Description

This EVM enables users to evaluate TPUL devices without requiring the soldering of the devices to the board. Users can visualize the footprint and size differences for K = 1 and K = 1000 devices. This board comes pre-configured with equal pulse widths for the standard and extended pulse width TPUL devices to demonstrate the solution size difference.

Get Started

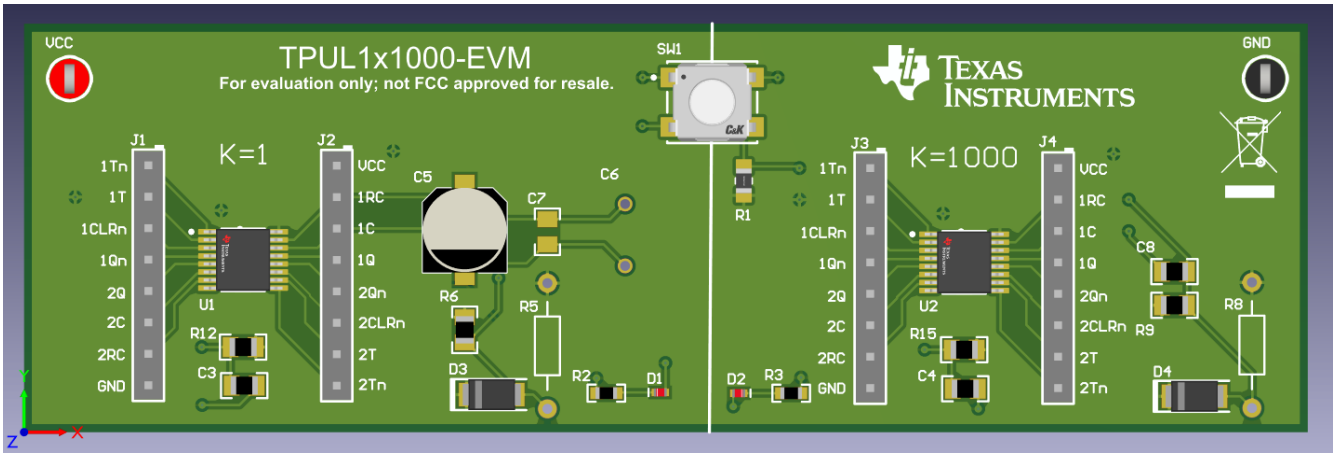
1. Order the TPUL1x1000-EVM
2. Connect 3.3V and visualize pulse width through LEDs
3. Compare K = 1 and K = 1000 footprint sizes
4. See the latest selection of MMV devices

Features

- Compare standard and extended pulse width monostable multivibrators
- Supports a variety of resistor and capacitor types
- Inegrated button and LEDs allow for quick evaluation

Applications

- Demodulate a digitial Amplitude Shift Keying (ASK) signal
- Reset a system for a fixed period of time
- Generate a positive fied-width digital pulse
- Detect a digital signal rising edge
- Detect a digital signal falling edge
- Debounce a switch



1 Evaluation Module Overview

1.1 Introduction

This EVM enables users to evaluate TPUL devices without requiring the soldering of the devices to the board. Users can visualize the footprint and size differences for K = 1 and K = 1000 devices. This board comes pre-configured with equal pulse widths for the standard and extended pulse width TPUl devices to demonstrate the solution size difference.

1.2 Kit Contents

Table 1-1. TPUL1x1000-EVM Kit Contents

Item	Description	Quantity
TPUL1x100-EVM	PCB	1

1.3 Device Information

The EVM contains TPUL2G123 and TPUL2T123 monstable multivibrator (MMV) devices. MMVs can resolve common digital timing issues such as generating a pulse or capturing an edge. The TPUL2G123 has a K value of 1 while the TPUL2T123 has a K value of 1000. As MMVs require external timing from a discrete resistor and capacitor, designs become gated by capcitor sizes. A higher K value allows the capacitor smaller which results in smaller footprints.

2 Hardware

2.1 Power Requirements

The TPUL1x1000-EVM runs on 3.3V connected to the headers in the top two corners.

