti.com/tool/OPT8320-cdk-evm>.
2. Installation of the software:
 - Windows - Install the software by running the downloaded executable.
 - Ubuntu – The following dependencies must be installed before installing the Voxel Viewer software.
 - libusb ≥ libusb-1.0
 - ibudev
3. The default installation directory is “C:\Program Files\Texas Instruments\Voxel Viewer-0.x.y.z” on Windows. On Ubuntu, the name of the executable is voxelviewer.

8 Hardware Setup

The hardware setup is shown in the following steps:

1. Ensure the software setup is complete.
2. Verify the EVM is in a fully-assembled state, as shown in [Figure 1](#).
3. Ensure the power switch on the board (SW2) is in the off position (to the left).
4. Verify there is no apparent damage and the EVM is in good shape.
5. Connect the board to the PC using the provided micro-USB cable.
6. Move the power switch on the board (SW2) to the ON position (to the right).
7. Check both the Sensor Board LED and the Expansion Board LED are blue in color.

9 Launching the Software

Launch the software using the following:

1. On Windows, click on the desktop shortcut if created or navigate to <installation folder>/bin and click on VoxelViewer.exe to launch the software.
2. Once the viewer is up, streaming should automatically start.
3. If the EVM is connected after the viewer has started, use the Select Depth Camera dialog box to refresh the list of cameras, choose the appropriate camera and click OK. The camera connection dialog box is also available through the File menu : **File** → **Connect Depth Camera (CTRL+C)**.
4. A sample screenshot with streaming enabled is shown in [Figure 3](#).
5. The streaming can be paused or started using the play/pause button near the top-left corner of the window.
6. The state of streaming can also be confirmed on the hardware by looking at the color of the Expansion Board LED. The Expansion Board LED is magenta while streaming and blue when the streaming is stopped.

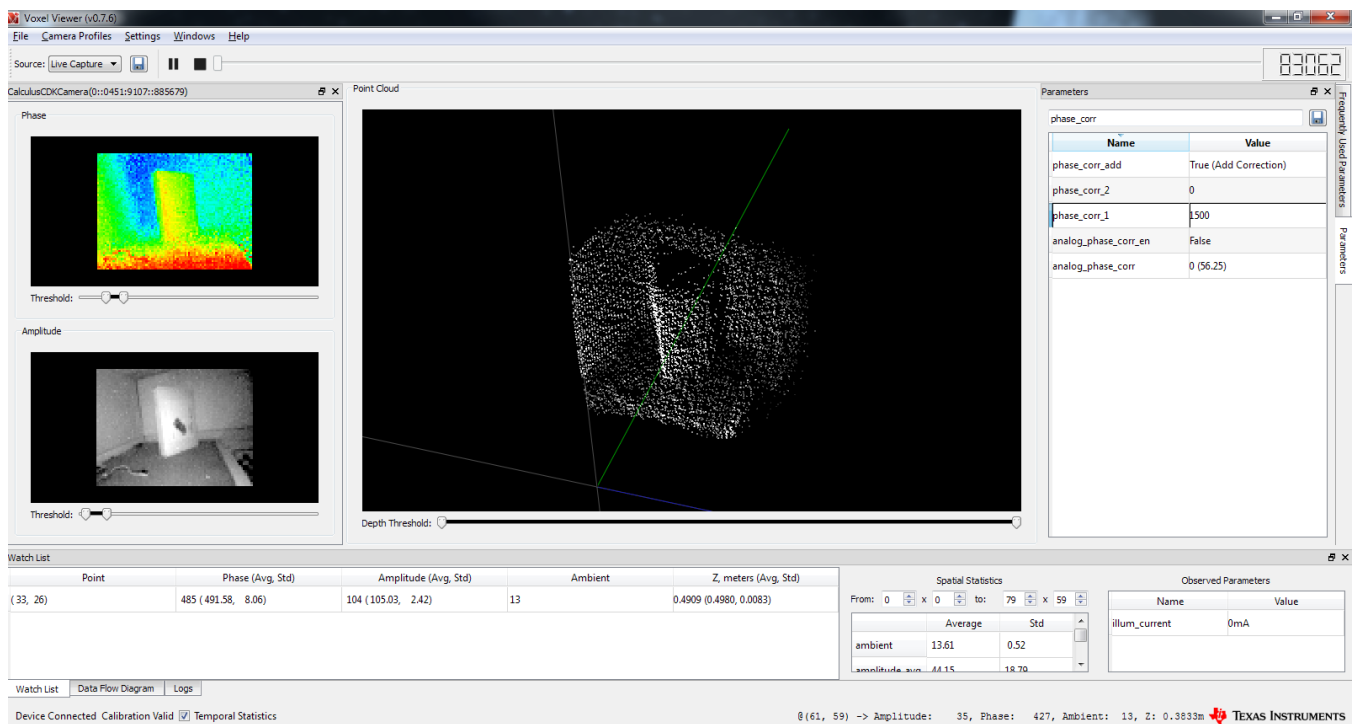


Figure 3. Streaming Enabled

10 Basic Troubleshooting

The EVM has 2 LEDs for indicating various operating states of the board. The Expansion Board LED indicates the overall status of the board and the Sensor Board LED indicates if the Sensor Board is getting power. The various states of the board are listed in [Table 3](#).

Table 3. States of Board

State	Sensor Board LED	Expansion Board LED
All OK, Streaming OFF	Blue	Blue
All OK, Streaming On	Blue	Magenta
No power to SB	Off	X
No FX2 Firmware	Blue	Off

In usual operating conditions, the Sensor Board LED should be blue and the Expansion Board LED should be magenta.

11 Related Documentation from Texas Instruments

Related documentation regarding the EVM is available here: <http://www.ti.com/tool/OPT8320-cdk-evm>. The documentation related to the ToF chipset used in the EVM is available in the following:

- Sensor - <http://www.ti.com/product/OPT8320>

12 If You Need Assistance

If you have questions about the ToF evaluation module, post a question in the optical sensors forum at <http://e2e.ti.com> Include OPT8320-CDK-EVM in the subject heading.

For servicing and other technical issues related to the EVM, please contact TI at the address below:

Attn: Kelly Livesay
Texas Instruments
12500 TI Boulevard Dallas,
TX 75243
Tel: (512) 750-2405
Email: klivesay@ti.com

Revision History

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

Changes from Original (June 2016) to A Revision	Page
• Added class A product statement pertaining to EN 61326-1:2013 in the <i>Safety</i> section.	6

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- 3 *Regulatory Notices:*

- 3.1 *United States*

- 3.1.1 *Notice applicable to EVMs not FCC-Approved:*

FCC NOTICE: This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

- 3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

CAUTION

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 Canada

3.2.1 For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

3.3 Japan

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/llds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。
http://www.tij.co.jp/llds/ti_ja/general/eStore/notice_01.page

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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This is a class A product intended for use in environments other than domestic environments that are connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

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4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

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