PCA9306 I²C Buffer Evaluation Module

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Trademarks

1 Introduction

The PCA9306EVM allows designers to evaluate device performance for I2C translation for their system. This EVM allows the designer to evaluate the PCA9306 with different pullup resistor values and with different capacitive loading. The PCA9306EVM has a PCA9306 loaded at U1. It also supports the use of a socket for when multiple parts need to be tested. For additional details on I^2C buffer performance, application notes, and the data sheet, see www.ti.com/I2C.

1.1 Overview

The PCA9306 is a dual-channel bidirectional translator intended for I2C bus and SMBus/PMBus systems. The PCA9306 provides bidirectional level shifting between two voltage nodes. Figure 1 shows the PCA9306EVM.

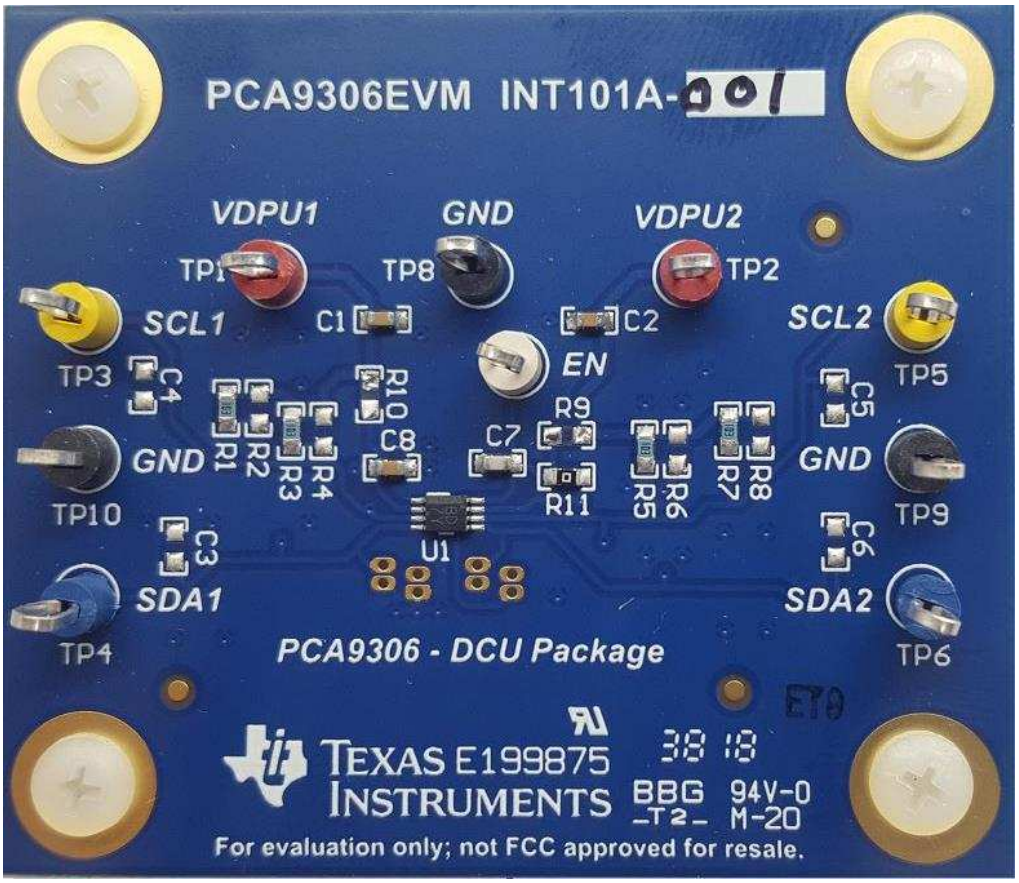

Figure 1. PCA9306EVM

1.2 EVM Features

This EVM has the following features:

- VDPU1 input voltage range: 1.2V to 5.5V
- VDPU2 input voltage range: 1.8V to 5.5V
- Access to VDPU1, VDPU2, EN, SDA1, SCL1, SDA2, and SCL2 pins
- Footprint for a socket for evaluating multiple PCA9306 devices
- Footprints to test different capacitive loads
- Footprints to test different pullup resistor values
- Different load options allow for the testing of different translator configurations

2 EVM Hardware Block Diagram and Images

The PCA9306EVM is designed to perform voltage level translation between two buses. The two voltage nodes are voltage device pull-up 1 (V_{DPU1}) and voltage device pull-up 2 (V_{DPU2}). The EVM divides the buses into BUS1 and BUS2. All the pull-ups and capacitive loads are reference to the bus they are used on, for example resistor pull-up 1 (R_{PU1}) is on BUS1. Figure 2 shows the high level block diagram for the PCA9306EVM with respect to how it is connected between I²C devices. Figure 3 illustrates the EVM schematic.

