User’s Guide
TMUX1575 Evaluation Module

ABSTRACT
This user's guide describes the characteristics, operation, and use of the TMUX1575 Evaluation Module (EVM). A complete schematic diagram, printed-circuit board layouts, and bill of materials are included in this document.

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Trademarks
All trademarks are the property of their respective owners.
1 Information About Cautions and Warnings

The information in the warning statement is provided for personal protection and the information in the caution statement is provided to protect the equipment from damage. Read each caution and warning statement carefully.

1.1 Introduction

The TMUX1575 is a low-voltage 4 channel 2:1 multiplexer. The device operates off of a supply voltage of 1.08 V to 3.6 V. The signal pathways can accept either 2 × VDD or 3.6 V whichever is lower. It has high bandwidth at a nominal rating of 1.5 GHz allowing for high-speed applications to be utilized with this device. The device also features powered off protection, in which the switch will be high impedance when VDD = 0 V. Fail-safe logic is also integrated into the integrated (IC) allowing for a voltage to be applied to the logic pins before power is applied to the device. The device is featured in a very small WSCP package with dimensions of 1.34 mm × 1.34 mm.

1.2 Description

The TMUX1575EVM allows for quick DC testing of the TMUX1575 device with easily configurable loads and SMA connectors for a variety of different tests.

1.3 Features

The EVM has the following features:

- A TMUX1575 device in a small WSCP (YKB) package
- Two power-supply decoupling capacitors (1 μF and 0.1 μF)
- Quick prototyping and testing of the 16-pin TMUX1575 in the WSCP (YKB) package
- All 16 signal paths have test point and jumper access
- All 12 source and drain pins have two 0805 pads each for an easily-configurable test setup
- SMA Connectors on channels 2 and 3 of the device for high-speed evaluation of the TMUX1575
2 EVM Setup

Figure 2-1 shows the topside view of the TMUX1575EVM.

![Figure 2-1. TMUX1575EVM Topside View](image)

Use the information in Table 2-1 to power up the board. VDD is indicated by the only red test point on the board with an overlay stating "VDD" next to it; it is closest to the J15 jumper on the topside of the PCB. This is where the positive (+) terminal of the power source is connected. The negative (–) terminal is connected to the only black test point on the PCB labeled ground; it is closest to the J13 jumper on the upper right side of the board. To test DC characteristics, adjust the input voltage between 1.08 V to 3.6 V.

**Table 2-1. Power Supplies Connection Points**

<table>
<thead>
<tr>
<th>Connector</th>
<th>Connector Color</th>
<th>Adjacent Jumper</th>
<th>Operating Voltage (VDD With Regard to GND)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDD</td>
<td>Red</td>
<td>J15</td>
<td>1.08 V–3.6 V</td>
</tr>
<tr>
<td>GND</td>
<td>Black</td>
<td>J13</td>
<td></td>
</tr>
</tbody>
</table>
The IC is controlled through the two white test points at the top of the board. Using Table 2-2, external signals can be applied to the white test points to meet the logic thresholds as Table 2-3 shows. Table 2-3 shows the truth table for the TMUX1575 device.

### Table 2-2. Control Lines Connection Points

<table>
<thead>
<tr>
<th>Connector</th>
<th>Connector Color</th>
<th>Adjacent Jumper</th>
<th>Logic Low Voltage Range</th>
<th>Logic High Voltage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN</td>
<td>White</td>
<td>J14</td>
<td>0 V–0.45 V</td>
<td>0.8 V–3.6 V</td>
</tr>
<tr>
<td>SEL</td>
<td>White</td>
<td>J16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 2-3. TMUX1575EVM Truth Table

<table>
<thead>
<tr>
<th>EN</th>
<th>SEL</th>
<th>Channels Selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>x</td>
<td>Device Disabled</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>SxA &lt;-&gt; Dx Connected</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SxB &lt;-&gt; Disconnected</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>SxB &lt;-&gt; Dx Connected</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SxA &lt;-&gt; Dx Disconnected</td>
</tr>
</tbody>
</table>

Table 2-4 describes the component pads of the TMUX1575EVM 0805 and which pin of the TMUX1575 IC is connected to those pads. This is to allow for configuring different loading conditions depending on the end user's application.