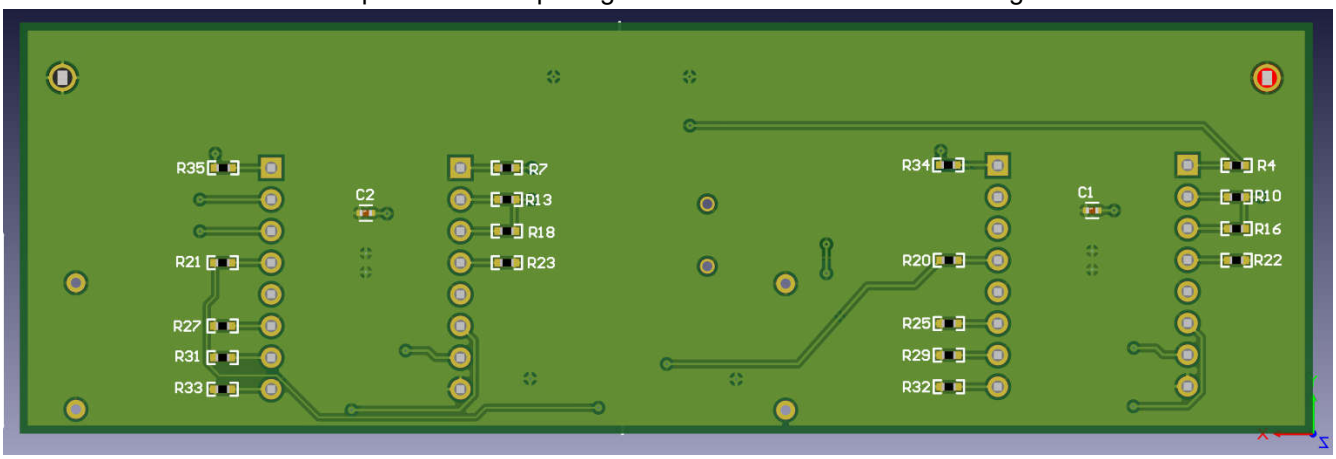
2.2 Setup

The TPUL1x1000-EVM is designed for easy evaluation of the TPUL devices. Connect 3.3V and GND to the jumpers in the top corners of the board. Once connected to power, press the button and the LEDs at the bottom of the board will light up. The TPUL devices are both pre-configured with RC components for a pulse width of ~10 seconds. Comparing the footprint sizes of discrete components, K = 1000 will be much smaller while still achieving the same pulse width.

2.3 Header and Jumper Information

There are two headers provided to connect the entire board to Vcc and GND. Do not connect any voltages other than 3.3V to the Vcc header.

Other header rails are provided for experimentation outside of the given demo of the EVM. The devices on the board can be disconnected from the discrete RC components via 0 ohm jumpers on the backside of the board. External RC components and input signals can then be connected through the header rails.