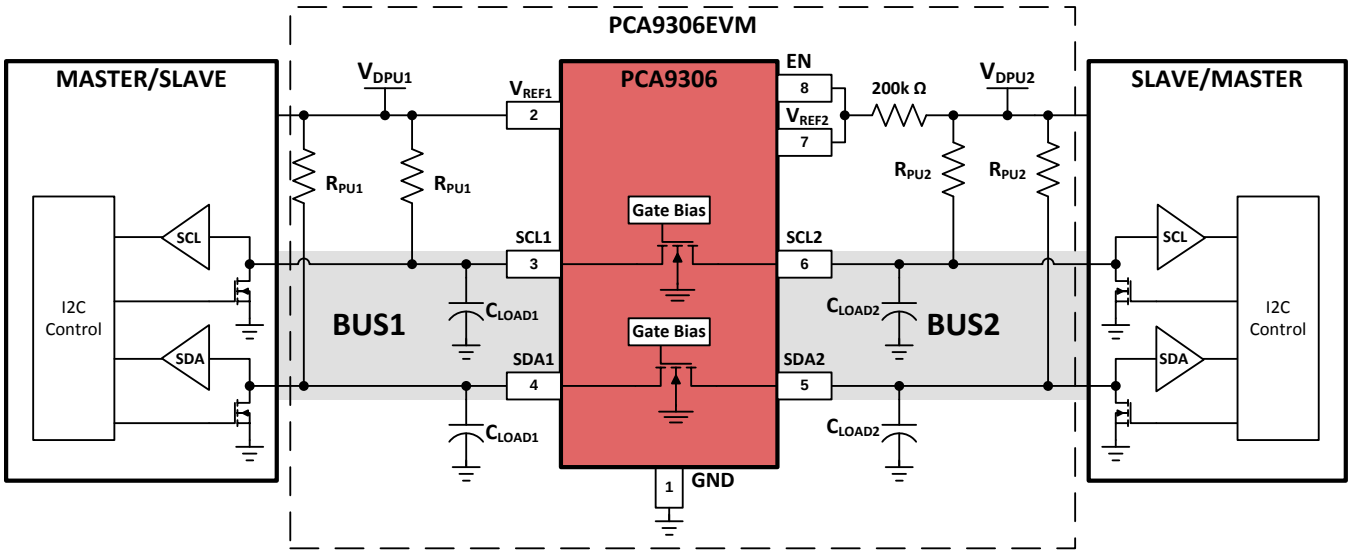

Figure 2. Block level diagram of PCA9306EVM in system

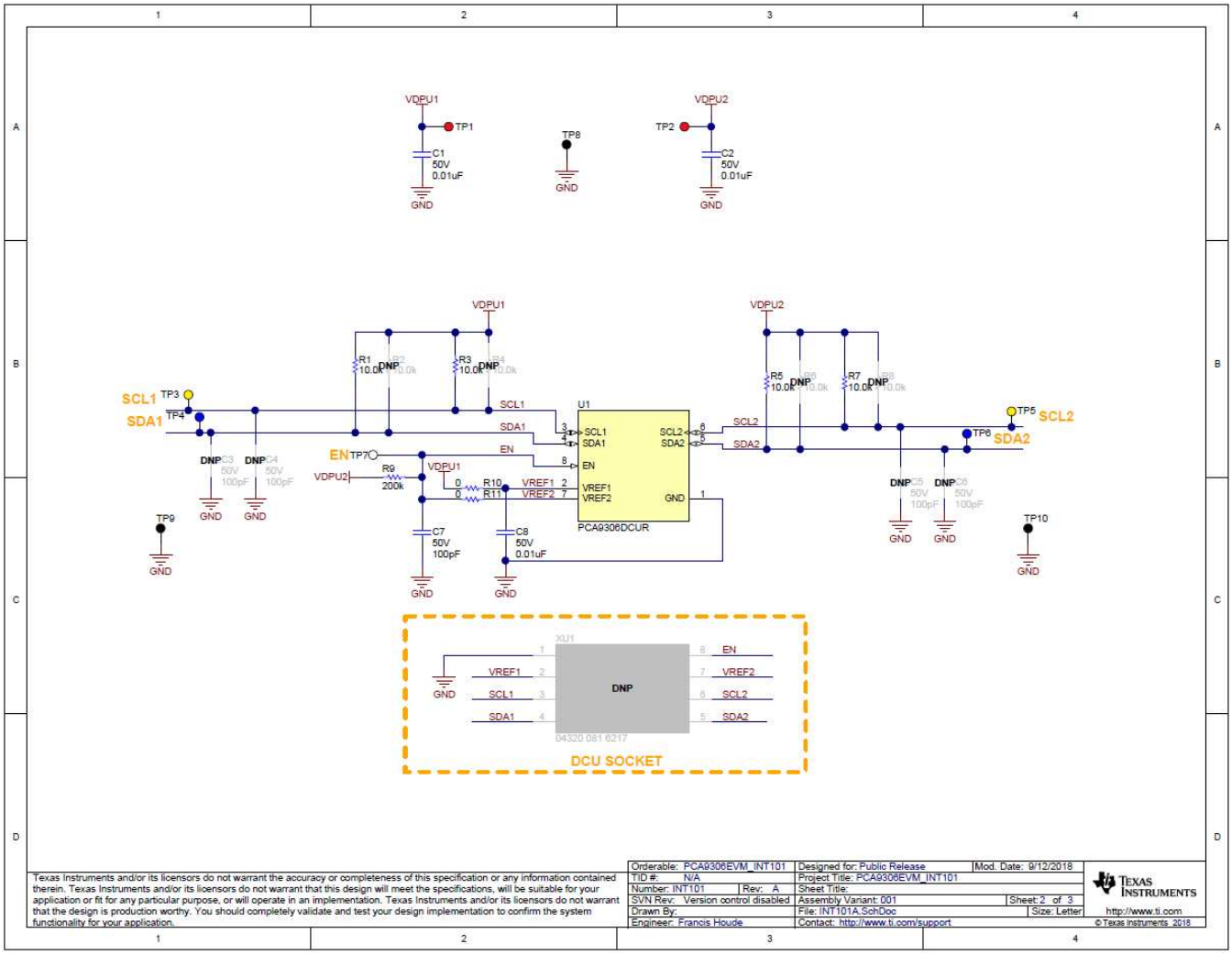

Figure 3. PCA9306EVM Schematic

3 Hardware Description

The PCA9306 EVM is designed to allow the user to easily evaluate the I^2C buffer for a variety of conditions. The breakdown of all the features and design of the EVM follows:

