



### ABSTRACT

This document provides information on how to use the TCA39416EVM.

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### Trademarks

All trademarks are the property of their respective owners.

## 1 Introduction

This EVM allows user's to evaluate the TCA39416 and provides external pull-up resistors and capacitive loads that can be enabled on the board.

## 2 EVM Setup

Equipment needed to evaluate the TCA39416:

- Two Channel power supply (If  $V_{CCA}=V_{CCB}$  then 1 channel is sufficient)
- 4 channel oscilloscope if user wishes to observe the I3C transactions on both sides
  - Male SMA connectors which can attach to J5, J7, J12, J17
- Microcontroller, processor, or digital analyzer which can send and receive I3C

## 3 Power

Power can be supplied to the device on TP1 (VCCA) and TP2 (VCCB). GND is provided on J18, J19, J20, and J21. An example is provided below.

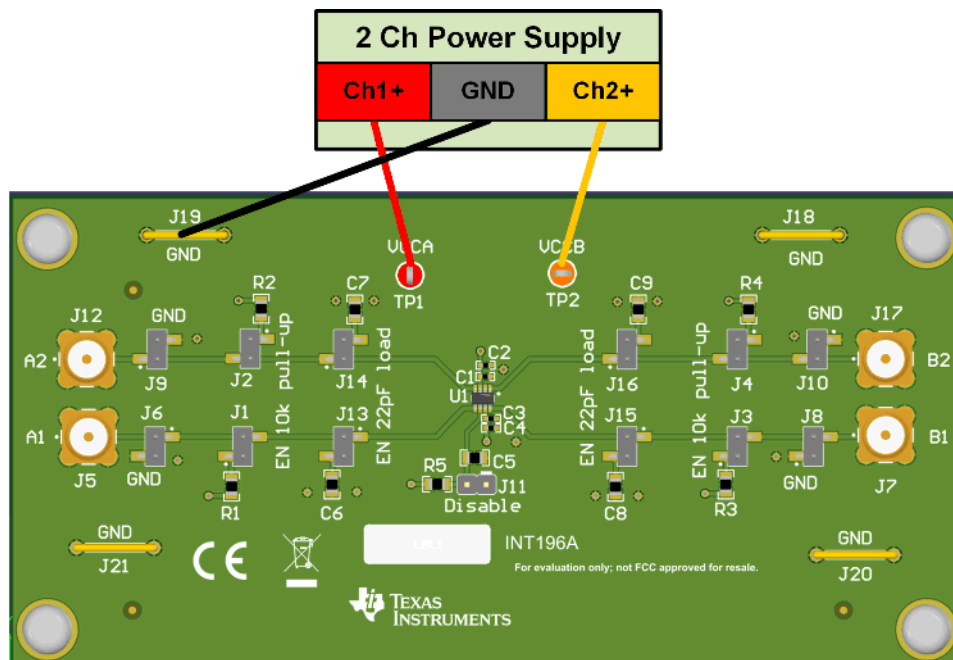


Figure 3-1. Power Set Up

## 4 Enabling Pull-up Resistors

Pull-up resistors can be enabled by placing a jumper on J1, J2, J3, and J4. Pull-up resistors values are 10k with 1% tolerance. An image below shows the location of the headers with a red square to indicate jumpers to short  $V_{CC}$  to the bus.