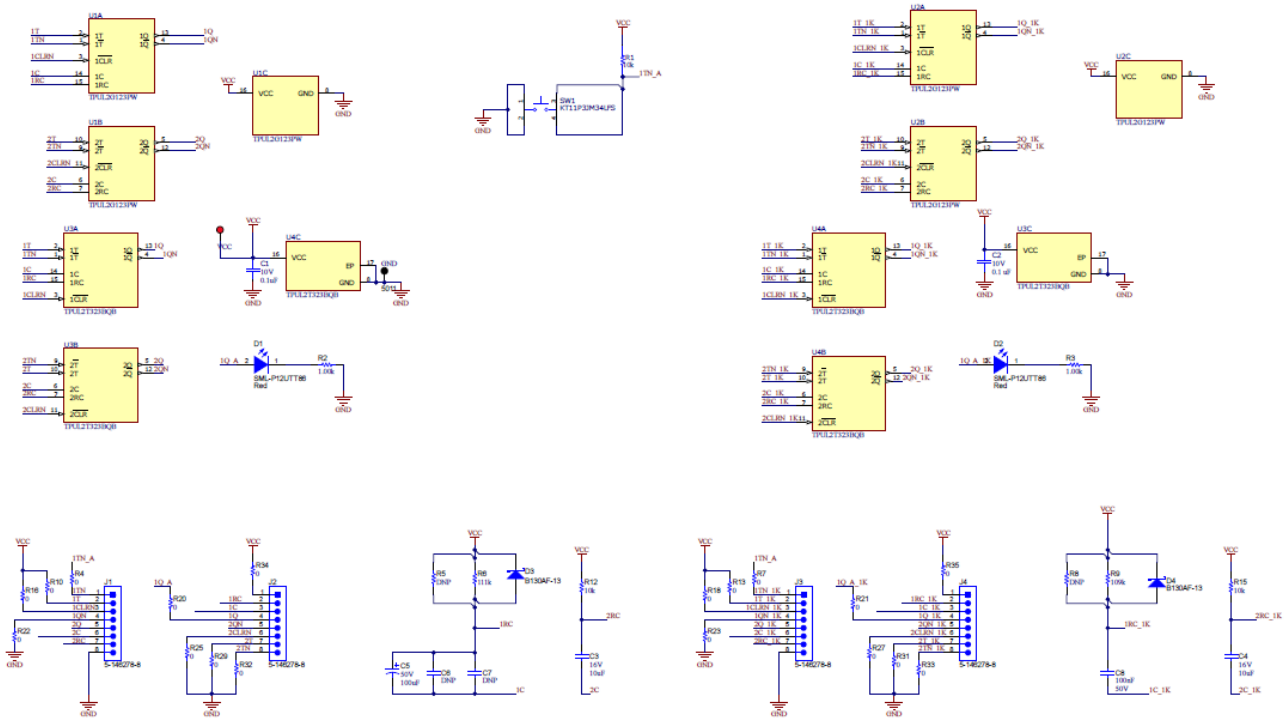


2.4 Push Buttons

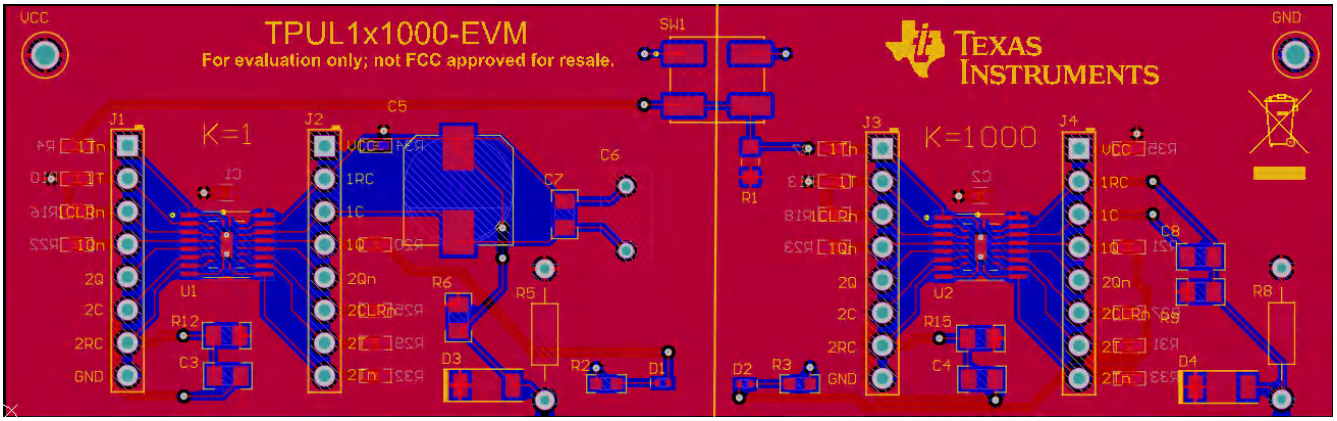
One push button is on the board to activate a pulse to both K = 1 and K = 1000 devices. The pulse can be visulized with the two LEDs at the bottom of the board.