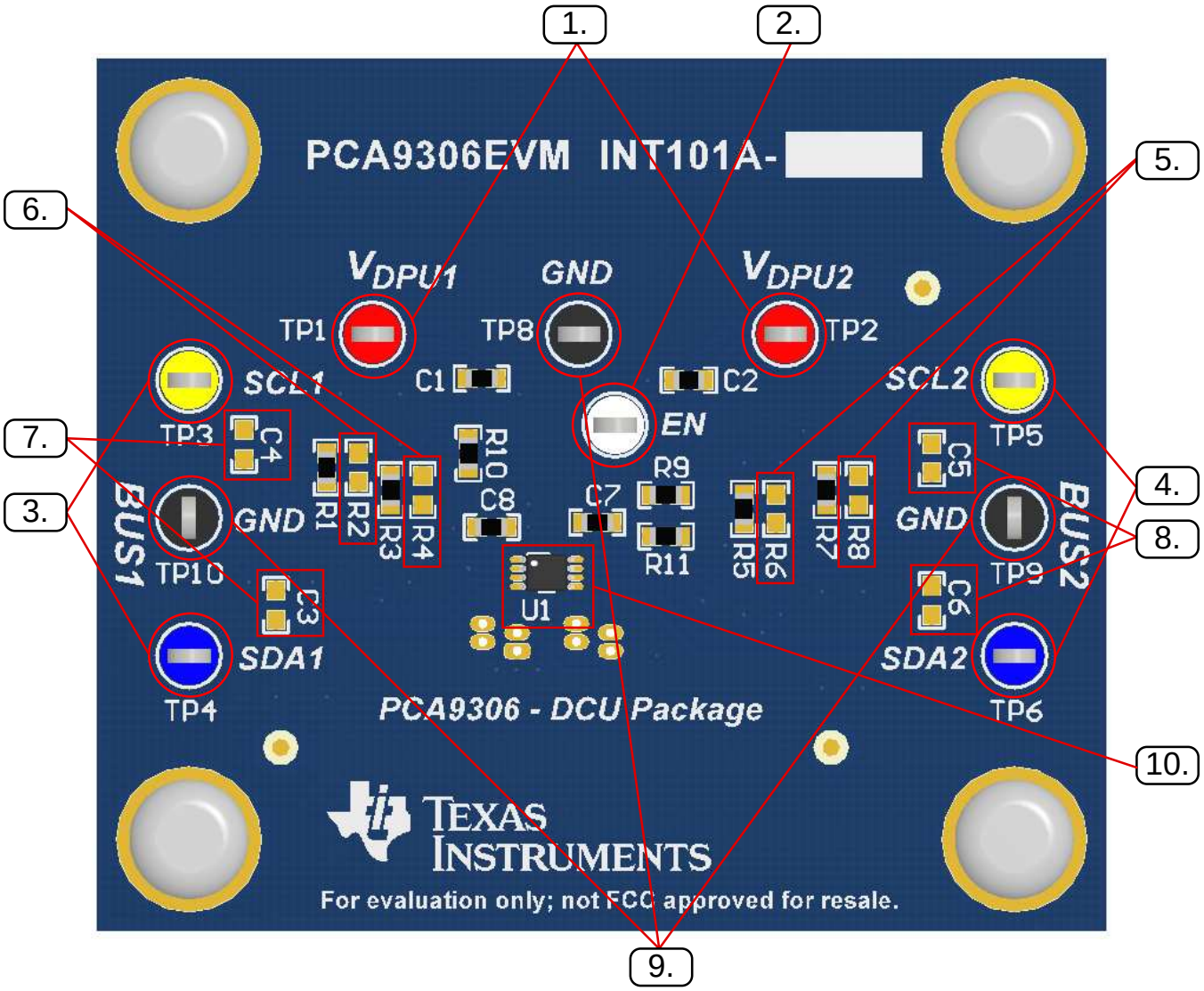

Figure 4. PCA9306EVM test points, devices, resistors, and capacitor map.

1. VDPU1 is the supply for BUS1 and VDPU2 is the supply for BUS2. VDPU2 must be greater than or equal to VDPU1 + 0.7 V.
2. Test point for EN pin, which allows the user to disable the translator.
3. Test points for SCL1 and SDA1 on BUS1 side of translator, which is referenced to VDPU1.
4. Test points for SCL2 and SDA2 on BUS2 side of translator, which is referenced to VDPU2.
5. Footprint for additional pullup resistors (R6 and R8) on SDA2 and SCL2, which allows increasing pullup strength by placing a resistor in parallel with the 10k already placed on the board (R5 and R7).
6. Footprint for additional pullup resistors (R2 and R4) on SDA1 and SCL1, which allows increasing pullup strength by placing a resistor in parallel with the 10k already placed on the board (R1 and R3).
7. Footprint for adding capacitor to SDA1 and SCL1(C3 and C4) to test desired capacitive load.
8. Footprint for adding capacitor to SDA2 and SCL2(C6 and C5) to test desired capacitive load.
9. Test points for ground.

4 Layout

Figure 5 and Figure 6 show the PCB layout images.