### Table 2-4. TMUX1575 Pins to Component Pads

<table>
<thead>
<tr>
<th>Pin Name</th>
<th>0805 Capacitor Pad ID</th>
<th>0805 Resistor Pad ID</th>
<th>Pad Location</th>
<th>Adjacent Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1A</td>
<td>C1</td>
<td>R1</td>
<td>Top Layer</td>
<td>J1</td>
</tr>
<tr>
<td>S1B</td>
<td>C12</td>
<td>R12</td>
<td>Top Layer</td>
<td>J12</td>
</tr>
<tr>
<td>D1</td>
<td>C5</td>
<td>R5</td>
<td>Bottom Layer</td>
<td>J5</td>
</tr>
<tr>
<td>S2A</td>
<td>C2</td>
<td>R2</td>
<td>Top Layer</td>
<td>J2</td>
</tr>
<tr>
<td>S2B</td>
<td>C11</td>
<td>R11</td>
<td>Top Layer</td>
<td>J11</td>
</tr>
<tr>
<td>D2</td>
<td>C6</td>
<td>R6</td>
<td>Bottom Layer</td>
<td>J6</td>
</tr>
<tr>
<td>S3A</td>
<td>C3</td>
<td>R3</td>
<td>Top Layer</td>
<td>J3</td>
</tr>
<tr>
<td>S3B</td>
<td>C10</td>
<td>R10</td>
<td>Top Layer</td>
<td>J10</td>
</tr>
<tr>
<td>D3</td>
<td>C7</td>
<td>R7</td>
<td>Bottom Layer</td>
<td>J7</td>
</tr>
<tr>
<td>S4A</td>
<td>C4</td>
<td>R4</td>
<td>Top Layer</td>
<td>J4</td>
</tr>
<tr>
<td>S4B</td>
<td>C9</td>
<td>R9</td>
<td>Top Layer</td>
<td>J9</td>
</tr>
<tr>
<td>D4</td>
<td>C8</td>
<td>R8</td>
<td>Bottom Layer</td>
<td>J8</td>
</tr>
</tbody>
</table>
3 EVM Connectors and Test Points

Before using the EVM, make sure to connect an external power supply to the following points on the board. The power supply provides VDD at every jumper that can be further configured by the user.

Table 3-1. Required External Connections

<table>
<thead>
<tr>
<th>Signal</th>
<th>Voltage with Regard to Ground</th>
<th>Signal Input Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDD (Power Supply)</td>
<td>1.08 V to 3.6 V - Operating</td>
<td>Red Test Point Labeled VDD</td>
</tr>
<tr>
<td></td>
<td>0 V - Powered Off Protection</td>
<td></td>
</tr>
<tr>
<td>Ground (Power Supply)</td>
<td>0 V</td>
<td>Black Test Point Labeled GND</td>
</tr>
</tbody>
</table>

The user controls the board using the 16 configurable jumpers laid along the perimeter of the board. Table 3-2 shows the generic jumper position definitions as well as the different configurations that can be utilized with these 16 jumpers.

All jumpers on the TMUX1575EVM use the same numbering system: 1 = Ground, 2 = Signal Pathway, and 3 = VDD.