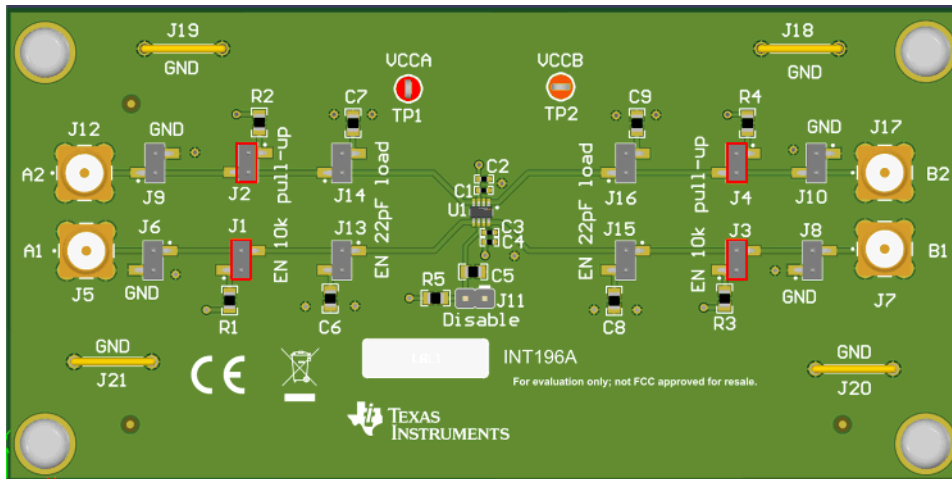


Figure 4-1. Enabling Pull-Up Resistor

## 5 Enabling Bus Capacitance

Bus capacitance can be enabled by placing a jumper on J13, J14, J15, and J16. Bus capacitance values are 22 pF with 5% tolerance. The A2, A1, B2, and B1 traces are set to be 50  $\Omega$  characteristic impedance and the expected parasitic capacitance from the trace is about 6 pF. TCA39416 A/B pins are a typical bus capacitance of 4 pF and a max of 8 pF. This means without the bus cap enabled, the load is a maximum of 14 pF. With the bus capacitance selector enabled, the bus capacitance is about 36 pF. The controller or target connected to this board increases the capacitance further. Recall the I3C max bus capacitance Ver 1.1.1 is 50 pF and this device does not redrive or separate the capacitive loading. This means enabling both sides violates the max loading allowed by I3C standard.