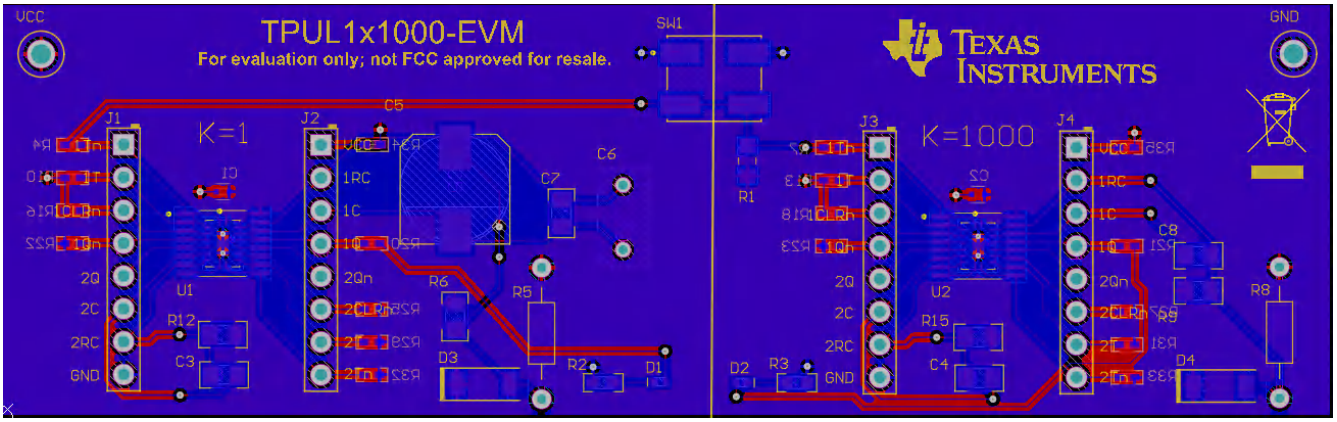
3 Hardware Design Files

3.1 Schematics



3.2 PCB Layouts





3.3 Bill of Materials (BOM)

Table 3-1. Bill of Materials

Designator	Quantity	Description	Part Number	Manufacturer
C1, C2	2	Ceramic, Capacitor, 0.1µF ±10% 10V X7R 0402 (1005 Metric)	885012205018	Würth Elektronik
C3, C4	2	Ceramic, Capacitor, 10µF, 16 V, ±10%, X5R, 0805	GRM21BR61C106KE15L	Murata Electronics
D1, D2	2	LED, Red, SMD	SML-P12UTT86	Rohm Semiconductor
D3, D4	2	Diode, Schottky, 30V, 1A, SMAF	B130AF-13	Diodes Incorporated
GND	1	Test Point, Multipurpose, Black, TH	5011	Keystone Electronics
J1, J2, J3, J4	4	Header, 100mil, 8x1, Tin, TH	5-146278-8	Molex
LBL1	1	Thermal Transfer Printable Labels, 0.650	THT-14-423-10	Brady Corporation
R1	1	Resistor, chip, 10kΩ, ±1% 0.5W, 1/2W 0805 (2012 Metric) Anti-Sulfur, Automotive AEC-Q200, Moisture Resistant, Pulse Withstanding Thick Film	CMP0805AFX-1002ELF	Bourns Inc.
R2, R3	2	Resistor, 1.00kΩ, 0.5%, 0.1W, 0603	RT0603DRE071KL	YAGEO
R4, R7, R10, R13, R16, R18, R20, R21, R25, R27, R29, R31, R32, R33, R34, R35	18	Resistor, 0Ω, 5%, 0.063W, AEC-Q200 Grade 0, 0402	CRCW04020000Z0ED	Vishay Dale
R12, R15	2	Resistor, 1.30MΩ, 1%, 0.125 W, AEC-Q200 Grade 0, 0805	CRCW08051M30FKEA	Vishay Dale
SW1	1	Switch Tactile N.O. SPST Round Button J-Bend 32VAC 32VDC 1VA 100000Cycles 3N SMD Tube/T/R	KT11P3JM34LFS	C&K
VCC	1	Test Point, Multipurpose, Red, TH	5010	Keystone Electronics
R6	1	Thin Film Resistors - SMD 111kΩ,0805, 0.1%, 25 ppm, 125mW, 100V	RN73H2ATTD1113B25	KOA Speer Electronics Inc.
R9	1	Thin Film Resistors - SMD 109KΩ, .1% 25ppm	TNPW0805109KBETY	Vishay Dale
C5	1	Capacitor, aluminum, 100µF, 20%,50V, SMD	UUD1H101MNL1GS	Nichicon
C8	1	Ceramic, capacitor, multilayer MLCC - SMD/SMT 50V 0.1µF X7R 0805 5% AEC-Q200	08055C104J4T2A	Samsung Electro-Mechanics
U1	1	TPUL2G123PWR	TPUL2G123PWR	Texas Instruments
U2	1	TPUL2T323PWR	TPUL2T323PWR	Texas Instuments
C7, C6, R5, R8, R22, R23	DNP	DNP	DNP	DNP

4 Compliance Information

4.1 Compliance and Certifications

RoHS Certified - Dec 17, 2024

5 Additional Information

5.1 Trademarks

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

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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

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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.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. 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

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https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-delivered-in-japan.html

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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
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