Figure 3-1. TMUX1575EVM Jumper Position Definition

Table 3-2. TMUX1575EVM Jumper Position Definition

<table>
<thead>
<tr>
<th>Test Point Name</th>
<th>Test Point Function</th>
<th>Test Point Color</th>
<th>Associated Connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1A</td>
<td>External Signal I/O or Test Point</td>
<td>Yellow</td>
<td>J1</td>
</tr>
<tr>
<td>S2A</td>
<td>External Signal I/O or Test Point</td>
<td>Yellow</td>
<td>J2 and J17</td>
</tr>
<tr>
<td>S3A</td>
<td>External Signal I/O or Test Point</td>
<td>Yellow</td>
<td>J3 and J18</td>
</tr>
<tr>
<td>S4A</td>
<td>External Signal I/O or Test Point</td>
<td>Yellow</td>
<td>J4</td>
</tr>
<tr>
<td>D1</td>
<td>External Signal I/O or Test Point</td>
<td>Yellow</td>
<td>J5</td>
</tr>
<tr>
<td>D2</td>
<td>External Signal I/O or Test Point</td>
<td>Yellow</td>
<td>J6</td>
</tr>
<tr>
<td>D3</td>
<td>External Signal I/O or Test Point</td>
<td>Yellow</td>
<td>J7</td>
</tr>
<tr>
<td>D4</td>
<td>External Signal I/O or Test Point</td>
<td>Yellow</td>
<td>J8</td>
</tr>
<tr>
<td>S4B</td>
<td>External Signal I/O or Test Point</td>
<td>Yellow</td>
<td>J9</td>
</tr>
<tr>
<td>S3B</td>
<td>External Signal I/O or Test Point</td>
<td>Yellow</td>
<td>J10 and J21</td>
</tr>
<tr>
<td>S2B</td>
<td>External Signal I/O or Test Point</td>
<td>Yellow</td>
<td>J11 and J22</td>
</tr>
<tr>
<td>S1B</td>
<td>External Signal I/O or Test Point</td>
<td>Yellow</td>
<td>J12</td>
</tr>
<tr>
<td>GND</td>
<td>Power Supply Input (- Terminal )</td>
<td>Black</td>
<td>J13</td>
</tr>
<tr>
<td>EN</td>
<td>Control Signal Input or Test Point</td>
<td>White</td>
<td>J14</td>
</tr>
<tr>
<td>VDD</td>
<td>Power Supply Input (+ Terminal )</td>
<td>Red</td>
<td>J15</td>
</tr>
<tr>
<td>SEL</td>
<td>Control Signal Input or Test Point</td>
<td>White</td>
<td>J16</td>
</tr>
</tbody>
</table>
4 Testing Procedures

The TMUX1575EVM was tested against the *TMUX1575 2:1 (SPDT) 4-Channel, Powered-Off Protected Switch in WCSP with 1.2 V Logic Data Sheet* for charge injection. The voltage supply was set to 3.6 V. For the test, the jumpers and external signals in Table 4-1 are supplied.

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Connection</th>
<th>Signal, Description</th>
<th>External Signal Input Test Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>J15</td>
<td>J15.3 shorted to J15.2</td>
<td>VDD (3.6 V)</td>
<td>Test Point: VDD Color: Red Voltage: 3.6 V</td>
</tr>
<tr>
<td>J13</td>
<td>J13.1 shorted to J13.2</td>
<td>Ground (0 V)</td>
<td>Test Point: GND Color: Black Voltage: 0 V</td>
</tr>
<tr>
<td>J14</td>
<td>J14.3 shorted to J14.2</td>
<td>Enable (3.6 V)</td>
<td>N/A</td>
</tr>
<tr>
<td>J16</td>
<td>J16.2 left floating</td>
<td>External Signal To Be Applied</td>
<td>Test Point: SEL Color: White Voltage: 0 V–1.8 V</td>
</tr>
<tr>
<td>J1</td>
<td>J1.2 left floating</td>
<td>External Signal to Be Applied</td>
<td>Test Point: S1A Color: Yellow Voltage: 1.8V</td>
</tr>
<tr>
<td>J5</td>
<td>J5.2 left floating</td>
<td>Output Signal Path</td>
<td>N/A</td>
</tr>
<tr>
<td>JX</td>
<td>JX.1 shorted to JX.2</td>
<td>All Other Source Pins Grounded (0 V)</td>
<td>N/A</td>
</tr>
<tr>
<td>JY</td>
<td>JY.2 left floating</td>
<td>Unused Drain Pins Left Floating</td>
<td>N/A</td>
</tr>
</tbody>
</table>

The load was capacitive with a total output capacitance of about 12 pF. The charge injection was quantified by measuring the voltage transient after switching between 0 V and 1.8 V. Charge injection can be calculated by multiplying the output capacitance by the change in voltage to get charge injection results.
5 Test Results

Figure 5-1 shows the charge injection test results. The first picture shows about three cycles of switching; while the second picture details a close up view of the charge injection spike. The test resulted in a voltage transient of 450 mV; when multiplied by 12 pF, the result is 5.4 pC which is right around the typical value of 5 pC expected for this device in typical operating conditions.

The top scope shows the square wave being sent through the device. The bottom scope shows a close up of the charge injection event.

![Figure 5-1. Charge Injection](image_url)
6 PCB Layouts

Figure 6-1 and Figure 6-2 show the EVM PCB layout images.

