User’s Guide
14-24-NL-Logic-EVM Evaluation Module

ABSTRACT

This user’s guide contains support documentation for the 14-24-NL-Logic Evaluation Module (EVM). Included is a description of how to set up and configure the EVM, the printed circuit board (PCB) layout, and the bill of materials (BOM) of the 14-24-NL-Logic-EVM.

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Trademarks

All trademarks are the property of their respective owners.
1 Introduction

The 14-24-NL-Logic-EVM is a generic EVM developed to support non-leaded (NL) logic and translation devices in the BQA, BQB, RGY, RSV, RHL, and RJW packages. This EVM can be used to evaluate any device in the package family and pin counts listed in Table 1-1. The PCB can be broken down into nine sections with each section supporting the package indicated on the board. This EVM allows the user to have a great amount of flexibility when evaluating NL logic and translation devices.

<table>
<thead>
<tr>
<th>TI Package Name</th>
<th>Package Family</th>
<th># of Pins</th>
</tr>
</thead>
<tbody>
<tr>
<td>BQA</td>
<td>WQFN</td>
<td>14</td>
</tr>
<tr>
<td>BQB</td>
<td>WQFN</td>
<td>16</td>
</tr>
<tr>
<td>RGY</td>
<td>VQFN</td>
<td>14, 16, 20, 24</td>
</tr>
<tr>
<td>RSV</td>
<td>UQFN</td>
<td>16</td>
</tr>
<tr>
<td>RHL</td>
<td>VQFN</td>
<td>24</td>
</tr>
<tr>
<td>RJW</td>
<td>UQFN</td>
<td>24</td>
</tr>
<tr>
<td>RKS</td>
<td>VQFN</td>
<td>20</td>
</tr>
</tbody>
</table>

1.1 Kit Contents

Table 1-2 lists the EVM kit contents.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-24-NL-Logic-EVM</td>
<td>PCB</td>
<td>1</td>
</tr>
<tr>
<td>Headers</td>
<td>12 position, 100-mil (2.54 mm), thru-hole</td>
<td>12</td>
</tr>
<tr>
<td>Red Test Points</td>
<td>Thru-hole, red test point</td>
<td>4</td>
</tr>
<tr>
<td>Black Test Points</td>
<td>Thru-hole, red test point</td>
<td>4</td>
</tr>
</tbody>
</table>

1.2 Features

The 14-24-NL-Logic-EVM has the following features:
- Multiple package support (9 total)
- Breadboard compatible
- Easy-to-use, flexible evaluation
- Support for both single supply and dual supply devices
- Small form factor for system integration
2 Hardware

2.1 PCB Overview

Figure 2-1 shows the EVM PCB.

Figure 2-1. 14-24-NL-Logic-EVM PCB
The 14-24-NL-Logic-EVM PCB is designed to be straightforward for new users to begin evaluating NL logic and translation devices. This section highlights a few aspects of the PCB, which are as follows:

- Board is breakable into smaller sections with the inclusion of v-scored grooves
- Each section has headers connected to device pins, $V_{CCA}$, $V_{CCB}$, and GND
- Designated supply inputs with included thru-hole test points
- Bypass capacitor footprints included for device supplies (capacitors not included in kit)
- Option for single supply or dual supply evaluation with easy configuration

2.2 Hardware Setup

This section covers the five steps needed to get started when using this EVM to evaluate an NL logic or translation device, which are as follows:

1. Identify the desired package for the device being evaluated. As stated previously, this EVM has nine sections each of which contains a footprint for one of the packages mentioned. Break off the selected section (optional).
2. Solder down the device. Figure 2-2 shows an example of proper placement.

![Figure 2-2. BQB Placement Example](image-url)
3. Ensure the EVM is configured accordingly for dual supply or single supply device. The EVM comes default configured for dual supply devices, but is easily configured using a 0-Ω resistor for single supply devices. Figure 2-3 shows how this is done.

![Figure 2-3. Single Supply Configuration](image)

4. Interface with device pins. The kit includes twelve 12-pin headers and eight supply test points which will allow the user to fully populate two sections (headers can be broken apart for lower pin counts). An example of this, with the addition of bypass capacitors for the supplies, as shown in Figure 2-4.

![Figure 2-4. Fully Populated Section](image)

5. Before applying power to the EVM, ensure the proper supply configuration is in place to avoid shorting two supplies together.
2.3 Hardware Conclusion

Overall, this board is designed with ease-of-use and flexibility in mind. There is no one way to use this EVM to evaluate the multitude of devices it can support. Some users may find using the headers easy for them to interface with test equipment or connect to an external board, others will see benefit in using through-hole passive components to simulate expected loads for their system.

Some of the packages have thermal pads which were taken into account with this board design. These thermal pads were either grounded or left floating (depending on clearance constraints) which is the appropriate method for the devices being supported.

3 Board Layout

![Figure 3-1. 14-24-NL-Logic-EVM Layout (Top Layer)](image1)

![Figure 3-2. 14-24-NL-Logic-EVM Layout (Bottom Layer)](image2)

4 Bill of Materials

Table 4-1 provides information on the components that can be used with the 14-24-NL-Logic-EVM. Other components can be used as long as they are able to fit the provided plated holes and pads.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Package Reference</th>
<th>Part Number</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bypass Capacitor</td>
<td>CAP, CERM, 0.1 µF, 25 V, ±10%, X7R, 0603</td>
<td>0603</td>
<td>C1608X7R1E04K080AA</td>
<td>TDK</td>
</tr>
<tr>
<td>Header</td>
<td>Header, 100 mil, 4x1, Tin, TH</td>
<td></td>
<td>TSW-112-07-G-S</td>
<td>Samtec</td>
</tr>
<tr>
<td>Red Test Point</td>
<td>Test Point, Multipurpose, Red, TH</td>
<td></td>
<td>5010</td>
<td>Keystone</td>
</tr>
<tr>
<td>Black Test Point</td>
<td>Test Point, Multipurpose, Black, TH</td>
<td></td>
<td>5011</td>
<td>Keystone</td>
</tr>
</tbody>
</table>
# 5 Revision History

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

## Changes from Revision * (August 2020) to Revision A (September 2022)

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
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<tr>
<td>Updated the numbering format for tables, figures, and cross-references throughout the document.</td>
<td>2</td>
</tr>
<tr>
<td>Updated the 14-24-NL-Logic-EVM PCB figure.</td>
<td>3</td>
</tr>
<tr>
<td>Updated the 14-24-NL-Logic-EVM Layout Top Layer and 14-24-NL-Logic-EVM Layout Bottom Layer figures.</td>
<td>6</td>
</tr>
</tbody>
</table>
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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 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 détaillables

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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3.3.1 Notice for EVMs delivered in Japan: Please see http://www.tij.co.jp/lsds/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/lsds/ti_ja/general/eStore/notice_01.page

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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):
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