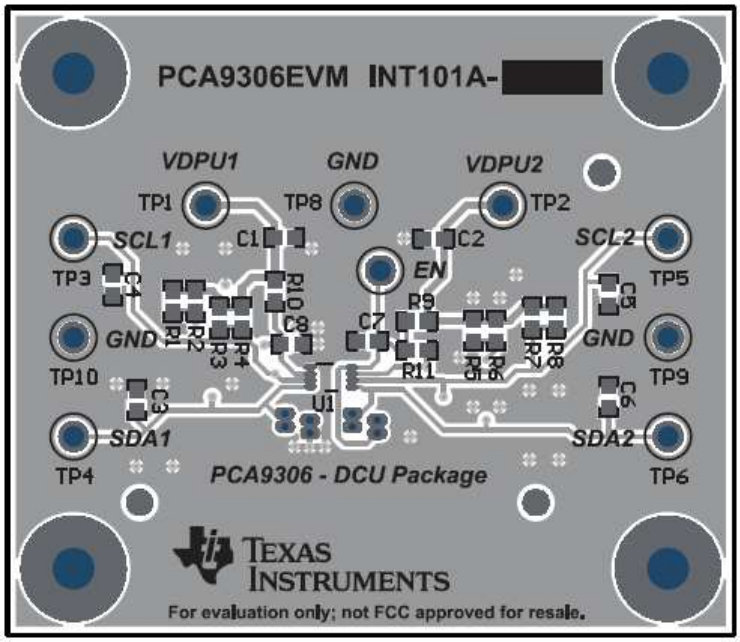

Figure 5. PCA9306EVM Top Layout

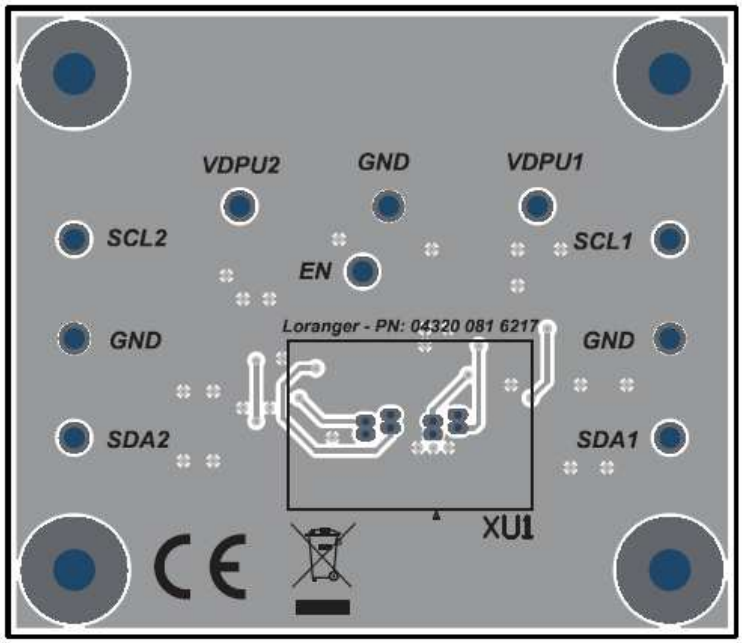

Figure 6. PCA9306EVM Bottom Layout

4.1 Setup

The PCA9306EVM can be used with other master and slave devices to perform voltage level translation. Figure 7 shows an example configuration using a computer with a microcontroller using the PCA9306EVM to translator SCL and SDA to the TMP102 temp sensing I²C slave device. The lines in the diagram represent wires used to perform interconnections between the PCA9306EVM, the Master (microcontroller), and the slave (TMP102).