![TMUX1575EVM Layout (Front)](image)

**Figure 6-1. TMUX1575EVM Layout (Front)**
Figure 6-2. TMUX1575EVM Layout (Back)
7 Schematics

Figure 7-1 illustrates the EVM schematic.
Figure 7-1. TMUX1575 Schematic Print
8 Bill of Materials

Table 8-1 details the EVM bill of materials.

<table>
<thead>
<tr>
<th>Designator</th>
<th>Part Number</th>
<th>Description</th>
<th>QTY</th>
<th>Manufacturer 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1</td>
<td>TMUX1575YCJR</td>
<td>2:1 (SPDT) 4-Channel, Powered-Off Protected Switch in WCSP with 1.8 V Logic</td>
<td>1</td>
<td>Texas Instruments</td>
</tr>
<tr>
<td>H1, H2, H3, H4</td>
<td>SJ-5303 (CLEAR)</td>
<td>Bumpon, Hemisphere, 0.44 X 0.20, Clear</td>
<td>4</td>
<td>3M</td>
</tr>
<tr>
<td>C2</td>
<td>C0603C104K5RACAUTO</td>
<td>CAP, CERM, 0.1 µF, 50 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0603</td>
<td>1</td>
<td>Murata</td>
</tr>
<tr>
<td>C1</td>
<td>GCM188R71E105KA64D</td>
<td>CAP, CERM, 1 uF, 25 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0603</td>
<td>1</td>
<td>Murata</td>
</tr>
<tr>
<td>J1, J2, J3, J4, J5, J6, J7, J8, J9, J10, J11, J12, J13, J14, J15, J16</td>
<td>PEC03SAAN</td>
<td>Header, 100mil, 3x1, Tin, TH</td>
<td>16</td>
<td>Sullins</td>
</tr>
<tr>
<td>J18, J23, J24, J27, J28, J29</td>
<td>CONSMA001-SMD-G</td>
<td>Jack, SMA, PCB, Gold, SMT</td>
<td>6</td>
<td>Linx Technologies</td>
</tr>
<tr>
<td>R10, R12, R14, R15, R16, R18, R19, R20, R22, R24, R26, R30, R31, R34, R35, R36</td>
<td>ERJ-6GEY0R00V</td>
<td>RES, 0, 5%, 0.125 W, AEC-Q200 Grade 0, 0805</td>
<td>16</td>
<td>Panasonic</td>
</tr>
<tr>
<td>GND</td>
<td>5006</td>
<td>Test Point, Compact, Black, TH</td>
<td>1</td>
<td>Keystone Electronics</td>
</tr>
<tr>
<td>VDD</td>
<td>5005</td>
<td>Test Point, Compact, Red, TH</td>
<td>1</td>
<td>Keystone Electronics</td>
</tr>
<tr>
<td>EN, SEL</td>
<td>5007</td>
<td>Test Point, Compact, White, TH</td>
<td>2</td>
<td>Keystone Electronics</td>
</tr>
<tr>
<td>D1, D2, D3, D4, S1A, S1B, S2A, S2B, S3A, S3B, S4A, S4B</td>
<td>5009</td>
<td>Test Point, Compact, Yellow, TH</td>
<td>12</td>
<td>Keystone Electronics</td>
</tr>
</tbody>
</table>
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1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.

2. **Limited Warranty and Related Remedies/Disclaimers:**

2.1 These terms do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.

2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for a nonconforming EVM if (a) the nonconformity was caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI, (b) the nonconformity resulted from User's design, specifications or instructions for such EVMs or improper system design, or (c) User has not paid on time. Testing and other quality control techniques are used to the extent TI deems necessary. TI does not test all parameters of each EVM. User's claims against TI under this Section 2 are void if User fails to notify TI of any apparent defects in the EVMs within ten (10) business days after delivery, or of any hidden defects with ten (10) business days after the defect has been detected.

2.3 TI's sole liability shall be at its option to repair or replace EVMs that fail to conform to the warranty set forth above, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

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**WARNING**

Evaluation Kits 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 shall operate the Evaluation Kit within TI's recommended guidelines and any applicable legal or environmental requirements as well as reasonable and customary safeguards. Failure to set up and/or operate the Evaluation Kit within TI's recommended guidelines may result in personal injury or death or property damage. Proper set up entails following TI's instructions for electrical ratings of interface circuits such as input, output and electrical loads.