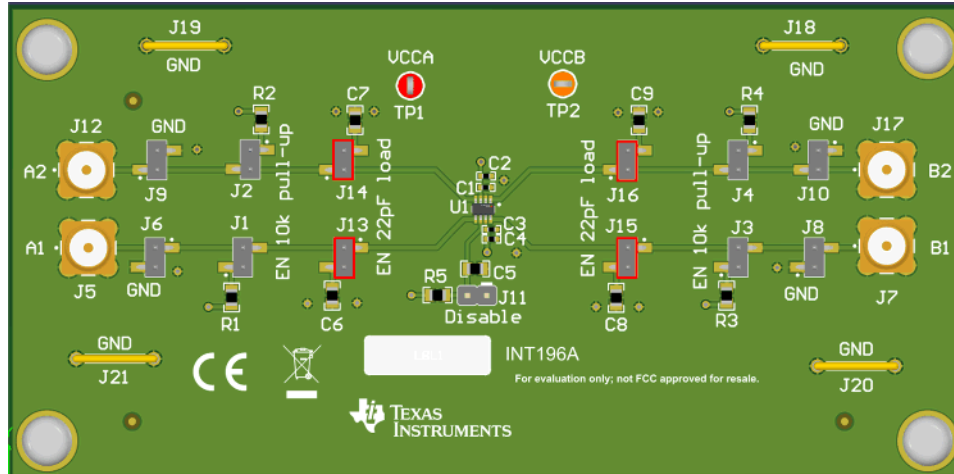


Figure 5-1. Capacitance Enable

## 6 Board Layout

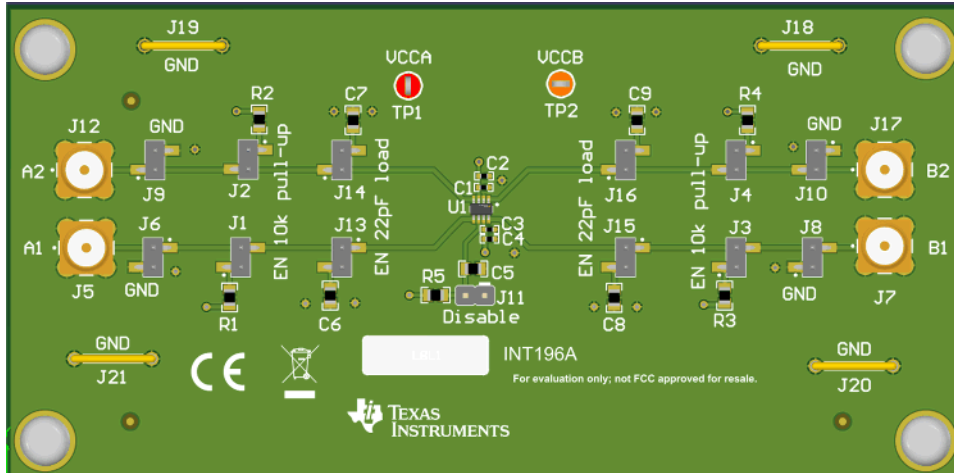


Figure 6-1. Board Top View

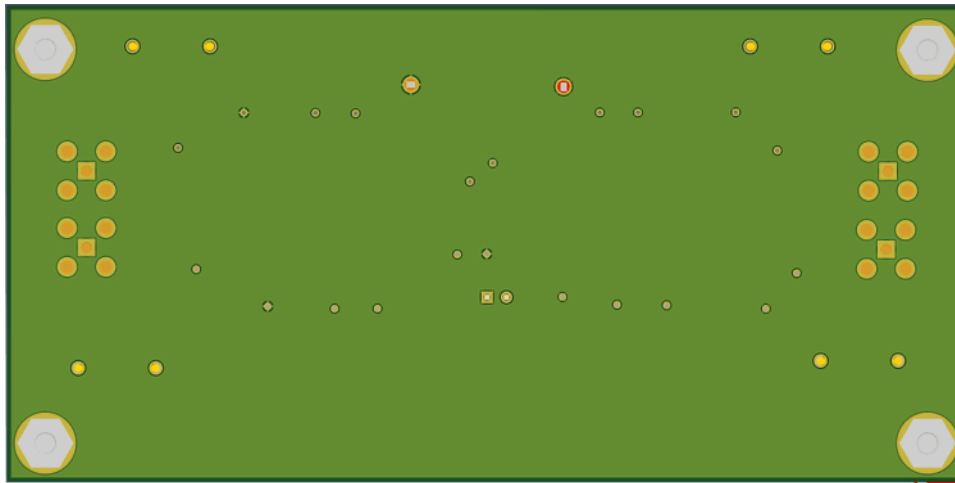
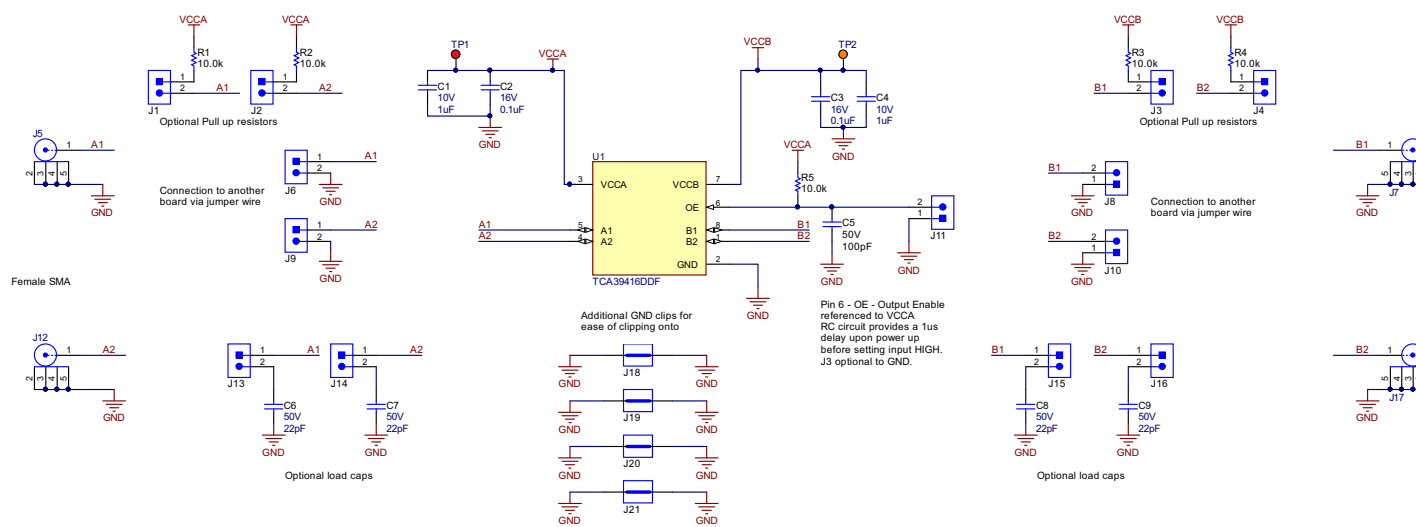