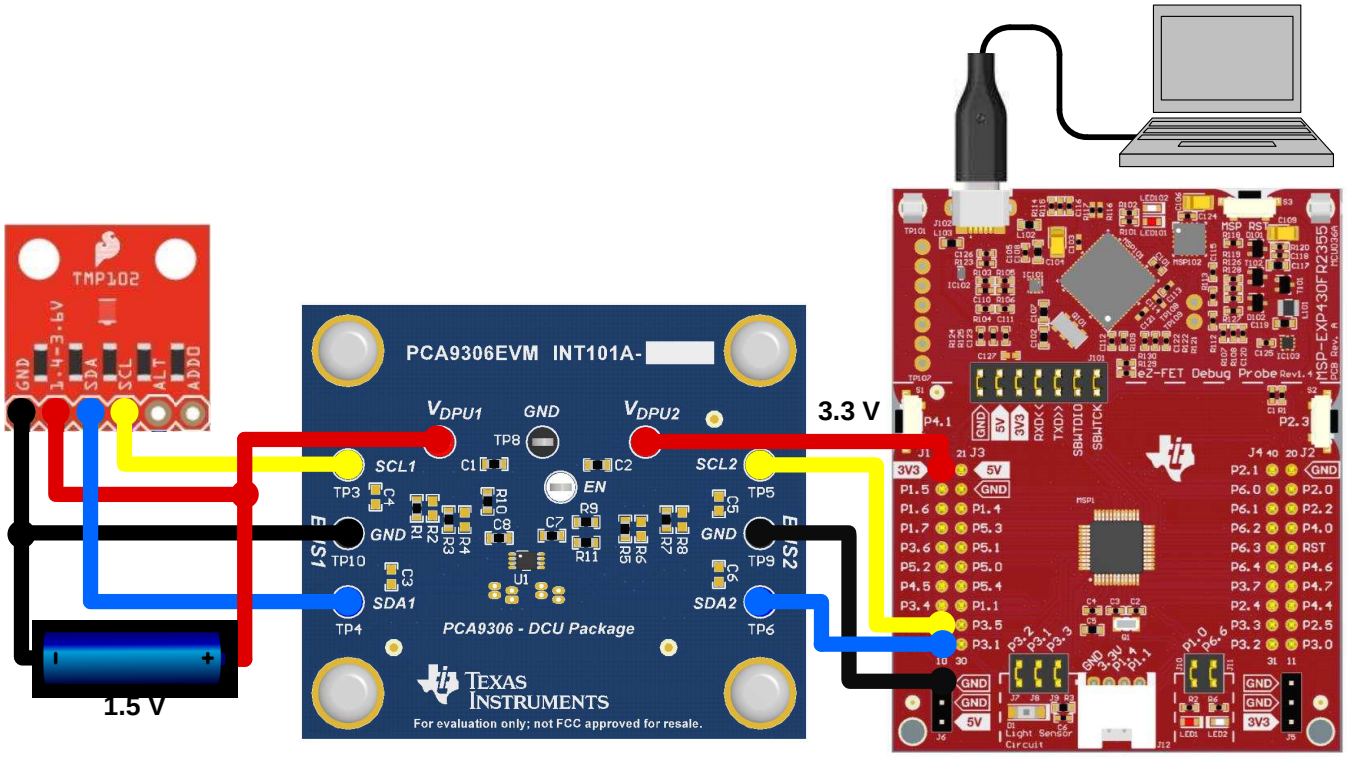

Figure 7. Computer connected to microcontroller using PCA9306EVM to translate and connect to TMP102 I²C sensor.

5 Bill of Materials (BOM)

Table 1 lists the EVM BOM.

Table 1. Bill of Materials PCA9306EVM

Qty	Designator	Value	Description	Package Reference	Manufacturer	Part Number
1	!PCB		Printed Circuit Board		Any	INT101
3	C1, C2, C8	0.01uF	CAP, CERM, 0.01 µF, 50 V, ±10%, X7R, 0603	0603	Murata	GCM188R71H103KA37D
1	C3	100pF	CAP, CERM, 100pF, 50 V, ±10%, COG, 0603	0603	AVX	06035A101JAT2A
4	H1, H2, H3, H4		Machine Screw, Round, #4-40 x 1/4, Nylon, Philips panhead	Screw	B&F Fastener Supply	NY PMS 440 0025 PH
4	H5, H6, H7, H8		Standoff, Hex, 0.5"L #4-40 Nylon	Standoff	Keystone	1902C
2	TP1, TP2		Test Point, Multipurpose, Red, TH	Red Multipurpose Testpoint	Keystone	5010
2	TP3, TP5		Test Point, Multipurpose, Yellow, TH	Yellow Multipurpose Testpoint	Keystone	5014
2	TP4, TP6		Test Point, Multipurpose, Blue, TH	Blue Multipurpose Testpoint	Keystone	5127
1	TP7		Test Point, Multipurpose, White, TH	White Multipurpose Testpoint	Keystone	5012
3	TP8, TP9, P10		Test Point, Multipurpose, Black, TH	Black Multipurpose Testpoint	Keystone	5011
2	R1, R3, R5, R7	10.0k	RES, 10.0 k, 1%, 0.1 W, 0603	0603	Vishay-Dale	CRCW060310K0FKEA
1	R9	200k	RES, 200 k, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	Vishay-Dale	CRCW0603200KFKEA
2	R10, R11	0	RES, 0, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	Vishay-Dale	CRCW06030000Z0EA
1	U1		2-Bit Bidirectional I2C Bus and SMBus Voltage-Level Shifter, DCU0008A (VSSOP-8)	DCU0008A	Texas Instruments	PCA9306DCUR
0	FID1, FID2, FID3		Fiducial mark. There is nothing to buy or mount.	Fiducial	N/A	N/A
0	XU1		Socket, SOIC-8, 0.5mm Pitch	Socket, SOP-8, 0.5mm Pitch	Loranger	04320 081 6217

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      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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Concernant les EVMs avec antennes détachables

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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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