**NOTE:**

EXPOSURE TO ELECTROSTATIC DISCHARGE (ESD) MAY CAUSED EGREDATION OR FAILURE OF THE EVALUATION KIT; TI RECOMMENDS STORAGE OF THE EVALUATION KIT IN A PROTECTIVE ESD BAG.
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 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 isotope
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/lstsd/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/lstsd/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.

【無線電波を送信する製品の開発キットをお使いになる際の注意事項】 開発キットの中には技術基準適合証明を受けて
いないものがあります。技術基準適合証明を受けていないもののご使用に際しては、電波法遵守のため、以下のいずれかの
措置を取っていただく必要がありますのでご注意ください。
1. 電波法施行規則第6条第1項第1号に基づく平成18年3月28日総務省告示第173号で定められた電波暗室等の試験設備でご使用
いただく。
2. 実験局の免許を取得後ご使用いただく。
3. 技術基準適合証明を取得後ご使用いただく。

なお、本製品は、上記の「ご使用にあたっての注意」を譲渡先、移転先に通知しない限り、譲渡、移転できないものとします。

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西新宿三井ビル

3.3.3 Notice for EVMs for Power Line Communication: Please see http://www.tij.co.jp/lstsd/ti_ja/general/eStore/notice_02.page

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www.tij.co.jp/lstsd/ti_ja/general/eStore/notice_02.page

3.4 European Union

3.4.1 For EVMs subject to EU Directive 2014/30/EU (Electromagnetic Compatibility Directive):
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.
4 EVM Use Restrictions and Warnings:

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.

4.3 Safety-Related Warnings and Restrictions:

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 designers. 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 designers.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User’s handling and use of the EVM and, if applicable, User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

5. Accuracy of Information: To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

6. Disclaimers:

6.1 Except as set forth above, EVMS and any materials provided with the EVM (including, but not limited to, reference designs and the design of the EVM itself) are provided “as is” and “with all faults.” TI DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, REGARDING SUCH ITEMS, INCLUDING BUT NOT LIMITED TO ANY EPIDEMIC FAILURE WARRANTY OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADE SECRETS OR OTHER INTELLECTUAL PROPERTY RIGHTS.

6.2 Except for the limited right to use the EVM set forth herein, nothing in these Terms shall be construed as granting or conferring any rights by license, patent, or any other industrial or intellectual property right of TI, its suppliers/licensors or any other third party, to use the EVM in any finished end-user or ready-to-use final product, or for any invention, discovery or improvement, regardless of when made, conceived or acquired.

7. User’s Indemnity Obligations and Representations. User will defend, indemnify and hold TI, its licensors and their representatives harmless from and against any and all claims, damages, losses, expenses, costs and liabilities (collectively, “Claims”) arising out of or in connection with any handling or use of the EVM that is not in accordance with these Terms. This obligation shall apply whether claims arise under statute, regulation, or the law of tort, contract or any other legal theory, and even if the EVM fails to perform as described or expected.
Limitations on Damages and Liability:

8.1 General Limitations. IN NO EVENT SHALL TI BE LIABLE FOR ANY SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF THESE TERMS OR THE USE OF THE EVMs, REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. EXCLUDED DAMAGES INCLUDE, BUT ARE NOT LIMITED TO, COST OF REMOVAL OR REINSTALLATION, ANCILLARY COSTS TO THE PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES, RETESTING, OUTSIDE COMPUTER TIME, LABOR COSTS, LOSS OF GOODWILL, LOSS OF PROFITS, LOSS OF SAVINGS, LOSS OF USE, LOSS OF DATA, OR BUSINESS INTERRUPTION. NO CLAIM, SUIT OR ACTION SHALL BE BROUGHT AGAINST TI MORE THAN TWELVE (12) MONTHS AFTER THE EVENT THAT GAVE RISE TO THE CAUSE OF ACTION HAS OCCURRED.

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9. Return Policy. Except as otherwise provided, TI does not offer any refunds, returns, or exchanges. Furthermore, no return of EVM(s) will be accepted if the package has been opened and no return of the EVM(s) will be accepted if they are damaged or otherwise not in a resalable condition. If User feels it has been incorrectly charged for the EVM(s) it ordered or that delivery violates the applicable order, User should contact TI. All refunds will be made in full within thirty (30) working days from the return of the components(s), excluding any postage or packaging costs.

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