Figure 6-2. Board Bottom View

## 7 Schematic



## 8 Bill of Materials

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number <sup>(1)</sup>	Alternate Manufacturer <sup>(1)</sup>
!PCB1	1		Printed Circuit Board		INT196	Any		
C1, C4	2	1uF	CAP, CERM, 1 uF, 10 V, +/- 10%, X7S, 0402	0402	C1005X7S1A105K050 BC	TDK		
C2, C3	2	0.1uF	CAP, CERM, 0.1 uF, 16 V, +/- 10%, X7R, 0402	0402	0402YC104KAT2A	AVX		
C5	1	100pF	CAP, CERM, 100 pF, 50 V, +/- 5%, C0G/NP0, 0805	0805	08055A101JAT2A	AVX		
C6, C7, C8, C9	4	22pF	CAP, CERM, 22 pF, 50 V, +/- 5%, C0G/NP0, 0805	0805	C0805C220J5GACTU	Kemet		
H1, H2, H3, H4	4		Machine Screw, Round, #4-40 x 1/4, Nylon, Philips panhead	Screw	NY PMS 440 0025 PH	B&F Fastener Supply		
H5, H6, H7, H8	4		Standoff, Hex, 0.5"L #4-40 Nylon	Standoff	1902C	Keystone		
J1, J2, J3, J4, J6, J8, J9, J10, J13, J14, J15, J16	12		Header, 100mil, 2x1, Tin, SMD	SMD, 2-Leads, Body 200x100mil	TSM-102-01-T-SV-P-TR	Samtec		
J5, J7, J12, J17	4		SMA Connector Jack, Female Socket 50Ohm Through Hole Solder	CONN_SMA_PT H	60312002114503	Würth Electronics		
J11	1		Header, 2.54 mm, 2x1, Gold, TH	Header, 2.54 mm, 2x1, TH	GBC02SAAN	Sullins Connector Solutions		
J18, J19, J20, J21	4		1mm Uninsulated Shorting Plug, 10.16mm spacing, TH	Shorting Plug, 10.16mm spacing, TH	D3082-05	Harwin		
R1, R2, R3, R4, R5	5	10.0k	RES, 10.0 k, 1%, 0.2 W, 0805	0805	MCU08050C1002FP500	Vishay/Beyschlag		
TCA39416EVM	1		Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	PCB Label 0.650 x 0.200 inch	THT-14-423-10	Brady		
TP1	1		Test Point, Multipurpose, Red, TH	Red Multipurpose Testpoint	5010	Keystone Electronics		
TP2	1		Test Point, Multipurpose, Orange, TH	Orange Multipurpose Testpoint	5013	Keystone Electronics		
U1	1		Ultra-Low-Voltage I3C Translator with Rise Time Accelerators	SOT23-8	TCA39416DDF	Texas Instruments		
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A		

(1) Unless otherwise noted in the Alternate Part Number and/or Alternate Manufacturer columns, all parts may be substituted with equivalents.

## 9 Revision History

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

DATE	REVISION	NOTES
December 2022	*	Initial Release



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#### **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.*

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- 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.

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(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.

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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.

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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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